

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	V _{in} (3, 4, 5pin)	-0.3 to V _{CC} +0.3	V
Operation temperature	T _{opr}	-30 to +85	°C
Storage temperature	T _{stg}	-40 to +100	°C

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

●Recommended operating conditions (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	V _{CC}	2.4	3.0	3.6	V
LED supply voltage	VLEDV _{CC}	2.6	3.0	5.5	V

Photo Link Module

●Block diagram and application circuit

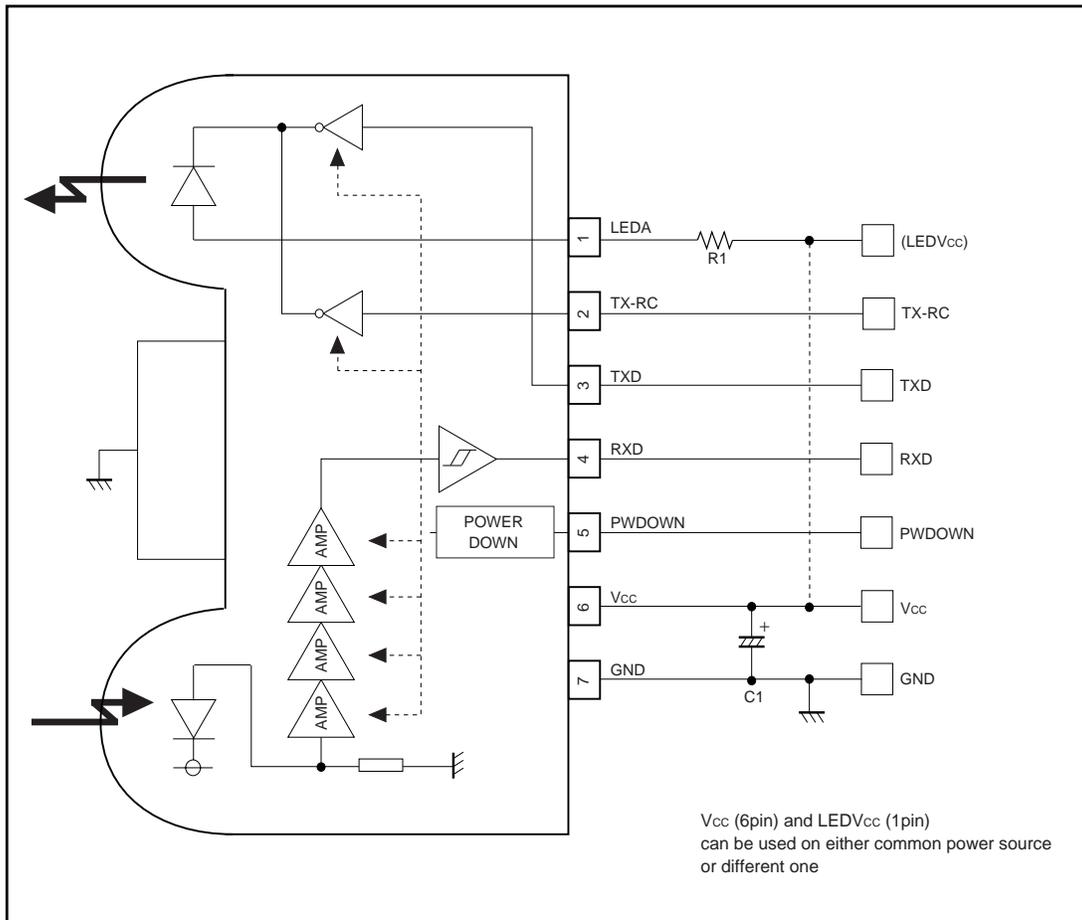


Photo Link Module

●Terminal description

Pin No	Terminal	Circuit	Function
1	LEDA		LED ANODE Terminal Other power source can be used difference between LEDV _{cc} and V _{cc} .
2	TX-RC		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		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		Receiving Data Output Terminal CMOS Logic Level Output When PWDOWN (5pin)= 'H', the RXD output will be pulled up to V _{cc} at approximately 300kΩ.
5	PWDOWN		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	V _{cc}		Power Supply Terminal For preventing from infection, connect a capacitor between V _{cc} (6pin) and GND (7pin).
7	GND		Ground Terminal
-	Shield Case		Connect to Ground.

