# PRODUCT INFORMATION

- Resistors
- RF Terminations
- Thermal Transfer Devices
- Fixed Attenuators
- Temperature Variable Attenuators
- Power Splitters & Couplers

International Manufacturing Services, Inc.
www.ims-resistors.com

# International Manufacturing Services, Inc. (IMS)
# is the Primary Source for Innovative Passive Components

We meet and exceed customer expectations with our quality, value, service and industry leading material management.

## HISTORY

Since 1974, IMS has been a global leader offering thick and thin film electronic components including: resistors, thermal management devices, attenuators, RF terminations, splitters, and couplers.

## INNOVATION

Our most innovative products are created as a result of close partnering and professional consultation with our customers, culminating in high quality custom solutions with short design lead times.

## DELIVERY

We maintain a substantial inventory of standard components for shipment.

## QUALITY

IMS, an AS9100D, ISO-9001:2015 registered company, maintains superior and comprehensive quality control assuring that our products conform to the highest standards. We offer additional testing services, including 100% Value/Visual and Thermal Shock.

## SERVICE

Our dedicated and knowledgeable staff is always here to assist with creating the optimal solution for your application. In addition, IMS maintains a global network of representatives and distributors who can meet with you face to face to help with problem solving.

## FLEXIBILITY

With design, development, manufacturing, sales and management personnel under one roof, IMS is positioned to respond quickly and effectively.

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# Products by Industry

## MEDICAL

Medical applications demand precision, quality, non-ferroresonant, and often micro and high voltage products to deliver the next generation devices.

- Non-Magnetic for MRI applications
- Small Package Sizes available 0201 and 01005
- Ultra Leach Resistant (ULR) metallization
- RoHS compliant options for all products

**TPI SERIES**
*Thin Film Nickel Barrier Resistors*

**A SERIES**
*Thin Film Attenuators*

**RCI SERIES**
*Thick Film Nickel Barrier Resistors*

**HVI SERIES**
*High Voltage Resistors*

**RCX SERIES**
*Resistors for RF, Microwave and Low PIM*

**N-SERIES**
*High Power AlN Resistors*

## AEROSPACE

IMS offers all products suitable for aerospace applications, but can also be customized for common requirements such as:

- Satellite Communications
- Commercial Space Applications
- 100% Value Testing

**N-SERIES**
*High Power AlN Resistors*

**ThermaBridge™**
*Thermal Management Device*

**AV-0805 & AV-0607**
*Temperature Variable Attenuators*

**IAX SERIES**
*Thick Film Attenuators*

## COMMUNICATIONS

IMS offers all products suitable for communication applications. Supporting the earthbound, airborne, underwater systems that make up the telecommunications infrastructure, base stations, transmission towers, satellites, submarine communications, line cards and mesh networks.

**N-SERIES**
*High Power AlN Resistors*

**A SERIES**
*Thin Film Attenuators*

**AV-0805 & AV-0607**
*Temperature Variable Attenuators*

**RCX SERIES**
*Resistors for RF, Microwave and Low PIM*

**IPS & IPT SERIES**
*Broadband Resistive Splitters*

## DEFENSE

IMS offers all products suitable for military and aerospace applications, but can also be customized for common requirements such as:

- 100% Value Testing
- Sn62 Leaded Solder Pre-Tin Option
- Application Support for Thermal Management Devices Available

**N-SERIES**
*High Power AlN Resistors*

**ThermaBridgeTM**
*Thermal Management Device*

**RCX PW SERIES**
*Resistors for RF & Microwave and Low PIM*

**IPS & IPT SERIES**
*Broadband Resistive Splitters*

**IAX SERIES**
*Thick Film Attenuators*

## INSTRUMENTATION

IMS offers a full complement of resistor and attenuator solutions for applications where data integrity and signal fidelity are integral in the design. IMS resistors can be offered from under 1 ohm to over 1 Trillion Ohms. The “High Megaohm” products are common to be seen in applications for metering devices.

**N-SERIES**
*High Power AlN Resistors*

**ThermaBridge™**
*Thermal Management Device*

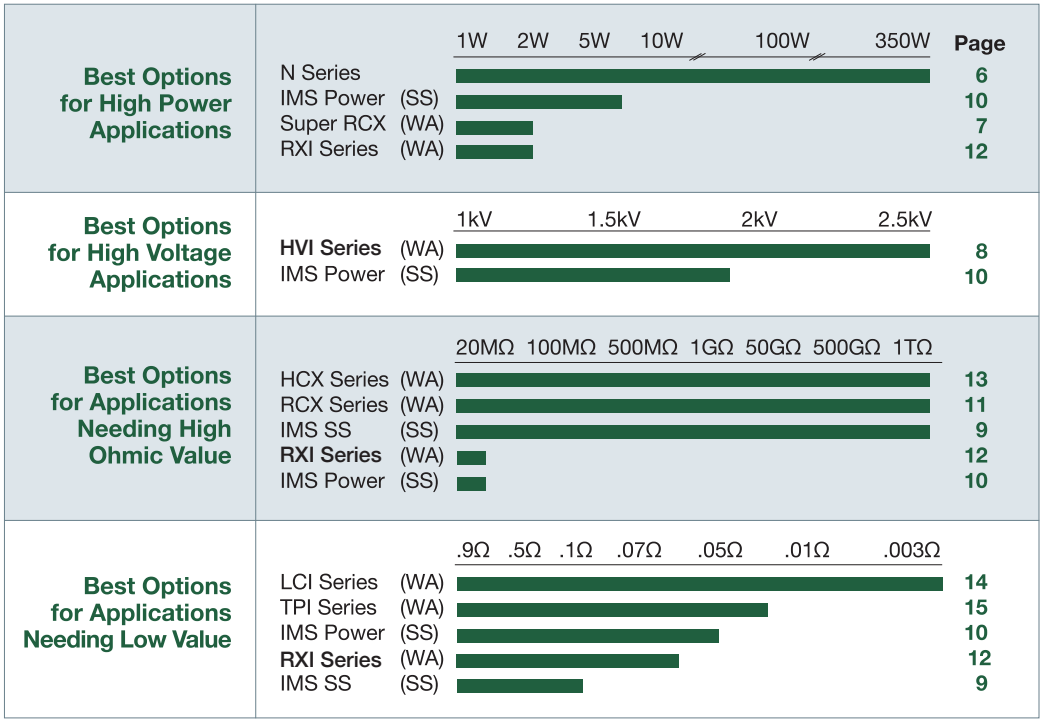
**IPS & IPT SERIES**
*Broadband Resistive Splitters*

**RCX SERIES**
*Resistors for RF, Microwave and Low PIM*

**RCI**
*Thick Film Nickel Barrier Resistors*

**A SERIES**
*Thin Film Attenuators*

# QUICK SELECTION GUIDE




# ATTACHMENT GUIDE

(Additional Terminal Materials Available)

| Attachment Method | Material Code |
|---|---|
| Tin Solder | **3, 8*, C, D, P, H*, R*, Q** |
| Gold Eutectic Solder | **1, 4, 7** |
| Epoxy | **1, 3, 4, 7, 8*** |
| Gold Wirebond | **1, 4, 7** |
| Aluminum Wirebond | **4** |

| Material Code | Terminal Material |
|---|---|
| **1** | Au |
| **3, 8*** | PtAg |
| **C, H*** | Sn62 over PtAg |
| **P, R*** | Sn96 over PtAg |
| **4** | PtAu |
| **D** | Sn62 over PtAu |
| **7**** | Input pad - Au over PtAu |
| | Backplane - PtAu |
| **Q** | Sn96 over PtAu |

*Ultra Leach Resistant PtAg (ULR)

**Available on AlN substrate products only.

Look for these buttons to help quickly identify key product attributes!

RoHS COMPLIANT · ULR · HI-OHM · HI PWR · RoHS · Sn62 · NON-MAG · LOW TCR · BONDABLE · KIT

Modelithics® Vendor Partner

AℓN Ceramic Thermal Transfer Devices

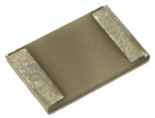
# ThermaBridge™

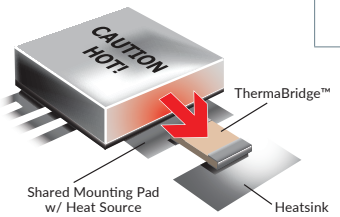
The **ThermaBridge™** provides the user with a simple, cost effective way to manage thermal issues at the board level. ThermaBridge™ moves heat from one area to another through an electrically isolated, thermally conductive ceramic chip device with metallized terminals.

- Electrically Isolated Thermal Conductor
- Thermal Design Tool
- Passive Thermal Control
- Extends Component Life
- Dramatic Temperature Reduction
- Epoxy or Solder Mountable

**Applications include:**

- RF Amplifiers
- Heat Sensing
- Conduction Cooled Computers
- Power Supplies & Converters
- JTRS, MIDS-J, GMR
- Temperature Controlled Oscillators
- Extracting Heat from Power FETS, LEDs, Pin & Laser Diodes
- Lighting Ballasts
- Protecting Neighboring Components
- Conduction Cooled Handheld Devices
- P25 Radios, Basestations & Repeaters
- Electrically Isolated Thermal Coupling
- Transformers



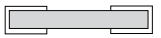



**SAMPLE PN:** B G 3 - 0805WA (0805 size, 0.025" Thickness ThermaBridge™, PtAg Terminals)

| PN Prefix | Thickness | Term Metals | Sizes | | | Configuration |
|---|---|---|---|---|---|---|
| B | C = 0.010"[1]<br>D = 0.015"<br>G = 0.025"[2]<br>T = 0.040"[3] | 3- PtAg<br>8- ULR PtAg<br>C- PtAg with Sn62 Solder<br>H- ULR PtAg with Sn62 Solder<br>P- PtAg w/ Sn96 Solder<br>R- ULR PtAg with Sn96 RoHS Solder | 0203** | 0612 | 2010 | **WA**= Wraparound<br>***DS**= Double sided without wrap |
| | | | 0402 | 0805 | 2512 | |
| | | | 0505 | 1005 | 2525 | |
| | | | 0510 | 1206 | 3725 | |
| | | | 0603 | 1010 | | |
| | | | 0605 | 1020 | | |

[1] Available in sizes 0203, 0402
[2] Available in sizes 0505 and larger
[3] Available in sizes 1010 and larger

Standard Sizes (Custom Sizes Available)
*DS only available in termination material 8, H & R
**0203 available in DS only



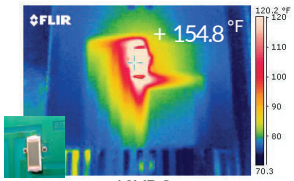
**WA**
Wraparound

**DS**
Double sided

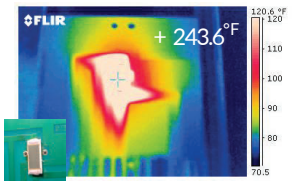

### Thermal Image Heat Transfer Demonstration

Below is an actual test 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™

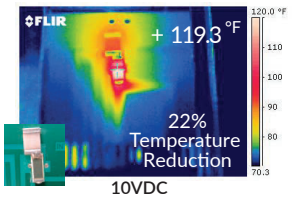



10VDC

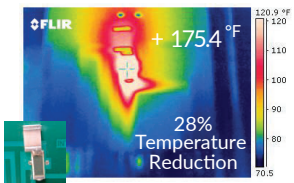



15VDC

With ThermaBridge™




10VDC




15VDC

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

AℓN Ceramic Thermal Transfer Devices

# ThermaPlane™

The **ThermaPlane™** uses the same concept as the ThermaBridge™ and consists of a high thermal conductivity ceramic with metallization on the top and bottom of the device.

