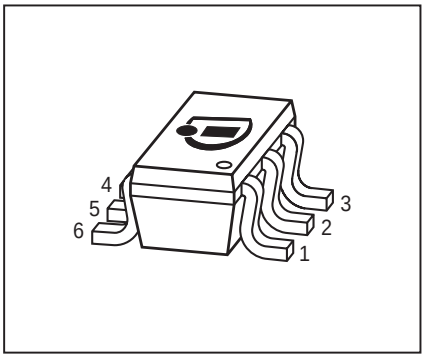
LED Driver



AEC Qualified

RoHS

Features

- Continuous output current up to 150mA with external resistor
- Suitable for supply voltages of 40V and above
- Low side current control, µC compatible PWM input (BCR421U) up to 10kHz
- Up to 1W power dissipation in a small SC74 package
- Negative thermal coefficient reduces output current at higher temperatures
- Easy paralleling of drivers to increase current
- Pb-free (RoHS compliant) package
- Automotive qualified according AEC Q101

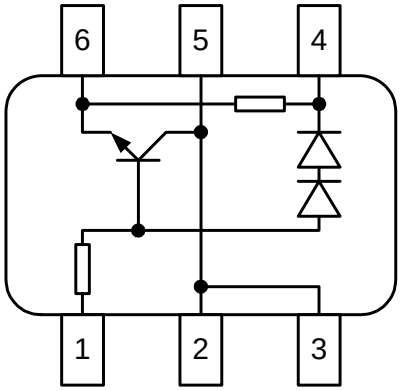
Applications

- Architectural LED lighting
- Channel letters for advertising, LED strips for decorative lighting
- Retail lighting in fridge, freezer case and vending machines
- Emergency lighting (e.g. steps lighting, exit way signs etc.)
- Ship, train and aircraft interior illumination

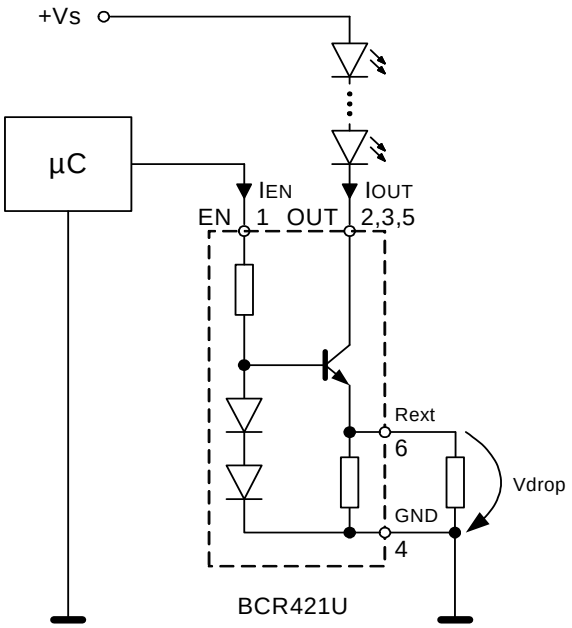
General Description

The BCR420U/BCR421U provide a low-cost solution for driving 0.25W LEDs with a typical LED current ILED of 75mA to 150mA. Internal breakdown voltage is >40V, this is the maximum voltage that the LED driver IC can sustain when connected to it directly.
The BCR420U/BCR421U can be operated at supply voltages of 40V or higher, by simply stacking a series of LEDs in front of the LED drivers, resulting in a certain voltage drop depending on the forward voltages of the LEDs, reducing the voltage at the supply pin of the driver below 40V. A digital input pin (BCR421U) allows dimming via a Microcontroller with frequencies of up to 10 kHz. A reduction of the output current at higher temperatures is the result of the negative thermal coefficient of 0.2% /K. of the LED drivers.
With no need for additional external components like inductors, capacitors and free wheeling diodes, the BCR420U/BCR421U LED drivers are a cost-efficient and PCB-area saving solution for driving 0.25W LEDs.

Pin Configuration



Typical Application



Type	Marking	Pin Configuration				Package
BCR420U	40	1 = EN	2;3;5 =	4 = GND	6 = R_{ext}	SC74
BCR421U	41		OUT			SC74

Maximum Ratings

Parameter	Symbol	Value	Unit
Enable voltage	V_{EN}		V
BCR420U		40	
BCR421U		4.5	
Output current	I_{out}	200	mA
Output voltage	V_{out}	38	V
Reverse voltage between all terminals	V_R	0.5	
Total power dissipation, T_S = 100 °C	P_{tot}	1000	mW
Junction temperature	T_j	150	°C
Storage temperature	T_{stg}	-65 ... 150	

Thermal Resistance

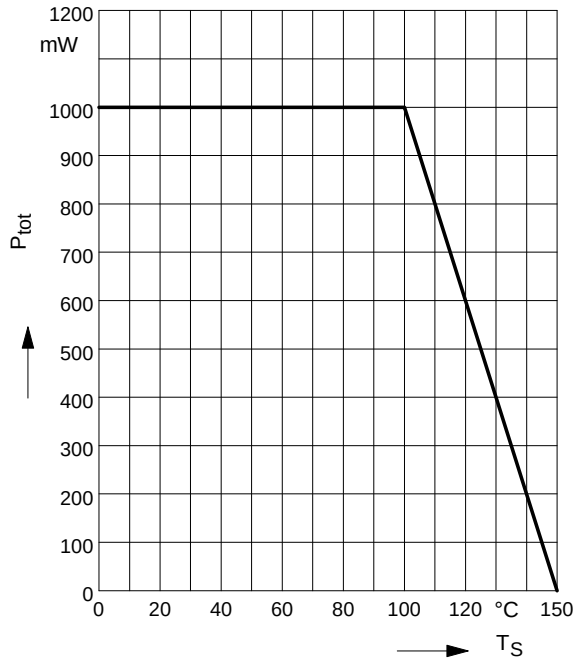
Parameter	Symbol	Value	Unit
Junction - soldering point[1)]	R_{thJS}	50	K/W

