Advance Datasheet

Low-Power Off-line Primary Side Regulation Controller BCT001

General Description

The BCT001 is a high performance AC/DC power supply controller for battery charger and adapter applications. The device uses Pulse Frequency Modulation (PFM) method to build discontinuous conduction mode (DCM) flyback power supplies.

The BCT001 provides accurate constant voltage, constant current (CV/CC) regulation without requiring an opto-coupler and the secondary control circuitry. It also eliminates the need of loop compensation circuitry while maintaining good stability. The BCT001 can achieve excellent regulation and high average efficiency, yet meets no-load consumption less than 30mW.

The BCT001 has a proprietary cable voltage drop compensation function. The magnitude of the cable compensation voltage can be set by the external resistor. It also has an adjustable built-in line compensation function to achieve tight CC.

The BCT001 is available in SOT-23-6 package.

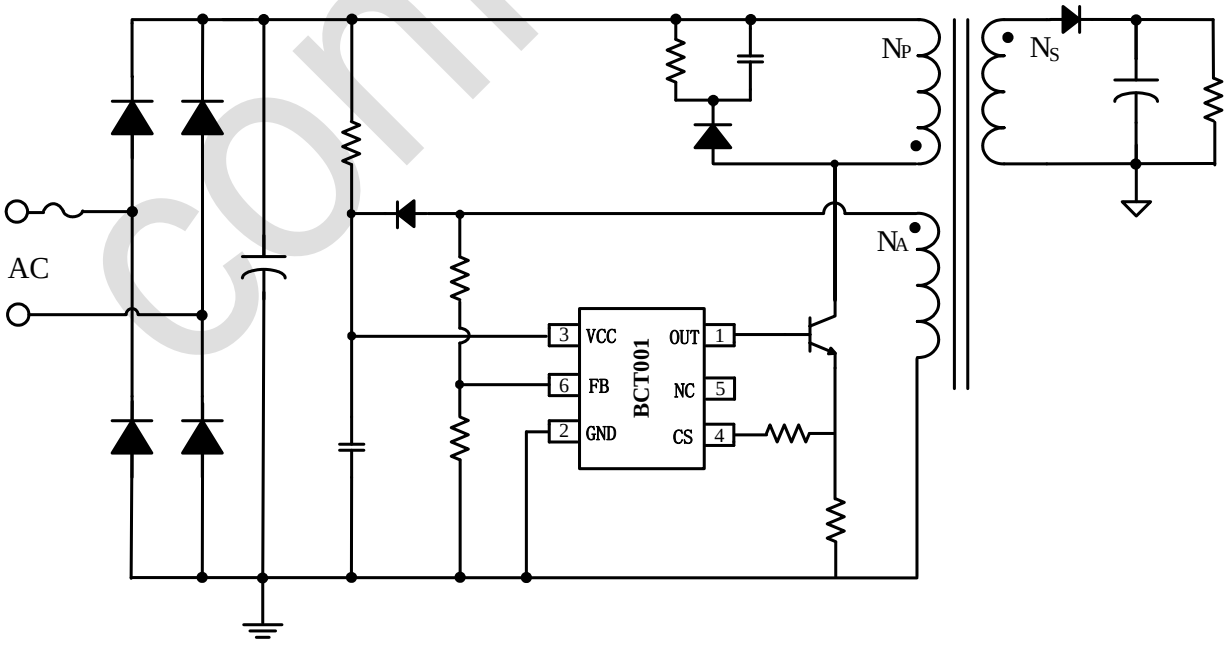
Features

- Primary Side Control for Tight Constant Current and Constant Voltage
- 30mW No-load Input Power
- Bipolar Junction Transistor (BJT) Driving
- Proprietary Adjustable Cable voltage drop Compensation
- Proprietary Adjustable Line Compensation for CC Variation
- Random Frequency Modulation to Reduce System EMI
- Enhanced Audio Noise Suppression
- Open Circuit Protection
- Over Voltage Protection
- Short Circuit Protection
- SOT-23-6 package

