



RACK MOUNTED | USB & ETHERNET CONTROL

Full Fan Out Matrix

ZT-8RFX8

Mini-Circuits

50Ω 500 to 6000 MHz 8 X 8

THE BIG DEAL

- Completely flexible 8 x 8 matrix
- Fully non-blocking / full fan-out
- Combine any combination of input & output ports
- Independently programmable loss on each path
- GUI & API for automation

APPLICATIONS

- eNodeB
- Mesh radio
- Massive MIMO
- Cellular handover

PRODUCT OVERVIEW

ZT-8RFX8 is a “full fan out” or “fully non blocking” matrix. These systems use a combination of programmable attenuators and splitter/combiners to provide a completely flexible set of paths between the input and output ports. The configuration is analogous to a switch matrix except any individual path can be “on” (0 dB attenuation), or “off”(max attenuation), or any specific path loss in between. In addition, all inputs can connect simultaneously to all outputs, and all paths are bi directional. This completely flexible set of path characteristics is ideal for cellular transceiver and handover test requirements, particularly complex LTE eNodeB applications. Multiple signal sources and interferers can be combined into any combination of DUT at precisely tailored signal levels

The matrix is housed in a 3U height, 19 inch rack chassis with SMA RF connectors on the front and rear panels. The system can be controlled via USB or Ethernet (supporting SSH, HTTP & 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 (both 32 bit and 64 bit systems).

KEY FEATURES

Feature	Advantages
Splitter / attenuator matrix	Connect any combination of inputs to any combination of outputs with precise signal levels on each path
Rack chassis	Compact rack mountable chassis for easy integration into automated test environments
Ethernet Control	Remote control from any computer or device with a network connection (SSH, HTTP or Telnet protocols).



CASE STYLE: WS3106

DOWNLOAD

SOFTWARE PACKAGE

RoHS Compliant

See our web site for RoHS Compliance methodologies and qualifications

REV. A
 ECO-012613
 ZT-8RFX8
 MCL NY
 220331





ELECTRICAL SPECIFICATIONS AT 25°C

Parameter	Condition (MHz)	Min.	Typ.	Max.	Unit
Frequency Range		500	-	6000	MHz
Path Loss	500 – 3000	-	23	28	dB
	3000 – 6000	-	28	32	
Return Loss	500 – 3000	-	18	-	dB
	3000 – 6000	-	13	-	
Attenuation Range	Per path, 0.25 dB steps	0	-	63	dB
Isolation (between adjacent ports @ 0 dB)	500 – 3000	45	52	-	dB
	3000 – 6000	48	57	-	
Isolation (in <-> out @ 63 dB)	500 – 3000	-	83	-	dB
	3000 – 6000	-	90	-	
Input Power		-	-	+20	dBm

MECHANICAL SPECIFICATIONS

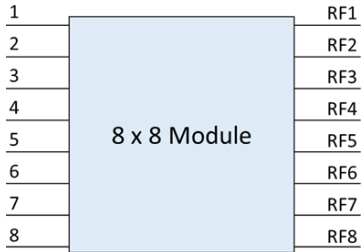
Dimensions	19" (W) x 3U (H) x 20" (D)				
Weight	13.6 kg				
Case Drawing	WS3106				
Case Material	<ul style="list-style-type: none"> Aluminum (with protective coating to prevent corrosion) 				
RF Connectors	Panel		Connector	Quantity	Port Labels
	Front		SMA female	8	RF1 to RF8
	Rear			8	1 to 8
Panel Items	Front Panel		Rear Panel		
Panel Marking	<ul style="list-style-type: none"> ZT-8RFX8 8 x 8 RF Port System 500-6000 MHz 		<ul style="list-style-type: none"> CE UKCA EAC Serial number / date code / model name 		
Other Connectors			<ul style="list-style-type: none"> AC mains power input (IEC C14 inlet) USB type B socket RJ45 (LAN) socket Serial In (D-Sub 9-pin) Serial Out (D-Sub 9-pin) 		
Other	<ul style="list-style-type: none"> Power on / off switch with LED Carry handles 				
Power Supply	AC mains power input (90-260 V, 47-63 Hz)				
Fuse	2A, 250V rating				
Power Consumption	70W max				
Temperature	Operating: 0 to +50 °C				



