

ULTRA LOW OHM (METAL STRIP) CHIP RESISTOR



TYPE TLR SERIES

INTRODUCTION

TE Connectivity (TE)'s TLR Series Ultra-Low Ohm Metal Strip Chip Resistors are engineered to deliver highly accurate current sensing, low power loss, and exceptional thermal stability for modern power electronic systems. Leveraging TE's expertise in passive component technology and high-reliability interconnect solutions, the TLR Series combines advanced metal strip construction with ultra-low resistance values to enable precise current measurement and improved power efficiency. Available in industry-standard 1206, 2010, and 2512 package sizes, the TE Connectivity TLR Series offers resistance values from 0.5mΩ to 10mΩ, power ratings up to 3 W, and low TCR performance down to ±50 ppm/°C, making it an ideal solution for high-current and power management applications. Designed for demanding environments, the TLR Series supports operating temperatures from -55°C to +170°C and includes AEC-Q200 compliant options for automotive and other mission-critical applications. Whether used in DC-DC converters, battery management systems, power supplies, computing platforms, industrial controls, or automotive electronics, TE's TLR Series helps engineers achieve higher



FEATURES

- Precision Current Sensing Performance
- High Power Density up to 3W
- Excellent Thermal Stability
- Customizable for Application-Specific Requirements
- Reliable Operation up to +170°C
- Automotive-Grade Reliability Options

APPLICATIONS

- Server & Data Center Power Supplies
- High-Current Sensing Circuits
- SWPS (DC-DC Converter, Charger, Adaptor)
- Monitoring Systems for Power Management

ELECTRICAL CHARACTERISTICS

STANDARD ELECTRICAL SPECIFICATIONS

Type		TLR 1206		TLR 2512			
Rated Power at 70°C		1W		1W			
Temperature range		-55°C ~ +170°C					
Resistance Range (mΩ)	±1%	0.5	0.75 - 10	0.5, 0.75, 1, 1.5, 2	6, 6.5, 7	4, 5, 10	2.5, 3
	±3%						
	±5%						
TCR (PPM/°C)		±200	±50	±50	±75	±100	±150

HIGH POWER RATING ELECTRICAL SPECIFICATIONS

Type		TLR 2010		TLR 2512		
Rated Power at 70°C		1.5W	1.5W	2W		
Temperature range		-55°C ~ +170°C				
Resistance Range (mΩ)	±1%	0.5	0.75 - 10	0.5, 0.75, 1, 1.5, 2	6, 6.5, 7	4, 5, 10
	±3%					
	±5%					
TCR (PPM/°C)		±100	±50		±75	±100

HIGH POWER RATING ELECTRICAL SPECIFICATIONS (CONTINUATION)

Type		TLR 2512				
Rated Power at 70°C		2W	3W			
Temperature range		-55°C ~ +170°C				
Resistance Range (mΩ)	±1%	2.5, 3	0.5, 0.75, 1, 1.5, 2	6, 6.5, 7	4, 5, 10	2.5, 3
	±3%					
	±5%					
TCR (PPM/°C)		±150	±50	±75	±100	±150

HIGH POWER RATING ELECTRICAL SPECIFICATIONS (CONTINUATION)

Type		TLR 2512			
Rated Power at 70°C		2W	2.5W	3W	
Temperature range		-55°C ~ +170°C			
Resistance Range (mΩ)	±1%	6.5, 7, 8, 9, 10	4, 4.5, 5, 6	1, 1.5, 2, 2.5, 3, 3.5	0.5, 0.75
	±3%				
	±5%				
TCR (PPM/°C)		±50			±100

Note:

- Operating Current = $\sqrt{P/R}$, Operating Voltage = $\sqrt{P \cdot R}$
- TE Connectivity can manufacture the following options based on customer requirements.

