

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°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

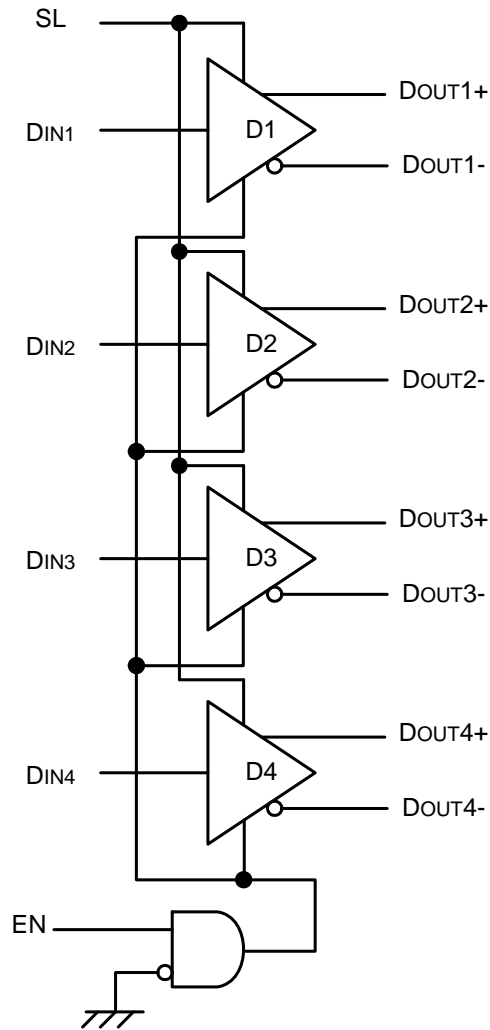
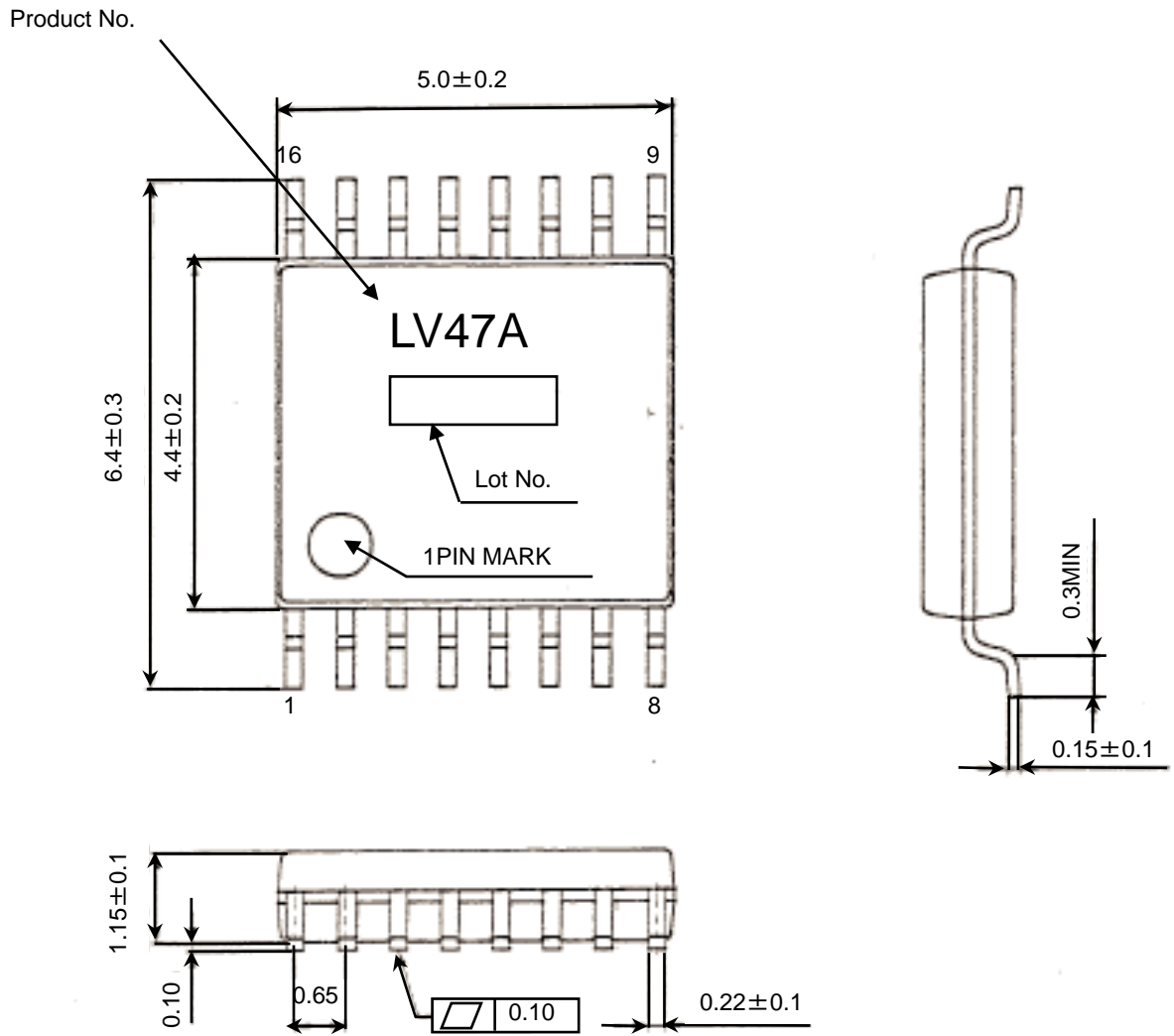


