

# SPECIAL QUALITY V.H.F. POWER TETRODE

# M8096

*Special quality r.f. beam power tetrode for use at frequencies up to 175Mc/s 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

|         |     |    |
|---------|-----|----|
| $V_h^1$ | 6.0 | V  |
| $I_h$   | 750 | mA |

## CAPACITANCES<sup>2</sup> (measured without an external shield)

|            |       |     |
|------------|-------|-----|
| $C_{a-g1}$ | < 300 | mpF |
| $C_{1n}$   | 9.5   | pF  |
| $C_{out}$  | 4.5   | pF  |

## CHARACTERISTICS<sup>3</sup>

|               |      |          |
|---------------|------|----------|
| $V_a$         | 250  | V        |
| $V_{bp}$      | 0    | V        |
| $V_{g2}$      | 250  | V        |
| $V_{g1}$      | -7.5 | V        |
| $I_a$         | 45   | mA       |
| $I_{g2}$      | 4.5  | mA       |
| $g_m$         | 7.0  | mA/V     |
| $\mu_{g1-g2}$ | 16   |          |
| $R_k$         | 0    | $\Omega$ |

## LIMITING VALUES<sup>4</sup> (absolute ratings)

|                                             |     |      |
|---------------------------------------------|-----|------|
| $f$ max.                                    | 175 | Mc/s |
| $V_{a(b)}$ max.                             | 500 | V    |
| $V_a$ max.                                  | 300 | V    |
| $V_{g2(b)}$ max.                            | 500 | V    |
| $V_{g2}$ max.                               | 250 | V    |
| $-V_{g1}$ max.                              | 125 | V    |
| $p_a$ max.                                  | 12  | W    |
| $p_{g2}$ max.                               | 2.0 | W    |
| $I_k$ max.                                  | 60  | mA   |
| $i_{k(pk)}$ max.                            | 550 | mA   |
| $V_{h-k}$ max.                              | 100 | V    |
| Maximum acceleration (continuous operation) | 2.5 | g    |
| Maximum shock (short duration)              | 500 | g    |
| $T_{bulb}$ max.                             | 250 | °C   |

**TEST CONDITIONS** (unless otherwise specified)

| TESTS                                  |              |                 |                 |                 |                            |                       |                  |                          |      |                                             |
|----------------------------------------|--------------|-----------------|-----------------|-----------------|----------------------------|-----------------------|------------------|--------------------------|------|---------------------------------------------|
| $V_h$<br>(V)                           | $V_a$<br>(V) | $V_{bp}$<br>(V) | $V_{g2}$<br>(V) | $V_{g1}$<br>(V) | A.Q.L. <sup>5</sup><br>(%) | $R_k$<br>( $\Omega$ ) | $V_{h-k}$<br>(V) | Individuals <sup>6</sup> |      | Lot standard deviation <sup>8</sup><br>Max. |
| 6.0                                    | 250          | 0               | 250             | -7.5            |                            | 0                     | 0                | Bogey <sup>9</sup>       | Min. | Max.                                        |
| GROUP A                                |              |                 |                 |                 |                            |                       |                  |                          |      |                                             |
| Insulation                             |              |                 |                 |                 |                            |                       |                  |                          |      |                                             |
| a-rest, $g_2$ -rest measured at -300V  |              |                 |                 |                 |                            |                       |                  |                          |      |                                             |
|                                        |              |                 |                 | 0.25            |                            | —                     | 100              | —                        | —    | M $\Omega$                                  |
| g <sub>1</sub> -rest measured at -100V |              |                 |                 |                 |                            |                       |                  |                          |      |                                             |
|                                        |              |                 |                 | 0.25            |                            | —                     | 100              | —                        | —    | M $\Omega$                                  |
| Reverse grid-current                   |              |                 |                 |                 |                            |                       |                  |                          |      |                                             |
|                                        |              |                 |                 | 0.25            |                            | —                     | —                | 2.5                      | —    | $\mu$ A                                     |
| $R_{g1}$ max. = 100k $\Omega$          |              |                 |                 |                 |                            |                       |                  |                          |      |                                             |
| GROUP B                                |              |                 |                 |                 |                            |                       |                  |                          |      |                                             |
| Heater current                         |              |                 |                 |                 |                            |                       |                  |                          |      |                                             |
|                                        |              |                 |                 | 0.65            |                            | —                     | 690              | 810                      | —    | mA                                          |
| Heater to cathode leakage current      |              |                 |                 |                 |                            |                       |                  |                          |      |                                             |
|                                        |              |                 |                 | 0.65            |                            | —                     | —                | —                        | —    | —                                           |
| $V_{h-k}$ = 100V (cathode negative)    |              |                 |                 |                 |                            |                       |                  |                          |      |                                             |
|                                        |              |                 |                 | —               |                            | —                     | —                | 20                       | —    | $\mu$ A                                     |
| $V_{h-k}$ = 100V (cathode positive)    |              |                 |                 |                 |                            |                       |                  |                          |      |                                             |
|                                        |              |                 |                 | —               |                            | —                     | —                | 20                       | —    | $\mu$ A                                     |
| †Anode current                         |              |                 |                 |                 |                            |                       |                  |                          |      |                                             |
|                                        |              |                 | {               | 0.65            |                            | 45                    | 33               | 57                       | —    | mA                                          |
|                                        |              |                 |                 | —               |                            | —                     | —                | —                        | 39   | 4.6                                         |
| Screen-grid current                    |              |                 |                 |                 |                            |                       |                  |                          |      |                                             |
|                                        |              |                 |                 | 0.65            |                            | —                     | —                | 7.0                      | —    | mA                                          |
| Mutual conductance                     |              |                 |                 |                 |                            |                       |                  |                          |      |                                             |
|                                        |              |                 | {               | 0.65            |                            | 7.0                   | 5.6              | 9.0                      | —    | mA/V                                        |
|                                        |              |                 |                 | —               |                            | —                     | —                | —                        | 6.3  | 0.54                                        |
| Group quality level <sup>10</sup>      |              |                 |                 |                 |                            |                       |                  |                          |      |                                             |
|                                        |              |                 |                 | 1.0             |                            | —                     | —                | —                        | —    | —                                           |

