CL2

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

Features

- 5.0 to 90V operating range (V_{A-B})
- 20 mA ±10% at 5.0 - 90V
- 0.01%/°C typical temperature coefficient
- Available in TO-243AA (SOT-89), TO-252(D-PAK), & TO-92 packages
- Can be paralleled for higher current

Applications

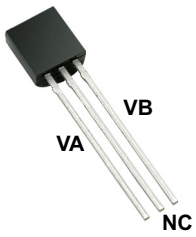
- LED driver
- Industrial lamp indicators
- Signage
- Accent lighting
- Automotive
- Constant current source
- Constant current sink

Description

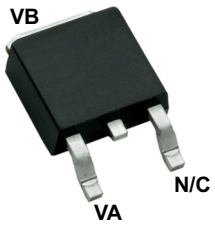
CL2 is a high voltage, temperature compensated, constant-current source. The device is trimmed to provide a constant current of 20 mA ±10% at an input voltage of 5–90V. The device can be used as a two-terminal, constant-current source or constant-current sink.

A typical application for the CL2 is to drive LEDs with a constant current of 20 mA. Multiple CL2s can also be used in parallel to provide higher currents such as 40 mA, 60 mA or 80 mA. The device is available in TO-243AA (SOT-89), TO-252 (D-PAK), and TO-92 packages.

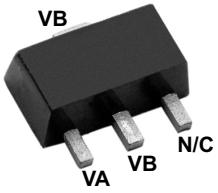
Package Type



TO-92



TO-252 (D-PAK)

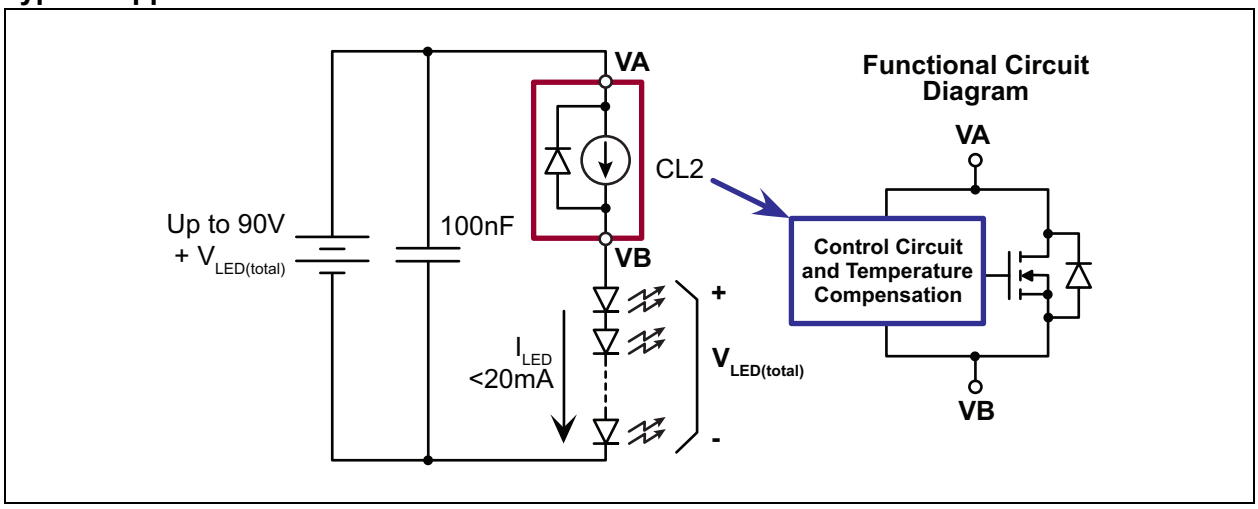


TO-243AA (SOT-89)

See Table 2-1 for pin information

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Typical Application Circuit



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1.0 ELECTRICAL CHARACTERISTICS

ABSOLUTE MAXIMUM RATINGS†

Operating voltage, V_{A-B} 100V
Operating junction temperature, T_j ..... -40 to +125 °C
Storage Temperature, T_s ..... -55 to +150 °C

† Notice: Stresses above those listed under “Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational listings of this specification is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

