LITEON

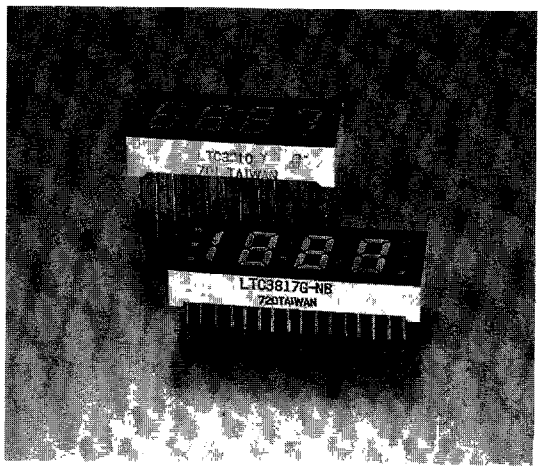
LTC-3710 SERIES

0.3" FOUR LED CLOCK FREQUENCY DISPLAYS

T-41-35

FEATURES

- 0.3 INCH (7.62mm) DIGIT HEIGHT.
- CONTINUOUS UNIFORM SEGMENTS.
- CHOICE OF SIX BRIGHT COLORS RED/BRIGHT RED/GREEN/YELLOW/ORANGE/HIGH EFFICIENCY RED.
- LOW POWER REQUIREMENT.
- EXCELLENT CHARACTERS APPEARANCE.
- HIGH CONTRAST.
- HIGH BRIGHTNESS.
- WIDE VEIWING ANGLE.
- SOLID STATE RELIABILITY.
- CATEGORIZED FOR LUMINOUS INTENSITY.
- I.C. COMPATIBLE.
- EASY MOUNTING ON P.C. BOARD OR SOCKETS.



DESCRIPTION

The LTC-3710 series devices are 0.3 inch (7.62mm) height four 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 yellow, orange and high efficiency red series devices utilize LED chips which are made from GaAsP on a transparent GaP substrate. Red and bright red displays have black face and red segment color. Green, and orange displays have black face and white segment color, Yellow displays have black face and yellow segment color. High efficiency red displays have red face and red segment color.

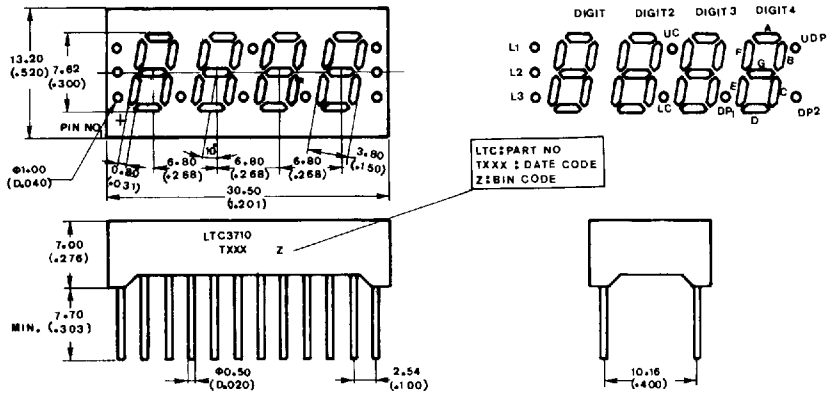
LED CLOCK & FREQUENCY DISPLAYS

DEVICES

PART NO. LTC–						DESCRIPTION
RED	BRIGHT RED	GREEN	YELLOW	ORANGE	HI.-EFF. RED	
3710R	3710P	3710G	3710Y	3710E	3710HR	Multiplex, Common Cathode
3718R	3718P	3718G	3718Y	3718E	3718HR	Multiplex, Common Cathode

PACKAGE DIMENSIONS

A. LTC-3710 Series



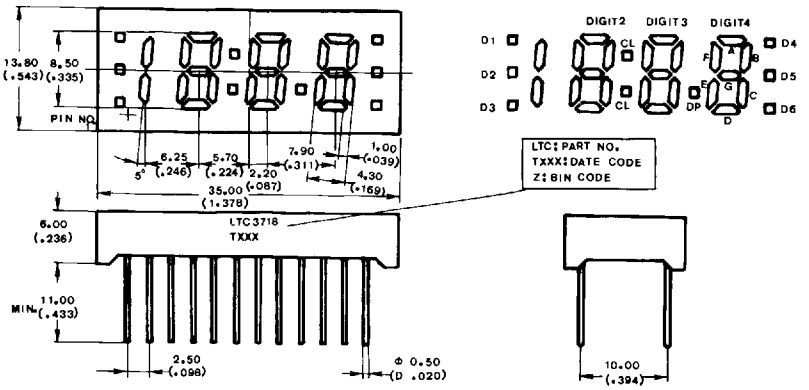
NOTE: All dimensions are in $\frac{\text{millimeters}}{(\text{inches})}$ tolerance are: $\frac{+1.00}{-0.00}$ mm

1. Lead length (from setting plane) MINIMUM VALUM $\frac{+0.040^{n}}{(-0.000^{n})}$ 2. $\frac{\pm 0.25\text{mm}}{(0.010^{n})}$ unless otherwise noted.

PIN NO.	CONNECTION	PIN NO.	CONNECTION
1	Anode L3	13	Cathode U.D.P.
2	Common Cathode Digit 1	14	Cathode D.P. 2.
3	Anode D, Digit 1, 2, 3, 4	15	Anode U.D.P.
4	Anode L2	16	Cathode D.P.1.
5	Common Cathode, Digit 2	17	Anode A, Digit 1, 2, 3, 4
6	Cathode UC, LC	18	Anode F, Digit 1, 2, 3, 4
7	Anode UC, LC	19	Anode B, Digit 1, 2, 3, 4
8	Common Cathode, Digit 3	20	Anode C, Digit 1, 2, 3, 4
9	Anode D.P.1.	21	Anode E, Digit 1
10	Common Cathode, Digit 4	22	Anode G, Digit 1, 2, 3, 4
11	Anode E, Digit 2, 3, 4	23	Anode L1
12	Anode D.P.2	24	Cathode L1, L2, L3

