USB & ETHERNET

Non-Blocking Switch Matrix ZT-4X6NB-6E

50Ω 600 to 7200 MHz 4 x 6 Rack-Mount SMA-Female

THE BIG DEAL

- Bi-directional, 4 x 6 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



Front View

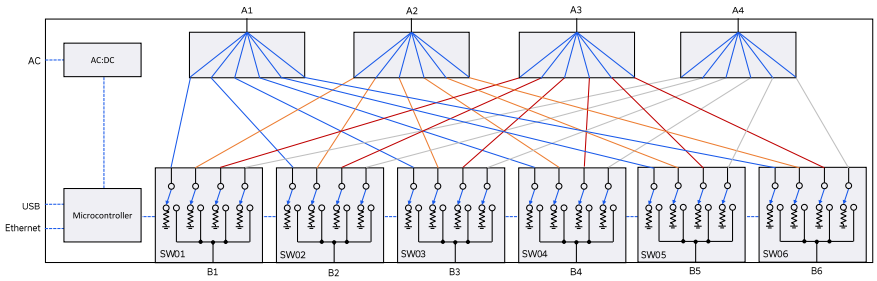


Rear View

APPLICATIONS

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- One-to-many / many-to-one switch paths
- Connect multiple inputs to the same output
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- SSH secure Ethernet communication
- Convenient rack-mountable chassis

FUNCTIONAL BLOCK DIAGRAM



PRODUCT OVERVIEW

Mini-Circuits' ZT-4X6NB-6E is a high performance 4 by 6 non-blocking switch matrix, operating over a wide bandwidth from 600 MHz to 7.2 GHz. The system is integrated into a compact 19-inch rack-mountable chassis with 4 RF ports (A1 to A4) on the front panel and 6 RF ports (B1 to B6) on the rear, all SMA female.

The non-blocking configuration supports up to 6 active switch paths at any time, with a single "A" port able to connect to any combination of "B" ports, including all 6 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 and minimize insertion loss.
Wide bandwidth	L-band coverage and operation to 7.2 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	3U height, 19" rack-mountable chassis suits integration in automated production test environments.

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ELECTRICAL SPECIFICATIONS AT +25°C

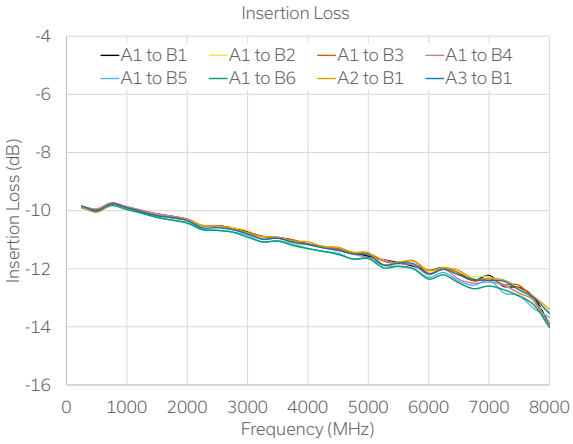
Parameter	Conditions	Frequency	Min.	Typ.	Max.	Units
Frequency Range	-		600		7200	MHz
Insertion Loss	Active paths	600 – 3600 MHz		11.0	12.5	dB
		3600 – 5500 MHz		12.0	14.0	
		5500 – 7200 MHz		13.0	14.5	
Isolation	Inactive paths[1] Between A ports[2] Between non-converging B ports[3]	600 – 3600 MHz	90	100		dB
		3600 – 5500 MHz	85	95		
		5500 – 7200 MHz	80	90		
	Between converging B ports[4]	600 – 3600 MHz	20	24		dB
		3600 – 5500 MHz	17	21		
		5500 – 7200 MHz	17	21		
Return Loss[2]	A ports	600 – 3600 MHz		20		dB
		3600 – 5500 MHz		14		
		5500 – 7200 MHz		14		
	B ports	600 – 3600 MHz		22		dB
		3600 – 5500 MHz		17		
		5500 – 7200 MHz		14		
Input Power	A ports	600-7200 MHz			30	dBm
	B ports	600-7200 MHz			20	

