Multi-Channel Attenuator

ZTDAT Series

50Ω **1 to 6000 MHz**

Product Overview

Mini-Circuits' ZTDAT series are multi-channel programmable attenuator systems suitable for a wide range of signal level control applications from 1 MHz to 6 GHz. Each independently controlled channel provides 0 to 95 dB attenuation in 0.25 dB* steps with more than 100 dB isolation between channels. Its unique design maintains linear attenuation change per dB, even at the highest attenuation settings.

Each model is housed in a compact 19-inch rack chassis with SMA or N-type RF connectors on the front and rear panels. A series of standard model options are available, from 8 to 48 attenuator channels, with custom configurations 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).

The series also includes Mini-Circuits' novel SPI daisy-chaining interface which allows multiple ZTDAT attenuator systems to be cascaded together into a Master / Slave chain. The full chain effectively becomes one system with every attenuator channel (from 8 to several hundred) controlled through the single USB or Ethernet connection and software interface of the Master unit.

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

Key Features

Feature	Advantages
Compact multi-channel attenuator configurations	8 to 16 attenuator channels available in a 1U height rack chassis with 24 channel in 2U (SMA connectors).
SPI daisy-chaining	Connect multiple units together to control even larger numbers of attenuator channels through a single software and control interface.
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.

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Electrical Specifications per Channel (at 0°C to 50°C)

Parameter	Conditions	Min	Typ	Max	Units
Frequency Range		1		6000	MHz
Attenuation Range	0.25 dB steps	0		90	dB
	0.5 dB steps	90		95	
Insertion Loss (@ 0dB Attn)	1 – 2000 MHz		5.5		dB
	2000 – 4000 MHz		7.0		
	4000 – 6000 MHz		8.5		
Isolation (A <> B) [1]			100		dB
Isolation (between channels)			100		dB
Input Operating Power [2,3]	1 MHz			+12	dBm
	50 – 6000 MHz			+23	
Return Loss	1 – 6000 MHz		15		dB
Attenuation Transition Time [4]			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

Absolute Maximum Power Rating [2,5]:

1 - 50 MHz	Derate linearly from +26 dBm at 50 MHz to +12 dBm at 1 MHz
50 - 6000 MHz	+26 dBm

1. Isolation between A and B port for any channel; defined as max attenuation + insertion loss
2. Total input power at A and B ports of any channel (channels are bi-directional)
3. Derate linearly from +23 dBm at 50 MHz to +12 dBm at 1 MHz
4. 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.
5. Operating in the range between the "Input Operating Power" and "Absolute Maximum Power Rating" specs for extended periods of time may result in reduced life and reliability. Permanent damage may occur if these limits are exceeded.

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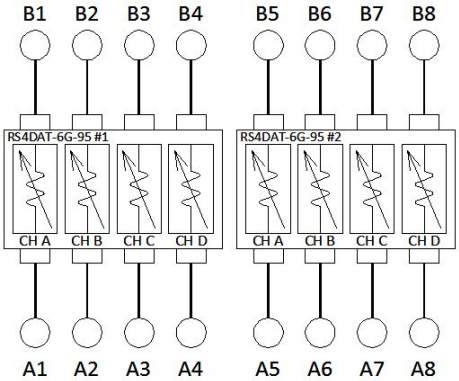
Catalog Configurations

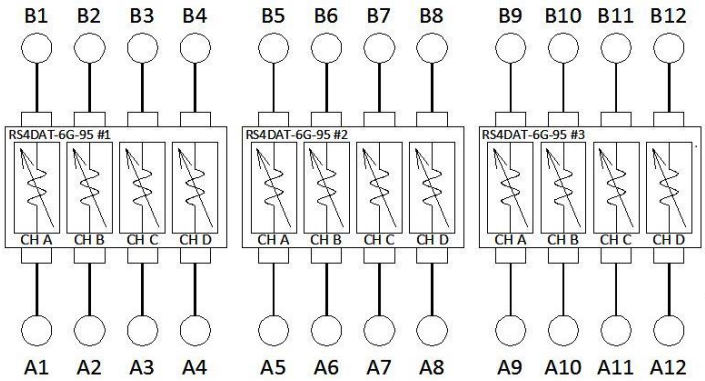
ZTDAT-8-6G95 (8 Channels)



