

LED Drivers for Low Power LEDs

BCR205W

Ultra low dropout LED controller

Data Sheet

Revision 2.1, 2011-04-27

Industrial and Multimarket

Edition 2011-04-27

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

**© 2011 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.

Revision History

Page or Item	Subjects (major changes since previous revision)
Revision 2.1, 2011-04-27	
7	Features updated
Revision 2.0, 2011-03-30	
All	Preliminary status removed

Trademarks of Infineon Technologies AG

AURIX™, BlueMoon™, C166™, CanPAK™, CIPOS™, CIPURSE™, COMNEON™, EconoPACK™, CoolMOS™, CoolSET™, CORECONTROL™, CROSSAVE™, DAVE™, EasyPIM™, EconoBRIDGE™, EconoDUAL™, EconoPIM™, EiceDRIVER™, eupec™, FCOS™, HITFET™, HybridPACK™, I²RF™, ISOFACE™, IsoPACK™, MIPAQ™, ModSTACK™, my-d™, NovalithIC™, OmniTune™, OptiMOS™, ORIGA™, PRIMARION™, PrimePACK™, PrimeSTACK™, PRO-SIL™, PROFET™, RASIC™, ReverSave™, SatRIC™, SIEGET™, SINDRION™, SIPMOS™, SMARTi™, SmartLEWIS™, SOLID FLASH™, TEMPFET™, thinQ!™, TRENCHSTOP™, TriCore™, X-GOLD™, X-PMU™, XMM™, XPOSSYS™.

Other Trademarks

Advance Design System™ (ADS) of Agilent Technologies, AMBA™, ARM™, MULTI-ICE™, KEIL™, PRIMECELL™, REALVIEW™, THUMB™, μVision™ of ARM Limited, UK. AUTOSAR™ is licensed by AUTOSAR development partnership. Bluetooth™ of Bluetooth SIG Inc. CAT-iq™ of DECT Forum. COLOSSUS™, FirstGPS™ of Trimble Navigation Ltd. EMV™ of EMVCo, LLC (Visa Holdings Inc.). EPCOS™ of Epcos AG. FLEXGO™ of Microsoft Corporation. FlexRay™ is licensed by FlexRay Consortium. HYPERTERMINAL™ of Hilgraeve Incorporated. IEC™ of Commission Electrotechnique Internationale. IrDA™ of Infrared Data Association Corporation. ISO™ of INTERNATIONAL ORGANIZATION FOR STANDARDIZATION. MATLAB™ of MathWorks, Inc. MAXIM™ of Maxim Integrated Products, Inc. MICROTEC™, NUCLEUS™ of Mentor Graphics Corporation. Mifare™ of NXP. MIPI™ of MIPI Alliance, Inc. MIPS™ of MIPS Technologies, Inc., USA. muRata™ of MURATA MANUFACTURING CO., MICROWAVE OFFICE™ (MWO) of Applied Wave Research Inc., OmniVision™ of OmniVision Technologies, Inc. Openwave™ Openwave Systems Inc. RED HAT™ Red Hat, Inc. RFMD™ RF Micro Devices, Inc. SIRIUS™ of Sirius Satellite Radio Inc. SOLARIS™ of Sun Microsystems, Inc. SPANSION™ of Spansion LLC Ltd. Symbian™ of Symbian Software Limited. TAIYO YUDEN™ of Taiyo Yuden Co. TEAKLITE™ of CEVA, Inc. TEKTRONIX™ of Tektronix Inc. TOKO™ of TOKO KABUSHIKI KAISHA TA. UNIX™ of X/Open Company Limited. VERILOG™, PALLADIUM™ of Cadence Design Systems, Inc. VLYNQ™ of Texas Instruments Incorporated. VXWORKS™, WIND RIVER™ of WIND RIVER SYSTEMS, INC. ZETEX™ of Diodes Zetex Limited.

Last Trademarks Update 2010-10-26

Table of Contents

	Table of Contents	4
	List of Figures	5
	List of Tables	6
1	Features	7
2	Maximum Ratings	8
3	Thermal Characteristics	9
4	Electrical Characteristics	10
4.1	DC Characteristics	10
5	Basic Application Information	11
6	Package Information	16

List of Figures

Figure 1	Pin out.	7
Figure 2	Total Power Dissipation	9
Figure 3	BCR205W supply current vs. supply voltage ($T_A=25^{\circ}\text{C}$)	10
Figure 4	30 mA Application using BCR108.	11
Figure 5	50 mA Application using BC817K-40	11
Figure 6	LED Current vs. Supply Voltage in 1 LED Application with BCR108	13
Figure 7	LED Current vs. Ambient Temperature in 1 LED Application with BCR108	13
Figure 8	Drop Voltage vs. LED current in 1 LED Application with BCR108	13
Figure 9	LED Current vs. Supply Voltage in 1 LED Application with BC817K-40.	14
Figure 10	LED Current vs. Ambient Temperature in 1 LED Application with BC817K-40	14
Figure 11	Drop Voltage vs. LED current in 1 LED Application with BC817K-40.	14
Figure 12	LED Current vs. Supply Voltage in 3 LED Application with BC817K-40.	15
Figure 13	LED Current vs. Ambient Temperature in 3 LED Application with BC817K-40	15
Figure 14	Drop Voltage vs. LED current in 3 LED Application with BC817K-40.	15
Figure 15	Package outline	16
Figure 16	Recommended PCB Footprint for Reflow Soldering	16
Figure 17	Tape Loading	16

List of Tables

Table 1	Maximum Ratings	8
Table 2	Maximum Thermal Resistance	9
Table 3	DC Characteristics	10
Table 4	DC Characteristics with BCR108	12
Table 5	DC Characteristics with BC817K-40	12

Ultra low dropout LED controller

1 Features

- Wide input voltage range 1.8 - 18 V
- Ultra low voltage overhead of only 0.2 V
- LED current 5 mA to 80 mA with external transistor
- Tailored to drive 0.1 W - 0.2 W LEDs
- Typical 3 % LED current accuracy
- Small Package: SOT343



Applications

- Channel letters for advertising
- LED strips for decorative lighting
- Aircraft, train, ship illumination
- Refrigerator, white goods lighting
- Architectural lighting

Description

The BCR205W is an easy to use LED Controller requiring a minimum supply voltage that is only 0.2 V higher than the forward voltage of the LEDs. This enables the possibility to connect the maximum amount of LEDs in series with available supply voltage. The LED current is supplied via an external transistor and adjusted by a sense resistor.

