MFHA

SMD current sensing resistor-metal film

Applications

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

Environmental compliance

Product features

- Low sensing resistance
- 1206 (3216 metric) to 2512 (6432 metric)
- High power dissipation
- AEC-Q200 compliant
- Moisture sensitivity level (MSL): 1

Table 1. Part numbering configuration scheme

MFH @ xxxx Rxxxx * ?

Family name	MFH	MFH
Grade option	@	A = Automotive grade
Footprint EIA option	xxxx	1206, 2512
Resistance option	Rxxxx	Rxxxx = xxx.x mΩ ex: R1000 = 100.0 mΩ
Resistance tolerance option	*	F = ±1%
Power rating option	?	C = 1 W, E = 2 W

See electrical specification table for option details

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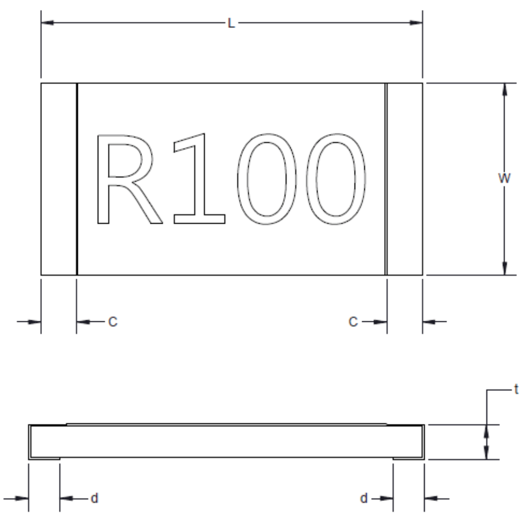
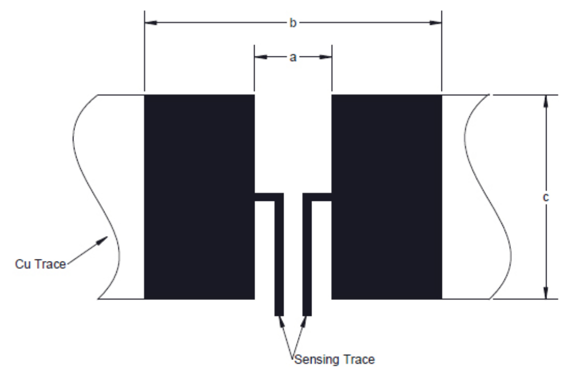
Mechanical parameters- Inches [mm]

Family	Size code	L	W	C	d	t
MFHA1206	1206 [3216]	0.126 ± 0.008 [3.20 ± 0.20]	0.063 ± 0.008 [1.60 ± 0.20]	0.020 ± 0.012 [0.50 ± 0.30]	0.016 ± 0.008 [0.40 ± 0.20]	0.022 ± 0.004 [0.55 ± 0.10]
MFHA2512	2512 [6432]	0.252 ± 0.008 [6.40 ± 0.20]	0.126 ± 0.008 [3.20 ± 0.20]	0.024 ± 0.012 [0.60 ± 0.30]	0.020 ± 0.010 [0.50 ± 0.25]	0.022 ± 0.004 [0.55 ± 0.10]

Part marking: Rxxx: (xxx= resistance value in ohms expressed in 3 digits, 100 = 0.100 Ω or 100 mΩ)



