ROHM SEMICONDUCTOR

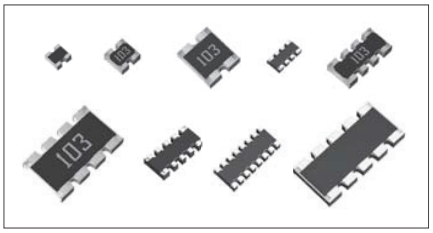
Data Sheet

Chip Resistor Networks

MNR Series < Automotive >

●Features

1) Can be mounted even more densely than chip resistors.
2) Mounting cost can be reduced by less frequency of mounting times.
3) Convex electrodes secures visual inspection of fillets after soldering.
4) ROHM resistors have obtained ISO9001 / ISO / TS16949 certification.
5) "Automotive" product is AEC-Q200 compliant.



Part No.	Size		No. of terminals	No. of elements	Type Code		Resistance Range	Packing Specification	Quantity / Reel
	(mm)	(inch)			GENERAL PURPOSE	AUTOMOTIVE ∗Corresponds to AEC–Q200			
MNR02	1005 × 2	0402 × 2	4	2	MRAP	M0AP	10Ω to 1MΩ	Paper tape (2mm Pitch)	10,000
MNR04	1005 × 4	0402 × 4	8	4	MRAP	M0AP	1Ω to 1MΩ		
MNR12	1608 × 2	0603 × 2	4	2	ERAP	E0AP	10Ω to 1MΩ	Paper tape (4mm Pitch)	5,000
MNR14	1608 × 4	0603 × 4	8	4	ERAP	E0AP	2.2Ω to 1MΩ		
MNR15	1608 × 5	0603 × 5	10	8	ERRP	E0RP	56Ω to 100kΩ		
MNR18	1605 × 8	0602 × 8	16	8	ERAP	E0AP	10Ω to 1MΩ		
MNR32	3216 × 2	1206 × 2	4	2	J0AB		10Ω to 1MΩ	Embossed tape (4mm Pitch)	4,000
MNR34	3216 × 4	1206 × 4	8	4	J5AB		10Ω to 1MΩ		
MNR35	3216 × 5	1206 × 5	10	8	J5R		56Ω to 100kΩ		

∗Please contact us for status of AEC-Q200 on "General purpose" products.

●Part Number Description

M N R — **Part No.**
MNR
(Chip Resistor Networks)

0 2 — **Size** (mm [inch])
02 (1005 [0402] × 2)
04 (1005 [0402] × 4)
12 (1608 [0603] × 2)
14 (1608 [0603] × 4)
15 (1608 [0603] × 5)
18 (1605 [0602] × 8)
32 (3216 [1206] × 2)
34 (3216 [1206] × 4)
35 (3216 [1206] × 5)

M 0 A P — **Type Code**

J — **Resistance Tolerance**
F (±1%)
J (±5%)(Including jumper type)

1 0 5 — **Nominal Resistance**
Resistance code, 3 or 4 digits.
000 denotes jumper type.

Resistance tolerance		Resistance code
F	:	4 digits
J	:	3 digits

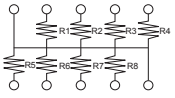
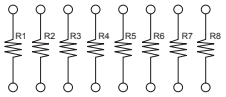
Ex.)
1Ω = 1R0 (±5%)
9.1Ω = 9R1 (±5%)
10Ω = 10R0 (±1%)
100 (±5%)
1MΩ = 1004 (±1%)
105 (±5%)

