50 to 100mA LED CONSTANT CURRENT REGULATOR in SOT26

Description

The BCR405UW6 monolithically integrates a transistor, diodes and resistors to function as a Constant Current Regulator (CCR) for LED driving. The device regulates with a preset 50mA nominal that can be adjusted with external resistor up to 100mA. It is designed for driving LEDs in strings and will reduce current at increasing temperatures to self-protect. Operating as a series linear CCR for LED string current control then it can be used in applications with supply voltages up to 40V.

With no need for additional external components, this CCR is fully integrated into a SOT26 minimizing PCB area and component count.

Features

- LED Constant Current Regulator Using PNP Emitter-Follower with Emitter Resistor to Current Limit
- I_{OUT} = 50mA ± 10% constant current (Preset)
- I_{OUT} up to 100mA adjustable with an external resistor
- Negative temperature coefficient (NTC) reduces Iout with increasing temperature
- Parallel devices to increase regulated current
- **Totally Lead-Free & Fully RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Applications

Constant current regulation (CCR) in:

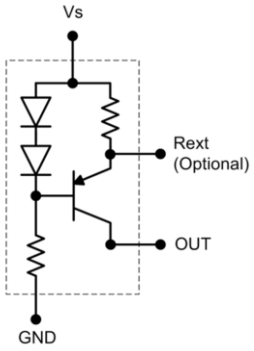
- Emergency lighting
- Signage, advertising, decorative and architectural lighting
- Retail lighting in fridge, freezer case and vending machines

Mechanical Data

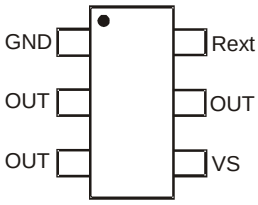
- Case: SOT26 (SC-74)
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Rating 94V-0
- Moisture Sensitivity: Level 1 per J-STD-020
- Terminals: Finish - Matte Tin Plated Leads, Solderable per MIL-STD-202, Method 208 e3
- Weight: 0.018 grams (Approximate)

SOT26 (SC-74)

Top View



Internal Device Schematic



Top View
Pin-Out

Pin Name	Pin Function
Vs	Supply Voltage
OUT	Regulated Output Current
Rext	External resistor for adjusting Output Current
GND	Power Ground

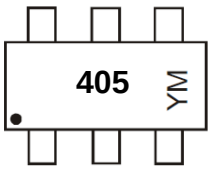
Ordering Information (Note 4)

Product	Marking	Reel size (inches)	Tape width (mm)	Quantity per reel
BCR405UW6-7	405	7	8	3,000

Notes:
1. No purposely added lead. Fully EU Directive 2002/95/EC (RoHS) & 2011/65/EU (RoHS 2) compliant.
2. See http://www.diodes.com/quality/lead_free.html 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 http://www.diodes.com/products/packages.html.

Marking Information

SOT26 (SC-74)



405 = Part Marking (See Ordering Information)
YM = Date Code Marking
Y = Year (ex: D = 2016)
M = Month (ex: 9 = September)

Date Code Key

Year	2016	2017	2018	2019	2020	2021	2022
Code	D	E	F	G	H	I	J

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

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

Characteristic	Symbol	Value	Unit
Supply Voltage	V_S	40	V
Output Current	I_{OUT}	100	mA
Output Voltage	V_{OUT}	40	V
Reverse voltage between all terminals	V_R	0.5	V

Thermal Characteristics

Characteristic		Symbol	Value	Unit
Power Dissipation	(Note 5)	P_D	1,190	mW
	(Note 6)		912	
Thermal Resistance, Junction to Ambient	(Note 5)	$R_{\theta JA}$	105	°C/W
	(Note 6)		137	
Thermal Resistance, Junction to Lead	(Note 7)	$R_{\theta JL}$	50	
Recommended Operating Junction Temperature Range		T_J	-55 to +150	°C
Maximum Operating Junction and Storage Temperature Range		T_J , T_{STG}	-65 to +150	

ESD Ratings (Note 8)

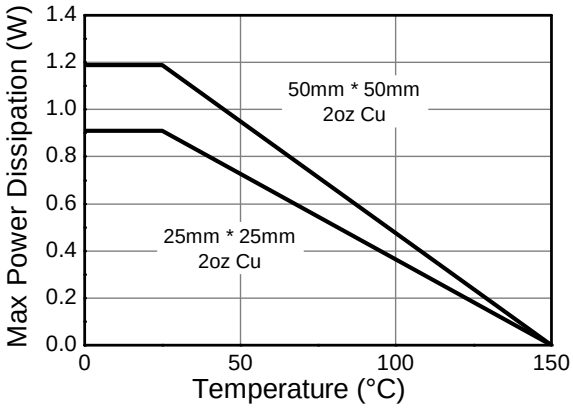
Characteristics	Symbols	Value	Unit	JEDEC Class
Electrostatic Discharge – Human Body Model	ESD HBM	800	V	1B
Electrostatic Discharge – Machine Model	ESD MM	300	V	B

