TUNG-SOL

TWIN TRIODE
MINIATURE TYPE

COATED UNIPOTENTIAL CATHODE

HEATER
6.3 VOLTS 0.35 AMP.
12.6 VOLTS 0.175 AMP.
AC OR DC
ANY MOUNTING POSITION

THE 5814WA IS A RUGGEDIZED, MEDIUM MU, TWIN TRIODE OF THE NINE PIN MINI-
ATURE CONSTRUCTION. THE TWO TRIODE SECTIONS ARE ELECTRICALLY INDEPENDENT,
ALLOWING SIMULTANEOUS USE OF THE TWO IN COMPLETELY DIFFERENT APPLICA-
TIONS. THE HEATER CENTER TAP PERMITS OPERATION FROM EITHER A 6.3 OR 12.6
VOLT SUPPLY. THE TUBE MAY BE ADAPTED TO SUCH APPLICATIONS AS VOLTAGE
AMPLIFIER, OSCILLATOR-MIXER COMBINATION, MULTIVIBRATOR, OR PHASE IN-
VERTER. CONTROLS ON THE PRODUCT AVERAGE FOR SUCH CHARACTERISTICS AS
PLATE CURRENT, TRANSCONDUCTANCE, AND AMPLIFICATION FACTOR ASSURE THAT
 THESE CRITICAL CHARACTERISTICS WILL REMAIN WELL CENTERED. SINCE IT MUST
BE ABLE TO WITHSTAND SEVERE MECHANICAL TESTS TO MEET TEST SPECIFICATIONS,
THE 5814WA IS ESPECIALLY SUITABLE FOR USE IN MILITARY OR INDUSTRIAL
AIRBORNE EQUIPMENT WHICH MAY BE SUBJECTED TO SEVERE SHOCK AND VIBRATION.

DIRECT INTERELECTRODE CAPACITANCES

<table>
<thead>
<tr>
<th>WITHOUT SHIELD</th>
<th>SECT. #1</th>
<th>SECT. #2</th>
<th>(\mu F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRID TO PLATE (RATED)</td>
<td>1.5</td>
<td>1.5</td>
<td>(\mu F)</td>
</tr>
<tr>
<td>INPUT (RATED)</td>
<td>1.6</td>
<td>1.6</td>
<td>(\mu F)</td>
</tr>
<tr>
<td>OUTPUT (RATED)</td>
<td>0.50</td>
<td>0.35</td>
<td>(\mu F)</td>
</tr>
</tbody>
</table>

RATINGS

<table>
<thead>
<tr>
<th></th>
<th>(6.3\pm10%)</th>
<th>(12.6\pm10%)</th>
<th>VOLTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEATER VOLTAGE</td>
<td>330</td>
<td>330</td>
<td>VOLTS</td>
</tr>
<tr>
<td>MAXIMUM DC PLATE VOLTAGE</td>
<td>3.0</td>
<td>3.0</td>
<td>VOLTS</td>
</tr>
<tr>
<td>MAXIMUM DC PLATE DISSIPATION (EACH SECTION)</td>
<td>200</td>
<td>200</td>
<td>VOLTS</td>
</tr>
<tr>
<td>MAXIMUM DC HEATER-CATHODE VOLTAGE</td>
<td>22</td>
<td>22</td>
<td>mA</td>
</tr>
<tr>
<td>MAXIMUM BULB TEMPERATURE</td>
<td>+165</td>
<td>+165</td>
<td>(^\circ)C</td>
</tr>
</tbody>
</table>

