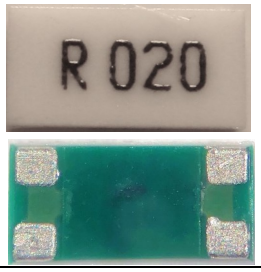
Thin Film Technology Corp.

Product Family: 4-Terminal, Current Sensing Chip Resistor

Part Number Series: D1WRL-L4 Series

RoHS COMPLIANT 2011/65/EU

HF HALOGEN-FREE



Construction:

- 4-terminals, separate voltage and current terminals
- High purity alumina substrate
- MnCu resistive alloy
- Inherently Anti-Sulfur
- 100% matte tin over Ni terminations
- RoHS compliant and Pb Free

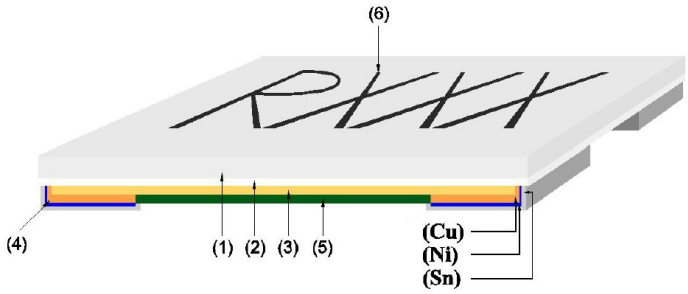
Features:

- 1206 & 2512 English case sizes
- Power rating up to 1W
- Tolerance down to ±0.3%
- Resistance from 0.5mΩ~100mΩ
- TCR down to ±30ppm/°C
- High sensing accuracy
- AEC-Q200 qualified

Description:

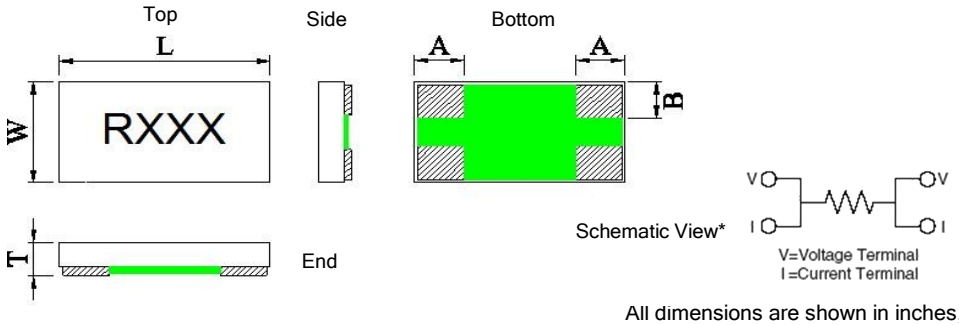
These four-terminal, low resistance chip resistors are of superior quality and provide separate voltage and current terminals for high precision and reliability, at a great price. Constructed with a bottom side element to reduce any terminal parasitic and provide better accuracy versus top side element competitors. The resistive foil element used is a proprietary alloy of nickel and copper making it impervious to environmental conditions as the element is anti-corrosive and anti-sulfur. This element exhibits ultra load life stability over time and industry leading heat dissipation making it suitable for automotive, battery pack or harsh environment use.

Product Construction:



Number	Description
1	Alumina ceramic
2	Adhesion layer (epoxy)
3	Resistive element (Cu-alloy)
4	Terminal electrodes (Cu, Ni, Sn)
5	Protective coating (UL-94-V0 flame retardant epoxy)
6	Marking coating

Product Dimensions:



All dimensions are shown in inches, mm in parentheses.

Dimension (Metric)	L	W	T	A	B
D1WRL1206 (3216)	0.126 ±0.008 (3.20 ±0.20)	0.063 ±0.008 (1.60 ±0.20)	0.024 ±0.008 (0.60 ±0.20)	0.024 ±0.008 (0.60 ±0.20)	0.022 ±0.008 (0.55 ±0.20)
D1WRL2512 (6432)	0.248 ±0.008 (6.30 ±0.20)	0.122 ±0.008 (3.10 ±0.20)	0.024 ±0.008 (0.60 ±0.20)	0.037 ±0.008 (0.95 ±0.20)	0.041 ±0.008 (1.05 ±0.20)

* Note: Rotating the schematic 180° will have no effect to the circuit.

