

Tilt Sensor Switch

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|----------|------------|-------------|---------------|---------------|----|
| Item No. | RBS310912T | Description | Photoelectric | Version | 12 |
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● **FUNCTIONS**

1. Tilt Angles: 20° within a 360° radius
2. Suitable to vertical PCB.
3. Slight Vibration Detecting

● **APPLICATIONS**

1. Rotation detection for LCD monitor
2. Automatically shut off for home appliances
3. Automatically shut off for Sporting equipment
4. Automatically shut off for motorbike
5. Alarm system
6. Anti-theft / Anti-tamper devices
7. Being motion detection (personal locator)
8. Wake up systems for power saving, such like remote controllers
9. Earthquake Detecting



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● **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. RoHS compliance, an ideal substitute for mercury switch.
6. A more economical tilt and vibration detection option than IC design solution.
7. All made in Taiwan and examined before shipment.

● **PATENTS**

1. Taiwan Patent No. I 310952
2. Taiwan Patent No. M 450817
3. U.S.A Patent No. US 6,800,841 B1
4. U.S.A Patent No. US 7,402,791 B2
5. China Patent No. ZL 200610083013.5
6. China Patent No. ZL 200820126206.9
7. China Patent No. ZL 201220539712.7
8. Japan Patent No. 4384217
9. Japan Patent No. 3148127

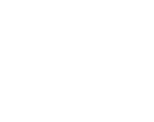
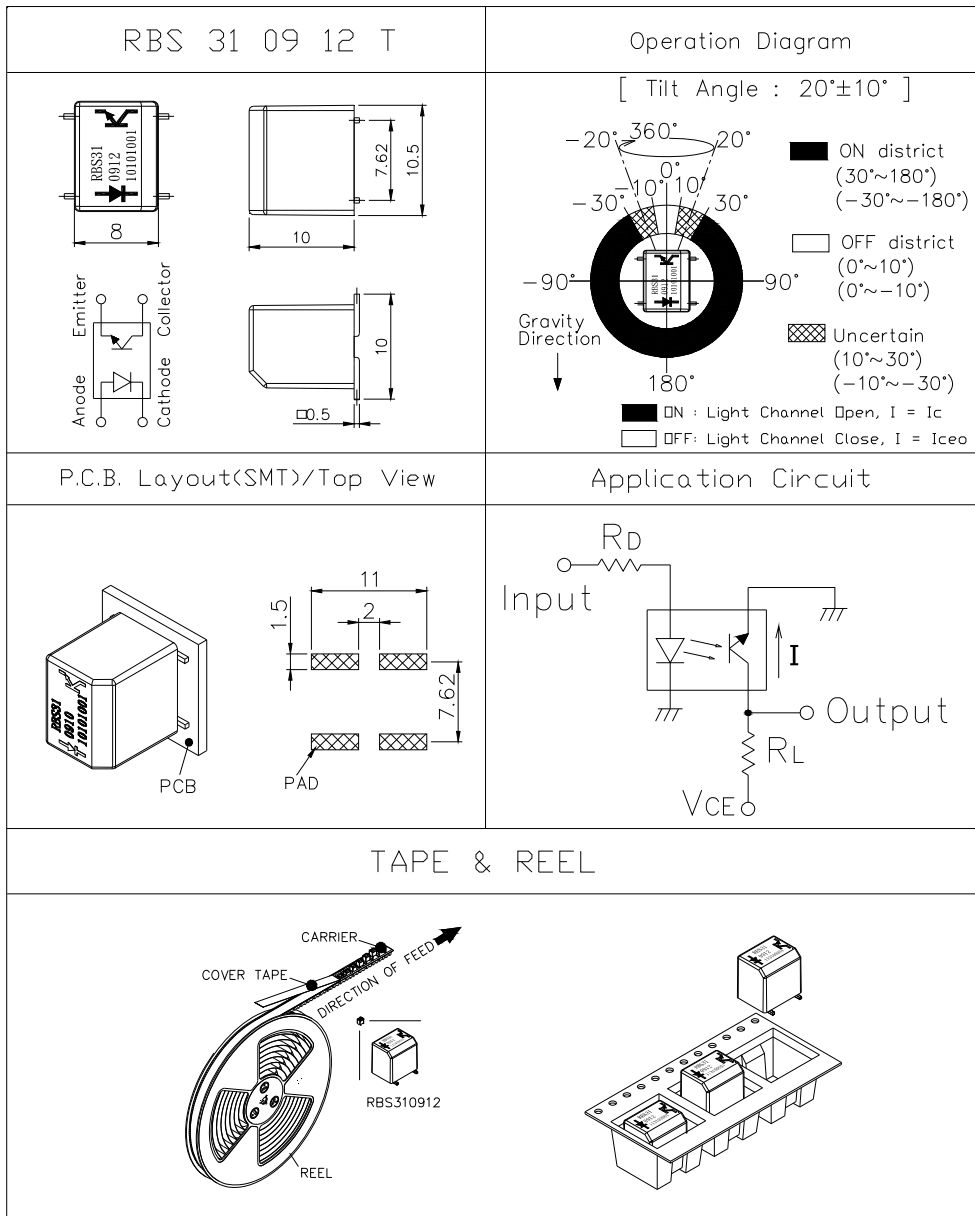


