



## ABSOLUTE MAXIMUM RATINGS

IN to GND.....	-0.3V to 6V
EN to GND.....	-0.3V to $V_{IN}$
OUT, BP/FB to GND.....	-0.3V to $(V_{IN}+0.3V)$
Output Short-Circuit Duration.....	Infinite
Power Dissipation, $P_D@T_A=25$	
SOT-23-5.....	0.4W
SC70-5.....	0.3W
Package Thermal Resistance	
SOT-23-5, $J_A$ .....	260 $^{\circ}C/W$
SC70-5, $J_A$ .....	330 $^{\circ}C/W$
Junction Temperature.....	150
Operating Temperature Range.....	-40 to +85
Storage Temperature Range.....	-65 to 150
Lead Temperature (Soldering, 10 sec).....	260
ESD Susceptibility	
HBM.....	2000V
MM.....	200V

### NOTE:

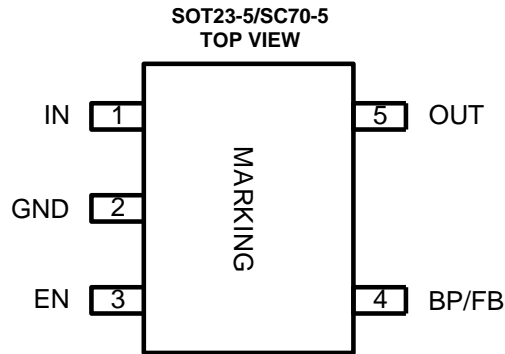
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## CAUTION

This integrated circuit can be damaged by ESD if you don't pay attention to ESD protection. Broadchip recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

Broadchip reserves the right to make any change in circuit design, specification or other related things if necessary without notice at any time. Please contact Broadchip sales office to get the latest datasheet.

## PIN CONFIGURATION



## PIN DESCRIPTION

PIN	NAME	FUNCTION
1	IN	Regulator Input. Supply voltage can range from 2.5V to 5.5V. Bypass with a 1uF capacitor to GND.
2	GND	Ground.
3	EN	Shutdown Input. A logic low reduces the supply current to 10nA. Connect to IN for normal operation.
4	BP	Reference-Noise Bypass (fixed voltage version only). Bypass with a low-leakage 0.01uF ceramic capacitor for reduced noise at the output.
	FB	Adjustable Voltage Version Only. This is used to set the output voltage of the device.
5	OUT	Regulator Output.

## ELECTRICAL CHARACTERISTICS

( $V_{IN} = V_{OUT(NOMINAL)} + 0.5V^{(1)}$ , Full = -40 to +85, unless otherwise specified.)

PARAMETER	SYM	CONDITIONS	MIN	TYP	MAX	UNITS
Input Voltage	$V_{IN}$		2.5		5.5	V
Output Voltage Accuracy <sup>(1)</sup>		$I_{OUT}=0.1mA$	-2.5		2.5	%
Maximum Output Current		SOT-23-5		300		mA
		$V_{OUT}=1.2V, 1.5V, 1.8V, SC70-5$		150		
		$V_{OUT}>2V, SC70-5$		250		
Current Limit	$I_{LIM}$			800		mA
Ground Pin Current	$I_Q$	No load, EN=2V		100	200	uA
Dropout Voltage <sup>(2)</sup>		$I_{OUT}=1mA$		0.9		mV
		$I_{OUT}=300mA$		270	400	
Line Regulation	$V_{LNR}$	$V_{IN}=2.5V$ or $(V_{OUT}+0.5V)$ to 5.5V, $I_{OUT}=1mA$		0.02	0.05	%/V
Load Regulation	$V_{LDR}$	$I_{OUT}=0.1mA$ to 300mA, $C_{OUT}=1\mu F, V_{OUT}>2V$		0.002	0.005	%/mA
		$I_{OUT}=0.1mA$ to 300mA, $C_{OUT}=1\mu F, V_{OUT} \leq 2V$		0.004	0.008	
Output Voltage Noise	$e_n$	f=10Hz to 100kHz, $C_{BP}=0.01\mu F, C_{OUT}=10\mu F$		30		$\mu V_{RMS}$
Power Supply Rejection Ratio	PSRR	$C_{BP}=0.1\mu F,$ $I_{LOAD}=50mA, C_{OUT}=1\mu F,$ $V_{IN}=V_{OUT}+1V$	f=	77		dB
			f=217Hz f=1kHz	74		
<b>SHUTDOWN<sup>(3)</sup></b>						
EN Input Threshold	$V_{IH}$	$V_{IN}=2.5V$ to 5.5V,	1.5			V
	$V_{IL}$	$V_{EN}=-0.3V$ to $V_{IN}$			0.3	
EN Input Bias Current	$I_{B(SHDN)}$	EN=0V or EN=5.5V		0.01	1	uA
Shutdown Supply Current	$I_{Q(SHDN)}$	EN=0.4V		0.01		uA
Shutdown Exit Delay <sup>(4)</sup>		$C_{BP}=0.01\mu F, C_{OUT}=1\mu F,$ No Load		30		us
<b>THERMAL PROTECTION</b>						
Thermal Shutdown Temperature	$T_{SHDN}$			150		°C
Thermal Shutdown Hysteresis	$T_{SHDN}$			15		°C

