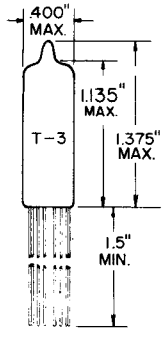
TUNG-SOL

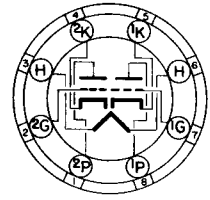
DOUBLE TRIODE

SUBMINIATURE TYPE



GLASS BULB

ANY MOUNTING POSITION



BOTTOM VIEW

SUBMINIATURE BUTTON
8 PIN
0.017" TINNED
FLEXIBLE LEADS

THE 6112 IS A HEATER-CATHODE TYPE HIGH-MU DOUBLE TRIODE OF SUBMINIATURE CONSTRUCTION, CAPABLE OF OPERATION IN THE UHF REGION. IT IS DESIGNED FOR SERVICE WHERE SEVERE CONDITIONS OF HIGH TEMPERATURE AND MECHANICAL SHOCK OR VIBRATION ARE ENCOUNTERED. THE FLEXIBLE LEADS MAY BE SOLDERED OR WELDED DIRECTLY TO THE TERMINALS OF CIRCUIT COMPONENTS WITHOUT THE USE OF SOCKETS. STANDARD SUBMINIATURE SOCKETS MAY BE USED BY CUTTING THE LEADS TO A SUITABLE LENGTH.

RATINGS

MECHANICAL

MAXIMUM IMPACT ACCELERATION (SHOCK TEST - NOTE 3)	450	G
MAXIMUM UNIFORM ACCELERATION (CENTRIFUGE TEST-NOTE 4)	1000	G
MAXIMUM VIBRATIONAL ACCELERATION (100 HOUR FATIGUE TEST-NOTE 5)	2.5	G
MAXIMUM BULB TEMPERATURE	220	°C

RATINGS

AND NORMAL OPERATION

	MIL-E-1B SYMBOL	ABS. MIN.	NORM. TEST CONDITIONS (NOTE 7)	NORM. OPERATION (NOTE 6)	ABS. MAX.	MIL-E-1B UNITS
HEATER VOLTAGE (NOTE 8)	Ef:	6.0	6.3	6.3	6.6	V
PLATE VOLTAGE	Eb:	---	100	100	165	Vdc
GRID #1 VOLTAGE	Ec1:	-55	0	0	0	Vdc
PLATE DISSIPATION (PER PLATE)	Pp/p:	---	---	0.08	0.10	W
GRID #1 CIRCUIT RESISTANCE	Rg/g:	---	---	1.0	1.1	MEG.
HEATER-CATHODE VOLTAGE	Ehk:	-200	---	100	+200	Vdc
PLATE CURRENT (PER PLATE)	Ib/p:	---	---	---	3.3	mAdc
GRID CURRENT	Ic/c:	---	---	---	---	mAdc
CATHODE RESISTANCE (PER UNIT)	Rk:	---	1500	1500	---	OHMS

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CHARACTERISTICS AND QUALITY CONTROL TESTS[1]

(IN THE FOLLOWING TESTS, EACH UNIT IS TESTED SEPARATELY)

