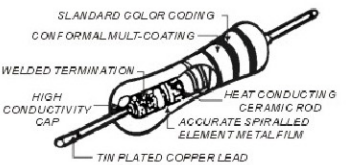
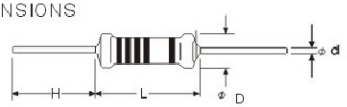
## INTRODUCTION:

MF series is a group of metal film-fixed resistors applying high Aluminum content base material vacuum sputtered by Ni-Cr alloy and excellent heat-and wet-proof special resin for protective coating. Those resistors are manufactured through integrated automatic production system and then have good stable and uniform property. Furthermore, they show excellent performance regardless open in air.

MF系列是一組鋁材經鎳鎘合金真空噴灑及特殊樹脂表被防火、防潮的金屬膜固定電阻。這些電阻由整體自動化系統製造，所以有穩定及均勻品質。而且，即使暴露在空氣中仍有極佳的品質。




DIMENSIONS




## GENERAL SPECIFICATIONS

| MIL STYLE | STYLE | POWER RATING(W) | DIMENSION (mm) | | | | MAX WORKING VOLTAGE | MAX OVERLODAD |
|---|---|---|---|---|---|---|---|---|
| | | | L | D | H(MIN) | d | | |
| RN-50 | MF-12 | 0.125W | 3.7 ±0.4 | 1.8 ±0.2 | 27 | 0.46 ±0.02 | 200 | 400 |
| RN-50 | MF-16 | 0.125W | 3.7 ±0.4 | 1.8 ±0.2 | 27 | 0.46 ±0.02 | 200 | 400 |
| RN-55 | MF-25 | 0.25W | 6.8 ±0.5 | 2.5 ±0.2 | 27 | 0.58 ±0.02 | 250 | 500 |
| RN-60 | MF-50 | 0.5W | 9.0 ±1.0 | 3.5 ±0.5 | 25 | 0.68 ±0.02 | 350 | 700 |
| RN-65 | MF-100 | 1W | 12 ±1.0 | 4.5 ±0.5 | 33 | 0.80 ±0.03 | 500 | 1000 |
| RN-70 | MF-200 | 2W | 16 ±1.0 | 5.5 ±0.5 | 33 | 0.80 ±0.03 | 500 | 1000 |
| RN-75 | MF-300 | 3W | 17 ±1.0 | 6.0 ±0.5 | 30 | 0.80 ±0.03 | 600 | 1000 |