DC AND AC CHARACTERISTICS

Electrical Specifications: Unless otherwise specified, for all specifications T_A = +25°C						
Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Units**	**Conditions**
Operating voltage	V_{A-B}	5.0	-	90	V	---
Current regulation	I_{A-B}	18.0	20	22	mA	V_{A-B}= 5.0V - 90V
I_{A-B} temperature coefficient	$\Delta I_{A-B}/\Delta T$	-	0.01	-	%/°C	V_{A-B}= 45V, T_j= -40°C to +100°C
Operating junction temperature	T_j	-40	-	125	°C	---
Dynamic resistance	R_{A-B}	-	300	-	kΩ	---

TEMPERATURE SPECIFICATIONS

Parameter	**Symbol**	**Min**	**Typ**	**Max**	**Units**	**Conditions**
Temperature Ranges						
Operating Junction Temperature	T_j	-40	–	125	°C	
Storage Temperature	T_s	-55	–	150	°C	
Package Thermal Resistances						
Thermal Resistance, TO-92	θ_{ja}	–	132	–	°C/W	
Thermal Resistance, TO-252	θ_{ja}	–	81	–	°C/W	Note 1
Thermal Resistance, TO-243AA	θ_{ja}	–	133	–	°C/W	Note 1

Note 1: Mounted on FR4 board, 25mm x 25mm x 1.57 mm

TABLE 1-1: THERMAL CHARACTERISTICS

Package	**Power Dissipation @T_A = 2.5°C (W)**	**Conditions**
TO-92	0.6	
TO-252	2.0	Note 1
TO-243AA	1.3	Note 1

Note 1: Mounted on FR4 board, 25mm x 25mm x 1.57 mm

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2.0 PIN DESCRIPTION

The locations of the pins are listed in Package Type and Packaging Information.

TABLE 2-1: PIN DESCRIPTION

Pin # TO-92	Pin # TO-252	Pin # To-243AA	Symbol	Function
1	1	1	VA	Current in
2	3	3	NC	No connect
3	4	2,4	VB	Current out

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3.0 FUNCTIONAL DESCRIPTION

Figure 3-1 provides the Functional Circuit diagram and its equivalent block diagram for CL2. Performance information is available in Figure 3-2 and Figure 3-3. Figure 3-4 and Figure 3-5 provide example schematics.

