

Photo Link Module

# IrDA Infrared communication Module

## RPM871-H7

RPM871-H7 is an infrared communication module for IrDA Ver. 1.2 (Low Power). The infrared LED, PIN photo diode, waveform shaping 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) Applied to IrDA version 1.2. (Low Power)
- 2) Designed for low power consumption at stand-by for receiving (Typ.73μA).
- 3) Suitable for sets driven by battery due to power down control function.
- 4) Power supply voltage range : 2.6V~3.6V
- 5) Constant LED load resistance can change communication range. (Approx. 20~60cm)

### ●Applications

Cellular phones, PDAs, etc.

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

| Parameter                   | Symbol | Limits    | Unit |
|-----------------------------|--------|-----------|------|
| Power supply voltage        | Vcc    | -0.3~+7.0 | V    |
| Power dissipation           | Pd     | 150*1     | mW   |
| Operating temperature range | Topr   | -20~+85   | °C   |
| Storage temperature range   | Tstg   | -30~+100  | °C   |
| LED peak current            | IFP    | 200*2     | mA   |

\*1 70mm×70mm, t=1.6mm, glass epoxy mounting. Derating : 2mW/°C for operation above Ta=25°C

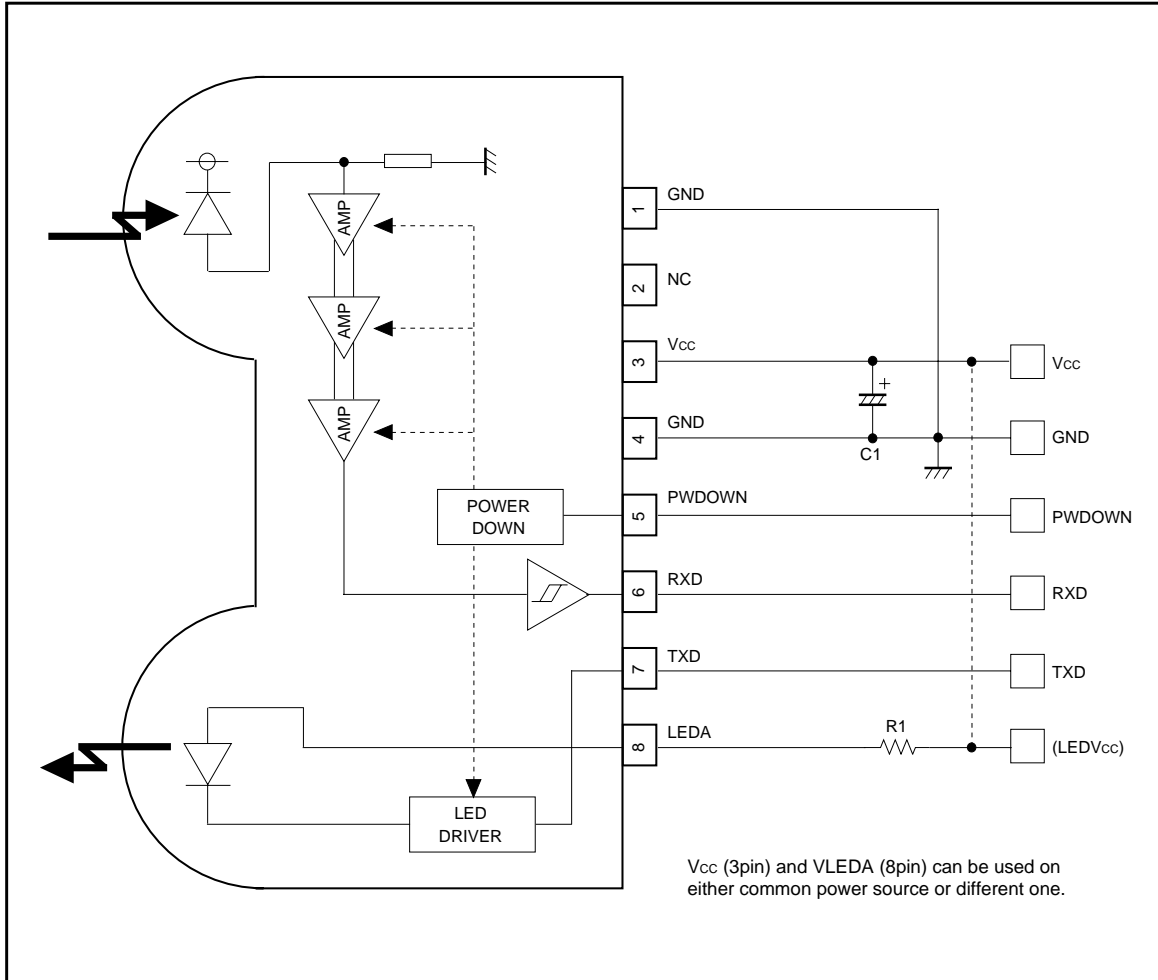
\*2 LED peak current<90μs. ON duty<20%

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

| Parameter            | Symbol | Min. | Typ. | Max. | Unit |
|----------------------|--------|------|------|------|------|
| Power supply voltage | Vcc    | 2.6  | 2.8  | 3.6  | V    |
|                      | VLEDA  | 2.6  | 2.8  | 5.5  | V    |

