



ELECTRONIC TUBE REFERENCE

1838

Specialized - Switching Tube electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

MICROWAVETR SWITCH

Gas-filled microwave TR/ATR switching tube for pulsed transmitter/receiver duplexer service, protecting or isolating receiver and transmitter paths during radar pulses.

GENERAL CHARACTERISTICS

BASE DESIGNATION	—	BASE PINS	—
NOMINAL HEATER	1.9 V / 21.5 A	PARALLEL HEATER	— / —
HEATING	Direct	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 MicrowaveTRSwitch	
PEAK INVERSE VOLTAGE	360 V
NOMINAL OUTPUT CURRENT	7500 A
PEAK FORWARD CURRENT	45000 A
FORWARD VOLTAGE DROP	10 V
WARM-UP TIME	2 s
<i>Promoted only where the locked section schema has a direct semantic match; additional published device-specific ratings, operating points, capacitances, life-test, pulse, RF, and rectifier data are retained in TUBE_SECTION_PARAMETER.</i>	

1838 — Double-Anode Rectifier and Gas

Switching Tubes

Overview

The designation **1838** (including its variant **GL-1838** or **GL-1B38**) represents two entirely distinct classes of specialized gas-filled electron tubes designed for widely different industrial and high-frequency applications.

The primary **1838** is a heavy-duty, double-anode, mercury-vapor and gas-filled rectifying valve. It is engineered specifically for high-current applications, such as cinema rectifiers delivering up to 15 A per valve. It features a directly heated oxide-coated filament, an auxiliary ignition electrode to facilitate low-voltage striking, and a vertical mounting requirement.

The **GL-1838** (also designated as **GL-1B38**) is a gas switching pre-TR (transmit-receive) tube. It is designed for pulsed microwave circuits, operating in the S-band (around 2800 megacycles) to suppress leakage energy at harmonic frequencies in conjunction with a narrow-band TR tube.

The 1838 Double-Anode Rectifying Valve

Construction and Mechanical Specifications

The 1838 rectifying valve is constructed with a robust glass envelope containing mercury vapor and an inert gas fill. The physical dimensions and mechanical requirements of this valve are substantial, reflecting its high-current power handling capabilities:

- **Maximum Envelope Diameter:** 97 mm
- **Maximum Height:** 262 mm
- **Net Weight:** 500 g (shipping weight is approximately 1400 g)
- **Mounting Position:** Must be mounted strictly vertically, with the base down, to ensure proper distribution and condensation of the mercury vapor.
- **Base and Socket:** Utilizes a specialized Spec. 3p base, which mates with a Type [1285](#) socket.

The electrical connections are split between the base and the top of the envelope:

- **Base Pins:** Two heavy filament pins (6 mm diameter) and one auxiliary ignition pin (a_h , 4 mm diameter).
- **Top Terminals:** Two anode connections (a and a') terminated with M6 threaded studs to secure high-current cabling.

Filament and Pre-heating Requirements

The 1838 rectifier utilizes a directly heated, oxide-coated filament designed for AC operation. Because of the mercury-vapor fill, strict pre-heating protocols must be observed to vaporize any condensed mercury on the electrodes before anode voltage is applied:

- **Filament Voltage (V_f):** 1.9 V

- **Filament Current (I_f):** 21.5 A
- **Recommended Pre-heating Time (T_w):** 2 minutes under normal operating conditions. This can be decreased to a minimum of 1 minute if urgently required (the use of a type [4152](#) time delay switch is recommended).
- **Extended Pre-heating:** A minimum of 5 minutes is required after transport or a long period of service interruption to ensure complete redistribution of the mercury.

Electrical and Operating Characteristics

The 1838 operates with a low internal arc drop and requires an auxiliary ignition supply to ensure reliable striking at low voltages:

- **Arc Voltage (V_{arc}):** 10 V (typical)
- **Ignition Voltage (V_{ign}):** 22 V (typical)
- **Auxiliary Ignition Requirements:** To achieve the nominal 22 V ignition voltage, an auxiliary DC supply delivering a minimum of 40 V at 10 mA must be connected through a current-limiting resistor between the auxiliary ignition electrode (a_h , positive) and the cathode (negative). An auxiliary ignition unit, such as type 1289, is recommended for this purpose.

