BCT530X

Ceramic Heat Controller

General Description

BCT530x is designed for ceramic heating control. It can set the temperature, drive SCR directly, detect and control the heater temperature by using heater itself without temperature sensor. It has the option of keys to turn on/off, adjust fast or slow heating up speed, and indicate the working status by different of LEDs, to meet customer needs. Some are also build-in AC timer and it will power off after turn on for 1 hour for 60Hz and 1.2 hour for 50Hz.

Applications

- Ceramic heating controller

Features

- Advanced Zero-triggered Circuit for better EMC performance
- High current pulse trigger for SCR
- Quickly Heating-Up and Quickly Lost Heat Recover
- Dual voltage (110VAC / 220VAC)
- Internal 5v zener
- Insensitive to environment temperature
- Auto power off（Optional）
- DIP-8 and SOIC-8 package

Ordering Information

1. With one or two keys option

Part No.	Package	
BCT530xLPE*	Low overshot when preheat	Lead free 8-pin DIP
BCT530xLWE*		Lead free 8-pin SOIC
BCT530xHPE*	High overshot when preheat	Lead free 8-pin DIP
BCT530xHWE*		Lead free8-pin SOIC

Note: : “x” is 0~7 with different function see *Function Comparison Table*.

Function Comparison Table

Part No.	LED	Timer	On/OFF Key
BCT5300H/L	Flash	Y	Two Key
BCT5301H/L	Constant	Y	Two Key
BCT5302H/L	Flash	N	Two Key
BCT5303H/L	Constant	N	Two Key
BCT5304H/L	Flash	Y	One Key
BCT5305H/L	Constant	Y	One Key
BCT5306H/L	Flash	N	One Key
BCT5307H/L	Constant	N	One Key

2. With no key option

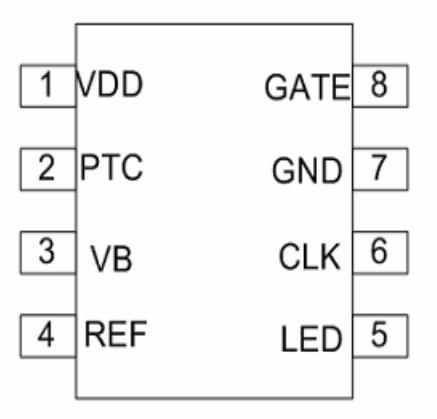
Part No. Package		
BCT530xAPE*	High overshot when preheat	Lead free 8-pin DIP
BCT530xAWE*		Lead free 8-pin SOIC
BCT530xBPE*	Low overshot when preheat	Lead free 8-pin DIP
BCT530xBWE*		Lead free8-pin SOIC

Note: : "x" is 0~7 with different function see *Function Comparison Table*.

Function Comparison Table

Part No.	LED	Timer	On/OFF Key
BCT5300A/B	Flash	Y	No Key
BCT5301A/B	Constant	Y	No Key
BCT5302A/B	Flash	N	No Key
BCT5303A/B	Constant	N	No Key

