USB & ETHERNET

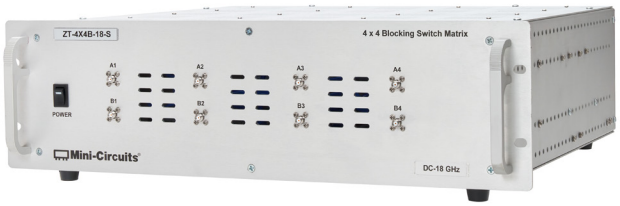
Blocking Switch Matrix

ZT-4X4B-18-S

50 Ω DC to 18 GHz 4 x 4 Rack-Mount SMA Female

THE BIG DEAL

- Bi-directional, 4 x 4 blocking switch matrix
- One-to-one switch paths
- Low insertion loss between connected ports
- High isolation between disconnected ports
- Software automation via Ethernet & USB
- Convenient rack-mountable chassis



Generic photo used for illustration purposes only

APPLICATIONS

- High throughput production testing
- RF test automation & signal routing
- 5G FR1 & FR3, WiFi 6E MIMO, UWB, Bluetooth
- MIMO antenna testing

PRODUCT OVERVIEW

Mini-Circuits' ZT-4X4B-18-S is a high-performance, 4 by 4 blocking switch matrix, operating over a wide bandwidth from DC to 18 GHz. The system is integrated into a compact, 3U height, 19-inch rack-mountable chassis with all RF ports (A1 to A4 and B1 to B4) on the front panel, all SMA female.

The blocking configuration supports 4 active switch paths at any time, with each of the 4 "A" ports able to connect to any of the 4 "B" ports in a one-to-one arrangement. 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 HTTP and Telnet network protocols). Full software support includes our user-friendly GUI application for Windows and a full API with programming instructions for Windows and Linux environments.

KEY FEATURES

Feature	Advantages
Blocking matrix	One-to-one switch paths with low loss when connected and high isolation when disconnected; minimizing the impact of the matrix itself on sensitive RF test results.
Ethernet & USB control	USB HID and Ethernet (HTTP & Telnet) interfaces ensure compatibility with most software environments and connection requirements.
Rack-mount chassis	Compact 3U height, 19" rack-mountable chassis suits integration in automated production test environments.

REV. 5
ZT-4X4B-18-S
MCL NY
240509

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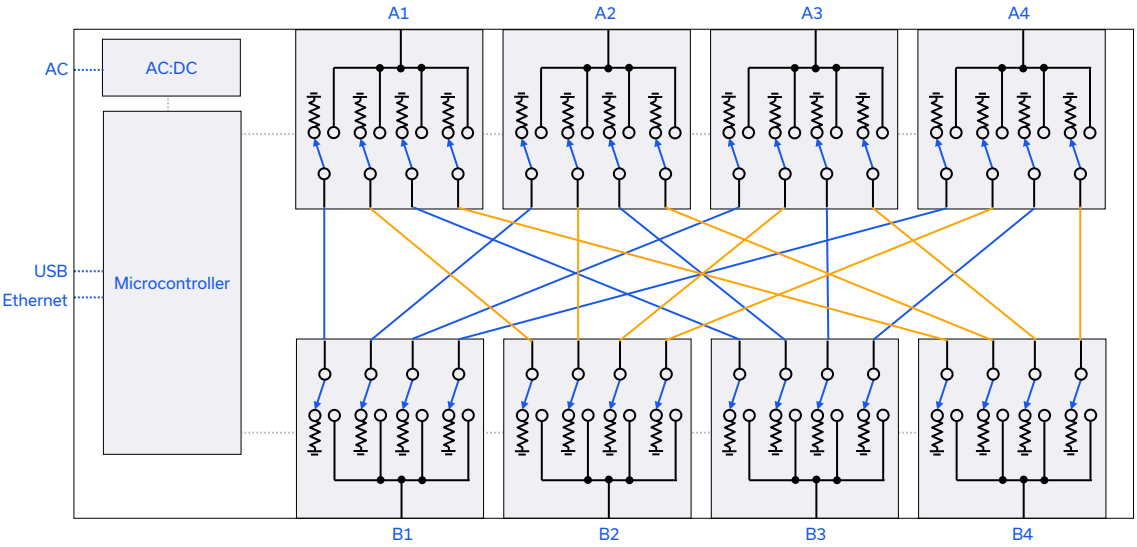
ELECTRICAL SPECIFICATIONS AT +25°C (EACH SWITCH)