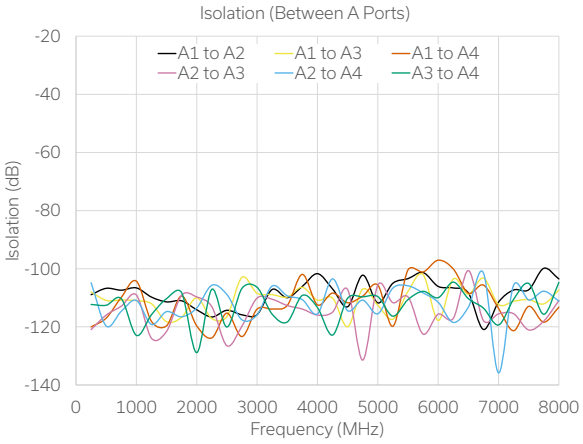
1. Isolation from input to output on a disconnected switch path. Example: A1 to B1 isolation is the leakage measured at B1 from a signal input at A1 when the switch in path is disconnected.
2. Isolation between any pair of A ports for any combination of connected switch paths. This parameter is influenced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

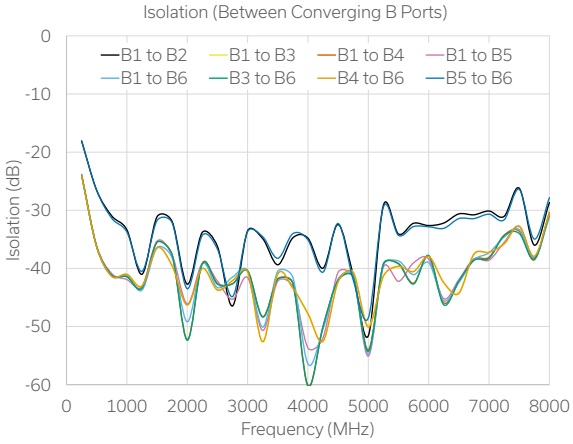
Non-Blocking Switch Matrix ZT-4X6NB-6E

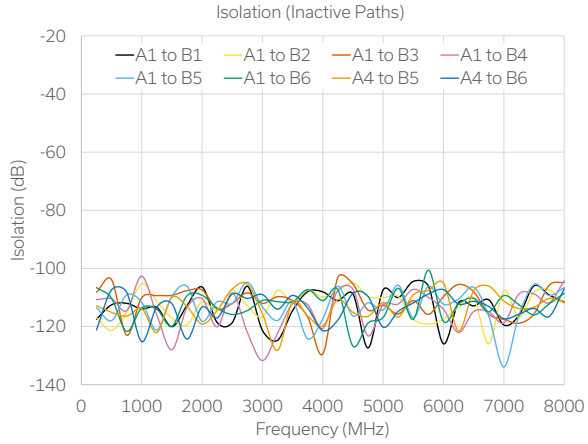
50Ω 600 to 7200 MHz 4 x 6 Rack-Mount SMA-Female

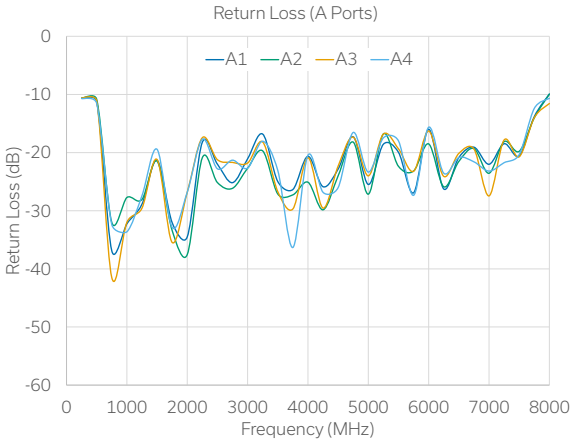
TYPICAL PERFORMANCE GRAPHS (EACH SWITCH)

