

# BCT3401

## PWM/PFM Automatic Controlled DC-DC Converters - Backlight Driver

### GENERAL DESCRIPTION

The BCT3401 is a high efficiency synchronous DC-DC step-down converter designed to drive LED, using a constant frequency and current. The 100% duty cycle ,Automatic PWM/PFM mode and a low 100mV feedback voltage minimizes power loss in the current setting resistor ,these feature increases efficiency, extending battery life in portable systems.

At shutdown mode, the input supply current is less than 1 $\mu$ A.

The current limit protection features provide protection against any combination of overload.

The BCT3401 is available in a 5-pin SOT23-5 package, which provides a compact solution with minimal external components.

### FEATURES

- 2.5V~5.5V Input Voltage Range
- 1.2A Output Current
- 1.5MHz Switching Frequency Minimizes the External Components
- Shutdown Current : <1 $\mu$ A
- Up to 92% efficiency
- 100% Duty Cycle in Dropout Operation
- Internal soft-start
- PWM dimming
- Output short protection
- Thermal Protection
- SOT23-5 Packages

### APPLICATIONS

- LED Driver

### ORDERING INFORMATION

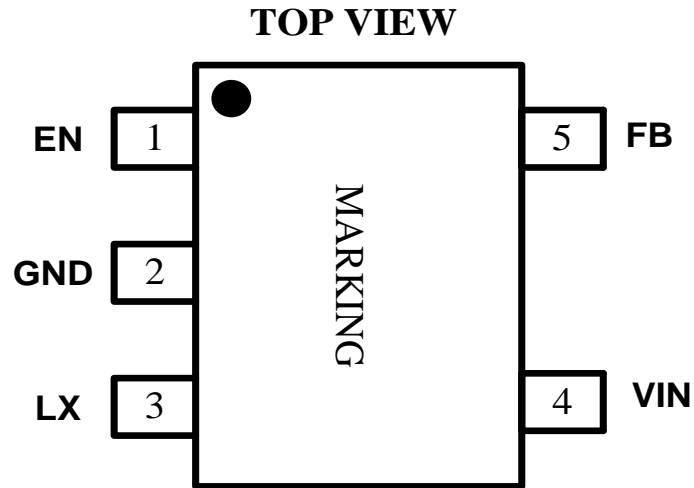
Order Number	Package Type	Temperature Range	Marking	QTY/Reel
BCT3401EUK-TR	SOT23-5	-40°C to +85°C	DEXX	3000

Note:

"DE" in Marking is product short code for BCT3401.

"XX" in Marking will be appeared as the batch code.

## PIN CONFIGURATION



## PIN DESCRIPTION

PIN	NAME	FUNCTION
1	EN	Chip enable pin, high to turn on the Chip and low to turn off the Chip.
2	GND	Power ground pin.
3	LX	Switching Output
4	VIN	Power Input. Must be closely decoupled to GND with a 4.7 $\mu$ F or greater ceramic capacitor.
5	FB	feedback Voltage pin.