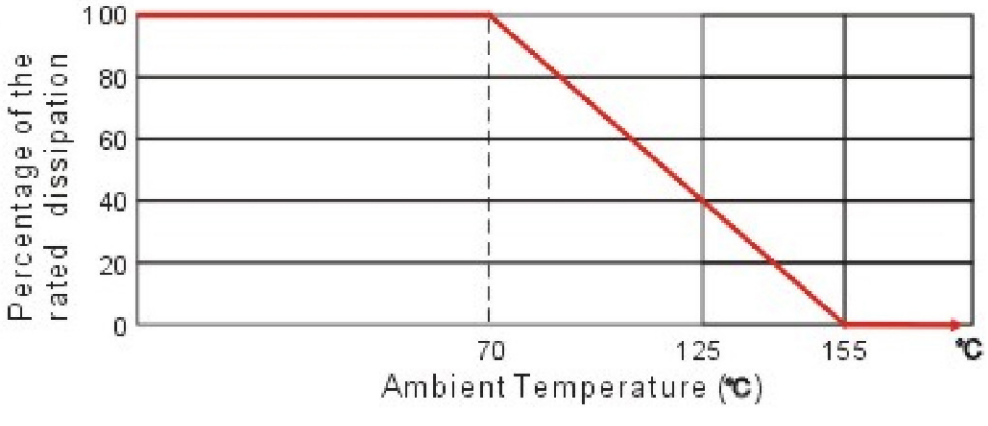
## RESISTANCE RANGE

| MIL STYLE | STYLE | TOLERANCE | TC ±25PPM/℃ | TC ±100PPM/℃<br>TC ±50PPM/℃ |
|---|---|---|---|---|
| RN-50 | MF-12<br>MF-16 | ±1%<br>±0.5%<br>±0.25%<br>±0.1% | 10Ω~1MΩ<br>100Ω~1MΩ<br>51.1Ω~470KΩ<br>51.1Ω~470KΩ | 1Ω~10MΩ<br>51.1Ω~470KΩ |
| RN-55 | MF-25 | ±1%<br>±0.5%<br>±0.25%<br>±0.1% | 0.1Ω~10MΩ<br>0.1Ω~10MΩ<br>10Ω~470KΩ<br>10Ω~470KΩ | 0.1Ω~10MΩ<br>0.1Ω~10MΩ |
| RN-60 | MF-50 | ±1%<br>±0.5%<br>±0.25%<br>±0.1% | 0.1Ω~10MΩ<br>0.1Ω~10MΩ<br>10Ω~470KΩ<br>10Ω~470KΩ | 0.1Ω~10MΩ<br>0.1Ω~10MΩ |
| RN-65 | MF-100 | ±1%<br>±0.5%<br>±0.25%<br>±0.1% | 0.1Ω~10MΩ<br>0.1Ω~10MΩ<br>10Ω~470KΩ<br>10Ω~470KΩ | 0.1Ω~10MΩ<br>0.1Ω~10MΩ |
| RN-70 | MF-200 | ±1%<br>±0.5%<br>±0.25%<br>±0.1% | 0.1Ω~10MΩ<br>0.1Ω~10MΩ<br>10Ω~470KΩ<br>10Ω~470KΩ | 0.1Ω~10MΩ<br>0.1Ω~10MΩ |
| RN-75 | MF-300 | ±1%<br>±0.5%<br>±0.25%<br>±0.1% | 0.1Ω~10MΩ<br>0.1Ω~10MΩ<br>10Ω~470KΩ<br>10Ω~470KΩ | 0.1Ω~10MΩ<br>0.1Ω~10MΩ |

# METAL FILM FIXED RESISTORS

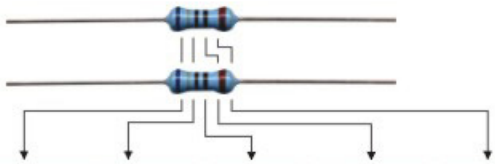
| Characteristic | Specification | Test Method |
|---|---|---|
| | | (All resistance measurements should be performed after stabilisation or conditioning periods) . |
| DC RESISTANCE | Within specified tolerance. | MIL-STD-202 Method 303 |
| TEMPERATURE COEFPICIENT | As buyer requested ±25PPM/℃, ± 100PPM/℃, ±50PPM/℃ | MIL-STD-202 Method 304 |
| DIELECTRIC STRENGTH | No flashover or damage | MIL-STD-202 Method 301 1/8W 300V 1 minute 1/4W 500V 1 minute 1/2W 700V 1 minute 1.2W 750V 1 minute |
| INSULATION RESISTANCE | at least 1,000MΩ | MIL-STD-202 Method 302 1000V 1 minute |
| CURRENT NOISE TEST | below 10KΩ below 0.05 μV/V 10KΩ~below 0.1 μV/V below 1M7 below 0.2 μV/V | MIL-STD-202 Method 308 |
| VIBRATION | ΔR within ± (0.25% +0.05Ω) | MIL-STD-202 Method 201 10~HZ X.Y.Z. 3directions 2 hours each |
| TORMINAL STRENGTH | Lead is not break or loose | MIL-STD-202 Method 211 |
| RESISTANCE TO SOLDERING HEAT | ΔR within ± (0.25% +0.05Ω) | MIL-STD-202 Method 210 350℃,3 ±0.05 sec |
| SOLDERABILITY | At least 95% coverage | MIL-STD-202 Method 208 230℃,5 sec |
| THERMAL SHOCK | ΔR within ± (0.5% +0.05Ω) | MIL-STD-202 Method 107 -55℃, +155℃ 5cycles |
| SHORT TIME OVERLOAD | ΔR within ± (0.5% +0.05%Ω) | MIL-R-10509 Para,4,6,6, 2.5times rated working voltage, 5 seconds |
| HUMI DITY | ΔR within ± (1% +0.05Ω) NO mechanical damage | MIL-STD-202 Method 103 40℃, RH95% 500 |
| LOW TEMPERATURE OPERATION | ΔR within ± (0.5% +0.05Ω) | MIL-R-10509 Para 4,6,5 rated working voltage, at-65℃ 45minutes. |
| LOAD LIFE | ΔR within ± (1% +0.05Ω) | MIL-STD-202 method 108 Rated working voltage 1.5 hours on.0.5 hours off for total 1000 hours |
| RESISTANCE TO SOVENT | Color bands legible No mechanical damage | MIL-STD-202 method 215 |