Applications

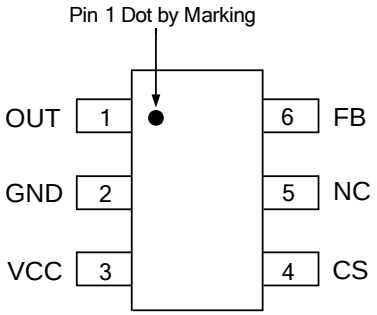
- Adapters/Chargers for Cell/cordless Phones, PDAs, MP3 and Other Portable Devices
- LED Driver
- Standby and Auxiliary Power Supplies

Typical Application



Pin Configuration

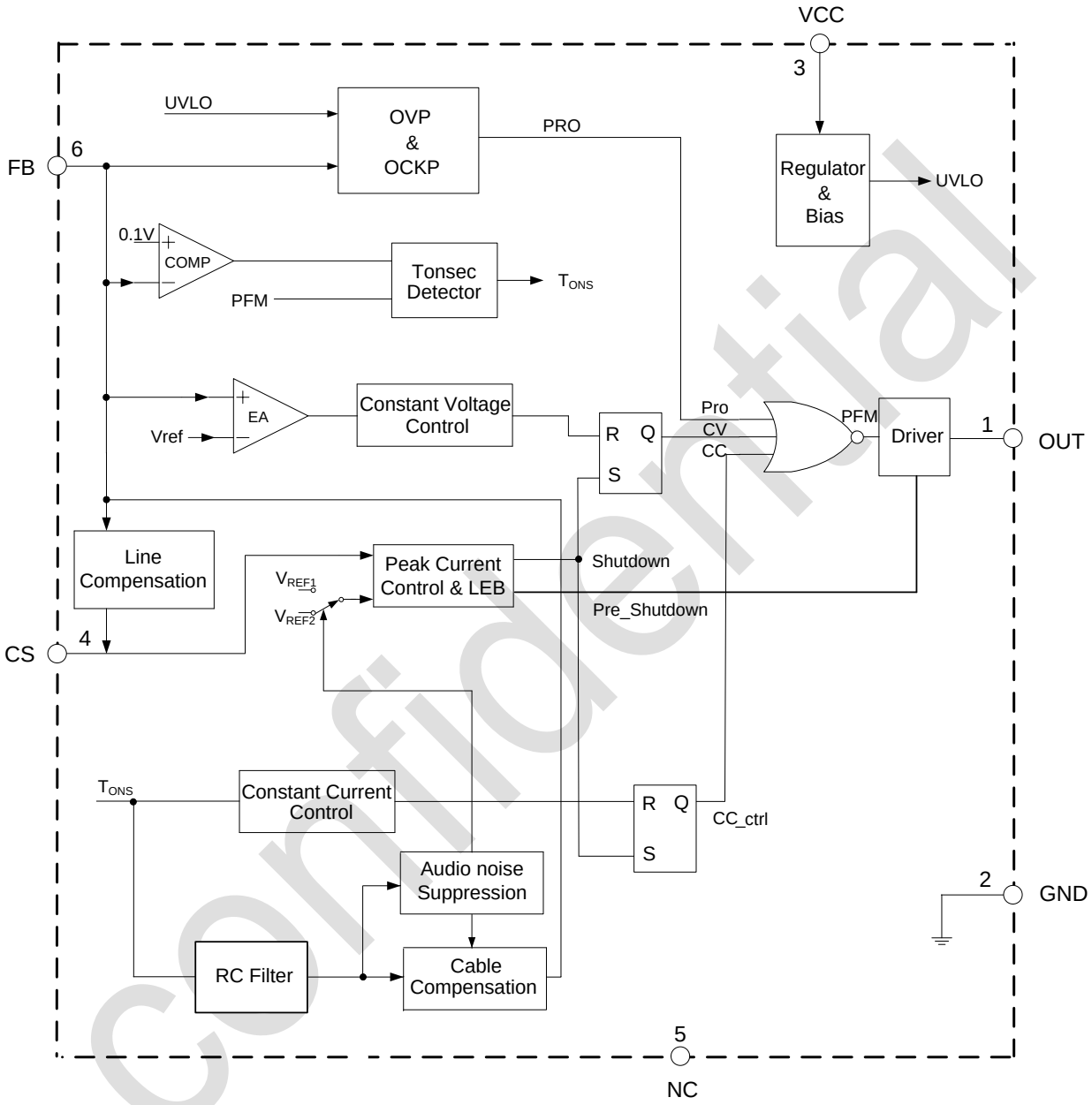
K6 Package
(SOT-23-6)



