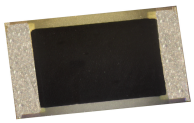
N-Series

High Power AℓN Thick Film Resistors

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

The IMS N-Series thick film high power chip resistors and chip terminations on aluminum nitride are ideal for most applications requiring high thermal conductivity in a small size package. AℓN is an ideal replacement for BeO with it's high power dissipation and no environmental or health hazards. Thick film technology provides a stable resistive element at a very affordable price.



FEATURES

- High stability thick film resistive element
- Very high power dissipation
- AℓN substrate material
- Tight TCRs
- Scrub cut available for maximum high power applications
- Maximum working voltage: E=√PR
- Non-magnetic
- Standard resistance range is 10Ω to 2KΩ* *(Other values available, contact IMS)*
- Standard tolerance is 2% or 5% *(Other tolerances available, contact IMS)*
- Operating temperature: -55°C to +150°C
- Ultra Leach Resistant terminals (ULR) available
- Aluminum Nitride Thermal Conductivity K=170 W/m-°K

** Max value for 0505 and reverse aspect sizes is 1K. Contact IMS for additional values.*

SPECIFICATIONS

ITEM	SPECIFICATION
Value Range:	10Ω to 2,000Ω*
Operating Temperature:	-55° to 150° C
Storage Temperature:	-65° to 150° C
Thermal Conductivity:	170 W/m-°K
Attachment:	Solder, Epoxy, Wirebondable
Electrostatic Sensitivity (ESD):	Class 3
End Of Life:	No E.O.L. Planned
Moisture Level:	Level 1

* For availability outside this range, contact IMS

DIMENSIONS

All dimensions are in inches

	PART	NOMINAL LENGTH	NOMINAL WIDTH	MAX HEIGHT 'C'	'D'	'G'	'T'
Standard	0402	.040	.020	.015	.020	N/A	N/A
	0505	.050	.050	.015	.020	.035	N/A
	0603	.060	.030	.015	.020	N/A	N/A
	0805	.080	.050	.015	.020	.035	N/A
	1005	.100	.050	.015	.020	.035	N/A
	1206	.126	.063	.015	.020	.035	N/A
	2010	.197	.098	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
Reverse Aspect	0510	.050	.100	.015	.020	.035	N/A
	1020	.098	.197	N/A	.020	.035	.050
	1225	.126	.025	N/A	.020	.035	.050

C=0.010" (available w/ size 0805 & smaller)
D=0.015"
G=0.025" (not available in 0402 and 0603 sizes)
T=0.040" (available w/ size 2010 & larger)

Modelithics simulated part

TERMINAL STYLE AVAILABILITY

	Part	WA	SS	SB	SG	SZG	CS	EW	EZW	DE	PW
Standard	0402	•	•	•	•	N/A	N/A	N/A	N/A	N/A	•
	0505	•	•	•	•	N/A	N/A	N/A	N/A	N/A	•
	0603	•	•	•	•	N/A	N/A	N/A	N/A	N/A	•
	0805	•	•	•	•	N/A	•	•	N/A	•	•
	1005	•	•	•	•	•	•	•	N/A	•	N/A
	1206	•	•	•	•	•	•	•	•	•	N/A
	2010	•	•	•	•	•	•	•	•	•	N/A
	2512	•	•	•	•	•	•	•	•	•	N/A
	2525	•	•	•	•	•	•	•	•	•	N/A
	3725	•	•	•	•	•	•	•	•	•	N/A
Reverse Aspect	0510	•	•	•	•	•	N/A	N/A	N/A	N/A	•
	1020	•	•	•	•	•	•	•	•	•	N/A
	1225	•	•	•	•	•	•	•	•	•	N/A

• Indicates Availability

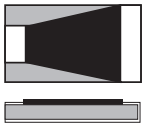
TERMINAL STYLES

WA - Wraparound

SS - Single Sided

SB - Single Sided w/ Backplane

SG - Single Wrap to Ground


SZG - Single Wrap to Ground w/ Tapered Resistor Element

SZG - Reverse Aspect Single Wrap to Ground w/ Tapered Resistor Element

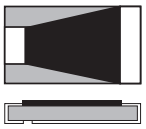
EZW - Reverse Aspect Extended Wrap w/ Tapered Resistor Element

CS - Center Stripe

EW - Extended Wrap

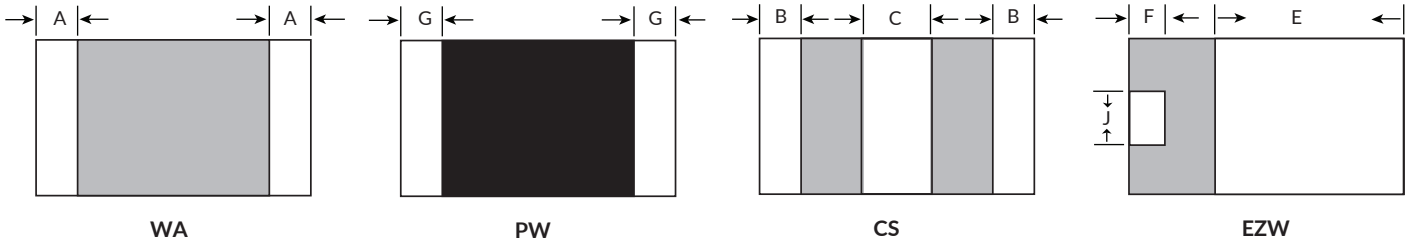
DE - Dual Extended

PW - Partial Wrap


EZW - Extended Wrap w/ Tapered Resistor Element

TERMINAL DIMENSIONS OF INSTALLED SURFACE

Attached Side



All dimensions are in inches (nominal)