PACKAGE DIMENSIONS

B. LTC-3718 Series



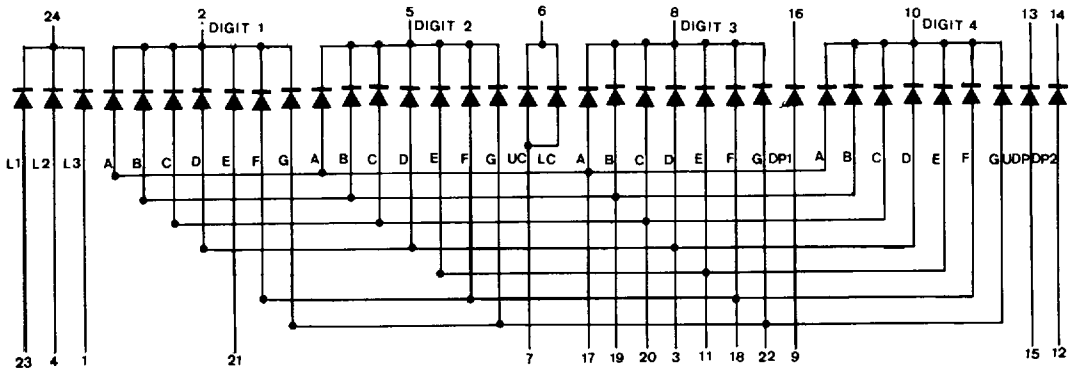
NOTE: All dimensions are in $\frac{\text{millimeters}}{(\text{inches})}$ tolerance are:

1. Lead length (from setting plane). MINIMUM VALUM $\frac{^{+1.00}_{-0.00}\ \text{mm}}{(^{+0.040''}_{-0.000''})}$ 2. $\frac{\pm 0.25\ \text{mm}}{(0.010'')}$ unless otherwise noted.

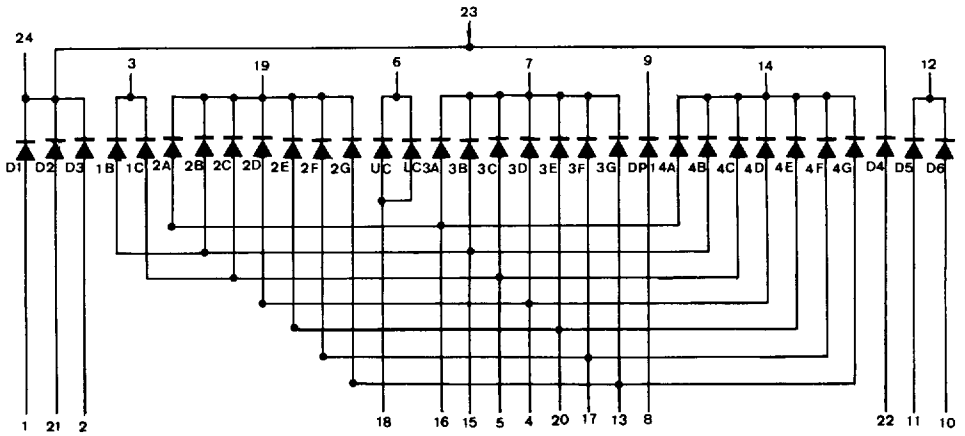
PIN NO.	CONNECTION	PIN NO.	CONNECTION
1	ANODE D1	13	ANODE G
2	ANODE D3	14	COMMON CATHODE DIGIT 4
3	COMMON CATHODE DIGIT 1	15	ANODE B
4	ANODE D	16	ANODE A
5	ANODE 3	17	ANODE F
6	CATHODE UC, LC	18	ANODE UC, LC
7	COMMON CATHODE DIGIT 3	19	COMMON CATHODE DIGIT 2
8	ANODE D.P.	20	ANODE E
9	CATHODE D.P.	21	ANODE D2
10	ANODE D6	22	ANODE 4
11	ANODE D5	23	CATHODE D2, D4
12	CATHODE D5, D6	24	CATHODE D1, D3

INTERNAL CIRCUIT DIAGRAM

LTC-3710 Series



LTC-3718 Series



ABSOLUTE MAXIMUM RATINGS

PARAMETER	RED	BRIGHT RED	GREEN	YELLOW	ORANGE	HI.-EFF. RED	UNIT
Power Dissipation Per Segment	45	30	60	50	60	60	mW
Peak Forward Current Per Segment (1/10 Duty Cycle, 0.1ms Pulse Width)	120	40	80	60	80	80	mA
Continuous Forward Current Per Segment	20	12	20 20	16	20	20	mA
Derating Linear From 25°C Per Segment	0.24	0.14	0.24	0.2	0.24	0.24	mA/°C
Reverse Voltage Per Segment	5	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							

ELECTRICAL/OPTICAL CHARACTERISTICS AT $T_A = 25°C$
LTC-3710R

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	Iv	200	450		µcd	I_F = 10 mA
Peak Emission Wavelength	λp		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 = 5 V
Luminous Intensity Matching Ratio	Iv-m			2:1		I_F = 20 mA

TYPICAL ELECTRICAL/OPTICAL CHARACTERISTIC CURVES

(25°C Ambient Temperature Unless Otherwise Noted)

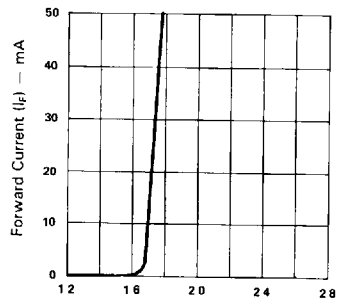


Fig 1 FORWARD CURRENT Vs FORWARD VOLTAGE

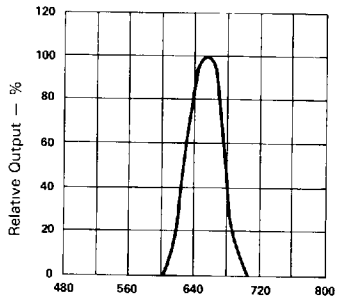


Fig 2 SPECTRAL RESPONSE

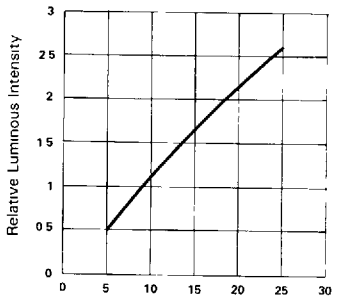


Fig 3 RELATIVE, LUMINOUS INTENSITY Vs FORWARD CURRENT (PER SEGMENT)

