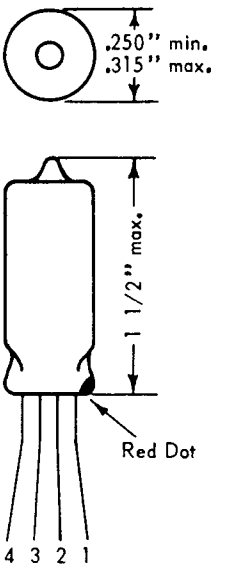
Excellence in Electronics

TYPE CK5704WA

The CK5704WA is a heater-cathode type diode of subminiature construction, designed for use as a detector capable of operation in the VHF region. This type is characterized by low heater current, long life, and stable performance. It is designed for service where severe conditions of high temperature and mechanical shock or vibration are encountered. The flexible terminal leads may be soldered or welded directly to the terminals of circuit components without the use of sockets. Standard inline subminiature sockets may be used by cutting the leads to a suitable length.



MECHANICAL DATA

ENVELOPE: T-2 Glass

BASE: None (0.016" tinned flexible leads. Length: 1.5" min. Spacing: 0.048" center-to-center.)

TERMINAL CONNECTIONS: *(Lead wire orientation shown by red dot adjacent to Lead 1)*

Lead 1 Plate
Lead 2 Heater
Lead 3 Heater
Lead 4 Cathode

MECHANICAL RATINGS:

Maximum Impact Acceleration (Shock Test-Note 3)	450 G
Maximum Uniform Acceleration (Centrifuge Test-Note 4)	1000 G
Maximum Vibrational Acceleration (96 Hour Fatigue Test-Note 5)	2.5 G
Maximum Bulb Temperature	220 °C

MOUNTING POSITION: Any

ELECTRICAL DATA

CAUTION-----To Electronic Equipment Design Engineers: Special attention should be given to the temperature at which the tubes are to be operated. Reliability will be seriously impaired if maximum bulb temperature is exceeded. The life expectancy may be reduced if conditions other than those specified for life test are imposed on the tube and will be reduced appreciably if maximum ratings are exceeded. Both reliability and performance will be jeopardized if filament voltage ratings are exceeded. Life and reliability of performance are closely related to the degree that regulation of the heater voltage is maintained at its center rated value.

RATINGS AND NORMAL OPERATION:	MIL-E-1 SYMBOL	DESIGN MINIMUM	NORMAL TEST CONDITIONS (Note 7)	NORMAL OPERATION (Note 6)	DESIGN MAXIMUM	MIL-E-1 UNITS
Heater Voltage (Note 8)	Ef:	5.7	6.3	6.3	6.9	V
Plate Supply Voltage (RMS)	Epp:	----	165	165	----	Vac
Load Resistance	RL:	----	19,000	19,000	----	ohms
Filter Input Capacitance	CL:	----	8	8	----	μf
Peak Inverse Plate Voltage	epx:	----	----	----	460	v
Steady State Peak Plate Current	ib:	----	----	----	60	ma
DC Output Current	Io:	----	----	9.0	10	mAdc
Peak Transient Plate Current	i surge:	----	----	----	350	ma
Heater-Cathode Voltage	Ehk:	----	----	----	360	v
Total Plate Supply Impedance	zp:	----	----	800	----	ohms

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Tentative Data

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RECEIVING TUBE AND SEMICONDUCTOR OPERATIONS

ELECTRICAL DATA (Cont'd)

CHARACTERISTICS AND QUALITY CONTROL TESTS (Note 1)

