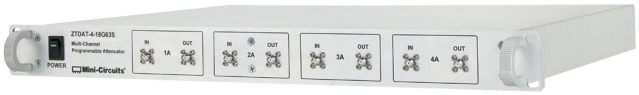
USB & ETHERNET

4-Channel Attenuator ZTDAT-4-18G63S

50 Ω 0.1 to 18 GHz 0 to 63 dB Rack-Mount SMA Female

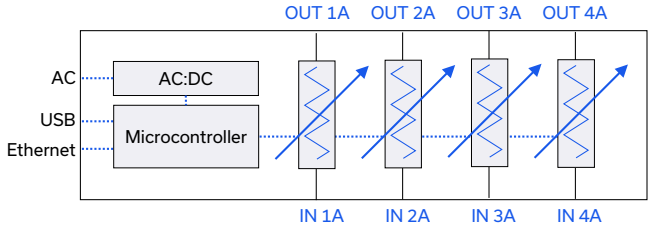
THE BIG DEAL

- Exceptionally wide frequency coverage, up to 18 GHz
- 4 independently programmable channels
- 0-63 dB attenuation per channel in 0.25 dB steps
- Configure automated sweep, hop & fading sequences
- Convenient rack-mountable chassis
- Ethernet & USB control



Generic photo used for illustration purposes only

FUNCTIONAL BLOCK DIAGRAM



APPLICATIONS

- Benchtop and rack-mounted automated test systems
- 5G, FR1 & FR3, WiFi 6E MIMO, UWB, Bluetooth
- Military radio, radar & electronic warfare
- Microwave radio & cellular infrastructure
- Transmission loss, signal fading & cellular handover testing

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. ZTDAT-4-18G63S operates from 100 MHz to 18 GHz with typically greater than 95 dB isolation between 4 bi-directional attenuator channels. Each channel can be independently controlled from 0 to 63 dB attenuation with 0.25 dB resolution.

The system is housed in a compact, 1U height, 19-inch rack chassis, with SMA female connectors on the front panel and power and control connections on the rear 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 flexible API with programming instructions for Windows and Linux environments.

KEY FEATURES

Feature	Advantages
Sweep / hop / fading sequences	Configure a wide range of real-world scenarios in a test environment, including receiver sensitivity, device / base-station handovers, device failures, and interference effects.
High isolation	High isolation between channels and from input to output when max attenuation is set; minimizes cross-talk and measurement errors.
Rack-mount chassis	Compact 1U height, 19" rack-mountable chassis suits integration in automated production test environments
Ethernet & USB control	USB HID and Ethernet (HTTP & Telnet) interfaces ensure compatibility with most software environments and connection requirements.

4-Channel Attenuator ZTDAT-4-18G63S

50 Ω 0.1 to 18 GHz 0 to 63 dB Rack-Mount SMA Female

ELECTRICAL SPECIFICATIONS AT +25°C

Parameter	Conditions	Min.	Typ.	Max.	Units
Frequency Range		0.1	-	18	GHz
Attenuation Range	Relative to insertion loss	0	-	63	dB
Attenuation Steps	Nominal	-	0.25	-	dB
Insertion Loss	0.1 – 6 GHz	-	5.0	6.0	dB
	6 – 12 GHz	-	7.0	8.0	
	12 – 18 GHz	-	8.0	9.0	
Isolation	IN x to OUT x @ max attenuation	-	65	-	dB
	Between channels	85	95	-	
Return Loss	0.1 – 18 GHz	-	15	-	dB
Minimum Dwell Time[1]	-	-	600	-	µs
Attenuation Transition Time[2]	-	-	80	-	ns
Input Operating Power	Per IN port	-	-	+24	dBm
	Per OUT port	-	-	+15	

1. Attenuator RF ports are interchangeable and support simultaneous, bidirectional signal transmission within the specified power limits
2. The time taken to respond to a command to change attenuation states (ignores USB / Ethernet communication time)
3. Time between starting to change the attenuation state and settling on the requested value

