

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

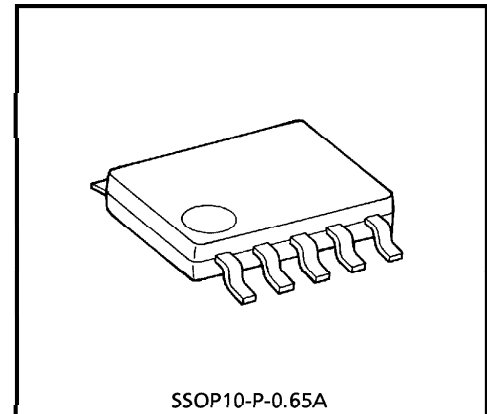
# TA8563FN

## SHOCK SENSOR IC (1ch VERSION)

TA8563FN detects an existence of external shock through the shock sensor and outputs.

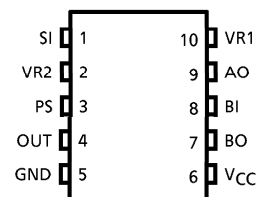
### FEATURE

- TA8563FN operates from 5VDC single power supply voltage.
- The signal from shock sensor is amplified according to the setting gain, and is detected through the internal window comparator.
- TA8563FN incorporates 1-ch shock detecting circuitry.
- Input terminal of sensor signal is hi-impedance  
Input impedance =  $50M\Omega$  (Typ.)
- LPF (low pass filter) circuitry is built in.  
Cut off frequency of LPF = 7kHz
- Sensitivity of shock detection can be adjusted by external devices.
- TA8563FN is designed for low power dissipation.  
Active mode (Pin 3 : 5V) 2mA (Typ.)  
Powersave mode (Pin 3 : 0V)  $0.1\mu A$  (Typ.)
- Small package  
SSOP10-P-0.65A (0.65mm pitch)



SSOP10-P-0.65A  
Weight : 0.04g (Typ.)

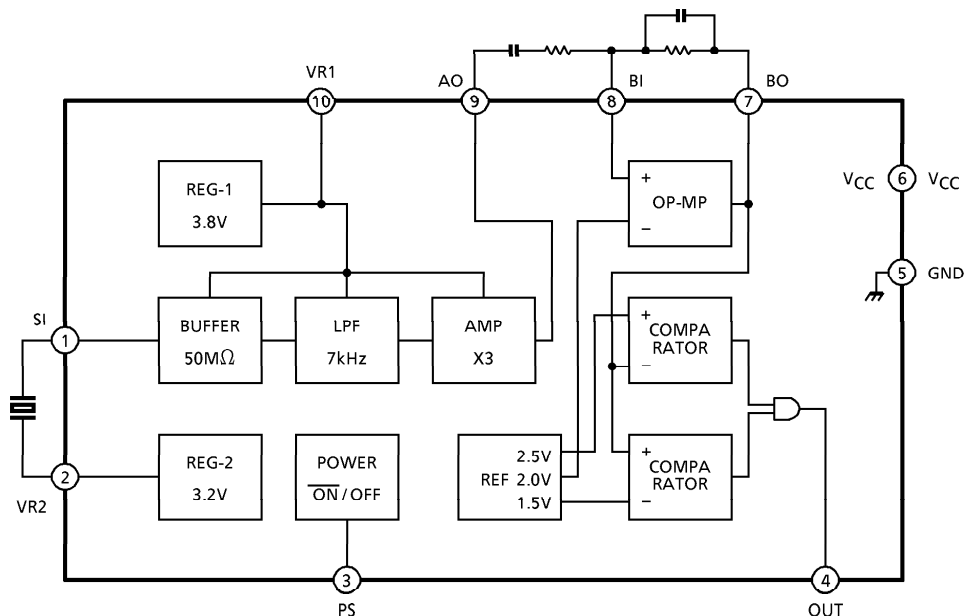
### PIN CONNECTION (TOP VIEW)



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**BLOCK DIAGRAM**



**PIN FUNCTION**

PIN No.	PIN NAME	FUNCTION
1	SI	Connection terminal of shock sensor (Positive polarity side)
2	VR2	Connection terminal of shock sensor (Reference voltage = 3.2V)
3	PS	Powersave control (0V input = powersave mode, 5V input = active mode)
4	OUT	Output terminal (Output = "L" when shock is detected)
5	GND	Ground terminal
6	VCC	Power supply voltage
7	BO	Operation amplifier's output terminal
8	BI	Operation amplifier's input terminal
9	AO	× 3 (3 times) amplifier's output terminal
10	VR1	3.8V output terminal

