Royal Parts

SPECIFICATION FOR APPROVAL

SIGMATRON S.L.

DESCRIPTION **METAL FILM FIXED RESISTORS**

PART NO. **MF ±1%**

A P P R O V E D B Y

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QS-9000:1998 / ISO 14001:1996

CNAB No . Q15

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FILE NO.: SSL - 02 - 004

PART NO.: MFR0**F****A*0	FILE NO.: SSL – 02 – 004

1. SCOPE:

THIS SPECIFICATION FOR APPROVE RELATES TO METAL FILM FIXED RESISTORS MANUFACTURED BY ROYAL PARTS' SPECIFICATION.

2. TYPE DESIGNATION:

THE TYPE DESIGNATION SHALL BE IN THE FOLLOWING FORM:

(EX.)

MF	1/2W	F	10Ω
TYPE	STYLE	RESISTANCE TOLERANCE	NORMINAL RESISTANCE

3. RATINGS:

RATINGS SHALL BE SHOWN IN THE TABLE 1

TABLE 1

TYPE	0.4WSS 1/4WS	1/8W 1/6W	1/2WSS 0.6WS	1/4W	1/2WS 1/2W	1W 2W 3W
RATED POWER	0.4W 1/4W	1/8W 1/6W	1/2W 0.6W	1/4W	1/2W 1/2W	1W 2W 3W
MAX. WORKING VOLTAGE	200V		250V		350V	500V
MAX. OVERLOAD VOLTAGE	400V		500V		700V	1000V
DIELECTRIC WITHSTANDING VOLTAGE	200V	400V	250V	500V	700V	1000V
RESISTANCE RANGE	10Ω --- 1MΩ					51.1Ω – 1MΩ
RATED AMBIENT TEMP.	70℃					
OPERATING TEMP. RANGE	-55℃ --- +155℃					
RESISTANCE TOLERANCE	±1%					

3.1 POWER RATING:

RESISTORS SHALL HAVE A POWER RATING BASED ON CONTINUOUS FULL LOAD OPERATION AT AN AMBIENT TEMPERATURE OF 70°C. FOR TEMPERATURE IN EXCESS OF 70°C, THE LOAD SHALL BE DERATED AS SHOWN IN THE FIGURE 1.

3.2 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:

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

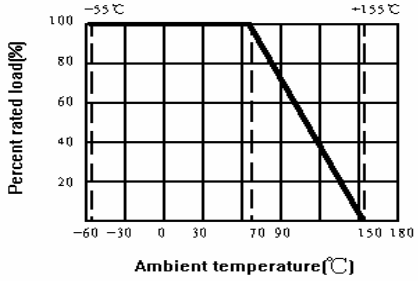
WHERE: RCWV = RATED DC OR RMS AC CONTINUOUS WORKING VOLTAGE AT COMMERCIAL-LINE FREQUENCY AND WAVEFORM (VOLT.)

P = POWER RATING (WATT.)

R= NOMINAL RESISTANCE (OHM)

IN NO CASE SHALL THE RATED DC OR RMS AC CONTINUOUS WORKING VOLTAGE BE GREATER THAN THE APPLICABLE MAXIMUM VALUE.

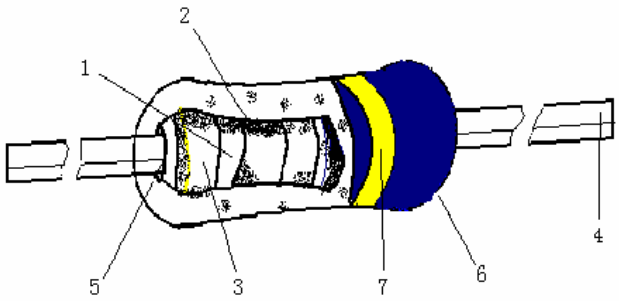
FIGURE 1



3.3 *NOMINAL RESISTANCE:*

EFFECTIVE FIGURES OF NOMINAL RESISTANCE SHALL BE IN ACCORDANCE WITH E-96 SERIES, AND RESISTANCE TOLERANCE SHALL BE SHOWN BY TABLE 1.