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● DIMENSIONS / OPERATION / P.C.B. LAYOUT (Unit: mm, Tolerance: ±0.25mm)

Fig. 1



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● Current/Voltage/Conditions Suggested

| Input Current (mA) | Operating Voltage (V) | Conditions |
|--------------------|-----------------------|---|
| 10 | 3.3 | V _{CE} =3.3V R _D =200 ohm R _L =33K ohm |
| 10 | 5 | V _{CE} =5V R _D =390 ohm R _L =33K ohm |

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

● Absolute Maximum Rating (Ta=25°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 | °C |
| Storage Temperature | | T _{stg} | -40~+85 | °C |
| Soldering Temperature (*2) | | T _{sol} | 260 | °C |

(*1) tw=100 μSec. 、 T=10 mSec.

(*2) Please refer to soldering condition.



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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 | μA |
| Peak Wavelength | λ_p | $I_F=10mA$ | | 940 | | nm |
| Dark Current | I_{ceo} | $V_{CE}=10V$ | - | - | 2 | μA |
| 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 | - | μsec |
| Fall Time | T_f | $R_L=1K\Omega$ | - | 5 | - | μsec |
| Operation Diagram | θ | Fig. 1 | 10 | 20 | 30 | ° |



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

Fig.1 Power Dissipation vs. Ambient Temperature

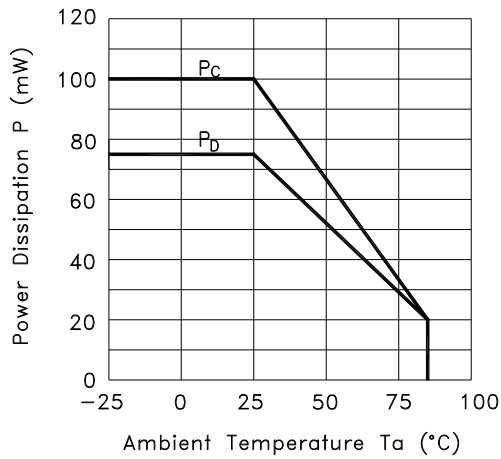


Fig.2 Forward Current vs. Forward Voltage

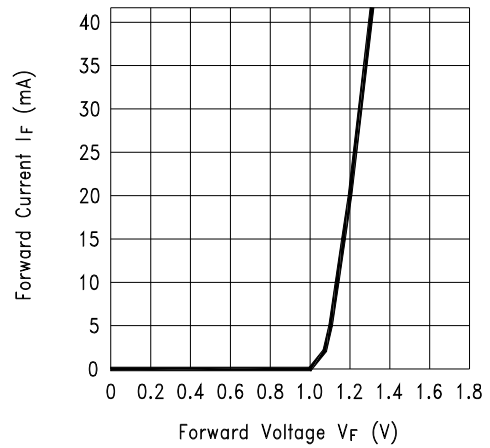


Fig.3 Collector Current vs. Collector-emitter Voltage

