

INCH-POUND

MIL-PRF-1/1097J  
 14 March 2013  
 SUPERSEDING  
 MIL-PRF-1/1097H  
 4 October 2006

PERFORMANCE SPECIFICATION SHEET

ELECTRON TUBE, RECEIVING

TYPE 12AT7WC

This specification sheet is inactive  
 for new design after 13 April 2001

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:** Twin triode, miniature, high Mu  
 Outline ----- 6-2 (EIA)  
 Base ----- E9-1  
 Envelope ----- T6-1/2  
 Cathode ----- Coated unipotential

Base connections:

Pin no. ----- 1 2 3 4 5 6 7 8 9  
 Element ----- 2a 2g 2k h h 1a 1g 1k hct

**ABSOLUTE-MAXIMUM RATINGS:**

<u>Normal</u>									
Parameter:	Ef	Eb	Ec	Ehk	Rk/k	Rg/g	Pp/p	TE	Alt
Unit:	V	Vdc	Vdc	v	Ohms	MegΩ	W	°C	ft
Maximum:	13.9	330	0, -55	135	---	0.25	2.7	165	See note 4
Minimum:	6.9	---	---	---	---	See note 1	---	---	---
	11.4	---	---	---	---	---	---	---	---
	5.7	---	---	---	---	---	---	---	---
Test condition (1):	12.6	250	---	---	200	---	---	---	---

<u>Pulse service</u>												
Parameter:	Ef	Eb	Ec	eb	egk	Pg/g	Du	ik/k	tp	pr	ehk	Pp/p
Unit:	V	Vdc	Vdc	v	v	W	%	ma	μs		v	W
Maximum:	13.9	330	---	660	50,-100	0.1	1.0	---	10	1,000	100	2.7
Minimum:	6.9	---	---	---	---	---					---	---
	11.4	---	---	---	---	---					---	---
	5.7	---	---	---	---	---	---	---	---	---	---	---
Test condition (2):	12.6	250	-30	---	30	---	1.0	---	10	1,000	---	---

**GENERAL:**

Qualification - Not required.

Reliable tube.

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

MIL-PRF-1/1097J

TABLE I. Testing and inspection.

MIL-STD-1311 method	Requirement or test	Conditions	Symbol	Limits		Unit
				Min	Max	
	<u>Conformance inspection, part 1</u>					
1301	Heater current		I <sub>f</sub>	142	158	mA
1336	Heater-cathode leakage	See note 8	I <sub>hk</sub>	---	7	μA dc
1266	Total grid current	Test condition (1); R <sub>g</sub> = 0.5 MegΩ (see note 3 and note 8)	I <sub>c</sub>	0	-0.7	μA dc
1256	Electrode current (1) (anode)	Test condition (1) (see note 8)	I <sub>b</sub>	7.0	14.0	mA dc
1256	Electrode current (2) (anode)	Test condition (1); E <sub>c</sub> = -20 Vdc; R <sub>p</sub> = 0.1 MegΩ; R <sub>k</sub> = 0; C <sub>k</sub> = 0 (see note 8)	I <sub>b</sub>	---	100	μA dc
1306	Transconductance (1)	Test condition (1) (see note 8)	S <sub>m</sub>	4,500	6,500	μmhos
1201	Short and discontinuity detection		---	---	---	---
	<u>Conformance inspection, part 2</u>					
1211	Insulation of electrodes	See note 8	R	500	---	MegΩ
1256	Electrode current (1) (anode) (difference between sections)	Test condition (1)	I <sub>b</sub>	---	3.2	mAdc
1256	Electrode current (3) (anode)	Test condition (1); E <sub>c</sub> = -6.5 Vdc; R <sub>p</sub> = 0.1 MegΩ; R <sub>k</sub> /k = 0 (see note 8)	I <sub>b</sub>	5	---	μA dc
1306	Transconductance (2)	Test condition (1); E <sub>f</sub> = 11.4 V (see note 8)	$\frac{\Delta S_m}{E_f}$	---	15	%
1266	Grid emission	E <sub>f</sub> = 15.0 V; E <sub>c</sub> = -20 Vdc; R <sub>g</sub> /g = 0.5 MegΩ R <sub>k</sub> = 0; C <sub>k</sub> = 0 (see note 7 and note 8)	I <sub>c</sub>	0	-1.5	μA dc
2201	Noise and microphonics	E <sub>bb</sub> = 300 Vdc; E <sub>cal</sub> = 100 mVac; R <sub>k</sub> = 200 ohms; R <sub>p</sub> = 10,000 ohms; grid grounded (see note 2)	---	---	---	---

