



ELECTRONIC TUBE REFERENCE

1A3

Diode (NOT rectifier) electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION

CONSTRUCTION

DIODE

Battery-operated RF detector diode intended for radio signal detection and low-level rectification. Its simple thermionic diode construction is optimized for receiving-equipment signal processing rather than power-supply rectification.

GENERAL CHARACTERISTICS

BASE DESIGNATION	5AP	BASE PINS	7
NOMINAL HEATER	1.4 V / 150 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Diode	
MAXIMUM CATHODE CURRENT	0.5 mA
PEAK INVERSE VOLTAGE	330 V
NOMINAL OUTPUT CURRENT	0.5 mA
PEAK FORWARD CURRENT	5 mA
MAXIMUM HEATER-CATHODE VOLTAGE	140 V
<i>Tung-Sol 1A3 high-frequency indirectly heated miniature diode, 1.4 V 150 mA, used as discriminator in portable FM receivers and HF measuring instruments, resonant frequency approximately 1000 MHz. Rated rectifier service maximum peak inverse anode voltage 330 V, maximum peak forward plate current 5 mA, maximum DC output current 0.5 mA, already reflected in max cathode-current value. Typical condenser-input rectifier application uses 117 V RMS supply and 2 μF capacitor. Peak inverse rating is not forward DC plate limit. Seven-pin miniature base and capacitances published.</i>	

1A3 — High-Frequency Diode Vacuum Tube

An indirectly heated miniature diode designed for high-frequency detection, FM discriminator circuits, and portable measuring equipment.

Overview

The **1A3** is an indirectly heated miniature diode designed primarily for high-frequency (HF) and radio-frequency (RF) applications. It is commonly employed as a discriminator tube in portable FM receivers and in portable high-frequency measuring equipment. The tube features a coated unipotential cathode, a 7-pin miniature construction, and is capable of operating at frequencies up to approximately 1000 MHz (1000 Mc/s), which is its approximate resonant frequency.

Physical and Mechanical Specifications

The 1A3 is constructed with a T-5 1/2 glass bulb (JEDEC 5-2 outline, also designated as A19-2) and a miniature button 7-pin base (E7-1, Pico 7, or 7C10).

Dimensions and Weight

- **Maximum Diameter:** 0.750 inches (approximately 19 mm)
- **Maximum Overall Length:** 2.125 inches (2-1/8 inches or 47.6 mm envelope height with a maximum pin length of 7 to 7.14 mm)
- **Maximum Seated Length:** 1.875 inches (1-7/8 inches)
- **Weight:** Approximately 7 grams

Installation and Mounting

The tube can be mounted in any position. When installing the 1A3, certain mechanical considerations apply:

- Sockets (such as RCA Stock No. 9914) must not have material obstructing the center hole. This accommodates potential manufacturing variations where the exhaust-tube tip is located at the base end of the tube.
- Special precautions should be taken to prevent the tube from becoming dislodged in portable or high-vibration environments.
- The tube is rated for operation at altitudes up to 3 km without pressurization.

Pinout and Basing Configurations

The 1A3 utilizes a 7-pin base layout (JEDEC 5AP or 7C10). Depending on the specific manufacturing standard, the pin assignments are generally configured as follows:

Pin	Connection (Standard 5AP / 7C10)	Alternative Configuration
Pin 1	Heater (Filament)	Heater
Pin 2	Plate (Anode)	Plate
Pin 3	Cathode	Cathode
Pin 4	No Connection / Internal Connection	No Connection
Pin 5	No Connection / Internal Connection	Heater
Pin 6	Plate (Anode)	—
Pin 7	Heater (Filament)	—

Note on Pins 4 and 5: Pins designated as "No Connection" or "Internal Connection" should not be used as external support tie points or connected to any external circuitry. In some alternative configurations, Pin 5 is designated as a heater connection.

Heater and Cathode Characteristics

The 1A3 features an indirectly heated, coated unipotential cathode designed for parallel AC or DC operation.

Parameter	Value / Range
Nominal Heater Voltage	1.4 V
Heater Voltage Limits (Design Center)	1.4 V $\pm$ 0.2 V
Absolute Heater Voltage Limits	1.2 V (minimum) to 1.6 V (maximum)
Nominal Heater Current	150 mA (0.15 A)

Heater-to-Cathode Voltage Ratings

The insulation between the heater and the cathode is rated to withstand significant potential differences:

- **Maximum Heater-Cathode Voltage (DC, Design Center):** 140 V
- **Maximum Peak Heater-Cathode Voltage (Absolute Maximum):** 100 V (or $\pm$ 100 V)

Electrical Ratings and Operating Conditions

The electrical limits of the 1A3 are defined under two rating systems: Design-Center Values (EIA Standard RS-239) and Absolute Maximum Ratings.

