

ELR/EWLR Series Low-Resistance Metal Film



■ Applications

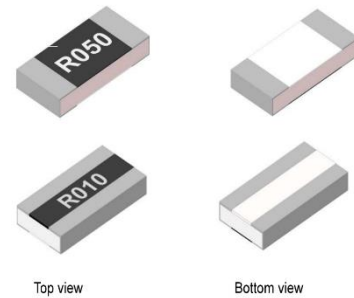
- Consumer electronics
- Computer & relative products
- Communication devices
- Measuring instrument
- Industrial/Power supply
- Battery management system

■ Features

- Low Resistance/TCR/inductance($\leq 5nH$)
- Excellent long-term stability
- High precision current sensing
- High power capability
- Halogen free and lead free
- RoHS compliant

■ Standard Electrical Specifications

- Standard Type



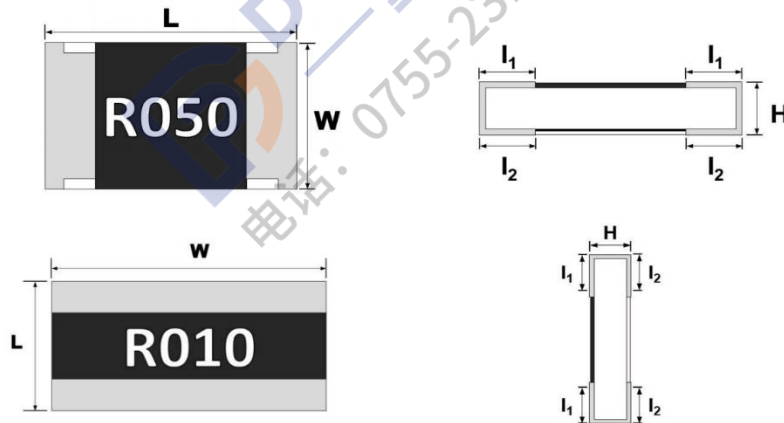
Type	EIA Size	Rated Power at 70°C	Max. Rated Current	Max. Overload Current	T.C.R. (ppm/°C)	Resistance Range	
						C(0.25%)	D(0.5%),F(1%),G(2%),J(5%)
ELR02	0201	1/20W	1.00A	2.50A	± 100	---	$50m\Omega \leq R < 100m\Omega$
		1/10W	1.41A	3.16A	± 100	---	$50m\Omega \leq R < 100m\Omega$
		1/5W	2.00A	4.47A	± 100	---	$50m\Omega \leq R < 100m\Omega$
ELR04	0402	1/16W	1.12A	2.80A	± 100	---	$50m\Omega \leq R < 100m\Omega$
		1/8W	1.58A	3.54A	± 100	---	$50m\Omega \leq R < 100m\Omega$
		1/4W	2.24A	5.00A	± 50	---	$100m\Omega \leq R \leq 10\Omega$
ELR06	0603	1/10W	1.41A	3.54A	± 50	---	$100m\Omega \leq R \leq 10\Omega$
		1/5W	2.00A	4.47A	± 50	---	$100m\Omega \leq R \leq 10\Omega$
		2/5W	2.83A	6.32A	± 50	---	$100m\Omega \leq R \leq 10\Omega$
ELR08	0805	1/8W	1.79A	4.48A	± 150	---	$39m\Omega \leq R < 50m\Omega$
		1/4W	2.53A	5.66A	± 100	---	$50m\Omega \leq R < 100m\Omega$
		1/2W	3.58A	8.00A	± 50	---	$100m\Omega \leq R \leq 10\Omega$
ELR16	1206	1/4W	2.53A	6.33A	± 150	---	$39m\Omega \leq R < 50m\Omega$
		1/4W	5.00A	12.50A	± 200	---	$10m\Omega \leq R < 39m\Omega$
		1/2W	3.58A	8.00A	± 150	---	$39m\Omega \leq R < 50m\Omega$
		1/2W	7.07A	15.80A	± 200	---	$10m\Omega \leq R < 39m\Omega$
		3/4W	4.39A	9.81A	± 100	---	$50m\Omega \leq R < 100m\Omega$
		1W	5.06A	11.32A	± 100	---	$100m\Omega \leq R \leq 10\Omega$
ELR12	1210	1/2W	3.58A	8.95A	± 50	$470m\Omega \leq R \leq 10\Omega$	$100m\Omega \leq R \leq 10\Omega$
		1W	5.06A	11.32A	± 50	$470m\Omega \leq R \leq 10\Omega$	$100m\Omega \leq R \leq 10\Omega$
ELR20	2010	3/4W	2.74A	6.85A	± 50	$470m\Omega \leq R \leq 10\Omega$	$100m\Omega \leq R \leq 10\Omega$
		3/2W	3.87A	8.66A	± 50	$470m\Omega \leq R \leq 10\Omega$	$100m\Omega \leq R \leq 10\Omega$
ELR25	2512	1W	3.16A	7.91A	± 50	$470m\Omega \leq R \leq 10\Omega$	$100m\Omega \leq R \leq 50.2\Omega$
		2W	4.47A	10.00A	± 50	$470m\Omega \leq R \leq 10\Omega$	$100m\Omega \leq R \leq 50.2\Omega$
		3W	5.48A	12.25A	± 50	$470m\Omega \leq R \leq 10\Omega$	$100m\Omega \leq R \leq 50.2\Omega$

