

# LED Drivers for Low Power LEDs

## BCR205W

Ultra low dropout LED controller

### Data Sheet

Revision 2.1, 2011-04-27

Industrial and Multimarket

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### Revision History

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

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Last Trademarks Update 2010-10-26

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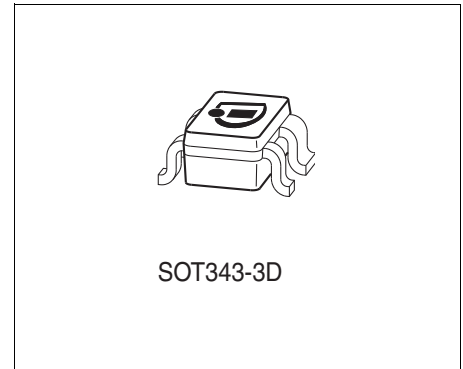
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## Ultra low dropout LED controller

### 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.

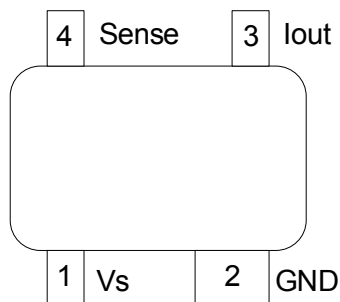


Figure 1 Pin out

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.

