

## LVDS Interface ICs

# 4bit LVDS Driver



BU90LV047A

No.12057EAT02

**●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) 300 ps typical differential skew
- 4) 400 ps maximum differential skew
- 5) 2.8 ns maximum propagation delay
- 6) 3.3V power supply design
- 7)  $\pm 200\text{mV}$  and  $\pm 350\text{mV}$  Selectable differential signaling
- 8) Interoperable with existing 5V LVDS receivers
- 9) High impedance on LVDS outputs on power down
- 10) Conforms to TIA/EIA-644 LVDS Standard
- 11) Industrial operating temperature range ( $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ )

**●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.

●Block Diagram

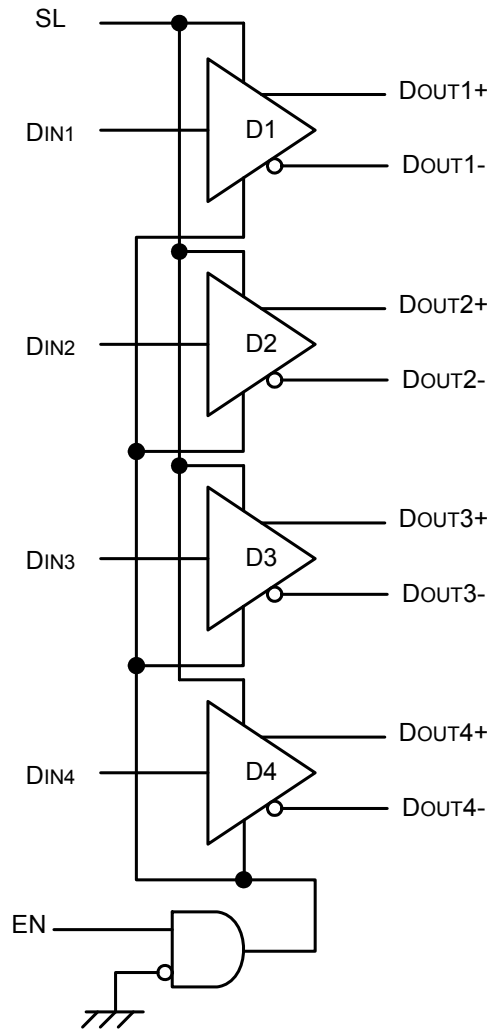
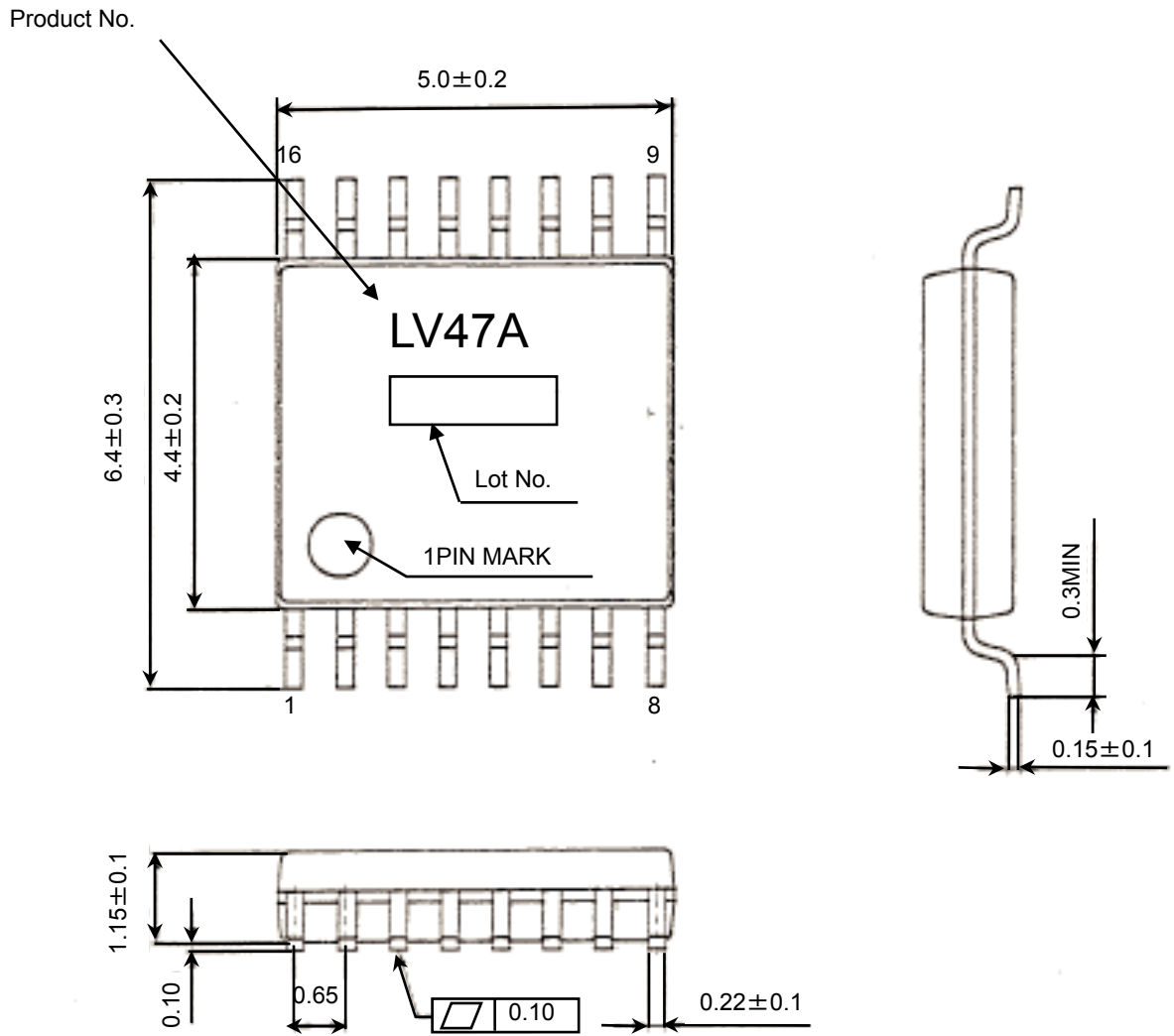


