



ISO14001



ISO/TS16949



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REG.-Nr.A759



CQC04001610658



Specification for Approval

Customer : **Hongkong Agent**

Product Name: **LEAD-FREE METAL GLAZE FILM FIXED RESISTORS**

Part Name : **MGR SERIES ±1%、±5%**

Part No. : **MGR0**F*****0**

MGR0J*****0**

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昆山厚聲電子工業有限公司
UNIROYAL ELECTRONICS INDUSTRY (KUNSHAN) CO., LTD.



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File Name: MGR SERIES ±1%、±5%		Date	2014.10.31	Edition No.	2
Amendment Record				Signature	
Edition	Prescription of amendment	Amend Page	Amend Date	Amended by	Checked by
2	Modify the dimension and Standard Packing	4/11 10/11	2014-10-31	Chen Yuanyuan	Yao Liting

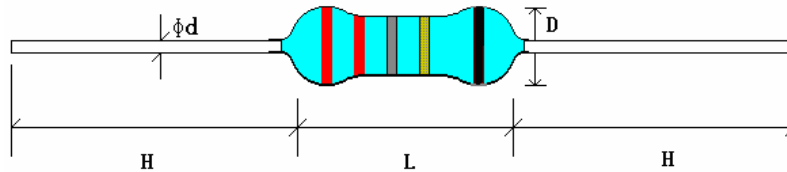
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1.0 Scope:

This specification for approve relates to Lead-Free Metal Glaze Film Fixed Resistors manufactured by ROYAL OHM.

2.0 Ratings & Dimension:



2.1 Normal size

Type	Dimension(mm)				Max Working Voltage	Max Overload Voltage	Dielectric Withstanding Voltage	Tolerance	Resistance Range
	D	L	d ±0.05	H ±3					
MGR 1/4W	2.2±0.5	6.5±1.0	0.54	28	500V	700V	500V	±1%	100KΩ~1MΩ
								±5%	1KΩ~100MΩ
MGR 1/2W	3.0±0.6	9.5±1.0	0.54	28	700V	1000V	700V	±1%	100KΩ~1MΩ
								±5%	1KΩ~100MΩ
MGR 1W	4.0±0.6	11.5±1.0	0.65	28	1000V	1400V	700V	±1%	100KΩ~1MΩ
								±5%	1KΩ~100MΩ
MGR 2W	5.0±0.6	15.5±1.0	0.75	28	1000V	1400V	700V	±1%	100KΩ~1MΩ
								±5%	1KΩ~100MΩ
MGR 3W	6.0±0.6	17.5±1.0	0.75	28	1000V	1400V	700V	±1%	100KΩ~1MΩ
								±5%	1KΩ~100MΩ

2.2 Small Size & Extra Small Size

Type	Dimension(mm)				Max Working Voltage	Max Overload Voltage	Dielectric Withstanding Voltage	Tolerance	Resistance Range
	D	L	d ±0.05	H ±3					
MGR 1/2WSS	2.2±0.5	6.5±1.0	0.54	28	500V	700V	500V	±1%	100KΩ~1MΩ
								±5%	1KΩ~33MΩ
MGR 1/2WS	3.0±0.5	9.0±1.0	0.54	28	500V	700V	500V	±1%	100KΩ~1MΩ
								±5%	1KΩ~33MΩ
MGR 1WSS	3.5±0.6	9.5±1.0	0.54	28	700V	1000V	700V	±1%	100KΩ~1MΩ
								±5%	1KΩ~33MΩ
MGR 1WS	3.5±0.6	9.5±1.0	0.60	28	700V	1000V	700V	±1%	100KΩ~1MΩ
								±5%	1KΩ~33MΩ
MGR 2WSS	4.0±0.6	11.5±1.0	0.65	28	1000V	1400V	700V	±1%	100KΩ~1MΩ
								±5%	1KΩ~33MΩ
MGR 2WS	4.5±0.6	11.5±1.0	0.65	28	1000V	1400V	700V	±1%	100KΩ~1MΩ
								±5%	1KΩ~33MΩ
MGR 3WSS	4.5±0.6	11.5±1.0	0.75	28	1000V	1400V	700V	±1%	100KΩ~1MΩ
								±5%	1KΩ~33MΩ
MGR 3WS	5.0±0.6	15.5±1.0	0.75	28	1000V	1400V	700V	±1%	100KΩ~1MΩ
								±5%	1KΩ~33MΩ