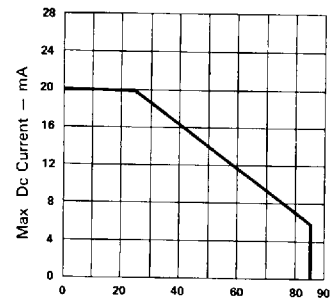


Fig 4 MAX. ALLOWABLE DC CURRENT PER SEG Vs AMBIENT TEMPERATURE

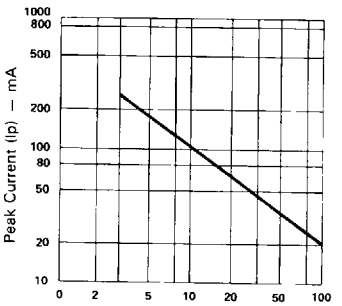


Fig 5 MAX. PEAK CURRENT Vs DUTY CYCLE % (REFRESH RATE — F = 1 KHz)

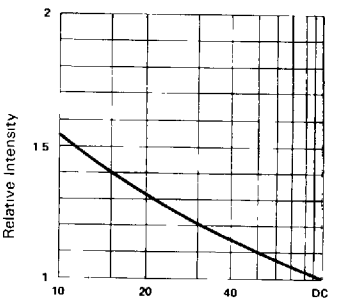


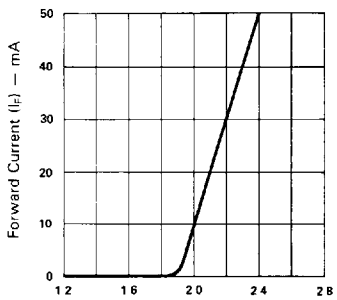
Fig 6 LUMINOUS INTENSITY Vs DUTY CYCLE% (AVERAGE I_F = 10mA PER SEG.)

ELECTRICAL/OPTICAL CHARACTERISTICS AT T_A = 25°C
LTC-3710P

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	Iv	250	600		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 = 5 V
Luminous Intensity Matching Ratio	Iv-m			2:1		I_F = 20 mA

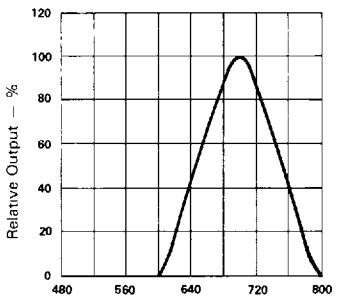
TYPICAL ELECTRICAL/OPTICAL CHARACTERISTIC CURVES

(25°C Ambient Temperature Unless Otherwise Noted)



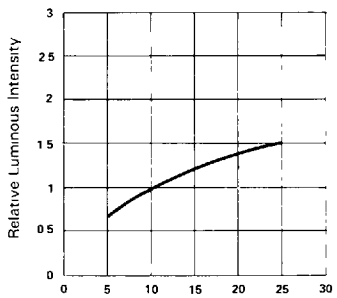
Forward Voltage (V_F) — Volts

Fig 1 FORWARD CURRENT Vs FORWARD VOLTAGE



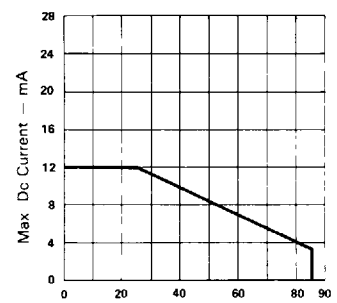
Wavelength (λ) — nm

Fig 2 SPECTRAL RESPONSE



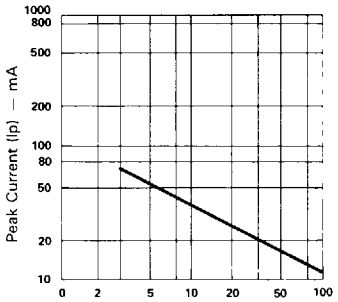
Forward Current (I_F) — mA

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



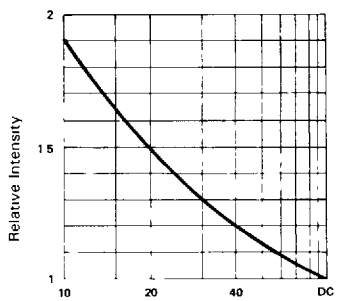
Ambient Temperature (Ta) — °C

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 %

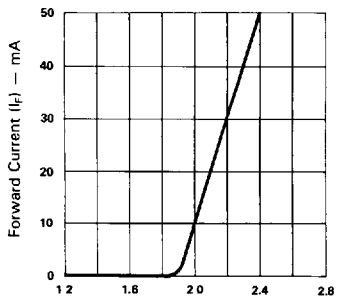
Fig 6 LUMINOUS INTENSITY Vs DUTY CYCLE% (AVERAGE I_F = 10mA PER SEG)

ELECTRICAL/OPTICAL CHARACTERISTICS AT $T_A = 25°C$
LTC-3710G

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	Iv	750	1800		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 = 5 V
Luminous Intensity Matching Ratio	Iv-m			2:1		I_F = 20 mA

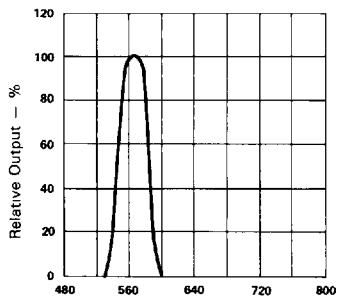
TYPICAL ELECTRICAL/OPTICAL CHARACTERISTIC CURVES

(25°C Ambient Temperature Unless Otherwise Noted)



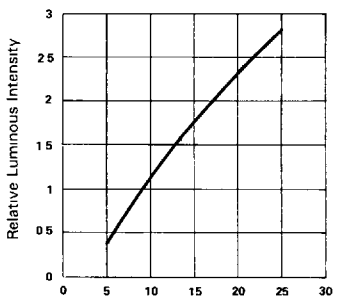
Forward Voltage (V_F) — Volts

Fig. 1 FORWARD CURRENT Vs FORWARD VOLTAGE.



