

DcAN Dual FFCS Interface
Part No 11454
Rev A

Features:

- Aluminum Enclosure
- Powder-Coated White
- Gigabit Ethernet
- Power-over-Ethernet Capable
- Compatible with simulated VIC-3 FFCS intercom boxes



Part number shown: 11454-V1

Part Number Information

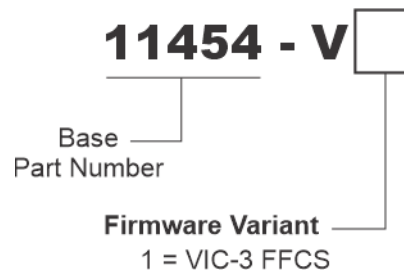


Table of Contents

1 Product Description.....	3
1.1 About DisComm Audio Network.....	3
1.2 Firmware Variants.....	4
1.2.1 -V1.....	4
1.3 Dimensions.....	5
1.4 Front Connectors.....	6
1.4.1 Audio Connectors.....	6
1.4.2 Compatible Headsets.....	6
1.4.3 I/O Connector Pinout (5747847-6).....	7
1.5 Rear Connectors.....	8
1.5.1 Auxiliary Power.....	8
1.5.2 LED Status Indicator.....	8
1.5.3 Ethernet Connector.....	8
1.6 IP Address Configuration.....	9
2 Software Interface.....	11
2.1 Audio Packet.....	11
2.2 Status/Control IP Port.....	12
2.3 FFCS Status Packet.....	12
2.4 Audio Levels Packet.....	13
2.5 Radio Access Control Packet.....	14
2.6 Radio Model Control Packet.....	15
2.7 Feature Control Packet.....	16
2.8 Mixer Control Packet.....	17
3 Specifications.....	18
3.1 Connectors.....	18
3.2 Power.....	18
3.3 Mechanical.....	18
3.4 Environmental.....	18

1 Product Description

The Dual FFCS Interface Box for DisComm Audio Network (DcAN) is a device that can accommodate two simulated FFCS intercom devices such as eMDee part number 10806, or similar. This device is compatible with other devices that operate on the DisComm Audio Network.

The enclosure is made of aluminum and has front connectors for switch I/O and audio from a simulated intercom box. A power connector is available on the back of the unit, but the unit can also be powered using Power-over-Ethernet (PoE). An external speaker can be connected to the back of the unit.

The audio and I/O is converted to digital and is interfaced through a network port from a locking RJ-45 connector on the back of the unit. This interfaces to our DisComm Audio Network using 1Gbps Ethernet allowing the use of standard network switches and Cat5e/Cat6 cabling.

1.1 About DisComm Audio Network

DisComm Audio Network (DcAN) uses IP-based networking to create a local voice network for a high-quality, low-latency audio network suitable for local intercoms and other full-duplex, clear-com applications. The network can also handle digital I/O for switches and displays. UDP/IP packets are used for digitized audio and digital I/O, control, and status.

The protocol for DisComm Audio Network is similar to Voice-over-IP (VoIP) and Audio over Ethernet but with some minor changes to work efficiently in a simulated intercom architecture. The packet format and protocol definition for DcAN is non-proprietary and is freely available to developers and end users.

Digitized audio packets are raw audio streams typically set at 16 bit samples at 8000 samples per second. Each audio packet contains as few samples as possible in order to reduce latency from talker to listener. A listener can capture one or more audio streams from the network and mix them into its output.

External communications, such as over a simulated radio, can be accomplished by using an application that has access to the DisComm Audio Network and to the distributed network. Our DisComm software can be used to build such an application that translates DisComm Audio Network packets to DIS PDUs and vice versa. DisComm also has built-in radio modeling and many other effects useful for distributed radio communications. Please contact eMDee Technology for more information about our compatible software products.

1.2 *Firmware Variants*

1.2.1 -V1

This firmware variant is specifically designed to interface to a simulated VIC-3 FFCS intercom box with basic I/O for switches and headset audio. One example of a compatible device is the eMDee Technology part number 10806, which is a housing that mimics the size and look of a tactical intercom box, and has direct connections to the switches and headset connector.

There are three variants of the 10806 intercom box: -H1, -H2, -H3. This interface box is compatible with all three of those variants. To simplify the connection between the 10806 intercom box and this device, eMDee Technology provides a wiring harness that is specifically built for this purpose. The part number for the wiring harness is 11455.

