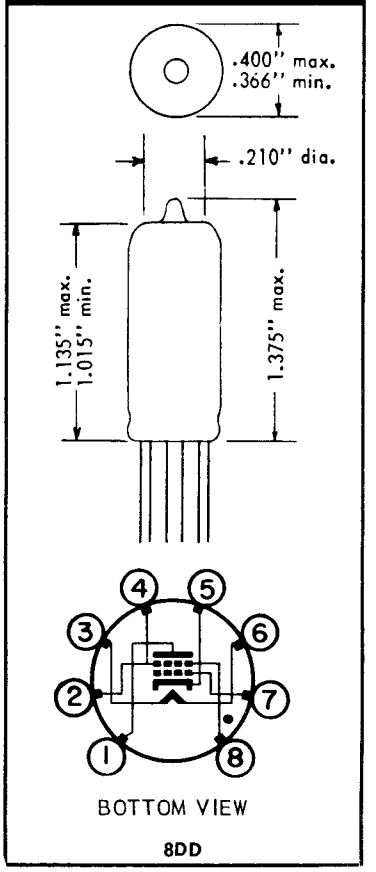
Excellence in Electronics

TYPE CK5643

The CK5643 is a xenon tetrode thyratron of subminiature construction. This type is characterized by long life, stable performance and is suitable for service where severe conditions of mechanical shock or vibration are encounted. It is designed for use in counters, grid control rectifiers and other control circuits where freedom from early failures, long average life and uniform operating characteristics are required. The flexible terminal leads may be soldered or welded 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.



BOTTOM VIEW

8DD

MECHANICAL DATA

ENVELOPE: T–3 Glass

BASE: Subminiature Button 8–Pin (0.017" tinned flexible leads Length: 1.5" min.)

TERMINAL CONNECTIONS:

Lead 1 Plate	Lead 5 Cathode
Lead 2 Grid #2 (Note 13)	Lead 6 Heater
Lead 3 Heater	Lead 7 Grid #1
Lead 4 Grid #2 (Note 13)	Lead 8 Grid #2 (Note 13)

MECHANICAL RATINGS:

Maximum Impact Acceleration (Shock Test–Note 2)	450 G
Maximum Uniform Acceleration (Centrifuge Test–Note 3)	1000 G
Maximum Vibrational Acceleration (96 hour Fatigue Test–Note 4)	2.5 G
Maximum Bulb Temperature	125 °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 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	ABSOLUTE MINIMUM	NORMAL TEST CONDITIONS (Note 6)	NORMAL OPERATION (Note 5)	ABSOLUTE MAXIMUM	MIL-E-1 UNITS
Heater Voltage (Note 7)	Ef:	6.0	6.3	6.3	6.6	V
Peak Forward Anode Voltage	epy:	----	----	----	500	v
Peak Inverse Anode Voltage	epx:	----	----	----	500	v
Grid #1 Voltage	Ec1:	–200	----	----	----	Vdc
Grid #2 Voltage	Ec2:	–100	0	0	----	Vdc
Heater-Cathode Voltage	Ehk:	–100	0	0	+25	Vdc
Cathode Conditioning Time	tk:	10	----	----	----	sec.
Peak Plate Current	ib:	----	----	----	100	ma.
Cathode Current	Ik:	----	----	----	16	mAdc
Ambient Temperature	TA:	–55	----	25±5	+90	°C
Anode Voltage	Ep:	----	----	150	----	Vac
Grid #1 Voltage (Note 8)	Eg1:	----	----	5.0	----	Vac
Peak Grid #1 Signal Voltage	eg1:	----	----	5.0	----	v
Anode Resistor	Rp:	----	----	3750	----	ohms
Grid #1 Resistance	Rg1:	----	----	1.0	10.0	Meg.

Tentative Data

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ELECTRICAL DATA (cont'd)

CHARACTERISTICS AND QUALITY CONTROL TESTS (Note 1)

