

UNIROYAL ELECTRONICS INDUSTRY (KUNSHAN) CO., LTD.



ISO14001



ISO/TS16949



244546



245468



REG.-Nr.A759



CQC04001610658

Specification for Approval

Customer : **SEMIC Trade s. r.o.****Product Name:** **LEAD-FREE METAL FILM FIXED RESISTORS****Part Name** : **MFR 0.6WS $\pm 0.1\%$ 1.5 Ω 50PPM****Part No.** : **MFR006B150KA10**

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| File Name: MFR 0.6WS ±0.1% 1.5Ω 50PPM | | Date | 2016.05.28 | Edition No. | 2 |
|---|-----------------------------|------------|-------------------|-------------|------------|
| Amendment Record | | | | Signature | |
| Edition | Prescription of amendment | Amend Page | Amend Date | Amended by | Checked by |
| 2 | Modify the Standard Packing | 9/10 | 2016.05.28 | Chen Haiyan | Chen Nana |

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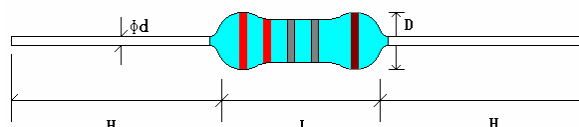


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1.0 Scope:

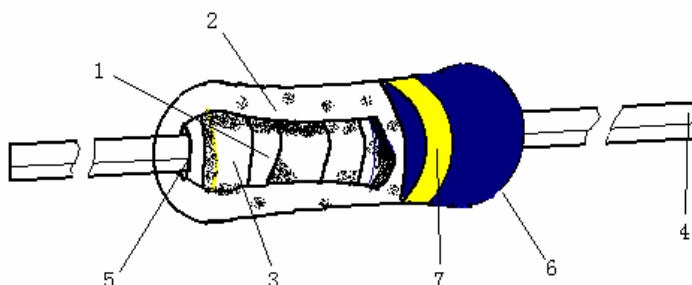
This specification for approve relates to Lead-Free Metal Film Fixed Resistors manufactured by UNIOHM.

2.0 Ratings & Dimension:



| Type | Dimension(mm) | | | | Max Working Voltage | Max Overload Voltage | Dielectric Withstanding Voltage | Tolerance | Resistance Range |
|----------|---------------|---------|------------|---------|---------------------|----------------------|---------------------------------|-----------|------------------|
| | D | L | d ±0.05 | H ±3 | | | | | |
| MF 0.6WS | 2.2±0.5 | 6.5±1.0 | 0.54 | 26 | 0.94V | 2.37V | 250V | ±0.1% | 1.5Ω |

3.0 Construction:



| No. | Name | Material |
|-----|------------|------------------------------------|
| 1 | Basic Body | Rod type ceramics |
| 2 | Resistor | Metal Film |
| 3 | End Cap | Cold steel plated with copper/tin |
| 4 | Lead Wire | Tin solder coated copper wire |
| 5 | Joint | By Welding |
| 6 | Coating | (1). Celluloid paint |
| | | (2) Insulated Resin Light Green |
| 7 | Color Code | Epoxy resin |

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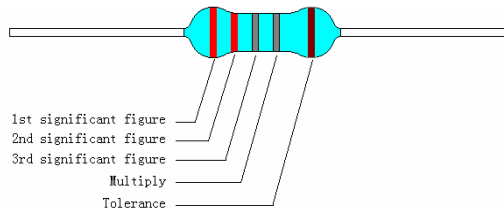
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4.0 Resistor marked:

Resistors shall be marked with color coding

Colors shall be in accordance with JIS C 0802



4.1 Label:

Label shall be marked with following items:

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

Example:

METAL FILM FIXED RESISTORS

WATT: 0.6WS

VAL: 1.5Ω

Q'TY: 5,000

TOL: 0.1%

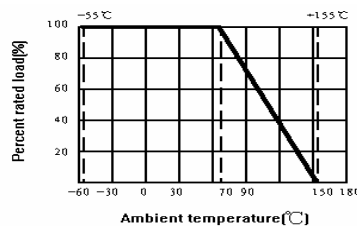
LOT: 5021548

PPM: 50

5.0 Derating Curve:

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

Figure1



5.1 Voltage rating:

Resistors shall have a rated direct-current (DC) continuous working voltage or an approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial-line frequency and waveform corresponding to the power rating, as determined from the following formula:

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

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

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

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

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6.0 Performance Specification:

| Characteristic | Limits | Test Method (JIS-C-5201&5202) | | | | | | | | | | | | | | | |
|---------------------------------|---|---|------|-------------|------|---|---|--------|---|------------|-------------|---|--|--------|---|------------|-------------|
| Temperature Coefficient | $\pm 50 \text{ PPM}/^{\circ}\text{C Max.}$ | 4.8 natural resistance changes per temp. Degree centigrade $R_2 - R_1 \times 10^6 \text{ (PPM}/^{\circ}\text{C)}$ $R_1(T_2 - T_1)$ R_1 : Resistance value at room temp. (T_1) R_2 : Resistance value at room temp. +100°C (T_2) Test pattern: room temp. (T_1), room temp. +100°C (T_2) | | | | | | | | | | | | | | | |
| Short-time overload | Resistance change rate must be in $\pm (0.5\% + 0.05 \Omega)$, and no mechanical damage. | 4.13 Permanent resistance change after the application of a potential of 2.5 times RCWV for 5 seconds. | | | | | | | | | | | | | | | |
| Dielectric withstanding voltage | No evidence of flashover mechanical damage, arcing or insulation break down. | 4.7 Resistors shall be clamped in the trough of a 90° metallic v-block and shall be tested at ac potential respectively specified in the above list for 60-70 seconds. | | | | | | | | | | | | | | | |
| Pulse overload | Resistance change rate must be in $\pm (1\% + 0.05 \Omega)$, and no mechanical damage. | 4.28 Resistance change after 10,000 cycles (1 second "ON", 25 seconds "OFF") at 4 times RCWV. | | | | | | | | | | | | | | | |
| Resistance to soldering heat | Resistance change rate must be in $\pm (1\% + 0.05 \Omega)$, and no mechanical damage. | 4.18 Permanent resistance change when leads immersed to a point 2.0-2.5mm from the body in $260^{\circ}\text{C} \pm 5^{\circ}\text{C}$ solder for 10 ± 1 seconds. | | | | | | | | | | | | | | | |
| Resistance to solvent | No deterioration of protective coatings & markings | 4.29 Specimens shall be immersed in a bath of alcohol completely for 3 min. With ultrasonic | | | | | | | | | | | | | | | |
| Terminal strength | No evidence of mechanical damage | 4.16 Direct load: Resistance to a 2.5 kg direct load for 10 seconds in the direction of the longitudinal axis of the terminal leads. Twist test: Terminal leads shall be bent through 90° at a point of about 6mm from the body of the resistor and shall be rotated through 360° about the original axis of the bent terminal in alternating direction for a total of 3 rotations. | | | | | | | | | | | | | | | |
| Solderability | 95% coverage Min. | 4.17 The area covered with a new, smooth, clean, shiny and continuous surface free from concentrated pinholes. Test temp. Of solder: $245^{\circ}\text{C} \pm 3^{\circ}\text{C}$ Dwell time in solder: 2~3seconds. | | | | | | | | | | | | | | | |
| Temperature cycling | Resistance change rate must be in $\pm (1\% + 0.05 \Omega)$, and no mechanical damage. | 4.19 Resistance change after continuous five cycles for duty cycle specified: <table border="1"> <thead> <tr> <th>Step</th><th>Temperature</th><th>Time</th></tr> </thead> <tbody> <tr> <td>1</td><td>$-55^{\circ}\text{C} \pm 3^{\circ}\text{C}$</td><td>30mins</td></tr> <tr> <td>2</td><td>Room temp.</td><td>10 – 15mins</td></tr> <tr> <td>3</td><td>$+155^{\circ}\text{C} \pm 2^{\circ}\text{C}$</td><td>30mins</td></tr> <tr> <td>4</td><td>Room temp.</td><td>10 – 15mins</td></tr> </tbody> </table> | Step | Temperature | Time | 1 | $-55^{\circ}\text{C} \pm 3^{\circ}\text{C}$ | 30mins | 2 | Room temp. | 10 – 15mins | 3 | $+155^{\circ}\text{C} \pm 2^{\circ}\text{C}$ | 30mins | 4 | Room temp. | 10 – 15mins |
| Step | Temperature | Time | | | | | | | | | | | | | | | |
| 1 | $-55^{\circ}\text{C} \pm 3^{\circ}\text{C}$ | 30mins | | | | | | | | | | | | | | | |
| 2 | Room temp. | 10 – 15mins | | | | | | | | | | | | | | | |
| 3 | $+155^{\circ}\text{C} \pm 2^{\circ}\text{C}$ | 30mins | | | | | | | | | | | | | | | |
| 4 | Room temp. | 10 – 15mins | | | | | | | | | | | | | | | |
| Load life in humidity | $\pm 1.5\%$ | 7.9 resistance change after 1,000 hours (1.5 hours "ON", 0.5 hour "OFF") at RCWV in a humidity test chamber controlled at $40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and 90 to 95% relative humidity. | | | | | | | | | | | | | | | |
| Load life | $\pm 1.5\%$ | 4.25.1 permanent resistance change after 1,000 hours operating at RCWV with duty cycle of 1.5 hours "ON", 0.5 hour "OFF" at $70^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ambient. | | | | | | | | | | | | | | | |