Full Fan Out Matrix

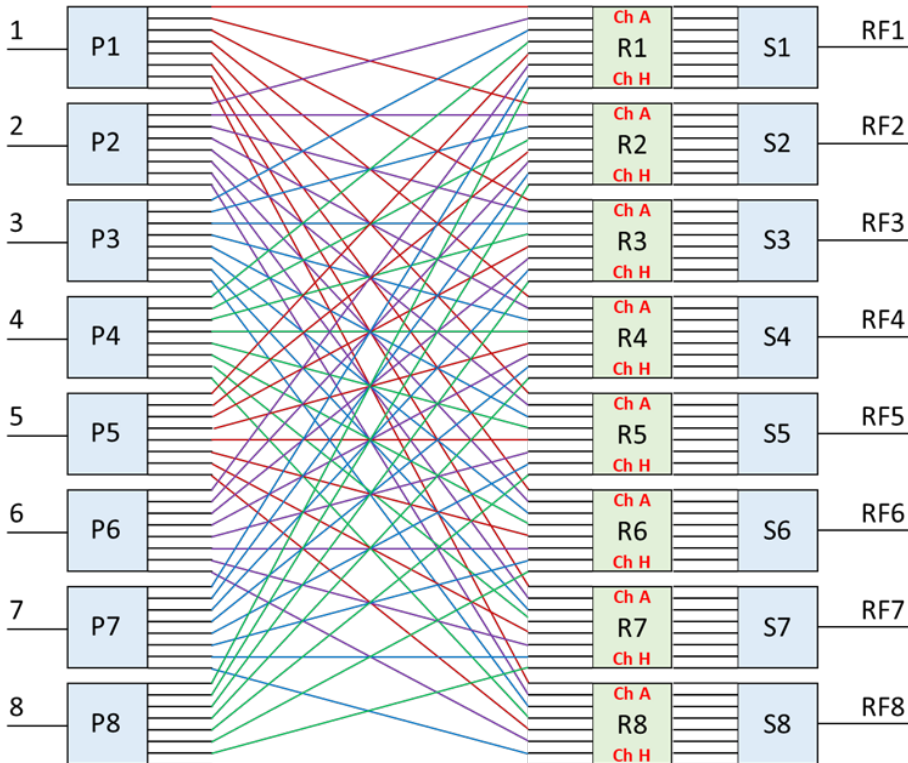
ZT-8RFX8

SIMPLIFIED FUNCTIONAL BLOCK DIAGRAM



- The system has 8 inputs and 8 outputs
- All paths are bi-directional
- Each internal path has an independent programmable attenuator (64 total)
- Each input can connect to each output in any combination and with precisely controlled path loss