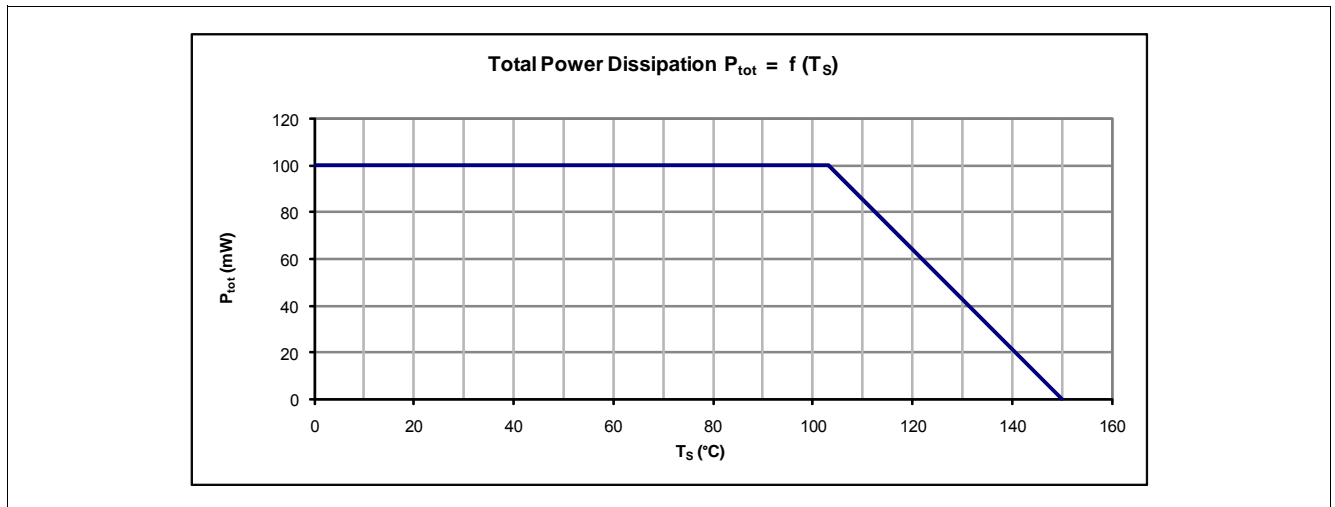


### 3 Thermal Characteristics

**Table 2 Maximum Thermal Resistance**

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

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



**Figure 2 Total Power Dissipation**

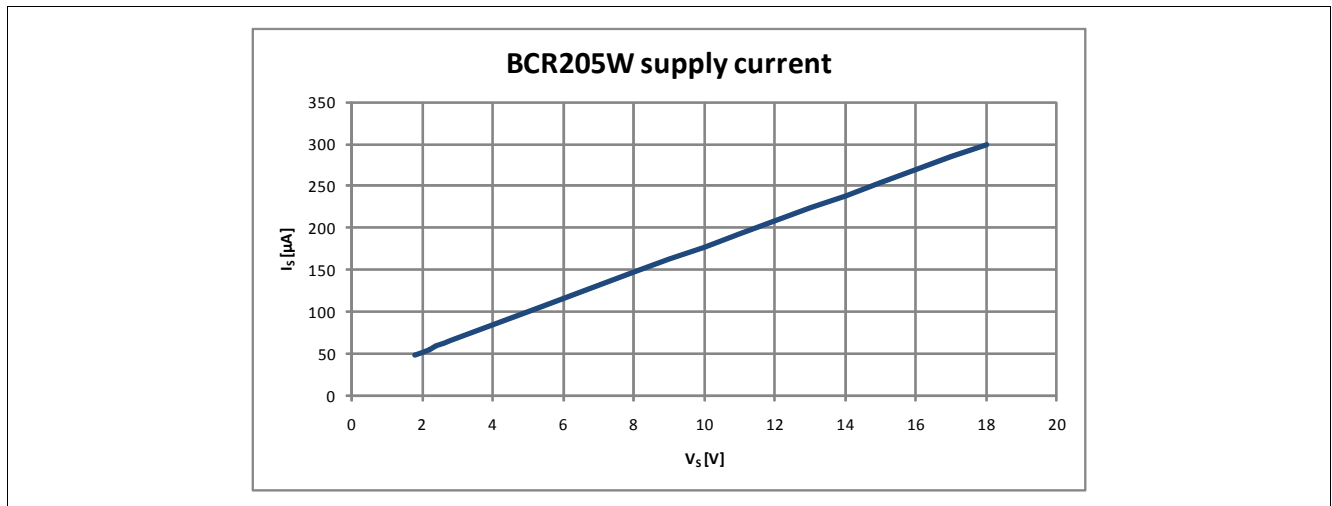
## 4 Electrical Characteristics

### 4.1 DC Characteristics

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