Group quality level<sup>10</sup>  
When  $V_{g1}$  is applied in turn to pins 8 and 9,

no change in anode current should result.

## GROUP C

Anode current.  $V_{g1} = -15V$

Change in mutual conductance.  $V_h = 5.7V$

Microphonic noise at the anode at 50c/s and

2.5g min. peak acceleration,  $V_b = 250V$ ,  
 $R_a = 2.0k\Omega$ ,  $V_g = -15V$ .

Amplification factor ( $\mu_{g1-g2}$ )

\*Beam plate continuity test.  $V_{bp} = 250V$

Group quality level<sup>10</sup>

\*The anode and screen-grid currents should

change from the values obtained in group B

## GROUP D

Glass strain test<sup>11A</sup>. No applied voltages

Base strain test<sup>12</sup>. No applied voltages

Capacitances (unshielded). No applied voltages

$C_{a-g}$

$C_{in}$

$C_{out}$

Reverse grid current.  $V_h = 6.6V$ ,  $V_a = 300V$ ,  
 $V_{g2} = 250V$ ,  $I_a = 40mA$

Power oscillation.  $V_{a(b)} = 300V$ ,  $I_a = 50mA$ ,  
 $R_{g1} = 16k\Omega$ ,  $f = 135Mc/s$

Reverse screen-grid current.  $V_a = 0V$ ,  
 $I_{g2} = 10mA$ ,  $V_{g2} = 170V_{r.m.s.}$

\*Peak cathode current.  $V_{a(pk)} = V_{g1(pk)}$   
 $= V_{bp(pk)} = 200V$

\*The voltage waveform should be a half-sine wave.

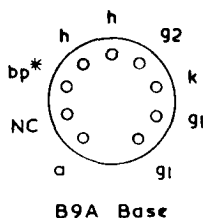
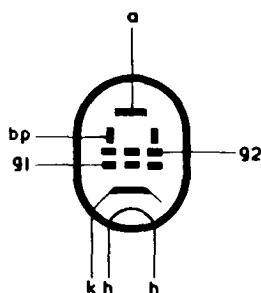
P.R.F. = 50p/s.,  $t_p$  max. = 12.5 $\mu s$ .



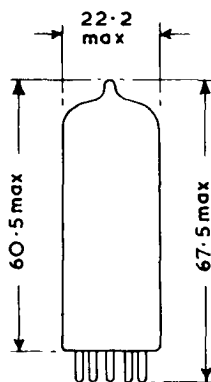


### GROUP G

|                                                                                    | A.Q.L. <sup>5</sup><br>(%) | Min. | Max.        |
|------------------------------------------------------------------------------------|----------------------------|------|-------------|
| Valves are held for 28 days and retested for<br>Inoperatives <sup>16</sup> .. .. . | 0.5                        | —    | —           |
| Reverse grid current. $R_{g1}$ max. = 100k $\Omega$                                | 0.5                        | —    | 2.5 $\mu$ A |



