

INCH-POUND

MIL-PRF-1/1657D
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SUPERSEDING
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PERFORMANCE SPECIFICATION SHEET

ELECTRON TUBE, NEGATIVE GRID (MICROWAVE)
TYPE 8727

This specification is approved for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the electron tube described herein shall consist of this document and the latest issue of MIL-PRF-1.

DESCRIPTION: Triode, pencil, ceramic-metal.

See figure 1.

Mounting position: Any.

Weight: 0.3 ounce (8.5 grams) nominal.

ABSOLUTE RATINGS: Class C amplifier

Parameter:	Ef	Eb	Ec	Ehk	Rk	Rg	Ik	Ic	Pp	TE	Barometric pressure, reduced mmHg
Unit:	V	V dc	V dc	V	Ohms	Meg	mA dc	mA dc	W	°C	
Maximum:	6.9	250	0	+50	---	0.25	25	6	2.5	225	8
Minimum:	5.7	---	-50	-50	---	---	---	---	---	---	---
Test condition:	6.3	125	g/	---	50	---	---	---	---	---	---

GENERAL:

Qualification - Not required.

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TABLE I. Testing and inspection.

Inspection	Method	Notes	Conditions	Acceptance Level 20/	Symbol	Limits		Unit		
						Min	Max			
<u>Conformance inspection, part 1</u>										
Total grid current	1266	3/	Eb = 200 V dc; Ec = -2 V dc; Rg = 0.5 Meg; Rk = 0	0.65	Ic	0	-0.3	μA dc		
Electrode current (1) (anode)	1256	---	Ck = 1,000 μF	0.65	Ib	9	19	mA dc		
Electrode current (2) (anode)	1256	---	Ec = -5 V dc; Rk = 0	0.65	Ib	---	50	μA dc		
Transconductance (1)	1306	---	Ck = 1,000 μF	0.65	Sm	12,500	19,500	μmhos		
Output power (1)	4250	4/	Eb = 250 V dc	0.65	Po	1.7	---	W		
<u>Conformance inspection, part 2</u>										
Heater current	1301	---	Ef = 6.3 V	---	If	205	245	mA		
Heater-cathode leakage	1336	---	Ehk = +60 V dc Ehk = -60 V dc	---	Ihk Ihk	---	+30 -30	μA dc μA dc		
Transconductance (2)	1306	5/	Ef = 5.7 V	---	ΔSm Ef	---	15	%		
Direct-interelectrode capacitance	1331	1/	}	---	{ Cgp Cgk Cpk	1.5 3.6 ---	2.7 5.00 0.040	pF pF pF		
Electrode current (3) (anode)	1256	---		Ec = -2.5 V dc Rk = 0		---	Ib	100	---	μA dc
Amplification factor	1316	---		Ck = 1,000 μF		---	Mu	55	85	---
Insulation of electrodes	1211	---	E(g-all) = -100 V dc E(p-all) = -300 V dc	---	}	R	100	---	Meg	
Output power (2)	4250	4/	Ef = 5.7 V; Eb = 250 V dc; do not retune cavity	---						ΔPo Ef
<u>Conformance inspection, part 3</u>										
Sweep frequency vibration	1031	2/ 18/	Ebb = 125 V dc; R1 = 10,000 ohms; Rk = 50 ohms	---	Ep	---	150	mV ac		

See footnotes at end of table.

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TABLE I. Testing and inspection - Continued.

