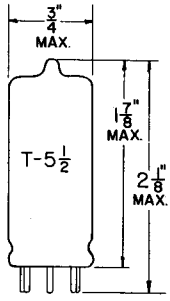
TUNG-SOL

PENTODE

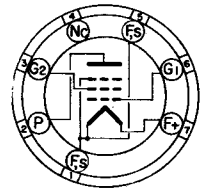
MINIATURE TYPE

HEATER

ANY MOUNTING POSITION



GLASS BULB



BOTTOM VIEW
MINIATURE BUTTON
7 PIN BASE
6AR

THE 1U4WA IS A FILAMENT TYPE SHARP CUT-OFF PENTODE IN THE 7 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED FOR RF AND AF APPLICATIONS IN PORTABLE EQUIPMENT WHERE EXTREME CONDITIONS OF MECHANICAL SHOCK OR VIBRATION ARE ENCOUNTERED. THE TUBE IS PARTICULARLY USEFUL IN VOLTAGE AMPLIFIER CIRCUITS WHERE ITS LOW MICROPHONIC NOISE AND VIBRATION OUTPUT ARE ESSENTIAL FOR SPECIALIZED MILITARY ELECTRONIC EQUIPMENT.

RATINGS
MECHANICAL

MAXIMUM IMPACT ACCELERATION (SHOCK TEST - NOTE 2)	450	G
MAXIMUM VIBRATIONAL ACCELERATION (96 HR. FATIGUE TEST (NOTE 3)	2.5	G

RATINGS
AND NORMAL OPERATION

	MIL-E-1 SYMBOL	DES. MIN.	NORM. TEST CONDITIONS NOTE 5	NORM. OPERATION NOTE 4	DES. MAX.	MIL-E-1 UNITS
HEATER VOLTAGE (NOTE 6)	Ef:	1.00	1.25	1.25	1.50	Vdc
PLATE VOLTAGE (NOTE 7)	Eb:	---	90	90	135	Vdc
GRID VOLTAGE	Ec1:	---	0	0	---	Vdc
GRID VOLTAGE #2 (NOTE 7)	Ec2:	---	90	90	135	Vdc
PLATE DISSIPATION	Pp:	---	---	---	0.17	WATTS
GRID #2 DISSIPATION	Pg2:	---	---	---	0.05	WATTS
GRID RESISTANCE	Rg(1):	---	---	---	2.0	MEG.
TRANSCONDUCTANCE	Sm:	---	---	900	---	μMHOS
PLATE CURRENT	Ib1:	---	---	1.6	---	mAdc
CATHODE CURRENT	Ik:	---	---	---	3.0	mAdc

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CHARACTERISTICS AND QUALITY CONTROL[1]

TEST	AQL %	MIL E-1 SYMBOL	MIN.	LAL	BOG.	UAL	MAX.	ALD	MIL-E-1 UNITS
MEASUREMENTS ACCEPTANCE TESTS PART 1	COMBINED AQL=1.0 % EXCLUDING MECH. AND INOPERATIVES								
GRID CURRENT (1): Eb=Ec2=135 Vdc; Ec1=-2.0 Vdc	0.65	Ic1:	0	---	---	---	-1.0	---	μAdc
PLATE CURRENT (1):	0.65	Ib1:	1.0	---	---	---	2.1	---	mAdc
SCREEN GRID CURRENT:	0.65	Ic2:	0.28	---	---	---	0.62	---	mAdc
TRANSCONDUCTANCE (1):	0.65	Sm(1):	720	---	---	---	1080	---	μMHOS
NOISE AND MICROPHONICS: Ebb=Ecc2=90 Vdc: Ecal=10.0mVac;Rp= 1.0 MEG.; Rg2=4.7 MEG.; Cg2=0.1 μf	0.65	EB:	---	---	---	---	17	---	VU
CONTINUITY AND SHORTS: (INOPERATIVES)	0.4	---	---	---	---	---	---	---	---
MECHANICAL: (ENVELOPE OUTLINE 6-2)	---	---	---	---	---	---	---	---	---
MEASUREMENTS ACCEPTANCE TESTS- PART 2									
INSULATION OF ELECTRODES: g-all=-100 Vdc	4.0	Rg-all:	100	---	---	---	---	---	MEG.
p-all=-100Vdc		Rp-all:	100	---	---	---	---	---	MEG.
PLATE CURRENT(2): Ec1=-4.5 Vdc	6.5	Ib:	0	---	---	---	30	---	μAdc
TRANSCONDUCTANCE (2): Ef= 1.0 Vdc	6.5	Sm(2):	610	---	---	---	1080	---	μMHOS
FILAMENT CURRENT:	6.5	If:	44	---	---	---	56	---	mA
CAPACITANCE: (SHIELD #316)	6.5	Cg1p:	---	---	---	---	0.02	---	μμf
CAPACITANCE (SHIELD #316)		Cin:	3.0	---	---	---	4.2	---	μμf
CAPACITANCE (SHIELD #316)		Cout:	5.6	---	---	---	7.6	---	μμf
VIBRATION (1): Rp=10,000 OHMS; 40 cps;15 g	6.5	Ep:	---	---	---	---	10	---	mVac
VIBRATION (2): f=50 cps-3500 cps; Rp=10,000 OHMS (NOTE 8)	6.5	Ep(2):	---	---	---	---	15	---	mVac
DEGRADATION RATE ACCEPTANCE TESTS									
SHOCK:: HAMMER ANGLE=30° (NOTE 2)	---	---	---	---	---	---	---	---	---
FATIGUE: G=2.5; F=25cps MIN; 60 cps MAX; FIXED FREQUENCY (NOTE 3)	6.5	---	---	---	---	---	---	---	---

