

SENSOR SWITCH

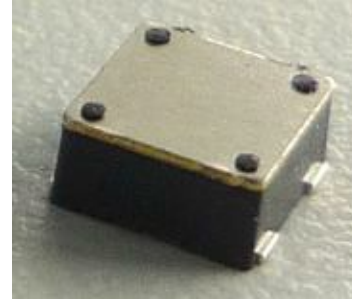
Item #	RBS3501 Series	Description	TILT SWITCH	Version	V99.0
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● FUNCTIONS

1. 45° Tilt Detecting
2. Rotation Detecting

● APPLICATIONS

1. The rotation of LCD
2. Automotive devices
3. Visual devices
4. Information devices
5. Communication devices



● FEATURES

1. Housing made of high insulation plastic material, free from electric conduction and rust problem.
2. Detecting with photo transistors, not affected by metal oxidization or wear ◦ Possesses highly reliable and stable signals.
3. All plastic materials subject to industrial purpose, resist high temperature and meet fireproof function.
4. Simple ON and OFF signals, easy for design.
5. Suitable to vertical PCB.
6. RoHS compliance, an ideal substitute for mercury switch.
7. A more economical tilt and rotation detection option than IC design solution.
8. All made in Taiwan and examined before shipment.

● PATENTS

1. Taiwan utility model Patent No. M 397113
2. China utility model Patent No.ZL 2010 2 0272893.2

● DIMENSIONS / OPERATION / P.C.B. LAYOUT (Unit: mm, Tolerance: ±0.20mm)

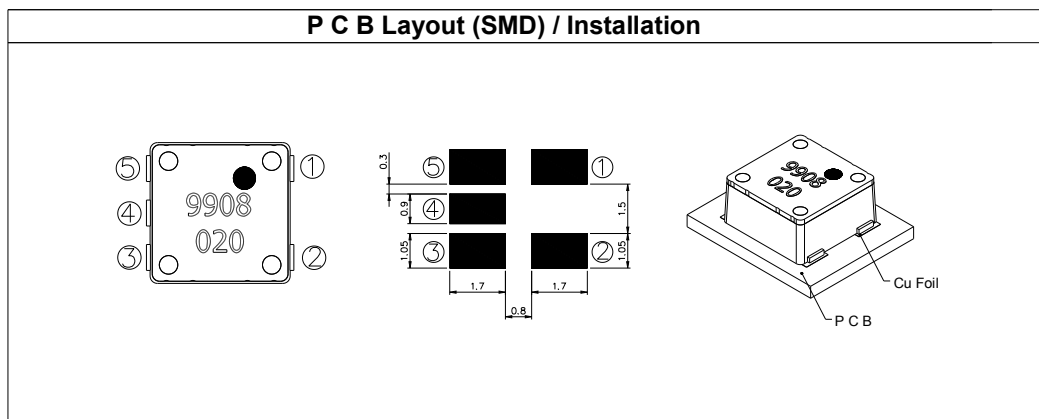
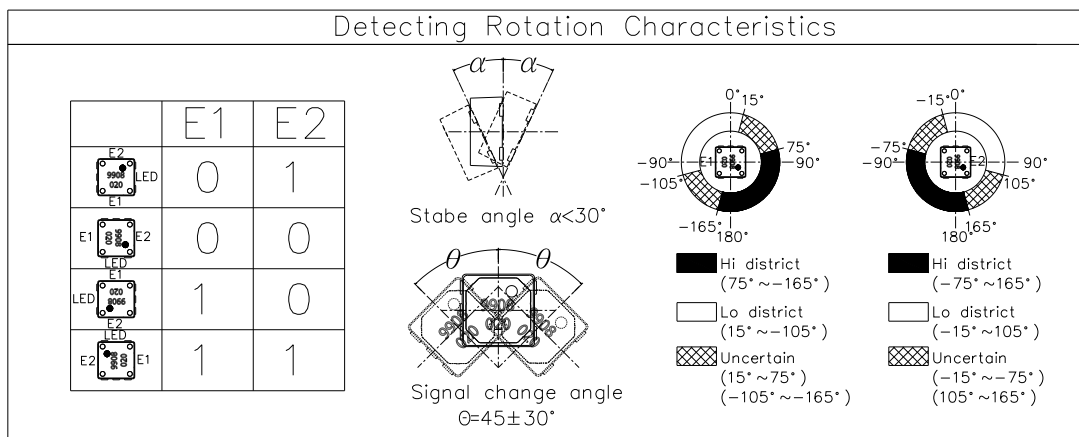
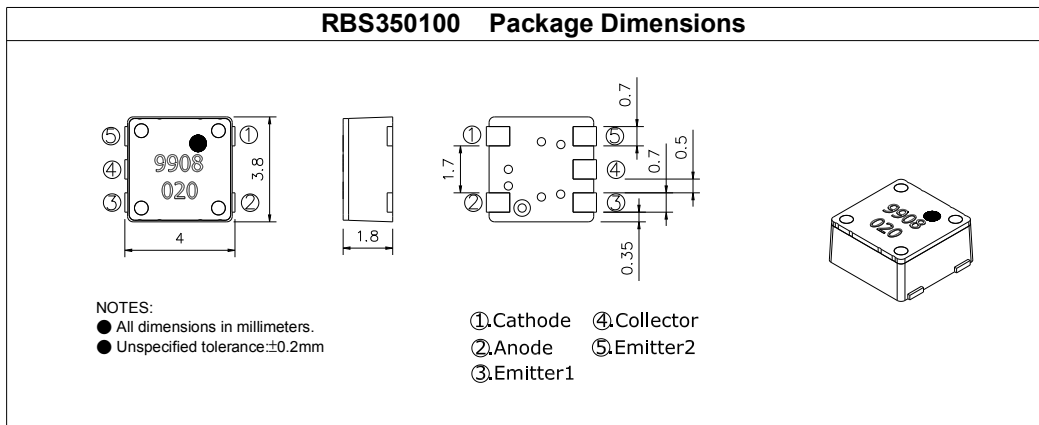


