USB & ETHERNET

Non-Blocking Switch Matrix

ZT-4X4NB

50Ω 350 to 6000 MHz 4 x 4 Rack-Mount SMA Female

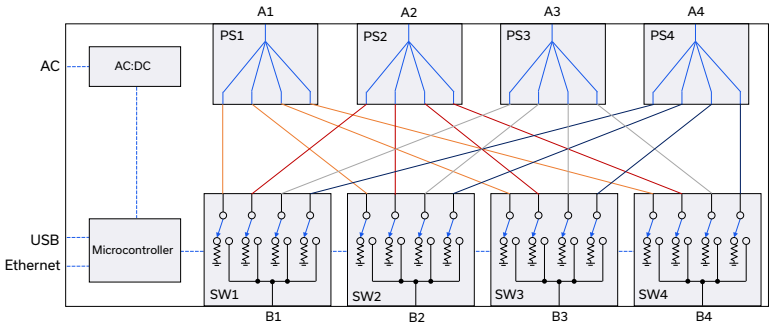
THE BIG DEAL

- Bi-directional, 4 x 4 non-blocking switch matrix
- One-to-many / many-to-one switch paths
- Connect multiple inputs to the same output
- High isolation between disconnected ports
- SSH secure Ethernet communication
- Convenient rack-mountable chassis



Generic photo used for illustration purposes only

FUNCTIONAL BLOCK DIAGRAM



APPLICATIONS

- 5G FR1, Bluetooth & WiFi signal distribution
- L-band satcom (satellite communications)
- GNSS (GPS, Galileo, GLONASS) signal distribution
- High throughput production testing
- RF test automation & signal routing
- MIMO antenna testing

PRODUCT OVERVIEW

Mini-Circuits' ZT-4X4NB is a high performance, 4 by 4 non-blocking switch matrix, operating over a wide bandwidth from 350 MHz to 6 GHz. The system is integrated into a compact19-inch rack-mountable chassis with all 8 SMA female RF ports on the front panel.

The non-blocking configuration supports up to 4 active switch paths at any time, with a single "A" port able to connect to any combination of "B" ports, including all 4 at the same time. The matrix is bi-directional so the "A" and "B" ports can be used interchangeably as both inputs and outputs.

The switch matrix can be controlled via USB or Ethernet (supporting SSH, 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
Non-blocking	One-to-many and many-to-one switch paths, allowing multiple external devices or systems to be connected to the same port.
Mechanical switches	Mechanical switches provide high isolation between disconnected ports with minimal added insertion loss.
Wide bandwidth	L-band coverage and operation to 6 GHz incorporates most of the key commercial satcom and wireless applications, including WiFi, 5G FR1 and Zigbee.
Secure Ethernet communication	Support for SSH (Secure Shell protocol) provides a means for secure communication over Ethernet networks with strict security policies. HTTP & Telnet communication via Ethernet are also supported.
Rack-mount chassis	3Uheight, 19" rack-mountable chassis suits integration in automated production test environments.

Non-Blocking Switch Matrix

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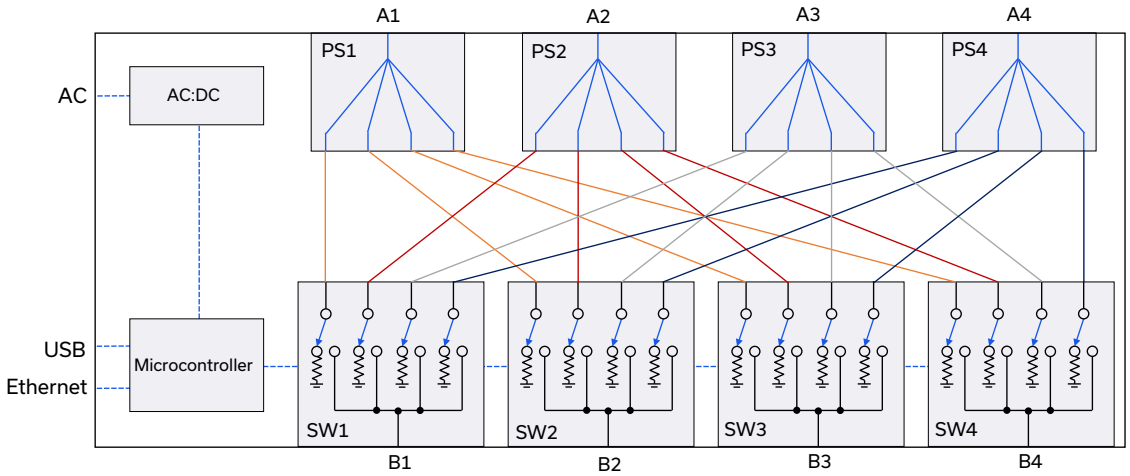
50Ω 350 to 6000 MHz 4 x 4 Rack-Mount SMA Female

