LVDS Interface ICs

4bit LVDS Receiver

BU90LV048

No.12057EAT03

●Description

LVDS Interface IC of ROHM "Serializer" "Deserializer" operate from 8MHz to 150MHz wide clock range, and number of bits range is from 35 to 70. Data is transmitted seven times (7X) stream and reduce cable number by 3(1/3) or less. The ROHM's LVDS has low swing mode to be able to expect further low EMI.
Driver and Receiver of 4 bits operate to 250MHz. It can be used for a variety of purposes, home appliances such as LCD-TV, business machines such as decoders, instruments, and medical equipment.

●Features

1) >500 Mbps (250 MHz) switching rates
2) Flow-through pinout simplifies PCB layout
3) 150 ps channel-to-channel skew (typical)
4) 100 ps differential skew (typical)
5) 3.7 ns maximum propagation delay
6) 3.3V power supply design
7) 6mA and 8mA selectable output drive strength
8) Accepts small swing (200 mV typical) differential signal levels
9) Supports open, short and terminated input fail-safe
10) Conforms to ANSI/TIA/EIA-644 Standard
11) Industrial temperature operating range (-40℃ to +85℃)

●Applications

Car Navigation System
Copier
Digital TV (Signal System)
FA equipment
Medical equipment
Vending machine, Ticket vending machine

●Precaution

■This chip is not designed to protect from radioactivity.
■This document may be used as strategic technical data which subjects to COCOM regulations.

© 2011 ROHM Co., Ltd. All rights reserved.

Downloaded from Arrow.com.

●Block Diagram

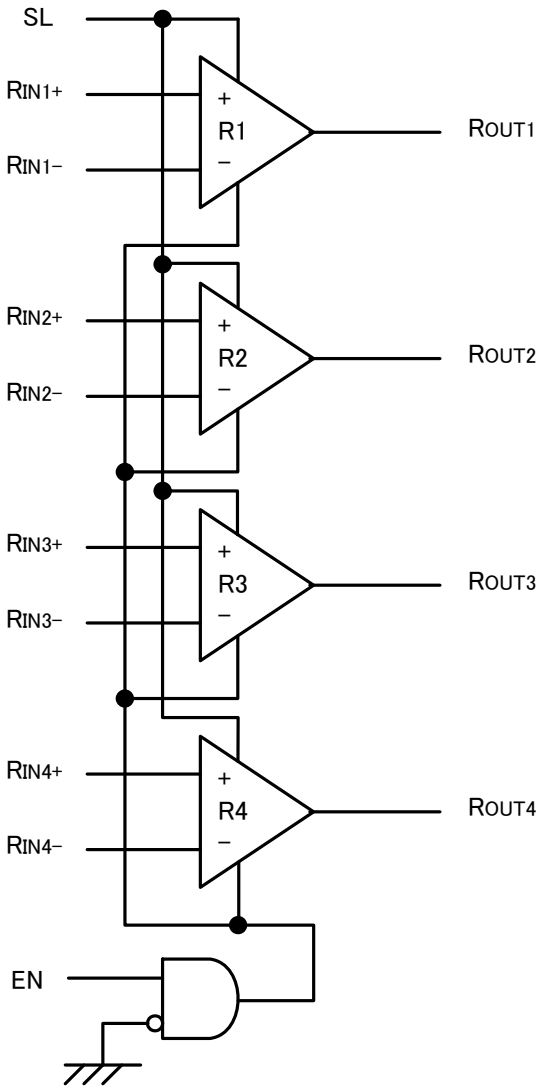


Fig.1. Block Diagram

© 2011 ROHM Co., Ltd. All rights reserved.

Downloaded from Arrow.com.

