FLEX TEST™

# Ultra-Flexible Test Cable

# ULC-4FT-SMSM+

50Ω 4FT DC to 18 GHz SMA-Male

## THE BIG DEAL

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

*Generic photo used for illustration purposes only*

| | |
|---|---|
| **Model No.** | ULC-4FT-SMSM+ |
| **Case Style** | NS1992-4 |
| **Connectors** | SMA-Male |

## APPLICATIONS

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

**+RoHS Compliant**
The +Suffix identifies RoHS Compliance.
See our website for methodologies and qualifications

**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.

## PRODUCT OVERVIEW

Mini-Circuits' ULC-SMSM+ 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 SMA-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. |

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ECO-019974
ULC-4FT-SMSM+
MCL NY
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50Ω 4FT DC to 18 GHz SMA-Male

## ELECTRICAL SPECIFICATIONS AT +25°C

| Parameter | Frequency (GHz) | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| Frequency Range | | DC | | 18 | GHz |
| Length[1] | | | 4 | | ft |
| Insertion Loss | DC-2 | — | 1.0 | 1.2 | dB |
| | 2-6 | — | 1.8 | 2.1 | |
| | 6-12 | — | 2.7 | 3.0 | |
| | 12-18 | — | 3.4 | 3.8 | |
| Return Loss | DC-2 | 17 | 24 | — | dB |
| | 2-6 | 17 | 23 | — | |
| | 6-12 | 17 | 21 | — | |
| | 12-18 | 17 | 21 | — | |

1. Custom sizes available, consult factory.

## PERFORMANCE CHANGE VS. FLEXURE (TYPICAL)[2]

| Parameter | Frequency (GHz) | Bend Radius (inches) | | | Units |
|---|---|---|---|---|---|
| | | 10.0 | 3.25 | 2.40 | |
| Insertion Loss[3] | DC - 6 | 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 - 6 | 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 - 6 | 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° around a 4" diameter mandrel.
3. Absolute values normalized to the reference position 0. See AN-46-003 under Associated Application Notes

## ABSOLUTE MAXIMUM RATINGS

| Parameter | Ratings |
|---|---|
| Operating Temperature | -55°C to +85°C |
| Storage Temperature | -55°C to +85°C |
| Power Handling at 25°C, Sea Level | 210 W Max at 2 GHz<br>120 W Max at 6 GHz<br>82 W Max at 12 GHz<br>67 W Max at 18 GHz |

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

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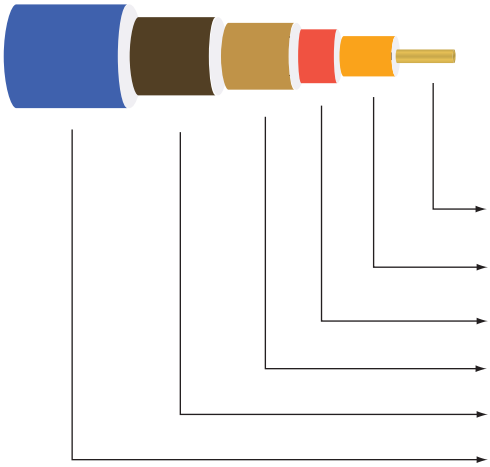
# Ultra-Flexible Test Cable

# ULC-4FT-SMSM+

50Ω 4FT DC to 18 GHz SMA-Male

## CABLE CONSTRUCTION



Inner Conductor: Silver Plated Copper Clad Steel

Dielectric

Inner Shield: Silver Plated Copper Flat Braid

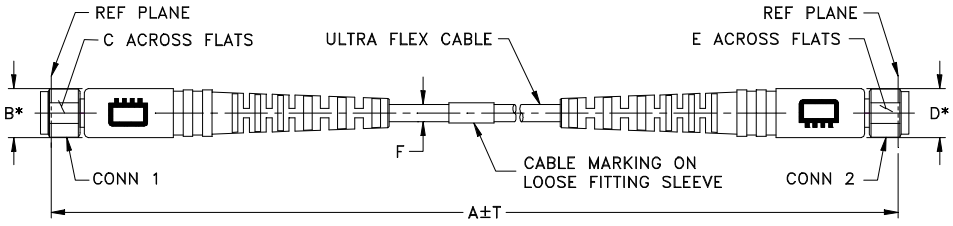
Interlayer Shield: Metalized Polyimide

Outer Shield: Silver Plated Copper Braid

Jacket: Polyurethane

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

## OUTLINE DRAWING




* OVERALL CONNECTOR/BOOT DIMENSION
[CONNECTOR/BOOT SHAPE MAY VARY]

