CL25

90V, 25 mA Simple Temperature-Compensated Constant-Current LED Driver IC

Features

- 5V to 90V Operating Voltage Range
- 25 mA ±10% at 5V to 90V
- 0.01%/°C Typical Temperature Coefficient
- Two-Terminal Device with no External Components
- Can be Paralleled for Higher Current

Applications

- LED Channel Lighting
- Industrial Lamp Indicators
- Accent Lighting

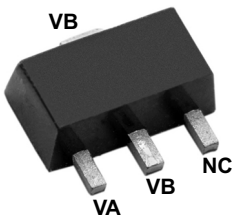
General Description

The CL25 is a high-voltage, temperature-compensated, constant-current source. This device is trimmed to provide a constant current of 25 mA ±10% at an input voltage of 5V to 90V. No external components are required. The device can be used as a two-terminal constant-current source or constant-current sink.

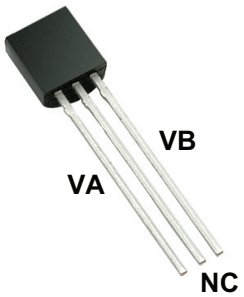
A typical application for the CL25 is to drive LEDs with a constant current of 25 mA. Multiple CL25 devices can also be used in parallel to provide higher currents, such as 50 mA, 75 mA and 100 mA. The device is available in TO-92 and SOT-89 packages.

Package Types

3-lead SOT-89
(Top view)



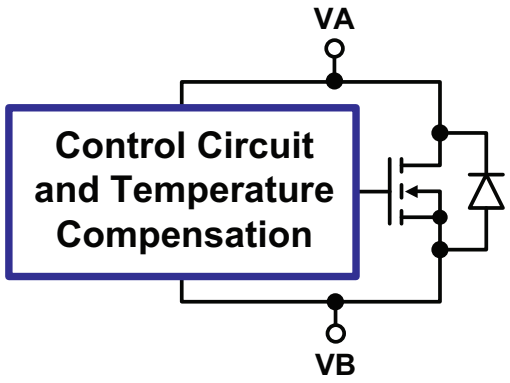
3-lead TO-92
(Top view)



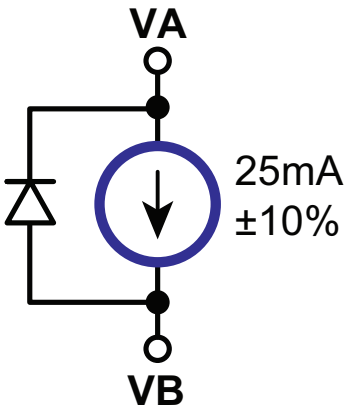
See Table 2-1 and Table 2-2 for pin information.

