LOW DROPOUT VOLTAGE LINEAR LED DRIVER IC IN SOT26

Description

The BCR430U is a monolithically integrated linear LED controller designed to function as a Constant Current Regulator (CCR) for linear LED driving. The device operates over a voltage range from 5V to 42V and regulates the output LED current up to 100mA, set by an external resistor. It is designed for driving LEDs in strings and will reduce current at increasing temperatures to self-protect. The low voltage drop during current regulation allows efficient driving of LED strings with a range of forward voltages and supply voltage tolerances.

Applications

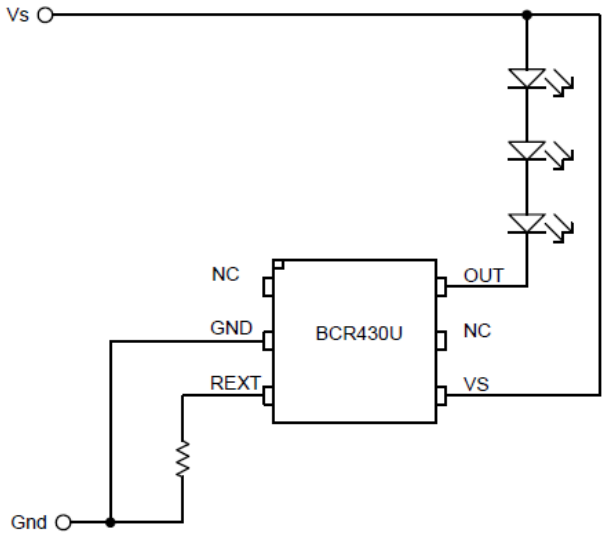
- LED Strips
- LED Panel Displays
- Architectural and Landscape Lighting
- Mood and Decorative Lighting
- Retail Lighting

Features

- LED Current Tolerance of ±5% at 95mA Output Current
- Thermal Protection Reduces LED Current at Elevated Temperature
- Low Typical Saturation Voltage of 115mV at 50mA
- 5mA to 100mA Adjustable LED Current with an External Resistor
- 5V to 42V Supply Voltage
- High Power 1W Dissipation in SOT26
- No External Capacitors Required for Stable Operation
- LED Dimming Using PWM
- Parallel Devices to Increase Regulated Current
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**
- **For automotive applications requiring specific change control (i.e. parts qualified to AEC-Q101, PPAP capable, and manufactured in IATF 16949 certified facilities), please contact us or your local Diodes representative. https://www.diodes.com/quality/product-definitions/**

Mechanical Data

- Case: SOT26
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads. Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.018 grams (Approximate)



SOT26

Ordering Information (Note 4)

Product	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
BCR430UW6-7	430	7	8	3,000

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.

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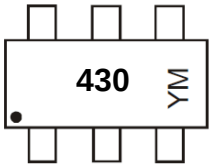
Marking Information

SOT26



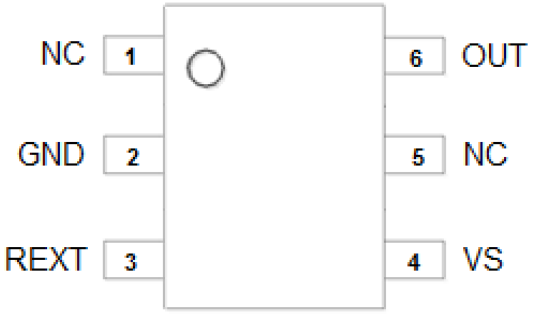
430 = Part Marking (See Ordering Information)
YM = Date Code Marking
Y = Year (ex: G = 2019)
M = Month (ex: 9 = September)

Date Code Key

Year	2019	2020	2021	2022	2023	2024	2025
Code	G	H	I	J	K	L	M

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Code	1	2	3	4	5	6	7	8	9	O	N	D

Pinout Diagram

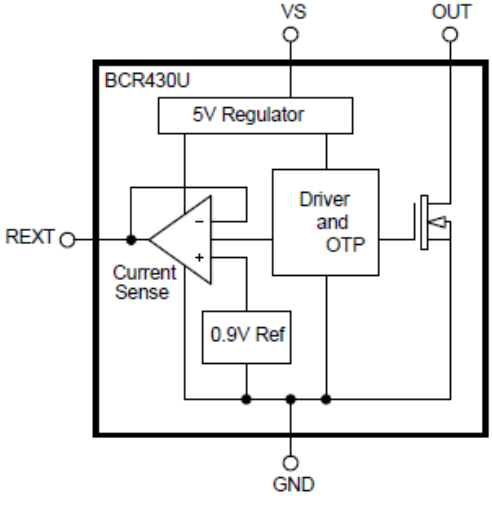


Top View: SOT26

Pin Description

Pin Number	Pin Name	Function
1	NC	Not Connected
2	GND	Power Ground
3	REXT	External Resistor for Adjusting Output Current
4	VS	Supply Voltage
5	NC	Not Connected
6	OUT	I_{OUT} - Regulated Output Current

Functional Block Diagram



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Absolute Maximum Ratings (Voltage relative to GND, @T_A = +25°C, unless otherwise specified.)