**Table 3 DC Characteristics**

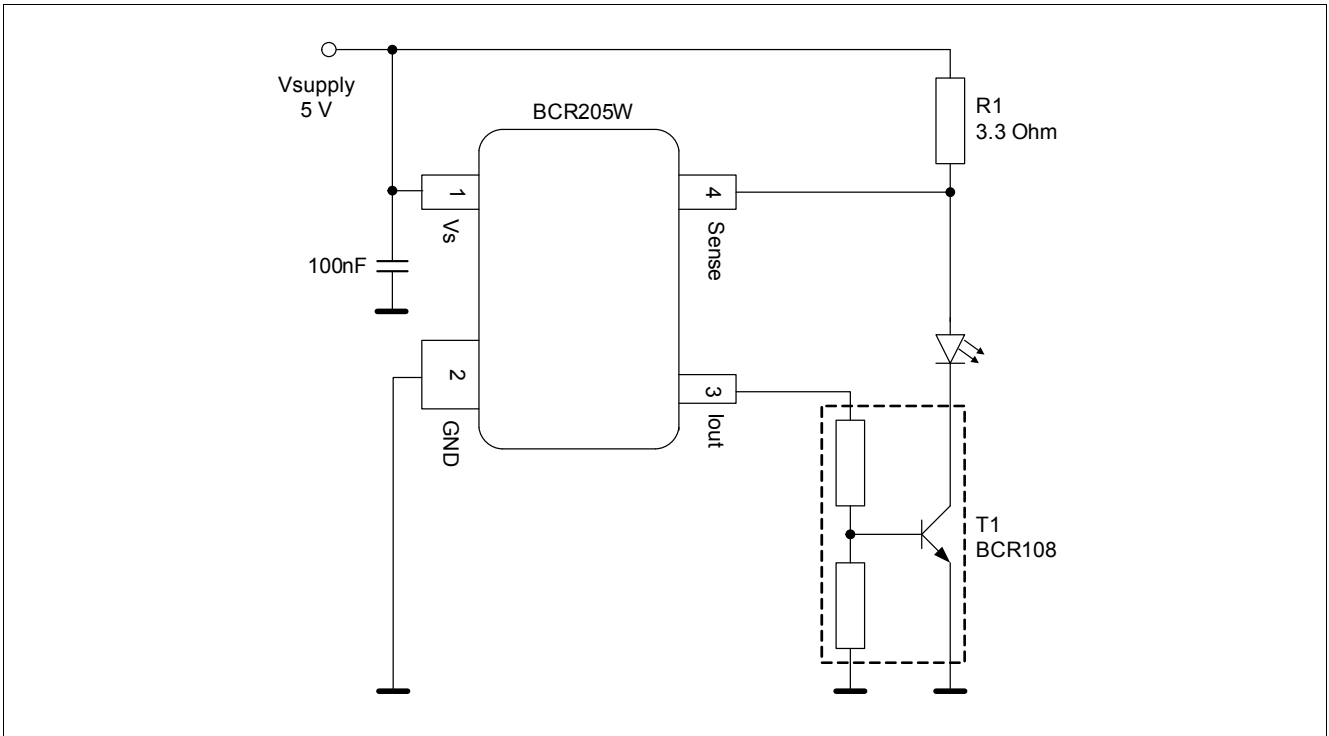
Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
Device supply current $V_S = 3\text{ V}, I_{OUT} = 0\text{ A}$	$I_S$	–	75	200	$\mu\text{A}$	–
Device supply current $V_S = 18\text{ V}, I_{OUT} = 0\text{ A}$	$I_S$	–	300	600	$\mu\text{A}$	–
Minimum supply voltage	$V_{Smin}$	–	1.8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



