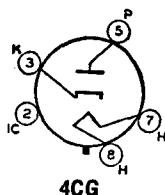


HALF-WAVE VACUUM RECTIFIER

6DE4/6CQ4

17DE4, 22DE4



Glass octal type used as damper tube in horizontal-deflection circuits of television receivers. Outlines section, 13G; requires octal socket. Socket terminals 1, 2, 4, and 6 should not be used as tie points. This tube, like other power-handling tubes, should be adequately ventilated. Types 17DE4 and 22DE4 are identical with type 6DE4/6CQ4 except for heater ratings.

	6DE4/6CQ4	17DE4	22DE4	
Heater Voltage (ac/dc)	6.3	17	22.4	volts
Heater Current	1.6	0.6	0.45	amperes
Heater Warm-up Time (Average)	—	11	11	seconds
Direct Interelectrode Capacitances (Approx.):				
Plate to Cathode and Heater			8.5	pF
Cathode to Plate and Heater			11.5	pF
Heater to Cathode			4	pF

Damper Service

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

MAXIMUM RATINGS (Design-Maximum Values)

Peak Inverse Plate Voltage#	5500	volts
Peak Plate Current	1100	mA
Average Plate Current	180	mA
Plate Dissipation	6.5	watts
Heater-Cathode Voltage:		
Peak value	+300 —5500	volts
Average value	+100 —900	volts

CHARACTERISTIC Instantaneous Value

Tube Voltage Drop for plate current of 350 mA	34	volts
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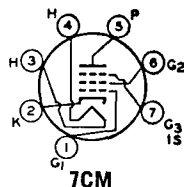
Pulse duration must not exceed 15% of a horizontal scanning cycle (10 microseconds).

6DE6

4DE6

SHARP-CUTOFF PENTODE

Miniature type used in the gain-controlled picture if stages of television receivers utilizing an intermediate frequency in the order of 40 MHz and as an rf amplifier in vhf television tuners. Outlines section, 5C; requires miniature 7-contact socket. Type 4DE6 is identical with type 6DE6 except for heater ratings.



	4DE6	6DE6	
Heater Voltage (ac/dc)	4.2	6.3	volts
Heater Current	0.45	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:			
Grid No.1 to Plate	Unshielded	Shielded ^A	
Grid No.1 to Cathode, Heater, Grid No.2,	0.025 max	0.015 max	pF
Grid No.3, and Internal Shield	6.5	6.5	pF
Plate to Cathode, Heater, Grid No.2, Grid No.3,	2	3	pF
and Internal Shield			

^A With external shield connected to cathode.

Class A₁ Amplifier

MAXIMUM RATINGS (Design-Maximum Values)

Plate Voltage	330	volts
Grid-No.3 (Suppressor-Grid) Voltage, Positive value	0	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	volts
Plate Dissipation	2.3	watts

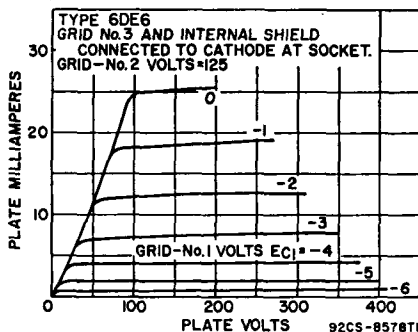
Grid-No.2 Input:

For grid-No.2 voltages up to 165 volts

0.55 watt

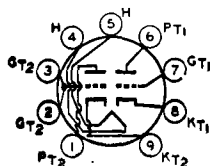
For grid-No.2 voltages between 165 and 330 volts

See curve page 300



CHARACTERISTICS

Plate Supply Voltage	125	volts
Grid No.3	Connected to cathode at socket	
Grid-No.2 Supply Voltage	125	volts
Cathode-Bias Resistor	56	ohms
Plate Resistance (Approx.)	0.25	megohm
Transconductance	8000	μ mhos
Transconductance for grid-No.1 volts of -5.5 and cathode resistor of 0 ohms	700	μ mhos
Plate Current	15.5	mA
Grid-No.2 Current	4.2	mA
Grid-No.1 Voltage (Approx.) for plate current of 20 μ A	-9	volts



9HF

ature 9-contact socket. For curve of average plate characteristics, Unit No.2, refer to type 6DR7. Types 10DE7 and 13DE7 are identical with type 6DE7 except for heater ratings.

