

# SIT Camera Tubes

Silicon-Intensifier Target (SIT),  
16-Millimeter Fiber-Optic Faceplate Types

- Very High Sensitivity
- Excellent Discharge Capability
- High Resolution
- Sturdy Compact Structure
- Low Lag
- Low-Power 0.6 Watt Dark Heater

The 4804A is similar to the 4804, except that the spurious signal (spot) rejection of the 4804A is more stringent than that of the 4804 and where indicated otherwise. The 4804A/P2 and 4804/P2 are potted versions of the 4804A and 4804, respectively.

## General Data

The majority of these data apply to both potted and non-potted versions. Where exceptions exist, the data are labeled appropriately.

Spectral Response ..... S-20

Wavelength of Maximum Response .....  $420 \pm 50$  nm

### Photocathode:

Material ..... Na-K-Cs-Sb (Multialkali)

Maximum useful diagonal of rectangular image ..... 16 mm (0.625 in)

Orientation of quality rectangle—Proper orientation is obtained when the horizontal scan is essentially parallel to the plane passing through the tube axis and the short index pin.

### Image Surface:

Shape ..... Flat, Circular

Material ..... Dark-clad Fiber Optics

Pitch (Nominal center-to-center spacing) .....  $6 \mu\text{m}$

### Direct Interelectrode Capacitance (Approx.):

Target to all other electrodes ..... 10 pF

### Maximum Overall Length:

Potted ..... 7.880 in (200 mm)

Non-potted ..... 7.500 in (190.5 mm)

### Maximum Diameter:

Potted ..... 2.080 in ( 52.8 mm)

Non-potted . . . (See Figure 11 Note a) 1.515 in ( 38.5 mm)

**Image Section:**

Focusing method . . . . . Electrostatic

**Configuration:**

Potted . . . . . Diode-connected Triode

Non-potted . . . . . Triode

Internal Focus Bleeder (potted only) . . . . .  $1.00 \pm 0.10 G\Omega$

**Scanning Section:**

Focusing method . . . . . Magnetic

Deflection method . . . . . Magnetic

Base . . . . . Small-Button Ditetra 8-Pin,  
(JEDEC No.E8-11)

Socket . . . . . Cinch<sup>a</sup> No.8VT (133-98-11-015), or  
equivalent

**Deflecting Yoke-Focusing Coil**

**Alignment Coil Assembly:**

Potted . . . . . Cleveland Electronics No.SVDA-2037-1 or  
Penn Tran No.1490-1

Non-Potted . . . . . Cleveland Electronics,<sup>b</sup> No.SVDA-2037,  
or Penn Tran<sup>c</sup>, No.1490, or equivalent

Operating Position . . . . . Any

**Approximate Weight:**

Potted . . . . . 9.3 oz (264 g)

Non-potted . . . . . 4.5 oz (127 g)

**Maximum Ratings, Absolute-Maximum Values:<sup>d</sup>**

	Min.	Max.	
<b>Temperature:</b>			
Operating . . . . .	-10	60	°C
Non-operating range . . . . .	-54	71	°C

**Image Section:**

**Photocathode voltage (negative with respect to anode):**

4804A/P2, 4804A . . . . . - -10,000 V

4804/P2, 4804 . . . . . - -9,000 V

DC photocathode current . . . . . - 350 nA

**Focus Electrode (negative with respect to anode, non-potted):**

4804A . . . . . - -10,000 V

4804 . . . . . - -9,000 V

**Anode voltage (zero with respect to thermionic cathode) . . . . .**

- Ground

Exposure<sup>e</sup> . . . . . -  $10^4$  fc-s

Scanning Section:

Heater-Voltage	6.0	6.6	V
Grid-No.4 Voltage <sup>f</sup>	—	350	V
Grid-No.3 Voltage <sup>f</sup>	—	350	V
Grid-No.2 Voltage	—	350	V
Grid-No.2 Dissipation	—	1	W
Grid-No.1 Voltage	-150	0	V
Heater-Cathode Voltage	-125	10	V
Target Voltage	—	300 <sup>g</sup>	V
Peak Target Current	—	750	nA

