

IrDA infrared communication IC (SIR / ASK compatible)

RPM-800CB Series

The RPM-800CB series is an infrared communication IC that is compatible with the IrDA1.0 and ASK communication systems. The infrared LED, PIN photodiode, and modulator circuit are combined onto a single package, and connection to a UART requires just three lines (transmit, receive, and control).

●Applications

Cellular phones, pagers, PDA, PHS, notebook PCs, and printers

●Features

- 1) Infrared emitting, receiver, and modulator / demodulator on the chip.
- 2) Switchable modes.
 - IrDA mode
 - ASK mode
- 3) 2.4 to 115.2kbps communication rate.
- 4) Built-in powerdown mode
- 5) Power supply voltage input range 2.7 to 5.5V.

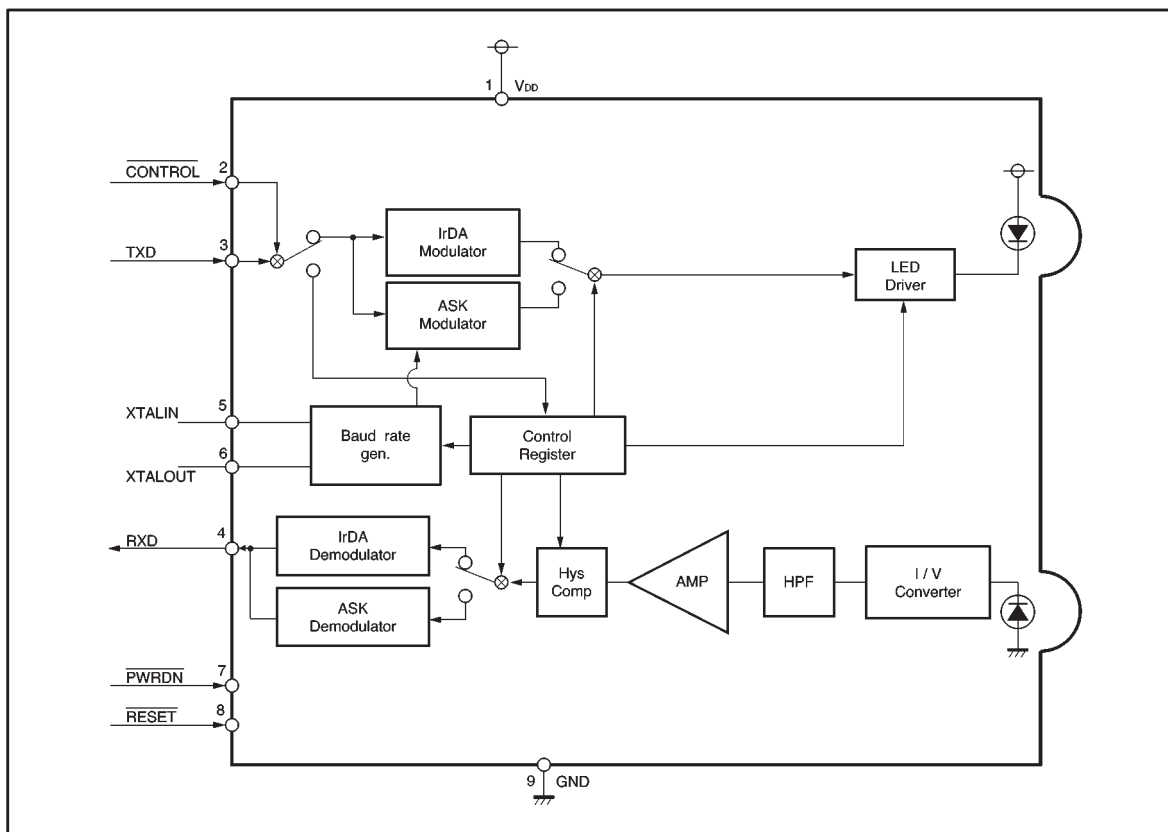
●Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits	Unit
Power supply voltage	V _{CC}	-0.3~+7.0	V
Operating temperature	T _{opr}	0~+60	°C
Storage temperature	T _{stg}	-20~+85	°C

