

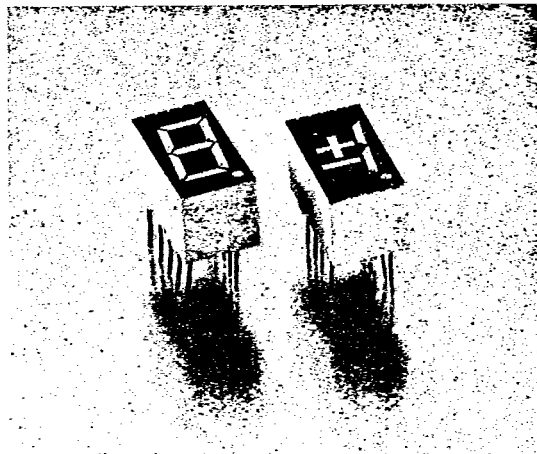


## LTS-360 SERIES

0.36" SINGLE DIGIT NUMERIC DISPLAYS

### FEATURES

- 0.36 INCH (9.20mm) DIGIT HEIGHT.
- CONTINUOUS UNIFORM SEGMENTS.
- CHOICE OF FIVE BRIGHT COLORS-RED/BRIGHT RED/GREEN/ORANGE/HIGH EFFICIENCY RED.
- LOW POWER REQUIREMENT.
- EXCELLENT CHARACTERS APPEARANCE.
- HIGH BRIGHTNESS.
- WIDE VIEWING ANGLE.
- SOLID STATE RELIABILITY.
- CATEGORIZED FOR LUMINOUS INTENSITY.
- I.C. COMPATIBLE.
- EASY MOUNTING ON P.C. BOARDS.



### DESCRIPTION

The LTS-360 series are 0.36 inch (9.20mm) height single digit displays.

The red series devices utilize LED chips which are made from GaAsP on a GaAs substrate. The bright red and green series devices utilize LED chips which are made from GaP on a transparent GaP substrate. The orange and high efficiency red series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate. Red, bright red and high efficiency red displays have red face and red segment color. Green and orange displays have gray face and white segment color.

### DEVICES

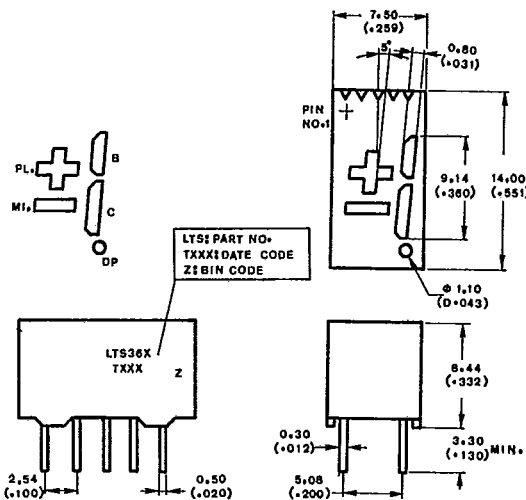
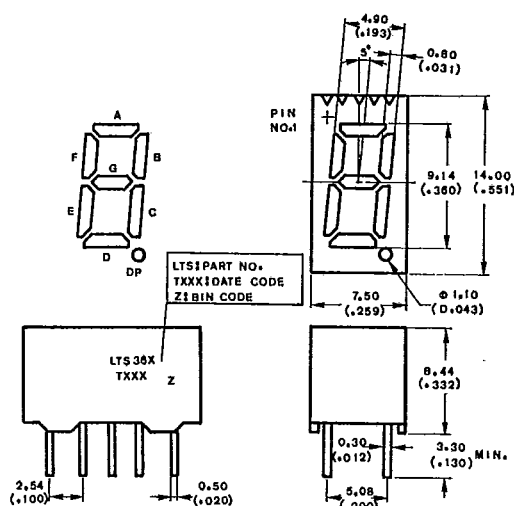
PART NO. LTS--					DESCRIPTION	PACKAGE DIMENSION	INTERNAL CIRCUIT DIAGRAM
RED	BRIGHT RED	GREEN	ORANGE	HI.-EFF. RED			
360R	360P	360G	360E	360HR	Common Anode, Rt. Hand Decimal	A	A
367R	367P	367G	367E	367HR	Common Cathode, Rt. Hand Decimal	A	B
368R	368P	368G	368E	368HR	Common Cathode, $\pm 1$ Overflow	B	C