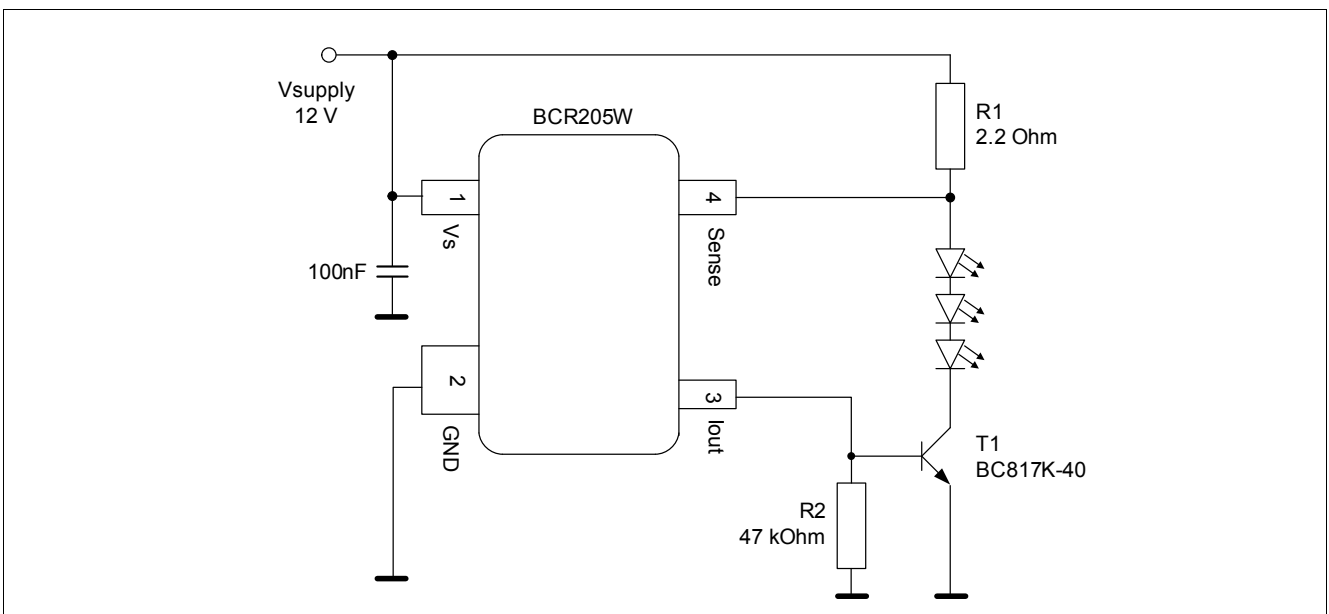
**Figure 3 BCR205W supply current vs. supply voltage ( $T_A=25^\circ\text{C}$ )**

## 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



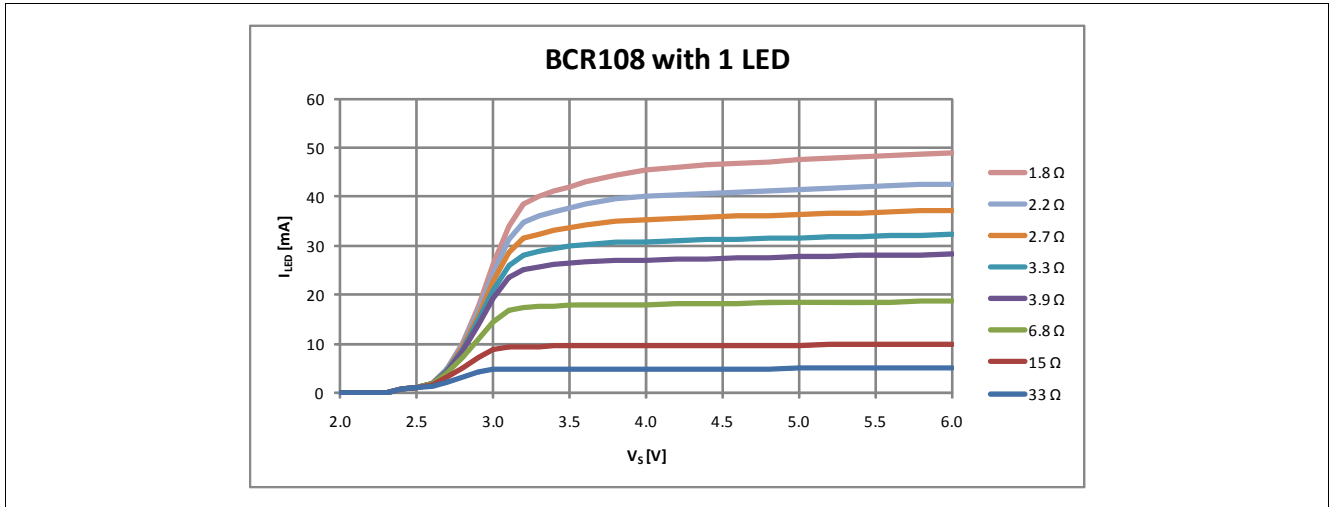
**Figure 5** 50 mA Application using BC817K-40

