

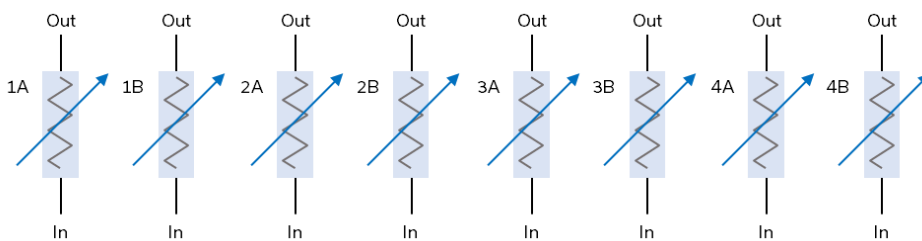
Product Overview

Mini-Circuits' ZTDAT series multi-channel programmable attenuator systems are ideal for a wide range of signal level control applications including transmission loss simulation, signal fading and MIMO measurements. The 10 MHz to 13 GHz operating bandwidth incorporates most of the common communications bands, supporting applications in LTE, 4G / 5G, IoT, Bluetooth, Zigbee, WiFi 6E and many more.

Each of the 8 independently controlled attenuator channels provides 0 to 60 dB attenuation with more than 100 dB isolation between channels. The system is housed in a compact, 2U height, 19-inch rack chassis, with SMA connectors on the front panel.

The system can be controlled via USB or Ethernet (supporting HTTP & Telnet 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). The full software and documentation package can be downloaded from our website at:

https://www.minicircuits.com/softwaredownload/ztm_rcm.html



Key Features

Feature	Advantages
Integrated attenuator system	Independent control of large numbers of attenuator channels with single power supply and control interface; ideal for testing receiver sensitivity, device / base-station hand-over, interference effects and many more.
Compact package	The compact 2U height chassis minimises rack space requirements.
Ethernet / LAN Control	Remote control from any computer or device with a network connection (HTTP or Telnet protocols).

Electrical Specifications at 25°C

Parameter	Conditions	Min	Typ	Max	Units
Frequency Range		10		13000	MHz
Attenuation Range		0		60	dB
Attenuation Steps			0.5		dB
Insertion Loss	10 – 500 MHz		5.8		dB
	500 – 5000 MHz		7.0		
	5000 – 11000 MHz		8.8		
	11000 – 13000 MHz		11.4		
Isolation	A <> B @ max attenuation		70		dB
	Between channels (<7.2 GHz)		100		
	Between channels (≥7.2 GHz)		90		dB
Input Operating Power ^{2,3}	10 – 400 MHz			+10	dBm
	400 – 13000 MHz			+23	
Return Loss			15		dB

1. Total input power at A and B ports of any channel (channels are bi-directional)

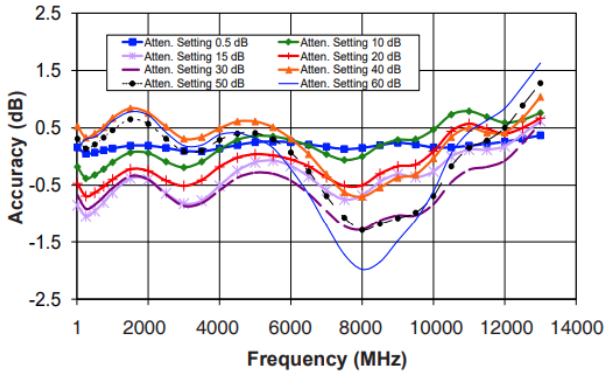
2. De-rate linearly from +23 dBm at 400 MHz to +10 dBm at 10 MHz

Attenuation Accuracy:

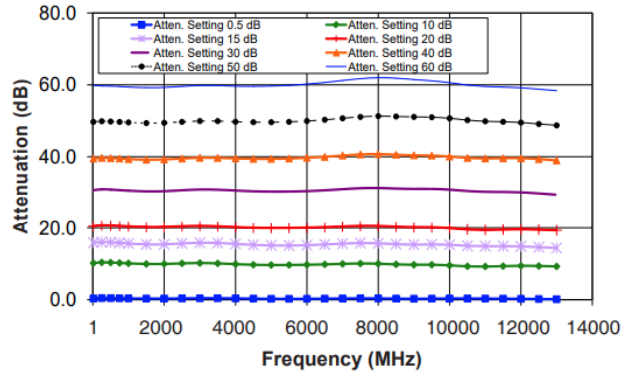
Frequency Range	Attenuation Range	Typ	Max	Units
10 – 500 MHz	0.5 – 14.0 dB	±0.60	±(0.9+5% of nominal value)	dB
	14.5 – 60 dB	±0.65	±(1.45+1% of nominal value)	
500 – 5000 MHz	0.5 – 14.0 dB	±0.35	±(0.9+5% of nominal value)	dB
	14.5 – 60 dB	±0.60	±(1.3+2% of nominal value)	
5000 – 11000 MHz	0.5 – 14.0 dB	±0.35	±(1.0+5% of nominal value)	dB
	14.5 – 60 dB	±0.60	±(1.35+2.5% of nominal value)	
11000 – 13000 MHz	0.5 – 14.0 dB	±0.60	±(1.1+4.5% of nominal value)	dB
	14.5 – 60 dB	±0.70	±(1.35+2.5% of nominal value)	

