

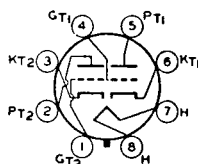
6SN7GT
6SN7GTA

Refer to chart at end of section.

6SN7GTB MEDIUM-MU TWIN TRIODE

12SN7GTA

Glass octal type used as combined vertical oscillator and vertical-deflection amplifier, and as horizontal-deflection oscillator, in color and black-and-white television receivers. Each unit may also be used in multi-vibrator or resistance-coupled amplifier circuits in radio equipment. **Outlines section, 13D**; requires octal socket. Except for the common heater, each triode unit is independent of the other. For typical operation as resistance-coupled amplifier, refer to **Resistance-Coupled Amplifier** section. Type 12SN7GTA is identical with type 6SN7GTB except for heater ratings.



8BD

	6SN7GTB	12SN7GTA	
Heater Voltage (ac/dc)	6.3	12.6	volts
Heater Current	0.6	0.3	ampere
Heater Warm-up Time (Average)	11	—	seconds
Heater-Cathode Voltage:			
Peak value	±200 max	±200 max	volts
Average value	100 max	100 max	volts
Direct Interelectrode Capacitances (Approx.):	Unit No.1	Unit No.2	
Grid to Plate	4.0	3.8	pF
Grid to Cathode and Heater	2.2	2.6	pF
Plate to Cathode and Heater	0.7	0.7	pF

Class A₁ Amplifier (Each Unit)

MAXIMUM RATINGS (Design-Center Values)

Plate Voltage	450	volts
Cathode Current	20	mA
Plate Dissipation:		
For either plate	5	watts
For both plates with both units operating	7.5	watts

CHARACTERISTICS

Plate Voltage	90	250	volts
Grid Voltage	0	-8	volts
Amplification Factor	20	20	
Plate Resistance (Approx.)	6700	7700	ohms
Transconductance	3000	2600	μmhos
Plate Current	10	9	mA
Plate Current for grid voltage of -12.5 volts	—	1.3	mA
Grid Voltage (Approx.) for plate current of 10 μA	-7	-18	volts

MAXIMUM CIRCUIT VALUE

Grid-Circuit Resistance, for fixed-bias operation	1	megohm
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Oscillator (Each Unit)

For operation in a 525-line, 30-frame system

	Vertical-Deflection Oscillator	Horizontal-Deflection Oscillator	
MAXIMUM RATINGS (Design-Center Values)			
DC Plate Voltage	450	450	volts
Peak Negative-Pulse Grid Voltage	400	600	volts
Peak Cathode Current	70	300	mA
Average Cathode Current	20	20	mA
Plate Dissipation:			
For either plate	5	5	watts
For both plates with both units operating	7.5	7.5	watts

MAXIMUM CIRCUIT VALUES

Grid-Circuit Resistance	2.2	2.2	megohms
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Vertical-Deflection Amplifier (Each Unit)

For operation in a 525-line, 30-frame system

MAXIMUM RATINGS (Design-Center Values)			
DC Plate Voltage	450	volts	
Peak Positive-Pulse Plate Voltage# (Absolute maximum)	1500*	volts	
Peak Negative-Pulse Grid Voltage	250	volts	
Peak Cathode Current	70	mA	

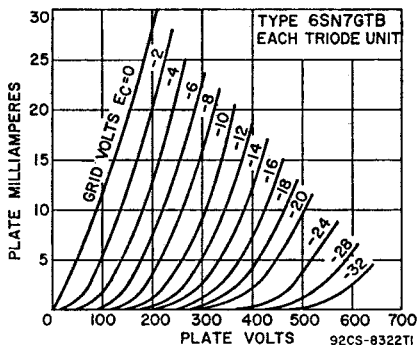
Average Cathode Current	20	mA
Plate Dissipation:		
For either plate	5	watts
For both plates with both units operating	7.5	watts

MAXIMUM CIRCUIT VALUE

Grid-Circuit Resistance, for cathode-bias operation	2.2	megohms
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Pulse duration must not exceed 15% of a vertical cycle (2.5 milliseconds).

■ Under no circumstances should this absolute value be exceeded.



Refer to chart at end of section.

**6SQ7
6SQ7GT**

Refer to chart at end of section.

6SR7

Refer to chart at end of section.

6SS7

Refer to chart at end of section.

6ST7

Refer to chart at end of section.

6SZ7

Refer to chart at end of section.
For replacement use type 6AF4A.

6T4

Refer to chart at end of section.

6T7G

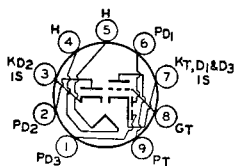
Refer to chart at end of section.

6T8

**TRIPLE DIODE—
HIGH-MU TRIODE**

6T8A

5T8, 19T8



9E

Miniature type used as combined audio amplifier, AM detector, and FM detector in AM/FM radio receivers. Diode unit No.1 is used for AM detection, and diode units No.2 and No.3 are used for FM detection. **Outlines section, 6B;** requires miniature 9-contact socket.