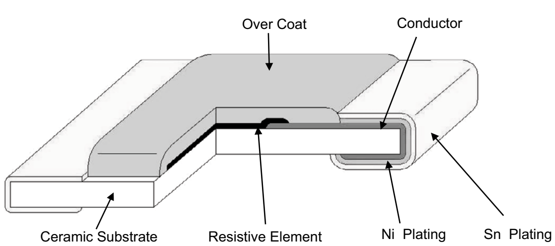
Recommended pad layout-mm



Family	a	b	c
MFHA1206	0.7	5.1	2.5
MFHA2512	1.0	7.5	4.2

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

Construction



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
MFH@1206Rxxxx*?	1206 (3216 metric)	A	100 (1000)	±1% (F)	1 W (C)	± 100	-55 °C to +155 °C
MFH@1206Rxxxx*?	1206 (3216 metric)	A	120 (1200)	±1% (F)	1 W (C)	± 100	-55 °C to +155 °C
MFH@1206Rxxxx*?	1206 (3216 metric)	A	150 (1500)	±1% (F)	1 W (C)	± 100	-55 °C to +155 °C
MFH@1206Rxxxx*?	1206 (3216 metric)	A	200 (2000)	±1% (F)	1 W (C)	± 100	-55 °C to +155 °C
MFH@1206Rxxxx*?	1206 (3216 metric)	A	220 (2200)	±1% (F)	1 W (C)	± 100	-55 °C to +155 °C
MFH@1206Rxxxx*?	1206 (3216 metric)	A	250 (2500)	±1% (F)	1 W (C)	± 100	-55 °C to +155 °C
MFH@1206Rxxxx*?	1206 (3216 metric)	A	270 (2700)	±1% (F)	1 W (C)	± 100	-55 °C to +155 °C
MFH@1206Rxxxx*?	1206 (3216 metric)	A	300 (3000)	±1% (F)	1 W (C)	± 100	-55 °C to +155 °C
MFH@1206Rxxxx*?	1206 (3216 metric)	A	400 (4000)	±1% (F)	1 W (C)	± 100	-55 °C to +155 °C
MFH@1206Rxxxx*?	1206 (3216 metric)	A	500 (5000)	±1% (F)	1 W (C)	± 100	-55 °C to +155 °C
MFH@1206Rxxxx*?	1206 (3216 metric)	A	510 (5100)	±1% (F)	1 W (C)	± 100	-55 °C to +155 °C
MFH@1206Rxxxx*?	1206 (3216 metric)	A	700 (7000)	±1% (F)	1 W (C)	± 100	-55 °C to +155 °C
MFH@2512Rxxxx*?	2512 (6432 metric)	A	100 (1000)	±1% (F)	2.0 W (E)	± 100	-55 °C to +155 °C
MFH@2512Rxxxx*?	2512 (6432 metric)	A	120 (1200)	±1% (F)	2.0 W (E)	± 100	-55 °C to +155 °C
MFH@2512Rxxxx*?	2512 (6432 metric)	A	130 (1300)	±1% (F)	2.0 W (E)	± 100	-55 °C to +155 °C
MFH@2512Rxxxx*?	2512 (6432 metric)	A	150 (1500)	±1% (F)	2.0 W (E)	± 100	-55 °C to +155 °C
MFH@2512Rxxxx*?	2512 (6432 metric)	A	180 (1800)	±1% (F)	2.0 W (E)	± 100	-55 °C to +155 °C
MFH@2512Rxxxx*?	2512 (6432 metric)	A	200 (2000)	±1% (F)	2.0 W (E)	± 100	-55 °C to +155 °C
MFH@2512Rxxxx*?	2512 (6432 metric)	A	240 (2400)	±1% (F)	2.0 W (E)	± 100	-55 °C to +155 °C
MFH@2512Rxxxx*?	2512 (6432 metric)	A	250 (2500)	±1% (F)	2.0 W (E)	± 100	-55 °C to +155 °C
MFH@2512Rxxxx*?	2512 (6432 metric)	A	270 (2700)	±1% (F)	2.0 W (E)	± 100	-55 °C to +155 °C
MFH@2512Rxxxx*?	2512 (6432 metric)	A	300 (3000)	±1% (F)	2.0 W (E)	± 100	-55 °C to +155 °C
MFH@2512Rxxxx*?	2512 (6432 metric)	A	360 (3600)	±1% (F)	2.0 W (E)	± 100	-55 °C to +155 °C
MFH@2512Rxxxx*?	2512 (6432 metric)	A	390 (3900)	±1% (F)	2.0 W (E)	± 100	-55 °C to +155 °C
MFH@2512Rxxxx*?	2512 (6432 metric)	A	450 (4500)	±1% (F)	2.0 W (E)	± 100	-55 °C to +155 °C
MFH@2512Rxxxx*?	2512 (6432 metric)	A	470 (4700)	±1% (F)	2.0 W (E)	± 100	-55 °C to +155 °C
MFH@2512Rxxxx*?	2512 (6432 metric)	A	500 (5000)	±1% (F)	2.0 W (E)	± 100	-55 °C to +155 °C
MFH@2512Rxxxx*?	2512 (6432 metric)	A	510 (5100)	±1% (F)	2.0 W (E)	± 100	-55 °C to +155 °C
MFH@2512Rxxxx*?	2512 (6432 metric)	A	680 (6800)	±1% (F)	2.0 W (E)	± 100	-55 °C to +155 °C
MFH@2512Rxxxx*?	2512 (6432 metric)	A	750 (7500)	±1% (F)	2.0 W (E)	± 100	-55 °C to +155 °C