See notes at end of table.

TABLE I. Testing and inspection - Continued.

MIL-STD-1311 method	Requirement or test	Conditions	Symbol	Limits		Unit
				Min	Max	
	<u>Conformance inspection, part 2</u> - Continued					
1296	Pulse current (1) (cathode)	Test condition (2); Rk = 1.0 ohm (see note 8 and note 11)	$\left\{ \begin{array}{l} i_k \\ \Delta i_k \\ (tp) \end{array} \right.$	300 ---	--- 15	mA %
1296	Pulse current (2) (cathode)	Test condition (2); Ef = 11.4 V; Rk = 1.0 ohm (see note 8 and note 11)	---	260	---	mA
1316	Amplification factor	Test condition (1) (see note 8)	Mu	50	70	---
1331	Direct-interelectrode capacitance	No shield No shield No shield, section 1 No shield, section 2 No shield No shield	$\left\{ \begin{array}{l} C_{gp} \\ C_{in} \\ C_{out} \\ C_{out} \\ C_{pp} \\ C_{hk} \end{array} \right.$	1.30 2.00 0.20 0.16 0.15 2.10	1.90 3.00 0.70 0.60 0.33 3.50	pF pF pF pF pF pF
1031	High-frequency vibration	Ec = -3 Vdc; Ebb = 250 Vdc; Rp = 2,000 ohms; Rk = 0; Ck = 0 (see note 2)	Ep	---	100	mVdc
1041	Shock	Test condition (1); 630 G; Ehk = 100 Vdc (see note 9)	---	---	---	---
1031	Vibration fatigue		---	---	---	---
---	Post-shock and vibration-fatigue test end points:					
1031	Low-frequency vibration		Ep	---	150	mVac
1336	Heater-cathode leakage		Ihk	---	20	$\mu$ A dc
1306	Transconductance (1)		Sm	3,800	---	$\mu$ hos
1266	Total grid current		Ic	0	-1.5	$\mu$ A dc
1121	Base strain	See note 12	---	---	---	---
2126	Envelope strain		---	---	---	---
1105	Permanence of marking		---	---	---	---

See notes at end of table.

TABLE I. Testing and inspection - Continued.

MIL-STD-1311 method	Requirement or test	Conditions	Symbol	Limits		Unit
				Min	Max	
	<u>Conformance inspection, part 3</u>					
1506	Heater-cycling life	Ef = 7.5 V; heaters in parallel; Ehk = 135 Vdc	---	---	---	---
---	Heater-cycling life-test end point:					
1336	Heater-cathode leakage		lhk	---	15	μAdc
1516	Stability life	Test condition (1); Ehk = 135 Vdc; Rg/g = 0.5 MegΩ; TA = room	---	---	---	---
---	Stability life-test end point:					
1306	Change in transconductance (1) of individual tubes		$\frac{\Delta Sm}{t}$	---	10	%
1501	Intermittent life	Test condition (1); Ehk = 135 Vdc; Rg/g = 0.5 MegΩ; TE = 165°C (min) (see note 5)	---	---	---	---
---	Intermittent life-test end points (1,000 hours):					
---	Inoperatives		---	---	---	---
1266	Total grid current		Ic	0	-0.7	μAdc
1301	Heater current		If	142	164	mA
1306	Change in transconductance (1) of individual tubes		$\frac{\Delta Sm}{t}$	---	25	%
1306	Transconductance (2)		$\frac{\Delta Sm}{E_f}$	---	20	%
1336	Heater-cathode leakage		lhk	---	7	μAdc
1211	Insulation of electrodes		R	100	---	MegΩ
---	Total defectives		---	---	---	---
1501	Intermittent life (pulse)	Test condition (2); Eb = 300 Vdc; Rb/p = 150 ohms (see note 10)	---	---	---	---
---	Intermittent pulse life-test end points (1,000 hours):					
---	Inoperatives		---	---	---	---
1296	Pulse current (1) (cathode)		ik	280	---	mA
1511	Cathode interface life	Ef = 6.9 V; heaters in parallel (see note 8)	Ri	---	50	ohms