●SSOP-B16 Package Outline and Specification

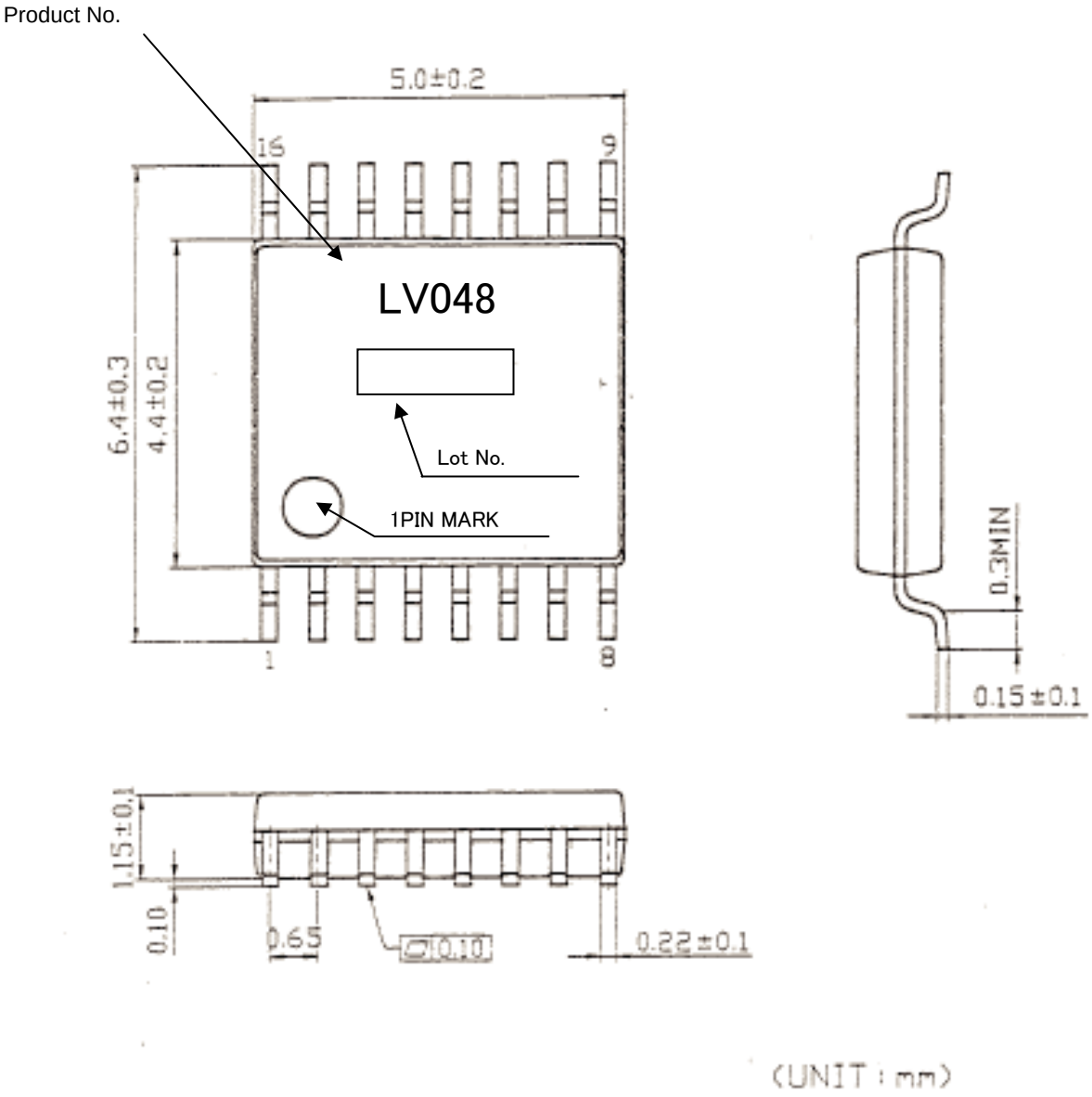


Fig.2. SSOP-B16 Package Outline and Specification

© 2011 ROHM Co., Ltd. All rights reserved.

Downloaded from Arrow.com.