Photo Link Module

●Electrical characteristics (Unless otherwise noted, $V_{CC}=3.0V$, $V_{LEDV_{CC}}=3.0V$, $T_a=25^{\circ}C$)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Consumption current1	I _{CC1}	–	90	120	μA	PWDOWN=0V At no input light
Consumption current2	I _{CC2}	–	0.01	0.2	μA	PWDOWN=V _{CC} At no input light
Data rate		2.4	–	115.2	kbps	
PWDOWN input high voltage	VPDH	2/3*V _{CC}	–	V _{CC}	V	V _{CC} =2.4 to 3.6V
PWDOWN input low voltage	VPDL	0	–	1/3*V _{CC}	V	V _{CC} =2.4 to 3.6V
PWDOWN input high current	IPDH	–1.0	0	1.0	μA	PWDOWN=V _{CC}
PWDOWN input low current	IPDL	–1.0	0	1.0	μA	PWDOWN=0V
<Transmitter>						
TXD input high voltage	V _{TXH}	2/3*V _{CC}	–	V _{CC}	V	V _{CC} =2.4 to 3.6V
TXD input low voltage	V _{TXL}	0	–	1/3*V _{CC}	V	V _{CC} =2.4 to 3.6V
TX-RC input high voltage	V _{TX-RCH}	1.5	–	V _{CC}	V	V _{CC} =2.4 to 3.6V
TX-RC input low voltage	V _{TX-RCL}	0	–	0.5	V	V _{CC} =2.4 to 3.6V
TXD/TX-RC input high current	I _{TXH}	6.2	12.5	25	μA	TXD=V _{CC} or TX-RC=V _{CC}
TXD/TX-RC input low current	I _{TXL}	–1.0	0	1.0	μA	TXD=0V or TX-RC=0V
LED anode current (IrDA Mode)	I _{LEDA1}	–	50	70	mA	TXD=V _{CC}
LED anode current (RC Mode)	I _{LEDA2}	–	211	245	mA	TX-RC=V _{CC} , R ₁ =2.2Ω
<Receiver>						
RXD output high voltage	V _{RXH}	V _{CC} –0.4	–	V _{CC}	V	I _{RXH} =–200μA
RXD output low voltage	V _{RXL}	0	–	0.4	V	I _{RXL} =200μA
RXD output rise Time	t _{RR}	–	25	100	ns	C _L =15pF
RXD output fall Time	t _{FR}	–	25	100	ns	C _L =15pF
RXD output pulse width	t _{wRXD}	1.7	2.6	3.5	μs	C _L =15pF, 2.4 to 115.2kbps
Receiver latency time	t _{RT}	–	40	200	μs	

●Optical characteristics (Unless otherwise noted, $V_{CC}=3.0V$, $V_{LEDV_{CC}}=3.0V$, $T_a=25^{\circ}C$)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Peak wave length1 (IrDA Mode)	λ _{P1}	880	888	892	nm	I _{LED} =50mA, Duty20%
		850	–	900	nm	I _{LED} =50mA, Duty20%, –20 to 60°C
Peak wave length2 (RC Mode)	λ _{P2}	880	890	920	nm	I _{LED} =200mA, Duty20%
Intensity1 (IrDA Mode)	I _{E1}	4	12	28	mW/sr	–15° ≤ θ _L ≤ 15° R ₁ =2.2Ω
Intensity2 (RC Mode)	I _{E2}	25	50	120	mW/sr	–15° ≤ θ _L ≤ 15° R ₁ =2.2Ω
Half-angle	θ _{L/2}	±15	–	–	deg	
Optical pulse width1 (IrDA Mode)	T _{WLED1}	1.42	1.63	2.02	μs	TXD=1.63μs pulse input R ₁ =2.2Ω
Optical pulse width2 (RC Mode)	T _{WLED2}	9.5	10	10.5	μs	TX-RC=10μs pulse input R ₁ =2.2Ω
Rise time / Fall time	T _r /T _f	–	20	120	ns	10% to 90%
Optical over shoot		–	–	25	%	
Edge jitter	T _J	–40	–	40	ns	
Minimum Irradiance in angular	E _{emin}	–	4.0	8.1	μW/cm ²	–15° ≤ θ _L ≤ +15°
Maximum Irradiance in angular	E _{emax}	500	–	–	mW/cm ²	–15° ≤ θ _L ≤ +15°
Input half-angle	θ _{D/2}	±15	–	–	deg	
Maximum emitting time	T _{LEDmax}	20.5	48	96	μs	TXD=0 → V _{CC} or TX-RC=0 → V _{CC}