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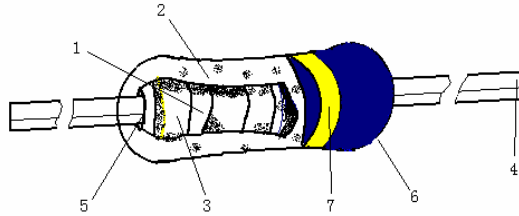
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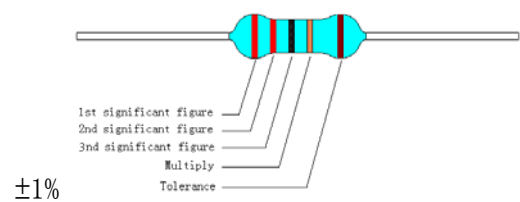
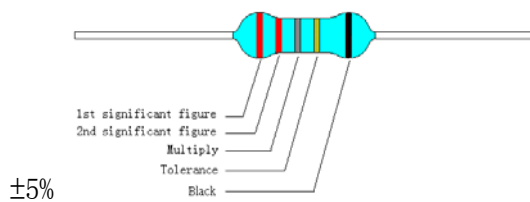
3.0 Construction:



No.	Name	Material
1	Basic Body	Rod type ceramics
2	Resistor	Metal Glaze Film (Ruthenium Oxide)
3	End Cap	Steel (Tin-Plated iron surface)
4	Lead Wire	Tin solder coated copper wire
5	Joint	By Welding
6	Coating	Color: 1/4W: (BLUE) 1/2WSS,1/2WS,1/2W, 1WS, 1W, 2WSS,2WS,2W, 3WSS,3WS 3W: (LIGHT SKY BLUE)
7	Color Code	Epoxy Resin

4.0 Resistor marked:

Resistors shall be marked with color coding
Colors shall be in accordance with JIS C 0802



4.1 Label:

Label shall be marked with following items:

- (1) Type and style
- (2) Nominal resistance
- (3) Resistance tolerance
- (4) Quantity
- (5) Lot number
- (6) PPM

Example:

METAL GLAZE FILM FIXED RESISTORS	
WATT: 1/2W	VAL: 750KΩ
Q'TY: 1,000	TOL: 1%
LOT: 4021548	PPM:

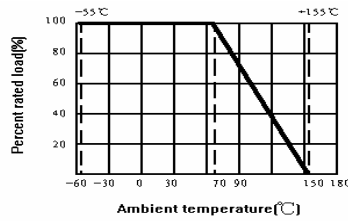
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5.0 Derating Curve:

Resistors shall have a power rating based on continuous load operation at an ambient temperature from -55°C to 70°C. For temperature in excess of 70°C, the load shall be derate as shown in figure 1

Figure1



5.1 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:

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

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

P = power rating (WATT.) R = nominal resistance (OHM)

The overload voltage is 2.5 times RCWV or Max. Overload voltage whichever is less.

6.0 Performance Specification:

Characteristic	Limits	Test Method (JIS-C-5201&JIS-C-5202)
Temperature Coefficient	±200PPM/°C Max..	4.8 natural resistance changes per temp. Degree centigrade $\frac{R_2 - R_1}{R_1(T_2 - T_1)} \times 10^6 \text{ (PPM/°C)}$ R ₁ : Resistance value at room temp. (T ₁) R ₂ : Resistance value at room temp.+100°C (T ₂) Test pattern: room temp. (T ₁), room temp. +100°C (T ₂)
Short-time overload	Resistance change rate is: ±(1%+0.05Ω)Max. With no evidence of mechanical damage.	4.13 Permanent resistance change after the application of a potential of 2.5 times rcwv for 5 seconds.
Dielectric withstanding voltage	No evidence of flashover mechanical damage, arcing or insulation break down.	4.7 Resistors shall be clamped in the trough of a 90°metallic v-block and shall be tested at ac potential respectively specified in the above list for 60-70 seconds.
Pulse overload	Resistance change rate is: ± (2%+0.05Ω) Max. With no evidence of mechanical damage.	4.28 Resistance change after 10,000 cycles (1 second "ON", 25 seconds "OFF") at 4 timesRCWV.
Resistance to soldering heat	Resistance change rate is: ± (1%+0.05Ω) Max. With no evidence of mechanical damage	4.18 Permanent resistance change when leads immersed to a point 2.0-2.5mm from the body in 260°C±5°C solder for 10±1 seconds.
Resistance to solvent	No deterioration of protective coatings & markings	4.29 Specimens shall be immersed in a bath of trichloroethylene completely for 3 min. With ultrasonic