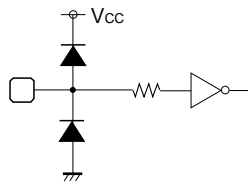
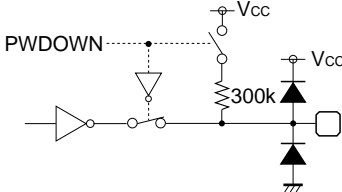
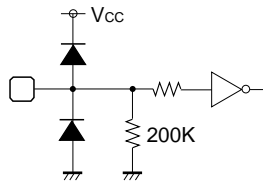
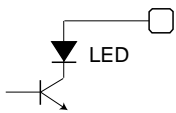
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●Block diagram and application circuit



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## ●Terminal description

| Pin No | Terminal        | Circuit   | Function   |
|--------|-----------------|---|--|
| 1, 4   | GND             |   | GND<br>Pin1 and pin4 must be connected to the ground.  |
| 2      | NC              |   | This Terminal must be left open.   |
| 3      | V <sub>cc</sub> |   | V <sub>cc</sub><br>For preventing from infection, connect a capacitor between V <sub>cc</sub> (3pin) and GND (4pin).   |
| 5      | PWDOWN          |    | Power-down Control Terminal<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             |  | Receiving Data Output Terminal<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             |  | Transmitting Data Input Terminal<br>H : LED (PWDOWN=L)<br>CMOS Logic Level Input<br>Holding TXD="H" status, LED will be turn off approximately 45μs.   |
| 8      | LEDA            |  | LED ANODE Terminal<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.   |

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● **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 <sub>cc1</sub>  | –             | 73   | 99    | μA   | Stand-by for receiving At no input light |
| Consumption current2      | I <sub>cc2</sub>  | –             | 0.01 | 0.2   | μA   | 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   | μA   | PWDOWN= $V_{CC}$ [V]                     |
| PWDOWN INPUT Low current  | IPDL              | –1.0          | 0    | 1.0   | μA   | PWDOWN=0 [V]                             |
| <Transmitter>             |                   |               |      |       |      |  |
| 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    | μA   | TXD= $V_{CC}$ [V]                        |
| TXD INPUT Low current     | ITXL              | –1.0          | 0    | 1.0   | μA   | TXD=0 [V]                                |
| LED ANODE current         | I <sub>LEDA</sub> | –             | 144  | –     | mA   | R1=7.5 [Ω]                               |
| <Receiver>                |                   |               |      |       |      |  |
| RXD OUTPUT High voltage   | VRXH              | $V_{CC}-0.5$  | –    | –     | V    | IRXH=–50μA                               |
| RXD OUTPUT Low voltage    | VRXL              | –             | –    | 0.4   | V    | IRXL=200μA                               |
| 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    | t <sub>wRXD</sub> | 1.5           | 2.3  | 3.6   | μs   | C <sub>L</sub> =15pF, 2.4–115.2kbps      |
| Receiver latency time     | t <sub>RT</sub>   | –             | 100  | 300   | μs   |  |

