

◆ **General**

- Scope

This specification is available for Alloy Shunt Resistors 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  $20 \pm 2^\circ\text{C}$ , Humidity  $65 \pm 5\%$ . Being no doubt about the judgment, measurements can be made within the following Temperature  $5 \sim 35^\circ\text{C}$ , Humidity  $45 \sim 85\%$ .

◆ **Applications**

- Current sensor for power hybrid applications
- Frequency converters
- Power modules
- Communication system
- Automatic control power supply
- High current applications for the automotive

◆ **Specification**

- Resistance Value:  $0.1\text{m}\Omega \sim 5\text{m}\Omega$
- Value accuracy:  $\pm 0.5\%(D)$ ,  $\pm 1\%(F)$ ,  $\pm 5\%(J)$
- Resistance temperature coefficient : MIN 20PPM/ $^\circ\text{C}$
- Working temperature range:  $-55^\circ\text{C} \sim +175^\circ\text{C}$
- Inductors:  $< 2\text{Nh}$
- EMV( $0 \sim 100^\circ\text{C}$ ):  $< 1\mu\text{V}/^\circ\text{C}$
- Power(P70 $^\circ\text{C}$ ): MAX15W
- AEC-Q200 Reliability Testing Passed

◆ **Part Number System**

<u>ESR</u>	<u>39</u>	<u>F</u>	<u>2W</u>	<u>R001</u>	<u>M</u>	<u>02</u>	<u>G</u>
Product Type	Size (Inch)	Resistor Tolerance	Rated Power	Resistor Value	Material	Quantity (Pcs)	Remarks
ESR	16=1206	D= $\pm 0.5\%$	1W5=1.5Watt	0M30=0.3m $\Omega$	F:FeCrAl	02=2000	S=standard G=High power
	25=2512	F = $\pm 1\%$	2W=2Watt	R001=1m $\Omega$	M:MnCu	04=4000	
	27=2726	G= $\pm 2\%$	3W=3Watt	---	K:Karma	05=5000	
	39=3920	J= $\pm 5\%$	5W=5Watt	R005=5m $\Omega$	A:Alloy		
	59=5930		---				
			15W=15Watt				

(1): ESR Series

(2): Size Code: 16=1206, 25=2512, 27=2726, 39=3920, 59=5930

(3): Tolerance Code: D= $\pm 0.5\%$ , F =  $\pm 1\%$ , G= $\pm 2\%$ , J= $\pm 5\%$

(4): Power Rating: Ex. 1W=1Watt; 1W5=1.5Watt; 2W=2Watt ; 3W=3Watt; 5W=5Watt ;

