MFFA

4-terminal SMD current sensing resistor-metal strip



Applications

- Switched-mode power supply (SMPS)
- Voltage regulator module
- Power management
- Stepper motor drives

Product features

- Low sensing resistance
- Four-terminal design
- 0612 (1630 metric) package
- High power dissipation
- AEC-Q200 compliant
- Moisture sensitivity level (MSL): 1

Environmental compliance

Pb HALOGEN HF FREE RoHS

Table 1. Part numbering configuration scheme

MFF @ xxxx Rxxxx * ? M

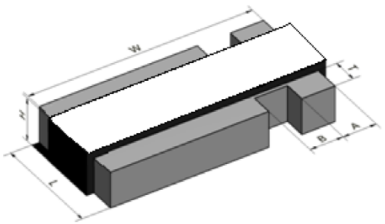
Family name	MFF
Grade option	A = Automotive grade
Footprint EIA option	0612 = 1206 wide terminal
Resistance option	Rxxxx = xxx.x mΩ ex: R0050 = 5.0 mΩ, R0008=0.75 mΩ
Resistance tolerance option	F = ±1%
Power rating option	C = 1 W
Metal material option	M = MnCu

See electrical specification table for option details

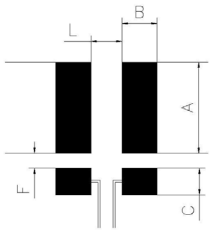
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Mechanical parameters- Inches [mm]

Family	Size code	L	W	H	T	A	B
MFFA0612	0612 [1630]	0.065 ± 0.008 [1.65 ± 0.20]	0.120 ± 0.010 [3.05 ± 0.25]	0.026 ± 0.008 [0.65 ± 0.20]	0.016 ± 0.010 [0.40 ± 0.25]	0.020 ± 0.005 [0.51 ± 0.13]	0.020 ± 0.005 [0.51 ± 0.13]



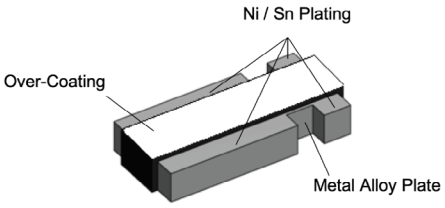
Recommended pad layout



Family	Resistance (mΩ)	A	B	C	L	F
MFFA0612	0.5 ≤ R ≤ 5	2.3	1.0	0.8	0.7	0.4

1. The copper foil minimum thickness of PCB is 3 oz.
2. PCB Dimension tolerance is +/-0.1 mm.
3. The resistance will change slightly after soldered; it is depending on PCB pad size deign and it's necessary to consider the effect of the resistance increase or decrease.

Construction

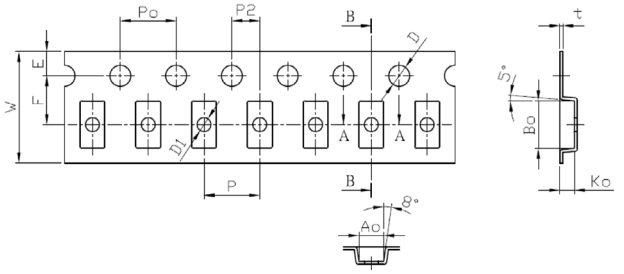


Packaging information- mm

Supplied in tape and reel on a 7.0" diameter reel (EIA-481 compliant)

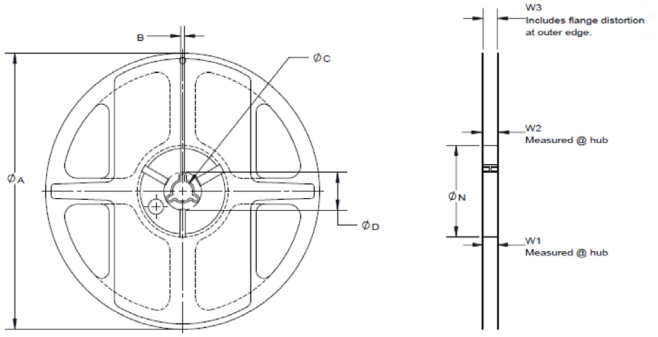
Size	Tape	Quantity
0612	7 inch embossed	4K

Tape carrier and dimensions



Dimension	millimeter
E1	1.75 ± 0.1
F	3.5 ± 0.05
P2	2.0 ± 0.1
D0	1.50 ± 0.1
P0	4.0 ± 0.1
W	8.0 ± 0.1
P1	4.0 ± 0.1
A0	1.77 ± 0.1
B0	3.4 ± 0.1
K0	1.04 ± 0.1
T	0.22 ± 0.05