Typical Operation

With tube operated in a Cleveland Electronics Assembly Type No.SVDA-2037, or equivalent, faceplate image size 1/2" x 3/8" (12.7 mm x 9.53 mm), and standard CCIR "M", or EIA, TV scanning rate (525 lines, interlaced 2:1, frame time 1/30 second)

Temperature ..... 25 to 31 °C

Image Section:

Photocathode voltage (negative with respect to anode)	-9000 to -2500	V
Focusing-grid voltage (positive with respect to photocathode)	1.5 ± 0.5% of photocathode voltage	
Anode voltage (zero with respect to thermionic cathode)	Ground	

Scanning Section:

Heater, for unipotential cathode:

Current	0.1	A
Nominal voltage for current of 0.1 ampere	6.3	V
Grid-No.4 (Decelerator) Voltage <sup>f</sup>	340	V
Grid-No.3 (Beam-Focus Electrode) Voltage <sup>f</sup>	300	V
Grid-No.2 (Accelerator) Voltage	300	V
Peak-to-Peak Blanking Voltage:		
When applied to grid No.1	75	V
When applied to cathode	20	V
Target Current	300	nA
Target Voltage <sup>g,h</sup>	8 to 10	V
Focusing-Coil Current <sup>j</sup> (Approx.)	40	mA
Peak-to-Peak Deflecting-Coil Current:		
Horizontal	180	mA
Vertical	20	mA

Field Strength of Each Adjustable Alignment Coil:

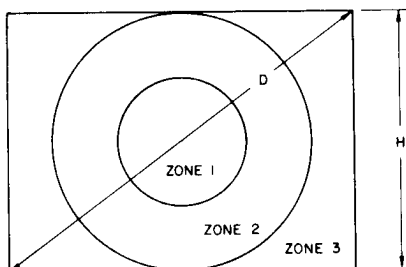
4804A/P2, 4804A	0 to 3	G
4804/P2, 4804	0 to 4	G

Performance Data

Under conditions shown under Typical Operation

	Min.	Typical	Max.	
Grid-No.1 Voltage for Picture Cutoff <sup>k</sup>	-65	-80	-120	V
Gain Ratio for Photocathode Voltage Swing from -9 to -2.5 kV	100	400	-	
Average "Gamma" of Transfer Characteristic for Signal Output Current between 1.0 nA and 700 nA (See Figure 7)	-	1	-	
Lag—Per Cent of Initial Signal Output Current 1/20 Second After Illumination is Removed <sup>m</sup> (See Figure 3)	-	7	12	%
Contrast Transfer (Amplitude Response) to a 400 TV Line Square-Wave Test Pattern at Center of Picture <sup>n</sup> (See Figure 2)				
4804A/P2, 4804A	24	30	-	%
4804/P2, 4804	20	30	-	%
Resolution (See Figure 6)	600	700	-	TV Lines
Sensitivity (See Figure 7)	250	350	-	$\mu\text{A}/\text{lm}/\text{ft}^2$ ( $\mu\text{A}/\text{fc}$ )
Target Current Gain at 9 kV (See Figure 5):	190,000	270,000	-	$\mu\text{A}/\text{lm}$
4804A/P2, 4804A	1100	1600	-	
4804/P2, 4804	-	1600	-	
Dark Current for Target Voltage of 8 Volts (See Figure 4)	-	7	15	nA
Photocathode Responsivity:				
Luminous (2854° K Tungsten Source)P:				
4804A/P2, 4804A	2.6	3.2	-	$\text{mA}/\text{W}-2854^\circ\text{K}$
4804/P2, 4804	-	3.2	-	
Luminous (See Figure 8)				
4804A/P2, 4804A	130	160	-	$\mu\text{A}/\text{lm}$
4804/P2, 4804	-	160	-	$\mu\text{A}/\text{lm}$

## Spurious Signal Test



92LS-3224

D – Active Target Diameter

H – Raster Height (4 x 3 Aspect Ratio)

Zone 1 – Diameter =  $H/2$ , Area  $\approx 15\%$

Zone 2 – Diameter =  $H$ , Area  $\approx 45\%$

Zone 3 – Peripheral Area  $\approx 40\%$

**Figure 1 – Spurious Signal Test Pattern**

This test is performed with the tube viewing a uniformly diffused white test pattern that identifies the three zones shown in **Figure 1**. The tube is operated under the conditions specified under Typical Operating Values and is illuminated to provide a peak highlight signal current of 300 nanoamperes. The tube is adjusted to provide maximum picture resolution. Spurious signals are evaluated by size which is represented by equivalent numbers of raster lines in a 525 TV line system.

