

USB &amp; Ethernet Controlled

# Rack-Mount SPDT Switch Matrix

# ZTRC-4SPDT-A18

50Ω DC to 18 GHz



## The Big Deal

- Rack-mount switch system, 4 x SPDT
- High reliability, 10 million switch cycles
- 20W power rating (cold switching)
- High isolation, 85 dB typ



Software Package

Case Style: 99-01-2711

## Typical Applications

- Automated test equipment
- Fail-safe / redundancy switching
- Switch matrices

### RoHS Compliant

See our website for RoHS compliance methodologies and qualifications

Please contact [testsolutions@minicircuits.com](mailto:testsolutions@minicircuits.com) for price and delivery information

## Product Overview

Mini-Circuits' ZTRC-4SPDT-A18 comprises 4 independently controlled, electro-mechanical SPDT switches. Each switch operates over a wide bandwidth, from DC to 18 GHz with high isolation (85 dB typical), low insertion loss (0.2 dB typical) and high input power rating (20W for cold switching). The switches are of a failsafe and break-before-make-configuration using a patented design which ensures long-term reliability, with a minimum lifetime of 10 million switching cycles when used within the noted specifications.

The switch system is housed in a rugged 19" rack chassis, 1U height, with 12 SMA (f) RF connectors and LED switch position indicators on the front panel. The switches are controlled via USB or Ethernet, allowing control directly from a PC, or remotely over a network. Full software support is provided, including our user-friendly GUI application for Windows and a full API with programming instructions for Windows and Linux environments (both 32-bit and 64-bit systems).

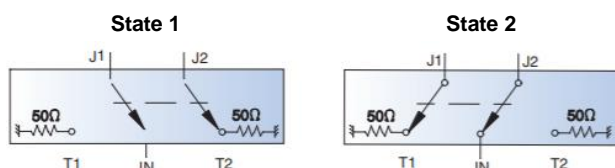
## Key Features

| Feature                         | Advantages   |
|---------------------------------|--|
| 4 independent SPDT switches     | Flexible front panel switch arrangement in a compact rack-mountable chassis supports a wide range of signal routing applications.  |
| Fail-safe design                | The switches revert to a known default state when the DC supply is removed, allowing their use in systems that must continue to operate safely in the event of power failure   |
| Break-before-make configuration | Prevents a momentary connection of the old and new signal paths, reducing the inconsistent transient effects that could otherwise be observed during switching   |
| USB & Ethernet control          | USB HID and Ethernet (HTTP / Telnet) interfaces provide easy compatibility with a wide range of software setups and programming environments   |
| Full software support           | User friendly Windows GUI (graphical user interface) allows manual control straight out of the box, while the comprehensive API (application programming interface) with examples and instructions allows easy automation in most programming environments |

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**Rack-Mount SPDT Switch Matrix****ZTRC-4SPDT-A18****Electrical Specifications at 25°C (per Switch)**

| Parameter                                 | Conditions             | Min                | Typ  | Max  | Units          |
|---|------------------------|--------------------|------|------|----------------|
| Frequency Range                           |                        | DC                 |      | 18   | GHz            |
| Insertion Loss                            | DC – 1 GHz             |                    | 0.10 | 0.15 | dB             |
|   | 1 – 8 GHz              |                    | 0.15 | 0.30 |                |
|   | 8 – 12 GHz             |                    | 0.25 | 0.40 |                |
|   | 12 – 18 GHz            |                    | 0.30 | 0.50 |                |
| Isolation                                 | DC – 1 GHz             | 85                 | 100  |      | dB             |
|   | 1 – 8 GHz              | 75                 | 90   |      |                |
|   | 8 – 12 GHz             | 70                 | 80   |      |                |
|   | 12 – 18 GHz            | 60                 | 66   |      |                |
| VSWR                                      | DC – 1 GHz             |                    | 1.05 | 1.10 | :1             |
|   | 1 – 8 GHz              |                    | 1.20 | 1.30 |                |
|   | 8 – 12 GHz             |                    | 1.20 | 1.35 |                |
|   | 12 – 18 GHz            |                    | 1.25 | 1.40 |                |
| Switching Time                            |                        |                    | 25   |      | ms             |
| RF Input Power <sup>1,2</sup>             | Cold switching         |                    |      | 20   | W              |
| Switch Lifetime (per Switch) <sup>3</sup> | @ 100 mW hot switching | 10                 |      |      | million cycles |
|   | @ 1 W hot switching    |                    | 3    |      |                |
| AC Input                                  |                        | 90-260 V, 47-63 Hz |      |      |                |

