

SPECIAL QUALITY TETRODE THYRATRON

M8204

100mA special quality tetrode xenon thyatron with negative control characteristic 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 OPERATIONAL RECOMMENDATIONS - THYRATRONS and GENERAL NOTES - SPECIAL QUALITY THYRATRONS which precede this section of the handbook, and the index numbers are used to indicate where reference should be made to a specific note.

LIMITING VALUES³ (absolute ratings, not design centre)

It is important that these limits are never exceeded and such variations as mains fluctuations, component tolerances and switching surges must be taken into consideration in arriving at actual valve operating conditions.

	Relay service and grid-controlled rectifier	Pulse modulator service	
*Max. anode supply voltage	—	500	V
Max. peak anode voltage			
Inverse	1300	100	V
Forward	650	500	V
Max. cathode current			
Peak	0.5	10	A
Average (max. averaging time 30s)	100	10	mA
Surge (fault protection max. duration 0.1s)	10	10	A
Max. negative control-grid voltage			
Before conduction	100	100	V
During conduction	10	10	V
Max. average positive control-grid current for anode voltage more positive than -10V (averaging time 30s)	10	—	mA
Max. peak positive control-grid current during the time that the anode voltage is more positive than -10V	50	20	mA
Max. peak positive control-grid current during the time that the anode voltage is more negative than -10V	30	—	μA
Max. control-grid resistor	10	0.5	MΩ
Recommended min. control-grid resistor	100	—	kΩ
Max. negative shield-grid voltage			
Before conduction	100	50	V
During conduction	10	10	V

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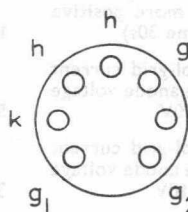
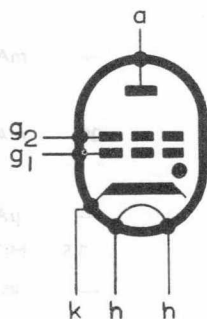
Max. average positive shield-grid current for anode voltage more positive than -10V (averaging time 30s)	10	—	mA
Max. shield-grid resistor	—	25	kΩ
Max. peak heater-to-cathode voltage			
Cathode negative	25	0	V
Cathode positive	100	0	V
Heater voltage	6.3V ± 10%	6.3V ± 10%	-5%
Min. valve heating time	20	20	s
Ambient temperature limits	-75 to +90	-75 to +90	°C
Max. pulse duration	—	5.0	μs
*Max. pulse repetition frequency	—	500	c/s
Max. duty cycle	—	0.001	
Max. rate of rise of current pulse	—	100	A/μs

*After completion of a pulse a 20μs delay is required before a positive voltage of more than 10V is applied to the anode.

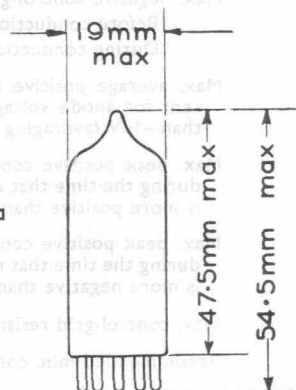
CAPACITANCES²

Anode to control grid	—	30	mpF
Control grid to cathode and shield grid	—	2.5	pF

4087



B7G Base



The bulb and base dimensions of this valve are in accordance with BS 448, Section B7G



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TEST CONDITIONS (unless otherwise specified)

V_h (V)	6.3
V_{g2} (V)	0

TESTS GROUP A

Heater current

Heater-to-cathode leakage current

 $V_{h-k} = 25V$ cathode negative $V_{b-k} = 100V$ cathode positive

*Grid 1 voltage $V_a = 460V_{r.m.s.}$, $R_{g1} = 100k\Omega$,
 $R_a = 3.0k\Omega$

*Grid 1 voltage $V_a = 460V_{r.m.s.}$, $R_{g1} = 10M\Omega$,
 $R_a = 3.0k\Omega$

*Anode voltage $V_{g1} = 0V$, $R_{g1} = 100k\Omega$, $R_a = 1.0k\Omega$

Anode voltage $V_h = 0V$, $V_{g1} = -100V$, $R_{g1} = 10k\Omega$

No breakdown must occur

Operation. I_{load} (pulse)

Measured at $V_{a(b)} = 500\text{V}$, $V_{a(pk)} = 1.0\text{kV}$,

 $V_{gI(pk)} = 100V, V_{gI} = -50V, R_{gI} = 10k\Omega,$ $R_{g2} = 75\text{k}\Omega$

P.R.F. = 500pps, $t_p = 2 \pm 0.2 \mu s$.

Modulator line impedance $Z_0 = 25\Omega$.

Load resistance = 20Ω , min. P.I.V. = 100V.

