CellGain Wireless

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Red Bank, NJ 07701

732-889-4671

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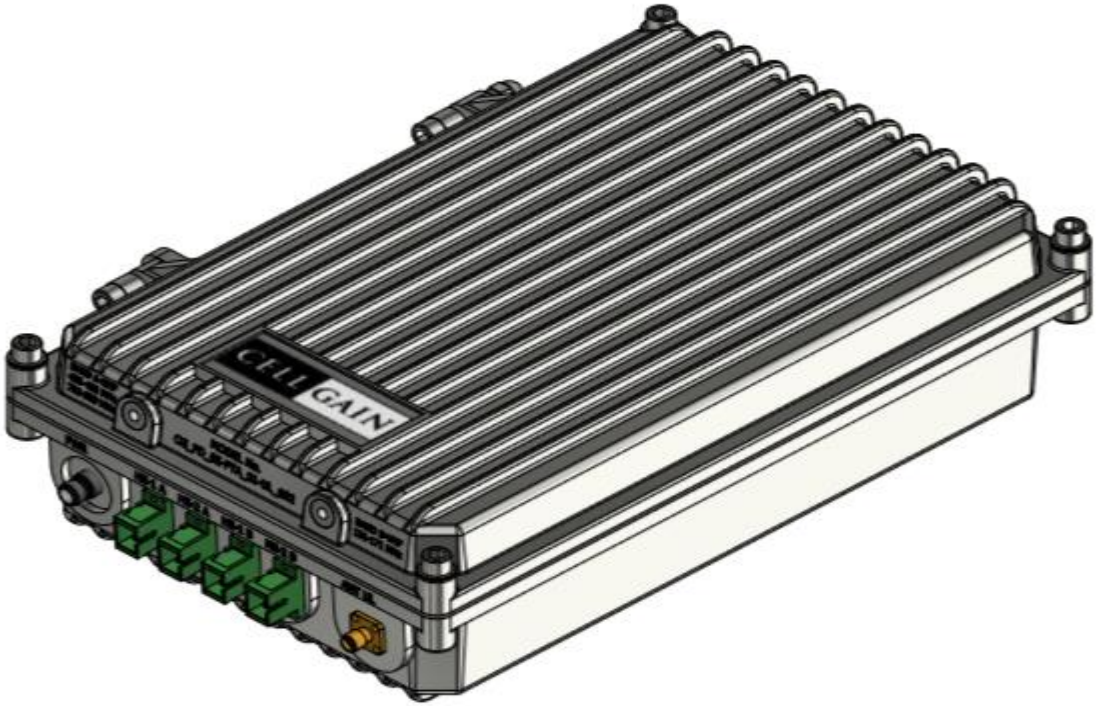

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Cautions, and Warnings

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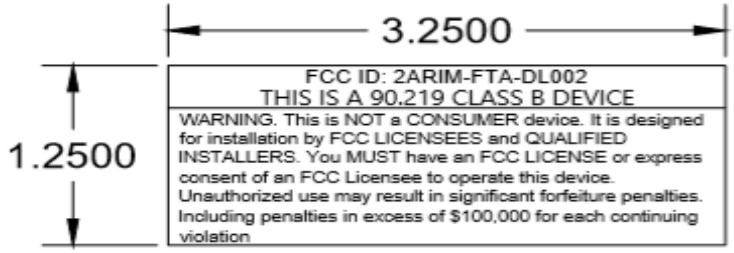
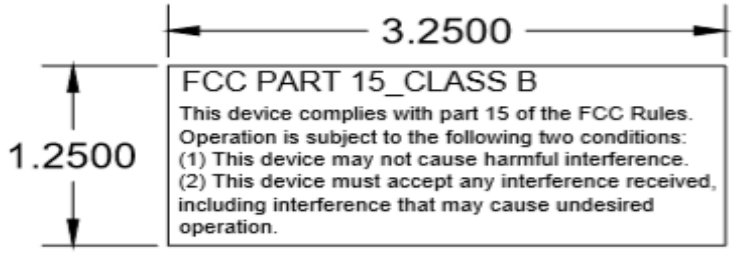
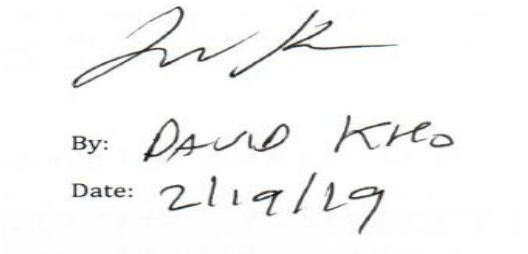
Notes, Cautions, and Warnings / CELLGAIN WIRELESS CEO SIGN OFF







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Acronyms

ALC - automatic level control

AGC - automatic gain control

DAS - distributed antenna system

DL - Downlink

DSP - digital signal processor

FO - fiber optic

HE - Head End

LNA - low-noise amplifier

NMS - Network Management System

PA - power amplifier

RF - radio frequency

UL – Uplink

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Introduction

There are two major elements to the system; the Head End (HE) hardware and the Remote Hardware. The Head End hardware is the interface to the user Base Stations (radios that are FCC certified). The Remote hardware consists of Uplink and Downlink Fiber-to-Antenna (FTA) units. Each UL and DL FTA has been submitted to Advanced Compliance Laboratory for FCC testing and certification.