●Pin Configuration

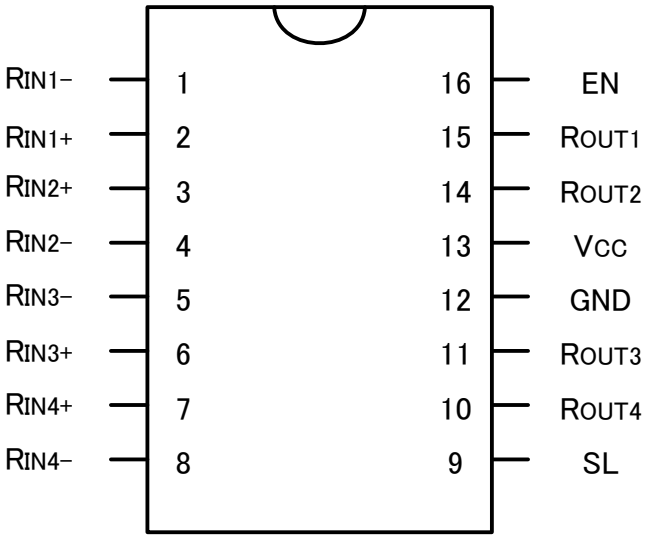


Fig.3. Pin Diagram (Top View)

© 2011 ROHM Co., Ltd. All rights reserved.

Downloaded from Arrow.com.

●Pin Description

Table 1 : Pin Description

Pin Name	Pin No.	Type	Descriptions
RIN+	2, 3, 6, 7	LVDS In	Non-inverting receiver input pin
RIN-	1, 4, 5, 8	LVDS In	Inverting receiver input pin
ROUT	10, 11, 14, 15	LVCMOS Out	Receiver output pin
SL	9	LVCMOS In	Drive strength select pin : When SL is low or open, Rout set 8mA mode. When SL is high, Rout set 6mA mode.
EN	16	LVCMOS In	Receiver enable pin: When EN is Low or open, the receiver is disabled. When EN is high, the receiver is enabled.
VCC	13	Power	Power supply pin, +3.3V±0.3V
GND	12	GND	Ground pin

●Function Description

		INPUT	OUTPUTS	Drive Strength
EN	SL	$R_{IN+} - R_{IN-}$	R_{OUT}	
H	L or Open	VID ≧ 0V	H	8mA
		VID ≦ −0.1V	L	
		Full Fail-safe OPEN/SHORT or Terminated	H	
H	H	VID ≧ 0V	H	6mA
		VID ≦ −0.1V	L	
		Full Fail-safe OPEN/SHORT or Terminated	H	
All other combinations of EN, SL inputs		X	Z	

© 2011 ROHM Co., Ltd. All rights reserved.

Downloaded from Arrow.com.

●Absolute Maximum Ratings

Item	Symbol	Value		Unit
		Min.	Max.	
Supply voltage	VCC	-0.3	4.0	V
Input voltage	VIN	-0.3	VCC+0.3	V
Output voltage	VOUT	-0.3	VCC+0.3	V
Storage temperature range	Tstg	-55	125	℃

●Package Power

Package	PD(mW)	DERATING(mW/℃) ※1
SSOP-B16	400	4.0
	450*2	4.5※2

※1 At temperature Ta > 25℃
※2 Package power when mounting on the PCB board.
The size of PCB board :70×70×1.6（mm^3）
The material of PCB board :The FR4 glass epoxy board.(3% or less copper foil area)

●Recommended Operating Conditions

Item	Symbol	Value			Unit	Condition
		Min.	Typ.	Max.		
Supply voltage	Vcc	3.0	3.3	3.6	V	
Operating temperature range	Topr	-40	-	85	℃	

© 2011 ROHM Co., Ltd. All rights reserved.

Downloaded from Arrow.com.

