

LED Driver

Features

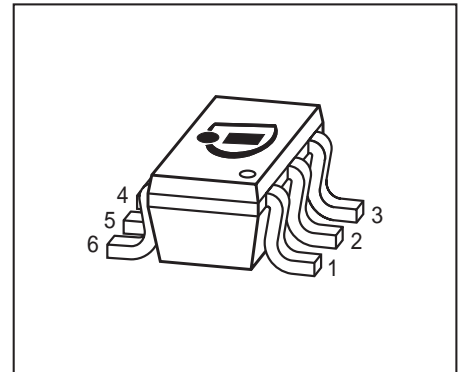
- Continuous output current up to 150mA with external resistor
- Suitable for supply voltages of 40V and above
- Low side current control, μC compatible PWM input (BCR421U) up to 10kHz
- Up to 1W power dissipation in a small SC74 package
- Negative thermal coefficient reduces output current at higher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

Applications

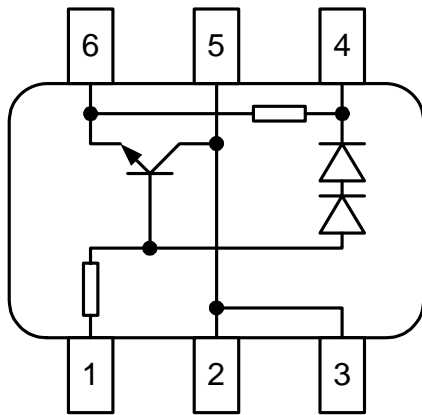
- Architectural LED lighting
- Channel letters for advertising, LED strips for decorative lighting
- Retail lighting in fridge, freezer case and vending machines
- Emergency lighting (e.g. steps lighting, exit way signs etc.)
- Ship, train and aircraft interior illumination

General Description

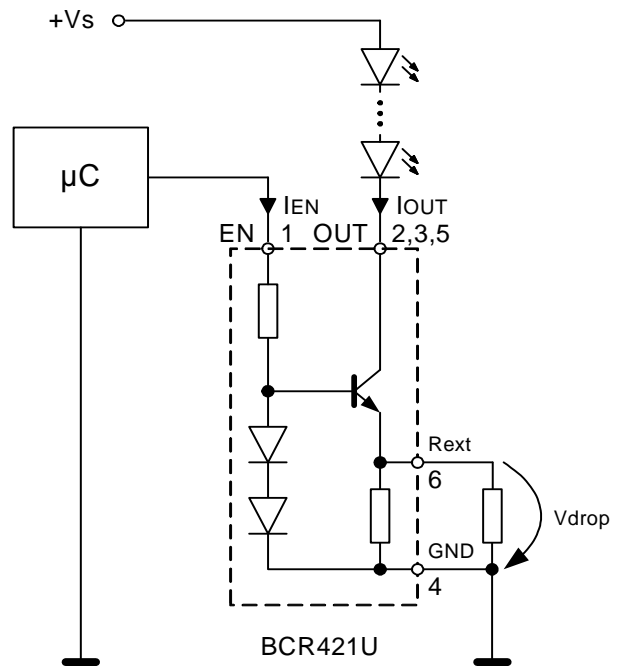
The BCR420U/BCR421U provide a low-cost solution for driving 0.25W LEDs with a typical LED current I_{LED} of 75mA to 150mA. Internal breakdown voltage is $>40\text{V}$, this is the maximum voltage that the LED driver IC can sustain when connected to it directly. The BCR420U/BCR421U can be operated at 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

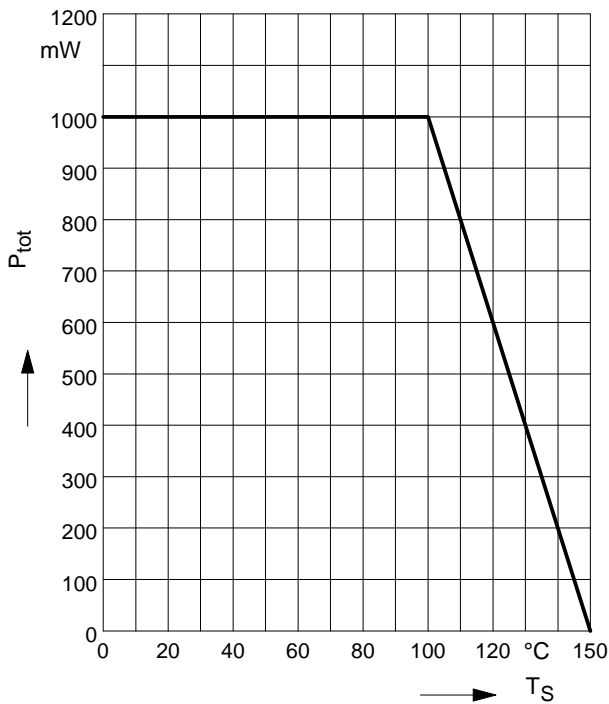
Parameter	Symbol	Value	Unit
Junction - soldering point ¹⁾	R _{thJS}	50	K/W

