

## SENSOR SWITCH

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### ● FUNCTIONS

1. One way tilt detection
2. Upside down detection
3. Rotation detection in vertical position



### ● APPLICATIONS

1. Anti-theft for motorbike

### ● FEATURES

1. Housing made of high insulation plastic material, free from electric conduction and rust problem.
2. Sensing by phototransistors, Generating highly reliable and stable signals, not affected by oxidation or wear of metal. °
3. All plastic materials subject to industrial purpose. Resist high temperature.
4. Simple ON and OFF signals, easy for design.
5. Suitable to horizontal PCB.
6. Tilt Angles : 30° within a 360° radius.
7. RoHS compliance, an ideal substitute for mercury switch.
8. A more economical tilt and vibration detection option than IC design solution.
9. All made in Taiwan and examined before shipment.



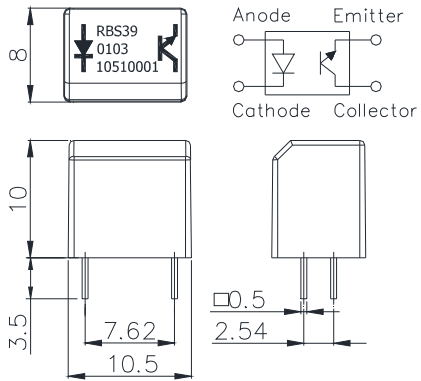
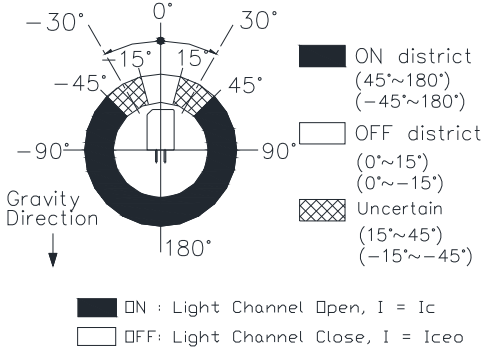
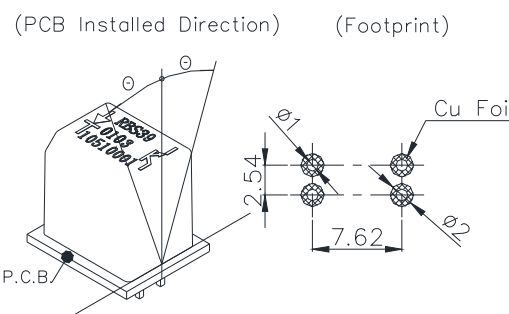
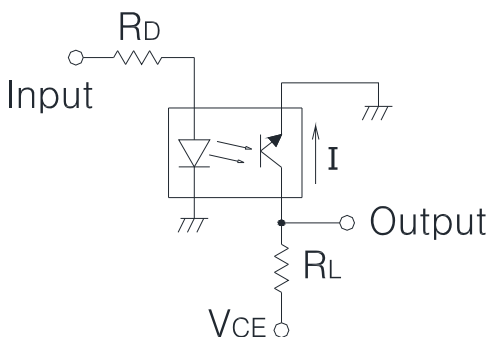
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● PATENTS

1. Taiwan Patent No.: M 420033
2. Taiwan Patent No.: M450817
3. Taiwan Patent No.: I 451463
4. China Patent No.: ZL 2011 2 0339658.7
5. China Patent No.: ZL 2012 2 0539712.7.
6. USA Patent No.: US 8,927,919,B2

● DIMENSIONS / OPERATION / P.C.B. LAYOUT (Unit: mm, Tolerance:  $\pm 0.25$ mm)  
Table 1

<p>RBS 39 01 03</p>  <p>Anode Emitter Cathode Collector</p> <p>Dimensions: 8, 10, 3.5, 7.62, 10.5, 0.5, 2.54</p>	<p>Operation Angle Diagram</p> <p>[ Tilt Angle : <math>30^{\circ} \pm 15^{\circ}</math> ]</p>  <p>ON district (45°~180°) (-45°~180°) OFF district (0°~15°) (0°~15°) Uncertain (15°~45°) (-15°~-45°)</p> <p>ON : Light Channel Open, I = I<sub>c</sub> OFF: Light Channel Close, I = I<sub>ce0</sub></p>
<p>P.C.B. Layout (DIP) / Top View</p> <p>(PCB Installed Direction) (Footprint)</p>  <p>Dimensions: 2.54, 7.62, <math>\phi 1</math>, <math>\phi 2</math></p> <p>Cu Foil</p>	<p>Application Circuit</p>  <p>Input, Output, VCE, R<sub>D</sub>, R<sub>L</sub>, I</p>



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● Current/Voltage Suggested

Input Current (mA)	Operating Voltage (V)	Condition
10	3.3	$V_{CE}=3.3V$ $R_D=200\text{ ohm}$ $R_L=82K\text{ ohm}$
10	5	$V_{CE}=5V$ $R_D=390\text{ ohm}$ $R_L=100K\text{ ohm}$

\* Please refer to above Application Circuit for designing electrical circuit.

