

INCH-POUND

MIL-PRF-1/1506D
 18 June 1999
 SUPERSEDING
 MIL-E-1/1506C
 15 November 1983

PERFORMANCE SPECIFICATION SHEET

ELECTRON TUBE, POWER

TYPE 8245

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, ceramic-metal.

See figure 1.

Mounting position: Any.

Weight: 4 ounces (113.4 grams) nominal.

ABSOLUTE RATINGS: F (CW) = 500 MHz, F (pulsed) = 1,500 MHz.

Parameter:	Ef	eb	Eb	ec1	Ec1	ec2	Ec2	lb	ib	ik
Unit:	V ac <u>1/</u>	kv <u>2/</u>	V dc	v <u>2/</u>	V dc	kv <u>2/</u>	V dc	mA dc	a <u>2/</u>	a
Maximum:										
Class C Telep:	6.0 ± 5%	---	1,500	---	-250	---	300	200	---	---
Class C Teleg:	6.0 ± 5%	---	2,000	---	-250	---	300	250	---	---
Class AB:	6.0 ± 5%	---	2,000	---	---	---	400	250	---	---
Class C pulsed:	6.0 ± 5%	7.0	---	-500	---	1.5	---	---	6.0	7.0
Test conditions:	6.0	---	1,000	---	Adj	---	300	150	---	---

ABSOLUTE RATINGS: F (CW) = 500 MHz, F (pulsed) = 1,500 MHz.

Parameter:	Pg1	Pg2	Pp	Pi	tp	tk	T(anode core and seal)	Cooling
Unit:	W	W	W	W	μs <u>2/</u>	s (min)	°C	---
Maximum:								
Class C Telep:	2	12	165	300	---	30	250	---
Class C Teleg:	2	12	250	500	---	30	250	---
Class AB:	2	12	250	500	---	30	250	---
Class C pulsed:	2	12	250	500	5.0	30	250	---
Test conditions:	---	---	---	---	---	120	---	<u>4/</u>

GENERAL:

Qualification: Required.

TABLE I. Testing and inspection.

Inspection	Method	Notes	Conditions	Symbol	Limits		Unit
					Min	Max	
<u>Conformance inspection, part 1</u>							
Heater current	1301	5/		If	2.30	3.00	A ac
Electrode voltage (grid)	1261			Ec1	-32	-45	V dc
Electrode current (screen)	1256			Ic2	-5.0	+3.0	mA dc
Total grid current	1266	6/	Eb = 2,000 V dc; Ec1/Ib = 125 mA dc	Ic1	---	-15	μA dc
Primary grid emission (control)	1266		Ic1 = 70 mA dc t = 15; anode and g2 floating	Isg1	---	-25	μA dc
Primary grid emission (screen)	1266		Ec1 = 0; t = 15; Ic2 = 100 mA dc; anode floating	Isg2	---	-250	μA dc
Pulse emission (1)	2212	7/	Eb = Ec2 = 250 V dc; Ec1 = -100 V dc; prr = 11 ± 1; tp = 4,500 μs (min); ec1/ik = 1.5 a; Ef = 5.4 V ac	Δik	---	200	ma
Current division (long pulse, method A)	1372		Eb = Ec2 = 250 V dc; Ec1 = -100 V dc; prr = 11 ± 1; tp = 4,500 μs (min); ec1/Ib = 1.0 a	egk	8.0	18.0	v
				ic	---	200	ma
				ic2	---	260	ma
<u>Conformance inspection, part 2</u>							
RF useful power output	2214	8/	Class C amplifier; F = 470 to 500 MHz; Eb = 2,000 V dc; Ec1 = -90 V dc; Ec2 = 250 to 300 V dc; Ic1 = 25 mA dc (max); Eg1/Ib = 250 mA dc; Ef = 5.50 V ac	Po	225	---	W (useful)
Pulse emission (2)	2212	7/	Eb = Ec2 = 250 V dc; Ec1 = -100 V dc; prr = 11 ± 1; tp = 4,500 μs (min); ec1/ik = 1.5 a	Δik	---	100	ma

