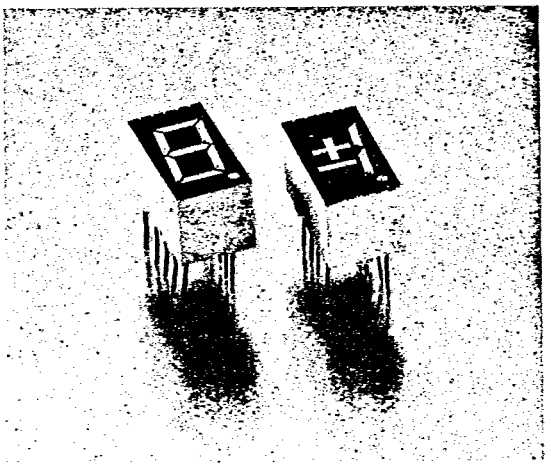
LITE-ON LED SPECIALIST

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

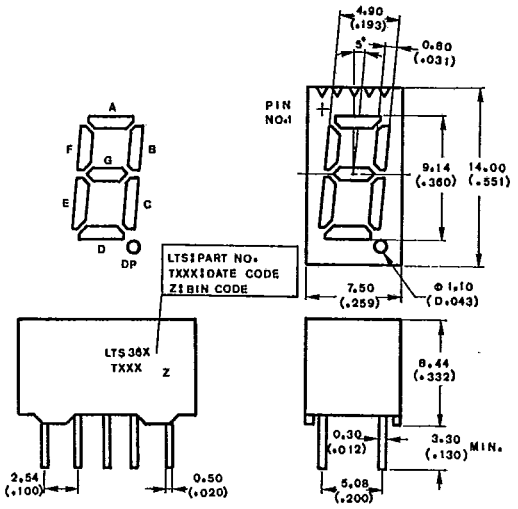
The LTS-360 series are 0.36 inch (9.20mm) height single digit displays.
The red series devices utilize LED chips which are made from GaAsP on a GaAs substrate. The bright red and green series devices utilize LED chips which are made from GaP on a transparent GaP substrate. The orange and high efficiency 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

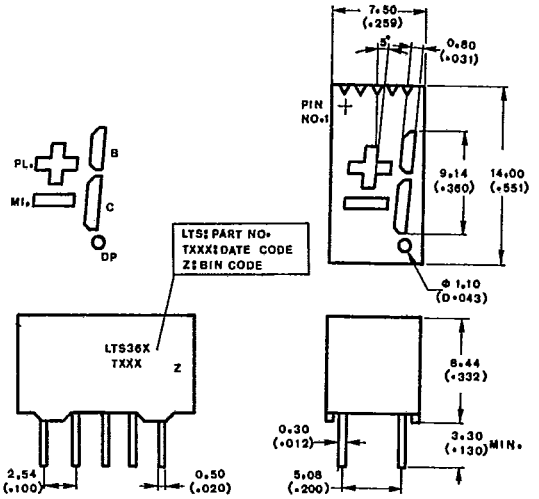
PART NO. LTS-					DESCRIPTION	PACKAGE DIMENSION	INTERNAL CIRCUIT DIAGRAM
RED	BRIGHT RED	GREEN	ORANGE	HI.-EFF. RED			
360R	360P	360G	360E	360HR	Common Anode, Rt. Hand Decimal	A	A
367R	367P	367G	367E	367HR	Common Cathode, Rt. Hand Decimal	A	B
368R	368P	368G	368E	368HR	Common Cathode, ±1 Overflow	B	C

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.

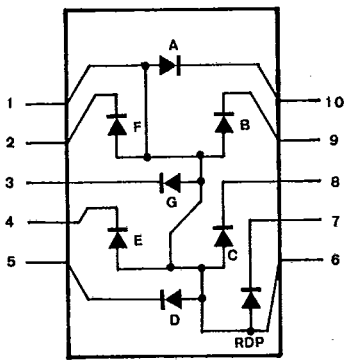
PIN CONNECTION

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

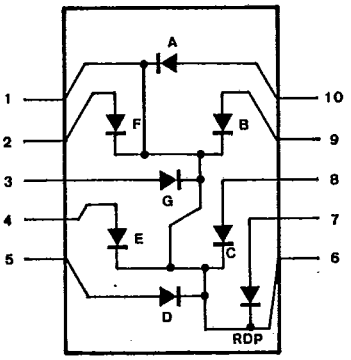
NOTES: 1. Pin 1 & 6 are internally connected.
2. Pin 1 & 4 are internally connected.
3. Pin 6 & 10 are internally connected.