[1]For calculation of R_{thJA} please refer to Application Note Thermal Resistance

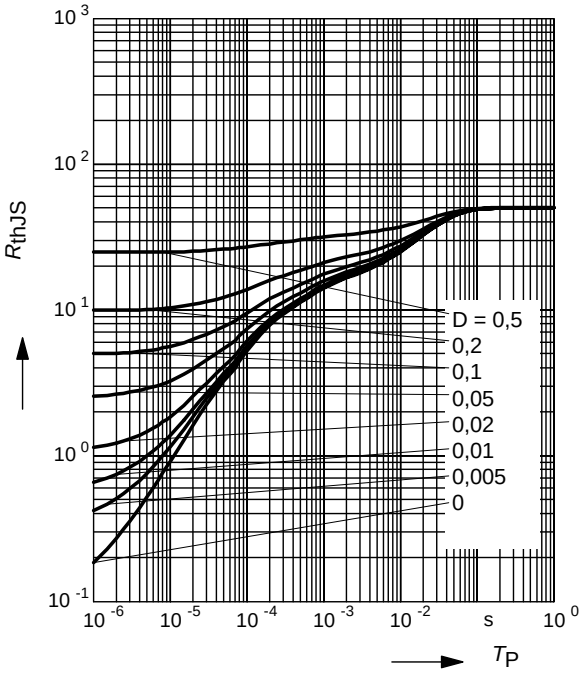
Electrical Characteristics at T_A=25°C, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Characteristics					
Collector-emitter breakdown voltage I_C = 1 mA, I_B = 0	$V_{BR(CEO)}$	40	-	-	V
Enable current	I_{EN}				mA
V_{EN} = 24 V , BCR420U		-	1.2	-	
V_{EN} = 3.3 V , BCR421U		-	1.2	-	
DC current gain I_C = 50 mA, V_{CE} = 1 V	h_{FE}	200	350	500	-
Internal resistor I_{Rint} = 10 mA	R_{int}	65	90	105	Ω
Bias resistor	R_B				kΩ
BCR420U		-	20	-	
BCR421U		-	1.5	-	
Output current	I_{out}				mA
V_{out} = 1.4 V, V_{EN} = 24 V, BCR420U		8	10	12	
V_{out} = 1.4 V, V_{EN} = 3.3 V, BCR421U		8	10	12	
V_{out} > 2.0 V, V_{EN} = 24 V, R_{EXT} = 5.1 Ω, BCR420U		-	150	-	
V_{out} > 2.0 V, V_{EN} = 3.3 V, R_{EXT} = 5.1 Ω, BCR421U		-	150	-	
Voltage drop (V_S - V_E) I_{out} = 10mA	V_{drop}	0.85	0.95	1.05	V
DC Characteristics with stabilized LED load					
Lowest sufficient supply voltage overhead I_{out} > 18mA	V_{Smin}	-	1.4	-	V
Output current change versus T_A	$\Delta I_{out}/I_{out}$				%/K
V_{EN} = 24 V; V_{out} > 2.0 V, BCR420U		-	-0.2	-	
V_{EN} = 3.3 V; V_{out} > 2.0 V, BCR421U		-	-0.2	-	
Output current change versus V_S	$\Delta I_{out}/I_{out}$				%/V
V_{EN} = 24 V; V_{out} > 2.0 V, BCR420U		-	1	-	
V_{EN} = 3.3 V; V_{out} > 2.0 V, BCR421U		-	1	-	