●DC Characteristics

Parameter	Symbol	Conditions	Pin	Min	Typ	Max	Units
Differential Input High Threshold	V_{TH}	V_{CM} = +1.2V, 0.05V, 2.95V	R_{IN+}, R_{IN-}	-	-	100	mV
Differential Input Low Threshold	V_{TL}			-100	-	-	mV
Common-Mode Voltage Range	VCMR	VID = 200mV pk to pk		0.1	-	2.3	V
Input Current	I_{IN}	V_{IN} = 0 or Vcc		-20	-	+20	μA
Output High Voltage	V_{OH1}	I_{OH} = −8 mA, V_{ID} = +200 mV, SL=low	R_{OUT}	V_{CC}-0.4	-	-	V
Output High Voltage	V_{OH2}	I_{OH} = −6 mA, V_{ID} = +200 mV, SL= high		V_{CC}-0.4	-	-	V
Output Low Voltage	V_{OL1}	I_{OL} = 8 mA, V_{ID} = −200 mV, SL=low		-	-	0.4	V
Output Low Voltage	V_{OL2}	I_{OL} = 6 mA, V_{ID} = −200 mV, SL= high		-	-	0.4	V
Output Short Circuit Current	I_{OS}	Enabled, V_{OUT} = 0V		-15	-80	-	mA
Output 3-STATE Current	I_{OZ}	Disabled, V_{OUT} = 0V or V_{CC}		-10	±1	+10	uA
Input High Voltage	V_{IH}		SL EN	V_{CC} ×0.8	-	V_{CC}	V
Input Low Voltage	V_{IL}			GND	-	V_{CC} ×0.2	V
Input Current	I_I	V_{IN} = 0V or V_{CC}, Other Input = V_{CC} or GND		-10	-	+10	μA
Input Clamp Voltage	V_{CL}	I_{CL} = −18 mA		-1.5	-0.8	-	V
No Load Supply Current Receivers Enabled	I_{CC}	EN = V_{CC}, Inputs Open	V_{CC}	-	1	-	mA
No Load Supply Current Receivers Disabled	I_{CCZ}	EN= GND, SL = GND, Inputs Open		-	0.5	-	mA

© 2011 ROHM Co., Ltd. All rights reserved.

Downloaded from Arrow.com.

●Switching Characteristics

V_{CC} = +3.3V ±0.3V, T_{opr} = -40℃ to +85℃.

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Differential Propagation Delay High to Low	t_{PHLD}	C_L = 15pF V_{ID} = 200mV (Fig.4 and Fig.5)	1.2	2.0	3.7	ns
Differential Propagation Delay Low to High	t_{PLHD}		1.2	1.9	3.7	ns
Differential Pulse Skew $\|t_{PHLD} - t_{PLHD}\|$	t_{SKD1}		0	0.1	0.4	ns
Differential Channel-to-Channel Skew; same device	t_{SKD2}		0	0.15	0.5	ns
Differential Part to Part Skew	t_{SKD3}		-	-	1.0	ns
Differential Part to Part Skew	t_{SKD4}		-	-	1.5	ns
Rise Time	t_{TLH}		-	0.5	1.5	ns
Fall Time	t_{THL}		-	0.5	1.5	ns
Disable Time High to Z	t_{PHZ}	R_L = 2kΩ C_L = 15pF (Fig.6 and Fig.7)	-	8	14	ns
Disable Time Low to Z	t_{PLZ}		-	8	14	ns
Enable Time Z to High	t_{PZH}		-	3	14	ns
Enable Time Z to Low	t_{PZL}		-	9	14	ns
Maximum Operating Frequency	f_{Max}	All Channels Switching	250	-	-	MHz

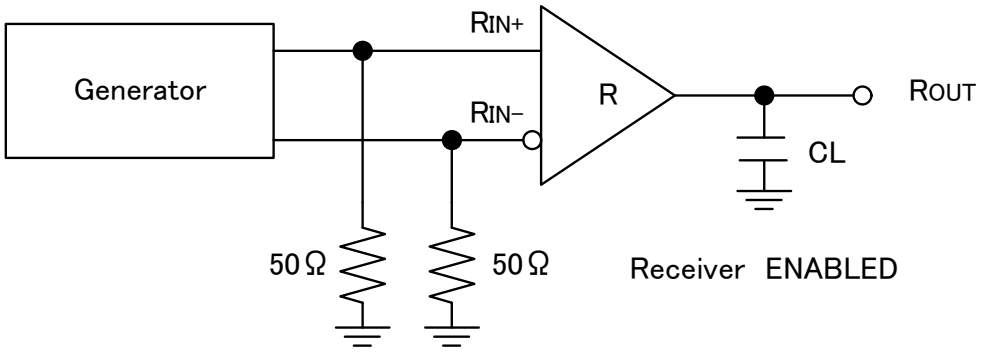


Fig.4. Receiver Propagation Delay and Transition Time Test Circuit

© 2011 ROHM Co., Ltd. All rights reserved.

