



USB & ETHERNET

Blocking Switch Matrix

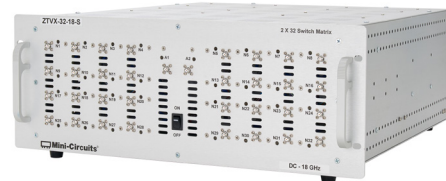
ZTVX-32-18-S

Mini-Circuits

50Ω DC to 18 GHz 2 x 32 Rack-Mount SMA Female

THE BIG DEAL

- Bi-directional, 2 x 32 blocking switch matrix
- One-to-one switch paths
- Low insertion loss between connected ports
- High isolation between disconnected ports
- Software automation via Ethernet & USB
- Convenient rack-mountable chassis

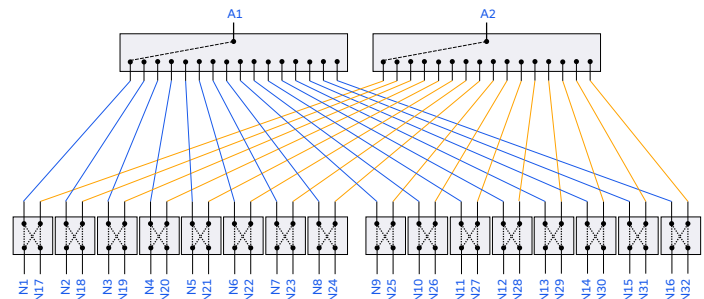


Generic photo used for illustration purposes only

APPLICATIONS

- High throughput production testing
- RF test automation & signal routing
- 5G FR1 & FR3, WiFi 6E MIMO, UWB, Bluetooth
- Quantum computing
- MIMO antenna testing

FUNCTIONAL BLOCK DIAGRAM



PRODUCT OVERVIEW

Mini-Circuits' ZTVX-32-18-S is a high performance, 2 by 32 blocking switch matrix, operating over a wide bandwidth from DC to 18 GHz. The system is integrated into a compact, 4U height, 19-inch rack-mountable chassis with all RF ports (SMA female) on the front panel and power / control connections on the rear.

The blocking configuration supports 2 active switch paths at any time, between the 2 "A" ports 32 "B" ports in a one-to-one arrangement. The matrix is bi-directional so the "A" and "B" ports can be used interchangeably as both inputs and outputs. This configuration is ideal for extending 2-port test equipment such as a VNA for multi-port or multiple device testing.

The switch matrix can be controlled via USB or Ethernet (supporting 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.

KEY FEATURES

Feature	Advantages
2 x 32 matrix	Share high value test instrumentation such as a 2-port VNA or a signal generator and power sensor combination, for testing multiple ports or devices in parallel.
Mechanical blocking matrix	One-to-one switch paths with low loss when connected and high isolation when disconnected; minimizing the impact of the matrix itself on sensitive RF test results.
Ethernet & USB control	USB HID and Ethernet (HTTP & Telnet) interfaces ensure compatibility with most software environments and connection requirements.
Rack-mount chassis	Compact 4U height, 19" rack-mountable chassis suits integration in automated production test environments.

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ELECTRICAL SPECIFICATIONS AT +25°C (EACH SWITCH)