Total power dissipation $P_{tot} = f(T_S)$

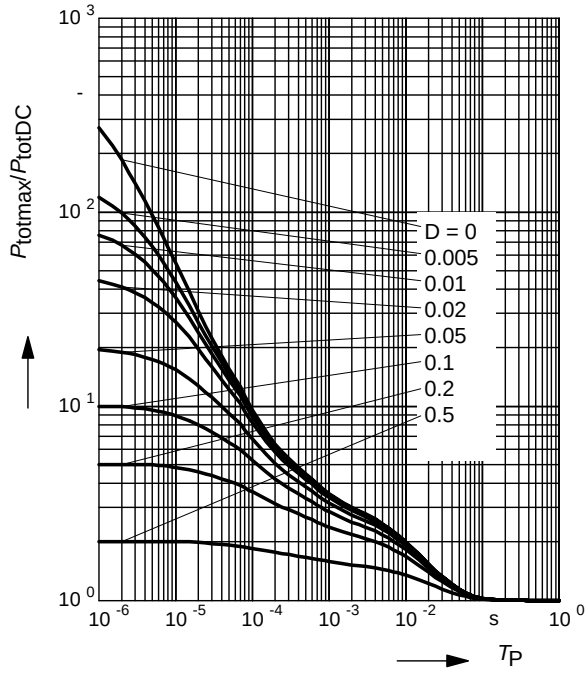


Permissible Pulse Load $R_{thJS} = f(t_p)$



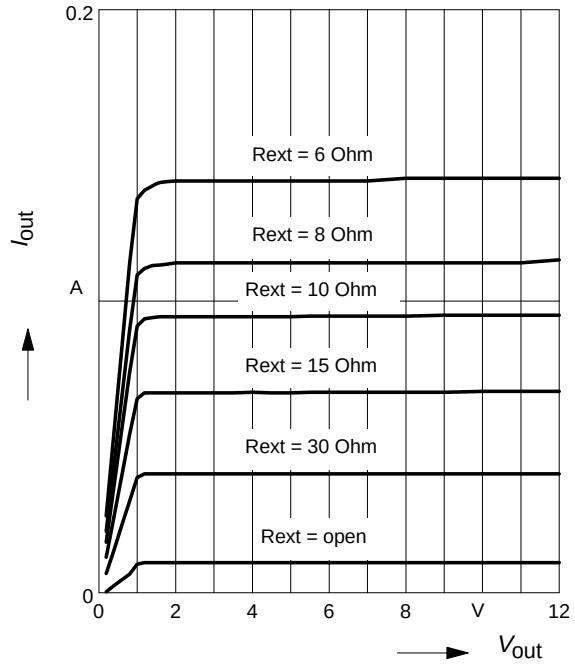
Permissible Pulse Load

$P_{totmax} / P_{totDC} = f(t_p)$



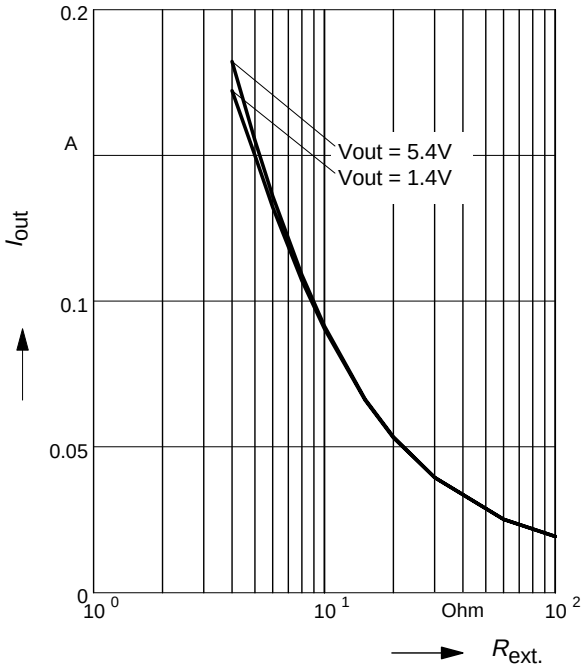
BCR420U: Output current versus V_{out}

$I_{out} = f(V_{out})$; $V_{EN} = 40$ V;
R_{ext} = Parameter



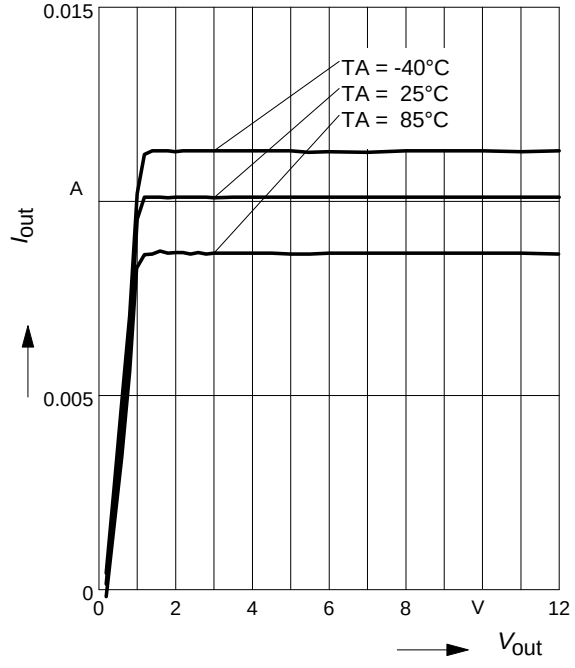
BCR420U: Output current versus R_{ext}

$I_{out} = f(R_{ext})$; $V_{EN} = 24$ V; $I_{out} = 0$;
V_{out} = Parameter



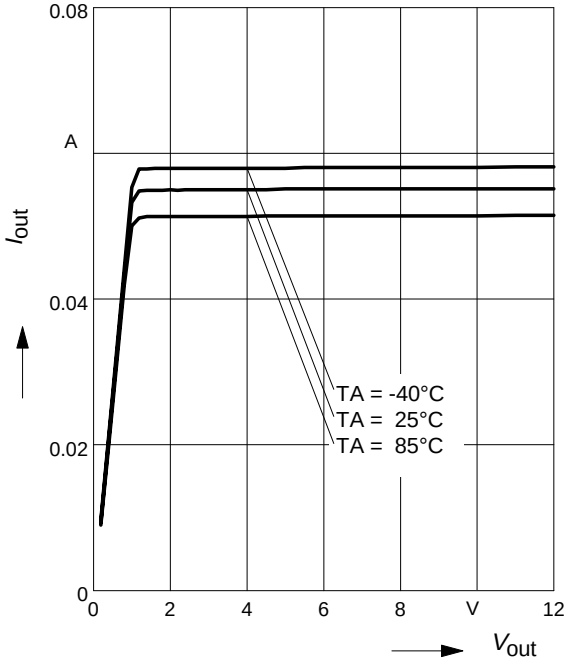
BCR420U: Output current versus V_{out}

