

UniOhm

C O N F I D E N T I A L D O C U M E N T

SPECIFICATION FOR APPROVAL

ROPLA ELEKTRONIK

Description : Cement Fixed Resistors

Uniohm Part no.:

PRW01WJxxxxB00	(PRW 1W +/-5% B/B)
PRW02WJxxxxB00	(PRW 2W +/-5% B/B)
PRW03WJxxxxB00	(PRW 3W +/-5% B/B)
PRW05WJxxxxB00	(PRW 5W +/-5% B/B)
PRW07WJxxxxB00	(PRW 7W +/-5% B/B)
PRW0AWJxxxxB00	(PRW 10W +/-5% B/B)
PRW0FWJxxxxB00	(PRW 15W +/-5% B/B)
PRW020JxxxxB00	(PRW 20W +/-5% B/B)
PRW025JxxxxB00	(PRW 25W +/-5% B/B)

Approved by

Parts corresponding to RoHS Compliant: 2005-Apr.-1

Approved	Checked	Prepared
Mr. Jack Lin	Mr. S. Polthanasan	Ms. P. Supatta

Issued Date: 2018/12/14

Customer: ROPLA ELEKTRONIK

1. Scope:

This specification for approval relates to Cement Fixed Resistors manufactured by UniOhm 's specifications.

2. Type designation:

The type designation shall be in the following form :

(Ex.) $\frac{\text{PRW}}{\text{Type}}$ $\frac{2\text{W}}{\text{Power Rating}}$ $\frac{\text{J}}{\text{Resistance Tolerance}}$ $\frac{330\Omega}{\text{Nominal Resistance}}$

3. Ratings:

Ratings shall be shown in the table 1.

Table 1

Type	PRW								
Rated Power	1W	2W	3W	5W	7W	10W	15W	20W	25W
Max.Working voltage	200 V	250 V	300 V	350 V	500 V	700 V	700 V	750 V	750 V
Max.Overload voltage	400 V	500 V	600 V	700 V	1000 V	1400 V	1400 V	1500 V	1500 V
Rated Ambient Temp.	70 °C								
Operating Temp. Range	-55°C --- +155°C								
Resistance Tolerance	± 5%								

3.1 Power rating:

Resistors shall have a power rating based on continuous full load operation at an ambient temperature of 70 °C

3.2 Voltage rating:

Resistors shall have a rated direct-current (DC) continuous working voltage or an approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial line frequency and waveform corresponding to the power rating , as determined from the following formula:

$$RCWV = \sqrt{P \times R}$$

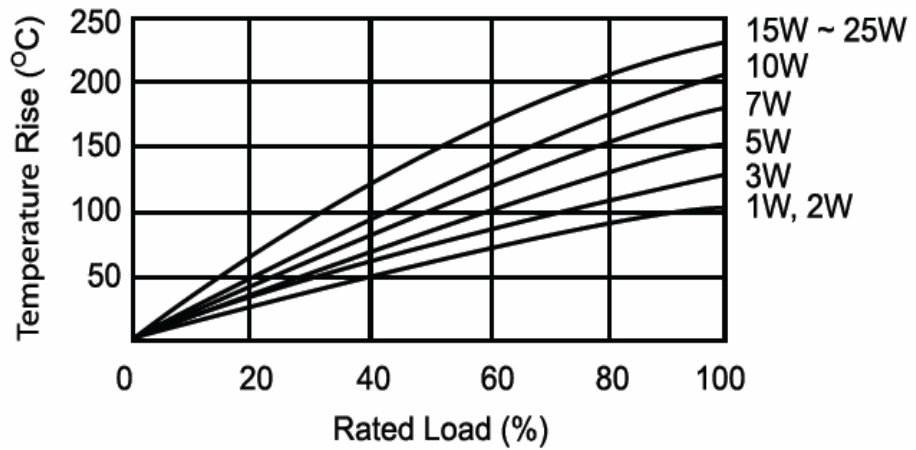
Were : RCWV = Rated DC or RMS AC continuous working voltage at commercial-line frequency and waveform (volt)

P = Power Rating (watt)