For typical operation as resistance-coupled amplifier,

refer to **Resistance-Coupled Amplifier** section. Types 5T8 and 19T8 are identical with type 6T8A except for heater ratings.

Heater Voltage (ac/dc)	5T8	6T8A	19T8	
Heater Current	4.7	6.3	18.9	volts
Heater Warm-up Time (Average)	0.6	0.45	0.15	ampere
Heater-Cathode Voltage:	11	11	11	seconds
Peak value	±200 max	±100 max	±90 max	volts
Average value	100 max	—	—	volts

Direct Interelectrode Capacitances:

Triode Unit:

	Unshielded	Shielded	
Grid to Plate	1.7	1.7	pF
Grid to Cathode, Internal Shield (pin 7), and Heater	1.6	1.7	pF
Plate to Cathode, Internal Shield (pin 7), and Heater	1.2	2.4	pF

Diode Units:

Diode-No.1 Plate to Cathode, Internal Shield (pin 7), and Heater	3.8	3.8	pF
Diode-No.2 Plate to Cathode, Internal Shield (pin 3), and Heater	3.8	3.8*	pF
Diode-No.3 Plate to Cathode, Internal Shield (pin 7), and Heater	3.4	3.6	pF
Diode-No.2 Cathode, Internal Shield (pin 3) to All Other Electrodes, and Heater	7.5	8.5 [■]	pF
Triode Grid to any Diode Plate	0.034 max	0.034 max	pF

- * With external shield connected to pin 7 except as noted.
- With external shield connected to pin 3.
- With external shield connected to pins 4 and 5.

Triode Unit as Class A₁ Amplifier

MAXIMUM RATINGS (Design-Maximum Values)

Plate Voltage	330	volts
Grid Voltage, Positive-bias value	0	volts
Plate Dissipation	1.1	watts

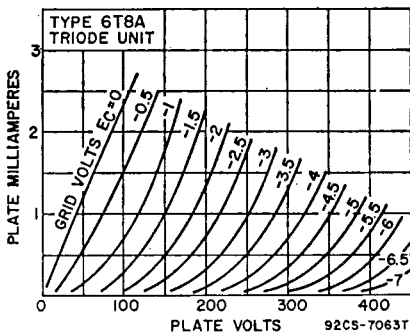
CHARACTERISTICS

Plate Voltage	100	250	volts
Grid Voltage	-1	-3	volts
Amplification Factor	70	70	
Plate Resistance (Approx.)	54000	58000	ohms
Transconductance	1300	1200	μmhos
Plate Current	0.8	1	mA

Diode Units

MAXIMUM RATING (Design-Maximum Values)

Plate Current (Each Unit)	5.5	mA
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6T9

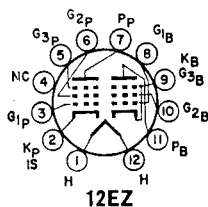
Refer to chart at end of section.

6T10

10T10, 12T10

BEAM POWER TUBE—SHARP-CUTOFF PENTODE

Duodecar type used as combined FM detector and audio-frequency output amplifier in color and black-and-white television receivers. The beam power unit is used in af output stages, and the sharp-cutoff, dual-control pentode unit is used as an FM detector. Outlines section, 8C; requires duodecar 12-contact socket. For maximum ratings and characteristics, refer to type 6AL11. Types 10T10 and 12T10 are identical with type 6T10 except for heater ratings.



	6T10	10T10	12T10	
Heater Voltage (ac/dc)	6.3	9.8	12.6	volts
Heater Current	0.95	0.6	0.45	amperes
Heater Warm-up Time (Average)	—	11	11	seconds
Heater-Cathode Voltage:				
Peak value	±200 max	±200 max	±200 max	volts
Average value	100 max	100 max	100 max	volts
Direct Interelectrode Capacitances:				
Unit No.1:				
Grid No.1 to Plate			0.22	pF
Grid No.1 to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield			11	pF
Plate to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield			10	pF
Unit No.2:				
Grid No.1 to Plate			0.032	pF
Grid No.3 to Plate			3	pF
Grid No.1 to Cathode, Heater, Grid No.2, Grid No.3 and Internal Shield			6.5	pF
Grid No.3 to Cathode, Heater, Grid No.1, Grid No.2, Plate, and Internal Shield			7.5	pF
Grid No.1 to Grid No.3			0.12	pF
Plate of Unit No.1 to Plate of Unit No.2			0.13	pF

Refer to chart at end of section.

6U5

Refer to chart at end of section.

6U7G

Refer to chart at end of section.

6U8

For replacement use type 6U8A/6KD8.

