

# IrDA Infrared communication Module

## RPM871-H12

RPM871-H12 is an infrared communication module for IrDA Ver. 1.2 (Low Power). The infrared LED, PIN photo diode, LSI are all integrated into a single package. This module is designed with power down function and low current consumption at stand-by mode. The ultra small package makes it a perfect fit for mobile devices.

### ●Features

- 1) Infrared LED, PIN photo diode, LED driver & Receiver frequency formation circuit built in. Improvement of EMI noise protection because of Shield Case.
- 2) Applied to SIR (2.4 to 115.2kbps)
- 3)  $V_{CC}$  supply voltage range is from 2.6V to 3.6V.
- 4) Surface mount type.
- 5) Power down function built in.
- 6) Adjustable communication distance by LED load resistance value. (approximately 20cm to 60cm)

### ●Applications

Cellular phone, PDA, DVC, Digital Still Camera, Printer, Handy Terminal etc.

### ●Absolute maximum ratings (Ta=25°C)

| Parameter             | Symbol    | Limits               | Unit |
|-----------------------|-----------|----------------------|------|
| Supply voltage        | $V_{max}$ | 7.0* <sup>1</sup>    | V    |
| Input voltage         | $V_{in}$  | -0.3 to $V_{CC}+0.3$ | V    |
| Operation temperature | $T_{opr}$ | -20 to +85           | °C   |
| Storage temperature   | $T_{stg}$ | -30 to +100          | °C   |
| LED peak current      | $I_{FP}$  | 200* <sup>2</sup>    | mA   |
| Power dissipation     | $P_d$     | 150* <sup>3</sup>    | mW   |

\*1 This applies to all pins basis ground pins (1.4pin)

\*2 LED peak current<90μs. ON duty<20%

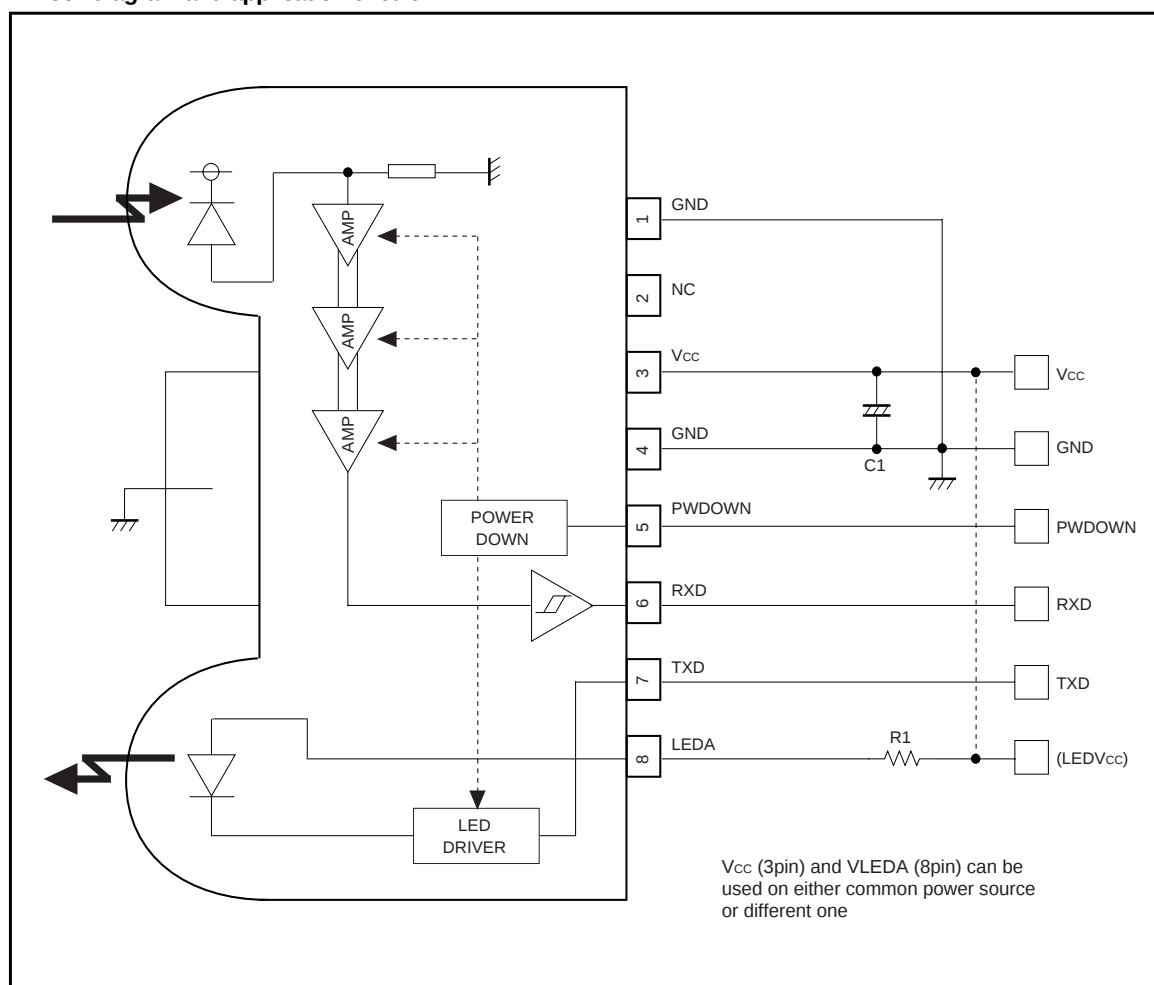
\*3 When glass-epoxy board (70×70×1.6mm) mounted. In case operating environment is over 25°C, 2mW would be reduced per each 1°C stepping up.

