



minibend® CTR – Phase Invariant Cable Assemblies

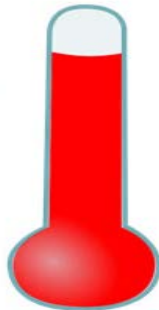
PTFE (Polytetrafluoroethylene)

ϵ_r

Dielectric Constant



Relative Velocity



Temperature

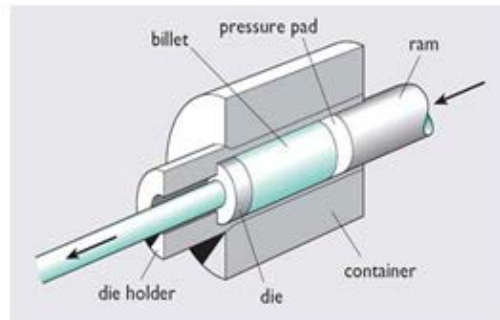


Power



PTFE Manufacturing Technologies

Paste (RAM)
Extrusion



Tape wrapping



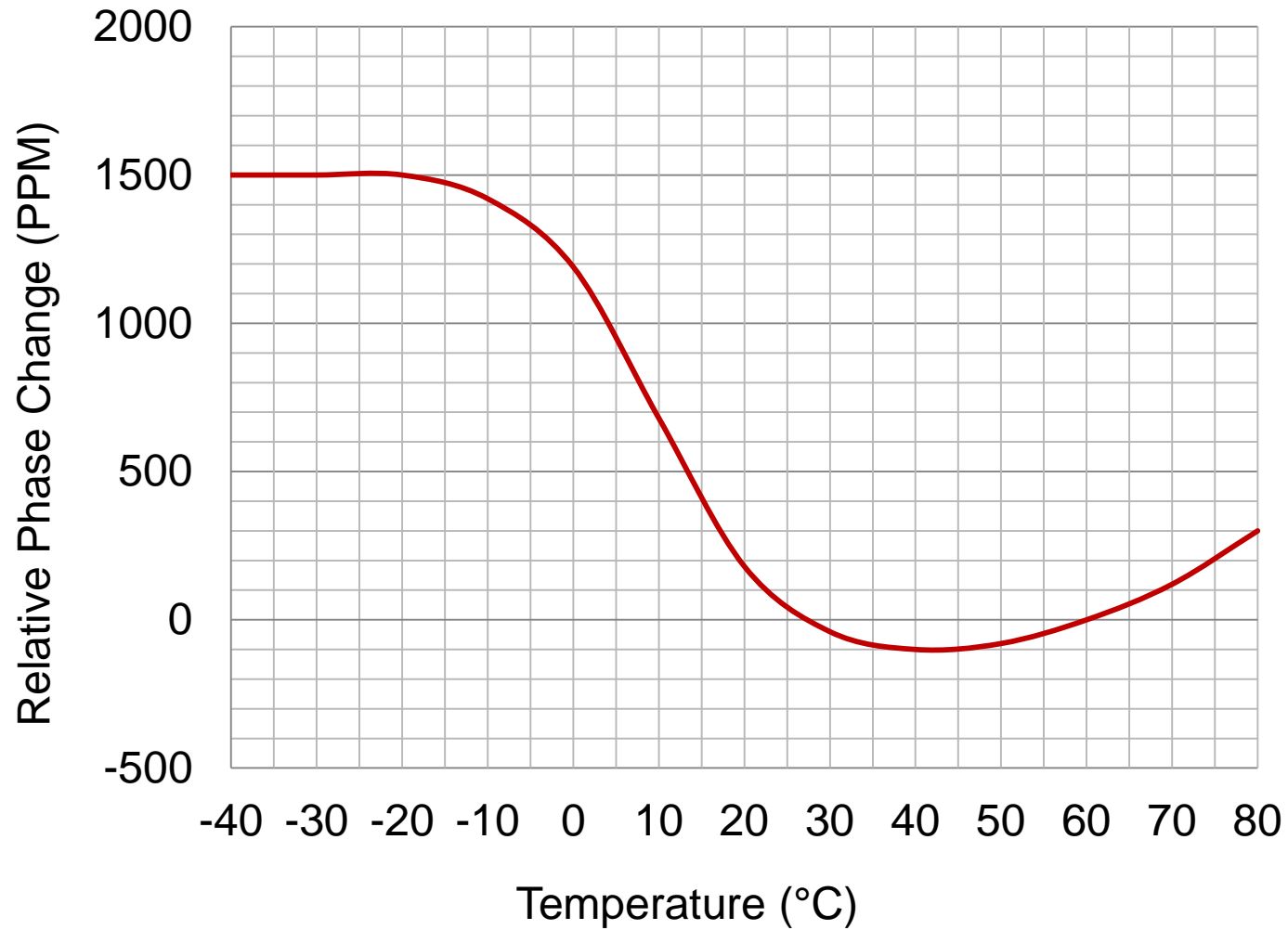
PTFE
(powder)