- Wide Terminal Type

Type	EIA Size	Rated Power at 70°C	Max. Rated Current	Max. Overload Current	T.C.R. (ppm/°C)	Resistance Range	
						C(0.25%)	D(0.5%),F(1%),G(2%),J(5%)
EWLR58	0508	1W	10.00A	22.36A	±150	---	10mΩ ≤ R < 20mΩ
		1W	10.00A	22.36A	±100	100mΩ ≤ R ≤ 500mΩ	20mΩ ≤ R ≤ 500mΩ
EWLR62	0612	1W	10.00A	22.36A	±150	---	10mΩ ≤ R < 20mΩ
		1W	10.00A	22.36A	±100	100mΩ ≤ R ≤ 500mΩ	20mΩ ≤ R ≤ 500mΩ
EWLR00	1020	2W	14.14A	31.62A	±150	---	10mΩ ≤ R < 20mΩ
		2W	14.14A	31.62A	±100	100mΩ ≤ R ≤ 500mΩ	20mΩ ≤ R ≤ 500mΩ
EWLR22	1225	3W	17.32A	38.73A	±150	---	10mΩ ≤ R < 20mΩ
		3W	17.32A	38.73A	±100	100mΩ ≤ R ≤ 500mΩ	20mΩ ≤ R ≤ 500mΩ

- For non-standard parts, please contact our sales dept.
- Operating Temperature Range: -55°C ~ +155°C

■ Type Dimensions



Unit: mm

TYPE	EIA Size	L	W	H	l ₁	l ₂
ELR02	0201	0.60±0.03	0.30±0.03	0.26±0.05	0.15±0.05	0.15±0.05
ELR04	0402	1.00±0.10	0.50±0.05	0.35±0.05	0.20±0.10	0.25±0.10
ELR06	0603	1.60±0.10	0.80±0.10	0.45±0.10	0.25±0.15	0.30±0.15
ELR08	0805	2.00±0.10	1.25±0.10	0.55±0.10	0.35±0.20	0.40±0.20
ELR16	1206	3.10±0.10	1.60±0.10	0.55±0.10	0.40±0.20	0.45±0.20
ELR12	1210	3.10±0.10	2.50±0.15	0.55±0.10	0.50±0.20	0.50±0.20
ELR20	2010	5.00±0.20	2.50±0.15	0.55±0.10	0.60±0.25	0.60±0.25
ELR25	2512	6.30±0.20	3.20±0.20	0.55±0.10	0.65±0.25	0.65±0.25
ELR25(3W)	2512	6.30±0.20	3.20±0.20	0.70±0.15	0.65±0.25	0.65±0.25
EWLR58	0508	1.25±0.10	2.00±0.10	0.55±0.15	0.25±0.15	0.35±0.15
EWLR62	0612	1.60±0.15	3.20±0.20	0.55±0.15	0.30±0.20	0.50±0.20
EWLR00	1020	2.50±0.15	5.00±0.15	0.55±0.15	0.40±0.20	0.50±0.20
EWLR22	1225	3.20±0.20	6.30±0.20	0.55±0.15	0.60±0.25	0.80±0.25

