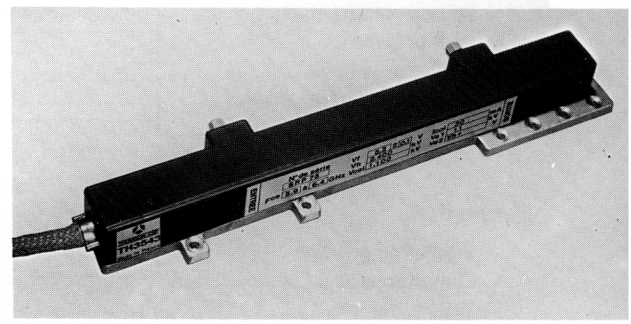
TH 3543
TRAVELING - WAVE TUBE
11 W - 5.9 - 6.4 GHz

- **Designed specifically for advanced line-of-sight microwave links,** carrying up to 1800 telephone channels.
- **Exceptional linearity and noise characteristics.**
- **Delivers 40.5 dBm** of carrier power.
- **Incorporates long-life space-TWT technology** and has high efficiency.
- **PPM-focused and cooled by simple conduction.**



Description

The TH 3543 traveling-wave tube has been developed to serve as the power amplifier in new, high-capacity microwave links over line-of-sight routes. Able to amplify a signal carrying up to 1800 telephone channels, or television or high bit-rate data, this TWT is designed to operate in the 5.9 to 6.4-GHz band and deliver an output power of 40.5 dBm, with an input power of 1.5 dBm. The operating band can be appreciably enlarged with a small output power reduction.

An important feature of this new tube is its low noise factor, which does not exceed 24 dB. Further, it easily meets a stringent specification concerning the admissible minimum signal-to-noise ratio. Even more important, this superior noise performance is achieved with an impregnated-tungsten cathode, of the type developed for our satellite-carried TWT's. The consequences for the expected reliability and long-life capacity of the TH 3543 are abvious.

Adjustment of this tube's electrical parameters has been made extremely simple. Only the anode voltage is adjustable, the heater, helix and collector voltages all being fixed, as is the drive-power level. To obtain the specified 40.5 dBm output (Fig. 1), it suffices to adjust the cathode current by changing the anode voltage applied to the tube. Because of this simplified procedure, TWT replacement is also easy to accomplish.

Designed to operate with its collector depressed about 50 % below the helix, the TH 3543 has a typical efficiency of 28 %. It also has a nearly flat gain characteristics (Fig. 2) and very low AM/PM conversion factor (Fig. 3). Employing PPM beam focusing, the TH 3543 is fully cooled by simple conduction alone.

This state-of-the-art TWT is also available with a matched solid-state power supply, in a compact, adjustment-free TWTA, the TH 20139, which eliminates all tube/power-supply interface problems for the equipment designer. Contact THOMSON-CSF for more information.

GENERAL CHARACTERISTICS

Electrical (1)

Operating-frequency range	5.925 - 6.425	GHz
Output power, min.	40.5 dBm (11.2 W)	
Drive power	1.5 dBm (1.4 mW)	
Noise factor, max.	24	dB
AM/PM Conversion factor, max.	4	°/dB
Input/output cold VSWR	1.7 : 1	
Heater voltage	5.5	V
Heater current	0.5 - 0.7	A
Helix voltage	2.5	kV
Helix current	2	mA
Anode voltage, max.	1.5	kV
Anode current	− 0.1 to + 0.1	mA
Collector voltage	1.2	kV
Collector current , max.	40	mA

(1) All voltages referred to the cathode.

Mechanical

Operating position	Any
Dimensions	See Outline Drawing
Weight, approx.	700 grams
Power-supply connections	Shielded cable
Cooling	By conduction

LIMITING VALUES FOR EQUIPMENT DESIGN (2)

(non-simultaneous)

	Min.	Max.	Units
Heater voltage	5.3	5.7	V
Heater surge current	−	1	A
Warm-up time	3	−	mn
Ambient temperature	− 10	+ 50	°C
Helix voltage	2.3	2.8	kV
Helix current	−	3	mA
Anode voltage	−	1.8	kV
Anode current	− 1	+ 1	A
Collector voltage	1	2	kV
Collector current	−	40	mA
Collector dissipation	−	80	W
Drive power	−	10	mW
Load VSWR	−	2 : 1	

(2) Equipment-design values, **NOT** operating values. No one value ever to be exceeded, even under transient conditions, and operation at more than one limiting value at the same time may cause tube damage.

