SPECIAL QUALITY DOUBLE TRIODE

M8137

Special quality high-μ double triode for use in equipment where 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

The heater is centre-tapped and the two sections may be operated in series or in parallel with one another.

Series — V_h applied between pins 4 and 5

Parallel — V_h applied between pin 9 and pins 4 and 5 connected together.

	Series	*Parallel*	
V_h[1]	12.6	6.3	V
I_h	150	300	mA

CAPACITANCES[2] (measured without an external shield)

*c_{a-g}	1.7	pF
*c_{in}	1.6	pF
$c_{out'}$	520	mpF
$c_{out''}$	400	mpF

*Each section

CHARACTERISTICS[3] (each section)

V_a	250	V
I_a	1.25	mA
V_g	−2.0	V
g_m	1.6	mA/V
μ	90	
r_a	56	kΩ
R_k	0	Ω

LIMITING VALUES[4] (absolute ratings) each section

$V_{a(b)}$ max.	550	V
V_a max.	330	V
p_a max.	1.1	W
I_k max.	20	mA
$-V_g$ max.	55	V
*$-V_{g(pulse)}$ max.	200	V ←
R_{g-k} max. (cathode bias)	2.2	MΩ
R_{g-k} max. (fixed bias)	1.0	MΩ
V_{h-k} max.	200	V
Maximum acceleration (continuous operation)	2.5	g
Maximum shock (short duration)	500	g
T_{bulb} max.	200	°C

*t_p = 800μs, Duty factor (max.) = 0.05

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TEST CONDITIONS (unless otherwise specified)

V_h (V)	V_a (V)	V_g (V)	R_k (Ω)	V_{h-k} (V)
12.6	250	−2.0	0	0

TESTS	A.Q.L.[5] (%)	Individuals[6] Bogey[9]	Individuals[6] Min.	Individuals[6] Max.	Lot average[7] Min.	Lot average[7] Max.	Lot standard deviation[8] Max.	
GROUP A								
Insulation								
a-rest, measured at −300V	0.25	—	100	—	—	—	—	MΩ
g-rest, measured at −100V	0.25	—	100	—	—	—	—	MΩ
Reverse grid current. R_g max. = 500kΩ	0.25	—	—	0.5	—	—	—	μA
GROUP B								
Heater current	0.65	—	138	162	—	—	—	mA
Heater to cathode leakage current								
V_{h-k} = 100V (cathode negative)	—	—	—	10	—	2.0	—	μA
V_{h-k} = 100V (cathode positive)	—	—	—	10	—	2.0	—	μA
Anode current	0.65	1.25	0.75	1.75	—	—	—	mA
	—	—	—	—	1.0	1.5	0.19	mA
Mutual conductance	0.65	1.6	1.25	2.05	—	—	—	mA/V
	—	—	—	—	1.425	1.775	0.136	mA/V
Anode current V_g = −4.0V	0.65	—	—	35	—	—	—	μA
Group quality level[10]	1.0	—	—	—	—	—	—	

GROUP C								
Anode current difference between sections	2.5	—	—	600	—	—	—	μA
Change in mutual conductance. V_h = 11.4V	2.5	—	—	15	—	—	—	%
Microphonic noise at the anode at 50c/s and 2g min. peak acceleration, V_b = 250V, R_a = 2kΩ, R_k = 1.5kΩ, C_k = 1000μF, V_{g-e} = 0V, both sections connected in parallel	2.5	—	—	25	—	—	—	mV (r.m.s.)
Group quality level[10]	6.5	—	—	—	—	—	—	
GROUP D								
Glass strain test[11A]. No applied voltages	6.5	—	—	—	—	—	—	
Base strain test[12]. No applied voltages	6.5	—	—	—	—	—	—	
Capacitances (unshielded). No applied voltages	6.5	—	—	—	—	—	—	
C_{in}	—	—	—	1.2	2.0	—	—	pF
$C_{out'}$	—	—	—	220	700	—	—	mpF
$C_{out''}$	—	—	—	180	600	—	—	mpF
C_{a-g}	—	—	—	1.27	2.12	—	—	pF
Amplification factor	6.5	—	75	115	—	—	—	
Grid emission V_h = 14V, R_g = 500kΩ	6.5	—	—	1.5	—	—	—	μA

