

S6F33

SPECIAL QUALITY DUAL CONTROL PENTODE

Indirectly heated

TENTATIVE**GENERAL**

The S6F33 is a Special Quality screened H.F. Pentode having a short cut off suppressor grid characteristic and is intended for use where dependable performance is required under conditions of shock and vibration. It is suitable for modulation, gating, and variable reactance applications, where only a small input is available. A diode has been tied to the suppressor grid to prevent blocking when this grid is under positive drive conditions.

RATING—Absolute Values

Heater Voltage (volts)	V_h	6.3
Heater Current (amps)	I_h	0.35
Maximum Anode Dissipation (watts)	$P_a(\max)$	3.0
Maximum Screen Dissipation (watts)	$P_{g2}(\max)$	1.5
Maximum Anode Voltage (volts)	$V_a(\max)$	300
Maximum Anode Voltage ($I_a=0$) (volts)	$V_{a(b)\max}$	550
Maximum Screen Voltage (volts)	$V_{g2}(\max)$	300
Maximum Screen Voltage ($I_{g2}=0$) (volts)	$V_{g2(b)\max}$	400
Maximum Heater/Cathode Voltage (volts)	$V_{h-k}(\max)$	± 150
Maximum Bulb Temperature ($^{\circ}\text{C}$)		200
Maximum Shock (Short Duration) (g)		500
Maximum Acceleration (Continuous Operation) (g)		2.5

INTER-ELECTRODE CAPACITANCES (pF)

(Measured with a close fitting metal shield)

Control Grid/Earth	c_{g1-E}	7.55
Anode/Earth	c_{a-E}	4.55
Anode/Control Grid	c_{a-g1}	<0.015

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TENTATIVE**DIMENSIONS**

Maximum Overall Length	(mm)	54.5
Maximum Diameter	(mm)	19
Maximum Seated Height	(mm)	47.5
Approximate Nett Weight	(ozs)	$\frac{1}{2}$
Approximate Packed Weight	(ozs)	$\frac{1}{2}$

MOUNTING POSITION—Unrestricted**TEST CONDITIONS**

Anode Voltage (volts)	V_a	200
Grid 2 Voltage (volts)	V_{g2}	200
Grid 3 Voltage (volts)	V_{g3}	0
Cathode Bias Resistance (ohms)	R_k	287
Anode Current (mA)	I_a	7.1
Grid 2 Current (mA)	I_{g2}	4.35
Mutual Conductance (mA/V)	g_m	4.05
Anode Impedance (Megohms)	r_a	0.1
Inner Mu	μ_{g1-g2}	42

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LIMITS OF CHARACTERISTICS

The test limits are for guidance in equipment design. The quality is controlled statistically to ensure that only a small percentage are outside these limits. The quality control levels are related to the importance of the characteristic being tested.

Test	Conditions				Life Period	Limits		Units
	V _h (V)	V _{a-E} (V)	V _{g2-E} (V)	V _{g3*} (V)		R _k (Ω)	Min.		Max.
Heater Current	6.3	.	.	.	Initial 500 hrs.	0.32 0.32	0.38 0.38	A A
Anode Current	6.3	200	200	0	Initial 500 hrs. 1,000 hrs.	5.6 5.05 4.6	8.6 8.6 8.6	mA mA mA
Screen Current	6.3	200	200	0	Initial	2.7	6.0	mA
Mutual Conductance	6.3	200	200	0	Initial 500 hrs. 1,000 hrs.	3.15 2.7 2.5	5.4 5.4 5.4	mA/V mA/V mA/V
Change of Mutual Conductance (1 hour life)	6.3	200	200	0	Initial to 1 hr.	.	15	%
Change of Mutual Conductance (c.f. gm at V _h = 6.3 V. Preheat valves for 5 mins.)	5.7	200	200	0	Initial	.	15	%
Average Change of Mutual Conductance	6.3	200	200	0	Initial to 500 hrs.	.	15	%

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LIMITS OF CHARACTERISTICS—Cont.

