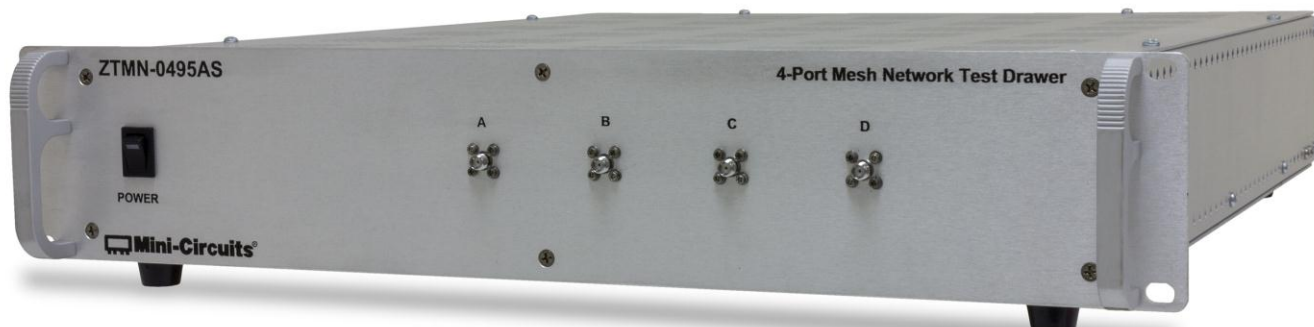


4-Port Mesh Network

ZTMN-0495AS

50Ω

350 to 6000 MHz



Product Overview

Mini-Circuits' ZTMN series are multi-port mesh networks covering all the key telecoms bands from 350 to 6000 MHz with independently variable attenuation on every path. This concept allows simulation of a “real-world” mesh communication network in the confined space of a production environment. Path loss can be varied independently between any pair of devices on the network without affecting any other combination of devices, allowing simulation of a complex range of test cases.

ZTMN-0495AS is a 4-port mesh network 0 to 95 dB attenuation range on each path, in 0.25 dB* steps. The unique attenuator design maintains linear attenuation change per dB, even at the highest attenuation settings.

The system model is housed in a compact 2U height, 19-inch rack chassis with SMA RF connectors on the front panel. The ZTMN series also supports larger mesh network combinations (up to 36 ports) with customer attenuation and frequency ranges available on request.

The system can be controlled via USB or Ethernet (supporting both 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 (both 32-bit and 64-bit systems).