FULL SYSTEM BLOCK DIAGRAM



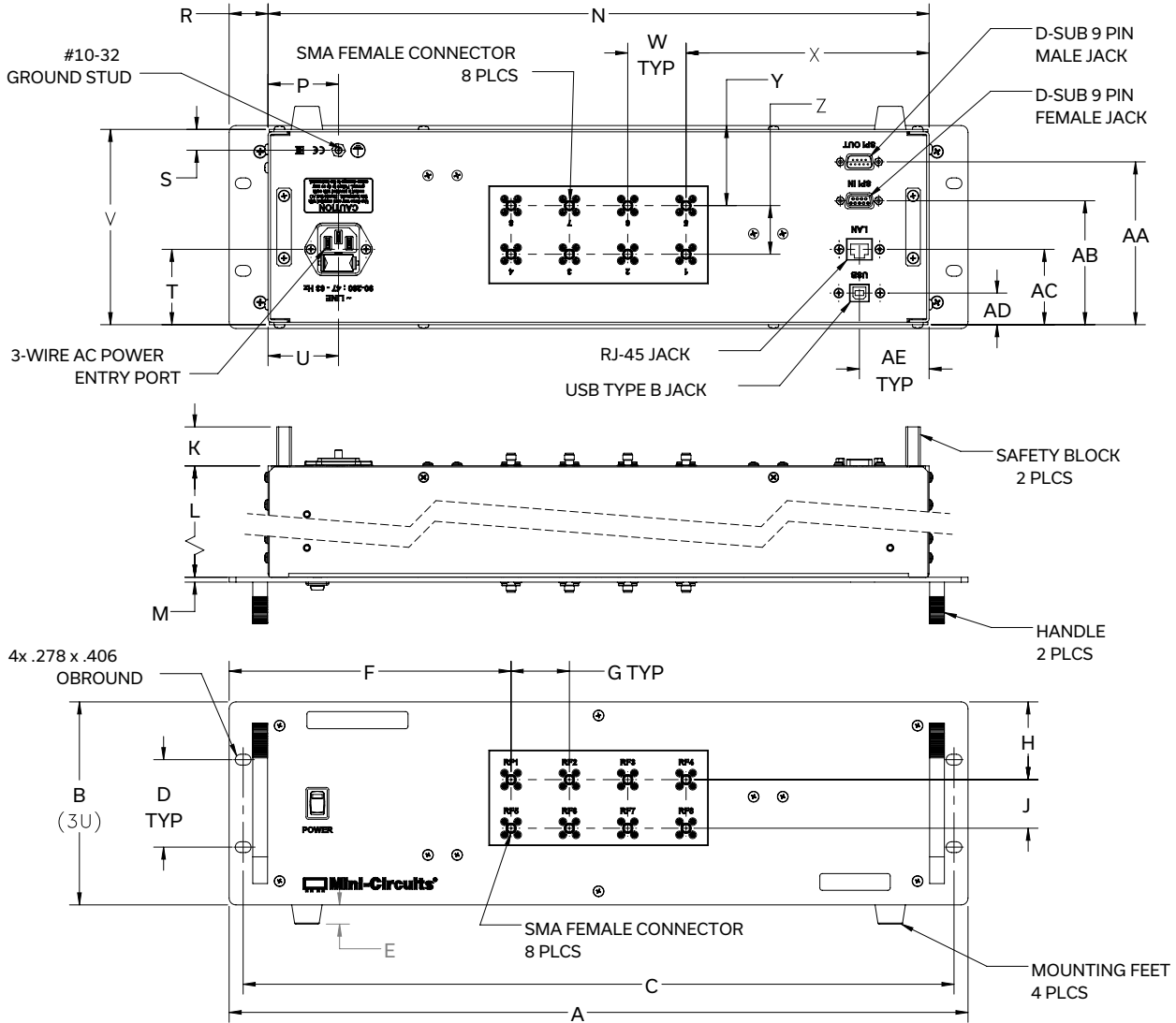
Label	Description
P1-P8 & S1-8	8-way splitter / combiner
R1-R8	8-channel programmable attenuator



Full Fan Out Matrix

ZT-8RFX8

OUTLINE DRAWING



OUTLINE DIMENSIONS (Inch/mm)

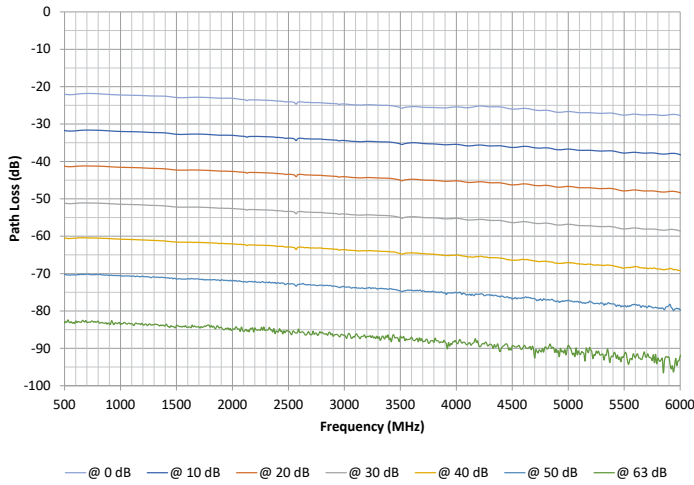
CASE#	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R
WS3106	19.00 (482.6)	5.22 (136.2)	18.280 (464.31)	2.250 (57.15)	.49 (12.5)	7.25 (184.2)	1.50 (38.1)	2.00 (50.8)	1.25 (31.8)	1.00 (25.4)	20.00 (508)	.13 (3.2)	17.00 (431.8)	1.81 (46)	1.00 (25.4)
	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	WT. GRAMS	
	.54 (13.6)	1.94 (49.2)	1.81 (46)	5.02 (127.6)	1.50 (38.1)	6.25 (158.7)	2.06 (25.3)	1.25 (31.8)	4.19 (106.4)	3.19 (81)	1.94 (49.2)	.81 (20.7)	1.79 (45.5)	13610	