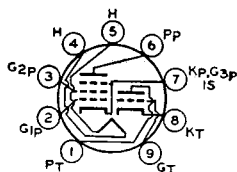
6U8A

For replacement use type 6U8A/6KD8.

MEDIUM-MU TRIODE— SHARP-CUTOFF PENTODE

6U8A/ 6KD8

5U8, 9U8A



9AE

Miniature types used as combined oscillator and mixer tube in color and black-and-white television receivers utilizing an intermediate frequency in the order of 40 MHz. Outlines section, 6B; require miniature 9-contact socket. Type 5U8 is identical with type 6U8A/6KD8 except for heater ratings.

	5U8	6U8A/6KD8	9U8A	
Heater Voltage (ac/dc)	4.7	6.3	9.45	volts
Heater Current	0.6	0.45	0.3	ampere
Heater Warm-up Time (Average)	11	11	11	seconds
Heater-Cathode Voltage:				
Peak value		±200 max	±200 max	volts
Average value		100 max	100 max	volts
Direct Interelectrode Capacitances:				
Triode Unit:				
Grid to Plate		1.8	1.8	pF
Grid to Cathode, Heater, Pentode Cathode, Pentode Grid No.3, and Internal Shield		2.8	2.8	pF
Plate to Cathode, Heater, Pentode Cathode, Pentode Grid No.3, and Internal Shield		1.5	2	pF
Pentode Unit:				
Grid No.1 to Plate		0.010 max	0.006 max	pF
Grid No.1 to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield		5	5	pF
Plate to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield		2.6	3.5	pF
Triode Cathode to Heater		3	3*	pF
Pentode Cathode, Pentode Grid No.3, and Internal Shield		3	3*	pF
Pentode Grid No.1 to Triode Plate		0.2 max	0.2 max	pF
Pentode Plate to Triode Plate		0.1 max	0.02 max	pF

▲ With external shield connected to pin 4 except as noted.

• With external shield connected to pin 6.

Class A₁ Amplifier

MAXIMUM RATINGS (Design-Maximum Values)	Triode Unit	Pentode Unit	
Plate Voltage	330	330	volts
Grid-No.2 (Screen-Grid) Supply Voltage	—	330	volts
Grid-No.2 Voltage	—	See curve page 300	
Grid-No.1 (Control-Grid) Voltage, Positive-bias value	0	0	volts
Plate Dissipation	2.5	3	watts
Grid-No.2 Input:			
For grid-No.2 voltages up to 165 volts	—	0.55	watt
For grid-No.2 voltages between 165 and 330 volts	—	See curve page 300	

CHARACTERISTICS

Plate Voltage	125	125	volts
Grid-No.2 Voltage	—	110	volts
Grid-No.1 Voltage	—1	—1	volts
Amplification Factor	40	—	
Plate Resistance (Approx.)	—	0.2	megohm
Transconductance	7500	5000	μ mhos
Plate Current	13.5	9.5	mA
Grid-No.2 Current	—	3.5	mA
Grid-No.1 Voltage (Approx.) for plate current of 20 μ A	—9	—8	volts

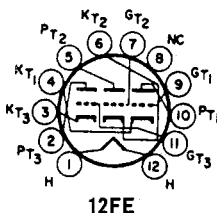
6U9/ECF201

Refer to chart at end of section.

6U10

THREE-UNIT TRIODE

Duodecar type used in amplifier applications. Units No.1 and No.3 are medium-mu triode units, and unit No.2 is a high-mu triode unit. Outlines section, 8A; requires duodecar 12-contact socket. Heater: volts (ac/dc), 6.3; amperes, 0.6; warm-up time (average), 11 seconds; maximum heater-cathode volts, ± 275 (peak) for units 1 and 3; ± 200 (peak) for unit 2; 100 (average) for each unit.



12FE

Class A₁ Amplifier

MAXIMUM RATINGS (Design-Maximum Values)	Units Nos. 1 and 3	Unit No.2	
Plate Voltage	330	330	volts
DC Grid Voltage:			
Positive-bias value	0	0	volts
Negative-bias value	50	50	volts
Average Cathode Current	20	—	mA
Plate Dissipation	2	1	watts

CHARACTERISTICS

Plate Voltage	200	200	volts
Grid Voltage	—6	—1.5	volts
Amplification Factor	17.5	90	
Plate Resistance (Approx.)	7700	61000	ohms
Transconductance	2300	1600	μ mhos
Plate Current	9.6	1.2	mA
Grid Voltage (Approx.):			
For plate current of 100 μ A	—15	—	volts
For plate current of 35 μ A	—	—3	volts

MAXIMUM CIRCUIT VALUES

Grid-Circuit Resistance:			
For fixed-bias operation	1	0.5	megohm
For cathode-bias operation	2.2	1 ^o	megohms

* This value may reach 10 megohms provided the plate-supply voltage and load resistance are such that the plate dissipation can never exceed 0.5 watt.

6V3A

Refer to chart at end of section.