DUAL TRIODE

6DE7

10DE7, 13DE7

Miniature type used as combined vertical oscillator and vertical-deflection amplifier in television receivers. Unit No.1 is used as a blocking oscillator in vertical-deflection circuits, and unit No.2 is used as a vertical-deflection amplifier. Outlines section, 6E; requires miniature 9-contact socket.

	6DE7	10DE7	13DE7	
Heater Voltage (ac/dc)	6.3	9.7	13	volts
Heater Current	0.9	0.6	0.45	ampere
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 (Approx.):	Unit No.1 Unit No.2			
Grid to Plate	4	8.5		pF
Grid to Cathode and Heater	2.2	5.5		pF
Plate to Cathode and Heater	0.52	1		pF

Class A₁ Amplifier

CHARACTERISTICS

	Unit No.1	Unit No.2	
Plate Voltage	250	150	volts
Grid Voltage	-11	-17.5	volts
Amplification Factor	17.5	6	
Plate Resistance (Approx.)	8750	925	ohms
Transconductance	2000	6500	μ mhos
Plate Current	5.5	35	mA
Plate Current for grid voltage of -24 volts	—	10	mA
Grid Voltage (Approx.) for plate current of 10 μ A	-20	—	volts
Grid Voltage (Approx.) for plate current of 50 μ A	—	-44	volts

Vertical-Deflection Oscillator and Amplifier

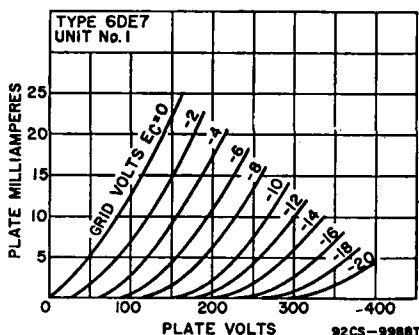
For operation in a 525-line, 30-frame system

MAXIMUM RATINGS (Design-Maximum Values)

	Unit No.1 Oscillator	Unit No.2 Amplifier	
DC Plate Voltage	330	275	volts
Peak Positive-Pulse Plate Voltage#	—	1500	volts
Peak Negative-Pulse Grid Voltage	400	250	volts
Peak Cathode Current	77	175	mA
Average Cathode Current	22	50	mA
Plate Dissipation	1.5	7	watts

MAXIMUM CIRCUIT VALUES

Grid-Circuit Resistance:			
For grid-resistor bias or cathode-bias operation	2.2	2.2	megohms
# Pulse duration must not exceed 15% of a vertical scanning cycle (2.5 milliseconds).			

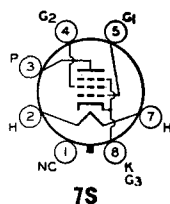


6DG6GT

BEAM POWER TUBE

Glass octal type used as output tube in audio-amplifier applications Outlines section, 13D; requires octal socket. This type may be supplied with pin 1 omitted.

Heater Voltage (ac/dc)	6.3	volts
Heater Current	1.2	amperes
Heater-Cathode Voltage:		
Peak value	±200 max	volts
Average value	100 max	volts
Direct Interelectrode Capacitances (Approx.):		
Grid No.1 to Plate	0.6	pF
Grid No.1 to Cathode, Heater, Grid No.2, and Grid No.3	15	pF
Plate to Cathode, Heater, Grid No.2, and Grid No.3	10	pF

Class A₁ Audio-Frequency Power Amplifier

MAXIMUM RATINGS (Design-Center Values)

Plate Voltage	200	volts
Grid-No.2 (Screen-Grid) Voltage	125	volts
Plate Dissipation	10	watts
Grid-No.2 Input	1.25	watts