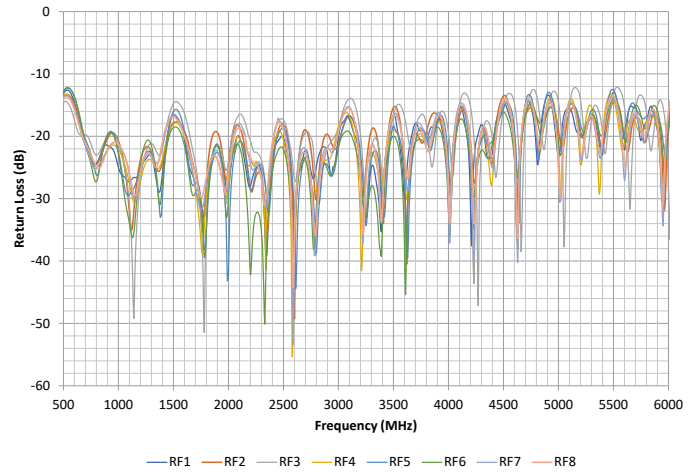
Full Fan Out Matrix

TYPICAL PERFORMANCE CURVES

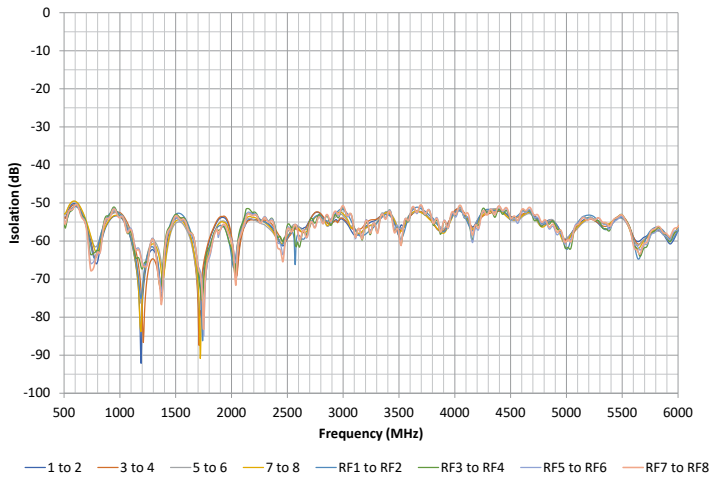
Path Loss @ Attenuation Settings (RF1 <-> 1)



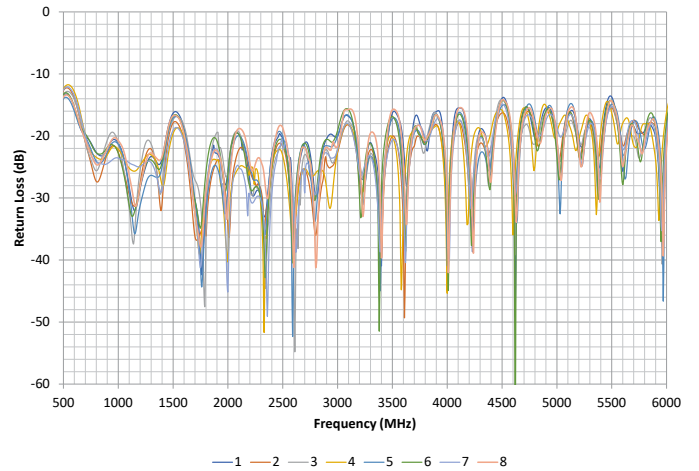
Return Loss (Ports RF1-RF8)



Isolation (Between Adjacent Ports @ 0 dB)



Return Loss (Ports 1-8)





SOFTWARE SPECIFICATIONS

- Please contact testsolutions@minicircuits.com for support

Ethernet Control	Supported Protocols	TCP / IP, SSH, HTTP, Telnet, DHCP, UDP
	Max Data Rate	100 Mbps (100Base-T Full Duplex)
USB Control	Supported Protocols	HID-High Speed
	Min Communication Time	400 μ s typ
Software Support	<ul style="list-style-type: none"> • Mini Circuits' Universal GUI for USB & LAN control (Windows only) • ASCII / SCPI command syntax for LAN programming (all OS) • ActiveX / .Net DLL APIs for USB programming (Windows only) • Interrupt codes for direct USB programming (all OS) • Full programming instructions and examples for a wide range of languages 	
Downloads	Software & Documentation	https://www.minicircuits.com/softwaredownload/multiatt.html