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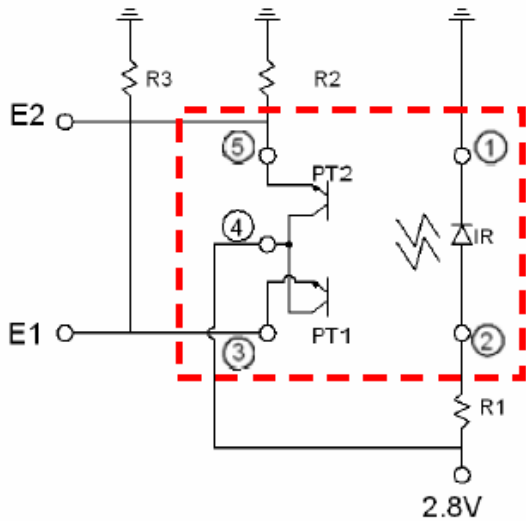
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● Recommended Circuit



- *1 R1=3.6k ohm
- *2 R2=R3=47k ohm
- *3 E1 and E2 be connected to GPIO

Note :

E1 : Output current of phototransistors PT1

E2 : Output current of phototransistors PT2

ON : Output current of phototransistors : 100 μ A or more

OFF : Output current of phototransistors : 20 μ A or less

Output current of ON/OFF is output when device is at a standstill

● Recommended current and voltage

Input Current (mA)	Operating Voltage (V)
0.5	2.8

Absolute Maximum Rating (Ta=25 $^{\circ}$ C)

	Item	Symbol	Rating	Unit
Input	Power Dissipation	Pd	75	mW
	Reverse Voltage	Vr	5	V
	Forward Current	I _F	50	mA
	Peak Forward Current (*1)	I _{FP}	1	A
Output	Collector Power Dissipation	Pc	100	mW
	Collector Current	Ic	20	mA
	C-E Voltage	V _{CEO}	30	V



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E-C Voltage			V _{Eco}	5	V
Operating Temperature			Topr	-40~+85	°C
Storage Temperature			Tstg	-40~+85	°C
Soldering Temperature (*2)			Tsol	260	°C

● Optical / Electrical Characteristics (Ta=25°C)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit	
Input	Forward voltage	V _F	I _F =20mA	-	1.45	1.7	V	
	Reverse current	I _R	V _R =5V	-	-	10	uA	
*1 Output	Dark current	I _{CEO}	V _{CE} =10V	-	-	0.1	nA	
*1 Coupling Characteristics	Collector current	I _C	V _{CE} =2.8V, R ₁ =3.6kΩ	60	-	-	uA	
	*2 Leak current	I _{LEAK}	V _{CE} =2.8V, R ₁ =3.6kΩ	-	-	15	uA	
	Responses time	Rise time	t _f	V _{CE} =5V, I _C =1Ma R _L =1000Ω	-	-	Us	Us
		Fall time	t _f		-	-	Us	Us
Collector-emitter saturation voltage		V _{CE(sat)}	I _C =2mA, I _B =1000uA	-	0.1	0.4	V	

*1 Output and coupling characteristics are common to both phototransistors.

*2 Leak current is the output of transistor when $\theta=0^\circ$ or $\pm 90^\circ$, $\varphi=0^\circ$ and I_C=OFF.

● Mechanical Characteristic



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1.	Temperature Range	Operating : -40°C to +85°C Storage : -40°C to +85°C			
2.	Operation Life	30,000 hrs			
3.	Humidity	95% RH 40°C · 96 hrs			
4.	Solder Ability	After flux 260±5°C for 5±0.5 seconds 95% coverage			
5.	Reflow Soldering Heat For SMT Type	Reflow zone 260±5°C for 20 seconds max.			

