USB & ETHERNET

# Full Fan Out Switch Matrix

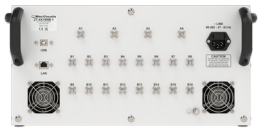
## ZT-4X16NB-1

50Ω 900 to 2150 MHz 4 x 16 Rack-Mount SMA Female

### THE BIG DEAL

- Completely flexible 4 x 16 switch matrix
- Fully non-blocking / full fan-out configuration
- Combine any combination of input & output ports
- High isolation between disconnected ports
- Software automation via Ethernet & USB
- Convenient rack-mountable chassis

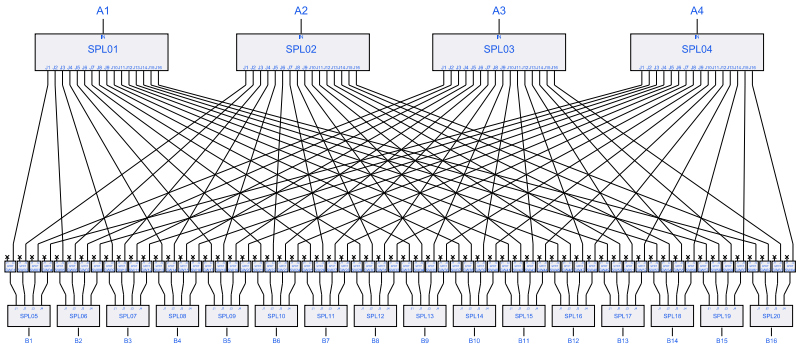
Frot View



Rear View

*Generic photo used for illustration purposes only*

### FUNCTIONAL BLOCK DIAGRAM




### APPLICATIONS

- L-band satcom (satellite communications)
- GNSS (GPS, Galileo, GLONASS) signal distribution
- RF test automation & signal routing
- DECT NR+ verification

### PRODUCT OVERVIEW

Mini-Circuits' ZT-4X16NB-1 is a "full fan out" or "fully non blocking" switch matrix. These systems use a combination of mechanical switches and splitter/combiners to provide a completely flexible set of paths between the input and output ports. The matrix comprises 64 bi-directional paths, allowing all inputs to connect simultaneously to all outputs, with the option to switch each path on or off independently.

The system is housed in a 5U height, 19-inch rack chassis, with the SMA female RF connections and AC power input on the rear panel. Removable carry handles are included on the front, rear and side panels to aid installation.

The switch matrix can be controlled via USB or Ethernet (supporting HTTP and Telnet network protocols). 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.

### KEY FEATURES

| Feature | Advantages |
|---|---|
| Fully non-blocking | Completely flexible, allowing any combination of inputs to connect to any combination of outputs, including all 64 paths active at the same time. |
| Mechanical switches | Mechanical switches provide high isolation between disconnected ports with minimal added insertion loss. |
| Wide bandwidth | Operation over 900-2150 MHz supports L-band satellite communications and GNSS applications. |
| Ethernet & USB control | USB HID and Ethernet (HTTP & Telnet) interfaces ensure compatibility with most software environments and connection requirements. |
| Rack-mount chassis | 5U height, 19" rack-mountable chassis suits integration in automated production test environments. |