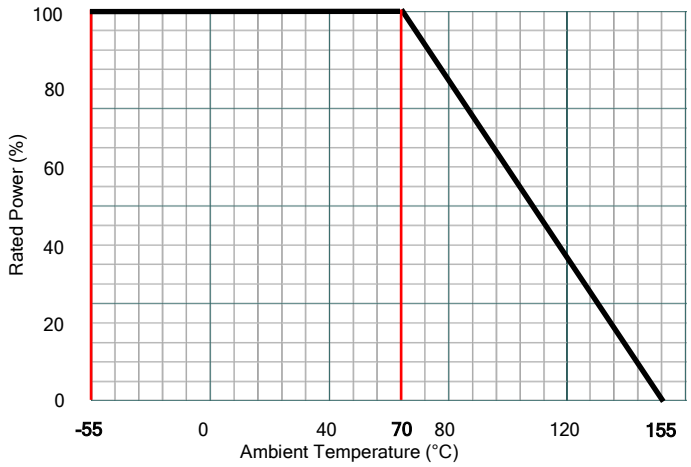
Part Numbering: Ex: D1WRL1206L4R010D-T5

Series Name	English Size (Metric Size)	4-Terminal Indicator	Resistance Value	Resistance Tolerance	Automotive Grade	T&R Packaging Quantity
D1WRL	**1206** (3216) **2512** (6432)	**L4**	Use 4 digit code for all values. "R" denotes decimal position. Ex: R005 = 5mΩ	**C** = ±0.3% **D** = ±0.5% **F** = ±1.0%	**A** = AEC-Q200 Leave Blank for Non AEC-Q200	**-T4** = 4,000 pcs/reel **-T5** = 5,000 pcs/reel (Refer to electrical table)

Electrical Specifications:

Type	D1WRL1206					D1WRL2512				
Metric Size	3216					6432				
Power Rating	1/2W					1/3W	1/2W	1W		
Resistance Range	0.5mΩ	1mΩ ~2mΩ	3mΩ ~4mΩ	5mΩ ~9mΩ	10mΩ ~100mΩ	0.5mΩ	1mΩ ~2mΩ	3mΩ ~4mΩ	5mΩ ~9mΩ	10mΩ ~100mΩ
TCR ppm/°C	±100	±75		±50	±30	±100	±75	±50		±30
Resistance Tolerance (code)	±0.5%(D) ±1.0%(F)				±0.3%(C) ±0.5%(D)	±0.5%(D) ±1.0%(F)				
Operating Temp. Range	-55°C~+155°C									
Packaging (code)	5,000 pcs/reel (-T5)					4,000 pcs/reel (-T4)				

Power Derating Curve:



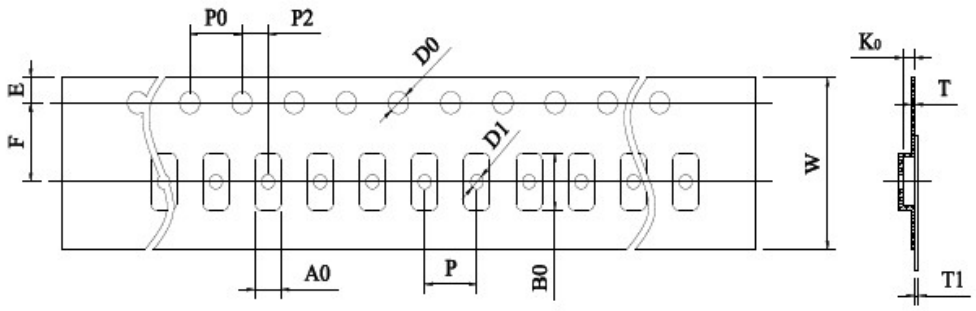
Reliability Specifications:

Test	Procedure	Specification
Short Time Over Load IEC60115-1 4.13	P= 2.5Pr ; T=25±2°C , t = 5sec.	±(1.0%+0.5mΩ)
High Temp. Exposure IEC60115-1 4.25	T = +170±2°C ; t = 1000h	±(1.0%+0.5mΩ)
Low Temp. Storage IEC60115-1 4.25	T = -55±2°C ; t = 1000h	±(1.0%+0.5mΩ)
Moisture Load Life IEC60115-1 4.25	Vtest = Vmax ; T=60±2°C ; RH=95% ; t= 90min ON , 30min OFF , 1000h	±(2.0%+0.5mΩ)
Thermal Shock IEC60115-1 4.19	[-55°C 30min. → R.T. 3min. → +150°C 30min. → R.T. 3min], 100 Cycles	±(1.0%+0.5mΩ)
Load Life at 70°C IEC60115-1 4.25	Vtest = Vmax ; T=70±2°C ;t= 90min ON , 30min OFF,1000h	±(2%+0.5mΩ)
Solderability IEC60115-1 4.17	Dip into solder at T = 245±5°C , t = 3±0.5sec.	The covered area >95%
Resistance to Solder Heat IEC60115-1 4.18	Through Reflow T= 275±5°C , t =20±1sec.	±(1.0%+0.5mΩ)
Mechanical Shock IEC60115-1 4.21	a =100G , t =11ms, 5 times shock	±(1.0%+0.5mΩ)
Substrate Bending IEC60115-1 4.33	Span between fulcrums : 90mm Bend Width : 2mm ; Test board : Glass-Epoxy Board Thickness = 1.6mm	±(1.0%+0.5mΩ)