Parameter	Conditions	Min.	Typ.	Max.	Units
Frequency Range		DC		18	GHz
Insertion Loss	DC – 8 GHz		1.1	1.5	dB
	8 – 12 GHz		1.4	1.8	
	12 – 18 GHz		1.8	2.2	
Isolation (Inactive Paths)[1]	DC – 8 GHz	85	100		dB
	8 – 12 GHz	80	90		
	12 – 18 GHz	80	90		
Isolation (Adjacent Ports)[2]	DC – 8 GHz	85	100		dB
	8 – 12 GHz	80	90		
	12 – 18 GHz	80	90		
Return Loss[3]	DC – 18 GHz		18		dB
RF Input Power	Cold switching			+33	dBm
	Hot switching			+20	
	Into internal terminations			+30	

1. Isolation from input to output on a disconnected switch path. Example: A1 to B1 isolation is the leakage measured at B1 when A1 is connected to B2.
2. Isolation between any pair of A or B ports. Example: Isolation measured from B1 to B2.
3. Return loss into all ports in all states

FUNCTIONAL BLOCK DIAGRAM



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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 Time1	3 ms typ

1. Based on the polling interval of the USB HID protocol 125 µs with 1024 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 that 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 that 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 switch state: • [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 B4) • Example :PATH:B4:?

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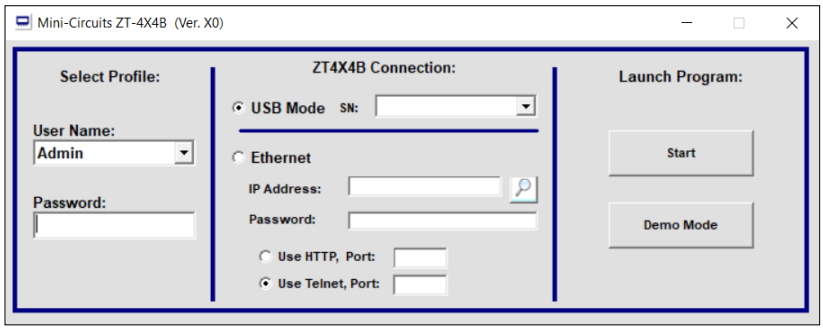
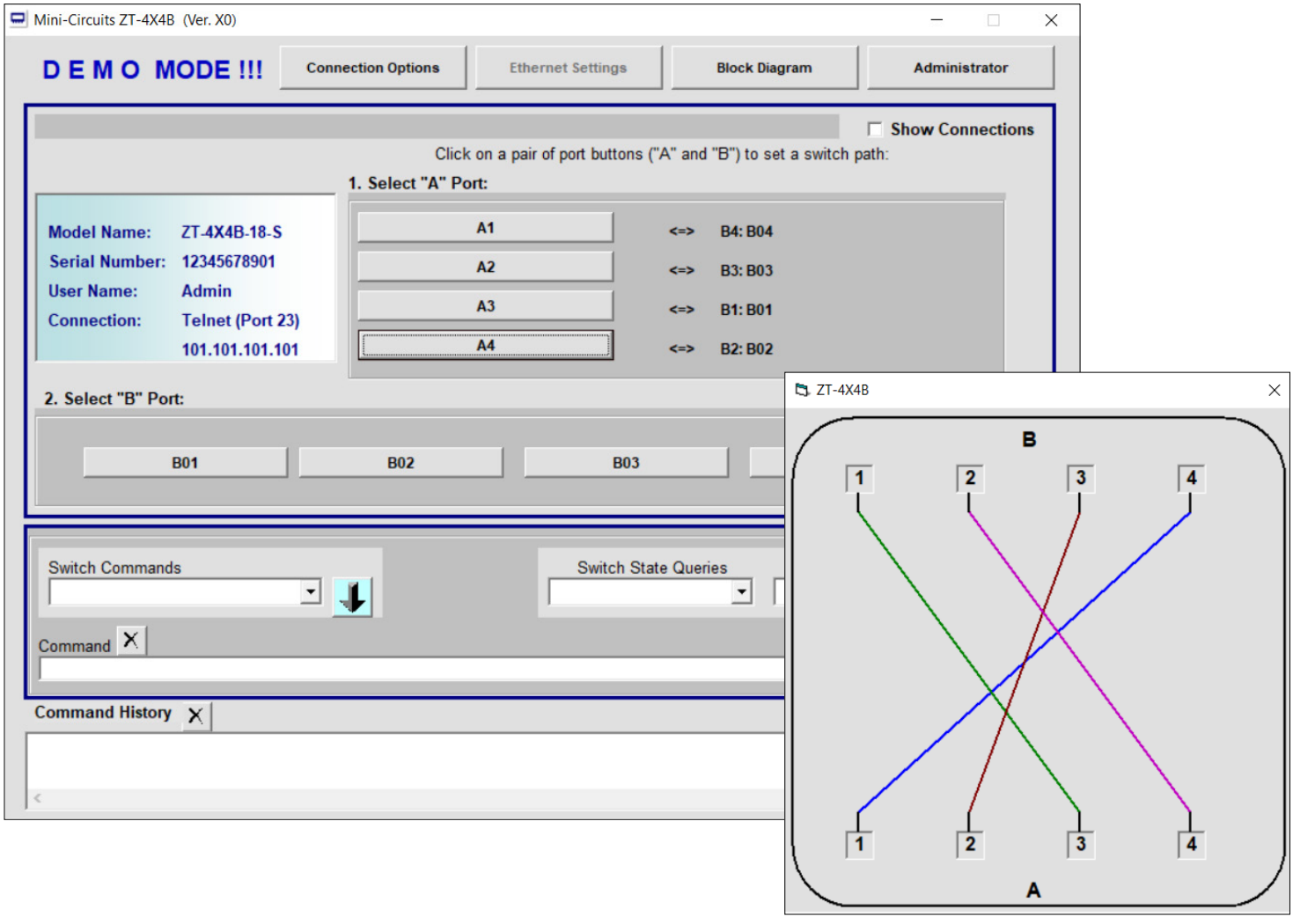
GRAPHICAL USER INTERFACE (GUI) FOR WINDOWS