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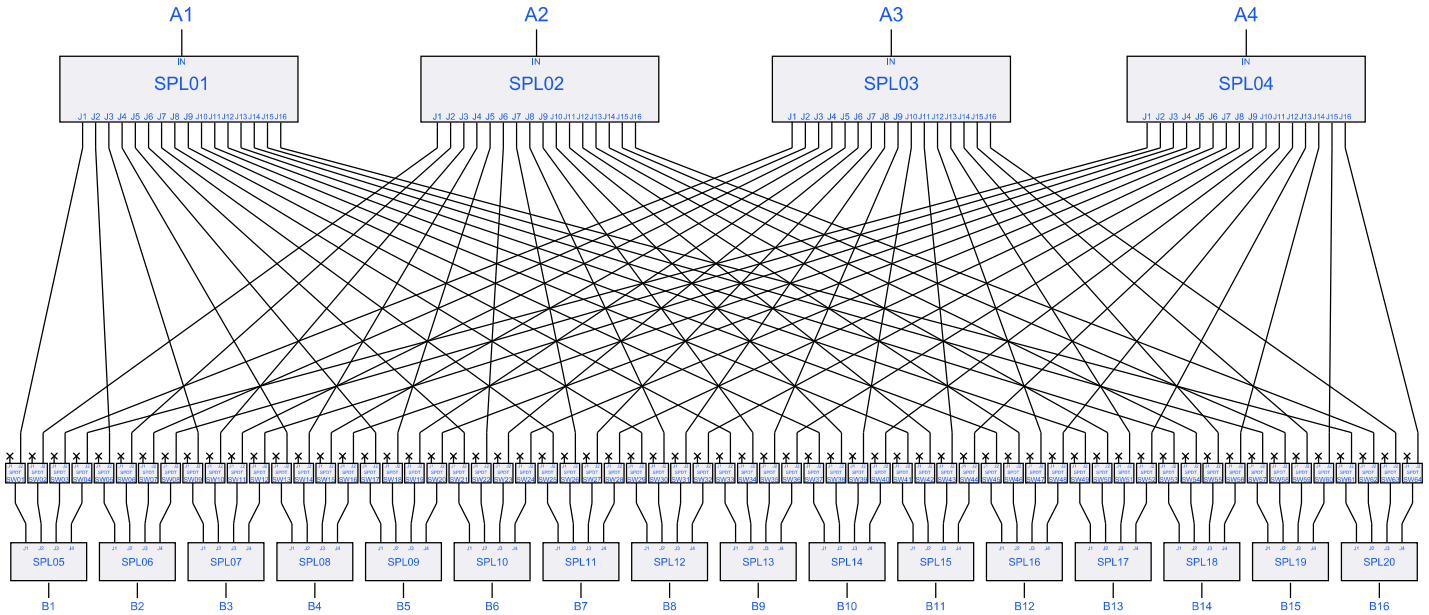
## ELECTRICAL SPECIFICATIONS AT +25°C

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| Frequency | | 900 | | 2150 | MHz |
| Insertion Loss | | | 20.5 | 23.0 | dB |
| Isolation (Inactive Paths)[1] | | 80 | 100 | | dB |
| Isolation (Adjacent Active Ports)[2] | $A_x$ to $A_y$<br>$B_x$ to $B_y$ | 40<br>30 | 50<br>40 | | dB |
| Isolation (Adjacent Inactive Ports)[3] | $A_x$ to $A_y$ or $B_x$ to $B_y$ | 80 | 100 | | dB |
| Return Loss[4] | A-Ports<br>B-Ports | | 18<br>18 | | dB |
| Input Power | All ports | | | +24 | dBm |

1. Isolation from input to output on a disconnected switch path. Example: A1 to B1 isolation is the leakage measured at B1 from a signal input at A1 when the switch in path is disconnected.
2. Isolation between any pair of A or B ports with all internal switch paths connected. This parameter is influenced by the isolation of the power splitter / combiner opposite.
3. Isolation between any pair of A or B ports with all internal switch paths disconnected. This parameter is influenced by the isolation of the mechanical switches.
4. Return loss into all ports in all states