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## PACKAGE DIMENSIONS

## A. LTS-360/367

## B. LTS-368



NOTE: All dimensions are in  $\frac{\text{millimeters}}{(\text{inches})}$ , tolerance is  $\frac{0.25\text{mm}}{(0.010'')}$  unless otherwise noted.

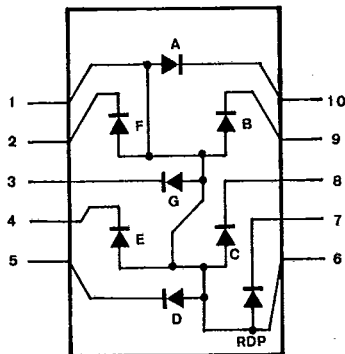
## PIN CONNECTION

PIN NO.	CONNECTION		
	A. LTS-360	B. LTS-367	C. LTS-368
1	Common Anode *1	Common Cathode *1	Cathode Pl. & Mi. *
2	Cathode F	Anode F	Anode Plus Sign
3	Cathode G	Anode G	Anode Minus Sign
4	Cathode E	Anode E	Cathode Pl. & Mi. *2
5	Cathode D	Anode D	No Pin
6	Common Anode *1	Common Cathode *1	Cathode B, C & D.P. *3
7	Cathode D.P.	Anode D.P.	Anode D.P.
8	Cathode C	Anode C	Anode C
9	Cathode B	Anode B	Anode B
10	Cathode A	Anode A	Cathode B, C & D.P. *3

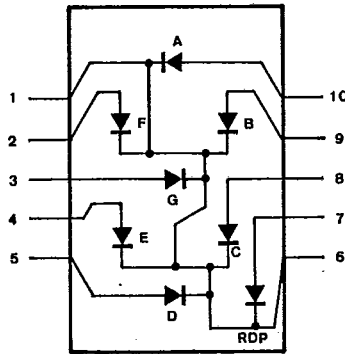
NOTES: 1. Pin 1 & 6 are internally connected.  
 2. Pin 1 & 4 are internally connected.  
 3. Pin 6 & 10 are internally connected.

## INTERNAL CIRCUIT DIAGRAM

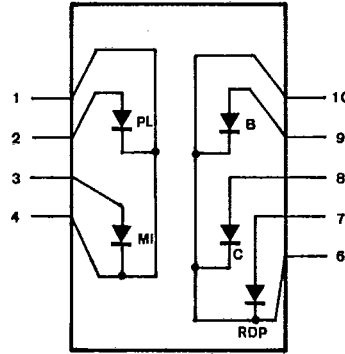
A. LTS-360



B. LTS-367



C. LTS-368

ABSOLUTE MAXIMUM RATINGS AT  $T_A = 25^\circ\text{C}$ 

PARAMETER	RED	BRIGHT RED	GREEN	ORANGE	HI.-EFF. RED	UNIT
Power Dissipation Per Segment	55	40	75	75	75	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1ms Pulse Width)	160	60	100	100	100	mA
Continuous Forward Current Per Segment	25	15	25	25	25	mA
Derating Linear From 25° C Per Segment	0.3	0.18	0.3	0.3	0.3	mA/° C
Reverse Voltage Per Segment	5	5	5	5	5	V
Operating Temperature Range	- 25° C to + 85° C					
Storage Temperature Range	- 25° C to + 85° C					
Solder Temperature 1/16 inch Below Seating Plane for 3 Seconds at 260° C						