Inspection	Method	Notes	Conditions	Symbol	Limits		Unit
					Min	Max	
<u>Conformance inspection, part 3</u> - Continued							
Variable-frequency vibration	1031	<u>2/ 18/</u>	Ebb = 125 V dc; R1 = 10,000 ohms; Rk = 50 ohms	Ep	---	150	mV ac
Shock	1041	<u>16/ 18/</u>	Hammer angle = 30°; no voltages applied	---	---	---	---
Vibration fatigue	1031	<u>17/ 18/</u>	2.5 G; fixed frequency; F = 25 Hz (min), 60 Hz (max)	---	---	---	---
Shock and vibration fatigue-test end points:	---	---	---	---	---	---	---
Sweep and variable-frequency vibration	1031	---	---	Ep	---	200	mV ac
Heater-cathode leakage	1336	---	---	lhk	---	±60	μA dc
Seal fracture	---	<u>6/ 7/ 18/</u>	---	---	30	---	pounds
Seal strain	---	<u>7/ 18/ 19/</u>	---	---	---	---	---
Heater-cycling life	1506	<u>9/ 12/ 14/</u>	Group D; Ef = 6.3 V; Ehk = 0; Eb = 0; Rk = 0; Ec = 0	---	---	---	---
Heater-cycling life-test end points:	---	---	---	---	---	---	---
Heater-cathode leakage	1336	---	Ehk = +60 V dc Ehk = -60 v dc	lhk lhk	---	+30 -30	μA dc μA dc
Insulation of electrodes	1211	---	E(g-all) = -100 V dc	R	50	---	Meg
Stability life test (2 hours)	1516	<u>11/ 12/</u>	Group D; Eb = 215 V dc; Rk = 150 ohms; TA = room temp, 25°C ± 5°C; g1 grounded	---	---	---	---

See footnotes at end of table.

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TABLE I. Testing and inspection - Continued.

Inspection	Method	Notes	Conditions	Symbol	Limits		Unit
					Min	Max	
<u>Conformance inspection, part 3</u> - Continued							
Stability life-test end point:	---						
Transconductance (1)	1306	---		ΔS_{m_t}	---	15	%
Survival-rate life	1521	13/ 15/	Stability life test, or equivalent conditions; TA = room temp, 25°C ± 5°C; t = 100 hours	---	---	---	---
Survival-rate life test end points:	---						
Electrode current (2) (anode)	1256	---		I _b	---	50	μA dc
Transconductance (1)	1306	---		S _m	9,000	---	μmhos
Intermittent life	1501	10/ 14/	Group C; E _f = 6.3 V; E _{bb} = 250 V dc	t	2,000	---	cycles
Intermittent life-test end points:	---						
Output power (1)	4250	---		P _o	0.90	---	W
Total grid current	1266	---		I _c	---	-1.0	μA dc
Insulation of electrodes	1211	---		R	60	---	Meg
Barometric pressure, reduced	1002	18/	Pressure = 8 ± 2 mmHg; voltage = 300 V ac	---	---	---	---

- 1/ Test in capacitance jig RCA Capacity Adapter Model H-1756E, or equivalent. A capacitance bridge operating frequency of 1.0 to 2.0 kHz may be used.
- 2/ The tube shall be vibrated perpendicular to the major tube axis through a frequency range from 5 to 500 Hz and back. From 5 to 50 Hz, the tube shall be vibrated at a constant displacement of 0.040 ± 0.0025 inch (1.02 ± 0.06 mm). From 50 to 500 Hz, the tube shall be vibrated at a constant acceleration of 10 ± 2 G. Total time to complete a sweep cycle shall be 10 ± 5 minutes.
- a. Each tube shall be vibrated for 60 seconds at the frequency that gives maximum vibration output. If at the end of 60 seconds the vibration output is still increasing, the vibration shall continue until there is not further increase.
 - b. The tube shall be rejected for vibration output voltage exceeding the limit specified herein.
- 3/ This test is to be the first test performed at the conclusion of the holding period.

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TABLE I. Testing and inspection - Continued.

