ThermaBridge™

ULR | HI PWR | RoHS | Sn62 | NON-MAG

0203 0402 0505 0510 0603 0605 0612 0805 1005 1010 1020 1206 2010 2512 2525 3725

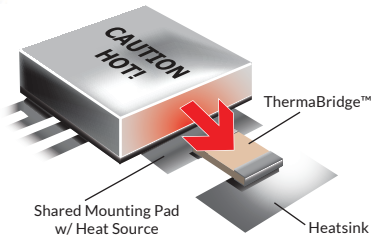
Electrically Isolated AℓN Thermal Management Device

FEATURES

- High thermal conductivity (170W/m-°k)
- Protects neighboring components
- Low shunt capacitance
- Multiple sizes and thicknesses
- Electrically isolated thermal connection
- Optimal control over board temperature
- RoHS PtAg or solder pre-tinned option

APPLICATIONS

- RF Amplifiers
- Commercial and Military Space
- Power Supplies & Converters
- JTRS, MIDS-J, GMR, AMF
- Temperature Controlled Oscillators
- Conduction Cooled Handheld Devices
- P25 Radios, Basestations & Repeaters
- Extract Heat from FETS, LEDs, Pin & Laser Diodes



DIMENSIONS

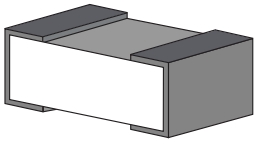
All dimensions in inches

SIZE	NOMINAL LENGTH	NOMINAL WIDTH	HEIGHT (MAX) C-.010	D-.015	G-.025	T-.040
0203[1]	.020	.030	.015	N/A	N/A	N/A
0402	.040	.020	.015	.020	N/A	N/A
0505	.050	.050	N/A	.020	.035	N/A
0510	.050	.100	N/A	.020	.035	N/A
0603	.060	.030	N/A	.020	.035	N/A
0605	.060	.050	N/A	.020	.035	N/A
0612	.060	.120	N/A	.020	.035	N/A
0805	.080	.050	N/A	.020	.035	N/A
1005	.100	.050	N/A	.020	.035	N/A
1206	.126	.063	N/A	.020	.035	N/A
1010	.100	.100	N/A	.020	.035	.050
1020	.100	.200	N/A	.020	.035	.050
2010	.200	.100	N/A	.020	.035	.050
2512	.250	.120	N/A	.020	.035	.050
2525	.250	.250	N/A	.020	.035	.050
3725	.375	.250	N/A	.020	.035	.050

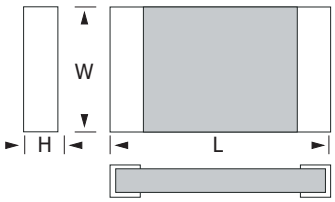
1. Only available in "C" Height and DS Style. Contact factory for custom size requirements

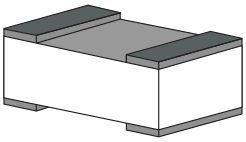
TERMINAL STYLE AVAILABILITY

Terminal Styles

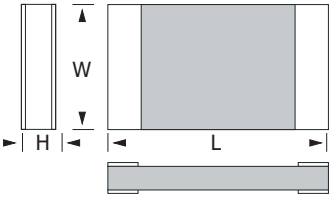


WA - Full Wraparound





DS - Double Sided



Termination Materials

- ☑ **-3** PtAg
- ☑ **-8** PtAg ULR
- **-C** PtAg w/ Sn62 Solder
- **-H** PtAg w/ Sn62 Solder ULR
- ☑ **-P** PtAg w/ Sn96 Solder
- ☑ **-R** PtAg w/ Sn96 Solder ULR

DS only available in ULR termination material 8, H & R

ORDERING INFORMATION

Ex: 1206 Size ThermaBridge™ on 0.025" substrate with PtAg terminals

B G 3 1206 WA

Substrate Thickness
C - 0.010"[1] G - 0.025"
D - 0.015" T - 0.040"[2]

Termination Material
- ☑ -3 PtAg
- ☑ -8 PtAg ULR[3]
- -C PtAg w/ Sn62 Solder
- -H PtAg w/ Sn62 Solder ULR[3]
- ☑ -P PtAg w/ Sn96 Solder
- ☑ -R PtAg w/ Sn96 Solder ULR[3]

WA - Wraparound
DS - Metallization on both sides

Case Size

0203[1]	0402	0505	0510
0603	0605	0612	0805
1005	1206	1010	1020[2]
2010[2]	2512[2]	2525[2]	3725[2]

Packaging: B=Bulk, T=Tape and Reel
RoHS Compliant = ☑
ULR = Ultra Leach Resistant

Choose the height option that best suits your thermal conductivity to build your part number.

