IrDA Infrared communication Module

RPM872-H12

RPM872-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) Surface mount type.
4) Power down function built in.
5) Low voltage operation as 1.5V of interface terminals to controller (TXD, RXD, Power down).

●**Applications**
Mobile phone, PDA, DVC, Digital Still Camera, Printer, Handy Terminal etc.

●**Absolute maximum ratings** (Ta=25℃)

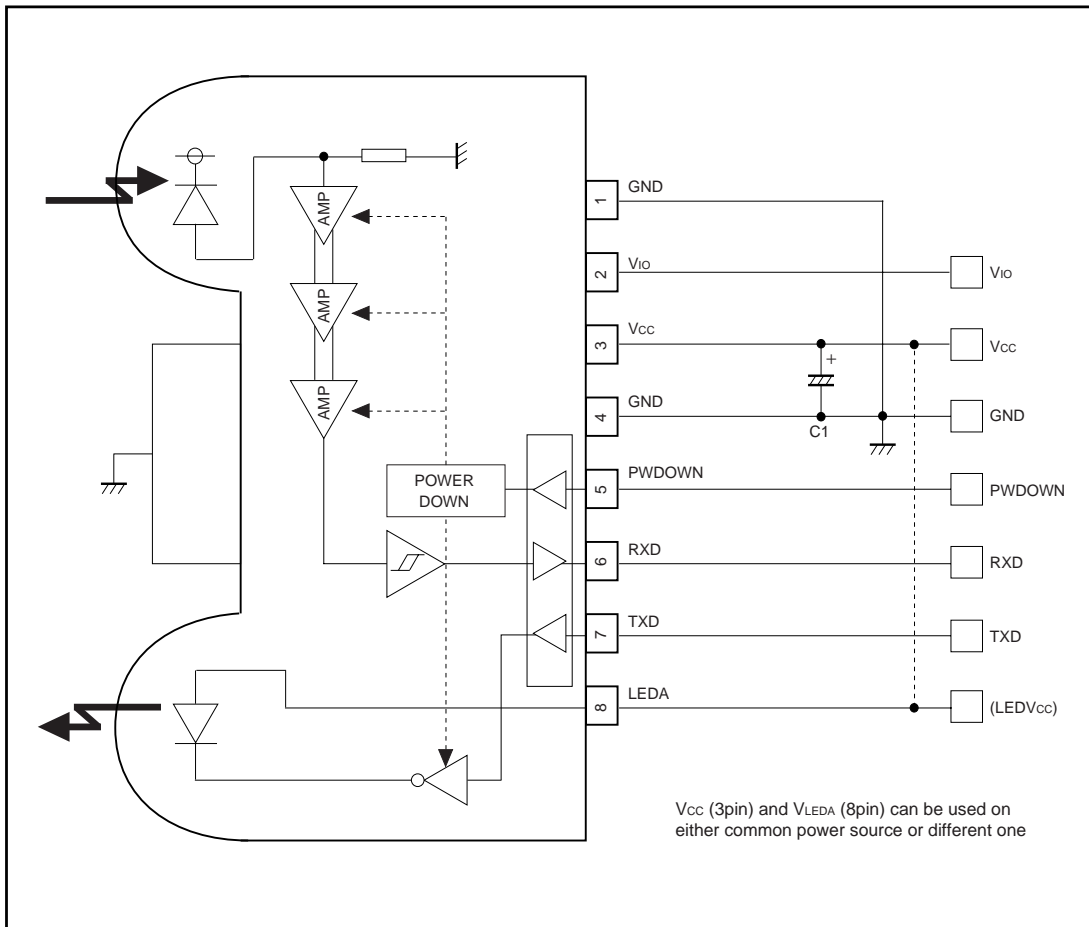| Parameter	Symbol	Limits	Unit
Supply voltage	V_{max}	7.0[*1]	V
Input voltage	V_{in} (5, 6, 7pin)	−0.3 to V_{IO}+0.3	V
Operation temperature	Topr	−30 to +85	℃
Storage temperature	Tstg	−30 to +100	℃
Power dissipation	Pd	100[*2]	mW

∗1 This applies to all pins basis ground pins (1.4pin)
∗2 In case operating environment is over 25℃, 1.33mW would be reduced per each 1℃ stepping up.