(5): Resistance Code: 0M30= 0.3mR R001=1mR

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

(7): Optional piece reel quantity: 02=2000PCS; 01=1000PCS; 04=4000PCS; 05=5000

(8): Remarks: Interior code

# Matel Type-current Shunt Resistors – ESR Series



## Standard Electrical Specifications

Type	EIA Code	Rated Power at 100°C	Rated Power at 70°C	Materials	T.C.R. (PPM/°C)	Resistance Range	T/mm
						D(±0.5%)F(±1%) G(+2%)J(±5%)	
ESR16	1206	1.5W	3W	K	±75	2mΩ	0.58±0.1
ESR25	2512	4W	7W	M	±100	0.2mΩ	1.7±0.1
		3W	6W	M	±200	0.25mΩ	0.98±0.1
		3W	6W	M	±100	0.3mΩ	0.95±0.1
		3W	6W	M	±100	0.35mΩ	0.80±0.1
		3W	6W	M	±100	0.4mΩ	0.88±0.1
		3W	6W	M	±100	0.5mΩ	0.85±0.1
		3W	6W	M	±100	0.7mΩ	0.60±0.1
		3W	6W	M	±100	0.75mΩ	0.56±0.1
		3W	6W	M	±100	1mΩ	0.42±0.1
		3W	6W	M	±100	1.5mΩ	0.40±0.1
		3W	5W	F	±20	2mΩ	0.67±0.1
		2W	4W	F	±20	3mΩ	0.45±0.1
		2W	3W	F	±20	4mΩ	0.32±0.1
		1.5W	2.5W	F	±20	5mΩ	0.32±0.1
		5W	7W	K	±25	1mΩ	1.3±0.1
		5W	7W	K	±25	1.5mΩ	1.3±0.1
		5W	7W	K	±25	2mΩ	1.3±0.1
		4W	6W	K	±25	2.5mΩ	1.3±0.1
		4W	5W	K	±25	3mΩ	1.3±0.1
		3.5W	5W	K	±50	3mΩ	0.65±0.1
		4W	5W	K	±25	4mΩ	1.3±0.1
		4W	5W	K	±25	5mΩ	1.3±0.1
		3.5W	5W	K	±50	5mΩ	0.65±0.1
		4W	6W	K	±50	2mΩ	0.65±0.1
		3W	4W	K	±50	2.5mΩ	0.50±0.1
3W	4W	K	±50	3mΩ	0.43±0.1		
2W	3W	K	±50	4mΩ	0.32±0.1		
1.5W	2.5W	K	±50	5mΩ	0.28±0.1		
ESR27	2726	9W	12W	M	±150	0.1mΩ	1.70±0.1
		9W	12W	M	±150	0.2mΩ	1.70±0.1
		7W	11W	M	±150	0.3mΩ	1.50±0.1
ESR39	3920	5W	12W	M	±100	0.2mΩ	1.70±0.1
		5W	10W	M	±100	0.3mΩ	1.28±0.1
		5W	9W	M	±100	0.4mΩ	1.00±0.1
		5W	9W	M	±100	0.5mΩ	0.80±0.1
		5W	8W	M	±100	0.7mΩ	0.55±0.1
		5W	7W	M	±100	0.8mR	0.48±0.1

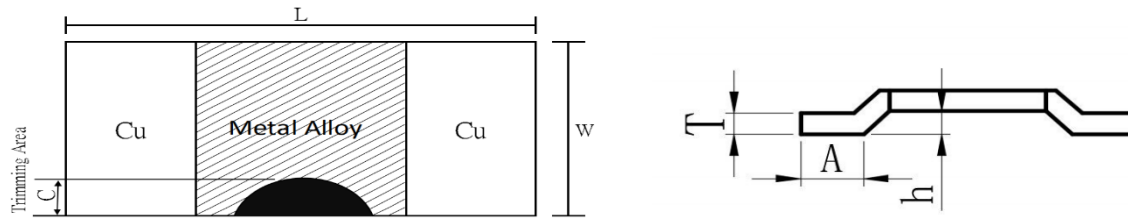
# Matel Type-current Shunt Resistors – ESR Series



		4W	7W	M	±100	1mΩ	0.40±0.1
		5W	8W	F	±50	1mΩ	1.25±0.1
		4W	7W	F	±50	1.5mΩ	0.94±0.1
		4W	6W	F	±50	2mΩ	0.62±0.1
		3W	5W	F	±50	3mΩ	0.42±0.1
		2.5W	4W	F	±50	4mΩ	0.35±0.1
		4W	5W	F	±50	5mΩ	0.28±0.1
		5W	8W	K	±75	1mΩ	1.16±0.1
		4W	7W	K	±75	1.5mΩ	1.05±0.1
		4W	6W	K	±75	2mΩ	0.65±0.1
		3W	5W	K	±75	3mΩ	0.43±0.1
		2.5W	4W	K	±75	4mΩ	0.32±0.1
		2W	3W	K	±75	5mΩ	0.28±0.1
ESR59	5930	10W	15W	M	±200	0.1mΩ	1.70±0.1
		10W	15W	M	±150	0.2mΩ	1.60±0.1
		9W	12W	M	±150	0.25mΩ	1.58±0.1
		7W	10W	M	±150	0.3mΩ	0.96±0.1
		6W	9W	M	±150	0.4mΩ	0.72±0.1
		6W	8W	M	±100	0.5mΩ	0.58±0.1
		6W	7W	M	±100	0.7mΩ	0.42±0.1
		5W	7W	M	±100	0.75mΩ	0.39±0.1
		5W	7W	M	±100	0.8mΩ	0.36±0.1
		6W	9W	F	±50	1mΩ	0.94±0.1
		6W	8W	F	±50	1.5mΩ	0.62±0.1
		5W	7W	F	±50	2mΩ	0.48±0.1
		5W	7W	F	±50	3mΩ	0.31±0.1
		6W	9W	K	±75	1mΩ	0.88±0.1
		6W	8W	K	±75	1.5mΩ	0.55±0.1
		5W	7W	K	±75	2mΩ	0.43±0.1
		4W	7W	K	±75	3mΩ	0.30±0.1