Fig.1. Block Diagram

●SSOP-B16 Package Outline and Specification



(UNIT:mm)

Fig.2. SSOP-B16 Package Outline and Specification

●Pin Configuration

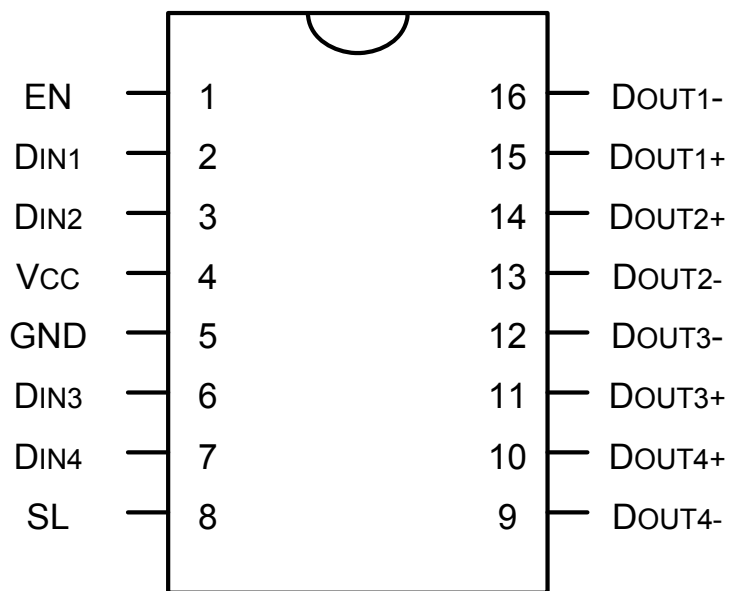


Fig.3. Pin Diagram (Top View)

## ●Pin Description

Table 1 : Pin Description

Pin Name	Pin No.	Type	Descriptions
DIN	2, 3, 6, 7	LVC MOS In	Driver input pin, LVC MOS compatible
DOUT+	10, 11, 14, 15	LVDS Out	Non-inverting driver output pin, LVDS levels
DOUT-	9, 12, 13, 16	LVDS Out	Inverting driver output pin, LVDS levels
SL	8	LVC MOS In	Swing Level select pin : When SL is high, the driver is reduce swing level (200mV). When SL is low or open, the driver is normal swing level (350mV).
EN	1	LVC MOS In	Driver enable pin: When EN is low or open, the driver is disabled. When EN is high, the driver is enabled.
VCC	4	Power	Power supply pin, 3.3V±0.3V
GND	5	GND	Ground pin