ZTDAT-8-6G95S
- SMA connectors (front & rear)
- 1U height

ZTDAT-8-6G95N
- N-type connectors (front & rear)
- 1U height

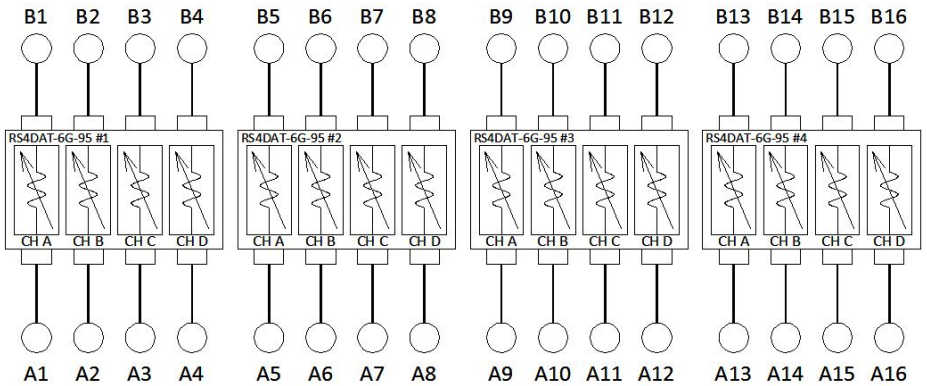
ZTDAT-12-6G95 (12 Channels)



ZTDAT-12-6G95S
- SMA connectors (front & rear)
- 1U height

ZTDAT-12-6G95N
- N-type connectors (front & rear)
- 2U height

ZTDAT-16-6G95 (16 Channels)



ZTDAT-16-6G95S
- SMA connectors (front & rear)
- 1U height

ZTDAT-16-6G95N
- N-type connectors (front & rear)
- 2U height

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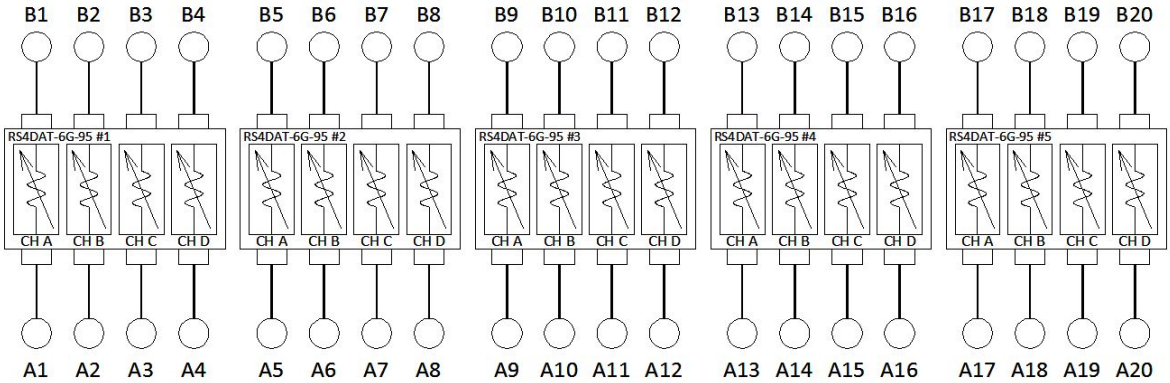
Catalog Configurations

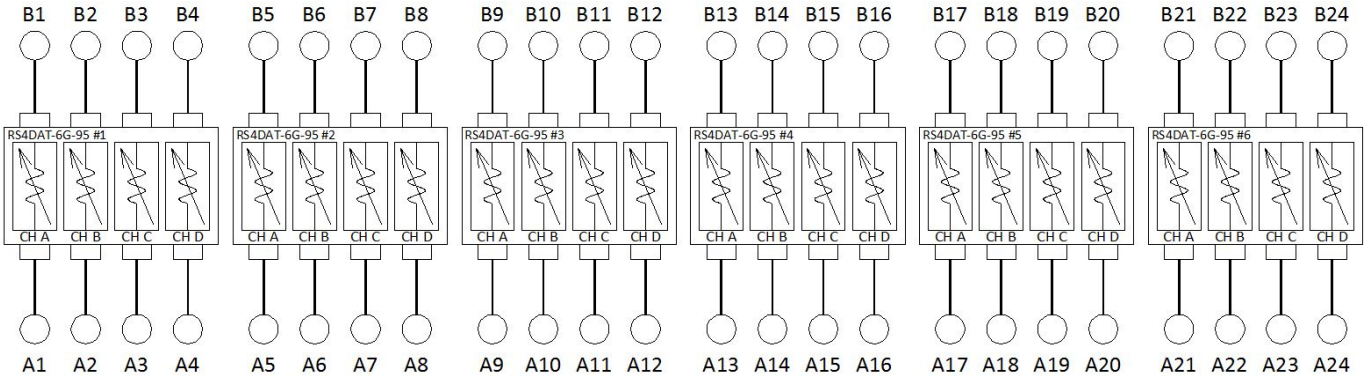
ZTDAT-20-6G95 (20 Channels)