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

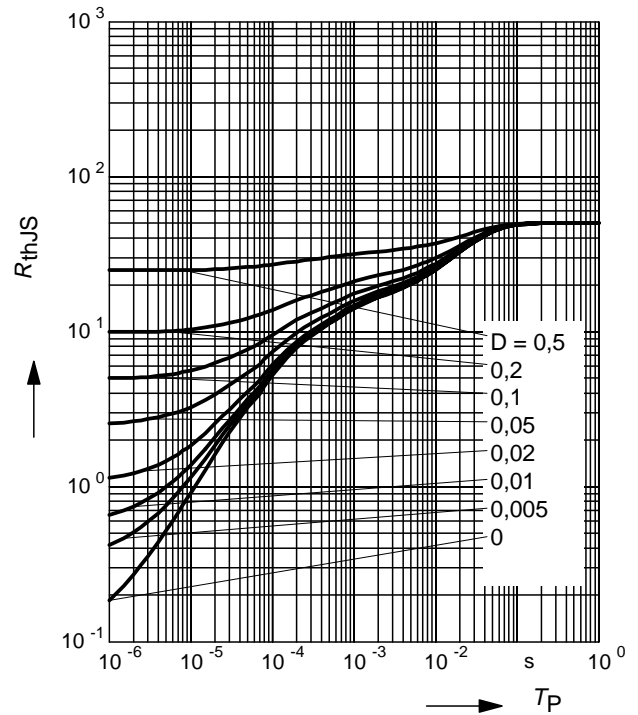
Electrical Characteristics at $T_A=25^\circ\text{C}$, unless otherwise specified