1.3 Dimensions

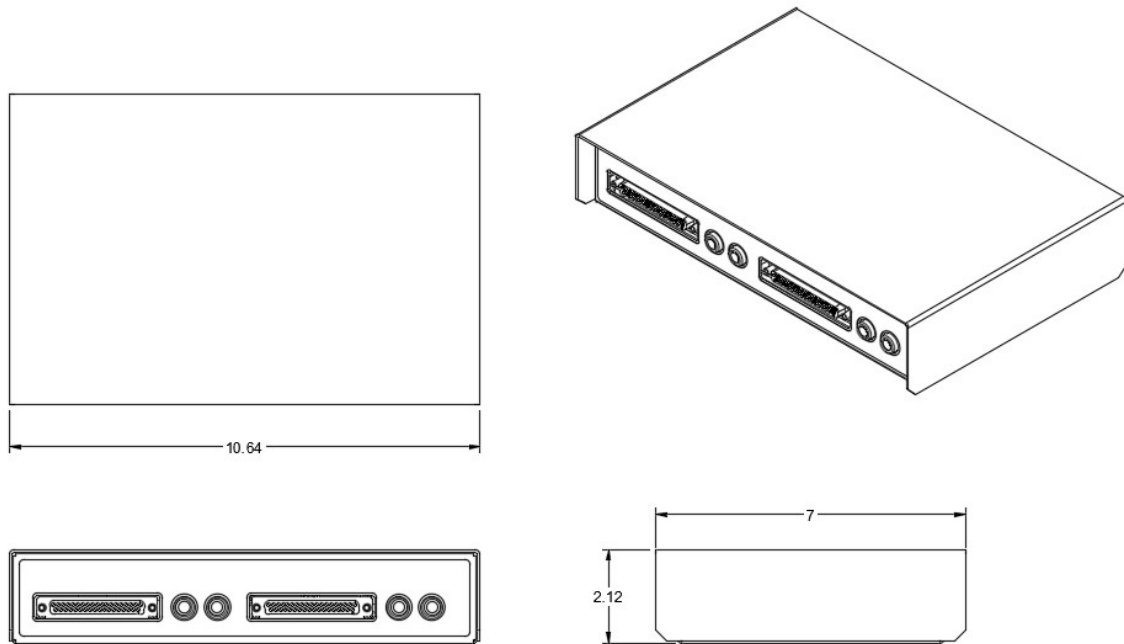


Figure 1: Enclosure Dimensions

1.4 Front Connectors

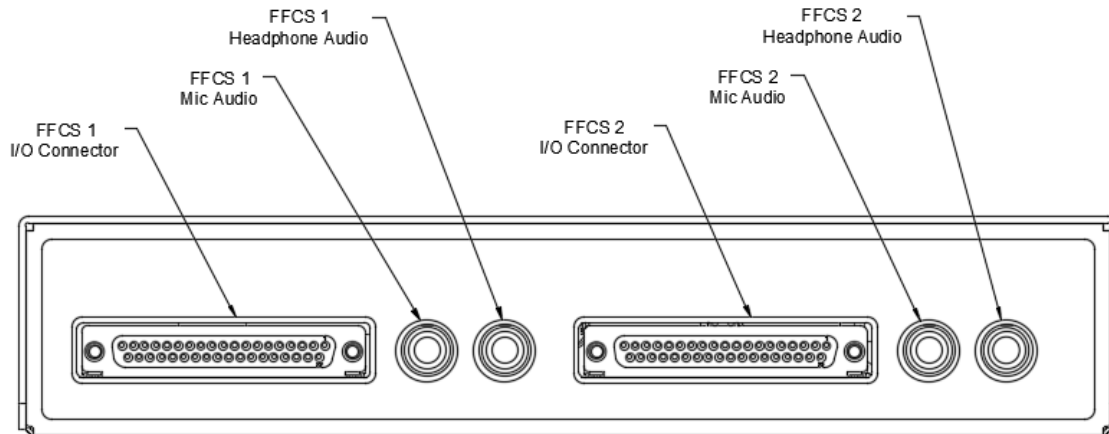


Figure 2: Front View

1.4.1 Audio Connectors

The connectors for the headset audio allow separate connection for the microphone audio and the headphone audio. The audio connectors have the following pinout:

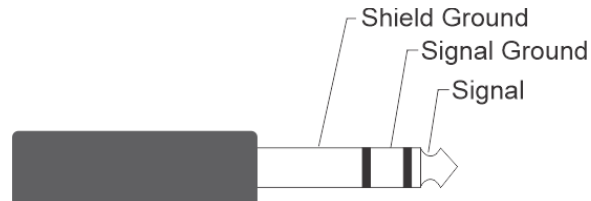


Figure 3: Audio Connector Pinout

1.4.2 Compatible Headsets

The audio connections are compatible with PICVC headsets and can be connected directly to the interface box without the need for external amplification (as long as the wiring length between the simulated intercom box and the interface box does not exceed 15 feet). Power for the PICVC microphone element can be taken from the I/O connector.

An H-250 handset can also be directly connected to the interface box (does not require microphone power). The input circuitry in the interface box can sense the connection of handset versus PICVC and automatically adjusts its gain accordingly.

1.4.3 I/O Connector Pinout (5747847-6)

	FFCS Function	Pin #
WORK	INT	1
	A	2
	B	3
	C	4
	D	5
	E	6
	F	7
	Common	8
MONITOR	WK	20
	A	21
	B	22
	C	23
	D	24
	E	25
	F	26
	ALL	27
	Common	28
VOLUME	VOL CCW	9
	VOL TAP	10
	VOL CW	11
INTERCOM	PTT	29
	VOX	30
	LIVE	31
	O/R	32
	Common	33
Headset/Handset Push-to-talk	PTT	12
	Common	13
External PTT	INT PTT	35
	Radio PTT	36
	Common	37
PICVC Headset Power	+20VDC	19
	GND	18
	GND	17
Misc. Power	+5VDC	16
	GND	15
	GND	14

1.5 Rear Connectors

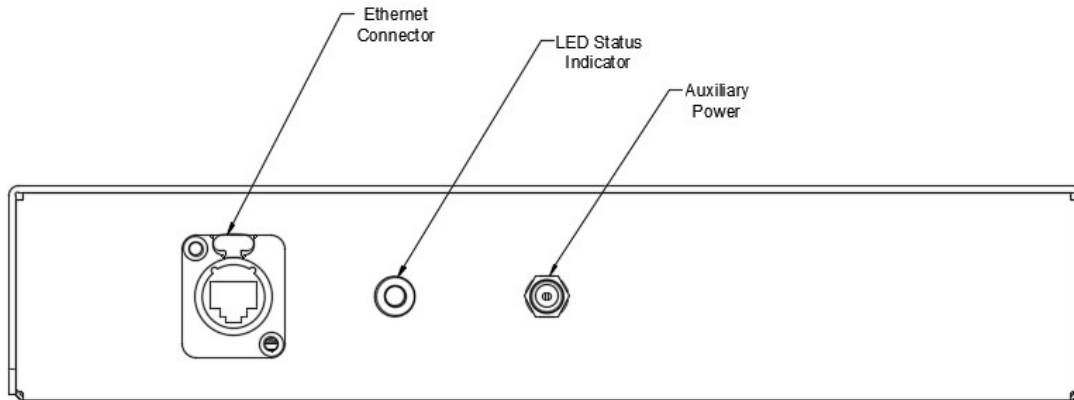


Figure 4: Rear View

1.5.1 Auxiliary Power

The recommended power source for this device is supplied through a Power over Ethernet (PoE) network connection. When a PoE network is not available, a standard Ethernet network connection can still be used but an external power source will need to be connected to the auxiliary power connector.

An external power supply can be purchased separately. The part number for the power supply is:

eMDee Part No.	Description
11494	24VDC 65W Power Supply

1.5.2 LED Status Indicator

The LED status indicator on the rear of the interface box shows the power status of the unit. When the interface box is properly powered it will glow amber until it is fully initialized. Then it will glow green when the device is powered and running.

1.5.3 Ethernet Connector

The Ethernet connector on the rear of the unit is compatible with a standard CAT5e/6 network cable with RJ-45 plugs. For a more durable connection, an XLR-type locking connector can be added to any CAT5e/6 cable such as the Neutrik NE8MC-B or any other compatible EtherCON product.

1.6 IP Address Configuration

The IP address of the interface box is configurable to a number of different addresses through a 16-position selector switch that is accessible from the bottom of the enclosure (see Fig 5). The table below shows the IP address that will be used for the interface box corresponding to the position of the selector switch.

