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Cell: 631-335-5669
E-mail: parib@dbtsales.com
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Precision In-Series adapters include: SMA, TNC, Type N, 3.5mm, 2.92mm, 2.40mm and 1.85mm.

Some of the Between-Series adapters available are Type N to SMA, SMA to 2.40mm, 3.5mm to 2.92mm, 2.92mm to 2.40mm, SSMA to 2.4mm.
In-Series Adapters
Type N Adapters • DC to 18.0 GHz

Application:
- DC to 18.0 GHz

Electrical:
- Frequency Range: DC - 18 GHz
- VSWR: DC - 18 GHz ........ 1.15:1
- Impedence: 50 Ohms
- Insertion Loss: .05 √ Frequency

Materials:
- Center Contact: Beryllium Copper
- Housing: Passivated, Stainless Steel
- Dielectric: Oxide-Noryl

N (f) to N (f)
NJ-NJ-18

N (m) to N (m)
NP-NP-RA

N (m) to N (f)
NP-NJ-RA
In-Series Adapters

TNC Adapters • DC to 18.0 GHz

Application:

- DC to 18.0 GHz

Electrical:

- Frequency Range: DC - 18 GHz
- VSWR: DC - 18 GHz ........ 1.15:1
- Impedance: 50 Ohms
- Insertion Loss: .05 √ Frequency

Materials:

- Center Contact: Beryllium Copper
- Housing: Passivated, Stainless Steel
- Dielectric: Oxide-Noryl
In-Series Adapters

SMA Adapters • DC to 27.0 GHz

Application:
- DC to 27.0 GHz High Performance

Features:
- Mode Free Through 27.0 GHz.
- Low VSWR:
  DC to 18.0 GHz........1.10:1 max.
  18.0 to 27.0 GHz......1.15:1 max.
- Minimum VSWR Contribution When Used as Connector Savers
- Performance Consistency Unit-to-unit
- Temperature Rating -55°C to +165°C

Interface:
- Per MIL-STD-348
- SMA Figs. 310-1 and 310-2

Construction:
- Housing: Stainless Steel, Passivated
- Contact: Beryllium Copper (BeCu) Gold Plated Per MIL-G-45204
- Dielectric: PTFE Fluorocarbon Per ASTM D1457
- Center Contact Capture: Ultem 1000 Per ASTM D5205

Super SMA Adapter (Model # 232-502SF) Test Data

APPLICATION:
- DC to 27.0 GHz High Performance

FEATURES:
- Mode Free Through 27.0 GHz.
- Low VSWR:
  DC to 18.0 GHz........1.10:1 max.
  18.0 to 27.0 GHz......1.15:1 max.
- Minimum VSWR Contribution When Used as Connector Savers
- Performance Consistency Unit-to-unit
- Temperature Rating -55°C to +165°C

INTERFACE:
- Per MIL-STD-348
- SMA Figs. 310-1 and 310-2

CONSTRUCTION:
- Housing: Stainless Steel, Passivated
- Contact: Beryllium Copper (BeCu) Gold Plated Per MIL-G-45204
- Dielectric: PTFE Fluorocarbon Per ASTM D1457
- Center Contact Capture: Ultem 1000 Per ASTM D5205

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### In-Series Adapters

**SMA Quick Mate Adapters • DC to 26.5 GHz**

**SMA-PJ-SO-18 • DC - 26.5 GHz**

- **SPECIFICATIONS**
  - **INSERTION LOSS**
    - DC - 18 GHz .......... 0.1 dB MAX
    - 18 - 26.5 GHz .......... 0.2 dB MAX
  - **Housing**
    - Passivated Stainless Steel
  - **Center and Outer Conductor**
    - Beryllium Copper, Gold Plate
  - **Dielectric**
    - Teflon
  - **VSWR**
    - DC - 18 GHz .......... 1.2:1
    - 18 - 26.5 GHz .......... 1.3:1
  - **Impedance**
    - 50 Ohms

**1312-33-50-QC3 • DC - 18 GHz**

- **SPECIFICATIONS**
  - **Housing**
    - Passivated Stainless Steel
  - **Center and Outer Conductor**
    - Beryllium Copper, Gold Plate
  - **Dielectric**
    - Teflon
  - **Impedance**
    - 50 Ohms
  - **Life:** >3,000 Mates
  - **Notes:** Not recommended for testing of PC Boards

### SMA Right Angle Adapters • DC to 27.0 GHz

**Application:**
- DC to 27.0 GHz High Performance

**Electrical:**
- **Frequency Range**
  - DC - 27 GHz
- **VSWR**
  - DC - 18 GHz .......... 1.20:1
  - 18 - 27 GHz .......... 1.35:1
- **Impedence**
  - 50 Ohms
- **Temperature Range**
  - -65°C to +165°C
- **Power**
  - Dielectric Withstanding Voltage, Sea Level: 1000 Volts RMS

**Materials:**
- **Center Contact**
  - Beryllium Copper, Per ASTM-B-196
- **Body and Coupling Nut**
  - Corrosion resistant steel Type 303 (Stainless)
  - Non-magnetic, per ASTM-A-484 & ASTM-A-582
- **Dielectric**
  - PTFE, (Fluorocarbon) per ASTM-D-1457
- **Gasket**
  - Silicone R. per ZZ-R-765, Class IIB, Grade 65-67
In-Series Adapters

3.5mm Adapters • DC to 34.0 GHz

Application:
- DC to 34.0 GHz

Electrical:
- Frequency Range: DC - 34 GHz
- VSWR: DC - 34 GHz 1.25:1
- Insertion Loss: 0.40 dB Max
- Impedence: 50 Ohms
- Temperature Range:
  - KEL-F: -240°C to +204°C
  - REXOLITE: -55°C to +125°C

Materials:
- Center and Contact: Beryllium Copper / Gold Plate
- Housing: Passivated Stainless Steel
- Dielectric: PCTFE (KEL-F)

3.5mm Right Angle Adapters • DC to 34.0 GHz

Application:
- DC to 34.0 GHz

Electrical:
- Frequency Range: DC - 34 GHz
- VSWR: DC - 34 GHz 1.25:1
- Insertion Loss: 0.40 dB Max
- Impedence: 50 Ohms
- Temperature Range:
  - KEL-F: -240°C to +204°C
  - REXOLITE: -55°C to +125°C

Materials:
- Inner Conductor: Beryllium Copper / Gold Plate
- Outer Conductor: Passivated Stainless Steel
- Dielectric: PCTFE (KEL-F)
In-Series Adapters
2.92mm “K®” Adapters • DC to 40.0 GHz

Application:
• DC to 40.0 GHz High Performance

Features:
• Mode Free Through 40.0 GHz
• Low VSWR:
  - DC to 27.0 GHz: 1.10:1 max.
  - 27.0 to 40.0 GHz: 1.15:1 max.
• Minimum VSWR Contribution When Used as Connector Savers
• Performance Consistency Unit-to-unit
• Temperature Rating -55°C to +135°C

Interface:
• Per MIL-STD-348
• 2.92 mm (SMK) Figs. 323-1 and 323-2

Construction:
• Housing: Stainless Steel, Passivated
• Contact: Beryllium Copper (BeCu) Gold Plated Per MIL-G-45204
• Center Contact Capture: Ultem 1000 Per ASTM D 5205 and KEL-F Per ASTM D 1430
In-Series Adapters

### 2.92mm Right Angle Adapters • DC to 40.0 GHz

<table>
<thead>
<tr>
<th>Application:</th>
<th>Electrical:</th>
<th>Materials:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• DC to 40.0 GHz</td>
<td>• Frequency Range: DC - 40 GHz</td>
<td>• Inner Conductor: Beryllium Copper</td>
</tr>
<tr>
<td></td>
<td>• VSWR: DC - 40 GHz 1.25:1</td>
<td>• Outer Conductor: Passivated Stainless Steel</td>
</tr>
<tr>
<td></td>
<td>• Impedance: 50 Ohms</td>
<td>• Dielectric: Oxide-Noryl™</td>
</tr>
<tr>
<td></td>
<td>• Temperature Range: -55°C to +100°C</td>
<td></td>
</tr>
</tbody>
</table>

- **2.92mm (f) to 2.92mm (f)**
  - 29J-29J-RA

- **2.92mm (m) to 2.92mm (m)**
  - 29P-29P-RA

- **2.92mm (m) to 2.92mm (f)**
  - 29P-29J-RA

### 2.4mm Right Angle Adapters • DC to 50.0 GHz

<table>
<thead>
<tr>
<th>Application:</th>
<th>Electrical:</th>
<th>Materials:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• DC to 50.0 GHz</td>
<td>• Frequency Range: DC - 50 GHz</td>
<td>• Inner Conductor: Beryllium Copper</td>
</tr>
<tr>
<td></td>
<td>• VSWR: DC - 50 GHz 1.30:1</td>
<td>• Outer Conductor: Passivated Stainless Steel</td>
</tr>
<tr>
<td></td>
<td>• Temperature Range: -55°C to +100°C</td>
<td>• Dielectric: PTFE</td>
</tr>
</tbody>
</table>

- **2.4mm (f) to 2.4mm (f)**
  - 24J-24J-RA

- **2.4mm (m) to 2.4mm (m)**
  - 24P-24P-RA

- **2.4mm (m) to 2.4mm (f)**
  - 24P-24J-RA
**In-Series Adapters**  
**2.40mm Adapters • DC to 50.0 GHz**

<table>
<thead>
<tr>
<th>2.40mm (f) to (m)</th>
<th>![Image]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1430-00SF</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.40mm (m) to (m)</th>
<th>![Image]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1431-00SF</strong></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.40mm (f) to (f)</th>
<th>![Image]</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1432-00SF</strong></td>
<td></td>
</tr>
</tbody>
</table>

### Application:
- DC to 50.0 GHz High Performance

### Features:
- Mode Free Through 50.0 GHz.
- Low VSWR:
  - DC to 27.0 GHz: 1.10:1 max.
  - 27.0 to 40.0 GHz: 1.15:1 max.
  - 40.0 to 50.0 GHz: 1.20:1 max.
- Minimum VSWR Contribution When Used as Connector Savers
- Performance Consistency Unit-to-unit
- Temperature Rating -55°C to +135°C

### Interface:
- Per MIL-STD-348
- 2.40 mm Figs. 324-1 and 324-2

### Construction:
- Housing: Stainless Steel, Passivated
- Contact: Beryllium Copper (BeCu) Gold Plated Per MIL-G-45204
- Center Contact Capture: Ultem 1000 Per ASTM D 5205 and KEL-F Per ASTM D 1430

---

Product specifications subject to change without notification.
In-Series Adapters

1.85mm Adapters • DC to 67.0 GHz

Application:
- DC to 67.0 GHz High Performance

Features:
- Mode Free Through 67.0 GHz
- Low VSWR:
  DC to 18.0 GHz........1.10:1 max.
  18.0 to 40.0 GHz........1.15:1 max.
  40.0 to 50.0 GHz........1.18:1 max.
  50.0 to 67.0 GHz........1.25:1 max.
- Low Insertion Loss
- Leakage: <-100dB
- Temperature Rating -55°C to +165°C

Interface:
- Per MIL-STD-348
- 1.85 mm Figs.

Construction:
- Housing: Stainless Steel, Passivated
- Contact: Beryllium Copper (BeCu)
  Gold Plated Per MIL-G-45204
- Center Contact Capture:
  Ultem 1000 Per ASTM D 5205
  and KEL-F Per ASTM D 1430

1.85mm (f) to 1.85mm (m)
1830-00SF

1.85mm (m) to 1.85mm (m)
1831-00SF

1.85mm (f) to 1.85mm (f)
1832-00SF
Between-Series Adapters

**TNC to SMA Adapters • DC to 18.0 GHz**

**Application:**
- DC to 18.0 GHz

**Features:**
- Low VSWR:
  - DC to 18.0 GHz: 1.15:1 max.
- Durability: 500 Cycles Min.
- Temperature Rating: -55°C to +100°C

**Materials:**
- Housing: Stainless Steel, Passivated
- Contact: Beryllium Copper
- Dielectric: Oxide-Noryl™ and PTFE Fluorocarbon

---

**TNC (f) to SMA (f)**

![TNCJ-SMAJ](image1)

**TNC (f) to SMA (m)**

![TNCJ-SMAP](image2)

**TNC (m) to SMA (f)**

![TNCP-SMAJ](image3)

**TNC (m) to SMA (m)**

![TNCP-SMAP](image4)
Between-Series Adapters

Type N to SMA Adapters • DC to 18.0 GHz

**Application:**
- DC to 18.0 GHz High Performance

**Features:**
- Low VSWR:
- DC to 18.0 GHz…1.15:1 max.
- Performance Consistency Unit-to-unit
- Temperature Rating -55°C to +165°C

**Interface:**
- Per MIL-STD-348
- SMA Figs. 310-1 and 310-2
- N Figs. 304-1 and 304-2

**Construction:**
- Housing: Stainless Steel, Passivated
- Contact: Beryllium Copper (BeCu) Gold Plated Per MIL-G-45204
- Dielectric: PTFE Fluorocarbon Per ASTM D1710
- Center Contact Capture: Ultem 1000 Per ASTM D5205

**Models:**
- Type N (f) to SMA (f): 2310SF
- Type N (m) to SMA (f): 2310SF
- Type N (f) to SMA (m): 2330SF
- Type N (m) to SMA (m): 2340SF
- Type N (f) to SMA (m): 2311SF
- Type N (f) to SMA (f): 2312SF
Between-Series Adapters

3.5mm to 2.40mm Adapters • DC to 33.0 GHz

**Application:**
- DC to 33.0 GHz High Performance

**Features:**
- Mode Free Through 33.0 GHz
- Low VSWR:
  - DC to 27.0 GHz: 1.10:1 max.
  - 27.0 to 33.0 GHz: 1.15:1 max.
- Performance Consistency Unit-to-unit
- Temperature Rating -55°C to +135°C

**Interface:**
- Per MIL-STD-348
- 2.40 mm Figs. 324-1 and 324-2
- 3.5 mm Ref IEEE Std 287

**Construction:**
- Housing: Stainless Steel, Passivated
- Contact: Beryllium Copper (BeCu)
  - Gold Plated Per MIL-G-45204
- Center Contact Capture: Ultem 1000 Per ASTM D 5205 and KEL-F Per ASTM D 1430

### Adapters

<table>
<thead>
<tr>
<th>Description</th>
<th>Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5mm (f) to 2.40mm (f)</td>
<td>61410-00SF</td>
</tr>
<tr>
<td>3.5mm (f) to 2.40mm (m)</td>
<td>61420-00SF</td>
</tr>
<tr>
<td>3.5mm (m) to 2.40mm (f)</td>
<td>61430-00SF</td>
</tr>
<tr>
<td>3.5mm (m) to 2.40mm (m)</td>
<td>61440-00SF</td>
</tr>
</tbody>
</table>

Product specifications subject to change without notification.
Between-Series Adapters

2.9mm to 3.5mm Adapters • DC to 34.0 GHz

**Application:**
- DC to 34.0 GHz

**Features:**
- Impedence 50 Ohms
- VSWR:
  DC to 34.0 GHz........1.25:1 max.
- Durability: 500 Cycles Min.
- Temperature Rating -60°C to +100°C

**Construction:**
- Housing: Stainless Steel, Passivated
- Center and Contact:
  Gold Plated Beryllium Copper
- Dielectric PTFE

---

**2.9mm (f) to 3.5mm (f)**

![Image](29J-35J)

**2.9mm (f) to 3.5mm (m)**

![Image](29J-35P)

**2.9mm (m) to 3.5mm (f)**

![Image](29P-35J)

**2.9mm (m) to 3.5mm (m)**

![Image](29P-35P)
Between-Series Adapters

2.4mm to 3.5mm Adapters • DC to 34.0 GHz

Application:
- DC to 34.0 GHz

Features:
- Impedance 50 Ohms
- VSWR:
  DC to 34.0 GHz........1.25:1 max.
- Durability: 500 Cycles Min.
- Temperature Rating -60°C to +100°C

Construction:
- Housing: Stainless Steel, Passivated
- Center and Contact: Gold Plated Beryllium Copper
- Dielectric PTFE
Between-Series Adapters

SSMA (Airline) to 2.40mm Adapters • DC to 40.0 GHz

**Application:**
- DC to 40.0 GHz High Performance

**Features:**
- Mode Free Through 40.0 GHz
- Low VSWR:
  DC to 27.0 GHz......1.10:1 max.
  27.0 to 40.0 GHz......1.15:1 max.
- Performance Consistency Unit-to-unit
- Temperature Rating -55°C to +135°C

**Interface:**
- Per MIL-STD-348
- SSMA Figs 319-1 and 319-2
- 2.40 mm Figs. 324-1 and 324-2

**Construction:**
- Housing: Stainless Steel, Passivated
- Contact: Beryllium Copper (BeCu) Gold Plated Per MIL-G-45204
- Center Contact Capture:
  Ultem 1000 Per ASTM D 5205
  and KEL-F Per ASTM D 1430

