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) ±200mV and ±350mV 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℃ 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.

●Block Diagram

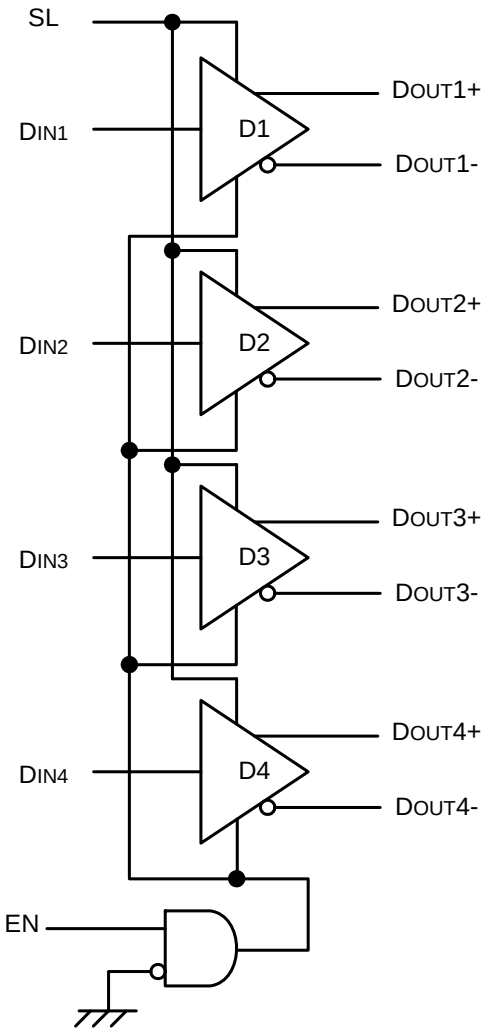


Fig.1. Block Diagram

●SSOP-B16 Package Outline and Specification

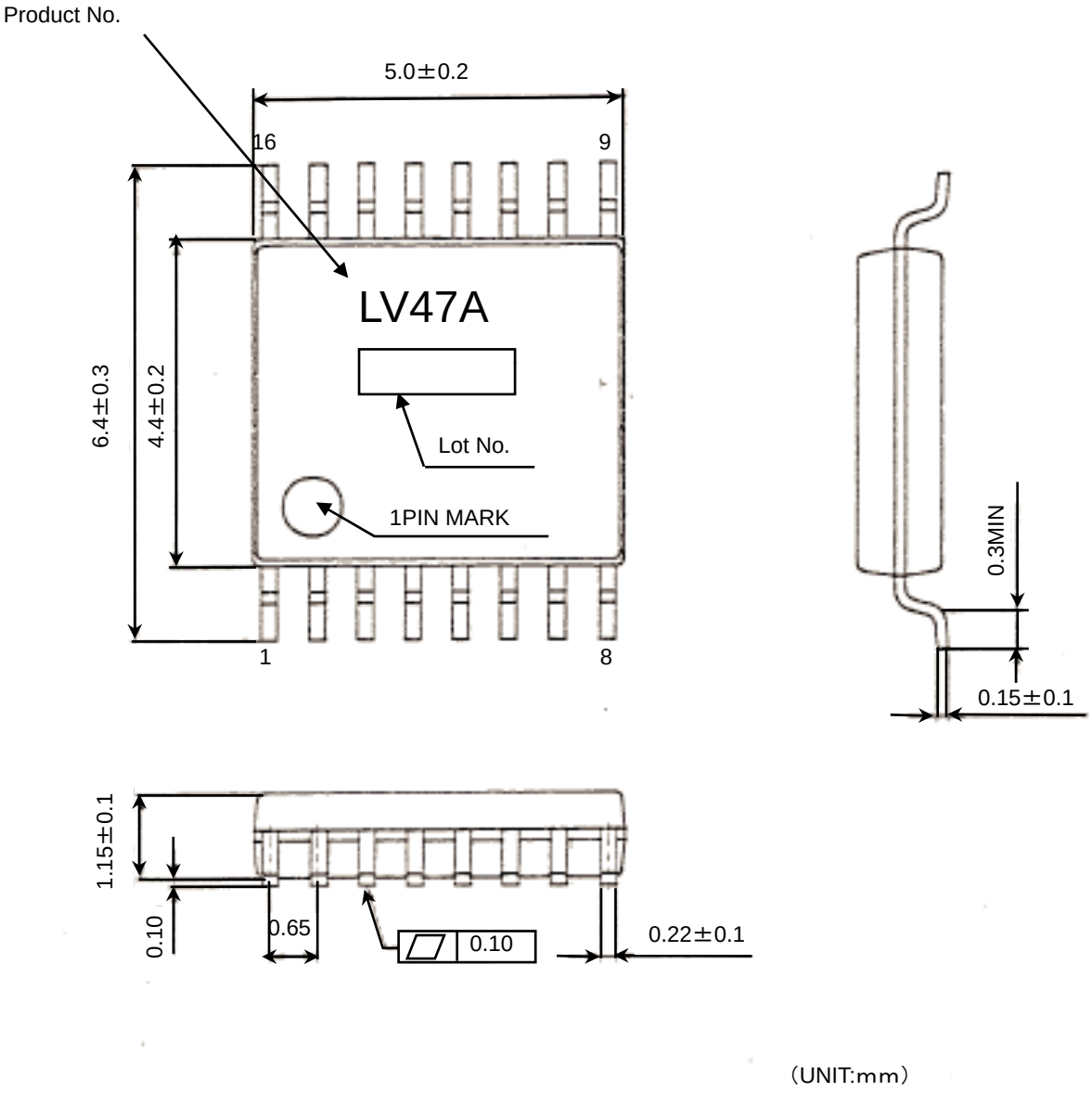


Fig.2. SSOP-B16 Package Outline and Specification

●Pin Configuration

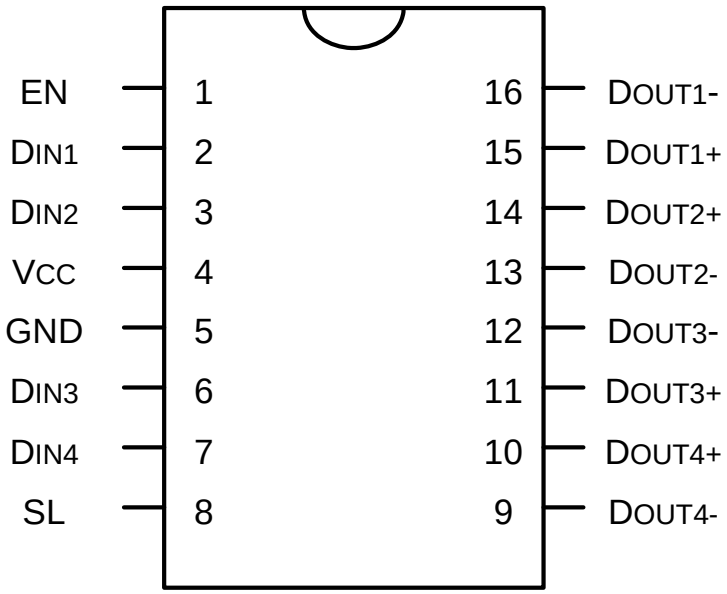


Fig.3. Pin Diagram (Top View)

●Pin Description

Table 1 : Pin Description

Pin Name	Pin No.	Type	Descriptions
DIN	2, 3, 6, 7	LVCMOS In	Driver input pin, LVCMOS 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	LVCMOS 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	LVCMOS 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	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	℃	

●DC Characteristics

Parameter	Symbol	Conditions	Pin	Min	Typ	Max	Units