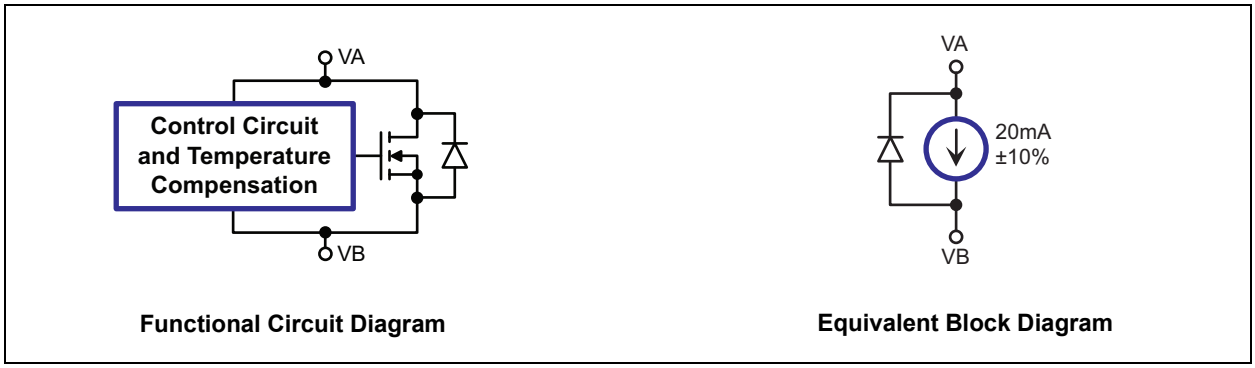


FIGURE 3-1: *Functional Circuit Diagram and Equivalent Block Diagram*

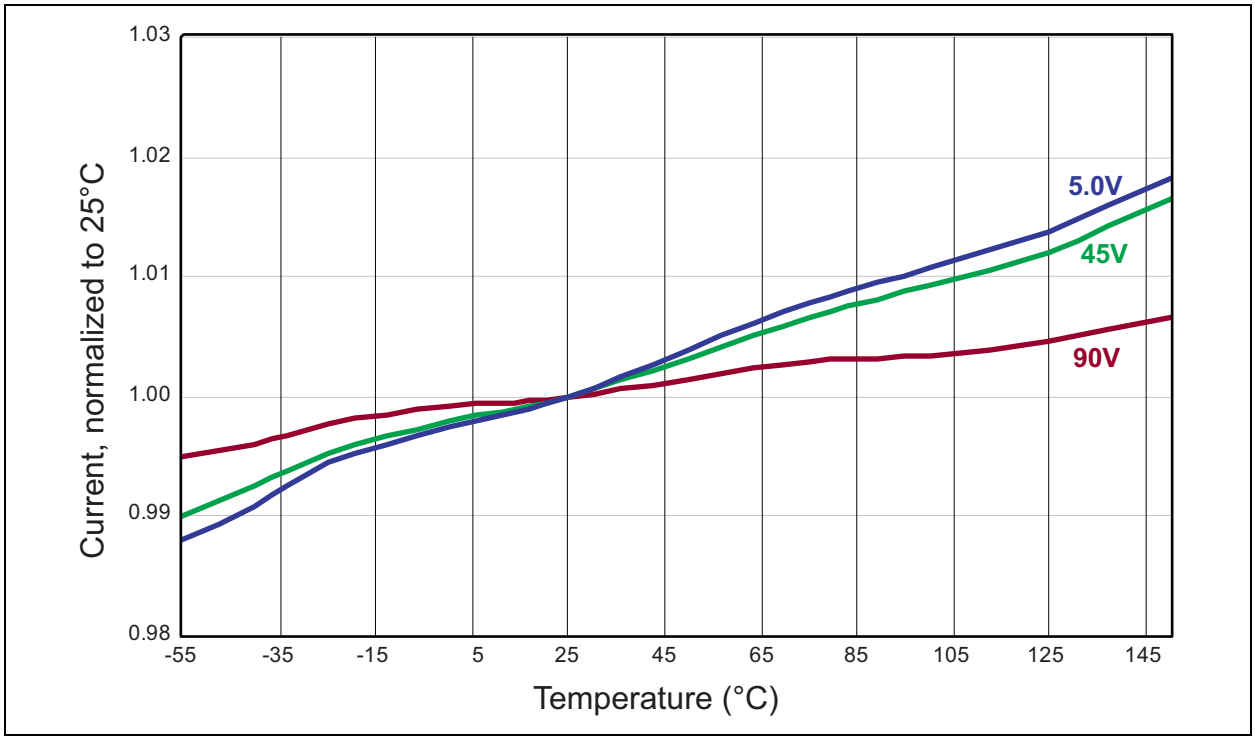


FIGURE 3-2: *Temperature Characteristics*

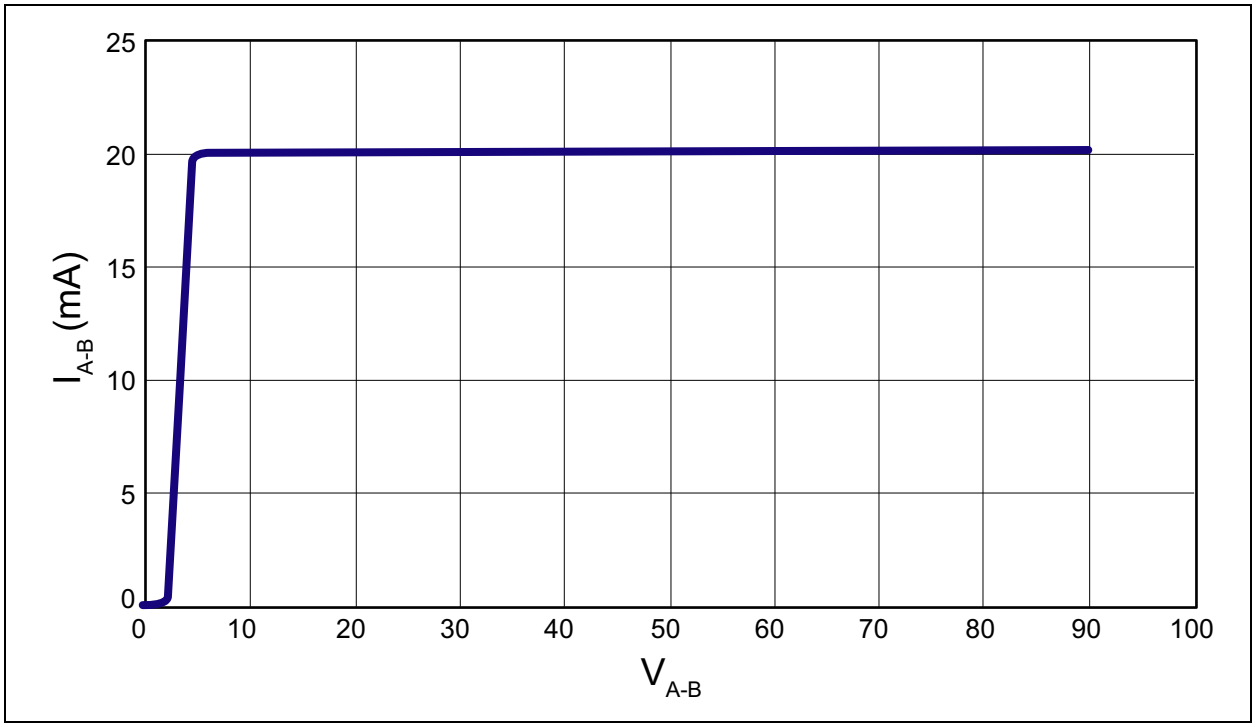


FIGURE 3-3: *Output Current vs Voltage*