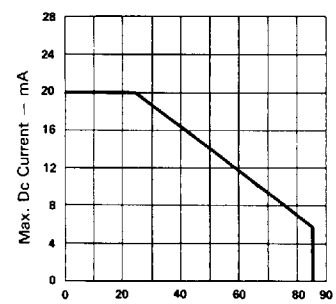
Wavelength (λ) — nm

Fig 2 SPECTRAL RESPONSE



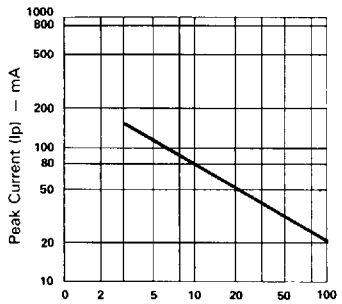
Forward Current (I_F) — mA

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



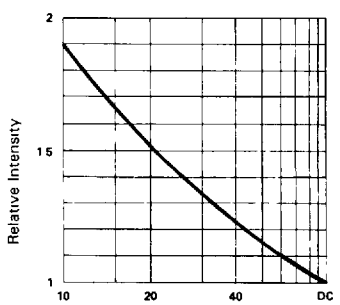
Ambient Temperature (Ta) — °C

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)

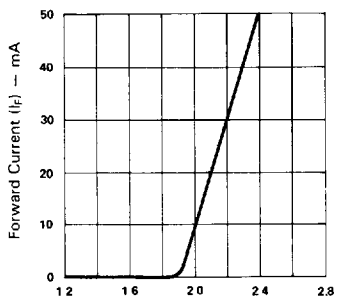
LED CLOCK & FREQUENCY DISPLAYS

ELECTRICAL/OPTICAL CHARACTERISTICS AT T_A = 25°C
LTC-3710Y

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	Iv	600	1300		μcd	I_F = 10 mA
Peak Emission Wavelength	λp		585		nm	I_F = 20 mA
Spectral Line Half-Width	Δλ		35		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 = 5 V
Luminous Intensity Matching Ratio	Iv-m			2:1		I_F = 20 mA

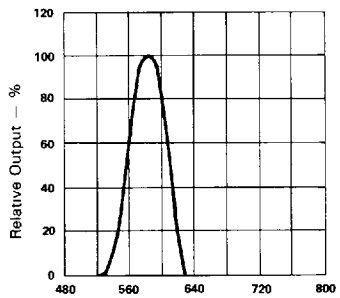
TYPICAL ELECTRICAL/OPTICAL CHARACTERISTIC CURVES

(25° C Ambient Temperature Unless Otherwise Noted)



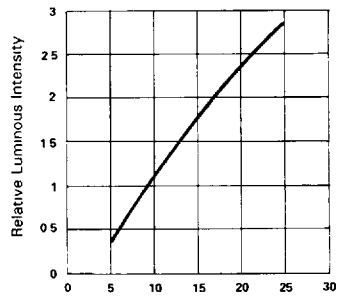
Forward Voltage (V_F) — Volts

Fig 1 FORWARD CURRENT Vs. FORWARD VOLTAGE



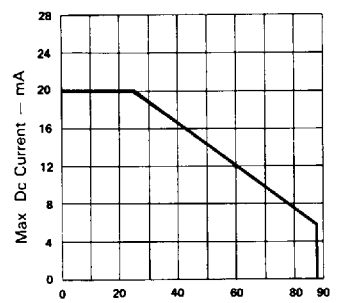
Wavelength (λ) — nm

Fig 2 SPECTRAL RESPONSE



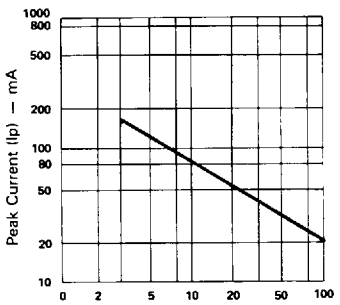
Forward Current (I_F) — mA

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



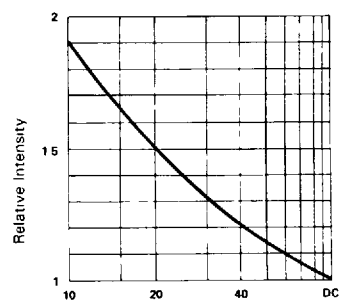
Ambient Temperature (Ta) — °C

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 $T_A = 25°C$
LTC-3710E

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	Iv	750	1800		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 = 5 V
Luminous Intensity Matching Ratio	Iv-m			2:1		I_F = 20 mA

TYPICAL ELECTRICAL/OPTICAL CHARACTERISTIC CURVES

(25°C Ambient Temperature Unless Otherwise Noted)

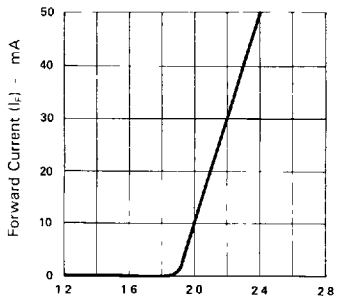


Fig. 1 FORWARD CURRENT Vs FORWARD VOLTAGE

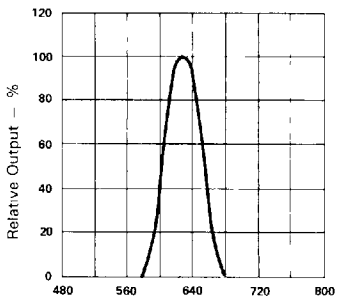


Fig. 2 SPECTRAL RESPONSE

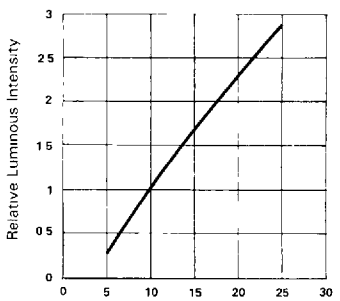


Fig 3 RELATIVE LUMINOUS INTENSITY Vs FORWARD CURRENT (PER SEGMENT)