Typical Performance Data

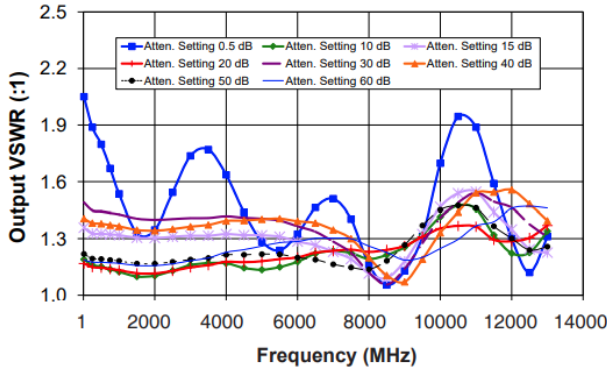
Attenuation Accuracy @ +25°C vs. Frequency over Attenuation settings



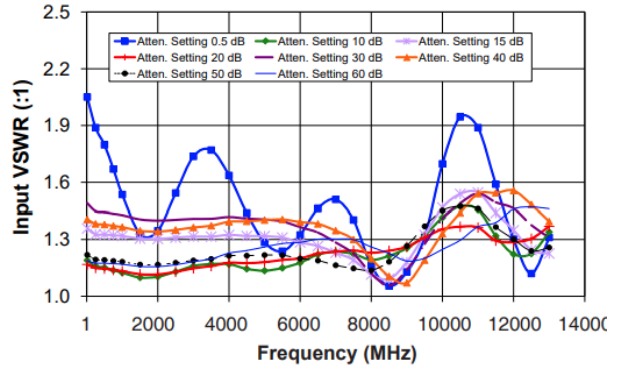
Attenuation relative to Insertion Loss @ +25°C vs. Frequency over Attenuation settings



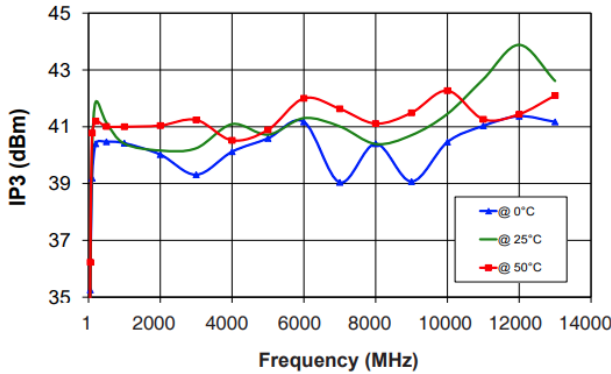
Output VSWR @ +25°C vs. Frequency over Attenuation settings



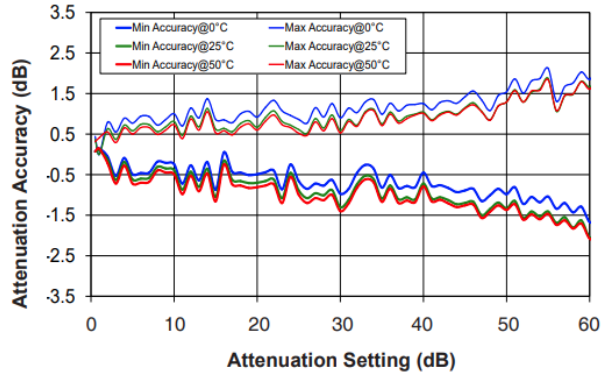
Input VSWR @ +25°C vs. Frequency over Attenuation settings



