

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°C to +85°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

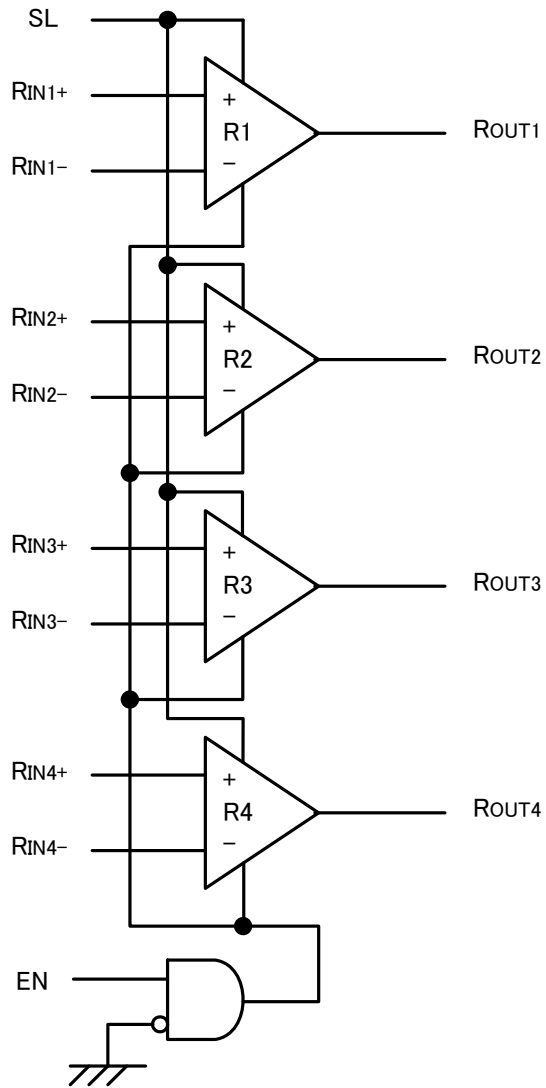


Fig.1. Block Diagram

●SSOP-B16 Package Outline and Specification

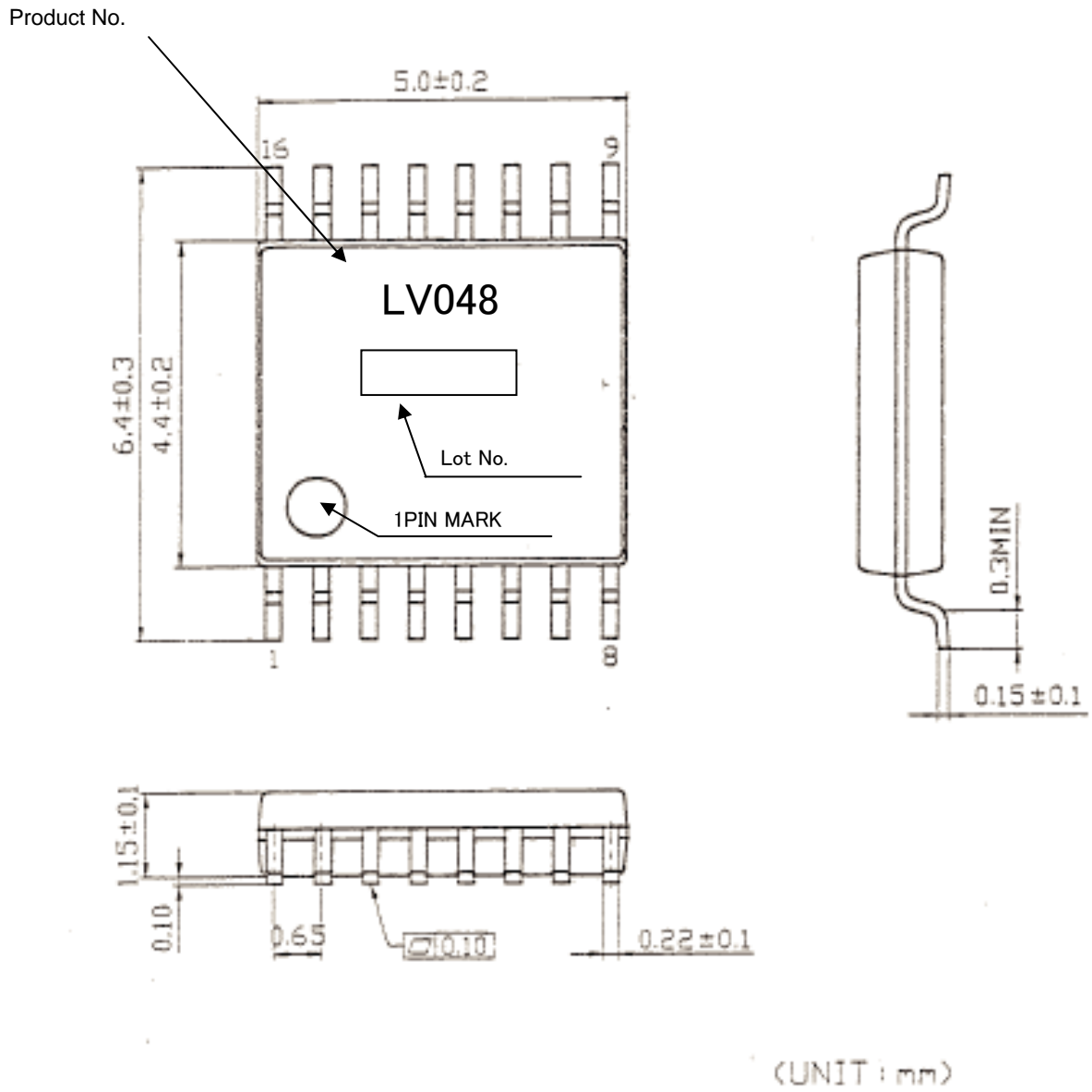


Fig.2. SSOP-B16 Package Outline and Specification

## ● Pin Configuration

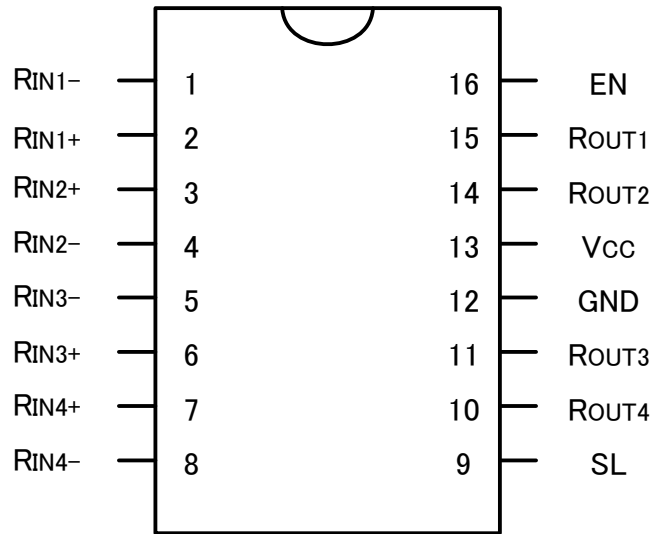


Fig.3. Pin Diagram (Top View)

## ●Pin Description

Table 1 : Pin Description

Pin Name	Pin No.	Type	Descriptions
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	LVC MOS Out	Receiver output pin
SL	9	LVC MOS 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	LVC MOS 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 <sub>IN+</sub> - R <sub>IN-</sub>	R <sub>OUT</sub>	
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	