●Products List

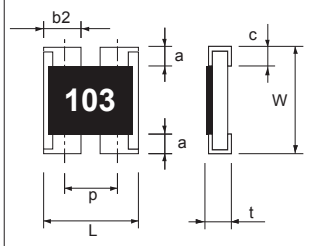
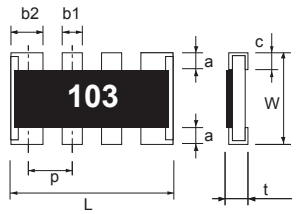
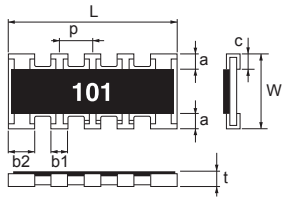
Part No.	Type Code	Rated Power (70°C) (W)	Limiting Element Voltage (V)	Maximum Overload Voltage (V)	Temperature Coefficient (ppm / °C)	Resistance Tolerance (%)	Resistance Range	Series	Operating Temperature Range (°C)
MNR02	M0AP	0.063 / Element	25	–	±200	J(±5%)	10Ω to 1MΩ	E24	–55 to +155
		Jumper type : Rmax = 50mΩ / Imax. = 1A (Element)							
MNR04	M0AP	0.063 / Element	25	50	+500/–250	J(±5%)	1Ω to 9.1Ω	E24	
					±200		10Ω to 1MΩ		
		Jumper type : Rmax = 50mΩ / Imax. = 1A (Element)							
MNR12	E0AP	0.063 / Element	50	–	±200	J(±5%)	10Ω to 1MΩ	E24	
					±100	F(±1%)	10Ω to 1MΩ		
		Jumper type : Rmax = 50mΩ / Imax. = 1A (Element)							
MNR14	E0AP	0.063 / Element	50	–	±500	J(±5%)	2.2Ω to 6.8Ω	E6	
					±200		10Ω to 1MΩ	E24	
					±100	F(±1%)	10Ω to 1MΩ		
		Jumper type : Rmax = 50mΩ / Imax. = 1A (Element)							
MNR15	E0RP	0.031 / Element	12.5	–	±200	J(±5%)	56Ω to 100kΩ	E24	–55 to +125
MNR18	E0AP	0.063 / Element	25	–	±200	J(±5%)	10Ω to 1MΩ	E24	
		Jumper type : Rmax = 50mΩ / Imax. = 1A (Element)							
MNR32	J0AB	0.125 / Element	200	400	±200	J(±5%)	10Ω to 1MΩ	E24	
		Jumper type : Rmax = 50mΩx / Imax. = 2A (Element)							
MNR34	J5AB	0.125 / Element	200	400	±200	J(±5%)	10Ω to 1MΩ	E24	
		Jumper type : Rmax = 50mΩ / Imax. = 2A (Element)							
MNR35	J5R	0.063 / Element	50	100	±200	J(±5%)	56Ω to 100kΩ	E12	

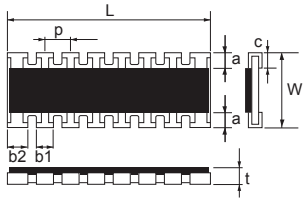
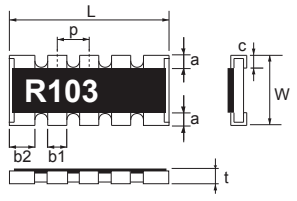
∗Design and specifications are subject to change without notice. Carefully check the specification sheet supplied with the product before using or ordering it.

●Circuit Construction

MNR02 / 12 / 32	MNR04 / 14 / 34	MNR15 / 35	MNR18
			
R1=R2	R1=R2=R3=R4	R1=R2=R3=R4=R5=R6=R7=R8	R1=R2=R3=R4=R5=R6=R7=R8

●Chip Resistor Dimensions and Markings

MNR02 / 12 / 32	MNR04 / 14 / 34	MNR15
		

MNR18	MNR35
	

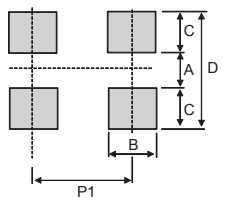
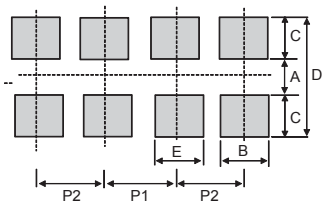
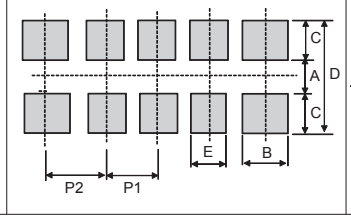
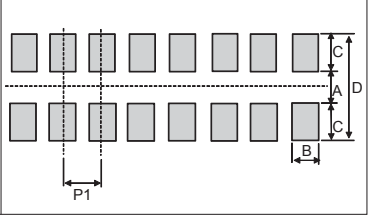
<Marking method>
There are three digits used for the calculation number according to IEC code and “R”is used for the decimal point.
MNR35 is ⌜R⌟ + three digits used for the calculation number according to IEC code.

