S2P20

SPECIAL QUALITY BEAM TETRODE

Directly heated—for battery operation

GENERAL

The S2P20 can withstand continuous vibration at an acceleration of 2·5g. and a short duration shock of 500g. Further interesting design features are as follows:

Miniature construction for Portable equipment.
For use as an R.F. Power Amplifier up to 100Mc/s
R.F. Power, Single ended ... ... > 2·4W
R.F. Power, Parallel or Push Pull ... ... > 4·8W
Designed to operate with a low H.T. Voltage of 150V.
Centre tapped Filament for Series or Parallel operation.

RATING—Absolute Values.		Series	Parallel	
Filament Voltage	V_f	5·0	2·5	V
Filament Current	I_f	0·23	0·46	A
Maximum Anode Dissipation	$P_{a(max)}$	5		W
Maximum Screen Dissipation	$P_{g2(max)}$	2		W
Maximum Anode Voltage	$V_{a(max)}$	150		V
Maximum Screen Voltage	$V_{g2(max)}$	150		V
Maximum Operating Frequency	$f_{(max)}$	100		Mc/s
Maximum Shock (short duration)	(g)	500		
Maximum Acceleration (continuous operation)	(g)	2·5		

INTER-ELECTRODE CAPACITANCES (pF)†

Anode/Grid 1	c_{a-g1}	< 0.17
Grid 1/Earth	c_{in}	8·5
Anode/Earth	c_{out}	6·6

† Measured with fully shielded socket, without can and skirt.

DIMENSIONS

Maximum Overall Length	67·5mm
Maximum Diameter	22·2mm
Maximum Seated Height	60·5mm

MOUNTING POSITION—Unrestricted.

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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
	$V_{f(dc)}$ (V)	V_a* (V)	V_{g2}* (V)	V_{g1}* (V)	V_{bp}* (V)		MIN.	MAX.	
Filament Current	5	.	.	.	.	Initial	0·21	0·25	A
Anode Current	5	150	150	−10	0	Initial	21	35	mA
Screen Current	5	150	150	−10	0	Initial	.	4	mA
Mutual Conductance	5	150	150	−10	0	Initial	3·2	5·4	mA/V
Grid No. 1 Cut-off Voltage (I_a = 2mA)	5	150	150	.	0	Initial	.	25	V
Peak Anode Current († $V_{a(b)}$ = 120V, R_L = 320Ω, V_{sig} = 20V_{rms}, R_{g1} = 22KΩ)	5	.	120	.	0	Initial	110	.	mA
						250 hrs.	100	.	mA
Change in Peak Anode Current	4·5	.	120	.	0	Initial	.	25	mA
Change in Peak Anode Current	5	.	120	.	0	Initial to 1 hr.	.	20	%
Reverse Grid Current	5	150	150	−10	0	Initial	.	2	μA
						250 hrs.	.	4	μA

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LIMITS OF CHARACTERISTICS, cont.

Interelectrode Leakage Resistance								
V_{g1} to all = −100V	0	.	.	.	Initial	.	100	MΩ
					250 hrs.	.	50	MΩ
V_{g2} to all = −300V	0	.	.	.	Initial	.	100	MΩ
					250 hrs.	.	50	MΩ
V_a to all = −300V	0	.	.	.	Initial	.	100	MΩ
					250 hrs.	.	50	MΩ
V_{bp} to all = −300V	0	.	.	.	Initial	.	100	MΩ
					250 hrs.	.	50	MΩ
Vibration Noise Output Voltage‡ $V_{a(b)}$ = 150V, R_L = 2KΩ	5	.	150	−10 0	Initial	.	500	mV_{rms}
Life Test Conditions								
Adjust Grid No. 1 Voltage to give I_a = 33mA	5	150 (rms)	150	. 0				
Capacitances measured in fully shielded socket, without can and skirt.	Electrodes g1 to E					6·5	10·5	pF
	a to E					5·6	7·6	pF
	a to g1					.	0·17	pF

* Voltages measured with respect to filament negative (pin 4).

† All power supplies shall have negligible impedance to operating frequency. Grid signal impedance shall be less than 5 ohms ; voltage sinusoidal.

‡ Preheat for 15 minutes before test at Anode Current test conditions.

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SPECIAL TESTS

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 Test

A statistical sample is tested to control heater failures and other mechanical defects. The heaters are successively run at 5V r.m.s. for one 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 three 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 five blows of approximately 500g acceleration in each of four directions.

Holding Period—Inoperatives Control

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

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CHARACTERISTICS			
Filament Voltage	V_f	5	V
Anode Voltage	V_a	150	V
Screen Voltage	V_{g2}	150	V
Control Grid Voltage	V_{g1}	−10	V
Beam Plates Voltage	V_{bp}	0	V
Anode Current	I_a	28	mA
Screen Current	I_{g2}	2	mA
Mutual Conductance	g_m	4·3	mA/V

TYPICAL OPERATION—Class "C" Power Amplifier (at 70 Mc/s)			
Anode Voltage	V_a	150	V
Screen Supply Voltage	$V_{g2(b)}$	150	V
Screen Feed Resistor	R_{g2}	3·9	kΩ
Anode Current	I_a	40	mA
Control Grid Current	I_{g1}	1	mA
Control Grid Voltage	V_{g1}	−22	V
Grid Bias Resistor	R_{g1}	22	kΩ
R.F. Power Output (min)	P_{out}	2·4	W

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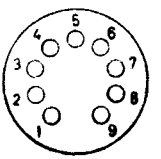
BASE—B9A



Viewed from free end of Pins.

CONNECTIONS

Pin 1	Anode	a
Pin 2	No Connection	NC
Pin 3	Beam Plates	bp
Pin 4	Filament	f
Pin 5	Filament	f+
Pin 6	Grid 2	g2
Pin 7	Grid 1	g1
Pin 8	Beam Plates	bp
Pin 9	Filament Centre Tap	f_{ct}

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