●Recommended operating conditions (Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	V _{DD}	2.7	3.0	5.5	V

● Block diagram



● Pin descriptions

Pin No.	Pin name	Function
1	V _{DD}	Power supply
2	$\overline{\text{CONTROL}}$	Register write control pin Transmit: High, Register set: Low
3	TXD	Transmit / register write data input pin Data1: High, Data 0: Low
4	RXD	Receive data output pin Data1: High, Data 0: Low
5	XTALIN	Crystal oscillator connection pin (3.6864MHz)
6	XTALOUT	Crystal oscillator connection pin (3.6864MHz)
7	$\overline{\text{PWRDN}}$	Power down control pin Power down: Low
8	$\overline{\text{RESET}}$	Internal register reset pin Reset: Low
9	GND	Ground

●Input / output circuits

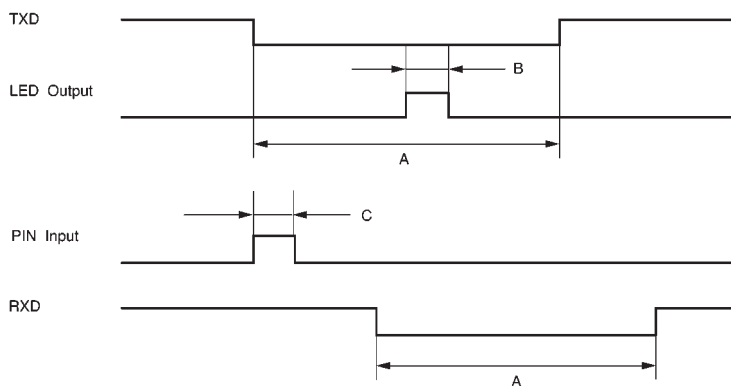
Pin No.	Pin name	Function	Equivalent circuit
1	V _{DD}	Power supply	—
2	$\overline{\text{CONTROL}}$	Register write control pin Transmit: High, Register set: Low	
3	TXD	Transmit / register write data input pin Data 1: High, Data 0: Low	
4	RXD	Receive data output pin Data 1: High, Data 0: Low	
5	XTALIN	Crystal oscillator connection pin (3.6864MHz)	
6	XTALOUT	Crystal oscillator connection pin (3.6864MHz)	
7	$\overline{\text{PWRDN}}$	Power down control pin Power down: Low	
8	$\overline{\text{RESET}}$	Internal register reset pin Reset: Low	
9	GND	Ground	—

●Electrical characteristics (unless otherwise noted, Ta = 25°C and V_{DD} = 3V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Power supply current 1	I _{DD1}	—	—	3.5	mA	Stand-by for receiving
Power supply current 2	I _{DD2}	—	—	10	μA	Power down, No ambient light
Power supply current 3	I _{DD3}	—	—	300	mA	With max. LED current drive
Control input high voltage	V _{IH}	V _{DD} −0.5	—	—	V	—
Control input low voltage	V _{IL}	—	—	0.8	V	—
Control input high current	I _{IH}	—	—	−2.0	μA	—
Control input low current	I _{IL}	—	—	2.0	μA	—
TXD input high voltage	V _{IH}	V _{DD} −0.5	—	—	V	—
TXD input low voltage	V _{IL}	—	—	0.8	V	—
TXD input high current	I _{IH}	—	—	−2.0	μA	—
TXD input low current	I _{IL}	—	—	2.0	μA	—
XTALIN input high voltage	V _{IH}	V _{DD} −0.5	—	—	V	—
XTALIN input low voltage	V _{IL}	—	—	0.8	V	—
XTALIN input high current	I _{IH}	—	—	−10.0	μA	—
XTALIN input low current	I _{IL}	—	—	10.0	μA	—
PWRDN input high voltage	V _{IH}	V _{DD} −0.5	—	—	V	—
PWRDN input low voltage	V _{IL}	—	—	0.8	V	—
PWRDN input high current	I _{IH}	—	—	−2.0	μA	—
PWRDN input low current	I _{IL}	—	—	2.0	μA	—
RESET input high voltage	V _{IH}	V _{DD} −0.5	—	—	V	—
RESET input low voltage	V _{IL}	—	—	0.8	V	—
RESET input high current	I _{IH}	—	—	−2.0	μA	—
RESET input low current	I _{IL}	—	—	2.0	μA	—
XTALOUT output high voltage	V _{OH}	V _{DD} −0.5	—	—	V	I _{OH} = −0.2mA
XTALOUT output low voltage	V _{OL}	—	—	0.5	V	I _{OL} = 0.2mA
RXD output high voltage	V _{OH}	V _{DD} −0.5	—	—	V	I _{OH} = −2.0mA
RXD output low voltage	V _{OL}	—	—	0.5	V	I _{OL} = 2.0mA