TYPICAL ATTENUATION ACCURACY AT +25°C

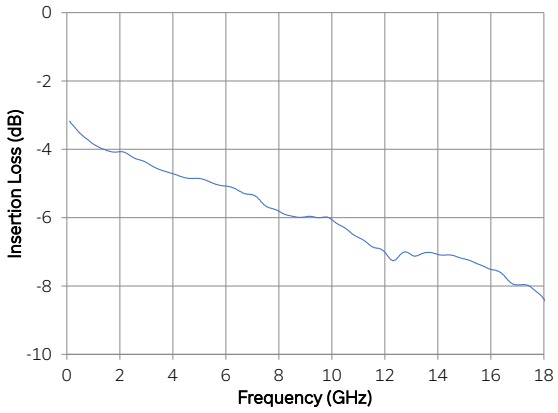
Frequency Range	Attenuation Range	Typ	Max	Units
0.1 – 10 GHz	0.25 – 63 dB	±0.60	±(0.35+2.5% of setting)	dB
10 – 18 GHz		±0.80	±(0.30+3.5% of setting)	

4-Channel Attenuator ZTDAT-4-18G63S

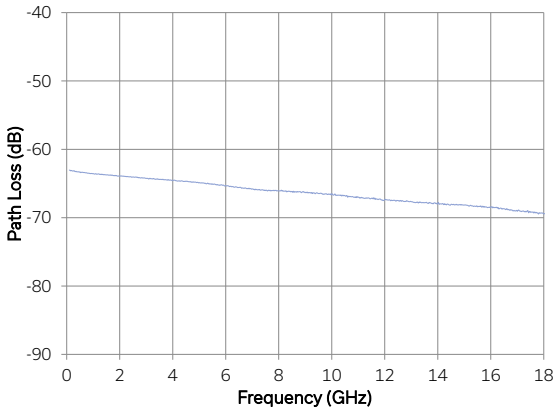
50 Ω 0.1 to 18 GHz 0 to 63 dB Rack-Mount SMA Female

TYPICAL PERFORMANCE CURVES

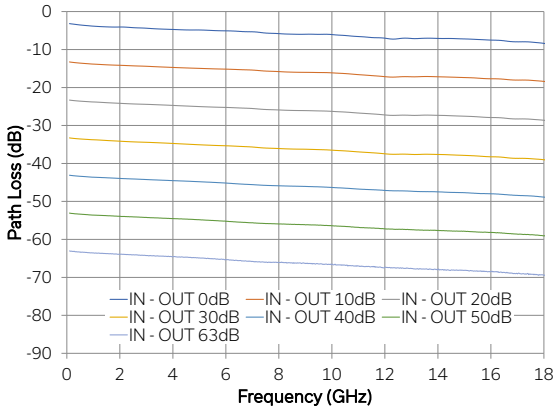
Insertion Loss @ 0 dB Attenuation (1A)



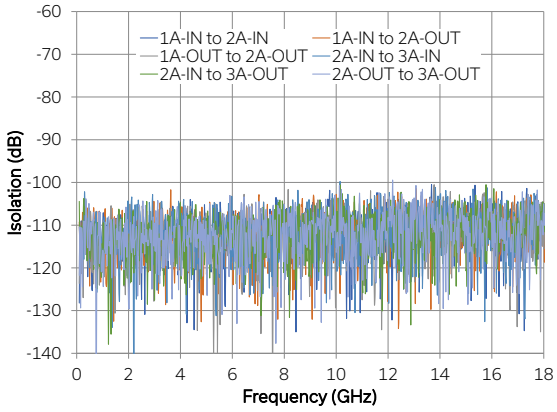
Isolation @ Max Attenuation (1A)



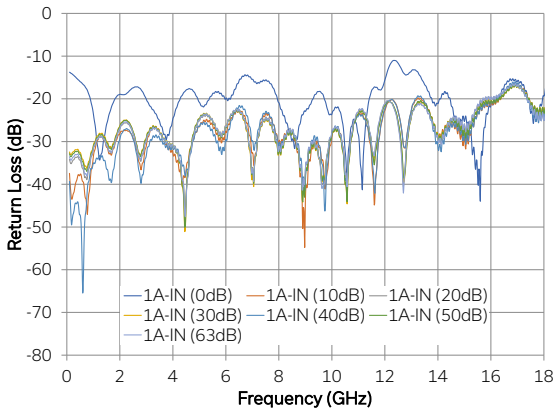
Path Loss @ Attenuation Steps (1A)



