Serial-in / Parallel-out Driver Series

Serial / Parallel 5-input Driver

BA829

No.09051EAT02

●Description

Serial-in-parallel-out driver is a constant-current output driver with a built-in shift register and a latch circuit to turn on a maximum of 8 LED by a 5-line interface linked to a microcontroller. Output current value of constant-current can be set up to a maximum of 300mA.

●Features

1) This product can drive a maximum of 300mA.
2) When the strobe terminal is controlled by the drive timing pulse, current during a period without driving can be reduced.
3) When the data output terminal is used as the next input data, cascade connection becomes possible.
4) Digital ground and power ground are separated.
5) Latch is built in between the shift register and the driver output.
6) Stand-by function is incorporated. (10μA Typ. upon standby)

●Applications

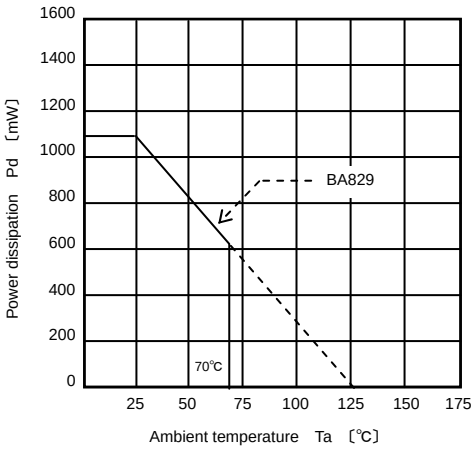
For AV equipment such as, component stereo sets, videos and TV sets, PCs, and control microcontroller mounted equipment.

●Absolute maximum ratings

Parameter	Symbol	Limit	Unit
Power supply voltage	V_{DD}	-0.3 to +7.0	V
Power dissipation	Pd	1100*	mW
Input voltage	I_{SINK}	-0.3 to V_{CC}	V
Output voltage	V_O	15	V
Operating temperature	Topr	-25 to +70	℃
Storage temperature	Tstg	-55 to +125	℃

*1 Reduced by 11 mW/°C over 25°C.

●Thermal derating curve



●Recommended operating conditions (Topr=-25℃ to +70℃)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition
Power supply	V_{CC}	4.5	5.0	5.5	V	-
Clock frequency	T_{CLK}	-	-	500	kHz	-
Power setup time	t_{Pset}	500	-	-	ns	Fig.4
Clock pulse width	t_{WC}	1	-	-	ns	Fig.4
Data setup time	t_{Dset}	300	-	-	ns	Fig.4
Data hold time	t_{Dhold}	400	-	-	ns	Fig.4
Latch pulse timing 1	t_{LT1}	600	-	-	ns	Fig.4
Latch pulse timing 2	t_{LT2}	250	-	-	ns	Fig.4
Latch pulse width	t_{WL}	800	-	-	ns	Fig.4
Strobe pulse timing 1	t_{ST1}	300	-	-	ns	Fig.4
Strobe pulse width	t_{WS}	3	-	-	μs	Fig.4
Voltage between L-GND and P-GND	V_G	-	-	0.2	V	-

* Electric potential is a difference of L-GND and P-GND. Short-circuit near the power source whenever possible.
However, between L-GND Pin and P-GND Pin, product should be used in a range not exceeding 0.2V.

●Electrical characteristics (Unless otherwise specified, Ta=25℃,V_{CC}=5.0V)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Condition	Test Circuit
Supply current 1	I_{CC1}	—	10	20	μA	PSW“L”	Fig.1
Supply current 2	I_{CC2}	—	110	158	mA	PSW“H”, STB“H”	Fig.1
Supply current 3	I_{CC3}	—	14	20	mA	PSW“H”, STB“L”	Fig.1
Output ON voltage	V_{OON}	—	0.4	0.6	V	I_{CCN}=300 mA	Fig.1
Output leakage current	I_{OOFF}	—	10	50	μA	V_0=13.5V	Fig.1
Data transference time	f_{CLK}	500	—	—	kHz	—	Fig.1
Input high-level voltage	V_{IH}	2.6	—	—	V	—	Fig.2
Input low-level voltage	V_{IL}	—	—	0.8	V	—	Fig.2
Input high-level current	I_{IH1}	—	0.1	10	μA	V_1=3.4V,CLK,LATCH ,DATA,STB	Fig.1
Input low-level current	I_{IL1}	—	-0.01	-0.1	mA	V_1=0.4V,CLK,LATCH ,DATA,STB	Fig.1
Out put high-level voltage	V_{DDH}	2.8	3.0	—	V	I_{DOH}=-400μA	Fig.1
Output low-level voltage	V_{DDL}	—	0.3	0.4	V	I_{DOL}=⊿1.6mA	Fig.1
Data output transmission delay	t_{DLH}	—	0.6	1.0	μs	R_{LD}=10kΩ	Fig.4
Data output transmission delay	t_{DHL}	—	0.6	2.0	μs	R_{LD}=10kΩ	Fig.4
Print output transmission delay	t_{OLH}	—	—	10	μs	R_L=560kΩ560, V_0=13.5V	Fig.4
Print output transmission delay	t_{OHL}	—	—	10	μs	R_L=560kΩ560, V_0=13.5V	Fig.4
Input high-level current	I_{IH2}	—	0.04	0.1	mA	V_1=3.4V,PSW	Fig.1
Input low-level current	I_{IL2}	—	0.1	10	μA	V_1=0.4V,PSW	Fig.1