ELECTRICAL SPECIFICATIONS AT +25°C

Parameter	Conditions	Min.	Typ.	Max.	Units
Frequency		350		6000	MHz
Insertion Loss	350 – 2000 MHz		7	9	dB
	2000 – 6000 MHz		9	11	
Isolation	Inactive paths[1]	80	100		dB
	A ports[2]	80	100		
	Converging B ports (350 – 750 MHz)[3]	8	12		
	Converging B ports (500 – 6000 MHz)[3]	18	22		
	Non-converging B ports[4]	80	100		
Return Loss[5]	A ports (350 – 2000 MHz)		14		dB
	A ports (2000 – 6000 MHz)		12		
	B ports (350 – 2000 MHz)		20		
	B ports (2000 – 6000 MHz)		12		
Input Power	A ports[6]			+30	dBm
	B ports			+20	

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 ports for any combination of connected switch paths. This parameter is influenced by the isolation of the mechanical switches opposite.
3. Isolation between any pair of B ports when connected to the same A port. This parameter is influenced by the isolation of the power splitter / combiner opposite.
4. Isolation between any pair of B ports when disconnected or connected to different A ports.
5. Return loss in all switch path states
6. Input power for cold switching. Derate to +26 dBm for hot switching.

FUNCTIONAL BLOCK DIAGRAM