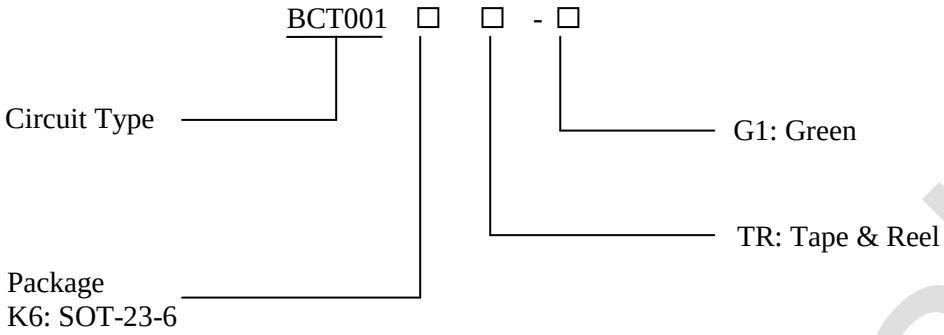
Pin Description

Pin Number	Pin Name	Function
1	OUT	The OUT pin is used to turn on and turn off the power switch. When turning on the power switch, the OUT pin will output 30mA source current to support the base current of the power BJT. When turning off the power switch, the resistance between the OUT and GND will become to 5Ω
2	GND	The GND pin is the ground of the IC. When the power BJT is turned off, a fast reverse sinking current to the gate of BJT will flow out from this pin. Attention should be paid to in the PCB layout
3	VCC	The VCC pin supplies the power for the IC. In order to get the correct operation of the IC, a capacitor with low ESR should be placed as close as possible to the VCC pin
4	CS	The CS is the current sense pin of the IC. The IC will turn off the power BJT according to the voltage on the CS pin. When the power BJT is on, a current is output from the CS pin which is proportional to the line voltage to realize the function of line compensation
5	NC	This pin must be floating.
6	FB	The CV and CC regulation are realized based on the voltage sampling of this pin

Functional Block Diagram



Ordering Information



Package	Temperature Range	Part Number	Marking ID	Packing Type
SOT-23-6	-40 to 85°C	BCT001A	CJC	Tape & Reel
SOT-23-6	-40 to 85°C	BCT001B	CJG	Tape & Reel

Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	-0.3 to 30	V
CS to GND	Vcs	-0.3 to 7	V
FB Input Voltage	V_{FB}	-40 to 8.5	V
Source Current at OUT Pin	I_{SOURCE}	Internally Limited	A
Operating Junction Temperature	T_J	150	℃
Storage Temperature	T_{STG}	-65 to 150	℃
Lead Temperature (Soldering, 10 sec)	T_{LEAD}	300	℃
Thermal Resistance (Junction to Ambient)	θ_{JA}	250	℃/W
ESD (Human Body Model)		2000	V

Note 1: Stresses greater than 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 under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.

Electrical Characteristics

V_{CC} =15V, T_A=25 ℃, unless otherwise specified.

Parameter		Symbol	Conditions	Min	Typ	Max	Unit
UVLO SECTION							
Startup Threshold		V_{ST}		13	15.5	18	V
Minimal Operating Voltage		V_{UVLO}		3.5	4	4.5	V
STANDBY CURRENT SECTION							
Startup Current		I_{ST}	V_{CC}=V_{TH} (ST)-1V, Before Startup	0	0.2	0.6	μA
Operating Current		I_{CC}	Static current		500		
DRIVE OUTPUT SECTION							
Output Current	Sink	I_{sink}	Apply 1V @OUT pin	150	200	330	mA
	Source	I_{SOURCE}		24	30	40	mA
Maximum Off Time		T_{OFFMAX}			18		ms
CURRENT SENSE SECTION							
Current Sense Threshold Voltage at CC Mode		V_{CS1}			500		mV
Current Sense Threshold Voltage at light load		V_{CS2}			330		mV
Leading Edge Blanking		T_{LEB}	The minimum POWER SWITCH turn on time		500		ns
FEEDBACK INPUT SECTION							
Input Resistance of FB Pin		R_{FB}	V_{FB}=4V	1	1.6	2	MΩ
Feedback Threshold		V_{FB}		3.94	4	4.06	V
LINE COMPENSATION SECTION							
Line Compensation Voltage		V_{COMP_LINE}	Vfb=-10V,R_{LINE}=30KΩ (Figure. 4)		120		mV
CABLE COMPENSATION SECTION							
Sink Current of FB Pin		Ifb	100% output current		100		μA
PROTECTION SECTION							
Over Voltage Protection		V_{FBOVP}		6	6.5	7	V
Max. On Time of Primary Side		$Tonp_{MAX}$			25		μs

