INCH-POUND
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SUPERSEDING
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PERFORMANCE SPECIFICATION SHEET

ELECTRON TUBE, NEGATIVE GRID (MICROWAVE)

TYPE 2C40A

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

Inactive for new design after 21 July 1997

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

DESCRIPTION: Planar triode, metal-glass.
See figure 1.
Mounting position: Any.
Weight: 1.2 ounces (34 grams) nominal.

ABSOLUTE RATINGS:

CW OSCILLATOR													
Parameter:	F	Ef	Eb	Ib	Ehk	Ik	Pp	tk	T(seal)	Ec	Ic		
Unit:	MHz	V	V	mA dc	V	mA dc	W	sec	°C	V dc	mA dc		
Maximum:	3,370	6.6	500	25	±90	33	6.5	---	200	-50	8.0		
Minimum:	---	6.0	---	---	---	---	---	60	---	---	---		
ANODE PULSED OSCILLATOR													
Parameter:	F	Ef	eb	ec	Ehk	Ib	ib	Ic	ic	Pp	tp	Du	T(seal)
Unit:	MHz	V	v	v	V	mA dc	a	mA dc	a	W	µs	--	°C
Maximum:	3,370	6.6	1,400	-100	±90	3.0	2.0	1.5	1.0	4.0	1.5	0.002	200
Minimum:	---	6.0	---	---	---	---	---	---	---	---	---	---	---
TEST CONDITIONS													
Parameter:	Ef	Eb	Ck	Rk	tk								
Unit:	V	V	µF	Ohms	sec								
	6.3	250	1,000	200	300								

GENERAL:

Qualification – Required.

Holding period (MIL-STD-1311) t = 168 hours.

--- See note 1/.

TABLE I. Testing and Inspection

Inspection	Method MIL-STD-1311	Conditions	Acceptance level note 8	Symbol	Limits		Unit
					Min	Max	
Conformance inspection, part 1							
Pulse emission	1231	prr = 500; tp = 2.0 µs; (eb=ec)/is = 2.5 a	0.65	etd	---	190	V
Total grid current	1266		0.65	Ic	---	-0.5	µA dc
Power oscillation (pulsed)	1236	Rk = Rg = 0; eb = 1,400 v; tp = 1.0 µs ±10%; prr = 1,000 ±10%; Du = 0.001 ±10%; F = 3,000 MHz (min); ib = 1.5 a (max); t = 30 sec (min) see notes 2,3 and Dwg 209-JAN	0.65	Po starting voltage	200	---	mW
Transconductance	1306		0.65	Sm	4,400	5,700	µmhos
Electrode current (anode)	1256		0.65	Ib	12	21	mA dc
Conformance inspection, part 2							
Insulation of electrodes	1211	E(g to all)= -100 V dc E(sh to all)=-500 V dc	---	R	100	---	MegΩ
Heater current	1301		---	If	700	800	mA dc
Electrode voltage (cutoff) (grid)	1261	Ec/Ib = 10 µAdc	---	Eco	---	-26	V dc
Heater-cathode leakage	1336		---	Ihk	---	50	µA dc
Power oscillation (cw)	1236	Eb = 250 V dc (max); Ib = 25 mA dc (max); Rg = 10,000 ohms; Rk = 0; F = 3,370 ±100 MHz; t = 30 sec (min) Dwg 102-JAN	---	Po	35	---	mW
Direct-interelectrode capacitance	1331	No voltages DESC Dwg 65025	---	Cgp Cin Cout Cksh	1.20 2.00 --- 50	1.40 2.45 0.030 200	pF pF pF pF
Emission	1231	(Eb=Ec)/Is = 40 mA dc	---	Etd	---	8	V dc
Amplification factor	1316		---	Mu	27	44	---