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V_S	-0.5	45	V
Output Current	I_{OUT}	0	100	mA
Output Voltage	V_{OUT}	-0.5	42	V
R_{EXT} Current	I_{REXT}	0	0.3	mA
R_{EXT} Voltage	V_{REXT}	-0.5	5	V

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V_S	5	42	V
OUT Pin Voltage Range	V_{OUT}	0.5	40	V
Output Current (Note 5)	I_{OUT}	5	100	mA
Ambient Temperature Range (Notes 5 & 6)	T_A	-40	+125	°C
Normal Operation Junction Temperature Range (Note 6)	T_J	-40	+125	°C

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 7)	P_D	922	mW
	(Note 8)		993	
Thermal Resistance, Junction to Ambient	(Note 7)	$R_{\theta JA}$	136	°C/W
	(Note 8)		126	
Thermal Resistance, Junction to Lead	(Note 9)	$R_{\theta JL}$	88.5	
Operating Junction Temperature		T_J	-40 to +150	°C
Recommended Storage Temperature		T_S	-55 to +165	°C

ESD Ratings (Note 10)

Characteristics	Symbols	Value	Unit	JEDEC Class
Electrostatic Discharge – Human Body Model	HBM	2000	V	2
Charge Device Model	CDM	1000	V	C5

Notes:
5. Subject to power dissipation and junction temperature not exceeding +125°C; beyond T_J = +100°C the LED current may start to fold back reducing the temperature of both the IC and LEDs.
6. Device will operate with its junction temperature at +125°C, however at this junction temperature the LED current will have been automatically reduced (folded back) from designed (room temperature/+25°C) level.
7. For a device mounted on MRP FR4-PCB; device is measured under still air conditions whilst operating in a steady-state.
8. Same as Note 7, except the device is mounted on 25mm × 25mm 2oz copper.
9. $R_{\theta JL}$ = Thermal resistance from junction to solder-point (at the end of the OUT leads).
10. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

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Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Supply Voltage	V_S	5	—	42	V	—
Supply Current (Note 11)	I_S	180	261	400	µA	I_{OUT} = 50mA, V_S = 5V
		—	285	500	µA	I_{OUT} = 50mA, V_S = 42V
Quiescent Current	I_Q	40	67	100	µA	V_S = 42V; R_{EXT} = open
Output Current range	I_{OUT}	5	—	100	mA	—
Output Current, set by R_{EXT} (Note 11)	I_{OUT}	18	20.8	22.7	mA	R_{EXT} = 30kΩ; V_{OUT} > 1V; V_S ≥ 5V
		45.7	49.1	52.3	mA	R_{EXT} = 12.7kΩ; V_{OUT} > 1V; V_S ≥ 5V
		90	95.3	100	mA	R_{EXT} = 6.49kΩ; V_{OUT} > 1V; V_S ≥ 5V
Driver Voltage Drop (Note 11)	$V_{OUT-MIN}$	50	115	200	mV	I_{OUT} = 50mA
REXT Pin Voltage (Note 11)	V_{REXT}	0.880	0.903	0.960	V	R_{EXT} = 300kΩ
		0.875	0.892	0.955	V	R_{EXT} = 6.49kΩ
Thermal Knee Junction Temperature (Note 12)	T_K	—	+125	—	°C	—
Output Current Change vs. Temperature	$(\Delta I_{OUT}/I_{OUT}) / \Delta T_J$	—	0.0032	—	%/°C	T_J > -40°C; T_J = +120°C; I_{OUT} = 50mA
Output Current Change vs. Supply Voltage or Output Voltage	$(\Delta I_{OUT}/I_{OUT}) / \Delta V$	—	0.0055	—	%/V	I_{OUT} = 50mA; 5V < V_S < 42V or 1V < V_{OUT} < 40V

Notes: 11. Measured under pulsed conditions. Pulse width ≤ 300µs. Duty cycle ≤ 2%.

