

DESCRIPTION

The N10110F is a broadband, high power, helix travelling wave tube. It is capable of providing 160 W minimum output power and operates over the frequency band 6 – 18 GHz. Saturation gain is >36 dB.

The tube incorporates a focus electrode grid switch that enables the TWT to be operated in either pulsed or CW mode. It features two helix sections, a convergent electron gun, depressed collector and PPM focusing within a small and lightweight package. It has been designed to meet MIL-STD specifications for use in rugged environments.

This TWT is one of a range of mini- and midi-types designed by e2v technologies using the latest CAD methods to achieve optimised reliability and performance whilst operating in the most demanding environments.

Other TWTs in the range include broader bandwidth, dual stage collectors and phase matching for multiple tube combining at system level.

ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Min	Typ	Max	Units
Heater					
Voltage	V_f	-6.0	-6.3	-6.6	V
Current	I_f		0.8		A
Warm-up time		100			s
Surge current				2.0	A
Helix					
Voltage	V_{hx}	6.0	6.3	6.6	kV
Current	I_{hx}	0	2	15	mA
Collector					
Voltage	V_c	3.5	3.7	4.0	kV
Current	I_c	250	260	285	mA
Focus Electrode					
Beam-on voltage		-15	0	0	V
Beam-off voltage		-2	-1.5	-1.4	kV
Capacitance				20	pF
Current				0.5	mA
Anode/Helix					
Voltage	V_h	-800	-400	0	V
Current	I_h			1	mA
Prime power		780	980	1200	W

Note

All electrode voltages are referenced to cathode potential except where stated otherwise. The TWT is to be operated with the helix grounded and the collectors depressed.

RF CHARACTERISTICS

Parameter	Min	Typ	Max	Units
Saturated Output Power				
Frequency: 6 – 7 GHz	170	180		W
7 – 8 GHz	190	210		W
8 – 12 GHz	210	240		W
12 – 15 GHz	190	210		W
15 – 16 GHz	180	190		W
16 – 17 GHz	170	180		W
17 – 18 GHz	160	170		W
Gain at Rated Power				
Frequency: 6 – 7 GHz	44	47		dB
7 – 8 GHz	50	54		dB
8 – 14 GHz	54	59		dB
14 – 15 GHz	50	55		dB
15 – 16 GHz	45	51		dB
16 – 17 GHz	40	47		dB
17 – 18 GHz	36	41		dB
Spectral Noise Density				
Beam on			-18	dBm/MHz
Beam off			-90	dBm/MHz
2nd Harmonic at Saturation				
			-2	dBc
Output VSWR				
			2.6:1	
Spurious Outputs (excluding harmonic related)				
			-50	dBc
AM/PM				
			9	°/dB

MECHANICAL

RF Connectors

Input.....SMA female
Output.....WRD650

Wiring

Element	Colour	Wire Type
Heater	Brown	18 kV rated, silicone coated FEP
Cathode	Yellow	18 kV rated, silicone coated FEP
Focus Electrode	Green	18 kV rated, silicone coated FEP
Anode	Blue	18 kV rated, silicone coated FEP
Collector	Red	15 kV rated, lossy, FEP
Thermal Switch	Purple	18 kV rated, silicone coated FEP

Mounting Position

Any

Weight

Total weight of the TWT shall not exceed 1.4 kg.

Cooling

Conduction

Maximum heatsink temperature..... 100 °C
Over-temperature protected by normally closed thermal switch.

ENVIRONMENTAL

Random vibration	10 – 2000 Hz at 0.05 g ² /Hz
Shock	15 g for 11 ms
Altitude	21,336 m (70,000 feet) max
Operating temperature range (ambient)	-40 to +85 °C
Low temperature storage	-50 °C

HEALTH AND SAFETY HAZARDS

e2v technologies electronic devices are safe to handle and operate provided that the relevant precautions stated herein are observed. e2v technologies does not accept responsibility for damage or injury resulting from the use of electronic devices it produces. Equipment manufacturers and users must ensure that adequate precautions are taken. Appropriate warning labels and notices must be provided on equipment incorporating e2v technologies devices and in operating manuals.

High Voltage

Equipment must be designed so that operators cannot come into contact with high voltage circuits. Tube enclosures should have fail-safe interlocked switches to disconnect the primary power supply and discharge all high voltage capacitors before allowing access.

