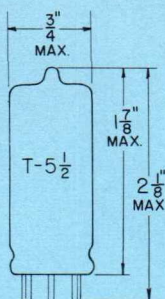


TUNG-SOL

PENTODE

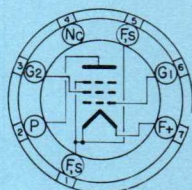
MINIATURE TYPE



GLASS BULB

HEATER

ANY MOUNTING POSITION


 BOTTOM VIEW
 MINIATURE BUTTON
 7 PIN BASE

6AR

THE 1T4WA IS A FILAMENT TYPE SEMI-REMOTE CUTOFF PENTODE IN THE 7 PIN MINIATURE CONSTRUCTION. IT IS DESIGNED FOR USE AS A RADIO FREQUENCY OR INTERMEDIATE FREQUENCY AMPLIFIER IN BATTERY OPERATED 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 HOUR FATIGUE TEST - NOTE 3)	2.5	G

RATINGS

AND NORMAL OPERATION

MIL E 1 SYMBOL	DES. MIN.	NORM. TEST COND. NOTE 5	NORM. OPER ATION 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	100	Vdc
GRID VOLTAGE	Ec1: ---	0	0	---	Vdc
GRID VOLTAGE #2 (NOTE 7)	Ec2: ---	67.5	67.5	75	Vdc
PLATE DISSIPATION	Pp: ---	---	---	0.4	WATTS
GRID #2 DISSIPATION	Pg2: ---	---	---	0.15	WATTS
GRID RESISTANCE	Rg(1): ---	---	---	2.0	MEG.
TRANSCONDUCTANCE	Sm: ---	---	900	---	μMHOS
PLATE CURRENT	Ib1: ---	---	3.5	---	mAde
CATHODE CURRENT	Ik: ---	---	---	6.5	mAde

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CHARACTERISTICS AND QUALITY CONTROL TESTS¹

TEST	AQL	MIL-E-1							MIL-E-1
	%	SYMBOL	MIN	LAL	BOG	UAL	MAX.	ALD	UNITS
MEASUREMENTS ACCEPTANCE TESTS, PART 1									
COMBINED AQL=1.0% EXCLUDING MECH. AND INOPERATIVES									
GRID CURRENT (1):									
Eb=Ec2=90 Vdc									
Ec1=-2.0 Vdc	0.65	Ic1:	0	---	---	---	-1.0	---	μ Adc
PLATE CURRENT (1):	0.65	Ib1:	2.3	---	---	---	4.7	---	mAdc
SCREEN GRID CURRENT:	0.65	Ic2:	0.65	---	---	---	2.15	---	mAdc
TRANSCONDUCTANCE (1):	0.65	Sm(1):	660	---	---	---	1125	---	μ MHOS
NOISE AND MICROPHONICS:									
Ebb=90 Vdc; Ecc2=67.5 Vdc;									
Ecal=10.0 mVac; Rp=1.0 MEG;									
Rg2=4.7 MEG; Cg2=0.1 μ f;									
Rg1=0	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=-100 Vdc		Rp-all:	100	---	---	---	---	---	MEG.
TRANSCONDUCTANCE (2):									
Ef=1.0 Vdc; Eb=75 Vdc;									
Ec2=55 Vdc	6.5	Sm(2):	500	---	---	---	1125	---	μ MHOS
TRANSCONDUCTANCE (3):									
Ec1=-16 Vdc	6.5	Sm(3):	1	---	---	---	50	---	μ MHOS
FILAMENT CURRENT:	6.5	If:	44	---	---	---	56	---	mA
GRID VOLTAGE:									
Ec1/Ic1=0.1 μ Adc									
Ec2=45 Vdc (NOTE 9)	6.5	Ec(1):	---	---	---	---	2.0	---	Vdc
PLATE CURRENT (2):									
Ef=1.25 Vdc; Rg=50,000									
OHMS; Ec1=25 Vdc (NOTE 10)	6.5	Ib:	2.0	---	---	---	---	---	mAdc
PLATE RESISTANCE:									
Eb=Ec2=45 Vdc	6.5	rp:	0.17	---	---	---	---	---	MEG.
CAPACITANCE: (SHIELD 316)		Cg1p:	---	---	---	---	0.02	---	μ f
CAPACITANCE: (WITHOUT SHIELD)	6.5	Cin:	3.0	---	---	---	4.7	---	μ f
CAPACITANCE: (WITHOUT SHIELD)		Cout:	4.5	---	---	---	8.5	---	μ f
VIBRATION (1):									
Rp=10,000 OHMS;									
40 cps; 15g	6.5	Ep:	---	---	---	---	10	---	mVac
VIBRATION (2):									
F=40 cps-3500 cps;									
Rp=10,000 OHMS									
(NOTE 8)	6.5	Ep(2):	---	---	---	---	20	---	mVac

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CHARACTERISTICS AND QUALITY CONTROL TESTS¹ cont'd.

TEST	AQL	MIL-E-1					MIL-E-1	
	%	SYMBOL	MIN.	LAL	BOG	UAL	MAX. ALD	UNITS
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	---	---	---	---	---	---	---
POST SHOCK AND FATIGUE								
TEST END POINTS:								
TRANSCONDUCTANCE (1):	---	Sm(1): 570	---	---	---	---	---	μMHOS
VIBRATION (1):	---	Ep: ---	---	---	---	15	---	mVac
MINIATURE TUBE BASE STRAIN:								
GLASS STRAIN (THERMAL SHOCK):	2.5	---	---	---	---	---	---	---
ALLOW. DEF. PER CHARACTER.								
TEST	1st	COMB.	AQL	MIL-E-1			MIL-E-1	
	SAMP.	SAMP.	%	SYMBOL	MIN.	MAX.	UNITS	
ACCEPTANCE LIFE TEST								
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 PARAGRAPH 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.

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NOTES - cont'd.

6. FOR MOST APPLICATIONS THE PERFORMANCE WILL NOT BE ADVERSELY AFFECTED BY $\pm 10\%$ HEATER VOLTAGE VARIATION, BUT WHEN THE APPLICATION CAN PROVIDE A CLOSER CONTROL OF HEATER VOLTAGE, AN IMPROVEMENT IN RELIABILITY WILL BE REALIZED.
7. PLATE AND SCREEN SUPPLY 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 E_p MONITORED WHILE THE FREQUENCY OF VIBRATION IS CONTINUOUSLY SWEEPED 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.
9. THE VOLTAGE DROP IN THE GRID CURRENT METER SHALL BE INCLUDED IN THE GRID VOLTAGE REQUIRED FOR THE $0.1\mu\text{A}_{dc}$ GRID CURRENT.
10. THE SIGNAL SHALL BE COUPLED THROUGH A $1\mu\text{f}$ CONDENSER AND SHALL HAVE A SOURCE IMPEDENCE OF APPROXIMATELY 500 OHMS.