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Functional Block Diagram



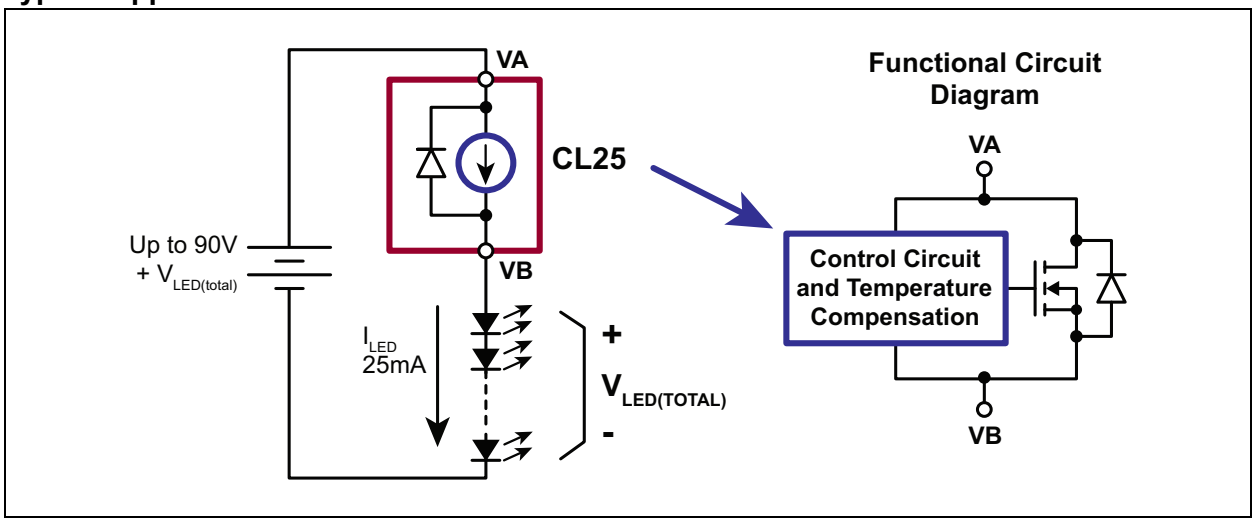
Functional Circuit Diagram



Equivalent Block Diagram

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Typical Application Circuit



1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings†

Operating Voltage, $V_{A–B}$ 100V
Junction Temperature, T_J .....–40°C to +135°C
Storage Temperature, T_S .....–55°C to +150°C
Power Dissipation (at T_A = 25°C):
3-lead SOT-89 ..... 1.3W
3-lead TO-92 ..... 0.6W

† Notice: Stresses above those listed under “Absolute 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 sections of this specification is not intended. Exposure to maximum rating conditions for extended periods may affect device reliability.

DC ELECTRICAL CHARACTERISTICS

Electrical Specifications: T_A = 25°C unless otherwise specified.

Parameter	Sym.	Min.	Typ.	Max.	Unit	Conditions
Operating Voltage	$V_{A–B}$	5	—	90	V	
Current Regulation	$I_{A–B}$	22.5	25	27.5	mA	$V_{A–B}$ = 5V–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	

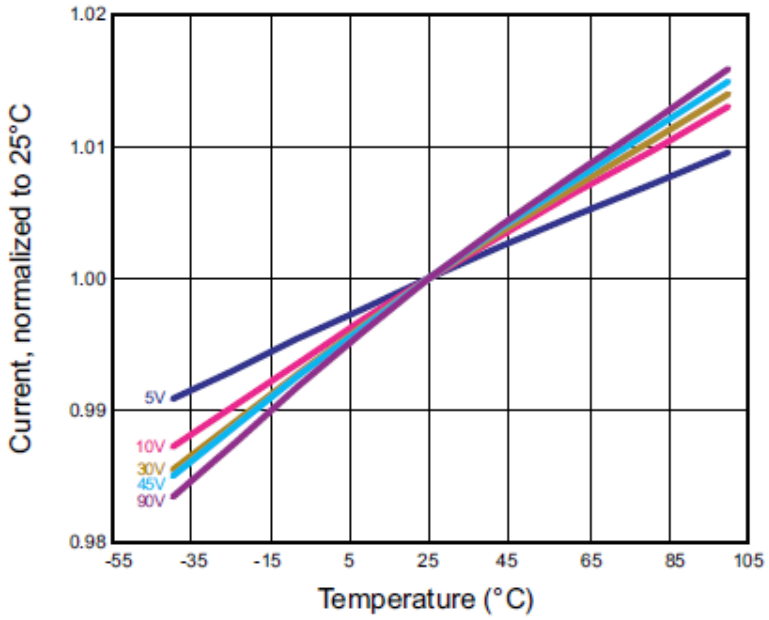
TEMPERATURE SPECIFICATIONS

Parameter	Sym.	Min.	Typ.	Max.	Unit	Conditions
TEMPERATURE RANGE						
Operating Junction Temperature	T_J	–40	—	+125	°C	
Maximum Junction Temperature	$T_{J(ABSMAX)}$	—	—	+135	°C	
Storage Temperature	T_S	–55	—	+150	°C	
PACKAGE THERMAL RESISTANCE						
3-lead SOT-89	θ_{JA}	—	133	—	°C/W	**Note 1**
3-lead TO-92	θ_{JA}	—	132	—	°C/W	

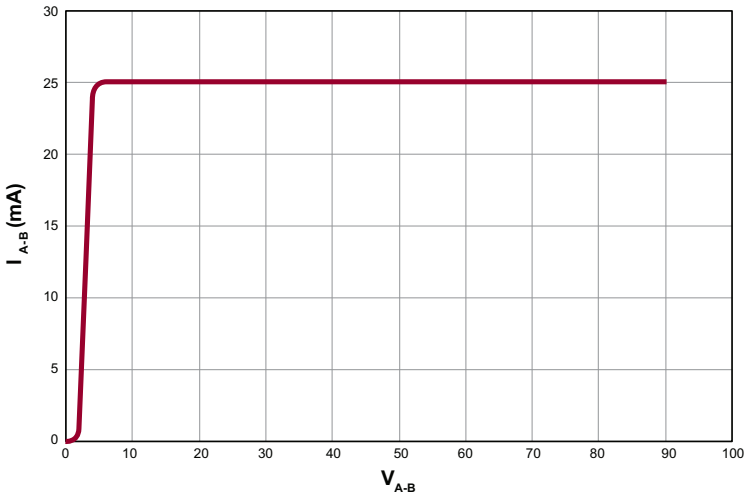
Note 1: Mounted on a 25 mm x 25 mm x 1.57 mm FR4 board

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Output Current vs.Temperature



Output Current vs. Voltage



2.0 PIN DESCRIPTION

The details on the pins of CL25 3-lead SOT-89 and 3-lead TO-92 packages are listed in Table 2-1 and Table 2-2. Refer to **Package Types** for the location of pins.

