

TUNG-SOL

PENTODE

MINIATURE TYPE

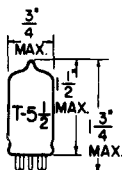
COATED UNIPOTENTIAL CATHODE

HEATER

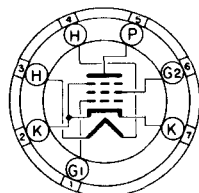
6.3 VOLTS 0.175 AMP.

AC OR DC

ANY MOUNTING POSITION



GLASS BULB



BOTTOM VIEW

MINIATURE BUTTON
7 PIN BASE

780

THE 5654/6AK5W/6096 IS A RUGGEDIZED, SHARP CUT-OFF PENTODE OF THE SEVEN PIN MINIATURE CONSTRUCTION. IT IS CHARACTERIZED BY LOW HEATER POWER REQUIREMENTS, HIGH TRANSCONDUCTANCE AND INPUT IMPEDENCE AND LOW INTER-ELECTRODE CAPACITANCES AND LEAD INDUCTANCES. THESE FACTORS CONTRIBUTE GREATLY TO EXCELLENT PERFORMANCE IN HIGH FREQUENCY WIDE-BAND APPLICATIONS SUCH AS RADAR EQUIPMENT IF STAGES. THE 5654/6AK5W/6096 IS ELECTRICALLY EQUIVALENT TO THE 6AK5, BUT CONTROLS ON THE PRODUCT AVERAGE FOR SUCH CHARACTERISTICS AS PLATE CURRENT, SCREEN GRID CURRENT AND TRANS-CONDUCTANCE ASSURE THAT THESE CRITICAL CHARACTERISTICS WILL REMAIN WELL CENTERED. SINCE IT MUST BE ABLE TO WITHSTAND SEVERE MECHANICAL TESTS TO MEET TEST SPECIFICATIONS, THE 5654/6AK5W/6096 IS ESPECIALLY SUITED FOR USE IN INDUSTRIAL AND MILITARY AIRBORNE NAVIGATIONAL EQUIPMENT WHICH MAY BE SUBJECTED TO SEVERE SHOCK AND VIBRATION.

DIRECT INTERELECTRODE CAPACITANCES

	WITHOUT SHIELD	WITH SHIELD #316	
MAXIMUM GRID #1 TO PLATE (RATED)	0.03	0.02	μf
INPUT: (RATED)	4.0	4.0	μf
MAXIMUM	---	4.6	μf
MINIMUM	---	3.4	μf
OUTPUT: (RATED)	2.1*	2.85	μf
MAXIMUM	---	3.25	μf
MINIMUM	---	2.45	μf

* NOMINAL VALUE.

RATINGS

ABSOLUTE MAXIMUM VALUES

HEATER VOLTAGE	6.3 ± 10%	VOLTS
MAXIMUM DC PLATE VOLTAGE	200	VOLTS
MAXIMUM DC GRID #2 VOLTAGE	155	VOLTS
MAXIMUM PLATE DISSIPATION	1.65	WATTS
MAXIMUM HEATER CATHODE VOLTAGE	130	VOLTS
MAXIMUM DC CATHODE CURRENT ^A	20	mA
MAXIMUM GRID #2 DISSIPATION	0.55	WATT
MAXIMUM BULB TEMPERATURE	+165	°C

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TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A₁ AMPLIFIER

HEATER VOLTAGE	6.3	VOLTS
HEATER CURRENT	0.175	AMP.
PLATE VOLTAGE	120	VOLTS
GRID #2 VOLTAGE	120	VOLTS
CATHODE BIAS RESISTOR ^B	200	OHMS
PLATE RESISTANCE (APPROX.)	0.34	MEGOHM
TRANSCONDUCTANCE	5000	μMHOS
PLATE CURRENT	7.5	mA
GRID #2 CURRENT	2.5	mA
GRID #1 VOLTAGE (APPROX.) $I_p=10 \mu a$	-12	VOLTS