- 4/ This test shall be performed in amplifier cavity Amerac Model No. 1244-1, or equivalent. Test frequency shall be 550 ± 10 MHz. Input = 0.2 W. When the amplifier has been tuned, adjust E_c for $I_b = 20$ mA dc.
- 5/ Transconductance (2) is the percent change in transconductance (1) of an individual tube resulting from a change in E_f .
- 6/ Tube supported at cathode and anode terminals with the grid disk centered. The supports shall be placed 0.938 ± 0.016 inch (23.83 ± 0.41 mm) apart. Apply force to the grid disk without shock, perpendicular to the axis of the tube. Inspect for defects described in MIL-PRF-1, appendix D, Vacuum Seal (metal-to-glass) defect classification.
- 7/ Electrical rejects may be used.
- 8/ Whenever E_c is not specified on any test, the grid shall be grounded directly or through a grid resistor (if specified) except when related MIL-STD-1311 test methods imply grid variance to accomplish this test.
- 9/ The no-load to a steady-state full load of the heater voltage supply shall be not more than 3 percent. A failure or defect shall consist of an open heater, open cathode circuit, heater cathode short, or heater cathode leakage in excess of the specified heater cycling life-test end-point limit.
- 10/ Test shall be performed in amplifier cavity Amerac Model No. 1244-1, or equivalent. Test frequency shall be 550 ± 10 MHz. Adjust R_k for $I_k = 25$ mA dc and R_g for $I_g = 6$ mA dc.
- 11/ Cycle E_f only, 110 minutes "on", 10 minutes "off".
- 12/ Test shall be performed on a group D basis every 90 days with the lot consisting of the current month and two subsequent months. Failure of any tube shall revert back to group D monthly lot sampling. After three consecutive successful lot submissions have been completed, the test may revert to the quarterly basis.
- 13/ Test shall be performed in accordance with method 1521 and MIL-PRF-1 every 90 days. Failure of any tube shall revert back to MIL-PRF-1 monthly lot sampling. After three consecutive successful submissions have been completed, the test shall revert to the quarterly basis.
- 14/ A complete cycle is made in a 6-minute period as follows: 3 minutes on, 3 minutes off. This is a destructive test. Mechanical or electrical rejects may be used.
- 15/ Tubes meeting the initial test requirements after stability and survival-rate life tests shall be accepted under this specification.
- 16/ Subject tubes to shock in axes X, Y, and Z for a total of 15 blows, five blows in each axis.
- 17/ Vibrate in axes X and Y only for a total of 64 hours, 32 hours in each axis.
- 18/ This test shall be performed during the initial production and once each succeeding 12-calendar months in which there is production. An accept on zero defect sampling plan shall be used, with sample of three tubes with an acceptance number of zero defects. In the event of failure, the test will be made as a part of conformance inspection, part 2, with an acceptance level of 6.5 (see 20/). The regular "12-calendar month" sampling plan shall be reinstated after three consecutive samples have been accepted.
- 19/ Use basic test method 2126 (for receiving tubes) for seal strain test of this ceramic tube type.
- 20/ This specification sheet uses accept on zero defect sampling in accordance with MIL-PRF-1, table III.