SEVEN-SEGMENT  
LED DISPLAYS

# ELECTRICAL/OPTICAL CHARACTERISTICS AT $T_A = 25^\circ\text{C}$ LTS-360R SERIES

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	$I_v$	200	500		$\mu\text{cd}$	$I_F = 10\text{ mA}$
Peak Emission Wavelength	$\lambda_p$		655		nm	$I_F = 20\text{ mA}$
Spectral Line Half-Width	$\Delta\lambda$		24		nm	$I_F = 20\text{ mA}$
Forward Voltage, any Segment or D.P.	$V_F$		1.7	2.0	V	$I_F = 20\text{ mA}$
Reverse Current, any Segment or D.P.	$I_R$			100	$\mu\text{A}$	$V_R = 5\text{V}$
Luminous Intensity Matching Ratio	$I_v\text{-m}$			2:1		$I_F = 20\text{ mA}$

Note: The BIN brightness classification see page 6-160, category B

## TYPICAL ELECTRICAL/OPTICAL CHARACTERISTIC CURVES

( $25^\circ\text{C}$  Ambient Temperature Unless Otherwise Noted)

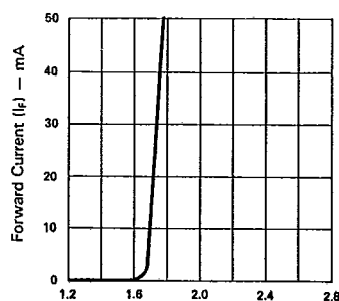


Fig. 1 FORWARD CURRENT Vs. FORWARD VOLTAGE.

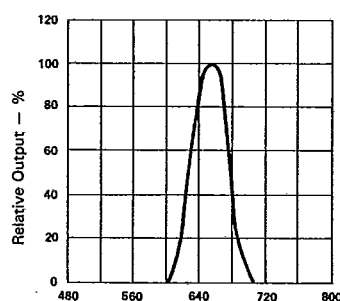


Fig. 2 SPECTRAL RESPONSE.

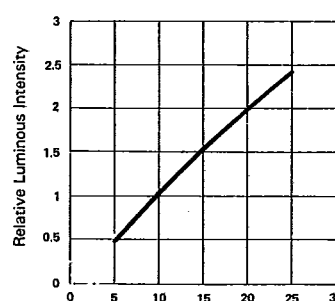


Fig. 3 RELATIVE LUMINOUS INTENSITY Vs. FORWARD CURRENT (PER SEGMENT).

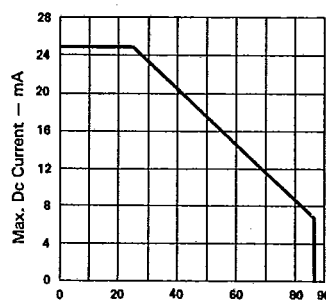


Fig. 4 MAX. ALLOWABLE DC CURRENT PER SEG. Vs AMBIENT TEMPERATURE.

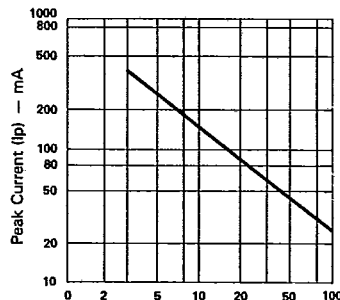


Fig. 5 MAX. PEAK CURRENT Vs. DUTY CYCLE.% (REFRESH RATE -  $F = 1\text{ KHz}$ )

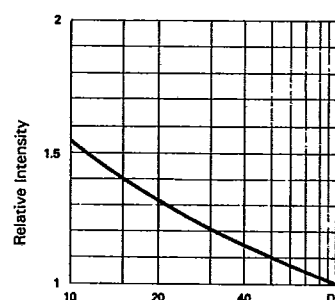


Fig. 6 LUMINOUS INTENSITY Vs. DUTY CYCLE.% (AVERAGE  $I_F = 10\text{ mA}$  PER SEG.)

