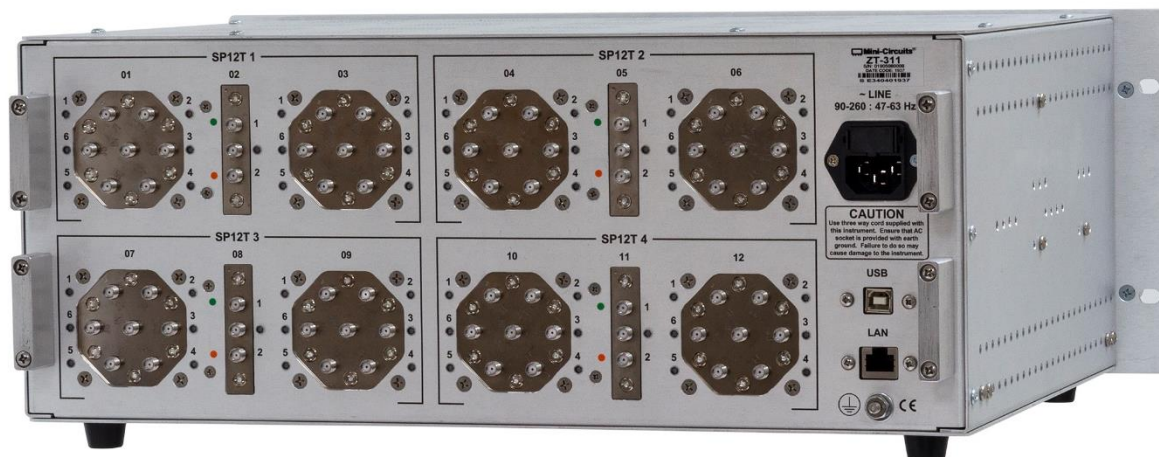


USB & Ethernet Controlled Mechanical Switch System

ZT-311

50Ω DC to 18 GHz (SPDT) & DC-12 GHz (SP6T)



Typical Applications

- 5G node / device testing
- Automated test equipment
- Fail-safe / redundancy switching
- Modular switch matrices

RoHS Compliant

See our website for RoHS compliance methodologies and qualifications

Product Overview

ZT-311 is part of Mini-Circuits' flexible series of rack-mounted mechanical switch systems, offering high performance and fast turnaround for automated test setups. This design consists of a 19" rack chassis (4U height) with 4 x SPDT and 8 x SP6T high reliability mechanical switches mounted on the rear panel.

With the use of Mini-Circuits' low cost Hand-Flex™ interconnect cables, multiple matrix configurations can be easily created by the user, including a 4 x SP12T configuration. The switches are controlled via USB or Ethernet, allowing control directly from a PC, or remotely over a network. 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
Flexible mechanical switch options	Mechanical absorptive switches provide high reliability, repeatable high performance and internal terminations of input signals on the disconnected paths
Fast turnaround time	Rapid applications support allows test configurations to be quickly developed without causing production delays.
Rack-mount chassis	Compact, 4U height 19" rack-chassis with all connections on the rear, suits integration in automated production test environments
USB & Ethernet control	USB HID and Ethernet (HTTP / Telnet) interfaces provide easy compatibility with a wide range of software setups and programming environments

USB & Ethernet Controlled Mechanical Switch System

ZT-311

Configuration

Row	Slot	Model Name	Frequency	Connectors	Description
Top	1	MSP6TA-12+	DC to 12 GHz	SMA (f)	SP6T Switch (Absorptive)
Top	3	MSP2TA-18XL+	DC to 18 GHz	SMA (f)	SPDT Switch (Absorptive)
Top	4	MSP6TA-12+	DC to 12 GHz	SMA (f)	SP6T Switch (Absorptive)
Top	6	MSP6TA-12+	DC to 12 GHz	SMA (f)	SP6T Switch (Absorptive)
Top	8	MSP2TA-18XL+	DC to 18 GHz	SMA (f)	SPDT Switch (Absorptive)
Top	9	MSP6TA-12+	DC to 12 GHz	SMA (f)	SP6T Switch (Absorptive)
Bottom	1	MSP6TA-12+	DC to 12 GHz	SMA (f)	SP6T Switch (Absorptive)
Bottom	3	MSP2TA-18XL+	DC to 18 GHz	SMA (f)	SPDT Switch (Absorptive)
Bottom	4	MSP6TA-12+	DC to 12 GHz	SMA (f)	SP6T Switch (Absorptive)
Bottom	6	MSP6TA-12+	DC to 12 GHz	SMA (f)	SP6T Switch (Absorptive)
Bottom	8	MSP2TA-18XL+	DC to 18 GHz	SMA (f)	SPDT Switch (Absorptive)
Bottom	9	MSP6TA-12+	DC to 12 GHz	SMA (f)	SP6T Switch (Absorptive)

Electrical Specifications @ 25°C (per SP6T Switch)