●Block diagram

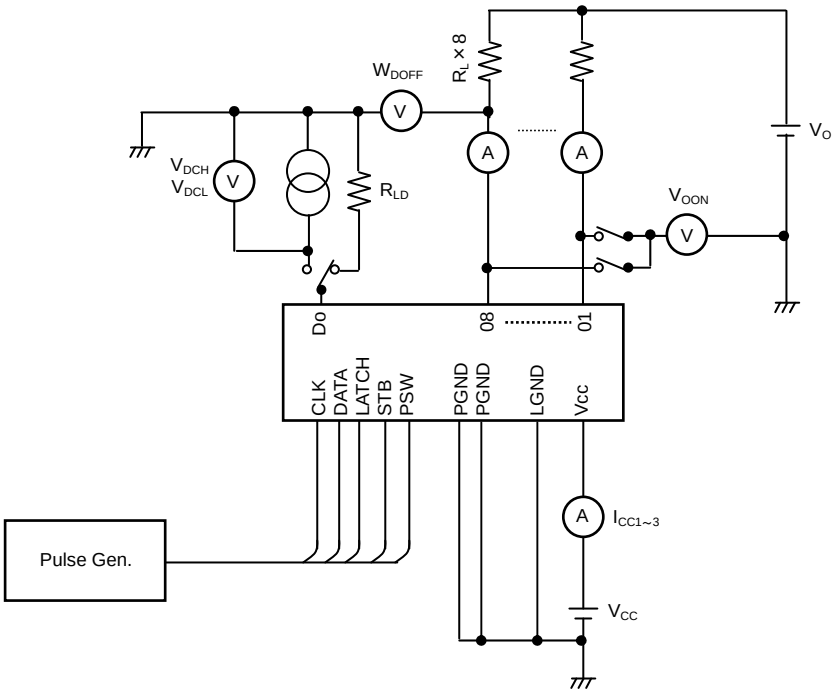


Fig.1

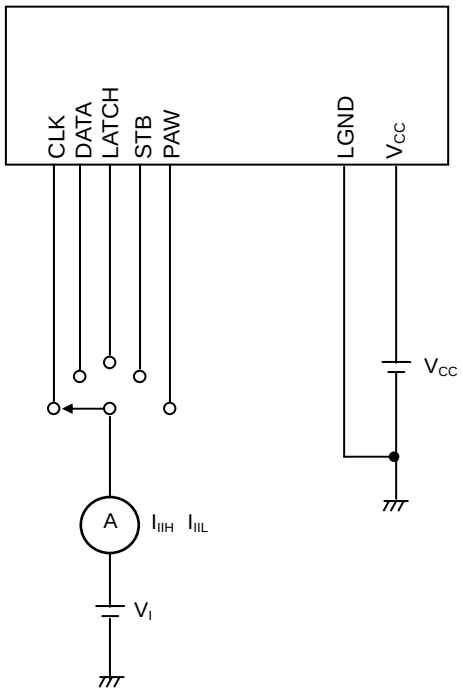


Fig.2

●Block diagram

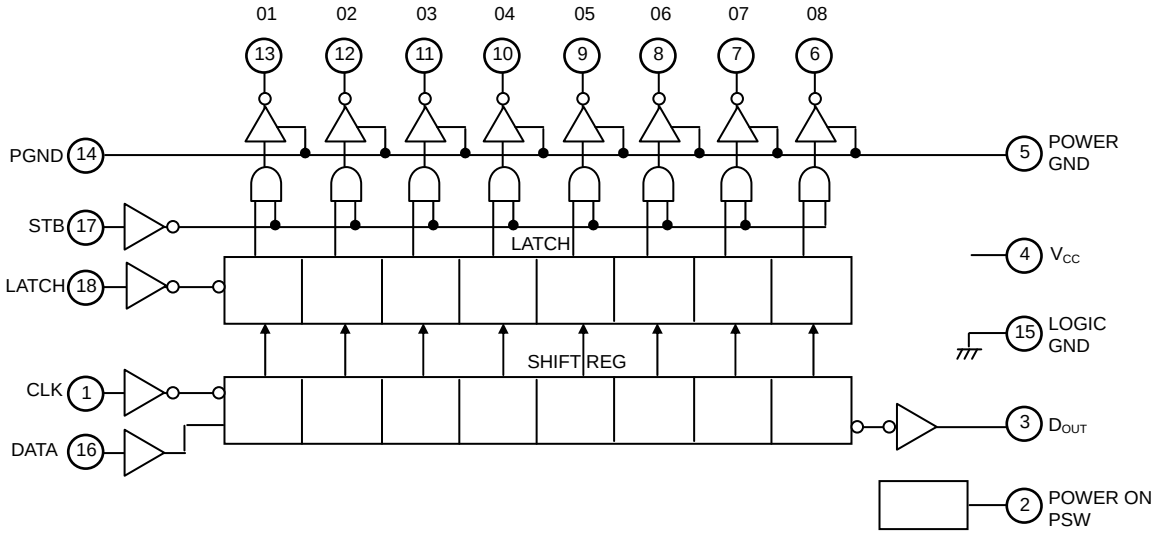


Fig.3

●Pin descriptions

PIN No.	Terminal	I/O	Function
1	CLK	I	Clock input
2	PSW	I	Power switch
3	DOUT	O	Cascade output
4	VCC	-	Power supply
5	PGND	-	GND
6	O8	O	Parallel data output
7	O7	O	
8	O6	O	
9	O5	O	
10	O4	O	
11	O3	O	
12	O2	O	
13	O1	O	
14	PGND	-	GND
15	LGND	-	GND
16	DATA	I	Serial data input
17	STB	I	Strobe input , “L” active
18	LATCH	I	Latch input

●Description of operation

BA829 is configured internally as shown in the logic circuit diagram. Terminals of clock (CLK), data (DATA), latch (LATCH), strobe (STB), and power switch (PSW) are available as input.

Data input is synchronized with the clock, read serially during the rise time and latched at the rise time edge of the shifted shift register. Latched data appears on the output terminal of O1-O8 by the strobe input. Pulse width is the same as that of the strobe input. Data output terminal DOUT, is a terminal used for cascade connection of the IC, where the output of the final stage of the shift register has appeared, and is connected to the next data input terminal DATA. In this case, when the clock and the strobe are used in conjunction, output terminal can be increased by 8 bits at a time.

To affect the standby mode, set the power switch to “L”.

