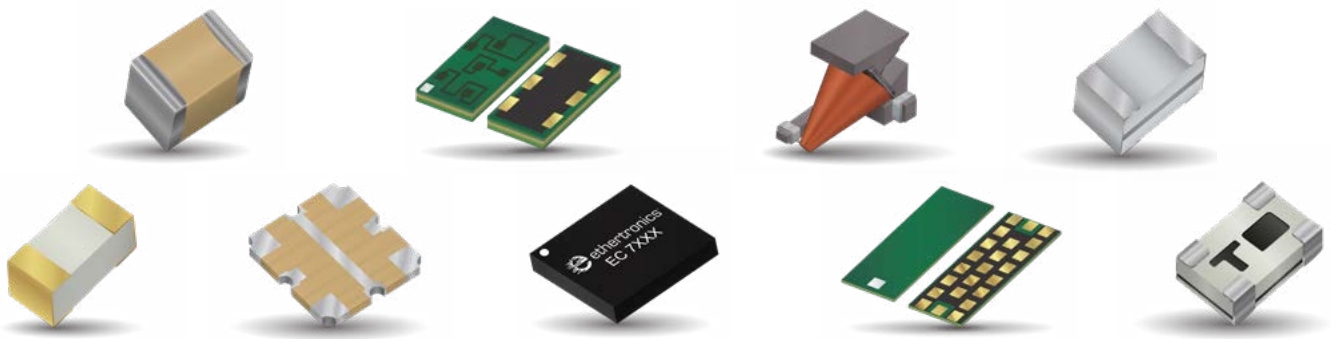




# RF/MICROWAVE PRODUCT GUIDE

CAPACITORS | INDUCTORS | CROSSOVERS | CONDUCTORS | COUPLERS  
ANTENNAS | RESISTORS | ATTENUATORS | FILTERS





BRANDS



# RF/MICROWAVE OVERVIEW

## ABOUT AVX

AVX is a worldwide leading supplier of passive electronic components, connectors, passive and active antennas, and sensing and control devices. We offer a wide range of components manufactured to the highest quality and reliability standards.

Our worldwide manufacturing capability includes facilities located in seventeen countries on four continents, allowing us to continue meeting customer needs on a global basis.

By continuing to invest heavily in R&D and submitting several new patent applications every year, AVX continues to further expand the company's strong technology base with newly innovative, next-generation product solutions.

AVX is committed to support the needs of its customers for future and present applications. Together with continuous quality improvement process, our components continue to provide reliable solutions for demanding application needs.

As a technology leader, AVX will continue to add to its product portfolio on a regular basis. Details of new devices being offered and their specifications will be shown on the AVX website, [www.avx.com](http://www.avx.com)



## RF/MICROWAVE APPLICATIONS

- Automotive
- Consumer
- Industrial
- Telecommunication
- Optical Communications
- Internet of Things (IoT)
- Safety & Security
- Wireless Network
- Healthcare
- Defense
- Aerospace
- Data Processing
- Medical
- Broadband Receivers
- Commercial
- Transportation



## GLOBAL TESTING CAPABILITIES

- MIMO Measurement Systems
- Automotive Test Chamber
- SAR Measurement Systems
- Wi-Fi Throughput Evaluation Systems
- Near-field Measurement Systems
- Far-field Measurement Chambers
- mmWave Measurement Chamber
- Extensive Simulation Capabilities
- 5 Global Design Centers

