## MECHANICAL DATA

- Bulb: T-3
- Base: E8-I0, Subminiature Button Flexible Leads
- Outline: JETEC 3-1
- Basing: 8DK
- Cathode: Coated Unipotential
- Mounting Position: Any

## RATINGS' (Absolute Values)

- Impact Acceleration: 450 G
- Fatigue (Vibrational Acceleration for Extended Periods): 2.5 G
- Bulb Temperature (At Hottest Point): 165°C
- Altitude: 80000 Ft.

## ELECTRICAL DATA

### HEATER CHARACTERISTICS
- Heater Voltage: 6.3 V
- Heater Current: 150 mA
- Heater Power: 0.95 W

### DIRECT INTERELECTRODE CAPACITANCES

<table>
<thead>
<tr>
<th>Shielded</th>
<th>Unshielded</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grid to Plate</td>
<td>1.3 µf</td>
</tr>
<tr>
<td>Input</td>
<td>2.4 µf</td>
</tr>
<tr>
<td>Output</td>
<td>2.4 µf</td>
</tr>
</tbody>
</table>

### RATINGS' (Absolute Maximum)

- Plate Voltage: 165 Vdc
- Peak Plate Forward Voltage: 600 V
- Plate Dissipation: 2.2 W
- DC Grid Voltage
  - Positive: 5.5 Vdc
  - Negative: 5.5 Vdc
- Peak Grid Voltage
  - Positive: 27.5 V
  - Negative: 220 V
- Average Positive Grid Current: 5.5 mA
- Peak Positive Grid Current: 110 mA
- Heater-Cathode Voltage
  - Heater Positive with Respect to Cathode
    - Total DC and Peak: 200 V
    - DC: 100 Vdc
  - Heater Negative with Respect to Cathode
    - Total DC and Peak: 200 V
- Grid Circuit Resistance: 1.0 Meg

### AVERAGE CHARACTERISTICS

- Plate Voltage: 100 Vdc
- Grid Voltage: 0 Vdc
- Cathode Resistor: 150 Ohms
- Plate Current: 10 mA
- Transconductance: 6000 µmhos
- Amplification Factor: 29
- Plate Resistance: 4800 Ohms
- Plate Current at Conditions Ebb = 125 Vdc;
  - Ecc = +3 Vdc; Rp = 2700 Ohms;
  - Rg = 6000 Ohms
  - Cutoff with Ebb = 140 Vdc; Rp = 2700 Ohms;
  - Rg = 6000 Ohms; Grid Supply Voltage for
    - lb = 100 µAdc
    - -8.5 Vdc Max.

The Premium Subminiature Type 6814 is a sharp cutoff, medium mu triode intended primarily for application in electronic computers. The tube is characterized by high zero bias plate current and exceptional freedom from the development of cathode interface.

The 6814 is designed to provide dependable service under severe conditions of shock, vibration, high temperature and high altitude.
AVERAGE CHARACTERISTICS (Continued)

Interelectrode Resistance
- Plate to All at 300 Vdc; Ef = 6.3 V .................................................. 10 Meg Min.
- Grid to All at 100 Vdc; Ef = 6.3 V .............................................. 10 Meg Min.
- Cathode Positive so that no Cathode Emission Occurs .............

TIME DEPENDENT CHARACTERISTICS

- Minimum Number of Heater Cycles ............................................. 2500
- Regulation of Heater Supply .................................................. 3 Percent Max.
- Ef = 7.0 Vac .................................................................
- Ehk = 140 Vac .................................................................

NOTES:
1. Limitations beyond which normal tube performance and tube life may be impaired.
2. If altitude rating is exceeded, reduction of instantaneous voltages (Ef excluded) may be required.
3. Tube life and reliability of performance are directly related to the degree of regulation of the heater voltage to its center rated value of 6.3 volts.
4. External shield of 0.045 inch diameter connected to cathode.
5. Values shown are as registered with RETMA.
6. The ratings of peak characteristics apply to a square topped pulse of 1000 cps frequency and 1.0% duty factor.
7. Per MIL-E-IC Par. 6.5 and General Section of the Sylvania Subminiature Tube Manual titled Specifications and Ratings.
8. Heater Positive not recommended for reliable operation.

