VS28VUA1LB

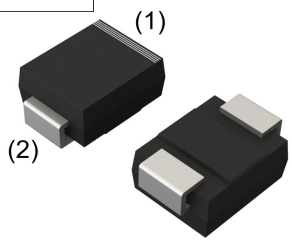
Transient Voltage Suppressor

Data sheet

V_{RWM}	28	V
P_{PP}	600	W
I_{PP}	13.2	A

● Outline

Package Code	DO-214AA(SMB)
JEITA Code	-
ROHM Code	SMBP

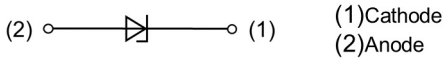


● Feature

High reliability

Small power mold type

● Inner Circuit



● Application

Surge Protection

● Packaging Specification

Packing	Embossed Tape
Reel Size(mm)	330
Taping Width(mm)	12
Quantity(pcs)	3000
Taping Code	TBR1
Marking	W9

● Structure

Silicon Epitaxial Planar

● Absolute Maximum Rating (T_a=25℃)

Parameter	Symbol	Conditions		Limits	Unit
Peak Pulse Power	P_{PP}	tp=10/1000μs		600	W
Peak Pulse Current	I_{PP}	tp=10/1000μs		13.2	A
Junction temperature	T_j			150	℃
Storage temperature	T_{stg}			-55 ~ 150	℃
Electrostatic discharge voltage	V_{ESD}	IEC61000-4-2 level 4	Contact discharge	30	kV
			Air discharge	30	kV

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●Characteristic (Ta = 25°C)

Part Number	Symbol							
	Breakdown Voltage : V_{BR}(V)(1)			Reverse Current : I_R(μA)		Clamping Voltage : V_{CL}(V)		Stand-off Voltage : V_{RWM}(V)
	Min.	Max.	I_T(mA)	Max.	V_R(V)	Max.	I_{PP}(A)	Max.
VS5V0UA1LB	6.45	7.14	10	800	5.0	10.5	57.0	5.0
VS6V0UA1LB	6.67	7.37	10	800	6.0	10.3	58.3	6.0
VS7V0UA1LB	7.78	8.60	10	500	7.0	12.0	50.0	7.0
VS8V0UA1LB	8.89	9.83	1	50	8.0	13.6	44.1	8.0
VS9V0UA1LB	10.0	11.1	1	5.0	9.0	15.4	39.0	9.0
VS10VUA1LB	11.1	12.3	1	5.0	10	17.0	35.3	10
VS11VUA1LB	12.2	13.5	1	5.0	11	18.2	33.0	11
VS12VUA1LB	13.3	14.7	1	2.5	12	19.9	30.2	12
VS13VUA1LB	14.4	15.9	1	2.5	13	21.5	28.0	13
VS14VUA1LB	15.6	17.2	1	2.5	14	23.2	25.9	14
VS15VUA1LB	16.7	18.5	1	2.5	15	24.4	24.6	15
VS16VUA1LB	17.8	19.7	1	2.5	16	26.0	23.1	16
VS17VUA1LB	18.9	20.9	1	2.5	17	27.6	21.7	17
VS18VUA1LB	20.0	22.1	1	2.5	18	29.2	20.5	18
VS20VUA1LB	22.2	24.5	1	2.5	20	32.4	18.5	20
VS22VUA1LB	24.4	26.9	1	2.5	22	35.5	16.9	22
VS24VUA1LB	26.7	29.5	1	2.5	24	38.9	15.4	24
VS26VUA1LB	28.9	31.9	1	2.5	26	42.1	14.3	26
VS28VUA1LB	31.1	34.4	1	2.5	28	45.4	13.2	28
VS30VUA1LB	33.3	36.8	1	2.5	30	48.4	12.4	30

Note(1) V_{BR} test time is 40ms.