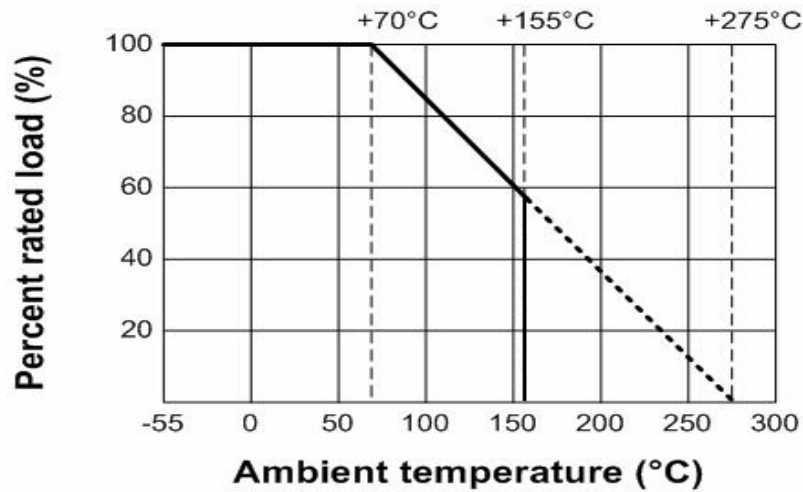
R = Nominal Resistance (ohm)

Cement Fixed Resistors

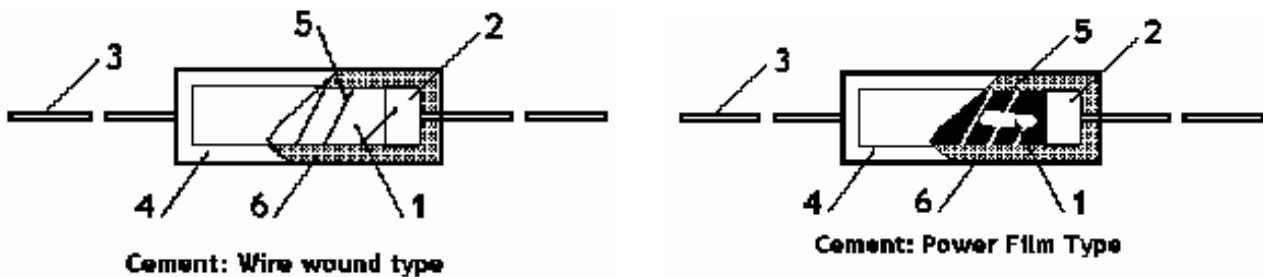
Heat Rise Chart



Derating Curve



4. Construction:



Confirmation List of Material

No.	Subpart Name	Material	Material Generic Name	Remark
1	Body	Rod Type Ceramics	Al ₂ O ₃ , SiO ₂	
2	End Cap	Tin plated iron surface	Tin : 5%, Iron : 95%	
3	Lead	Annealed copper wire	Tin-Plated Copper wire	
4	Ceramic Case	Ceramic	Al ₂ O ₃ , SiO ₂	
5	Resistance wire	Cu-Ni Alloy / Ni-Cr Alloy	Cu-Ni Alloy / Ni-Cr Alloy	
	Resistance film	Metal Oxide Film	Metal Oxide Film	
6	Filling Materials	Quartz mixed sand	SiO ₂	

