

APPROVAL SHEET

MR18X, MR20X, MR25X

±1%, ±5%

Power chip resistors

Size 1218, 2010, 2512 (Automotive & Anti-sulfuration)

*Contents in this sheet are subject to change without prior notice.



FEATURE

- 1. High power rating and compact size
- 2. High reliability and stability
- 3. Automotive AEC Q-200 compliant
- 4. 100% CCD visual inspection
- 5. RoHS compliant and Lead free product

APPLICATION

- Power supply
- Industry
- Motor control
- M/B Computer
- Automotives
- Servo

DESCRIPTION

The resistors are constructed in a high grade ceramic body (aluminum oxide). Internal metal electrodes are added at each end and connected by a resistive paste that is applied to the top surface of the substrate. The composition of the paste is adjusted to give the approximate resistance required and the value is trimmed to nominated value within tolerance which controlled by laser trimming of this resistive layer.

The resistive layer is covered with a protective coat. Finally, the two external end terminations are added. For ease of soldering the outer layer of these end terminations is a Tin (lead free) alloy.

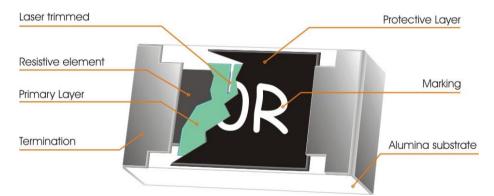


Fig 1. Construction of 2512, 2010 Chip-R

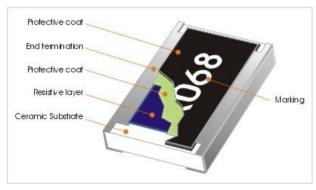


Fig 2. Construction of 1218 Chip-R



QUICK REFERENCE DATA

Item	General Specification		
Series No.	MR18	MR20	MR25
Size code	1218(3248)	2010 (5025),	2512(6432)
Resistance Tolerance	±!	5% (E24); ±1% (E24+E9	6)
Resistance Range	,	1Ω ~ 10M Ω , Jumper (0 Ω)
TCR (ppm/°C) < 10Ω	± 200 ppm/°C	± 200 ppm/°C	± 200 ppm/°C
10Ω ~ 1ΜΩ	± 100 ppm/°C	± 100 ppm/°C	± 100 ppm/°C
> 1MΩ	± 200 ppm/°C	± 200 ppm/°C	± 200 ppm/°C
Max. dissipation at T _{amb} =70°C	1W	0.75 W	1W
Max. Operation Voltage (DC or RMS)	200V	200V	250V
Max. Overload Voltage (DC or RMS)	400V	400V	500V
Climatic category (IEC 60068)		55/155/56	

Test conditions for jumper (0 ohm)

Type	MR18X	MR20X	MR25X
Power Rating At 70C	1 W	3/4 W	1 W
Resistance	Max. 50mR	Max. 50mR	Max. 50mR
Rated Current	4.5 A	3.2 A	4.5 A
Peak Current	11 A	8 A	11 A
Operating Temperature	-55C ~ 155℃		

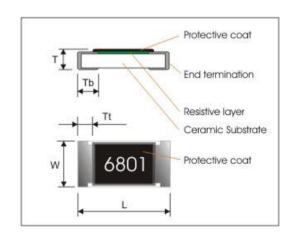
Note:

- 1. This is the maximum voltage that may be continuously supplied to the resistor element, see "IEC publication 60115-8"
- 2. Max. Operation Voltage: So called RCWV (Rated Continuous Working Voltage) is determined by

 $RCWV = \sqrt{RatedPower \times Resistance \ Value}$ or Max. RCWV listed above, whichever is lower.

MECHANICAL DATA (unit: mm)

TYPE	MR18	MR20	MR25	
L	3.05±0.15	5.00±0.20	6.40±0.20	
W	4.60±0.20	2.50±0.20	3.20±0.20	
Т	0.55±0.10	0.55±0.10	0.60±0.10	
Tt	0.45±0.25	0.65±0.25	0.65±0.25	
Tb	0.50±0.25	0.60±0.25	0.90±0.25	





MARKING

Each resistor is marked with a four-digit code on the protective coating to designate the nominal resistance value ±5%, ±1% tolerance!

Size	±5%	±1%	
2512, 2010, 1218	4-digits marking	4-digits marking	

FUNCTIONAL DESCRIPTION

Product characterization

Standard values of nominal resistance are taken from the E96 & E24 series for resistors with a tolerance of $\pm 5\%$ & $\pm 1\%$. The values of the E24/E96 series are in accordance with "IEC publication 60063".