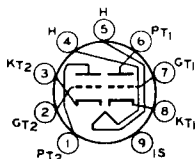
TYPICAL OPERATION

Plate Supply Voltage	110	200	volts
Grid-No.2 Supply Voltage	110	125	volts
Grid-No.1 (Control-Grid) Supply Voltage	—7.5	—	volts
Peak AF Grid-No.1 Voltage	7.5	8.5	volts
Cathode-Bias Resistor	—	180	ohms
Zero-Signal Plate Current	49	46	mA
Maximum-Signal Plate Current	50	47	mA
Zero-Signal Grid-No.2 Current	4	2.2	mA
Maximum-Signal Grid-No.2 Current	10	8.5	mA

Plate Resistance (Approx.)	13000	28000	ohms
Transconductance	8000	8000	μ mhos
Load Resistance	2000	4000	ohms
Total Harmonic Distortion	10	10	per cent
Maximum-Signal Power Output	2.1	3.8	watts

MAXIMUM CIRCUIT VALUES

Grid-No.1-Circuit Resistance:			
For fixed-bias operation	0.1	megohm	
For cathode-bias operation	0.5	megohm	

**9AJ****MEDIUM-MU TWIN TRIODE**

**6DJ8/
ECC88**
INDUSTRIAL
TYPE

Miniature type used as a cascode amplifier in vhf color and black-and-white television tuners. Outlines section, 6B; requires miniature 9-contact socket.

Heater Voltage (ac/dc)	6.3	volts
Heater Current	0.365	ampere
Heater-Cathode Voltage:		
Peak value	Unit No. 1 —	Unit No. 2 —150
Average value	50	—130
Direct Interelectrode Capacitances:		
Grid to Plate	1.4	1.4
Grid to Cathode, Heater, and Internal Shield	3.3	—
Cathode to Grid, Heater, and Internal Shield	—	6.0
Plate to Cathode, Heater, and Internal Shield	1.8	—
Plate to Grid, Heater, and Internal Shield	—	2.8
Plate to Cathode	—	1.8
Heater to Cathode	—	2.7
Grid to Heater	—	0.13
Plate of Unit No. 1 to Plate of Unit No. 2	0.045	—
Grid of Unit No. 2 to Plate of Unit No. 1	0.005	—

Class A₁ Amplifier (Each Unit)**MAXIMUM RATINGS (Design-Center Values)**

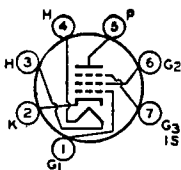
Plate Supply Voltage	130	volts
Cathode Current	25	mA
Plate Dissipation	1.8	watts
Negative Grid Voltage	50	volts
Plate Supply Voltage (cold condition)	550	volts

CHARACTERISTICS

Plate Voltage	90	volts
Grid Voltage	—1.3	volts
Amplification Factor	33	
Transconductance	12250	μ mhos
Plate Current	15	mA
Equivalent Noise Resistance	300	ohms

MAXIMUM CIRCUIT VALUES

Grid-Circuit Resistance	1.0	megohm
Heater to Cathode Circuit Resistance	0.02	megohm

**7CM****SHARP-CUTOFF PENTODE****3DK6, 4DK6, 12DK6****6DK6**

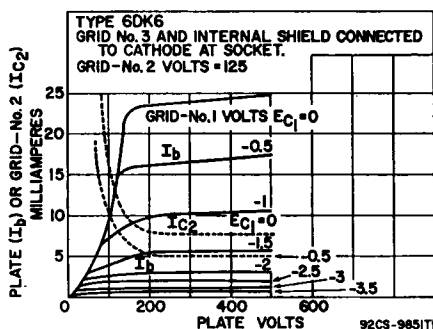
Miniature type used as if-amplifier tube in color and black-and-white television receivers. Outlines section, 5C; requires miniature 7-contact socket. Types 3DK6, 4DK6, and 12DK6 are identical with type 6DK6 except for heater ratings.