(Unit : mm)

Part No.	Type Code	(mm)	(inch)	L	W	t	a	b1	b2	c	p	Marking existence *Including jumper type
MNR02	M0AP	1005 × 2	0402 × 2	1.0±0.1	1.0±0.1	0.35±0.1	0.2±0.1	–	$0.33^{+0.1}_{0}$	0.25±0.1	0.68	No
MNR04	M0AP	1005 × 4	0402 × 4	2.0±0.2	1.0±0.1	0.35±0.1	0.2±0.1	0.3±0.1	0.4±0.1	0.25±0.1	0.5	No
MNR12	E0AP	1608 × 2	0603 × 2	1.6±0.1	1.6±0.1	0.5±0.1	0.3±0.2	–	0.6±0.15	0.25±0.15	0.8	Yes
MNR14	E0AP	1608 × 4	0603 × 4	3.2±0.1	1.6±0.1	0.5±0.1	0.3±0.2	0.4±0.15	0.6±0.15	0.25±0.15	0.8	Yes
MNR15	E0AP	1608 × 5	0603 × 5	3.2±0.1	1.6±0.1	0.5±0.1	0.3±0.1	0.32±0.15	0.48±0.15	0.3±0.1	0.64	Yes
MNR18	J5AB	1605 × 8	0602 × 8	3.8±0.1	1.6±0.1	0.45±0.1	0.3±0.2	0.3±0.1	0.3±0.1	0.3±0.2	0.5	No
MNR32	E0RP	3216 × 2	1206 × 2	2.6±0.2	3.1±0.2	0.55±0.1	0.5±0.3	–	1.0±0.2	0.5Max	1.27	Yes
MNR34	E0AP	3216 × 4	1206 × 4	5.2±0.4	3.1±0.2	0.55±0.1	0.5±0.3	0.8±0.2	1.0±0.2	0.5Max	1.27	Yes
MNR35	J5R	3216 × 5	1206 × 5	6.4±0.4	3.1±0.2	0.55±0.1	0.5±0.3	0.8±0.2	1.0±0.2	0.5Max	1.27	Yes

●Land pattern Example

··· Land

MNR02 / 12 / 32	MNR04 / 14 / 34	MNR15 / 35	MNR18
			

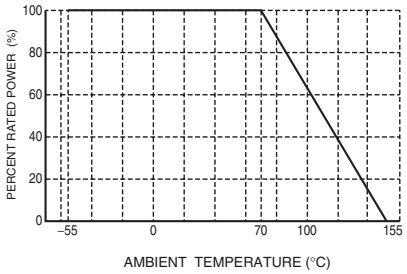
(Unit : mm)

Dimensions / Part No.	Type Code	A	B	C	D	E	P1	P2
MNR02	M0AP	0.5	0.4	0.5	1.5	–	0.65	–
MNR04	M0AP	0.5	0.4	0.5	1.5	0.3	0.5	0.55
MNR12	E0AP	1.0	0.4	0.8	2.6	–	0.8	–
MNR14	E0AP	1.0	0.4	0.8	2.6	–	0.8	0.8
MNR15	E0RP	1.0	0.48	0.7	2.4	0.32	0.64	0.72
MNR18	E0AP	1.0	0.3	0.7	2.4	–	0.5	–
MNR32	J0AB	2.1	0.8	1.0	4.1	–	1.27	–
MNR34	J5AB	2.1	0.8	1.0	4.1	0.8	1.27	1.27
MNR35	J5R	2.1	0.9	0.8	3.7	0.7	1.3	1.4

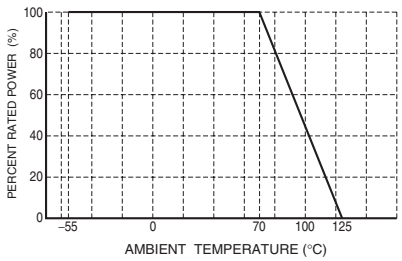
●Derating Curve

When the ambient temperature exceeds 70°C, power dissipation must be adjusted according to the derating curves below.

