

INCH-POUND

MIL-PRF-1/1314E
20 January 2015
SUPERSEDING
MIL-PRF-1/1314D
w/AMENDMENT 2
5 October 2009

PERFORMANCE SPECIFICATION SHEET

ELECTRON TUBE, POWER
TYPES 6283 AND 8500

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

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

DESCRIPTION: Tetrode.
See figures 1 and 2.
Mounting position: Any.
Weight: 1 pound nominal.

ABSOLUTE RATINGS: F1 = 400 MHz and F2 = 900 MHz. 1/ 2/

Parameter:	Ef	Eb	Ec1	Ec2	Ic1	Ib
Unit:	V	kV dc	V dc	V dc	mA dc	mA dc
<u>Maximum:</u>						
Class C Teleg: (900 MHz)	6.8	1.6	-100	320	50	300
Class B RF: (400 MHz)	6.8	2.0	---	320	50	250
Test conditions:	6.3	1.0	Adj	Adj	---	---

ABSOLUTE RATINGS:

Parameter:	Cooling	Pg1	Pg2	Pp	Pi	tk
Unit:	1/Se	W	W	W	W	sec
<u>Maximum:</u>						
Class C Teleg: (900 MHz)	---	2	15	480	480	60
Class B RF: (400 MHz)	---	---	5	500	500	60
Test conditions:	---	---	---	---	---	60

GENERAL:

Qualification: Not Required.

Holding period (t = 72 hours).

Alternate life test - With acquiring activity approval both first article testing and conformance inspection part 3 life test requirements for tube type 6283 may be satisfied using alternate life test conditions specified in 8/. Manufacturers utilizing the alternate life test shall provide service-life guarantee (see below) with all tubes delivered. Life test end points specified shall apply to alternate life test first article testing and conformance inspection part 3 as well as to originally specified life test qualification and conformance inspection part 3.

Service-life guarantee (MIL-PRF-1) - Type 6283 tubes manufactured using processes first article testing and conformance inspected (part 3) in accordance with the alternate life test (above) shall provide service-life guarantee with guaranteed service system-deployed, accumulated tube operating time of 500 hours minimum (see 9/).

Marking - (see 9/) Type 6283 tubes sold under service-life guarantee shall be marked as indicated in footnote 9/.

AMSC N/A



MIL-PRF-1/1314E

TABLE I. Testing and inspection.

Inspection	MIL-STD-1311 method	Types	Conditions	Symbol	Limits		Unit
					Min	Max	
<u>First Article Test</u>							
Life test <u>8/</u>	---	6283	F = 1050 ± 50 MHz E _f = <u>2/</u> ; E _b = 5,000 V dc; E _{c2} = 1,000 V dc; E _{c1} = -200 V dc; p _d = 1.5 kw; t _p = 5-15 μs; D _u = .005 <u>4/</u>	t	500	---	hours
	2214	8500	F = 350 - 400 MHz <u>4/</u> ; E _f = 5.5 V; E _b = 2,000 V dc; E _{c2} = Adjust; E _{c1} = -40 V dc; I _b = 250 mA dc; I _{c1} = 20 mA dc; t = 500 hours	Po	275	---	W
Life-test end points:							
Power output	---	6283	F = 405-450 MHz; E _f = 6.3 V; E _b = 5,000 V dc; E _{c2} = 1,000 v; E _{c1} = -50 V dc; p _d = 2.2 kw; t _p = 15-17 μs; D _u = .005 <u>4/</u>	po	12.0	---	kw
Power output (1)	---	8500	F = 850 ± 50 MHz <u>4/</u> ; E _b = 1,500 V dc; E _{c2} = Adjust; I _b = 300 mA dc; R _g = 2,000 ohms; I _{c1} = 20 mA dc	Po Ic2	135 ----	---- 15	W (useful) mAdc
Pulsing emission sinusoid	1231	6283	<u>3/</u>	is	40	---	a
	1231	8500		is	40	---	a
<u>Conformance inspection, part 1</u>							
Heater current	1301	Both		I _f	3.5	4.0	A
Total grid current	1266	6283	E _{c1} /I _b = 300 mA dc; E _b = 2,000 V dc; E _{c2} = 300 V dc <u>7/</u>	I _{c1}	---	-10.0	μA dc
	1266	8500	E _c /I _b = 300 mA dc; E _b = 2,000 V dc; E _{c2} = 300 V dc <u>7/</u>	I _{c1}	---	-7.0	μA dc

See footnotes at end of table.