● Circuit operation

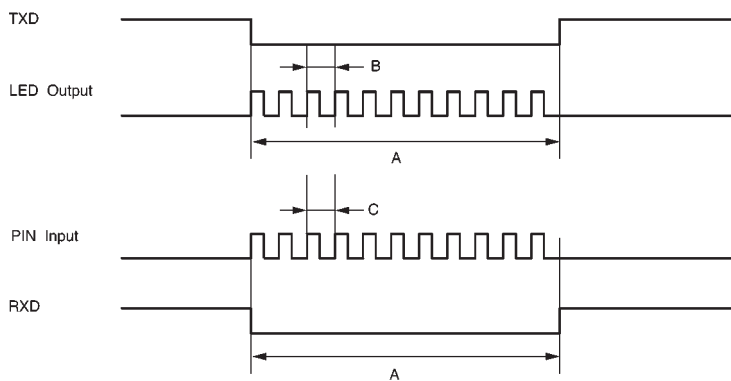
IrDA format



A : 1 / baud rate
 B : 1 / baud rate * 3 / 16
 C : 1.41 μ sec ~ 1 / baud rate * 3 / 16

Fig.1

ASK format



A : 1 / baud rate
 B : 1 / 527kHz
 C : 1 / 500kHz $\pm$ 10%

Fig.2

Register function

Control character format

As shown in the Fig.3, the control character is made up of four address bits, four data bits, a start bit and a stop bit.

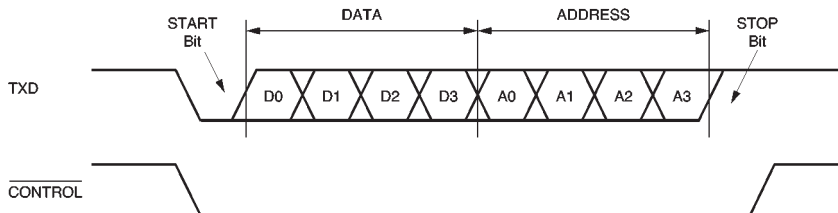


Fig.3

Explanation of the registers

Register table

No.	Address	Function
1	0000	Control register 1
2	0010	LED drive current control register
3	0011	Baud rate register
4	0100	Mode register
5	0101	Control register 2

1) Control register 1

D3	D2	D1	D0
ECHO	ECAN	RXEN	TXEN

Reset 0 0 0 0

ECHO 0 No control character echo back

1 Control character echo back

ECAN 0 Does not cancel reception of transmitted (self emitted) data

1 Cancels reception of transmitted (self emitted) data

RXEN 0 Receiver OFF

1 Receiver ON

TXEN 0 Transmitter OFF

1 Transmitter ON

2) LED drive current control register

D3	D2	D1	D0
0	LP2	LP1	LP0

Reset 0 0 0 0

0000 H

0001 M

0010 L

3) Baud rate register

D3	D2	D1	D0
0	BR2	BR1	BR0

Reset 0 0 1 0

0000 2.4Kbps

0001 4.8Kbps

0010 9.6Kbps

0011 19.2Kbps

0100 38.4Kbps

0101 57.6Kbps

0110 115.2Kbps

(when the clock is
3.6864MHz)