### 4804A/P2, 4804A

Allowable spot size for each zone is shown in Table I. To be classified as a spot, the spurious signal amplitude must be at least 10% of the peak white signal under either highlight or capped conditions. Smudges, streaks, or mottled and grainy background must have a spurious signal amplitude of at least 5% to constitute a reject item.

Table I - 4804A/P2, 4804A

Blemish Size (Equivalent Number of Raster Lines)	Zone 1 Allowed Spots	Zone 2 Allowed Spots	Zone 3 Allowed Spots
over 8	0	0	0
over 6	1	2	2
over 4	3	7	7
over 1	6	17	22
1 or less	*	*	*

Minimum separation between any 2 spots greater than 1 raster line is limited to 16 raster lines.

\*Spots of this size are allowed unless concentration causes a smudged appearance.

#### 4804/P2, 4804

Allowable spot size for each zone is shown in Table II. To be classified as a spot, the spurious signal amplitude must be at least 10% of the peak white signal under either highlight or capped conditions. Smudges, streaks, or mottled and grainy background (except fiber-optics block lines) must have a spurious signal amplitude of at least 10% to constitute a reject item. Fiber optics block lines under 30% amplitude are not counted.

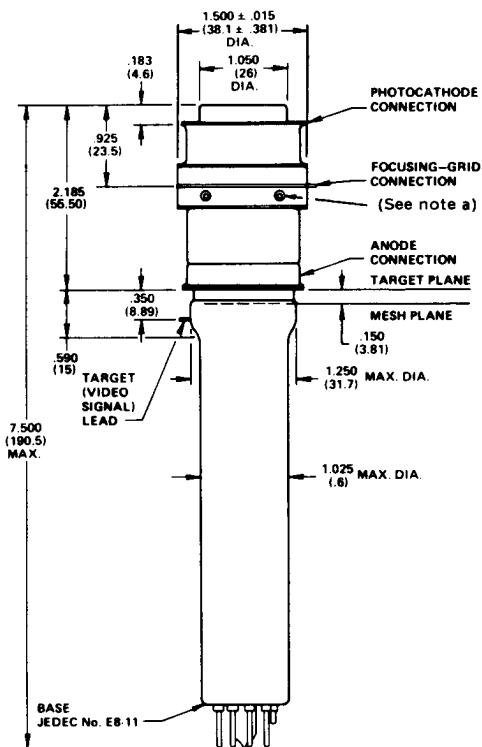
Table II - 4804/P2, 4804

Blemish Size (Equivalent Number of Raster Lines)	Zone 1 Allowed Spots	Zone 2 Allowed Spots	Zone 3 Allowed Spots
over 12	0	0	0
over 8	0	1	2
over 6	1	3	4
over 4	3	8	9
over 2	11	17	17
2 or less	*	*	*

\*Spots of this size are allowed unless concentration causes a smudged appearance.