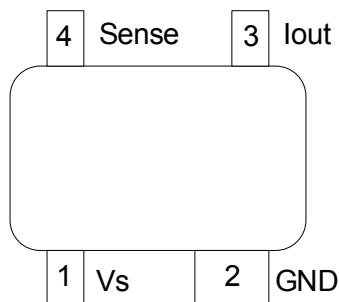
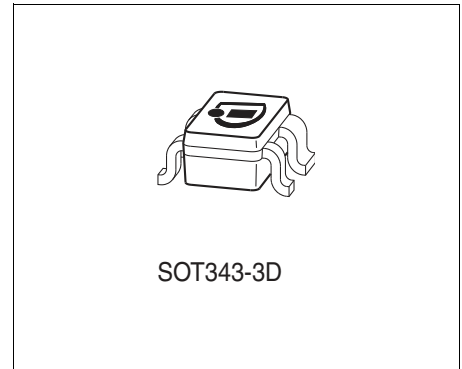


Figure 1 Pin out

Product Name	Package	Pin Configuration				Marking
BCR205W	SOT343	1 = Vs	2 = GND	3 = Iout	4 = Sense	W7s



2 Maximum Ratings

Table 1 Maximum Ratings

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Supply voltage	V_s	–	–	18	V	–
Output current	I_{out}	–	–	0.5	mA	–
Total power dissipation, $T_s \leq 103^\circ\text{C}$	P_{tot}	–	–	100	mW	–
Junction temperature	T_J	–	–	150	$^\circ\text{C}$	–
Storage temperature range	T_{STG}	-65	–	150	$^\circ\text{C}$	–

Attention: Stresses above the max. values listed here may cause permanent damage to the device. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. Maximum ratings are absolute ratings; exceeding only one of these values may cause irreversible damage to the integrated circuit.

3 Thermal Characteristics

Table 2 Maximum Thermal Resistance

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Junction - soldering point ¹⁾	R_{thJS}	–	–	470	K/W	–

1) For calculation of R_{thJA} please refer to application note AN077, "Thermal Resistance Calculation"

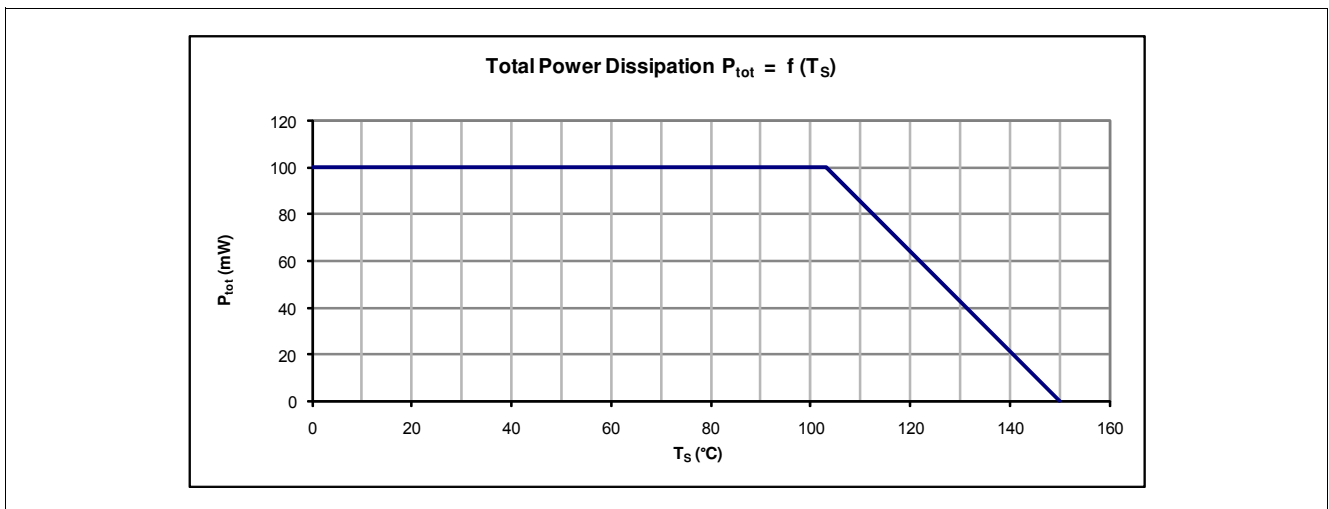


Figure 2 Total Power Dissipation

4 Electrical Characteristics

4.1 DC Characteristics

All parameters at $T_A = 25\text{ }^\circ\text{C}$, unless otherwise specified.

Table 3 DC Characteristics

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Device supply current $V_S = 3\text{ V}, I_{OUT} = 0\text{ A}$	I_S	–	75	200	μA	–
Device supply current $V_S = 18\text{ V}, I_{OUT} = 0\text{ A}$	I_S	–	300	600	μA	–
Minimum supply voltage	V_{Smin}	–	1.8	–	V	–