● Absolute Maximum Rating (  $T_a=25^\circ\text{C}$  )

Item		Symbol	Rating	Unit
Input	Power Dissipation	$P_d$	75	mW
	Reverse Voltage	$V_R$	5	V
	Forward Current	$I_F$	50	mA
	Peak Forward Current (*1)	$I_{FP}$	1	A
Output	Collector Power Dissipation	$P_C$	100	mW
	Collector Current	$I_C$	20	mA
	C-E Voltage	$V_{CEO}$	30	V
	E-C Voltage	$V_{ECO}$	5	V
Operating Temperature		$T_{opr}$	-25 ~ +85	$^\circ\text{C}$
Storage Temperature		$T_{stg}$	-40 ~ +85	$^\circ\text{C}$
Soldering Temperature (*2)		$T_{sol}$	260	$^\circ\text{C}$

(\*1)  $t_w=100\ \mu\text{Sec.}$  、  $T=10\ \text{mSec.}$

(\*2)  $t=5\ \text{Sec}$



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● Electrical Optical Characteristics (Ta=25°C)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Forward Voltage	$V_F$	$I_F=20mA$	-	1.2	1.5	V
Reverse Current	$I_R$	$V_R=5V$	-	-	10	$\mu A$
Peak Wavelength	$\lambda_p$	$I_F=10mA$		940		nm
Dark Current	$I_{ceo}$	$V_{CE}=10V$	-	-	20	$\mu A$
C-E Saturation Voltage	$V_{CE} (sat)$	$I_C=0.25mA$ $I_F=20mA$	-	-	0.4	V
Light Current	$I_C$	$V_{CE}=5V$ $I_F=20mA$	0.5	5	-	mA
Rise Time	$T_r$	$I_C=0.8mA$ $V_{CC}=30V$	-	5	-	$\mu sec$
Fall Time	$T_f$	$R_L=1K\Omega$	-	5	-	$\mu sec$