## FUNCTIONAL BLOCK DIAGRAM



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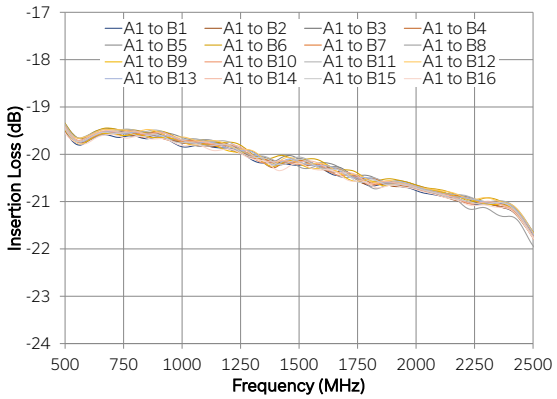
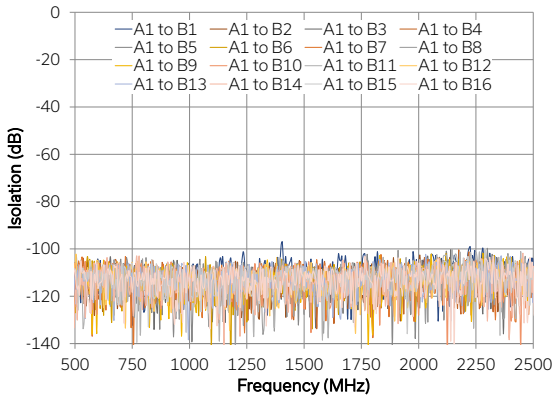
## TYPICAL PERFORMANCE CURVES

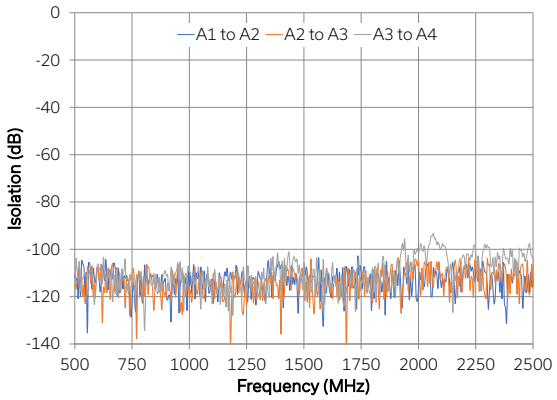
Insertion Loss



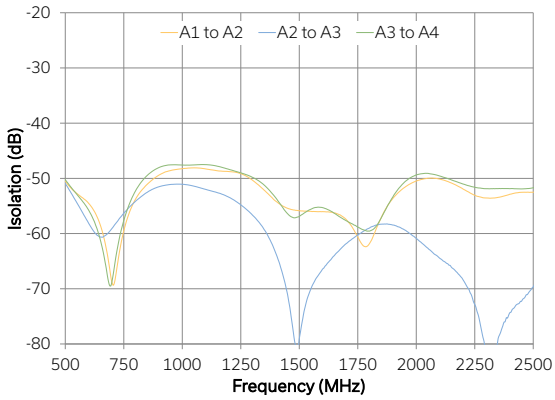

Isolation (Inactive Paths)



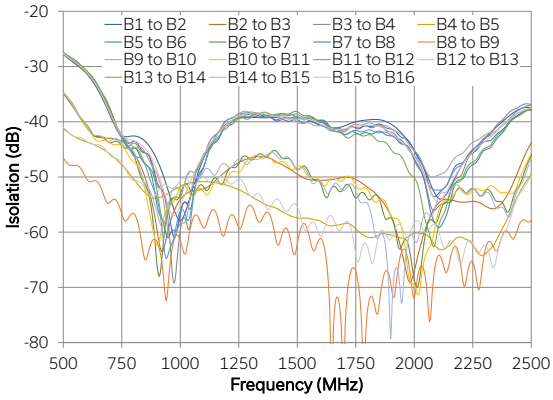

Isolation (Between Inactive Ax Ports)




Isolation (Between Active Ax Ports)