Reel dimensions



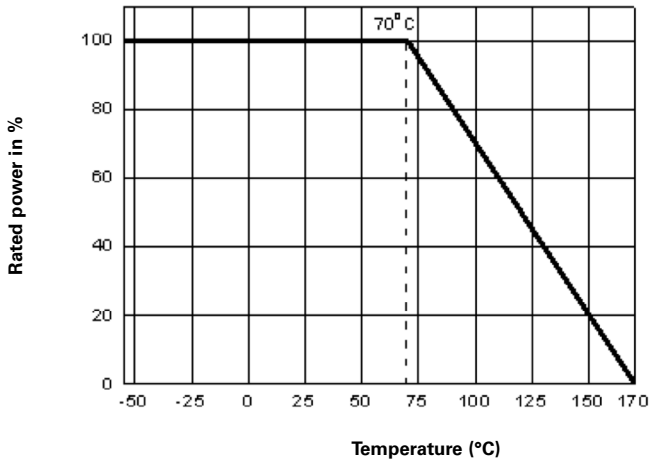
Dimension	millimeter
A	178 ± 2.0
B	3.5 ± 0.5
C	13 ± 1.0
D	na
N	60 ± 1.0
W1	9 ± 1.0
W2	11.5 ± 1.0
W3	na

Electrical specifications

Part number	Size	Grade option	Resistance value mΩ (Part number code)	Resistance tolerance (Part number code)	Power rating (Part number code)	TCR (ppm/°C)	Operating temperature
MFF@0612Rxxxx*?M	0612 (1630 metric)	A	0.5 (0005)	±1% (F)	1 W (C)	± 200	-55 °C to +170 °C
MFF@0612Rxxxx*?M	0612 (1630 metric)	A	0.75 (0008)	±1% (F)	1 W (C)	± 200	-55 °C to +170 °C
MFF@0612Rxxxx*?M	0612 (1630 metric)	A	1 (0010)	±1% (F)	1 W (C)	± 200	-55 °C to +170 °C
MFF@0612Rxxxx*?M	0612 (1630 metric)	A	1.5 (0015)	±1% (F)	1 W (C)	± 200	-55 °C to +170 °C
MFF@0612Rxxxx*?M	0612 (1630 metric)	A	2 (0020)	±1% (F)	1 W (C)	± 200	-55 °C to +170 °C
MFF@0612Rxxxx*?M	0612 (1630 metric)	A	3 (0030)	±1% (F)	1 W (C)	± 150	-55 °C to +170 °C
MFF@0612Rxxxx*?M	0612 (1630 metric)	A	5 (0050)	±1% (F)	1 W (C)	± 150	-55 °C to +170 °C

@= Enter grade option from table above (A=Automotive)
Rxxxx = Enter resitance code option from table above R= resistance, xxxx= resistance code (xxx.x mΩ ex: R0050 = 5.0 mΩ, 0008=0.75 mΩ)
*= Enter resistance tolerance code from table above (F= ±1%)
?= Enter power rating code from table above (C= 1 W)
M=MnCu (Metal material)

Temperature derating curve



Rated current & voltage

The rated Current and Voltage are calculated by the following formula:

$I=\sqrt{P \div R}$

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

I: Rated current (A)

V: Rated voltage (V)

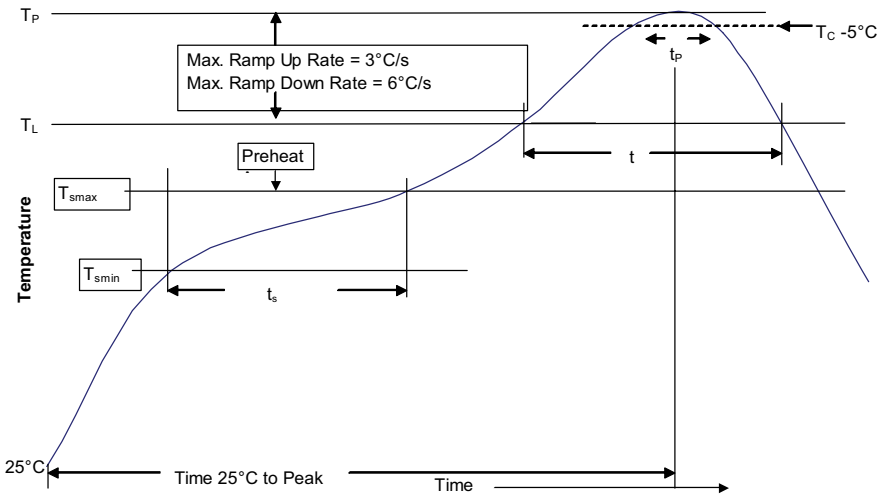
P: Rated power (W)

