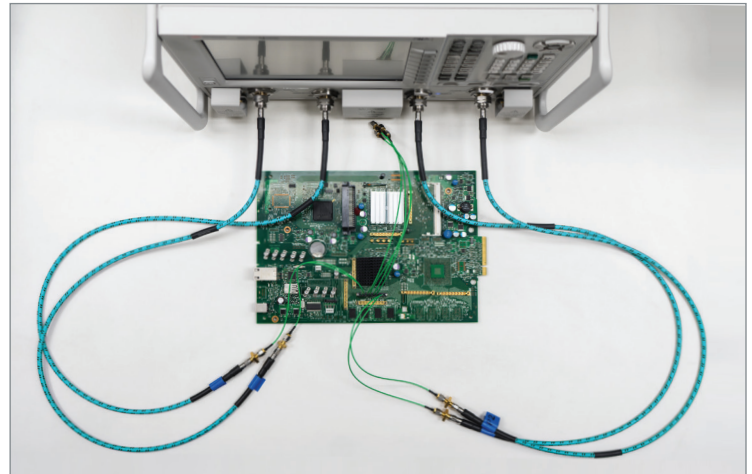


# RF Cable Assemblies

## WITH AN EXCEPTIONAL FOCUS ON THE NEEDS OF OUR CUSTOMERS

Carlisle Interconnect Technologies (CarlisleIT) designs, builds, tests, certifies and delivers comprehensive, high-performance interconnect solutions. We have facilities across the globe, with locally managed design and engineering teams at our state-of-the-art facilities.

We partner with customers in the Commercial Aerospace, Military, Space, Test & Measurement, Medical Technology and Industrial markets, providing limitless cable assembly and harness solutions. We work with you to manage complete end-to-end solutions, eliminating the need to manage multiple vendors and helping to ensure your applications deliver on time and on budget.



## ENGINEERING SUPPORT

CarlisleIT offers a wide array of engineering experience and capability across all our manufacturing locations worldwide, all of which can be utilized to support design, manufacture and qualification testing of assemblies and harnesses. Our capabilities include:

- » Electrical testing for AC, DC, RF and fiber-optic-based products, including EMC
- » Mechanical testing facilities for shock, vibration, crush resistance and flex life
- » Environmental testing
- » X-ray examination
- » Overmolding capability
- » In-house ability to design and manufacture custom-designed plastic and composite piece parts and connectors

## QUALITY

CarlisleIT's worldwide manufacturing locations are certified to the latest standards, including AS9100, ISO 9001, ISO 14001 and IPC. Plus, our facilities hold additional customer-specific approvals from many of the world's best-known platform and system OEMs.

- » Assembly test capabilities
- » Electrical length
- » Skew
- » Impedance (characteristic, differential, common mode)
- » Insertion loss, return loss/VSWR
- » TDR (time domain reflectometry)
- » Eye pattern
- » Jitter
- » Bit error rate testing (BERT)
- » Crosstalk
- » Propagation delay
- » Rise time
- » Fall time
- » Rise time degradation
- » Continuity/DC resistance
- » Hipot/dielectric strength testing

## LOGISTICS

CarlisleIT provides high-level service and support from our sales offices and manufacturing locations around the world. Our service levels include dedicated project-managed manufacturing cells that can deliver cable assembly and harness products to fit exactly with your specific production schedules. For many customers, we also stock product components to support particularly complex demands.

# RF and Microwave Cable Assemblies

## INTRODUCTION

When your applications call for high-performance coaxial cables and connectors, CarlisleIT's line of high-frequency RF/microwave assemblies are unparalleled.

CarlisleIT's capability to produce standard and custom RF connectors worldwide and our commitment to end-to-end program management mean we can support all your needs as a single local vendor for nearly every type of RF/microwave cable assembly.