Derating curve

The power that the resistor can dissipate depends on the operating temperature; see Fig.3

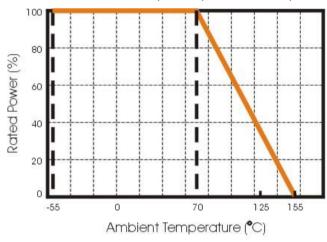


Fig 3 Maximum dissipation in percentage of rated power as a function of the ambient temperature

MOUNTING

Due to their rectangular shapes and small tolerances, Surface Mountable Resistors are suitable for handling by automatic placement systems. Chip placement can be on ceramic substrates and printed-circuit boards (PCBs). Electrical connection to the circuit is by individual soldering condition. The end terminations guarantee a reliable contact.

SOLDERING CONDITION

The robust construction of chip resistors allows them to be completely immersed in a solder bath of 260°C for 10 seconds. Therefore, it is possible to mount Surface Mount Resistors on one side of a PCB and other discrete components on the reverse (mixed PCBs).

Surface Mount Resistors are tested for solderability at 235°C during 2 seconds. The test condition for no leaching is 260°C for 30 seconds. Typical examples of soldering processes that provide reliable joints without any damage are given in Fig 4.

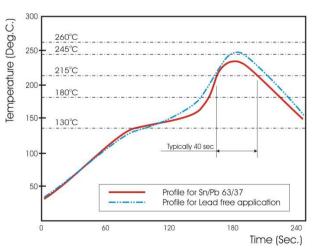


Fig 4. Infrared soldering profile for Chip Resistors



CATALOGUE NUMBERS

The resistors have a catalogue number starting with .

MR25	х	472_	J	Т	L
Size code	Type code	Resistance code	Tolerance	Packaging code	Termination
MR25 : 2512 MR20 : 2010 MR18 : 1218	X : $\pm 5\%$: 1Ω -10MΩ $\pm 1\%$: 10Ω -1MΩ \oplus $\pm 1\%$: < 10Ω ; >1MΩ	\pm 5%: E24: 2 significant digits followed by no. of zeros $100\Omega = 101_$ $10K\Omega = 103$ $\pm 11\%: E96: 3 significant digits followed by no. of zeros$	F:±1% J:±5% P:Jumper	T: 7" Reeled taping Q: 10" Reeled taping G: 13" Reeled taping B: Bulk	code L = Sn base (lead free)
		102Ω =1020			
		37.4ΚΩ = 3742			

^{*} Anti-Sulfuration test conditions: H2S 3ppm, 40°C, RH 90%, 1000hrs, criteria: +/-1%!

TEST AND REQUIREMENTS

Essentially all tests are carried out according to the schedule of IEC publication 115-8, category LCT/UCT/56(rated temperature range: Lower Category Temperature, Upper Category Temperature; damp heat, long term, 56 days). The testing also meets the requirements specified by EIA, EIAJ and JIS.

The tests are carried out in accordance with IEC publication 68, "Recommended basic climatic and mechanical robustness testing procedure for electronic components" and under standard atmospheric conditions according to IEC 60068-1, subclause 5.3. Unless otherwise specified, the following value supplied:

Temperature: 15°C to 35°C. Relative humidity: 45% to 75%.

Air pressure: 86kPa to 106 kPa (860 mbar to 1060 mbar). All soldering tests are performed with midly activated flux.

TEST	PROCEDURE / TEST METHOD	REQUIREMENT		
1531	PROCEDURE/TEST METHOD	Resistor	0Ω	
Electrical	- DC resistance values measurement	Within the specified tolerance		
Characteristics	- Temperature Coefficient of Resistance (T.C.R)	Refer to "QUICK REFERENCE DATA"		
	Natural resistance change per change in degree centigrade.			
JISC5201-1: 1998 Clause 4.8	$\frac{R_2 - R_1}{R_1(t_2 - t_1)} \times 10^6 \text{ (ppm/°C)} t_1 : 20^{\circ}\text{C} + 5^{\circ}\text{C} - 1^{\circ}\text{C}$			
	$R_1(t_2-t_1)$			
	R ₁ : Resistance at reference temperature			
	R ₂ : Resistance at test temperature			
Resistance to	Un-mounted chips completely immersed for 10±1second in a SAC	Δ R/R max. \pm (0.5%+0.05 Ω)		
soldering heat	solder bath at 270°C±5°C	No visible damage		
(R.S.H)				
MIL-STD-202 method 210				

^{* 100%} CCD visual inspection to guarantee visual quality!

