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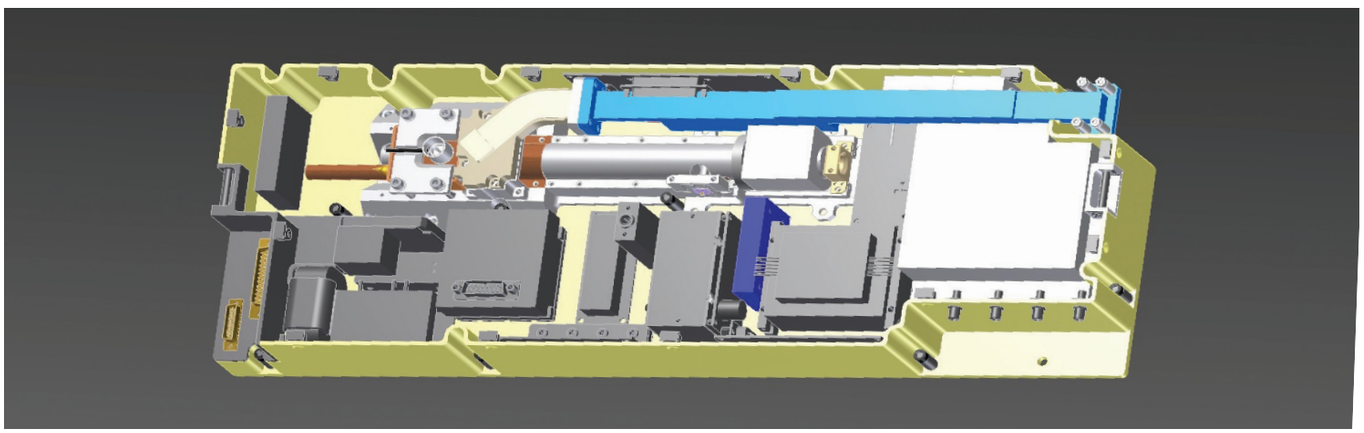
2009 Traveling Wave Tube Catalog



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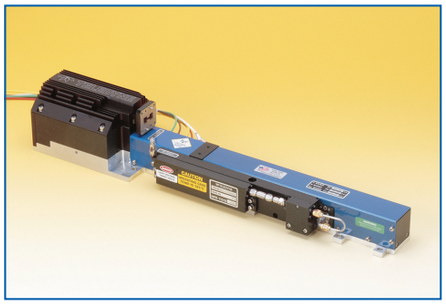
Significant Events in TMEC History

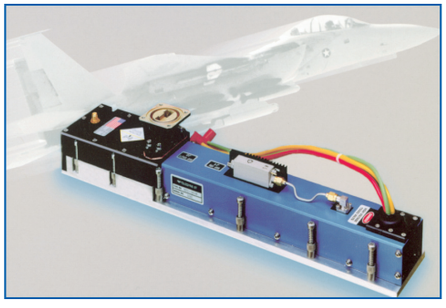
1959	MEC (Microwave Electronics Corporation) formed by Dr. Stanley Kaisel to design and manufacture low power broadband metal ceramic Traveling Wave Tubes Occupied 10,000 sq ft facility in Palo Alto, CA
1964	Acquired Sylvania High Power TWT product line
1965	MEC acquired by Teledyne and becomes Teledyne MEC
1966	First high power broadband TWT
1967	Bulk Acoustic Delay Device
1976	First multi-octave Traveling Wave tube
1984	Opened 75,000 sq ft manufacturing facility in Rancho Cordova, CA
1994	Developed Tri-Band communication TWT
2004	Opened 85,000 sq ft addition to Rancho Cordova, CA facility
2008	Shipped 3,000th Tri-Band TWT
2009	50th anniversary of TWT innovations

Teledyne MEC Manufactures
Broadband, High Power Helix Traveling Wave Tubes for . . .



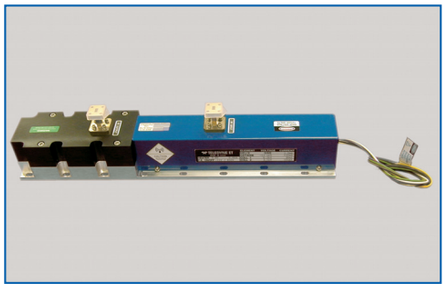
Communications

Highly efficient TWTs for Tri-Band, C, X, Ku, C/Ku, X/Ku, DBS, Ka and Ka/Q Band for use in Earth, Mobile and Fly-Away Terminals



EW and Radar

Shadow Gridded Helix TWTs for Broadband EW and Radar Applications from L through Ku Bands at Peak Power Levels to 12 kW and Average Power Levels to >700 W



Instrumentation/General Purpose

CW and Pulse TWTs for General Laboratory Amplifier Use Spanning the 1 to 44 GHz Frequency Range with Average Output Power to 750 W

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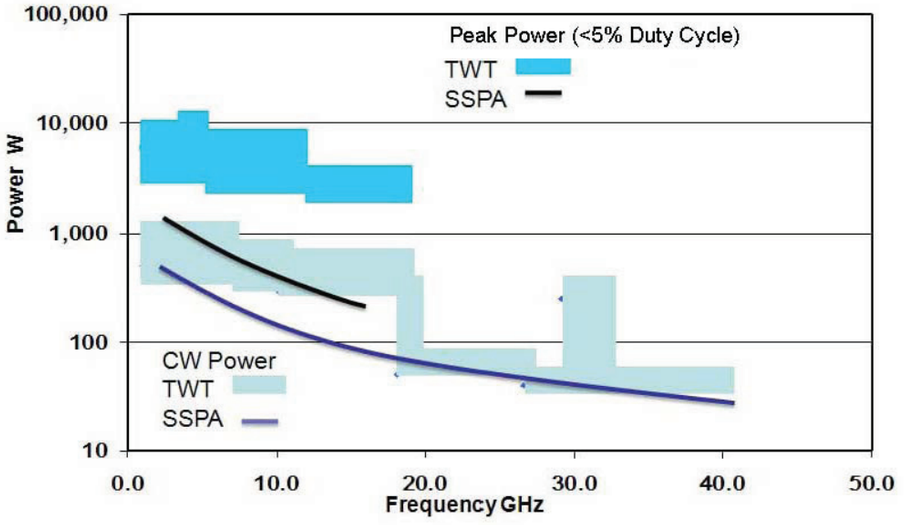
Traveling Wave Tube Amplifiers (TWTAs) & Solid State Power Amplifiers (SSPAs)

For many years, the only source for high power microwave amplifiers was a vacuum device such as a TWT. Now, with the advent of high power solid state devices such as LDMOS ICs for frequencies below 1.5 GHz, GaN PHEMT ICs for frequencies from 1 GHz through 18 GHz and GaAs, as well as InP ICs through 94GHz, new Solid State Power Amplifier (SSPA) designs are possible. For some microwave transmitter applications, SSPAs offer a cost effective alternative to traditional traveling wave based amplifiers. Typically available at lower power levels, SSPAs can offer an alternative to TWTs for narrow band applications. The chart below compares TWT availability to the current frontier state-of–the-art in SSPAs.



Power Amplifier Availability

TWT Amplifiers

As a single power amplification block, construction of a TWT amplifier is fairly straight forward and is comprised of a high voltage power supply (5 to 20 KV), the TWT, and sundry protection and control circuitry. Depending on the particular application, additional filtering or protection, linearization circuitry, and a pre-amplification block can be part of the amplifier. This last component can often reduce the gain needed from the TWT and increase overall amplifier performance as shown in Figures A and B.

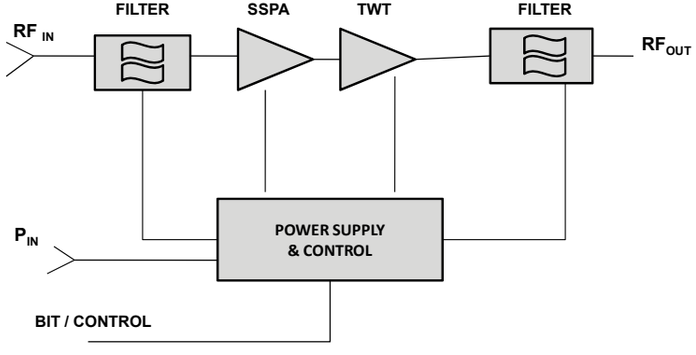


Figure A. Typical TWT Amplifier Block Diagram

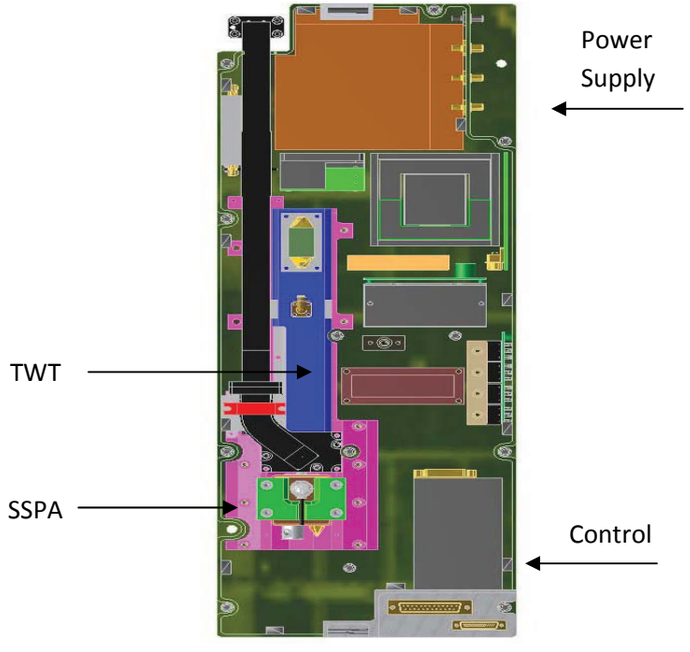


Figure B. An Amplifier Example

Solid State Power Amplifiers

While the basic functionality of the amplifier is the same in a high power solid state amplifier, multiple devices are combined into unit building blocks or power modules which, in turn, are combined to develop the needed gain and power. The network is fed by a high current, low voltage supply and, similar to TWTAs, added control and protection circuitry is usually incorporated into the amplifier. An example of an SSPA block diagram and power module is shown below.

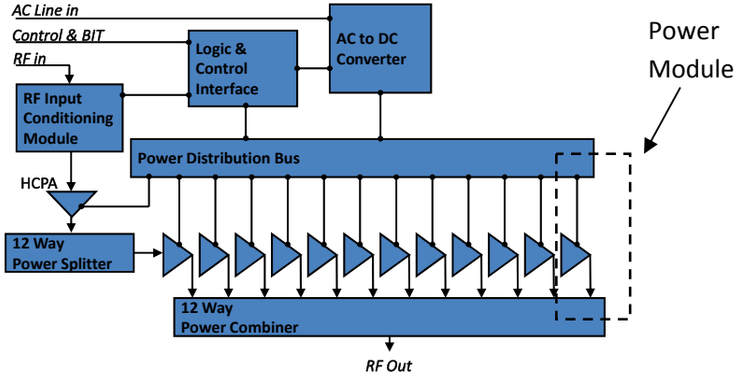


Figure C. Block Diagram

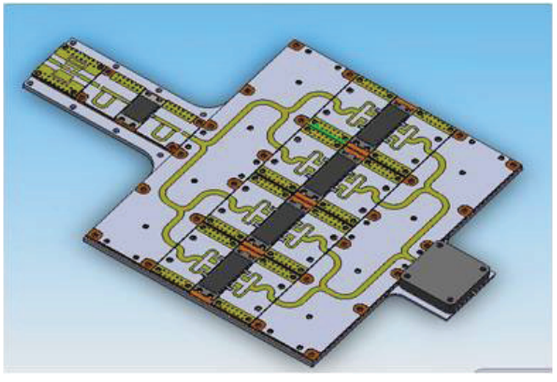


Figure D. Power Module

Depending on the cost and performance goals, solid state amplifiers can be built with commercial package parts, mil-spec parts, or bare die. Packaged parts, which incorporate 1 to 3 discrete ICs, are usually partially matched to ease the design and manufacturing process. Alternatively, discrete die allow for maximum flexibility with an increase in design expense. For most customers, discrete die are used when the goal is to maximize performance in the smallest unit volume.

TWTA and SSPA Comparison

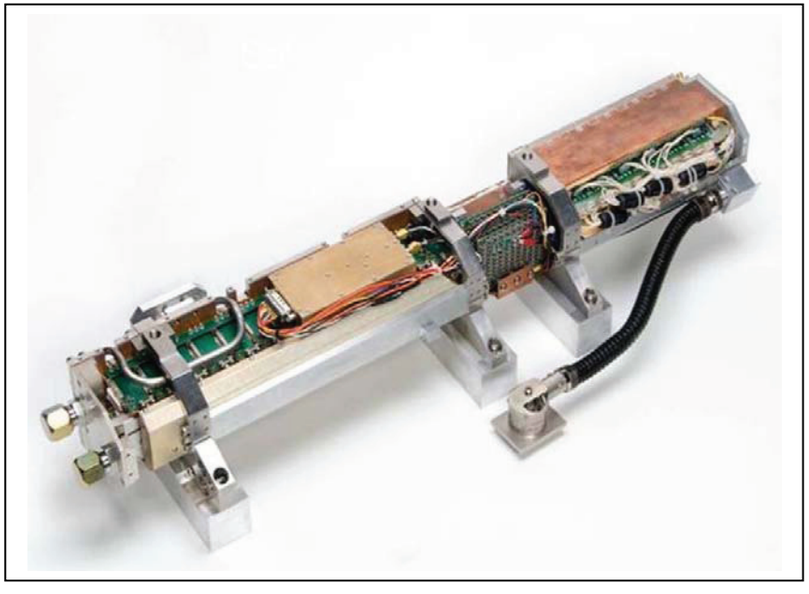
Depending on the particular system and application, both SSPAs and TWTAs have advantages and disadvantages. While there are many variables used to determine the most appropriate choice, the matrix below can help to refine the decision.

		TWTA	SSPA
High Power >500W @ 1GHz (CW) >50W @ 30 GHz (CW) >1KW @ 1 GHz (Pulse) >100W @ 30 GHz (Pulse)	Narrow Band <20% BW		
	Wide Band >50% BW		
	Size		
	Efficiency		
Low Power <50W @ 1 GHz (CW) <5W @ 30 GHz (CW) <100W @ 1GHz (Pulse) <10W @ 30 GHz (Pulse)	Narrow Band <20% BW		
	Wide Band >50% BW		
	Size		
	Efficiency		
High Temperature Operation > 75˚C Environment			

Superior Acceptable Poor

TWTA & SSPA Matrix

Given the relative merits of TWTAs and SSPAs, it is not surprising that each technology lends itself to particular applications. In general, wideband, applications such as EW systems are typically implemented using TWT technology. Conversely, narrow band applications, such as single frequency satellite uplink terminals, are often based on SSPAs. Narrow band high power applications, such as those found in radar systems, represent a middle ground with some systems using TWTs and others, especially phased array systems, using solid state amplifiers.



Diminished Material Supply (DMS)

Unavailable, unreliable, or obsolete parts cause significant problems for many long term military platforms. While Teledyne MEC has been in business for 50 years and remains capable of manufacturing many of our products that were first fielded in the 1970s, there are a number of systems that can no longer be supported by the existing TWT supply base. In these cases, Teledyne is capable of providing Form, Fit, and Function (FFT) replacement products either based on TWT technology or SSPAs. An example of a compliant solid state transmitter that retains the same functional outline is depicted on the left.

Regardless of your application, Teledyne has a dedicated staff of engineers to help you achieve your mission. As a producer of both TWTAs and SSPAs, we will work with you determine the most economic product that fulfills your requirements.

TWT Performance Fundamentals

Traveling wave tubes remain the best source for efficient generation of microwave power over broad frequency bandwidths. When compared to solid state technology, today's metal-ceramic traveling wave tube amplifiers combine low acquisition price with affordable maintenance and support. TWTA systems are smaller, lighter, and much more efficient than their SSA counterparts. TWT amplifiers do behave somewhat differently than SSAs. Following is a discussion of some of the more important TWT performance features and design attributes.

➢ Power and Bandwidth

TWT power output is determined by the efficiency with which energy in the electron beam is converted to microwave energy (sometimes called "interaction efficiency" or "beam efficiency").

$$P_{out} = I_{beam} V_{beam} \eta_{interaction}$$

Current emitted from a thermionic cathode obeys a 3/2 power law with respect to applied voltage

$$I_{beam} = K V_{beam}^{3/2}$$

where the constant K is called perveance. Perveance is an important design parameter since it is totally determined by electron gun dimensions. Using this expression, power output often is given by

$$P_{out} = K V_{beam}^{5/2} \eta_{interaction}$$

CW (continuous wave) TWTs generally use electron guns which operate in the 0.2 to 1.0 x 10^{-6} perveance range while pulse TWTs push the limits imposed by practical electron gun design and magnetic focusing materials which is not much greater than 2.0 x 10^{-6}. Interaction efficiency is determined by beam size, the uniformity of beam electron trajectories (often called beam laminarity), and helix circuit parameters such as helix and backwall diameter, helix pitch, dielectric support material and shape, helix loss, etc. It varies with frequency because the interaction of helix parameters in a given circuit change as frequency is varied. For example, backwall diameter predominantly affects low band edge performance while the shape of the dielectric rods predominantly affect the high band edge. Practical helix designs have band center interaction efficiencies which range from 10% to 25% and band edge to center efficiency variations of 50% or more. Practical bandwidths range from hundreds of Mhz to double octave ($F_{hi} = 4\ F_{lo}$). Teledyne specifies "rated output power" which typically is several tenths of a dB or more below saturation.

➢ Efficiency

As the beam gives up energy to the amplified signal, it slows down. By tapering or stepping helix pitch to maintain synchronism between the RF wave and the slowing beam, interaction efficiency often can be enhanced. Determining a satisfactory pitch configuration that works well over the entire frequency band and which preserves other important performance parameters requires computer simulation of the non-linear beam-helix interaction and involves numerous compromises which often trade one desirable effect for another.

A second means of enhancing TWT efficiency is to depress the beam collector voltage(s) below ground so that unused energy can be recovered from the spent electron beam. The power consumed by a TWT with n stages of collector depression is calculated as follows where collector voltages are referenced to cathode:

$$P_{prime} = V_{filament}\, I_{filament} + V_{beam}\, I_{helix} + \sum_{n} V_{collector}\, I_{collector}$$

$$\eta_{overall} = P_{out} / P_{prime}$$

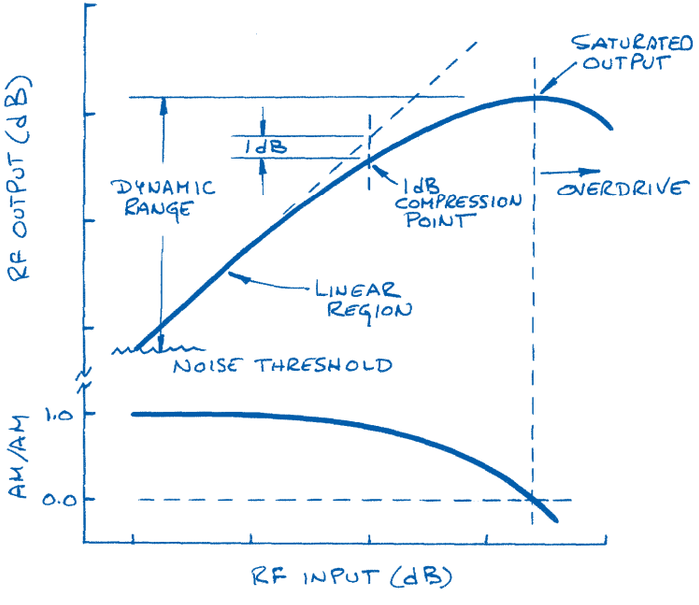
Since both output power and prime power vary with signal frequency, RF input drive, etc., it is best to state the maximum allowable prime power consumption rather than efficiency when specifying a TWT.
Waste heat dissipation is given by

$$P_{diss} = P_{prime} - P_{out}$$

The electro optics of a multi-stage depressed collector are quite complicated and depend not only on the geometry and relative voltages of the collector segments but also upon the degree of RF modulation, the magnetic field used to focus the beam, the yield of secondary electrons at the collecting surfaces, etc. The higher the interaction efficiency, the greater the difficulty in collecting the spent beam since strong RF modulation causes the electron velocity distribution to spread. In wide band TWTs, the low band edge harmonic interaction causes a similar effect. Pulse TWTs with high interaction efficiency often cannot practically utilize more than a single stage collector while CW TWTs with lower interaction efficiency successfully utilize two or three stages. In a TWT having a well designed multi-stage depressed collector, the waste heat dissipated by the TWT is nearly constant as RF input drive is varied.

➢ Gain

The dynamic range of a TWT is the region between the point at which the RF output signal just breaks through the noise threshold to the point at which the output power saturates. The linear or small signal region is most often defined as ending when increasing RF drive causes gain to drop 1 dB from its small signal level (1 dB compression point). Saturation generally occurs at an input drive level 6 to 8 dB above the 1 dB compression point and with 2 to 3 dB higher output power.



AM / AM conversion is a measure of the change in RF output power that results from a change in the RF input drive, i.e. the slope of the transfer curve. In the linear region, AM / AM conversion is 1.0 dB / dB. At saturation, AM / AM conversion is 0 dB / dB. TWTs with high interaction efficiency often exhibit gain expansion near the high band edge (AM / AM > 1.0). This is caused by the inability of the helix velocity tapers to equally match beam slow-down at all frequencies within the band. It generally is undesirable to operate the TWT too far into overdrive as severe beam defocusing can occur in this region.

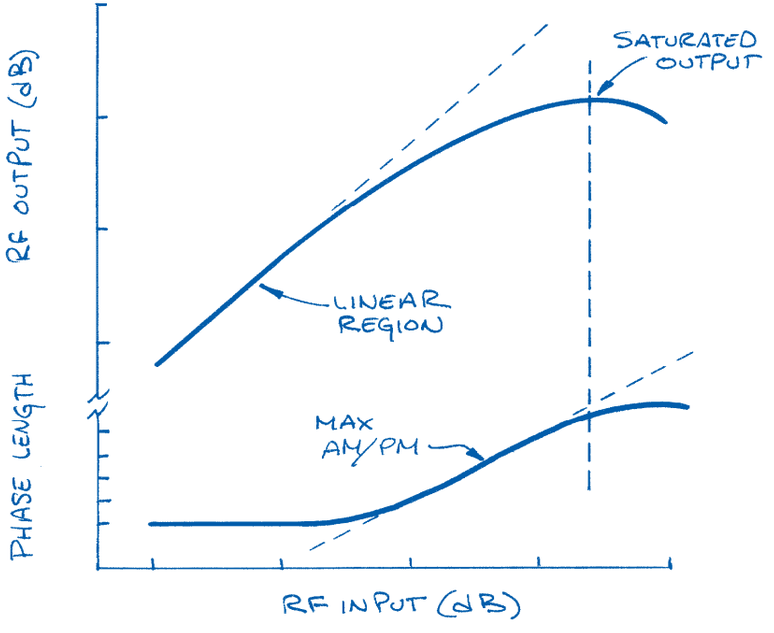
Gain variations over the frequency band result from the frequency dependence of helix velocity and impedance. Additionally, gain varies with the electrical length of the circuit, which, in turn, varies with frequency. A two octave TWT can exhibit as much as 25 dB gain variation. This typically can be reduced to ±2.0 dB with the use of an external gain equalizer.

Gain ripple results from signal reflections either internal or external to the tube. Since a TWT is electrically "long" (a typical TWT has a phase length of about 10,000 degrees), a relatively small change in frequency (typically 100 to 300 Mhz) shifts phase 360°. Most TWTs exhibit an approximate ±0.2 dB gain ripple at this frequency.

➢ Phase

Any factor which affects the velocity of the electron beam produces phase changes in the RF output signal. As the RF drive level is increased into the non-linear region, the phase length of the tube increases as beam velocity is slowed by transfer of energy to the RF wave. This effect, called AM / PM conversion, is relatively insensitive to RF drive in the linear region. As the TWT is driven toward saturation, the rate of phase change increases. The peak value of AM / PM generally occurs at or several dB below saturation and is frequency dependent (typically increasing with increasing frequency for a given helix design).

If the factor that changes beam velocity varies with time, the result is phase modulation of the RF output signal. The primary factor affecting the velocity of the beam is the cathode voltage. Other voltages or external affects (such as voltages induced by placement of a blower motor too close to the tube) have secondary affects.



Typical phase pushing values for TWTs are:

- 100° / 1% change in Cathode Voltage
- 10° / 1% change in Grid "on" Voltage
- 0.0005° / 1% change in Collector Voltage

These numbers are approximate. The actual values of phase pushing for any specific TWT are determined by gun perveance, gain, efficiency, etc. Any periodic voltage modulation produces signal side bands, separated from the main signal by the modulation frequency. The depression below carrier of these spurious signals (δ in dB) for sinusoidal ripple can roughly be approximated by the following expression:

$$\delta \cong 10\,\mathrm{Log}\left(\frac{1.13 \times 10^{3} \times L^{2} \times F^{2} \times v^{2}}{V^{3}}\right)$$

L = TWT pin-to-pin length (in)
F = RF Signal Frequency (Ghz)
v = peak-to-peak Cathode ripple (Volts)
V = Cathode Voltage (Volts)

A ±0.5 volt sinusoidal ripple on a 10 kV TWT with 10" input-to-output length produces -49.5 dBc sidebands at 10 Ghz. Peak-to-peak phase ripple ($\Delta\phi$ in degrees) is directly related to small signal gain ripple (dG -- peak-to-peak in dB) by the following expression:

$$\Delta\phi \cong 57.3\,(10^{(dG/20)} - 1)$$

A small signal gain ripple of ±0.2 dB produces phase ripple of ±1.35°. Time delay is the total time it takes for a signal to pass through the tube (typically 3 to 5 nsec) and is the derivative of phase delay. Thus, the same mechanisms that cause phase non-linearity are responsible for time delay distortion. The maximum rate of change of time delay ($\Delta\gamma$ in nsec / Mhz) due to gain and phase ripple is calculated by:

$$\Delta\gamma \cong \frac{\pi \times (10^{(dG/20)} - 1)}{dF^{2}} \times 10^{15}$$

where dF is the frequency periodicity of the small signal gain ripple (in Hz). A 200 Mhz gain ripple with ±0.2 dB amplitude causes 3.7 psec / Mhz time delay distortion.

➢ Power Combining

With the tube-to-tube performance consistency that is achieved with modern TWT manufacturing technology, power combining is a practical and relatively inexpensive means of achieving high power levels. Typical tracking of a TWT to a phase standard over an octave or greater frequency band when the absolute phase difference between the tubes is zeroed with an input phase shifter is ±20° (40° maximum imbalance between any two randomly selected tubes). When combined in a standard 4-port hybrid junction, such as a waveguide Magic Tee, the resultant combined power in Watts of two tubes with output powers P1 and P2 due to phase (ϕ) and amplitude imbalance at the input ports is:

$$P_{combined} = (P1 + P2) \times \left\{ \frac{1 + 2X\cos\phi + X^2}{2 + 2X^2} \right\}$$

$$X = \left(\frac{P2}{P1} \right)^{1/2} \quad \text{for } P2 \leq P1$$

Ignoring combining losses (which are on the order of tenths of dB), two 300W TWTs with equal power output and 40° maximum phase imbalance combine to produce 530W (0.54 dB phase imbalance loss). If it were desired to combine a 400W TWT with a 200W TWT with the same maximum phase imbalance, the result would be 517W (0.65 dB phase and amplitude imbalance loss). Because of the relative insensitivity to amplitude imbalance, odd numbers of TWTs combine reasonably well. Power combining neither reduces the amplifier's tolerance to output mismatch nor its modulation fidelity. With the use of 180° hybrids, harmonic content can be reduced by at least 10 dB relative to the tube's stand-alone performance since in this case, harmonic is directed to the "lost-power" rather than to the "combined-power" port of the hybrid. Likewise, since TWT noise output is non-coherent and thus splits evenly between the two output ports of the hybrid, noise is reduced 3 dB per combination.

➢ Harmonics

Due to the wide bandwidth and high gain of the TWT, harmonics of the fundamental RF drive signal will appear in the output spectrum as the tube is driven into the non-linear region. Single octave TWTs typically have 3 dB or more low band edge harmonic separation while dual octave TWTs may exhibit harmonics equal to or greater than the fundamental. Higher harmonics also will be present, but to a lesser degree. Broadband TWTs may react to harmonics in the RF drive which, if sufficiently strong, can either enhance or degrade output power depending upon the relative phase angle between the harmonic and fundamental input signals.

➢ Noise

Noise in the output spectrum of a TWT results from the fact that electron emission from the cathode is a random process. Furthermore, the velocities of electrons emitted by the hot cathode have a Maxwellian distribution. TWT noise figure (in dB) is given by the following expression:

$$NF = 114 + NPO - 10\ Log(BW) - G_{ss}$$

-114 dBm/Mhz is the reference thermal noise caused by a room temperature termination at the TWT input. BW is the bandwidth relative to 1 Mhz over which the noise power output (NPO in dBm) is measured. G_{ss} is the small signal gain in dB averaged over the bandwidth BW. Typical noise figures for medium power TWTs are 25 to 35 dB.

Noise can be reduced by gating off the beam when signal transmission is not required either with a grid or focus electrode (FE). A grid cuts off noise to the thermal level. A focus electrode typically cuts gain to zero dB which generally results in noise output 25 to 35 dB above thermal. Most Teledyne CW TWTs are offered in both gridded and focus electrode gated versions. With modern design and fabrication techniques, the reliability of shadow grid versions is equal to or greater than their FE counterparts.

Spurious outputs not correlated to the fundamental signal frequency are minimized by oscillation suppression techniques such as special helix attenuation patterns and pitch changes. Operation of the TWT into highly mismatched loads may increase spurious output since these suppression techniques are sometimes less effective in the presence of strong reflected signals.

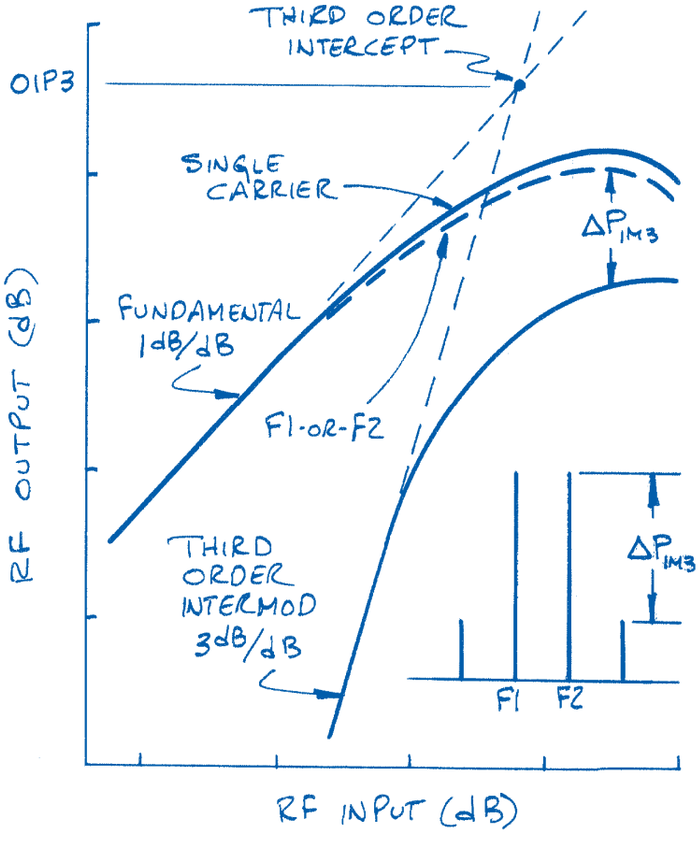
➢ Intermodulation Distortion

When the RF input signal contains two or more discrete carrier frequencies, a mixing process occurs which results in intermodulation products displaced from the carriers at multiples of the difference frequencies. The power levels of these intermodulation products are dependent upon the relative power levels of the carriers and the linearity of the TWT. The two-tone third order intermodulation products (at 2F1 - F2 and 2F2 - F1) are the most important because they are closest to the signal frequencies and largest in amplitude. At saturation, the separation of IM products from the fundamental is typically 10 dB. The amplitude of these products decrease 2 dB for every dB the power is backed down from saturation.

$$\Delta P_{IM3} \cong 2 \times \text{Back-off} + 10 \text{ dB}$$

The third order intercept point OIP3 is a figure of merit and is equal to the output power of each of the two tones when the third order IM separation is 0 dBc. Obviously, the TWT saturates before this point is reached but it can be calculated by projecting the single carrier and IM3 linear gain slopes to their intersection. The separation in dB of the intermod from carrier (at power P_o) is more accurately given by:

$$\Delta P_{IM3} = 2 (OIP3 - P_o)$$



An effect related to IM distortion is spectral regrowth. The name comes from the observation that band limited signals, after passing through a non-linear amplifier, often have components outside of the original band that the signal occupied at the input. This phenomenon is often encountered with a digitally modulated carrier. For example, with Quadrature Phase-Shift Keying (QPSK) modulation, the amplitude of the signal is theoretically constant. However, in the frequency domain, the signal occupies a relatively wide bandwidth. When a QPSK signal is filtered to limit its

bandwidth, the sidebands furthest from the carrier are removed. The result is that in the time domain, the signal is no longer constant in amplitude, and AM / AM and AM / PM processes within the amplifier generate new sidebands. Typically, these "regrowth skirts" are separated 8 dB further from carrier than the two-tone IM3 products that would result with the same average carrier power, i.e., -18 dBc IM3 (4 dB back-off) roughly corresponds to -26 dBc spectral regrowth. Use of a predistortion linearizer with the TWT can allow comparable operation to within 2 dB of saturation.

TWTs traditionally have been used for FM applications where they're operated to saturation and are typically so specified. SSAs, on the other hand, traditionally have been specified at their one dB compression point. As a result, the two cannot be compared at a given output back-off level. When specifying a power requirement it is best to specify the absolute output power required for a given level of IM3 distortion, spectral regrowth, or the OIP3. At this point, a SSA will operate closer to saturation but will not have the approximate 3 dB reserve "burn-through" capability of a TWT.

➢ TWT Reliability

If a large number of TWTs were simultaneously put into service, their survival rate history would be characterized by three distinct periods:

- Infant Mortality
- Random Failures
- Wear-out

Infant mortality failures due to workmanship defects are effectively screened-out by “burn-in” before delivery. Random failures during the long middle period are characterized by the time constant MTBF (Mean Time Before Failure) which is a measure of the time to which about 37% (e^{-1}) of the tubes will have survived. Cathode exhaustion triggers the point at which tubes wear-out and failure rates increase substantially. MTBF and life clearly are two different measures of a tubes history. Ideally, MTBF exceeds life by a substantial amount. In some cases, cathode life may be so long or the environment may be so severe that random failures account for the majority of tube removals. The best currently available measure of TWT MTBF is MIL-HDBK-217F Notice 2[1] which provides the following estimates:

$$\text{MTBF} = \frac{10^6}{5.5 \times (1.00001)^P \times (1.1)^F} \qquad \text{Air Conditioned Fixed Site}$$

[1] *Military Handbook, Reliability Prediction of Electronic Equipment*, MIL-HDBK-217F Notice 2, 28 February, 1995

$$MTBF = \frac{10^6}{16.5 \times (1.00001)^P \times (1.1)^F} \quad \text{Fixed Site with Unconditioned Air}$$

$$MTBF = \frac{10^6}{77.0 \times (1.00001)^P \times (1.1)^F} \quad \text{Ground Mobile}$$

Where P is the rated power in Watts (peak if pulsed) and F is the operating Frequency in Ghz (the geometric mean of the end points is used if the operating frequency ranges over a band).

As an example, the 250W 0.8 to 2.0 Ghz M5670NO is predicted by this model to have MTBFs of 158,494 hrs for Air Conditioned sites, 52,831 hrs for unconditioned sites, and 11,321 hrs for ground mobile operation. This model is very simplistic and does not address failure drivers such as thermal and voltage stress gradients within the TWT, system VSWR, heater on – off cycling, power supply energy discharge during fault conditions, etc. Despite these concerns, experience with modern TWTs used on switching power supplies indicates that the MIL-HDBK typically under predicts MTBF by a factor of 2[2].

A Safety and Set-up instruction booklet is provided with each Teledyne TWT. It contains good advice on set-up procedures to prevent infant mortality problems. The high voltage power supply should be designed to limit energy dissipation to substantially less than 10J with at least several ohms of series resistance in the TWT cathode connection. The tube also should be provided with adequate cooling so that temperatures are maintained within the recommended ranges under all operating conditions. Unlike SSAs, however, TWTs can operate for short periods at chill plate temperatures above their recommended level. TWTs are equipped with thermal interlocks to prevent permanent damage. Any TWT in this catalog can be special ordered for prolonged operation at temperatures reasonably beyond the recommended limits.

➢ TWT Life

Modern TWTs are designed with low temperature cathodes capable of at least 20,000 hours of continuous operation. Many Teledyne TWTs have accumulated three to five times this life. A key to achieving long cathode life is to maintain

[2] A. S. Gilmour, Jr., *Principles of Traveling Wave Tubes*, Artech House, Inc., See especially p. 523.

heater voltage within it's recommended range. If the tube is to spend a substantial portion of its' life in standby, cathode life can be extended by reducing heater voltage 10% during standby. The majority of Teledyne TWTs employ shadow grids to turn the electron beam on and off. For most applications the life and reliability of shadow grid versions is equal to or greater than their ungridded counterparts. However, for those situations where the TWT is expected to be turned on and off infrequently and to operate uninterrupted for thousands of hours, ungridded versions will offer maximum life.

Current process and fabrication technologies have eliminated the need to periodically "refresh" tube vacuum during prolonged storage. If there is concern about turning-on a tube after storage, an extended heater warm-up of from 8 to 24 hours prior to the application of cathode voltage should be adequate. The primary enemies of TWTs are foreign material in HV and RF connectors and corrosion-causing moisture. Keeping stored tubes clean and dry is the best means of insuring high vacuum integrity and long life.

The current generation of TWTs is amassing an excellent reliability record. This is being illustrated by experience in Space where the failure rate of TWTs on Intelsat satellites has been 15% lower than for SSAs.

TELEDYNE MEC

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An ISO 9001:2000 Quality System Certified Company

GENERAL PURPOSE TWTs (CONTINUOUS WAVE)

Page #	Model	Frequency (GHz)	Power (W)	Duty (%) Max	Typical Gain (dB) Min/Max @ Rated Pout	Efficiency (%) Typical	Modulation (Control Electrode)	Output Connection	Weight (Lbs/Kg) (NTE)
1	M5670NO	0.8 – 2.0	250 *	100	24/36	17 *	N/A	N	10/4.5
	MEC 5670	0.8 – 2.0	250 *	100	24/36	17 *	GRID	N	10/4.5
2	MTD 5119	0.8 – 2.8	250 *	100	32/47	20 *	N/A	N	10/4.5
	MEC 5119	0.8 – 2.8	250 *	100	32/47	20 *	GRID	N	10/4.5
3	MEC 5203	1.0 – 2.5	535 *	100	28/43	22 *	GRID	SC	15/6.8
4	MTE 5107	2.0 – 4.0	250	100	44/53	22	N/A	N	8/3.6
5	MEC 5208	2.0 – 8.0	250 *	100	37/62	19 *	GRID	SC	8.0/3.6
6	MEC 5196	2.0 – 8.0	450 *	100	26/46	26 *	GRID	SC	9/4.1
7	MTG 5082H	2.5 – 8.0	275	100	40/64	23	GRID	SC	8/3.6
8	MEC 5296	2.5 – 7.5	535	100	31/43	28	GRID	SC	9/4.1
9	MEC 5498	2.5 – 7.5	535	100	26/43	28	GRID	WRD 250	9.5/4.32
10	MEC 5497	2.5 – 7.5	630	100	31/43	37	GRID	SC	9/4.1
11	M5889NO	4.0 – 8.0	250	100	46/59	21	N/A	N	9/4.1
	MEC 5889	4.0 – 8.0	250	100	46/59	21	GRID	N	9/4.1
12	MEC 5096	5.0 – 11.0	400	100	31/33	30	GRID	WRD 475	9/4.1
13	MTG 5130	5.0 – 11.0	500 *	100	40/57	21	FE	WRD 475	8/3.6
14	MEC 5413	6.0 – 18.0	200	100	35/46	20	GRID	WRD 650	9/4.1
	MEC 5414	6.0 – 18.0	200	100	35/46	20	FE	WRD 650	9/4.1
15	MEC 5423	6.0 – 18.0	250	100	35/46	23	GRID	WRD 650	9/4.1
	MEC 5424	6.0 – 18.0	250	100	35/46	23	FE	WRD 650	9/4.1
16	MEC 5415	6.0 – 18.0	300	100	35/46	26	GRID	WRD 650	9/4.1
	MEC 5416	6.0 – 18.0	300	100	35/46	26	FE	WRD 650	9/4.1
17	MEC 5409	6.5 – 18.0	200	100	35/48	20	GRID	WRD 650	9/4.1
	MEC 5410	6.5 – 18.0	200	100	35/48	20	FE	WRD 650	9/4.1
18	MEC 5421	6.5 – 18.0	250	100	35/45	24	GRID	WRD 650	9/4.1
	MEC 5422	6.5 – 18.0	250	100	35/45	24	FE	WRD 650	9/4.1
19	MEC 5411	6.5 – 18.0	300	100	35/45	25	GRID	WRD 650	9/4.1
	MEC 5412	6.5 – 18.0	300	100	35/45	25	FE	WRD 650	9/4.1
20	MEC 5405	7.5 – 18.0	200	100	35/55	22	GRID	WRD 750	9/4.1
	MEC 5406	7.5 – 18.0	200	100	35/55	22	FE	WRD 750	9/4.1
21	MEC 5419	7.5 – 18.0	250	100	35/55	25	GRID	WRD 750	9/4.1
	MEC 5420	7.5 – 18.0	250	100	35/55	25	FE	WRD 750	9/4.1
22	MEC 5407	7.5 – 18.0	300	100	35/55	29	GRID	WRD 750	9/4.1
	MEC 5408	7.5 – 18.0	300	100	35/55	29	FE	WRD 750	9/4.1
23	MEC 5493	18.0 – 27.0	50	100	26/28	20 *	FE	2X WRD 180	7/3.2
24	MEC 5496	26.5 – 40.0	40	100	35/50	20 *	FE	2X WRD 180	7.5/3.4

* Over majority of frequency range – Performance may be reduced at band edges.

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

This model number is subject to the jurisdiction of the U.S. Department of Commerce.

MODEL NO. M5670NO
MEC 5670 (GR)
0.8 to 2.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		-6.3 Vdc	3.4 A	-5.2 Vdc	-6.6 Vdc	4.5 A
HELIX	W/RF	GROUND	30 mA	GROUND		80 mA
	W/O RF		4 mA			
ANODE		140 Vdc	0.4 mA	0	500 Vdc	4 mA
GRID ON		110 Vdc	0.5 mA	100 Vdc	250 Vdc	10 mA
GRID OFF		-200 Vdc	0.1 mA	-200 Vdc	-500 Vdc	1 mA
CATHODE (Ek)		-3.75 kV	450 mA	-3 kV	-4 kV	550 mA
COLLECTOR W/ RF		3.2 kV	420 mA	87% X Ek ±2%		550 mA

NOTE 1: CATHODE AND ANODE VOLTAGES ARE MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.
NOTE 3: ANODE VOLTAGE NOT REQUIRED WITH GRID MODULATED VERSION.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	1.7:1	2.5:1
OUTPUT VSWR	1.6:1	2.5:1
MAXIMUM DUTY	——	CW
GRID CAPACITANCE	50 pF	65 pF
MIN HARMONIC SEPARATION	-4.0/-7.0 dBc	-2 */-3.0 ** dBc
NOISE POWER DENSITY	-40 dBm/MHz	-30 dBm/MHz
PRIME POWER	1500 W	1700 W
TEMPERATURE RANGE	-40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
0.8	230	200 *	24
0.9	285	250	27
1.0	330	250 **	31
1.2	320	250	34
1.4	300	250	36
1.6	300	250	35
1.8	295	250	33
2.0	280	250	29

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

GAIN IS W/O EQUALIZER.

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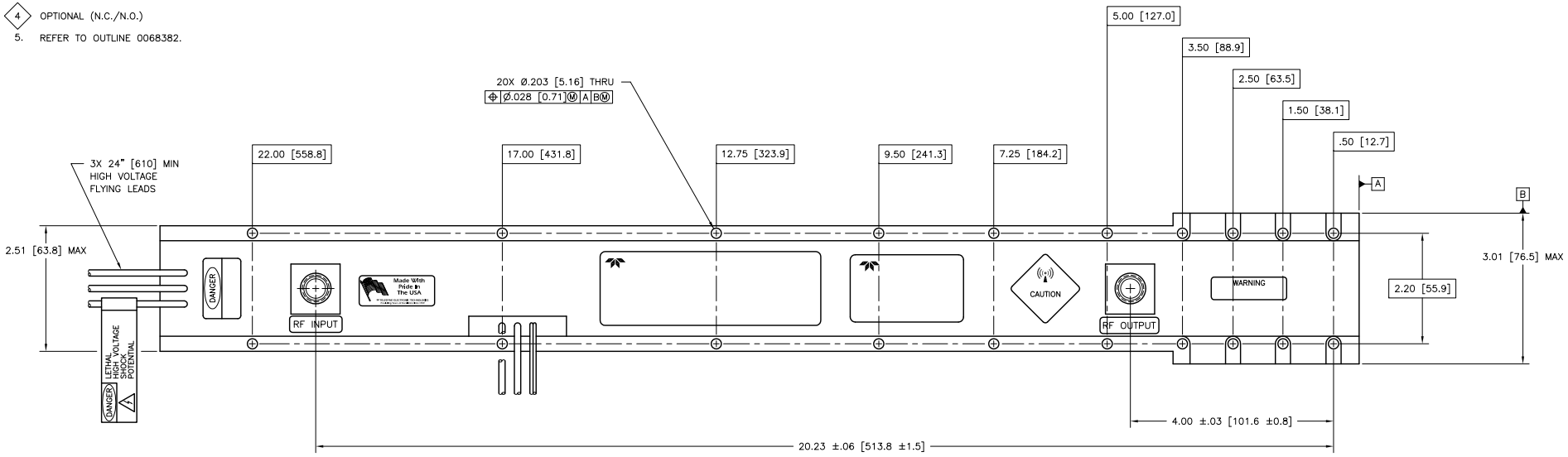
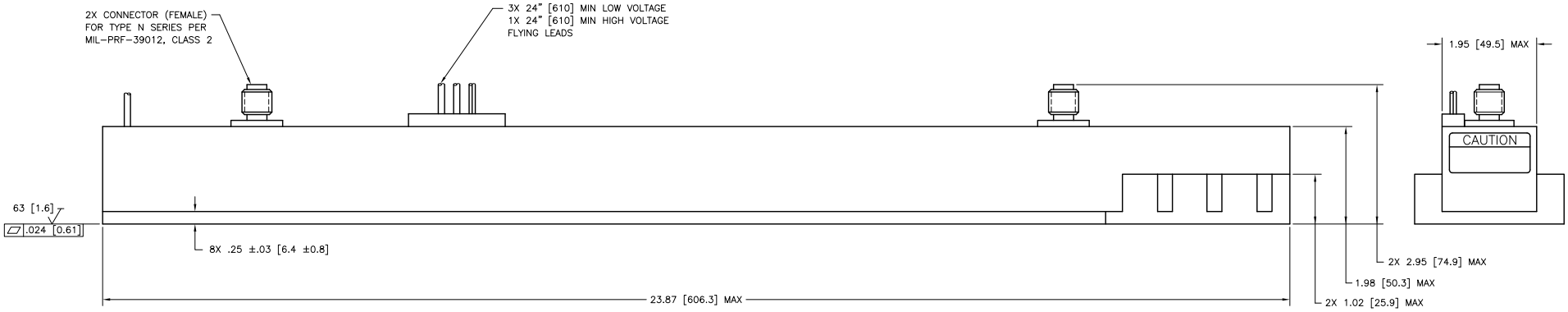
11/08

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 10.0 Lbs MAXIMUM.
   4.5 Kg MAXIMUM.
3. ANODE = BLUE
   GRID = GREEN
4. OPTIONAL (N.C./N.O.)
5. REFER TO OUTLINE 0068382.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
CONTROL ELECTRODE	
COLLECTOR	RED

3

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (2 WIRES)	TWIN GRAY

4

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED

DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC

11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
M5670NO
MEC 5670 (GRID)

11/08

TELEDYNE MEC

11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

This model number is controlled by the International Traffic in Arms Regulations, and can only be exported via a U.S. Department of State export license. They may not be transferred, transshipped on a non-continuous voyage, or otherwise be disposed of in any other country, either in their original form or after being incorporated into other end-items, without the prior written approval of the U.S. Department of State.

MODEL NO. MTD 5119
MEC 5119 (GR)
0.8 to 2.8 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		-6.3 Vdc	3.4 A	-5.2 Vdc	-6.5 Vdc	4.5 A
HELIX	W/RF	GROUND	40 mA	GROUND		80 mA
	W/O RF		4 mA			
ANODE		250 Vdc	1.5 mA	0	500 Vdc	4 mA
GRID ON		120 Vdc	0.5 mA	100 Vdc	250 Vdc	10 mA
GRID OFF		-250 Vdc	0.1 mA	-200 Vdc	-500 Vdc	1 mA
CATHODE (Ek)		-3.75 kV	480 mA	-3 kV	-4 kV	550 mA
COLLECTOR W/ RF		3.2 kV	440 mA	87% X Ek ±2%		550 mA

NOTE 1: CATHODE AND ANODE VOLTAGES ARE MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.
NOTE 3: ANODE VOLTAGE NOT REQUIRED WITH GRID MODULATED VERSION.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	1.6:1	2.5:1
OUTPUT VSWR	1.6:1	2.5:1
MAXIMUM DUTY	——	CW
GRID CAPACITANCE	50 pF	65 pF
MIN HARMONIC SEPARATION	-3.5/-8.0 dBc	-2 */-3 ** dBc
NOISE POWER DENSITY	-25 dBm/MHz	-20 dBm/MHz
PRIME POWER	1560 W	1700 W
TEMPERATURE RANGE	-40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
0.8	210	200 *	33
0.9	355	250	35
1.0	390	250 **	43
1.2	355	250	46
1.4	315	250	47
1.6	325	250	47
1.8	325	250	47
2.0	315	250	45
2.2	315	250	42
2.4	325	250	39
2.6	335	250	35
2.8	335	250	32

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

GAIN IS W/O EQUALIZER.

±4 dB GAIN EQUALIZER AVAILABLE.