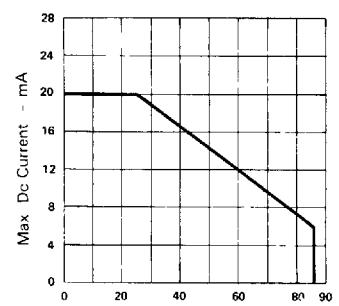


Fig 4 MAX ALLOWABLE DC CURRENT PER SEG Vs AMBIENT TEMPERATURE

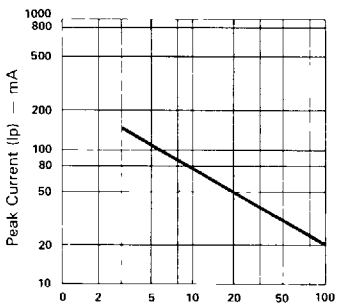


Fig 5 MAX PEAK CURRENT Vs DUTY CYCLE % (REFRESH RATE F = 1 KHz)

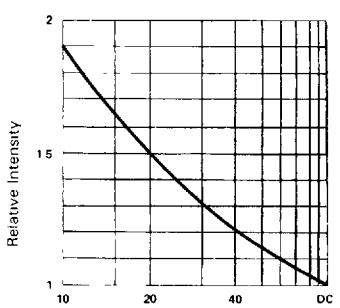


Fig 6 LUMINOUS INTENSITY Vs DUTY CYCLE % (AVERAGE I_F = 10mA PER SEG)

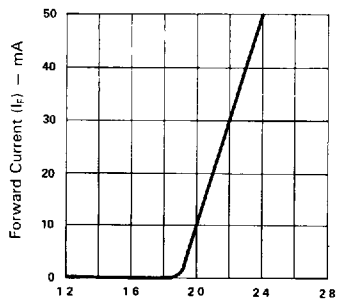
LED CLOCK & FREQUENCY DISPLAYS

ELECTRICAL/OPTICAL CHARACTERISTICS AT T_A = 25°C
LTC-3710HR

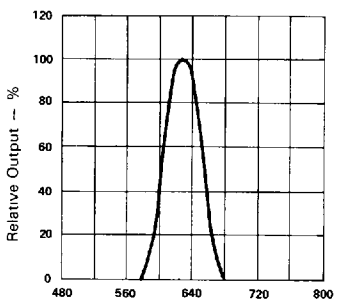
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	Iv	750	1800		μcd	I_F = 10 mA
Peak Emission Wavelength	λp		635		nm	I_F = 20 mA
Spectral Line Half-Width	Δλ		40		nm	I_F = 20 mA
Forward Voltage any Segment or D.P.	V_F		2.1	2.8	V	I_F = 20 mA
Reverse Current, any Segment or D.P.	I_R			100	μA	V_R = 5 V
Luminous Intensity Matching Ratio	Iv-m			2:1		I_F = 20 mA

TYPICAL ELECTRICAL/OPTICAL CHARACTERISTIC CURVES

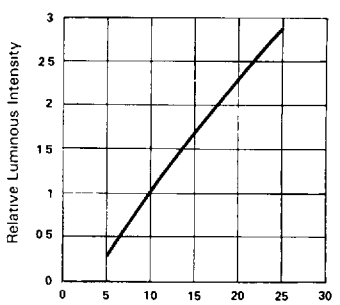
(25°C Ambient Temperature Unless Otherwise Noted)



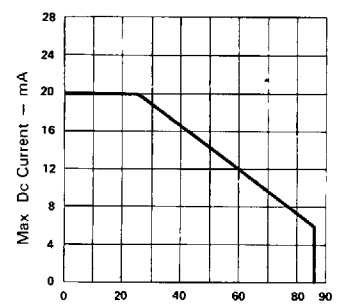
Forward Voltage (V_F) — Volts
Fig. 1 FORWARD CURRENT Vs. FORWARD VOLTAGE



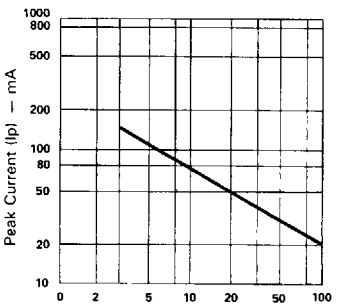
Wavelength (λ) — nm
Fig 2 SPECTRAL RESPONSE



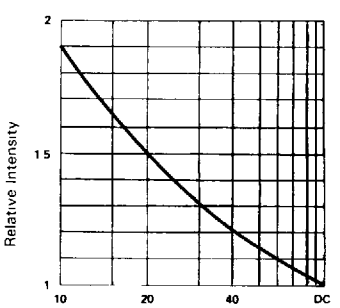
Forward Current (I_F) — mA
Fig 3 RELATIVE, LUMINOUS INTENSITY Vs FORWARD CURRENT (PER SEGMENT)



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
LTC-3718R

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	Iv	200	450		µcd	I_F = 10 mA
Peak Emission Wavelength	λp		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 = 5 V
Luminous Intensity Matching Ratio	Iv-m			2:1		I_F = 20 mA

TYPICAL ELECTRICAL/OPTICAL CHARACTERISTIC CURVES

(25°C Ambient Temperature Unless Otherwise Noted)