* 0.25 dB steps from 0 to 90 dB; 0.5 dB steps above 90 dB

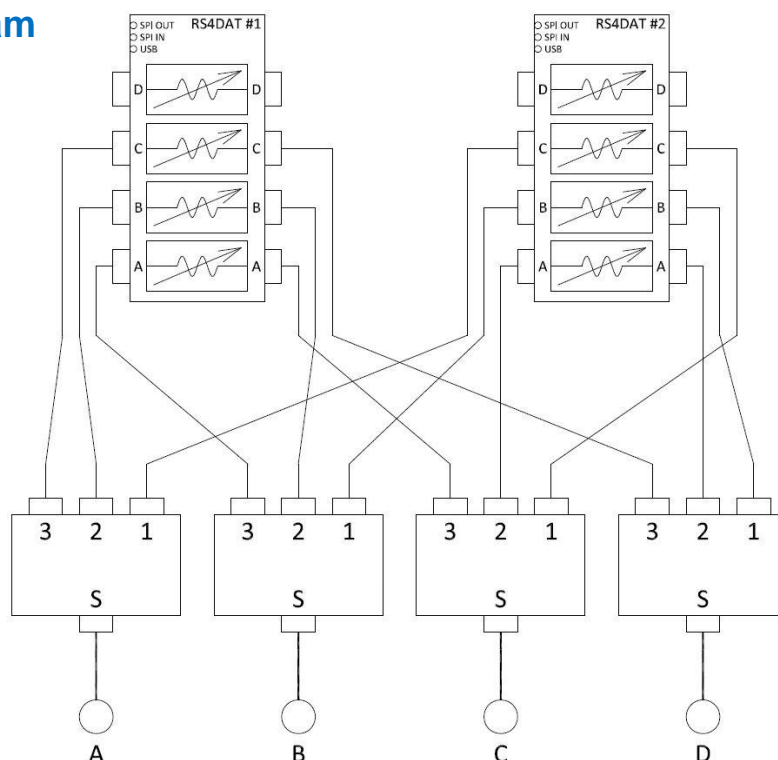
Key Features

Feature	Advantages
Wide attenuation range	Independently controllable 0-95 dB attenuators on each path allow simulation of a wide range of test scenarios including receiver sensitivity, device / base-station hand-overs, device failures, interference effects.
Ethernet-TCP/IP-HTTP and Telnet Protocols (Supports DHCP and Static IP)	Remote control from any Windows®, Mac®, or Linux® computer, or even a mobile device with a network connection and Ethernet-TCP/IP (HTTP or Telnet protocols) support. Using a VPN would allow remote control from anywhere in the world.
USB HID (Human Interface Device)	Local control via USB connection. Plug-and-Play, no driver required. Compatible with Windows® or Linux® operating systems using 32 and 64 bit architectures.
Full software support	The user friendly Windows GUI (graphical user interface automation) allows manual control straight out of the box. A full API (application programming interface), programming examples and manuals are provided to allow automation in most programming environments.

4-Port Mesh Network

ZTMN-0495AS

Block Diagram



Electrical Specifications per Path (at 5°C to 45°C)

Parameter	Conditions	Min	Typ	Max	Units
Frequency Range		350		6000	MHz
Attenuation Range	0.25 dB steps	0		90	dB
	0.5 dB steps	90		95	
Insertion Loss	1 - 2000 MHz		16.5		dB
	2000 - 4000 MHz		18.5		
	4000 - 6000 MHz		21.0		
Input Operating Power ¹	1 MHz			+12	dBm
Return Loss			12		dB
Attenuation Transition Time ²			650		ns

Attenuation Accuracy:

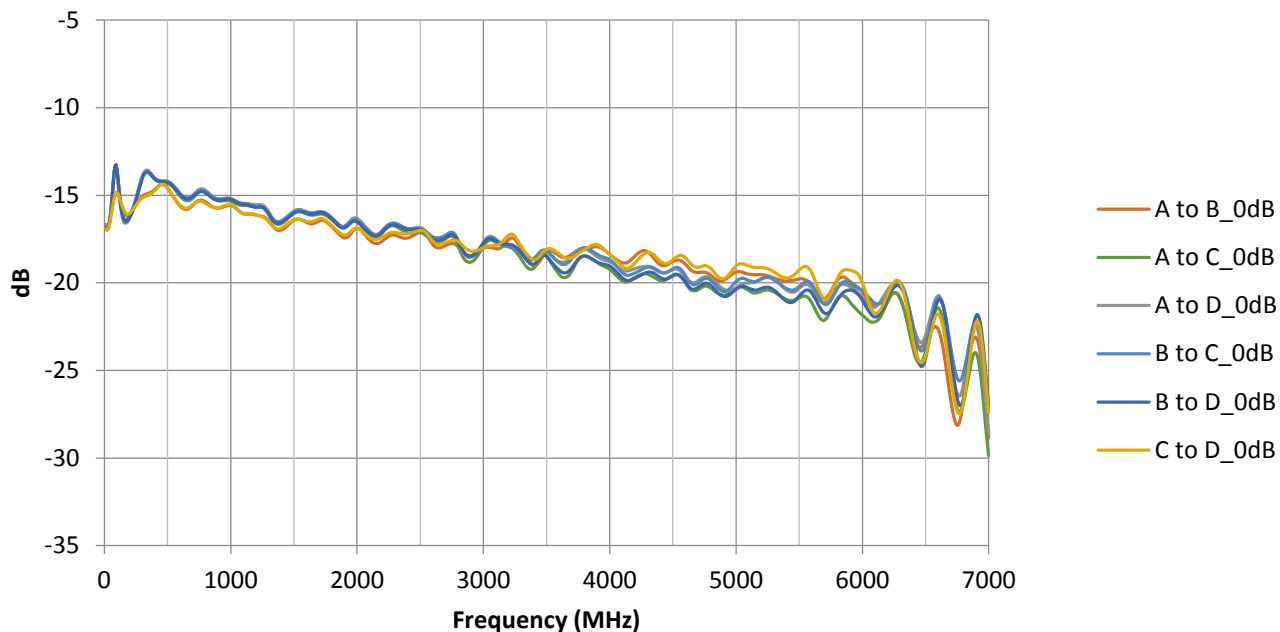
Frequency Range	Attenuation Range	Typ	Max	Units
1 - 2000 MHz	0.25 - 20 dB	±0.25	±(5.5% of nominal value + 0.25)	dB
	20.25 - 60 dB	±0.50	±(2% of nominal value + 0.90)	
	60.25 - 90 dB	±0.75	±(3.5% of nominal value + 0.70)	
2000 - 4000 MHz	0.25 - 20 dB	±0.20	±(5.5% of nominal value + 0.25)	dB
	20.25 - 60 dB	±0.30	±(2% of nominal value + 0.7)	
	60.25 - 90 dB	±0.40	±(3% of nominal value + 0.90)	
4000 - 6000 MHz	0.25 - 20 dB	±0.15	±(6.5% of nominal value + 0.15)	dB
	20.25 - 60 dB	±0.35	±(3.5% of nominal value + 0.45)	
	60.25 - 90 dB	±0.65	±(3.5% of nominal value + 0.90)	
1 - 6000 MHz	90.5 - 95 dB	±0.90	±(6% of nominal value - 1.35)	dB