## CAPACITORS

PRODUCT		SPECS	FEATURES	APPLICATIONS
	<b>High Q<sup>®</sup> Ultra Low ESR Capacitors</b>	<b>Case Size:</b> 0402, 0603, 0605, 0709, 0805, 1111, 1210, 2325, 3838	<ul style="list-style-type: none"> <li>• Ultra Low ESR</li> <li>• High Self Resonance</li> <li>• High Current Carrying Capability</li> </ul>	<ul style="list-style-type: none"> <li>• RF Power Amplifiers</li> <li>• Low Noise Amplifiers</li> <li>• Filter Networks</li> <li>• MRI Systems</li> </ul>
		<b>Voltage:</b> Up to 7,200V		
		<b>Tolerance:</b> ±0.05pF / ±0.20%		
		<b>Capacitance:</b> 0.1 – 5,100pF		
	<b>MOS Capacitors</b>	<b>Size:</b> 0.01 – 0.07Sq.Inches	<ul style="list-style-type: none"> <li>• Ideal Low-Cost Alternative to Ceramic SLCs</li> <li>• High Design Flexibility / Short Turn Around Cycle Times</li> <li>• Low RF Insertion Loss</li> </ul>	<ul style="list-style-type: none"> <li>• Hybrid Circuits</li> <li>• Bias Networks</li> <li>• TOSA &amp; ROSA</li> <li>• Test &amp; Measurement Equipment</li> <li>• System in Package</li> </ul>
		<b>Voltage:</b> 25 – 200WVDC		
		<b>Frequency:</b> Up to 20GHz		
		<b>Capacitance:</b> Up to 1,000pF		
	<b>Tight Tolerance Capacitors</b>	<b>Case Size:</b> 01005, 0201, 0402, 0603, 0805, 1210	<ul style="list-style-type: none"> <li>• Repeatability, IoT to IoT</li> <li>• Ultra Tight Cap. Tolerances</li> <li>• High Stability with Respect to Time, Temp., and Frequency</li> </ul>	<ul style="list-style-type: none"> <li>• Matching Network for Antenna, PA</li> <li>• 5G AAU Active Antenna System</li> <li>• High Order Discrete Filters</li> <li>• Cellular Communications</li> </ul>
		<b>Frequency:</b> Up to 26.5GHz		
		<b>Tolerance:</b> As Tight as ±0.01pF		
		<b>Capacitance:</b> Starting 0.05pF (with 0.05pF Increments)		

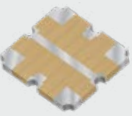
## INDUCTORS

PRODUCT		SPECS	FEATURES	APPLICATIONS
	<b>SMT Ultra- Broadband Inductors</b>	<b>Inductance:</b> 0.47 – 10.7uH	<ul style="list-style-type: none"> <li>• Flat Frequency Response from 400KHz to 40+GHz</li> <li>• Excellent Return Loss Through 40+GHz</li> <li>• Rugged Powdered Iron Core</li> </ul>	<ul style="list-style-type: none"> <li>• Optical Comm. System</li> <li>• Ultra-Broadband DC Decoupling</li> <li>• Bias Tee</li> <li>• Broadband Amplifier</li> </ul>
		<b>Insertion Loss:</b> < 0.4dB Typical		
		<b>Return Loss:</b> > 20dB Typical		
		<b>DC Current:</b> 150 – 815mA		
	<b>Tight Tolerance Inductors – Thin Film</b>	<b>Size:</b> 0201, 0402, 0603, 0805	<ul style="list-style-type: none"> <li>• Thin Film Multilayer Technology</li> <li>• Tightest Tolerances Offered in the Industry</li> <li>• Std. Surface Mount Terminations</li> </ul>	<ul style="list-style-type: none"> <li>• Mobile Communications</li> <li>• Satellite TV Receivers</li> <li>• Matching Network</li> <li>• High Order Discrete Filters</li> </ul>
		<b>Inductance:</b> 0.33 – 22nH		
		<b>Tolerance:</b> As Tight as 0.05nH		
		<b>SRF:</b> Up to 35GHz		