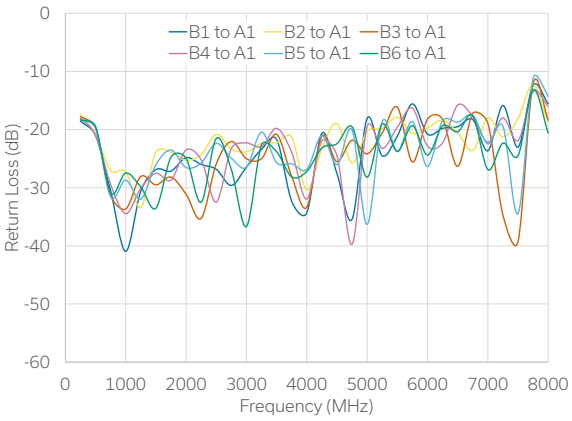












CONTROL INTERFACES

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[6]	400 µs typ

6. 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):

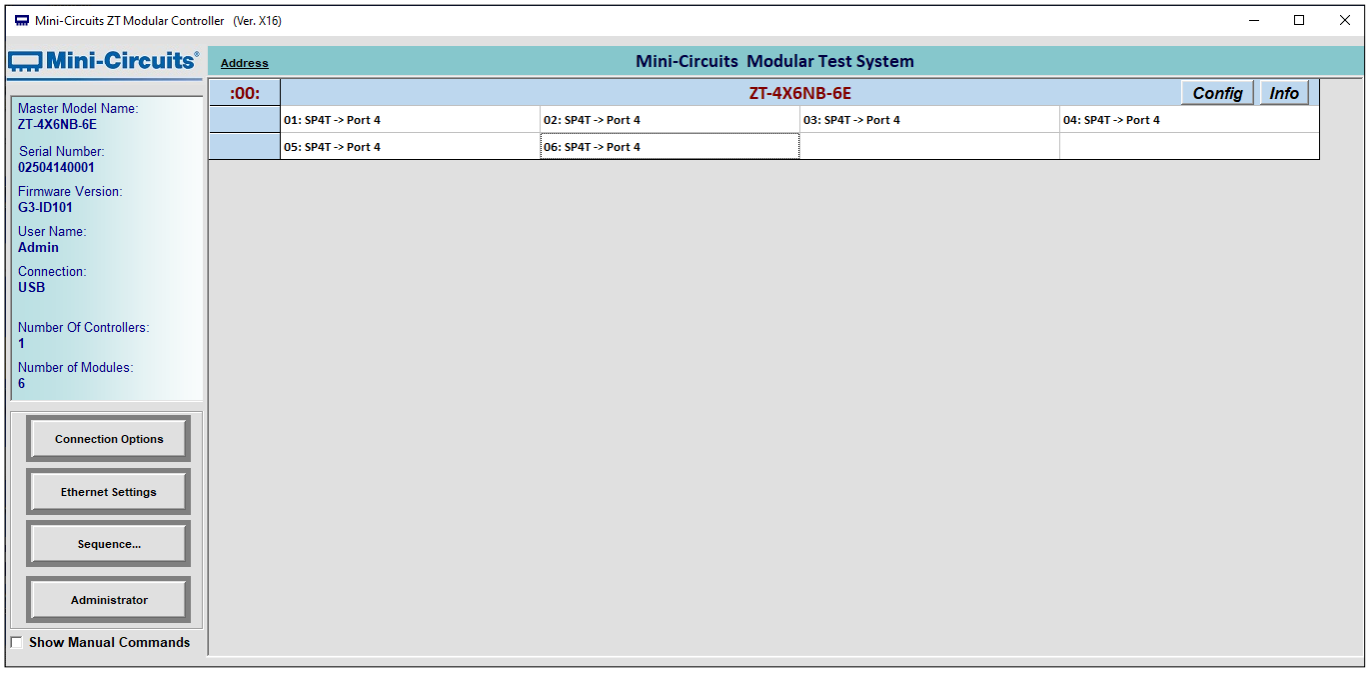
Command / Query	Description
:MN?	Read model name
:SN?	Read serial number
:FIRMWARE?	Read firmware version
:SP4T:[B_number]:STATE:[A_number]	Set a single path: • [A_number] = The "A" port number to connect (1 to 4) • [B_number] = The "B" port number to connect (1 to 6) • Example :SP4T:1:STATE:4
:SP4T:[B_number]:STATE?	Check which A port a given B port is connected to: • [B_number] = The "B" port number to check (1 to 6) • Example :SP4T:1:STATE?