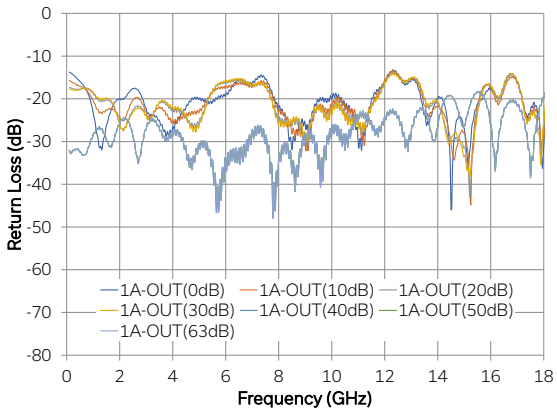
Isolation Between Channels



Input Return Loss @ Attenuation Steps (1A)



Output Return Loss @ Attenuation Steps (1A)



CONTROL INTERFACES

Ethernet Control	Supported Protocols	TCP / IP, HTTP, Telnet, DHCP, UDP (limited)
	Max Data Rate	10 Mbps (10Base-T Half Duplex)
USB Control	Supported Protocols	HID – Full Speed
	Min Communication Time[4]	3 ms typ

4. Based on the polling interval of the USB HID protocol (1 ms 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):

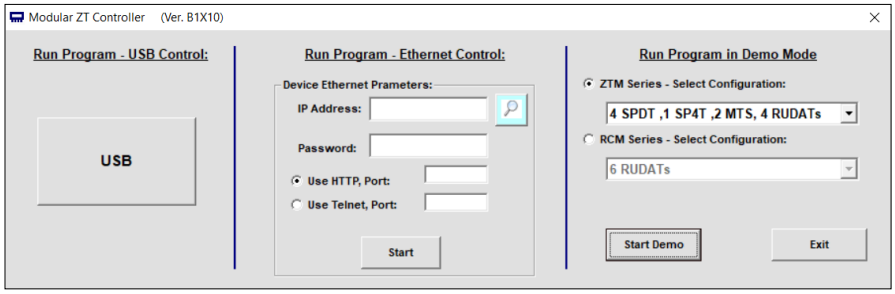
Command / Query	Description
:MN?	Read model name
:SN?	Read serial number
:FIRMWARE?	Read firmware version
:RUDAT:[address]:ATT=[value]	Set a single attenuator values • [address] = 1A, 2A, 3A, 4A • [value] = attenuator value to set in dB • Example :RUDAT:1A:ATT=12.5
:RUDAT:[address]:ATT?	Return a single attenuator value: • [address] = 1A, 2A, 3A, 4A • Example :RUDAT:1A:ATT?

4-Channel Attenuator ZTDAT-4-18G63S

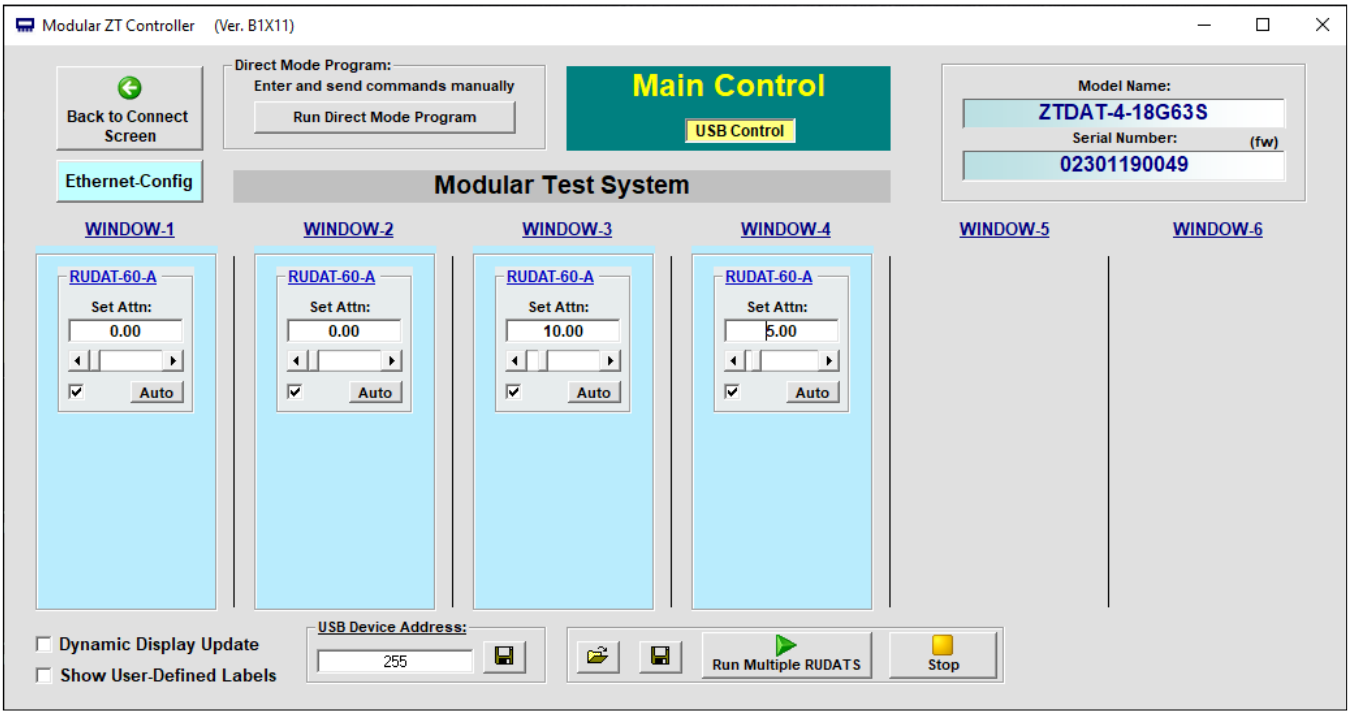
50 Ω 0.1 to 18 GHz 0 to 63 dB Rack-Mount SMA Female