ZTDAT-20-6G95S
- SMA connectors (front & rear)
- 2U height

ZTDAT-20-6G95N
- N-type connectors (front & rear)
- 3U height

ZTDAT-24-6G95 (24 Channels)



ZTDAT-24-6G95S
- SMA connectors (front & rear)
- 2U height

ZTDAT-24-6G95N
- N-type connectors (front & rear)
- 3U height

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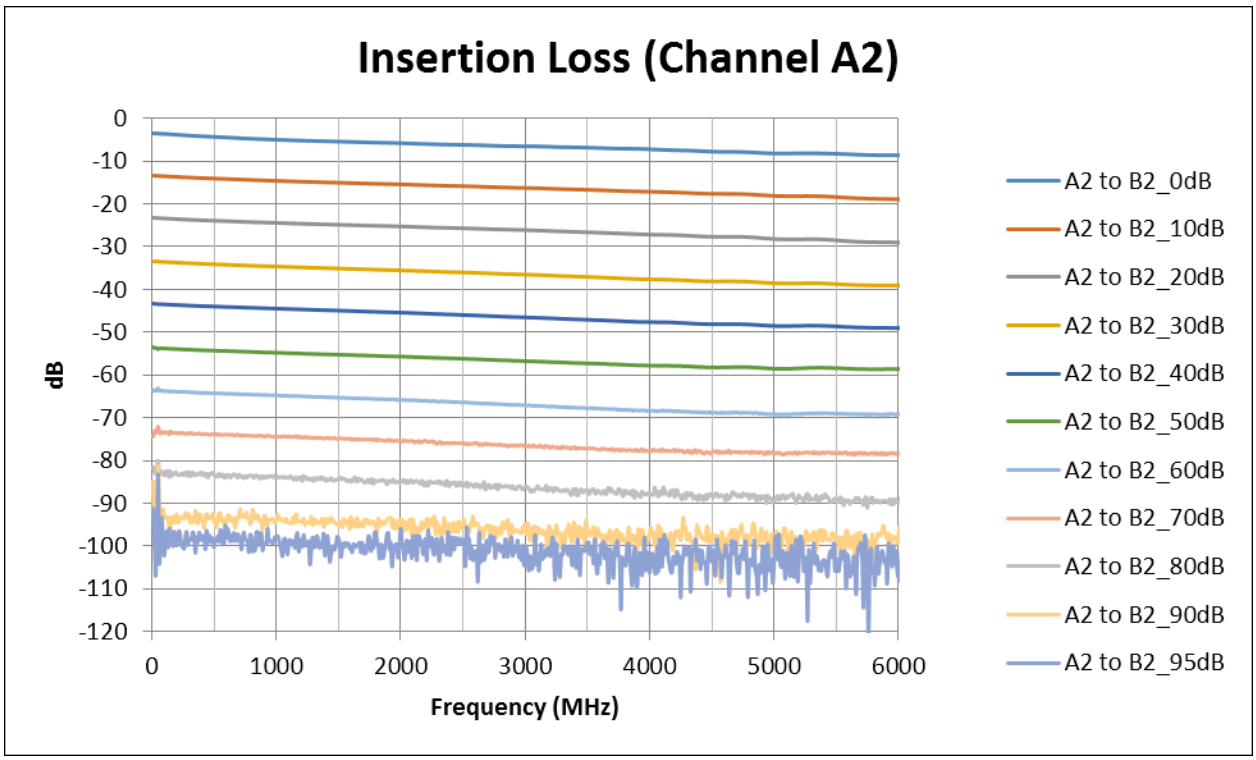
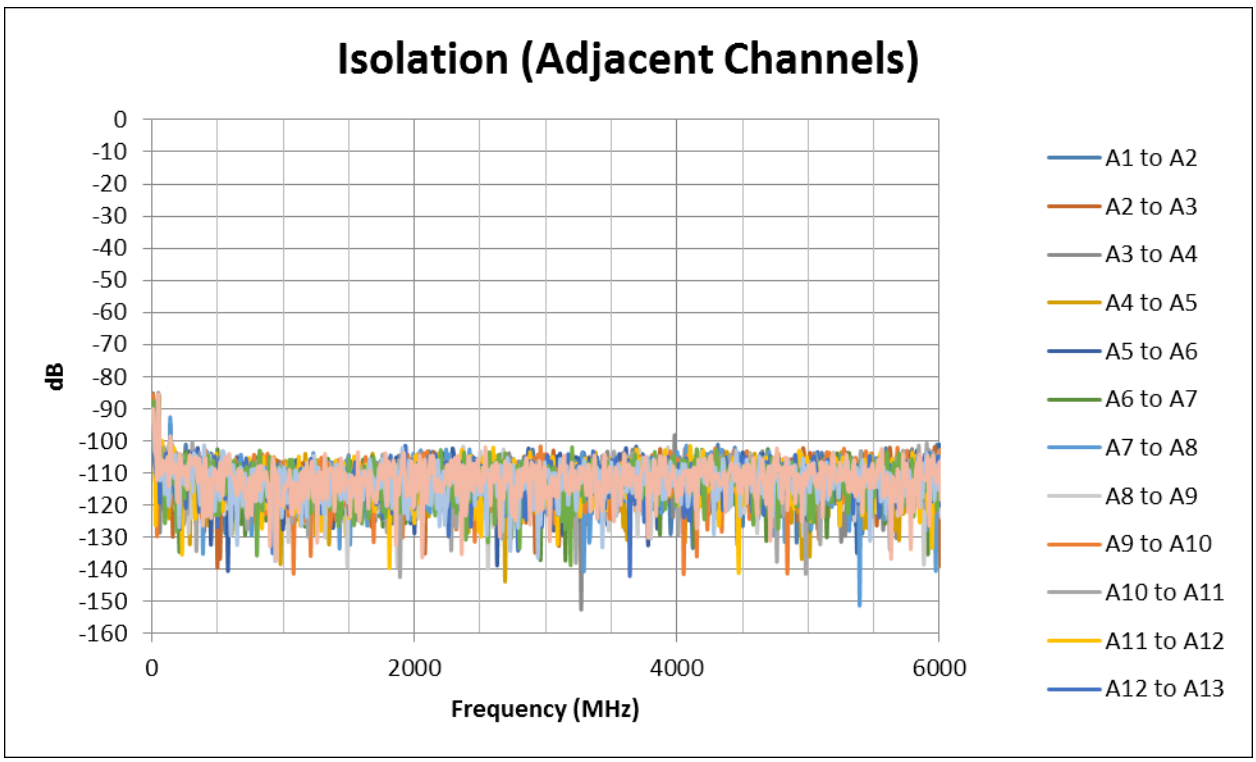
Typical Performance Curves