### ●Recommended operating conditions (Ta=25°C)

| Parameter          | Symbol      | Min. | Typ. | Max. | Unit |
|--------------------|-------------|------|------|------|------|
| Supply voltage     | $V_{CC}$    | 2.6  | 3.0  | 3.6  | V    |
| LED supply voltage | $LEDV_{CC}$ | 2.6  | 2.8  | 5.5  | V    |

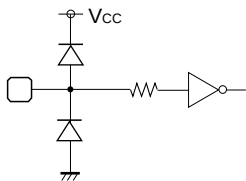
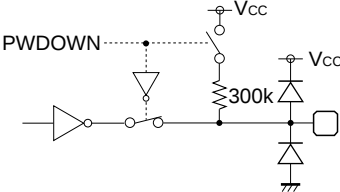
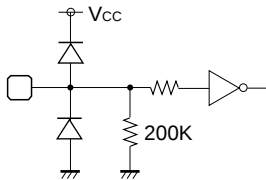
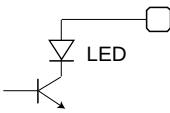
## Photo Link Module

## ●Block diagram and application circuit



## Photo Link Module

## ●Terminal description

| Pin No | Terminal         | Circuit                                                                             | Function                                                                                                                                                                                              |
|--------|------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1, 4   | GND              |                                                                                     | <b>GND</b><br>Pin1 and Pin4 must be connected to the ground.                                                                                                                                          |
| 2      | NC               |                                                                                     | This Terminal must be left open.                                                                                                                                                                      |
| 3      | V <sub>CC</sub>  |                                                                                     | <b>V<sub>CC</sub></b><br>For preventing from infection, connect a capacitor between V <sub>CC</sub> (3pin) and GND (4pin).                                                                            |
| 5      | PWDOWN           |    | <b>Power-down Control Terminal</b><br>H : POWERDOWN<br>L : OPERATION<br>CMOS Logic Level Input<br>When input is H, it will stop the receiving circuit, Pin-PD current and transmitting LED operation. |
| 6      | RXD              |   | <b>Receiving Data Output Terminal</b><br>CMOS Logic Level Output<br>When PWDOWN (5pin)=H, the RXD output will be pulled up to V <sub>CC</sub> at approximately 300kΩ.                                 |
| 7      | TXD              |  | <b>Transmitting Data Input Terminal</b><br>H : LED (PWDOWN=L)<br>CMOS Logic Level Input<br>Holding TXD="H" status, LED will be turn off approximately 45μs.                                           |
| 8      | LED <sub>A</sub> |  | <b>LED ANODE Terminal</b><br>Other power source can be used difference between LEDV <sub>CC</sub> and V <sub>CC</sub> .<br>LED current depends on LED load resistance value.                          |
| —      | Shield Case      |                                                                                     | Connect to Ground.                                                                                                                                                                                    |

