Thin Film Technology Corp.

Product Family: 2-Terminal Low Ohm Current Sense Resistors

Part Number Series: D1WEL Series Long Electrode

Construction:

- High purity alumina substrate
- Metal foil resistive element
- Epoxy-resin overcoat
- Wrap around electrodes
- 100% matte tin over Ni terminations
- RoHS complainant and Pb free
- Inherently Anti-Sulfur

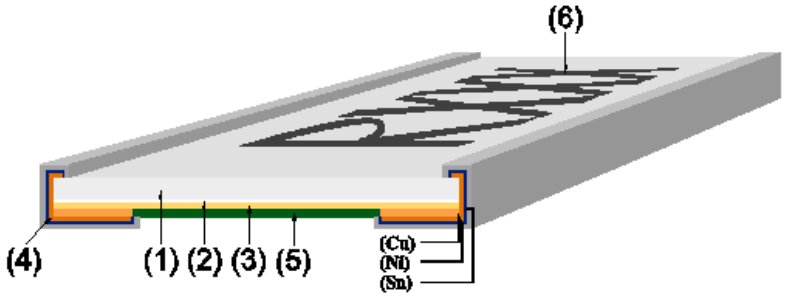
Features:

- TCR down to ±50ppm/°C
- Resistances from 1mΩ~100mΩ
- Optimal linearity in I/V conversion
- High volume production suitable for commercial and special applications
- Competitive pricing
- Moisture Sensitivity Level=1

Description:

These low ohm current sense resistors are designed for tight resistance tolerance, low noise, long-term stability and high heat dissipation capability in a small package. This series is ideal for use in power management modules.

Product Construction:



Number	Description
1	Substrate (Alumina Ceramic)
2	Adhesion Layer (Epoxy)
3	Resistive Element (Cu Alloy Foil)
4	Terminal Electrode (Cu, Ni, Sn)
5	Protective Coating (Flame-retardant epoxy, UL-94-V0)
6	Marking* (Flame-retardant epoxy, UL-94-V0)

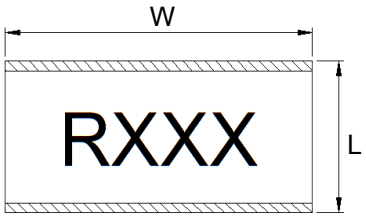
***** Note: Marking is 3 digits (XXX) 0508 case size, and 4 digits (RXXX) for all other case sizes.

Part Numbering: Ex: D1WEL0508MR010F-T5

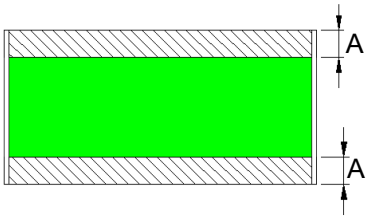
Series Name	English Size	Material	Resistance Value	Resistance Tolerance	T&R Packaging Quantity
D1WEL	(refer to "type" in electrical tables)	M	4 digit code for all values. "R" denotes decimal position. Ex. **R010** = 10mΩ **R100** =100mΩ	**D** = ±0.5%***** **F** = ±1.0% **H** = ±3.0% (refer to tables)	**-T2** = 2,000 **-T4** = 4,000 **-T5** = 5,000 (refer to tables)

Product Dimensions:

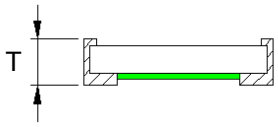
Top



Bottom



Side



All dimensions shown in inches, mm in parentheses.