### NOTES:

- $V_{IN} = V_{OUT(NOMINAL)} + 0.5V$  or 2.5V, whichever is greater.
- The dropout voltage is defined as  $V_{IN} - V_{OUT}$ , when  $V_{OUT}$  is 100mV below the value of  $V_{OUT}$  for  $V_{IN} = V_{OUT} + 0.5V$ .  
(Only applicable for  $V_{OUT} = +2.5V$  to  $+5.0V$ .)
- $V_{EN} = -0.3V$  to  $V_{IN}$
- Time needed for  $V_{OUT}$  to reach 90% of final value.

Ver 1.5

## TYPICAL APPLICATION CIRCUIT

### Standard 1% Resistor Values for Common Output Voltages of Adjustable Voltage Version

VOUT (V)	R1 (k )	R2 (k )
1.2	0	

Ver 1.5

---

## Programming the BCT2019 Adjustable LDO regulator

The output voltage of the BCT2019 adjustable regulator is programmed using an external resistor divider as show in Figure as below. The output voltage is calculated using equation as below:

$$V_{OUT} = V_{REF} \times \left( 1 + \frac{R1}{R2} \right)$$

Where:

$V_{REF}=1.207V$  typ (the internal reference voltage)

Resistors R1 and R2 should be chosen for approximately 50uA divider current. Lower value resistors can



---

$$P_D(\text{MAX}) = (125^\circ\text{C} - 25^\circ\text{C}) / 250 = 400\text{mW (SOT-23-5)}$$

The maximum power dissipation depends on operating ambient temperature for fixed  $T_J(\text{MAX})$  and thermal resistance  $\theta_{JA}$ . It is also useful to calculate the junction temperature of the BCT2019 under a set of specific conditions. In this example let the Input voltage  $V_{IN}=3.3\text{V}$ , the output current  $I_o=300\text{mA}$  and the case temperature  $T_A=40^\circ\text{C}$  measured by a thermal couple during operation. The power dissipation for the  $V_o=2.8\text{V}$  version of the BCT2019 can be calculated as:

$$P_D = (3.3\text{V} - 2.8\text{V}) \times 300\text{mA} + 3.6\text{V} \times 100\mu\text{A} \\ = 150\text{mW}$$