- Electrically Isolated Thermal Conductor
- Thermal Design Tool
- Passive Thermal Control
- Extends Component Life
- Dramatic Temperature Reduction
- Epoxy or Solder Mountable

**Applications include:**

- RF Amplifiers
- Heat Sensing
- Transceivers
- Extracting Heat From Processors & Pin Diodes
- Transformers
- Power Supplies & Converters

**SAMPLE PN:** P D 3 - 2010 OS (2010 size, 0.015" Thickness ThermaPlane™, PtAg One Side)

| Prefix | Thickness | Metals | Sizes | | Configuration |
|---|---|---|---|---|---|
| **P** | **D** = 0.015"[1]<br>**G** = 0.025"<br>**T** = 0.040"[2]<br><br>[1] Available in sizes 2512 and smaller.<br><br>[2] Available in 2010 and larger. | ✓ **3-** PtAg<br>✓ **7-** Au over PtAu<br>✓ **8-** ULR PtAg<br>**C-** PtAg with Sn62 Solder<br>**H-** ULR PtAg with Sn62 Solder<br>✓ **P-** PtAg w/ Sn96 Solder<br>✓ **R-** ULR PtAg with Sn96 RoHS Solder | 0505 | 2010 | **OS** = One Sided<br>**DS** = Double Sided |
| | | | 0805 | 2512 | |
| | | | 1005 | 2525 | * Custom Sizes Available |
| | | | 1206 | 3725 | |

**OS**
One sided

**DS**
Double sided

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

## High Power AlN Resistors

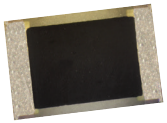
# N-Series

The **N-Series** resistors on AlN suit applications which require high power dissipation in a small size. The N-Series allows users to tailor the device to their specific power requirements with the choice of four thicknesses.

- Applications up to 20GHz†
- High Power Dissipation‡
- Sn62 Solder Available
- Non-Magnetic

**Applications Include:**

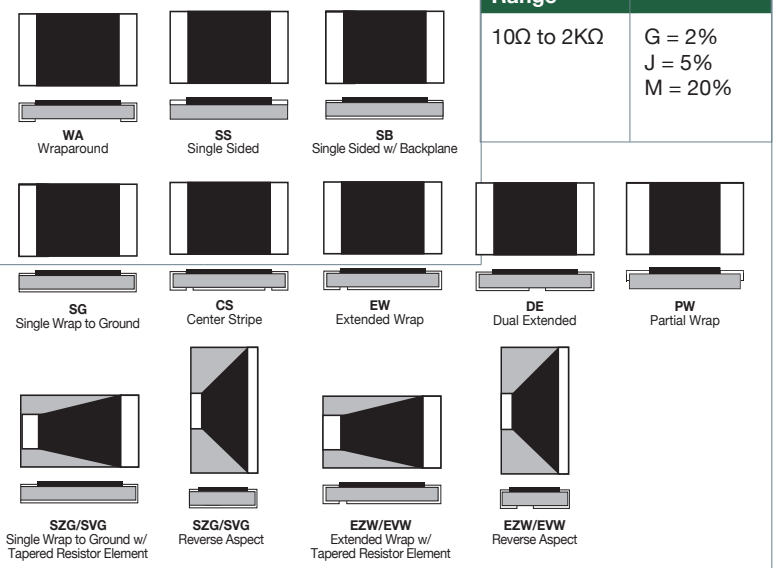
- Amplifier Circuits
- Power Converters
- Test & Measurement
- Handheld Devices



**SAMPLE PN:** N D 3 - 0510 SWA 1000 J (0510 size, 0.015" Thickness 100Ω, 5%, Scrub Cut, PtAg Terminals)

| PN Prefix | Thickness | Term Metals | Sizes* | Trim |
|---|---|---|---|---|
| N | C = 0.010"[1]<br>D = 0.015"<br>G = 0.025 "[2]<br>T = 0.040"<br>[1] Available with sizes 0402, 0505, 0603, 0805, 0510, 1005, 1206<br>[2] Not available with sizes 0402, 0603 | 3-PtAg ✓<br>7-Au over PtAu[1] ✓<br>8-ULR PtAg ✓<br>C-PtAg with Sn62 Solder<br>P-PtAg ✓ with Sn96 Solder<br>H-ULR PtAg with Sn62 Solder<br>R-ULR PtAg ✓ with Sn96 Solder | 0402<br>0505<br>0510<br>0603<br>0805<br>1005<br>1020<br>1206<br>1225<br>2010<br>2512<br>2525<br>3725 | S = Scrub Cut<br>Leave blank for normal<br>Scrub cut is inherent for SZG & EZW |

**Terminal Styles**




*SVG and EVW indicate a trimless resistor element (20% tolerance)*

| Value Range◊ | Tolerances |
|---|---|
| 10Ω to 2KΩ | G = 2%<br>J = 5%<br>M = 20% |

CS, EW, DE available in sizes 0805 and higher
PW available in sizes 0805 and lower
SZG/SVG/EZW/EVW available in sizes 0510 and higher
SVG/EVW indicate a trimless resistor element (20% tolerance)
Reverse aspect ratios available for most sizes

**Power Ratings by Size and Thickness ‡**

| Thickness | | 0.010" (C) | | | 0.015" (D) | | | 0.025" (G) | | | 0.040" (T) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Baseplate Temp | | 50C | 75C | 100C | 50C | 75C | 100C | 50C | 75C | 100C | 50C | 75C | 100C |
| 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 | 10W | 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 |

Assumed resistor max temp 150°C. Thermal Management is crucial for the operation of these devices. Please visit our website for more information.

† Performance based on mounting in matched continuous 50Ω system with proper application of RF principles.

◊ First 3 digits of value code are significant value. The 4th is the number of zeros following. An 'R' indicates a decimal when resistance is under 100Ω
For value under 10Ω contact IMS.

‡ Proper thermal management required

RoHS COMPLIANT

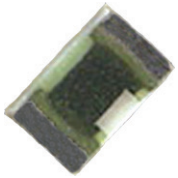
Modelithics data available

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

Extended Power
Wraparound Resistors

# Super RCX Series

- Extra Power Density in the Same Footprint
- Not Limited to EIA Standard Values
- Sn62 Solder Available
- Non-Magnetic



**SAMPLE PN:** RC3 - 0805S - 11R4 J (Extended Power 0805 Size, 11.4Ω, 5%, PtAg terminals)

| Attachment/ Term Metal | Size | Rated Power† | Max RCW Voltage | Value Range◊ |
|---|---|---|---|---|
| ✓ **RC3**-PtAg Wraparound | 0402S* | 160mW | 50VDC | 10Ω to 1MΩ |
| ✓ **RC8-ULR** PtAg Wraparound | 0603S | 200mW | 50VDC | 10Ω to 1MΩ |
| **RCC**-PtAg Wraparound with Sn62 Solder | 0805S | 350mW | 150VDC | 10Ω to 1MΩ |
| **RCH-ULR** PtAg Wraparound with Sn62 Solder | 1206S | 500mW | 200VDC | 10Ω to 1MΩ |
| ✓ **RCP**-PtAg Wraparound with Sn96 Solder | 2010S | 1W | 200VDC | 10Ω to 1MΩ |
| ✓ **RCR-ULR** PtAg Wraparound with Sn96 Solder | 2512S | 2W | 200VDC | 10Ω to 1MΩ |

| Tolerance Ranges | |
|---|---|
| F = 1% | 10Ω to 1MΩ* |
| G = 2% | 10Ω to 1MΩ |
| J = 5% | 10Ω to 1MΩ |
| K = 10% | 10Ω to 1MΩ |

* 0402S not available in 1% tolerance.

† Free air rated at 70°C
◊ First 3 digits of value code are significant value. The 4th is the number of zeros following. An 'R' indicates a decimal when resistance is under 100Ω.

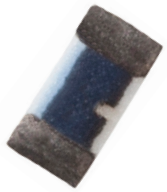
RoHS COMPLIANT · ULR · RoHS · Sn62 · NON-MAG

## Resistors Optimized for RF & Microwave

# RCX Partial Wrap Series

- Improved Frequency Response
- Characterized to 40GHz †
- Sn62 Solder Available
- Non-Magnetic
- Improved Performance to 40GHz (0302 Size)

This design allows visual inspection of the terminal joint connection when mounted face down.



