# Thick film chip resistors

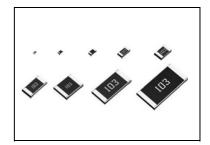
**MCR** series

## Features

ROHM

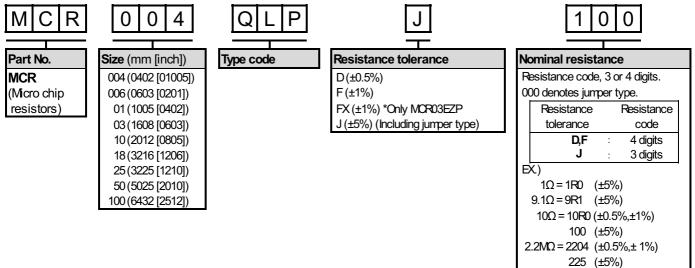
1) Full line up from ultra small size (01005) to 2512 with jumper type.

- 2) High reliability metal glazed thick film.
- 3) ROHM resistors have obtained ISO9001/ISO/TS16949 certification.



Part No.	Siz (mm)	ze (inch)	Type code	Packaging specifications	Quantity / Reel	Automotive Grade Available
MCR004	0402	01005	QLP	Paper tape(2mmPtch)	20,000	-
MCR006	0603	0201	YLP	Paper tape(2mmPtch)	15,000	Yes
MCR01	1005	0402	MZP	Paper tape(2mmPtch)	10,000	Yes
MCR03	1608	0603	EZP	Paper tape(4mmPitch)	5,000	Yes
MCR10	2012	0805	EZP	Paper tape(4mmPitch)	5,000	Yes
MCR18	3216	1206	EZP	Paper tape(4mmPtch)	5,000	Yes
MCR25	3225	1210	JZH	Embossed tape(4mm Ptch)	4,000	Yes
MCR50	5025	2010	JZH	Embossed tape(4mm Ptch)	4,000	Yes
MCR100	6432	2512	JZH	Embossed tape(4mm Ptch)	4,000	Yes