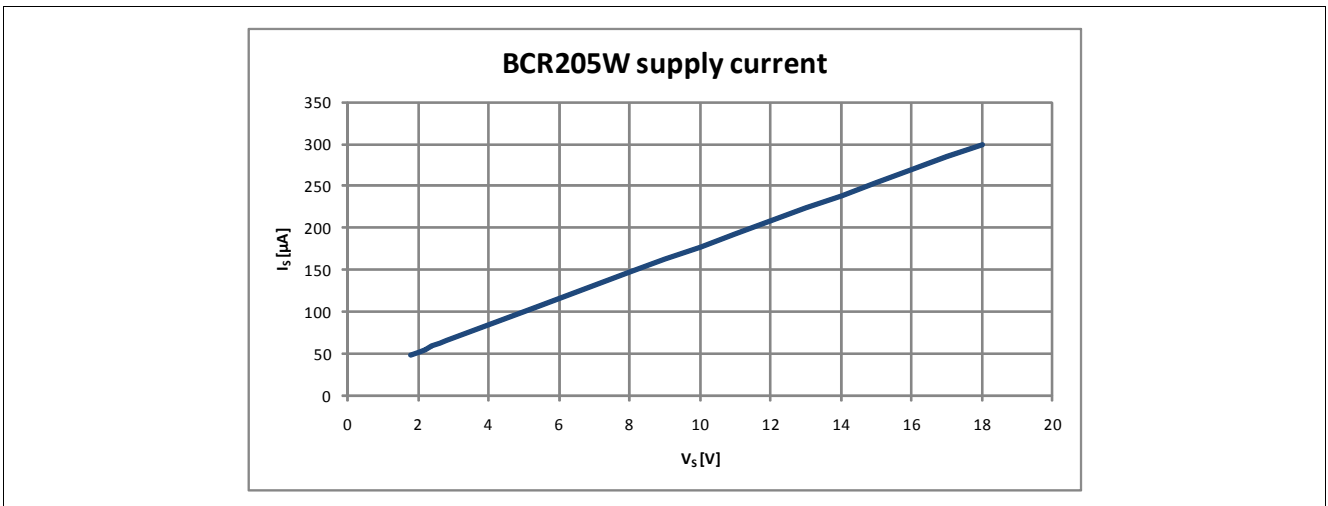


Figure 3 BCR205W supply current vs. supply voltage ($T_A=25^\circ\text{C}$)

5 Basic Application Information

BCR205W is an easy to use LED Controller requiring just an external sense resistor and transistor to control the LED current. Subsequent application examples show the electrical measurement results of BCR205W controlling 1 respective 3 LEDs with an external transistor BCR108 or BC817K-40.

