



The Customer Relationship Experts.



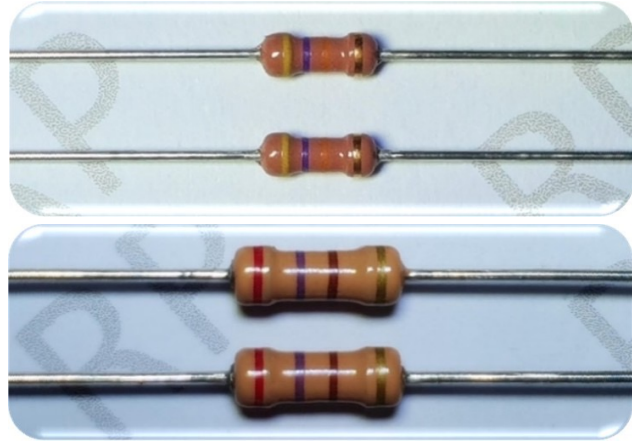
(주) 알피전자
Resistor Professional Electronics Co.,Ltd.

Resistors and Components Technology

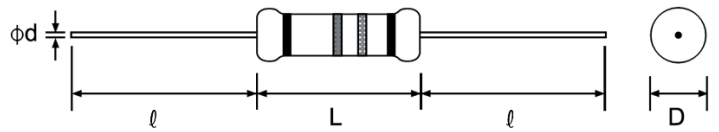
This Catalogue is copyright 2024

TABLE OF CONTENTS

Model	Description	Page
RD	탄소피막 고정저항기 Fixed Carbon Film Resistors	3~4
RN	금속피막 고정저항기 Fixed Metal Film Resistors	5~6
MOR	산화금속피막 고정저항기 Fixed Metal Oxide Film Resistors	7~8
MOF	휴즈형 금속피막 저항기 Fusible Metal Film Resistors	9
RW	권선 고정저항기(불연성 도료) Fixed Wire Wound Resistors	10~11
RWF	휴즈형 권선 저항기 Fusible Wire Wound Resistors	12
HRW	대전력형 권선 저항기 High Power Type Wire Wound Resistors	13~15
SGR	써지 저항기 Surge Resistors	16
MGR	메탈 글레이즈 저항기 Metal Glazed Resistors	17
MGRA	블리드 저항기(전하 방전용 저항기) Metal Glazed Bleed Resistors	18
MFM	메탈필름 멜프 저항기 Metal Film MELF Resistors	19~20
MOM	산화금속필름 멜프 저항기 Metal Oxide Film MELF Resistors	21~22
MGM	메탈 글레이즈 필름 멜프 저항기 Metal Glaze Film MELF Resistors	23~24
Jumper	점프 와이어 Jump Wire	25
CSR	전류 센싱 저항기 Current Sensing Resistors	26~27
MPR	금속판 저항기(Metal Plate Resistors) Current Sensing Shunt Resistors	28~29
PMS	파워메탈 선트 저항기 Power Metal Strip Shunt Resistors	30~31
RH	알루미늄(메탈) 클래드 저항기 Aluminun(Metal) Clad Resistors	32~35
IRH, IRV	고전력 메탈 클래드 저항기 High Power Metal Clad Resistors[60W-500W]	36~38
IRV	고전력 메탈 클래드 저항기 High Power Metal Clad Resistors[600W~]	39~41
IRB	보트형 메탈 클래드 저항기 Metal Clad Resistors[Boat Shape]	42~44
CR	시멘트 저항기 Cement Fixed Resistors	45~50
TFR	온도휴즈 내장형 시멘트 저항기 Thermal Fuse build-in Resistors	51~52



■ 치 수 DIMENSIONS

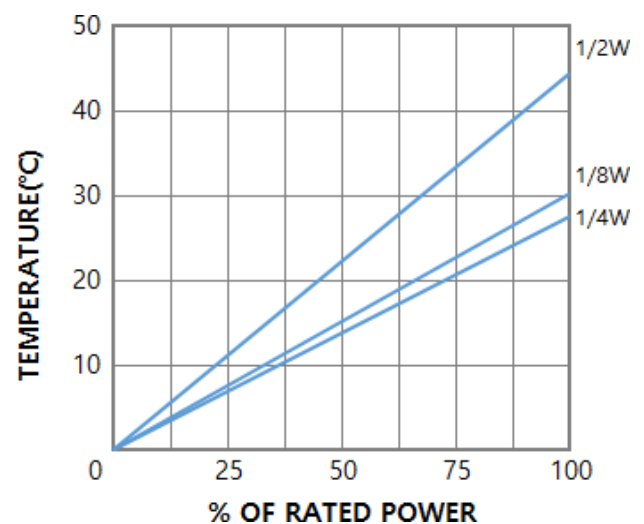
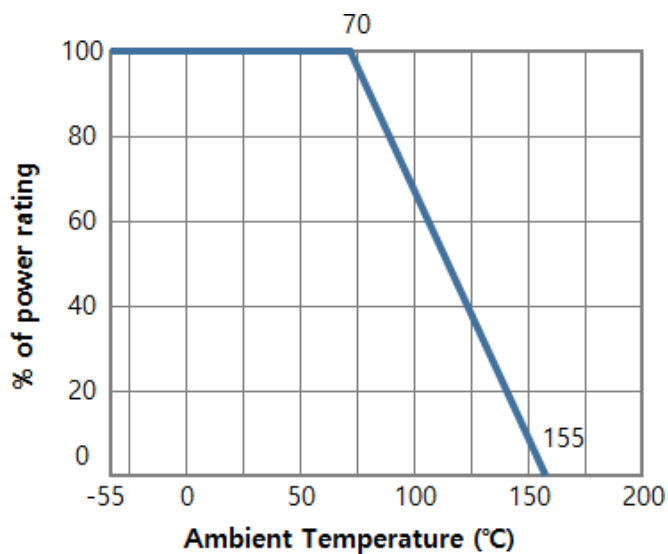


형 명 Type	치 수 Dimensions [mm]			
	D	L	d ± 0.05	$l \pm 2$
RD 1/8W	1.8 ± 0.2	3.2 ± 0.2	0.45	28
RDS 1/4W				
RD 1/4W	2.4 ± 0.2	6.0 ± 0.5	0.55	27
RDS 1/2W				
RD 1/2W	3.2 ± 0.5	9.0 ± 1.0	0.67	26

■ 일반규격 GENERAL SPECIFICATIONS

형 명 Type	정격전력 Rated Wattage	최고사용전압 Max. Working Voltage	최고과부하전압 Max. Overload Voltage	내전압 Dielectric With Voltage	저항치범위 Resistance Range	저항치허용차 Resistance Tolerance
RD 1/8W	0.125W	150V	300V	300V	4.7 Ω ~10M Ω	$\pm 2\%$ (G) $\pm 5\%$ (J)
RDS 1/4W	0.25W	250V	500V	500V		
RD 1/4W	0.25W	250V	500V	500V		
RDS 1/2W	0.5W	300V	600V	600V		
RD 1/2W	0.5W	300V	600V	600V		

■ 전력경감곡선 DERATING CURVE & 온도상승곡선 TEMPERATURE RISE CURVE



RD 탄소피막 고정저항기

Fixed Carbon Film Resistors (Coat-Insulated)

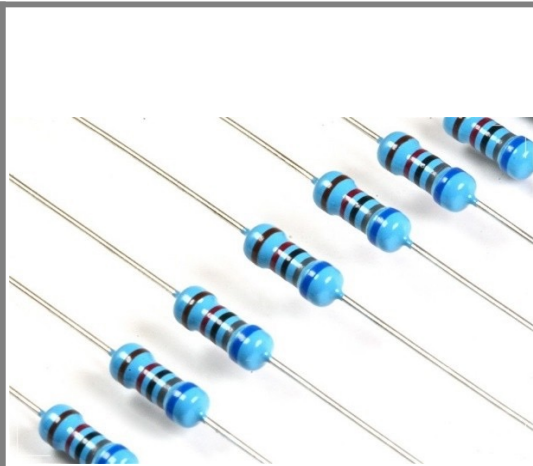
■ 특 성 CHARACTERISTICS

항 목 ITEM	성능 Performance	시험방법 Test method
1. 사용온도범위 Operating Temp. Range	-55°C ~ +155°C	-
2. 절연저항 Insulation Resistance	1000MΩ Min	DC500V, 1minute
3. 내전압 Dielectric Withstanding Voltage	±[0.1% + 0.05Ω]	500VAC for 1minute
4. 온도계수 Temperature coefficient	Max +350/-1200ppm/°C	$TCR = \frac{(R_2 - R_1) \times 10^6}{R_1 \times (t_2 - t_1)}$ $t_1: 25^\circ\text{C}, t_2: 125^\circ\text{C}$ $R_1: \Omega \text{ at } t_1, R_2: \Omega \text{ at } t_2$
5. 단시간과부하 Short Time Overload	±[1.0% + 0.05Ω]	2.5×Power rating 5seconds
6. 납내열성 Resistance against Soldering	±[2.0% + 0.05Ω]	260 ±5°C for 10seconds
7. 내습부하수명 Load Life in Humidity	±[5.0% + 0.05Ω]	40°C, 90~95%RH, 0.1×Power rating, 90minutes on, 30minutes off, 1000hours
8. 부하수명 Load Life	±[5.0% + 0.05Ω]	25°C, Power rating 90minutes on, 30minutes off, 1000Hour

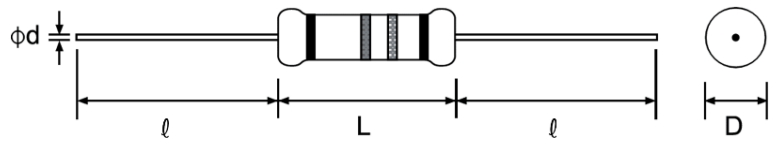
■ 주문방법 HOW TO ORDER

RD	1/2W	J	50K	TB
1	2	3	4	5

1. 형명 Type (RD : Normal Size, RDS : Mini Size)
2. 정격전력 Rated Wattage
3. 허용오차 Tolerance
4. 저항치 Resistance (OR01=0.01, OR1=0.1, 1K1=1.1KΩ)
5. 2차 가공 Shape (TB:52mm, TC:64mm, RT=Radial Taping, PS=Bulk)



■ 치 수 DIMENSIONS

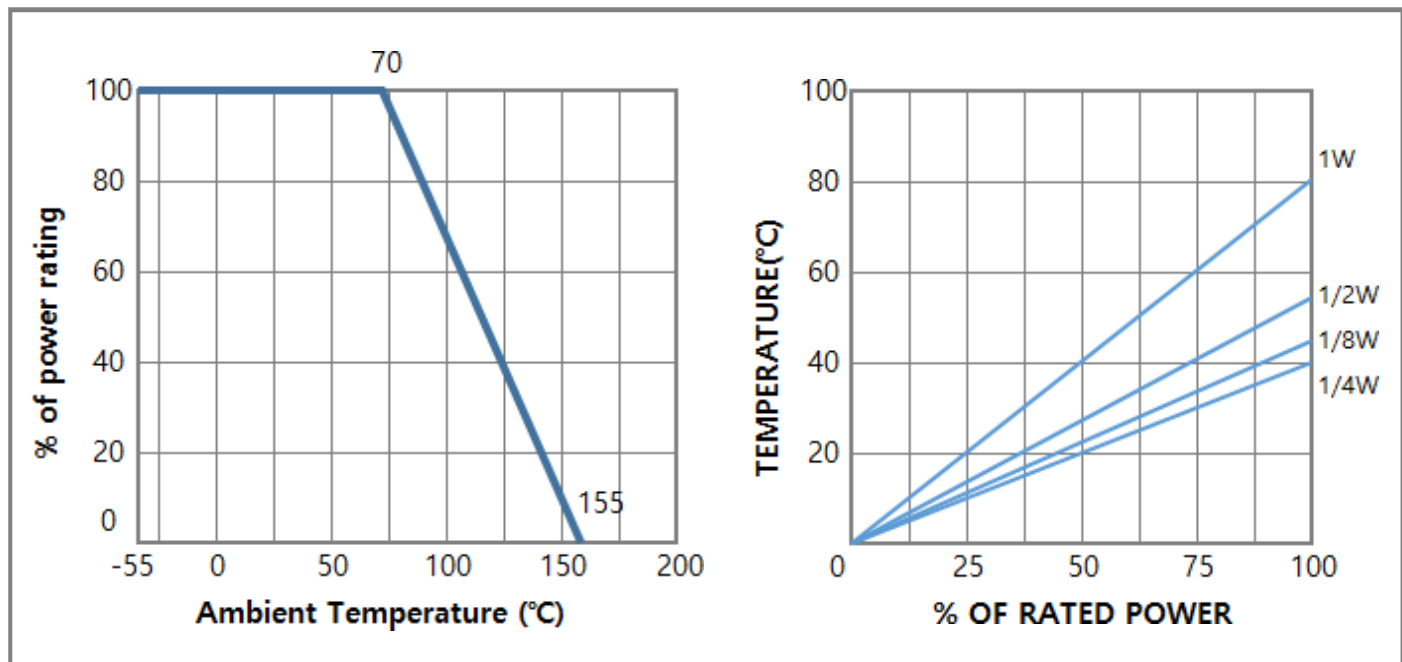


형 명 Type	치 수 Dimensions [mm]			
	D	L	d ± 0.05	l ± 2
RN 1/8W	1.8 ± 0.2	3.2 ± 0.2	0.45	28
RN 1/4W, RNS 1/2W	2.4 ± 0.2	6.0 ± 0.5	0.55	27
RN 1/2W, RNS 1W	3.2 ± 0.5	9.0 ± 1.0	0.67	26
RN 1W	4.0 ± 0.5	11 ± 1.0	0.67	28

■ 일반규격 GENERAL SPECIFICATIONS

형 명 Type	정격전력 Rated Wattage	최고사용전압 Max. Working Voltage	최고과부하전압 Max. Overload Voltage	내전압 Dielectric With Voltage	저항치범위 Resistance Range	저항치허용차 Resistance Tolerance
RN 1/8W	0.125W	150V	300V	300V	1~4.7M Ω	$\pm 0.1\%$ (B) $\pm 0.5\%$ (D) $\pm 1.0\%$ (F) $\pm 5.0\%$ (J)
RN 1/4W	0.25W	250V	500V	400V	0.47~4.7M Ω	
RNS 1/2W	0.5W	250V	500V	400V	0.47~4.7M Ω	
RN 1/2W	0.5W	350V	700V	500V	0.47~4.7M Ω	
RNS 1W	1W	350V	700V	500V	0.47~4.7M Ω	
RN 1W	1W	350V	700V	500V	0.47~4.7M Ω	

■ 전력경감곡선 DERATING CURVE & 온도상승곡선 TEMPERATURE RISE CURVE



RN 금속피막 고정저항기

Fixed Metal Film Resistors (Coat-Insulated)

■ 특 성 CHARACTERISTICS

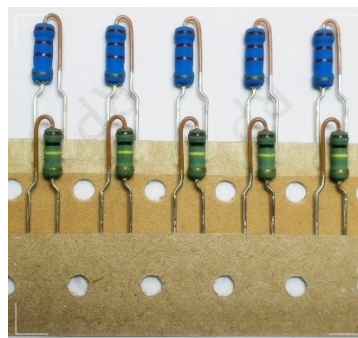
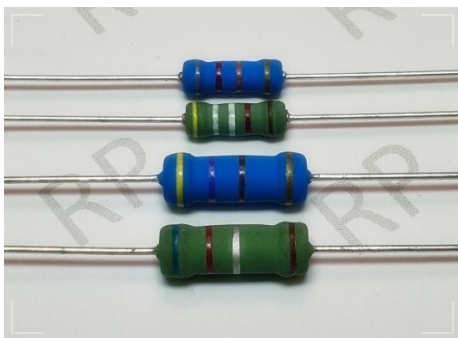
항 목 ITEM	성능 Performance	시험방법 Test method
1. 사용온도범위 Operating Temp. Range	-55°C ~ +155°C	-
2. 절연저항 Insulation Resistance	1000MΩ Min	DC500V, 1minute
3. 내전압 Dielectric Withstanding Voltage	±[0.1% + 0.05Ω]	500VAC for 1minute
4. 온도계수 Temperature coefficient	±50 ~ ±350ppm/°C	$TCR = \frac{(R_2 - R_1) \times 10^6}{R_1 \times (t_2 - t_1)}$ $t_1: 25^\circ\text{C}, t_2: 125^\circ\text{C}$ $R_1: \Omega \text{ at } t_1, R_2: \Omega \text{ at } t_2$
5. 단시간과부하 Short Time Overload	±[1.0% + 0.05Ω]	2.5×Power rating 5seconds
6. 납내열성 Resistance against Soldering	±[2.0% + 0.05Ω]	260 ±5°C for 10seconds
7. 내습부하수명 Load Life in Humidity	±[5.0% + 0.05Ω]	40°C, 90~95%RH, 0.1×Power rating, 90minutes on, 30minutes off, 1000hours
8. 부하수명 Load Life	±[5.0% + 0.05Ω]	25°C, Power rating 90minutes on, 30minutes off, 1000hours

■ 주문방법 HOW TO ORDER

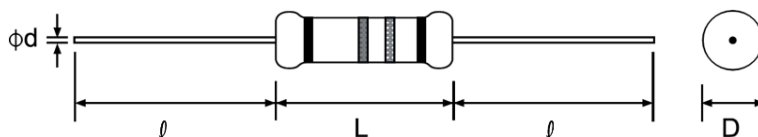
RN 1	1/2W 2	J 3	10R 4	TB 5
1. 형 명 Type (RN : Normal Size, RNS : Mini Size) 2. 정격전력 Rated Wattage 3. 허용오차 Tolerance 4. 저항치 Resistance (OR01=0.01, OR1=0.1, 1K1=1.1KΩ) 5. 2차 가공 Shape (TB:52mm, TC:64mm, RT=Radial Taping, PS=Bulk)				

MOR, MORS 산화금속피막 고정저항기

Fixed Metal Oxide Film Resistors (Flame Proof)



■ 치 수 DIMENSIONS

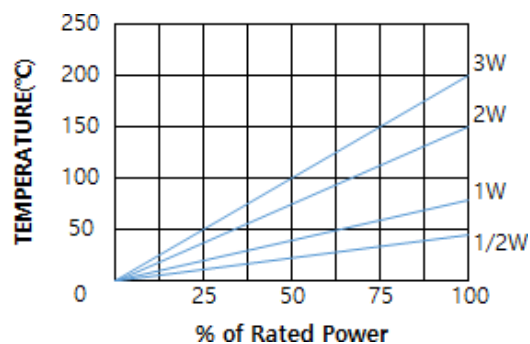
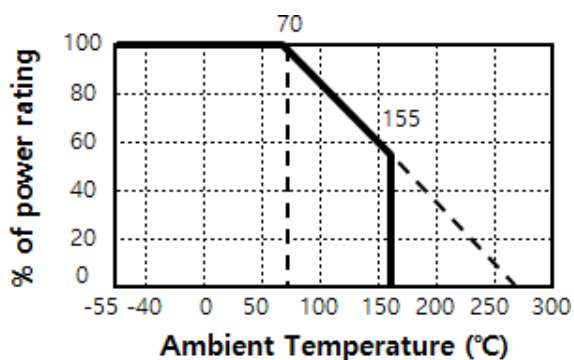


형 명 Type	치 수 Dimensions [mm]			
	D ± 0.5	L ± 1.0	d ± 0.05	l ± 2
MORSS 1W	2.4	6	0.55	23
MORS 1W	3.5	9	0.67	31.5
MOR 1W, MORS 2W	4.0	11	0.67	31.0
MOR 2W, MORS 3W	5.5	15	0.77	28.5

■ 일반규격 GENERAL SPECIFICATIONS

형 명 Type	정격전력 Rated Wattage	최고사용전압 Max. Working Voltage	최고과부하전압 Max. Overload Voltage	내전압 Dielectric With Voltage	저항치범위 Resistance Range	저항치허용차 Resistance Tolerance
MORSS 1W	1W	300V	500V	500V	1~100K Ω	$\pm 0.1\%$ (B) $\pm 0.5\%$ (D) $\pm 1.0\%$ (F) $\pm 5.0\%$ (J)
MORS 1W	1W	350V	600V	500V	1~1.5M Ω	
MOR 1W	1W	350V	600V	500V	1~1.5M Ω	
MORS 2W	2W	350V	600V	500V	1~1.5M Ω	
MOR 2W	2W	350V	600V	1000V	1~1.5M Ω	
MORS 3W	3W	550V	800V	1000V	1~1.5M Ω	

■ 전력경감곡선 DERATING CURVE & 온도상승곡선 TEMPERATURE RISE CURVE



■ 특 성 CHARACTERISTICS

항 목 ITEM	성능 Performance	시험방법 Test method
1. 사용온도범위 Operating Temp. Range	-55°C ~ +155°C	-
2. 절연저항 Insulation Resistance	1000MΩ Min	DC500V, 1minute
3. 내전압 Dielectric Withstanding Voltage	±[0.1% + 0.05Ω]	500VAC, 1000VAC for 1minute
4. 온도계수 Temperature coefficient	R≥10Ω : ±350 PPM/°C R≤10Ω : ±600 PPM/°C	$TCR = \frac{(R_2 - R_1) \times 10^6}{R_1 \times (t_2 - t_1)}$ t ₁ :25°C, t ₂ :125°C R ₁ :Ω at t ₁ , R ₂ :Ω at t ₂
5. 단시간과부하 Short Time Overload	±[1.0% + 0.05Ω]	2.5×Power rating 5seconds
6. 납내열성 Resistance against Soldering	±[1.0% + 0.05Ω]	350 ±10°C for 3seconds
7. 내습부하수명 Load Life in Humidity	±[3.0% + 0.05Ω]	40°C, 90~95%RH, 0.1×Power rating, 90minutes on, 30minutes off, 480hours
8. 부하수명 Load Life	±[5.0% + 0.05Ω]	25°C, Power rating 90minutes on, 30minutes off, 60 Cycle (120Hour)

■ 주문방법 HOW TO ORDER

<u>MOR</u> 1	<u>2W</u> 2	<u>J</u> 3	<u>470K</u> 4	<u>TC</u> 5
1. 형 명 Type (MOR : Normal Size, MORS : Mini Size, MORSS : Super Mini Size)				
2. 정격전력 Rated Wattage				
3. 허용오차 Tolerance				
4. 저항치 Resistance (OR01=0.01, OR1=0.1, 1K1=1.1KΩ)				
5. 2차 가공 Shape (TB:52mm, TC:64mm, RT=Radial Taping, PS=Bulk)				

MOF 휴즈형 금속피막 저항기

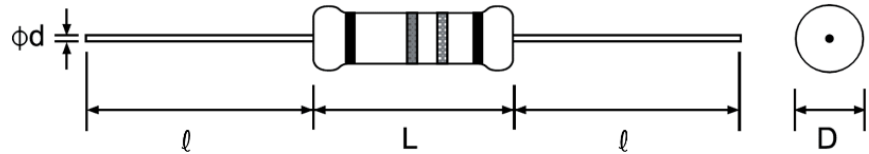
FUSIBLE METAL FILM RESISTORS

특징 FEATURES

- * MOF, MOFS are fusible metal film resistors. These resistor have same characters of general resistors, but when is applied an over electric current prescribed, these is fused and the current.
- MOFS is small type and suitable to be minimized space in the circuit.
- Function as resistor in normal condition.
- Safe without flaming due to flame proof coating.
- Quick open at an excessive over load.
- High reliability for performance



치수 DIMENSIONS



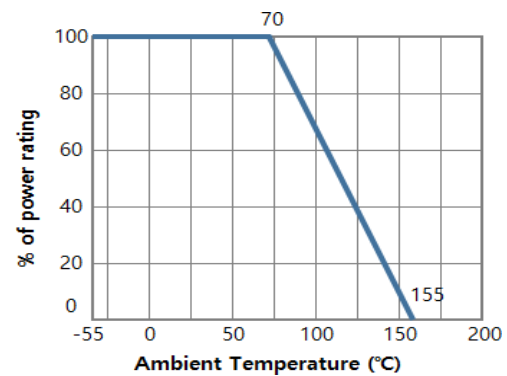
일반규격 GENERAL SPECIFICATIONS

형 명 Type	정격전력 Rated Wattage	치 수 Dimensions [mm]				내전압 Dielectric With Voltage	저항치범위 Resistance Range	저항치허용차 Resistance Tolerance
		D±0.5	L±1.0	d ±0.05	ℓ ±2			
MOF 1/4W	0.25W	2.4	6	0.55	23	250V	0.05~470Ω	±2% (G) ±5% (J) ±10% (K)
MOFS 1W	1W	3.5	9	0.67	31.5	350V	0.05~1.0KΩ	
MOF 1W, MOFS 2W	1W, 2W	4	11	0.67	31	500V		
MOF 2W	2W	5.5	15	0.77	28.5			

정격 RATED POWER

Characteristics		Specification
Range of using temp		-55°C ~ +155°C
Ambient temperature		70°C
Open circuit voltage	0.25W	200V
	0.5W	250V
	1W	350V
	2W	350V

전력경감곡선 DERATING CURVE

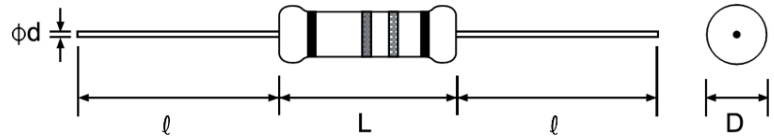


특성 CHARACTERISTICS

항목 ITEM	성능 Performance	시험방법 Test method
Temperature coefficient	±350ppm/°C	$TCR = \frac{(R_2 - R_1) \times 10^6}{R_1 \times (t_2 - t_1)}$ $t_1: 25^\circ\text{C}, t_2: 125^\circ\text{C}$ $R_1: \Omega \text{ at } t_1, R_2: \Omega \text{ at } t_2$
Short Time Overload	±[2.0% + 0.05Ω]	2.5×Power rating 5seconds
Resistance against Soldering	±[2.0% + 0.05Ω]	260 ±5°C for 10seconds
Load Life in Humidity	±[5.0% + 0.1Ω]	40°C, 90~95%RH, 0.1×Power rating, 90minutes on, 30minutes off, 1000hours
Load Life	±[5.0% + 0.1Ω]	25°C, Power rating 90minutes on, 30minutes off, 1000hours
Fusing Characters	• Residual resistance 100 times nominal resistance • ARC discharge must not arise. • Maximum electric current must be Below twice.	Rated Power×16, Within 60seconds