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CHARACTERISTICS AND QUALITY CONTROL[1]; cont'd.

TEST	AQL %	MIL-E-1 SYMBOL	MIN	LAL	BOG.	UAL	MAX.	ALD	MIL-E-1 UNITS
DEGRADATION RATE ACCEPTANCE TESTS (CONT'D.)	COMBINED AQL=1.0% EXCLUDING MECH. AND INOPERATIVES								
POST SHOCK AND FATIGUE TEST END POINTS:									
TRANSCONDUCTANCE (1)	---	Sm:	540	---	---	---	---	---	μMHOS
VIBRATION	---	Ep:	---	---	---	---	15	---	mVac
MINIATURE TUBE BASE STRAIN:	---	---	---	---	---	---	---	---	---
GLASS STRAIN (THERMAL SHOCK):	2.5	---	---	---	---	---	---	---	---

ACCEPTANCE LIFE TESTS	ALLOWABLE DEF. PER CHARACTER. 1st SAMP.	COMB. SAMP.	AQL %	MIL-E-1 SYM.	MIN.	MAX.	MIL-E-1 UNITS
INTERMITTENT LIFE TEST: Ef=1.25 Vdc; OR Vac WITH EQUIVALENT BIAS; GROUP A	---	---	---	t:	500	---	HOURS
INTERMITTENT LIFE TEST END POINTS:							
TRANSCONDUCTANCE (1)	---	---	---	Sm(1):	540	---	μMHOS
GRID CURRENT	---	---	---	Ic(1):	---	-1.0	μAdc

NOTES

1. CHARACTERISTICS, QUALITY CONTROL PROCEDURES, AND INSPECTION LEVELS ARE MADE ACCORDING TO THE APPROPRIATE PARAGRAPHS OF MIL-E-1, AND MIL-STD-105A.

2. TEST CONDITIONS AND ACCEPTANCE CRITERIA PER SHOCK TEST PROCEDURES OF MIL-E-1 BASIC SPECIFICATIONS.

3. TEST CONDITIONS AND ACCEPTANCE CRITERIA PER FATIGUE TEST PROCEDURES OF MIL-E-1 BASIC SPECIFICATIONS.

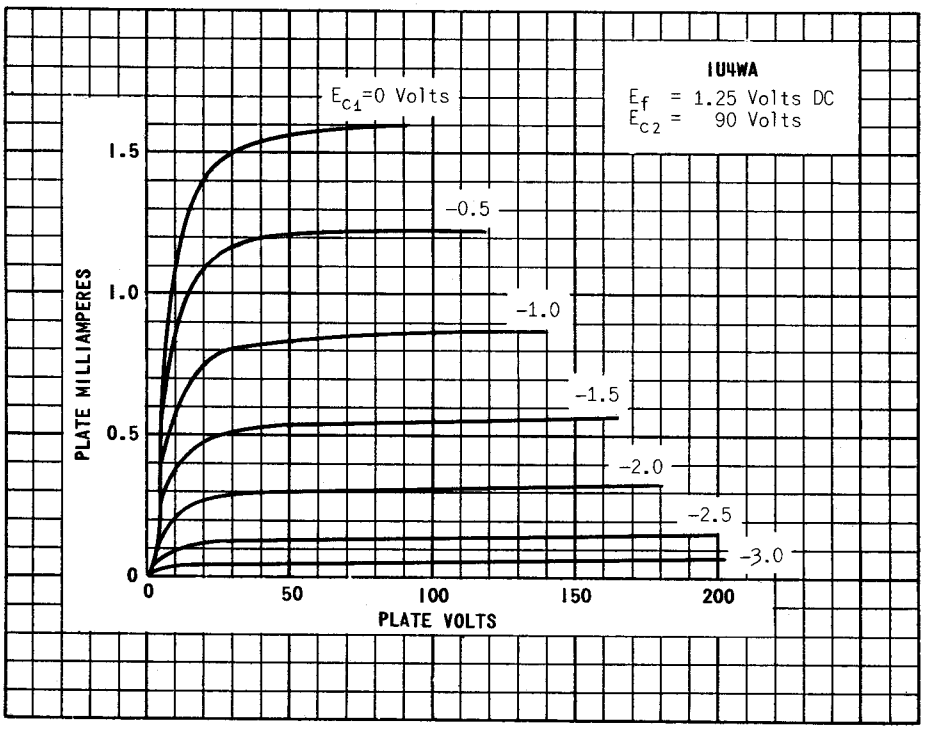
4. THESE NORMAL VALUES REPRESENT CONDITIONS AT WHICH CONTROL OF RELIABILITY MAY BE EXPECTED.