4. *CONSTRUCTION:*



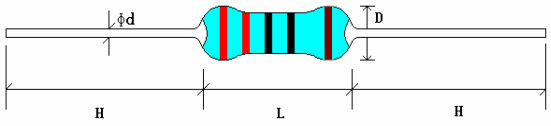
NO.	NAME	MATERIAL
1	BASIC BODY	ROD TYPE CERAMICS
2	RESISTOR	METAL FILM
3	END CAP	STEEL (TIN PLATED IRON SURFACE)
4	LEAD WIRE	ANNEALED COPPER WIRE (ELECTROSOLDER PLATED SURFACE)
5	JOINT	BY WELDING
6	COATING	INSULATED RESIN (NORMAL SIZE; 1/2WS): BLUE (SMALL SIZE): LIGHT GREEN 0.4WSS: DEEP GREEN
7	COLOR CODE	EPOXY RESIN

METAL FILM FIXED RESISTORS		
5. *CHARACTERISTIC:*		
CHARACTERISTIC	**LIMITS**	**TEST METHOD (JIS-C-5202)**
TEMPERATURE COEFFICIENT	WITHIN THE TEMPERATURE COEFFICIENT SPECIFIED BELOW: ±50PPM/℃MAX.	5.2 NATURAL RESISTANCE CHANGE PER TEMP. DEGREE CENTIGRADE $\frac{R_2-R_1}{R_1(T_2-T_1)} \times 10^6$ (PPM/℃) R_1: RESISTANCE VALUE AT ROOM TEMP. (T_1) R_2: RESISTANCE VALUE AT ROOM TEMP. +100℃ (T_2) TEST PATTERN: ROOM TEMP., ROOM TEMP. +100℃
SHORT-TIME OVERLOAD	RESISTANCE CHANGE RATE IS:±(0.5%+0.05Ω)MAX. WITH NO EVIDENCE OF MECHANICAL DAMAGE.	5.5 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.	5.7 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+10/-0 SECONDS.
PULSE OVERLOAD	RESISTANCE CHANGE RATE IS: ± (1%+0.05Ω) MAX. WITH NO EVIDENCE OF MECHANICAL DAMAGE.	5.8 RESISTANCE CHANGE AFTER 10,000 CYCLES (1 SECOND “ON ”, 25 SECONDS “OFF ”) AT 4 TIMES RCWV.
TERMINAL STRENGTH	NO EVIDENCE OF MECHANICAL DAMAGE	6.1 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.

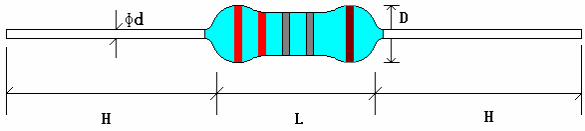
<table>
<tr><th colspan="5">METAL FILM FIXED RESISTORS</th></tr>
<tr><td colspan="5"></td></tr>
<tr><th>CHARACTERISTIC</th><th>LIMITS</th><th colspan="3">TEST METHOD
(JIS-C-5202)</th></tr>
<tr><td>RESISTANCE TO SOLDERING HEAT</td><td>RESISTANCE CHANGE RATE IS: ± (1%+0.05Ω) MAX. WITH NO EVIDENCE OF MECHANICAL DAMAGE</td><td colspan="3">6.4 PERMANENT RESISTANCE CHANGE WHEN LEADS IMMERSED TO 3.2 – 4.8 mm FROM THE BODY IN 350℃±10℃ SOLDER FOR 3±0.5 SECONDS.</td></tr>
<tr><td>SOLDERABILITY</td><td>95% COVERAGE MIN.</td><td colspan="3">6.5 THE AREA COVERED WITH A NEW, SMOOTH, CLEAN, SHINY AND CONTINUOUS SURFACE FREE FROM CONCENTRATED PINHOLES.
TEST TEMP. OF SOLDER:235℃±5℃
DWELL TIME IN SOLDER: 3+0.5/-0 SECONDS.</td></tr>
<tr><td>RESISTANCE TO SOLVENT</td><td>NO DETERIORATION OF PROTECTIVE COATINGS & MARKINGS</td><td colspan="3">6.9 SPECIMENS SHALL BE IMMERSED IN A BATH OF TRICHLOROETHYLENE COMPLETELY FOR 3 MIN. WITH ULTRASONIC</td></tr>
<tr><td>TEMPERATURE CYCLING</td><td>RESISTANCE CHANGE RATE IS:±(1%+0.05Ω) MAX.. WITH NO EVIDENCE OF MECHANICAL DAMAGE.</td><td colspan="3">7.4 RESISTANCE CHANGE AFTER CONTINUOUS FIVE CYCLES FOR DUTY CYCLE SPECIFIED:
<table><tr><th>STEP</th><th>TEMPERATURE</th><th>TIME</th></tr><tr><td>1</td><td>-55℃ ± 3℃</td><td>30 MINS</td></tr><tr><td>2</td><td>ROOM TEMP.</td><td>10 – 15 MINS</td></tr><tr><td>3</td><td>+155℃ ± 2℃</td><td>30 MINS</td></tr><tr><td>4</td><td>ROOM TEMP.</td><td>10 – 15 MINS</td></tr></table></td></tr>
<tr><td>LOAD LIFE IN HUMIDITY</td><td>NORMAL TYPE: ΔR/R ±1.5%; FLAME RETARDANT TYPE: ΔR/R ±5%</td><td colspan="3">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℃±2℃ AND 90 TO 95% RELATIVE HUMIDITY.</td></tr>
<tr><td>LOAD LIFE</td><td>NORMAL TYPE: ΔR/R ±1.5%; FLAME RETARDANT TYPE: ΔR/R ±5%</td><td colspan="3">7.10 PERMANENT RESISTANCE CHANGE AFTER 1,000 HOURS OPERATING AT RCWV WITH DUTY CYCLE OF 1.5 HOURS “ON”, 0.5 HOUR “OFF” AT 70℃±2℃ AMBIENT.</td></tr>
<tr><td></td><td></td><td colspan="3"></td></tr>
</table>