■ 치 수 DIMENSIONS

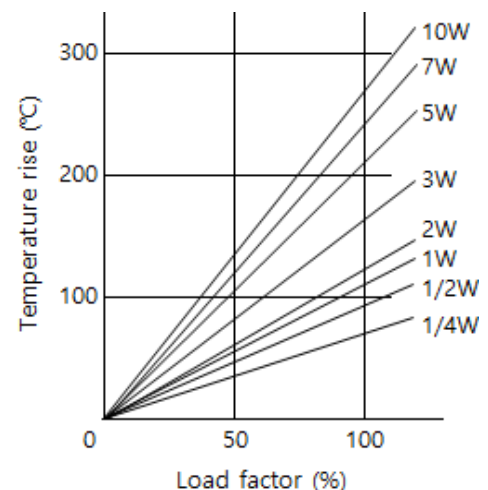
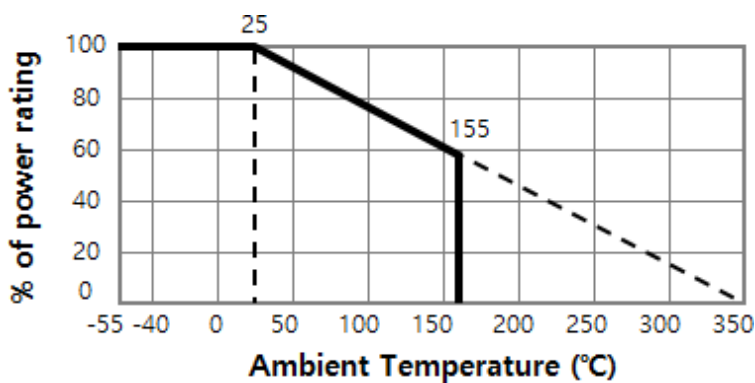


형 명 Type	치 수 Dimensions [mm]			
	D ±0.8	L ±1.5	d ±0.05	l ±2
RWS 1W	3.5	9	0.67	37
RW 1W, RWS 2W	4	11	0.67	37
RW 2W, 3W, RWS 5W	5.5	15	0.77	35
RW 5W, 7W	8.52	24.5	0.8	32
RWS 10W	8.52	39.2	0.8	35
RWL 10W(14W)	10.5	46.2	1.0	33

■ 일반규격 GENERAL SPECIFICATIONS

형 명 Type	정격전력 Rated Wattage	최고사용전압 Max. Working Voltage(V)	저항치범위 Resistance Range(Ω)		온도계수 T.C.R	저항치허용차 Resistance Tolerance
			유도 W*	무유도 N**		
RWS 1W	1W	50	0.05~3K	0.05~1.5K	±90ppm/°C ~ ±350ppm/°C	±1.0% (F) ±2.0% (G) ±5.0% (J)
RW 1W	1W	50	0.05~10K	0.05~4K		
RWS 2W	2W	100	0.05~10K	0.05~4K		
RW 2W	2W	100	0.1~47K	0.05~40K		
RW 3W	3W	200	0.1~47K	0.05~40K	Special Order ±5 ppm/°C ±10 ppm/°C ±25 ppm/°C	Special Order ±0.01% (T) ±0.05% (A) ±0.10% (B) ±0.25% (C) ±0.50% (D)
RWS 5W	5W	450	0.1~47K	0.05~40K		
RW 5W	5W	450	0.5~100K	0.1~50K		
RW 7W	7W	500	0.5~150K	0.1~50K		
RWS 10W	10W	700	0.5~150K	0.1~50K		
RWL 10W	14W	800	0.5~200K	0.1~70K		

■ DERATING CURVE & TEMPERATURE RISE CURVE



■ 특 성 CHARACTERISTICS

TEST	Conditions	Test method
1. 사용온도범위 Operating Temp. Range	-55°C ~ +275°C	-
2. 절연저항 Insulation Resistance	1000MΩ Min	DC500V, 1minute
3. 내전압 Dielectric Withstanding Voltage	±[0.1% + 0.05Ω]	500VAC for 1minute
4. 고온노출 High Temperature Exposure	±[2.0% + 0.05Ω]	No Load 275°C for 2hours
5. 저온환경 Low Temperature Storage	±[2.0% + 0.05Ω]	-65°C for 24hours / 25°C for 2hours
6. 납땜성 Solderability	95% coverage minimum	260°C ±5°C for 5 seconds
7. 단시간과부하 Short Time Overload	±[2.0% + 0.05Ω]	1~3W : 5×Power rating 5seconds 5~10W : 10×Power rating 5seconds
8. 단자강도 Terminal Strength	No mechanical damages	Direct load : 4.5kg for 10seconds Bending test : 2 cycles
9. 부하수명 Load Life	±[3.0% + 0.05Ω]	25°C, Power rating 90minutes on, 30minutes off, 1000hours
10. 내습부하수명 Load Life in Humidity	±[3.0% + 0.05Ω]	40°C, 90~95%RH, 0.1×Power rating, 90minutes on, 30minutes off, 1000hours
11. 온도충격 Thermal Shock	±[2.0% + 0.05Ω]	-55°C[30minutes], 25°C[5minutes], 125°C[30minutes], 25°C[30minutes], 5cycles

■ 주문방법 HOW TO ORDER

RW

1

2W

2

J

3

OR22

4

TC

5

1. 형 명 Type (RW : Normal Size, RWS : Mini Size)

2. 정격전력 및 권선형 Rated Wattage & Wound Style

(W : 유도 권선 Inductively wound, N : 무유도 권선 Non-Inductively wound)

3. 허용오차 Tolerance

4. 저항치 Resistance (OR01=0.01, OR1=0.1, 1K1=1.1KΩ)

5. 2차 가공 Shape (TB:52mm, TC:64mm, RT=Radial Taping, PS=Bulk)

RWF 휴즈형 권선 저항기

Fusible Wire Wound Resistor

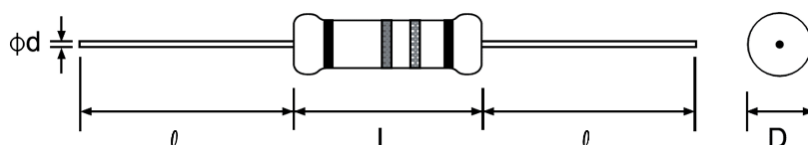
특징 FEATURES

* RWF is fusible wire wound resistor that is wound with special fusing wire on a high quality ceramic rod and protected by special high temperature silicon coating. This fusing type offering effect control surge is the most suitable for precision power circuit applications.

- Quick open at an excessive over load.
- Safe without flaming due to flame proof coating.
- Excellent pulse characteristic
- High reliability for performance



치수 DIMENSIONS



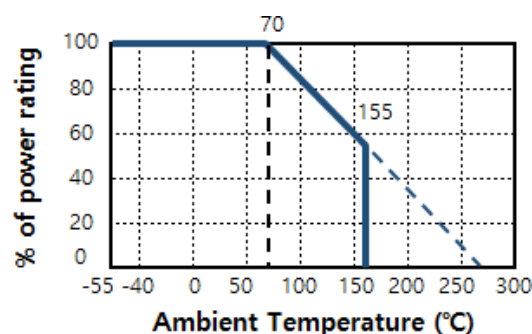
일반규격 GENERAL SPECIFICATIONS

형 명 Type	정격전력 Rated Wattage	치 수 Dimensions [mm]				내전압 Dielectric With Voltage	저항치범위 Resistance Range	저항치허용차 Resistance Tolerance
		D±0.5	L±1.0	d ±0.05	ℓ ±2			
RWFS 1W	1W	3.2	9	0.67	31.5	350V	0.1~100Ω	±5% (J) ±10% (K)
RWF 1W	1W	4	11	0.67	31	500V		
RWFS 2W	2W	4	11	0.67	31			
RWF 2W	2W	5.5	15	0.77	28.5			

정격 RATED POWER

Characteristics		Specification
Range of using temp		-55°C ~ +155°C
Ambient temperature		70°C
Open circuit voltage	0.5W	250V
	1W	350V
	2W	350V

전력경감곡선 DERATING CURVE



특성 CHARACTERISTICS

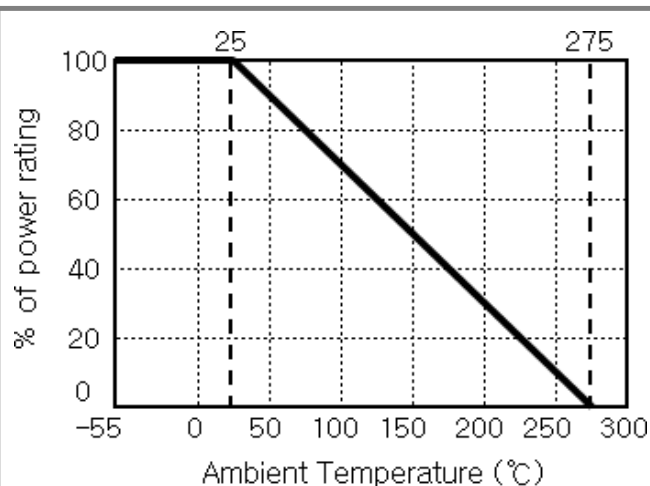
항목 ITEM	성능 Performance	시험방법 Test method
Temperature coefficient	±300ppm/°C	TCR= $\frac{(R_2 - R_1) \times 10^6}{R_1 \times (t_2 - t_1)}$ t ₁ :25°C, t ₂ :125°C R ₁ :Ω at t ₁ , R ₂ :Ω at t ₂
Short Time Overload	±[2.0% + 0.05Ω]	2.5×Power rating 5seconds
Resistance against Soldering	±[2.0% + 0.05Ω]	260 ±5°C for 10seconds
Load Life in Humidity	±[5.0% + 0.1Ω]	40°C, 90~95%RH, 0.1×Power rating, 90minutes on, 30minutes off, 1000hours
Load Life	±[5.0% + 0.1Ω]	25°C, Power rating 90minutes on, 30minutes off, 1000hours
Fusing Characters	• Residual resistance 100 times nominal resistance • ARC discharge must not arise. • Maximum electric current must be Below twice.	Rated Power×16, Within 60seconds



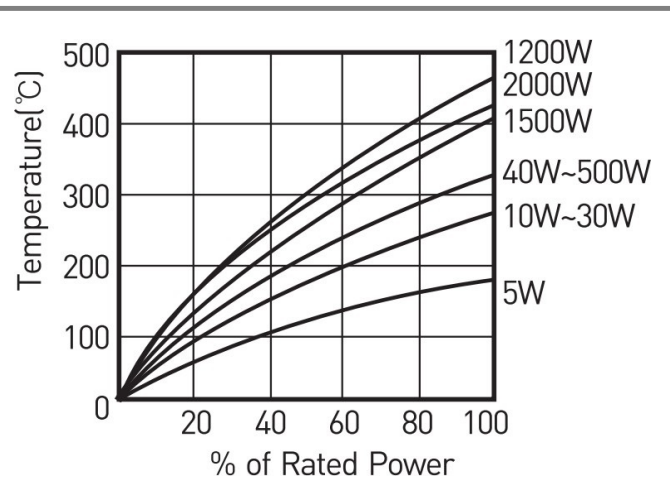
■ 특 성 CHARACTERISTICS

TEST	Conditions	Test method
1. 사용온도범위 Operating Temp. Range	-55°C ~ +275°C	-
2. 절연저항 Insulation Resistance	100MΩ Min	DC500V, 1minute
3. 내전압 Dielectric Withstanding Voltage	±[0.1% + 0.05Ω]	1000VAC for 1minute
4. 온도계수 Temperature coefficient	±200ppm/°C Maximum	$TCR = \frac{(R_2 - R_1) \times 10^6}{R_1 \times (t_2 - t_1)}$ $t_1: 25^\circ\text{C}, t_2: 125^\circ\text{C}$ $R_1: \Omega \text{ at } t_1, R_2: \Omega \text{ at } t_2$
6. 납땜성 Solderability	75% coverage minimum	270°C ±5°C for 5 seconds
7. 내열성 Heat Resistance	±[2.0% + 0.05Ω]	275 ±5°C for 2hours
8. 단시간과부하 Short Time Overload	±[2.0% + 0.05Ω]	10×Power rating 5seconds
9. 단자강도 Terminal Strength	No mechanical damages	5~20W:4.5kgf, 20~40W:6kgf, 60~200W:8kgf, 300W~ :10kgf - 30sec
10. 부하수명 Load Life	±[5.0% + 0.05Ω]	25°C, Power rating 90minutes on, 30minutes off, 1000hours
11. 내습부하수명 Load Life in Humidity	±[3.0% + 0.05Ω]	40°C, 90~95RH, 0.1×Power rating, 90minutes on, 30minutes off, 1000hours
12. 내진동 Vibration	±[1.0% + 0.05Ω]	X-2 hours, Y-2 hours

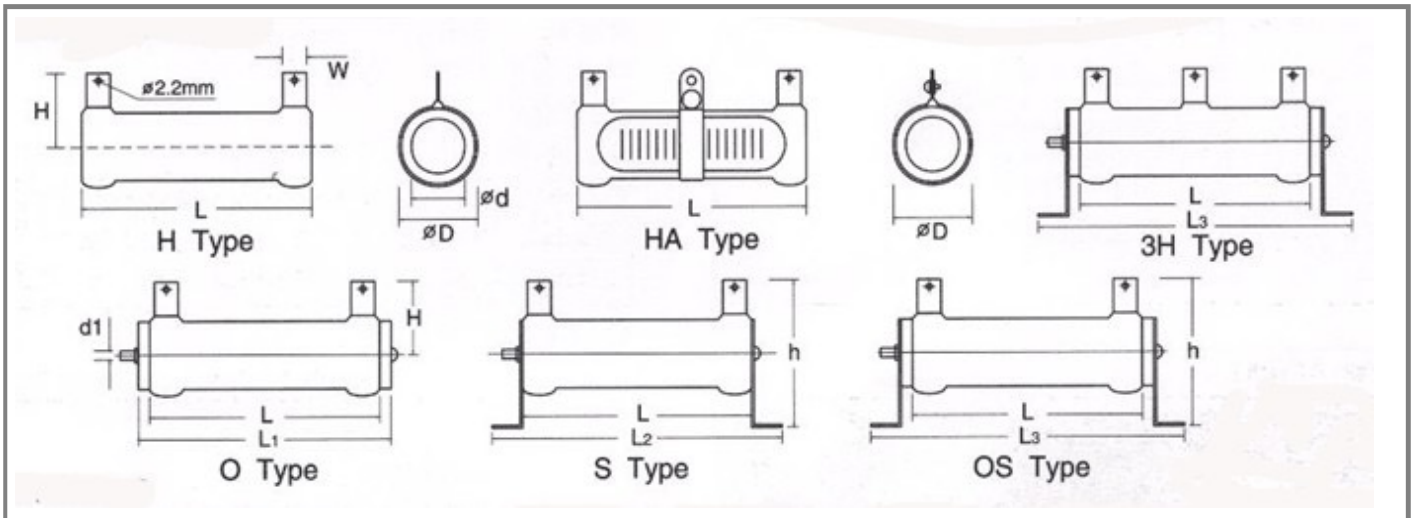
■ RATED POWER DERATING CURVE



■ TEMPERATURE RISE CURVE



■ 치 수 DIMENSIONS



■ 일반규격 및 치수 GENERAL SPECIFICATIONS & DIMENSIONS

형 명 Type	정격전력 Rated Wattage	저항치범위 Resistance Range(Ω)	치 수 Dimensions [mm]								
			L ± 3	L ₁ ± 3	L ₂ ± 3	L ₃ ± 3	$\phi D \pm 2$	W ± 0.5	H ± 1	h ± 2	d ₁
HRW 15	15W	0.1~15K	45	51	70	78	14	5	15	32	M3
HRW 20	20W	0.1~20K	50	56	75	93	18	5	19	40	M3
HRW 30	30W	0.1~30K	75	81	100	118	18	5	19	40	M3
HRW 40	40W	0.1~40K	90	96	115	133	18	5	19	40	M3
HRW 60	60W	0.3~50K	90	102	120	167	28	7	31	61	M4
HRW 80	80W	0.3~50K	115	127	140	192	28	7	31	61	M4
HRW 100	100W	0.5~50K	140	152	175	217	28	7	31	61	M4
HRW 120	120W	0.5~50K	165	177	195	242	28	7	31	61	M4
HRW 150	150W	0.5~100K	195	207	225	272	28	7	31	61	M4
HRW 200	200W	0.5~100K	254	266	285	331	28	7	31	61	M4
HRW 300	300W	0.5~100K	254	270	295	333	43	10	38	82	M6
HRW 400	400W	0.5~150K	330	346	370	409	43	10	38	82	M6
HRW 500	500W	0.5~150K	300	316	340	379	56	10	44	95	M6
HRW 600	600W	0.5~150K	330	346	370	409	56	10	44	95	M6
HRW 1000	1000W	0.5~200K	330	358	372	409	75	10	64	100	M6
HRW 1500	1500W	0.5~230K	420	448	470	498	77	20	71	130	M6
HRW 2000	2000W	0.5~270K	490	528	550	565	77	20	71	130	M6
HRW 3000	3000W	0.5~579K		600		674	80			148	
HRW 4000	4000W	0.5~750K		600		684	100			187	
HRW 5000	5000W	0.5~1M2		600		794	150			352	

◆ 3000W 이상 제품은 특별 주문 사양으로 세부 사양은 당사에 문의 주시기 바랍니다.

Watts over 3,000 watts are a special order specification. Please contact us.

■ 원자재 구성 MATERIALS

◆ CORE

-STEATITE CHEMICALLY INSERT WILL WITHSTAND SEVERE THERMAL SHOCK AND IMPERVIOUS TO MOISTURE.

◆ ELEMENT

-HIGHEST QUALITY COPPER - NICKEL ALLOY OR NICKEL CHROME ALLOY DEPENDING ON RESISTANCE VALUE
-SPECIAL ALLOY AVAILABLE UPON REQUEST

◆ COATING

-SPECIAL HIGH TEMPERATURE SILICONE.

■ 주문방법 HOW TO ORDER

HRW

1

100W(N)

2

J

3

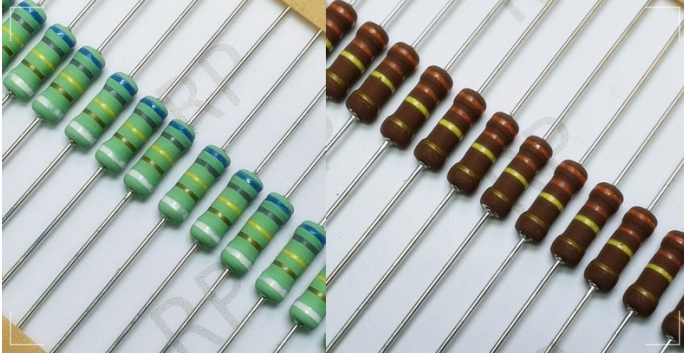
200R

4

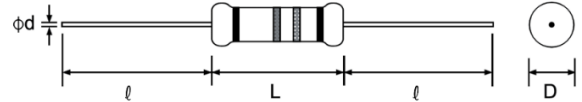
- | | |
|---------|--|
| 1. 형 명 | TYPE |
| 2. 정격전력 | RATED WATTAGE ("N"= Non Inductive winding 무유도 권선) |
| 3. 허용오차 | Tolerance |
| 4. 저항치 | Nominal Resistance
Ex) 1M2=1.2MΩ, 1K2=1.2KΩ, 1R2=1.2Ω |

특징 FEATURES

- * Provide high stable performance against environmental conditions and over load voltage.
- * Wide resistance range (10Ω ~ 10KΩ)



치수 DIMENSIONS



형명 Type	치수 Dimensions [mm]			
	D ±0.5	L ±1.0	d ±0.05	l ±3
SGR 1/4	2.4	6	0.55	27
SGR 1/2	3.5	9	0.67	26
SGR 1W	4	11	0.67	28
SGR 2W	5.5	15	0.77	28

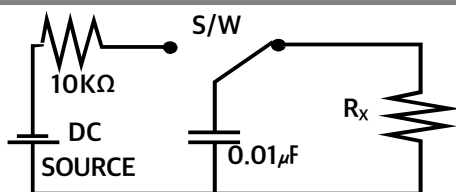
일반규격 GENERAL SPECIFICATIONS

Type	Rated Wattage	Max. Working Voltage	Insulation Resistance (V-block method)	Surge Test	Resistance Range	Resistance Tolerance
SGR 1/4	0.25W	500V	Min. 1000MΩ (350±50V DC during 1min)	R < 4K7: 1nF/2KV 4K7 ≤ R < 10K: 1nF/3KV	10Ω ~ 10KΩ	±1.0%(F) ±5.0%(J) ±10%(K)
SGR 1/2	0.5W	700V	Min. 1000MΩ (500±50V DC during 1min)	R < 4K7: 1nF/5KV 4K7 ≤ R < 10K: 1nF/6KV		
SGR 1W	1W	1,000V	Min. 10MΩ (1000±50V DC during 1min)	R < 10K : 10nF/7KV		
SGR 2W	2W	1,200V	Min. 10MΩ (1000±50V DC during 1min)	R < 10K : 10nF/10KV		

특성 CHARACTERISTICS

항목 ITEM	성능 Performance
1. Temperatures Range	-55°C ~ +155°C
2. Temp. Coefficient	1000ppm/°C Maximum
3. Solder ability	95% Coverage minimum 260°C for 3 seconds
4. Short Time Overload	±[1.0%] 2.5× Power rating for 5 seconds
5. Load Life	±[5.0%] 25°C, Power Rating, 1.5hours On, 30minutes off, 1000hours
6. Load Life in Humidity	±[3.0%] 40°C, 90~95%RH, 0.1×Power rating, 90minutes on, 30minutes off, 1000hours
7. Terminal Strength	Tensile : ≥2.5kgf Direct Load for 10sec. In the direction off the terminal leads
8. Thermal Shock	±[1.0%] -55°C[30minutes], 25°C[5minutes], 125°C[30minutes], 25°C[30minutes], 5cycles

SURGE TEST



*Ten discharges from a 10nF capacitor charged to Vmax : 2.5sec on/off 5cycle

*No evidence of over, mechanical damage, arcing or insulation breakdown.

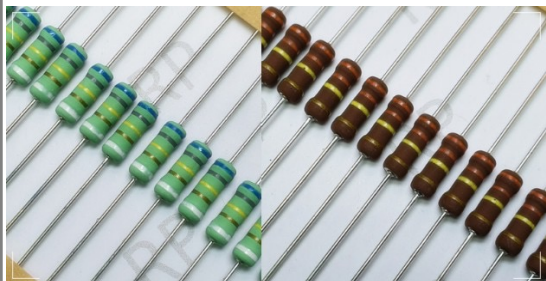
HOW TO ORDER

SGR	1W	J	10M	TB
1	2	3	4	5

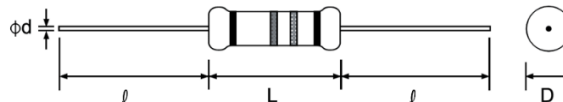
1. Type
2. Rated Wattage
3. Tolerance
4. Resistance (1K1=1.1KΩ, 1M1=1.1MΩ)
5. Shape (TB:52mm, RT=Radial Taping, PS=Bulk)

특징 FEATURES

- * Provide high stable performance against environmental conditions and over load voltage.
- * Wide resistance range (10KΩ~500MΩ)



치수 DIMENSIONS



형명 Type	치수 Dimensions [mm]			
	D ±0.5	L ±1.0	d ±0.05	l ±3
MGR 1/4, MGRS 1/2	2.4	6	0.55	27
MGR 1/2, MGRS 1W	3.5	9	0.67	26
MGR 1W, MGRS 2W	4	11	0.67	28
MGR 2W, MGR 3W	5.5	15	0.77	28

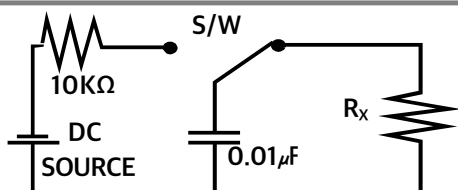
일반규격 GENERAL SPECIFICATIONS

Type	Rated Wattage	Max. Working Voltage	Max. Overload Voltage	Dielectric Withstanding Voltage	Surge Test	Resistance Range(Ω)	Resistance Tolerance
MGR 1/4 MGRS 1/2	0.25W 0.5W	700V	1,000V	500V	10nF/2KV	10K~500M	±1.0%(F) ±2.0%(G) ±5.0%(J) ±10%(K)
MGR 1/2 MGRS 1W	0.5W 1W	1,000V	1,500V		R < 560K : 10nF/5KV R > 560K : 10nF/10KV		
MGR 1W MGRS 2W	1W 2W	1,500V 2,000V	2,000V 3,000V		R < 560K : 10nF/5KV R > 560K : 10nF/10KV		
MGR 2W MGR 3W	2W 3W	3,000V	5,000V	1,000V	R < 560K : 10nF/5KV R > 560K : 10nF/10KV		
					R < 560K : 10nF/5KV R > 560K : 10nF/10KV		

특성 CHARACTERISTICS

항목 ITEM	성능 Performance
1. Temperatures Range	-55℃ ~ +155℃
2. Temp. Coefficient	350ppm/℃ Maximum
3. Solder ability	95% Coverage minimum 260℃ for 3 seconds
4. Short Time Overload	±[1.0%] 2.5 × Power rating for 5 seconds
5. Load Life	±[5.0%] 25℃, Power Rating, 1.5hours On, 30minutes off, 1000hours
6. Load Life in Humidity	±[3.0%] 40℃, 90~95%RH, 0.1×Power rating, 90minutes on, 30minutes off, 1000hours
7. Terminal Strength	Tensile : ≥2.5kgf Direct Load for 10sec. In the direction off the terminal leads
8. Thermal Shock	±[1.0%] -55℃[30minutes], 25℃[5minutes], 125℃[30minutes], 25℃[30minutes], 5cycles

SURGE TEST



*Ten discharges from a 10nF capacitor charged to Vmax : 2.5sec on/off 5cycle

*No evidence of over, mechanical damage, arcing or insulation breakdown.

