RF Cable Assemblies
Test & Measurement

BRING US YOUR MOST COMPLEX CHALLENGES

WWW.CARLISLEIT.COM
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

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 ultralow 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.

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.
## Performance and Specifications

<table>
<thead>
<tr>
<th>Type</th>
<th>Product Name</th>
<th>Frequency Nom [fmax GHz]</th>
<th>Outer Shield /Center Conductor Diameter Inch</th>
<th>Speed [vp % Nom]</th>
<th>Loss @fmax Max [dB/ft]</th>
<th>Connector Options</th>
<th>Use Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flexible High Performance Low Loss</td>
<td>UTIFLEX/UFCD92D</td>
<td>70</td>
<td>0.092 (with jacket); 0.079 (w/o jacket)</td>
<td>78</td>
<td>1.94</td>
<td>SMA, 2.92, 2.4 and 1.85 mm</td>
<td>ATE systems, emulation systems, adapters and pitch translators, antenna systems, navigation and feedback control systems</td>
</tr>
<tr>
<td></td>
<td>UTIFLEX/UFA125A</td>
<td>50</td>
<td>0.125 (with jacket); 0.105 (w/o jacket)</td>
<td>77</td>
<td>1.19</td>
<td>SMA, 2.92, 2.4 and 1.85 mm</td>
<td></td>
</tr>
<tr>
<td>Flexible Standard</td>
<td>UF-70-047-042-011</td>
<td>26.5</td>
<td>0.047 (outer shield); 29AWG (center conductor)</td>
<td>70</td>
<td>2.6</td>
<td>SMA, 2.92, 2.4 and 1.85 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>UF-70-087-073-020</td>
<td>40</td>
<td>0.087 (outer shield); 24AWG (center conductor)</td>
<td>70</td>
<td>1.8</td>
<td>SMA, 2.92, 2.4 and 1.85 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>UF-70-141-129-037</td>
<td>18</td>
<td>0.141 (outer shield); 19AWG (center conductor)</td>
<td>70</td>
<td>0.62</td>
<td>SMA, 2.92, 2.4 and 1.85 mm</td>
<td></td>
</tr>
<tr>
<td>Conformable/ Semi-Flex</td>
<td>047 Type Semi-Flex</td>
<td>20</td>
<td>0.047</td>
<td>70</td>
<td>1.9</td>
<td>MCX, SMA, SMP, SSMP</td>
<td>Amplifiers and microwave antennas that need high shielding</td>
</tr>
<tr>
<td></td>
<td>086 Type Semi-Flex</td>
<td>40</td>
<td>0.086</td>
<td>70</td>
<td>1.92</td>
<td>MCX, TNC, Type N, BMA, SMA, K, SMP, SSMP</td>
<td></td>
</tr>
<tr>
<td></td>
<td>141 Type Semi-Flex</td>
<td>26.5</td>
<td>0.141</td>
<td>70</td>
<td>0.94</td>
<td>TNC, N, BMA, SMA</td>
<td>RF test enclosures with tight space</td>
</tr>
<tr>
<td>Semi-Rigid</td>
<td>M17/151-00001</td>
<td>20</td>
<td>0.047</td>
<td>70</td>
<td>1.9</td>
<td>SMP, 3.5 and SMA</td>
<td>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</td>
</tr>
<tr>
<td></td>
<td>UT-047-TP</td>
<td>20</td>
<td>0.047</td>
<td>70</td>
<td>1.56</td>
<td>SMP, 3.5 and SMA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>M17/130-RG402</td>
<td>20</td>
<td>0.141</td>
<td>70</td>
<td>0.64</td>
<td>SMA, TMP, BMA, TNC, Type N</td>
<td></td>
</tr>
<tr>
<td></td>
<td>UT-141C-LL</td>
<td>20</td>
<td>0.141</td>
<td>70</td>
<td>0.5</td>
<td>SMA, TMP, BMA, TNC, Type N</td>
<td></td>
</tr>
<tr>
<td></td>
<td>M17/133-RG405</td>
<td>20</td>
<td>0.087</td>
<td>70</td>
<td>1.3</td>
<td>SMP, SMA, SMK, TMP, BMA, TNC, TNC, TYPE N</td>
<td></td>
</tr>
<tr>
<td></td>
<td>UT-085-DS</td>
<td>20</td>
<td>0.087</td>
<td>70</td>
<td>1</td>
<td>SMP, SMA, SMK, TMP, BMA, TNC, TNC, TYPE N</td>
<td></td>
</tr>
<tr>
<td>RG Cables</td>
<td>RG178</td>
<td>2.4</td>
<td>0.071</td>
<td>70</td>
<td>6</td>
<td>SMA, Type N, TNC, SMC, MCX, MMCX, BNC, SMB</td>
<td>Motor control systems; satellite and security camera systems; home cable TV systems; lab test environments</td>
</tr>
<tr>
<td></td>
<td>RG316</td>
<td>2.4</td>
<td>0.098</td>
<td>70</td>
<td>4.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>RG142</td>
<td>10</td>
<td>0.116</td>
<td>70</td>
<td>5.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Armor Braid</td>
<td>MKR300C</td>
<td>22</td>
<td>0.3</td>
<td>81</td>
<td>0.44</td>
<td>NMD</td>
<td>VNA Test; Lab Test Environment</td>
</tr>
<tr>
<td>Twinax</td>
<td>IPT-70-058-100-015</td>
<td>40</td>
<td>0.015; 28AWG</td>
<td>70</td>
<td>5.48</td>
<td>Custom, Direct Attach</td>
<td>Optical transceivers, high-frequency loss inter- or intra-board communication</td>
</tr>
<tr>
<td></td>
<td>IPT-70-030-100-009</td>
<td>40</td>
<td>0.009; 32AWG</td>
<td>70</td>
<td>6.7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Insertion Loss Performance

Flexible Cables

Insertion Loss

Frequency (GHz)

0 10 20 30 40 50 60

dB/ft

0 0.5 1 1.5 2 2.5 3

UFC012D  UFA210B  HGE100D  HPE100D  HPE160D

RG Cables

Maximum Insertion Loss

Frequency (GHz)

0 0.5 1.0 1.5 2.0 2.5 3.0 3.5

dB/ft

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9

MKR300C

Semi-Flex/Conformable Cables

Insertion Loss

Frequency (GHz)

0 5 10 15 20 25

dB/ft

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1

UFC092D  UFA210B  HGE100D  HPE100D  HPE160D

MKR Armor Braid Cables

Maximum Insertion Loss

Frequency (GHz)

0 3 6 9 12 15 18 21 24 27

dB/ft

0 0.05 0.1 0.15 0.2 0.25 0.3

UT-047-TP  UT-085-DS  UT-141C-LL

Semi-Rigid Cables

Insertion Loss

Frequency (GHz)

0 5 10 15 20 25

dB/ft

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1

M17/130-RG402  M17/133-RG405  M17/151-00001  M17/151-00001

Twinax Cables

Maximum Insertion Loss

Frequency (GHz)

0 5 10 15 20 25 30 35 40 45

dB/ft

0 2.0 4.0 6.0 8.0 10.0 12.0

IPT-70-085-500-015-BLUE  IPT-70-085-500-015-BLUE  IPT-70-030-100-009
Global Manufacturing. Local Support.

Wherever you are, so are we. With manufacturing centers around the globe, our highly qualified team of nearly 350 engineers is up to any challenge. Our extensive worldwide manufacturing capabilities, coupled with end-to-end local project management and engineering support, allow us to design, build, test and certify your product in-house, saving you the time and hassle of managing multiple vendors.