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

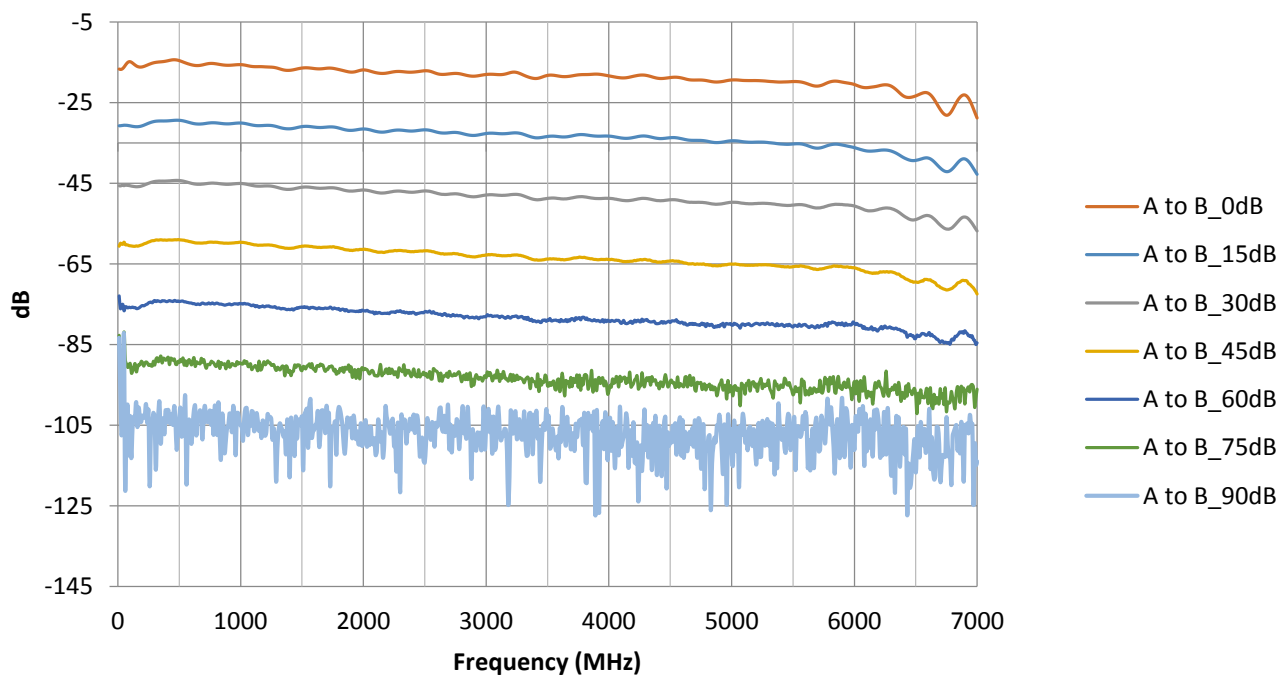
2. Defined as the time between the attenuator starting to change state and settling on the final value. Communication delays (in the order of 1-10 ms via USB or Ethernet) and microcontroller delays must also be considered.

Typical Performance Curves

Insertion Loss (Attenuator Setting @ 0 dB)