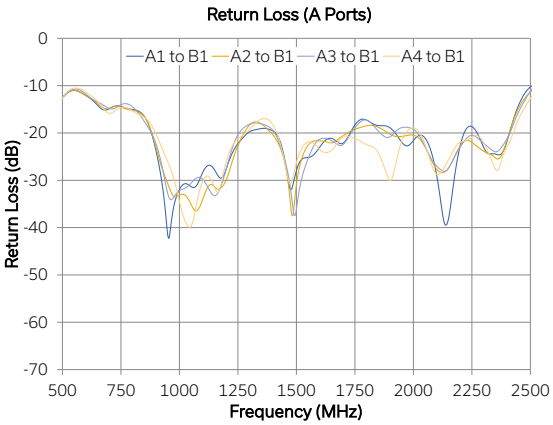

Isolation (Between Active Bx Ports)

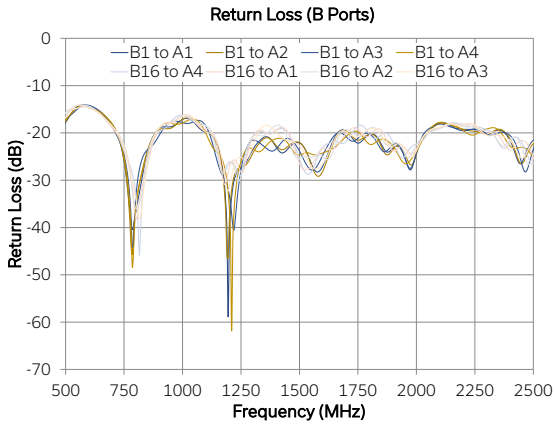


# Full Fan Out Switch Matrix ZT-4X16NB-1

50Ω 900 to 2150 MHz 4 x 16 Rack-Mount SMA Female

## TYPICAL PERFORMANCE CURVES



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## CONTROL INTERFACES

| | | |
|---|---|---|
| **Ethernet Control** | Supported Protocols | TCP / IP, HTTP, Telnet, DHCP, UDP (limited) |
| | Max Data Rate | 10 Mbps (10 Base-T Half Duplex) |
| **USB Control** | Supported Protocols | HID – Full Speed |
| | Min Communication Time[5] | 3 ms typ |

5. Based on the polling interval of the USB HID protocol (1 ms with 64 bytes per packet) and no other significant CPU or USB activity

## SOFTWARE & DOCUMENTATION

Mini-Circuits' full software and support package including user guide, Windows GUI, API, programming manual and examples can be downloaded free of charge (refer to the last page for the download path).
A comprehensive set of software control options is provided:

- GUI for Windows – Simple software interface for control via Ethernet and USB
- Programming / automation via Ethernet
  - Complete set of control commands which can be sent via any supported protocol – simple to implement in the majority of modern programming environments

- Programming / automation via USB
  - DLL files provide a full API for Windows with a set of intuitive functions which can be implemented in any programming environment supporting .Net Framework or ActiveX
  - Direct USB programming is possible in any other environment (not supporting .Net or ActiveX)

Please contact testsolutions@minicircuits.com for support

## MINIMUM SYSTEM REQUIREMENTS

| | |
|---|---|
| **Hardware** | Intel i3 (or equivalent) or later |
| **GUI (USB or Ethernet Control)** | Windows 7 or later |
| **USB API DLL** | Windows 7 or later with support for Microsoft .Net Framework or ActiveX |
| **USB Direct Programming** | Windows 7 or later; Linux |
| **Ethernet** | Windows, Linux or macOS with Ethernet TCP / IP support |

## PROGRAMMING COMMANDS

The key ASCII / SCPI commands for control of the system for control via the Ethernet or USB API are summarized below (refer to the programming manual for full details):

| Command / Query | Description |
|---|---|
| :MN? | Read model name |
| :SN? | Read serial number |
| :FIRMWARE? | Read firmware version |
| :PATH:[A_port]:[B_port] | Set a single path:<br>• [A_port] = The "A" port name to connect (A1 to A4)<br>• [B_port] = The "B" port name to connect (B1 to B16)<br>• Example :PATH:A1:B16 |
| :PATH:[input_port]? | Get the "output" port connected to the specified "input port":<br>• [input_port] = The "A" or "B" port name to check (A1 to A4 or B1 to B16)<br>• Example :PATH:B16:? |
| PATH:[input_port]:DIST | Disconnect all paths to the a specific port:<br>• [input_port] = The "A" or "B" port name to disconnect (A1 to A4 or B1 to B16)<br>• Example :PATH:A1:DIST |
| :DIST:[A_port]:[B_port] | Disconnect a single path between 2 named ports:<br>• [A_port] = The "A" port name (A1 to A4)<br>• [B_port] = The "B" port name (B1 to B16)<br>• Example :DIST:A1:B16 |

