

## ■ General

### • Scope

This specification is available for Metal Film 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

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

## ■ Features

- Low Resistance/TCR/inductance( $\leq 5\text{nH}$ )
- 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	$\pm 100$	---	$50\text{m}\Omega \leq R < 100\text{m}\Omega$
		1/10W	1.41A	3.16A	$\pm 100$	---	$50\text{m}\Omega \leq R < 100\text{m}\Omega$
		1/5W	2.00A	4.47A	$\pm 100$	---	$50\text{m}\Omega \leq R < 100\text{m}\Omega$
ELR04	0402	1/16W	1.12A	2.80A	$\pm 100$	---	$50\text{m}\Omega \leq R < 100\text{m}\Omega$
		1/8W	1.58A	3.54A	$\pm 100$	---	$50\text{m}\Omega \leq R < 100\text{m}\Omega$
		1/4W	2.24A	5.00A	$\pm 50$	---	$100\text{m}\Omega \leq R \leq 10\Omega$
ELR06	0603	1/10W	1.41A	3.54A	$\pm 50$	---	$100\text{m}\Omega \leq R \leq 10\Omega$
		1/5W	2.00A	4.47A	$\pm 50$	---	$100\text{m}\Omega \leq R \leq 10\Omega$
		2/5W	2.83A	6.32A	$\pm 50$	---	$100\text{m}\Omega \leq R \leq 10\Omega$
ELR08	0805	1/8W	1.79A	4.48A	$\pm 150$	---	$39\text{m}\Omega \leq R < 50\text{m}\Omega$
		1/4W	2.53A	5.66A	$\pm 100$	---	$50\text{m}\Omega \leq R < 100\text{m}\Omega$
		1/2W	3.58A	8.00A	$\pm 50$	---	$100\text{m}\Omega \leq R \leq 10\Omega$
ELR16	1206	1/4W	2.53A	6.33A	$\pm 150$	---	$39\text{m}\Omega \leq R < 50\text{m}\Omega$
		1/4W	5.00A	12.50A	$\pm 200$	---	$10\text{m}\Omega \leq R < 39\text{m}\Omega$
		1/2W	3.58A	8.00A	$\pm 150$	---	$39\text{m}\Omega \leq R < 50\text{m}\Omega$
		1/2W	7.07A	15.80A	$\pm 200$	---	$10\text{m}\Omega \leq R < 39\text{m}\Omega$
		3/4W	4.39A	9.81A	$\pm 100$	---	$50\text{m}\Omega \leq R < 100\text{m}\Omega$

# Metal Film Resistor ELR/EWLR Series



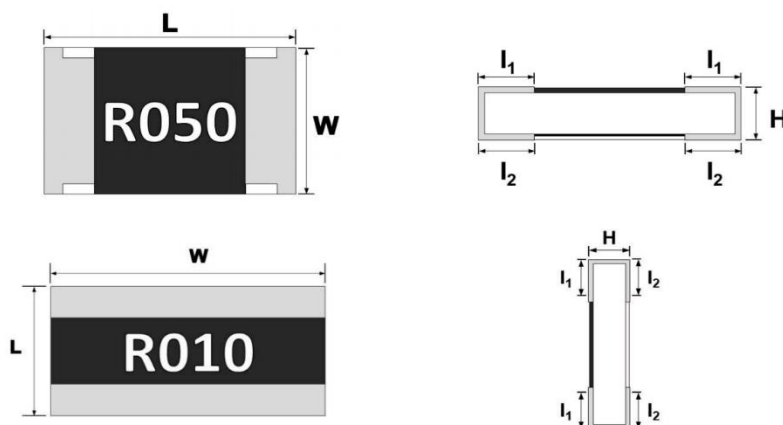
Type	EIA Size	Rated Power	Max. Rated Current	Max. Overload Current	T.C.R. (ppm/°C)	Resistance Range
ELR12	1210	1W	5.06A	11.32A	±100	---
		1/2W	3.58A	8.95A	±50	470mΩ ≤ R ≤ 10Ω
		1W	5.06A	11.32A	±50	470mΩ ≤ R ≤ 10Ω
ELR20	2010	3/4W	2.74A	6.85A	±50	470mΩ ≤ R ≤ 10Ω
		3/2W	3.87A	8.66A	±50	470mΩ ≤ R ≤ 10Ω
ELR25	2512	1W	3.16A	7.91A	±50	470mΩ ≤ R ≤ 10Ω
		2W	4.47A	10.00A	±50	470mΩ ≤ R ≤ 10Ω
		3W	5.48A	12.25A	±50	470mΩ ≤ R ≤ 10Ω