## ●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	°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 Input High Threshold	$V_{TH}$	$V_{CM} = +1.2V, 0.05V, 2.95V$	$R_{IN+}$	-	-	100	mV
Differential Input Low Threshold	$V_{TL}$		$R_{IN-}$	-100	-	-	mV
Common-Mode Voltage Range	VCMR	$V_{ID} = 200mV$ pk to pk		0.1	-	2.3	V
Input Current	$I_{IN}$	$V_{IN} = 0$ or $V_{CC}$		-20	-	+20	$\mu A$
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	$\pm 1$	+10	$\mu A$
Input High Voltage	$V_{IH}$		SL	$V_{CC} \times 0.8$	-	$V_{CC}$	V
Input Low Voltage	$V_{IL}$		EN	GND	-	$V_{CC} \times 0.2$	V
Input Current	$I_I$	$V_{IN} = 0V$ or $V_{CC}$ , Other Input = $V_{CC}$ or GND		-10	-	+10	$\mu A$
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

●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	$t_{PHLD}$	$C_L = 15pF$ $V_{ID} = 200mV$ (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	$t_{PHZ}$	$R_L = 2k\Omega$ $C_L = 15pF$ (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

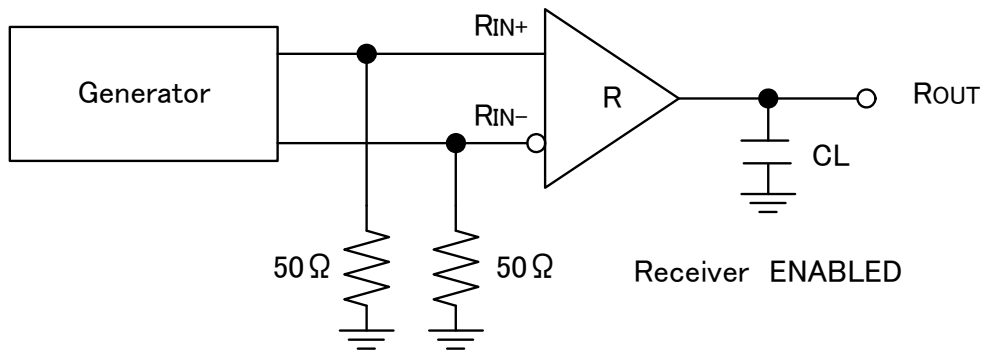


Fig.4. Receiver Propagation Delay and Transition Time Test Circuit



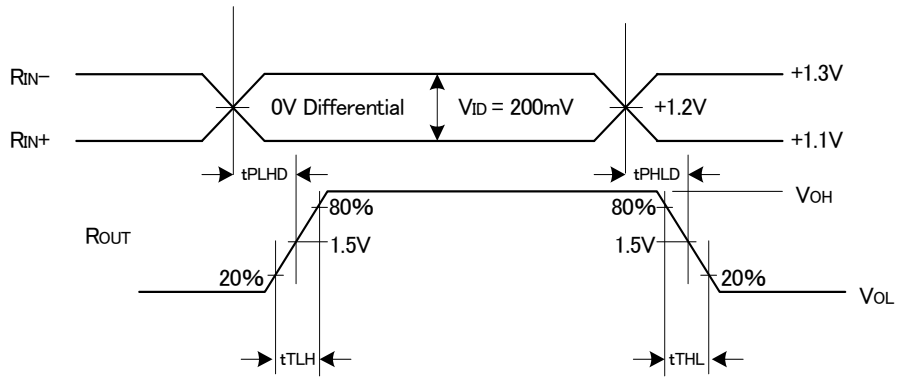