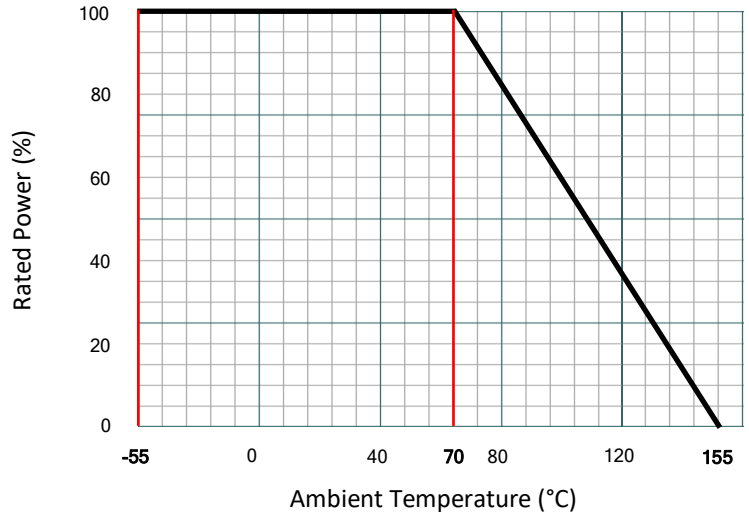
Dimension (Metric)	Resistance Range	Material	L	W	A	T
D1WEL0508 (1220)	1mΩ~100mΩ	M	0.053 ±0.008 (1.35 ±0.20)	0.083 ±0.008 (2.10 ±0.20)	0.026 ±0.008 (0.43 ±0.20)	0.017 ±0.008 (0.65 ±0.20)
D1WEL0612 (1632)	1mΩ		0.067 ±0.008 (1.70 ±0.20)	0.129 ±0.008 (3.30 ±0.20)	0.022 ±0.012 (0.55 ±0.30)	0.026 ±0.008 (0.65 ±0.20)
	2mΩ~4mΩ				0.016 ±0.008 (0.40 ±0.20)	
	5mΩ~100mΩ					
D1WEL0815 (2040)	1mΩ~100mΩ		0.087 ±0.008 (2.20 ±0.20)	0.150 ±0.008 (3.80 ±0.20)	0.024 ±0.008 (0.61 ±0.20)	0.026 ±0.008 (0.65 ±0.20)
D1WEL1020 (2550)	0.50mΩ		0.102 ±0.008 (2.60 ±0.20)	0.201 ±0.008 (5.10 ±0.20)	0.037 ±0.008 (0.95 ±0.20)	0.026 ±0.008 (0.65 ±0.20)
	1mΩ~100mΩ				0.026 ±0.008 (0.65 ±0.20)	
D1WEL1225 (3264)	1mΩ~100mΩ		0.126 ±0.012 (3.20 ±0.30)	0.252 ±0.012 (6.40 ±0.30)	0.024 ±0.008 (0.60 ±0.20)	0.026 ±0.008 (0.65 ±0.20)
D1WEL0830 (2276)	1mΩ~100mΩ		0.102 ±0.012 (2.60 ±0.30)	0.299 ±0.012 (7.60 ±0.30)	0.027 ±0.012 (0.68 ±0.30)	0.026 ±0.008 (0.65 ±0.20)
D1WEL1530 (3876)	1mΩ~100mΩ		0.153 ±0.012 (3.90 ±0.30)	0.303 ±0.012 (7.70 ±0.30)	0.027 ±0.012 (0.70 ±0.30)	0.026 ±0.008 (0.65 ±0.20)
D1WEL1836 (4590)	1mΩ~100mΩ		0.181 ±0.012 (4.60 ±0.30)	0.358 ±0.012 (9.10 ±0.30)	0.031 ±0.012 (0.80 ±0.30)	0.026 ±0.008 (0.65 ±0.20)
D1WEL2043 (05110)	1mΩ~100mΩ		0.201 ±0.012 (5.10 ±0.30)	0.437 ±0.016 (11.1 ±0.40)	0.035 ±0.012 (0.90 ±0.30)	0.026 ±0.008 (0.65 ±0.20)

Electrical Specifications:

Type	D1WEL0508		D1WEL0612		D1WEL0815		D1WEL1020			D1WEL1225	
Metric Size	1220		1632		2040		2550			3264	
Power Rating	1W		1 1/2W		2W		2W			3W	
Resistance Range (mΩ)	1~9	10~100	1~9	10~100	1~9	10~100	0.5	1~9	10~100	1~9	10~100
Resistance Tolerance % (code)	±1.0(F)	±0.5(D) ±1.0(F)	±1.0(F)	±0.5(D) ±1.0(F)	±1.0(F)	±0.5(D) ±1.0(F)	±3.0(H)	±1.0(F)	±0.5(D) ±1.0(F)	±1.0(F)	±0.5(D) ±1.0(F)
TCR ppm/°C	±100	±50	±100	±50	±100	±50	±150	±100	±50	±100	±50
Operating Temp. Range	-55°C~+155°C										
Rated Voltage	√(Power x Resistance)										
Packaging (code)	5,000 pcs/reel (-T5)				4,000 pcs/reel (-T4)						