TEST	AQL %	MIL-E-1B SYMBOL	MIN.	LAL	BOG.	UAL.	MAX.	ALD	MIL-E-1B UNITS
MEASUREMENTS ACCEPTANCE TESTS - PART 1									
COMBINED AQL=1.0% EXCLUDING MECHANICAL AND INOPERATIVES									
HEATER CURRENT:	0.65	If:	280	288	300	312	320	24	mA.
HEATER-CATHODE LEAKAGE: Ehk=- 100 Vdc	0.65	Ihk:	---	---	---	---	5.0	---	μAdc
Ehk=+100 Vdc			---	---	---	---	5.0	---	μAdc
GRID CURRENT: Eb=150 Vdc: Ec=0; Rk=820 OHMS; Rg= 1.0 MEG.	0.65	Ic(1):	---	---	---	---	-0.3	---	μAdc
PLATE CURRENT (1):	0.65	Ib(1):	0.50	---	0.8	---	1.10	---	mAdc
PLATE CURRENT (2): Ec1 =-2.8 Vdc	0.65	Ib(2):	---	---	---	---	50	---	μAdc
TRANSCONDUCTANCE (1):	0.65	Sm(1):	1500	1650	1800	1950	2100	350	μMHOS
CONTINUITY AND SHORTS (INOPERATIVES):	0.4	---	---	---	---	---	---	---	---
MECHANICAL: (ENVELOPE (8-1)	---	---	---	---	---	---	---	---	---
MEASUREMENTS ACCEPTANCE TESTS - PART 2									
INSULATION OF ELECTRODES: Ef =6.3 V									
Eg-all=-100 Vdc	2.5	Rg-all:	100	---	---	---	---	---	MEG.
Ep-all=-300 Vdc		Rp-all:	100	---	---	---	---	---	MEG.
TRANSCONDUCTANCE (2): Ef =5.7 V (NOTE 9)	2.5	ΔSm(2): Ef:		---	---	---	15	---	PERCENT
GRID EMISSION: Eb=150 Vdc: Rg=1.0 MEG; Rk=820 OHMS; Ef=7.5 V: PREHEAT AT Ec =0; TEST AT Ec=-4.0 Vdc:	2.5	Ic(2):	---	---	---	---	-0.5	---	μAdc
AF NOISE: Esig=45 mVac; Rg=0.5 MEG: Rp=0.02 MEG; Rk= 750 OHMS: CK = 1000 μf; UNITS CONNECTED IN PARALLEL	2.5	EB:	---	---	---	---	17	---	VU
AMPLIFICATION FACTOR;	6.5	Mu:	60	---	70	---	80	---	---
A.C. AMPLIFICATION: Esig=0.2 Vac; Ebb =100 Vdc: Ecc=0; Rk=0;	6.5	Ep:	8.0	---	---	---	---	---	Vac
CAPACITANCE:		Cgp:	0.8	---	1.00	---	1.20	---	μμf
CAPACITANCE:		Cin:	1.30	---	1.70	---	2.10	---	μμf
CAPACITANCE: (NOTE 2)	6.5	Cout (Unit #1)	0.16	---	0.23	---	0.30	---	μμf
CAPACITANCE:		Cout (Unit #2)	0.21	---	0.28	---	0.35	---	μμf
CAPACITANCE:		Cgg:	---	---	---	---	0.014	---	μμf
CAPACITANCE:		Cpp:	---	---	---	---	0.80	---	μμf

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CHARACTERISTICS AND QUALITY CONTROL TESTS[1] - cont'd.

TEST	AQL %	MIL-E-1B SYMBOL	MIN.	LAL	BOG.	UAL.	MAX.	ALD	MIL-E-1B UNITS
MEASUREMENTS ACCEPTANCE TESTS - PART 2 (cont'd.)									
LOW PRESSURE VOLTAGE BREAKDOWN: PRESSURE = 55±5mmHG; VOLTAGE = 300 Vac.	6.5								
VIBRATION (1): NO VOLTAGES; F VARIABLE FROM 10 - 50 cps; G MAX. = 10; FIXED AMPLITUDE 0.040"; POST SHOCK AND FATIGUE TEST END POINTS APPLY	10.0	---	---	---	---	---	---	---	---
VIBRATION (2): F= 40cps; G=15; Rp= 10,000 OHMS	2.5	Ep:	---	---	---	---	25	---	mVac
DEGRADATION RATE ACCEPTANCE TESTS									
SUBMINIATURE LEAD FATIGUE:	2.5	---	4.0	---	---	---	---	---	arcs
SHOCK: Ehk =+100 Vdc; Rg =0.1 MEG HAMMER ANGLE =30°. (NOTE 3)	20	---	---	---	---	---	---	---	---
FATIGUE: 96 HOURS; G = 2.5 ; FIXED FREQUENCY; F=25 min; 60 max. (NOTE 5)	6.5	---	---	---	---	---	---	---	---
POST SHOCK AND FATIGUE TEST END POINTS:									
VIBRATION (2): F=40 cps; G=15; Rp= 10,000 OHMS	---	Ep:	---	---	---	---	100	---	mVac
HEATER-CATHODE LEAKAGE: Ehk=± 100 Vdc Ehk=-100 Vdc		Ihk:	---	---	---	---	20	---	μAdc
CHANGE IN TRANSCONDUCTANCE (1) OF INDIVIDUAL TUBES: Ef=6.3 V		ΔtSm(1):	---	---	---	---	20	---	PERCENT
GLASS STRAIN (THERMAL SHOCK):	6.5	---	---	---	---	---	---	---	---

ACCEPTANCE LIFE TESTS

	MAX. DEFECTS PER CHARACTERISTIC 1st SAMPLE	MAX. DEFECTS PER CHARACTERISTIC COMB. SAMPLE	AQL %	MIL-E-1B SYMBOL	MIN.	MAX.	MIL-E-1B UNITS
HEATER CYCLING: Ef= 7.0 V; Eb=Ec= 0V; Ehk =140 Vac; 1 min. on, 4 min. off.	---	---	2.5	---	2000	---	CYCLES

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CHARACTERISTICS AND QUALITY CONTROL TESTS[1] - cont'd.

