

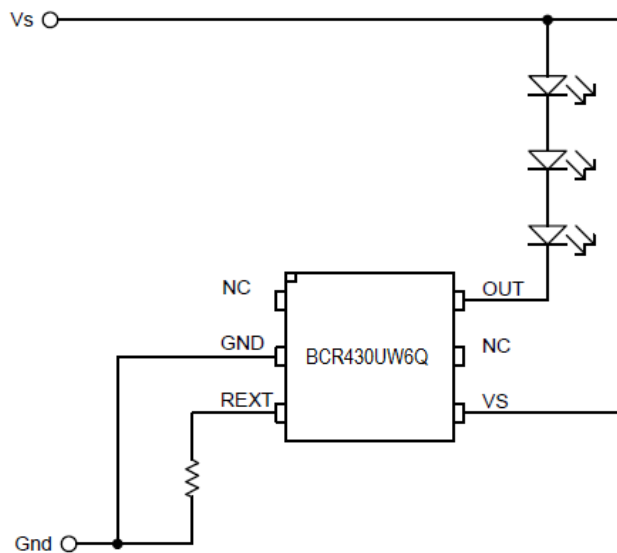
Description

This linear LED driver is designed to meet the stringent requirements of automotive applications.

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

- Automotive Lighting




Typical Configuration

Features

- LED Current Tolerance of $\pm 5\%$ 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 Capacitor is 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)**
- The BCR430UW6Q is suitable for automotive applications requiring specific change control; this part is AEC-Q100 qualified, PPAP capable, and manufactured in IATF16949 certified facilities.**

<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 
- Weight: 0.018 grams (Approximate)



SOT26

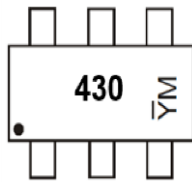
Ordering Information (Note 4)

Part Number	Compliance	Marking	Reel Size (inches)	Tape Width (mm)	Quantity per Reel
BCR430UW6Q-7	Automotive	430	7	8	3,000

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

Marking Information

SOT26



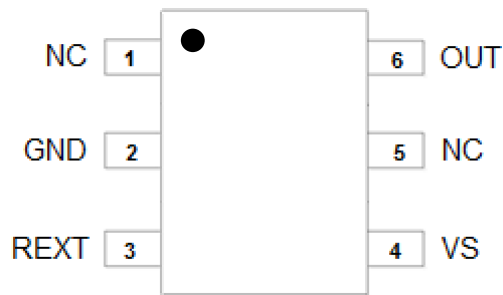
430 = Part Marking (See Ordering Information)
 YM = Date Code Marking
 Y = Year (ex: 1 = 2021)
 M = Month (ex: 9 = September)

Date Code Key

Year	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Code	H	I	J	K	L	M	N	O	P	R	S	T

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

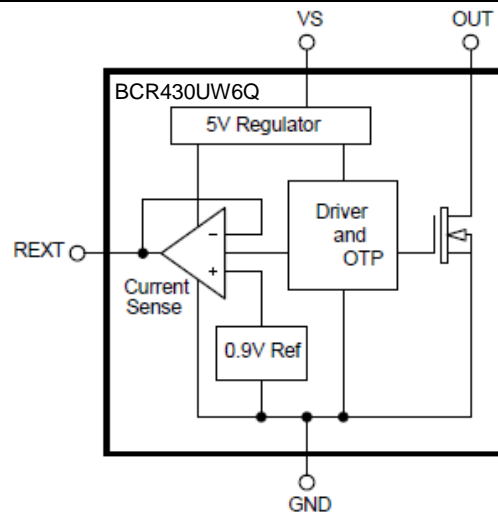


Top View: SOT26

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



Absolute Maximum Ratings (Voltage relative to GND, @ $T_A = +25^\circ\text{C}$, 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 6)	I_{OUT}	5	100	mA
Ambient Temperature Range (Notes 5 & 6)	T_A	-40	+125	$^\circ\text{C}$
Normal Operation Junction Temperature Range (Note 7)	T_J	-40	+125	$^\circ\text{C}$

Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

Characteristic	Symbol	Value	Unit
Power Dissipation	(Note 7)	735	mW
	(Note 8)	793	
Thermal Resistance, Junction to Ambient	(Note 7)	136	$^\circ\text{C/W}$
	(Note 8)	126	
Thermal Resistance, Junction to Lead	(Note 9)	88.5	
Operating Junction Temperature	T_J	-40 to +125	$^\circ\text{C}$
Recommended Storage Temperature	T_S	-55 to +165	$^\circ\text{C}$

ESD Ratings (Note 10)

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

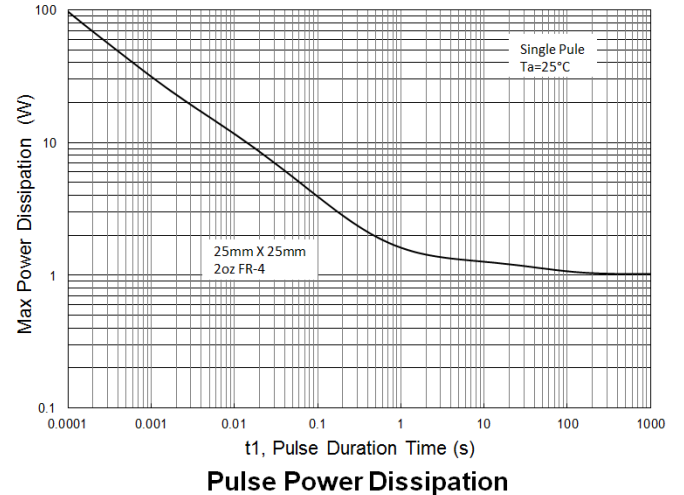
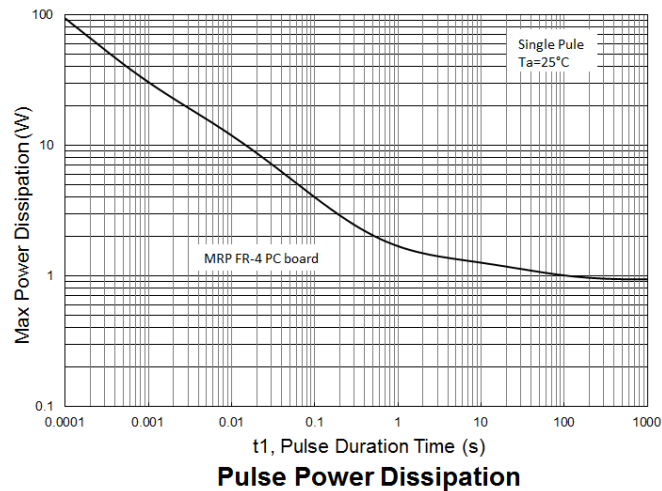
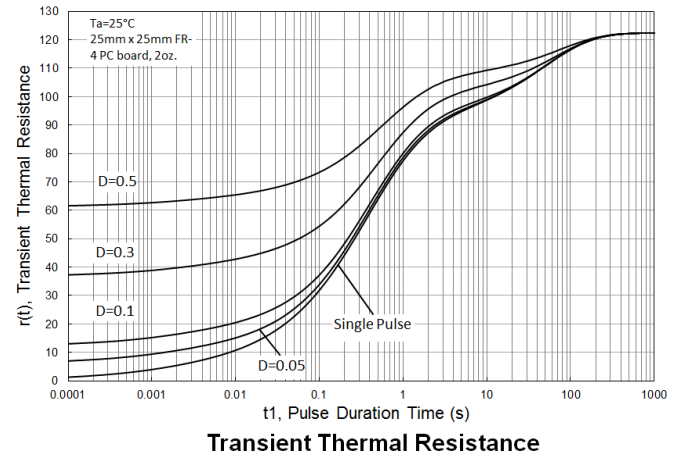
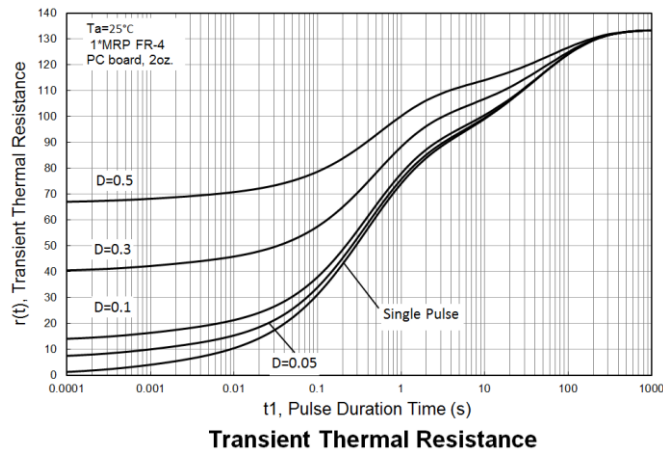
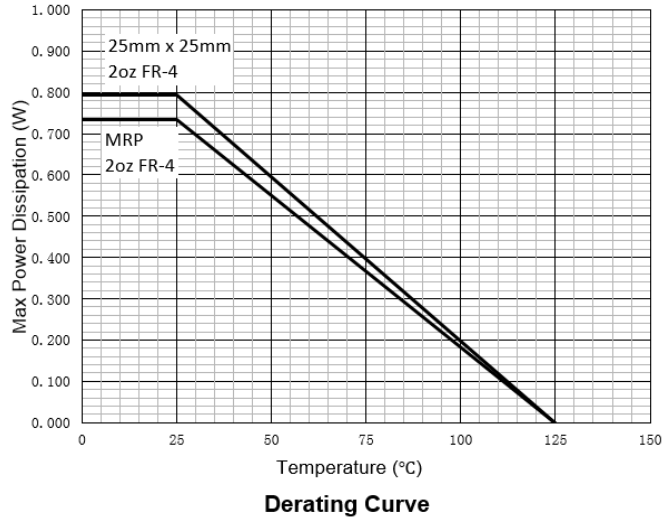
- Notes:
- Subject to the device junction temperature not exceeding the onset point of Over Temperature Protection (OTP) operation. The OTP operation typically starts at $+125^\circ\text{C}$, but can start as low as $+100^\circ\text{C}$ or as high as $+140^\circ\text{C}$.
 - A typical device will operate at its defined output current (set by R_{EXT}) up to a junction temperature of $+125^\circ\text{C}$. However, if the combination of power dissipation and ambient temperature drives T_J above $+125^\circ\text{C}$, the output current will be reduced linearly with temperature, reaching zero output current at $+150^\circ\text{C}$.
 - For a device mounted on MRP FR4-PCB; device is measured under still air conditions whilst operating in a steady-state.
 - Same as Note 7, except the device is mounted on $25\text{mm} \times 25\text{mm}$ 2oz copper.
 - $R_{\theta JL}$ = Thermal resistance from junction to solder-point (at the end of the OUT leads).
 - Refer to JEDEC specification JESD22-A114 and JESD22-A115.