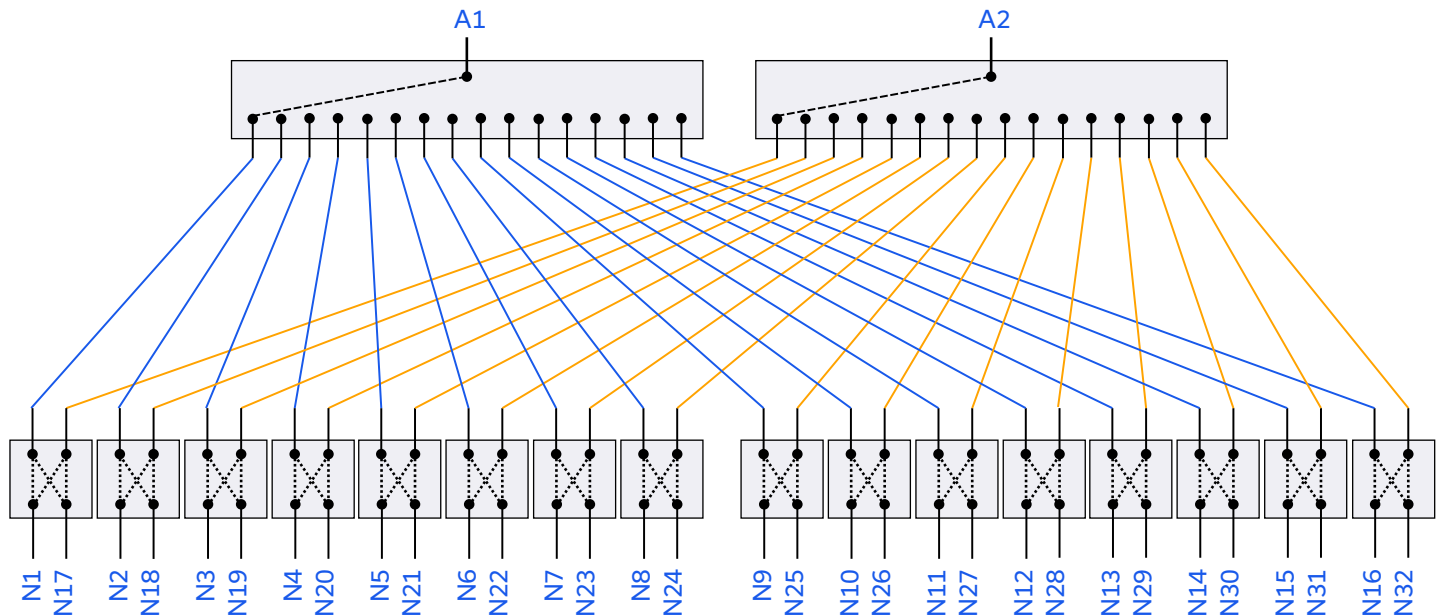
Parameter	Conditions	Min.	Typ.	Max.	Units
Frequency	-	DC		18	GHz
Path Loss	DC - 6 GHz		1.20	1.70	dB
	6 - 12 GHz		1.75	2.25	
	12 - 18 GHz		2.25	2.75	
Isolation (Inactive Paths) ¹	DC - 6 GHz	80	90		dB
	6 - 12 GHz	70	80		
	12 - 18 GHz	60	70		
Isolation (Adjacent Ports) ²	DC - 6 GHz	80	90		dB
	6 - 12 GHz	70	80		
	12 - 18 GHz	60	70		
Return Loss ³	DC - 6 GHz		18		dB
	6 - 12 GHz		15		
	12 - 18 GHz		12		
Input Power				+20	dBm

1. Isolation from input to output on a disconnected path. Example: A1 to N1 isolation is the leakage measured at N1 when A1 is connected to N2.

2. Isolation between any pair of A or N ports. Example: Isolation measured from N1 to N2.

3. Return loss into all ports in all states. N ports are terminated internally (absorptive) when disconnected.

FUNCTIONAL BLOCK DIAGRAM



**CONTROL INTERFACES**

Ethernet Control	Supported Protocols	TCP / IP, HTTP, Telnet, DHCP, UDP (limited)
	Max Data Rate	10 Mbps (10 Base-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
:PATH:[A_port]:[N_port]	Set a single switch state: • [sw_label] = Switch number (1 to 24) • [port] = The port to be connected to Com of the specified switch (1 or 2) • Example :SPDT:1:STATE:2
:PATH:[input_port]?	Get the state of all switches: • [input_port] = The "A" or "N" port name to check (A1 to A2 or N1 to N32) • Example :PATH:N12:?