**SAMPLE PN:** RCC - 0402PW - 50R0 J (0402 Size, 50Ω, 5%, PtAg w/ Solder Partial Wrap Terminals)

| PN Prefix | Size | Frequency† | Rated Power** | Value Range◊ | Tolerances |
|---|---|---|---|---|---|
| ✓ **RC3**-PtAg Partial Wrap | 0302PW | To 40GHz | 63mW | 10Ω to 10KΩ | F = 1%<br>G = 2%<br>J = 5% |
| ✓ **RC8-ULR** PtAg Partial Wrap | 0402PW | To 36GHz | 80mW | | |
| **RCC**-PtAg Partial Wrap with Sn62 Solder | 0502PW | To 26.5GHz | 100mW | | |
| ✓ **RCP**-PtAg Partial Wrap with Sn96 Solder | 0603PW | To 15GHz | 100mW | | |
| ✓ **RC4**-*PtAu Partial Wrap | 0805PW | To 8GHz | 175mW | | |
| **RCD**-*PtAu Partial Wrap with Sn62 Solder | | | | | |
| **RCH-ULR** PtAg Partial Wrap with Sn62 Solder | | | | | |
| ✓ **RCQ**-*PtAu with Sn96 Solder | | | | | |
| ✓ **RCR-ULR** PtAg Partial Wrap with Sn96 Solder | | | | | |

**PW**
Partial Wrap

* Applies to 0302 only.
◊ Other Values Available. Contact factory.
† Based on smallest size & mounting in matched continuous 50Ω system with proper application of RF principles.
** Rated at 70°C free air temperature.

Modelithics data available

RoHS COMPLIANT | ULR | RoHS | Sn62 | NON-MAG | KIT

## High Voltage Surface Mount Chip Resistors

# HVI Series

- High Rated Continuous Working Voltage
- High Stability Thick Film Resistor Element
- 96% $Al_2O_3$ Substrate Material Provides Excellent Solder Leach Resistance
- Trimmed to EIA Standard Values
- Tolerances to ± 1%
- Passivated Resistor Element
- Available in Cut Tape or on Tape and Reel Packaging

**Applications Include:**
- Power Supplies
- Power Converters
- Defibrillators
- Pacemakers
- Power Metering Devices

**SAMPLE PN:** HVI - 2010 - 4005 J (2010 Size, 40 MegΩ, 5%)

| Attachment/ Term Metal | Size | Rated Power† | Max RCW Voltage[1] | Max Overload Voltage[1] | Value Range F = 1% Tolerance | Value Range J = 5% Tolerance |
|---|---|---|---|---|---|---|
| ✓ **HVI** | 0402 | 62.5mW | 100V | 200V | 39K to 10MΩ | 39K to 100MΩ |
| | 0603 | 100mW | 200V | 400V | 56K to 10MΩ | 56K to 100MΩ |
| | 0805 | 125mW | 400V | 800V | 100K to 10MΩ | 100K to 100MΩ |
| | 1206 | 250mW | 500V | 1kV | 100K to 10MΩ | 100K to 100MΩ |
| | 2010 | 500mW | 2kV | 3kV | 51K to 20MΩ | 51K to 100MΩ |
| | 2512 | 1W | 3kV | 4kV | 30K to 20MΩ | 30K to 100MΩ |

Nickel barrier layer with 100% matte finish

**WA**
Wraparound

[1] Operating Voltage = √(P*R) or Max RCW Voltage, whichever is lower.
† Free air rated at 70°C.
◊ First 3 digits of value code are significant value. The 4th is the number of zeros following. An 'R' indicates a decimal when resistance is under 100Ω.
* Not all values are available in all tolerances. See datasheet on the website.

RoHS COMPLIANT | HI-OHM | RoHS | Sn62 | NON-MAG

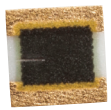
Single-Sided Resistors

# IMS Single Sided

- Gold Terminals Provide Excellent Wire Bondability
- Ultra High Resistance Available
- PtAg or PtAg with Sn62 Solder Available
- Non-Magnetic PtAg Great for Epoxy Attachment

Larger bond pads and optional metallized backplane are available.

**This series is ideal for hybrids and microstrip circuits.**



**SS**
Single Sided

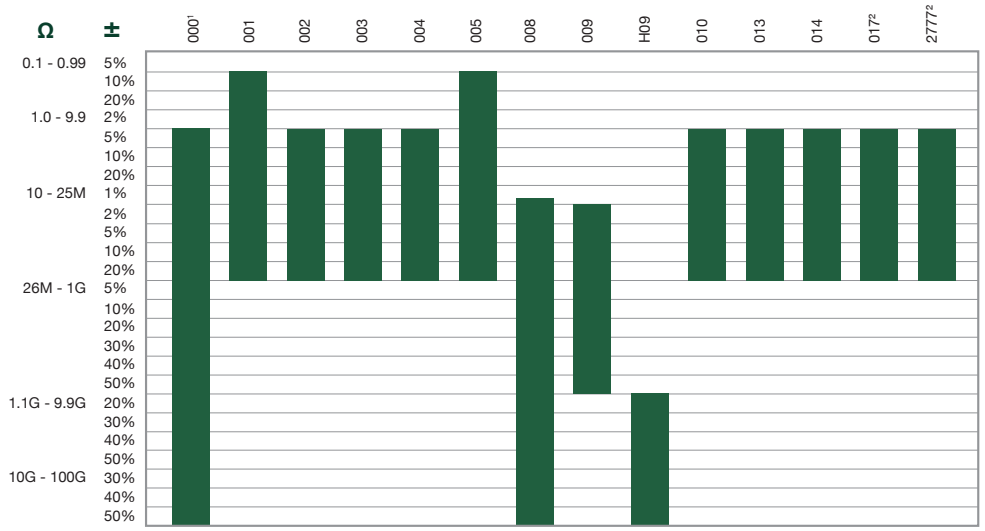
**SB**
Single Sided
W/ Backplane

**SAMPLE PN:** IMS000 - 1 B - 2001 J (0.045" x 0.030" Size, 2KΩ, 5%, Au Terminals w/ Backplane)

| PN Prefix | Size (inches) | Rated Power† | Max RCW Voltage | Term Metal | Backplane (optional) | Value Range◊ |
|---|---|---|---|---|---|---|
| IMS017[1] | 0.025 x 0.030 | 30mW | 40VDC | -1 ✓ Au Single-sided | B-Backplane "SB" style | 1Ω to 25MΩ |
| IMS000 | 0.045 x 0.030 | 125mW | 60VDC | | | 1Ω to 1TΩ |
| IMS001 | 0.050 x 0.050 | 125mW | 60VDC | -3 ✓ PtAg Single-sided | Omit for "SS" style | 0.1Ω to 25MΩ |
| IMS014[1] | 0.035 x 0.035 | 125mW | 50VDC | | | 1Ω to 25MΩ |
| IMS002 | 0.075 x 0.050 | 175mW | 100VDC | | | 1Ω to 25MΩ |
| IMS009 | 0.080 x 0.050 | 175mW | 150VDC | -C PtAg Single-sided with Sn62 Solder | | 10Ω to 1GΩ |
| IMSH09[2] | 0.080 x 0.050 | 175mW | 150VDC | | | 1.2GΩ to 1TΩ |
| IMS008 | 0.100 x 0.025 | 100mW | 175VDC | -P ✓ PtAg Single-sided with Sn96 Solder | | 10Ω to 1TΩ |
| IMS003 | 0.100 x 0.050 | 250mW | 160VDC | | | 1Ω to 25MΩ |
| IMS010 | 0.125 x 0.050 | 250mW | 230VDC | | | 1Ω to 25MΩ |
| IMS004 | 0.150 x 0.050 | 350mW | 350VDC | | | 1Ω to 25MΩ |
| IMS005 | 0.100 x 0.100 | 500mW | 160VDC | | | 0.1Ω to 25MΩ |
| IMS013[1] | 0.045 x 0.030 | 125mW | 60VDC | | | 1Ω to 25MΩ |
| IMS2777[1] | 0.030 x 0.020 | 30mW | 40VDC | | | 1Ω to 25MΩ |

**Tolerance Ranges***

F = 1% 1Ω to 25MΩ
G = 2% 1Ω to 25MΩ
J = 5% 1Ω to 200MΩ
K = 10% 1Ω to 1GΩ[2]
M = 20% 1Ω to 100GΩ[2]
N = 30% 1.2GΩ to 1TΩ[2]
P = 40% 1Ω to 100GΩ
R = 50% 1.2GΩ to 1TΩ




*Jumpers are available in all sizes.*

1. Larger bond pads available for auto wirebonding.
2. Highest Value for 1% or 2% Tolerance is 1MΩ.

1. Available with Au (-1) terminals only.
2. Available in 10% and higher tolerances only
*1%, 2% not available over 1Mohm.

† Free air rated at 70°C.

◊ First 3 digits of value code are significant value. The 4th is the number of zeros following. An 'R' indicates a decimal when resistance is under 100Ω. For 1Teraohm use code 1.0T (if available).

RoHS COMPLIANT | HI-OHM | RoHS | Sn62 | NON-MAG | BONDABLE

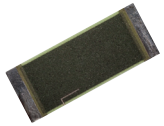
## High Power Single-Sided Alumina Resistors

# IMS Power Series

- High Power Dissipation
- Sn62 Solder Available
- Non-Magnetic

Optional metallized backplane is available on all sizes.

**For Higher Power Options See Page 6**



**SAMPLE PN:** IMS204 - C - 12R0 J (0.440" x 0.180" Size, 12Ω, 5%, PtAg w/ Sn62 Solder Terminals)

| PN Prefix | Length | | Width | | Rated Power† | Max RCW Voltage | Term Metal | Value Range◊ | Tolerance Ranges |
|---|---|---|---|---|---|---|---|---|---|
| IMS024 | 0.240 | +.008 -.002 | 0.120 | +.008 -.002 | 1W | 350VDC | -1 ✓ Au Single-sided<br>-3 ✓ PtAg Single-sided<br>-C PtAg Single-sided with Sn62 Solder<br>-P ✓ PtAg Single-sided with Sn96 Solder | 1Ω to 20MΩ | F = 1% 1Ω to 20MΩ<br>G = 2% 1Ω to 20MΩ<br>J = 5% 1Ω to 20MΩ<br>K = 10% 0.05Ω to 20MΩ |
| IMS026* | 0.120 | +.008 -.002 | 0.240 | +.012 -.008 | 1W | 1VDC | | 0.05Ω to 1Ω | |
| IMS202 | 0.360 | +.008 -.002 | 0.140 | +.008 -.002 | 2W | 800VDC | | 1Ω to 20MΩ | |
| IMS204 | 0.440 | +.008 -.002 | 0.180 | +.008 -.002 | 4W | 1100VDC | | 1Ω to 20MΩ | |
| IMS206 | 0.520 | +.008 -.002 | 0.215 | +.008 -.002 | 6W | 1400VDC | | 1Ω to 20MΩ | |
| IMS208 | 0.560 | +.008 -.002 | 0.240 | +.008 -.002 | 8W | 1500VDC | | 1Ω to 20MΩ | |
| IMS210 | 0.620 | +.008 -.002 | 0.270 | +.008 -.002 | 10W | 1800VDC | | 1Ω to 20MΩ | |

*IMS026 available < 1Ω and 10% tolerance only.