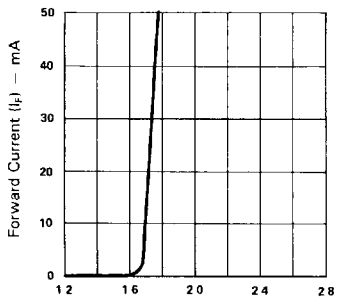


Fig 1 FORWARD CURRENT Vs FORWARD VOLTAGE

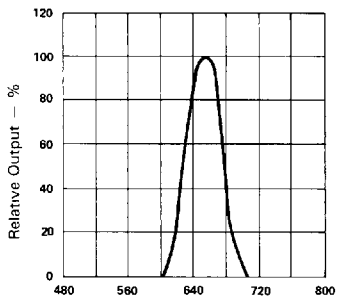


Fig. 2 SPECTRAL RESPONSE

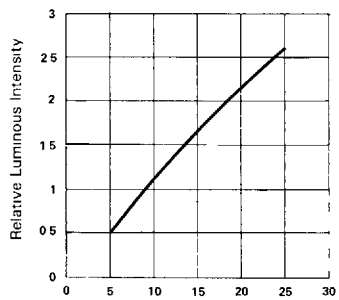


Fig 3 RELATIVE, LUMINOUS INTENSITY Vs FORWARD CURRENT (PER SEGMENT)

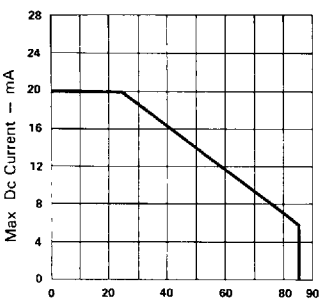


Fig 4 MAX. ALLOWABLE DC CURRENT PER SEG Vs AMBIENT TEMPERATURE

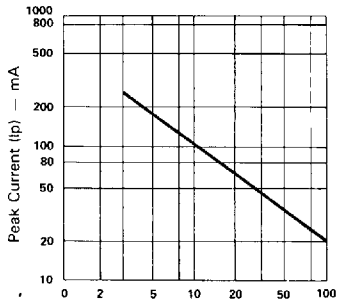


Fig 5 MAX. PEAK CURRENT Vs DUTY CYCLE % (REFRESH RATE - F = 1 KHz)

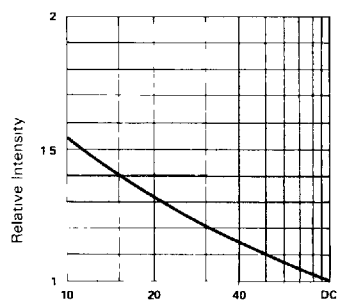


Fig 6 LUMINOUS INTENSITY Vs DUTY CYCLE% (AVERAGE I_F = 10mA PER SEG.)

ELECTRICAL/OPTICAL CHARACTERISTICS AT T_A = 25°C
LTC-3718P

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	Iv	250	600		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 = 5 V
Luminous Intensity Matching Ratio	Iv-m			2:1		I_F = 20 mA

TYPICAL ELECTRICAL/OPTICAL CHARACTERISTIC CURVES

(25°C Ambient Temperature Unless Otherwise Noted)

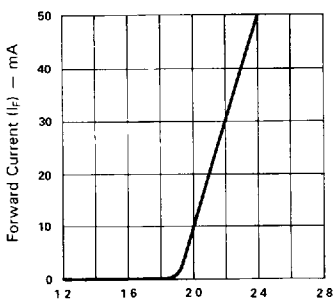


Fig 1 FORWARD CURRENT Vs FORWARD VOLTAGE

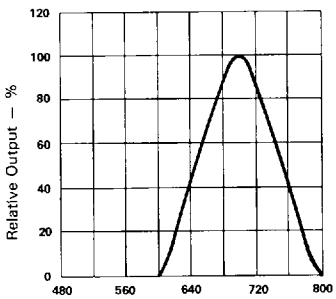


Fig 2 SPECTRAL RESPONSE

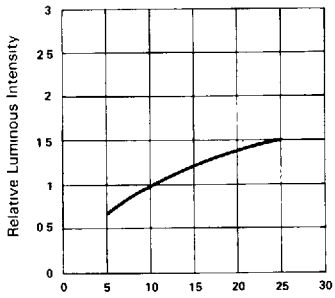


Fig 3 RELATIVE, LUMINOUS INTENSITY Vs FORWARD CURRENT (PER SEGMENT)

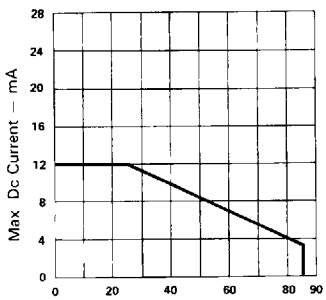


Fig 4 MAX ALLOWABLE DC CURRENT PER SEG Vs AMBIENT TEMPERATURE

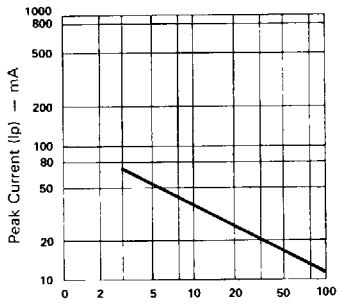


Fig 5 MAX PEAK CURRENT Vs DUTY CYCLE % (REFRESH RATE – F = 1 KHz)

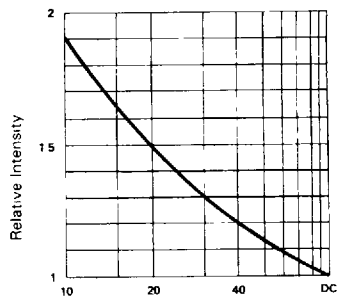


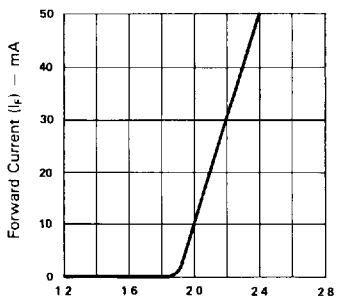
Fig 6 LUMINOUS INTENSITY Vs DUTY CYCLE% (AVERAGE I_F = 10mA PER SEG)