# ELECTRICAL/OPTICAL CHARACTERISTICS AT $T_A = 25^\circ\text{C}$ LTS-360P SERIES

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	$I_v$	350	750		$\mu\text{cd}$	$I_F = 10\text{ mA}$
Peak Emission Wavelength	$\lambda_p$		697		nm	$I_F = 20\text{ mA}$
Spectral Line Half-Width	$\Delta\lambda$		90		nm	$I_F = 20\text{ mA}$
Forward Voltage, any Segment or D.P.	$V_F$		2.1	2.8	V	$I_F = 20\text{ mA}$
Reverse Current, any Segment or D.P.	$I_R$			100	$\mu\text{A}$	$V_R = 5\text{V}$
Luminous Intensity Matching Ratio	$I_v\text{-m}$			2:1		$I_F = 20\text{ mA}$

Note: The BIN brightness classification see page 6-160, category B-1

## TYPICAL ELECTRICAL/OPTICAL CHARACTERISTIC CURVES

( $25^\circ\text{C}$  Ambient Temperature Unless Otherwise Noted)

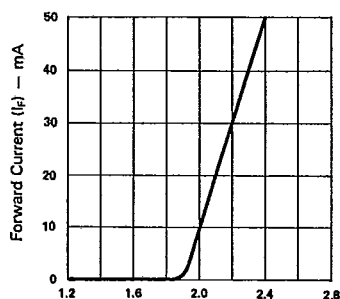


Fig. 1 FORWARD CURRENT Vs. FORWARD VOLTAGE.

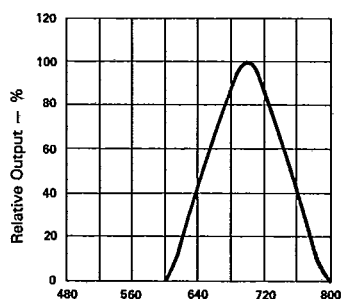


Fig. 2 SPECTRAL RESPONSE.

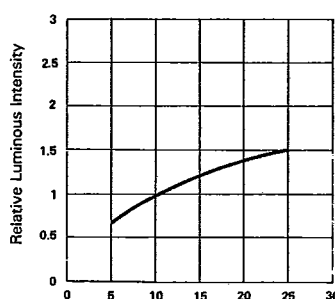


Fig. 3 RELATIVE, LUMINOUS INTENSITY Vs. FORWARD CURRENT (PER SEGMENT).

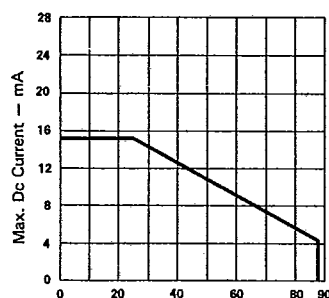


Fig. 4 MAX. ALLOWABLE DC CURRENT PER SEG. Vs AMBIENT TEMPERATURE.

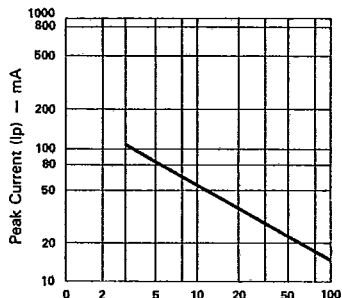


Fig. 5 MAX. PEAK CURRENT Vs. DUTY CYCLE. (REFRESH RATE -  $F = 1\text{ KHz}$ )