- 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
- Configure automated switching sequences
- Define custom switch and port labels
- Configure Ethernet settings
- Update firmware



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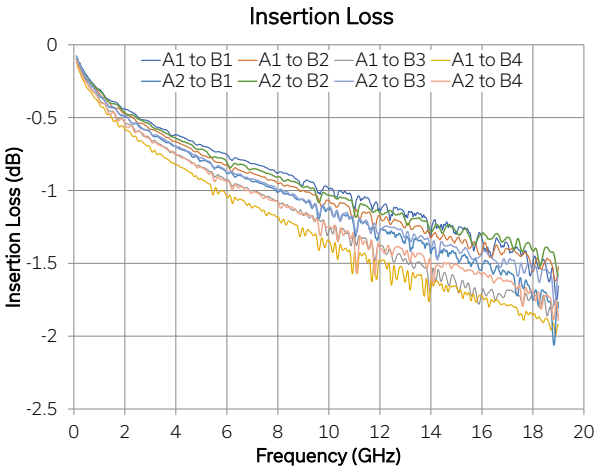
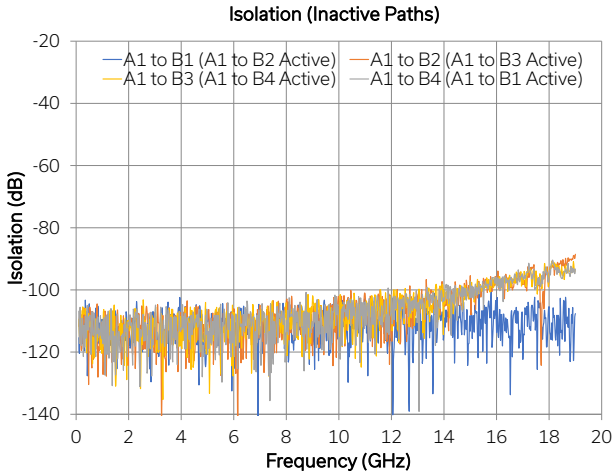
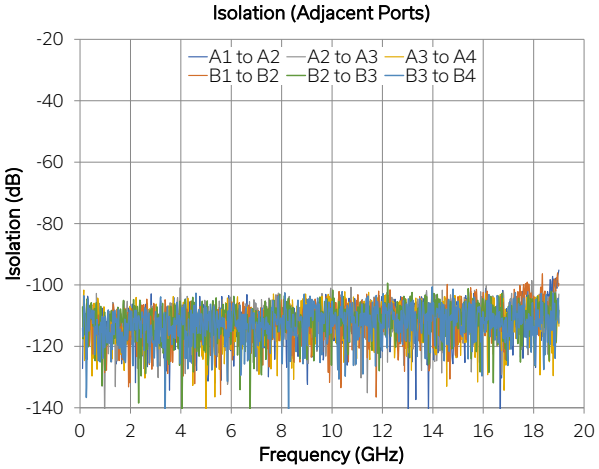
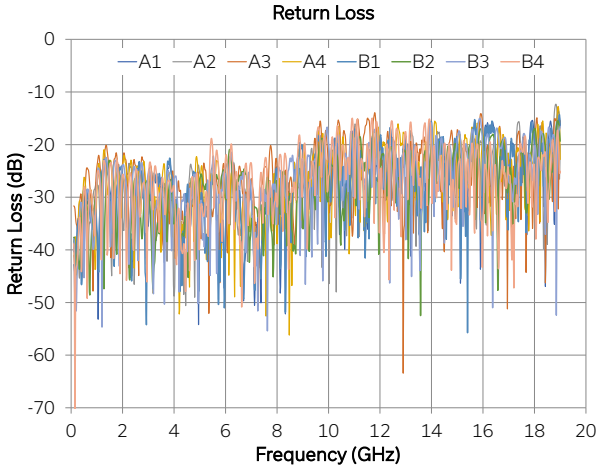
TYPICAL PERFORMANCE GRAPHS









