6EN4

Sharp-Cutoff Beam Triode

High-Voltage, Low-Current Type Shunt Voltage-Regulator For DC Power Supplies in Color-TV Receivers

Designed to minimize X-radiation.

Max. DC Plate Volts = 30000 V

Max. Plate Dissipation = 40 watts

ELECTRICAL CHARACTERISTICS – Bogey Values

Heater Voltage, ac or dc	E_h	6.3	V
Heater Current	I_h	0.2	A
Direct Interelectrode Capacitances (approx.)			
Grid to plate	$c_{g\text{-}p}$	1.0	pF
Input: G to (K,H)	c_i	2.6	pF
Output: P to (K,H)	c_o	1.0	pF
Amplification Factor (Approx.)	μ	2000	

MECHANICAL CHARACTERISTICS

Maximum Overall Length	5.00 in (127.0 mm)
Maximum Seated Length	4.4375 in (112.7 mm)
Maximum Diameter	1.562 in (39.6 mm)
Envelope	JEDEC T12
Cap	Small (JEDEC No. C1-50)
Base	Short Medium-Shell Octal 8-Pin With External Barriers, Style B (JEDEC Group 1, No. B8-118)
Terminal Diagram	JEDEC 8NH
Type of Cathode	Coated Unipotential
Operating Position	Any

MAXIMUM RATINGS[a]

SHUNT VOLTAGE-REGULATOR SERVICE

DC Plate Voltage (absolute maximum)	E_b	30000	V
Unregulated DC Supply Voltage	E_{bb}	60000	V
Grid Voltage:			
Negative dc value	$-E_c$	135	V
Negative peak value for 20 seconds maximum during equipment warm-up period	$-E_{cm}$	440	V
DC Plate Current (absolute maximum)	I_b	1.6	mA
Plate Dissipation (absolute maximum)	P_b	40	W
Peak heater-cathode voltage:			V
Heater negative with respect to cathode	$-E_{hk}$	450[b]	V
Heater positive with respect to cathode	$+E_{hk}$	Not Recommended	

Heater Voltage (absolute maximum)	E_h	6.9	V
Heater Voltage (absolute minimum)	E_h	5.7	V

MAXIMUM CIRCUIT VALUES:

Grid-Circuit Resistance	$R_{g(CKT)}$	3	MΩ

Typical Operation:

As Shunt Voltage-Regulator Tube in Accompanying Circuit

Unregulated Supply:		
DC Voltage	36000	V
Equivalent resistance	11	MΩ
Voltage Divider Values:		
R_1 (5 watts)	220	MΩ
R_2 (2 watts)	1	MΩ
R_3 (½ watt)	0.82	MΩ
Reference Voltage Supply:		
DC Value	200	V
Equivalent resistance	1000	Ω
Effective Grid-Plate Transconductance	200	μmhos
DC Plate Current:		
For load current of 0 ma	1000	μA
For load current of 1 ma	45	μA
Regulated DC Output Voltage:		
For load current of 0 ma	25000	V
For load current of 1 ma	24500	V

[a] As defined in the current issue of EIA Standard RS-239A.

[b] Sufficient impedance should be used in series with the cathode to limit the cathode current under prolonged short-circuit conditions to 450 mA. This protective impedance will minimize the danger of heater burnout in case of a momentary internal arc within the tube.

CHARACTERISTIC RANGE VALUES FOR EQUIPMENT DESIGN

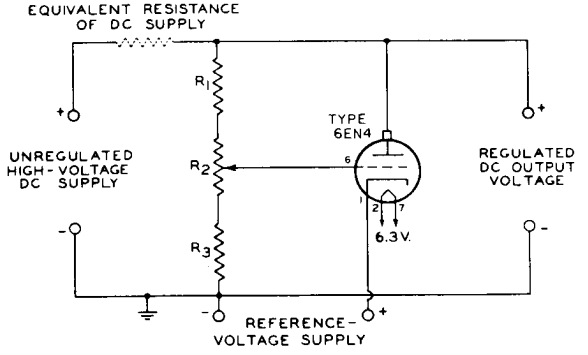
	Note	*Min.*	*Max.*	
Grid Voltage (1)	1	-7	-	V
Grid Voltage (2)	2	-	-40	V
Grid Voltage Change	3	-	9	V

Note 1: With dc plate voltage of 30000 V and dc plate current of 1 mA.

Note 2: With dc plate voltage of 30000 V and dc plate current of 0.1 mA.

Note 3: Difference between grid voltage (1) and grid voltage (2).

SHUNT VOLTAGE-REGULATOR CIRCUIT



Typical performance data for this basic circuit with certain characteristics of the unregulated dc supply and related voltage-divider values are given in the tabulated data. Other combinations are feasible within the maximum ratings and the maximum circuit values for the 6EN4.

OPERATING CONSIDERATIONS

The *base pins* of the 6EN4 fit the standard octal socket. Socket terminals for pins 3, 4 and 8 *should not be used for tie points.* If this precaution is not followed, tube performance may be adversely affected.

