INCH-POUND

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7 July 1999
SUPERSEDING
MIL-E-1/776D
1 October 1982

PERFORMANCE SPECIFICATION SHEET

ELECTRON TUBE, POWER
TYPE 4D21

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: Tetrode.

See figure 1.

Mounting position: Vertical, base down or up.

Weight: 6.5 ounces (184 grams) nominal.

ABSOLUTE RATINGS: C Telegraphy.

Parameter:	F1	Ef	Eb	Ec1	Ec2	Ib	Pg1	Pg2	Pp	Cooling	T(seal)	TE
Unit:	MHz	V ac	V dc	V dc	V dc	mA dc	W	W	W	---	°C	°C
Maximum:	110	5.25	3,000	-500	400	225	5	20	125	---	200	225
Minimum:	---	4.76	---	---	---	---	---	---	---	---	---	---
Test conditions:	---	5.0	2,500	Adj	500	50	---	---	---	1/	---	---

See footnotes at end of table I.

GENERAL:

Qualification: Required.

TABLE I. Testing and inspection.

Inspection	Method	Notes	Conditions	Symbol	Limits		Unit
					Min	Max	
Conformance inspection, part 1		2/					
Filament current	1301	---		If	6.4	7.2	A ac
Peak emission	1231	---	eb = ec2 = ec1 = 2,500 v	is	3.5	---	a
Electrode voltage (grid)	1261	---		Ec1	-60	-83	V dc
Total grid current	1266	3/		Ic1	---	-10	µA dc
Primary grid emission (control)	1266	---	Ef = 5.5 V ac; t = 15 seconds; Pg1 = 6 watts or Ic1 = 85 mA dc; anode and screen grid floating	Isg1	---	-200	µA dc
Primary grid emission (screen)	1266	---	Ef = 5.5 V ac; t = 15 seconds; Ec1 = 0; Pg2 = 25 watts or Ic2 = 75 mA dc; anode floating	Isg2	---	-200	µA dc
Current division (method B)	1372	---	Eb = 500 V dc; Ec2 = 350 V dc; Ec1 = -150 V dc; egk/ib = 800 ma; tp = 2 µs (min); prr = 30 (min)	egk ic1 ic2	--- --- ---	150 160 300	v ma ma
Conformance inspection, part 2							
Amplification factor	1316	---	Connect g1 to g2; Ec2 = 300 V dc; Ic2 = 60 mA dc; anode floating	Mu	5.2	6.5	---
Power oscillation (1)	1236	4/	Eb = 3,000 V dc; Ec2 = 350 V dc; Ib = 100 mA dc; Rg1 = 15,000 ohms; F = 15 MHz	Po Ic2	175 15	--- 50	W (useful) mA dc
Direct-interelectrode capacitance	1331	---		Cgp Cin Cout	--- 9.2 2.5	0.07 12.4 3.5	pF pF pF

See footnotes at end of table.

TABLE I. Testing and inspection - Continued.

Inspection	Method	Notes	Conditions	Symbol	Limits		Unit
					Min	Max	
Conformance inspection, part 2 - Continued							
Low-frequency vibration	1031	---	No voltages	---	---	---	---
Shock, specified pulse	1042	---	No voltages; test condition A, except 15G	---	---	---	---
Low-frequency vibration and shock, specified pulse-test end points:	---						
Electrode voltage (grid)	1261	---		Ec1	-60	-83	V dc
Total grid current	1266	---		Ic1	---	-10	µA dc
Conformance inspection part 3							
Life test	---	4/	Group C; Eb = 3,000 V dc; Ec2 = 350 V dc; Ib = 100 mA dc; Rg1 = 15,000 ohms; F = 15 MHz (min)	t	500	---	hrs
Life-test end points:	---						
Peak emission	1231	---		is	3.0	---	a
Primary grid emission (control)	1266	---		Isg1	---	-200	µA dc
Primary grid emission (screen)	1266	---		Isg2	---	-200	µA dc
Total grid current	1266	---		Ic1	---	-10	µA dc
Power oscillation (2)	1236	4/ 5/	Eb = 3,000 V dc; Ec2 = 350 V dc; Ib = 100 mA dc; Rg1 = 15,000 ohms; F = 110 MHz	Po	175	---	W (useful)

See footnotes at top of next page.

TABLE I. Testing and inspection - Continued.