PTFE
(tape)



Teflon™ Knee



PFA (Perfluoroalkoxy alkane)

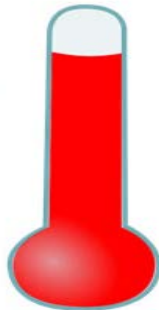
ϵ_r



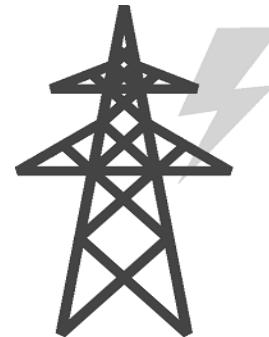
Dielectric Constant



Relative Velocity



Temperature

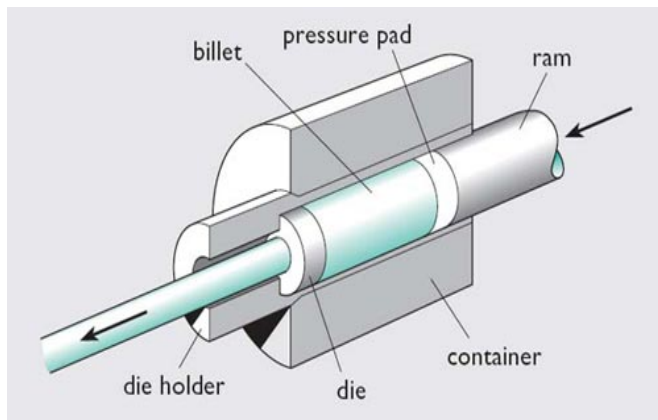


Power

PTFE process vs. Thermoplastic extrusion

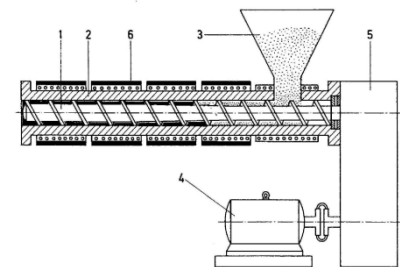
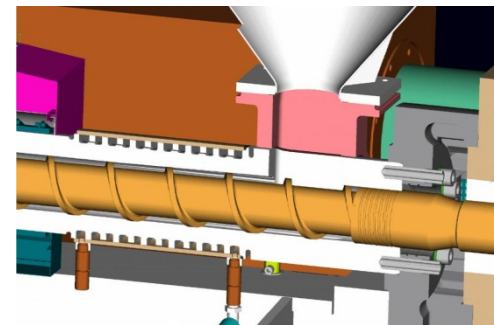
Paste extrusion (*RAM-Extrusion*)