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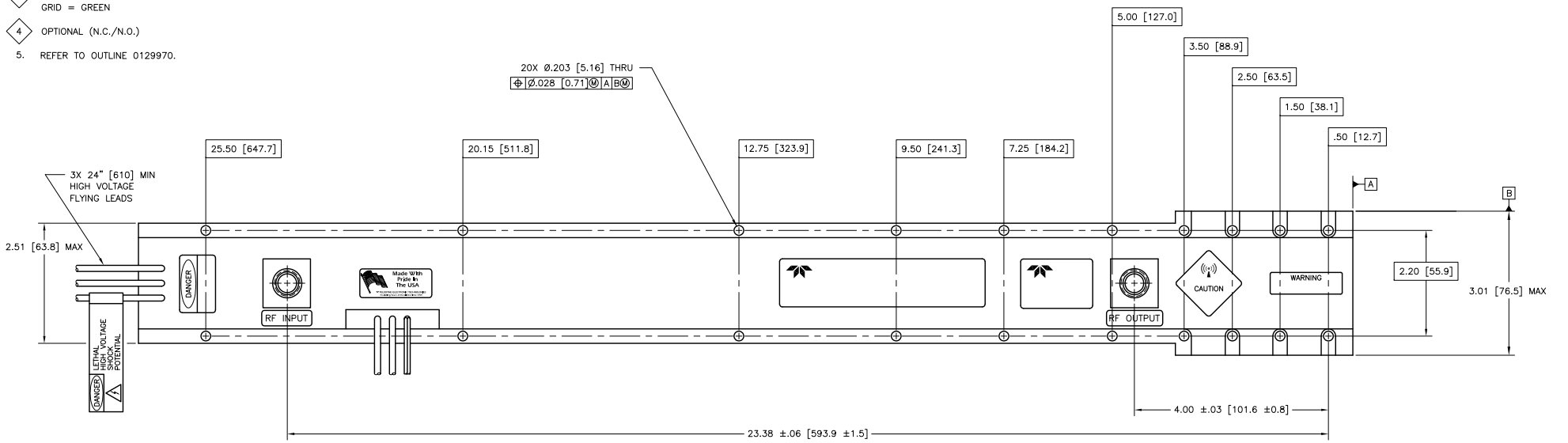
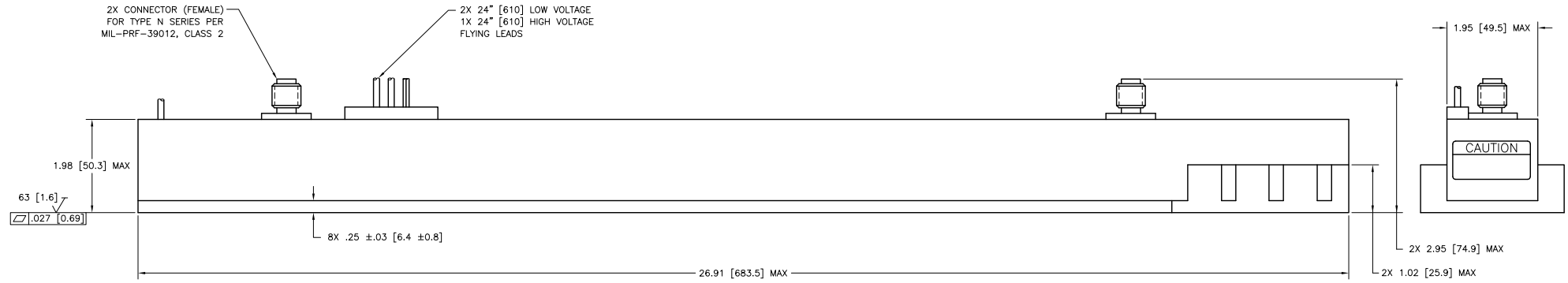
NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 10.0 Lbs MAXIMUM.
   4.5 Kg MAXIMUM.
3. ANODE = BLUE
   GRID = GREEN
4. OPTIONAL (N.C./N.O.)
5. REFER TO OUTLINE 0129970.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
CONTROL ELECTRODE	
COLLECTOR	RED

3

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (2 WIRES)	TWIN GRAY

4

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

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TOLERANCES ON
DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MTD 5119
MEC 5119 (GRID)

05/99

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

This model number is subject to the jurisdiction of the U.S. Department of Commerce.

MODEL NO. MEC 5203

1.0 to 2.5 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.3 Vdc	3.5 A	−5.2 Vdc	−6.6 Vdc	4.5 A
HELIX	W/RF	GROUND	90 mA	GROUND		100 mA
	W/O RF		10 mA			
GRID ON		150 Vdc	1 mA	100 Vdc	250 Vdc	10 mA
GRID OFF		−200 Vdc	0.1 mA	−200 Vdc	−500 Vdc	1 mA
CATHODE (Ek)		−4.70 kV	900 mA	−4.5 kV	−5.2 kV	1 A
COLLECTOR W/ RF	#1	3.71 kV	425 mA	79% X Ek ±2%		0.55 A
	#2	1.65 kV	250 mA	35% X Ek ±2%		1 A

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2:1	2.5:1
OUTPUT VSWR	2:1	2.5:1
MAXIMUM DUTY	——	CW
GRID CAPACITANCE	45 pF	60 pF
MIN HARMONIC SEPARATION	−2 dBc	−1 dBc
NOISE POWER DENSITY	−35 dBm/MHz	−30 dBm/MHz
PRIME POWER	2719 W	3000 W
TEMPERATURE RANGE	−40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
1.0	540	535	28
1.2	550	535	35
1.4	550	535	41
1.6	600	535	41
1.8	630	535	43
2.0	630	535	43
2.2	630	535	41
2.4	630	535	38
2.5	630	535	37

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

GAIN IS W/O EQUALIZER.

±4 dB GAIN EQUALIZER AVAILABLE.

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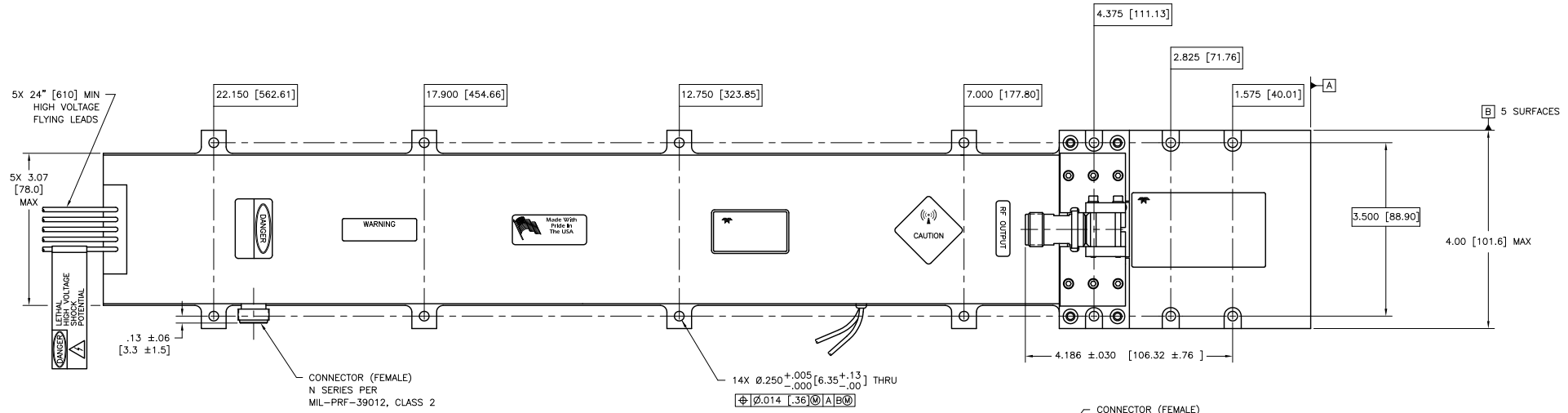
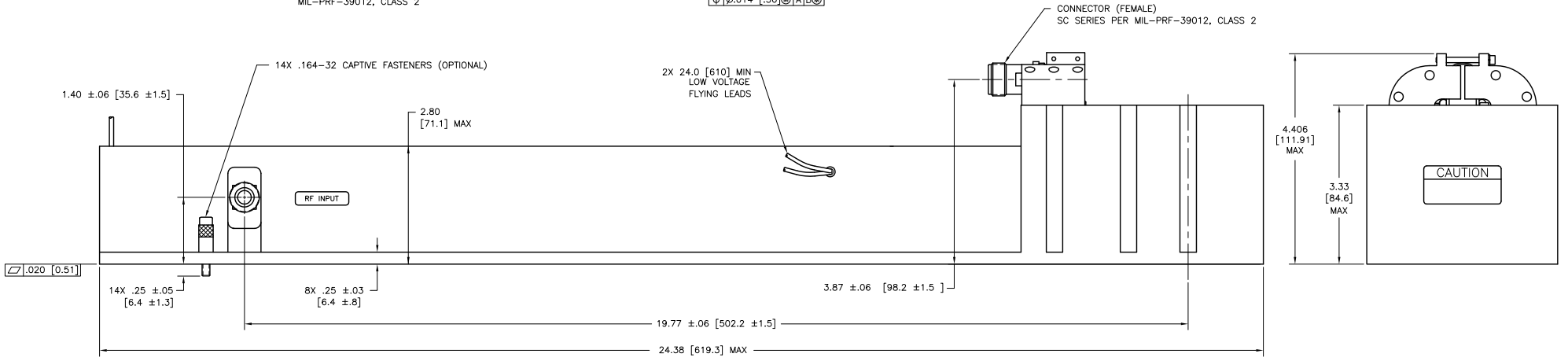
NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 15.0 Lbs MAXIMUM.
   6.8 Kg MAXIMUM.
3. REFER TO OUTLINE 0133167.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
CONTROL ELECTRODE	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (N.C.)	GRAY

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M - 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MEC 5203

09/08

TELEDYNE MEC
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Telephone (916) 638-3344 Fax (916) 636-7453

This model number is subject to the jurisdiction of the U.S. Department of Commerce.

MODEL NO. MTE 5107

2.0 to 4.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		-6.3 Vdc	2.1 A	-6 Vdc	-6.6 Vdc	3 A
HELIX	W/RF	GROUND	33 mA	GROUND		45 mA
	W/O RF		3 mA			
ANODE		210 Vdc	0.7 mA	0	500 Vdc	4 mA
CATHODE (Ek)		-4.4 kV	410 mA	-4.1 kV	-4.6 kV	450 mA
COLLECTOR W/ RF		3.08 kV	375 mA	70% X Ek ±2%		450 mA

NOTE 1: CATHODE AND ANODE VOLTAGES ARE MEASURED WITH RESPECT TO GROUND.

NOTE 2: HEATER AND COLLECTOR VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
2.00	250	250 *	44
2.25	295	250	48
2.50	320	250	51
2.75	330	250	52
3.00	345	250	53
3.25	360	250	53
3.50	360	250	52
3.75	355	250	51
4.00	345	250	49

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

GAIN IS W/O EQUALIZER.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	1.9:1	2.5:1
OUTPUT VSWR	1.7:1	2.5:1
MAXIMUM DUTY	——	CW
MIN HARMONIC SEPARATION	-5 dBc	-4 dBc *
NOISE POWER DENSITY	-30 dBm/MHz	-10 dBm/MHz
PRIME POWER	1300 W	1500 W
TEMPERATURE RANGE	-40° to 85 °C	——

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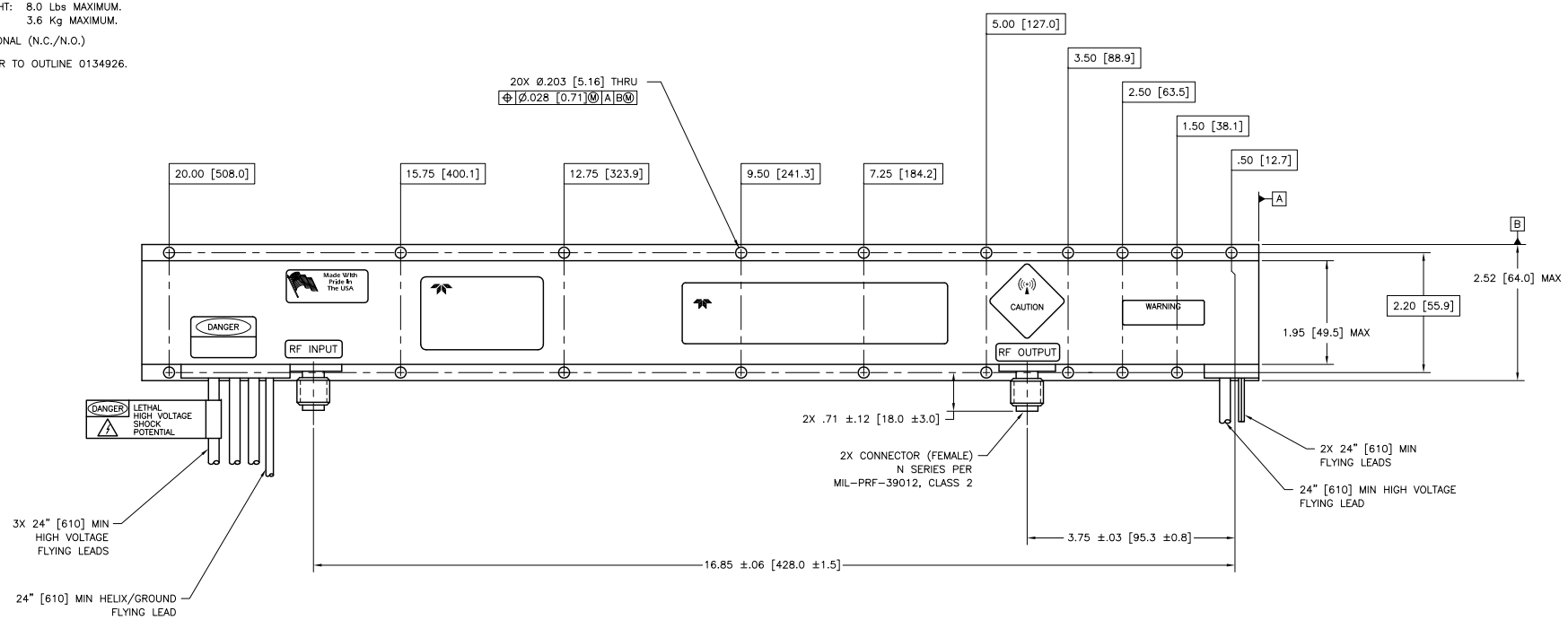
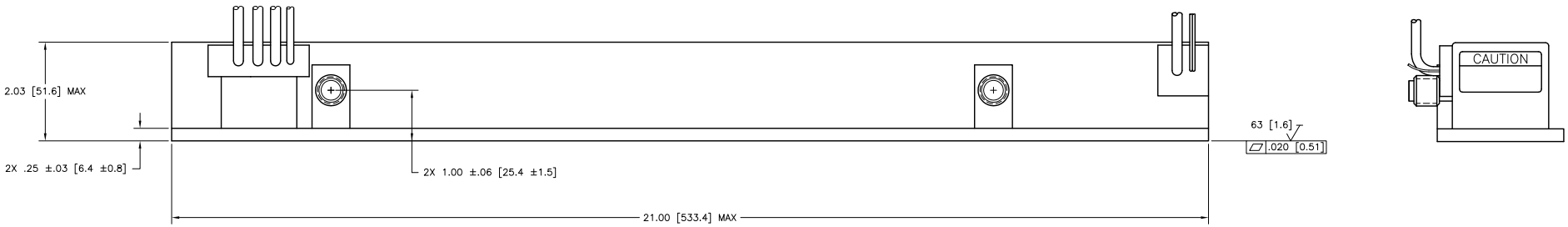
NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 8.0 Lbs MAXIMUM.
   3.6 Kg MAXIMUM.
3. OPTIONAL (N.C./N.O.)
4. REFER TO OUTLINE 0134926.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
ANODE	BLUE
COLLECTOR	RED

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (2 WIRES)	GRAY

3

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED

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TOLERANCES ON
DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MTE 5107

10/08

TELEDYNE MEC

11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MEC 5208

2.0 to 8.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.3 Vdc	1.85 A	−6.0 Vdc	−6.5 Vdc	2.5 A
HELIX	W/RF	GROUND	40 mA	GROUND		55 mA
	W/O RF		5 mA			
GRID ON		125 Vdc	0.2 mA	90 Vdc	190 Vdc	5 mA
GRID OFF		−200 Vdc	0.05 mA	−200 Vdc	−500 Vdc	0.5 mA
CATHODE (Ek)		−5.6 kV	405 mA	−5.2 kV	−5.8 kV	500 mA
COLLECTOR W/ RF	#1	3.58 kV	180 mA	64% X Ek ±2%		425 mA
	#2	2.8 kV	185 mA	50% X Ek ±2%		500 mA

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2:1	2.5:1
OUTPUT VSWR	1.75:1	2.0:1
MAXIMUM DUTY	——	CW
GRID CAPACITANCE	32 pF	50 pF
MIN HARMONIC SEPARATION	−4.5 dBc	−3 dBc *
NOISE POWER DENSITY	−30 dBm/MHz	−25 dBm/MHz
PRIME POWER	1398 W	1800 W
TEMPERATURE RANGE	−40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
2.0	200	175	38
2.1	250	200	40
2.2	300	250	41
2.3	425	250	44
2.4	500	250	45
2.5	500	250 *	48
3.0	600	250	55
3.5	630	250	58
4.0	600	250	61
4.5	560	250	62
5.0	550	250	61
5.5	525	250	59
6.0	450	250	56
6.5	450	250	53
7.0	400	250	48
7.5	350	250	43
7.7	280	250	40
7.8	265	250	39
8.0	260	250	37

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

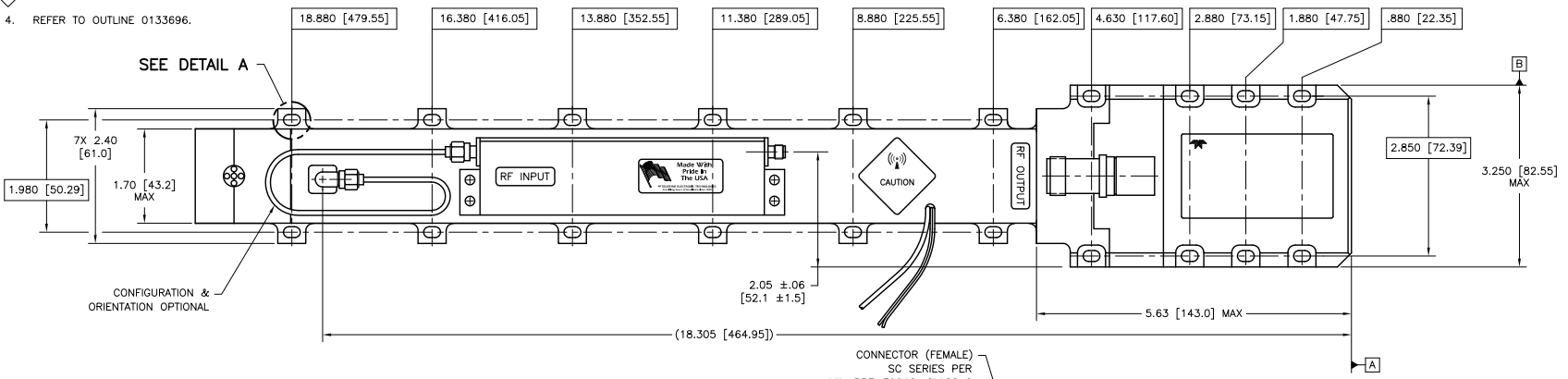
GAIN IS W/O EQUALIZER.

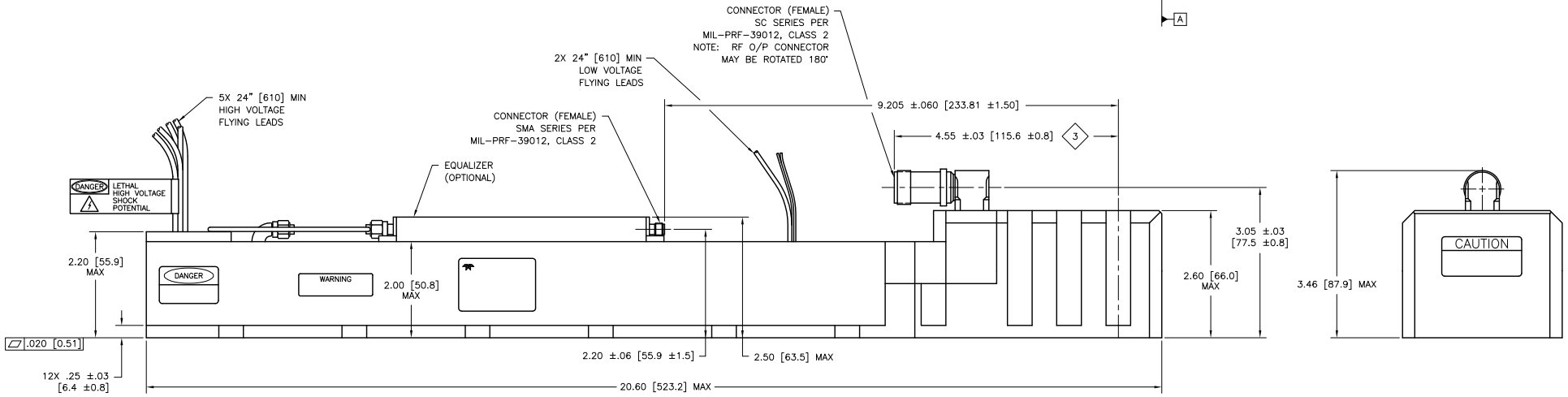
An ISO 9001:2000 Quality System Certified Company

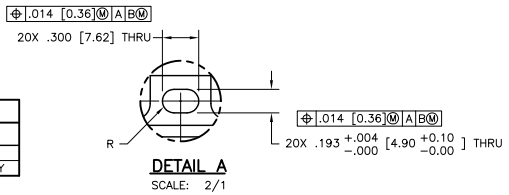
01/06

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 8.0 Lbs MAXIMUM.
   3.6 Kg MAXIMUM.
3. DIMENSION APPLIES ONLY WHEN CONFIGURED IN THIS POSITION.
4. REFER TO OUTLINE 0133696.







HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
CONTROL ELECTRODE	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (N.C.)	TWIN GRAY

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED

DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MEC 5208

11/08

TELEDYNE MEC

11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

This model number is controlled by the International Traffic in Arms Regulations, and can only be exported via a U.S. Department of State export license. They may not be transferred, transshipped on a non-continuous voyage, or otherwise be disposed of in any other country, either in their original form or after being incorporated into other end-items, without the prior written approval of the U.S. Department of State.

MODEL NO. MEC 5196 (GR)

2.0 to 8.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		-6.3 Vdc	2.1 A	-6 Vdc	-6.6 Vdc	2.5 A
HELIX	W/ RF	GROUND	30 mA	GROUND		50 mA
	W/O RF		5 mA			
GRID ON		165 Vdc	0.2 mA	100 Vdc	250 Vdc	5 mA
GRID OFF		-200 Vdc	0.05 mA	-200 Vdc	-500 Vdc	0.5 mA
CATHODE (Ek)		-6.2 kV	495 mA	-5.8 kV	-6.5 kV	550 mA
COLLECTOR W/ RF	#1	3.95 kV	350 mA	64% X Ek ±2%		450 mA
	#2	2.1 kV	115 mA	34% X Ek ±2%		550 mA

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2:1	2.5:1
OUTPUT VSWR	1.75:1	2.5:1
MAXIMUM DUTY	——	CW
GRID CAPACITANCE	32 pF	50 pF
MIN HARMONIC SEPARATION	-3.5 dBc	-3 dBc *
NOISE POWER DENSITY	-35 dBm/MHz	-25 dBm/MHz
PRIME POWER	1825 W	1850 W
TEMPERATURE RANGE	-40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
2.0	175	150	26
2.5	500	450 *	32
3.0	650	450	40
3.5	700	450	44
4.0	700	450	46
4.5	725	450	46
5.0	675	450	46
5.5	630	450	45
6.0	600	450	45
6.5	550	450	43
7.0	525	450	39
7.5	500	450	34
8.0	475	450	28

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

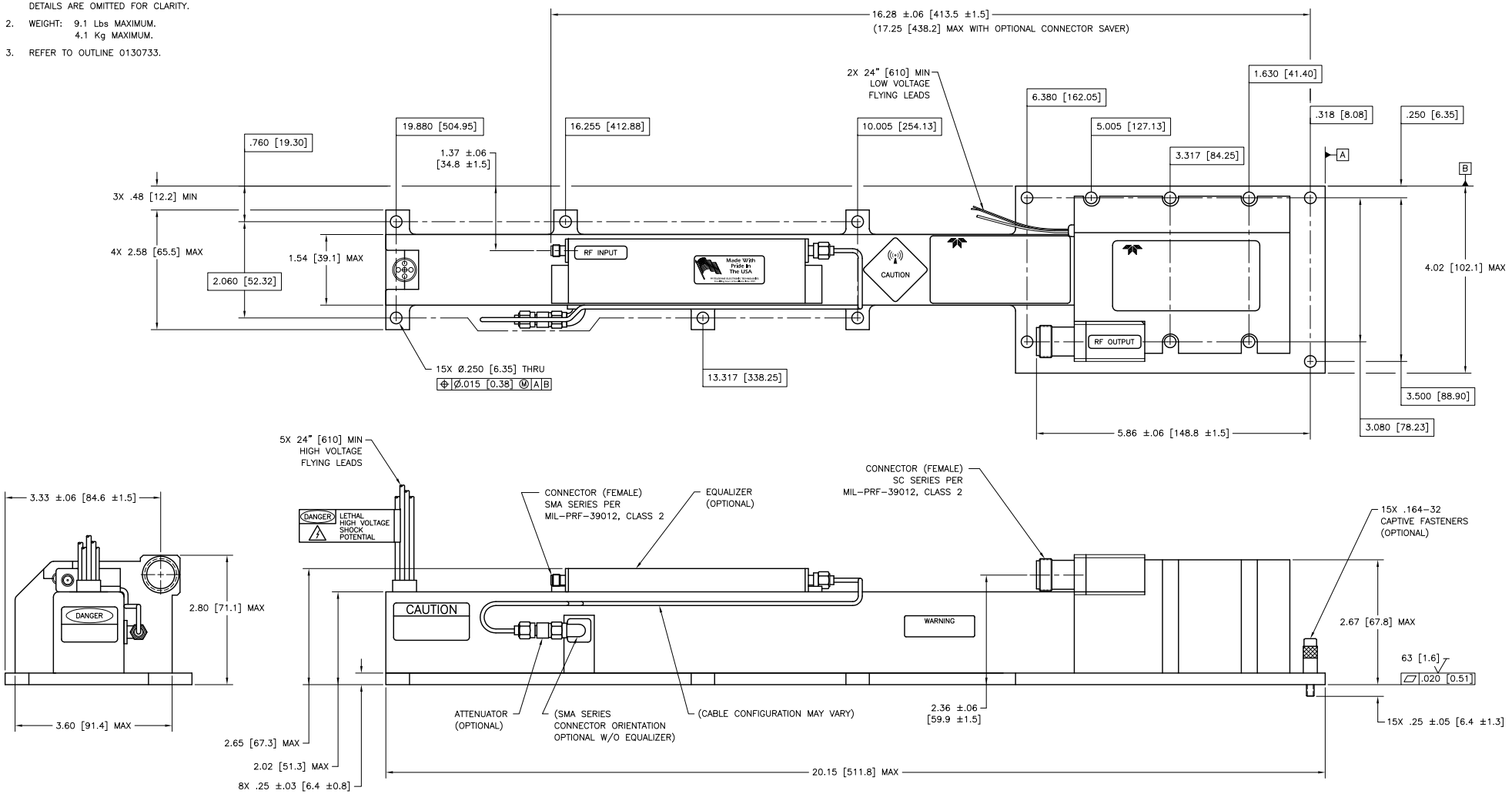
GAIN IS W/O EQUALIZER.

An ISO 9001:2000 Quality System Certified Company

01/06

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 9.1 Lbs MAXIMUM.
   4.1 Kg MAXIMUM.
3. REFER TO OUTLINE 0130733.



HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
CONTROL ELECTRODE	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (N.C.)	TWIN GRAY

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING MEC 5196 (GRID)

11/08

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

This model number is subject to the jurisdiction of the U.S. Department of Commerce.

MODEL NO. MTG 5082H

2.5 to 8.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.3 V	−1.9 A	−6 V	−6.6 V	2.5 A
HELIX	W/RF	GROUND	37 mA	GROUND		45 mA
	W/O RF		5 mA			
GRID ON		114 Vdc	0.25 mA	75 Vdc	130 Vdc	10 mA
GRID OFF		−200 Vdc	0.01 mA	−200 Vdc	−500 Vdc	0.1 mA
CATHODE (Ek)		−5 kV	320 mA	−4.75 kV	−5.2 kV	400 mA
COLLECTOR W/ RF	#1	3.25 kV	138 mA	65% X Ek ±2%		200 mA
	#2	2.05 kV	145 mA	41% X Ek ±2%		400 mA

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
2.5	230	220 *	42
3.0	280	275	55
4.0	280	275	62
5.0	280	275	64
6.0	280	275	55
7.0	250	234	48
8.0	225	215	40

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

GAIN IS W/O EQUALIZER.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2:1	2.5:1
OUTPUT VSWR	2:1	2.5:1
MAXIMUM DUTY	——	CW
GRID CAPACITANCE	47 pF	50 pF
MIN HARMONIC SEPARATION	−2.5 dBc	−2 dBc *
NOISE POWER DENSITY	−12 dBm/MHz	−9 dBm/MHz
PRIME POWER	943 W	1085 W
TEMPERATURE RANGE	−40° to 85 °C	——

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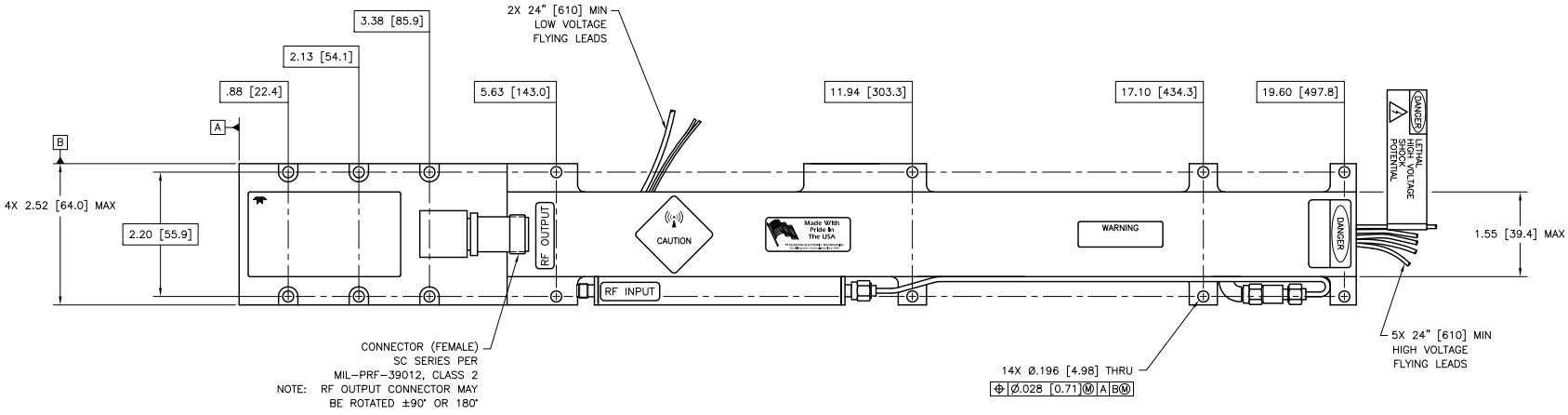
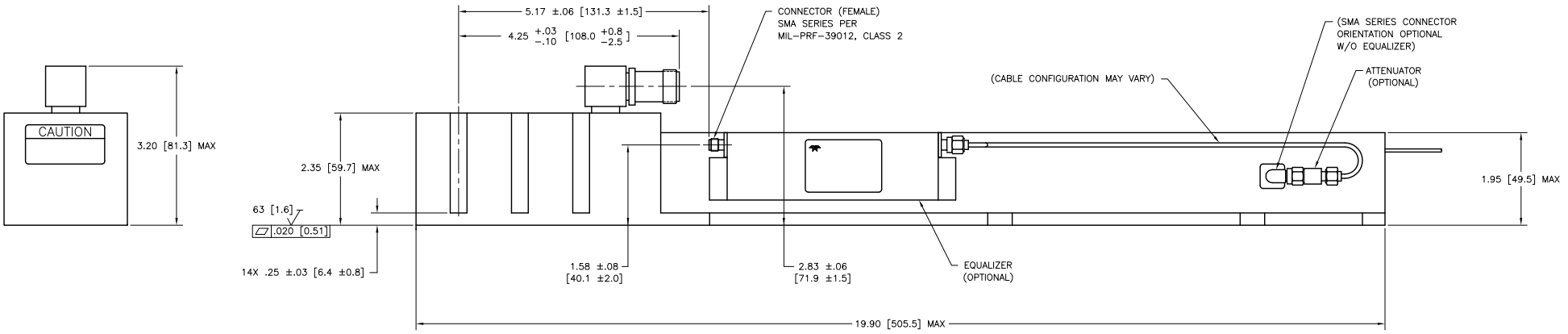
01/06

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 8.0 Lbs MAXIMUM.
   3.6 Kg MAXIMUM.
3. REFER TO OUTLINE 0128658.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
GRID	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (N.C.)	TWIN GRAY

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

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TOLERANCES ON
DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MTG 5082H

01/06

TELEDYNE MEC

11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MEC 5296

2.5 to 7.5 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.3 Vdc	2.1 A	−6 Vdc	−6.5 Vdc	2.5 A
HELIX	W/RF	GROUND	35 mA	GROUND		50 mA
	W/O RF		5 mA			
GRID ON		165 Vdc	0.2 mA	100 Vdc	250 Vdc	5 mA
GRID OFF		−200 Vdc	0.05 mA	−200 Vdc	−500 Vdc	0.5 mA
CATHODE (Ek)		−6.15 kV	500 mA	−5.8 kV	−6.5 kV	550 mA
COLLECTOR W/ RF	#1	4.31 kV	300 mA	70% X Ek ±2%		450 mA
	#2	2.89 kV	165 mA	47% X Ek ±2%		550 mA

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2:1	2.5:1
OUTPUT VSWR	1.75:1	2.5:1
MAXIMUM DUTY	——	CW
GRID CAPACITANCE	32 pF	50 pF
MIN HARMONIC SEPARATION	−5 dBc	−3 dBc *
NOISE POWER DENSITY	−40 dBm/MHz	−25 dBm/MHz
PRIME POWER	1995 W	2500 W
TEMPERATURE RANGE	−40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
2.5	600	535 *	32
3.0	775	535	38
3.5	825	535	40
4.0	775	535	42
4.5	750	535	43
5.0	750	535	43
5.5	700	535	42
6.0	675	535	40
6.5	675	535	38
7.0	635	535	34
7.5	550	535	31

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

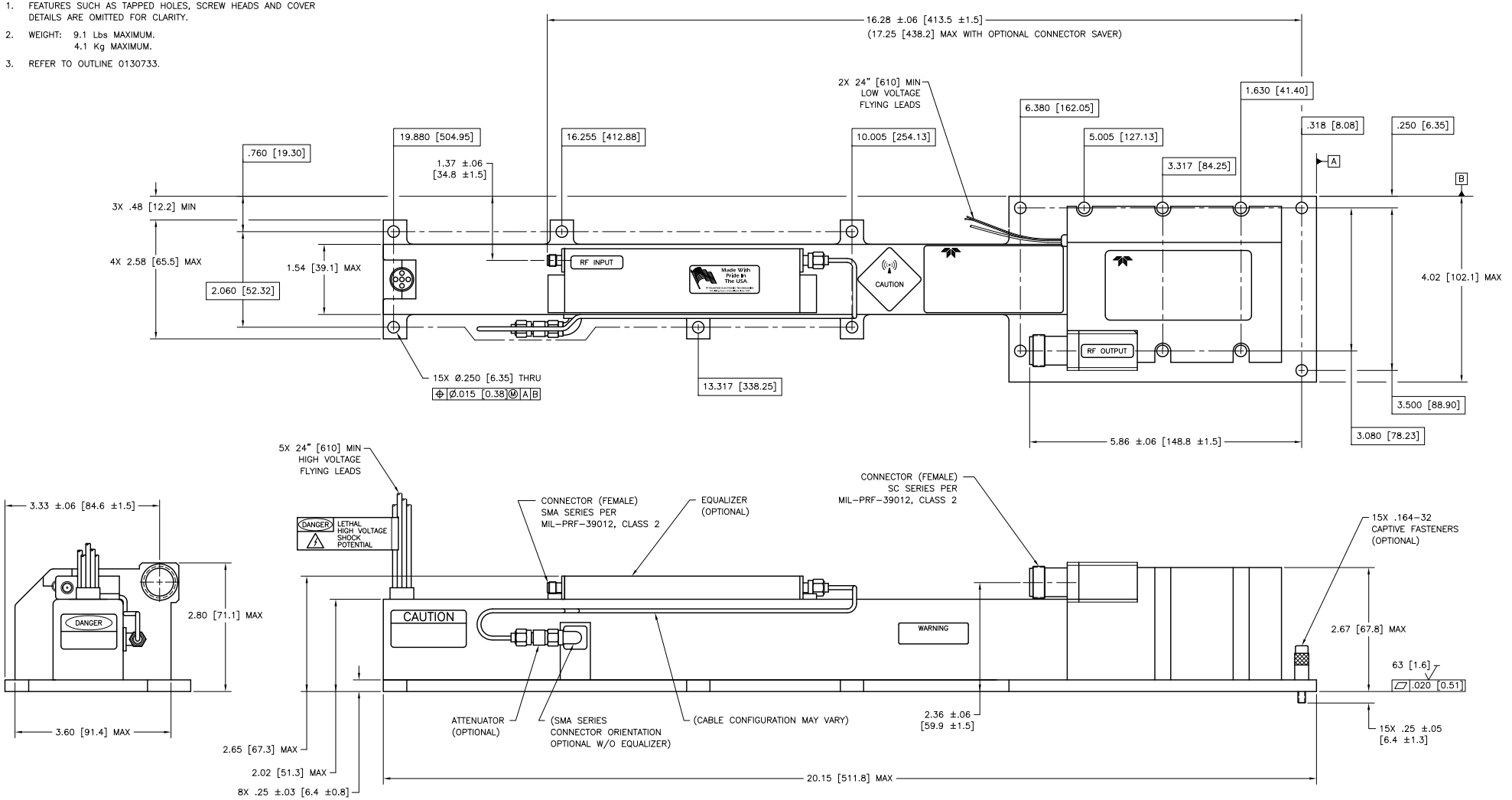
GAIN IS W/O EQUALIZER.

An ISO 9001:2000 Quality System Certified Company

01/06

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 9.1 Lbs MAXIMUM.
   4.1 Kg MAXIMUM.
3. REFER TO OUTLINE 0130733.



HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
CONTROL ELECTRODE	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (N.C.)	TWIN GRAY

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

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DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M - 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MEC 5296

11/08

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

This model number is subject to the jurisdiction of the U.S. Department of Commerce.

MODEL NO. MEC 5498

2.5 to 7.5 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.3 Vdc	2.1 A	−6 Vdc	−6.5 Vdc	2.5 A
HELIX	W/RF	GROUND	35 mA	GROUND		50 mA
	W/O RF		5 mA			
GRID ON		165 Vdc	0.2 mA	100 Vdc	250 Vdc	5 mA
GRID OFF		−200 Vdc	0.05 mA	−200 Vdc	−500 Vdc	0.5 mA
CATHODE (Ek)		−6.15 kV	500 mA	−5.8 kV	−6.5 kV	550 mA
COLLECTOR W/ RF	#1	4.31 kV	300 mA	70% X Ek ±2%		450 mA
	#2	2.89 kV	165 mA	47% X Ek ±2%		550 mA

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2:1	2.5:1
OUTPUT VSWR	2.2:1	2.5:1
MAXIMUM DUTY	——	CW
GRID CAPACITANCE	40 pF	60 pF
MIN HARMONIC SEPARATION	−5 dBc	−3 dBc
NOISE POWER DENSITY	−40 dBm/MHz	−25 dBm/MHz
PRIME POWER	1995 W	2500 W
TEMPERATURE RANGE	−40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
2.5	550	535	26
3.0	775	535	38
3.5	825	535	40
4.0	775	535	42
4.5	750	535	43
5.0	750	535	43
5.5	700	535	42
6.0	675	535	40
6.5	675	535	38
7.0	635	535	34
7.5	550	535	31

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

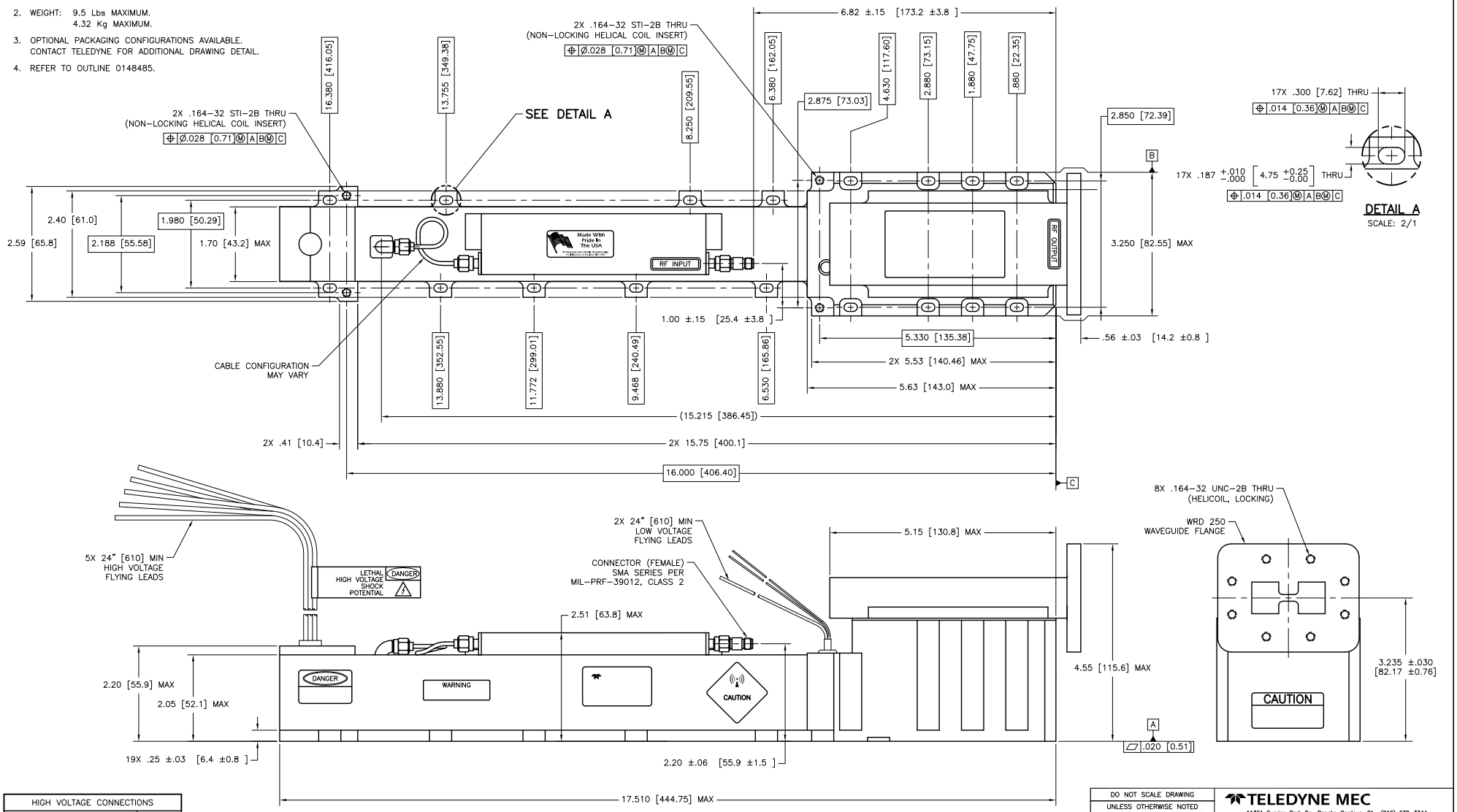
GAIN IS W/O EQUALIZER.

An ISO 9001:2000 Quality System Certified Company

01/06

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 9.5 Lbs MAXIMUM.
   4.32 Kg MAXIMUM.
3. OPTIONAL PACKAGING CONFIGURATIONS AVAILABLE.
   CONTACT TELEDYNE FOR ADDITIONAL DRAWING DETAIL.
4. REFER TO OUTLINE 0148485.



HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
CATHODE	YELLOW
HEATER	BROWN
GRID	GREEN
COLLECTOR 1	RED
COLLECTOR 2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (NC)	TWIN GRAY

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638–3344

TITLE

OUTLINE DRAWING
MEC 5498

01/06

TELEDYNE MEC

11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MEC 5497

2.5 to 7.5 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.3 Vdc	1.93 A	−6.0 Vdc	−6.6 Vdc	2.5 A
HELIX	W/RF	GROUND	35 mA	GROUND		55 mA
	W/O RF		5 mA			
GRID ON		138 V	0.2 mA	100 V	250 V	10 mA
GRID OFF		−250 V	0.05 mA	−250 V	−350 V	1.0 mA
CATHODE (Ek)		−5.60 kV	430 mA	−5.4 kV	−5.7 kV	475 mA
COLLECTOR #1	W/RF	3.584 kV	360 mA	64% X Ek ±2%		425 mA
	W/O RF		42 mA			
COLLECTOR #2	W/RF	2.184 kV	35 mA	39% X Ek ±2%		475 mA
	W/O RF		383 mA			

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
2.5	575	500	31
3.0	700	630	40
3.5	700	630	41
4.0	680	630	43
4.5	725	630	43
5.0	700	630	42
5.5	650	575	40
6.0	600	550	37
6.5	600	550	37
7.0	500	450	32
7.5	450	400	30

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

GAIN IS W/O EQUALIZER.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2:1	2.5:1
OUTPUT VSWR	2:1	2.5:1
MAXIMUM DUTY	——	CW
MIN HARMONIC SEPARATION	−5 dBc	−3 dBc
NOISE POWER DENSITY	−30 dBm/MHz	−20 dBm/MHz
PRIME POWER	1575 W	1650 W
TEMPERATURE RANGE	−40° to 85 °C	——

HV CONNECTIONS	
ELEMENT	COLOR
HEATER	BROWN
GRID	GREEN
CATHODE	YELLOW
COLLECTOR #1	RED
COLLECTOR #2	WHITE

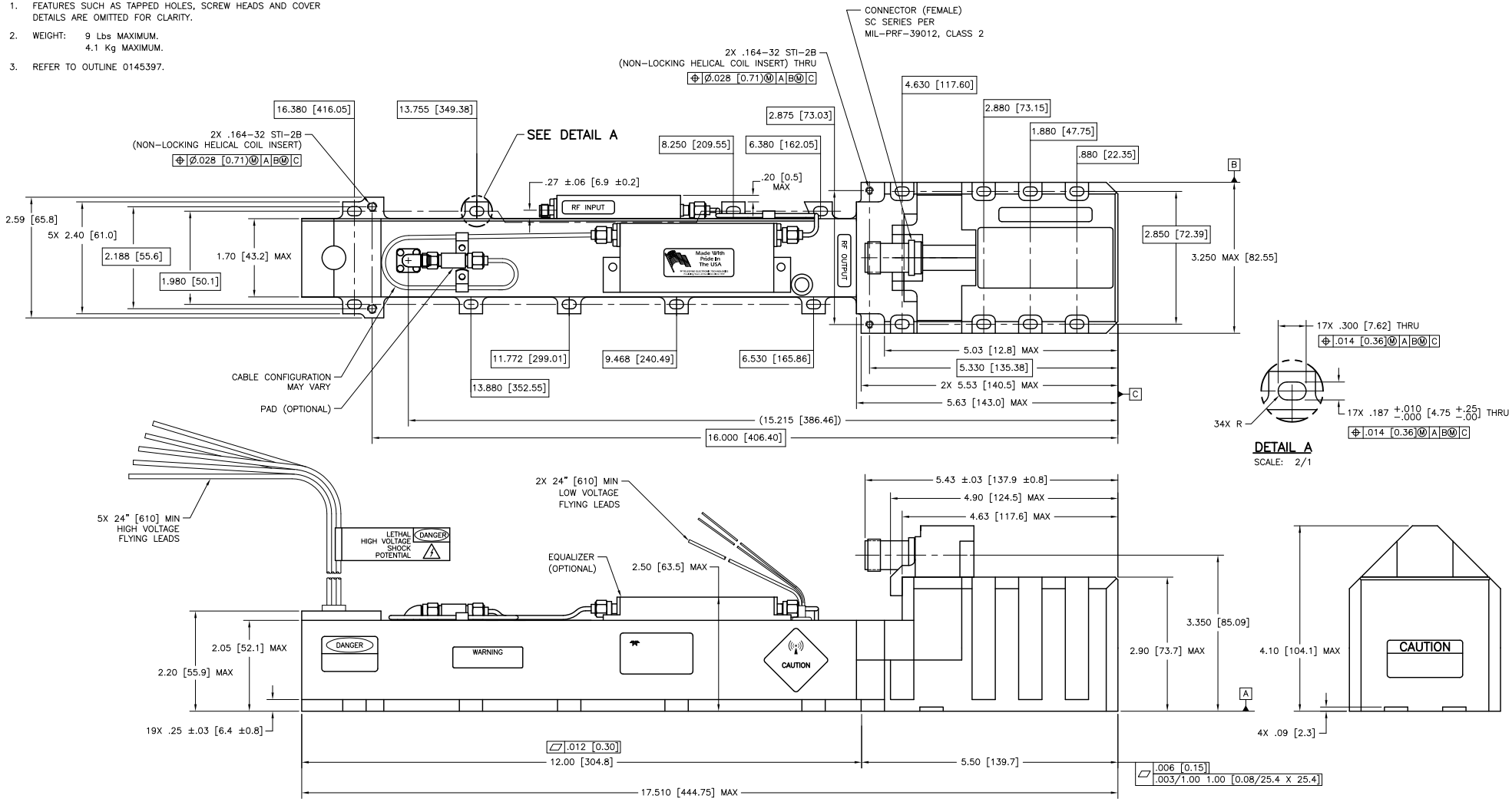
LV CONNECTIONS	
ELEMENT	COLOR
THERMOSTAT	GREY
HELIX/GROUND	BLACK

An ISO 9001:2000 Quality System Certified Company

11/08

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 9 Lbs MAXIMUM.
   4.1 Kg MAXIMUM.
3. REFER TO OUTLINE 0145397.



HIGH VOLTAGE CONNECTIONS		
PIN	FUNCTION	COLOR
1	CATHODE	YELLOW
2	HEATER	BROWN
3	GRID	GREEN
4	COLLECTOR 1	RED
5	COLLECTOR 2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (NC)	TWIN GRAY

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.02 .XXX ±.005
ANGLES ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MEC 5497

11/08

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

This model number is subject to the jurisdiction of the U.S. Department of Commerce.

MODEL NO. M5889NO
MEC 5889 (GRID)
4.0 to 8.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		-6.3 Vdc	2.3 A	-6 Vdc	-6.6 Vdc	3.5 A
HELIX	W/RF	GROUND	6 mA	GROUND		12 mA
	W/O RF		2 mA			
ANODE		240 Vdc	1 mA	0	450 Vdc	4 mA
GRID ON		140 Vdc	0.5 mA	125 Vdc	250 Vdc	10 mA
GRID OFF		-200 Vdc	0.5 mA	-200 Vdc	-500 Vdc	1 mA
CATHODE (Ek)		-8 kV	260 mA	-7.7 kV	-8.2 kV	300 mA
COLLECTOR W/ RF		4.4 kV	275 mA	55% X Ek ±2%		300 mA

NOTE 1: CATHODE AND ANODE VOLTAGES ARE MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.
NOTE 3: ANODE VOLTAGE NOT REQUIRED WITH GRID MODULATED VERSION.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	1.6:1	2.5:1
OUTPUT VSWR	2:1	2.5:1
MAXIMUM DUTY	——	CW
GRID CAPACITANCE	50 pF	65 pF
MIN HARMONIC SEPARATION	-8 dBc	-4 dBc *
NOISE POWER DENSITY	-20 dBm/MHz	-10 dBm/MHz
PRIME POWER	1300 W	1400 W
TEMPERATURE RANGE	-40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
4.0	260	250 *	48
4.5	320	250	54
5.0	370	250	57
5.5	395	250	59
6.0	395	250	59
6.5	385	250	57
7.0	370	250	54
7.5	360	250	50
8.0	285	250	46

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

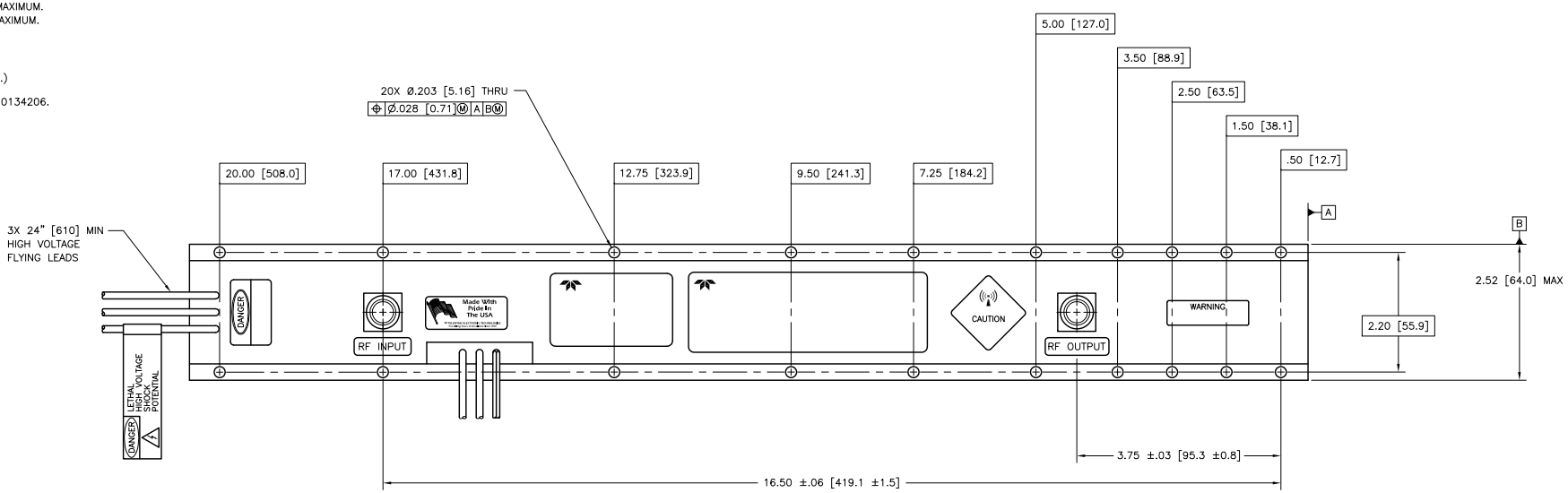
GAIN IS W/O EQUALIZER.