We manufacture a broad range of standard and high-performance products at our facilities around the world, including UTIFLEX® high-performance flexible microwave assemblies, avionics standard RF cables and assemblies, and Semi-Flex® (conformable), semi-rigid and industry-standard flexible RG-series (QPL listed) coaxial cables that meet or exceed MIL-DTL-17 specifications. We specialize in phase, amplitude and delay-matched assemblies, and all assemblies are individually tested to ensure 100% compliance with your specifications.

If your applications involve test-and-measurement cable-assembly needs, we engineer a complete line of customizable, high-frequency RF test cables and assemblies, including single-position, ganged and high-frequency interconnects.





# RF Cables for Test & Measurement

## FLEXIBLE CABLES

CarlisleIT offers a complete line of high-performance, flexible microwave cables with excellent loss characteristics, outstanding phase stability, and unsurpassed flexibility, compared to standard flexible cables—all without sacrificing mechanical integrity. CarlisleIT has greatly increased connector reliability through a unique connector attachment that withstands mechanical and thermal stresses far better than standard connectors.

## SEMI-RIGID CABLES

CarlisleIT has decades of experience in producing some of the highest-quality semi-rigid cable assemblies in the industry. We carry a vast selection of commercial, QPL and custom RF/microwave connectors, along with a variety of cable types and diameter sizes.

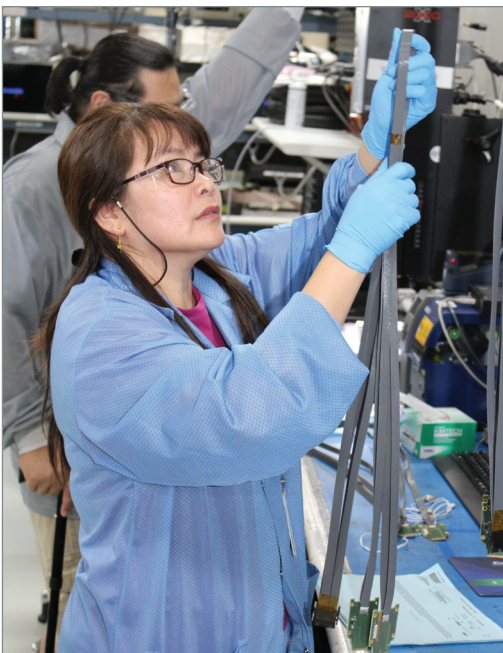
CarlisleIT's semi-rigid assemblies meet J-STD-001E cable assembly standards and MIL-C-17 specifications. These semi-rigid cables include different connector options, higher frequency coverage and extended electrical and environmental testing. Our semi-rigid cables offer tight physical tolerances, phase matching, minimal VSWR, and high-phase stability to meet your system design requirements. Semi-rigid cables are available at 50 ohm standard and as low-loss or ultra-low-loss cables with copper and aluminum outer conductors. Aluminum center conductors offer lighter weight cable assemblies. Dimensionally stable "M" and "DS" semi-rigid cables utilize a unique dielectric that provides significantly improved thermal stability for extended temperature ranges. Stainless steel 50 ohm semi-rigid cables are designed for applications where low thermal heat transfer is required, such as cryogenic feed cables for highly corrosive environments. Cables with impedances from 10 to 100 ohms and diameters from 0.020 to 0.250 inch are also available. CarlisleIT's odd impedance semi-rigid cables are the right solution for any impedance matching requirement.

## SEMI-FLEX/CONFORMABLE CABLES

Semi-Flex coaxial cable assemblies allow simple formation for use within RF/microwave systems and for making external connections to other equipment.

## RG CABLES

Standard Radio Guide (RG) coaxial cables are also available from CarlisleIT in various sizes and connector options. Low-cost RG cables offer excellent low loss performance for short distance, low-frequency applications like radio to antenna in electronic PCBs, home cable, phone and satellite television systems and standard 10/100Mbps ethernet communications.