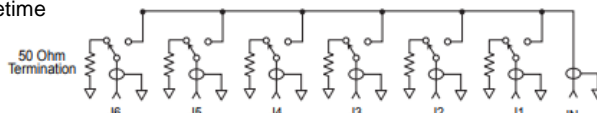
Parameter	Conditions	Min	Typ	Max	Units
Frequency Range		DC		12	GHz
Insertion Loss	DC – 6 GHz		0.15	0.25	dB
	6 – 8 GHz		0.20	0.30	
	8 – 12 GHz		0.25	0.45	
Isolation	DC – 6 GHz	80	95		dB
	6 – 8 GHz	80	90		
	8 – 12 GHz	80	90		
VSWR	DC – 6 GHz		1.20		:1
	6 – 8 GHz		1.20		
	8 – 12 GHz		1.20		
Switching Time			25		ms
RF Input Power (Cold Switching) ¹	DC – 12 GHz			20	W
Switch Lifetime (per Switch)	100 mW hot switching ²	10			million cycles
	1W hot switching		1		

Notes:

- Maximum power into any internal termination is 1W per port, 3W max
- Hot switching powers above this level will degrade the switch lifetime

Switch Configuration:

- Normally open (all ports disconnected)
- Absorptive (internal terminations on ports J1-J6)



Electrical Specifications @ 25°C (per SPDT Switch)

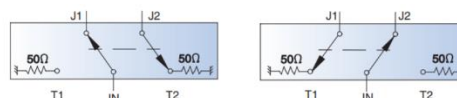
Parameter	Conditions	Min	Typ	Max	Units
Frequency Range		DC		18	GHz
Insertion Loss	DC – 8 GHz		0.15	0.30	dB
	8 – 12 GHz		0.25	0.40	
	12 – 18 GHz		0.30	0.50	
Isolation	DC – 8 GHz	75	90		dB
	8 – 12 GHz	70	80		
	12 – 18 GHz	60	66		
VSWR	DC – 8 GHz		1.20		:1
	8 – 12 GHz		1.20		
	12 – 18 GHz		1.15		
Switching Time			25		ms
RF Input Power (Cold Switching) ¹	DC – 18 GHz			20	W
Switch Lifetime (per Switch)	100 mW hot switching ²	10			million cycles
	1W hot switching		3		

Notes:

- Maximum power for any connected through path as stated; maximum power into any internal termination is 1W per port
- Hot switching powers above this level will degrade the switch lifetime

Switch Configuration:

- Fail-safe
- Absorptive



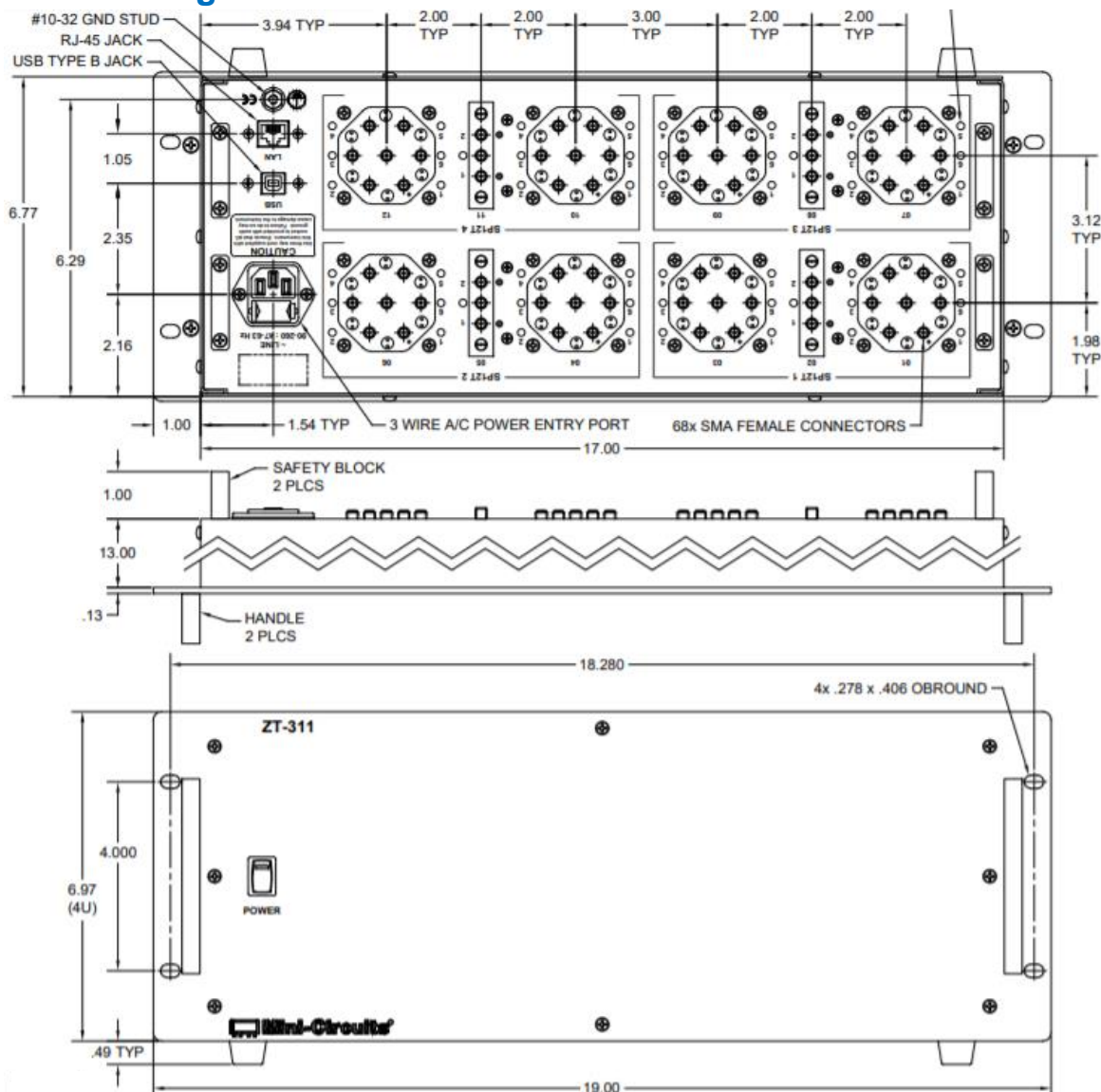
USB & Ethernet Controlled Mechanical Switch System