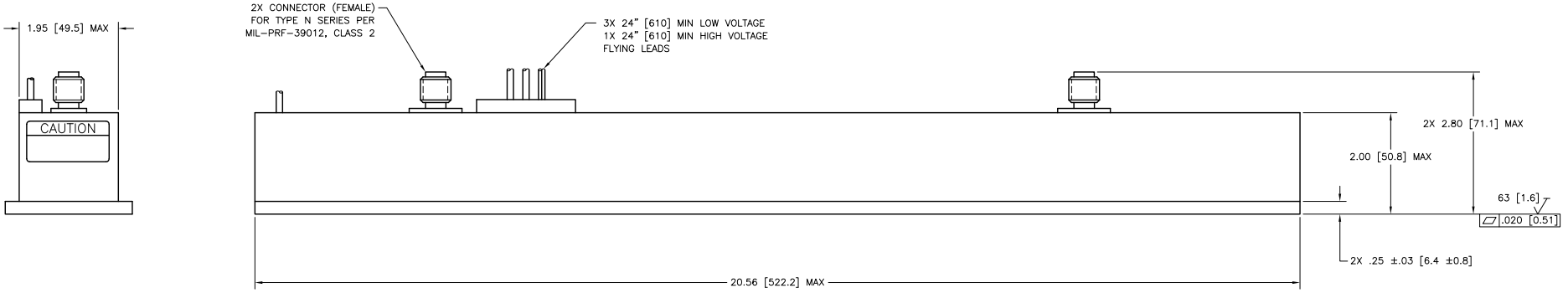
An ISO 9001:2000 Quality System Certified Company

11/08

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 9.0 Lbs MAXIMUM.
   4.1 Kg MAXIMUM.
3. ANODE = BLUE
   GRID = GREEN
4. OPTIONAL (N.C./N.O.)
5. REFER TO OUTLINE 0134206.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
CONTROL ELECTRODE	
COLLECTOR	RED

3

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (2 WIRES)	GRAY

4

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
M5889NO
MEC 5889 (GRID)

05/97

TELEDYNE MEC

11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MEC 5096

5.0 to 11.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.3 Vdc	2.0 A	−5.985 Vdc	−6.615 Vdc	2.8 A
HELIX	W/RF	GROUND	17 mA	GROUND		50 mA
	W/O RF		4.0 mA			
GRID ON		174 Vdc	0.01 mA	100 Vpk	250 Vpk	10 mA
GRID OFF		−200 Vdc	0.01 mA	−200 Vdc	−200 Vdc	1.0 mA
CATHODE (Ek)		−7.6 kV	390 mA	−7.5 kV	−8 kV	400 mA
COLLECTOR #1	W/RF	4.86 kV	275 mA	64% X Ek ±2%		300 mA
	W/O RF		42 mA			
COLLECTOR #2	W/RF	2.58 kV	98 mA	34% X Ek ±2%		370 mA
	W/O RF		344 mA			

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
5.0	610	400	32
6.0	660	400	33
7.0	575	400	32
8.0	525	400	32
9.0	575	400	32
10.0	525	400	32
11.0	480	400	31

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

GAIN IS WITH EQUALIZER.

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.

NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	1.97:1	2.0:1
OUTPUT VSWR	1.99:1	2.0:1
MAXIMUM DUTY	——	CW
GRID CAPACITANCE	42 pF	50 pF MAX
MIN HARMONIC SEPARATION	−9 dBc	−3 dBc MAX
NOISE POWER DENSITY	−20 dBm/MHz	−18 dBm/MHz
PRIME POWER	1730 W	1900 W
TEMPERATURE RANGE	−40° to 85 °C	——

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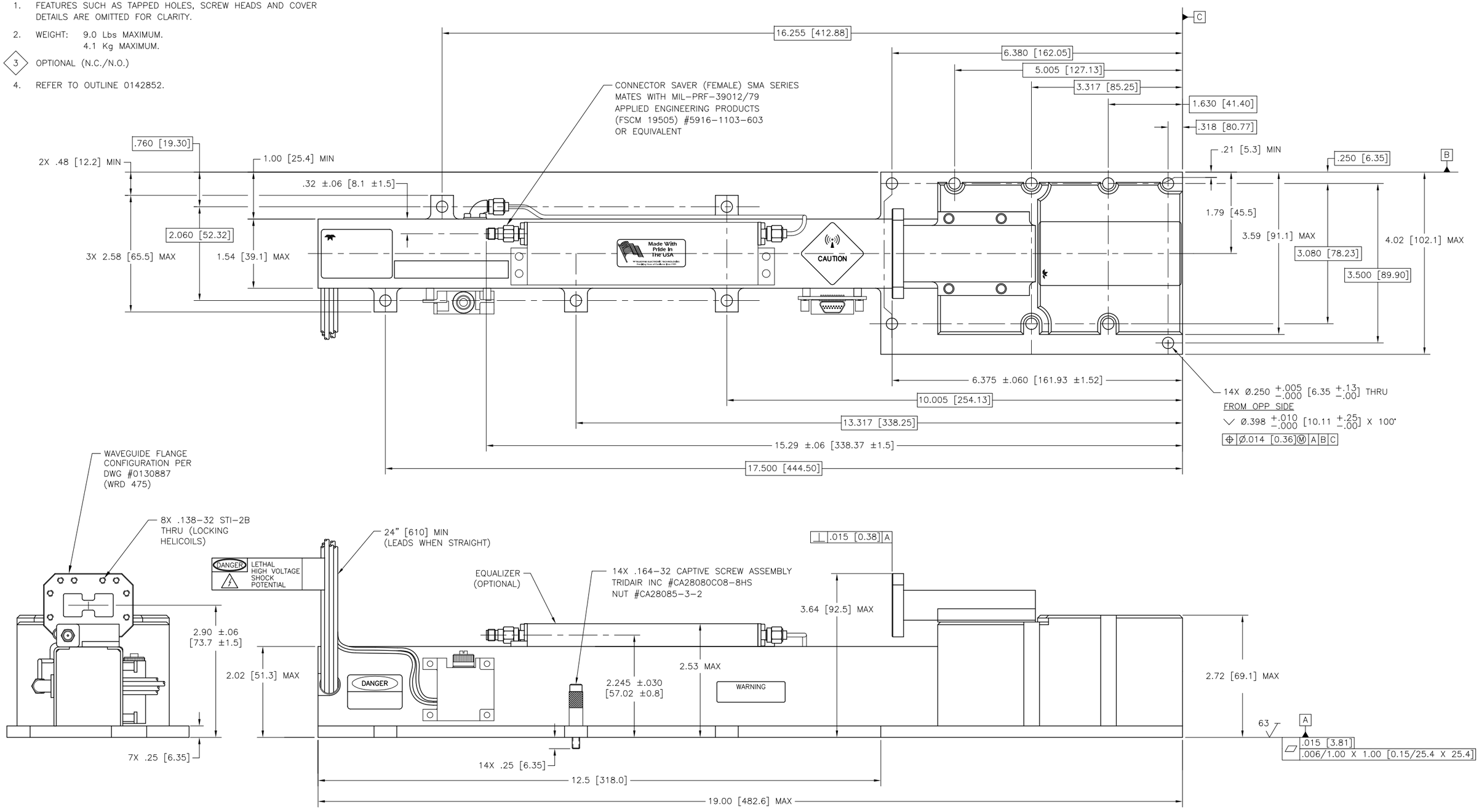
01/06

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 9.0 Lbs MAXIMUM.
   4.1 Kg MAXIMUM.
3. OPTIONAL (N.C./N.O.)
4. REFER TO OUTLINE 0142852.



HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
COLLECTOR #1	RED
NC	———
NC	———
GRID	GREEN

LOW VOLTAGE CONNECTIONS			
PIN	FUNCTION	# OF WIRES	COLOR
E1	THERMOSTAT	1	GRAY
E2	GROUND	1	BLACK

3

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

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DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MEC 5096

01/04

TELEDYNE MEC

11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MTG 5130

5.0 to 11.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.3 Vdc	1.7 A	−6.1 Vdc	−6.5 Vdc	2.7 A
HELIX	W/RF	GROUND	25 mA	GROUND		30 mA
	W/O RF		6 mA			
FE ON		−3 Vdc	0	0	−50 Vdc	0.1 mA
FE OFF		−1200 Vdc	0	−1200 Vdc	−1500 Vdc	1 mA
CATHODE		−9.05 kV	430 mA	−8.5 kV	−9.3 kV	475 mA
COLLECTOR W/ RF	#1	4.7 kV	105 mA	52% X Ek ±2%		250 mA
	#2	3.08 kV	300 mA	34% X Ek ±2%		450 mA

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR AND FOCUS ELECTRODE (FE) VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2:1	2.5:1
OUTPUT VSWR	1.8:1	2.5:1
MAXIMUM DUTY	——	CW
FE CAPACITANCE	40 pF	50 pF
MIN HARMONIC SEPARATION	−6 dBc	−4 dBc *
NOISE POWER DENSITY	−20 dBm/MHz	−18 dBm/MHz
PRIME POWER	1655 W	2000 W
TEMPERATURE RANGE	−40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
5.0	400	300	56
5.5	450	350	56
6.0	415	400 *	53
6.5	500	450	56
7.0	589	500	57
7.5	589	500	56
8.0	646	500	55
8.5	646	500	54
9.0	617	500	51
9.5	537	500	47
10.0	550	500	45
10.5	550	400	45
11.0	450	400	40

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

GAIN IS W/O EQUALIZER.

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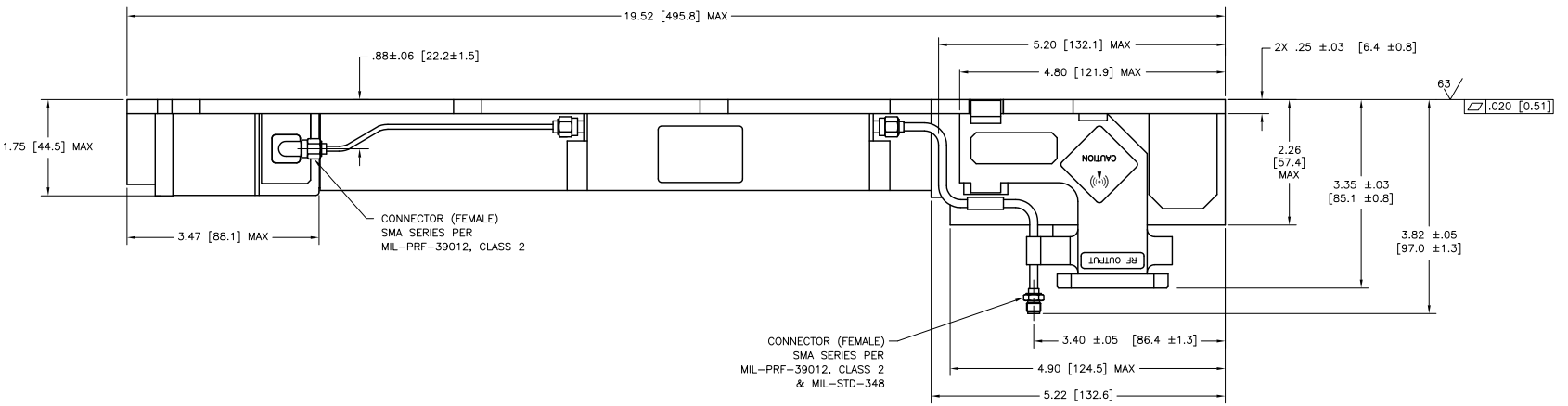
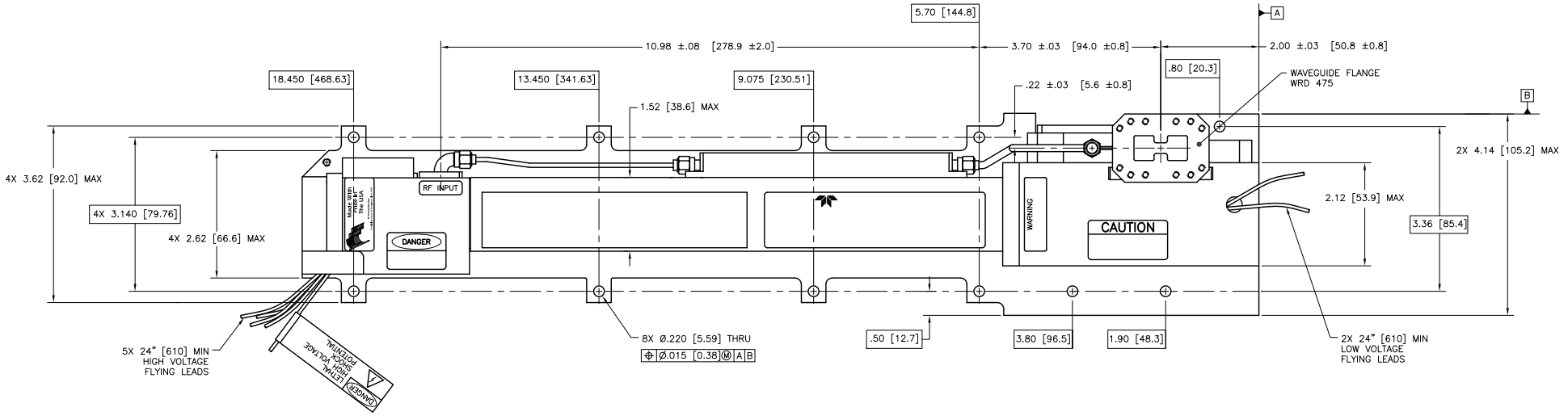
01/06

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 8.0 Lbs MAXIMUM.
   3.6 Kg MAXIMUM.
3. REFER TO OUTLINE 0145159.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
HEATER/CATHODE	YELLOW
COLLECTOR #1	RED
COLLECTOR #2	WHITE
CONTROL ELECTRODE	GREEN

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (N.C.)	WHITE

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

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TOLERANCES ON
DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC

11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING MTG 5130

11/08

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MEC 5413 (GR)
MEC 5414 (FE)
6.0 to 18.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.3 Vdc	1.6 A	−6.0 Vdc	−6.6 Vdc	2 A
HELIX	W/ RF	GROUND	7 mA	GROUND		15 mA
	W/O RF		1 mA			
FE ON		−50 Vdc	0.1 mA	0	−75 Vdc	1 mA
FE OFF		−1300 Vdc	0.1 mA	−1500 Vdc	−1700 Vdc	1 mA
GRID ON		180 Vdc	1 mA	125 Vdc	250 Vdc	10 mA
GRID OFF		−200 Vdc	0.1 mA	−200 Vdc	−500 Vdc	1 mA
CATHODE (Ek)		−10.3 kV	270 mA	−10 kV	−10.5 kV	300 mA
COLLECTOR W/ RF	#1	5.36 kV	45 mA	52% x Ek ±2%		100 mA
	#2	3.71 kV	218 mA	36% x Ek ±2%		300 mA

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR, GRID OR FOCUS ELECTRODE (FE) VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2:1	2.5:1
OUTPUT VSWR	2:1	2.25:1
MAXIMUM DUTY	——	CW
FE CAPACITANCE	50 pF	65 pF
GRID CAPACITANCE	37 pF	50 pF
MIN HARMONIC SEPARATION	−5.5 dBc	−5 dBc *
NOISE POWER DENSITY	−15 dBm/MHz	−10 dBm/MHz
PRIME POWER	1132 W	1400 W
TEMPERATURE RANGE	−40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
6.0	225	200 *	35
7.0	245	200	38
8.0	245	200	41
9.0	245	200	43
10.0	225	200	45
11.0	250	200	46
12.0	250	200	46
13.0	250	200	46
14.0	250	200	45
15.0	245	200	43
16.0	240	200	41
17.0	230	200	38
18.0	220	200	35

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

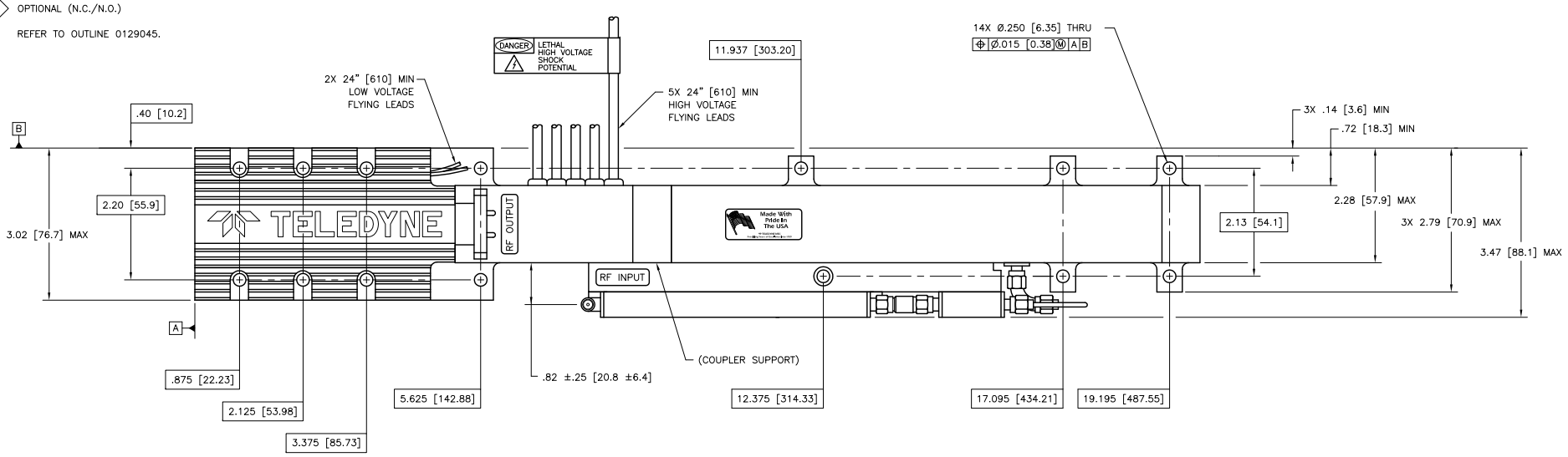
GAIN IS WITH EQUALIZER.

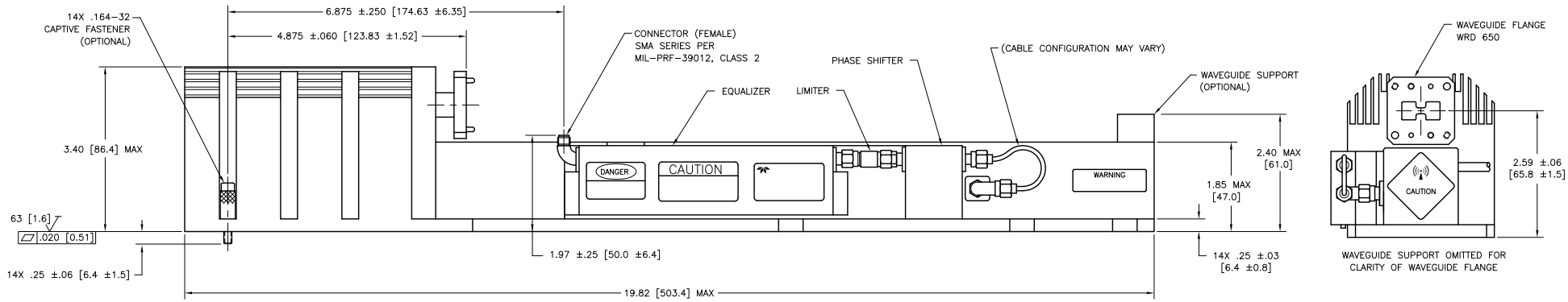
An ISO 9001:2000 Quality System Certified Company

01/06

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 9.0 Lbs MAXIMUM.
   4.1 Kg MAXIMUM.
3. OPTIONAL (N.C./N.O.)
4. REFER TO OUTLINE 0129045.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
CONTROL ELECTRODE	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT	GRAY

3

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.02 .XXX ±.005
ANGLES ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MEC 5413 (GRID)
MEC 5414 (FE)

05/99

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MEC 5423 (GR)
MEC 5424 (FE)
6.0 to 18.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.3 Vdc	1.6 A	−6.0 Vdc	−6.6 Vdc	2 A
HELIX	W/ RF	GROUND	9 mA	GROUND		15 mA
	W/O RF		1 mA			
FE ON		−50 Vdc	0.1 mA	0	−75 Vdc	1 mA
FE OFF		−1300 Vdc	0.1 mA	−1500 Vdc	−1700 Vdc	1 mA
GRID ON		180 Vdc	1 mA	125 Vdc	250 Vdc	10 mA
GRID OFF		−200 Vdc	0.1 mA	−200 Vdc	−500 Vdc	1 mA
CATHODE (Ek)		−10.3 kV	280 mA	−10 kV	−10.5 kV	300 mA
COLLECTOR W/ RF	#1	5.36 kV	50 mA	52% x Ek ±2%		100 mA
	#2	3.71 kV	221 mA	36% x Ek ±2%		300 mA

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR, GRID OR FOCUS ELECTRODE (FE) VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2:1	2.5:1
OUTPUT VSWR	2:1	2.25:1
MAXIMUM DUTY	——	CW
FE CAPACITANCE	50 pF	65 pF
GRID CAPACITANCE	37 pF	50 pF
MIN HARMONIC SEPARATION	−5.5 dBc	−5 dBc *
NOISE POWER DENSITY	−15 dBm/MHz	−10 dBm/MHz
PRIME POWER	1191 W	1400 W
TEMPERATURE RANGE	−40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
6.0	275	250 *	35
7.0	290	250	38
8.0	290	250	41
9.0	290	250	43
10.0	275	250	45
11.0	300	250	46
12.0	300	250	46
13.0	300	250	46
14.0	300	250	45
15.0	300	250	43
16.0	290	250	41
17.0	275	250	38
18.0	275	250	35

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

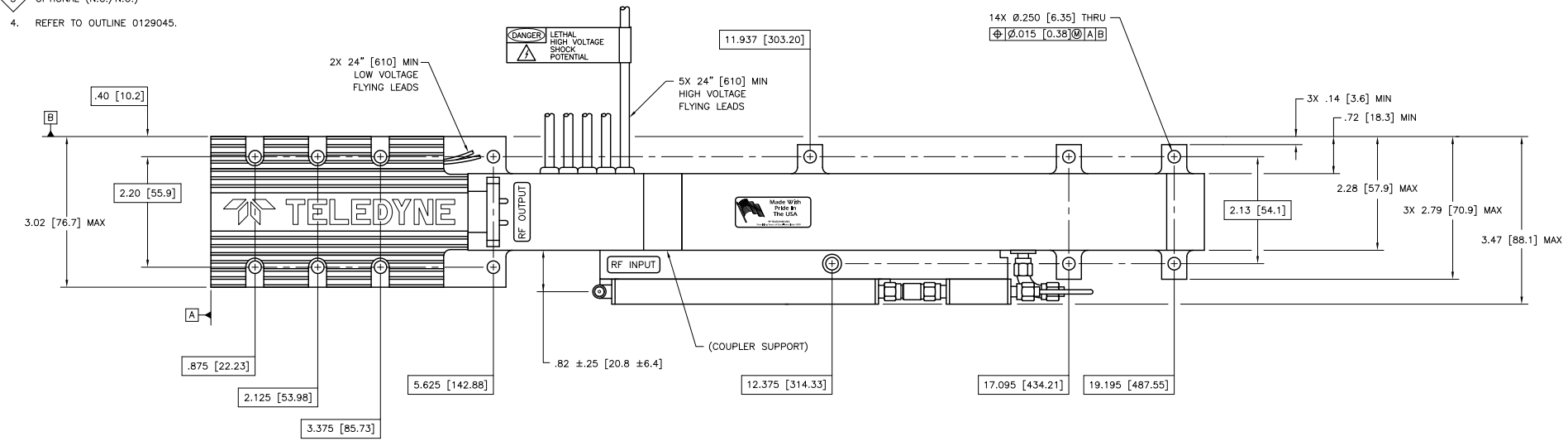
GAIN IS WITH EQUALIZER.

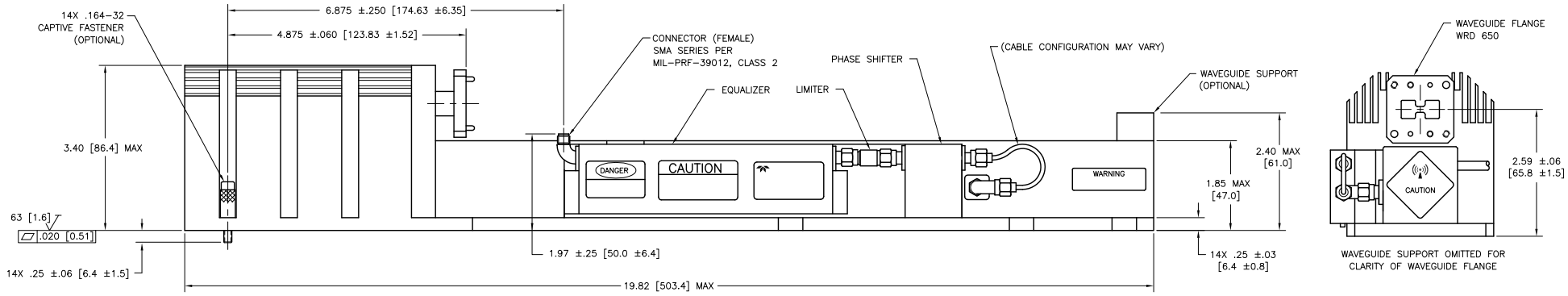
An ISO 9001:2000 Quality System Certified Company

01/06

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 9.0 Lbs MAXIMUM.
   4.1 Kg MAXIMUM.
3. OPTIONAL (N.C./N.O.)
4. REFER TO OUTLINE 0129045.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
CONTROL ELECTRODE	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT	GRAY

3

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED

DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.02 .XXX ±.005
ANGLES ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MEC 5423 (GRID)
MEC 5424 (FE)

05/99

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MEC 5415 (GR)
MEC 5416 (FE)
6.0 to 18.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.3 Vdc	1.6 A	−6.0 Vdc	−6.6 Vdc	2 A
HELIX	W/ RF	GROUND	10 mA	GROUND		15 mA
	W/O RF		2 mA			
FE ON		−25 Vdc	0.1 mA	0	−75 Vdc	1 mA
FE OFF		−1300 Vdc	0.1 mA	−1500 Vdc	−1700 Vdc	1 mA
GRID ON		200 Vdc	1 mA	125 Vdc	250 Vdc	10 mA
GRID OFF		−200 Vdc	0.1 mA	−200 Vdc	−500 Vdc	1 mA
CATHODE (Ek)		−10.3 kV	290 mA	−10 kV	−10.5 kV	300 mA
COLLECTOR W/ RF	#1	5.36 kV	60 mA	52% x Ek ±2%		100 mA
	#2	3.71 kV	220 mA	36% x Ek ±2%		300 mA

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR, GRID OR FOCUS ELECTRODE (FE) VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2:1	2.5:1
OUTPUT VSWR	2:1	2.25:1
MAXIMUM DUTY	——	CW
FE CAPACITANCE	50 pF	65 pF
GRID CAPACITANCE	37 pF	50 pF
MIN HARMONIC SEPARATION	−5.5 dBc	−5 dBc *
NOISE POWER DENSITY	−15 dBm/MHz	−10 dBm/MHz
PRIME POWER	1251 W	1400 W
TEMPERATURE RANGE	−40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
6.0	325	300 *	35
7.0	330	300	38
8.0	340	300	41
9.0	350	300	43
10.0	325	300	45
11.0	350	300	46
12.0	350	300	46
13.0	350	300	46
14.0	350	300	45
15.0	340	300	43
16.0	330	300	41
17.0	325	300	38
18.0	325	300	35

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

GAIN IS WITH EQUALIZER.

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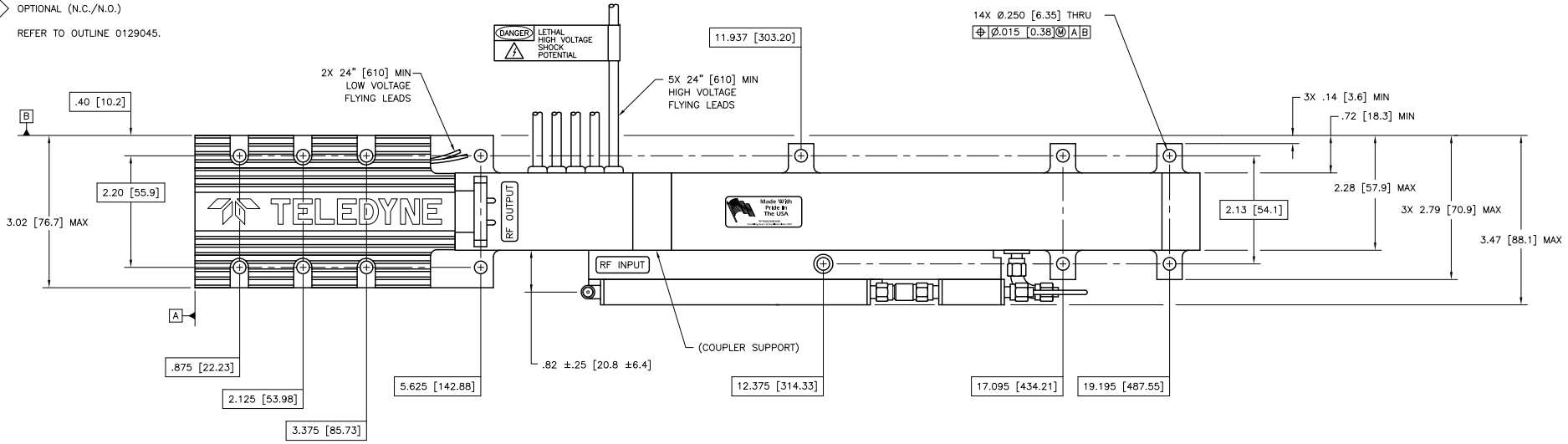
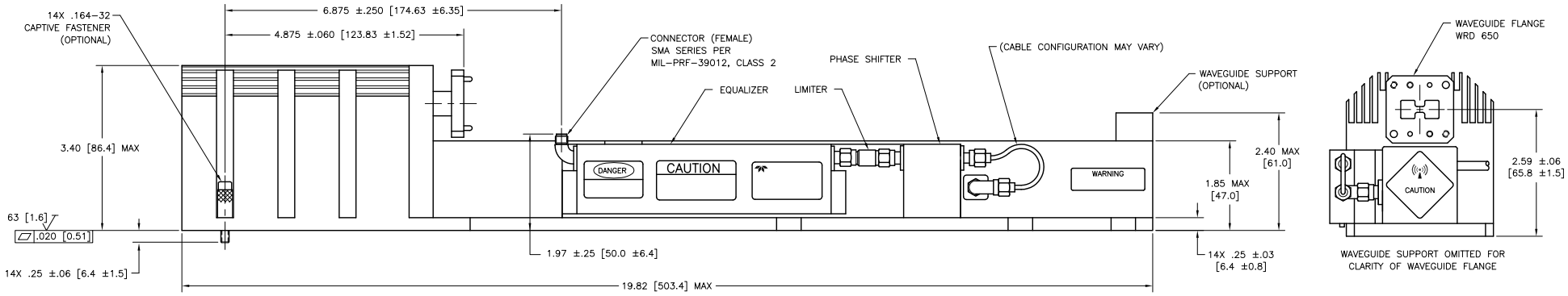
01/06

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 9.0 Lbs MAXIMUM.
   4.1 Kg MAXIMUM.
3. OPTIONAL (N.C./N.O.)
4. REFER TO OUTLINE 0129045.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
CONTROL ELECTRODE	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT	GRAY

3

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.02 .XXX ±.005
ANGLES ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MEC 5415 (GRID)
MEC 5416 (FE)

05/99

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MEC 5409 (GR)
MEC 5410 (FE)
6.5 to 18.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.3 Vdc	1.6 A	−6.0 Vdc	−6.6 Vdc	2 A
HELIX	W/ RF	GROUND	7 mA	GROUND		15 mA
	W/O RF		1 mA			
FE ON		−50 Vdc	0.1 mA	0	−75 Vdc	1 mA
FE OFF		−1300 Vdc	0.1 mA	−1500 Vdc	−1700 Vdc	1 mA
GRID ON		180 Vdc	1 mA	125 Vdc	250 Vdc	10 mA
GRID OFF		−200 Vdc	0.1 mA	−200 Vdc	−500 Vdc	1 mA
CATHODE (Ek)		−10.3 kV	260 mA	−10 kV	−10.5 kV	280 mA
COLLECTOR W/ RF	#1	5.36 kV	45 mA	52% x Ek ±2%		100 mA
	#2	3.71 kV	208 mA	36% x Ek ±2%		280 mA

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR, GRID OR FOCUS ELECTRODE (FE) VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2:1	2.5:1
OUTPUT VSWR	2:1	2.25:1
MAXIMUM DUTY	——	CW
FE CAPACITANCE	50 pF	65 pF
GRID CAPACITANCE	37 pF	50 pF
MIN HARMONIC SEPARATION	−6 dBc	−5 dBc *
NOISE POWER DENSITY	−15 dBm/MHz	−10 dBm/MHz
PRIME POWER	1095 W	1400 W
TEMPERATURE RANGE	−40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
6.5	215	200 *	35
7.0	240	200	40
8.0	250	200	41
9.0	275	200	43
10.0	225	200	45
11.0	275	200	45
12.0	275	200	46
13.0	275	200	46
14.0	275	200	45
15.0	250	200	43
16.0	240	200	41
17.0	230	200	48
18.0	220	200	35

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

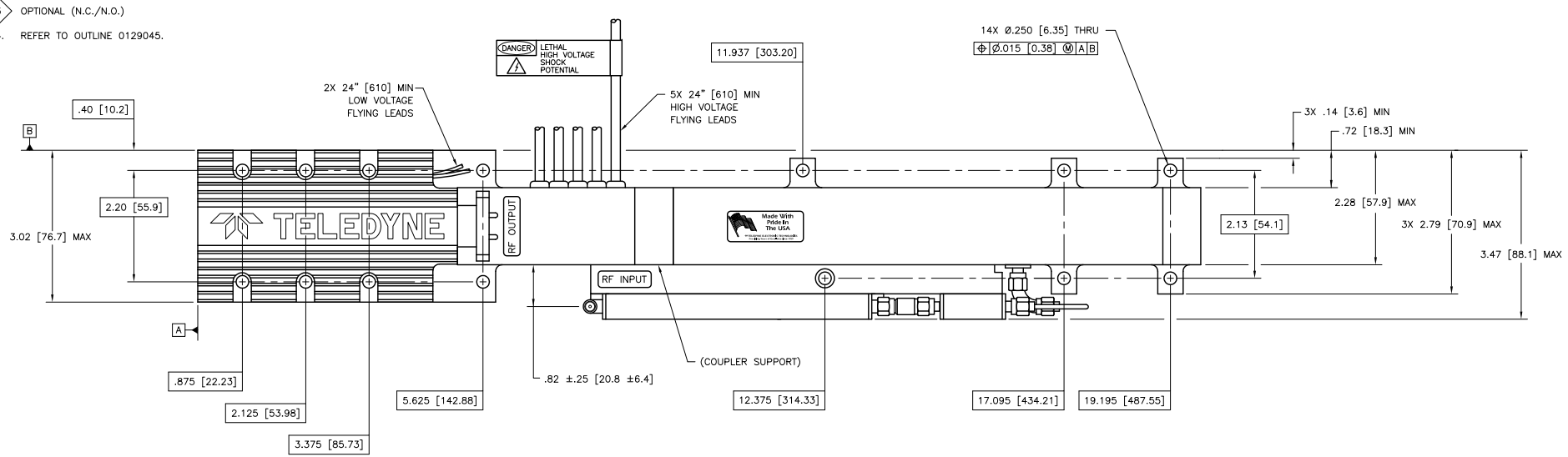
GAIN IS WITH EQUALIZER.

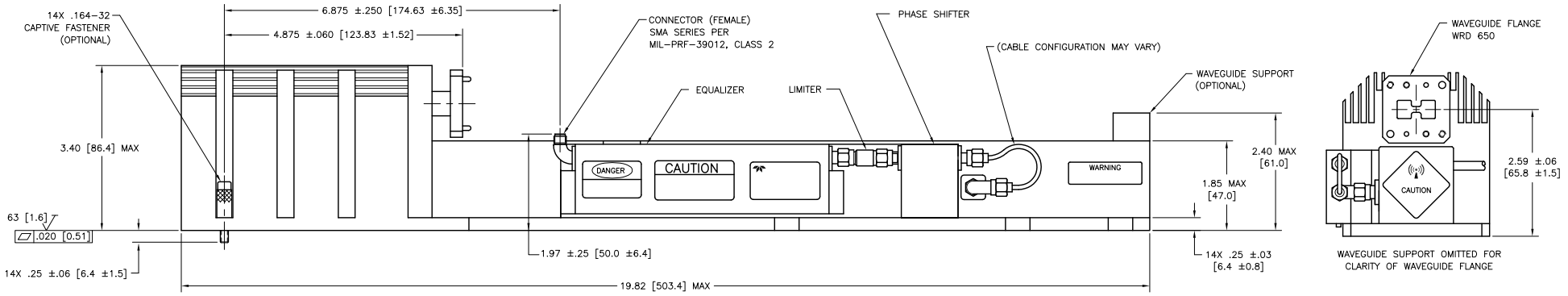
An ISO 9001:2000 Quality System Certified Company

01/06

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 9.0 Lbs MAXIMUM.
   4.1 Kg MAXIMUM.
3. OPTIONAL (N.C./N.O.)
4. REFER TO OUTLINE 0129045.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
CONTROL ELECTRODE	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT	GRAY

3

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

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TOLERANCES ON
DECIMALS .XX ±.02 .XXX ±.005
ANGLES ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MEC 5409 (GRID)
MEC 5410 (FE)

05/99

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MEC 5421 (GR)
MEC 5422 (FE)
6.5 to 18.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.3 Vdc	1.6 A	−6.0 Vdc	−6.6 Vdc	2 A
HELIX	W/ RF	GROUND	8 mA	GROUND		15 mA
	W/O RF		2 mA			
FE ON		−25 Vdc	0.1 mA	0	−75 Vdc	1 mA
FE OFF		−1300 Vdc	0.1 mA	−1500 Vdc	−1700 Vdc	1 mA
GRID ON		200 Vdc	1 mA	125 Vdc	250 Vdc	10 mA
GRID OFF		−200 Vdc	0.1 mA	−200 Vdc	−500 Vdc	1 mA
CATHODE (Ek)		−10.3 kV	270 mA	−10 kV	−10.5 kV	300 mA
COLLECTOR W/ RF	#1	5.36 kV	50 mA	52% x Ek ±2%		100 mA
	#2	3.71 kV	212 mA	36% x Ek ±2%		300 mA

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR, GRID OR FOCUS ELECTRODE (FE) VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2:1	2.5:1
OUTPUT VSWR	2:1	2.25:1
MAXIMUM DUTY	——	CW
FE CAPACITANCE	50 pF	65 pF
GRID CAPACITANCE	37 pF	50 pF
MIN HARMONIC SEPARATION	−7 dBc	−5 dBc *
NOISE POWER DENSITY	−15 dBm/MHz	−10 dBm/MHz
PRIME POWER	1147 W	1400 W
TEMPERATURE RANGE	−40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
6.5	275	250 *	35
7.0	275	250	38
8.0	290	250	41
9.0	280	250	43
10.0	275	250	45
11.0	280	250	45
12.0	300	250	45
13.0	300	250	45
14.0	300	250	45
15.0	300	250	43
16.0	285	250	41
17.0	275	250	38
18.0	275	250	35

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

GAIN IS WITH EQUALIZER.

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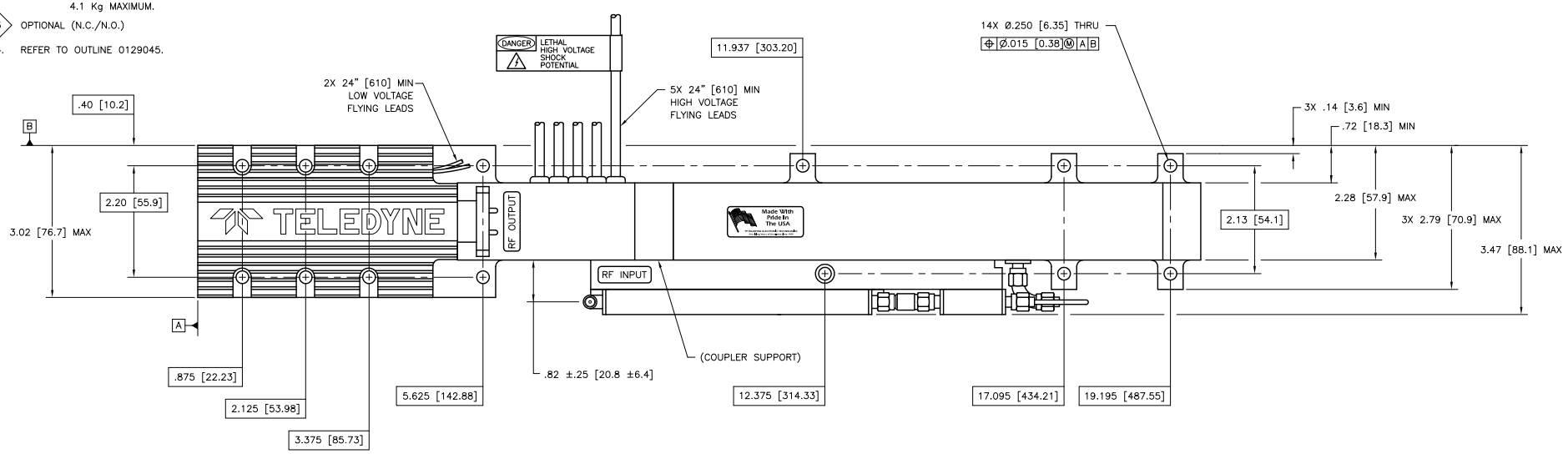
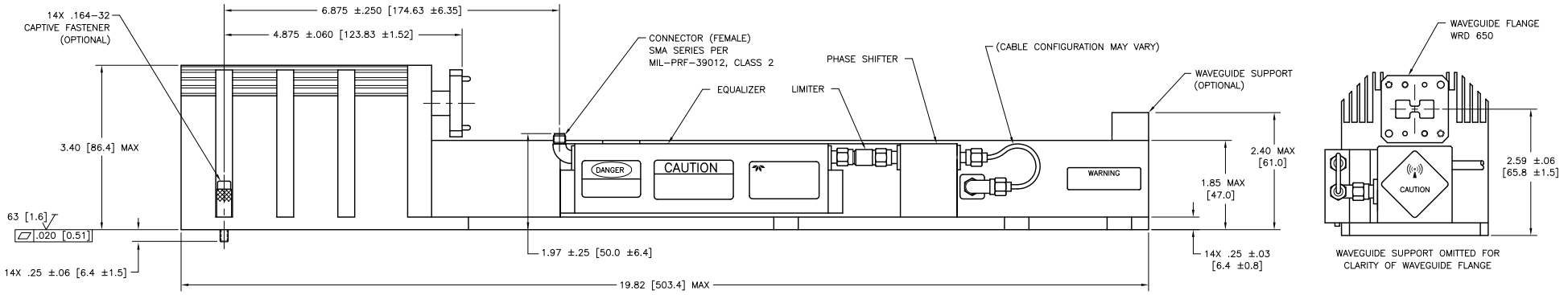
01/06

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 9.0 Lbs MAXIMUM.
   4.1 Kg MAXIMUM.
3. OPTIONAL (N.C./N.O.)
4. REFER TO OUTLINE 0129045.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
CONTROL ELECTRODE	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT	GRAY

3

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

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ANGLES ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MEC 5421 (GRID)
MEC 5422 (FE)

05/99

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MEC 5411 (GR)
MEC 5412 (FE)
6.5 to 18.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.3 Vdc	1.6 A	−6.0 Vdc	−6.6 Vdc	2 A
HELIX	W/ RF	GROUND	8 mA	GROUND		15 mA
	W/O RF		2 mA			
FE ON		−25 Vdc	0.1 mA	0	−75 Vdc	1 mA
FE OFF		−1300 Vdc	0.1 mA	−1500 Vdc	−1700 Vdc	1 mA
GRID ON		200 Vdc	1 mA	125 Vdc	250 Vdc	10 mA
GRID OFF		−200 Vdc	0.1 mA	−200 Vdc	−500 Vdc	1 mA
CATHODE (Ek)		−10.3 kV	290 mA	−10 kV	−10.5 kV	300 mA
COLLECTOR W/ RF	#1	5.36 kV	50 mA	52% x Ek ±2%		100 mA
	#2	3.71 kV	232 mA	36% x Ek ±2%		300 mA

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR, GRID OR FOCUS ELECTRODE (FE) VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2:1	2.5:1
OUTPUT VSWR	2:1	2.25:1
MAXIMUM DUTY	——	CW
FE CAPACITANCE	50 pF	65 pF
GRID CAPACITANCE	37 pF	50 pF
MIN HARMONIC SEPARATION	−7 dBc	−5 dBc *
NOISE POWER DENSITY	−15 dBm/MHz	−10 dBm/MHz
PRIME POWER	1221 W	1400 W
TEMPERATURE RANGE	−40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
6.5	310	300 *	35
7.0	325	300	38
8.0	350	300	41
9.0	350	300	43
10.0	325	300	45
11.0	350	300	45
12.0	375	300	45
13.0	375	300	45
14.0	375	300	45
15.0	365	300	43
16.0	350	300	41
17.0	340	300	38
18.0	325	300	35

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

GAIN IS WITH EQUALIZER.

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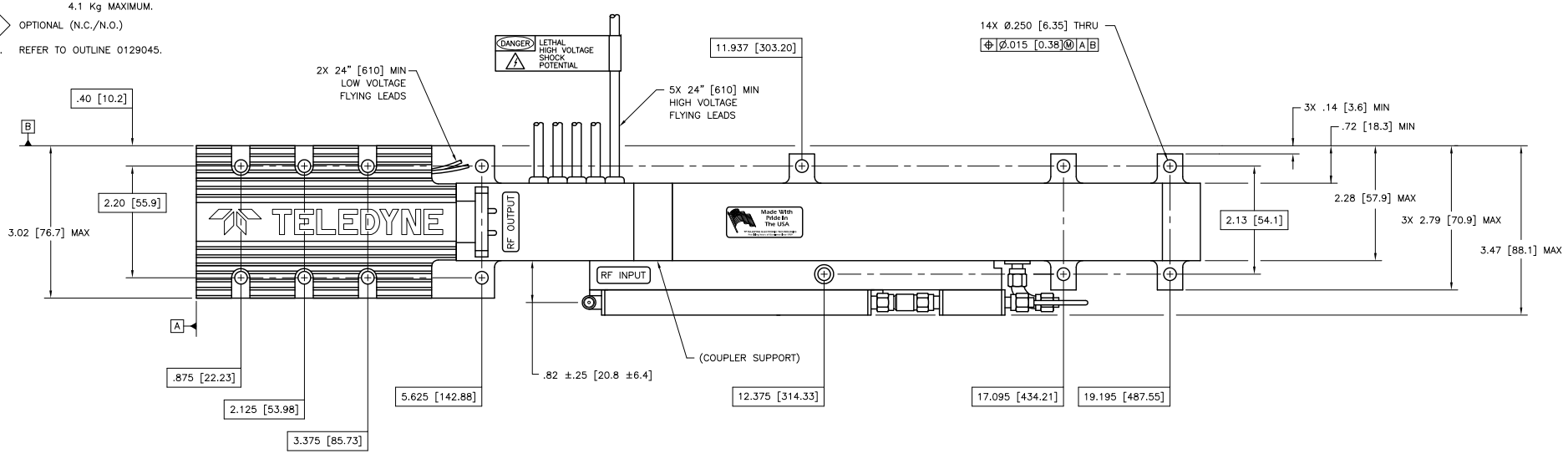
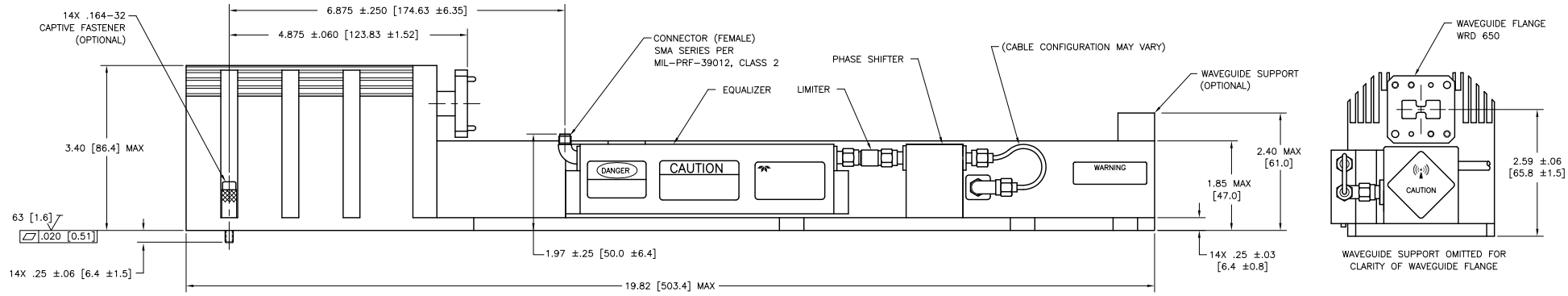
NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 9.0 Lbs MAXIMUM.
   4.1 Kg MAXIMUM.
3. OPTIONAL (N.C./N.O.)
4. REFER TO OUTLINE 0129045.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
CONTROL ELECTRODE	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT	GRAY

3

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

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TOLERANCES ON
DECIMALS .XX ±.02 .XXX ±.005
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REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MEC 5411 (GRID)
MEC 5412 (FE)

05/99

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MEC 5405 (GR)
MEC 5406 (FE)
7.5 to 18.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		-6.3 Vdc	1.6 A	-6.0 Vdc	-6.6 Vdc	2 A
HELIX	W/ RF	GROUND	7 mA	GROUND		12 mA
	W/O RF		0.5 mA			
FE ON		-65 Vdc	0.1 mA	0	-75 Vdc	1 mA
FE OFF		-1300 Vdc	0.1 mA	-1500 Vdc	-1700 Vdc	1 mA
GRID ON		160 Vdc	1 mA	125 Vdc	250 Vdc	10 mA
GRID OFF		-200 Vdc	0.1 mA	-200 Vdc	-500 Vdc	1 mA
CATHODE (Ek)		-10.2 kV	250 mA	-10 kV	-10.5 kV	280 mA
COLLECTOR W/ RF	#1	5.3 kV	45 mA	52% x Ek ±2%		100 mA
	#2	3.67 kV	198 mA	36% x Ek ±2%		280 mA

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR, GRID OR FOCUS ELECTRODE (FE) VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2:1	2.5:1
OUTPUT VSWR	2:1	2.25:1
MAXIMUM DUTY	——	CW
FE CAPACITANCE	50 pF	65 pF
GRID CAPACITANCE	37 pF	50 pF
MIN HARMONIC SEPARATION	-8 dBc	-5 dBc *
NOISE POWER DENSITY	-15 dBm/MHz	-10 dBm/MHz
PRIME POWER	1047 W	1250 W
TEMPERATURE RANGE	-40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
7.5	250	200 *	35
8.0	250	200	45
9.0	270	200	50
10.0	250	200	55
11.0	270	200	55
12.0	270	200	55
13.0	270	200	55
14.0	270	200	55
15.0	260	200	55
16.0	250	200	55
17.0	240	200	50
18.0	230	200	35

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

GAIN IS W/O EQUALIZER.