TEST	MAX. DEFECTS PER CHARACT. 1st SAMPLE	COMB. SAMPLE	AQL %	MIL-E-1B SYMBOL	MIN.	MAX.	MIL-E-1B UNITS
ACCEPTANCE LIFE TESTS (cont'd.)							
1 HOUR STABILITY LIFE TEST: TA = ROOM; Ehk=+200 Vdc; Rg/g =1.0 MEG.	---	---	---	---	---	---	---
1 HOUR STABILITY LIFE TEST END POINTS: CHANGE IN TRANSCONDUCTANCE (1) OF INDIVIDUAL TUBES: (TYPICALSAMPLE SIZE = 50 TUBES.	---	---	1.0	ΔtSm(1):	---	10	PERCENT
100 HOUR SURVIVAL RATE LIFE TEST: TA = ROOM; Ehk =+200 Vdc; Rg/g =1.0 MEG.							
100 HOUR SURVIVAL RATE LIFE TEST, END POINTS: (TYPICAL SAMPLE SIZE = 200 TUBES)	---	---	---	---	---	---	---
CONTINUITY AND SHORTS (INOPERATIVES):	---	---	0.65	---	---	---	---
TRANSCONDUCTANCE (1):	---	---	1.0	Sm(1):	1200	---	μMHOS
500 HOUR INTERMITTENT HIGH TEMPERATURE LIFE TEST: T BULB = 220 °C; Ehk =+200 Vdc; Rg/g =1.0 MEG.	---	---	---	---	---	---	---
500 HOUR INTERMITTENT HIGH TEMPERATURE LIFE TEST END POINTS: (TYPICAL SAMPLE SIZE = 20 TUBES 1st SAMPLE; 40 TUBES 2nd SAMPLE)	---	---	---	---	---	---	---
INOPERATIVES	1	3	---	---	---	---	---
HEATER CURRENT	2	5	---	If:	276	328	mA
HEATER-CATHODE LEAKAGE: Ehk =±100 Vdc Ehk=-100 Vdc	2	5	---	Ihk:	---	10	μAdc
GRID CURRENT (1)	1	3	---	Ic(1):	---	-0.9	μAdc
TRANSCONDUCTANCE (1) CHANGE OF INDIVIDUAL TUBES FROM INITIAL:	1	3	---	ΔtSm(1):	---	25	PERCENT
TRANSCONDUCTANCE (1) AVERAGE CHANGE:	---	---	---	AveΔtSm(1):	---	15	PERCENT
INSULATION OF ELECTRODES; g1-all	2	5	---	Rg1-all:	50	---	MEG.
p-all	2	5	---	Rp-all:	50	---	MEG.
TRANSCONDUCTANCE (2):(NOTE 9)	2	5	---	ΔtSm(2):	---	15	PERCENT
TOTAL DEFECTIVES	4	8	---	---	---	---	---
1000 HOUR HIGH TEMPERATURE INFORMATION LIFE TEST: T BULB=220°C; Ehk =+200 Vdc: Rg/g = 1.0 MEG.							
1000 HOUR HIGH TEMPERATURE INFORMATION LIFE TEST END POINTS: READ FOR SAME CHARACTERISTICS AS FOR 500 HOUR INTERMITTENT HIGH TEMPERATURE LIFE TEST. LIMITS NOT ESTABLISHED.							

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NOTES

NOTE 1: CHARACTERISTICS, QUALITY CONTROL TEST PROCEDURES, AND INSPECTION LEVELS ARE MADE ACCORDING TO THE APPROPRIATE PARAGRAPHS OF MIL-E-1B, 'INSPECTION INSTRUCTIONS FOR ELECTRON TUBES,' AND MIL-STD-105A.

NOTE 2: WITHOUT SHIELD.

