

BRITISH STANDARDS INSTITUTION 2, PARK STREET LONDON W1A 2BS	BS CECC 35 001-005
Specification available from : AS SHOWN IN PD 9002, CECC 00 200 AND STC DEFENCE SYSTEMS, ELECTRON TUBES DIVISION, BRIXHAM ROAD, PAIGNTON, DEVON TQ4 7BE.	ISSUE 1 SEPTEMBER 1986 PAGE 1 OF 20 PAGES
ELECTRONIC COMPONENTS OF ASSESSED QUALITY DETAIL SPECIFICATION IN ACCORDANCE WITH BS CECC 35 000 : 1978	MANUFACTURER'S TYPE NUMBER W3MC12D SEE PD 9002 AND CECC 00 200 For ordering information see 3.2
Outline and dimensions THIRD ANGLE PROJECTION DIMENSIONS SEE APPENDIX A	METAL/CERAMIC PACKAGED TRAVELLING WAVE TUBE AMPLIFIER WARNING: THIS TUBE CONTAINS BERYLLIUM OXIDE GAIN 40.4 dB AT 22 W FREQUENCY RANGE: 10.7 GHz - 11.7 GHz COOLING: CONDUCTION (BASEPLATE) TO HEATSINK BASIC ASSESSMENT PLUS ADDITIONAL
Marking information SEE 3.1	

1.RATINGS (NOT FOR INSPECTION PURPOSES)

Ratings are limiting values, and absolute, in accordance with IEC 134.

<u>Electrical</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Unit</u>
Heater power	-	3.6	W
Cathode current	-	55.0	mA
Grid 2 voltage	-	3600	V
Grid 2 current	-	0.5	mA
Grid 2 power dissipation	-	1.5	W
Helix voltage	3200	3600	V
Helix current	-	4.0	mA
Helix power dissipation	-	14.0	W
Helix switching transient energy	-	3.0	J
Collector 1 voltage	1270	1500	V
Collector 2 voltage	570	1000	V
Collector 1 power dissipation	-	50.0	W
Collector 2 power dissipation	-	45.0	W
Heater warm-up time	1.0	-	min
Operation interruption time) without heater warm-up)	-	2.0	s

/Physical

Physical Documents

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<u>Physical</u> (Environmental)	<u>Minimum</u>	<u>Maximum</u>	<u>Unit</u>
Proximity of any ferromagnetic material to the amplifier	25.0	-	mm
Ambient or stray magnetic fields (at surface of TWT)	-	2.5	mT
Ambient temperature range for storage	-40	+70	°C
Ambient temperature range for operation	-30	+55	°C
Operating altitude	-	4500	m
Non-operating altitude	-	13700	m
Relative humidity at 35 °C (no condensation)	-	95	%
Mounting position	Horizontal, or vertical with collectors uppermost		

2. Related Documents

CECC 00 006	Basic Specification: Environmental test procedures.
CECC 00 007	Basic Specification: Sampling plans and procedures for inspection by attributes.
CECC 00 100	Basic Rules.
CECC 00 107	RP7: Quality assessment procedures.
CECC 00 200	Qualified Products List.
CECC 35 000	Generic Specification: Travelling wave amplifier tubes.
IEC 68	Basic environmental testing procedures (see CECC 00 006).
IEC 134	Rating systems for electronic tubes and valves and analogous semiconductor devices.
IEC 151	Measurement of the electrical properties of electronic tubes.
-1	Part 1. Measurement of electrode current.
-2	Part 2. Measurement of heater or filament current.
-15	Part 15. Methods of measurement of spurious and unwanted electrode currents.
IEC 235	Measurement of the electrical properties of microwave tubes.
-2	Part 2. General measurements.
-2A	First supplement to Publication 235-2. (1972)
IEC 410	Sampling plans and procedures for inspection by attributes (see CECC 00 007).
PD 9002	Qualified Products List for electronic components of assessed quality.

3. Supplementary Information (not for inspection purposes)

3.1 Marking: The following shall be marked on the tube in the following order of precedence as space permits. All this information, except the terminal marking, shall appear on the primary pack:

- a) Terminal identification and where appropriate, any special operating conditions.
- b) Type designation.
- c) Date code and factory identification code.
- d) Manufacturer's name or trademark.
- e) Mark of conformity unless a certificate of conformity is used.

