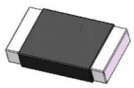
Metal Alloy Low-Resistance Resistor-EMA



- **General**
  - **Scope**
    This specification is available for metal alloy Low-Resistance Resistor manufactured by ELLON Electro-Mechanics co., ltd.
  - **Quality**
    The resistor is manufactured by highly quality-controlled process and guaranteed high reliability. It meets RoHS & Halogen-Free requirement.
  - **Standard measuring conditions**
    Temperature 20±2°C,Humidity 65±5%.Being no doubt about the judgment, measurements can be made Within the following temperature 5~35°C,Humidity 45~85%.
- **Application**
  - **Entertainment**
  - **Power supply**
  - **Measuring instrument**
  - **Industrial**
  - **Battery management system**
- **Specification**
  - **Surface mount 0805/1206/2512/2725/2728/2817/4527 case sizes**
  - **Resistance values up to 500mΩ**
  - **High precision current sensing and voltage division**
  - **Resistance tolerance ±0.1%(B), ±0.25%(C), 0.5%(D), ±1%(F)**
  - **Low resistance / Low TCR**
- **Part number system**

EMA	25	F	3W0	R001	M	D	S
Product Type	**Size (Inch)**	**Resistor Tolerance**	**Rated Power**	**Resistor Value**	**Material**	**Quantity (Pcs)**	**Remarks**
EMA	08=0805 16=1206 25=2512 27=2725 28=2728 87=2817 45=4527	B =±0.1% C =±0.25% D =±0.5% F =±1% J=±5%	0W5=0.5Watt 2W0=2.0Watt 3W0=3.0Watt --- 15W=15Watt	0M30=0.3mΩ R001=1mΩ --- R005=5mΩ	F:FeCrAl M:MnCu K:Karma S:MnCuSn A:Alloy	B=2000 D=4000 E=5000 M=500 N=1500 J=1000	S=Standard B=Big Electrode G=High power H=Heat radiation D=Big Electrode + Heat radiation

(1) EMA Series

(2): Size Code: 08=0805, 16=1206, 25=2512, 27=2725,28=2728, 87=2817,45=4527

(3): Tolerance Code: B =±0.1%, C =±0.25%, D =±0.5%, F =±1%

(4): Power Rating: Ex. 2W0=2.0Watt ; 3W0=3.0Watt;5W0=5.0Watt 12W=12.0Watt;

(5): Resistance Code: 0M30=0.3mΩ 1M50=1.5mΩ R005=5mΩ R010=10mΩ.

(6): Materials: F=FeCrAl; M:MnCu; K:Karma

(7): Optional piece reel quantity：

(8): Remarks: interior code

Metal Alloy Low-Resistance Resistor-EMA

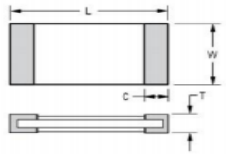
ELLON

◆ **SPECIFICATIONS**

Type	EIA SIZE	Rating Power at 70℃	Material	Resistance Range (Ω)		T.C.R. (ppm/℃)	Operating Temperature Range (℃)
				0.1% (B) 0.5%(D)	1.0%(F) 2.0% (G) 5.0% (J)		
EMA08	0805	0.5W	R000:Alloy R003-R040:MnCU	--	R000	≦±50	-55 ~ + 170
					R003-R040		
		0.75W	R003-R040:MnCU	--	R003-R040		
EMA16	1206	0.75W	FeCrAl	R051-R100	R051~R100	≦±50	
		1W	R001:MnCuSn	--	R001	≦±300	
			R002:MnCu	--	R002		
			R003-R100:MnCu R008-R100 :FeCrAl R008-R100 :Karma	R007~R050	R001~R100	≦±50	
		1/2W	R101-R200 :Karma	--	R101~R200		
		2W	R001: MnCu	R001	R001	≦±150	
			R002-R020: MnCu	R002-R020	R002-R020	≦±75	
			R006-R025: Karma	R006-R025	R006-R025	≦±75	
			R006-R025: FeCrAl	R006-R025	R006-R025	≦±50	
EMA25	2512	2W	0M25-0M75:MnCuSn R001-R200:MnCu R005-R500:FeCrAl R003-R500: Karma	R077-R450	0M25~0M75	≦±75	
					R001-R500	≦±50	
					R005-R050	≦±25	
		3W	0M25-0M75:MnCuSn R001-R200:MnCu R007-R300:FeCrAl R151-R500: Karma	R077-R100	0M25~0M75	≦±75	
					R001-R500	≦±50	
EMA27	2725	4W	0M25-0M30:MnCuSn 0M50-0M25:MnCu R003:FeCrAl	--	0M25~0M30	≦±75	
					0M50-R003	≦±50	
EMA28	2728	4W	R004-R450:FeCrAl	R007-R450	R004-R450	≦±50	
		5W	R003-R050:FeCrAl	--	R003-R050	≦±50	
EMA87	2817	5W	R001-R003 MnCu	--	R001-R003	≦±75	
			R004-R050 Karma	--	R004-R050	≦±50	
			R001-R006:MnCu R007-R100:FeCrAl	R007-R100	R001-R100	≦±50	
		3W	0M50:MnCuSn	--	0M50	≦±75	
			R001-R005:MnCu R006-R60:FeCrAl	R007-R060	R001-R060	≦±50	
		5W	0M50:MnCuSn	--	0M50	≦±75	
			R001-R005:MnCu R006-R500:FeCrAl R005-R500:Karma	R007~R500	R001~R500	≦±50	