12. Thermal Knee Junction Temperature is defined as the asymptotic intersection of the +25°C temperature I_{OUT} current and the I_{OUT} current in over-temperature protection mode.

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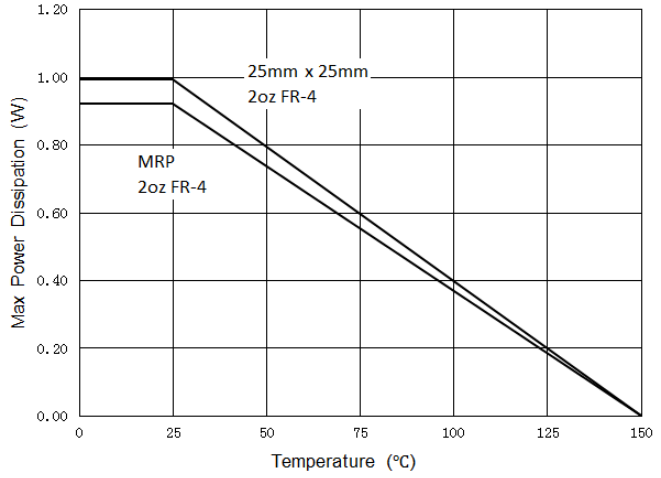
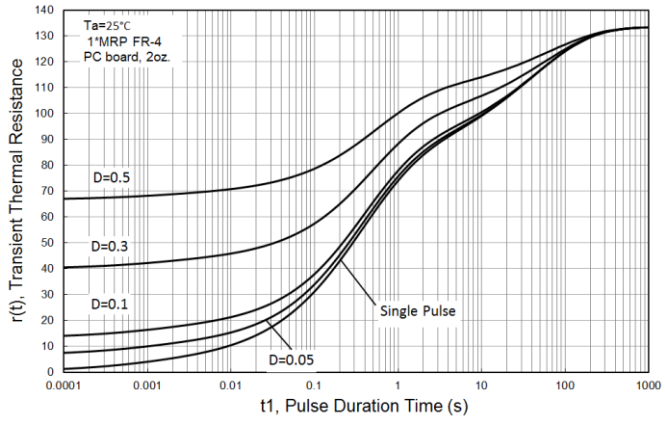
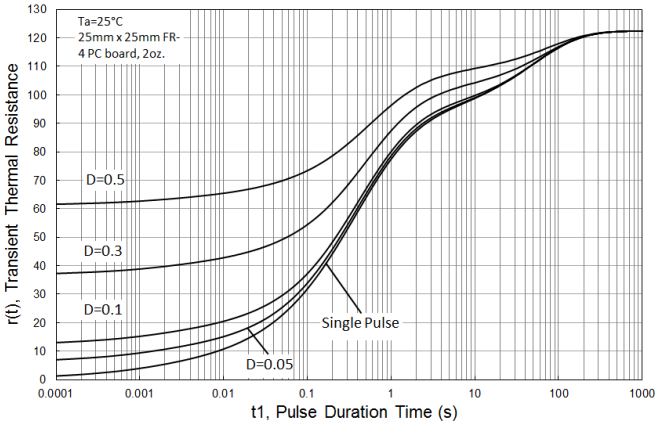
Typical Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)