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 attenuator values independently or in groups
- Configure automated sweep / hop / fading sequences
- Configure system and Ethernet settings



4-Channel Attenuator ZTDAT-4-18G63S

50 Ω 0.1 to 18 GHz 0 to 63 dB Rack-Mount SMA Female

ABSOLUTE MAXIMUM RATINGS

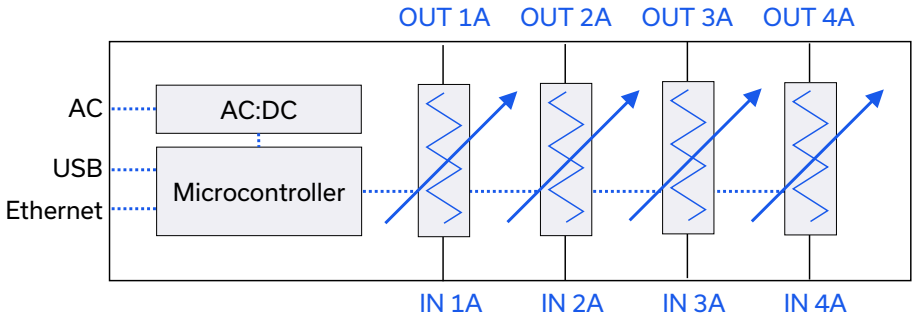
Parameter	Conditions	Limits	Units
Temperature	Operating	0 to +50	°C
	Storage	-20 to +60	
Input Power (No Damage)	Per port	+25	dBm
	Per OUT port	+16	

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	2A, 250V rating
Power Consumption	85W maximum