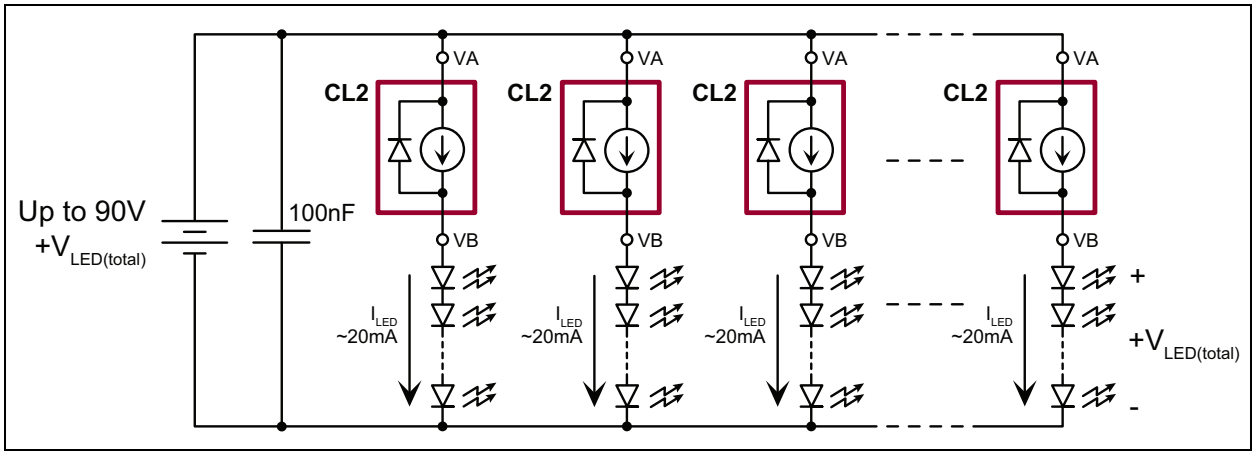


FIGURE 3-4: *CL2 for Multiple LED Strings*

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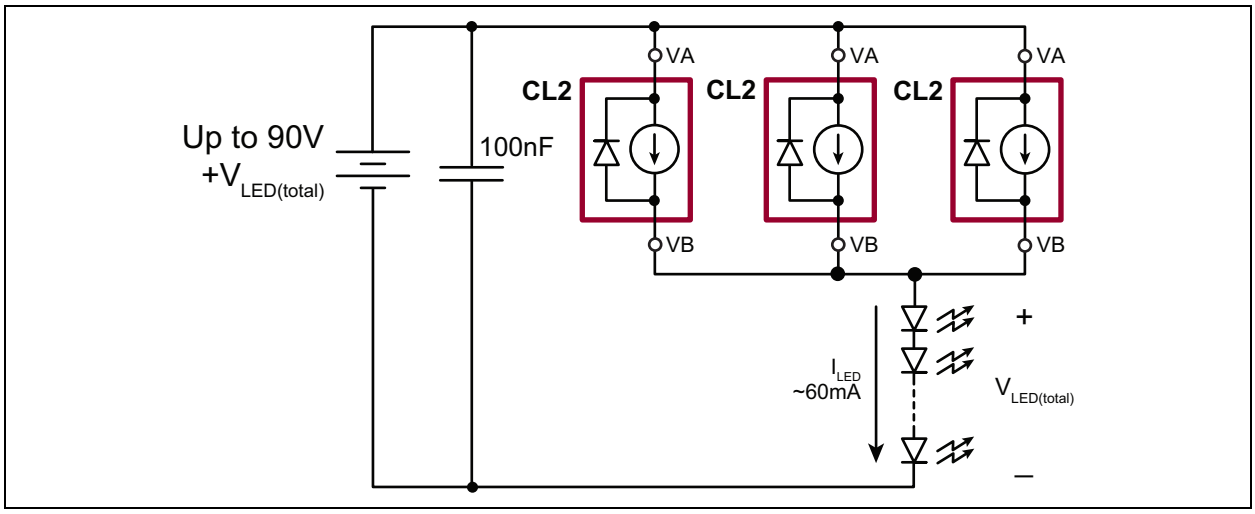
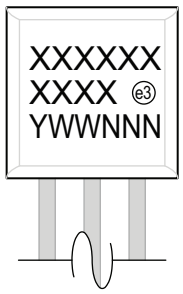


FIGURE 3-5: *CL2 for Higher Current*

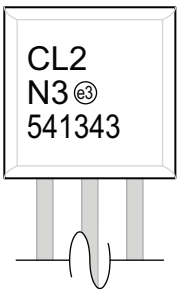