RF Radiation

Personnel must not be exposed to excessive RF radiation. All RF connectors must be correctly fitted before operation, so that no leakage of RF energy can occur, and the RF output must be correctly terminated.

X-Ray Radiation

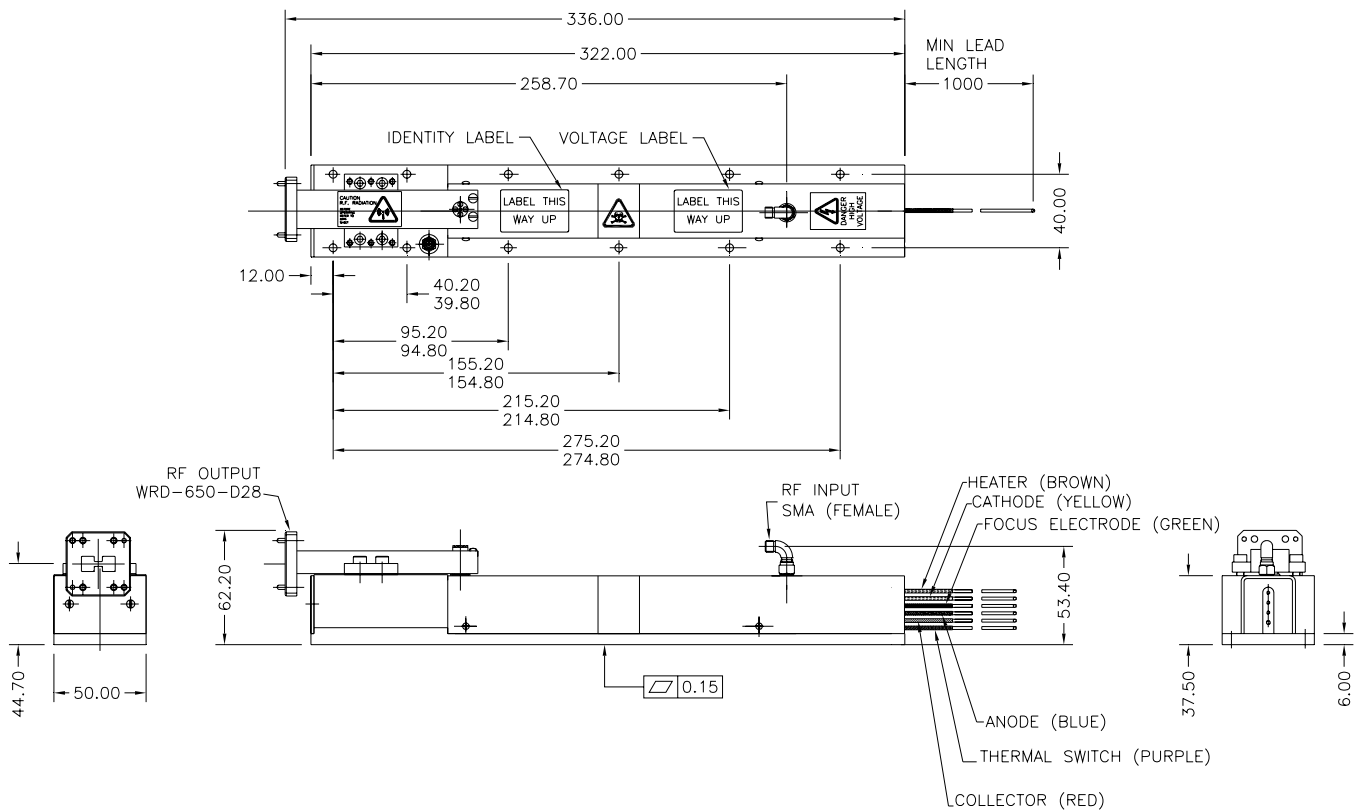
The operating voltage of this device results in the emission of X-rays. The maximum penetrating ability of the X-rays may correspond to a voltage approximately twice the applied voltage. Shielding is required.

Beryllium Oxide Ceramics

This tube contains beryllium oxide ceramic parts, which are not accessible unless the metal casing of the tube is damaged or removed. *Beryllium oxide dust or fumes are highly toxic if inhaled, or if particles enter a cut or abrasion.* Consult e2v technologies regarding the disposal of damaged or life-expired tubes.

OUTLINE

(All dimensions in millimetres)



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