

SPECIAL QUALITY VARIABLE-MU R.F. PENTODE

5899

Special quality subminiature variable-mu r.f. pentode for use in equipment where high ambient temperatures, mechanical vibration and shocks are unavoidable and where statistically controlled major electrical characteristics are required.

This data should be read in conjunction with GENERAL NOTES—SPECIAL QUALITY VALVES which precede this section of the handbook, and the index numbers are used to indicate where reference should be made to a specific note.

HEATER

V_h ¹	6.3	V
I_h	150	mA

MOUNTING POSITION

Any

Note—Direct soldered connections to the leads of this valve must be at least 5mm from the seal and any bending of the valve leads must be at least 1.5mm from the seal.

CAPACITANCES² (measured with an external shield)

C_{a-g1}	<15	mpF
C_{in}	4.3	pF
C_{out}	3.4	pF

CHARACTERISTICS³

V_a	100	V
V_{g2}	100	V
V_{g1}	-1.1	V
I_a	7.2	mA
I_{g2}	2.0	mA
g_m	4.5	mA/V
r_a	>175	kΩ
R_k	0	Ω
g_m ($V_{g1} = -15.5V$)	25	μA/V

LIMITING VALUES⁴ (absolute ratings)

V_h max.	6.6	V
V_h min.	6.0	V
$V_{a(b)}$ max.	330	V
V_a max.	165	V
p_a max.	750	mW
$V_{g2(b)}$ max.	310	V
V_{g2} max.	155	V
p_{g2} max.	350	mW
$+V_{g1}$ max.	0	V ←
$-V_{g1}$ max.	55	V
I_k max.	16.5	mA
R_{g1-k} max.	1.1	MΩ
V_{h-k} max.	200	V
Maximum acceleration (continuous operation)	2.5	g
Maximum shock (short duration)	500	g
T_{bulb} max.	220	°C

TEST CONDITIONS (unless otherwise specified)

V_h (V)	V_{a-e} (V)	V_{g2-e} (V)	V_{g1-e} (V)	R_k (Ω)	C_k (μF)
6.3	100	100	0	120	1000

TESTS

GROUP A

	A.Q.L. ⁵ (%)	Individuals ⁶		Lot average ⁷		Lot standard deviation ⁸ Max.
		Bogey ⁹	Min.	Max.	Min.	
Heater current		150	140	160	—	—
Heater-to-cathode leakage current $V_{h-k} = \pm 100V$	{ 0.65 —	—	—	—	144	4.2
Reverse grid current $R_{g1} = 1.0M\Omega$	0.65	—	—	5.0	—	μA
Anode current	0.65	—	0	0.3	—	μA
Screen-grid current	{ 0.65 —	7.2	5.2	9.2	—	mA
Mutual conductance	0.65	—	—	—	6.4	0.8
		—	1.0	3.0	8.0	mA
	0.65	—	—	—	—	mA
Sub-group quality level ¹⁰	{ 0.65 —	4.5	3.8	5.2	—	—
Inoperatives ¹⁶	1.0	—	—	—	4.2	0.28 mA/V
	0.4	—	—	—	—	—

GROUP B

Insulation

a-rest, measured at -300V
g1-rest, measured at -100V

2.5 {

Change in mutual conductance $V_h = 5.7V$

Mutual conductance $V_{g1} = -14V$, $R_k = 0\Omega$

Reverse grid current $V_h = 7.5V$, $V_{g1} = -14V$,
 $R_{g1} = 1.0M\Omega$, $R_k = 0\Omega$. Measured after 5
minutes preheat under standard test con-
ditions except $V_h = 7.5V$, $R_{g1} = 1.0M\Omega$

†A.F. noise at anode, $V_{g2-e} = 19V$, $R_{g1} = 100k\Omega$,
 $R_{g2} = 1.0k\Omega$, $R_a = 200k\Omega$

Anode impedance

Capacitances² (shielded). No applied voltages

C_{in}

C_{out}

C_{a-g1}

Low pressure voltage breakdown

Pressure $\approx 55 \pm 5mmHg$
Voltage $\approx 300V_{r.m.s.}$. No other applied
voltages

Microphonic noise at the anode at 50c/s,
15g min. peak acceleration, $R_a = 10k\Omega$

100 — — — — —
100 — — — — —
— 10 — — — —
1.0 75 — — — —
— 0 0.5 — — — —
— 70 — — — —
175 — — — — —
— 3.5 4.5 — — — —
— 2.9 3.9 — — — —
— 15 — — — — —
6.5 — — — — —
2.5 — — — — —
60 — — — — —
mV (r.m.s.)

†The valve is tapped with a specified hammer and the output observed on a meter of specified dynamic response.