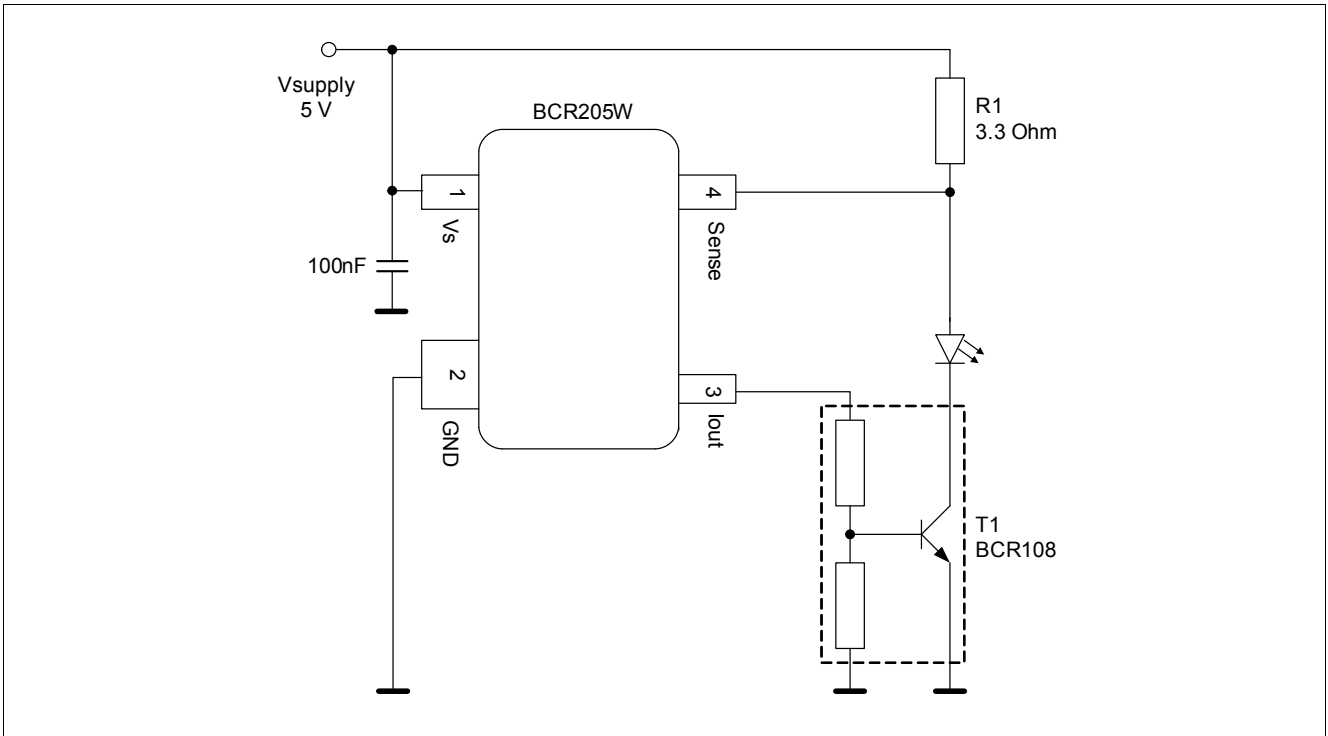


Figure 4 30 mA Application using BCR108

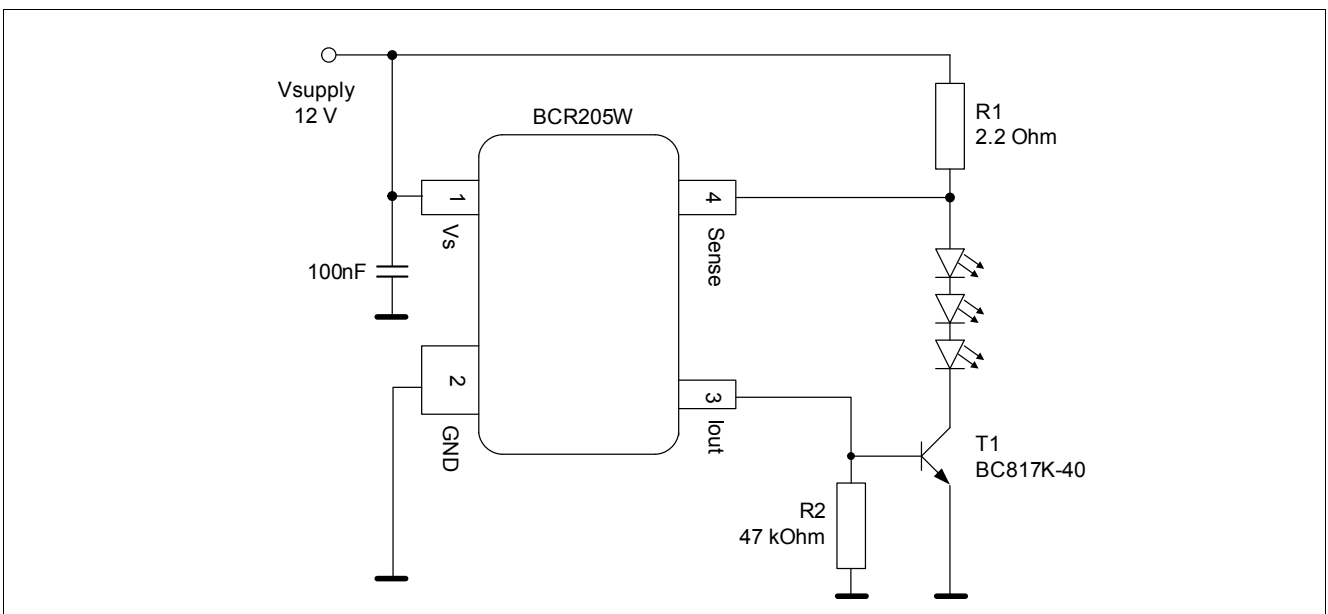


Figure 5 50 mA Application using BC817K-40

Table 4 DC Characteristics with BCR108

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
LED current $R_1 = 3.3 \Omega, V_S = 5 \text{ V}$	I_{LED}	–	32	–	mA	
Voltage drop at resistor R_1 $R_1 = 3.3 \Omega, V_S = 5 \text{ V}$	V_{drop}	–	104	–	mV	
Change of I_{LED} versus V_S $R_1 = 3.3 \Omega, V_S = 5 \text{ V}$	$\Delta I_C / \Delta V_S$	–	2.4	–	%/V	
Change of I_{LED} versus T_A $R_1 = 3.3 \Omega, V_S = 5 \text{ V}$	$\Delta I_C / \Delta T_A$	–	0.4	–	%/K	

Table 5 DC Characteristics with BC817K-40

Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
LED current $R_1 = 2.2 \Omega, V_S = 12 \text{ V}$	I_{LED}	–	48	–	mA	
Voltage drop at resistor R_1 $R_1 = 2.2 \Omega, V_S = 12 \text{ V}$	V_{drop}	–	107	–	mV	
Change of I_C versus V_S $R_1 = 2.2 \Omega, V_S = 12 \text{ V}$	$\Delta I_C / \Delta V_S$	–	1.4	–	%/V	
Change of I_C versus T_A $R_1 = 2.2 \Omega, V_S = 12 \text{ V}$	$\Delta I_C / \Delta T_A$	–	0.4	–	%/K	