## • 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 <sub>1</sub>	l <sub>2</sub>
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

# Metal Film Resistor ELR/EWLR Series



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	S	10K0	C	D	S
Product Type	Size (Inch)	Resistor Tolerance	Rated Power	Resistor Value	TCR (PPM/°C)	Quantity (Pcs)	Remarks
ELR EWLR	02=0201	C=±0.25%	N=1/20W	R056=56mΩ	D=±50PPM	A=15000	S=Standard W= Wide Terminal
	04=0402	D=±0.5%	Y=1/16W	R010=10mΩ	E=±100PPM	C=10000	
	06=0603	F=±1%	X=1/10W	10K0=10KΩ	K=±150PPM	B=2000	
	08=0805	G=±2%	W=1/8W	100K=100KΩ	F=±200PPM	D=4000	
	16=1206	J=±5%	P=1/5W			E=5000	
	12=1210		V=1/4W				
	20=2010		O=1/3W				
	25=2512		G=2/5W				
	58=0508		U=1/2W				
	62=0612		Q=3/4W				
	00=1020		T=1W				
	22=1225		A=1.5W				
		S=2W					
		R=3W					

(1): ELR/EWLR Series

(2): Size Code: 02=0201, 04=0402, 06=0603, 08=0805, 16=1206, 12=1210, 20=2010, 25=2512;58=0508,62=0612, 00=1020,22=1225

(3): Tolerance Code: C=±0.25%, D=±0.5%, F=±1%,G=±2%, J=±5%

(4): Power Rating

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

(6): TCR(PPM/°C) : D =±50ppm,E=±100ppm, K=±150ppm,F=±200ppm

(7): Quantity:A=15000PCS,C=10000PCS,B=2000PCS,D=4000PCS,E=5000

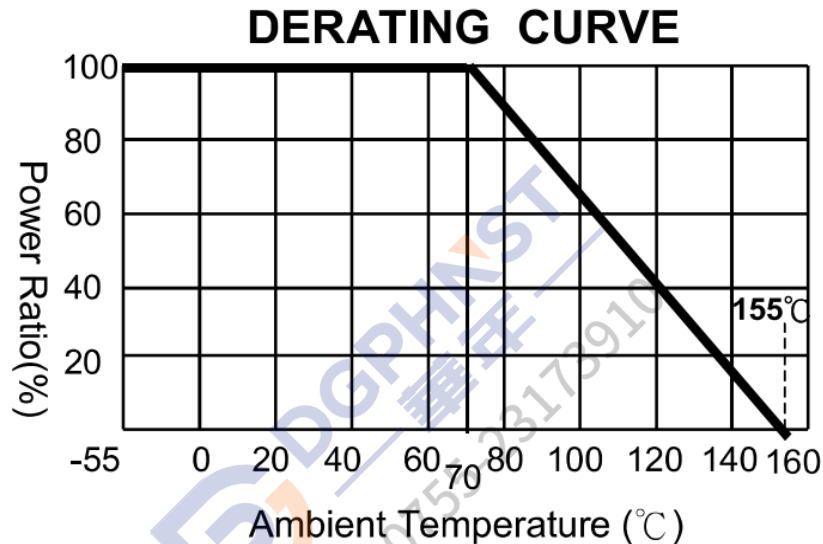
(8): Remarks: S=Standard; W=Wide Terminal