### SSD (Airline) to 2.4 mm (Model # 11430-00SF) Test Data

<table>
<thead>
<tr>
<th>Frequency (GHz)</th>
<th>Return Loss (S11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>0.000</td>
</tr>
<tr>
<td>2.0</td>
<td>1.200</td>
</tr>
<tr>
<td>20.0</td>
<td>1.000</td>
</tr>
<tr>
<td>50.0</td>
<td>1.100</td>
</tr>
</tbody>
</table>

#### SSMA (f) to 2.40mm (f)

- **Part Number:** 11410-00SF

#### SSMA (f) to 2.40mm (m)

- **Part Number:** 11420-00SF

#### SSMA (m) to 2.40mm (f)

- **Part Number:** 11430-00SF

#### SSMA (m) to 2.40mm (m)

- **Part Number:** 11440-00SF

Product specifications subject to change without notification.
### Between-Series Adapters

**2.92mm to 2.40mm Adapters • DC to 40.0 GHz**

**Application:**
- DC to 40.0 GHz High Performance

**Features:**
- Mode Free Through 40.0 GHz
- Low VSWR:
  - DC to 27.0 GHz: 1.10:1 max.
  - 27.0 to 40.0 GHz: 1.15:1 max.
- Performance Consistency Unit-to-unit
- Temperature Rating -55°C to +135°C

**Interface:**
- Per MIL-STD-348
- 2.92 mm (SMK) Figs 323-1 and 323-2
- 2.40 mm Figs. 324-1 and 324-2

**Construction:**
- Housing: Stainless Steel, Passivated
- Contact: Beryllium Copper (BeCu) Gold Plated Per MIL-G-45204
- Center Contact Capture: Ultem 1000 Per ASTM D 5205 and KEL-F Per ASTM D 1430

<table>
<thead>
<tr>
<th>Type</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.92mm (f) to 2.40mm (f)</td>
<td>101410-00SF</td>
<td>Ultem 1000 Per ASTM D 5205 and KEL-F Per ASTM D 1430</td>
</tr>
<tr>
<td>2.92mm (m) to 2.40mm (f)</td>
<td>101430-00SF</td>
<td>Ultem 1000 Per ASTM D 5205 and KEL-F Per ASTM D 1430</td>
</tr>
<tr>
<td>2.92mm (m) to 2.40mm (m)</td>
<td>101440-00SF</td>
<td>Ultem 1000 Per ASTM D 5205 and KEL-F Per ASTM D 1430</td>
</tr>
</tbody>
</table>

---

### Additional Adapters

**2.92mm (f) to 2.40mm (f)**

- DC to 40.0 GHz High Performance

**Features:**
- Impedence 50 Ohms
- VSWR:
  - DC - 40.0 GHz: 1.25:1 max.
- Durability: 500 Cycles Min.
- Temperature Rating -55°C to +100°C

**Construction:**
- Housing: Stainless Steel, Passivated
- Center and Contact: Gold Plated Beryllium Copper (BeCu)
- Dielectric: PTFE

<table>
<thead>
<tr>
<th>Type</th>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.92mm (f) to 2.40mm (f)</td>
<td>24J-29J</td>
<td>Gold Plated Beryllium Copper (BeCu)</td>
</tr>
<tr>
<td>2.92mm (f) to 2.40mm (m)</td>
<td>24P-29J</td>
<td>Gold Plated Beryllium Copper (BeCu)</td>
</tr>
<tr>
<td>2.92mm (m) to 2.40mm (f)</td>
<td>24J-29P</td>
<td>Gold Plated Beryllium Copper (BeCu)</td>
</tr>
<tr>
<td>2.92mm (m) to 2.40mm (m)</td>
<td>24P-29P</td>
<td>Gold Plated Beryllium Copper (BeCu)</td>
</tr>
</tbody>
</table>
# Low PIM In-Series Adapters

## 7/16 Adapters • DC to 6.0 GHz

### Application:
- DC to 6.0 GHz High Performance

### Electrical:
- **Frequency Range**: DC - 6 GHz
- **VSWR**: DC - 6 GHz 1.2:1
- **Impedence**: 50 Ohms
- **PIM**: <-160 dBC (at 1800 MHz, 43dBm per tone)

### Materials:
- **Inner Conductor**: Silver Plated Be-Cu/Phos. Bronze
- **Outer Conductor**: Silver/Trimetal Plated Brass
- **Dielectric**: PTFE

---

![716J-716J-SLP](image1)

7/16 (f) to 7/16 (f)

- **716J-716J-SLP**

![716P-716P-SLP](image2)

7/16 (m) to 7/16 (m)

- **716P-716P-SLP**

![716P-716J-SLP](image3)

7/16 (m) to 7/16 (f)

- **716P-716J-SLP**

---

Product specifications subject to change without notification.
Low PIM In-Series Adapters

Type N Adapters • DC to 6.0 GHz

Application:
- DC to 6.0 GHz High Performance

Electrical:
- Frequency Range: DC - 6 GHz
- VSWR: DC - 6 GHz 1.2:1
- Impedance: 50 Ohms
- PIM: < -160 dBc (at 1800 MHz, 43dBm per tone)

Materials:
- Inner Conductor: Silver Plated Be-Cu/Phos. Bronze
- Outer Conductor: Silver/Trimetal Plated Brass
- Dielectric: PTFE
Low PIM Between-Series Adapters

7/16 to SMA Adapters • DC to 6.0 GHz

Application:
- DC to 6.0 GHz High Performance

Electrical:
- Frequency Range  DC - 6 GHz
- VSWR  DC - 6 GHz  1.2:1
- Impedance  50 Ohms
- PIM  <-160 dBC (at 1800 MHz, 43dBm per tone)

Materials:
- Inner Conductor  Silver Plated Be-Cu/Phos. Bronze
- Outer Conductor  Silver/Trimetal Plated Brass
- Dielectric  PTFE

7/16 (m) to SMA (m)
716P-SMP-SLP

7/16 (m) to SMA (f)
716P-SMJ-SLP

7/16 (f) to SMA (m)
716J-SMP-SLP

7/16 (f) to SMA (f)
716J-SMJ-SLP

Product specifications subject to change without notification.
Low PIM Between-Series Adapters

7/16 to Type N Adapters • DC to 6.0 GHz

Application:
- DC to 6.0 GHz High Performance

Electrical:
- Frequency Range: DC - 6 GHz
- VSWR: DC - 6 GHz 1.2:1
- Impedence: 50 Ohms
- PIM: <-160 dBc (at 1800 MHz, 43dBm per tone)

Materials:
- Inner Conductor: Silver Plated Be-Cu/Phos. Bronze
- Outer Conductor: Silver/Trimetal Plated Brass
- Dielectric: PTFE

7/16 (m) to Type N (m)
- 716P-NP-SLP

7/16 (m) to Type N (f)
- 716P-NJ-SLP

7/16 (f) to Type N (m)
- 716J-NP-SLP

7/16 (f) to Type N (f)
- 716J-NJ-SLP
Low PIM Between-Series Adapters

7/16 to Mini Din Adapters • DC to 6.0 GHz

**Application:**
- DC to 6.0 GHz High Performance

**Electrical:**
- **Frequency Range**  DC - 6 GHz
- **VSWR**  DC - 6 GHz  1.2:1
- **Impedence**  50 Ohms
- **PIM**  <-160 dBC (at 1800 MHz, 43dBm per tone)

**Materials:**
- **Inner Conductor**  Silver Plated Be-Cu/Phos. Bronze
- **Outer Conductor**  Silver/Trimetal Plated Brass
- **Dielectric**  PTFE

<table>
<thead>
<tr>
<th>Adapter Type</th>
<th>Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/16 (m) to Mini Din (m)</td>
<td><img src="716P-MDP-SLP" alt="Diagram" /></td>
</tr>
<tr>
<td>7/16 (m) to Mini Din (f)</td>
<td><img src="716P-MDJ-SLP" alt="Diagram" /></td>
</tr>
<tr>
<td>7/16 (f) to Mini Din (m)</td>
<td><img src="716J-MDP-SLP" alt="Diagram" /></td>
</tr>
</tbody>
</table>

Mini Din to Type N Adapters • DC to 6.0 GHz

**Application:**
- DC to 6.0 GHz High Performance

**Electrical:**
- **Frequency Range**  DC - 6 GHz
- **VSWR**  DC - 6 GHz 1.2:1
- **Impedence**  50 Ohms
- **PIM**  <-160 dBC (at 1800 MHz, 43dBm per tone)

**Materials:**
- **Inner Conductor**  Silver Plated Be-Cu/Phos. Bronze
- **Outer Conductor**  Silver/Trimetal Plated Brass
- **Dielectric**  PTFE

<table>
<thead>
<tr>
<th>Adapter Type</th>
<th>Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mini Din (m) to Type N (m)</td>
<td><img src="MDP-NP-SLP" alt="Diagram" /></td>
</tr>
<tr>
<td>Mini Din (m) to Type N (f)</td>
<td><img src="MDP-NJ-SLP" alt="Diagram" /></td>
</tr>
</tbody>
</table>
RF attenuators are used to reduce signal levels and improve the match between components.

HASCO stocks thousands of RF and Microwave attenuators and can support most requirements, such as SMA, 2.92mm, 2.4mm, 1.85mm, Type N and TNC in addition to many other RF and Microwave coaxial attenuators.
SMA Attenuators

Male to Female • 50 Ohms

**SMA ATTENUATOR • DC - 6 GHz • 2 WATTS**

**HA6A-XX***

- **Attenuation (dB)**
  - 0 .................................................. ± 0.3 dB
  - 1 - 6 ......................................... ± 0.3 dB
  - 7 - 12 & 20 ............................... ± 0.5 dB
  - 30 ........................................ 0.75 dB
- **Housing** - Passivated Stainless Steel
- **Center Conductor**
  - Gold Plated IAW MIL-PRF-39012
- **Dielectric**
  - High Temperature Plastic Bead
- **VSWR**
  - DC - 2.5 GHz ................................. 1.15
  - 2.5 – 6 GHz: 0-6 dB .................. 1.20
  - 7-12 dB ................................ 1.25
  - 15, 20 dB .............................. 1.30
  - 30 dB .................................. 1.35
- **RF Power Nominal**
  - 2 Watts@ 25°C • Peak: 200W
- **Temperature Range**
  - -65°C - +125°C

**SMA ATTENUATOR • DC - 18 GHz • 2 WATTS**

**HA18A-XX***

- **Attenuation (dB)**
  - 1 - 9 .................................................. ± 0.3 dB
  - 10, 20 ........................................ ± 0.5 dB
  - 25, 30 ........................................ ± 0.75 dB
- **Housing** - Passivated Stainless Steel
- **Center Conductor**
  - Beryllium Copper, Gold Plate
- **Dielectric**
  - PTFE, Virgin Electrical Grade
- **VSWR**
  - DC - 4 GHz ................................. 1.15
  - 4- 8 GHz: 0-6 dB .................. 1.20
  - 9 - 12.4 GHz ............................. 1.25
  - 12.4 - 18 GHz ...................... 1.35
- **RF Power Nominal**
  - 2 Watts@ 25°C • Peak: 250W
  - (5 µSec Pulse, 0.05% Duty Cycle)
- **Temperature Range**
  - -55°C - +85°C

**SMA ATTENUATOR • DC - 18 GHz • 5 WATTS**

**HA18A5W-XX***

- **Attenuation (dB)**
  - 1 - 6 .................................................. ± 0.3 dB
  - 7 - 12, 15 & 20 ............................... ± 0.5 dB
  - 30 ........................................ 0.75 dB
  - 40 ........................................ 1.23 dB
- **Housing** - Aluminum (May be one of several QQ-A-XXX or ASTM Standard)
- **Center Conductor**
  - Beryllium Copper, Gold Plate
- **Dielectric**
  - Teflon per ASTM D1710
- **VSWR**
  - DC - 4 GHz ................................. 1.15
  - 4- 12.4 GHz ............................. 1.25
  - 12.4 - 18GHz ...................... 1.35
- **RF Power Nominal**
  - 5 Watts@ 25°C • Peak: 500W
  - (5 µSec Pulse, 0.05% Duty Cycle - Derates Linearly to .5W @ 125°C)
- **Temperature Range**
  - -65°C - +125°C

**SMA ATTENUATOR • DC - 26 GHz • 2 WATTS**

**HA26A-XX***

- **Attenuation (dB)**
  - 0 .................................................. ± 0.5 dB
  - 1 - 12 ......................................... ± 0.5 dB
  - 15 & 20 ........................................ ± 0.75 dB
  - 30 ........................................ 1.25 dB
- **Housing** - Passivated Stainless Steel
- **Center Conductor**
  - Beryllium Copper, Gold Plate
- **Dielectric**
  - Teflon
- **VSWR**
  - DC - 6 GHz ................................. 1.15
  - 6 - 18 GHz ............................. 1.25
  - 18 - 26 GHz ...................... 1.35
- **RF Power Nominal**
  - 2 Watts Ave.@ 25°C • Peak: 500W
  - (5 µSec Pulse, 0.10% Duty Cycle)
- **Temperature Range**
  - -65°C - +125°C

*Replace XX with dB Value
# 2.92mm, 2.4mm & 1.85mm Attenuators

**Male to Female • 50 Ohms**

## 2.92 mm ATTENUATOR • DC - 40 GHz • 0.5 & 2.0 WATT

<table>
<thead>
<tr>
<th>Attenuation (dB)</th>
<th>DC-26.5GHz</th>
<th>26.5-40GHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>3, 6, 10</td>
<td>± 0.5 dB</td>
<td>± 1.0 dB</td>
</tr>
<tr>
<td>10, 20</td>
<td>± 0.75 dB</td>
<td>± 1.25 dB</td>
</tr>
<tr>
<td>30</td>
<td>± 1.0 dB</td>
<td>± 2.0 dB</td>
</tr>
</tbody>
</table>

- **Housing**: Passivated Stainless Steel
- **Center Conductor**: Beryllium Copper, Gold Plate
- **Dielectric**: High Temperature Plastic Bead
- **VSWR**: DC - 26.5 GHz: 1.35
  26.5 - 40 GHz: 1.75
- **RF Power Nominal**: 0.5 Watts @ 25°C
  (Derates linearly to 10% @ 125°C)
- **Temperature Range**: -55°C - +125°C

## 2.40 mm ATTENUATOR • DC - 50 GHz • 0.5 WATT

<table>
<thead>
<tr>
<th>Attenuation (dB)</th>
<th>DC-26.5GHz</th>
<th>26.5-50GHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>3, 6, 10</td>
<td>± 0.5 dB</td>
<td>± 1.0 dB</td>
</tr>
<tr>
<td>20 &amp; 30</td>
<td>± 0.75 dB</td>
<td>± 1.25 dB</td>
</tr>
</tbody>
</table>

- **Housing**: Passivated Stainless Steel
- **Center Conductor**: Beryllium Copper, Gold Plate
- **Dielectric**: High Temperature Plastic Bead
- **VSWR**: DC - 26.5 GHz: 1.35
  26.5 - 40 GHz: 1.60
  40 - 50 GHz: 1.75
- **RF Power Nominal**: 0.5 Watts @ 25°C
  (Derates linearly to 10% @ 100°C)
- **Temperature Range**: -55°C - +100°C

## 2.40 mm ATTENUATOR • DC - 50 GHz • 1 WATT

<table>
<thead>
<tr>
<th>Attenuation (dB)</th>
<th>DC-26.5GHz</th>
<th>26.5-50GHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>3, 6</td>
<td>± 0.75 dB</td>
<td>± 1.5 dB</td>
</tr>
<tr>
<td>10</td>
<td>± 0.75 dB</td>
<td>± 1.5 dB</td>
</tr>
<tr>
<td>15 &amp; 20</td>
<td>± 1.0 dB</td>
<td>± 2.0 dB</td>
</tr>
<tr>
<td>30</td>
<td>± 1.5 dB</td>
<td>± 2.5 dB</td>
</tr>
</tbody>
</table>

- **Housing**: Passivated Stainless Steel
- **Center Conductor**: Beryllium Copper, Gold Plate
- **Dielectric**: High Temperature Plastic Bead
- **VSWR**: DC - 26.5 GHz: 1.35
  26.5 - 40 GHz: 1.55
  50 - 65 GHz: 1.65
- **RF Power Nominal**: 1.0 Watts @ 25°C
  (Derates linearly to 10% @ 100°C)
- **Temperature Range**: -55°C - +100°C

## 1.85 mm ATTENUATOR • DC - 65 GHz • 1 WATT

<table>
<thead>
<tr>
<th>Attenuation (dB)</th>
<th>DC-26.5GHz</th>
<th>26.5-65GHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>3, 6</td>
<td>± 0.75 dB</td>
<td>± 1.5 dB</td>
</tr>
<tr>
<td>10</td>
<td>± 0.75 dB</td>
<td>± 1.5 dB</td>
</tr>
<tr>
<td>15 &amp; 20</td>
<td>± 1.0 dB</td>
<td>± 2.0 dB</td>
</tr>
<tr>
<td>30</td>
<td>± 1.5 dB</td>
<td>± 2.5 dB</td>
</tr>
</tbody>
</table>