- a Made by Cinch Manufacturing Corporation, 1501 Morse Ave., Elk Grove Village, IL 60007.
- b Made by Cleveland Electronics Inc., 2000 Highland Road, Twinsburg, OH 44087.
- c Made by Penn-Tran Inc., 1155 Zion Road, Bellefonte, PA.
- d A description of the Absolute-Maximum Rating is given in the General Section, titled Rating Systems for Electron Tubes.
- e Excessive faceplate exposure for long periods of time should be prevented whenever possible. For applications covering wide ranges of illumination, suitable combinations of lens stop, light filters and photocathode voltage should be chosen to provide close to typical signal currents.
- f Grid-No.4 voltage must always be greater than grid-No.3 voltage. The recommended ratio of grid-No.3 to grid-No.4 voltage is 9/10 to 8/10. The optimum ratio is that ratio providing the most uniform center-to-edge highlight discharge.
- g In normal operation, the target voltage should not exceed 15 volts.
- h With respect to thermionic cathode.
- j The polarity of the focusing coil should be such that a north-seeking pole is attracted to the image end of the focusing coil, with the indicator located outside of and at the image end of the focusing coil.
- k For picture cutoff with no blanking voltage on grid No.1.
- m For an initial signal output current of 300 nanoamperes.
- n Measured under the following conditions. Photocathode voltage = 8.0 kV, signal current = 300 nanoamperes, and an RCA P200 slant-burst test pattern is employed.
- p The unit, watts-2854° K, is used to designate the total radiated power in watts, integrated over all wavelengths, from a tungsten-filament lamp operated at a color temperature of 2854° K. This unit is directly converted into lumens by the following relationship: 1 watt-2854° K = 20 lumens. From this relationship, sensitivity can be expressed in units of either amperes/lumen or amperes/watt-2854° K.

Dimensional Outline of 4804A and 4804 (Non-potted Types)



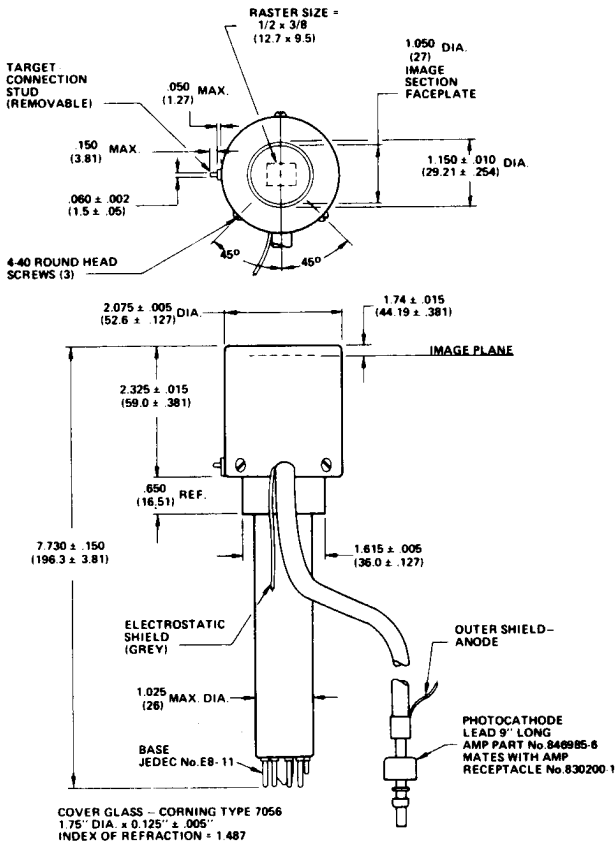
92LM-4019

Note a — Clearance of 1.765 in (44.8) is required to pass all protrusions.

Dimensions are in inches unless otherwise stated. Dimensions in parentheses are in millimeters and are derived from the basic inch dimension. (One inch = 25.4 mm)



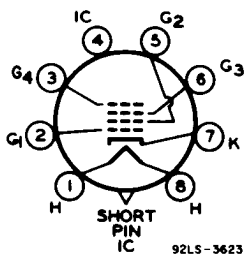
**Dimensional Outline of 4804A/P2 and 4804/P2 (Potted Types)**



92LM 3978

Dimensions are in inches unless otherwise stated. Dimensions in parentheses are in millimeters and are derived from the basic inch dimension. ( One inch = 25.4 mm).