PROGRAMMING COMMANDS

- The key ASCII / SCPI commands for control of the system are summarized below
- These can be sent via the USB or Ethernet API
- Please refer to the programming manual for full details

Command / Query	Description
:MN?	Read model name
:SN?	Read serial number
:FIRMWARE?	Read firmware version
: [address] :CHAN: [channels] :SETATT: [Att]	Set attenuation: <ul style="list-style-type: none"> • [address] • Address of the 8-channel attenuator module • SL can be used to refer to all 8-channel modules • [channels] • Channel number (1 to 8) within the 8-channel module • Multiple channels can be listed, separated by ":" • [Att] • Attenuation value (0-63) Examples: :01:CHAN:1:SETATT:10.25 Sets channel 1 of RS8DAT 01 to 10.25dB :01:CHAN:1:2:3:SETATT:10.25 Sets channels 1, 2, & 3 of RS8DAT 01 to 10.25dB :SL:CHAN:1:2:3:4:SETATT:10.25 (Sets channels 1, 2, 3, & 4 of all RS8DATs to 0.25dB)
: [address] :CHAN: [channels] :ATT?	Returns the attenuation of a single channel <ul style="list-style-type: none"> • [address] : Address of the RS8DAT (01, 02, ..., SL) • [channels] : Channel of the RS8DAT (1, 2, ..., 8) Examples: :01:CHAN:1:ATT? (Returns the attenuation of channel 1 of RS8DAT 1)



Full Fan Out Matrix

ZT-8RFX8

ATTENUATOR LOGIC TABLE

- Signal routing and level control within the matrix is accomplished using programmable attenuators
- The 64 attenuator channels are organised over 8 separate 8 channel attenuator modules
- The logic table below maps out the specific attenuator channel which applies to each independent input / output path

	Channel 1 (A)	Channel 2 (B)	Channel 3 (C)	Channel 4 (D)	Channel 5 (E)	Channel 6 (F)	Channel 7 (G)	Channel 8 (H)
Att 01	1 ↔ RF1	2 ↔ RF1	3 ↔ RF1	4 ↔ RF1	5 ↔ RF1	6 ↔ RF1	7 ↔ RF1	8 ↔ RF1
Att 02	1 ↔ RF2	2 ↔ RF2	3 ↔ RF2	4 ↔ RF2	5 ↔ RF2	6 ↔ RF2	7 ↔ RF2	8 ↔ RF2
Att 03	1 ↔ RF3	2 ↔ RF3	3 ↔ RF3	4 ↔ RF3	5 ↔ RF3	6 ↔ RF3	7 ↔ RF3	8 ↔ RF3
Att 04	1 ↔ RF4	2 ↔ RF4	3 ↔ RF4	4 ↔ RF4	5 ↔ RF4	6 ↔ RF4	7 ↔ RF4	8 ↔ RF4
Att 05	1 ↔ RF5	2 ↔ RF5	3 ↔ RF5	4 ↔ RF5	5 ↔ RF5	6 ↔ RF5	7 ↔ RF5	8 ↔ RF5
Att 06	1 ↔ RF6	2 ↔ RF6	3 ↔ RF6	4 ↔ RF6	5 ↔ RF6	6 ↔ RF6	7 ↔ RF6	8 ↔ RF6
Att 07	1 ↔ RF7	2 ↔ RF7	3 ↔ RF7	4 ↔ RF7	5 ↔ RF7	6 ↔ RF7	7 ↔ RF7	8 ↔ RF7
Att 08	1 ↔ RF8	2 ↔ RF8	3 ↔ RF8	4 ↔ RF8	5 ↔ RF8	6 ↔ RF8	7 ↔ RF8	8 ↔ RF8

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 all attenuator states
- Configure Ethernet settings
- Upgrade firmware

The screenshot shows the Mini-Circuits Multi-Channel Programmable Attenuator GUI (Ver. B0X3). On the left, a sidebar displays system information: Model Name: ZT-8RFX8, Serial Number: 02110280001, System Name: Attenuator System, Channels: 64, User Name: Admin, Connection: USB. A navigation menu includes Connection Options, Automation Mode, Configuration Settings, Ethernet Settings, Firmware, User Access Control, Multi Sequence, and Show Log.



