

## Simple, 90V, 20mA, Temperature Compensated, Constant Current, LED Driver IC

### Features

- ▶ 5.0 to 90V operating range ( $V_{A-B}$ )
- ▶ 20mA  $\pm 5\%$  at 45V ( $V_{A-B}$ )
- ▶  $-8.5\mu A/^{\circ}C$  typical temperature coefficient
- ▶ Available in TO-243AA (SOT-89), TO-252 (D-PAK), & TO-92 packages
- ▶ No external components (two terminal device)
- ▶ Can be paralleled for higher current

### Applications

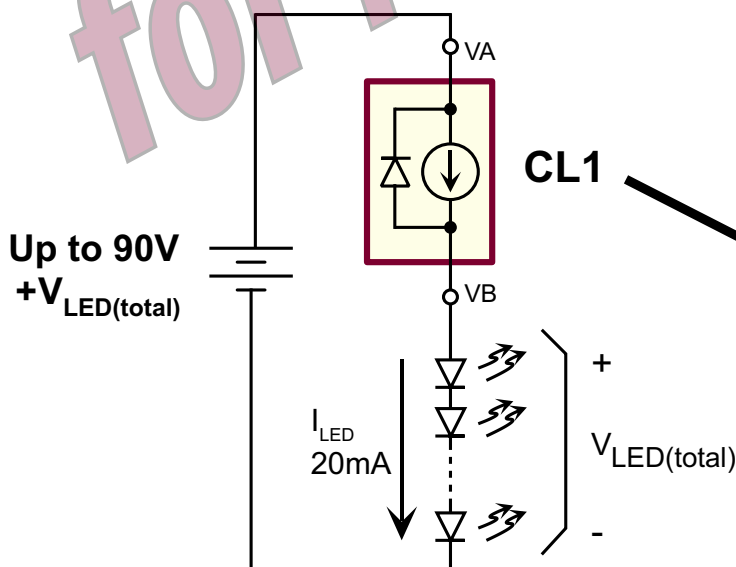
- ▶ LED driver
- ▶ Industrial lamp indicators
- ▶ Signage
- ▶ Accent lighting
- ▶ Automotive
- ▶ Constant current source
- ▶ Constant current sink

### General Description

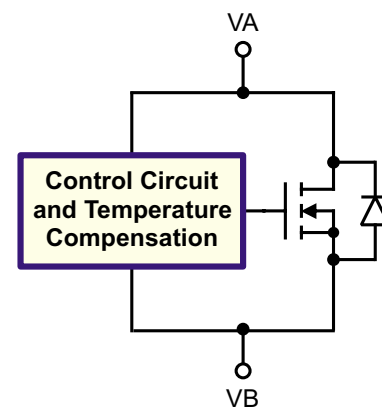
The Supertex CL1 is a high voltage, temperature compensated, constant current source. The device is trimmed to provide a constant current of 20mA $\pm 5\%$  at an input voltage of 45V. No external components are required. The device can be used as a two terminal constant current source or constant current sink.

A typical application for the CL1 is to drive LEDs with a constant current of 20mA. Multiple CL1s can also be used in parallel to provide higher currents such as 40mA, 60mA or 80mA. The device is available in TO-243AA (SOT-89), TO-252 (D-PAK), and TO-92 packages.

### Typical Application Circuit



### Functional Circuit Diagram



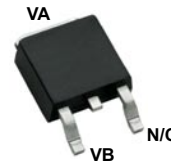
## Ordering Information

Device	Package Options		
	TO-252 (D-PAK)	TO-92	TO-243AA (SOT-89)
CL1	CL1K4-G	CL1N3-G	CL1N8-G

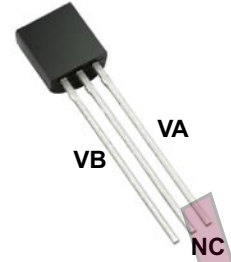
-G indicates package is RoHS compliant ('Green')



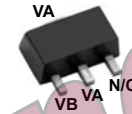
## Pin Configurations



TO-252 (D-PAK) (K4)



TO-92 (N3)



TO-243AA (SOT-89) (N8)

## Product Marking

Si YYWW  
CL1K4  
LLLLLL

YY = Year Sealed  
WW = Week Sealed  
L = Lot Number  
\_\_\_\_\_ = "Green" Packaging

