

# IrDA wireless communication transceiver IC (supports Ver.1.0)

## RPM851A Series

The RPM851A series is an IC that supports IrDA Ver 1.0, and is ideal for wireless communications. An infrared LED, a pin-photo diode, and a receiver frequency formation LSI are all contained in a single package. Also equipped with low power consumption and power down functions making this IC perfect for mobile sets.

### ●Applications

Personal computers, PDAs, DVCs, digital cameras, printers, cellular phones, PHS systems, hand-held terminals, and others

### ●Features

- 1) Supports IrDA Ver. 1.0
- 2) Low power consumption while standing by for reception (typ. 220 $\mu$ A).
- 3) A power-down function is perfect for battery applications.
- 4) Supports a broad power supply voltage range from 2.7V to 5.5V.
- 5) The package supports mounting on both the upper and side surfaces.
- 6) Integrated shield case (RPM851A-H6)

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

Parameter	Symbol	Limits	Unit
Power supply voltage	V <sub>CC</sub>	-0.3~+7.0	V
Operating temperature	T <sub>opr</sub>	-20~+70	°C
Storage temperature	T <sub>stg</sub>	-25~+85	°C
LED peak current	I <sub>FP</sub> *	300	mA

\* The LED peak current value is less than 90  $\mu$ s, with an ON duty of less than 20%.

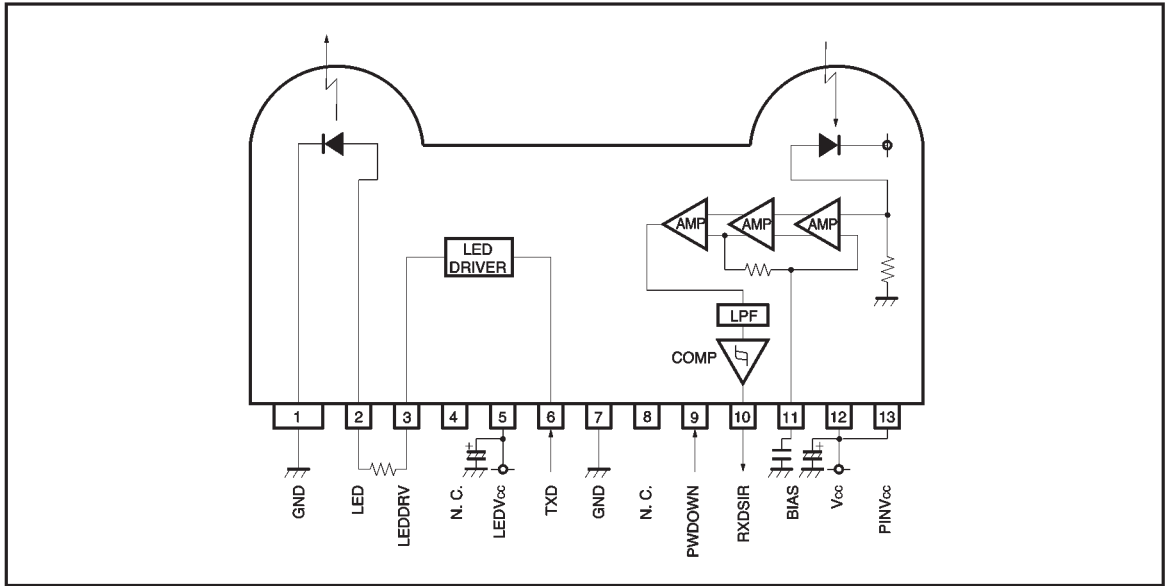
### ●Recommended operating conditions (Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	V <sub>CC</sub>	2.7	3.0	5.5	V

### ●Series

Type	Shield Case	Vertical Mount	Horizontal Mount
RPM851A	—	○	○
RPM851A-H6	Integrated	×	×

● Block diagram



● Pin descriptions

Pin No.	Pin name	Equivalent circuit	Function
1, 7	GND		GND
2	LED ANODE		LED ANODE Terminal
3	LED DRIVER		LED Driver Output Terminal Please LED Current Restriction Resistor between PIN2
5	LEDV <sub>cc</sub>		Power for LED DRIVER and MOS
6	TXD		Transmitting Data Input Terminal CMOS logic level input
9	POWER DOWN CONTROL		Power-down Control Terminal LOW: POWERDOWN CMOS logic level input When input is LOW, it will stop the receiving circuit as well as Pin-PD current.
10	RXDSIR		SIR Logic Level Output Terminal CMOS logic level output High-z at PWDOWN=0V
11	BIAS		AMP Bias Terminal
12	V <sub>cc</sub>		Power for Receiver
13	PINV <sub>cc</sub>		Power for Pin PD