HOW TO ORDER

MGR	1W	J	100M	TB
1	2	3	4	5

1. Type
2. Rated Wattage
3. Tolerance
4. Resistance (1K1=1.1KΩ, 1M1=1.1MΩ)
5. Shape (TB:52mm, RT=Radial Taping, PS=Bulk)

특징 FEATURES

- * Provide high stable performance against environmental conditions and over load voltage.
- * Wide resistance range (1MΩ ~ 1GΩ)

■ 치 수 DIMENSIONS

형 명 Type	치 수 Dimensions [mm]			
	D ± 0.5	L ± 1.0	d ± 0.05	l ± 3
MGRA 1/2W	3.5	9	0.67	26
MGRA 1W	4	11	0.67	28
MGRA 2W	5.5	15	0.77	28

일반규격 GENERAL SPECIFICATIONS

Type	Rated Wattage	Max. Working Voltage	Insulation Resistance (V-block method)	Surge Test	Resistance Range	Resistance Tolerance
MGRA 1/2W	0.5W	8,000V	Min. 10MΩ (700±50V DC during 1min)	R > 1MΩ:10KV/10nF (2.5sec on/off 5cycle)	1MΩ~1GΩ	±1.0%(F) ±5.0%(J) ±10%(K)
MGRA 1W	1W	10,000V	Min. 10MΩ (1000±50V DC during 1min)			
MGRA 2W	2W	13,000V	Min. 10MΩ (1000±50V DC during 1min)			

특성 CHARACTERISTICS

항목 ITEM	성능 Performance
1. Temperatures Range	-55°C ~ +155°C
2. Temp. Coefficient	200ppm/°C Maximum
3. Solder ability	95% Coverage minimum 260°C for 3 seconds
4. Short Time Overload	±[1.0%] 2.5× Power rating for 5 seconds
5. Load Life	±[5.0%] 25°C, Power Rating, 1.5hours On, 30minutes off, 1000hours
6. Load Life in Humidity	±[3.0%] 40°C, 90~95%RH, 0.1×Power rating, 90minutes on, 30minutes off, 1000hours
7. Terminal Strength	Tensile : ≥2.5kgf Direct Load for 10sec. In the direction off the terminal leads
8. Thermal Shock	±[1.0%] -55°C[30minutes], 25°C[5minutes], 125°C[30minutes], 25°C[30minutes], 5cycles

SURGE TEST

*Ten discharges from a 10nF capacitor charged to Vmax : 2.5sec on/off 5cycle *No evidence of over, mechanical damage, arcing or insulation breakdown.

HOW TO ORDER

MGRA	1W	J	100M	TB
1	2	3	4	5
1. Type 2. Rated Wattage 3. Tolerance 4. Resistance (1K1=1.1KΩ, 1M1=1.1MΩ) 5. Shape (TB:52mm, RT=Radial Taping, PS=Bulk)				



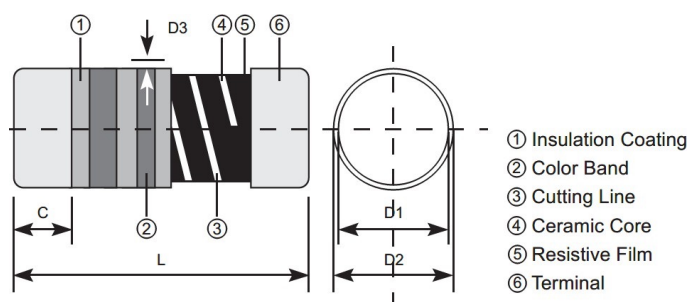
■ Features

- * Excellent heat dissipation
- * Low noise characteristics
- * Force fitted steel caps, tin plated on nickel barrier
- * Excellent overall stability, most advanced thin film technology
- * Free direction for mounting due to cylindrical design
- * Lead (Pb)-free and RoHS compliant

■ Applications

- * Automotive
- * Industrial Control Systems
- * Telecommunication Equipment
- * Medical Equipment
- * Lighting Ballast
- * Electronic Energy Meter

■ Construction



■ Reference Standards

- * JIS C 5201
- * IEC 60115-1

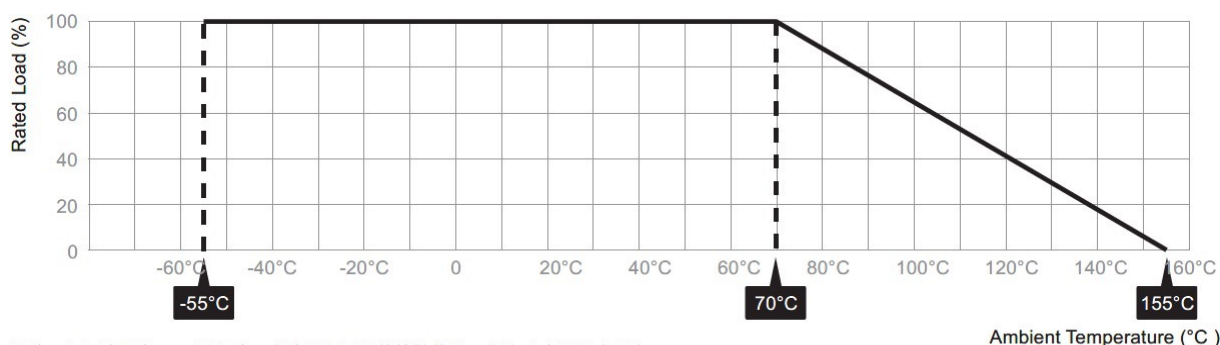
Style	Dimension (mm)				
	L	D1	D2 Max	D3 Max	C Min
A (0102)	2.0±0.1	1.25±0.05	1.35	0.07	0.30
B (0204)	3.5±0.2	1.40±0.15	1.55	0.10	0.50
C (0207)	5.9±0.2	2.20±0.20	2.40	0.15	1.00
D (0309)	8.5±0.2	3.20±0.20	3.40	0.30	1.50

■ Ordering Code

M	F	M	B	2	5	S	F	C	2	R	-	1	0	0	K
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Series Code	Size Code	Power Rating	Resistance Tolerance	Temperature Coefficient	Packaging Code	Special Code	Resistance Value
MFM	A=0102	-16 = 0.125W	F = ±1%	C1 = ±100ppm/°C	R = Tape/Reel B = Bulk	- = Base on Spec.	100R=100
	B=0204	25S = 0.25WS	G = ±2%	C2 = ±50ppm/°C			10K10,000
	C=0207	50S = 0.5WS	J = ±5%	C3 = ±25ppm/°C			4M7=4,700,000
	D=0309	-50 = 0.5W					

■ Derating Curve



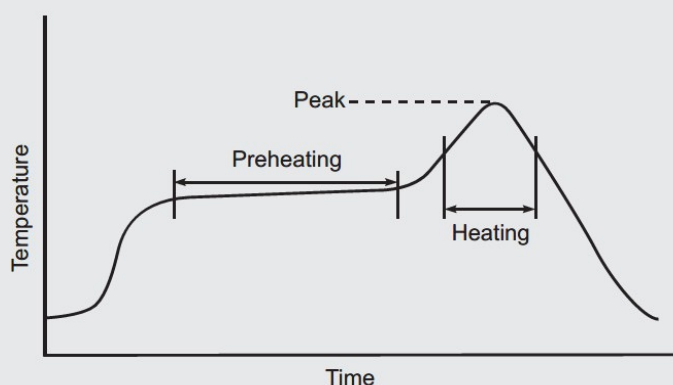
■ Ratings

Series	MFMA-16	MFMB25S	MFMC50S	MFMD-50
Size Code	0102	0204	0207	0309
Rated dissipation, P ₇₀	0.125W	0.25W	0.5W	0.5W
Resistance range	100Ω~100KΩ	1Ω~4M7Ω	1Ω~4M7Ω	1Ω~4M7Ω
Resistance tolerance	±1% ; ±2% ; ±5%			
Significant figure	E-24 and E-96 series value			
Temperature coefficient	±25ppm/°C ; ±50ppm/°C ; ±100ppm/°C			
Operation temp. range	-55°C ~ +155°C			
Max. working voltage	150V	200V	250V	350V
Max. overload voltage	300V	400V	500V	700V

■ Performance

Test Items	Requirements	Test Methods
Resistance	Within specified tolerance	25°C
T.C.R	Within specified T.C.R	+25°C/-55°C and +25°C/+125°C
Solderability	95% Min. coverage	235°C±5°C, 3±0.5 sec.
Resistance to soldering heat	±(0.5%+0.05Ω)	260°C±5°C, 10±1 sec. (for lead-free soldering)
Operating temperature range	By type	-55°C to +155°C
Short time overload	±(0.5%+0.05Ω)	Rated voltage × 2.5 for 5 sec.
Humidity resistance	±(1%+0.05Ω)	40°C±2°C, 90%~95% RH, 1,000h 1.5hr ON / 0.5hr OFF cycles
Endurance at 70°C (Load life test)	±(3%+0.05Ω)	70°C±2°C, 1,000h 1.5hr ON/0.5hr OFF cycles

■ Recommended soldering conditions



Reflow soldering (lead-free)

Status	Temperature	Time
Preheating	180°C Max	120 sec. Max
Main heating	220°C Max	60 sec. Max
Peak	260°C Max	3 sec. Max

Flow soldering (lead-free)

Status	Temperature	Time
Soldering	260°C Max	10 sec. Max

■ Cautions

* Storage condition

It is desirable that the resistors are stored in the ambient temperature from -5°C to +40°C and relative humidity under 55%~75%.
High humidity, dust, harmful gas, for example hydrogen chloride and sulfuric gas should be avoided.

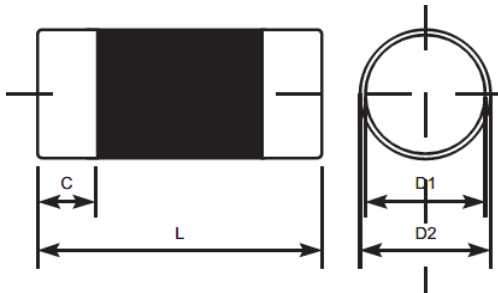
Please do not store the resistors for a long time, use the resistors within a year after the delivery is recommended.



■ Features

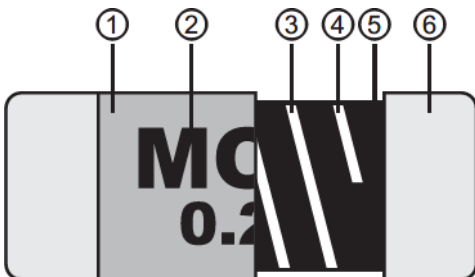
- * Small size power type resistors and SMD type.
- * High reliability.
- * Products meet RoHS requirement.

■ Dimension



Size Code	Dimension (mm)			
	L	D1	D2 Max	C Min
C (0207)	5.9±0.2	2.20±0.1	2.4	0.5
D (0309)	8.5±0.2	3.20±0.2	3.4	0.5
E (0411)	10.5±1.0	3.80±0.5	3.9	2.2
G (0416)	16.5±1.0	4.50±0.3	4.6	2.2

■ Construction

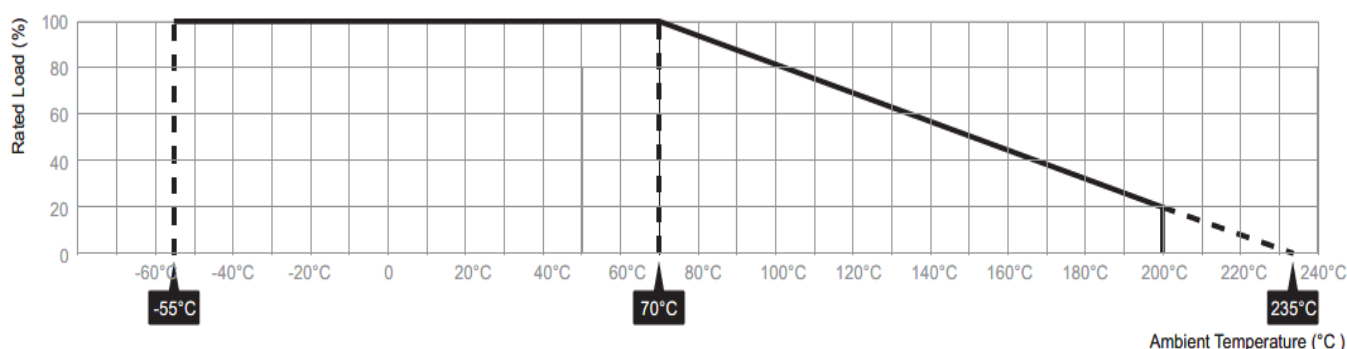


Item		Material
①	Insulation Coating	Epoxy Molding(Color : Black)
②	Marking	Printed
③	Cutting Line	-
④	Ceramic Core	Aluminum Material
⑤	Resistive Film	Metal Film
⑥	Terminal	Terminal Cap

■ Rated Power

Type	Rated Power	Max working Voltage	Max overload Voltage	Dielectric withstanding Voltage	Resistance Range	Operating temperature range
MOMC-25	0.25W	200V	350V	500V	10Ω~22KΩ	-55°C~+155°C
MOMD-50	0.5W	250V	400V	500V	10Ω~75KΩ	
MOME-100	1W	350V	600V	750V	10Ω~100KΩ	
MOMG-200	2W	350V	600V	750V	10Ω~120KΩ	
MOMC-50S	0.5W	250V	400V	500V	10Ω~22KΩ	
MOMD-1WS	1W	350V	600V	750V	10Ω~68KΩ	
MOME-2WS	2W	350V	600V	750V	10Ω~68KΩ	
MOMG-3WS	3W	350V	600V	750V	10Ω~100KΩ	

Derating Curve



備註：在環境溫度70°C以上時，應按照上圖負荷特性曲線，額定功率比隨之減少。

Note : for resistors operated in ambient temperatures above 70°C, power rating must be derated in accordance with the above curve.

Characteristics

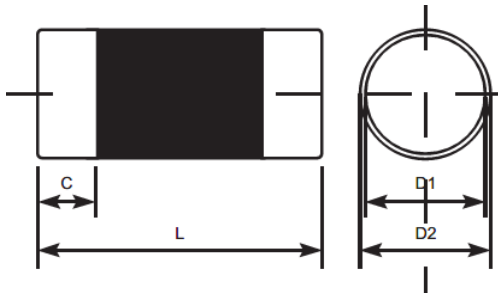
Item	Performance	Test methods
Temperature coefficient	within $\pm 350\text{PPM}/^{\circ}\text{C}$.	$\frac{R_1 - R_0}{R_1(T_1 - T_0)} \times 10^6 (\text{PPM}/^{\circ}\text{C})$ R_0 : Resistance value at room temp. (T_0). R_1 : Resistance value at room temp. plus 100°C (T_1).
Short time overload	within $\pm(1\%+0.05\Omega)$ No evidence of mechanical damage.	Rated voltage $\times 2.5$ for 5 sec.
Resistance to soldering heat	within $\pm(1\%+0.05\Omega)$ No evidence of mechanical damage.	350 $\pm$ 10°C, 3.5 $\pm$ 0.5sec or 260 $\pm$ 5°C, 10 $\pm$ 1sec. After test leave for 3h.
Solderability	More than 95% of the total area of the electrode part shall be covered with new solder.	Test temperature of solder : 235 $\pm$ 5°C. Dipping time in solder : 5 $\pm$ 0.5sec.
Resistance to solvent	No deterioration of protective coating and markings.	Specimens shall be immersed in a bath of isopropyl salcohol completely for 3 minutes with ultraoic.
Load life	within $\pm(5\%+0.05\Omega)$	70 $\pm$ 3°C, 1000h. Rated voltage(90 min ON, 30 min OFF)
Pulse overload	within $\pm(5\%+0.05\Omega)$	Rated voltage $\times 4$ times, 10000 cycle (1s ON, 25s OFF). But not to exceed maximum overload voltage.



■ Features

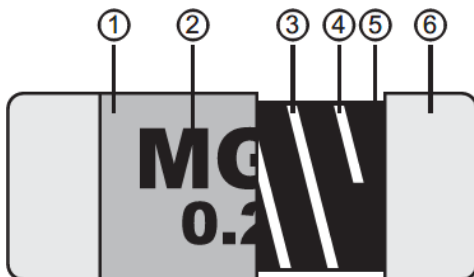
- * Miniature construction endurable to high voltage and high power.
- * Resistors excellent in anti-surge characteristics.
- * Wide resistance range $10^3 \sim 10^8 \Omega$ and Low T.C.R.

■ Dimension



Size Code	Dimension (mm)			
	L	D1	D2 Max	C Min
C (0207)	5.9±0.2	2.20±0.1	2.4	0.5
D (0309)	8.5±0.2	3.20±0.2	3.4	0.5
E (0411)	10.5±1.0	3.80±0.5	3.9	2.2
G (0416)	16.5±1.0	4.50±0.3	4.6	2.2

■ Construction

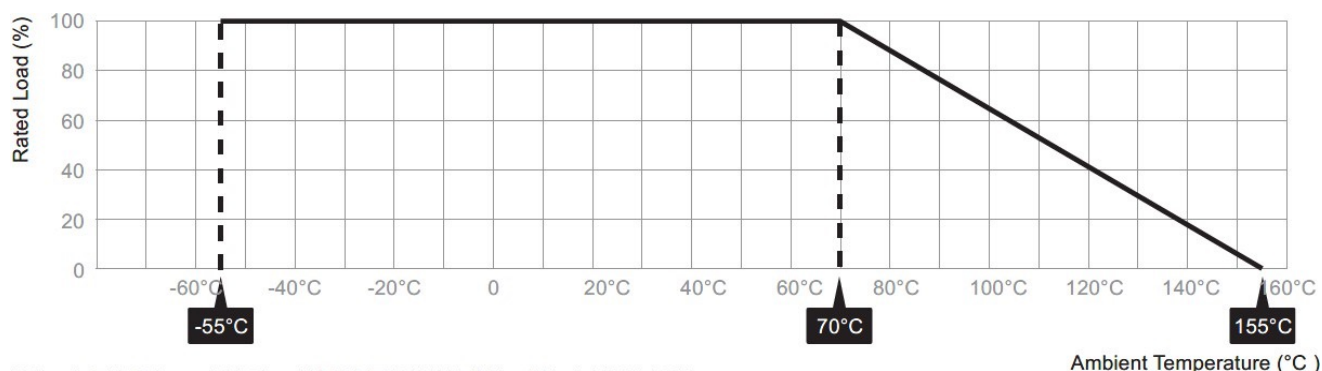


Item		Material
①	Insulation Coating	Epoxy Molding(Color : Black)
②	Marking	Printed
③	Cutting Line	-
④	Ceramic Core	Aluminum Material
⑤	Resistive Film	Metal Film
⑥	Terminal	Terminal Cap

■ Rated Power

Type	Rated Power	Max working Voltage	Max overload Voltage	Dielectric withstanding Voltage	Resistance Range	Operating temperature range
MGMC-25	0.25W	1600V	2000V	500V	1K Ω ~5.1M Ω	-55℃~+155℃
MGMD-50	0.5W	2000V	2500V	700V	1K Ω ~33M Ω	
MGME-100	1W	3500V	5000V	1000V	100K Ω ~56M Ω	
MGMG-200	2W	3500V	5000V	1000V	100K Ω ~100M Ω	

Derating Curve

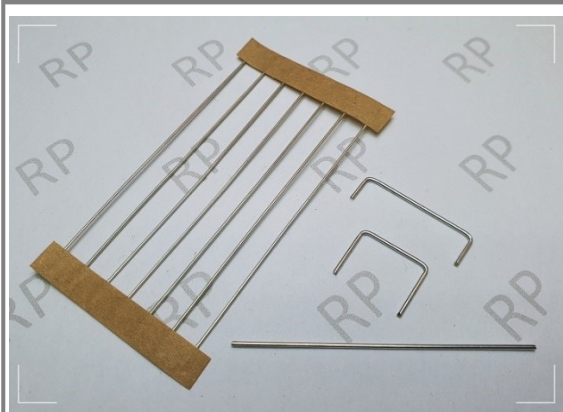


備註：在環境溫度70°C以上時，應按照上圖負荷特性曲線，額定功率比隨之減少。

Note : for resistors operated in ambient temperatures above 70°C, power rating must be derated in accordance with the above curve.

Characteristics

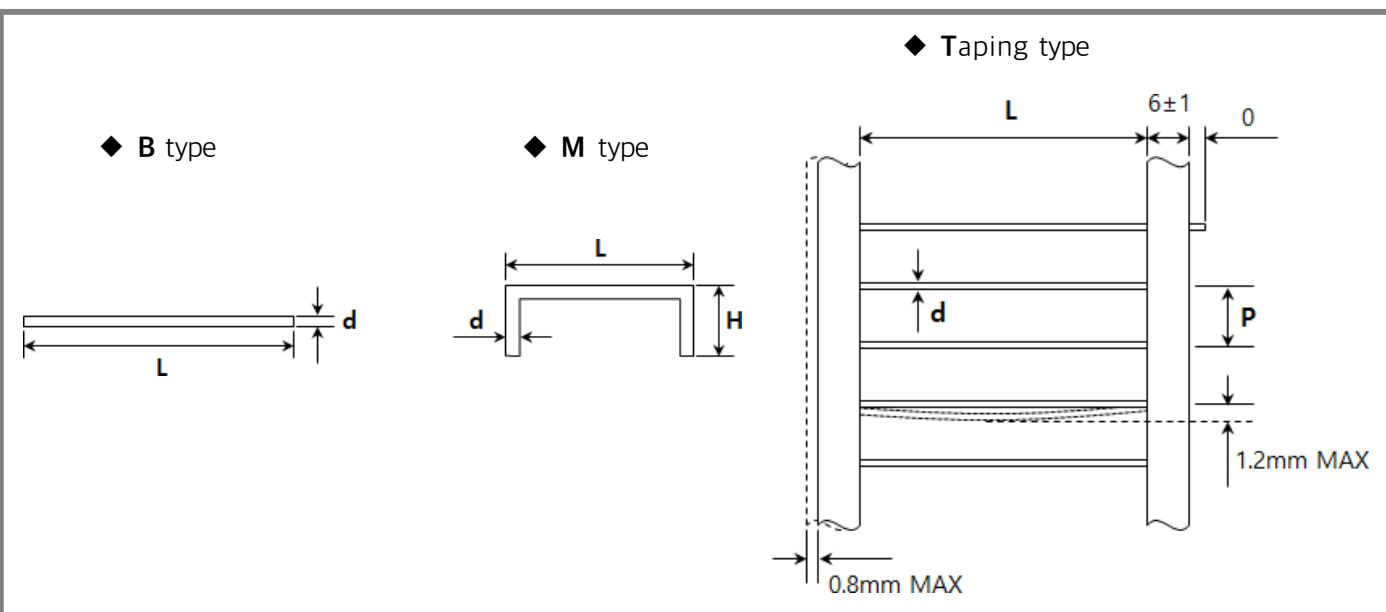
Item	Performance	Test methods
Temperature coefficient	<100KΩ ±350PPM/°C ≥100KΩ ±200PPM/°C	$\frac{R_1 - R_0}{R_1(T_1 - T_0)} \times 10^6 (\text{PPM}/^\circ\text{C})$ R ₀ : Resistance value at room temp. (T ₀). R ₁ : Resistance value at room temp. plus 100°C (T ₁).
Short time overload	within ±(1%+0.05Ω) No evidence of mechanical damage.	Rated voltage × 2.5 for 5 sec.
Resistance to soldering heat	within ±(1%+0.05Ω) No evidence of mechanical damage.	350±10°C, 3.5±0.5sec or 260±5°C, 10±1sec. After test leave for 3h.
Solderability	More than 95% of the total area of the electrode part shall be covered with new solder.	Test temperature of solder : 235±5°C. Dipping time in solder : 5±0.5sec.
Resistance to solvent	No deterioration of protective coating and markings.	Specimens shall be immersed in a bath of isopropyl salcohol completely for 3 minutes with ultrasoic.
Load life	within ±(5%+0.05Ω)	70±3°C, 1000h. Rated voltage(90 min ON, 30 min OFF)
Pulse overload	within ±(2%+0.05Ω)	Rated voltage × 4 times, 10000 cycle (1s ON, 25s OFF). But not to exceed maximum overload voltage.



특징 FEATURES

1. 0.03Ω 이하의 매우 낮은 저항값을 가지고 있다.
The resistance value is lower than 0.03Ω .
2. 다양한 크기로 제작이 가능하며, PCB와 결합 특성이 우수함.
It can be made in various sizes and is fully connected to the PCB.

치수 DIMENSIONS



구분	치수 DIMENSIONS(mm)		
	L±1	H±2	d±0.05
T26	26	-	0.45~0.6
T52	52	-	0.45~0.8
B	1~60	-	0.45~1.6
M	3~40	4~8	0.45~1.6

특성 CHARACTERISTICS

항목 ITEM	성능 Performance
1. 사용온도범위 Operating Temp. Range	-55°C ~ +200°C
2. 최대 저항값 Max. Resistance value	0.03Ω
3. 선 재질 Lead Wire Material	Tinned Copper wire or Tinned CP wire
4. 인장강도 Tensile strength	0.45 ~ 1.6mm : 10~28kgf/mm ²
5. 구부림 강도 Flex fold character	Left 90° and Light 90° / 2 Time
6. 납땜성 Solder ability	95% coverage minimum / 260°C ±5°C for 5 seconds
7. 납내열성 Resistance to soldering heat	The tin color wouldn't be changed 180°C for 1Hour

CSR 전류 센싱 저항기

Current Sensing Resistors

특징 FEATURES

The extremely low resistance(3mΩ) makes these resistors suitable for high power current detection. Various pitches and heights are available. These are all custom-made, non-inductive products exhibiting easy soldering.