## Part number description



## MCR series

### Products list

		Rated power	Limiting element	Temperature	Resistance	Resistance rang	o Operatir	ng
Part No.	Type code	(70°C)	voltage	coefficient	tolerance	-	temperature	range
		(VV)	(V)	(ppm/°C)	(%)	(Ω)	(°°)	
				±300	F(±1%)	10≦R<100 (E24/96 s	series)	
				±250	F(±1%)	100≦R≦3M (E24/96s	series)	
MCR004	QLP	0.031	15	+600/-100	J(±5%)	1.0≦R<10 (E24 seri	ies) -55 ~ +1	175
IVICRU04	QLF			±300	J(±5%)	10≦R<100 (E24 seri	ies) -55 ~ +1	125
				±250	J(±5%)	100≦R≦3M (E24 seri	ies)	
			Jumper	type)Rmax: 50				
				±200	D(±0.5%)	10≦R<1k (E24/96 s	series)	
				±100	D(±0.5%)	1k≦R≦1M (E24/96s	series)	
MCR006	YLP	0.05	25	±250	F(±1%)	10≦R≦10M (E24/96s	series) -55 ~ +1	105
INCRUUG	TLP			+600 / -200	J(±5%)	1≦R<10 (E24 seri	ies) -55 ~ +1	125
				±250	J(±5%)	10≦R≦10M (E24 seri	ies)	
			Jumper	type) Rmax : 50	mΩMax., Imax	0.5A		
				±100	D(±0.5%)	10≦R<100 (E24 seri	ies)	
				±50	D(±0.5%)	100≦R≦1M (E24 seri	ies)	
MCR01	MZP	0.063	50	±100	F(±1%)	10≦R≦2.2M (E24/96 s	series) -55 ~ +1	155
NICRUI	IVEF			+500/-250	J(±5%)	1.0≦R<10 (E24 seri	ies) -55 ~ +1	155
				±200	J(±5%)	10≦R≦10M (E24 seri	ies)	
			Jumpe	rtype)Rmax:50	DmΩMax., Imax	: 1A		
				±100	D(±0.5%)	10≦R<100 (E24/96 s	series)	
				±50	D(±0.5%)	100≦R≦1M (E24/96 s	series)	
MCR03		0.10	50	±100	FX(±1%)	10≦R≦10M (E24/96 s	series)	155
MCR03	EZP			±400	J(±5%)	1≦R<10 (E24 seri	ies) -55 ~ +1	-55 ~ +155
				±200	J(±5%)	10≦R≦10M (E24 seri	ies)	
			Jumpe	rtype)Rmax : 50	DmΩMax., Imax	: 1A		
		0.100	150	±100	D(±0.5%)	10≦R<100 (E24/96 s	series)	166
		0.100	150	±50	D(±0.5%)	100≦R≦1M (E24/96 s	$\frac{1}{\text{series}}$ -55 ~ +1	100
MODIO				±100	F(±1%)	10≦R≦2.2M (E24/96 s	series)	
MCR10	EZP	0.125	150	±400	J(±5%)	1.0≦R<10 (E24 seri	ies)	155
				±200	J(±5%)	10≦R≦10M (E24 seri	ies) -55 ~ +1	100
			Jumpe	rtype)Rmax:50	DmΩMax., Imax			
		0 125	200	±100	D(±0.5%)	10≦R<100 (E24/96 s	series) $-55 \sim +1$	155
		0.125	200	±50	D(±0.5%)	100≦R≦1M (E24/96 s	series) -55 ~ +1	100
MODIO				±100	F(±1%)	10≦R≦2.2M (E24/96 s	series)	
MCR18	EZP	0.25	200	±400	J(±5%)	1.0≦R<10 (E24 seri	ies) -55 ~ +1	166
				±200	J(±5%)	10≦R≦10M (E24 seri	ies) -55 ~ +1	100
			Jumpe	rtype)Rmax : 50	OmΩMax., Imax	: 2A		
				±100	F(±1%)	10≦R≦1M (E24/96 s	series)	
		0.5 to 0.5 <sup>*1</sup>	200	500±350	J(±5%)	1.0≦R<2.2 (E24 seri	ies)	
MCR25	JZH	0.5 to 0.5	200	±500	J(±5%)	2.2≦R<5.6 (E24 seri	ies) -55 ~ +1	155
				±200	J(±5%)	5.6≦R≦3.3M (E24 seri	ies)	
			Jumpe	rtype)Rmax : 50	<u>O</u> mΩMax., Imax			
				±100	F(±1%)	$10 \le R \le 180k$ (E24/96 s		
				500±350	J(±5%)	1.0 ≦ R < 2.2 (E24 seri	ies)	
MCR50	JZH	0.5	200	±500	J(±5%)	2.2 ≦ R < 10 (E24 seri	ies) -55 ~ +1	155
	JZII			±200	J(±5%)	$10 \leq R \leq 330k$ (E24 seri	ies)	155
				±350	J(±5%)	330k < R ≦ 560k (E24 seri	ies)	
			Jumpe	rtype)Rmax:50				<u> </u>
				±100	F(±1%)	10≦R≦82k (E24/96 s	series)	
				500±350	J(±5%)	1.0≦R<2.2 (E24 seri	ies)	
MCD400	1711	1	200	±500	J(±5%)	2.2≦R<10 (E24 seri	ies)	105
MCR100	JZH			±350	J(±5%)	10≦R<24 (E24 seri	ies) -55 ~ +1	120
				±200	J(±5%)	24≦R≦100k (E24 seri	ies)	
			lumpe	r type) Rmax : 50				

\* Design and specifications are subject to change without notice. Carefully check the specification sheet supplied with the product before using or ordering it.

\* Rated voltage is determained from the following.

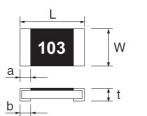
When rated voltage exceeds the limiting element voltage, the limiting element voltage shall be the rated voltage.

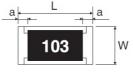
\* Rated voltage =  $\sqrt{\text{Rated power} \times \text{Rasistance}}$ 

\* E24 : Standard products, E96 : Custom products

\*1. Rated power  $~1\Omega \sim 9.76\Omega$  :  $0.25W,~10\Omega \sim 9.76k\Omega$  :  $0.5W,~10k\Omega \sim 3.3M\Omega$  : 0.33W

## ●Chip resistor dimensions and markings ■MCR 004 / 006 / 01 / 03 ■MCR 10 / 18 / 25 / 50 / 100





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## <Marking method>

There are three or four digits used for the calculation number according to IEC code and Ris used for the decimal point.