4.0 PACKAGING INFORMATION

4.1 Package Marking Information

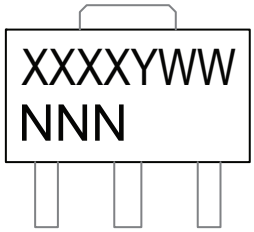
3-lead TO-92



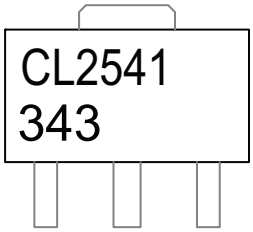
Example



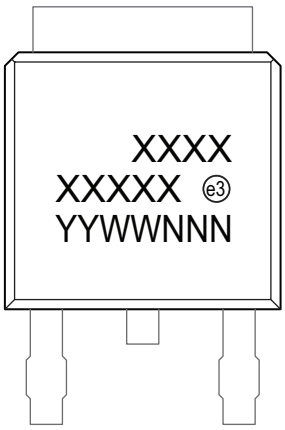
3-lead TO-243AA *
(SOT-89)



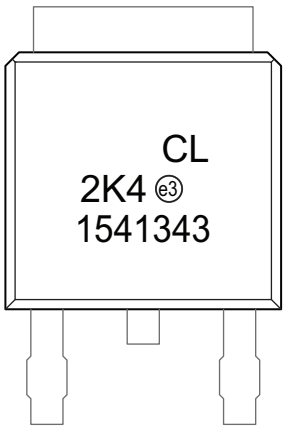
Example



TO-252 (D-PAK)