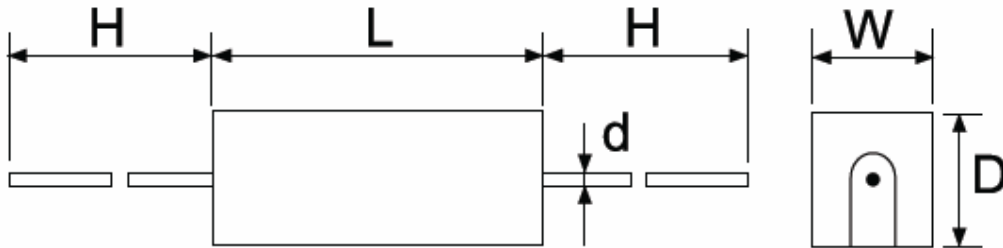
Cement Fixed Resistors		
5. Characteristic :		
Characteristics	Limits	Test Methods (JIS C 5201-1)
Dielectric withstanding voltage	No evidence of flashover, mechanical damage, arcing or insulation break down	Resistors shall be clamped in the trough of a 90° metallic V-block and shall be tested at AC potential respectively for 60 +10/ -0 secs. (Sub-clause 4.7)
Temperature coefficient	$< 20\Omega : \pm 400 \text{ PPM}/^\circ\text{C}$ $\geq 20\Omega : \pm 350 \text{ PPM}/^\circ\text{C}$	Natural resistance change per temp. degree centigrade. $\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (PPM}/^\circ\text{C)}$ R1: Resistance value at room temperature (t1) R2: Resistance value at room temp. plus 100 °C (t2) (Sub-clause 4.8)
Short time overload	Resistance change rate is $\pm (5\% + 0.05\Omega)$ Max. with no evidence of mechanical damage	Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds (Sub-clause 4.13)
Terminal strength	No evidence of mechanical damage	Direct load : Resistance to a 2.5 kgs direct load for 10 secs. in the direction of the longitudinal axis of the terminal leads Twist test : Terminal leads shall be bent through 90 ° at a point of about 6mm from the body of the resistor and shall be rotated through 360° about the original axis of the bent terminal in alternating direction for a total of 3 rotations (Sub-clause 4.16)
Solderability	95 % coverage Min.	The area covered with a new , smooth clean , shiny and continuous surface free from concentrated pinholes. Test temp. of solder : $245^\circ\text{C} \pm 5^\circ\text{C}$ Dwell time in solder : 2 to 3 secs. (Sub-clause 4.17)
Soldering temp. reference	Electrical characteristics shall be satisfied. Without distinct deformation in appearance. (95 % coverage Min.)	The leads immersed into solder bath to 3.2 to 4.8 mm. from the body. Permanent resistance change shall be checked. <u>Wave soldering condition: (2 cycles Max.)</u> Pre-heat : $100 \sim 120^\circ\text{C}$, 30 ± 5 sec. Suggestion solder temp.: $235 \sim 255^\circ\text{C}$, 10 sec. (Max.) Peak temp.: 260°C <u>Hand soldering condition:</u> Hand Soldering bit temp. : $380 \pm 10^\circ\text{C}$ Dwell time in solder : $3 +1/-0$ sec.