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7.0 Explanation of Part No. System:

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

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

Example: MFRF= Metal Film Fixed Resistors Non-flame type;

7.2 5th~6th digits:

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

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

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

Hexadecimal:

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

| Wattage | 1/2 | 1/3 | 1/4 | 1/5 | 1/6 | 1/8 | 0.6 | 0.4 |
|------------------|-----|-----|-----|-----|-----|-----|-----|-----|
| Normal Size | W2 | W3 | W4 | W5 | W6 | W8 | / | / |
| Small Size | S2 | S3 | S4 | S5 | S6 | S8 | 06 | / |
| Extra Small Size | U2 | U3 | U4 | U5 | U6 | U8 | / | 04 |

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

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

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

Example: WA=1/10W; 06=0.6W-S

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

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

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

F=±1% G=±2% J=±5%

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

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

For the standard resistance values of E-96 series, the 8th digit to the 10th digits is to denote the

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significant figures of the resistance and the 11th digit is the 11th digit is the zeros following.

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

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

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

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

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

7.4.4 The 13th digit is normally to indicate the Packing Quantity of Tape/Box & Tape/Reel packaging types. Except for Chip products Bulk packing, this digit should be filled “0” or other products with Bulk/Box packing requirement. The following letter code and number is to be used for some packing quantities:

A=500pcs B=2500pcs 1=1000pcs 2=2000pcs

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

MF=M-type with flattened lead wire

F0= F-type

MK= M-type with kinked lead wire

F1= F1-type

ML= M-type with normal lead wire

F2= F2-type

MC= M type with kinked lead and narrow pitch wire

F3= F3-type

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

P=Panasert type

1=Avisert type 1

2=Avisert type 2

3=Avisert type 3

A=Cutting type CO 1/4W-A type

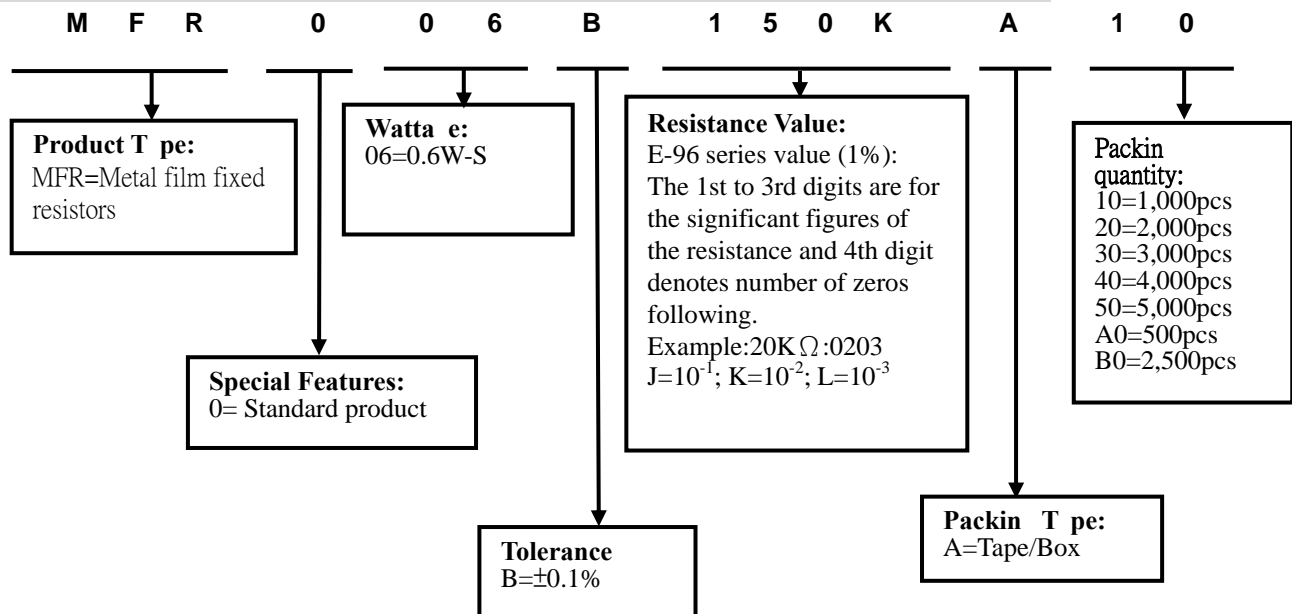
B= Cutting type CO 1/4W-B type

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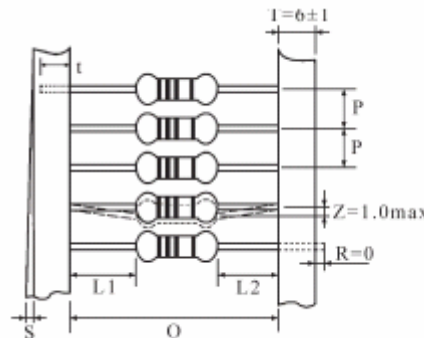
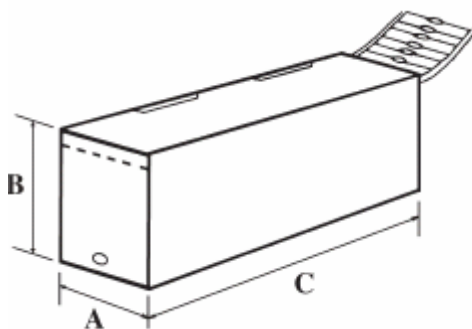
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8.0 Ordering Procedure (Example: MFR 0.6WS $\pm 0.1\%$ 1.5 Ω T/B-1000)



9.0 Standard Packing:



*L1-L2=1.0 Max.
ZW: 0
**S=0.5 Max.
PT-26: 0.8 Max.

Dimension of Reel (mm)

| Part No. | O | P | A ± 5 | B ± 5 | C ± 5 | Qty/Box |
|----------|------------|-------------|-----------|-----------|-----------|----------|
| MF 0.6WS | 52 ± 1 | 5 ± 0.3 | 73 | 28 | 255 | 1,000pcs |

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10.0 Precaution for storage/Transportation:

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

(Put condition for individual product)

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

(Put condition for each product) may be degraded.

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

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

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

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

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