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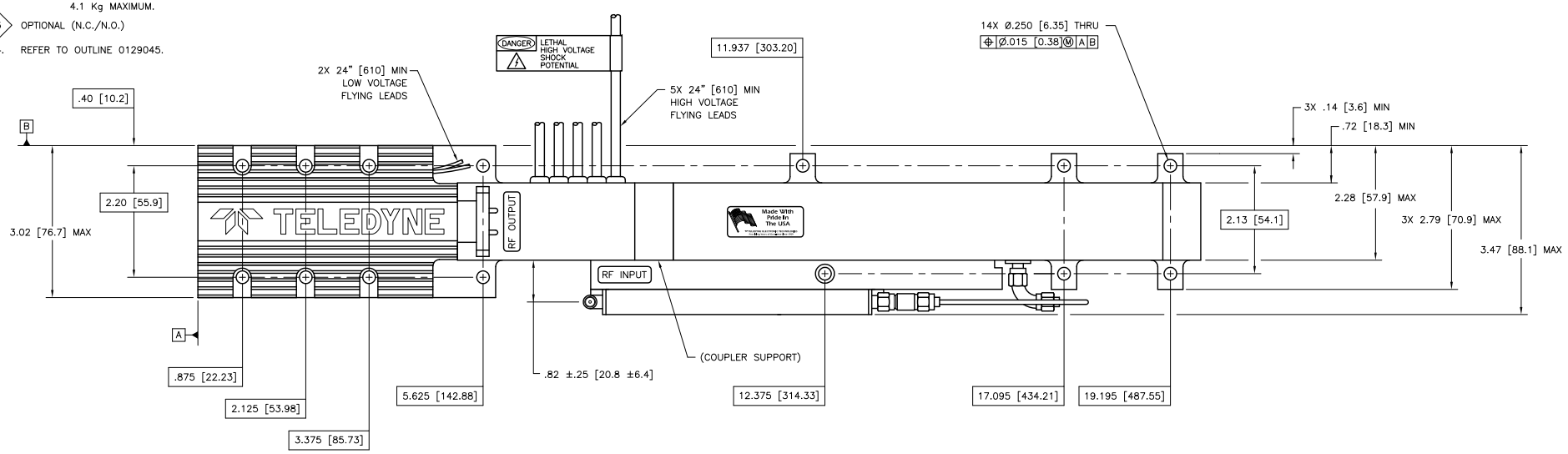
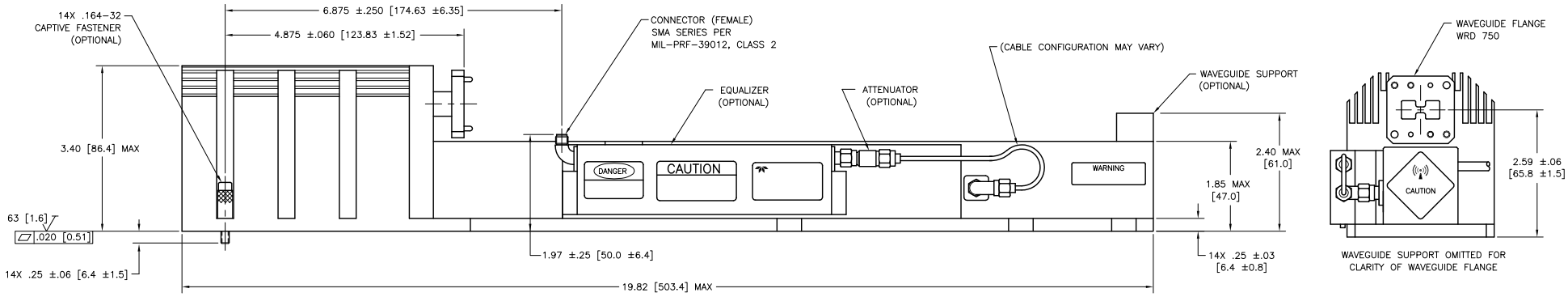
NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 9.0 Lbs MAXIMUM.
   4.1 Kg MAXIMUM.
3. OPTIONAL (N.C./N.O.)
4. REFER TO OUTLINE 0129045.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
CONTROL ELECTRODE	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT	GRAY

3

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

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REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MEC 5405 (GRID)
MEC 5406 (FE)

05/99

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MEC 5419 (GR)
MEC 5420 (FE)
7.5 to 18.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.3 Vdc	1.6 A	−6.0 Vdc	−6.6 Vdc	2 A
HELIX	W/ RF	GROUND	7 mA	GROUND		12 mA
	W/O RF		1 mA			
FE ON		−45 Vdc	0.1 mA	0	−75 Vdc	1 mA
FE OFF		−1300 Vdc	0.1 mA	−1500 Vdc	−1700 Vdc	1 mA
GRID ON		190 Vdc	1 mA	125 Vdc	250 Vdc	10 mA
GRID OFF		−200 Vdc	0.1 mA	−200 Vdc	−500 Vdc	1 mA
CATHODE (Ek)		−10.2 kV	260 mA	−10 kV	−10.5 kV	280 mA
COLLECTOR W/ RF	#1	5.3 kV	45 mA	52% x Ek ±2%		100 mA
	#2	3.67 kV	208 mA	36% x Ek ±2%		280 mA

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR, GRID OR FOCUS ELECTRODE (FE) VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2:1	2.5:1
OUTPUT VSWR	2:1	2.25:1
MAXIMUM DUTY	——	CW
FE CAPACITANCE	50 pF	65 pF
GRID CAPACITANCE	37 pF	50 pF
MIN HARMONIC SEPARATION	−8 dBc	−5 dBc *
NOISE POWER DENSITY	−15 dBm/MHz	−10 dBm/MHz
PRIME POWER	1083 W	1250 W
TEMPERATURE RANGE	−40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
7.5	275	250 *	35
8.0	275	250	45
9.0	300	250	50
10.0	275	250	55
11.0	300	250	55
12.0	300	250	55
13.0	300	250	55
14.0	300	250	55
15.0	300	250	50
16.0	290	250	55
17.0	280	250	50
18.0	270	250	35

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

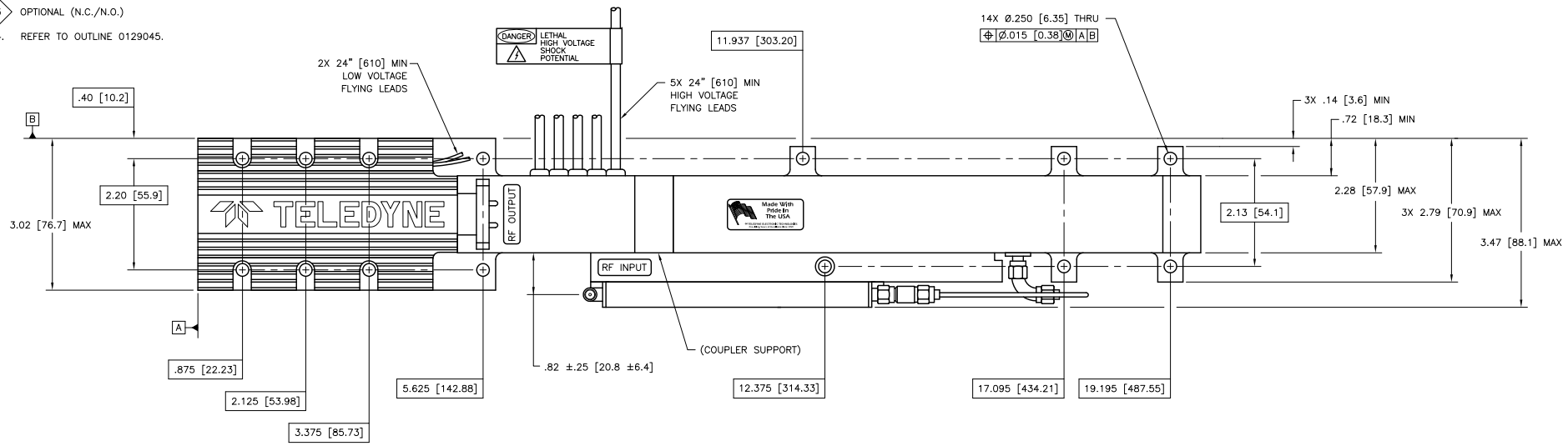
GAIN IS W/O EQUALIZER.

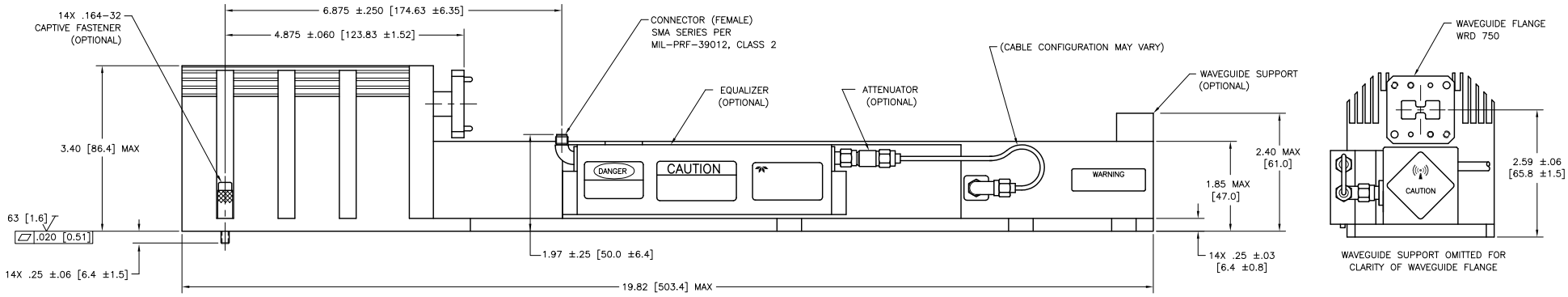
An ISO 9001:2000 Quality System Certified Company

01/06

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 9.0 Lbs MAXIMUM.
   4.1 Kg MAXIMUM.
3. OPTIONAL (N.C./N.O.)
4. REFER TO OUTLINE 0129045.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
CONTROL ELECTRODE	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT	GRAY

3

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.02 .XXX ±.005
ANGLES ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MEC 5419 (GRID)
MEC 5420 (FE)

05/99

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

This model number is controlled by the International Traffic in Arms Regulations, and can only be exported via a U.S. Department of State export license. They may not be transferred, transshipped on a non-continuous voyage, or otherwise be disposed of in any other country, either in their original form or after being incorporated into other end-items, without the prior written approval of the U.S. Department of State.

MODEL NO. MEC 5407 (GR)
MEC 5408 (FE)
7.5 to 18.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.3 Vdc	1.6 A	−6.0 Vdc	−6.6 Vdc	2 A
HELIX	W/ RF	GROUND	7 mA	GROUND		12 mA
	W/O RF		1 mA			
FE ON		−45 Vdc	0.1 mA	0	−75 Vdc	1 mA
FE OFF		−1300 Vdc	0.1 mA	−1500 Vdc	−1700 Vdc	1 mA
GRID ON		190 Vdc	1 mA	125 Vdc	250 Vdc	10 mA
GRID OFF		−200 Vdc	0.1 mA	−200 Vdc	−500 Vdc	1 mA
CATHODE (Ek)		−10.2 kV	270 mA	−10 kV	−10.5 kV	300 mA
COLLECTOR W/ RF	#1	5.3 kV	45 mA	52% x Ek ±2%		100 mA
	#2	3.67 kV	218 mA	36% x Ek ±2%		300 mA

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR, GRID OR FOCUS ELECTRODE (FE) VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2:1	2.5:1
OUTPUT VSWR	2:1	2.25:1
MAXIMUM DUTY	——	CW
FE CAPACITANCE	50 pF	65 pF
GRID CAPACITANCE	37 pF	50 pF
MIN HARMONIC SEPARATION	−7 dBc	−5 dBc *
NOISE POWER DENSITY	−12 dBm/MHz	−10 dBm/MHz
PRIME POWER	1120 W	1400 W
TEMPERATURE RANGE	−40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
7.5	320	300 *	35
8.0	325	300	45
9.0	350	300	50
10.0	325	300	55
11.0	340	300	55
12.0	350	300	55
13.0	350	300	55
14.0	350	300	55
15.0	350	300	55
16.0	340	300	55
17.0	330	300	50
18.0	320	300	35

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

GAIN IS W/O EQUALIZER.

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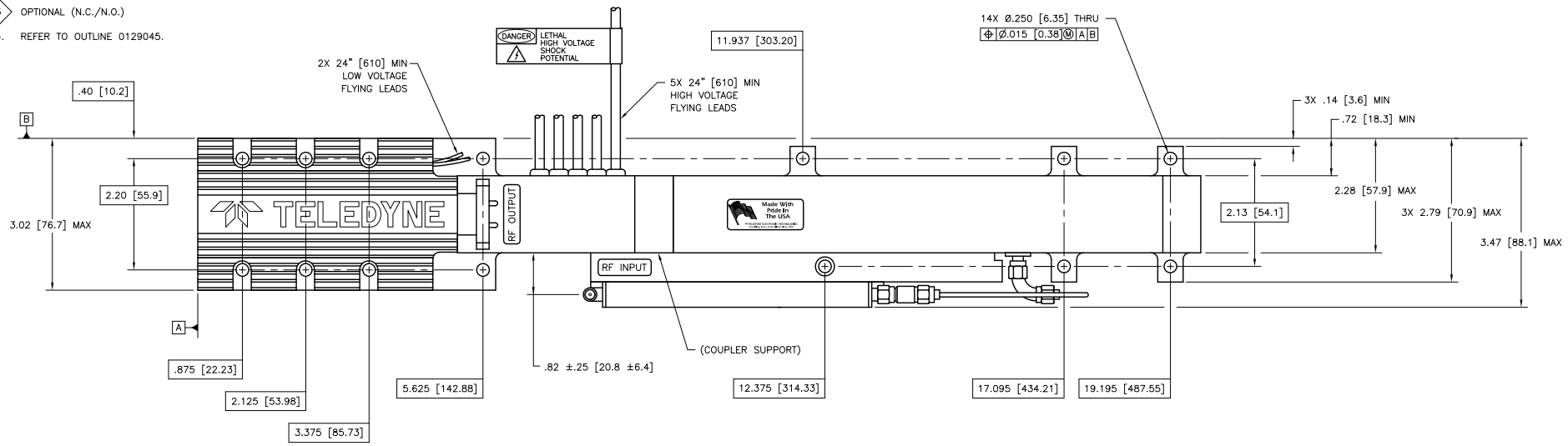
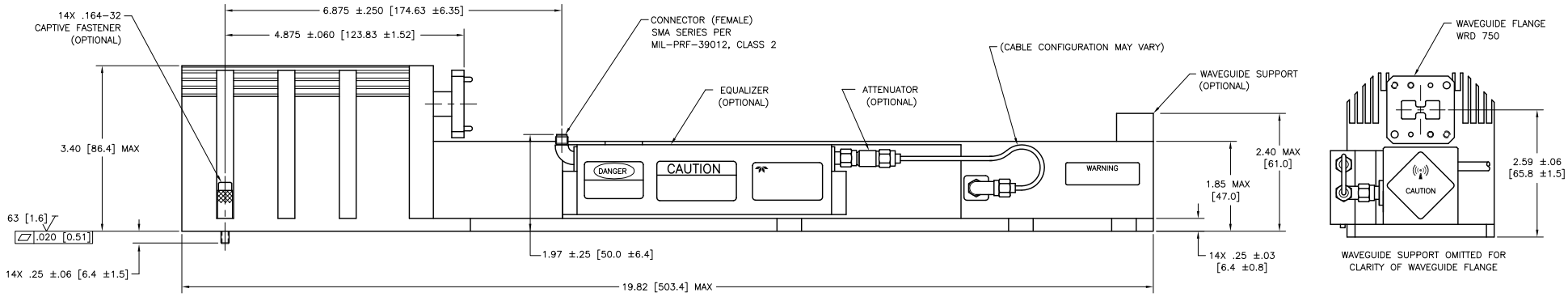
01/06

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 9.0 Lbs MAXIMUM.
   4.1 Kg MAXIMUM.
3. OPTIONAL (N.C./N.O.)
4. REFER TO OUTLINE 0129045.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
CONTROL ELECTRODE	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT	GRAY

3

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED

DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MEC 5407 (GRID)
MEC 5408 (FE)

05/99

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

This model number is subject to the jurisdiction of the U.S. Department of Commerce.

MODEL NO. MEC 5493

18.0 to 27.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.3 Vdc	0.7 A	−5.8 Vdc	−6.4 Vdc	1.5 A
HELIX	W/ RF	GROUND	2 mA	GROUND		4 mA
	W/O RF		0.5 mA			
FE ON		−6.3 Vdc	0.1 mA	0	−40 Vdc	1 mA
FE OFF		−800 Vdc	0.1 mA	−800 Vdc	−1200 Vdc	0.2 mA
CATHODE (Ek)		−10.7 kV	130 mA	−10.3 kV	−10.8 kV	140 mA
COLLECTOR W/ RF	#1	5.35 kV	30 mA	50% x Ek ±2%		75 mA
	#2	2.70 kV	100 mA	25% x Ek ±2%		140 mA

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR AND FOCUS ELECTRODE (FE) VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.
NOTE 3: CAN BE MADE AVAILABLE WITH INTEGRATED SSM.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	1.25:1	2:1
OUTPUT VSWR	1.75:1	2:1
MAXIMUM DUTY	——	CW
FE CAPACITANCE	50 pF	60 pF
MIN HARMONIC SEPARATION	−8 dBc	−6 dBc *
NOISE POWER DENSITY	−35 dBm/MHz	−30 dBm/MHz
PRIME POWER	500 W	600 W
TEMPERATURE RANGE	−40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN OPERATING POWER OUTPUT (WATTS)	TYP GAIN AT SAT POWER dB
18.0	80	50	26
19.0	80	50	26
20.0	80	50	27
21.0	100	50	27
22.0	100	50	28
23.0	100	50	28
24.0	100	50	28
25.0	100	50	28
26.0	80	50	27
27.0	80	50	27

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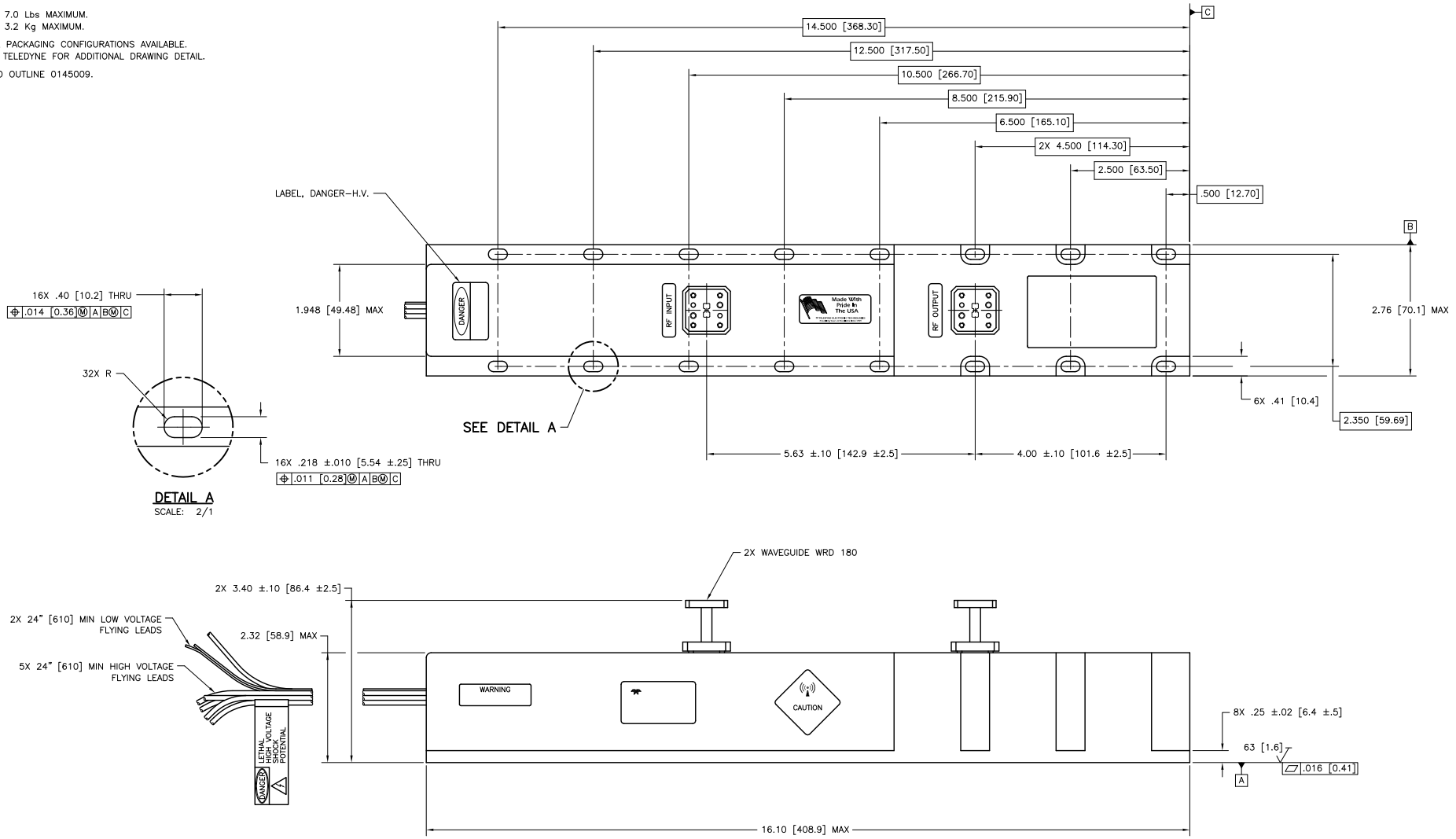
01/06

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 7.0 Lbs MAXIMUM.
   3.2 Kg MAXIMUM.
3. OPTIONAL PACKAGING CONFIGURATIONS AVAILABLE.
   CONTACT TELEDYNE FOR ADDITIONAL DRAWING DETAIL.
4. REFER TO OUTLINE 0145009.



HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
CONTROL ELECTRODE	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (N.C.)	GRAY

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

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DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MEC 5493

01/04

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

This model number is subject to the jurisdiction of the U.S. Department of Commerce.

MODEL NO. MEC 5496

26.5 to 40.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.3 Vdc	0.7 A	−5.8 Vdc	−6.4 Vdc	1.5 A
HELIX	W/ RF	GROUND	2 mA	GROUND		4 mA
	W/O RF		0.5 mA			
FE ON		−6.3 Vdc	0.1 mA	0	−40 Vdc	1 mA
FE OFF		−1200 Vdc	0.1 mA	−1200 Vdc	−1500 Vdc	0.2 mA
CATHODE (Ek)		−13.5 kV	100 mA	−12.8 kV	−13.8 kV	110 mA
COLLECTOR W/ RF	#1	6.75 kV	10 mA	50% x Ek ±2%		50 mA
	#2	3.38 kV	80 mA	25% x Ek ±2%		110 mA

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR AND FOCUS ELECTRODE (FE) VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.
NOTE 3: CAN BE MADE AVAILABLE WITH INTEGRATED SSM.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2.0:1	2.5:1
OUTPUT VSWR	2.0:1	2.0:1
MAXIMUM DUTY	——	CW
FE CAPACITANCE	50 pF	60 pF
MIN HARMONIC SEPARATION	−8 dBc	−6 dBc *
NOISE POWER DENSITY	−25 dBm/MHz	−20 dBm/MHz
PRIME POWER	400 W	500 W
TEMPERATURE RANGE	−40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN OPERATING POWER OUTPUT (WATTS)	TYP GAIN AT SAT POWER dB
26.5	40	40	45
27.0	40	40	46
28.0	40	40	47
29.0	50	40	48
30.0	50	40	50
31.0	50	40	50
32.0	50	40	50
33.0	60	40	50
34.0	70	40	50
35.0	65	40	50
36.0	60	40	50
37.0	55	40	42
38.0	45	40	38
39.0	40	40	36
40.0	40	40	35

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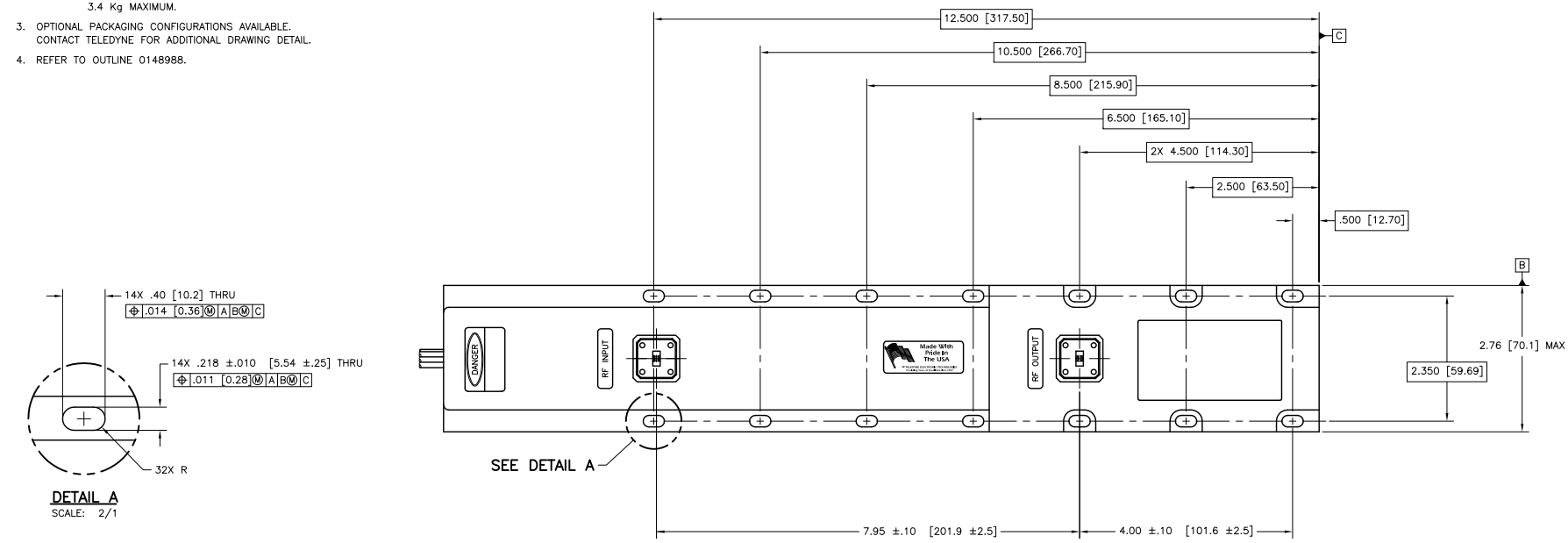
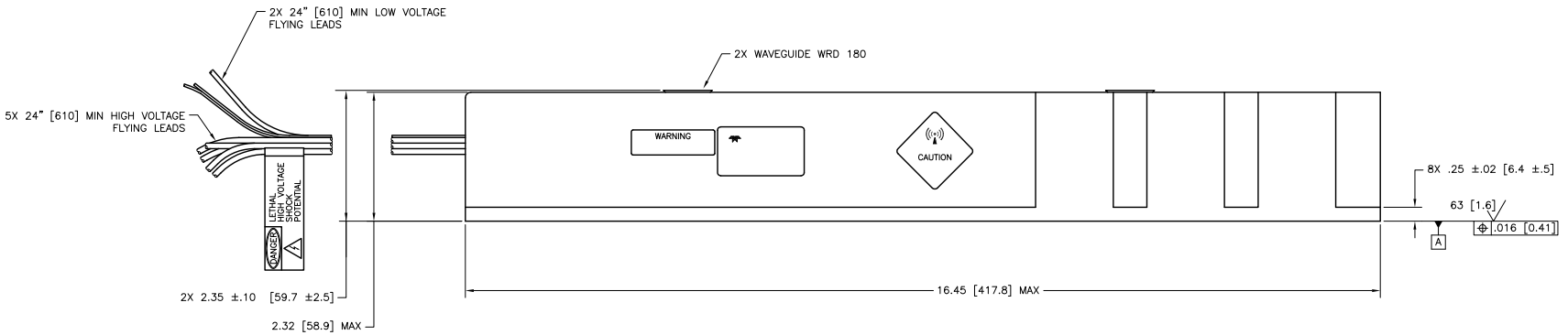
01/06

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 7.5 Lbs MAXIMUM.
   3.4 Kg MAXIMUM.
3. OPTIONAL PACKAGING CONFIGURATIONS AVAILABLE. CONTACT TELEDYNE FOR ADDITIONAL DRAWING DETAIL.
4. REFER TO OUTLINE 0148988.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
CONTROL ELECTRODE	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (N.C.)	TWIN GRAY

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

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TOLERANCES ON
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.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MEC 5496

01/06

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

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dBm To Watts Power Conversion Table

dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts	dBm	Watts
30.0	1.00	38.6	7.24	47.2	52.50	52.9	195.00	57.2	525.00	61.5	1410.00	65.8	3800.00
30.2	1.05	38.8	7.59	47.4	55.00	53.0	200.00	57.3	537.00	61.6	1450.00	65.9	3890.00
30.4	1.10	39.0	7.94	47.6	57.50	53.1	204.00	57.4	550.00	61.7	1480.00	66.0	3980.00
30.6	1.15	39.2	8.32	47.8	60.30	53.2	209.00	57.5	562.00	61.8	1510.00	66.1	4070.00
30.8	1.20	39.4	8.71	48.0	63.10	53.3	214.00	57.6	575.00	61.9	1550.00	66.2	4170.00
31.0	1.26	39.6	9.12	48.2	66.10	53.4	219.00	57.7	589.00	62.0	1580.00	66.3	4270.00
31.2	1.32	39.8	9.55	48.4	69.20	53.5	224.00	57.8	603.00	62.1	1620.00	66.4	4370.00
31.4	1.38	40.0	10.00	48.6	72.40	53.6	229.00	57.9	617.00	62.2	1660.00	66.5	4470.00
31.6	1.45	40.2	10.50	48.8	75.90	53.7	234.00	58.0	631.00	62.3	1700.00	66.6	4570.00
31.8	1.51	40.4	11.00	49.0	79.40	53.8	240.00	58.1	646.00	62.4	1740.00	66.7	4680.00
32.0	1.58	40.6	11.50	49.2	83.20	53.9	245.00	58.2	661.00	62.5	1780.00	66.8	4790.00
32.2	1.66	40.8	12.00	49.4	87.10	54.0	251.00	58.3	676.00	62.6	1820.00	66.9	4900.00
32.4	1.74	41.0	12.60	49.6	91.20	54.1	257.00	58.4	692.00	62.7	1860.00	67.0	5010.00
32.6	1.82	41.2	13.20	49.8	95.50	54.2	263.00	58.5	708.00	62.8	1910.00	67.1	5130.00
32.8	1.91	41.4	13.80	50.0	100.00	54.3	269.00	58.6	724.00	62.9	1950.00	67.2	5250.00
33.0	2.00	41.6	14.50	50.1	102.00	54.4	275.00	58.7	741.00	63.0	2000.00	67.3	5370.00
33.2	2.09	41.8	15.10	50.2	105.00	54.5	282.00	58.8	759.00	63.1	2040.00	67.4	5500.00
33.4	2.19	42.0	15.80	50.3	107.00	54.6	288.00	58.9	776.00	63.2	2090.00	67.5	5620.00
33.6	2.29	42.2	16.60	50.4	110.00	54.7	295.00	59.0	794.00	63.3	2140.00	67.6	5750.00
33.8	2.40	42.4	17.40	50.5	112.00	54.8	302.00	59.1	813.00	63.4	2190.00	67.7	5890.00
34.0	2.51	42.6	18.20	50.6	115.00	54.9	309.00	59.2	832.00	63.5	2240.00	67.8	6030.00
34.2	2.63	42.8	19.10	50.7	117.00	55.0	316.00	59.3	851.00	63.6	2290.00	67.9	6170.00
34.4	2.75	43.0	20.00	50.8	120.00	55.1	324.00	59.4	871.00	63.7	2340.00	68.0	6310.00
34.6	2.88	43.2	20.90	50.9	123.00	55.2	331.00	59.5	891.00	63.8	2400.00	68.1	6460.00
34.8	3.02	43.4	21.90	51.0	126.00	55.3	339.00	59.6	912.00	63.9	2450.00	68.2	6610.00
35.0	3.16	43.6	22.90	51.1	129.00	55.4	347.00	59.7	933.00	64.0	2510.00	68.3	6760.00
35.2	3.31	43.8	24.00	51.2	132.00	55.5	355.00	59.8	955.00	64.1	2570.00	68.4	6920.00
35.4	3.47	44.0	25.10	51.3	135.00	55.6	363.00	59.9	977.00	64.2	2630.00	68.5	7080.00
35.6	3.63	44.2	26.30	51.4	138.00	55.7	372.00	60.0	1000.00	64.3	2690.00	68.6	7240.00
35.8	3.80	44.4	27.50	51.5	141.00	55.8	380.00	60.1	1020.00	64.4	2750.00	68.7	7410.00
36.0	3.98	44.6	28.80	51.6	145.00	55.9	389.00	60.2	1050.00	64.5	2820.00	68.8	7590.00
36.2	4.17	44.8	30.20	51.7	148.00	56.0	398.00	60.3	1070.00	64.6	2880.00	68.9	7760.00
36.4	4.37	45.0	31.60	51.8	151.00	56.1	407.00	60.4	1100.00	64.7	2960.00	69.0	7940.00
36.6	4.57	45.2	33.10	51.9	155.00	56.2	417.00	60.5	1120.00	64.8	3020.00	69.1	8130.00
36.8	4.79	45.4	34.70	52.0	158.00	56.3	427.00	60.6	1150.00	64.9	3090.00	69.2	8320.00
37.0	5.01	45.6	36.30	52.1	162.00	56.4	437.00	60.7	1170.00	65.0	3160.00	69.3	8510.00
37.2	5.25	45.8	38.00	52.2	166.00	56.5	447.00	60.8	1200.00	65.1	3240.00	69.4	8710.00
37.4	5.50	46.0	39.80	52.3	170.00	56.6	457.00	60.9	1230.00	65.2	3310.00	69.5	8910.00
37.6	5.75	46.2	41.70	52.4	174.00	56.7	468.00	61.0	1260.00	65.3	3390.00	69.6	9120.00
37.8	6.03	46.4	43.70	52.5	178.00	56.8	479.00	61.1	1290.00	65.4	3470.00	69.7	9330.00
38.0	6.31	46.6	45.70	52.6	182.00	56.9	490.00	61.2	1320.00	65.5	3550.00	69.8	9650.00
38.2	6.61	46.8	47.90	52.7	186.00	57.0	501.00	61.3	1350.00	65.6	3630.00	69.9	9770.00
38.4	6.92	47.0	51.10	52.8	191.00	57.1	513.00	61.4	1380.00	65.7	3720.00	70.0	10000.00

TELEDYNE MEC

11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587

An ISO 9001:2000 Quality System Certified Company

GENERAL PURPOSE TWTs (PULSE)

Page #	Model	Frequency (GHz)	Peak Power (W)	Duty (%) Max	Typical Gain (dB) Min/Max @ Rated Pout	Efficiency (%) Typical	Modulation (Control Electrode)	Output Connection	Weight (Lbs/Kg) (NTE)
25	MEC 3095	1.9 – 2.7	6,000	10	30	33	GRID	SC	21.0/9.6
26	MEC 3102	2.0 – 4.0	4,500	6	35	29	GRID	SC	15.0/6.8
27	MTG 3041L2	2.0 – 8.0	2,000	6	38/58	24	GRID	SC	8.0/3.6
28	MTG 3041K	2.5 – 8.0	2,000 *	6	43/68	21 *	GRID	SC	8.0/3.6
29	MEC 3082B	2.7 – 5.7	4,000	4	36/55	21 *	GRID	SC	15.0/6.8
30	MEC 3103	4.0 – 8.0	4,500	6	32/34	34	GRID	WRD 350	15.0/6.8
31	MEC 3096	5.0 – 11.0	1,780	5	37/38	34	GRID	WRD 475	9.0/4.1
32	MEC 3094A	5.35 – 5.65	8,000	4	46	33	GRID	SC	8.0/3.6
33	MTI 3444L	6.5 – 18.0	1,580 *	6	43/46	14 *	GRID	WRD 650/750	7.0/3.2
34	MEC 3848	8.0 – 11.0	8,000 *	5	48/51	40	GRID	WR 90	10.0/4.5
35	MEC 3848N	8.0 – 12.0	5,000	8	48/50	32	GRID	WR 90	10.0/4.5
36	MTI 3044J	8.0 – 18.0	1,000	4	42/62	12 *	GRID	TNC	6.0/2.7
37	MTI 3048Q	8.2 – 12.4	3,000 *	8	43/50	24 *	GRID	WR 90	6.0/2.7
38	MTI 3048D	8.7 – 10.5	4,000 *	10	45/47	32 *	GRID	WR 90	6.0/2.7
39	MTI 3948B	8.8 – 10.5	8,000 *	5	48/51	35 *	GRID	WR 90	7.5/3.4
40	MTI 3948	8.8 – 10.5	8,700 *	2	50/51	30 *	GRID	WR 90	7.5/3.4
41	MTI 3948U	9.0 – 10.0	7,945	5	47/48	38	GRID	WR 90	9.5/4.3
42	MEC 3104	12.0 – 18.0	3,470	6	32/39	38	GRID	WR 62	9.0/4.1
43	MTI 3056C	15.0 – 17.0	4,000 *	2	50/56	16 *	GRID	WR 62	6.5/3.0
44	MEC 3086	15.53 – 17.87	700	35	45/48	32	GRID	WR 62	9.5/4.3

* Over majority of frequency range – Performance may be reduced at band edges.

Dec-08

NOTES:

1) Teledyne MEC engineers can effectively align, combine or modify TWTs to achieve special specifications quickly and reliably.

2) Specific tests and conditions can be modified to customer specifications.

3) Published specifications are subject to change by Teledyne MEC at any time. We reserve the right to discontinue products without prior notice.

4) Teledyne MEC will furnish certificates of compliance and suitable test data as needed to meet customer quality and traceability requirements.

For further information call (916) 638-3344, FAX (916) 636-7453 or E:MAIL TWT_MARKETING@TELEDYNE.COM

TELEDYNE MEC

11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MEC 3095

1.9 to 2.7 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.5 Vdc	4.2 A	−6.4 Vdc	−6.8 Vdc	5 A
HELIX	W/ RF	GROUND	600 mApk	GROUND		800 mApk
	W/O RF		50 mApk			
GRID ON		155 Vpk	5.0 mApk	125 Vpk	350 Vpk	25 mApk
GRID OFF		−400 Vdc	50 μA	−350 Vdc	−500 Vdc	1 mA
CATHODE (Ek)		−12.3 kV	2.15 Apk	−12.0 kV	−13.0 kV	2.7 Apk
COLLECTOR W/ RF	#1	9.23 kV	420 mApk	75% x Ek ±2%		2 Apk
	#2	6.15 kV	1.16 Apk	50% x Ek ±2%		2.7 Apk

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.

NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	1.9:1	2.0:1
OUTPUT VSWR	1.5:1	2.0:1
MAXIMUM DUTY	——	10%
MAXIMUM PULSEWIDTH	——	150 μsec
GRID CAPACITANCE	45 pF	60 pF
MIN HARMONIC SEPARATION	−10 dBc	−5 dBc
NOISE POWER DENSITY	−40 dBm/MHz	−20 dBm/MHz
PRIME POWER	1900 W	2100 W
TEMPERATURE RANGE	−40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
1.9	6200	6000	30
2.0	6300	6000	30
2.1	6400	6000	30
2.2	6600	6000	30
2.3	6600	6000	30
2.4	6400	6000	30
2.5	6300	6000	30
2.6	6200	6000	30
2.7	6200	6000	30

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

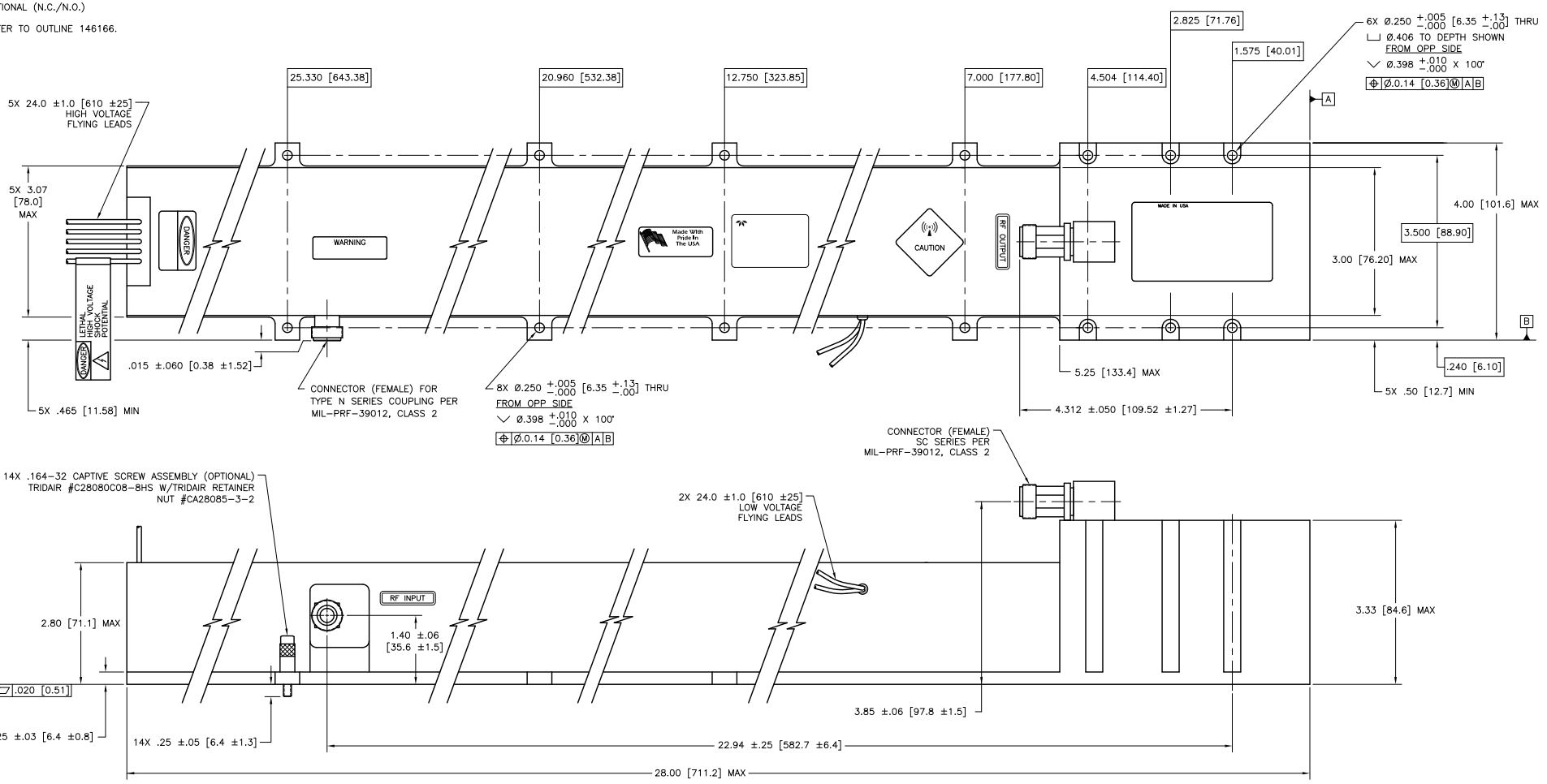
GAIN IS WITHOUT EQUALIZER.

An ISO 9001:2000 Quality System Certified Company

01/06

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 21.0 Lbs MAXIMUM.
   9.6 Kg MAXIMUM.
3. OPTIONAL (N.C./N.O.)
4. REFER TO OUTLINE 146166.



HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
GRID	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT	GRAY

3

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED

DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.02 .XXX ±.005
ANGLES ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M − 1994

TELEDYNE MEC

11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638−3344

TITLE

OUTLINE DRAWING MEC 3095

01/04

TELEDYNE MEC

11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MEC 3102

2.0 to 4.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.5 Vdc	4.3 A	−6.4 Vdc	−6.8 Vdc	5.00 A
HELIX	W/ RF	GROUND	600 mA	GROUND		800 mApk
	W/O RF		70 mA			
GRID ON		157 Vpk	3.3 mA	100 Vpk	300 Vpk	30 mApk
GRID OFF		−325 Vdc	.010 mA	−300 Vdc	−500 Vdc	1 mA
CATHODE (Ek)		−10.9 kV	2.3 Apk	−10.2 kV	−11.2 kV	2.5 Apk
COLLECTOR W/ RF	#1	8.7 kV	530 mApk	80% X Ek ±2%		.7 Apk
	#2	7.7 kV	780 mApk	71% X Ek ±2%		1.2 Apk
	#3	4.21 kV	425 mApk	39% X Ek ±2%		2.5 Apk

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.

NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2.0:1	2.5:1
OUTPUT VSWR	1.7:1	2.0:1
MAXIMUM DUTY	——	6%
MAXIMUM PULSEWIDTH	——	100 μsec
GRID CAPACITANCE	59 pF	65 pF
MIN HARMONIC SEPARATION	−3.8 dBc	−3 dBc
NOISE POWER DENSITY	−30 dBm/MHz	5 dBm/MHz
PRIME POWER	1220 W	1800 W
TEMPERATURE RANGE	−40° to 85 °C	———

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
2.0	5500	4500	35
2.25	5500	4500	35
2.5	6000	4500	35
2.75	7000	4500	35
3.0	7000	4500	35
3.25	7000	4500	35
3.5	6000	4500	35
3.75	5500	4500	35
4.0	5500	4500	35

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

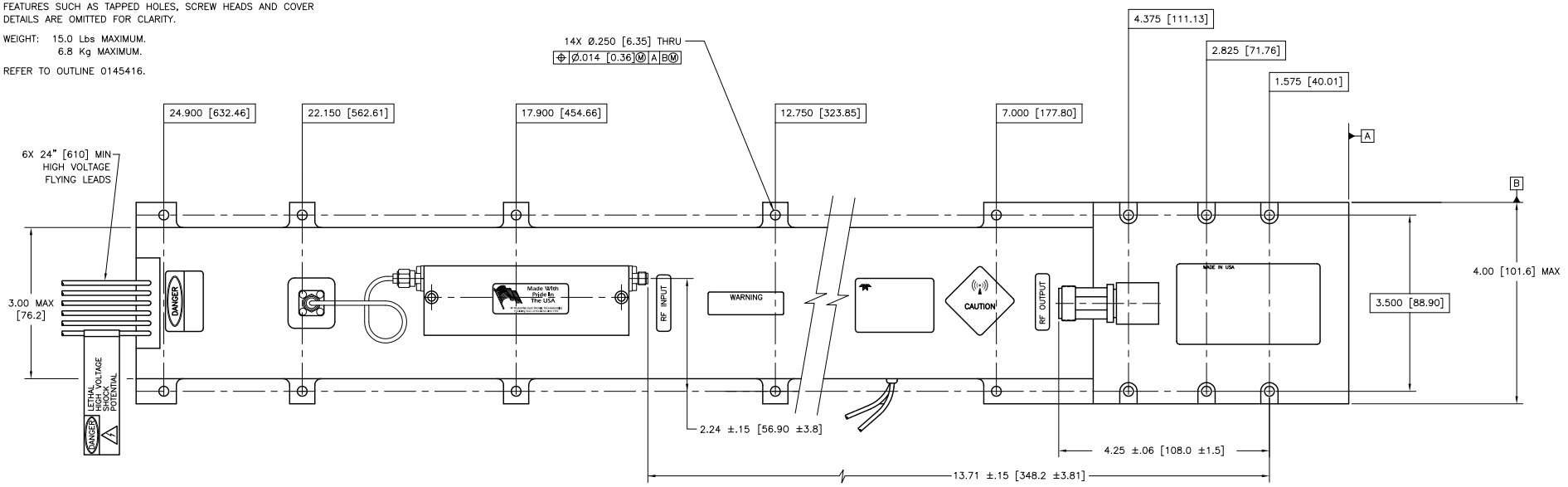
REQUIRED DRIVE IS WITH EQUALIZER

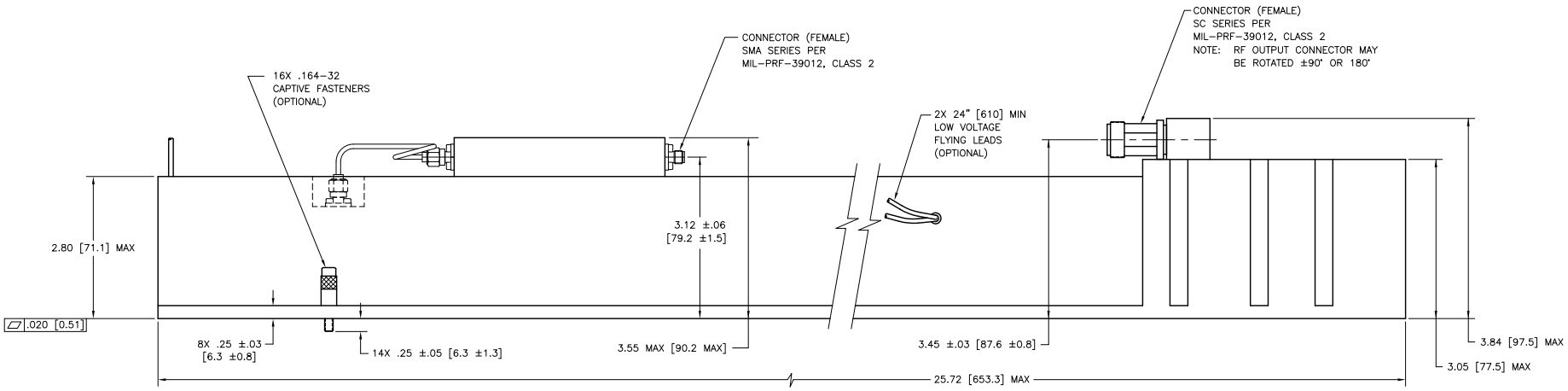
An ISO 9001:2000 Quality System Certified Company

11/08

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 15.0 Lbs MAXIMUM.
   6.8 Kg MAXIMUM.
3. REFER TO OUTLINE 0145416.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
GRID	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE
COLLECTOR #3	BLUE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (N.C.)	GRAY

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

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DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M - 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MEC 3102

01/04

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MTG 3041L2

2.0 to 8.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		-6.3 Vdc	2.2 A	-6.1 Vdc	-6.5 Vdc	3.0 A
HELIX	W/ RF	GROUND	650 mApk	GROUND		700 mApk
	W/O RF		150 mApk			
GRID ON		217 Vpk	1.8 mApk	100 Vpk	250 Vpk	20 mApk
GRID OFF		-250 Vdc	0.01 mA	-250 Vdc	-500 Vdc	0.5 mA
CATHODE (Ek)		-8.5 kV	1.65 Apk	-8.2 kV	-8.8 kV	1.8 Apk
COLLECTOR W/ RF		6.38 kV	1 Apk	75% X Ek ±2%		1.8 Apk

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.

NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	3.5:1	3.5:1
OUTPUT VSWR	1.8:1	2.5:1
MAXIMUM DUTY	——	6%
MAXIMUM PULSEWIDTH	——	100 μsec
GRID CAPACITANCE	47 pF	50 pF
MIN HARMONIC SEPARATION	3.5/0/-2.5 dBc	4.5*/1.5**/-1*** dBc
NOISE POWER DENSITY	-12 dBm/MHz	-10 dBm/MHz
PRIME POWER	725 W	800 W
TEMPERATURE RANGE	-40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
2.0	2040	2000 *	38
2.2	2040	2000	38
2.3	2300	2000 **	39
2.5	2400	2000	40
2.6	2500	2000 ***	44
3.0	2500	2000	50
4.0	2500	2000	57
5.0	2500	2000	58
6.0	2500	2000	55
7.0	2350	2000	50
7.5	2300	2000	48
8.0	2040	2000	44

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

GAIN IS WITH EQUALIZER AND LIMITER. (FOR HARMONIC INJECTION)

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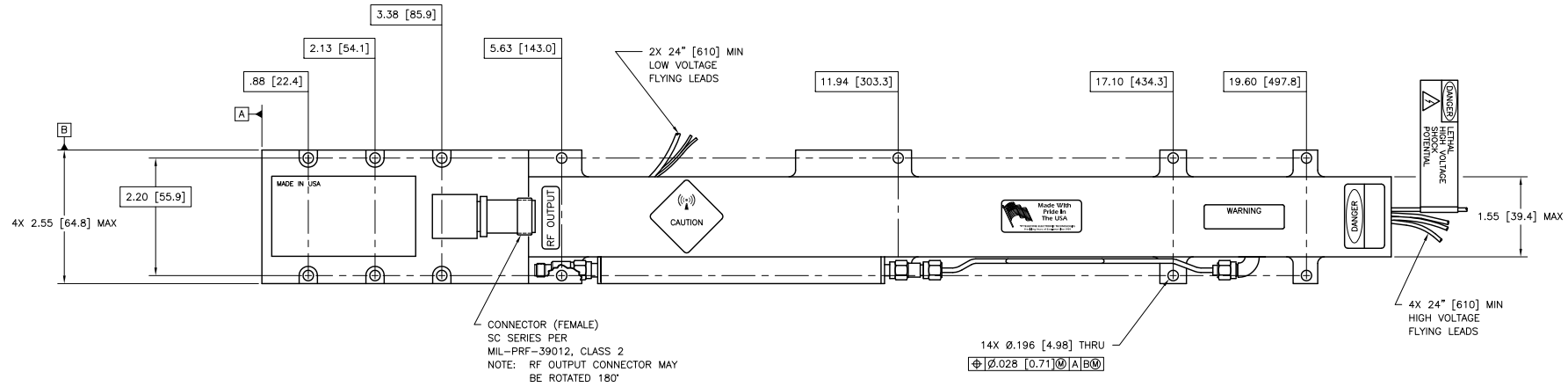
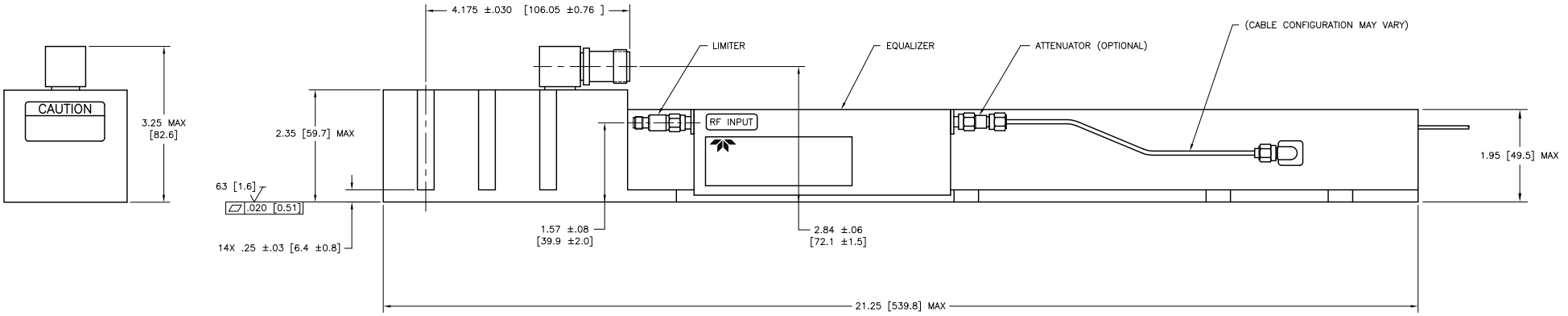
11/08

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 8.0 Lbs MAXIMUM.
   3.6 Kg MAXIMUM.
3. REFER TO OUTLINE 0128672.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
GRID	GREEN
COLLECTOR	RED

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (N.C.)	TWIN GRAY

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED

DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MTG 3041L2

11/08

TELEDYNE MEC

11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MTG 3041K

2.5 to 8.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.3 Vdc	2.2 A	−6.1 Vdc	−6.5 Vdc	3.0 A
HELIX	W/RF	GROUND	400 mApk	GROUND		600 mApk
	W/O RF		150 mApk			
GRID ON		217 Vpk	1.8 mApk	100 Vpk	250 Vpk	50 mApk
GRID OFF		−250 Vdc	0.01 mA	−250 Vdc	−500 Vdc	0.5 mA
CATHODE (Ek)		−8.6 kV	1.4 Apk	−8.2 kV	−8.8 kV	2.0 Apk
COLLECTOR W/ RF		6.45 kV	1.0 Apk	75% X Ek ±2%		2.0 Apk

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2:1	2.5:1
OUTPUT VSWR	1.8:1	2.5:1
MAXIMUM DUTY	——	6%
MAXIMUM PULSEWIDTH	——	100 μsec
GRID CAPACITANCE	47 pF	50 pF
MIN HARMONIC SEPARATION	−1.7 dBc	−1.5 dBc *
NOISE POWER DENSITY	−12 dBm/MHz	−10 dBm/MHz
PRIME POWER	650 W	750 W
TEMPERATURE RANGE	−40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
2.5	2000	1900 *	50
2.7	2040	2000	52
3.0	2150	2000	54
4.0	2450	2000	60
5.0	2450	2000	68
6.0	2450	2000	59
7.0	2450	2000	51
8.0	2400	2000	43

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

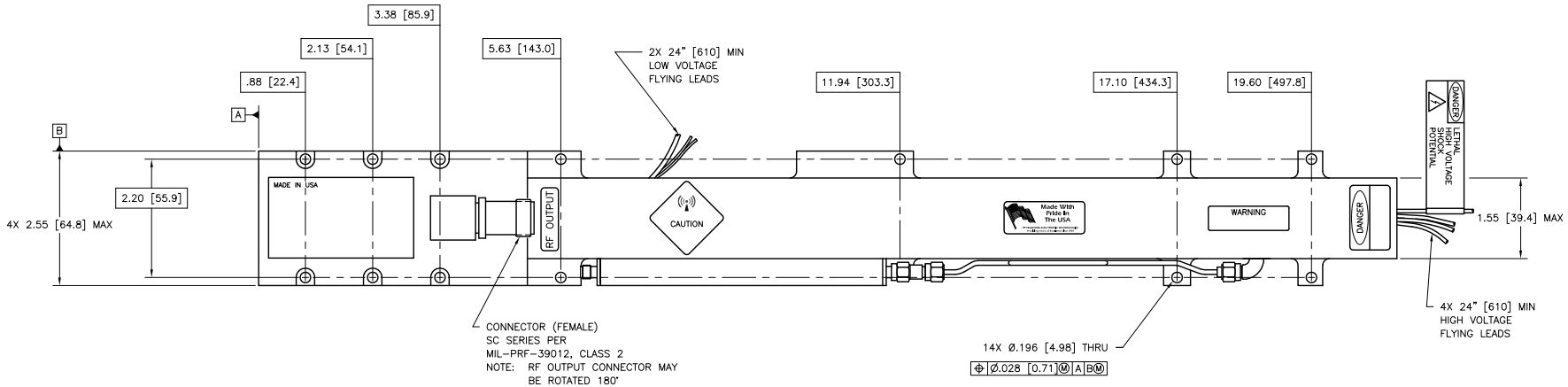
GAIN IS WITHOUT EQUALIZER.

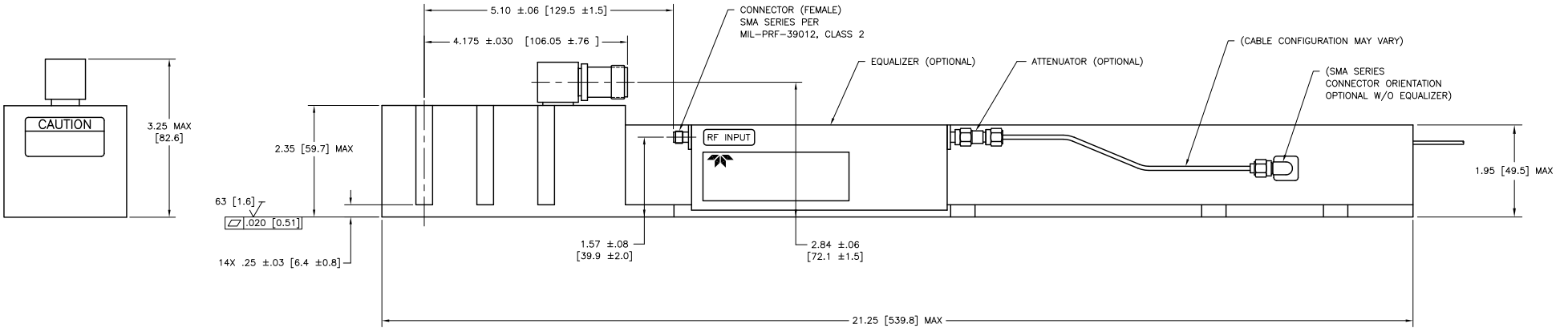
An ISO 9001:2000 Quality System Certified Company

12/08

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 8.0 Lbs MAXIMUM.
   3.6 Kg MAXIMUM.
3. REFER TO OUTLINE 0128672.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
GRID	GREEN
COLLECTOR	RED

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (N.C.)	TWIN GRAY

SUBJECT TO CHANGE W/O NOTICE

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DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MTG 3041K

12/08

TELEDYNE MEC
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MODEL NO. MEC 3082B

2.7 to 5.7 GHz

TYPICAL OPERATING CONDITIONS			POWER SUPPLY REQUIREMENTS		
ELEMENT	VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER	−6.6 V	4.2 A	6.4 V	6.8 V	5 A
HELIX W/ RF	GROUND	* .63 Apk	GROUND		0.8 Apk
HELIX W/O RF		** .12 Apk			
GRID ON	192 Vpk	3.0 mApk	100 Vpk	250 Vpk	30 mApk
GRID OFF	−400 Vdc	0 mA	−400 Vdc	−500 Vdc	1.0 mA
CATHODE (Ek)	−13.0 kV	3.02 Apk	−12.5 kV	−15.0 kV	3.5 Apk
COLLECTOR	11.44 kV	* .750 Apk	88% X Ek ±2%		2 Apk
		** .185 Apk			
COLLECTOR	8.58 kV	* 1.220 Apk	66% X Ek ±2%		3.5 Apk
		** .210 Apk			
COLLECTOR	4.69 kV	* .420 Apk	41% X Ek ±2%		3.5 Apk
		** 2.505 Apk			

* WITH RF DRIVE ** WITHOUT RF DRIVE *** AT RATED POWER OUTPUT

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	1.55:1	2:1 MAX
OUTPUT VSWR	1.6:1	2:1 MAX
GRID CAPACITANCE	45 pF	50 pF
DUTY CYCLE	——	4% MAX
MAXIMUM PULSEWIDTH	——	150 μsec
PRIME POWER	1200 W	1500 W MAX
SECOND HARMONIC ***	−7.7	−6 dBc
TEMPERATURE RANGE	——	−40° to 85°C
NOISE POWER DENSITY	−24 dBm/MHz	−20 dBm/MHz

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SAT POWER (dB)
2.7	5250	4000	39
3.2	6450	4000	43
3.7	7080	4000	45
4.2	9350	4000	49
4.9	11750	4000	48
5.4	10000	4000	43
5.7	5400	4000	37

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

GAIN IS WITHOUT EQUALIZER.

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.

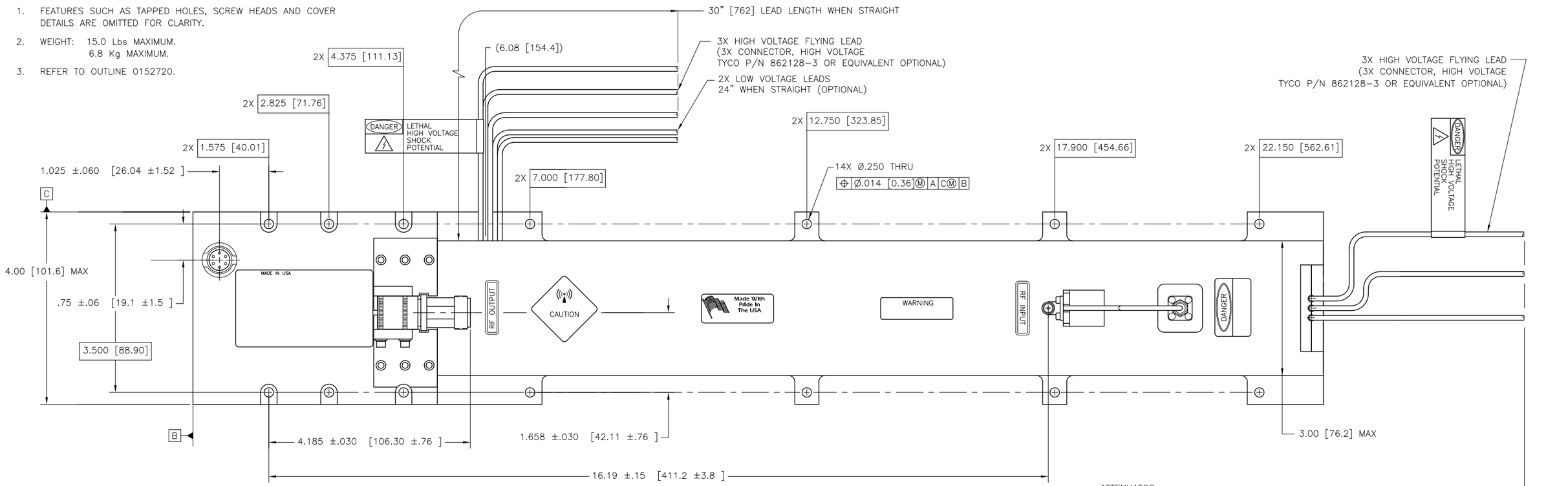
NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

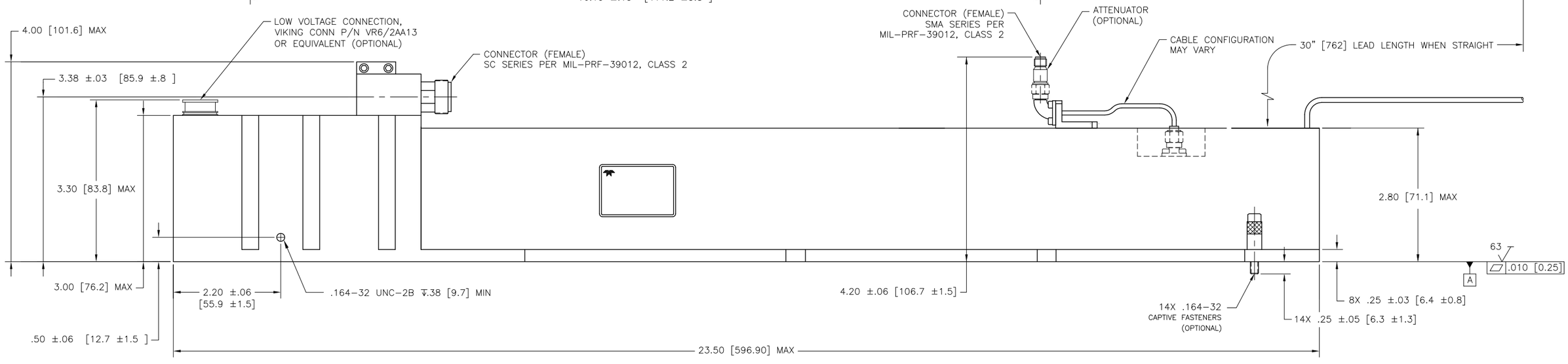
An ISO 9001:2000 Quality System Certified Company

08/09

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 15.0 Lbs MAXIMUM.
   6.8 Kg MAXIMUM.
3. REFER TO OUTLINE 0152720.





HIGH VOLTAGE CONNECTIONS		
PIN NO.	FUNCTION	COLOR
FL1	CATHODE	YELLOW
FL2	HEATER	BROWN
FL3	GRID	GREEN
FL4	COLLECTOR #1	RED
FL5	COLLECTOR #2	WHITE
FL6	COLLECTOR #3	BLUE

LOW VOLTAGE CONNECTIONS	
PIN	FUNCTION
A	HELIX/GROUND
B	SPARE
C	THERMOSTAT (NO)
D	SPARE
E	SPARE
F	SPARE

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

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DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MEC 3082B

2/09

TELEDYNE MEC

11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MEC 3103

4.0 to 8.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.3 Vdc	2.25 A	−6.1 Vdc	−6.5 Vdc	3.0 A
HELIX	W/ RF	GROUND	600 mA	GROUND		800 mApk
	W/O RF		80 mA			
GRID ON		216 Vpk	3 mA	100 Vpk	300 Vpk	30 mApk
GRID OFF		−300 Vdc	0.1 mA	−300 Vdc	−500 Vdc	1.0 mA
CATHODE (Ek)		−12.6 kV	1.9 Apk	−12 kV	−14 kV	3.0 Apk
COLLECTOR W/ RF	#1	9.70	485 mApk	77% X Ek ±2%		700 mApk
	#2	7.30	555 mApk	58% X Ek ±2%		1200 mApk
	#3	5.65	700 mApk	45% X Ek ±2%		2700 mApk

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.

NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	1.8:1	2.5:1
OUTPUT VSWR	1.9:1	2.0:1
MAXIMUM DUTY	——	6%
MAXIMUM PULSEWIDTH	——	100 μsec
GRID CAPACITANCE	64 pF	70 pF
MIN HARMONIC SEPARATION	−5.1 dBc	−0.5 dBc
NOISE POWER DENSITY	−29 dBm/MHz	−5 dBm/MHz
PRIME POWER	1185 W	1800 W
TEMPERATURE RANGE	−40° to 85 °C	———

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
4.0	4500	4500	32
4.5	5500	4500	33
5.0	6000	4500	33
5.5	7000	4500	34
6.0	7000	4500	34
6.5	7000	4500	34
7.0	6000	4500	33
7.5	5500	4500	33
8.0	4500	4500	32

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

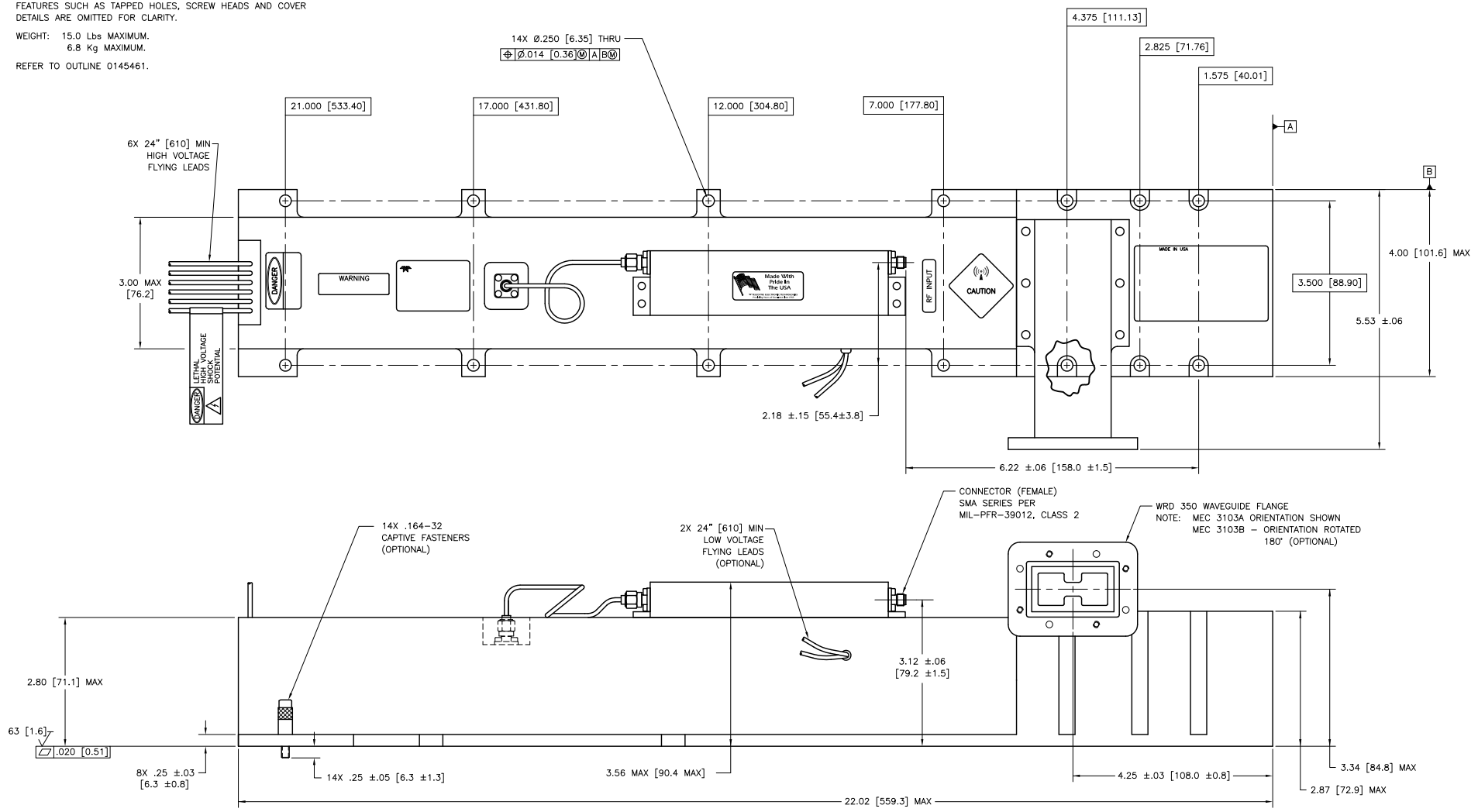
GAIN IS WITH EQUALIZER

An ISO 9001:2000 Quality System Certified Company

12/08

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 15.0 Lbs MAXIMUM.
   6.8 Kg MAXIMUM.
3. REFER TO OUTLINE 0145461.



HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
GRID	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE
COLLECTOR #3	BLUE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (N.C.)	GRAY

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MEC 3103

01/04

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MEC 3096

5.0 to 11.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		-6.3 Vdc	2.0 A	-5.985 Vdc	-6.615 Vdc	2.8 A
HELIX	W/ RF	GROUND	* 270 mApk	GROUND		500 mApk
	W/O RF		** 100 mApk			
GRID ON		225 Vpk	0 mApk	100 Vpk	250 Vpk	10 mApk
GRID OFF		-200 Vdc	0 mA	-200 Vdc	-200 Vdc	1.0 mA
CATHODE (Ek)		-10.2 kV	1300 mApk	-10.2 kV	-11 kV	1300 mApk
COLLECTOR		8.16 kV	*1030 mApk	80% X Ek ±2%		* 800 TO 1200 mApk
			**1200 mApk			**1300 mApk

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.

NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	1.8:1	2.0:1
OUTPUT VSWR	1.8:1	2.0:1
MAXIMUM DUTY	5%	5%
MAXIMUM PULSEWIDTH	——	100 μsec
GRID CAPACITANCE	48 pF	50 pF MAX
MIN HARMONIC SEPARATION	-5.5 dBc	-3 dBc MAX
NOISE POWER DENSITY	-19.5 dBm/MHz	0 dBm/MHz
PRIME POWER	570 W	1000 W
TEMPERATURE RANGE	-40° to 85 °C	——

* WITH RF DRIVE

** WITHOUT RF DRIVE

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
5.0	2400	1780	38
6.0	2750	1780	38
7.0	2290	1780	38
8.0	2510	1780	38
9.0	2750	1780	38
10.0	2750	1780	38
11.0	2090	1780	37

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

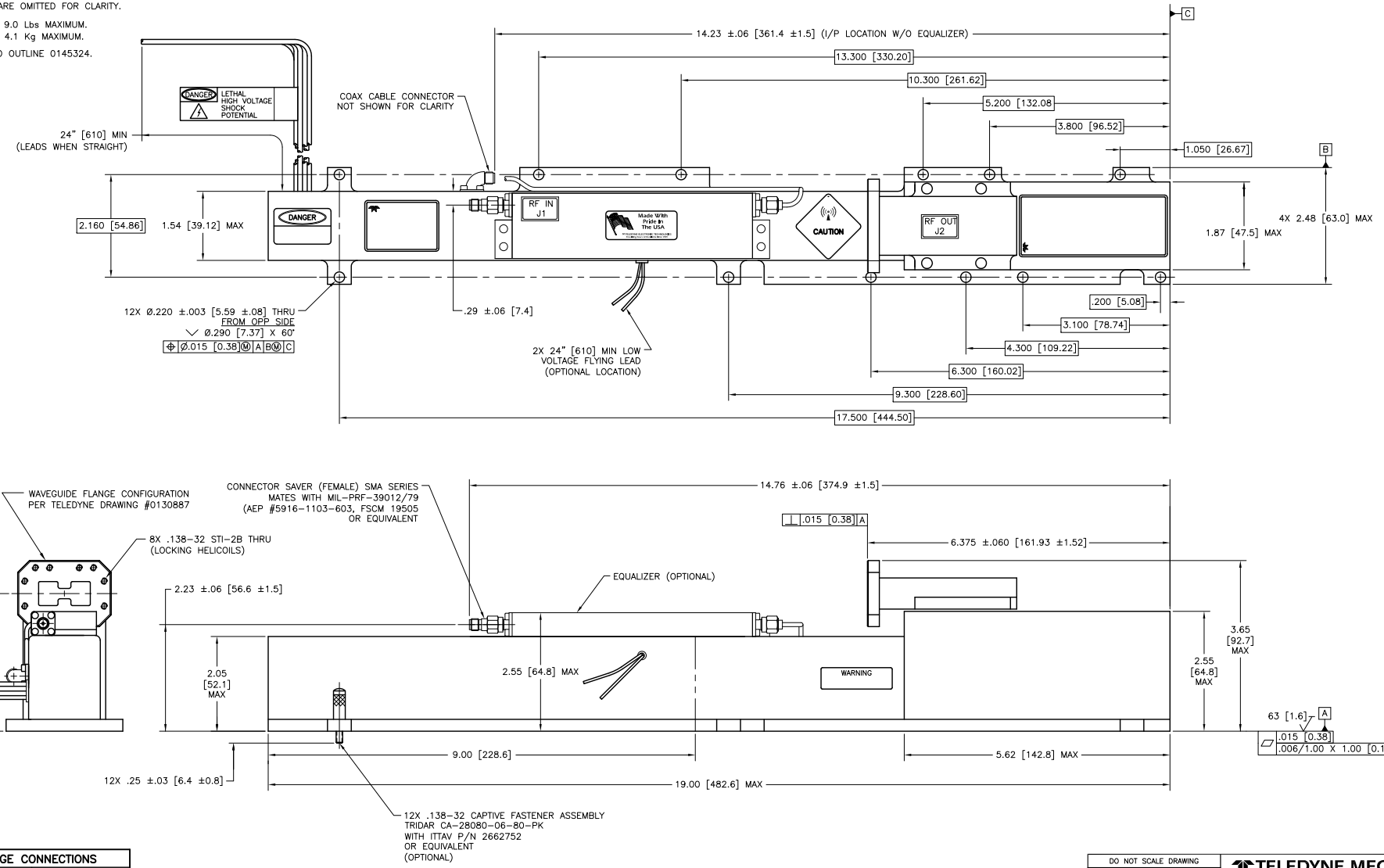
GAIN IS WITH EQUALIZER.

An ISO 9001:2000 Quality System Certified Company

01/06

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 9.0 Lbs MAXIMUM.
   4.1 Kg MAXIMUM.
3. REFER TO OUTLINE 0145324.



HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
COLLECTOR #1	RED
NC	———
NC	———
GRID	GREEN

LOW VOLTAGE CONNECTIONS		
FUNCTION	# OF WIRES	COLOR
THERMOSTAT(N/C)	1	GRAY
GROUND	1	BLACK

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

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TOLERANCES ON
DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MEC 3096

01/04

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

This model number is subject to the jurisdiction of the U.S. Department of Commerce.

MODEL NO. MEC 3094A

5.35 to 5.65 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		-6.3 Vdc	2.25 Apk	-6.0 Vdc	-6.6 Vdc	3.0 A
HELIX	W/RF	GROUND	300 mApk	GROUND		500 mApk
	W/O RF		80 mApk			
GRID ON		180 Vpk	1.8 mApk	100 Vpk	250 Vpk	30 mApk
GRID OFF		-300 Vdc	0 mA	-300 Vdc	-300 Vdc	1 mApk
CATHODE (Ek)		-14.0 kV	2.3 Apk	-13.5 kV	-14.5 kV	2.8 Apk
COLLECTOR	W/RF	10.3 kV	2.0 Apk	73.5% X Ek ±2%		2.8 Apk
	W/O RF		2.2 Apk			

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
5.35	8510	8000	46
5.40	8130	8000	46
5.45	7800	8000	46
5.50	8200	8000	46
5.55	8300	8000	46
5.60	8200	8000	46
5.65	5600	5000	46

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

GAIN IS W/O EQUALIZER.

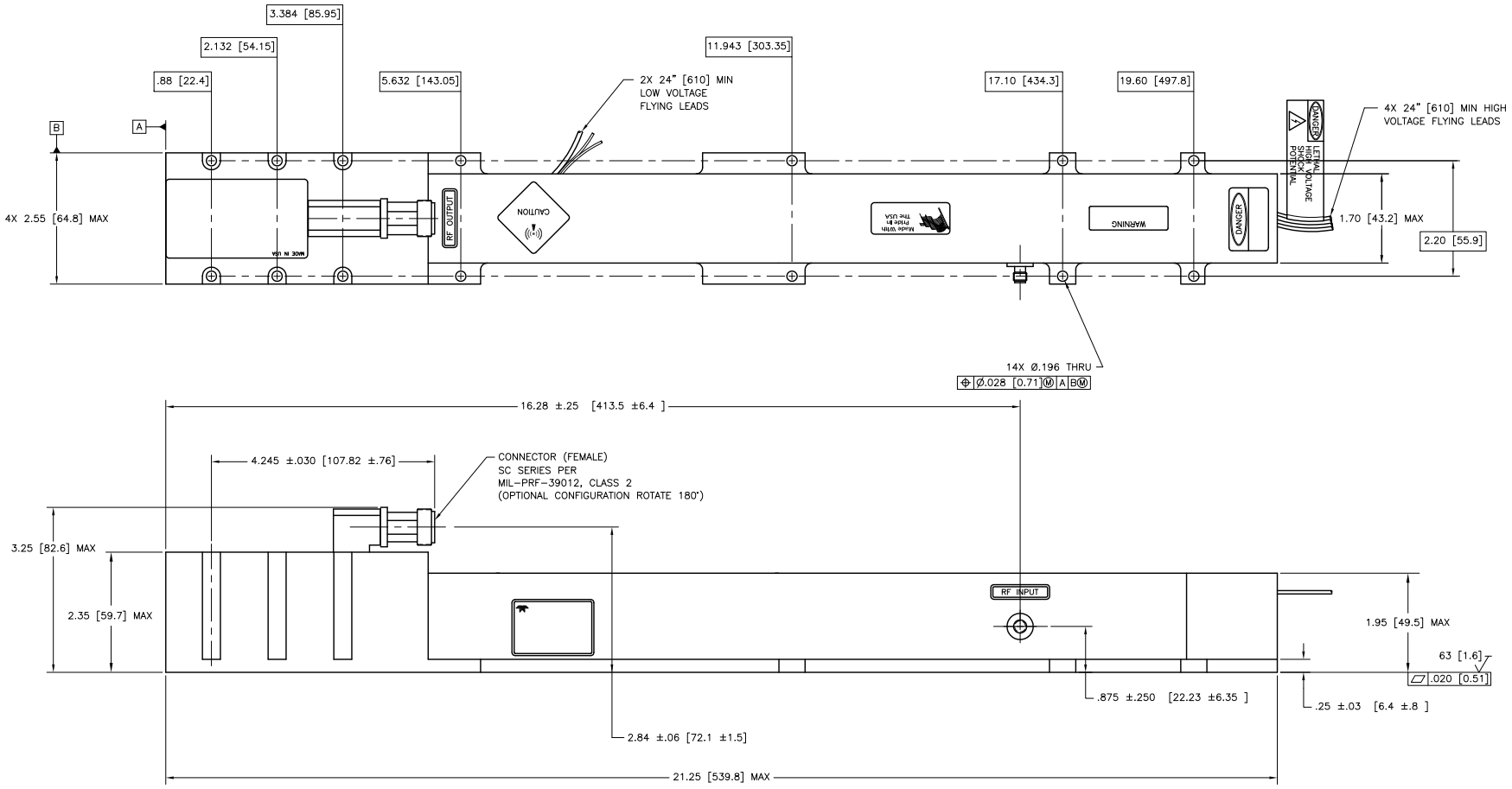
SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	1.3:1	2:1
OUTPUT VSWR	1.5:1	2:1
MAXIMUM DUTY	——	4%
MAXIMUM PULSEWIDTH	——	100 μsec
GRID CAPACITANCE	40 pF	60 pF
NOISE POWER DENSITY	-35 dBm/MHz	-10 dBm/MHz
PRIME POWER	1000 W	1100 W

An ISO 9001:2000 Quality System Certified Company

12/08

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 8.0 Lbs MAXIMUM.
   3.6 Kg MAXIMUM.
3. REFER TO OUTLINE 0144607.



HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
GRID	GREEN
COLLECTOR	RED

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (N.C.)	TWIN GRAY

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

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DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.02 .XXX ±.005
ANGLES ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MEC 3094A

12/08

TELEDYNE MEC

11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MTI 3444L

6.5 to 18.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.3 Vdc	1.9 A	−6.1 Vdc	−6.5 Vdc	2.5 A
HELIX	W/RF	GROUND	450 mApk	GROUND		500 mApk
	W/O RF		110 mApk			
GRID ON		160 Vpk	4 mApk	100 Vpk	250 Vpk	20 mApk
GRID OFF		−200 Vdc	0.1 mA	−200 Vdc	−500 Vdc	0.5 mA
CATHODE (Ek)		−11.2 kV	1.65 Apk	−10.5 kV	−11.5 kV	1.9 Apk
COLLECTOR W/ RF		7 kV	1.2 Apk	63% X Ek ±2%		1.9 Apk

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2.2:1	2.5:1
OUTPUT VSWR	2.3:1	2.5:1
MAXIMUM DUTY	——	6%
MAXIMUM PULSEWIDTH	——	100 μsec
GRID CAPACITANCE	38 pF	50 pF
MIN HARMONIC SEPARATION	−3 dBc	−2 dBc *
NOISE POWER DENSITY	2 dBm/MHz	3 dBm/MHz
PRIME POWER	818 W	950 W
TEMPERATURE RANGE	−40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
6.5	1320	1260 *	43
7.0	1580	1510	44
8.0	2140	1580	45
9.0	2340	1580	46
10.0	1660	1580	46
11.0	2140	1580	46
12.0	2450	1580	46
13.0	2510	1580	46
14.0	2450	1580	46
15.0	2400	1580	46
16.0	2240	1580	46
17.0	2000	1580	46
18.0	1700	1580	45

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

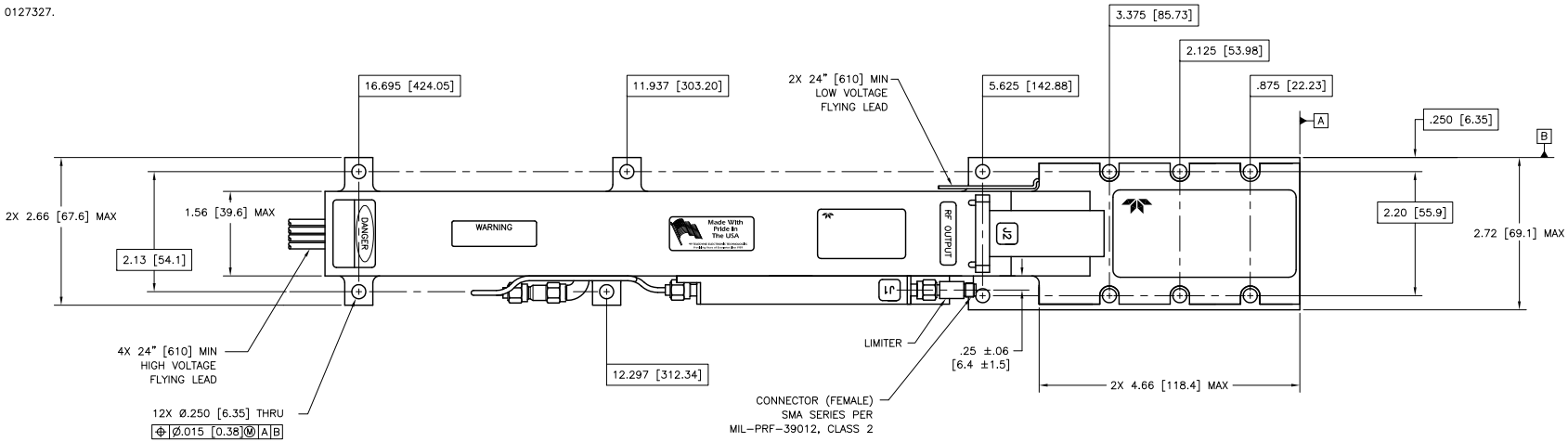
GAIN IS WITH EQUALIZER.

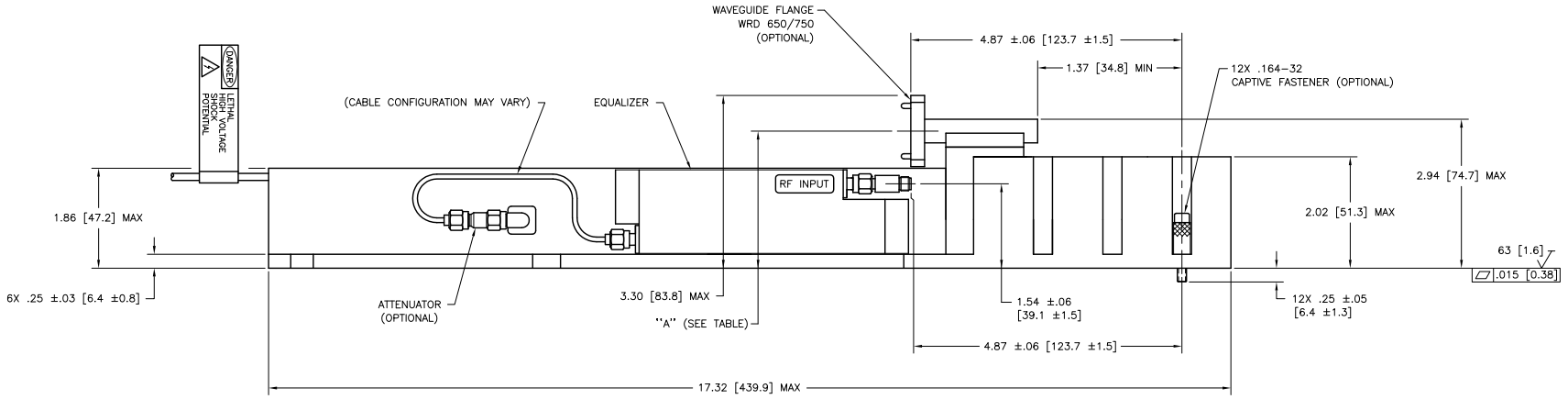
An ISO 9001:2000 Quality System Certified Company

05/98

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 7.0 Lbs MAXIMUM.
   3.2 Kg MAXIMUM.
3. REFER TO OUTLINE 0127327.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
GRID	GREEN
COLLECTOR	RED

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (N.C.)	GRAY

FLANGE	"A"
WRD 650	2.50 ± .03 [63.5 ± 0.8]
WRD 750	2.59 ± .03 [65.8 ± 0.8]

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

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TOLERANCES ON
DECIMALS .XX ±.02 .XXX ±.005
ANGLES ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MTI 3444L

05/99

TELEDYNE MEC

11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MEC 3848

8.0 to 11.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.3 Vdc	2.1 A	−6.1 Vdc	−6.5 Vdc	2.5 A
HELIX	W/RF	GROUND	400 mApk	GROUND		500 mApk
	W/O RF		75 mApk			
GRID ON		150 Vpk	0	100 Vpk	300 Vpk	30 mApk
GRID OFF		−300 Vdc	0	−300 Vdc	−500 Vdc	0.5 mA
CATHODE (Ek)		−13.3 kV	2.3 Apk	−13 kV	−15.0 kV	2.8 Apk
COLLECTOR W/ RF	#1	9.0 kV	0.84 Apk	69% X Ek ±2%		1.1 Apk
	#2	6.4 kV	0.48 Apk	48% X Ek ±2%		0.8 Apk
	#3	4.7 kV	0.58 Apk	35% X Ek ±2%		2.5 Apk

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	1.5:1	2:1
OUTPUT VSWR	1.5:1	1.8:1
MAXIMUM DUTY	——	5%
MAXIMUM PULSEWIDTH	——	100 μsec
GRID CAPACITANCE	40 pF	60 pF
MIN HARMONIC SEPARATION	−14 dBc	−10 dBc *
NOISE POWER DENSITY	−14 dBm/MHz	−10 dBm/MHz
PRIME POWER	947 W	1200 W
TEMPERATURE RANGE	−40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
8.0	8000	7500 *	48
8.5	8300	8000	48
9.0	8300	8000	49
9.2	8300	8000	50
9.4	8300	8000	50
9.6	8300	8000	50
9.8	8300	8000	50
10.0	8300	8000	51
10.5	8000	7500	50
11.0	7000	6500	49

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

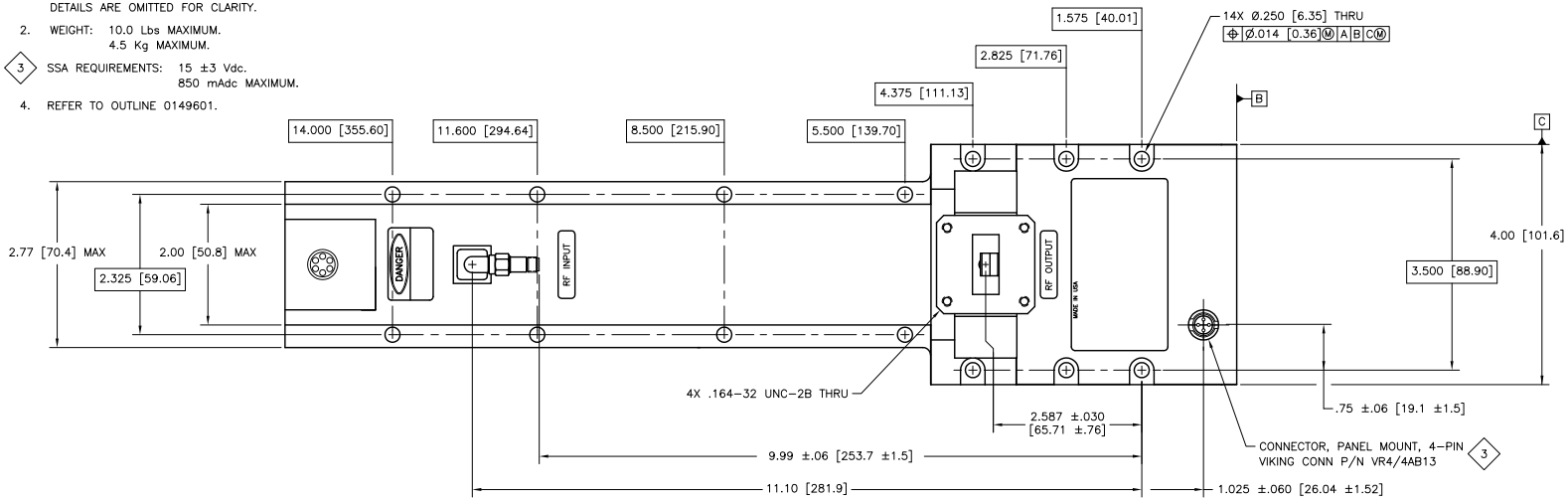
GAIN IS WITHOUT EQUALIZER.

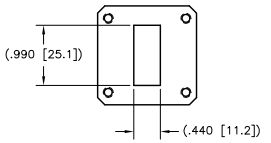
An ISO 9001:2000 Quality System Certified Company

12/08

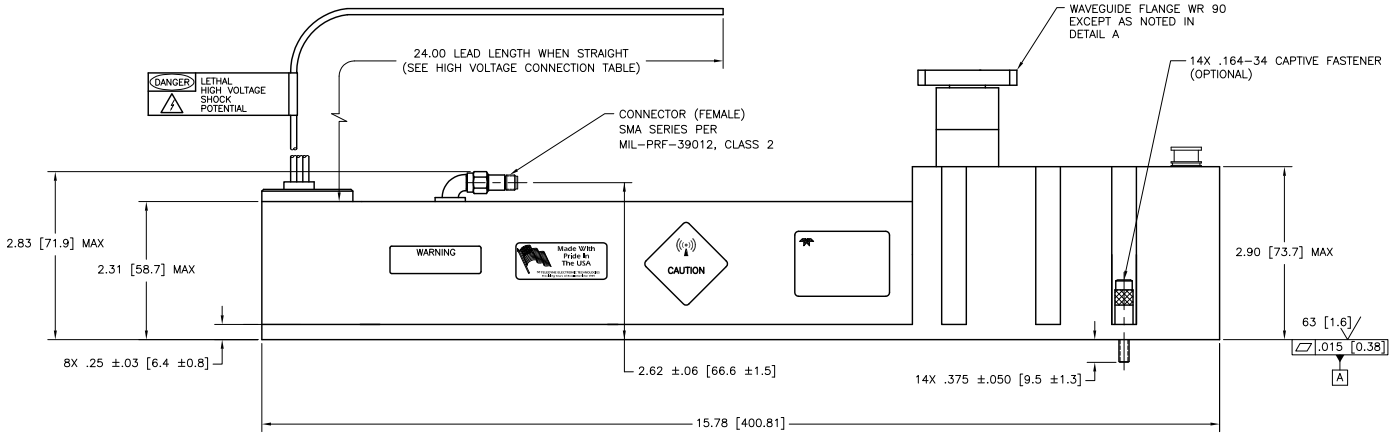
NOTES:

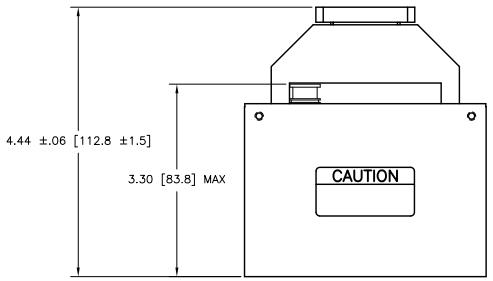
1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 10.0 Lbs MAXIMUM.
   4.5 Kg MAXIMUM.
3. SSA REQUIREMENTS: 15 ±3 Vdc.
   850 mAdc MAXIMUM.
4. REFER TO OUTLINE 0149601.





DETAIL A





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
CATHODE	YELLOW
HEATER	BROWN
GRID	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE
COLLECTOR #3	BLUE
HEATER RETURN	VIOLET

LOW VOLTAGE CONNECTIONS	
PIN	FUNCTION
A	HELIX GROUND
B	SPARE
C	THERMOSTAT (NO/NC)
D	SPARE

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

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DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638–3344

TITLE

OUTLINE DRAWING
MEC 3848

12/08

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MEC 3848N

8.0 TO 12.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.3 Vdc	2.1 A	−6.1 Vdc	−6.5 Vdc	2.50 A
HELIX	W/ RF	GROUND	* 230 mApk	GROUND		315 mApk
	W/O RF		** 75 mApk			
GRID ON		150 Vpk	0.0 mApk	100 Vpk	300 Vpk	30 mApk
GRID OFF		−350 Vdc	0.0 mA	−300 Vdc	−500 Vdc	0.5 mA
CATHODE (Ek)		−13.0 kV	1.8 Apk	−13 kV	−15 kV	2.5 Apk
COLLECTOR #1		8.97 kV	* 650 mApk	69% X Ek ±2%		1.1 mApk
COLLECTOR #2		6.24 kV	* 450 mApk	48% X Ek ±2%		0.8 mApk
COLLECTOR #3		4.55 kV	* 470 mApk	35% X Ek ±2%		2.5 mApk

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
8.0	6610	5000	48
8.5	7080	5000	48
9.0	7080	5000	49
9.5	6610	5000	50
10.0	6610	5000	50
10.5	7240	5000	49
11.0	6760	5000	48
11.5	6610	5000	44
12.0	5620	5000	41

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	1.82:1	2.0:1
OUTPUT VSWR	1.65:1	1.75:1
MAXIMUM DUTY	8%	8%
MAXIMUM PULSEWIDTH	50 μsec	100 μsec
GRID CAPACITANCE	50 pF	60 pF MAX
MIN HARMONIC SEPARATION	−13.0 dBc	−10 dBc
NOISE POWER DENSITY	−14 dBm/MHz	−10 dBm/MHz
PRIME POWER	1213 W	1700 W
TEMPERATURE RANGE	−40° to 85 °C	——

* WITH RF DRIVE

** WITHOUT RF DRIVE

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.

NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

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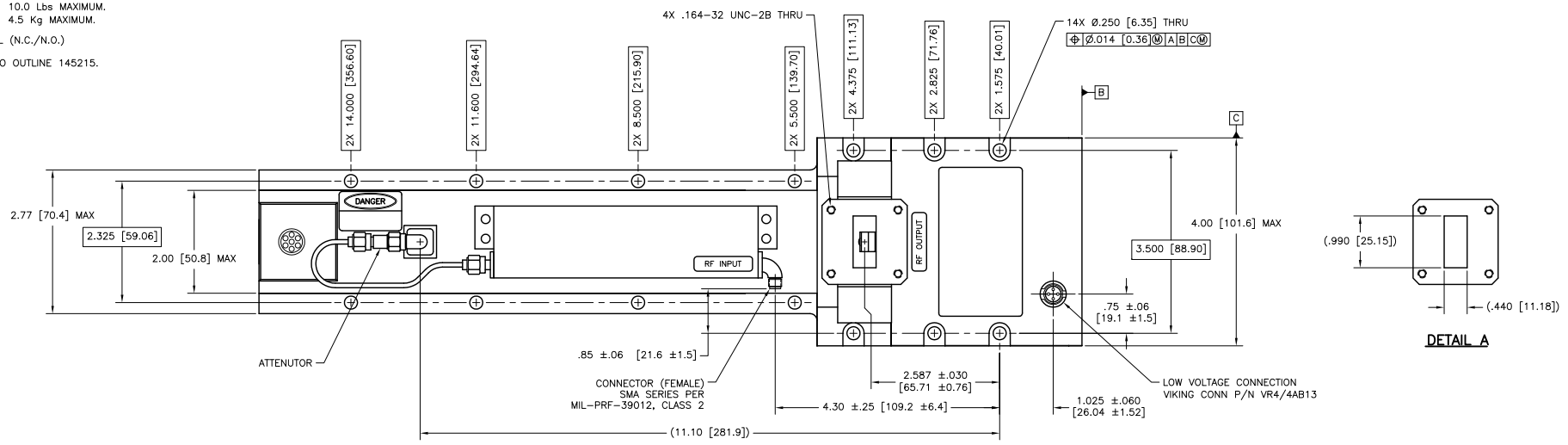
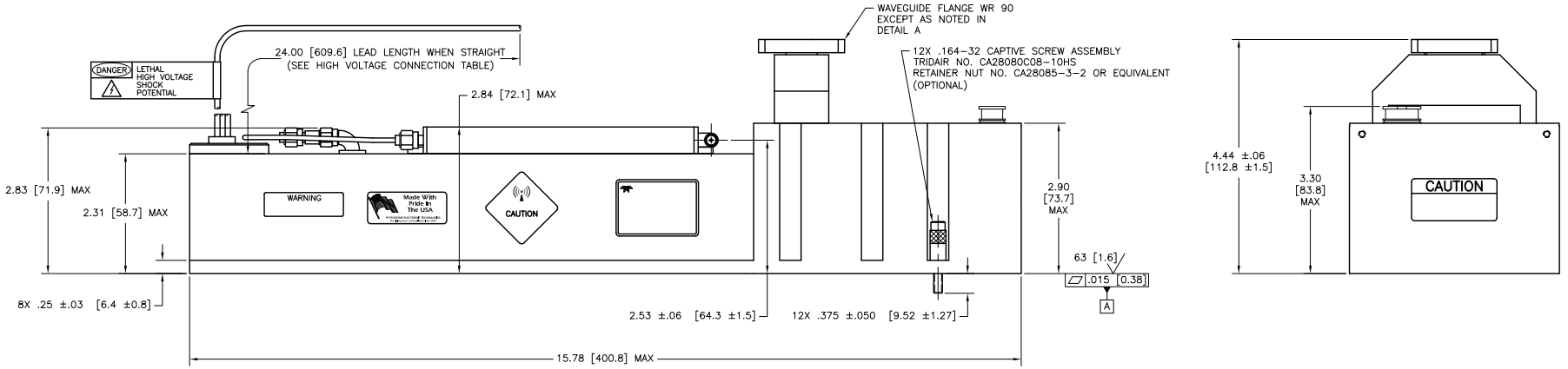
12/08

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 10.0 Lbs MAXIMUM.
   4.5 Kg MAXIMUM.
3. OPTIONAL (N.C./N.O.)
4. REFER TO OUTLINE 145215.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
CATHODE	YELLOW
HEATER	BROWN
GRID	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE
COLLECTOR #3	BLUE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT	GRAY

3

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MEC 3848N

01/04

TELEDYNE MEC

11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MTI 3044J

8.0 to 18.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.3 Vdc	1.9 A	−6.1 Vdc	−6.5 Vdc	2.5 A
HELIX	W/RF	GROUND	325 mApk	GROUND		500 mApk
	W/O RF		75 mApk			
GRID ON		123 Vpk	1 mApk	100 Vpk	200 Vpk	30 mApk
GRID OFF		−200 Vdc	0.2 mA	−200 Vdc	−500 Vdc	1 mA
CATHODE (Ek)		−11.2 kV	1.6 Apk	−10.5 kV	−11.5 kV	1.8 Apk
COLLECTOR W/ RF		8 kV	1.275 Apk	72% X Ek ±2%		1.8 Apk

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2.1:1	2.5:1
OUTPUT VSWR	1.9:1	2.5:1
MAXIMUM DUTY	——	4%
MAXIMUM PULSEWIDTH	——	100 μsec
GRID CAPACITANCE	46 pF	50 pF
MIN HARMONIC SEPARATION	−4.3 dBc	−3 dBc *
NOISE POWER DENSITY	−12 dBm/MHz	−8 dBm/MHz
PRIME POWER	566 W	750 W
TEMPERATURE RANGE	−40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
8.0	1170	1000 *	54
9.0	1475	1000	60
10.0	1580	1000	60
11.0	1780	1000	62
12.0	2140	1000	62
13.0	2250	1000	61
14.0	2090	1000	59
15.0	2000	1000	58
16.0	2000	1000	55
17.0	1900	1000	48
18.0	1250	1000	42

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

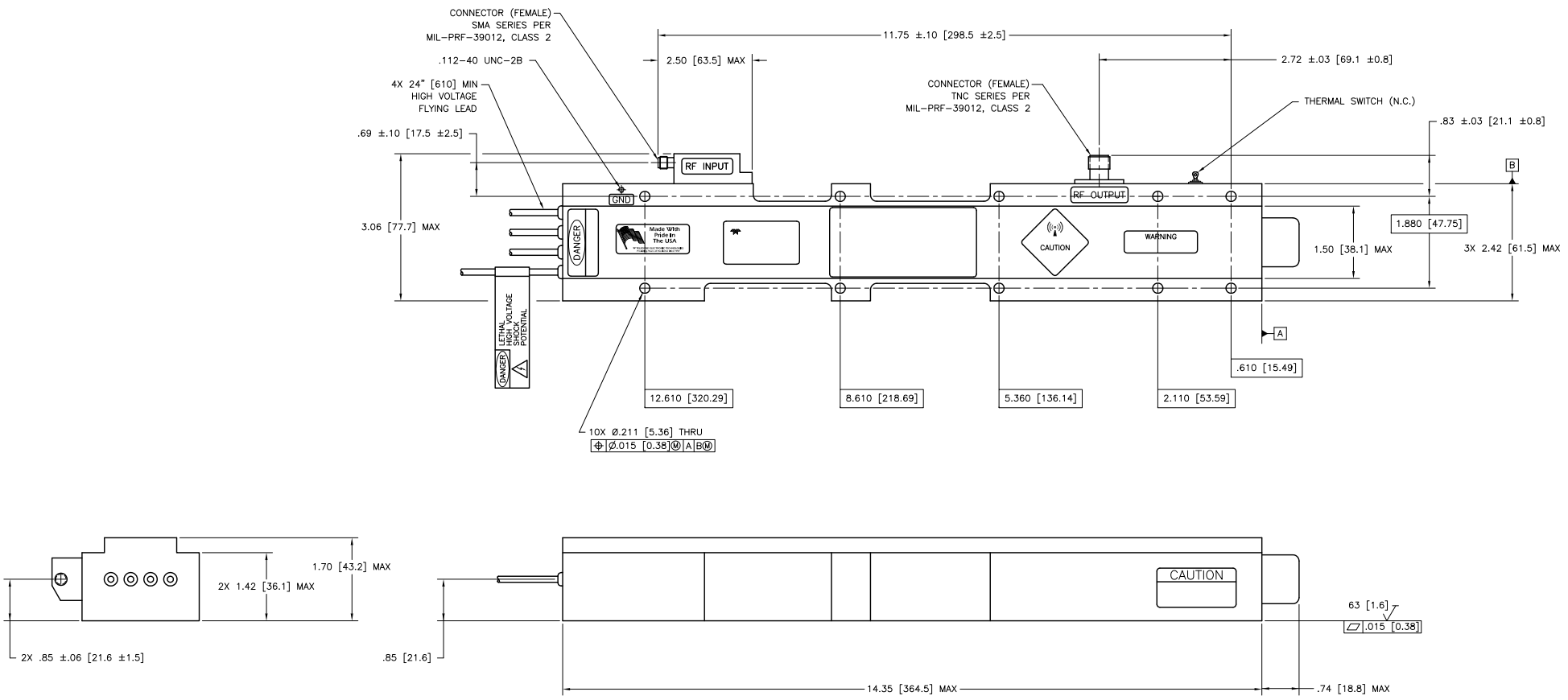
GAIN IS W/O EQUALIZER.

An ISO 9001:2000 Quality System Certified Company

01/06

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 6.0 Lbs MAXIMUM.
   2.7 Kg MAXIMUM.
3. REFER TO OUTLINE 0138829.



HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
GRID	GREEN
COLLECTOR	RED

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED

DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC

11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MTI 3044J

05/99

TELEDYNE MEC

11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MTI 3048Q

8.2 to 12.4 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		-6.3 Vdc	1.7 A	-6.1 Vdc	-6.5 Vdc	2.5 A
HELIX	W/RF	GROUND	300 mApk	GROUND		550 mApk
	W/O RF		70 mApk			
GRID ON		200 Vpk	2.5 mApk	110 Vpk	300 Vpk	150 mApk
GRID OFF		-200 Vdc	0	-150 Vdc	-230 Vdc	.2 mA
CATHODE (Ek)		-12 kV	1.6 Apk	-11 kV	-13 kV	2 Apk
COLLECTOR W/ RF	#1	7.8 kV	0.9 Apk	65% X Ek ±2%		1.2 Apk
	#2	5 kV	0.4 Apk	42% X Ek ±2%		2 Apk

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2.3:1	2.5:1
OUTPUT VSWR	2.0:1	2.5:1
MAXIMUM DUTY	——	8%
MAXIMUM PULSEWIDTH	——	100 μsec
GRID CAPACITANCE	49 pF	55 pF
MIN HARMONIC SEPARATION	-10 dBc	-8 dBc *
NOISE POWER DENSITY	-15 dBm/MHz	-10 dBm/MHz
PRIME POWER	1020 W	1300 W
TEMPERATURE RANGE	-40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
8.2	2600	2500 *	45
8.5	3500	3000	47
9.0	4000	3000	50
10.0	4300	3000	50
11.0	4180	3000	48
12.4	3020	3000	43

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

GAIN IS W/O EQUALIZER.

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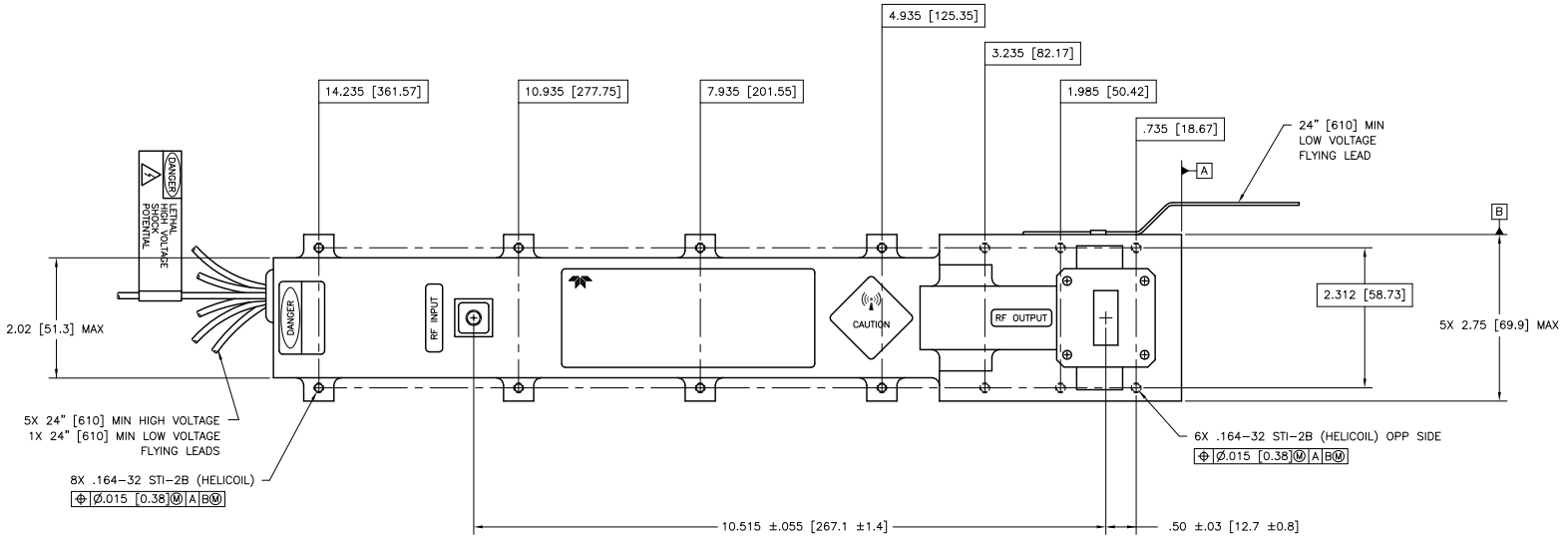
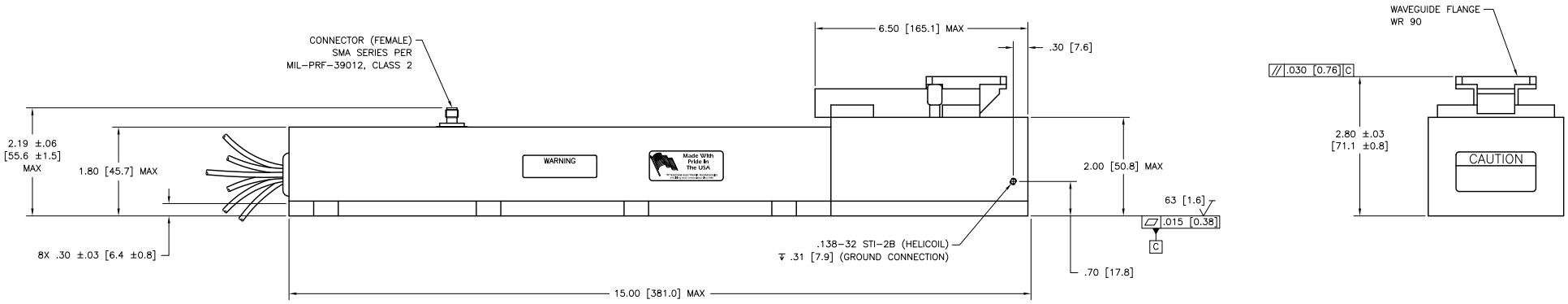
NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 6.0 Lbs MAXIMUM.
   2.7 Kg MAXIMUM.
3. REFER TO OUTLINE 0128412.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
GRID	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (N.C.)	WHITE

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

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TOLERANCES ON
DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638–3344

TITLE

OUTLINE DRAWING
MTI 3048Q

05/99

TELEDYNE MEC

11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MTI 3048D

8.7 to 10.5 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		-6.3 Vdc	1.7 A	-6.1 Vdc	-6.5 Vdc	2.5 A
HELIX	W/RF	GROUND	300 mApk	GROUND		550 mApk
	W/O RF		70 mApk			
GRID ON		200 Vpk	2 mApk	110 Vpk	300 Vpk	150 mApk
GRID OFF		-200 Vdc	0	-150 Vdc	-230 Vdc	.2 mA
CATHODE (Ek)		-11.9 kV	1.6 Apk	-11 kV	-13 kV	2 Apk
COLLECTOR W/ RF	#1	7.8 kV	0.9 Apk	65% X Ek ±2%		1.2 Apk
	#2	5 kV	0.4 Apk	42% X Ek ±2%		2 Apk

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	1.8:1	2.0:1
OUTPUT VSWR	1.8:1	2.0:1
MAXIMUM DUTY	——	10%
MAXIMUM PULSEWIDTH	——	100 μsec
GRID CAPACITANCE	49 pF	55 pF
MIN HARMONIC SEPARATION	-16 dBc	-10 dBc *
NOISE POWER DENSITY	-15 dBm/MHz	-10 dBm/MHz
PRIME POWER	1270 W	1400 W
TEMPERATURE RANGE	-40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
8.7	3700	3500	46
8.8	3800	3500	46
8.9	3900	3600	46
9.0	4000	3600 *	46
9.2	4000	3800	46
9.4	4100	4000	46
9.6	4100	4000	47
9.8	4200	4000	47
10.0	4200	4000	47
10.1	4100	3800	47
10.2	4000	3700	47
10.3	3800	3600	46
10.4	3600	3200	46
10.5	3400	3000	45

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

GAIN IS W/O EQUALIZER.

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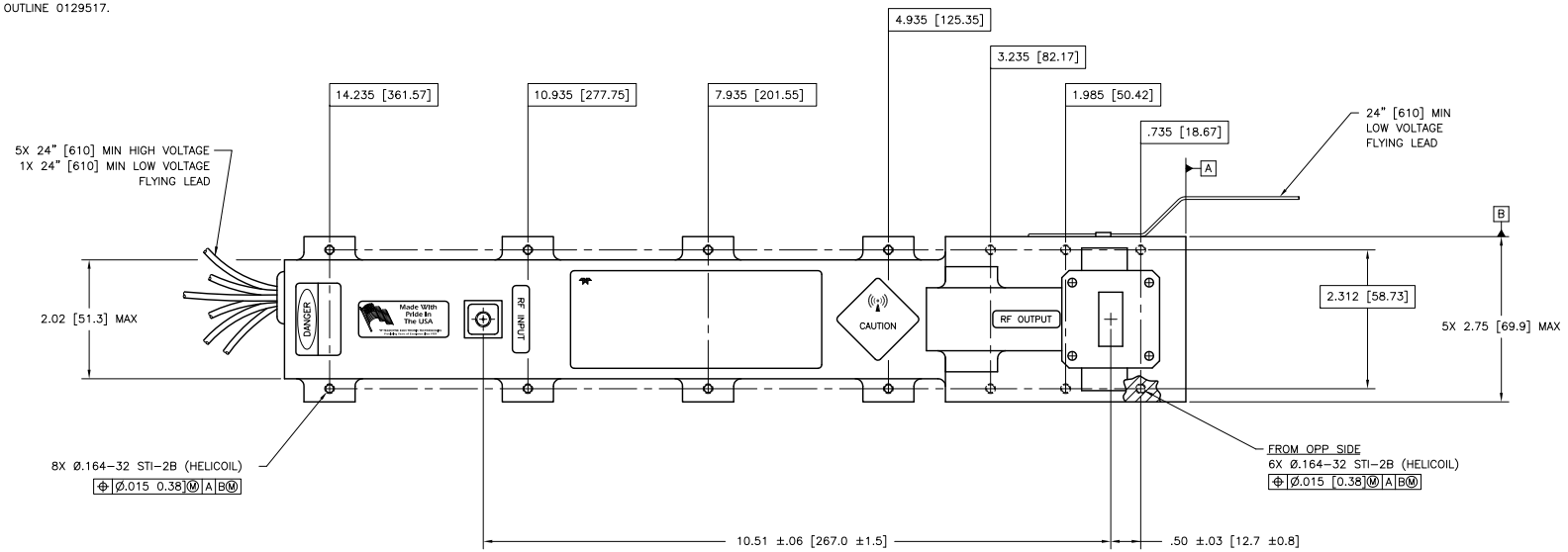
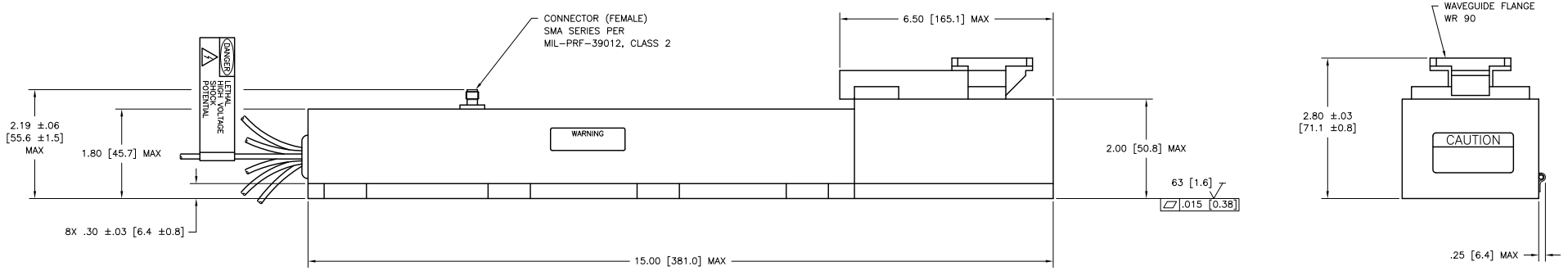
NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 6.0 Lbs MAXIMUM.
   2.7 Kg MAXIMUM.
3. REFER TO OUTLINE 0129517.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
GRID	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (N.C.)	GRAY

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED

DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638–3344

TITLE

OUTLINE DRAWING MTI 3048D

05/99

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MTI 3948B

8.8 to 10.5 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		-6.3 Vdc	2.2 A	-6.1 Vdc	-6.5 Vdc	2.5 A
HELIX	W/ RF	GROUND	400 mApk	GROUND		500 mApk
	W/O RF		75 mApk			
GRID ON		250 Vpk	0	100 Vpk	300 Vpk	30 mApk
GRID OFF		-300 Vdc	0	-300 Vdc	-500 Vdc	0.5 mA
CATHODE (Ek)		-14.2 kV	2.3 Apk	-14.0 kV	-15 kV	2.5 Apk
COLLECTOR W/ RF	#1	11.7 kV	0.4 Apk	80% X Ek ±2%		1 Apk
	#2	8.5 kV	1.5 Apk	58% X Ek ±2%		2.5 Apk

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	1.5:1	2.0:1
OUTPUT VSWR	1.5:1	1.8:1
MAXIMUM DUTY	——	5%
MAXIMUM PULSEWIDTH	——	50 μsec
MIN HARMONIC SEPARATION	-12 dBc	-10 dBc *
NOISE POWER DENSITY	-14 dBm/MHz	-10 dBm/MHz
PRIME POWER	1179 W	1300 W
TEMPERATURE RANGE	——	-54° to 85 °C

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
8.8	7400	6800	48
8.9	7800	7400	49
9.0	8300	8000 *	50
9.2	8350	8000	50
9.4	8400	8000	50
9.6	8500	8000	50
9.8	8600	8000	51
10.0	8700	8000	51
10.1	8700	8000	51
10.2	8700	8000	51
10.3	8300	7800	50
10.4	8200	7500	50
10.5	8200	7500	49

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

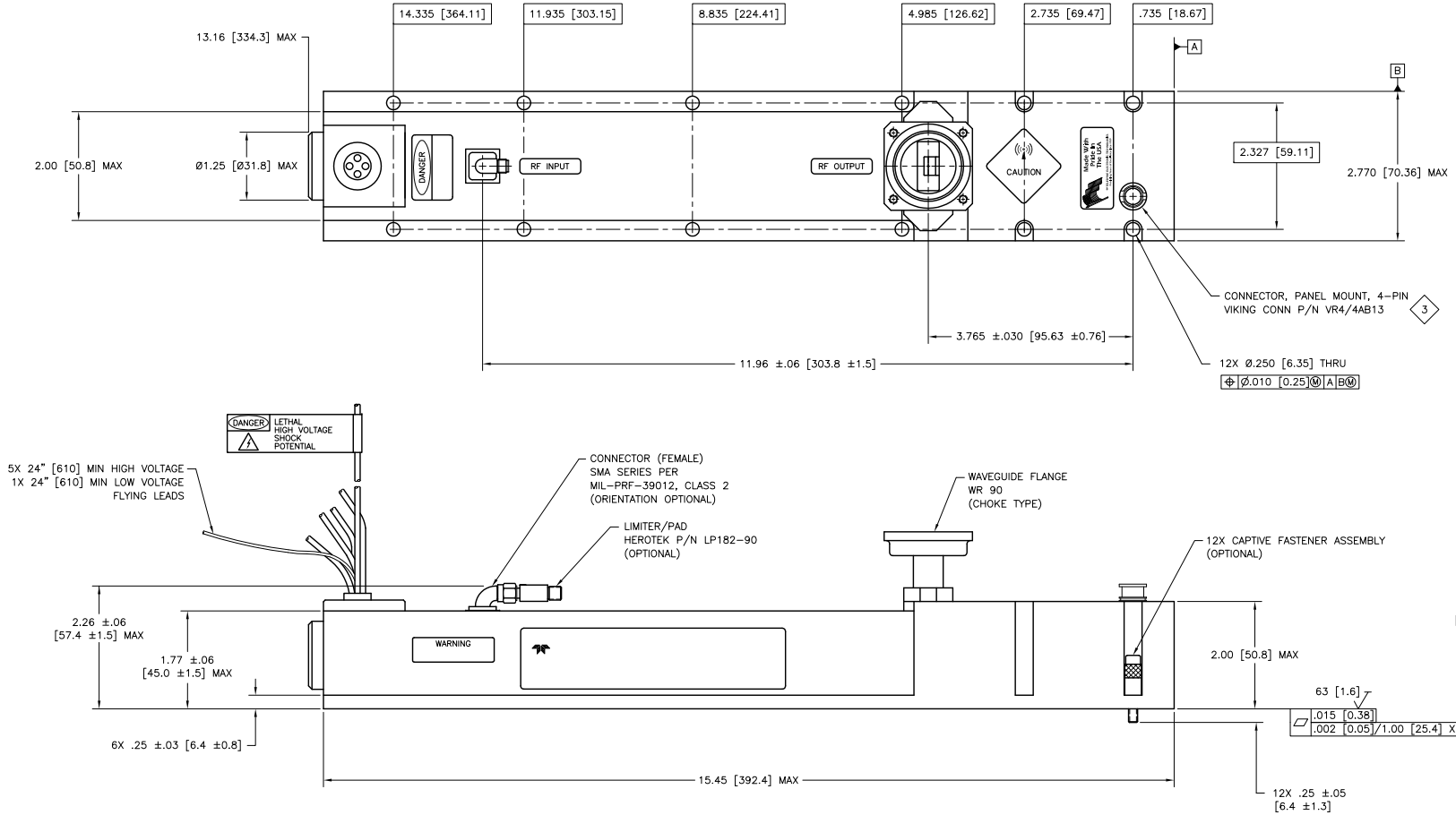
GAIN IS WITHOUT EQUALIZER.
HIGHER GAIN IS AVAILABLE WITH SSA.

An ISO 9001:2000 Quality System Certified Company

12/08

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 7.5 Lbs MAXIMUM.
   3.4 Kg MAXIMUM.
3. THERMOSTAT (N.C.).
4. REFER TO OUTLINE 0131813.



HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
GRID	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS		
FUNCTION	COLOR	PIN
SPARE	——	A
SPARE	——	B
THERMOSTAT (N.C.)	GREY	C
GROUND	BLACK	D

3

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

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TOLERANCES ON
DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MTI 3948B

12/08

TELEDYNE MEC

11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MTI 3948

8.8 to 10.5 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.3 Vdc	2.2 A	−6.1 Vdc	−6.5 Vdc	2.5 A
HELIX	W/RF	GROUND	470 mApk	GROUND		800 mApk
	W/O RF		75 mApk			
GRID ON		250 Vpk	0	50 Vpk	250 Vpk	30 mApk
GRID OFF		−300 Vdc	0	−300 Vdc	−500 Vdc	0.5 mA
CATHODE (Ek)		−14.2 kV	2.5 Apk	−14.0 kV	−15 kV	2.5 Apk
COLLECTOR #1 W/ RF		11 kV	2.13 Apk	75% X Ek ±2%		2.5 Apk

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	1.5:1	2.0:1
OUTPUT VSWR	1.5:1	1.8:1
MAXIMUM DUTY	——	2%
MAXIMUM PULSEWIDTH	——	50 μsec
GRID CAPACITANCE	40 pF	60 pF
MIN HARMONIC SEPARATION	−12 dBc	−10 dBc *
NOISE POWER DENSITY	−14 dBM/MHz	−10 dBM/MHz
PRIME POWER	621 W	750 W
TEMPERATURE RANGE	−40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
8.8	8510	8200	50
8.9	8700	8600	50
9.0	8700	8700 *	51
9.2	8800	8700	51
9.4	8900	8700	51
9.6	8900	8700	51
9.8	8900	8700	51
10.0	8900	8700	51
10.1	8900	8700	51
10.2	8800	8700	51
10.3	8800	8700	51
10.4	8800	8700	51
10.5	8700	8500	50

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

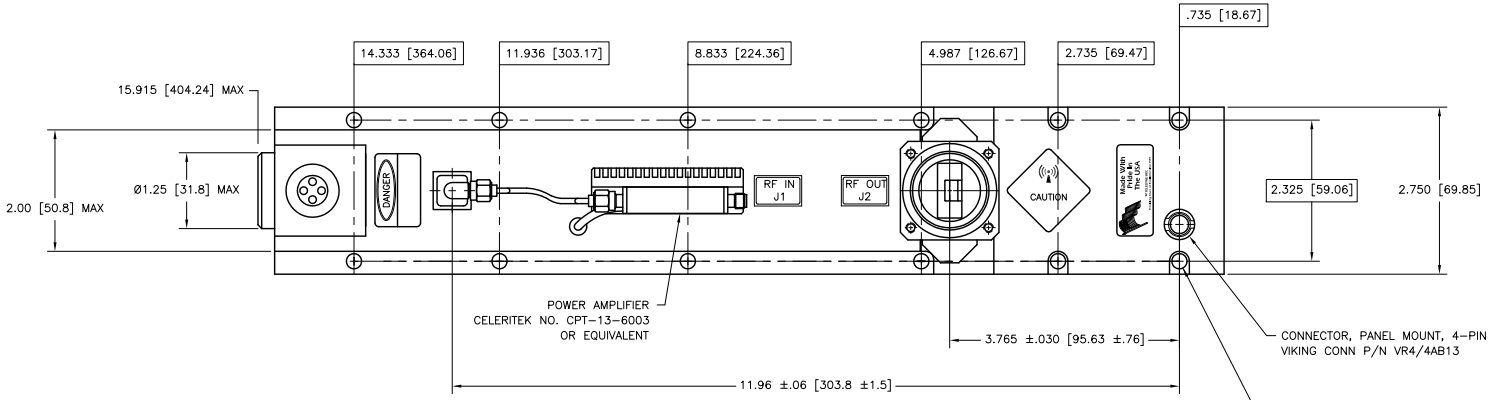
GAIN IS W/O EQUALIZER.
HIGHER GAIN IS AVAILABLE WITH SSA.

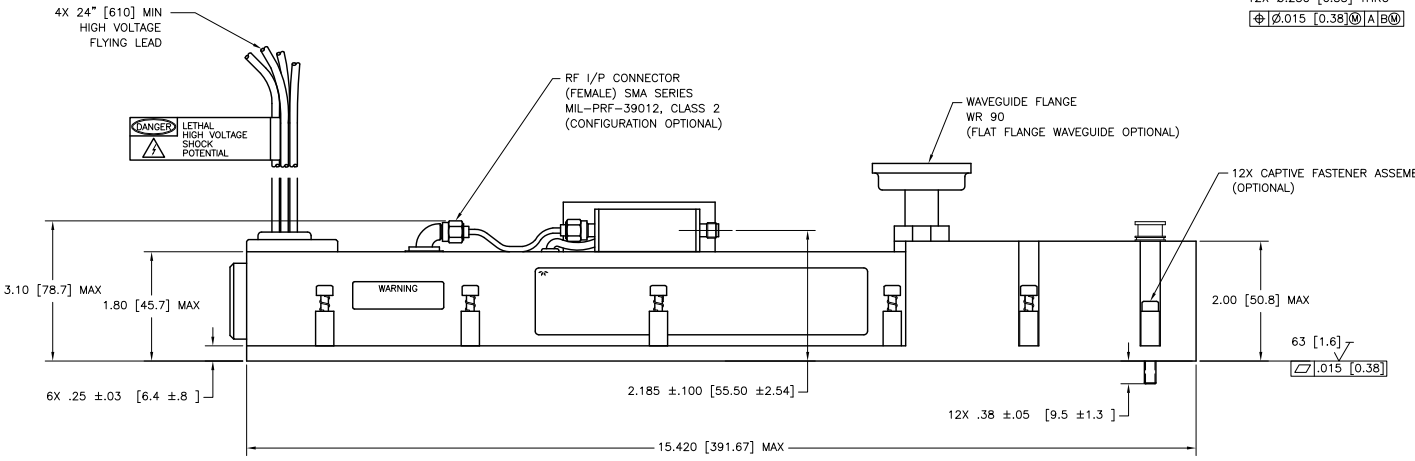
An ISO 9001:2000 Quality System Certified Company

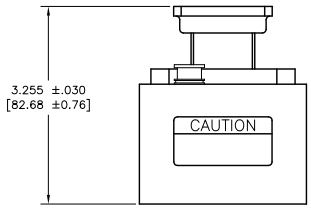
12/08

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 7.5 Lbs MAXIMUM.
   3.4 Kg MAXIMUM.
3. REFER TO OUTLINE 0128993.







HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
GRID	GREEN
COLLECTOR	RED

LOW VOLTAGE CONNECTIONS		
FUNCTION	COLOR	PIN
SPARE	——	A
SPARE	——	B
THERMOSTAT	GREY	C
GROUND	BLACK	D

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MTI 3948

12/08

TELEDYNE MEC

11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MTI 3948U

9.0 to 10.0 GHz

TYPICAL OPERATING CONDITIONS			
ELEMENT		VOLTAGE	CURRENT
HEATER		-6.3 Vdc	2.2 A
HELIX	W/RF	GROUND	400 mApk
	W/O RF		80 mApk
GRID ON		185 Vpk	1.0 mApk
GRID OFF		-325 Vdc	.02 mA
CATHODE (Ek)		-14.2 kV	2.25 Apk
COLLECTOR W/ RF	#1	10.5 kV	825 mApk
	#2	7.67 kV	740 mApk
	#3	5.4 kV	285 mApk

POWER SUPPLY REQUIREMENTS		
VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
-6.1 Vdc	-6.5 Vdc	2.8 A
GROUND		500 mApk
100 Vpk	300 Vpk	30 mApk
-300 Vdc	-500 Vdc	0.5 mA
-13 kV	-15 kV	2.5 Apk
74% X Ek ±2%		1.1 Apk
54% X Ek ±2%		1.0 Apk
38% X Ek ±2%		2.4 Apk

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	1.6:1	2.0:1
OUTPUT VSWR	1.4:1	2.0:1
MAXIMUM DUTY	5%	5%
MAXIMUM PULSEWIDTH	50 μsec	100 μsec
GRID CAPACITANCE	49 pF	60 pF
MIN HARMONIC SEPARATION	-12 dBc	-10 dBc *
NOISE POWER DENSITY	>-14 dBm/MHz	-10 dBm/MHz
PRIME POWER	1150 W	1500 W
TEMPERATURE RANGE	-40° to 85 °C	————

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
9.0	8000	7945	47
9.1	8000	7945	47
9.2	8000	7945	47
9.3	8000	7945	47
9.4	8000	7945	48
9.5	8000	7945	47
9.6	8000	7945	47
9.7	8000	7945	47
9.8	8000	7945	47
9.9	8000	7945	47
10.0	8000	7945	47

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

GAIN IS W/O EQUALIZER.

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.

NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

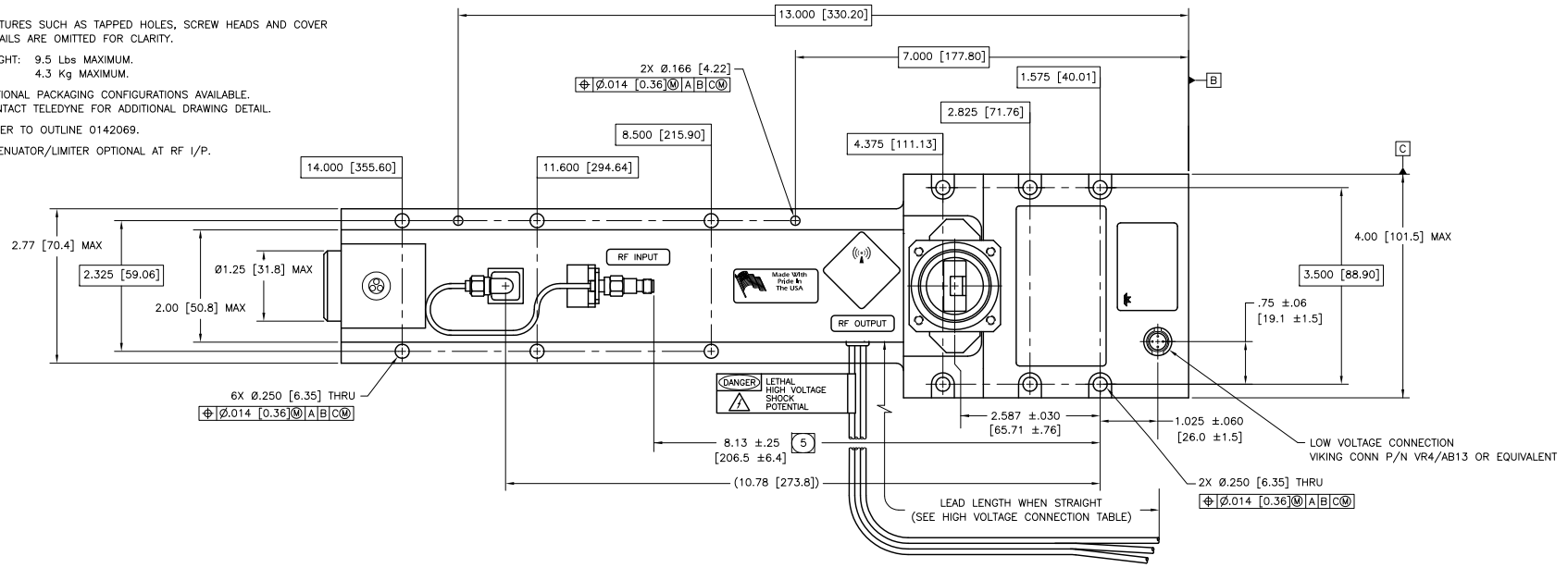
An ISO 9001:2000 Quality System Certified Company

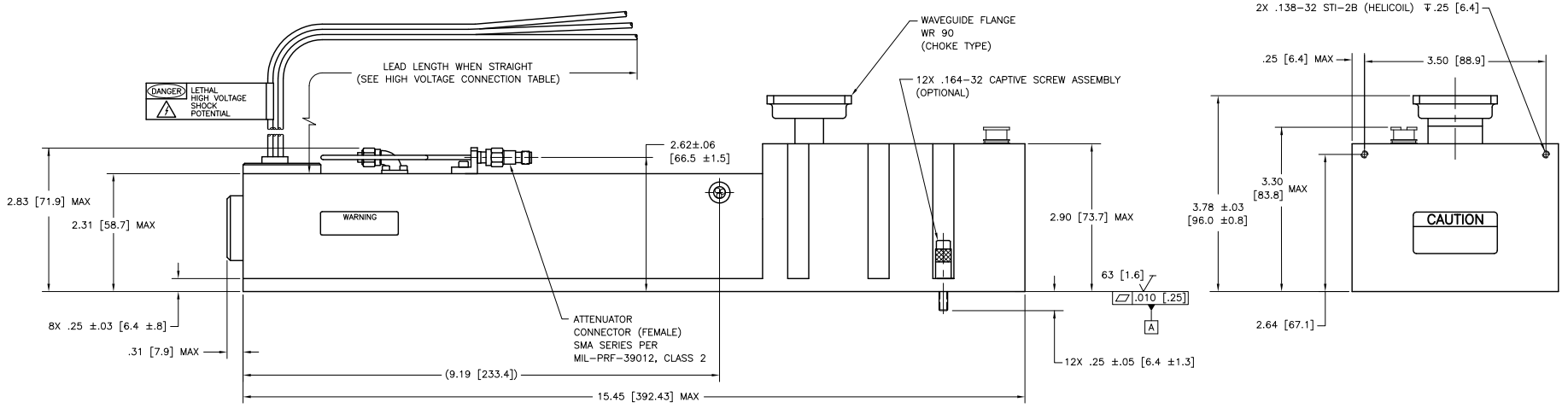
12/08

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 9.5 Lbs MAXIMUM.
   4.3 Kg MAXIMUM.
3. OPTIONAL PACKAGING CONFIGURATIONS AVAILABLE. CONTACT TELEDYNE FOR ADDITIONAL DRAWING DETAIL.
4. REFER TO OUTLINE 0142069.

(5) ATTENUATOR/LIMITER OPTIONAL AT RF I/P.





HIGH VOLTAGE CONNECTIONS			
PIN NO.	FUNCTION	COLOR	LEAD LENGTH ±.50 [±12.7]
FL1	CATHODE	YELLOW	9.25 [235.0]
FL2	HEATER	BROWN	11.25 [285.8]
FL3	GRID	GREEN	10.25 [260.4]
FL4	COLLECTOR #1	RED	15.25 [387.4]
FL5	COLLECTOR #2	WHITE	14.25 [362.0]
FL6	COLLECTOR #3	BLUE	13.25 [336.6]

LOW VOLTAGE CONNECTIONS	
PIN	FUNCTION
A	HELIX/GROUND
B	SPARE
C	THERMOSTAT (NO)
D	SPARE
E	SPARE
F	SPARE

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

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TOLERANCES ON
DECIMALS .XX ±.02 .XXX ±.005
ANGLES ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MTI 3948U

12/08

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MEC 3104

12.0 TO 18.0 GHz

TYPICAL OPERATING CONDITIONS			POWER SUPPLY REQUIREMENTS		
ELEMENT	VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER	−6.3 Vdc	2.2 A	−6.1 Vdc	−6.5 Vdc	2.75 A
HELIX	GROUND	* 375 mApk ** 139 mApk	GROUND		700 mApk
GRID ON	176 Vpk	2 mApk	100 Vpk	300 Vpk	30 mApk
GRID OFF	−300 Vdc	0.5 mA	−200 Vdc	−500 Vdc	1.0 mA
CATHODE (Ek)	−14.0 kV	1.92 A	−13.4 kV	−15.4 kV	2.0 Apk
COLLECTOR #1	10.4 kV	* 259 mApk ** 110 mApk	74% X Ek ±2%		410 mApk
COLLECTOR #2	8.3 kV	* 520 mApk ** 54 mApk	59% X Ek ±2%		700 mApk
COLLECTOR #3	6.17 kV	* 849 mApk **1620 mApk	44% X Ek ±2%		1800 mApk

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
12.0	4000	3470	32
13.0	5000	3470	35
14.0	5000	3470	37
15.0	5000	3470	39
16.0	5000	3470	37
17.0	5000	3470	34
18.0	4000	3470	32

GAIN IS WITH EQUALIZER.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2.0:1	2.5:1
OUTPUT VSWR	1.6:1	2.0:1
MAXIMUM DUTY	——	6%
MAXIMUM PULSEWIDTH	——	50 μsec
GRID CAPACITANCE	58 pF	60 pF
NOISE POWER DENSITY	−10 dBm/MHz	5 dBm/MHz
PRIME POWER	1000 W	1800 W
TEMPERATURE RANGE	−40° to 85 °C	——

* WITH RF DRIVE

** WITHOUT RF DRIVE

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.

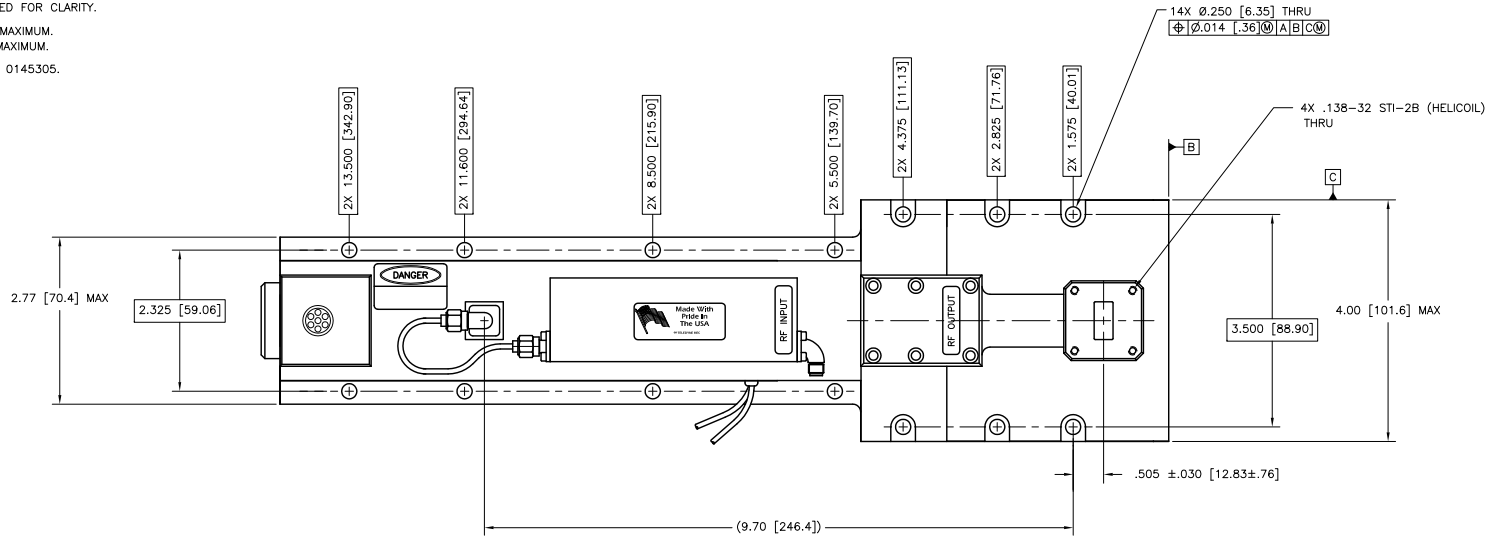
NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

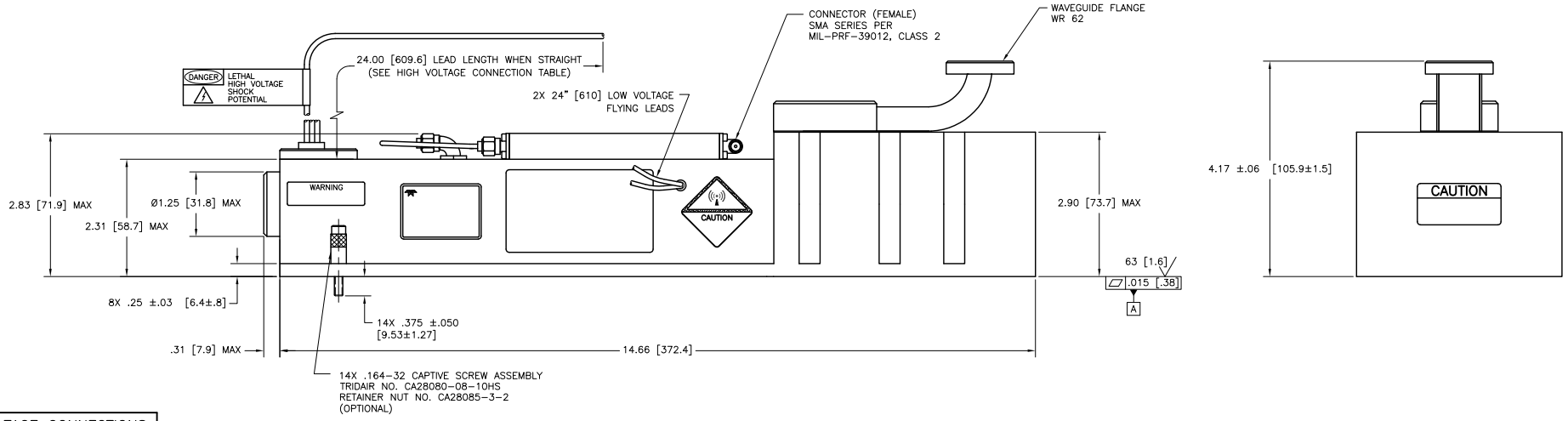
An ISO 9001:2000 Quality System Certified Company

12/08

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 9.0 Lbs MAXIMUM.
   4.1 Kg MAXIMUM.
3. REFER TO OUTLINE 0145305.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
CATHODE	YELLOW
HEATER	BROWN
GRID	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE
COLLECTOR #3	BLUE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (NC)	GRAY

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

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DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.02 .XXX ±.005
ANGLES ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638–3344

TITLE

OUTLINE DRAWING MEC 3104

8/08

TELEDYNE MEC

11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MTI 3056C

15.0 to 17.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.3 Vdc	2 A	−6.0 Vdc	−6.6 Vdc	3.0 A
HELIX	W/RF	GROUND	400 mApk	GROUND		500 mApk
	W/O RF		150 mApk			
GRID ON		235 Vpk	2 mApk	130 Vpk	300 Vpk	30 mApk
GRID OFF		−250 Vdc	0.005 mA	−250 Vdc	−500 Vdc	0.1 mA
CATHODE (Ek)		−13.5 kV	1.65 Apk	−13 kV	−13.75 kV	3.0 Apk
COLLECTOR W/ RF		GROUND	1.1 Apk	GROUND		1.6 Apk

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	1.8:1	2:1
OUTPUT VSWR	1.8:1	2:1
MAXIMUM DUTY	——	2%
MAXIMUM PULSEWIDTH	——	100 μsec
GRID CAPACITANCE	35 pF	50 pF
MIN HARMONIC SEPARATION	−20 dBc	−15 dBc *
NOISE POWER DENSITY	−13 dBm/MHz	−10 dBm/MHz
PRIME POWER	492 W	500 W
TEMPERATURE RANGE	−40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
15.00	3800	3800 *	50
15.25	3850	3800	52
15.50	3900	3800	50
15.75	4075	4000	51
16.00	4175	4000	50
16.25	4200	4000	53
16.50	4250	4000	54
16.75	4300	4000	55
17.00	4400	4000	56

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

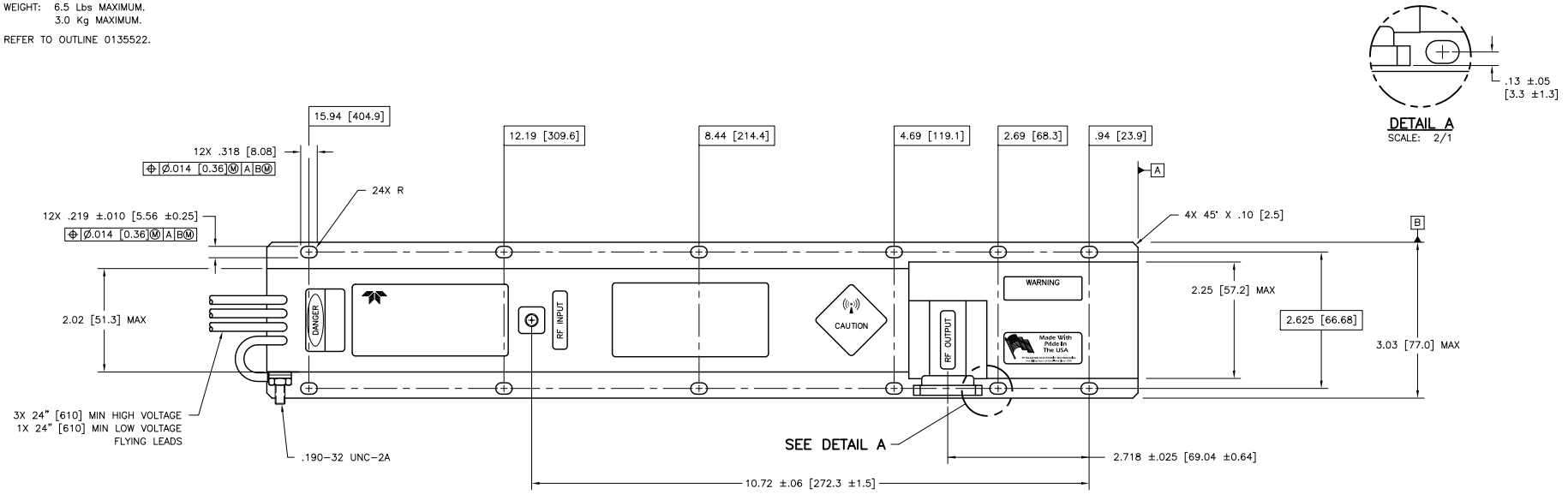
GAIN IS WITHOUT EQUALIZER.

