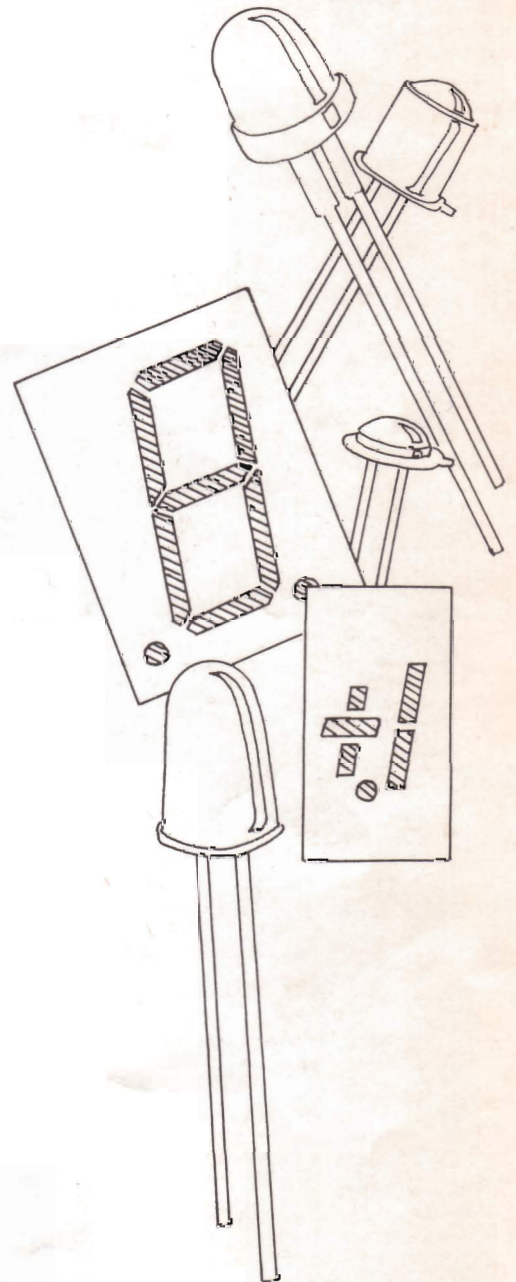


Xciton



INFRARED



Optoelectronics

Catalog

1978

FROM XCITON...THE 1978 CATALOG

This optoelectronic short-form catalog is designed to provide the Design Engineer and the Buyer with detailed, up-to-date product specifications. It will enable him to select reliable, cost effective, and practical components. It is divided into six major product lines: Standard LED Lamps, High Performance LED Lamps, 5-Volt Resistor LED Lamps, High Output Infrared and Visible Emitters, LED Hybrid Numerics, and Light Emitting Materials. Also included are Electrical Characteristic Curves and Package Outlines.

HOW TO USE THIS CATALOG

- A Table of Contents allows you to locate parts by their general performance description.
- Within each general performance description, parts are further described by package style.

As a further service to customers needing more detailed information a complete, tabulated listing of data sheets is available. This listing includes information in the areas of LED and Infrared reliability test results, basic assembly sequence, Q.C. procedures, LED hybrid numeric filtering techniques, and dice characteristics. Copies may be obtained by contacting Xciton or one of its representatives directly.

HOW TO ORDER

All Xciton components may be ordered through any of the world-wide representatives or stocking distributors. Contact Xciton for the representative nearest your area.

Xciton Corporation
Shaker Park
5 Hemlock Street
Latham, NY 12110
U.S.A.

Telephone: (518) 783-7726

TWX: 710-444-4962

During the past decade, Xciton has been recognized as the world's leader in liquid epitaxy and GaP technology. This is the result of Xciton's basic goal of serving its customers with a full selection of LED products spanning the spectrum from Infrared to the world's brightest green. Striving to maintain this leadership position, Xciton encourages all inquiries to be directed to its field representatives or factory personnel.

XCITON'S 1978 PRODUCT LINES

■ STANDARD LED LAMPS ----- PAGE 2

POPULAR STYLES IN RED, YELLOW, AND GREEN:

RED GaP for maximum brightness at low currents

RED GaAsP — the industry standard

RED GaAsP/GaP for maximum brightness at higher currents

YELLOW GaAsP/GaP

GREEN GaP — the world's brightest

■ HIGH PERFORMANCE LED LAMPS ----- PAGE 5

SPECIALLY CONSTRUCTED AND SELECTED LAMPS
FOR SPECIFIC APPLICATIONS:

low drive currents

high brightness

guaranteed limits on brightness

■ 5-VOLT RESISTOR LED LAMPS ----- PAGE 5

IN RED, YELLOW, AND GREEN

■ TRI-STATE LED LAMP ----- PAGE 6

BRIGHT RED AND GREEN LIGHT FROM THE SAME UNIT

■ HIGH OUTPUT INFRARED AND VISIBLE EMITTERS ----- PAGE 8 FOR APPLICATION IN:

control systems

couplers

instrumentation

smoke detectors

■ LED HYBRID NUMERICS ----- PAGE 12

.3 INCH (7.6 mm)

.5 INCH (12.7 mm)

.6 INCH (15.2 mm)

1.5 INCH (38.1 mm)

in red, yellow, and green

■ LIGHT EMITTING MATERIALS FOR VISIBLE AND INFRARED LED MANUFACTURING ----- PAGE 17

STATE-OF-THE-ART CHIPS AND WAFERS

STANDARD LED LAMPS



T-1 MINIATURE LAMP

D = .125 Inch (3.18 mm)
L = .210 Inch (5.33 mm)

Xciton Part Number	Use	Lens Type	Emission Color	Dice Type	Typical Viewing Angle*	Luminous Intensity in mcd @ 10 mA		**Elect. Specs	Package Style***
						Min	Typ		
XC-209-R	Miniature Ind.	Red Diff.	Red	GaP	75	.6	1.5	C-2	B
XC-2090	Miniature Ind.	Red Diff.	Red	GaAsP/GaAs	70	.6 @ 20	1.2 @ 20	C-1	BB
XC-209-Y	Miniature Ind.	Yellow Diff.	Yellow	GaAsP/GaP	75	.6	1.5	C-4	B
XC-209-G	Miniature Ind.	Green Diff.	Green	GaP	75	.6	1.5	C-5	B
XC-309-R	Miniature Ind.	Red Diff.	Red	GaAsP/GaP	75	1.0	2.0	C-3	B
XC-309-R2	Miniature Ind.	Red Diff.	Red	GaAsP/GaP	75	2.0	4.0	C-3	B



T-1 1/4 TAPERED BODY LAMP

D = .185 Inch (4.70 mm)
L = .340 Inch (8.64 mm)
Radius of Tip = .080 Inch (2.03 mm)

Use C-160 Panel Mounting Clip (p. 11).

Xciton Part Number	Use	Lens Type	Emission Color	Dice Type	Typical Viewing Angle*	Luminous Intensity in mcd @ 10 mA		**Elect. Specs	Package Style***
						Min	Typ		
XC-520-R	Point Ind.	Water Clear	Red	GaP	55	1.0	3.0	C-2	C
XC-520-Y	Point Ind.	Water Clear	Yellow	GaAsP/GaP	55	1.0	3.0	C-4	C
XC-520-G	Point Ind.	Water Clear	Green	GaP	55	1.0	3.0	C-5	C
XC-521-R	Indicator	White Diff.	Red	GaP	70	.5	1.5	C-2	C
XC-5210	Indicator	White Diff.	Red	GaAsP/GaAs	70	.6 @ 20	1.5 @ 20	C-1	CC
XC-521-Y	Indicator	White Diff.	Yellow	GaAsP/GaP	70	.5	1.5	C-4	C
XC-521-G	Indicator	White Diff.	Green	GaP	70	.5	1.5	C-5	C
XC-522-R	Point Ind.	Red Clear	Red	GaP	55	1.0	3.0	C-2	C
XC-522-Y	Point Ind.	Yellow Clear	Yellow	GaAsP/GaP	55	1.0	3.0	C-4	C
XC-522-G	Point Ind.	Green Clear	Green	GaP	55	1.0	3.0	C-5	C
XC-526-R	Indicator	Red Diff.	Red	GaP	70	.5	1.5	C-2	C
XC-526-R2	Indicator	Red Diff.	Red	GaP	70	2.0	2.8	C-2	C
XC-5260	Indicator	Red Diff.	Red	GaAsP/GaAs	70	.6 @ 20	1.5 @ 20	C-1	CC
XC-526-Y	Indicator	Yellow Diff.	Yellow	GaAsP/GaP	70	.5	1.5	C-4	C
XC-526-Y2	Indicator	Yellow Diff.	Yellow	GaAsP/GaP	70	2.0	2.8	C-4	C
XC-526-G	Indicator	Green Diff.	Green	GaP	70	.5	1.5	C-5	C
XC-526-G2	Indicator	Green Diff.	Green	GaP	70	2.0	2.8	C-5	C

* Total included viewing angle between half power points, measured in degrees.