- **Housing**: Passivated Stainless Steel
- **Center Conductor**: Beryllium Copper, Gold Plate
- **Dielectric**: High Temperature Plastic Bead
- **VSWR**: DC - 26.5 GHz: 1.35
  26.5 - 40 GHz: 1.55
  50 - 65 GHz: 1.65
- **RF Power Nominal**: 1.0 Watts @ 25°C
  (Derates linearly to 10% @ 100°C)
- **Temperature Range**: -55°C - +100°C

*Replace XX with dB Value*
# Type N & TNC Attenuators

## Male to Female • 50 Ohms

### Type N ATTENUATOR • DC - 18 GHz • 5 WATTS

**HA18N5W-XX**

<table>
<thead>
<tr>
<th>Attenuation (dB)</th>
<th>DC-12.4 GHz</th>
<th>12.4-18 GHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 6</td>
<td>± 0.3 dB</td>
<td>± 0.3 dB</td>
</tr>
<tr>
<td>7 - 12, 15 &amp; 20</td>
<td>± 0.5 dB</td>
<td>± 0.5 dB</td>
</tr>
<tr>
<td>30</td>
<td>± 0.75 dB</td>
<td>± 0.75 dB</td>
</tr>
<tr>
<td>40</td>
<td>± 1.25 dB</td>
<td>± 1.25 dB</td>
</tr>
</tbody>
</table>

- **Housing** - Aluminum (May be one of several QQ-A-XXX or ASTM Standard)
- **Outer Conductor** - Passivated Stainless Steel
- **Center Conductor** - Gold Plated IAW MIL-PRF-39012
- **Dielectric** - Teflon

### SPECIFICATIONS

- **VSWR**
  - DC - 4 GHz: 1.15
  - 4 - 12.4 GHz: 1.25
  - 12.4 - 18 GHz: 1.35

- **RF Power Nominal**
  - 5 Watts CW
    - (Derates linearly to 10% @ 125°C)
    - Peak: 500W
      - (@5 µSec Pulse Width x 0.25% Duty Cycle)
  - Temperature Range: -65°C - +125°C
- **Resistor Substrate**
  - AIM or Aluminum Oxide
  - Resistor: Proprietary Thin Film Hybrid with Protective SiO Coating

### Type N ATTENUATOR • DC - 18 GHz • 10 WATTS

**HA18N10W-XX**

<table>
<thead>
<tr>
<th>Attenuation (dB)</th>
<th>DC-12.4 GHz</th>
<th>12.4-18 GHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 6</td>
<td>± 0.30 dB</td>
<td>± 0.30 dB</td>
</tr>
<tr>
<td>7 - 12, 15 &amp; 20</td>
<td>± 0.50 dB</td>
<td>± 0.50 dB</td>
</tr>
<tr>
<td>30</td>
<td>± 0.75 dB</td>
<td>± 1.00 dB</td>
</tr>
</tbody>
</table>

- **Housing** - Aluminum (May be one of several QQ-A-XXX or ASTM Standard)
- **Outer Conductor** - Passivated Stainless Steel
- **Center Conductor** - Gold Plated IAW MIL-PRF-39012
- **Dielectric** - Teflon

### SPECIFICATIONS

- **VSWR**
  - DC - 4 GHz: 1.15
  - 4 - 12.4 GHz: 1.25
  - 12.4 - 18 GHz: 1.35

- **RF Power Nominal**
  - 10 Watts CW
    - (Derates linearly from 25% @ 125°C)
    - Peak: 500W
      - (@5 µSec Pulse Width x 0.25% Duty Cycle)
  - Temperature Range: -65°C - +125°C
- **Resistor Substrate**
  - AIM or Aluminum Oxide
  - Resistor: Proprietary Thin Film Hybrid with Protective SiO Coating

### TNC ATTENUATOR • Coming Soon

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*Replace XX with dB Value*
DC Blocks are usually nothing more than a capacitor that has low series reactance at the RF frequency, and allows you to separate DC voltage along a transmission line.

HASCO stocks an extensive selection of RF and Microwave DC Blocks in SMA, 2.92mm and 2.40mm. HASCO offers coaxial DC Blocks in all three configurations, Inner-Only, Outer-Only and Inner-Outer.
## DC BLOCKS • SMA, 2.92mm, 2.40 mm

<table>
<thead>
<tr>
<th>SMA MALE - FEMALE • INNER/OUTER • 10 MHz to 18 GHz</th>
<th>SMA MALE - FEMALE • INNER ONLY • 7 KHz to 23 GHz</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HDC18IO</strong></td>
<td><strong>HDC23I</strong></td>
</tr>
<tr>
<td><img src="image1" alt="HDC18IO" /></td>
<td><img src="image2" alt="HDC23I" /></td>
</tr>
<tr>
<td><strong>Specifications</strong></td>
<td><strong>Specifications</strong></td>
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<tr>
<td>VSWR</td>
<td>VSWR</td>
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<tr>
<td>10 MHz - 18 GHz</td>
<td>7 KHz - 23 GHz</td>
</tr>
<tr>
<td>Insertion Loss</td>
<td>Insertion Loss</td>
</tr>
<tr>
<td>10 MHz - 18 GHz</td>
<td>100 KHz - 12.4 GHz</td>
</tr>
<tr>
<td>0.60 dB</td>
<td>0.50 dB</td>
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<td>Impedence</td>
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<tr>
<td>50 Ohms</td>
<td>50 Ohms</td>
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<tr>
<td>Voltage</td>
<td>Voltage</td>
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<tr>
<td>200 Volts Max</td>
<td>200 Volts Max</td>
</tr>
<tr>
<td>Temperature Range</td>
<td>Temperature Range</td>
</tr>
<tr>
<td>-65°C - +125°C</td>
<td>-65°C - +125°C</td>
</tr>
<tr>
<td>SMA Connectors</td>
<td>Body and Coupling Nut</td>
</tr>
<tr>
<td>Passivated Stainless Steel</td>
<td>Passivated Stainless Steel</td>
</tr>
<tr>
<td>Housing</td>
<td>Housing</td>
</tr>
<tr>
<td>High Temperature Plastic</td>
<td>High Temperature Plastic</td>
</tr>
<tr>
<td>Inner Conductor</td>
<td>Inner Conductor</td>
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<tr>
<td>Gold Plated Beryllium Copper</td>
<td>Gold Plated Beryllium Copper</td>
</tr>
<tr>
<td>Dielectric</td>
<td>Dielectric</td>
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<tr>
<td>Teflon</td>
<td>Teflon</td>
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<table>
<thead>
<tr>
<th>2.92MM MALE - FEMALE • INNER ONLY • 10 MHz to 40 GHz</th>
</tr>
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<tbody>
<tr>
<td><strong>HDC40I</strong></td>
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<tr>
<td><img src="image3" alt="HDC40I" /></td>
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<td><strong>Specifications</strong></td>
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</tr>
<tr>
<td>Insertion Loss</td>
</tr>
<tr>
<td>10 MHz - 40 GHz</td>
</tr>
<tr>
<td>0.75 dB Max</td>
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<tr>
<td>Impedence</td>
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<td>50 Ohms</td>
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<tr>
<td>Voltage</td>
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<tr>
<td>200 Volts Max</td>
</tr>
<tr>
<td>Temperature Range</td>
</tr>
<tr>
<td>-65°C - +125°C</td>
</tr>
<tr>
<td>Body and Coupling Nut</td>
</tr>
<tr>
<td>Passivated Stainless Steel</td>
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<tr>
<td>Inner Conductor</td>
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<tr>
<td>Gold Plated Beryllium Copper</td>
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<tr>
<td>Dielectric</td>
</tr>
<tr>
<td>Teflon</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.40MM MALE - FEMALE • INNER ONLY • 10 MHz to 50 GHz</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HDC50I</strong></td>
</tr>
<tr>
<td><img src="image4" alt="HDC50I" /></td>
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<tr>
<td><strong>Specifications</strong></td>
</tr>
<tr>
<td>VSWR</td>
</tr>
<tr>
<td>10 MHz - 50 GHz</td>
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<tr>
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<tr>
<td>Voltage</td>
</tr>
<tr>
<td>100 Volts Max</td>
</tr>
<tr>
<td>Temperature Range</td>
</tr>
<tr>
<td>-65°C - +125°C</td>
</tr>
<tr>
<td>Body and Coupling Nut</td>
</tr>
<tr>
<td>Passivated Stainless Steel</td>
</tr>
<tr>
<td>Inner Conductor</td>
</tr>
<tr>
<td>Gold Plated Beryllium Copper</td>
</tr>
<tr>
<td>Dielectric</td>
</tr>
<tr>
<td>High Temperature Plastic Bead</td>
</tr>
</tbody>
</table>

Product specifications subject to change without notification.
# DC BLOCKS - Type N

## TYPE N MALE - FEMALE • INNER ONLY • 10 MHz to 18 GHz

**HDC18NI**

- **VSWR**
  - 10 MHz - 18 GHz: 1.35
- **Insertion Loss**
  - 10 MHz - 18 GHz: 0.60 dB
- **Impedance**: 50 Ohms
- **Voltage**: 100 Volts - Inner Only
- **Temperature Range**
  - -65°C - +125°C
- **N Connectors**
  - Passivated Stainless Steel
- **Conductors**
  - Gold Plated Beryllium Copper
- **Housing**
  - High Temperature Plastic

## TYPE N MALE - FEMALE • INNER/OUTER • 10 MHz to 18 GHz

**HDC18NIO**

- **VSWR**
  - 10 MHz - 18 GHz: 1.35
- **Insertion Loss**
  - 10 MHz - 18 GHz: 0.60 dB
- **Impedance**: 50 Ohms
- **Voltage**: 200 Volts - Inner/Outer
- **Temperature Range**
  - -65°C - +125°C
- **N Connectors**
  - Passivated Stainless Steel
- **Conductors**
  - Gold Plated Beryllium Copper
- **Housing**
  - High Temperature Plastic

Product specifications subject to change without notification.
**Description:**

HASCO RF break-over torque wrenches are designed to guarantee an accurate mating torque when joining two components together. When the proper force has been achieved, these wrenches will become ineffective by “breaking” and making them unusable until reset.

- Anodized aluminum handles
- Nickel-plated steel wrench heads
- ANSI/NCSLZ540-3 and ISO-10011 calibration certification
- Packaged in a wooden box
- Labeled and serial numbered

**Sizes Available:**

<table>
<thead>
<tr>
<th>Part #</th>
<th>Connector Type (S)</th>
<th>Bit Size</th>
<th>Preset</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTW-1564-04</td>
<td>1.0mm</td>
<td>15/64</td>
<td>4 in-lbs</td>
</tr>
<tr>
<td>HTW-14-08</td>
<td>SMA</td>
<td>1/4</td>
<td>8 in-lbs</td>
</tr>
<tr>
<td>HTW-516-08</td>
<td>SMA, 3.5mm, 2.4mm, 1.85mm</td>
<td>5/16</td>
<td>8 in-lbs</td>
</tr>
<tr>
<td>HTW-58-12</td>
<td>TNC</td>
<td>5/8</td>
<td>12 in-lbs</td>
</tr>
<tr>
<td>HTW-916-12</td>
<td>TNC</td>
<td>9/16</td>
<td>12 in-lbs</td>
</tr>
<tr>
<td>HTW-1316-14</td>
<td>SC, N</td>
<td>13/16</td>
<td>14 in-lbs</td>
</tr>
<tr>
<td>HTW-2532-14</td>
<td>N</td>
<td>25/32</td>
<td>14 in-lbs</td>
</tr>
<tr>
<td>HTW-34-14</td>
<td>N, 7mm</td>
<td>3/4</td>
<td>14 in-lbs</td>
</tr>
</tbody>
</table>
Coaxial terminations are used to terminate unused ports, on isolated ports of hybrids and combiners and to protect devices from signal reflections.

HASCO stocks an extensive selection of Low and High-Power RF and Microwave Terminations, SMA, 2.92mm, 2.40mm, and 1.85mm, Type N and Waveguide terminations, in addition to many other RF and Microwave coaxial terminations.
## SMA Terminations • DC - 18 GHz

### SMA MALE TERMINATION • 1 WATT

<table>
<thead>
<tr>
<th>Model</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>HT18M-S</td>
<td>- VSWR  DC - 4 GHz: 1.05  4 - 6 GHz: 1.10  8 - 12 GHz: 1.15  12.4 - 18 GHz: 1.20</td>
</tr>
<tr>
<td></td>
<td>- Impedance: 50 Ohms</td>
</tr>
<tr>
<td></td>
<td>- RF Power Nominal: 1 Watt Average @ 25°C (Derates linearly from +45° to &lt;10% @ 125°C)</td>
</tr>
<tr>
<td></td>
<td>- Temperature Range: -54°C - +125°C</td>
</tr>
</tbody>
</table>

### HT18M-L • SMA MALE TERMINATION • 1 & 2 WATTS

<table>
<thead>
<tr>
<th>Model</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>HT18M-L</td>
<td>- VSWR  DC - 4 GHz: 1.05  4 - 6 GHz: 1.10  8 - 12 GHz: 1.15  12.4 - 18 GHz: 1.20</td>
</tr>
<tr>
<td></td>
<td>- Impedance: 50 Ohms</td>
</tr>
<tr>
<td></td>
<td>- RF Power Nominal: 1 Watt Average @ 25°C (Derates linearly from +45° to &lt;10% @ 125°C)</td>
</tr>
<tr>
<td></td>
<td>- Temperature Range: -65°C - +125°C</td>
</tr>
</tbody>
</table>

### SMA QUICK MATE “PUSH ON” MALE TERMINATION • 1 WATT

<table>
<thead>
<tr>
<th>Model</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>HT18QMM</td>
<td>- VSWR  DC - 18 GHz: 1.15</td>
</tr>
<tr>
<td></td>
<td>- Impedance: 50 Ohms</td>
</tr>
<tr>
<td></td>
<td>- RF Power Nominal: 1 Watt</td>
</tr>
<tr>
<td></td>
<td>- Temperature Range: -55°C - +125°C</td>
</tr>
</tbody>
</table>

### HT18M2-02 • SMA MALE TERMINATION • 2 WATTS

<table>
<thead>
<tr>
<th>Model</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>HT18M2-02</td>
<td>- VSWR  DC - 4 GHz: 1.05:1  4 - 8 GHz: 1.10:1  8 - 12.4 GHz: 1.15:1  12.4 - 18 GHz: 1.20:1</td>
</tr>
<tr>
<td></td>
<td>- Impedance: 50 Ohms</td>
</tr>
<tr>
<td></td>
<td>- RF Power Nominal: 2 Watt Average     (Derates linearly from +45° to &lt;10% @ 125°C)</td>
</tr>
<tr>
<td></td>
<td>- Power Peak: 500 Watts (5 µsec PW, &lt;0.01 Duty Cycle)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>HT18M2-02C</td>
<td>- Temperature Range: -55°C - +125°C</td>
</tr>
<tr>
<td></td>
<td>- Housing: Passivated Stainless Steel</td>
</tr>
<tr>
<td></td>
<td>- Contact: Gold Plated Beryllium Copper</td>
</tr>
<tr>
<td></td>
<td>- Dielectric: Teflon</td>
</tr>
</tbody>
</table>

Product specifications subject to change without notification.
SMA Medium Power Terminations • DC - 18 GHz

### SMA 5 WATT TERMINATIONS

**HT18M-5 (MALE)**

- **VSWR**
  - DC - 4 GHz: 1.15:1
  - 4 - 12.4 GHz: 1.20:1
  - 12.4 - 18 GHz: 1.25:1
- **Impedance**
  - 50 Ohms
- **RF Power Nominal**
  - 5 Watts CW (Full @<25°C Ambient to 20% @125°C)
  - 500 Watts Max (@5 µSec Pulse Width x 0.25% Duty Cycle)
- **Temperature Range**
  - -65°C - +125°C

**HT18F-5 (FEMALE)**

- **Heatsink**
  - Black Anodized Aluminum
- **Inner Conductor**
  - Gold Plated Beryllium Copper
- **Connector Housing**
  - Passivated Stainless Steel
- **Resistor**
  - Proprietary Thin Film with SIO Protective Coating
- **Dielectric**
  - Teflon per ASTM D1710

### SMA 10 WATT TERMINATIONS

**HT18M-10 (MALE)**

- **VSWR**
  - DC - 6 GHz: 1.05:1 + .015f(GHz)
  - 6 - 12.4 GHz: 1.25:1 Max
  - 12.4 - 18 GHz: 1.35:1 Max
- **Impedance**
  - 50 Ohms
- **RF Power Nominal**
  - 10 Watts (Derates linearly to 10% @125°C from 25°C)
  - 500 Watts Max (@5 µSec Pulse Width x 1% Duty Cycle)
- **Temperature Range**
  - -65°C - +125°C

**HT18F-10 (FEMALE)**

- **Heatsink**
  - Black Anodized Aluminum
- **Inner Conductor**
  - Gold Plated Beryllium Copper
- **Connector Housing**
  - Passivated Stainless Steel
- **Resistor**
  - Proprietary Thin Film with SIO Protective Coating
- **Dielectric**
  - Teflon per ASTM D1710
# Type N Terminations • DC - 18 GHz