TYPICAL OPERATION

Operating frequency	6	GHz	Helix voltage	2.5	kV
Drive power	1.4	mW	Helix current	0.4	mA
Output power	40.5	dBm	Collector voltage	1.2	kV
Heater voltage	5.5	V	Collector current	32	mA
Heater current	0.65	A	Harmonic level max.	31	dBm
Anode voltage	1.16	kV	Efficiency	26	%

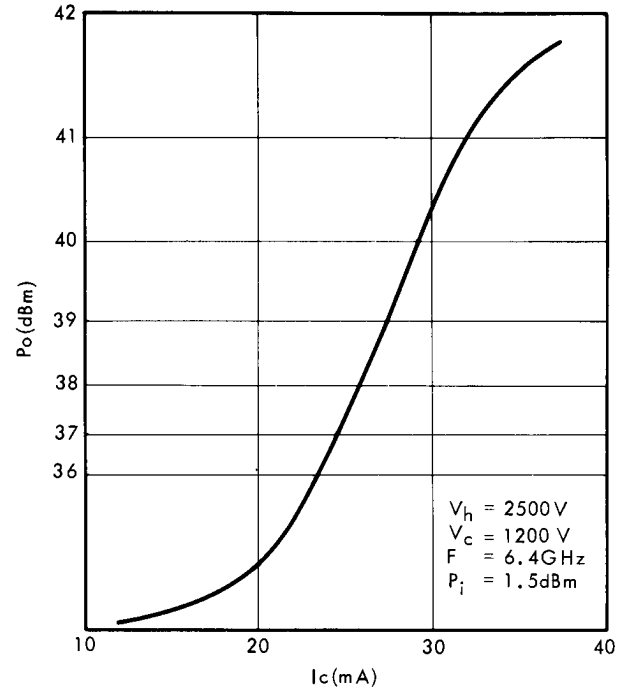


FIGURE 1 - Output power versus collector current

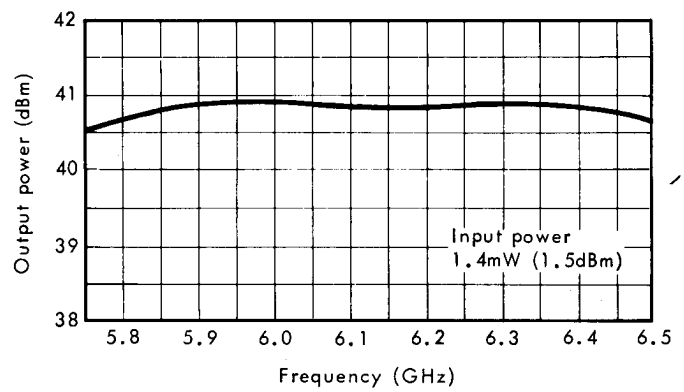


FIGURE 2 - Frequency response

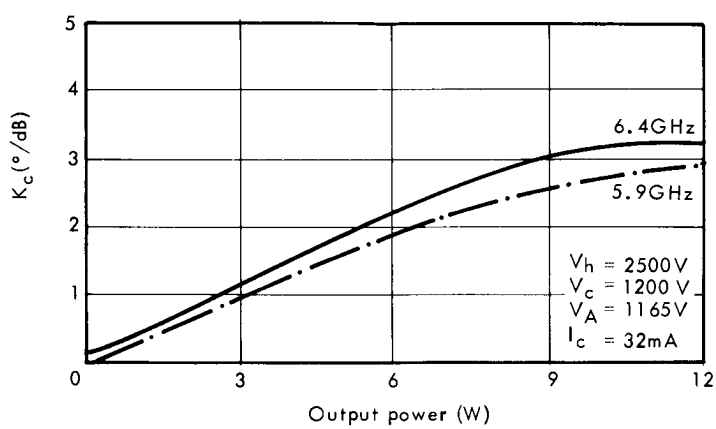
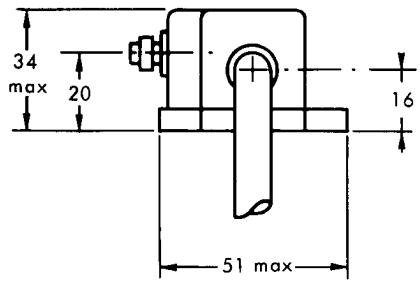


FIGURE 3 - AM-PM conversion coefficient versus output power with constant collector current