TO-252 (D-PAK) (K4)

SiCL  
1  
YYWW

YY = Year Sealed  
WW = Week Sealed  
\_\_\_\_\_ = "Green" Packaging

TO-92 (N3)

CL1W

W = Code for week sealed  
\_\_\_\_\_ = "Green" Packaging

TO-243AA (SOT-89) (N8)

## Absolute Maximum Ratings

Parameter	Value
Operating voltage, $V_{A-B}$	100V
Operating junction temperature, $T_J$	0°C to +125°C
Storage temperature, $T_S$	-55°C to +150°C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied. Continuous operation of the device at the absolute rating level may affect device reliability. All voltages are referenced to device ground.

## Thermal Characteristics

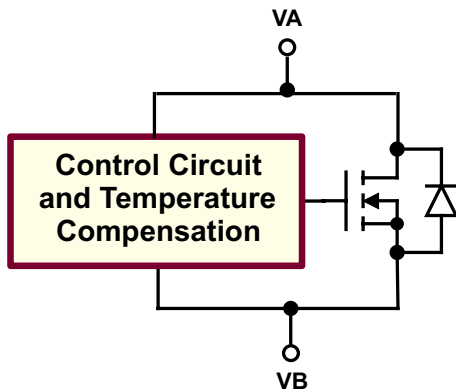
Package	Power Dissipation @ $T_A = 25^\circ\text{C}$ (w)	$\theta_{JC}$ (°C/W)	$\theta_{JA}$ (°C/W)
TO-252	2.0*	6.0	50*
TO-92	0.73	125	170
TO-243AA	1.3*	15	78*

\* Mounted on FR4 board; 25mm x 25mm x 1.57mm

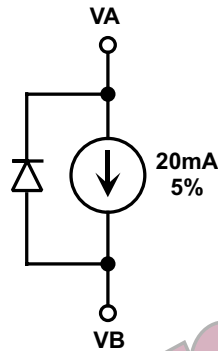
## Electrical Characteristics ( $T_A = 25^\circ\text{C}$ unless otherwise specified)

Sym	Parameter	Min	Typ	Max	Units	Conditions
$V_{A-B}$	Maximum operating voltage	-	-	90	V	---
$I_{A-B}$	Current regulation	17.1	18.0	18.9	mA	$V_{A-B} = 5.0\text{V}$
		19.0	20.0	21.0		$V_{A-B} = 45\text{V}$
		19.0	22.0	24.2		$V_{A-B} = 90\text{V}$
$\Delta I_{A-B}/\Delta T$	$I_{A-B}$ temperature coefficient	-	-8.5	-	$\mu\text{A}/^\circ\text{C}$	$V_{A-B} = 45\text{V}$ , $T_J = 0^\circ\text{C}$ to $100^\circ\text{C}$
$T_J$	Operating junction temperature	-40	-	125	°C	---
$R_{A-B}$	AC resistance	-	17	-	k $\Omega$	$V_{A-B} = 5.0\text{V}$ to $90\text{V}$