## Type N Female Termination • 2 Watts

<table>
<thead>
<tr>
<th>Model</th>
<th>Specifications</th>
</tr>
</thead>
</table>
| 221-34-50-001 | - Return Loss
  DC - 4 GHz ........ 30dB Max
  4 - 8 GHz........... 25 dB Max
  8 - 18 GHz.......... 15 dB Max
- Impedance - 50 Ohms
- RF Power Nominal
  2 Watt Average @ 25°C
  (Derates linearly 1 Watt @ 125°C)
- Temperature Range -55°C - +125°C |

## Type N Male Termination • 2 Watts

<table>
<thead>
<tr>
<th>Model</th>
<th>Specifications</th>
</tr>
</thead>
</table>
| 231-34-50-001 | - Return Loss
  DC - 4 GHz ........ 30dB Max
  4 - 8 GHz........... 25 dB Max
  8 - 18 GHz.......... 15 dB Max
- Impedance - 50 Ohms
- RF Power Nominal
  2 Watt Average @ 25°C
  (Derates linearly 1 Watt @ 125°C)
- Temperature Range -55°C - +125°C |
| 231-37-50-001 | - Return Loss
  DC - 4 GHz ........ 30dB Max
  4 - 8 GHz........... 25 dB Max
  8 - 18 GHz.......... 15 dB Max
- Impedance - 50 Ohms
- RF Power Nominal
  2 Watt Average @ 25°C
  (Derates linearly 1 Watt @ 125°C)
- Temperature Range -55°C - +125°C |

## Type N Male Termination • 10 Watts

<table>
<thead>
<tr>
<th>Model</th>
<th>Specifications</th>
</tr>
</thead>
</table>
| HT18NM-10 | - VSWR
  DC - 18 GHz ....... 1.05+.015(F) MAX
- Impedance - 50 Ohms
- RF Power Nominal
  10 Watts Ave. (0.5 kW - Peak)
  (Derates linearly from 100% @ +25°C to 10 Watt @ 125°C)
  PEAK: 5µs Pulse W, 0.50% Duty Cycle
- Temperature Range -55°C - +125°C |

## Type N Male Termination • 25 Watts

<table>
<thead>
<tr>
<th>Model</th>
<th>Specifications</th>
</tr>
</thead>
</table>
| HT18NM-25 | - VSWR
  DC - 18 GHz ....... 1.05+.015(F) MAX
- Impedance - 50 Ohms
- RF Power Nominal
  10 Watts Ave. (0.5 kW - Peak)
  (Derates linearly from 100% @ +25°C to 10 Watt @ 125°C)
  PEAK: 5µs Pulse W, 0.50% Duty Cycle
- Temperature Range -55°C - +125°C |

Product specifications subject to change without notification.

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TNC Terminations • DC - 18 GHz

TNC MALE TERMINATION • 2 WATTS

HT18TM-2

- VSWR
  DC - 4 GHz .................. 1.10:1
  4 - 12.4 GHz .......... 1.15:1
  12.4 - 18 GHz ........... 1.25:1
- Impedence - 50 Ohms
- RF Power Nominal
  2 Watt Average @ 25°C
  (Derated linearly from 100% @ ≤25°C to 10% @ 125°C)
- Power Peak
  500 Watts
  (5 µSec PWL <0.02 Duty Cycle)

SPECIFICATIONS

- Temperature Range -55°C - +125°C
- Housing
  Passivated Stainless Steel
- Contact
  Gold Plated Beryllium Copper
- Resitive Element
  Thin Film on Ceramic Resistor

2.92mm Terminations • DC - 40 GHz

2.92mm MALE TERMINATION • 1 & 2 WATTS

HT40M (1 WATT)
HT40M-2 (2 WATTS)

- VSWR
  DC - 40 GHz .................. 1.25:1
- Impedence - 50 Ohms
- RF Power Nominal
  1 Watt Ave. @ 25°C
  (Derates linearly to 1 Watt @ 125°C)
  2 Watt Ave. @ 25°C
  (Derates linearly to 1 Watt @ 125°C)
- Temperature Range -55°C - +125°C

SPECIFICATIONS

- Housing
  Passivated Stainless Steel
- Contact
  Gold Plated Beryllium Copper
- Dielectric
  High Temperature Plastic Bead

2.92 FEMALE TERMINATION • 1 & 2 WATTS

HT40F (1 WATT)
HT40F-2 (2 WATTS)

OPTIONAL BEAD CHAIN - 2" MIN (52 mm) LENGTH
ADD "C" TO PART NUMBER TO SPECIFY OPTION

Product specifications subject to change without notification.
### 2.40 mm Terminations • DC - 50 GHz

<table>
<thead>
<tr>
<th>2.40mm MALE TERMINATION • 1 &amp; 2 WATTS</th>
<th>SPECIFICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HT50M (1 WATT)</strong></td>
<td>• VSWR DC - 18 GHz: 1.15:1</td>
</tr>
<tr>
<td><strong>HT50M-2 (2 WATTS)</strong></td>
<td>18 - 35 GHz: 1.30:1</td>
</tr>
<tr>
<td></td>
<td>35 - 50 GHz: 1.45:1</td>
</tr>
<tr>
<td></td>
<td>• Impedence - 50 Ohms</td>
</tr>
<tr>
<td></td>
<td>• RF Power Nominal</td>
</tr>
<tr>
<td></td>
<td>1 Watt Ave. @ 25°C (Derates linearly to 1 Watt @ 125°C)</td>
</tr>
<tr>
<td></td>
<td>2 Watt Ave. @ 25°C (Derates linearly to 1 Watt @ 125°C)</td>
</tr>
<tr>
<td></td>
<td>• Temperature Range -55°C - +100°C</td>
</tr>
<tr>
<td><strong>HT50F (1 WATT)</strong></td>
<td>• Housing Passivated Stainless Steel</td>
</tr>
<tr>
<td><strong>HT50F-2 (2 WATTS)</strong></td>
<td>• Contact Gold Plated Beryllium Copper</td>
</tr>
<tr>
<td></td>
<td>• Dielectric High Temperature Plastic Bead</td>
</tr>
<tr>
<td></td>
<td>• VSWR DC - 18 GHz: 1.15:1</td>
</tr>
<tr>
<td></td>
<td>18 - 35 GHz: 1.30:1</td>
</tr>
<tr>
<td></td>
<td>35 - 50 GHz: 1.45:1</td>
</tr>
<tr>
<td></td>
<td>• Impedence - 50 Ohms</td>
</tr>
<tr>
<td></td>
<td>• RF Power Nominal</td>
</tr>
<tr>
<td></td>
<td>1 Watt Ave. @ 25°C (Derates linearly to 1 Watt @ 125°C)</td>
</tr>
<tr>
<td></td>
<td>2 Watt Ave. @ 25°C (Derates linearly to 1 Watt @ 125°C)</td>
</tr>
<tr>
<td></td>
<td>• Temperature Range -55°C - +100°C</td>
</tr>
<tr>
<td></td>
<td>• Housing Passivated Stainless Steel</td>
</tr>
<tr>
<td></td>
<td>• Contact Gold Plated Beryllium Copper</td>
</tr>
<tr>
<td></td>
<td>• Dielectric High Temperature Plastic Bead</td>
</tr>
</tbody>
</table>

### 1.85 mm Terminations • DC - 65 GHz

<table>
<thead>
<tr>
<th>1.85 mm MALE TERMINATION • 1 WATT</th>
<th>SPECIFICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HT65M (1 WATT)</strong></td>
<td>• VSWR DC - 18 GHz: 1.10:1</td>
</tr>
<tr>
<td></td>
<td>18 - 40 GHz: 1.30:1</td>
</tr>
<tr>
<td></td>
<td>40 - 65 GHz: 1.45:1</td>
</tr>
<tr>
<td></td>
<td>• Impedence - 50 Ohms</td>
</tr>
<tr>
<td></td>
<td>• RF Power Nominal</td>
</tr>
<tr>
<td></td>
<td>1 Watt Ave. @ 25°C (Derates linearly to 1 Watt @ 125°C)</td>
</tr>
<tr>
<td></td>
<td>• Temperature Range -55°C - +105°C</td>
</tr>
<tr>
<td></td>
<td>• Housing Passivated Stainless Steel</td>
</tr>
<tr>
<td></td>
<td>• Contact Gold Plated Beryllium Copper</td>
</tr>
<tr>
<td></td>
<td>• Dielectric High Temperature Plastic Bead</td>
</tr>
</tbody>
</table>

**COMING SOON**
HASCO stocks an extensive selection of coaxial cable assemblies

- Standard length
- Semi-Rigid
- Hand Formable
- Flexible Low Loss
- Conformable
- Aluminum
- Tin-Braided
- Phase Matched
- Ultra Low Loss
- Phase Stable vs. Flexure
- Amplitude Stable
- Phase Stable over Temperature
- Precision Bench Test
- VNA
- Armored

HASCO’s RF and Microwave cables are terminated with high quality precision SMA, 3.5mm, 2.92mm, 2.40mm and 1.85mm male (Plug) and female (Jack) connectors.

In addition to the standard lengths in stock, HASCO builds custom cable assemblies with SMA, SSMA, 2.92mm, 2.40mm, 1.85mm, 1.0mm, Type N, TNC, GPO™ and GPPO™ connectors.

*GPO and GPPO are registered trademarks of Corning Gilbert.
HT316 Series
6 GHz - Low Loss Ultra Flexible Cable

FEATURES
- RoHs Compliant
- RG316 Cable, FEP Jacket
- VSWR: 1.35:1 MAX to 6 GHz
- SMA Straight or Right Angle Connectors
- 100% VSWR test to 6 GHz
- 100% Hi-pot and continuity tests
- Insertion Loss: +25°C: 0.3 dB + 0.07 x length (per inch)

ELECTRICAL SPECIFICATIONS
Max Frequency (GHz) 6
Capacitance (pF/Ft) 29.4
Velocity Propagation (%) 69.5
RF Leakage @ 6 GHz (dB) >100
Time Delay (ns/Ft) 1.48
Impedance (Ohms) 50

MECHANICAL SPECIFICATIONS
Cable Max Dia. (Inch) 0.114
Min. bend radius (Inch) 1
Recommend Bend Radius (Inch) 1.5
Raw Cable Temperature Range (°C) -55 to +85

MATERIALS AND FINISHES

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MATERIALS</th>
<th>FINISH OR COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jacket</td>
<td>FEP</td>
<td>Tan</td>
</tr>
<tr>
<td>Marker</td>
<td>Mil-H-23053</td>
<td>Black</td>
</tr>
<tr>
<td>Contacts</td>
<td>Brass</td>
<td>Gold Plated</td>
</tr>
<tr>
<td>Insulators</td>
<td>PTFE</td>
<td>None</td>
</tr>
<tr>
<td>Connector Bodies</td>
<td>Brass</td>
<td>Gold</td>
</tr>
<tr>
<td>Connector Nuts</td>
<td>Brass</td>
<td>Gold</td>
</tr>
<tr>
<td>Gasket</td>
<td>Silicon Rubber</td>
<td>A-A-59588</td>
</tr>
</tbody>
</table>

Standard Length Tolerances

<table>
<thead>
<tr>
<th>L (inches)</th>
<th>Tolerance (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 - 5.9</td>
<td>+/- 0.125</td>
</tr>
<tr>
<td>6 - 11.9</td>
<td>+/- 0.187</td>
</tr>
<tr>
<td>12 - 23.9</td>
<td>+/- 0.250</td>
</tr>
<tr>
<td>24 - 35.9</td>
<td>+/- 0.313</td>
</tr>
<tr>
<td>36 - 47.9</td>
<td>+/- 0.375</td>
</tr>
<tr>
<td>48 - 59.9</td>
<td>+/- 0.500</td>
</tr>
<tr>
<td>60 - 71.9</td>
<td>+/- 0.563</td>
</tr>
<tr>
<td>72 - 83.9</td>
<td>+/- 0.625</td>
</tr>
</tbody>
</table>

Typical performance @ +25° C

Insertion Loss vs. Frequency - 12 in. cable

VSWR vs. Frequency - 12 in. cable
**Re-Flex™ Cables** have been tested to more than 24,000 bends with no electrical or mechanical degradation.

**FEATURES**
- RoHs Compliant
- IW TPRF141 and TPRF085 Cable
- Choose from Direct Solder (SPSD) or Shell Style (TPRF141 only) (SPSH)
- SMA Straight Plug Connectors
- Available with FEP Jacket

**ELECTRICAL SPECIFICATIONS**
- VSWR: 1.35:1 (DC - 18 GHz)
- Max Loss (TPRF141): Length (foot) x (0.009 sqrt(f) + 0.0006 x f) + 0.012 x f
- Max Loss (TPRF085): Length (foot) x (0.015 sqrt(f) + 0.0007 x f) + 0.012 x f
- Cut Off Frequency: TPRF141: 34 GHz, TPRF085: 60 GHz (Cable ONLY)
- Tolerance:
  - L < 36” = ±.100
  - 26” ≤ L < 96” = ±.250
  - L ≥ 96” = ±.500
- RF Leakage: Equivalent to Semi-Rigid cable
- Time Delay: TPRF141: 1.48 ns/ft, TPRF085: 1.40 ns/ft
- Impedance: 50 Ω

**MECHANICAL SPECIFICATIONS**
- Min. bend radius: TPRF141: .125 (Inch), TPRF085: .0625 (Inch)
- Temperature Range (°C): TPRF141: -55 to +135, TPRF085: -65 to +165

**MATERIALS AND FINISHES**
- Center Conductor: Silver Plated OFHC Copper
- Dielectric: Multi-ply PTFE Laminates
- Shield: Silver Plated Copper
- Braid: Tin Plated Copper
- Solder: SN96

---

**PART NO.** (*XXX=Length in tenths of an inch*)

- **Direct Solder SMA Plug:**
  - SPSD-TPRF141-XXX*-SPSD (with Polyolefin Strain Relief)
  - SPSD-TPRF085-XXX*-SPSD (with Polyolefin Strain Relief)

- **Shell Style SMA Plug:**
  - SPSH-TPRF141-XXX*-SPSH
HA085C Series
18 GHz - .085 Dia. Conformable Cable

FEATURES
- RoHS Compliant
- Easily Hand-Formable to Final Shape
- Anti-torque Nut on SMA Straight Connectors
- 100% VSWR test to 18 GHz
- 100% Hi-pot and continuity tests
- Insertion Loss: +25° C: 0.4 dB + 0.10 x length (per inch)

ELECTRICAL SPECIFICATIONS

Max Frequency (GHz) 20
Capacitance (pF/Ft) 29.5
Velocity Propagation (%) 69.5
RF Leakage @ 18 GHz (dB) >100
Time Delay (ns/Ft) 1.46
Impedance (Ohms) 50

MECHANICAL SPECIFICATIONS

Cable Max Dia. (Inch) 0.085
Min. bend radius (Inch) 0.125
Recommend Bend Radius (Inch) 1.5
Raw Cable Temperature Range (° C) -55 to +125

MATERIALS AND FINISHES

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MATERIALS</th>
<th>FINISH OR COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marker</td>
<td>Mil-l-23053</td>
<td>Black</td>
</tr>
<tr>
<td>Contacts</td>
<td>Brass</td>
<td>Gold Plated</td>
</tr>
<tr>
<td>Insulators</td>
<td>PTFE</td>
<td>None</td>
</tr>
<tr>
<td>Connector Bodies</td>
<td>Brass</td>
<td>Gold</td>
</tr>
<tr>
<td>Connector Nuts</td>
<td>Stainless Steel</td>
<td>Passivated</td>
</tr>
<tr>
<td>Gasket</td>
<td>Silicon Rubber</td>
<td>A-A-59588</td>
</tr>
</tbody>
</table>
HA141AL Series
18 GHz - .141 Dia. Hand Formable Cable

FEATURES
- RoHS Compliant
- Easily Hand-Formable to Final Shape
- SMA Straight or Right Angle Connectors
- 100% VSWR test to 18 GHz
- 100% Hi-pot and continuity tests
- Insertion Loss: +25°C: 0.8 dB/ft

ELECTRICAL SPECIFICATIONS
Max Frequency (GHz) 18
Capacitance (pF/Ft) 29
Velocity Propagation (%) 70
RF Leakage @ 18 GHz (dB) >100
Time Delay (ns/Ft) 1.46
Impedance (Ohms) 50

MECHANICAL SPECIFICATIONS
Cable Max Dia. (Inch) 0.141
Min. bend radius (Inch) 0.25
Recommend Bend Radius (Inch) 1.5
Raw Cable Temperature Range (°C) -55 to +200

MATERIALS AND FINISHES
<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MATERIALS</th>
<th>FINISH OR COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marker</td>
<td>Mil-I-23053</td>
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<tr>
<td>Contacts</td>
<td>Brass</td>
<td>Gold Plated</td>
</tr>
<tr>
<td>Insulators</td>
<td>PTFE</td>
<td>None</td>
</tr>
<tr>
<td>Connector Bodies</td>
<td>Brass</td>
<td>Gold</td>
</tr>
<tr>
<td>Connector Nuts</td>
<td>Stainless Steel</td>
<td>Passivated</td>
</tr>
<tr>
<td>Gasket</td>
<td>Silicon Rubber</td>
<td>A-A-59588</td>
</tr>
</tbody>
</table>