TESTS	A.Q.L.[5] (%)	Individuals[6] Bogey[9]	Min.	Max.	Lot average[7] Min.	Max.	Lot standard deviation[8] Max.	
GROUP E								
Fatigue[14]								
V_h = 14V, 1 minute on 3 minutes off. No other voltages applied, 5g min. peak acceleration. f = 170c/s for 33 hours in each of 3 mutually perpendicular planes								
Post fatigue tests								
Heater to cathode leakage current. V_{h-k} = ±100V	2.5	—	—	30	—	—	—	μA
Reverse grid current. R_g max. = 500kΩ	2.5	—	—	1.5	—	—	—	μA
Microphonic noise as in group C	2.5	—	—	40	—	—	—	mV (r.m.s.)
Sub-group quality level[10]	6.5	—	—	—	—	—	—	
Shock[15]								
No applied voltages, 500g								
Post shock tests								
Heater to cathode leakage current. V_{h-k} = ±100V	2.5	—	—	30	—	—	—	μA
Reverse grid current. R_g max. = 500kΩ	2.5	—	—	1.5	—	—	—	μA
Microphonic noise as in group C	2.5	—	—	40	—	—	—	mV (r.m.s.)
Sub-group quality level[10]	6.5	—	—	—	—	—	—	
GROUP F								
Stability life test[14]								
Running conditions. R_g = 500kΩ, V_{h-k} = 135V (cathode negative)								

Stability life test end points

Change in mutual conductance after 1 hour	1.0	—	—	10	—	—	—	%

Intermittent life test

Running conditions $R_g = 500k\Omega$, $V_{h-k} = 135V$ (cathode negative)

Intermittent life test end points		*A.Q.L.*[5] (%)	*Min.*	*Max.*	
Sub-group (a)					
Inoperatives[16]	500 hours	2.5	—	—	
	1000 hours	4.0	—	—	
Heater current	500 hours	2.5	138	162	mA
Heater to cathode leakage. $V_{h-k} = \pm 100V$	500 hours	2.5	—	20	μA
	1000 hours	4.0	—	20	μA
Reverse grid current. R_g max. = 500kΩ	500 hours	2.5	—	0.5	μA
	1000 hours	4.0	—	0.5	μA
Mutual conductance	500 hours	2.5	1.15	2.05	mA/V
	1000 hours	4.0	1.12	2.05	mA/V
Average change in mutual conductance	500 hours	—	—	15	%
Sub-group (b)					
Anode current	500 hours	4.0	0.65	1.75	mA
	1000 hours	6.5	0.6	1.75	mA
Insulation as in group A	500 hours	4.0	50	—	MΩ
	1000 hours	6.5	30	—	MΩ
Group quality level[10]	500 hours	6.5	—	—	
	1000 hours	10	—	—	

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	A.Q.L.[5] (%)	Min.	Max.	
GROUP G				
Valves are held for 28 days and retested for Inoperatives[16]	0.5	—	—	
Reverse grid current. R_g max. = 500kΩ	0.5	—	0.5	μA

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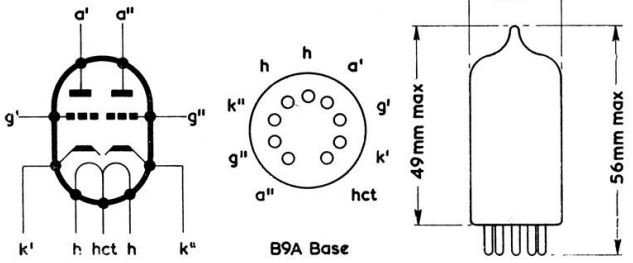

The bulb and base dimensions of this valve are in accordance with BS448, Section B9A