

STRUCTURE                      Silicon Monolithic Integrated Circuit

PRODUCT SERIES              Voltage Detector IC with Adjustable Output Delay

TYPE                              **BD53XXG Series**

FEATURES                      •Detection voltage lineup : 2.3~6.0V  
    •High precision detection : ±1.0%

**ABSOLUTE MAXIMUM RATINGS (Ta=25°C)**

Parameter	Symbol	Limit	Unit
Supply Voltage ※1	VDD-GND	-0.3 to +10	V
Output Voltage ※1 CMOS Output	VOUT	GND-0.3 to VDD+0.3	V
Input Voltage of CT	VCT	GND-0.3 to VDD+0.3	V
Power Dissipation ※2	Pd	540	mW
Operating Temperature ※1	Topr	-40 to +105	°C
Storage Temperature Range	Tstg	-55 to +125	°C
Junction Temperature	Tjmax	125	°C

※1 Do not exceed Pd.

※2 Mounted on 70mm × 70mm × 1.6mm Glass Epoxy PCB, Pd derated at 5.4mW/°C for temperature above Ta=25°C

NOTE : The product described in this specification is a strategic product (and/or service) subject to COCOM regulations.

It should not be exported without authorization from the appropriate government.

NOTE : This product is not designed for protection against radioactive rays.

Status of this document

The Japanese version of this document is the formal specification.

A customer may use this translation version only for a reference to help reading the formal version.

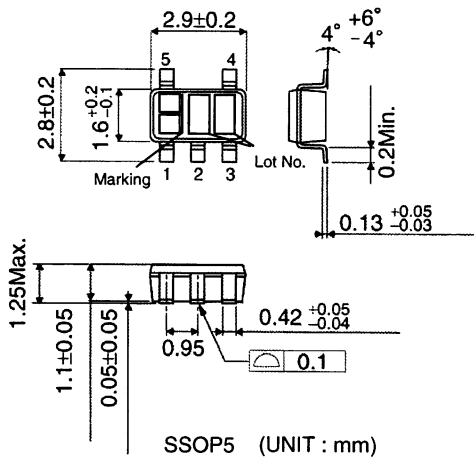
If there are any differences in translation version of this document, formal version takes priority.

OELECTRICAL CHARACTERISTICS (Unless Otherwise Specified Ta=-40 to 105°C)

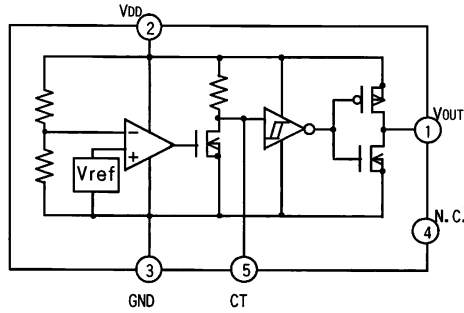
Parameter	Symbol	Condition	Limit			Unit
			Min.	Typ.	Max.	
Detection Voltage	V <sub>DET</sub>	V <sub>DD</sub> =H→L ※3	V <sub>DET</sub> (T) × 0.99	V <sub>DET</sub> (T)	V <sub>DET</sub> (T) × 1.01	V
Circuit Current when ON	I <sub>DD1</sub>	V <sub>DD</sub> =V <sub>DET</sub> -0.2V, V <sub>DET</sub> =2.3-3.1V	-	0.80	2.40	μA
		V <sub>DET</sub> =3.2-4.2V	-	0.85	2.55	
		V <sub>DET</sub> =4.3-5.2V	-	0.90	2.70	
		V <sub>DET</sub> =5.3-6.0V	-	0.95	2.85	
Circuit Current when OFF	I <sub>DD2</sub>	V <sub>DD</sub> =V <sub>DET</sub> +2.0V, V <sub>DET</sub> =2.3-3.1V	-	0.75	2.25	μA
		V <sub>DET</sub> =3.2-4.2V	-	0.80	2.40	
		V <sub>DET</sub> =4.3-5.2V	-	0.85	2.55	
		V <sub>DET</sub> =5.3-6.0V	-	0.90	2.70	
Operating Voltage Range	V <sub>OPL</sub>	V <sub>OL</sub> ≤ 0.4V, Ta=-25~-105°C	0.95	-	-	V
		V <sub>OL</sub> ≤ 0.4V, Ta=-40~-25°C	1.20	-	-	
'Low' Output Current (Nch)	I <sub>OL</sub>	V <sub>DS</sub> =0.5V V <sub>DD</sub> =1.2V	0.4	1.2	-	mA
		V <sub>DS</sub> =0.5V V <sub>DD</sub> =2.4V	2.0	5.0	-	
'High' Output Current (Pch)	I <sub>OH</sub>	V <sub>DS</sub> =0.5V V <sub>DD</sub> =8.0V	1.1	2.2	-	mA
CT pin Threshold Voltage	V <sub>CTH</sub>	V <sub>DD</sub> =V <sub>DET</sub> × 1.1, V <sub>DET</sub> =2.3-2.6V	V <sub>DD</sub> × 0.30	V <sub>DD</sub> × 0.40	V <sub>DD</sub> × 0.60	V
		V <sub>DD</sub> =V <sub>DET</sub> × 1.1, V <sub>DET</sub> =2.7-4.2V	V <sub>DD</sub> × 0.30	V <sub>DD</sub> × 0.45	V <sub>DD</sub> × 0.60	
		V <sub>DD</sub> =V <sub>DET</sub> × 1.1, V <sub>DET</sub> =4.3-5.2V	V <sub>DD</sub> × 0.35	V <sub>DD</sub> × 0.50	V <sub>DD</sub> × 0.60	
		V <sub>DD</sub> =V <sub>DET</sub> × 1.1, V <sub>DET</sub> =5.3-6.0V	V <sub>DD</sub> × 0.40	V <sub>DD</sub> × 0.50	V <sub>DD</sub> × 0.60	
Output Delay Resistance	R <sub>CT</sub>	V <sub>DD</sub> =V <sub>DET</sub> × 1.1 V <sub>CT</sub> =0.5V ※3	5.5	9.0	12.5	MΩ
CT pin Output Current	I <sub>CT</sub>	V <sub>CT</sub> =0.1V V <sub>DD</sub> =0.95V ※3	15	40	-	μA
		V <sub>CT</sub> =0.5V V <sub>DD</sub> =1.5V	150	240	-	
Detection Voltage Temperature coefficient	V <sub>DET</sub> /ΔT	Ta=-40°C to 105°C	-	±100	±360	ppm/°C
Hysteresis Voltage	ΔV <sub>DET</sub>	V <sub>DD</sub> =L→H→L	V <sub>DET</sub> × 0.03	V <sub>DET</sub> × 0.05	V <sub>DET</sub> × 0.08	V