## MAXIMUM RATINGS

CHARACTERISTICS	SYMBOL	RATINGS	UNIT
Power Supply Voltage	$V_{CC}$	7	V
Input Voltage to PS Terminal	$V_{IN}$	$-0.3 \sim V_{CC} + 0.3$	V
Power Dissipation	$P_D$	300	mW
Storage Temperature	$T_{stg}$	$-55 \sim 150$	$^{\circ}\text{C}$

## RECOMMEND OPERATING CONDITION

CHARACTERISTICS	SYMBOL	RATINGS	UNIT
Power Supply Voltage	$V_{CC}$	4.2~5.5	V
Operating Temperature	$T_{OPR}$	$-25 \sim 85$	$^{\circ}\text{C}$

ELECTRICAL CHARACTERISTICS (Unless Otherwise Specified,  $V_{CC} = 5\text{V}$ ,  $T_a = 25^{\circ}\text{C}$ )

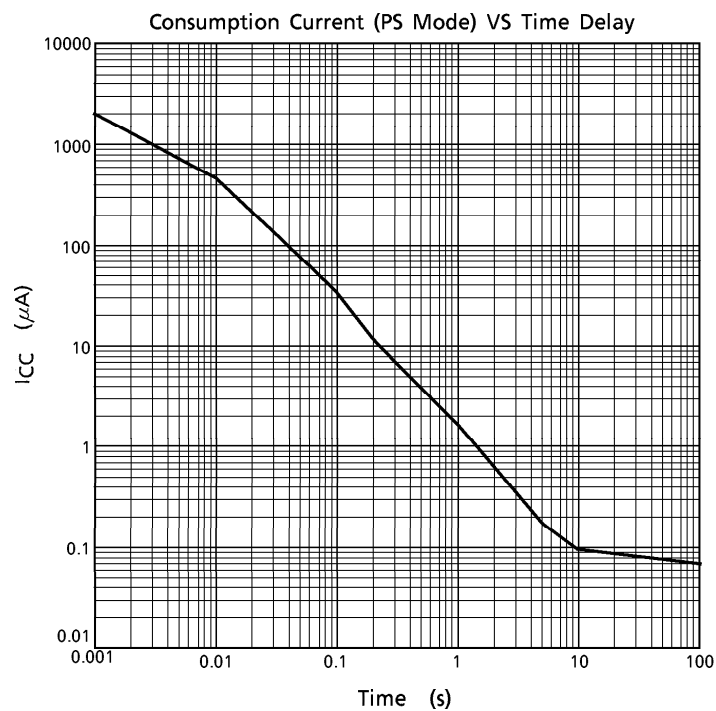
\*: Marked parameters are reference data.

CHARACTERISTICS	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Current (In active mode)	$I_{CCD}$	—	Pin 3 (PS) = 5V	—	2	—	mA
Supply Current (In PS mode)	$I_{CCS}$	—	Pin 3 (PS) = 0V, Please refer to the characteristic list on next page	—	0.1	1.0	$\mu\text{A}$
*Input impedance	$Z_{IN}$	—	Input impedance of pin 1 (SI)	—	50	—	$\text{M}\Omega$
SI-VR1 (Different Voltage Drop)	VR1-SI	—	$T_a = 0 \sim 70^{\circ}\text{C}$	-200	—	200	mV
LPF Cut-Off Frequency	$f_c$	—	-3dB	5	7	10	kHz
*Gain of 3X	G	—	—	8	9.5	11	dB
OP-AMP Input Current	$I_{IN}$	—	—	—	30	100	nA
*OP-AMP $f_T$	$f_T$	—	—	—	1.5	—	MHz
OP-AMP Output Sink Current	$I_{si}(\text{OP})$	—	—	—	—	60	$\mu\text{A}$
OP-AMP Output Source Current	$I_{so}(\text{OP})$	—	—	—	—	400	$\mu\text{A}$
Pin 8 Terminal Voltage	BI	—	—	1.85	2.0	2.15	V
*Trip Voltage (H Level)	$V_{trip(+)}$	—	Comparison with the reference voltage (2.0V) of 8 terminal	0.45	0.5	0.55	V
*Trip Voltage (L Level)	$V_{trip(-)}$	—	Comparison with the reference voltage (2.0V) of 8 terminal	-0.45	-0.5	-0.55	V
Output Sink Current	$I_{sink}$	—	$V_{OL} = 0.5\text{V}$	0.5	—	—	mA
Output Source Current	$I_{source}$	—	$V_{OH} = V_{CC} - 1.0\text{V}$	35	50	—	$\mu\text{A}$
Output Voltage of Pin VR1	VR1	—	Pin 10 output voltage	3.62	3.8	3.98	V
Output Voltage of Pin VR2	VR2	—	Pin 2 output voltage	VR1 -0.6	VR1 -0.55	VR1 -0.5	V
VR1 Terminal Output Sink Current	$I_{si}(\text{VR1})$	—	—	—	—	600	$\mu\text{A}$
VR1 Terminal Output Source Current	$I_{so}(\text{VR1})$	—	—	—	—	100	$\mu\text{A}$