** See Page 7 for Table of Characteristics for LED Lamps.

*** See Page 11 for Package Dimensions for LED Lamps.



T-1 1/2 MEDIUM HEIGHT LAMP

D = .190 Inch (4.83 mm)
L = .285 Inch (7.24 mm)

Xciton Part Number	Use	Lens Type	Emission Color	Dice Type	Typical Viewing Angle*	Luminous Intensity in mcd @ 10 mA		**Elect. Specs	Package Style***
						Min	Typ		
XC-110-R	Indicator	Red Diff.	Red	GaP	75	.5	1.0	C-2	D
XC-1170	Wide Angle Illum.	Red Diff.	Red	GaAsP/GaAs	70	.5 @ 20	1.0 @ 20	C-1	DD
XC-110-Y	Indicator	Yellow Diff.	Yellow	GaAsP/GaP	75	.5	1.0	C-4	D
XC-110-G	Indicator	Green Diff.	Green	GaP	75	.5	1.2	C-5	D
XC-111-R	Wide Angle Illum.	Red Clear	Red	GaP	45	.5	2.0	C-2	D
XC-1110	Wide Angle Illum.	Red Clear	Red	GaAsP/GaAs	45	.5 @ 20	1.5 @ 20	C-1	DD
XC-111-Y	Wide Angle Illum.	Yellow Clear	Yellow	GaAsP/GaP	45	.5	2.0	C-4	D
XC-111-G	Wide Angle Illum.	Green Clear	Green	GaP	45	.5	2.5	C-5	D



T-1 1/2 LOW PROFILE LAMP

D = .200 Inch (5.08 mm)
L = .240 Inch (6.10 mm)

Xciton Part Number	Use	Lens Type	Emission Color	Dice Type	Typical Viewing Angle*	Luminous Intensity in mcd @ 10 mA		**Elect. Specs	Package Style***
						Min	Typ		
XC-21-R	Wide Angle Ind.	Red Clear	Red	GaP	55	.6	2.0	C-2	F
XC-21-Y	Wide Angle Ind.	Yellow Clear	Yellow	GaAsP/GaP	55	.6	2.0	C-4	F
XC-21-G	Wide Angle Ind.	Green Clear	Green	GaP	55	.6	2.0	C-5	F
XC-22-R	Wide Angle Ind.	Red Diff.	Red	GaP	80	.6	1.5	C-2	F
XC-22-Y	Wide Angle Ind.	Yellow Diff.	Yellow	GaAsP/GaP	80	.6	1.5	C-4	F
XC-22-G	Wide Angle Ind.	Green Diff.	Green	GaP	80	.6	1.5	C-5	F



T-1 1/2 LONG, NARROW DIAMETER LAMP

D = .190 Inch (4.83 mm)
L = .340 Inch (8.64 mm)

Use C-200 panel mounting clip (p. 11).

Xciton Part Number	Use	Lens Type	Emission Color	Dice Type	Typical Viewing Angle*	Luminous Intensity in mcd @ 10 mA		**Elect. Specs	Package Style***
						Min	Typ		
XC-4651-R	Wide Angle Ind.	Red Diff.	Red	GaAsP/GaP	80	1.0	2.0	C-3	GG
XC-4656-R3	Wide Angle Ind.	Red Diff.	Red	GaAsP/GaP	80	3.0	4.0	C-3	GG
XC-4850-R	Wide Angle Ind.	Red Diff.	Red	GaAsP/GaAs	80	.6	1.3	C-1	GG
XC-4850-Y	Wide Angle Ind.	Yellow Diff.	Yellow	GaAsP/GaP	80	.6	1.5	C-4	GG
XC-4850-G	Wide Angle Ind.	Green Diff.	Green	GaP	80	.6	1.8	C-5	GG

STANDARD LED LAMPS



T-1 1/4 LONG, STANDARD DIAMETER LAMP

D = .200 inch (5.08 mm)
L = .340 inch (8.64 mm)

Use C-200 Panel Mounting Clip (p. 11).

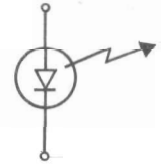
Xciton Part Number	Use	Lens Type	Emission Color	Dice Type	Typical Viewing Angle*	Luminous Intensity in mcd @ 10 mA		**Elect. Specs	Package Style***
						Min	Typ		
XC-554-R	Illuminator	Red Clear	Red	GaP	24	2.0	6.0	C-2	E
XC-554-R9	Illuminator	Red Clear	Red	GaP	24	9.0	12.0	C-2	E
XC-554-R12	Illuminator	Red Clear	Red	GaP	24	12.0	15.0	C-2	E
XC-554-Y	Illuminator	Yellow Clear	Yellow	GaAsP/GaP	24	2.0	6.0	C-4	E
XC-554-Y6	Illuminator	Yellow Clear	Yellow	GaAsP/GaP	24	6.0	8.0	C-4	E
XC-554-Y12	Illuminator	Yellow Clear	Yellow	GaAsP/GaP	24	12.0	15.0	C-4	E
XC-554-G	Illuminator	Green Clear	Green	GaP	24	2.0	6.0	C-5	E
XC-554-G6	Illuminator	Green Clear	Green	GaP	24	6.0	8.0	C-5	E
XC-554-G15	Illuminator	Green Clear	Green	GaP	24	15.0	17.0	C-5	E
XC-554-G24	Illuminator	Green Clear	Green	GaP	24	24.0	27.0	C-5	E
XC-556-R	Indicator/Illum.	Red Diff.	Red	GaP	30	.6	1.8	C-2	E
XC-556-R2	Indicator/Illum.	Red Diff.	Red	GaP	30	2.0	2.8	C-2	E
XC-556-R3	Indicator/Illum.	Red Diff.	Red	GaP	30	3.0	3.8	C-2	E
XC-5560	Indicator/Illum.	Red Diff.	Red	GaAsP/GaAs	30	.6 @ 20	1.5 @ 20	C-1	EE
XC-5054-1	Indicator/Illum.	Red Diff.	Red	GaAsP/GaAs	30	1.0	1.5	C-1	E
XC-5054-2	Indicator/Illum.	Red Diff.	Red	GaAsP/GaAs	30	2.0	2.5	C-1	E
XC-556-Y	Indicator/Illum.	Yellow Diff.	Yellow	GaAsP/GaP	30	.6	1.8	C-4	E
XC-556-Y2	Indicator/Illum.	Yellow Diff.	Yellow	GaAsP/GaP	30	2.0	2.8	C-4	E
XC-556-Y3	Indicator/Illum.	Yellow Diff.	Yellow	GaAsP/GaP	30	3.0	3.8	C-4	E
XC-556-Y4	Indicator/Illum.	Yellow Diff.	Yellow	GaAsP/GaP	30	4.0	5.0	C-4	E
XC-556-G	Indicator/Illum.	Green Diff.	Green	GaP	30	.6	1.8	C-5	E
XC-556-G2	Indicator/Illum.	Green Diff.	Green	GaP	30	2.0	2.8	C-5	E
XC-556-G3	Indicator/Illum.	Green Diff.	Green	GaP	30	3.0	3.8	C-5	E
XC-556-G4	Indicator/Illum.	Green Diff.	Green	GaP	30	4.0	5.0	C-5	E
XC-5053-R	Wide Angle Ind.	Red Diff.	Red	GaP	80	.4	1.2	C-2	E
XC-5053-R2	Wide Angle Ind.	Red Diff.	Red	GaP	80	1.5	2.0	C-2	E
XC-5530	Wide Angle Ind.	Red Diff.	Red	GaAsP/GaAs	75	.6 @ 20	1.5 @ 20	C-1	EE
XC-5053-Y	Wide Angle Ind.	Yellow Diff.	Yellow	GaAsP/GaP	80	.4	1.2	C-4	E
XC-5053-Y2	Wide Angle Ind.	Yellow Diff.	Yellow	GaAsP/GaP	80	1.5	2.0	C-4	E
XC-5053-G	Wide Angle Ind.	Green Diff.	Green	GaP	80	.4	1.2	C-5	E
XC-5053-G2	Wide Angle Ind.	Green Diff.	Green	GaP	80	1.5	2.0	C-5	E
XC-5055-R	Ext. Wd. Ang. Ind.	Red Ext. Diff.	Red	GaP	120	.3	1.0	C-2	E
XC-5055-Y	Ext. Wd. Ang. Ind.	Yellow Ext. Diff.	Yellow	GaAsP/GaP	120	.3	1.0	C-4	E
XC-5055-G	Ext. Wd. Ang. Ind.	Green Ext. Diff.	Green	GaP	120	.3	1.0	C-5	E

* Total included viewing angle between half power points measured in degrees.

** See Page 7 for Table of Characteristics for LED Lamps.

***See Page 11 for Package Dimensions for LED Lamps.

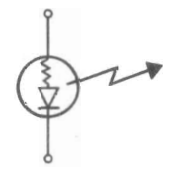
HIGH PERFORMANCE LED LAMPS



Xciton high performance LEDs are luminous intensity screened, high light output versions of standard products. This process assures a "tight" distribution around a pre-selected value. The user can obtain units that have increased brightness, more uniform intensity, and if desired, the same intensity in different colors. These premium units are designed for the user who requires more than commercial quality parts.