■ MNR02 / 04 / 12 / 14



■ MNR15 / 18 / 32 / 34 / 35



●Characteristics

Test Items	Guaranteed Value		Test Conditions
	Resistor Type	Jumper Type	
Resistance	See "Products List"		20°C
Variation of resistance with temperature	See "Products List"		Measurement : +20 / –55 / +20 / +125°C
Overload	± (2.0%+0.1Ω)	Max. 50mΩ	Rated voltage (current) ×2.5, 2s. Maximum overload voltage
Solderability	A new uniform coating of minimum of 95% of the surface being immersed and no soldering damage.		Rosin·Ethanol : 25% (weight) Soldering condition : 235±5°C Duration of immersion : 2.0±0.5s
Resistance to soldering heat	± (1.0%+0.05Ω) ± (1.0%+0.1Ω)※MNR35 No remarkable abnormality on the appearance.	Max. 50mΩ	Soldering condition : 260±5°C Duration of immersion : 10±1s
Rapid change of temperature	± (1.0%+0.05Ω) ± (1.0%+0.1Ω)※MNR35	Max. 50mΩ	Test temp. : –55°C to +125°C 5cycle
Damp heat, steady state	± (3.0%+0.1Ω)	Max. 100mΩ	40°C, 93%RH (Relative Humidity) Test time : 1,000h to 1,048h
Endurance at 70°C	± (3.0%+0.1Ω)	Max. 100mΩ	70°C Rated voltage (current) 1.5h : ON – 0.5h : OFF Test time : 1,000h to 1,048h
Endurance	± (3.0%+0.1Ω)	Max. 100mΩ	125°C (MNR15 / 18 / 32 / 34 / 35) 155°C (MNR02 / 04 / 12 / 14) Test time : 1,000h to 1,048h
Resistance to solvent	± (1.0%+0.05Ω) ± (1.0%+0.1Ω)※MNR35	Max. 50mΩ	23±5°C, Immersion cleaning, 5±0.5min Solvent : 2–propanol
Bend strength of the end face plating	± (1.0%+0.05Ω) Without mechanical damage such as breaks.	Max. 50mΩ	–

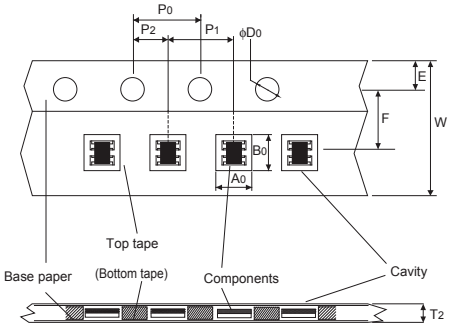
Compliance Standard(s) : IEC60115–8
JISC 5201–8

●Technical data

Parameter	Unit	MNR02 M0AP	MNR04 M0AP	MNR12 E0AP	MNR14 E0AP	MNR15 E0RP	MNR18 E0AP	MNR32 J0AB	MNR34 J5AB	MNR35 J5R
Insulation resistance	MΩ	1000	1000	1000	1000	–	–	–	–	–
Failure rate	Fit	0.0373	0.0037	0.0400	0.0088	0.4085	0.0175	0.3958	0.2010	1.1996
Weight	mg/pc	1.04	2.22	4.04	7.55	7.41	8.90	15.9	31.2	38.4

●Tape Dimensions

■ Paper Tape

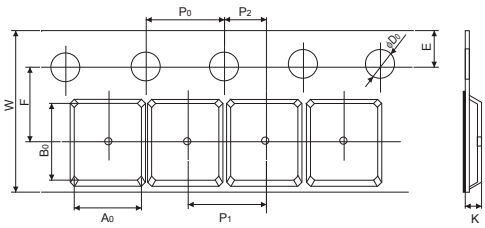


(Unit : mm)

Part No.	Type Code	W	F	E	A0	B0
MNR02	M0AP	8.0±0.3	3.5±0.05	1.75±0.1	1.17±0.1	1.17±0.1
MNR04	M0AP	8.0±0.3	3.5±0.05	1.75±0.1	1.2±0.1	2.2±0.1
MNR12	E0AP	8.0±0.3	3.5±0.05	1.75±0.1	1.8±0.1	1.8±0.1
MNR14	E0AP	8.0±0.3	3.5±0.05	1.75±0.1	1.8±0.1	3.4±0.1
MNR15	E0RP	8.0±0.3	3.5±0.05	1.75±0.1	1.8±0.1	3.4±0.1
MNR18	E0AP	8.0±0.3	3.5±0.05	1.75±0.1	1.95±0.15	4.1±0.15

