IrDA Infrared Communication Module RPM882-H12

RPM882-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, PWDOWN, TX-RC).
- 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* ¹	V
Input voltage	Vin (4, 5, 6, 7pin)	-0.3 to Vio+0.3	V
Operation temperature	Topr	-25 to +85	°C
Storage temperature	Tstg	-30 to +100	°C
LED peak current	IFP	300* ²	mA
Power dissipation	Pd	300* ³	mW

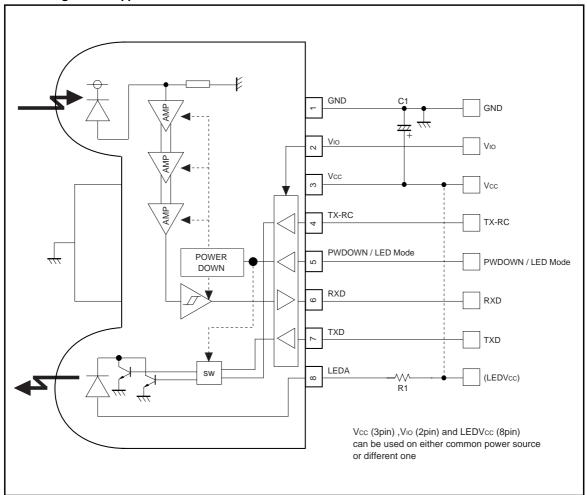
^{*1} This applies to all pins basis ground pins (1pin) *2 LED Peak Current< 90μs, On duty≤50%

● Recommended operating conditions (Ta=25°C)

Parameter	Symbol	Min.	Тур.	Max.	Unit
Supply voltage	Vcc	2.4	3.0	3.6	V
Interface supply voltage	Vio	1.5	3.0	Vcc	V
LED supply voltage	VLEDV cc	2.6	3.0	5.5	V

^{*3} When glass-epoxy board (70 × 70 × 1.6mm) mounted. In case operating environment is over 25°C, 4mW would be reduced per each 1°C stepping up.

●Block diagram and application circuit



Terminal description

Pin No	Terminal	Circuit	Function
1	GND		Ground
2	Vio		Supply voltage for I/O pins. (TX-RC, PWDOWN, RXD, TXD)
3	Vcc		Power Supply Terminal For preventing from infection, connect a capacitor between Vcc (3pin) and GND (1pin).
4	TX-RC	Vio	RC Transmitting Data Input Terminal H: LED Emitting CMOS Logic Level Input Holding TX-RC='H' status, LED will be turn off approximately 48µs.
5	PWDOWN / LED Mode	VIO W	Power-down Control and LED Intensity switching Terminal H: POWERDOWN (RC transmitting Mode) L: OPERATION CMOS Logic Level Input When input is 'H', it will stop the receiving circuit and Pin-PD current.
6	RXD	PWDOWN VIO	Receiving Data Output Terminal CMOS Logic Level Output When PWDOWN (5pin)= 'H', the RXD output will be pulled up to Vio at approximately 300kΩ.
7	TXD	Vio	Transmitting Data Input Terminal IrDA TXD input at PWDOWN=L (Remote control transmitting input at PWDOWN=H). H: LED Emitting CMOS Logic Level Input 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 LEDVcc and Vcc. LED current depends on LED load resistance value at RC mode.
	Shield Case		Connect to Ground.