●Timing chart

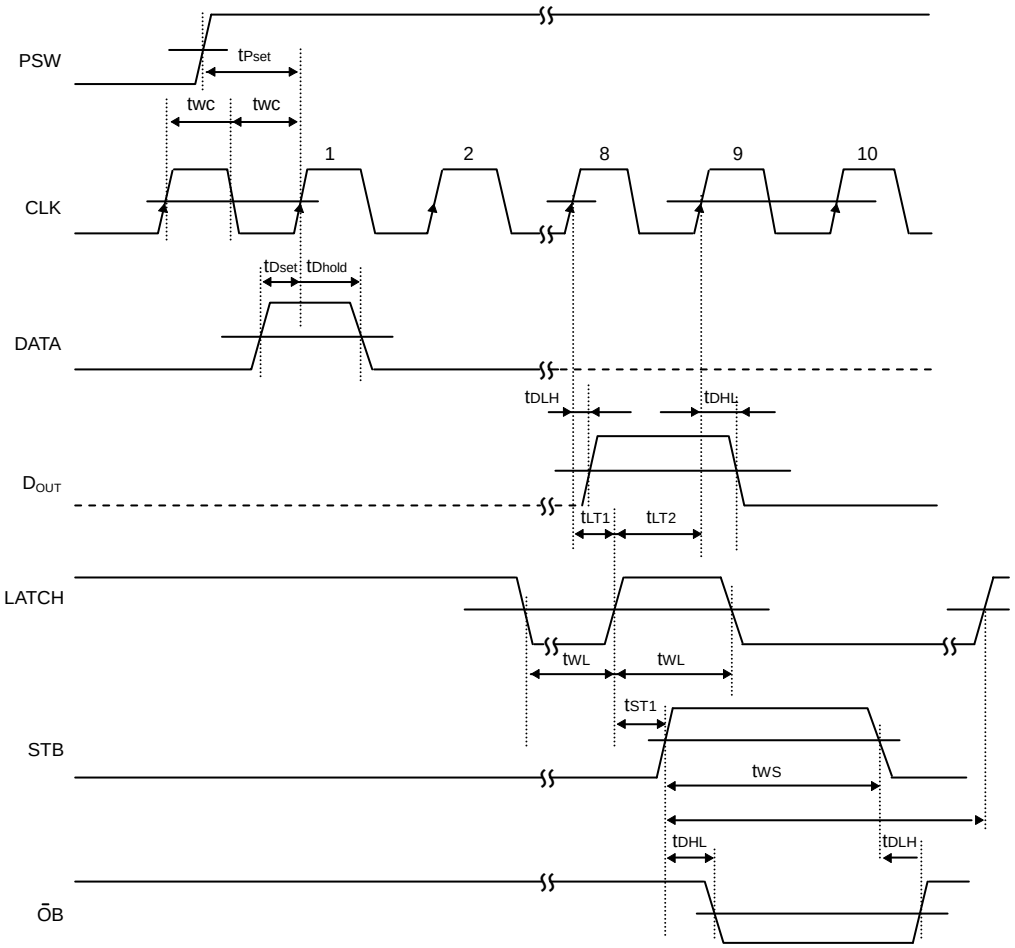
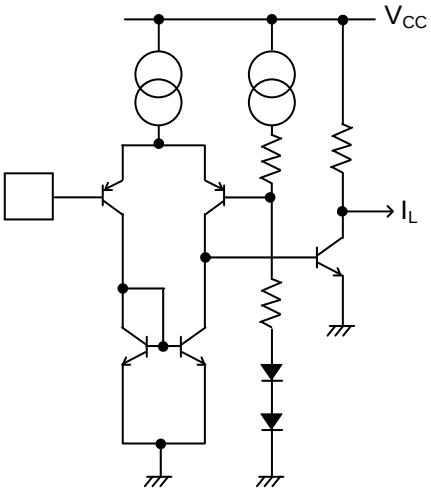
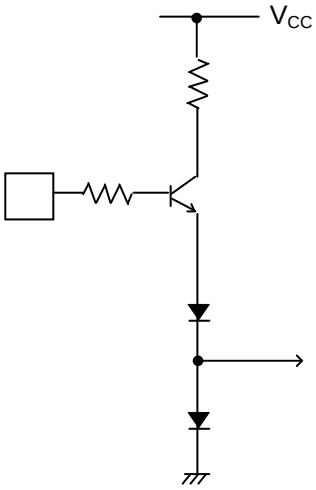


Fig.4

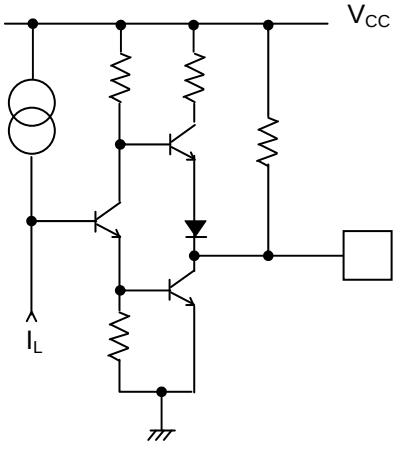
●Interfaces



(a) INPUT (CLK , DATA , LATCH , STB)



(b) INPUT (PSW)



(c) OUTPUT (D_{OUT})

●Operation Notes

1. Absolute maximum ratings
   An excess in the absolute maximum ratings, such as supply voltage, temperature range of operating conditions, etc., can break down the devices, thus making impossible to identify breaking mode, such as a short circuit or an open circuit. If any over rated values will expect to exceed the absolute maximum ratings, consider adding circuit protection devices, such as fuses.

2. Connecting the power supply connector backward
   Connecting of the power supply in reverse polarity can damage IC. Take precautions when connecting the power supply lines. An external direction diode can be added.