## ●Function Description

		INPUT	OUTPUTS		Swing Level
EN	SL	DIN	DOUT+	DOUT-	
H	L or Open	L	L	H	350mV
		H	H	L	
H	H	L	L	H	200mV
		H	H	L	
All other combinations of EN, SL inputs		X	Z	Z	

### ●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	VOOUT	-0.3	VCC+0.3	V
Storage temperature range	Tstg	-55	125	°C

### ●Package Power

Package	PD(mW)	DERATING(mW/°C) ※1
SSOP-B16	400	4.0
	450 <sup>*2</sup>	4.5 <sup>*2</sup>

※1 At temperature Ta > 25°C

※2 Package power when mounting on the PCB board.

The size of PCB board :70 × 70 × 1.6 (mm<sup>3</sup>)

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	°C	

## ●DC Characteristics

Parameter	Symbol	Conditions	Pin	Min	Typ	Max	Units
Differential Output Voltage	$V_{OD1}$	SL = GND, $R_L = 100\ \Omega$ (Fig.4)	D <sub>OUT-</sub> D <sub>OUT+</sub>	250	350	450	mV
Output High Voltage	$V_{OH1}$			-	1.42	1.6	V
Output Low Voltage	$V_{OL1}$			0.90	1.08	-	V
Differential Output Voltage	$V_{OD2}$	SL = $V_{CC}$ , $R_L = 100\ \Omega$ (Fig.4)		120	200	300	mV
Output High Voltage	$V_{OH2}$			-	1.35	1.50	V
Output Low Voltage	$V_{OL2}$			1.00	1.15	-	V
Change in Magnitude of $V_{OD}$ for Complementary Output States	$\Delta V_{OD}$	SL = $V_{CC}$ or GND, $R_L = 100\ \Omega$ (Fig.4)		-	1	35	mV
Offset Voltage	$V_{OS}$			1.125	1.25	1.375	V
Change in Magnitude of $V_{OS}$ for Complementary Output States	$\Delta V_{OS}$			-	1	25	mV
Input High Voltage	$V_{IH}$		D <sub>IN</sub>	$V_{CC} \times 0.8$	-	$V_{CC}$	V
Input Low Voltage	$V_{IL}$	SL		GND	-	$V_{CC} \times 0.2$	V
Input Current	$I_I$	$V_{IN} = 0V$ or $V_{CC}$ , Other Input = $V_{CC}$ or GND	EN	-10	-	+10	$\mu A$
Input Clamp Voltage	$V_{CL}$	$I_{CL} = -18mA$		-1.5	-0.8	-	V
Output Short Circuit Current	$I_{OS}$	ENABLED, D <sub>IN</sub> = $V_{CC}$ , D <sub>OUT+</sub> = 0V or D <sub>IN</sub> = GND, D <sub>OUT-</sub> = 0V	D <sub>OUT-</sub> D <sub>OUT+</sub>	-	-5.4	-9.0	mA
Differential Output Short Circuit Current	$I_{OSD}$	ENABLED, $V_{OD} = 0V$		-	-5.4	-9.0	mA
Power-off Leakage	$I_{OFF}$	$V_{OUT} = 0V$ or 3.6V, $V_{CC} = 0V$ or Open		-20	$\pm 1$	+20	$\mu A$
No Load Supply Current Drivers Enabled	$I_{CC}$	D <sub>IN</sub> = $V_{CC}$ or GND	$V_{CC}$	-	20	-	mA
Load Supply Current Drivers Enabled	$I_{CCL}$	$R_L = 100\ \Omega$ All Channels, D <sub>IN</sub> = $V_{CC}$ or GND (all outputs)		-	20	-	mA
No Load Supply Current Drivers Disabled	$I_{CCZ}$	D <sub>IN</sub> = $V_{CC}$ or GND, EN = GND, SL = GND		-	3	-	mA