Custom size available using standard available thicknesses. Consult factory.

ULR | HI PWR | RoHS | Sn62 | NON-MAG

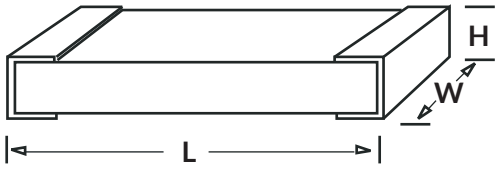
1. "C" thickness only available in sizes 0203 & 0402.
2. "T" thickness only available in size 1010 and larger.
3. "DS" (Double Sided) termination style only available in ULR termination material 8, H & R.

THERMAL RESISTANCE & TEMPERATURE DEPENDANCE OF THERMAL CONDUCTIVITY

Thermal resistance is the normalized reciprocal of thermal conductivity.

The thermal constant of AℓN is: k ~ 170 W/m-°K @ 25°C

Thermal resistance (ΘR) is calculated as: $\theta_R = \frac{L}{kA_{CSA}} = \frac{L}{kWH}$



As temperature increases, an effect known as "temperature dependance of thermal conductivity" modifies downward the thermal constant (k) of most materials, including AℓN ceramics.

Industry measurements (ASTM/ISO) often report values of thermal conductivity based on a 25°C environmental baseline . IMS recognizes that this may not be appropriate for devices designed for use in thermal management applications where heat source temperatures of 100°C or higher are commonplace.

As part of the IMS strategy for deployment, the thermal resistance data table presented here has been modified to assume a value of k that is more consistent with material properties at 100°C.

THERMAL RESISTANCE (°C/W) - STANDARD CASE SIZE & THICKNESS

SIZE	C-.010	D-.015	G-.025	T-.040
0203	17	N/A	N/A	N/A
0402	54	34	N/A	N/A
0505	N/A	17	10	N/A
0510	N/A	9	5	N/A
0603	N/A	34	21	N/A
0605	N/A	21	12	N/A
0612	N/A	9	5	N/A
0805	N/A	27	16	N/A

SIZE	C-.010	D-.015	G-.025	T-.040
1005	N/A	34	21	N/A
1206	N/A	36	21	N/A
1010	N/A	17	10	6
1020	N/A	9	5	3
2010	N/A	34	21	13
2512	N/A	17	10	6
2525	N/A	36	21	13
3725	N/A	26	15	10

ELECTRICAL CAPACITANCE - WA vs. DS TERMINAL STYLE ESTIMATES

THICKNESS	WA (pF)	DS (pF)
C - .010	**.015 to .06**	**.01 to .015**
D - .015	**.01 to .12**	**.001 to .06**
G - .025	**.017 to .15**	**.001 to .07**
T - .040	**.01 to .15**	**.001 to .08**

A parallel plate capacitor is an electrical component consisting of two conductive plates separated by an insulating dielectric.

By this definition, the stackup of materials present in ThermaBridge™ results in some capacitance. However, with only one layer of capacitive geometry, values of capacitance for ThermaBridge™ are low.

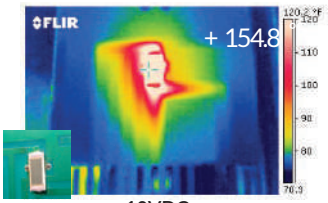
This table summarizes the estimated capacitance range of ThermaBridge™ devices over substrate thickness for each type and style of terminal.

The majority of customers report no adverse impact to RF performance due to ThermaBridge™ shunt capacitance. If these values indicate risk in your application, contact techsupport@ims-resistors for additional information.