Example

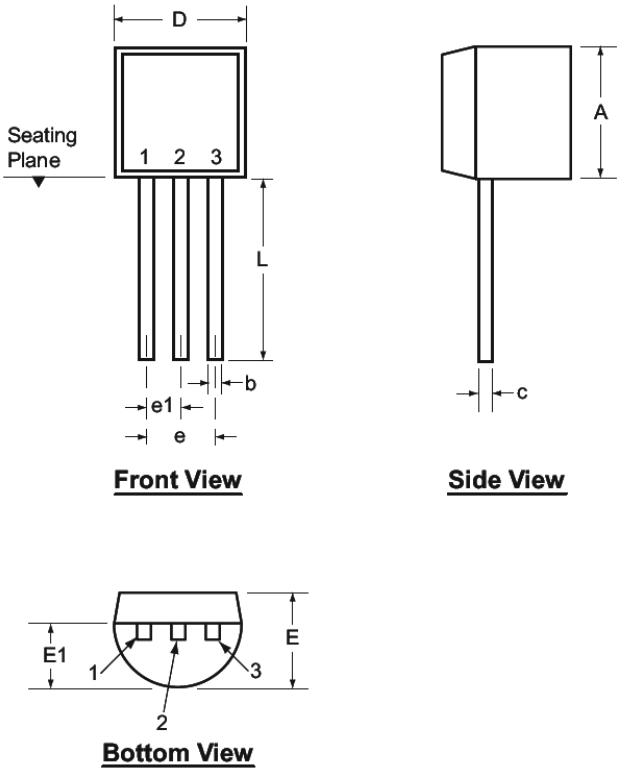


Legend:	XX...X	Product Code or Customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week ‘01’)
	NNN	Alphanumeric traceability code
	(e3)	Pb-free JEDEC® designator for Matte Tin (Sn)
	*	This package is Pb-free. The Pb-free JEDEC designator ((e3)) can be found on the outer packaging for this package.

Note: In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for product code or customer-specific information. Package may or not include the corporate logo.

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3-Lead TO-92 Package Outline (L/LL/N3)

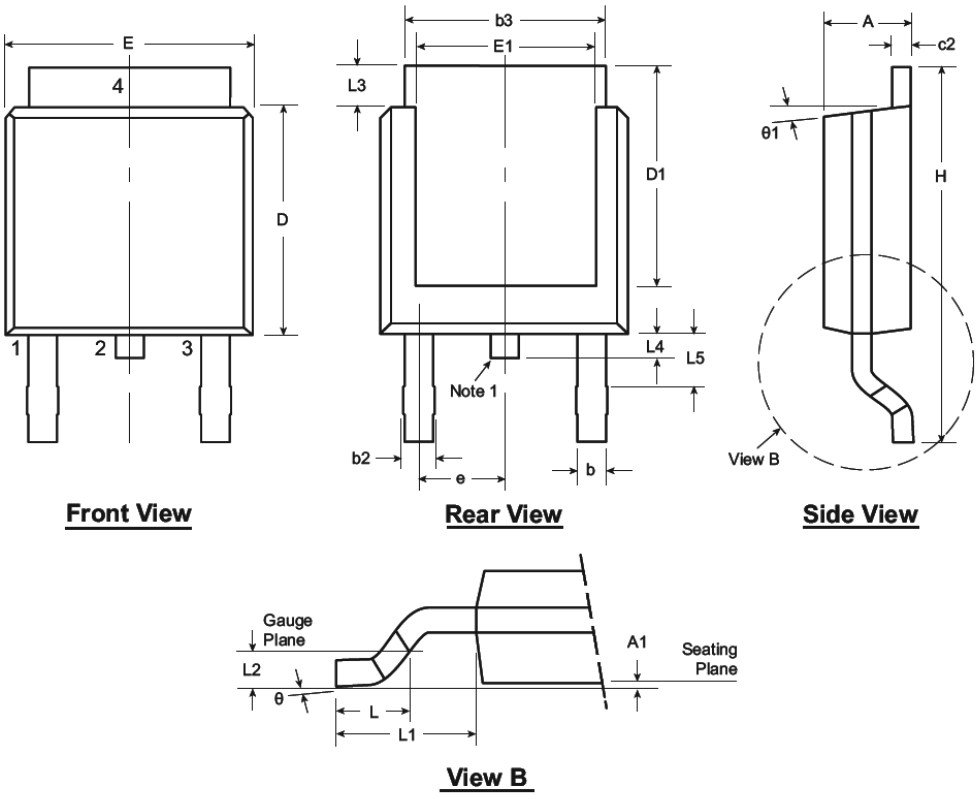


Note: For the most current package drawings, see the Microchip Packaging Specification at www.microchip.com/packaging.