Ultra Low Ohm (Metal Strip) Chip Resistor

Type TLR Series

CATEGORY INDEX

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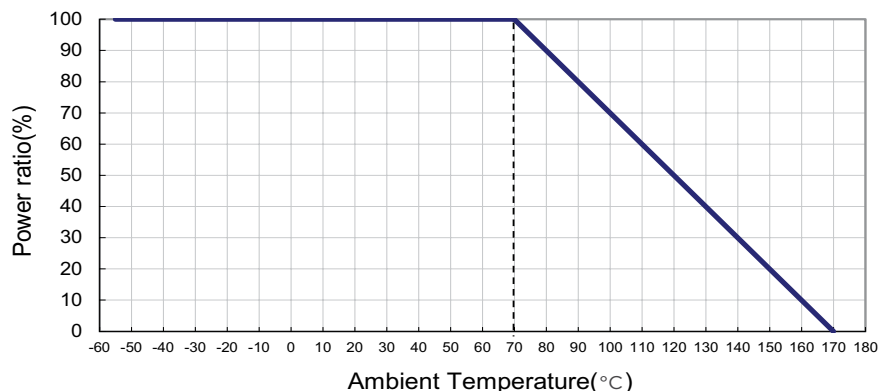
ENVIRONMENTAL CHARACTERISTICS

Item	Requirement		Test Methods
	Black coating	Green coating	
Temperature Coefficient of Resistance (T.C.R.)	As Spec.		+25°C -125°C, 25°C is reference MIL-STD-202 Method 304
Short Time Overload	±0.5%	±1%	5× rated power for 5s JIS-C-5201-1 5.5
Endurance	±1%	±1%	70±2°C, 1000 hrs, 1.5 hrs ON/0.5 hr OFF MIL-STD-202 Method 108A
Dry Heat	±1%	±1%	At +170°C for 1000 hrs JIS-C-5201-1 7.2
Solderability	95% min. coverage		245±5°C for 3s MIL-STD-202 Method 208H
Resistance to Soldering Heat	±0.5%	±1%	260±5°C for 10s MIL-STD-202 Method 210E
Thermal Shock	±0.5%	±1%	-55°C ~150°C, 100 cycles MIL-STD-202 Method 107G

Note:

- Green coating cannot be used with wave soldering.
- RCWV(Rated Continuous Working Voltage) = $\sqrt{P \times R}$ or Max. Operating Voltage whichever is lower.

DERATING CURVE



VOLTAGE RATING

Resistors shall have a rated direct-current (DC) continuous working voltage or an approximate sine-wave root-mean-square (RMS) alternating-current (AC) continuous working voltage at commercial-line frequency and waveform corresponding to the power rating, as determined from the following formula:

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

Note:

- Max. working voltage or $\sqrt{P \times R}$ whichever is lesser
- Max. overload voltage or $2.5 \sqrt{P \times R}$ whichever is lesser

Where: RCWV = Rated DC or RMS AC continuous working voltage at commercial-line frequency and waveform (volt) and

P = Power Rating (watt)

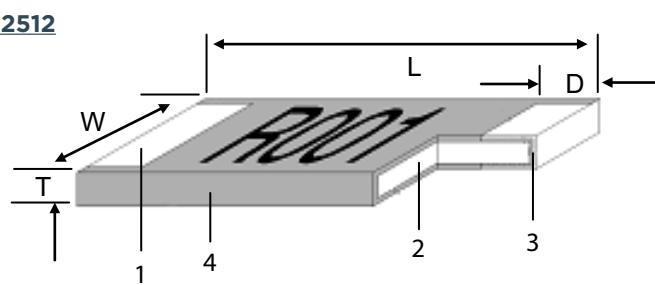
R = Nominal Resistance (ohm)

Ultra Low Ohm (Metal Strip) Chip Resistor

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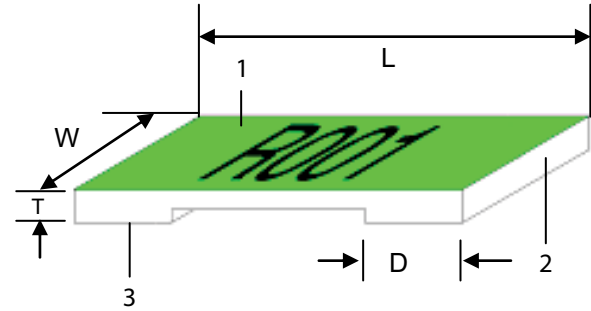
CONSTRUCTION AND DIMENSIONS (Unit:mm)