Downloaded from Arrow.com.

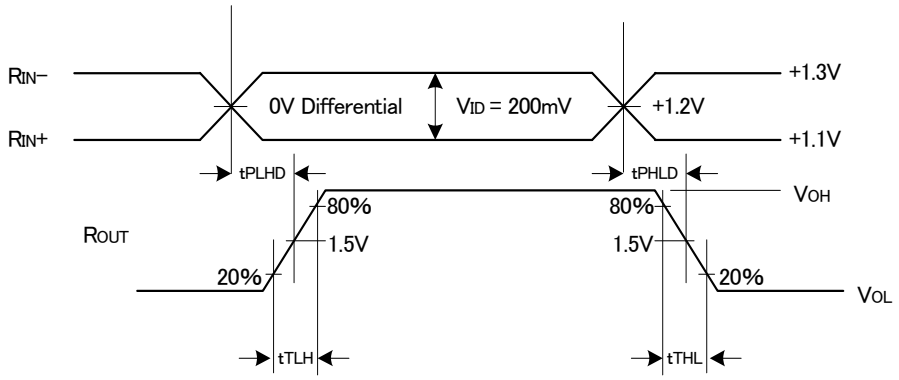


Fig.5. Receiver Propagation Delay and Transition Time Waveforms

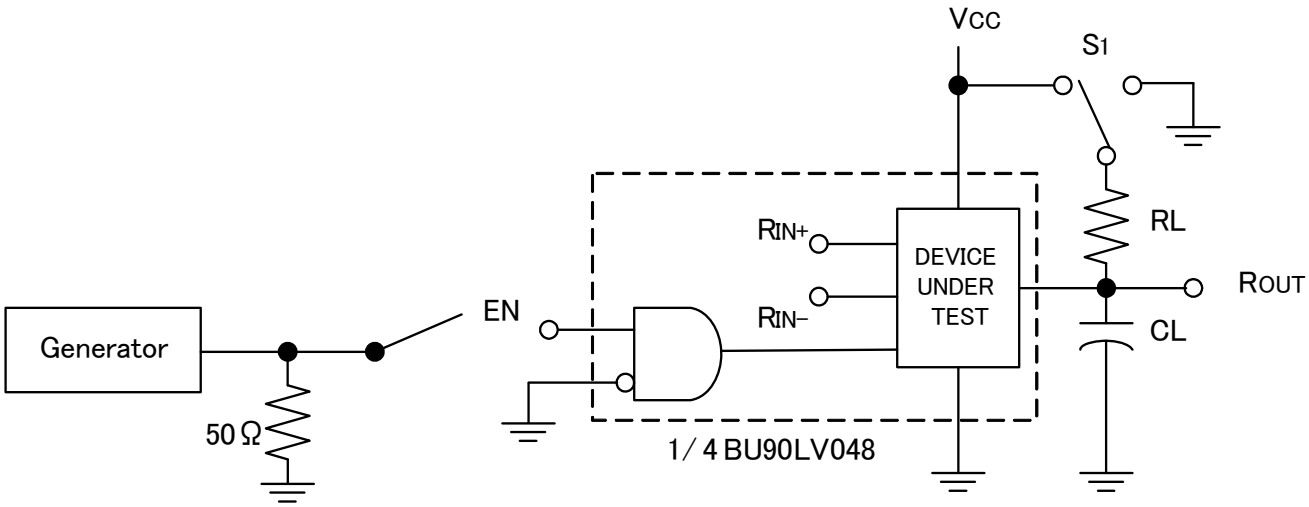


Fig.6. Receiver 3-STATE Delay Test Circuit

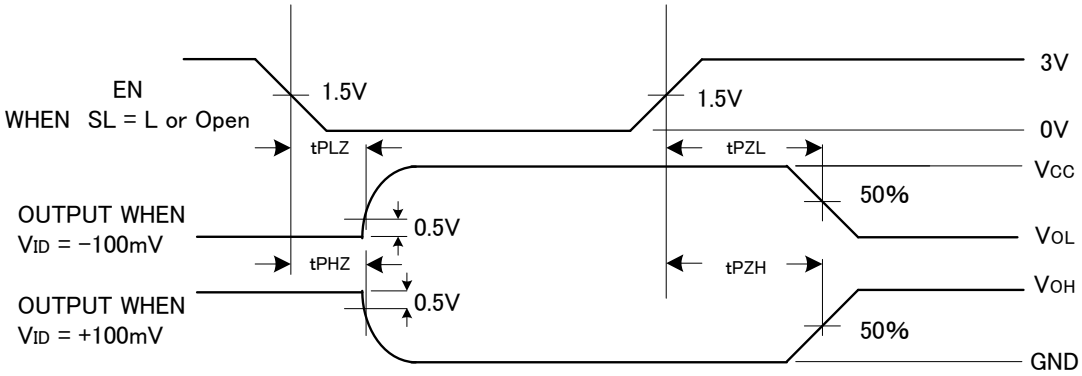


Figure7. Receiver 3-STATE Delay Waveforms

© 2011 ROHM Co., Ltd. All rights reserved.

Downloaded from Arrow.com.

Typical Application

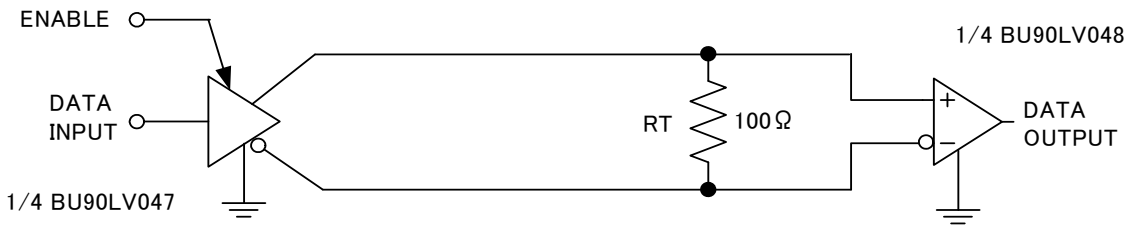


Fig.8. Point-to-Point Application

© 2011 ROHM Co., Ltd. All rights reserved.

Downloaded from Arrow.com.