Pressure extrusion

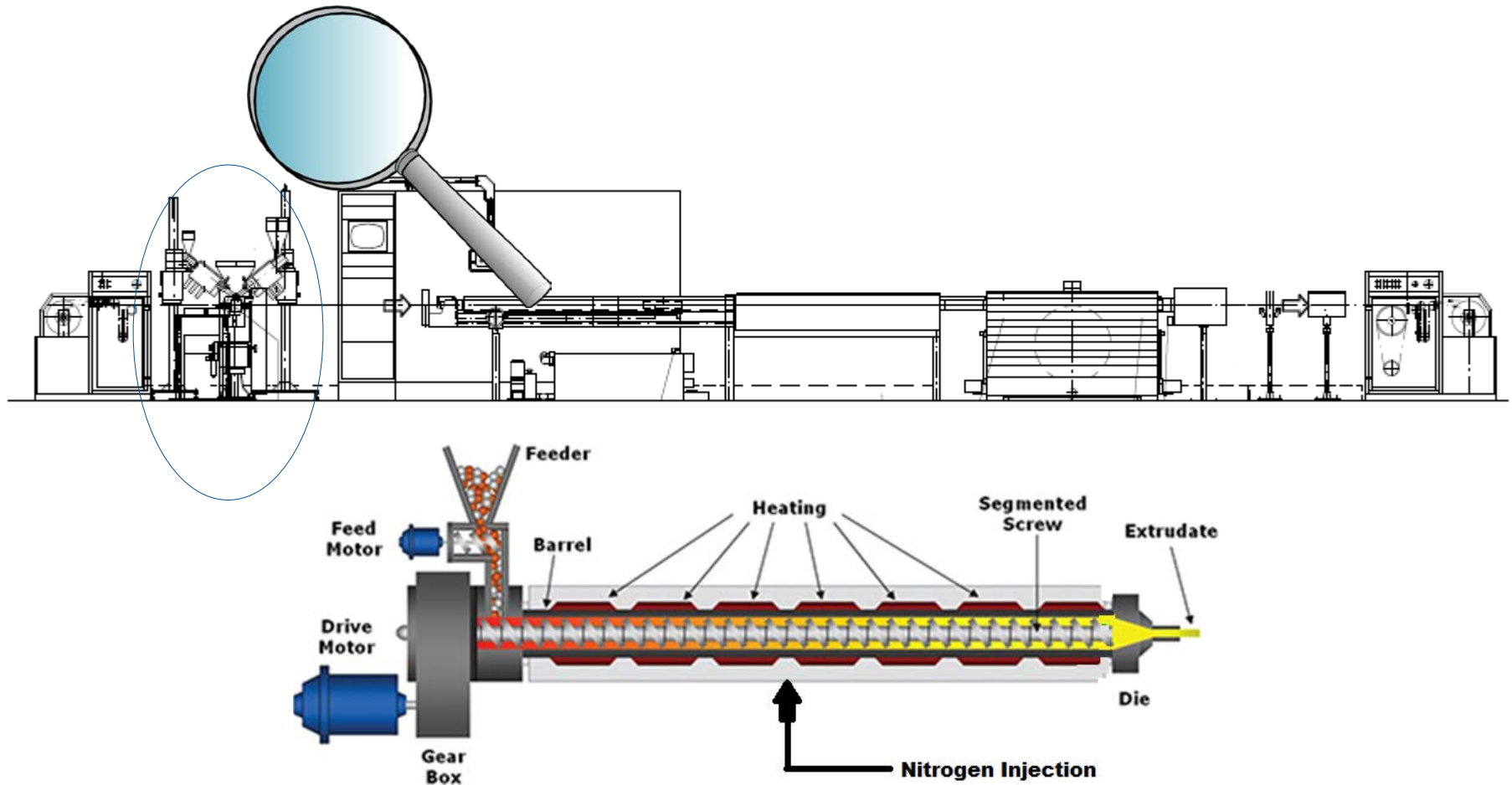


Thermoplastic extrusion

