

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* ¹	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* ²	mA
Power dissipation	P _d	150* ³	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

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●Block diagram and application circuit

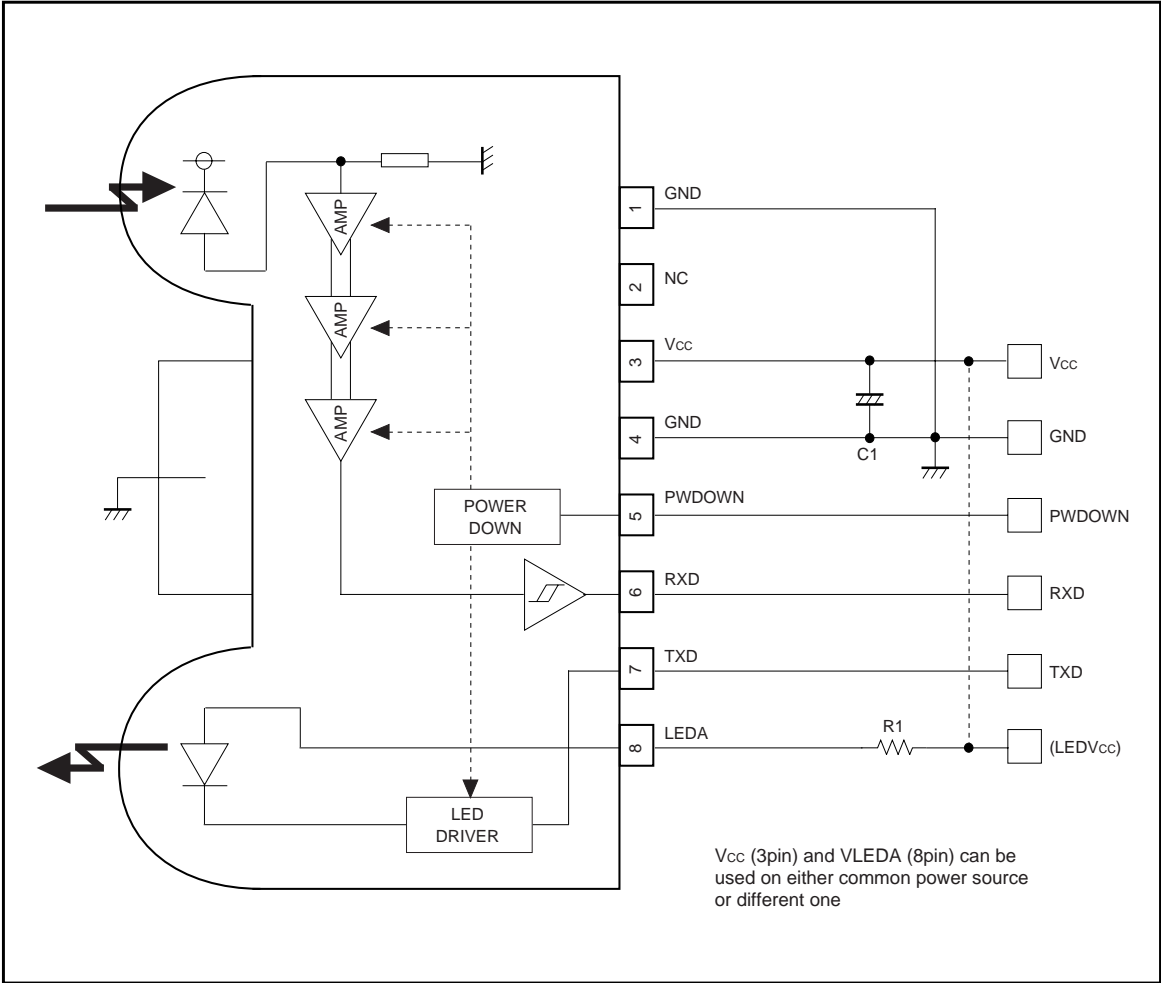


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●Terminal description

Pin No	Terminal	Circuit	Function
1, 4	GND		GND Pin1 and Pin4 must be connected to the ground.
2	NC		This Terminal must be left open.
3	V _{cc}		V_{cc} For preventing from infection, connect a capacitor between V _{cc} (3pin) and GND (4pin).
5	PWDOWN		Power-down Control Terminal H : POWERDOWN L : OPERATION CMOS Logic Level Input When input is H, it will stop the receiving circuit, Pin-PD current and transmitting LED operation.
6	RXD		Receiving Data Output Terminal CMOS Logic Level Output When PWDOWN (5pin)=H, the RXD output will be pulled up to V _{cc} at approximately 300kΩ.
7	TXD		Transmitting Data Input Terminal H : LED (PWDOWN=L) CMOS Logic Level Input Holding TXD="H" status, LED will be turn off approximately 45μs.
8	LEDA		LED ANODE Terminal Other power source can be used difference between LEDV _{cc} and V _{cc} . 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 _{CC1}	–	73	99	μA	Stand-by for receiving At no input light
Consumption current2	I _{CC2}	–	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	V _{TXH}	$V_{CC}-0.55$	–	–	V	
TXD input low voltage	V _{TXL}	–	–	0.55	V	
TXD input high current	I _{TXH}	7	14	28	μA	TXD= V_{CC} [V]
TXD input low current	I _{TXL}	–1.0	0	1.0	μA	TXD=0 [V]
LED anode current	I _{LEDA}	–	144	–	mA	R ₁ =7.5 [Ω]