$I_{out} = f(V_S)$; $V_{EN} = 40$ V; R_{ext} = open;
T_A= Parameter



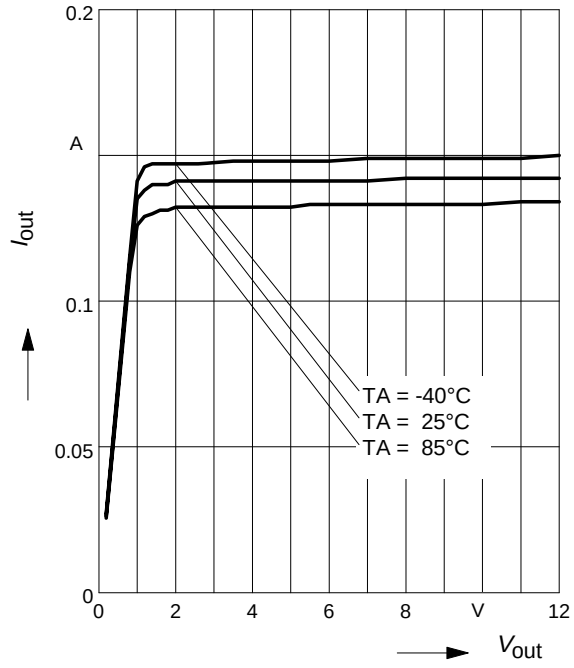
BCR320U: Output current versus V_{out}

$I_{out} = f(V_S)$; $V_{EN} = 40$ V; $R_{ext} = 20$ Ohm;
T_A= Parameter



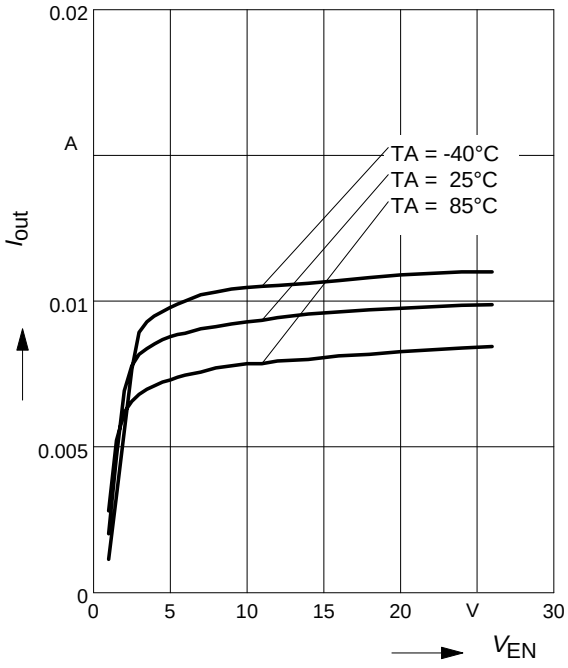
BCR420U: Output current versus V_{out}

$I_{out} = f(V_S)$; V_{EN} = 40 V; R_{ext} = 6 Ohm;
T_A= Parameter



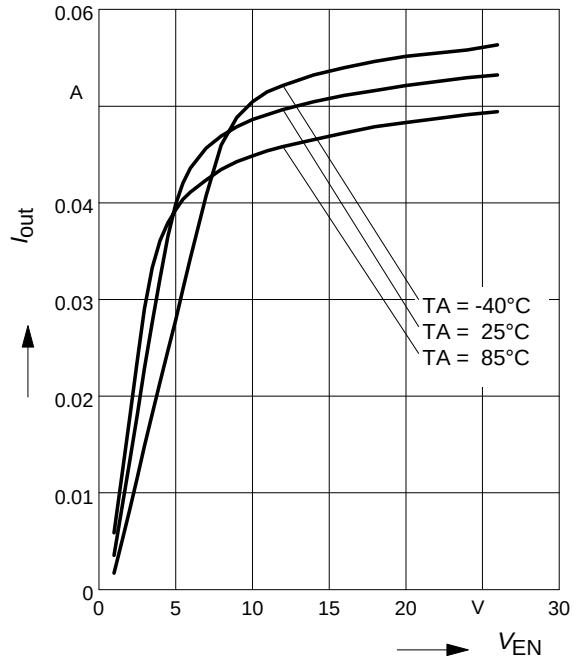
BCR420U: Output current versus V_{EN}

$I_{out} = f(V_{EN})$; V_{out} = 2.0 V; R_{ext} = open;
T_A = Parameter



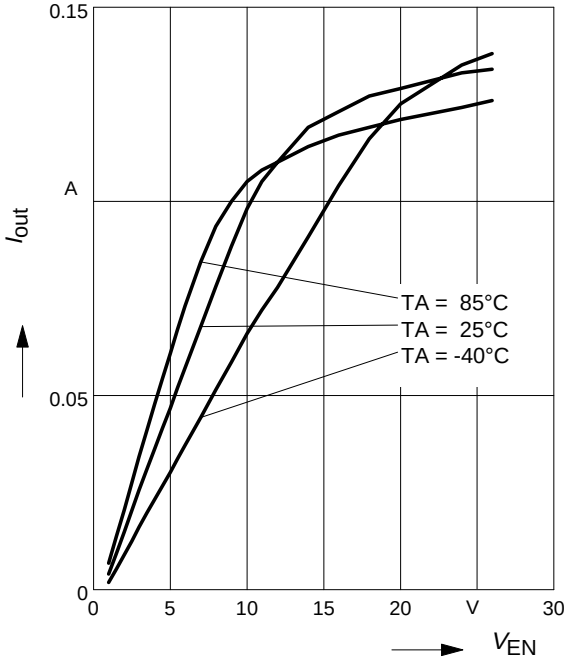
BCR420U: Output current versus V_{EN}