■ PART NUMBER SYSTEM

ELR	25	B	10K0	C	1W0	F	04
ELR	02=0201	T=±0.01%	R056=56mΩ	S=±5PPM	3W0=3W	F=ROHS	15=15K
EWLR	04=0402	A=±0.05%	R010=10mΩ	B=±10PPM	2W0=2W		10=10K
	06=0603	B=±0.1%	10K0=10KΩ	N=±15PPM	1W5=1.5W		05=5K
	08=0805	C=±0.25%	100K=100KΩ	C=±25PPM	-----		04=4K
	16=1206	D=±0.5%		D=±50PPM			03=3K
	12=1210	F=±1%		E=±100PPM			01=1K
	20=2010	G=±2%					
	25=2512	J=±5%					
	58=0508						
	62=0612						
	00=1020						
	22=1225						

(1): ELR/EWLR Series

(2): Size Code: 02=0201, 04=0402, 06=0603, 08=0805, 16=1206, 12=1210, 20=2010, 25=2512; EWLR58=0508, EWLR62=0612, EWLR00=1020, EWLR22=1225

(3): Tolerance Code: T=±0.01%, A=±0.05%, B=±0.1%, C=±0.25%, D=±0.5%, F=±1%, G=±2%, J=±5%

(4): Resistance Code: R056=56mΩ; 0M5=0.0005mΩ; R010=10mΩ; R100=100mΩ; 10K0=10KΩ-----

(5): TCR(PPM/°C) : S =±5ppm, B =±10ppm, N =±15ppm, C =±25ppm, D =±50ppm, E=±100ppm,

F=±200ppm, G=±300ppm, H=±400ppm, J=±600ppm, K=±150ppm, R=±1000ppm

(6): Power Rating: 3W0; 2W0; 1W0; 1W5; 1/8W; 1/20W-----

(7): RoHS compliant

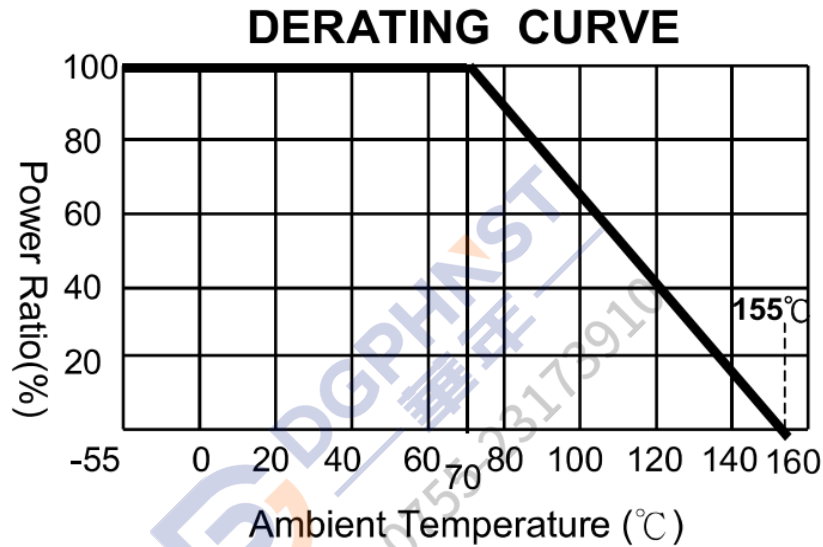
(8): Optional 1,000 piece reel quantity: 10=10K; 05=5K; 04=4K

■ Performance Characteristics

• Power Derating Curve

The Operating Temperature Range:-55°C~+155°C

Power rating or current rating is in the case Based on continuous full-load at ambient temperature of 70°C. For operation at ambient temperature in excess of 70°C, the load should be derated in accordance with figure of derating Curve.



