MILITARY SPECIFICATION SHEET

ELECTRON TUBE, NEGATIVE GRID (MICROWAVE)

1/ TYPE DOD-038

This specification is approved for use by the Electronics Research and Development Command, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

The complete requirements for procuring the electron tube described herein shall consist of this document and the latest issue of Specification MIL-E-1.

DESCRIPTION: Planar triode
See figure 1
Mounting position: Any
Weight: 0.06 ounce (1.7 grams) nominal

ABSOLUTE RATINGS: Grid-pulsed oscillator service

Parameter:	F	Ef	Eb	Ec	Rk	Ib	ib	Ic	ic	tp	Du	Pp	TE
Unit:	GHz	V	Vdc	Vdc	Ohms	mAdc	a	mAdc	a	µs	---	W	°C
Maximum:	6.0	6.6	550	-50	---	10	1.0	5.0	0.5	1.0	0.01	4.5	250
Minimum:	---	6.0 (Note 1)	---	---	---	---	---	---	---	---	---	---	---
TEST CONDITIONS:	---	6.3	125	---	82	---	---	---	---	---	---	---	---

GENERAL:

Qualification - Required

1/ Replaces GE type Y-1124-3

Ⓑ denotes changes

METHOD	REQUIREMENT OR TEST	NOTES	CONDITIONS	AQL (PERCENT DEFECTIVE)	INSPECTION LEVEL OR CODE	SYMBOL	LIMITS MIN	LIMITS MAX	UNIT
	Qualification inspection								
1031	Sweep-frequency vibration fatigue	6	Eb = Ec = 0; Ef = 6.3 V	---	---	---	---	---	---
---	Sweep-frequency vibration fatigue test end points:								
1031	Low-frequency vibration	-		---	---	Ep	---	15	mVac
1336	Heater-cathode leakage	-		---	---	Ihk	---	20	µAdc
1306	Transconductance	-		---	---	Sm	12,000	---	µmhos
1301	Heater current	-		---	---	If	198	232	mA
	Quality conformance inspection, part 1								
1301	Heater current	-		0.65	II	If	198	232	mA
1336	Heater-cathode leakage	-		0.65	II	Ihk	---	20	µAdc
(B) 1306	Transconductance	8	Ck = 1,000 µF	---	---	Sm	16,000	24,000	µmhos
1261	Electrode voltage (grid)	-	Rk = 0; Ec/Ib = 0.1 mAdc	0.65	II	Ec	---	-6.0	Vdc
4250	Pulsed oscillation	-	F = 5.7 GHz; Ebb = 400 Vdc; egy/ib = 0.6 a; tp = 1 µs; Du = 0.016; prr = 16,000; Rg = 100 ohms; Eg = -20 Vdc	0.65	II	po	20	---	w
(B) ---	Grid pulse voltage	8	Eb = 400 Vdc; Ec = -20 V; tp = 1 µs; prr = 1,000; egy/ip = 1.2 a	---	---	egy	---	50	v
1211	Insulation of electrodes	-		0.65	II	R	50	---	Meg
4303	Cathode warmup time	2	Grid pulse voltage conditions	0.65	II	t	---	0.75	sec

METHOD	REQUIREMENT OR TEST	NOTES	CONDITIONS	AQL (PERCENT DEFECTIVE)	INSPECTION LEVEL OR CODE	SYMBOL	LIMITS		UNIT
							MIN	Max	
	Quality conformance inspection, part 2								
Ⓑ 1316	Amplification factor	-	Ck = 1,000 µF	---	---	Mu	40	90	---
Ⓑ 1256	Electrode current (anode)	-		---	---	Ib	11.0	22.0	mAdc
Ⓑ 1331	Direct-interelectrode capacitance	8		---	---	Cgp	0.85	1.25	pF
						Cin	1.5	2.7	pF
						Cout	---	0.026	pF
1031	Low-frequency vibration	3	Ebb = 150 Vdc; Ec = 0; Ck = 1,000 µF; Rp = 10,000 ohms; 15 G; F = 40 Hz	---	---	Ep	---	10	mVac
	Quality conformance inspection, part 3								
1506	Heater-cycling life	4	Ef = 7.0 V; Ehk = +70 Vdc; no other voltages applied	---	---	Cycles	2,000	---	---
---	Heater-cycling life test end point:								
1336	Heater-cathode leakage	-		---	---	Ihk	---	40	µAdc
---	Life test	5, 7	Group A; Ef = 6.3 Vac, filament standby; no other voltages applied; t = 100 hours	---	---	---	---	---	---
---	Life-test end point	5		---	---	Δib	---	25	%

NOTES:

1. For purpose of achieving a faster warmup, a momentary elevated heater voltage up to 12 V may be used provided the duration does not exceed 1.0 second.

