BX300

Ultralow Power Supervisory ICs with Watchdog Timer and Manual Reset

Datasheet

DS-300-00

Version: 0.0
Released Date: 2018/03/07

General Description

The BX300 is a voltage supervisory circuits that monitor power supply voltage levels and code execution integrity in microprocessor-based systems. Apart from providing power-on reset signals, an on-chip watchdog timer can reset the microprocessor if it fails to strobe within a preset timeout period. A reset signal can also be asserted by an external push-button through a manual reset input.

The ultralow power consumption of these devices makes them suitable for power efficiency sensitive systems, such as battery-powered portable devices and energy meters.

There are several monitoring threshold options shown in Table 6. Each device subdivides into submodels with differences in factory preset voltage monitoring threshold options. In the range of 1.5 V to 4.63 V, seven options are available for the BX300. The BX300 can reset on demand through the manual reset input. The watchdog function on the BX300 monitors the heartbeat of the microprocessor through the WDI pin. The BX300 has a watchdog disable input, which allows the user to disable the watchdog function, if required.

The BX300 is available in a 6-ball, 1.46 mm × 0.96 mm WLCSP. The device is specified over the temperature range of −40°C to +85°C.

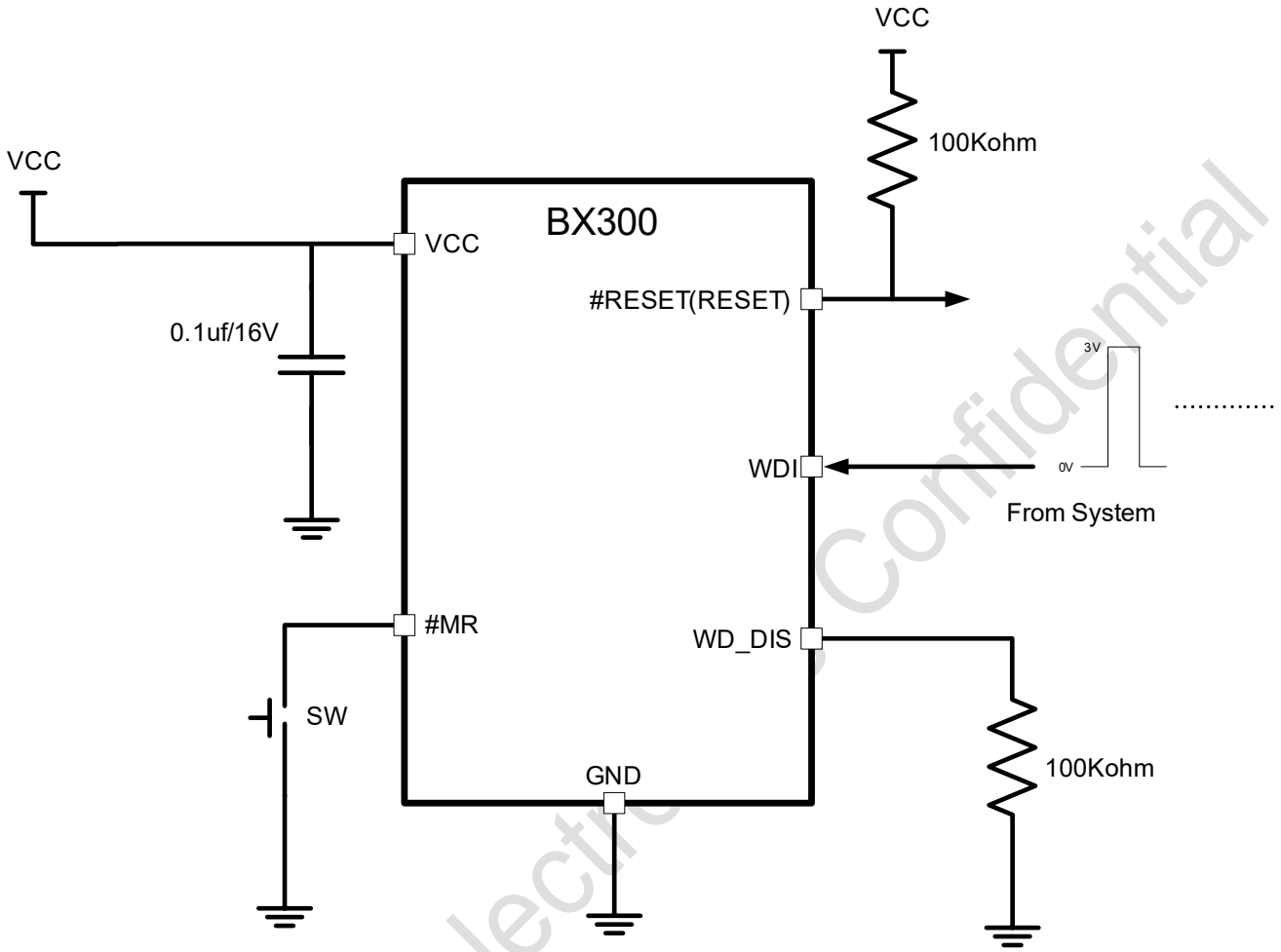
Feature

Ultralow power consumption With Icc=107nA (Typical).
Continuous monitoring with no blank time.
Pretrimmed voltage monitoring threshold options.
7 options from 1.5V to 4.63V. (1.5V/1.8V/2.32V/2.63V/2.93V/3.08V/4.63V)
+/- 1.3% threshold accuracy over full temperature range.
Manual input reset.
200ms(typical) reset timeout.
Low input voltage monitoring down to 1.5V.
Watchdog timer and Watchdog disable input.
Optional for open-drain or push-pull #RESET(RESET) output.
Power supple glitch immunity.
Available in 1.46mm x 0.96mm WLCSP.
Operational temperature range :-40°C to +85°C.

