

ELECTRONIC TUBE REFERENCE

1B54

Specialized - Switching Tube electronic tube

CONSOLIDATED TECHNICAL DATA
1 SECTION
CONSTRUCTION
MICROWAVETR SWITCH

Broadband non-tunable pre-TR gas-switching tube with integral microwave cavity. It provides rapid protective RF switching in radar transmit-receive systems.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	— / —	PARALLEL HEATER	— / —
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 MicrowaveTRSwitch
No fixed ratings recorded.
Physical section extracted from supplied datasheet.

1B54 — Broad-Band Pre-TR Gas Switching Tube

The **1B54** is a broad-band, non-tunable Pre-TR (transmit-receive) gas switching tube of the integral cavity type. It is designed specifically for microwave radar applications, operating in the 3550 Mc (megacycles per second) region. As a Pre-TR tube, its primary function is to protect sensitive receiver components from high-power transmitter pulses by ionizing and presenting a short circuit during transmission, while allowing low-power received signals to pass with minimal attenuation.

Electrical Characteristics and Operational Band

The 1B54 is engineered to operate over a defined high-frequency spectrum, providing consistent performance across its entire operational band.

- **Operational Band:** 3400 to 3700 Mc
- **Center Frequency Region:** 3550 Mc
- **Low-Level Input Voltage Standing Wave Ratio (V.S.W.R.):** 1.30 maximum, measured with a matched load over the entire 3400 to 3700 Mc operational band.
- **Insertion Loss:** 0.4 dB maximum. This low insertion loss ensures that weak incoming signals during the receive cycle are transmitted to the receiver with negligible signal degradation.

Transmitter Power Ratings and Environmental Limits

The device is designed to handle high-power RF pulses while operating under extreme environmental conditions. The power ratings define the operational envelope within which the gas switching tube will reliably ionize and protect the system.

Parameter	Value
Maximum Transmitter Peak Power	1000 kW
Minimum Transmitter Peak Power	10 kW
Ambient Temperature Range	-55 to +100 °C

The minimum transmitter peak power of 10 kW represents the threshold required to ensure reliable gas ionization (firing) of the tube to protect the receiver. The maximum peak power rating of 1000 kW indicates the upper limit of RF power the tube can safely withstand in its fired state. The wide ambient temperature range allows the 1B54 to remain operational in demanding military and aerospace environments.

Mechanical Construction and Physical Dimensions

The 1B54 features an integral cavity design, meaning the resonant cavity is built directly into the tube structure rather than requiring an external housing. The mechanical assembly is robust, with a net weight of approximately 1 lb. It can be mounted in any position.

Flange Configurations and Mounting

The tube is designed to be bolted directly into a waveguide system using two distinct flanges, designated as Flange A and Flange B.

- **Overall Length:** 2.060 inches between the flange faces.
- **Flange Height:** 4-1/8 inches (4.125 inches).
- **Flange Width:** 2.250 inches (symmetrically positioned at 1.125 inches from the centerline to each side).
- **Cavity Opening (Inner):** 1.500 inches by 3.000 inches.
- **Cavity Opening (Outer Raised Portion):** 1.718 inches by 3.218 inches.

The mounting hole configurations differ between the two flanges to facilitate secure and correct alignment:

- **Flange A Mounting Holes:** 4 unthreaded holes, 7/32 inch in diameter. These holes are spaced 2.000 inches horizontally (1.000 inch from the centerline) and 2.500 inches vertically (1.250 inches from the centerline).
- **Flange B Mounting Holes:** 4 threaded holes with 10-32 threads, sharing the same spacing of 2.000 inches horizontally (1.000 inch from the centerline) and 2.500 inches vertically (1.250 inches from the centerline).

Additional Physical Features

- **Exhaust Tube:** Located on the top of the tube assembly, with a maximum height of 1/4 inch (0.250 inches).
- **Spring Assembly:** A spring with a diameter of 0.125 inches is fastened at the corners of the assembly. The thickness dimension of this spring assembly ranges from a minimum of 0.354 inches to a maximum of 0.370 inches, featuring a 0.180-inch offset.

Technical Summary

The **1B54** is a specialized, non-tunable Pre-TR gas switching tube designed for microwave radar systems operating in the 3550 Mc region. Featuring an integral cavity construction, it operates across a band of 3400 to 3700 Mc with a maximum low-level input V.S.W.R. of 1.30 and a maximum insertion loss of 0.4 dB. It is rated to handle transmitter peak powers ranging from a minimum of 10 kW (to ensure ionization) up to a maximum of 1000 kW, and it is capable of operating across an ambient temperature range of -55 to +100 °C. Weighing approximately 1 lb, the tube supports mounting in any position and utilizes a dual-flange design (one unthreaded and one with 10-32 threaded holes) for integration into standard waveguide systems.

TUBE TINKER

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and their source documents.

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