SEVEN-SEGMENT  
LED DISPLAYS

# ELECTRICAL/OPTICAL CHARACTERISTICS AT $T_A = 25^\circ\text{C}$ LTS-360G SERIES

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	$I_v$	800	2000		$\mu\text{cd}$	$I_F = 10\text{ mA}$
Peak Emission Wavelength	$\lambda_p$		565		nm	$I_F = 20\text{ mA}$
Spectral Line Half-Width	$\Delta\lambda$		30		nm	$I_F = 20\text{ mA}$
Forward Voltage, any Segment or D.P.	$V_F$		2.1	2.8	V	$I_F = 20\text{ mA}$
Reverse Current, any Segment or D.P.	$I_R$			100	$\mu\text{A}$	$V_R = 5\text{V}$
Luminous Intensity Matching Ratio	$I_v\text{-m}$			2:1		$I_F = 20\text{ mA}$

Note: The BIN brightness classification see page 6-160, category B

## TYPICAL ELECTRICAL/OPTICAL CHARACTERISTIC CURVES

( $25^\circ\text{C}$  Ambient Temperature Unless Otherwise Noted)

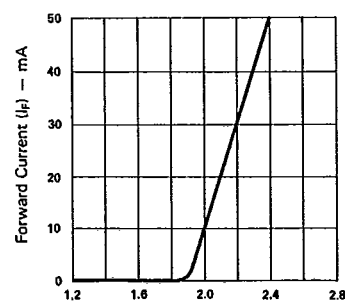


Fig. 1 FORWARD CURRENT Vs. FORWARD VOLTAGE.

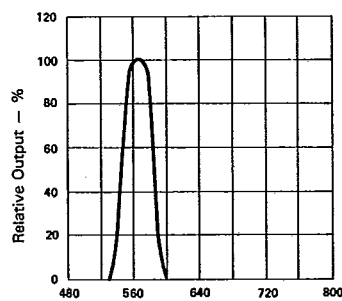


Fig. 2 SPECTRAL RESPONSE.

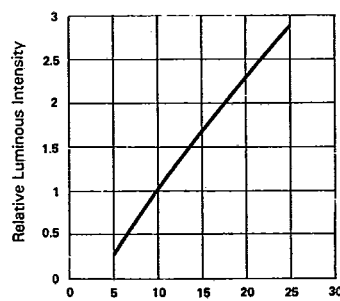


Fig. 3 RELATIVE LUMINOUS INTENSITY Vs. FORWARD CURRENT (PER SEGMENT).

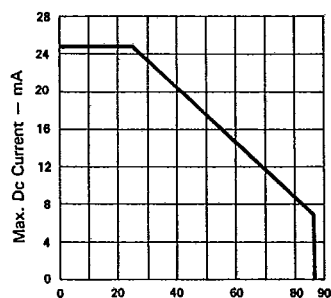


Fig. 4 MAX. ALLOWABLE DC CURRENT PER SEG. Vs AMBIENT TEMPERATURE.

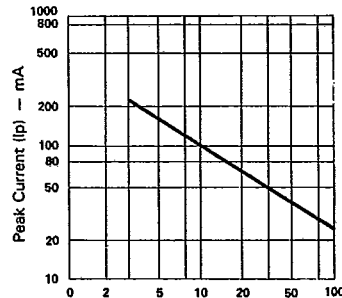


Fig. 5 MAX. PEAK CURRENT Vs. DUTY CYCLE.% (REFRESH RATE -  $F = 1\text{ KHz}$ )

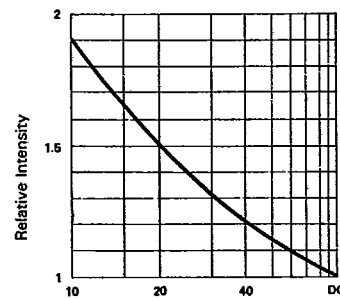


Fig. 6 LUMINOUS INTENSITY Vs. DUTY CYCLE% (AVERAGE  $I_F = 10\text{mA}$  PER SEG.)