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 2</u> – Continued							
Direct-interelectrode capacitance	1331		Grounded grid	Cpk Cin Cout	--- 14.5 4.2	0.01 19.0 5.2	pF pF pF
Direct-interelectrode capacitance	1331		Grounded cathode	Cgp Cin Cout	--- 25.0 4.2	0.05 29.0 5.2	pF pF pF
<u>Conformance inspection, part 3</u>							
Low-frequency vibration	1031		No voltages	---	---	---	---
Shock, specified pulse	1042		No voltages; 15 G peak (min); D = 11 ± 2 ms; half-sine wave	---	---	---	---
Life test (1)	---		Group C; Class C amplifier; F = 470 to 500 MHz Eb = 2,000 V dc; Ec1 = -90 V dc; Ec2 = 250 to 300 V dc; Ic1 = 25 mA dc (max); Eg1/Ib = 250 mA dc; Ef = 5.50 V ac	t	500	---	hours
Life-test (1) end points:	---						
Pulse emission (2)	2212	Z/	Eb = Ec2 = 250 V dc; Ec1 = -100 V dc; prr = 11 ± 1; tp = 4,500 μs (min); ec1/ik = 1.5 a	Δik	---	100	ma
Primary grid emission (control)	1266		Ic1 = 70 mA dc; t = 15; anode and g2 floating	Isg1	---	-100	μA dc
Primary grid emission (screen)	1266		Ec1 = 0; t = 15; Ic2 = 100 mA dc; anode floating	Isg2	---	-250	μA dc
Life test (2)	---		Group C; Ec1 = Ec2 = Eb = 0; Ef = 6.6 V ac	t	500	---	hours
Life-test (2) end point:	---						
Interelement leakage resistance, cold	1366		Rs = 2.5 Meg; supply voltage = E = 100 V dc; g1 negative E = 500 V dc; g2 positive E = 500 V dc; g1 negative	Rg1k Rg2K Rg1g2	10 10 10	--- --- ---	Meg Meg Meg
Pulse power output	---	g/	eb = 7.0 kv; ec2 = 1.2 kv; Ib = 6.0 a; tp = 5 μs; prr = 1,000; F = 1,200 ± 50 MHz	po	17	---	kw

See footnotes at top of next page.

TABLE I. Testing and inspection - Continued.

- 1/ At frequencies above approximately 300 MHz, it may be necessary to reduce heater voltage to compensate for rf transit-time heating of the cathode after dynamic operation of the tube has started. This back heating is a function of frequency, grid current, grid bias, anode current, duty cycle, and circuit design and adjustment. There is an optimum heater voltage which will maintain the cathode at the correct operating temperature for any particular set of operating conditions. A maximum variation of ± 5 percent from optimum shall be maintained. For straight-through, class C CW amplifier operation, the following heater operation voltages are indicated:

<u>Frequency (MHz)</u>	<u>E_f (V ac)</u>
301 to 400	5.75
401 to 500	5.50

- 2/ With a pulse repetition rate (prf) of 1,000 or less and a pulse duration (tp) of 5 μ s or less, peak anode current (ib) shall be limited to 6.0 amperes. For pulses of longer duration or higher repetition rates, peak anode current shall be reduced in accordance with the data shown on figure 2, and pulse anode voltage, screen voltage, and grid voltage shall be reduced in accordance with the data shown on figure 3.
- 3/ Forced-air cooling shall be provided for the base and anode. The maximum seal and anode core temperature rating shall not be exceeded. At an anode dissipation of 250 watts and with an incoming air temperature of 25°C maximum at sea level, a minimum airflow of 3.8 cfm shall pass through the anode cooler. With no voltages applied to the tube, the static pressure drop across the anode cooler with an airflow of 3.8 cfm (at 25°C at sea level) is approximately .15 inch of water. The pressure drop varies with the amount of escaping air and with the shape and construction of the air director. This airflow requirement applies at bias voltages less than -100 volts and at frequencies less than 500 MHz (CW) and 1,500 MHz (pulsed). Air cooling on the tube shall be increased with increased negative grid bias, increased incoming air temperature, or increased frequency of operation. The stem shall be cooled either by a portion of the anode air or by a separate air supply. Airflow shall be applied before or simultaneously with the electrode voltages and may be removed simultaneously with them. In cases where long life and reliable operation are factors, operation with cooling in excess of minimum requirements is recommended.
- 4/ In all electrical tests involving application of heater voltage, forced-air cooling is permitted at the rate of 4.0 cfm maximum for the base and anode. A separate source may be used for the base and anode but neither source shall exceed 4.0 cfm. The cooling air shall not have a temperature less than 20°C nor an absolute pressure greater than 32 inches Hg.
- 5/ The acceptance level for each test in conformance inspection, part 1, shall be 0.65, inspection level II.
- 6/ This test shall be the first test performed at the conclusion of the holding period.
- 7/ The input wave shape shall have a tr and a tf of 25 μ s maximum each, and the slope of the top of the pulse may be not greater than 0.5 percent with a ripple not to exceed 0.1 percent.
- 8/ Use cavity and circuit as shown on Drawing 224-JAN.
- 9/ This test shall be performed during the initial production and once each succeeding 12-calendar month period in which there is production. A regular double sampling plan shall be used, with the first sample of three tubes having an acceptance number of zero, and a second sample of three tubes having a combined acceptance number of one. In the event of failure, the test shall 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.
- 10/ Revision letters are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