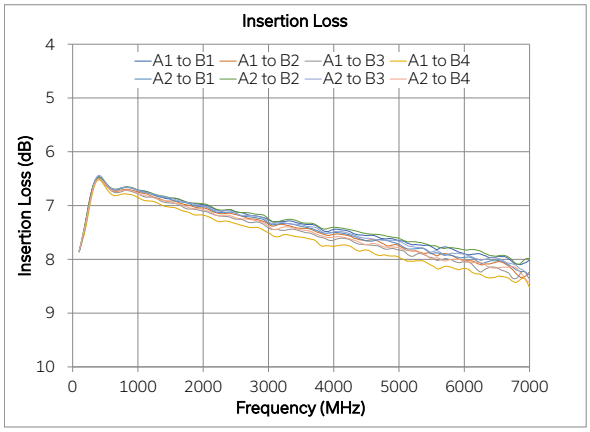


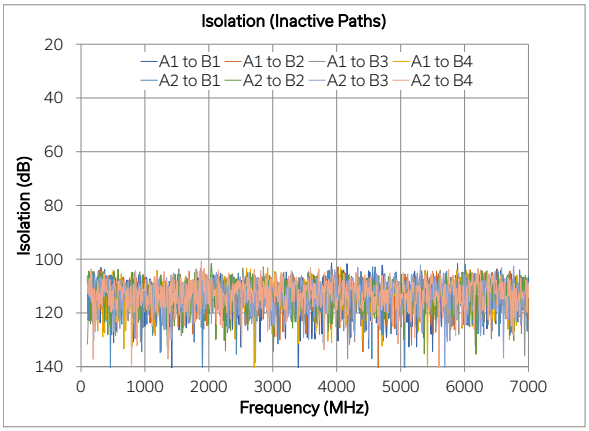
Non-Blocking Switch Matrix

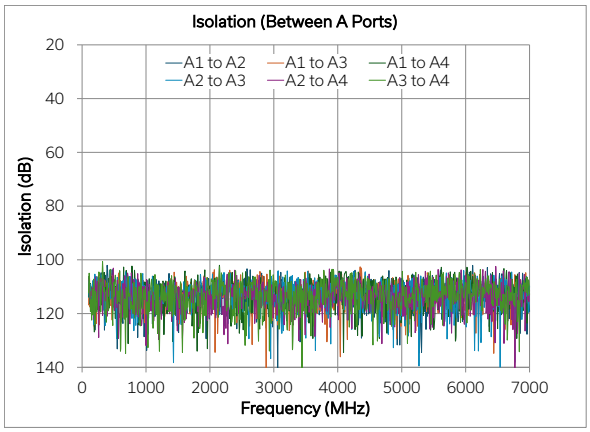
ZT-4X4NB

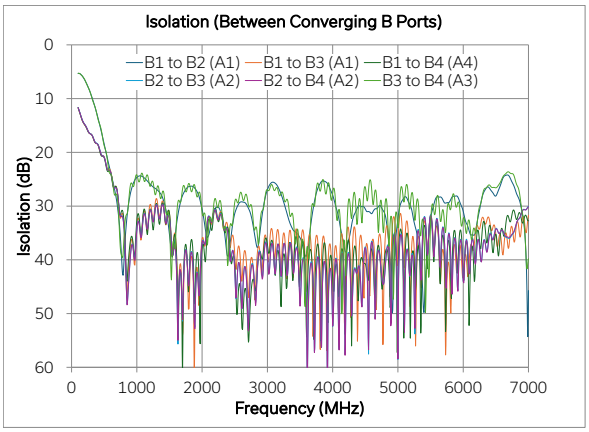
50Ω 350 to 6000 MHz 4 x 4 Rack-Mount SMA Female

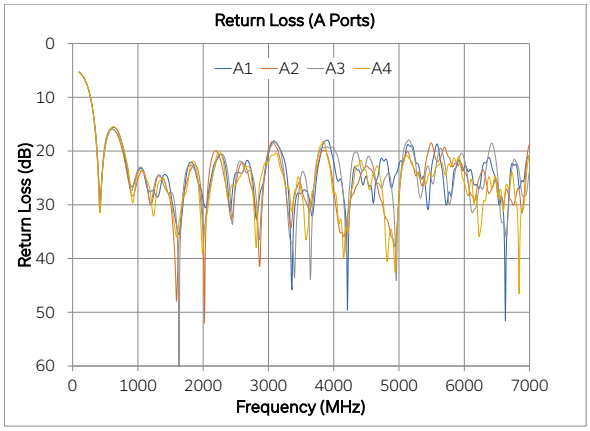
TYPICAL PERFORMANCE CURVES

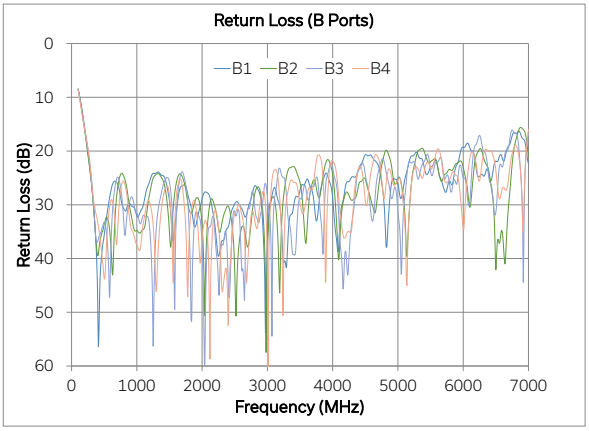












Non-Blocking Switch Matrix

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CONTROL INTERFACES

Ethernet Control	Supported Protocols	TCP / IP, SSH, HTTP, Telnet, DHCP, UDP (limited)
	Max Data Rate	100 Mbps (100 Base-T Full Duplex)
USB Control	Supported Protocols	HID – High Speed
	Min Communication Time[7]	400 µs typ

7. Based on the polling interval of the USB HID protocol (125 µs 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: • [A_port] = The "A" port name to connect (A1 to A4) • [B_port] = The "B" port name to connect (B1 to B4) • Example :PATH:A1:B4
:PATH:[input_port]?	Get the "output" port connected to the specified "input port": • [input_port] = The "A" or "B" port name to check (A1 to A4 or B1 to B16) • Example :PATH:B4:?