When the selector switch is set to position F, the interface box will use DHCP to assign its IP address. When using this setting, a DHCP server must be accessible from the audio network.

When the selector switch is changed, the power to the interface box must be cycled to apply the new IP address settings.

Switch Setting	IP Address
0	10.200.1.100
1 (default)	10.200.1.101
2	10.200.1.102
3	10.200.1.103
4	10.200.1.104
5	10.200.1.105
6	10.200.1.106
7	10.200.1.107
8	10.200.1.108
9	10.200.1.109
A	192.168.33.0
B	192.168.33.1
C	192.168.33.2
D	192.168.33.3
E	192.168.33.4
F	DHCP

IP Address Configuration (Cont.)

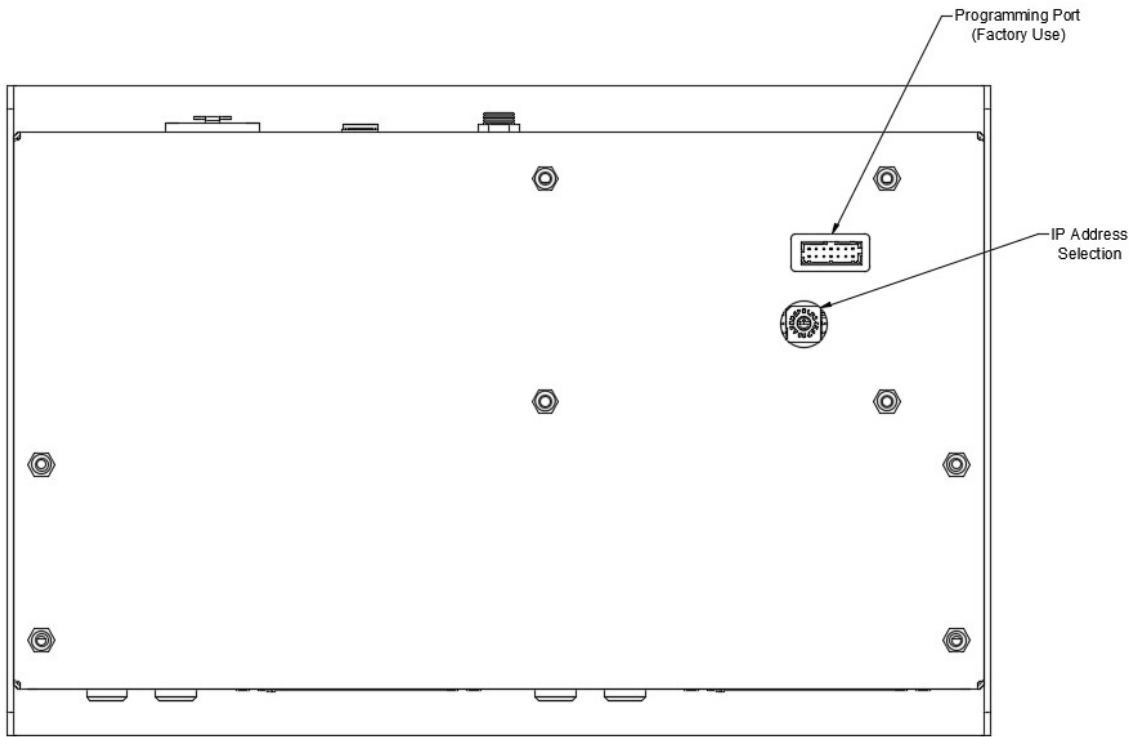


Figure 5: Bottom View

2 Software Interface

2.1 Audio Packet

- Audio packets are sent to the network on UDP/IP port 33000 in broadcast mode. All DcAN nodes listen to port 33000.
- An external process can read audio data sent on port 33000 and also send audio data to port 33000. When an external process is sending data to port 33000, it must follow this packet format but can send more or less samples than what is shown.
- Sending 64 samples per packet is the default setting for each DcAN node which creates an 8 msec delay from talker to listener.