# ELECTRICAL/OPTICAL CHARACTERISTICS AT $T_A = 25^\circ\text{C}$ LTS-360E SERIES

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	$I_v$	800	2000		$\mu\text{cd}$	$I_F = 10\text{ mA}$
Peak Emission Wavelength	$\lambda_p$		630		nm	$I_F = 20\text{ mA}$
Spectral Line Half-Width	$\Delta\lambda$		40		nm	$I_F = 20\text{ mA}$
Forward Voltage, any Segment or D.P.	$V_F$		2.1	2.8	V	$I_F = 20\text{ mA}$
Reverse Current, any Segment or D.P.	$I_R$			100	$\mu\text{A}$	$V_R = 5\text{V}$
Luminous Intensity Matching Ratio	$I_v\text{-m}$			2:1		$I_F = 20\text{ mA}$

Note: The BIN brightness classification see page 6-160, category B

## TYPICAL ELECTRICAL/OPTICAL CHARACTERISTIC CURVES

( $25^\circ\text{C}$  Ambient Temperature Unless Otherwise Noted)

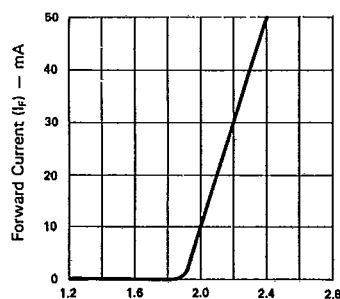


Fig. 1 FORWARD CURRENT Vs. FORWARD VOLTAGE.

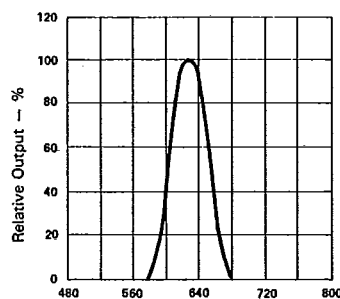


Fig. 2 SPECTRAL RESPONSE.

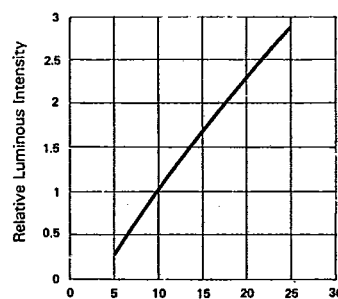


Fig. 3 RELATIVE, LUMINOUS INTENSITY Vs. FORWARD CURRENT (PER SEGMENT).

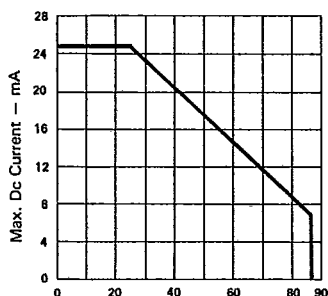


Fig. 4 MAX. ALLOWABLE DC CURRENT PER SEG. Vs AMBIENT TEMPERATURE.

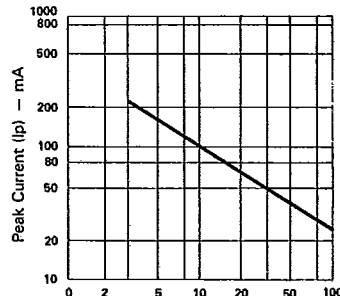


Fig. 5 MAX. PEAK CURRENT Vs. DUTY CYCLE.% (REFRESH RATE -  $F = 1\text{ KHz}$ )

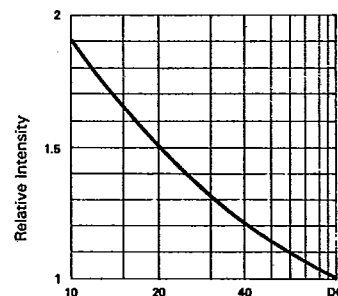


Fig. 6 LUMINOUS INTENSITY Vs. DUTY CYCLE.% (AVERAGE  $I_F = 10\text{mA PER SEG.}$ )