AEC-Q200 Reliability Specifications:

AEC Test #	Test	Procedure	Specification
3	High Temp. Exposure (Storage) MIL-STD-202, Method 108	Test Temp 125°C +/-3°C Test Period: 1,000 hours No Electrical Load	±1.0%
4	Temp. Cycling (Thermal Shock) JESD22 Method JA-104	Repeat 1,000 cycles as follows: -55°C +/-3°C for 30 minutes +125°C +/-3°C for 30 minutes Transition time of 1 minute max	±1.0%
7	Biased Humidity MIL-STD-202, Method 103	Test conditions: 85°C and 85% RH 10% of rated power Test Period 1,000 hours	±1.0%
8	Load Life (Operational Life) MIL-STD-202, Method 108	Test Temperature: 125°C +/-3°C Applied voltage: rated power (derated Power will be required if temp exceeds the derating point of part) Test Period: 1,000 hours (condition D)	±1.0%
12	Resistance to Solvents MIL-STD-202, Method 215	3 minute soak 2-3 ounce force 10 strokes/repetition 3 repetitions	No damage
13	Mechanical Shock MIL-STD-202, Method 213	Force: 100G peak Test duration: 6 ms Half-sine waveform Velocity: 12.3ft/sec	±1.0%
14	Vibration MIL-STD-202, Method 204	Frequency: 10-2,000 Hz Acceleration: 5G Test duration: 20 minutes, 12 cycles	±1.0%
15	Resistance to soldering heat MIL-STD-202, Method 210	Condition B (Solder dip, no pre-heat) 260°C +/-5°C	±1.0%
17	ESD AEC-Q200-002	HBM, 100pF, 1.5k ohms Repetition: 5 times	±1.0%
18	Solderability J-STD-002	Non-activated flux dip: 5-10 seconds SAC solder dip: 2 +/-0.5 seconds at 245°C +/-5°C	95% coverage
20	Flammability UL-94	V-0 or V-1 are acceptable Electrical test not required	Provide certificate
21	Board Flex AEC-Q200-005	90 mm span between fulcrums 2 mm bend 60 seconds minimum holding time	±1.0%
22	Terminal Strength (SMD) AEC-Q200-006	Force of 17.7 N 60 seconds	±1.0%
24	Flame Retardance AEC-Q200-001	Mounted parts subjected to voltages from 9.0 to 32 VDC (current clamped up to 500A) in 1.0 VDC increments. Voltage applied for 1 hour minimum or until failure occurs	Must meet AEC-Q200 requirements

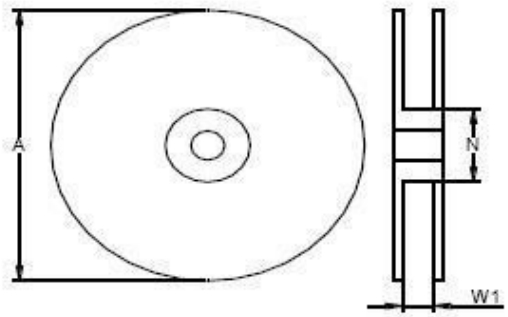
Plastic Tape Dimensions:



All dimensions in mm.