@= Enter grade option from table above (A=Automotive)
Rxxxx = Enter resistance code option from table above   xxxx= resistance code (R1000 = 100.0 mΩ)
*= Enter resistance tolerance code from tbale above (F= ±1%)
?= Enter power rating code from table above (C= 1 W, E= 2.0 W)

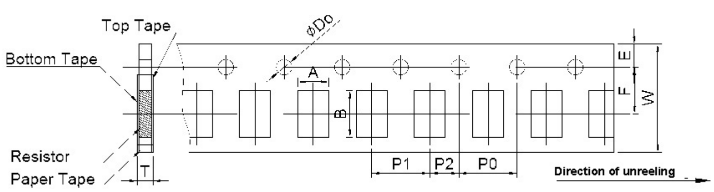
Packaging information- mm

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

Size	Tape	Quantity
1206	7 inch paper	5K
2512	7 inch embossed	4K

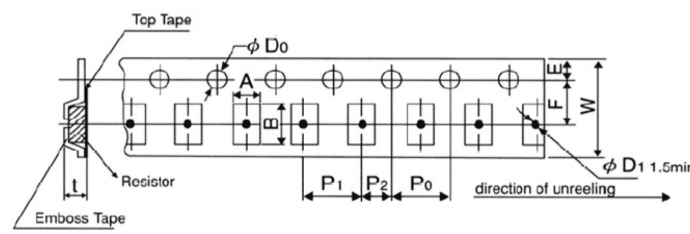
Tape carrier and dimensions

Paper tape carrier drawing

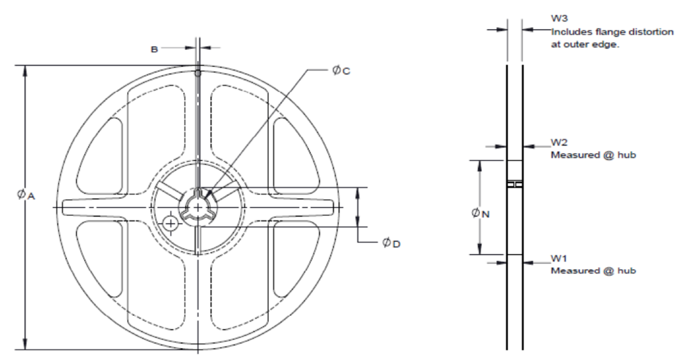


Dimension	1206	2512
E	1.75 ± 0.1	1.75 ± 0.1
F	3.5 ± 0.05	5.5 ± 0.05
P2	2.0 ± 0.1	2.0 ± 0.1
D0	1.5 ± 0.1	1.5 ± 0.1
P0	4.0 ± 0.1	4.0 ± 0.1
W	8.0 ± 0.1	12.0 ± 0.1
P1	4.0 ± 0.1	4.0 ± 0.1
A0	2.0 ± 0.15	3.6 ± 0.2
B0	3.6 ± 0.2	6.9 ± 0.2
T	0.84 ± 0.1	0.85 ± 0.15