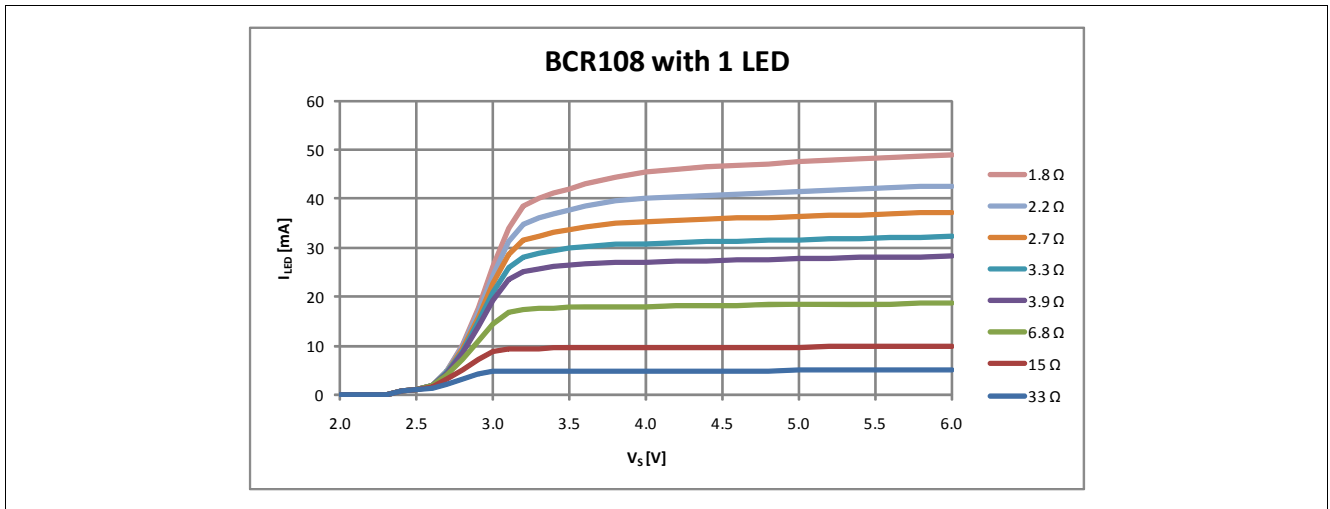


Figure 6 LED Current vs. Supply Voltage in 1 LED Application with BCR108

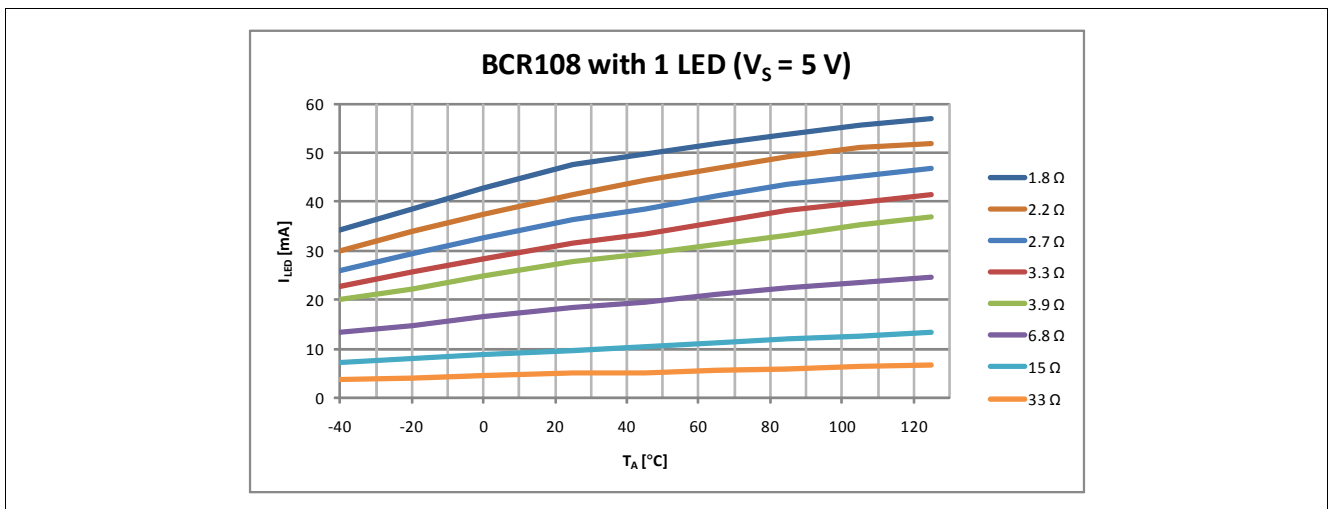


Figure 7 LED Current vs. Ambient Temperature in 1 LED Application with BCR108

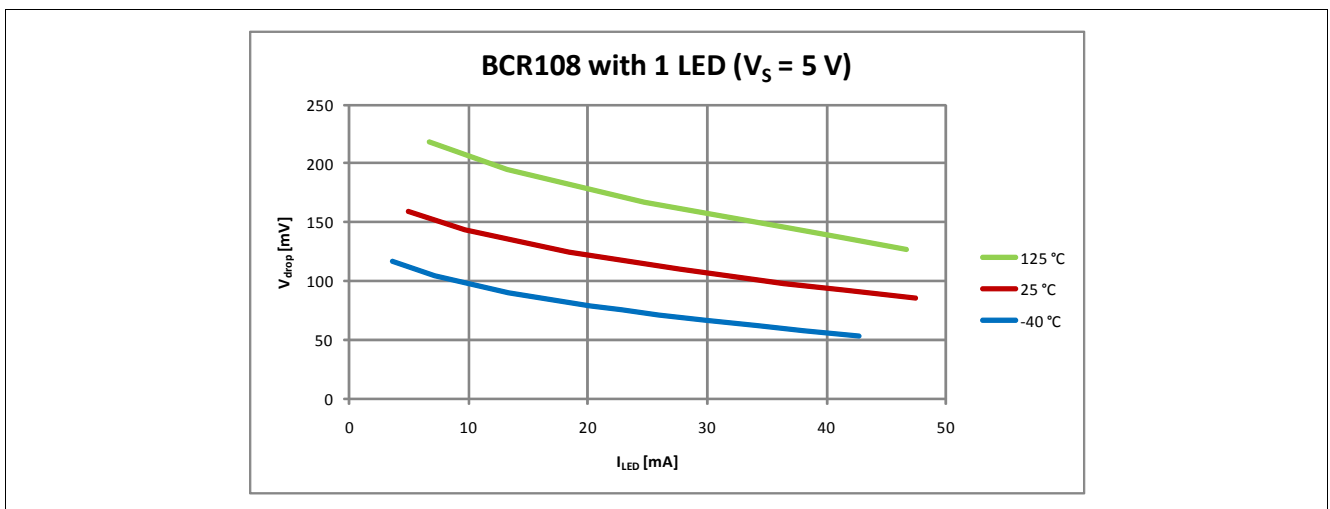


