

ELECTRONIC TUBE REFERENCE

CONSOLIDATED TECHNICAL DATA

1B3GT

1 SECTION
CONSTRUCTION
RECTIFIER

Rectifier - TV Line Scan Boost electronic tube

High-voltage television flyback/EHT rectifier designed to convert horizontal-output transformer pulses into the DC accelerating supply required by the CRT.

GENERAL CHARACTERISTICS

BASE DESIGNATION	3C	BASE PINS	8
NOMINAL HEATER	1.25 V / 200 mA	PARALLEL HEATER	– / –
HEATING	Direct	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

3C - TERMINAL PINOUT

TERMINAL	SECTION	ELEMENT	STATUS
PIN1 – Pin 1	–	–	IC
PIN2 – Pin 2	–	F – Filament	CONNECTED
PIN3 – Pin 3	–	–	IC
PIN5 – Pin 5	–	–	IC
PIN7 – Pin 7	–	F – Filament	CONNECTED
PIN8 – Pin 8	–	–	IC
CAP1 – Top cap	A	P – Plate (Anode)	CONNECTED

SECTION RATINGS

SECTION1 Rectifier	
PEAK INVERSE VOLTAGE	33000 V
NOMINAL OUTPUT CURRENT	1.1 mA
PEAK FORWARD CURRENT	50 mA
FORWARD VOLTAGE DROP	100 V
<i>Promoted values use primary flyback rectifier service; RF rectifier limits retained separately as parameters.</i>	

1B3GT — Half-Wave High-Voltage Vacuum Rectifier

The **1B3GT** (also designated as **1G3GT/1B3GT** or **1B3-GT**) is a directly heated, half-wave vacuum diode rectifier designed for high-voltage, low-current applications. It is primarily used as a high-voltage rectifier in television receivers to supply power to the anode of picture tubes, operating as a flyback rectifier or in high-voltage RF-operated power supplies.

The tube features high insulation between the plate and the filament, a low filament power requirement, and an internal shield. It is housed in a T-9 glass envelope with an octal base and a top cap for the plate connection to handle high peak inverse voltages.

Mechanical Construction and Physical Dimensions

The 1B3GT is constructed with a T-9 glass bulb and a small top cap (JEDEC No. C1-34) with tubular support. The top cap serves as the plate (anode) terminal, providing physical separation from the base to prevent high-voltage arcing. The maximum radial compression on the top cap connector must not exceed 7 pounds.

The tube uses an octal base, which can have 5, 6, 7, or 8 pins depending on the specific base variant (such as JEDEC B5-82, B6-8, B6-60, B6-144, B7-166, B7-211, B8-6, B8-50, B8-58, or short intermediate-shell variants).

Physical Dimensions

- **Maximum Overall Length:** 3-9/16 to 4-1/16 inches
- **Maximum Seated Height:** 3-1/2 inches (some variants specify 3.312 inches or a seated length of 2-13/16 ± 3/16 inches)
- **Maximum Bulb/Base Diameter:** 1-9/32 inches (some variants specify 1-3/16 inches or 1.188 inches)
- **Cap Diameter:** 1.062 inches (minimum) to 1.188 inches (maximum)
- **Mounting Position:** Any position

Filament Ratings and Operation

The 1B3GT features a coated, directly heated filament. Because the filament operates at high DC potentials in typical television flyback circuits, precise voltage regulation is critical to ensure tube longevity and performance.

Filament Parameter	Value
Nominal Filament Voltage (AC or DC)	1.25 V
Nominal Filament Current	0.2 A (200 mA)
Absolute Minimum Filament Voltage	1.05 V
Absolute Maximum Filament Voltage	1.45 V

The nominal filament power can be calculated as: $\text{Power} = \text{Voltage} \times \text{Current} = 1.25 \text{ V} \times 0.2 \text{ A} = 0.25 \text{ W}$

Filament Voltage Measurement

When the filament is operating at a high DC potential, direct electrical measurement of the filament voltage can be difficult and hazardous. In such cases, the filament voltage can be adjusted by visual comparison. In a darkened room, the color temperature (glow) of the filament is observed by looking at its reflection on the internal shield. This glow is compared against another 1B3GT operated from a known, safe DC or low-frequency AC supply of 1.25 V. The excitation of the in-circuit tube is then adjusted until the color temperatures match.