† Free air rated at 70°C.

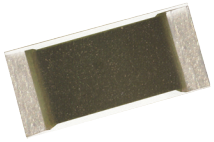
◊ First 3 digits of value code are significant value. The 4th is the number of zeros following. An 'R' indicates a decimal when resistance is under 100Ω. For 1Teraohm use code 1.0T (if available).

RoHS COMPLIANT · HI PWR · RoHS · Sn62 · NON-MAG · BONDABLE

## Full Wrap & Single Wrap to Ground Resistors

# RCX Series

- Values from 1Ω to 1TΩ
- Not Limited to EIA Standard Values
- Sn62 Solder Available
- Non-Magnetic



**SG**
Single Wrap to Ground

**WA**
Wraparound

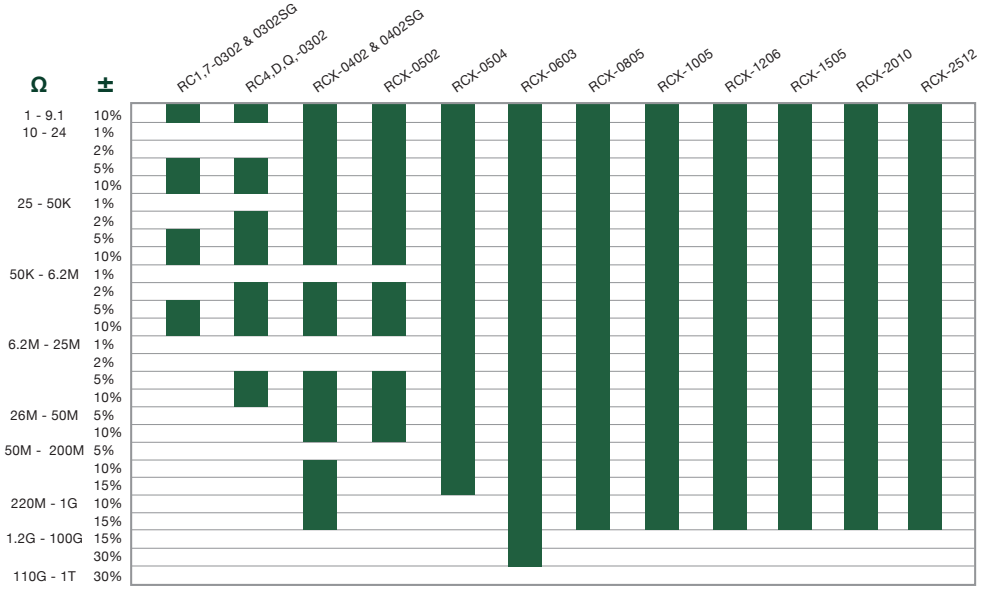
**SAMPLE PN:** RCC - 0805 - 2003 J (0805 Size, 200KΩ, 5%, PtAg w/ Sn62 Solder Terminals)

| | Attachment/ Term Metal |
|---|---|
| ✓ | **RC1**-Au Wraparound |
| ✓ | **RC3**-PtAg Wraparound |
| ✓ | **RC4**-*PtAu Single Wrap |
| ✓ | **RC7**-Au over PtAu[1] |
| ✓ | **RC8**-ULR PtAg Wraparound |
| | **RCC**-PtAg Wraparound with Sn62 Solder |
| | **RCD**-*PtAu Single Wrap with Sn62 Solder |
| | **RCH**-ULR PtAg Wraparound with Sn62 Solder |
| ✓ | **RCP**-PtAg Wraparound with Sn96 Solder |
| ✓ | **RCQ**-PtAu w/ Sn96 Solder |
| ✓ | **RCR**-ULR PtAg Wraparound with Sn96 Solder |

| Size | Rated Power† | Max RCWVoltage | Value Range◊[3] |
|---|---|---|---|
| 0302[2] | 63mW | 50VDC | 1Ω to 25MΩ |
| 0402[3] | 80mW | 50VDC | 1Ω to 1TΩ |
| 0502 | 100mW | 50VDC | 1Ω to 50MΩ |
| 0504 | 125mW | 50VDC | 1Ω to 200MΩ |
| 0603 | 100mW | 50VDC | 1Ω to 1TΩ |
| 0805 | 175mW | 150VDC | 1Ω to 1GΩ |
| 1005 | 250mW | 160VDC | 1Ω to 1GΩ |
| 1206 | 250mW | 200VDC | 1Ω to 1GΩ |
| 1505 | 250mW | 200VDC | 1Ω to 1GΩ |
| 2010 | 500mW | 200VDC | 1Ω to 1GΩ |
| 2512[3] | 1W | 200VDC | 1Ω to 1GΩ |

| Tolerance Ranges | |
|---|---|
| F = 1% | 10Ω to 25MΩ |
| G = 2% | 5Ω to 25MΩ |
| J = 5% | 1Ω to 200MΩ |
| K = 10% | 1Ω to 1GΩ |
| L = 15% | 1Ω to 50GΩ |
| M = 20% | 1Ω to 100GΩ |
| N = 30% | 1Ω to 100GΩ |
| 35 = 35% | 1Ω to 100GΩ |
| P = 40% | 1Ω to 100GΩ |

*Not all values and tolerances available in all sizes.*




*Consult factory for additional values, sizes and tolerances.*

1. PtAu on wrap terminal and backplane (GND side), Au over PtAu on input terminal for 0302 and 0402 only
2. RCX-0302 available in 5% and 10% tolerances.
3. Values over 200MΩ available in 10%, 15%, 20%, 30%, 35%, 40%, and 50% tolerances.

* SG available in RCX-0302 and RCX-0402 only.

Substitute **SG** in place of dash after size to indicate Single Wrap to Ground terminal style.

† Free air rated at 70°C
◊ First 3 digits of value code are significant value. The 4th is the number of zeros following. An 'R' indicates a decimal when resistance is under 100Ω.

RoHS COMPLIANT | ULR | HI-OHM | RoHS | Sn62 | NON-MAG | BONDABLE

## Thick Film Nickel Barrier Solderable Resistors

# RXI Series

- Large Inventory Available for Same-day Shipping
- Partial Reel Quantities Available
- Low Minimum Order Quantities
- 100% Matte Tin Finish over Nickel Barrier Terminals


**SAMPLE PN:** RCI - 0402 - 49R9 F (0402 Size, 49.9Ω, 1%, Nickel Barrier Terminals)

| PN Prefix | Size | Rated Power† | Max RCW Voltage | Value Range◊ | Tolerances |
|---|---|---|---|---|---|
| ☑ **RCI-** Nickel Barrier Layer with 100% Matte Tin Finish | 01005 | 30mW | 15VDC | E96 Values - 10Ω to 1MΩ | F = 1% |
| | | | | E24 Values - 1Ω to 10MΩ | J = 5% |
| | 0201 | 50mW | 25VDC | E96 Values - 10Ω to 1MΩ | F = 1% |
| | | | | E24 Values - 1Ω to 10MΩ | J = 5% |
| | 0402 | 63mW | 50VDC | E96 Values - 1Ω to 10MΩ | F = 1% |
| | | | | E24 Values - 1Ω to 10MΩ | J = 5% |
| | 0603 | 100mW | 50VDC | E96 Values - 1Ω to 10MΩ | F = 1% |
| | | | | E24 Values - 1Ω to 22MΩ | J = 5% |
| | 0805(S) | 175mW (350mW) | 150VDC | E96 Values - 1Ω to 10MΩ | F = 1% |
| | | | | E24 Values - 1Ω to 22MΩ | J = 5% |
| | 0805* | 125mW | 150VDC | E96 Values - 1Ω to 10MΩ | F = 1% |
| | | | | E24 Values - 1Ω to 22MΩ | J = 5% |
| | 1206(S) | 250mW (500mW) | 200VDC | E96 Values - 1Ω to 10MΩ | F = 1% |
| | | | | E24 Values - 1Ω to 22MΩ | J = 5% |
| | 1206* | 250mW | 200VDC | E96 Values - 1Ω to 10MΩ | F = 1% |
| | | | | E24 Values - 1Ω to 22MΩ | J = 5% |
| | 2010(S)* | 750mW (1W) | 200VDC | E96 Values - 1Ω to 1MΩ | F = 1% |
| | | | | E24 Values - 1Ω to 1MΩ | J = 5% |
| | 2512(S)* | 1W (2W) | 200VDC | E96 Values - 1Ω to 1MΩ | F = 1% |
| | | | | E24 Values - 1Ω to 1MΩ | J = 5% |
| ☑ **RLI-** **Low Value** Nickel Barrier Layer with 100% Matte Tin Finish | 0805 | 125mW | 150VDC | E24 Values - 0.1Ω to 1Ω | G = 2% |
| | | | | E24 Values - 0.1Ω to 1Ω | J = 5% |
| | 1206 | 250mW | 200VDC | E24 Values - 0.1Ω to 1Ω | G = 2% |
| | 1210 | 500mW | 200VDC | E24 Values - .068Ω to 1Ω | J = 5% |

**WA**
Wraparound

† Free air rated at 70°C
◊ First 3 digits of value code are significant value. The 4th is the number of zeros following An 'R' indicates a decimal when resistance is under 100Ω.
* User trimmable versions, non-EIA values and tolerances available, contact factory

RoHS COMPLIANT RoHS KIT

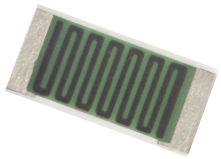
High Ohmic Value
Wraparound Resistors

# HCX Series

- Ultra High Resistance
- Not Limited to EIA Standard Values
- Sn62 Solder Available
- Non-Magnetic