Embossed tape carrier drawing



Reel dimensions

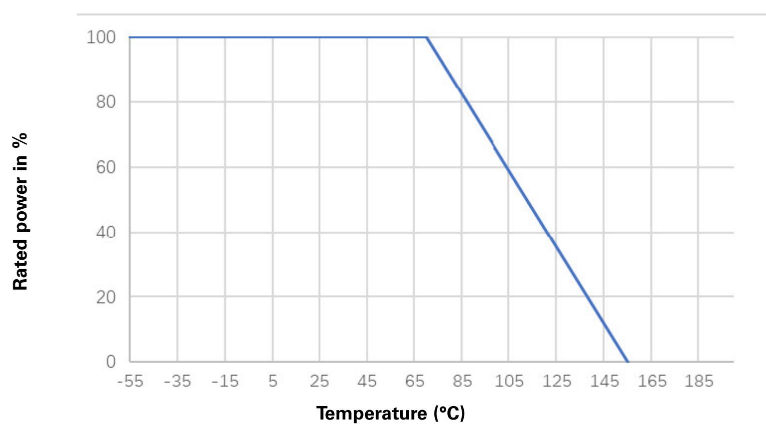


Size	A	B	C	D	N	W1	W2	W3
1206	178 ±2.0	3.5 ±0.5	13.0 ±1.0	na	60 ±1.0	9.0 ±1.0	11.5 ±1.0	na
2512	178 ±2.0	3.5 ±0.5	13.0 ±1.0	na	60 ±1.0	13.0 ±1.0	15.5 ±1.0	na

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, 2.5 X rated power for 5 s
High temperature exposure (storage): AEC-Q200-REV D-test 3, MIL-STD202 Method 108, 1000 hours. @ +155 °C unpowered
Temperature cycling: AEC-Q200-REV D-Test 4, JESD22 Method JA-104, 1000 cycles (-55 °C to +155 °C), 30 minute maximum dwell time at each temperature extreme. 1 minute maximum transition time.
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, Without plastic part, Use final goods burn with methane twice, each 10 s, Electrical test not required.
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

Temperature derating curve



Rated current & voltage

The rated current and voltage are calculated by the following formula:

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

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

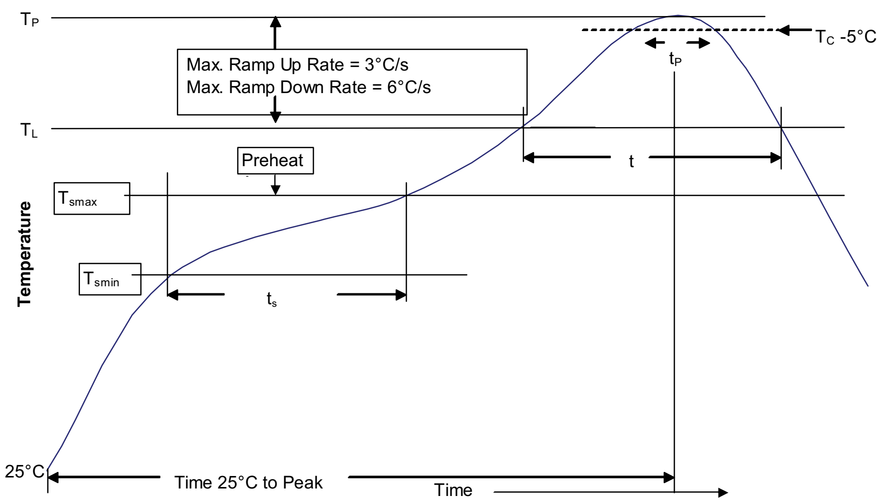
I: Rated current (A)

V: Rated voltage (V)

P: Rated power (W)

R: Resistance value (Ω)

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 (T_P)*		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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