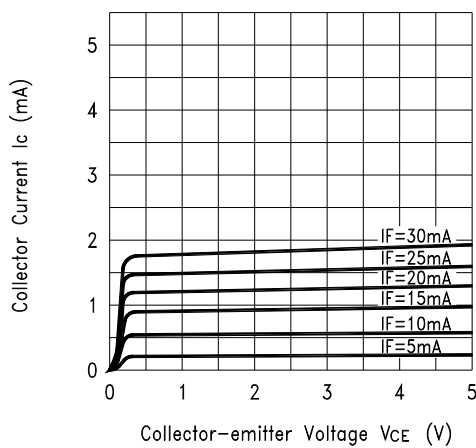
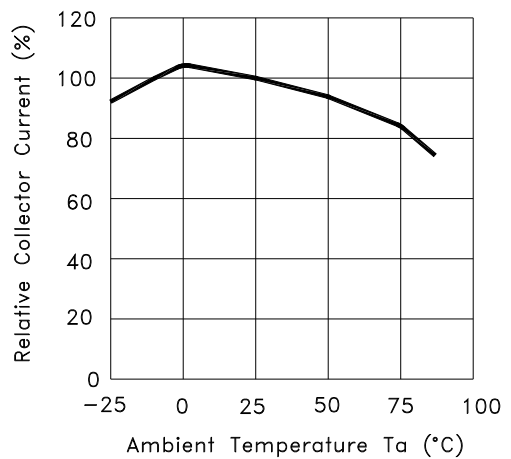


Fig.4 Collector Current vs. Ambient Temperature



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

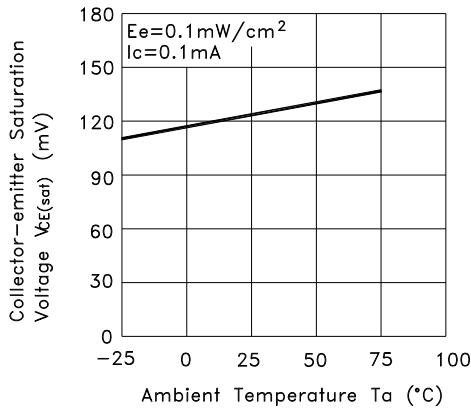


Fig.6 Response Time vs. Load Resistance

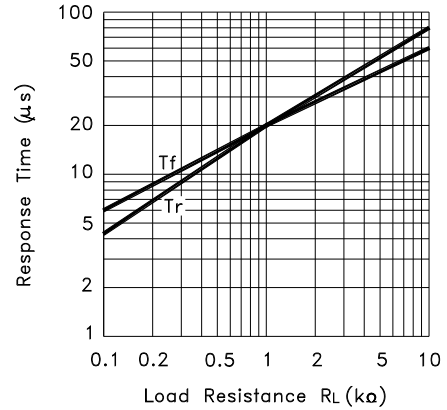
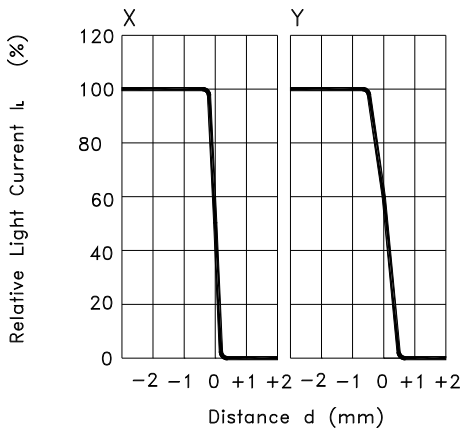
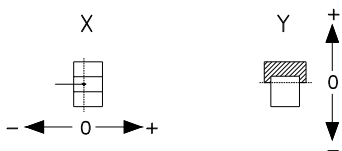


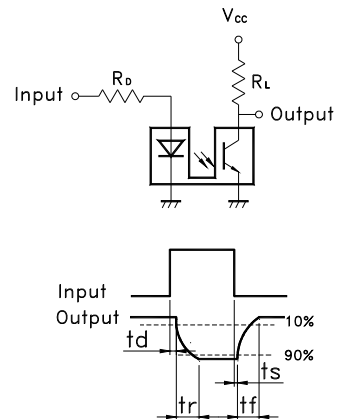
Fig.7 Sensing Position Characteristics (Typical)



(Center of Optical axis)



Test Circuit for Response Time



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● RELIABLE TEST ITEMS

Reliable Test for RBS310912T

| | Test Item | Test Content |
|---|-----------------------|---|
| 1 | IR Reflow | Peak temp.=255~260°C |
| 2 | Operation Temperature | -25°C ~ 85°C |
| 3 | Storage Temperature | -40°C ~ 85°C |
| 4 | Humidity | 40 °C / 95 %RH |
| 5 | Mechanical Life | 2Hz, horizontal 1,000,000 times |
| 6 | Electrical Life | I _F =20 mA, V _{CE} =5 V TIME: 30,000 hrs |

● SOLDERING CONDITION

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

| Condition | Soldering Temperature | Soldering Time | Wattage of Manual Soldering | Type |
|-----------------------------|--|------------------|--|------|
| Suitable Production Process | | | | |
| IR Reflow | Please refer to following < Table of classification Reflow profile > and Table 2 | | - | SMD |
| Manual Soldering | 300±5°C | < 3 seconds max. | 30W or Temperature-controlled manual soldering | SMD |



