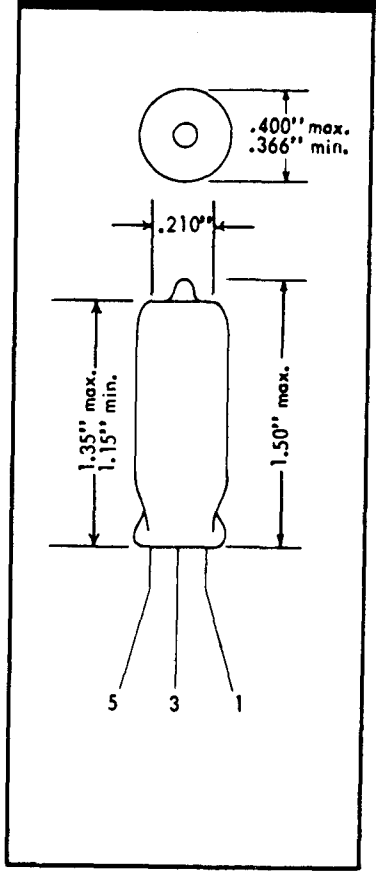
TYPE CK5783WA

The CK5783WA is a cold-cathode, gas filled, glow-discharge diode of subminiature construction designed for use as a voltage reference tube in electronically regulated dc power supplies. It has an operating current range of 1.5 to 3.5 milliamperes over which it maintains a substantially constant operating voltage of 85 volts. Sudden voltage fluctuations of the CK5783WA are appreciably less than 0.005 volts within the rated operating current range and voltage drift is reduced by careful manufacturing processing. Two cathode leads are provided for use in circuits which serve to disconnect the load when the tube is removed from the socket. This type is characterized by long life and is designed for service where severe conditions of high temperature and mechanical shock or vibration are encountered. The flexible 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-3 Glass

BASE: None (0.016" tinned flexible leads. Length: 1.5" min. Spacing: 0.096" center-to-center)

TERMINAL CONNECTIONS:

Lead 1 Cathode
Lead 3 Anode
Lead 5 Cathode

MECHANICAL RATINGS:

Maximum Impact Acceleration (Shock Test-Note 2)	450 G
Maximum Uniform Acceleration (Centrifuge Test-Note 4)	1000 G
Maximum Vibrational Acceleration (96 Hour Fatigue Test-Note 3)	2.5 G
Maximum Bulb Temperature	165 °C

MOUNTING POSITION: Any

ELECTRICAL DATA

CAUTION-----To Electronic Equipment Design Engineers. Special attention should be given to the temperature of the tubes. Reliability will be seriously impaired if maximum bulb temperature is exceeded. The life expectancy may be reduced if conditions more severe than those specified for life are imposed on the tube and will be reduced appreciably if absolute ratings are exceeded. Attention should be given to the specified minimum supply voltage to insure operation in total darkness. Tube characteristics may deteriorate markedly if the tubes are stored at elevated ambient temperatures without drawing current.

RATINGS:	Ebb Vdc	Total Darkness Starting Voltage Vdc	Ambient Light Starting Voltage Vdc	Operating Voltage Range Vdc	Operating Current Range mAdc (Note 7)	Ambient Temperature °C (Note 7)	Bulb Temperature °C (Note 7)
Absolute:							
Maximum:	----	----	----	91	3.5	+150	+165
Minimum:	145	140	115	81	1.5	-55	----
Test Conditions:	150	----	----	----	----	25±5	----

Tentative Data

ELECTRICAL DATA (Cont'd.)

CHARACTERISTICS AND QUALITY CONTROL TESTS (Note 1)