Part	A	B	C	D	E	F	G	H	I	J	K	L
0402	.008	N/A	N/A	N/A	N/A	N/A	.009	.040	.020	N/A	N/A	N/A
0505	.017	N/A	N/A	N/A	N/A	N/A	.012	.050	.050	N/A	N/A	N/A
0603	.015	N/A	N/A	N/A	N/A	N/A	.009	.060	.030	N/A	N/A	N/A
0805	.022	.011	.018	.031	.049	.011	.011	.080	.050	N/A	N/A	N/A
1005	.022	.013	.025	.038	.063	.013	N/A	.100	.050	.025	.013	.013
1206	.018	.018	.038	.051	.082	.019	N/A	.126	.063	.025	.013	.023
2010	.031	.031	.078	.084	.136	.031	N/A	.197	.098	.050	.022	.033
2512	.045	.045	.100	.110	.175	.045	N/A	.250	.120	.060	.029	.045
2525	.045	.045	.100	.110	.175	.045	N/A	.250	.250	.098	.042	.042
3725	.065	.065	.165	.167	.270	.065	N/A	.375	.250	.100	.042	.065
0510	.017	N/A	N/A	N/A	N/A	N/A	.012	.050	.100	.024	.012	.019
1020	.022	.014	.025	.038	.061	.014	N/A	.100	.200	.025	.013	.013
1225	.019	.019	.038	.050	.083	.019	N/A	.125	.250	.050	.020	.018

Modelithics simulated part

A Word About Thermal Management

The below power capacities assume WA terminal style and application where the steady-state baseplate temperature of the chip is maintained at or below the values identified in the below table and the maximum film temperature did not exceed 150°C. The data also shows that the ratio of temperature rise versus power applied increases with increasing chip size (for a given thickness) so the criteria should be carefully considered when using larger chips. As with any application, actual performance of these chips will depend on a host of circuit dependent parameters.

STANDARD PRODUCT

Thickness		0.010" (C)			0.015" (D)			0.025" (G)			0.040" (T)		
Baseplate Temp		50°C	75°C	100°C	50°C	75°C	100°C	50°C	75°C	100°C	50°C	75°C	100°C
Item Size	0402	13W	11W	7.1W	8.8W	7.3W	4.7W	N/A	N/A	N/A	N/A	N/A	N/A
	0505	45W	37W	24W	30W	25W	16W	20W	16W	10W	N/A	N/A	N/A
	0603	24W	20W	13W	16W	13W	8.7W	N/A	N/A	N/A	N/A	N/A	N/A
	0805	75W	55W	37W	50W	37W	25W	30W	25W	16W	N/A	N/A	N/A
	1005	90W	70W	45W	60W	48W	30W	40W	30W	20W	N/A	N/A	N/A
	1206	150W	125W	80W	105W	85W	55W	70W	55W	35W	N/A	N/A	N/A
	2010	N/A	N/A	N/A	150W	120W	75W	90W	75W	48W	60W	48W	30W
	2512	N/A	N/A	N/A	200W	150W	100W	120W	100W	60W	70W	60W	38W
	2525	N/A	N/A	N/A	400W	300W	200W	240W	190W	120W	150W	120W	75W
	3725	N/A	N/A	N/A	640W	500W	340W	380W	310W	200W	250W	200W	125W

**WA terminal style*

Z Power Product

In high power high frequency applications, IMS offers Z Power resistors as either a termination or feed through component. Utilizing a high precision scrub cut and tapered resistor body also available in reverse aspect ratio, Z Power resistors achieve improved frequency response and equivalent power capabilities in the same footprint. For more information regarding the features and benefits of Z Power please refer to the Whitepaper "Z Power Resistors – High Power and High Frequency without Compromise" on our website in the Tech Info section.

Power density of L-cut (left) and scrub cut (right) resistor elements.