Learn more: [CarlisleIT.com/products](https://www.carlisleit.com/products)

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### ARMOR BRAID

MKR armor braid cables use UTIFLEX microwave cables as a base with an additional highly flexible and abrasive resistant ruggedization. MKR cables are ideally suitable for lab test environments with greater mechanical strength and long-term reliability in a compact package. These cables are extremely flexible and have excellent crush, torque and kink resistance.

### TWINAX CABLES

Twinax cables consist of two inner conductors instead of one and are ideal for short-range, high-speed differential signaling applications. Twinax cables are available in different sizes like 28, 30 and 32AWG operating up to 40GHz with very low typical insertion loss in the range of 5 to 7dB at fmax. Typical applications are optical network interconnects, PCI Gen4 and higher interconnects.



Learn more: [CarlisleIT.com/products](https://www.carlisleit.com/products)

PERFORMANCE & SPECIFICATIONS

Type	Product Name	Frequency	Outer Shield / Center Conductor Diameter	Speed	Loss @ fmax	Connector Options	Use Cases
		fmax GHz	Inch	vp % Nom	Max dB/ft		
Flexible High Performance Low Loss	UTIFLEX/UFC092D	70	0.092 (with jacket); 0.079 (w/o jacket)	78	1.94	SMA, 2.92, 2.4 and 1.85mm	ATE systems, emulation systems, adapters and pitch translators, antenna systems, navigation and feedback control systems
	UTIFLEX/UFA125A	50	0.125 (with jacket); 0.105 (w/o jacket)	77	1.19	SMA, 2.92, 2.4 and 1.85mm	
Flexible Standard	UF-70-047-042-011	26.5	0.047 (outer shield); 29AWG (center conductor)	70	2.6	SMA, 2.92, 2.4 and 1.85mm	
	UF-70-087-073-020	40	0.087 (outer shield); 24AWG (center conductor)	70	1.8	SMA, 2.92, 2.4 and 1.85mm	
	UF-70-141-129-037	18	0.141 (outer shield); 19AWG (center conductor)	70	0.62	SMA, 2.92, 2.4 and 1.85mm	
Conformable/ Semi-Flex	047 Type Semi-Flex	20	0.047	70	1.9	MCX, SMA, SMP, SSMP	
	086 Type Semi-Flex	40	0.086	70	1.92	MCX, TNC, Type N, BMA, SMA, K, SMP, SSMP	RF test enclosures with tight space
	141 Type Semi-Flex	26.5	0.141	70	0.94	TNC, N, BMA, SMA	
Semi-Rigid	M17/151-00001	20	0.047	70	1.9	SMP, 3.5 and SMA	Create short delays in RF/microwave systems; RF signal propagation on PCB, board-to-board signal transmission; radar and differential signal propagation; Used in oscillators, amplifiers, printed circuit boards, delay lines and capacitor sections
	UT-047-TP	20	0.047	70	1.56	SMP, 3.5 and SMA	
	M17/130-RG402	20	0.141	70	0.64	SMA, TMP, BMA, TNC, TYPE N	
	UT-141C-LL	20	0.141	70	0.5	SMA, TMP, BMA, TNC, TYPE N	
	M17/133-RG405	20	0.087	70	1.3	SMP, SMA, SMK, TMP, BMA, TNC, TYPE N	
	UT-085-DS	20	0.087	70	1	SMP, SMA, SMK, TMP, BMA, TNC, TYPE N	
RG Cables	RG178	2.4	0.071	70	6	SMA, Type N, TNC, SMC, MCX, MMCX, BNC, SMB	Motor control systems; satellite and security camera systems; home cable TV systems; lab test environments
	RG316	2.4	0.098	70	4.1		
	RG142	10	0.116	70	5.5		
Armor Braid	MKR300C	22	0.3	81	0.44	NMD	VNA Test; Lab Test Environment
Twinax	IPT-70-058-100-015	40	0.015; 28AWG	70	5.48	Custom, Direct Attach	Optical transceivers, high- frequency loss inter- or intra- board communication
	IPT-70-030-100-009	40	0.009; 32AWG	70	6.7		