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

Parameter	Symbol	Min.	Тур.	Max.	Unit	Conditions
Consumption current1	Icc1	-	80	104	μΑ	PWDOWN=0V At no input light
Consumption current2	Icc2	_	0.01	0.2	μΑ	PWDOWN=Vio At no input light
Data rate		2.4	_	115.2	kbps	
DMDOMN issue high voltage	VPDH	2/3*Vio		Vio	V	Vio=1.8 to 3.6V
PWDOWN input high voltage	VPDH	1.2	_	VIO	V	Vio=1.5 to 1.8V
PWDOWN input low voltage	VPDL	0		1/3*Vio	V	Vio=1.8 to 3.6V
F WDOWN Input low voltage	VFDL	0		Vio-1.2	V	Vio=1.5 to 1.8V
PWDOWN input high current	IPDH	-1.0	0	1.0	μΑ	PWDOWN=V _{IO}
PWDOWN input low current	IPDL	-1.0	0	1.0	μΑ	PWDOWN=0V
Transmitter>						
TVD TV DO:	VTXH	2/3*Vio		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	V	Vio=1.8 to 3.6V
TXD/TX-RC input high voltage		1.2	_	Vio		Vio=1.5 to 1.8V
TXD/TX-RC input low voltage	VTXL	0	_	1/3*Vio	V	Vio=1.8 to 3.6V
TAB/TA-ING input low voltage	VIXL			Vio-1.2	· ·	Vio=1.5 to 1.8V
TXD/TX-RC input high current	ITXH	7.5	15	30	μΑ	TXD=Vio or TX-RC=Vio
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	28	40	52	mA	TXD=Vio, R1=4.7Ω, PWDOWN=0V
LED anode current (RC Mode)	ILEDA2	150	200	245	mA	TX-RC=V _{IO} , R1=4.7Ω, PWDOWN=V _{IO}
Receiver>	•					
RXD output high voltage	VRXH	Vcc-0.4	-	Vio	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, Vcc= Vio=3.0V, VLEDVcc=3.0V, Ta=25°C)

Parameter	Symbol	Min.	Тур.	Max.	Unit	Conditions
Peak wave length1 (IrDA Mode)	λP1	880	890	892	nm	ILED=50mA, Duty20%
reak wave length (IIDA Mode)	, AF I	850	_	900	nm	ILED=50mA, Duty20%, -20 to 60°C
Peak wave length2 (RC Mode)	λP2	880	890	920	nm	ILED=200mA, Duty20%
Intensity1 (IrDA Mode)	IE1	4	13	28	mW/sr	$-15^{\circ} \le \theta_L \le 15^{\circ}$ R ₁ =4.7 Ω
Intensity2 (RC Mode)	IE2	30	65	130	mW/sr	$-15^{\circ} \le \theta$ L $\le 15^{\circ}$ R ₁ =4.7 Ω
Half-angle	θL/2	±15	±22	_	deg	
Optical pulse width1 (IrDA Mode)	TWLED1	1.42	1.63	2.02	μs	TXD=1.63μs pulse input R ₁ =4.7Ω
Optical pulse width2 (RC Mode)	TWLED2	9.5	10	10.5	μs	TX-RC=10μs pulse input R ₁ =4.7Ω
Rise time / Fall time	Tr/Tf	-	60	120	ns	10% to 90%
Optical over shoot		-	_	25	%	
Edge jitter	Tj	-40	_	40	ns	
Minimum Irradiance in angular	Eemin	-	3.6	6.8	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	120	μs	TXD=0→Vio or TX-RC=0→Vio

^{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.

●LED Operation Mode Table

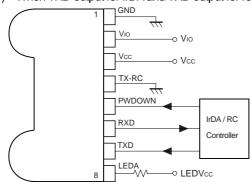
PWDOWN (5pin)	TX-RC (4pin)	TXD (7pin)	LED Emitting Mode	IrDA Receiver Operation Condition
L	L	L	OFF	ON
L	L	Л	IrDA	ON
L	Л	L	RC	ON
Н	L	L	OFF	OFF
Н	L	JL	RC	OFF
Н	Л	L	RC	OFF

Notes) •Please be sure to set up the TX-RC (4pin) and the TXD (7pin) input to be "L" (under 0.3V) except transmitting data (for < 90μ s. ON Duty $\leq 50\%$).