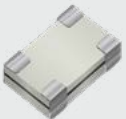

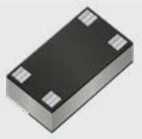
## CONDUCTORS

PRODUCT		SPECS	FEATURES	APPLICATIONS
	<b>Q-Bridge Thermal Conductors</b>	<b>Thermal Resistance:</b> 10 – 32 (°C/W)	<ul style="list-style-type: none"> <li>• High Thermal Conductivity</li> <li>• Low Thermal Resistance</li> <li>• Low Capacitance</li> </ul>	<ul style="list-style-type: none"> <li>• GaN Power Amplifiers</li> <li>• High RF Power Amplifiers</li> <li>• Switch Mode Power Supplies</li> <li>• Pin &amp; Laser Diodes</li> </ul>
		<b>Thermal Conductivity:</b> 30 – 153 (mW/°C)		
		<b>Cap. Value:</b> 0.04 – 0.13pF		
		<b>Case Size:</b> 0302, 0402, 0603, 0805		




## CROSSOVERS

PRODUCT		SPECS	FEATURES	APPLICATIONS
	RF-DC/RF Crossovers - MLO®	Insertion Loss: 0.05 – 0.15dB	<ul style="list-style-type: none"> <li>• DC – 6.0 GHz</li> <li>• Surface Mountable</li> <li>• Available in RF / RF and DC/RF Crossover</li> </ul>	<ul style="list-style-type: none"> <li>• Mobile Communications</li> <li>• Satellite Communication</li> <li>• RF Line Crossing a DC Line</li> <li>• RF Line Crossing a RF Line</li> </ul>
		Voltage: 20 – 50dB		
		Power Rating: 9 – 30W		
		Return Loss: 10 – 20dB		

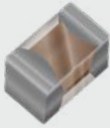
## COUPLERS

PRODUCT		SPECS	FEATURES	APPLICATIONS
	Hybrid 3dB Couplers	Case Size: 0603, 0805	<ul style="list-style-type: none"> <li>• Smallest Size in the Market</li> <li>• Optimum Heat Dissipation, Low Parasitic</li> <li>• Dedicated Test Jigs Available</li> </ul>	<ul style="list-style-type: none"> <li>• Power Amplifier</li> <li>• Indoor and Outdoor WLAN</li> <li>• Antenna Distribution</li> <li>• RF Module</li> </ul>
		Frequency: 0.7 – 6.0GHz		
		Insertion Loss: Typical 0.25dB		
		Power Rating: 3W, 10W		
	Hybrid 3dB Couplers MLO®	Case Size: 2025	<ul style="list-style-type: none"> <li>• Excellent Isolation</li> <li>• Expansion Matched to PCB</li> <li>• 30 Watt Max. Power</li> </ul>	<ul style="list-style-type: none"> <li>• Mobile Communications</li> <li>• Combiner / Divider</li> <li>• High RF Power Amplifiers</li> <li>• Switch Networks</li> </ul>
		Frequency: 1.5 – 2.1GHz / 2.1 – 2.7GHz		
		Insertion Loss: Max 0.25dB		
		Power Rating: 30W		
	Directional Couplers	Case Size: 0402, 0603, 0805	<ul style="list-style-type: none"> <li>• Inherent Low Profile</li> <li>• Tightest Coupling Tolerance Available (<math>\pm 0.5</math>dB)</li> <li>• Any Coupling Factor within 5 – 40dB is Readily Available</li> </ul>	<ul style="list-style-type: none"> <li>• Power Amplifiers</li> <li>• Satellite Receivers</li> <li>• Telecom Communications</li> <li>• Wireless Base Station</li> </ul>
		Frequency: Sub-6G and mmWave Band Available		
		Coupling: 5 – 40dB		
		Power Rating: 3W, 10W		