Input IP3 @ 0dB Attenuation vs. Frequency over Temperatures



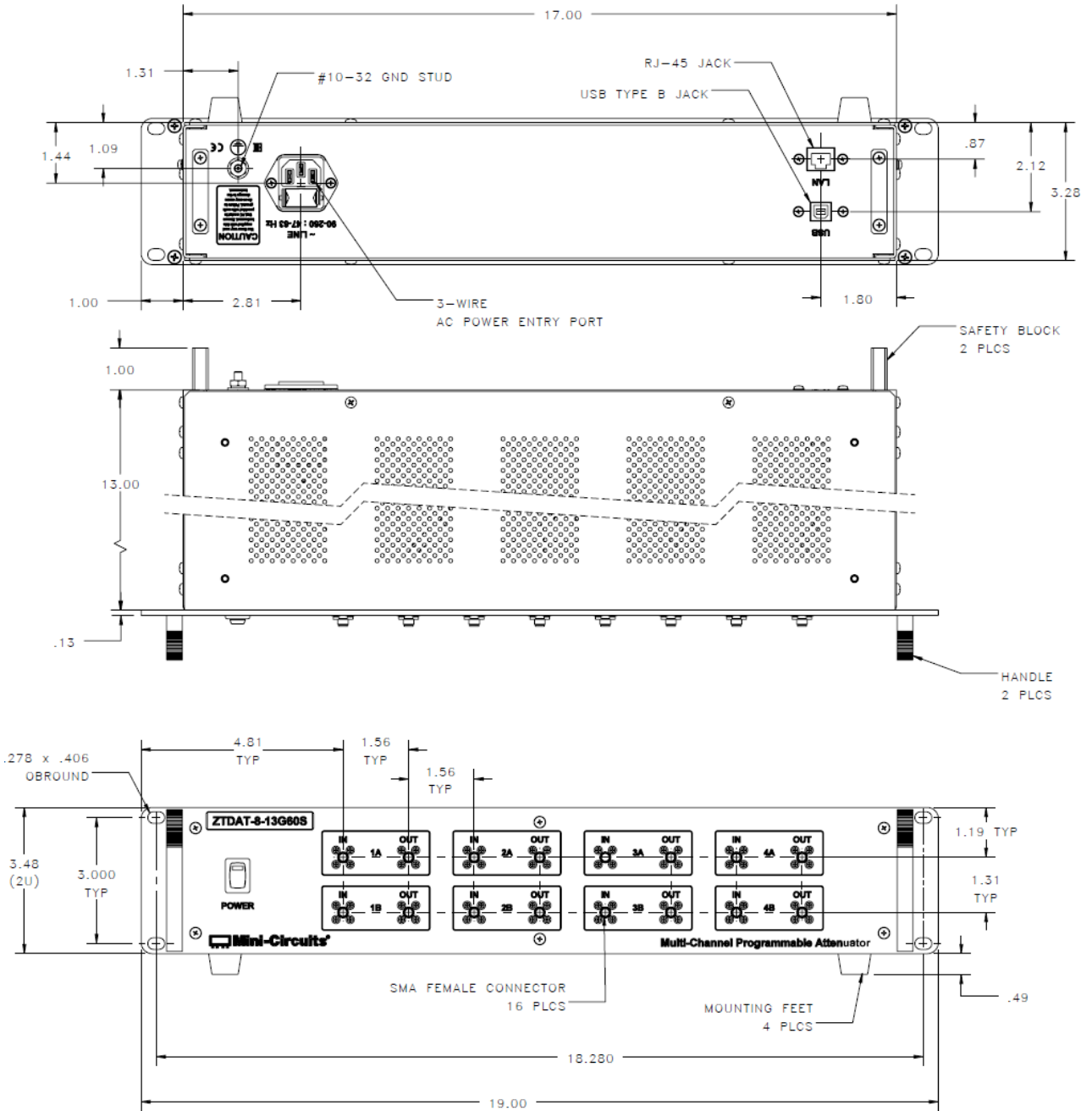
Typical Attenuation Accuracy @ 10-13000 MHz vs. Attenuation settings over Temperature



Mechanical Specifications

Dimensions	19" (W) x 2U (H) x 13" (D)			
Case Drawing	99-01-3221			
Case Material	• Aluminum (with protective coating to prevent corrosion)			
RF Connectors	Panel	Connector	Quantity	Port Labels
	Front	SMA female	8	IN & OUT per channel (channels 1A to 4B)
Panel Items	Front Panel			Rear Panel
Panel Marking	<ul style="list-style-type: none"> • Model name • Multi-Channel Programmable Attenuator 			<ul style="list-style-type: none"> • CE • EAC • Serial number / date code / model name
Other	<ul style="list-style-type: none"> • Power on / off switch with LED • Carry handles 			<ul style="list-style-type: none"> • AC mains power input (IEC C14 inlet) • USB type B socket • RJ45 (LAN) socket
Power Supply	AC mains power input (90-260 V, 47-63 Hz)			
Fuse	2A, 250V rating			
Temperature	Operating: 0 to +50 °C			