CHARACTERISTICS RANGE VALUES FOR EQUIPMENT DESIGN

 $E_f = 6.3V$, $E_b = 120Vdc$, $E_{c1} = -2Vdc$, $E_{c2} = 120Vdc$

EXCEPT AS MODIFIED BELOW

	INITIAL				500 HOUR LIFE TEST			
	INDIVIDUAL MIN.	INDIVIDUAL MAX.	PROD. MIN.	AVG. MAX.	INDIVIDUAL MIN.	INDIVIDUAL MAX.		
HEATER CURRENT	160	190	---	---	160	190		mA
HEATER-CATHODE LEAKAGE ($E_{hk}=\pm 100Vdc$)	---	10	---	---	---	10		μAdc
GRID #1 CURRENT ($R_g=0.1 \text{ MEG.}$)	0	-0.1	---	---	0	-0.1		μAdc
PLATE CURRENT (1)	5.0	11.0	6.5	8.5	4.5	11.0		mA
TRANSCONDUCTANCE (1)	4000	6250	4525	5475	3750	6250		μMHOS
INSULATION OF ELECTRODES ($E_f=6.3V$, $E(g1-ALL)=$ $-100Vdc$, $E(p-a11)=$ $-300Vdc$, $E(g2-a11)=$ $-300Vdc$,								
$R(g1-a11)$	100	---	---	---	50	---		MEGOHMS
$R(p-a11)$	100	---	---	---	50	---		MEGOHMS
$R(g2-a11)$	100	---	---	---	50	---		MEGOHMS
SCREEN CURRENT	0.8	4.0	1.8	3.2	---	---		mA
Δ AVERAGE TRANS- CONDUCTANCE (1)	---	---	---	---	---	15		PERCENT
PLATE CURRENT (2) ($E_{c1}=-10Vdc$)	---	200	---	---	---	---		μAdc
PLATE CURRENT (3) ($E_{c1}=-5.5Vdc$)	5.0	---	---	---	---	---		μAdc
Δ TRANSCONDUCTANCE (2) ^D ($E_f=5.7V.$)	---	---	---	---	---	15		PERCENT
GRID CURRENT (2) ^E ($E_f=7.0V$, $R_{g1}=0.1 \text{ MEG}$)	0	-0.5	---	---	---	---		μAdc

SPECIAL REQUIREMENTS

	MIN.	MAX.	
VARIABLE FREQUENCY VIBRATION ^F ($R_p = 10,000$)	---	150	mVac
VIBRATIONAL FATIGUE ^G	---	---	
SHOCK ^H (HAMMER ANGLE=30°, $E_{hk}=100Vdc$, HEATER POS., $R_{g1} = 0.1 \text{ MEG.}$)	---	---	
POST SHOCK AND VIBRATIONAL FATIGUE TEST END POINTS			
LOW FREQUENCY VIBRATION	---	450	mVac
HEATER-CATHODE LEAKAGE	---	±30	μAdc
TRANSCONDUCTANCE (1)	3500	---	μMHOS
GRID #1 CURRENT	0	-0.2	μAdc

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SPECIAL REQUIREMENTS -CONT'D.