WARNING - THIS TUBE CONTAINS BERYLLIUM OXIDE

Tube contains flammable materials and when operating high voltages are present. A Product Safety Information sheet is included with each device. (See also statement of Product Safety, 4.2)

3.2 Ordering: Orders for this amplifier shall contain the following minimum information:

- a) The number, issue and date of detail specifications.
- b) The type designation number.
- c) The quantity required.
- d) Any special requirements.

4. Additional Information (not for inspection purposes)

4.1 Proximity of Magnetic Materials

- a) A 25 mm minimum distance for any magnetic materials shall be maintained at all times in both the operating and non-operating condition.
- b) The ambient or stray magnetic fields shall not exceed 2.5 mT at the surface of the TWT.
- c) The minimum distance between two TWT's in both the operating and non-operating condition is 50 mm.
- d) It is strongly advised that the TWT is always stored and transported in the full transport pack in which it is delivered.

4.2 Product Safety

- a) WARNING: THIS TUBE CONTAINS BERYLLIUM OXIDE
- b) Safe operating conditions for the TWT are the responsibility of the equipment designer and user. Personnel must not come into contact with the high voltages required for operating this TWT, and the TWT body must be properly earthed.
- c) Exposure to microwave radiation can be dangerous. Waveguides or r.f. terminals must be properly connected and a microwave energy absorbing load attached to the output termination before operation. Personnel must not look into an open waveguide or coaxial r.f. port whilst the TWT is energised.
- d) The TWT power supply shall be fitted with a trip relay which shall disconnect the tube voltages if the helix current limit of 4.0 ± 0.4 mA is exceeded for more than 5 seconds. The relay shall trip with the following limits on the switching transients:

50 mA for not longer than 10 ms
10 mA for not longer than 1 s
4 mA for not longer than 5 s

- e) A Product Safety Information sheet relating to TWT's is supplied with every tube.

4.3 Installation and Dismantling

- a) To prevent damage to the r.f. connectors, it is essential that a suitable torque wrench (recommended torque: 90 Ncm) be used for interconnection purposes at all times.

4.4 Mounting Requirements

- a) The TWT must be attached to the heatsink by eight 4 mm diameter screws. The preferred mounting positions are horizontal, or vertical with the collectors uppermost.

4.5 Cooling Requirements

- a) It is intended that the TWT be conduction cooled through the base plate which shall be bolted to a heatsink in the equipment. The TWT body temperature limit, +90 °C, at the measurement point, marked 'X' on the outline drawing attached, see Appendix A, must not

4.5 continued

- be exceeded under any operating conditions, including operation without drive or any condition of ambient temperature.
- b) For heatsink design the maximum TWT dissipation under any approved operating condition is 65 W.

4.6 Establishment of Operating Conditions (see 4.2, 'Product Safety')

4.6.1. Switch-on

- a) The package shall not operate for longer than 15 minutes. with only the heater voltage applied. If operated from a DC supply, the free side of the heater must be negative with respect to the cathode.
- b) The following is one way to obtain satisfactory setting up when switching on a tube for the first time.

The STC Defence Systems Test Data sheet supplied with each TWT should always be employed when setting the conditions. The tube must be operated with the helix electrode earthed. The voltages specified below are referred to the cathode. See Appendix A for connection details.

As a minimum the TWT cathode and helix currents should be monitored during setting up.

- a) Ensure the r.f. input power is at a minimum level.
- b) Set collector 1 and collector 2 supplies to 1300 V and 650 V respectively.
- c) Set the helix voltage supply to 3380 V.
- d) Set the grid 2 (anode) voltage supply to cathode potential.
- e) Apply 6.3 V to the TWT heater.
- f) Allow a one minute minimum cathode preheat period.
- g) Apply collector 1 and 2, grid 2 and helix voltages as set.
- h) When these voltages have reached their operating values apply the minimum operating grid 2 (anode) voltage, 2650 V. The rise time of the grid 2 supply should be a few milliseconds.
- i) Adjust the grid 2 supply to obtain the value of cathode (beam) current indicated on the Test Data sheet for the required operating frequency.
- j) Increase the r.f. input power to obtain the required working r.f. output power. Correct the cathode current if necessary. Check the helix current. This will vary with the working output power but should relate to Test Data sheet values.

4.6.2 Switch-off

Switching off is the reverse procedure to switching on.

Subsequent switch-ons may be carried out with the grid 2 voltage and r.f. input power at their operating values.