0	UINT16	0x0100
1	UINT16	<i>Audio Signal Source</i>
2	UINT16	<i>Communications Channel</i>
3	UINT16	<i>Sequence Number</i>
4 . . 67	INT16	<i>Audio Payload Data</i> <i>64 samples</i>

Packet ID

Unique ID of the audio signal source
 MS byte = 4th octet of IP address
 LS byte = index of FFCS panel
 0 = FFCS 1
 1 = FFCS 2

1 = Intercom
 10 = Radio A
 11 = Radio B
 12 = Radio C
 13 = Radio D
 14 = Radio E
 15 = Radio F

A number that increases by one each time a packet is sent

16 bit PCM values in 2's complement form
 -32768 to 32767

2.2 Status/Control IP Port

All status and control packets are sent to/received from the FFCS interface on a unique IP port number. The IP port number is formed by adding the 4th octet of the interface's IP address to 31000. For example, an FFCS interface that is configured with IP address 10.200.1.101 will communicate on port 31101.

2.3 FFCS Status Packet

- Sent to the DcAN network by the FFCS interface on the Status/Control IP Port (ref 2.2).
- Reports the current settings of an FFCS panel.
- A packet is sent every 2 seconds or when the state of the FFCS settings have changed.

0	UINT16	0x2002	Packet ID
1	UINT16	<i>FFCS Panel Index</i>	Index of the FFCS panel 0 = FFCS 1 1 = FFCS 2
2	UINT16	<i>Work Switch</i>	0 = undefined 1 = INT 2 = A 3 = B 4 = C 5 = D 6 = E 7 = F
3	UINT16	<i>Monitor Switch</i>	0 = undefined 1 = WK 2 = A 3 = B 4 = C 5 = D 6 = E 7 = F 8 = ALL
4	UINT16	<i>Intercom Switch</i>	0 = undefined 1 = PTT 2 = LIVE 3 = VOX 4 = O/R
5	UINT16	<i>PTT Switch</i>	0 = PTT Off 1 = Radio PTT 2 = Intercom PTT
6	UINT16	0xFF	(reserved for future use)
7	UINT16	<i>Version</i>	Firmware Version

2.4 Audio Levels Packet

- Sent to the DcAN network by the FFCS interface on the Status/Control IP Port (ref 2.2).
- Sent every 100ms when enabled (ref 2.7).

0	UINT16	0x2202
1	UINT16	<i>Input Audio Level – FFCS 1</i>
2	UINT16	<i>Input Audio Level – FFCS 2</i>
3	UINT16	<i>Output Audio Level – FFCS 1</i>
4	UINT16	<i>Output Audio Level – FFCS 2</i>

Packet ID

Sampled value of signal (averaged)
0 to 32767

Sampled value of signal (averaged)
0 to 32767

Sampled value of signal (averaged)
0 to 32767

Sampled value of signal (averaged)
0 to 32767

2.5 Radio Access Control Packet

- Sent by an external process on the Status/Control IP Port (ref 2.2).
- The default setting is all available radios and intercom are available for transmit and receive access. Use this packet to change that behavior.
- A remote PTT switch can be sent to activate a transmission on an FFCS. The remote PTT will be effectively 'OR'ed with the PTT switch on the FFCS.

0	UINT16	0x2001
1	UINT16	<i>FFCS Panel Index</i>
2	UINT16	<i>Radio Receive Access Bitwise Control for Receive Access to given radios</i>
3	UINT16	<i>Radio Transmit Access Bitwise Control for Transmit Access to given radios</i>
4	UINT16	<i>Remote PTT</i>

Packet ID

Index of the FFCS panel
 0 = FFCS 1
 1 = FFCS 2

Bit 15 (MSB): Radio F
 Bit 14: Radio E
 Bit 13: Radio D
 Bit 12: Radio C
 Bit 11: Radio B
 Bit 10: Radio A
 Bit 9:1: Not used
 Bit 0 (LSB): Intercom

Bit 15 (MSB): Radio F
 Bit 14: Radio E
 Bit 13: Radio D
 Bit 12: Radio C
 Bit 11: Radio B
 Bit 10: Radio A
 Bit 9:1: Not used
 Bit 0 (LSB): Intercom

0 = PTT Off
 1 = Radio PTT
 2 = Intercom PTT

2.6 Radio Model Control Packet

- Sent by an external process on the Status/Control IP Port (ref 2.2).
- The default setting is that the internal model of the FFCS interface is enabled and transmit and receive behavior will follow the internal model. Use this packet to override the behavior of the internal model.
- When the internal model is disabled, the transmit and receive functions of the FFCS will be dictated strictly from this packet.