●Ordering part number

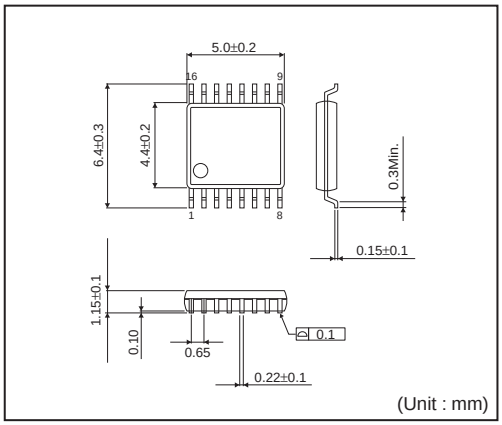
B	U		9	0	L	V	0	4	8	-	E	2

Part No.

Part No.
90LV048 (Package: SSOP-B16)

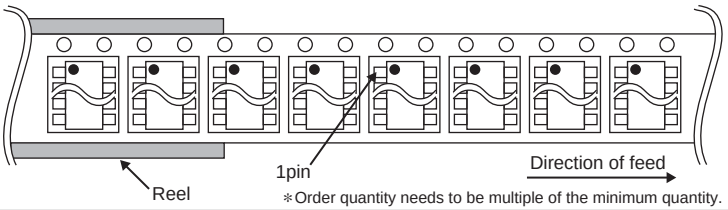
Packaging and forming specification
E2: Embossed tape and reel

SSOP-B16



<Tape and Reel information>

Tape	Embossed carrier tape
Quantity	2500pcs
Direction of feed	E2 (The direction is the 1pin of product is at the upper left when you hold reel on the left hand and you pull out the tape on the right hand)



∗Order quantity needs to be multiple of the minimum quantity.