TEST	CONDITIONS	AQL %	MIL-E-1 SYMBOL	MIN	LAL	BOGIE	UAL	MAX	MIL-E-1 UNITS
MEASUREMENTS ACCEPTANCE TESTS PART 1			**Combined AQL = 1.0% Excluding Mechanical and Inoperatives**						
Heater Current:		0.65	If:	140	----	150	----	160	mA
Heater-Cathode Leakage:	Ehk = +100 Vdc	0.65	Ihk:	----	----	----	----	10	μAdc
	Ehk = −100 Vdc		Ihk:	----	----	----	----	10	μAdc
Operation:	Half-wave Operation	0.65	Io:	8.0	8.5	9.0	----	----	mAdc
Emission (1):	Es = 10 Vdc		Is:	43	50	----	----	----	mAdc
Continuity and Shorts: (Inoperatives):		0.4	----	----	----	----	----	----	----
Mechanical:	Envelope T−2 (Note 9)	----	----	----	----	----	----	----	----
MEASUREMENTS ACCEPTANCE TESTS PART 2									
Insulation of Electrodes:	Ef = 6.3 V; Ep−all = −300 Vdc	2.5	Rp−all:	100	----	----	----	----	Meg.
Anode Leakage:	Ef = 6.9 V; Eb = −100 Vdc	2.5	----	----	----	----	----	1.0	μAdc
Emission (2):	Ef = 5.7; Eb = 10 Vdc	2.5	Is:	40	----	----	----	----	mAdc
Plate Current:	Ebb = 0; Rp = 40,000 ohms	2.5	Ib:	2	----	----	----	20	μAdc
Pulse Emission:	Ef = 6.0 V; e pulse = 50 v; tp = 25 μsec; Prr = 200 pps	6.5	is:	300	----	----	----	----	ma.
Capacitance:			Cp−k+h:	1.5	----	2.2	----	2.9	μμf
Capacitance:	(Note 2)	6.5	Cp−h:	0.43	----	0.63	----	0.83	μμf
Capacitance:			Ch−k:	1.5	----	2.2	----	2.9	μμf
Low Pressure Voltage Breakdown:	Pressure = 55 ± 5 mmHg; Voltage = 330 Vac	6.5	----	----	----	----	----	----	----
Operation Time:	(Note 10)	4.0	t:	----	----	----	----	20	sec.
Vibration (2):	Eb = 100 Vdc; Rp = 10,000 ohms; G = 15; F = 30−1000 cps; t = 3 minutes; positions X_1 and X_2 only.	4.0	ep:	----	----	----	----	25 peak to peak	mv
DEGRADATION RATE ACCEPTANCE TESTS									
Subminiature Leak Fatigue:		2.5	----	4.0	----	----	----	----	arcs
Shock (1):	Hammer Angle = 30° (Note 3)	20	----	----	----	----	----	----	----
Fatigue (1):	96 hours; G = 2.5; Fixed frequency; F = 25 min., 60 max. (Note 5)	6.5	----	----	----	----	----	----	----
Fatigue (2):	6 hours; G = 10; Fixed frequency; F = 25 min., 60 max. (Note 11)	6.5	----	----	----	----	----	----	----
Post Shock (1) and Fatigue Tests (1) and (2) End Points:									
Heater-Cathode Leakage:	Ehk = +100 Vdc	----	Ihk:	----	----	----	----	20	μAdc
	Ehk = −100 Vdc	----	Ihk:	----	----	----	----	20	μAdc
Operation:	Half-wave Operation	----	Io:	7.0	----	----	----	----	mAdc
Shock (2):	G = 75; (Hammer Angle = 120° + rubber pad); t = 10 milliseconds duration (Note 12)	----	----	----	----	----	----	----	----
Post Shock Test (2) End Points:									
Heater-Cathode Leakage:	Ehk = +100 Vdc	----	Ihk:	----	----	----	----	20	μAdc
	Ehk = −100 Vdc	----	Ihk:	----	----	----	----	20	μAdc
Operation:	Half-wave Operation	----	Io:	7.0	----	----	----	----	mAdc

ELECTRICAL DATA (Cont'd.)

CHARACTERISTICS AND QUALITY CONTROL TESTS (Note 1) (cont'd.)