## OUTLINE DIMENSIONS (Inch / mm)

| A | | B | C | D | E | F | T | | wt |
|---|---|---|---|---|---|---|---|---|---|
| Feet | Meters | .426 | .313 | .426 | .313 | .150±.004 | Feet | Meters | grams |
| 4.00 | 1.22 | 10.82 | 7.95 | 10.82 | 7.95 | 3.81±0.10 | 0.12 | 0.04 | 63 |

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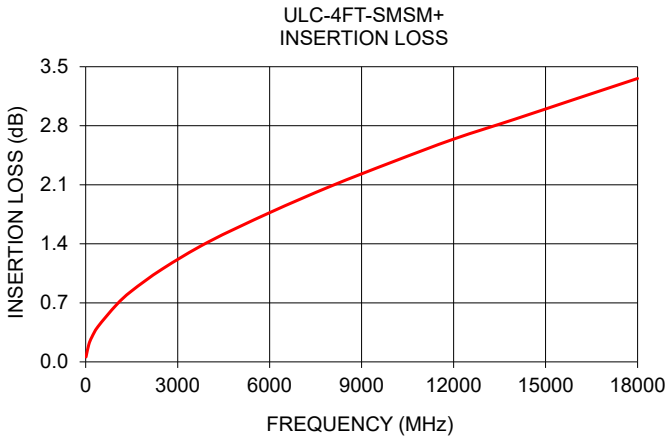
# Ultra-Flexible Test Cable

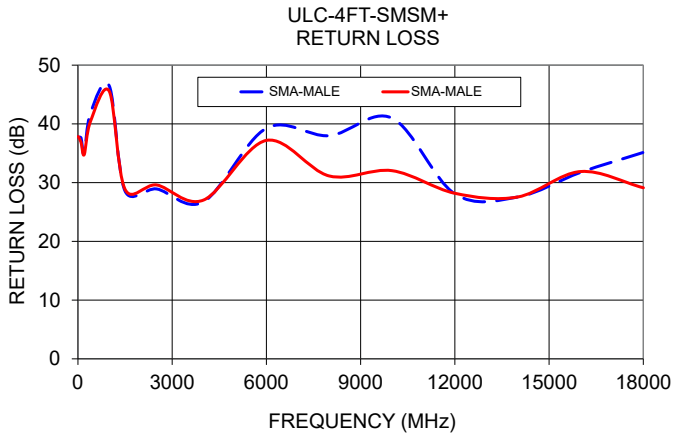
# ULC-4FT-SMSM+

50Ω 4FT DC to 18 GHz SMA-Male

## TYPICAL PERFORMANCE DATA AND CHARTS

| Frequency (MHz) | Insertion Loss (dB) | Return Loss (dB) | |
|---|---|---|---|
| | | SMA-Male 1 | SMA-Male 2 |
| 10 | 0.06 | 37.75 | 37.84 |
| 100 | 0.20 | 37.60 | 36.87 |
| 200 | 0.29 | 34.98 | 34.77 |
| 400 | 0.42 | 41.84 | 40.42 |
| 1000 | 0.68 | 46.44 | 45.53 |
| 1500 | 0.84 | 28.58 | 28.86 |
| 2500 | 1.10 | 28.93 | 29.61 |
| 4000 | 1.42 | 26.74 | 27.04 |
| 6000 | 1.77 | 39.27 | 37.19 |
| 8000 | 2.08 | 37.99 | 31.13 |
| 10000 | 2.37 | 40.98 | 32.03 |
| 12000 | 2.64 | 28.08 | 28.18 |
| 14000 | 2.88 | 27.55 | 27.55 |
| 16000 | 3.12 | 31.75 | 31.89 |
| 18000 | 3.36 | 35.15 | 29.12 |