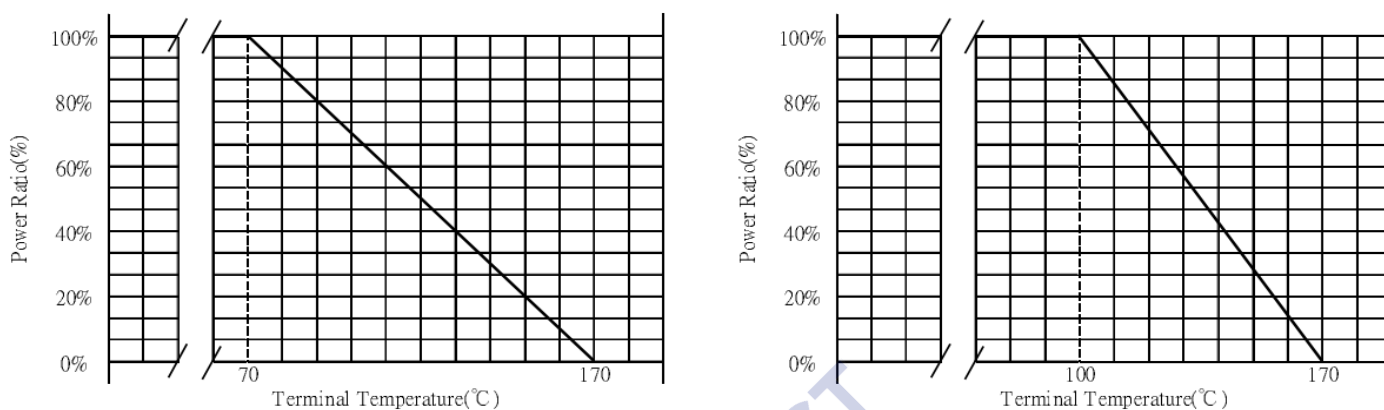
- For non-standard parts, please contact our sales dept.
- Power rating is guaranteed for use an aluminum substrate.
- Operating Temperature Range :-55°C~+170°C