Pinout and Socket Connections

The 1B3GT uses the JEDEC [3C](#) basing diagram (bottom view). The pin connections are as follows:

- **Pin 1:** Internal Connection (IC) / Limited Connection (LC) / Omitted on some bases
- **Pin 2:** Filament (F)
- **Pin 3:** Internal Connection (IC) / Limited Connection (LC)
- **Pin 4:** No Connection (NC) / Limited Connection (LC) / Omitted on some bases
- **Pin 5:** Internal Connection (IC) / Limited Connection (LC)
- **Pin 6:** No Connection (NC) / Limited Connection (LC) / Omitted on some bases
- **Pin 7:** Filament and Internal Shield (F, IS)
- **Pin 8:** Internal Connection (IC) / Limited Connection (LC)
- **Top Cap:** Plate (P)

Socket Wiring Considerations

To minimize corona discharge at high operating voltages, socket terminals 1, 3, 4, 5, 6, and 8 may be connected directly to terminal 7 (filament/internal shield) or to an external corona shield that is connected to terminal 7.

- Terminals 4 and 6 may be used as tie points for circuit components that are at or near filament potential.
- Some configurations warn that terminals 1, 3, 4, 5, 6, and 8 must not be used as general tie points for other circuitry.

Electrical Characteristics and Capacitance

The 1B3GT is characterized by a low interelectrode capacitance and a relatively low internal voltage drop during conduction.

- **Direct Interelectrode Capacitance (Plate to Filament and Internal Shield):** Approximately 1.3 pF (measured without an external shield).
- **Typical Tube Voltage Drop:** Approximately 100 V when conducting an instantaneous plate current of 7.0 mA.

Qualitative Plate Characteristics

The average plate characteristics (at a nominal filament voltage of 1.25 V) show a smooth, upward-curving, non-linear diode characteristic starting at 0 V and 0 mA.

- At 50 V DC, the plate current is approximately 3 to 4.5 mA.
- At 100 V DC, the plate current is approximately 7 to 7.5 mA.
- At 150 V DC, the plate current rises to approximately 12 to 14.5 mA.
- At 190 to 200 V DC, the plate current reaches approximately 17 to 19.5 mA. Above approximately 25 V, the curve becomes nearly linear.

Maximum Ratings and Service Categories

The 1B3GT has distinct maximum ratings depending on the application. These ratings are defined under the Design-Maximum system (or Design-Center system in some earlier specifications) and represent limiting values.

Pulsed/Flyback Rectifier Service

This service is defined for operation in a standard 525-line, 30-frame television system, where the high-voltage pulse duration does not exceed 15% of one horizontal scanning cycle (or 10 microseconds).

- **Maximum Peak Inverse Plate Voltage (Total DC and Peak):** 26,000 V
- **Maximum DC Component of Inverse Plate Voltage:** 21,000 V or 22,000 V (depending on the specific rating system applied)
- **Maximum Peak Plate Current:** 50 mA
- **Maximum Average Plate Current (DC Output Current):** 0.5 mA

Radio-Frequency (RF) Rectifier Service

For operation in high-voltage RF-operated power supplies:

- **Maximum Peak Inverse Plate Voltage:** 33,000 V
- **Maximum Peak Plate Current:** 30 mA or 35 mA (depending on the rating system)
- **Maximum DC Output Current:** 1.0 mA or 1.1 mA
- **Supply Voltage Frequency Range:** 1.5 kHz (minimum) to 100 kHz (maximum)

Safety and Shielding Requirements

Operating the 1B3GT at high voltages involves significant safety hazards that must be addressed in equipment design:

1. **High-Voltage Shock Hazard:** The plate cap and associated circuitry operate at extremely high potentials (up to 33,000 V). These circuits must be enclosed in a protective housing with safety interlocks. Before servicing or touching any parts of the circuit, the power must be turned off and both terminals of the high-voltage filter capacitors must be grounded.
2. **X-Radiation Hazard:** When vacuum tubes are operated at voltages above approximately 16,000 V, they can produce soft X-rays. The intensity of this radiation increases with operating voltage. To prevent health hazards from prolonged close-range exposure, adequate shielding (such as a metal enclosure around the tube and high-voltage section) must be incorporated into the equipment design. Operation of the tube outside its maximum ratings can also cause temporary or permanent changes that increase its X-radiation output.

Technical Summary

The **1B3GT** is a **glass octal, half-wave high-voltage vacuum rectifier** featuring a **directly heated 1.25 V, 0.2 A coated filament** and an internal shield. It is designed to deliver up to **0.5 mA** of DC output current under pulsed flyback conditions with peak inverse voltages up to **26,000 V**, or up to **1.1 mA** in RF rectifier service with peak inverse voltages up to **33,000 V** over a frequency range of **1.5 to 100 kHz**.