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

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

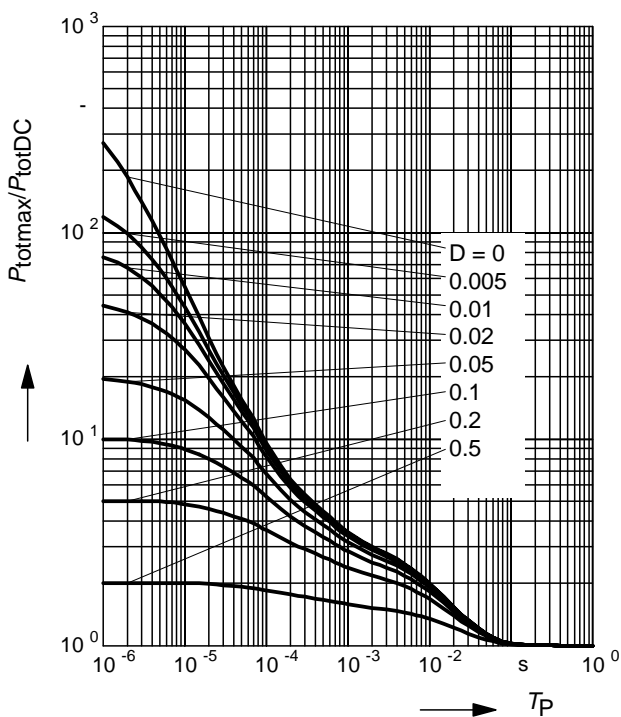


Permissible Pulse Load $R_{thJS} = f(t_p)$



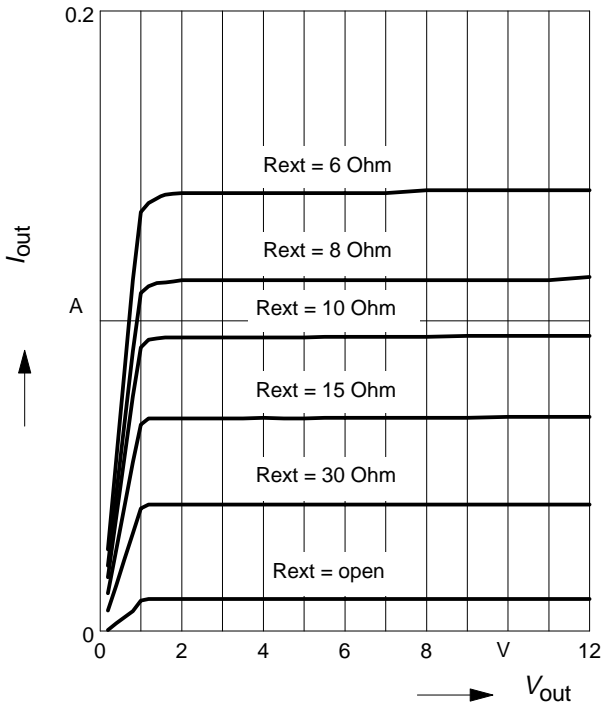
Permissible Pulse Load

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



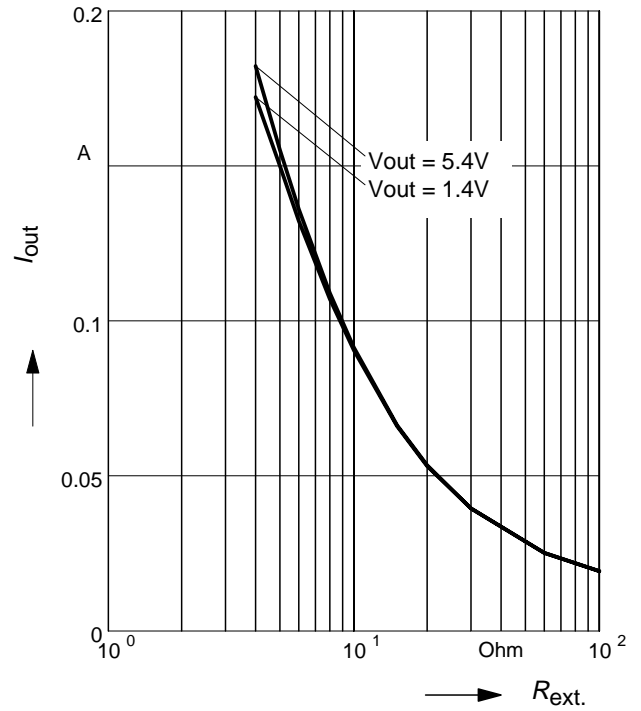
BCR420U: Output current versus V_{out}

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



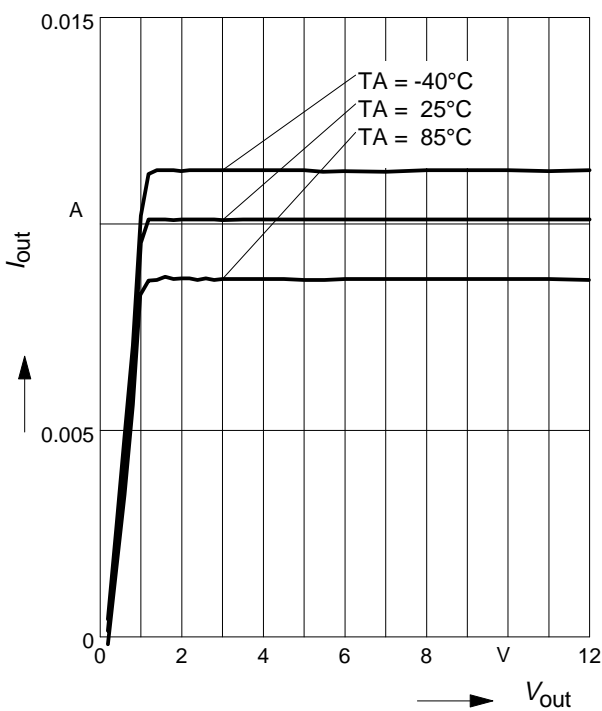
BCR420U: Output current versus R_{ext}

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



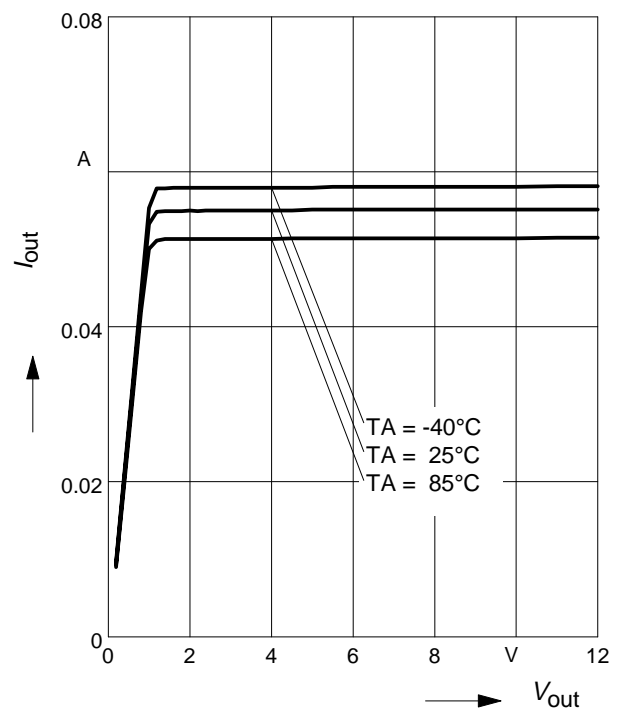
BCR420U: Output current versus V_{out}

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



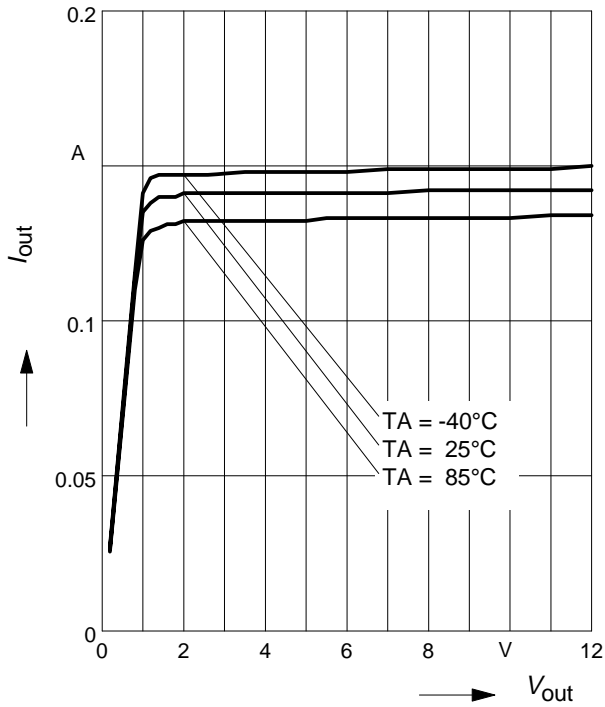
BCR320U: Output current versus V_{out}