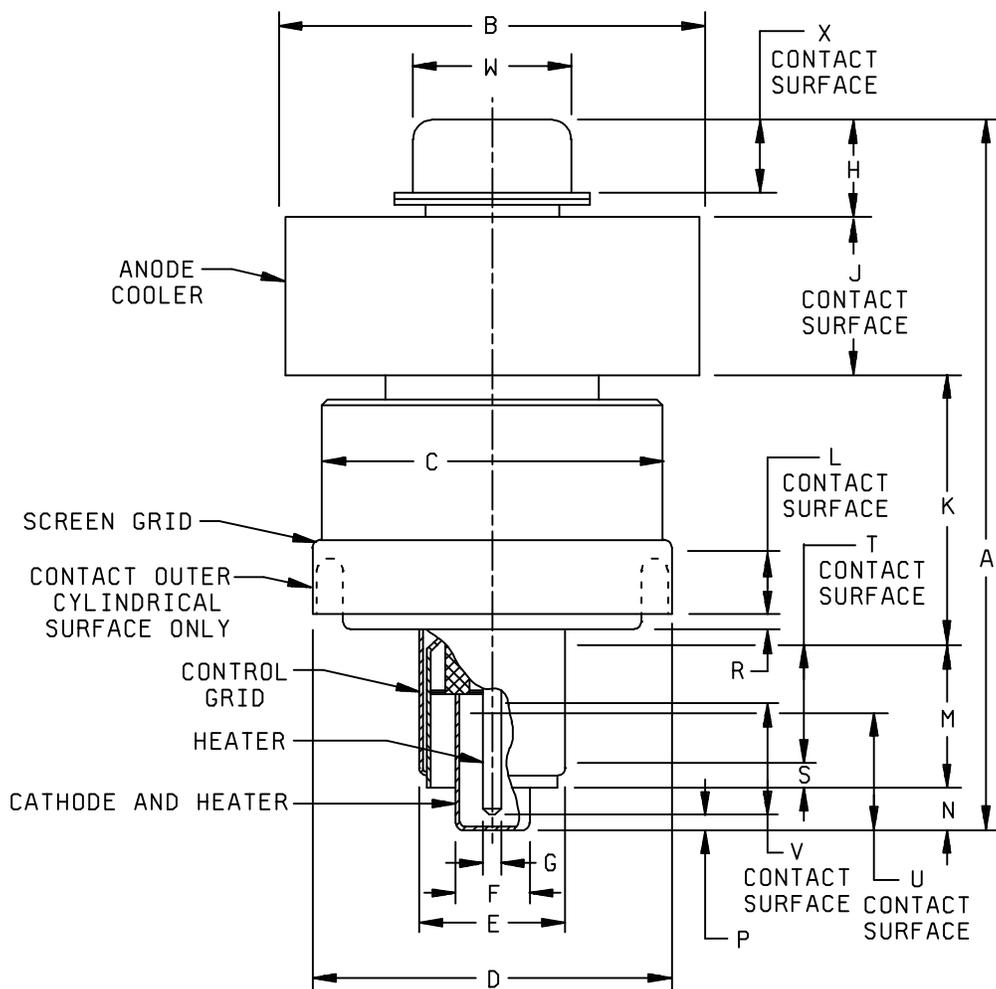


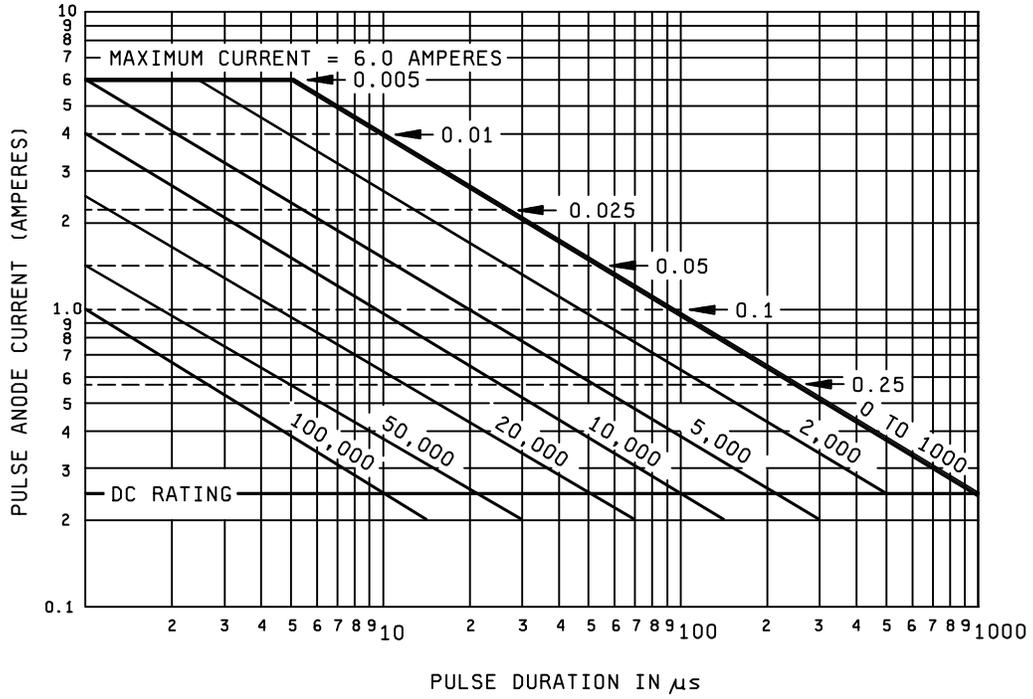
FIGURE 1. Outline drawing of electron tube type 8245.