TABLE 2-1: 3-LEAD SOT-89 PIN FUNCTION TABLE

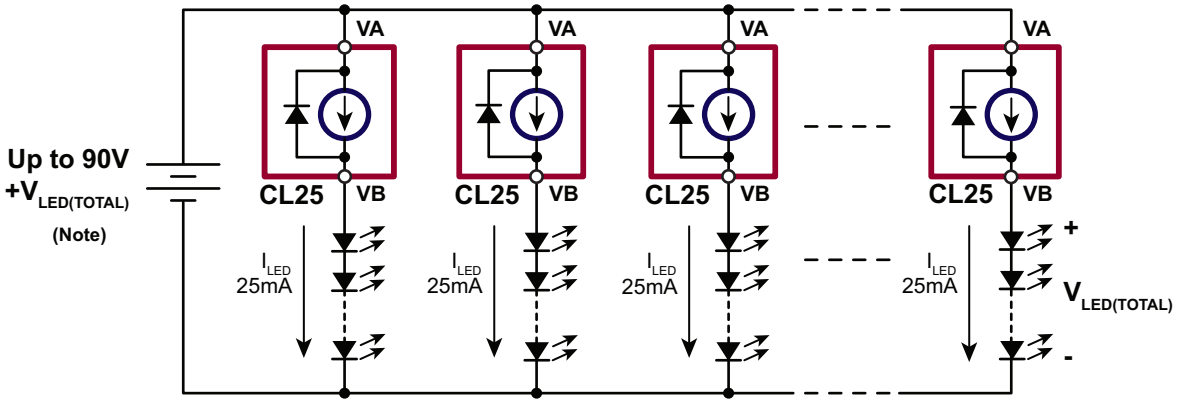
Pin Number	Pin Name	Description
1	VA	Supply voltage and constant-current sink
2	VB	Constant-current source
3	NC	No connection
4	VB	Constant-current source

TABLE 2-2: 3-LEAD TO-92 PIN FUNCTION TABLE

Pin Number	Pin Name	Description
1	VA	Supply voltage and constant-current sink
2	NC	No connection
3	VB	Constant-current source

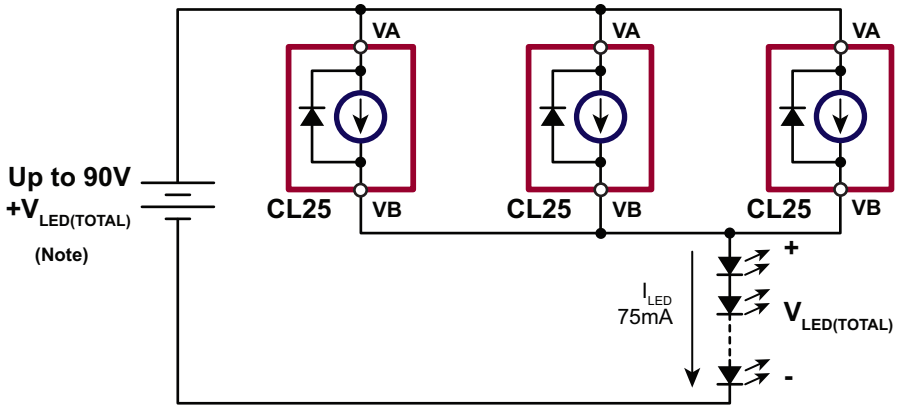
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3.0 APPLICATION INFORMATION



Note: At high voltages across the VA pin and VB pin, pulse operation with suitable duty cycle should be used to keep the device power dissipation and junction temperature below the maximum limit.

FIGURE 3-1: *CL25 for Multiple LED Strings.*



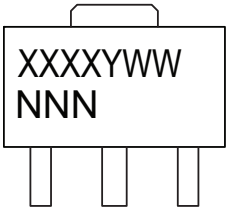
Note: At high voltages across the VA pin and VB pin, pulse operation with suitable duty cycle should be used to keep the device power dissipation and junction temperature below the maximum limit.

