

ELECTRONIC TUBE REFERENCE

12SY7GT

Voltage - Radio Detector Converter electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
HEPTODE

GT-envelope heptode oscillator-converter for superheterodyne receivers. Its multi-grid structure combines local oscillation and mixing, translating incoming radio-frequency signals to the intermediate frequency while providing useful isolation between input and oscillator circuits.

GENERAL CHARACTERISTICS

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

SECTION RATINGS

SECTION1 Heptode	
PLATE RESISTANCE	500000 Ω
TRANSCONDUCTANCE	0.00044 S
MAXIMUM PLATE VOLTAGE	200 V
MAXIMUM SCREEN VOLTAGE	100 V
MAXIMUM PLATE DISSIPATION	1 W
Published promoted fields populated semantically; identical repeated sections compressed.	

12SY7GT — Heptode Pentagrid Converter

The **12SY7GT** (also referenced as the **12SY7**) is an indirectly heated heptode pentagrid converter vacuum tube designed for frequency converter service in superheterodyne radio receivers. It is engineered to operate either with separate excitation or in a self-excited oscillator circuit. Featuring a unipotential coated cathode and a 12.6 V heater, the tube is well-suited for series-string heater chains or applications utilizing a 12 V electrical supply.

Physical Specifications and Base Connections

The 12SY7GT is constructed in a T-9 glass bulb with an 8-pin small wafer octal base featuring a metal shell. The physical dimensions of the device are as follows:

- **Maximum Diameter:** 1 5/16 inches
- **Maximum Overall Length:** 3 5/16 inches
- **Maximum Seated Height:** 2 3/4 inches
- **Mounting Position:** Any

The octal base connections, viewed from the bottom of the tube, conform to the following pinout:

Pin	Connection
Pin 1	Base Shell
Pin 2	Heater
Pin 3	Plate
Pin 4	Screen (Grids <u>G2</u> and G4)
Pin 5	Oscillator Grid (Grid G1)
Pin 6	Cathode, Grid G5, and Internal Shield (K, G5, SI)
Pin 7	Heater
Pin 8	Signal Grid (Grid G3)

Electrical Ratings and Capacitances

The maximum ratings for the 12SY7GT are established under the RMA Standard MB-210. These values represent the absolute limits for reliable operation:

- **Heater Voltage (AC or DC):** 12.6 V
- **Heater Current:** 0.15 A
- **Calculated Heater Power:** 1.89 W
- **Maximum Plate Voltage:** 300 V
- **Maximum Screen Voltage (Grids G2 & G4):** 100 V
- **Maximum Screen Supply Voltage:** 300 V
- **Maximum Plate Dissipation:** 1.0 W
- **Maximum Screen Dissipation:** 1.0 W
- **Maximum Total Cathode Current:** 14 mA
- **Minimum External Signal Grid Bias Voltage (Grid G3):** 0 V (with self-excited oscillator)

Interelectrode Capacitances

The capacitances of the 12SY7GT are measured with the base shell and a standard tube shield connected directly to the cathode:

- **Signal Grid to Mixer Plate (G3 to P):** 0.2 μF (maximum)
- **Signal Grid to Oscillator Grid (G3 to G1):** 0.2 μF (maximum)
- **Oscillator Grid to Mixer Plate (G1 to P):** 0.2 μF (maximum)
- **Cathode (K) to all other electrodes except G1:** 30 μF
- **Signal Input (G3 to all other electrodes):** 11 μF
- **Oscillator Input (G1 to all other electrodes):** 8.0 μF
- **Oscillator Grid (G1) to all other electrodes except K:** 5 μF
- **Mixer Output (P to all other electrodes):** 12 μF
- **Oscillator Grid to Cathode (G1 to K):** 3.0 μF

Typical Operating Conditions and Characteristics

In typical converter service with separate excitation, the 12SY7GT can be operated across a range of plate and screen voltages. The conversion transconductance characteristics correspond closely to those obtained with zero bias in a self-excited oscillator circuit.

The following table details the typical operating parameters at three distinct voltage levels:

Parameter	Low-Voltage Operation	Medium-Voltage Operation	High-Voltage Operation
Plate Voltage	28 V	100 V	250 V
Screen Voltage (<u>G2</u> & G4)	28 V	100 V	100 V
Signal Grid Bias (G3)	-1 V	-2 V	-2 V
Anode-Grid Voltage (G5)	0 V	0 V	0 V
Plate Current	0.5 mA	3.3 mA	3.5 mA
Screen Current	1.8 mA	8.5 mA	8.5 mA
Oscillator-Grid Current (<u>I_{g1}</u>)	0.1 mA	0.5 mA	0.5 mA
Total Cathode Current	2.4 mA	12.3 mA	12.5 mA
Oscillator-Grid Resistor (<u>R_{g1}</u>)	20,000 Ω	20,000 Ω	20,000 Ω

Parameter	Low-Voltage Operation	Medium-Voltage Operation	High-Voltage Operation
Approximate Plate Resistance	—	0.5 MΩ	1.0 MΩ

Conversion Transconductance vs. Signal Grid Bias

The conversion transconductance (g_c) varies significantly with the applied signal grid bias (Grid G3), providing the mechanism for automatic volume control (AVC) or manual gain control:

- **At Low-Voltage Operation (28 V Plate/Screen):**
 - g_c at -1 V Bias: 250 μmhos
 - g_c at -6 V Bias: 8 μmhos
- **At Medium-Voltage Operation (100 V Plate/Screen):**
 - g_c at -2 V Bias: 425 μmhos
 - g_c at -6 V Bias: 310 μmhos
 - g_c at -10 V Bias: 75 μmhos
 - g_c at -35 V Bias: 2 μmhos (approximate)
- **At High-Voltage Operation (250 V Plate / 100 V Screen):**
 - g_c at -2 V Bias: 450 μmhos
 - g_c at -6 V Bias: 325 μmhos
 - g_c at -10 V Bias: 80 μmhos
 - g_c at -35 V Bias: 2 μmhos (approximate)

Special Test Configuration

A specific test configuration is defined to evaluate the basic triode-like characteristics of the oscillator section. In this test, the screen grids (G2 and G4) are connected directly to the plate, and a potential of 100 V is applied to this combined electrode. The signal grid (G3) is connected to ground, and the input signal is applied to the oscillator grid (G1) at 0 V bias. Under these conditions, the tube exhibits the following characteristics:

- **Transconductance:** 4500 μmhos
- **Plate Current:** 27 mA
- **Amplification Factor (μ):** 13

Technical Summary

The **12SY7GT** is a heptode pentagrid converter featuring a 12.6 V, 0.15 A heater and an 8-pin octal base with a metal shell. It is designed to perform frequency conversion in superheterodyne receivers, offering high plate resistance (up to 1.0 MΩ) and a conversion transconductance of up to 450 μmhos under typical high-voltage operating conditions. Its multi-grid structure allows for effective separation of the oscillator

and mixer functions, while its remote-cutoff signal grid characteristic enables effective gain control over a wide range of input signal levels.

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 · Heptode

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum plate voltage	300 V	Published handbook rating
Maximum screen voltage	100 V	Published handbook rating
Plate voltage	28 V	ClassA
Screen voltage	28 V	ClassA
Control-grid bias	1 V	ClassA
Plate current	0.5 mA	ClassA
Screen current	1.8 mA	ClassA

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Transconductance	250 μ S	Published handbook characteristic
Heater voltage	12.6 V	Published heater rating
Heater current	150 mA	Published heater rating

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

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Conversion Transconductance	440 uS	ZeroGridBias

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