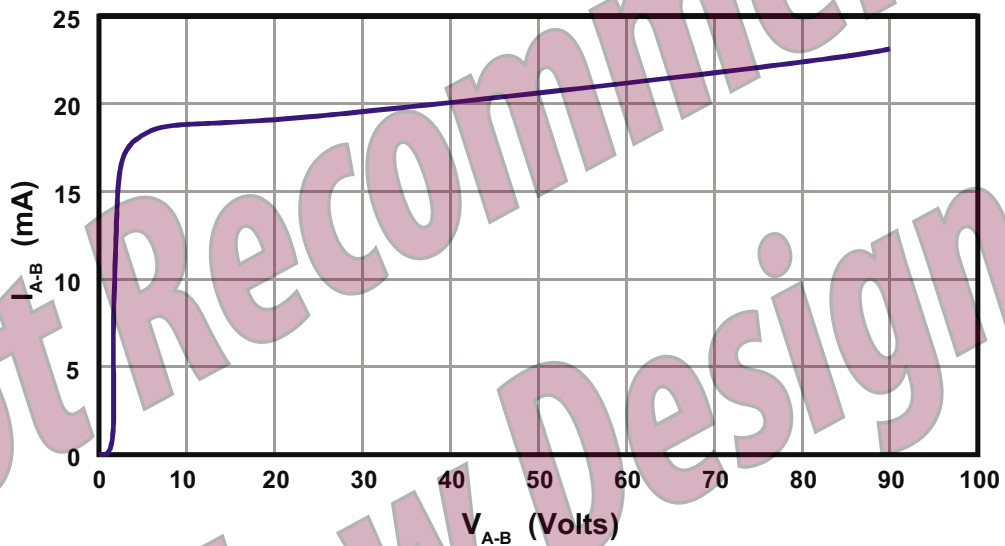
Functional Block Diagram



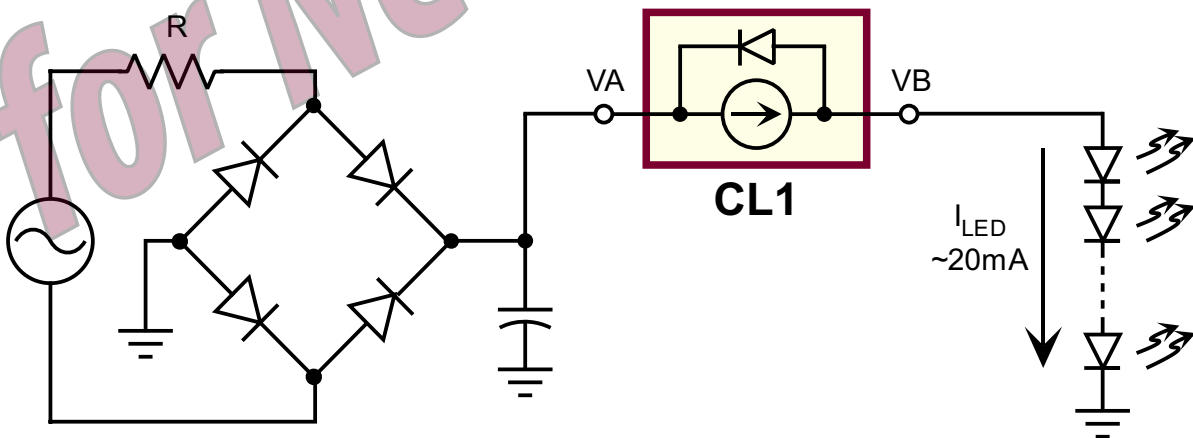
Equivalent Block Diagram



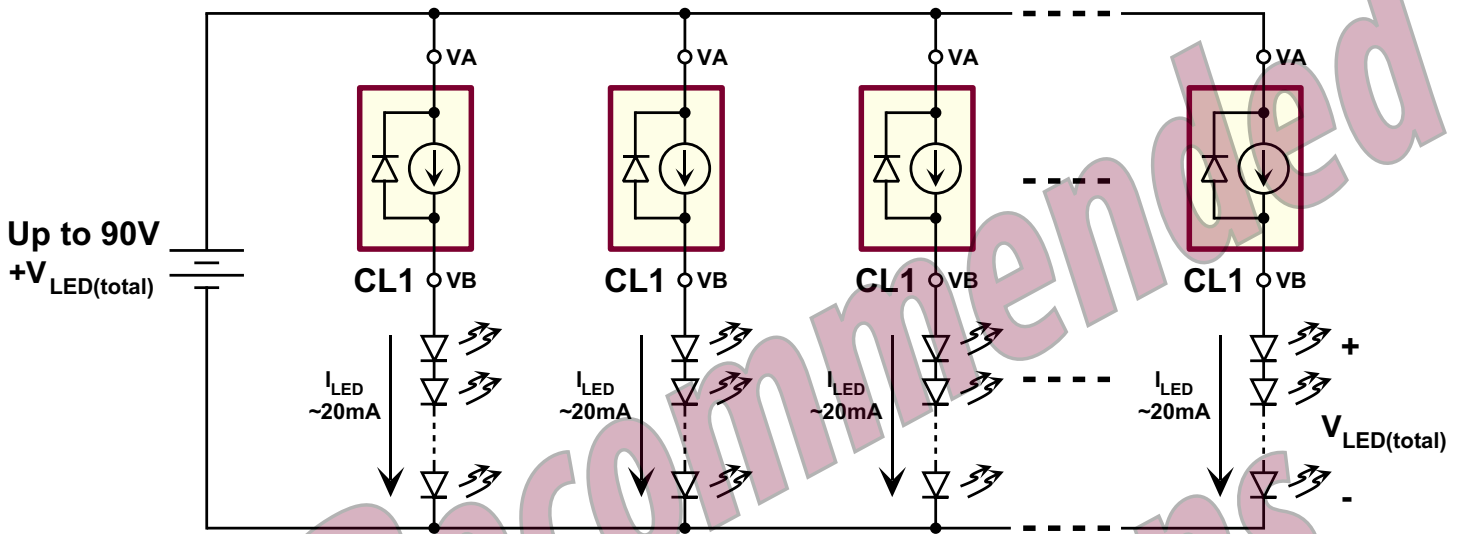
Output Current vs Voltage



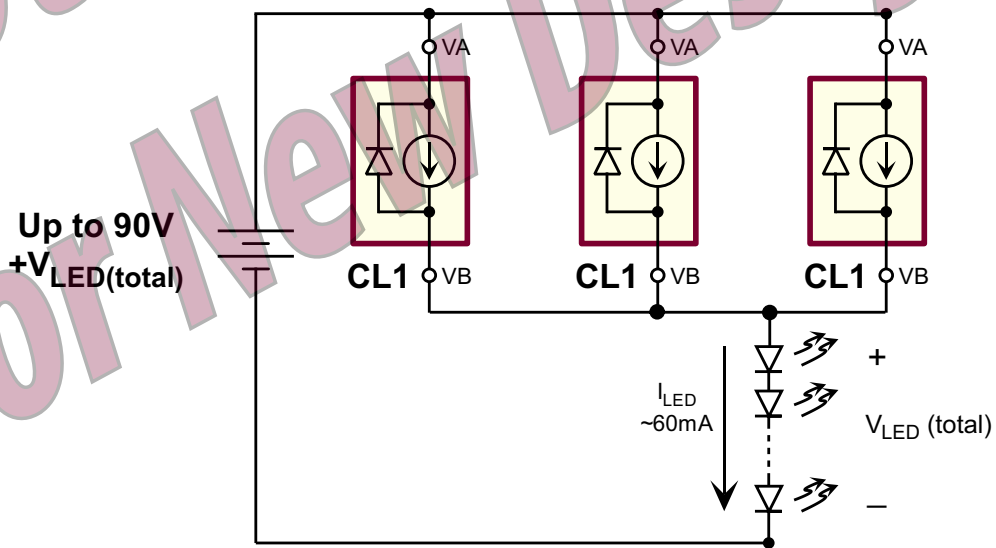
CL1 for 120V Off-Line LED Driver



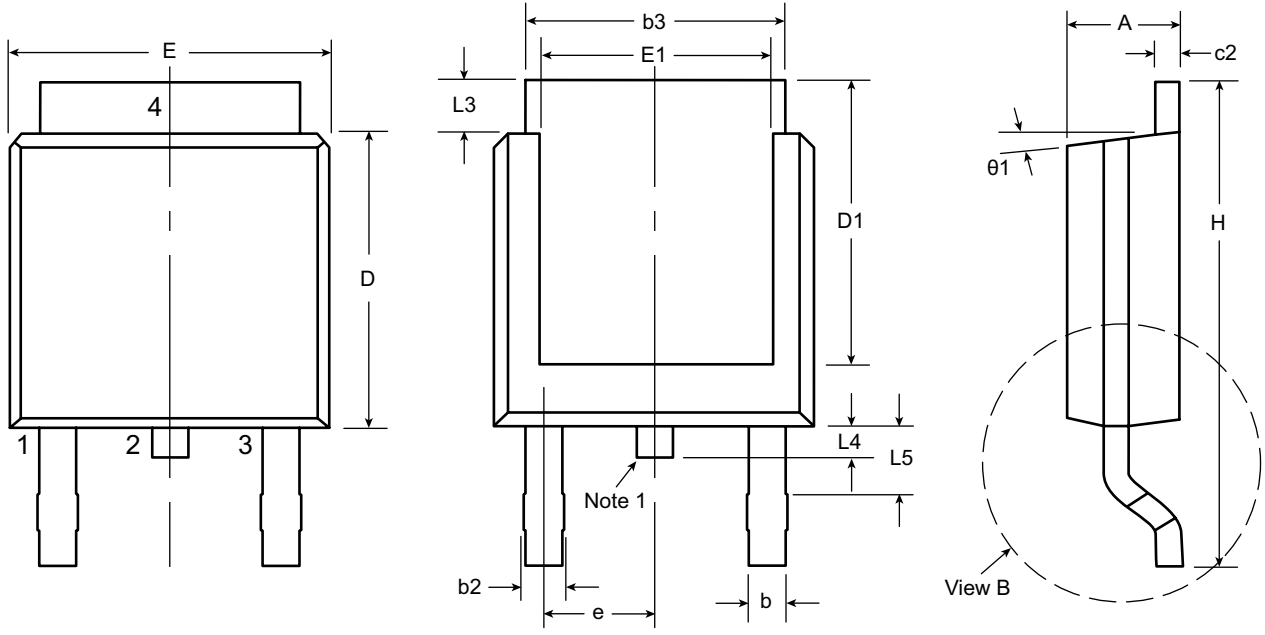
CL1 for Multiple LED Strings



CL1 for 120V Off-Line LED Driver