Test	Conditions				Life Period	Limits		Units
	V _h (V)	V _a -E (V)	V _{g2} -E (V)	V _{g3} * R _k (Ω)		Min.	Max	
Inner Amplification Factor (I _k = 12mA, δ V _{g1} = 1V) Grid No. 1 Cut-off (I _a = 0.1mA) Grid No. 3 Cut-off (With V _{g3} = 0 vary V _{g1} to give I _k = 10mA then adjust V _{g3} for I _a = 0.1mA)	6.3	200	200	0	287	34	50	V
	6.3	200	200	0	.	5	11	V
	6.3	200	100	.	.	.	11.5	V
Grid No. 3 Current (V _{g1} = -30V) Reverse Grid No. 1 Current (R _{g1} = 0.5 MΩ (max))	6.3	200	200	20	.	1	.	mA
	6.3	200	200	0	287	.	0.5	μA
	6.3	200	200	0	.	.	1.0	μA
Reverse Grid No. 1 Current** Heater/Cathode Leakage Current (V _h -k = 100V, Cathode positive and negative successively)	6.9	300	300	0	560	.	1.0	μA
	6.3	.	.	.	.	.	20	μA
	6.3	.	.	.	.	.	40	μA
Inter-Electrode Leakage Resistance V _{g1} to all = -100V	6.3	100	.	MΩ
	6.3	50	.	MΩ
	6.3	30	.	MΩ
V _{g2} to all = -300V	6.3	100	.	MΩ
	6.3	50	.	MΩ
	6.3	30	.	MΩ

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LIMITS OF CHARACTERISTICS—Cont.

Test	Conditions				Life Period	Limits		Units
	V _h (V)	V _{a-E} (V)	V _{g2-E} (V)	V _{g3* R_k} (V) (Ω)		Min.	Max.	
V _{g3} to all = -300V	6.3	.	.	.	Initial 500 hrs. 1,000 hrs.	100 50 30	.	MΩ MΩ MΩ
V _a to all = -300V	6.3	.	.	.	Initial 500 hrs. 1000 hrs.	100 50 30	.	MΩ MΩ mV (r.m.s.)
Vibration Noise Output Voltage † (V _{a(b)} = 250V, V _{g1} = -4.5V, R _L = 2KΩ at 50c/s and 2 g min. peak acceleration) Life Test Conditions Capacitances †† Electrodes g1 to E a to E a to g1	6.3	250	0	150	Initial	.	15	
	6.3	250	200	0		6.5 3.9	8.6 5.2	pF pF

* A zero indicates that grid 3 and cathode are joined.

** Preheat valve for 5 minutes under test conditions, after a further 5 minutes the grid 1 current must not be rising or out of limits.

† Valve mounted so that the direction of vibration is parallel to the minor axis of the electrode mounting structure.

Test of sufficient duration to obtain a steady reading of noise output.

†† Inter Electrode capacity on 1 Mc/s bridge with valve mounted in a fully shielded socket and in a cylindrical screening can.

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TENTATIVE**GLASS ENVELOPE STRAIN TEST**

A statistical sample is tested to control glass quality. No voltages are applied to the electrodes.

The valves are completely immersed in boiling water at a temperature between 97°C and 100°C for 15 seconds and then immediately plunged into ice cold water for 5 seconds. The valves are then examined for glass cracks.

BASE STRAIN TEST

A statistical sample is tested to control base strain. No voltages are applied to the electrodes.

The pins of the valves are forced over a specified cone, valves and cones are then completely submerged in boiling water at a temperature between 97°C and 100°C for 10 seconds. The valves and cones are allowed to cool to room temperature on a wooden support before examining for glass cracks.

FATIGUE TESTS

A statistical sample is tested to control heater failures and other mechanical defects. The heaters are successively run at 6.9V for 1 minute and switched off for 3 minutes, no other voltages applied.

The valves are rigidly mounted on a vibrating machine and vibrated for at least 100 hours, for not less than 30 hours in each of 3 mutually perpendicular planes at a frequency of 170 c/s with a minimum peak acceleration of 5g.

SHOCK TEST

A statistical sample is tested to control mechanical defects likely to be caused by shock. No voltages are applied to the electrodes.

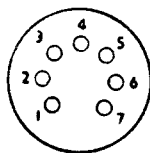
The valves are subjected to 5 blows of approximately 500g acceleration in each of 4 directions.

HOLDING PERIOD—Inoperatives Control

After completing the test specification the valves are held for at least 28 days and then retested to ensure that there has been no deterioration on storage.

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BASE—B7G



Viewed from free end of pins.

CONNECTIONS

Pin 1	Grid 1	g1
Pin 2	Cathode	k
Pin 3	Heater	h
Pin 4	Heater	h
Pin 5	Anode	a
Pin 6	Grid 3, Diode Anode	g3,ad
Pin 7	Grid 2	g2