**Table 4 DC Characteristics with BCR108**

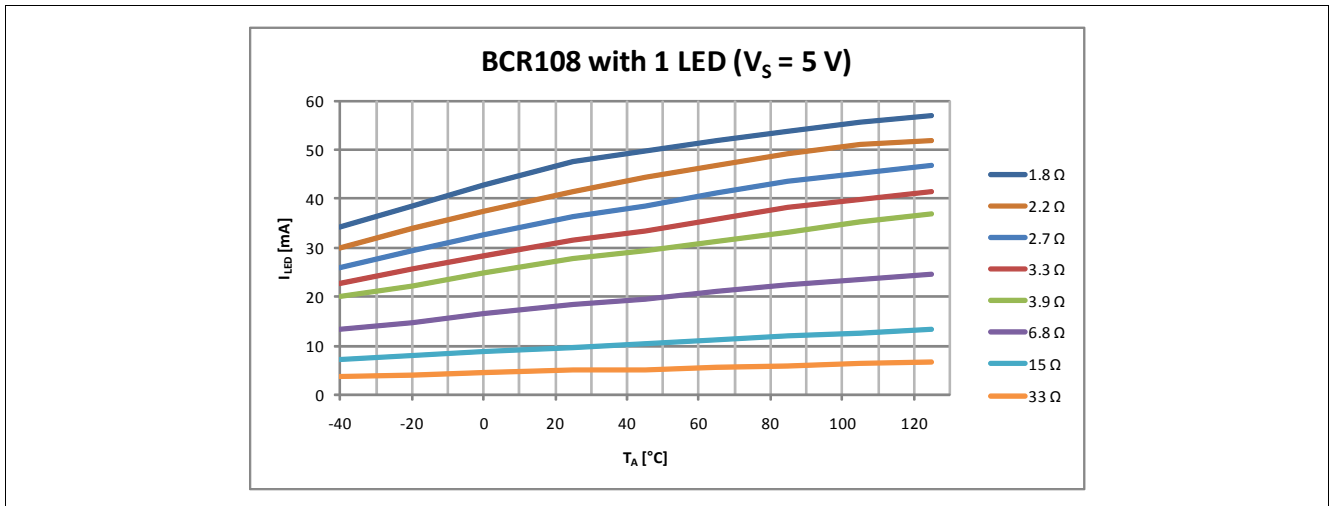
Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
LED current $R_1 = 3.3 \Omega, V_S = 5 \text{ V}$	$I_{LED}$	–	32	–	mA	
Voltage drop at resistor $R_1$ $R_1 = 3.3 \Omega, V_S = 5 \text{ V}$	$V_{drop}$	–	104	–	mV	
Change of $I_{LED}$ versus $V_S$ $R_1 = 3.3 \Omega, V_S = 5 \text{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

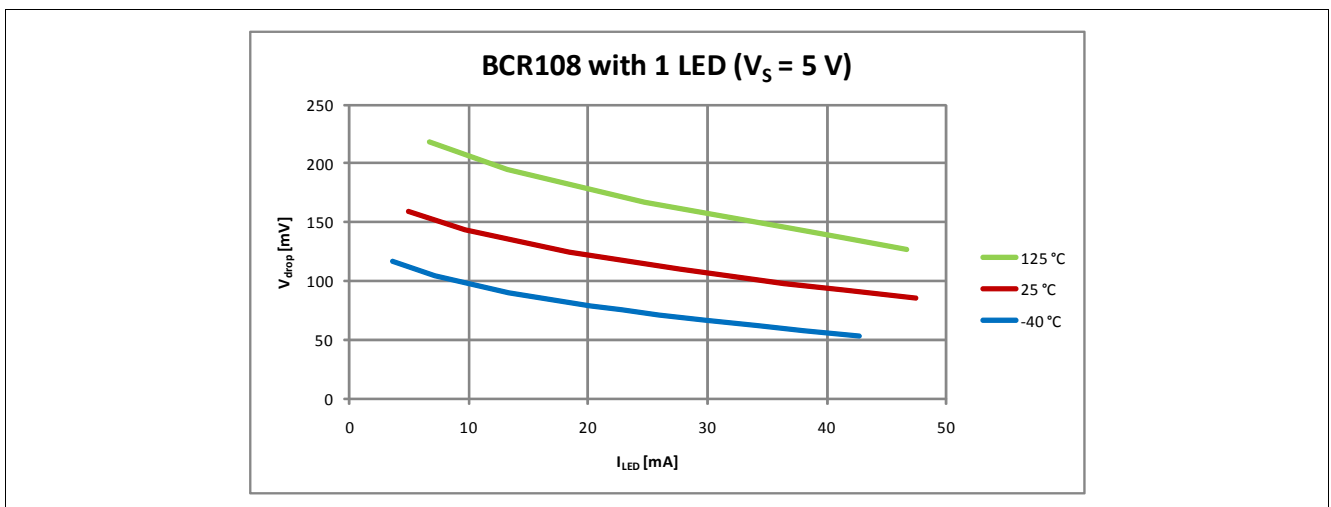
Parameter	Symbol	Values			Unit	Note / Test Condition
		Min.	Typ.	Max.		
LED current $R_1 = 2.2 \Omega, V_S = 12 \text{ V}$	$I_{LED}$	–	48	–	mA	
Voltage drop at resistor $R_1$ $R_1 = 2.2 \Omega, V_S = 12 \text{ V}$	$V_{drop}$	–	107	–	mV	
Change of $I_C$ versus $V_S$ $R_1 = 2.2 \Omega, V_S = 12 \text{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