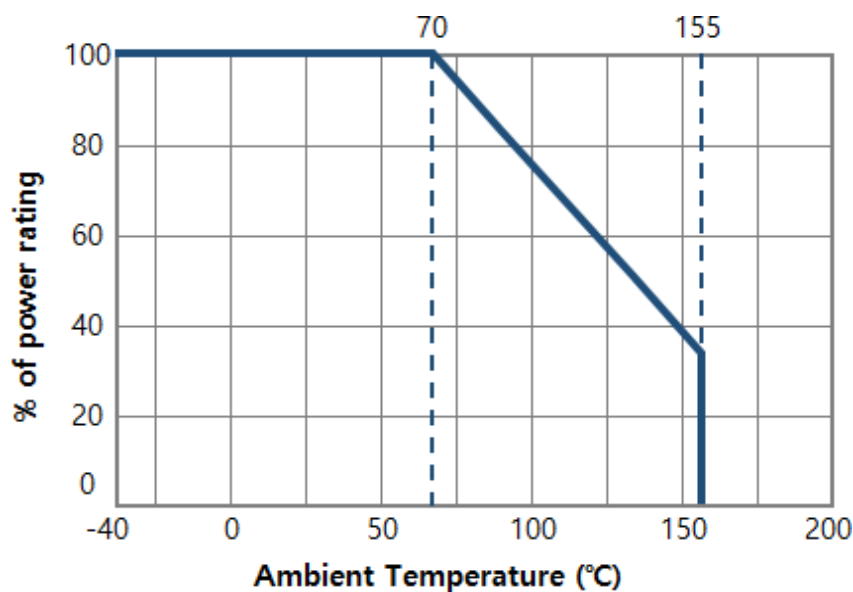
일반규격 GENERAL SPECIFICATIONS

Model	Φd (Diameter)	Max. Current Rating(A)	Resistance Range(mΩ)	Resistivity (mΩ/10mm)	Resistance Tolerance(%)	Rated Ambient Temp.
CSR 04	0.4	2.0	70 ~ 200	38.98	R≥20mΩ J[±5] R < 20mΩ K[±10]	+70℃
CSR 05	0.5	2.5	50 ~ 150	24.95		
CSR 06	0.6	3.0	50 ~ 100	17.34		
CSR 07	0.7	4.0	30 ~ 70	12.74		
CSR 08	0.8	5.5	20 ~ 50	9.747		
CSR 09	0.9	5.0	20 ~ 40	7.702		
CSR 10	1.0	5.5	15 ~ 30	6.238		
CSR 11	1.1	6.0	15 ~ 20	5.157		
CSR 12	1.2	7.0	10 ~ 20	4.332		
CSR 13	1.3	7.5	10 ~ 20	3.693		
CSR 14	1.4	8.0	10 ~ 20	3.184		
CSR 15	1.5	9.0	10 ~ 20	2.773		
CSR 16	1.6	9.5	10 ~ 15	2.436		
CSR 18	1.8	11.0	5 ~ 10	1.925		
CSR 20	2.0	12.0	5 ~ 10	1.560		

특성 CHARACTERISTICS

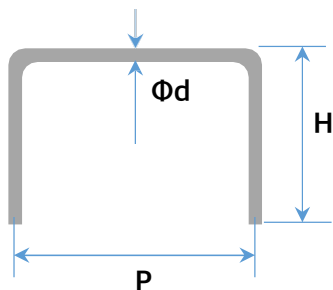
항목 ITEM	성능 Performance
1. Temperatures Range	-40℃ ~ +155℃
2. Temperature coefficient	9.0A ≥±100ppm/℃ maximum, 9.5A ≤±260ppm/℃ maximum
3. Short Time Overload	±[2.0%] 2.5× Power rating for 5 seconds
4. Moisture Resistance	±[2.0%] 40℃, 95%RH, 240hours
5. Heat Resistance	±[2.0%] 200℃ for 2huors
6. Solderability	90% Coverage minimum 260℃ for 5 seconds
7. Thermal Shock	±[2.0%] Power Rating 30minutes On, -40℃, 15minutes off
8. Load Life	±[5.0%] Power Rating, 1.5hours On, 30minutes off, 1000hours

■ 전력 경감곡선 POWER DERATING CURVE



■ 치 수 DIMENSIONS

※ P, H 치수는 당사와 상의해 주십시오.
※ Please consult with us about dimensions
'P' and 'H'

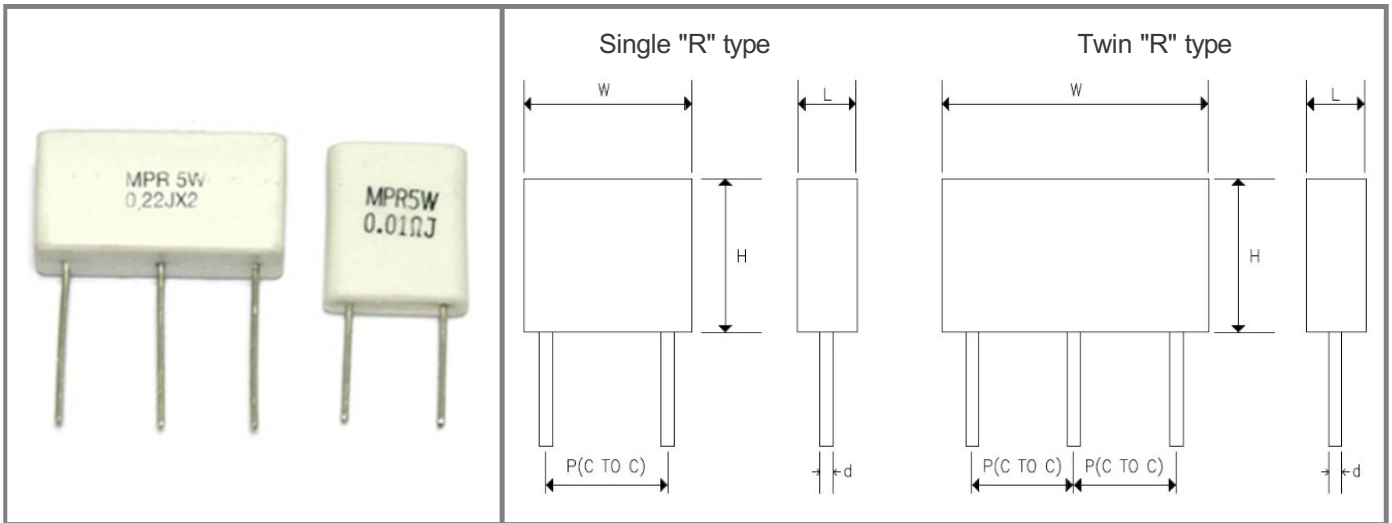


TYPE	FORM	TYPE	FORM
A		C	
B		D	
T		U	

■ 주문방법 HOW TO ORDER

Model	Type	Nominal Resistance	Resistance Tolerance	Terminal Pitch
CSR	T	10mΩ	K(±10%)	10mm

<RADIAL TYPE> Non-inductive



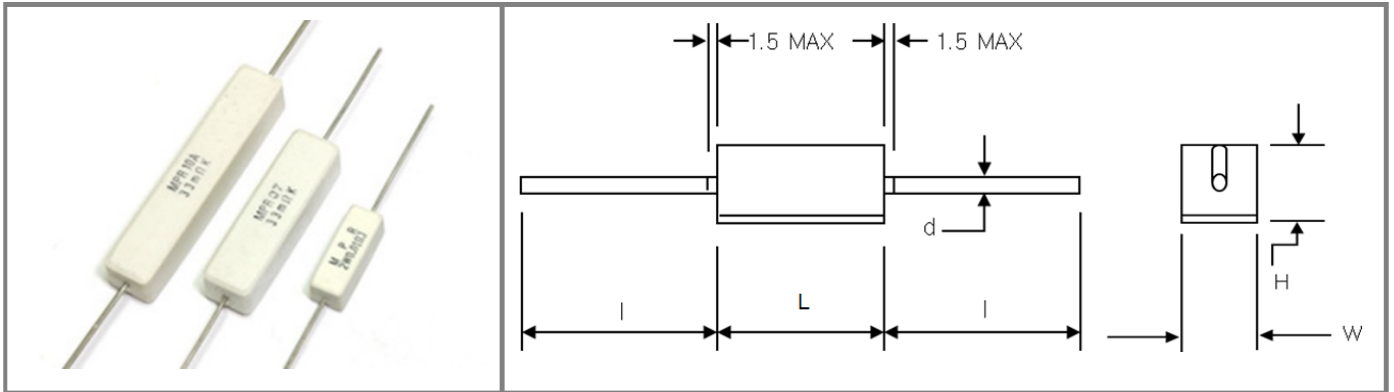
■ 특 징 FEATURES & DIMENSIONS(mm)

특 징 FEATURES	형 명 Type	치 수 Dimensions(mm)				
		W±1	H±1	L±1	P±0.5	d±0.03
1. Good heat-durability 2. Low temperature coefficient 3. Low inductance (low noise) 4. High overload power 5. Low value resistors	MPR 2R	14	8.5	5	10	0.8
	MPR 3R	14	13	5	10	0.8
	MPR 5R(S)	14	18	5	10	0.8
	MPR 10R(S)	16	18	8.5	10	0.8
	MPR 22R	26	10	5	10	0.8
	MPR 33R	26	13	5	10	0.8
	MPR 55R	26	17	5	10	0.8
	MPR 77R	26	20	5	10	0.8

■ 일반규격 GENERAL SPECIFICATIONS

형 명 Type	정격전력 Rated Wattage	저항치범위 Resistance Range	최고사용전압 Max. Working Voltage	최고과부하전압 Max. Overload Voltage	최대허용전류 Maximum Current	저항치허용차 Resistance Tolerance
MPR 2R	2W	0R005~2R2	100V	100V	5A	±1% (F) ±2% (G) ±5% (J) ±10% (K)
MPR 3R	3W	0R005~2R2	100V	100V	5A	
MPR 5R(S)	5W	0R005~2R7	150V	150V	10A	
MPR 10R(S)	10W	0R005~2R7	150V	150V	10A	
MPR 22R	2W+2W	0R01~4R7	200V	200V	15A	
MPR 33R	3W+3W	0R01~4R7	250V	250V	15A	
MPR 55R	5W+5W	0R01~4R7	300V	300V	20A	
MPR 77R	7W+7W	0R01~4R7	350V	350V	20A	

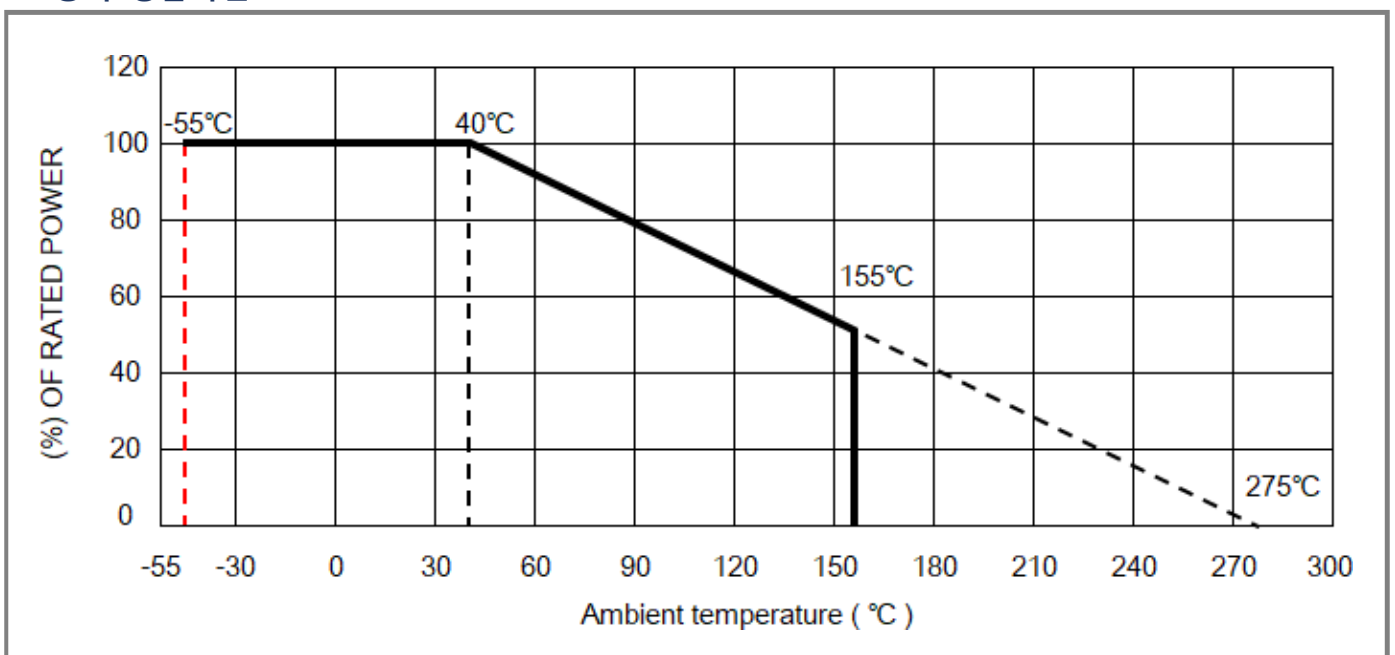
<AXLAL TYPE> Non-inductive



■ 일반규격 GENERAL SPECIFICATIONS

형 명 Type	정격전력 Rated Wattage	저항치범위 Resistance Range	최대허용전류 Maximum Current	치 수 Dimensions(mm)				
				L ±1	W ±1	H ±1	l (Min)	d ±0.03
MPR 1A	1W	0R005~0R03	5A	14	6.5	5.5	23	0.8
MPR 2A	2W	0R005~0R05	5A	18	7.0	7.5	21	0.8
MPR 3A	3W	0R005~0R10	10A	22	8.0	8.0	25	0.8
MPR 5A	5W	0R005~0R10	10A	22	10.0	9.0	25	0.8
MPR 7A	7W	0R01~0R12	10A	35	10.0	9.0	25	0.8
MPR 10A	10W	0R01~0R30	20A	48	10.0	9.0	25	1.0
MPR 15A	15W	0R01~0R30	20A	48	12.5	11.5	25	1.0
MPR 20A	20W	0R01~0R40	20A	60	14.0	13.5	25	1.0

■ 정격 경감곡선 RATED POWER DERATING CURVE





■ FEATURES

This specification covers the High Power Current Resistor for use in Car BMS(Battery Management System), EV/HEV/PEV Battery Pack, ESS(Energy Storage System)

- * High power to resistor size ratio
- * Proprietary processing technique produces extremely low resistance values
- * Further versions with various dimensions upon request

■ GENERAL SPECIFICATIONS

Model	Max. Power Rating[W] (At terminal temp. ≤70℃)	Resistance [Ω]	Continuous current[A] at 0.1mΩ (At terminal temp. ≤110℃)	Resistance Tolerance
PMS 12	12	0.1m	200	±5% [J]
PMS 15	15		245	
PMS 36	36		350	

* Referring to power derating curve

* Also available in extended ohmic ranges of 0.05mΩ to 0.5mΩ

■ CHARACTERISTICS

항 목 ITEM	성 능 Performance
Operating Temperature	-55℃ ~ +170℃
Temperature Coefficient	(+20℃ and +60℃) ±100ppm/℃
High Temp. exposure	±[1.0%] +125℃, 1000hours
Temperature Cycle	±[1.0%] -55℃[30minutes] to +125℃[30minutes] 1000cycles, 1min. Max. transition time
Resistance to solvent	±[1.0%] OKEM Clean or equivalent
Vibration	±[0.5%] 10-2000Hz, 5g's for 20min., 12 Cycle each of 3 orientations
Operational Life	±[1.0%] +20℃, Rated power, 1.5hours"On" 0.5hours"Off", for 1000hours

■ DIMENSIONS(mm)

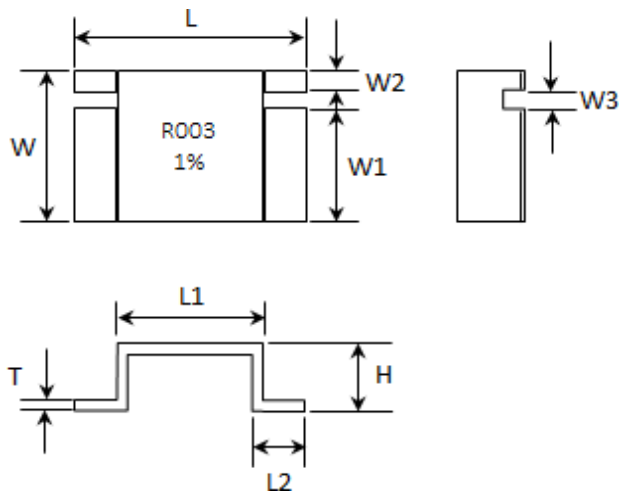
◆ Non type voltage sensing

◆ Hole(Tap) type voltage sensing

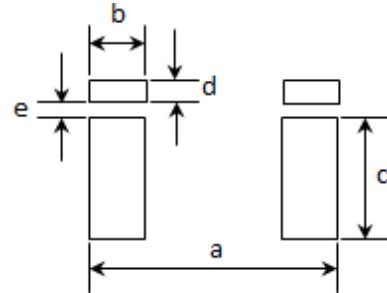
◆ Pin type voltage sensing

Model	Dimensions[mm]						
	L±1	W±0.5	T±0.1	P±0.5	E±0.3	F±0.5	G±0.5
PMS 12	52	16	3	33.7	6.2	15.3	7.2
PMS 15	60	18	3	42	6.6	17.1	9
PMS 36	85	18	3	60	8.3	17.1	9

◆ PMS 03 Chip type



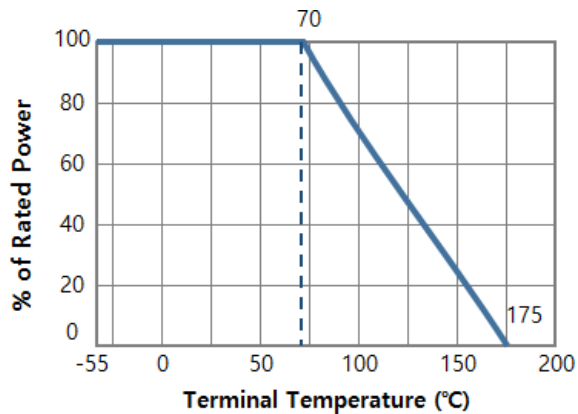
◆ PCB Land



Div.	Dimensions(mm)													
	$L \pm 0.2$	$L1 \pm 0.2$	$L2 \pm 0.1$	$W \pm 0.2$	$W1 \pm 0.1$	$W2 \pm 0.1$	$W3 \pm 0.15$	$H \pm 0.2$	$T \pm 0.05$	$a \pm 0.1$	$b \pm 0.1$	$c \pm 0.1$	$d \pm 0.1$	$e \pm 0.1$
3W	10.1	6.9	2	6.6	4.91	0.7	0.99	2.9	0.4	10.67	2.44	5.6	0.89	0.89

* Further versions with various dimensions upon request

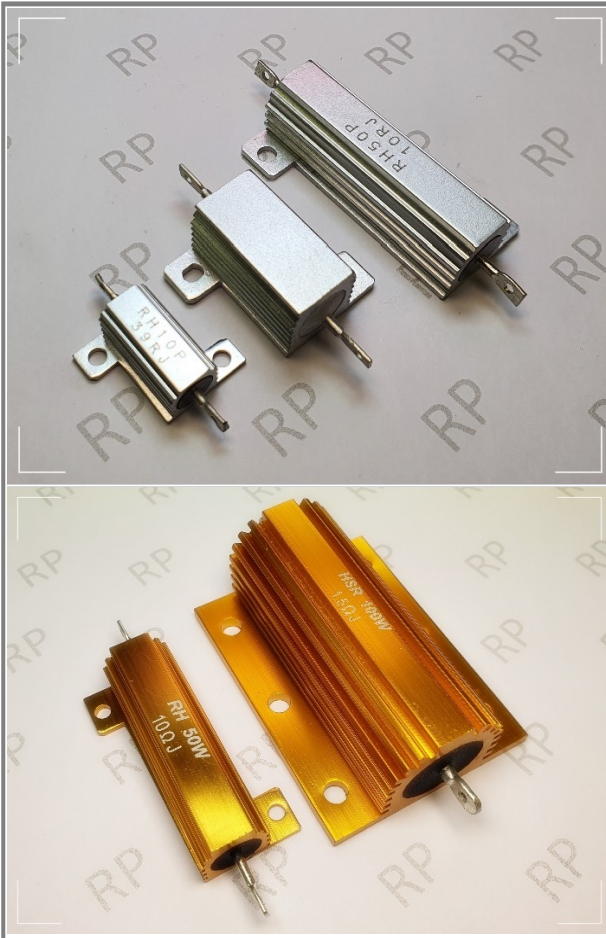
■ POWER DERATING CURVE



■ HOW TO ORDER

PMS	12	H	R001	J
1	2	3	4	5

1. Model Type
2. Rated Wattage
3. Shape (H: Hole type, T: Tap type, P: Pin type, N: Non type, C: Chip type)
4. Resistance (R001=0.001Ω)
5. Tolerance



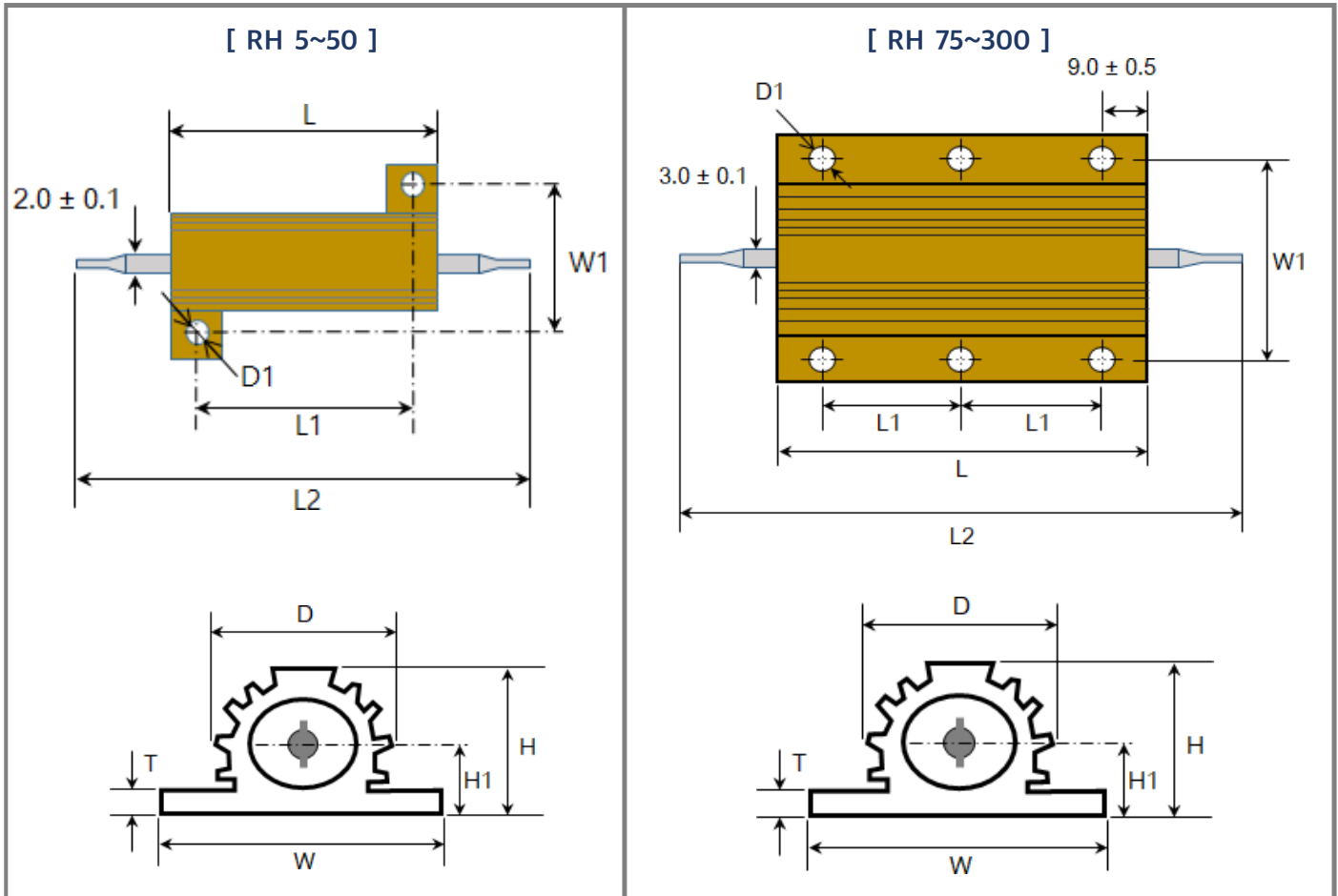
특징 FEATURES

1. 단시간 과부하 특성이 우수하다.
Excellent short time overload.
2. 고온에서 기계적 강도가 우수하다.
Excellent mechanical thermal strength at a high temperature.
3. 안정된 부하 수명 특성
Excellent long time stability.
4. 내습, 내압, 내진, 내약품성, 절연성이 우수하다.
Excellent Electrical requirment.
5. 유도형, 무유도형 권선이 가능
Avaible inductive type, None inductive type

일반규격 GENERAL SPECIFICATIONS

구분	Power rating on std. Heatsink @25°C	Power rating with no Heatsink @25°C	Resistance Range	Max. Working Voltage	Dielectric Strength Voltage	Standard Heatsink	
						cm ²	Thickness (mm)
RH 5	5W	2W	0R02~5K	120	500	415	1
RH 10	10W	5W	0R02~10K	245	1500	415	1
RH 25	25W	8W	0R02~25K	500	1500	535	1
RH 50	50W	10W	0R05~50K	1250	2500	535	1
RH 75	75W	20W	0R05~50K	1400	4500	995	3
RH 100	100W	25W	0R05~50K	1900	4500	995	3
RH 150	150W	35W	0R05~70K	1900	4500	995	3
RH 200	200W	45W	0R05~70K	1900	5000	3750	3
RH 250	250W	50W	0R05~70K	2200	5000	4765	3
RH 300	300W	55W	0R05~70K	2200	5000	5780	3

■ 치 수 DIMENSIONS

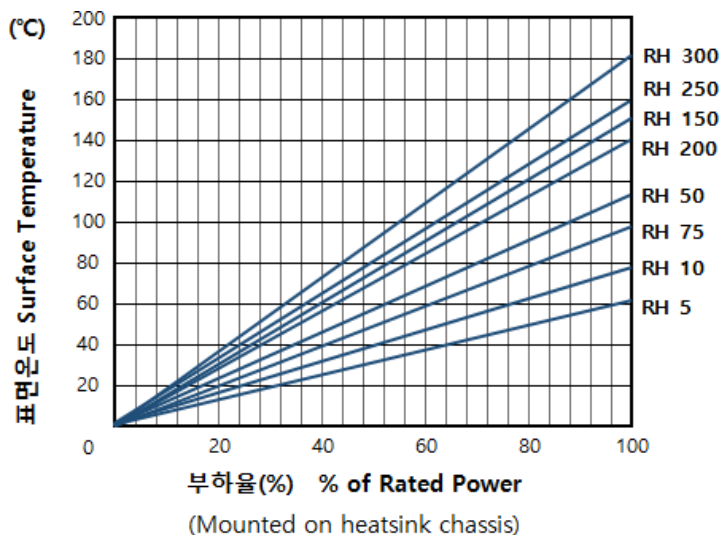


구 분	DIMENSIONS(mm)									
	L±1.0	L1±1	L2±2	W±1	W1±1	H±1	H1±1	D±1	T±0.3	D1±0.3
RH 5	16	11.3	27	16.5	12.5	9	4	8.5	1.5	Φ2.3
RH 10	20	14.3	36.5	22	15.9	10.5	5.3	10	1.5	Φ3.2
RH 25	27	18.5	49	29	21	16	8	14	1.85	Φ3.2
RH 50	50	40	75	29	21.5	15.5	7.3	14.5	1.85	Φ3.5
RH 75	49	29	72	48	37	26	11.5	27	3.5	Φ4.8
RH 100	66	24	88	48	37	26	11.5	27	3.5	Φ4.8
RH 150	98	29	121	48	37	26	11.5	27	3.5	Φ4.8
RH 200	90	35	146	72.5	57.2	42	20.5	45	5	Φ5.5
RH 250	110	45	167	72.5	57.2	42	20.5	45	5	Φ5.5
RH 300	128	52	185	72.5	59	42	20.5	45	5	Φ6.5