Electrical Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

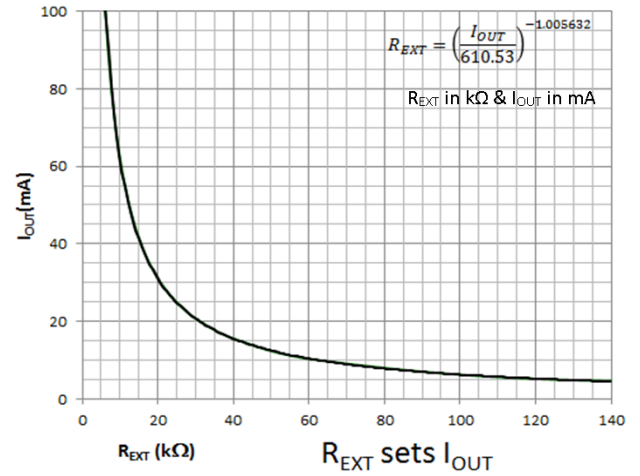
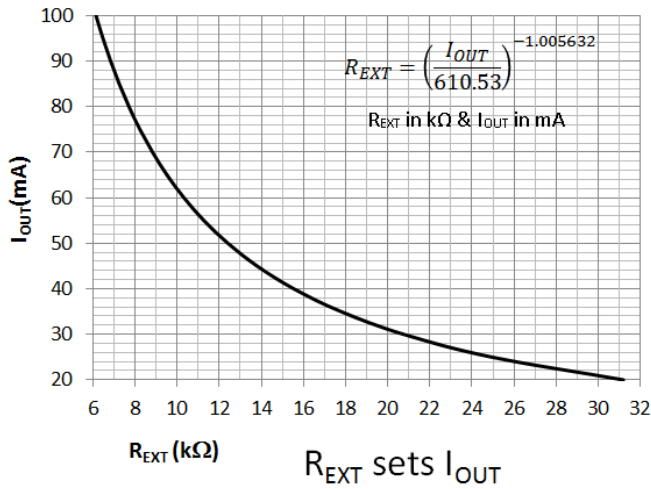
Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Supply Voltage	V_S	5	—	42	V	—
Supply Current (Note 11)	I_S	180	261	400	μA	$I_{OUT} = 50\text{mA}$, $V_S = 5\text{V}$
		—	285	500	μA	$I_{OUT} = 50\text{mA}$, $V_S = 42\text{V}$
Quiescent Current	I_Q	40	67	100	μA	$V_S = 42\text{V}$; $R_{EXT} = \text{open}$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