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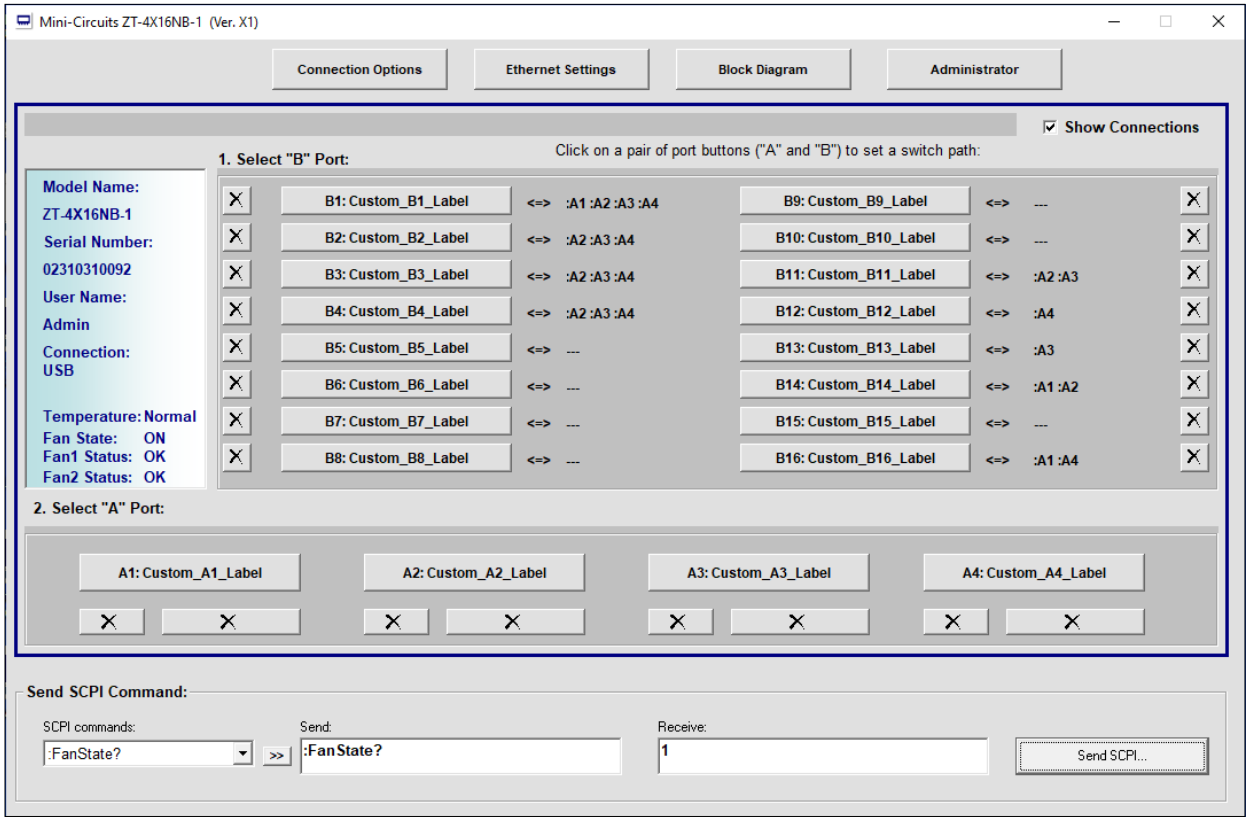
## GRAPHICAL USER INTERFACE (GUI) FOR WINDOWS