●Electrical characteristics (unless otherwise noted, LEDV<sub>CC</sub> = V<sub>CC</sub> = PINV<sub>CC</sub> = 3V, Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Consumption current 1	I <sub>CC1</sub>	—	220	330	μA	Stand-by for receiving At no input light
Consumption current 2	I <sub>CC2</sub>	—	0.01	10	μA	PWDOWN PIN Low At no input light
Transmission rate	—	2.4	—	115.2	kbps	—
〈Transmitter〉						
TXD input high voltage	V <sub>IH</sub>	V <sub>LEDVCC</sub> −0.5	—	—	V	—
TXD input low voltage	V <sub>IL</sub>	—	—	0.5	V	—
TXD input high current	I <sub>IH</sub>	−5.0	0	5.0	μA	TXD=V <sub>CC</sub> [V]
TXD input low current	I <sub>IL</sub>	−5.0	0	5.0	μA	TXD=0 [V]
LED ANODE voltage	V <sub>LEDA</sub>	1.15	1.40	1.65	V	I <sub>LED</sub> =50mA
〈Receiver〉						
RXDSIR output high voltage	V <sub>OSH</sub>	V <sub>CC</sub> −0.5	—	—	V	I <sub>OSH</sub> =−30 μA
RXDSIR output low voltage	V <sub>OSL</sub>	—	—	0.5	V	I <sub>OSL</sub> =30 μA
RXDSIR output rise time	t <sub>RR</sub>	—	200	500	ns	C <sub>L</sub> =15pF
RXDSIR output fall time	t <sub>FR</sub>	—	30	75	ns	C <sub>L</sub> =15pF

●Optical characteristics (unless otherwise noted, LEDV<sub>CC</sub> = V<sub>CC</sub> = PDV<sub>CC</sub> = 3V, Ta = 25°C)

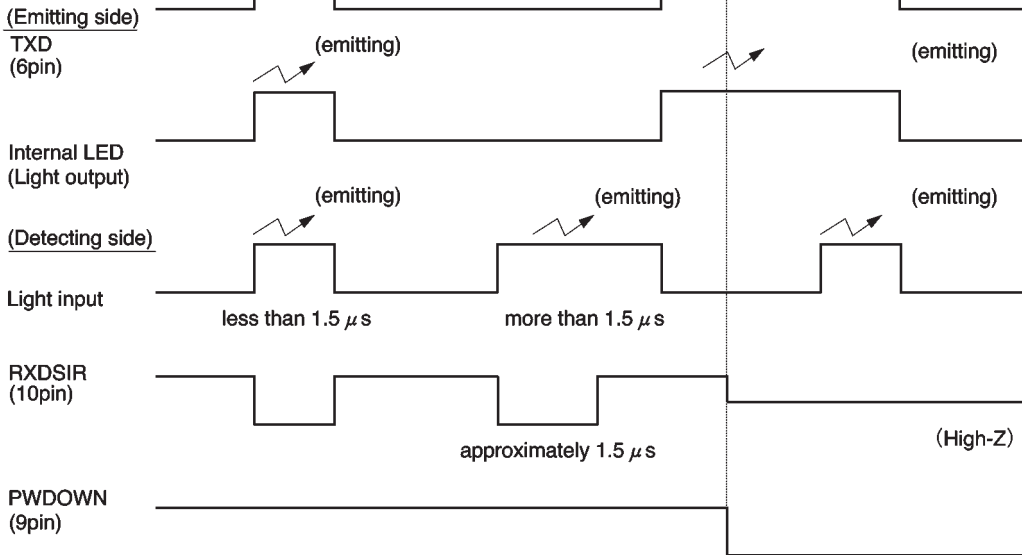
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Peak wavelength	λ <sub>P</sub>	850	870	900	nm	—
Intensity 1	I <sub>E1</sub>	40	—	500	mW / Sr	R <sub>L</sub> =5.6 Ω, −15° ≤ θ <sub>L</sub> ≤ 15°
Intensity 2	I <sub>E2</sub>	—	—	40	mW / Sr	R <sub>L</sub> =5.6 Ω, θ <sub>L</sub> ≤ −30°, 30° ≤ θ <sub>L</sub>
Half-Angle	θ <sub>L</sub> / 2	—	±18	—	deg	—
Rise time / Fall time	T <sub>r</sub> / T <sub>f</sub>	—	—	100	ns	R <sub>L</sub> =5.6 Ω, 10%~90%
Optical overshoot	—	—	—	25	%	R <sub>L</sub> =5.6 Ω
Edge jitter	T <sub>j</sub>	−40	—	40	ns	R <sub>L</sub> =5.6 Ω
Irradiance in angular	E <sub>e</sub>	0.004	—	500	mW / cm <sup>2</sup>	−15° ≤ θ <sub>L</sub> ≤ 15°
Input Half-Angular	θ <sub>D</sub> / 2	±15	—	—	deg	—

© This product is not designed for protection against radioactiverays.

1. This product dose not include laser transmitter.
2. This product includes one PIN photo diode.
3. This product dose not include optical load.