Xciton Part Number	Use	Lens Type	Emission Color	Dice Type	Typical Viewing Angle*	Luminous Intensity in mcd @ 10mA		**Elect. Specs	Package ***Style
						Min	Typ		
XC-309-R	Miniature Ind.	Red Diff.	Red	GaAsP/GaP	75	1.0	2.0	C-3	B
XC-309-R2	Miniature Ind.	Red Diff.	Red	GaAsP/GaP	75	2.0	4.0	C-3	B
XC-554-R9	Illuminator	Red Clear	Red	GaP	24	9.0	12.0	C-2	E
XC-554-R12	Illuminator	Red Clear	Red	GaP	24	12.0	15.0	C-2	E
XC-554-Y6	Illuminator	Yellow Clear	Yellow	GaAsP/GaP	24	6.0	8.0	C-4	E
XC-554-Y12	Illuminator	Yellow Clear	Yellow	GaAsP/GaP	24	12.0	15.0	C-4	E
XC-554-G6	Illuminator	Green Clear	Green	GaP	24	6.0	8.0	C-5	E
XC-554-G15	Illuminator	Green Clear	Green	GaP	24	15.0	17.0	C-5	E
XC-554-G24	Illuminator	Green Clear	Green	GaP	24	24.0	27.0	C-5	E
XC-556-R2	Indicator/Illum.	Red Diff.	Red	GaP	30	2.0	2.8	C-2	E
XC-556-R3	Indicator/Illum.	Red Diff.	Red	GaP	30	3.0	3.8	C-2	E
XC-556-Y2	Indicator/Illum.	Yellow Diff.	Yellow	GaAsP/GaP	30	2.0	2.8	C-4	E
XC-556-Y3	Indicator/Illum.	Yellow Diff.	Yellow	GaAsP/GaP	30	3.0	3.8	C-4	E
XC-556-Y4	Indicator/Illum.	Yellow Diff.	Yellow	GaAsP/GaP	30	4.0	5.0	C-4	E
XC-556-G2	Indicator/Illum.	Green Diff.	Green	GaP	30	2.0	2.8	C-5	E
XC-556-G3	Indicator/Illum.	Green Diff.	Green	GaP	30	3.0	3.8	C-5	E
XC-556-G4	Indicator/Illum.	Green Diff.	Green	GaP	30	4.0	5.0	C-5	E
XC-4651-R	Wide Angle Ind.	Red Diff.	Red	GaAsP/GaP	80	1.0	2.0	C-3	GG
XC-4656-R3	Wide Angle Ind.	Red Diff.	Red	GaAsP/GaP	80	3.0	4.0	C-3	GG
XC-5053-R2	Wide Angle Ind.	Red Diff.	Red	GaP	80	1.5	2.0	C-2	E
XC-5053-Y2	Wide Angle Ind.	Yellow Diff.	Yellow	GaAsP/GaP	80	1.5	2.0	C-4	E
XC-5053-G2	Wide Angle Ind.	Green Diff.	Green	GaP	80	1.5	2.0	C-5	E

5-VOLT RESISTOR LED LAMPS



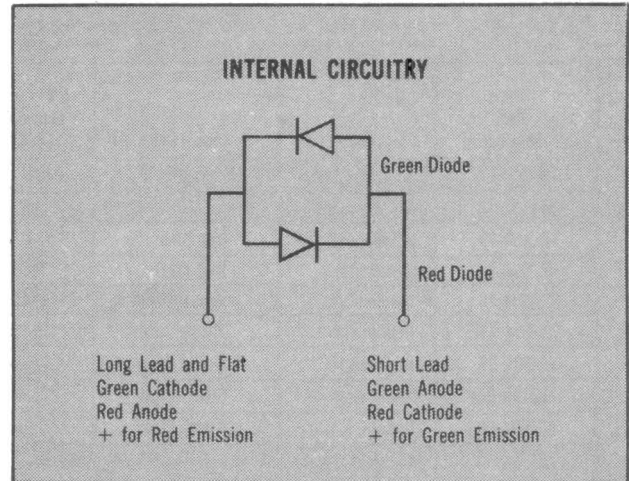
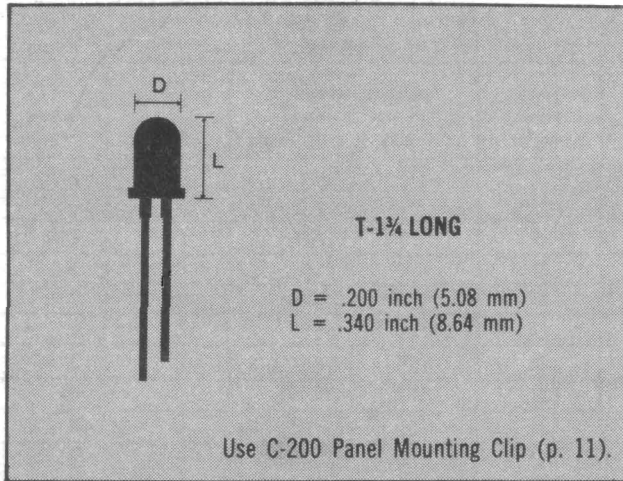
Xciton resistor LEDs incorporate an internal current limiting resistor directly into the LED. This eliminates the necessity of providing a separate current limiting resistor for each LED. Xciton resistor LEDs are designed to operate directly from 5 volts D.C. For each resistor LED used, a discrete resistor is eliminated along with the cost of stocking inventory, production line handling, and actual mounting of the resistor. An additional dividend is paid in terms of circuit board simplification, savings in board space, and overall cost reduction. Resistor LEDs find application when it is necessary to drive LEDs directly from 5 volt logic.

Xciton Part Number	Use	Lens Type	Emission Color	Dice Type	Typical Viewing Angle*	Luminous Intensity at 5 V		**Elect. Specs	Package ***Style
						Min	Typ		
XC-22-5VR	Indicator	Red Diff.	Red	GaP	80	.5	1.5	C-2	F
XC-22-5VY	Indicator	Yellow Diff.	Yellow	GaAsP/GaP	80	.5	1.5	C-4	F
XC-22-5VG	Indicator	Green Diff.	Green	GaP	80	.5	1.5	C-5	F
XC-209-5VR	Indicator	Red Diff.	Red	GaP	75	.6	1.5	C-2	B
XC-209-5VY	Indicator	Yellow Diff.	Yellow	GaAsP/GaP	75	.6	1.5	C-4	B
XC-209-5VG	Indicator	Green Diff.	Green	GaP	75	.6	1.5	C-5	B
XC-4850-5VR	Indicator	Red Diff.	Red	GaAsP/GaAs	80	.4	1.3	C-1	GG
XC-4850-5VY	Indicator	Yellow Diff.	Yellow	GaAsP/GaP	80	.4	1.3	C-4	GG
XC-4850-5VG	Indicator	Green Diff.	Green	GaP	80	.4	1.3	C-5	GG
XC-5053-5VR	Indicator	Red Diff.	Red	GaP	80	.4	1.2	C-2	E
XC-5053-5VY	Indicator	Yellow Diff.	Yellow	GaAsP/GaP	80	.4	1.2	C-4	E
XC-5053-5VG	Indicator	Green Diff.	Green	GaP	80	.4	1.2	C-5	E

* Total included viewing angle between half power points measured in degrees.
 ** See Page 7 for Table of Characteristics for LED Lamps.
 ***See Page 11 for Package Dimensions for LED Lamps.

TRI-STATE LED LAMP XC-5491

RED---GREEN---OFF



The Xciton XC-5491 tri-state lamp provides red and green emission in the same package. This LED is a popular .200 diameter, two-leaded package containing a red and green LED chip in inverse parallel. By reversing the polarity of the applied current, the LED will emit red or green light. The chips used in the XC-5491 are brightness matched so that the green and red light output is uniform. This eliminates the necessity for the special drive circuits previously required with tri-state lamps. In appearance, the XC-5491 matches the XC-556 series.

Tri-state lamps provide the designer with the capability of efficiently displaying three functions with one indicator. This reduces the number of front panel indicators and simplifies design.

ELECTRICAL/OPTICAL CHARACTERISTICS AT 25°C				ABSOLUTE MAXIMUM RATINGS at 25°C		
Forward Voltage at 10 mA	Typ	Volts	2.2	Maximum Continuous Current (Red and Green)	mA	25
	Max	Volts	2.8			
Dynamic Resistance	Typ	Ohms	25	Peak Pulse Current 1 μ s, 300 pps	A	1
Capacitance, V = 0	Typ	pf	100	Maximum Power Dissipation	mW	115
Peak Wavelength	Red	nm	697	Derate Linearly From 25°C	mW/°C	1.5
	Grn	nm	565			
Light Output (Red and Green) at 10 mA	Min	mcd	0.6	Operating Temp Range	°C	-55 to +100
	Typ	mcd	1.8			
				Storage Temp Range	°C	-55 to +100
				Max Lead Solder Temperature (5 sec. immersion, 1/16 inch from plastic)	°C	260

TABLE OF CHARACTERISTICS FOR LED LAMPS

Electrical/Optical Characteristics at 25° C		Units	C-1 GaAsP/GaAs Red	C-2 GaP/GaP Red	C-3 GaAsP/GaP Red	C-4 GaAsP/GaP Yellow	C-5 GaP/GaP Green
Peak Wavelength		nm	655	697	635	585	565
Line Half Width		nm	40	95	40	40	30
Temperature Coefficient of Luminous Intensity		%/°C	-2.0	-2.0	-1.0	-1.0	-1.0
Response Time, 10% — 90%		ns	15	500	100	100	100
*Forward Voltage Drop at Current Indicated	TYP	Volts @ mA	1.6 @ 20	2.0 @ 10	2.0 @ 10	2.0 @ 10	2.0 @ 10
	MAX	Volts @ mA	2.0 @ 20	2.8 @ 10	2.8 @ 10	2.8 @ 10	2.8 @ 10
Forward Current at 5.0 Volts for Resistor LEDs Only	TYP	mA	12	12	N.A.	12	12
	MAX	mA	20	20	N.A.	20	20
**Approximate Forward Dynamic Resistance		Ohms	5	20	30	30	25
Maximum Reverse Leakage Current, at -3.0 Volt		μA	10	10	10	10	10
Capacitance at V = 0		pf	200	50	50	50	50

Absolute Maximum Ratings at 25° C

Storage Temp Range	°C Min/Max	-55/+100	-55/+100	-55/+100	-55/+100	-55/+100
Operating Temp Range	°C Min/Max	-55/+100	-55/+100	-55/+100	-55/+100	-55/+100
*Max. Continuous Forward Current	mA	50	40	40	30	40
Maximum Applied Voltage, for Resistor LEDs Only	Volts	7.5	7.5	7.5	7.5	7.5
Maximum Continuous Power Dissipation	mW	100	100	115	115	115
Derate Linearly From 25° C	mW/°C	1.5	1.3	1.5	1.5	1.5
Peak Forward Current, at 1 μs, 300 pps	A	1	1	1	1	1
Peak Reverse Voltage	Volts	5	5	5	5	5
Lead Solder Temperature, 5 Sec. Immersion 1/16 Inch from Case	°C	260	260	260	260	260

*Applies only to standard LED lamps. Does not apply to 5-volt resistor LEDs.