TLR 2512



TLR series Black-Wave or Reflow soldering

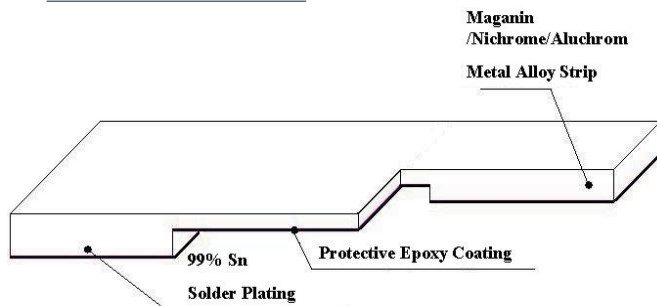
1	Solder Plating	3	Barrier Layer
2	Alloy Plate	4	Overcoat



TLR series Green-Wave or Reflow soldering

1	Overcoat	3	Solder Plating
2	Alloy Plate		

TLR 1206 & TLR 2010



Type	Resistance	Material
TLR Series1206	0M50-R003	Manganese, Copper
	3M50-R010	Aluminum, Iron, Chromium
TLR Series2010	0M50-3M50	Manganese, Copper
	R004-R010	Aluminum, Iron, Chromium

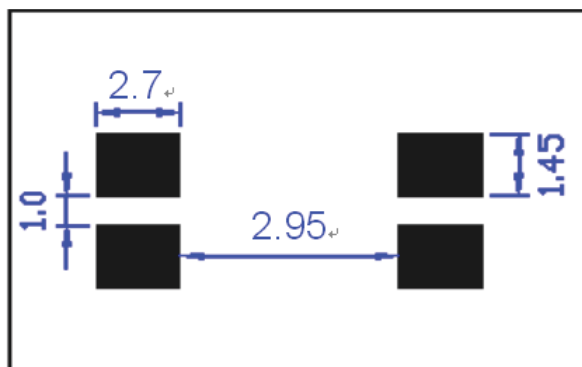
Type	Resistance (mΩ))	L (mm)	W (mm)	T (mm)	D (mm)	Weight(g) (1000pcs)
TLR 1206	0.5	3.20±0.25	1.60±0.10	0.60±0.20	1.35±0.25	22.6
TLR 1206	0.75	3.20±0.25	1.60±0.10	0.60±0.20	1.23±0.25	22.6
TLR 1206	1.0, 3.5, 4.0, 5.0, 6.0	3.20±0.25	1.60±0.10	0.60±0.20	1.10±0.25	22.6
TLR 1206	2.0, 2.5, 3.0, 10	3.20±0.25	1.60±0.10	0.60±0.20	1.06±0.25	22.6
TLR 1206	1.2, 1.5, 7.0, 8.0, 9.0	3.20±0.25	1.60±0.10	0.60±0.20	0.90±0.25	22.6
TLR 2010	0.5	5.08±0.25	2.54±0.15	0.60±0.20	2.17±0.25	42.3
TLR 2010	0.75	5.08±0.25	2.54±0.15	0.60±0.20	2.04±0.25	42.3
TLR 2010	1.0, 1.5	5.08±0.25	2.54±0.15	0.60±0.20	1.84±0.25	42.3
TLR 2010	2.0, 6.0, 7.0, 8.0	5.08±0.25	2.54±0.15	0.60±0.20	1.54±0.25	42.3
TLR 2010	3.0, 3.5	5.08±0.25	2.54±0.15	0.60±0.20	1.04±0.25	42.3
TLR 2010	4.0, 5.0, 5.5	5.08±0.25	2.54±0.15	0.60±0.20	1.84±0.25	42.3
TLR 2010	9.0, 10	5.08±0.25	2.54±0.15	0.60±0.20	1.29±0.25	42.3
TLR 2512	0.50	6.35±0.25	3.00±0.20	0.60±0.20	2.68±0.25	59.13
TLR 2512	0.75	6.35±0.25	3.00±0.20	0.60±0.20	2.48±0.25	59.13
TLR 2512	1.0, 5.0, 6.0	6.35±0.25	3.00±0.20	0.60±0.20	1.93±0.25	59.13
TLR 2512	1.5, 6.5, 7.0, 7.5	6.35±0.25	3.00±0.20	0.60±0.20	1.43±0.25	59.13
TLR 2512	2.0, 2.5, 3.0, 3.5	6.35±0.25	3.00±0.20	0.60±0.20	1.18±0.25	59.13
TLR 2512	4.0, 4.5	6.35±0.25	3.00±0.20	0.60±0.20	2.18±0.25	59.13
TLR 2512	5.0, 6.0	6.35±0.25	3.00±0.20	0.60±0.20	1.93±0.25	59.13
TLR 2512	8.0 - 10	6.35±0.25	3.00±0.20	0.60±0.20	1.18±0.25	59.13