MIL-PRF-1/1314E

TABLE I. Testing and inspection - Continued.

Inspection	MIL-STD-1311 method	Types	Conditions	Symbol	Limits		Unit
					Min	Max	
<u>Conformance inspection, part 1</u> - Continued							
Electrode voltage (grid) (cutoff)	1261	Both	Ec2 = 300 V dc; Ec1/lb = 10 mA dc	Ec1	-23.0	-34.0	V dc
Pulsing emission sinusoid	1231	Both	ec1 = ec2 = eb = 750 V; tk = 90 <u>3/</u>	is	60.0	---	a
Power output	2214	6283	F = 405-450 MHz; Eb = 5,000 V dc; Ec2 = 1,000 v; Ec1 = -50 V dc; pd = 2.2 kw; tp = 15-17 μ s; Du = .005 <u>4/</u>	po	12.0	---	kw
Power output (1)	2214	8500	F = 850 \pm 50 MHz <u>4/</u> ; Eb = 1,500 V dc; Ec2 = Adjust; lb = 300 mA dc; Rg = 2,000 ohms; lc1 = 20 mA dc	Po	140	---	W (useful)
				lc2	---	15	mA dc
<u>Conformance inspection, part 2</u>							
Electrode voltage (1) (grid)	1261	Both	Ec2 = 300 V dc; lb = 200 mA	Ec1	-8	-15	V dc
Electrode voltage (2) (grid)	1261	Both	Ec2 = 250 V dc; lb = 200 mA	Ec1	-5	-11	V dc
Electrode voltage (3) (grid)	1261	Both	Ec2 = 300 V dc; lb = 250 mA	Ec1	-5	-12	V dc
Amplification factor	1316	Both	<u>5/</u>	Mu	11	17	---
Transconductance	1306	Both	<u>6/</u>	Sm	20,000	---	μ mhos
Direct-interelectrode capacitance	1331	6283	g1 to g2 (anode grounded) <u>12/</u>	Cin	17	19.5	pF
			g1 to g2 (cathode grounded) <u>11/</u>	Cout	6.1	6.7	pF
	1331	8500	g1 to g2 (anode grounded)	Cin	18	21	pF
			g1 to g2 (cathode grounded)	Cout	6.1	6.7	pF

See footnotes at end of table.

MIL-PRF-1/1314E

TABLE I. Testing and inspection - Continued.

Inspection	MIL-STD-1311 method	Types	Conditions	Symbol	Limits		Unit
					Min	Max	
<u>Conformance inspection, part 3</u>							
Low-frequency vibration	1031	Both	No voltage	---	---	---	---
Life test <u>8/</u>	---	6283	Group D F = 1050 ± 50 MHz; Ef = <u>2/</u> ; Eb = 5,000 V dc; Ec2 = 1,000 V dc; Ec1 = -200 V dc; pd = 1.5 kw; tp = 5-15 μs; Du = .005 <u>4/</u>	t	500	---	hours
Life-test (2) provisions	---	8500	Group D; F = 850 ± 50 MHz <u>4/</u> ; Eb = 1,500 V dc; Ec2 = Adjust; Ib = 300 mA dc; Rg = 2,000 ohms; Ic1 = 20 mA dc; Ef = 5.5 V; t = 500 hours	---	---	---	---
				Po	140	---	W (useful)
				Ic2	---	15	mA dc
Life-test end points	---	6283	Power output F = 405-450 MHz; Ef = 6.3 V; Eb = 5,000 V dc; Ec2 = 1,000 V; Ec1 = -50 V dc; pd = 2.2 kw; tp = 15-17 μs; Du = .005 <u>4/</u>	po	12.0	---	kw
Life-test (2) end points	---	8500	Power output (1) F = 850 ± 50 MHz <u>4/</u> ; Eb = 1,500 V dc; Ec2 = Adjust; Ib = 300 mA dc; Rg = 2,000 ohms; Ic1 = 20 mA dc	Po	135	---	W (useful)
				Ic2	---	20	mA dc
			Pulsing emission sinusoid <u>3/</u>	is	40	---	a