Type	D1WEL0830		D1WEL1530		D1WEL1836		D1WEL2043	
Metric Size	2276		3876		4590		05110	
Power Rating	3W		4W		4W		5W	
Resistance Range (mΩ)	1~9	10~100	1~9	10~100	1~9	10~100	1~9	10~100
Resistance Tolerance % (code)	±1.0(F)	±0.5(D) ±1.0(F)	±1.0(F)	±0.5(D) ±1.0(F)	±1.0(F)	±0.5(D) ±1.0(F)	±1.0(F)	±0.5(D) ±1.0(F)
TCR ppm/°C	±100	±50	±100	±50	±100	±50	±100	±50
Operating Temp. Range	-55°C~+155°C							
Rated Voltage	√(Power x Resistance)							
Packaging (code)	4,000 pcs/reel (-T4)		2,000 pcs/reel (-T2)					

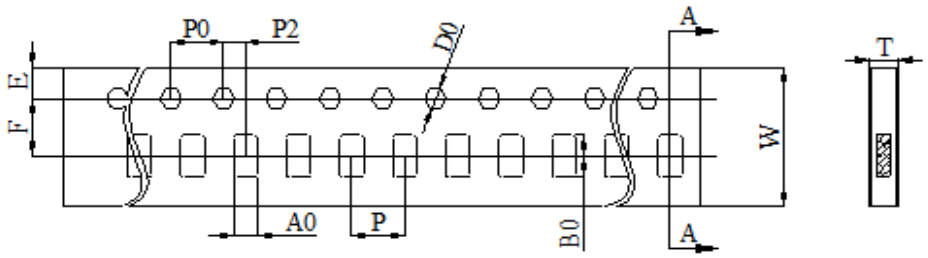
Power Derating Curve:



Reliability Specifications:

Test	Procedure	Specification
Short Time Overload JIS-C-5201, 4.13	Applied voltage: 2.5X rated power. Test duration: 5 seconds Test Temperature: 25 ±2°C	±(1.0%+0.5mΩ)
High Temperature Exposure IEC60115-1 4.25	Test Temperature: +155 ±2°C Test period: 1,000 hours	±(1.0%+0.5mΩ)
Low Temp. Storage IEC60115-1 4.25	Test Temperature: -55 ±2°C Test period: 1,000 hours	±(1.0%+0.5mΩ)
Moisture Load Life IEC60115-1 4.25	Test Temperature: 60°C ±2°C Applied voltage: 95% rated voltage Test period: 1,000 hours with power cycling as follows: 90 min. power ON/30 min. power OFF	±(2.0%+0.5mΩ)
Thermal Shock IEC60115-1 4.19	-55°C 30min. → R.T. 3min. → +155°C 30min. → R.T. 3min, 100 Cycles	±(1.0%+0.5mΩ)
Load life at 70°C IEC60115-1 4.25	Test Condition: 70°C ±2° Test period: 90 min ON, 30 min OFF, 1,000 hours	±(2.0%+0.5mΩ)
Solderability IEC60115-1 4.17	Dipped into molten solder for 3 ±1 seconds at 245 ±5°C	Coverage of >95%
Resistance To Solder Heat IEC60115-1 4.18	Parts are subjected to 3 reflow cycles	±(1.0%+0.5mΩ)
Mechanical Shock IEC60115-1 4.21	Force: 100g Test Duration: 6ms	±(1.0%+0.5mΩ)
Substrate Bending IEC60115-1 4.33	90mm span between fulcrums 2mm bend Glass-Epoxy test board Thickness: 1.6mm	±(1.0%+0.5mΩ)

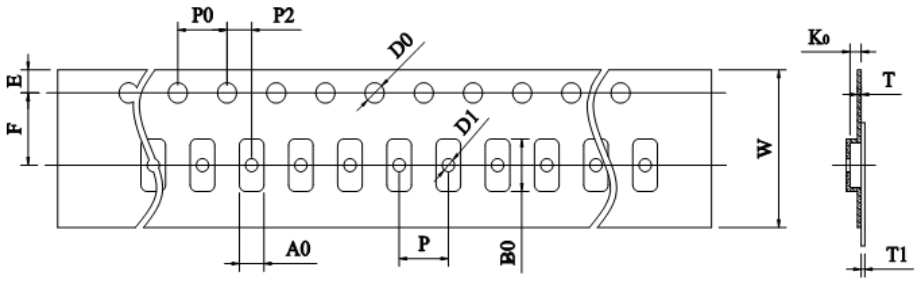
Paper Tape Dimensions:



All dimensions in mm.