**ELECTRICAL CHARACTERISTICS** (Unless Otherwise Specified,  $V_{CC} = 5V$ ,  $T_a = 25^\circ C$ )

\* : Marked parameters are reference data.

CHARACTERISTICS	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Input Voltage of Pin PS	$V_{IH}$	—	H LEVEL	3.0	—	—	V
	$V_{IL}$	—	L LEVEL	—	—	1.0	
Threshold Volt of Pin PS	$V_{TH}$	—	—	—	2.3	—	V
* Delay time to Steady the Operation after supply voltage rising	tPS	—	Delay time to steady the output voltage of 9 pin with $C_L = 210pF$ of sensor, after supply voltage rising	—	110	—	$\mu s$



THE EXTERNAL DEVICES SETTING

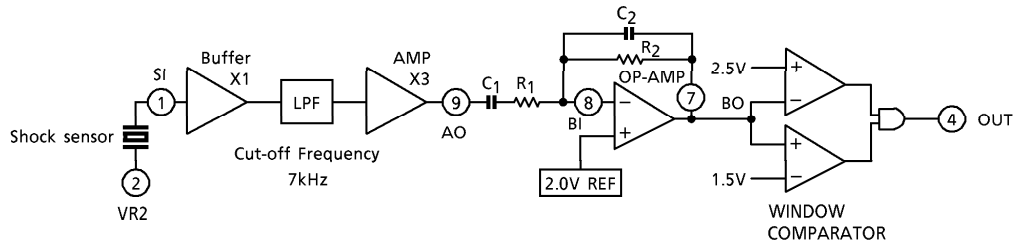


Fig.1 The Composition of G-Force Sense Amplifier

Fig.1 is the composition of G-force sense amplifier.

The shock sensor is connected between 1 and 2 terminal. (Please connect the positive polarity side to 1 terminal.)

The setting of sensitivity is adjusted by external resistors of  $R_1$  &  $R_2$ . Please refer to below figure (fig.2) about setting value. For instance, when the signal from sensor (1 terminal input signal) is 5mV, the standard setting for detection is following :

$$R_1 = 15k\Omega, R_2 = 500k\Omega$$

Besides, the liner high pass filter is composed by  $C_1$  &  $R_1$ , and the secondary LPF is composed by  $C_1$  &  $C_2$ . Its cut-off frequency is defined as :

$$f = 1 / (2\pi \times C \times R)$$

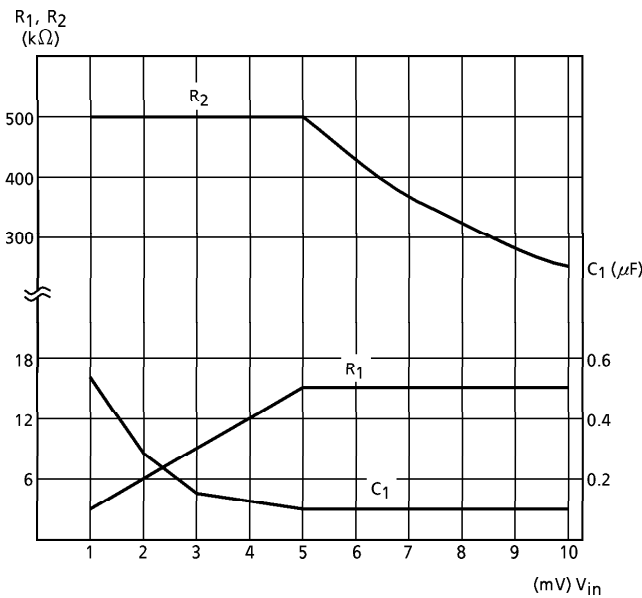


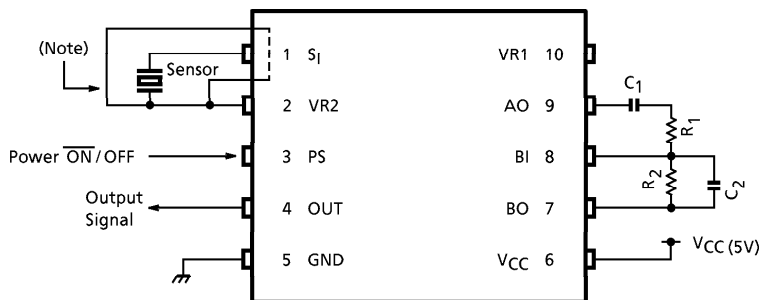
Fig.2 The Signal Form Sensor ( $V_{in}$ ) vs The Standard External Devices For Detection