Differential Output Voltage	V_{OD1}	SL= GND, R_L = 100Ω (Fig.4)	D_{OUT-} D_{OUT+}	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 = 100Ω (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	ΔV_{OD}	SL = V_{CC} or GND, R_L = 100Ω (Fig.4)		-	1	35	|mV|
Offset Voltage	V_{OS}			1.125	1.25	1.375	V
Change in Magnitude of Vos for Complementary Output States	ΔV_{OS}			-	1	25	|mV|
Input High Voltage	V_{IH}		$D_{IN,}$	V_{CC} ×0.8	-	V_{CC}	V
Input Low Voltage	V_{IL}		SL	GND	-	V_{CC} ×0.2	V
Input Current	I_I	V_{IN} = 0V or V_{CC}, Other Input = V_{CC} or GND	EN	-10	-	+10	μA
Input Clamp Voltage	V_{CL}	I_{CL} = -18mA		-1.5	-0.8	-	V
Output Short Circuit Current	I_{OS}	ENABLED, D_{IN} = V_{CC}, D_{OUT+} = 0V or D_{IN} = GND, D_{OUT-} = 0V	D_{OUT-} D_{OUT+}	-	-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	±1	+20	μA
No Load Supply Current Drivers Enabled	I_{CC}	D_{IN} = V_{CC} or GND	V_{CC}	-	20	-	mA
Load Supply Current Drivers Enabled	I_{CCL}	R_L = 100Ω All Channels, D_{IN} = V_{CC} or GND (all outputs)		-	20	-	mA
No Load Supply Current Drivers Disabled	I_{CCZ}	D_{IN} = V_{CC} or GND, EN = GND, SL = GND		-	3	-	mA