2. Cathode warmup is defined as the time in seconds required for the cathode current to attain 90 percent of the normally stabilized value at 6.0 seconds.

   a. Conditions: Use grid pulse voltage test conditions (except Ef) including the grid pulse amplitude (egy/ip = 1.2a) previously determined.

   b. Procedure: With the specified anode and grid voltages applied to the TUT, a heater voltage of 12.0 ±0.5 Vdc shall be switched "ON" at "to". At "to +0.75" ±0.05 seconds, the Ef shall be automatically switched to 6.4 ±0.1 Vdc. An X-Y recording of the cathode current rise versus time shall be made on individual tubes. The ik level at "to +0.75" seconds shall be at least 90 percent of the "to +6.0" second value.

3. The tube shall be vibrated with simple harmonic motion in each of two planes, (1) parallel to the cylindrical axis and (2) perpendicular to the cylindrical axis and parallel to a plane through the heater pins.

4. Sampling procedure and acceptance criteria for this test shall be as follows: Sample (n1) shall consist of 4 tubes with an acceptance number (c1) of zero. Electrical rejects other than inoperatives and heater-cathode defects may be used in performance of this test.

5. At zero hours, establish the drive conditions necessary to obtain 0.6 a peak anode current with an anode voltage of 400 Vdc and a bias voltage of -20 Vdc. The pulse width of the modulator shall be 1 µs and the duty cycle shall be 0.001 (nominal). With the drive level determined at zero hours, check the anode current at the end-of-life. The maximum allowable drop in anode current (Δib) is 25 percent.

6. Test shall be performed as specified in method 1031, except that the tubes shall be vibrated for a total of 6 hours that is, 3 hours in each of two directions; first, parallel to the cylindrical axis; second, perpendicular to the cylindrical axis and perpendicular to a line through the heater pins.

7. The filament voltage shall be cycled on 1 hour 45 minutes and off 15 minutes. The specified life-test duration applies to accumulated on time.

(B) 8. The TUT's acceptance and rejection criteria for this test shall be based on 100 percent inspection with no failures permitted.