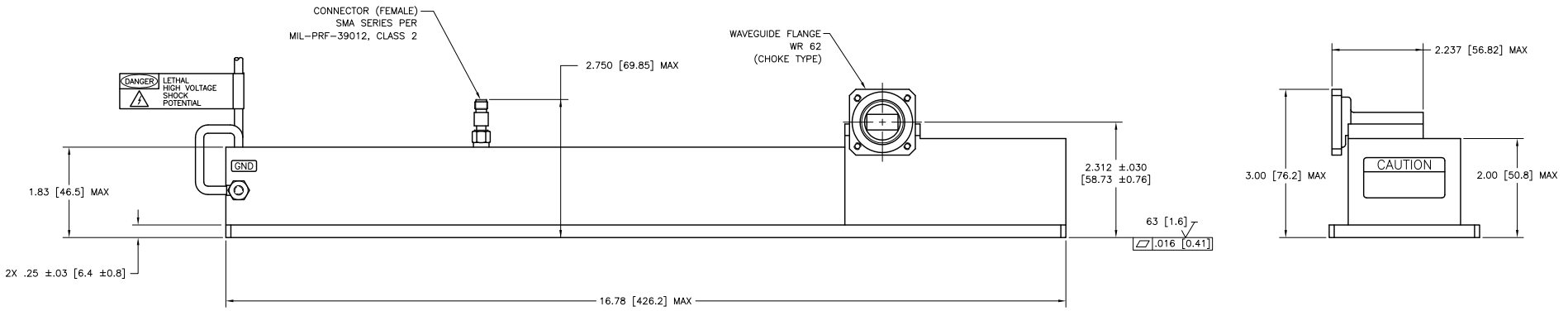
An ISO 9001:2000 Quality System Certified Company

01/06

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 6.5 Lbs MAXIMUM.
   3.0 Kg MAXIMUM.
3. REFER TO OUTLINE 0135522.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
GRID	GREEN

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

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DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638–3344

TITLE

OUTLINE DRAWING
MTI 3056C

05/99

TELEDYNE MEC

11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MEC 3086

15.53 TO 17.87 GHz

TYPICAL OPERATING CONDITIONS			POWER SUPPLY REQUIREMENTS		
ELEMENT	VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER	−6.2 Vdc	1.66 A	−5.8 Vdc	−6.6 Vdc	2.5 A
HELIX	GROUND	* 5.2 mApk ** 3.1 mApk	GROUND		20 mApk
GRID DRIVE	195 Vpk	0 mApk	150 Vpk	275 Vpk	20 mApk
GRID BIAS OFF	−300 Vdc	0 mA	−300 Vdc	−300 Vdc	1.0 mA
CATHODE (Ek)	−12.2 kV	416 mApk	−12 kV	−13 kV	480 mApk
COLLECTOR #1	7.2 kV	*38.0 mApk ** 5.0 mApk	59% X Ek ±2%		200 mApk
COLLECTOR #2	5.0 kV	* 373 mApk ** 408 mApk	41% X Ek ±2%		480 mApk

* WITH RF DRIVE

** WITHOUT RF DRIVE

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
15.53	710	700	45
16.15	725	700	47
16.70	725	700	48
17.15	725	700	47
17.87	710	700	47

GAIN IS WITHOUT EQUALIZER.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	1.65:1	2.0:1
OUTPUT VSWR	1.33:1	1.5:1
DUTY CYCLE	35%	35%
NOISE POWER DENSITY (OFF)	> −105 dBm/MHz	−105 dBm/MHz
SPECTURAL PURITY	> −50 dBc	−50 dBc
TEMPERATURE RANGE	−40° to 85 °C	——

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.

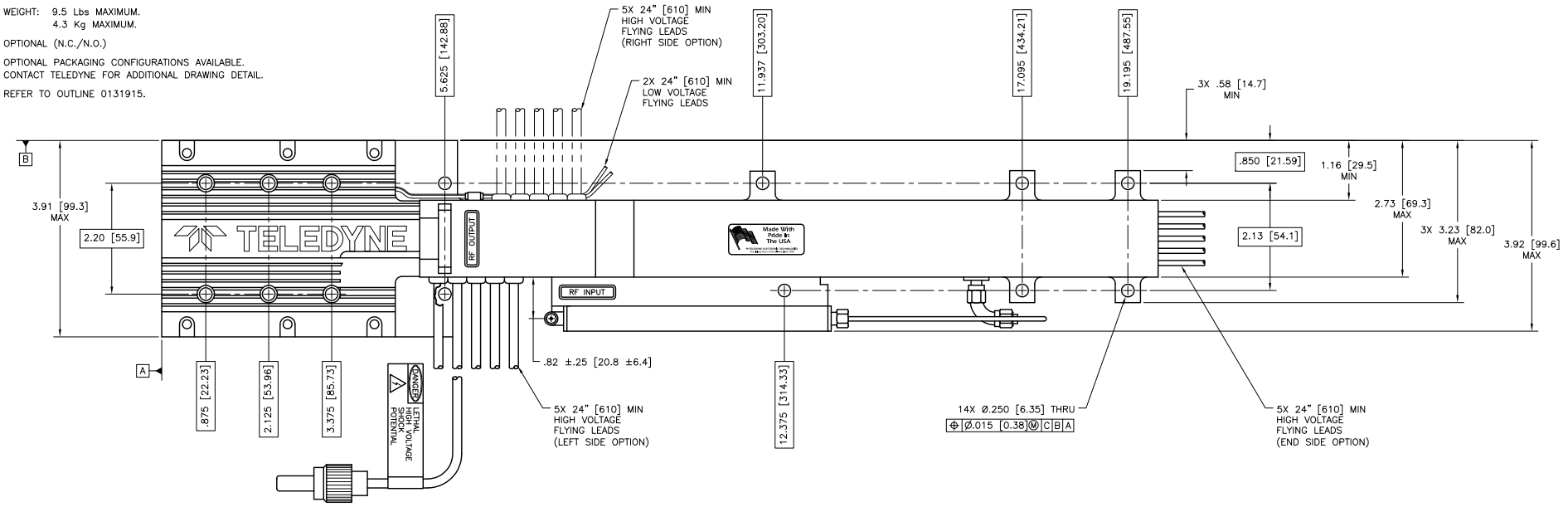
NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

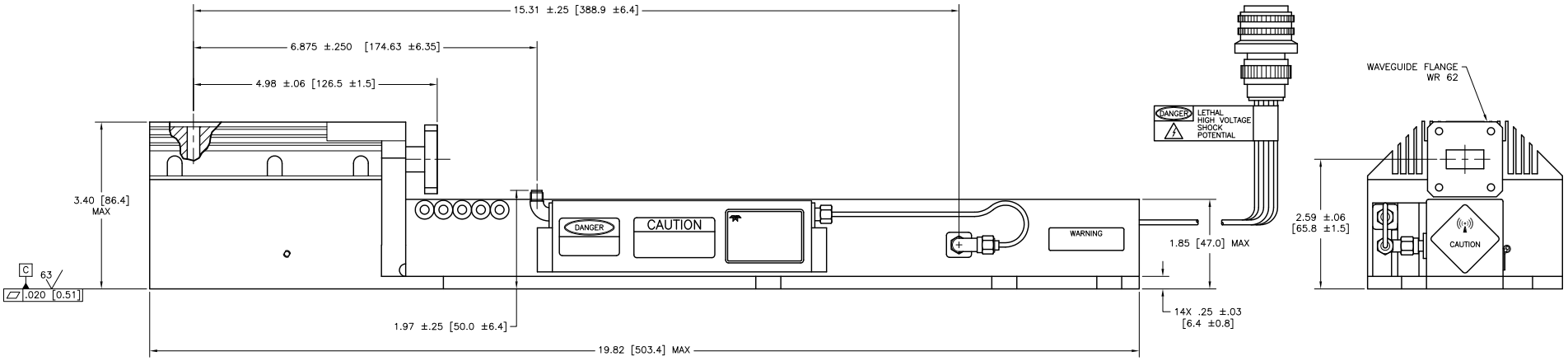
An ISO 9001:2000 Quality System Certified Company

01/04

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 9.5 Lbs MAXIMUM.
   4.3 Kg MAXIMUM.
3. OPTIONAL (N.C./N.O.)
4. OPTIONAL PACKAGING CONFIGURATIONS AVAILABLE.
   CONTACT TELEDYNE FOR ADDITIONAL DRAWING DETAIL.
5. REFER TO OUTLINE 0131915.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
GRID	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT	GRAY

3

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

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DECIMALS .XX ±.02 .XXX ±.005
ANGLES ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MEC 3086

01/04

TELEDYNE MEC

11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

An ISO 9001:2000 Quality System Certified Company

RECTANGULAR WAVEGUIDE SPECIFICATIONS

EIA WG Designation	Recommended Operating Range for $TE_{1,0}$ Mode		Cut-Off for $TE_{1,0}$ Mode		Range In $\frac{2\lambda}{\lambda_c}$	Range In $\frac{\lambda}{\lambda_c}$	Recommended Power Rating (At One Atmosphere)		Theoretical Attenuation lowest to highest frequency (dB/100 ft.)	DIMENSIONS (Inches)				Wall Thickness Nominal
	Frequency (GHz-Sec)	Wavelength (cm)	Frequency (GHz-Sec)	Wavelength (cm)			cw(KW)	peak(KW)		Inside	Tol. ±	Outside	Tol. ±	
WR137	5.85-8.20	5.12-3.66	4.285	6.996	1.47-1.05	1.48-1.17	10.0 8.0	1980	1.987-1.562 2.955-2.348	1.372 x .622	.004	1.500 x .750	.004	.064
WR102	7.00-11.00	4.28-2.72	5.786	5.182	1.65-1.05	1.78-1.18	5.0 4.0	1020	3.516-2.217 5.285-3.333	1.020 x .510	.005	1.148 x .638	.005	.064
WR112	7.05-10.00	4.25-2.99	5.260	5.700	1.49-1.05	1.51-1.17	6.0 4.8	1280	2.776-2.154 4.173-3.238	1.122 x .497	.004	1.250 x .625	.004	.064
WR90 R/H	8.20-12.40	3.66-2.42	6.560	4.572	1.60-1.06	1.68-1.18	2.0	340	10.47-9.254	.900 x .200	.003	1.000 x .300	.003	.050
WR90	8.20-12.40	3.66-2.42	6.560	4.572	1.60-1.06	1.68-1.18	3.0 2.4	760	4.238-2.995 6.506-4.502	.900 x .400	.003	1.000 x .500	.003	.050
WR75 R/H	10.00-15.00	2.99-2.00	7.847	3.820	1.57-1.05	1.64-1.17	1.8	280	7.806-5.950	.750 x .200	.003	.850 x .300	.003	.050
WR75	10.00-15.00	2.99-2.00	7.847	3.820	1.57-1.05	1.64-1.17	2.8 2.2	620	5.121-3.577 7.698-5.377	.750 x .375	.003	.850 x .475	.003	.050
WR62	12.40-18.00	2.42-1.66	9.490	3.160	1.53-1.05	1.55-1.18	1.8 1.4	460	6.451-4.743 9.700-7.131	.622 x .311	.002	.702 x .391	.003	.040
WR28	26.50-40.00	1.13-.75	21.10	1.422	1.59-1.05	1.65-1.17	0.5 0.4	100	23.02-15.77 34.46-23.59	.280 x .140	.001	.360 x .220	.002	.040

Courtesy of Continental Microwave & Tool Company, Inc.

DOUBLE RIDGE WAVEGUIDE SPECIFICATIONS

Waveguide Size	MIL-W-23351 Dash No.	Material	Recommended Frequency Range $TE_{1,0}$ Mode (GHz)	(3) Cut-Off Frequency for $TE_{1,0}$ Mode (GHz)	(1) $F=\sqrt{3}Fc_{1,0}$ Theoretical Attenuation Decibels/Foot	(2) Recommended Power Rating (At One Atmosphere)		DIMENSIONS (Inches)						
						cw(KW)	peak(KW)	A	B	C	D	E	F	R1	R2
WRD 475D24	4-033 4-034 4-035 4-036	Aluminum Alloy Brass Copper Silver Alloy	4.75 - 11.0	3.961	0.0487 0.0481 0.0324 0.0347	8.0	85	1.090	.506	1.190	.606	.272	.215	.043	.030
WRD 580D28		Aluminum Alloy Brass Copper Silver Alloy	5.80 - 16.00	4.892	0.100 0.098 0.067 0.070	5.2	32	.780	.370	.880	.470	.200	.120	.043	.015
WRD 650D28		Aluminum Alloy Brass Copper Silver Alloy	6.50 - 18.00	5.348	0.106 0.105 0.070 0.076	4.0	25	.721	.321	.821	.421	.173	.101	.022	.020
WRD 750D24	4-037 4-038 4-039 4-040	Aluminum Alloy Brass Copper Silver Alloy	7.50 - 18.00	6.239	0.0964 0.0951 0.0641 0.0686	4.8	35	.691	.321	.791	.421	.173	.136	.027	.020
WRD 180C24	4-045 4-046 4-047 4-048	Aluminum Alloy Brass Copper Silver Alloy	18.00 - 40.00	14.995	0.358 0.353 0.238 0.255	0.8	5	.288	.134	.368	.214	.072	.057	.011	.015

Courtesy of Continental Microwave & Tool Company, Inc.

Waveguide Size	MIL-W-23351 Dash No.	Material	Recommended Frequency Range $TE_{1,0}$ Mode (GHz)	(3) Cut-Off Frequency for $TE_{1,0}$ Mode (GHz)	(1) $F=\sqrt{3}Fc_{1,0}$ Theoretical Attenuation Decibels/Foot	(2) Recommended Power Rating (At One Atmosphere)		DIMENSIONS (Inches)						
						cw(KW)	peak(KW)	A	B	C	D	E	F	R1	R2
WRD 584		Aluminum	5.80 - 18.40	4.467	0.188	4	30	.720	.310	.925	.510	.180	.064	.043	.015

Courtesy of (MDC) Microwave Development Co.

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587

An ISO 9001:2000 Quality System Certified Company

COMMUNICATION TWTs

Page #	Model	Frequency Band	Power (W)	Duty (%) Max	Typical Gain (dB) Min/Max @ Rated Pout	Efficiency (%) Typical	Modulation (Control Electrode)	Output Connection	Weight (Lbs/Kg) (NTE)
45	MEC 5417	5.85-6.45	282 **	100	39/41	19	GRID	WRD 580	8.5/3.9
46	MEC 5337	C/Ku	350/400	100	38/52	27	GRID	WRD 580	8.5/3.9
47	MTG 5336B	C/Ku	325/325	100	38/52	27	FE	WRD 580	8.5/3.9
48	MTG 5336AX	C/Ku	400/400	100	38/52	30	FE	WRD 580	8.5/3.9
49	MTG 5333	C/X/Ku	325/400/325	100	37/46/48	27	GRID	WRD 580	8.5/3.9
	MTG 5336	C/X/Ku	325/400/325	100	37/46/48	27	FE	WRD 580	8.5/3.9
50	MEC 5599	C/X/Ku	112/158/91	100	41/41/40	28	FE	WRD 580	4.5/2.0
51	MTG 5338X	C/X/Ku	350/600/350	100	37/46/48	35 *	FE	WRD 580	8.5/3.9
52	MEC 5450X	7.9-8.4	600	100	46	35	FE	CMR 112	8.5/3.9
53	MEC 5499	13.75-14.5	200	100	53/55	32 **	N/A	WR 75	8.5/3.9
54	MEC 5441	Ku/DBS	350/300	100	43/51	29 *	GRID	WR 62	7.5/3.4
	MEC 5442	Ku/DBS	350/300	100	43/51	29 *	FE	WR 62	7.5/3.4
55	MEC 5452	13.75-14.50	500	100	60	40	FE	WR 75	8.5/3.9
	MEC 5455	13.75-14.50	500	100	60	40	GRID	WR 75	8.5/3.9
56	MEC 5466	17.30-18.40	450/500	100	45/47	32 *	FE	WR 62	9.0/4.1
57	MEC 5495	27.00-31.00	120	100	34	17 **	FE	2X WR 28	7.0/3.2

* Over majority of frequency range – Performance may be reduced at band edges.

** With <-26 dBc QPSK spectral regrowth @ mid band.

Note: RF input components may be integrated with the TWT at TELEDYNE to improve system gain and phase variation performance.

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

This model number is subject to the jurisdiction of the U.S. Department of Commerce.

MODEL NO. MEC 5417

5.85 to 6.45 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6 Vdc	1.6 A	−5.8 Vdc	−6.6 Vdc	2 A
HELIX	W/ RF	GROUND	5 mA	GROUND		10 mA
	W/O RF		1 mA			
GRID ON		200 Vdc	0.5 mA	100 Vdc	250 Vdc	5 mA
GRID OFF		−250 Vdc	0.1 mA	−250 Vdc	−500 Vdc	1 mA
CATHODE (Ek)		−10.7 kV	300 mA	−10 kV	−11 kV	325 mA
COLLECTOR	#1	5.99 kV	75 mA	56% x Ek ±2%		150 mA
	#2	4.28 kV	220 mA	40% x Ek ±2%		325 mA

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR AND GRID VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.
NOTE 3: CURRENTS MEASURED AT LINEAR POWER OUTPUT.
NOTE 4: COLLECTOR VOLTAGE OPTIMIZED FOR LINEAR PERFORMANCE. HELIX CURRENT WILL EXCEED MAX IF TWT DRIVEN TO SATURATION.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2.4:1	2.5:1
OUTPUT VSWR	1.5:1	1.6:1
THIRD ORDER INTERCEPT	61 dBm	——
GRID CAPACITANCE	37 pF	65 pF
MIN HARMONIC SEPARATION	−15 dBc	−10 dBc *
NOISE POWER DENSITY	−12 dBm/MHz	−10 dBm/MHz
PRIME POWER	1459W **	1500W **
TEMPERATURE RANGE	−40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN *** LINEAR POWER OUTPUT (WATTS)	TYP GAIN AT LINEAR POWER dB
5.85	445	282 *	41
6.15	445	282 **	41
6.45	445	282	39

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

GAIN IS WITH EQUALIZER.

*** SPECTRAL REGROWTH (QPSK MODULATION) MEASURED AT ONE SYMBOL RATE SHALL BE NO GREATER THAN −26dBc.

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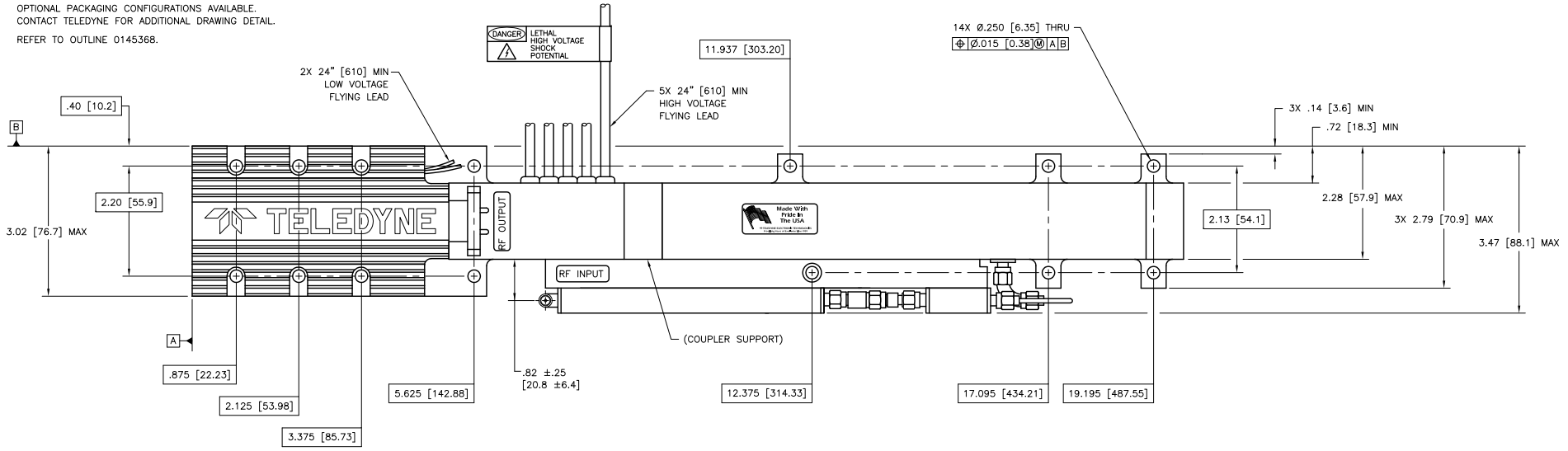
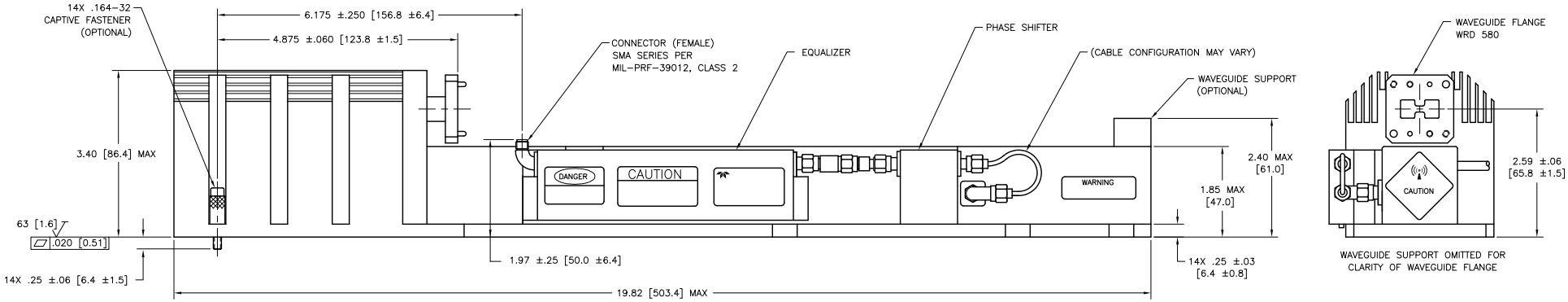
01/04

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 8.5 Lbs MAXIMUM.
   3.9 Kg MAXIMUM.
3. OPTIONAL PACKAGING CONFIGURATIONS AVAILABLE. CONTACT TELEDYNE FOR ADDITIONAL DRAWING DETAIL.
4. REFER TO OUTLINE 0145368.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
CONTROL ELECTRODE	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (N.C.)	GRAY

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MEC 5417

01/04

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

This model number is controlled by the International Traffic in Arms Regulations, and can only be exported via a U.S. Department of State export license. They may not be transferred, transshipped on a non-continuous voyage, or otherwise be disposed of in any other country, either in their original form or after being incorporated into other end-items, without the prior written approval of the U.S. Department of State.

MODEL NO. MEC 5337 (GR)

DUAL-BAND

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		-6 Vdc	1.62 A	-5.8 Vdc	-6.6 Vdc	2 A
HELIX	W/ RF	GROUND	5 mA	GROUND		10 mA
	W/O RF		0.6 mA			
GRID ON		200 Vdc	1 mA	125 Vdc	250 Vdc	5 mA
GRID OFF		-250 Vdc	0.1 mA	-250 Vdc	-500 Vdc	1 mA
CATHODE (Ek)		-10.5 kV	300 mA	-10 kV	-10.8 kV	310 mA
COLLECTOR W/ RF	#1	5.88 kV	60 mA	56% x Ek ±2%		150 mA
	#2	4.2 kV	235 mA	40% x Ek ±2%		310 mA

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR, GRID OR FOCUS ELECTRODE (FE) VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
5.850	375	350 *	38
6.150	375	350	38
6.650	375	350	38
13.750	420	400 **	52
14.000	420	400	52
14.250	420	400	52
14.500	420	400	52

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

GAIN IS WITH EQUALIZER.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	1.8:1	2:1
OUTPUT VSWR	2.3:1	2.5:1
MAXIMUM DUTY	——	CW
GRID CAPACITANCE	37 pF	50 pF
MIN HARMONIC SEPARATION	-5/-20 dBc	-3*/-15** dBc
NOISE POWER DENSITY	-12 dBm/MHz	-10 dBm/MHz
PRIME POWER	1412 W	1450 W
TEMPERATURE RANGE	-40° to 85 °C	——

SPECTRAL REGROWTH:

FREQUENCY	MINIMUM LINEAR POWER	MODULATION	LEVEL@1 SYMBOL RATE.
5.85 GHz	225W	QPSK	-26dBc
6.425 GHz	225W	QPSK	-26dBc
13.75 GHz	125W	QPSK	-26dBc
14.5 GHz	125W	QPSK	-26dBc

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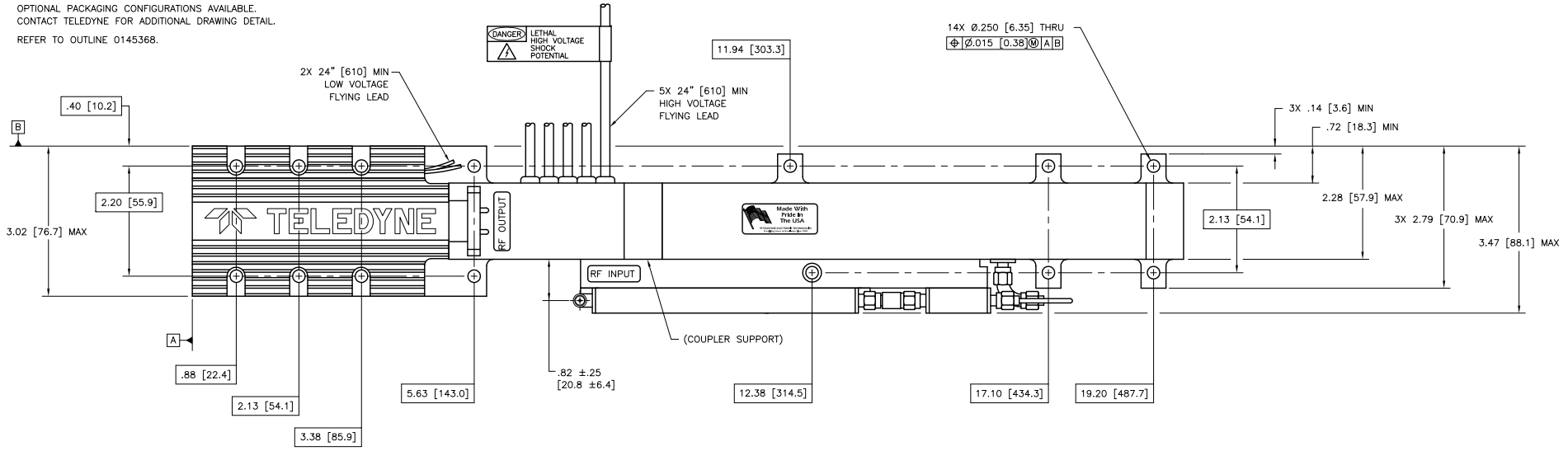
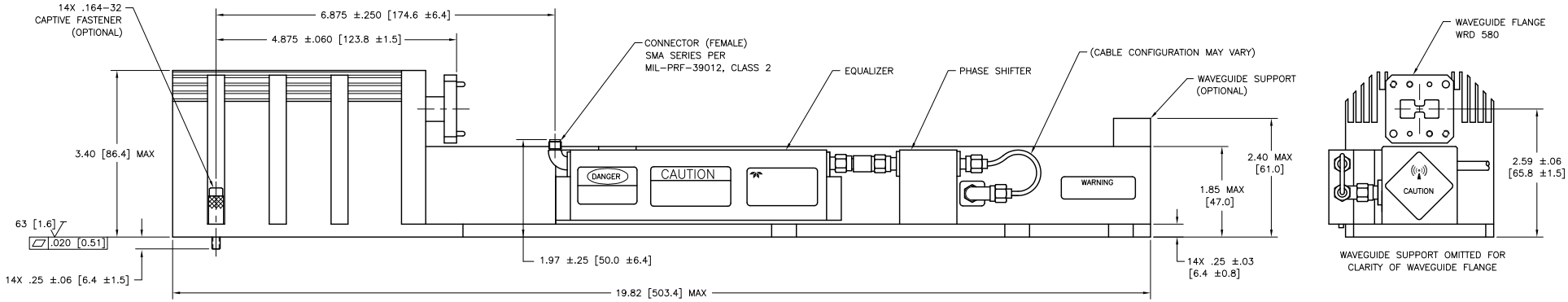
NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 8.5 Lbs MAXIMUM.
   3.9 Kg MAXIMUM.
3. OPTIONAL PACKAGING CONFIGURATIONS AVAILABLE. CONTACT TELEDYNE FOR ADDITIONAL DRAWING DETAIL.
4. REFER TO OUTLINE 0145368.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
CONTROL ELECTRODE	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (N.C.)	GRAY

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED
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TOLERANCES ON
DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING MEC 5337 (GRID)

01/04

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MTG 5336B (FE)

DUAL-BAND

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		-6 Vdc	1.62 A	-5.8 Vdc	-6.6 Vdc	2 A
HELIX	W/ RF	GROUND	8 mA	GROUND		10 mA
	W/O RF		0.6 mA			
FE ON		-40 Vdc	0.1 mA	0	-75 Vdc	1 mA
FE OFF		-1300 Vdc	0.1 mA	-1300 Vdc	-1500 Vdc	1 mA
CATHODE (Ek)		-10.75 kV	290 mA	-10 kV	-10.8 kV	300 mA
COLLECTOR W/ RF	#1	6.02 kV	80 mA	56% x Ek ±2%		150 mA
	#2	4.3 kV	202 mA	40% x Ek ±2%		300 mA

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR, GRID OR FOCUS ELECTRODE (FE) VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
5.850	375	325 *	38
6.000	375	325	38
6.425	375	325	38
6.650	375	325	38
13.750	420	325	52
14.000	420	325 **	52
14.250	420	325	52
14.500	420	325	52

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

GAIN IS WITH EQUALIZER.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2.0:1	2.3:1
OUTPUT VSWR	2.3:1	2.5:1
MAXIMUM DUTY	——	CW
FE CAPACITANCE	50 pF	65 pF
MIN HARMONIC SEPARATION	-5/-20 dBc	-3*/-15** dBc
NOISE POWER DENSITY	-12 dBm/MHz	-10 dBm/MHz
PRIME POWER	1412 W	1450 W
TEMPERATURE RANGE	-40° to 85 °C	——

SPECTRAL REGROWTH:

FREQUENCY	MINIMUM LINEAR POWER	MODULATION	LEVEL@1 SYMBOL RATE.
5.85 GHz	225W	QPSK	-26dBc
6.425 GHz	225W	QPSK	-26dBc
13.75 GHz	125W	QPSK	-26dBc
14.5 GHz	125W	QPSK	-26dBc

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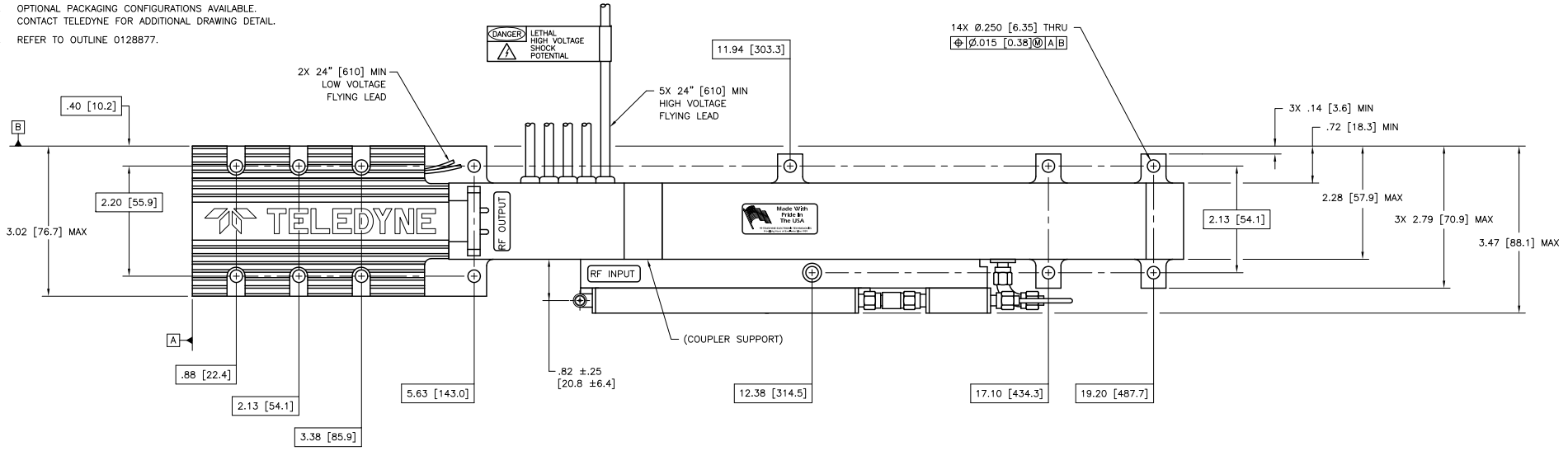
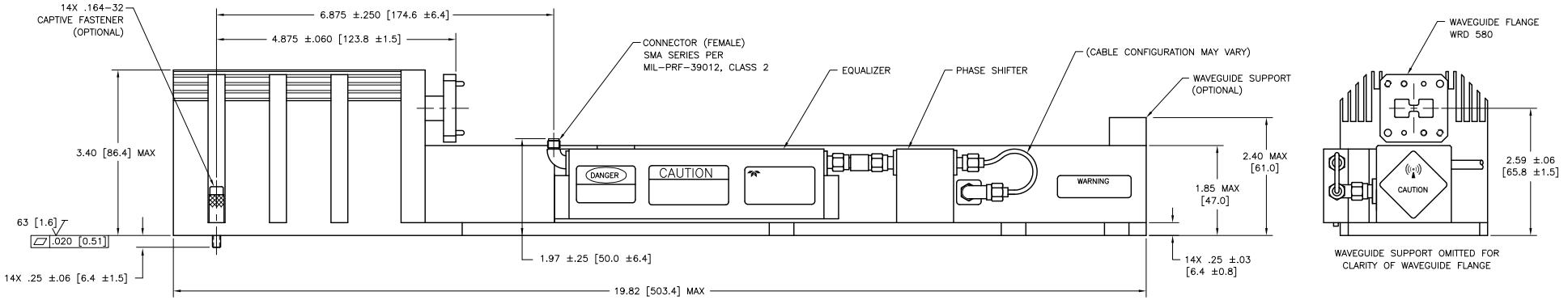
01/06

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 8.5 Lbs MAXIMUM.
   3.9 Kg MAXIMUM.
3. OPTIONAL PACKAGING CONFIGURATIONS AVAILABLE. CONTACT TELEDYNE FOR ADDITIONAL DRAWING DETAIL.
4. REFER TO OUTLINE 0128877.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
CONTROL ELECTRODE	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (N.C.)	GRAY

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

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.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MTG 5336B (FE)

01/02

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MTG 5336AX (FE)

DUAL-BAND

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		-6 Vdc	1.3 A	-5.8 Vdc	-6.6 Vdc	2 A
HELIX	W/ RF	GROUND	6 mA	GROUND		10 mA
	W/O RF		1 mA			
FE ON		-6 Vdc	0.1 mA	0	-10 Vdc	1 mA
FE OFF		-1600 Vdc	0.1 mA	-1600 Vdc	-1800 Vdc	1 mA
CATHODE (Ek)		-10.8 kV	300 mA	-9.6 kV	-11.4 kV	340 mA
COLLECTOR W/ RF	#1	6.05 kV	70 mA	56% x Ek ±2%		125 mA
	#2	4.32 kV	224 mA	40% x Ek ±2%		330 mA

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR, AND FOCUS ELECTRODE (FE) VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
5.850	425	400 *	38
6.250	425	400	38
6.650	425	400	38
13.750	420	400 **	52
14.250	420	400	52
14.500	420	400	52

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

GAIN IS WITH EQUALIZER.

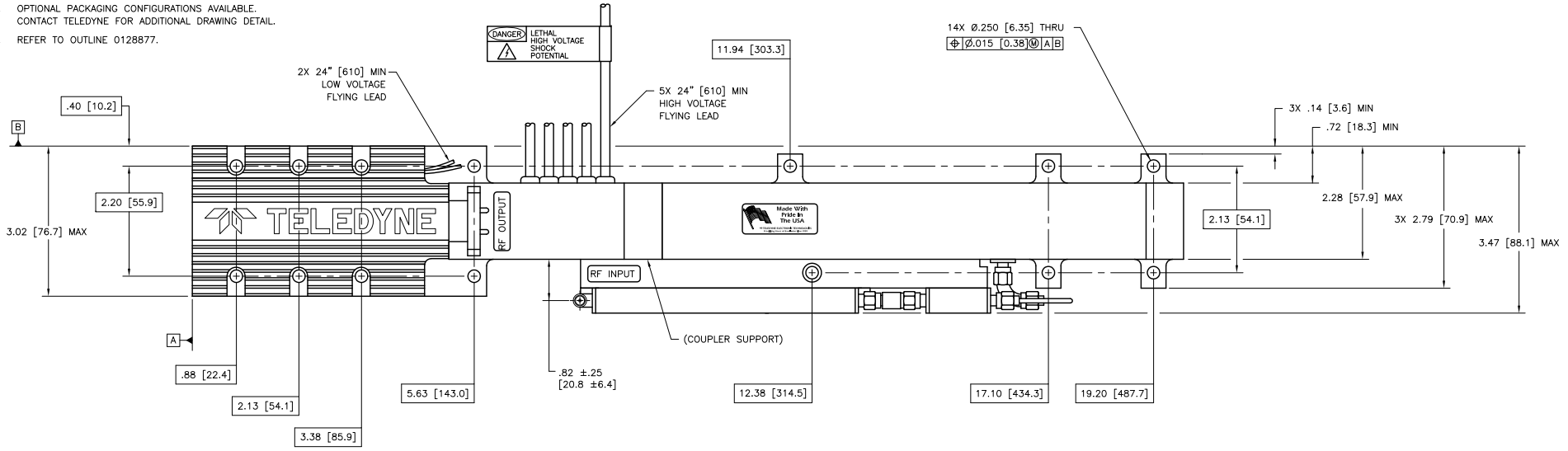
SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2.0:1	2.25:1
OUTPUT VSWR	2.2:1	2.3:1
MAXIMUM DUTY	——	CW
FE CAPACITANCE	50 pF	65 pF
MIN HARMONIC SEPARATION	-5/-20 dBc	-3*/-15** dBc
NOISE POWER DENSITY	-14 dBm/MHz	-12 dBm/MHz
PRIME POWER	1465 W	1550 W
TEMPERATURE RANGE	-40° to 85 °C	——

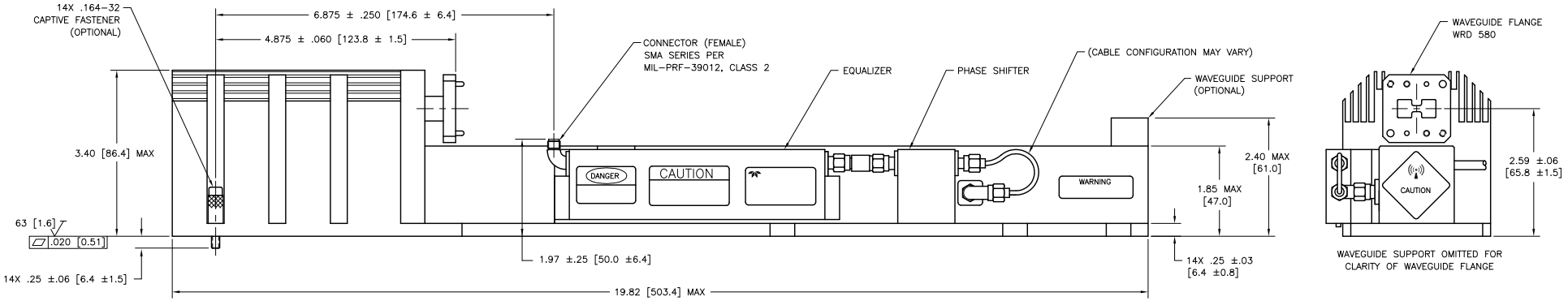
An ISO 9001:2000 Quality System Certified Company

01/06

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 8.5 Lbs MAXIMUM.
   3.9 Kg MAXIMUM.
3. OPTIONAL PACKAGING CONFIGURATIONS AVAILABLE. CONTACT TELEDYNE FOR ADDITIONAL DRAWING DETAIL.
4. REFER TO OUTLINE 0128877.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
CONTROL ELECTRODE	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (N.C.)	GRAY

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED
DIMENSIONS ARE IN INCHES
TOLERANCES ON DECIMALS .XX ±.02 .XXX ±.005 ANGLES ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING MTG 5336AX (FE)

01/02

TELEDYNE MEC
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MODEL NO. MTG 5333 (GR)
MTG 5336 (FE)
TRI-BAND

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		-5.8 Vdc	1.62 A	-5.8 Vdc	-6.6 Vdc	2 A
HELIX	W/ RF	GROUND	8 mA	GROUND		10 mA
	W/O RF		0.6 mA			
FE ON		-6 Vdc	0.1 mA	0	-10 Vdc	1 mA
FE OFF		-1300 Vdc	0.1 mA	-1300 Vdc	-1500 Vdc	1 mA
GRID ON		200 Vdc	1 mA	125 Vdc	250 Vdc	5 mA
GRID OFF		-250 Vdc	0.1 mA	-250 Vdc	-500 Vdc	1 mA
CATHODE (Ek)		-10.65 kV	300 mA	-10 kV	-10.8 kV	300 mA
COLLECTOR W/ RF	#1	5.96 kV	80 mA	56% x Ek ±2%		150 mA
	#2	4.26 kV	202 mA	40% x Ek ±2%		300 mA

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR, GRID OR FOCUS ELECTRODE (FE) VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2.3:1	2.5:1
OUTPUT VSWR	1.8:1	2:1
MAXIMUM DUTY	——	CW
FE CAPACITANCE	50 pF	65 pF
GRID CAPACITANCE	37 pF	50 pF
MIN HARMONIC SEPARATION	-5/-8/-20 dBc	-3*/-5**/-15*** dBc
NOISE POWER DENSITY	-12 dBm/MHz	-10 dBm/MHz
PRIME POWER	1412 W	1450 W
TEMPERATURE RANGE	-40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
5.850	375	325 *	37
6.000	375	325	37
6.425	375	325	37
7.900	450	400 **	46
8.200	450	400	46
8.400	450	400	46
14.000	375	325***	48
14.250	375	325	48
14.500	375	325	48

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

GAIN IS WITH EQUALIZER.

SPECTRAL REGROWTH: USING A TELEDYNE APPROVED LINEARIZER

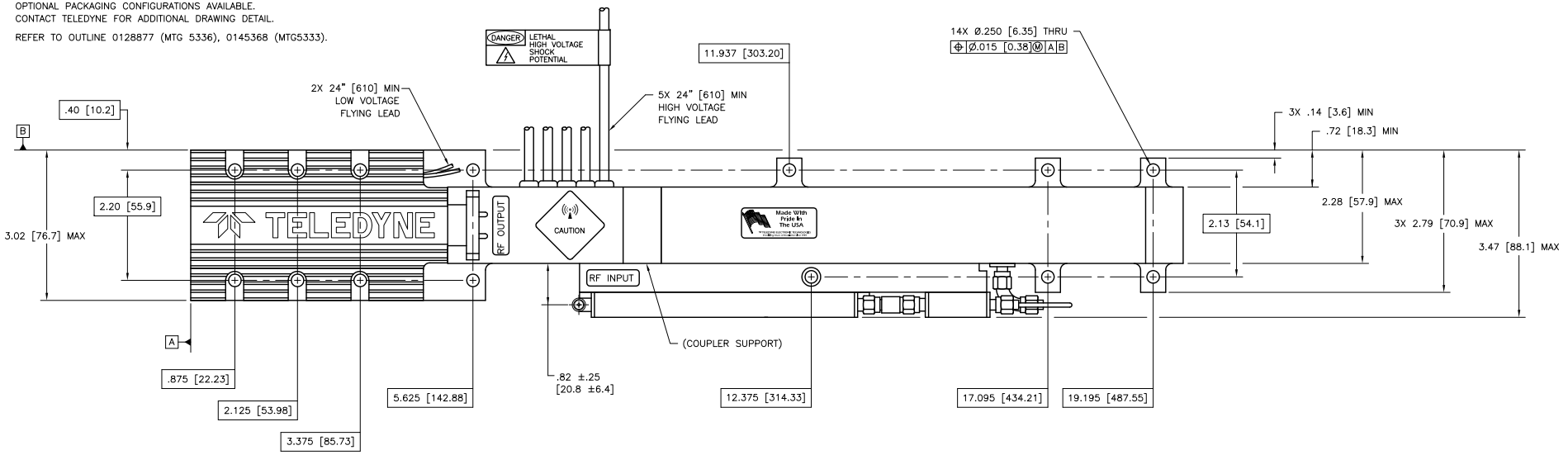
FREQUENCY	MINIMUM LINEAR POWER	MODULATION	LEVEL@1 SYMBOL RATE.
7.9 GHz	250W	OQPSK	-30dBc
8.4 GHz	250W	OQPSK	-30dBc

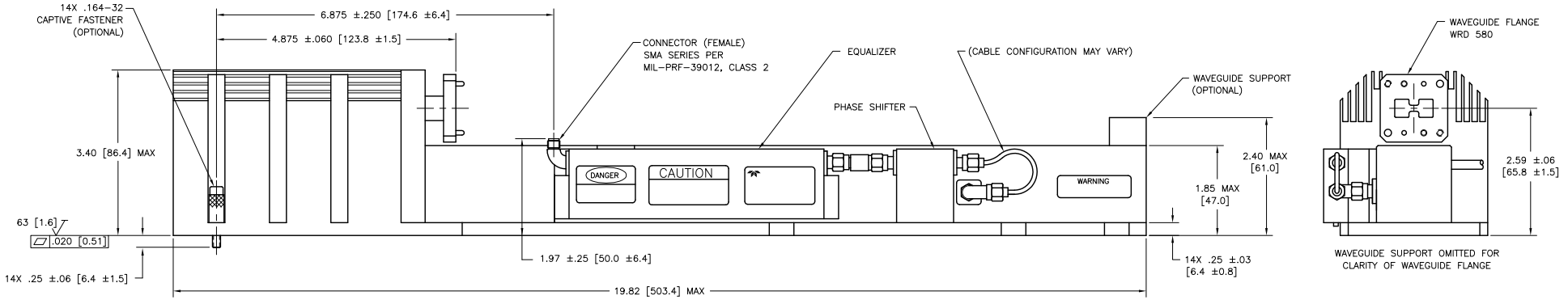
An ISO 9001:2000 Quality System Certified Company

01/04

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 8.5 Lbs MAXIMUM.
   3.9 Kg MAXIMUM.
3. OPTIONAL PACKAGING CONFIGURATIONS AVAILABLE.
   CONTACT TELEDYNE FOR ADDITIONAL DRAWING DETAIL.
4. REFER TO OUTLINE 0128877 (MTG 5336), 0145368 (MTG5333).





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
CONTROL ELECTRODE	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (N.C.)	GRAY

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED
DIMENSIONS ARE IN INCHES
TOLERANCES ON DECIMALS .XX ±.02 .XXX ±.005 ANGLES ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC

11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MTG 5333 (GRID)
MTG 5336 (FE)

01/04

TELEDYNE MEC

11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

This model number is subject to the jurisdiction of the U.S. Department of Commerce.

MODEL NO. MEC 5599

TRI-BAND

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		-6.0 Vdc	1.3 A	-5.9 Vdc	-6.7 Vdc	1.5 A
HELIX	W/ RF	GROUND	15 mA	GROUND		22 mA
	W/O RF		5 mA			
FE ON		-6 Vdc	0.1 mA	0	-10 Vdc	1 mA
FE OFF		-1400 Vdc	0.5 mA	-1400 Vdc	-1600 Vdc	1 mA
CATHODE (Ek)		-5.0 kV	220 mA	-4.6 kV	-5.2 kV	220 mA
COLLECTOR W/ RF	#1	4.0 kV	65.0 mA	80% x Ek ±2%		100 mA
	#2	2.0 kV	140 mA	40% x Ek ±2%		220 mA

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR, GRID OR FOCUS ELECTRODE (FE) VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
5.850	130	112 *	41
6.000	140	112	41
6.425	160	112	41
7.900	199	158 **	41
8.200	190	158	41
8.400	181	158	41
14.000	95	91 ***	40
14.250	95	91	40
14.500	100	91	40

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2.95:1	3.0:1
OUTPUT VSWR	2.1:1	2.3:1
MAXIMUM DUTY	——	CW
FE CAPACITANCE	46 pF	65 pF
MIN HARMONIC SEPARATION	-5/-10/-20 dBc	-3*/-8**/-12*** dBc
NOISE POWER DENSITY	-19 dBm/MHz	-17 dBm/MHz
PRIME POWER	640 W	660 W
TEMPERATURE RANGE	-40° to 85 °C	——

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.
GAIN IS WITH EQUALIZER.
REQUIRES INDEPENDENT (Ek) IN EACH BAND.

SPECTRAL REGROWTH: X BAND IS USING A TELEDYNE APPROVED LINEARIZER

FREQUENCY	MINIMUM LINEAR POWER	MODULATION	LEVEL@1SYMBOL RATE
5.85 GHz	42W	QPSK	-26dBc
6.425 GHz	50W	QPSK	-26dBc
7.9 GHz	43W	OQPSK	-30dBc
8.4 GHz	32W	OQPSK	-30dBc
13.75 GHz	45W	QPSK	-26dBc
14.5 GHz	44W	QPSK	-26dBc

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NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 4.5 Lbs MAXIMUM.
   2.0 Kg MAXIMUM.
3. REFER TO OUTLINE 0149795.

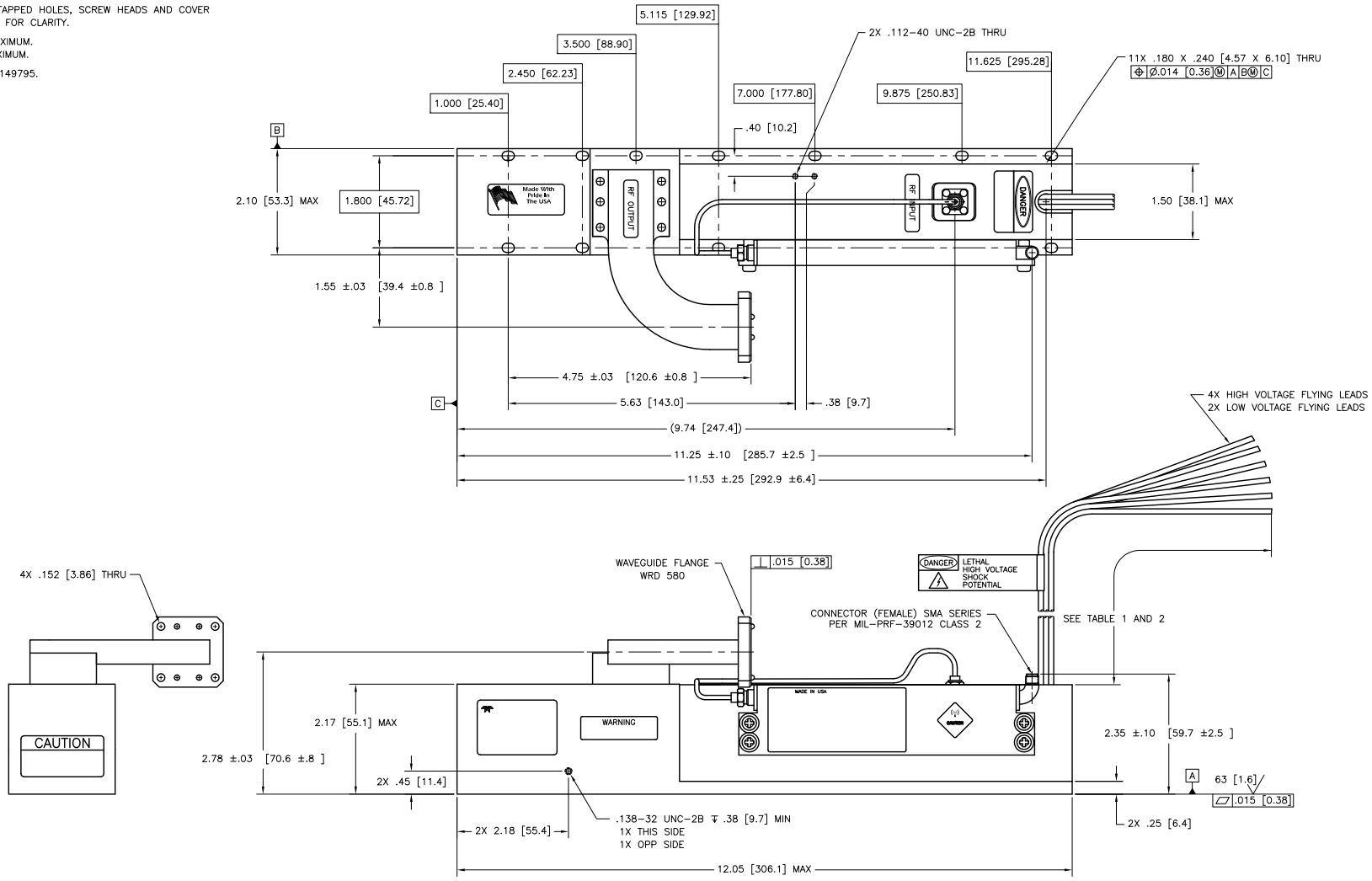

TABLE 1 – HIGH VOLTAGE CONNECTIONS		
FUNCTION	COLOR	LEAD LENGTH ±.50 [±12.7]
HEATER	BROWN	26.00 [660.4]
CATHODE	YELLOW	26.00 [660.4]
COLLECTOR #1	RED	26.00 [660.4]
COLLECTOR #2	WHITE	26.00 [660.4]

TABLE 2 – LOW VOLTAGE CONNECTIONS		
FUNCTION	COLOR	LEAD LENGTH ±.50 [±12.7]
HELIX/GROUND	BLACK	26.00 [660.4]
THERMOSTAT (N.C.)	TWIN GRAY	26.00 [660.4]

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED

DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.02 .XXX ±.005
ANGLES ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MEC 5599

12/08

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

This model number is controlled by the International Traffic in Arms Regulations, and can only be exported via a U.S. Department of State export license. They may not be transferred, transshipped on a non-continuous voyage, or otherwise be disposed of in any other country, either in their original form or after being incorporated into other end-items, without the prior written approval of the U.S. Department of State.

