IrDA Infrared Communication Module RPM841-H16

RPM841-H16 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) Super small package (W=6.8mm, D=1.7mm, H=2.28mm).
- 6) Infrared remote control transmission driver built-in.

Applications

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

● Absolute maximum ratings (Ta=25°C)

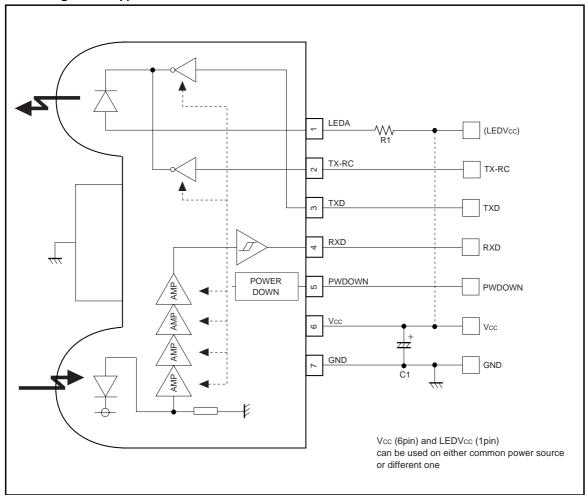
Parameter	Symbol	Limits	Unit
Supply voltage	V _{max}	7.0 *	V
Input voltage	Vin (3, 4, 5pin)	-0.3 to Vcc+0.3	V
Operation temperature	Topr	-30 to +85	°C
Storage temperature	Tstg	-40 to +100	°C

^{*} This applies to all pins basis ground pins (7pin)

■Recommended operating conditions (Ta=25°C)

Parameter	Symbol	Min.	Тур.	Max.	Unit
Supply voltage	Vcc	2.4	3.0	3.6	٧
LED supply voltage	VLEDVcc	2.6	3.0	5.5	V

●Block diagram and application circuit



Terminal description

Pin No	Terminal	Circuit	Function
1	LEDA	LED	LED ANODE Terminal Other power source can be used difference between LEDVcc and Vcc.
2	TX-RC	Vcc	RC Transmitting Data Input Terminal H: LED Emitting (Remote Control Mode) CMOS Logic Level Input Holding TX-RC='H' status, LED will be turn off approximately 48µs.
3	TXD	Vcc	Transmitting Data Input Terminal TXD input at PWDOWN=L H: LED Emitting CMOS Logic Level Input Holding TXD="H" status, LED will be turn off approximately 48µs.
4	RXD	PWDOWN \$300k	Receiving Data Output Terminal CMOS Logic Level Output When PWDOWN (5pin)= 'H', the RXD output will be pulled up to Vcc at approximately 300kΩ.
5	PWDOWN	Vcc W———————————————————————————————————	Power-down Control Terminal H: POWERDOWN L: OPERATION CMOS Logic Level Input When input is 'H', it will stop the receiving circuit and Pin-PD current.
6	Vcc		Power Supply Terminal For preventing from infection, connect a capacitor between Vcc (6pin) and GND (7pin).
7	GND		Ground Termianl
_	Shield Case		Connect to Ground.

●Electrical characteristics (Unless otherwise noted, Vcc= 3.0V, VLEDVcc=3.0V, Ta=25°C)