●**Recommended operating conditions** (Ta=25℃)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	V_{CC}	2.0	3.0	3.6	V
	V_{LEDA}	2.6	3.0	5.5	V
	V_{IO}	1.5	3.0	V_{CC}	V

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●**Block diagram and application circuit**

GND — 1
V_{IO} — 2 — V_{IO}
V_{CC} — 3 — V_{CC}
GND — 4 — GND
PWDOWN — 5 — PWDOWN
RXD — 6 — RXD
TXD — 7 — TXD
LEDA — 8 — (LEDV$_{CC}$)

V_{CC} (3pin) and V_{LEDA} (8pin) can be used on either common power source or different one

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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	V$_{IO}$		**V$_{IO}$** Supply voltage for I/O pins. (PWDOWN, RXD, TXD)
3	V$_{CC}$		**V$_{CC}$** Supply voltage for Transceiver circuits. For preventing from infection, connect a capacitor between V$_{CC}$ (3pin) and GND (4pin).
5	PWDOWN	V$_{IO}$	**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	V$_{IO}$ PWDOWN 300k V$_{IO}$	**Receiving Data Output Terminal** CMOS Logic Level Input When PWDOWN (5pin)=H, the RXD output will be pulled up to V$_{IO}$ at approximately 300kΩ.
7	TXD	V$_{IO}$ 600k	**Transmitting Data Input Terminal** H : LED (PWDOWN=L) CMOS Logic Level Output Holding TXD="H" status, LED will be turn off approximately 48μs.
8	LEDA	LED	**LED ANODE Terminal** Other power source can be used difference between LEDV$_{CC}$ and V$_{CC}$. This can be connected to battery kinds of unegulated constant source by internal constant current driver.
–	Shield Case		Connect to Ground.

●**Electrical characteristics** (Unless otherwise noted, V_{CC}=3V, V_{LEDA}=3V, V_{IO}=3V, Ta=25℃)

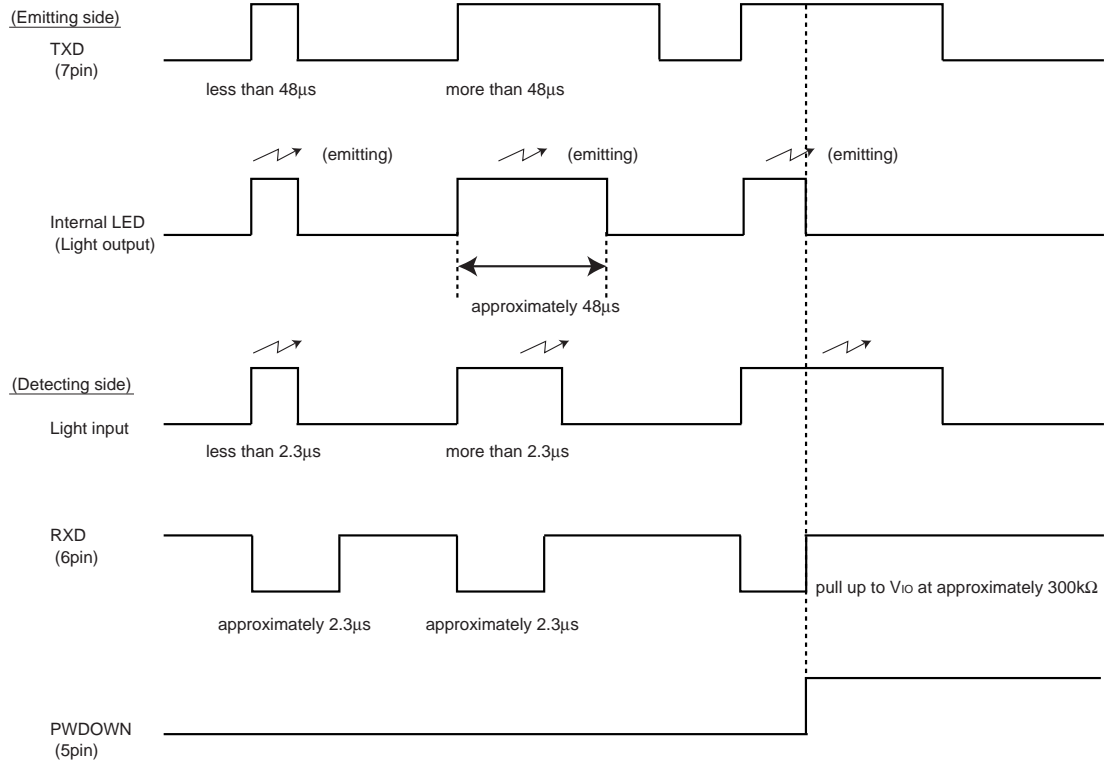| Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Consumption current1	$I_{CC}1$	–	75	99	μA	PWDOWN=0V At no input light
Consumption current2	$I_{CC}2$	–	0.01	0.2	μA	PWDOWN=V_{IO} At no input light
Transmission rate		2.4	–	115.2	kbps	
PWDOWN input high voltage	VPDH	$2/3*V_{IO}$	–	V_{IO}	V	V_{IO}=1.8 to 3.6 [V]
		1.2				V_{IO}=1.5 to 1.8 [V]
PWDOWN input low voltage	VPDL	0	–	$1/3*V_{IO}$	V	V_{IO}=1.8 to 3.6 [V]
				V_{IO}–1.2		V_{IO}=1.5 to 1.8 [V]
PWDOWN input high current	IPDH	–1.0	0	1.0	μA	PWDOWN=V_{IO} [V]
PWDOWN input low current	IPDL	–1.0	0	1.0	μA	PWDOWN=0 [V]
<Transmitter>						
TXD input high voltage	VTXH	$2/3*V_{IO}$	–	–	V	V_{IO}=1.8 to 3.6 [V]
		1.2				V_{IO}=1.5 to 1.8 [V]
TXD input low voltage	VTXL	0	–	$1/3*V_{IO}$	V	V_{IO}=1.8 to 3.6 [V]
				V_{IO}–1.2		V_{IO}=1.5 to 1.8 [V]
TXD input high current	ITXH	2.5	5	10	μA	TXD=V_{IO} [V]
TXD input low current	ITXL	–1.0	0	1.0	μA	TXD=0 [V]
LED anode current	ILEDA	–	30.5	–	mA	
<Receiver>						
RXD output high voltage	VRXH	V_{IO}–0.4	–	V_{IO}	V	IRXH=−200μA
RXD output low voltage	VRXL	0	–	0.4	V	IRXL=200μA
RXD output rise time	tRR	–	35	–	ns	C_L=15pF
RXD output fall time	tFR	–	35	–	ns	C_L=15pF
RXD output pulse width	twRXD	1.5	2.3	4.2	μs	C_L=15pF, 2.4 to 115.2kbps
Receiver latency time	tRT	–	100	200	μs	