Outline Drawing



Software Specifications

- Please contact testsolutions@minicircuits.com for support

Ethernet Control	Supported Protocols	TCP / IP, HTTP, Telnet, DHCP, UDP
	Max Data Rate	10 Mbps (10Base-T Half Duplex)
USB Control	Supported Protocols	HID – Full Speed
	Min Communication Time	3 ms 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/ztm_rcm.html

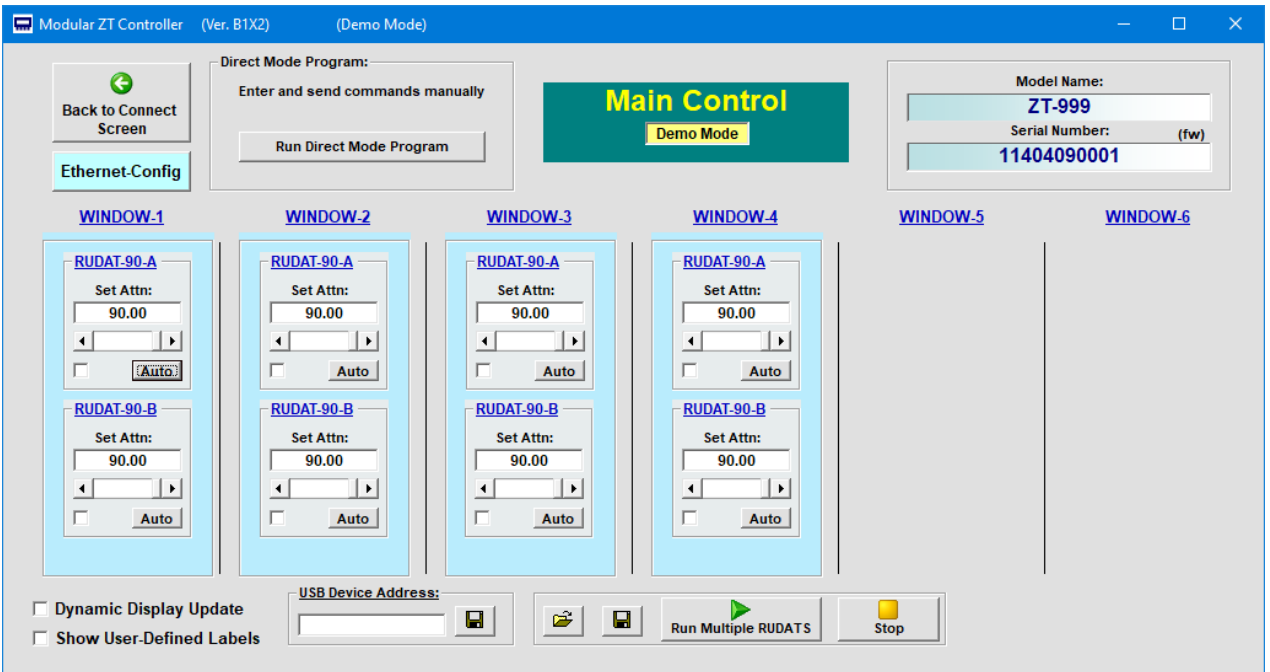
Programming Commands

- 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
:RUDAT:address:ATT:value	Set a single attenuator channel: <ul style="list-style-type: none"> • address = attenuator channel address (1A to 4B), refer to block diagram • value = the attenuation value to set in dB • Example: :RUDAT:2A:ATT:10.25 (set channel 2A to 10.25 dB)
:RUDAT:address:ATT?	Read a single attenuator channel: <ul style="list-style-type: none"> • address = attenuator channel address (1A to 4B), refer to block diagram • Example: :RUDAT:2A:ATT? (read channel 2A attenuation)

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 channels independently or in groups
- Configure automated attenuation sweep or hop sequences
- Configure Ethernet settings
- Upgrade firmware



Ordering Information

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

Included Accessories

Model Name	Quantity	Description
CBL-3W-xx*	1	AC power cord (IEC C13 connector to local plug)
USB-CBL-AB-7+	1	USB cable (6.8 ft)
CBL-RJ45-MM-5+	1	Ethernet cable (5 ft)
HT-4-SMA	1	SMA Cable Wrench (4 in)

Cable Model	Region
CBL-3W-US	USA
CBL-3W-EU	Europe
CBL-3W-IL	Israel
CBL-3W-UK	UK
CBL-3W-AU	Australia / China

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

Additional 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