	3DK6	4DK6	6DK6	12DK6	
Heater Voltage (ac/dc)	3.15	4.2	6.3	12.6	volts
Heater Current	0.6	0.45	0.3	0.15	ampere
Heater Warm-up Time (Average)	11	11	—	—	seconds
Heater-Cathode Voltage:					
Peak value	{ +200 max -300 max				volts
Average value	100 max				volts
Direct Interelectrode Capacitances:					
Grid No.1 to Plate					0.025 max pF
Grid No.1 to Cathode, Heater, Grid No.2, Grid No.3 and Internal Shield					6.3 pF
Plate to Cathode, Heater, Grid No.2, Grid No.3, and Internal Shield					1.9 pF

Class A₁ Amplifier

MAXIMUM RATINGS (Design-Maximum Values)

Plate Voltage	330	volts
Grid-No.3 (Suppressor-Grid) Voltage, Positive value	0	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	volts
Plate Dissipation	2.3	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

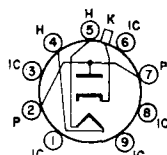
Plate Supply Voltage	125	volts
Grid No.3	Connected to cathode at socket	
Grid-No.2 Supply Voltage	125	volts
Cathode-Bias Resistor	56	ohms
Plate Resistance (Approx.)	0.35	megohm
Transconductance	9800	μmhos
Plate Current	12	mA
Grid-No.2 Current	3.8	mA
Grid-No.1 Voltage (Approx.) for plate current of 20 μA	-6.5	volts

6DL3

25DL3

HALF-WAVE VACUUM RECTIFIER

Novar type used as a damper tube in television receivers. Outlines section, 40B; requires novar 9-contact socket. Socket terminals 1, 3, 6, 8, and 9 should not be used as tie points. Type 25DL3 is identical with type 6DL3 except for heater ratings.



9GD

	6DL3	25DL3	
Heater Voltage (ac/dc)	6.3	25.2	volts
Heater Current	2.3	0.45	ampere
Heater Warm-up Time (average)	—	11	seconds
Direct Interelectrode Capacitances:			
Cathode to Plate and Heater		17	pF
Plate to Cathode and Heater		13	pF
Heater to Cathode		4.4	pF

Damper Service

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

Peak Inverse Plate Voltage#	6500	volts
Peak Plate Current	1800	mA
Average Plate Current	400	mA
Plate Dissipation	11	watts
Bulb Temperature (At hottest point)	220	°C
Heater-Cathode Voltage:		
Peak value	+300 —6500	volts
Average value	+100 —900	volts

CHARACTERISTIC, Instantaneous Value

Tube Voltage Drop for plate current of 800 mA	25	volts
# Pulse duration must not exceed 15% of a horizontal scanning cycle.		

Refer to chart at end of section.

6DL4/EC88

Refer to chart at end of section.

6DL5
6DL5/EL95

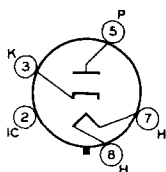
Refer to chart at end of section.

For replacement use type 6DM4A/6DA4.

6DM4
6DM4A

6DM4A/
6DA4
17DM4A

HALF-WAVE VACUUM RECTIFIER



4CG

Glass octal type used as damper tube in horizontal-deflection circuits of television receivers. Outlines section, 13G; requires octal socket. Socket terminals 1, 2, 4, and 6 should not be used as tie points. This tube, like other power-handling tubes, should be adequately ventilated. Type 17DM4A is identical with type 6DM4A/6DA4 except for heater ratings.

	6DM4A/6DA4	17DM4A	
Heater Voltage (ac/dc)	6.3	16.8	volts
Heater Current	1.2	0.45	amperes
Heater Warm-up Time (Average)	—	11	seconds

Damper Service

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

MAXIMUM RATINGS (Design-Maximum Values)

Peak Inverse Plate Voltage#	5000	volts
Peak Plate Current	1200	mA
Average Plate Current	200	mA
Plate Dissipation	6.5	watts
Heater-Cathode Voltage:		
Peak value	+300 —5000	volts
Average value	+100 —900	volts

Pulse duration must not exceed 15% of a horizontal scanning cycle (10 microseconds).