Pin Configuration

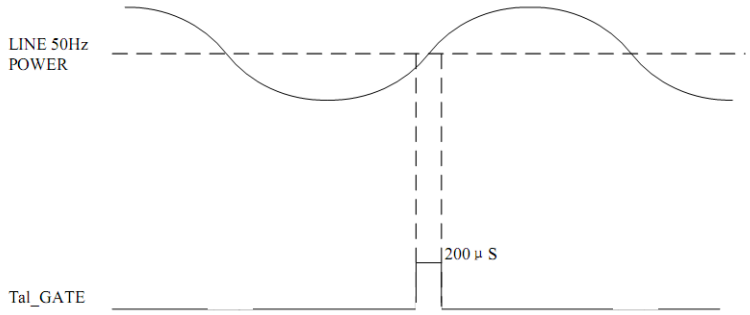


Pin Description

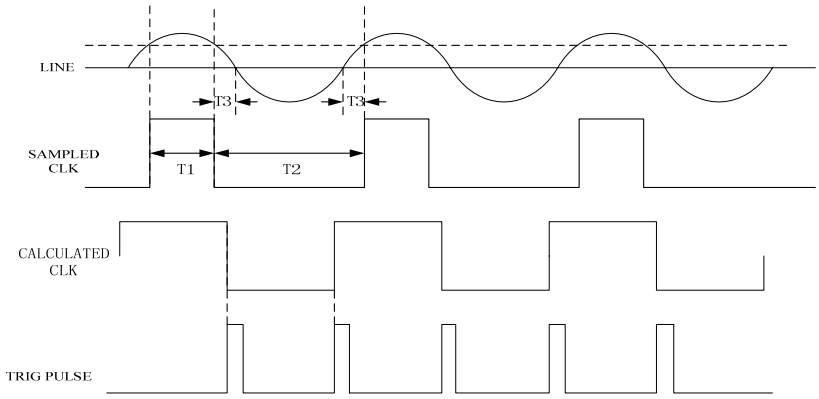
Name	Pin No.	Type	Description
VDD	1	power	Power input or OFF button in two key option
PTC	2	I	Temperature detect input or ON button in two key option or ON/OFF button in one key option ,internal pull high
VB	3	O	Sampling bias voltage
REF	4	O	Reference for the internal comparator
LED	5	O	LED indication output
CLK	6	I	Clock input from AC power line
GND	7	power	Power Ground
GATE	8	O	SCR trigger output, active high

Function description

1. High Current pulse triggering for SCR
   - High trigger peak current (>15mA), enough to trigger 20A SCR
   - Pulse triggering current to reduce the false self trigger by the leakage of SCR at high temperature environment.
   - Tal_GATE = 200us



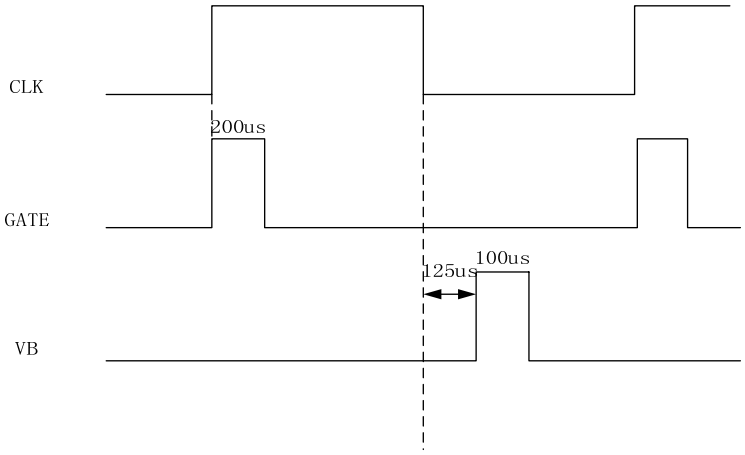
2. Advanced Zero-triggered Circuit
   - Digital way to calculate the Zero point, mor accurate
   - Comparator will not need to detect small voltage or minus voltage, which will be effected by interference of the AC line.



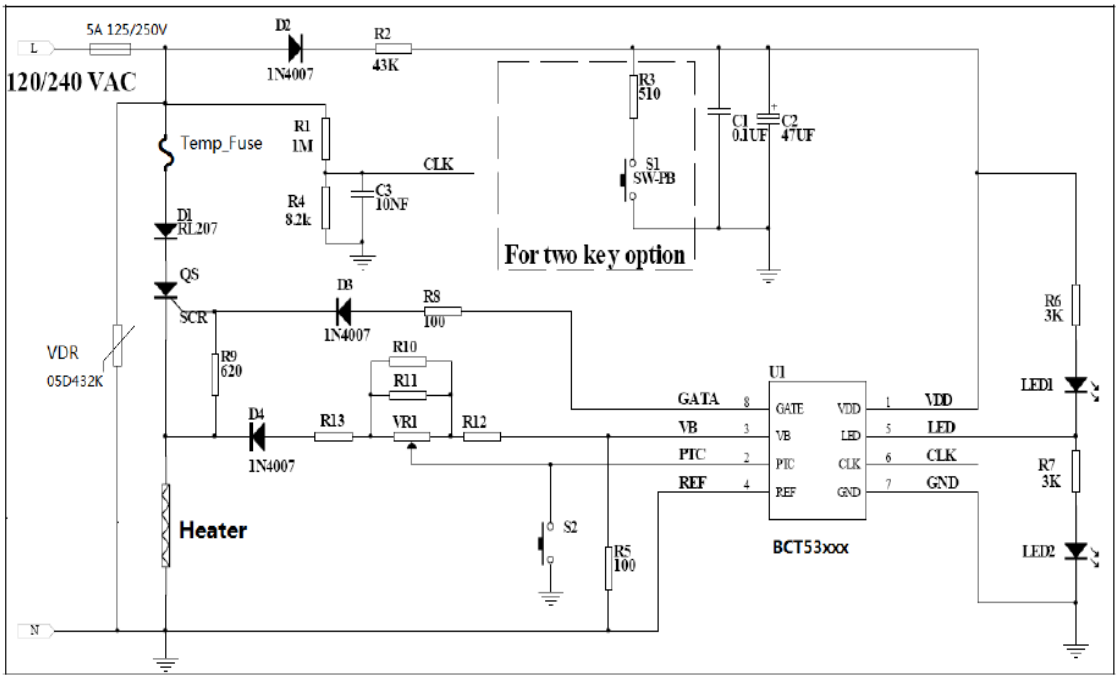
3. Reset
   - After power on the chip will be reset by POR circuit,
   - LED is disabled. GATE is low level.
4. Key option
   - One key: (Only for BCT5304/5/6/7(H/L))
     The PTC input will toggle Heating-on and Heating-off key function. Once Heating-on the heater will rise to the desired temperature.
   - Two key: (Only for BCT5300/1/2/3(H/L))
     Have two buttons to toggle Heating-on and Heating-off respectively.
   - NO key: (Only for BCT5300(A/B))
     Have no key. Heat-on when plug in the power.