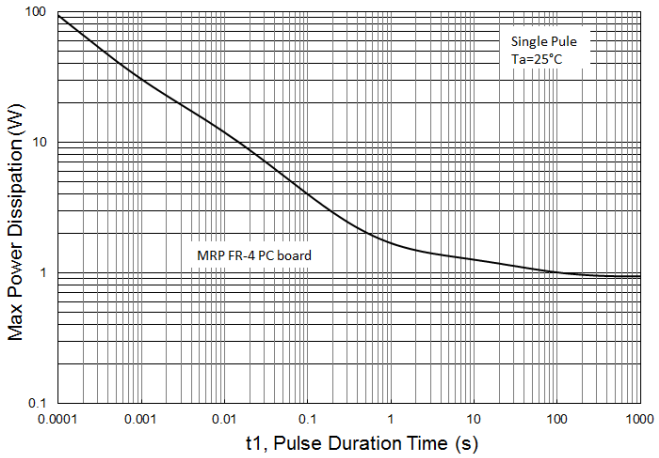
Derating Curve



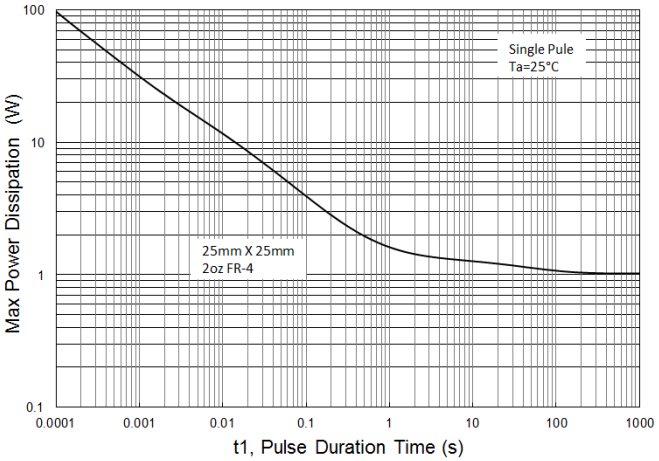
Transient Thermal Resistance



Transient Thermal Resistance



Pulse Power Dissipation



Pulse Power Dissipation

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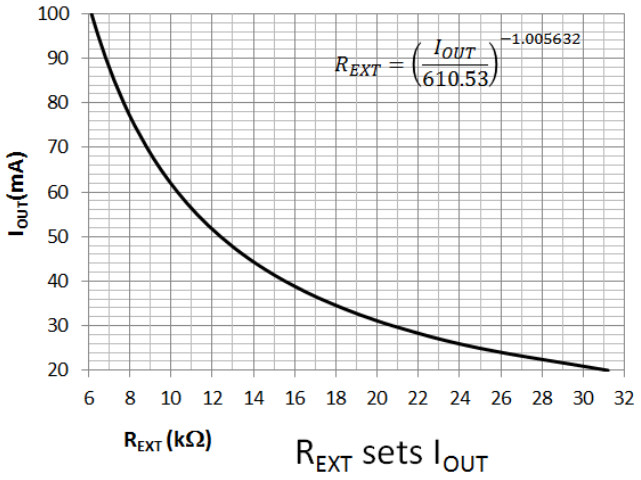
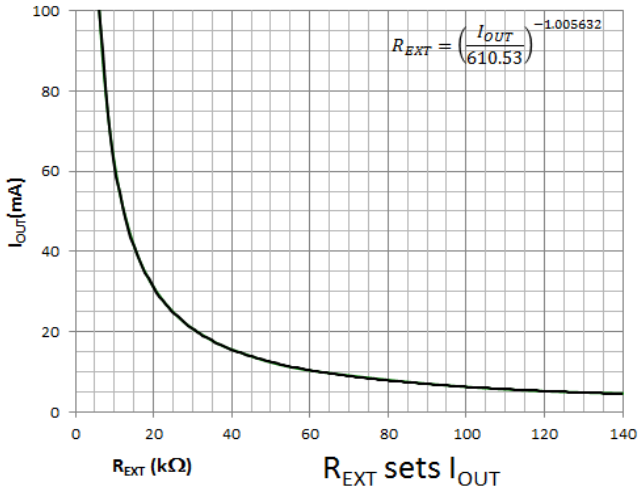
Typical Electrical Characteristics (continued) (@T_A = +25°C, unless otherwise specified.)