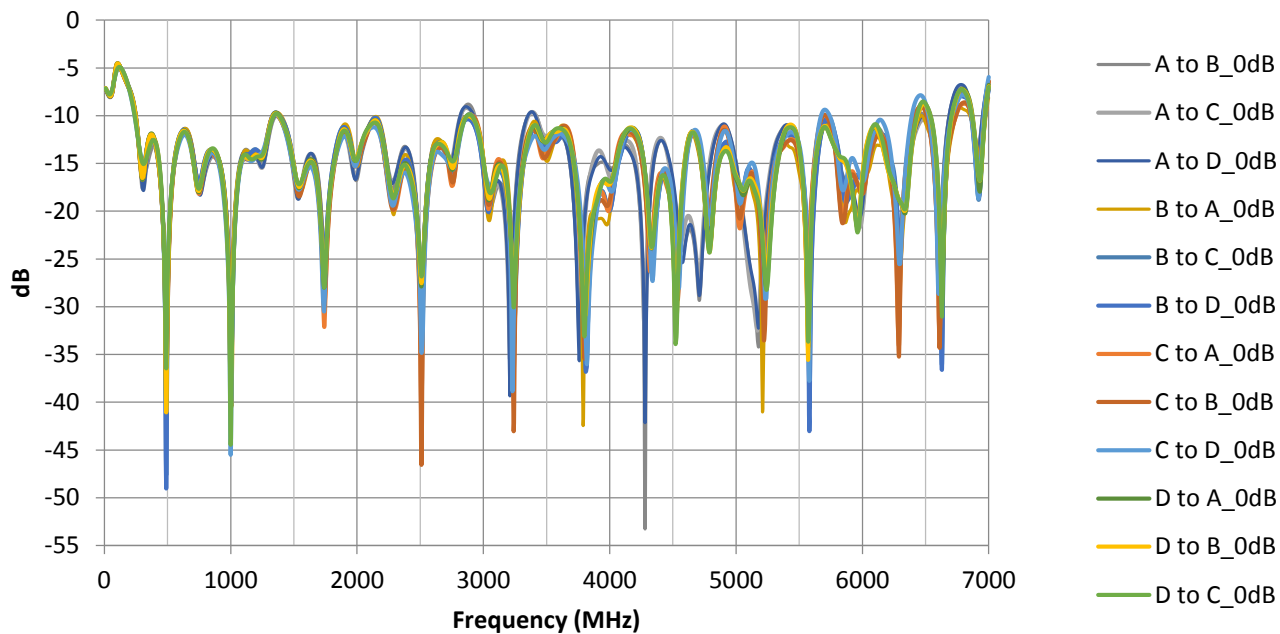
Path Loss vs Attenuator Settings



Typical Performance Curves (Continued)

Return Loss

(Attenuator Setting @ 0 dB)



4-Port Mesh Network

ZTMN-0495AS

Software Specifications

Control Interface	<ul style="list-style-type: none"> a) USB HID (Human Interface Device) b) Ethernet (TCP/IP supporting HTTP and TELNET)
Software Support	<ul style="list-style-type: none"> a) Windows GUI for USB & Ethernet control b) Windows API DLL for USB control (ActiveX and .NET) c) SCPI command set for Ethernet control d) USB interrupt codes for Linux operating systems
Operating System Requirements	<p>For GUI application software:</p> <ul style="list-style-type: none"> • Windows operating system (Windows 98 or later) <p>For API DLL files:</p> <ul style="list-style-type: none"> • Windows operating system (Windows 98 or later) • ActiveX or .NET support <p>For USB interrupt API:</p> <ul style="list-style-type: none"> • Linux or Windows operating system <p>Ethernet Control:</p> <ul style="list-style-type: none"> • Linux, Windows or Mac operating system • Ethernet connection with HTTP (Get / Post) or Telnet support