Preparing activity:
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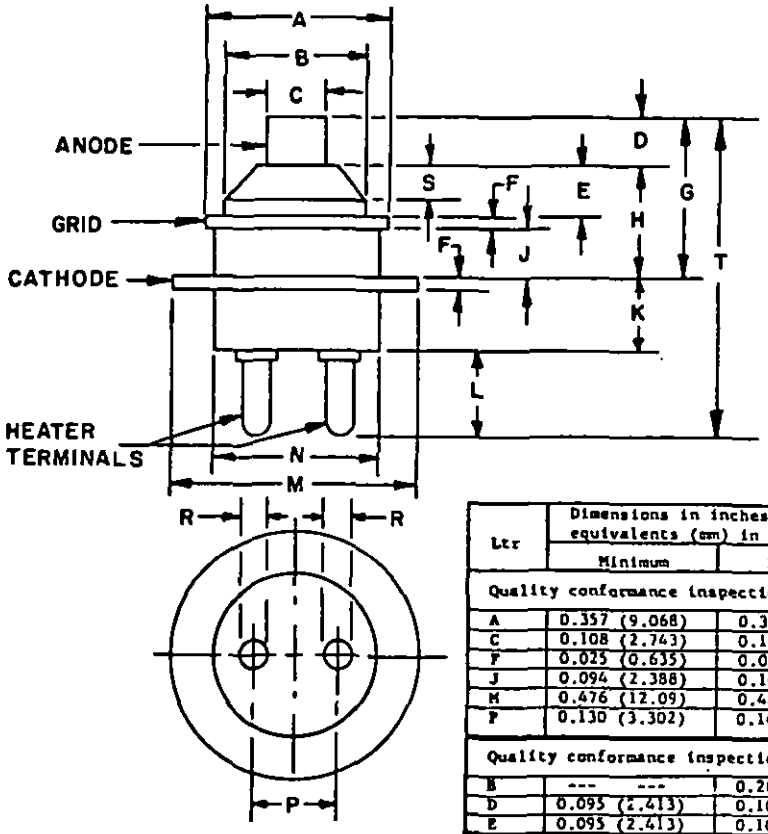
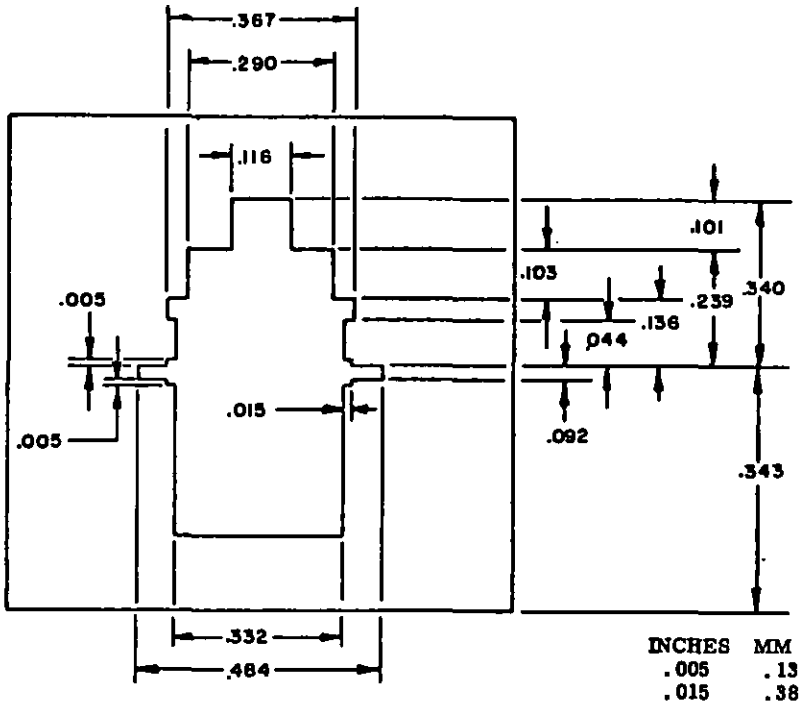
(Project 5960-A165)



Ltr	Dimensions in inches with metric equivalents (mm) in parentheses	
	Minimum	Maximum
Quality conformance inspection, part 1		
A	0.357 (9.068)	0.363 (9.220)
C	0.108 (2.743)	0.112 (2.845)
F	0.025 (0.635)	0.031 (0.787)
J	0.094 (2.388)	0.102 (2.591)
M	0.476 (12.09)	0.484 (12.29)
P	0.130 (3.302)	0.142 (3.607)
Quality conformance inspection, part 2		
B	--- ---	0.285 (7.239)
D	0.095 (2.413)	0.105 (2.667)
E	0.095 (2.413)	0.105 (2.667)
G	0.315 (8.001)	0.335 (8.509)
H	0.216 (5.486)	0.232 (5.893)
K	0.143 (3.632)	0.157 (3.988)
L	0.165 (4.191)	0.185 (4.699)
N	--- ---	0.330 (8.458)
R	0.048 (1.219)	0.054 (1.372)
T	0.623 (15.82)	0.677 (17.20)

NOTE: Tube shall be so alined that it is capable of being inserted into the alinement gage as shown on figure 2 and rotated 360 degrees without binding.

FIGURE 1. Outline drawing of electron tube type DOD-038.



INCHES	MM
.005	.13
.015	.38
.044	1.12
.092	2.34
.101	2.57
.103	2.62
.116	2.95
.136	3.45
.239	6.07
.250	6.35
.290	7.37
.332	8.43
.340	8.64
.343	8.71
.367	9.32
.484	12.29

NOTES:
a. Dimensions are in inches.
b. Metric equivalents (to the nearest .01 mm) are given for general information only and are based upon 1 inch = 25.4 mm.
c. Tolerances of all gage dimensions are ±.001 (.03 mm) unless otherwise specified.

FIGURE 2. Alinement gage.

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DOCUMENT IDENTIFIER *(Number)* AND TITLE

MIL-E-1/1764B(ER), Electron Tube, Negative Grid (Microwave), Type DOD-038

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