**Switch States (per Switch):****Absolute Maximum Ratings:**

|                                 |               |
|---------------------------------|---------------|
| RF Power (Through Path)         | 20 W          |
| RF Power (Internal Termination) | 1 W           |
| Operating Temperature           | 0°C to 40°C   |
| Storage Temperature             | -15°C to 85°C |

## Notes:

1. Power handling is specified with RF applied to the COM port and external load connected to either 1 or 2 of the respective switch
2. Cold switching describes switch operation where there is no significant user signal present at the moment the switch contacts open or close.
3. Hot switching powers above this level will degrade the switch lifetime

**Connections:**

| Port Name                                       | Connector Type     |
|---|--------------------|
| Switch Ports (Switch A-H, Ports 1-2 per Switch) | 12 x SMA female    |
| USB   | USB type-B         |
| Ethernet / LAN                                  | RJ45               |
| AC Input  | C14 AC mains input |

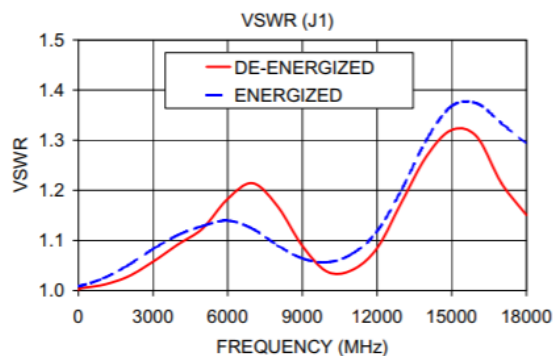
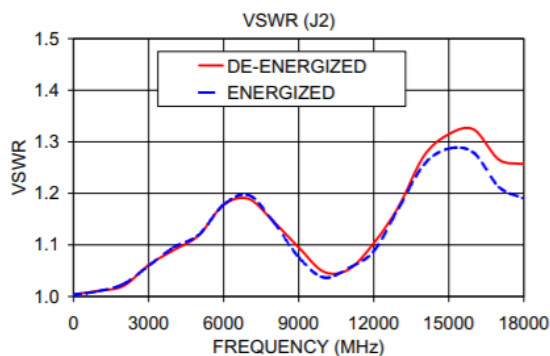
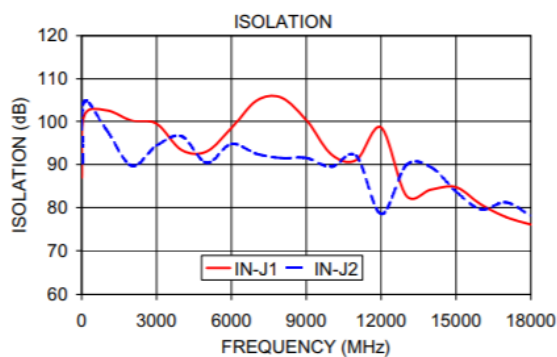
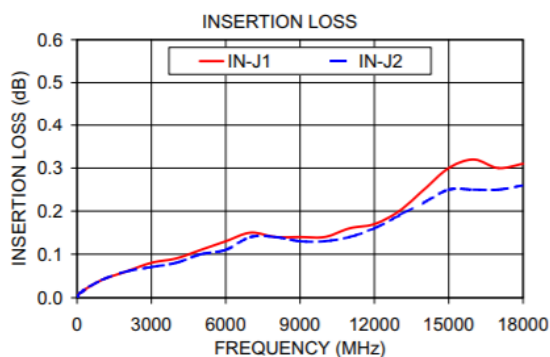
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## Typical Performance Data (per Switch)