Notes: 11. Measured under pulsed conditions. Pulse width $\leq 300\mu\text{s}$. Duty cycle $\leq 2\%$.
12. Thermal Knee Junction Temperature is defined as the asymptotic intersection of the $+25^\circ\text{C}$ temperature I_{OUT} current and the I_{OUT} current in over-temperature protection mode.

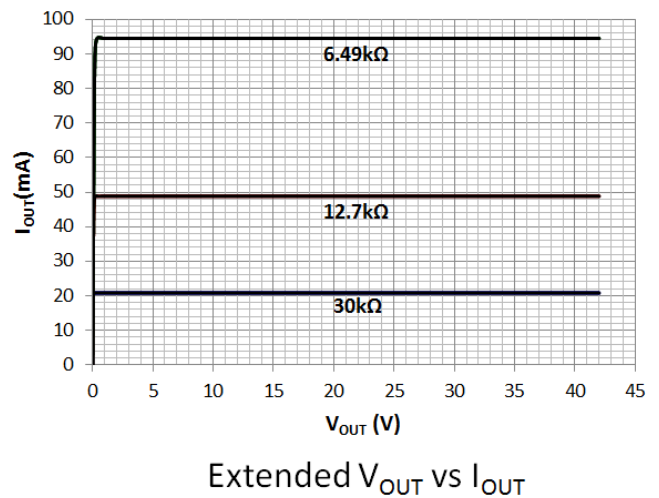
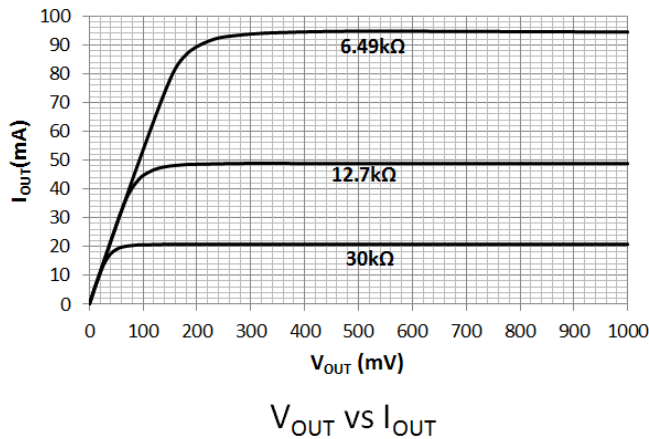
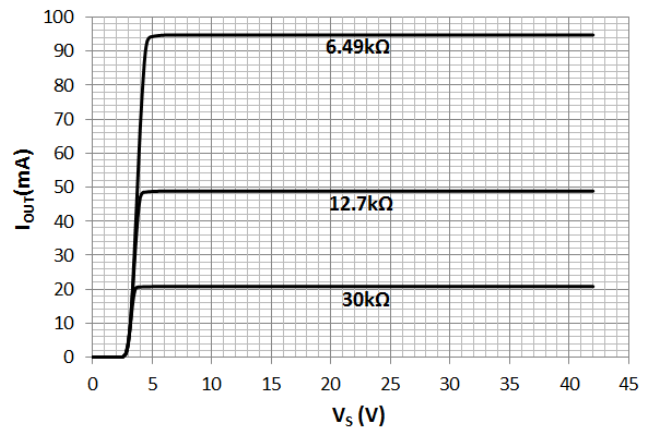
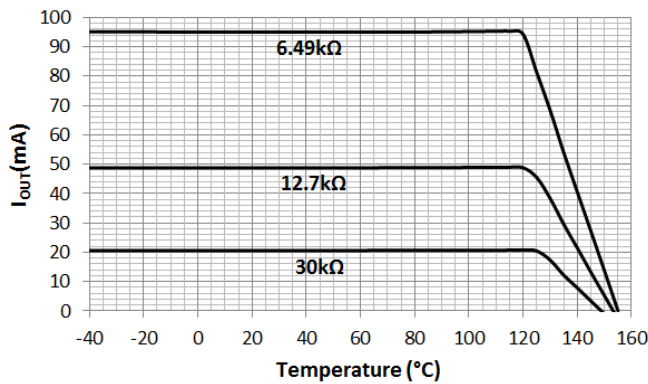
Typical Thermal Characteristics (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)