Cement Fixed Resistors																	
Characteristics	Limits	Test Methods (JIS C 5201-1)															
Resistance to soldering heat	Resistance change rate is $\pm (1\% + 0.05\Omega)$ Max. with no evidence of mechanical damage	Permanent resistance change when leads immersed to 3.2 to 4.8 mm from the body in $350^{\circ}\text{C} \pm 10^{\circ}\text{C}$ solder for 3 ± 0.5 secs. (Sub-clause 4.18)															
Temperature cycling	Resistance change rate is $\pm (2\% + 0.05\Omega)$ Max. with no evidence of mechanical damage	Resistance change after continuous 5 cycles for duty shown below: <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Step</th> <th style="text-align: center;">Temperature</th> <th style="text-align: center;">Time</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">$-55^{\circ}\text{C} \pm 3^{\circ}\text{C}$</td> <td style="text-align: center;">30 mins</td> </tr> <tr> <td style="text-align: center;">2</td> <td style="text-align: center;">Room temp.</td> <td style="text-align: center;">10~15 mins</td> </tr> <tr> <td style="text-align: center;">3</td> <td style="text-align: center;">$+155^{\circ}\text{C} \pm 2^{\circ}\text{C}$</td> <td style="text-align: center;">30 mins</td> </tr> <tr> <td style="text-align: center;">4</td> <td style="text-align: center;">Room temp.</td> <td style="text-align: center;">10~15 mins</td> </tr> </tbody> </table> (Sub-clause 4.19)	Step	Temperature	Time	1	$-55^{\circ}\text{C} \pm 3^{\circ}\text{C}$	30 mins	2	Room temp.	10~15 mins	3	$+155^{\circ}\text{C} \pm 2^{\circ}\text{C}$	30 mins	4	Room temp.	10~15 mins
Step	Temperature	Time															
1	$-55^{\circ}\text{C} \pm 3^{\circ}\text{C}$	30 mins															
2	Room temp.	10~15 mins															
3	$+155^{\circ}\text{C} \pm 2^{\circ}\text{C}$	30 mins															
4	Room temp.	10~15 mins															
Load life in humidity	<table border="1" style="width: 100%;"> <thead> <tr> <th style="text-align: center;">Resistance value</th> <th style="text-align: center;">$\Delta R/R$</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Wire-wound</td> <td style="text-align: center;">$\pm 5\%$</td> </tr> <tr> <td style="text-align: center;">Power film :</td> <td style="text-align: center;">$\pm 5\%$</td> </tr> <tr> <td style="text-align: center;"> $< 100\text{K}\Omega$</td> <td style="text-align: center;">$\pm 5\%$</td> </tr> <tr> <td style="text-align: center;"> $\geq 100\text{K}\Omega$</td> <td style="text-align: center;">$\pm 10\%$</td> </tr> </tbody> </table>	Resistance value	$\Delta R/R$	Wire-wound	$\pm 5\%$	Power film :	$\pm 5\%$	$< 100\text{K}\Omega$	$\pm 5\%$	$\geq 100\text{K}\Omega$	$\pm 10\%$	Resistance change after 1,000 hours operating at RCWV with duty cycle of (1.5 hours "on", 0.5 hour "off") in a humidity test chamber controlled at $40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and 90 to 95 % relative humidity (Sub-clause 4.24.2.1)					
Resistance value	$\Delta R/R$																
Wire-wound	$\pm 5\%$																
Power film :	$\pm 5\%$																
$< 100\text{K}\Omega$	$\pm 5\%$																
$\geq 100\text{K}\Omega$	$\pm 10\%$																
Load life	<table border="1" style="width: 100%;"> <thead> <tr> <th style="text-align: center;">Resistance value</th> <th style="text-align: center;">$\Delta R/R$</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Wire-wound</td> <td style="text-align: center;">$\pm 5\%$</td> </tr> <tr> <td style="text-align: center;">Power film :</td> <td style="text-align: center;">$\pm 5\%$</td> </tr> <tr> <td style="text-align: center;"> $< 100\text{K}\Omega$</td> <td style="text-align: center;">$\pm 5\%$</td> </tr> <tr> <td style="text-align: center;"> $\geq 100\text{K}\Omega$</td> <td style="text-align: center;">$\pm 10\%$</td> </tr> </tbody> </table>	Resistance value	$\Delta R/R$	Wire-wound	$\pm 5\%$	Power film :	$\pm 5\%$	$< 100\text{K}\Omega$	$\pm 5\%$	$\geq 100\text{K}\Omega$	$\pm 10\%$	Permanent resistance change after 1,000 hours operating at RCWV with duty cycle of (1.5 hours "on", 0.5 hour "off") at $70^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ambient (Sub-clause 4.25.1)					
Resistance value	$\Delta R/R$																
Wire-wound	$\pm 5\%$																
Power film :	$\pm 5\%$																
$< 100\text{K}\Omega$	$\pm 5\%$																
$\geq 100\text{K}\Omega$	$\pm 10\%$																