| FREQ.<br>(MHz) | ON INSERTION<br>LOSS<br>(dB) |        | OFF ISOLATION<br>(dB) |        | VSWR, IN<br>(:1) |        | VSWR, (J2)<br>(:1) |        | VSWR (J1)<br>(:1) |        |
|----------------|------------------------------|--------|-----------------------|--------|------------------|--------|--------------------|--------|-------------------|--------|
|                | COM-J1                       | COM-J2 | COM-J1                | COM-J2 | COM-J1           | COM-J2 | COM-J1             | COM-J2 | COM-J1            | COM-J2 |
| 10.00          | 0.00                         | 0.00   | 86.92                 | 90.23  | 1.00             | 1.00   | 1.00               | 1.00   | 1.00              | 1.01   |
| 100.00         | 0.01                         | 0.01   | 101.44                | 104.72 | 1.00             | 1.01   | 1.00               | 1.00   | 1.00              | 1.01   |
| 1000.00        | 0.04                         | 0.04   | 102.68                | 97.93  | 1.01             | 1.01   | 1.01               | 1.01   | 1.01              | 1.02   |
| 2000.00        | 0.06                         | 0.06   | 100.29                | 89.71  | 1.02             | 1.03   | 1.02               | 1.02   | 1.03              | 1.05   |
| 3000.00        | 0.08                         | 0.07   | 99.44                 | 94.36  | 1.06             | 1.06   | 1.06               | 1.06   | 1.06              | 1.08   |
| 4000.00        | 0.09                         | 0.08   | 93.35                 | 96.55  | 1.09             | 1.09   | 1.09               | 1.10   | 1.09              | 1.11   |
| 5000.00        | 0.11                         | 0.10   | 92.98                 | 90.42  | 1.12             | 1.13   | 1.12               | 1.12   | 1.12              | 1.13   |
| 6000.00        | 0.13                         | 0.11   | 98.44                 | 94.76  | 1.16             | 1.18   | 1.18               | 1.18   | 1.18              | 1.14   |
| 7000.00        | 0.15                         | 0.14   | 104.93                | 92.46  | 1.18             | 1.21   | 1.19               | 1.20   | 1.21              | 1.12   |
| 8000.00        | 0.14                         | 0.14   | 105.64                | 91.48  | 1.14             | 1.17   | 1.15               | 1.14   | 1.17              | 1.09   |
| 9000.00        | 0.14                         | 0.13   | 100.36                | 91.51  | 1.09             | 1.09   | 1.10               | 1.08   | 1.09              | 1.06   |
| 10000.00       | 0.14                         | 0.13   | 92.35                 | 89.45  | 1.04             | 1.04   | 1.05               | 1.04   | 1.04              | 1.06   |
| 11000.00       | 0.16                         | 0.14   | 91.02                 | 91.97  | 1.04             | 1.04   | 1.05               | 1.06   | 1.04              | 1.07   |
| 12000.00       | 0.17                         | 0.16   | 98.57                 | 78.50  | 1.10             | 1.08   | 1.10               | 1.09   | 1.08              | 1.12   |
| 13000.00       | 0.20                         | 0.19   | 82.82                 | 89.80  | 1.19             | 1.17   | 1.17               | 1.17   | 1.18              | 1.20   |
| 14000.00       | 0.25                         | 0.22   | 84.16                 | 89.36  | 1.27             | 1.26   | 1.27               | 1.26   | 1.27              | 1.30   |
| 15000.00       | 0.30                         | 0.25   | 84.72                 | 83.73  | 1.32             | 1.32   | 1.31               | 1.29   | 1.32              | 1.37   |
| 16000.00       | 0.32                         | 0.25   | 80.73                 | 79.61  | 1.31             | 1.32   | 1.32               | 1.28   | 1.31              | 1.37   |
| 17000.00       | 0.30                         | 0.25   | 77.82                 | 81.23  | 1.30             | 1.23   | 1.27               | 1.21   | 1.21              | 1.33   |
| 18000.00       | 0.31                         | 0.26   | 76.06                 | 78.10  | 1.27             | 1.17   | 1.26               | 1.19   | 1.15              | 1.29   |

