



Application Hint 21

Sense Resistors for the Super LDO™ Regulator

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Power Dissipation

The power dissipation of sense resistors used in Super LDO regulator circuits is small and generally does not require the power dissipation capability found in most low-value resistors.

Alternate Resistors

A low-value resistor can be made from a length of copper magnet wire or from a printed circuit board trace. Tables are provided for wire and printed circuit traces.

Copper has a positive temperature coefficient of resistivity of +0.39%/°C. This can be significant when higher accuracy current limiting is required.

A Kelvin connection between the sense element and the Super LDO Regulator Controller improve the accuracy of the current limit setpoint.

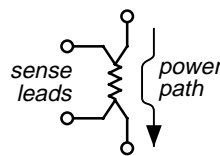
Printed Circuit Copper Resistance

Conductor Thickness	Conductor Width in	Resistance mΩ / in
1/2oz/ft ² (18μm)	0.025	39.3
	0.050	19.7
	0.100	9.83
	0.200	4.91
	0.500	1.97
1 oz/ft ² (35μm)	0.025	19.7
	0.050	9.83
	0.100	4.91
	0.200	2.46
	0.500	0.98
2oz/ft ² (70μm)	0.025	9.83
	0.050	4.91
	0.100	2.46
	0.200	1.23
	0.500	0.49
3oz/ft ² (106μm)	0.025	6.5
	0.050	3.25
	0.100	1.63
	0.200	0.81
	0.500	0.325

Kelvin Connections

A Kelvin connection is a measurement connection that avoids the error caused by voltage drop in the power path leads.

Sense leads are attached directly across the resistance element—intentionally excluding the power path leads. Because the sense conductors carry negligible current (sense inputs are typically high impedance voltage measurement inputs), there is no voltage drop to skew the “ $E = I \times R$ ” measurement.



Wire Resistance Table (Copper Wire)

AWG Wire Size	Resistance at 20°C	
	10 ⁻⁶ Ω / cm	10 ⁻⁶ Ω / in
10	32.70	83.06
11	41.37	105.1
12	52.09	132.3
13	65.64	166.7
14	82.80	210.3
15	104.3	264.9
16	131.8	334.8
17	165.8	421.1
18	209.5	532.1
19	263.9	670.3
20	332.3	844.0
21	418.9	1064.0
22	531.4	1349.8
23	666.0	1691.6
24	842.1	2138.9
25	1062.0	2697.5
26	1345.0	3416.3
27	1687.6	4286.5
28	2142.7	5442.5
29	2664.3	6767.3
30	3402.2	8641.6
31	4294.6	10908.3
32	5314.9	13499.8
33	6748.6	17141.4
34	8572.8	21774.9
35	10849	27556.5
36	13608	34564.3
37	16801	42674.5
38	21266	54015.6
39	27775	70548.5
40	35400	89916.0
41	43405	110248.7
42	54429	138249.7
43	70308	178582.3
44	85072	216082.9

4-Lead Resistor Manufacturers

Dale Electronics, Columbus, NE (402) 563-6506
 Vishay Resistors, Malvern, PA (215) 644-1300

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