



## SENSOR SWITCH

Item #	RBS3302 Series	Description	TILT SWITCH	Version	V99.0
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### ● FUNCTIONS

1. Tilt Detecting within a 360° radius
2. Slight Vibration Detecting

### ● APPLICATIONS

1. LCD monitor rotation
2. Home appliance tilt-off function
3. Earthquake alarm
4. Automotive devices
5. Visual devices
6. Information devices
7. Communication devices



### ● FEATURES

1. Housing made of high insulation plastic material, free from electric conduction and rust problem.
2. Detecting with photo transistors, generating 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 horizontal PCB.
6. Tilt Angles: 15°, 20°, 30°, and 45° within a 360 ° radius.
7. RoHS compliance, an ideal substitute for mercury switch.
8. A more economical vibration detection option than IC design solution.
9. All made in Taiwan and examined before shipment.

### ● PATENTS

1. TAIWAN Patent NO. 181431
2. CHINA Patent NO. ZL 01 2 60920.X
3. U.S.A. Patent NO. US 6,800,841 B1

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● DIMENSIONS / OPERATION / P.C.B. LAYOUT (Unit: mm, Tolerance: ±0.25mm)

<p>RBS 33 02 10</p>	<p>Tilt Angle For <math>45^\circ \pm 10^\circ</math></p>	<p>P.C.B. Layout (SMT)/Top View</p>
<p>Installation Position</p>	<p>Application Circuit</p>	
	<p>1. Vce=5V 2. RD=430ohm 3. RL=33Kohm</p>	

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<p>RBS 33 02 11</p>	<p>Tilt Angle For <math>30^\circ \pm 10^\circ</math></p>	<p>P.C.B. Layout (SMT)/Top View</p>
<p>Installation Position</p>	<p>Application Circuit</p>	
	<p>1. <math>V_{ce}=5V</math>                  2. <math>R_D=430\text{ohm}</math>                  3. <math>R_L=33\text{Kohm}</math></p>	

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<p>RBS 33 02 12</p>	<p>Tilt Angle For <math>20^\circ \pm 10^\circ</math></p> <p> <span style="display:inline-block; width:10px; height:10px; background-color:black;"></span> Uncertain              (10°-30°)              (-10°--30°)         </p> <p> <span style="display:inline-block; width:10px; height:10px; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px);"></span> Lo district              (0°-10°)              (0°--10°)         </p> <p> <span style="display:inline-block; width:10px; height:10px; border: 1px solid black;"></span> Hi district              (30°-180°)              (-30°-180°)         </p>	<p>P.C.B. Layout (SMT)/Top View</p>
<p>Installation Position</p>	<p>Application Circuit</p>	
	<p>             1. <math>V_{ce}=5V</math>              2. <math>R_D=430\text{ohm}</math>              3. <math>R_L=33K\text{ohm}</math> </p>	

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<p>RBS 33 02 13</p>	<p>Tilt Angle For <math>15^\circ \pm 10^\circ</math></p> <p> <span style="display:inline-block; width:10px; height:10px; background-color:black;"></span> Uncertain (<math>5^\circ \sim 25^\circ</math>) (<math>-5^\circ \sim -25^\circ</math>)  <span style="display:inline-block; width:10px; height:10px; border:1px dashed black;"></span> Lo district (<math>0^\circ \sim 5^\circ</math>) (<math>0^\circ \sim -5^\circ</math>)  <span style="display:inline-block; width:10px; height:10px; border:1px solid black;"></span> Hi district (<math>25^\circ \sim 180^\circ</math>) (<math>-25^\circ \sim -180^\circ</math>)         </p>	<p>P.C.B. Layout (SMT)/Top View</p>
<p>Installation Position</p>	<p>Application Circuit</p>	
	<p>             1. <math>V_{ce}=5V</math>              2. <math>R_D=430\Omega</math>              3. <math>R_L=33K\Omega</math> </p>	

### ● Device Selection Guide

Input Current (mA)	Operating Voltage (V)
10	5

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### ● Absolute Maximum Rating (Ta=25°C)

