



TUBES

— PRODUCT INFORMATION —

Compactron Diode

3BW2

**FOR TV HIGH-VOLTAGE
RECTIFIER APPLICATIONS**

- COLOR TV TYPE
- 30000 VOLTS DC
- 2.2 MILLIAMPERES DC
- DIFFUSION BONDED CATHODE
- X-RADIATION RATING

The 3BW2 is a heater-cathode type diode designed for use in color television receivers as the high-voltage rectifier to supply power to the anode of the picture tube. Features of the tube include a diffusion bonded cathode coating to minimize reverse emission failures, and X-radiation controls.

The diffusion bonded cathode coating practically eliminates one of the major failure mechanisms in high-voltage rectifiers, which is back-emission from the anode due to emissive particles being pulled from the cathode by the very high electrostatic field.

The 3BW2 features built-in X-radiation shielding and additional design and specification controls for the reduction of X-radiation output.

GENERAL

ELECTRICAL

Cathode - Coated Unipotential

Heater Characteristics and Ratings

Heater Voltage, AC or DC * 3.15 ± 0.5 Volts

Heater Current • 0.48 Amperes

Direct Interelectrode Capacitances, approximate †

Plate to Heater, Cathode, and Internal Shield:

p to (h+k+i.s.) 1.6 pf

MECHANICAL

Operating Position - Any

Envelope - T-9, Glass

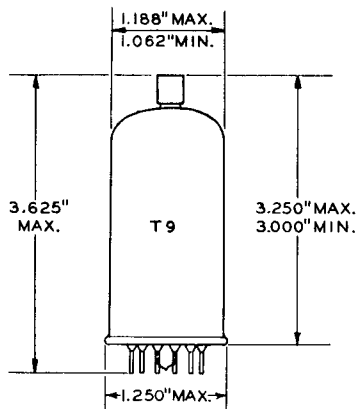
Base - E12-70, Button 12-Pin

Top Cap - C1-49, Small

Outline Drawing

Maximum Bulb Diameter	1.188	Inches
Maximum Seal Diameter	1.250	Inches
Minimum Diameter	1.062	Inches
Maximum Over-all Length	3.625	Inches
Maximum Seated Height	3.250	Inches
Minimum Seated Height	3.000	Inches

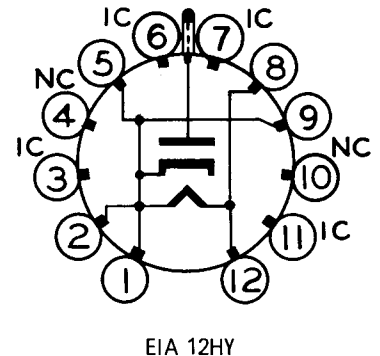
PHYSICAL DIMENSIONS



TERMINAL CONNECTIONS ▲

- Pin 1 - Heater, Cathode and Internal Shield
- Pin 2 - Heater, Cathode and Internal Shield
- Pin 3 - Internal Connection - Do Not Use
- ▲ Pin 4 - No Connection
- Pin 5 - Heater, Cathode and Internal Shield
- Pin 6 - Internal Connection - Do Not Use
- Pin 7 - Internal Connection - Do Not Use
- Pin 8 - Heater
- Pin 9 - Heater, Cathode and Internal Shield
- ▲ Pin 10 - No Connection
- Pin 11 - Internal Connection - Do Not Use
- Pin 12 - Heater
- Cap - Plate

BASING DIAGRAM



Supersedes PI Sheet dated 8-69

MAXIMUM RATINGS

FLYBACK RECTIFIER SERVICE[®]—DESIGN-MAXIMUM VALUES UNLESS OTHERWISE STATED

Peak Inverse Voltage		
DC Component (Absolute-Maximum Value).....	30000	Volts
Total DC and Peak (Absolute-Maximum Value).....	38000	Volts
Steady-State Peak Plate Current	110	Milliamperes
DC Output Current.....	2.2	Milliamperes
Heater Voltage, AC or DC (Absolute-Maximum Value) §	3.65	Volts
Heater Voltage, AC or DC (Absolute-Minimum Value).....	2.65	Volts