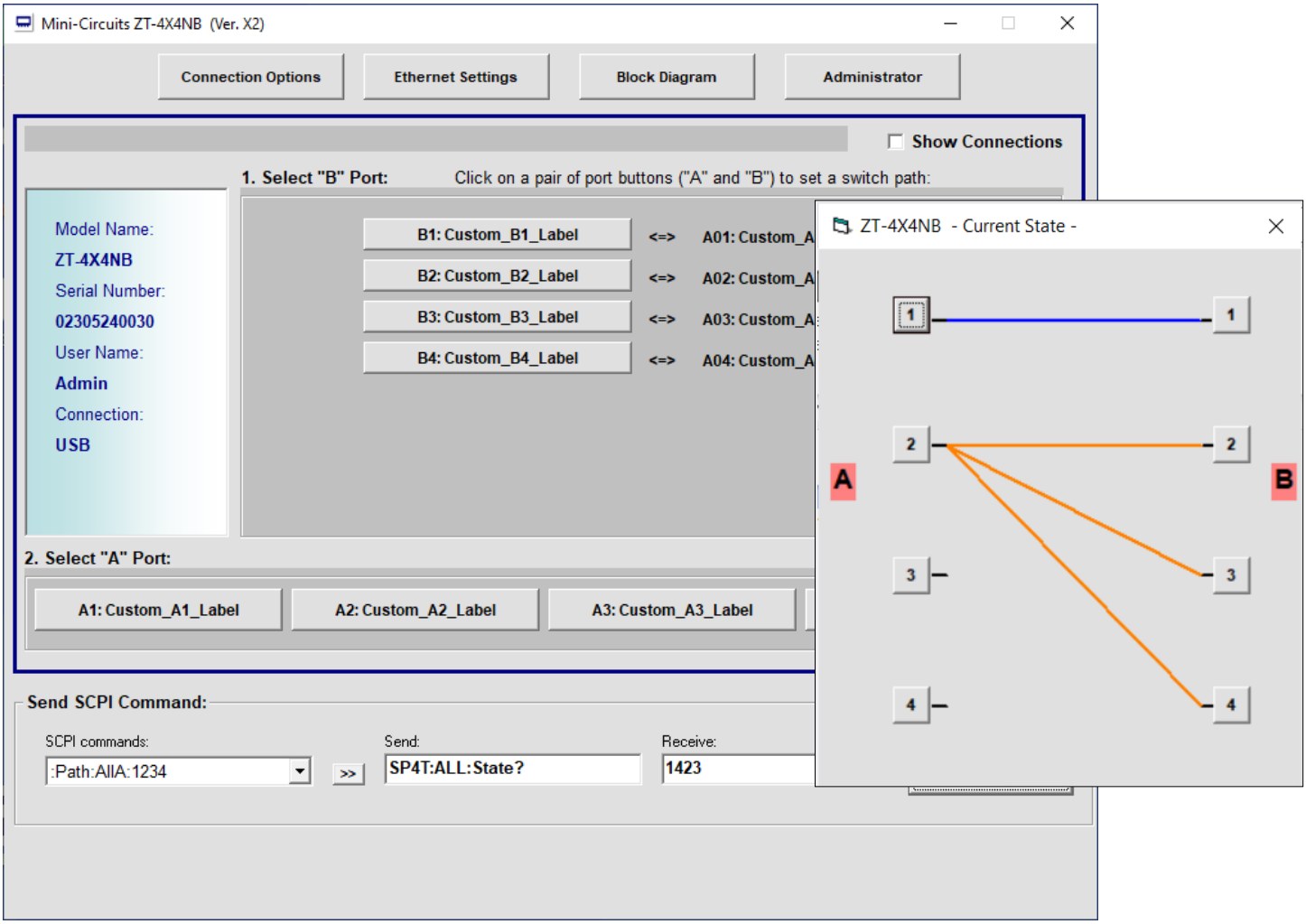
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GRAPHICAL USER INTERFACE (GUI) FOR WINDOWS

- 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



Non-Blocking Switch Matrix

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ABSOLUTE MAXIMUM RATINGS

Parameter	Conditions	Limits	Units
Temperature	Operating	0 to +50	°C
	Storage	-20 to +60	
Input Power	A ports (cold switching)	+30	dBm
	A ports (hot switching)	+26	
	B ports	+20	

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: 100-240 V, 50 / 60 Hz
Fuse	2A, 250V rating
Power Consumption	150W maximum