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



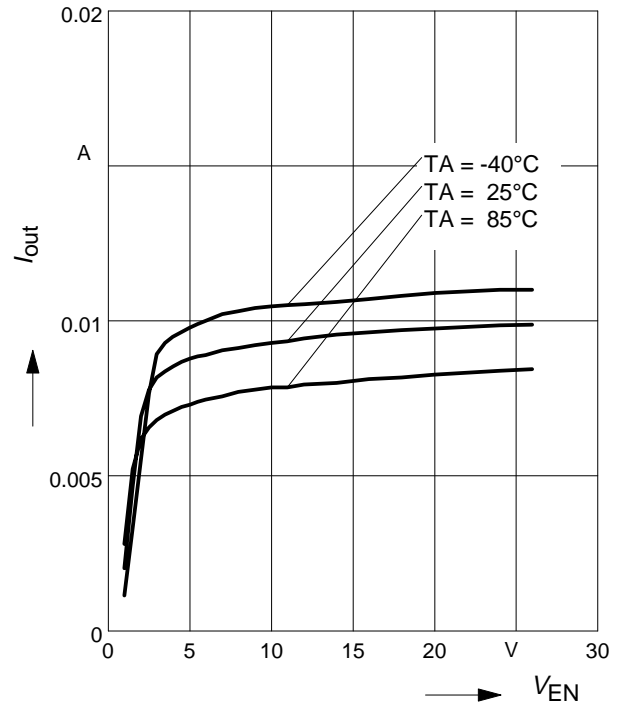
BCR420U: Output current versus V_{out}

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



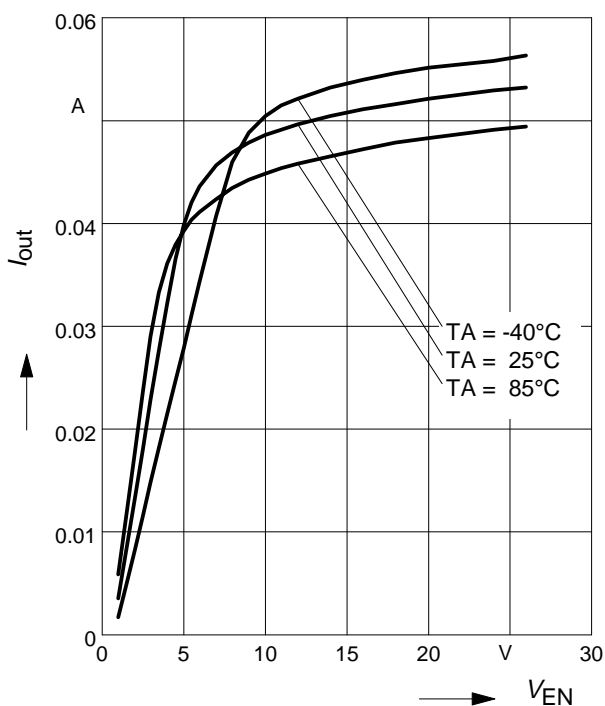
BCR420U: Output current versus V_{EN}

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



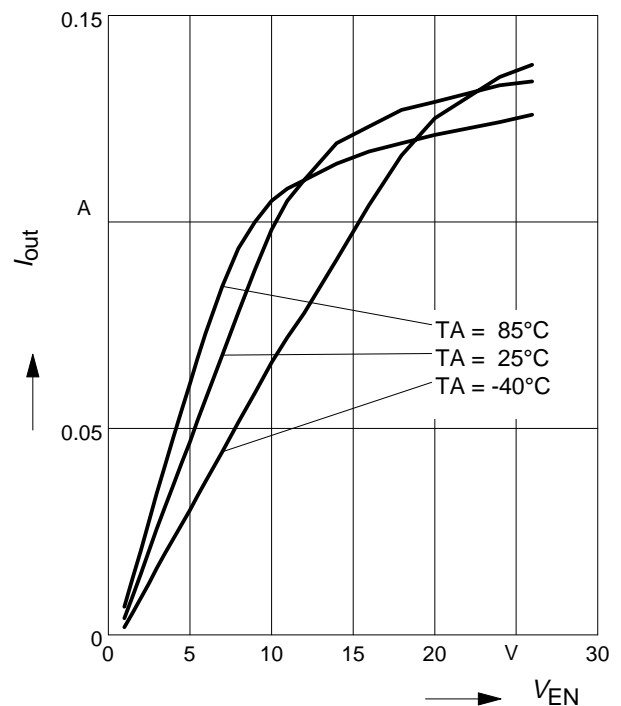
BCR420U: Output current versus V_{EN}

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



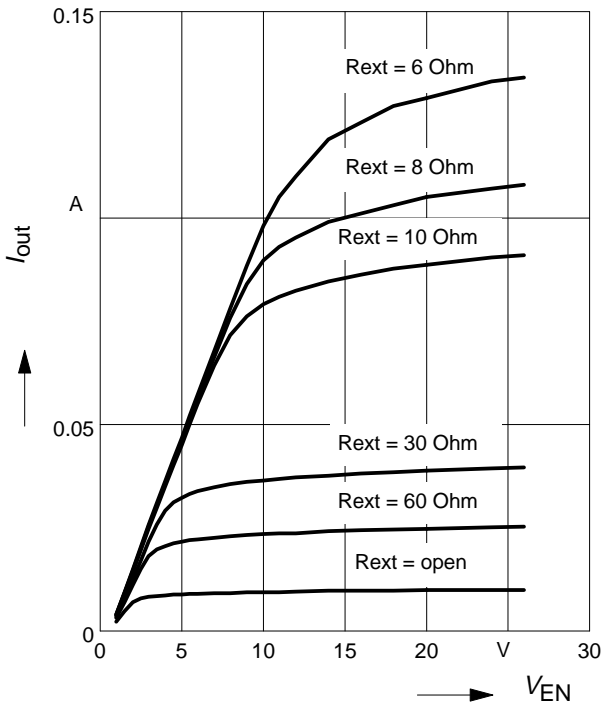
BCR420U: Output current versus V_{EN}

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



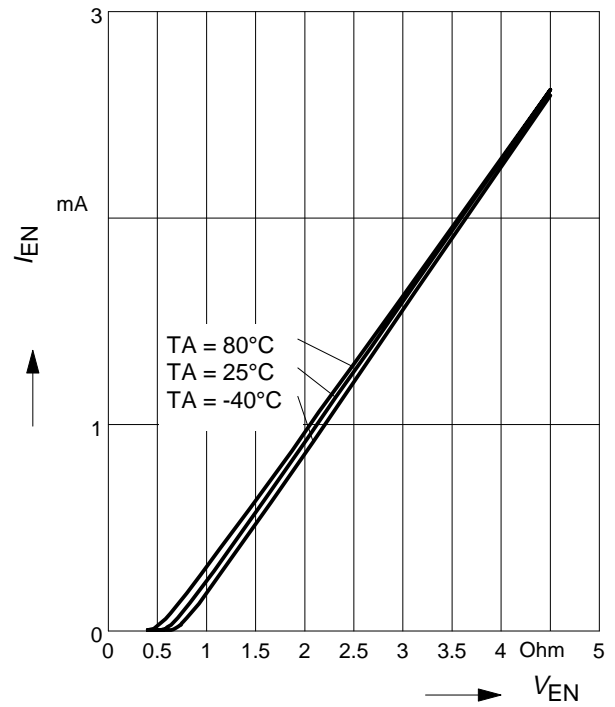
BCR420U: Output current versus V_{EN}

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



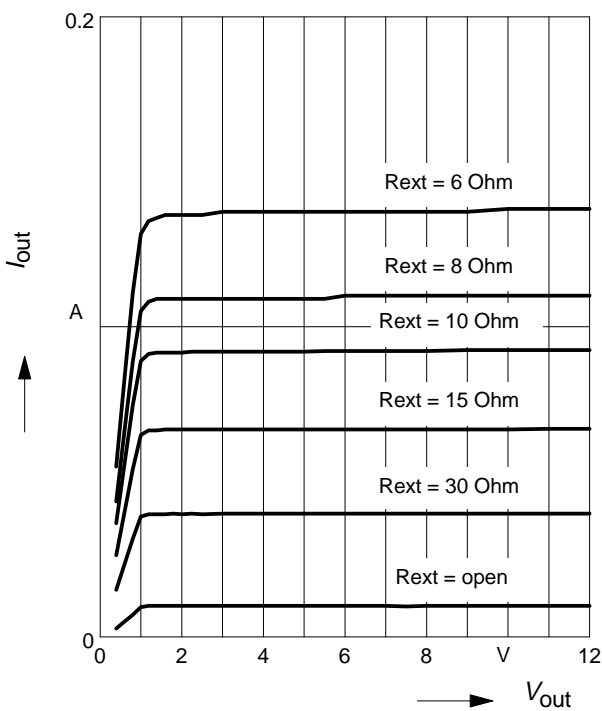
BCR420U: Enable current versus V_{EN}

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