<p>Design-Maximum ratings are limiting values of operating and environmental conditions applicable to a bogey electron tube of a specified type as defined by its published data and should not be exceeded under the worst probable conditions.</p> <p>The tube manufacturer chooses these values to provide acceptable serviceability of the tube, making allowance for the effects of changes in operating conditions due to variations in the characteristics of the tube under consideration.</p>	<p>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, equipment control adjustment, load variation, signal variation, environmental conditions, and variations in the characteristics of all other electron devices in the equipment.</p>
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<p>Absolute-Maximum ratings are limiting values of operating and environmental conditions applicable to any electron tube of a specified type as defined by its published data and should not be exceeded under the worst probable conditions.</p> <p>The tube manufacturer chooses these values to provide acceptable serviceability of the tube, making no allowance for equipment variations, environmental variations, and the effects of changes in operating conditions due to variations in the characteristics of the tube under consideration and of</p>	<p>all other electron devices in the equipment.</p> <p>The equipment manufacturer should design so that initially and throughout life no absolute-maximum value for the intended service is exceeded with any tube under the worst probable operating conditions with respect to supply-voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, environmental conditions, and variations in the characteristics of the tube under consideration and of all other electron devices in the equipment.</p>
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AVERAGE CHARACTERISTICS

Tube Voltage Drop, approximate		
I _b = 7.0 Milliamperes	70	Volts

X-RADIATION RATING[®]

X-radiation, maximum	25	mR/hr
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Based on accumulated sample test data taken initially and during life test, tubes do not exceed the maximum rating limit of 25 mR/hr at any time throughout their useful life, when operated within the maximum ratings, including heater voltage, specified on this data sheet.

This X-radiation maximum rating is based on the use of the Victoreen 440 RF/C survey meter as the standard instrument for X-radiation measurement. X-radiation is measured with the plastic spacer of the 440 RF/C survey meter at a distance of four (4) inches from the external surface of the tube under test.

This rating information is not necessarily applicable when a different radiation measuring instrument is used.

Operation of the 3BW2 outside of the Absolute-Maximum Ratings indicated may damage the tube and/or result in either temporary or permanent changes in the X-radiation characteristics of the tube. Equipment design must be such that these Absolute-Maximum Ratings are not exceeded.

The General Electric Company makes no representation concerning the X-radiation output from these tubes when operated beyond the maximum ratings set forth herein.

X-RADIATION CHARACTERISTICS

The 3BW2 will produce varying levels of X-radiation depending on operating conditions. Based on known attenuation factors of tube construction materials and accumulated sample test data taken initially and during life test, X-radiation output is not expected to exceed the maximum expected values indicated below for the different values of total DC and peak inverse voltage, with all other operating conditions remaining constant.

TOTAL DC AND PEAK INVERSE VOLTAGE	MAXIMUM EXPECTED X-RADIATION OUTPUT
38 KV (30 KV Maximum DC Component)	25.0 mR/hr
33 KV (27 KV Maximum DC Component)	3.0 mR/hr
30 KV (25 KV Maximum DC Component)	0.5 mR/hr

The above X-radiation characteristics are measured in accordance with JEDEC Publication No. 67A, "Recommended Practice for Measurement of X-radiation from Receiving Tubes," and controlled in accordance with JEDEC Publication No. 73A, "Recommended Practice for Quality Control of X-radiation from High Voltage Rectifier and Shunt Regulator Receiving Tubes."

WARNING

X-RADIATION

The high voltages associated with the 3BW2 result in production of X-radiation which may constitute a health hazard on prolonged exposure at close range unless the tube is adequately shielded. Equipment design must provide for this shielding.

Precautions must be exercised during the servicing of equipment employing the 3BW2 to assure that the high voltage is adjusted to the recommended value and that any shielding components are replaced to their intended positions before the equipment is operated.