## Photo Link Module

●Electrical characteristics (Unless otherwise noted,  $V_{CC}=2.8V$ ,  $V_{LEDV_{CC}}=2.8V$ ,  $T_a=25^{\circ}C$ )

| Parameter                 | Symbol    | Min.          | Typ. | Max.  | Unit    | Conditions                               |
|---------------------------|-----------|---------------|------|-------|---------|------------------------------------------|
| Consumption current1      | $I_{CC1}$ | —             | 73   | 99    | $\mu A$ | Stand-by for receiving At no input light |
| Consumption current2      | $I_{CC2}$ | —             | 0.01 | 0.2   | $\mu A$ | PWDOWN PIN High At no input light        |
| Transmission rate         |           | 2.4           | —    | 115.2 | kbps    |                                          |
| PWDOWN input high voltage | VPDH      | $V_{CC}-0.55$ | —    | —     | V       |                                          |
| PWDOWN input low voltage  | VPDL      | —             | —    | 0.55  | V       |                                          |
| PWDOWN input high current | IPDH      | -1.0          | 0    | 1.0   | $\mu A$ | PWDOWN= $V_{CC}$ [V]                     |
| PWDOWN input low current  | IPDL      | -1.0          | 0    | 1.0   | $\mu A$ | PWDOWN=0 [V]                             |

## &lt;Transmitter&gt;

|                        |                   |               |     |      |         |                    |
|------------------------|-------------------|---------------|-----|------|---------|--------------------|
| TXD input high voltage | VTXH              | $V_{CC}-0.55$ | —   | —    | V       |                    |
| TXD input low voltage  | VTXL              | —             | —   | 0.55 | V       |                    |
| TXD input high current | ITXH              | 7             | 14  | 28   | $\mu A$ | TXD= $V_{CC}$ [V]  |
| TXD input low current  | ITXL              | -1.0          | 0   | 1.0  | $\mu A$ | TXD=0 [V]          |
| LED anode current      | ILED <sub>A</sub> | —             | 144 | —    | mA      | $R_1=7.5 [\Omega]$ |

## &lt;Receiver&gt;

|                         |                   |              |     |     |         |                                        |
|-------------------------|-------------------|--------------|-----|-----|---------|----------------------------------------|
| RXD output high voltage | VRXH              | $V_{CC}-0.5$ | —   | —   | V       | IRXH= -50 $\mu A$                      |
| RXD output low voltage  | VRXL              | —            | —   | 0.4 | V       | IRXL=200 $\mu A$                       |
| RXD output rise time    | t <sub>RR</sub>   | —            | 70  | —   | ns      | C <sub>L</sub> =15pF                   |
| RXD output fall time    | t <sub>FR</sub>   | —            | 30  | —   | ns      | C <sub>L</sub> =15pF                   |
| RXD output pulse width  | tw <sub>RXD</sub> | 1.5          | 2.3 | 3.6 | $\mu s$ | C <sub>L</sub> =15pF, 2.4 to 115.2kbps |
| Receiver latency time   | t <sub>RT</sub>   | —            | 100 | 300 | $\mu s$ |                                        |

●Optical characteristics (Unless otherwise noted,  $V_{CC}=2.8V$ ,  $V_{LEDV_{CC}}=2.8V$ ,  $T_a=25^{\circ}C$ )

