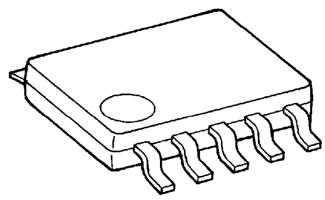
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA8563FN

SHOCK SENSOR IC (1ch VERSION)

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



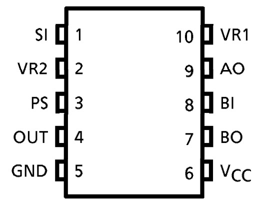
SSOP10-P-0.65A

Weight : 0.04g (Typ.)

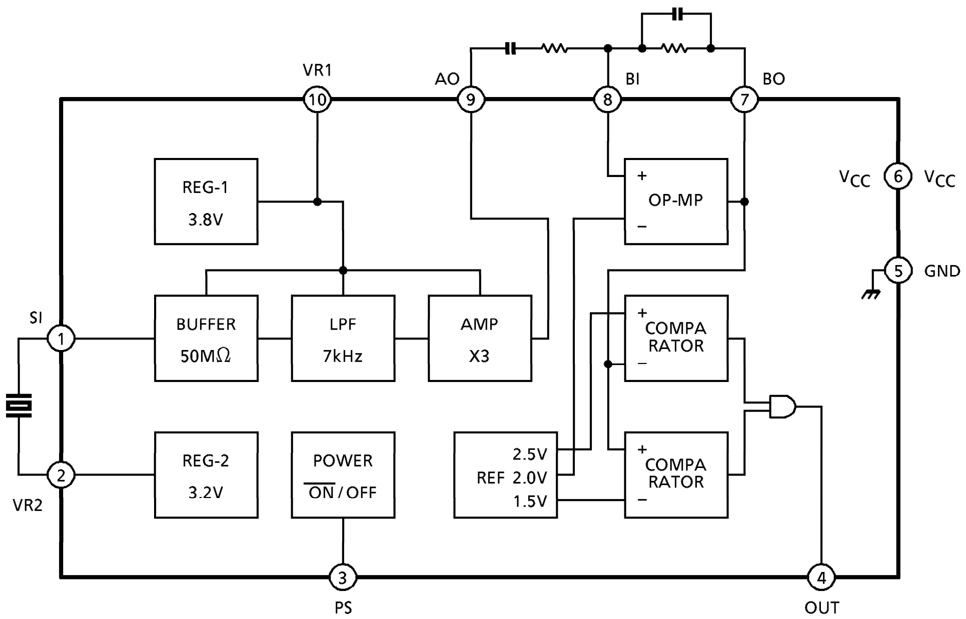
FEATURE

- 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 = 50MΩ (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) 0.1μA (Typ.)
- Small package
  SSOP10-P-0.65A (0.65mm pitch)

PIN CONNECTION (TOP VIEW)



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	V_{CC}	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~V_{CC}+0.3	V
Power Dissipation	P_D	300	mV
Storage Temperature	T_{stg}	−55~150	°C

RECOMMEND OPERATING CONDITION

CHARACTERISTICS	SYMBOL	RATINGS	UNIT
Power Supply Voltage	V_{CC}	4.2~5.5	V
Operating Temperature	T_{OPR}	−25~85	°C

ELECTRICAL CHARACTERISTICS (Unless Otherwise Specified, V_{CC} = 5V, Ta = 25°C)

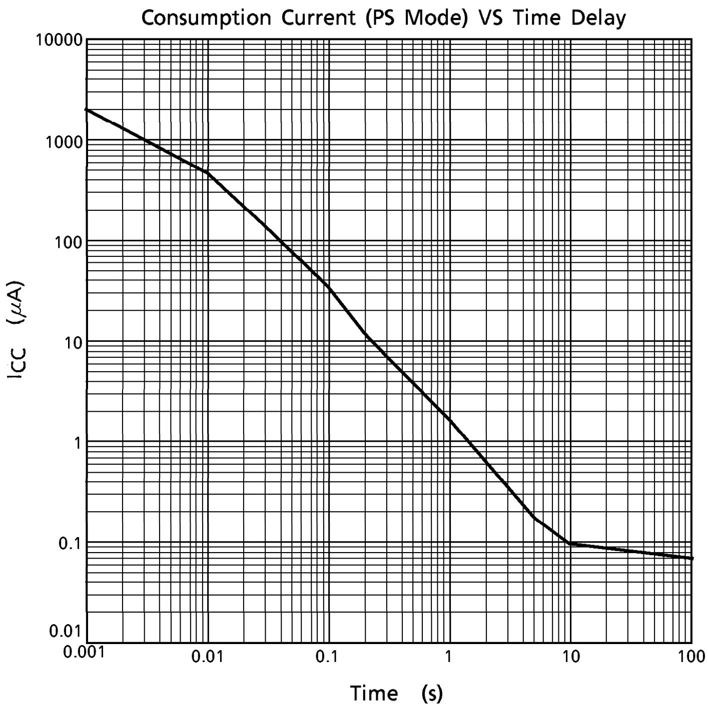
* : Marked parameters are reference data.