Typical Performance Characteristics

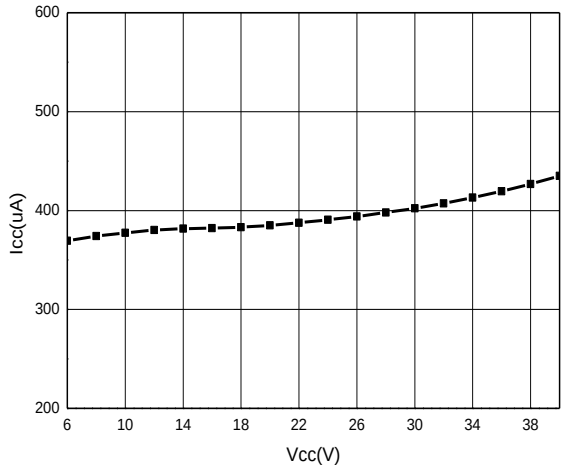


Figure 1. Operating Current Vs. Vcc Voltage

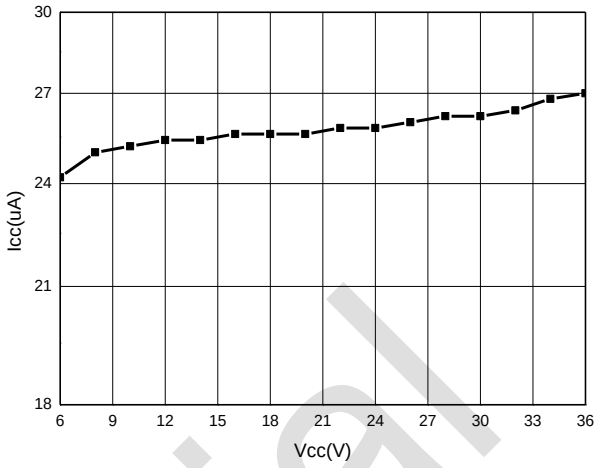


Figure 2. Drive Current Vs. Vcc Voltage

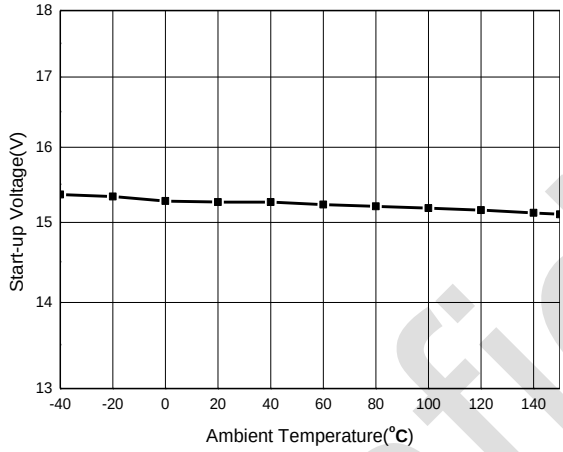


Figure 3. Startup Voltage Vs. Temperature

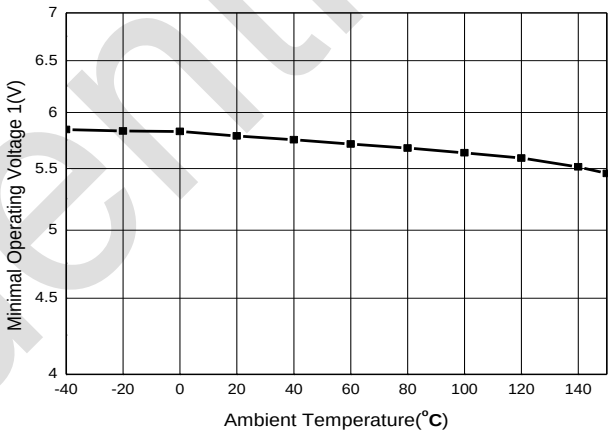


Figure 4. Minimal Operation Voltage Vs. Temperature