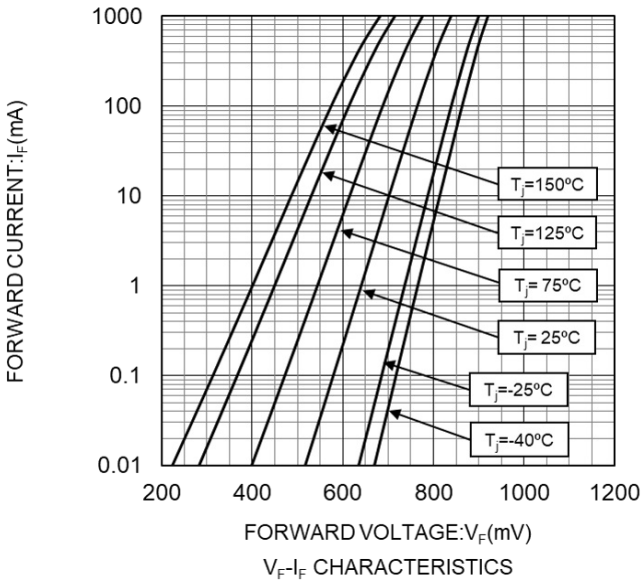
●Marking

Part Number	Marking	Part Number	Marking
VS5V0UA1LB	U2	VS15VUA1LB	W5
VS6V0UA1LB	V2	VS16VUA1LB	X5
VS7V0UA1LB	X2	VS17VUA1LB	T6
VS8V0UA1LB	U4	VS18VUA1LB	U6
VS9V0UA1LB	V4	VS20VUA1LB	V6
VS10VUA1LB	W4	VS22VUA1LB	W6
VS11VUA1LB	X4	VS24VUA1LB	X6
VS12VUA1LB	T5	VS26VUA1LB	Y6
VS13VUA1LB	U5	VS28VUA1LB	W9
VS14VUA1LB	V5	VS30VUA1LB	X9

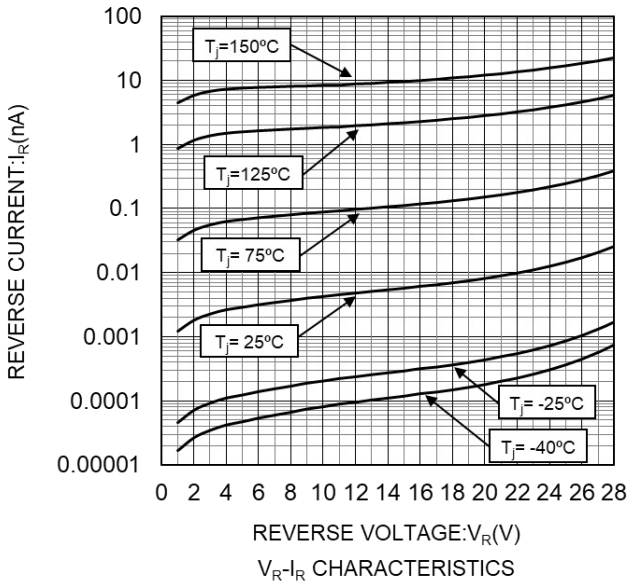
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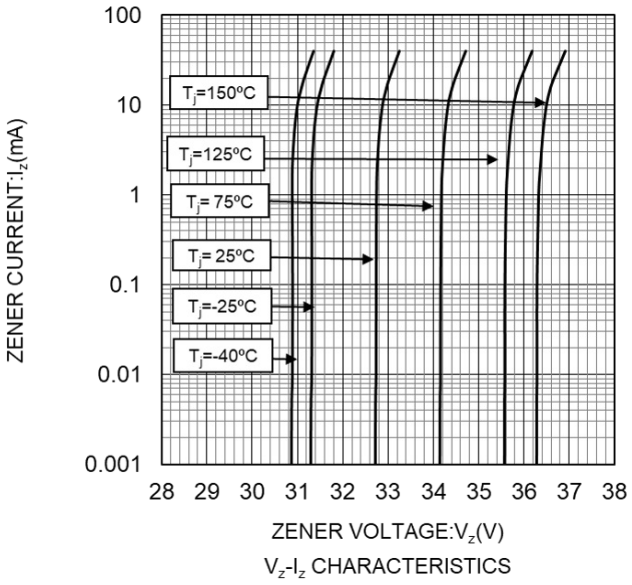
●Characteristic Curves