Size	W	P0	P	P2	A0	B0	D0	F	E	T
0508	8.00 ±0.30	4.00 ±0.10	4.00 ±0.10	2.00 ±0.10	1.55 ±0.10	2.30 ±0.10	1.50 ±0.10	3.50 ±0.10	1.75 ±0.10	0.87 ±0.10
0612	8.00 ±0.30	4.00 ±0.10	4.00 ±0.10	2.00 ±0.10	2.05 ±0.20	3.65 ±0.20	1.50 ±0.10	3.50 ±0.10	1.75 ±0.10	0.87 ±0.10

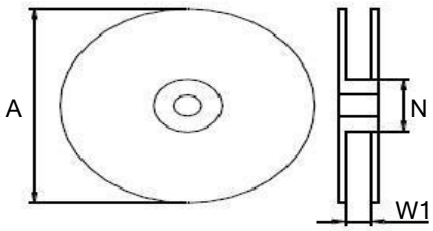
Plastic Tape Dimensions:



All dimensions in mm.

Size	W	P0	P	P2	A0	B0	D0	F	E	T	T1	K0
0815	12.0 ±0.40	4.00 ±0.10	4.00 ±0.10	2.00 ±0.10	2.30 ±0.20	4.10 ±0.20	1.50 ±0.10	5.50 ±0.10	1.75 ±0.10	0.25 ±0.10	Max 0.10	0.75 ±0.20
1020	12.0 ±0.30				2.85	5.45						0.80
1225					3.40	6.75						1.00
0830	16.0 ±0.30				2.80	8.00		7.50 ±0.10		0.30 ±0.10		0.80
1530			8.00 ±0.10		4.15 ±0.20	7.95 ±0.20						0.90 ±0.20
1836					4.85 ±0.20	9.35 ±0.20						
2043	24.0				5.50	11.5		11.5				

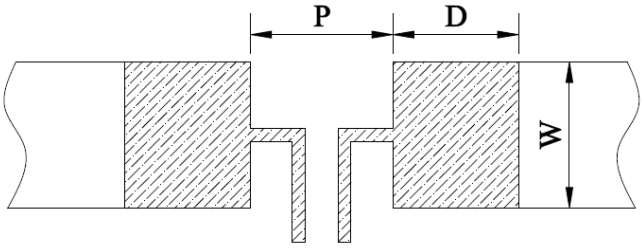
Reel Dimensions:



All dimensions in mm.

Size	0508	0612	0518	1020	1225	0830	1530	1836	2043
Quantity	5,000 pcs/reel		4,000 pcs/reel			2,000 pcs/reel			
A	178 ±5.00								
N	60.0 ±2.00								
W1	9.00 ±1.00		13.0 ±1.00			17.0 ±1.00			24.5 ±1.00

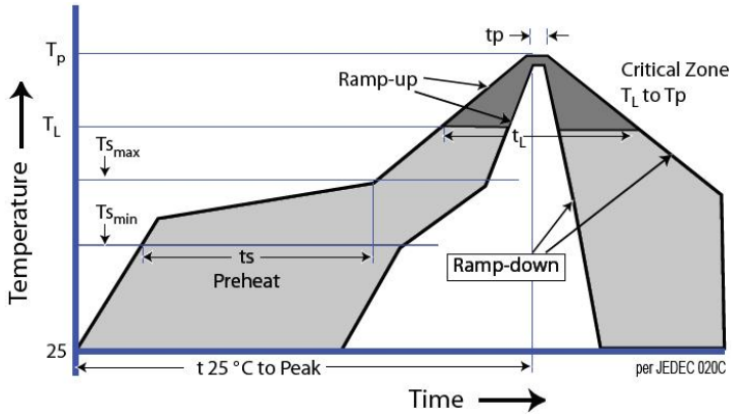
Recommended Land Pattern:



All dimensions in mm.

Size	Resistance Range	P	W	D
0508	1mΩ~100mΩ	0.60	2.30	1.10
0612	1mΩ	0.50	3.68	1.35
	2mΩ~100mΩ	0.60	3.68	1.30
0815	1mΩ~100mΩ	0.70	4.26	1.45
1020	0.50mΩ	0.55	5.75	2.48
	1mΩ~100mΩ	1.00	5.75	2.25
1225	1mΩ~100mΩ	1.40	7.25	2.35
0830	1mΩ~100mΩ	0.95	8.63	2.28
1530	1mΩ~100mΩ	1.70	8.74	2.55
1836	1mΩ~100mΩ	2.10	10.35	2.70
2043	1mΩ~100mΩ	2.40	12.65	2.80

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:

Environment 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.