Notes:
5. For a device mounted with the OUT leads on 50mm x 50mm 2oz copper that is on a single-sided 1.6mm FR4 PCB; device is measured under still air conditions while operating in steady-state.
6. Same as Note 5, except mounted on 15mm x 15mm 1oz copper.
7. $R_{\theta JL}$ = Thermal resistance from junction to solder-point (at the end of the OUT leads).
8. Refer to JEDEC specification JESD22-A114 and JESD22-A115.

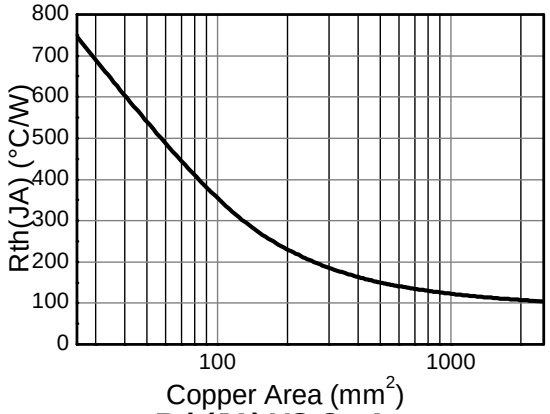
Electrical Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic	Symbol	Min	Typ	Max	Unit	Test Condition
Collector-Emitter Breakdown Voltage	BV_{CEO}	40	-	-	V	I_C = 1mA
GND (Enable) Current	I_{GND}	340	420	500	µA	V_S = 10V; V_{OUT} = open
GND (Enable) Current	I_{GND}	-	380	-	µA	V_S = 10V; V_{OUT} = 8.6V
DC Current Gain	h_{FE}	100	220	470	-	I_C = 50mA; V_{CE} = 1V
Internal Resistor	R_{int}	13	16.5	22	Ω	I_{Rint} = 50mA
Output Current (nominal)	I_{OUT}	45	50	55	mA	V_{out} = 8.6V; V_S = 10V
Voltage Drop (V_{Rext})	V_{drop}	-	0.83	-	V	I_{OUT} = 50mA
Lowest Sufficient Supply Voltage (V_S-V_{OUT})	V_{Smin}	-	1.4	-	V	I_{OUT} > 18mA
Output Current Change vs. Temperature	$\Delta I_{OUT}/I_{OUT}$	-	-0.25	-	%/°C	V_S = 10V
Output Current Change vs. Supply Voltage	$\Delta I_{OUT}/I_{OUT}$	-	1.5	-	%/V	V_S = 10V

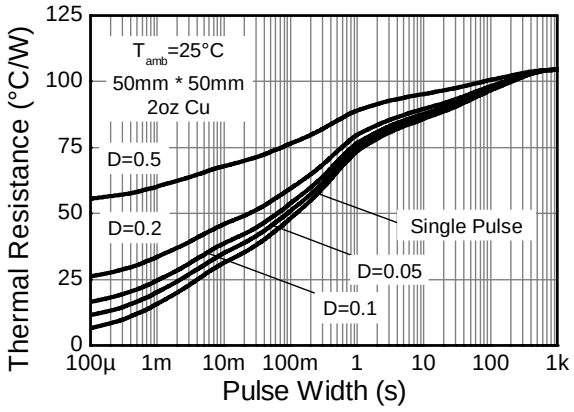
Typical Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)