The 6EN4 may exhibit a blue glow on the upper half of the inner surface of the bulb wall under normal operating conditions. This effect is caused by fluorescence and is not to be mistaken for gas.

The *plate* of the 6EN4 shows a dull red color when the tube is operated at maximum plate dissipation. Connection to the plate cap should be made by a suitable connector with flexible lead to prevent any strain on the seal of the cap.

The *bulb* of the 6EN4 becomes hot during operation. To insure adequate cooling, it is essential that free circulation of air be provided around the 6EN4. The bulb will eventually darken during service. This darkening is normal and has no effect on tube performance.

X-RADIATION CHARACTERISTIC

X-Radiation, Maximum

Statistical Value Controlled On A Lot
Sampling Basis 0.5mR/hr

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

Operation of the 6EN4 outside of the absolute values indicated above may result in either temporary or permanent changes in the X-radiation characteristic of the tube. Equipment design must be such that these absolute values are not exceeded.

WARNING

X-Radiation

The high voltage associated with the 6EN4 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 6EN4 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

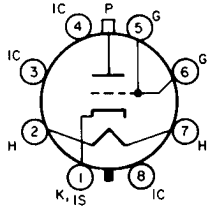
The high voltages at which the 6EN4 is operated can be extremely dangerous to the user or serviceman. Extreme care should be taken in the use of, and for the servicing and adjustment of, any high voltage circuit.

Precautions must be exercised during the replacement or servicing of the 6EN4 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.

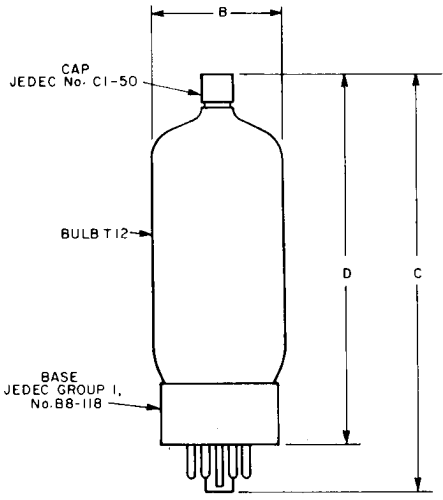
TERMINAL DIAGRAM – JEDEC 8NH – Bottom View

Pin 1: Cathode, Internal Shield
Pin 2: Heater
Pin 3: Do Not Use
Pin 4: Do Not Use
Pin 5: Grid
Pin 6: Grid
Pin 7: Heater
Pin 8: Do Not Use
Cap : Plate



Note: For new equipment design make grid connection to pin 6 only.

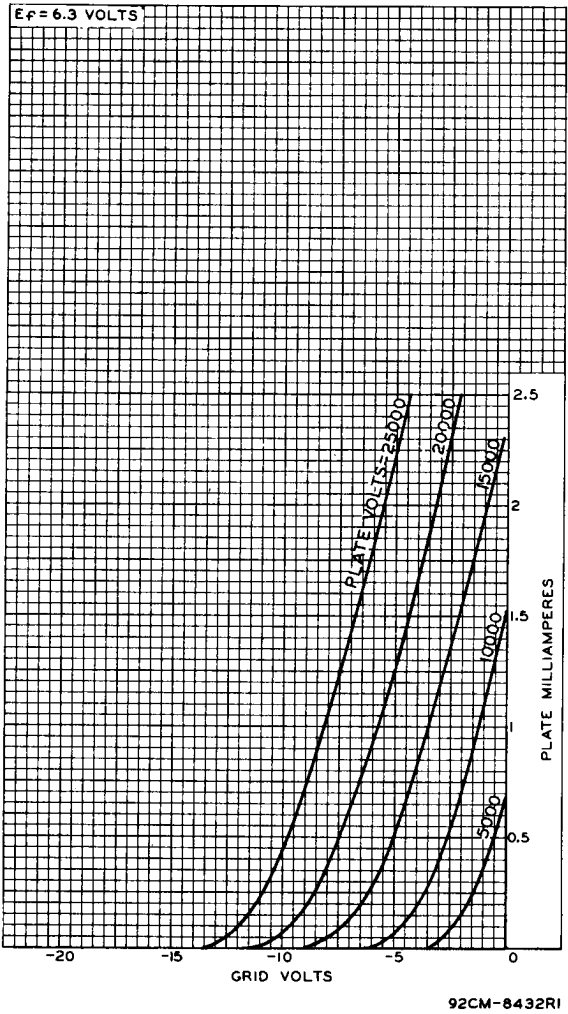
DIMENSIONAL OUTLINE



DIMENSION	INCHES			MILLIMETERS		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
B	1.438	–	1.562	36.6	–	39.6
C	–	–	5.00	–	–	127.0
D	4.0625	4.25	4.4375	103.2	108.0	112.7

MILLIMETER DIMENSION DERIVED FROM INCH DIMENSION

AVERAGE TRANSFER CHARACTERISTICS



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