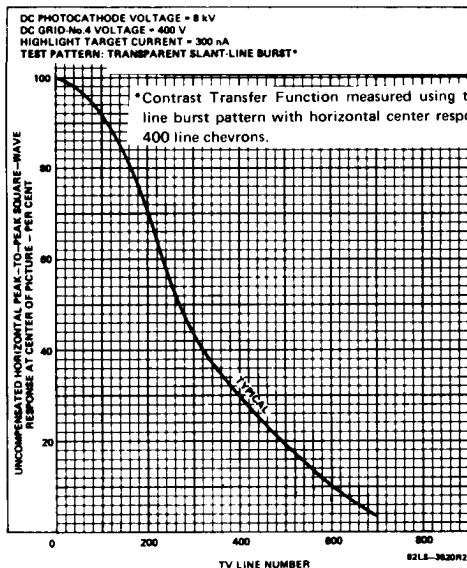
### Basing Diagram, Bottom View



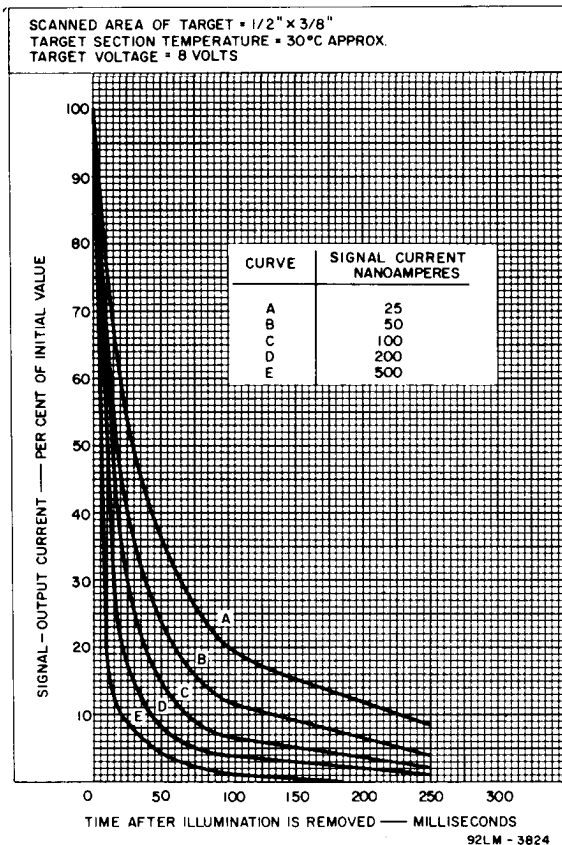
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- Pin 1— Heater
- Pin 2— Grid No.1
- Pin 3— Grid No.4
- Pin 4— Internal Connection —  
Do not use
- Pin 5— Grid No.2
- Pin 6— Grid No.3
- Pin 7— Cathode
- Pin 8— Heater
- Short Index Pin — Internal Connection—  
Make no connection

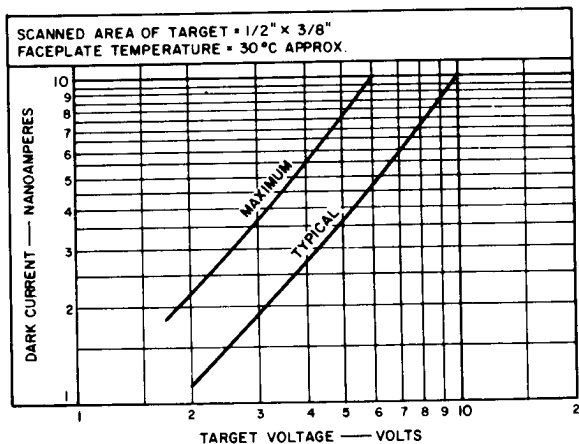
### Horizontal Square Wave Response (Figure 2)



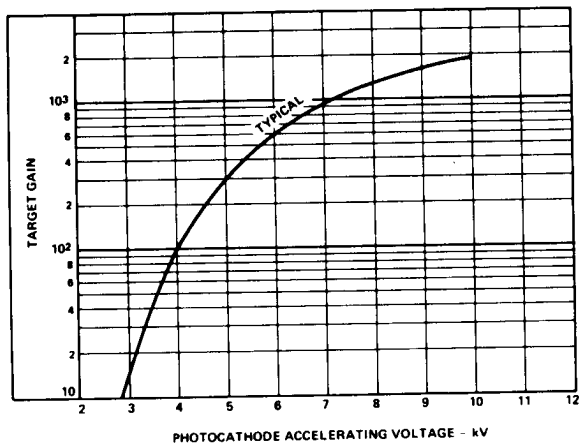
Typical Persistence Characteristics (Figure 3)