© 2011 ROHM Co., Ltd. All rights reserved.

Downloaded from Arrow.com.

Notice

Precaution on using ROHM Products

1. Our Products are designed and manufactured for application in ordinary electronic equipments (such as AV equipment, OA equipment, telecommunication equipment, home electronic appliances, amusement equipment, etc.). If you intend to use our Products in devices requiring extremely high reliability (such as medical equipment (Note 1), transport equipment, traffic equipment, aircraft/spacecraft, nuclear power controllers, fuel controllers, car equipment including car accessories, safety devices, etc.) and whose malfunction or failure may cause loss of human life, bodily injury or serious damage to property ("Specific Applications"), please consult with the ROHM sales representative in advance. Unless otherwise agreed in writing by ROHM in advance, ROHM shall not be in any way responsible or liable for any damages, expenses or losses incurred by you or third parties arising from the use of any ROHM's Products for Specific Applications.

(Note1) Medical Equipment Classification of the Specific Applications

JAPAN	USA	EU	CHINA
CLASSⅢ	CLASSⅢ	CLASSⅡb	CLASSⅢ
CLASSⅣ		CLASSⅢ	

2. ROHM designs and manufactures its Products subject to strict quality control system. However, semiconductor products can fail or malfunction at a certain rate. Please be sure to implement, at your own responsibilities, adequate safety measures including but not limited to fail-safe design against the physical injury, damage to any property, which a failure or malfunction of our Products may cause. The following are examples of safety measures:
   [a] Installation of protection circuits or other protective devices to improve system safety
   [b] Installation of redundant circuits to reduce the impact of single or multiple circuit failure

3. Our Products are designed and manufactured for use under standard conditions and not under any special or extraordinary environments or conditions, as exemplified below. Accordingly, ROHM shall not be in any way responsible or liable for any damages, expenses or losses arising from the use of any ROHM's Products under any special or extraordinary environments or conditions. If you intend to use our Products under any special or extraordinary environments or conditions (as exemplified below), your independent verification and confirmation of product performance, reliability, etc, prior to use, must be necessary:
   [a] Use of our Products in any types of liquid, including water, oils, chemicals, and organic solvents
   [b] Use of our Products outdoors or in places where the Products are exposed to direct sunlight or dust
   [c] Use of our Products in places where the Products are exposed to sea wind or corrosive gases, including Cl_2, H_2S, NH_3, SO_2, and NO_2
   [d] Use of our Products in places where the Products are exposed to static electricity or electromagnetic waves
   [e] Use of our Products in proximity to heat-producing components, plastic cords, or other flammable items
   [f] Sealing or coating our Products with resin or other coating materials
   [g] Use of our Products without cleaning residue of flux (even if you use no-clean type fluxes, cleaning residue of flux is recommended); or Washing our Products by using water or water-soluble cleaning agents for cleaning residue after soldering
   [h] Use of the Products in places subject to dew condensation

4. The Products are not subject to radiation-proof design.

5. Please verify and confirm characteristics of the final or mounted products in using the Products.

6. In particular, if a transient load (a large amount of load applied in a short period of time, such as pulse. is applied, confirmation of performance characteristics after on-board mounting is strongly recommended. Avoid applying power exceeding normal rated power; exceeding the power rating under steady-state loading condition may negatively affect product performance and reliability.

7. De-rate Power Dissipation (Pd) depending on Ambient temperature (Ta). When used in sealed area, confirm the actual ambient temperature.

8. Confirm that operation temperature is within the specified range described in the product specification.

9. ROHM shall not be in any way responsible or liable for failure induced under deviant condition from what is defined in this document.

Precaution for Mounting / Circuit board design

1. When a highly active halogenous (chlorine, bromine, etc.) flux is used, the residue of flux may negatively affect product performance and reliability.

2. In principle, the reflow soldering method must be used; if flow soldering method is preferred, please consult with the ROHM representative in advance.

For details, please refer to ROHM Mounting specification

© 2014 ROHM Co., Ltd. All rights reserved.