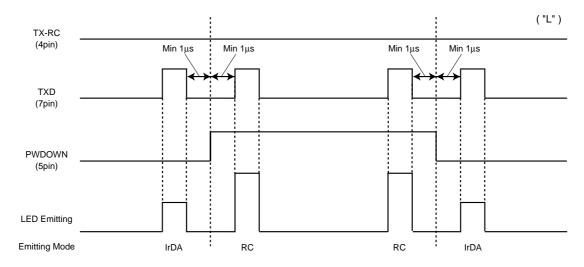
●Interface operating timing

(Emitting side)

(1) When TXD output for IrDA and TXD output for remote controller is 1 line.



Inp	out	Cond	dition
PWDOWN	TXD	LED Mode	Recriver circuit
L	L	OFF	ON
L	7	IrDA	ON
Н	L	OFF	OFF
Н	7	RC	OFF



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

^{• ☐} of TX-RC (4pin) and TXD (7pin) in the table above is supposed to be the pulse input.

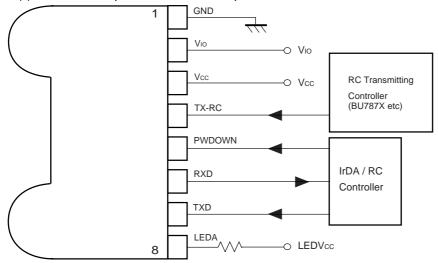
^{*}When either TX-RC (4pin) input TXD (7pin) input keeps the state of "H" (more than appproximately 48µs),

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.

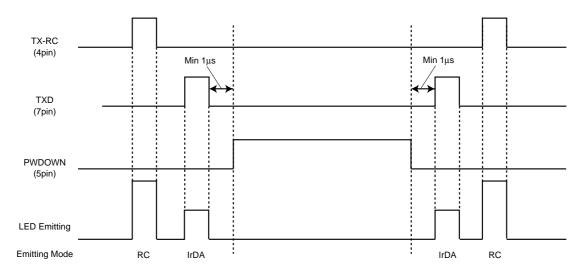
[•]Please input the pulse when both TX-RC (4pin) and TXD (7pin) are "L".





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

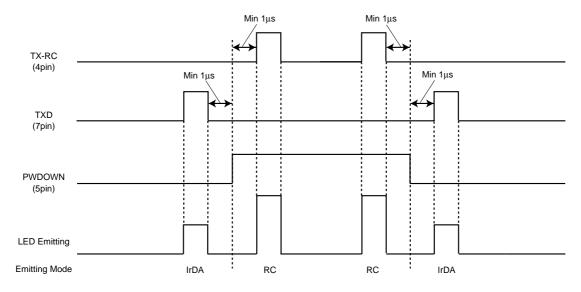
	Input	Co	ndition	
PWDOWN	TX-RC	TXD	LED Mode	Recriver circuit
L	L	L	OFF	ON
L	L	Л	IrDA	ON
L	Л	L	RC	ON
Н	L	L	OFF	OFF



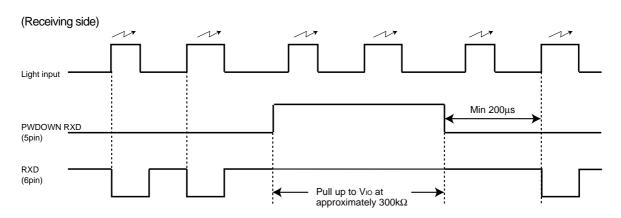
*If TX-RC or TXD input pulse width is wider than 48µs, output LED emitting pulse will be turn off approximately 48µs.

(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



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



 $*\mbox{RXD}$ output width is fixed approximately 2.3 μs .

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

Attached components

Recommended values

F	Part symbol Recommended value		Notice
	C1 1µF, tantalum or ceramic Ex.) TCFGA1A105M8R (ROHM)		Bigger capacitance is recommended with much noise from power supply
	R1	4.7Ω±5%, 1/8W (VLEDVcc=3V)	At LED Emitting Duty=20%

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

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

LED resistance value : $R1[\Omega]$, LED average consumption current : ILED[mA], Supply voltage : VLEDVcc[V], minimum necessary of irradiant intensity le1 [mW/sr]

(Including LED's distribution within ±15deg)

R1=166 × (VLEDVcc-1.28) / le1-5.0 ILED=Duty × (VLEDVCC-1.28) / (R1+3.5) Duty : LED duty at emitting

- * Please set up to be ILED / Duty < 250[mA] (Duty $\le 50\%$)
- * At IrDA Mode, LED current is constantly approximately 40mA.