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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 switch paths at the click of a button
- Configure automated switching sequences
- Configure Ethernet settings
- Update firmware

ZTVX (Ver. A3X7)

Main Control

[Help](#) [Block Diagram](#)

Set Path
From: A2 To: N5
[Show Command](#) [Save to Quick Set Button](#) [SEND](#)

Model Name ZTVX-32-18-S **Serial Number** 02209270075 - USB
Protocol USB **IP** **Password**
[Firmware Upgrade](#) [Ethernet Config](#)
Connection Status Connected

Switch Status

Switch	State	Count
1	1	53
2	2	24
3	1	20
4	0	-
5	1	11
6	1	10
7	1	9
8	1	10
9	2	26
10	1	53
11	1	53
21	2	24
22	1	24
23	1	24
24	0	-
25	1	24
26	1	24
27	1	24
28	1	24

Quick-Set Buttons Configuration File: [FactoryDefault_2_32.txt](#)
Set A1: N1-16 Set A1: N17-32 Set A2: N1-16 Set A2: N17-32 TAB5 (Empty)
[Modify Buttons](#)

A2 -> N17	A2 -> N18	A2 -> N19	A2 -> N20	A2 -> N21
A2 -> N22	A2 -> N23	A2 -> N24	A2 -> N25	A2 -> N26
A2 -> N27	A2 -> N28	A2 -> N29	A2 -> N30	A2 -> N31
A2 -> N32	Query A2 Path	EMPTY18	EMPTY19	EMPTY20

[Load Config](#)
[Clear All](#)

Manual Commands
Switch Commands: Switch States: Switch Counters: :SP8T:24:SCounter? Additional Commands:
Command [SEND](#)

Connection Status:
A1 - N4
A2 - N5

Command History
[8/9/2023 9:17:38 AM] [Manual Comm] SCPI: :SP8T:24:SCounter? Result: 17;20;8;8;11;11;30;20 Return: 1
[8/9/2023 9:17:41 AM] [Manual Comm] SCPI: ClearAll Result: 1 - Success Return: 1
[8/9/2023 9:17:45 AM] [Set Path] [From:A1 To:N1] SCPI: :PATH:A1:N1 Result: 1 - Success Return: 1
[8/9/2023 9:18:04 AM] [Set Path] [From:A1 To:N4] SCPI: :PATH:A1:N4 Result: 1 - Success Return: 1
[8/9/2023 9:18:09 AM] [Set Path] [From:A2 To:N5] SCPI: :PATH:A2:N5 Result: 1 - Success Return: 1