MODEL NO. MTG 5338X (FE)

TRI-BAND

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		-5.8 Vdc	1.62 A	-5.8 Vdc	-6.8 Vdc	2 A
HELIX	W/ RF	GROUND	4 mA	GROUND		10 mA
	W/O RF		1 mA			
FE ON		-6 Vdc	0.1 mA	0	-10 Vdc	1 mA
FE OFF		-1300 Vdc	0.1 mA	-1300 Vdc	-1500 Vdc	1 mA
CATHODE (Ek)		-10.95 kV	340 mA	-10.1 kV	-11.1 kV	340 mA
COLLECTOR W/ RF	#1	6.68 kV	80 mA	61% x Ek ±2%		125 mA
	#2	4.38 kV	256 mA	40% x Ek ±2%		340 mA

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR, GRID OR FOCUS ELECTRODE (FE) VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
5.850	400	350 *	37
6.000	400	350	37
6.425	400	350	37
7.900	640	600 **	46
8.200	635	600	46
8.400	630	600	46
14.000	400	350***	48
14.250	400	350	48
14.500	400	350	48

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2.3:1	2.5:1
OUTPUT VSWR	1.8:1	2:1
MAXIMUM DUTY	——	CW
FE CAPACITANCE	50 pF	65 pF
MIN HARMONIC SEPARATION	-5/-8/-20 dBc	-3*/-5**/-15*** dBc
NOISE POWER DENSITY	-14 dBm/MHz	-12 dBm/MHz
PRIME POWER	1700 W	1750 W
TEMPERATURE RANGE	-40° to 85 °C	——

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.
GAIN IS WITH EQUALIZER.
REQUIRES INDEPENDENT (Ek) IN EACH BAND.

SPECTRAL REGROWTH: X BAND IS USING A TELEDYNE APPROVED LINEARIZER

FREQUENCY	MINIMUM LINEAR POWER	MODULATION	LEVEL@1SYMBOL RATE
5.85 GHz	280W	QPSK	-26dBc
6.425 GHz	280W	QPSK	-26dBc
7.9 GHz	380W	OQPSK	-30dBc
8.4 GHz	380W	OQPSK	-30dBc
13.75 GHz	125W	QPSK	-26dBc
14.5 GHz	125W	QPSK	-26dBc

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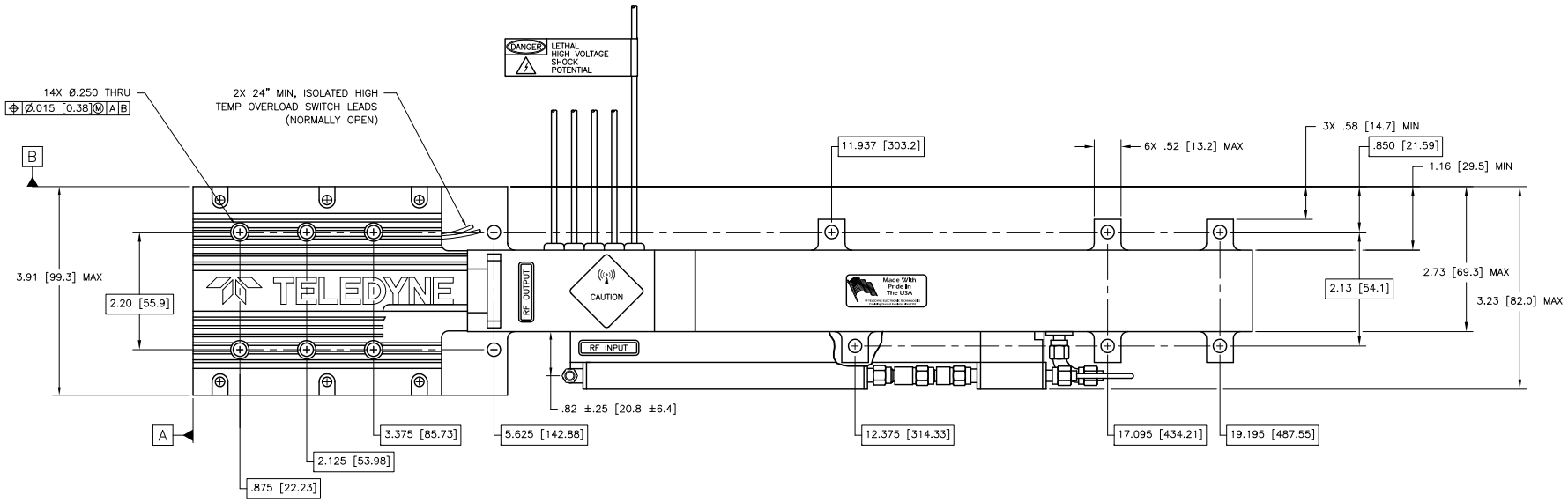
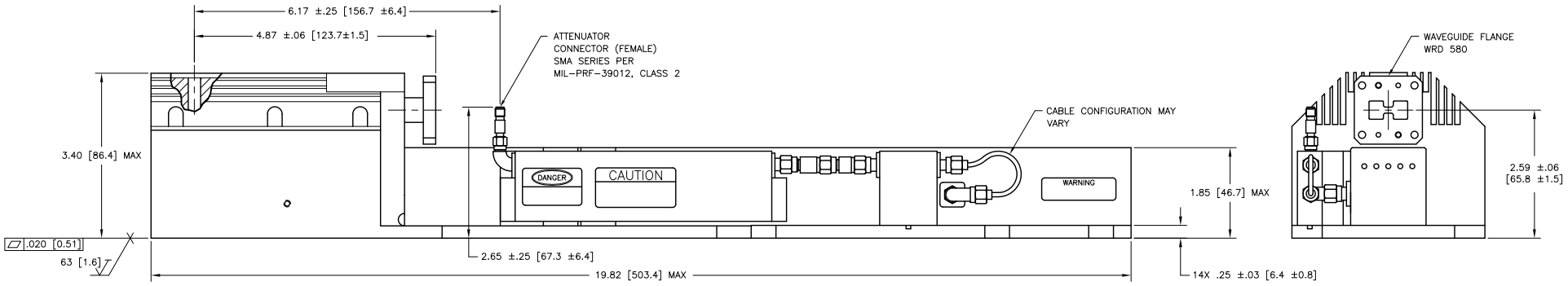
NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 8.5 Lbs MAXIMUM.
   3.9 Kg MAXIMUM.
3. OPTIONAL PACKAGING CONFIGURATIONS AVAILABLE. CONTACT TELEDYNE FOR ADDITIONAL DRAWING DETAIL.
4. REFER TO OUTLINE 0142545.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
CONTROL ELECTRODE	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
GROUND	BLACK
THERMOSTAT (N.O.)	GRAY

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MTG 5338X

01/04

TELEDYNE MEC

11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

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MODEL NO. MEC 5450X (FE)

7.9 TO 8.4 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−5.8 Vdc	1.62 A	−5.8 Vdc	−6.6 Vdc	2 A
HELIX	W/ RF	GROUND	2 mA	GROUND		10 mA
	W/O RF		1 mA			
FE ON		−6 Vdc	0.1 mA	0	−10 Vdc	1 mA
FE OFF		−1300 Vdc	0.1 mA	−1300 Vdc	−1500 Vdc	1 mA
CATHODE (Ek)		−10.95 kV	340 mA	−10.5 kV	−11.1 kV	345 mA
COLLECTOR W/ RF	#1	6.68 kV	80 mA	61% x Ek ±2%		150 mA
	#2	4.38 kV	258 mA	40% x Ek ±2%		345 mA

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.

NOTE 2: HEATER, COLLECTOR, GRID OR FOCUS ELECTRODE (FE) VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
7.900	630	600	46
8.200	630	600	46
8.400	630	600	46

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

GAIN IS WITH EQUALIZER.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	2.3:1	2.5:1
OUTPUT VSWR	1.8:1	2:1
MAXIMUM DUTY	——	CW
FE CAPACITANCE	50 pF	65 pF
MIN HARMONIC SEPARATION	−20 dBc	−15 dBc
NOISE POWER DENSITY	−16 dBm/MHz	−14 dBm/MHz
PRIME POWER	1700 W	1750 W
TEMPERATURE RANGE	−40° to 85 °C	——

SPECTRAL REGROWTH: USING A TELEDYNE APPROVED LINEARIZER

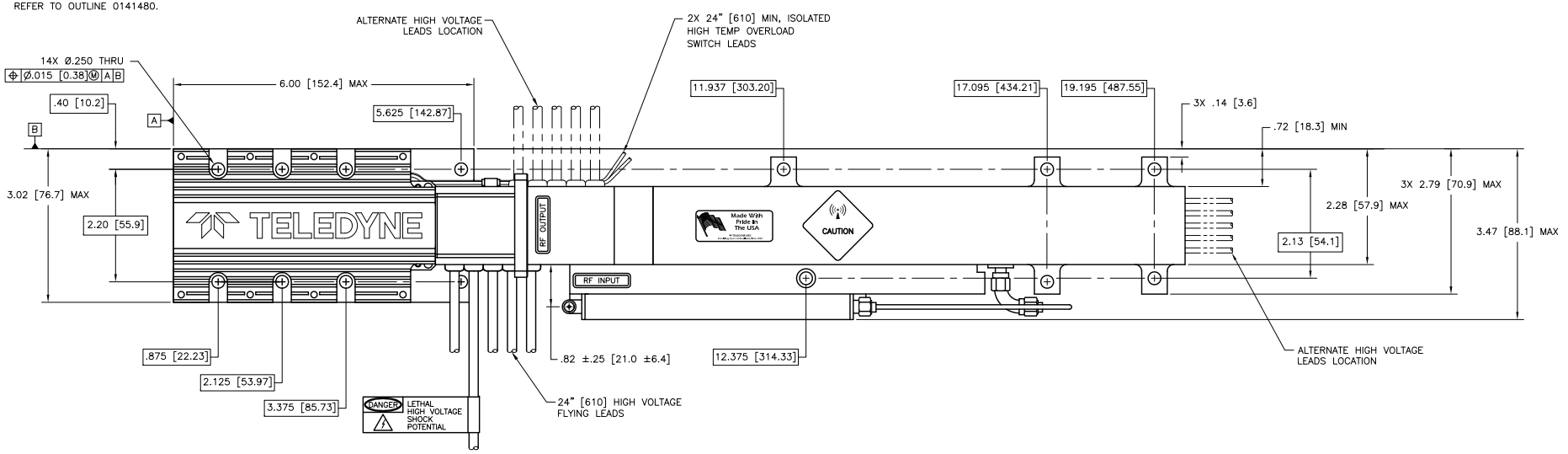
FREQUENCY	MINIMUM LINEAR POWER	MODULATION	LEVEL@1 SYMBOL RATE.
7.9 GHz	380W	OQPSK	−30dBc
8.4 GHz	380W	OQPSK	−30dBc

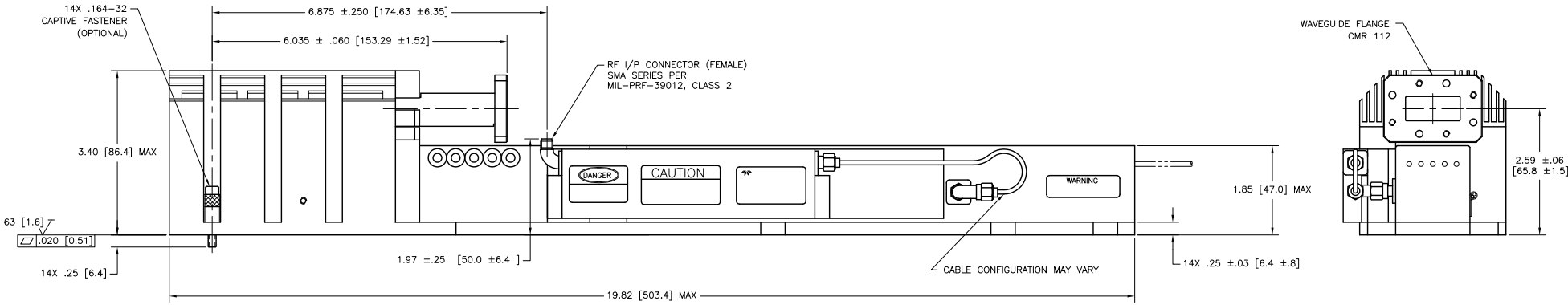
An ISO 9001:2000 Quality System Certified Company

01/04

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 8.5 Lbs MAXIMUM.
   3.9 Kg MAXIMUM.
3. OPTIONAL PACKAGING CONFIGURATIONS AVAILABLE.
   CONTACT TELEDYNE FOR ADDITIONAL DRAWING DETAIL.
4. REFER TO OUTLINE 0141480.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
CONTROL ELECTRODE	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT	GRAY

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS ANGLES
.XX ±.02 .XXX ±.005 ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING MEC 5450X

12/08

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

This model number is subject to the jurisdiction of the U.S. Department of Commerce.

MODEL NO. MEC 5499

13.75 to 14.5 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.3 Vdc	1.3 A	−6.0 Vdc	−6.6 Vdc	1.5 A
HELIX	W/RF	GROUND	6.0 mA	GROUND		12 mA
	W/O RF		2.0 mA			
CATHODE (Ek)		−6.4 kV	235 mA	−5.2 kV	−6.5 kV	300 mA
COLLECTOR #1	W/RF	3.1 kV	150 mA	48% X Ek ±2%		165 mA
	W/O RF		34 mA			
COLLECTOR #2	W/RF	1.47 kV	80 mA	23% X Ek ±2%		290 mA
	W/O RF		195 mA			

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER AND COLLECTOR ARE MEASURED WITH RESPECT TO CATHODE.

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
13.75	210	200	55
14.0	210	200	55
14.1	210	200	54
14.2	210	200	54
14.3	210	200	53
14.4	210	200	53
14.5	210	200	53

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	1.3:1	1.6:1
OUTPUT VSWR	1.4:1	1.6:1
MAXIMUM DUTY	——	CW
NOISE POWER DENSITY	−30 dBm/MHz	−26 dBm/MHz
PRIME POWER	615 W	649 W
TEMPERATURE RANGE	−30° to 75 °C	——

SPECTRAL REGROWTH:

FREQUENCY	MIN LINEAR POWER	MODULATION	LEVEL@1SYMBOL RATE
13.75 GHz	90W	QPSK	−26dBc
14.5 GHz	90W	QPSK	−26dBc

An ISO 9001:2000 Quality System Certified Company

12/08

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 8.5 Lbs MAXIMUM.
   3.9 Kg MAXIMUM.
3. OPTIONAL PACKAGING CONFIGURATIONS AVAILABLE. CONTACT TELEDYNE FOR ADDITIONAL DRAWING DETAIL.
4. REFER TO OUTLINE 0147983.

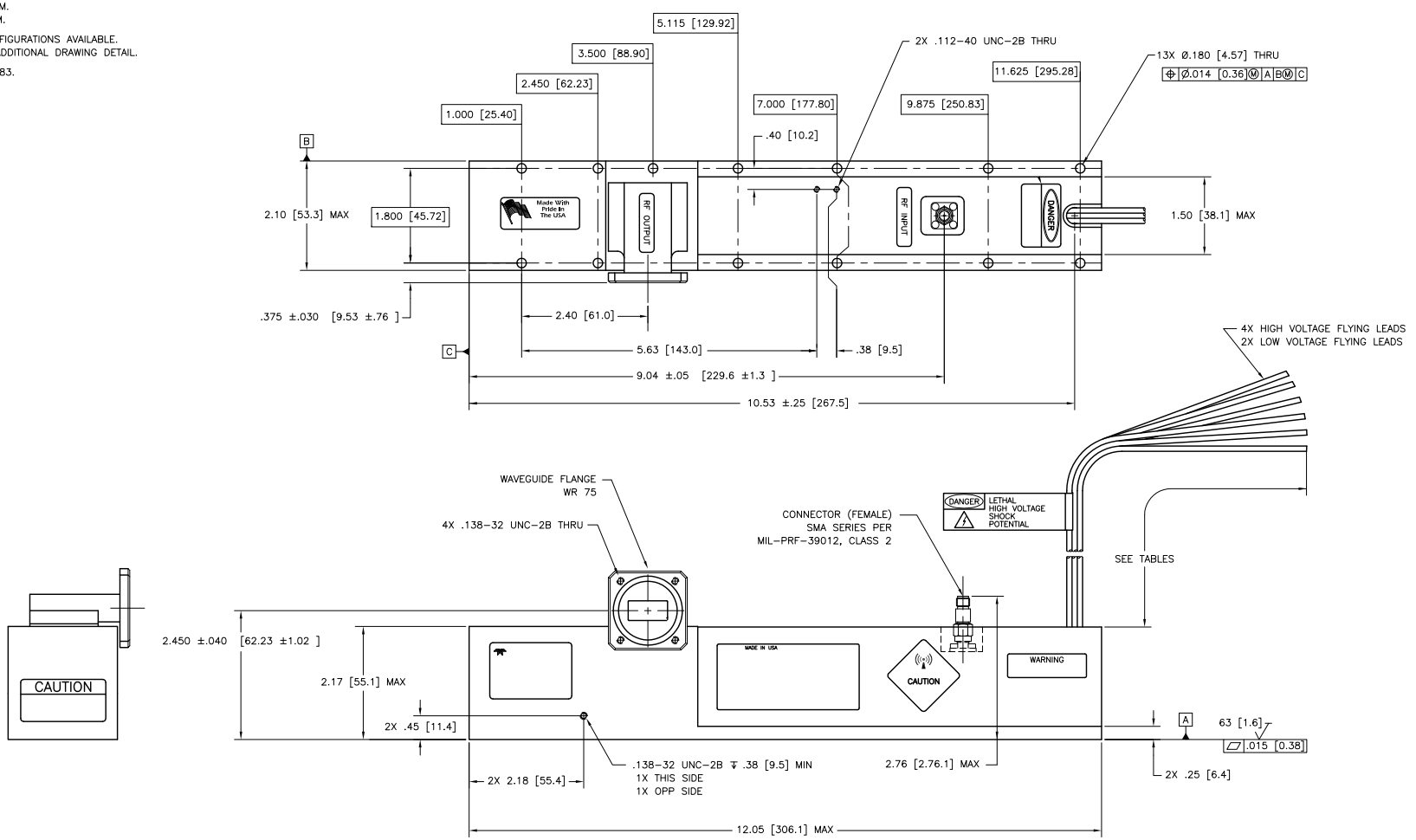


TABLE 1 – HIGH VOLTAGE CONNECTIONS		
FUNCTION	COLOR	LEAD LENGTH ±.50 [±12.7]
HEATER	BROWN	26.00 [660.4]
CATHODE	YELLOW	26.00 [660.4]
COLLECTOR #1	RED	26.00 [660.4]
COLLECTOR #2	WHITE	26.00 [660.4]

TABLE 2 – LOW VOLTAGE CONNECTIONS		
FUNCTION	COLOR	LEAD LENGTH ±.50 [±12.7]
HELIX/GROUND	BLACK	26.00 [660.4]
THERMOSTAT (N.C.)	TWIN GRAY	26.00 [660.4]

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

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DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.02 .XXX ±.005
ANGLES ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638–3344

TITLE

OUTLINE DRAWING
MEC 5499

12/08

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

This model number is subject to the jurisdiction of the U.S. Department of Commerce.

MODEL NO. MEC 5441 (GR)
MEC 5442 (FE)
Ku/DBS BAND

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.1 Vdc	1.6 A	−5.8 Vdc	−6.6 Vdc	2 A
HELIX	W/ RF	GROUND	2.3 mA	GROUND		10 mA
	W/O RF		1.0 mA			
FE ON		−25 Vdc	0.3 mA	0	−75 Vdc	1 mA
FE OFF		−1300 Vdc	0.02 mA	−1300 Vdc	−1500 Vdc	1 mA
GRID ON		174 Vdc	0.5 mA	125 Vdc	250 Vdc	5 mA
GRID OFF		−250 Vdc	0.5 mA	−250 Vdc	−500 Vdc	1 mA
CATHODE (Ek)		−10.2 kV	295 mA	−10 kV	−10.8 kV	300 mA
COLLECTOR W/ RF	#1	5.71 kV	38 mA	56% x Ek ±2%		100 mA
	#2	4.08 kV	255 mA	40% x Ek ±2%		300 mA

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR, GRID OR FOCUS ELECTRODE (FE) VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	1.7:1	2.5:1
OUTPUT VSWR	2.0:1	2.5:1
MAXIMUM DUTY	——	CW
FE CAPACITANCE	50 pF	65 pF
GRID CAPACITANCE	37 pF	50 pF
MIN HARMONIC SEPARATION	−30 dBc	−15 dBc *
NOISE POWER DENSITY	−13.9 dBm/MHz	−5 dBm/MHz
PRIME POWER	1299 W	1400 W
TEMPERATURE RANGE	−40° to 85 °C	——

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

GAIN IS W/O EQUALIZER.

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
14.0	400	350 *	51
14.1	400	350	51
14.2	400	350	51
14.3	400	350	51
14.4	400	350	50
14.5	400	350	50
17.3	400	300	46
17.4	400	300	46
17.5	400	300	46
17.6	400	300	46
17.7	400	300	46
17.8	400	300	46
17.9	390	300	45
18.0	380	300	45
18.1	360	300	44
18.2	355	300	43
18.3	340	300	43
18.4	330	300	43

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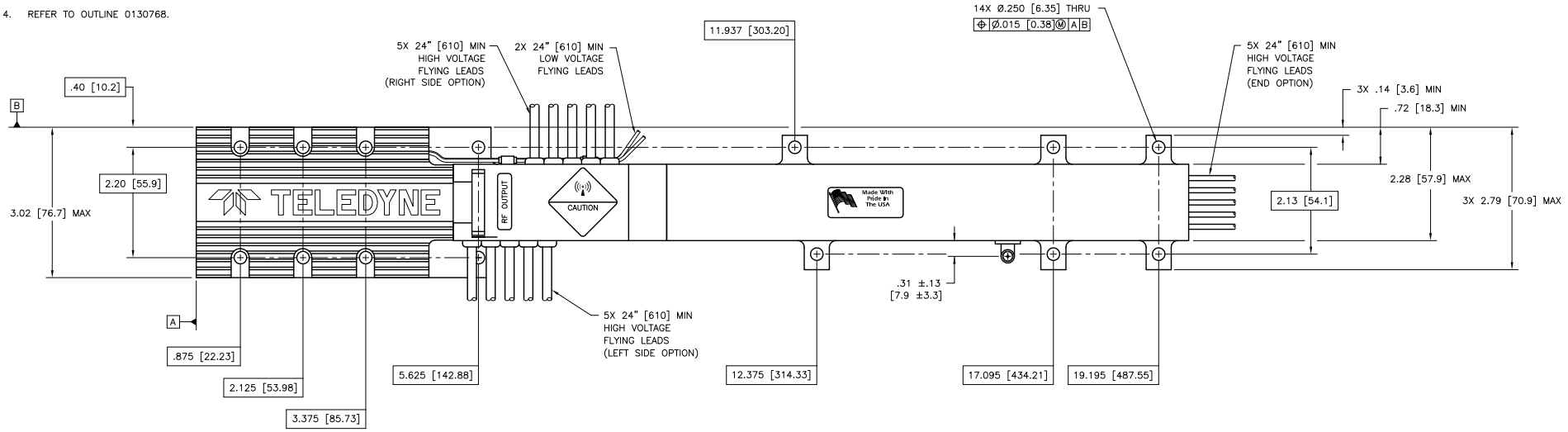
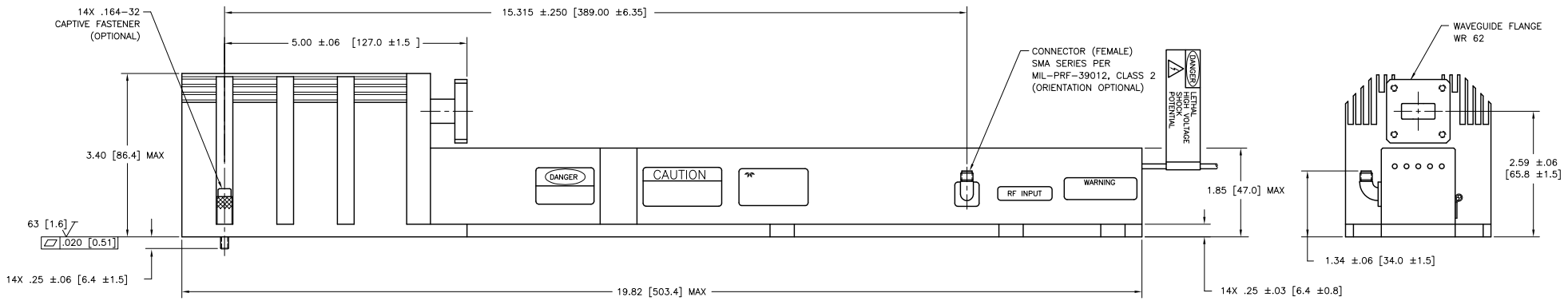
12/08

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 7.5 Lbs MAXIMUM.
   3.4 Kg MAXIMUM.
3. OPTIONAL PACKAGING CONFIGURATIONS AVAILABLE.
   CONTACT TELEDYNE FOR ADDITIONAL DRAWING DETAIL.
4. REFER TO OUTLINE 0130768.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
CONTROL ELECTRODE	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (N.C.)	GRAY

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.02 .XXX ±.005
ANGLES ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MEC 5441 (GRID)
MEC 5442 (FE)

09/08

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

This model number is subject to the jurisdiction of the U.S. Department of Commerce.

MODEL NO. MEC 5452 (FE)
MEC 5455 (GR)
13.75 to 14.5 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.3 Vdc	1.6 A	−5.8 Vdc	−6.6 Vdc	2 A
HELIX	W/ RF	GROUND	5 mA	GROUND		10 mA
	W/O RF		0.5 mA			
FE ON		−35 Vdc	0.3 mA	0	−75 Vdc	1 mA
FE OFF		−1300 Vdc	0.05 mA	−1300 Vdc	−1500 Vdc	1 mA
GRID ON		160 Vdc	0.1 mA	125 Vdc	250 Vdc	10 mA
GRID OFF		−250 Vdc	0.02 mA	−250 Vdc	−500 Vdc	1 mA
CATHODE (Ek)		−10.3 kV	320 mA	−10 kV	−10.8 kV	320 mA
COLLECTOR W/ RF	#1	5.5 kV	88 mA	54% x Ek ±2%		100 mA
	#2	3.4 kV	226 mA	33% x Ek ±2%		320 mA

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR, GRID OR FOCUS ELECTRODE (FE) VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	1.38:1	1.5:1
OUTPUT VSWR	1.45:1	1.7:1
MAXIMUM DUTY	——	CW
FE CAPACITANCE	50 pF	65 pF
GRID CAPACITANCE	37 pF	50 pF
MIN HARMONIC SEPARATION	−30 dBc	−15 dBc *
NOISE POWER DENSITY	−7 dBm/MHz	−5 dBm/MHz
PRIME POWER	1320 W	1450 W
TEMPERATURE RANGE	−40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
13.75	510	500 *	60
14.0	510	500 *	60
14.1	510	500	60
14.2	520	500	60
14.3	520	500	60
14.4	520	500	60
14.5	510	500	60

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

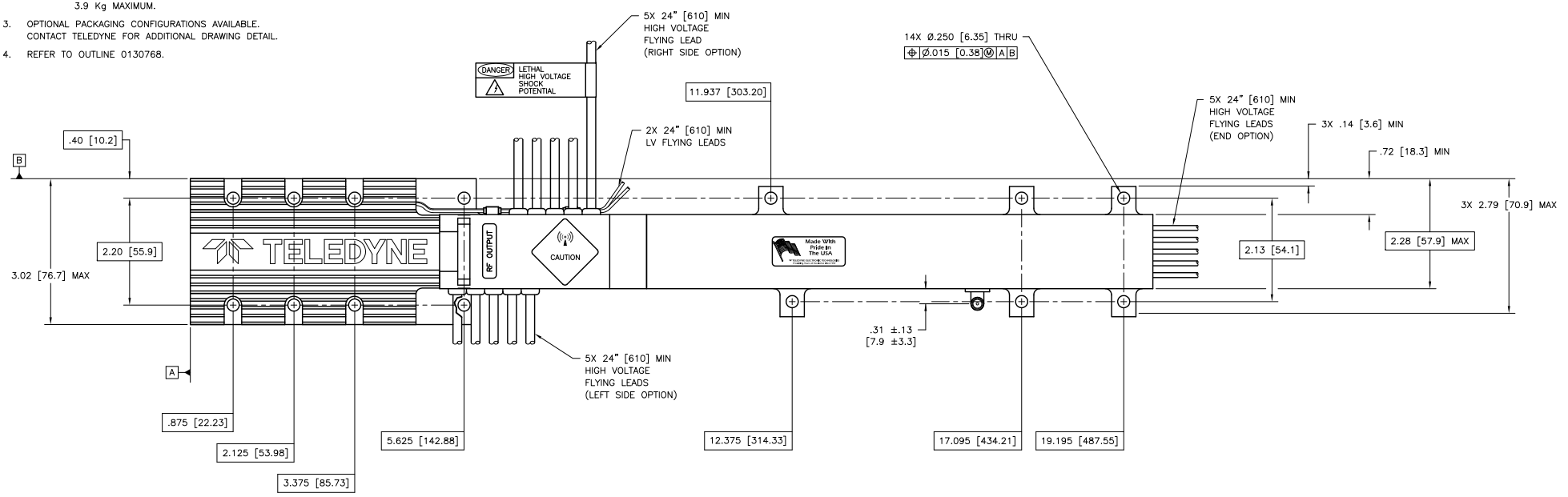
GAIN IS W/O EQUALIZER.

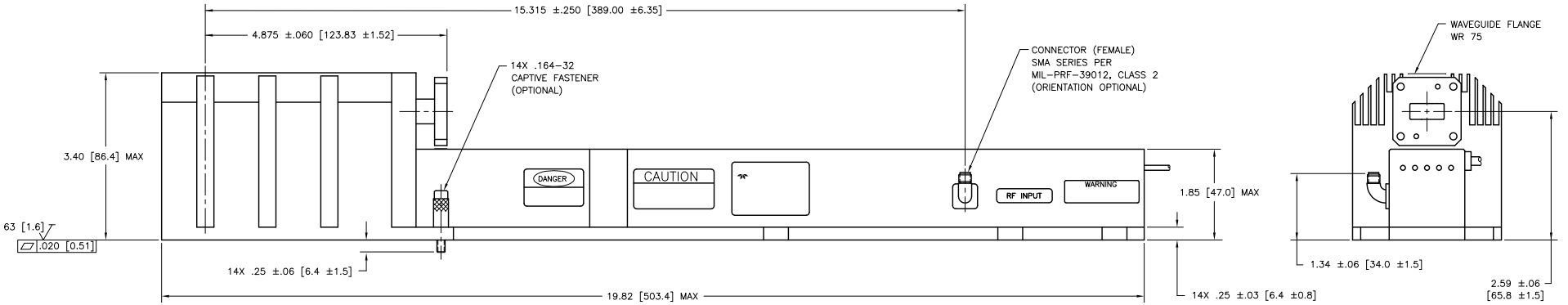
An ISO 9001:2000 Quality System Certified Company

12/08

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 8.5 Lbs MAXIMUM.
   3.9 Kg MAXIMUM.
3. OPTIONAL PACKAGING CONFIGURATIONS AVAILABLE. CONTACT TELEDYNE FOR ADDITIONAL DRAWING DETAIL.
4. REFER TO OUTLINE 0130768.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
CONTROL ELECTRODE	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (N.C.)	GRAY

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

UNLESS OTHERWISE NOTED
DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.02 .XXX ±.005
ANGLES ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MEC 5452 (FE)
MEC 5455 (GRID)

05/99

TELEDYNE MEC

11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

This model number is controlled by the International Traffic in Arms Regulations, and can only be exported via a U.S. Department of State export license. They may not be transferred, transshipped on a non-continuous voyage, or otherwise be disposed of in any other country, either in their original form or after being incorporated into other end-items, without the prior written approval of the U.S. Department of State.

MODEL NO. MEC 5466

17.3 to 18.4 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.1 Vdc	1.7 A	−5.8 Vdc	−6.6 Vdc	2 A
HELIX	W/ RF	GROUND	5 mA	GROUND		10 mA
	W/O RF		1 mA			
FE ON		−10 Vdc	0.1 mA	0	−50 Vdc	3 mA
FE OFF		−1600 Vdc	0.1 mA	−1600 Vdc	−2000 Vdc	1 mA
CATHODE (Ek)		−11.8 kV	385 mA	−11.5 kV	−12.5 kV	400 mA
COLLECTOR W/ RF	#1	5.81 kV	110 mA	49% x Ek ±2%		250 mA
	#2	3.20 kV	270 mA	27% x Ek ±2%		375 mA

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR AND FOCUS ELECTRODE (FE) VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.

SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	1.75:1	2.25:1
OUTPUT VSWR	1.92:1	2.3:1
MAXIMUM DUTY	——	CW
FE CAPACITANCE	50 pF	65 pF
MIN HARMONIC SEPARATION	−30 dBc	−15 dBc *
NOISE POWER DENSITY	−20 dBm/MHz	−15 dBm/MHz
PRIME POWER	1555 W	1600 W
TEMPERATURE RANGE	−40° to 85 °C	——

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MIN SPEC POWER OUTPUT (WATTS)	TYP GAIN AT SPEC POWER dB
17.3	550	500 *	47
17.4	550	500	47
17.5	550	500	47
17.6	550	500	47
17.7	540	500	47
17.8	530	500	47
17.9	525	500	47
18.0	500	450	46
18.1	490	450	46
18.2	480	450	46
18.3	460	450	45
18.4	450	450	45

TYPICAL POWER OUTPUT IS SHOWN TO ILLUSTRATE CAPABILITY.

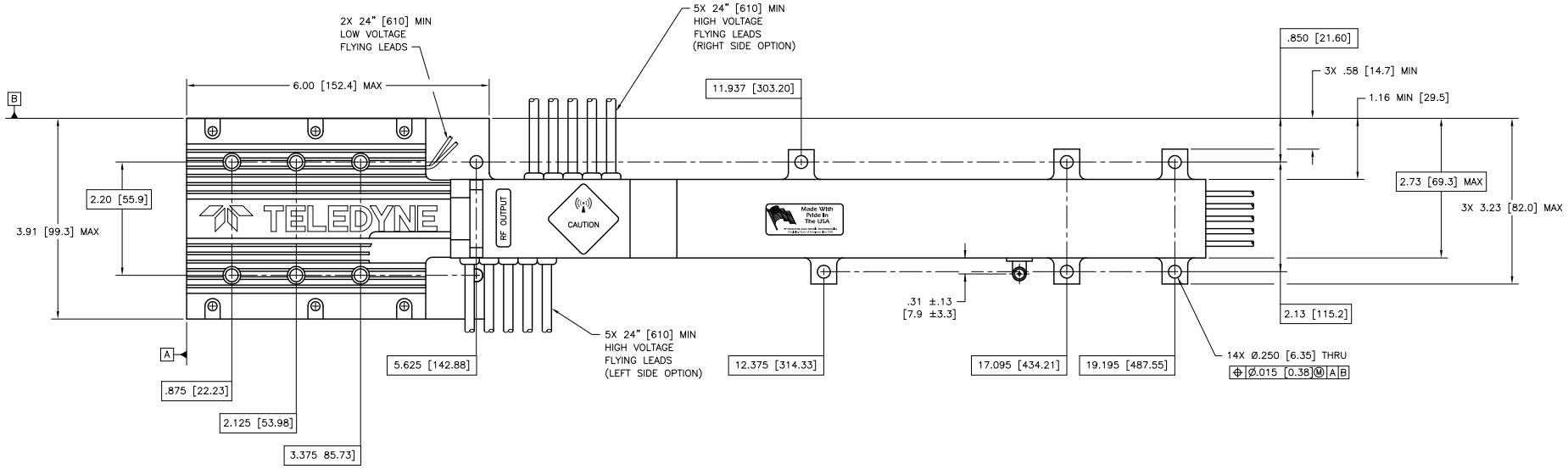
GAIN IS W/O EQUALIZER.

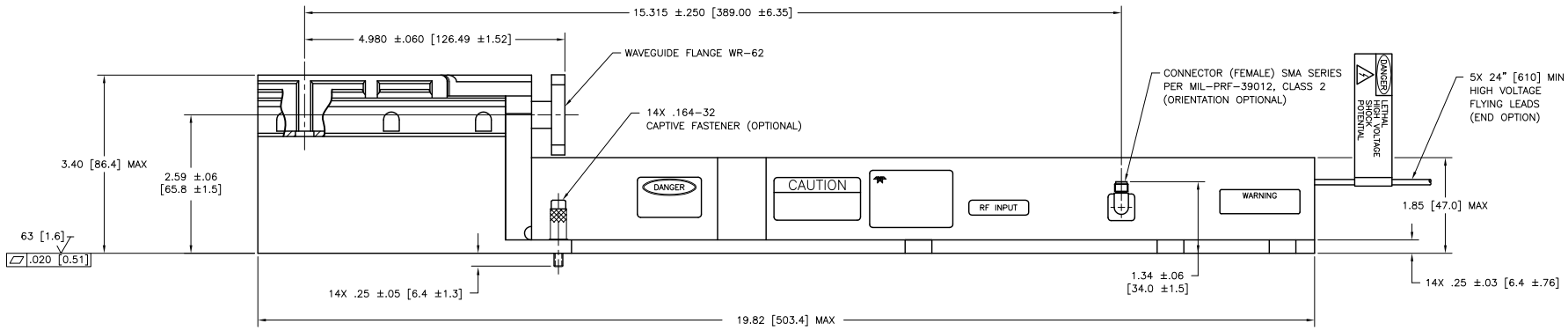
An ISO 9001:2000 Quality System Certified Company

12/08

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 9.0 Lbs MAXIMUM.
   4.1 Kg MAXIMUM.
3. OPTIONAL PACKAGING CONFIGURATIONS AVAILABLE.
   CONTACT TELEDYNE FOR ADDITIONAL DRAWING DETAIL.
4. REFER TO OUTLINE 0131915.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
CONTROL ELECTRODE	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (N.C.)	GRAY

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

DO NOT SCALE DRAWING

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DIMENSIONS ARE IN INCHES
TOLERANCES ON
DECIMALS .XX ±.02 .XXX ±.005
ANGLES ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MEC 5466

05/99

TELEDYNE MEC
11361 Sunrise Park Drive, Rancho Cordova, Calif. 95742-6587
Telephone (916) 638-3344 Fax (916) 636-7453

This model number is subject to the jurisdiction of the U.S. Department of Commerce.

MODEL NO. MEC 5495

27.0 to 31.0 GHz

TYPICAL OPERATING CONDITIONS				POWER SUPPLY REQUIREMENTS		
ELEMENT		VOLTAGE	CURRENT	VOLTAGE MIN	VOLTAGE MAX	CURRENT MAX
HEATER		−6.3 Vdc	0.7 A	−5.8 Vdc	−6.6 Vdc	1.5 A
HELIX	W/ RF	GROUND	1.5 mA	GROUND		4 mA
	W/O RF		0.5 mA			
FE ON		−6.3 Vdc	0.1 mA	0	−40 Vdc	1 mA
FE OFF		−1200 Vdc	0.1 mA	−1200 Vdc	−1400 Vdc	0.2 mA
CATHODE (Ek)		−14.25 kV	190 mA	−13.5 kV	−14.5 kV	200 mA
COLLECTOR W/ RF	#1	4.42 kV	10 mA	31% x Ek ±2% *		75 mA
	#2	2.28 kV	180 mA	16% x Ek ±2% *		200 mA

RF PERFORMANCE			
FREQ GHz	TYP SAT POWER OUTPUT (WATTS)	MAX OPERATING POWER OUTPUT (WATTS) **	TYP GAIN AT SAT POWER dB
27.0	250	120	34
28.0	250	120	34
29.0	250	120	34
30.0	250	120	34
31.0	250	120	34

NOTE 1: CATHODE VOLTAGE IS MEASURED WITH RESPECT TO GROUND.
NOTE 2: HEATER, COLLECTOR AND FOCUS ELECTRODE (FE) VOLTAGES ARE MEASURED WITH RESPECT TO CATHODE.
NOTE 3: CAN BE MADE AVAILABLE WITH INTEGRATED SSA.

* COLLECTOR DEPRESSIONS SUBJECT TO CHANGE

** TWT IS DESIGNED FOR LINEAR/DIGITAL COMMUNICATION APPLICATIONS. TYPICAL SIDEBAND RE-GROWTH WITH 100 WATTS OUTPUT POWER USING QPSK MODULATION IS −26 dBc.

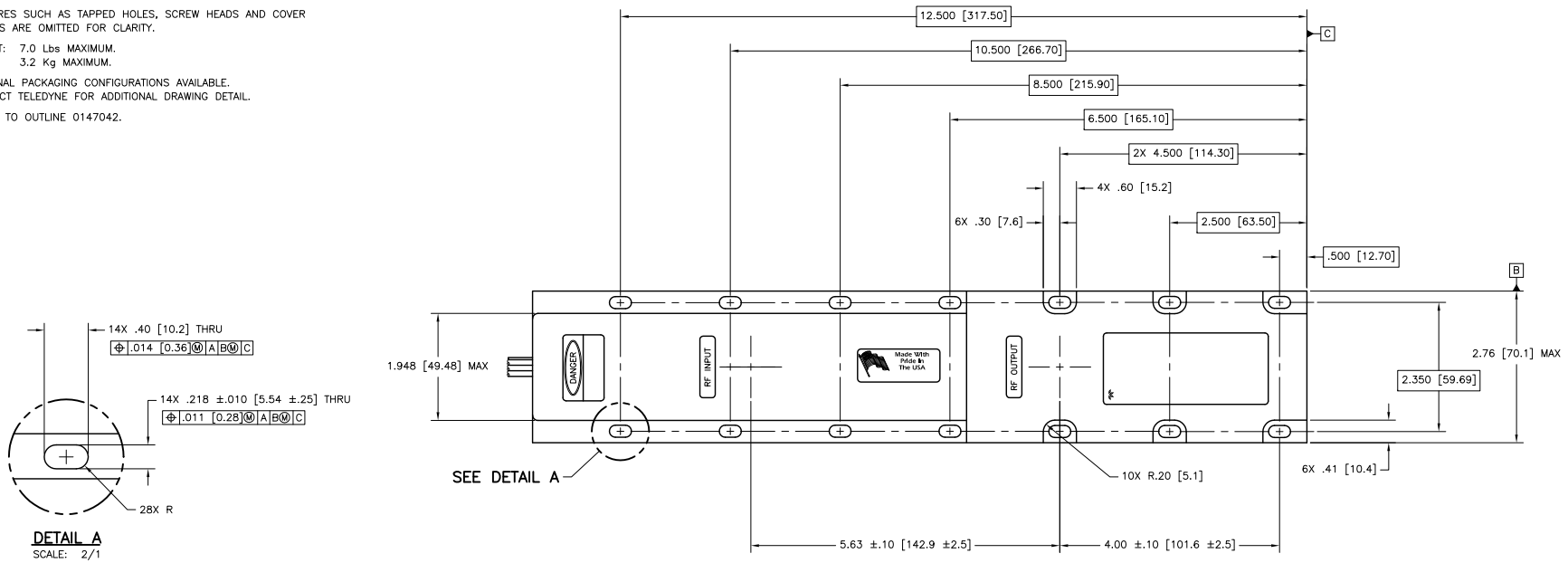
SELECTED PERFORMANCE	TYPICAL	SPECIFIED
INPUT VSWR	1.25:1	2:1
OUTPUT VSWR	1.5:1	1.75:1
MAXIMUM DUTY	——	CW
FE CAPACITANCE	50 pF	60 pF
MIN HARMONIC SEPARATION	−30 dBc	−15 dBc *
NOISE POWER DENSITY	−35 dBm/MHz	−30 dBm/MHz
PRIME POWER (@ 120 W)	600 W	700 W
TEMPERATURE RANGE	−40° to 85 °C	——

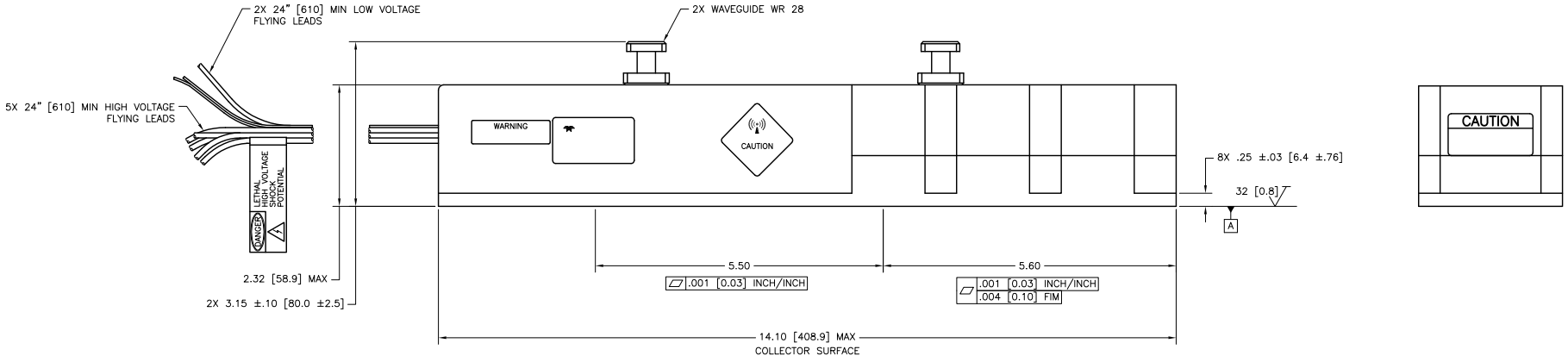
An ISO 9001:2000 Quality System Certified Company

01/06

NOTES:

1. FEATURES SUCH AS TAPPED HOLES, SCREW HEADS AND COVER DETAILS ARE OMITTED FOR CLARITY.
2. WEIGHT: 7.0 Lbs MAXIMUM.
   3.2 Kg MAXIMUM.
3. OPTIONAL PACKAGING CONFIGURATIONS AVAILABLE.
   CONTACT TELEDYNE FOR ADDITIONAL DRAWING DETAIL.
4. REFER TO OUTLINE 0147042.





HIGH VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HEATER	BROWN
CATHODE	YELLOW
CONTROL ELECTRODE	GREEN
COLLECTOR #1	RED
COLLECTOR #2	WHITE

LOW VOLTAGE CONNECTIONS	
FUNCTION	COLOR
HELIX/GROUND	BLACK
THERMOSTAT (N.C.)	TWIN GRAY

SUBJECT TO CHANGE W/O NOTICE

ISO 9001:2000 Registered

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DECIMALS .XX ±.02 .XXX ±.005
ANGLES ±2°

REMOVE ALL BURRS AND SHARP EDGES
SURFACE ROUGHNESS PER ASA B46.1

DIM AND TOL IAW ASME Y14.5M – 1994

TELEDYNE MEC
11361 Sunrise Park Dr., Rancho Cordova, CA (916) 638-3344

TITLE

OUTLINE DRAWING
MEC 5495

12/08

TELEDYNE MEC

A Teledyne Technologies Company

The Microwave Electronic Component (MEC) facility is the world leader in the design, development and manufacture of broadband metal-ceramic traveling wave tubes (TWTs), meeting stringent airborne, shipboard and transport vehicle environments used in today's ECM, radar and communications markets.

Our state of the art EW and radar TWTs are found on nearly all major platforms of the United States and its allies throughout the world. Additionally, our communications product line has become the standard in long-life performance for commercial broadcast and military communications uplinks which have demonstrated performance MTBF in excess of 40,000 hours. Every new TWT is warranted against defects in material or workmanship for 13 months from date of shipment.

These items are subject to U.S. Government Export Control laws and regulations; diversion is contrary to these U.S. laws and regulations. Prior authorization from the U.S. Government is required before these items can be transferred, transshipped on a non-continuous voyage or otherwise be disposed of in any other country, either in their original form or after being incorporated into other end-items.

For over 50 years, Teledyne MEC has worked with our customers to develop and manufacture TWTs and amplifier products to the highest industry standards. We look forward to bringing our dedication to performance, quality, and value to meet your system needs.

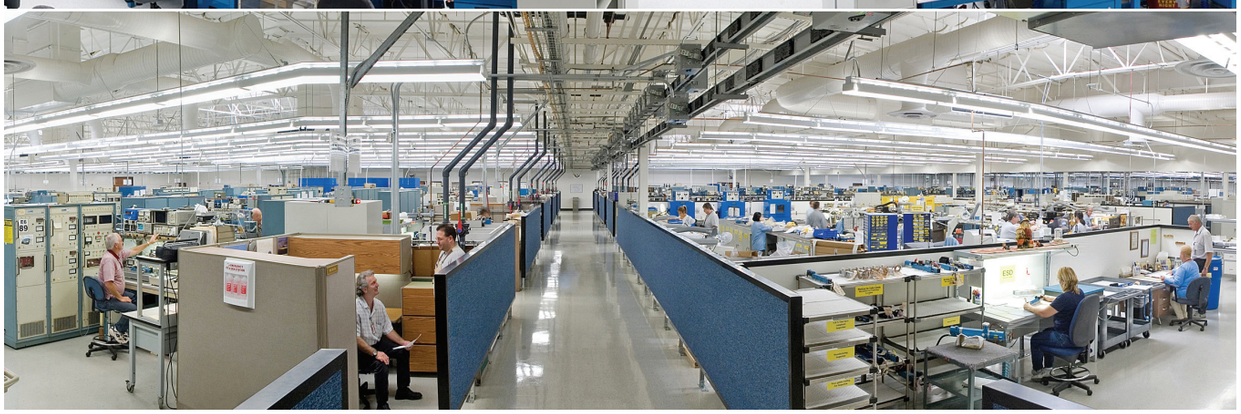
INTERTEK ISO 9001:2008

ANAB ACCREDITED

TELEDYNE MEC MISSION STATEMENT

We recognize the importance of our employee commitment and participation to continually improve our products and services. Above all, we will endeavor to provide our customers with the highest quality products and services, delivered when promised, and to their specifications.

Russell Shaller
Vice President and General Manager
Teledyne Microwave Electronic Components



TELEDYNE MEC

A Teledyne Technologies Company

11361 Sunrise Park Drive, Rancho Cordova, CA 95742-6582