## ■ 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: <math><1\Omega</math>

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( $\Omega$ )**

### • Rated Voltage

Resistance Range:  $\geq 1\Omega$

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( $\Omega$ )**

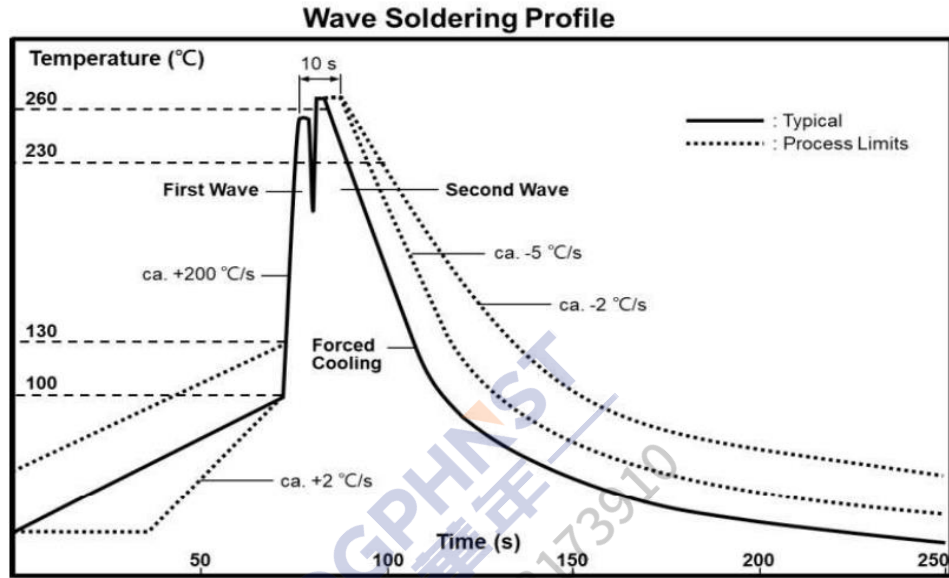
## ■ Reliability Tests and Requirements

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

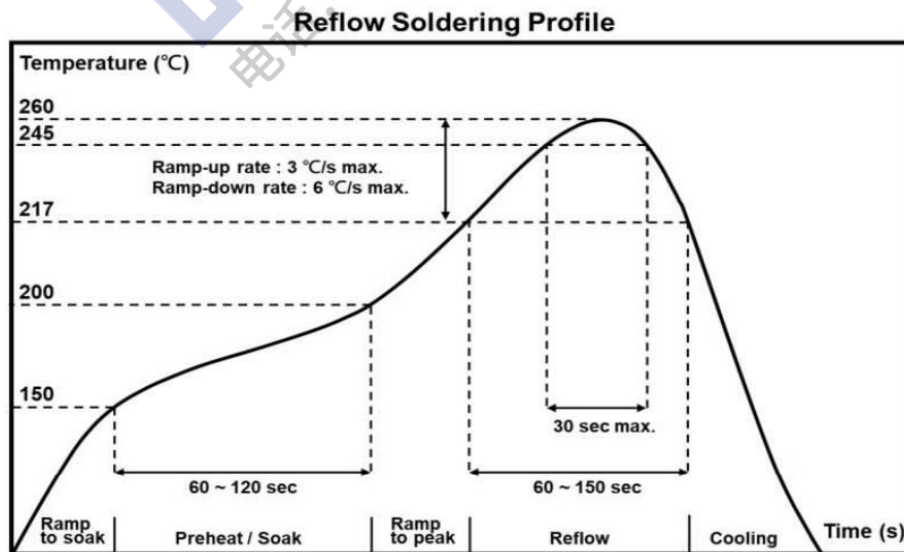
Temperature Coefficient of Resistance test to -55°C is available on request

## ■ Recommend Customer Soldering Parameters

- Wave solder Temperature condition

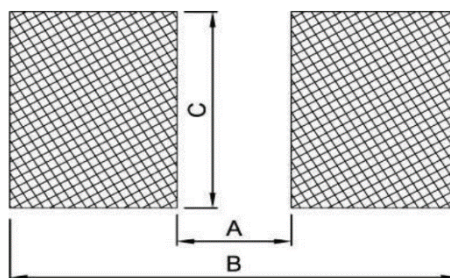


- Solder Reflow Temperature Condition



- 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

:

## ■ PAPER TAPE DIMENSIONS (mm)

FIG. A

Type	EIA Size	A	B	D	E	F	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	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 EWLR58	0805	1.60 ± 0.05	2.37 ± 0.05	1.60 ± 0.10	1.75 ± 0.05	3.50 ± 0.05	4.0 ± 0.10	4.0 ± 0.05	2.0 ± 0.05	8.0 ± 0.1	0.75 ± 0.05
ELR16 EWLR62	1206	2.00 ± 0.05	3.55 ± 0.05								
ELR12	1210	2.75 ± 0.05	3.40 ± 0.05								