**Applications Include:**

- Sensors
- Current Flow Management
- Test & Measurement
- Piezoelectrics



**SAMPLE PN:** HCC - 2010 - 3009 N (2010 Size, 300GΩ, 30%, PtAg w/ Sn62 Solder Terminals)

| Attachment/ Term Metal | Size[1] | Rated Power† | Max RCW Voltage | Value Range◊ | Tolerance Ranges |
|---|---|---|---|---|---|
| ✓ **HC3-** PtAg Wraparound | 0805 | 175mW | 150VDC | 1.2GΩ to 1TΩ | L = 15% 1.2G to 1TΩ<br>M = 20% 1.2G to 1TΩ<br>N = 30% 1.2G to 1TΩ<br>P = 40% 1.2G to 1TΩ<br>R = 50% 1.2G to 1TΩ |
| **HCC-** PtAg Wraparound with Sn62 Solder | 1206 | 250mW | 200VDC | 1.2GΩ to 1TΩ | |
| ✓ **HCP-** PtAg Wraparound with Sn96 Solder | 2010 | 500mW | 200VDC | 1.2GΩ to 1TΩ | |
| ✓ **HCR-** ULR PtAg Wraparound with Sn96 Solder | | | | | |

[1] Smaller sizes available. Please contact factory.
† Free air rated at 70°C
◊ First 3 digits of value code are significant value. The 4th is the number of zeros following. For 1Teraohm use code 1.0T. (if available).

RoHS COMPLIANT | HI-OHM | RoHS | Sn62 | NON-MAG

Current Sensing Thin Film
Nickel Barrier Resistors

# LCI Series

- Ultra Low Resistance
- 100% Matte Tin Finish over Nickel Barrier Terminals
- Values from 0.003Ω

**Applications Include:**

- **Stepping Motors**
- **Switching Power Supplies**
- **Voltage Regulation**
- **DC-DC Converters**
- **Battery Monitors**


**SAMPLE PN:** LCI - 1225 - R047 J (1225 size, 0.047Ω, 5% with Nickel Barrier)

| PN Prefix | Size | Length | Width | Height (max) | Thickness (max) | Rated Power† | mΩ◊ | TCR | Max RCW Voltage | Tolerances |
|---|---|---|---|---|---|---|---|---|---|---|
| **LCI-** ✓ Nickel Barrier Layer with 100% Matte Tin Finish | 0402 | 0.039±.002 | 0.020±.002 | 0.017 | 0.008±.004 | 63mW | 50-100<br>102-500<br>510-1000 | ±400<br>±300<br>±200 | = √PR | F = 1%<br>G = 2%<br>J = 5% |
| | 0603 | 0.063±.004 | 0.031±.004 | 0.022 | 0.012±.008 | 100mW | 20-50<br>50-100<br>102-500<br>510-1000 | ±600<br>±400<br>±300<br>±200 | | |
| | 0805 | 0.079±.006 | 0.049±.006 | 0.026 | 0.016±.010 | 125mW | 20-50<br>51-100<br>102-500<br>510-1000 | ±600<br>±400<br>±300<br>±200 | | |
| | 1206 | 0.120±.006 | 0.061±.006 | 0.026 | 0.016±.010 | 250mW | 10-20<br>21-50<br>51-91<br>100-1000 | ±600<br>±400<br>±300<br>±200 | | |
| | 2010 | 0.197±.008 | 0.096±.006 | 0.030 | 0.020±.010 | 750mW | 10-20<br>21-50<br>51-91<br>100-1000 | ±600<br>±400<br>±300<br>±200 | | |
| | 2512 | 0.250±.008 | 0.124±.006 | 0.028 | 0.022±.010 | 1W | 10-20<br>21-50<br>51-91<br>100-100 | ±600<br>±400<br>±300<br>±200 | | |
| | 1225 | 0.122±.006 | 0.248±.006 | 0.041 | 0.022±.010 | 3W | 3-5<br>6-20<br>21-30<br>33-1000 | ±300<br>±200<br>±150<br>±100 | | |

**WA**
Wraparound

† Free air rated at 70°C.
◊ First 3 digits of value code are significant value. The 4th is the number of zeros following. An 'R' indicates a decimal when resistance is under 100Ω.

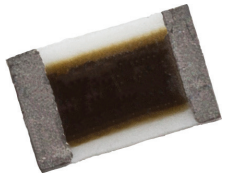
RoHS COMPLIANT RoHS LOW TCR

## Precision Thin Film Nickel Barrier Resistors

# TPI Series

- Low TCRs and Tight Tolerances
- Large Inventory for Same Day Shipping
- Partial Reel Quantities Available
- 100% Matte Tin Finish over Nickel Barrier Terminals
- Low Minimum Order Quantities

Tighter Tolerances to 0.01% Available.
Please contact factory.



**SAMPLE PN:** TPI - 0402 - 49R9 B (0402 Size, 49.9Ω, 0.1% with Nickel Barrier)

| PN Prefix |
|---|
| **TPI-** ✓ Nickel Barrier Layer with 100% Matte Tin Finish |

**WA**
Wraparound

| Size | Length | Width | Height (max) | Rated Power† | Max RCW Voltage | Value Range◊ | Tolerances |
|---|---|---|---|---|---|---|---|
| 0402 | 0.039 ±.002 | 0.020±.002 | 0.016 | 63mW | 25VDC | E96 Values - 10Ω to 205KΩ | B = 0.1%<br>D = 0.5% |
| 0603 | 0.063±.008 | 0.031±.008 | 0.022 | 63mW | 50VDC | E96 Values - 4.7Ω to 1MΩ | B = 0.1% |
| | | | | | | E96 Values - 2Ω to 1MΩ | D = 0.5% |
| 0805 | 0.079±.008 | 0.049±.008 | 0.026 | 100mW | 100VDC | E96 Values - 4.7Ω to 2MΩ | B = 0.1% |
| | | | | | | E96 Values - 1Ω to 2MΩ | D = 0.5% |
| 1206 | 0.124±.010 | 0.063±.008 | 0.026 | 125mW | 150VDC | E96 Values - 4.7Ω to 2.5MΩ | B = 0.1% |
| | | | | | | E96 Values - 1Ω to 2.5MΩ | D = 0.5% |
| 1210 | 0.124±.006 | 0.100±.006 | 0.026 | 250mW | 150VDC | E96 Values - 4.7Ω to 2.5MΩ | B = 0.1% |
| | | | | | | E96 Values - 1Ω to 2.5MΩ | D = 0.5% |
| 2010 | 0.200±.006 | 0.100±.006 | 0.026 | 250mW | 150VDC | E96 Values - 4.7Ω to 3MΩ | B = 0.1% |
| | | | | | | E96 Values - 1Ω to 3MΩ | D = 0.5% |
| 2512 | 0.250±.006 | 0.122±.006 | 0.026 | 500mW | 150VDC | E96 Values - 4.7Ω to 3MΩ | B = 0.1% |
| | | | | | | E96 Values - 1Ω to 3MΩ | D = 0.5% |

**TCR***

| Part | 25 ppm/°C | 10 ppm/°C | 5 ppm/°C |
|---|---|---|---|
| TPI-0402 | 10Ω to 205KΩ | 49.9Ω to 12KΩ | 49.9Ω to 3KΩ |
| TPI-0603 | 2Ω to 1MΩ | 4.7Ω to 332KΩ | 24.9Ω to 15KΩ |
| TPI-0805 | 1Ω to 2MΩ | 4.7Ω to 500KΩ | 24.9Ω to 30KΩ |
| TPI-1206 | 1Ω to 2.5KΩ | 4.7Ω to 1MΩ | 24.9Ω to 50KΩ |
| TPI-1210 | 1Ω to 2.5KΩ | 4.7Ω to 1MΩ | 24.9Ω to 100KΩ |
| TPI-2010 | 1Ω to 3MΩ | 4.7Ω to 1MΩ | 24.9Ω to 100KΩ |
| TPI-2512 | 1Ω to 3MΩ | 4.7Ω to 1MΩ | 24.9Ω to 100KΩ |

* Available as special order only
Add "N" after size for 10PPM
Add "V" after size for 5PPM
(i.e. TPI-0805V-49R9B for 5PPM)

† Free air rated at 70°C.
◊ First 3 digits of value code are significant value. The 4th is the number of zeros following.
An 'R' indicates a decimal when resistance is under 100Ω.

RoHS COMPLIANT RoHS LOW TCR KIT

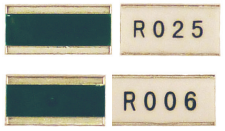
Metal Foil Current Sensing
Surface Mount Chip Resistors

# MLI Series

- High Stability Metal Foil Technology
- Single Sided or Full Wraparound Terminals
- 100% Matte Tin over Nickel Barrier for Solder Attachment
- Resistance Values from 0.001Ω to 0.500Ω
- Tolerances to ± 1%
- TCR to ± 50 PPM/°C
- Available in Cut Tape or on Tape and Reel Packaging

**SAMPLE PN:** MLI - 1835WA - R005 F (1835 Size, wraparound, 5 milliohms, 1%)

| PN Prefix | Size | Length ± 0.008" | Width ± 0.008" | Thickness (max) | Terminal Width | Rated Power† | Value Range◊ | Tolerance | Attachment Method | Terminal Metallization |
|---|---|---|---|---|---|---|---|---|---|---|
| **MLI** ✓ Nickel Barrier Layer with 100% Matte Tin Finish | 1835SS | .180" | .350" | 0.028" | 2 mΩ up 0.028" 1 mΩ 0.063" | 5W | .001Ω .002Ω . 003Ω - up | ±5% ±2% ±1% | Solder | NiCr/Ni/Sn |
| | 1835WA | .180" | .350" | 0.028" | 2 mΩ up 0.028" 1 mΩ 0.063" | 4W | .001Ω .002Ω .003Ω - up | ±5% ±2% ±1% | Solder | NiCr/Ni/Sn |
| | 2043SS | .200" | .430" | 0.028" | 2 mΩ up 0.031" 1 mΩ 0.063" | 6W | .001Ω .002Ω .003Ω - up | ±5% ±2% ±1% | Solder | NiCr/Ni/Sn |
| | 2043WA | .200" | .430" | 0.028" | 2 mΩ up 0.031" 1 mΩ 0.063" | 5W | .001Ω .002Ω .003Ω - up | ±5% ±2% ±1% | Solder | NiCr/Ni/Sn |




† Free air rated at 70°C.
Highest resistor value is 500 mΩ (R500).
◊ First 3 digits of value code are significant value. The 4th is the number of zeros following.
An 'R' indicates a decimal when resistance is under 100Ω.
For example: 0.005Ω is noted as R005, 0.05Ω is noted as R050.