Figure 8 Drop Voltage vs. LED current in 1 LED Application with BCR108

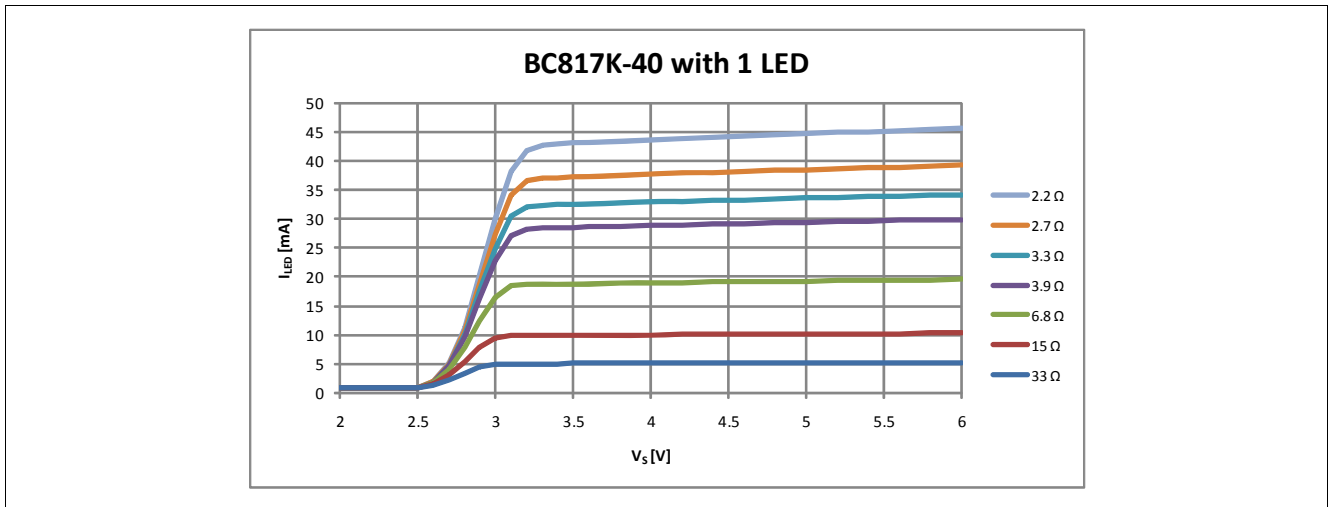


Figure 9 LED Current vs. Supply Voltage in 1 LED Application with BC817K-40

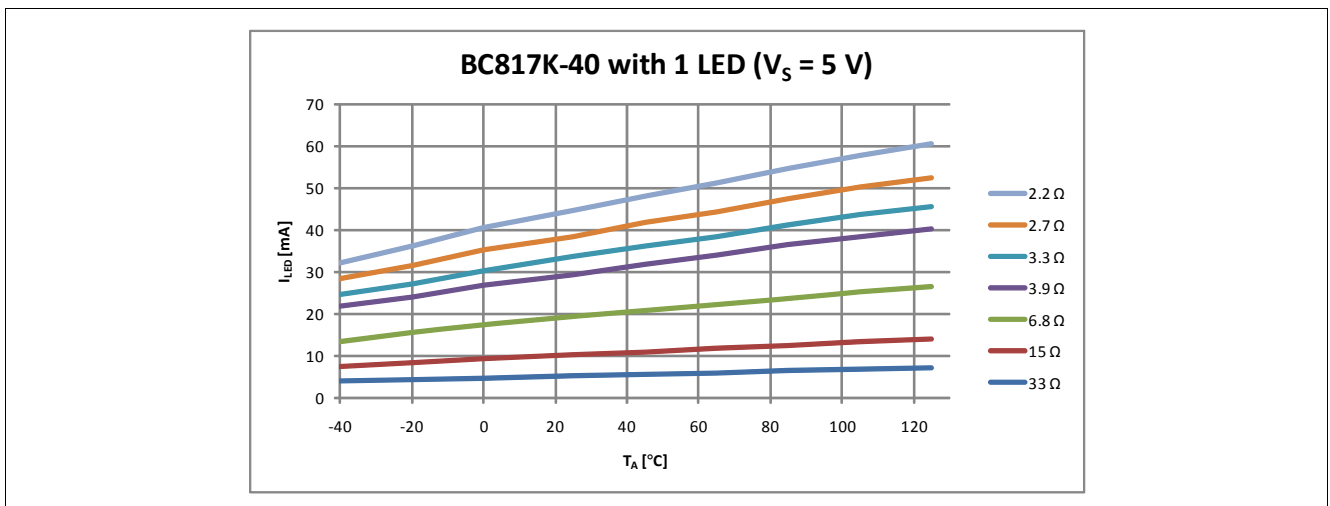


Figure 10 LED Current vs. Ambient Temperature in 1 LED Application with BC817K-40