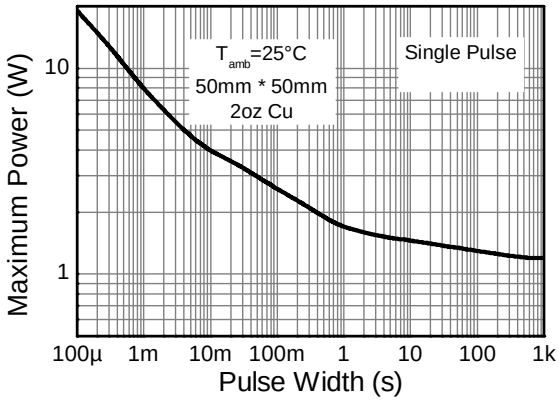
Derating Curve



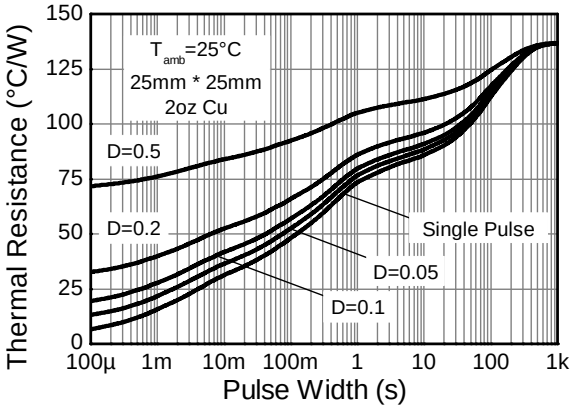
Rth(JA) VS Cu Area



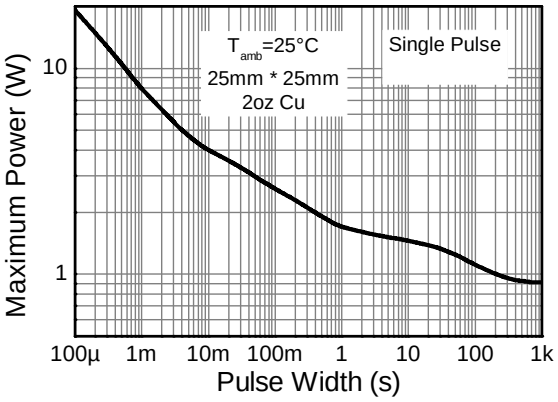
Transient Thermal Impedance



Pulse Power Dissipation

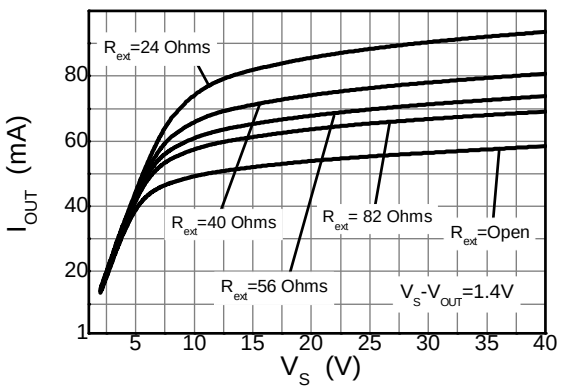


Transient Thermal Impedance

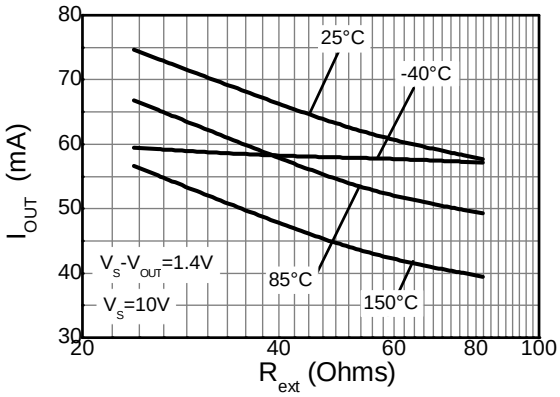


Pulse Power Dissipation

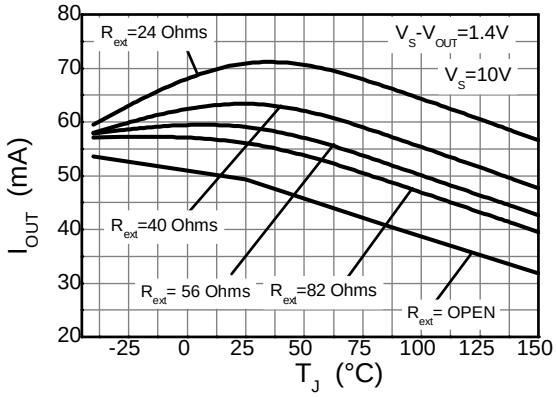
Typical Electrical Characteristics (continued) (@T_A = +25°C, unless otherwise specified.)