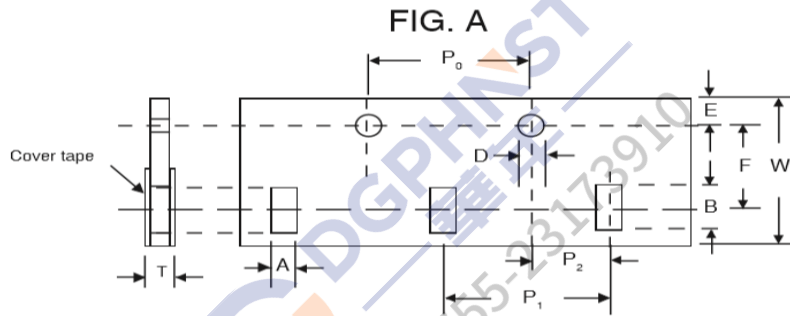
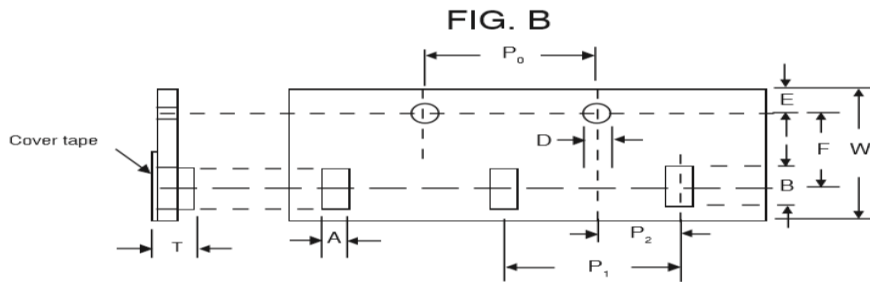


FIG. B

Type	EIA Size	A	B	D	E	F	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	W	T
ELR20 EWLR00	2010 1020	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
ELR25 EWLR22	2512 1225	3.40 ± 0.10	6.65 ± 0.10								



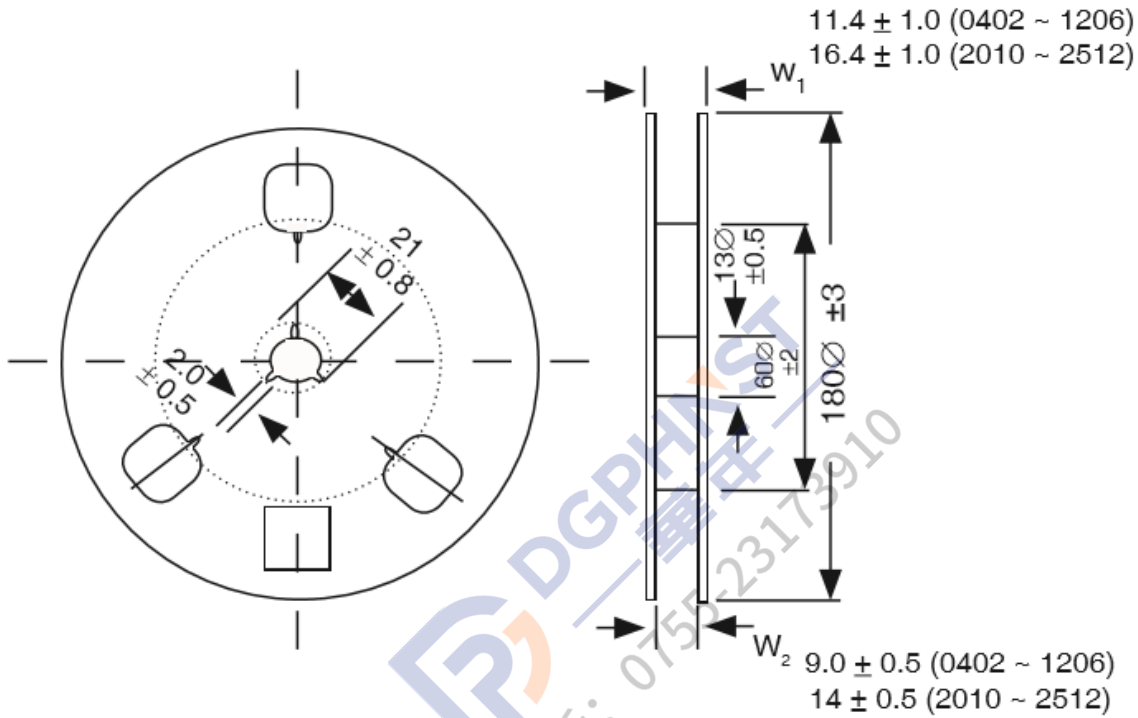
## ■ TAPING SPECIFICATIONS

Availability

Type	Power Rating	EIA Size	Carrier Tape			Qty per Reel (pcs)
			Fig.	Material	Width (mm)	Standard
ELR02	1/32W	0201	A	Paper	8	10000/15000
ELR04	1/16W	0402	A			10000
ELR06	1/16W	0603	A			5000
ELR08 EWLR58	1/10W	0805	A			
ELR16 EWLR62	1/8W	1206	A			
ELR12	1/4W	1210	A			Plastic
ELR20 EWLR00	1/4W	2010	B			
ELR25 EWLR22	1/2W	2512	B			



■ 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			