●Switching Characteristics

$V_{CC} = +3.3V \pm 0.3V$ ,  $T_{opr} = -40^{\circ}C$  to  $+85^{\circ}C$

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Differential Propagation Delay High to Low	$t_{PHLD}$	$R_L = 100\Omega$ , $C_L = 15pF$ (Fig.5 and Fig.6)	0.5	1.7	2.8	ns
Differential Propagation Delay Low to High	$t_{PLHD}$		0.5	1.7	2.8	ns
Differential Pulse Skew $ t_{PHLD} - t_{PLHD} $	$t_{SKD1}$		0	0.3	0.4	ns
Channel-to-Channel Skew	$t_{SKD2}$		0	0.4	0.5	ns
Differential Part to Part Skew	$t_{SKD3}$		0	-	1.0	ns
Differential Part to Part Skew	$t_{SKD4}$		0	-	1.2	ns
Rise Time	$t_{TLH}$		-	0.5	1.5	ns
Fall Time	$t_{THL}$	-	0.5	1.5	ns	
Disable Time High to Z	$t_{PHZ}$	$R_L = 100\Omega$ , $C_L = 15pF$ (Fig.7 and Fig.8)	-	2	5	ns
Disable Time Low to Z	$t_{PLZ}$		-	2	5	ns
Enable Time Z to High	$t_{PZH}$		-	3	7	ns
Enable Time Z to Low	$t_{PZL}$		-	3	7	ns
Maximum Operating Frequency	$f_{Max}$		250	-	-	MHz