	•		b	← → <mark>D</mark>		(Unit:mm)			
Part No.	Type code	(mm)	(inch)	L	W	t	а	b	Marking existence
MCR004	QLP	0402	01005	0.40 ±0.02	0.20 ±0.02	0.13±0.02	0.10±0.03	0.10±0.03	No
MCR006	YLP	0603	0201	0.60 ±0.03	0.30 ±0.03	0.23±0.03	0.10±0.05	0.15±0.05	No
MCR01	MZP	1005	0402	1.00 ±0.05	0.50 ±0.05	0.35±0.05	0.20±0.10	0.25 <sup>+0.05</sup> -0.10	No
MCR03	EZP	1608	0603	1.60 ±0.10	0.80 ±0.10	0.45±0.10	0.30±0.20	0.30±0.20	Yes*
MCR10	EZP	2012	0805	2.00 ±0.10	1.25±0.10	0.55±0.10	0.40±0.20	0.40±0.20	Yes
MCR18	EZP	3216	1206	3.20 ±0.15	1.60 ±0.15	0.55±0.10	0.50 ±0.25	0.50±0.25	Yes
MCR25	JZH	3225	1210	3.20 ±0.15	2.50 ±0.15	0.55±0.10	0.50 ±0.25	0.50±0.25	Yes
MCR50	JZH	5025	2010	5.00 ±0.15	2.50 ±0.15	0.55±0.15	0.60±0.25	0.60±0.25	Yes
MCR100	JZH	6432	2512	6.30 ±0.15	3.20 ±0.15	0.55±0.15	0.60±0.25	0.60±0.25	Yes

## Marking method of jumper type

Jumper type	Marking existence
MCR 004 / 006 / 01 / 25 / 50 / 100	No
MCR 03 / 10 / 18	Yes

\*Marking method of MCR25/50/100

Blueglass over coat is used for the jumper type.

There is no marking on the jumper type.

\*Marking method of MCR03

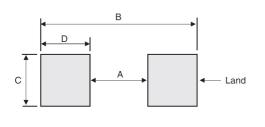
For MCR03 series resistors, the printing process restricts the marking to three digits/characters.

Consequently, 1% tolerance resistors with values from the E24 series will be marked the same as 5% resistors with the same value, but 1% tolerance resistors with values from the E96 series will not be marked.

#### Examples:

MCR03EZPJ243 MCR03EZPFX2402 MCR03EZPFX2432	$\begin{array}{l} (5\% \text{ tolerance, E24 / 24 k}\Omega ) \\ (1\% \text{ tolerance, E24 / 24 k}\Omega ) \\ (1\% \text{ tolerance, E96 / 24.3 k}\Omega ) \end{array}$	Marking = 243 Marking = 243 No Marking
MCR18EZPJ243 MCR18EZFF2402 MCR18EZFF2432	$\begin{array}{l} (5\% \mbox{ tolerance, E24 / 24 k} \Omega \ ) \\ (1\% \mbox{ tolerance, E24 / 24 k} \Omega \ ) \\ (1\% \mbox{ tolerance, E96 / 24.3 k} \Omega \ ) \end{array}$	Marking = 243 Marking = 2402 Marking = 2432

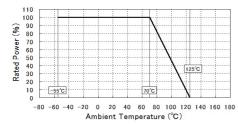
## •Land pattern example

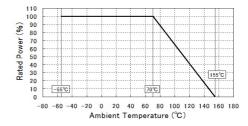


				(Unit:mm)
Dimensions Part No.	А	В	С	D
MCR004	0.12	0.48	0.22	0.18
MCR006	0.3	0.84	0.3	0.27
MCR01	0.5	1.3	0.5	0.4
MCR03	1.0	2.0	0.8	0.5
MCR10	1.2	2.6	1.15	0.7
MCR18	2.2	4.0	1.5	0.9
MCR25	2.2	4.0	2.3	0.9
MCR50	3.8	6.0	2.3	1.1
MCR100	5.1	8.1	3.0	1.5