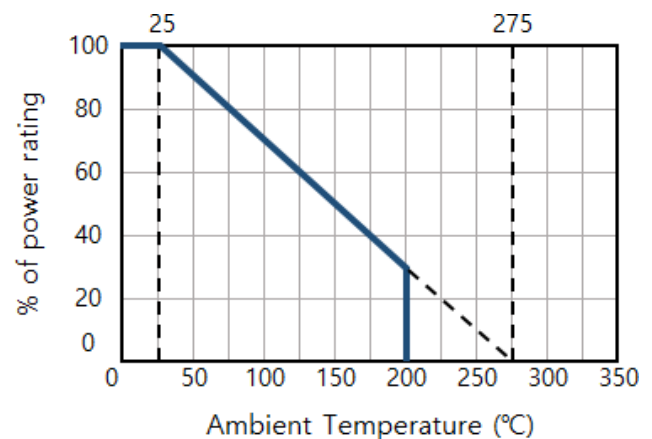
특 성 CHARACTERISTICS

항 목 ITEM	조 건 Conditions	시험방법 Test method
1. 사용온도범위 Operating Temp. Range	-55°C ~ +200°C	-
2. 절연저항 Insulation Resistance	1000MΩ Min	DC500V, 1minute
3. 내전압 Dielectric Withstanding Voltage	±[0.5% + 0.05Ω]	500VAC, 1500VAC for 1minute
4. 온도계수 Temperature coefficient	Special ±30, ±50ppm/°C General ±260ppm/°C	TCR= $\frac{(R_2 - R_1) \times 10^6}{R_1 \times (t_2 - t_1)}$ t ₁ :25°C, t ₂ :125°C R ₁ :Ω at t ₁ , R ₂ :Ω at t ₂
5. 단시간과부하 Short Time Overload	±[2.0% + 0.05Ω]	5×Power rating 5seconds
6. 내열성 Heat Resistance	±[1.0% + 0.05Ω]	275 ±5°C for 2hours
7. 내습부하수명 Load Life in Humidity	±[3.0% + 0.05Ω]	40°C, 90~95%RH, 0.1×Power rating, 90minutes on, 30minutes off, 1000hours
8. 부하수명 Load Life	±[3.0% + 0.05Ω]	25°C, Power rating 90minutes on, 30minutes off, 1000hours (With heatsink mounted)
9. 내진성 Vibration	±[0.5% + 0.05Ω]	X-2hours, Y-2hours

온도상승곡선 TEMPERATURE RISE CURVE



전력경감곡선 DERATING CURVE



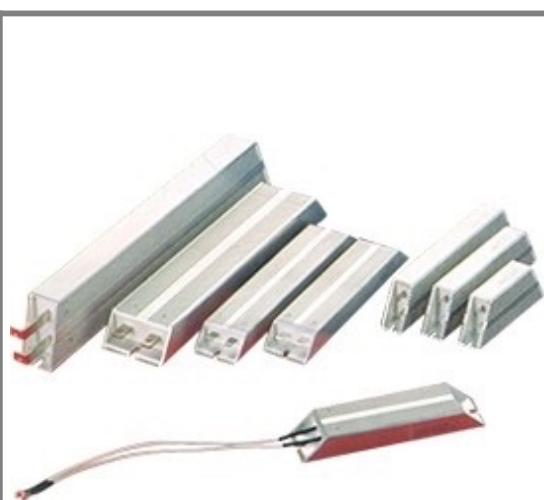
사용상 주의사항 NOTES

- 이 저항기는 샤시 취부형으로 설계되어 있기 때문에 다음사항을 준수하여 주시기 바랍니다.
 - 저항기를 샤시에 완전히 밀착고정하기 위해, 취부표면에 요철이 없이 매끄러워야 합니다.
 - 샤시와 저항기 취부면에는 방열컴파운드 같은 열 전도가 좋은것을 균일하게 도포해 주시기 바랍니다.
- This RH series is designed for chassis mounting style and note the followings.
 - In order to mount the resistor tightly to chassis, mounting surface should be completely smooth.
 - On the mounting surface, paint flatly the well temperature conductive material like the radiant heat.

■ 주문방법 HOW TO ORDER

RH	50W(N)	J	0R22	TC
1	2	3	4	5

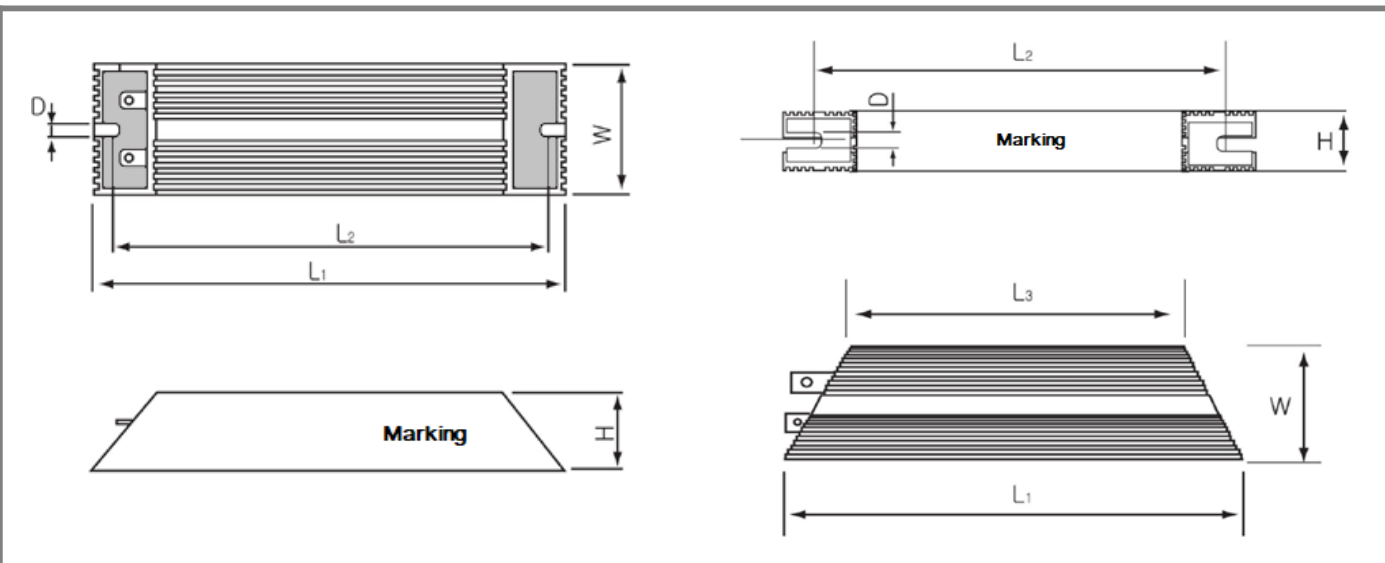
1. 형 명 Type : RH 50W(권선형 유도권선 Inductively wound)
RH 50N(권선형 무유도 권선 Non-Inductively wound)
2. 정격전력 및 권선형 Rated Wattage & Wound Style
(W : 유도 권선 Inductively wound, N : 무유도 권선 Non-Inductively wound)
3. 허용오차 Tolerance
4. 저항치 Resistance (0R01=0.01, 0R1=0.1, 1K1=1.1K Ω)
5. 2차 가공 Shape (TB:52mm, TC:64mm, RT=Radial Taping, PS=Bulk)



■ 일반규격 GENERAL SPECIFICATIONS

형 명 TYPE	RATED POWER		Resistance Range(Ω)		Resistance Tolerance
	With Heatsink	In Free Air	Inductive	Non-Inductive	
IRH, IRV 60	60W	50W	0.1~1K	0.1~56	$\pm 0.5\%$ (D) $\pm 1.0\%$ (F) $\pm 2.0\%$ (G) $\pm 5.0\%$ (J) $\pm 10\%$ (K)
IRH, IRV 80	80W	64W	0.1~1K	0.1~110	
IRH, IRV 100	100W	80W	0.1~1.1K	0.1~240	
IRH, IRV 120	120W	96W	0.1~1.3K	0.1~300	
IRH, IRV 150	150W	120W	0.1~1.6K	0.1~390	
IRH, IRV 200	200W	140W	0.1~2.2K	0.1~1.0K	
IRH, IRV 300	300W	210W	0.1~2.7K	0.1~1.5K	
IRH, IRV 400	400W	240W	0.1~4.3K	0.1~2.2K	
IRH, IRV 500	500W	300W	0.1~6.8K	0.1~3.0K	

■ 치 수 DIMENSIONS



구 분	치 수 DIMENSIONS(mm)						Weight[g] $\pm 10\%$	
	L1 ± 2	L2 ± 2	L3 ± 2	W ± 1	H ± 1	D ± 0.5	IRH	IRV
IRH, IRV 60	100	87	60	41	22	4.3	110	113
IRH, IRV 80	150	137	110	41	22	4.3	195	189
IRH, IRV 100	165	152	125	41	22	4.3	216	215
IRH, IRV 120	182	169	142	41	22	4.3	245	241
IRH, IRV 150	210	197	170	41	22	4.3	283	290
IRH, IRV 200	165	146	125	60	30	5.3	485	447
IRH, IRV 300	215	196	175	60	30	5.3	600	600
IRH, IRV 400	265	246	225	60	30	5.3	770	780
IRH, IRV 500	335	316	295	60	30	5.3	990	980

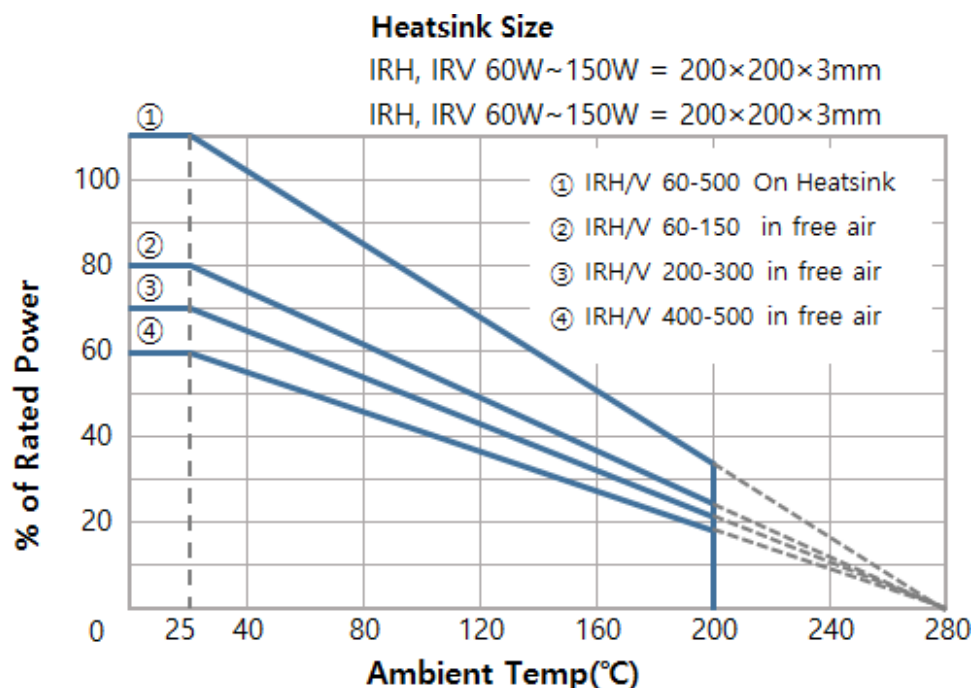
■ 단자전선규격 FLYING LEADS

형 명 TYPE	8mm ²	5.5mm ²	2mm ²	1.25mm ²
IRH, IRV 60~150	×	×	0.1Ω~ 0.99Ω	1Ω~
IRH, IRV 200~500	0.1Ω~ 0.99Ω	1Ω~ 4.99Ω	5Ω~	×

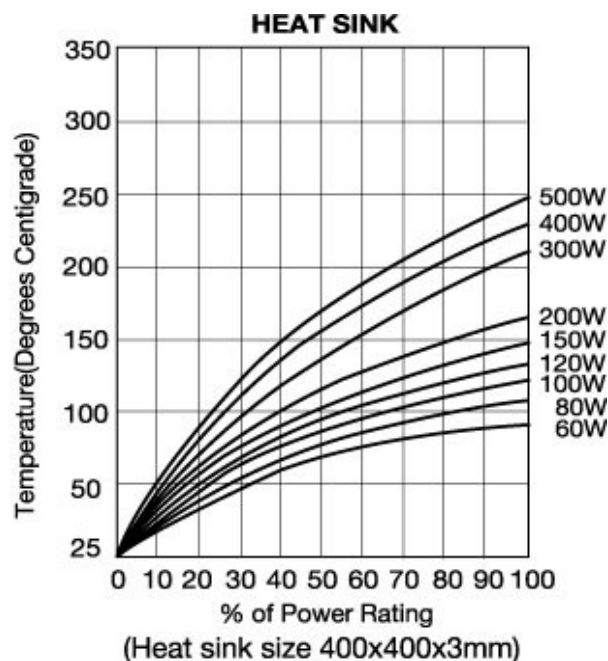
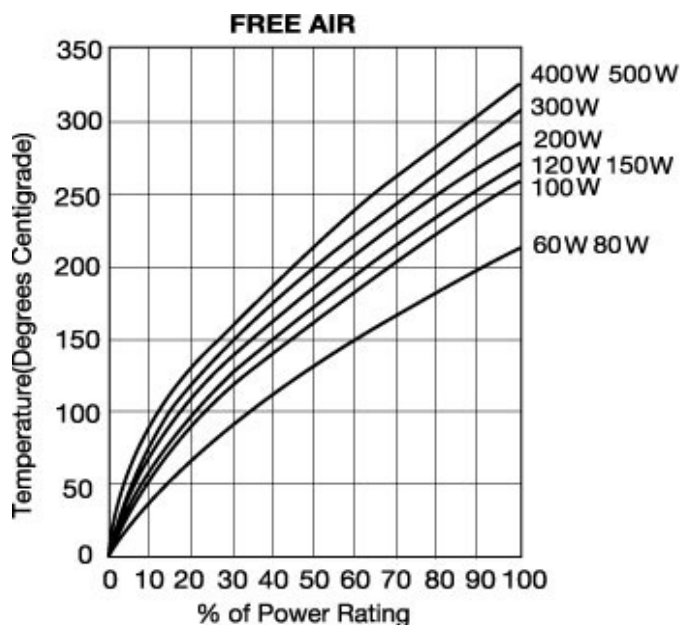
■ 특 성 CHARACTERISTICS

항 목 ITEM	조 건 Conditions	시험방법 Test method
1. 사용온도범위 Operating Temp. Range	-55°C ~ +200°C	-
2. 절연저항 Insulation Resistance	1000MΩ Min	DC500V, 1 minute
3. 내전압 Dielectric Withstanding Voltage	±[0.5% + 0.05Ω]	1500VAC, 2500VAC for 1 minute
4. 온도계수 Temperature coefficient	MAX ±260ppm/°C	$TCR = \frac{(R_2 - R_1) \times 10^6}{R_1 \times (t_2 - t_1)}$ $t_1: 25^\circ\text{C}, t_2: 125^\circ\text{C}$ $R_1: \Omega \text{ at } t_1, R_2: \Omega \text{ at } t_2$
5. 단시간과부하 Short Time Overload	±[2.0% + 0.05Ω]	5×Power rating 5seconds
6. 내열성 Heat Resistance	±[1.0% + 0.05Ω]	275 ±5°C for 2hours
7. 내습부하수명 Load Life in Humidity	±[3.0% + 0.05Ω]	40°C, 90~95%RH, 0.1×Power rating, 90minutes on, 30minutes off, 500hours
8. 부하수명 Load Life	±[5.0% + 0.05Ω]	25°C, Power rating 90minutes on, 30minutes off, 500hours (With heatsink mounted)
9. 내진성 Vibration	±[1.0% + 0.05Ω]	10Hz - 55Hz - 10Hz (1 min), 2hrs. each direction

■ 전력 경감곡선 POWER DERATING CURVE



■ 온도상승곡선 TEMPERATURE RISE CURVE



A mid-point bracket is required for 150W, 300W, 400, 500W models to ensure sufficient contact with the heat sink.

■ 주문방법 HOW TO ORDER

IRH,IRV

1

60W(N)

2

J

3

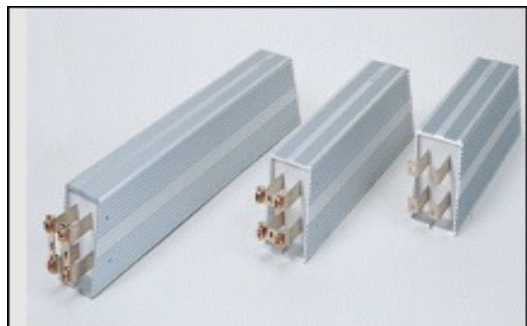
0R22

4

TC

5

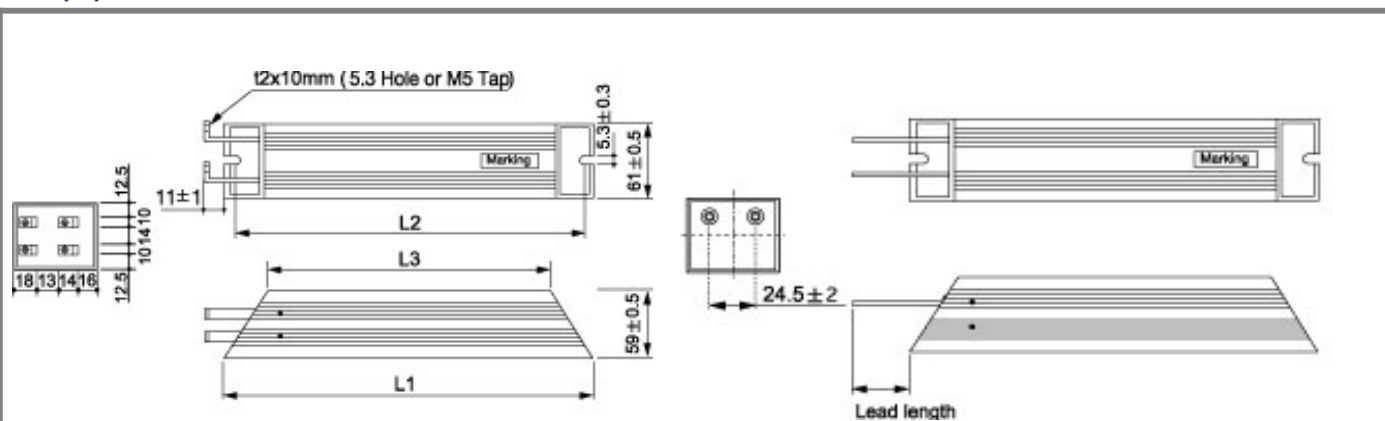
1. 형 명 Type : IRH, IRV 60W(권선형 유도권선 Inductively wound)
IRH, IRV 60N(권선형 무유도 권선 Non-Inductively wound)
2. 정격전력 및 권선형 Rated Wattage & Wound Style
(W : 유도 권선 Inductively wound, N : 무유도 권선 Non-Inductively wound)
3. 허용오차 Tolerance
4. 저항치 Resistance (0R01=0.01, 0R1=0.1, 1K1=1.1KΩ)
5. 2차 가공 Shape (TB:52mm, TC:64mm, RT=Radial Taping, PS=Bulk)



■ 일반규격 GENERAL SPECIFICATIONS

형 명 TYPE	RATED POWER		Resistance Range(Ω)		Resistance Tolerance
	With Heatsink	In Free Air	Inductive	Non- Inductive	
IRV 600	600W	330W	0.1~94	0.1~21	$\pm 0.5\%(D)$ $\pm 1.0\%(F)$ $\pm 2.0\%(G)$ $\pm 5.0\%(J)$ $\pm 10\%(K)$
IRV 800	800W	360W	0.1~112	0.1~29	
IRV 1000	1000W	400W	0.1~140	0.1~36	
IRV 1200	1200W	480W	0.1~160	0.1~48	
IRV 1600	1600W	590W	0.1~200	0.1~55	
IRV 1800	1800W	620W	0.1~250	0.1~60	
IRV 2000	2000W	660W	0.1~250	0.1~60	

■ 치 수 DIMENSIONS



구 분	치 수 DIMENSIONS(mm)			Weight[g] $\pm 10\%$
	L1 ± 2	L2 ± 2	L3 ± 2	
IRV 600	235	216	195	1165
IRV 800	285	266	245	1500
IRV 1000	335	316	295	1835
IRV 1200	405	386	365	2304
IRV 1600	430	405	390	
IRV 1800	450	422	410	
IRV 2000	510	491	470	

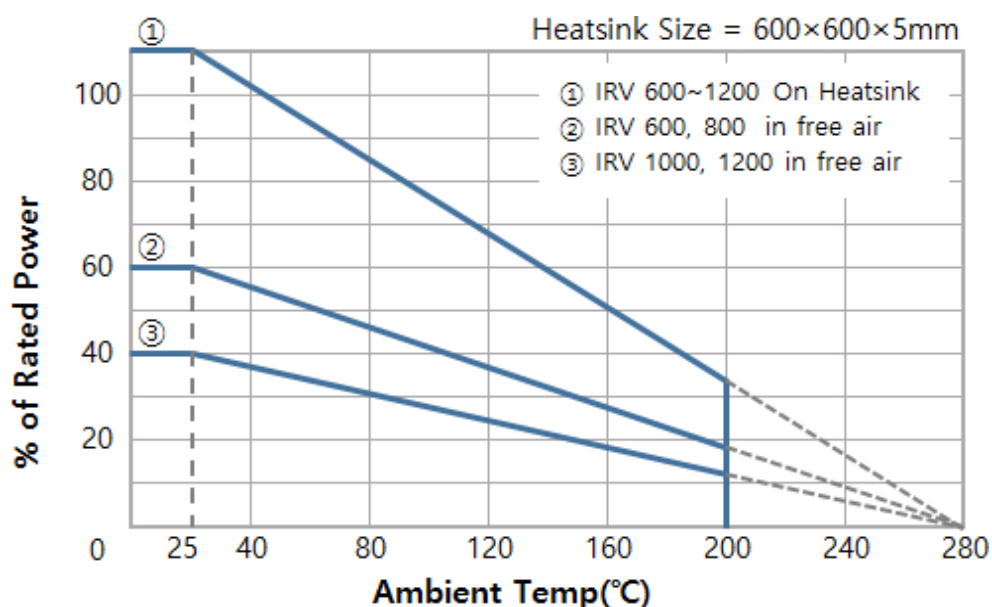
■ 단자전선규격 FLYING LEADS

형 명 TYPE	8mm ²	5.5mm ²	2mm ²
IRV 600~2000	0.1 Ω ~ 0.99 Ω	1 Ω ~ 4.99 Ω	5 Ω ~

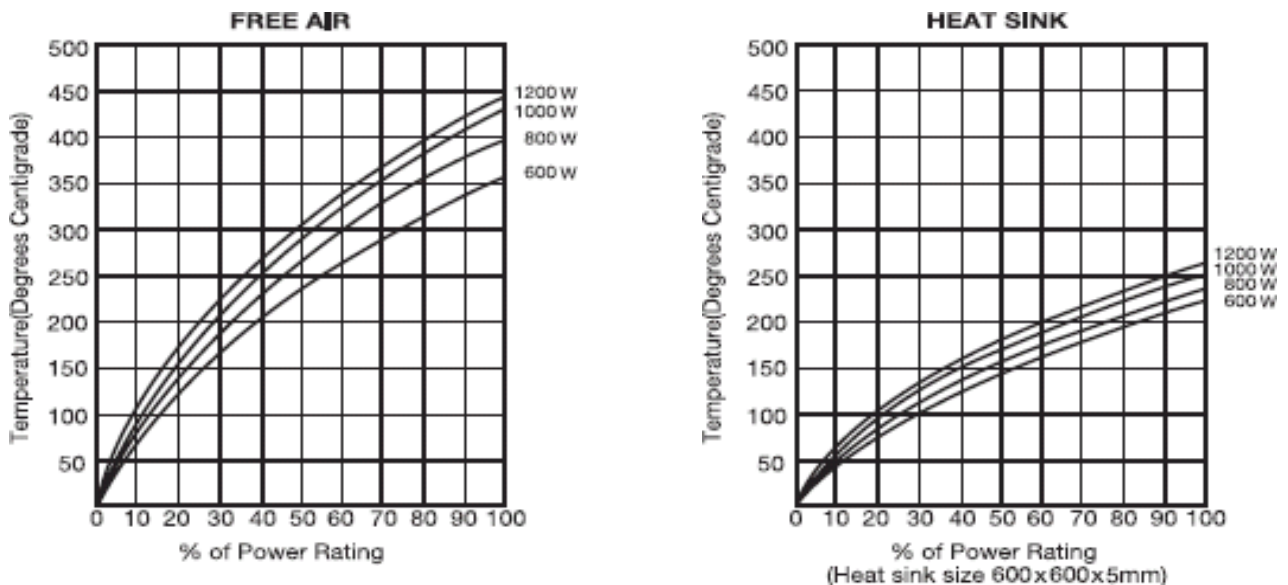
특 성 CHARACTERISTICS

항 목 ITEM	조 건 Conditions	시험방법 Test method
1. 사용온도범위 Operating Temp. Range	-55°C ~ +200°C	-
2. 절연저항 Insulation Resistance	1000MΩ Min	DC500V, 1minute
3. 내전압 Dielectric Withstanding Voltage	±[0.5% + 0.05Ω]	1500VAC, 2500VAC for 1minute
4. 온도계수 Temperature coefficient	MAX ±260ppm/°C	$TCR = \frac{(R_2 - R_1) \times 10^6}{R_1 \times (t_2 - t_1)}$ $t_1: 25^\circ\text{C}, t_2: 125^\circ\text{C}$ $R_1: \Omega \text{ at } t_1, R_2: \Omega \text{ at } t_2$
5. 단시간과부하 Short Time Overload	±[2.0% + 0.05Ω]	5×Power rating 5seconds
6. 내열성 Heat Resistance	±[1.0% + 0.05Ω]	275 ±5°C for 2hours
7. 내습부하수명 Load Life in Humidity	±[3.0% + 0.05Ω]	40°C, 90~95%RH, 0.1×Power rating, 90minutes on, 30minutes off, 500hours
8. 부하수명 Load Life	±[5.0% + 0.05Ω]	25°C, Power rating 90minutes on, 30minutes off, 500hours (With heatsink mounted)
9. 내진성 Vibration	±[1.0% + 0.05Ω]	10Hz - 55Hz - 10Hz (1min), 2hrs. each direction

전력 경감곡선 POWER DERATING CURVE



온도상승곡선 TEMPERATURE RISE CURVE



A mid-point bracket is required for 600~1200W models to ensure sufficient contact with the heat sink.