$I_{out} = f(V_{EN})$; V_{out} = 2.0 V; R_{ext} = 20 Ohm;
T_A = Parameter



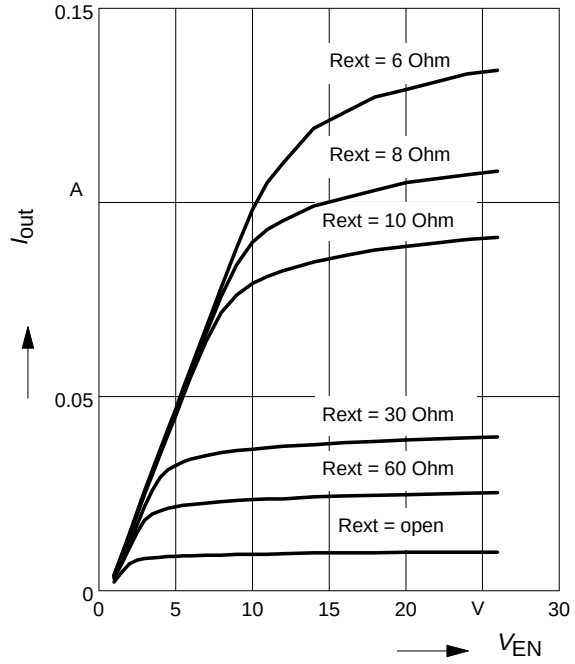
BCR420U: Output current versus V_{EN}

$I_{out} = f(V_{EN})$; V_{out} = 2.0 V; R_{ext} = 6 Ohm;
T_A = Parameter



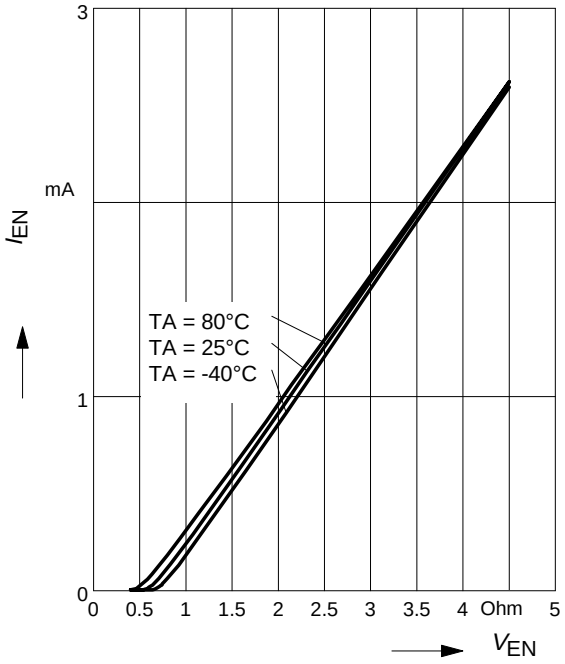
BCR420U: Output current versus V_{EN}

I_{out} = $f(V_{EN})$; V_{out} = 2.0 V;
R_{ext} = Parameter



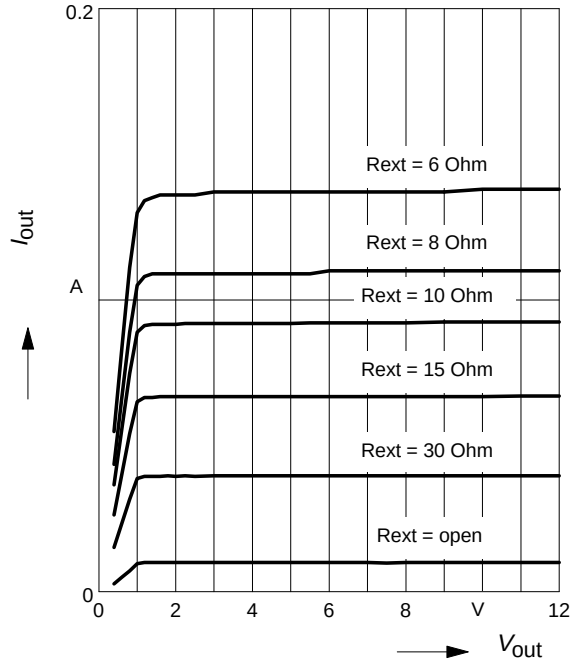
BCR420U: Enable current versus V_{EN}

I_{EN} = $f(V_{EN})$; R_{ext} = open; I_{out} = 0;
T_A = Parameter



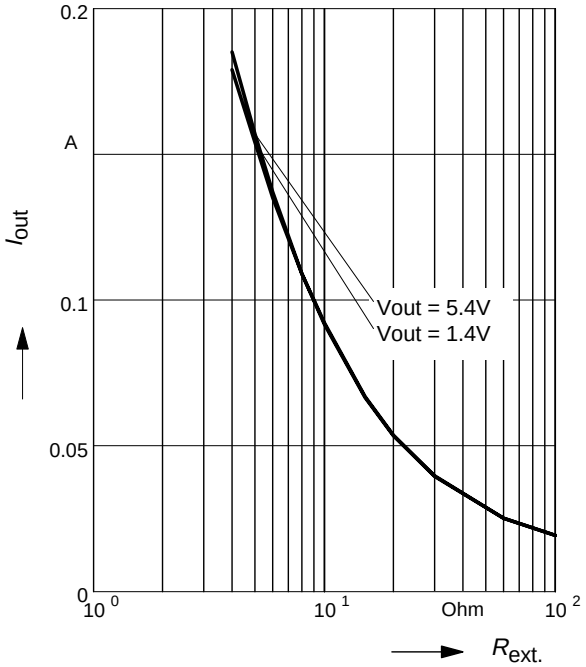
BCR421U: Output current versus V_{out}