## DERATING CURVE



# GENERAL SPECIFICATION OF RESISTORS

**E24 E96**
**E192**



| COLOR | 1ST BAND | 2ND BAND | 3RD BAND | MULITIPLIER | TOLERANCE |
|---|---|---|---|---|---|
| BLACK | 0 | 0 | 0 | $10^0$ | |
| BROWN | 1 | 1 | 1 | $10^1$ | F(±1%) |
| RED | 2 | 2 | 2 | $10^2$ | G(±2%) |
| ORANGE | 3 | 3 | 3 | $10^3$ | |
| YELLOW | 4 | 4 | 4 | $10^4$ | |
| GREEN | 5 | 5 | 5 | $10^5$ | D (±0.5%) |
| BLUE | 6 | 6 | 6 | $10^6$ | C (±0.25%) |
| VIOLET | 7 | 7 | 7 | $10^7$ | B (±0.1%) |
| GRAY | 8 | 8 | 8 | | |
| WHITE | 9 | 9 | 9 | $10^{-3}$ | |
| GOLD | | | | $10^{-1}$ | J (±5%) |
| SILVER | | | | $10^{-2}$ | K (±10%) |
| PLAIN | | | | | M (±20%) |

## TEMPERATURE COEFFICIENT

UNIT/PPM/°C

| SYMBOL | T | E | C | K | J | L | D |
|---|---|---|---|---|---|---|---|
| T.C.R | ±10 | ±25 | ±50 | ±100 | ±150 | ±200 | +200 -500 |

## RESISTANCE TOLERANCE

UNIT/%

| SYMBOL | A | B | C | D | F | G | J | K | M |
|---|---|---|---|---|---|---|---|---|---|
| RESISTANCE TOLERANCE | ±0.05 | ±0.1 | ±0.25 | ±0.5 | ±1 | ±2 | ±5 | ±10 | ±20 |

## HOW TO APPLY RESISTORS CORRECTLY

▲THE CHARACTERISTICS OF RESISTOR HAVE RELATIONS TO TEMPERATURE MOISTURE AND VOLTAGE.

▲THE RATING OF RESISTOR IS SPECIFIED ON THE BASIS OF TEMPERATURE.

▲THE POWER RATING OF RESISTOR IS ALL SPECIFIED WITH A DIRECT-CURRENT (D.C.)CONTINUOUS WORKING VOLTAGE OR SINE-WAVE ROOT-MEAN-SQUARE (RMS) CONTINUOUS WORKING VOLTAGE AT COMMERCIAL-LINE FREQUENCY.

▲THE TESTS REGARDING CHARACTERISTICS OF RESISTOR, IS PRINCIPALLY SPECIFIED ON THE BASIS OF MOISTURE.

▲MAXIMUM RATED VOLTAGE AND MAXIMUM OVERLOAD VOLTAGE ARE LIMITED FOR EACH STYLE OF RESISTOR.(1)GENERALLY, RATED VOLTAGE= $\sqrt{P.R}$ WHERE, E=VOLT, P=WATT, R=OHM. (2)GENERALLY, OVERLOAD VOLTAGE ET=$\sqrt{P.R}$x2.5, APPLICATION TIME=5 SECS.
NOTE/MAX. RATED AND MAX. OVERLOAD VOLTAGE ARE SPECIFIED IN EACH SPECIFICATION, SO IF THE VOLTAGE VALUE COMPUTED, IS OVER THAN SPECI-FIED VOLTAGE VALUE, THE SPECIFIED VALUE SHOULD BE APPLIED TO RESISTOR..

▲IN THE COMPLICATED OR HIGH DENSITY CIRCUIT, IT IS RECOMMENDED THAT THE WATTAGE OR OHMIC VALUES OF RESISTOR SHOULD HAVE A LARGE REDUNDANCY FROM A VIEW POINT OF RELIABILITY.