GROUP C

Lead fragility test^{13B} 4 arcs

A.Q.L. ⁵ (%)	Individuals ⁶		Lot average ⁷		Lot standard deviation ⁸ Max.
	Bogey ⁹	Min.	Max.	Min.	
2.5	—	—	—	—	—

Fatigue¹⁴

$V_h = 6.3V$. No other voltages applied. 2.5g min. peak acceleration, fixed frequency $f = 25c/s$ min 60c/s max for 32 hours in each of 3 mutually perpendicular planes

Post fatigue tests

Heater-to-cathode leakage current

 $V_{h-k} = \pm 100V$

Change in mutual conductance

Microphonic noise as in group B

} 6.5 {	—	—	—	—	μA
	—	—	—	—	%
	—	—	—	—	mV (r.m.s.)

Shock¹⁵ $V_{h-k} = 100V$ (cathode negative), $R_{g1} = 100k\Omega$, 500g

Post shock tests

Heater-to-cathode leakage current

 $V_{h-k} = \pm 100V$

Change in mutual conductance

Microphonic noise as in group B

} 20 {	—	—	—	—	μA
	—	—	—	—	%
	—	—	—	—	mV (r.m.s.)

Glass strain test^{11B}. No applied voltages

6.5

—

—



GROUP D

Heater cycling life test

$V_h = 7.0V$, 1 minute on, 4 minutes off
 $V_{h-k} = 140V_{r.m.s.}$ (continuous). No other applied voltages

2.5

Stability life test¹⁴

Running conditions $R_{g1} = 1.0M\Omega$
 $V_{h-k} = 200V$ (cathode negative)
 $T_{ambient} = \text{Room temperature}$

Stability life test end points

Change in mutual conductance after 1 hour

1.0

Survival rate life test¹⁴

Running conditions $R_{g1} = 1.0M\Omega$
 $V_{h-k} = 200V$ (cathode negative)
 $T_{ambient} = \text{Room temperature}$

Survival rate life test end points (100 hours)

Inoperatives¹⁶
Mutual conductance

0.65
1.0

Intermittent life test

Running conditions, $R_{g1} = 1.0M\Omega$
 $V_{h-k} = 200V$, T_{bulb} min = $220^\circ C$

Intermittent life test end points (500 hours)

Inoperatives¹⁶

Heater current
Heater-to-cathode leakage current $V_{h-k} = \pm 100V$
Reverse grid current $R_{g1} = 1.0M\Omega$
Change in mutual conductance (Individuals)
Change in mutual conductance $V_h = 5.7V$
Insulation as in group B
Average change in mutual conductance
Sub-group quality level¹⁰

%

Max.

Min.

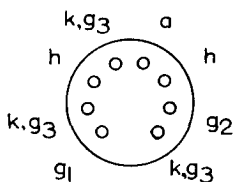
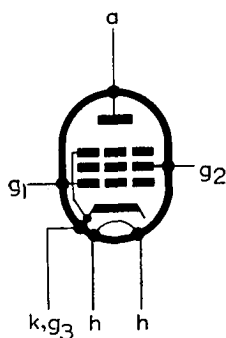
A.Q.L.⁵
(%)