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	μA
*Input impedance	Z_{IN}	—	Input impedance of pin 1 (SI)	—	50	—	MΩ
SI-VR1 (Different Voltage Drop)	VR1-SI	—	Ta = 0~70°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 fT	f_T	—	—	—	1.5	—	MHz
OP-AMP Output Sink Current	I_{si} (OP)	—	—	—	—	60	μA
OP-AMP Output Source Current	I_{so} (OP)	—	—	—	—	400	μA
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} = 0.5V	0.5	—	—	mA
Output Source Current	I_{source}	—	V_{oh} = V_{CC} − 1.0V	35	50	—	μA
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 volatge	VR1 −0.6	VR1 −0.55	VR1 −0.5	V
VR1 Terminal Output Sink Current	I_{si} (VR1)	—	—	—	—	600	μA
VR1 Terminal Output Source Current	I_{so} (VR1)	—	—	—	—	100	μA

ELECTRICAL CHARACTERISTICS (Unless Otherwise Specified, V_{CC} = 5V, Ta = 25°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	—	μs



THE EXTERNAL DEVICES SETTING

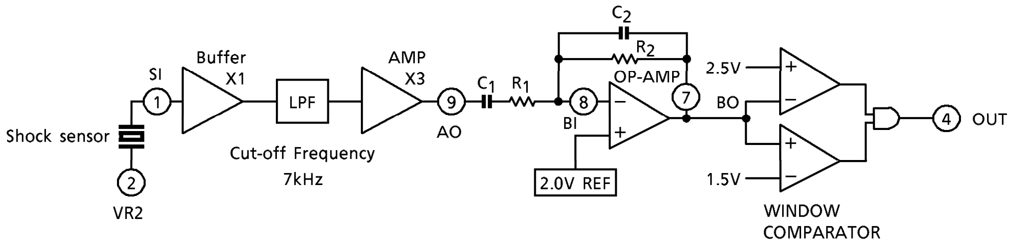


Fig.1 The Composition of G-Force Sense Amplifier

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 :

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

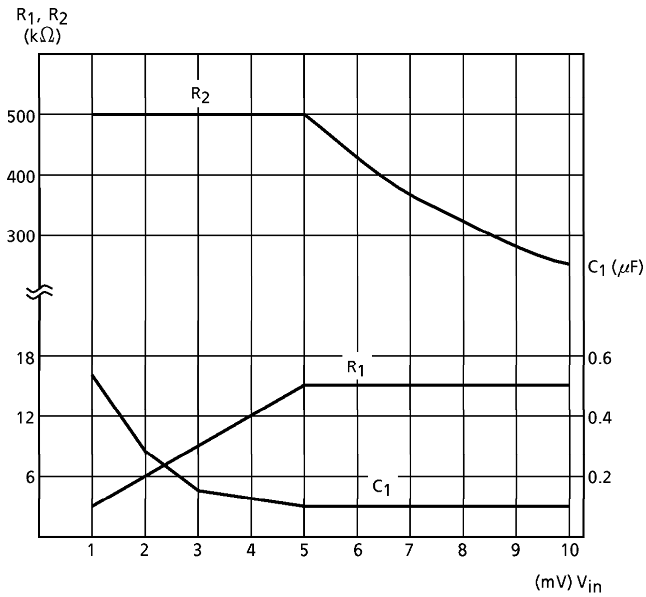


Fig.2 The Signal Form Sensor (V_{in}) vs The Standard External Devices For Detection

(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. Therfore, please pay attetion not to occur the leak current from other terminals.
   If the leak current occured 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 circule 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.)

