



*Excellence in Electronics*

**TYPE**  
**CK6152**

The CK6152 is a heater-cathode type low- $\mu$  triode of subminiature construction capable of operation in the UHF region. This type is characterized by 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 subminiature sockets may be used by cutting the leads to a suitable length.

**MECHANICAL DATA**

ENVELOPE: T-3 Glass

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

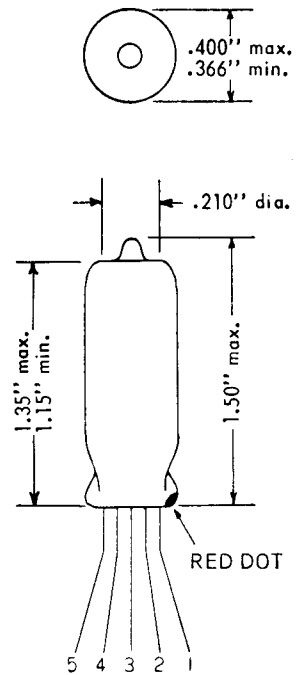
TERMINAL CONNECTIONS: (Red dot is adjacent to lead 1)

- Lead 1 Plate
- Lead 2 Cathode
- Lead 3 Grid #1
- Lead 4 Heater
- Lead 5 Heater

MECHANICAL RATINGS:

- Maximum Impact Acceleration (Shock Test - Note 3) 450 G
- Maximum Uniform Acceleration (Centrifuge Test - Note 4) 1000 G
- Maximum Vibrational Acceleration (100 Hour Fatigue Test - Note 5) 2.5 G
- Maximum Bulb Temperature 265 °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 absolute maximum ratings are exceeded. Both reliability and performance will be jeopardized if filament voltage ratings are exceeded. Life and reliability of performance are directly related to the degree that regulation of the heater voltage is maintained at its center rated value.

RATINGS AND NORMAL OPERATION:	MIL - E - 1B SYMBOL	ABSOLUTE MINIMUM	NORMAL TEST CONDITIONS (Note 7)	NORMAL OPERATION (Note 6)	ABSOLUTE MAXIMUM	MIL - E - 1B UNITS
Heater Voltage (Note 8)	Ef:	5.7	6.3	6.3	6.9	V
Plate Voltage	Eb:	----	100	100	180	Vdc
Grid #1 Voltage	Ec1:	-55	0	0	0	Vdc
Plate Dissipation	Pp:	----	----	1.0	1.1	W
Grid #1 Circuit Resistance	Rg1:	----	----	1.0	----	Meg.
Heater - Cathode Voltage	Ehk:	-200	----	100	+200	Vdc
Cathode Current	Ik:	----	----	----	22	mAdc
Cathode Resistance	Rk:	----	270	270	----	ohms

**CHARACTERISTICS AND QUALITY CONTROL TESTS (Note 1)**

TEST	CONDITIONS	AQL %	MIL - E - 1B SYMBOL	MIN.	LAL	BOGIE	UAL	MAX.	ALD	MIL - E - 1B UNITS
<b>MEASUREMENTS ACCEPTANCE TESTS PART 1</b>										
Combined AQL = 1.0% excluding Mechanical and Inoperatives.										
Heater Current:		0.65	If:	183	190	200	210	217	16	mA
Heater - Cathode Leakage:	Ehk = +100 Vdc } Ehk = -100 Vdc }	0.65	{ lhk:	----	----	----	----	5	----	$\mu$ Adc
Grid Current:		0.65	lc (1):	----	----	----	----	-0.3	----	$\mu$ Adc
Plate Current (1):		0.65	lb (1):	7	8.5	10	11.5	13	3.4	mAdc
Plate Current (2):	Ec1 = -13.5 Vdc	0.65	lb (2):	----	----	----	----	100	----	$\mu$ Adc
Transconductance (1):		0.65	Sm (1):	4200	4600	5100	5600	6000	900	$\mu$ mhos
Continuity and Shorts (Inoperatives):		0.4	----	----	----	----	----	----	----	----
Mechanical:	Envelope (8-7) (Note 10)	----	----	----	----	----	----	----	----	----

Tentative Data

**RAYTHEON MANUFACTURING COMPANY**

RECEIVING AND CATHODE RAY TUBE OPERATIONS



RELIABLE SUBMINIATURE TRIODE

ELECTRICAL DATA (Cont'd)

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

TEST	CONDITIONS	AQL %	MIL - E - 1B SYMBOL	MIN.	LAL	BOGIE	UAL	MAX.	ALD	MIL - E - 1B UNITS
<b>MEASUREMENTS ACCEPTANCE TESTS PART 2</b>										
Insulation of Electrodes:	Ef = 6.3 V Eg - all = - 100 Vdc Ep - all = - 300 Vdc	2.5	Rg1 - all: Rp - all:	100	----	----	----	----	----	Meg.
Transconductance (2):	Ef = 5.5 V			100	----	----	----	----	----	----
Grid Emission:	Eb = 100 Vdc; Rg = 1.0 meg; Ef = 7.5 V; Rk = 270 ohms; preheat 5 minutes at Ec1 = 0; Test at Ec1 = - 45 Vdc	2.5	ΔEfSm(2): Ic(2):	----	----	----	----	10	----	% μAdc
AF Noise:	Esig = 70 mVac; Ec1 = - 5.5 Vdc; Rg = 0.1 Meg; Rp = 0.01 Meg; Rk = 0	2.5	EB:	----	----	----	----	17	----	VU
Amplification Factor:		6.5	Mu:	14.5	15.5	17.5	19.5	20.5	3.5	-----
Capacitance:		6.5	Cgp: Cin: Cout:	0.95	----	1.32	----	1.7	----	μμf
Capacitance:	Note 2			2.1	----	2.9	----	3.7	----	μμf
Capacitance:				0.91	----	1.28	----	1.61	----	μμf
Low Pressure Voltage Breakdown:	Pressure = 55 ± 5 mm Hg; Voltage = 300 Vac	6.5	-----	-----	-----	-----	-----	-----	-----	-----
Vibration (2):	F = 40 Cps; G = 15; Rp = 10,000 ohms	2.5	Ep:	----	----	----	----	25	----	mVac