3. Power supply lines
   Design PCB layout pattern to provide low impedance GND and supply lines. To obtain a low noise ground and supply line, separate the ground section and supply lines of the digital and analog blocks. Furthermore, for all power supply terminals to ICs, connect a capacitor between the power supply and the GND terminal. When applying electrolytic capacitors in the circuit, note that capacitance characteristic values are reduced at low temperatures.

4. GND voltage
   The potential of GND pin must be minimum potential in all operating conditions.

5. Inter-pin shorts and mounting errors
   Use caution when positioning the IC for mounting on printed circuit boards. The IC may be damaged if there is any connection error or if pins are shorted together.

6. Actions in strong electromagnetic field
   Use caution when using the IC in the presence of a strong electromagnetic field as doing so may cause the IC to malfunction.

7. Testing on application boards
   When testing the IC on an application board, connecting a capacitor to a pin with low impedance subjects the IC to stress. Always discharge capacitors after each process or step. Always turn the IC's power supply off before connecting it to or removing it from a jig or fixture during the inspection process. Ground the IC during assembly steps as an antistatic measure. Use similar precaution when transporting or storing the IC.

8. Regarding input pin of the IC
   This monolithic IC contains P+ isolation and P substrate layers between adjacent elements in order to keep them isolated. P-N junctions are formed at the intersection of these P layers with the N layers of other elements, creating a parasitic diode or transistor. For example, the relation between each potential is as follows:
   When GND > Pin A and GND > Pin B, the P-N junction operates as a parasitic diode.
   When GND > Pin B, the P-N junction operates as a parasitic transistor.
   Parasitic diodes can occur inevitable in the structure of the IC. The operation of parasitic diodes can result in mutual interference among circuits, operational faults, or physical damage. Accordingly, methods by which parasitic diodes operate, such as applying a voltage that is lower than the GND (P substrate) voltage to an input pin, should not be used.

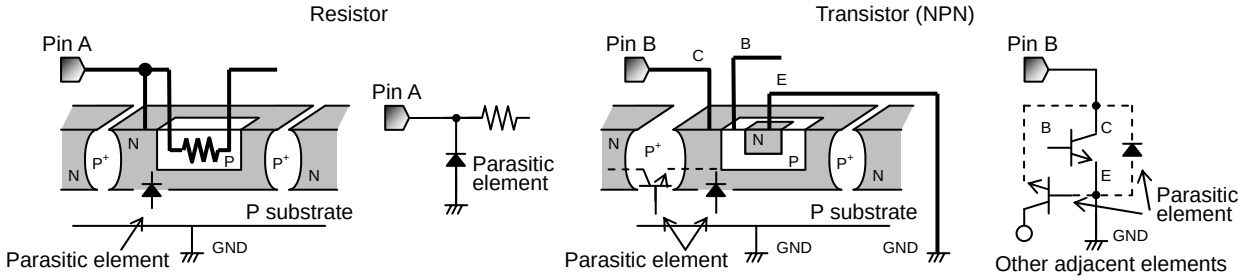


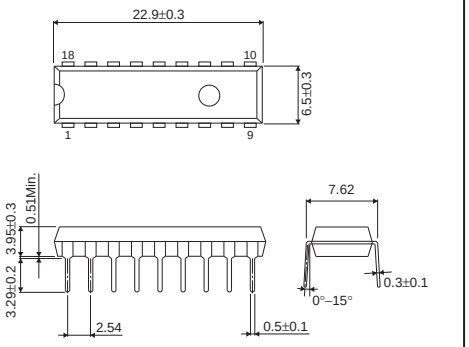
Fig.5 Example of IC structure

9. Ground Wiring Pattern
   When using both small signal and large current GND patterns, it is recommended to isolate the two ground patterns, placing a single ground point at the ground potential of application so that the pattern wiring resistance and voltage variations caused by large currents do not cause variations in the small signal ground voltage. Be careful not to change the GND wiring pattern of any external components, either.

●Ordering part number

B	D	8	2	9			
Part No.		Part No.			Package None:DIP18	Packaging and forming specification None: Tube	

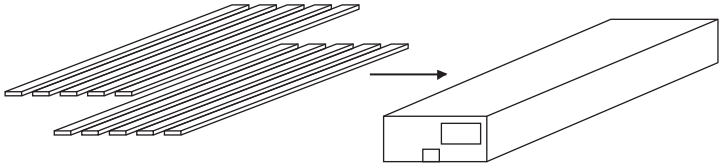
DIP18



(Unit : mm)

<Tape and Reel information>

Container	Tube
Quantity	1000pcs
Direction of feed	Direction of products is fixed in a container tube



∗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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   [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.

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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.

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