TEST	CONDITIONS	AQL %	MIL-E-1 SYMBOL	MIN	MAX	MIL-E-1 UNITS	Allowable Defec per Characteris 1st Sample	Combine Sample
DEGRADATION RATE ACCEPTANCE TESTS (cont'd.)								
Glass Strain (Thermal Shock):		6.5	----	----	----	----		
ACCEPTANCE LIFE TESTS								
Heater Cycle:	Ef=7.5V; Eb=0V; Ehk=140 Vac; 1 min. on, 1 min. off.	1.0	----	2000	----	cycles		
Heater Cycling Life Test End Points:								
Heater-Cathode Leakage:	Ehk=+100 Vdc Ehk=−100 Vdc	---- ----	Ihk: Ihk:	---- ----	20 20	μAdc μAdc		
100 Hour Survival Rate Life Test:	TA=room; Ehk=Eo+117 Vac	----	----	----	----	----		
100 Hour Survival Rate Life Test End Points:	(Typical sample size=200 tubes)	----	----	----	----	----		
Inoperatives:		0.65	----	----	----	----		
Operation:		1.0	Io:	7.0	----	mAdc		
Intermittent High Temperature Life Tests:	T Bulb=220°C; Ehk=Eo+117 Vac	----	----	----	----	----		
500 Hour Intermittent High Temperature Life Test End Points:	(Typical sample size=20 tubes 1st sample 40 tubes 2nd sample)	----	----	----	----	----		
Inoperatives:		----	----	----	----	----	1	3
Heater Current:		----	If:	138	162	mA	1	3
Operation:		----	Io:	7.0	----	mAdc	1	3
Change in Operation of individual tubes:		----	Δ_t Io:	----	15	%	1	3
Heater-Cathode Leakage:	Ehk=+100 Vdc Ehk=−100 Vdc	---- ----	Ihk: Ihk:	---- ----	20 20	μAdc μAdc	1	3
Insulation of Electrodes:								
p−all:		----	Rp−all:	50	----	Meg.	2	5
Total Defective		----	----	----	----	----	4	8
1000 Hour Intermittent High Temperature Life Test End Points:	(Typical Sample Size=20 tubes 1st sample, 40 tubes 2nd sample)	----	----	----	----	----	---	---
Inoperatives:		----	----	----	----	----	2	5
Heater Current:		----	If:	135	165	mA	2	5
Operation:		----	Io:	7.0	----	mAdc	2	5
Heater-Cathode Leakage:	Ehk=+100 Vdc Ehk=−100 Vdc	---- ----	Ihk: Ihk:	---- ----	30 30	μAdc μAdc	2	5
Total Defectives		----	----	----	----	----	5	10

NOTES

Note 1: Characteristics, Quality Control Test Procedures, and Inspection Levels are made according to the appropriate paragraphs of MIL-E-1 "Inspection Instructions for Electron Tubes" and MIL-STD-105A.

Note 2: Without Shield.

Note 3: Test conditions and acceptance criteria per Shock Test Procedures of MIL-E-1 basic specification.

Note 4: Centrifuge Test with forces applied in any direction.

Note 5: Test Conditions and Acceptance Criteria per Fatigue Test Procedures of MIL-E-1 basic specifications.

ELECTRICAL DATA (Cont'd.)

NOTES (cont'd.)

Note 6: These normal values represent conditions at which control of reliability may be expected.

Note 7: These normal test conditions are used for all characteristic tests unless otherwise stated under the individual test item.

Note 8: For most applications the performance will not be adversely affected by ±10% heater voltage variation, but when the application can provide a closer control of heater voltage, an improvement in reliability will be realized.

Note 9: In addition to meeting the tightened electrical, physical and mechanical tests described in this data sheet, Raytheon Reliable Tubes are now guaranteed to be free from "potential" defects identifiable by microscopic inspection as described by appendix B of "Inspection Instructions for Electron Tubes."

Note 10: Operation time is the time in seconds required for Io, the operation current, to attain a value within plus or minus 10 percent of the three minute Io value using a cold tube. No preheating before this test will be allowed.