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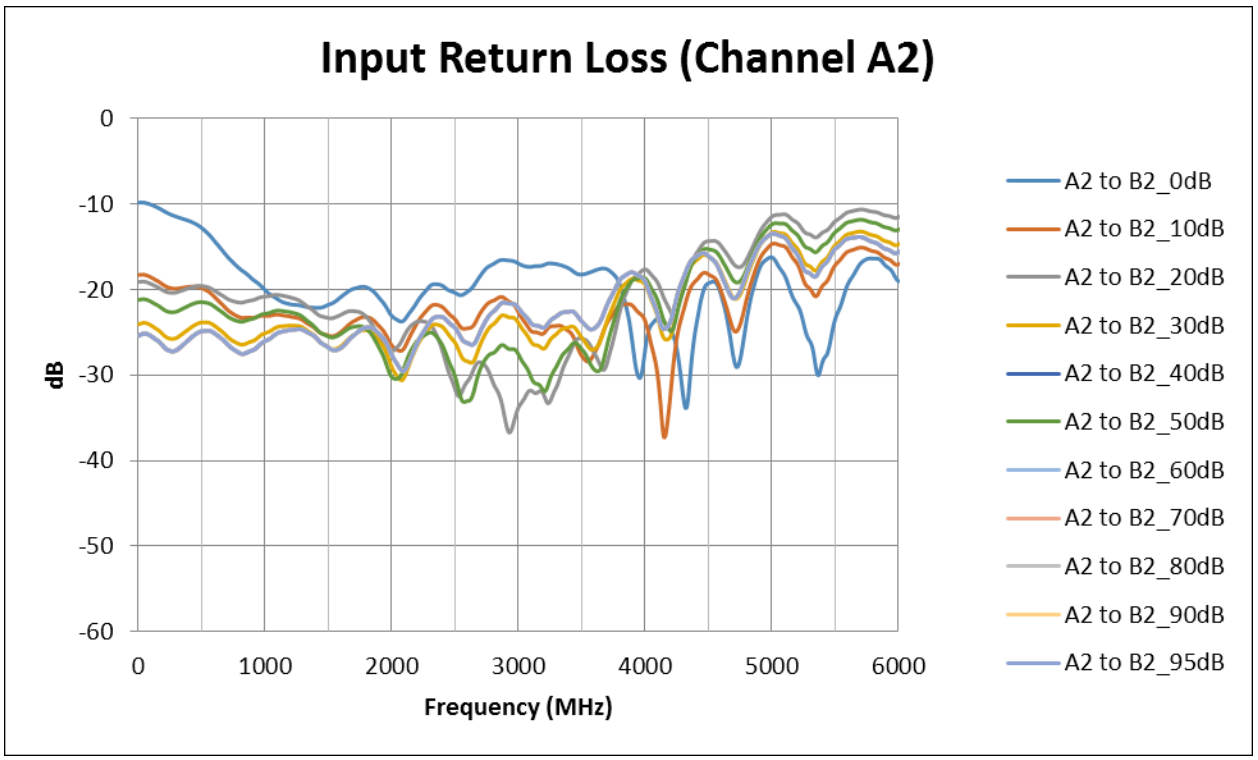
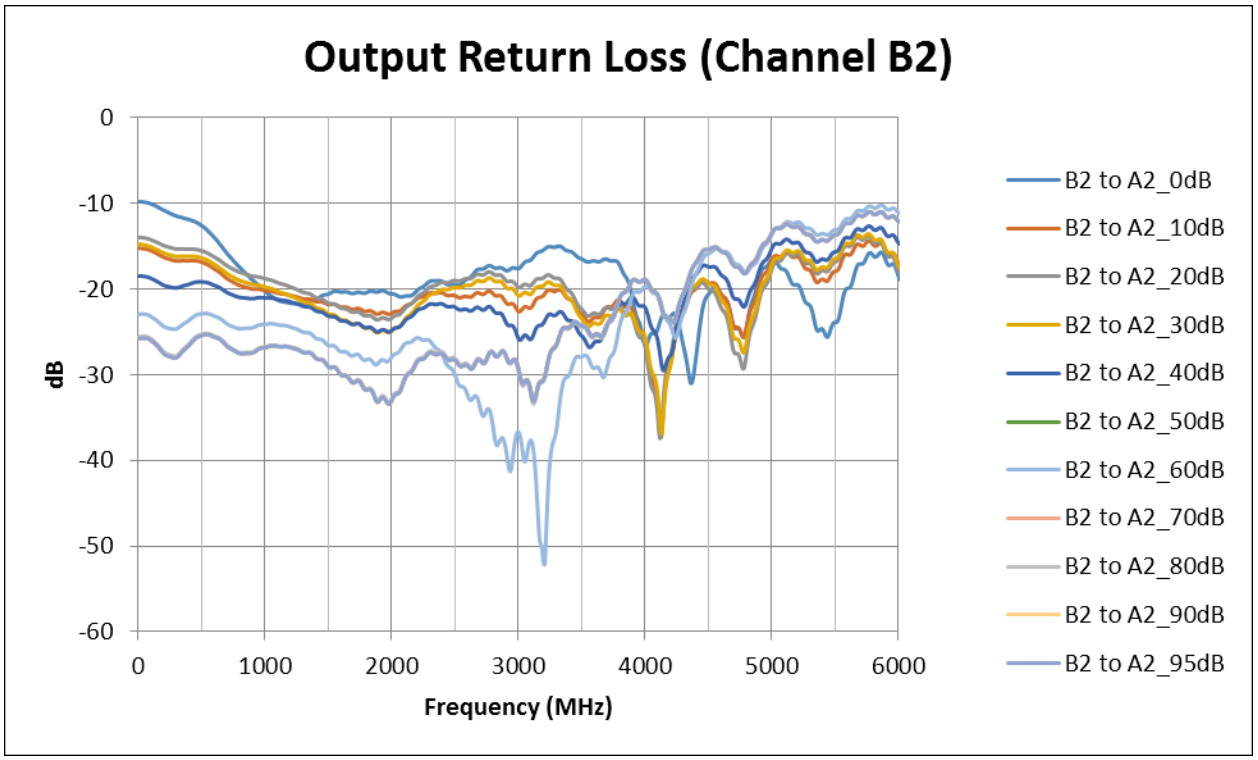
Typical Performance Curves