1. This product is not designed for protection against radioactive rays.
2. This product does not include laser transmitter.
3. This product includes one PIN photo diode.
4. This product does not include optical load.

Photo Link Module

●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		IrDA	ON
L		L	RC	ON
H	L	L	OFF	OFF
H	L		OFF	OFF
H		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 approximately 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.

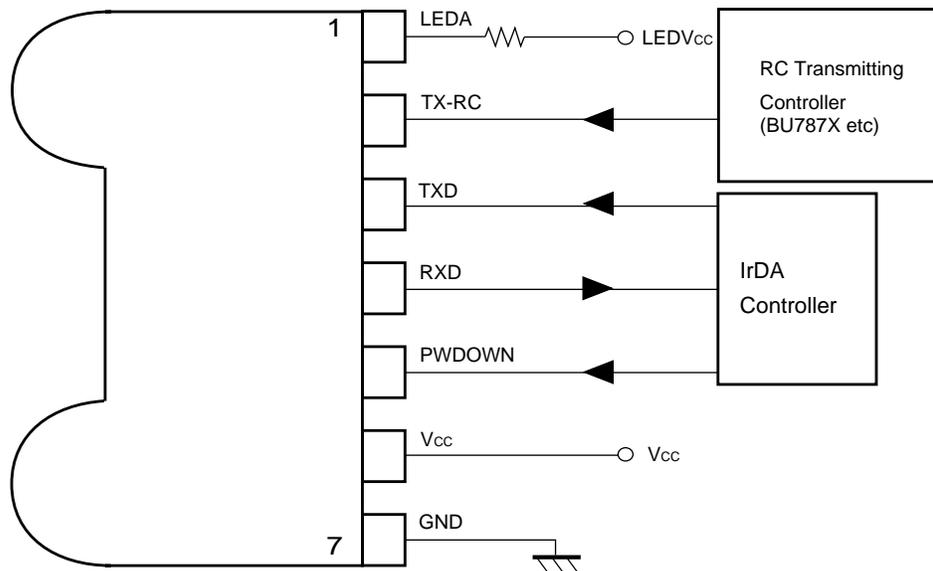
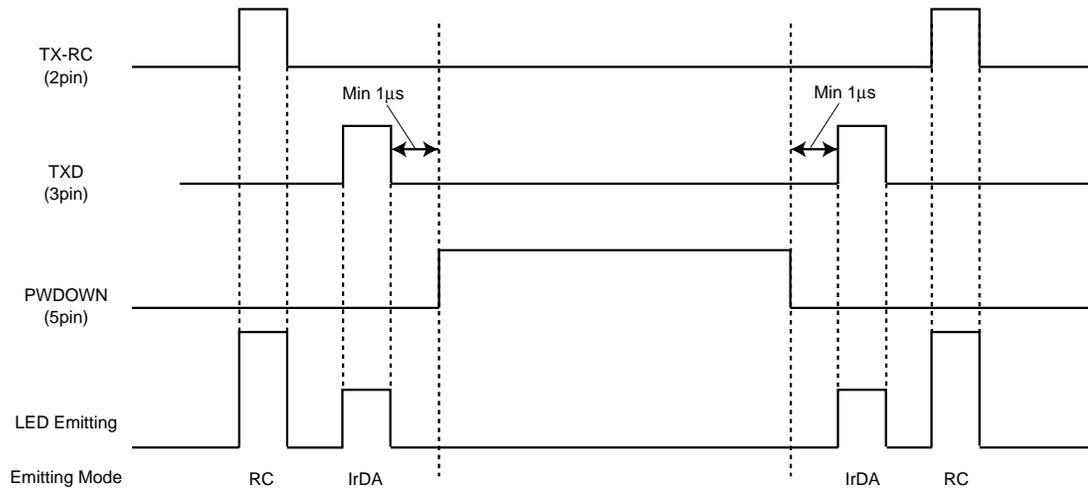