I_{out} = $f(V_{out})$; V_{EN} = 3.3 V;
R_{ext} = Parameter



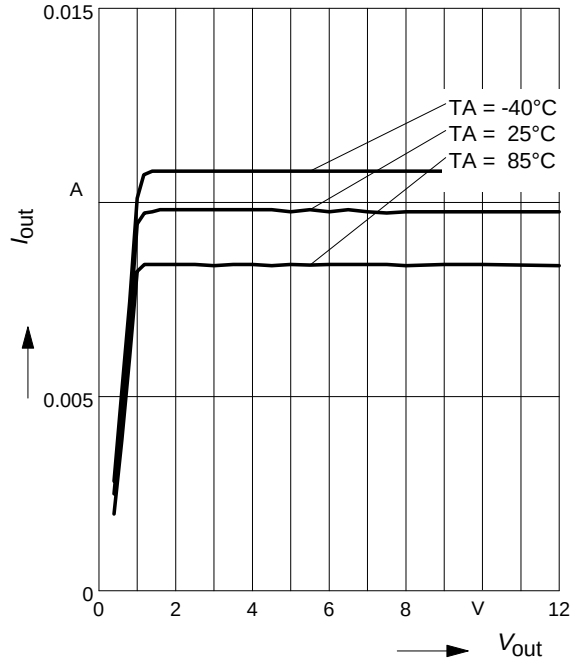
BCR421U: Output current versus R_{ext}

I_{out} = $f(R_{ext})$; V_{EN} = 3.3 V;
V_{out} = Parameter



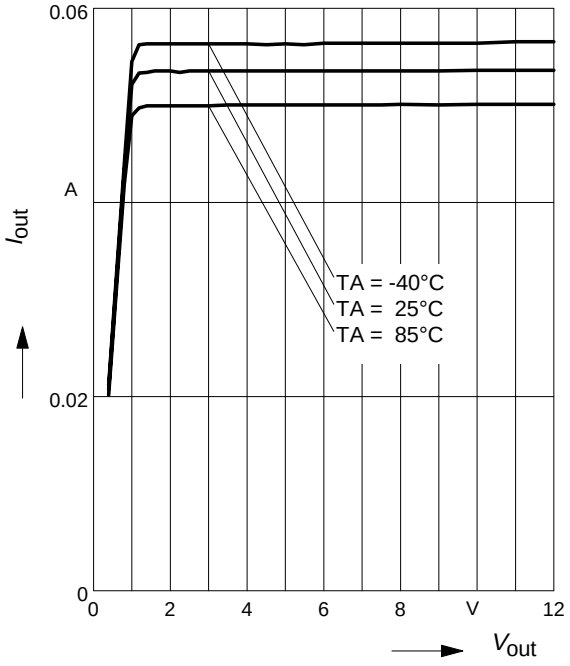
BCR421U: Output current versus V_{out}

$I_{out} = f(V_S)$; $V_{EN} = 3.3$ V; R_{ext} = open;
T_A= Parameter



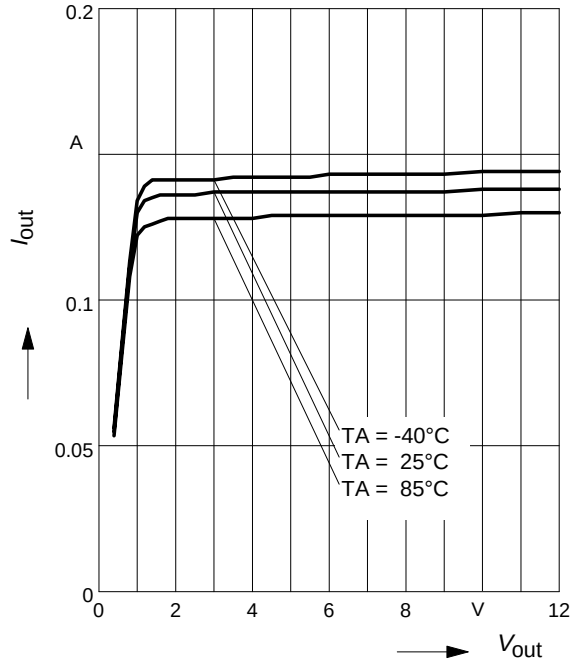
BCR421U: Output current versus V_{out}

$I_{out} = f(V_S)$; $V_{EN} = 3.3$ V; $R_{ext} = 20$ Ohm;
T_A= Parameter



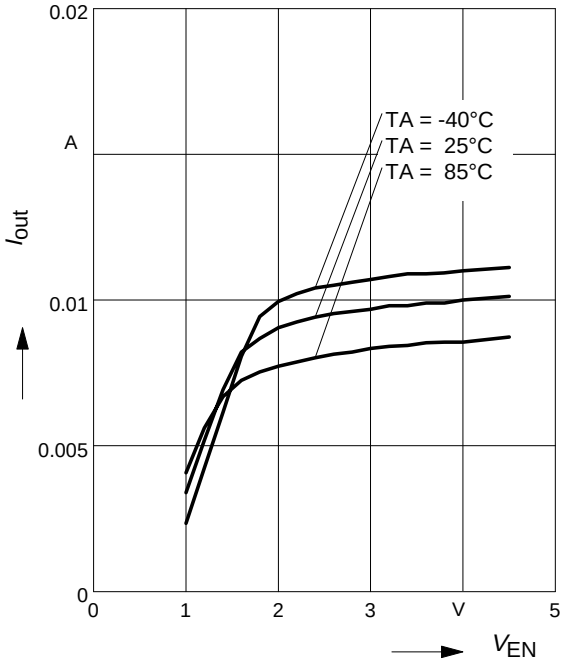
BCR421U: Output current versus V_{out}