| Parameter             | Symbol                         | Min.     | Typ.     | Max.     | Unit               | Conditions                                                        |
|-----------------------|--------------------------------|----------|----------|----------|--------------------|-------------------------------------------------------------------|
| Peak wave length      | $\lambda_P$                    | 850      | 870      | 900      | nm                 |                                                                   |
| Intensity1            | IE1                            | 14.4     | 36       | 93.6     | mW/Sr              | $-15^{\circ} \leq \theta_L \leq 15^{\circ}$<br>$R_1=7.5 [\Omega]$ |
| Half-angle            | $\theta_{L/2}$                 | —        | $\pm 18$ | $\pm 30$ | deg                |                                                                   |
| Rise time / Fall time | T <sub>r</sub> /T <sub>f</sub> | —        | —        | 100      | ns                 | 10% to 90%                                                        |
| Optical over shoot    |                                | —        | —        | 25       | %                  |                                                                   |
| Edge jitter           | T <sub>j</sub>                 | -40      | —        | 40       | ns                 |                                                                   |
| Irradiance in angular | E <sub>e</sub>                 | 0.0068   | —        | 500      | mW/cm <sup>2</sup> | $-15deg \leq \theta_L \leq +15deg$                                |
| Input half-angle      | $\theta_{D/2}$                 | $\pm 15$ | —        | —        | deg                |                                                                   |
| Maximum emitting time | TLED <sub>max</sub>            | 10       | 45       | 120      | $\mu s$            | TXD= $V_{CC}$                                                     |

1. This product is not designed for protection against radioactive rays.

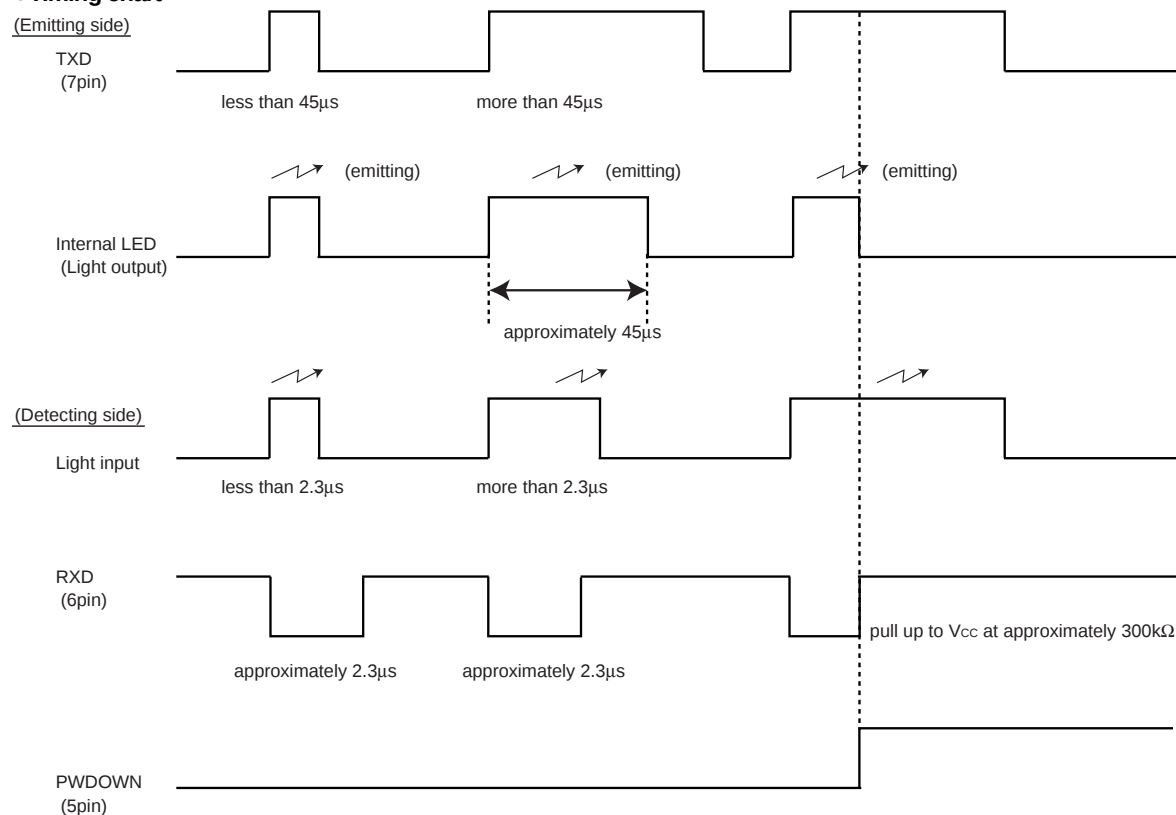
2. This product dose not include laser transmitter.