FIGURE 3-2: *CL25 for Higher Current.*

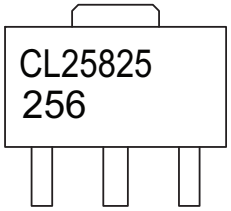
4.0 PACKAGING INFORMATION

4.1 Package Marking Information

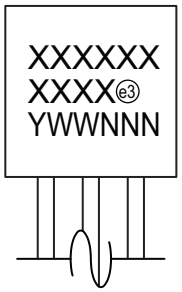
3-lead SOT-89



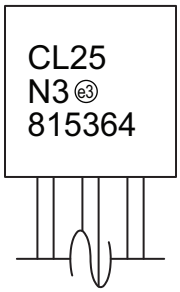
Example



3-lead TO-92



Example

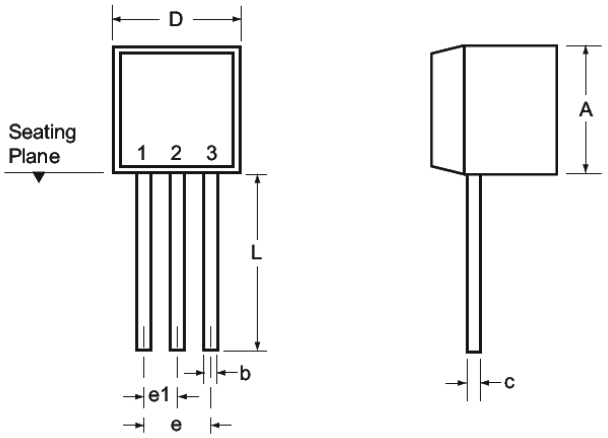


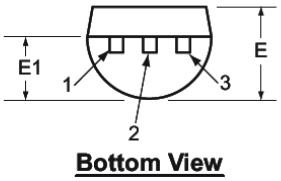
Legend:	XX...X	Product Code or Customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week ‘01’)
	NNN	Alphanumeric traceability code
	(e3)	Pb-free JEDEC® designator for Matte Tin (Sn)
	*	This package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



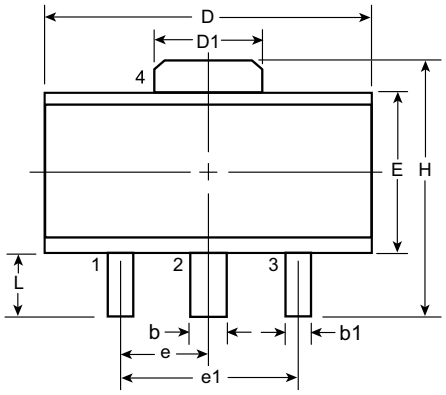


Note: For the most current package drawings, see the Microchip Packaging Specification at www.microchip.com/packaging.

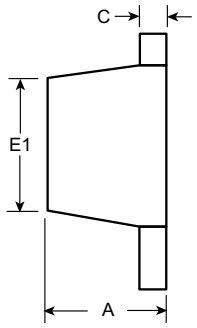
Symbol		A	b	c	D	E	E1	e	e1	L
Dimensions (inches)	MIN	.170	.014†	.014†	.175	.125	.080	.095	.045	.500
	NOM	-	-	-	-	-	-	-	-	-
	MAX	.210	.022†	.022†	.205	.165	.105	.105	.055	.610*

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-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**.*

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APPENDIX A: REVISION HISTORY

Revision A (November 2018)

- Converted Supertex Doc# DSFP-CL7 to Microchip DS20005804A
- Changed the maximum junction temperature in the Absolute Maximum Ratings from 125°C to 135°C
- Changed the package marking format
- Removed the 3-lead TO-92 N3 P002, P003, P005, P013, and P013 media types
- Made new sections to comply with the standard Microchip document format
- Made minor text changes throughout the document

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, contact your local Microchip representative or sales office.

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

Device:	CL25	=	90V, 25 mA Simple Temperature-Compensated Constant-Current LED Driver IC
Packages:	N8	=	3-lead SOT-89
	N3	=	3-lead TO-92
Environmental:	G	=	Lead (Pb)-free/RoHS-compliant Package
Media Types:	(blank)	=	2000/Reel for an N8 Package
	(blank)	=	1000/Bag for an N3 Package

Examples:

a) CL25N8-G: 90V, 25 mA Simple Temperature-Compensated Constant-Current LED Driver IC, 3-lead SOT-89 Package, 2000/Reel

b) CL25N3-G: 90V, 25 mA Simple Temperature-Compensated Constant-Current LED Driver IC, 3-lead TO-92 Package, 1000/Bag

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