1/ Airflow through the radiators required for cooling at sea level shall meet the following:

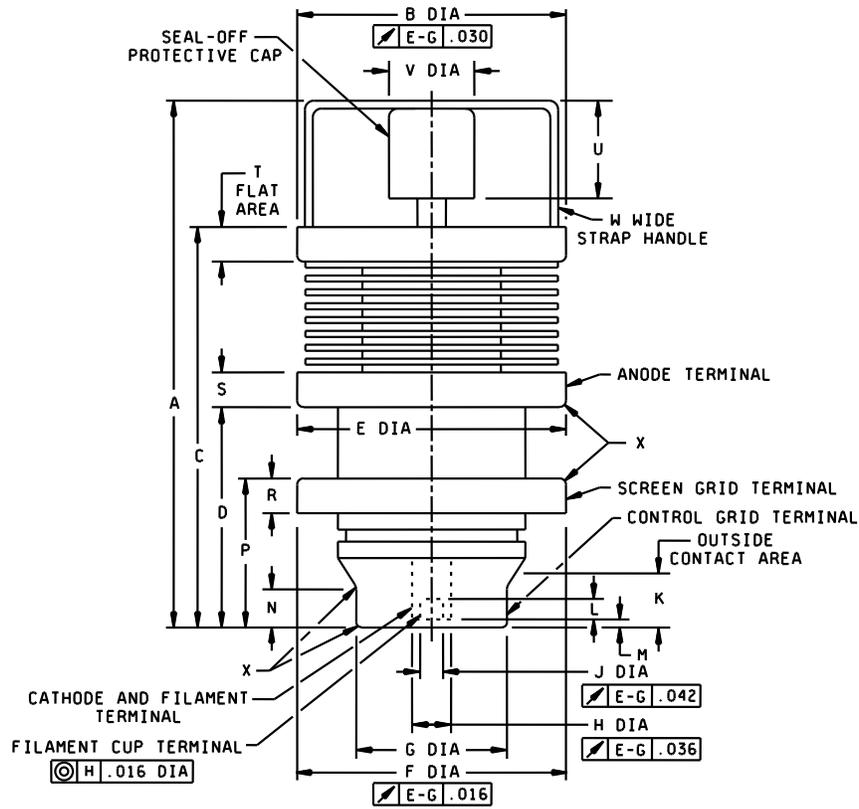
- Anode dissipation 500 W
- Airflow 17 cfm (min)
- Static pressure 0.90 Inch (H₂O) (approximate)
- Heater-cathode seals 1.0 cfm (min)
- Screen-grid control-grid seals 1.0 cfm (min)
- Incoming air temperature 45°C (max)
- Radiator hub temperature (at fin adjacent to anode seal) 250°C (max)
- Tube temperature (at any point) 200°C (max)

TABLE I. Testing and inspection - Continued.

Cooling shall be applied prior to and during application of any voltages and shall be maintained for 1 minute after the removal of all voltages. Provision shall be made for unobstructed passage of cooling air between radiator fins and between the anode terminal and adjacent radiator fin. The volume of cooling air indicated for various seals is only approximate. Distribution of cooling air may vary with the cavity configuration about the tube. For most satisfactory operation, the maximum temperature at any point on the tube shall be below 200°C.