**Does not apply to Resistor Lamps.

HIGH OUTPUT INFRARED AND VISIBLE EMITTERS

Xciton offers a variety of high power output LED emitters in both the visible (697 nm) and infrared (940 nm) regions of the optical spectrum.

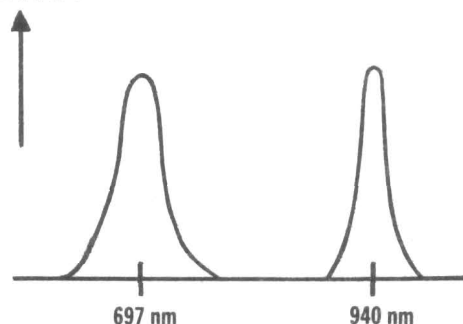
These emitters are optically, electrically, and physically optimized for use in applications that require rugged, solid state sources of optical radiation.

These devices are used to advantage in:

SMOKE DETECTORS
SILICON COUPLERS
CdS and CdSe COUPLERS
OPTICAL ENCODERS
HIGH VOLTAGE ISOLATORS

PROCESS CONTROLS
REFLECTIVE TRANSDUCERS
DOOR OPENERS
INTRUSION ALARMS
LEVEL INDICATORS

POWER
OUTPUT



1. INFRARED EMITTERS

The Xciton IR emitters are constructed from liquid phase epitaxial (LPE) Gallium Arsenide. They emit at 940 nm and are characterized by:

High power output — up to 6 mW at 100 mA drive.
Low forward voltage drop — 1.75 Volts Maximum at 100 mA.
An excellent spectral match to silicon photodetectors.

The following package styles are available:

Plastic Lens/Lead Frame Construction

T-1 Miniature Package: XC-1209
T-1 $\frac{3}{4}$ Standard Package: XC-1554

Characteristics: Moderate power dissipation, commercial environmental specs, $\pm 10^\circ$ alignment of optical and mechanical axes.

Metal Can TO-46 Construction

TO-46, high dome: XC-55
TO-46, high dome, with double wirebond: XC-55-P

Characteristics: High power dissipation capability, hermetic package, $\pm 4^\circ$ alignment of optical and mechanical axes.

2. VISIBLE EMITTERS

The Xciton visible emitters are constructed from liquid phase epitaxial (LPE) Gallium Phosphide. They emit red light at 697 nm and are characterized by:

High visible power output — up to 300 μ W at 10 mA drive.
Useful power output at very low drive levels.
Effective spectral coupling to CdS and CdSe photoconductors.
Good coupling to silicon photodetectors.

The following package styles are available:

Plastic Lens/Lead Frame Construction

T-1 Miniature Package: XC-02
T-1 $\frac{3}{4}$ Medium Height: XC-110-RWC
T-1 $\frac{3}{4}$ Standard Package: XC-554-RWC

Characteristics: Moderate power dissipation, commercial environmental specs, $\pm 10^\circ$ alignment of optical and mechanical axes.

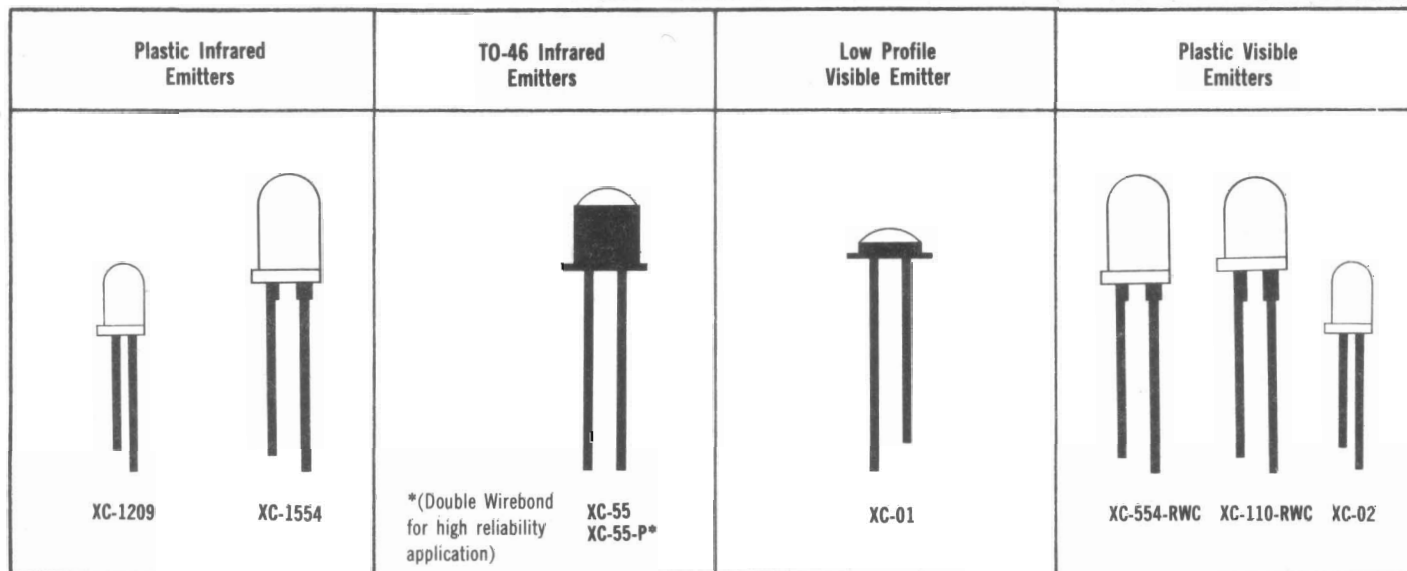
Header Construction/Plastic Lens

TO-46 stem, Low Profile, non-hermetic: XC-01

Characteristics: Low profile, .105 inch maximum height, excellent coupling efficiency to photoconductive films in close spaced coupler geometries, flexible wire leads.

CUSTOM SERVICE: Custom power output grading, environmental stressing, burn-in, and custom packages are available. Xciton is capable of supplying custom engineered units for those applications that require non-standard emitters.

HIGH OUTPUT INFRARED AND VISIBLE EMITTERS



		Units	IR	IR	IR	IR	IR	Red Visible	Red Visible	Red Visible	Red Visible
			XC-1209	XC-1554	XC-55-A XC-55-PA	XC-55-B XC-55-PB	XC-55-C XC-55-PC	XC-01	XC-554-RWC	XC-110-RWC	XC-02
Package Outline See Page 11			B	E	K	K	K	J	E	D	B
Total Radiant Output Power, P _o	Min	mW @ mA	.5 20	.5 20	1.0 100	2.5 100	3.3 100	.050 10	.050 10	.050 10	.050 10
	Typ	mW @ mA	1.5 20	1.5 20	3.0 100	5.0 100	6.0 100	.300 10	.300 10	.300 10	.300 10
Temp Coef of P _o , 25°C		%/°C	-.53	-.53	-.53	-.53	-.53	-1.0	-1.0	-1.0	-1.0
Forward Voltage	Typ	V @ mA	1.2 20	1.2 20	1.35 100	1.35 100	1.35 100	1.9 10	1.9 10	1.9 10	1.9 10
	Max	V @ mA	1.6 20	1.6 20	1.75 100	1.75 100	1.75 100	2.4 10	2.4 10	2.4 10	2.4 10
Temp Coef of Fwd Voltage		mV/°C	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8	-1.8
Dynamic Resistance, Typ.		Ohms	1.0	1.0	.6	.6	.6	15	15	15	15
Angle between Half Power Intensity Points		Degrees	45°	24°	10°	10°	10°	80°	24°	35°	45°
Peak Wavelength		nm	940	940	940	940	940	697	697	697	697
Line Halfwidth		nm	50	50	50	50	50	95	95	95	95
Reverse Current, Max. at 25°C		µA @ Volts	10 -3.0	10 -3.0	10 -2.0	10 -2.0	10 -2.0	10 -5.0	10 -3.0	10 -3.0	10 -3.0
Response Time (10% to 90%)	Rise	ns	300	300	300	300	300	500	500	500	500
	Fall	ns	200	200	200	200	200	500	500	500	500