## •Derating curve

When the ambient temperature exceeds 70°C, power dissipation must be adjusted according to the derating curves below. **MCR 004 / 100 MCR 006 / 01 / 03 / 10 / 18 / 25 / 50** 



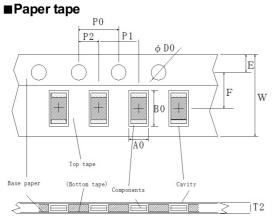


## Characteristics

	Test items			Gu	aranteed	value			Test conditions	
	lest tierns		Resistor type Jumper type			r type				
Resistance	9			Se	e "Product	s list"		20°C		
Variation o with tempe	f resistance erature			Se	e "Product	s list"		Measure	ment: +25/-55, +25/+125°C	
Overload			±(2.0	%+0.1Ω)		MAX. 5	0mΩ	Test voltage is the smaller one of ① or ② ①Rated voltage(current)×2.5, 2s ②Maximum overload voltage ※		
Solderabilit	У		A new uniform coati 95% of the surface no soldering damage					Rosin-ethanol solution(25% weight) Soldering condition: 245±5°C Duration of immersion: 2.0±0.5s		
Resistance soldering h				%+0.05Ω) markable at		MAX. 5 on the appe	••••		g condition: 260±5°C of immersion: 10±1s	
Rapid char temperatur			±(1.0%+0.05Ω)			MAX. 5	OmΩ	Test temp. -55°c~+125°c 1000cycle(MOR01) -55°c~+125°c 100cycle(MOR04/006) -55°c~+125°c 5cycle(MOR03/10/18/25/50/100)		
Damp heat	, steady stat	e	$\pm (3.0\% + 0.1\Omega)$			MAX. 100mΩ		40°C, 93%(Relative humidity) Test time: 1.000h		
Endurance	at 70°c		±(3.0%+0.1Ω)			MAX. 100mΩ			ltage(current),70°C±3°C – 0.5h:OFF : 1,000h	
Endurance	9		±(3.0%+0.1Ω) MAX. 100mΩ		MAX. 100mΩ		125°C(MOR004/100) 155°C(MOR006/01/03/10/18/25/50) Test time: 1,000h			
Resistance	esistance to solvent		±(1.0%+0.05Ω) MAX. 50mΩ		MAX. 50mΩ		23±5°C, Immersion cleaning, 5±0.5min Solvent: 2-propanol			
Bend strength of		±(1.0%+0.05Ω)			MAX. 5	0mΩ				
the end face plating		Without mechanical da			e such as l	breaks.		-		
ЖМахіти	im overload	d voltage (	Test voltage	e)				1	Compliance Standard(s): IEC60115-8	
	MCR006	MCR01	MCR03	MCR10	MCR18	MCR25	MCR50	MCR100	JISC 5201-8	
30V	50V	100V	100V	200V	400V	400V	400V	400V		

## Datasheet

## **MCR** series



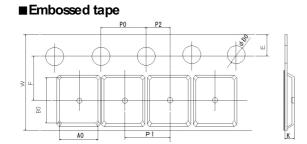
					(U	Init : mm)
Part No.	Type code	W	F	E	AO	BO
MCR004	QLP	8.0±0.20	3.5±0.05	1.75±0.10	0.24 ±0.03	0.45±0.03
MCR006	YLP	8.0±0.20	3.5±0.05	1.75±0.10	0.38±0.03	0.68±0.03
MCR01	MZP	8.0±0.3	3.5±0.05	1.75±0.1	0.7±0.1	1.2±0.1
MCR03	EZP	8.0±0.3	3.5±0.05	1.75±0.1	1.1 ±0.1	1.9±0.1
MCR10	EZP	8.0±0.3	3.5±0.05	1.75±0.1	1.65 <sup>+0.2</sup> -0.1	2.4 <sup>+0.2</sup> -0.1
MCR18	EZP	8.0±0.3	3.5±0.05	1.75±0.1	1.95 <sup>+0.1</sup> -0.05	3.5 <sup>+0.15</sup> -0.05