TYPICAL OPERATING CONDITIONS AND CHARACTERISTICS

CLASS A\(_2\) AMPLIFIER – EACH TRIODE SECTION

<table>
<thead>
<tr>
<th></th>
<th>(6.3)</th>
<th>12.6</th>
<th>6.3</th>
<th>12.6</th>
<th>VOLTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEATER VOLTAGE</td>
<td>6.3</td>
<td>12.6</td>
<td>6.3</td>
<td>12.6</td>
<td>VOLTS</td>
</tr>
<tr>
<td>HEATER CURRENT</td>
<td>0.35</td>
<td>0.175</td>
<td>0.35</td>
<td>0.175</td>
<td>AMP</td>
</tr>
<tr>
<td>PLATE VOLTAGE</td>
<td>100</td>
<td>250</td>
<td>100</td>
<td>250</td>
<td>VOLTS</td>
</tr>
<tr>
<td>GRID VOLTAGE (^B)</td>
<td>0</td>
<td>-8.5</td>
<td>0</td>
<td>-8.5</td>
<td>VOLTS</td>
</tr>
<tr>
<td>AMPLIFICATION FACTOR</td>
<td>19.5</td>
<td>17</td>
<td>19.5</td>
<td>17</td>
<td>VOLTS</td>
</tr>
<tr>
<td>PLATE RESISTANCE</td>
<td>6250</td>
<td>7700</td>
<td>6250</td>
<td>7700</td>
<td>OHMS</td>
</tr>
<tr>
<td>TRANSCONDUCTANCE</td>
<td>3100</td>
<td>2200</td>
<td>3100</td>
<td>2200</td>
<td>(\mu)HDS</td>
</tr>
<tr>
<td>PLATE CURRENT</td>
<td>11.8</td>
<td>10.5</td>
<td>11.8</td>
<td>10.5</td>
<td>mA</td>
</tr>
</tbody>
</table>

CONTINUED ON FOLLOWING PAGE
### Characteristics Range Values for Equipment Design

**E_F** = 32.6V, **E_B** = 250Vdc, **E_C** = -8.5Vdc  
*(except as modified below)*

<table>
<thead>
<tr>
<th></th>
<th><strong>Initial</strong></th>
<th><strong>500 Hour Life Test</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>MIN.</strong></td>
<td><strong>MAX.</strong></td>
</tr>
<tr>
<td><strong>Heater Current</strong></td>
<td>160</td>
<td>190</td>
</tr>
</tbody>
</table>
| **Heater-Cathode Leakage**<sup>C</sup>  
(Emk = 100Vdc) | 10          | ±10      | 10       | ±10      | μAde     |
| **Grid Current (I)**  
(Rg = 0.5 ohms) | 0           | -0.5     | 0        | -0.5     | μAde     |
| **Plate Current (I)**  
(Emk = 100Vdc) | 6.5         | 14.5     | 9.0      | 12.0     | mAde     |
| **Transconductance (1)**  
(Emk = 100Vdc) | 1750        | 2650     | 2000     | 2400     | 1600      | 2650     | μMhos   |
| **Δ AVG. Transconductance (1)** | 15          | percent  | 15       | percent  |
| **Insulation of Electrodes**<sup>D</sup>  
(Emk = 12.6V, E(g-n) = 100Vdc)  
R [g-n] = 300Vdc/megohms  
R [p-n] = 300Vdc/megohms) | 900         | 300      | 250      | 250      | MEGOHM |
| **Plate Current (2)**  
(Emk = -25Vdc) | 20         | 20       | 20       | 20       | μAde     |
| **Δ Transconductance (2)**<sup>S</sup>  
(Emk = 14V) | 15         | 15       | 15       | 15       | percent  |
| **Grid Current (2)**<sup>†</sup>  
(Emk = 4V) | 0           | -1.5     | 0        | -1.5     | μAde     |
| **Plate Current (3)**  
(Emk = 100Vdc, Ece = 0) | 2500        | 3700     | 2775     | 3425     | 2000      | 3700     | μMhos   |
| **Transconductance (3)** | 15.5        | 18.5     | 16.2     | 17.8     |          |          |         |
| **Amplification Factor** | 15          | 18.5     | 16.2     | 17.8     |          |          |         |

### Special Requirements

<table>
<thead>
<tr>
<th></th>
<th><strong>MIN.</strong></th>
<th><strong>MAX.</strong></th>
</tr>
</thead>
</table>
| **VARIABLE FREQUENCY VIBRATION**<sup>C</sup>  
(Rp = 2000) | 100      | mVac     |
| **VIBRATIONAL FATIGUE**<sup>S</sup> |            |          |
| **SHOCK**<sup>H</sup>  
(Hammer Angle = 30°, Emk = 100Vdc, Heater Positive,  
Rg = 0.4, MEG.) |          |          |
| **POST SHOCK AND VIBRATIONAL FATIGUE TEST END POINTS** |          |          |
| **LOW FREQUENCY VIBRATION**  
(Emk = 100Vdc, Ece = 0, Rp = 50,000) | 150      | mVac     |
| **GRID CURRENT**<sup>L</sup>  
(Emk = 14V) | 1.5       | μAde     |
| **CONTINUITY AND SHORT**<sup>J</sup> |            |          |
| **GLASS STRAIN**<sup>L</sup> |            |          |
| **RF NOISE**<sup> LC</sup>  
(Emk = -9Vdc, Eca = 7.0mVdc) | 3.0       | mW       |
| **NOISE AND MICROPHONICS**<sup> M</sup> | 50       | mVac     |
| **LOW FREQUENCY VIBRATION**<sup>C</sup>  
(Rp = 2000) | 100      | mVac     |
| **LOW PRESSURE VOLTAGE BREAKDOWN**<sup>K</sup>  
(Pressure = 50±5 mm Mercury, Temp. = 25±5°C,  
Humidity = 50%, Voltage = 500Vdc, 60 Cycles  
Sinusoidal Waveform) | 500      | Vac      |
| **1 HOUR STABILITY LIFE TEST**  
(Intermittent life test conditions) |          |          |
| **STABILITY LIFE TEST END POINTS**  
(Intermittent life test conditions or equivalent) |          |          | 10       | percent  |
SPECIAL REQUIREMENTS - CONT'D.