**SS**
Single Sided

**WA**
Wraparound

| Item | Specification |
|---|---|
| Operating Temperature: | -55°C to +150°C |
| TCR: | 1 mΩ ± 200 ppm/°C<br>2 mΩ ± 100 ppm/°C<br>3 mΩ up ± 50 ppm/°C |
| Resistance Range | 1 mΩ - 9 mΩ (1 mΩ steps)<br>10 mΩ - 500 mΩ (E-6 values) |
| Substrate Material | 99.6% Alumina |

RoHS COMPLIANT RoHS LOW TCR

## Thin Film Nickel Barrier Attenuators

# A-Series

- Characterized to 50GHz †
- 100% Matte Tin Finish over Nickel Barrier Terminals
- 50 Ohm Nominal Impedance
- Sample Kits Available
- Low Minimum Order Quantities
- Available in Cut Tape or on Tape and Reel Packaging

**SAMPLE PN:** A - 0805 - C - 03DB (0805 Size, 50Ω, 3dB, Nickel Barrier Terminals)

| PN Prefix/Size | Length | Width | Height (max) | Terminal | Value Range◊ | Rated Power** |
|---|---|---|---|---|---|---|
| A-0402WA-C | 0.039 ±.002 | 0.020 ±.002 | 0.015" | 0.011 ±.002 | 00 to 10dB | 32mW |
| IMS2652-C (0402 face down) | 0.039 ±.002 | 0.020 ±.002 | 0.015" | 0.011 ±.002 | | 32mW |
| IMS2647 | 0.039 ±.002 | 0.020 ±.002 | 0.015" | 0.011 ±.002 | | 32mW |
| A-0603-C | 0.063 ±.004 | 0.032 ±.004 | 0.020" | 0.020 ±.006 | | 63mW |
| IMS2533 (0603 face down) | 0.063 ±.004 | 0.032 ±.004 | 0.020" | 0.020 ±.006 | | 63mW |
| A-0805-C | 0.079 ±.008 | 0.049 ±.008 | 0.020" | 0.020 ±.008 | | 100mW |
| IMS1141 (0805 face down) | 0.079 ±.008 | 0.049 ±.008 | 0.020" | 0.020 ±.008 | | 100mW |
| A-1206-C | 0.126 ±.008 | 0.063 ±.008 | 0.020" | 0.039 ±.010 | 00 to 10dB, 16dB | 125mW |
| A-1612 | 0.165 ±.008 | 0.118 ±.008 | 0.038" | 0.035 ±.020 | 00 to 10dB, 16dB | 250mW |

**Input Power**

| | A-0402WA IMS2647 IMS2652 | A-0603 IMS2533 | A-0805 IMS1141 | A-1206 | A-1612 |
|---|---|---|---|---|---|
| **1dB** | 155mW | 300mW | 485mW | 607mW | 1.2W |
| **2dB** | 87mW | 171mW | 271mW | 339mW | 678mW |
| **3dB** | 64mW | 126mW | 200mW | 251mW | 501mW |
| **4dB** | 53mW | 105mW | 166mW | 208mW | 415mW |
| **5dB** | 47mW | 92mW | 146mW | 183mW | 365mW |
| **6dB** | 43mW | 85mW | 134mW | 168mW | 336mW |
| **7dB** | 40mW | 79mW | 125mW | 156mW | 313mW |
| **8dB** | 38mW | 75mW | 119mW | 148mW | 297mW |
| **9dB** | 37mW | 72mW | 114mW | 143mW | 286mW |
| **10dB** | 36mW | 70mW | 111mW | 139mW | 278mW |

◊ Other Values Available. Contact factory.
† Based on smallest size & mounting in matched continuous 50Ω system with proper application of RF principles.
* Max RCW Voltage Based on √P*R.
** Rated at 70°C free air temperature.

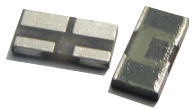
Modelithics data available

RoHS COMPLIANT RoHS KIT

## High Power AlN Thick Film Attenuators

# V-Series

- High Power Dissipation†
- Aluminum Nitride Substrate
- Sn62 Solder
- Attenuation to 30dB
- Half dB Increments
- 50 Ohm Nominal Impedance
- Optimized for Low Duty Cycle Pulse



**SAMPLE PN:** V D 3 - 2010 T WA - 03D0 (2010 size, 0.15" thickness, 3.0dB, PtAg Terminals, wraparound, optimized for pulse)

| PN | Thickness |
|---|---|
| V | D = 0.015"<br>G = 0.025" |

| Term Metal |
|---|
| 3- ✓ PtAg |
| 7- ✓ Au over PtAu (input) PtAu (ground) |
| 8- ✓ ULR PtAg |
| C- PtAg with Sn62 Solder |
| H- ULR PtAg with Sn62 Solder |
| R- ✓ ULR PtAg with Sn96 Solder |

| Size | 5db, T = 50°C | 3db, T = 100°C |
|---|---|---|
| D-1206 | 32W | 21W |
| D-2010 | 56W | 37W |
| D-2512 | 125W | 81W |
| D-3725 | 423W | 276W |
| G-1206 | 19W | 13W |
| G-2010 | 34W | 22W |
| G-2512 | 75W | 49W |
| G-3725 | 254W | 165W |

**Optional**

T[1] - Optimized for Pulse, 0.5 thru 3.0dB only

**Term Style**

WA Wraparound

SG Single Wrap to Ground

| Value Range | |
|---|---|
| 00dB to 30dB | '0' indicates whole dB increments.<br>'5' indicates 0.5dB increments up to 16.5dB. |

| Attenuation Accuracy | |
|---|---|
| 0.5dB to 4dB | ±0.2dB |
| 4.5dB to 6.0dB | ±0.3dB |
| 6.5dB to 8.5dB | ±0.4dB |
| 9dB to 11dB | ±0.5dB |
| 11.5dB to 14.5dB | ±0.6dB |
| 15dB to 19dB | ±0.7dB |
| 20dB to 28dB | ±0.8dB |
| >28dB to 30dB | ±0.9dB |

| T Parts Attenuation Accuracy | |
|---|---|
| 0dB to 1.5dB | ±0.2dB |
| 2dB to 2.5dB | ±0.3dB |
| 2.5dB to 3.0dB | ±0.4dB |

Other sizes, power ratings and values can be supplied.

1. Conductive heat estimates do not apply to average power dissipation in Low Duty Cycle (LDC) Pulse Applications. IMS offers an alternate part configuration for use in pulse applications by specifying the "T" code in the item number. Increased LDC pulse performance is feasible for this optimized "T" code design for values 0.0 - 3.0dB only

† Based on smallest size & mounting in matched continuous 50Ω system with proper application of RF principles. For pulsed power applications, a scan trim should be specified. Please contact factory for more information.

Modelithics data available

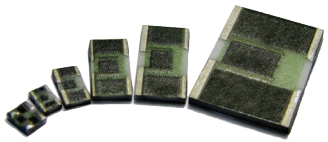
RoHS COMPLIANT

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

Thick Film Attenuators

# IAX Series

- Attenuation to 70dB
- Half dB Increments
- 50 Ohm Nominal Impedance



**SAMPLE PN:** IAC - 2512 WA - 06D5 (2512 Size, 6.5dB, PtAg w/ Sn 62 Terminals)

| PN Prefix/Term Metal | Size | Rated Power** |
|---|---|---|
| ✓ **IA1-***Au | 0706 | 2.3W |
| ✓ **IA3 -** PtAg | 0805 | 1.8W |
| ✓ **IA8 -** ULR PtAg | 1206 | 6.5W |
| **IAC-** PtAg with Sn62 Solder | 2010 | 7.1W |
| **IAH-** ULR PtAg with Sn62 Solder | 2512 | 15.8W |
| ✓ **IAP-** PtAg with Sn96 Solder | 3725 | 52.8W |
| ✓ **IAR-** ULR PtAg with SN96 Solder | | |

| Term Style |
|---|
| **WA** Wraparound |
| **SG** Single Wrap to Ground |
| **SS*** Single Sided |
| **PW** Partial Wrap |

| Value Range | |
|---|---|
| 00dB to 70dB | '0' indicates whole dB increments.<br>'5' indicates 0.5dB increments up to 16.5dB. |

| Attenuation Accuracy | |
|---|---|
| 0 - 3.5dB | ±0.2dB |
| 4 - 13dB | ±0.3dB |
| 13.5 - 70dB | ±0.5dB |

*Single Sided & Au terminals available in 0706 size only.

**Based on a baseplate temp of 50C and an attenuation value of 3dB

Modelithics data available

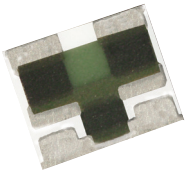
RoHS COMPLIANT

ULR | RoHS | Sn62 | NON-MAG | BONDABLE

## Standard Size T-Pad Attenuators

# IMA Series

- 0.122" x 0.145" Size
- Characterized to 12.4GHz†
- Sn62 Solder Available
- Attenuation to 40dB
- Half dB Increments



**SAMPLE PN:** IMA2373 - 12 D0 (0.122" x 0.145" Size, 12dB, PtAg Terminals)

| PN Prefix | Term Style | Term Metal | Rated Power‡ | Increment | Accuracy | Value Range◊ |
|---|---|---|---|---|---|---|
| **IMA2314** | Wraparound | PtAg w/ Sn62 | 2W | 1 - 3.5dB | +/-0.2dB | dB Increment |
| **IMA2370** | Single-Sided w/ Backplane | PtAg w/ Sn62 | 2W | 4 - 19dB | +/-0.3dB | D0 denotes whole value |
| **IMA2371** | Single Wrap to Ground | PtAg w/ Sn62 | 2W | 20 - 30dB | +/-0.5dB | D5 denotes whole value + 0.5dB, available up to 16.5 dB |
| ✓ **IMA2373** | Wraparound | PtAg | 2W | 31-40dB | +/-1.0dB | |
| ✓ **IMA2381** | Single-Sided | PtAg | 2W | | | |
| ✓ **IMA2609** | Wraparound | PtAg w/ Sn96 | 2W | | | |
| ✓ **IMA2686** | Wraparound | ULR PtAg | 2W | | | |

† Based on smallest size & mounting in matched continuous 50Ω system with proper application of RF principles.
‡ Rated at 70°C free air temperature. Rated at 100°C baseplate temperature. Proper thermal management required.