Metal Alloy Low-Resistance Resistor-EMA

◆ **Component Dimensions**



Case Size	EIA SIZE	Rating Power	Resistance Range (Ω)	L	W	T	C
EMA08	0805	0.5W	R000	2.000±0.200	1.250±0.200	0.500±0.200	0.400±0.20
			R003-R040	2.000±0.200	1.250±0.200	0.500±0.200	0.400±0.20
		0.75W	R003-R040	2.000±0.200	1.250±0.200	0.500±0.200	0.400±0.20
EMA16	1206	0.75W	R051~R075	3.200±0.254	1.650±0.254	0.420±0.254	0.508±0.25
			R076-R100	3.200±0.254	1.650±0.254	0.370±0.254	0.508±0.25
		1W	R001	3.200±0.254	1.650±0.254	0.790±0.254	0.508±0.25
			R002	3.200±0.254	1.650±0.254	0.670±0.254	0.508±0.25
			R003-R020	3.200±0.254	1.650±0.254	0.570±0.254	0.508±0.25
			R021-R100	3.200±0.254	1.650±0.254	0.490±0.254	0.508±0.25
		1/2W	R101-R200	3.200±0.254	1.650±0.254	0.490±0.254	0.508±0.25
		2W	R001	3.200±0.254	1.650±0.254	0.80±0.154	0.70±0.25
			R002-R005	3.200±0.254	1.650±0.254	0.80±0.154	0.60±0.25
			R006-R025	3.200±0.254	1.650±0.254	0.80±0.154	0.60±0.25
			R006-R025	3.200±0.254	1.650±0.254	0.80±0.154	0.60±0.25
EMA25	2512	2W	0M25-R004	6.350±0.254	3.050±0.254	0.790±0.254	2.200±0.20
			0M25-0M75	6.350±0.254	3.050±0.254	0.790±0.254	1.4±0.25
			R001	6.350±0.254	3.050±0.254	0.670±0.254	1.4±0.25
			R0015	6.350±0.254	3.050±0.254	0.570±0.254	1.4±0.25
			R002	6.350±0.254	3.050±0.254	0.570±0.254	1.4±0.25
			R0025-R006	6.350±0.254	3.050±0.254	0.570±0.254	1.1±0.25
			R007-RR075	6.350±0.254	3.050±0.254	0.620±0.254	1.1±0.25
			R076-R100	6.350±0.254	3.050±0.254	0.570±0.254	1.1±0.25
			R101-R135	6.350±0.254	3.050±0.254	0.490±0.254	1.1±0.25
			R136-R200	6.350±0.254	3.050±0.254	0.420±0.254	1.1±0.25
			R201-R500	6.350±0.254	3.050±0.254	0.420±0.254	0.80±255
		1W	R450-R500	6.350±0.254	3.050±0.254	0.370±0.254	0.80±255
		3W	0M25-R004	6.350±0.254	3.050±0.254	0.790±0.254	2.200±0.20
			0M25-0M75	6.350±0.254	3.050±0.254	0.790±0.254	1.4±0.25
			R001	6.350±0.254	3.050±0.254	0.670±0.254	1.4±0.25
			R0015	6.350±0.254	3.050±0.254	0.570±0.254	1.4±0.25
			R002	6.350±0.254	3.050±0.254	0.570±0.254	1.4±0.25
			R0025-R006	6.350±0.254	3.050±0.254	0.570±0.254	1.1±0.25
			R007-RR075	6.350±0.254	3.050±0.254	0.620±0.254	1.1±0.25
			R076-R500	6.350±0.254	3.050±0.254	0.570±0.254	1.1±0.25
EMA27	2725	4W	0M25	6.800±0.254	6.350±0.254	0.790±0.254	2.300±0.25
			0M30	6.800±0.254	6.350±0.254	0.790±0.254	1.800±0.25