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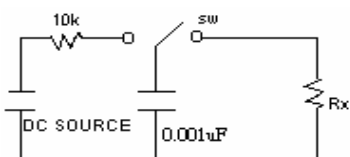
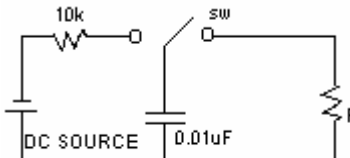
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Terminal strength	No evidence of mechanical damage	4.16 Direct load: Resistance to a 2.5 kg direct load for 10 seconds in the direction of the longitudinal axis of the terminal leads. Twist test: Terminal leads shall be bent through 90° at a point 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.																																							
Solderability	95% coverage min.	4.17 The area covered with a new, smooth, clean, shiny and continuous surface free from concentrated pinholes. Test temp. Of solder: 245°C ± 3°C Dwell time in solder: 2~3seconds.																																							
Temperature cycling	Resistance change rate is: ±(1%+0.05Ω) Max.. With no evidence of mechanical damage.	4.19 Resistance change after continuous five cycles for duty cycle specified: <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature</th> <th>Time</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-55°C ± 3°C</td> <td>30 mins</td> </tr> <tr> <td>2</td> <td>Room temp.</td> <td>10 – 15 mins</td> </tr> <tr> <td>3</td> <td>+155°C ± 2°C</td> <td>30 mins</td> </tr> <tr> <td>4</td> <td>Room temp.</td> <td>10 – 15 mins</td> </tr> </tbody> </table>	Step	Temperature	Time	1	-55°C ± 3°C	30 mins	2	Room temp.	10 – 15 mins	3	+155°C ± 2°C	30 mins	4	Room temp.	10 – 15 mins																								
Step	Temperature	Time																																							
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4	Room temp.	10 – 15 mins																																							
Load life in humidity	Resistance change rate is: ±(5%+0.05Ω)Max. With no evidence of mechanical damage.	7.9 resistance change after 1,000 hours (1.5 hours "ON", 0.5 hour "OFF") at RCWV in a humidity test chamber controlled at 40°C ± 2°C and 90 to 95% relative humidity.																																							
Load life	Resistance change rate is: ±(5%+0.05Ω)Max. With no evidence of mechanical damage.	4.25.1 permanent resistance change after 1,000 hours operating at RCWV with duty cycle of 1.5 hours "ON", 0.5 hour "OFF" at 70°C ± 2°C ambient.																																							
Surge withstanding voltage	Allowable resistance change: ±20% Test circuit: 	The following discharge cycle is repeated in the circuit in the left fig. 2.5 sec. ON, 2.5 sec. OFF, 50cycles Applied voltage (DC source) <table border="1"> <thead> <tr> <th>Resistance Range</th> <th>1/4W, 1/2W, 1W, 2W, 3W,</th> </tr> </thead> <tbody> <tr> <td>100KΩ-100MΩ</td> <td>10KV</td> </tr> </tbody> </table>	Resistance Range	1/4W, 1/2W, 1W, 2W, 3W,	100KΩ-100MΩ	10KV																																			
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Allowable resistance change: ±10% Test circuit: 	The following discharge cycle is repeated in the circuit in the left fig. 2.5 sec. "ON", 2.5 sec "OFF", 10 cycles Applied voltage (DC source) <table border="1"> <thead> <tr> <th>Resistance range</th> <th>1/2WSS</th> <th>1/2WS</th> <th>1WSS</th> <th>1WS</th> </tr> </thead> <tbody> <tr> <td>100K-1M</td> <td>3000V</td> <td>3000V</td> <td>4000V</td> <td>4000V</td> </tr> <tr> <td>1M1-6M2</td> <td>4000V</td> <td>4000V</td> <td>5000V</td> <td>5000V</td> </tr> <tr> <td>≥6M8</td> <td>6000V</td> <td>6000V</td> <td>8000V</td> <td>8000V</td> </tr> <tr> <th>Resistance range</th> <th>2WSS</th> <th>2WS</th> <th>3WSS</th> <th>3WS</th> </tr> <tr> <td>100K-1M</td> <td>5000V</td> <td>5000V</td> <td>5000V</td> <td>8000V</td> </tr> <tr> <td>1M1-6M2</td> <td>6000V</td> <td>6000V</td> <td>6000V</td> <td>9000V</td> </tr> <tr> <td>≥6M8</td> <td>9000V</td> <td>9000V</td> <td>9000V</td> <td>10000V</td> </tr> </tbody> </table>	Resistance range	1/2WSS	1/2WS	1WSS	1WS	100K-1M	3000V	3000V	4000V	4000V	1M1-6M2	4000V	4000V	5000V	5000V	≥6M8	6000V	6000V	8000V	8000V	Resistance range	2WSS	2WS	3WSS	3WS	100K-1M	5000V	5000V	5000V	8000V	1M1-6M2	6000V	6000V	6000V	9000V	≥6M8	9000V	9000V	9000V	10000V
Resistance range	1/2WSS	1/2WS	1WSS	1WS																																					
100K-1M	3000V	3000V	4000V	4000V																																					
1M1-6M2	4000V	4000V	5000V	5000V																																					
≥6M8	6000V	6000V	8000V	8000V																																					
Resistance range	2WSS	2WS	3WSS	3WS																																					
100K-1M	5000V	5000V	5000V	8000V																																					
1M1-6M2	6000V	6000V	6000V	9000V																																					
≥6M8	9000V	9000V	9000V	10000V																																					