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

le1typ= $300 \times (VLEDVcc-1.28) / (R1+3.5)$ le1max= $600 \times (VLEDVcc-1.28) / (R1+3.5)$

Notes

- 1) LEDVcc (8pin), Vcc (3pin) and Vio (2pin)
 - \cdot Other power source can be used difference between LEDVcc and Vcc and Vio. (Vio < Vcc + 0.3V)
- 2) Caution in designing board lay-out

To get maximum potential from RPM882-H12, please keep in mind following instruction.

- The line of RXD (6pin) should be connected at backside via through hole close to RPM882-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 1-3 pin should be placed close to RPM882-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) Notes

- Please be sure to set up the TX-RC (4pin) and the TXD (7pin) 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.



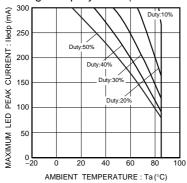
4) Eye safe

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

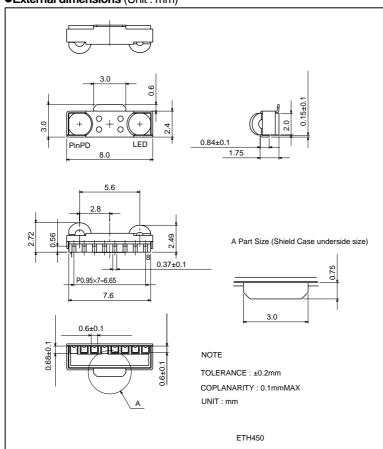
5) LED current derating and amdient temperature

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 (70×70×1.6mm) mounted.



●External dimensions (Unit: mm)



Notes

- No technical content pages of this document may be reproduced in any form or transmitted by any
 means without prior permission of ROHM CO.,LTD.
- The contents described herein are subject to change without notice. The specifications for the
 product described in this document are for reference only. Upon actual use, therefore, please request
 that specifications to be separately delivered.
- Application circuit diagrams and circuit constants contained herein are shown as examples of standard
 use and operation. Please pay careful attention to the peripheral conditions when designing circuits
 and deciding upon circuit constants in the set.
- Any data, including, but not limited to application circuit diagrams information, described herein are intended only as illustrations of such devices and not as the specifications for such devices. ROHM CO.,LTD. disclaims any warranty that any use of such devices shall be free from infringement of any third party's intellectual property rights or other proprietary rights, and further, assumes no liability of whatsoever nature in the event of any such infringement, or arising from or connected with or related to the use of such devices.
- Upon the sale of any such devices, other than for buyer's right to use such devices itself, resell or
 otherwise dispose of the same, no express or implied right or license to practice or commercially
 exploit any intellectual property rights or other proprietary rights owned or controlled by
- ROHM CO., LTD. is granted to any such buyer.
- Products listed in this document are no antiradiation design.

The products listed in this document are designed to be used with ordinary electronic equipment or devices (such as audio visual equipment, office-automation equipment, communications devices, electrical appliances and electronic toys).

Should you intend to use these products with equipment or devices which require an extremely high level of reliability and the malfunction of with would directly endanger human life (such as medical instruments, transportation equipment, aerospace machinery, nuclear-reactor controllers, fuel controllers and other safety devices), please be sure to consult with our sales representative in advance.

About Export Control Order in Japan

Products described herein are the objects of controlled goods in Annex 1 (Item 16) of Export Trade Control Order in Japan.

In case of export from Japan, please confirm if it applies to "objective" criteria or an "informed" (by MITI clause) on the basis of "catch all controls for Non-Proliferation of Weapons of Mass Destruction.