Fig.1. Block Diagram

●SSOP-B16 Package Outline and Specification



(UNIT:mm)

Fig.2. SSOP-B16 Package Outline and Specification

●Pin Configuration

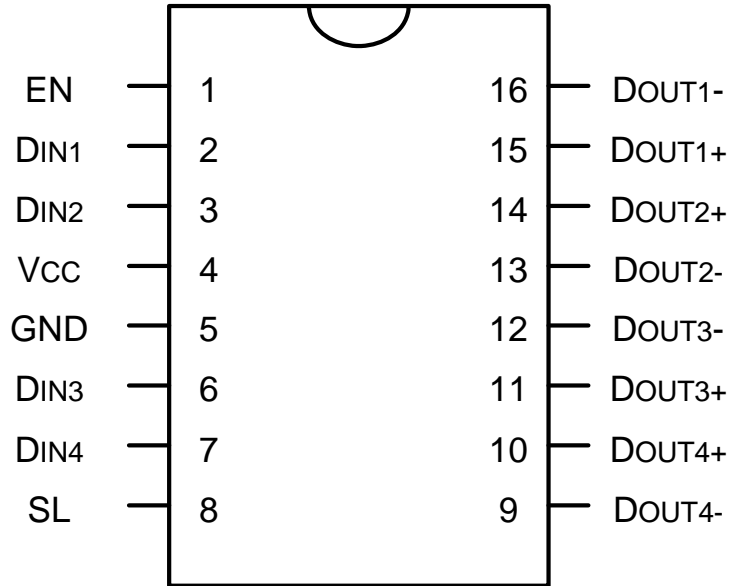


Fig.3. Pin Diagram (Top View)

●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 ^{*2} | 4.5 ^{*2} |

※1 At temperature Ta > 25°C

※2 Package power when mounting on the PCB board.

The size of PCB board :70 × 70 × 1.6 (mm³)

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 _{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} , $R_L = 100\Omega$ (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 | ΔV_{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 | ΔV_{OS} | | | - | 1 | 25 | mV |
| Input High Voltage | V_{IH} | | D _{IN} | $V_{CC} \times 0.8$ | - | 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 | 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} | $R_L = 100\Omega$ 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