Item		Symbol	Rating	Unit
Input	Power Dissipation	Pd	75	mW
	Reverse Voltage	Vr	5	V
	Forward Current	I <sub>F</sub>	50	mA
	Peak Forward Current (*1)	I <sub>FP</sub>	1	A
Output	Collector Power Dissipation	Pc	100	mW
	Collector Current	Ic	20	mA
	C-E Voltage	V <sub>CEO</sub>	30	V
	E-C Voltage	V <sub>ECO</sub>	5	V
Operating Temperature		Topr	-25~+85	°C
Storage Temperature		Tstg	-40~+100	°C
Soldering Temperature (*2)		Tsol	260	°C

(\*1) tw=100 uSec. · T=10 mSec.

(\*2) t=5 Sec

### ● MECHANICAL CHARACTERISTICS

1.	Temperature Range	Operating: -25°C to +85°C Storage: -40°C to +85°C
2.	Pull Force of Terminal	500 gf for 1 minute
3.	Operation Life	30,000 hrs.
4.	Humidity	95% RH, 40°C for 96 hrs.
5.	Solder Ability	After flux 260±5°C for 5±0.5 seconds 95% coverage
6.	Reflow Soldering Heat for SMT Type	Reflow zone 260±5°C for 20 seconds max.

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

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Forward Voltage	$V_F$	$I_F=20mA$	—	—	1.5	V
Reverse Current	$I_R$	$V_R=5V$	—	—	10	$\mu A$
Peak Wavelength	$\lambda_p$	$I_F=10mA$		940		nm
Dark Current	$I_D$	$V_{CE}=10V$	—	—	2	$\mu A$
C-E Saturation Voltage	$V_{CE(sat)}$	$I_C=0.25mA$ $I_F=20mA$	—	—	0.4	V
Light Current	$I_L$	$V_{CE}=5V$ $I_F=20mA$	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	—	$\mu sec$

### ● BILL OF MATERIAL

1.	Housing	Polyamide + Glass-Fiber
2.	Base	Polyamide + Glass-Fiber
3.	Ball	Stainless Steel
4.	Infrared Emitting Diodes	
5.	Silicon Photo Transistors	
6.	Inside Part	Copper Alloy, Nickel Plated