DIMENSIONS (CONTINUATION) (Unit:mm)

Type	Resistance (mΩ)	L (mm)	W (mm)	T (mm)	D (mm)	Weight(g) (1000pcs)
TLR 2512	0.50	6.35±0.254	3.18±0.254	1.25±0.20	1.85±0.38	184.11
TLR 2512	0.75	6.35±0.254	3.18±0.254	0.75±0.20	1.55±0.38	131.11
TLR 2512	1.00	6.35±0.254	3.18±0.254	0.65±0.20	1.55±0.38	110.85
TLR 2512	1.50	6.35±0.254	3.18±0.254	0.45±0.20	1.55±0.38	67.16
TLR 2512	2.00	6.35±0.254	3.18±0.254	0.35±0.20	1.55±0.38	49.30
TLR 2512	2.50	6.35±0.254	3.18±0.254	0.65±0.20	1.40±0.38	97.95
TLR 2512	3.00	6.35±0.254	3.18±0.254	0.55±0.20	1.40±0.38	83.49
TLR 2512	4.00	6.35±0.254	3.18±0.254	0.45±0.20	1.40±0.38	62.59
TLR 2512	5.00	6.35±0.254	3.18±0.254	0.35±0.20	1.40±0.38	49.84
TLR 2512	6.00	6.35±0.254	3.18±0.254	0.32±0.20	1.40±0.38	41.76
TLR 2512	6.50	6.35±0.254	3.18±0.254	0.30±0.20	1.40±0.38	35.85
TLR 2512	7.00	6.35±0.254	3.18±0.254	0.27±0.20	1.40±0.38	34.01
TLR 2512	10.00	6.35±0.254	3.18±0.254	0.25±0.20	1.40±0.38	25.97

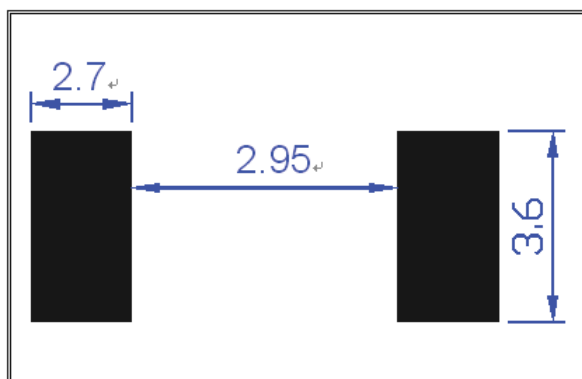
RECOMMENDED LAND PATTERN (Unit: mm)