			0M50	6.800±0.254	6.350±0.254	0.670±0.254	2.300±0.25
			R001	6.800±0.254	6.350±0.254	0.670±0.254	1.800±0.25
			R0015	6.800±0.254	6.350±0.254	0.670±0.254	1.500±0.25
			R002-R003	6.800±0.254	6.350±0.254	0.570±0.254	1.500±0.25
EMA28	2728	4W	R004-R450	6.600±0.254	6.700±0.254	0.600±0.254	1.050±0.25
		5W	R003-R050	7.200±0.254	6.800±0.254	1.050±0.254	1.050±0.254
EMA87	2817	5W	R001-R003	7.100±0.254	4.300±0.254	1.000±0.155	1.20±0.25
			R004-R050	7.100±0.254	4.300±0.254	1.000±0.155	1.20±0.25
EMA45	4527	2W	R0005	11.30±0.500	6.600±0.500	0.790±0.254	3.000±0.25
			R001	11.30±0.500	6.600±0.500	0.670±0.254	3.000±0.25
			0M15-R005	11.30±0.500	6.600±0.500	0.670±0.254	2.000±0.25
			R006-R100	11.30±0.500	6.600±0.500	0.570±0.254	2.000±0.25
		3W	R0005	11.30±0.500	6.600±0.500	0.790±0.254	3.000±0.25
			R001	11.30±0.500	6.600±0.500	0.670±0.254	3.000±0.25
			R0015-R005	11.30±0.500	6.600±0.500	0.670±0.254	2.000±0.25
			R006-R060	11.30±0.500	6.600±0.500	0.570±0.254	2.000±0.25
		5W	R0005	11.30±0.500	6.600±0.500	0.820±0.254	3.000±0.25
			R001	11.30±0.500	6.600±0.500	0.700±0.254	3.000±0.25
			R0015-R005	11.30±0.500	6.600±0.500	0.700±0.254	2.000±0.25
			R006-R500	11.30±0.500	6.600±0.500	0.600±0.254	2.000±0.25

◆ Environmental characteristics

Item	Specification	Test Method	Reference Standard
Temperature Coefficient of Resistance	Within specified value	+25°C ~ +150°C, 25°C is the reference temperature	IEC60115-1 4.8 JIS-C5201 4.8
Load Life	ΔR/R1≦±2.0%(4527) ΔR/R1≦±1.0% others	1,000 hours at rated power, +70°C, 1.5 hours	IEC60115-1 4.25.1 JIS-C5201 4.25.1
Short Time Overload	4527-5W:3 times of rated power for 5 seconds, others 5 times	5 x rated power for 5 seconds	IEC60115-1 4.13 JIS-C5201 4.13
Moisture Resistance	ΔR/R1≦±0.5%	T=24 Hours/Cycles. Steps 7a& 7b not required Unpowered.	MIL-STD 202 Method 106
Temperature Cycling	ΔR/R1≦±0.5%	1000 Cycles(-55°C to +155°C), Measurement at 24±4 hours after test conclusion. 30min maximum dwell time at each temperature extreme.	JESD22 Method JA-104
Resistance to Soldering Heat	ΔR/R1≦±0.5%	+260°C ± 5°C for 10 sec. ±1 sec .,Two cycles	IEC60115-1 4.18 JIS-C5201 4.18
Solderability	At least 95% coverage of electrode surface	+245°C ± 5°C, 2 sec. ± 0.5sec.	IEC60115-1 4.17 JIS-C5201 4.17
High Temperature Exposure	ΔR/R1≦±2.0%(4527) ΔR/R1≦±1.0% others	+170°C for 1,000 hours	IEC60115-1 4.18 JIS-C5201 4.18
Low Temperature Storage	ΔR/R1≦±2.0%(4527) ΔR/R1≦±1.0% others	-55°C for 1,000 hours	IEC60115-1 4.23.4 JIS-C5201 4.23.4

Substrate Bending	ΔR/R1≦±2.0%(4527) ΔR/R1≦±1.0% others	Bending within 2mm	IEC60115-1 4.33 JIS-C5201 4.33
Core Body Strength	No broken	Central part pressurizing force:5N ,10 seconds	JIS-C5201-1 4.15
Terminal Strength(SMD)	No broken	Pressurizing force 17.7n for to seconds	AEC Q200-006
Bending Strength	ΔR/R1≦±0.5% No broken	Bending once 2mm for 10 seconds	JIS-C-5201-1 4.33 IEC-60115-1 4.33
Dielectric Withstanding Voltage	No short or burned on the appearance.	Applied 500V AC FOR 1 Minute	JIS-C5201-1 4.7