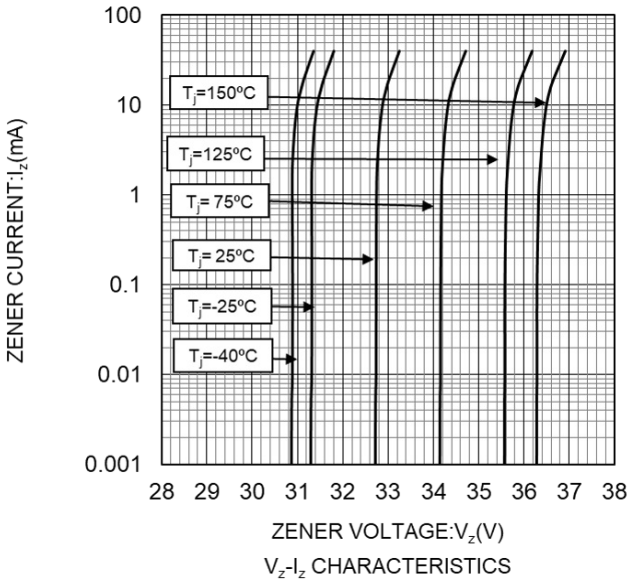
V_F-I_F CHARACTERISTICS



V_R-I_R CHARACTERISTICS



V_z-I_z CHARACTERISTICS

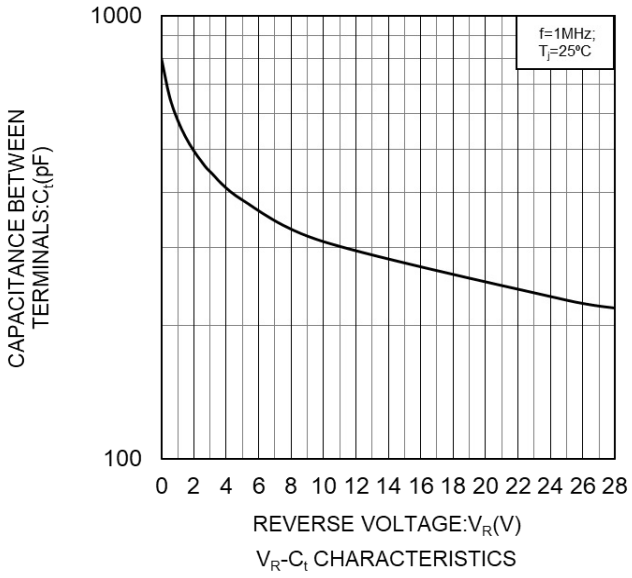


V_z-I_z CHARACTERISTICS

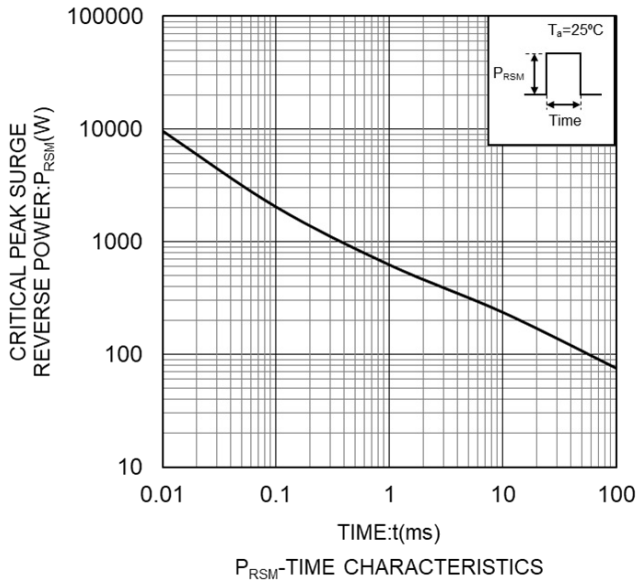
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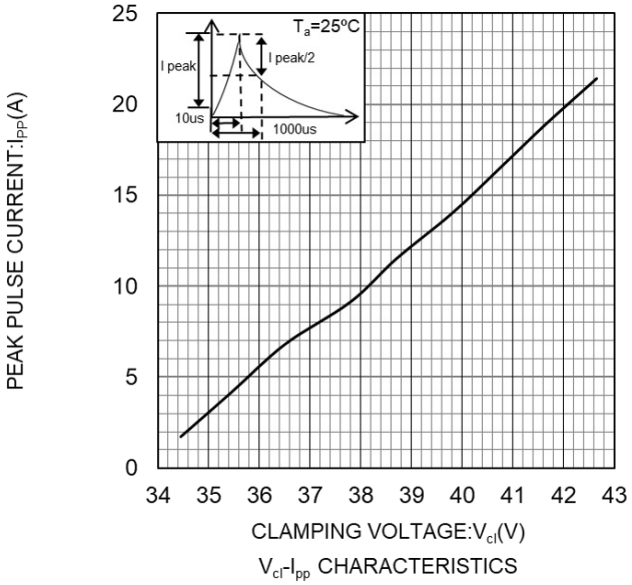
●Characteristic Curves