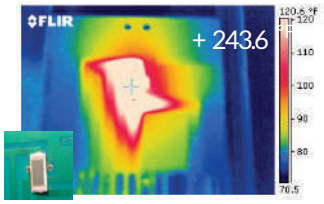
THERMAL IMAGE HEAT TRANSFER DEMONSTRATION

Below are test images of the ThermaBridge™ showing a heat generating component mounted on an FR4 board. The images on the right show the temperature of the component being thermally aided by the ThermaBridge™ connected to a heat sink.

Without ThermaBridge™

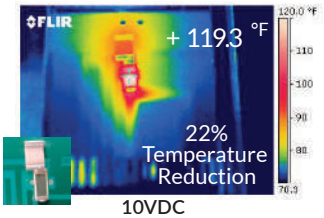


10VDC

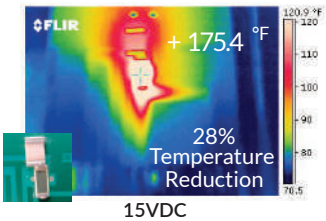


15VDC

With ThermaBridge™



10VDC



15VDC

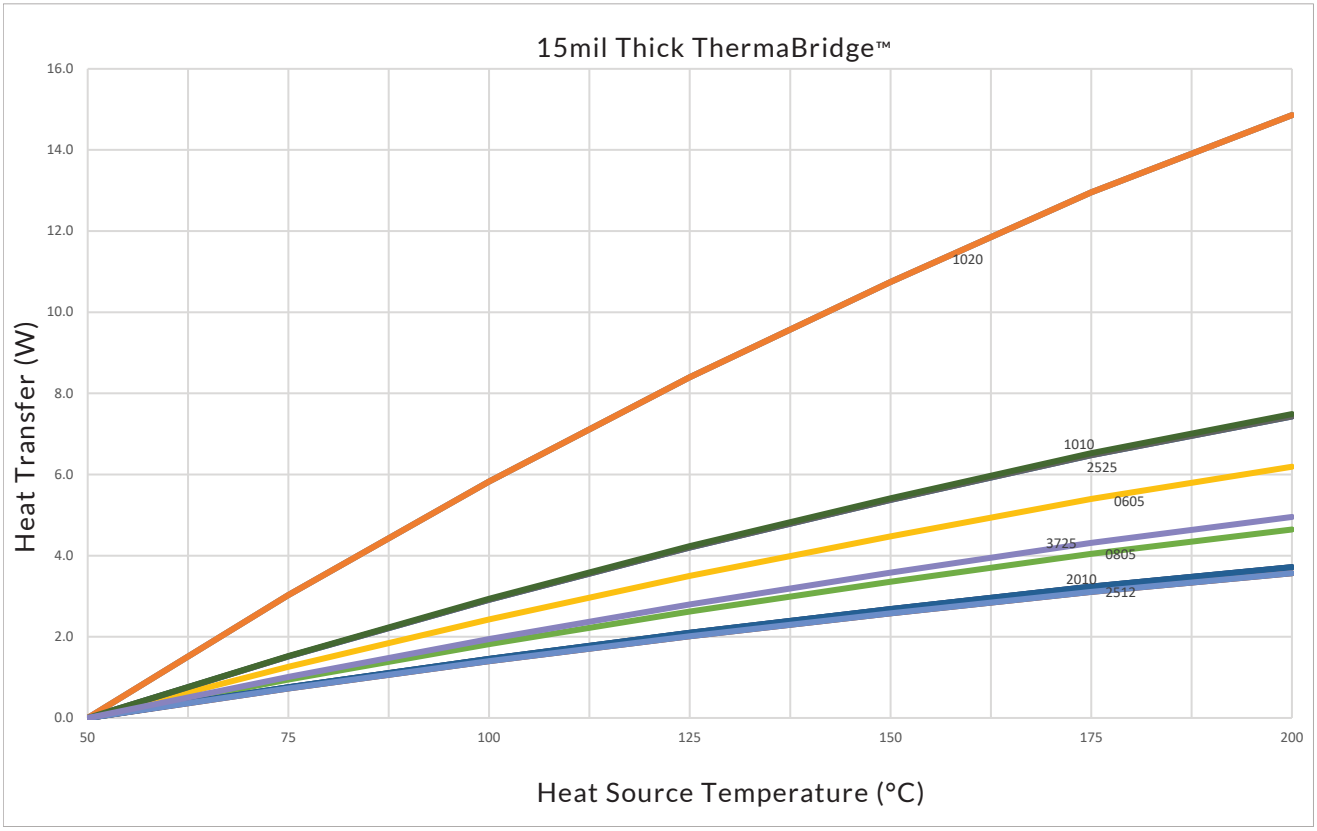
In practice, temperature of the hot and cold sides can vary significantlly over the course of operation of a system/module over time. Steady state plots are intended to demonstrate the potential of various ThermaBridge™ case size / thickness to transfer thermal energy.