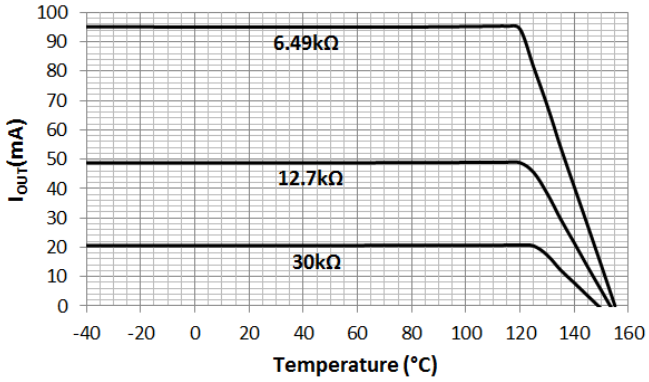


R_{EXT} sets I_{OUT}

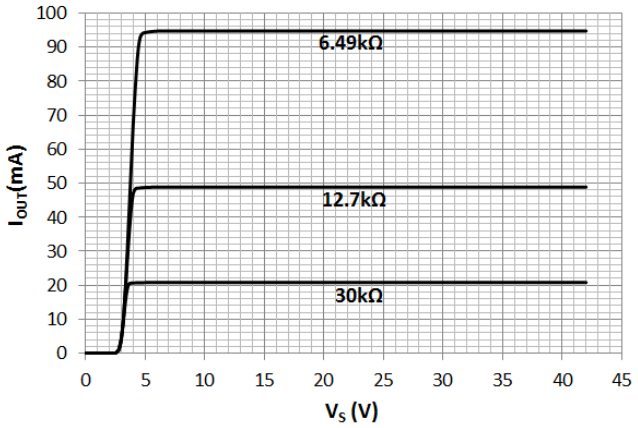


R_{EXT} sets I_{OUT}

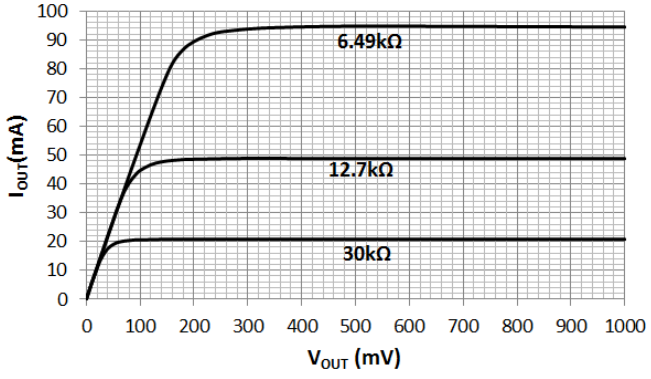
The LED current is set according to the resistor value which is connected to the REXT pin.



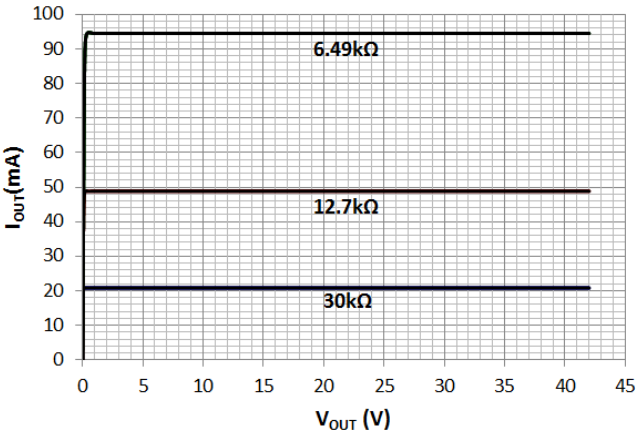
$T_{JUNCTION}$ vs I_{OUT} with Shutdown



V_{SUPPLY} vs I_{OUT}



V_{OUT} vs I_{OUT}



Extended V_{OUT} vs I_{OUT}

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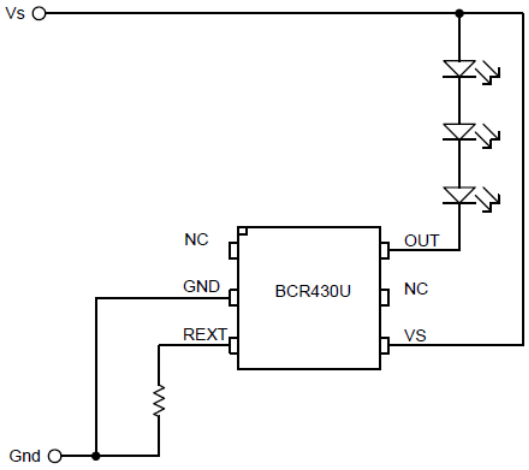
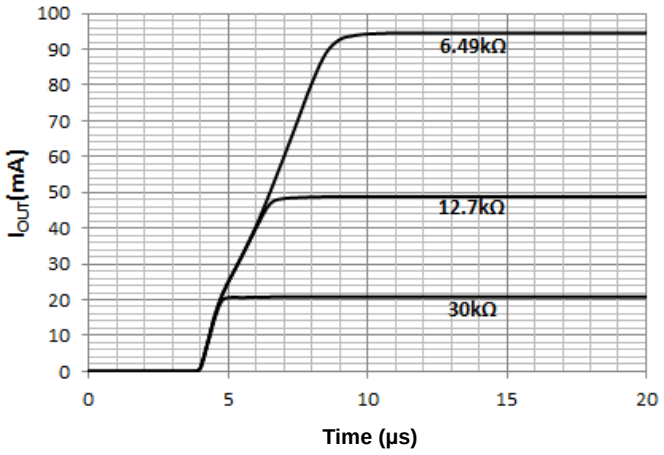
Application Information