Typical Electrical Characteristics (continued) (@ $T_A = +25^\circ\text{C}$, unless otherwise specified.)

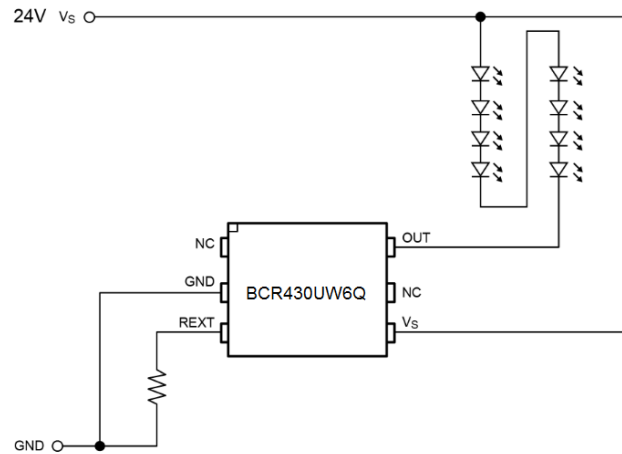


The LED current is set according to the resistor value which is connected to the REXT pin.



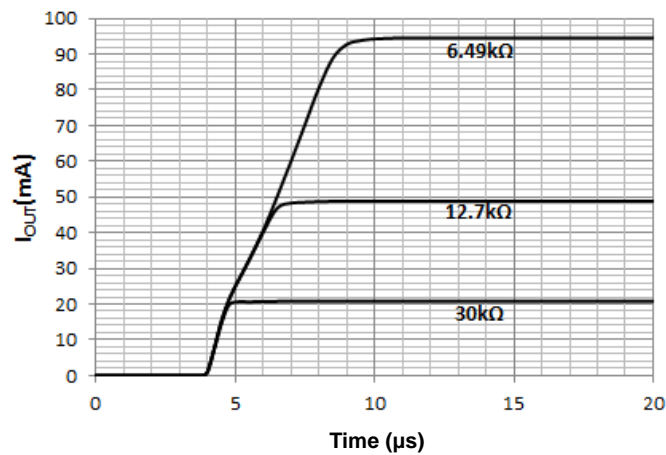
Application Information

Typical Application Circuit

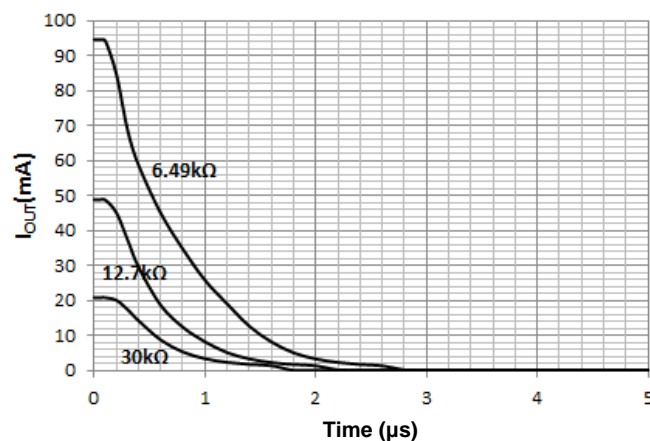


No external capacitor is required for stable operation. Suitable for dimming with VS or REXT pin modulation.

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



For $R_{EXT} = 6.49k\Omega$, $t_R = 14\mu s$ at $-40^\circ C$, $9\mu s$ at $+25^\circ C$ and $7\mu s$ at $+110^\circ C$.
Rise time does not change significantly with LED loads (delay increases by less than $2\mu s$).

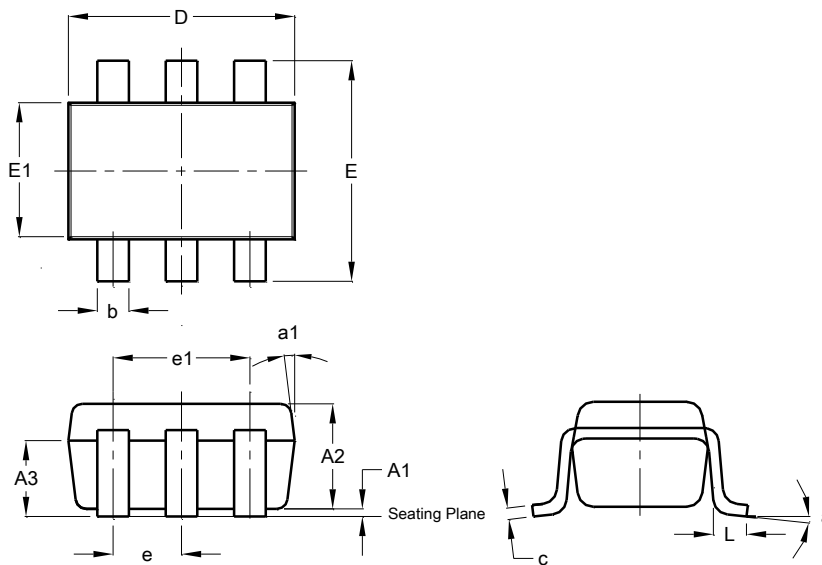


Fall time is independent of temperature.
Fall time does not change significantly with LED loads.

Package Outline Dimensions

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

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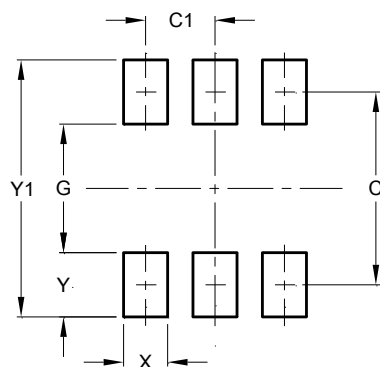


SOT26			
Dim	Min	Max	Typ
A1	0.013	0.10	0.05
A2	1.00	1.30	1.10
A3	0.70	0.80	0.75
b	0.35	0.50	0.38
c	0.10	0.20	0.15
D	2.90	3.10	3.00
e	-	-	0.95
e1	-	-	1.90
E	2.70	3.00	2.80
E1	1.50	1.70	1.60
L	0.35	0.55	0.40
a	-	-	8°
a1	-	-	7°
All Dimensions in mm			

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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