Thermoplastic melt extrusion

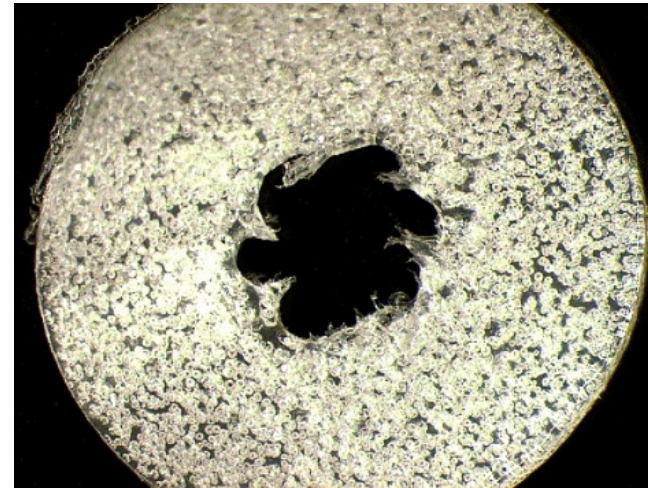
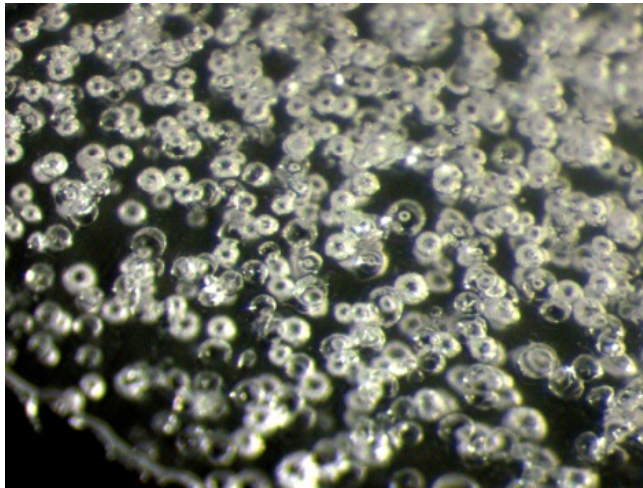