Temperature / Fans Status

Temperature	Normal
Fan1 operation	OK
Fan2 operation	OK
Fans state	OFF





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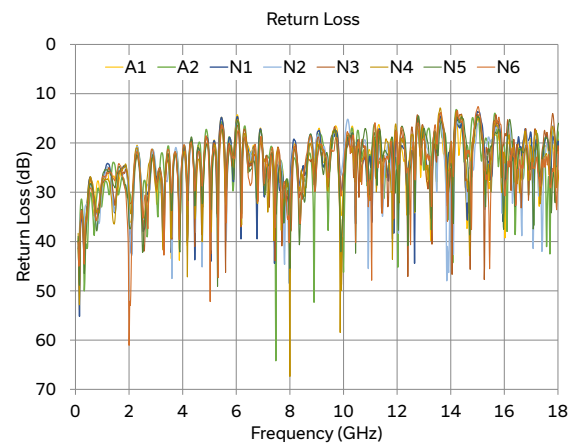
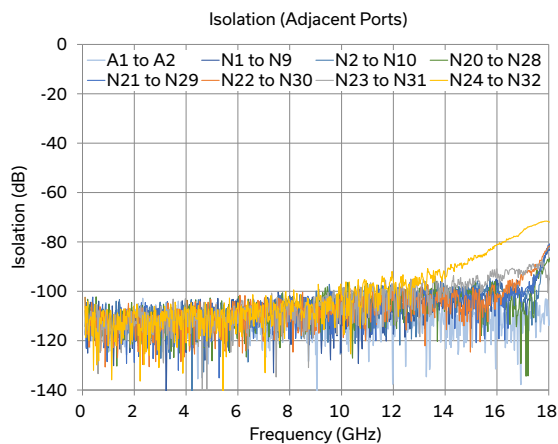
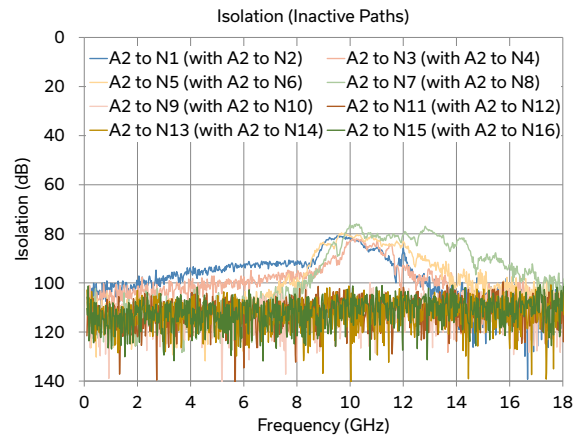
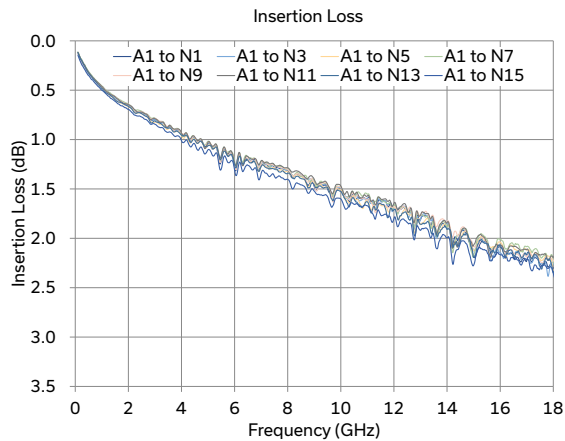
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TYPICAL PERFORMANCE GRAPHS



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**ABSOLUTE MAXIMUM RATINGS**

Parameter	Conditions	Limits	Units
Temperature	Operating	0 to +50	°C
	Storage	-20 to +60	
Input Power (No Damage)	Cold switching	+30	dBm
	Hot switching	+20	
	Into internal termination	+30	

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	150W maximum

FRONT PANEL LED LOGIC

LED / Port	Color / State	Switch Path State
A1	Off	Port A1 disconnected
	Green	Port A1 connected
A2	Off	Port A2 disconnected
	Orange	Port A2 connected
N1-32	Off	Port disconnected
	Green	Port connected to A1
	Orange	Port connected to A2

CONNECTIONS

Port	Connector
A1-A2 & N1-N32	SMA female
USB	USB type B
Ethernet / LAN	RJ45
AC Input	IEC C14 inlet