• Rated Current

Resistance Range:<1Ω

Rated Current: The resistor shall have a DC continuous working or a AC(rms) continuous working current at commercial-line frequency and wave form corresponding to the power rating ,as determined formula as following:

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

I=Rated current(A)

P=Rated Power (W)

R=Resistance(Ω)

• Rated Voltage

Resistance Range: ≥ 1Ω

Rated Voltage: The resistor shall have a DC Continuous working voltage or a RMS AC continuous working voltage at commercial-line frequency and wave form corresponding to the power rating ,as determined formula as following:

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

I=Rated voltage(V)

P=Rated Power (W)

R=Nominal Resistance(Ω)

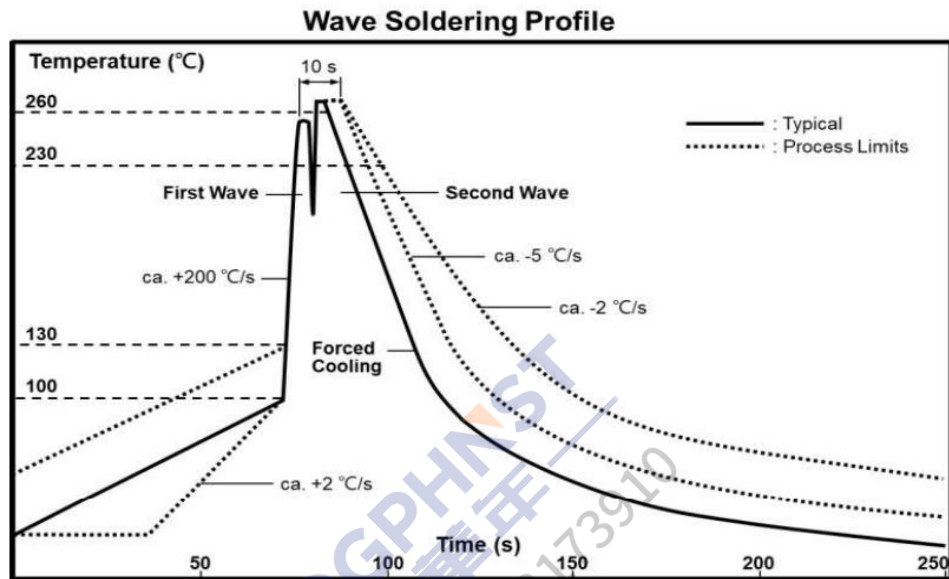
■ Reliability Tests and Requirements

Test Item	Requirements	Procedure	Test Method
Temperature Coefficient of Resistance(T.C.R)	Refer to Standard Electrical Specifications	At 25°C/+125°C,25°C is the reference temperature	JIS-C-5201-1 4.8 IEC-60115-1 4.8
Short Time Overload	$\pm(1.0\%+0.001\Omega)$	Standard power :6.25 times rated power whichever is less for 5 seconds	JIS-C-5201-1 4.6 IEC-60115-1 4.13
		High power (2x/4x) and wide terminal type:5 times rated power whichever is less for 5 seconds	
Insulation Resistance	$\geq 10G\Omega$	Apply 100VDC for 1 Minute.	JIS-C-5201-1 4.6 IEC-60115-1 4.6
Dielectric withstanding Voltage	No short or burned on the appearance.	0805/0508 and above applied 500VAC for 1 minute. 0201 0402 0603 applied 300VAC for 1 minute	JIS-C5201-1 4.7
Core Body Strength	No Broken	Central Part Pressurizing force:10N, 10 seconds	JIS-C5201-1 4.15
Solderability	>95% Coverage No Visual Damage	245 \pm 5°C for 3 seconds.	JIS-C-5201-1 4.17 IEC-60115-1 4.17
Resistance to Soldering heat	$\pm(1.0\%+0.001\Omega)$ No Visual Damage	260 \pm 5°C for 10 seconds.	JIS-C-5201-1 4.18 IEC-60115-1 4.18
Leaching	>95% Coverage No Visual Damage	260 \pm 5°C for 30 seconds.	JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1
Rapid Change of Temperature	$\pm(1.0\%+0.001\Omega)$ No Visual Damage	-55°C to+155°C,300 cycles	JIS-C-5201-1 4.19 IEC-60115-1 4.19
Damp Heat with Load	$\pm(1.0\%+0.001\Omega)$	40 \pm 2°C,90-95% R.H. RCWV or Max.working current whichever is less for 1000 Hrs with 1.5 Hrs "ON" and 0.5 Hr "OFF"	JIS-C-5201-1 4.24 IEC-60115-1 4.24
Biased Humidity	$\pm(0.5\%+0.05\Omega)$	1,000 hours; 85°C/85% RH, 10% of operating power. Measurement at 24 \pm 4 hours after test conclusion	MIL-STD-202 Method 103
Load Life (Endurance)	$\pm(1.0\%+0.001\Omega)$	70 \pm 2°C,Rated power ,or Max. working current whichever is less for 1000 hrs with 1.5 hrs "ON" and 0.5 Hr "OFF"	JIS-C-5201-1 4.25 IEC-60115-1 4.25.1
High Temperature Exposure	$\pm(1.0\%+0.001\Omega)$	At 155 \pm 5°C for 1000 hours.	JIS-C5201-1 4.25 IEC 60068-2-2
Resistance to Solvent	$\pm(1.0\%+0.001\Omega)$ No Visual Damage	The tested resistor be immersed into isopropyl alcohol of 20~25°C for 60 secs. Then the resistor is left in the room for 48 hrs.	JIS-C5201-1 4.29
Terminal Strength	No Broken	Pressurizing force for 10 seconds 0201,0402,0603 :8N; 0805/0508 and above :17.7N	JIS-C5201-1 4.33 AEC Q200-006
Bending Strength	$\pm(1.0\%+0.001\Omega)$ No Visual Damage	Bending once for 5 seconds D:0201 0402 0603 0805=5mm 1206 1210 0508 0612=3mm 2010 2512 1020 1225=2mm	JIS -C-5201-1 4.33 IEC-60115-1 4.33