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Mechanical Specifications

Dimensions	19.0” width x 13.0” depth
Case Material	Aluminum to be protected from corrosion / rust
Labelling	a) Model name b) Description (including # of channels)
Front Panel	a) Power ON/OFF switch with indicator and protective cover b) RF connectors (SMA or N-type) labelled A1 to An c) Carry handles
Rear Panel	a) RF connectors (SMA or N-type) labelled B1 to Bn b) USB type B port for local control c) RJ45 LAN port for Ethernet control d) D-Sub “SPI In” and “SPI Out” connectors for cascading units e) 90-260 V / 47-63 Hz AC supply input
Operating Temperature	0 to +50 °C

Software Specifications

Software & Documentation Download:

- Mini-Circuits’ full software and support package including user guide, Windows GUI, DLL files, programming manual and examples is available for download.
- Please contact testsolutions@minicircuits.com for support

Minimum System Requirements:

Parameter	Requirements	
Interface	USB HID & Ethernet (HTTP & Telnet)	
System Requirements	GUI	Windows 98 or later
	USB API DLL	Windows 98 or later and programming environment with ActiveX or .NET support
	USB interrupt API	Linux; Windows 98 or later
	Ethernet	Windows, Linux or Mac computer with a network port and Ethernet TCP / IP support
Hardware	Pentium II or later with 256 MB RAM	

Application Programming Interface (API)

Ethernet Support:

- ASCII commands via HTTP or Telnet
- Supported by most common programming environments

USB Support (Windows):

- ActiveX COM DLL file for creation of 32-bit programs
- .NET library DLL file for creation of 32 / 64-bit programs
- Supported by most common programming environments (refer to application note AN-49-001 for summary of supported environments)

USB Support (Linux):

- Full control in using USB interrupt commands

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Model Images

ZTDAT-8-6G95S (8 Channels, SMA)

Front View

Rear View

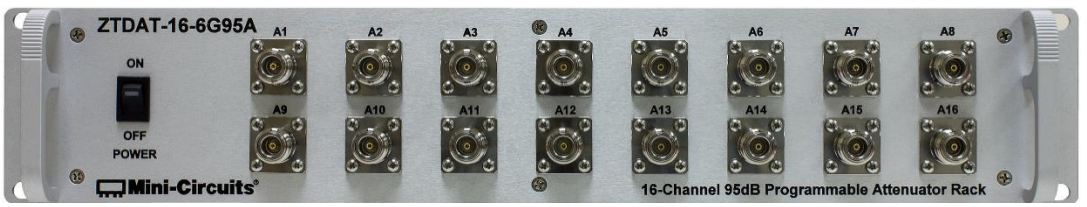
ZTDAT-16-6G95S (16 Channels, SMA)

Front View

Rear View

ZTDAT-16-6G95N (16 Channels, N-type)

Front View



Rear View

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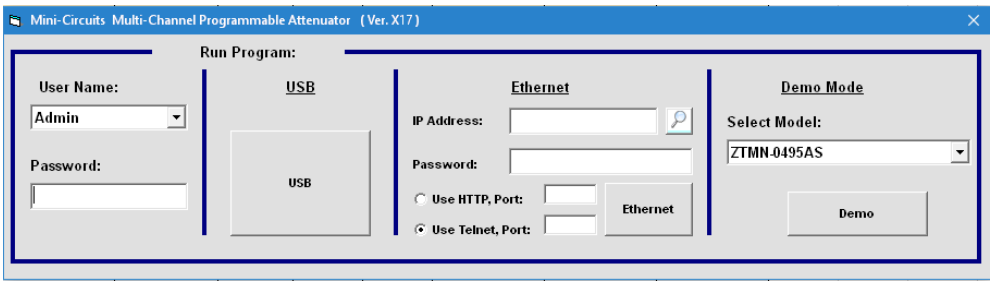
Graphical User Interface (GUI)