The valve can be configured in several standard rectifier circuits. Typical operating points across these configurations are detailed below:

Circuit Configuration	Transformer Voltage V_{tr} (V_{eff})	Output Voltage V_o (V)	Output Current I_o (A)
Circuit a	115 V	85 V	15 A
Circuit e	115 V	120 V	30 A
Circuit f	105 V	120 V	45 A
Circuit g	115 V	110 V	45 A

Absolute Maximum Ratings

To prevent arc-back, cathode damage, or thermal runaway, the 1838 rectifier must be operated within the following absolute limits:

- **Peak Inverse Anode Voltage (V_{ainvp}):** 360 V maximum
- **Average Anode Current (I_a):** 7.5 A maximum (averaged over a maximum integration time of 5 seconds)
- **Peak Anode Current (I_{ap}):** 45 A maximum
- **Surge Current (I_{surge}):** 375 A maximum for a duration of $t \leq 0.1$ seconds
- **Minimum Circuit Resistance (R_t):** 0.25 Ω (to limit fault currents)
- **Mercury Temperature (t_{Hg}):** 30 to 80 °C (the operating temperature of the condensed mercury must be maintained within this range for stable ionization)

The GL-1838 (GL-1B38) Gas Switching Pre-TR Tube

Design and Microwave Applications

The GL-1838 (GL-1B38) is a gas-filled switching tube designed for pulsed microwave systems. It functions as a pre-TR tube, working in tandem with a narrow-band TR tube to protect sensitive receiver components by suppressing harmonic leakage energy.

Unlike the low-frequency rectifier, the GL-1838 is compact and optimized for high-frequency waveguide or cavity mounting:

- **Overall Length:** 3.250" $\pm$ 0.015" (excluding projections)
- **Body Width:** 1.500" $\pm$ 0.010" (1.750" $\pm$ 0.015" overall width including mounting flanges)
- **Body Height:** 1.375" $\pm$ 0.010" (1.625" $\pm$ 0.015" overall height including flanges)
- **Exhaust Projection:** 1/2" maximum length, 3/16" maximum diameter
- **Net Weight:** Approximately 1 pound
- **Mounting Position:** Any position is permissible.

High-Frequency Performance and Ratings

The GL-1838 operates in the S-band microwave spectrum and is rated for high-power transmitter pulses:

- **Center Frequency:** 2800 megacycles (MHz)
- **Operational Band:** 2700 to 2910 megacycles, maintained at a maximum Voltage Standing Wave Ratio (VSWR) of 1.2
- **Voltage Standing Wave Ratio (VSWR):** 1.07 maximum at the 2800 megacycles center frequency
- **Leakage Energy:** 1.3×10^{-1} joules
- **Transmitter Peak Power:** 1000 kilowatts (maximum rating)
- **Ambient Temperature Range:** -40 to +100 °C

Technical Summary

The designation **1838** encompasses two highly specialized, non-interchangeable gas-discharge devices:

1. **The 1838 Cinema Rectifier:** A large, vertically mounted, double-anode mercury-vapor and gas-filled valve. It features a 1.9 V / 21.5 A filament, an auxiliary ignition electrode, and is capable of delivering up to 45 A of rectified output current in multi-valve configurations, with a peak inverse voltage limit of 360 V.
2. **The GL-1838 (GL-1B38) Pre-TR Tube:** A compact, flange-mounted gas switching tube for S-band pulsed microwave systems. It operates between 2700 and 2910 megacycles, handles up to 1000 kW of peak transmitter power, and serves to suppress harmonic leakage energy.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1950 General Electric Transmitting Types

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1950 GENERAL ELECTRIC TRANSMITTING TYPES

Section 1 · MicrowaveTRSwitch

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Center/operating frequency	2800 MHz	—

APPLICATION		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Gas switching service	TR/ATR microwave switching	—



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1963 Philips Electron Tubes Handbook V3

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1963 PHILIPS ELECTRON TUBES HANDBOOK V3

Section 1 · MicrowaveTRSwitch

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Filament heating time	2 s	IndustrialRectifier
Arc voltage drop	10 V	IndustrialRectifier
Ignition voltage	22 V	IndustrialRectifier

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Peak inverse anode voltage maximum	360 V	IndustrialRectifier
Average anode current maximum	7.5 A	IndustrialRectifier
Peak anode current maximum	45 A	IndustrialRectifier
Surge current maximum	375 A	IndustrialRectifier
Recommended temperature range	30-80 °C	IndustrialRectifier
Transformer RMS voltage	115 V	CircuitA
DC output voltage	85 V	CircuitA
DC output current	15 A	CircuitA
Transformer RMS voltage	115 V	CircuitE
DC output voltage	120 V	CircuitE
DC output current	30 A	CircuitE
Transformer RMS voltage	105 V	CircuitF
DC output voltage	120 V	CircuitF
DC output current	45 A	CircuitF
Transformer RMS voltage	115 V	CircuitG
DC output voltage	110 V	CircuitG
DC output current	45 A	CircuitG



SOURCE DATA APPENDIX

SOURCE OPERATING CONDITIONS

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1999 Philips 0-D

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1999 PHILIPS 0-D

Section 1 · MicrowaveTRSwitch

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	1.9 V	Nominal

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater current	21.5 A	Nominal

TUBE TINKER

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