- Connect via USB or Ethernet
- Run GUI in “demo mode” to evaluate software without a hardware connection
- View and set all switch paths at the click of a button
- Define custom port labels
- Configure Ethernet settings
- Update firmware



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## ABSOLUTE MAXIMUM RATINGS

| Parameter | Conditions | Limits | Units |
|---|---|---|---|
| **Temperature** | Operating | 0 to +50 | °C |
| | Storage | -20 to +60 | |
| **Input Power** | No damage | +24 | dBm |

Permanent damage may occur if any of these limits are exceeded. Operating in the range between operating power limits and absolute maximum ratings for extended periods of time may result in reduced life and reliability.

## POWER SUPPLY

| | |
|---|---|
| **Power Supply** | AC mains input:<br>100-240 V, 50 / 60 Hz |
| **Fuse** | 2A, 250V rating |
| **Power Consumption** | 480W maximum |

## CONNECTIONS

| Port | Connector |
|---|---|
| A1-A4 & B1-B16 | SMA female |
| USB | USB type B |
| Ethernet / LAN | RJ45 |
| AC Input | IEC C14 inlet |

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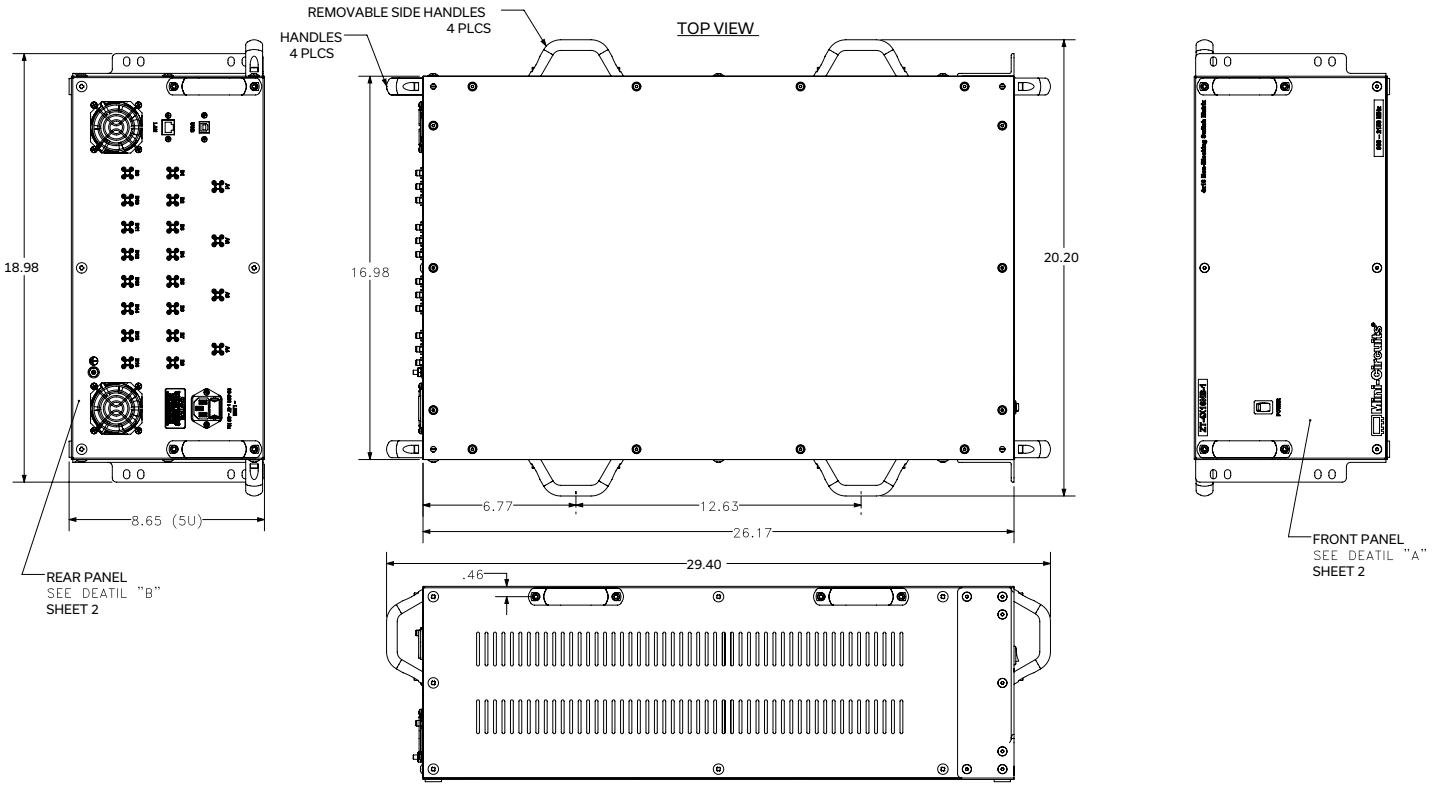
## CASE STYLE DRAWING




