



# SUBMINIATURE SOLID STATE LAMPS

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LTL-93BEK1 ORANGE  
LTL-93BGK1 GREEN  
LTL-93BYK1 YELLOW

TAIWAN LITON ELECTRONIC 24E D

## FEATURES

- SUBMINIATURE PACKAGE STYLE.
- LOW PACKAGE PROFILE.
- AXIAL LEADS
- WIDE VIEWING ANGLE.
- LONG LIFE SOLID STATE RELIABILITY.

## DESCRIPTION

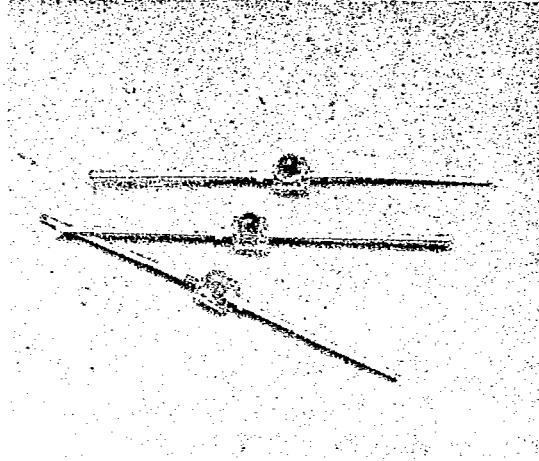
The Orange source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Orange Light Emitting Diode.

The Green source color devices are made with Gallium Phosphide on Gallium Phosphide Green Light Emitting Diode.

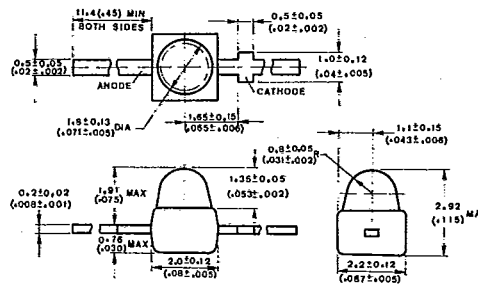
The Yellow source color devices are made with Gallium Arsenide Phosphide on Gallium Phosphide Yellow Light Emitting Diode.

Lamps in this series of solid state indicators are molded in an axial lead subminiature package of molded epoxy. They utilize a water clear lens.

Size makes these lamp suitable for PC board mounting in space sensitive application.



## PACKAGE DIMENSIONS



## DEVICES

PART NO. LTL-	LENS		SOURCE COLOR
	COLOR	DIFFUSION	
93BEK1	Water Clear	Non-Diffused	Orange
93BGK1	Water Clear	Non-Diffused	Green
93BYK1	Water Clear	Non-Diffused	Yellow

### NOTES:

1. All dimensions are in millimeters (inches).
2. Tolerance is  $\pm 0.25\text{mm}$  (.010") unless otherwise noted.
3. Specifications are subject to change without notice.

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

PARAMETER	ORANGE	GREEN	YELLOW	UNIT
Power Dissipation	100	100	60	mW
Peak Forward Current (1/10 Duty Cycle, 0.1ms Pulse Width)	120	120	80	mA
Continuous Forward Current	30	30	20	mA
Derating Linear From $25^\circ\text{C}$	0.4	0.4	0.25	mA/ $^\circ\text{C}$
Reverse Voltage	5	5	5	V
Operating Temperature Range	-55 $^\circ\text{C}$ to +100 $^\circ\text{C}$			
Storage Temperature Range	-55 $^\circ\text{C}$ to +100 $^\circ\text{C}$			
Lead Soldering Temperature [1.6mm (0.063in) From Body]	260 $^\circ\text{C}$ for 5 Seconds			