주문방법 HOW TO ORDER

IRV	600W(N)	J	0R22	TC
1	2	3	4	5

1. 형 명 Type : IRV 600W(권선형 유도권선 Inductively wound)
IRV 600N(권선형 무유도 권선 Non-Inductively wound)
2. 정격전력 및 권선형 Rated Wattage & Wound Style
(W : 유도 권선 Inductively wound, N : 무유도 권선 Non-Inductively wound)
3. 허용오차 Tolerance
4. 저항치 Resistance (0R01=0.01, 0R1=0.1, 1K1=1.1KΩ)
5. 2차 가공 Shape (TB:52mm, TC:64mm, RT=Radial Taping, PS=Bulk)

IRB 보트형 메탈 클래드 저항기

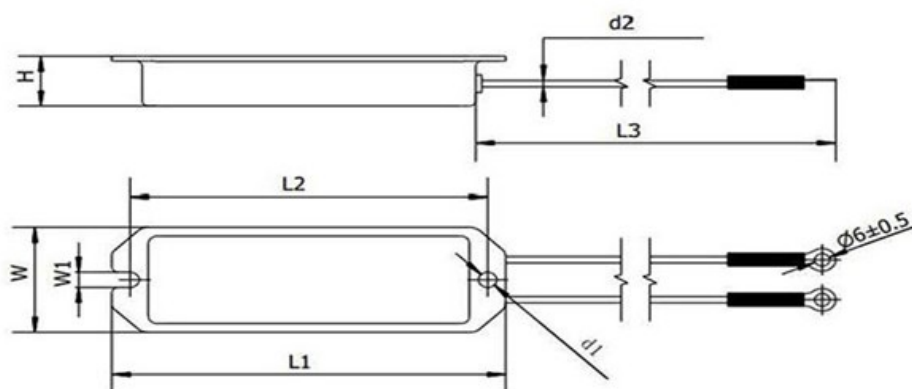
Metal Clad Resistors (Boat shape)



■ 일반규격 GENERAL SPECIFICATIONS

형 명 TYPE	Rated Wattage	Resistance Range(Ω)		Resistance Tolerance
		Inductive	Non-Inductive	
IRB 50	50W	0.1~1.0K	0.1~200	±1.0%(F) ±2.0%(G) ±5.0%(J) ±10%(K)
IRB 60	60W	0.1~1.0K	0.1~200	
IRB 80	80W	0.1~1.2K	0.1~350	
IRB 100	100W	0.1~1.2K	0.1~350	
IRB 120	120W	0.1~1.5K	0.1~500	
IRB 150	150W	0.1~1.5K	0.1~500	
IRB 200	200W	0.1~2.0K	0.1~1.0K	

■ 치 수 DIMENSIONS



구 분	치 수 DIMENSIONS(mm)								
	L1±1	L2±1	L3±10	W±1	W1±0.5	H±1	d1±0.5	d2±0.6	Ø±0.5
IRB 50	100	90	200	30	4.5	14	4.5	2.51	6
IRB 60	100	90	200	30	4.5	14	4.5	2.51	6
IRB 80	130	118	200	42	6	20	6	3.44	6
IRB 100	130	118	200	42	6	20	6	3.44	6
IRB 120	182	172	200	42	6	20	6	3.44	6
IRB 150	182	172	200	42	6	20	6	3.44	6
IRB 200	230	220	200	60	4.5	20	4.5	3.44	6

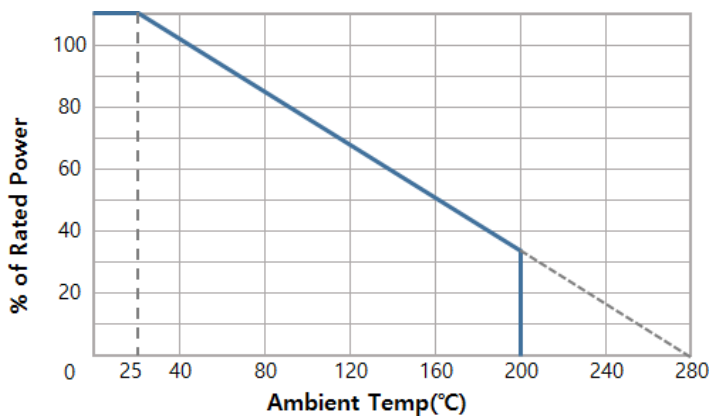
IRB 보트형 메탈 클래드 저항기

Metal Clad Resistors (Boat shape)

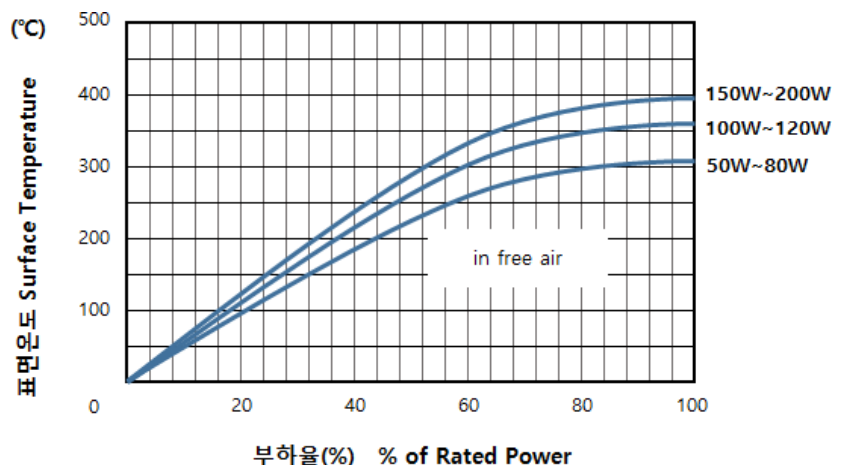
■ 특 성 CHARACTERISTICS

항 목 ITEM	조 건 Conditions	시험방법 Test method
1. 사용온도범위 Operating Temp. Range	-55°C ~ +200°C	-
2. 절연저항 Insulation Resistance	100MΩ Min	DC500V, 1minute
3. 내전압 Dielectric Withstanding Voltage	±[0.5% + 0.05Ω]	1500VAC for 1minute
4. 온도계수 Temperature coefficient	MAX ±300ppm/°C	TCR= $\frac{(R_2 - R_1) \times 10^6}{R_1 \times (t_2 - t_1)}$ $t_1: 25^\circ\text{C}, t_2: 125^\circ\text{C}$ $R_1: \Omega \text{ at } t_1, R_2: \Omega \text{ at } t_2$
5. 단시간과부하 Short Time Overload	±[2.0% + 0.05Ω]	5×Power rating 5seconds
6. 내열성 Heat Resistance	±[1.0% + 0.05Ω]	275 ±5°C for 2hours
7. 내습부하수명 Load Life in Humidity	±[3.0% + 0.05Ω]	40°C, 90~95%RH, 0.1×Power rating, 90minutes on, 30minutes off, 500hours
8. 부하수명 Load Life	±[5.0% + 0.05Ω]	25°C, Power rating 90minutes on, 30minutes off, 500hours
9. 온도충격 Thermal Shock	±[2.0% + 0.05Ω]	-55°C[30minutes], 25°C[5minutes], 155°C[30minutes], 25°C[30minutes], 5cycles
10. 내진성 Vibration	±[1.0% + 0.05Ω]	10Hz - 55Hz - 10Hz (1min), 2hrs. each direction

■ 전력 경감곡선 POWER DERATING CURVE



■ 온도상승곡선 TEMPERATURE RISE CURVE

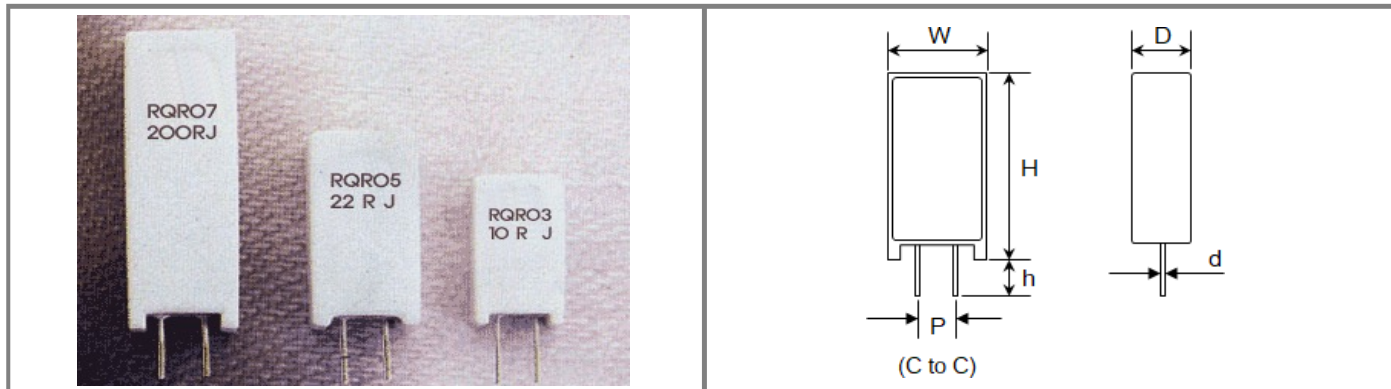


■ 주문방법 HOW TO ORDER

IRB	50W(N)	J	0R22	TC
1	2	3	4	5

1. 형 명 Type : IRB 50W(권선형 유도권선 Inductively wound)
IRB 50N(권선형 무유도 권선 Non-Inductively wound)
2. 정격전력 및 권선형 Rated Wattage & Wound Style
(W : 유도 권선 Inductively wound, N : 무유도 권선 Non-Inductively wound)
3. 허용오차 Tolerance
4. 저항치 Resistance (0R01=0.01, 0R1=0.1, 1K1=1.1K Ω)
5. 2차 가공 Shape (TB:52mm, TC:64mm, RT=Radial Taping, PS=Bulk)

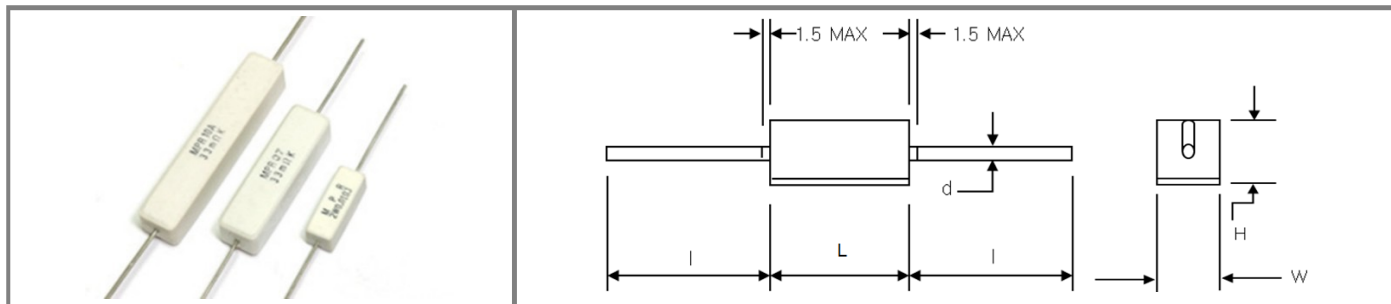
<RQR TYPE>



■ 일반규격 및 치수 GENERAL SPECIFICATIONS & DIMENSIONS

형 명 Type	정격전력 Rated Wattage	치 수 Dimensions(mm)						저항치범위 Resistance Range(Ω)		
		H±1	W±1	D±1	h±0.5	P±0.5	d±0.03	GLASS CORE	MOR CORE	CERAMIC CORE
RQR 2W	2W	20.5	11	7	4	5	0.77	0R1~50R	50R1~20K	0R1~5K
RQR 3W	3W	25	12	8	4	5	0.77	0R1~150R	150R1~100K	0R1~15K
RQR 5W	5W	25	13	10	4	5	0.77	0R1~150R	150R1~100K	0R1~15K
RQR 7W	7W	39	13	10	4	5	0.8	0R1~220R	220R1~100K	0R1~15K
RQR 10W	10W	35	16	12	4	8	0.8	0R1~330R	220R1~100K	0R1~30K
RQR 20W	20W	49	20	10	4	8	0.8	0R1~660R		0R2~30K

<RQA TYPE>



■ 일반규격 및 치수 GENERAL SPECIFICATIONS & DIMENSIONS

형 명 Type	정격전력 Rated Wattage	치 수 Dimensions(mm)					저항치범위 Resistance Range(Ω)		
		L±1	W±1	H±1	l (Min)	d ±0.03	GLASS CORE	MOR CORE	CERAMIC CORE
RQA 2W	2W	18	7	7.5	21	0.8	0R1~50R	50R1~20K	0R1~8K
RQA 3W	3W	22	8	8	25	0.8	0R1~150R	150R1~100K	0R1~18K
RQA 5W	5W	22	10	9	25	0.8	0R1~150R	150R1~100K	0R1~18K
RQA 7W	7W	35	10	9	25	0.8	0R1~200R	200R1~100K	0R1~18K
RQA 10W	10W	48	10	9	25	0.8	0R1~300R	300R1~200K	0R1~36K
RQA 15W	15W	48	12.5	11.5	25	0.8	0R1~350R	350R1~200K	0R1~36K
RQA 20W	20W	60	14	13.5	25	0.8	0R1~500R	500R1~300K	0R1~36K

The image shows two types of electronic components. On the left, there are two small, white, rectangular components with gold-colored pins. One is labeled '5W10J' and the other '5W18KJ'. On the right, there are two larger, yellow, rectangular components with gold-colored pins.

s-style

j-style

[3W~10W] [15W~20W]

z-style

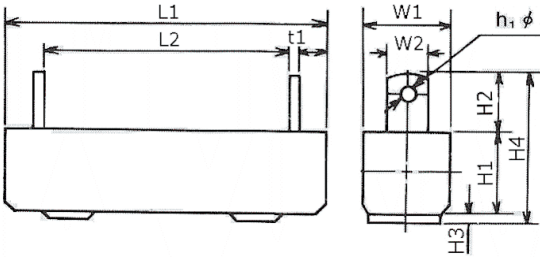
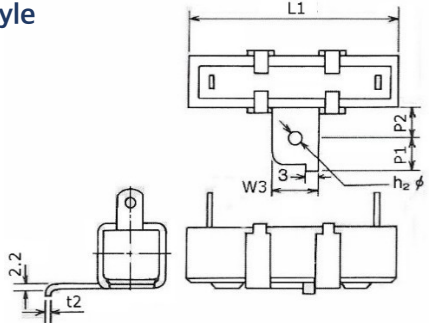
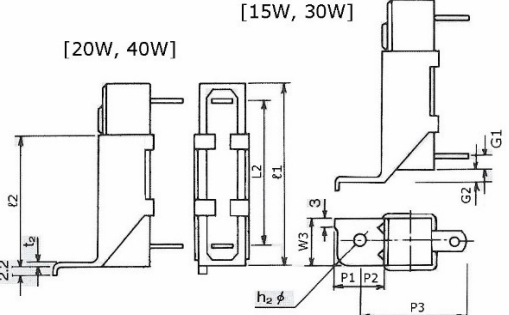
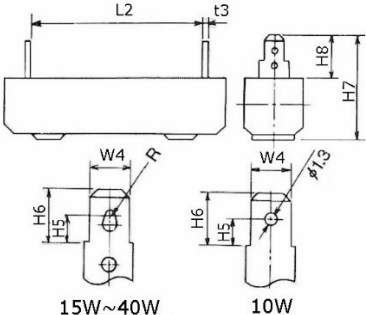
d-style

형 명 Type	정격전력 Rated Wattage	치 수 Dimensions(mm)				저항치범위 Resistance Range(Ω)	
		L±1.5	W±1.2	H±1.2	P±1.5	Glass core	MOR core
RQB 5W	5W	27	9.5	9.5	15	0.1 ~ 300Ω	301 ~ 100KΩ
RQB 7W	7W	35	9.5	9.5	22.5	0.1 ~ 400Ω	401 ~ 100KΩ
RQB 10W	10W	48	9.5	9.5	35	0.1 ~ 500Ω	501 ~ 100KΩ
RQB 15W	15W	48	12.5	12.5	32.5	0.1 ~ 500Ω	501 ~ 100KΩ
RQB 20W	20W	63.5	12.5	12.5	47.5	0.1 ~ 600Ω	601 ~ 200KΩ

<RQL TYPE>

형 명 Type	정격전력 Rated Wattage	저항치범위 Resistance Range
RQL 10	10W	0R1~500R
RQL 15	15W	0R1~500R
RQL 20	20W	0R1~600R
RQL 25	25W	0R1~700R
RQL 30	30W	0R1~5K
RQL 40	40W	0R1~10K

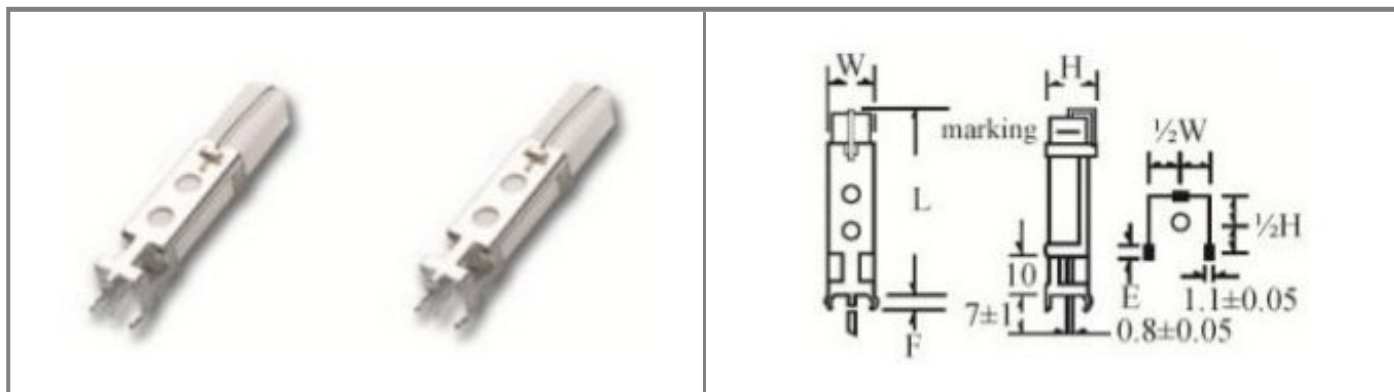
■ 치수 DIMENSIONS

◆ g-style 	◆ b-style 
◆ S-style 	◆ t-style 

형 명 Type	치 수 Dimensions [mm]													
	L1±2.5	L2	W1±1.2	W2±0.2	W3±0.2	W4±0.2	H1±1.5	H2±2	H3±0.2	H4±1.5	H5±0.2	H6±0.2	H7±2.5	H8±2
RQL10	48	36 -2	9.5	5	12	4.75	9.5	6	0.8	16.5	3.2	6.35	20.8	10
RQL15	48	34 -2	12.5	6	12	4.75	12.5	7.5	1	21	3.2	6.35	25.5	12
RQL20	63	49.5 -3	12.5	6	12	4.75	12.5	7.5	1	21	3.2	6.35	25.5	12
RQL25	62	46.5 -3	16	7.5	12	-	16	12	1	29	-	-	-	-
RQL30	76	56 -4	19	7.5	18	6.35	19	10	1	30	4	7.95	35.5	15.5
RQL40	90	71 -4	19	7.5	18	6.35	19	10	1	30	4	7.95	35.5	15

형 명 Type	치 수 Dimensions [mm]													
	P1±0.2	P2±0.2	P3±3	l1±2.5	l2±1.5	G1±2	G2±2	h1Φ	h2Φ	t1±0.1	t2±0.1	t3±0.1	R	
RQL10	6	8	-	-	-	5.5	-	2	4	0.4	0.6	0.5	Φ13	
RQL15	6	8	28	56	43	6.5	8	2.5	4	0.5	0.8(0.6)	0.5	0.65	
RQL20	6	8	28	63.5	43	6.5	-	2.5	4	0.5	0.8(0.6)	0.5	0.65	
RQL25	6	10	-	-	-	8	-	3	4.2	0.5	0.8	-	-	
RQL30	8	10	39	82.5	64	9	7.5	3	4.2	0.5	0.8	0.8	0.825	
RQL40	8	10	39	90	64	9	-	3	4.2	0.5	0.8	0.8	0.825	

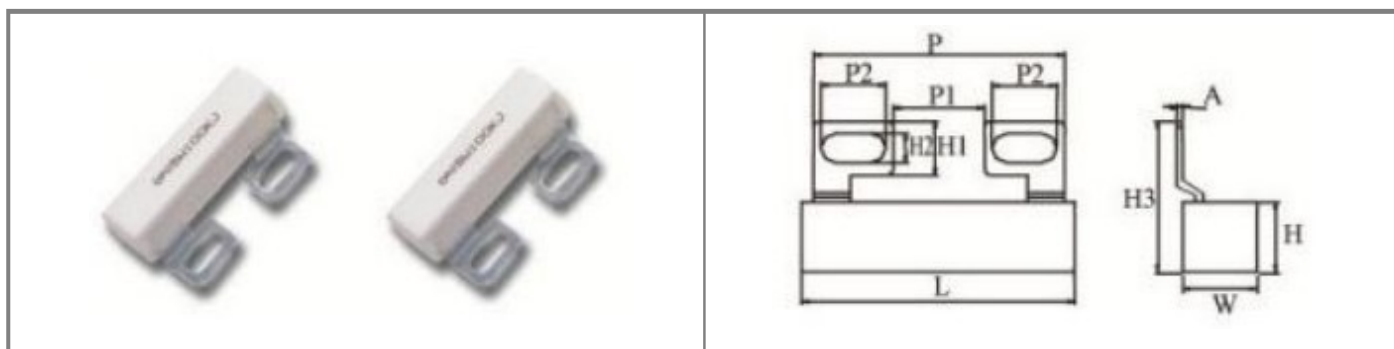
<RQS TYPE>



■ 일반규격 및 치수 GENERAL SPECIFICATIONS & DIMENSIONS

형 명 Type	정격전력 Rated Wattage	치 수 Dimensions(mm)					저항치범위 Resistance Range(Ω)		
		H±1.5	W±1	L±2	E±1	F±1	GLASS CORE	MOR CORE	CERAMIC CORE
RQS 5W	5W	10	10	28	1.4	4.0	1R~120R	100R~100K	0R1~3K3
RQS 7W	7W	10	10	45	1.4	4.0	1R~390R	820R~100K	0R1~7K5
RQS 10W	10W	10	10	58	1.4	4.0	1R~470R	1K~100K	0R1~12K
RQS 15W	15W	15	12.5	58	2.5	4.0	1R~560R		0R2~18K
RQS 20W	20W	14.5	14	71	2.5	4.0	1R~620R		0R2~30K

<RQC TYPE>



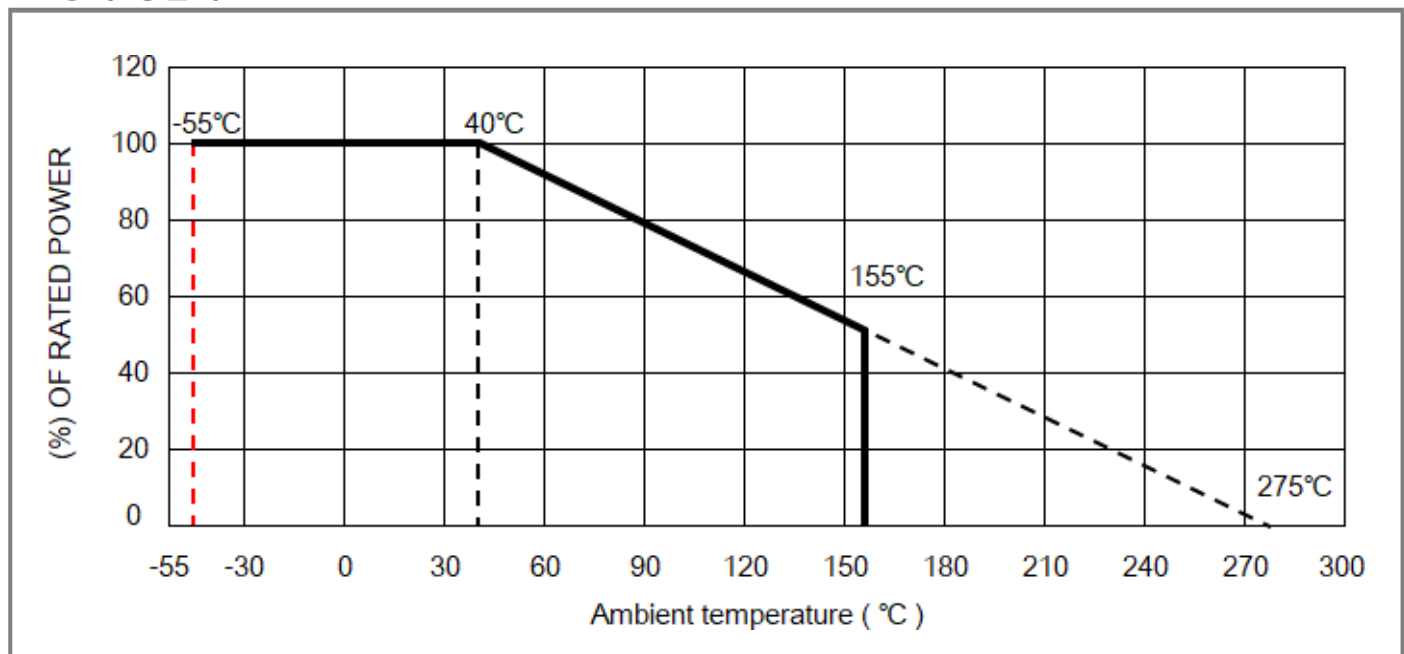
■ 일반규격 및 치수 GENERAL SPECIFICATIONS & DIMENSIONS