Absolute Maximum Rating at 25°C

Average Power Dissipation	mW	75	75	250	250	250	150	100	100	90
Derate Linearly from 25°C	mW/°C	-1.0	-1.0	-2.5	-2.5	-2.5	-1.3	-1.3	-1.3	-1.2
Average Fwd. Current	mA	40	50	150	150	150	50	40	40	40
Reverse Volt	V	3.0	3.0	3.0	3.0	3.0	5.0	5.0	5.0	5.0
Operating Temp Range	°C	-55	-55	-65	-65	-65	-40	-55	-55	-55
		+85	+85	+125	+125	+125	+100	+85	+85	+85
Storage or Process Temp Range	°C	-55	-55	-65	-65	-65	-40	-55	-55	-55
		+85	+85	+125	+125	+125	+100	+85	+85	+85
Solder Temp, 5 Sec 1/16 Inch from Case	°C	260	260	260	260	260	260	260	260	260
Peak Pulse Current 1 µ sec Duration @ 300 pps	Amp	1.0	1.0	10.0	10.0	10.0	1.0	1.0	1.0	1.0

TYPICAL CHARACTERISTIC CURVES

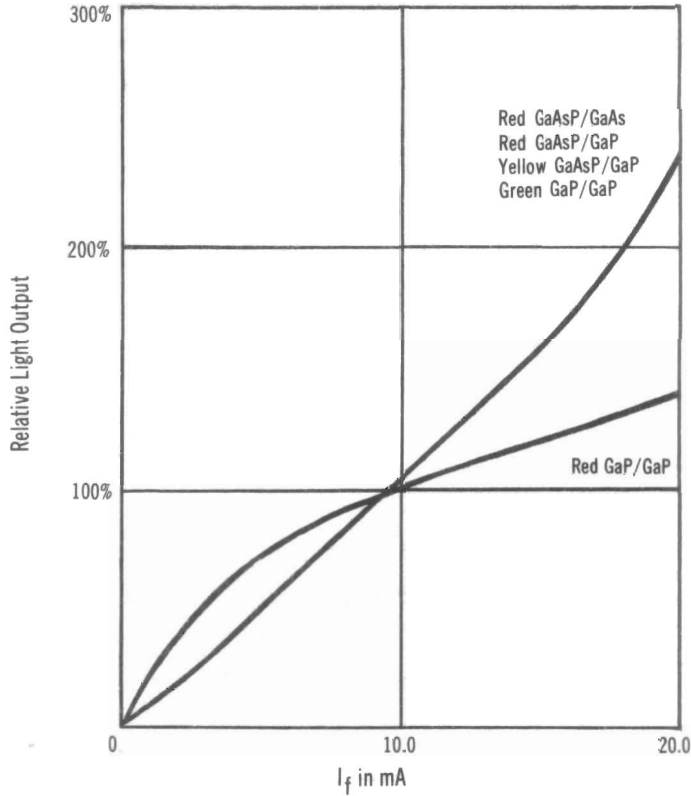


FIGURE 1: RELATIVE LIGHT OUTPUT VS. FORWARD CURRENT NORMALIZED TO 10 mA.

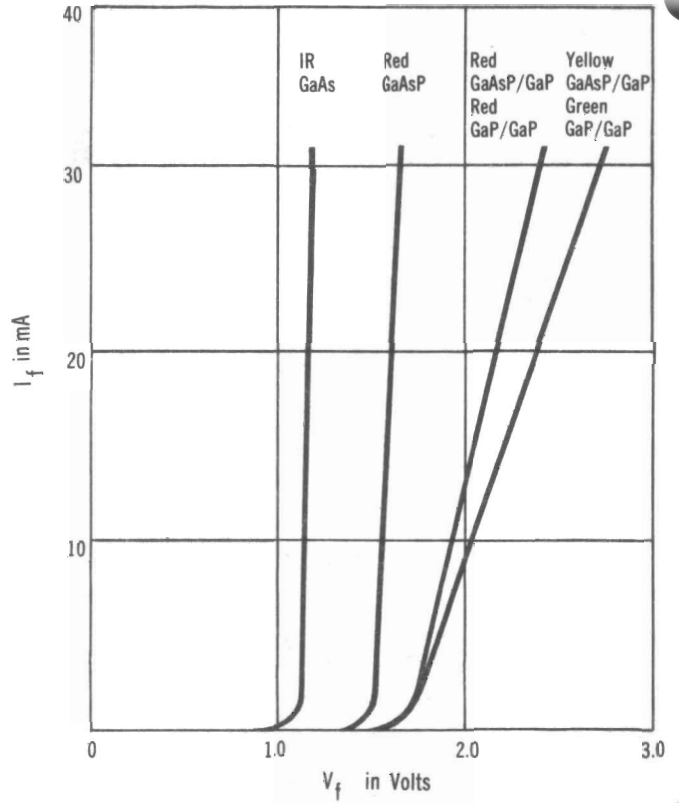


FIGURE 2: APPROXIMATE FORWARD CURRENT VS. FORWARD VOLTAGE.

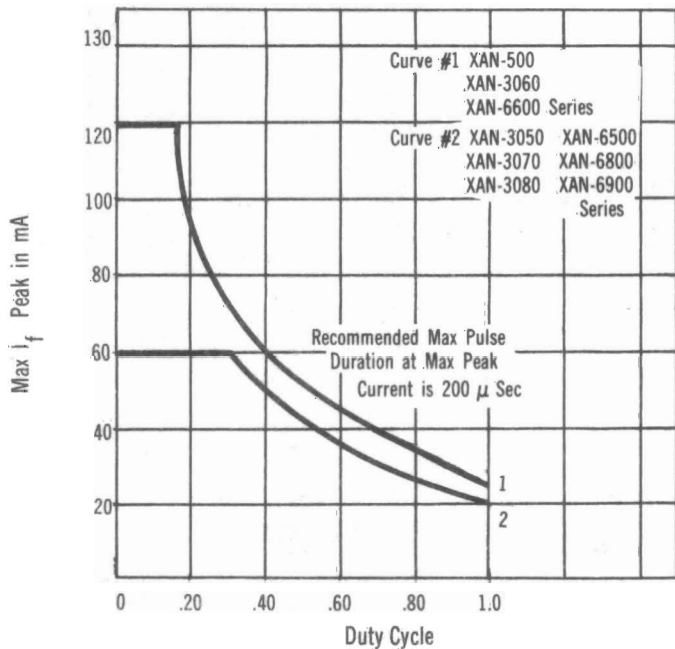


FIGURE 3: NUMERIC MAX PEAK FORWARD CURRENT VS. DUTY CYCLE

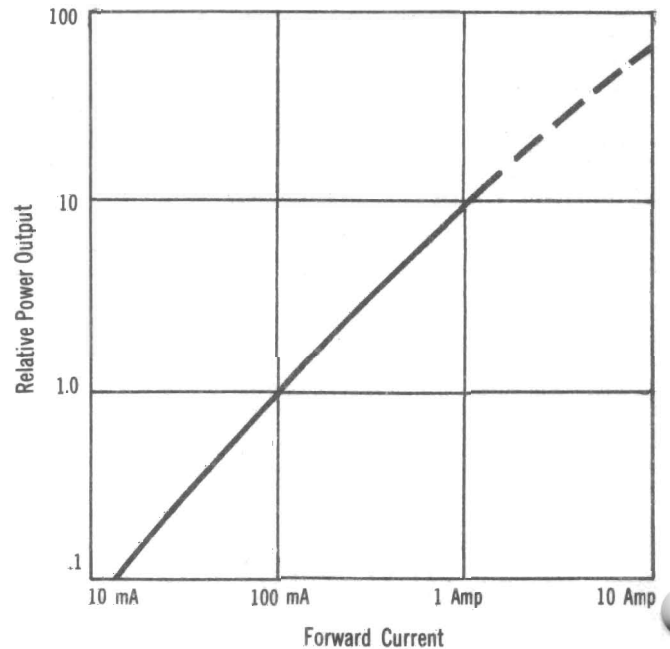
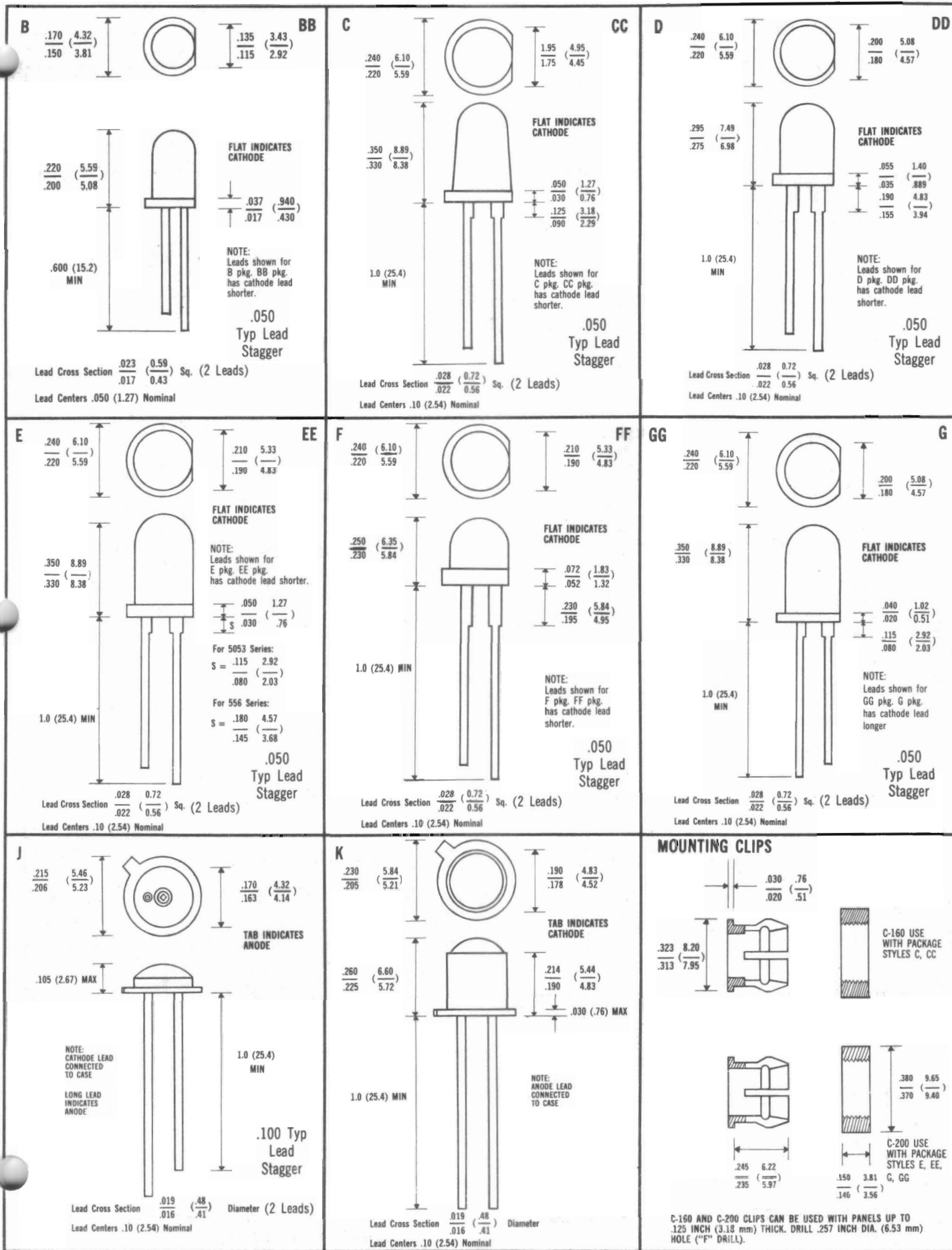