Typical performance @ +25°C

Product specifications subject to change without notification.
HA141C Series
18 GHz - .141 Dia. Conformable Cable

FEATURES
• RoHs Compliant
• Easily Hand-Formable to Final Shape
• Anti-torque Nut on SMA Straight Connectors
• 100% VSWR test to 18 GHz
• 100% Hi-pot and continuity tests
• Insertion Loss: +25°C: 0.4 dB + 0.065 x length (per inch)

ELECTRICAL SPECIFICATIONS
Max Frequency (GHz) 20
Capacitance (pF/Ft) 29
Velocity Propagation (%) 70
RF Leakage @ 18 GHz (dB) >100
Time Delay (ns/Ft) 1.46
Impedance (Ohms) 50

MECHANICAL SPECIFICATIONS
Cable Max Dia. (Inch) 0.141
Min. bend radius (Inch) 0.25
Recommend Bend Radius (Inch) 1.5
Raw Cable Temperature Range (°C) -55 to +200

MATERIALS AND FINISHES

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MATERIALS</th>
<th>FINISH OR COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marker</td>
<td>Mil-I-23053</td>
<td>Black</td>
</tr>
<tr>
<td>Contacts</td>
<td>Brass</td>
<td>Gold Plated</td>
</tr>
<tr>
<td>Insulators</td>
<td>PTFE</td>
<td>None</td>
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<tr>
<td>Connector Bodies</td>
<td>Brass</td>
<td>Gold</td>
</tr>
<tr>
<td>Connector Nuts</td>
<td>Stainless Steel</td>
<td>Passivated</td>
</tr>
<tr>
<td>Gasket</td>
<td>Silicon Rubber</td>
<td>A-A-59588</td>
</tr>
</tbody>
</table>

Typical performance @ +25°C

Insertion Loss vs. Frequency - 12 in. cable

VSWR vs. Frequency - 12 in. cable
HA141TB Series
18 GHz - .141 Dia. Tin-Braided Hand Formable Cable

FEATURES

• RoHs Compliant
• Easily Hand-Formable to Final Shape
• SMA Straight or Right Angle Connectors

ELECTRICAL SPECIFICATIONS

Frequency: DC ~ 18 GHz
Insertion Loss: Not to exceed ≤ 0.7dB/ft + .04 dB per connector pair
VSWR: ≤ 1.30:1 @ DC - 18GHz
Dielectric Withstanding Voltage: 1,000V Max at Sea Level
Insulation Resistance: 5,000MΩ Min
Impedance: 50Ω

MECHANICAL SPECIFICATIONS

Cable Max Dia. (Inch): 0.141
Min. bend radius (Inch): 0.25
Recommend Bend Radius (Inch): 1.5
Raw Cable Temperature Range: -55 °C to +125 °C

MATERIALS AND FINISHES

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MATERIALS</th>
<th>FINISH OR COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contacts</td>
<td>Beryllium Copper</td>
<td>Gold Plated</td>
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<tr>
<td>Dielectric</td>
<td>PTFE</td>
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<tr>
<td>Connector Bodies</td>
<td>Beryllium Copper</td>
<td>Gold Plated</td>
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<td>Connector Nuts</td>
<td>Stainless Steel</td>
<td>Passivated</td>
</tr>
<tr>
<td>Jacket</td>
<td>Tin Braid</td>
<td>Tin</td>
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</table>

Typical Test Data for 12” cable
HLL142® Series
18 GHz Low Loss Cable Assemblies
Excellent Phase Stability Vs. Flexure & Temperature

FEATURES
- RoHs Compliant
- Low Loss, Low VSWR, High Reliability
- Phase Stable over Temp: 250ppm Max @ +22°C ~ +100°C
- Phase Stability Vs. Flexure: ± 6.4° @ 18 GHz
  (When wrapped 360° around a 1.5” diameter mandrel)
- Available with Stainless Steel Armor
- Cable Insertion Loss: -0.48 dB per Ft @ 18 GHz
- Amplitude Stability: ≤ ± 0.3 dB through 18 GHz

ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Frequency (GHz)</td>
<td>33</td>
</tr>
<tr>
<td>Capacitance (pF/Ft)</td>
<td>25</td>
</tr>
<tr>
<td>Velocity Propagation (%)</td>
<td>83</td>
</tr>
<tr>
<td>RF Leakage @ 26.5 GHz (dB)</td>
<td>&lt; -95</td>
</tr>
<tr>
<td>Time Delay (ns/Ft)</td>
<td>N/A</td>
</tr>
<tr>
<td>Impedance (Ohms)</td>
<td>50</td>
</tr>
<tr>
<td>Frequency (GHz)</td>
<td>2 6 10 28</td>
</tr>
<tr>
<td>Power CW (Watts)</td>
<td>5 10 220 165</td>
</tr>
<tr>
<td>Phase Stability vs. Flexure (°)</td>
<td>± 0.4 ± 1.2 ± 2 ± 3.6</td>
</tr>
</tbody>
</table>

MECHANICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable Max Dia. (Inch)</td>
<td>0.195</td>
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<tr>
<td>Min. bend radius (Inch)</td>
<td>1.0</td>
</tr>
<tr>
<td>Recommend Bend Radius (Inch)</td>
<td>2.0</td>
</tr>
<tr>
<td>Raw Cable Temperature Range (°C)</td>
<td>-55 to +85</td>
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MATERIALS AND FINISHES

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<th>Description</th>
<th>Material</th>
<th>Finish or Color</th>
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<tbody>
<tr>
<td>Cable Jacket</td>
<td>FEP</td>
<td>Light Green</td>
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<tr>
<td>Marker</td>
<td>Mil-H-23053</td>
<td>Black or White</td>
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<tr>
<td>Contacts</td>
<td>Brass or BeCu</td>
<td>Gold Plated</td>
</tr>
<tr>
<td>Insulators</td>
<td>PTFE</td>
<td>None</td>
</tr>
<tr>
<td>Connector Bodies</td>
<td>Stainless Steel</td>
<td>Passivated</td>
</tr>
<tr>
<td>Connector Nuts</td>
<td>Stainless Steel</td>
<td>Passivated</td>
</tr>
<tr>
<td>Gasket</td>
<td>Silicon Rubber</td>
<td>A-A-59588</td>
</tr>
</tbody>
</table>

Test #1: SMA Male to SMA Male, 24 inches, DC - 18 GHz

Test #2: Type N Male to Type N Male, 24 inches, DC - 18 GHz
HLL142A® Armored Series
18 GHz Low Loss Armored Cable Assemblies
Excellent Phase Stability Vs. Flexure & Temperature

FEATURES
- RoHs Compliant
- Low Loss, Low VSWR, High Reliability
- Phase Stable over Temp: 250 ppm Max @ +22°C ~ +100°C
- Phase Stability Vs. Flexure: ± 6.4° @ 18 GHz
  (When wrapped 360° around a 3.0” diameter mandrel)
- Stainless Steel Armor
- Cable Insertion Loss: -.48 dB per Ft @ 18 GHz
- Amplitude Stability: ≤ ± 0.3 dB through 18 GHz

ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Frequency (GHz)</td>
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<tr>
<td>Capacitance (pF/Ft)</td>
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<tr>
<td>Velocity Propagation (%)</td>
<td>83</td>
</tr>
<tr>
<td>RF Leakage @ 26.5 GHz (dB)</td>
<td>&lt; -95</td>
</tr>
<tr>
<td>Time Delay (ns/Ft)</td>
<td>N/A</td>
</tr>
<tr>
<td>Impedance (Ohms)</td>
<td>50</td>
</tr>
<tr>
<td>Frequency (GHz)</td>
<td>2 6 10 28</td>
</tr>
<tr>
<td>Power CW (Watts)</td>
<td>510 285 220 165</td>
</tr>
<tr>
<td>Phase Stability vs. Flexure (°)</td>
<td>± 0.4  ± 1.2  ± 2  ± 3.6</td>
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</tbody>
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MECHANICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable Max Dia. (Inch)</td>
<td>0.195</td>
</tr>
<tr>
<td>Min. bend radius (Inch)</td>
<td>2.5</td>
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<tr>
<td>Recommend Bend Radius (Inch)</td>
<td>3.0</td>
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<tr>
<td>Temperature Range (°C)</td>
<td>-55 to +200</td>
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MATERIALS AND FINISHES

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<tr>
<th>Description</th>
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<th>Finish or Color</th>
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<tr>
<td>Interlok Armor</td>
<td>304 Stainless Steel</td>
<td>Passivated</td>
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<td>FEP</td>
<td>Light Green</td>
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<tr>
<td>Marker</td>
<td>Mil-I-23053</td>
<td>Black or White</td>
</tr>
<tr>
<td>Contacts</td>
<td>Brass or BeCu</td>
<td>Gold Plated</td>
</tr>
<tr>
<td>Insulators</td>
<td>PTFE</td>
<td>None</td>
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<tr>
<td>Connector Bodies</td>
<td>Stainless Steel</td>
<td>Passivated</td>
</tr>
<tr>
<td>Connector Nuts</td>
<td>Stainless Steel</td>
<td>Passivated</td>
</tr>
<tr>
<td>Gasket</td>
<td>Silicon Rubber</td>
<td>A-A-59588</td>
</tr>
</tbody>
</table>
HSS42 Series
18 GHz Low Loss Ultra Flexible Cable Assemblies with Good Phase Stability

FEATURES
- RoHs Compliant
- Low Loss, Low VSWR, High Reliability
- Phase Stability Vs. Flexure: ± 1.4° @ 26.5 GHz
  (When wrapped 360° around a 1.65” diameter mandrel)

ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Capacitance (pF/m)</th>
<th>95.8</th>
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<tr>
<td>Velocity Propagation (%)</td>
<td>70</td>
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<td>Time Delay (ns/Ft)</td>
<td>4.6</td>
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<tr>
<td>Impedance (Ohms)</td>
<td>50</td>
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</table>

Attenuation and Power Handling @ +25° and Sea Level

<table>
<thead>
<tr>
<th>Frequency (MHz)</th>
<th>1,000</th>
<th>3,000</th>
<th>6,000</th>
<th>10,000</th>
<th>18,000</th>
<th>26,500</th>
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</thead>
<tbody>
<tr>
<td>Attenuation</td>
<td>0.34</td>
<td>0.65</td>
<td>0.98</td>
<td>1.35</td>
<td>1.9</td>
<td>2.52</td>
</tr>
<tr>
<td>Max Power Handling (Watts)</td>
<td>550</td>
<td>350</td>
<td>215</td>
<td>140</td>
<td>125</td>
<td>90</td>
</tr>
</tbody>
</table>

MECHANICAL SPECIFICATIONS

| Cable Max Dia. (Inch) | 0.18 |
| Min. bend radius (Inch) | 0.83 |
| Shielding Effectiveness @18GHz (dB) | 110 |
| Raw Cable Cut-off Frequency (GHz) | 34 |
| Raw Cable Temperature Range (°C) | -55 to +200 |

MATERIALS AND FINISHES

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MATERIALS</th>
<th>FINISH OR COLOR</th>
<th>DIA</th>
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<tbody>
<tr>
<td>Cable Jacket</td>
<td>FEP</td>
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<td>Copper</td>
<td>Silver Plated</td>
<td>0.036</td>
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<tr>
<td>Dielectric</td>
<td>PTFE</td>
<td>-</td>
<td>0.12</td>
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<td>Inner Braid</td>
<td>Copper Strip</td>
<td>Flat Silver Plated</td>
<td>0.128</td>
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<tr>
<td>Outer Braid</td>
<td>Copper Braid</td>
<td>Silver Plated</td>
<td>0.141</td>
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</tbody>
</table>

Product specifications subject to change without notification.
HULL320® Series
18 GHz Ultra Low Loss Flexible Cable Assemblies with Excellent Phase Stability vs. Flexure & Temperature

FEATURES
- RoHS Compliant
- Low Loss, Low VSWR, High Reliability
- Phase Stable over Temp: 550ppm Max @ -45°C ~ +85°C
- Phase Stability Vs. Flexure: ± 4° @ 18 GHz
  (When wrapped 360° around a 3.2" radius mandrel)
- Available with Stainless Steel Armor
- Cable Insertion Loss: -0.192 dB per Ft @ 18 GHz
- Amplitude Stability: ≤ ± 0.1 dB through 18 GHz

ELECTRICAL SPECIFICATIONS

Max Frequency (GHz) 18  
Capacitance (pF/Ft) 23.7  
Velocity Propagation (%) 85  
RF Leakage @ 18 GHz (dB) <-90  
Time Delay (ns/Ft) 1.19  
Impedance (Ohms) 50  
Frequency (GHz) 2 6 10 18  
Power CW (Watts) 1480 840 650 480  
Phase Stability vs. Flexure (°) ±0.5 ±1.5 ±2.5 ±4.5

MECHANICAL SPECIFICATIONS

Cable Max Dia. (Inch) 0.319  
Min. bend radius (Inch) 1.6  
Recommend Bend Radius (Inch) 3.19  
Raw Cable Temperature Range (°C) -65 to +200

MATERIALS AND FINISHES

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MATERIALS</th>
<th>FINISH OR COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable Jacket</td>
<td>PFA</td>
<td>Grey</td>
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<tr>
<td>Marker</td>
<td>Mil-l-23053</td>
<td>White</td>
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<tr>
<td>Inner Conductor</td>
<td>Copper</td>
<td>Silver Plated</td>
</tr>
<tr>
<td>Dielectric</td>
<td>Expanded PTFE Tape</td>
<td>None</td>
</tr>
<tr>
<td>Inner Braid</td>
<td>Flat Copper Strip</td>
<td>Silver Plated</td>
</tr>
<tr>
<td>Outer Braid</td>
<td>Copper Braid</td>
<td>Silver Plated</td>
</tr>
<tr>
<td>Connector Bodies/Nuts</td>
<td>Stainless Steel</td>
<td>Passivated</td>
</tr>
<tr>
<td>Gasket</td>
<td>Silicon Rubber</td>
<td>A-A-59588</td>
</tr>
</tbody>
</table>
HSB42i® Series
26.5 GHz Low Loss Flexible Cable Assemblies with Good Phase Stability vs. Flexure

FEATURES
• RoHs Compliant
• Low Loss, Low VSWR, High Reliability
• Outstanding durability vs. flexure
• Available with stainless steel armor
• Phase Stability vs. Flexure: ± 2.95 @ 26.5 GHz
  (When wrapped 360° around a 1.0” diameter mandrel)
• Cable Insertion Loss: -0.79 dB per Ft @ 26.5 GHz
• Amplitude Stability: < ± 0.2 dB through 26.5 GHz

ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Frequency (GHz)</td>
<td>26.5</td>
</tr>
<tr>
<td>Capacitance (pF/Ft)</td>
<td>29.4</td>
</tr>
<tr>
<td>Velocity Propagation (%)</td>
<td>70</td>
</tr>
<tr>
<td>RF Leakage @ 18 GHz (dB)</td>
<td>&lt; -95</td>
</tr>
<tr>
<td>Time Delay (ns/Ft)</td>
<td>1.43</td>
</tr>
<tr>
<td>Impedance (Ohms)</td>
<td>50</td>
</tr>
<tr>
<td>Frequency (GHz)</td>
<td>2 6 10 18 26.5</td>
</tr>
<tr>
<td>Power CW (Watts)</td>
<td>420 215 140 125 75</td>
</tr>
<tr>
<td>Phase Stability vs. Flexure (°)</td>
<td>± 0.22 ± .67 ± 1.11 ± 2 ± 2.95</td>
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</tbody>
</table>

MECHANICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tbody>
<tr>
<td>Cable Max Dia. (Inch)</td>
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<tr>
<td>Min. bend radius (Inch)</td>
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<tr>
<td>Recommend Bend Radius (Inch)</td>
<td>1.72</td>
</tr>
<tr>
<td>Raw Cable Temperature Range (°C)</td>
<td>-55 to +200</td>
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MATERIALS AND FINISHES

<table>
<thead>
<tr>
<th>Description</th>
<th>Material</th>
<th>Finish or Color</th>
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<tbody>
<tr>
<td>Cable Jacket</td>
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<td>Marker</td>
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<td>White</td>
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<tr>
<td>Inner Conductor</td>
<td>Copper</td>
<td>Silver Plated</td>
</tr>
<tr>
<td>Interlayer</td>
<td>Polyester</td>
<td>Aluminum</td>
</tr>
<tr>
<td>Inner Braid</td>
<td>Flat Copper Strip</td>
<td>Silver Plated</td>
</tr>
<tr>
<td>Outer Braid</td>
<td>Copper Braid</td>
<td>Silver Plated</td>
</tr>
<tr>
<td>Dielectric</td>
<td>Solid PTFE</td>
<td>None</td>
</tr>
<tr>
<td>Connector Bodies/Nuts</td>
<td>Stainless Steel</td>
<td>Passivated</td>
</tr>
</tbody>
</table>
HSB42® Series
26.5 GHz Test Cable Assemblies with Excellent Phase and Amplitude Stability vs. Flexure