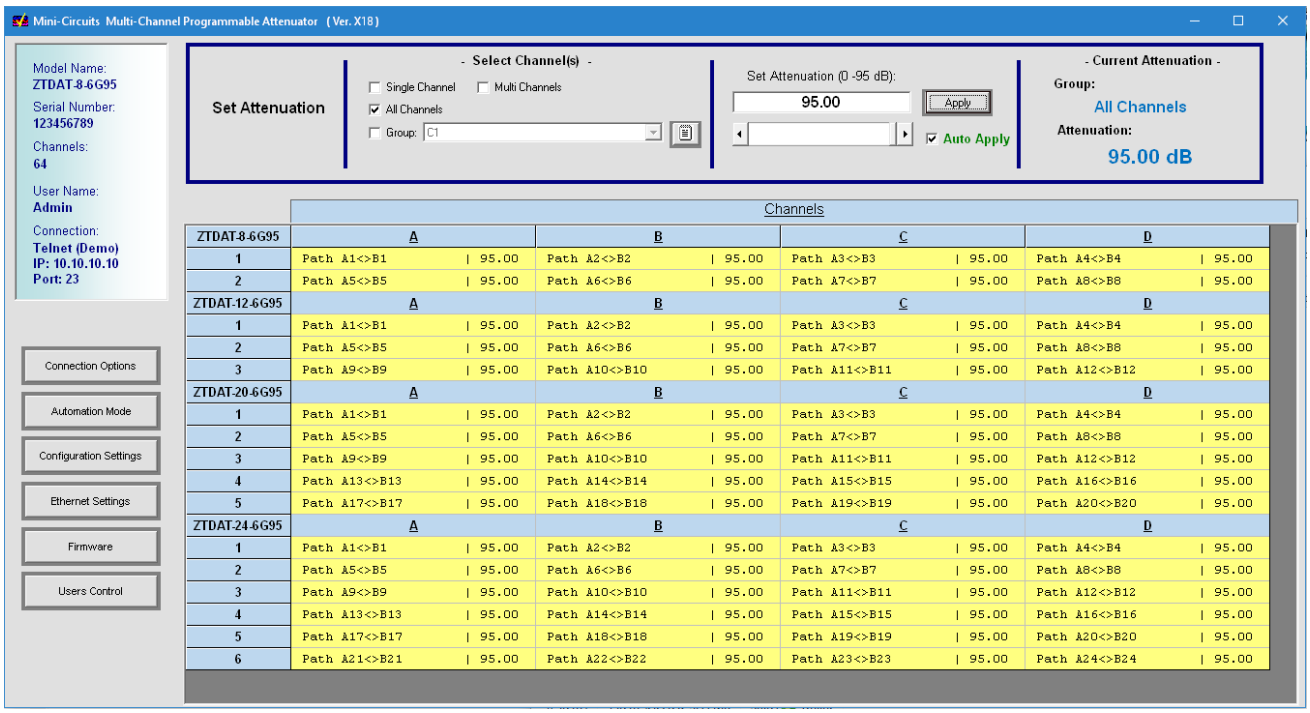
1) Launch Screen

- 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 attenuator settings
- Set any attenuator individually
- Define groups of attenuators 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
- Control multiple “cascaded” ZTDAT racks from the same screen
    - The below image shows control of 64 attenuator channels, made up of a cascaded chain of ZTDAT-8-6G95 (8-channels), ZTDAT-12-6G95 (12-channels), ZTDAT-20-6G95 (20-channels) and ZTDAT-24-6G95 (24-channels)



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Cascading ZTDAT Attenuator Racks

Multiple ZTDAT attenuator racks can be combined to form much larger programmable attenuator systems by “cascading” the SPI interfaces. This allows large numbers of attenuator channels to be controlled through a single USB or Ethernet connection and software interface. All software commands are issued to the Master unit (the first unit in the chain) which will in turn control all Slave units as required. The process is:

1) Connect the SPI Out port of the first ZTDAT unit to the SPI In port of the next ZTDAT unit
2) Continue connecting additional ZTDAT units in the same manner, as required
3) Connect the AC power inputs for all ZTDAT units in the chain
4) Connect the control connection (USB or Ethernet) to the first ZTDAT in the chain; this becomes the Master unit
5) Each individual attenuator channel within the cascaded chain can now be addressed as if they are part of the Master