▲IT IS NECESSARY THAT THE HANDLING OR WIRING OF RESISTOR TO THE CIRCUIT, IS CAREFULLY AND PLEASE DO NOT INFLICT ANY STRESS TO RESISTOR WITH OVER, HEATING APPOLICTION.

▲TO RISE THE RELIABILITY OF RESISTOR, IT IS BETTER TO PRERER RESISTOR WITH UNFORM QUALITY THAN TAKING RESISTOR MET WITH SEVERE SPECIFI-CATION.

▲TO RISE THE STABILITY OF RESISTOR, IT IS VERY IMPORTANT TO TAKE RESISTOR MET WITH CIRCUIT CONDITIONS AND IS ALSO ECONOMICAL NO TO HAVE UNREASONABLE DESIGE FROM A POINT OF PRICING OF RESISTOR.

▲GENERALLY, FAILURE OF RESISTOR TAKES A CONCENTRATED TREND IN THE IMPULSE CIRCUIT WITH COMPLICATED PULSE WAVE FORM OF LC CIRCUIT GENERATED HIGH VOLTAGE WITH TRANSIENT PHENOMENA, THEREFORE, IT IS VERY IMPORTANT FOR DESIGNERS TO CONSIDER. THESE CONDITIONS IN THE CIRCUIT DESIGN, IF THE RESISTOR IS APPLIED IN THESE CIRCUIT.

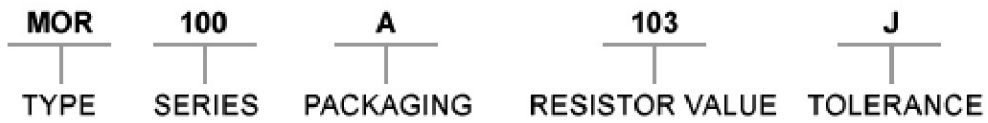
| ±2%, ±5% | ±1% | ±0.5%, ±0.1% |
|---|---|---|
| E24 | E96 | E192 |
| 100 | 100 | 100 |
| | | 101 |
| | 102 | 102 |
| | | 104 |
| | 105 | 105 |
| | | 106 |
| | 107 | 107 |
| | | 108 |
| | | 109 |
| 110 | 110 | 110 |
| | | 111 |
| | 113 | 113 |
| | | 114 |
| | 115 | 115 |
| | | 117 |
| | 118 | 118 |
| 120 | | 120 |
| | 121 | 121 |
| | | 123 |
| | 124 | 124 |
| | | 126 |
| | 127 | 127 |
| | | 129 |
| 130 | 130 | 130 |
| | | 132 |
| | 133 | 133 |
| | | 135 |
| | 137 | 137 |
| | | 138 |
| | 140 | 140 |
| | | 142 |
| | 143 | 143 |
| | | 145 |
| | 147 | 147 |
| | | 149 |
| 150 | 150 | 150 |
| | | 152 |
| | 154 | 154 |
| | | 156 |
| | 158 | 158 |
| 160 | | 160 |
| | 162 | 162 |
| | | 164 |
| | 165 | 165 |
| | | 167 |
| | 169 | 169 |
| | | 172 |
| | 174 | 174 |
| | | 176 |
| | 178 | 178 |
| 180 | | 180 |
| | 182 | 182 |
| | | 184 |
| | 187 | 187 |
| | | 189 |
| | 191 | 191 |
| | | 193 |
| | 196 | 196 |
| | | 198 |
| 200 | 200 | 200 |
| | | 203 |
| | 205 | 205 |
| | | 208 |
| | 210 | 210 |
| | | 213 |
| | 215 | 215 |
| | | 218 |
| 220 | | |
| | 221 | 221 |
| | | 223 |
| | 226 | 226 |
| | | 229 |
| | 232 | 232 |
| | | 234 |
| | 237 | 237 |
| 240 | | 240 |
| | 243 | 243 |
| | | 246 |
| 249 | 249 | 249 |
| | | 252 |
| | 255 | 255 |
| | | 258 |
| | 261 | 261 |
| | | 264 |
| | 267 | 267 |
| 270 | | |
| | | 271 |
| | 274 | 274 |
| | | 277 |
| | 280 | 280 |
| | | 284 |
| | 287 | 287 |
| | | 291 |
| | 294 | 294 |
| | | 298 |
| 300 | | |
| | 301 | 301 |
| | | 305 |
| | 309 | 309 |
| | | 312 |
| | 316 | 316 |
| | | 320 |
| | 324 | 324 |
| | | 328 |