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7.0 Explanation of Part No. System:

The standard Part No. includes 14 digits with the following explanation:

7.1 Coated type, the 1st to 3rd digits are to indicate the product type and 4th digit is the special feature.

Example: MGR0= Metal Glaze film fixed Resistors;

7.2 5th~6th digits:

7.2.1 This is to indicate the wattage or power rating. To dieting the size and the numbers,

The following codes are used; and please refer to the following chart for detail:

W=Normal Size; S=Small Size; U=Extra Small Size; “1” ~ “G” to denotes “1” ~ “16” as Hexadecimal:

1/16W~1/2W (<1W)

Wattage	1/2	1/3	1/4	1/5	1/6	1/8	1/10	1/16
Normal Size	W2	W3	W4	W5	W6	W8	WA	WG
Small Size	S2	S3	S4	S5	S6	S8	SA	SG
Extra Small Size	U2	U3	U4	U5	U6	U8	UA	UG

1W~16W ($\geq 1W$)

Wattage	1	2	3	5	7	8	9	10	15
Normal Size	1W	2W	3W	5W	7W	8W	9W	AW	FW
Small Size	1S	2S	3S	5S	7S	8S	9S	AS	FS
Extra Small Size	1U	2U	3U	5U	7U	8U	9U	AU	FU

7.2.2 For power rating less than 1 watt, the 5th digit will be the letters W, S or U to represent the size required & the 6th digit will be a number or a letter code.

Example: WA=1/10W; U2=1/2W-SS.

7.2.3 For power of 1 watt to 16 watt, the 5th digit will be a number or a letter code and the 6th digit will be the letters of W, S or U.

Example: AW=10W; 3S=3W-S

7.3 The 7th digit is to denote the Resistance Tolerance. The following letter code is to be used for indicating the standard Resistance Tolerance.