## Typical Operating Circuit

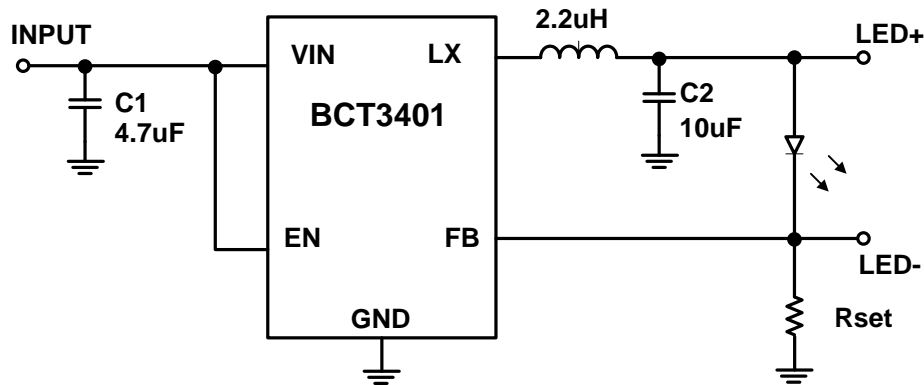


Figure 1 Typical application

**Note:**  $I_{LED} = 100mV/R_{SET}$

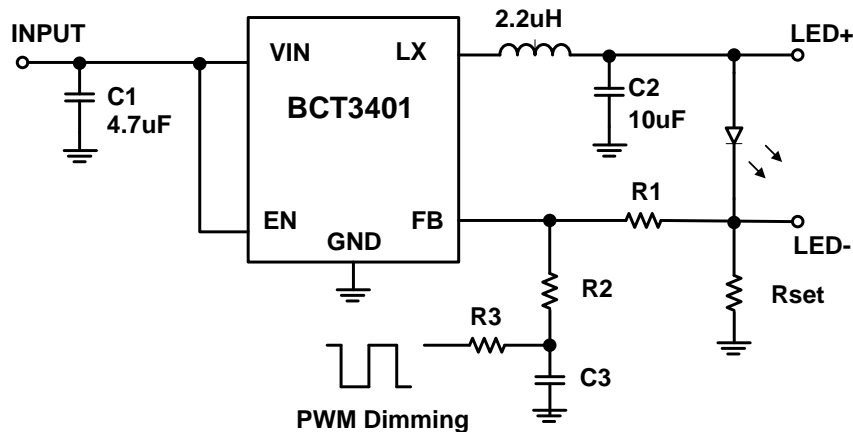


Figure 2 Typical application circuits with PWM dimming signal

Calculate  $I_{LED}$  using the following equations

$$I_{LED} = \frac{0.1 - \frac{R1 \times (VPWM \times DUTY - 0.1)}{(R2 + R3)}}{RSET}$$

Where VPWM is the amplitude of PWM signal.

For example, for 3.3V VPWM, R1=4.7K, R2=100K, R3=47K.

The value of C3 depends on the frequency of PWM dimming; an empirical suggestion is around 0.1uF for MHz and 10uF for low frequency under KHz



## ABSOLUTE MAXIMUM RATINGS

Input Supply Voltage.....	-0.3V to 6.5V
EN, FB ,LX PIN .....	-0.3V to VIN+0.3V
Storage Temperature Range.....	-65°C to +150°C
Junction Temperature.....	150°C
Operating Temperature Range.....	-40°C to +85°C
Lead Temperature (Soldering, 10 sec).....	260°C
Package Thermal Resistance( $\theta_{JA}$ )	
SOT23-5.....	250°C/W
Package Thermal Resistance( $\theta_{JC}$ )	
SOT23-5.....	110°C/W

## RECOMMENDED OPERATING CONDITIONS

Operating Voltage Range.....	2.5V to 5.5V
Operating Temperature Range .....	-40°C to +85°C

## OVERSTRESS CAUTION

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.

## ESD SENSITIVITY 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.

## DISCLAIMER

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.

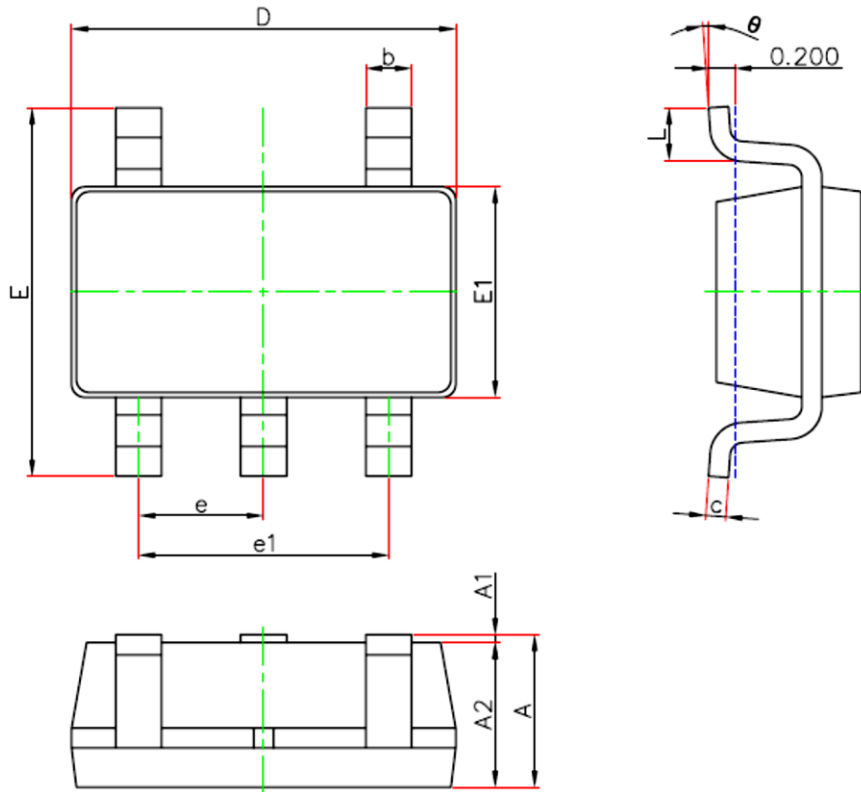
## ELECTRICAL CHARACTERISTICS

(VIN= 5V,L=2.2uH, TA = 25°C, unless otherwise specified.)