| ±2%, ±5% | ±1% | ±0.5%, ±0.1% |
|---|---|---|
| E24 | E96 | E192 |
| 330 | | |
| | 332 | 332 |
| | | 336 |
| | 340 | 340 |
| | | 344 |
| | 348 | 348 |
| | | 352 |
| | 357 | 357 |
| 360 | | |
| | | 361 |
| | 365 | 365 |
| | | 370 |
| | 374 | 374 |
| | | 379 |
| | 383 | 383 |
| | | 388 |
| 390 | | |
| | 392 | 392 |
| | | 397 |
| | 402 | 402 |
| | | 407 |
| | 412 | 412 |
| | | 417 |
| | 422 | 422 |
| | | 427 |
| 430 | | |
| | 432 | 432 |
| | | 437 |
| | 442 | 442 |
| | | 448 |
| | 453 | 453 |
| | | 459 |
| | 464 | 464 |
| 470 | | 470 |
| | 475 | 475 |
| | | 481 |
| | 487 | 487 |
| | | 493 |
| | 499 | 499 |
| | | 505 |
| 510 | | |
| | 511 | 511 |
| | | 517 |
| | 523 | 523 |
| | | 530 |
| | 536 | 536 |
| | | 542 |
| | 549 | 549 |
| | | 556 |
| 560 | | |
| | 562 | 562 |
| | | 569 |
| | 576 | 576 |
| | | 583 |
| | 590 | 590 |
| | | 597 |
| | 604 | 604 |
| | | 612 |
| | 619 | 619 |
| 620 | | |
| | | 626 |
| | 634 | 634 |
| | | 642 |
| | 649 | 649 |
| | | 657 |
| | 665 | 665 |
| | | 673 |
| 680 | | |
| | 681 | 681 |
| | | 690 |
| | 698 | 698 |
| | | 706 |
| | 715 | 715 |
| | | 723 |
| | 732 | 732 |
| | | 741 |
| 750 | 750 | 750 |
| | | 759 |
| | 768 | 768 |
| | | 777 |
| | 787 | 787 |
| | | 796 |
| | 806 | 806 |
| | | 816 |
| 820 | | |
| | 825 | 825 |
| | | 835 |
| | 845 | 845 |
| | | 856 |
| | 866 | 866 |
| | | 876 |
| | 887 | 887 |
| | | 898 |
| | 909 | 909 |
| 910 | | |
| | | 920 |
| | 931 | 931 |
| | | 942 |
| | 953 | 953 |
| | | 965 |
| | 976 | 976 |
| | | 988 |

## EXAMPLE:

| DESCRIPTION | MOR | 1W | 10K | 5% |
|---|---|---|---|---|

**SERIAL NUMBER**




| TYPE |
|---|
| METAL OXIDE FILM RESISTORS (MOR) |
| METAL FILM FIXED RESISTORS (MF) |
| CARBON FILM FIXED RESISTORS (CR) |

| SERIES | |
|---|---|
| 12 | 1/8W |
| 25 | 1/4W |
| 50 | 1/2W |
| 100 | 1W |
| 200 | 2W |
| 300 | 3W |
| 500 | 5W |
| 100S | 1W (SMALL SIZE) |

| PACKAGING | |
|---|---|
| A | Tape Box |
| R | Tape Reel |
| B | Bulk |
| C | Forming |
| hor120Ntal Type | |

| TOLERANCE | |
|---|---|
| F | ±1% |
| G | ±2% |
| J | ±5% |
| B | ±0.1% |

| RESISTOR VALUE | |
|---|---|
| E24 Series 5% 3Digits | |
| 2R2 | 2.2Ω |
| 101 | 100Ω |
| 103 | 10k |
| 105 | 1M |

| RESISTOR VALUE | |
|---|---|
| E96 Series 1% 4Digits | |
| 2R20 | 2.2Ω |
| 1000 | 100Ω |
| 1002 | 10K |
| 1004 | 1M |