Maximum Ratings (Rectifier Service)

Parameter	Design-Center Rating	Absolute Maximum Rating
Peak Inverse Plate Voltage	330 V	365 V
Peak Plate Current	5.0 mA	5.5 mA
DC Output Current (Rectified Current)	0.5 mA	0.55 mA

Typical Half-Wave Rectifier Operation (Condenser-Input Filter)

When operated as a half-wave rectifier with a condenser-input filter, the typical operating parameters are:

- **AC Plate Supply Voltage (RMS):** 117 V (also specified as the maximum RMS plate voltage)
- **Filter Input Condenser:** 2 μ F
- **Minimum Total Effective Plate-Supply Impedance:** 0 Ω

Interelectrode Capacitances

The direct interelectrode capacitances of the 1A3, measured without an external shield, are approximately:

- **Plate to Cathode ($C_{p/k}$ or $C_{a/k}$):** 0.4 pF
- **Plate to Heater ($C_{p/h}$ or $C_{a/f}$):** 0.6 pF to 0.8 pF
- **Heater to Cathode ($C_{h/k}$ or $C_{k/f}$):** 0.6 pF

Electrical Characteristics and Curves

Under test conditions with a diode voltage (U_d) of 4 V, the diode current (I_d) is typically 0.6 mA when measured over a 30-second interval.

Average Plate Characteristics

The relationship between plate voltage and plate current exhibits distinct regions:

- **Low Voltage Region (0 to 5 V DC):** The characteristic is non-linear and exponential. The current rises from 0 mA at 0 V to approximately 0.7–0.75 mA at 4 V or 5 V.
- **Linear Region (5 to 20 V DC):** Above 5 V, the plate current becomes highly linear. Typical current values along this curve include:
 - **At 8 V DC:** Approximately 1.45 mA
 - **At 10 V DC:** Approximately 1.8 to 2.0 mA (or up to 2.4 mA / 2400 μ A depending on the specific curve)
 - **At 15 V DC:** Approximately 3.0 to 3.3 mA
 - **At 20 V DC:** Approximately 4.2 to 4.6 mA

Technical Summary

The **1A3** is a high-frequency miniature diode featuring an indirectly heated, coated unipotential cathode. Operating with a nominal 1.4 V, 150 mA heater supply, it is housed in a 7-pin miniature glass envelope and can function at frequencies up to 1000 MHz. Its low interelectrode capacitances (0.4 pF plate-to-cathode) and linear plate characteristics above 5 V make it highly suitable for RF detection and FM discriminator circuits in portable equipment. The tube's ratings support a maximum peak inverse voltage of 330 V (Design Center) or 365 V (Absolute Maximum), with a maximum DC output current of 0.5 mA to 0.55 mA.



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1959 Telefunken

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

1959 TELEFUNKEN

Section 1 · Diode

APPLICATION

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Application	RF diode	—



SOURCE OPERATING CONDITIONS

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195X General Electric Essential Characteristics

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195X GENERAL ELECTRIC ESSENTIAL CHARACTERISTICS

Section 1 · Diode

OTHER

PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum rms supply voltage	117 V	HalfWaveRectifier



SOURCE OPERATING CONDITIONS

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1961 Tung Sol

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1961 TUNG SOL

Section 1 · Diode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
AC plate supply voltage RMS	117 V	CapacitorInputFilter
Filter input condenser	2 uF	CapacitorInputFilter

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate to cathode	0.4 pF	—



SOURCE OPERATING CONDITIONS

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1966 Tung Sol Electronic Tubes 3 of 4

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1966 TUNG SOL ELECTRONIC TUBES 3 OF 4

Section 1 · Diode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum peak inverse plate voltage	330 V	RectifierService
Maximum peak plate current	5 mA	RectifierService
Maximum DC output current	0.5 mA	RectifierService
Heater-cathode voltage	140 V	—

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate-to-cathode capacitance	0.4 pF	—
Plate-to-heater capacitance	0.6 pF	—
Heater-to-cathode capacitance	0.6 pF	—



1968 Mazda Belvu

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1968 MAZDA BELVU

Section 1 · Diode

APPLICATION		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Application	RFDetector text	—

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