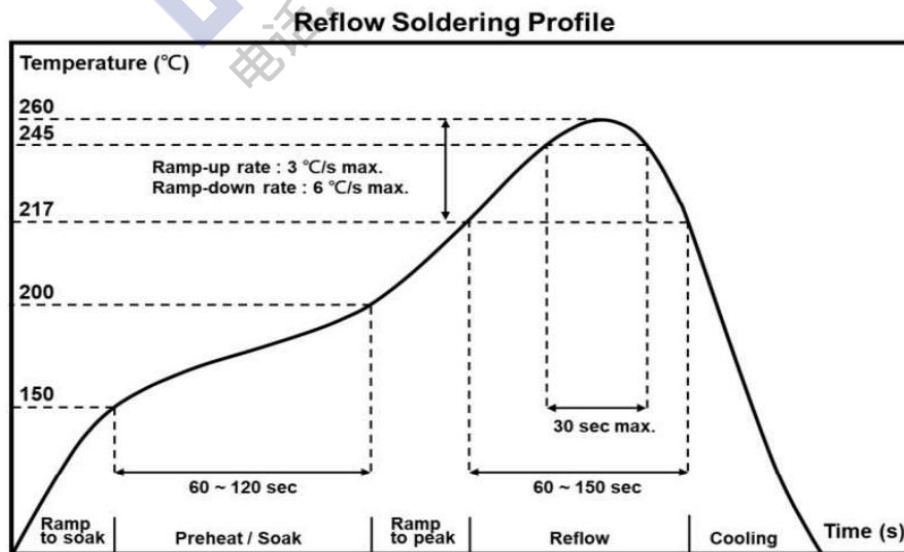
Temperature Coefficient of Resistance test to -55°C is available on request

■ Recommend Customer Soldering Parameters

- Wave solder Temperature condition

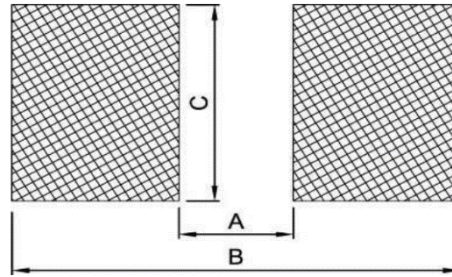


- Solder Reflow Temperature Condition



- Reword temperature (hot air equipment) :350°C, 3-5seconds
 - Recommended reflow methods
 - IR, vapor phase oven, hot air oven
- If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.