Cement Fixed Resistors

6. Dimension :

Unit : mm

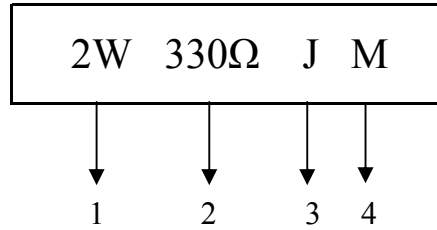


Type	Rating Wattage	W±1	D±1	L±1	d ± 0.05	H	Wire-wound Resistance Range	Power Film Resistance Range
PRW	1W	6	6	13.5	0.70	25 ± 3	1Ω ~ 27Ω	28Ω ~ 100KΩ
PRW	2W	7	7	18	0.70	28 ± 5	0.1Ω ~ 27Ω	28Ω ~ 120KΩ
PRW	3W	8	8	22	0.70	32 ± 5	0.1Ω ~ 39Ω	40Ω ~ 150KΩ
PRW	5W	10	9	22	0.75	35 ± 5	0.1Ω ~ 47Ω	48Ω ~ 150KΩ
PRW	7W	10	9	35	0.75	35 ± 5	0.1Ω ~ 680Ω	681Ω ~ 200KΩ
PRW	10W	10	9	49	0.75	35 ± 5	0.1Ω ~ 910Ω	911Ω ~ 200KΩ
PRW	15W	12.5	11.5	49	0.75	35 ± 5	1Ω ~ 1KΩ	1.1KΩ ~ 200KΩ
PRW	20W	14.5	13.5	60	0.75	35 ± 5	2Ω ~ 1.2KΩ	1.3KΩ ~ 200KΩ
PRW	25W	14.5	13.5	64	0.75	35 ± 5	2Ω ~ 1.2KΩ	1.3KΩ ~ 200KΩ

Cement Fixed Resistors

7. Marking :

Ex.



Code description and regulation

1. Wattage Rating
2. Nominal Resistance Value
3. Resistance Tolerance.

J : ± 5 %

K : ± 10 %

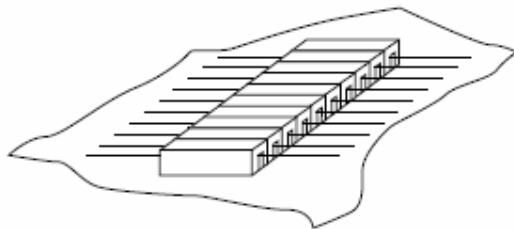
4. Pattern:

M: Power film

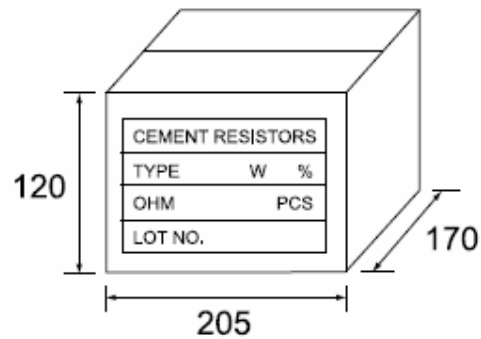
W: Wire wound

Color of marking: Black ink

8. Packing :



plastic bag

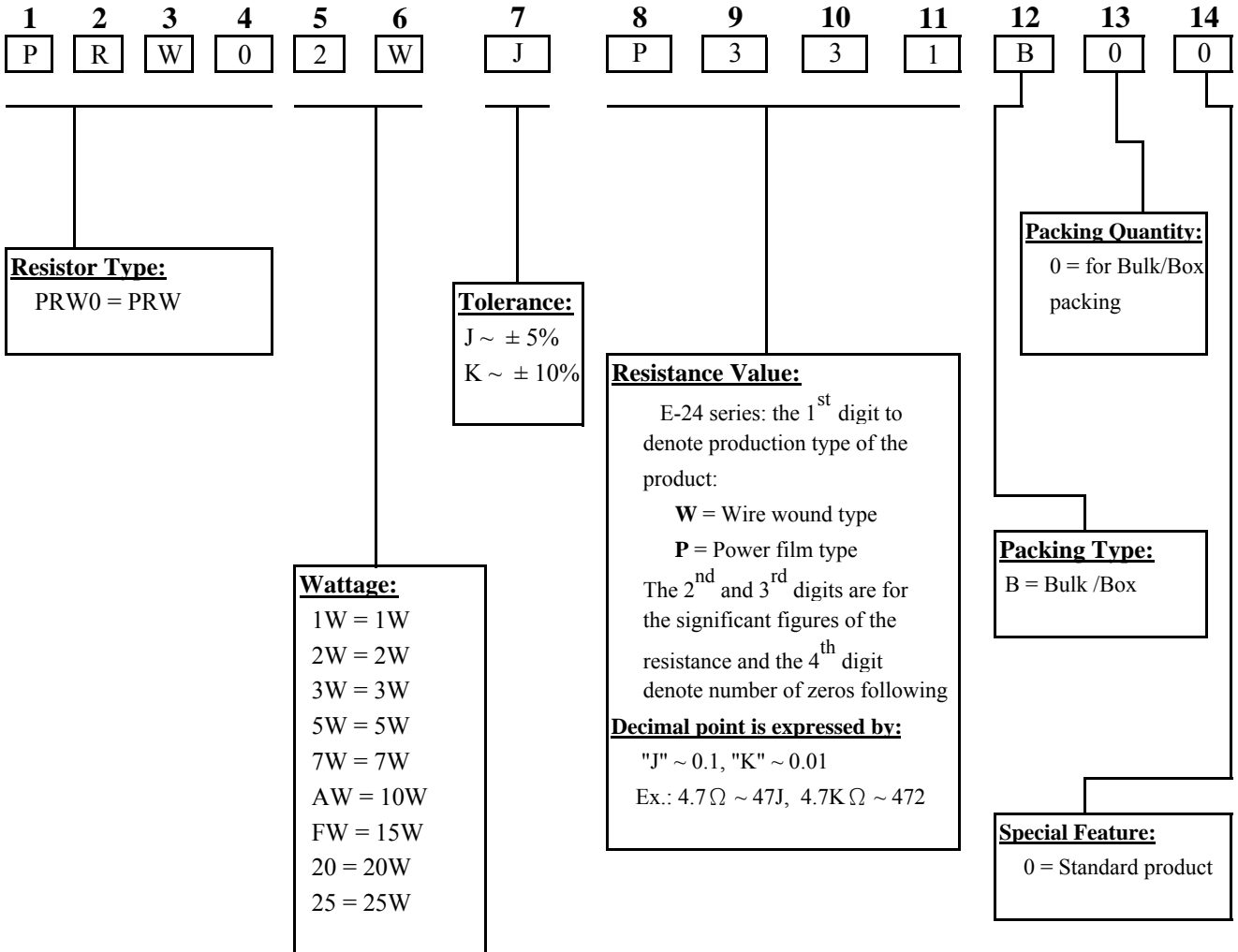


Inner box

Type	Rating Wattage	Qty/plastic Bag (pcs)	Qty/Inner Box (pcs)	Qty/Carton (pcs)	Carton size L x W x H (±5)
PRW	1W	10	500	3,000	485 x 190 x 200
PRW	2W	10	400	2,400	485 x 190 x 200
PRW	3W	10	500	3,000	520 x 220 x 250
PRW	5W	10	400	2,400	520 x 220 x 250
PRW	7W	10	300	1,800	520 x 220 x 250
PRW	10W	10	250	1,500	520 x 220 x 250
PRW	15W	10	70	420	510 x 200 x 250
PRW	20W	10	60	360	510 x 200 x 250
PRW	25W	10	60	360	510 x 200 x 250

Part Number System

Explanation of Part Number System (Cement Fixed Resistors)



Sample: PRW 2W +/- 5% (Power film type) 330Ω B/B → PRW02WJP331B00

Cement Fixed Resistor

Environment Related Substance

This product complies to EU RoHS directive, EU PAHs directive, EU PFOS directive and Halogen free.

Ozone layer depleting substances.

Ozone depleting substances are not used in our manufacturing process of this product.

This product is not manufactured using Chloro fluorocarbons (CFCs), Hydrochlorofluorocarbons (HCFCs), Hydrobromofluorocarbons (HBFCs) or other ozone depleting substances in any phase of the manufacturing process.

Storage Condition

The performance of these products, including the solderability, is guaranteed for a year from the date of arrival at your company, provided that they remain packed as they were when delivered and stored at a temperature of $25^{\circ}\text{C} \pm 10^{\circ}\text{C}$ and a relative humidity of $60\% \text{RH} \pm 10\% \text{RH}$, chemical and dust free atmosphere

Even within the above guarantee periods, do not store these products in the following conditions. Otherwise, their electrical performance and/or solderability may be deteriorated, and the packaging materials (e.g. taping materials) may be deformed or deteriorated, resulting in mounting failures.

1. In salty air or in air with a high concentration of corrosive gas, such as Cl_2 , H_2S , NH_3 , SO_2 , or NO_2
2. In direct sunlight