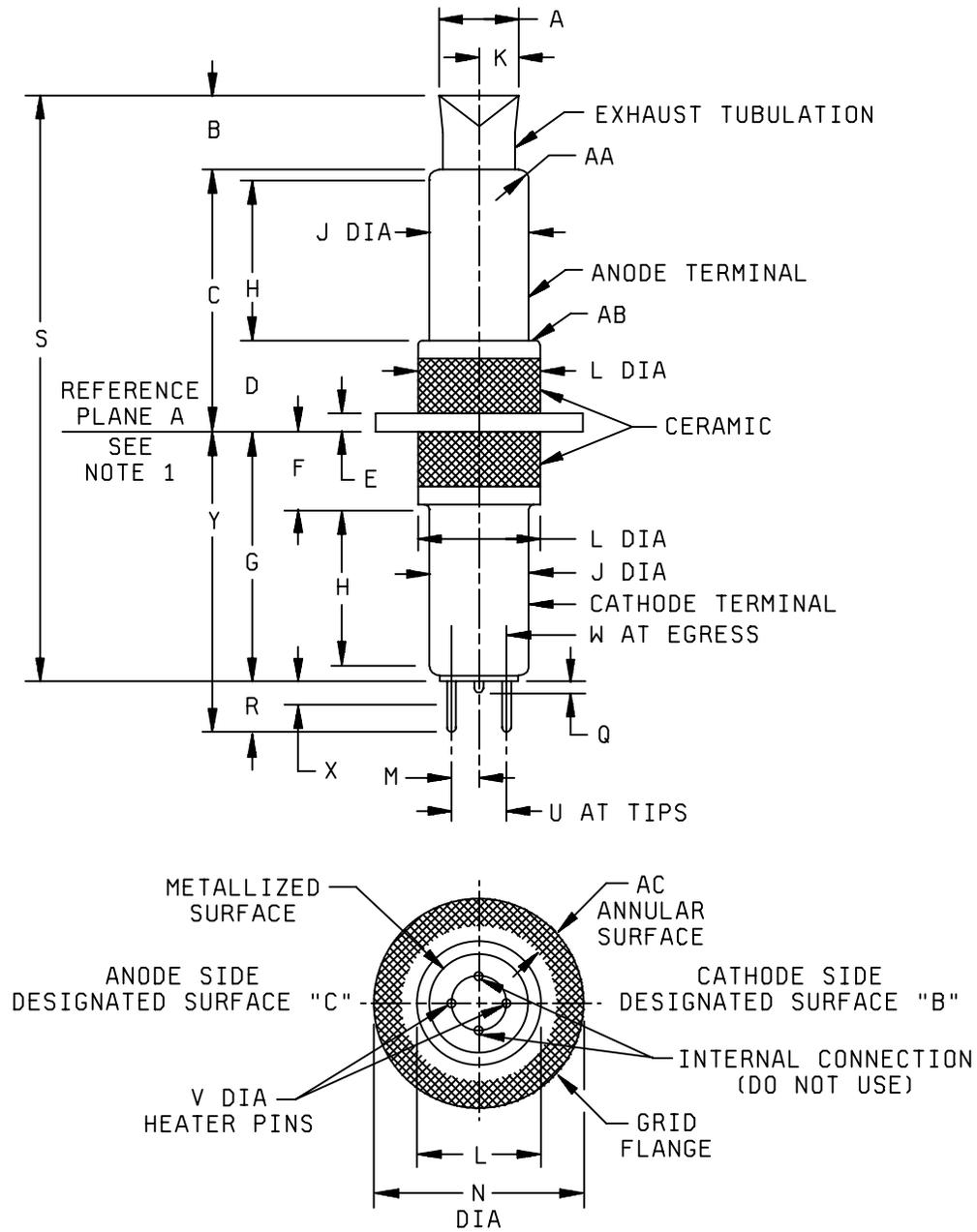


FIGURE 1. Outline drawing of electron tube type 8727.

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Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
Conformance inspection, part 1					
C	.555	.605	14.10	15.36	
G	.535	.575	13.59	14.60	
H	.320	---	8.13	---	
Y	.650	.700	16.51	17.78	
Conformance inspection, part 2					
A	---	.230	---	5.84	
B	---	.180	---	4.57	
D	.165	.205	4.19	5.20	
E	.049	.055	1.24	1.40	
F	.120	.150	3.05	3.81	
J	.245	.252	6.22	6.40	2, 4
K	---	.115	---	2.92	
L	.335	.355	8.51	9.01	
M	.048	.068	1.22	1.73	
N	.547	.557	13.89	14.15	3
Q	---	.010	---	0.25	
R	.095	.125	2.41	3.17	
S	---	1.360	---	34.54	
U	.095	.135	2.41	3.43	
V	.020	.030	0.51	0.76	
W	.110	.120	2.79	3.05	
X	---	.065	---	1.65	5
Reference dimensions					
AA	.015 RAD		0.38 RAD		
AB	.030 RAD		0.76 RAD		
AC	.060		1.52		

NOTES:

1. Reference plane "A" is defined as that plane against which annular surface "B" of the grid flange abuts.
2. The axis of the anode terminal shall be coincident with the axis of the cathode terminal within 0.010 inch (0.25 mm).
3. The axis of the cathode terminal shall pass through the exact center of the grid flange (dimension N) within 0.005 inch (0.13 mm).
4. With annular surface "B" resting on reference plane "A", the axis of the cathode terminal (dimensions H and J) shall be within 2 degrees of a line perpendicular to reference plane "A".
5. Leads shall be tinned except as specified by dimension X. Untinned length of leads shall be measured from end of ceramic stem wafer.

FIGURE 1. Outline drawing of electron tube type 8727 - Continued.

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Custodians:

Navy - EC
DLA - CC

Review activities:

Navy - AS, CG, MC, OS

Preparing activity:

DLA - CC

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