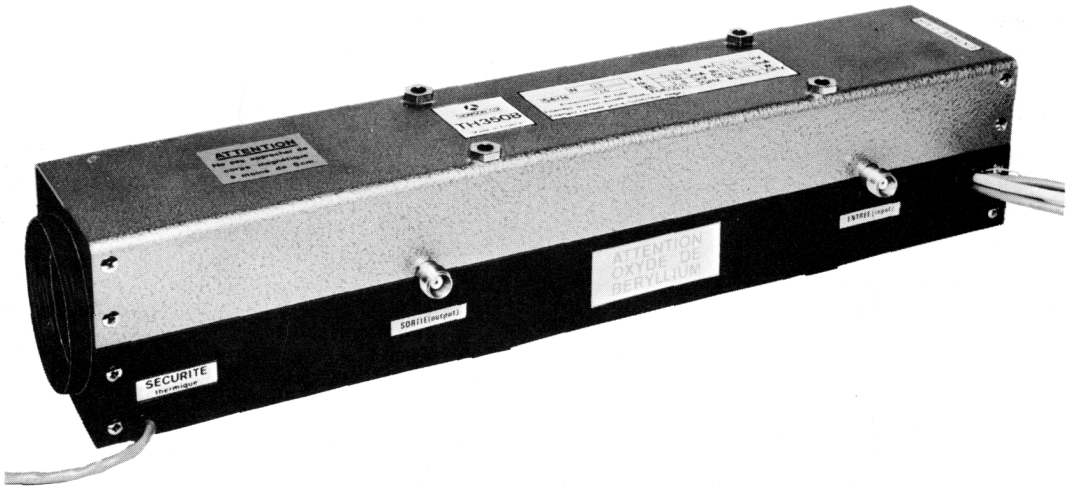
TH 3508
250 W CW TRAVELING WAVE TUBE

Features

- Specially designed for communications-satellite earth stations
- More than 250 Watts of CW power in C Band
- PPM-focused, for reduced power consumption and simple forced-air cooling
- Rugged all metal-and-ceramic construction, with a copper helix brazed to berylium-oxide support rods
- Compact and light weight
- Highly reliable and offers long tube life.



The TH 3508 is a high-gain, medium-power traveling-wave tube, designed for transmitter use in satellite-communications-system earth stations operating in the 5. 925 to 6. 425 GHz band.

Featuring a brazed copper helix slow-wave structure, the TH 3508 is especially well-suited for multicarrier operation in low-cost, smaller capacity INTELSAT IV-type earth stations, either fixed or transportable. Careful matching of its coupling elements and lossy sections has resulted in a TWT providing wideband operation with nearly flat gain, very low group-delay distortion and small AM/PM conversion distortion.

If operated in the normal depressed-collector configuration, the TH 3508 has a minimum overall efficiency of 25 %, with typical efficiency on the order of 30 %.

Air-cooled, the TH 3508 requires a minimum cooling-air flow of only 47 liters a second (100 cu.ft./min.).

The dispenser-type cathode, made of specially treated barium-impregnated tungsten, ensures long tube life. In addition, tube life can be further prolonged because the electron-gun design allows readjusting the cathode current as the tube ages, without changing the helix voltage.

Presently in use in the French earth station at Pleumeur-Bodou, the TH 3508 has already achieved several thousands of hours of successful operation.