Its physical construction utilizes a T-9 envelope with a top cap plate connection to ensure high insulation. Proper installation requires careful attention to socket wiring to prevent corona discharge, visual filament temperature calibration when operating at high potentials, and robust physical shielding to protect against high-voltage shock and soft X-radiation.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

195X General Electric Essential Characteristics

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

195X GENERAL ELECTRIC ESSENTIAL CHARACTERISTICS

Section 1 · Rectifier

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Tube voltage drop	100 V	At 7 mA DC

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
DC output current maximum	0.5 mA	TV Flyback Rectifier
Inverse voltage maximum	21000 V	TV Flyback Rectifier
Peak current maximum	50 mA	TV Flyback Rectifier



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1961 Tung Sol

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

1961 TUNG SOL

Section 1 · Rectifier

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Filament Voltage	1.25 V	Nominal
Filament Current	200 mA	Nominal
InversePlateVoltageTotalDcAndPeak	26 kV	FlybackVoltageRectifier
InversePlateVoltageDc	22 kV	FlybackVoltageRectifier

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Peak Plate Current	40 mA	FlybackVoltageRectifier
Average Plate Current	0.5 mA	FlybackVoltageRectifier
Peak Inverse Plate Voltage	33 kV	RFVoltageRectifier
Peak Plate Current	0.35 mA	RFVoltageRectifier
Average Plate Current	1.1 mA	RFVoltageRectifier
Supply Frequency	100 kHz	RFVoltageRectifier;Maximum
Supply Frequency	1.5 kHz	RFVoltageRectifier;Minimum

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate To Filament Capacitance	1.3 pF	Approx

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Tube Voltage Drop	100 V	PlateCurrent=7mA;Approx


SOURCE DATA APPENDIX

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1965 Westinghouse Data Book

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

1965 WESTINGHOUSE DATA BOOK

Section 1 · Rectifier

CHARACTERISTICS		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Filament Voltage	1.25 V	—
Filament Current	200 mA	—
Plate-to-Filament Capacitance	1.3 pF	—
Tube Voltage Drop	100 V	PlateCurrent=7mA

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Peak Inverse Plate Voltage	26000 V	Flyback
Steady-State Peak Plate Current	30 mA	—
DC Output Current	1 mA	—
RF Rectifier Absolute Maximum Inverse Voltage	33000 V	RFRectifier


SOURCE DATA APPENDIX

SOURCE OPERATING CONDITIONS

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1966 Tung Sol Electronic Tubes 1 of 4

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

1966 TUNG SOL ELECTRONIC TUBES 1 OF 4

Section 1 · Rectifier

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Filament/heater voltage	1.25 V	—
Filament/heater current	200 mA	—
Maximum total DC-plus-peak inverse voltage	—30000 V	FlybackRectifier
Maximum steady-state peak plate current	50 mA	FlybackRectifier
Maximum DC output current	0.5 mA	FlybackRectifier

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate-to-filament/heater capacitance	1.3 pF	Approximate


SOURCE DATA APPENDIX

1968 General Electric Co

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

1968 GENERAL ELECTRIC CO

Section 1 · Rectifier

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Peak inverse plate voltage DC component	22000 V	FlybackRectifier
Peak inverse plate voltage total DC and peak	26000 V	FlybackRectifier
Steady state peak plate current	50 mA	FlybackRectifier
DC output current	0.5 mA	FlybackRectifier

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Tube voltage drop	100 V	I _b =7mA

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Interelectrode capacitance	1.3 pF	—



SOURCE DATA APPENDIX

1971 RCA HB3 Binder 4 of 7

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

1971 RCA HB3 BINDER 4 OF 7

Section 1 · Rectifier

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater/filament voltage	1.25 V	—
Heater/filament current	200 mA	—

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Peak inverse plate voltage total DC plus peak	26000 V	PulsedRectifier
Maximum DC component of inverse plate voltage	22000 V	PulsedRectifier
Peak plate current	50 mA	PulsedRectifier
Average plate current	0.5 mA	PulsedRectifier
Peak inverse plate voltage	33000 V	RFRectifier
Peak plate current	35 mA	RFRectifier
Average plate current	1.1 mA	RFRectifier
Supply-frequency range minimum	1.5 kHz	RFRectifier
Supply-frequency range maximum	100 kHz	RFRectifier

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Tube voltage drop	100 V	PlateCurrent=7mA

APPLICATION		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Application	High-voltage half-wave pulsed rectifier	TelevisionFlyback


SOURCE DATA APPENDIX

SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1975 RCA RC30

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

1975 RCA RC30

Section 1 · Rectifier

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Peak Inverse Plate Voltage	26000 V	FlybackRectifier
Peak Plate Current	50 mA	—
Average Plate Current	0.5 mA	—

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Filament Voltage Minimum	1.05 V	—
Filament Voltage Maximum	1.45 V	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Tube Voltage Drop	100 V	PlateCurrent=7mA
X-Radiation Maximum	0.5 mR/hr	LotSamplingMaximum

TUBE TINKER

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