Learn more: [CarlisleIT.com/products](http://CarlisleIT.com/products)

Product Type	Customer Features and Benefits
Flexible Cables	<ul style="list-style-type: none"> <li>» Versatile low loss cables offer outstanding performance in almost any environment</li> <li>» Low loss cables have the lowest insertion loss available at 18, 26.5, 40, 50, 65GHz</li> <li>» Low SWR (1.25:1 at 40GHz typical)</li> <li>» Excellent shielding effectiveness and precision phase matching</li> </ul>
Semi-Flex/Conformable Cables	<ul style="list-style-type: none"> <li>» Semi-flex cables are hand formable without the need for bending tools</li> <li>» Semi-flex cables have lower leakage and improved bending radius than semi-rigid types</li> </ul>
Semi-Rigid Cables	<ul style="list-style-type: none"> <li>» RF shielding in excess of -130 dB provides excellent insulation</li> <li>» Lowest attenuation and lightest weight</li> <li>» Very tight bend radii allow utilization in the tightest configurations</li> <li>» Uniform conductor and dielectric forming results in unequalled impedance control and VSWR performance</li> <li>» Availability of unique dielectric to provide significantly improved thermal stability for extended temperature ranges</li> </ul>
RG Cables	<ul style="list-style-type: none"> <li>» Low cost for use in wide variety of general purpose RF communication</li> <li>» Low-loss performance for short-distance, low-frequency applications</li> </ul>
Armor Braid	<ul style="list-style-type: none"> <li>» Excellent crush, torque and kink resistance for use in rugged environment</li> <li>» Higher mechanical strength and long-term reliability for use in lab test setups</li> </ul>
Twinax	<ul style="list-style-type: none"> <li>» 100 ohm impedance for high performance differential signaling</li> <li>» Optimum conductor sizes and shielding for low loss performance at high frequencies</li> <li>» Excellent phase matching guaranteed by design and construction</li> </ul>