PFA Extrusion Line



Foamed PFA

Reduction of dielectric constant



ϵ_r

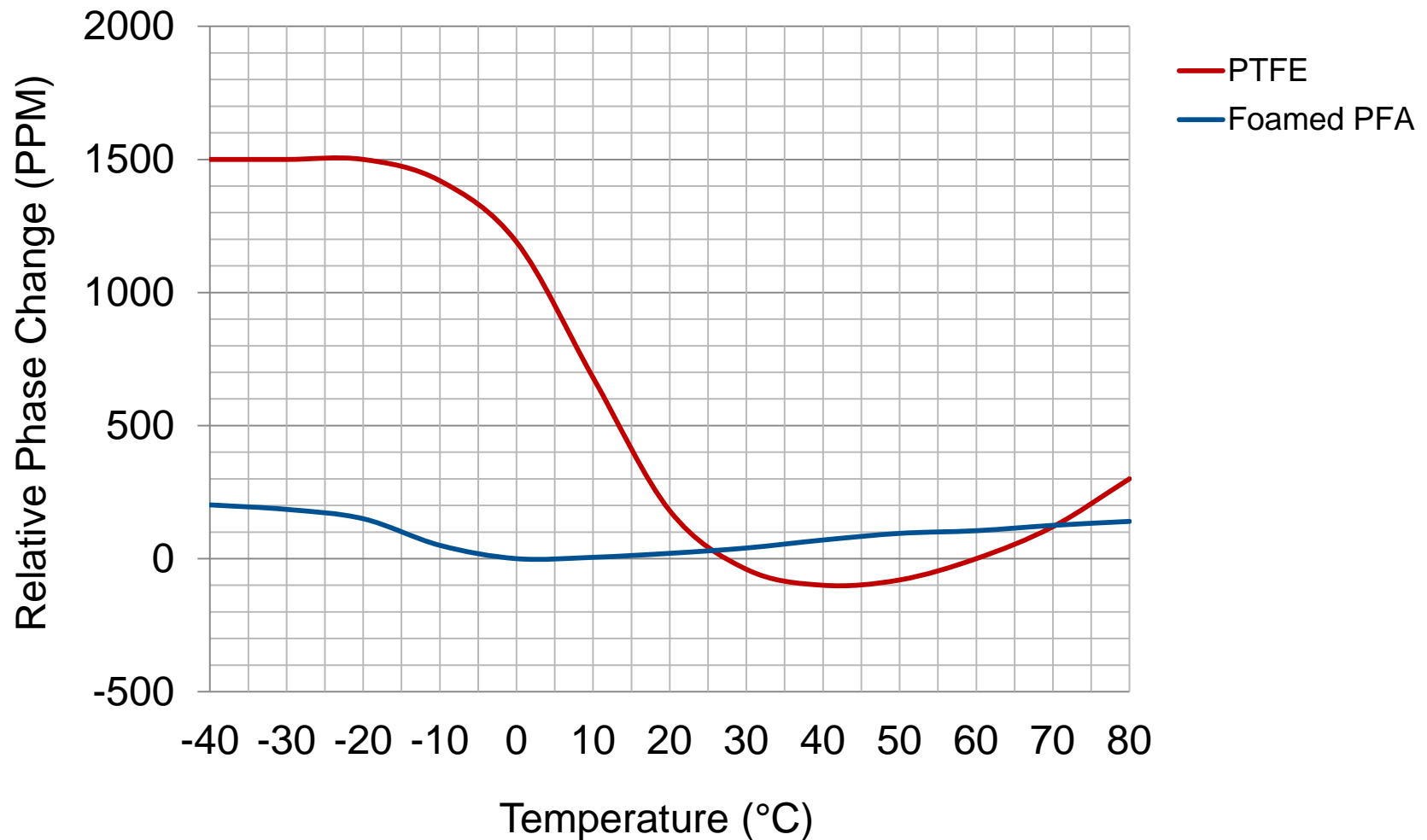


Dielectric Constant

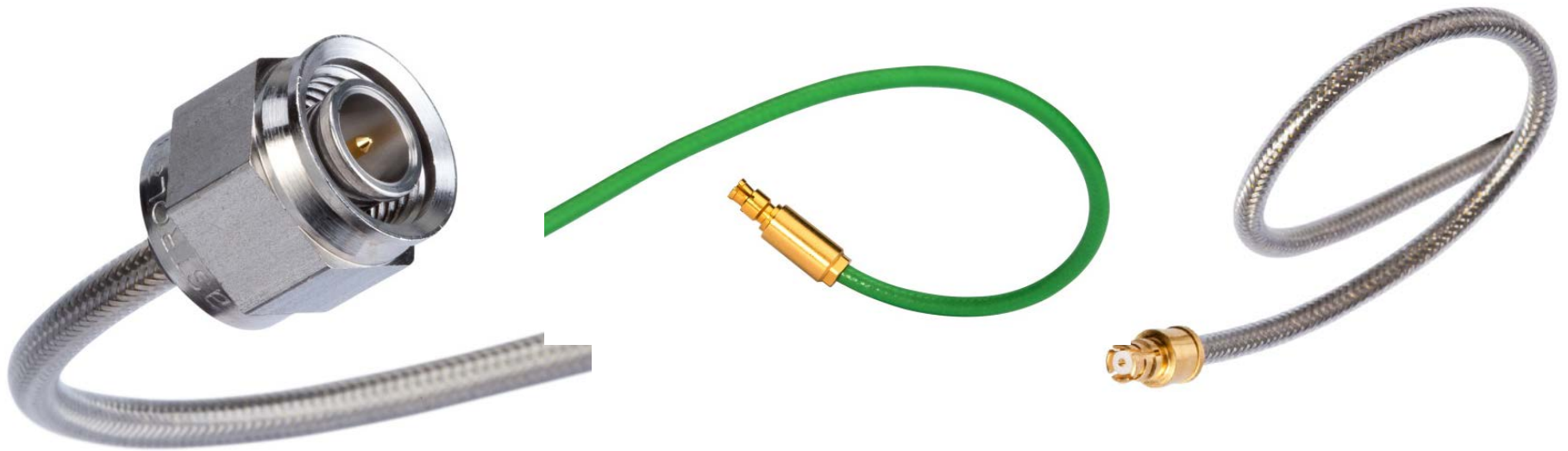


Relative Velocity

Foamed PFA – Phase vs. Temperature

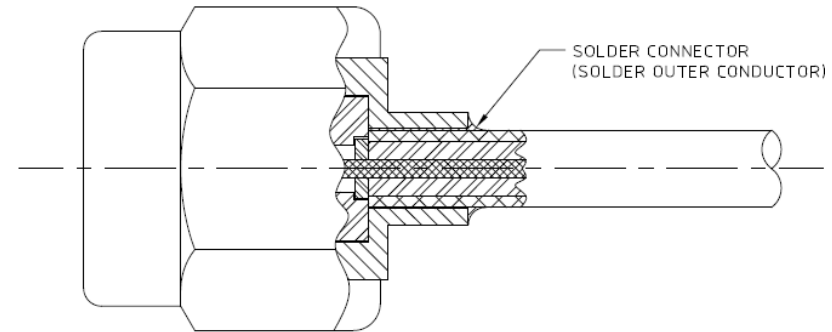


minibend® Family

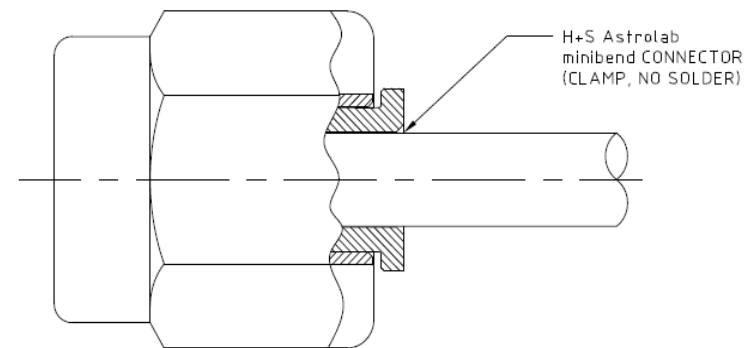


minibend® – Solderless Termination

- Bend-to-the-end
- $\pm 90^\circ$ bends behind the connector
- No performance degradation up to 30 bends
- Eliminate risk of solder wicking
- Stainless steel braids allows up to 1,000 flexes