FEATURES
- RoHS Compliant
- Very flexible with bend radius of 1.95"
- Good performance even after 20,000 flex cycles
- Available with stainless steel armor
- Phase Stability vs. Flexure: ± 2.95°@ 26.5 GHz
  (When wrapped 360° around a 1.95" radius mandrel)
- Cable Insertion Loss: -0.79 dB per Ft @ 26.5 GHz
- Excellent Amplitude Stability: ± 0.1 dB through 26.5 GHz

ELECTRICAL SPECIFICATIONS

Max Frequency (GHz) 26.5
Capacitance (pf/Ft) 29.4
Velocity Propagation (%) 70
RF Leakage @ 18 GHz (dB) < -95
Time Delay (ns/Ft) 1.40
Impedance (Ohms) 50
Frequency (GHz) 2 6 10 18 26.5
Power CW (Watts) 420 215 140 125 75
Phase Stability vs. Flexure (°) ± 0.22 ± 0.67 ± 1.11 ± 2 ± 2.95

MECHANICAL SPECIFICATIONS

Cable Max Dia. (Inch) 0.195
Min. bend radius (Inch) 1.0
Recommend Bend Radius (Inch) 1.95
Raw Cable Temperature Range (° C) -55 to +105

MATERIALS AND FINISHES

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MATERIALS</th>
<th>FINISH OR COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable Jacket</td>
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<td>Blue</td>
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<tr>
<td>Marker</td>
<td>Mil-H-23053</td>
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</tr>
<tr>
<td>Inner Conductor</td>
<td>Copper</td>
<td>Solid Silver Plated</td>
</tr>
<tr>
<td>Interlayer</td>
<td>Polyester</td>
<td>Aluminum</td>
</tr>
<tr>
<td>Inner Braid</td>
<td>Flat Copper Strip</td>
<td>Silver Plated</td>
</tr>
<tr>
<td>Outer Braid</td>
<td>Copper Braid</td>
<td>None</td>
</tr>
<tr>
<td>Dielectric</td>
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<tr>
<td>Connector Bodies/Nuts</td>
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</tr>
<tr>
<td>Gasket</td>
<td>Silicon Rubber</td>
<td></td>
</tr>
</tbody>
</table>

Test #1: SMA Male to SMA Male, 30 inches, DC - 26.5GHz
HSFL42® Series
26.5 GHz Low Loss Ultra Flexible Cable Assemblies with Good Phase Stability

FEATURES
- RoHS Compliant
- Low Loss, Low VSWR, High Reliability
- Phase Stability Vs. Flexure: ± 3° @ 26.5 GHz
  (When wrapped 360° around a 1” diameter mandrel)
- Available with stainless steel armor
- Cable Insertion Loss: 0.83 dB per Ft @ 26.5 GHz
- Amplitude Stability: < ± 0.3 dB through 26.5 GHz

ELECTRICAL SPECIFICATIONS

Max Frequency (GHz) 26.5
Capacitance (pF/Ft) 29.4
Velocity Propagation (%) 70
RF Leakage @ 18 GHz (dB) <-110
Time Delay (ns/Ft) 1.43
Impedance (Ohms) 50
Frequency (GHz) 2 6 18 26.5
Power CW (Watts) 350 175 100 72
Phase Stability vs. Flexure (°) ±0.23 ±0.7 ±2.0 ±3.0

MECHANICAL SPECIFICATIONS

Cable Max Dia. (Inch) 0.18
Min. bend radius (Inch) 1.0
Recommend Bend Radius (Inch) 1.63
Raw Cable Temperature Range (°C) -55 to +105

MATERIALS AND FINISHES

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MATERIALS</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Cable Jacket</td>
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<td>Marker</td>
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<td>White</td>
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<tr>
<td>Inner Conductor</td>
<td>Stranded Copper</td>
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<tr>
<td>Inner Braid</td>
<td>Flat Copper Strip</td>
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<td>Outer Braid</td>
<td>Copper Braid</td>
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<tr>
<td>Dielectric</td>
<td>Solid PTFE</td>
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<tr>
<td>Connector Bodies/Nuts</td>
<td>Stainless Steel</td>
<td>Passivated</td>
</tr>
</tbody>
</table>
HVNA26® Series
26.5 GHz Phase Stable Test Cable For Vector Network Analyzer

FEATURES
- RoHs Compliant
- Extra rugged and long-life performance
- High stability for test lab precision measurements
- Negligible changes of phase & amplitude after flexing
- Phase Stability vs. Flexure: ± 2.5° @ 26.5 GHz
  (When wrapped 90° around a 2” radius mandrel)
- Cable Insertion Loss: 0.79 dB per ft @ 26.5 GHz
- Excellent Amplitude Stability: < 0.05 dB through 26.5 GHz

ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Frequency (GHz)</td>
<td>26.5</td>
</tr>
<tr>
<td>Capacitance (pF/Ft)</td>
<td>29.4</td>
</tr>
<tr>
<td>Velocity Propagation (%)</td>
<td>70</td>
</tr>
<tr>
<td>RF Leakage @ 18 GHz (dB)</td>
<td>&lt; -95</td>
</tr>
<tr>
<td>Time Delay (ns/Ft)</td>
<td>1.40</td>
</tr>
<tr>
<td>Impedance (Ohms)</td>
<td>50</td>
</tr>
<tr>
<td>Frequency (GHz)</td>
<td>2 6 10 18 26.5</td>
</tr>
<tr>
<td>Power CW (Watts)</td>
<td>420 215 140 125 75</td>
</tr>
<tr>
<td>Phase Stability vs. Flexure (°)</td>
<td>±0.19 ±0.57 ±0.94 ±1.7 ±2.5</td>
</tr>
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MECHANICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
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</thead>
<tbody>
<tr>
<td>Cable Outer Braid Max Dia. (Inch)</td>
<td>0.6</td>
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<tr>
<td>Min. bend radius (Inch)</td>
<td>1.5</td>
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<tr>
<td>Recommend Bend Radius (Inch)</td>
<td>2</td>
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<tr>
<td>Temperature Range (°C)</td>
<td>-40 to +105</td>
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MATERIALS AND FINISHES

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MATERIALS</th>
<th>FINISH OR COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable Outer Braid</td>
<td>Polyester-PET</td>
<td>Black</td>
</tr>
<tr>
<td>Marker</td>
<td>Mil-I-23053</td>
<td>White</td>
</tr>
<tr>
<td>Contacts</td>
<td>BeCu</td>
<td>Gold Plated</td>
</tr>
<tr>
<td>Insulators</td>
<td>PEEK</td>
<td>None</td>
</tr>
<tr>
<td>Connector Bodies (3SP)</td>
<td>Stainless Steel &amp; Aluminum Alloy</td>
<td>Passivated / Electrophoresis</td>
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<tr>
<td>Connector Bodies (NMD35)</td>
<td>Stainless Steel</td>
<td>Passivated</td>
</tr>
<tr>
<td>Connector Nuts (3SP)</td>
<td>Stainless Steel &amp; Aluminum</td>
<td>Passivated</td>
</tr>
<tr>
<td>Gasket (3SP)</td>
<td>Silicon Rubber</td>
<td>A-A-59588</td>
</tr>
</tbody>
</table>
HULL190® Series
26.5 GHz Ultra Low Loss Flexible Cable Assemblies with Excellent Phase Stability vs. Flexure & Temperature

FEATURES
- RoHs Compliant
- Low Loss, Low VSWR, High Reliability
- Phase Stable over Temp: 550ppm Max @ -45°C ~ +85°C
- Phase Stability Vs. Flexure: ± 4.5° @ 26.5 GHz
  (When wrapped 360° around a 1.89” radius mandrel)
- Available with Stainless Steel Armor
- Cable Insertion Loss: -.39 dB per Ft @ 26.5 GHz
- Amplitude Stability: ± 0.2 dB through 26.5 GHz

ELECTRICAL SPECIFICATIONS

Max Frequency (GHz) 26.5
Capacitance (pF/Ft) 23.7
Velocity Propagation (%) 85
RF Leakage @ 26.5 GHz (dB) <-90
Time Delay (ns/Ft) 1.18
Impedance (Ohms) 50
Frequency (GHz) 2 6 12 18 26.5
Power CW (Watts) 650 390 260 220 190
Phase Stability vs. Flexure (°) ±0.33 ±1 ±2 ±3 ±4.5

MECHANICAL SPECIFICATIONS

Cable Max Dia. (Inch) 0.189
Min. bend radius (Inch) 1.0
Recommend Bend Radius (Inch) 1.89
Raw Cable Temperature Range (°C) -65 to +200

MATERIALS AND FINISHES

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MATERIALS</th>
<th>FINISH OR COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable Jacket</td>
<td>PFA</td>
<td>Gray</td>
</tr>
<tr>
<td>Inner Braid</td>
<td>Flat Copper Strip</td>
<td>Silver Plated</td>
</tr>
<tr>
<td>Outer Braid</td>
<td>Copper Braid</td>
<td>Silver Plated</td>
</tr>
<tr>
<td>Marker</td>
<td>Mil-l-23053</td>
<td>White</td>
</tr>
<tr>
<td>Contacts</td>
<td>BeCu</td>
<td>Gold Plated</td>
</tr>
<tr>
<td>Inner Conductor</td>
<td>Copper</td>
<td>Solid Silver Plated</td>
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<tr>
<td>Dielectric</td>
<td>Expanded PTFE Tape</td>
<td>None</td>
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<td>Connector Bodies/Nuts</td>
<td>Stainless Steel</td>
<td>Passivated</td>
</tr>
<tr>
<td>Gasket</td>
<td>Silicon Rubber</td>
<td>A-A-59588</td>
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</tbody>
</table>

Test: SMA Male to SMA Male, 24 inches, DC - 26.5 GHz

RF Leakage @ 26.5 GHz (dB) <-90
Time Delay (ns/Ft) 1.18
Impedance (Ohms) 50
Frequency (GHz) 2 6 12 18 26.5
Power CW (Watts) 650 390 260 220 190
Phase Stability vs. Flexure (°) ±0.33 ±1 ±2 ±3 ±4.5

Cable attenuation @ +25°C and Sea Level
Max RF Power @ +25°C and Sea Level
Phase Change vs. Temperature

Product specifications subject to change without notification.
HLL180 Series
30 GHz Ultra Low Loss Flexible Cable

FEATURES
- RoHs Compliant
- One of the Lowest Loss Cables Through 30 GHz
- Phase Stability Vs. Flexure: ± 9° @ 30 GHz
  (When wrapped 360° around a 2” diameter mandrel)

ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Capacitance (pF/m)</th>
<th>78.7</th>
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<tbody>
<tr>
<td>Velocity Propagation (%)</td>
<td>83</td>
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<tr>
<td>Time Delay (ns/Ft)</td>
<td>3.94</td>
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<td>Impedance (Ohms)</td>
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**Attenuation and Power Handling @ +25° and Sea Level**

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<thead>
<tr>
<th>Frequency (MHz)</th>
<th>1,000</th>
<th>3,000</th>
<th>6,000</th>
<th>10,000</th>
<th>18,000</th>
<th>22,000</th>
<th>26,500</th>
<th>30,000</th>
<th>32,000</th>
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<tbody>
<tr>
<td>Attenuation</td>
<td>0.25</td>
<td>0.38</td>
<td>0.65</td>
<td>0.85</td>
<td>1.2</td>
<td>1.33</td>
<td>1.48</td>
<td>1.56</td>
<td>1.6</td>
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<tr>
<td>Max Power Handling (Watts)</td>
<td>720</td>
<td>460</td>
<td>285</td>
<td>220</td>
<td>165</td>
<td>145</td>
<td>135</td>
<td>120</td>
<td>105</td>
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MECHANICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Cable Max Dia. (Inch)</th>
<th>0.18</th>
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<tbody>
<tr>
<td>Min. bend radius (Inch)</td>
<td>1</td>
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<tr>
<td>Shielding Effectiveness @18GHz (dB)</td>
<td>100</td>
</tr>
<tr>
<td>Raw Cable Cut-off Frequency (GHz)</td>
<td>32</td>
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<tr>
<td>Raw Cable Temperature Range (°C)</td>
<td>-65 to +200</td>
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MATERIALS AND FINISHES

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<tr>
<th>DESCRIPTION</th>
<th>MATERIALS</th>
<th>FINISH OR COLOR</th>
<th>DIA</th>
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<tbody>
<tr>
<td>Cable Jacket</td>
<td>FEP</td>
<td>Yellow</td>
<td>0.190</td>
</tr>
<tr>
<td>Inner Conductor</td>
<td>Copper</td>
<td>Silver Plated</td>
<td>0.051</td>
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<tr>
<td>Dielectric</td>
<td>PTFE</td>
<td></td>
<td>0.147</td>
</tr>
<tr>
<td>Inner Braid</td>
<td>Copper Strip</td>
<td>Flat Silver Plated</td>
<td>0.155</td>
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<tr>
<td>Outer Braid</td>
<td>Copper Braid</td>
<td>Silver Plated</td>
<td>0.168</td>
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</tbody>
</table>

Product specifications subject to change without notification.
HLL142® Series
34 GHz Ultra Low Loss Flexible Cable Assemblies
with Excellent Phase Stability vs. Flexure & Temperature

FEATURES
- RoHS Compliant
- Low Loss, Low VSWR, High Reliability
- Phase Stable over Temp: 250ppm Max @ +22°C ~ +100°C
- Phase Stability Vs. Flexure: ± 6.4° @ 30 GHz
  (When wrapped 360° around a 1.5” diameter mandrel)
- Available with Stainless Steel Armor
- Cable Insertion Loss: ~.48 dB per Ft @ 30 GHz
- Amplitude Stability: ≤ ± 0.3 dB through 30 GHz

ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
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</thead>
<tbody>
<tr>
<td>Max Frequency (GHz)</td>
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<tr>
<td>Capacitance (pF/Ft)</td>
<td>25</td>
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<tr>
<td>Velocity Propagation (%)</td>
<td>80</td>
</tr>
<tr>
<td>RF Leakage @ 26.5 GHz (dB)</td>
<td>&lt; -95</td>
</tr>
<tr>
<td>Time Delay (ns/Ft)</td>
<td>1.26</td>
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<tr>
<td>Impedance (Ohms)</td>
<td>50</td>
</tr>
<tr>
<td>Frequency (GHz)</td>
<td>2, 6, 18, 26.5, 30</td>
</tr>
<tr>
<td>Power CW (Watts)</td>
<td>510, 285, 165, 135, 120</td>
</tr>
<tr>
<td>Phase Stability vs. Flexure (°)</td>
<td>±0.4, ±1.2, ±3.6, ±5.3, ±6.4</td>
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MECHANICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable Max Dia. (Inch)</td>
<td>0.195</td>
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<tr>
<td>Min. bend radius (Inch)</td>
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<tr>
<td>Recommend Bend Radius (Inch)</td>
<td>2.0</td>
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<tr>
<td>Raw Cable Temperature Range (°C)</td>
<td>-55 to +85</td>
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MATERIALS AND FINISHES

<table>
<thead>
<tr>
<th>Description</th>
<th>Materials</th>
<th>Finish or Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable Jacket</td>
<td>FEP</td>
<td>Light Green</td>
</tr>
<tr>
<td>Marker</td>
<td>Mil-I-23053</td>
<td>White</td>
</tr>
<tr>
<td>Contacts</td>
<td>BeCu</td>
<td>Gold Plated</td>
</tr>
<tr>
<td>Insulators</td>
<td>PEEK</td>
<td>None</td>
</tr>
<tr>
<td>Connector Bodies</td>
<td>Stainless Steel</td>
<td>Passivated</td>
</tr>
<tr>
<td>Connector Nuts</td>
<td>Stainless Steel</td>
<td>Passivated</td>
</tr>
<tr>
<td>Gasket</td>
<td>Silicon Rubber</td>
<td>A-A-59588</td>
</tr>
</tbody>
</table>

Test #1: 3.5mm Male to 3.5mm Male, 24 inches, DC - 30 GHz
Test #2: 3.5mm Male to 3.5mm Male, 24 inches, DC - 30 GHz
**HLL150® Series**
40 GHz Ultra Low Loss Flexible Cable Assemblies with Excellent Phase Stability vs. Flexure & Temperature

**FEATURES**
- RoHs Compliant
- Low Loss, Low VSWR, High Reliability
- Phase Stable over Temp: 500ppm Max @ -40°C ~ +85°C
- Phase Stability Vs. Flexure: ± 8° @ 40 GHz
  (When wrapped 360° around a 2” diameter mandrel)
- Available with Stainless Steel Armor
- Cable Insertion Loss: - .75 dB per Ft @ 40 GHz
- Amplitude Stability: < ± 0. 4 dB through 40 GHz