Substrate Thickness D=0.015"

Size	Max Frequency -15dB RL²	Power Rating¹ 50°C	75°C	100°C
0510	20 GHz	19W	14W	9.5W
1005	8.0 GHz	25W	19W	12W
1020	10 GHz	120W	90W	60W
1225	4.5 GHz	66W	50W	33W
2010	4.0 GHz	116W	87W	58W
2512	3.5 GHz	190W	140W	95W
2525	4.0 GHz	427W	320W	213W
3725	1.5 GHz	391W	293W	195W

Substrate Thickness C=0.010"

Size	Max Frequency -15dB RL²	Power Rating¹ 50°C	75°C	100°C
0510	18 GHz	28W	21W	14W
1005	7.0 GHz	37W	28W	19W
1020	8.0 GHz	180W	135W	90W
1206	7.2 GHz	74W	56W	37W
2010	5.5 GHz	174W	131W	87W

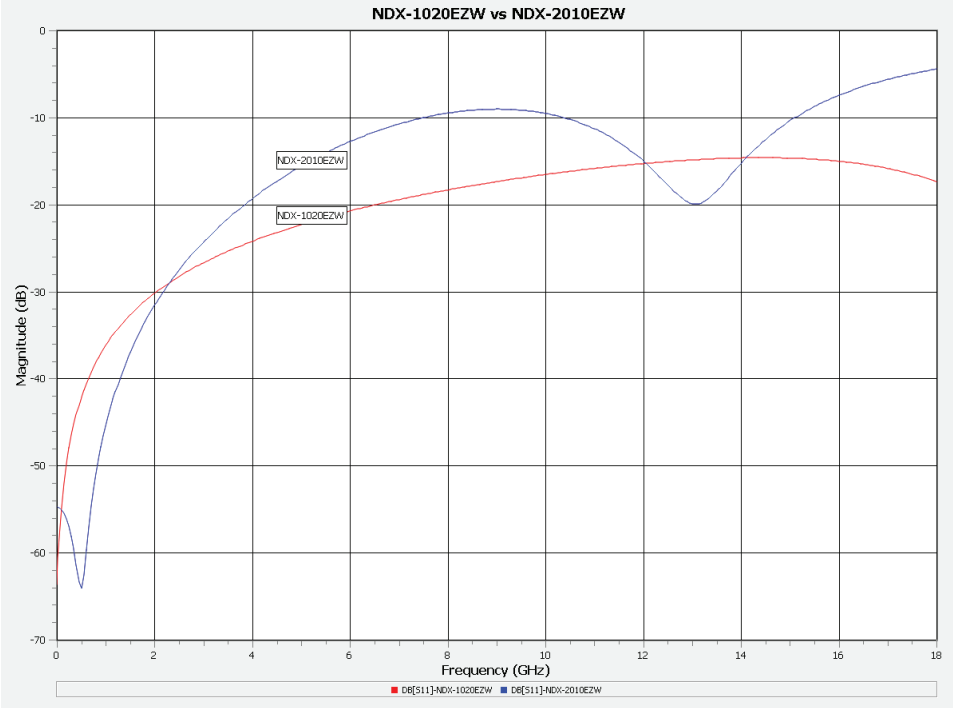
Modelithics simulated part

1. Maximum theoretical power ratings assume entire metalized termination footprint (SZG) is in contact with thermally conductive baseplate where ΔT = 150°C ~ T where T is the maintained baseplate/groundplane temperature.

2. -15dB return loss and frequency range assume ideal circuit matching where input pad is matched to 50Ω line.

Z POWER CASE STUDY

Return loss plots for the 50Ω Z-power terminations demonstrate the RF performance (S11) of a reverse aspect 1020EZW termination resistor compared to a 2010 EZW component. Simulated return loss plots assume terminations are mounted on a contiguous Rogers 4350B PCB with a 50Ω microstrip line whose width matches the components input pad.



Performance will vary with circuit parameters and is subject to customer verification.

ORDERING INFORMATION

Example: 33Ω, 2%, 2010 scrub cut trim resistor on 0.015" substrate with PtAg CS style terminal

N D 3 - 2010 S CS 33R0 G

Substrate Thickness
C - 0.010" G - 0.025"*
D - 0.015" T - 0.040"

Terminal Material
☑ - 3 PtAg
☑ - 7 Au over PtAu[1]
☑ - 8 ULR PtAg
C PtAg w/ Sn62 Solder
☑ - P PtAg w/ Sn96 Solder
H ULR PtAg w/ Sn62 Solder
☑ - R ULR PtAg w/ Sn96 Solder

Case Size

0402	0505	0510	0603	0805
1005	1020	1206	1225	
2010	2512	2525	3725	

Trim Method
Leave blank for normal
S=Scrub Cut
Scrub cut is inherent for SZG & EZW

Style

WA	SB	CS	DE	PW
SS	EW	EZW	SZG	SG

Resistance value
The first three digits are significant values. The fourth is the number of zeros following. The R indicates a decimal point when resistance value is less than 100Ω.

Tolerance
G - 2% J - 5%

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Modelithics simulated part (1020 EZW)

For packaging options please visit our website www.ims-resistors.com/packaging
RoHS Compliant = ☑
ULR = Ultra Leach Resistant

ULR HI PWR RoHS
Sn62 NON-MAG BONDABLE

1. Au over PtAu terminal metalization available on Single Sided (SS), Single Sided with Backplane (SB) and Single Wrap to Ground (SG) only. The NX7- Single Wrap to Ground style features bondable terminal on input pad only, ground pad in PtAu.

** G thickness not available in 0402 and 0603 sizes.*