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## Temperature Variable Attenuators

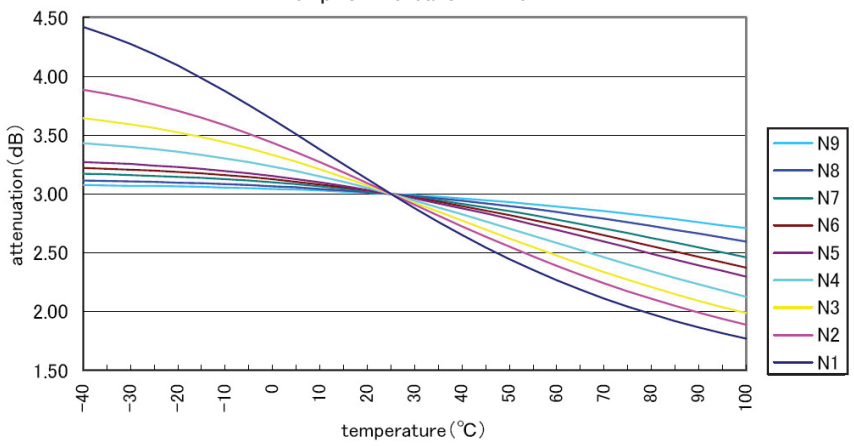
# AV-0805

- NiCr Thin Film
- DC to 5GHz
- Impedance - 50Ω
- Power Rating - 63 mW
- Temperature Curves from N1 to N9
- Operating Temperature: -40°C to +100°C
- Available in Cut Tape or on Tape and Reel Packaging
- 100% Matte Tin over Nickel Barrier for Solder Attachment

**SAMPLE PN:** AV - 0805 - C - 03 N6 (0805 Size, nickel barrier, tin, wraparound, 3 dB N6)

| PN Prefix | Size | Impedance | Attenuation | Temperature Curve |
|---|---|---|---|---|
| ✓ **AV** | 0805 | C = 50Ω | 1 to 10 dB | N1 to N9 |

Temp vs. Attenuation N1-N9

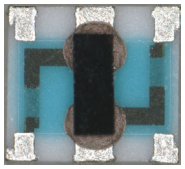



RoHS COMPLIANT · RoHS

## Temperature Variable Attenuators

# AV-0607

- NiCr Thin Film
- DC to 18GHz
- Impedance - 50Ω
- Power Rating - up to 200 mW
- Temperature Curves from N1 to N8
- Operating Temperature: -40°C to +100°C
- Available in Cut Tape or on Tape and Reel Packaging
- 100% Matte Tin over Nickel Barrier for Solder Attachment



**SAMPLE PN:** AV - 0607 - C - 03 N1 (0607 Size, nickel barrier, tin, wraparound, 3 dB N1)

| PN Prefix | Size | Impedance | Attenuation | Temperature Curve |
|---|---|---|---|---|
| ✓ AV | 0607 | C = 50Ω | 3 to 9 dB | N1 to N8 |

RoHS COMPLIANT RoHS

Temperature sensitivity decreases with increasing 'N' value.
N1 attenuation will decrease more than N8 per °C temp increase.
N1 is not available for 7dB.
N2 is not available for 8dB or 9dB.

### Temperature Characteristic Attenuation (dB/°C)

| 03N1 | | 0.01Ghz | 4 Ghz | 8 Ghz | 12 Ghz | 16 Ghz | 20 Ghz |
|---|---|---|---|---|---|---|---|
| Temp | 50°C | -0.0050 | -0.0038 | -0.0032 | -0.0026 | -0.0018 | -0.0006 |
| | 75°C | -0.0047 | -0.0035 | -0.0029 | -0.0024 | -0.0016 | -0.0004 |
| | 100°C | -0.0042 | -0.0031 | -0.0026 | -0.0022 | -0.0015 | -0.0004 |
| | 125°C | -0.0037 | -0.0027 | -0.0023 | -0.0019 | -0.0013 | -0.0001 |

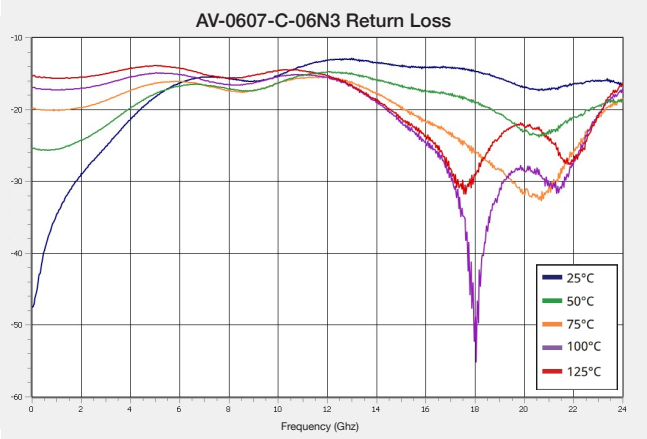
| 04N2 | | 0.01Ghz | 4 Ghz | 8 Ghz | 12 Ghz | 16 Ghz | 20 Ghz |
|---|---|---|---|---|---|---|---|
| Temp | 50°C | -0.0054 | -0.0047 | -0.0044 | -0.0044 | -0.0039 | -0.0028 |
| | 75°C | -0.0049 | -0.0041 | -0.0038 | -0.0038 | -0.0032 | -0.0021 |
| | 100°C | -0.0044 | -0.0036 | -0.0034 | -0.0033 | -0.0029 | -0.0019 |
| | 125°C | -0.0039 | -0.0032 | -0.0030 | -0.0029 | -0.0025 | -0.0015 |

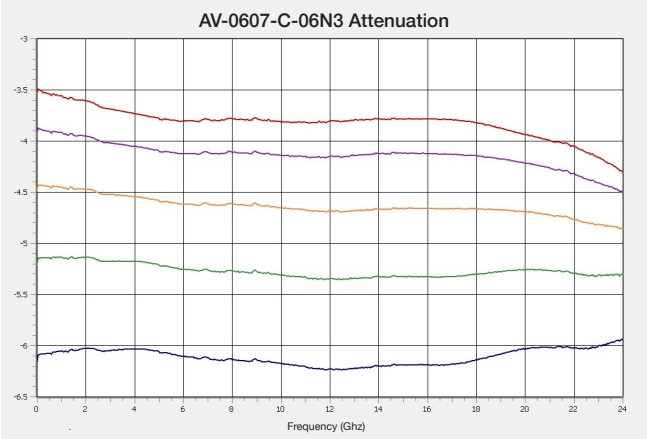
| 05N1 | | 0.01Ghz | 4 Ghz | 8 Ghz | 12 Ghz | 16 Ghz | 20 Ghz |
|---|---|---|---|---|---|---|---|
| Temp | 50°C | -0.0077 | -0.0066 | -0.0060 | -0.0054 | -0.0041 | -0.0022 |
| | 75°C | -0.0063 | -0.0054 | -0.0049 | -0.0044 | -0.0034 | -0.0019 |
| | 100°C | -0.0053 | -0.0045 | -0.0041 | -0.0037 | -0.0028 | -0.0015 |
| | 125°C | -0.0045 | -0.0037 | -0.0034 | -0.0030 | -0.0023 | -0.0012 |

| 06N1 | | 0.01Ghz | 4 Ghz | 8 Ghz | 12 Ghz | 16 Ghz | 20 Ghz |
|---|---|---|---|---|---|---|---|
| Temp | 50°C | -0.0089 | -0.0079 | -0.0078 | -0.0077 | -0.0073 | -0.0063 |
| | 75°C | -0.0071 | -0.0062 | -0.0062 | -0.0061 | -0.0058 | -0.0050 |
| | 100°C | -0.0058 | -0.0050 | -0.0050 | -0.0050 | -0.0049 | -0.0042 |
| | 125°C | -0.0048 | -0.0042 | -0.0041 | -0.0042 | -0.0040 | -0.0034 |

| 06N3 | | 0.01Ghz | 4 Ghz | 8 Ghz | 12 Ghz | 16 Ghz | 20 Ghz |
|---|---|---|---|---|---|---|---|
| Temp | 50°C | -0.0067 | -0.0062 | -0.0062 | -0.0061 | -0.0061 | -0.0055 |
| | 75°C | -0.0054 | -0.0049 | -0.0050 | -0.0049 | -0.0049 | -0.0044 |
| | 100°C | -0.0048 | -0.0044 | -0.0044 | -0.0044 | -0.0044 | -0.0039 |
| | 125°C | -0.0042 | -0.0038 | -0.0039 | -0.0039 | -0.0039 | -0.0035 |

| 07N2 | | 0.01Ghz | 4 Ghz | 8 Ghz | 12 Ghz | 16 Ghz | 20 Ghz |
|---|---|---|---|---|---|---|---|
| Temp | 50°C | -0.0085 | -0.0077 | -0.0076 | -0.0076 | -0.0074 | -0.0066 |
| | 75°C | -0.0069 | -0.0062 | -0.0062 | -0.0061 | -0.0060 | -0.0053 |
| | 100°C | -0.0056 | -0.0051 | -0.0051 | -0.0050 | -0.0050 | -0.0044 |
| | 125°C | -0.0047 | -0.0042 | -0.0042 | -0.0042 | -0.0041 | -0.0035 |

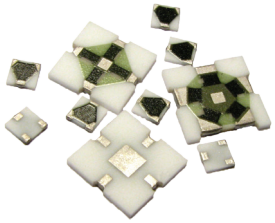


## Wideband Resistive Splitters

# IPS Series

- Characterized to 20GHz†
- Two, Three or Four Way Split
- Alternative to Softboard Solutions
- Multiple termination materials and backplanes available