R: Resistance value (Ω)

General specifications

Insulation resistance: > 100 MΩ
Temperature coefficient of resistance: IEC60115-1 4.8, +25 °C to +125 °C
Short time overload: IEC60115-1 4.13, 5 X rated power for 5 s
High temperature exposure (storage): AEC-Q200-REV D-test 3, MIL-STD202 Method 108, 1000 hours. @ +170 °C.
Temperature cycling: AEC-Q200-REV D-Test 4, JESD22 Method JA-104, 1000 cycles (-55 °C to +125 °C), 30 minute maximum dwell time at each temperature extreme. 1 minute maximum transition time.
Moisture resistance: AEC-Q200-REV D-Test 6 , MIL-STD-202 method 106, 24 hours per cycle, 10 cycles, Notes: Steps 7a& 7b not required. Unpowered
Biased humidity: AEC-Q200-REV D-Test 7, MIL-STD-202 method 103, 1000 hours +85 °C/85% RH. Note: Specified conditions: 10% of operating power (not exceeding max working voltage).
Operational life: AEC-Q200-REV D-Test 8, MIL-STD-202 method 108, 1000 hours, +125 °C at rated derating power.
Resistance to solvents: AEC-Q200-REV D-Test 12, MIL-STD-202 method 215, a: Isopropyl alcohol : mineral spirits= 1 : 3, b: Terpene defluxer (Bioact EC-7R) c: Deionized water : Propylene glycol Monomethyl ether : monoethanolamine = 42 : 1
Mechanical shock: AEC-Q200-REV D-Test 13, MIL-STD-202 Method 213, half sine shock pulse, peak value is 100 g's. Normal duration (D) is 6 (ms)
Vibration: AEC-Q200-REV D-Test 14, MIL-STD-202 method 204, 5 g's for 20 minutes, 12 cycles each of 3 orientations. Test from 10-2000 Hz
Resistance to soldering heat: AEC-Q200-REV D-Test 15, MIL-STD-202 method 210, Condition B : Immerse in eutectic solder at +260 °C ± 5 °C for 10 ± 1 second
Thermal shock: AEC-Q200-REV D-Test 16, MIL-STD-202 method 107, -55 °C/+155 °C. 300 cycles, Maximum transfer time 20 seconds, Dwell time 15 minutes. Air-Air
ESD: AEC-Q200-REV D-Test 17, AEC-Q200-002 or ISO/DIS 10605, verify the voltage setting at 500 V
Solderability: AEC-Q200-REV D-Test 18, J-STD-002, method B, aging 4 hours at +155 °C dry heat Lead-free solder bath at +235 °C ± 3 °C, Dipping time: 3 ± 0.5 seconds, > 95% area covered with tin
Flammability: AEC-Q200-REV D-Test 20, UL-94, V-0 or V-1 are acceptable.
Board flex (bending): AEC-Q200-REV D-Test 21, AEC-Q200-005, The duration of the applied forces shall be 60 (+ 5) seconds, 2 mm deflection
Terminal strength (SMD): AEC-Q200-REV D-Test 22, AEC-Q200-006, Force of 1.8 kg for 60 seconds

Solder reflow profile



Profile feature		Lead (Pb) free solder
Preheat and soak	• Temperature min. (T_{smin})	150 °C
	• Temperature max. (T_{smax})	200 °C
	• Time (T_{smin} to T_{smax}) (t_s)	60-150 seconds
Ramp up rate T_L to T_p		3 °C/ second max.
Liquidous temperature (T_L) Time (t_L) maintained above T_L		217 °C 60-120 seconds
Peak package body temperature (Tp)*		260 °C
Time (t_p)* within 5 °C of the specified classification temperature (T_C)		10 seconds*
Ramp-down rate (T_p to T_L)		6 °C/ second max.
Time 25 °C to peak temperature		8 minutes max.

* Tolerance for peak profile temperature (T_p) is defined as a supplier minimum and a user maximum.

Manual solder

+350 °C ±10 °C , 3 +1/-0 seconds 1 time (by soldering iron), generally manual, hand soldering is not recommended

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