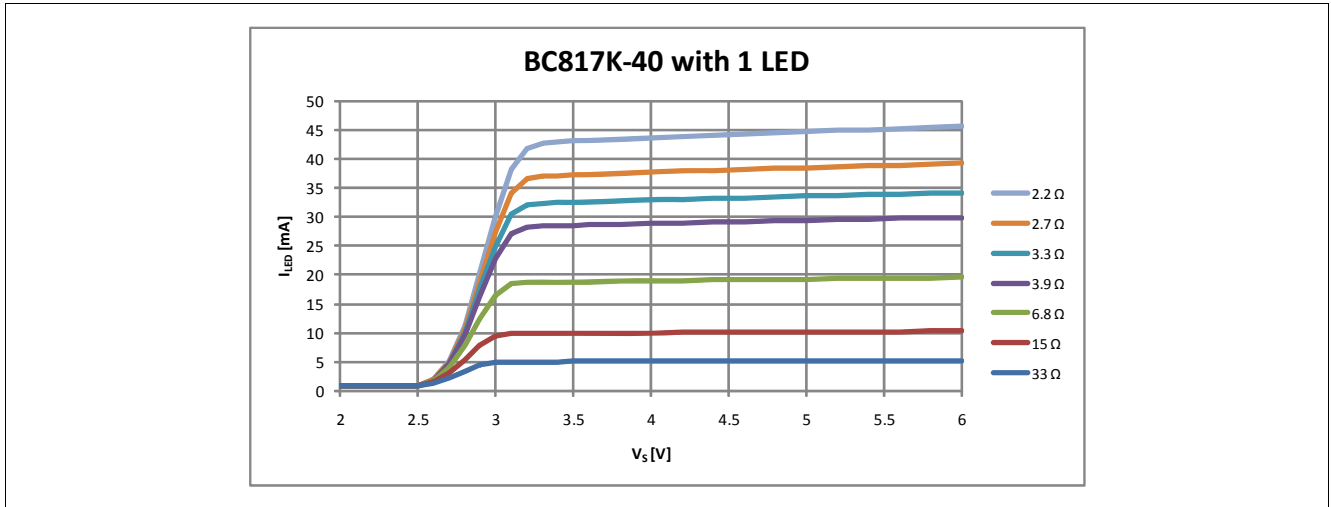


Figure 9 LED Current vs. Supply Voltage in 1 LED Application with BC817K-40

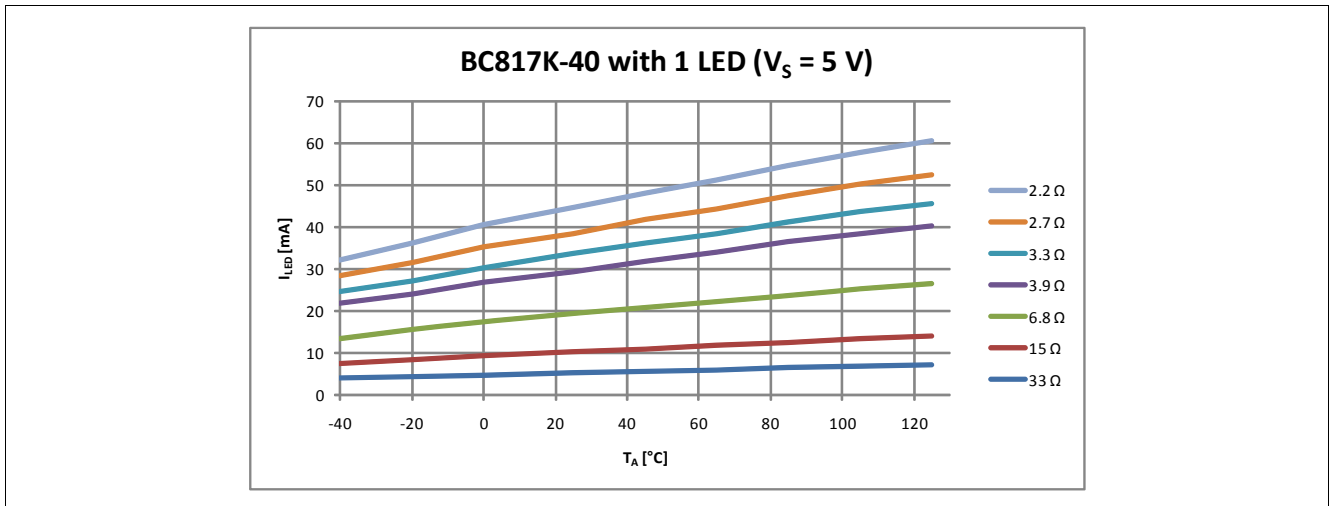


Figure 10 LED Current vs. Ambient Temperature in 1 LED Application with BC817K-40