4) Mode register

D3	D2	D1	D0
0	0	0	MD

Reset 0 0 0 0

0000 IrDA

0001 ASK When $V_{DD} = 5V$ and ASK is used, set the LED drive control register to M or L.

5) Control register 2

D3	D2	D1	D0
0	0	0	LOAD

Reset 0 0 0 0

LOAD 0 Do not load the baud rate counter value

1 Load the baud rate counter value

* The load bit automatically returns to 0 after the counter value is loaded.

Timing chart

1) Reset operation

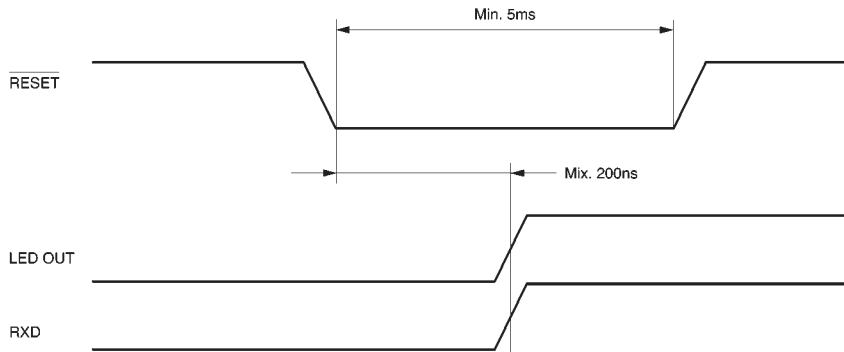


Fig.4

2) Register write

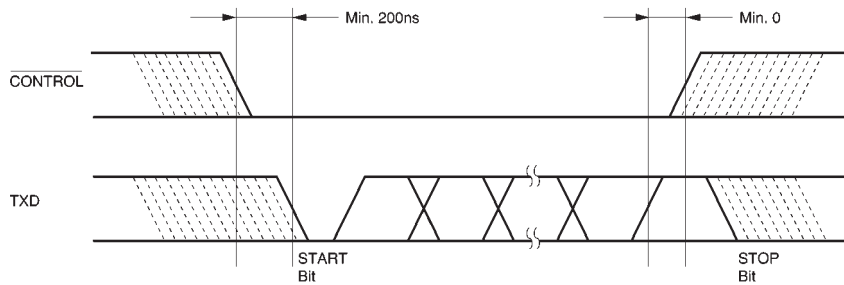


Fig.5