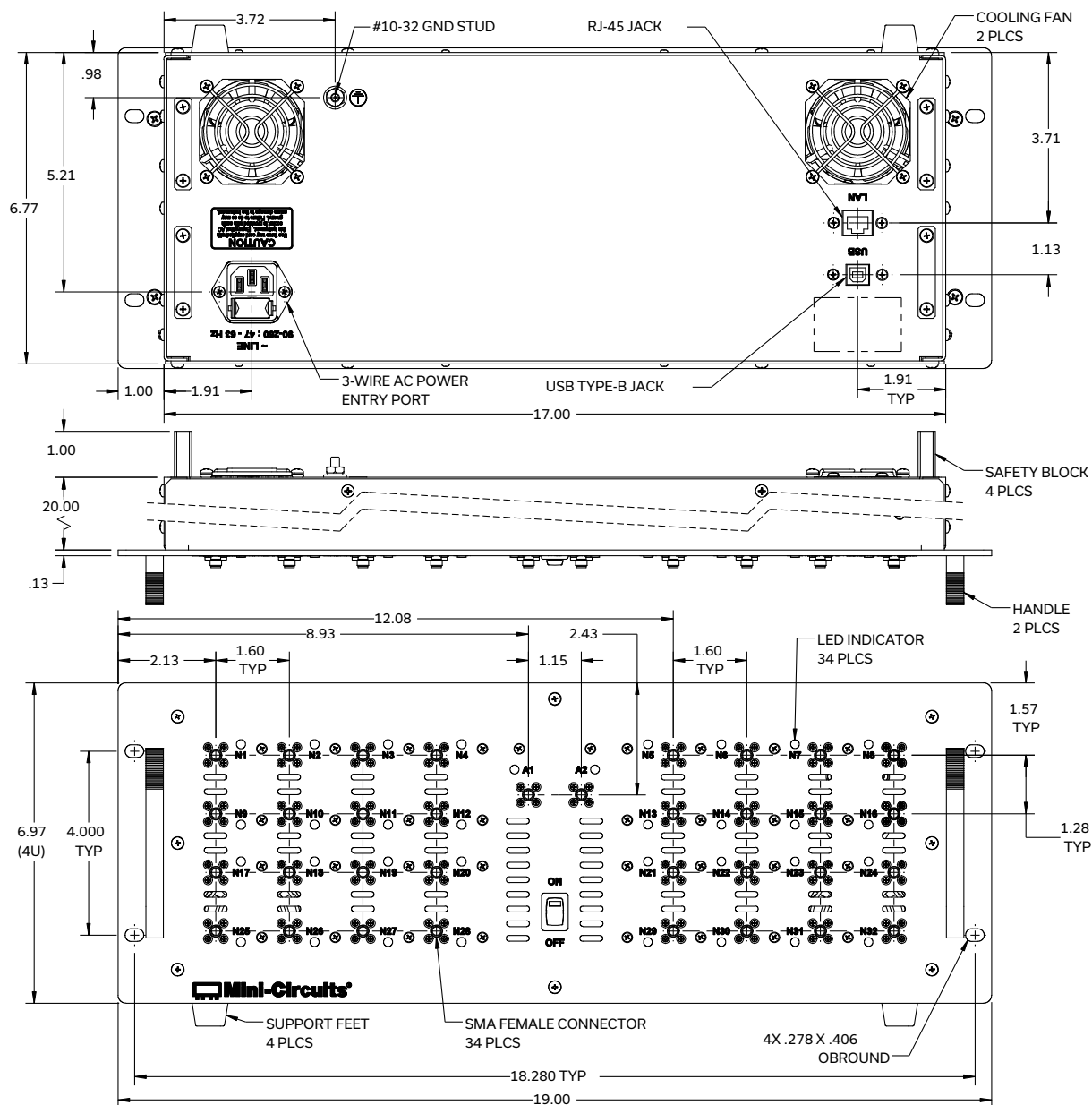
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CASE STYLE DRAWING



PRODUCT MARKING*

Product Marking: ZTVX-32-18-S

Product Description: 2 x 32 Switch Matrix

Product Frequency: DC - 18 GHz

Unit ID Label: Serial number and other identification marks

*Marking may contain other features or characters for internal lot control

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DETAILED MODEL INFORMATION IS AVAILABLE ON OUR WEBSITE [CLICK HERE](#)

Case Style	99-01-2910
Software, User Guide & Programming Manual	https://www.minicircuits.com/softwaredownload/ztvx.html
Environmental Rating	ENV55
Regulatory Compliance	Refer to our website for compliance methodologies and qualifications  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 testsolutions@minicircuits.com if your region 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/terms/viewterm.html





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