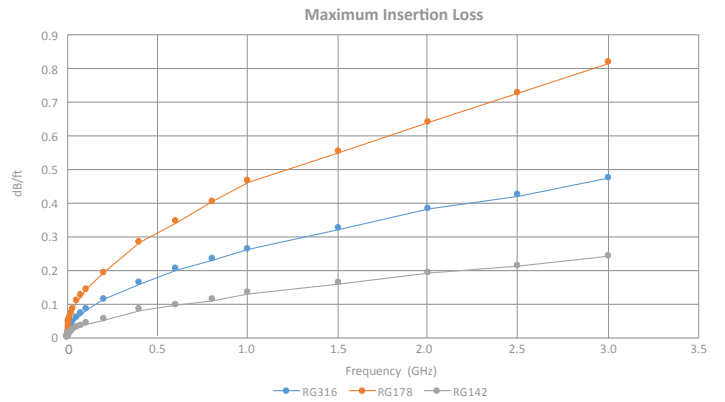


INSERTION LOSS PERFORMANCE

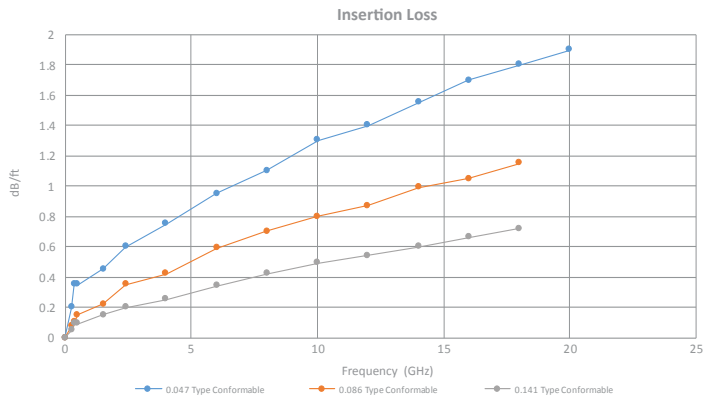
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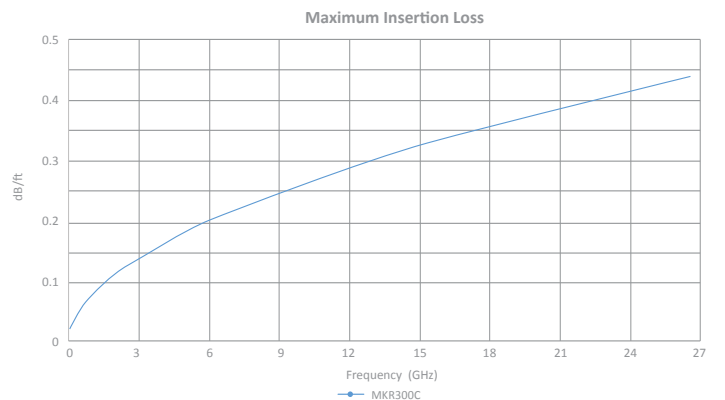
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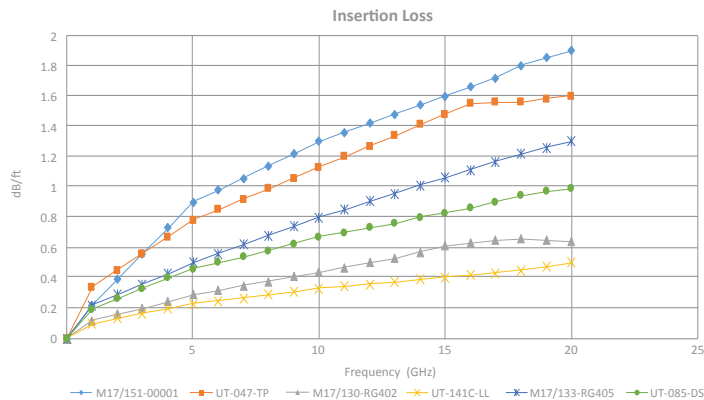
Semi-Flex/Conformable Cables



MKR Armor Braid Cables



Semi-Rigid Cables



Twinax Cables



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# We Are Interconnect.

At Carlisle Interconnect Technologies, we do more than make interconnect technologies for a spectrum of industries. We deliver the critical connections and products that make amazing performances possible.



## Carlisle Operating System (COS)

### Driving the Industry Forward

We're leading the way with our Carlisle Operating System (COS). COS is our standardized methodology using the tools of Lean Manufacturing and Six Sigma to drive continuous improvement for our customers and our business. It promotes the systems and culture of safety, employee involvement, quality, and on-time delivery — all of this with our customers in mind.

The COS methodology is woven into our leadership fabric and everything we do. This thought process is both supported and driven by our top leadership and ensures the sustainability of our successes with our customers and our business. Every CarlisleIT location participates with the goal of continuous improvement at all facilities.

With COS, companies working with CarlisleIT know they're partnering with a world-class interconnect manufacturer dedicated to providing comprehensive, next-level solutions they can't get anywhere else.

### Nine Key Metrics

- » MDI - Managing for Daily Improvement
- » TPM - Total Preventative Maintenance
- » Culture
- » Supply Chain
- » Environment
- » Safety
- » Quality
- » Delivery
- » Cost

The COS Operational Excellence program recognizes and rewards facility performance with a specific and defined level of achievement, providing each facility a road map for continuous success. The program allows CarlisleIT to monitor and track performance to ensure we're achieving our performance goals.



See CarlisleIT's full line of products at:  
[CarlisleIT.com/products](http://CarlisleIT.com/products)

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