**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/terms/viewterm.html

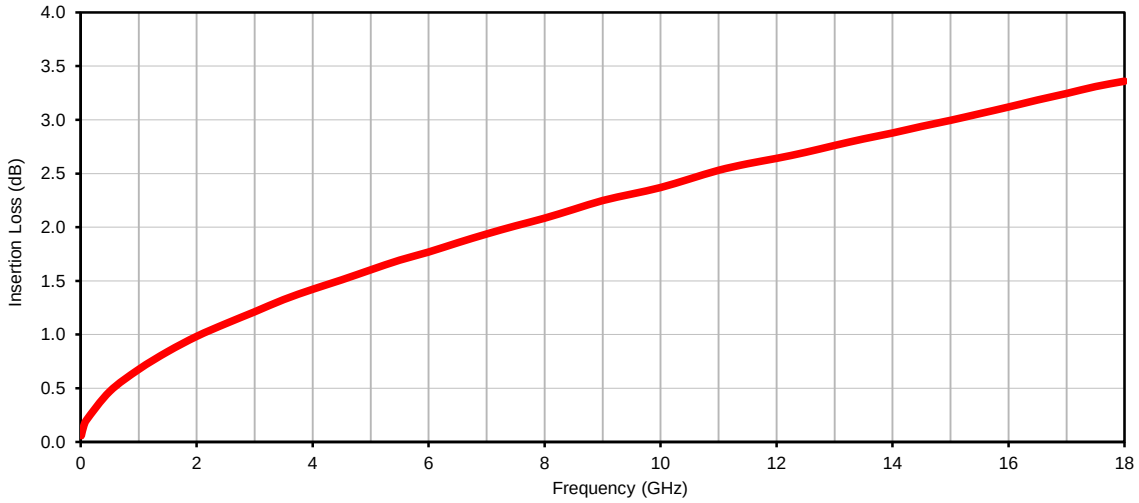
# Ultra Flexible Test Cable, SMA-Male/SMA-Male ULC-4FT-SMSM+

*Typical Performance Data*

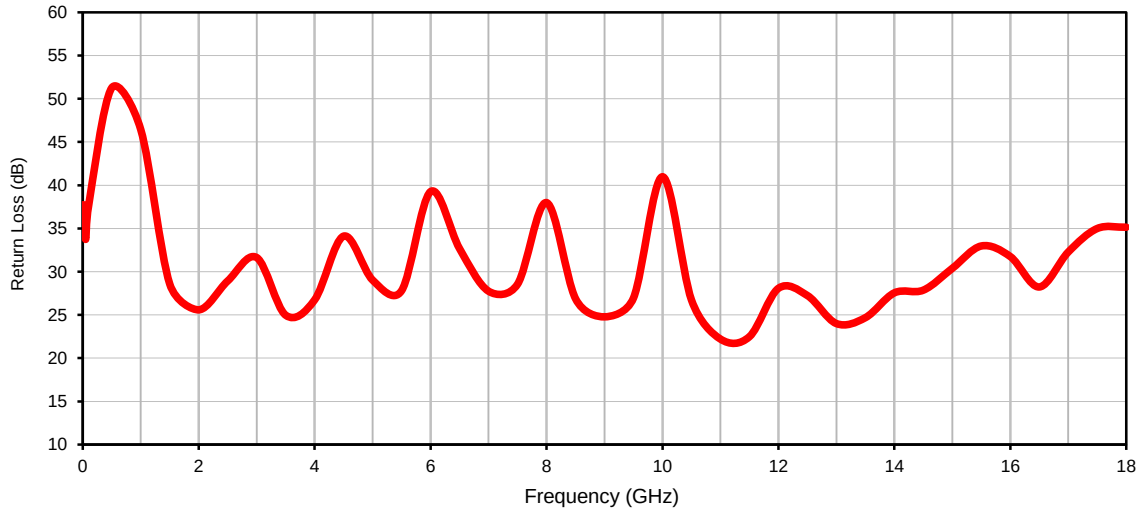
| FREQUENCY (GHz) | INSERTION LOSS (dB) | SMA-MALE 1 RETURN LOSS (dB) | SMA-MALE 2 RETURN LOSS (dB) |
|---|---|---|---|
| 0.01 | 0.06 | 37.75 | 37.84 |
| 0.05 | 0.14 | 33.74 | 33.63 |
| 0.1 | 0.20 | 37.60 | 36.87 |
| 0.5 | 0.47 | 51.27 | 51.80 |
| 1.0 | 0.68 | 46.44 | 45.53 |
| 1.5 | 0.84 | 28.58 | 28.86 |
| 2.0 | 0.98 | 25.59 | 25.92 |
| 2.5 | 1.10 | 28.93 | 29.61 |
| 3.0 | 1.21 | 31.63 | 33.28 |
| 3.5 | 1.33 | 24.97 | 25.18 |
| 4.0 | 1.42 | 26.74 | 27.04 |
| 4.5 | 1.51 | 34.11 | 46.12 |
| 5.0 | 1.60 | 29.02 | 31.01 |
| 5.5 | 1.69 | 27.81 | 28.85 |