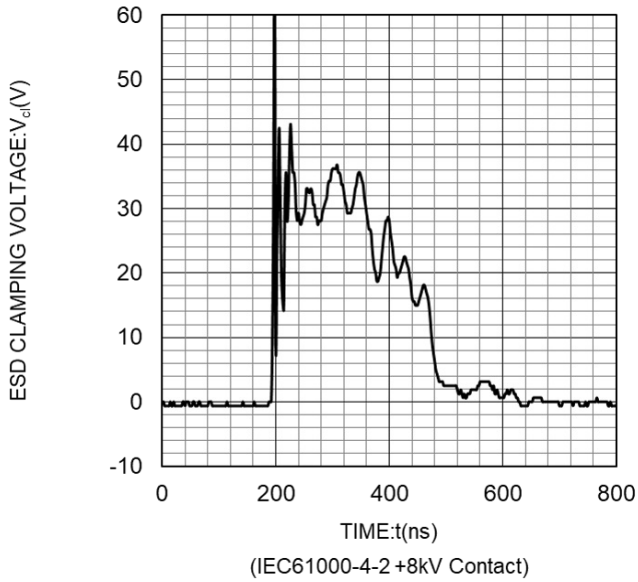
V_R-C_t CHARACTERISTICS



P_{RSM}-TIME CHARACTERISTICS



V_{cl}-I_{pp} CHARACTERISTICS

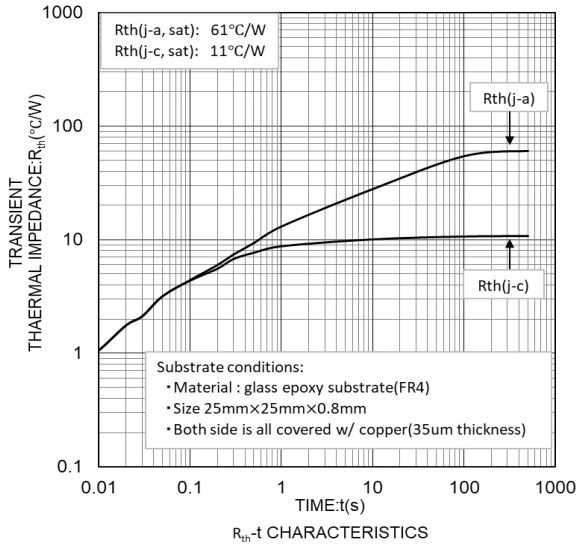


(IEC61000-4-2 +8kV Contact)

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●Characteristic Curves



Rth-t CHARACTERISTICS

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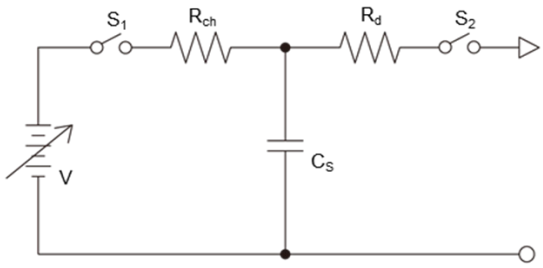
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● Appended figure