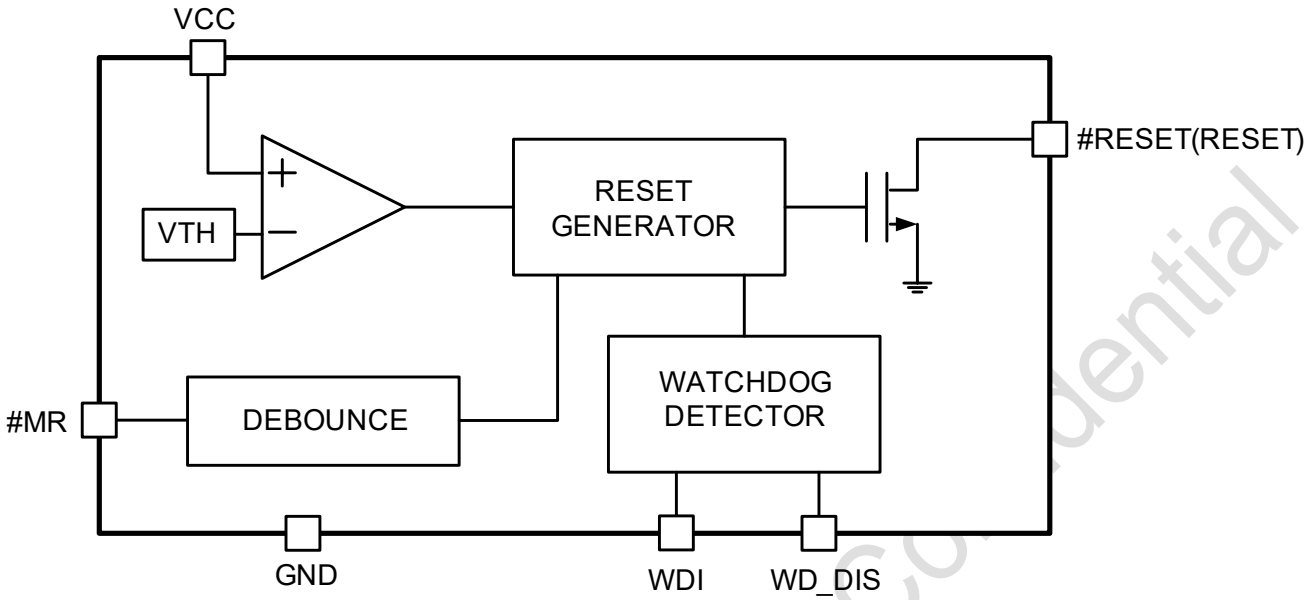
Applications

Portable/battery-operated equipment.
Microprocessor systems.
Energy metering.
Energy harvesting.

Application Circuit



Function Block Diagram



PIN CONFIGURATION AND FUNCTION DESCRIPTION

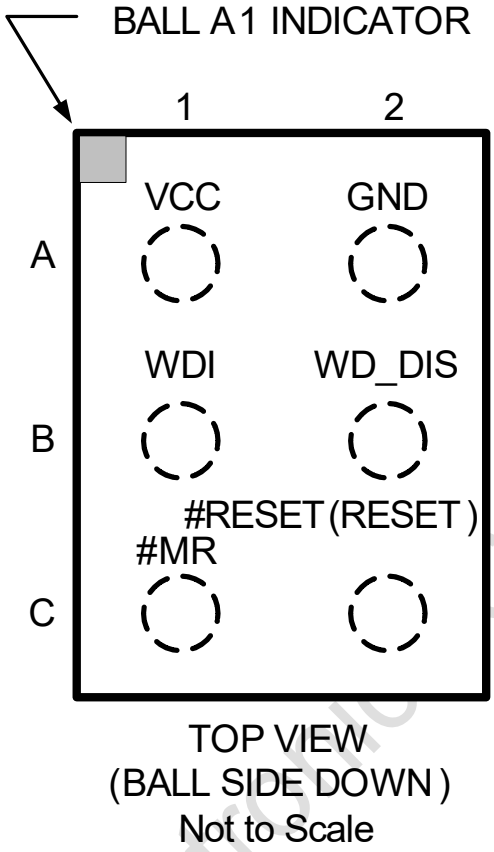


Table 1.

Pin No.	Pin Function	Pin Description
A1	VCC	Power Supply Input. The voltage on the VCC pin is monitored on the BX300.It is recommended to place a 0.1 µF decoupling capacitor as close as possible to the device between the VCC pin and the GND pin.
A2	GND	GROUND
B1	WDI	Watchdog Timer Input.
B2	WD_DIS	Watchdog Function Disable Input. Tie this pin high to disable the watchdog function of the device. Connect this pin to ground if it is not used.
C1	#MR	Manual Reset Input, Active Low.
C2	#RESET(RESET)	Active Low (Active High) , open-drain #RESET(RESET) Output.

ABSOLUTE MAXIMUM RATINGS

(Note: Do not exceed these limits to prevent damage to the device. Exposure to absolute maximum rating conditions for long periods may affect device reliability.)

Table 2.

Parameter	Value	Unit
VCC	-0.3 ~ +6	V
WD_DIS	-0.3 ~ +6	V
#RESET(RESET)	-0.3 ~ +6	V
#MR	-0.3 ~ Vcc+0.3	V
WDI	-0.3 ~ Vcc+0.3	V
Input/Output Current	10	mA
Storage Temperature Range	-40°C to 150°C	NA

Thermal Resistance

θ_{JA} is specified for a device soldered on an FR4 board with a minimum footprint.

Table 3.

Package Type	θ_{JA}	Unit
6-Ball WLCSP	105.6	°C/W

Electrical Characteristics

VCC=1.5V to 5.5V , Ta=-40°C to +85°C , unless otherwise noted. Typical value are at VCC=3.6, Ta=25°C, open-drain #RESET(RESET) output.

Table 4.