	MIN.	MAX.	
GLASS STRAIN ^J	---	---	
CONTINUITY AND SHORT ^K	---	---	
RF NOISE ^L	---	---	
($E_{c1}=0$, $E_{c2}=15.0\text{mVac}$, $R_k=200$, $C_k=0.2\ \mu\text{f}$)	---	3.0	mW
NOISE AND MICROPHONICS ^{MN}	---	---	
($E_f=6.3\text{Vac}$, $E_{hk}=0$, $E_{bb}=E_{c2}=200\text{Vdc}$, $E_{c1}=0$, $R_k=1000$, $R_p=0.1\text{MEG}$, $R_{g2}=0.5\text{MEG}$, $C_{g2}=2\ \mu\text{f}$)	---	100	mVac
LOW FREQUENCY VIBRATION ^P	---	---	
($R_p=10,000$)	---	150	mVac
LOW PRESSURE VOLTAGE BREAKDOWN ^Q	---	---	
(PRESSURE $\approx \pm 5\text{mm}$ mercury, TEMP $= 25 \pm 5^\circ\text{C}$, HUMIDITY $= 0$, VOLTAGE $= 500\text{Vac}$, 60 CYCLES, SINUSOIDAL WAVEFORM)	500	---	Vac
1 HOUR STABILITY LIFE TEST (INTERMITTENT LIFE TEST CONDITIONS)	---	---	
STABILITY LIFE TEST END POINTS Δ TRANSCONDUCTANCE (1)	---	10	PERCENT
100 HOUR SURVIVAL RATE LIFE TEST (INTERMITTENT LIFE TEST CONDITIONS OR EQUIVALENT)	---	---	
HEATER CYCLING LIFE TEST ($E_f=7.5\text{V}$, $E_{hk}=135\text{Vdc}$, HEATER POS., $E_b=E_{c1}=E_{c2}=0$)	---	---	
HEATER CYCLING LIFE TEST END POINTS HEATER CATHODE LEAKAGE	---	± 20	μAdc
INTERMITTENT LIFE TEST ^R	---	---	
($E_b=150\text{Vdc}$, $E_{c1}=0$, $E_{c2}=125\text{Vdc}$, $E_{hk}=135\text{Vdc}$, HEATER POSITIVE, $R_{g1}=0.1\text{MEG}$, $R_k=130$, MIN. BULB TEMPERATURE $\approx +165^\circ\text{C}$)	---	---	

NOTES:

A DIFFICULTY MAYBE ENCOUNTERED IF THIS TUBE IS OPERATED FOR LONG PERIODS OF TIME WITH VERY SMALL VALUES OF CATHODE CURRENT.

B FIXED-BIAS OPERATION NOT RECOMMENDED.

C SEE MIL-E-1C 4.8.2

D THE VALUE OF TRANSCONDUCTANCE (2) SHALL APPLY TO INDIVIDUAL TUBES AND IS EXPRESSED:

$$\frac{(\text{SM AT } 6.3) - (\text{SM AT } 5.7)}{(\text{SM AT } 6.3)} \times 100$$

E PRIOR TO THIS TEST TUBES TO BE PREHEATED 5 MINUTES AT CONDITIONS INDICATED BELOW. TEST IMMEDIATELY FOLLOWING PREHEATING. $E_f=7.0\text{Vac}$, $E_{c1}=0\text{Vdc}$, $R_k=1300\text{HMS}$, $R_{g1}=0.1\text{MEG}$, $E_b=150\text{Vdc}$, $E_{c2}=125\text{Vdc}$.

F SEE MIL-E-1C 4.9.20.3

G SEE MIL-E-1C 4.9.20.6

H SEE MIL-E-1C 4.9.20.5

J GLASS STRAIN TEST CONSISTS OF COMPLETELY SUBMERGING THE TUBE INTO BOILING WATER (97°C - 100°C) FOR A PERIOD OF 15 SECONDS, THEN IMMEDIATELY PLUNGING INTO COLD WATER (0°C - 3°C). THE AMOUNT OF WATER SHALL BE AT LEAST 2 LITERS PER FIFTEEN TUBES. TUBES FOR THIS TEST SHALL HAVE BEEN EXHAUSTED A MINIMUM OF 48 HOURS PRIOR TO PERFORMANCE OF THIS TEST. REJECT FOR EVIDENCE OF AIR LEAK.

K SEE MIL-E-1C 4.7.5

L SEE MIL-E-1C 4.10.3.1

M SEE MIL-E-1C 4.10.3.5

N THE CATHODE RESISTOR SHALL BE SHUNTED WITH A CAPACITIVE REACTANCE NOT EXCEEDING 3 OHMS @ 60 CYCLES.

P SEE MIL-E-1C 4.9.20.4

Q BREAKDOWN SHALL BE DEFINED AS THE VOLTAGE AT WHICH ARCING OCCURS BETWEEN ANODE BASE PIN AND ADJACENT PINS.

R SEE MIL-E-1C 4.11.5

5654/6AK5W/6096

PREMIUM TUBE