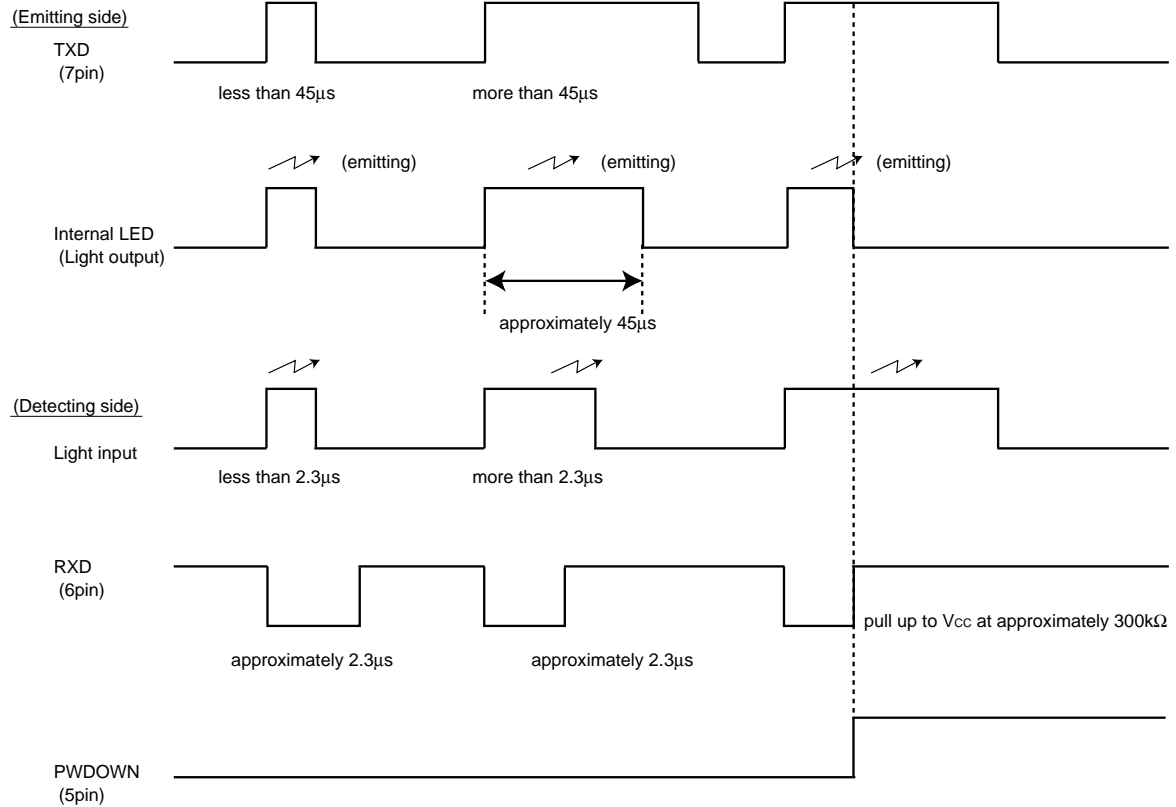
● **Optical characteristics** (Unless otherwise noted,  $V_{CC}=2.8V$ ,  $V_{LEDV_{CC}}=2.8V$ ,  $T_a = 25^{\circ}C$ )

| Parameter             | Symbol                         | Min.   | Typ. | Max. | Unit               | Conditions                             |
|-----------------------|--------------------------------|--------|------|------|--------------------|--|
| Peak wave length      | λ <sub>P</sub>                 | 850    | 870  | 900  | nm                 |  |
| Intensity1            | I <sub>E1</sub>                | 14.4   | 36   | 93.6 | mW/Sr              | –15°≤θ <sub>L</sub> ≤15°<br>R1=7.5 [Ω] |
| Half-angle            | θ <sub>L/2</sub>               | –      | ±18  | ±30  | deg                |  |
| Rise time / Fall time | T <sub>r</sub> /T <sub>f</sub> | –      | –    | 100  | ns                 | 10%–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> | –15°≤θ <sub>L</sub> ≤15°               |
| INPUT Half-Angular    | θ <sub>D/2</sub>               | ±15    | –    | –    | deg                |  |
| Maximum emitting time | T <sub>LEDmax</sub>            | 10     | 45   | 96   | μs                 | 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.

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## ●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-H7) |

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],

Link distance : d[cm] (Including LED's distribution within ±15deg)

$$R1 = T \times (VLEDV_{CC} - 1.45) / d^2 - 3.5 \text{ [}\Omega\text{]}$$

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

Duty : LED duty at emitting

T : 17300 (vs. RPM871-H7), 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-H7, please keep in mind following instruction.

- The line of RXD (6pin) should be connected at backside via through hole close to RPM871-H7 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-H7.
- 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

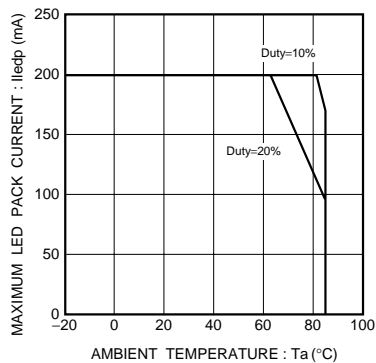
- Please be sure to set up the TXD (7pin) input to be "L" (under 0.55V) except transmitting data (for < 90μsec. on duty < 20%).
- Power down current might increase if exposed by strong light (ex. direct sunlight) at power down mode.
- Please use by the signal format which is specified by IrDA Ver1.2 (2.4k~115.2kbps). There might be an error if used by different signal format.
- Dust or dirt on lens portion may affect the characteristics, so pay sufficient attention.

#### 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-H7

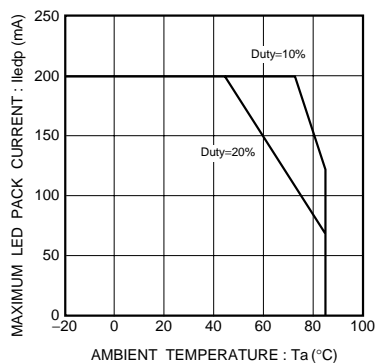


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●External dimensions (Units : mm)