INTERNAL CIRCUIT DIAGRAM

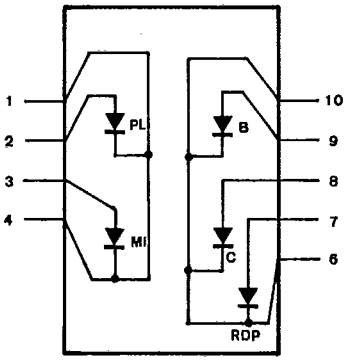
A. LTS-360



B. LTS-367



C. LTS-368



ABSOLUTE MAXIMUM RATINGS AT T_A = 25°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

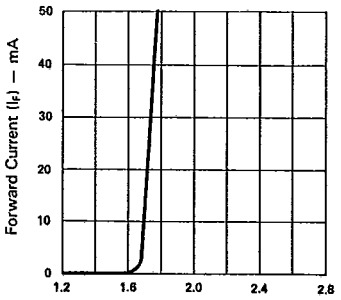
ELECTRICAL/OPTICAL CHARACTERISTICS AT T_A = 25°C
LTS-360R SERIES

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	Iv	200	500		μcd	I_F = 10 mA
Peak Emission Wavelength	λ p		655		nm	I_F = 20 mA
Spectral Line Half-Width	Δλ		24		nm	I_F = 20 mA
Forward Voltage, any Segment or D.P.	V_F		1.7	2.0	V	I_F = 20 mA
Reverse Current, any Segment or D.P.	I_R			100	μA	V_R = 5V
Luminous Intensity Matching Ratio	Iv-m			2:1		I_F = 20 mA

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

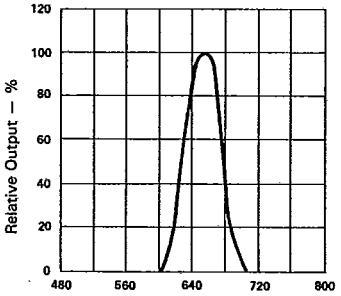
TYPICAL ELECTRICAL/OPTICAL CHARACTERISTIC CURVES

(25°C Ambient Temperature Unless Otherwise Noted)



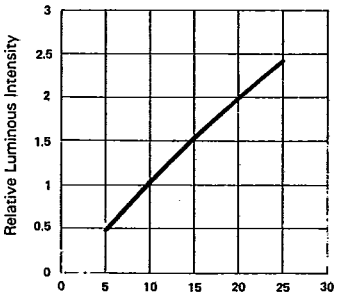
Forward Voltage (V_F) — Volts

Fig. 1 FORWARD CURRENT Vs. FORWARD VOLTAGE.



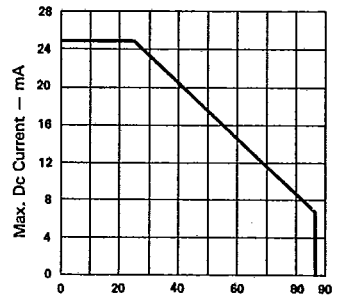
Wavelength (λ) — nm.

Fig. 2 SPECTRAL RESPONSE.



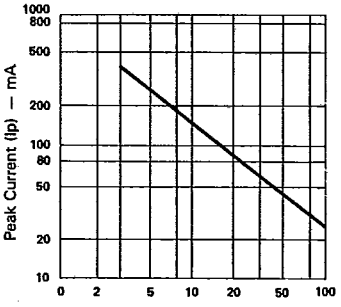
Forward Current (I_F) — mA

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



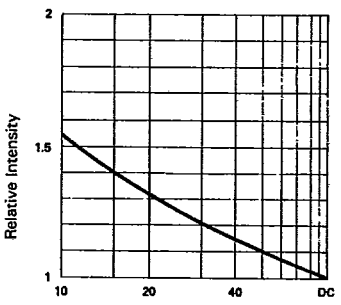
Ambient Temperature (Ta) — °C

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



Duty Cycle %

Fig. 5 MAX. PEAK CURRENT Vs. DUTY CYCLE.% (REFRESH RATE – F = 1 KHz)



Duty Cycle %

Fig.6 LUMINOUS INTENSITY Vs. DUTY CYCLE% (AVERAGE I_F = 10mA PER SEG.)