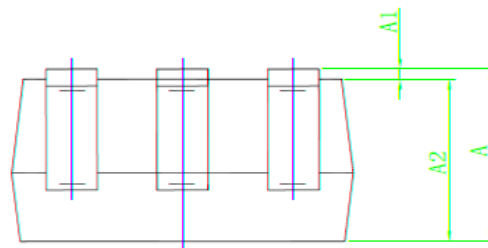
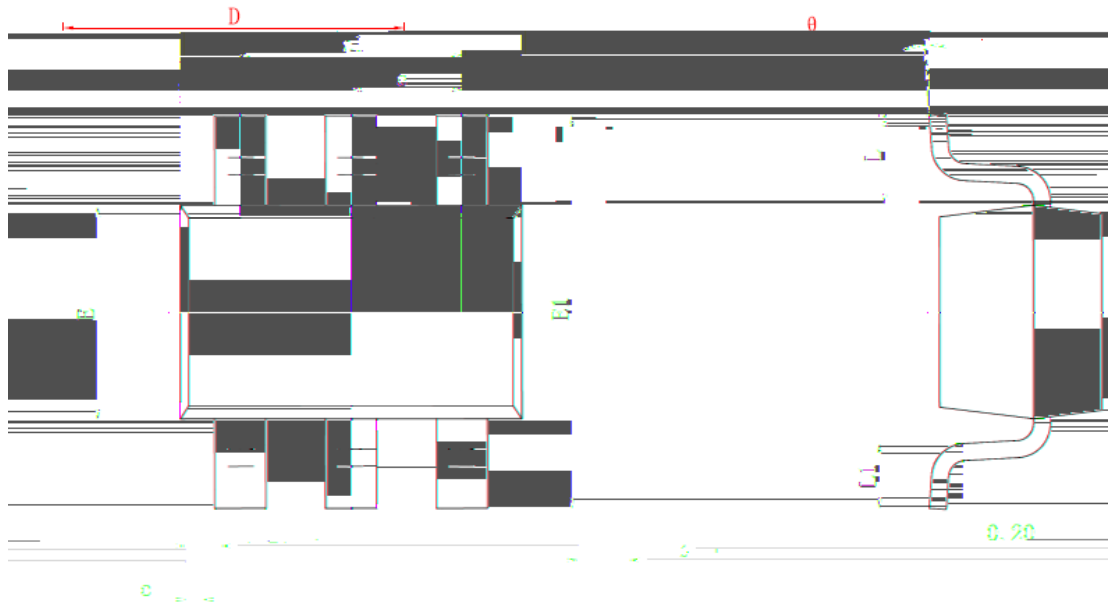
And the junction temperature,  $T_J$ , can be calculated as follows:

$$T_J = T_A + P_D \times \theta_{JA} = 40^\circ\text{C} + 0.15\text{W} \times 250^\circ\text{C/W} \\ = 40^\circ\text{C} + 37.5^\circ\text{C} = 77.5^\circ\text{C} < T_J(\text{MAX}) = 125^\circ\text{C}$$

For this operating condition,  $T_J$  is lower than the absolute maximum operating junction temperature,  $125^\circ\text{C}$ , so it is safe to use the BCT2019 in this configuration.

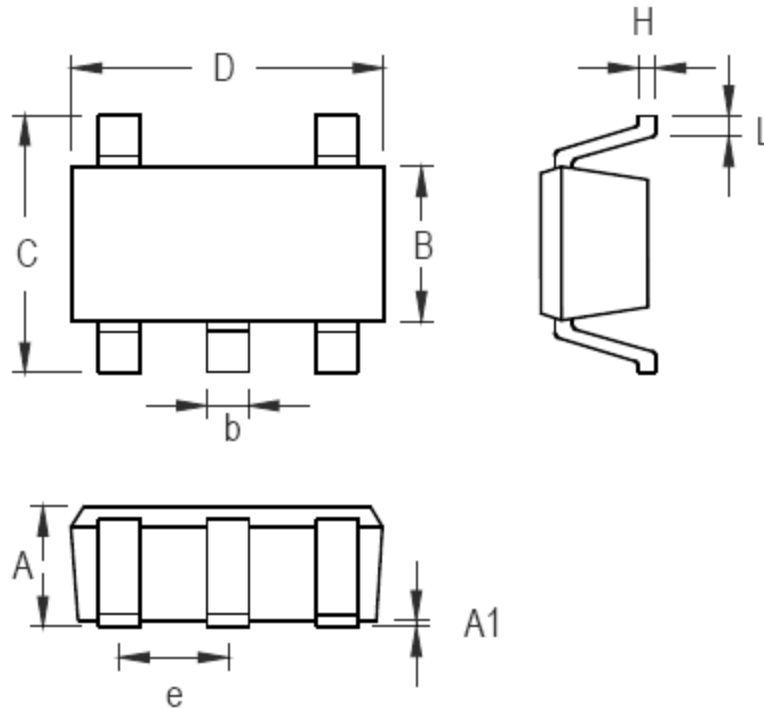
# PACKAGE OUTLINE DIMENSIONS

Packaging Mechanical: SC70 (C)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.100	0.035	0.043
A1	0.000	0.100	0.000	0.004
A2	0.900	1.000	0.035	0.039
b	0.150	0.350	0.006	0.014

**Packaging Mechanical: SOT23-5**



Symbol	Dimensions In Millimeters	
	Min	Max
A	1.05	1.15
A1	0.03	0.15
B	1.5	1.7
b	0.28	0.45
C	2.75	3.05
D	2.82	3.02
e	0.95(BSC)	
H	0.12	0.23
L	0.35	0.55

SOT-23-5 Surface Mount Package