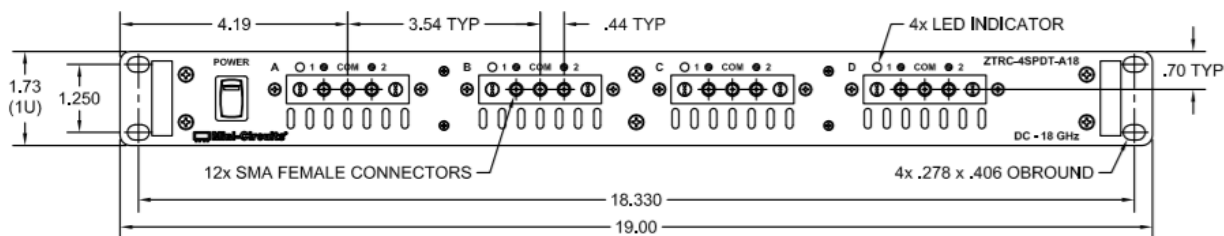
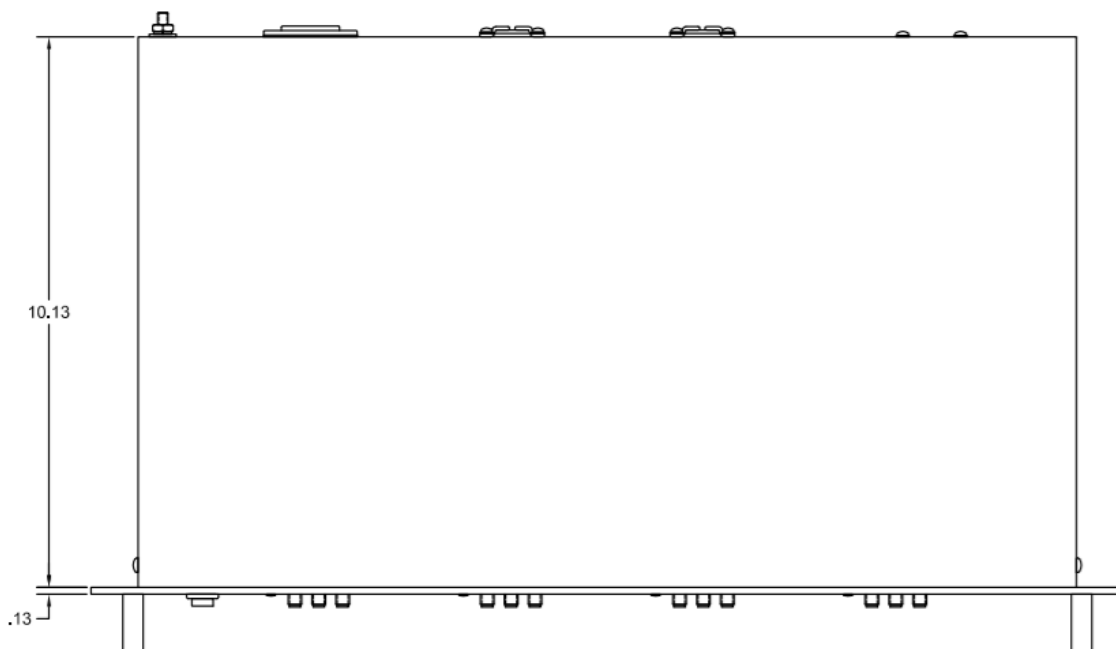
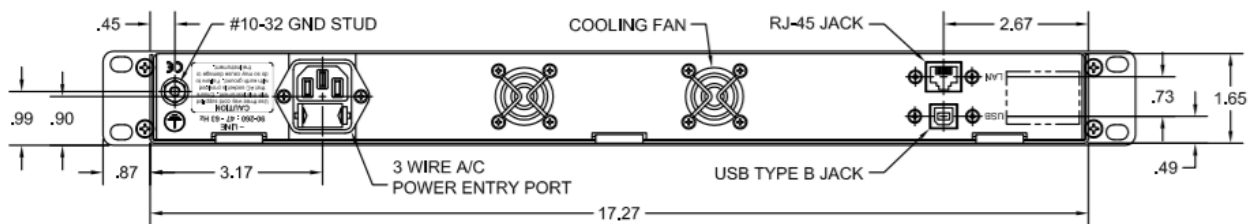