SEVEN-SEGMENT  
LED DISPLAYS

# ELECTRICAL/OPTICAL CHARACTERISTICS AT $T_A = 25^\circ\text{C}$ LTS-360HR SERIES

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	$I_v$	800	2000		$\mu\text{cd}$	$I_F = 10\text{ mA}$
Peak Emission Wavelength	$\lambda_p$		635		nm	$I_F = 20\text{ mA}$
Spectral Line Half-Width	$\Delta\lambda$		40		nm	$I_F = 20\text{ mA}$
Forward Voltage, any Segment or D.P.	$V_F$		2.1	2.8	V	$I_F = 20\text{ mA}$
Reverse Current, any Segment or D.P.	$I_R$			100	$\mu\text{A}$	$V_R = 5\text{ V}$
Luminous Intensity Matching Ratio	$I_v\text{-m}$			2:1		$I_F = 20\text{ mA}$

Note: The BIN brightness classification see page 6-160, category B

## TYPICAL ELECTRICAL/OPTICAL CHARACTERISTIC CURVES

( $25^\circ\text{C}$  Ambient Temperature Unless Otherwise Noted)

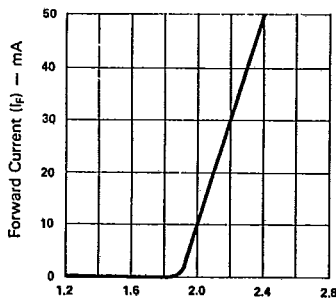


Fig. 1 FORWARD CURRENT Vs. FORWARD VOLTAGE.

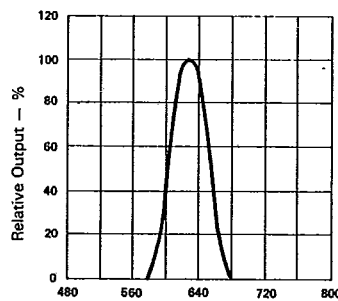


Fig. 2 SPECTRAL RESPONSE.

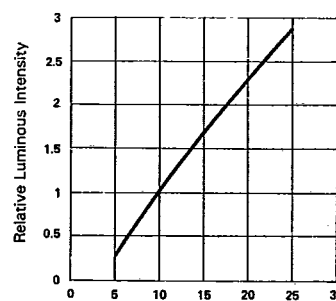


Fig. 3 RELATIVE LUMINOUS INTENSITY Vs. FORWARD CURRENT (PER SEGMENT).

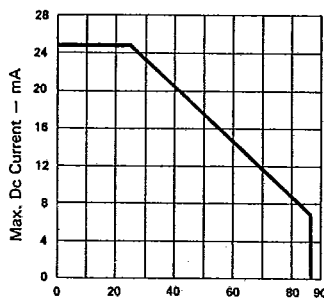


Fig. 4 MAX. ALLOWABLE DC CURRENT PER SEG. Vs AMBIENT TEMPERATURE.

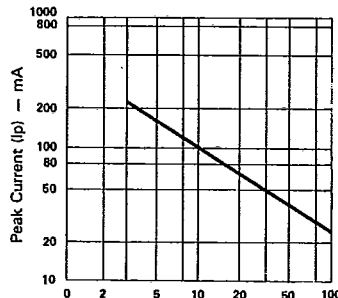


Fig. 5 MAX. PEAK CURRENT Vs. DUTY CYCLE.% (REFRESH RATE -  $F = 1\text{ KHz}$ )

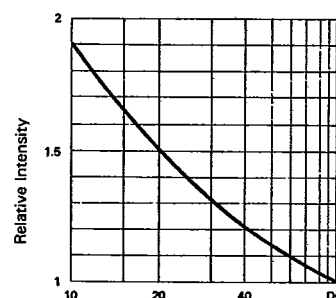


Fig. 6 LUMINOUS INTENSITY Vs. DUTY CYCLE.% (AVERAGE  $I_F = 10\text{ mA PER SEG.}$ )