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

Fig.1 Power Dissipation vs. Ambient Temperature

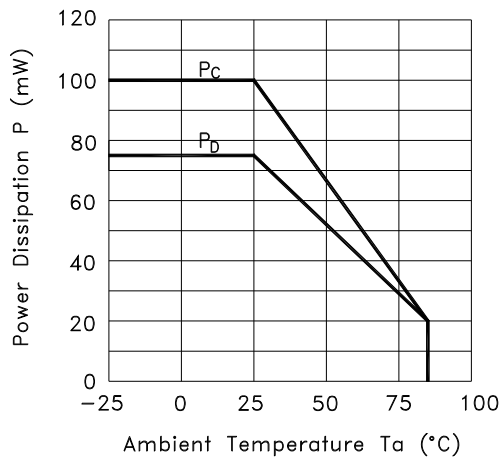


Fig.2 Forward Current vs. Forward Voltage

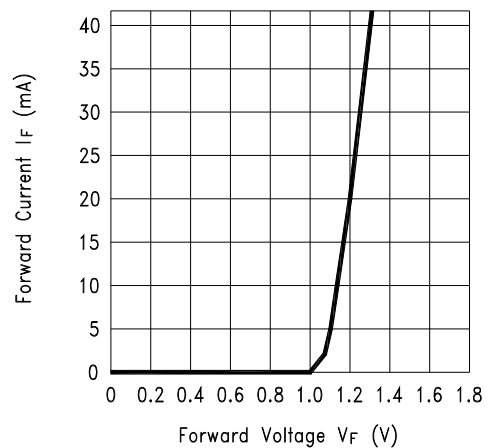


Fig.3 Collector Current vs. Collector-emitter Voltage

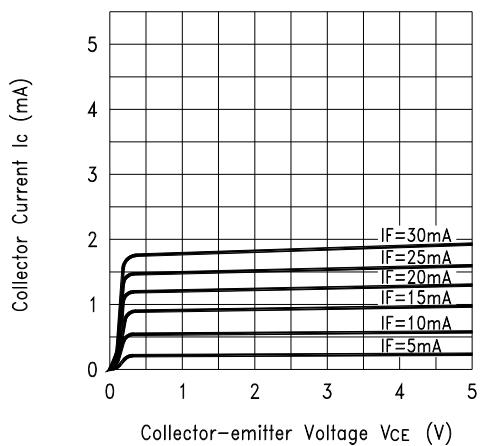
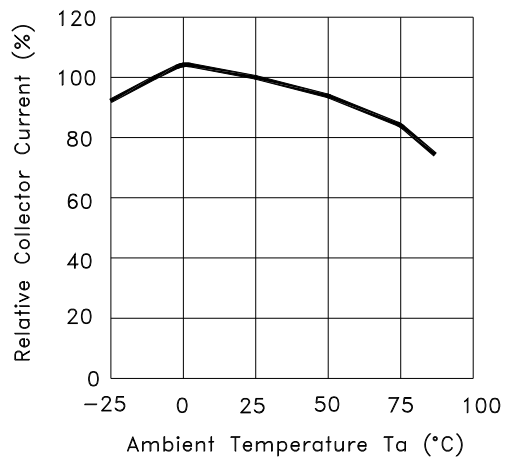


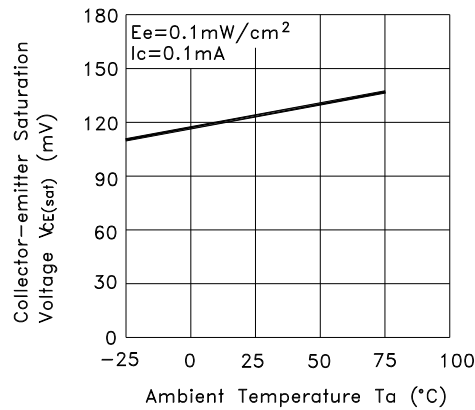
Fig.4 Collector Current vs. Ambient Temperature



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Fig.5 Collector-emitter Saturation Voltage vs. Ambient Temperature



### ● RELIABILITY TEST

Test Item	Standard	Contents
Operating Temp	MIL-STD-202H, TEST METHOD 107G, TEST A	-25°C~85°C
Storage Temp	MIL-STD-202H, TEST METHOD 107G, TEST A	-40°C~85°C
Humidity Test	MIL-STD-202H, TEST METHOD 103B	40°C/95%RH
Mechanical Test	--	2Hz, horizontal 1,000,000 times
Operation Life Test	MIL-STD-883E:1016	$I_F=20$ mA, $V_{CE}=5$ V TIME: 30,000 hrs



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### ● SOLDERING CONDITION

Following soldering conditions are for reference only, please use soldering information that solder paste manufacturer recommends.

Condition Operation Method	Soldering Temperature	Soldering Time	Wattage of Manual Soldering	Suitable Production Process
Wave Soldering	260±5°C	< 5 seconds max.	-	DIP
Manual Soldering	260±5°C	< 5 seconds max.	20W or Temperature-controlled manual soldering	DIP · SMT

### PACKAGE

	Part Number	Package	Quantity	Total Q'ty	Size (mm)
1.	RBS390103	IC Tube	48 pcs	48 pcs	525L*10W*17.5H
		Inner box	84 Tubes	4,032 pcs	539L*130W*130H
		Carton	4 Boxes	16,128 pcs	551L*285W*288H

※ Package is shown as below for reference !



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● NOTE

1. Suggestion for usage : For vibration usage or application · we suggest to add hysteresis (on delay) for IC.
2. 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.

● PRECAUTIONS FOR USE

1. If the products is intended to be used for other endurance equipment requiring higher safety and reliability such as life support system, space and aviation devices, disaster and safety system, it's necessary to make verification of conformity or contact us for the details before using.
2. Do not clean the switch with solvent or similar substance after the soldering process.
3. Use water-soluble flux may damage the switch.
4. When the soldering temperature exceeds specifications, the switch may fall apart.
5. Do not use switch in the environment of high humidity · because such an environment may cause the leakage current between the terminals.
6. Please do not exceed the rated load as there will be a risk of disabling the product function.
7. In the circuit · switch should not be near or directly connected with the magnetic component solder joints (for example: relays, transformers, etc.).
8. To prevent damaging IR and PT, please make ESD protection, for example: wearing a conductive wrist strap or antistatic gloves during production process, or grounding machinery etc.