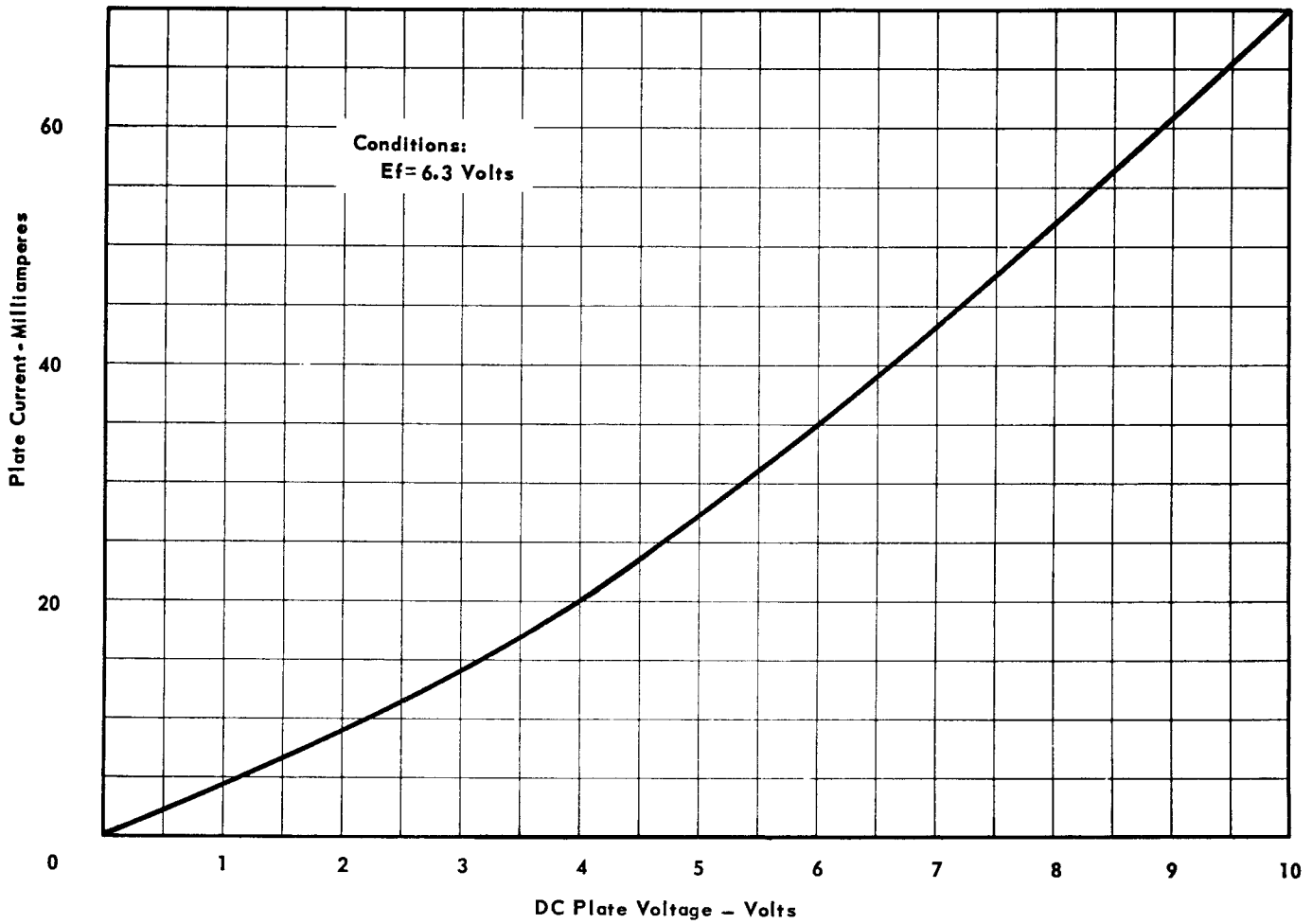
Note 11: The tubes shall be rigidly mounted on a table vibrating with simple harmonic motion. The tubes shall be vibrated for a total of 6 hours, 2 hours in each of three positions, X1, X2, and Y1. Only rated heater voltage shall be applied. Tubes which show one or more of the following defects shall be considered failures.

(a) Tubes which show permanent or tap shorts or open circuits following fatigue test, when tested as specified in 4.7.2 and 4.7.3.

(b) Tubes which do not comply with post fatigue limits. This is a destructive test.

Note 12: The provisions of paragraph 4.9.20.5 of Specification MIL-E-1 shall apply, except for test conditions listed for shock test (2).

AVERAGE PLATE CHARACTERISTICS



RELIABLE SUBMINIATURE DIODE

AVERAGE CHARACTERISTICS
(Half-Wave Rectification)