mA
 μA
%
M Ω
%

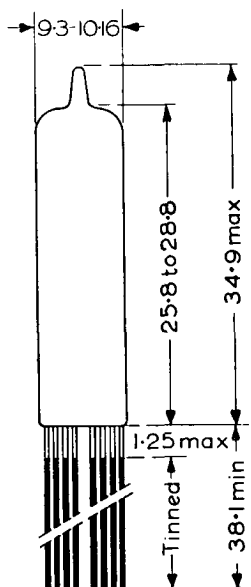
5899

**SPECIAL QUALITY VARIABLE-MU
R.F. PENTODE**

5494

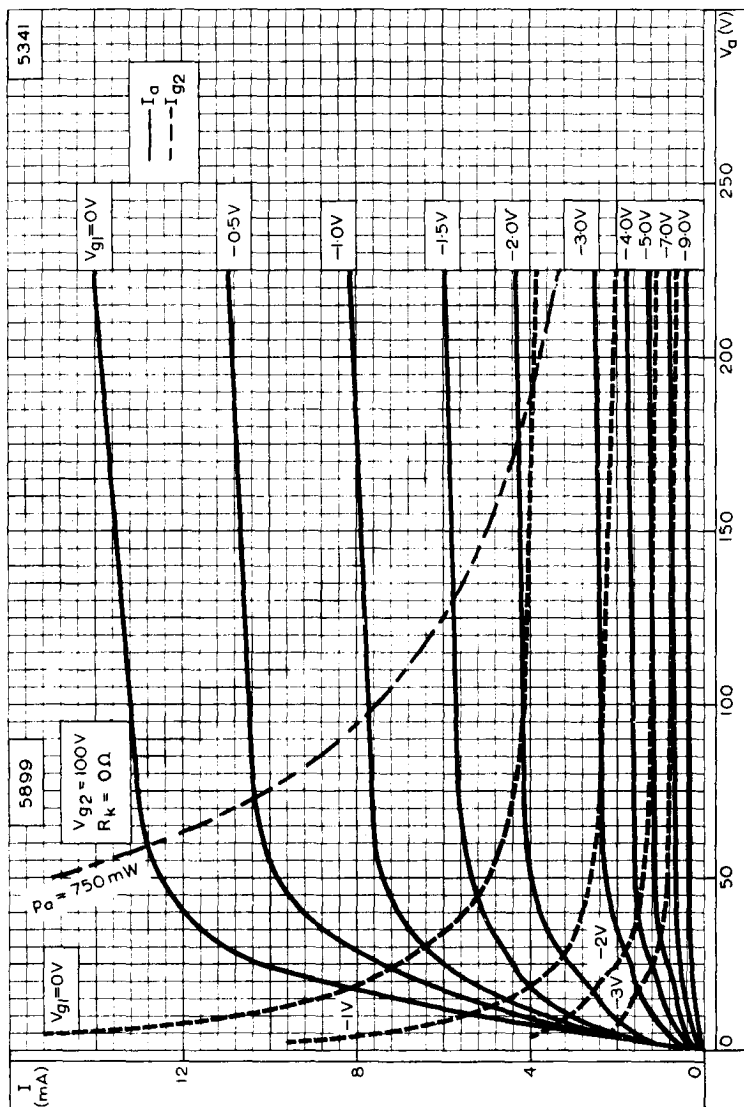


B8D/F Base

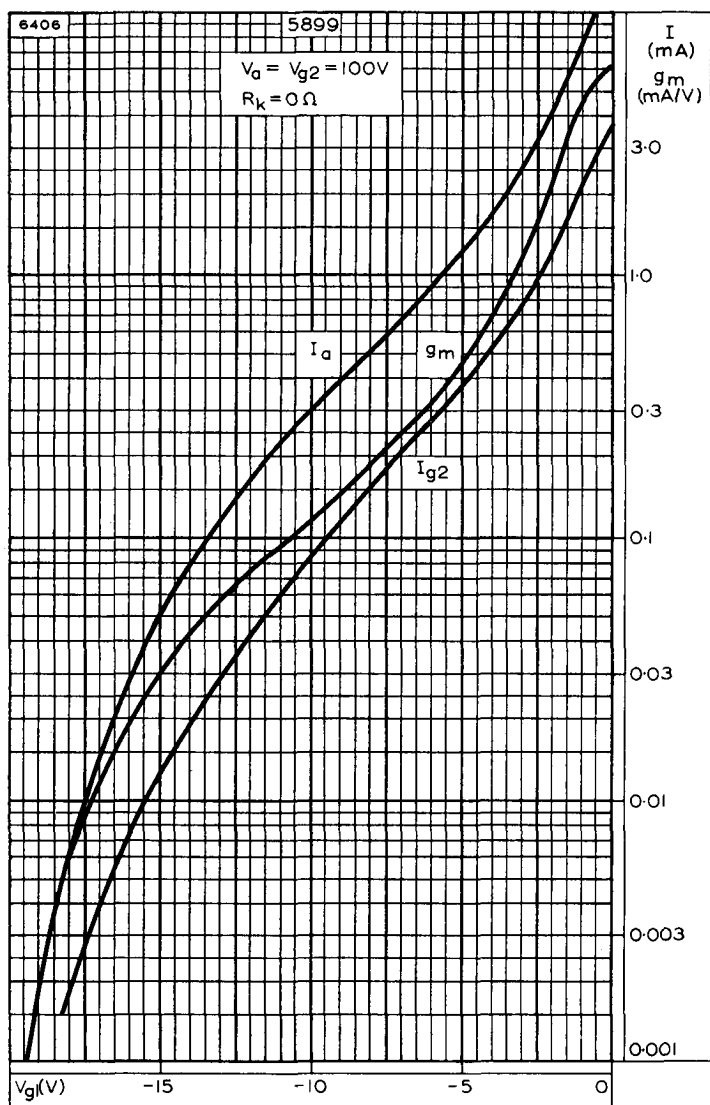


All dimensions in mm

The bulb and base dimensions of this valve are in accordance with BS.448, Section B8D/F.



ANODE AND SCREEN-GRID CURRENTS PLOTTED AGAINST ANODE VOLTAGE WITH CONTROL-GRID VOLTAGE AS PARAMETER



ANODE CURRENT, SCREEN-GRID CURRENT AND MUTUAL
CONDUCTANCE PLOTTED AGAINST CONTROL-GRID VOLTAGE