Part No.	Type code	D0	P0	P1	P2	T2
MCR004	QLP	Ф1.5 <sup>+0.10</sup> 0	4.0 ±0. 10	2.0±0.05	2.0±0.05	MAX0.50
MCR006	ΥLΡ	Ф1.5 <sup>+0.10</sup> 0	4.0 ±0. 10	2.0±0.05	2.0±0.05	MAX0.50
MCR01	MZP	Ф1.5 <sup>+0.1</sup>	4.0 ±0.1	2.0±0.05	2.0±0.05	MAX1.1
MCR03	EZP	Ф1.5 <sup>+0.1</sup>	4.0 ±0.1	4.0±0.1	2.0±0.05	MAX1.1
MCR10	EZP	Ф1.5 <sup>+0.1</sup>	4.00.1	4.0±0.1	2.0±0.05	MAX1.1
MCR18	EZP	Ф1.5 <sup>+0.1</sup>	4.0 ±0.1	4.0±0.1	2.0±0.05	MAX1.1

(Unit:mm)

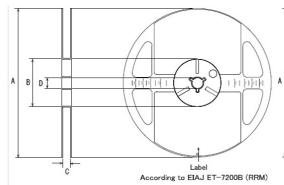
Part No.	Type code	W	F	E	AO	BO
MCR25	JZH	8.0±0.3	3.5±0.05	1.75±0.1	3.0±0.1	3.5±0.1
MCR50	JZH	12.0±0.3	5.5±0.05	1.75±0.1	3.4±0.2	5.6±0.2
MCR100	JZH	12.0±0.3	5.5±0.05	1.75±0.1	3.5±0.2	6.7±0.2

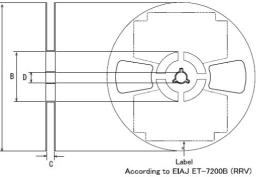
Part No.	Type code	W	F	E	AO	B0
MCR25	JZH	Ф1.5 <sup>+0.1</sup>	4.0±0.1	4.0±0.1	2.0±0.05	MAX1.1
MCR50	JZH	Ф1.5 <sup>+0.1</sup>	4.0±0.1	4.0±0.1	2.0±0.05	MAX1.1
MCR100	JZH	Ф1.5 <sub>0</sub> +0.1	4.0±0.1	4.0±0.1	2.0±0.05	MAX1.1



## Reel dimensions

## ①MCR 004/006/01/03/10/18/25/50/100





②MCR 004/006/01/03/10/18/25

(Unit:mm)

Part No.	Type code	A	В	С	D
MCR004	QLP				
MCR006	YLP				
MCR01	MZP	0	110	110	
MCR03	EZP	Ф180 <sup>0</sup> -1.5	Ф60 <sup>+1.0</sup>	9 <sup>+1.0</sup> 0	Ф13±0.2
MCR10	EZP	-1.5	0	0	
MCR18	EZP				
MCR25	JZH				
MCR50	JZH			13 <sup>+1.0</sup>	
MCR100	JZH			50	

## Notice

#### **Precaution on using ROHM Products**

1. If you intend to use our Products in devices requiring extremely high reliability (such as medical equipment <sup>(Note 1)</sup>, aircraft/spacecraft, nuclear power controllers, etc.) and whose malfunction or failure may cause loss of human life, bodily injury or serious damage to property ("Specific Applications"), please consult with the ROHM sales representative in advance. Unless otherwise agreed in writing by ROHM in advance, 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 any ROHM's Products for Specific Applications.

(Note1) Medical Equipment Classification of the Specific Ap	pplications
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JAPAN	USA	EU	CHINA	
CLASSI	CLASSⅢ	CLASS II b	CLASSⅢ	
CLASSⅣ	CLASS III	CLASSⅢ	CLASSII	

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

- 3. Our Products are not designed under any special or extraordinary environments or conditions, as exemplified below. Accordingly, ROHM shall not be in any way responsible or liable for any damages, expenses or losses arising from the use of any ROHM's Products under any special or extraordinary environments or conditions. If you intend to use our Products under any special or extraordinary environments or conditions (as exemplified below), your independent verification and confirmation of product performance, reliability, etc, prior to use, must be necessary:
  - [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<sub>2</sub>, H<sub>2</sub>S, NH<sub>3</sub>, SO<sub>2</sub>, and NO<sub>2</sub>
  - [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 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

#### **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 lonizer, 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**

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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