NOTE 3: TEST CONDITIONS AND ACCEPTANCE CRITERIA PER SHOCK TEST PROCEDURES OF MIL-E-1B BASIC SPECIFICATION.

NOTE 4: CENTRIFUGE TEST WITH FORCES APPLIED IN ANY DIRECTION.

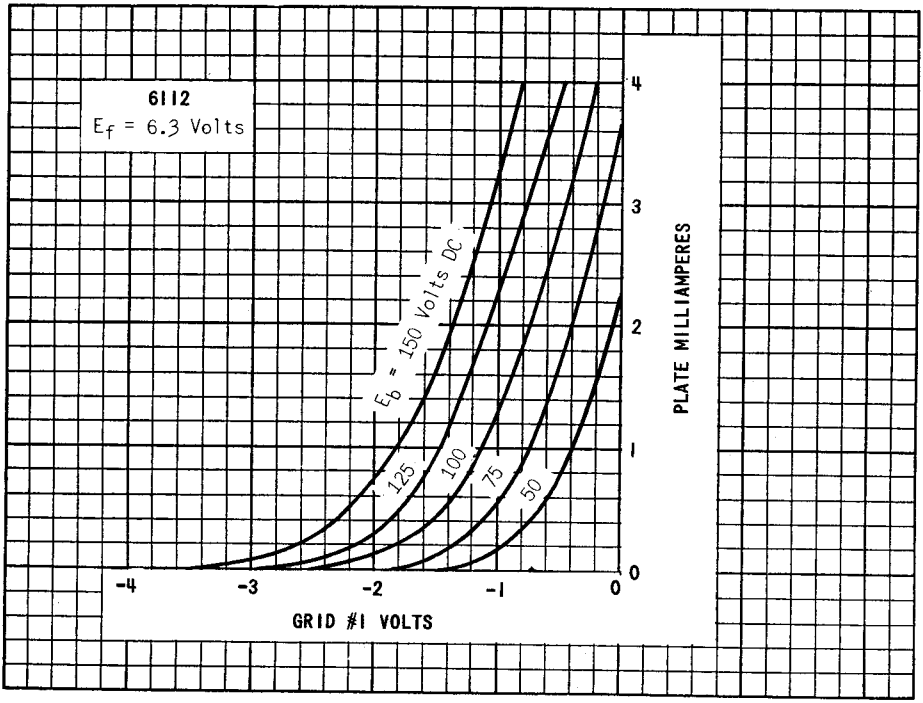
NOTE 5: TEST CONDITIONS AND ACCEPTANCE CRITERIA PER FATIGUE TEST PROCEDURES OF MIL-E-1B BASIC SPECIFICATION.

NOTE 6: THESE NORMAL VALUES REPRESENT CONDITIONS AT WHICH CONTROL OF RELIABILITY MAY BE EXPECTED.

NOTE 7: THESE NORMAL TEST CONDITIONS ARE USED FOR ALL CHARACTERISTIC TESTS UNLESS OTHER WISE STATED UNDER THE INDIVIDUAL TEST ITEM.

NOTE 8: FOR MOST APPLICATIONS THE PERFORMANCE WILL NOT BE ADVERSELY AFFECTED BY ±5% HEATER VOLTAGE VARIATION, BUT WHEN THE APPLICATION CAN PROVIDE A CLOSER CONTROL OF HEATER VOLTAGE, AN IMPROVEMENT IN RELIABILITY WILL BE REALIZED.

NOTE 9: CHANGE OF TRANSCONDUCTANCE FOR INDIVIDUAL TUBES FROM THAT VALUE MEASURED AT Ef=6.3 V TO THAT VALUE MEASURED AT Ef=5.7 V.