- 2/ The cathode of the tube, because of transit time effects which raise the temperature of the cathode is subject to considerable back bombardment in ultra-high frequency service. The amount of heating due to bombardment is a function of the operating conditions and frequency, and must be compensated for by a reduction of the heater input to prevent over heating of the cathode with resulting short life. For long life, tube type 6283 and 8500 should be put in operation with rated heater voltage. After the circuit has been adjusted for proper tube operation, the heater voltage should be reduced to a value slightly above that at which circuit performance is affected. In any case, it is important from a tube life standpoint to keep the filament voltage at as low a level as possible consistent with required performance. However, the filament voltage should not be reduced below 5.5 volts. At a frequency of 900 MHz and with typical operating conditions, the heater voltage can be reduced to approximately 5.5 volts. At lower frequencies, the reduction will be less. Minor circuit readjustment may be necessary after this adjustment. The procedure for determining proper heater power should be repeated periodically.
- 3/ Applied voltage shall be approximately sinusoidal. The pulse duration 2 to 3.5 μ s, prr = 60. Also, $e_{c1} = e_{c2} = e_b = 750$ volts and $t_k = 90$.
- 4/ Any frequency within the specified range may be used.
- 5/ This test shall be for screen grid to control-grid amplification factor and shall be calculated by dividing the difference in E_{c2} (50 V) by the difference in E_{c1} as read from the electrode voltage (1) (grid) and electrode voltage (2) (grid) tests.
- 6/ This test shall be calculated by dividing 50,000 by the difference in E_{c1} as read from the electrode voltage (1) and the electrode voltage (3) (grid) tests.
- 7/ This test is to be the first test performed at the conclusion of the holding period ($t = 72$ hours).
- 8/ With acquiring activity approval both first article testing and conformance inspection, part 3 life test requirements for tube type 6283 may be satisfied using alternate life test conditions specified as follows:
- | | | | |
|--------------------------|--------------------------------|---------------------|-----------------|
| $F = 427.5 \pm 22.5$ MHz | $t = 500$ hours min | $E_{c2} = 1000$ v | $p_o = 12.0$ kw |
| $E_f = 6.3$ V | $D_u = 0.005$ (see <u>4/</u>) | $E_{c1} = -50$ V dc | $P_d = 2.2$ kw |
| $E_b = 5000$ V dc | $t_p = 15 - 17$ μ s | | |
- Manufacturers using the alternate life test requirements shall provide service-life guarantee (see 9/) with all tubes delivered and tubes shall be marked accordingly. Life test end points specified shall apply to alternate life test first article testing and conformance inspection part 3 as well as to originally specified life-test qualification and inspection 3.
- 9/ Service-life guarantee (MIL-PRF-1): Type 6283 tubes manufactured using processes first article testing and conformance inspected (part 3) in accordance with alternate life test (see 8/) shall provide service-life guarantee with guaranteed service system-deployed, accumulated tube operating time of 500 hours minimum. Type 6283 tubes sold under service-life guarantee shall be marked with the following pertinent information: JAN-6283, manufactured date code and serial number.
- 10/ This specification sheet uses accept on zero defect sampling in accordance with MIL-PRF-1, table III.
- 11/ Output capacitance measured between anode and screen grid. Control grid connected directly to screen grid.
- 12/ Input capacitances measured between control grid (G1) and cathode. Control grid tied directly to screen grid (G2).