| 6.0 | 1.77 | 39.27 | 37.19 |
| 6.5 | 1.85 | 32.66 | 31.57 |
| 7.0 | 1.94 | 27.74 | 28.29 |
| 7.5 | 2.01 | 28.56 | 28.44 |
| 8.0 | 2.08 | 37.99 | 31.13 |
| 8.5 | 2.17 | 26.87 | 26.81 |
| 9.0 | 2.25 | 24.78 | 24.72 |
| 9.5 | 2.31 | 26.96 | 26.59 |
| 10.0 | 2.37 | 40.98 | 32.03 |
| 10.5 | 2.45 | 26.73 | 26.29 |
| 11.0 | 2.53 | 22.20 | 22.09 |
| 11.5 | 2.59 | 22.48 | 22.47 |
| 12.0 | 2.64 | 28.08 | 28.18 |
| 12.5 | 2.70 | 27.24 | 28.68 |
| 13.0 | 2.76 | 24.00 | 24.00 |
| 13.5 | 2.82 | 24.68 | 23.72 |
| 14.0 | 2.88 | 27.55 | 27.55 |
| 14.5 | 2.94 | 27.87 | 38.23 |
| 15.0 | 3.00 | 30.39 | 32.79 |
| 15.5 | 3.06 | 32.97 | 29.03 |
| 16.0 | 3.12 | 31.75 | 31.89 |
| 16.5 | 3.18 | 28.23 | 44.62 |
| 17.0 | 3.25 | 32.28 | 33.77 |
| 17.5 | 3.31 | 35.00 | 27.48 |
| 18.0 | 3.36 | 35.15 | 29.12 |