TEST	CONDITIONS	AQL %	MIL-E-1 SYMBOL	MIN	LAL	AVERAGE	UAL	MAX	ALD	MIL-E-1 UNITS
MEASUREMENTS ACCEPTANCE TEST – PART 1			**Combined AQL = 1.0% excluding Mechanical and Inoperatives**							
Ionization Voltage (1):	Rp/Ib = 1.5 – 3.5 mAdc Ambient Light	0.65	(1) Ez:	----	----	103	----	115	----	Vdc
Tube Voltage Drop (1):	Rp/Ib = 3.5 mAdc	0.65	(1) Etd:	83	----	86.3	----	88	----	Vdc
Tube Voltage Drop (2):	Rp/Ib = 1.5 mAdc	0.65	(2) Etd:	83	----	83.9	----	88	----	Vdc
Regulation:	(1) Etd – (2) Etd	0.65	Reg.:	----	----	2.4	----	3.0	----	Vdc
Voltage Jump:	Ebb/Ib = 1.5 – 3.5 mAdc; (Note 8)	0.65	Jump:	----	----	< 1.0	----	5.0	----	mVdc
Continuity and Shorts (Inoperatives):		0.4	----	----	----	----	----	----	----	----
Mechanical:	(Note 9)	----	----	----	----	----	----	----	----	----
MEASUREMENTS ACCEPTANCE TESTS – PART 2			**(Generally considered as Design Tests)**							
Ionization Voltage (2):	Rp/Ib = 1.5 – 3.5 mAdc Total Darkness	6.5	(2) Ez:	----	----	105	----	140	----	Vdc
Leakage:	Eb = 50 Vdc; Rp = 3000 ohms	6.5	LIb:	----	----	< 1	----	5	----	μAdc
Tube Voltage Drop (3):	Rp/Ib = 2.5 mAdc	6.5	(3) Etd:	83	----	85	----	86	----	Vdc
Noise:	Rp/Ib = 3.5 mAdc	1.0	EB:	----	----	< 1	----	5	----	mVac
Oscillation:	Esig = 5 mVac; RL = 500 ohms; Rp/Ib = 1.5 – 3.5 mAdc	1.0	----	----	----	----	----	----	----	----
Vibration:	Rp = 10,000; Ebb/Ib = 2.5 mAdc; F = 40 cps; G = 15	6.5	Ep:	----	----	< 1	----	20	----	mVac
Repeatability:	Rp/Ib = 2.5 mAdc (Note 5)	6.5	ΔEtd:	----	----	20	----	100	----	mVdc
DEGRADATION RATE ACCEPTANCE TEST										
Subminiature Lead Fatigue:		2.5	----	4.0	----	----	----	----	----	arcs
Shock:	Hammer Angle = 30° (Note 2)	20	----	----	----	----	----	----	----	arcs
Fatigue:	G = 2.5; Fixed Frequency F = 25 min.; 60 max. (Note 3)	6.5	----	----	----	----	----	----	----	----
Post Shock and Fatigue Test End Points:										
Vibration:	F = 40 cps; G = 15; Ebb/Ib = 2.5 mAdc; Rp = 10,000 ohms	----	Ep:	----	----	1	----	30	----	mVac
Ionization Voltage (1):	Rp/Ib = 1.5 – 3.5 mAdc	----	(1) Ez:	----	----	103	----	115	----	Vdc
Tube Voltage Drop (1):	Rp/Ib = 3.5 mAdc	----	(1) Etd:	83	----	86.3	----	88	----	Vdc
Tube Voltage Drop (2):	Rp/Ib = 1.5 mAdc	----	(2) Etd:	83	----	83.9	----	88	----	Vdc
Regulation:	(1) Etd – (2) Etd	----	Reg.:	----	----	2.4	----	3.0	----	Vdc
Glass Strain (Thermal Shock):		2.5	----	----	----	----	----	----	----	---

ELECTRICAL DATA (Cont'd.)

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

TEST	CONDITIONS	AQL %	MIL-E-1 SYMBOL	MIN	AVERAGE	MAX	MIL-E-1 UNITS	Allowable Defects per Characteristic 1st Sample	Allowable Defects per Characteristic Combined Samples
ACCEPTANCE LIFE TESTS									
1 Hour Stability Life Test:	TA=Room; Rp/lb=2.5 mAdc	6.5	----	----	----	----	----		
1 Hour Stability Life Test End Points:	Typical Sample Size= 50 tubes	----	----	----	----	----	----		
Change in Tube Voltage Drop (3) of individual tubes	(Note 6)	----	Δ_t(3)Etd:	----	50	200	mVdc		
100 Hour Survival Rate Life Test:	TA=Room; Rp/lb= 2.5 mAdc	----	----	----	----	----	----		
100 Hour Survival Rate Life Test End Points:	Typical Sample Size= 200 tubes	----	----	----	----	----	----		
(Inoperatives):		0.4	----	----	----	----	----		
Change in Tube Voltage Drop (3) of individual tubes:	(Note 6)	6.5	Δ_t(3)Etd:	----	100	500	mVdc		
Intermittent High Temperature Life Test:	T Bulb=155°C; Rp/lb= 2.5 mAdc	----	----	----	----	----	----		
500 Hour Intermittent High Temperature Life Test End Points:	(Typical Sample Size= 20 tubes 1st sample; 40 tubes 2nd sample)	----	----	----	----	----	----		
Inoperatives:		----	----	----	----	----	----	1	3
Regulation:		----	Reg:	----	2.5	4.0	Vdc	1	3
Tube Voltage Drop (1):		----	(1)Etd:	83	86.5	89	Vdc	1	3
Tube Voltage Drop (2):		----	(2)Etd:	83	84.0	89	Vdc	1	3
Tube Voltage Drop (3):		----	(3)Etd:	83	85.1	88	Vdc	1	3
Change in Tube Voltage Drop (3) of individual tubes:	(Note 6)	----	Δ_t(3)Etd:	----	----	2.0	Vdc	1	3
Ionization Voltage (1):		----	(1)EZ:	----	103	115	Vdc	1	3
Total Defectives:		----	----	----	----	----	----	2	3
1000 Hour Intermittent High Temperature Life Test End Points:	Typical Sample Size= 20 tubes 1st sample, 40 tubes 2nd sample	----	----	----	----	----	----	---	---
Inoperatives:		----	----	----	<1	----	----	3	4
Regulation:		----	Reg:	----	3.0	4.0	Vdc	3	4
Tube Voltage Drop (3):		----	(3)Etd:	83	85.5	88	Vdc	3	4
Change in Tube Voltage Drop (3) of individual tubes:	(Note 6)	----	Δ_t(3)Etd:	----	1.0	3.0	Vdc	3	4
Ionization Voltage (1):		----	(1)EZ:	----	103	115	Vdc	3	4
Total Defectives:		----	----	----	----	----	----	3	4