$I_{out} = f(V_S)$; $V_{EN} = 3.3$ V; $R_{ext} = 6$ Ohm;
T_A= Parameter



BCR421U: Output current versus V_{EN}

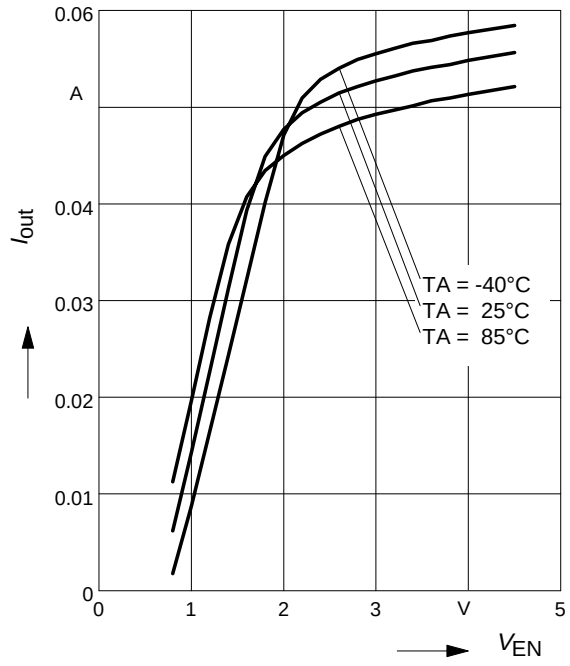
$I_{out} = f(V_{EN})$; $V_{out} = 2.0$ V; R_{ext} = open
T_A = Parameter



BCR421U: Output current versus V_{EN}

$I_{out} = f(V_{EN})$; V_{out} = 2.0 V; R_{ext} = 20 Ohm

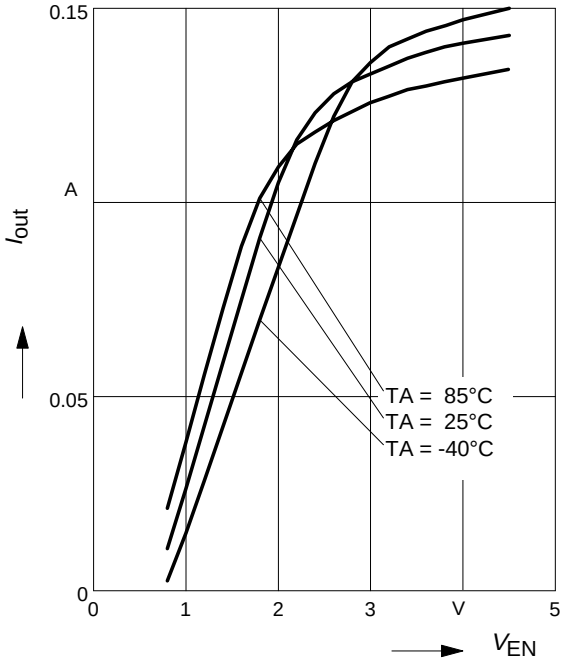
T_A = Parameter



BCR421U: Output current versus V_{EN}

$I_{out} = f(V_{EN})$; V_{out} = 2.0 V; R_{ext} = 6 Ohm

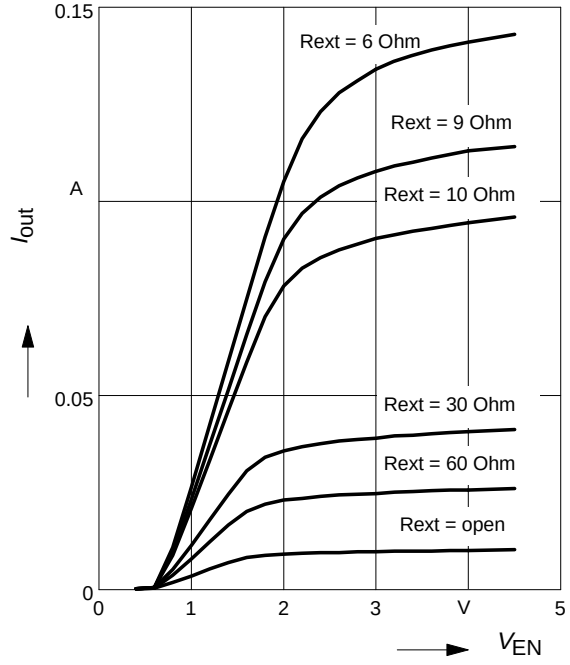
T_A = Parameter



BCR421U: Output current versus V_{EN}

$I_{out} = f(V_{EN})$; V_S = 3.3 V;