<Receiver>

RXD output high voltage	V _{RXH}	$V_{CC}-0.5$	–	–	V	I _{RXH} = –50μA
RXD output low voltage	V _{RXL}	–	–	0.4	V	I _{RXL} =200μA
RXD output rise time	t _{RR}	–	70	–	ns	C _L =15pF
RXD output fall time	t _{FR}	–	30	–	ns	C _L =15pF
RXD output pulse width	t _{wRXD}	1.5	2.3	3.6	μs	C _L =15pF, 2.4 to 115.2kbps
Receiver latency time	t _{RT}	–	100	300	μs	

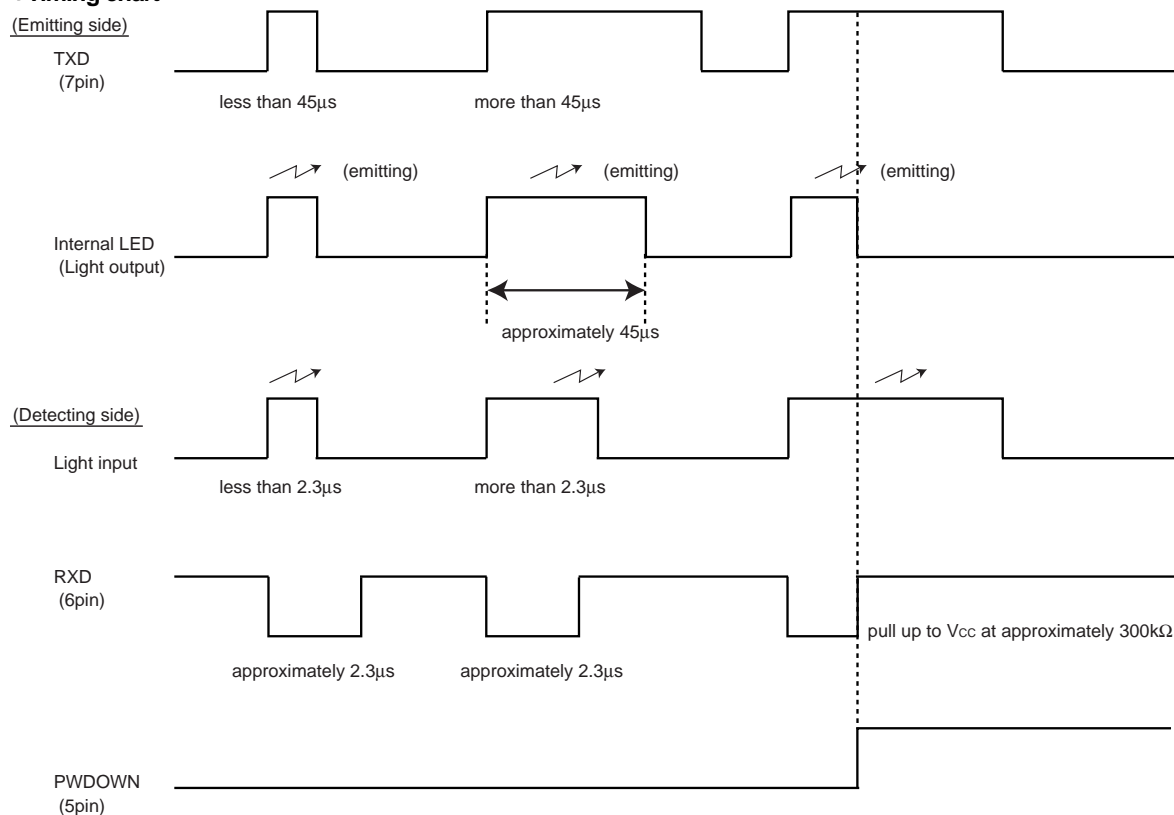
●Optical characteristics (Unless otherwise noted, $V_{CC}=2.8V$, $V_{LEDV_{CC}}=2.8V$, $T_a=25^{\circ}C$)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Peak wave length	λ _P	850	870	900	nm	
Intensity1	I _{E1}	14.4	36	93.6	mW/Sr	$-15^{\circ} \leq \theta_L \leq 15^{\circ}$ R ₁ =7.5 [Ω]
Half-angle	θ _{L/2}	–	±18	±30	deg	
Rise time / Fall time	T _r /T _f	–	–	100	ns	10% to 90%
Optical over shoot		–	–	25	%	
Edge jitter	T _j	–40	–	40	ns	
Irradiance in angular	E _e	0.0068	–	500	mW/cm ²	$-15deg \leq \theta_L \leq +15deg$
Input half-angle	θ _{D/2}	±15	–	–	deg	
Maximum emitting time	T _{LEDmax}	10	45	120	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 Ex.) TCFGA1A105M8R (ROHM)	Bigger capacitance is recommended with much noise from power supply
R1	7.5Ω±5%, 1/4W (VLEDV _{cc} =2.8V)	More than 60cm distance, more than 4[μW/cm ²] at detecting side. (vs ver1.0) More than 46cm distance, more than 6.8[μW/cm ²] at detecting side. (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_{cc}[V],
necessary d[cm] (Including LED's distribution within ±15deg)