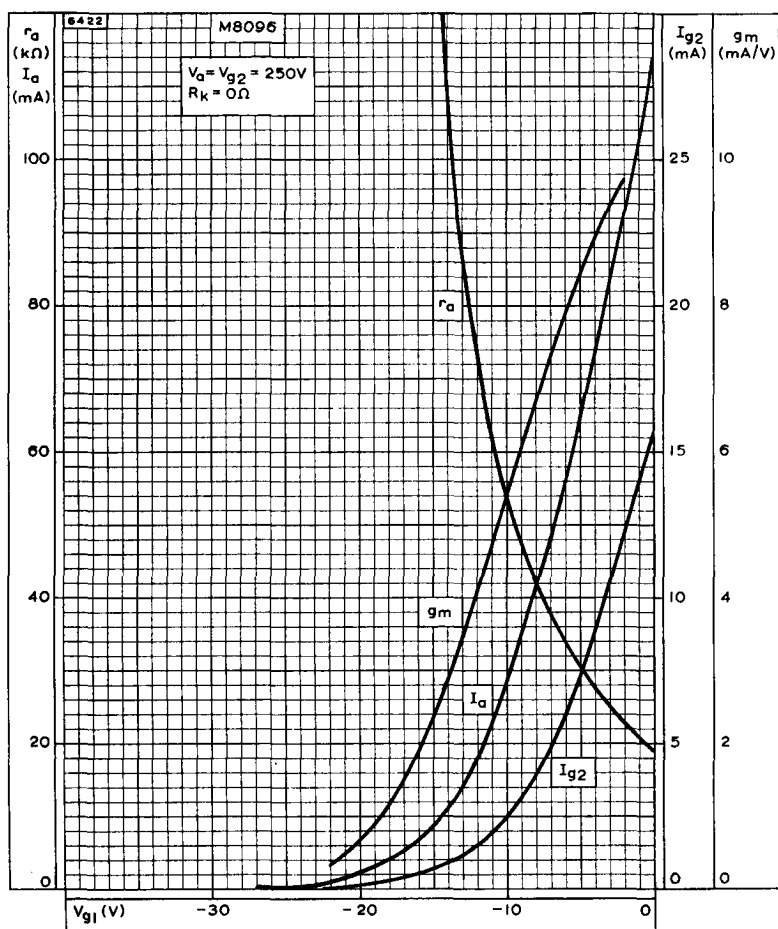
All dimensions in mm



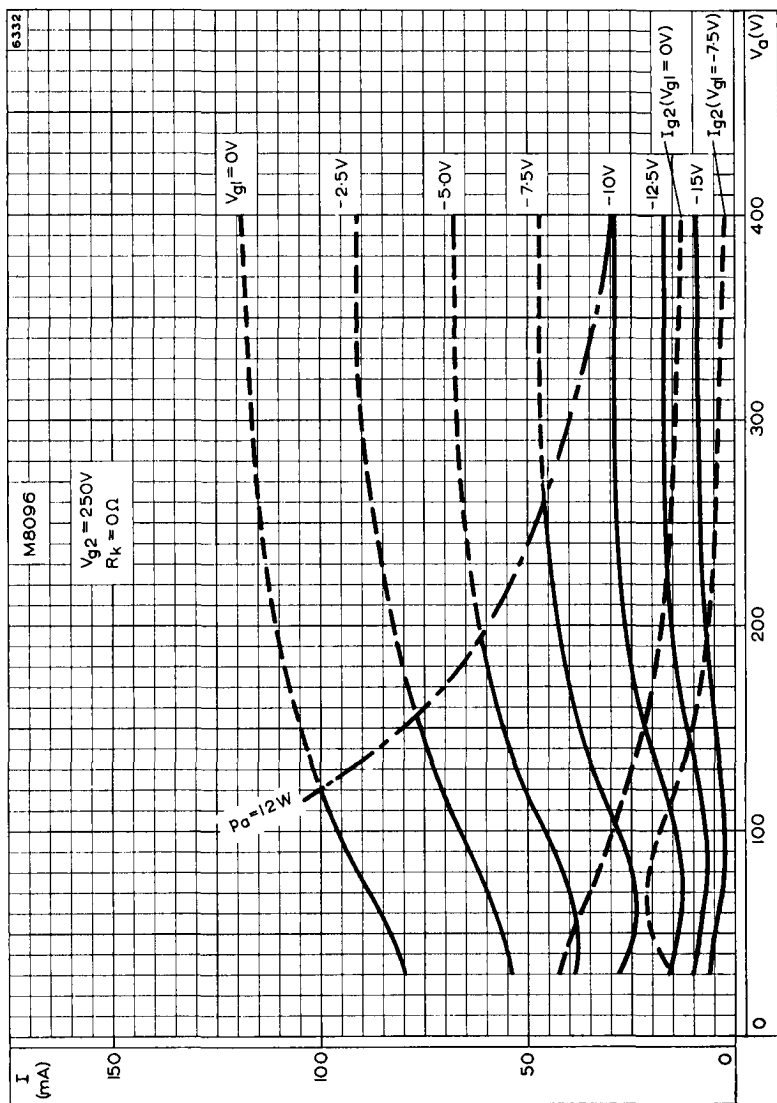
\* Connect contact 3 to contact 7 at socket.  
Contacts 8 and 9 should be connected to  
external circuit with leads of equal length.

6309

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



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



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