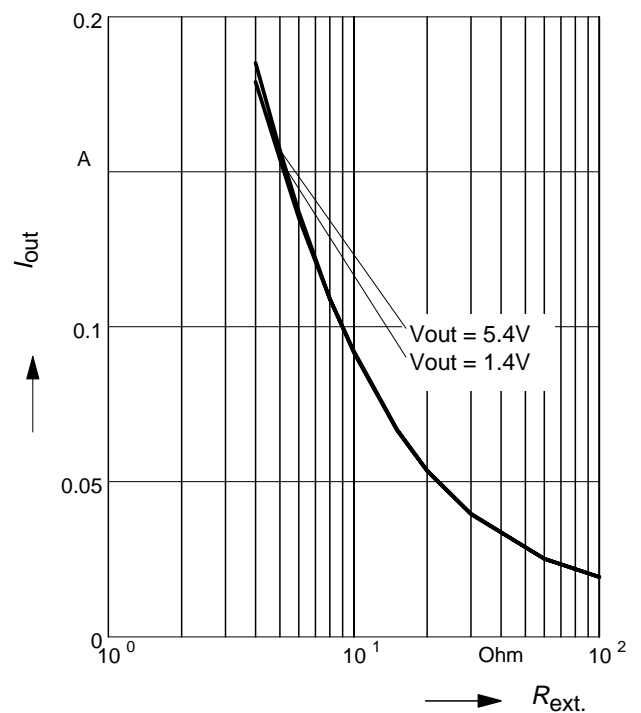
BCR421U: Output current versus V_{out}

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



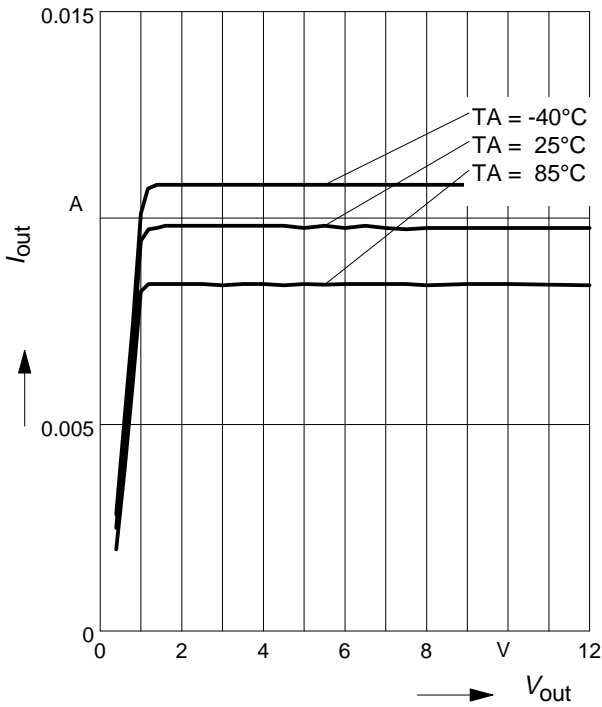
BCR421U: Output current versus R_{ext}

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



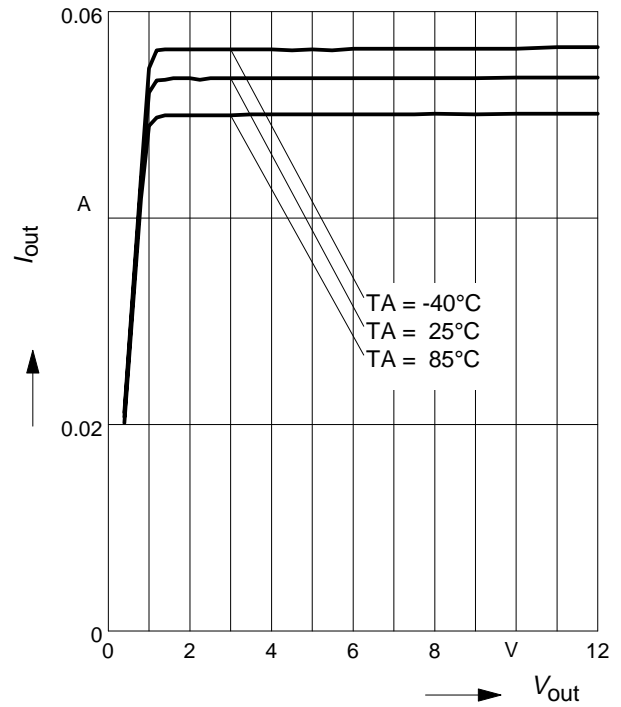
BCR421U: Output current versus V_{out}

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



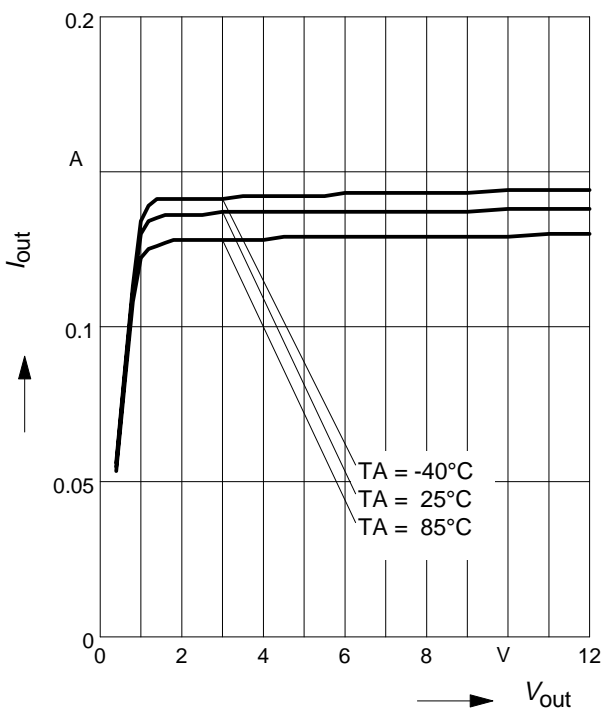
BCR421U: Output current versus V_{out}

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



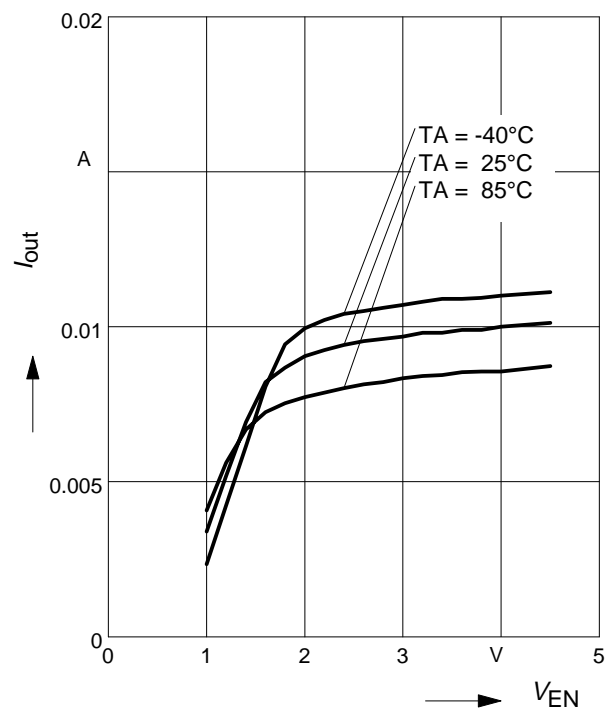
BCR421U: Output current versus V_{out}

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



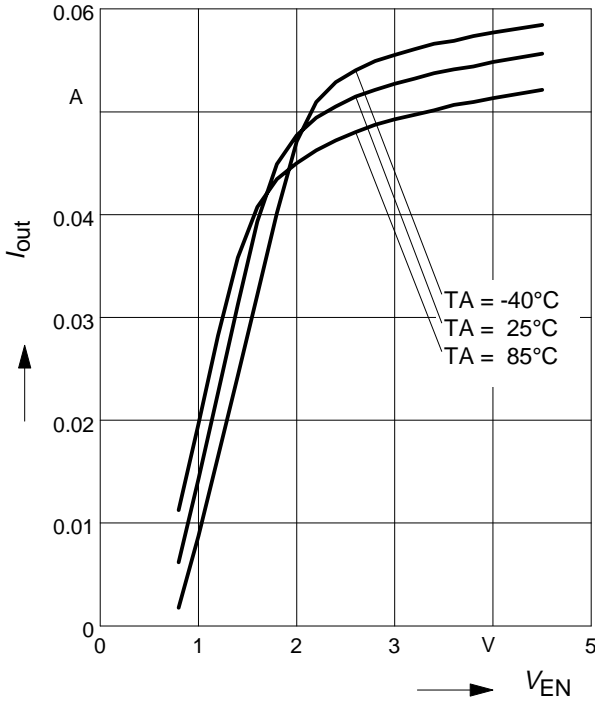
BCR421U: Output current versus V_{EN}

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