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< Table of classification Reflow profile >

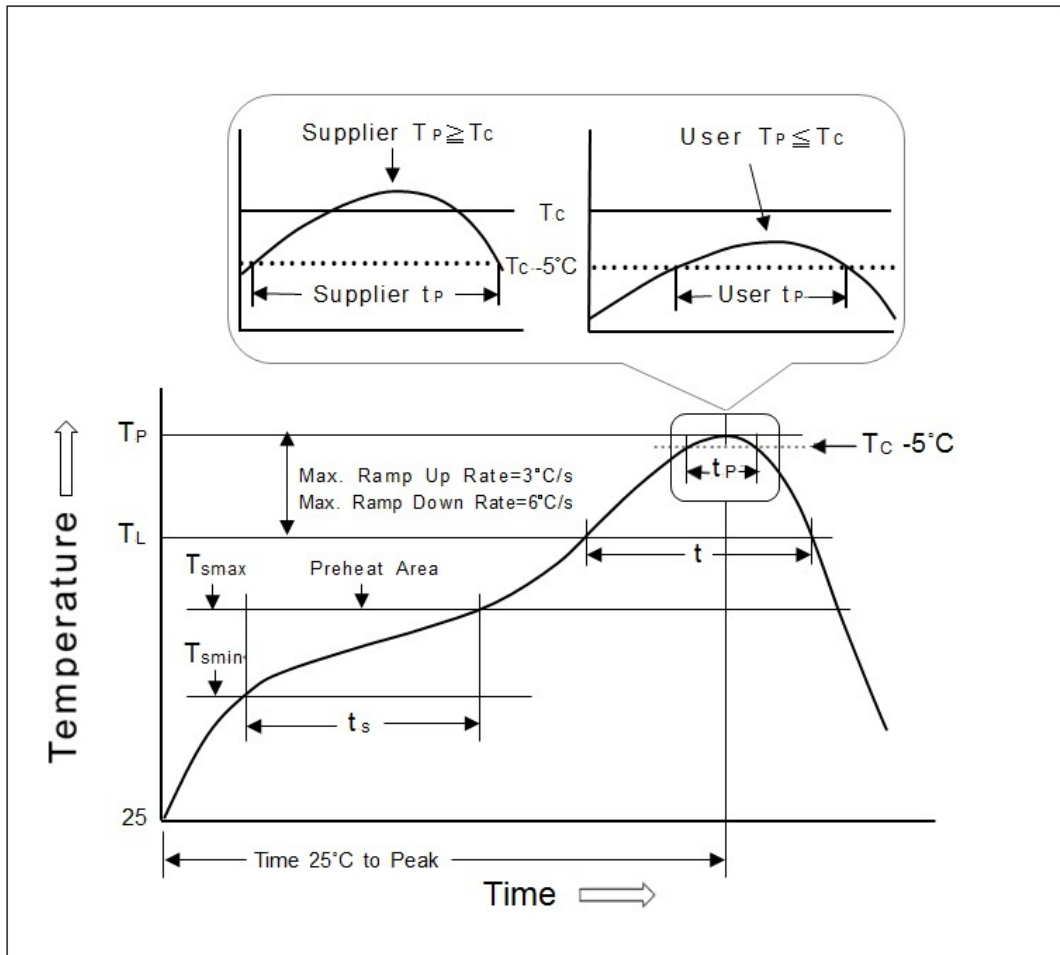
| Item | Pb process | Pb free process |
|--|------------------------------------|------------------------------------|
| Pre-heat and Soak Temperature min.(T _{smin}) Temperature max.(T _{smax}) Time (T _{smin} to T _{smax})(t _s) | 100 °C 150 °C 60-120 seconds | 150 °C 200 °C 60-120 seconds |
| Average ram-up Rate (T _{smax} 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 _{smax}) | 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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Fig. 2



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● PACKAGE

| | Part Number | Package | Quantity | Total | Dimension(mm) |
|----|-------------|-------------|----------|-----------|----------------|
| 1. | RBS310912T | Tape & Reel | 350 pcs | 350 pcs | φ330*25H |
| | | Inner Box | 2 Reels | 700 pcs | 355L*340W*68H |
| | | Carton | 10 Boxes | 7,000 pcs | 703L*364W*380H |

※ Package shown as below for reference.