Parameter	Symbol	Min.	Тур.	Max.	Unit	Conditions
Consumption current1	Icc1	-	90	120	μΑ	PWDOWN=0V At no input light
Consumption current2	Icc2	-	0.01	0.2	μΑ	PWDOWN=Vcc At no input light
Data rate		2.4	-	115.2	kbps	
PWDOWN input high voltage	VPDH	2/3*Vcc	_	Vcc	V	Vcc=2.4 to 3.6V
PWDOWN input low voltage	VPDL	0	-	1/3*Vcc	V	Vcc=2.4 to 3.6V
PWDOWN input high current	IPDH	-1.0	0	1.0	μΑ	PWDOWN=Vcc
PWDOWN input low current	IPDL	-1.0	0	1.0	μΑ	PWDOWN=0V
<transmitter></transmitter>						
TXD input high voltage	VTXH	2/3*Vcc	-	Vcc	V	Vcc=2.4 to 3.6V
TXD input low voltage	VTXL	0	-	1/3*Vcc	V	Vcc=2.4 to 3.6V
TX-RC input high voltage	VTX-RCH	1.5	-	Vcc	V	Vcc=2.4 to 3.6V
TX-RC input low voltage	VTX-RCL	0	-	0.5	V	Vcc=2.4 to 3.6V
TXD/TX-RC input high current	ITXH	6.2	12.5	25	μΑ	TXD=Vcc or TX-RC=Vcc
TXD/TX-RC input low current	ITXL	-1.0	0	1.0	μΑ	TXD=0V or TX-RC=0V
LED anode current (IrDA Mode)	ILEDA1	-	50	70	mA	TXD=Vcc
LED anode current (RC Mode)	ILEDA2	-	211	245	mA	TX-RC=Vcc, R1=2.2Ω
<receiver></receiver>						
RXD output high voltage	VRXH	Vcc-0.4	-	Vcc	V	IRXH=-200μA
RXD output low voltage	VRXL	0	-	0.4	V	IRXL=200μA
RXD output rise Time	tRR	-	25	100	ns	C _L =15pF
RXD output fall Time	tFR	-	25	100	ns	C _L =15pF
RXD output pulse width	twRXD	1.7	2.6	3.5	μs	C _L =15pF, 2.4 to 115.2kbps
Receiver latency time	tRT	-	40	200	μs	

● Optical characteristics (Unless otherwise noted, Vcc= 3.0V, VLEDVcc=3.0V, Ta=25°C)

Parameter	Symbol	Min.	Тур.	Max.	Unit	Conditions
Dools were longithd (InDA Mode)	λP1	880	888	892	nm	ILED=50mA, Duty20%
Peak wave length1 (IrDA Mode)	٨٣١	850	_	900	nm	ILED=50mA, Duty20%, -20 to 60°C
Peak wave length2 (RC Mode)	λΡ2	880	890	920	nm	ILED=200mA, Duty20%
Intensity1 (IrDA Mode)	IE1	4	12	28	mW/sr	-15°≤θL≤15° R₁=2.2Ω
Intensity2 (RC Mode)	IE2	25	50	120	mW/sr	$-15^{\circ} \le \theta_L \le 15^{\circ}$ R ₁ =2.2 Ω
Half-angle	θL/2	±15	_	_	deg	
Optical pulse width1 (IrDA Mode)	TWLED1	1.42	1.63	2.02	μs	TXD=1.63μs pulse input R ₁ =2.2Ω
Optical pulse width2 (RC Mode)	TWLED2	9.5	10	10.5	μs	TX-RC=10μs pulse input R ₁ =2.2Ω
Rise time / Fall time	Tr/Tf	-	20	120	ns	10% to 90%
Optical over shoot		_	_	25	%	
Edge jitter	Tj	-40	_	40	ns	
Minimum Irradiance in angular	Eemin	_	4.0	8.1	μW/cm ²	-15°≤θ∟≤+15°
Maximum Irradiance in angular	Eemax	500	-	_	mW/cm ²	-15°≤θ∟≤+15°
Input half-angle	θD/2	±15	_	_	deg	
Maximum emitting time	TLEDmax	20.5	48	96	μs	TXD=0→Vcc or TX-RC=0→ Vcc

This product is not designed for protection against radioactive rays.
 This product dose not include laser transmitter.
 This product includes one PIN photo diode.
 This product dose not include one plical load.

