# Ultra-Flexible Test Cable

## ULC SMNM+ Series

50Ω DC to 18 GHz



CASE STYLE: NS1993

## The Big Deal

- Wideband, DC to 18 GHz
- Minimal performance change versus flexure
- Tight Bend radius of 2.0 inches

## Product Overview

Mini-Circuits' ULC-SMNM+ are ultra-flexible cables which provide wideband performance from DC to 18 GHz with low insertion loss and excellent VSWR. The cable is designed for stability of phase and amplitude versus flexure while offering tremendous durability and reliability. Its unique construction of a triple shielded cable with a unique molded boot allows the cable to have the greatest of flexibility and yet handle the demanding lab environments where constant bending and flexing are required. In addition, they feature SMA-M to N-M stainless steel connectors. Available from stock in a variety of lengths to support many different requirements.

## Key Features

| Feature | Advantages |
|---|---|
| Ultra-Flexible<br>0.75 inch static bend radius<br>2.0 inch dynamic bend radius | Supports a wide range of test measurements in which tight bends are needed to be made. |
| Excellent stability of phase and insertion loss versus flexure | ULC-series test cables have been tested in bend radii as tight as 2.0 inches to qualify minimal change in insertion loss, insertion phase, and VSWR, providing reliable performance in a wide range of configurations. |
| Performance qualified to 20,000 flexures | Like all Mini-Circuits test cables, ULC-series models have been performance qualified up to 20,000 bend cycles, ensuring outstanding durability and extra long life. |

# Ultra-Flexible Test Cable

# ULC-3FT-SMNM+

50Ω 3FT DC to 18 GHz



CASE STYLE: NS1993-3

| Connectors | | Model |
|---|---|---|
| Conn 1 | Conn2 | |
| SMA-Male | N-Type Male | ULC-3FT-SMNM+ |

***+RoHS Compliant***

*The +Suffix identifies RoHS Compliance. See our web site for RoHS Compliance methodologies and qualifications*

## Maximum Ratings

| | |
|---|---|
| Operating Temperature | -55°C to +85°C |
| Storage Temperature | -55°C to +85°C |
| Power Handling at 25°C | 210W Max. at 2 GHz |
| | 120W Max. at 6 GHz |
| | 82W Max. at 12 GHz |
| | 67W Max. at 18 GHz |

Permanent damage may occur if any of these limits are exceeded.

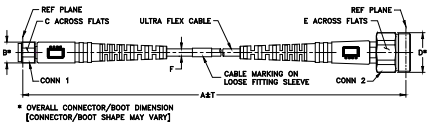
## Features

- Ultra flexible design for easy connection & bend radius
- Extra rugged construction with strain relief for longer life
- Triple shield cable for excellent shielding effectiveness
- Stainless steel SMA & N-type connectors for long mating-cycle life
- 6 month guarantee*

## Applications

- Test and measurement
- Research & development labs
- Environmental & temperature test chambers
- Field RF testing

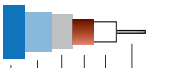
## Outline Drawing




## Outline Dimensions (inch / mm)

| A | | B | C | D | E | F | T | | wt |
|---|---|---|---|---|---|---|---|---|---|
| Feet | Meters | .426 | .313 | .812 | .750 | 150±.004 | Feet | Meters | grams |
| 3.00 | 0.91 | 10.82 | 7.95 | 20.62 | 19.05 | 3.81±0.10 | 0.09 | 0.03 | 75 |

## Cable Construction



- Inner Conductor: *Silver Plated Copper Clad Steel*
- Dielectric
- Inner Shield: *Silver Plated Copper Flat Braid*
- Interlayer Shield: *Metalized Polyimide*
- Outer Shield: *Silver Plated Copper Braid*
- Jacket: *Polyurethane*

Connectors:
*- Passivated stainless steel (Body & Hex Nut)*
*- Gold plated beryllium copper center contacts*
*- PTFE Dielectric*

FLEX TEST™ *20K stress flex's*

***Product Guarantee***

*Mini-Circuits® will repair or replace your test cable at its option if the connector attachment fails within six months of shipment. This guarantee excludes cable or connector interface damage from misuse or abuse.*

## Electrical Specifications at 25°C

| Parameter | Condition (GHz) | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| **Frequency Range** | | DC | | 18 | GHz |
| **Length**[1] | | | 3 | | M |
| **Insertion Loss** | DC-2 | — | 0.5 | 1.0 | dB |
| | 2-6 | — | 1.0 | 1.7 | |
| | 6-12 | — | 1.7 | 2.4 | |
| | 12-18 | — | 2.2 | 3.05 | |
| **Return Loss** | DC-2 | 17 | 24 | — | dB |
| | 2-6 | 17 | 23 | — | |
| | 6-12 | 17 | 21 | — | |
| | 12-18 | 17 | 19 | — | |