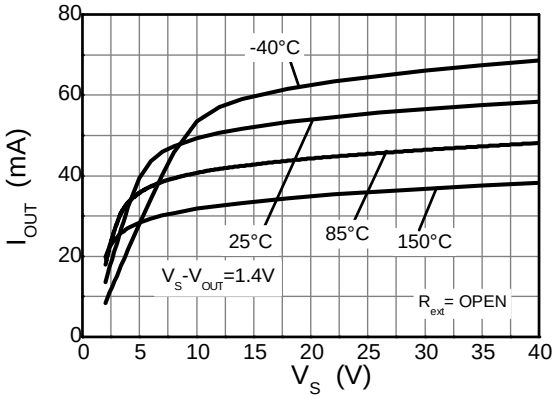
V_S vs I_{OUT}



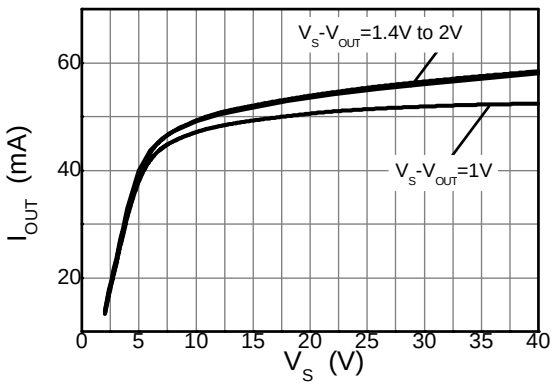
R_{ext} (Ohms)vs I_{OUT}



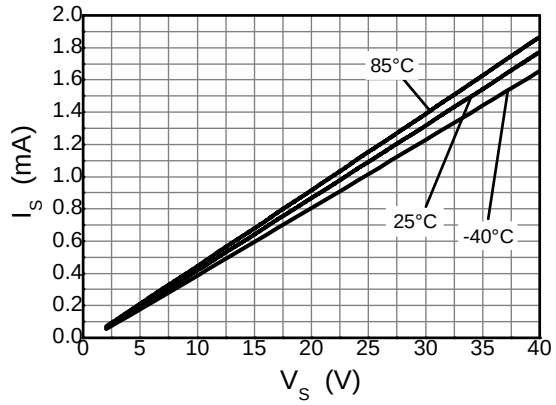
T_J vs I_{OUT}



V_S vs I_{OUT}



V_S vs I_{OUT}

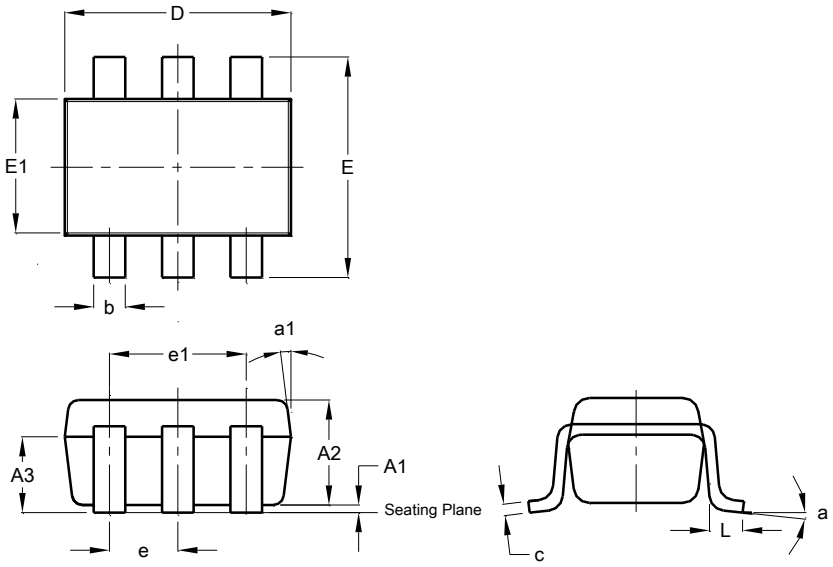


V_S vs I_S

Package Outline Dimensions

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

SOT26 (SC74R)

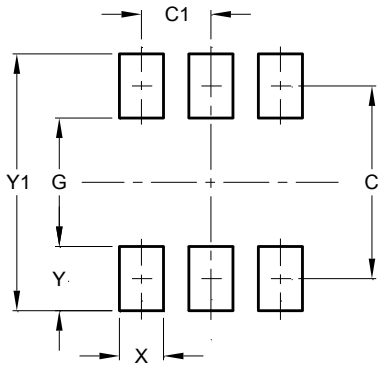


SOT26 (SC74R)			
Dim	**Min**	**Max**	**Typ**
A1	0.013	0.10	0.05
A2	1.00	1.30	1.10
A3	0.70	0.80	0.75
b	0.35	0.50	0.38
c	0.10	0.20	0.15
D	2.90	3.10	3.00
e	-	-	0.95
e1	-	-	1.90
E	2.70	3.00	2.80
E1	1.50	1.70	1.60
L	0.35	0.55	0.40
a	-	-	8°
a1	-	-	7°
All Dimensions in mm			

Suggested Pad Layout

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

SOT26 (SC74R)



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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