•LED Operation Mode Table

PWDOWN (5pin)	TX-RC (4pin)	TXD (7pin)	LED Emitting Mode	IrDA Receiver Operation Condition
L	L	L	OFF	ON
L	L	Л	IrDA	ON
L	Л	L	RC	ON
Н	L	L	OFF	OFF
Н	L	Л	OFF	OFF
Н	Л	L	RC	OFF

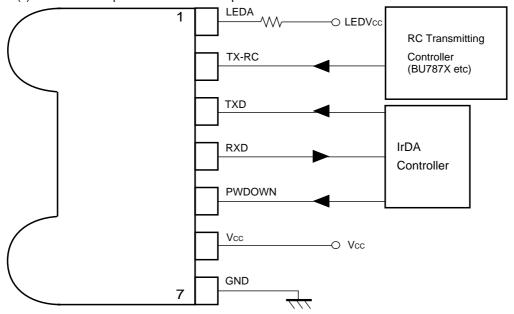
Notes) •Please be sure to set up the TX-RC (2pin) and the TXD (3pin) input to be "L" (under 0.3V) except transmitting data (for < 90μs. ON Duty ≤ 50%).

- ☐ of TX-RC (2pin) and TXD (3pin) in the table above is supposed to be the pulse input.
- *When either TX-RC (2pin) input TXD (3pin) input keeps the state of "H" (more than appproximately 48µs),
- LED will be turned off due to LED pulse width limiting circuit if the pulse is input from the other terminal. Therefore, don't use as the normal transmitting is impossible.
- •Please input the pulse when both TX-RC (2pin) and TXD (3pin) are "L".
- •Even if RPM841-H16 input H pulse into TXD in the state of a power down, LED does not emanate.

●Interface operating timing

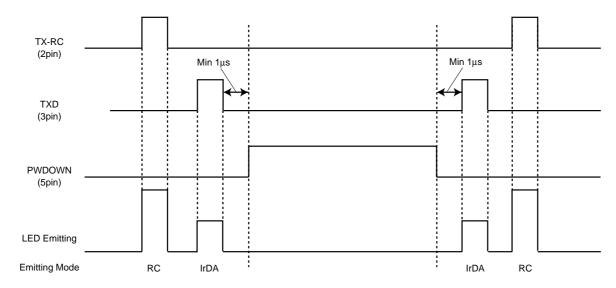
(Emitting side)

(1) When TXD output for IrDA and TXD output for controller are different lines.



(2-a) RC transmitting mode at IrDA receiver active condition.

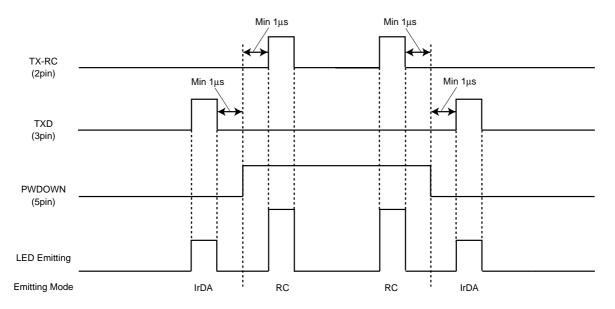
Input			Co	ndition
PWDOWN	TX-RC	TXD	LED Mode	Recriver circuit
L	L	L	OFF	ON
L	L	Л	IrDA	ON
L	Л	L	RC	ON
Н	L	L	OFF	OFF



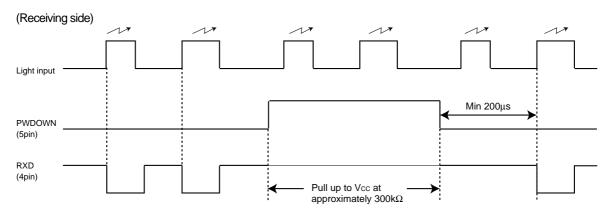
 $* If TX-RC \ or \ TXD \ input \ pulse \ width \ is \ wider \ than \ 48\mu s, \ output \ LED \ emitting \ pulse \ will \ be \ turn \ off \ approximately \ 48\mu s.$

(2-b) RC transmit mode at IrDA receiver power down condition.