## FEATURED 5G ANTENNAS

PRODUCT		SPECS	FEATURES
	EC7XX 5G Chipsets	Frequency: 28GHz Front for 5G	<ul style="list-style-type: none"> <li>• <b>Each RF TX Path Includes:</b> 12dBm max Power Amplifier, Controllable Amplifier (1dB step), and Controllable Phase Shifter (5.6deg step)</li> <li>• <b>Each RF XX Path Includes:</b> LNA, Controllable Amplifier (1dB step), and Controllable Phase Shifter (5.6deg step)</li> </ul>
		RF TX / RF Paths: 4 Paths with Power Combiner / Divider	
		Power Rating: 20dBm Maximum Combined Power	
	EtherHelix 5G Antennas	Frequency: 26.5 – 29.5GHz	<ul style="list-style-type: none"> <li>• For Industrial Nano Cells / Application Development</li> <li>• K-Type (2.92mm) RF Connector</li> <li>• Omnidirectional Radiation Pattern</li> </ul>
		Height: 35mm	
		Sectors: 4	
	5G Antenna Arrays	Frequency: 26.5 – 29.5GHz	<ul style="list-style-type: none"> <li>• Scalable Antenna Array Family</li> <li>• From 2x2 Single Polarization to 4x4 Dual Polarization</li> <li>• <b>Passive Version:</b> With Distributed Fixed Phase Shifter and Power Splitter</li> <li>• <b>Active Version:</b> With Ethertronics® EC7XX Chipsets</li> </ul>
		Gain: Up to 10dB	

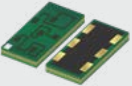
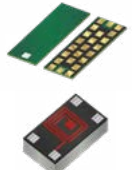
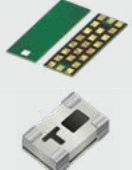
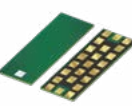

## RESISTORS

PRODUCT		SPECS	FEATURES	APPLICATIONS
	Ultra-Broadband Resistors	Resistance: From 25 – 400Ω	<ul style="list-style-type: none"> <li>EIA 0402 Case Size</li> <li>100% Laser Trimming for Tight Tolerances</li> <li>Terminations: (Ag/Epoxy) NiSn Plated, Ni/Au Gold Plated</li> </ul>	<ul style="list-style-type: none"> <li>Broadband Receiver</li> <li>Optical Transceiver Modules</li> <li>TOSA / ROSA</li> <li>Wide-Band Test Equipment</li> <li>MMIC Amplifiers</li> </ul>
		Power Rating: 125mW		
		Tolerance: 0.5%, 1%, 2%		
		Frequency: DC to 20GHz		

## ATTENUATORS

PRODUCT		SPECS	FEATURES	APPLICATIONS
	SMT Attenuators	Size: 0603	<ul style="list-style-type: none"> <li>Thin Film Design</li> <li>Characterized to 20 GHz</li> <li>AlN Construction</li> </ul>	<ul style="list-style-type: none"> <li>Microwave Radio</li> <li>ISM</li> <li>Satellite Communications</li> <li>Telecommunications</li> </ul>
		Frequency: Up to 20GHz		
		Power Rating: Up to 1W		
		Attenuation: 0 – 10dB (1dB Increments)		