ELECTRICAL DATA (Cont'd.)

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: Test Conditions and Acceptance Criteria per Shock Test Procedures of MIL-E-1 Basic Specifications.

Note 3: Test Conditions and Acceptance Criteria per Fatigue Test Procedures of MIL-E-1 Basic Specifications.

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

Note 5: Repeatability is the maximum shift in tube voltage drop between successive firings of the tube.

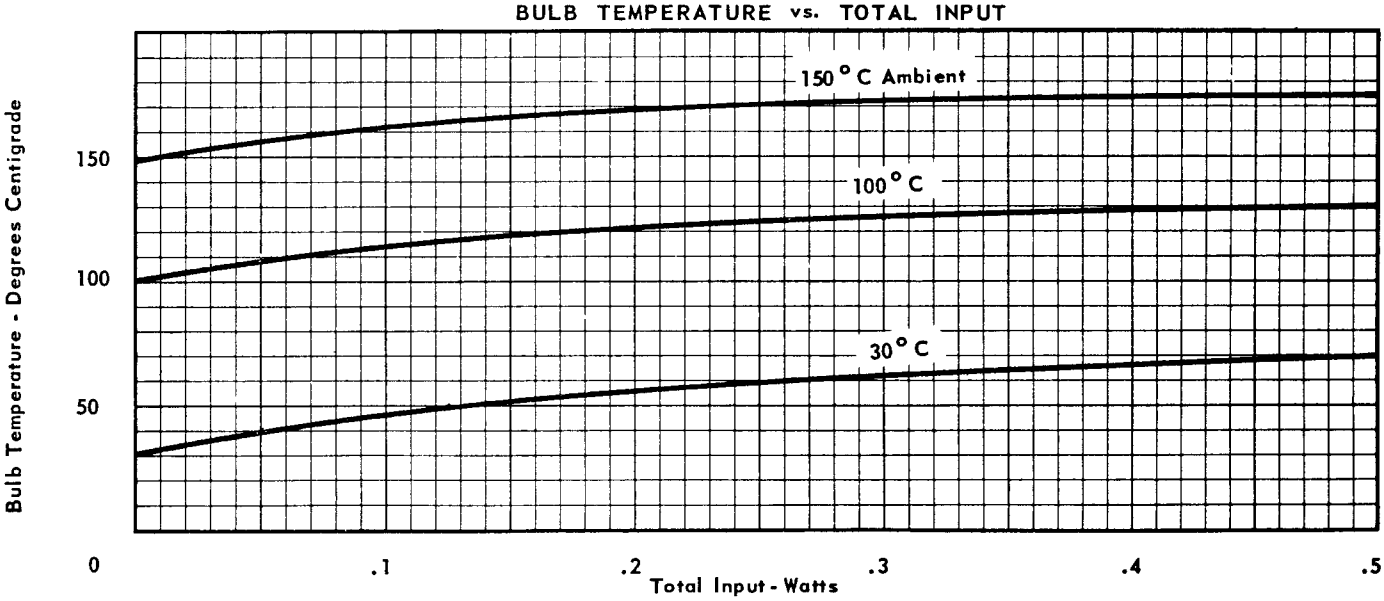
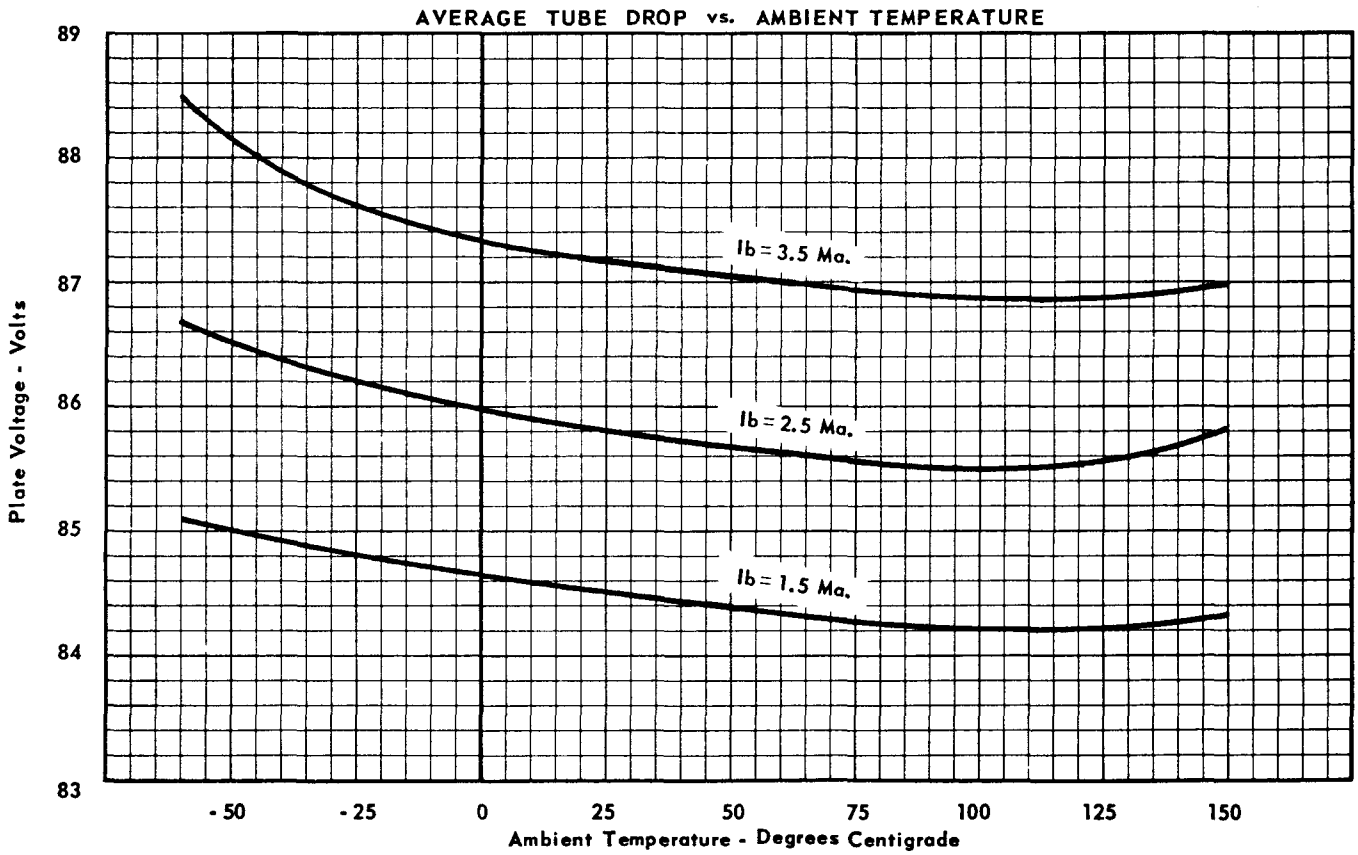
Note 6: ΔTube Voltage Drop is the change in individual tubes of tube voltage drop (3) from the beginning of life to its value at the specified life hour (s).

Note 7: Limits beyond which normal tube performance and tube life may be impaired.

Note 8: Sudden voltage jumps as measured on an oscilloscope connected across the tube, with the current through the tube varied slowly over its operating range, should be less than 5 mVdc.

Note 9: 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 appendix B of Inspection Instructions for Electron Tubes.

BULB TEMPERATURE vs. TOTAL INPUT



RELIABLE SUBMINIATURE GAS DIODE