5. LED Indicator
   - Flash: (Only for BCT5300/2/4/6)
     When turn -on, the LED will flash (1.5Hz @50Hz power CLK) to indicate the heater is being heated, and keep lighting while reaching the desired temperature
   - Constant (Only for BCT5301/3/5/7)
     The LED will keep lighting after turn-on
6. Timer
   Once push down the ON button and without pushing down the OFF button during the heating-on state, the internal timer will start to count ,After 1 hour, the IC will power off the heater until pushing down the ON button again.

7. Timing



Application Circuit



ABSOLUTE MAXIMUM RATINGS(1)

Supply Voltage VCC..... .....–0.5V to + 6V
DC Switch Voltage (VS)..... .....–0.5V to VCC +0.5V
DC Input Voltage (VIN)..... .....–0.5V to + 6V
Storage Temperature Range (TSTG) .... –65°C to +150°C
Junction Temperature under Bias (TJ) ....…..... 150°C
Junction Lead Temperature (TL) (Soldering, 10 seconds) ..... 260°C
Power Dissipation (PD) @ +85°C 180mW

Note 1:Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied.

Electrical Characteristics

DC Electrical Characteristics

Symbol	Description	Test Conditions		Min	Typ	Max	Unit
IIH	Input high current	PIN: CLK	VIN = VDD	–	–	5	μA
IIL	Input low current	PIN: PTC ,CLK, REF	VIN = GND	–	–	-5	μA
RREF	The resistor between REF and GND	PIN: REF	VIN = 1V	20	47	80	KOhms
RPTC	The resistor between PTC and GND	PIN : PTC		160	220	280	KOhms
IOH	Output High Current	PIN: GATE	V DD = 4.5V VOUT = 2.5V	-15	–	–	mA
IOL	Output Low Current	PIN: GATE	V DD = 4.5V VOUT =0.5V	4	–	–	mA
IVBSHORT	Output short current	PIN: VB, VB short to GND		IC No break	–	–	mA
RON_VB	Resistor of switch on	PIN: VDD to VB	VDD = 4.5V IOUT = 100mA	–	–	15	Ohms
ROFF_VB	Resistor of switch off	PIN: VDD to VB	VDD = 4.5V IOUT <1uA	5M	–	—	Ohms
RON_TS	Resistor of Rma_TSet	PIN: VB to REF	VDD = 4.5V IOUT = 50uA	35	–	65	K ohms
IOH	Output High Current	PIN: LED	VDD = 4.5V VOUT = 3.5V	-3	–	–	mA
IOL	Output Low Current	PIN: LED	VDD = 4.5V VOUT =1.5V	5	–	–	mA

Power Supply Characteristics

Symbol	Description	Test Conditions	Min	Typ	Max	Unit
VPOR	Voltage of POR	-	2	-	3	V
VKON	Input Threshold Voltage of PTC Pin for key detecting	RON=10ohm	0.8	1	1.1	V
IDD	Current consumption	No loading, VDD = 4.5V (Internal zener no working)	-	200	400	μA
VDD	Supply voltage	IDD=0.3~10mA (according to the zener inside) Control function normal	4	-	5.5	V
TPOoff	Power off timer	FCLK= 50Hz	0.95	1	1.05	Hour

Line Clock Synchronization Characteristics

Symbol	Description	Test Conditions	Min	Typ	Max	Unit
FCLK	Frequency of CLK	-	-	50/60	-	Hz
VLEVEL	Input voltage of CLK Pin	-	1.69	1.88	2.07	V
VTCLK	Compare Threshold Voltage of CLK Pin	VDD = 4.5V	0.8	1	1.2	mV