**ELECTRICAL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Max Frequency (GHz)</td>
<td>40</td>
</tr>
<tr>
<td>Capacitance (pF/Ft)</td>
<td>24</td>
</tr>
<tr>
<td>Velocity Propagation (%)</td>
<td>83</td>
</tr>
<tr>
<td>RF Leakage @ 18 GHz (dB)</td>
<td>&lt; -100</td>
</tr>
<tr>
<td>Time Delay (ns/Ft)</td>
<td>1.2</td>
</tr>
<tr>
<td>Impedance (Ohms)</td>
<td>50</td>
</tr>
<tr>
<td>Frequency (GHz)</td>
<td>2 6 18 26.5 40</td>
</tr>
<tr>
<td>Power CW (Watts)</td>
<td>420 215 125 100 75</td>
</tr>
<tr>
<td>Phase Stability vs. Flexure (°)</td>
<td>±0.4 ±1.2 ±3.6 ±5.3 ±8.0</td>
</tr>
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**MECHANICAL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>VA Armor Max Dia. (Inch)</td>
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<tr>
<td>Min. bend radius (Inch)</td>
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<tr>
<td>Recommend Bend Radius (Inch)</td>
<td>2.0</td>
</tr>
<tr>
<td>Raw Cable Temperature Range (°C)</td>
<td>-65 to +135</td>
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</tbody>
</table>

**MATERIALS AND FINISHES**

<table>
<thead>
<tr>
<th>Description</th>
<th>Materials</th>
<th>Finish or Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable Jacket</td>
<td>FEP</td>
<td>Blue</td>
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<td>Marker</td>
<td>Mil-l-23053</td>
<td>White</td>
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<tr>
<td>Contacts</td>
<td>Copper</td>
<td>Silver Plated</td>
</tr>
<tr>
<td>Insulators</td>
<td>Low Density PTFE</td>
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</tr>
<tr>
<td>Connector Bodies/Nuts</td>
<td>Stainless Steel</td>
<td>Passivated</td>
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<tr>
<td>Gasket</td>
<td>Silicon Rubber</td>
<td>A-A-59588</td>
</tr>
</tbody>
</table>
HLL150A® Series
40 GHz Ultra Low Loss Flexible Cable Assemblies with Excellent Phase Stability vs. Flexure & Temperature

FEATURES

- RoHs Compliant
- Low Loss, Low VSWR, High Reliability
- Phase Stable over Temp: 500ppm Max @ -40°C ~ +85°C
- Phase Stability Vs. Flexure: ± 8° @ 40 GHz
  (When wrapped 360° around a 2” diameter mandrel)
- VA Armor: With good results in Resist compression,
  Resist torsion, Waterproof and Dustproof.
- Cable Insertion Loss: -0.75 dB per Ft @ 40 GHz
- Amplitude Stability: < ± 0.4 dB through 40 GHz

ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Frequency (GHz)</td>
<td>40</td>
</tr>
<tr>
<td>Capacitance (pF/Ft)</td>
<td>24</td>
</tr>
<tr>
<td>Velocity Propagation (%)</td>
<td>83</td>
</tr>
<tr>
<td>RF Leakage @ 18 GHz (dB)</td>
<td>&lt; -100</td>
</tr>
<tr>
<td>Time Delay (ns/Ft)</td>
<td>1.2</td>
</tr>
<tr>
<td>Impedance (Ohms)</td>
<td>50</td>
</tr>
<tr>
<td>Frequency (GHz)</td>
<td>2 6 18 26.5 40</td>
</tr>
<tr>
<td>Power CW (Watts)</td>
<td>420 215 125 100 75</td>
</tr>
<tr>
<td>Phase Stability vs. Flexure (°)</td>
<td>±0.4 ±1.2 ±3.6 ±5.3 ±8.0</td>
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</tbody>
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MECHANICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
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<tbody>
<tr>
<td>VA Armor Max Dia. (Inch)</td>
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<tr>
<td>Recommend Bend Radius (Inch)</td>
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</tr>
<tr>
<td>Raw Cable Temperature Range (° C)</td>
<td>-65 to +135</td>
</tr>
</tbody>
</table>

MATERIALS AND FINISHES

<table>
<thead>
<tr>
<th>Description</th>
<th>Material</th>
<th>Finish or Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable Jacket</td>
<td>PVC</td>
<td>Blue</td>
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<td>VA Armor</td>
<td>Stainless Steel Flat Spiral</td>
<td>Blue</td>
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<td>Marker</td>
<td>Mil-I-23053</td>
<td>White</td>
</tr>
<tr>
<td>Inner Conductor</td>
<td>Copper</td>
<td>Silver Plated</td>
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<tr>
<td>Inner Braid</td>
<td>Flat Copper Strip</td>
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<td>Connector Bodies/Nuts</td>
<td>Stainless Steel</td>
<td>Passivated</td>
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</table>
HSS45A® Series
40 GHz Low Loss Flexible Cable Assemblies with Good Phase Stability vs. Flexure

FEATURES
- RoHs Compliant
- Low Loss, Low VSWR, High Reliability
- Phase Stability Vs. Flexure: ± 3.5° @ 40 GHz
  (When wrapped 360° around a 2" diameter mandrel)
- VA Armor: With good results in Resist compression, Resist torsion, Waterproof and Dustproof
- Cable Insertion Loss: 1.59 dB per Ft @ 40 GHz
- Amplitude Stability: < ± 0.4 dB through 40 GHz

ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Max Frequency (GHz)</th>
<th>Capacitance (pF/Ft)</th>
<th>Velocity Propagation (%)</th>
<th>RF Leakage @ 18 GHz (dB)</th>
<th>Time Delay (ns/Ft)</th>
<th>Impedance (Ohms)</th>
<th>Frequency (GHz)</th>
<th>Power CW (Watts)</th>
<th>Phase Stability vs. Flexure (°)</th>
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<tbody>
<tr>
<td>40</td>
<td>96.4</td>
<td>70</td>
<td>&lt; -110</td>
<td>1.4</td>
<td>50</td>
<td>2</td>
<td>81</td>
<td>± 0.2</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6</td>
<td>48</td>
<td>± 0.6</td>
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<td></td>
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<td></td>
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<td></td>
<td></td>
<td>18</td>
<td>21</td>
<td>± 1.8</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>26.5</td>
<td>17</td>
<td>± 2.65</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>40</td>
<td>10</td>
<td>± 4.0</td>
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</table>

MECHANICAL SPECIFICATIONS

- VA Armor Max Dia. (Inch) 0.256
- Min. bend radius (Inch) 1
- Recommend Bend Radius (Inch) 1.5
- Raw Cable Temperature Range (° C) -55 to +200

MATERIALS AND FINISHES

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MATERIALS</th>
<th>FINISH OR COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable Jacket</td>
<td>FEP</td>
<td>Blue</td>
</tr>
<tr>
<td>VA Armor</td>
<td>Stainless Steel Flat Spiral</td>
<td>Blue</td>
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<tr>
<td>Marker</td>
<td>Mil-I-23053</td>
<td>White</td>
</tr>
<tr>
<td>Inner Conductor</td>
<td>Copper</td>
<td>Silver Plated</td>
</tr>
<tr>
<td>Inner Braid</td>
<td>Flat Copper Strip</td>
<td>Silver Plated</td>
</tr>
<tr>
<td>Outer Braid</td>
<td>Copper Braid</td>
<td>Silver Plated</td>
</tr>
<tr>
<td>Dielectric</td>
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<td>None</td>
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<tr>
<td>Connector Bodies/Nuts</td>
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<td>Passivated</td>
</tr>
<tr>
<td>Gasket</td>
<td>Silicon Rubber</td>
<td>A-A-59588</td>
</tr>
</tbody>
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Test #1: 2.92mm Male to 2.92mm Male, 24 inches, DC - 40 GHz

Cable Attenuation
@ +25°C and Sea Level

Max RF Power
@ +25°C and Sea Level
HULL 140 Series
40 GHz Millimeter Wave Ultra Low Loss Flexible Cable Assemblies with Excellent Phase Stability vs. Flexure and Temperature

FEATURES
- RoHS Compliant
- Low Loss, Low VSWR, High Reliability
- Phase Stable over Temp: 500pp Max @ -40°C - +85°C
- Phase Stability vs. Flexure: ± 7.2° @ 40 GHz
- Available with Stainless Steel Armor
- Cable Insertion Loss: -0.75 dB per ft @ 40 GHz
- Amplitude Stability: < ± 0.3 dB through 40 GHz

ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Max Frequency (GHz)</th>
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<tbody>
<tr>
<td>Capacitance (pF/ft)</td>
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<tr>
<td>Velocity Propagation (%)</td>
<td>85</td>
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<tr>
<td>RF Leakage @ 18 GHz (dB)</td>
<td>&lt;-90</td>
</tr>
<tr>
<td>Time Delay (ns/ft)</td>
<td>1.18</td>
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<tr>
<td>Impedance (Ohms)</td>
<td>50</td>
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<table>
<thead>
<tr>
<th>Frequency (GHz)</th>
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<th>6</th>
<th>18</th>
<th>26.5</th>
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<tr>
<td>Power CW (Watts)</td>
<td>415</td>
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<td>120</td>
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<td>70</td>
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<tr>
<td>Phase Stability vs. Flexure (°)</td>
<td>±0.36</td>
<td>±1.1</td>
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MECHANICAL SPECIFICATIONS

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<thead>
<tr>
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<tr>
<td>Min. bend radius (Inch)</td>
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<tr>
<td>Recommend Bend Radius (Inch)</td>
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<td>Raw Cable Temperature Range (°C)</td>
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MATERIALS AND FINISHES

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<th>FINISH OR COLOR</th>
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<tr>
<td>Marker</td>
<td>MIL-I-23053</td>
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<tr>
<td>Inner Conductor</td>
<td>Copper</td>
<td>Solid Silver Plated</td>
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<tr>
<td>Dielectric</td>
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<tr>
<td>Inner Braid</td>
<td>Flat Copper Strip</td>
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</tr>
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<td>Outer Braid</td>
<td>Copper Braid</td>
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</tr>
<tr>
<td>Connector Bodies/Nuts</td>
<td>Stainless Steel</td>
<td>Passivated</td>
</tr>
<tr>
<td>Gasket</td>
<td>Silicon Rubber</td>
<td>A-A-59588</td>
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</table>
HULL140A Series
40 GHz Millimeter Wave Ultra Low Loss Armored Flexible Cable Assemblies with Excellent Phase Stability vs. Flexure and Temperature

FEATURES
• RoHs Compliant
• Low Loss, Low VSWR, High Reliability
• Phase Stable over Temp: 500pp Max @ -40°C - +85°C
• Phase Stability vs. Flexure: ± 7.2° @ 40 GHz
• Cable Insertion Loss: -.75 dB per ft @ 40 GHz
• Amplitude Stability: < ± 0.3 dB through 40 GHz

ELECTRICAL SPECIFICATIONS
Max Frequency (GHz) 40
Capacitance (pF/Ft) 23.7
Velocity Propagation (%) 85
RF Leakage @ 18 GHz (dB) < -90
Time Delay (ns/Ft) 1.18
Impedance (Ohms) 50
Frequency (GHz) 2 6 18 26.5 40
Power CW (Watts) 415 210 120 100 70
Phase Stability vs. Flexure (°) ±0.36 ±1.1 ±3.3 ±4.8 ±7.2

MECHANICAL SPECIFICATIONS
Cable Max Dia. (Inch) 0.142
Min. bend radius (Inch) 0.5
Recommend Bend Radius (Inch) 1.42
Raw Cable Temperature Range (°C) -55 to +200

MATERIALS AND FINISHES

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>MATERIALS</th>
<th>FINISH OR COLOR</th>
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</thead>
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<tr>
<td>Cable Jacket</td>
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<tr>
<td>Marker</td>
<td>Mil-l-23053</td>
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<td>VA Armor</td>
<td>Stainless Steel + PUR</td>
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<td>Inner Conductor</td>
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<tr>
<td>Dielectric</td>
<td>Expanded PTFE Tape</td>
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<td>Inner Braid</td>
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<td>Connector Bodies/Nuts</td>
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Test Data: 2.92 Male to 2.92 Female, DC - 40GHz
HASCO Bench Test Cable
HBTC® Series Phase Stable and Ultra Low Loss Cable Assemblies

FEATURES
- RoHS Compliant
- Low Loss, Low VSWR, High Reliability
- Phase Stable over Temp: 900pp ax @ -40°C - +85°C
- Phase Stability vs. Flexure: ± 8° @ 40 GHz
- Stainless Steel Armor
- Cable Insertion Loss: -0.79 dB per Ft @ 26 GHz
- Amplitude Stability: < ± 0.1 dB through 40 GHz

ELECTRICAL SPECIFICATIONS

<table>
<thead>
<tr>
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<td>Capacitance (pF/Ft)</td>
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<tr>
<td>Velocity Propagation (%)</td>
<td>78</td>
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<tr>
<td>RF Leakage @ 18 GHz (dB)</td>
<td>&lt;-100</td>
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<tr>
<td>Time Delay (ns/Ft)</td>
<td>1.30</td>
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<tr>
<td>Impedance (Ohms)</td>
<td>50 ±2</td>
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<tr>
<td>Frequency (GHz)</td>
<td>1 6 18 26 40</td>
</tr>
<tr>
<td>Power CW (Watts)</td>
<td>400 215 125 100 75</td>
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<tr>
<td>Phase Stability vs. Flexure (°)</td>
<td>±0.4 ±1.2 ±3.6 ±5.3 ±8.0</td>
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MECHANICAL SPECIFICATIONS

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MATERIALS AND FINISHES

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<tr>
<td>Contacts</td>
<td>BeCu</td>
<td>Gold Plated</td>
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<td>Insulators</td>
<td>PTFE</td>
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<tr>
<td>Connector Bodies/Nuts</td>
<td>Stainless Steel</td>
<td>Passivated</td>
</tr>
<tr>
<td>Gasket</td>
<td>Silicon Rubber</td>
<td>A-A-59588</td>
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Test Data: 2.92 Male to 2.92 Female, DC - 40GHz

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Product specifications subject to change without notification.
HLL140 Series
50 GHz Low Loss Cable Assemblies
Excellent Phase Stability Vs. Flexure & Temperature

FEATURES
- RoHS Compliant
- Low Loss, Low VSWR, High Reliability
- Cable Attenuation: .95 dB/ft
- VSWR: 2 Straight Connectors 1.40:1

ELECTRICAL SPECIFICATIONS

Max Frequency (GHz) 52
Velocity Propagation (%) 84
RF Leakage to 18 GHz <-100 dB
Time Delay (ns/Ft) 1.2
Impedance (Ohms) 50
Frequency (GHz) 50

MECHANICAL SPECIFICATIONS

Cable Max Dia. (Inch) 0.14
Min. bend radius (Inch) .75
Recommend Bend Radius (Inch) 3.0
Raw Cable Temperature Range (°C) -55 to +85

MATERIALS AND FINISHES

<table>
<thead>
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<th>DESCRIPTION</th>
<th>MATERIALS</th>
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<td>Insulators</td>
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<td>Connector Bodies</td>
<td>Stainless Steel</td>
<td>Passivated</td>
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<tr>
<td>Connector Nuts</td>
<td>Stainless Steel</td>
<td>Passivated</td>
</tr>
<tr>
<td>Gasket</td>
<td>Silicon Rubber</td>
<td>A-A-59588</td>
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</table>

CABLE ATTENUATION

AVERAGE POWER
HLL125 Series • 67 GHz Ultra Low Loss Flexible Cable Assemblies with Excellent Phase Stability vs. Flexure & Temperature

FEATURES
- RoHs Compliant
- Low Loss, Low VSWR, High Reliability
- Temperature Range: -65°C ~ +200°C
- Phase Stability vs. Flexure: ± 15° @ 67 GHz
  (When wrapped 360° around a 2” diameter mandrel)
- Cable Insertion Loss: -2.10 dB per Ft @ 67 GHz
- Amplitude Stability: < ± XX dB through 67 GHz

ELECTRICAL SPECIFICATIONS

Max Frequency (GHz) 67
Capacitance (pF/Ft) 27
Velocity Propagation (%) 75
RF Leakage @ 18 GHz (dB) > 100
Time Delay (ns/Ft) 1.35
Impedance (Ohms) 50
Frequency (GHz) 6 18 26.5 40 67
Power CW (Watts) 93 39 30 20 13
Phase Stability vs. Flexure (°) ± 1.50 ± 4.00 ± 6.00 ± 10.00 ± 15.00

MECHANICAL SPECIFICATIONS

Cable Max Dia. (Inch) 0.110
Min. bend radius (Inch) 0.5
Recommend Bend Radius (Inch) 4.00*
Raw Cable Temperature Range (°C) -55 to +85

MATERIALS AND FINISHES

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<td>Connector Nuts</td>
<td>Stainless Steel</td>
<td>Passivated</td>
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</table>
Handling High Performance Coaxial Cables

Limit bend radius whenever possible
It is recommend to use the widest possible bend radius to fit the application. This will help to keep mechanical stresses low through the bend and prolong the life of the assembly.

Avoid torquing down connector ends until both connectors are mated in position
It is important to tighten both connectors into position before any torque is applied. If a connector is torqued down before the assembly is routed into position, excessive torsion could be applied at the torqued connector’s termination during the routing. These torsion forces could cause the dielectric to change its mechanical position at the connector termination, and ultimately lead to an electrical failure.