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Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
Conformance inspection, part 2				
A	---	2.813	---	71.45
B	1.610	1.640	40.89	41.66
D	1.410	1.440	35.81	36.58
E	.587	.597	14.91	15.16
F	.317	.327	8.05	8.31
G	.088	.098	2.24	2.49
Conformance inspection, part 3 (see note)				
C	---	1.406	---	35.71
H	---	.358	---	9.09
J	.710	.790	18.03	20.07
K	.740	.820	18.80	20.83
L	.187	---	4.75	---
M	.500	.580	12.70	14.73
N	.235	.265	5.97	6.73
P	.032	.062	0.81	1.57
T	.344	---	8.74	---
U	.406	---	10.31	---
V	.468	---	11.89	---
W	.559	.573	14.20	14.55
X	.240	---	6.10	---
Reference dimensions				
R	.020		0.51	
S	.125		3.18	

NOTE: Dimensions shall be checked yearly. 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 an acceptance number of one. In the event of failure, the test will be made as a part of conformance inspection, part 2, acceptance level of 6.5, inspection level S3. The regular yearly double sampling plan may be reinstated after three consecutive samples have been accepted.

FIGURE 1. Outline drawing of electron tube type 8245 - Continued.



NOTES:

1. Solid lines represent constant repetition rates; dashed lines represent constant duty factors.
2. Do not extrapolate above or to the left of bold lines.

FIGURE 2. Anode current versus pulse duration.

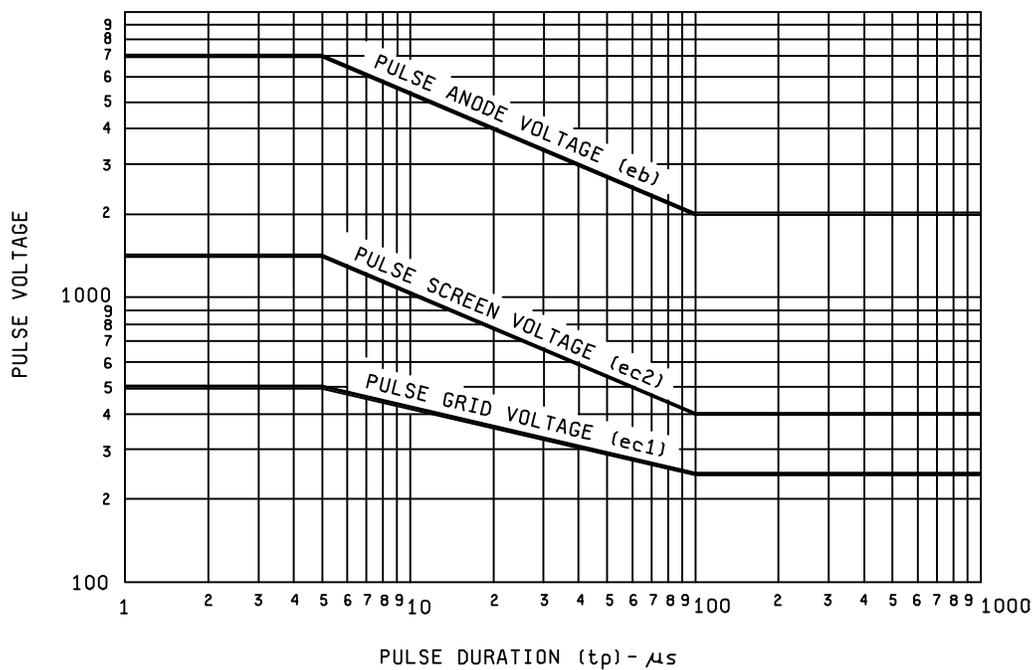


FIGURE 3. Derating chart: pulse anode voltage, screen voltage, and grid voltage versus pulse duration (tp).

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Custodian:

Army - CR
Navy - EC
Air Force - 11

Preparing activity:

DLA - CC

(Project 5960-3518)

Review activities:

Army - CR4
Navy - AS, CG, MC, OS, SH
Air Force - 99