Symbol		A	b	c	D	E	E1	e	e1	L
Dimensions (inches)	MIN	.170	.014†	.014†	.175	.125	.080	.095	.045	.500
	NOM	-	-	-	-	-	-	-	-	-
	MAX	.210	.022†	.022†	.205	.165	.105	.105	.055	.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.

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



Note: For the most current package drawings, see the Microchip Packaging Specification at www.microchip.com/packaging.

Note:

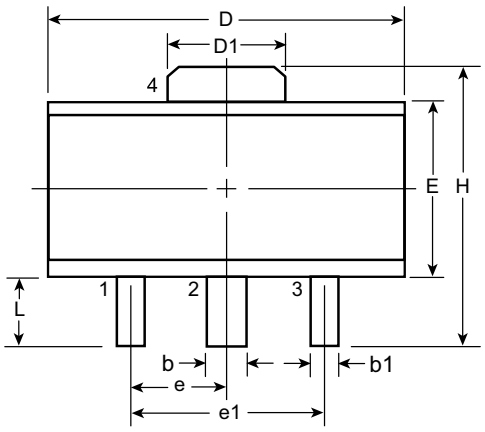
1. Although 4 terminal locations are shown, only 3 are functional. Lead number 2 was removed.

Symbol		A	A1	b	b2	b3	c2	D	D1	E	E1	e	H	L	L1	L2	L3	L4	L5	θ	θ1
Dimension (inches)	MIN	.086	.000*	.025	.030	.195	.018	.235	.205	.250	.170	.090 BSC	.370	.055	.108 REF	.020 BSC	.035	.025*	.035†	0°	0°
	NOM	-	-	-	-	-	-	.240	-	-	-		-	.060			-	-	-	-	-
	MAX	.094	.005	.035	.045	.215	.035	.245	.217*	.265	.200*		.410	.070			.050	.040	.060	10°	15°

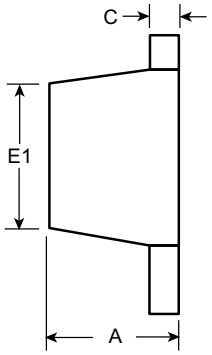
JEDEC Registration TO-252, Variation AA, Issue E, June 2004.
** This dimension is not specified in the JEDEC drawing.*
† This dimension differs from the JEDEC drawing.
Drawings not to scale.

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



Top View



Side View

Note: For the most current package drawings, see the Microchip Packaging Specification at www.microchip.com/packaging.

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	0.73†
	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**.*

APPENDIX A: REVISION HISTORY

Revision A (November 2015)

- Updated file to Microchip format

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PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, refer to the factory or the listed sales office.

PART NO.	XX	-	X	-	X
Device	Package Options		Environmental		Media Type

Device:	CL2	= Simple 90V, 20 mA, Temperature-Compensated, Constant-Current LED Driver IC
Package:	N3	= TO-92, 3-lead
	K4	= TO-252 (D-PAK), 3-lead
	N8	= TO-243AA (SOT-89), 3-lead
Environmental	G	= Lead (Pb)-free/ROHS-compliant package
Media Type:	(blank)	= 1000/Bag for N3 packages
		= 2000/Reel for K4 packages
		= 2000/Reel for N8 packages
	P002	= 2000/Reel for N3

Examples:

a)	CL2N3-G	TO-92 package, 1000/Bag
b)	CL2K4-G	TO-252 package, 2000/Reel
c)	CL2N8-G	TO-243AA package, 2000/Reel
d)	CL2N3-G-P002	TO-92 package, 2000/Reel

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