Fig.5. Receiver Propagation Delay and Transition Time Waveforms

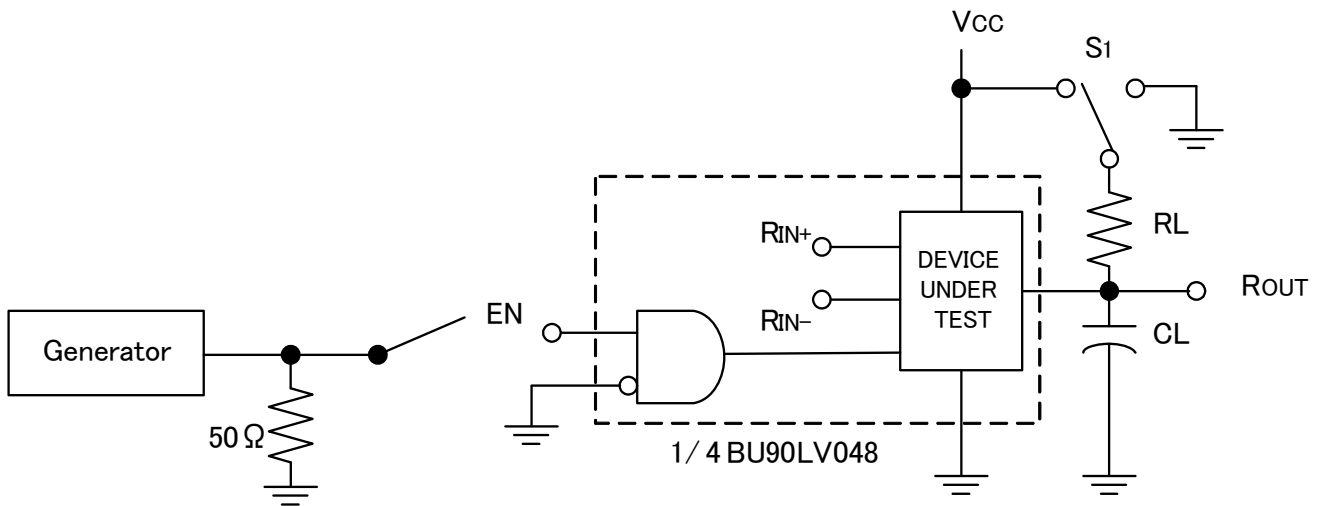


Fig.6. Receiver 3-STATE Delay Test Circuit

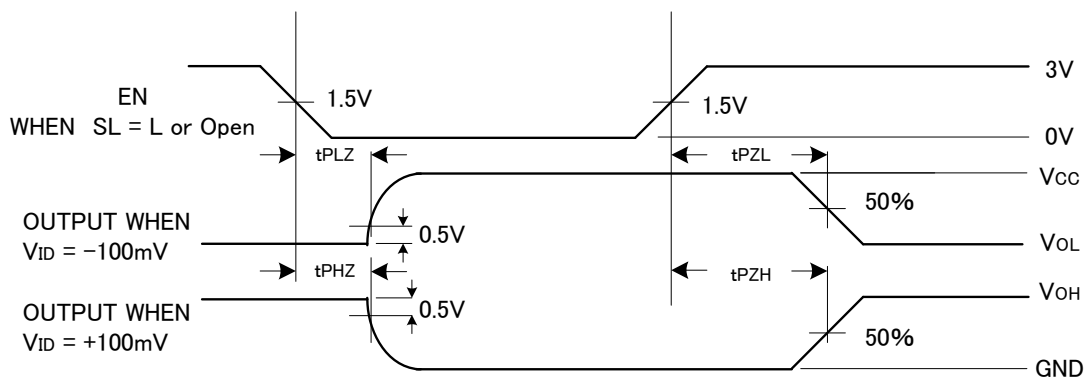


Figure7. Receiver 3-STATE Delay Waveforms

Typical Application

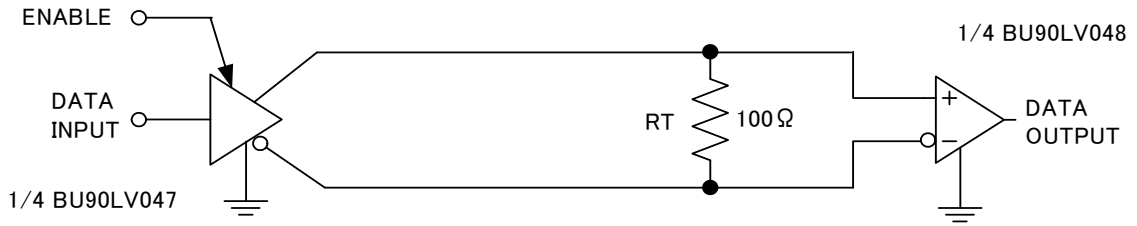
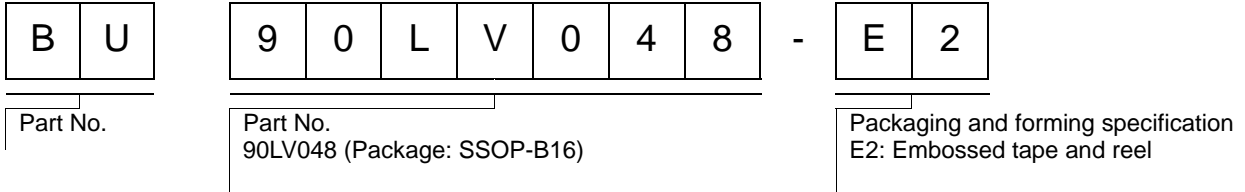
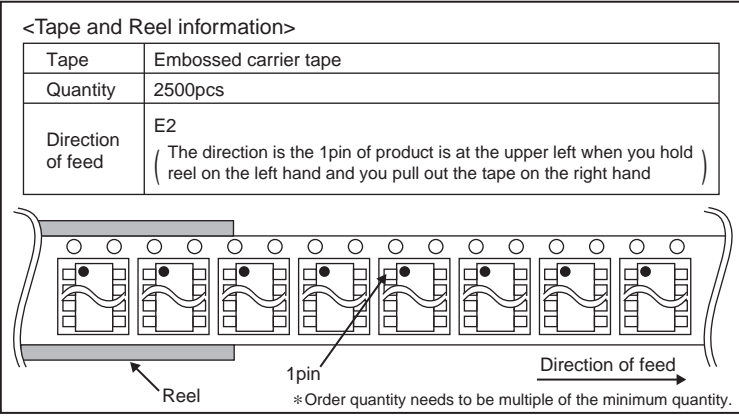
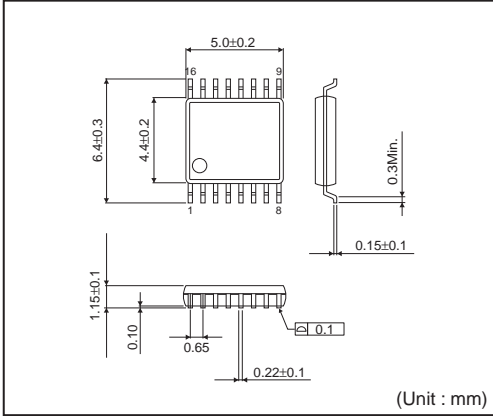


Fig.8. Point-to-Point Application

●Ordering part number



SSOP-B16



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(Note1) Medical Equipment Classification of the Specific Applications

JAPAN	USA	EU	CHINA
CLASS III	CLASS III	CLASS II b	CLASS III
CLASS IV		CLASS III	

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  - Use of our Products in proximity to heat-producing components, plastic cords, or other flammable items
  - Sealing or coating our Products with resin or other coating materials
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  - Use of the Products in places subject to dew condensation
- The Products are not subject to radiation-proof design.
- Please verify and confirm characteristics of the final or mounted products in using the Products.
- 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.
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- Confirm that operation temperature is within the specified range described in the product specification.
- 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

- When a highly active halogenous (chlorine, bromine, etc.) flux is used, the residue of flux may negatively affect product performance and reliability.
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For details, please refer to ROHM Mounting specification

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  - [b] the temperature or humidity exceeds those recommended by ROHM
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  - [d] the Products are exposed to high Electrostatic
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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.

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Part Number	BU90LV048
Package	SSOP-B16
Unit Quantity	2500
Minimum Package Quantity	2500
Packing Type	Taping
Constitution Materials List	inquiry
RoHS	Yes