## ◆ Type Dimension

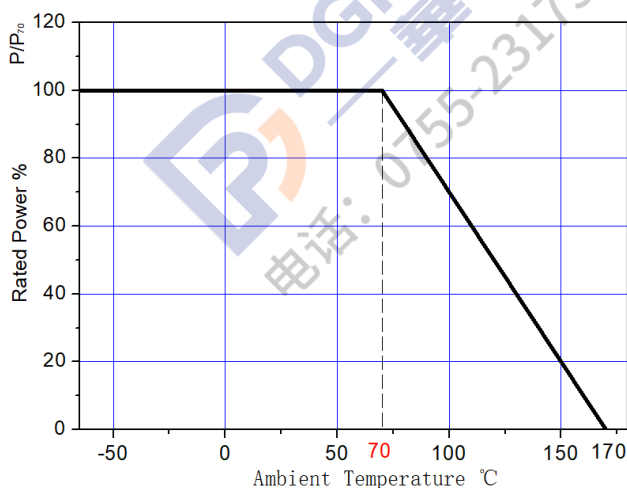


Type	EIA Code	Resistance	L(mm)	w(mm)	A(mm)	H(mm)
ESR16	1206	2mΩ	3.2±0.3	1.6±0.3	0.8±0.5	0.58±0.1
ESR25	2512	0.25mΩ~5mΩ	6.4±0.2	3.2±0.25	1.2±0.2	0.5±0.1
ESR27	2726	0.1mΩ~0.2mΩ	6.95±0.2	6.6±0.15	2.3±0.3	1.7±0.1
		0.3mΩ	6.95±0.2	6.6±0.15	2.1±0.3	1.5±0.1
ESR39	3920	0.2mΩ~5mΩ	10±0.2	5.1±0.25	2.0±0.2	1.0±0.25
ESR59	5930	0.1mΩ	15±0.2	7.7±0.3	5.5±0.2	1.0±0.3
		0.2mΩ~3mΩ	15±0.2	7.7±0.3	4.2±0.2	0.5±0.15

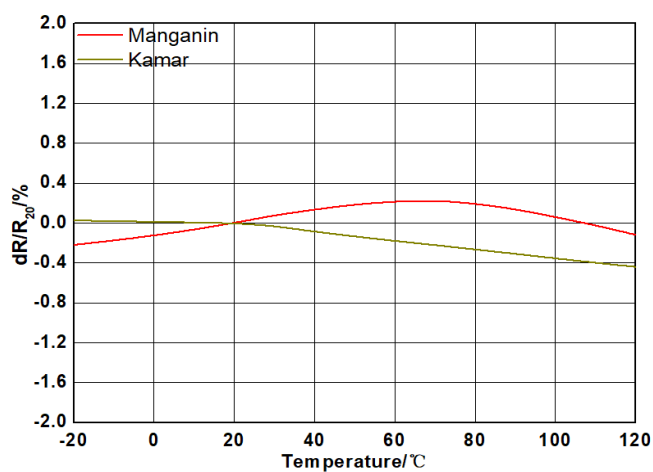
## ◆ Power Derating Curve



## ◆ Power Derating



## ◆ TCR Derating



◆ **Rated Voltage:**

The rated voltage is calculated by the following formula:

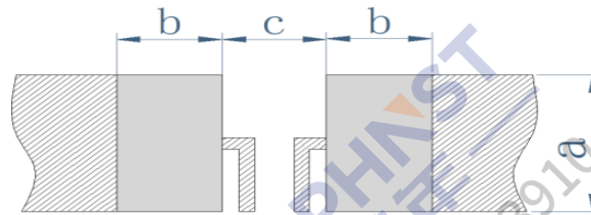
$$E(RCWV) = \sqrt{P * R}$$

E=Rated Voltage(V)

P=Rated Power(W)

R=Resistance Value(R)

◆ **Recommended Solder Pad Layout**



Unit: mm

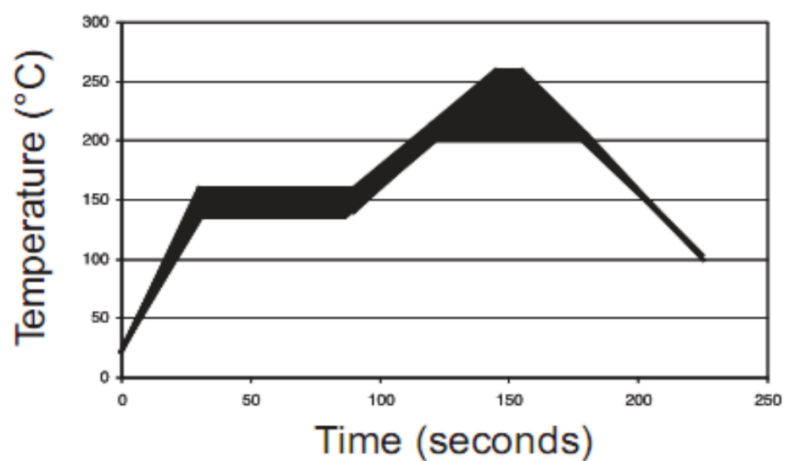
TYPE	EIA Code	Resistance	a	b	c
ESR16	1206	2mΩ	3.5	1.5	1.0
ESR25	2512	0.25mΩ~5mΩ	3.6	1.8	3.8
ESR27	2726	0.1mΩ~0.2mΩ	7.95	3	1.6
		0.3mΩ	7.95	3	1.6
ESR39	3920	0.2mΩ~5mΩ	6.2	2.7	5.6
ESR59	5930	0.1mΩ	8.75	6.2	3.6
		0.2mΩ~3mΩ	8.75	5.2	5.6