TEST	CONDITIONS	AQL %	MIL-E-1 SYMBOL	MIN	LAL	BOGIE	UAL	MAX	ALD	MIL-E-1 UNITS
MEASUREMENTS ACCEPTANCE TESTS PART 1			**Combined AQL = 1.0% Excluding Mechanical and Inoperatives**							
Heater Current:		0.65	If:	140	144	150	156	160	12	mA
Heater-Cathode Leakage:	Ehk = +25 Vdc		+Ihk:	----	----	----	----	10	----	μAdc
	Ehk = −100 Vdc	0.65	−Ihk:	----	----	----	----	10	----	μAdc
Grid Voltage (1):	Epp = 350 Vac; Rg 1 = 0.1 Meg. Rp = 10,000 ohms. (Note 9)	0.65	Ecc 1:	−2.0	----	----	----	−4.0	----	Vdc
Grid Voltage (2):	Epp = 350 Vac; Rg 1 = 10 Meg.; Rp = 10,000 ohms. (Note 9)	0.65	Ecc 1:	----	----	----	----	−6.0	----	Vdc
Anode Voltage:	Vary Ebb; Ec 1 = 0 Vdc; Rg 1 = 0.1 Meg.; Rp = 10,000 ohms. (Note 10)	0.65	Ebb:	----	----	----	----	26	----	Vdc
Continuity and Shorts (Inoperatives):	(Note 11)	0.4	----	----	----	----	----	----	----	----
Mechanical:	Envelope T-3 (8-1) (Note 12)	----	----	----	----	----	----	----	----	----
MEASUREMENTS ACCEPTANCE TESTS PART 2										
Pulse Emission:	epy = egy 1 = egy 2 = 180 ± 9 v; tp = 5 ± 0.25 μsec.; tr = 0.5 μsec. max.; tf = 1.0 μsec. max.; Prr = 120 ± 5; tk = 5 minimum; Ra = 150 ± 5% noninductive; Rp = 100 ± 5% noninductive; Calibrating Resistor = 50 ± 5% noninductive; Zo = 75; t = 3 max.	2.5	etd:	----	----	----	----	76	----	v
Vibration:	No Voltage; F variable from 10-50 cps; G max. = 10; Fixed amplitude 0.040 inch; Post Shock and Fatigue Test End Points Apply	10.0	----	----	----	----	----	----	----	----
DEGRATION RATE ACCEPTANCE TESTS										
Subminiature Lead Fatigue:		2.5	----	4.0	----	----	----	----	----	arcs
Shock:	Hammer Angle = 30° (Note 2)	20	----	----	----	----	----	----	----	----
Fatigue:	96 hours; G = 2.5; Fixed Frequency f = 25 min., 60 max. (Note 4)	6.5	----	----	----	----	----	----	----	----
Post Shock and Fatigue Test End Points:										
Heater-Cathode Leakage:	Ehk = +25 Vdc	----	Ihk:	----	----	----	----	20	----	μAdc
	Ehk = −100 Vdc	----	Ihk:	----	----	----	----	20	----	μAdc
Anode Voltage:		----	Ebb:	----	----	----	----	26	----	Vdc
Glass Strain:		6.5	----	----	----	----	----	----	----	----
ACCEPTANCE LIFE TESTS										
Heater Cycling:	Es = 7.0 V; Eb = Ec 1 = Ec 2 = 0V; Ehk = 18 Vac; 1 min. on, 4 min. off	2.5	Hcy:	2500	----	----	----	----	----	cycles
100 Hour Survival Rate Life Test Conditions:	Ib = 16 mAdc; ib = 100 ma; Rg 1 = 0.05 Meg.; Epp = 350 Vac; EHK = −100, +25 Vdc; Rp = 5000 ohms; TA = Room									

RAYTHEON

RELIABLE XENON TETRODE THYRATRON

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 Defects per Characteristics 1st Sample	Allowable Defects per Characteristics Combined Samples
ACCEPTANCE LIFE TESTS (cont'd)								
100 Hour Survival Rate Life Test End Points:	(Typical Sample Size = 200 tubes)							
Continuity and Shorts (Inoperatives)		0.65	----	----	----	----	----	----
500 Hour Intermittent Life Test Conditions:	Survival Rate Life Test Conditions T Bulb = 125 °C tk = 10 sec max. (Notes 14, 15)	----	----	----	----	----	----	----
500 Hour Intermittent Life Test End Points:	(Typical Sample Size = 20 tubes 1st sample; 40 tubes 2nd sample)	----	----	----	----	----	----	----
Inoperatives:	(Note 11)	----	----	----	----	----	1	3
Heater Current:		----	If:	138	164	mA	2	5
Grid Voltage (1):		----	Ecc 1:	-0.8	-5.0	Vdc	1	3
Anode Voltage:		----	Ebb:	----	70	Vdc	1	3
Pulse Emission:		----	etd:	----	100	v	2	5
Heater-Cathode Leakage:	Ehk = +25 Vdc Ehk = -100 Vdc	---- ----	Ihk: Ihk:	---- ----	20 20	μAdc μAdc	2	5
Total Defectives:		----	----	----	----	----	4	8
1000 Hour High Temperature Information Life Test:	Same conditions as 500 Hour Intermittent Life Test. Limits not established.							

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

Note 2 Test conditions and acceptance criteria per Shock Test Procedures of MIL-E-1 basic specification.

Note 3 Centrifuge Test with forces applied in any direction.

Note 4 Test Conditions and Acceptance Criteria per Fatigue Test Procedures of MIL-E-1 basic specifications.

Note 5 These normal values represent conditions at which control of reliability may be expected.

Note 6 These normal test conditions are used for all characteristic tests unless other wise stated under the individual test item.

Note 7 For most applications the performance will not be adversely affected by ± 5% heater voltage variation, but when the application can provide a closer control of heater voltage, an improvement in reliability will be realized.

Note 8 Bias voltage, 180° out of phase with anode voltage.

Note 9 Under the conditions specified, the control-grid voltage shall be changed in a positive direction until the tube starts to conduct current. The grid voltage measured at the grid voltage supply required to cause conduction shall be within the limits specified

Note 10 Under the conditions specified, the anode voltage shall be increased until the tube starts to conduct current. The anode voltage required to cause conduction shall be within the limits specified.

Note 11 The last sentence of paragraph 4. 7. 5. shall not apply.

Note 12 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 13 The Grid #2 shall not be used for control purposes.

Note 14 Phase of grid voltage shall be adjusted to provide start of conduction at the peak.

Note 15 The heater-cathode voltage shall be cycled 30 seconds positive and 30 seconds negative.