Procedure to obtain ESD Clampimg Voltage

IEC61000-4-2 Spec

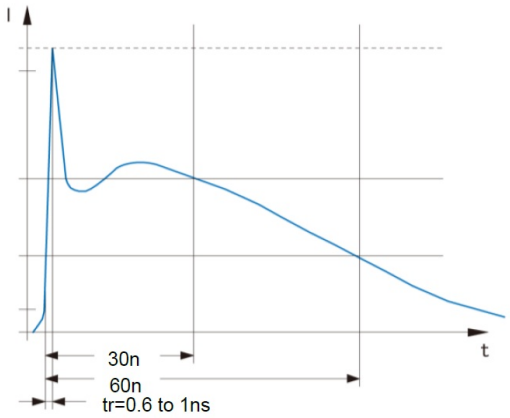
Level	Test Voltage (kV)	First Peak Current (A)	Current at 30ns (A)	Current at 60ns (A)
1	2	7.5	4	2
2	4	15	8	4
3	6	22.5	12	6
4	8	30	16	8

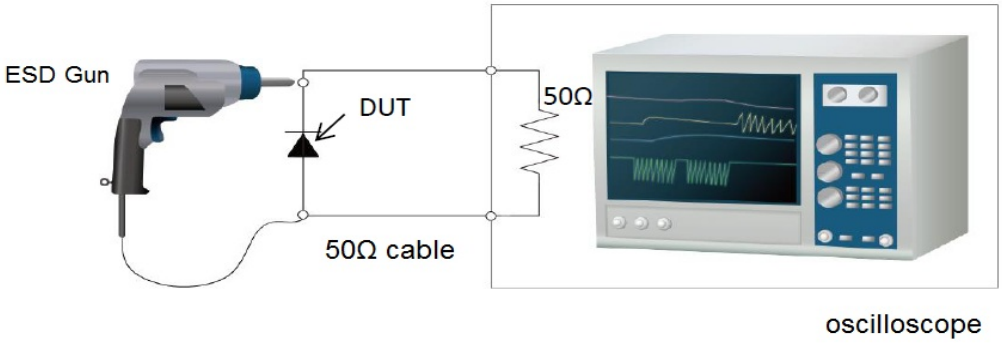


C_S:150pF R_d:330Ω

simplified diagram in ESD machine

IEC61000-4-2 Waveform





1 Set up ESD Tester at IEC61000-4-2 condition.
(IEC61000-4-2 : C=150pF, R=330Ω)

2 Mount a sample on the high frequency test board with the SMA connector.

3 Connect the SMA connector to the oscilloscope by 50Ωcable.
Then, add the 10X-attenuator between test board and the cable to protect the oscilloscope.

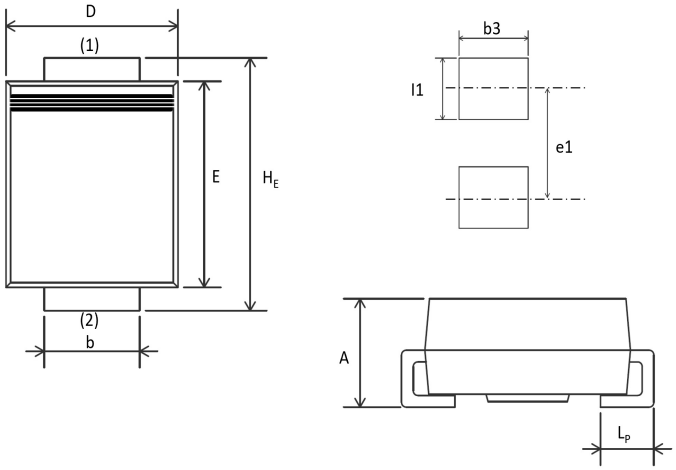
4 Discharge ESD in contact discharge mode at any voltage.
(normally 8kV Max.)