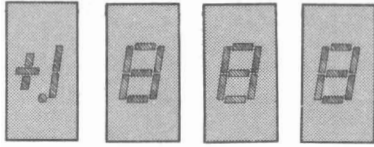
FIGURE 4: INSTANTANEOUS POWER OUTPUT VS. FORWARD CURRENT (INFRARED PARTS)

PACKAGE DIMENSIONS FOR LED LAMPS

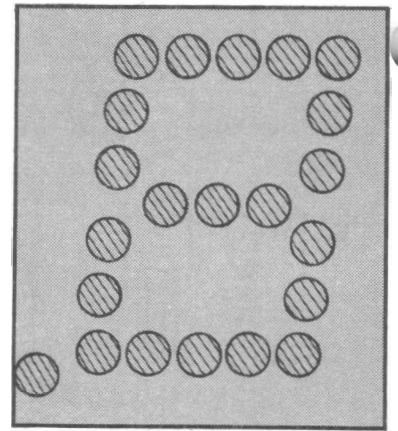


LED HYBRID NUMERIC

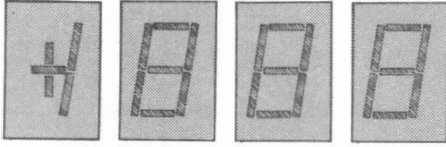
.3 INCH
(7.6 mm)



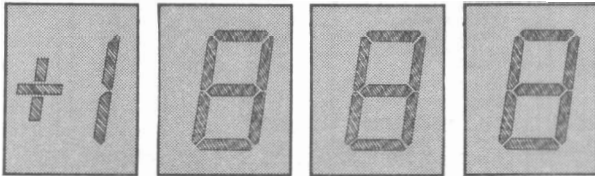
1.5 INCH
(38.1 mm)



.5 INCH
(12.7 mm)



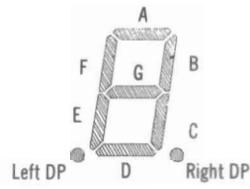
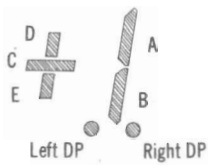
.6 INCH
(15.2 mm)



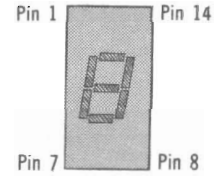
PART TYPE SELECTION TABLE		Standard Red GaAsP (1)	High Output Green GaP	Yellow GaAsP	Red GaP (2)
		655 nm	565 nm	585 nm	697 nm
.3 INCH	Numeric, Common Anode, Right Decimal Pt.	XAN-3061	XAN-3051	XAN-3081	XAN-3071
	Numeric, Common Anode, Left Decimal Pt.	XAN-3062	XAN-3052	XAN-3082	XAN-3072
	Overflow, Common Anode, Left Decimal Pt.	XAN-3063	XAN-3053	XAN-3083	XAN-3073
	Numeric, Common Cathode, Right Decimal Pt.	XAN-3064	XAN-3054	XAN-3084	XAN-3074
.5 INCH	Numeric, Common Anode, Right Decimal Pt.	XAN-507	—	—	—
	Numeric, Common Cathode, Right Decimal Pt.	XAN-500	—	—	—
	Overflow, Common Anode, Right Decimal Pt.	XAN-508	—	—	—
.6 INCH	Numeric, Common Anode, Left Decimal Pt.	XAN-6620	XAN-6520	XAN-6820	XAN-6920
	Overflow, Common Anode, No Decimal Pt.	XAN-6630	XAN-6530	XAN-6830	XAN-6930
	Numeric, Common Cathode, Left Decimal Pt.	XAN-6640	XAN-6540	XAN-6840	XAN-6940
	Overflow, Common Cathode, No Decimal Pt.	XAN-6650	XAN-6550	XAN-6850	XAN-6950
1.5 INCH	Numeric, Common Anode, Left Decimal Pt.	—	XDN-1500-G	—	XDN-1500-R
	Numeric, BCD Decoder Driver Left Decimal Pt.	—	XDN-1500-G-DD	—	XDN-1500-R-DD

NOTES: (1) Red GaAsP is the industry standard red numeric. Recommended for strobed operation at 15 mA and above.
(2) Red GaP is recommended for d.c. drive at 15 mA and below.

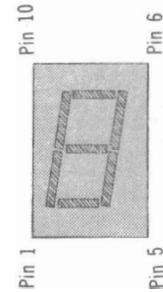
LED HYBRID NUMERIC PINOUTS



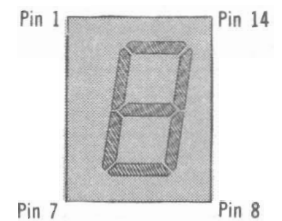
Pin	.3" NUMERICS			.3" OVERFLOW *
	Common Anode Left Decimal	Common Anode Right Decimal	Common Cathode Right Decimal	Common Anode Left Decimal
	XAN-3052	XAN-3051	XAN-3054	XAN-3053
	XAN-3062	XAN-3061	XAN-3064	XAN-3063
	XAN-3072	XAN-3071	XAN-3074	XAN-3073
	XAN-3082	XAN-3081	XAN-3084	XAN-3083
1	Cathode A	Cathode A	Anode F	Anode C, D
2	Cathode F	Cathode F	Anode G	No Pin
3	Common Anode	Common Anode	No Pin	No Pin
4	No Pin	No Pin	Common Cathode	Internal Conn.
5	No Pin	No Pin	No Pin	No Pin
6	Cathode DP	NC	Anode E	No Pin
7	Cathode E	Cathode E	Anode D	Cathode E
8	Cathode D	Cathode D	Anode C	Cathode C
9	NC	Cathode DP	Anode DP	Cathode DP
10	Cathode C	Cathode C	No Pin	Cathode B
11	Cathode G	Cathode G	No Pin	Cathode A
12	No Pin	No Pin	Common Cathode	No Pin
13	Cathode B	Cathode B	Anode B	No Pin
14	Common Anode	Common Anode	Anode A	Anode A, B, DP



Pin	.5" NUMERICS		.5" OVERFLOW
	Common Anode Right Decimal	Common Cathode Right Decimal	Common Anode Right Decimal
	XAN-507	XAN-500	XAN-508
1	Cathode E	Anode E	Cathode E
2	Cathode D	Anode D	NC
3	Common Anode	Common Cathode	Common Anode
4	Cathode C	Anode C	Cathode B
5	Cathode DP	Anode DP	Cathode DP
6	Cathode B	Anode B	Cathode A
7	Cathode A	Anode A	NC
8	Common Anode	Common Cathode	Common Anode
9	Cathode F	Anode F	Cathode D
10	Cathode G	Anode G	Cathode C



Pin	.6" NUMERICS		.6" OVERFLOW	
	Common Anode Left Decimal	Common Cathode Left Decimal	Common Anode* No Decimal	Common Cathode* No Decimal
	XAN-6520	XAN-6540	XAN-6530	XAN-6550
	XAN-6620	XAN-6640	XAN-6630	XAN-6650
	XAN-6820	XAN-6840	XAN-6830	XAN-6850
	XAN-6920	XAN-6940	XAN-6930	XAN-6950
1	Cathode A	Anode A	Cathode D	Anode D
2	Cathode F	Anode F	No Pin	No Pin
3	Common Anode	Common Cathode	No Pin	No Pin
4	Cathode E	Anode E	Internal Conn.	Internal Conn.
5	No Pin	No Pin	No Pin	No Pin
6	Cathode DP	Anode DP	No Pin	No Pin
7	No Pin	No Pin	Anode C, E	Cathode C, E
8	Cathode D	Anode D	Cathode B	Anode B
9	Common Anode	Common Cathode	No Pin	No Pin
10	Cathode C	Anode C	No Pin	No Pin
11	Cathode G	Anode G	Anode A, B	Cathode A, B
12	Cathode B	Anode B	No Pin	No Pin
13	No Pin	No Pin	Cathode A	Anode A
14	Common Anode	Common Cathode	Cathode C	Anode C



*For .3 and .6 overflow segments D and E are electrically connected in series.