Typical Application Circuit

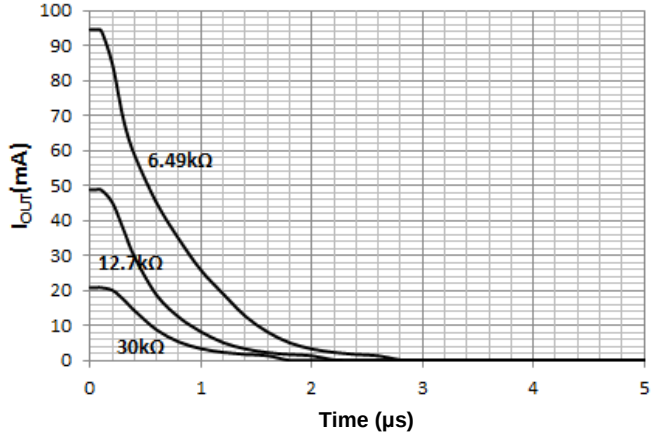


No external capacitors required for stable operation. Suitable for diming with VS or REXT pin modulation.

Switching / Timing Information (@V_S = 10V, V_{OUT} = 1V, 1kHz, 50% Mark-Space ratio, R_{EXT} modulation.)



For R_{EXT} = 6.49kΩ, t_R = 14µs at -40°C, 9µs at +25°C and 7µs at +110°C.
Rise time does not change significantly with LED loads (delay increases by less than 2µs).



Fall time is independent of temperature.
Fall time does not change significantly with LED loads.

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Package Outline Dimensions

Please see https://www.diodes.com/package-outlines.html for the latest version.

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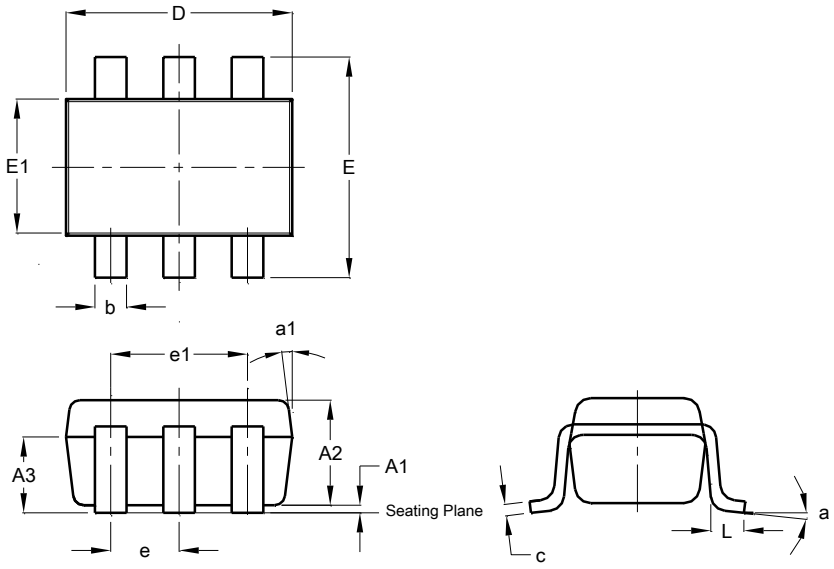
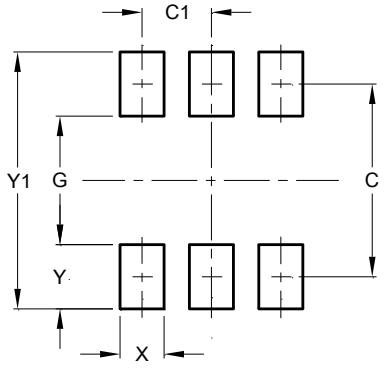


SOT26			
Dim	**Min**	**Max**	**Typ**
A1	0.013	0.10	0.05
A2	1.00	1.30	1.10
A3	0.70	0.80	0.75
b	0.35	0.50	0.38
c	0.10	0.20	0.15
D	2.90	3.10	3.00
e	-	-	0.95
e1	-	-	1.90
E	2.70	3.00	2.80
E1	1.50	1.70	1.60
L	0.35	0.55	0.40
a	-	-	8°
a1	-	-	7°
All Dimensions in mm			

Suggested Pad Layout

Please see https://www.diodes.com/package-outlines.html for the latest version.

SOT26



Dimensions	Value (in mm)
C	2.40
C1	0.95
G	1.60
X	0.55
Y	0.80
Y1	3.20

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