F=±1% G=±2% J=±5% K= ±10%

7.4 The 8th to 11th digits is to denote the Resistance Value.

7.4.1 For the standard resistance values of E-24 series, the 8th digit is “0”, the 9th & 10th digits are to denote the significant figures of the resistance and the 11th digit is the number of zeros following;

For the standard resistance values of E-96 series, the 8th digit to the 10th digits is to denote the significant figures of the resistance and the 11th digit is the zeros following.

7.4.2 The following number s and the letter codes are to be used to indicate the number of zeros in the 11th digit:

0=10⁰ 1=10¹ 2=10² 3=10³ 4=10⁴ 5=10⁵ 6=10⁶ J=10⁻¹ K=10⁻² L=10⁻³ M=10⁻⁴

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7.4.3 The 12th, 13th & 14th digits.

The 12th digit is to denote the Packaging Type with the following codes:

- A=Tape/Box (Ammo pack) B=Bulk/Box
- T=Tape/Reel P=Tape/Box of PT-26 products

7.4.4 The 13th digit is normally to indicate the Packing Quantity of Tape/Box & Tape/Reel packaging types. The following letter code is to be used for some packing quantities:

- A=500pcs B=2500pcs C=10000pcs D=20000pcs G=25000pcs H=50000pcs

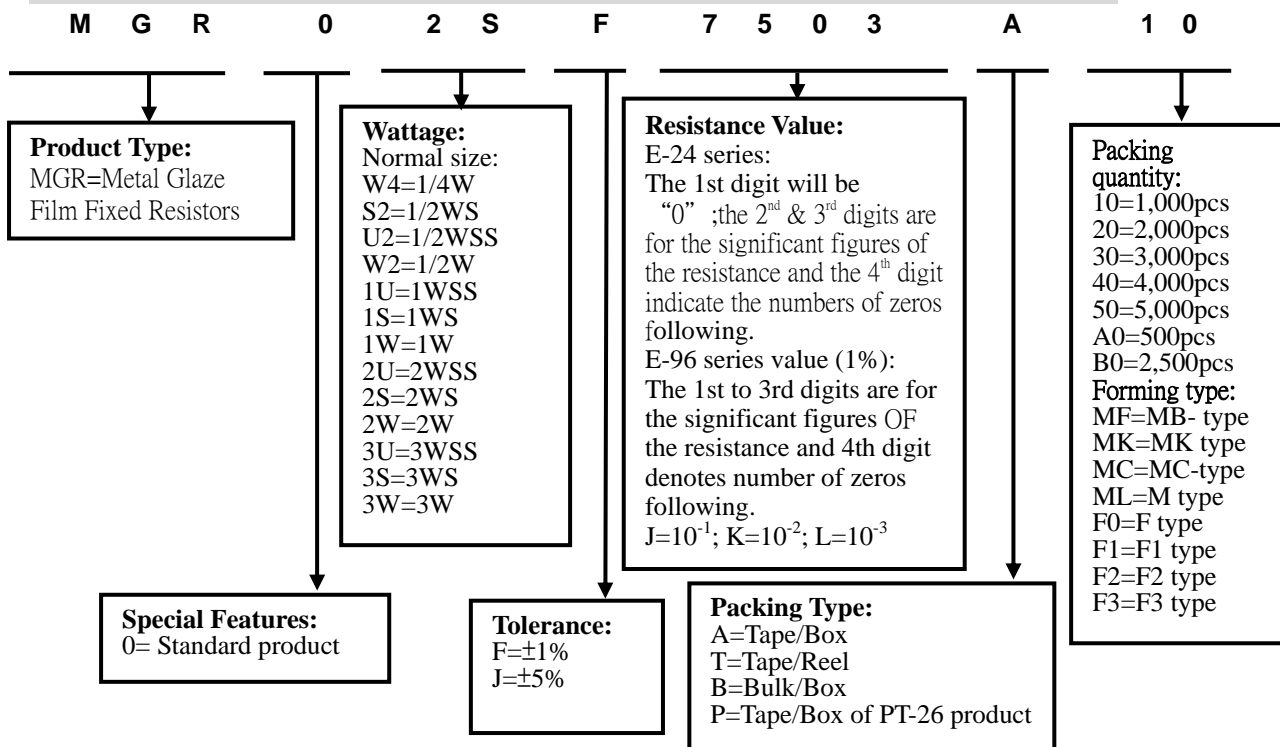
7.4.5 For the FORMED type products, the 13th & 14th digits are used to denote the forming types of the product with the following letter codes:

- MF=M-type with flattened lead wire F0= F-type
- MK= M-type with kinked lead wire F1= F1-type
- ML= M-type with normal lead wire F2= F2-type
- MC= M type with kinked lead and narrow pitch wire F3= F3-type

7.4.6 For some items, the 14th digit alone can use to denote special features of additional information with the following codes:

- P=Panaset type 1=Avisert type 1 2=Avisert type 2
- 3=Avisert type 3 A=Cutting type CO 1/4W-A type B= Cutting type CO 1/4W-B type

8.0 Ordering Procedure (Example: MGR 2WS ±1% 750KΩ T/B-1000)



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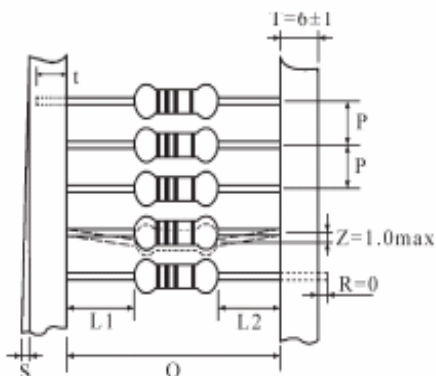
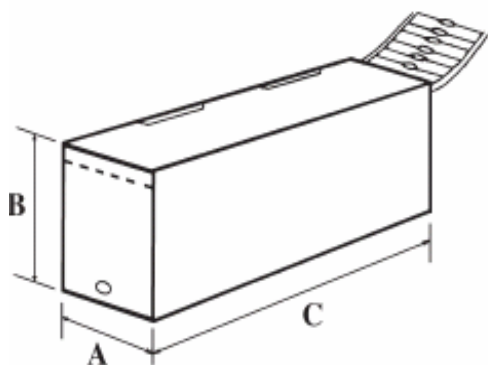


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9.0 Standard Packing:



*L1-L2=1.0 Max.

ZW: 0

**S=0.5 Max.

PT-26: 0.8 Max.

Dimension of T/B (mm)

Part No.	O	P	A±5	B±5	C±5	Qty/Box
MGR 1/4W	52±1	5±0.3	75	116	255	4000 PCS
MGR 1/2WSS	52±1	5±0.3	75	116	255	4000 PCS
MGR 1/2WS	52±1	5±0.3	75	45	255	1000 PCS
MGR 1/2W	52±1	5±0.3	75	70	255	1000 PCS
MGR 1WSS	52±1	5±0.3	75	70	255	1000 PCS
MGR 1WS	58±1	5±0.3	80	82	255	1000 PCS
MGR 1W	58±1	5±0.3	80	82	255	1000 PCS
MGR 2WSS	58±1	5±0.3	80	82	255	1000 PCS
MGR 2WS	58±1	5±0.3	80	82	255	1000 PCS
MGR 2W	65±5	10±0.5	90	119	255	1000PCS
MGR 3WSS	58±1	5±0.3	80	82	255	1000 PCS
MGR 3WS	65±5	10±0.5	90	119	255	1000PCS
MGR 3W	65±5	10±0.5	90	88	255	500 PCS

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10.0 Storage:

10.1 ROYAL OHM recommend the storage condition temperature: 15°C~35°C, humidity :25%~75%.

(Put condition for individual product)

Even under ROYAL OHM recommended storage condition, solderability of products over 1 year old.

(Put condition for each product) may be degraded.

10.2 Store / transport cartons in the correct direction, which is indicated on a carton as a symbol.

Otherwise bent leads may occur due to excessive stress applied when dropping of a carton.

10.3 Product performance and soldered connections may deteriorate if the products are stored in the following places:

- a. Storage in high Electrostatic
- b. Storage in direct sunshine 、rain and snow or condensation
- c. Where the products are exposed to sea winds or corrosive gases, including Cl₂, H₂S₃ NH₃, SO₂, NO₂.

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