Voltage and Current Ratings: Voltage and current ratings can be calculated for each part number by using the formulas below:

Current Rating Formula: I=$\sqrt{P/R}$
Example: EMA12F0R006TR5F
P=1W
R=0.006Ω(6milli-ohm)

I=$\sqrt{P/R}$= $\sqrt{1.0/0.006}$=12.909A

Voltage Rating Formula: V =$\sqrt{P*R}$
Example: EMA12F0R006TR5F
P=1W
R=0.006Ω(6milli-ohm)

V=$\sqrt{P*R}$= $\sqrt{1.0*0.006}$=0.07745V

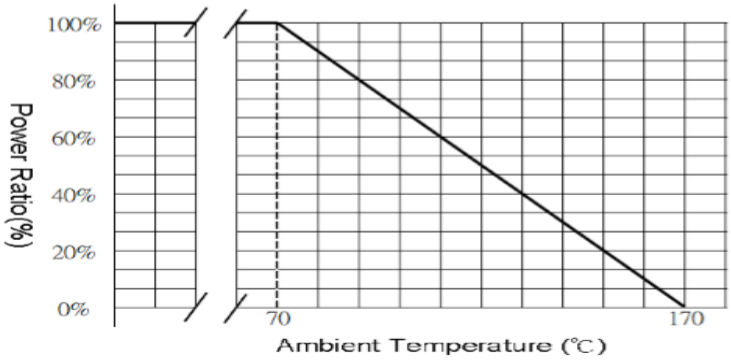
Thermal EMF Characteristics:
Thermal EMF=-1μV/℃

◆ **Performance characteristics**

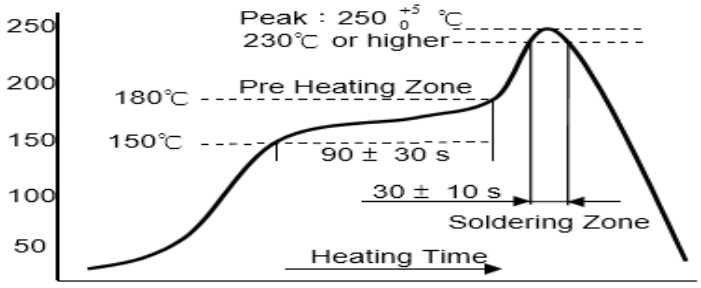
Power Derating Curve

The Operating Temperature Range: -55°C ~+170°C.

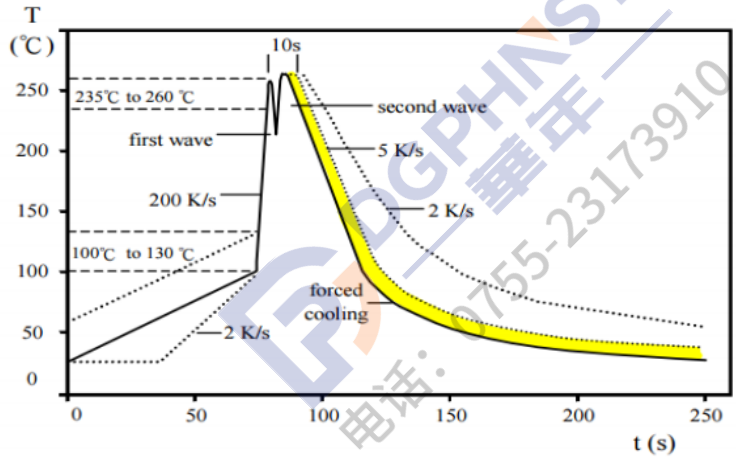
For resistors operated in ambient temperatures above 70°C, power rating must be derating in accordance with the curve below



◆ Soldering Profile



Reflow Soldering

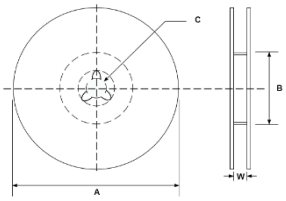


WAVE soldering.

◆ Packaging information

REEL DIMENIONS (mm) AND QUANTITY

Type	A	B	C	W	Quantity
EMA08	178 ±2.0	60 ±1.0	13 ±1.0	9.0 ±1.0	5000
EMA16					5000/4000/3000
EMA25					
EMA27				13.0 ±1.0	2000/1000/500
EMA28					
EMA45					
EMA87				12.3 ±1.0	1000/500



◆ Storage Temperature

Temperature 20~30℃, Humidity 40~80%