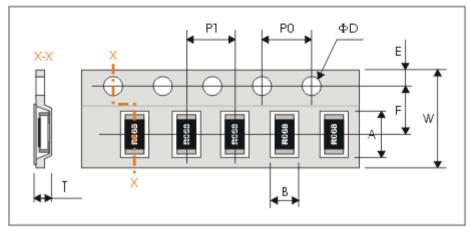


TEOT	PROCEDURE (TEXT METURE	REQUIREMENT	REQUIREMENT		
TEST	PROCEDURE / TEST METHOD	Resistor	0Ω		
Solderability J-STD-002	235 C/ 5Sec.		g and no		
J-31D-002	b) Steam the sample dwell time 1 hour/ solder dipping	visible damage			
	260°C/7sec.		1		
Temperature cycling	1000 cycles, -55°C \sim +155°C, dwell time 5 \sim 10min	Δ R/R max. \pm (0.5%+0.05 Ω)			
JESD22		No visible damage	<50mΩ		
Method JA-104	05:000 00 4000/ BU 40 1 04 1 / 1	(2.70)			
Moisture Resistance	65±2°C, 80~100% RH, 10 cycles, 24 hours/ cycle	Δ R/R max. \pm (0.5%+0.05 Ω)	<50mΩ		
MIL-STD-202		No visible damage	<3011152		
method 106					
Bias Humidity	1000+48/-0 hours; 85°C, 85% RH, 10% of operation power	Δ R/R max. ±(1.0%+0.05Ω)	.500		
MIL-STD-202		No visible damage	<50mΩ		
method 103					
Operational Life	1000+48/-0 hours; 35% of operation power, 125±2°C	Δ R/R max. \pm (1%+0.05 Ω)	.500		
MIL-STD-202 method 108		No visible damage	<50mΩ		
High Temperature	1000+48/-0 hours; without load in a temperature chamber	Δ R/R max. \pm (1.0%+0.05 Ω)			
Exposure	controlled 155±3°C	No visible damage	.500		
MIL-STD-202			<50mΩ		
Method 108					
Mechanical Shock	1/2 Sine Pulse / 1500g Peak / Velocity 15.4ft/sec	Within the specified tolerance			
MIL-STD-202		No visible damage	$<$ 50m Ω		
method 213					
Board Flex	Resistors mounted on a 90mm glass epoxy resin PCB(FR4),	Δ R/R max. ±(1.0%+0.05 Ω).	-E0m0		
AEC-Q200-005	bending once 2mm for 10sec	No visible damage	<50mΩ		
Terminal strength	Pressurizing force: 1.8Kg, Test time: 60±1sec.	No remarkable damage or re	moval of		
AEC-Q200-006		the terminations			
Vibration	Test 5g's for 20min., 12 cycles each of 3 orientations	Δ R/R max. \pm (1.0%+0.05 Ω)			
MIL-STD-202		No visible damage	<50mΩ		
method 204					
Thermal shock	Test –55 to 155℃/ dwell time 15min/ Max transfer time 20sec	Δ R/R max. \pm (0.5%+0.05 Ω)			
MIL-STD-202	300cycles	No visible damage	<50mΩ		
method 107					
ESD	Test contact 3.0KV	Δ R/R max. \pm (1.0%+0.05 Ω).	.500		
AEC-Q200-002		No visible damage	<50mΩ		



PACKAGING

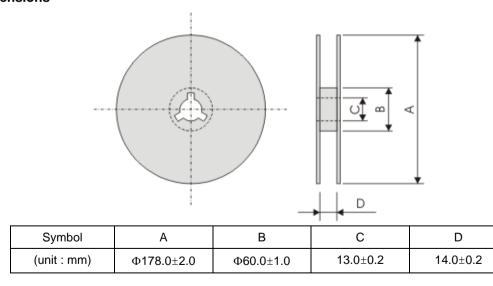
Plastic Tape specifications (unit :mm)



Type	А	В	W	F	E
MR18	4.90±0.20	3.55±0.30			
MR20	5.50±0.20	2.80±0.20	12.00±0.30	5.50±0.10	1.75±0.10
MR25	6.90±0.20	3.60±0.20			

Туре	P1	P0	ΦD	Т
MR18	8.00±0.10			1.30±0.20
MR20	4.00±0.10	4.00±0.10 Φ1.50 ^{+0.1} _{-0.0}	MAX1.2	
MR25	4.00±0.10			IVIAAT.2

Reel dimensions



Taping quantity

MR20, MR25 by plastic tape taping 4,000 pcs per reel.

MR18 by plastic tape taping 3,000 pcs per reel