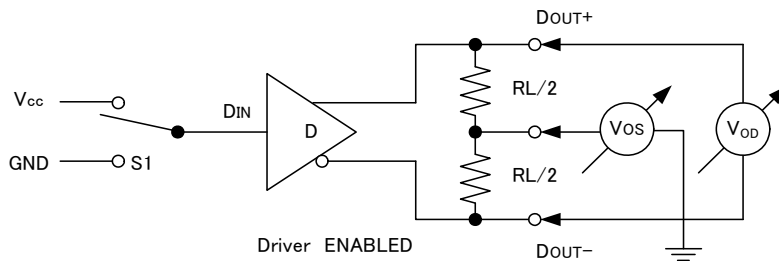


Fig.4. Driver VOD and VOS Test Circuit

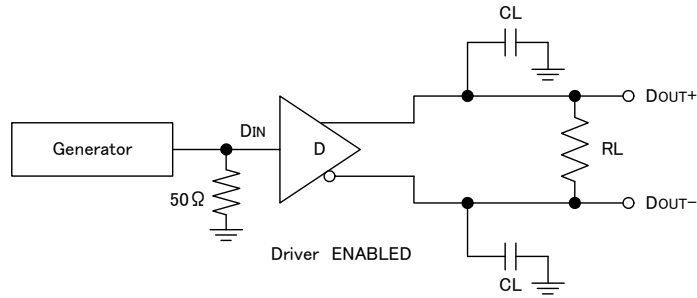


Fig.5. Driver Propagation Delay and Transition Time Test Circuit

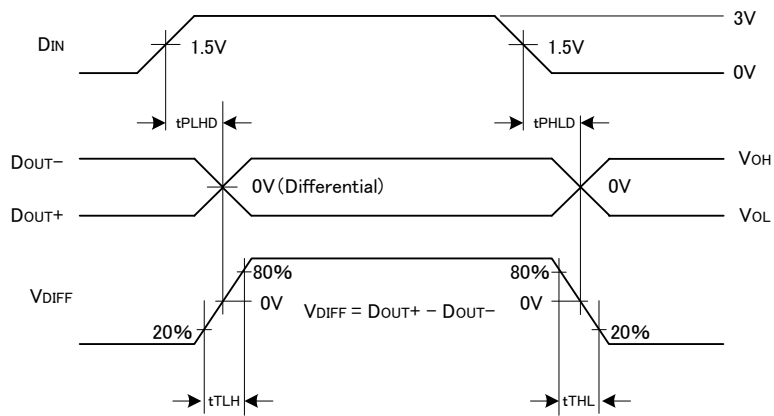


Fig.6. Driver Propagation Delay and Transition Time Waveforms

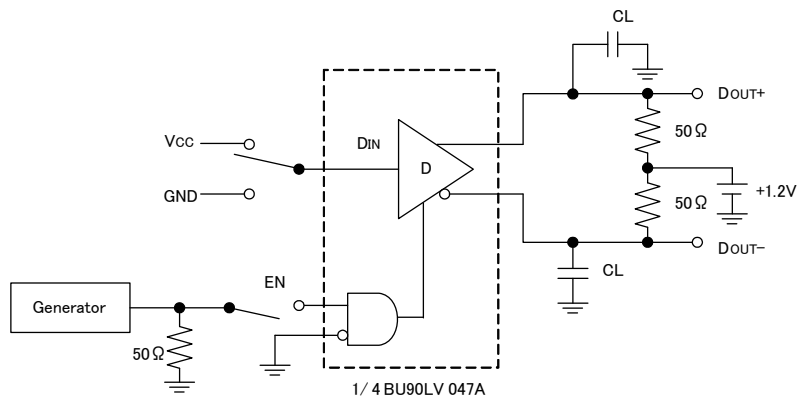


Fig.7. Driver 3-STATE Delay Test Circuit

Parameter Measurement Information (Continued)

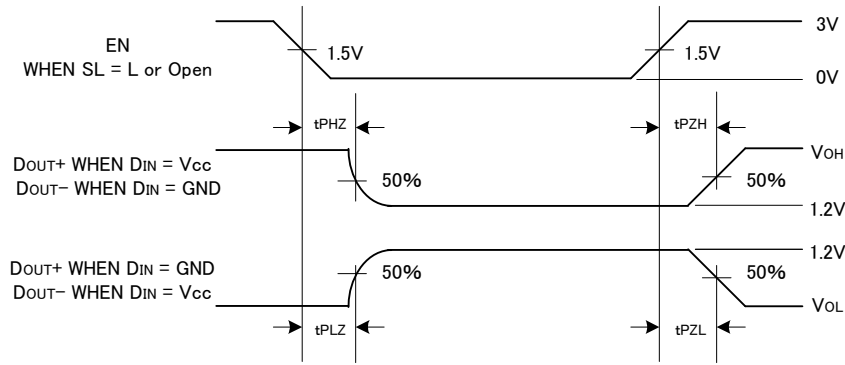


Fig.8. Driver 3-STATE Delay Waveform

Typical Application

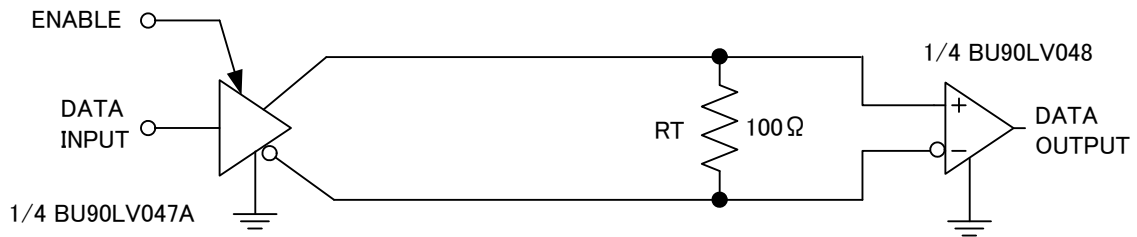


Fig.9. Point-to-Point Application

Typical Application (Continued)

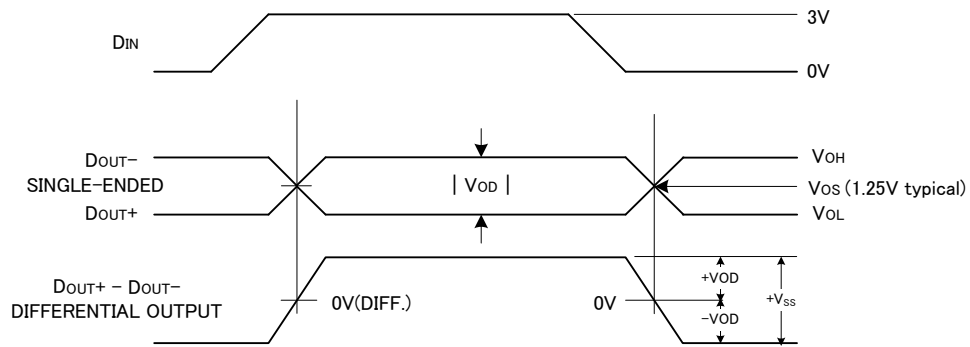


Fig.10. Driver Output Levels

●Ordering part number

B	U
---	---

Part No.