ELECTRICAL SCHEMATIC



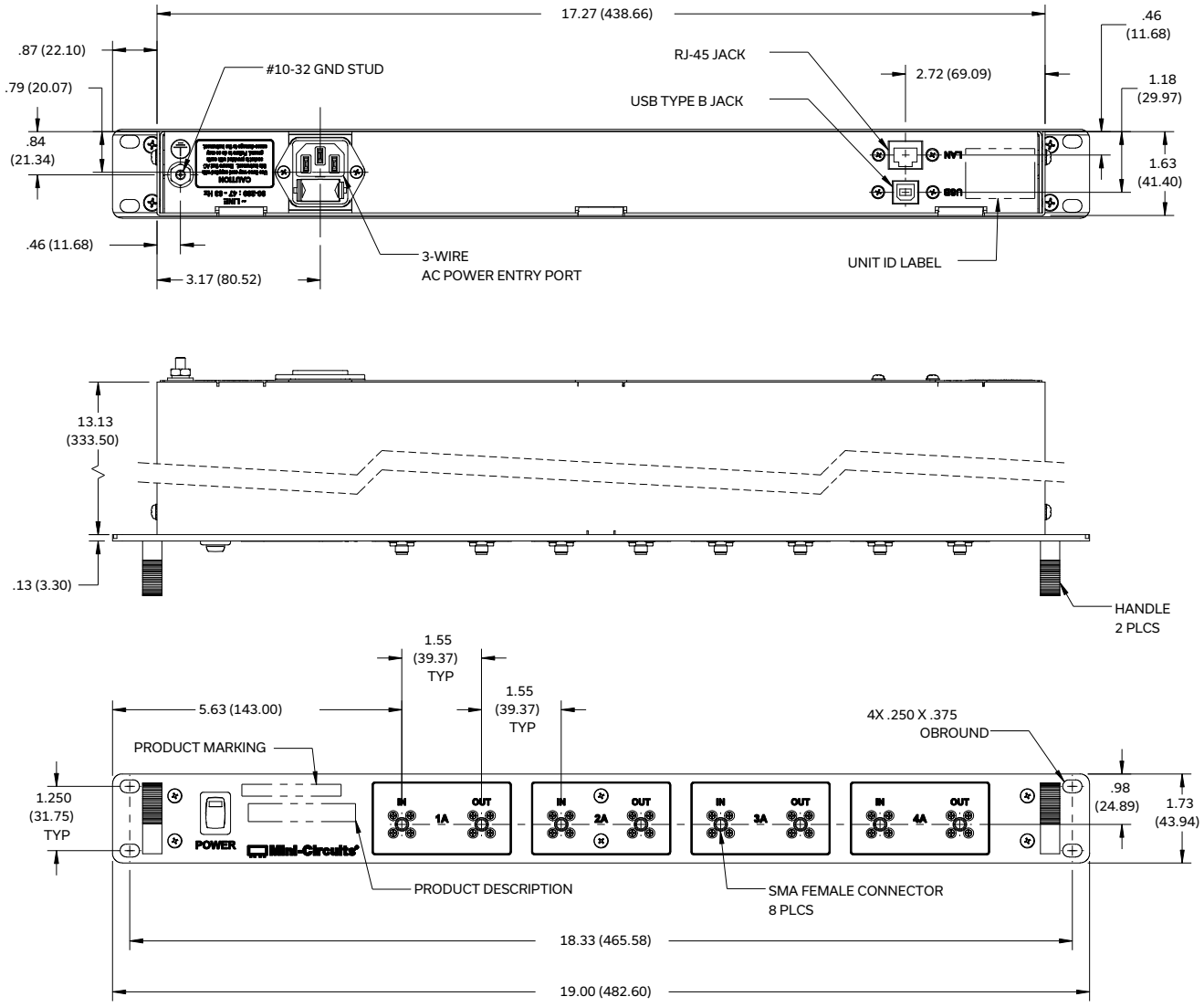
CONNECTIONS

Port	Connector
IN1A-4A & OUT1A-4A	SMA female
USB	USB type B
Ethernet / LAN	RJ45
AC Input	IEC C14 inlet

4-Channel Attenuator ZTDAT-4-18G63S

50 Ω 0.1 to 18 GHz 0 to 63 dB Rack-Mount SMA Female

CASE STYLE DRAWING



Weight: 3770 grams.
Dimensions are in inches [mm]. Tolerances: 2 Pl. ±.03 inch; 3 Pl. ±.015 inch.

PRODUCT MARKING*

Model Name: ZTDAT-4-18G63S
Product Description: Multi-Channel Programmable Attenuator
Unit ID Label: Serial number and other identification marks
*Marking may contain other features or characters for internal lot control

USB & ETHERNET

4-Channel Attenuator ZTDAT-4-18G63S

50 Ω 0.1 to 18 GHz 0 to 63 dB Rack-Mount SMA Female

DETAILED MODEL INFORMATION IS AVAILABLE ON OUR WEBSITE CLICK HERE

Case Style	VH3223
Software, User Guide & Programming Manual	www.minicircuits.com/softwaredownload/ztm_rcm.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 Please contact testsolutions@minicircuits.com if your regions 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.