6. *DIMENSION:*

FOR 1/8W,1/6W,1/4WS,0.4WSS



OTHERS



UNIT: mm

TYPE	L (MAX.)	D (MAX.)	d +0.02/-0.05	H±3
MF 1/8W	3.5	1.85	0.45	28.0
MF 1/6W	3.5	1.85	0.45	28.0
MF 1/4WS	3.5	1.85	0.45	28.0
MF 0.4WSS	3.7	1.9	0.50	28.0
MF 1/2WSS	6.8	2.5	0.60	28.0
MF 0.6WS	6.8	2.5	0.60	28.0
MF 1/4W	6.8	2.5	0.60	28.0
MF 1/2WS	9.0	3.0	0.60	28.0
MF 1/2W	10.0	3.5	0.60	28.0
MF 1W	12.0	5.0	0.70	28.0
MF 2W	16.0	5.5	0.80	28.0
MF 3W	17.5	6.5	0.80	28.0

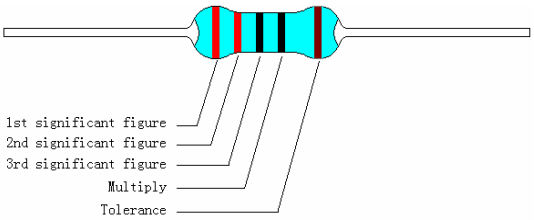
7. *MARKING:*

7.1 *RESISTOR:*

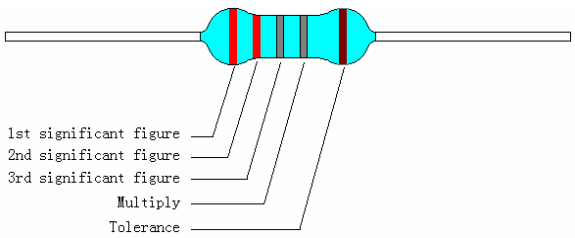
RESISTORS SHALL BE MARKED WITH COLOR CODING

COLORS SHALL BE IN ACCORDANCE WITH JIS C 0802

FOR 1/8W,1/6W,1/4WS,0.4WSS



OTHERS



7.2 *LABEL:*

LABEL SHALL BE MARKED WITH FOLLOWING ITEMS:

(1) TYPE AND STYLE

(2) NOMINAL RESISTANCE

(3) RESISTANCE TOLERANCE

(4) QUANTITY

(5) LOT NUMBER

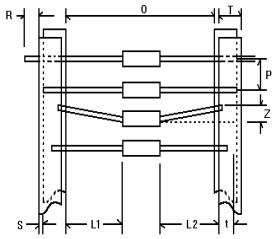
(6) PPM

EXAMPLE:

METAL FILM FIXED RESISTORS	
WATT: 1/2W	VAL: 10Ω
Q'TY: 1,000	TOL: 1%
LOT: 702548	PPM: 50

8. *PACKING SPECIFICATION:*

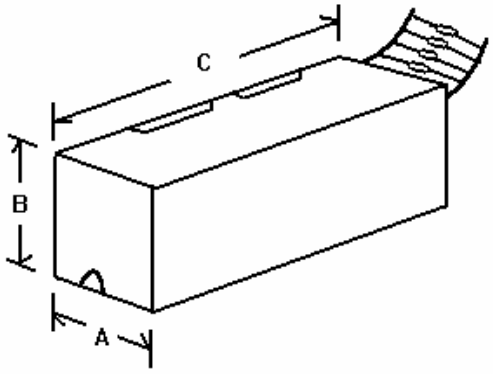
8.1 *TAPING DIMENSION:*



DIMENSION: mm

TYPE	O	P	L_1-L_2	T	Z	R	t	S
MF 1/8W	52±1	5±0.3	1 MAX.	6±1	1 MAX.	0	4 MIN.	0.5 MAX.
MF 1/6W	52±1	5±0.3						
MF 1/4WS	52±1	5±0.3						
MF 1/4W	52±1	5±0.3						
MF 0.4WSS	52±1	5±0.3						
MF 1/2WSS	52±1	5±0.3						
MF 1/2WS	52±1	5±0.3						
MF 1/2W	52±1	5±0.3						
MF 0.6WS	52±1	5±0.3						
MF 1W	58±1	5±0.3						
MF 2W	65±5	10±0.5						
MF 3W	65±5	10±0.5						

8.2 *TAPE IN BOX PACKING:*



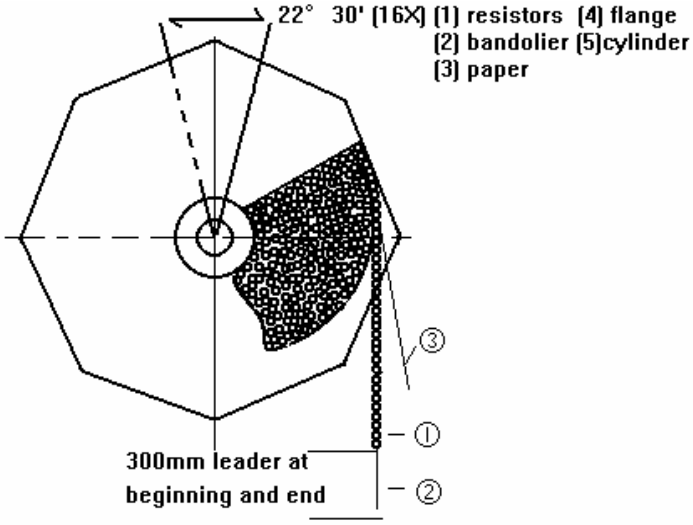
BANDOLIERS MAY ALSO BE CONTAINED IN A CARDBOARD BOX (“AMMOPACK”)

DIMENSION (mm)

TYPE	W (A) ±5	H (B) ±5	L (C) ±5	QUANTITY PER BOX
MF 1/8W	75	65	255	5,000PCS
MF 1/6W	75	65	255	5,000PCS
MF 1/4WS	75	65	255	5,000PCS
MF 1/4W	75	100	250	5,000PCS
MF 0.4WSS	75	65	255	5,000PCS
MF 1/2WSS	70	115	250	5,000PCS
MF 1/2WS	75	65	255	2,000PCS
MF 1/2W	75	45	250	1,000PCS
MF 0.6WS	70	115	250	5,000PCS
MF 1W	75	80	255	1,000PCS
MF 2W	85	85	255	1,000PCS
MF 3W	85	65	255	500PCS

“AMMOPACK” IS ABBREVIATION OF “AMMUNITION PACK”