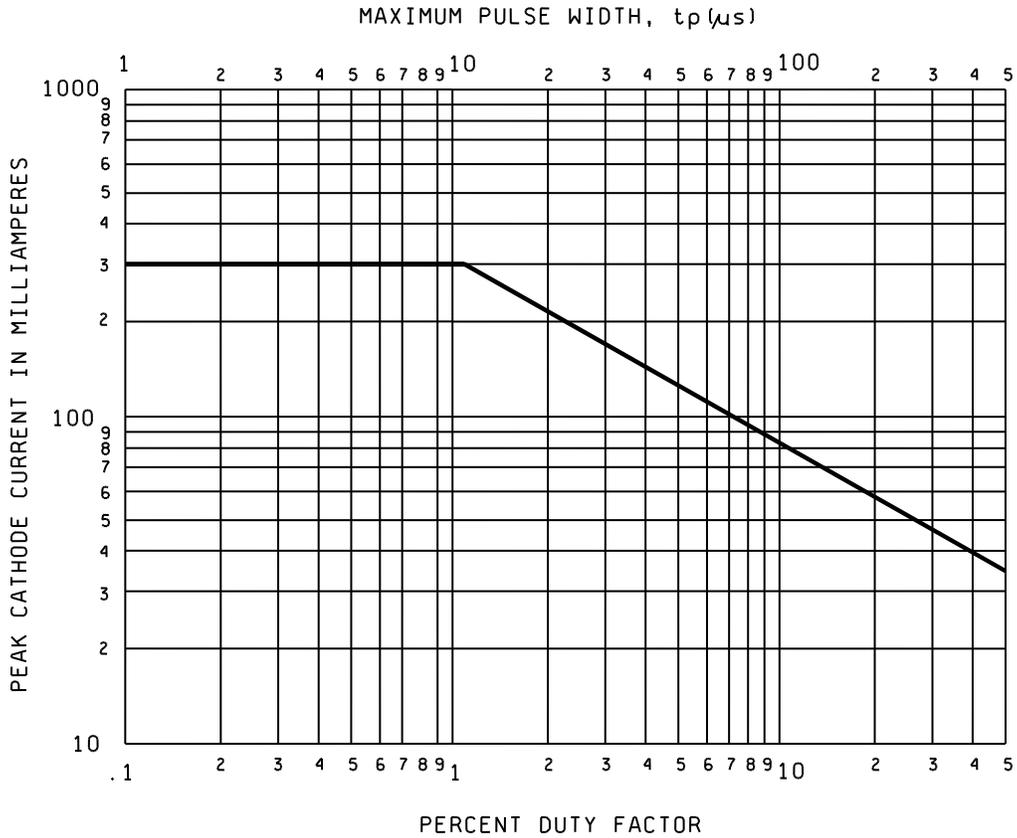
See notes on top of next page.

