

STRUCTURE	Silicon Monolithic Integrated Circuit
PRODUCT SERIES	Low Voltage Detector IC with Adjustable Output Delay
TYPE	BU42XXF Series
FEATURES	- Detection voltage lineup : 0.9V~4.8V - High precision detection voltage : $\pm 1\%$

ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

Parameter	Symbol	Limit	Unit
Supply Voltage ※1	VDD—GND	-0.3 to +7	V
Output Voltage ※1 Nch Open Drain Output	VOUT	GND-0.3 to +7	V
Input Voltage of CT	VCT	GND-0.3 to VDD+0.3	V
Power Dissipation ※2	Pd	400	mW
Operating Temperature ※1	Topr	-40 to +125	°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 4.0mW/°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=-25 to 125°C)

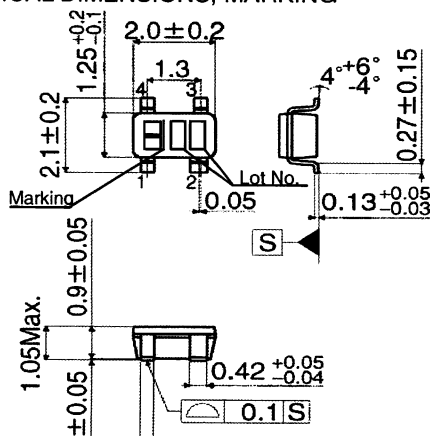
Parameter	Symbol	Condition	Limit			Unit
			Min.	Typ.	Max.	
Detection Voltage	V _{DET}	V _{DD} =H→L Ta=25°C R _L =470kΩ	V _{DET} (T) × 0.99	V _{DET} (T)	V _{DET} (T) × 1.01	V
Circuit Current when ON	I _{DD1}	V _{DD} =V _{DET} -0.2V, V _{DET} =0.9-1.3V	-	0.15	0.88	μA
		V _{DET} =1.4-2.1V	-	0.20	1.05	
		V _{DET} =2.2-2.7V	-	0.25	1.23	
		V _{DET} =2.8-3.3V	-	0.30	1.40	
		V _{DET} =3.4-4.2V	-	0.35	1.58	
		V _{DET} =4.3-4.8V	-	0.40	1.75	
Circuit Current when OFF	I _{DD2}	V _{DD} =V _{DET} +2.0V, V _{DET} =0.9-1.3V	-	0.30	1.40	μA
		V _{DET} =1.4-2.1V	-	0.35	1.58	
		V _{DET} =2.2-2.7V	-	0.40	1.75	
		V _{DET} =2.8-3.3V	-	0.45	1.93	
		V _{DET} =3.4-4.2V	-	0.50	2.10	
		V _{DET} =4.3-4.8V	-	0.55	2.28	
Operating Voltage Range	V _{OPL}	V _{OL} ≤0.4V, R _L =470kΩ Ta=25°C~125°C	0.70	-	-	V
		V _{OL} ≤0.4V, R _L =470kΩ Ta=-25°C~25°C	0.90	-	-	
'Low' Output Current (Nch)	I _{OL}	V _{DS} =0.05V, V _{DD} =0.85V	20	100	-	μA
		V _{DS} =0.5V, V _{DD} =1.5V, V _{DET} =1.7-4.8V	1.0	3.3	-	mA
		V _{DS} =0.5V, V _{DD} =2.4V, V _{DET} =2.7-4.8V	3.6	6.5	-	
Leak Current when OFF	I _{leak}	V _{DD} =V _{DS} =7V Ta=-40°C~85°C	-	0	0.1	μA
		V _{DD} =V _{DS} =7V Ta=85°C~125°C	-	0	1	
CT pin Threshold Voltage	V _{CTH}	V _{DD} =V _{DET} × 1.1 R _L =470kΩ Ta=25°C V _{DET} =0.9V-2.5V	V _{DD} × 0.35	V _{DD} × 0.45	V _{DD} × 0.55	V
		V _{DD} =V _{DET} × 1.1 R _L =470kΩ Ta=25°C V _{DET} =2.6V-4.8V	V _{DD} × 0.40	V _{DD} × 0.50	V _{DD} × 0.60	
Output Delay Resistance	R _{CT}	V _{DD} =V _{DET} × 1.1 V _{CT} =0.5V Ta=25°C	9.0	10.0	11.0	MΩ
CT pin Output Current	I _{CT}	V _{CT} =0.1V V _{DD} =0.85V	5	40	-	μA
		V _{CT} =0.5V V _{DD} =1.5V, V _{DET} =1.7V-4.8V	200	400	-	
Detection Voltage Temperature coefficient	V _{DET} /ΔT	Ta=-40°C~125°C (Designed Guarantee)	-	±30	-	ppm/°C
Hysteresis Voltage	ΔV _{DET}	R _L =470kΩ, V _{DD} =L→H→L Ta=-40°C~125°C	V _{DET} ≤ 1.0V	V _{DET} × 0.03	V _{DET} × 0.05	V
			V _{DET} ≥ 1.1V	V _{DET} × 0.03	V _{DET} × 0.07	

V_{DET}(T) : Standard Detection Voltage (0.9V to 4.8V, 0.1V step)

R_L : Pull-up resistor to be connected between V_{OUT} and power supply.