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GENERAL CHARACTERISTICS

Electrical

Frequency range		5.925 to	6.425	GHz
Output power, at saturation		⩾	250	W
Efficiency (depressed collector)		⩾	25	%
Gain, at rated power		⩾	35	dB
Gain slope, small signal		⩽	0.05	dB/MHz
AM/PM Conversion		⩽	8	°/dB
Noise figure			30	dB
Noise measured in a 4 KHz window		⩽	−35	dBm
Heater voltage			6.3	V
Heater current	2.3	to	2.6	A
Cathode current	240	to	300	mA
Anode voltage	4.4	to	5.4	kV
Collector voltage	2.8	to	4.0	kV

Mechanical

Operating position	Any
Dimensions	See outline drawing
Weight, approximate	2.5 kg
RF connections	Coaxial, TNC female
Power-supply connections	Flying leads
Thermal-switch connections	Flying leads
Cooling	Forced air

ABSOLUTE RATINGS
(non-simultaneous)

	Min.	Max.	Units
Heater surge current	–	5	A
Heater voltage	6.2	6.4	V
Warm-up time	3	–	mn
Anode voltage	–	1.1 V_a (nom)	kV
Anode current	−1	+3	mA
Drive power	–	P_d (nom.) + 3 dB	mW
Helix voltage	–	V_h (nom.) + 0.1	kV
Helix current	–	1.5 I_h (nom.)	mA
Load VSWR	–	2.5 : 1	
Collector voltage	See note (1)	4.5	kV
Collector dissipation	–	1.2	kW
Cooling air flow (2)	47	–	l/s
Inlet cooling air temperature	−40	+50	°C
Distance from magnetic materials	5	–	cm

(1) The difference between the helix voltage and the collector voltage shall not exceed 5 kV.

(2) At normal atmospheric pressure : 1013 millibars.

TYPICAL OPERATION

Single-carrier mode

Frequency	6. 175	GHz
Drive power	11	mW
Output power	280	W
Gain :		
- saturated	44	dB
- small signal	48	dB
Efficiency	30	%
Maximum gain variation over the band, saturated	1	dB
Gain slope, maximum	0. 02	dB/MHz
Noise measured in a 4 - kHz window	– 60	dBm
Heater voltage	6. 3	V
Heater current	2. 42	A
Cathode current	260	mA
Anode voltage	4. 7	kV
Anode current	0	mA
Helix voltage	5. 75	kV
Helix current	20	mA
Collector voltage	3. 8	kV
Collector current	240	mA

Multi-carrier mode

First carrier frequency, F_1	6. 125	GHz
Second carrier frequency, F_2	6. 130	GHz
Drive power, per carrier	0. 5	mW
Output power, per carrier	35	W
Intermodulation products	$\leqslant$ – 22	dB
AM/PM conversion	$\leqslant$ 1. 3	°/dB
Maximum gain variation over the band, small signal	1	dB