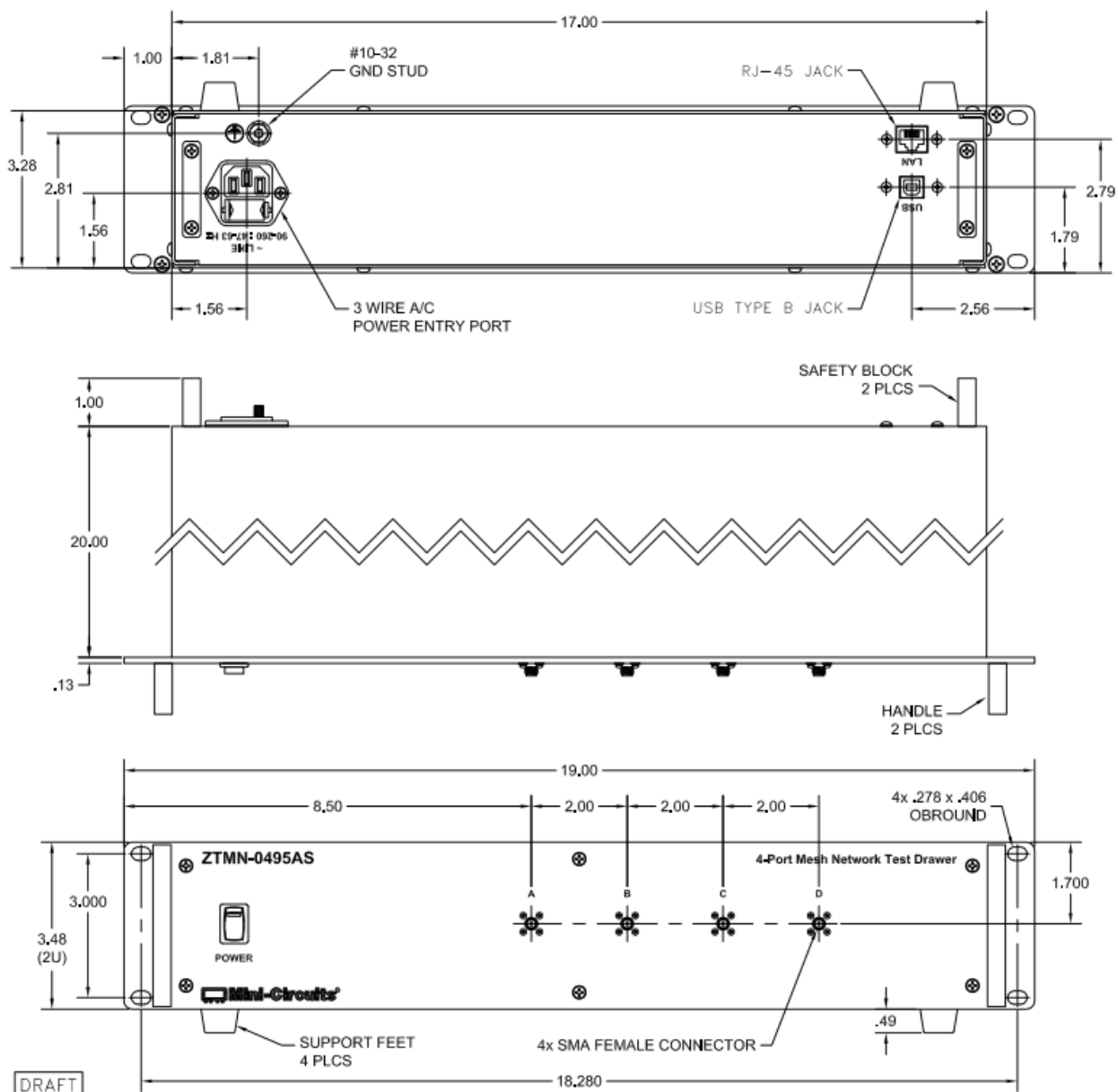
Mechanical Specifications

Dimensions	19.0" width x 13.0" depth x 2U height
Case Material	Aluminum to be protected from corrosion / rust
Labelling	<ul style="list-style-type: none"> a) ZTMN-0495AS b) 4-Port Mesh Network Test Drawer
Front Panel	<ul style="list-style-type: none"> a) Power ON/OFF switch with indicator and protective cover b) RF connectors (SMA female) labelled A to D c) Carry handles
Rear Panel	<ul style="list-style-type: none"> a) USB type B port for local control b) RJ45 LAN port for Ethernet control c) 90-260 V / 47-63 Hz AC supply input
Operating Temperature	5 to 45 °C

4-Port Mesh Network

ZTMN-0495AS

Case Drawing (99-01-2370)



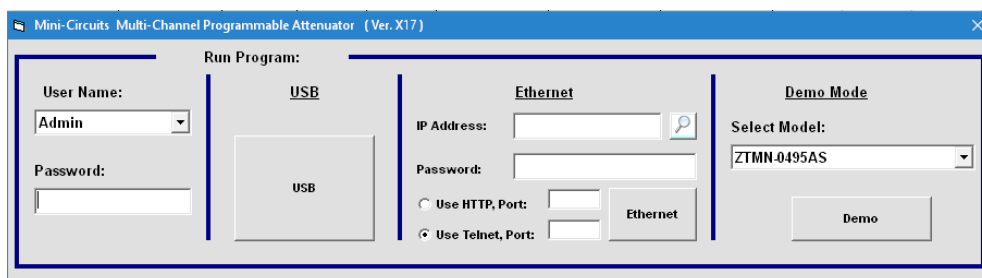
4-Port Mesh Network

ZTMN-0495AS

Graphical User Interface (GUI)

1) Launch Screen

- Log in according to pre-defined user profiles
- Connect via USB or Ethernet
- Run GUI in demo mode to trial software without a hardware connection



2) Main Control Screen

- View all system settings
- Set any path attenuation individually
- Define groups of paths to be set simultaneously
- Configure automated attenuation sequence for individual or groups of attenuators
- Administrator control over which attenuators are accessible to each user profile
- View system block diagram

		Channels					
ZTMN-0495		A		B		C	
1	Path B<>C		95.00	Path A<>B		95.00	Path A<>D 95.00
2	Path C<>D		95.00	Path B<>D		95.00	Path A<>C 95.00