LED HYBRID NUMERIC CHARACTERISTICS

ELECTRICAL/OPTICAL CHARACTERISTICS AT 25° C

		.3 INCH (7.6 mm)				.5 INCH (12.7 mm)	.6 INCH (15.2 mm)				
		Std Red GaAsP	Hi Output Red GaP	Yellow GaAsP	Hi Output Green GaP		Std Red GaAsP	Hi Output Red GaP	Yellow GaAsP	Hi Output Green GaP	
		XAN-3061 3062 3063 3064	XAN-3071 3072 3073 3074	XAN-3081 3082 3083 3084	XAN-3051 3052 3053 3054	XAN-500 507 508	XAN-6620 6630 6640 6650	XAN-6920 6930 6940 6950	XAN-6820 6830 6840 6850	XAN-6520 6530 6540 6550	
		Units									
Peak Wavelength		nm	655	697	585	565	655	655	697	585	565
Line Halfwidth		nm	40	95	40	30	40	40	95	40	30
Luminous Intensity Per Seg (Digit Ave) (1)	Min	μ cd @ mA	130 20	130 10	130 10	130 10	130 20	130 20	130 10	130 10	130 10
	Typ	μ cd @ mA	450 20	500 10	300 10	500 10	500 20	550 20	500 10	700 10	1500 10
Luminous Intensity with all Segments Lighted (2)	Typ	mcd @ mA	3.1 20	3.5 10	2.1 10	3.5 10	3.5 20	3.9 20	3.5 10	4.9 10	10.5 10
Temperature Coefficient of Luminous Intensity		%/°C	-2.0	-2.0	-1.0	-1.0	-2.0	-2.0	-2.0	-1.0	-1.0
Forward Volt per Segment or D.P. (3)	Typ	Volts @ mA	1.7 20	2.1 10	2.1 10	2.2 10	1.7 20	1.7 20	2.1 10	2.3 10	2.2 10
	Max	Volts @ mA	2.0 20	2.8 10	2.8 10	2.8 10	2.0 20	2.2 20	2.8 10	2.8 10	2.8 10
Dynamic Resistance	Typ	Ohms	5	15	30	25	5	5	15	30	25
Temp. Coef of Fwd Voltage		mV/°C	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Maximum Reverse Current per Segment or D.P., at -3 Volts		μ A	10	10	10	10	250	10	10	10	10
Response Time (Nominal) 10%-90%		ns	15	500	100	100	15	15	500	100	100

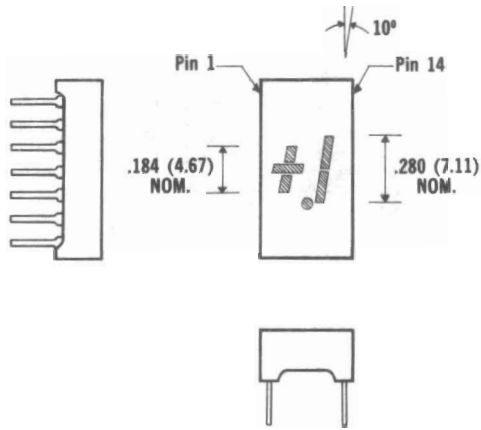
ABSOLUTE MAXIMUM RATINGS AT 25°C

Operating and Storage Temp Range	°C	-30 to +85	-30 to +85	-30 to +85	-30 to +85	-30 to +85	-30 to +85	-30 to +85	-30 to +85	-30 to +85
		D.C. Power Dissipation per Segment or D.P.	mW	50	50	50	50	50	50	50
Derate Linearly from 25°C (per Seg or D.P.)	mW/°C	.6	.6	.6	.6	.6	.6	.6	.6	.6
Maximum Average Forward Current per Segment or D.P.	mA	25	20	20	20	25	25	20	20	20
Maximum Peak Forward Current per Segment or D.P., 200 μ sec Maximum	mA	120	60	60	60	120	120	60	60	60
Peak Reverse Volt per Segment or D.P.	Volts	5	5	5	5	3	5	5	5	5

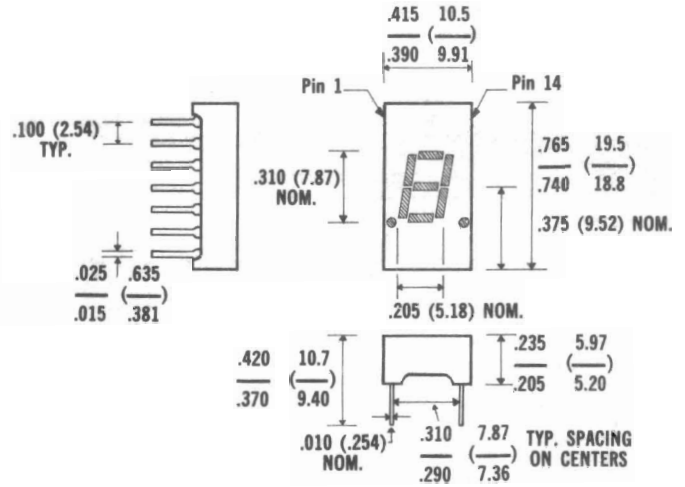
- (1) The Luminous Intensity of Decimal Points and Overflow Digit C, D, E Segments is typ. 1/5 to 1/3 of the Luminous Intensity of a Segment.
- (2) Maximum variation in seg to seg brightness is 2.5:1 within a digit.
- (3) Segments D and E of the overflow digit are operated in series. The typ. and max. forward voltages are, therefore, two times greater than the table values.
- (4) Lead soldering temperature: 260°C maximum for 5 seconds, 1/16 inch from plastic.