3) Echo back

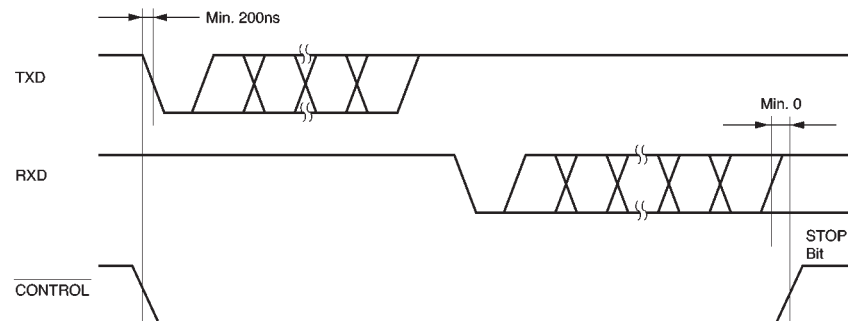


Fig.6

4) Transmit

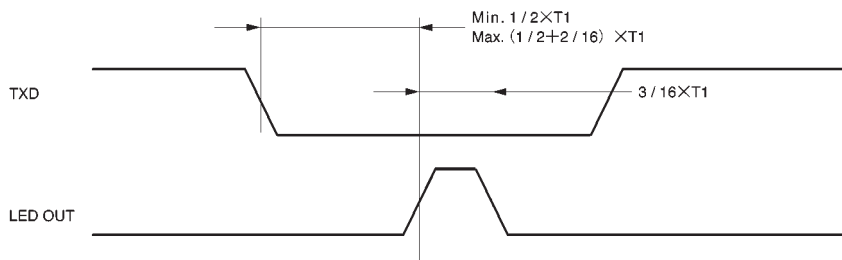


Fig.7

5) Receive

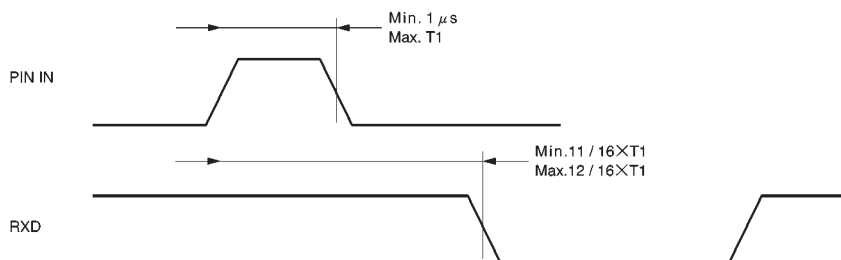


Fig.8

6) Echo cancel

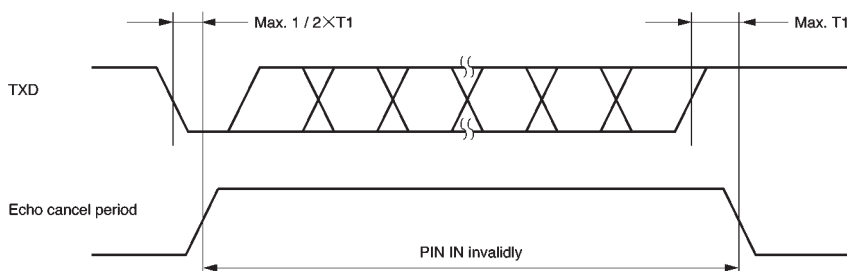


Fig.9

7) Power down

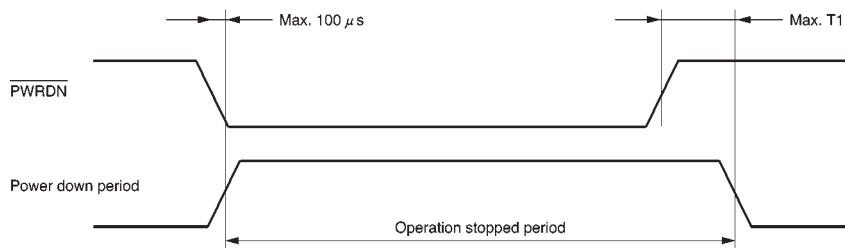


Fig.10

* $T_1 = 1 / \text{baud rate}$

●Application example

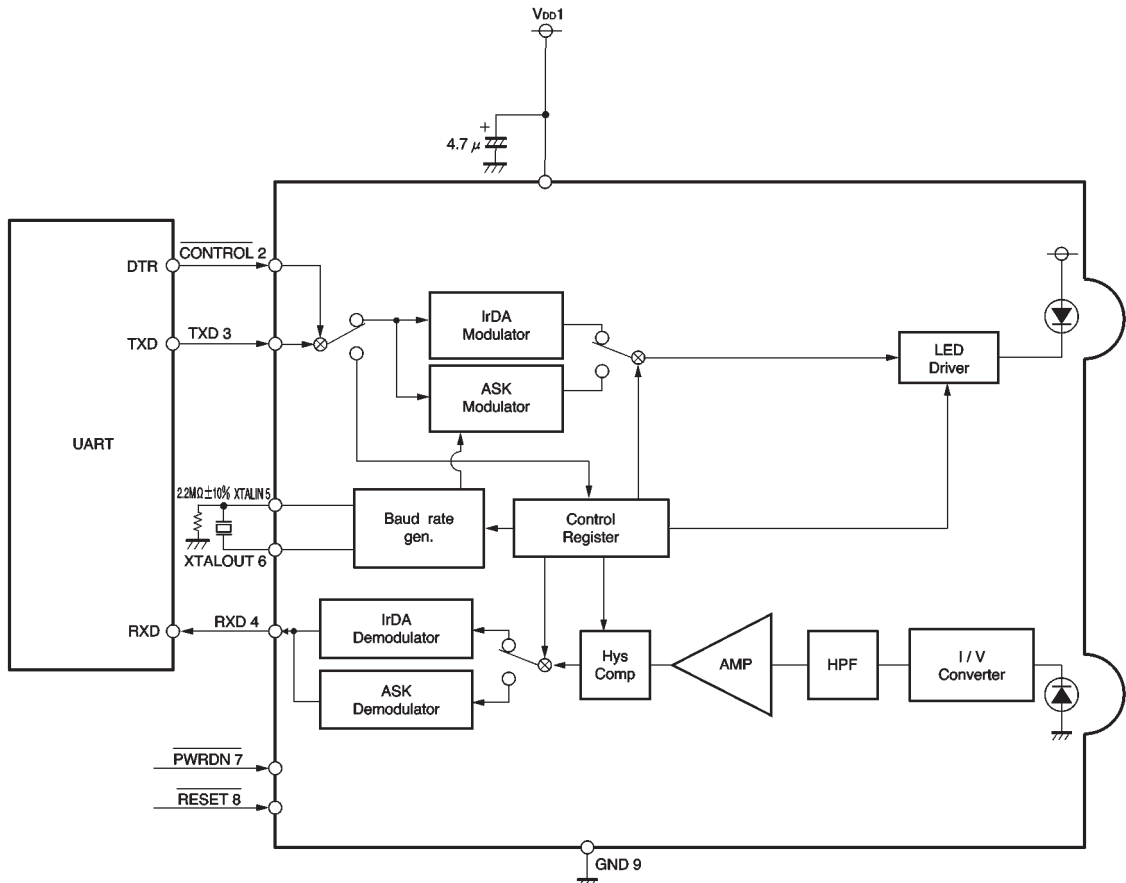


Fig.11

●Operation notes

- (1) Use a shield when there is a possibility of influence due to electromagnetic noise.