형 명 Type				정격전력 Rated Wattage			저항치범위 Resistance Range		
RQC 15				15W			1K~100K		
치 수 Dimensions(mm)									
L±1.5	P±1.5	P1±1.5	P2±1.5	W±1	H±1	A±0.05	H1±1	H2±1	H3±1
48	43	12	12	13	12	0.5/0.8	10	5	25

■ 특 성 CHARACTERISTICS

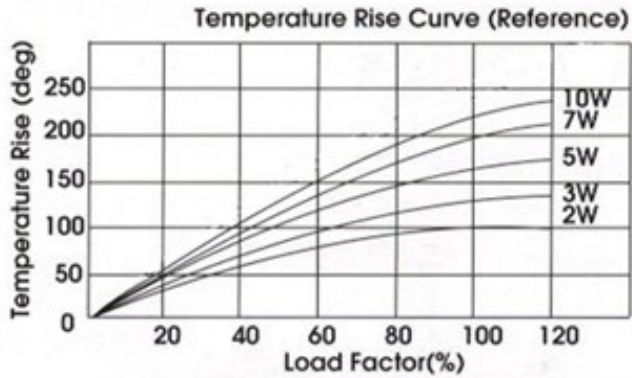
TEST	Conditions	Test method
1. 사용온도범위 Operating Temp. Range	-55°C ~ +155°C	-
2. 절연저항 Insulation Resistance	1000MΩ Min	DC500V, 1 minute
3. 내전압 Dielectric Withstanding Voltage	±[0.5% + 0.05Ω]	500VAC for 1 minute
4. 고온노출 High Temperature Exposure	±[2.0% + 0.05Ω]	No Load 155°C for 240hours
5. 저온노출 Low Temperature Exposure	±[2.0% + 0.05Ω]	No Load -25°C for 240hours
6. 납땜성 Solderability	95% coverage minimum	250°C ±3°C for 5 seconds
7. 단시간과부하 Short Time Overload	±[2.0% + 0.05Ω]	1~5W : 5×Power rating 5seconds 7~20W : 10×Power rating 5seconds
8. 단자강도 Terminal Strength	No mechanical damages	Direct load : 4.5kg for 10seconds Bending test : 2 cycles
9. 부하수명 Load Life	±[5.0% + 0.05Ω]	25°C, Power rating 90minutes on, 30minutes off, 1000hours
10. 내습부하수명 Load Life in Humidity	±[3.0% + 0.05Ω]	40°C, 90~95%RH, 0.1×Power rating, 90minutes on, 30minutes off, 1000hours
11. 온도충격 Thermal Shock	±[2.0% + 0.05Ω]	-55°C[30minutes], 25°C[5minutes], 85°C[30minutes], 25°C[30minutes], 5cycles

■ 정격 경감곡선 RATED POWER DERATING CURVE

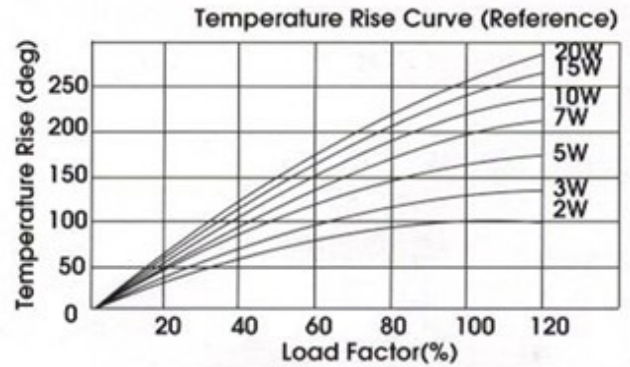


■ 온도상승곡선 TEMPERATURE RISE CURVE

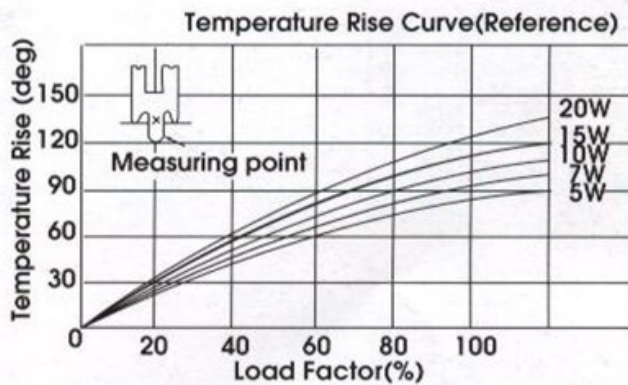
◆ RQR TYPE



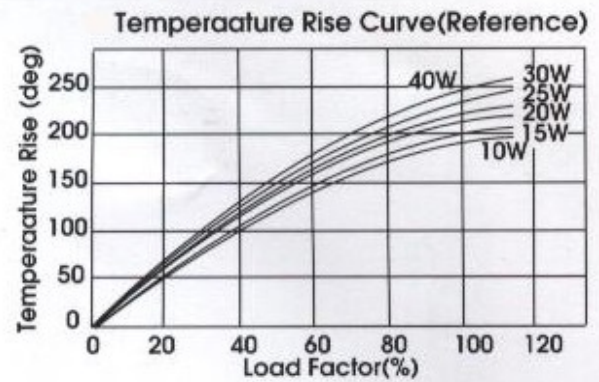
◆ RQA TYPE

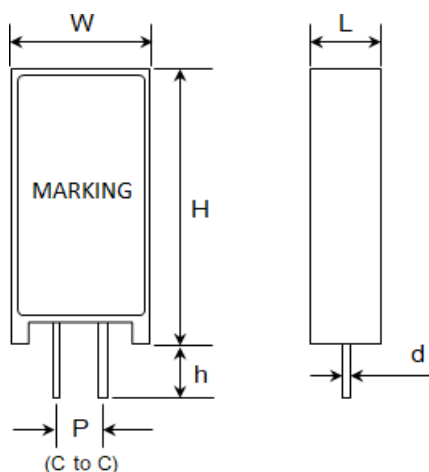


◆ RQB TYPE



◆ RQL TYPE





■ 치 수 DIMENSIONS

구 분	치 수 Dimension (mm)						
	W ±1	L ±1	H ±2	h ±0.5	P ±0.5	d ±0.03	d ±0.03
						Resistor	Fuse
5W	14	9.5	29	4	5	0.8	2A, 3A : 0.6 10A : 0.6
7W	14	9.5	40	4	5	0.8	

■ 일반규격 GENERAL SPECIFICATIONS

Thermal Fuse Symbol	Type of Thermal Fuse			Continuous Rated Power[W]		Resistance Range(Ω)	Resistance Tolerance(%)		
	Nominal Operating Temp.[°C]	Voltage Rating[V]	Current Rating[A]						
				TFR 5	TFR 7				
E	102°C	250V	2A, 3A	0.9	-	0.47~240	J [±5%] K [±10%]		
F	115°C			1.0	-				
K	127°C			1.2	-				
L	133°C			1.3	-				
D	136°C			1.4	-				
B	139°C			1.6	-				
T	145°C			1.7	-				
C	100°C	250V	10A	1.0	1.3				
G	109°C			1.2	1.5				
H	121°C			1.3	1.7				
J	126°C			1.5	1.9				
P	128°C			1.5	1.9				
B	139°C			1.6	2.1				
N	144°C			1.7	2.2				
S	152°C			1.8	2.3				
Q	167°C			2.0	2.4				

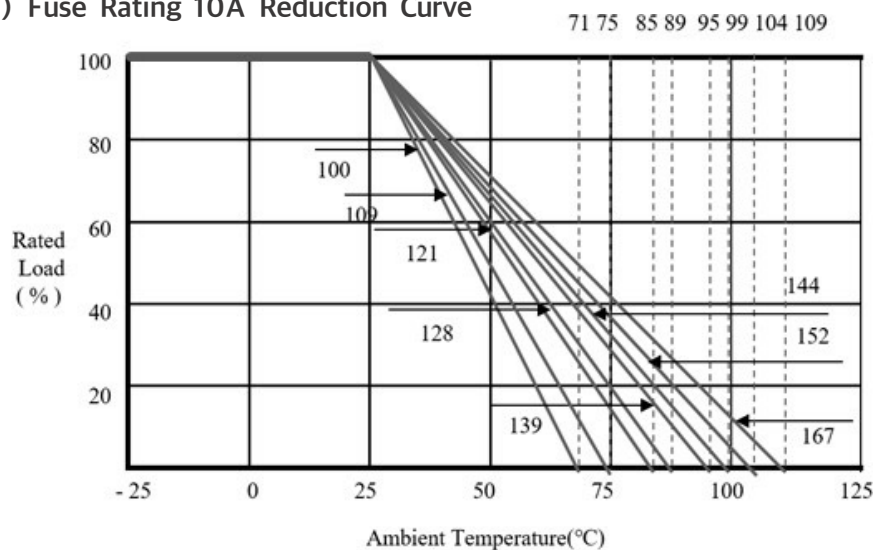
특 성 CHARACTERISTICS

항 목 ITEM	성 능 Performance	시험 방법 Test method
1. 절연저항 Insulation Resistance	1000MΩ Min	DC500V, 1minute
2. 내전압 Dielectric Withstanding Voltage	±[0.5% + 0.05Ω]	500VAC for 1minute
3. 온도계수 Temperature coefficient	MAX ±260 PPM/°C	TCR= $\frac{(R_2 - R_1) \times 10^6}{R_1 \times (t_2 - t_1)}$ $t_1: 25^\circ\text{C}, t_2: 125^\circ\text{C}$ $R_1: \Omega \text{ at } t_1, R_2: \Omega \text{ at } t_2$
4. 단시간과부하 Short Time Overload	±[2.0% + 0.1Ω]	2.5× Continuous Rated Power 5seconds
5. 납내열성 Resistance against Soldering	±[1.0% + 0.05Ω]	260 ±5°C for 10seconds Put in the PCB(1mm thick)
6. 내습부하수명 Load Life in Humidity	±[3.0% + 0.05Ω]	40°C, 90~95%RH, 0.1×Power rating, 90minutes on, 30minutes off, 1000hours
7. 부하수명 Load Life	±[5.0% + 0.05Ω]	25°C, Power rating 90minutes on, 30minutes off, 1000hours

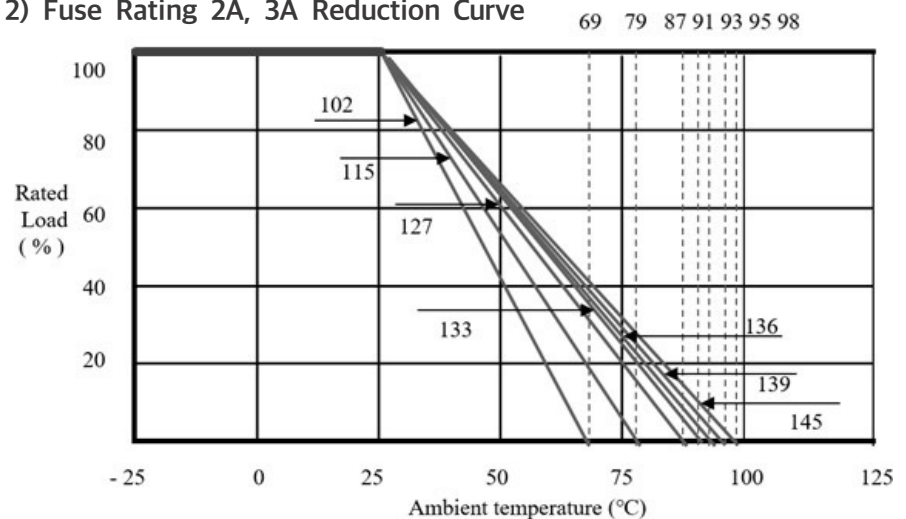
POWER RATING CURVE

The rated power shall be the maximum power applicable continuous operation at an ambient temperature of 25°C. The rated power for continuous operation or test at an ambient temperature of more than 25°C shall be determined by multiplying value of the road factor as per power reduction curve and the rated power.

1) Fuse Rating 10A Reduction Curve



2) Fuse Rating 2A, 3A Reduction Curve

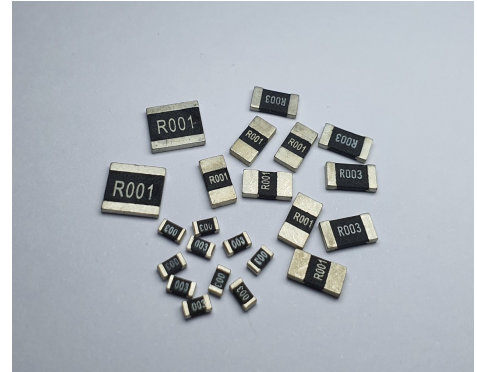


電流檢測厚膜片式固定電阻器

Current Sensing Thick Film Chip Fixed Resistor

特點 Features

- * 阻值範圍: 10m Ω ~ 1000m Ω
Resistance values from 10m to 1000m Ohm
- * 適于作電流檢測用電阻器
Current detecting resistors for power supply, motor circuits, etc
- * RoHS
Compliant with RoHS directive
- * Halogen free requirement



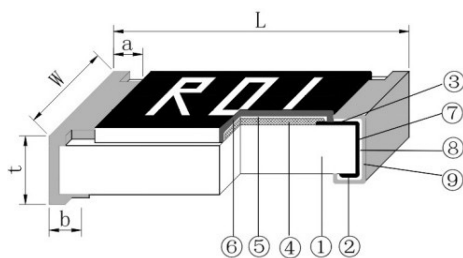
應用領域 Applications

開關電源、音響設備的過電流保護、電壓調節器、電源轉換器、充電器、LED燈驅動電源、便携式設備等。
Switching Power Supply、Over Current Protection in Audio Application、Voltage Regulation、Module(VRM)、DC-DC Converter、Charger、LED Lamp Devices、Portable Devices etc.

品名構成 Type Designation

RB	F	—	06	M	R200	F	T						
產品代號 Product Code	額定功率代號 Power Rating Code		封裝尺寸 Dimensions		電阻溫度系數代號 T.C.R Code		電阻值代號 Resistance Value Code	阻值誤差精度代號 Resistance Tolerance Code		包裝方式代號 Packaging Style Code			
電流檢 測厚膜片式 固定電阻器 Current Sensing Thick Film Chip Fixed Resistor	代 號 Code	額定功率系列 Power rating	代 號 Code	型號 Type	型號 Type	代 號 Code	T.C.R (ppm/℃)	單位 Ω， 小數點用R表示； 單位m Ω， 小數點用M表示； Units: Ω Decimal point should be expressed by «R» ; Units: m ΩDecimal point should be expressed by «M» . 例如Example : R005=0.005 Ω R100=0.100 Ω R047=0.047 Ω 6M50=6.50m Ω	代 號 Code	誤差精度 Tolerance	代 號 Code	包裝方法 Packaging Style	
	C	1/16W	02	0402	0402 0603 0805 1206 1210 2010 2512	U	±400		F	± 1%	T	編帶包裝 Tape & Reel	
	D	1/10W	03	0603		M	±500		G	± 2%			
	E	1/8W	05	0805		R	±700		H	± 3%			
	Y	1/6W	06	1206		Q	±800		J	± 5%	C	塑料袋散裝 Case	
	Q	1/5W	1210	1210		S	±1000						
	R	1/3W	10	2010		Y	±1500						
	F	1/4W	12	2512									
	H	3/4W											
	G	1/2W											
J	1W												

● 結構 Construction



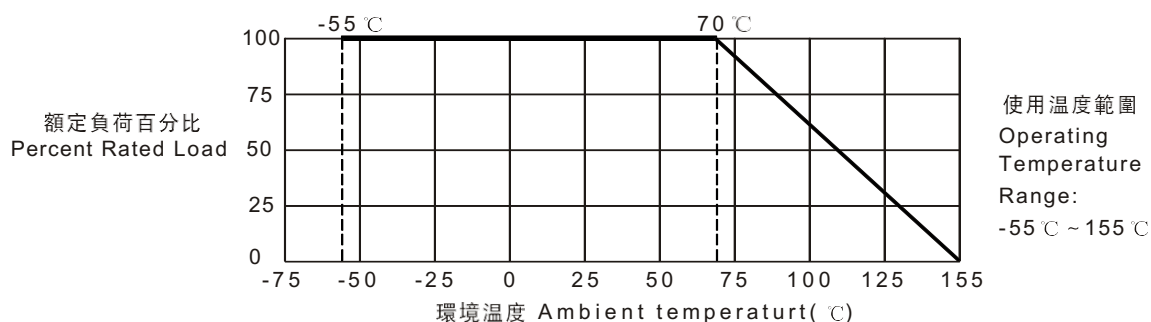
- ① 陶瓷基板 Ceramic Substrate
- ② 背電極 Bottom Electrode
- ③ 面電極 Top Electrode
- ④ 電阻體 Resistor Layer
- ⑤ 一次保護 Primary Overcoat
- ⑥ 二次保護 Secondary Marking
- ⑦ 端電極 Edge Electrode
- ⑧ 中間電極 Barrier Layer
- ⑨ 外部電極 External Electrode

● 規格尺寸 Dimensions

單位 Unit:mm

型號 Type	L	W	t	a	b
0402	1.00±0.05	0.50±0.05	0.30±0.05	0.20±0.10	0.25±0.10
0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20
0805	2.00±0.10	1.25±0.15	0.50±0.10	0.30±0.20	0.40±0.20
1206	3.20±0.20	1.60±0.15	0.55±0.10	0.40±0.20	0.50±0.20
1210	3.20±0.20	2.50±0.20	0.55±0.10	0.40±0.20	0.50±0.20
2010	5.00±0.20	2.50±0.20	0.55±0.10	0.60±0.20	0.60±0.20
2512	6.30±0.20	3.20±0.20	0.55±0.10	0.60±0.20	0.60±0.20

● 負荷下降曲線 Derating Curve



注：當電阻使用的環境溫度超過70℃時，其額定負荷(額定功率)按上述曲線下降。

Note: For resistors operated in ambient over 70 °C, rated load(rated power) shall be derated in accordance with the above figure.

電流檢測厚膜片式固定電阻器

Current Sensing Thick Film Chip Fixed Resistor

• 額定值 Ratings

型 號 Type	70℃下額定功率 Rating Power at 70℃ (W)			元件極限電流 Limiting Element Current (A)	最大過負荷電流 Max.Overload Current(A)	阻值範圍 Resistance Range (mΩ)	電阻溫度系數 T.C.R (PPM/℃)			
							±1%	±2%	±3%	±5%
0402	C:1/16	Y:1/6		0.79	1.98	100~199	±700			
						200~499	±500			
						500~1000	±400			
0603	D:1/10	E:1/8	Q:1/5	3.16	7.91	10~32.9	±1500			
						33~67.9	±1000			
						68~99.9	±800			
						100~199	±700		±1000	
						200~499	±500			
						500~1000	±400			
0805	E:1/8	F:1/4		3.54	8.84	10~19.9	±1500			
1206	F:1/4	G:1/2		5	12.5	20~49.9	±1000			
						50~99.9	±800			
1210	R:1/3	G:1/2		5.77	14.43	100~199	±700		±1000	
2010	H:3/4	J:1		8.66	21.65	200~499	±500			
2512	J:1			10	25	500~1000	±400			

注 Note:

- 電壓為直流或交流有效值。
Voltage of DC or AC RMS value.
- $E = \sqrt{P \times R}$
E: 額定電壓 Rated voltage(V)
P: 額定功率 Rated power(W)
R: 標稱阻值 Normal resistance(Ω)

• 特性 Characteristics

項目 Item	標準 Specifications	測試方法 (IEC60115-1) Test Methods (IEC60115-1)
可焊性 Solderability	可焊面積 ≥ 95% 95% Cover Min	IEC 60115-1 4.17 245℃ ± 5℃ 錫槽, 保持 3s ± 0.3s. Lead-free solder bath at 245℃ ± 5℃ for 3s ± 0.3s.
耐焊接熱 Resistance to Soldering Heat	無可見損傷 No mechanical damage $\Delta R \leq \pm(1.0\%R + 0.5m\Omega)$	IEC 60115-1 4.18 270℃ ± 5℃ 錫槽, 保持 10s ± 1s. Lead-free solder bath at 270℃ ± 5℃ for 10s ± 1s.
基板彎曲試驗 Substrate Bending Test	無可見損傷 No mechanical damage $\Delta R \leq \pm(1.0\%R + 0.5m\Omega)$	IEC 60115-1 4.33 彎曲距離(Bending distance): 0402、0603、0805:5mm; 1206、1210:4mm; 2010、2512:2mm 保持時間(Duration): 60s ± 5s.

• 特性 Characteristics

(續上頁 Continue)

項目 Item	標準 Specifications	測試方法 (IEC60115-1) Test Methods (IEC60115-1)
電阻溫度系數 T.C.R	在規定值內 Within specified T.C.R	IEC 60115-1 4.8 +20 ℃/-55 ℃/+20 ℃/+125 ℃/+20 ℃
溫度快速變化 Rapid Change of Temperature	無可見損傷 No mechanical damage $\Delta R \leq \pm(1.0\%R+0.5m\ \Omega)$	IEC 60115-1 4.19 -55 ℃(30分鐘)~常溫(5分鐘)~155 ℃(30分鐘) 300個循環。 -55 ℃(30min) ~ normal temperature(5min) ~155 ℃(30min) 300 cycles.
短時間過負載 Short Time Overload	無可見損傷 No mechanical damage $\Delta R \leq \pm(1.0\%R+0.5m\ \Omega)$	IEC 60115-1 4.13 2.5 倍額定電壓，持續5秒。 2.5 times rated voltage for 5s.
穩態濕熱 Damp Heat Steady State	無可見損傷 No mechanical damage $\Delta R \leq \pm(3.0\%R+0.5m\ \Omega)$	IEC 60115-1 4.24 40 ℃ $\pm 2\ \text{℃}$ ，93% $\pm 3\%RH$ ，1000h，額定電壓，通1.5小時/斷0.5小時。 40 ℃ $\pm 2\ \text{℃}$ ，93% $\pm 3\%RH$ ，1000h，rated voltage for 1.5h ON/0.5h OFF.
剪切力試驗 Shear Test	無可見損傷 No mechanical damage	IEC 60115-1 4.32 施加力 (Applying force):0402、0603:5N;0805:9N;1206、1210:25N; 2010\2512:45N 保持時間(Duration):10s $\pm 1s$
70 ℃ 耐久性 Endurance at 70 ℃	無可見損傷 No mechanical damage $\Delta R \leq \pm(2.0\%R+0.5m\ \Omega)$	IEC 60115-1 4.25.1 70 ℃ $\pm 2\ \text{℃}$ ，1000 小時，額定電壓，通1.5小時/斷0.5小時。 70 ℃ $\pm 2\ \text{℃}$ ，1000h，rated voltage for 1.5h ON/0.5h OFF.
上限類別溫度耐久性 Endurance at Upper Category Temperature	無可見損傷 No mechanical damage $\Delta R \leq \pm(1.0\%R+0.5m\ \Omega)$	IEC 60115-1 4.25.3 155 ℃ $\pm 2\ \text{℃}$ ，1000 小時 155 ℃ $\pm 2\ \text{℃}$ ，1000h
低溫負載 Operation at Low Temperature	無可見損傷 No mechanical damage $\Delta R \leq \pm(1.0\%R+0.5m\ \Omega)$	IEC 60115-1 4.36 -55 ℃ $\pm 5\ \text{℃}$ ，無負載1小時，額定電壓45分鐘，無負載15分鐘。 -55 ℃ $\pm 5\ \text{℃}$ ，1h without load,rated voltage for 45min, 15min without load.
絕緣電阻 Insulation Resistance	1000M Ω Min	IEC 60115-1 4.6 在電極與基片間施加100V $\pm 15V$ 直流電壓，保持1分鐘，然後測絕緣電阻值。 Apply DC 100V $\pm 15V$ between substrate and terminations for 1min, then check insulation resistance.
耐電壓 Voltage Proof	無擊穿或飛弧 No breakdown or flashover	IEC 60115-1 4.7 在電極與基片間以大約100V/s的速率施加有效值為最大過負荷電壓的交流電壓， 保持60s $\pm 5s$ 。 最大過負荷電壓：0402、0603: 100V;0805:300V;1206、1210、2010、2512:400V Apply max.overload voltage of AC RMS at a rate of approximately 100V/s between substrate and terminations for 60s $\pm 5s$. Max.Overload Voltage (V):0402、0603: 100V;0805:300V; 1206、1210、2010、2512:400V
耐溶劑 Component Solvent Resistance	無可見損傷 No mechanical damage $\Delta R \leq \pm(1.0\%R+0.5m\ \Omega)$	IEC 60115-1 4.29 異丙醇 (IPA)，23 ℃ $\pm 5\ \text{℃}$ ，浸10小時。 Iso-propyl alcohol (IPA)，23 ℃ $\pm 5\ \text{℃}$ ，10h.

• 包裝 Packaging

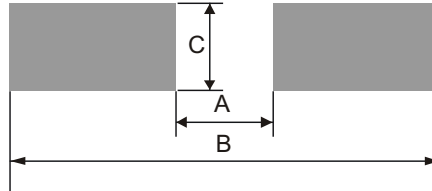
包裝方式見附錄1~10頁 Packaging can refer to the appendix 1-10 Page .