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## Outline Drawing / Dimensions (99-01-2711)



## Software Specifications

### Software & Documentation Download:

- Mini-Circuits' full software and support package including user guide, Windows GUI, DLL files, programming manual and examples can be downloaded free of charge from <https://www.minicircuits.com/softwaredownload/rfswitchcontroller.html>
- Please contact [testsolutions@minicircuits.com](mailto:testsolutions@minicircuits.com) for support

### Minimum System Requirements:

| Parameter           | Requirements                        |  |
|---------------------|-------------------------------------|--|
| Interface           | USB HID & Ethernet (HTTP & Telnet)  |  |
| System Requirements | GUI                                 | Windows 98 or later  |
|                     | USB API DLL                         | Windows 98 or later and programming environment with ActiveX or .NET support     |
|                     | USB Direct Programming              | Linux; Windows 98 or later   |
|                     | Ethernet                            | Windows, Linux or Mac computer with a network port and Ethernet TCP / IP support |
| Hardware            | Pentium II or later with 256 MB RAM |  |

### Application Programming Interface (API)

#### Ethernet Support:

- Simple ASCII / SCPI command set for attenuator control
- Communication via HTTP or Telnet
- Supported by most common programming environments

#### USB Support (Windows):

- ActiveX COM DLL file for creation of 32-bit programs
- .NET library DLL file for creation of 32 / 64-bit programs
- Supported by most common programming environments (refer to application note [AN-49-001](#) for summary of supported environments)

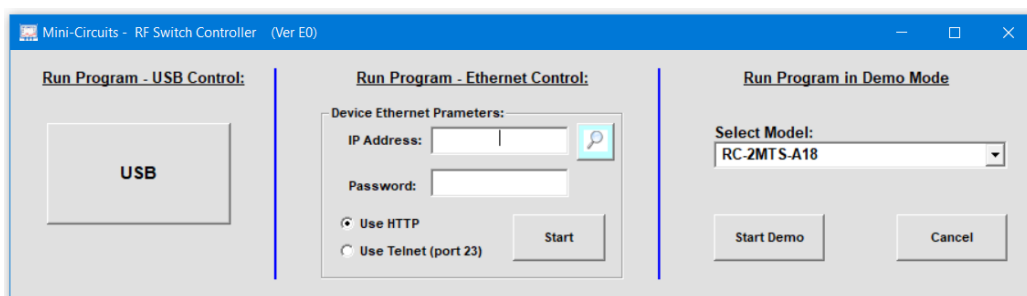
#### USB Support (Linux):