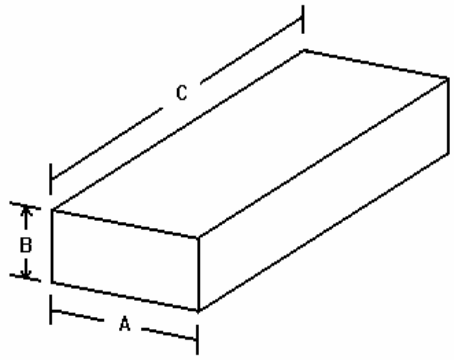
8.3 *TAPE ON REEL PACKING:*



DIMENSION: mm

TYPE	ACROSS FLANGE (A)	QUANTITY PER REEL
MF 1/8W	73 ± 2	5,000PCS
MF 1/6W	73 ± 2	5,000PCS
MF 1/4WS	73 ± 2	5,000PCS
MF 1/4W	73 ± 2	5,000PCS
MF 0.4WSS	73 ± 2	5,000PCS
MF 1/2WSS	73 ± 2	5,000PCS
MF 1/2WS	73 ± 2	4,000PCS
MF 1/2W	73 ± 2	2,500PCS
MF 0.6WS	73 ± 2	5,000PCS
MF 1W	73 ± 2	2,500PCS
MF 2W	80 ± 5	1,000PCS
MF 3W	80 ± 5	1,000PCS

8.4 *BULK IN BOX PACKING:*



DIMENSION: mm

TYPE	QUANTITY PER BAG	W (A) ±5	H (B) ±5	L (C) ±5	QUANTITY PER BOX
MF 1/8W	1,000PCS	140	80	240	20,000PCS
MF 1/6W	1,000PCS	140	80	240	20,000PCS
MF 1/4WS	1,000PCS	140	80	240	20,000PCS
MF 1/4W	500PCS	140	80	240	10,000PCS
MF 0.4WSS	1,000PCS	140	80	240	20,000PCS
MF 1/2WSS	500PCS	140	80	240	10,000PCS
MF 1/2WS	500PCS	140	80	240	8,000PCS
MF 1/2W	250PCS	140	80	240	2,000PCS
MF 0.6WS	500PCS	140	80	240	10,000PCS
MF 1W	100PCS	140	80	240	2,500PCS
MF 2W	100PCS	140	80	240	1,500PCS
MF 3W	100PCS	140	80	240	1,000PCS

PART NUMBER SYSTEM

EXPLANATION OF PART NUMBER SYSTEM
(**METAL FILM FIXED RESISTORS**)

ORDERING PROCEDURE (EXAMPLE: MF 1/2W 1% 100Ω T/B-1000):

M	F	R	0	W	2	F	1	0	0	0	A	1	0

PRODUCT TYPE:
MFR=METAL FILM FIXED RESISTORS

SPECIAL FEATURES:
0=STANDARD PRODUCT
F=FLAME RETARDANT
I=NON-INDUCTIVE

WATTAGE:
NORMAL SIZE:
W8=1/8W
W6=1/6W
W4=1/4W
W2=1/2W
1W=1W
2W=2W
3W=3W

SMALL SIZE:
S4=1/4WS
S2=1/2WS
06=0.6WS

SUPER SMALL SIZE:
04=0.4WSS
U2=1/2WSS

RESISTANCE VALUE:
E-24 SERIES VALUE (2%&5% TOL.): THE 1st DIGIT IS "0", THE 2nd &3rd DIGITS ARE FOR THE SIGNIFICANT FIGURES OF THE RESISTANCE AND THE 4th INDICATE THE NUMBERS OF ZEROS FOLLOWING;
E-96 SERIES VALUE (1% TOL.): THE 1st TO 3rd DIGITS ARE FOR THE SIGNIFICANT FIGURES OF THE RESISTANCE AND 4th DIGIT DENOTES NUMBER OF ZEROS FOLLOWING.

PACKING QUANTITY:
1=1,000PCS
2=2,000PCS
3=3,000PCS
4=4,000PCS
5=5,000PCS
A=500PCS
B=2,500PCS
0=FOR BULK/BOX PACKING

TOLERANCE (ALSO T.C.R.):
B=±0.1% 15PPM
C=±0.25% 25PPM
D=±0.5% 50PPM
F=±1% 50PPM
G=±2% 100PPM
J=±5% 200PPM
FOR SPECIAL TOLERANCE - PPM REQUIREMENT, PLEASE INDICATE IT IN THE PURCHASE ORDER (P.O.) EXAMPLE: ±1% 15PPM

PACKAGING TYPE:
A=TAPE/BOX
T=TAPE/REEL
B=BULK/BOX
P=TAPE/BOX OF PT - 26 PRODUCT

ADDITIONAL INFORMATION:
0=NIL