0	UINT16	0x2003
1	UINT16	<i>FFCS Panel Index</i>
2	UINT16	<i>Disable Internal FFCS Model</i>
3	UINT16	<i>Set Transmitting</i>
4	UINT16	<i>Set Receiving</i>

Packet ID

Index of the FFCS panel

0 = FFCS 1

1 = FFCS 2

0 = enabled (default)

1 = disabled

Set transmitting mode/channel
(only one transmit channel can be active at a time)

0 = Not Transmitting

1 = Transmit on Intercom

10 = Transmit on Radio A

11 = Transmit on Radio B

12 = Transmit on Radio C

13 = Transmit on Radio D

14 = Transmit on Radio E

15 = Transmit on Radio F

Set channels to receive from
(one or more channels can be active at a time)

Bit 15 (MSB): Receive Radio F

Bit 14: Receive Radio E

Bit 13: Receive Radio D

Bit 12: Receive Radio C

Bit 11: Receive Radio B

Bit 10: Receive Radio A

Bit 9:1: Not used

Bit 0 (LSB): Receive Intercom

2.7 Feature Control Packet

- Sent by an external process on the Status/Control IP Port (ref 2.2).
- The FFCS interface will send Audio Level packets (ref 2.4) when this feature is enabled.
- Audio Level packets are disabled by default, use this packet to enable them.

0	UINT16	0x2004
1	UINT16	<i>Audio Level Packets Enabled</i>

Packet ID

Enable/disable audio level packets from being sent
0 = Disabled (default)
1 = Enabled

2.8 Mixer Control Packet

- Sent by an external process on the Status/Control IP Port (ref 2.2).
- The default settings of the mixer is that all elements are set to 0dB of gain (0x4000 in Q2.14 format).
- Use this Mixer Control packet to change the volume of any of the elements.

0	UINT16	0x0202	Packet ID
1	UINT16	<i>Mixer Mode</i>	0 = Mixer is qualified with PTT switches to enable/disable sidetones 1 = Mixer is set “as-is”
2	UINT16	<i>Capture Volume – FFCS 1</i>	Q2.14 fixed point ¹
3	UINT16	<i>Capture Volume – FFCS 2</i>	Q2.14 fixed point ¹
4	UINT16	<i>Mixer Volume Input 1 to Output 1</i>	Q2.14 fixed point ¹
5	UINT16	<i>Mixer Volume Input 2 to Output 1</i>	Q2.14 fixed point ¹
6	UINT16	<i>Mixer Volume Input 1 to Output 2</i>	Q2.14 fixed point ¹
7	UINT16	<i>Mixer Volume Input 2 to Output 2</i>	Q2.14 fixed point ¹
8	UINT16	<i>Playback Volume – FFCS 1</i>	Q2.14 fixed point ¹
9	UINT16	<i>Playback Volume – FFCS 2</i>	Q2.14 fixed point ¹
10	UINT16	<i>Master Output Volume – FFCS 1</i>	Q2.14 fixed point ¹
11	UINT16	<i>Master Output Volume – FFCS 2</i>	Q2.14 fixed point ¹

¹ Q2.14 fixed point format can represent values from 0.0 to 3.99 in order to provide attenuation or gain of the audio signal. Q2.14 format uses 2 bits to represent the integer portion of the volume and 14 bits to represent the fractional component. Examples of using this format as a volume are shown in the table:

Fixed point integer	Floating point equivalent	Atten/Gain
0x0000	0.0	Full attenuation
0x0665	0.1	-20dB
0x2000	0.5	-6dB
0x4000	1.0	0dB
0xFFFF	3.999	+12dB

3 Specifications

3.1 Connectors

Headset	1/4" TRS Phone Jack
Switch I/O	37-pin D-sub, AMP part number 5747847-6
Aux. Power	2.1mm x 5.0mm barrel connector jack
Network	Neutrik NE8FDX-P6-B (compatible with standard RJ-45 connector)

3.2 Power

Input Power	when not using PoE: +12VDC, 3A provided at Aux Power connector when using PoE: IEEE 802.3af Power-over-Ethernet at Network connector
Power Consumption	10W Max
Current Protection	Internal resettable fuse

3.3 Mechanical

Size (W x D x H)	10.64 x 7.0 x 2.12 in (270 x 178 x 54 mm)
Enclosure	Powder coated aluminum
Color	White

3.4 Environmental

Storage Temperature	-20° to +70° C
Storage Humidity	5% to 95% Non-condensing
Operating Temperature	0° to +40° C
Operating Humidity	5% to 95% Non-condensing

Made in the USA