●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}	R_L = 100Ω, 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 = 100Ω, 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

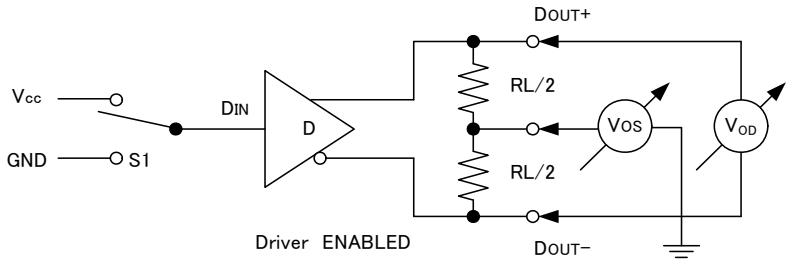


Fig.4. Driver VOD and VOS Test Circuit

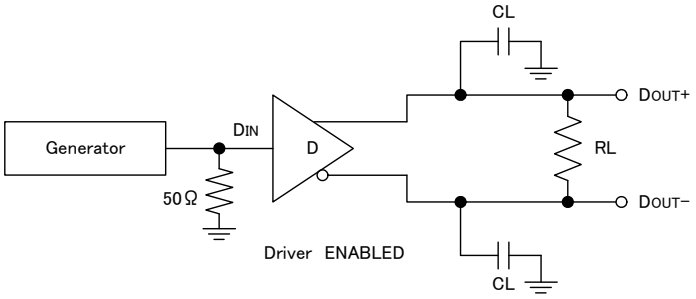


Fig.5. Driver Propagation Delay and Transition Time Test Circuit

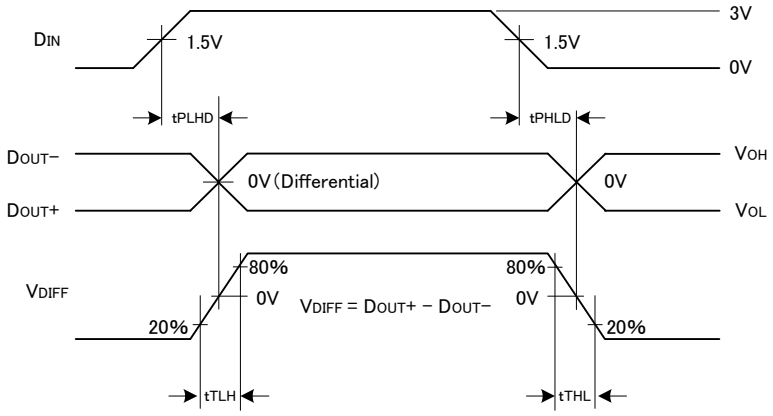


Fig.6. Driver Propagation Delay and Transition Time Waveforms

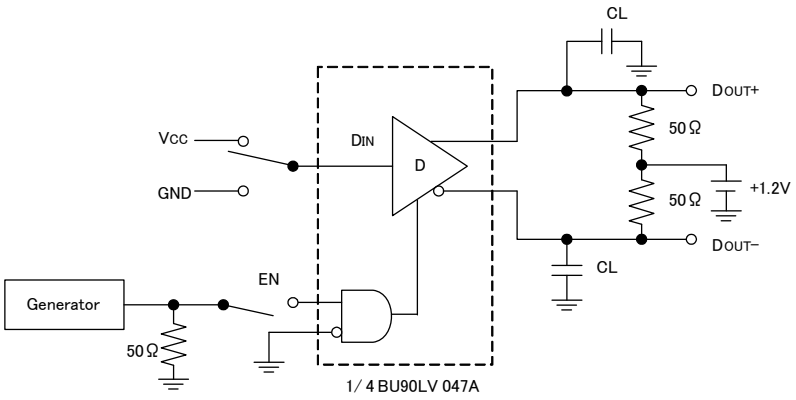


Fig.7. Driver 3-STATE Delay Test Circuit

Parameter Measurement Information (Continued)