■ Recommend Land Pattern Design



Unit:mm

TYPE	A	B	C
ELR02	0.25	0.85	0.35
ELR04	0.50	1.60	0.70
ELR06	0.80	2.40	1.00
ELR08	1.30	2.90	1.45
ELR16	2.20	4.20	1.80
ELR16 10mΩ ≤ R < 39mR	1.20	4.80	1.84
ELR12	2.00	4.40	2.70
ELR20	3.80	6.60	2.70
ELR25	4.90	8.10	3.40
EWLR58	0.40	1.80	2.00
EWLR62	0.50	2.60	3.20
EWLR00	1.00	4.05	5.50
EWLR22	1.20	5.20	7.00

■ Plating Thickness

Ni: ≥ 3μm

Sn(Tin): ≥ 3μm

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■ PAPER TAPE DIMENSIONS (mm)

FIG. A

Type	EIA Size	A	B	D	E	F	P ₀	P ₁	P ₂	W	T
ELR02	0201	0.40 ± 0.05	0.70 ± 0.05	1.55 ± 0.05	1.75 ± 0.05	3.50 ± 0.05	4.0 ± 0.10	2.0 ± 0.05	2.0 ± 0.05	8.0 ± 0.1	0.42 ± 0.02
ELR04	0402	0.70 ± 0.05	1.16 ± 0.05								0.40 ± 0.03
ELR06	0603	1.10 ± 0.05	1.90 ± 0.05								0.60 ± 0.03
ELR08	0805	1.60 ± 0.05	2.37 ± 0.05					4.0 ± 0.05			0.75 ± 0.05
EWLR58											
ELR16	1206	2.00 ± 0.05	3.55 ± 0.05								
EWLR62											
ELR12	1210	2.75 ± 0.05	3.40 ± 0.05	1.60 ± 0.10							

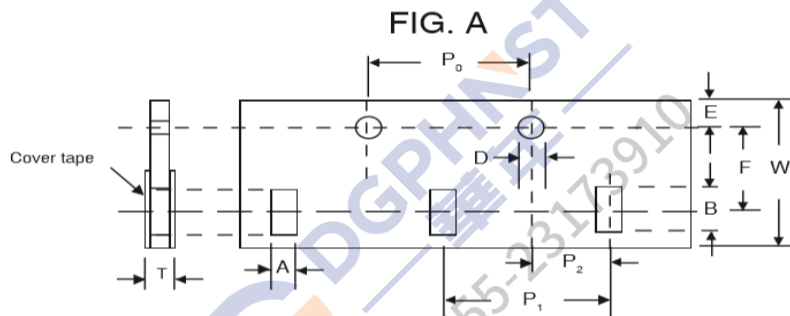
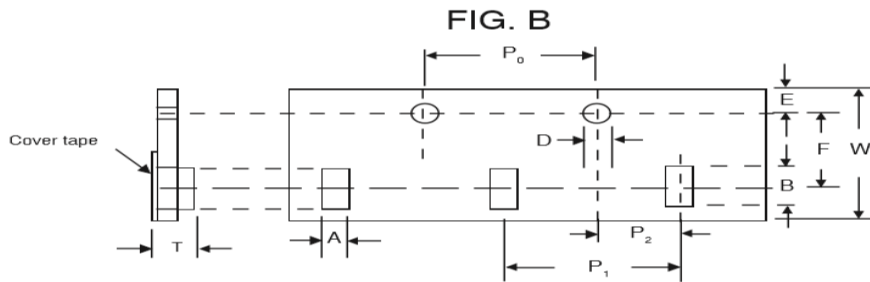


FIG. B

Type	EIA Size	A	B	D	E	F	P ₀	P ₁	P ₂	W	T
ELR20	2010	2.85 ± 0.10	5.45 ± 0.10	1.50 ± 0.10	1.75 ± 0.10	5.50 ± 0.05	4.0 ± 0.10	4.0 ± 0.05	2.0 ± 0.05	12.0 ± 0.1	1.0 ± 0.20
EWLR00	1020										
ELR25	2512	3.40 ± 0.10	6.65 ± 0.10								
EWLR22	1225										

