



ELECTRONIC TUBE REFERENCE

12S8GT

Voltage - Triode (with diode, heptode or hexode) electronic tube

CONSOLIDATED TECHNICAL
DATA

3 SECTIONS

CONSTRUCTION

DIODE-DIODE-TRIODE

Dual-diode high-mu triode providing detector diode sections and a Class-A voltage-amplifier triode for conventional receiving applications.

GENERAL CHARACTERISTICS

BASE DESIGNATION	8CB	BASE PINS	8
NOMINAL HEATER	12.6 V / 150 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Dissimilar

SECTION RATINGS

SECTION1 Triode	
PLATE RESISTANCE	91000 Ω
TRANSCONDUCTANCE	0.0011 S
AMPLIFICATION FACTOR	100
MAXIMUM PLATE VOLTAGE	300 V
<i>Promoted from printed maximum/characteristic columns; additional published values retained in TUBE_SECTION_PARAMETER.</i>	

SECTION2 Diode	
<i>No fixed ratings recorded.</i>	
<i>Promoted from printed maximum/characteristic columns; additional published values retained in TUBE_SECTION_PARAMETER. The chart identifies the repeated detector-diode section(s) but does not publish separate diode electrical ratings on this row.</i>	

No fixed ratings recorded.

12S8GT — Triple-Diode High-Mu Triode Vacuum Tube

The **12S8GT** (also designated as **12S8-GT**) is a multi-unit, indirectly heated vacuum tube designed for use in combined AM/FM radio receivers. It integrates a single high-mu triode and three independent diode units within a single glass envelope. This specialized configuration provides all the necessary elements for detection and audio voltage amplification of both AM and FM signals without requiring additional switching circuitry.

Overview

The 12S8GT is engineered to simplify the detector and first audio stages of AM/FM receivers. By combining three separate diodes and a high-mu triode, the tube can perform multiple functions simultaneously, such as AM detection, FM detection (using two of the diodes in a balanced discriminator or ratio detector configuration), and subsequent audio pre-amplification.

The tube features coated unipotential cathodes and is housed in a T-9 glass bulb with an intermediate shell 8-pin octal base. It is designed to operate in any mounting position.

Construction, Heater, and Pinout

The internal structure of the 12S8GT consists of a high-mu triode and three separate diode plates. To facilitate its use in balanced detector circuits, the cathode arrangement is split:

- **Diode 1** is provided with its own separate, independent cathode.
- **Diode 2, Diode 3**, and the **Triode unit** share a common cathode.

This configuration allows Diode 1 to operate at a different cathode potential than the other elements. It is specifically recommended that Diode 1 and Diode 3 be utilized in balanced detector circuits to take advantage of this isolation.

Heater Characteristics

The heater is designed to operate from either an AC or DC source.

Heater Parameter	Value
Nominal Heater Voltage	12.6 V
Nominal Heater Current	0.15 A (150 mA)
Calculated Heater Power	1.89 W (calculated as 12.6 V * 0.15 A)

Pin Connections (8CB Base)

The 12S8GT utilizes an 8-pin octal base with an 8CB basing arrangement. The triode grid is connected to a skirted miniature top cap on the glass envelope. The pin connections, viewed from the bottom of the base, are as follows:

Pin / Cap	Connection
Pin 1	Plate of Diode 3 (P3)
Pin 2	Common Cathode (K) for Diode 2, Diode 3, and Triode
Pin 3	Plate of Diode 1 (P1)
Pin 4	Separate Cathode (K) for Diode 1
Pin 5	Plate of Diode 2 (<u>P2</u>)
Pin 6	Plate of Triode (P)
Pin 7	Heater (H)
Pin 8	Heater (H)
Top Cap	Grid of Triode (G)

Physical Dimensions

- **Maximum Overall Length:** 3-3/16 inches
- **Maximum Seated Height:** 3 inches
- **Maximum Diameter:** 1-5/16 inches

Electrical Ratings

The maximum ratings for the 12S8GT are established under the RMA Standard M8-210 system. These limits represent absolute boundaries that must not be exceeded under any operating conditions.

Rating Parameter	Maximum Limit
Triode Plate Voltage	300 V
Triode Plate Dissipation	0.5 W
Continuous Diode Current (Each Diode)	1 mA
Heater-Cathode Voltage	90 V

Typical Operating Conditions and Characteristics

The triode section of the 12S8GT is characterized by a high amplification factor ($\mu = 100$), making it highly suitable for voltage pre-amplification. Typical Class A operating points for the triode unit are detailed below:

Parameter	Operating Point A	Operating Point B
Plate Voltage	100 V	250 V
Grid Voltage	-1 V	-2 V
Grid Circuit Resistor	0 M	0 M
Plate Current	0.4 mA	0.9 mA
Plate Resistance (Approx.)	110,000,	91,000,
Transconductance	900,mhos	1,100,mhos
Amplification Factor	100	100

Diode Unit Characteristics

Each of the three diode units is capable of rectification. With 10 Volts DC applied directly to any individual diode plate, the average diode current is typically **2.5 mA**.