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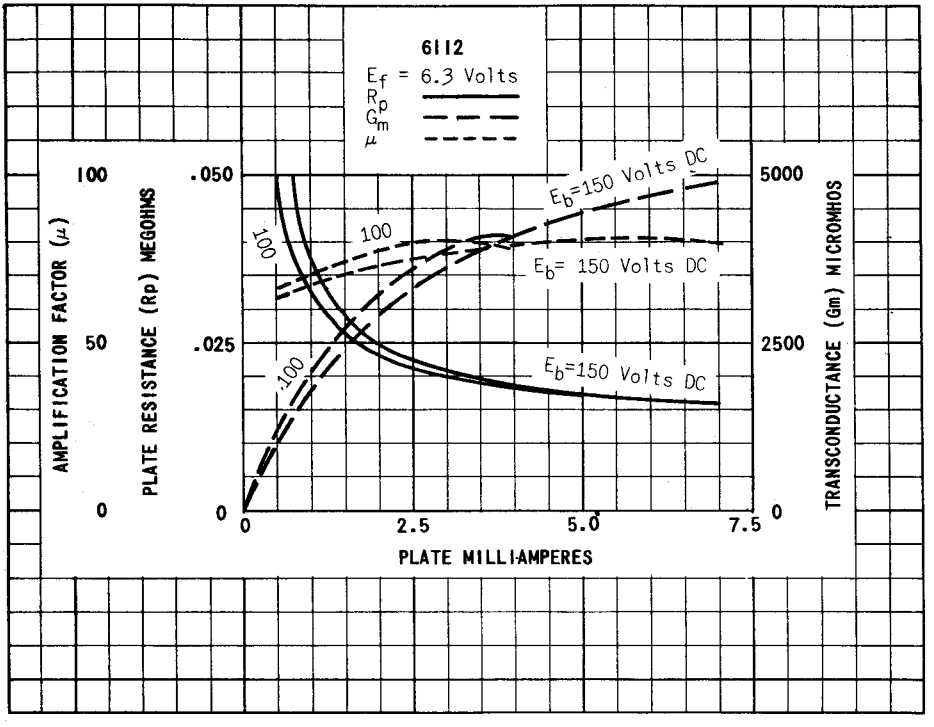
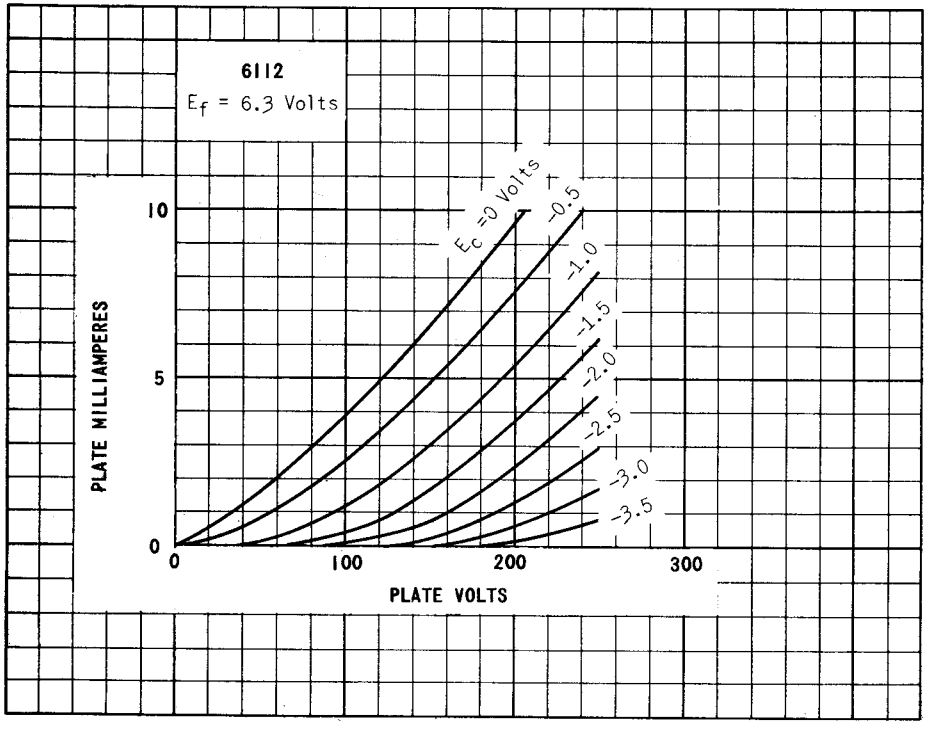

6112
E_f = 6.3 Volts
R_p
G_m
μ
AMPLIFICATION FACTOR (μ)
PLATE RESISTANCE (R_p) MEGOHMS
TRANSCONDUCTANCE (G_m) MICROMHOS
PLATE MILLIAMPERES
100
50
0
.050
.025
0
5000
2500
0
2.5
5.0
7.5
E_b=150 Volts DC
E_b= 150 Volts DC
E_b=150 Volts DC
100
100
100


6112
E_f = 6.3 Volts
PLATE MILLIAMPERES
PLATE VOLTS
10
5
0
0
100
200
300
E_c =0 Volts
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5