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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 states at the click of a button
- Set switch power-up states
- 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)	A ports	+30	dBm
	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	2 A, 250 V rating
Power Consumption	150 W maximum

SWITCH PATH TABLE

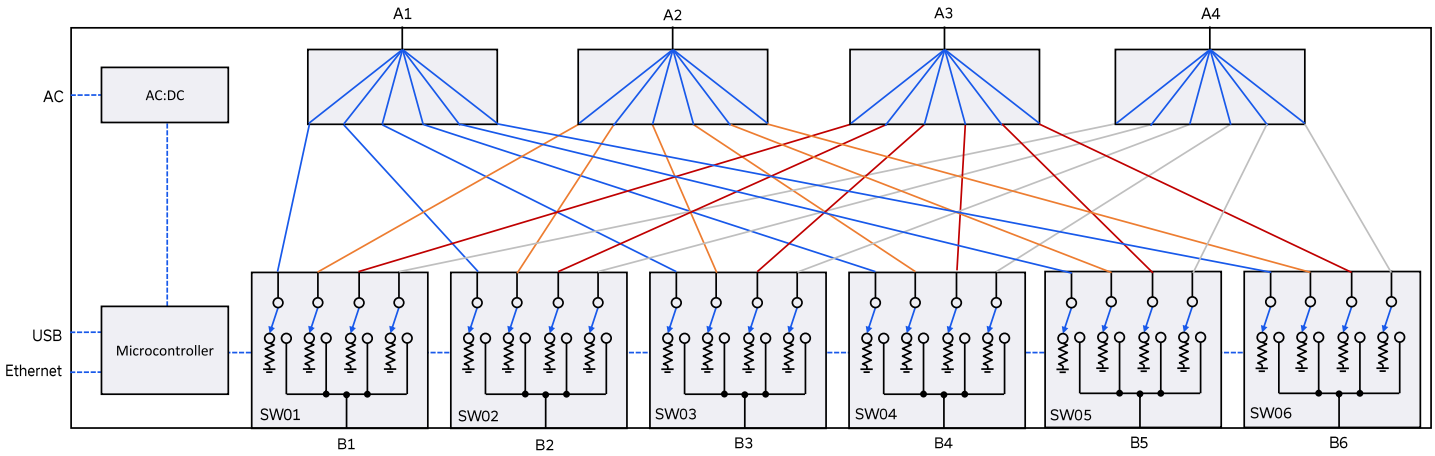
Switch Command[7]	Switch Path
:SP4T:x:STATE:0	Port Bx disconnected[8]
:SP4T:x:STATE:1	Bx connected to A1
:SP4T:x:STATE:2	Bx connected to A2
:SP4T:x:STATE:3	Bx connected to A3
:SP4T:x:STATE:4	Bx connected to A4

7. x = Switch number / B port number
8. B port will be open (reflective) in the disconnected state

CONNECTIONS

Port	Connector
A1-A6 & B1-B4	SMA female
USB	USB type B
Ethernet / LAN	RJ45
AC Input	IEC C14 inlet