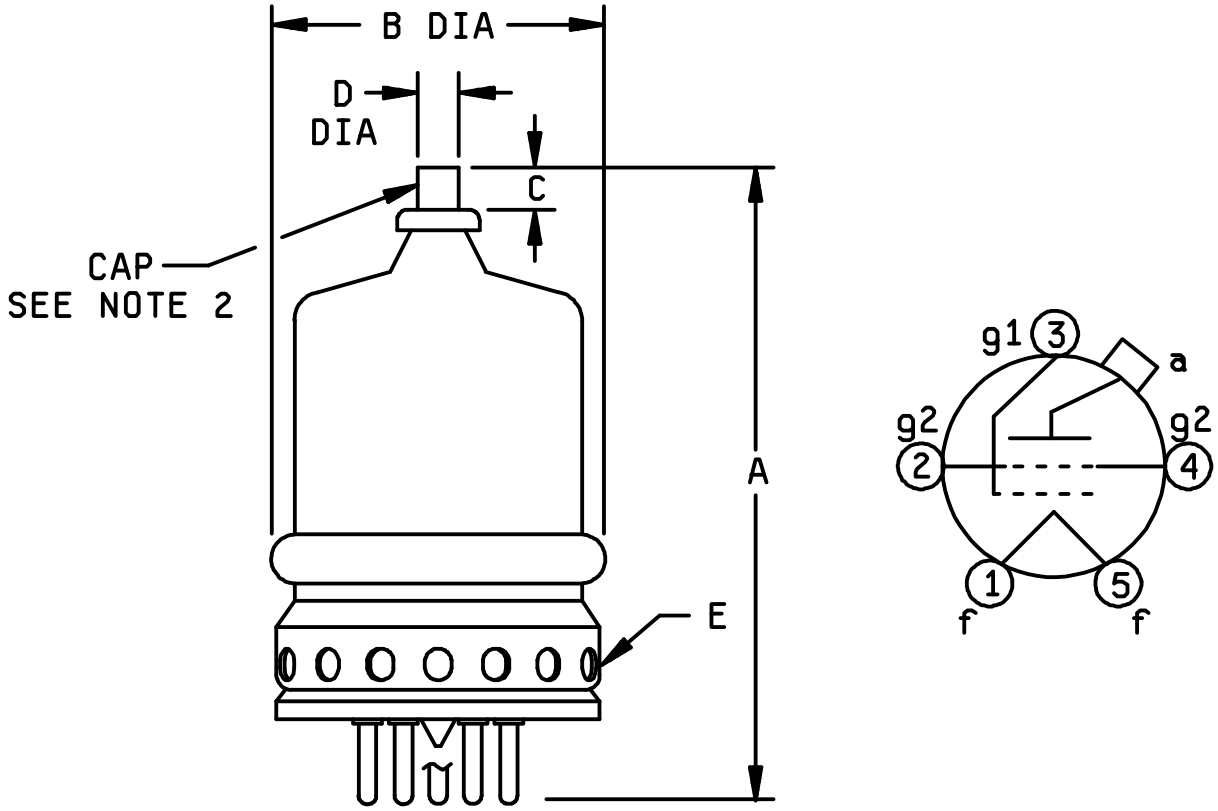
1/ During all electrical tests involving application of filament power, forced-air cooling of the tube under test is allowable and a heat-dissipating connector (EIMAC HR-6, or equivalent) may be used on the anode terminal.

2/ The acceptance level for each test listed under conformance inspection, part 1, shall be 1.0, inspection level II.

3/ This test shall be the first test performed at the conclusion of the holding period.

4/ The value of Rg1 = 15,000 ohms shall apply when a self-excited oscillator circuit is used. If an amplifier circuit is used, fixed bias or a combination of fixed bias and grid-leak resistance may be used.

5/ This test shall be performed during the initial production and once each succeeding 12-calendar months in which there is production. A regular double sampling plan shall be used, with the first sample of three tubes with an acceptance number of zero, and a second sample of three tubes with a combined acceptance number of one. In the event of failure, the test will be made as a part of conformance inspection, part 2, acceptance level 6.5, inspection level S3. The regular "12-calendar month" double sampling plan shall be reinstated after three consecutive samples have been accepted.



Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
Conformance inspection, part 2				
A	5.188	5.688	131.78	144.48
B	---	2.812	---	71.42
Conformance inspection (periodic check) part 3 (see note 1)				
C	.328	---	8.33	---
D	.350	.365	8.89	9.27
E	A5-97 (EIA)			

NOTES:

1. This test shall be performed during the initial production and once each succeeding 12-calendar months in which there is production. A regular double sampling plan shall be used, with the first sample of three tubes with an acceptance number of zero, and a second sample of three tubes with a combined acceptance number of one. In the event of failure, the test will be made as a part of conformance inspection, part 2, acceptance level 6.5, inspection level S3. The regular "12-calendar month" double sampling plan shall be reinstated after three consecutive samples have been accepted.
2. Does not include increase due to solder.

FIGURE 1. Outline drawing of electron tube type 4D21.

Custodians:
Army - CR
Navy - EC
Air Force - 11
DLA - CC

Review activities:
Army - AR, CR4
Navy - AS, CG, MC, OS
Air Force - 99

Preparing activity:
DLA - CC

(Project 5960-3551-07)