ELECTRICAL/OPTICAL CHARACTERISTICS AT T_A = 25°C
LTC-3718G

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	Iv	750	1800		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 = 5 V
Luminous Intensity Matching Ratio	Iv-m			2:1		I_F = 20 mA

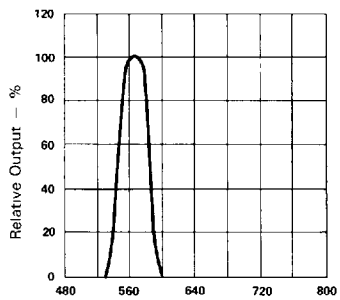
TYPICAL ELECTRICAL/OPTICAL CHARACTERISTIC CURVES

(25°C Ambient Temperature Unless Otherwise Noted)



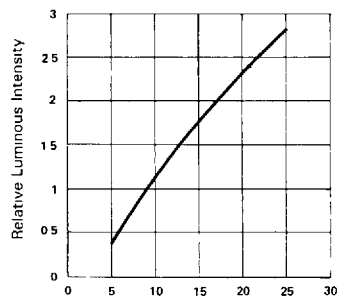
Forward Voltage (V_F) — Volts

Fig 1 FORWARD CURRENT Vs FORWARD VOLTAGE



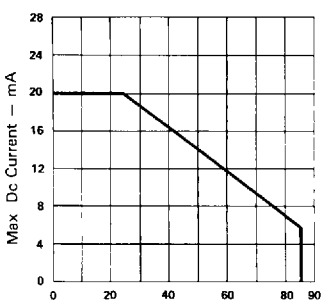
Wavelength (λ) — nm

Fig 2 SPECTRAL RESPONSE



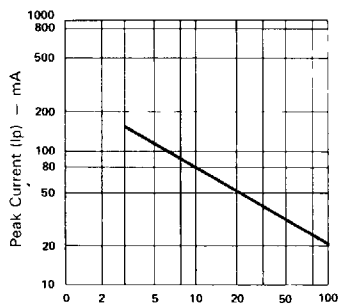
Forward Current (I_F) — mA

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



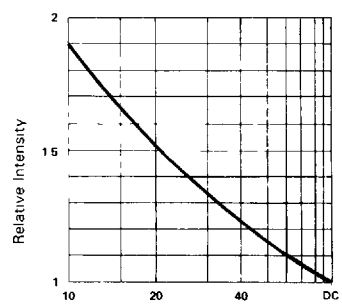
Ambient Temperature (Ta) — °C

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
LTC-3718Y

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	Iv	600	1300		μcd	I_F = 10 mA
Peak Emission Wavelength	λp		585		nm	I_F = 20 mA
Spectral Line Half-Width	Δλ		35		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 = 5 V
Luminous Intensity Matching Ratio	Iv-m			2:1		I_F = 20 mA

TYPICAL ELECTRICAL/OPTICAL CHARACTERISTIC CURVES

(25°C Ambient Temperature Unless Otherwise Noted)

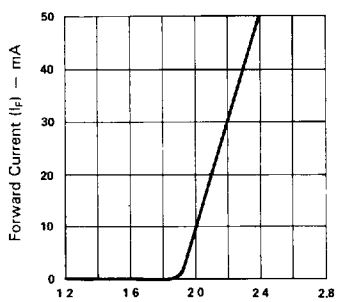


Fig 1 FORWARD CURRENT Vs FORWARD VOLTAGE

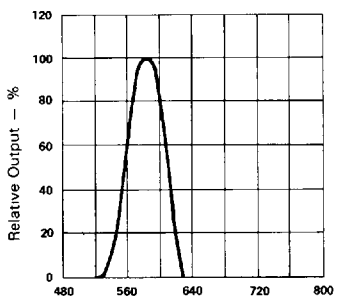


Fig 2 SPECTRAL RESPONSE

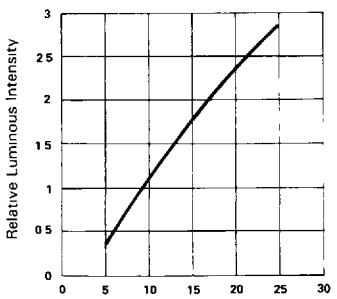


Fig 3 RELATIVE, LUMINOUS INTENSITY Vs. FORWARD CURRENT (PER SEGMENT)

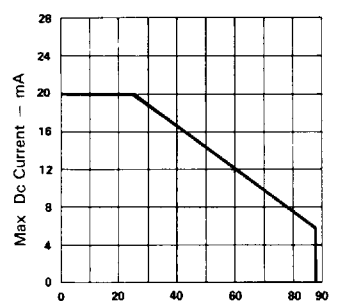


Fig 4 MAX. ALLOWABLE DC CURRENT PER SEG Vs AMBIENT TEMPERATURE

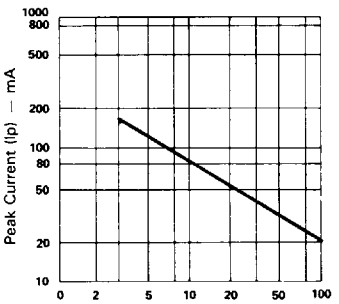


Fig 5 MAX. PEAK CURRENT Vs DUTY CYCLE % (REFRESH RATE – F = 1 KHz)

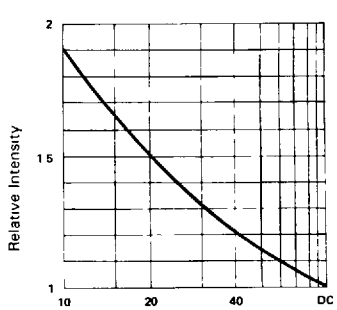


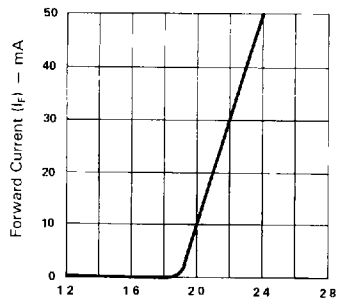
Fig 6 LUMINOUS INTENSITY Vs DUTY CYCLE% (AVERAGE I_F = 10mA PER SEG)