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

Fig.1 Power Dissipation vs. Ambient Temperature

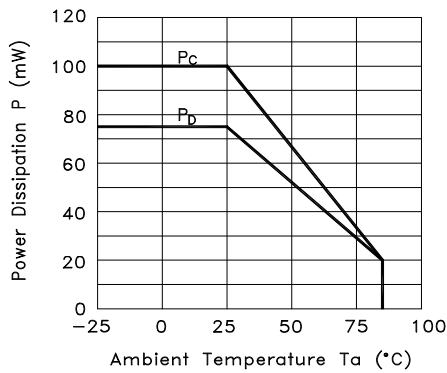


Fig.2 Forward Current vs. Forward Voltage

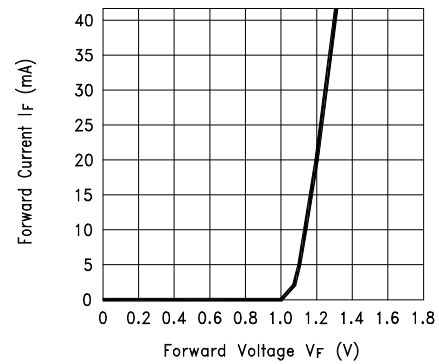


Fig.3 Collector Current vs. Collector-emitter Voltage

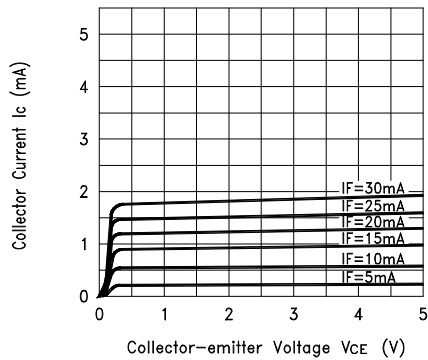
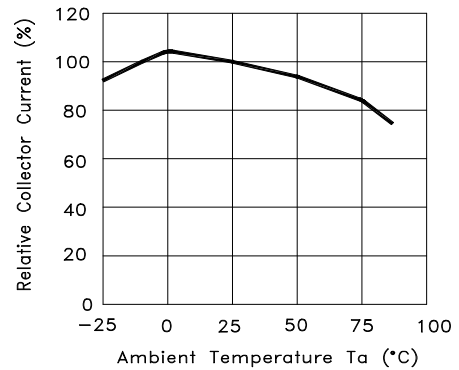


Fig.4 Collector Current vs. Ambient Temperature



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

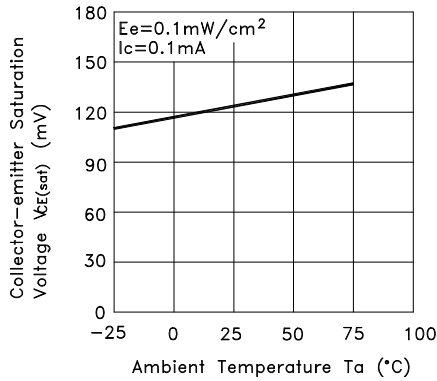


Fig.6 Response Time vs. Load Resistance

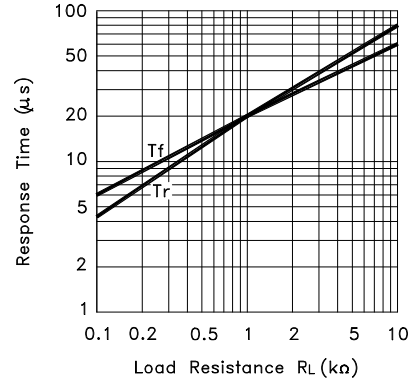
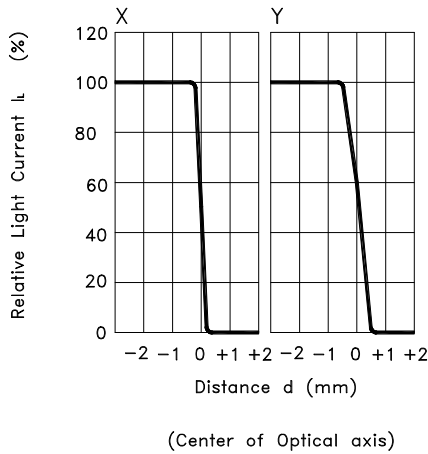
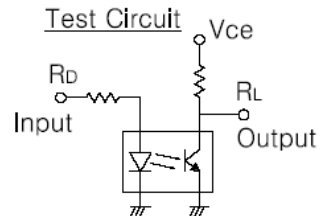
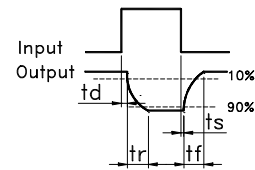
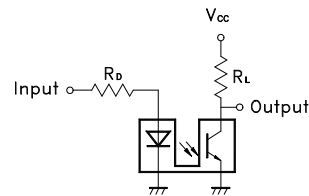


Fig.7 Sensing Position Characteristics (Typical)



Test Circuit for Response Time



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### ● PACKAGE

	Part Number	Package	Quantity	Total	Size
1.	RBS330210T	Reel	200 pcs	200 pcs	Diameter = 30; Width = 2.9 (cm)
	RBS330211T	Inner Box	2 Reels	400 pcs	36 x 34 x 7 (cm)
	RBS330212T	Carton(1)	4 Boxes	1,600 pcs	37 x 36 x 31 (cm)
	RBS330213T	Carton(2)	10 Boxes	4,000 pcs	70 x 36 x 38 (cm)

\* Minimum Order Quantity: One Reel

### ● NOTE

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 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.
2. Don't try to clean the switch with a solvent or similar substance after the soldering process.
3. The switch might be damaged if using the water-soluble flux.

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