1. TLR 2512 4-wire pad layout (recommended for precision current sensing)



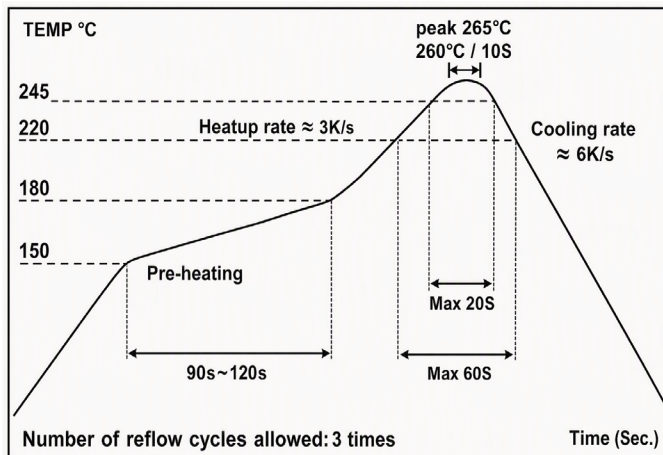
Note: No circuits between pads to avoid short circuit.

2. TLR 2512 2-wire pad layout



Note: No circuits between pads to avoid short circuit

SOLDERING PROFILE



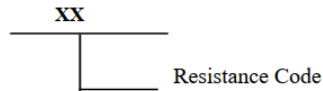
Note:

- Green coating "Reflow Air Convection" is available in direct sunlight
- Green coating cannot be used with wave soldering.

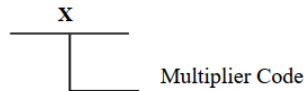
MULTIPLIER CODE

Code	A	B	C	D	E	F	G	H	X	Y	Z
Multiplier	10^0	10^1	10^2	10^3	10^4	10^5	10^6	10^7	10^{-1}	10^{-2}	10^{-3}

Coding



Formula



Example :

$$10.2K\Omega = \begin{matrix} 102 \\ \downarrow \\ 02 \end{matrix} \times \begin{matrix} 10^2 \\ \downarrow \\ C \end{matrix} \Omega = 02C$$

$$33.2\Omega = \begin{matrix} 332 \\ \downarrow \\ 51 \end{matrix} \times \begin{matrix} 10^{-1} \\ \downarrow \\ X \end{matrix} \Omega = 51X$$

Value	Code	Value	Code	Value	Code	Value	Code	Value	Code
100	01	162	21	261	41	422	61	681	81
102	02	165	22	267	42	432	62	698	82
105	03	169	23	274	43	442	63	715	83
107	04	174	24	280	44	453	64	732	84
110	05	178	25	287	45	464	65	750	85
113	06	182	26	294	46	475	66	768	86
115	07	187	27	301	47	487	67	787	87
118	08	191	28	309	48	499	68	806	88
121	09	196	29	316	49	511	69	825	89
124	10	200	30	324	50	523	70	845	90
127	11	205	31	332	51	536	71	866	91
130	12	210	32	340	52	549	72	887	92
133	13	215	33	348	53	562	73	909	93
137	14	221	34	357	54	576	74	931	94
140	15	226	35	365	55	590	75	953	95
143	16	232	36	374	56	604	76	976	96
147	17	237	37	383	57	619	77		
150	18	243	38	392	58	634	78		
154	19	249	39	402	59	649	79		
158	20	255	40	412	60	665	80		

MARKING

- For Green Coating

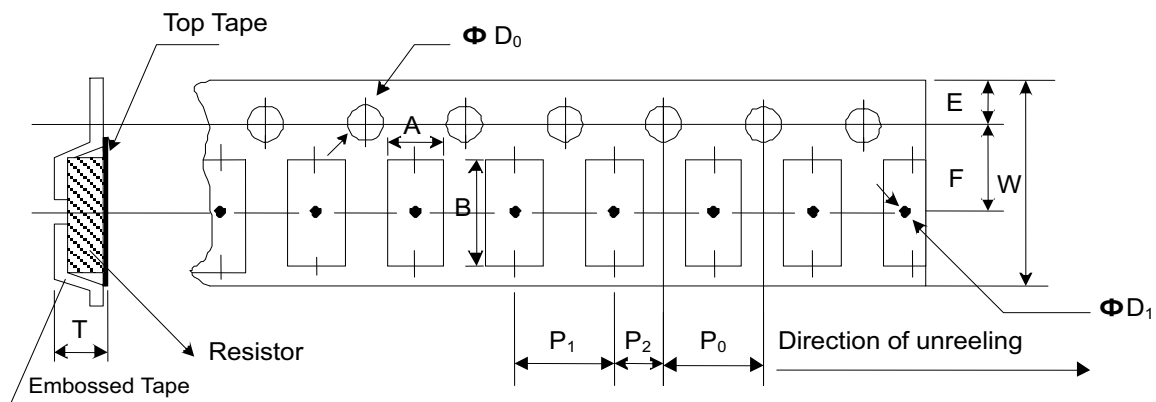
Resistance	0.5mΩ	1.5mΩ	1mΩ	2mΩ	7mΩ	10mΩ
Marking	M50	1M5	R001	R002	R007	R010