Downloaded from Arrow.com.

Precautions Regarding Application Examples and External Circuits

1. If change is made to the constant of an external circuit, please allow a sufficient margin considering variations of the characteristics of the Products and external components, including transient characteristics, as well as static characteristics.

2. You agree that application notes, reference designs, and associated data and information contained in this document are presented only as guidance for Products use. Therefore, in case you use such information, you are solely responsible for it and you must exercise your own independent verification and judgment in the use of such information contained in this document. ROHM shall not be in any way responsible or liable for any damages, expenses or losses incurred by you or third parties arising from the use of such information.

Precaution for Electrostatic

This Product is electrostatic sensitive product, which may be damaged due to electrostatic discharge. Please take proper caution in your manufacturing process and storage so that voltage exceeding the Products maximum rating will not be applied to Products. Please take special care under dry condition (e.g. Grounding of human body / equipment / solder iron, isolation from charged objects, setting of Ionizer, friction prevention and temperature / humidity control).

Precaution for Storage / Transportation

1. Product performance and soldered connections may deteriorate if the Products are stored in the places where:
   - [a] the Products are exposed to sea winds or corrosive gases, including Cl2, H2S, NH3, SO2, and NO2
   - [b] the temperature or humidity exceeds those recommended by ROHM
   - [c] the Products are exposed to direct sunshine or condensation
   - [d] the Products are exposed to high Electrostatic

2. Even under ROHM recommended storage condition, solderability of products out of recommended storage time period may be degraded. It is strongly recommended to confirm solderability before using Products of which storage time is exceeding the recommended storage time period.

3. Store / transport cartons in the correct direction, which is indicated on a carton with a symbol. Otherwise bent leads may occur due to excessive stress applied when dropping of a carton.

4. Use Products within the specified time after opening a humidity barrier bag. Baking is required before using Products of which storage time is exceeding the recommended storage time period.

Precaution for Product Label

QR code printed on ROHM Products label is for ROHM's internal use only.

Precaution for Disposition

When disposing Products please dispose them properly using an authorized industry waste company.

Precaution for Foreign Exchange and Foreign Trade act

Since our Products might fall under controlled goods prescribed by the applicable foreign exchange and foreign trade act, please consult with ROHM representative in case of export.

Precaution Regarding Intellectual Property Rights

1. All information and data including but not limited to application example contained in this document is for reference only. ROHM does not warrant that foregoing information or data will not infringe any intellectual property rights or any other rights of any third party regarding such information or data. ROHM shall not be in any way responsible or liable for infringement of any intellectual property rights or other damages arising from use of such information or data.:

2. No license, expressly or implied, is granted hereby under any intellectual property rights or other rights of ROHM or any third parties with respect to the information contained in this document.

Other Precaution

1. This document may not be reprinted or reproduced, in whole or in part, without prior written consent of ROHM.

2. The Products may not be disassembled, converted, modified, reproduced or otherwise changed without prior written consent of ROHM.

3. In no event shall you use in any way whatsoever the Products and the related technical information contained in the Products or this document for any military purposes, including but not limited to, the development of mass-destruction weapons.

4. The proper names of companies or products described in this document are trademarks or registered trademarks of ROHM, its affiliated companies or third parties.

© 2014 ROHM Co., Ltd. All rights reserved.

Downloaded from Arrow.com.

General Precaution

1. Before you use our Products, you are requested to carefully read this document and fully understand its contents. ROHM shall not be in any way responsible or liable for failure, malfunction or accident arising from the use of any ROHM's Products against warning, caution or note contained in this document.

2. All information contained in this document is current as of the issuing date and subject to change without any prior notice. Before purchasing or using ROHM's Products, please confirm the latest information with a ROHM sales representative.

3. The information contained in this document is provided on an "as is" basis and ROHM does not warrant that all information contained in this document is accurate and/or error-free. ROHM shall not be in any way responsible or liable for any damages, expenses or losses incurred by you or third parties resulting from inaccuracy or errors of or concerning such information.

© 2014 ROHM Co., Ltd. All rights reserved.

Downloaded from Arrow.com.