PACKAGE DIMENSIONS FOR LED HYBRID NUMERIC

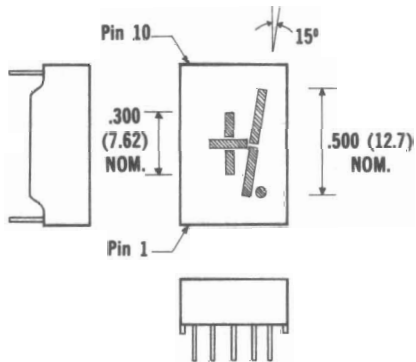
.3 INCH (7.6 mm) OVERFLOW



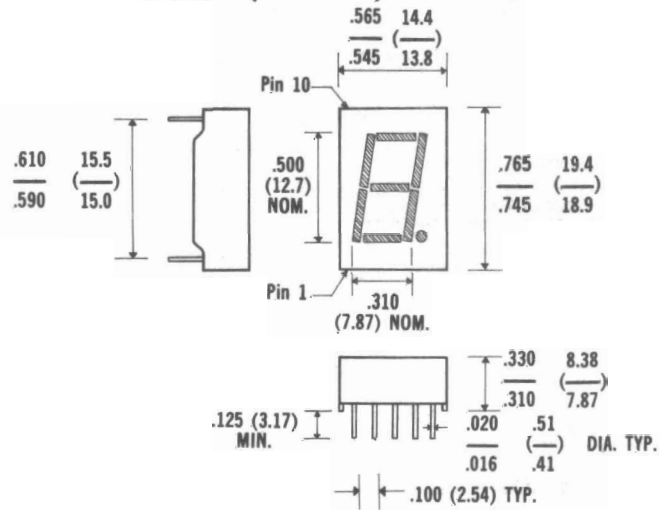
.3 INCH (7.6 mm) NUMERIC



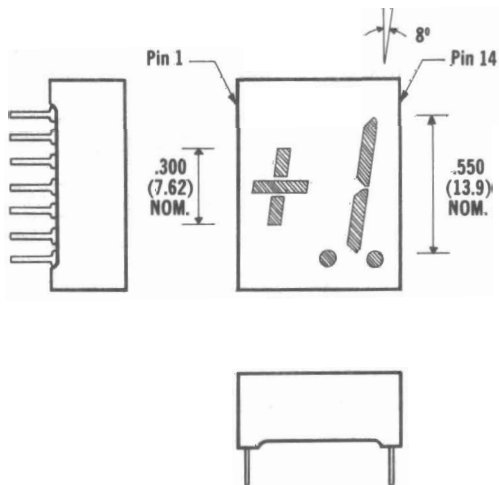
.5 INCH (12.7 mm) OVERFLOW



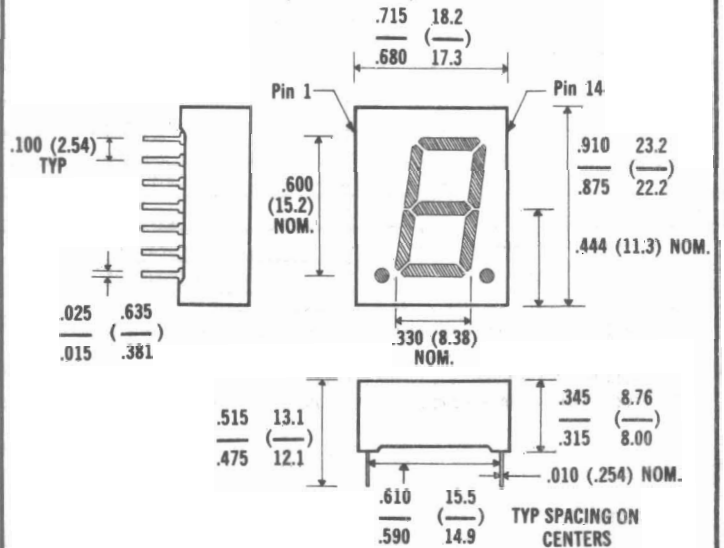
.5 INCH (12.7 mm) NUMERIC



.6 INCH (15.2 mm) OVERFLOW



.6 INCH (15.2 mm) NUMERIC



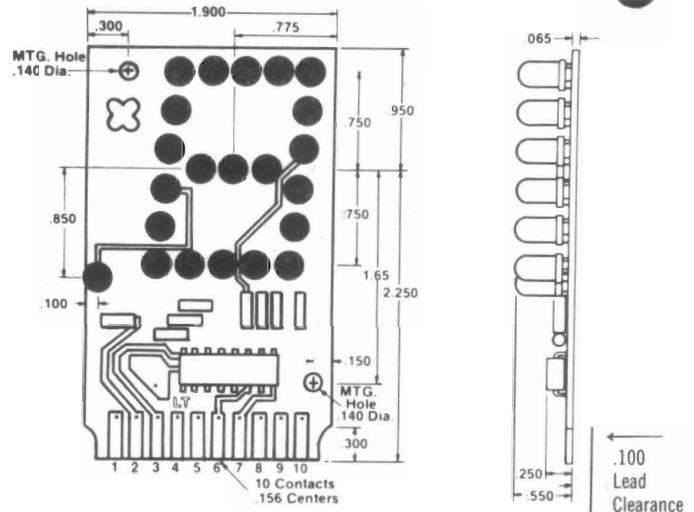
XDN-1500 SERIES

1.5 INCH (38.1 mm) LED HYBRID NUMERIC

- 1.5 Inch High Character.
- Easily Readable From 60 Feet.
- Available in Red or Green.
- Available With or Without On Board Decoder/Driver.
- Designed for Edge Mounting in Standard P.C. Board Connectors.

Part Number	Description	Typ. Luminous Intensity/Seg
XDN-1500-R	Red, Common Anode, Left Hand Decimal, Seven Segment Numeric	4.5 mcd at 10 mA/seg
XDN-1500-RDD	Red, Common Anode, Left Hand Decimal with BDC Decoder/Driver*	4.5 mcd
XDN-1500-G	Green, Common Anode, Left Hand Decimal, Seven Segment Numeric	4.5 mcd at 10 mA/seg
XDN-1500-GDD	Green, Common Anode, Left Hand Decimal with BDC Decoder/Driver*	4.5 mcd

Contact	FUNCTION	
	XDN-1500-DD	XDN-1500 Without Decoder
1	+5 V Logic Supply	NC
2	Decimal Point	Decimal Point
3	BDC Input A	Segment D
4	BCD Input B	Segment F
5	BCD Input C	Segment G
6	BCD Input D	Segment C
7	Ground	Segment E
8	Blanking Input/Ripple Blanking Output	Segment A
9	Ripple Blanking Input	Segment B
10	+15 V LED Supply	+15 LED Supply
PAD	Lamp Test	NC



Dimensions in Inches
Tolerance $\pm .010$ Inch

*7446 Type Decoder/Driver

ABSOLUTE MAXIMUM RATINGS			
Description	Min	Max	Units
Storage Temp	-40	+85	°C
Operating Temp	0	+70	°C
LED Supply Volt	14.0	16.0	V
Logic Supply Volt	4.75	5.25	V

BRIGHTNESS CATEGORIES FOR XCITON LED HYBRID NUMERICS

XAN-3000 and XAN-6000 numerics have the brightness category ("bin") indicated by a color dot on the top side of the numeric case. The XAN-500 series have the brightness category indicated by a code letter which is printed on the bottom side of the numeric case.

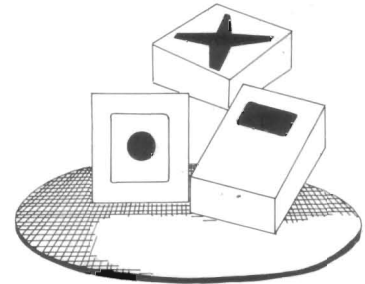
.3 INCH, XAN-3000 and .6 INCH, XAN-6000	
Color Dot	Average Luminous Intensity Per Segment, Microcandela (2)
Red	130- 220
Orange	182- 308
Yellow	255- 431
Green	356- 604
Blue	499- 845
White	698-1184
Red-Red	978-1657
Orange-Orange	1369-2320

.5 INCH, XAN-500 SERIES	
Code Letter	Average Luminous Intensity Per Segment, Microcandela (2)
D	240- 420
E	380- 675
F	610-1050
G	950-1680
H	1525-Up

- Notes.
- (1) High performance GaP chip numerics are measured at a D.C. drive current of 10 mA/segment. This includes XAN-3050, 3070, 3080 series and XAN-6500, 6800, 6900 series.
Standard Red GaAsP chip numerics are measured at a D.C. drive current of 20 mA/segment. This includes XAN-3060 series, XAN-500 series, and XAN-6600 series.
 - (2) The quoted average luminous intensity/segment is measured by driving all seven (7) segments at the indicated D.C. current, measuring the total luminous intensity and arithmetically dividing the total value by seven (7).
 - (3) Because of its substantially smaller area, the decimal point has a lower luminous intensity than a typical segment. Typically, the D.P. intensity is 1/4 of the segment intensity.
 - (4) Typical maximum/minimum segment luminous intensity ratio within a digit is 1.7:1 or better. The maximum value of this ratio is 2.5:1.
 - (5) Generally, any two adjacent brightness categories can be mixed when combining digits into arrays.

Epitaxial Wafers and Dice

Xciton is a volume supplier of light emitting materials. Popular forms are epitaxial wafers and finished LED dice. Tens of millions of units have been sold worldwide. These are the same materials that are used in finished Xciton LED indicators and numerics. They fit the important criteria of predictability and yield. Contact Xciton for detailed information, price, delivery, and support.



TYPE OF LIGHT EMISSION	DICE DESCRIPTION
Infrared	<p>Gallium Arsenide infrared emitting LED dice fabricated by Liquid Phase Epitaxy (LPE). High output power at 940 nm. Particularly useful in high performance couplers, reflective transducers, and encoders.</p> <p>CXC-1210-IR Die Size .012 x .010 inch (.305 x .254 mm) Wire bonding pad is cathode (-).</p> <p>CXC-1414-IR Die size .014 x .014 inch (.356 x .356 mm) Wire bonding pad is anode (+).</p> <p>CXC-1818-IR Die size .018 x .018 inch (.457 x .457 mm) Wire bonding pad is cathode (-).</p>
Red	<p>Gallium Phosphide LED dice fabricated by Liquid Phase Epitaxy (LPE). High radiometric output power at 697 nm. Used to advantage in constructing photocouplers with CdS detectors. Also used to make high luminous output LED lamps and numerics that operate at low drive currents. Red GaP is a good driver for silicon detectors in applications that require a "visible infrared beam" for alignment.</p> <p>CXC-1012-R Die size: rhomboid, nominal 120 sq. mil junction area. Wire bonding pad is anode (+).</p> <p>CXC-1515-R Die size: nominal 0.15 x .015 inch (.381 x .381 mm). Wire bonding pad is anode (+).</p> <p>Gallium Arsenide Phosphide LED dice, GaAs substrate, planar diffused construction. The industry standard red emitter at 655 nm.</p> <p>CXC-1717-R Die size: nominal .014 x .014 inch (.356 x .356 mm). Wire bonding pad is anode (+).</p>
Yellow	<p>Gallium Arsenide Phosphide epitaxy on GaP substrate. Diffused junction. Nominal emission wavelength is 585 nm.</p> <p>CXC-1414-Y Die size: nominal .014 x .014 inch (.356 x .356 mm). Wire bonding pad is anode (+).</p>
Green	<p>Gallium Phosphide on GaP substrate; liquid phase epitaxy. This is the world's highest output green emitting material. Used to make high photometric output LED lamps and displays. Emission is at 565 nm.</p> <p>CXC-1012-G Die size: rhomboid, nominal 120 sq. mil junction area. Wire bonding pad is anode (+).</p>
Epitaxial Wafers	<p>The epitaxial wafers, which are used to construct most of the above types of dice, are available from Xciton.</p>

Xciton

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