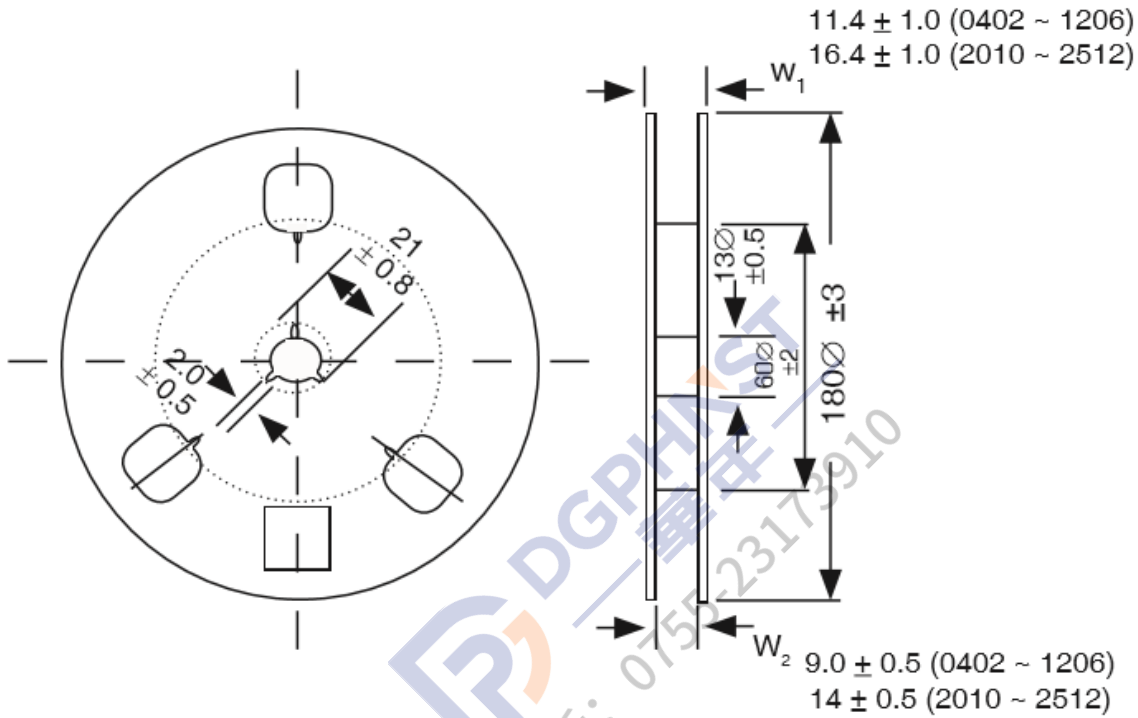


■ TAPING SPECIFICATIONS

Availability

Type	Power Rating	EIA Size	Carrier Tape			Qty per Reel (pcs)
			Fig.	Material	Width (mm)	Standard
ELR02	1/32W	0201	A	Paper	8	10000
ELR04	1/16W	0402	A			10000
ELR06	1/16W	0603	A			
ELR08	1/10W	0805	A			5000
EWLR58						
ELR16	1/8W	1206	A			
EWLR62						
ELR12	1/4W	1210	A			
ELR20	1/4W	2010	B	Plastic	12	4000
EWLR00						
ELR25	1/2W	2512	B			
EWLR22						

■ REEL DIMENSIONS (mm)



■ LAND PATTERN DIMENSIONS (mm)

Type	EIA Size	A	B	C
ELR02	0201	0.25	0.30	0.40 ± 0.2
ELR04	0402	0.50	0.50	0.60 ± 0.2
ELR06	0603	0.80	1.00	0.90 ± 0.2
ELR08	0805	1.00	1.00	1.35 ± 0.2
EWLR58	0508			
ELR16	1206	2.00	1.15	1.70 ± 0.2
EWLR62	0612			
ELR12	1210	2.00	1.15	2.50 ± 0.2
ELR20	2010	3.60	1.40	2.50 ± 0.2
EWLR00	1020			
ELR25	2512	4.90	1.60	3.10 ± 0.2
EWLR22	1225			