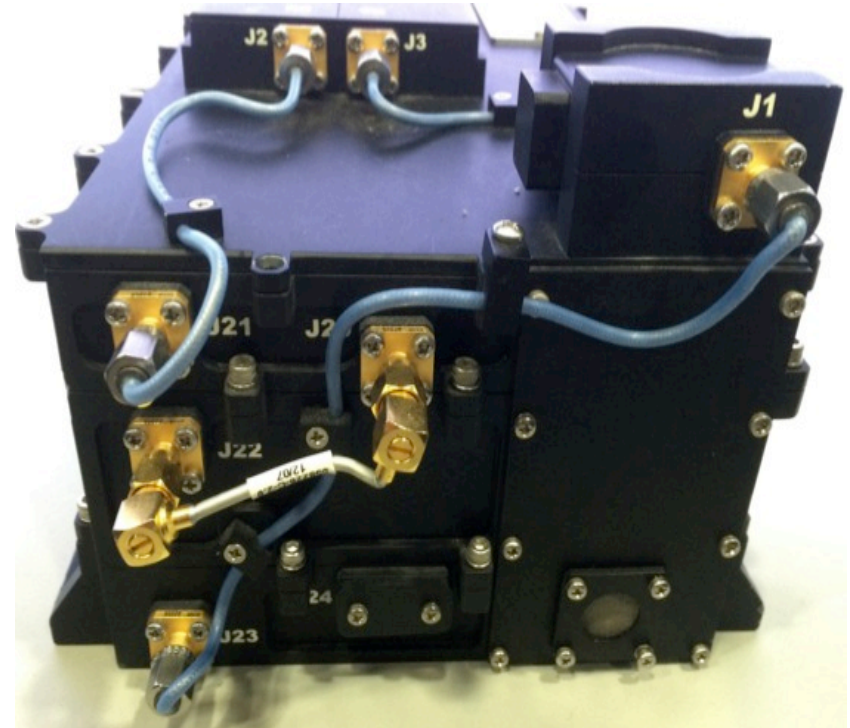


Conventional method of attaching connector

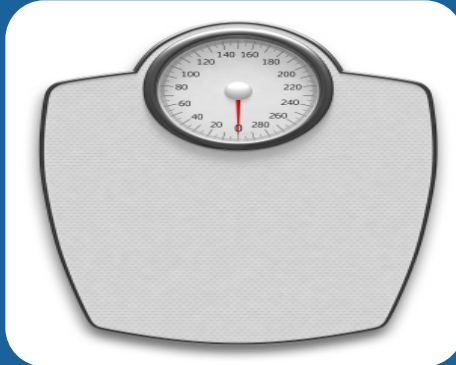


Connector for minibend® cable assemblies

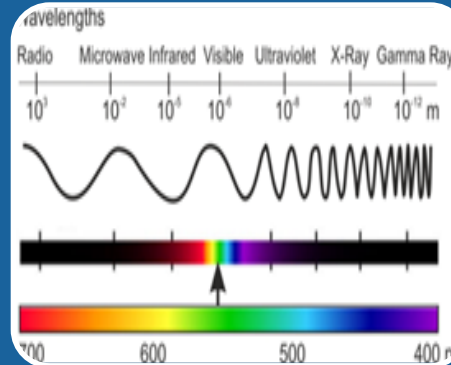
minibend® – Solderless Termination



Advantages of minibend®



- Eliminate bulky right angle/swept connectors
- Lower weight than Semi-rigid
- No taper sleeve
- Shortest male connectors



- Higher frequencies with straight connectors
- Wider temperature range
- Avoid failures associated with solder joints
- Eliminate pre-defined lengths and bend configurations



- No need for costly right angle connectors
- No cost intensive soldering process
- No need for costly X-ray inspection due to our solderless connector junction
- Reduced packing costs

minibend® CTR – Phase Invariant Cable Assemblies

- Excellent phase stability vs. temperature

<300 ppm

- Outstanding phase stability vs. bending

1.0° at 24 GHz

- Revolutionary Minibend bend-to-the-end flexibility

5 mm minimum bend radius



minibend® CTR Specifications

Electrical Specifications	
Impedance (nominal)	50 Ohm
Operating Frequency	DC – 40 GHz
Return Loss (min)	-32 dB @ 18 GHz -25 dB @ 40 GHz
Insertion Loss (typical)	3.67 dB @ 18 GHz 5.83 dB @ 18 GHz
RF Leakage	100 dB
Phase variation vs. temperature	< 300 ppm
Mechanical Specifications	
Diameter	2.49 mm
Minimum Bend Radius	5.08 mm
Weight	15.6 g/m
Environmental Specifications	
Outgassing according ECSS-Q-ST-70-02 and NASA Reference Publication 1124	TML < 1% CVCM < 0.1%

Product Qualification

Huber+Suhner products are certified to the following standards through testing or similar

Cable qualification

- MIL-DTL-17

Connector qualification

- MIL-PRF-39012
- MIL-PRF-31031

Cable assembly qualification

- MIL-PRF-55427

Space qualification

- MIL-STD-1547
- MIL-STD-790
- NASA EEE-INST-002 LEVEL 1
- ESA 3902
- ESA 3402

Mechanical Shock

- MIL-STD-202, method 2013, 12000g peak
- MIL-STD-883, method 2002, 1500g peak

HUBER+SUHNER Capabilities



Thank You

Hasteen Jobalia

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<http://aerospacedefense.hubersuhner.com/en/Home>

Questions?