PARAMETER	SYM	CONDITIONS	MIN	TYP	MAX	UNITS
Feedback Voltage	V <sub>FB</sub>		0.09	0.1	0.11	V
Input Supply Voltage	V <sub>IN</sub>		2.5		5.5	V
Line regulation	ΔV <sub>OUT</sub>	I <sub>LED</sub> =300mA		0.45		%
Efficiency	E <sub>EFF</sub>	I <sub>LED</sub> =200mA		92		%
EN "Low" voltage	V <sub>ENL</sub>				0.7	V
EN "High" voltage	V <sub>ENH</sub>		1.1			V
Shutdown Current	I <sub>SHDN</sub>	V <sub>EN</sub> =0V			1	uA
Quiescent Current	I <sub>Q</sub>	V <sub>FB</sub> =0.1V*0.9		300		uA
Switch Current Limit	I <sub>LIM</sub>			1800		mA
PFM Switch Point	I <sub>PFM</sub>	I <sub>N</sub> =5V		100		mA
Oscillation Frequency	F <sub>OSC</sub>	I <sub>LED</sub> =500mA		1.5		MHz
Max Duty Circle	M <sub>AXDTY</sub>		100			%

## PACKAGE OUTLINE DIMENSIONS

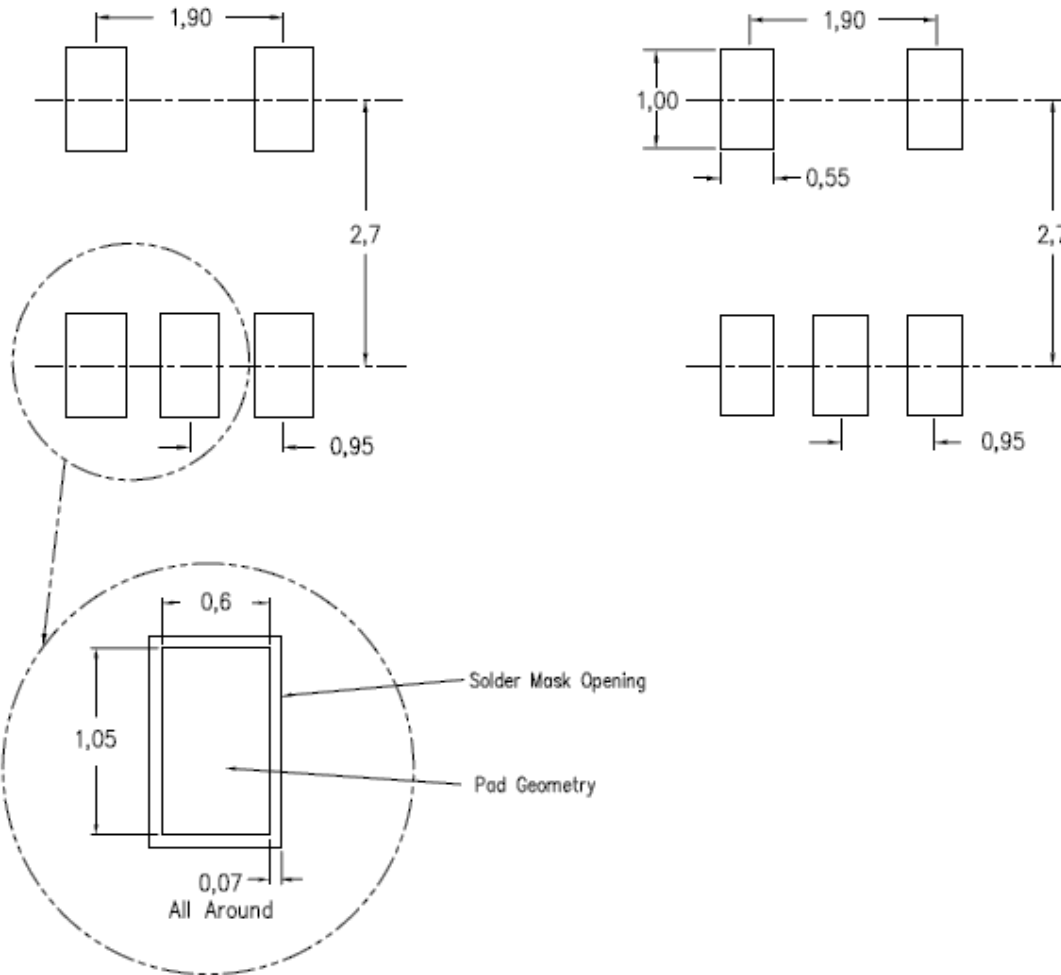
SOT23-5



Symbol	Dimensions In Millimeters	
	Min	Max
A	1.05	1.3
A1	0	0.15
A2	1.05	1.15
b	0.28	0.5
c	0.1	0.23
D	2.82	3.02
E1	1.5	1.7
E	2.65	3.05
e	0.95(BSC)	
e1	1.8	2
L	0.3	0.6
$\theta$	0	8°

SOT-23-5 Surface Mount Package

**PCB Layout Pattern: SOT23-5**



**RECOMMENDED PCB LAYOUT PATTERN (Unit: mm)**