OUTLINE DRAWING

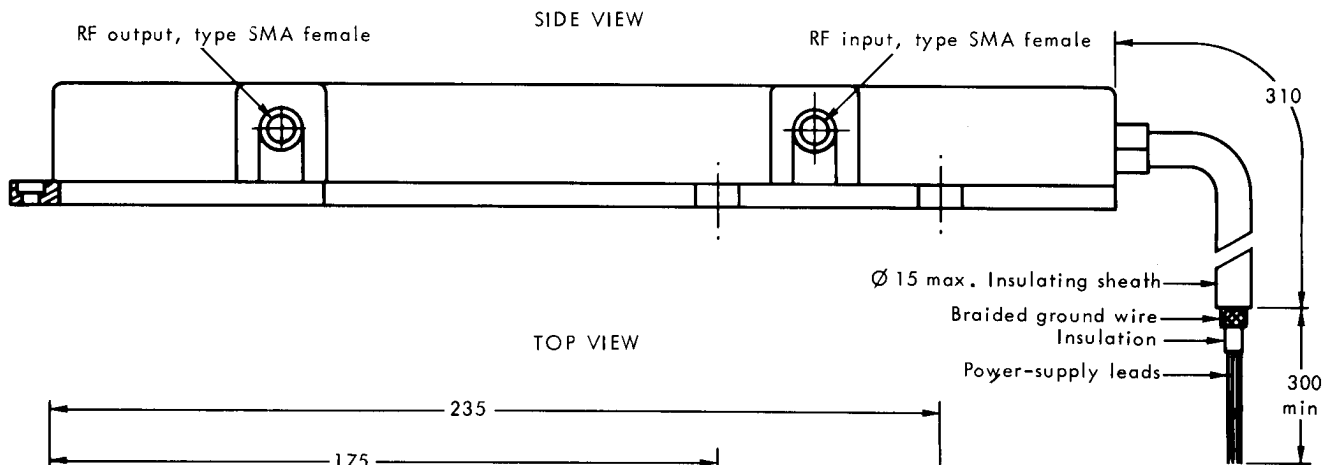
RIGHT VIEW



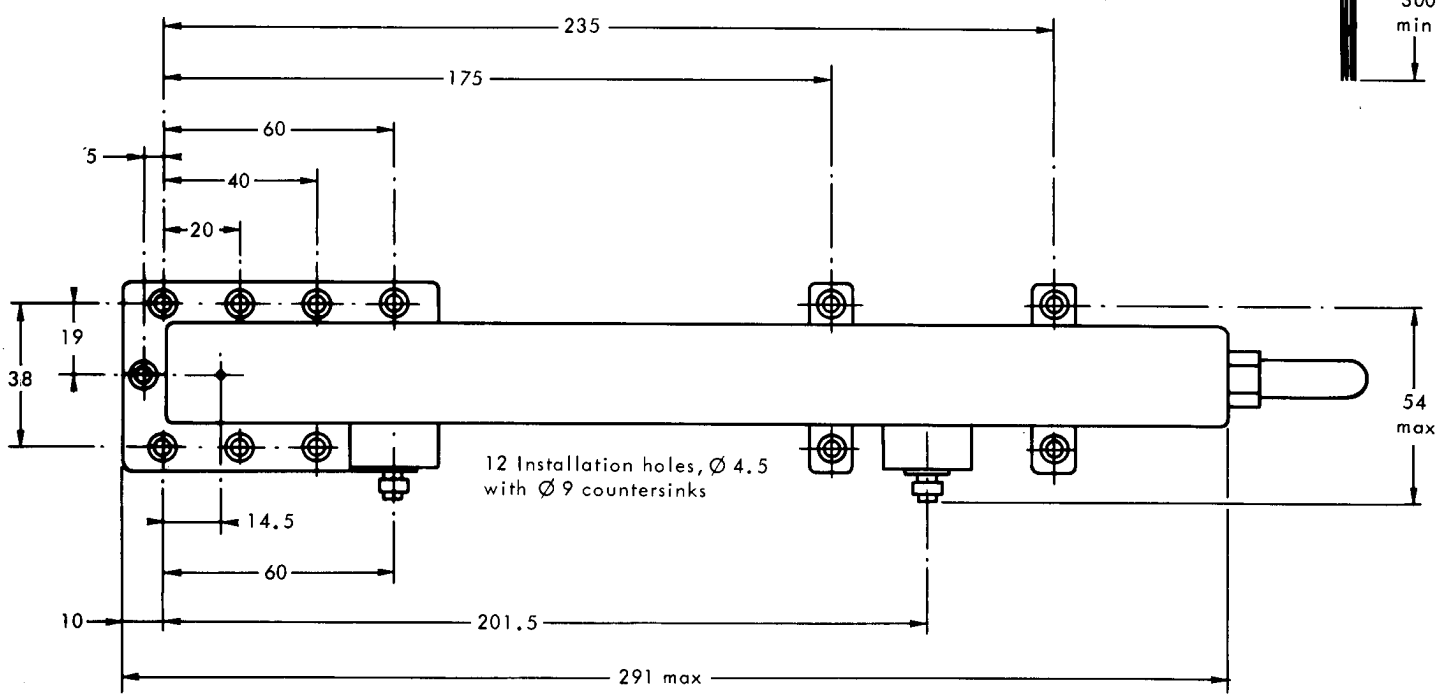
POWER-SUPPLY LEAD COLOR CODE

Filament	Brown
Filament-cathode	Yellow
Anode	Blue
Helix-ground	Orange
Collector	Red

SIDE VIEW



TOP VIEW



Dimensions in mm, nominal except those marked " max " or " min ".