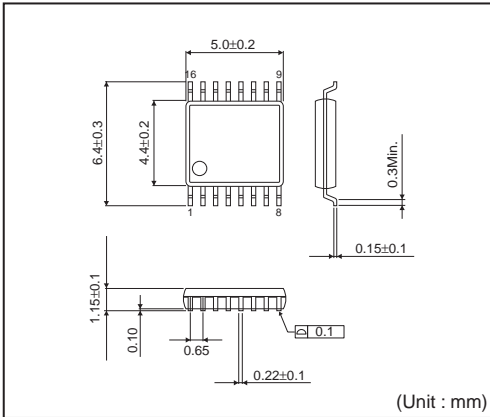
9	0	L	V	0	4	7	A
---	---	---	---	---	---	---	---

Part No.  
90LV047A (Package: SSOP-B16)

E	2
---	---

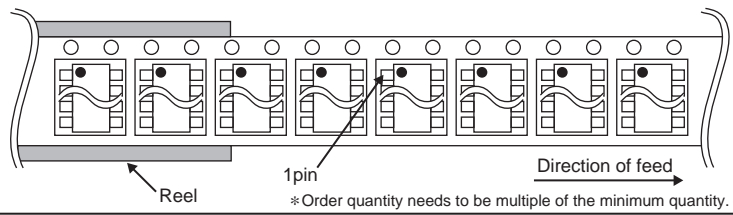
Packaging and forming specification  
E2: Embossed tape and reel

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 )



## Notes

No copying or reproduction of this document, in part or in whole, is permitted without the consent of ROHM Co.,Ltd.

The content specified herein is subject to change for improvement without notice.

The content specified herein is for the purpose of introducing ROHM's products (hereinafter "Products"). If you wish to use any such Product, please be sure to refer to the specifications, which can be obtained from ROHM upon request.

Examples of application circuits, circuit constants and any other information contained herein illustrate the standard usage and operations of the Products. The peripheral conditions must be taken into account when designing circuits for mass production.

Great care was taken in ensuring the accuracy of the information specified in this document. However, should you incur any damage arising from any inaccuracy or misprint of such information, ROHM shall bear no responsibility for such damage.

The technical information specified herein is intended only to show the typical functions of and examples of application circuits for the Products. ROHM does not grant you, explicitly or implicitly, any license to use or exercise intellectual property or other rights held by ROHM and other parties. ROHM shall bear no responsibility whatsoever for any dispute arising from the use of such technical information.

The Products specified in this document are intended to be used with general-use electronic equipment or devices (such as audio visual equipment, office-automation equipment, communication devices, electronic appliances and amusement devices).

The Products specified in this document are not designed to be radiation tolerant.

While ROHM always makes efforts to enhance the quality and reliability of its Products, a Product may fail or malfunction for a variety of reasons.

Please be sure to implement in your equipment using the Products safety measures to guard against the possibility of physical injury, fire or any other damage caused in the event of the failure of any Product, such as derating, redundancy, fire control and fail-safe designs. ROHM shall bear no responsibility whatsoever for your use of any Product outside of the prescribed scope or not in accordance with the instruction manual.

The Products are not designed or manufactured to be used with any equipment, device or system which requires an extremely high level of reliability the failure or malfunction of which may result in a direct threat to human life or create a risk of human injury (such as a medical instrument, transportation equipment, aerospace machinery, nuclear-reactor controller, fuel-controller or other safety device). ROHM shall bear no responsibility in any way for use of any of the Products for the above special purposes. If a Product is intended to be used for any such special purpose, please contact a ROHM sales representative before purchasing.

If you intend to export or ship overseas any Product or technology specified herein that may be controlled under the Foreign Exchange and the Foreign Trade Law, you will be required to obtain a license or permit under the Law.



Thank you for your accessing to ROHM product informations.  
More detail product informations and catalogs are available, please contact us.

## ROHM Customer Support System

<http://www.rohm.com/contact/>