SHOCK HAZARD

The high voltages at which the 3BW2 is operated can be extremely dangerous to the user or serviceman. Extreme care should be taken in the use of and for the servicing and adjustment of any high voltage circuit.

Precautions must be exercised during the replacement or servicing of the 3BW2 in equipment to assure that the high voltage output terminal is properly grounded while inserting or removing the tube from its socket or while connecting or disconnecting the top cap connector.

THE EQUIPMENT MANUFACTURER SHOULD PROVIDE A WARNING LABEL IN AN APPROPRIATE POSITION ON THE EQUIPMENT TO ADVISE THE SERVICEMAN OF ALL PRECAUTIONS HEREIN.

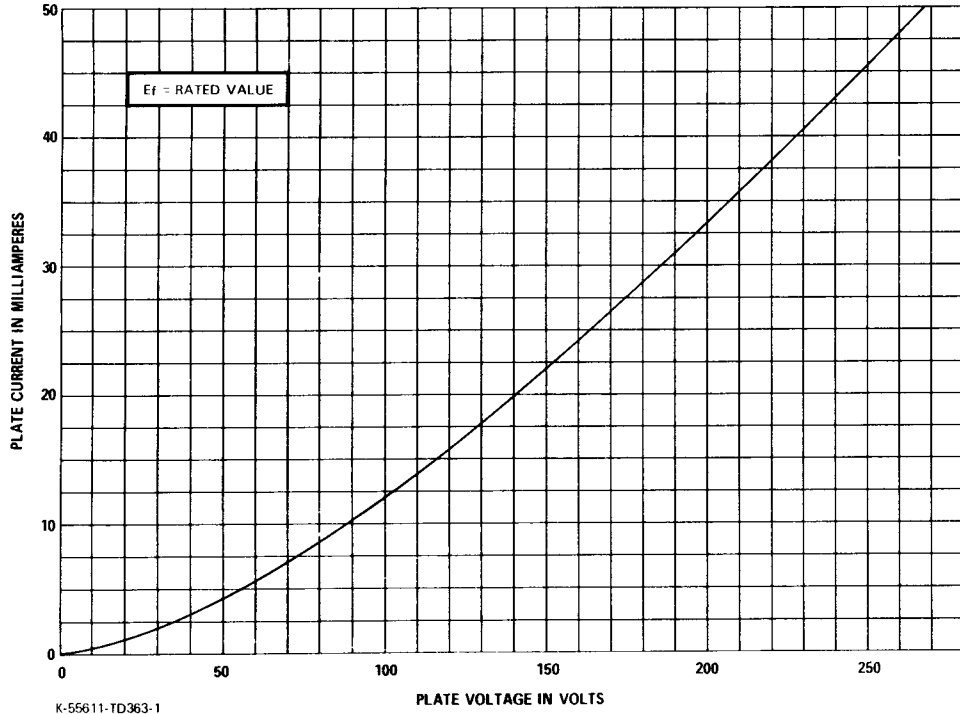
NOTES

- ★ The equipment designer should design the equipment so that heater voltage is centered at the specified bogey value, with heater supply variations restricted to maintain heater voltage within the specified tolerance.
- Heater current of a bogey tube at $E_f = 3.15$ volts.
- ◆ Without external shield.
- ▲ Socket terminals 4 and 10 may be used as tie points for components at or near heater potential.
- ⊕ For operation in a 525-line, 30-frame television system as described in "Standards of Good Engineering Practice Concerning Television Broadcast Stations," Federal Communications Commission. The duty cycle of the voltage pulse must not exceed 15 percent of one scanning cycle.
- § **CAUTION** - Operation of this tube for an extended period of time with the heater voltage above the absolute maximum rated value of 3.65 volts may result in the production of X-radiation in excess of the maximum rated limit of 25 mR/hr.

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.

AVERAGE PLATE CHARACTERISTICS



TUBE PRODUCTS DEPARTMENT
GENERAL  **ELECTRIC**
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