**SAMPLE PN:** IPS2346 - C (2 Way. 1W. 50Ω Impedance, Wraparound PtAg Terminals)

| PN Prefix | Split | Size | Term Style | Term Material | Frequency† | Rated Power‡ | Impedance |
|---|---|---|---|---|---|---|---|
| **IPS2290** ✓ | 2 Way | 0.098" x 0.098" | Single-Sided | PtAg/PtAg BP | To 8.5GHz | 1W | C=50Ω |
| **IPS2331** ✓ | 2 Way | 0.098" x 0.098" | Single-Sided | Au/Au BP | To 12GHz | 1W | C=50Ω |
| **IPS2346** ✓ | 2 Way | 0.098" x 0.098" | Wraparound | PtAg | To 8.5GHz | 1W | C=50Ω |
| **IPS2480** ✓ | 3 Way | 0.240" x 0.240" | Single-Sided | Au/Au BP | To 2GHz | 3W | C=50Ω |
| **IPS2481** ✓ | 3 Way | 0.240" x 0.240" | Single-Sided | PtAg/PtAg BP | To 2GHz | 3W | C=50Ω |
| **IPS2521** ✓ | 3 Way | 0.240" x 0.240" | Wraparound | PtAg/PtAg BP | To 2GHz | 3W | C=50Ω |
| **IPS2522** ✓ | 4 Way | 0.295" x 0.287" | Wraparound | PtAg/PtAg BP | To 1GHz | 3W | C=50Ω |
| **IPS2528** | 2 Way | 0.098" x 0.098" | Wraparound | PtAg w/Sn62 | To 8.5GHz | 1W | C=50Ω |
| **IIPS2640** ✓ | 2 Way | 0.098" x 0.098" | Wraparound | PtAg w/Sn96 | To 8.5GHz | 1W | C=50Ω |
| **IPS2645** | 2 Way | 0.098" x 0.098" | Single-Sided | PtAg w/Sn62 | To 27GH | 1W | C=50Ω |
| **IPS2649** ✓ | 2 Way | 0.098" x 0.098" | Wraparound | ULR PtAg w/Sn96 | To 8.5GHz | 1W | C=50Ω |
| **IPS2656** ✓ | 2 Way | 0.098" x 0.098" | Wraparound | ULR PtAg | To 8.5GHz | 1W | C=50Ω |
| **IPS2668** ✓ | 2 Way | 0.098" x 0.098" | Single-Sided | PtAg/marked BP | To 27GHz | 1W | C=50Ω |
| **IPS2669** | 2 Way | 0.098" x 0.098" | Partial Wrap | ULR PtAg w/ Sn62 | To 8.5GHz | 1W | C=50Ω |

† Based on mounting in a matched continuous 50Ω system with proper RF techniques.

‡ Rated at 70°C free air temperature. Rated at 100°C baseplate temperature. Proper thermal management required.

Modelithics data available

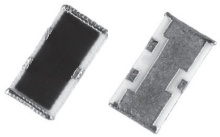
RoHS COMPLIANT | RoHS | Sn62 | NON-MAG | BONDABLE

Thin Film Splitters

# IPT Series

- 96% Alumina Substrate
- NiCr Resistive Element
- Broadband to 30 GHz (face down mounting)
- 100% Matte Tin over Nickel Barrier for Solder Attachment
- Sizes from 0402 to 1206

- Three Resistor “Y” Configuration
- Wraparound Terminals
- Available in Cut Tape or on Tape and Reel Packaging



**SAMPLE PN:** IPT - 0402WA C - U (0402 Size, 50Ω impedance, taped face down)

| PN Prefix | Size | Max Power | Rated Power | Impedance | Packaging |
|---|---|---|---|---|---|
| IPT | 0402WA | 200mW | 100mW | C = 50Ω | U - T/R face down |
| | 0603WA | 200mW | 100mW | C = 50Ω | Blank - T/R<br>U - T/R face down |
| | 0805WA | 250mW | 125mW | C = 50Ω | Blank - T/R<br>U - T/R face down |
| | 1206WA | 500mW | 250mW | C = 50Ω | Blank - T/R<br>U - T/R face down |

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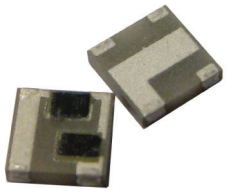
Wideband Resistive Couplers

# IMK Series

- 0.120" x 0.120" Size
- Characterized to 15GHz†

**Applications Include:**

- **RF Amplifiers**
- **Signal Analyzers**
- **Transmitters**



**SAMPLE PN:** IMK2549 - 18dB (0.12" x 0.12" Size, 18dB coupler, PtAg Terminals)

| | PN Prefix | Direction | Term Style | Term Material | Impedance | Frequency | Rated Power‡ | Value Range |
|---|---|---|---|---|---|---|---|---|
| ✓ | **IMK2549** | Right | Wraparound | PtAg | C = 50Ω | To 15GHz | 1W Dissipated | 06 to 30dB |
| ✓ | **IMK2550** | Left | Wraparound | PtAg | C = 50Ω | To 15GHz | 1W Dissipated | 06 to 30dB |
| ✓ | **IMK2574** | Right | Wraparound | Au (Inputs) PtAu (GND) | C = 50Ω | To 15GHz | 1W Dissipated | 06 to 30dB |
| ✓ | **IMK2575** | Left | Wraparound | Au (Inputs) PtAu (GND) | C = 50Ω | To 15GHz | 1W Dissipated | 06 to 30dB |
| | **IMK2637** | Right | Wraparound | PtAg w/Sn62 | C = 50Ω | To 15GHz | 1W Dissipated | 06 to 30dB |
| | **IMK2638** | Left | Wraparound | PtAg w/Sn62 | C = 50Ω | To 15GHz | 1W Dissipated | 06 to 30dB |
| ✓ | **IMK2650** | Left | Wraparound | PtAg w/Sn96 | C = 50Ω | To 15GHz | 1W Dissipated | 06 to 30dB |
| ✓ | **IMK2658** | Left | Wraparound | ULR PtAg | C = 50Ω | To 15GHz | 1W Dissipated | 06 to 30dB |
| ✓ | **IMK2659** | Left | Wraparound | ULR PtAg w/Sn96 | C = 50Ω | To 15GHz | 1W Dissipated | 06 to 30dB |

‡ Rated at 100°C Baseplate temperature.

RoHS COMPLIANT · ULR · RoHS · Sn62 · NON-MAG · BONDABLE

# CUSTOM SOLUTIONS

Since 1974, IMS has been building unique products based on customer supplied drawings to solve design challenges. Here are examples of custom designs and product variations.

- Design Assistance Available
- Rapid & Low Cost Prototyping
- Minimal NRE Cost
- Low Minimum Order Quantities
- Quick Turn Around

**Heater Chips**
**Custom Resistors**
**Resistor Networks**
**Custom Attenuators**
**Jumpers**
**Dual-Sided Devices**
**Oversized Terminations**
**Ultra High Ohmic Values**
**Ultra Low Ohmic Values**
**Multi-Function Devices**
**Stand Alone Bonding Pads**
**Special Laser Trims**
**Custom Pad Sizes**
**High Isolation Splitters**

# ENGINEERING KITS

IMS offers engineering kits for many popular thick and thin film surface mount products at a reasonable cost. Below are standard engineering kits. Also available are custom kits of nearly any IMS product.

- Convenient source of components when you need them
- Custom kit configurations available upon request

**RCI Series Resistor Kits**
- RCI-0402 5%
- RCI-0603 1% & 5%
- RCI-0805 1% & 5%
- RCI-1206 1% & 5%
- RCI-2010 1% & 5%
- RCI-2512 1% & 5%

**RCX Series PW Resistor Kits**
- RCX-0302PW 5%
- RCX-0402PW 5%
- RCX-0502PW 5%
- RCX-0603PW 5%
- RCX-0805PW 5%

**TPI Series Kits**
- TPI-0603 0.5%
- TPI-0805 0.5%

**A-Series Attenuator Kits**
- A-0402WA-C/IMS2647
- A-0603-C
- A-0805-C
- A-1206-C

**AV Attenuator Kits**
- AV-0607

# AS9100D CERTIFIED

International Manufacturing Services, Inc. (IMS) has achieved quality certification to AS9100D. The AS9100D certification is an internationally recognized quality management standard for aerospace, aviation and defense industries, managed by the International Aerospace Quality Group (IAQG). It encompasses the ISO 9001:2015 standards with additional requirements specific to the aerospace industry and is endorsed worldwide by all major aerospace OEMs and suppliers.

The AS9100D certification exhibits IMS's continued commitment to ensuring the highest level of operations and production standards, and enables the company to continue to exceed customer expectations.

CERTIFICATE

TUV Rheinland of North America, Inc.
400 Beaver Brook Road, Boxborough, MA 01719 United States

TÜVRheinland
Precisely Right.

Hereby certifies that

ims

International Manufacturing Services, Inc.

50 Schoolhouse Lane
Portsmouth, RI 02871
USA

has established and maintains a quality management system for the

Design and Manufacture of Resistors and Passive Components.

The audit was performed in accordance with the requirements of SAE AS9104/1:2012-01 by an ANAB-accredited Certification Body under the Aerospace Registration Management Program administered by the Americas Aerospace Quality Group (AAQG) in accordance with the Aerospace Sector Scheme and documented in Report No. 4248.

Proof has been furnished that the requirements according to

AS9100D / ISO 9001:2015

are fulfilled.
Further clarification regarding the scope of this certificate and the applicability of AS9100D / ISO 9001:2015 requirements may be obtained by contacting TRNA.

Certificate Registration No.

74 300 4248

Certificate Issue Date
December 20, 2023

Certificate Expiration Date
December 19, 2026

ANAB IAF

Site Structure: Single
Certificate Reissue Date: 12/20/2023

Certification of Management Systems

**International Manufacturing Services, Inc.**
50 Schoolhouse Lane
Portsmouth, RI 02871

**P:** 401.683.9700
**F:** 401.683.5571

**www.ims-resistors.com**

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