ELECTRICAL/OPTICAL CHARACTERISTICS AT T_A = 25°C
LTS-360P SERIES

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	Iv	350	750		μcd	I_F = 10 mA
Peak Emission Wavelength	λp		697		nm	I_F = 20 mA
Spectral Line Half-Width	Δλ		90		nm	I_F = 20 mA
Forward Voltage, any Segment or D.P.	V_F		2.1	2.8	V	I_F = 20 mA
Reverse Current, any Segment or D.P.	I_R			100	μA	V_R = 5V
Luminous Intensity Matching Ratio	Iv-m			2:1		I_F = 20 mA

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

TYPICAL ELECTRICAL/OPTICAL CHARACTERISTIC CURVES

(25°C Ambient Temperature Unless Otherwise Noted)

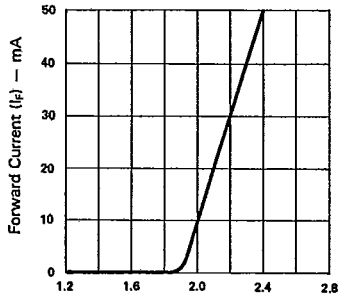


Fig. 1 FORWARD CURRENT Vs. FORWARD VOLTAGE.

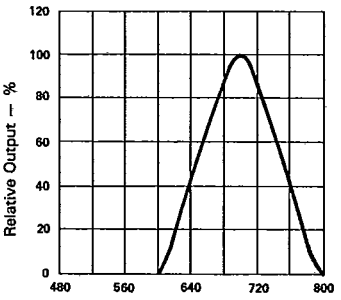


Fig. 2 SPECTRAL RESPONSE.

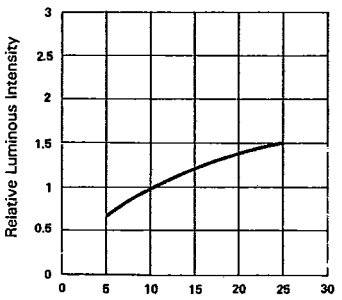


Fig. 3 RELATIVE, LUMINOUS INTENSITY Vs. FORWARD CURRENT (PER SEGMENT).

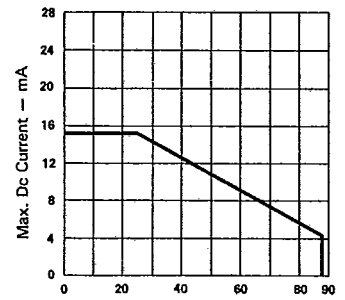


Fig. 4 MAX. ALLOWABLE DC CURRENT PER SEG. Vs AMBIENT TEMPERATURE.

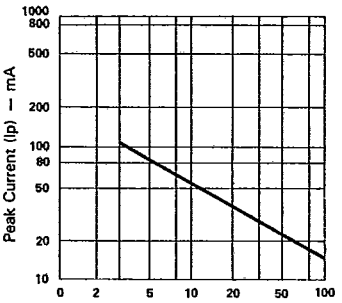


Fig. 5 MAX. PEAK CURRENT Vs. DUTY CYCLE.% (REFRESH RATE — F = 1 KHz)

SEVEN-SEGMENT LED DISPLAYS

ELECTRICAL/OPTICAL CHARACTERISTICS AT $T_A = 25°C$
LTS-360G SERIES

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	Iv	800	2000		μcd	I_F = 10 mA
Peak Emission Wavelength	λp		565		nm	I_F = 20 mA
Spectral Line Half-Width	Δλ		30		nm	I_F = 20 mA
Forward Voltage, any Segment or D.P.	V_F		2.1	2.8	V	I_F = 20 mA
Reverse Current, any Segment or D.P.	I_R			100	μA	V_R = 5V
Luminous Intensity Matching Ratio	Iv-m			2:1		I_F = 20 mA

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

TYPICAL ELECTRICAL/OPTICAL CHARACTERISTIC CURVES

(25°C Ambient Temperature Unless Otherwise Noted)

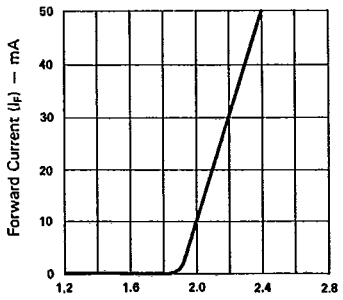


Fig. 1 FORWARD CURRENT Vs. FORWARD VOLTAGE.

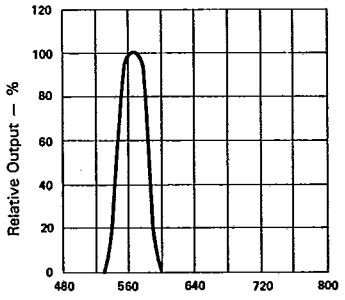


Fig. 2 SPECTRAL RESPONSE.