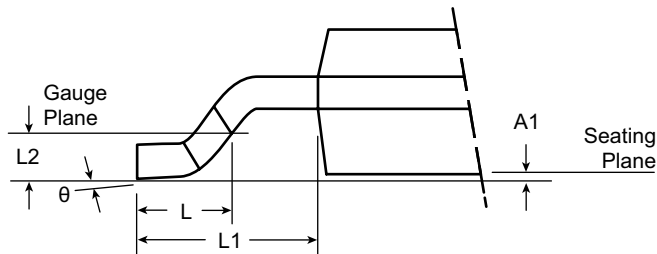
### 3-Lead TO-252 D-PAK Package Outline (K4)



**Front View**

**Rear View**

**Side View**



**View B**

**Note:**

1. Although 4 terminal locations are shown, only 3 are functional. Lead number 2 was removed.

Symbol	A	A1	b	b2	b3	c2	D	D1	E	E1	e	H	L	L1	L2	L3	L4	L5	$\theta$	$\theta1$	
Dimension (inches)	MIN	.086	.000*	.025	.030	.195	.018	.235	.205	.250	.170	.370	.055	.108 REF	.020 BSC	.035	.025*	.045	0°	0°	
	NOM	-	-	-	-	-	-	.240	-	-	-	-	.060			-	-	-	-	-	-
	MAX	.094	.005	.035	.045	.215	.035	.245	.217*	.265	.182*	.410	.070			.050	.040	.060	10°	15°	

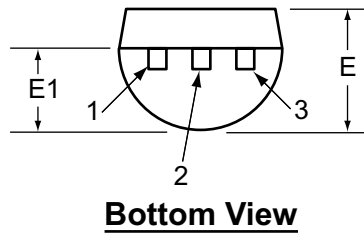
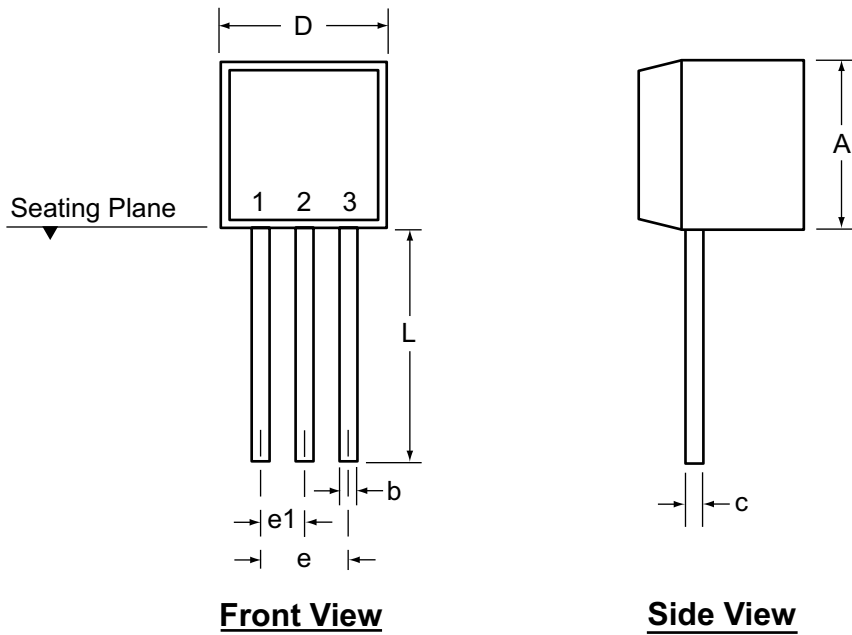
JEDEC Registration TO-252, Variation AA, Issue E, June 2004.