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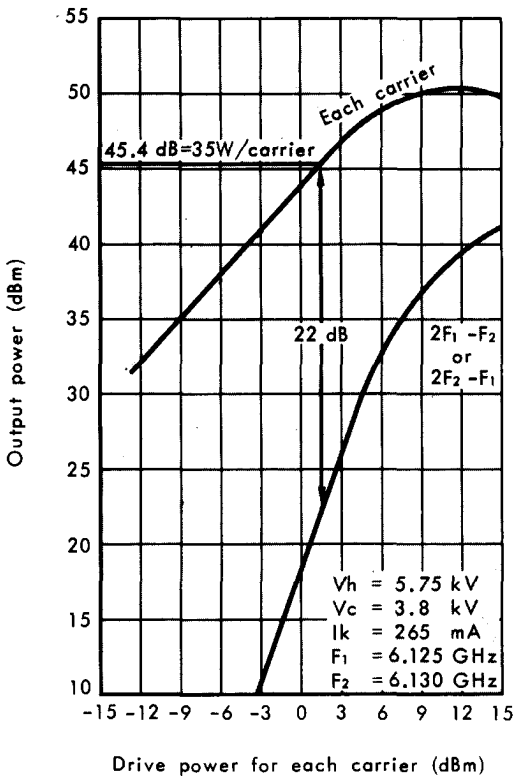
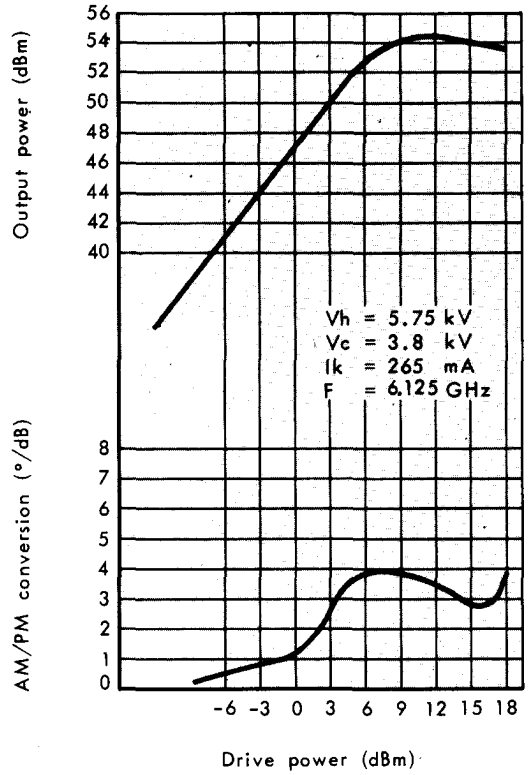
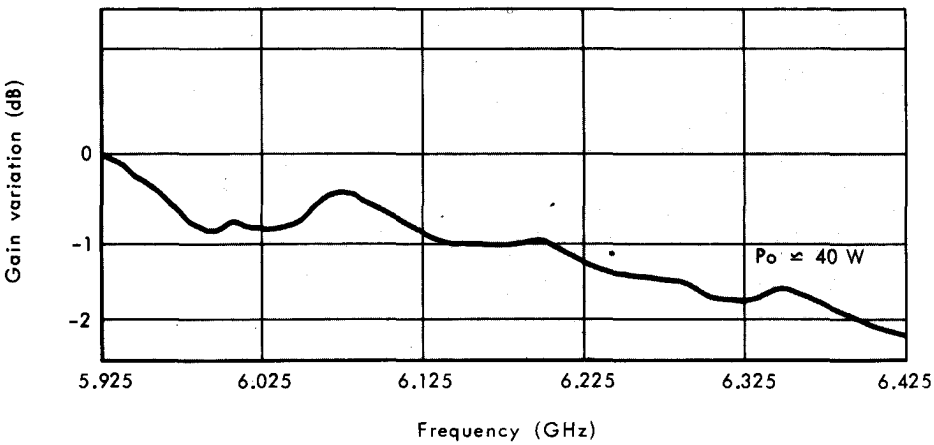
THIRD - ORDER INTERMODULATION PRODUCTS