- (2) The baud rate is set to 9600bps after the power is applied, or the IC is reset.
- (3) The setting in the baud rate register becomes effective when the LOAD bit of control register 2 is set to 1.
- (4) Avoid using together with strong light sources.
- (5) We recommend to use crystal oscillator.

●Electrical characteristics curves

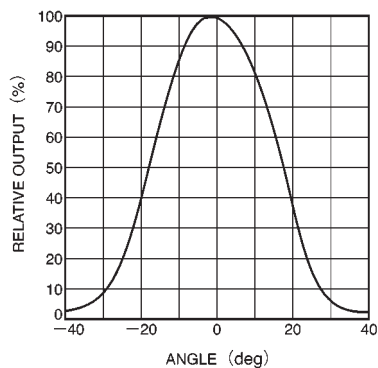


Fig.12 Light transmitter characteristics

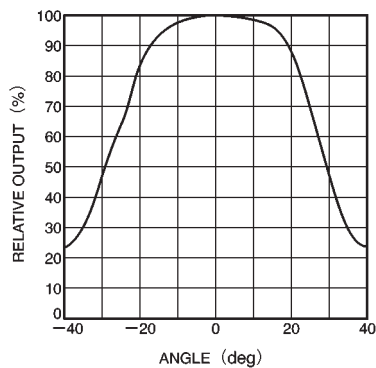


Fig.13 Light receiver characteristics

●External dimensions (Units: mm)