Avoid twisting assembly to orient connectors
When installing assemblies with right angle connectors, do not twist the cable or connectors to orient it with the mating connectors. Twisting the assembly could result in mechanically changing the dielectric position at the termination and ultimately lead to an electrical failure. Assemblies should be purchased with a specific connector offset angle to match the proper mating connector.

Avoid bending the assembly at the connector termination
A cable assembly should never be bent at the back of the connector. Applying a bend prematurely at the end of an assembly and allowing the bend to encompass the connector could lead to the build up of excessive cable forces against the connector and through the bend area. The applied forces will cause the cable to kink, resulting in electrical degradation and possible failure.

Avoid pulling an assembly through channeling by the connector end
Never pull an assembly by its connector when routing it through a frame work, channeling or building. Doing this could mechanically damage the connector termination. The assembly should always be pulled by the cable itself. Furthermore, the installation should be assisted by pushing the assembly through the channeling while the cable is pulled. Additionally, it is less stressful to the assembly if it is installed in phases (through individual sections) rather than a single run across the entire routing length.

Never allow an assembly to support its own weight when routed in a vertical installation
Never allow an assembly to hang freely by its own weight. Clamp down the cable at equal intervals along its length. Cable hangers can be used when it is not possible to clamp down the assembly in a vertical installation, provided the assembly has been reinforced for such an installation. Using multiple hangers whenever possible is also recommended to help evenly distribute the assembly’s weight along the run.

Avoid the use of cable ties
Most high performance cables use an air-filled dielectric core. This makes the cable very soft. Therefore, any compressive load applied to the cable has the potential of collapsing the dielectric core within the cable. Cable ties and tie wraps are not recommended for this reason. They offer virtually no load distribution and consequently focus very high compressive forces through the tied down area. A concentrated force such as this almost always deforms the cable and significantly degrades assembly performance. For best holding results with minimal clamping forces, we recommend rubberized clamps. Be sure to select a clamp that will apply a minimum amount of compression force while still offering the desired holding strength. Selecting a clamp that is too small can do as much damage to an assembly as a cable tie.

Avoid subjecting the connector ends to cable axial loads
Cable assembly life can be increased by clamping down the cable a few inches from the connector ends in applications where the cable will be moving (such as a moving antenna) or where a high vibration condition exists. Clamping the cable down at the cable ends reduces mechanical loads applied to the connector when the cable is moved.

Always wrap connectors in weather proofing when installing outside
All cable connections that will be subjected to rain and snow should be wrapped in a weather proofing material. A self-fusing silicone tape is recommended to create a weather tight seal over the connection. If weather precautions are not taken, water will eventually work its way into the connector assembly causing high insertion losses.

Take extra care with short assemblies
Always bend assemblies around mandrels whenever possible
The use of mandrels or wheels will help to evenly distribute bending loads applied to the cable. This is the preferred method for bending cables.

Take caution when bending cables by hand
Sometimes bending a cable by hand is the only option. In this case the following method should be used;
- Start at bending point keeping hands close together.
- Bend the cable a little at a time working in an outward direction along the bend.
- Return to the center point of the bend and work in an outward direction making the bend a little tighter.
- Continue to return to the center of the bend, and working outward until the desired bend is reached.

Take caution bending cables under 12” in length
An assembly that is 12” in length and smaller can be very rigid depending on the cable type. The cable becomes rigid because its inner and outer conductors are fully (mechanically) terminated to the cable connectors. The cable is terminated this way to yield maximum electrical performance. Unfortunately, it minimizes the bending characteristics of the assembly because the cable is too short to accommodate the total material volume displacement needed for a typical bend. Often, the minimum bend radius cannot be achieved without damaging the assembly. Therefore, short cables should only be used in applications where slight jogging bends will be used. A longer assembly that uses a service loop should be considered as a replacement for a short cable in situation where a tight or sharp bend is needed.
Coaxial Cable Terminology

Phase Stability over Flexure for Low Loss Coaxial Cable

Phase stability over flexure can be significantly affected by the cable assembly technique, cable bend radius, and the length of the cable assembly.

Phase Stability over Temperature for Low Loss Coaxial Cable

The electrical length for a given frequency will “shift” as a result of environmental changes. The degree of change is based on mechanical stresses, connector to torque and thermal conditions.

Power Handling Capability of Coaxial Cable

The power handling capability of coaxial cable is dependent either on its maximum voltage-withstanding capability for the transmission of peak power or on its thermal dissipation ability for average power transmission, which is the more common problem for RF applications. The thermal dissipation of cable depends upon its thermal resistance. For a cable in air, the thermal resistance of the surrounding air is related to the condition and radiation losses and dependent upon the surface area of the cable, the temperature of the surfaces, the ambient temperature, emissivity of the surface, and the flow of air.

The amount of heat which flows radially from the line will depend upon the composite thermal resistivity of the dielectric and insulating material of the cable, and the temperature gradients therein. The heat generated within a cable is given by the ratio of temperature rise between the inner conductor and the ambient temperature to its thermal resistance, which is equal to the difference of the input power and the output power in a matched system. The ratio of these powers is a function of the attenuation per unit length, which is directly proportional to the heat generated in the cable. For any particular cable construction, the average power rating will depend on the permissible temperature rise above a stated ambient which is limited by the maximum operating temperature that the dielectric can withstand. The generally accepted maximum operating temperature for polyethylene is 80°C and for PTFE is 250°C. Simply stated, power handling of a coaxial cable is a function of attenuation and the temperature of the dielectric. The higher the operating frequency, the lower the power handling capability.

VSWR and Return Loss of Coaxial Cables

Voltage Standing Wave Ratio (VSWR) and Structural Return Loss (SRL) are basically the same – only different. Both terms are used to characterize the uniformity of a cable’s impedance along its length as it relates to reflected energy. VSWR is essentially the ratio of the Input Impedance to the average Characteristic Impedance as a result of signal losses due to reflections and is expressed as a ratio (1.xxxx:1). SRL is the measurement of reflected energy expressed in decibels (-dB). Connectors and termination techniques are major sources of reflected energy and can significantly deteriorate system VSWR or SRL. The difference between VSWR and SRL is no more than how reflected energy is measured.

Structural Return loss (SRL) is expressed as VSWR (Voltage Standing Wave Ratio) by the following formula:

$$\text{VSWR} = \frac{1 + 10^{RL/20}}{1 - 10^{RL/20}}$$

<table>
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<th>VSWR</th>
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<td>29dB</td>
<td>1.0736:1</td>
<td>18dB</td>
<td>1.2880:1</td>
</tr>
<tr>
<td>38dB</td>
<td>1.0255:1</td>
<td>27dB</td>
<td>1.0935:1</td>
<td>16dB</td>
<td>1.3767:1</td>
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<td>36dB</td>
<td>1.0322:1</td>
<td>25dB</td>
<td>1.1192:1</td>
<td>14dB</td>
<td>1.4985:1</td>
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<td>34dB</td>
<td>1.0407:1</td>
<td>23dB</td>
<td>1.1524:1</td>
<td>12dB</td>
<td>1.6709:1</td>
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<td>33dB</td>
<td>1.0458:1</td>
<td>22dB</td>
<td>1.1726:1</td>
<td>11dB</td>
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<td>31dB</td>
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<td>30dB</td>
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<td>19dB</td>
<td>1.2528:1</td>
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GLOSSARY OF TERMS

Albaloy: A plating finish comprised primarily of copper, tin and zinc which provides good electrical performance, but unlike silver, albaloy is highly resistant to tarnish. Being non-magnetic, it also provides excellent passive intermodulation (PIM) performance comparable to silver.

Amplitude Balance: The maximum peak-to-peak amplitude difference (in dB) between the output ports of a power divider or hybrid coupler over the specified frequency range.

Attenuation Accuracy: The amount of variation in magnitude from the nominal value across the entire frequency band.

Attenuator: A passive device or network that absorbs part of the input signal and transmits the remainder with minimal distortion. Attenuators are used to extend the dynamic range of devices such as power meters and amplifiers, reduce signal levels to detectors, match circuits and are used daily in lab applications to aid in product design. Attenuators are also used to balance out transmission lines that otherwise would have unequal signal levels.

Base Station: A fixed transmitter/receiver with which a mobile radio transceiver establishes a connection link to gain access to the public-switched telephone network.

Bias Tees: A passive device used in applications to inject/remove DC voltages in RF circuits without affecting the RF signal through the main transmission path. Ideal for remote powering of bi-directional amplifiers (BDAs), repeaters and tower top attenuators (TTAs) by BTS control modules.

Circulator: A three-port ferromagnetic passive device used to control the direction of signal flow in an RF circuit.

Coaxial: A transmission line in which one conductor completely surrounds the other, the two being coaxial and separated by a continuous dielectric such as air or PTFE.

CW – (Continuous Wave): Signal of constant amplitude. Used to differentiate between the performance of a microwave component for continuous power level vs. pulsed signals.

dB – (Decibel): A unit of gain equal to ten times the common logarithm of the ratio of two power levels or 20 times the common logarithm of the ratio between two voltages.

dBC: Decibel related to the signal of a carrier. Passive intermodulation distortion is typically stated in dBC which takes into consideration the 43 dBm carrier tones.

dBM: Decibels related to 1mW – the standard unit of power level used in the microwave industry. Example: 0 dBm = 1mw, +10 dBm = 10mw, +20dBm = 100mw, etc.

DC Block: An in-line device primarily used in applications to block DC voltages in RF circuits without affecting the RF signal through the main transmission path. The three basic types are:

1. Inner – Blocks DC voltages on inner conductor only
2. Outer – Blocks DC voltages on outer conductor only
3. Inner/Outer – Blocks DC voltages on both conductors

Directional Coupler: A passive device used for sampling incident and reflected microwave power conveniently and accurately with minimal disturbance to the transmission line. Some general applications for directional couplers include line monitoring, power measurements and load source isolators.

Directivity: A measurement of the desired signal strength to the undesired signal strength. Determined by taking the value of isolation and subtracting the specified coupling (including all variations). Directivity is a measure of how good the couplers performance is (similar to the Q factor of a coil).

EMI – (Electromagnetic Interference): Unintentional interfering signals generated within or external to electronic equipment. Typical sources could be power line transients and electromechanical switching equipment.

Frequency Range: The minimum and maximum frequencies between which the specified component will meet all guaranteed specification.

Frequency Sensitivity: The maximum peak-to-peak variation in coupling (in dB) of a directional or hybrid coupler over the specified frequency range. Also referred to as “flatness.”

GHz - (Gigahertz): A unit of frequency measure equal to 1000 MHz (Megahertz) or a billion hertz.

Hybrid Coupler: A passive four-port device that is used either to equally split an input signal with a resultant 90° phase shift between output signals or to combine two signals while maintaining high isolation between them.

Impedance: Resistance to alternating current. Most RF and microwave systems are designed to operate with a characteristic impedance of 50 ohms.

Insertion Loss: The change in load power due to the insertion of a particular device into a transmission system.

Iridite: A chemical film (typically clear or yellow in color) which provides a barrier medium to prevent corrosion on aluminum surfaces and enhance adhesion of subsequent coatings such as paints and primers.

Isolator: A two-port ferromagnetic passive device which is used to control the direction of signal flow and utilizes an internal resistor. Typically used to protect other RF components from excessive signal reflection.

MHz – (Megahertz): A unit of frequency measure equal to 1000 kHz (Kilohertz) or a million hertz.

Microstrip – (Microstripline): A transmission line consisting of a metalized strip and solid ground plane metallization separated by a thin, solid dielectric. Microstrip is a popular material above 400 MHz and below 6 GHz because it permits accurate fabrication of transmission lines on ceramic or PC board substrates. Higher frequencies or broadband devices tend to favor stripline technology.

MTBF – (Mean Time Between Failure): The mean (average) time between failures of a component and is often attributed to the “useful life” of the materials used to assemble the device. MTBF assumes that the component can be “renewed” or fixed after each failure and returned to service immediately after failure.

Non-Coherent Signals: The limiting factor for most Wilkinson power dividers used as combiners is power dissipation. When input signals are out of phase, non-coherent or have amplitude unbalance this causes a cancellation across the isolation resistors resulting in power dissipation. Since these devices are most commonly used as dividers, typical industry designs utilize low power alumina surface mount resistor chips on a thermally insulative circuit board. However, maximum input for combining non-coherent signals on adjacent ports is: (Rated input power of divider * 5%) / “N” # of input channel. If the rated power is exceeded, the chip resistors will heat up and degrade resulting in loss of port-to-port isolation and VSWR.

Output VSWR: Minimum voltage standing wave ratio of a power divider at any output port over the specified frequency range with all other ports terminated in 50 ohm loads.
**GLOSSARY OF TERMS**

**Passivation**: The formation of an insulated layer directly over a metal to protect the surface from contaminants, moisture or particles.

**Phase Balance**: The maximum peak-to-peak phase difference (in degrees) between the output ports of a power divider over the specified frequency range.

**PIM (Passive Intermodulation)**: Passive Intermodulation (PIM) occurs when two or more signals are present in a passive device (cable, connector, coupler, etc.) that exhibits a nonlinear response. The nonlinearity is typically caused by dissimilar metals or dirty/loose interconnects. Nonlinearity is typically not troublesome at low input signal levels, but if PIM is generated from a high power transmitter path to an adjacent receiver channel, desensitization will occur. A common PIM specification is typically -110 dBc or greater.

**Power (Average)**: The maximum amount of mean (average) power of a modulated/pulsed signal a given component can dissipate at ambient temperature without degradation in performance.

**Power (Peak)**: Instantaneous power a given component can dissipate for a percentage of the duty cycle (typically 2%) without degradation in performance.

**PTFE (PolyTetraFluoroEthylene)**: Used as an insulator in RF and microwave coaxial connectors because of its low & stable dielectric constant and loss factor over a wide temperature and frequency range.

**Reactive Splitter**: A broadband passive network that equally divides power applied to the input ports between any particular number of output ports without substantially affecting the phase relationship or causing distortion. Reactive splitters differ from Wilkinson power dividers as they provide no isolation between adjacent ports. Therefore, power entering any output of a reactive splitter will divide evenly between the adjacent and input ports.

**Return Loss**: When expressed in dB is the ratio of reflected power to incident power. It is a measure of the amount of reflected power on a transmission line when it is terminated or connected to any passive or active device. Once it is measured, it can be converted by equation to reflection coefficient which can be converted to VSWR.

**RF – (Radio Frequency)**: Generally referring to any frequency at which the radiation of electromagnetic energy is possible typically above 50 MHz. Above 1000 MHz and up is considered microwave.

**RF Leakage**: The amount of energy which “leaks” or radiates from a connector and/or device. Typically tested at one frequency and expressed in dB. Very large negative values indicate that the device does not radiate much energy.

**RoHS**: (Restriction of Hazardous Substances) Directive adopted by the European Union in February 2003 with the specified limits for the following elements in the manufacture of various types of electronic and electrical equipment:

1. Lead (Pb) < 0.1%
2. Mercury (Hg) < 0.1%
3. Cadmium (Cd) < 0.01%
4. Hexavalent Chromium (CrVI) < 0.1%
5. Polybrominated Biphenyls (PBB) < 0.1%
6. Polybrominated Diphenyl Esters (PBDE) < 0.1%

**Stripline**: A transmission line consisting of a conductor above or between extended conducting surfaces. Higher frequencies or broadband devices tend to favor stripline technology.

**Termination (RF Loads)**: Used at the end of a transmission line designed to absorb RF power with very little reflection, effectively terminating the line or port in its characteristic impedance. Terminations are used in a wide variety of measurement systems; any port of a multi-port microwave device that is not involved in the measurement should be terminated in its characteristic impedance in order to ensure an accurate measurement.

**Temperature**: The minimum and maximum ambient temperatures a given component can operate at and still meet all guaranteed specifications unless otherwise noted.

**Torque**: Recommended mating torque for industry standard connectors:
1. SMA - 7 to 10 in-lbs
2. Type-N – 12 to 15 in-lbs
3. TNC – 12 to 15 in-lbs
4. 7/16 DIN – 220 to 300 in-lbs

**Transmission Line**: The conductive connections between circuit elements which carry signal power. Wire, coaxial cable, microstrip and stripline traces and waveguide are common examples.

**VSWR – (Voltage Standing Wave Ratio)**: The ratio of the incident signal compared to the reflected signal in a transmission line. VSWR cannot be directly measured, so a return loss measurement (expressed in dB) is taken of reflected power to incident power. Once it is measured, it can be converted by equation to reflection coefficient which can be converted to VSWR.

**Wilkinson Power Divider**: A passive device that equally splits an input signal to each output or combines signals to a common port. Wilkinson power divider differ from reactive splitters as the output ports are isolated, so signals entering one of the output ports will not interfere with signals on the adjacent port. The limiting factor for Wilkinson power dividers used as combiners is power dissipation. When input signals are out of phase, non-coherent or have amplitude unbalance this causes a cancellation across the isolation resistors resulting in power dissipation.
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