ACCEPTANCE CRITERIA

Test Conditions

- Heater Voltage ......................................................... 6.3 V
- Plate Voltage ......................................................... 100 Vdc
- Grid Voltage ........................................................... 0 V
- Heater-Cathode Voltage ............................................. 0 V
- Cathode Resistor MIL-E-1 Par. 3.2.2.1 .......................... 150 Ohms

For the purposes of inspection, use applicable reliable paragraphs of MIL-E-1 and Inspection Instructions for Electron Tubes.

<table>
<thead>
<tr>
<th>MIL-E-1 Ref.</th>
<th>Test Description</th>
<th>AQL (%)</th>
<th>Limits</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.10.8</td>
<td>Heater Current:</td>
<td>0.65</td>
<td>138</td>
<td>162</td>
</tr>
<tr>
<td>4.10.15</td>
<td>Heater-Cathode Leakage:</td>
<td>0.65</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>Ehk = +100 Vdc</td>
<td>—</td>
<td>—</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ehk = -100 Vdc</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>4.10.6.1</td>
<td>Grid Current:</td>
<td>0.65</td>
<td>0</td>
<td>-0.4</td>
</tr>
<tr>
<td></td>
<td>Eb = 150 Vdc; Rk = 220 Ohms; Rg = 1.0 Meg.</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>4.10.4.1</td>
<td>Plate Current (1):</td>
<td>0.65</td>
<td>14</td>
<td>15.5</td>
</tr>
<tr>
<td></td>
<td>Eb = 125 Vdc; Ecc = +3 Vdc; Rp = 2700 Ohms; Rg = 0.06 Meg.</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>4.10.5.2</td>
<td>Grid Voltage:</td>
<td>0.65</td>
<td>—</td>
<td>8.5</td>
</tr>
</tbody>
</table>
|              | Ebh = 140 Vdc; Rp = 2700 Ohms; 
|              | Rg = 0.06 Meg; Adj Ecc for Ib = 100 μA | —       | —      | —     | —     |
|              | Continuity and Shorts (Inoperatives): Note 2 | 1.0     | —      | —     | —     |
| 4.9.1        | Mechanical:     | —       | —      | —     | —     |
|              | Envelope (8-1) | —       | —      | —     | —     |
### ACCEPTANCE CRITERIA (Continued)

<table>
<thead>
<tr>
<th>MIL-E-1 Ref.</th>
<th>Test</th>
<th>Limits</th>
<th>Allowable Defectives per Characteristic</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Min.</td>
<td>LAL</td>
<td>Bogey</td>
</tr>
</tbody>
</table>

#### Measurements Acceptance Tests, Part 2

4.8.2 Insulation of Electrodes:
- g-all = 100 V.
- p-all = 300 V.
- 2.5

4.10.4.1 Plate Current (2):
- $E_f = 5.7 \text{ V}; E_{bh} = 125 \text{ Vdc}; E_{cc} = +3 \text{ Vdc};$
- $R_p = 2700 \text{ Ohms}; R_g = 0.06 \text{ Meg};$
- 2.5

4.10.6.2 Grid Emission: Note 5
- $E_f = 7.5 \text{ V}; R_g = 1.0 \text{ Meg}; R_k = 0 \text{ Ohms}; E_{cc} = -8.5 \text{ Vdc};$
- 2.5

4.10.9 Transconductance: Sm
- 2.5

4.10.11 Amplification Factor:
- 6.5

4.10.14 Plate Current (3):
- 6.5

4.9.12.1 Low Pressure Voltage Breakdown:
- Pressure = 20 ± 5 mm Hg; Voltage = 300 Vac.
- 6.5

4.9.19.1 Vibration:
- $F = 40 \text{ cps}; G = 15; R_p = 10,000 \text{ Ohms}; C_k = 1000 \mu\text{f};$
- 2.5

#### Degradation Rate Acceptance Tests, Note 3

4.9.5.3 Subminiature Lead Fatigue:
- 2.5

4.9.20.5 Shock:
- Hammer Angle = 30°
- 20

4.9.20.6 Fatigue:
- $G = 2.5; \text{ Fixed Frequency; } F = 25 \text{ min., } 60 \text{ max.}$
- 6.5

4.9.6.3 Glass Strain:
- 6.5

---

<table>
<thead>
<tr>
<th>MIL-E-1 Ref.</th>
<th>Test</th>
<th>Limits</th>
<th>Allowable Defectives per Characteristic</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Min.</td>
<td>LAL</td>
<td>Bogey</td>
</tr>
</tbody>
</table>