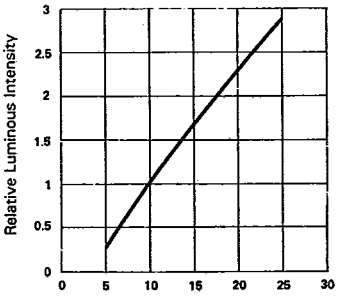


Fig. 3 RELATIVE LUMINOUS INTENSITY Vs. FORWARD CURRENT (PER SEGMENT).

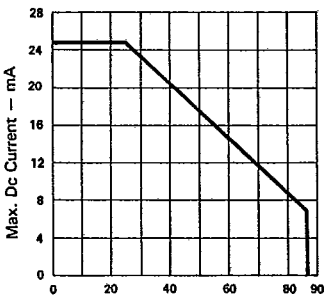


Fig. 4 MAX. ALLOWABLE DC CURRENT PER SEG. Vs AMBIENT TEMPERATURE.

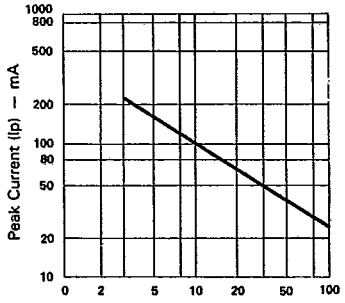


Fig. 5 MAX. PEAK CURRENT Vs. DUTY CYCLE.% (REFRESH RATE — F = 1 KHz)

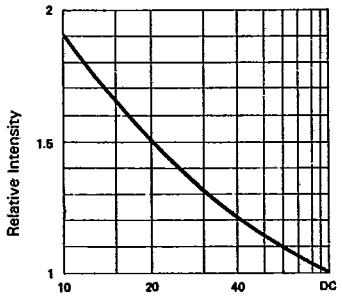


Fig. 6 LUMINOUS INTENSITY Vs. DUTY CYCLE% (AVERAGE I_F = 10mA PER SEG.)

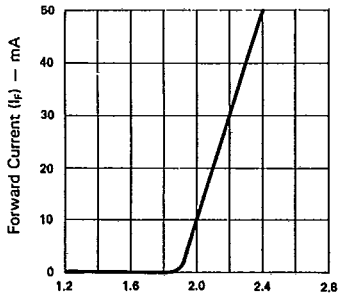
ELECTRICAL/OPTICAL CHARACTERISTICS AT $T_A = 25°C$
LTS-360E SERIES

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	Iv	800	2000		μcd	I_F = 10 mA
Peak Emission Wavelength	λp		630		nm	I_F = 20 mA
Spectral Line Half-Width	Δλ		40		nm	I_F = 20 mA
Forward Voltage, any Segment or D.P.	V_F		2.1	2.8	V	I_F = 20 mA
Reverse Current, any Segment or D.P.	I_R			100	μA	V_R = 5V
Luminous Intensity Matching Ratio	Iv-m			2:1		I_F = 20 mA

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

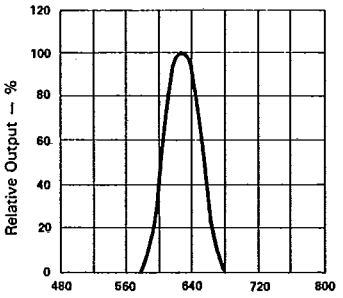
TYPICAL ELECTRICAL/OPTICAL CHARACTERISTIC CURVES

(25°C Ambient Temperature Unless Otherwise Noted)



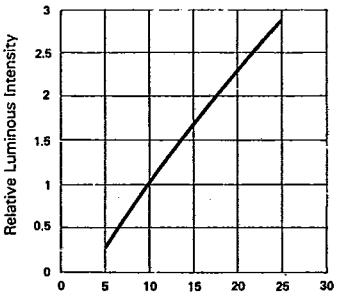
Forward Voltage (V_F) — Volts

Fig. 1 FORWARD CURRENT Vs. FORWARD VOLTAGE.



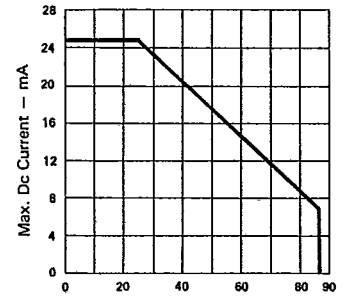
Wavelength (λ) — nm.

Fig. 2 SPECTRAL RESPONSE.