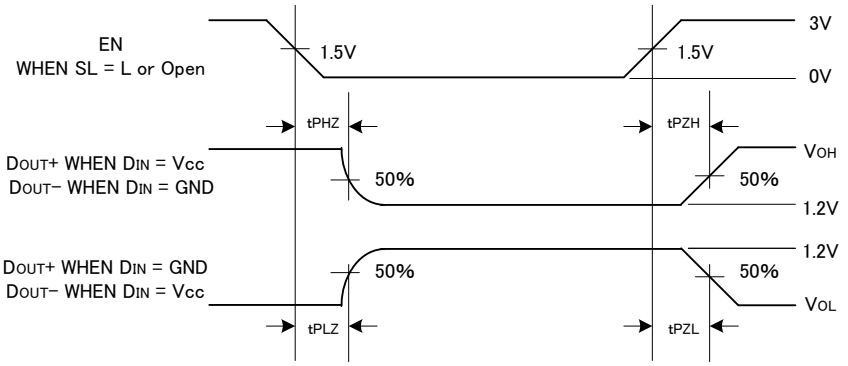


Fig.8. Driver 3-STATE Delay Waveform

Typical Application

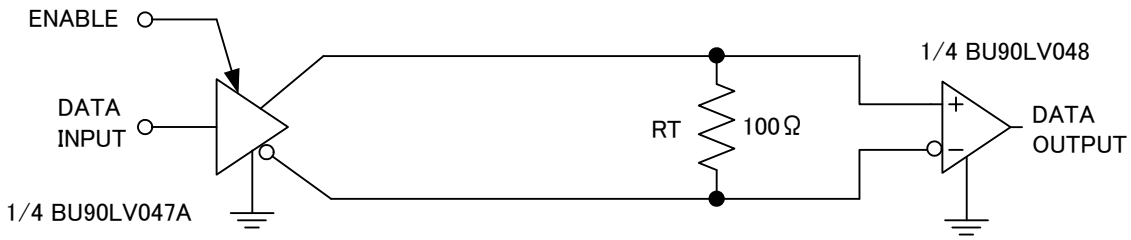


Fig.9. Point-to-Point Application

Typical Application (Continued)

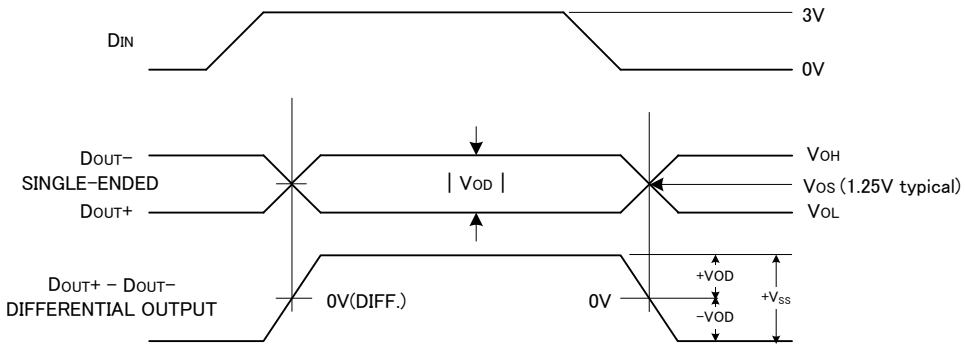


Fig.10. Driver Output Levels

●Ordering part number

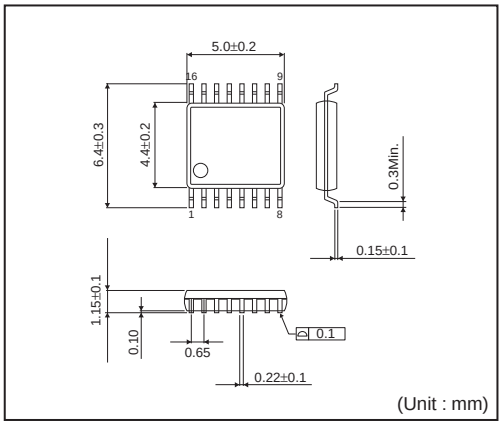
B	U	9	0	L	V	0	4	7	A	-	E	2

Part No.

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

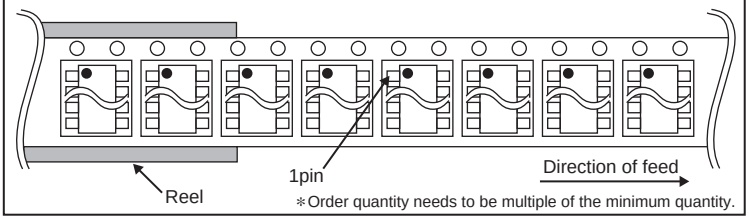
Packaging and forming specification
E2: Embossed tape and reel

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.

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(Note1) Medical Equipment Classification of the Specific Applications

JAPAN	USA	EU	CHINA
CLASSⅢ	CLASSⅢ	CLASSⅡb	CLASSⅢ
CLASSⅣ		CLASSⅢ	

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   [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

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.

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