- For Black Coating

Resistance	0.5mΩ	1.5mΩ	1mΩ	2mΩ	7mΩ	10mΩ
Marking	0M50	1M50	R001	R002	R007	R010

PACKING SPECIFICATION

EMBOSED PLASTIC TAPE SPECIFICATIONS (Unit:mm)



Type	Resistance (mΩ)	A	B	W	E	F	P ₀	P ₁	P ₂	ΦD ₀	ΦD ₁	T	Quantity (EA)
TLR 1206	0.5 - 10	1.90±0.1	3.60±0.1	8.0±0.2	1.75±0.1	3.5±0.05	4.0±0.1	4.0±0.1	2.0±0.05	1.55±0.05	1.0min.	0.87±0.1	2,000
TLR 2010	0.5 - 10	2.85±0.1	5.55±0.1	12.0±0.2	1.75±0.1	5.5±0.05	4.0±0.1	4.0±0.1	2.0±0.05	1.55±0.05	1.4min.	0.85±0.1	2,000
TLR 2512	0.50 - 0.75	3.40±0.1	6.75±0.1	12.0±0.1	1.75±0.1	5.5±0.05	4.0±0.1	4.0±0.1	2.0±0.05	1.55±0.05	1.4min.	1.45±0.2	2,000
	1-10	3.40±0.1	6.75±0.1	12.0±0.1	1.75±0.1	5.5±0.05	4.0±0.1	4.0±0.1	2.0±0.05	1.55±0.05	1.4min.	1.45±0.2	2,000
TLR 2512	0.50 - 10	3.40±0.1	6.75±0.1	12.0±0.1	1.75±0.1	5.5±0.05	4.0±0.1	4.0±0.1	2.0±0.05	1.55±0.05	1.4min.	0.81±0.1	2,000

- The cumulative tolerance of 10 sprockets hole pitch is $\pm 0.2\text{mm}$.
- Carrier camber shall be not more than 1mm per 100mm through a length of 250mm.
- A & B measured 0.3mm from the bottom of the pocket.
- T measured at a point on the inside bottom of the packet to the top surface of the carrier.
- Pocket position relative to sprocket hole is measured as the true position of the pocket and not the pocket hole.