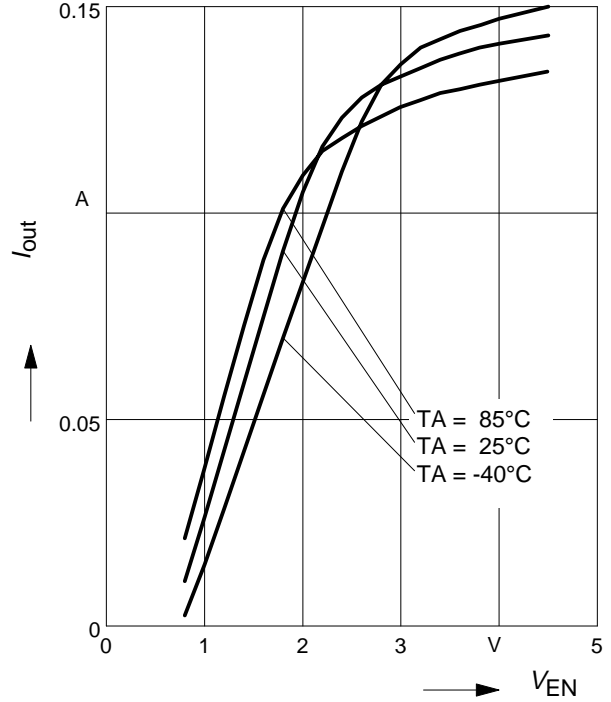
BCR421U: Output current versus V_{EN}

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



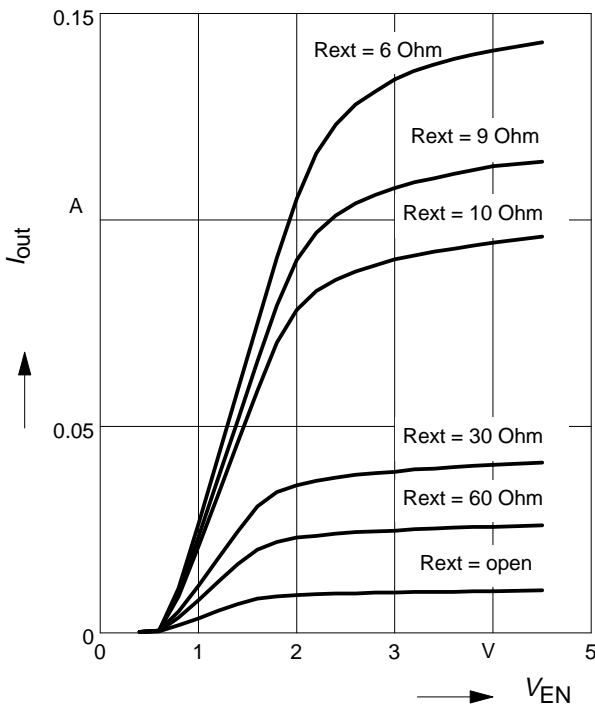
BCR421U: Output current versus V_{EN}

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



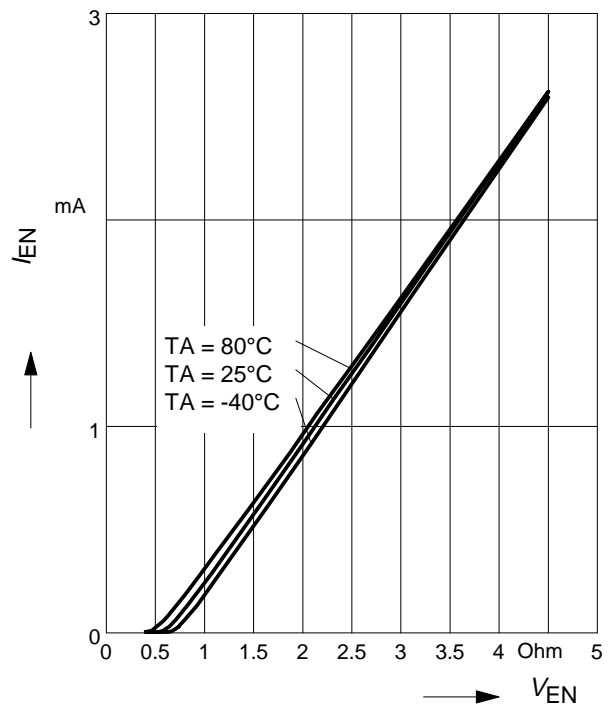
BCR421U: Output current versus V_{EN}

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



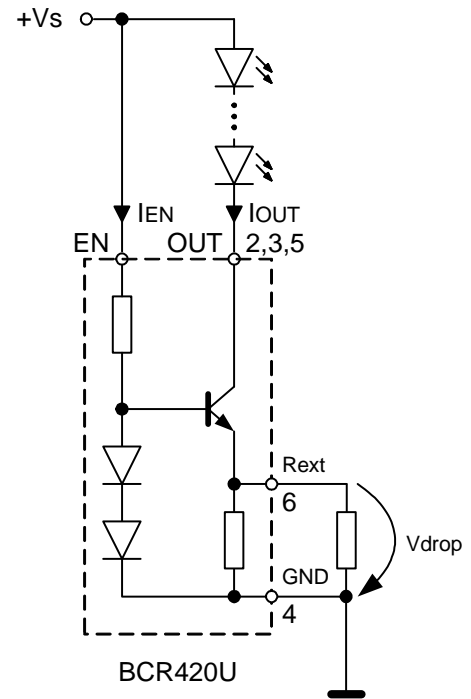
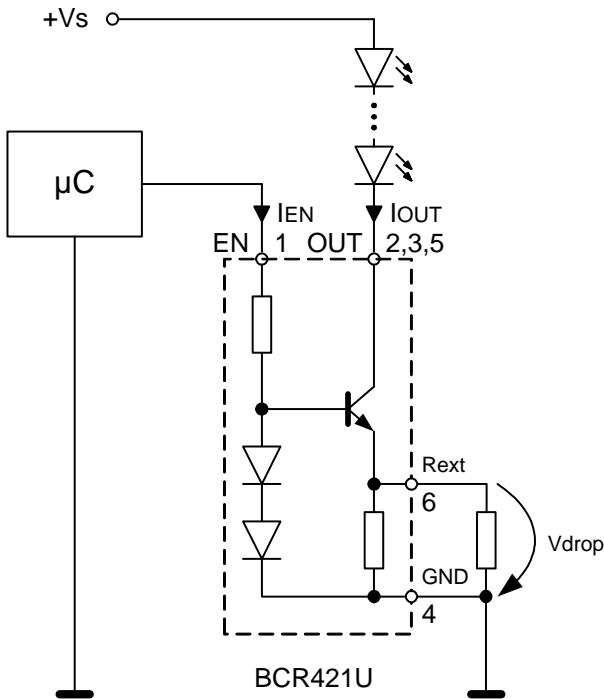
BCR421U: Enable current versus V_{EN}

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



Application circuit:
Enabling / PWM by micro controller

Application circuit:
Enabling by connecting to Vs

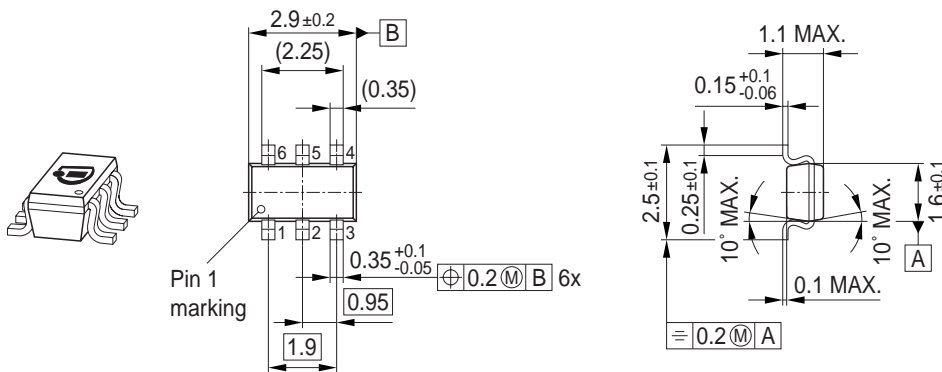


Application hints

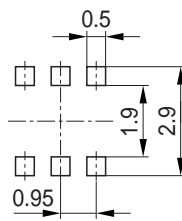