● Test Items For Reliability

The following table presents the operating life, mechanical and environmental testing.

Reliability Tests - 1

Test Item	Test Content	Duration	Failure criteria
Storage temperature	-40°C~85°C	5 cycles	Cm < 95% Ca < 99.5%
Infrared Reflow	Peak temp.=255~260°C*3times	3 times	

Reliability Tests - 2

Test Item	Test Content	Duration	Failure criteria
Humidity	40°C/95%RH, 12VDC, I=5.0mA	120 hours	Cm < 95.0% Ca < 99.5%
Operating temperature	-40°C~85°C, 12VDC, I=5.0mA	5 cycles	
Mechanical life	2Hz	1,000,000 times	
Electrical life	2Hz, 12VDC, I=5.0mA	100,000 times	

Notes:

1. Reliability Tests-2 will be proceeded after reliability tests-1 was qualified.
2. Cm represents minimum conductive rate °
3. Ca represents average conductive rate °

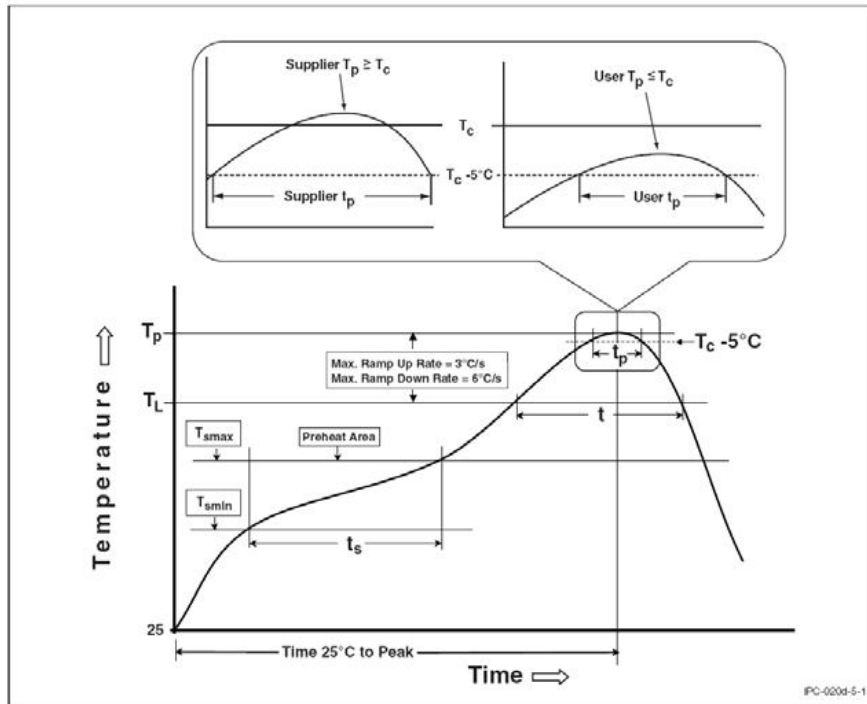


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● Referable Profile for Infrared Reflow(Oven)

Following profile is for reference only. Please use the solder paste that solder paste manufacturer recommends.



< Table of classification Reflow profile >



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Item	Pb process	Pb free process
Pre-heat and Soak Temperature min.(T _{min}) Temperature max.(T _{max}) Time (T _{min} to T _{max})(t _s)	100 °C 150 °C 60-120 seconds	150 °C 200 °C 60-120 seconds
Average ram-up Rate (T _{max} to T _p)	3 °C/second max.	3 °C/second max.
Liquidous Temperature (TL) Time at Liquidous (tL)	183 °C 60-150 seconds	217 °C 60-150 seconds
Peak package body Temperature (T _p)*	230 °C ~235 °C *	255 °C ~260 °C *
Classification temperature(T _c)	235 °C	260 °C
Time(tp)** within 5 °C of the specified classification temperature (T _c)	20** seconds	30** seconds
Average ram-down Rate (T _p to T _{max})	6 °C/second max.	6 °C/second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.
* Tolerance for peak profile temperature (T _p) is defined as a supplier minimum and a user maximum. ** Tolerance for time at peak profile temperature (tp) is defined as a supplier minimum and a user maximum.		