TABLE I. Testing and Inspection Continued

Inspection	Method MIL-STD-1311	Conditions	Acceptance level note 8	Symbol	Limits		Unit
					Min	Max	
Conformance inspection, part 3							
Life-test (1)	---	Group A Eb = 300 Vdc; Rk/Ib = 17 mAdc; t = 500 hours	---	---	---	---	---
Life-test (1) end point:	---						
Power oscillation (cw)	1236		---	Po	25	---	mW
Life-test (2)	---	Group C; power oscillation (pulsed) except prr = 2,000 ±10% t = 500 hours	---	---	---	---	---
Life-test (2) end point	---	Life-test (2) conditions	---	Po	300	---	mW
High-frequency vibration	1031	F = 50 Hz; 10G; Ebb = 300 V dc; Rp = 10,000 ohms; Ec/Ib = 10 mA dc Notes 4, 5 and 7	---	Ep	---	100	mV
Secureness of base, cap, or insert	1101	No voltages; torque to be applied between anode and pins without shock Notes 4 and 7	---	---	20	---	lb-in
Torque-test end point	---						
Total grid current	1266	Note 7	---	Ic	---	-0.5	A dc
Frequency draft	---	Notes 4, 6 and 7	---	F	---	2.0	MHz

NOTES:

1. The following test methods shall not apply: MIL-STD-1311 Methods 1006 and 1201.

2. The pulse shape shall be in accordance with method 1296. Minimum power output limit, based on a duty factor of 0.001, may be adjusted for the exact duty factor used. Coupling and tuning to be adjusted for maximum power output. The tube shall operate under the given conditions and minimum output, or greater, for a minimum of 30 seconds without arcing or instability as evidenced by pronounced variations in the average anode current meter or the power output meter. If temporary arcing does occur during the 30-second period, the tube must subsequently operate for 60 seconds without arcing. The test may be discontinued, at the end of the 30-second period, if the power output has not completely stabilized but is rising. If the power output is falling, the test is continued until a stable reading is obtained. For qualification approval, a stable reading shall be obtained.

3. The starting voltage is measured by raising the pulsed anode voltage from zero and noting the voltage at which a readable indication is obtained on the power meter. The tube may not be oscillating during the full width of the modulation pulse during this test.

4. Test 10 tubes selected at random from the first production lot of each calendar year, and approximately every 90 days of production during the year. If one tube fails to pass the specified end point, the failed test shall become a part of conformance inspection, part 2, on all lots in process. After three consecutive successful submissions, the test shall revert to the 10-tube quarterly test.

5. Vibrate in direction perpendicular to plane of grid.

6. Frequency drift.

   (a) Set for conditions of power oscillation (cw).

   (b) Reduce Ef to 6.0 volts and allow frequency to stabilize. Record frequency.

   (c) Raise Ef to 6.6 volts and allow frequency to stabilize. Record frequency.

   (d) Reduce Ef to 6.0 volts and allow frequency to stabilize. Record frequency.

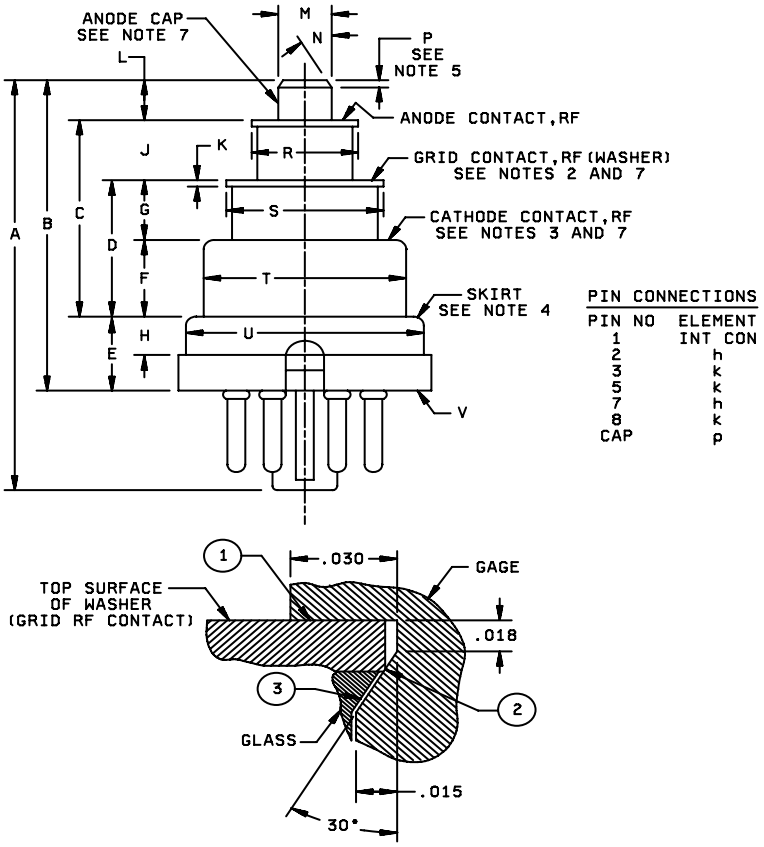
   (e) Readings (b) and (d) shall not differ by more than 0.3 MHz. If a greater difference is found, repeat (a) through (c) inclusive.