MIL-PRF-1/1314E



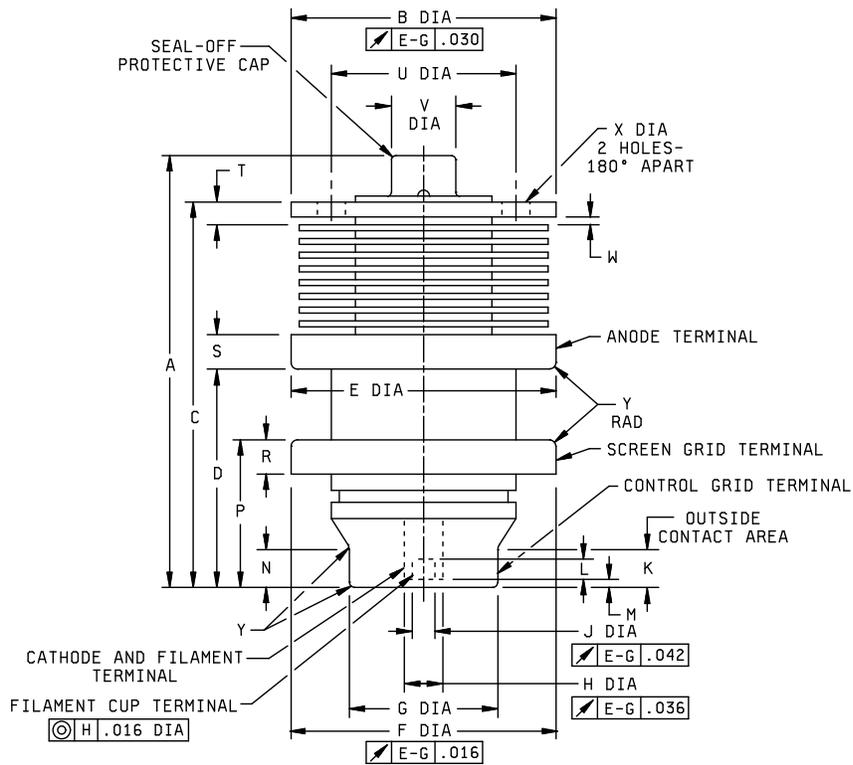
Dimensions														
Ltr	Inches		Millimeters		Ltr	Inches		Millimeters		Ltr	Inches		Millimeters	
	Min	Max	Min	Max		Min	Max	Min	Max		Min	Max	Min	Max
Conformance inspection, part 2														
A	4.094	4.344	103.99	110.34	H	.320	.328	8.13	8.33	R	.250	.313	6.35	7.95
B	2.303	2.323	58.50	59.00	J	.181	.191	4.60	4.85	S	.281	.312	7.14	7.92
C	3.047	3.234	77.39	82.14	K	.375	---	9.53	---	T	.188	---	4.78	---
D	1.672	1.765	42.47	44.83	L	.188	---	4.78	---	U	.688	.813	17.48	20.65
E	2.271	2.291	57.68	58.19	M	.063	.125	1.60	3.18	V	.625	.750	15.88	19.05
F	2.115	2.135	53.72	54.23	N	.250	---	6.35	---	W	.344	.406	8.74	10.31
G	1.302	1.322	33.07	33.58	P	1.063	1.125	27.00	28.58	X	---	.047	---	1.19

NOTES:

1. Metric equivalents (to the nearest .01 mm) are given for general information only and are based upon 1 inch = 25.4 mm.
2. Bottom of cup must not be used as a socket stop.

FIGURE 1. Outline drawing of electron tube type 6283.

MIL-PRF-1/1314E



Dimensions									
Ltr	Inches		Millimeters		Ltr	Inches		Millimeters	
	Min	Max	Min	Max		Min	Max	Min	Max
Conformance inspection, part 2									
A	3.297	3.453	83.74	87.71	M	.063	.125	1.60	3.18
B	2.303	2.323	58.50	59.00	N	.250	---	6.35	---
C	2.921	3.047	74.19	77.39	P	1.063	1.125	27.00	28.58
D	1.672	1.765	42.47	44.83	R	.250	.313	6.35	7.95
E	2.271	2.291	57.68	58.19	S	.281	.312	7.14	7.92
F	2.115	2.135	53.72	54.23	T	.109	.141	2.77	3.58
G	1.302	1.322	33.07	33.58	U	1.615	1.635	41.02	41.53
H	.320	.328	8.13	8.33	V	.500	.625	12.70	15.88
J	.181	.191	4.60	4.85	W	.063	---	1.60	---
K	.375	---	9.53	---	X	.256	.276	6.50	7.01
L	.188	---	4.78	---	Y	---	.047	---	1.19

NOTES:

1. Metric equivalents (to the nearest .01 mm) are given for general information only and are based upon 1 inch = 25.4 mm.
2. Bottom of cup must not be used as a socket stop.

FIGURE 2. Outline drawing of electron tube type 8500.

MIL-PRF-1/1314E

Referenced documents. In addition to MIL-PRF-1, this specification sheet references MIL-STD-1311 test methods.

The margins of this specification are marked with vertical lines to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Custodian:

Army - CR
Navy - EC
Air Force - 85
DLA - CC

Preparing activity:
DLA - CC

(Project 5960-2015-007)

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 <https://assist.dla.mil/>.