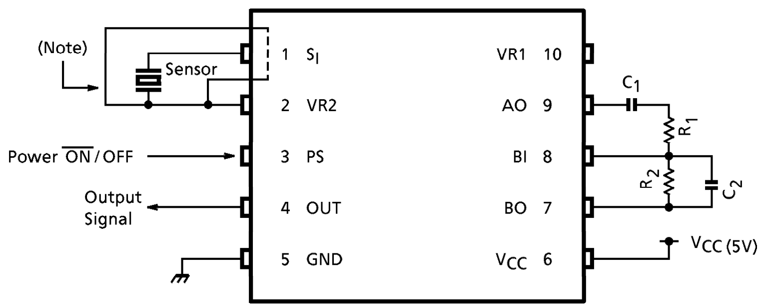
2. The shock sensor :

   Please confirm the characteristic of the using shock sensor sufficiently.

3. V_{CC}, GND :

   Please connected the capacitor between V_{CC} and GND closely to the TA8563FN.

APPLICATION CIRCUIT

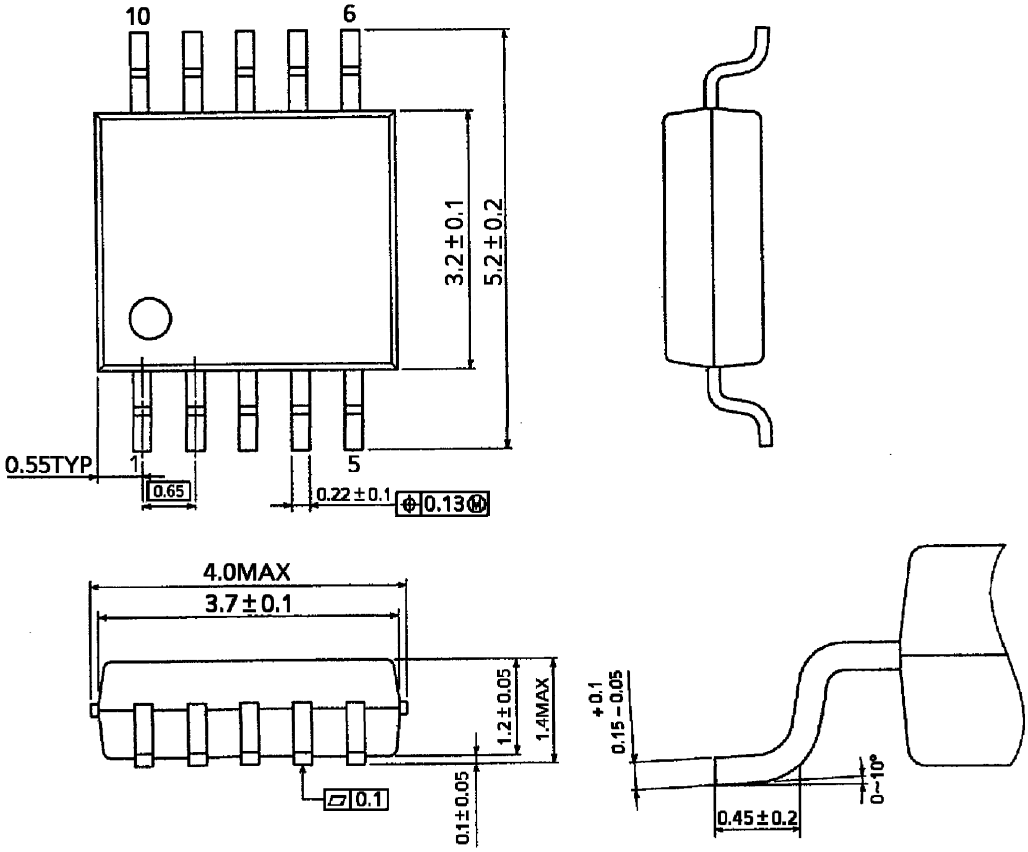


Note) 1 terminal's voltage is same as 2 terminal. It's recommended to circle between the shock sensor and 1 terminal by 2 terminal line for a protection of leak current occurrence.

OUTLINE DRAWING

SSOP10-P-0.65A

UNIT : mm



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