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●Dimensions

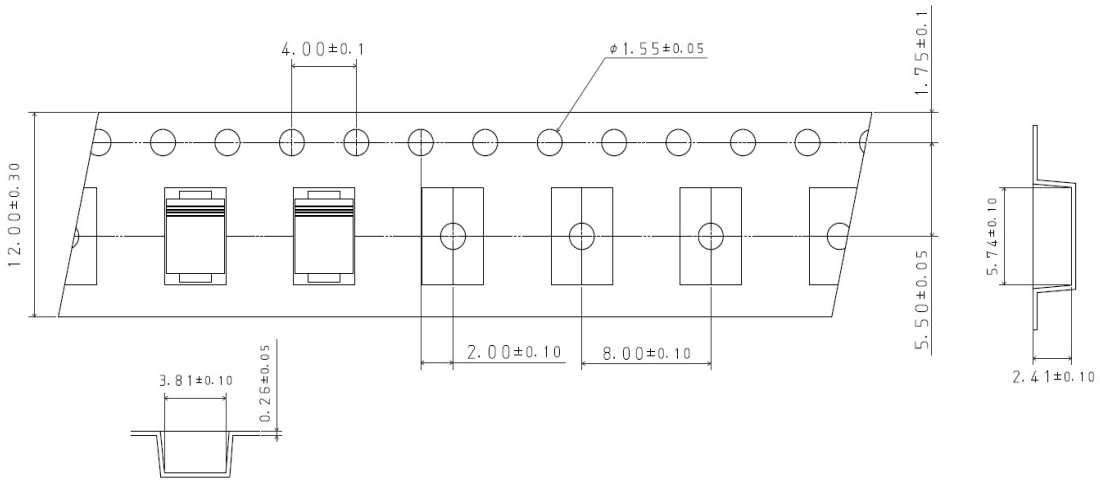
DO-214AA (SMB), (SMBP)



DIM	Milimeters			Inches		
	Min.	Average	Max.	Min.	Average	Max.
A	2.13	2.29	2.45	0.084	0.090	0.096
b	1.89	2.00	2.11	0.074	0.079	0.083
D	3.30	3.62	3.94	0.130	0.143	0.155
E	4.06	4.38	4.70	0.160	0.173	0.185
H_E	5.08	5.34	5.60	0.200	0.210	0.220
L_P	0.76	1.14	1.52	0.030	0.045	0.060
I1	–	2.29	–	–	0.090	–
b3	–	2.72	–	–	0.107	–
e1	–	4.05	–	–	0.159	–

(1) The marking bar indicates the cathode.
(2) The direction indicates the cathode.

●Taping (Unit:mm)



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(Note1) Medical Equipment Classification of the Specific Applications

JAPAN	USA	EU	CHINA
CLASSⅢ	CLASSⅢ	CLASSⅡb	CLASSⅢ
CLASSⅣ		CLASSⅢ	

2. ROHM designs and manufactures its Products subject to strict quality control system. However, semiconductor products can fail or malfunction at a certain rate. Please be sure to implement, at your own responsibilities, adequate safety measures including but not limited to fail-safe design against the physical injury, damage to any property, which a failure or malfunction of our Products may cause. The following are examples of safety measures:
   [a] Installation of protection circuits or other protective devices to improve system safety
   [b] Installation of redundant circuits to reduce the impact of single or multiple circuit failure

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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 (Exclude cases where no-clean type fluxes is used. However, recommend sufficiently about the residue.) ; 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 depending on ambient temperature. When used in sealed area, confirm that it is the use in the range that does not exceed the maximum junction 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 on a surface-mount products, the flow soldering method must be used on a through hole mount products. If the flow soldering method is preferred on a surface-mount products, please consult with the ROHM representative in advance.

For details, please refer to ROHM Mounting specification

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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 Cl_2, H_2S, NH_3, SO_2, and NO_2
   - [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

A two-dimensional barcode 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.

Precaution for Foreign Exchange and Foreign Trade act

Since concerned goods might be fallen under listed items of export control prescribed by Foreign exchange and Foreign trade act, please consult with ROHM in case of export.

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