6CA4
TWIN DIODE
FOR FULL-WAVE POWER-RECTIFIER APPLICATIONS

DESCRIPTION AND RATING

The 6CA4 is a miniature, heater-cathode, twin diode for full-wave rectifier operation. High output current and small size make it especially suitable for compact amplifier designs.

GENERAL

Cathode—Coated Unipotential
Heater Voltage, AC or DC ........................................... 6.3 ± 10% Volts
Heater Current ...................................................... 1.0 Amperes

MECHANICAL

Mounting Position—Any
Envelope—T-6½, Glass
Base—E9-1, Small Button 9-Pin

MAXIMUM RATINGS

RECTIFIER SERVICE—DESIGN-MAXIMUM VALUES
Peak Inverse Plate Voltage ........................................ 1200 Volts
AC Plate-Supply Voltage per Plate—See Rating Chart 1
Steady-State Peak Plate Current per Plate ...................... 500 Milliamperes
Transient Peak Plate Current per Plate,
  Maximum Duration 0.2 Seconds .............................. 1.85 Amperes
DC Output Current—See Rating Chart 1
Heater-Cathode Voltage
  Heater Negative with Respect to Cathode .................. 500 Volts

Design-Maximum ratings are limiting values of operating and environmental conditions applicable to a bogey tube of a specified type as defined by its published data, and should not be exceeded under the worst probable conditions.

These values are chosen by the tube manufacturer to provide acceptable serviceability of the tube, taking responsibility for the effects of changes in operating conditions due to variations in the characteristics of the tube under consideration.

The equipment manufacturer should design so that initially and throughout life no design-maximum value for the intended service is exceeded with a bogey tube under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, variation in characteristics of all other tubes in the equipment, equipment control adjustment, load variation, signal variation, and environmental conditions.

The tubes and arrangements disclosed herein may be covered by patents of General Electric Company or others. Neither the disclosure of any information herein nor the sale of tubes by General Electric Company conveys any license under patent claims covering combinations of tubes with other devices or elements. In the absence of an express written agreement to the contrary, General Electric Company assumes no liability for patent infringement arising out of any use of the tubes with other devices or elements by any purchaser of tubes or others.

GENERAL ELECTRIC
CHARACTERISTICS AND TYPICAL OPERATION

FULL-WAVE RECTIFIER WITH CAPACITOR-INPUT FILTER

<table>
<thead>
<tr>
<th>AC Plate-Supply Voltage per Plate, RMS</th>
<th>250</th>
<th>300</th>
<th>350</th>
<th>Volts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filter Input Capacitor</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>Microfarads</td>
</tr>
<tr>
<td>Total Plate-Supply Resistance per Plate</td>
<td>150</td>
<td>200</td>
<td>240</td>
<td>Ohms</td>
</tr>
<tr>
<td>DC Output Current</td>
<td>150</td>
<td>150</td>
<td>150</td>
<td>Milliamperes</td>
</tr>
<tr>
<td>DC Output Voltage at Filter Input</td>
<td>245</td>
<td>293</td>
<td>347</td>
<td>Volts</td>
</tr>
</tbody>
</table>

Tube Voltage Drop

\[ I_b = 150 \text{ Milliamperes DC per Plate} \]

\[ \text{Design-Maximum Ratings} \]

To simplify the application of the maximum ratings to circuit design, the Design-Maximum ratings are presented in chart form as Rating Charts I, II, and III. Rating Chart I presents the maximum ratings for a-c plate supply voltage and d-c output current. Rating Chart II provides a convenient method for checking conformance with the maximum steady-state peak-plate-current rating. Rating Chart III offers a convenient method for checking conformance with the maximum transient peak-plate-current rating. Rating Chart I applies to both capacitor-input and choke-input filters, while Rating Charts II and III apply to capacitor-input filters only.

Operating points should be so selected that the boundary limits of a-c plate supply voltage and d-c output current on Rating Chart I, and maximum d-c output current per plate and rectification efficiency on Rating Chart II, are not exceeded with a bogy tube under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, equipment control adjustment, and environmental conditions. On Rating Chart I the boundary FAEDG defines the limits for capacitor-input filter operation, and the boundary FABCDG defines the limits for choke-input filter operation.

Rating Chart III shows the minimum value of plate supply resistance \( R_p \) required to remain within the transient peak-plate-current rating. The value of \( R_p \) should be such that it lies to the left of the line on Rating Chart III at the highest probable value of line voltage.

![Rating Chart I](image-url)
RATING CHART II

FOR CAPACITOR-INPUT FILTER
THE BOUNDARY CURVE IS BASED ON A STEADY-STATE PEAK PLATE CURRENT OF 0.5 AMPERE MAXIMUM PER PLATE.

RECTIFICATION EFFICIENCY = \frac{E}{E_s}

WHERE E = DC OUTPUT VOLTAGE AT FILTER INPUT
E_s = RMS SUPPLY VOLTAGE PER PLATE

RATING CHART III

FOR CAPACITOR-INPUT FILTER
THE VALUES OF R_s ARE BASED ON A TRANSIENT (HOT SWITCHING) PEAK PLATE CURRENT OF 1.05 AMPERES MAXIMUM PER PLATE.

R_s = R_{sec} + N^2R_{pri} + R_A

WHERE
R_s = PLATE SUPPLY RESISTANCE PER PLATE
R_{sec} = DC RESISTANCE OF TRANSFORMER SECONDARY PER SECTION
R_{pri} = DC RESISTANCE OF TRANSFORMER PRIMARY
R_A = DC RESISTANCE OF ADDED SERIES RESISTANCE PER PLATE
N = TRANSFORMER VOLTAGE STEP-UP RATIO PER SECTION

IF SERIES INDUCTANCE IS PRESENT IN THE PLATE SUPPLY, IT IS PERMISSIBLE TO USE A SMALLER-THAN-INDICATED VALUE OF R_s PROVIDING THE RATED MAXIMUM VALUE OF TRANSIENT PEAK PLATE CURRENT IS NEVER EXCEEDED.
OPERATION CHARACTERISTICS
FULL-WAVE RECTIFIER WITH CHOKE-INPUT FILTER

\[ E_f = \text{RATED VALUE} \]
(Boundary line CBA is same as shown on rating chart I)

DC OUTPUT VOLTAGE AT INPUT TO FILTER IN VOLTS

\[ 500 \]
\[ 400 \]
\[ 300 \]
\[ 200 \]
\[ 100 \]

DC OUTPUT CURRENT IN MILLIAMPERES

\[ 250 \]
\[ 200 \]
\[ 150 \]
\[ 100 \]
\[ 50 \]
\[ 0 \]