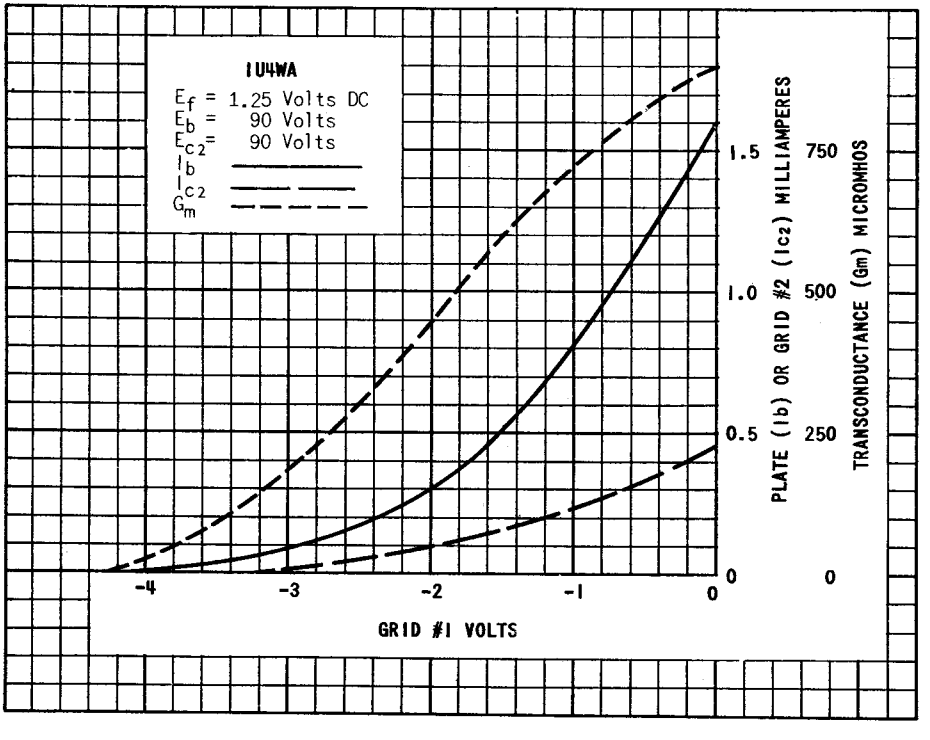
5. THESE NORMAL TEST CONDITIONS ARE USED FOR ALL CHARACTERISTICS UNLESS OTHERWISE STATED UNDER THE INDIVIDUAL TEST ITEM.

6. FOR MOST APPLICATIONS THE PERFORMANCE WILL NOT BE ADVERSELY AFFECTED BY ±10% HEATER VOLTAGE VARIATION, BUT WHEN THE APPLICATION CAN PROVIDE A CLOSER CONTROL OF HEATER VOLTAGE, AND IMPROVEMENT IN RELIABILITY WILL BE REALIZED.

7. PLATE AND SCREEN VOLTAGES SHOULD NOT EXCEED THESE VALUES UNDER ANY CIRCUMSTANCES.

8. THE TUBE UNDER TEST SHALL BE RIGIDLY MOUNTED ON A VIBRATION TABLE VIBRATING WITH SIMPLE HARMONIC MOTION. THE TEST CONDITIONS OF PARAGRAPH 4.9.19.1 OF MIL-E-1 SHALL BE APPLIED AND Ep MONITORED WHILE THE FREQUENCY OF VIBRATION IS CONTINUOUSLY SWEPT FROM 50-3500 CPS AND THE PEAK ACCELERATION CONTROLLED CONSTANT AT 2G. A LOW PASS FILTER WHICH FOLLOWS THE LOAD RESISTOR OF THE TUBE UNDER TEST SHALL HAVE A CUT-OFF FREQUENCY OF 3500 CPS. THE TOTAL TIME OF SWEEP SHALL NOT BE LESS THAN ONE (1) MINUTE.


1U4WA
E_f = 1.25 Volts DC
E_{c2} = 90 Volts
E_{c1}=0 Volts
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
PLATE MILLIAMPERES
1.5
1.0
0.5
0
0
50
100
150
200
PLATE VOLTS


1U4WA
E_f = 1.25 Volts DC
E_b = 90 Volts
E_{c2} = 90 Volts
I_b
I_{c2}
G_m
PLATE (I_b) OR GRID #2 (I_{c2}) MILLIAMPERES
TRANSCONDUCTANCE (Gm) MICROMHOS
1.5
750
1.0
500
0.5
250
0
0
-4
-3
-2
-1
0
GRID #1 VOLTS