V<sub>DET</sub>(T) : Standard Detection Voltage (2.3V to 6.0V, 0.1V step)  
 Designed Guarantee. (Outgoing inspection is not done on all products.)  
 ※3 Guarantee is Ta=25°C.

OPHYSICAL DIMENSIONS, MARKING



○ BLOCK DIAGRAM



○ PIN NO. , PIN NAME

Pin Number	Pin Name
1	VOUT
2	VDD
3	GND
4	N.C.
5	CT

NOTE : Substrate Pin should be connected with GND.

※ Please refer to Technical note concerning application circuit, and etc.

○ STANDARD DETECTION VOLTAGE AND MARKING

BD53XXG Series

Type	Standard Detection Voltage [V]	Marking	Type	Standard Detection Voltage [V]	Marking
BD5360	6.000	RW	BD5341	4.100	RB
BD5359	5.900	RV	BD5340	4.000	RA
BD5358	5.800	RU	BD5339	3.900	QV
BD5357	5.700	RT	BD5338	3.800	QU
BD5356	5.600	RS	BD5337	3.700	QT
BD5355	5.500	RR	BD5336	3.600	QS
BD5354	5.400	RQ	BD5335	3.500	QR
BD5353	5.300	RP	BD5334	3.400	QQ
BD5352	5.200	RN	BD5333	3.300	QP
BD5351	5.100	RM	BD5332	3.200	QN
BD5350	5.000	RL	BD5331	3.100	QM
BD5349	4.900	RK	BD5330	3.000	QL
BD5348	4.800	RJ	BD5329	2.900	QK
BD5347	4.700	RH	BD5328	2.800	QJ
BD5346	4.600	RG	BD5327	2.700	QH
BD5345	4.500	RF	BD5326	2.600	QG
BD5344	4.400	RE	BD5325	2.500	QF
BD5343	4.300	RD	BD5324	2.400	QE
BD5342	4.200	RC	BD5323	2.300	QD

## ONOTES FOR USE

## 1 . Absolute maximum range

Absolute Maximum Ratings are those values beyond which the life of a device may be destroyed. We cannot be defined the failure mode, such as short mode or open mode. Therefore a physical security countermeasure, like fuse, is to be given when a specific mode to be beyond absolute maximum ratings is considered.

## 2 . GND potential

GND terminal should be a lowest voltage potential every state.

Please make sure all pins which are over ground even if include transient feature.

## 3 . Electrical Characteristics

Be sure to check the electrical characteristics, that is one the tentative specification will be changed by temperature, supply voltage, and external circuit.

## 4 . Bypass Capacitor for Noise Rejection

Please put into the to reject noise between VDD pin and GND. If extremely big capacitor is used, transient response might be late. Please confirm sufficiently for the point.

## 5 . Short Circuit between Terminal and Soldering

Don't short-circuit between Output pin and VDD pin, Output pin and GND pin, or VDD pin and GND pin. When soldering the IC on circuit board, please be unusually cautious about the orientation and the position of the IC. When the orientation is mistaken the IC may be destroyed.

## 6 . Electromagnetic Field

Mal-function may happen when the device is used in the strong electromagnetic field.

## 7 . The VDD line inpedance might cause oscillation because of the detection current.

## 8 . A VDD -GND capacitor (as close connection as possible) should be used in high VDD line impedance condition.

9 . BD53XXG has extremely high impedance terminals. Small leak current due to the uncleanness of PCB surface might cause unexpected operations. Application values in these conditions should be selected carefully. If  $10\text{M}\Omega$  leakage is assumed between the CT terminal and the GND terminal,  $1\text{M}\Omega$  connection between the CT terminal and the VDD terminal would be recommended. Also, if the leakage is assumed between the VOUT terminal and the GND terminal, the pull up resistor should be less than 1/10 of the assumed leak resistance.

The value of  $R_{CT}$  depends on the external resistor that is connected to CT terminal, so please consider the delay time that is decided by  $\tau \times R_{CT} \times C_{CT}$  changes.

## 10. External parameters

The recommended parameter range for  $C_T$  is  $10\text{pF} \sim 0.1 \mu\text{F}$ . When attempting to operate beyond these parameters, be sure to verify the actual operation before continuing use.

## 11. CT pin discharge

Due to the capabilities of the CT pin discharge transistor, the CT pin may not completely discharge when a short input pulse is applied, and in this case the delay time may not be controlled. Please verify the actual operation.

## 12. Power on reset operation

Please note that the power on reset output varies with the Vcc rise up time.

Please verify the actual operation.

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