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
OPERATIN VOLTGE RANGE						
Input Voltage	VCC	Guarantees valid #RESET(RESET) output	0.9	--	5.5	V
		Guarantees valid #RESET(RESET) output low	0.9	--	--	V
INPUT CURRENT						
VCC Quiescent Current	I_{CC}	VCC = 1.5 V to 5.5 V, #RESET(RESET) deasserts, V_{WDI} = VCC	78	107	180	nA
		VCC = 1.5 V to 5.5 V, #RESET(RESET) deasserts, V_{WDI} = VCC, TA = 25°C	--	--	165	
#RESET(RESET) OUTPUT						
#RESET(RESET) THRESHOLD VOLTAGE	V_{TH}	Input falling , see table 12	V_{TH} - 1.3%	V_{TH}	V_{TH} + 1.3%	V
#RESET(RESET) THRESHOLD HYSTERESIS	V_{HYST}	V_{TH} > 1V	--	0.9%*V_{TH}	--	V
#RESET(RESET) TIMEOUT PERIOD	T_{RP}		--	200	--	ms
Output Voltage Low	V_{RST_OL}	VCC> 4.25V , Isink=6.5mA	--	TBD	0.4	V
		VCC > 2.5V , Isink=6mA	--		0.4	
		VCC > 1.2V , Isink=4.6mA	--		0.4	
		VCC > 0.9V , Isink=0.9mA	--		0.4	
Leakage Current		$V_{\#RESET}$(V_{RESET})=VCC=5.5V	--	--	--	nA
PROPAGATION DELAY						
VCC to #RESET(RESET)	T_{PD_VCC}	VCC falling with V_{TH} × 10% overdrive		26		us
INPUT GLITCH REJECTION						
VCC Glitch Rejection	T_{GR_VCC}	VCC falling, with V_{TH} × 10% overdrive		23		us
WATCHDOG INPUT , WDI						
Watchdog Timerout Period	T_{WD}	Base period, WD_DIS low Extended period, WD_DIS high	T_{WD}-13%	T_{WD}	T_{WD}+19%	sec
Leakage Current		V_{WDI}=Vcc=5.5V	--	--	---	nA
Input Threshold High			0.9	--	--	V
Input Threshold Low			--	--	0.4	V
WDI Pulse Width	T_{WPR}		85	--	--	ns
	T_{WPF}		300	--	--	ns
WDI Glitch Rejection			--	60	--	ns
MANUAL RESET INPUT , #MR						
VIL			--	--	0.5	V
VIH			1	--	--	V
#MR Minimum Input Pulse Width			1	--	--	us

#MR Glitch Rejection			--	0.4	--	us
#MR to #Reset Delay	T_{D_MR}		--	0.65	--	us
#MR Pull-Up Resistance			500	600	820	KΩ
WATCHDOG TIMEOUT DISABLE INPUT,WD_DIS						
VIL			--	--	0.4	V
VIH			0.9	--	--	V
Leakage Current		V_{WD_DIS}=VCC	--	--	--	nA
Glitch Rejection			--	0.1	--	us

Table 5. Select Table

Device Number	Low Voltage Monitoring	Manual Reset	Watchdog Timer	Watchdog Disable Input	Watchdog Timeout Selection Input
BX300	NO	YES	YES	YES	NO

Table 6. BX300 Vcc Reset Threshold Voltage(V_{TH}) Option(Ta = -40°C to 85°C).

Reset Threshold Number	Min	Typ	Max	Unit
TBD	1.481	1.5	1.52	V
TBD	1.777	1.8	1.823	V
TBD	2.290	2.32	2.350	V
TBD	2.596	2.63	2.664	V
TBD	2.892	2.93	2.968	V
TBD	3.040	3.08	3.120	V
TBD	4.570	4.63	4.690	V

Table 7. Watchdog Timeout Option(Ta = -40°C to 85°C).

Watchdog Timeout Period	Test Condition/Comments	Min	Typ	Max	Unit
BX300	WD_DIS low	TBD	25.6	TBD	sec