The main interface features a 'Set Attenuation' section with a 'Select Channel(s)' dropdown (set to 'Single Channel'), a 'Set Attenuation (0-63 dB)' input field (set to 5.00), and an 'Apply' button. The 'Current Attenuation' section shows 'Channel: 01A: RF1 ↔ 1' and 'Attenuation: 5.00 dB'.

Below is a table of channels with columns for ZT-8RFX8, A/E, B/E, C/G, and D/H. Each cell contains a channel ID and its routing/attenuation status.






ZT-8RFX8	A/E	B/E	C/G	D/H
01	RF1 ↔ 1 5.00	RF1 ↔ 2 0.00	RF1 ↔ 3 0.00	RF1 ↔ 4 0.00
01	RF1 ↔ 5 0.00	RF1 ↔ 6 0.00	RF1 ↔ 7 0.00	RF1 ↔ 8 0.00
02	RF2 ↔ 1 0.00	RF2 ↔ 2 0.00	RF2 ↔ 3 0.00	RF2 ↔ 4 0.00
02	RF2 ↔ 5 0.00	RF2 ↔ 6 0.00	RF2 ↔ 7 0.00	RF2 ↔ 8 0.00
03	RF3 ↔ 1 0.00	RF3 ↔ 2 0.00	RF3 ↔ 3 0.00	RF3 ↔ 4 0.00
03	RF3 ↔ 5 0.00	RF3 ↔ 6 0.00	RF3 ↔ 7 0.00	RF3 ↔ 8 0.00
04	RF4 ↔ 1 0.00	RF4 ↔ 2 0.00	RF4 ↔ 3 0.00	RF4 ↔ 4 0.00
04	RF4 ↔ 5 0.00	RF4 ↔ 6 0.00	RF4 ↔ 7 0.00	RF4 ↔ 8 0.00
05	RF5 ↔ 1 0.00	RF5 ↔ 2 0.00	RF5 ↔ 3 0.00	RF5 ↔ 4 0.00
05	RF5 ↔ 5 0.00	RF5 ↔ 6 0.00	RF5 ↔ 7 0.00	RF5 ↔ 8 0.00
06	RF6 ↔ 1 0.00	RF6 ↔ 2 0.00	RF6 ↔ 3 0.00	RF6 ↔ 4 0.00
06	RF6 ↔ 5 0.00	RF6 ↔ 6 0.00	RF6 ↔ 7 0.00	RF6 ↔ 8 0.00
07	RF7 ↔ 1 0.00	RF7 ↔ 2 0.00	RF7 ↔ 3 0.00	RF7 ↔ 4 0.00
07	RF7 ↔ 5 0.00	RF7 ↔ 6 0.00	RF7 ↔ 7 0.00	RF7 ↔ 8 0.00
08	RF8 ↔ 1 0.00	RF8 ↔ 2 0.00	RF8 ↔ 3 0.00	RF8 ↔ 4 0.00
08	RF8 ↔ 5 0.00	RF8 ↔ 6 0.00	RF8 ↔ 7 0.00	RF8 ↔ 8 0.00

**ORDERING INFORMATION**Please contact Mini-Circuits' Test Solutions department for price and availability: testsolutions@minicircuits.com