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

| 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 |

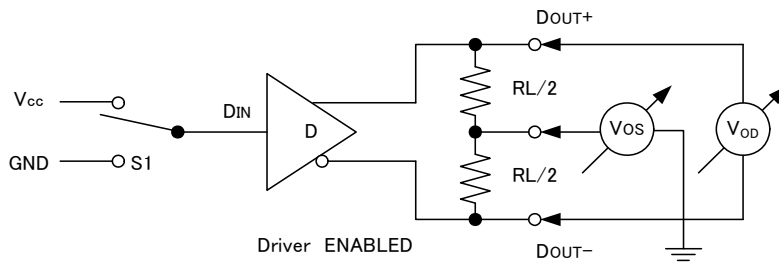


Fig.4. Driver VOD and VOS Test Circuit

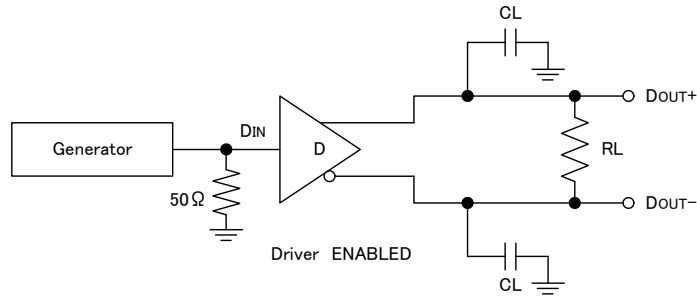


Fig.5. Driver Propagation Delay and Transition Time Test Circuit

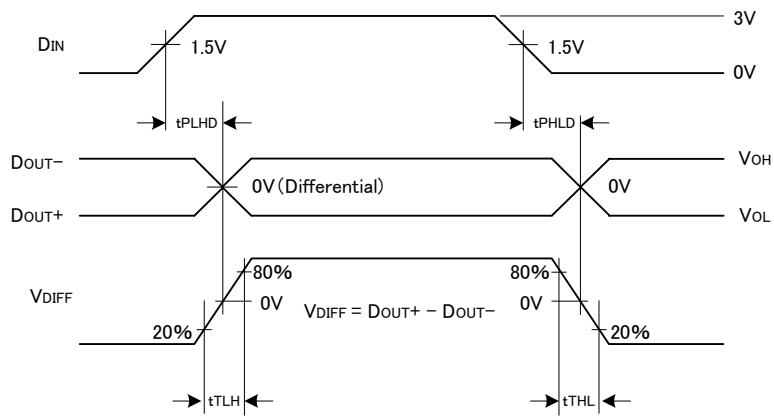


Fig.6. Driver Propagation Delay and Transition Time Waveforms

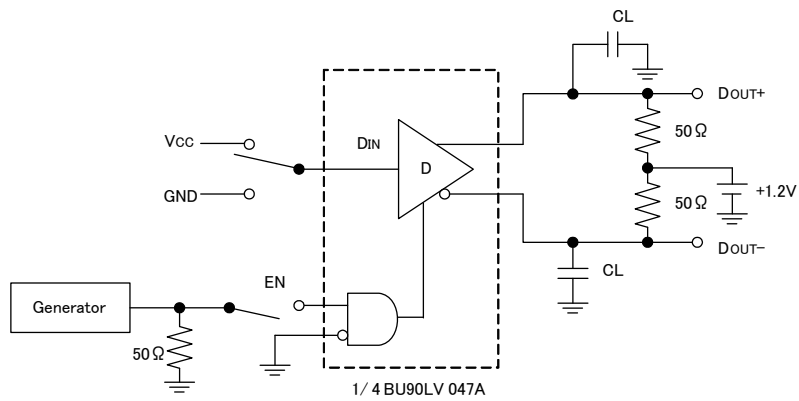


Fig.7. Driver 3-STATE Delay Test Circuit

Parameter Measurement Information (Continued)