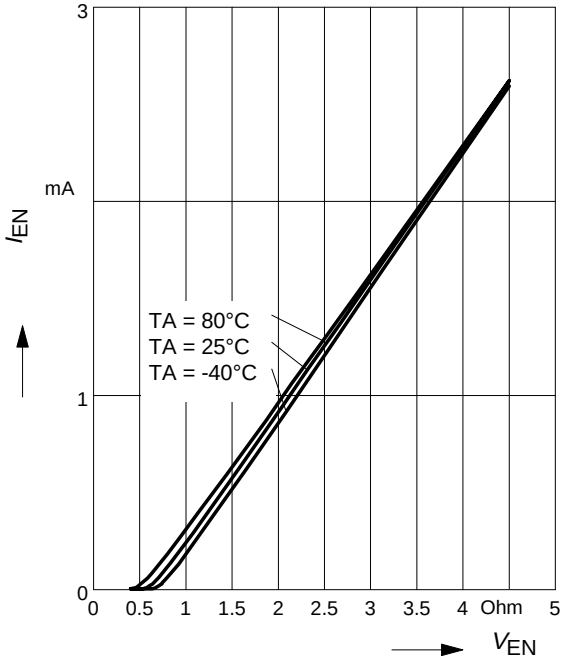
R_{ext} = Parameter



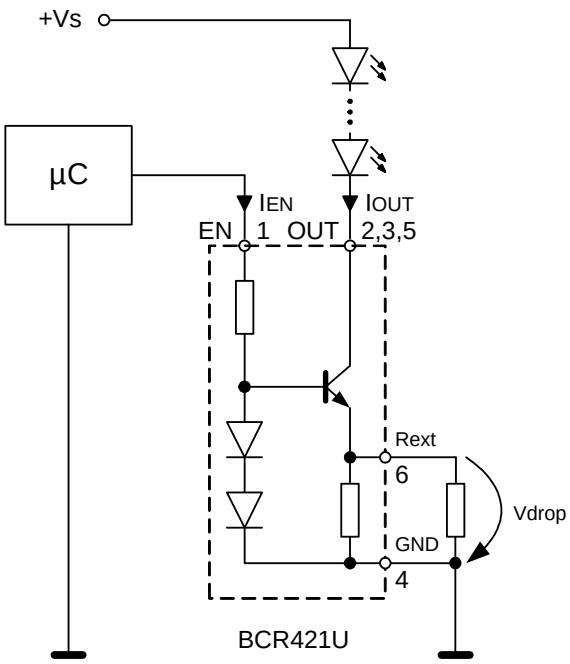
BCR421U: Enable current versus V_{EN}

$I_{EN} = f(V_{EN})$; R_{ext} = open; I_{out} = 0

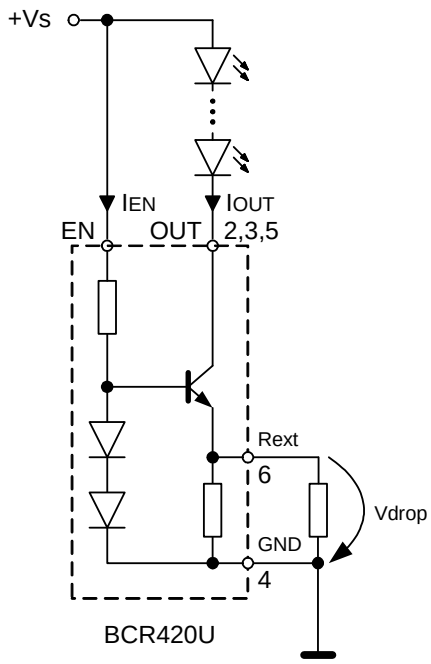
T_A = Parameter



Application circuit:
Enabling / PWM by micro controller



Application circuit:
Enabling by connecting to Vs

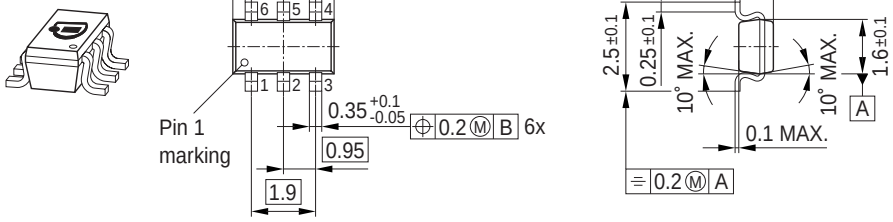


Application hints

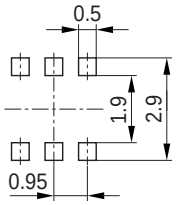
BCR420U / BCR421U serve as an easy to use constant current sources for LEDs.
In stand alone application an external resistor can be connected to adjust the current from 10 mA to 150 mA. R_{ext} can be determined by using the diagram 'Output current versus external resistor'. Please take into account that the resulting output currents will be slightly lower due to the self heating of the component and the negative thermal coefficient.

Please visit our web site for application notes: www.infineon.com/lowcostleddriver
for up-to-date application information

Package Outline

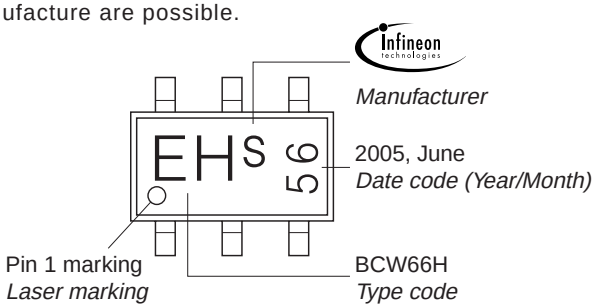


Foot Print



Marking Layout (Example)

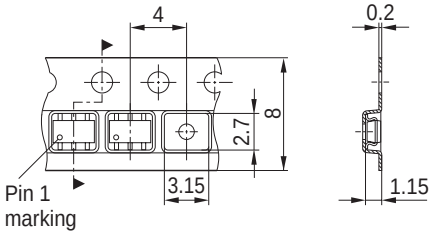
Small variations in positioning of
Date code, Type code and Manufacture are possible.



Standard Packing

Reel ø180 mm = 3.000 Pieces/Reel
Reel ø330 mm = 10.000 Pieces/Reel

For symmetric types no defined Pin 1 orientation in reel.



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