1. Custom sizes available, consult factory.

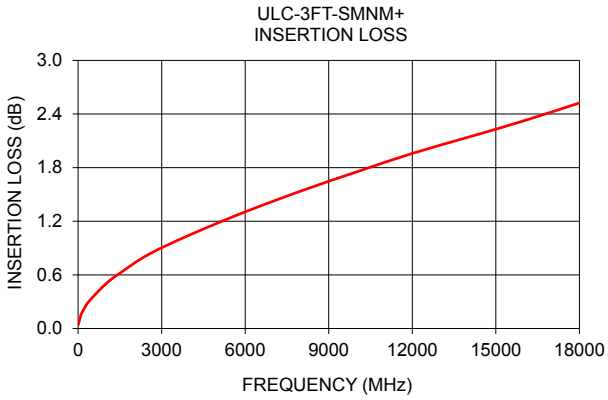
## Performance Change vs. Flexure (Typical)[2]

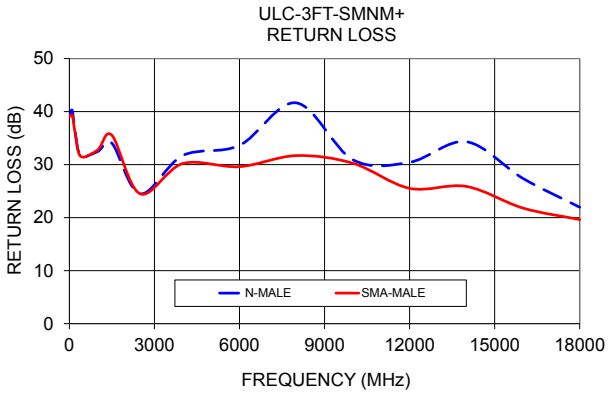
| Parameter | Condition (GHz) | Bend Radius (inches) | | | Units |
|---|---|---|---|---|---|
| | | 10.0 | 3.25 | 2.00 | |
| Insertion Loss[3] | DC - 2 | 0.00 | 0.00 | 0.01 | dB |
| | 2 - 6 | 0.00 | 0.01 | 0.01 | |
| | 6 - 12 | 0.01 | 0.02 | 0.03 | |
| | 12 - 18 | 0.01 | 0.02 | 0.03 | |
| Insertion Phase[3] | DC - 2 | 0.06 | 0.05 | 0.21 | Deg |
| | 2 - 6 | 0.17 | 0.18 | 0.69 | |
| | 6 - 12 | 0.36 | 0.42 | 1.45 | |
| | 12 - 18 | 0.49 | 0.73 | 2.37 | |
| VSWR[3] | DC - 2 | 0.00 | 0.00 | 0.00 | :1 |
| | 2 - 6 | 0.00 | 0.00 | 0.00 | |
| | 6 - 12 | 0.01 | 0.01 | 0.02 | |
| | 12 - 18 | 0.01 | 0.01 | 0.02 | |

2. Performance change versus flexure with a 3 ft cable 360° wrapped a 4" diameter sliding mandrel.
3. Absolute values normalized to the reference position 0. See AN-46-003 under Associated Application Notes

## Typical Performance Data

| Frequency (MHz) | Insertion Loss (dB) | Return Loss (dB) | |
|---|---|---|---|
| | | N-MALE | SMA-MALE |
| 10 | 0.04 | 39.12 | 39.14 |
| 100 | 0.15 | 40.22 | 39.31 |
| 200 | 0.21 | 36.29 | 36.11 |
| 400 | 0.31 | 31.74 | 31.56 |
| 1000 | 0.50 | 32.47 | 32.77 |
| 1500 | 0.62 | 34.04 | 35.53 |
| 2500 | 0.82 | 24.50 | 24.49 |
| 4000 | 1.05 | 31.72 | 30.21 |
| 6000 | 1.30 | 33.63 | 29.62 |
| 8000 | 1.54 | 41.65 | 31.70 |
| 10000 | 1.75 | 30.91 | 30.26 |
| 12000 | 1.96 | 30.44 | 25.53 |
| 14000 | 2.14 | 34.32 | 25.89 |
| 16000 | 2.32 | 27.39 | 21.80 |
| 18000 | 2.52 | 21.96 | 19.63 |




### Additional Notes

A. Performance and quality attributes and conditions not expressly stated in this specification document are intended to be excluded and do not form a part of this specification document.

B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.

C. The parts covered by this specification document are subject to Mini-Circuits standard limited warranty and terms and conditions (collectively, "Standard Terms"); Purchasers of this part are entitled to the rights and benefits contained therein. For a full statement of the Standard Terms and the exclusive rights and remedies thereunder, please visit Mini-Circuits' website at www.minicircuits.com/MCLStore/terms.jsp