Resistance-Coupled Amplifier Service

The high- μ triode section is frequently employed as a resistance-coupled audio amplifier. It can be configured using either conventional cathode-resistor bias or grid-leak bias.

The following table outlines representative operating conditions for the triode unit across various plate supply voltages (Ebb), load resistances (R1), and coupling configurations (Rc). The output voltage (Eo) is measured in RMS volts at 5% total harmonic distortion, and the voltage gain is measured at an output level of 2.0 Volts RMS.

Plate Load (<u>R1</u>)	Grid Resistor (Rg1)	Coupling Resistor (Rc)	Supply (Ebb)	Cathode Resistor (Rk)	Voltage Gain	Output Voltage (Eo)
0.1 M	A	0.1 M	90 V	6,800,	25	6 V
0.1 M	A	0.1 M	180 V	4,700,	27	10 V
0.1 M	A	0.1 M	300 V	2,200,	36	29 V
0.27 M	A	0.27 M	90 V	10,000,	35	9 V
0.27 M	A	0.27 M	180 V	6,800,	44	19 V

Plate Load (<u>R1</u>)	Grid Resistor (Rg1)	Coupling Resistor (Rc)	Supply (Ebb)	Cathode Resistor (Rk)	Voltage Gain	Output Voltage (Eo)
0.27 M	A	0.27 M	300 V	4,700,	53	42 V
0.47 M	A	1.0 M	90 V	18,000,	46	15 V
0.47 M	A	1.0 M	180 V	12,000,	54	29 V
0.47 M	A	1.0 M	300 V	9,100,	63	59 V
0.27 M	10 M	0.27 M	90 V	Grounded (0,)	34	5 V
0.27 M	10 M	0.27 M	180 V	Grounded (0,)	54	20 V
0.27 M	10 M	0.27 M	300 V	Grounded (0,)	58	40 V
0.47 M	10 M	1.0 M	90 V	Grounded (0,)	42	9.5 V
0.47 M	10 M	1.0 M	180 V	Grounded (0,)	65	33 V
0.47 M	10 M	1.0 M	300 V	Grounded (0,)	70	63 V

Note: "A" indicates that the value of the grid resistor Rg1 is not critical for the associated cathode-biased operating point.

Interelectrode Capacitances

The capacitive coupling between the internal elements of the 12S8GT is minimized to prevent unwanted feedback and signal degradation, particularly at high frequencies.

Capacitances Without External Shield

- **Triode Input Capacitance:** 1.2 pF
- **Triode Output Capacitance:** 5.0 pF
- **Triode Grid-to-Plate Capacitance:** 2.0 pF

Capacitances With External Shield (Shield #308 Connected to Pin 2)

- **Triode Grid to Any Diode Plate (Max):** 0.005 pF
- **Diode Input (Each Diode, Approx.):** 1 pF

Characteristic Curves and Interpretation

The plate characteristic curves for the triode unit of the 12S8GT illustrate its behavior as a high- μ voltage amplifier. At typical operating plate voltages (between 100 V and 300 V), the plate current remains low (generally under 1.5 mA), which is characteristic of high plate resistance devices. The curves demonstrate that small changes in grid voltage produce significant variations in plate voltage, confirming the tube's high amplification factor of 100.

For the diode units, the rectification curves show the relationship between the rectified microamperes and the DC volts developed across various load resistors (ranging from 0.1 Megohm to 2 Megohms) under different RMS signal inputs (up to 30 Volts). These curves indicate that higher load resistances yield higher developed DC voltages for a given signal input, which is a critical consideration when designing detector and automatic volume control (AVC) circuits.

Related Designations

The **6S8GT** is a closely related designation. It shares the same physical construction, triple-diode triode configuration, and electrical characteristics as the 12S8GT, with the sole exception of the heater requirements. The **6S8GT** is designed for a nominal **6.3 V** heater supply, whereas the 12S8GT requires a **12.6 V** heater supply. These two types are not directly interchangeable without modifying the heater supply circuit.

Technical Summary

The **12S8GT** is an octal-based, triple-diode high- μ triode vacuum tube designed for AM/FM receiver applications. It features a 12.6 V, 150 mA heater, a T-9 glass envelope, and an 8CB pinout configuration. By incorporating three diodes (one with an independent cathode) and a high-gain triode ($\mu = 100$) in a single envelope, it provides an efficient solution for detection and pre-amplification. Designers must adhere to its maximum plate voltage of 300 V and plate dissipation of 0.5 W to ensure reliable operation.

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 · Triode

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Input capacitance	1.2 pF	Section1
Output capacitance	5 pF	Section1
Grid-to-plate capacitance	2 pF	Section1

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate voltage	250 V	ClassA
Control-grid voltage	-2 V	ClassA
Plate current	0.9 mA	ClassA

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Plate resistance	91000 Ω	Section1
Transconductance	1100 μS	Section1
Amplification factor	100	Section1

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 · Triode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	12.6 V	Nominal

1961 TUNG SOL
Section 2 · Diode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	12.6 V	Nominal

1961 TUNG SOL
Section 3 · Diode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Heater voltage	12.6 V	Nominal

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