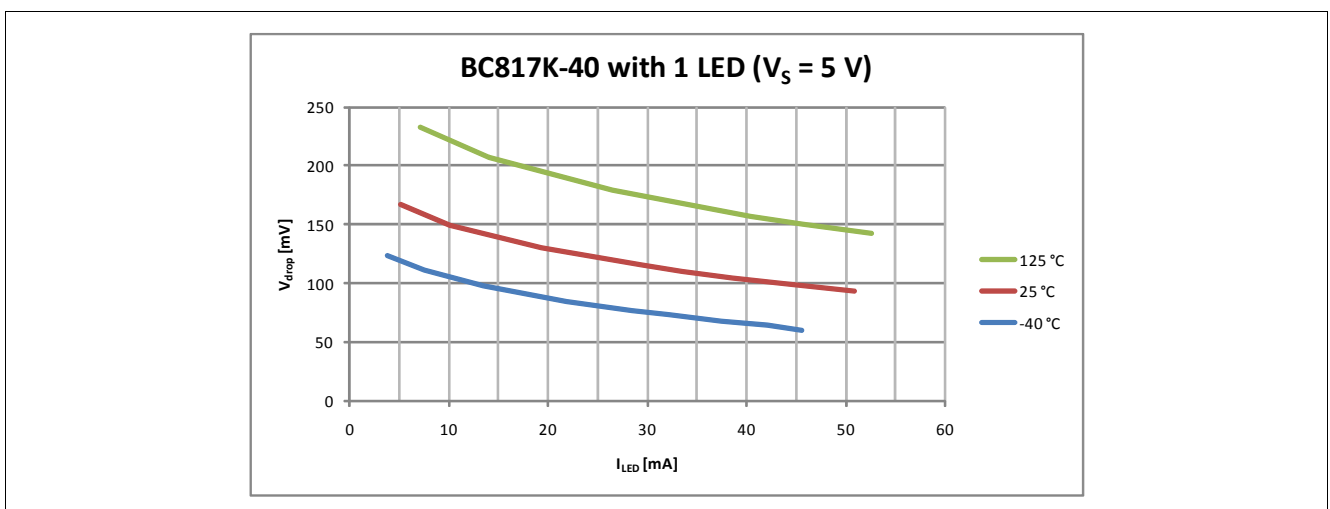


Figure 11 Drop Voltage vs. LED current in 1 LED Application with BC817K-40

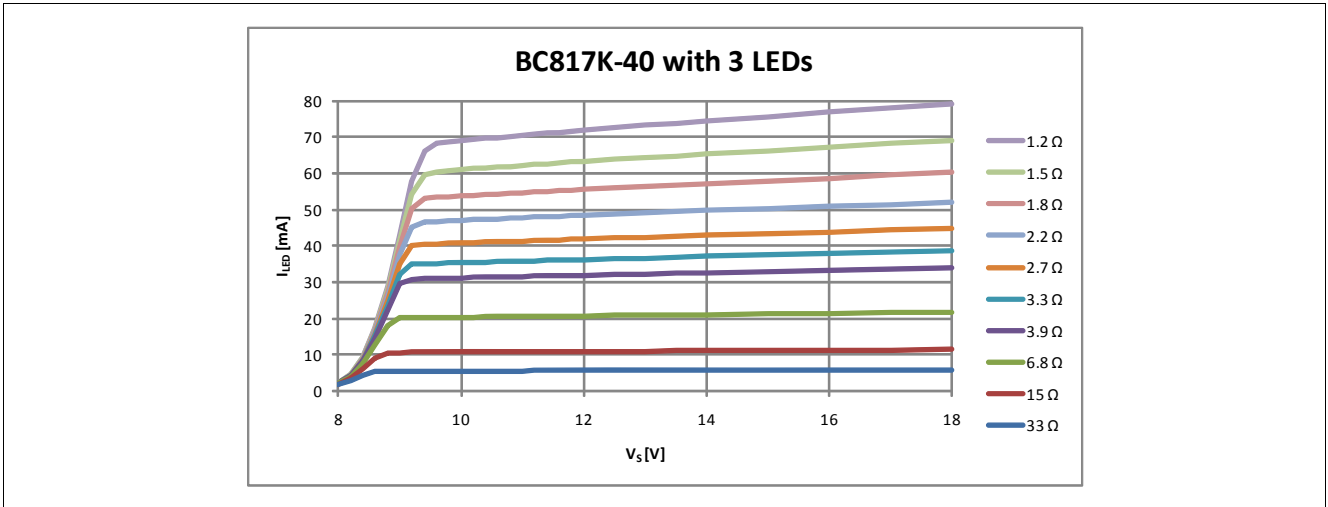


Figure 12 LED Current vs. Supply Voltage in 3 LED Application with BC817K-40

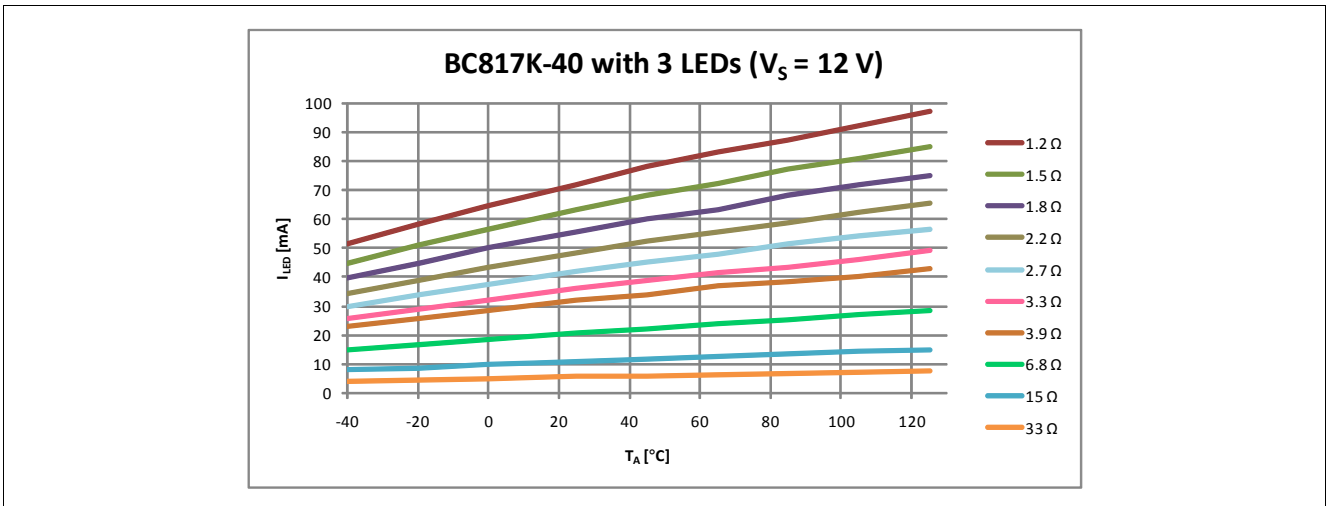


Figure 13 LED Current vs. Ambient Temperature in 3 LED Application with BC817K-40