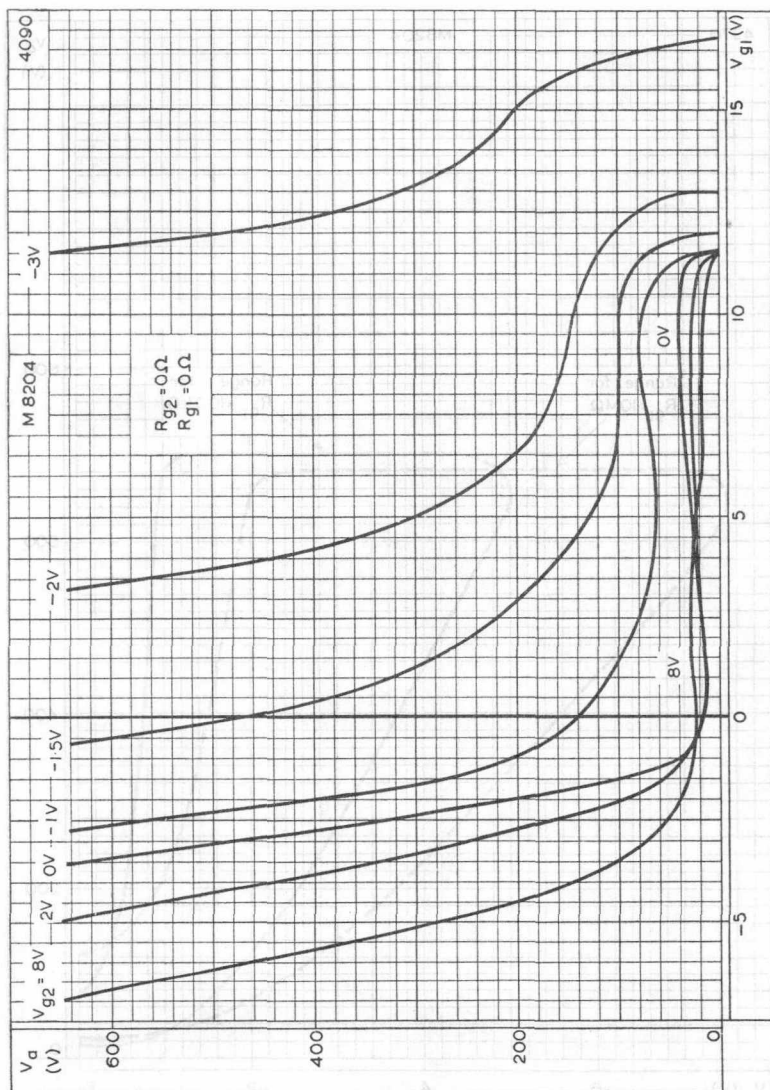
Pulse rise time = $0.2\mu s$ max.

Pulse fall time = $0.4\mu s$ max.

A.Q.L. ⁴ (%)	Bogey ⁸	Individuals ⁵ Min.	Max.	Lot average ⁶ Min.	Max.
{ 0.65 — }	600	540	660	567	633
0.65	—	—	15	—	—
0.65	—	—	15	—	—
{ 0.65 — }	3.7	2.9	4.5	—	—
—	—	—	—	-3.4	-4.0
0.65	4.2	—	-5.6	—	—
{ 0.65 — }	22	—	38	—	33
—	—	—	—	—	—
0.65	—	650	—	—	—
0.65	—	16	—	—	—



	A.Q.L. ⁴ (%)	Individuals ⁵ Bogey ⁸		Lot average ⁶	
		Min.	Max.	Min.	Max.
Pulse emission $V_h = 6.3V$, $V_a = V_{g2} = V_{g1} = 180 \pm 9V$, min. P.I.V. = 100V, $t_p = 5 \pm 0.25\mu s$, pulse rise time = $0.5\mu s$ max., pulse fall time = $1.0\mu s$ max., p.r.f. = 100 ± 5 pps. Pulse applied across valve and $10k\Omega$ resistor in series.	$\begin{cases} 0.65 \\ - \end{cases}$	—	76	—	—
Voltage measured across valve	1.0	—	—	—	65
Group quality level ⁹	...	...	...	...	...
*Adjust voltage to initiate conduction.					
GROUP B					
Inoperatives ¹⁴	0.4	—	—	—	—
GROUP C					
Insulation					
g_2 -a measured at $V_{a-g2} = \pm 380V$	2.5	—	760	—	—
*Anode voltage. $V_h = 5.7V$, $V_{g1} = 0V$, $R_{g1} = 100k\Omega$, $R_a = 1.0k\Omega$	$\begin{cases} 2.5 \\ - \end{cases}$	—	—	—	45
*Grid 1 voltage. $V_h = 7.0V$, $V_a = 460V_{r.m.s.}$, $R_{g1} = 10M\Omega$, $R_a = 3.0k\Omega$	6.5	—	—	—	—
(Following special pre-heat condition)					
*Grid 2 voltage. $V_a = 150V_{r.m.s.}$, $R_a = 1.0k\Omega$, $R_{g1} = 2.5k\Omega$ V_{g1} supply in phase with V_a supply, V_{g2} in antiphase: r.m.s. voltage	—	—	—	—	—
Vibration. No applied voltages. Vibrate for 60s at 25c/s 2.5g then repeat group B test	6.5	—	—	—	—
*Adjust voltage to initiate conduction.					