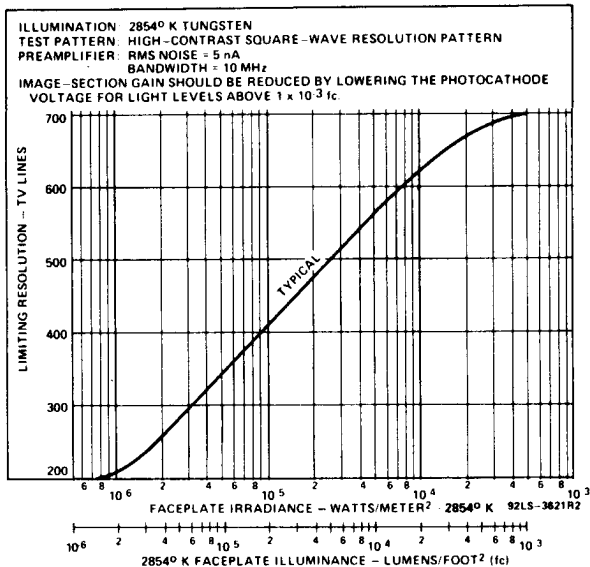
Dark Current Characteristics (Figure 4)



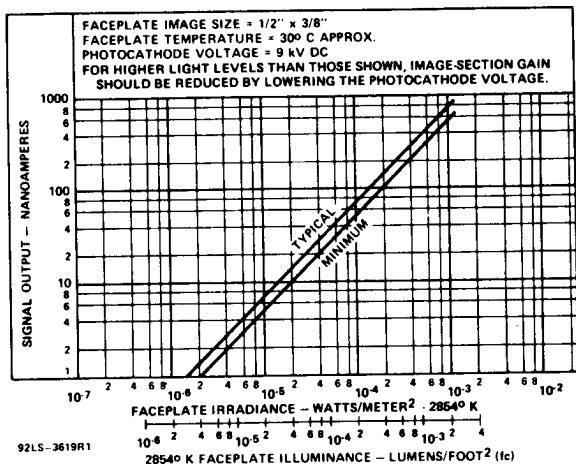
Target Gain Characteristics (Figure 5)



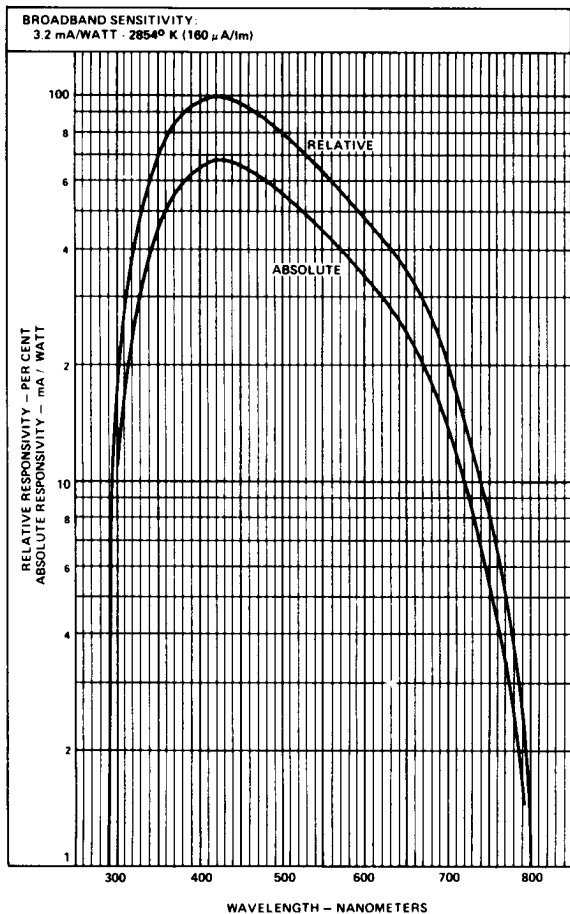
Resolution Characteristics (Figure 6)



Transfer Characteristics (Figure 7)



### Typical Photocathode Responsivity (Figure 8)



92LM 3622