◆ **Recommend Soldering Conditions:**

Peaks reflow temperatures and durations

- Reflow Peak = 260 max for 10 sec
- Not suitable for wave soldering

Recommended IR Reflow Profile



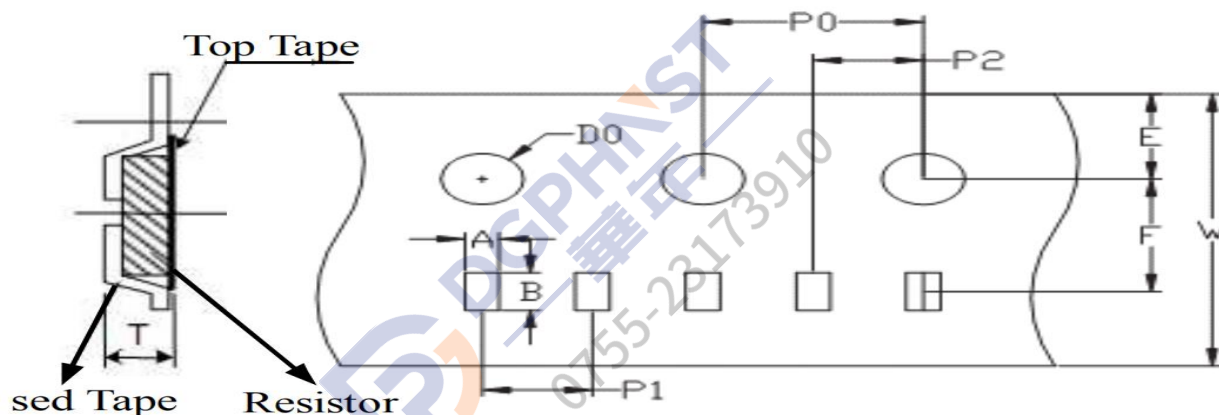
◆ **Storage Temperature**

Temperature 20~30℃, Humidity 40~80%

◆ **Packaging**

Size EIA	ESR16	ESR25	ESR27	ESR39	ESR59
Standard Packing Quantity (pcs /reel)	5000	4000	2000	2000	2000

Embossed plastic Tape Specifications



◆ **Dimension**

ITEM	A	B	E	F	W	P0	P1	P2	D0	T
ESR16	1.95±0.1	3.6±0.1	1.75±0.1	3.5±0.1	8.0±0.3	4.0±0.1	4.0±0.1	2.0±0.05	1.5±0.1	0.95±0.2
ESR25	3.55±0.1	6.75±0.1	1.75±0.1	5.5±0.05	12.0±0.2	4.0±0.05	4.0±0.1	2.0±0.05	1.5±0.1	1.2±0.2
ESR27	7.8±0.1	7.5±0.1	1.75±0.1	7.5±0.05	16.0±0.2	4.0±0.05	12.0±0.1	2.0±0.05	1.5±0.1	1.9±0.2
ESR39	5.5±0.1	10.8±0.1	1.75±0.1	6.5±0.05	16.0±0.2	4.0±0.05	12.0±0.1	6.0±0.05	1.5±0.1	1.2±0.2
ESR59	8.40±0.1	15.3±0.1	1.75±0.1	11.5±0.1	24.0±0.3	4.0±0.1	12.0±0.1	2.0±0.1	1.5±0.1	2.30±0.1