(Note :  $C_1$  is figured as the cut-off frequency of HPF is setting to 100Hz)

**CAUTION IN USING THE TA8563FN**

1. The treatment of connection from the shock sensor to signal input terminal (1 terminal) :  
 1 terminal of the TA8563FN is high-impedance input terminal. Therefore, please pay attention not to occur the leak current from other terminals.  
 If the leak current occurred to 1 terminal (Particularly at soldering on PC substrate), there is possibility to cause the problem of operation.  
 Due to avoid this problem, it's recommended to circle the signal line between the shock sensor and 1 terminal by 2 terminal line, same voltage as 1 terminal.  
 (Please refer to the below application circuit.)
2. The shock sensor :  
 Please confirm the characteristic of the using shock sensor sufficiently.
3. V<sub>CC</sub>, GND :  
 Please connected the capacitor between V<sub>CC</sub> and GND closely to the TA8563FN.

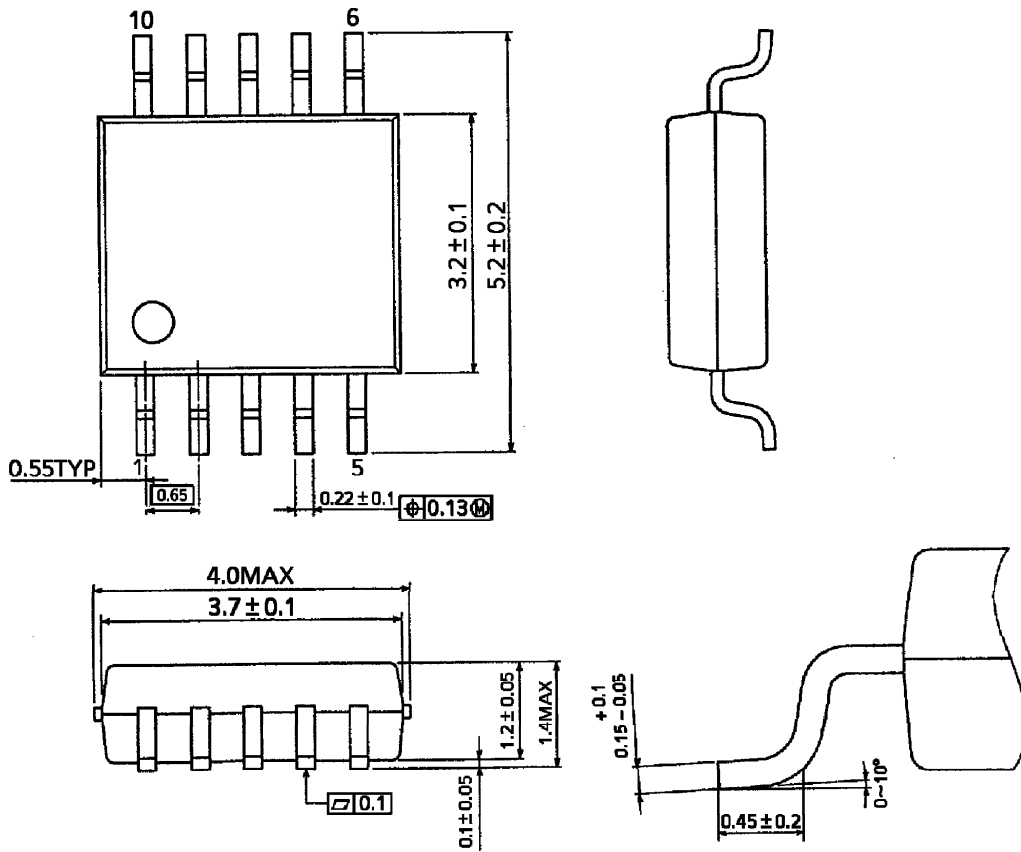
**APPLICATION CIRCUIT**



Note) 1 terminal's voltage is same as 2 terminal. It's recommended to circle between the shock sensor and 1 terminal by 2 terminal line for a protection of leak current occurrence.

OUTLINE DRAWING  
SSOP10-P-0.65A

UNIT : mm



Weight : 0.04g (Typ.)