#### Acceptance Life Tests, Note 3

4.11.7 Heater Cycling Life Test:
- $E_f = 7.0 \text{ V}; \text{ 1 min. on, 4 min. off};$
- $E_{hk} = 140 \text{ Vac}; E_c = E_b = 0 \text{ V}.$
- 2.5

4.11.5 Intermittent Life Test: Note 4
- $E_b = 150 \text{ Vdc}; R_k = 220 \text{ Ohms};$
- $R_{gl} = 1.0 \text{ Meg}; T \text{ Envelope} = +165^\circ \text{C min.};$
- $E_{hk} = +200 \text{ Vdc}.$
### ACCEPTANCE CRITERIA (Continued)

<table>
<thead>
<tr>
<th>MIL-E-1 Ref.</th>
<th>Test</th>
<th>Allowable Defectives per Characteristic</th>
<th>Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1st Sample</td>
<td>Combined Samples</td>
</tr>
<tr>
<td>4.11.3.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.11.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermittent Life Test End Points: (300 Hours)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inoperatives</td>
<td>-</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Plate Current (1)</td>
<td>-</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Grid Voltage</td>
<td>-</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Grid Current</td>
<td>-</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Heater-Cathode Leakage</td>
<td>-</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Ehk = +100 Vdc</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Heater Current</td>
<td>-</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Insulation of Electrodes</td>
<td>-</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>g1-all</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>p-all</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total Defectives</td>
<td>-</td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

### Information Life Test, Note 6
- Interface Impedance Evaluation Life Test:
  - Continuous Operation for 500 Hours
  - Evaluation Life Test End Points: (300 Hours)
  - Note 7
  - Interface Impedance Z

### ACCEPTANCE CRITERIA NOTES:
1. The AQL for the combined defectives for attributes in Measurements Acceptance Tests, Part I, excluding inoperatives and mechanical shall be one (1) percent. A tube having one (1) or more defects shall be counted as one (1) defective.
2. All tubes shall be tested for continuity of all circuits, including duplicate pin connections to the same electrode; for shorts between any of the tube elements or between the elements and the no-connection base pins; and for air leaks.

Testing for shorts shall be performed using the Sylvania Automatic Tapper, BY-1379-A6. Each tube shall be tapped a total of six taps, three in each of two planes 90° apart. The tapper shall be adjusted so that the peak acceleration level delivered to the tube is 75 G's as measured with a Galton A-305 accelerometer and KA-1 kit. The shorts detecting equipment shall be a dc device capable of detecting as shorts the following interelement resistances of the given time durations.

<table>
<thead>
<tr>
<th>Interelement Resistance</th>
<th>Time Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.5 megohms or less</td>
<td>80 µsec or greater</td>
</tr>
<tr>
<td>2.2 megohms or less</td>
<td>27 µsec or greater</td>
</tr>
<tr>
<td>1.0 megohms or less</td>
<td>14 µsec or greater</td>
</tr>
<tr>
<td>0.1 megohms or less</td>
<td>4.5 µsec or greater</td>
</tr>
<tr>
<td>0.0001 ohms or less</td>
<td>2.5 µsec or greater</td>
</tr>
</tbody>
</table>

Continuity testing shall be performed with tapping of the tube as specified in MIL-E-1 Par. 4.7.3.

Tubes which give indication of one or more of the following shall be rejected without retesting:

(a) Any short during tapping
(b) Any open circuit
(c) Air leaks (defined in 5.3.6.1, Inspection Instructions for Electron Tubes).

3. Tubes subjected to the following destructive tests are not to be accepted under this specification:
   - 4.9.5.3 Subminiature lead fatigue
   - 4.9.20.5 Shock
   - 4.9.20.6 Fatigue
   - 4.11.7 Heater cycling life test
   - 4.11.5 Intermittent life test

4. Envelope temperature is defined as the highest temperature indicated when using a thermocouple of #40 BS or smaller diameter elements welded to a ring of 0.025 inch diameter phosphor bronze placed in contact with the bulb. Envelope temperature requirement will be satisfied if a tube, having bongy f (±5%) under normal test conditions, is determined to operate at maximum specified temperature at any position on the life rack.

5. Prior to this test, tubes shall be preheated five (5) minutes at conditions indicated below. Test within three (3) seconds after preheating. Three-minute test is not permitted. Grid Emission shall be the last test performed on the sample selected for the Grid Emission Test.