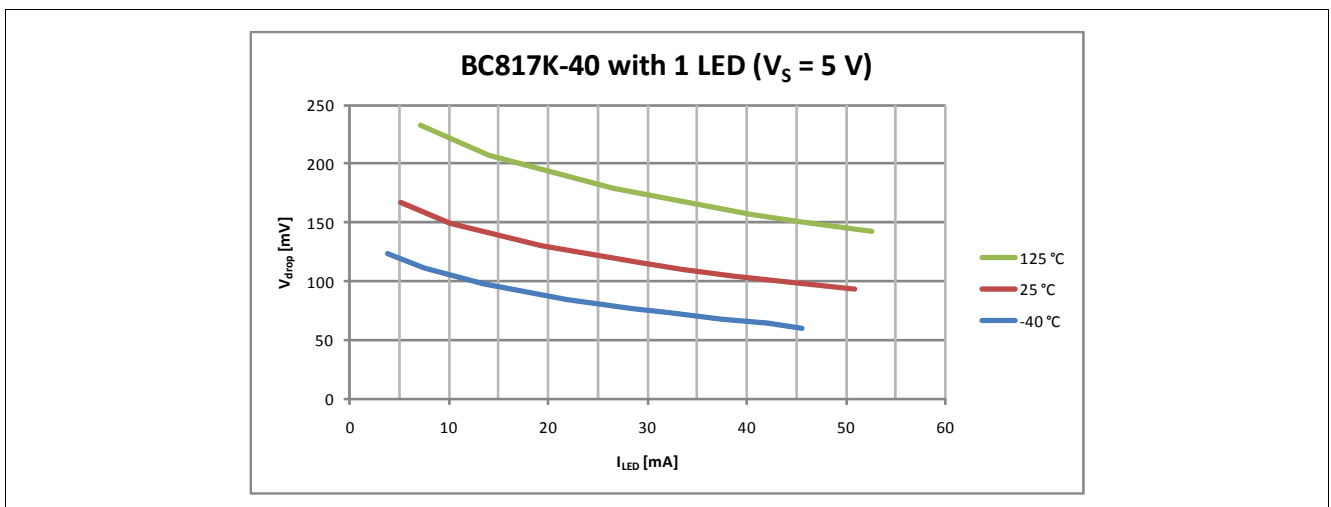


Figure 11 Drop Voltage vs. LED current in 1 LED Application with BC817K-40

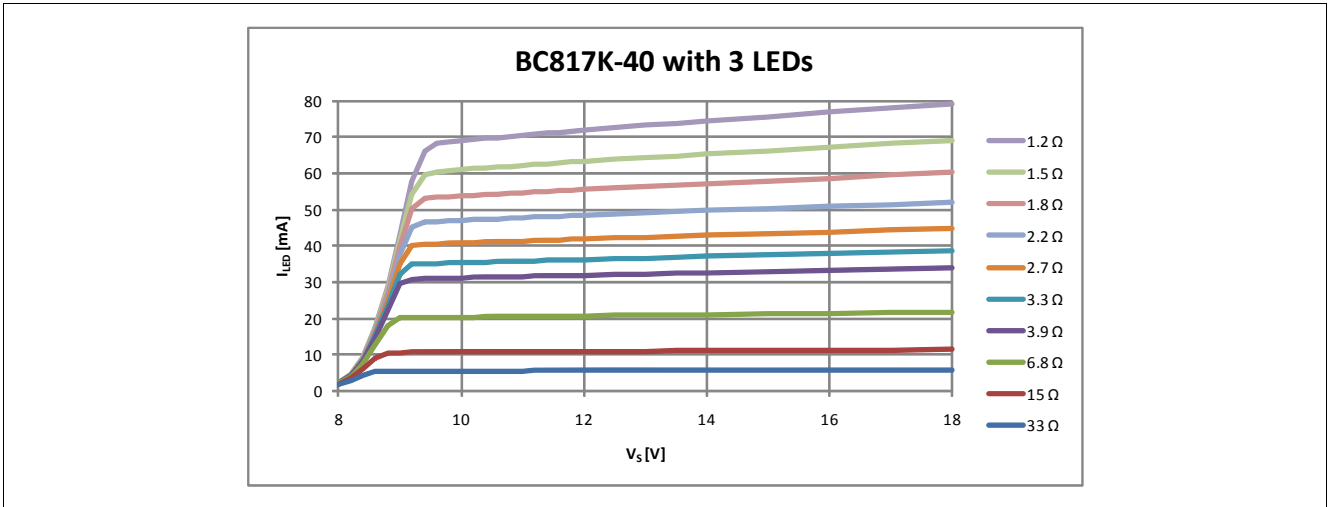


Figure 12 LED Current vs. Supply Voltage in 3 LED Application with BC817K-40

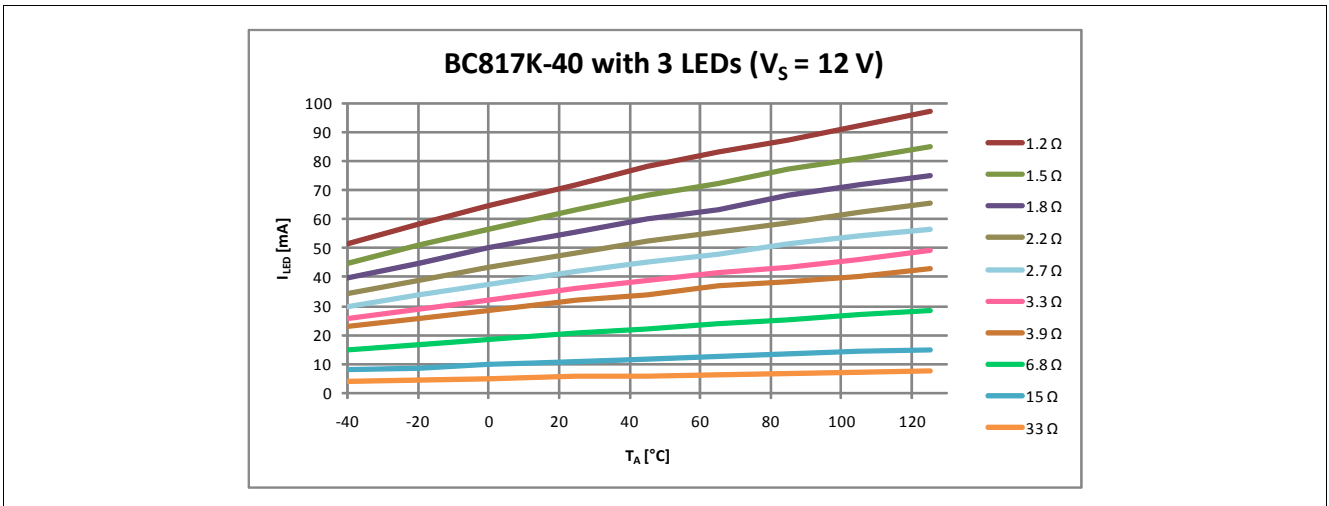


Figure 13 LED Current vs. Ambient Temperature in 3 LED Application with BC817K-40