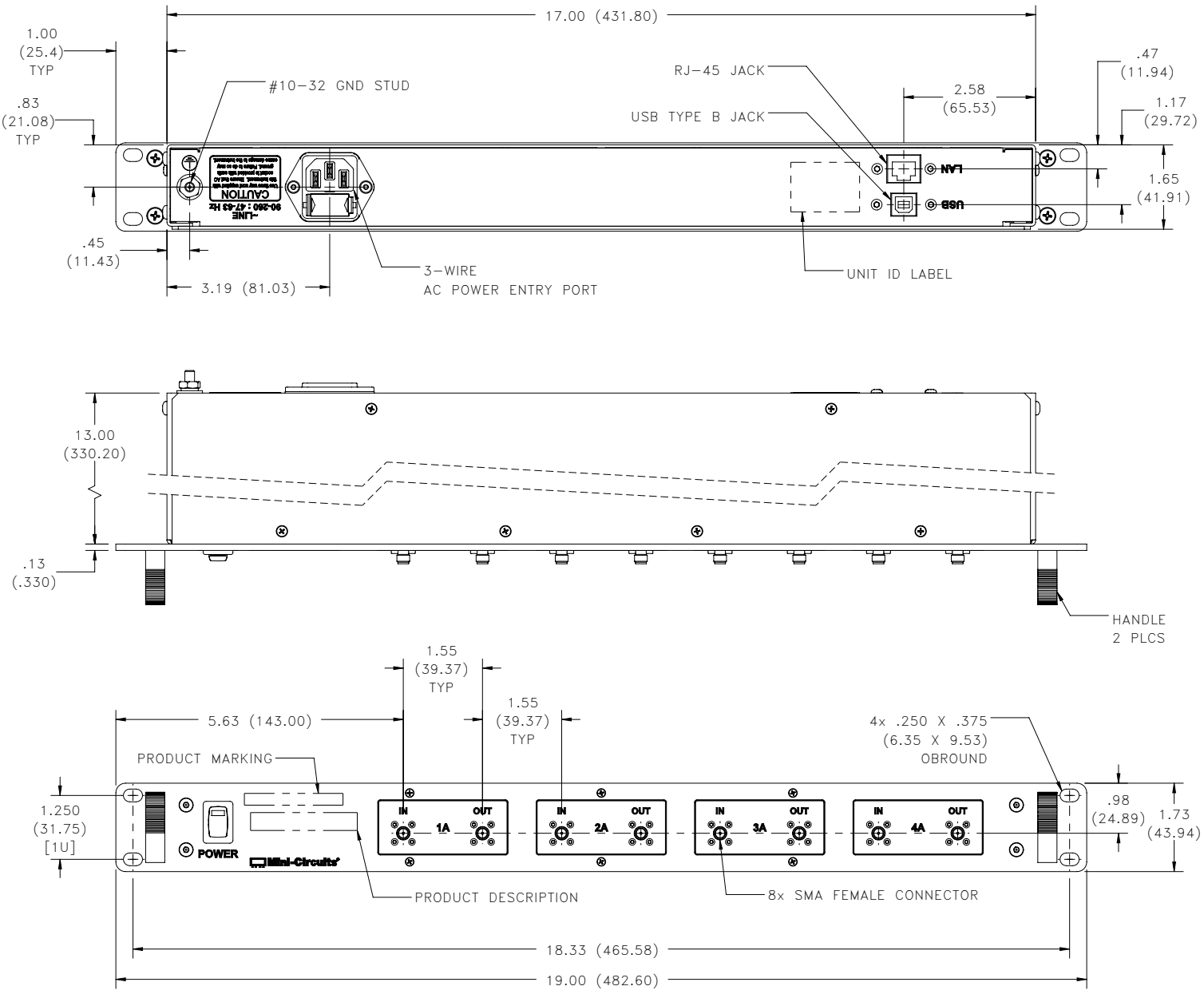
B. Electrical specifications and performance data contained in this specification document are based on Mini-Circuit's applicable established test performance criteria and measurement instructions.

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/MCLStore/terms.jsp

Case Style VH

Outline Dimensions

VH3223



Notes:

1. Case material: Aluminum (with protective coating to prevent corrosion).
2. Dimensions are in inches (mm). Tolerances: 2 Pl. ±.03 inch; 3 Pl. ±.015 inch.
3. Weight: 4100 grams.
4. Marking may contain other features or characters for internal lot control.

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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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