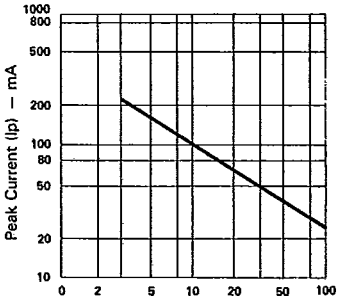
Forward Current (I_F) — mA

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



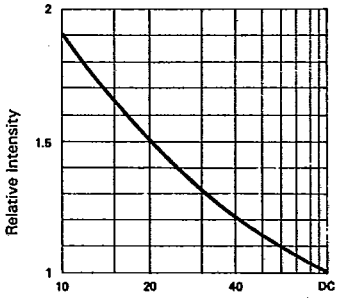
Ambient Temperature (Ta) — °C

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



Duty Cycle %

Fig. 5 MAX. PEAK CURRENT Vs. DUTY CYCLE.% (REFRESH RATE — F = 1 KHz)



Duty Cycle %

Fig. 6 LUMINOUS INTENSITY Vs. DUTY CYCLE% (AVERAGE I_F = 10mA PER SEG.)

SEVEN-SEGMENT LED DISPLAYS

ELECTRICAL/OPTICAL CHARACTERISTICS AT T_A = 25°C
LTS-360HR SERIES

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	Iv	800	2000		μcd	I_F = 10 mA
Peak Emission Wavelength	λp		635		nm	I_F = 20 mA
Spectral Line Half-Width	Δλ		40		nm	I_F = 20 mA
Forward Voltage, any Segment or D.P.	VF		2.1	2.8	V	I_F = 20 mA
Reverse Current, any Segment or D.P.	IR			100	μA	V_R = 5V
Luminous Intensity Matching Ratio	Iv-m			2:1		I_F = 20 mA

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

TYPICAL ELECTRICAL/OPTICAL CHARACTERISTIC CURVES

(25°C Ambient Temperature Unless Otherwise Noted)

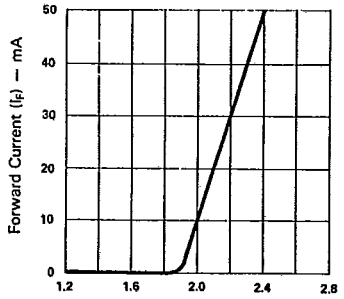


Fig. 1 FORWARD CURRENT Vs. FORWARD VOLTAGE.

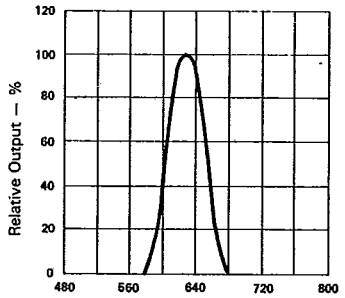


Fig. 2 SPECTRAL RESPONSE.

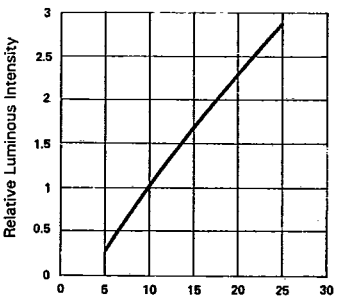


Fig. 3 RELATIVE LUMINOUS INTENSITY Vs. FORWARD CURRENT (PER SEGMENT).

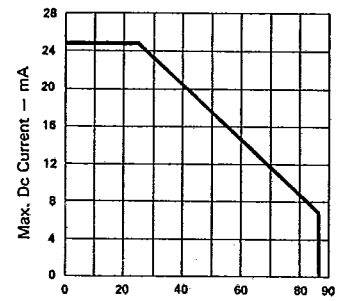


Fig. 4 MAX. ALLOWABLE DC CURRENT PER SEG. Vs AMBIENT TEMPERATURE.

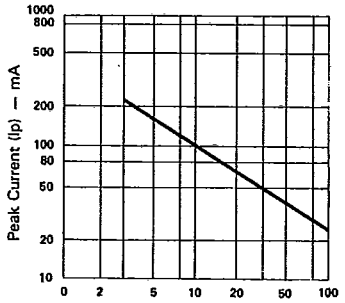


Fig. 5 MAX. PEAK CURRENT Vs. DUTY CYCLE.% (REFRESH RATE — F = 1 KHz)

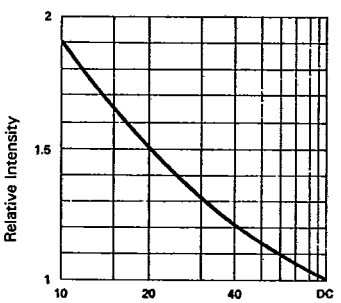


Fig. 6 LUMINOUS INTENSITY Vs. DUTY CYCLE% (AVERAGE I_F = 10mA PER SEG.)