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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)	Cold switching	+33	dBm
	Hot switching	+20	
	Into internal termination	+30	

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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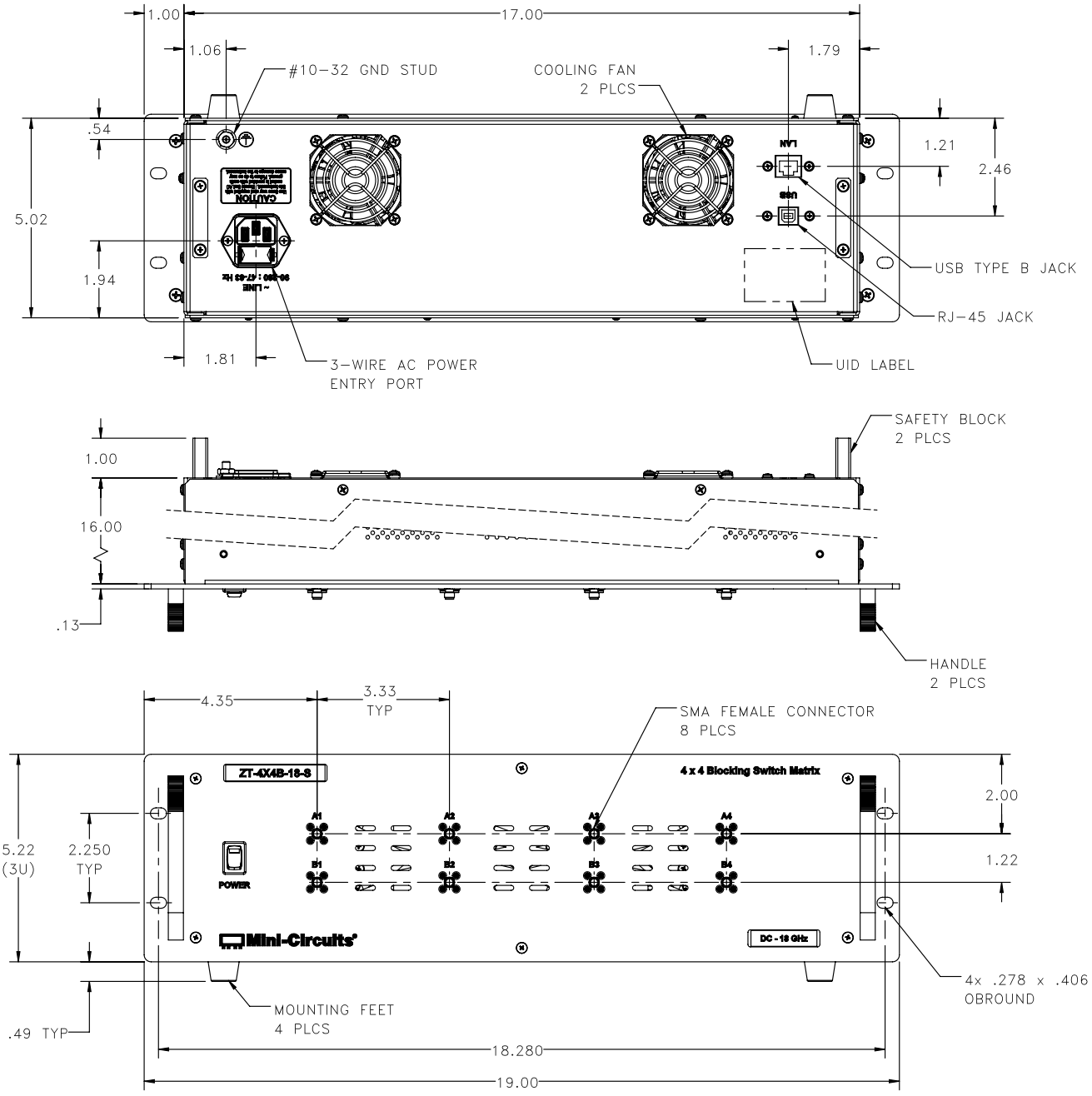
CASE STYLE DRAWING



PRODUCT MARKING*

Product Marking: ZT-4X4B-18-S
Product Description: 4 x 4 Blocking Switch Matrix
Product Frequency: DC – 18 GHz
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	99-01-3394
Software, User Guide & Programming Manual	www.minicircuits.com/softwaredownload/zt/MCL_ZT4X4B-18-S_Setup_X0.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/MCLStore/terms.jsp

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