A mindful designer concerned with thermal management will note that:

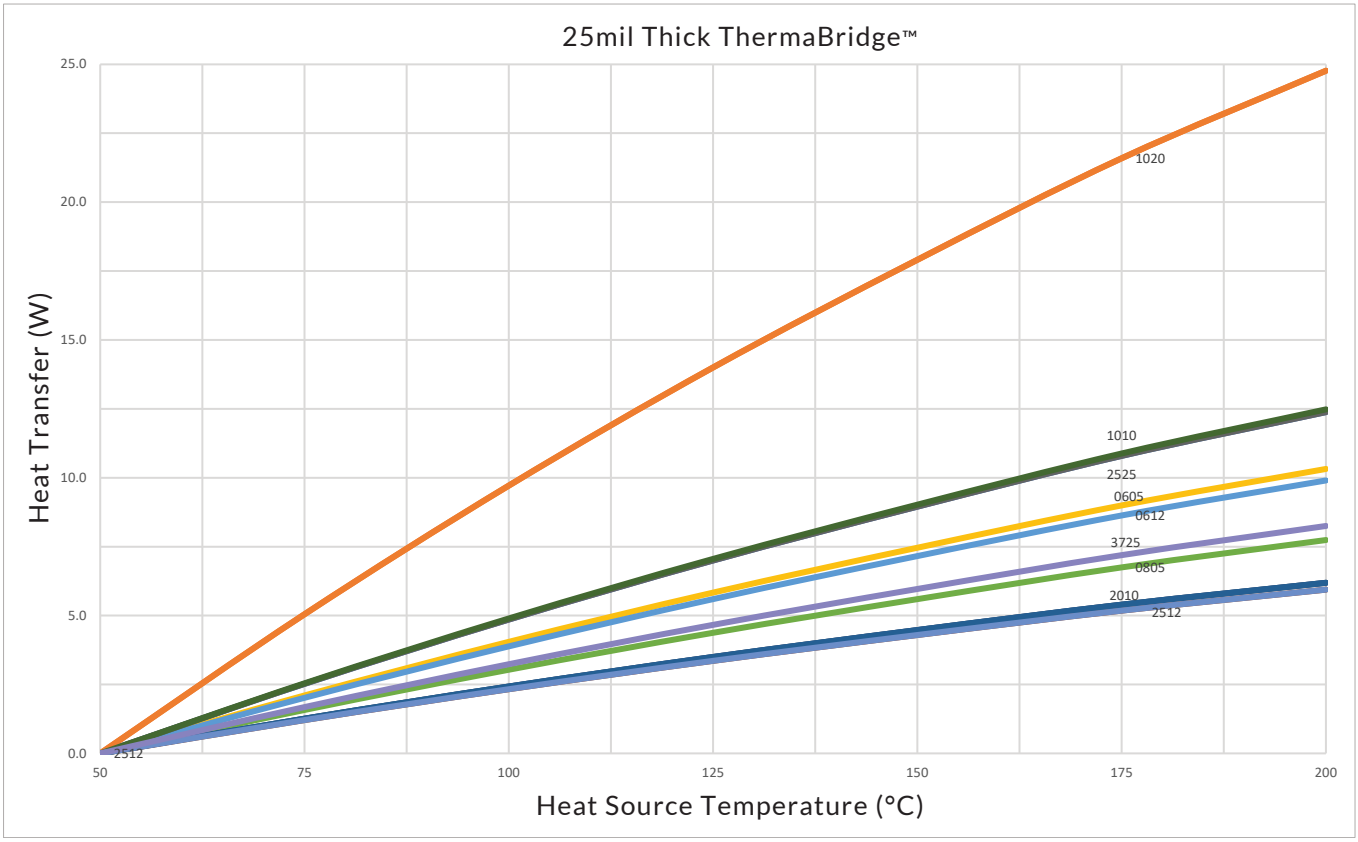
- Maximizing part thickness increases total CSA where heat may flow
- Shorter part lengths decrease thermal resistance compared to longer parts
- Maximizing a high ΔTemperature (Hot Temp - Cold Temp) maximizes heat flow
- Thermal properties and geometry of attachment chemistry (solder/epoxy) must also be considered