●**Optical characteristics** (Unless otherwise noted, V_{CC}=3V, V_{LEDA}=3V, V_{IO}=3V, Ta=25℃)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Peak wave length	λP	850	870	900	nm	
Intensity1	IE1	4.0	10	26	mW/Sr	$-15°≤θ_L≤15°$
Half-angle	θL/2	–	±18	±30	deg	
Optical pulse width	TWLED	1.42	1.63	2.02	μs	TXD=1.63μs pulse input
Rise time / Fall time	Tr/Tf	–	–	100	ns	10% to 90%
Optical over shoot		–	–	25	%	
Edge jitter	Tj	–40	–	40	ns	
Irradiance in angular	Ee	0.0068	–	500	mW/cm^2	$-15deg ≤ θ_L ≤ +15deg$
Input half-angle	θD/2	±15	–	–	deg	
Maximum emitting time	TLEDmax	10	48	120	μs	TXD=V_{IO}

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

(Emitting side)

TXD
(7pin)

less than 48µs   more than 48µs

↗↗ (emitting)   ↗↗ (emitting)   ↗↗ (emitting)

Internal LED
(Light output)

←——→
approximately 48µs

↗↗   ↗↗   ↗↗

(Detecting side)

Light input

less than 2.3µs   more than 2.3µs

RXD
(6pin)

pull up to V_IO at approximately 300kΩ

approximately 2.3µs   approximately 2.3µs

PWDOWN
(5pin)

●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

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●**Notes**

1) V$_{LEDA}$ (8pin), V$_{CC}$ (3pin) and V$_{IO}$ (2pin)

・Other power source can be used difference between V$_{LEDA}$ and V$_{CC}$ and V$_{IO}$.

(V$_{IO}$ < V$_{CC}$ + 0.3V)

2) Caution in designing board lay-out

To get maximum potential from RPM872-H12, please keep in mind following instruction.

・The line of RXD (6pin) should be connected at backside via through hole close to RPM872-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 RPM872-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 0.3V) 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 (Low Power).

・There might be on error if used by different signal format.

・Please pay attention to the lens carefully. Dusts of scratch on the lens may effect the characteristics of product. Please handle it with care.

4) Eye safe

・IEC825-1 (EN60825-1) Class 1 Eye Safe.

●**External dimensions** (Unit : mm)
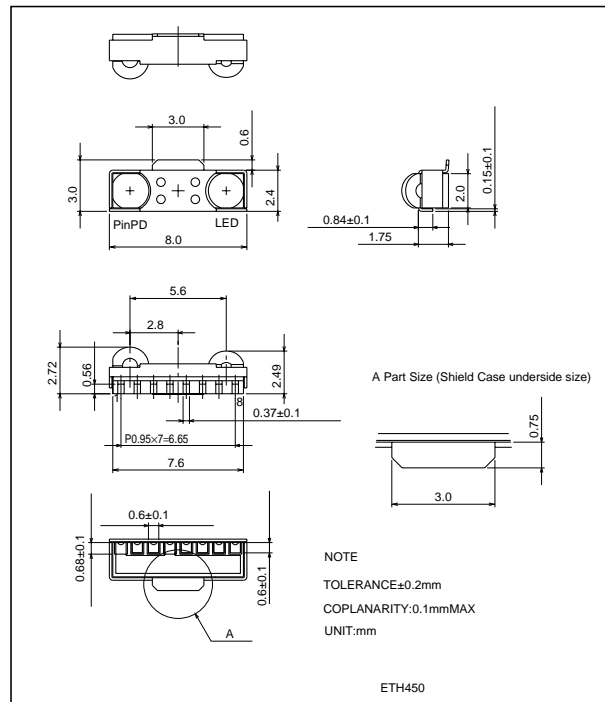
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