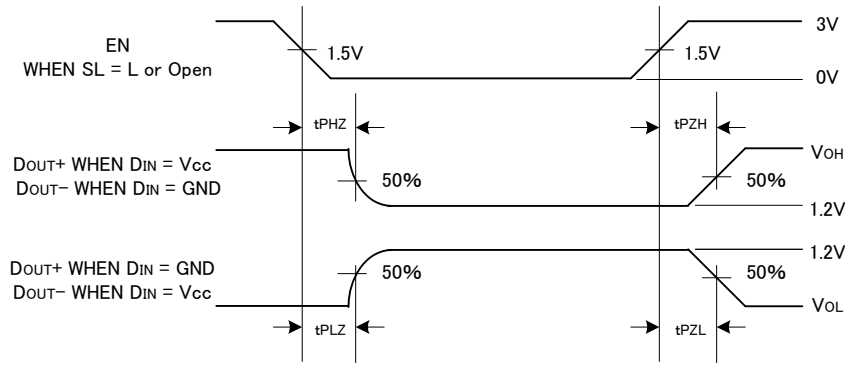


Fig.8. Driver 3-STATE Delay Waveform

Typical Application

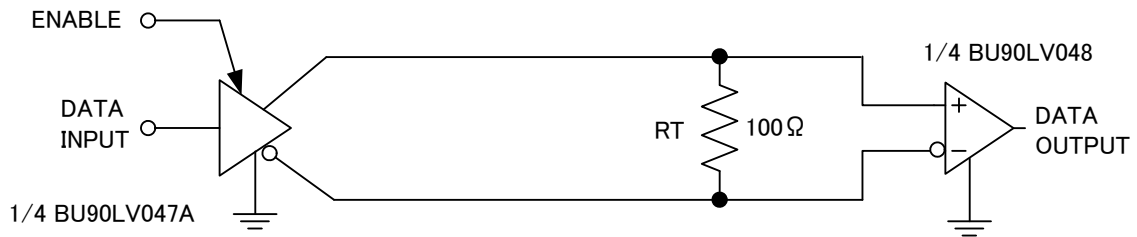


Fig.9. Point-to-Point Application

Typical Application (Continued)

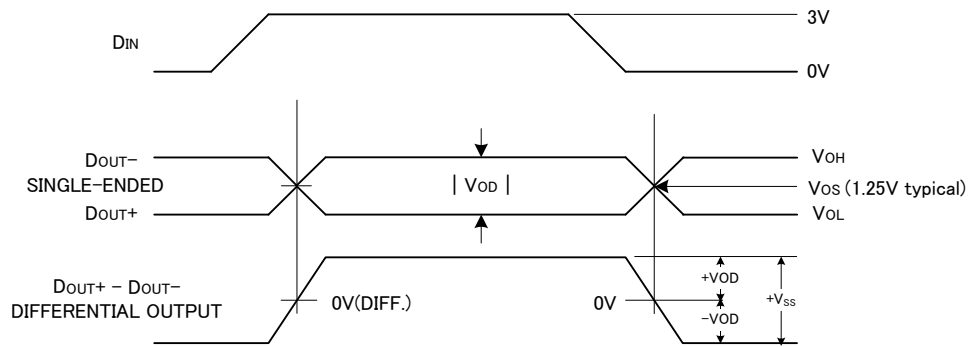


Fig.10. Driver Output Levels

●Ordering part number

| | |
|---|---|
| B | U |
|---|---|

Part No.

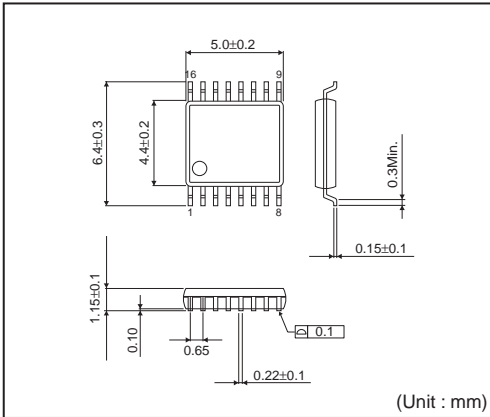
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 9 | 0 | L | V | 0 | 4 | 7 | A |
|---|---|---|---|---|---|---|---|

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

| | |
|---|---|
| E | 2 |
|---|---|

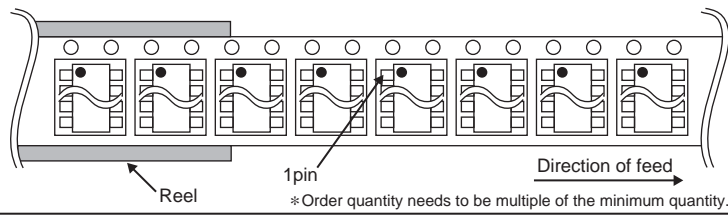
Packaging and forming specification
E2: Embossed tape and reel

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) |



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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 places where the Products are exposed to sea wind or corrosive gases, including Cl₂, H₂S, NH₃, SO₂, and NO₂
 - Use of our Products in places where the Products are exposed to static electricity or electromagnetic waves
 - 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
 - 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
 - Use of the Products in places subject to dew condensation
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- 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.

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

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 - [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.
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