*Typical Performance Curves*

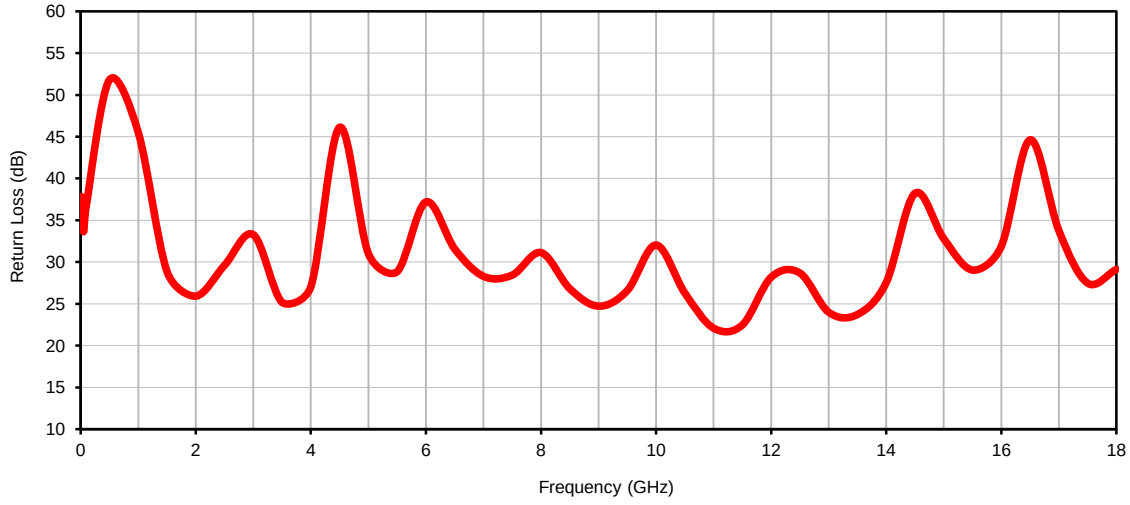
**Insertion Loss**




**SMA-Male 1 Return Loss**



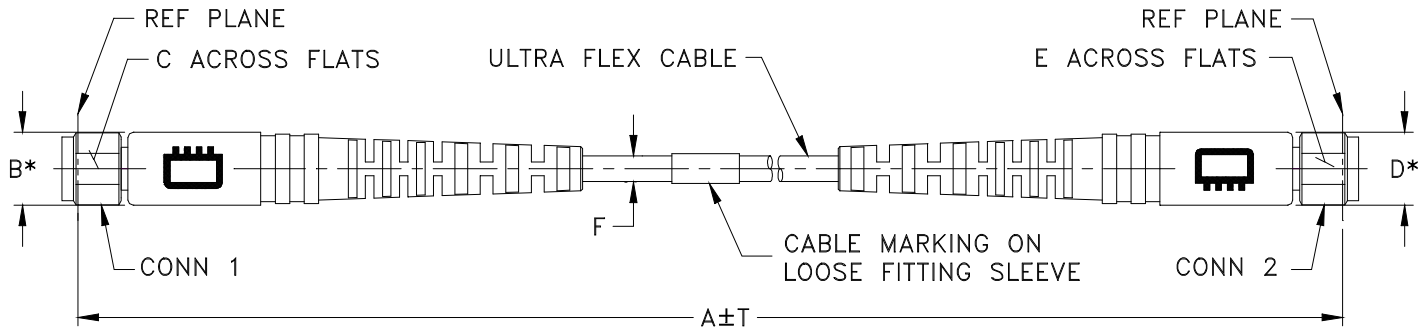

**SMA-Male 2 Return Loss**



# Case Style NS

## Outline Dimensions

**NS1992**




* OVERALL CONNECTOR/BOOT DIMENSION
[CONNECTOR/BOOT SHAPE MAY VARY]

NS1992 SERIES
SMA MALE (CONN-1)
SMA MALE (CONN-2)

| CASE STYLE # | A | | B | C | D | E | F | T | | WEIGHT GRAMS |
|---|---|---|---|---|---|---|---|---|---|---|
| | FEET | METERS | | | | | | FEET | METERS | |
| NS1992-1 | 1.00 | 0.30 | .426 [10.82] | .313 [7.95] | .426 [10.82] | .313 [7.95] | .150±.004 [3.81±0.10] | .06 | 0.02 | 34 |
| NS1992-1.5 | 1.50 | 0.46 | | | | | | .06 | 0.02 | 39 |
| NS1992-2 | 2.00 | 0.61 | | | | | | .06 | 0.02 | 44 |
| NS1992-3 | 3.00 | 0.91 | | | | | | .09 | 0.03 | 53 |
| NS1992-3.28 | 3.28 | 1.00 | | | | | | .10 | 0.03 | 56 |
| NS1992-4 | 4.00 | 1.22 | | | | | | .12 | 0.04 | 63 |
| NS1992-6 | 6.00 | 1.83 | | | | | | .18 | 0.05 | 82 |
| NS1992-6.56 | 6.56 | 2.00 | | | | | | .20 | 0.06 | 87 |
| NS1992-8 | 8.00 | 2.44 | | | | | | .24 | 0.07 | 101 |
| NS1992-10 | 10.00 | 3.05 | | | | | | .30 | 0.09 | 120 |

Tolerances: 2Pl. ± .03; 3Pl. ± .015

**Note:**

1. Flexible Coaxial Cable.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Mini-Circuits

# Environmental Specifications ENV60

All Mini-Circuits products are manufactured under exacting quality assurance and control standards, and are capable of meeting published specifications after being subjected to any or all of the following physical and environmental test.

| Specification | Test/Inspection Condition | Reference/Spec |
|---|---|---|
| Operating Temperature | -55° to 85°C<br>Ambient Environment | Individual Model Data Sheet |
| Storage Temperature | -55° to 85° C<br>Ambient Environment | Individual Model Data Sheet |
| Thermal Shock | -55° to 100° C, 100 cycles | MIL-STD-202, Method 107, Condition A-3 |
| Mechanical Flexing | 20,000 cycles<br>During each cycle, cable flexed from 90° through 0° to -90° and back with a Radii of 3 inches | - - - |


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