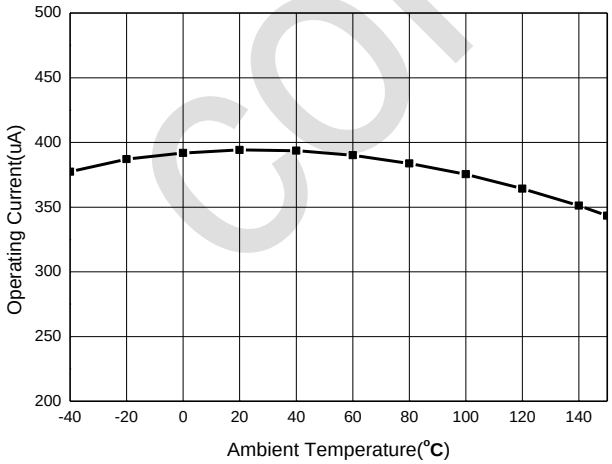


Figure 5. Operating Current Vs. Temperature

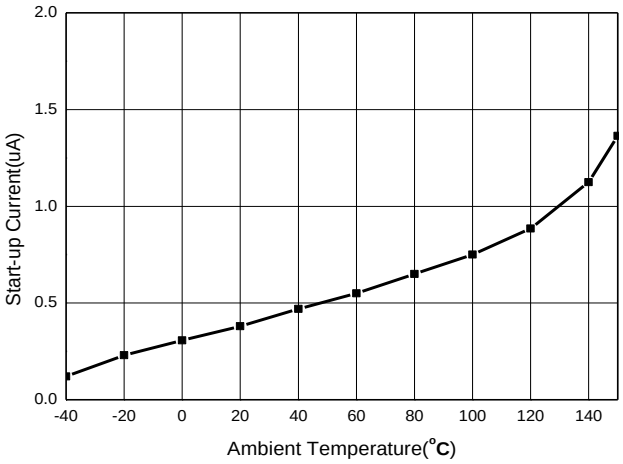


Figure 6. Startup Current Vs. Temperature

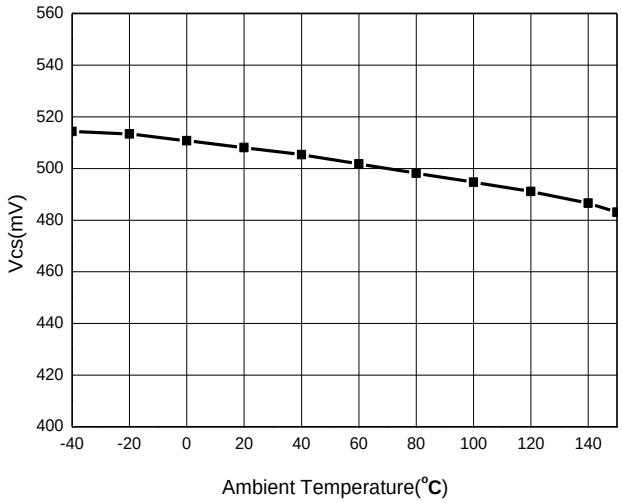


Figure 7. Vcs Vs. Temperature

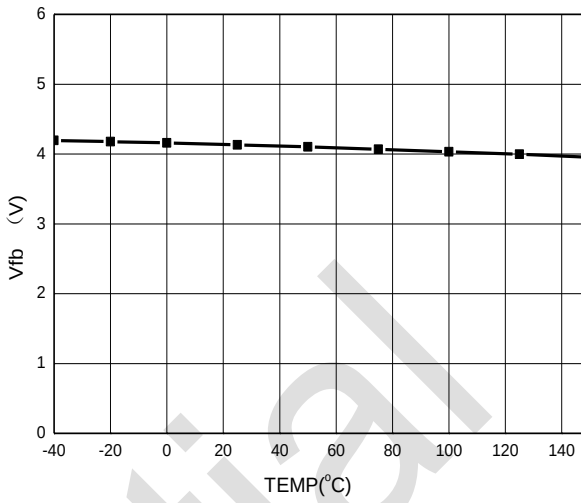


Figure 8. Vfb Vs. Temperature

Mechanical Dimensions

SOT-23-6 **Unit: mm(inch)**