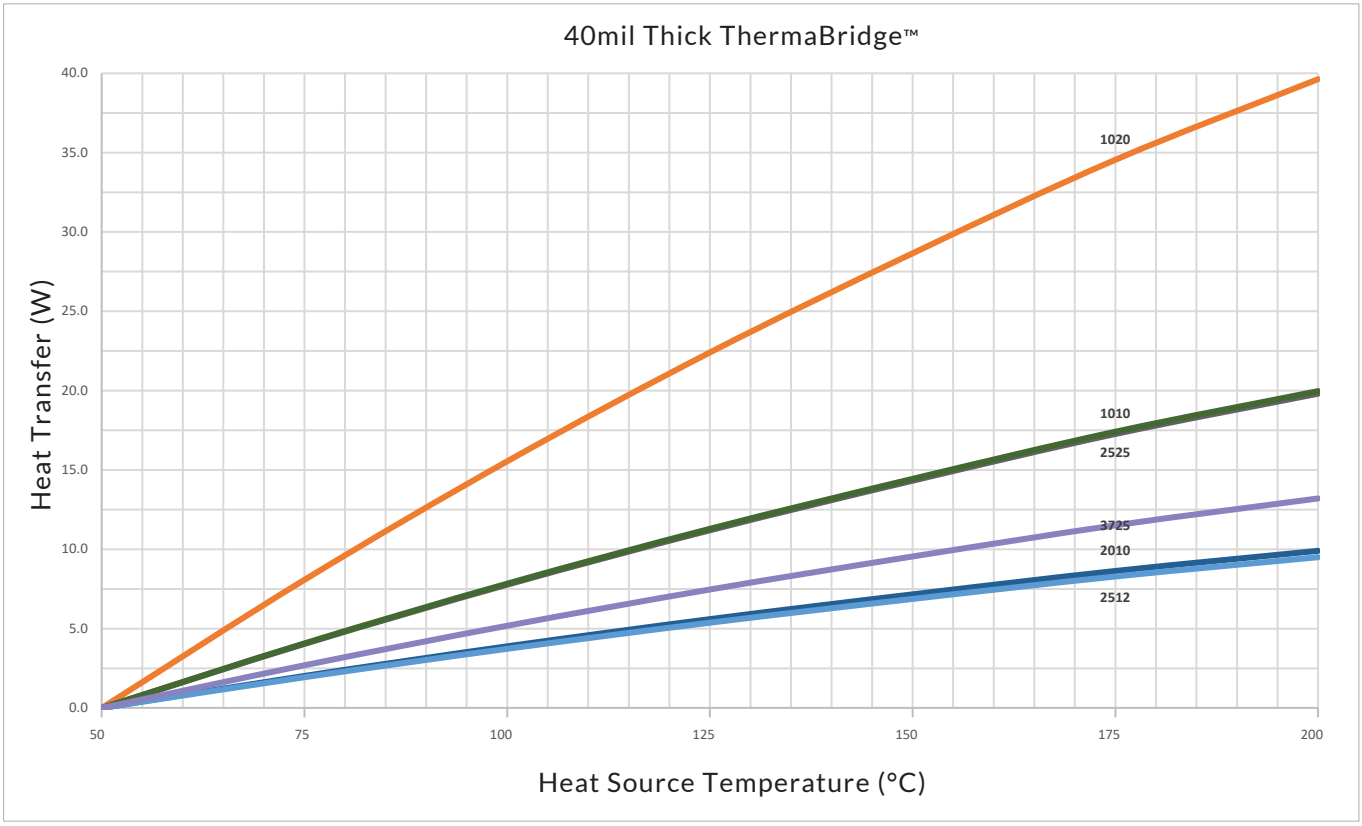
As part of thermal management practices, whenever possible designers find it advantageous to evaluate the thicknes and shortest part that might fit into their (new or existing) circuit layout.