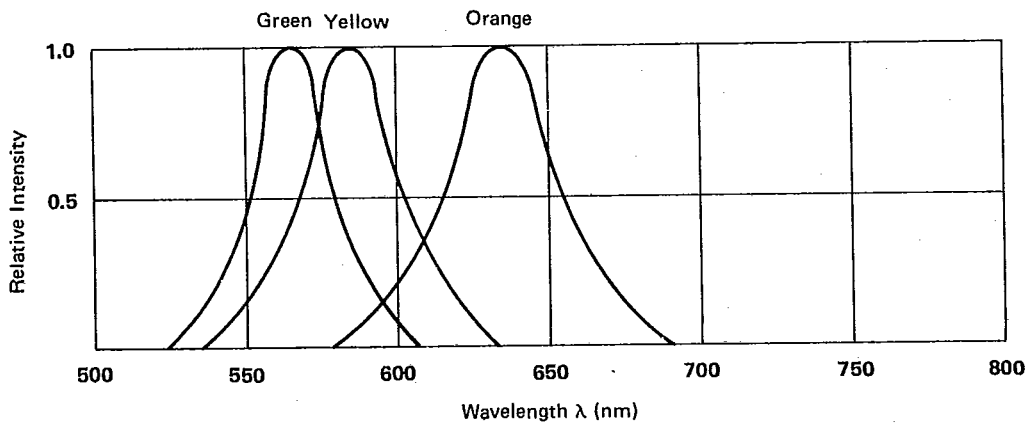


FIG. 1 RELATIVE INTENSITY VS. WAVELENGTH

ELECTRICAL/OPTICAL CHARACTERISTICS AND CURVES AT  $T_A = 25^\circ C$

PARAMETER	SYMBOL	PART NO. LTL-	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Luminous Intensity	$I_v$	93BEK1	3.7	12.5		mcd	$I_F = 10 \text{ mA}$ Note 1
Viewing Angle	$2\theta_{1/2}$	93BEK1		34		deg.	Note 2 (Fig. 6)
Peak Emission Wavelength	$\lambda_{PEAK}$			630		nm	Measurement @ Peak (Fig. 1)
Spectral Line Half Width	$\Delta\lambda$			40		nm	
Forward Voltage	$V_F$			2.0	2.8	V	$I_F = 20 \text{ mA}$
Reverse Current	$I_R$				100	$\mu A$	$V_R = 5V$
Capacitance	C			20		PF	$V_F = 0$ $f = 1 \text{ MHz}$

NOTES: 1. Luminous Intensity is measured with a light sensor and filter combination that approximates the CIE (Commission Internationale De L'Eclairage) eye-response curve.  
 2.  $\theta_{1/2}$  is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