\* This dimension is not specified in the JEDEC drawing.

Drawings not to scale.

Supertex Doc. #: DSPD-3TO252K4, Version E041309.

### 3-Lead TO-92 Package Outline (N3)



Symbol	A	b	c	D	E	E1	e	e1	L
Dimensions (inches)	MIN	.170	.014 <sup>†</sup>	.175	.125	.080	.095	.045	.500
	NOM	-	-	-	-	-	-	-	-
	MAX	.210	.022 <sup>†</sup>	.022 <sup>†</sup>	.205	.165	.105	.105	.610*

JEDEC Registration TO-92.

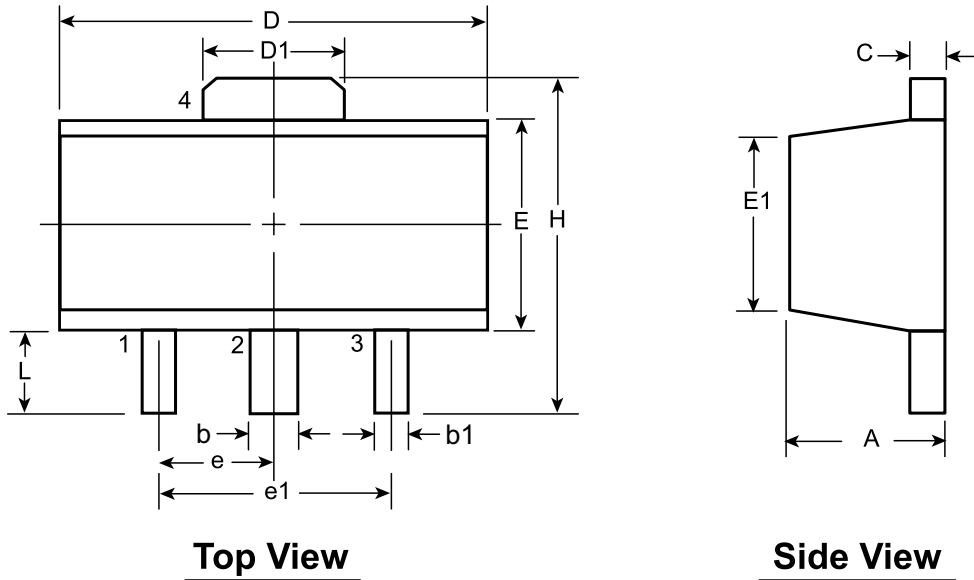
\* This dimension is not specified in the JEDEC drawing.

† This dimension differs from the JEDEC drawing.

Drawings not to scale.

Supertex Doc.#: DSPD-3TO92N3, Version E041009.

### 3-Lead TO-243AA (SOT-89) Package Outline (N8)



Symbol		A	b	b1	C	D	D1	E	E1	e	e1	H	L	
Dimensions (mm)	MIN	1.40	0.44	0.36	0.35	4.40	1.62	2.29	2.00†	1.50 BSC	3.00 BSC	3.94	0.89	
	NOM	-	-	-	-	-	-	-	-			-	-	-
	MAX	1.60	0.56	0.48	0.44	4.60	1.83	2.60	2.29			4.25	1.20	

JEDEC Registration TO-243, Variation AA, Issue C, July 1986.

† This dimension differs from the JEDEC drawing

Drawings not to scale.

Supertex Doc. #: DSPD-3TO243AAN8, Version E051509.

(The package drawings in this data sheet may not reflect the most current specifications. For the latest package outline information go to <http://www.supertex.com/packaging.html>.)

Supertex inc. does not recommend the use of its products in life support applications, and will not knowingly sell them for use in such applications unless it receives an adequate "product liability indemnification insurance agreement." Supertex inc. does not assume responsibility for use of devices described, and limits its liability to the replacement of the devices determined defective due to workmanship. No responsibility is assumed for possible omissions and inaccuracies. Circuitry and specifications are subject to change without notice. For the latest product specifications refer to the Supertex inc. website: <http://www.supertex.com>.