HEAT TRANSFER ESTIMATES - 50°C STEADY STATE SINK TEMPERATURE

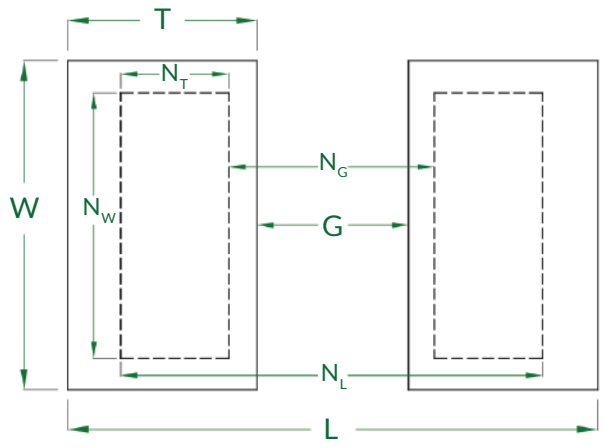


HEAT TRANSFER ESTIMATES - 50°C STEADY STATE SINK TEMPERATURE (CONT)





DIMENSIONS - NOMINAL TERMINALS



All dimensions in inches

SIZE	N_L	N_W	N_T	N_G
0203	.020	.030	.006	.020
0402	.040	.020	.011	.018
0505	.050	.050	.016	.018
0510	.050	.100	.016	.018
0603	.060	.030	.015	.030
0605	.060	.054	.015	.030
0612	.060	.120	.014	.032
0805	.080	.050	.021	.038
1005	.100	.050	.022	.056
1206	.126	.063	.022	.082
1010	.100	.106	.021	.058
1020	.100	.206	.021	.058
2010	.200	.100	.031	.138
2512	.250	.120	.045	.160
2525	.250	.150	.046	.158
3725	.375	.250	.066	.243

DIMENSIONS - PCB LANDING EXAMPLES

10MIL 'C' THICKNESS

SIZE	L	W	T	G
0203	.026	.036	.009	.008
0402	.050	.025	.018	.014

10mil thick 0203 only available with DS terminal style

15MIL 'D' THICKNESS

SIZE	L	W	T	G
0402	.054	.025	.020	.014
0505	.069	.058	.027	.013
0510	.069	.110	.028	.130
0603	.080	.038	.030	.020
0605	.078	.062	.028	.020
0612	.080	.130	.030	.020
0805	.100	.062	.035	.028
1005	.124	.066	.041	.040
1206	.150	.079	.041	.066
1010	.124	.122	.040	.042
1020	.130	.222	.043	.042
2010	.230	.116	.054	.120
2512	.280	.140	.069	.140
2525	.280	.274	.072	.134
3725	.411	.274	.095	.219

25MIL 'G' THICKNESS

SIZE	L	W	T	G
0505	.081	.058	.032	.013
0510	.081	.110	.034	.013
0603	.092	.039	.036	.020
0605	.090	.062	.034	.020
0612	.092	.130	.036	.020
0805	.112	.062	.041	.028
1005	.140	.066	.049	.040
1206	.166	.079	.049	.066
1010	.140	.122	.048	.042
1020	.146	.222	.051	.042
2010	.246	.116	.062	.120
2512	.296	.140	.077	.140
2525	.290	.274	.077	.134
3725	.419	.274	.103	.219

40MIL 'T' THICKNESS

SIZE	L	W	T	G
1010	.160	.122	.048	.042
1020	.160	.222	.051	.042
2010	.260	.116	.062	.120
2512	.310	.140	.077	.140
2525	.310	.274	.077	.134
3725	.439	.274	.103	.219