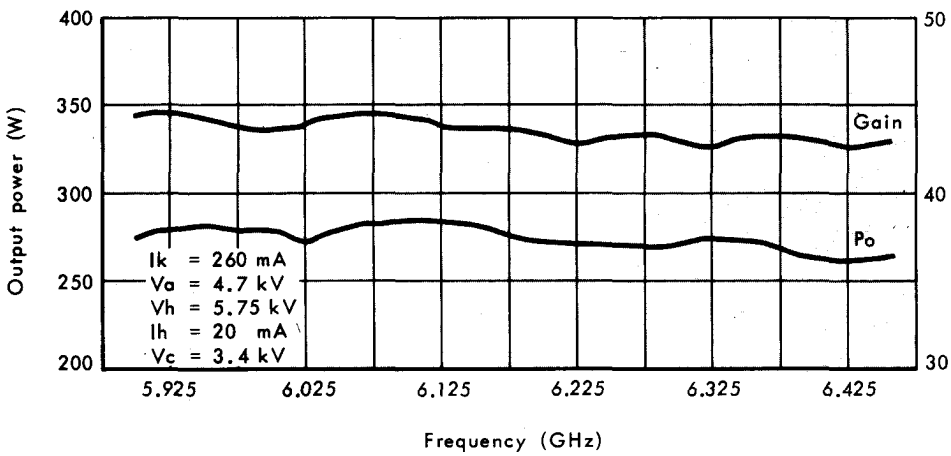


OUTPUT POWER AND AM/PM CONVERSION VERSUS DRIVE POWER



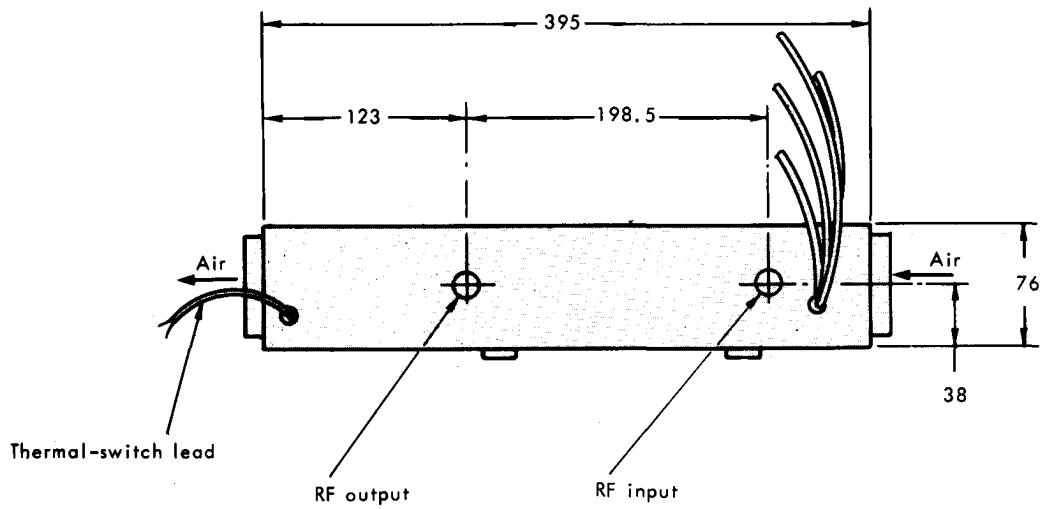


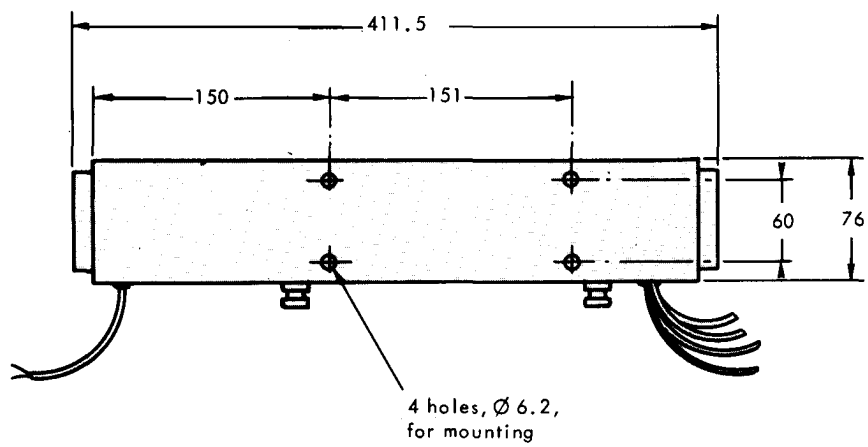
SMALL - SIGNAL GAIN VARIATIONS
(Drive power = 0.85 mW)

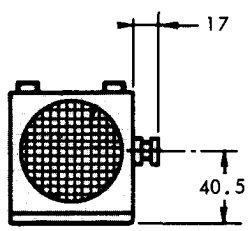


OUTPUT POWER AND SATURATED GAIN VERSUS FREQUENCY

OUTLINE DRAWING







LEADS	
Yellow	Heater-cathode
Brown	Heater
Blue	Anode
Ground	Helix and tube body
Red	Collector

Dimensions nominal, in mm.

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