● Circuit operation

Timing charts



● Application example

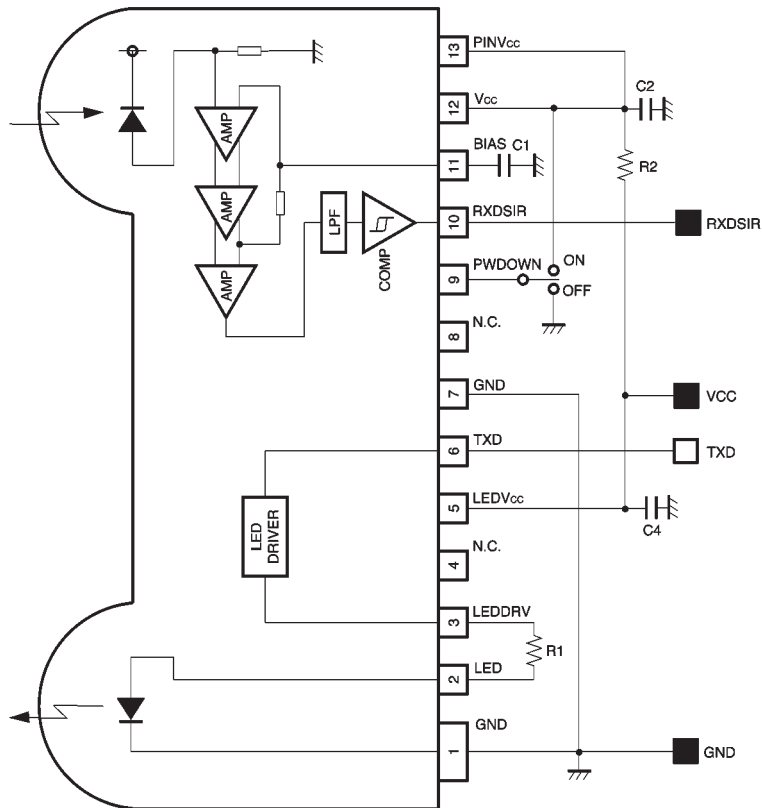


Fig. 1

● Recommended values (at  $V_{CC} = 3V$ )

Part symbol	Recommended value	Caution
R1	$5.6\Omega \pm 5\%$ , 1/4W (SIR)	More than 100cm distance, more than $4[\mu W/cm^2]$ at detecting side
	$100\Omega \pm 5\%$ , 1/8W (Low Power)	More than 20cm distance, more than $9[\mu W/cm^2]$ at detecting side
R2	$47\Omega \pm 5\%$ , 1/8W	—
C1	$3300pF \pm 10\%$ , Ceramic	Recommended to use capacitor with less leak current
C2	$0.33\mu F \pm 20\%$ , Ceramic	Recommended to place capacitor around pin 12 and 7. Bigger capacitance is recommended with much noise from power supply.
C4	$4.7\mu F$ , Tantalum EX.) TCFGA1A475M8R (ROHM PRODUCT)	Bigger capacitor is recommended with much noise from power supply.

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

LED resistance value:  $R1[\Omega]$ , LED average consumption current:  $I_{led}[mA]$ , Supply voltage:  $V_{led}[V]$  necessary  $d[cm]$   
(Including LED'S distribution within  $\pm 15deg$ )

$$R1 = T * (V_{led} - 1.36/d^2 - 3) [\Omega]$$

$$I_{led} = Duty * (V_{led} - 1.36) / (3 + R1) [A]$$

Duty : LED duty at emitting

T : 24420(Low Power), 55000(SIR)

※Please set up to be  $I_{led} < 50 [mA]$  moreover  $I_{led}/Duty < 250 [mA]$

## ● Operation notes

- LEDV<sub>CC</sub> (pin5), V<sub>CC</sub> (pin122) and PINV<sub>CC</sub> (pin13)
- Other power source can be used within ± 0.2 [V] voltage difference between LEDV<sub>CC</sub> and V<sub>CC</sub>. V<sub>CC</sub> and PINV<sub>CC</sub> should be supplied from the same source.
- Caution in designing board lay-out
  - Pin1 is radiator pin from LED as well. Wider pattern is better.
  - The line of RXDSIR (pin10) should be connected at backside via through hole close to RPM851A pin lead. Better not to be close to photo diode side (pin13).  
→ This is to minimize feedback supplied to photo diode from RXDSIR.
  - Capacitors for pin12 (V<sub>CC</sub>) and pin13 (PINV<sub>CC</sub>) should be placed close to RPM851A.

- Better to be placed more than 1.0cm in radius from photo diode (pin13) and also away from the parts which generates noise, such as DC / DC converter. Digital signal line, such as clock pulse, bus etc, are also away more than 1.0cm in radius from photo diode.
  - As for C1, C2 and, GND should be close to pin7 and placed close to pins11, 12 and 13 (within 5mm).
- Please be sure to set up the TXD (pin6) input to be "L" (under 0.5 [V]) except transmitting data (for < 90 μ s. ON Duty < 20%).
  - Powerdown current might increase if exposed by strong light (ex. direct sunlight) at powerdown mode.
  - Please use by the signal form which is specified by IrDA Ver1.0. There might be an error if used by different signal form.

## ● External dimensions (Units: mm)