   (f) Frequency drift is equal to the difference between the frequency recorded at (b) and (c), or (c) and (d), whichever is greater.

   (g) During the frequency drift test, there shall be no evidence of abrupt change in the power output meter. If such a change does occur, the oscillator shall be returned for a more stable operation.

7. This test shall be performed yearly. An accept on zero defect sampling plan shall be used with sample of three tubes with an acceptance number of zero. In the event of failure, the test will be made as a part of conformance inspection, part 2, acceptance level 6.5 (see 8/). The yearly sampling plan may be reinstated after three consecutive sampling have been accepted.

8. This specification sheet uses accept on zero defect sampling in accordance with MIL-PRF-1, table III.



With top surface of washer (grid rf contact) in contact with surface (1) of gage and with lower edge of washer (grid rf contact) in contact with surface (2) of gage, external glass surface (3) of tube shall not be in contact with gage at any point. Equivalent gaging procedure any be used.

GAGING PROCEDURE, GLASS SURFACE

FIGURE 1. Outline drawing of electron tube type 2C40A.

Ltr	Dimensions in inches with metric equivalents (mm) in parentheses		Notes
	Minimum	Maximum	
Conformance inspection, part 2			
A		2.562 (65.07)	a
B		1.973 (50.11)	
C	1.220 (30.99)	1.260 (32.00)	
D	.850(21.59)	.880(22.35)	
E	.395(10.03)	.455(11.56)	a
F	.475(12.07)	.505(12.83)	
G	.360(9.14)	.390(9.91)	
H	.180(4.57)	.210(5.33)	a
J	.360(9.14)	.390(9.91)	a
K	.030(.76)	.035(.89)	a
L	.242(6.15)	.258(6.55)	
M	.248(6.30)	.252(6.40)	
P	.016(.41)	.047(1.19)	a
R	.557(14.15)	.567(14.40)	a
S	.808(20.52)	.816(20.73)	
T	1.023 (25.98)	1.039 (26.39)	
U	1.216 (30.89)	1.236 (31.39)	a
V	B6-108		
Reference dimensions			
N	45°		

Notes:

a. These dimensions shall be inspection on 10 tubes a month when in continuous production. Failure of one tube to meet tolerances for any dimensions shall cause that dimension to become for all lots in process, part of conformance inspection, part 2.

b. External glass surface of tube shall conform to the detailed requirements of figure 1. Conformance inspection, part 2 shall apply.

c. Cathode rf contact surface shall be free from welding flash material, Conformance inspection, part 2 shall apply.

d. Limits of dimension U do not apply at points where skirt is crimped to base.

e. Radius with limits as specified may be used instead of chamfer.

f. External metal surfaces, except base pins, shall be silver plated 30msi, minimum. Conformance inspection, part 2, shall apply.

g. Eccentricity of contact surfaces shall be as follows. Conformance inspection, part 2, shall apply.

Contact surface	TIR maximum	Reference surface
Grid	.016	Anode cap
Cathode, rf	.016	Grid

FIGURE 1. Outline drawing of electron tube type 2C40A. Continued.

Referenced documents: In addition to MIL-PRF-1, this document references the following:
MIL-STD-1311
DESC DWG 65025
DWG 102-JAN
DWG 209-JAN

Marginal notations are not used in the revision to identify changes with respect to the previous issue due to the extent of the changes.

Custodians:
Army – CR
Navy – EC
Air Force – 85
DLA – CC

Preparing activity:
DLA- CC

(Project 5960-2008-056)

Review activities:
Army – AR
Navy – AS, CG, MC, OS
Air Force – 99

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at http://assist.daps.dla.mil/