ELECTRICAL/OPTICAL CHARACTERISTICS AT T_A = 25°C
LTC-3718E

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	Iv	750	1800		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 = 5 V
Luminous Intensity Matching Ratio	Iv-m			2:1		I_F = 20 mA

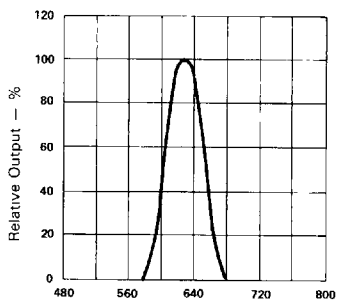
TYPICAL ELECTRICAL/OPTICAL CHARACTERISTIC CURVES

(25°C Ambient Temperature Unless Otherwise Noted)



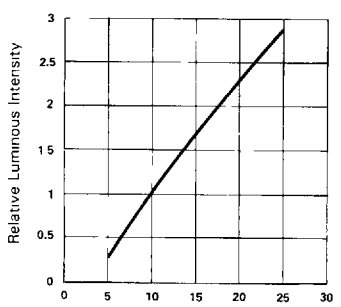
Forward Voltage (V_F) — Volts

Fig 1 FORWARD CURRENT Vs. FORWARD VOLTAGE



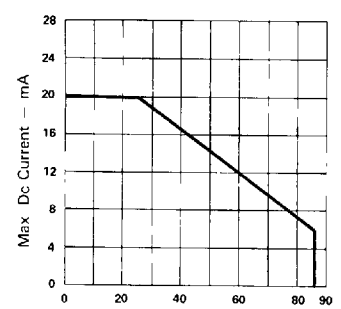
Wavelength (λ) — nm

Fig 2 SPECTRAL RESPONSE



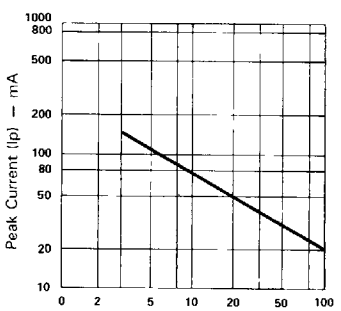
Forward Current (I_F) — mA

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



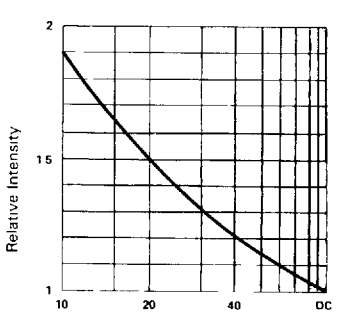
Ambient Temperature (Ta) — °C

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)

LED CLOCK & FREQUENCY DISPLAYS

ELECTRICAL/OPTICAL CHARACTERISTICS AT $T_A = 25°C$
LTC-3718HR

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Average Luminous Intensity	Iv	750	1800		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.	V_F		2.1	2.8	V	I_F = 20 mA
Reverse Current, any Segment or D.P.	I_R			100	μA	V_R = 5 V
Luminous Intensity Matching Ratio	Iv-m			2:1		I_F = 20 mA

TYPICAL ELECTRICAL/OPTICAL CHARACTERISTIC CURVES

(25°C Ambient Temperature Unless Otherwise Noted)

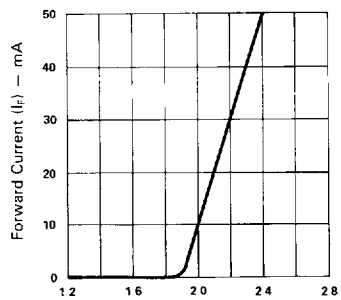


Fig 1 FORWARD CURRENT Vs FORWARD VOLTAGE

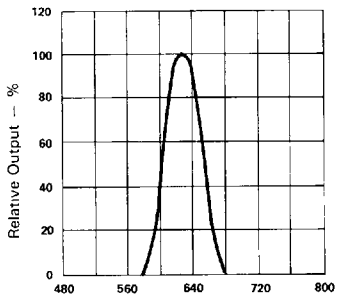


Fig 2 SPECTRAL RESPONSE

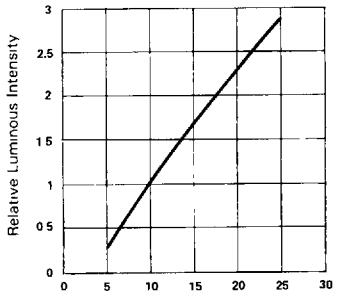


Fig 3 RELATIVE LUMINOUS INTENSITY Vs FORWARD CURRENT (PER SEGMENT)

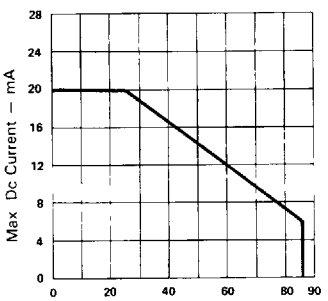


Fig 4 MAX ALLOWABLE DC CURRENT PER SEG Vs AMBIENT TEMPERATURE

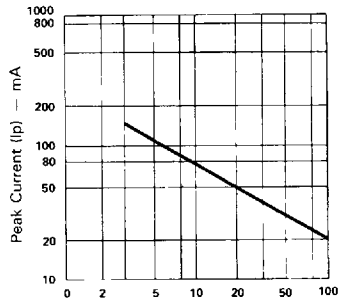


Fig 5 MAX PEAK CURRENT Vs DUTY CYCLE % (REFRESH RATE – F – 1 KHz)

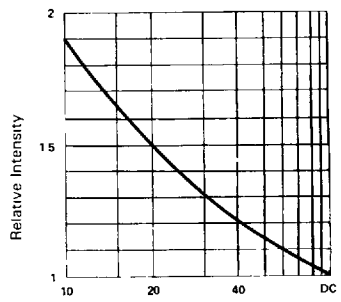


Fig 6 LUMINOUS INTENSITY Vs DUTY CYCLE % (AVERAGE I_F = 10mA PER SEG)