BCR420U / BCR421U serve as an easy to use constant current sources for LEDs. In stand alone application an external resistor can be connected to adjust the current from 10 mA to 150 mA. R_{ext} can be determined by using the diagram 'Output current versus external resistor'. Please take into account 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

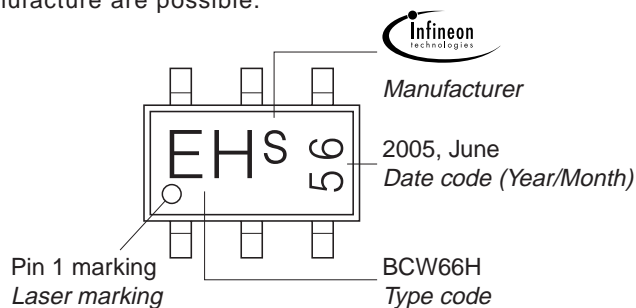


Foot Print



Marking Layout (Example)

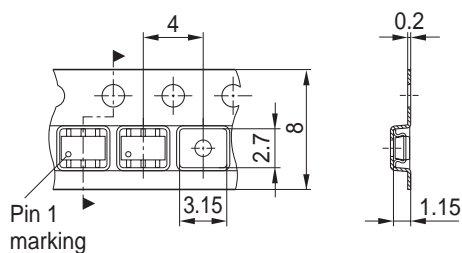
Small variations in positioning of Date code, Type code and Manufacture are possible.



Standard Packing

Reel \varnothing 180 mm = 3.000 Pieces/Reel
 Reel \varnothing 330 mm = 10.000 Pieces/Reel

For symmetric types no defined Pin 1 orientation in reel.



Edition 2009-11-16

**Published by
Infineon Technologies AG
81726 Munich, Germany**

**© 2009 Infineon Technologies AG
All Rights Reserved.**

Legal Disclaimer

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics. With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation, warranties of non-infringement of intellectual property rights of any third party.

Information

For further information on technology, delivery terms and conditions and prices, please contact the nearest Infineon Technologies Office (www.infineon.com).

Warnings

Due to technical requirements, components may contain dangerous substances. For information on the types in question, please contact the nearest Infineon Technologies Office.

Infineon Technologies components may be used in life-support devices or systems only with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support device or system or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.