DEGRADATION RATE ACCEPTANCE TESTS

Subminiature Lead Fatigue:		2.5	-----	4.0	----	----	----	----	----	arcs
Shock:	Hammer Angle = 30° (Note 3)	20	-----	-----	-----	-----	-----	-----	-----	-----
Fatigue:	96 Hours; G = 2.5; Fixed frequency; F = 25 min. 60 max. (Note 5)	6.5	-----	-----	-----	-----	-----	-----	-----	-----
Post Shock and Fatigue Test End Points:										
Vibration (2):	F = 40 Cps; G = 15; Rp = 10,000 ohms	-----	Ep:	-----	-----	-----	-----	100	-----	mVac
Heater - Cathode Leakage:	Ehk = + 100 Vdc Ehk = - 100 Vdc	-----	Ihk:	-----	-----	-----	-----	20	-----	μAdc
Change in Transconductance (1) of individual tubes:	Er = 6.3 V	-----	ΔI <sub>f</sub> Sm(1):	-----	-----	-----	-----	20	-----	%
Glass Strain (Thermal Shock):		2.5	-----	-----	-----	-----	-----	-----	-----	-----

TEST	CONDITIONS	AQL %	MIL - E - 1B SYMBOL	MIN.	MAX.	MIL - E - 1B UNITS	Max. Defects per characteristic 1st Sample	Combined Sample
<b>ACCEPTANCE LIFE TESTS</b>								
Heater Cycling Life Test:	Ef = 7.5 V; Eb = Ec1 = 0V; Ehk = 140 Vac; 1 min. on, 1 min. off	-----	-----	2000	----	cycles	---	---
Heater Cycling Life Test End Points:								
Heater - Cathode Leakage:	Ehk = + 100 Vdc Ehk = - 100 Vdc	1.0	Ihk: Ihk:	----	20	μAdc	---	---
1 Hour Stability Life Test:	TA = Room; Ehk = + 200 Vdc; Rg = 1.0 Meg.			----	----	----	20	μAdc
1 Hour Stability Life Test End Points:								
Change in Transconductance (1) of individual tubes:	(Typical Sample Size = 50 tubes)	1.0	ΔI <sub>f</sub> Sm(1):	----	10	%	---	---
100 Hour Survival Rate Life Test:	TA = Room; Ehk = + 200 Vdc; Rg = 1.0 Meg.	-----	-----	-----	-----	-----	---	---
100 Hour Survival Rate Life Test End Points:	(Typical Sample Size = 200 tubes)							
Inoperatives:		0.65	-----	-----	-----	-----	---	---
Transconductance (1):		1.0	Sm(1):	3600	----	μmhos	---	---

RAYTHEON MANUFACTURING COMPANY

RECEIVING AND TESTING TUBES FROM TUBE OPERATIONS



RELIABLE SUBMINIATURE TRIODE

ELECTRICAL DATA (Cont'd)

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

TEST	CONDITIONS	AQL %	MIL - E - 1B SYMBOL	MIN.	MAX.	MIL - E - 1B UNITS	Max. Defects per characteristic	
							1st Sample	Combined Sample
<b>ACCEPTANCE LIFE TESTS (cont'd)</b>								
500 Hour Intermittent High Temperature Life Test:	T Bulb=250°C; Ehk=+200 Vdc; Rg=1.0 Meg.	----	-----	----	----	-----	---	---
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:	180	220	mA	2	5
Heater - Cathode Leakage:	Ehk=+100 Vdc Ehk=-100 Vdc	----	lhk:	----	10	μAdc	}	5
Grid Current (1):		----	lhk:	----	10	μAdc		1
Transconductance (1) change of individual tubes from initial:		----	lc (1):	----	-1.0	μAdc	1	3
Transconductance (1) Average Change:		----	Δ <sub>f</sub> Sm(1):	----	20	%	1	3
Insulation of Electrodes:		----	Ave. Δ <sub>f</sub> Sm(1):	----	15	%	---	---
g - all		----	Rg1 - all:	50	----	Meg.	}	5
p - all		----	Rp - all:	50	----	Meg.		2
Transconductance (2):		----	Δ <sub>f</sub> Sm(1):	----	15	%	2	5
Total Defectives		----	-----	----	----	-----	4	8
1000 Hour High Temperature Information Life Test:	T Bulb=250°C; Ehk=+200 Vdc; Rg=1.0 Meg.							
1000 Hour High Temperature Information Life Test End Points:	Read for same characteristics as for 500 Hour Intermittent High Temperature Life Test. Limits not established.							

NOTES:

- Note 1: Characteristics, Quality Control Test Procedures, and Inspection Levels are made according to the appropriate paragraphs of MIL - E - 1B, "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 - 1B basic specifications.
- Note 4: Centrifuge Test with forces applied in any direction.
- Note 5: Test conditions and acceptance criteria per Fatigue Test procedures of MIL - E - 1B basic specifications.
- 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: Change of transconductance for individual tubes from that value measured at Ef=6.3 V to that value measured at Ef=5.5 V.
- Note 10: In addition to meeting the tightened electrical, physical and mechanical tests described in this data sheet these Raytheon Reliable Tubes are now guaranteed to be free from "potential" defects identifiable by microscopic inspection as described by paragraph 5.3.8 of "Inspection Instructions for Electron Tubes."