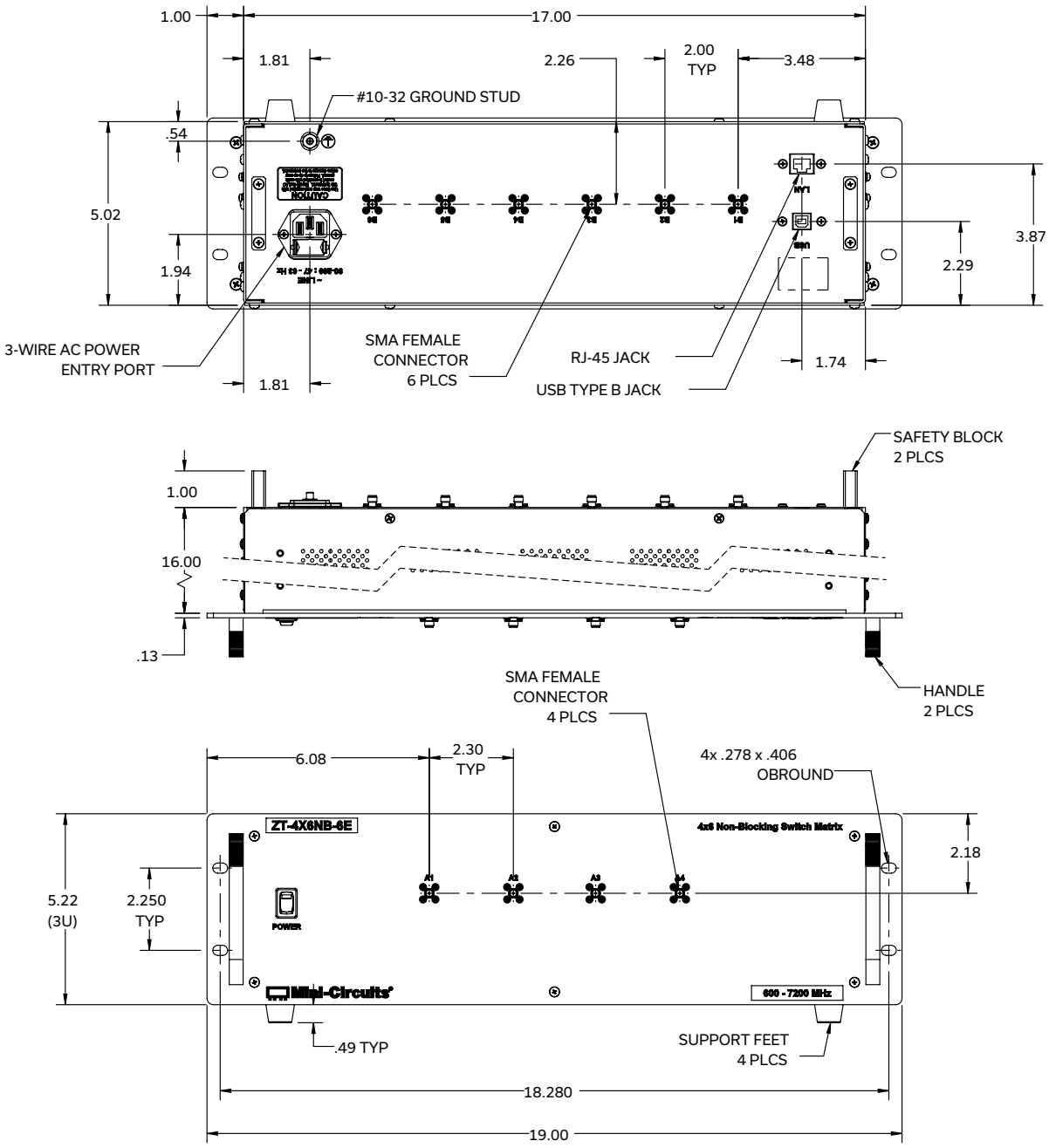
FUNCTIONAL BLOCK DIAGRAM



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CASE STYLE DRAWING



PRODUCT MARKING*

Product Marking: ZT-4X6NB-6E
Product Description: 4x6 Non-Blocking Switch Matrix
Product Frequency: 600-7200 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	99-01-3722
Software, User Guide & Programming Manual	www.minicircuits.com/softwaredownload/ztm_ztm2.html
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
	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.
	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)

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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