Photo Link Module

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

Input			Condition	
PWDOWN	TX-RC	TXD	LED Mode	Receiver circuit
L	L	L	OFF	ON
L	L		IrDA	ON
L		L	RC	ON
H	L	L	OFF	OFF

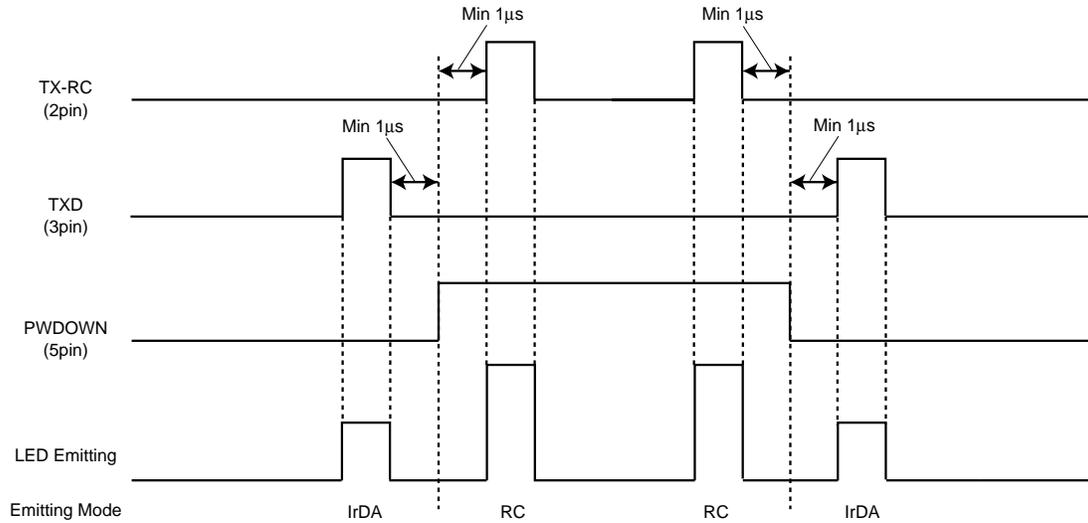


*If TX-RC or TXD input pulse width is wider than 48µs, output LED emitting pulse will be turn off approximately 48µs.

Photo Link Module

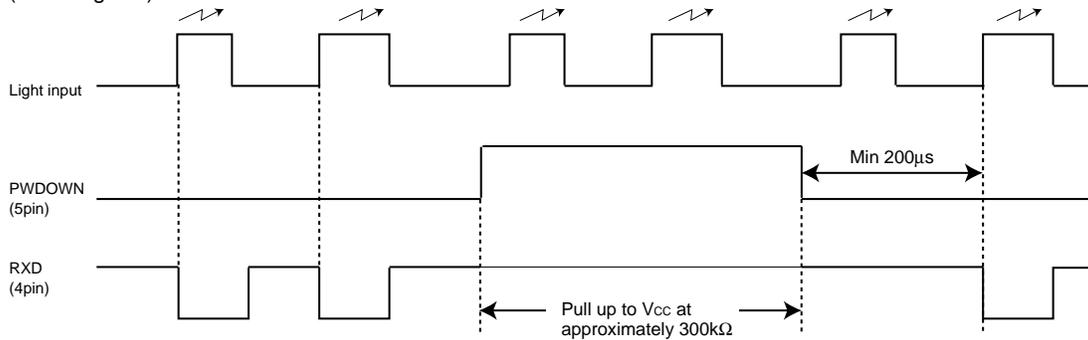
(2-b) RC transmit mode at IrDA receiver power down condition.