<table>
<thead>
<tr>
<th>Ef</th>
<th>Eb</th>
<th>Ec</th>
<th>Rk</th>
<th>Rg</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>Vdc</td>
<td>Vdc</td>
<td>Ohms</td>
<td>Meg</td>
</tr>
<tr>
<td>7.5</td>
<td>150</td>
<td>0</td>
<td>220</td>
<td>1.0</td>
</tr>
</tbody>
</table>

6. This life test shall be conducted on a minimum of one sample of ten tubes each month of production. Operate the life test tubes continuously. Read at 500 hours for information only.

7. Interface impedance measurements shall be made in accordance with Method B, the Frost Method, of ASTM Standard F300-SST, "Interface Impedance Characteristics of Vacuum Tube Cathodes". Preheat tubes to be tested for three minutes with EF = 6.3 V the only applied voltages every time interface impedance test is to be performed. Test with conditions EF = 6.3 V; Eb = 100 Vdc; Ec/1b = 1.0 mA; Easig = 0.2 V peak to peak square wave at 50 kc.
APPLICATION DATA

The Sylvania Premium Subminiature Type 6814 is a sharp cutoff, medium mu triode having high zero bias plate current. The Type 6814 is characterized by extremely tight controls on cutoff and zero bias plate current, making it especially well suited for multivibrator and/or frequency divider service in electronic computers. The Type 6814 also exhibits exceptional freedom from the development of cathode interface after long periods under off conditions, and freedom from momentary shorts. The heater-cathode construction is designed to provide dependable service under conditions of intermittent operation.

The Type 6814 is designed for long life and stable operation under conditions of severe shock, vibration, high altitude and high temperature and is manufactured and inspected to meet the applicable specification for reliability.

Life expectancy is described by the life tests specified on the attached pages and/or individual specification. The actual life expectancy of the tubes in an operating circuit is affected by both the operating and environmental conditions involved. Likewise, the life tests specified indicate performance under certain operating criteria to a set of specified end points. Performance at conditions other than those specified can usually be estimated only roughly as giving better or poorer life expectancy. For further discussion of life expectancy, reference should be made to the front section of this manual.

RESISTANCE COUPLED AMPLIFIER DATA

<table>
<thead>
<tr>
<th>Rb (megohms)</th>
<th>.047</th>
<th>.10</th>
<th>.27</th>
<th>.047</th>
<th>.10</th>
<th>.27</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ref (megohms)</td>
<td>.01</td>
<td>.027</td>
<td>.47</td>
<td>.27</td>
<td>.47</td>
<td>.27</td>
</tr>
<tr>
<td>Rk (ohms)</td>
<td>1500</td>
<td>1800</td>
<td>3000</td>
<td>3000</td>
<td>6200</td>
<td>10000</td>
</tr>
<tr>
<td>Ib (ma)</td>
<td>1.13</td>
<td>1.06</td>
<td>0.57</td>
<td>0.53</td>
<td>0.24</td>
<td>0.22</td>
</tr>
<tr>
<td>Ec (volts)</td>
<td>-1.69</td>
<td>-1.91</td>
<td>-1.88</td>
<td>-2.06</td>
<td>-1.93</td>
<td>-2.18</td>
</tr>
<tr>
<td>Eb (volts)</td>
<td>45.5</td>
<td>48</td>
<td>41</td>
<td>45</td>
<td>34</td>
<td>39</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ebb = 100 Volts</th>
<th>Ebb = 250 Volts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rb (megohms)</td>
<td>.047</td>
</tr>
<tr>
<td>Ref (megohms)</td>
<td>.01</td>
</tr>
<tr>
<td>Rk (ohms)</td>
<td>1500</td>
</tr>
<tr>
<td>Ib (ma)</td>
<td>1.13</td>
</tr>
<tr>
<td>Ec (volts)</td>
<td>-1.69</td>
</tr>
<tr>
<td>Eb (volts)</td>
<td>45.5</td>
</tr>
</tbody>
</table>

*Maximum signal for 5% distortion or 1/3 microampere grid current.

Resistance coupled amplifier circuit

The information presented on this data sheet is furnished without assuming any obligation.
AVERAGE TRANSFER CHARACTERISTICS

GRID VOLTAGE

TRANSCONDUCTANCE (gm) IN MICROMHOS

E = RATED VALUE

E = 200 VOLTS

100

150

gm