NOTES:

1. This value is for operation under fixed-bias conditions. With cathode bias, Rg may be 0.5 MegΩ maximum.
2. Tie 1k to 2k; 1g to 2g; and 1a to 2a.
3. This test shall be performed at the conclusion of the holding period.
4. See "Reduced pressure (altitude) rating", and altitude, maximum peak voltage.
5. Envelope temperature (TE) requirements, when measured in accordance with the temperature by conduction-band measurement (method 1226), will be satisfied if a tube having bogey Ib (±5 percent) under normal test conditions, is determined to operate at or above minimum specified temperature at any position in the life-test rack.
6. This test shall be conducted on the initial lot and thereafter on a lot approximately every 12 months. When one lot has passed, the 12-month rule shall apply. In the event of lot failure, the lot shall be rejected and the succeeding lots shall be subjected to this test until a lot passes.
7. Prior to this test, tubes shall be preheated a minimum of 5 minutes with all sections operating at the conditions specified below. Test at specified conditions within 3 seconds after preheating. The 3-minute test shall not be permitted. Grid emission shall be the last test performed on the sample selected for the grid-emission test.

Ef	Eb	Ec1	Rk/k	Rg/g
V	Vdc	Vdc	Ohms	MegΩ
15.0	250	0	200	0.5

8. Test each unit separately.
9. A grid resistor of 0.1 MegΩ shall be added to each section.
10. The positive portion of the grid pulse shall be a rectangular wave meeting pulse shape requirement of method 1296. The pulse shall be applied to the grid by means of a driving circuit which produces the specified peak pulse voltage directly at the grid terminal with respect to the cathode. Grid resistance not exceeding 50 ohms may be inserted to prevent oscillation, provided readjustment of grid drive is made to maintain the specified pulse amplitude directly at the grid terminal. The pulse width, tp, shall be 10 ± 2 μs, and the duty factor, 0.9 percent to 1.1 percent. Self-excited life-test circuitry is permissible provided any additional anode voltage drops during the time of the pulse are compensated for by increasing Ebb. No fixed Ec1 need be applied under self-excited conditions.
11. The grid pulse shall be a square wave meeting the pulse shape requirement of method 1296, and in addition the maximum amplitude shall occur within the first 20 percent of tp, tp = 10 μs, and prr = 1,000 pps. The pulse shall be applied to the grid by means of a driving circuit which produces the specified peak pulse voltage directly at the grid terminal with respect to the positive end of the cathode resistor. Grid resistance, not exceeding 50 ohms, may be inserted to prevent oscillation provided readjustment of grid drive is made to maintain the specified pulse amplitude directly at the grid terminal. Peak currents shall be measured by means of a high impedance oscilloscope, or equivalent device, connected across a cathode resistor of 1.0 ± 0.01 ohm. The specified limit refers to the maximum of the pulse amplitude. The variation of the output pulse amplitude between 20 and 80 percent tp shall not exceed the specified limits for Δik(tp).
12. Acceptance sampling procedure shall be in accordance with "Base-strain test, miniature, sampling (method 1121), except that data covered in "Acceptance and rejection criteria" shall be modified as follows:
  - a. Accepted if no defectives for class "A", "B", or "C" defects, respectively (see method 112).
  - b. Rejected if any defectives for "A", "B", or "C" defects, respectively.



NOTE: The area below and to the left of the line is the area of permissible operation. Three hundred milliamperes is the maximum peak current at any duty factor less than 1 percent. For any tube operating under the worst probable conditions, the point indicating peak cathode current and percent duty factor and the point indicating peak cathode current and pulse width should both be in the area of permissible operation. Duty factor is defined as the ratio of the average current to the maximum peak current occurring in any 1,000-microsecond period.

FIGURE 1. Pulse rating chart for tube type 12AT7WC.

NOTE: Referenced documents. In addition to MIL-PRF-1, this specification sheet references the following document:  
MIL-STD-1311.

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Custodians:

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

Preparing activity:

DLA - CC

(Project 5960-2013-005)

Review activities:

Army - AR, AV, MI  
Navy - AS, CG, MC, OS, SH  
Air Force - 71, 99

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