Input			Condition	
PWDOWN	TX-RC	TXD	LED Mode	Receiver circuit
L	L	L	OFF	ON
L	L		IrDA	ON
H		L	RC	OFF
H	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.

(Receiving side)



*RXD output width is fixed approximately 2.6µs.

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.

Photo Link Module

●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 (VLEDV _{CC} =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 :

LED resistance value : R1[Ω], LED average consumption current : ILED[mA], Supply voltage : VLEDV_{CC}[V],
 minimum necessary of irradiant intensity I_{e1} [mW / sr]
 (Including LED's distribution within ±15deg)

$$R1=166 \times (VLEDV_{CC}-1.31) / I_{e1}-7.2$$

$$I_{LED}=\text{Duty} \times (VLEDV_{CC}-1.31) / (R1+5.8)$$

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 (I_{e1typ}) and maximum intensity (I_{e1max}) on axis are described as below.

$$I_{e1typ}=280 \times (VLEDV_{CC}-1.31) / (R1+5.8)$$

$$I_{e1max}=560 \times (VLEDV_{CC}-1.31) / (R1+5.8)$$

●Notes

1) LEDV_{CC} (1pin), V_{CC} (6pin)

- Other power source can be used difference between LEDV_{CC} and V_{CC}.

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 < 90μs, ON duty ≤ 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.

Photo Link Module

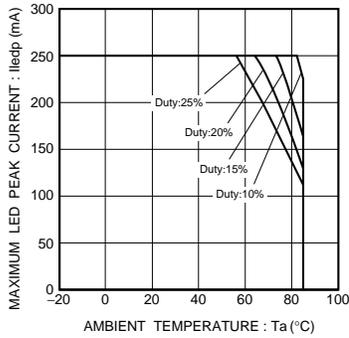
4) Eye safe

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

5) LED current derating and ambient temperature

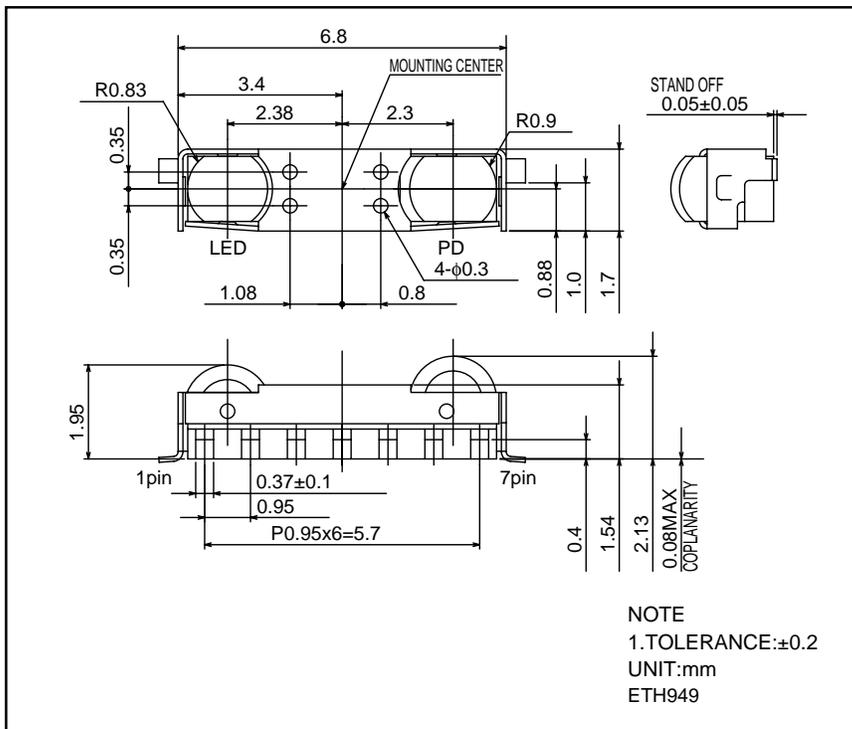
The relation between LED peak current and maximum ambient temperature is shown below.
 We recommend you to use within the range as indicated in below.

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



●Dimensions (Unit : mm)

RPM841-H16



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 which 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.