Input			Cond	dition
PWDOWN	TX-RC	TXD	LED Mode	Recriver circuit
L	L	L	OFF	ON
L	L	Л	IrDA	ON
Н	Л	L	RC	OFF
Н	L	L	OFF	OFF



*If TX-RC or TXD input pulse width is wider than 48µs, output LED emitting pulse will be turn off approximately 48µs.



 $*\mbox{RXD}$ output width is fixed approximately 2.6 $\mu\mbox{s}$.

Note RXD output become stable after 200µs since PWDOWN is changed from H to L. RXD output could be unstable at H to L within 200µs.



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	2.2Ω±5%, 1/8W (VLEDVcc=3V)	At LED Emitting Duty=25%

[LED current set-up method for Remote control mode]

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

minimum necessary of irradiant intensity le1 [mW/sr]

(Including LED's distribution within ±15deg)

R1=166 × (VLEDVcc-1.31) / le1-7.2 ILED=Duty × (VLEDVCC-1.31) / (R1+5.8) Duty : LED duty at emitting

- * Please set up to be ILED / Duty < 250[mA] (Duty ≤ 25%)
- * At IrDA Mode, LED current is constantly approximately 50mA.

(Reference) In case of using R1, typical intensity (le1typ) and maximum intensity (le1max) on axis are described as below.

 $\label{eq:le1typ=280 x (VLEDVcc-1.31) / (R1+5.8)} $$ le1max=560 \times (VLEDVcc-1.31) / (R1+5.8) $$$

●Notes

- 1) LEDVcc (1pin), Vcc (6pin)
 - · Other power source can be used difference between LEDVcc and Vcc.
- 2) Caution in designing board lay-out

To get maximum potential from RPM841-H16, please keep in mind following instruction.

- The line of RXD (4pin) should be connected at backside via through hole close to RPM841-H16 pin lead. Better not to be close to photo diode side (7pin).
- ⇒This is to minimize feedback supplied to photo diode from RXD.
- · As for C1 between 6-7 pin should be placed close to RPM841-H16.
- Better to be placed more than 1.0cm in radius from photo diode (pin7 side) and also away from the parts which generates noise, such as DC/DC converter.

3) Notes

- Please be sure to set up the TX-RC (2pin) and the TXD (3pin) input to be "L" (under 0.3V) except transmitting data (for $< 90\mu s$, ON duty $\le 50\%$).
- · Power down current might increase if exposed by strong light (ex. direct sunlight) at powerdown mode.
- Please use by the signal format at IrDA operating mode which is specified by IrDA Ver1.2 (2.4k to 115.2kbps). 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.



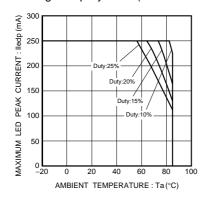
4) Eye safe

· IEC60825-1 (IEC60825-1 amendment2), Class 1 Eye Safe.

5) LED current derating and amdient temperature

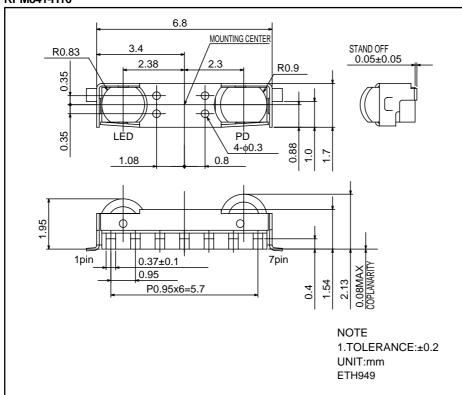
The relation between LED peak current and maximum ambient temperature is shown below. We recommend you to use within the range as indicated in below.

When glass-epoxy board (50×50×1.6mm) mounted.



●Dimensions (Unit: mm)

RPM841-H16



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