ZT-311

Mechanical / Environmental Specifications

Dimensions	19" (w) x 4U (h) x 13" (d); mounting feet add 0.5" height
Case Material	Aluminum (with protective coatings to prevent corrosion)
Case Drawing	99-01-2954
RF Connectors	SMA female
Front Panel	a) Power ON/OFF switch with indicator light
Rear Panel	a) All RF ports b) LED switch position indicators c) AC mains power supply input (IEC C14 inlet) d) USB & RJ45 control connections
Control Interface	USB and Ethernet TCP/IP supporting HTTP and TELNET protocols
Power Supply	AC mains power input (90-260 V, 47-63 Hz) with 2A, 250V fuse rating
Operating Temperature	0° to +50° C

Case Drawings



Software Specifications

Software & Documentation Download:

- Mini-Circuits' full software and support package including user guide, Windows GUI, DLL files, programming manual and examples can be downloaded free of charge from <https://www.minicircuits.com/softwaredownload/ztm2.html>
- 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 Direct Programming	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:

- Simple ASCII / SCPI command set for switch & attenuator control
- Communication 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):

- Direct USB programming using a series of USB interrupt codes

Full programming instructions and examples available for a wide range of programming environments / languages.

USB & Ethernet Controlled Mechanical Switch System

ZT-311

Graphical User Interface (GUI) for Windows - Key Features

- Connect via USB or Ethernet
- Run GUI in demo mode to preview functionality without ZTM2 hardware
- View and set all switch states at the click of a button
- View system status
- Configure user profiles to label switches and control access
- Send programmatic commands
- Configure Ethernet IP settings

Switch	Type	State	Count
1: Switch 1	SPDT	2: Port 2	-
2: Switch 2	SP4T	0: Disconnected	-
3: Switch 3	MTS	2: Port 2	-
4: Switch 4	SP6T	0: Disconnected	-
5: Switch 5	SP8T	6: Port 6	-
6: Switch 6	SPDT	1: Port 1	-
7: Switch 7	SP4T	0: Disconnected	-
8: Switch 8	MTS	2: Port 2	-
9: Switch 9	SP6T	0: Disconnected	-
10: Switch 10	SP8T	6: Port 6	-
11: Switch 11	SPDT	2: Port 2	-
12: Switch 12	SP4T	0: Disconnected	-
13: Switch 13	MTS	1: Port 1	-
14: Switch 14	SP6T	0: Disconnected	-
15: Switch 15	SP8T	7: Port 7	-
16: Switch 16	SPDT	2: Port 2	-
17: Switch 17	SP4T	0: Disconnected	-
18: Switch 18	MTS	2: Port 2	-
19: Switch 19	SP6T	0: Disconnected	-
20: Switch 20	SP8T	3: Port 3	-
21: Switch 21	SPDT	2: Port 2	-
22: Switch 22	SP4T	0: Disconnected	-
23: Switch 23	MTS	1: Port 1	-
24: Switch 24	SP6T	0: Disconnected	-

Temperature / Fans Status	
Temperature	Normal
Fan1 operation	OK
Fan2 operation	OK
Fans state	OFF

USB & Ethernet Controlled Mechanical Switch System

ZT-311

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)
B13-67-11+	2	Rear safety block
B18-DD-125+	4	Pan-head screw

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

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