Model	Description
ZT-8RFX8	Full Fan Out Matrix

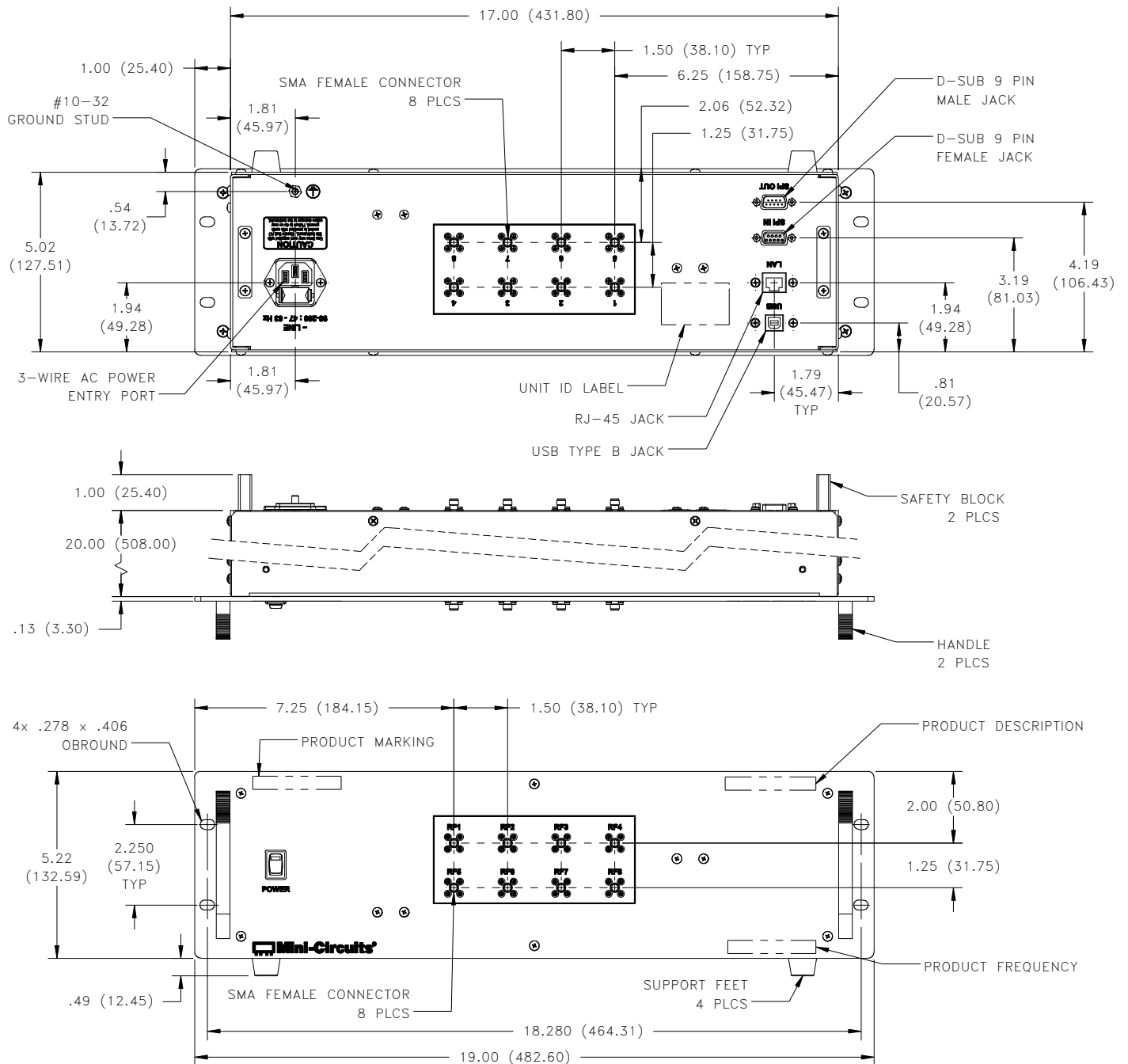
Included Accessories	Part No.	Description
See Below	CBL-3W-xx*	AC power cord (IEC C13 connector to local plug)
	USB-CBL-AB-7+	6.8 ft (2.1 m) USB Cable: USB type A(Male) to USB type B(Male)
	CBL-RJ45-MM-5+	5 ft (1.5 m) Ethernet cable: RJ45(Male) to RJ45(Male) Cat 5E cable
	HT-4-SMA	SMA Cable Wrench (4 in)

*Please specify one option on the purchase order, at no charge

AC Power Cords ⁵	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
	CBL-3W-AU	Power Cord for Australia and China
	CBL-3W-IL	Power Cord for Israel

5. If you need a Power cord for a country not listed please contact testsolutions@minicircuits.com

- 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



Notes:

1. Case material: Aluminum (with protective coating to prevent corrosion).
2. Dimensions are in inches (mm). Tolerances: 2 Pl. $\pm .03$ inch; 3 Pl. $\pm .015$ inch
3. Weight: 13610 grams.
4. Marking may contain other features or characters for internal lot control.



P.O. Box 350166, Brooklyn, New York 11235-0003 (718) 934-4500 Fax (718) 332-4661 For detailed performance specs & shopping online see Mini-Circuits web site



The Design Engineers Search Engine Provides ACTUAL Data Instantly From MINI-CIRCUITS At: www.minicircuits.com

RF/IF MICROWAVE COMPONENTS



Environmental Specifications **ENV56**

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 40° C Ambient Environment	Individual Model Data Sheet
Storage Temperature	-15° to 85° 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