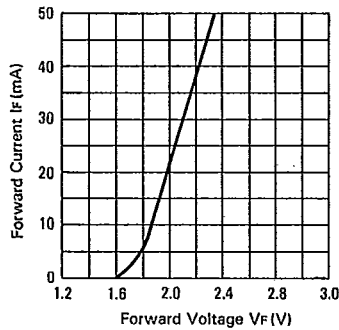


FIG. 2 FORWARD CURRENT VS. FORWARD VOLTAGE

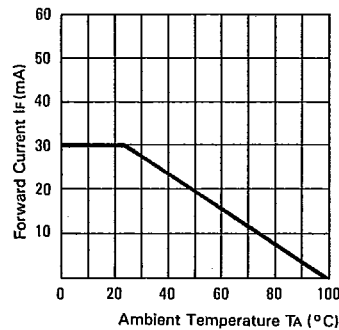


FIG. 3 FORWARD CURRENT DERATING CURVE

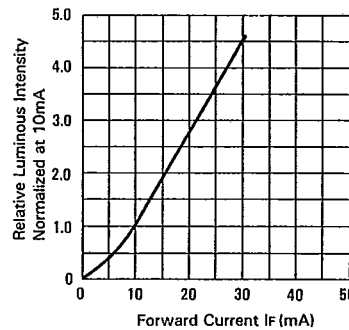


FIG. 4 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

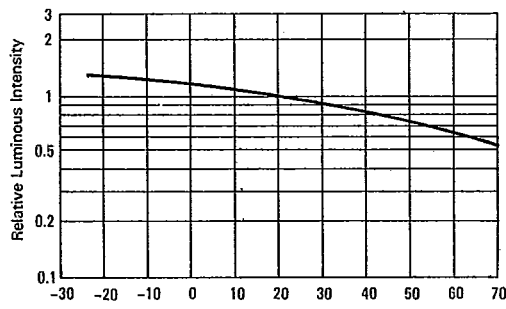


FIG. 5 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

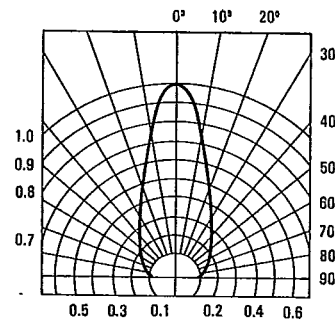


FIG. 6 SPATIAL DISTRIBUTION

ELECTRICAL/OPTICAL CHARACTERISTICS AND CURVES AT TA = 25°C

PARAMETER	SYMBOL	PART NO. LTL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Luminous Intensity	Iv	93BGK1 93BYK1	4.0 2.5	15.0 8.5		mcd	IF = 10 mA Note 1
Viewing Angle	2θ½	93BGK1 93BYK1		34		deg.	Note 2 (Fig. 11)
Peak Emission Wavelength	λPEAK	93BGK1 93BYK1		565 585		nm	Measurement @ Peak (Fig. 1)
Spectral Line Half Width	Δλ	93BGK1 93BYK1		30 35		nm	
Forward Voltage	VF	93BGK1 93BYK1		2.1	2.8	V	IF = 20 mA
Reverse Current	IR	93BGK1 93BYK1			100	μA	VR = 5V
Capacitance	C	93BGK1 93BYK1		35 15		PF	VF = 0 f = 1 MHZ

LED LAMPS

NOTES: 1. Luminous Intensity is measured with a light sensor and filter combination that approximates the CIE (Commission Internationale De L'Eclairage) eye-response curve.  
 2. θ½ is the off-axis angle at which the luminous intensity is half the axial luminous intensity.

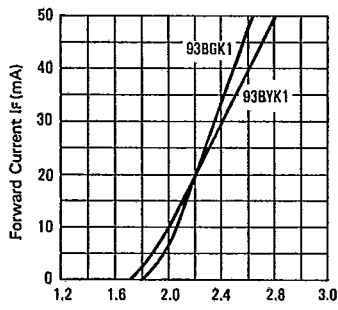


FIG. 7 FORWARD CURRENT VS. FORWARD VOLTAGE

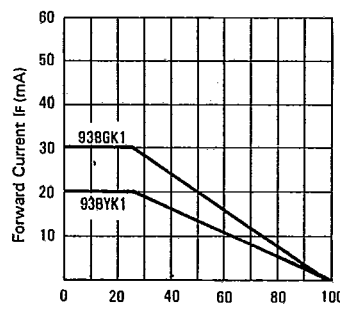


FIG. 8 FORWARD CURRENT DERATING CURVE

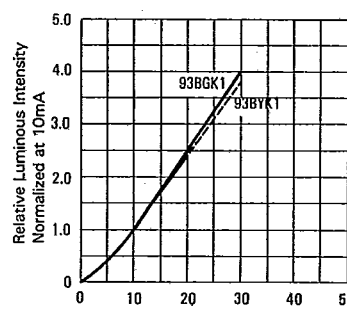


FIG. 9 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

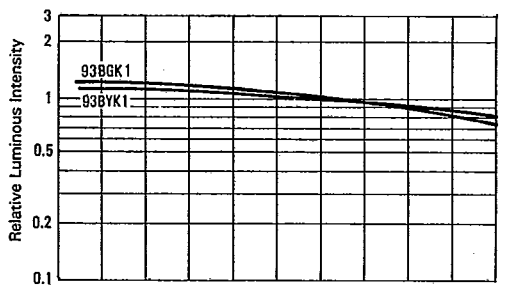


FIG. 10 LUMINOUS INTENSITY VS. AMBIENT TEMPERATURE

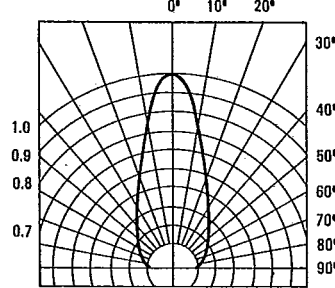


FIG. 11 SPATIAL DISTRIBUTION