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

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

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%)

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●Notes

1) LEDV_{CC} (8pin) and V_{CC} (3pin)

- Other power source can be used difference between LEDV_{CC} and V_{CC}.

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

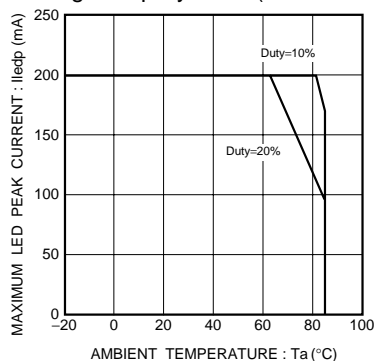
- Please be sure to set up the TXD (7pin) input to be "L" (under 0.55V) except transmitting data (for < 90μs, on duty < 20%).
- Power down current might increase if exposed by strong light (ex. direct sunlight) at powerdown mode.
- Please use by the signal format which is specified by IrDA Ver1.2 (2.4k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

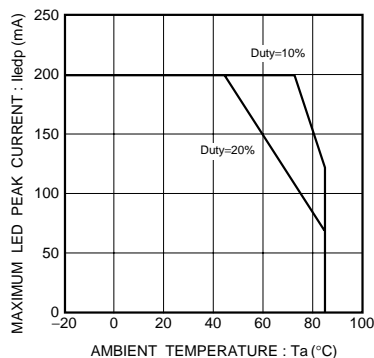
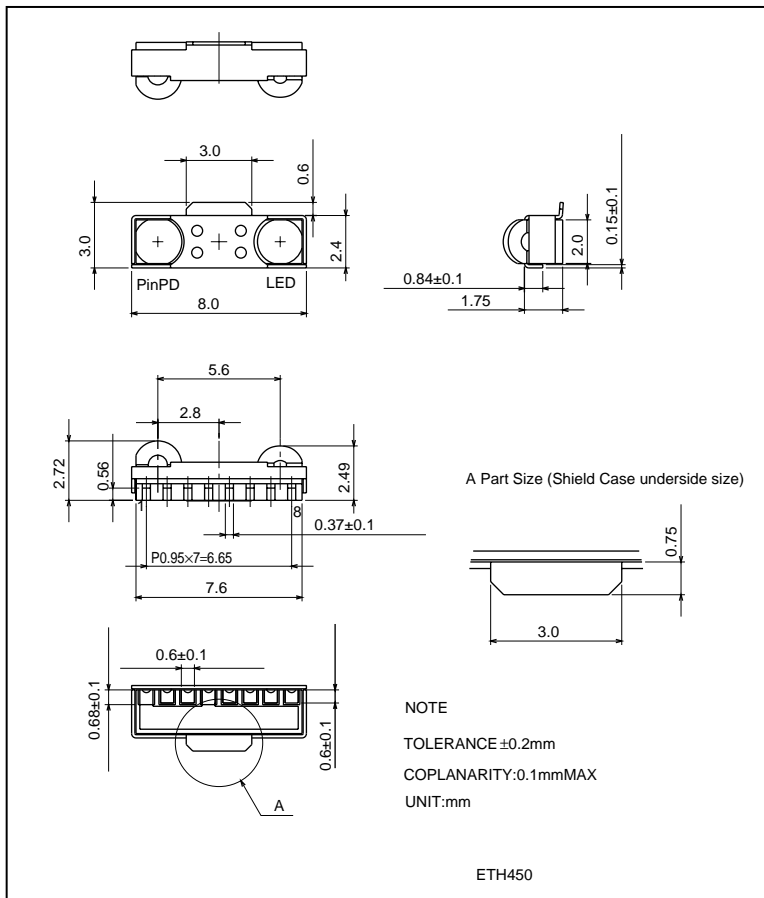


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●External dimensions (Unit : mm)



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