ENVIRONMENT RELATED SUBSTANCE

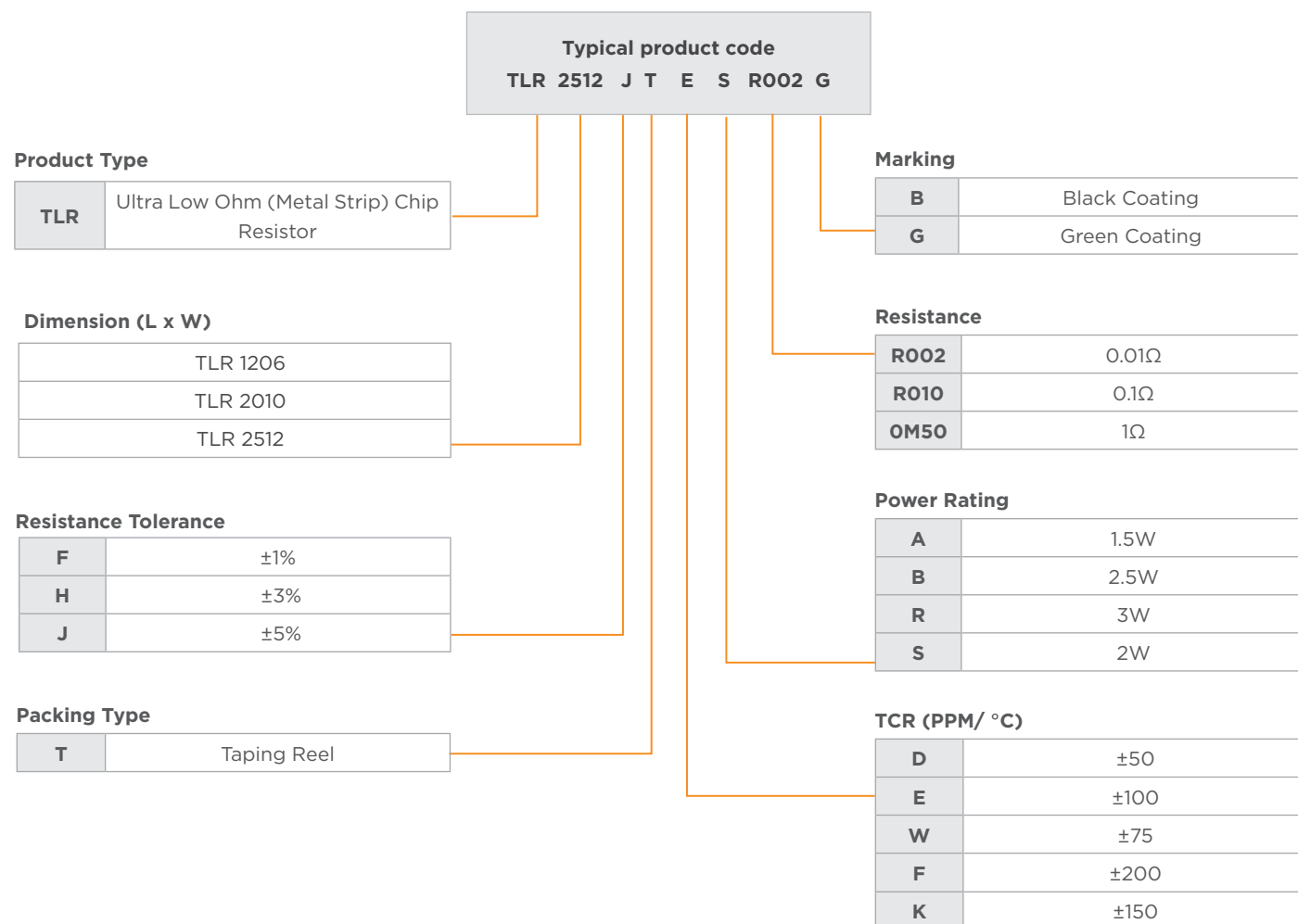
This product complies with the applicable requirements of the EU RoHS Directive, EU PAHs requirements, EU PFOS requirements, and halogen-free material expectations. Ozone-depleting substances are not used in the manufacturing process for this product. This product is not manufactured using chlorofluorocarbons (CFCs), Hydrochlorofluorocarbons (HCFCs), hydrobromofluorocarbons (HBFCs), or other ozone-depleting substances at any stage of manufacture.

STORAGE CONDITION (MSL1)

The performance of these products, including solderability, is guaranteed for two years from the date of arrival at the customer location, provided the products remain in the original delivered packaging and are stored at 15-28 °C; Humidity 80%RH. Even within this period, the products should not be stored under conditions that may adversely affect electrical performance, solderability, or packaging integrity.

1. In salty air or in atmospheres containing corrosive gases such as Cl₂, H₂S, NH₃, SO₂, or NO₂.
2. Products should not be stored in direct sunlight.

ORDERING INFORMATION



Note: TLR2010/TLR1206 No coating / marking

Legal Disclaimer Notice

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For the latest dimensions, specifications and other information, please contact TE Connectivity.