Part No.	Type Code	D0	P0	P1	P2	T2
MNR02	M0AP	$\phi 1.5^{+0.1}_{0}$	4.0±0.1	2.0±0.1	2.0±0.05	Max 0.5
MNR04	M0AP	$\phi 1.5^{+0.1}_{0}$	4.0±0.1	2.0±0.1	2.0±0.05	Max 1.1
MNR12	E0AP	$\phi 1.5^{+0.1}_{0}$	4.0±0.1	4.0±0.1	2.0±0.05	Max 1.1
MNR14	E0AP	$\phi 1.5^{+0.1}_{0}$	4.0±0.1	4.0±0.1	2.0±0.05	Max 1.1
MNR15	E0RP	$\phi 1.5^{+0.1}_{0}$	4.0±0.1	4.0±0.1	2.0±0.05	Max 1.1
MNR18	E0AP	$\phi 1.5^{+0.1}_{0}$	4.0±0.1	4.0±0.1	2.0±0.05	Max 1.1

■ Embossed Tape



(Unit : mm)

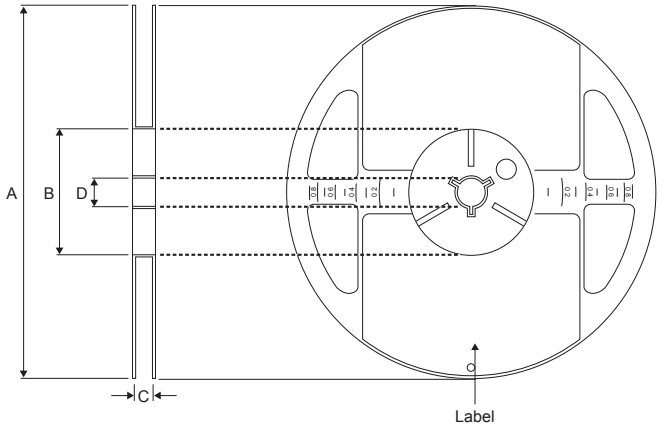
Part No.	Type Code	W	F	E	A0	B0
MNR32	J0AB	8.0±0.3	3.5±0.05	1.75±0.1	3.0±0.1	3.5±0.1
MNR34	J5AB	12.0±0.3	5.5±0.05	1.75±0.1	3.4±0.1	5.6±0.1
MNR35	J5R	12.0±0.3	5.5±0.05	1.75±0.1	3.4±0.1	6.6±0.1

Part No.	Type Code	D0	P0	P1	P2	K
MNR32	J0AB	$\phi 1.5^{+0.1}_{0}$	4.0±0.1	4.0±0.1	2.0±0.05	0.9±0.1
MNR34	J5AB	$\phi 1.5^{+0.1}_{0}$	4.0±0.1	4.0±0.1	2.0±0.05	1.0±0.15
MNR35	J5R	$\phi 1.5^{+0.1}_{0}$	4.0±0.1	4.0±0.1	2.0±0.05	1.0±0.15

●Reel Dimensions

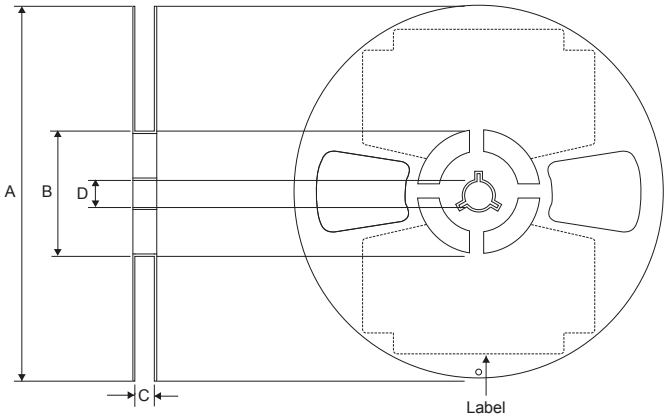
Using two kinds of reels for taping. (∗MNR34/35 applies Fig. 1 only.)

■ Fig.1



According to EIAJ ET-7200B (RRM)

■ Fig.2



According to EIAJ ET-7200B (RRV)

(Unit : mm)

Part No.	Type Code	A	B	C	D
MNR02	M0AP	$\phi 180\ ^{0}_{-1.5}$	$\phi 60\ ^{+1.0}_{0}$	$9\ ^{+1.0}_{0}$	$\phi 13 \pm 0.2$
MNR04	M0AP				
MNR12	E0AP				
MNR14	E0AP				
MNR15	E0RP				
MNR18	E0AP				
MNR32	J0AB				
MNR34	J5AB			$13\ ^{+1.0}_{0}$	
MNR35	J5R				

Notes

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Examples of application circuits, circuit constants and any other information contained herein illustrate the standard usage and operations of the Products. The peripheral conditions must be taken into account when designing circuits for mass production.

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ROHM SEMICONDUCTOR

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