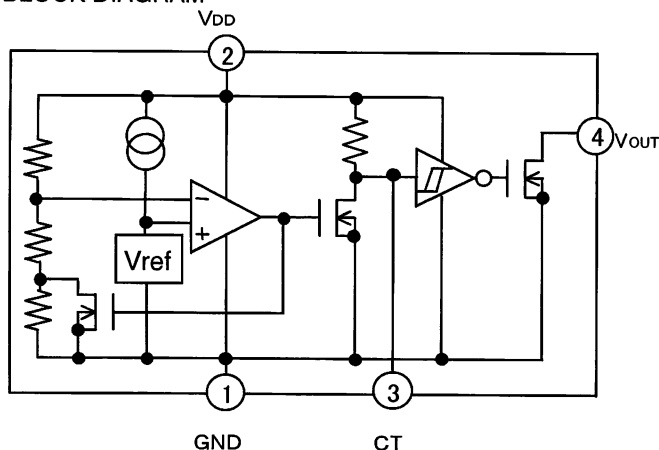
Designed Guarantee.(Outgoing inspection is not done on all products.)

OPHYSICAL DIMENSIONS, MARKING



SOP4 (UNIT:mm)

OBLOCK DIAGRAM



OPIN NO. , PIN NAME

Pin Number	Pin Name
1	GND
2	VDD
3	CT
4	VOUT

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

OSTANDARD DETECTION VOLTAGE AND MARKING

Type	Standard Detection Voltage[V]	Marking	Type	Standard Detection Voltage[V]	Marking
BU4248	4.800	ZR	BU4228	2.800	YV
BU4247	4.700	ZQ	BU4227	2.700	YU
BU4246	4.600	ZP	BU4226	2.600	YT
BU4245	4.500	ZN	BU4225	2.500	YS
BU4244	4.400	ZM	BU4224	2.400	YR
BU4243	4.300	ZL	BU4223	2.300	YQ
BU4242	4.200	ZK	BU4222	2.200	YP
BU4241	4.100	ZJ	BU4221	2.100	YN
BU4240	4.000	ZH	BU4220	2.000	YM
BU4239	3.900	ZG	BU4219	1.900	YL
BU4238	3.800	ZF	BU4218	1.800	YK
BU4237	3.700	ZE	BU4217	1.700	YJ
BU4236	3.600	ZD	BU4216	1.600	YH
BU4235	3.500	ZC	BU4215	1.500	YG
BU4234	3.400	ZB	BU4214	1.400	YF
BU4233	3.300	ZA	BU4213	1.300	YE
BU4232	3.200	YZ	BU4212	1.200	YD
BU4231	3.100	YY	BU4211	1.100	YC
BU4230	3.000	YX	BU4210	1.000	YB
BU4229	2.900	YW	BU4209	0.900	YA

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 impedance 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 . Lower than the minimum input voltage makes the VOUT high impedance, and it must be VDD in pull up (VDD) condition.

10. Case of needless Delay time, recommended to insert more 470k Ω resistor between VDD and CT.11. Recommended value of RL Resistor is over 10k Ω . (VDET $\geq$ 1.5V)
over 100k Ω . (VDET $\leq$ 1.4V)12. BU42XXF 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 10M Ω leakage is assumed between the CT terminal and the GND terminal, 1M Ω 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 RCT depends on the external resistor that is connected to CT terminal, so please consider the delay time that is decided by $\tau \times RCT \times CCT$ changes.

13. Delay time (tPLH)

$$t_{PLH} = \tau \times RCT \times CCT \text{ (sec)}$$

τ : time constant

RCT : 10M Ω (typ.) (built-in resistor)

CCT : capacitor connected CT pin.

Recommended value of CCT capacitor TS over 100pF.

The reference value

$$(\tau \times RCT) \times 10^6$$

$$V_{DET} = 0.9 \text{ to } 2.5V$$

Ta = 25°C	(min. = 5.1×10^6	typ. = 6.0×10^6	max = 6.9×10^6)
Ta = -25 to 125°C	(min. = 3.3×10^6	typ. = 6.0×10^6	max = 8.7×10^6)

$$V_{DET} = 2.6 \text{ to } 4.8V$$

Ta = 25°C	(min. = 5.9×10^6	typ. = 6.9×10^6	max = 7.9×10^6)
Ta = -25 to 125°C	(min. = 3.8×10^6	typ. = 6.9×10^6	max = 10.0×10^6)

14. External parameters

The recommended parameter range for CT is 10pF $\sim$ 0.1 μ F. For RL, the recommended range is 50k Ω $\sim$ 1M Ω . When attempting to operate beyond these parameters, be sure to verify the actual operation before continuing use.

15. 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.

16. 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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