## PRODUCT MARKING*

Product Marking: ZT-4X16NB-1
Product Description: 4 x 16 Non-Blocking Switch Matrix
Product Frequency: 900-2150 MHz
Unit ID Label: Serial number and other identification marks
*Marking may contain other features or characters for internal lot control

# Full Fan Out Switch Matrix ZT-4X16NB-1

50Ω 900 to 2150 MHz 4 x 16 Rack-Mount SMA Female

**DETAILED MODEL INFORMATION IS AVAILABLE ON OUR WEBSITE** CLICK HERE

| | |
|---|---|
| **Case Style** | 99-01-3632 |
| **Software, User Guide & Programming Manual** | https://www.minicircuits.com/softwaredownload/zt/MCL_ZT_4X16NB-1_UG_setup_X1.zip |
| **Environmental Rating** | ENV55 |
| **Regulatory Compliance** | Refer to our website for compliance methodologies and qualifications CE UKCA www.minicircuits.com/quality/environmental_introduction.html |

Contact Us: testsolutions@minicircuits.com

| Included Accessories | Part Number | Description |
|---|---|---|
|  | USB-CBL-AB-7+ | USB cable (6.8ft) type A to type B |
|  | CBL-RJ45-MM-5+ | Ethernet cable (5 ft) |
|  | HT-4-SMA | SMA connector wrench (4" length) |
| | B13-345-08+ | Rack-mounting support kit |
| | CBL-3W-xx | AC power cord (IEC C13 connector to local plug) Select one option from the list below. Please contact testsolutions@minicircuits.com if your region is not listed. |

| AC Power Cord Options | Part Number | Description |
|---|---|---|
|  | CBL-3W-US | USA<br>NEMA 5-15 plug (type B) to IEC C13 connector |
|  | CBL-3W-EU | Europe<br>CEE 7/7 plug (type E/F) to IEC C13 connector |
|  | CBL-3W-UK | UK<br>BS-1363 plug (type G) to IEC C13 connector |
|  | CBL-3W-AU | Australia & China<br>AS/NZS 3112 plug (type I) to IEC C13 connector |
|  | CBL-3W-IL | Israel<br>SI-32 plug (type H) to IEC C13 connector |

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

Mini-Circuits

**Environmental Specifications** **ENV55**

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 | -0° to 50° C<br>Ambient Environment | Individual Model Data Sheet |
| Storage Temperature | -20° to 60° C<br>Ambient Environment | Individual Model Data Sheet |
| Operating and Storage Humidity | 5% to 85% RH (non-condensing) | Ambient |
| Bench Handling Test | Bench Top Tip 45° & Drop | MIL-PRF-28800F |
| Transit Drop Test | Free Fall Drop, 20 cm (7.9 inches) | MIL-PRF-28800F Class 3 |