3. This product includes one PIN photo diode.

4. This product dose not include optical load.

## Photo Link Module

## ●Timing chart



## ●Attached components

## Recommended values

| Part symbol | Recommended value                                     | Notice                                                                                                                                                                                           |
|-------------|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| C1          | 1μF, tantalum or ceramic<br>Ex.) TCFGA1A105M8R (ROHM) | Bigger capacitance is recommended with much noise from power supply                                                                                                                              |
| R1          | 7.5Ω±5%, 1/4W<br>(VLEDV <sub>CC</sub> =2.8V)          | More than 60cm distance, more than 4[μW/cm <sup>2</sup> ] at detecting side.<br>(vs ver1.0)<br>More than 46cm distance, more than 6.8[μW/cm <sup>2</sup> ] at detecting side.<br>(vs RPM871-H12) |

In case of using R1 with different condition from the above, formula is as follows :

LED resistance value : R1[Ω], LED average consumption current : ILED[mA], Supply voltage : VLEDV<sub>CC</sub>[V],  
necessary d[cm] (Including LED's distribution within ±15deg)

$$R1 = T \times (VLEDV_{CC} - 4.45) / d^2 - 3.5 \text{ [}\Omega\text{]}$$

$$ILED = Duty \times (VLEDV_{CC} - 1.36) / (R1 + 2.5) \text{ [A]}$$

Duty : LED duty at emitting

T : 17300 (vs. RPM871-H12), 29400 (vs. ver1.0)

\* Please set up to be ILED / Duty < 200[mA] (Duty < 20%)

## Photo Link Module

### ●Notes

#### 1) LEDV<sub>CC</sub> (8pin) and V<sub>CC</sub> (3pin)

- Other power source can be used difference between LEDV<sub>CC</sub> and V<sub>CC</sub>.

#### 2) Caution in designing board lay-out

To get maximum potential from RPM871-H12, please keep in mind following instruction.

- The line of RXD (6pin) should be connected at backside via through hole close to RPM871-H12 pin lead. Better not to be close to photo diode side (1pin).
- ⇒ This is to minimize feedback supplied to photo diode from RXD.
- As for C1 between 3-4 pin should be placed close to RPM871-H12.
- Better to be placed more than 1.0cm in radius from photo diode (pin1 side) and also away from the parts which generates noise, such as DC/DC converter.

#### 3) Others

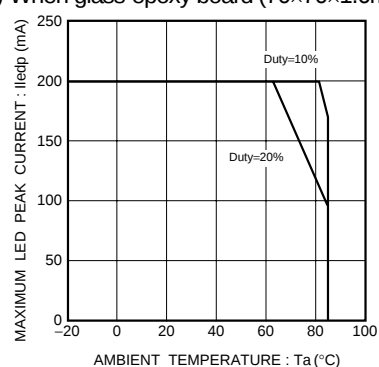
- Please be sure to set up the TXD (7pin) input to be "L" (under 0.55V) except transmitting data (for < 90μs, on duty < 20%).
- Power down current might increase if exposed by strong light (ex. direct sunlight) at powerdown mode.
- Please use by the signal format which is specified by IrDA Ver1.2 (2.4k to 115.2kbps). There might be on error if used by different signal format.

#### 4) LED current derating and ambient temperature

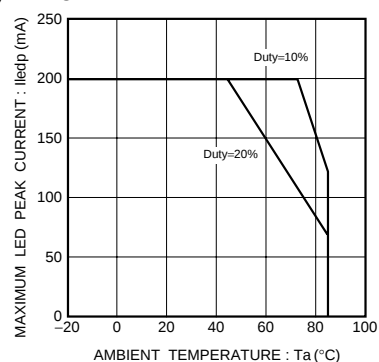
The relation between LED peak current and maximum ambient temperature is shown below.

We recommend you to use within the range as indicated in below.