CONNECTIONS

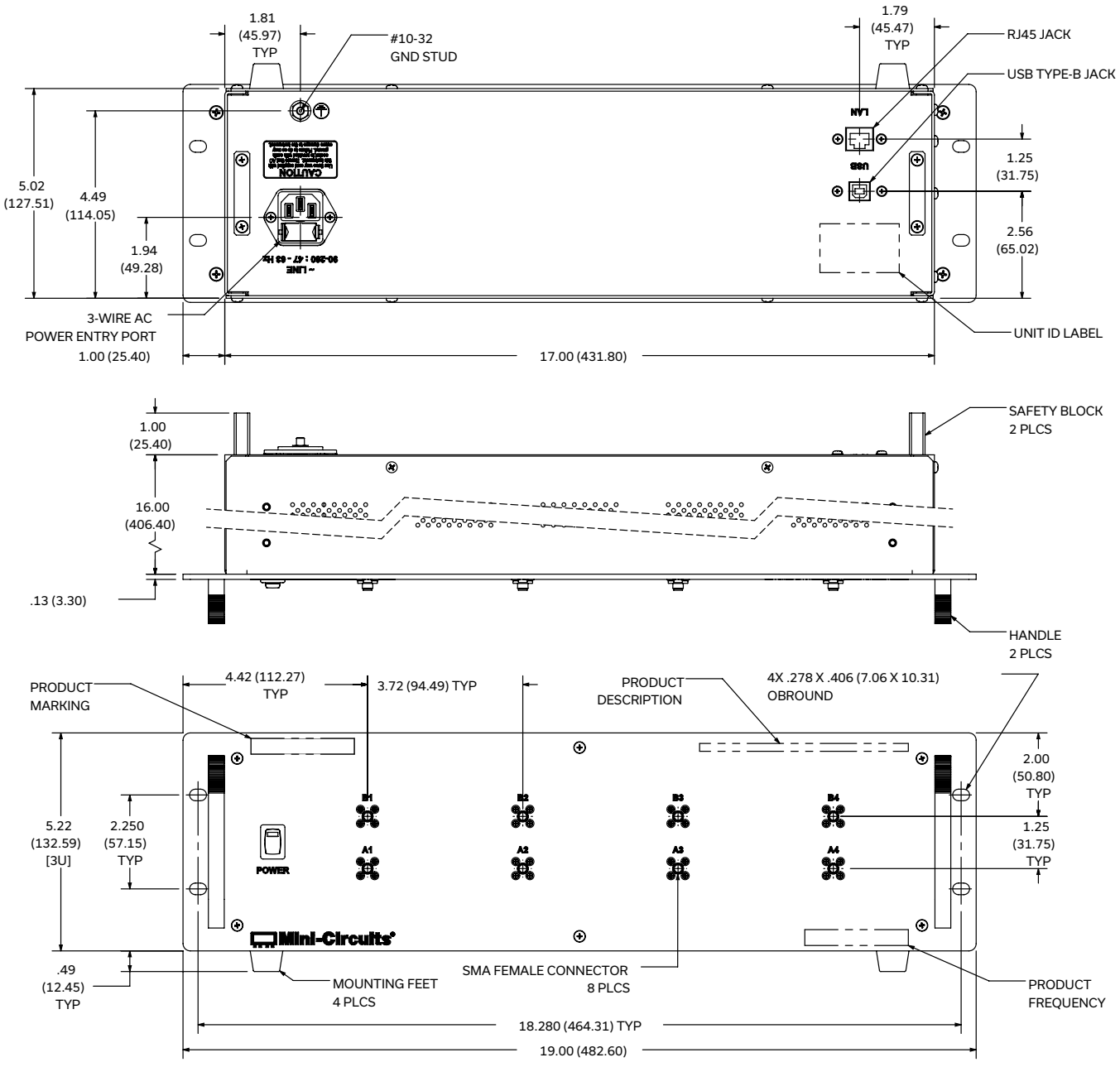
Port	Connector
A1-A4 & B1-B4	SMA female
USB	USB type B
Ethernet / LAN	RJ45
AC Input	IEC C14 inlet

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CASE STYLE DRAWING



Weight: 5670 grams.
Dimensions are in inches (mm). Tolerances: 2 Pl. ±.03 inch; 3 Pl. ±.015 inch.

PRODUCT MARKING*

Product Marking: ZT-4X4NB
Product Description: Non-Blocking Switch Matrix
Product Frequency: 350-6000 MHz
Unit ID Label: Serial number and other identification marks
*Marking may contain other features or characters for internal lot control

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DETAILED MODEL INFORMATION IS AVAILABLE ON OUR WEBSITE CLICK HERE

Case Style	AAK2073
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)
	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 NEMA 5-15 plug (type B) to IEC C13 connector
	CBL-3W-EU	Europe CEE 7/7 plug (type E/F) to IEC C13 connector
	CBL-3W-UK	UK BS-1363 plug (type G) to IEC C13 connector
	CBL-3W-AU	Australia & China AS/NZS 3112 plug (type I) to IEC C13 connector
	CBL-3W-IL	Israel 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 Ambient Environment	Individual Model Data Sheet
Storage Temperature	-20° to 60° C 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

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