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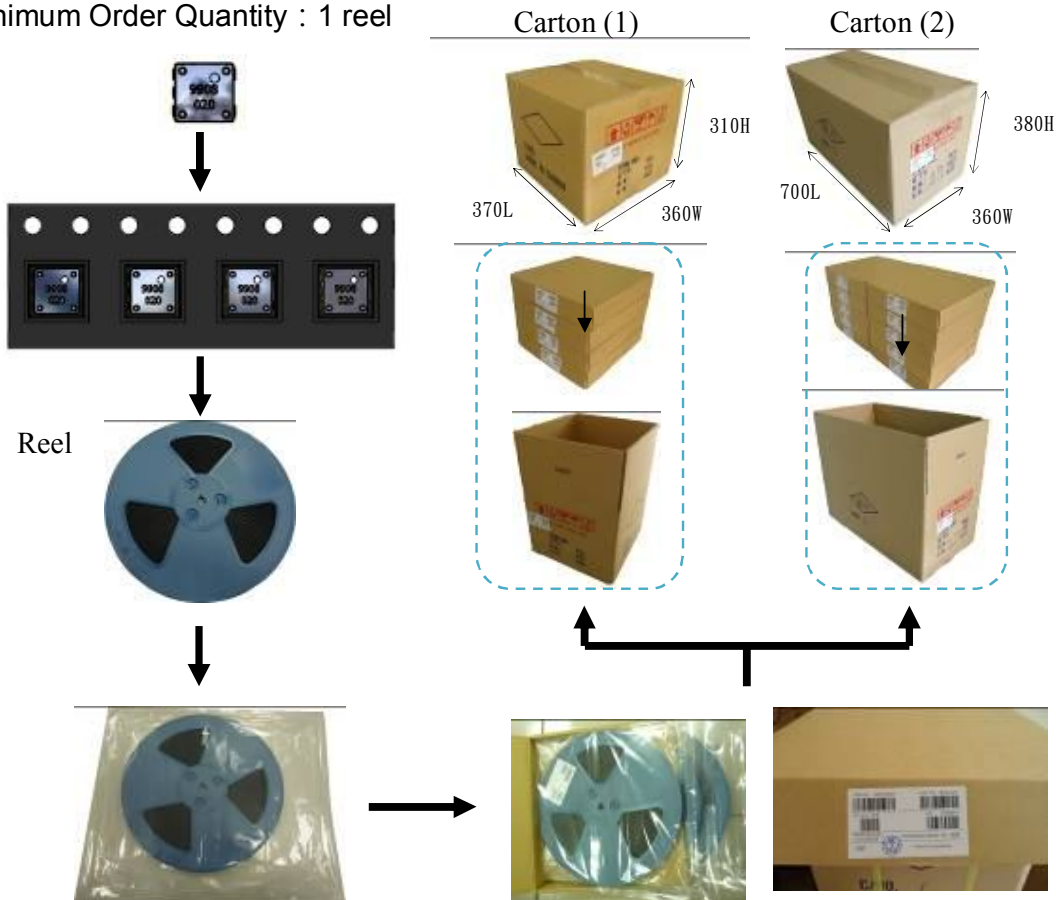
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PACKAGE

	Part Number	Package	Quantity	Total	Size
1.	RBS350100T	Reel	3,600 pcs	3,600 pcs	diameter =30(cm) ; thickness=1.7 (cm)
		Inner Box	3reels	10,800 pcs	36 x 34 x 7 (cm)
		Carton(1)	4 inner boxes	43,200 pcs	37 x 36 x 31 (cm)
		Carton(2)	10 inner boxes	108,000 pcs	70 x 36 x 38 (cm)

* Minimum Order Quantity : 1 reel



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● Notes for Design:

1. Caution should be taken not to overload with instantaneous voltage at the turning ON and OFF of the circuit.
2. When using the pulse drive care must be taken to keep the average current with the rate figures.
3. Avoid close to or direct circuit connect to magnetic devices. (ex: Relay, transformer ...and so on)
4. Don't try to clean the switch with a solvent or similar substance after the soldering process.
5. The switch might be damaged if using the water-soluble flux.
6. For the continued product improvement as one of the company policy, specifications may change or update without notice. The latest information can be obtained through our sales offices. Normally, all products are supplied under our standard conditions.

● Storage:

1. In order to avoid the absorption of moisture, it is recommended to solder as soon as possible after unpacking the sealed bag.
2. If the bag is still sealed, to store it in the environment as following:
 - (1) Temperature: 5°C - 30°C (40°F)
 - (2) Relative humidity: RH 60% MAX.
3. After the bag is opened, devices that will be applied to infrared reflow, vapor-phase reflow or equivalent soldering process must be:
 - a. Completed within 168 hours
 - b. Stored at less than 30% RH.
4. Devices require baking before mounting if above 3 a. or 3 b. is not met.
If baking is required, device must be baked under below condition:
48 hours at 60°C +/-3°C.

● PRECAUTIONS FOR USE:

1. If the products is intended to be used for other endurance equipments requiring higher safety and reliability such as life support system, space and aviations devices, disaster and safety system, it's necessary to make verification of conformity or contact us for the details before using.