HEATER CYCLING LIFE TEST
\( E_E = 7.5V, \ E_{HK} = 135 \ Vdc \)
HEATER POSITIVE, \( E_C = E_{HK} \)

MIN. MAX.

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HEATER CYCLING LIFE TEST END POINTS
HEATER-CAPODE LEAKAGE

--- ±20 \( \mu A_{dc} \)

INTERMITTENT LIFE TEST
\( E_{HK} = 135 \ Vdc, \ \text{HEATER POS.}, \ R_g = 0.5 \ \text{MEG}, \)
MIN. BULB TEMP. \( = 165^\circ C \)

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NOTES

A. DIFFICULTY MAY BE ENCOUNTERED IF THIS TUBE IS OPERATED FOR LONG PERIODS OF TIME WITH VERY SMALL VALUES OF CATHODE CURRENT.

B. THE DC RESISTANCE IN THE GRID CIRCUIT UNDER RATED MAXIMUM CONDITIONS SHOULD NOT EXCEED 0.25.

C. TIE \( I_g \) TO \( 2p \), \( 1_g \) TO \( 2g \), \( 1_k \) TO \( 2_k \). (PARASITIC SUPPRESSORS OF 50 OHMS MAXIMUM PERMITTED.

D. SEE MIL-E-13C 4.9.2

E. PRIOR TO THIS TEST TUBES TO BE PREHEATED 5 MINUTES AT CONDITIONS INDICATED BELOW. TEST IMMEDIATELY AFTER PREHEATING. \( E_{E} = 24.5V, \ E_{C} = 8.0V, \ R_{g} = 0.5 \ \text{OMM}, \ E_{d} = 250 \ VOC, \ R_{d} = 0.5 \ \text{MEG}.

F. SEE MIL-E-13C 4.9.20.3

G. SEE MIL-E-13C 4.9.20.6

H. SEE MIL-E-13C 4.9.20.5

J. SEE MIL-E-13C 4.7.5

K. GLASS STRAIN TEST CONSISTS OF COMPLETELY SUBMERGING THE TUBE INTO BOILING WATER (97^\circ C-100^\circ C)
FOR A PERIOD OF 15 SECONDS. THEN IMMEDIATELY PLUNGING INTO COLD WATER (0^\circ C-8^\circ C). THE AMOUNT
OF WATER SHALL BE AT LEAST (2) LITERS PER 35 TUBES. TUBES FOR THIS TEST SHALL HAVE BEEN
EXHAUSTED A MINIMUM OF 48 HOURS PRIOR TO PERFORMANCE OF THIS TEST. REJECT FOR EVIDENCE OF AIR
LEAK.

L. SEE MIL-E-13C 4.10.3.1

M. SEE MIL-E-13C 4.10.3.5

N. THE CATHODE RESISTOR SHALL BE SHunted WITH A CAPACITIVE REACTANCE NOT EXCEEDING 3 OHM @ 60
CYCLES.

P. TIE CATHODES TOGETHER AND GROUND THRU A 1500 OHM RESISTOR. GRIDS ARE GROUNDED.

Q. SEE MIL-E-13C 4.9.20.4

R. BREAKDOWN SHALL BE DEFINED AS THE VOLTAGE AT WHICH ARcing OCCURS BETWEEN ANODE BASE PIN AND
ADJACENT PINS.

S. THE VALUE OF TRANSCONDUCTANCE \( (2) \) SHALL APPLY TO INDIVIDUAL TUBES AND IS EXPRESSED:
\[
\frac{(E_M AT 32.0) - (E_M AT 31.4)}{E_M AT 32.6} \times 100
\]