##### a) When glass-epoxy board (70×70×1.6mm) mounted.

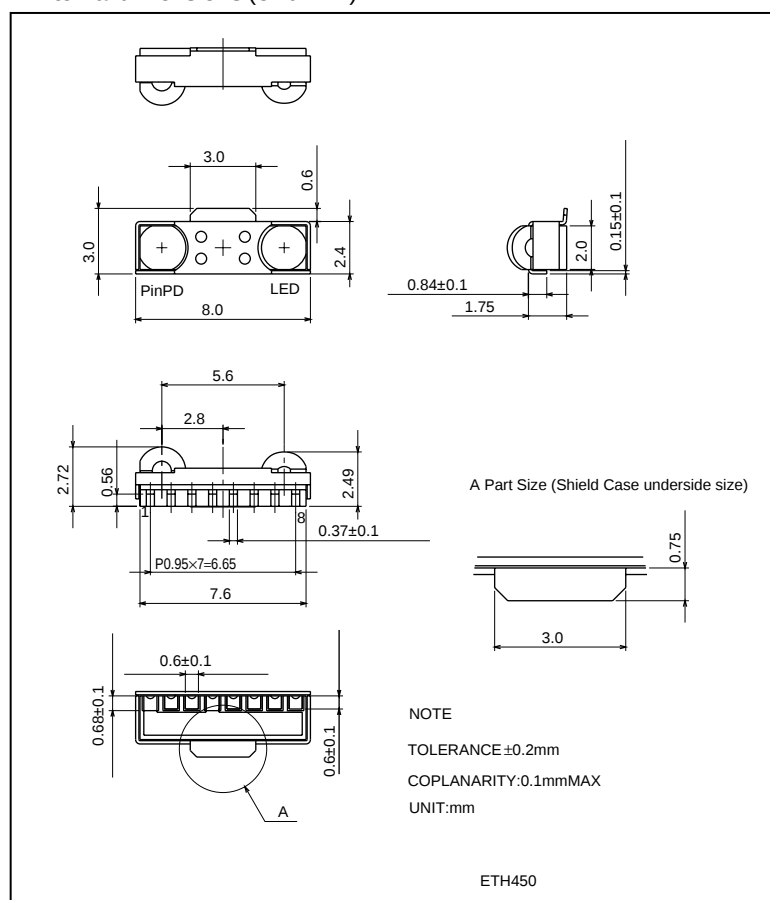


##### b) RPM871-H12



## Photo Link Module

## ●External dimensions (Unit : mm)



### Notes

- No technical content pages of this document may be reproduced in any form or transmitted by any means without prior permission of ROHM CO.,LTD.
- The contents described herein are subject to change without notice. The specifications for the product described in this document are for reference only. Upon actual use, therefore, please request that specifications to be separately delivered.
- Application circuit diagrams and circuit constants contained herein are shown as examples of standard use and operation. Please pay careful attention to the peripheral conditions when designing circuits and deciding upon circuit constants in the set.
- Any data, including, but not limited to application circuit diagrams information, described herein are intended only as illustrations of such devices and not as the specifications for such devices. ROHM CO.,LTD. disclaims any warranty that any use of such devices shall be free from infringement of any third party's intellectual property rights or other proprietary rights, and further, assumes no liability of whatsoever nature in the event of any such infringement, or arising from or connected with or related to the use of such devices.
- Upon the sale of any such devices, other than for buyer's right to use such devices itself, resell or otherwise dispose of the same, no express or implied right or license to practice or commercially exploit any intellectual property rights or other proprietary rights owned or controlled by
- ROHM CO., LTD. is granted to any such buyer.
- Products listed in this document are no antiradiation design.

The products listed in this document are designed to be used with ordinary electronic equipment or devices (such as audio visual equipment, office-automation equipment, communications devices, electrical appliances and electronic toys).

Should you intend to use these products with equipment or devices which require an extremely high level of reliability and the malfunction of which would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), please be sure to consult with our sales representative in advance.

#### About Export Control Order in Japan

Products described herein are the objects of controlled goods in Annex 1 (Item 16) of Export Trade Control Order in Japan.

In case of export from Japan, please confirm if it applies to "objective" criteria or an "informed" (by MITI clause) on the basis of "catch all controls for Non-Proliferation of Weapons of Mass Destruction.