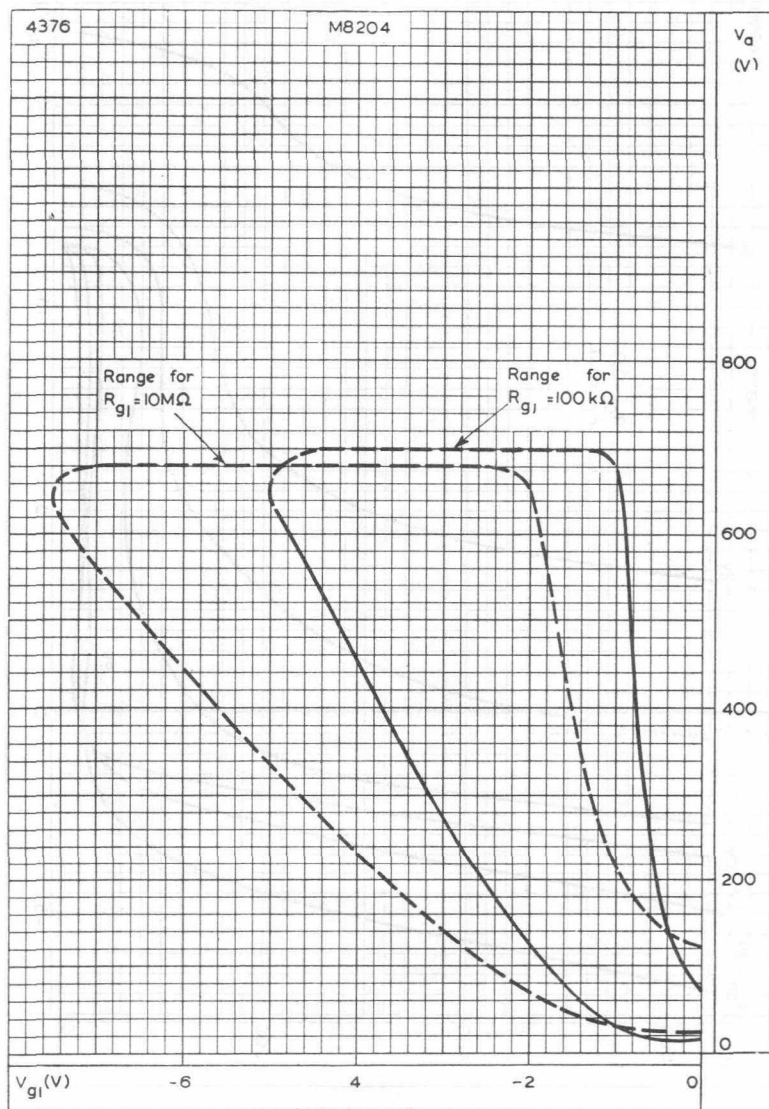


CONTROL CHARACTERISTIC



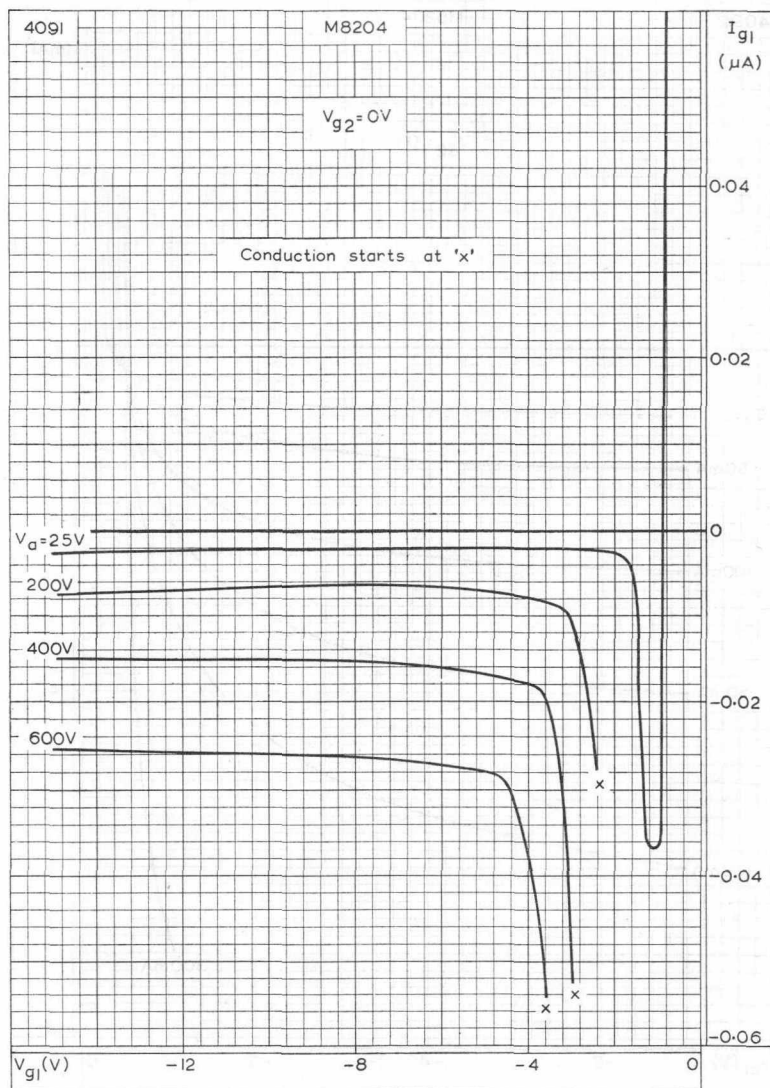
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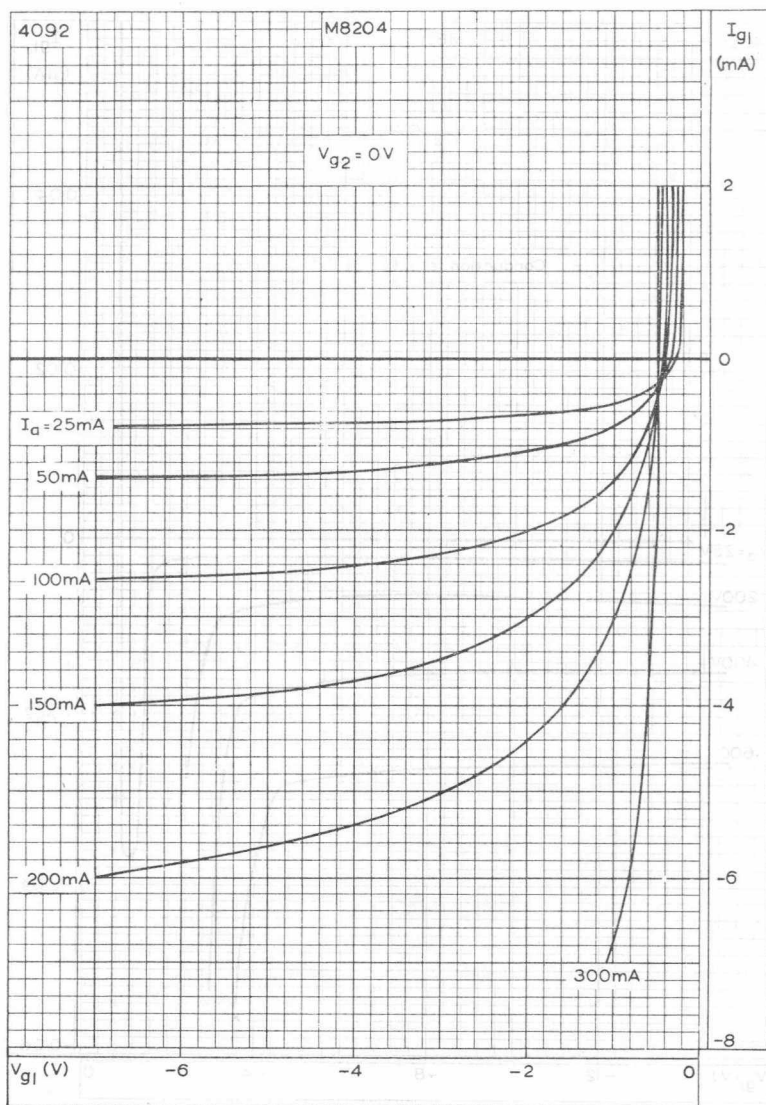


OPERATING RANGE OF CRITICAL CONTROL-GRID VOLTAGE





CONTROL-GRID CURRENT PLOTTED AGAINST CONTROL-GRID VOLTAGE
BEFORE CONDUCTION



CONTROL-GRID CURRENT PLOTTED AGAINST CONTROL-GRID VOLTAGE
DURING CONDUCTION