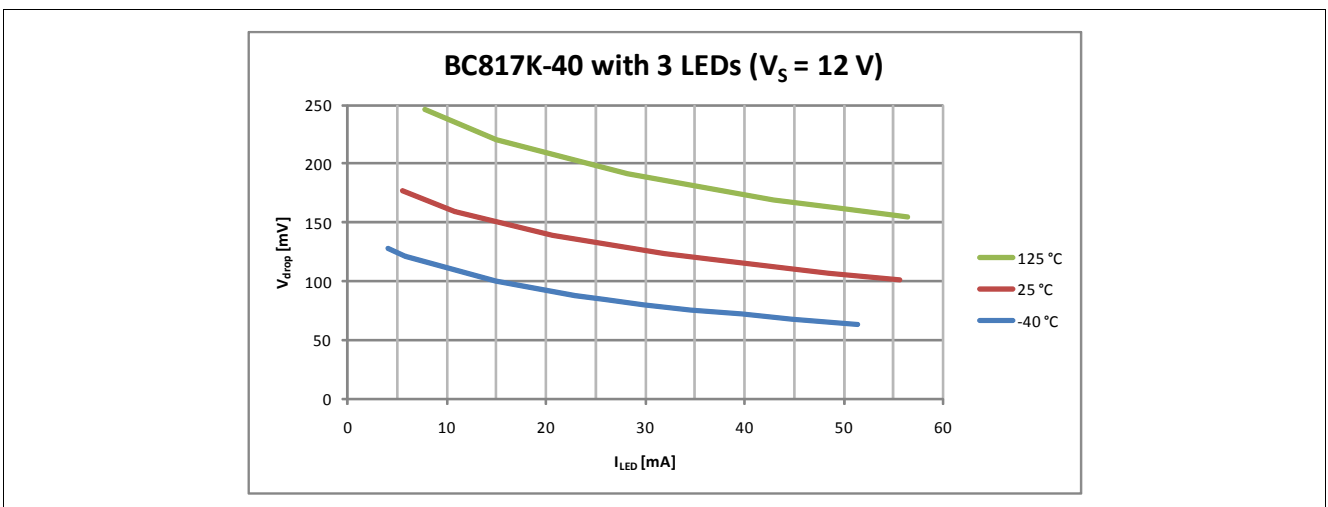


Figure 14 Drop Voltage vs. LED current in 3 LED Application with BC817K-40

6 Package Information

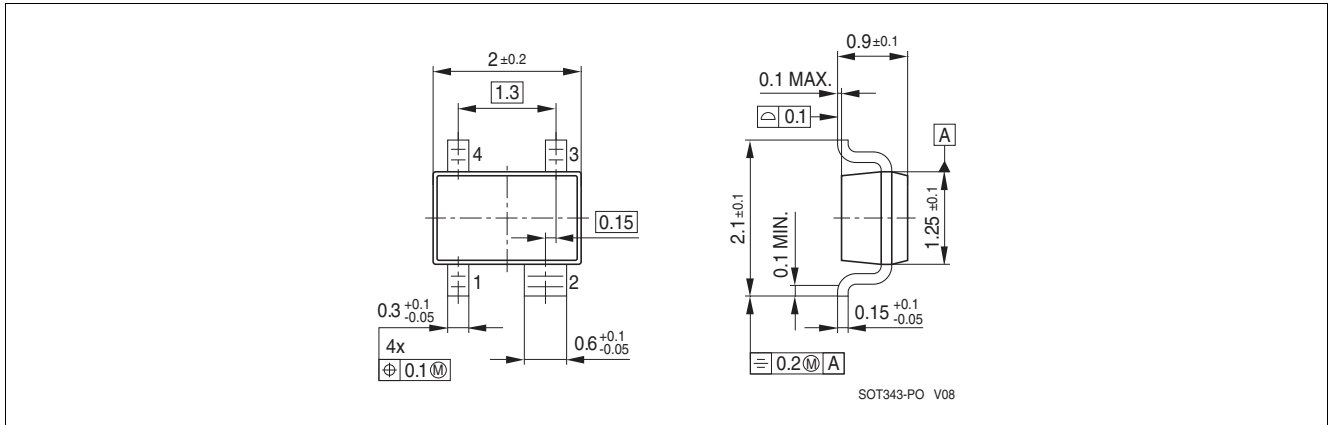


Figure 15 Package outline

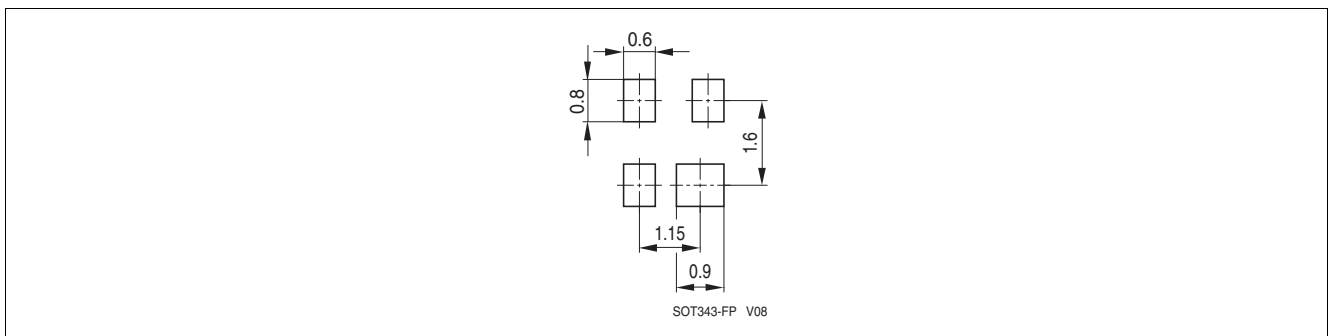


Figure 16 Recommended PCB Footprint for Reflow Soldering

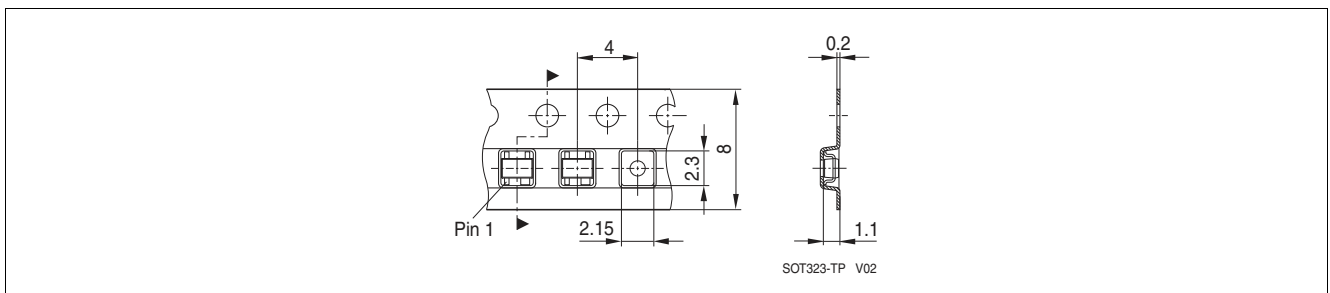


Figure 17 Tape Loading

www.infineon.com

Published by Infineon Technologies AG