## FILTERS

PRODUCT		SPECS	FEATURES	APPLICATIONS
	MLO® Diplexers	Size: 0603, 0805	<ul style="list-style-type: none"> <li>Designed for Various Wireless Stds. (WiFi, GPS, WLAN, CDMA, WCDMA, and Bluetooth)</li> <li>4.5 Watts Max Power Capability, CTE Match to PCB</li> <li>Thinnest Size in the Industry</li> </ul>	<ul style="list-style-type: none"> <li>4G / LTE, WiFi</li> <li>Dual Band Small Cell</li> <li>Base Stations</li> <li>Repeaters</li> </ul>
		Power Rating: DC – 6.0GHz		
		Insertion Loss: 0.45dB Typical		
		VSWR: 1.45 Typical		
	Low Pass Filters	Size: 0402 – 5021	<ul style="list-style-type: none"> <li>Small Size, Using Hi-Q Inductors</li> <li>Low Profile</li> <li>Rugged Construction</li> </ul>	<ul style="list-style-type: none"> <li>Telecom Small Cell, Femtocell, and Macro Cell</li> <li>Military Aerospace Radar</li> <li>Wireless Base Station</li> </ul>
		Power Rating: 1 – 25W		
		Insertion Loss: Typical 0.25dB		
		Frequency: 55MHz to Sub-6G mmWave Band Available		
	Band Pass Filters	Size: 0805 – 3416	<ul style="list-style-type: none"> <li>Wide Band, High Order, and Low Insertion Loss</li> <li>Steep Roll-Off and High Rejection Out-of-Band</li> <li>Expansion Matched to PCB</li> </ul>	<ul style="list-style-type: none"> <li>Military Radios, EMS Radios</li> <li>Instrumentation</li> <li>Wireless Transmitters and Receivers</li> </ul>
		Power Rating: 1 – 8W		
		Insertion Loss: Typical 1 – 2dB		
		Frequency: 110MHz – 9.0GHz (Upon Request)		
	High Pass Filters	Size: 2616 – 6025	<ul style="list-style-type: none"> <li>Designed for Various Wireless Stds.</li> <li>4 Watts CW Power CTE Match to PCB</li> <li>Thinnest Size in the Industry</li> </ul>	<ul style="list-style-type: none"> <li>Satellite Receiver</li> <li>Test Equipment</li> <li>Base Stations</li> <li>Electronic Warfare Systems</li> </ul>
		Frequency: 4W		
		Insertion Loss: 0.5 – 0.8dB		
		VSWR: 55MHz – 8GHz		
	Thin Film Filters	Substrate: Silicon, Quartz, glass, Alumina, and More	<ul style="list-style-type: none"> <li>High Accuracy (No Shrinkage, Precise Patterning) Due to Thin Film Process</li> <li>Customizable Device Size</li> <li>Highly Reproducible</li> </ul>	<ul style="list-style-type: none"> <li>RF/Microwave</li> <li>Medical</li> <li>Military / Defense</li> <li>Telecommunications</li> </ul>
		Termination: SMT, Wire Bondable, BGA, and LGA		
		Lumped Element Freq.: 500 – 5GHz		
		Frequency Distribution: 1 – 100+GHz		

# MILLIMETER WAVE MEASUREMENT SYSTEM

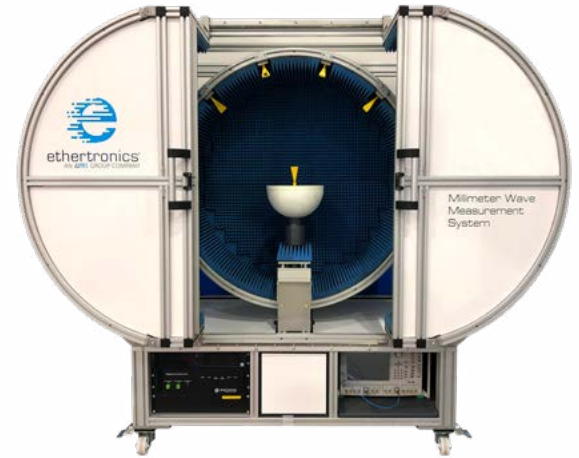
A Cost Effective, Compact, and Adaptable Solution for Testing Antennas/Devices at mmWave Frequencies.

## System

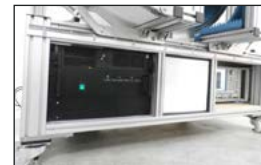
### Features:



- Self-Contained Portable System Chamber
- Accurate and Cost Effective Far-Field Measurement
- Suitable for All Testing Needs for mm Wave System Development
- 3D Radiation Pattern in Any Polarization



The Ethertronics® Millimeter Measurement System supports multiple combinations of mmWave frequencies with scalability to cover existing and forthcoming 5G mmWave frequencies and bandwidths (18 – 26.5GHz, 26.5 – 40GHz, 33 – 50GHz, 50 – 67GHz). Each measurement frequency band uses a dedicated RF path (high performance RF cables, rectangular waveguides, and horns). Its fully anechoic enclosure provides a shielded environment over a very wide frequency range (from 18GHz – 75GHz) and insures stable gain and phase measurement results. The system can be easily installed into a new or existing test facility by the movable chassis with steerable lifting wheels.



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