片式電阻包裝方式及注意事項

PACKAGING AND PRECAUTION OF CHIP RESISTOR

■ 推薦焊盤尺寸 Recommend Solder Pad Size

- 片式固定電阻器 Chip fixed resistor



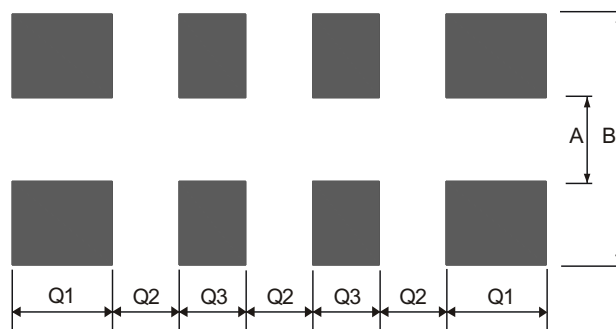
單位 unit: mm

厚膜電阻及薄膜電阻 Thick Film Resistor and Thin Film Resistor			
型號Type	A	B	C
01005	0.17	0.60	0.22
0201	0.23	0.84	0.38
0402	0.45	1.45	0.60
0603	0.80	2.50	0.95
0805	1.05	3.25	1.40
1206	1.90	4.50	1.75
1210	2.00	4.60	2.70
2010	3.50	6.50	2.70
2512 (1W、1.5W)	4.80	7.80	3.40
2512 (2W)	2.70	7.80	3.60

單位 unit: mm

合金片式固定電阻 Metal Foil Resistor				
型號Type	阻值(mΩ)	A	B	C
0603	R003~R004	0.4	2.8	1.0
	R005~R030	0.6		
0805	R003~R004	0.5	3.2	1.4
	R005~R047	0.8		
1206	R003~R004	0.8	4.4	1.8
	R005~R068	1.8		
2010	R003~R009	1.6	6.3	2.9
	R010~R100	2.7		
2512	R002~R004	1.0	8.0	3.4
	R005~R200	3.8		

- 厚膜片式網絡電阻器 Thick film chip network resistor



RCMY08 / RCMT08 / RCML08

單位 unit: mm

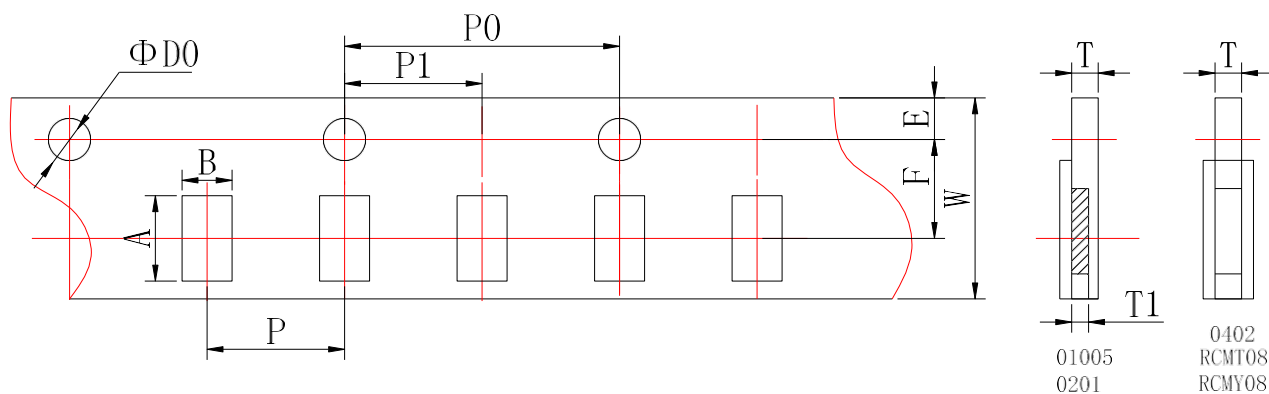
型號 Type	A	B	Q1	Q2	Q3
RCMY08	0.30	0.90	0.20	0.20	0.20
RCMT08	0.38	1.60	0.40	0.20	0.30
RCML08	0.80	2.70	0.60	0.40	0.40

■ 包裝 Packaging

● 紙帶編帶 Paper Taping

適用於 01005、0201、0402、RCMY08、RCMT08：

For 01005、0201、0402、RCMY08、RCMT08：



單位 unit: mm

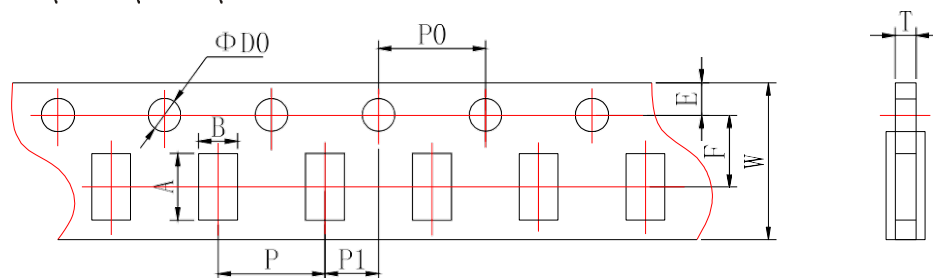
型號 Type	A	B	W	F	E
01005	0.45 ± 0.02	0.25 ± 0.02	8.00 ± 0.02	3.50 ± 0.05	1.75 ± 0.05
0201	0.70 ± 0.10	0.40 ± 0.10	8.00 ± 0.20	3.50 ± 0.05	1.75 ± 0.10
0402	1.20 ± 0.10	0.70 ± 0.10	8.00 ± 0.20	3.50 ± 0.05	1.75 ± 0.10
RCMY08	1.57 ± 0.05	0.77 ± 0.05	8.00 ± 0.20	3.50 ± 0.05	1.75 ± 0.10
RCMT08	2.20 ± 0.10	1.20 ± 0.10	8.00 ± 0.20	3.50 ± 0.05	1.75 ± 0.10

單位 unit: mm

型號 Type	P	P0	P1	ΦD0	T1	T
01005	2.00 ± 0.05	4.00 ± 0.10	2.00 ± 0.05	1.55 ± 0.02	0.17 ± 0.02	0.31 ± 0.02
0201	2.00 ± 0.05	4.00 ± 0.10	2.00 ± 0.05	1.50 ± 0.10	0.28 ± 0.04	0.42 ± 0.05
0402	2.00 ± 0.05	4.00 ± 0.10	2.00 ± 0.05	1.50 ± 0.10	/	0.42 ± 0.05
RCMY08	2.00 ± 0.05	4.00 ± 0.10	2.00 ± 0.05	1.50 ± 0.10	/	0.60 ± 0.10
RCMT08	2.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	1.50 ± 0.10	/	0.60 ± 0.10

適用於 0603、0805、1206、1210、RCML08：

For 0603、0805、1206、1210、RCML08：



片式電阻包裝方式及注意事項

PACKAGING AND PRECAUTION OF CHIP RESISTOR

單位 unit: mm

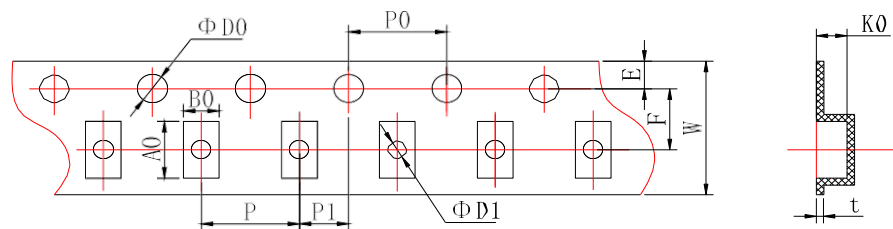
型號 Type	A	B	W	F	E
0603	1.85 ± 0.10	1.10 ± 0.10	8.00 ± 0.20	3.50 ± 0.05	1.75 ± 0.10
0805	2.35 ± 0.10	1.65 ± 0.10	8.00 ± 0.20	3.50 ± 0.05	1.75 ± 0.10
1206	3.50 ± 0.20	1.90 ± 0.20	8.00 ± 0.20	3.50 ± 0.05	1.75 ± 0.10
1210	3.50 ± 0.20	2.80 ± 0.20	8.00 ± 0.20	3.50 ± 0.05	1.75 ± 0.10
RCML08	3.50 ± 0.20	1.90 ± 0.20	8.00 ± 0.20	3.50 ± 0.05	1.75 ± 0.10

單位 unit: mm

型號 Type	P	P0	P1	$\Phi D0$	T	
					厚膜電阻及薄膜電阻 Thick Film Resistor and Thin Film Resistor	合金片式固定電阻 Metal Foil Resistor
0603	4.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	1.50 ± 0.10	0.60 ± 0.10	0.75 ± 0.10
0805	4.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	1.50 ± 0.10	0.75 ± 0.10	0.95 ± 0.10
1206	4.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	1.50 ± 0.10	0.75 ± 0.10	0.95 ± 0.10
1210	4.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	1.50 ± 0.10	0.75 ± 0.10	---
RCML08	4.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	1.50 ± 0.10	0.75 ± 0.10	---

● 塑料帶編帶 Embossed Taping

適用於2010、2512;
For 2010、2512;



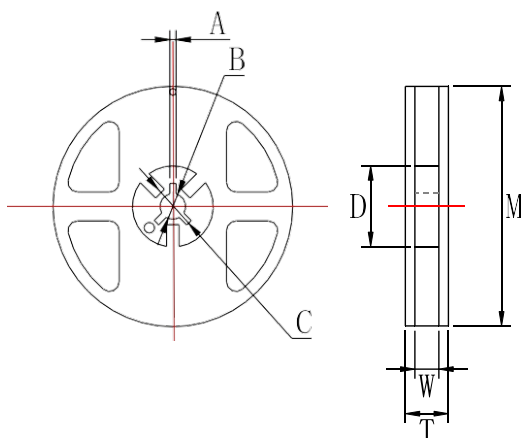
單位 unit: mm

型號 Type	A0	B0	W	F	E	t
2010	5.50 ± 0.15	2.82 ± 0.15	12.00 ± 0.10	5.50 ± 0.10	1.75 ± 0.10	0.25 ± 0.05
2512	6.78 ± 0.15	3.45 ± 0.15	12.00 ± 0.10	5.50 ± 0.10	1.75 ± 0.10	0.25 ± 0.05

單位 unit: mm

型號 Type	P	P0	P1	$\Phi D0$	$\Phi D1$	K0	
						厚膜電阻及薄膜電阻 Thick Film Resistor and Thin Film Resistor	Metal Foil Resistor
2010	4.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	$1.50 \pm 0.10/-0$	1.50 ± 0.10	0.84 ± 0.10	0.84 ± 0.10
2512	4.00 ± 0.10	4.00 ± 0.10	2.00 ± 0.05	$1.50 \pm 0.10/-0$	1.50 ± 0.10	0.81 ± 0.10	1.00 ± 0.10

● 卷盤 Reel



單位 unit: mm

型號 Type	M	W	T	A	B	C	D
01005、0201 0402、0603 0805、1206 1210、RCMY08、 RCMT08、RCML08	178 ± 2.0	9.5 ± 1.0	12.5 ± 1.5	2.0 ± 0.5	13.0 ± 0.5	21.0 ± 0.5	58.0 ± 2.0
2010、2512	178 ± 2.0	13.0 ± 0.5	15.5 ± 1.5	2.0 ± 0.5	13.0 ± 0.5	21.0 ± 0.5	57.0 ± 2.0

● 包裝數量 Packaging Quantity

包裝方法 Packaging style	編帶 Tape & reel				塑料袋散裝 Case		
型號 Type	01005	0201、0402 RCMY08、 RCMT08	0603、0805 1206、1210 RCML08	2010 2512	01005 0201 0402	0603、0805 1206、 RCMY08、RCMT08、 RCML08	1210 2010 2512
數量 Quantity(pcs)	20000	10000	5000	4000	≤50000	≤10000	≤4000

■ IEC E-24、E-96系列電阻值代碼對照表

IEC E-24、E-96 Series Resistance Cross-reference List

● E-24 系列 E-24 series($\times 10^n \Omega$)

(單位 unit: 0.001Ω 、 0.01Ω 、 0.1Ω 、 1Ω 、 10Ω 、 100Ω 、 $1k \Omega$ 、 $10k \Omega$ 、 $100k \Omega$ 、 $1M \Omega$ 、 $10M \Omega$ 、 $100M \Omega$ 、 $1000M \Omega$)

1.0	1.5	2.2	3.3	4.7	6.8
1.1	1.6	2.4	3.6	5.1	7.5
1.2	1.8	2.7	3.9	5.6	8.2
1.3	2.0	3.0	4.3	6.2	9.1

片式電阻包裝方式及注意事項

PACKAGING AND PRECAUTION OF CHIP RESISTOR

● E-96系列 E-96 series ($\times 10^n \Omega$)

(單位unit: 0.001Ω 、 0.01Ω 、 0.1Ω 、 1Ω 、 10Ω 、 100Ω 、 $1k \Omega$ 、 $10k \Omega$ 、 $100k \Omega$ 、 $1M \Omega$ 、 $10M \Omega$ 、 $100M \Omega$ 、 $1000M \Omega$)

1.00	1.33	1.78	2.37	3.16	4.22	5.62	7.50
1.02	1.37	1.82	2.43	3.24	4.32	5.76	7.68
1.05	1.40	1.87	2.49	3.32	4.42	5.90	7.87
1.07	1.43	1.91	2.55	3.40	4.53	6.04	8.06
1.10	1.47	1.96	2.61	3.48	4.64	6.19	8.25
1.13	1.50	2.00	2.67	3.57	4.75	6.34	8.45
1.15	1.54	2.05	2.74	3.65	4.87	6.49	8.66
1.18	1.58	2.10	2.80	3.74	4.99	6.65	8.87
1.21	1.62	2.15	2.87	3.83	5.11	6.81	9.09
1.24	1.65	2.21	2.94	3.92	5.23	6.98	9.31
1.27	1.69	2.26	3.01	4.02	5.36	7.15	9.53
1.30	1.74	2.32	3.09	4.12	5.49	7.32	9.76

● E-96系列0603型號《乘數代碼對照表》及《電阻值代碼對照表》

E-96 series(0603) 《multiplied Cross-reference List》and 《Resistance Cross-reference List》

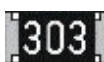
乘數multiplied	$\times 10^0$	$\times 10^1$	$\times 10^2$	$\times 10^3$	$\times 10^4$	$\times 10^5$	$\times 10^6$	$\times 10^7$	$\times 10^{-1}$	$\times 10^{-2}$	$\times 10^{-3}$
代碼 code	A	B	C	D	E	F	G	H	X	Y	Z

代號 Code	E-96系列電阻 E-96 resistance	代號 Code	E-96系列電阻 E-96 resistance	代號 Code	E-96系列電阻 E-96 resistance	代號 Code	E-96系列電阻 E-96 resistance
01	100	25	178	49	316	73	562
02	102	26	182	50	324	74	576
03	105	27	187	51	332	75	590
04	107	28	191	52	340	76	604
05	110	29	196	53	348	77	619
06	113	30	200	54	357	78	634
07	115	31	205	55	365	79	649
08	118	32	210	56	374	80	665
09	121	33	215	57	383	81	681
10	124	34	221	58	392	82	698
11	127	35	226	59	402	83	715
12	130	36	232	60	412	84	732
13	133	37	237	61	422	85	750
14	137	38	243	62	432	86	768
15	140	39	249	63	442	87	787
16	143	40	255	64	453	88	806
17	147	41	261	65	464	89	825
18	150	42	267	66	475	90	845
19	154	43	274	67	487	91	866
20	158	44	280	68	499	92	887
21	162	45	287	69	511	93	909
22	165	46	294	70	523	94	931
23	169	47	301	71	536	95	953
24	174	48	309	72	549	96	976

■ 厚膜电阻阻值代码及标记规则

Description for Resistance Value Code and Marking of Thick Film Chip Resistor

- 阻值代码 Resistance Value Code
所有厚膜电阻的阻值代码与其标记是相对应的。
All the resistance value code of thick film chip resistor is corresponding with the marking .
- 标记 Marking
- * E-24系列(0603、±5%)：采用三位数字表示，前二位表示电阻值有效数字，第三位表示乘以10的次方数。
E-24 series: Express resistance value on the glass side with three digits, the first two digits should be significant and the third one denote number of zeros.

例 For example:  → 30K Ω  → 33 Ω

- * E-24系列(0603、±1%& ±0.5%)：在三位数字标记下方增加下横线识别。
E-24 series(0603、±1%& ±0.5%): One short bar under marking letter.

例 For example: 

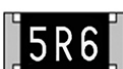
- * E-96系列和E24系列 (±1%& ±0.5%) :
▲0805、1206、1210、2010、2512 采用四位数字表示，前三位表示电阻值有效数字，第四位表示乘以10的次方数。
E-96 series & E-24 series: For the dimension type of 0805 1206 1210 2010 2512 express the resistance value with four digits, the first three digits are significant figures and the fourth one denotes the number of zeros.

例 For example:  → 100K Ω

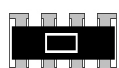
- * E-96系列:
▲0603用三位代码表示，前二位表示E-96系列阻值代码，后一位字母表示乘数代码(见表三和表四)。
For the dimension type of 0603, express the resistance value with three code, the first two digit code denote the resistance of E-96 series, and the third code of letter denote the multiplier (see the table three and four).

例 For example:  → 2 M Ω

- * 小数点以“R”表示 The decimal point should be expressed by “R” .

例 For example:  → 5.6 Ω  → 1 Ω

- * 跨接电阻以“0”表示 The jumper should be expressed by “0”

例 For example:  → 0 Ω  → 0 Ω

- * 01005、0201、0402 不作标记 For the dimension type of 01005、0201、0402 there is no mark on the glass side.

例 For example: 

- * 非IEC标准系列的电阻值标记表示方法：一般以最接近IEC E24系列标称阻值的标记表示方法。
For the resistance which don't belong to IEC serial, use the resistance of IEC serial which is most close to the required resistance of non-IEC serial for replacement.
- * 客户对标记有特殊要求时，则按照协商的结果印刷标记。
To get agreement by both party if there special requirement for the marking.

■ 薄膜電阻阻值代碼及標記規則

Description for Resistance Value Code and Marking of Thin Film Chip Resistor

● 阻值代碼 Resistance Value Code

所有薄膜電阻包括 0201、0402、0603、0805、1206、1210、2010、2512 統一採用四位數阻值代碼表示。
All resistance value code of thin film chip resistor, including 0201、0402、0603、0805、1206、1210、2010、2512 size used four digits.

例 Example

TD03G4701BT

四位數代號表示，如：4701=4.7K Ω ；1R50=1.5 Ω
To use four digits code represent resistance value ,
例 Example 4701=4.7K Ω ；1R50=1.5 Ω

● 標記 Marking

* 當阻值同時存在於E24和E96系列時，優先採用E96系列。

When resistance value belongs to E24 as well as E96 series, we suggest preferentially use E96 series.

例 Example 10K=1002, $\neq$ 103

* 0805、1206、1210、2010、2512 標記 Marking for 0805、1206、1210、2010、2512 Size Resistor

▲ 0805、1206、1210、2010、2512 印刷四位數字代碼；

For 0805、1206、1210、2010、2512 size resistor, express the resistance value with four digits code;

例 Example

 100K Ω

* 0603 標記 Marking for 0603 Size Resistor

▲ 0603-E96 系列：印刷三位字母代碼；

For resistance value belongs to E96 series, express the resistance value with three digits code.

例 Example

 2M Ω

▲ 0603-E24 系列：印刷三位數字代碼；

For resistance value belongs to E24 series, express the resistance value with three digits code.

例 Example

 30K Ω

* ▲ 小數點以“R”表示 The decimal point should be expressed by“R” .

例 Example

 5.6 Ω

* 0201、0402：不作標記 For the dimension type of 0201、0402 there is no mark on the glass side.

例 Example



■ 电流检测电阻阻值代码及标记规则

Description for Resistance Value Code and Marking of Current Sensing Thick Film Chip Resistor

● 阻值代码 Resistance Value Code

所有电流检测电阻包括 0402、0603、0805、1206、1210、2010、2512 统一采用四位数字阻值代码表示。
All resistance value code of current sensing thick film chip resistor, including 0402、0603、0805、1206、1210、2010、2512 size used four digits.

例 Example

RBF03MR010FT

四位数字代码表示，如：R010=10mΩ；30M1=30.1mΩ

To use four digits code represent resistance value,

例 Example R010=10mΩ；30M1=30.1mΩ

● 标记 Marking

* E-24和E-96系列(0805至2512，±5%、±1%、±0.5%)：采用四位标记代码。

For 0805、1206、1210、2010、2512, when resistance value belongs to E24 and E96 series, we suggest preferentially use four digits.

标记代码 Mark Code	阻值范围 Resistance Value	示例 Sample
R00X	1mΩ ≤ R ≤ 9mΩ	R005=5mΩ
R0XX	10mΩ ≤ R ≤ 99mΩ	R033=33mΩ
RXXX	100mΩ ≤ R ≤ 999mΩ	R100=100mΩ
XMXX	1mΩ < R < 10mΩ (包含小数点后两位有效数字) (Contains two significant digits after the decimal point.)	5M10=5.1mΩ
XXMX	10mΩ < R < 100mΩ (包含小数点后一位有效数字) (Contains one significant digit after the decimal point.)	30M1=30.1mΩ

* E-24和E-96系列(0603，±5%、±1%、±0.5%)：采用三位标记代码。

For 0603, when resistance value belongs to E24 and E96 series, we suggest preferentially use three digits.

标记代码 Mark Code	阻值范围 Resistance Value Range	示例 Sample
V0X	1mΩ ≤ R ≤ 9mΩ	V05=5mΩ
VXX	10mΩ ≤ R ≤ 99mΩ	V33=33mΩ
RXX	100mΩ ≤ R ≤ 999mΩ	R100=100mΩ
XXM	1mΩ < R < 10mΩ (包含小数点后一位有效数字) (Contains one significant digit after the decimal point.)	5M1=5.1mΩ

* 0402及以下规格不印刷标记。

For 0402, there is no mark on the glass side.

* 非IEC标准系列的电阻值标记表示方法：一般以最接近IEC E24系列标称阻值的标记表示方法。

For the resistance which don't belong to IEC serial, use the resistance of IEC serial which is most close to the required resistance of non-IEC serial for replacement.

* 客户对标记有特殊要求时，则按照协商的结果印刷标记。

To get agreement by both party if there special requirement for the marking.

■ 片式電阻器使用說明 Chip Resistor Instructions for Use

- 本產品在以下特殊環境下應用，性能可能會受到影響：

- 1、在各種類型的液體，包括水、油、化學品、有機溶劑的使用。
- 2、在戶外直接暴露在陽光的地方，或在灰塵多的地方使用。
- 3、在產品暴露的地方，有海風或腐蝕性氣體，包括氯氣、硫化氫、氨氣、二氧化硫、二氧化氮等。
- 4、在產品暴露于靜電或電磁波的地方使用。
- 5、在產生熱量的部件、塑料綫，或其他易燃物品附近使用。
- 6、在用樹脂或其他塗層材料密封產品的情況下使用。
- 7、焊接后使用不潔焊料或使用水或水溶性清洗劑清洗產品。
- 8、片狀電阻器的基材是氧化鋁。由于和安裝基板的熱膨脹系數不同，在反復施加提供熱循環等熱應力時，接合部的焊錫（焊縫部）有時會發生裂紋。如果環境溫度反復發生很大的變動，并且載荷反復進行ON/OFF，則需要注意龜裂的發生。因熱應力而發生的龜裂，取決于所安裝的焊盤的大小、焊錫量、安裝基板的散熱性等，因此在環境溫度有很大的變化或載荷ON/OFF的條件下使用時，請充分注意以進行設計。

- Application of the products in a special environment can deteriorate product performance:

- 1、Use in various types of liquid, including water, oils, chemicals, and organic solvents.
- 2、Use outdoors where the products are exposed to direct sunlight, or in dusty places.
- 3、Use in places where the products are exposed to sea winds or corrosive gases, including Cl_2 , H_2S , NH_3 , SO_2 , and NO_2 etc.
- 4、Use in places where the products are exposed to static electricity or electromagnetic waves.
- 5、Use in proximity to heat-producing components, plastic cords, or other flammable items.
- 6、Use involving sealing or coating the products with resin or other coating materials.
- 7、Use involving unclean solder or use of water or water-soluble cleaning agents for cleaning after soldering.
- 8、The substrate of chip resistors is alumina. Cracks may occur at the connection of solder (solder fillet portion) due to the difference of the coefficient of thermal expansion from a mounting board when heat stress like heat cycle, etc. are repeatedly given to them. Care should be taken to the occurrence of the cracks when the change in ambient temperature or ON/OFF of load is repeated. The occurrence of the crack by heat stress may be influenced by the size of a pad, solder volume, heat radiation of mounting board etc., so please pay careful attention to designing when a big change in ambient temperature and conditions for use like ON/OFF of load can be assumed.

- 產品使用注意事項

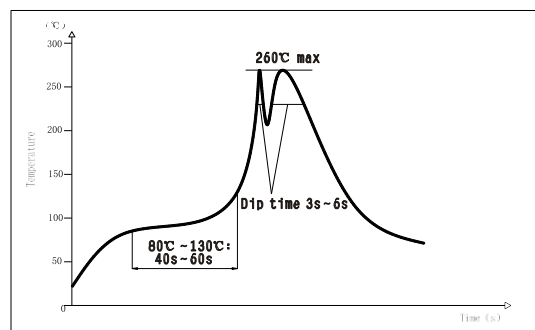
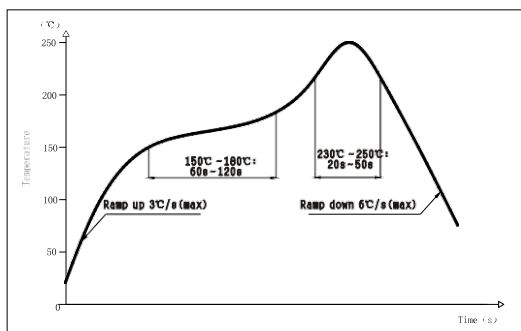
- 1、避免采用超過正常額定功率的功率，超過額定功率的穩態負載條件下可能會對產品性能和可靠性產生負面影響。
- 2、用鑷子拿起產品時要小心，有可能會將保護或電阻體夾碎。
- 3、手動安裝產品時，烙鐵頭勿觸碰產品。
- 4、貯存條件：溫度 $5^{\circ}\text{C} \sim 30^{\circ}\text{C}$ ，相對濕度30%~70%。
- 5、用于車載設備、醫療設備、航空設備以及其它涉及人身安全、或可能引起重大損失的設備上時，請務必事先與我公司聯系。這些產品在這類用途中出現故障或失靈可能導致人身事故或嚴重損壞。

- Precautions on use of products

- 1、Avoid applying power exceeding normal rated power, exceeding the power rating under steady-state loading condition may negatively affect product performance and reliability.
- 2、Be careful when pick up the products with tweezers. There may be a care that the overcoat and / or the body can be chipped.
- 3、Soldering tip shall not touch the product when install product manually.
- 4、Storage conditions: T: $5^{\circ}\text{C} \sim 30^{\circ}\text{C}$, RH: 30%~70%.
- 5、Contact our sales representatives before you use our products for applications including automotive, medical equipment and aerospace equipment. Malfunction or failure of the products in such applications may cause loss of human life or serious damage.

■ 焊接 Soldering

- 推薦的回流焊曲線 Recommended reflow profile
- 推薦的波峰焊曲線 Recommended wave solder profile



- 推薦的焊膏類型 Recommended solder alloy: 96.5Sn/3.0Ag/0.5Cu