- Direct USB programming using a series of USB interrupt codes

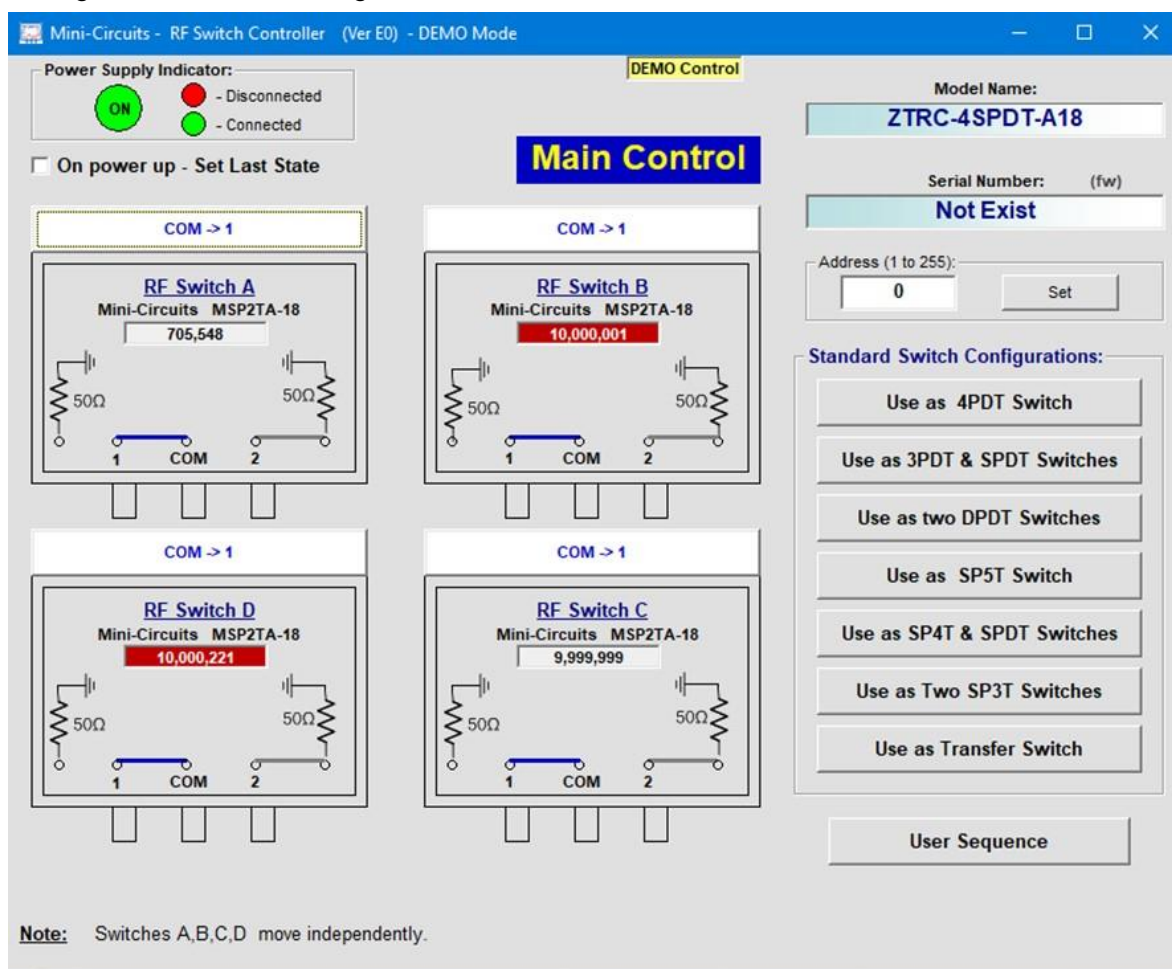
Full programming instructions and examples available for a wide range of programming environments / languages.

**Graphical User Interface (GUI) for Windows - Key Features**

- Connect via USB or Ethernet
- Run GUI in “demo mode” to evaluate software without a hardware connection



- View and set switch states at the click of a button
- Configure and run timed switching sequences
- Set start-up switch state
- Configure Ethernet IP settings



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## Ordering Information

Contact us for pricing and availability information:

[testsolutions@minicircuits.com](mailto:testsolutions@minicircuits.com)

| Model          | Description   |
|----------------|---|
| ZTRC-4SPDT-A18 | USB & Ethernet controlled rack-mount SPDT switch matrix |

| Included Accessories  | Part No.      | Description  |
|---|---------------|--|
|  | CBL-3W-XX     | AC Power Cord (Select one power cord from below with each Switch Matrix box) |
|  | USB-CBL-AB-3+ | 2.7 ft (0.8 m) USB Cable: USB type A(Male) to USB type B(Male)               |

| AC Power Cords  | Part No.  | Description                   |
|---|-----------|-------------------------------|
|    | CBL-3W-US | Power Cord for United States  |
|   | CBL-3W-EU | Power Cord for Europe         |
|  | CBL-3W-UK | Power Cord for United Kingdom |

| Optional Accessories  | Description  |
|-----------------------|--|
| USB-CBL-AB-3+ (Spare) | 2.7 ft (0.8 m) USB Cable: USB type A(Male) to USB type B(Male)     |
| USB-CBL-AB-7+         | 6.8 ft (2.1 m) USB Cable: USB type A(Male) to USB type B(Male)     |
| USB-CBL-AB-11+        | 11 ft (3.4 m) USB Cable: USB type A(Male) to USB type B(Male)      |
| CBL-RJ45-MM-5+        | 5 ft (1.5 m) Ethernet cable: RJ45(Male) to RJ45(Male) Cat 5E cable |

### Additional Notes

- 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.
- Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.
- 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](http://www.minicircuits.com/MCLStore/terms.jsp)