Size	W	P0	P	P2	A0	B0	D0	F	E	T	T1	K0
1206	8.00 ±0.03	4.00 ±0.10	4.00 ±0.10	2.00 ±0.10	1.90 ±0.20	3.50 ±0.20	1.50 ±0.10	3.50 ±0.10	1.75 ±0.10	0.20 ±0.10	Max 0.10	0.85 ±0.20
2512	12.0 ±0.30	4.00 ±0.10	4.00 ±0.10	2.00 ±0.10	3.40 ±0.20	6.75 ±0.20	1.50 ±0.10	5.50 ±0.10	1.75 ±0.10	0.25 ±0.10	Max 0.10	0.81 ±0.20

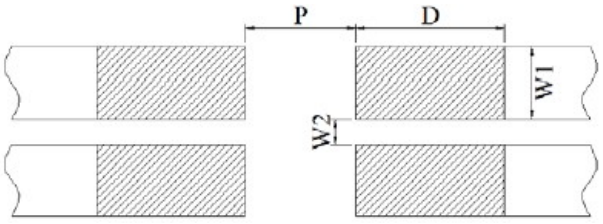
Reel Dimensions:



All dimensions in mm.

Size	A	N	W1
1206	178 ±5.00	60.0 ±2.00	9.00 ±1.00
2512	178 ±5.00	60.0 ±2.00	13.0 ±1.00

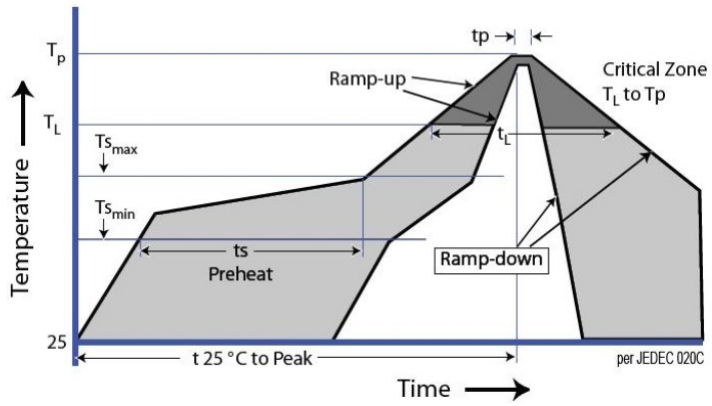
Recommended Land Pattern:



All dimensions in mm.

Size	P	D	W1	W2
1206	1.20	1.80	1.10	0.30
2512	3.10	2.00	1.40	0.70

Soldering Profile:



Profile Feature	Pb-Free Assembly
Average Ramp-Up Rate (Ts_{max} to Tp)	3 °C/second max.
Preheat	
- Temperature Min (Ts_{min})	150 °C
- Temperature Max (Ts_{max})	200 °C
- Time (ts_{min} to ts_{max})	60-180 seconds
Time maintained above:	
- Temperature (T_L)	217 °C
- Time (t_L)	60-150 seconds
Peak Temperature (T_p)	260 +0 °C
Time within 5 °C of actual Peak Temperature (tp)	20-40 seconds
Ramp-Down Rate	6 °C/second max.
Time 25 °C to Peak Temperature	8 minutes max.

Storage Conditions:

Environmental Conditions:

Products should be stored under the following environmental conditions:

- Temperature: +5 to +35°C
- Humidity: 45 to 85% relative humidity
- Do not keep products in environments where they may be subject to particulate contamination or harmful gases such as sulfuric acid or hydrogen chloride as it may cause oxidization on electrodes, resulting in poor solderability.
- Products should be stored in a space that does not expose it to high temperatures, vibration, or direct sunlight.
- Products should be stored in the original airtight packaging until use.

Unikeyic Electronics

Global Electronic Components Distributor

Click to view pricing, inventory, delivery, and lifecycle information:

Thin Film Technology:

D1WEL1206MR130F-T5 D1MPAA1206DR015FA-T4 D1WEL0805CR300F-T5 D1CPA0612QR005FFA-T50 D1CSA2512M0M30F-T2 D1MPAC2512G0M50FA-T3 D1MPAC2512QR005FA-T4 D1WEL0805CR500F-T5 D1WEL0805CR200FA-T5 D1CPC0306RR004FF-T50 D1WEL0612MR003F-T5 D1WEL0805MR007F-T5 D1WRL2512L4R005F-T4 D1WRL1206L4R025D-T5 D1MPC0402RR015FF-T10 D1WEL0805CR499F-T5 D1MPC0805QR020FF-T5 D1WEL0805MR005F-T5 D1WEL0805MR018F-T5 D1WKL0805MR010F-T5 D1CPA0612QR005FF-T50 D1CSA5931M0M70F-T15 D1MPAB2512QR020FA-T4 D1MPAC2512QR008FA-T4 D1WEL0805MR008F-T5 D1WEL0805MR470F-T5 D1WEL4527MR020F-T1 D1WEL0805MR009F-T5 D1WEL1206MR010F-T5 D1WEL1206MR062F-T5