VB and GATE Pulse Characteristics

Symbol	Description	Test Conditions	Min	Typ	Max	Unit
Tal_VB	Width of VB pulse	TA=25 °C, V DD = 4.5V	80	100	120	μs
		VDD = 4.5V TA = -20 ~ 85°C	60	-	150	μs
Tal_GATE	Width of Gate trigger pulse	TA=25 °C, VDD = 4.5V	160	200	240	μs
		VDD = 4.5V TA = -20 ~ 85°C	120	-	300	μs

EMC Electrical Characteristics

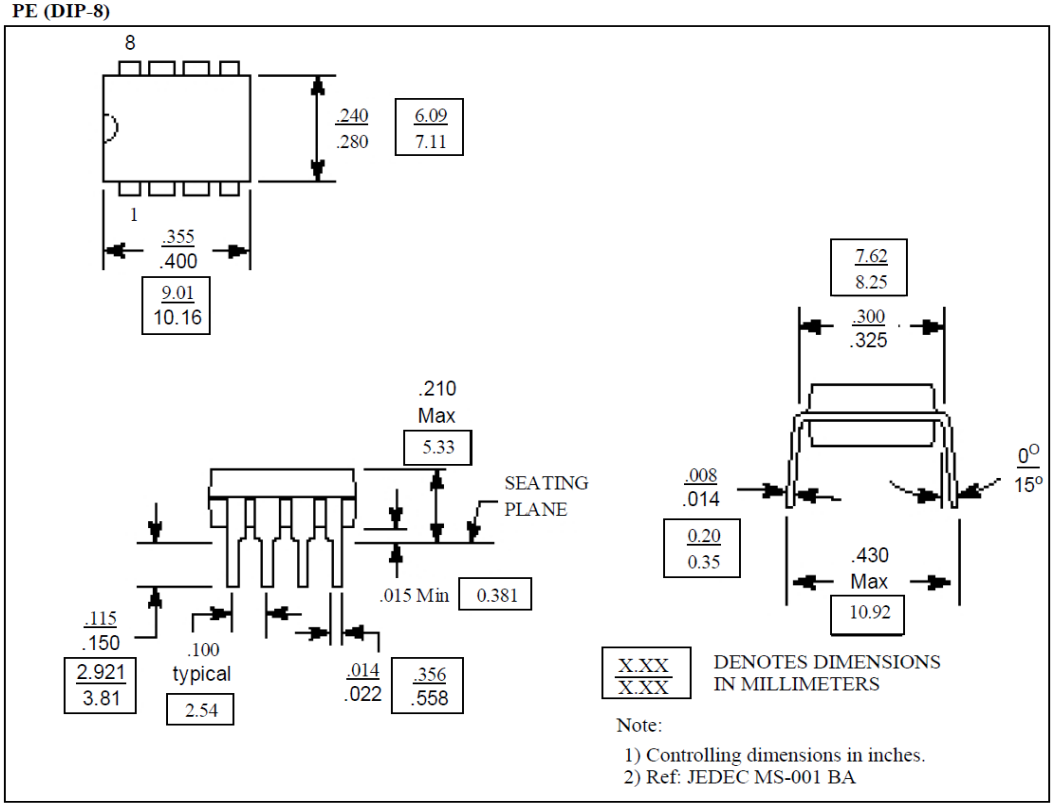
Symbol	Description	Test Conditions	Min	Typ	Max	Unit
EFT	IEC61000-4-4 Transient/Bursts	EN/IEC61000-4-4 is Electrical fast transient/burst immunity test, requirement > 1000V pulse amplitude (Tr=5ns, Tw=50ns, Z=50 ohms, burst duration 15 ms, burst period 300 ms, burst frequency 2,5 kHz)	2000	-	-	VPP

Temperature Control Characteristics

Symbol	Description	Test Conditions		Min	Type	Max	Unit
VT	Normal heat-up Threshold Voltage	VDD = 4.5V VREF=0.7V Test GATE output about 50% heating power		-	0.5(VB-VREF)	-	V
VTH	Fast heat-up Threshold Voltage	BCT5330xL/B (x: 0~7)	VDD=4.5V VREF=0.7V Test GATE output about 50% heating power	VT +0.4% (VB-VREF)	VT +0.6% (VB-VREF)	VT +0.8% (VB-VREF)	V
		BCT5330xH/A (x: 0~7)		VT +1.9% (VB-VREF)	VT +2.1% (VB-VREF)	VT +2.3% (VB- VREF)	
VOS_COMP	Input Offset Voltage of Comparator	Pin: PTC		-3mV	-	+3mV	mV
T-heat	Heating cycle time	FCLK= 50Hz		-	640	-	ms

Package Information

PE (DIP-8)



WE (SOIC-8)