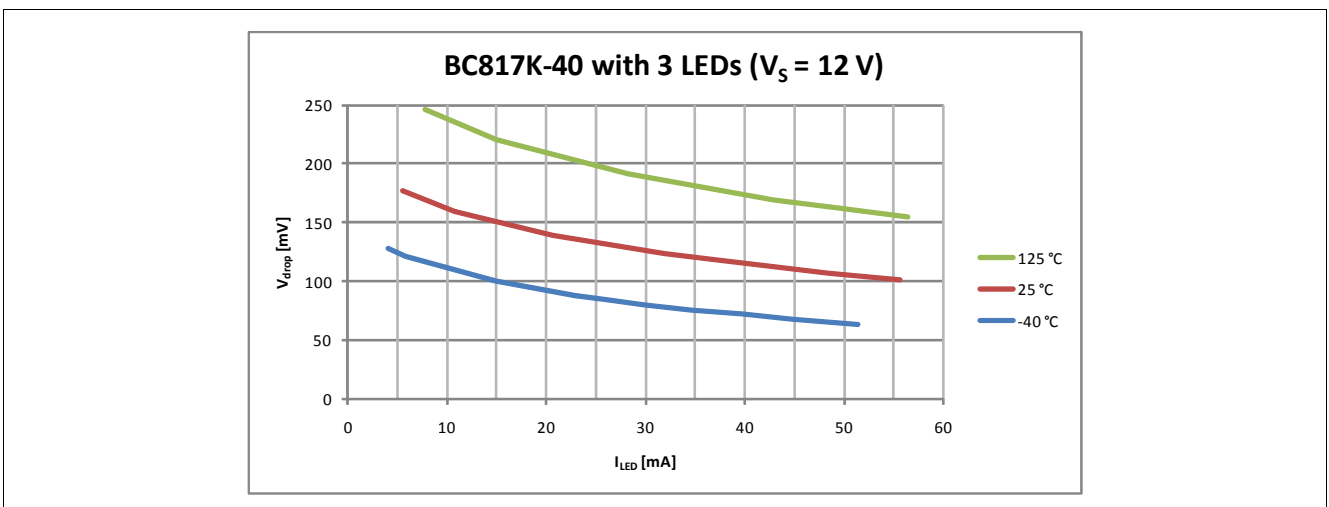


Figure 14 Drop Voltage vs. LED current in 3 LED Application with BC817K-40

## 6 Package Information

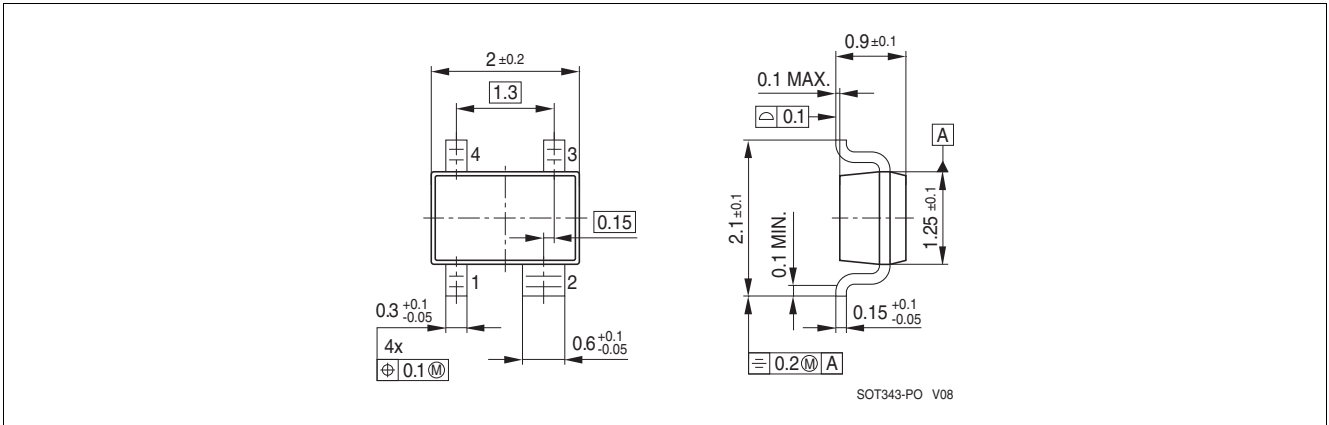


Figure 15 Package outline

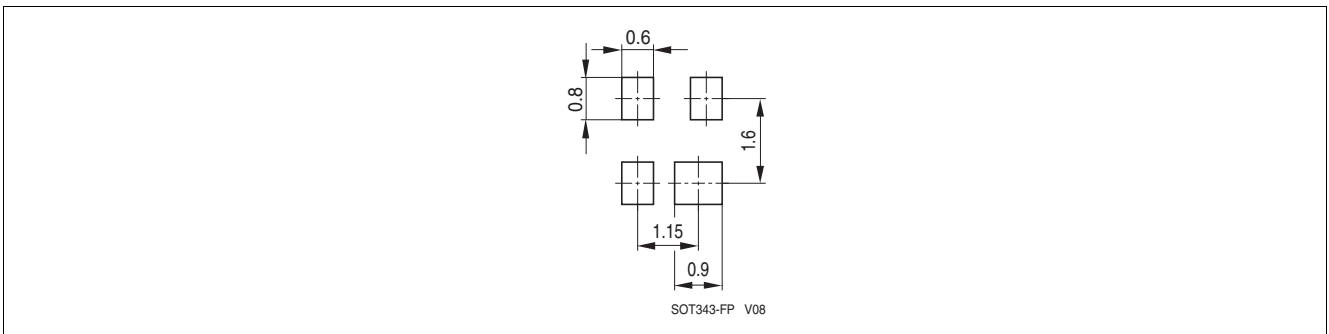


Figure 16 Recommended PCB Footprint for Reflow Soldering

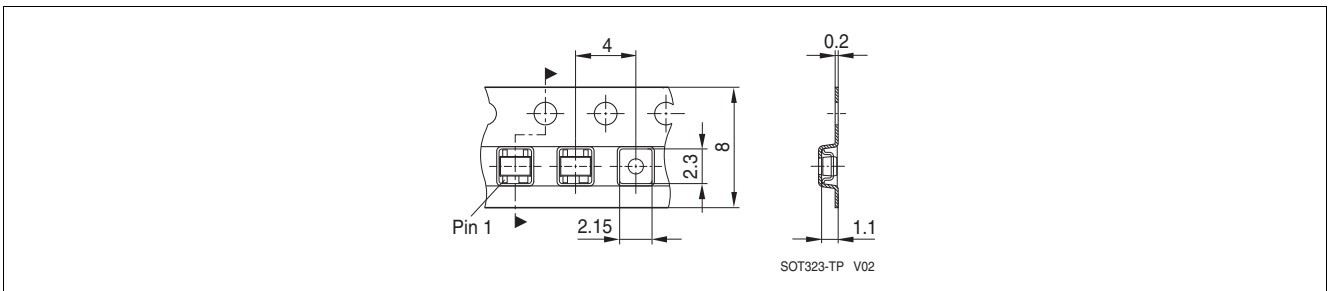


Figure 17 Tape Loading



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