The system operates over three bands: VHF, 450 MHz, and 800 MHz. These are the communications frequencies between the Base Stations and the remote FTA units. A Network Management System (NMS) sends polling messages from the HE to the FTA and receives status messages back from the FTA to the HE. These messages are transported via SFP modules.

The three communications bands (in the HE and FTA) is supported by one fiber run. The FTA's are able to support two headend locations (OS1, OS2) via fiber and SFP (SFP1, SFP2) ports. The FTA's also provides a secondary RJ45 port for local and remote monitoring over Ethernet.

In the Downlink (DL) path, communications signal from user base stations and polling messages from the NMS are input to the DL HE hardware (FCC certified). These band of signals are filtered, converted to light by a pair of Fiber Optic Transmitters, and transmitted to the FTA via fiber optic cable. In the FTA units, the light from the fiber optic cables is converted back to RF by a pair of Fiber Optic Receivers. The RF communications signals are filtered, amplified, and combined in a Triplexer; the triplexer output is fed to the antenna. A more detailed system description, including the polling and status messages, appears in the DL section below.

In the Uplink (UL) path, signals from portable radios are input the UL FTA via an antenna tied to a triplexer. These signals are filtered, amplified with ALC, and converted to light by a pair of Fiber Optic Transmitters, and transmitted to the HE via fiber optic cable. A more detailed system description, including the polling and status messages, appears in the UL section below. The Theory of Operation and technical description follow. Block diagrams are included at the back of this document.

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Down Link FTA (Basic Operation / Purpose / Function)

The Model FTA-DL002 is a Fiber-Fed, multi-band, antenna interface. Communications signals from user Base Stations is filtered and ALC controlled at the Base Station (FCC Certified) and polling messages from the NMS are input to the DL HE hardware. These band groups converted from light to RF by a pair of Fiber Optic Transmitters. The RF communications signals are filtered, amplified, and combined in a Triplexer; the triplexer output is fed to the antenna.

The NMS polling message is input to an SFP module; the NMS polling message is input to the FTA processor. The status response message is output from the processor to the SFP module, the NMS signal is input to a Fiber Optic transmitter and output back to the HE on the SFP fiber. The FTA Fiber Optic Transmitter wavelength is 1310 nm and the HE Fiber Optic Transmitter wavelength is 1550 nm.

The FTA-DL002 has a processor board that monitors overall unit operation. The processor board monitors diode currents for each of the FO RX diodes, laser current for the FO TX laser, and amplifier current for each of the four filter-amplifier chains. Current is derived from a sense resistor in series with each element monitored.

The processor board receives polling messages from the HE and transmits status messages back to the HE. The HE chassis provide remote monitoring capability via Ethernet. The Graphical User Interface (GUI) of the Network Management System (NMS) computer can display the status of the FTA hardware. Down Link FTA Emissions, Frequency Ranges, Operating Power

The emission type for the FM analog channels is 12K5F3E.

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The Operating DL communications bands and Output Power to the antenna are:

Pass Band I:	151.115MHz-196.2MHz.	Bandwidth 45.088MHz	Max. gain 48.1 at 160.1MHz	0.0dBm ±3
Pass Band II:	337.5MHz-564.0MHz.	Bandwidth 226.5MHz.	Max gain 47.3 at 412MHz	0.0dBm ±3
Pass Band III:	658.0MHz-1119.0MHz.	Bandwidth 461MHz.	Max gain 45.6 at 760MHz	0.0dBm ±3

Part 90 Frequencies list

Pass Band I.	Pass Band II	Pass Band III
151.115-196.27 MHz	**337.5-564.0 MHz**	**658.0-1119.0 MHz**
151.115-156.2475 MHz	406.1-454 MHz	758-775 MHz
157.1875-161.575 MHz	456-462.5375 MHz	788-805 MHz
161.775-161.9625 MHz	462.7375-467.5375 MHz	806-849 MHz
162.0375-173.4 MHz	467.7375-512 MHz	851-894 MHz
.		896-901 MHz
		902-930 MHz
		935-940 MHz

Note: Downlink power is not adjustable; it is set at the factory for the above-listed levels. An Automatic Level Control (ALC) circuit built into the Head End limits the input power to the FO TX and the FTA output power.

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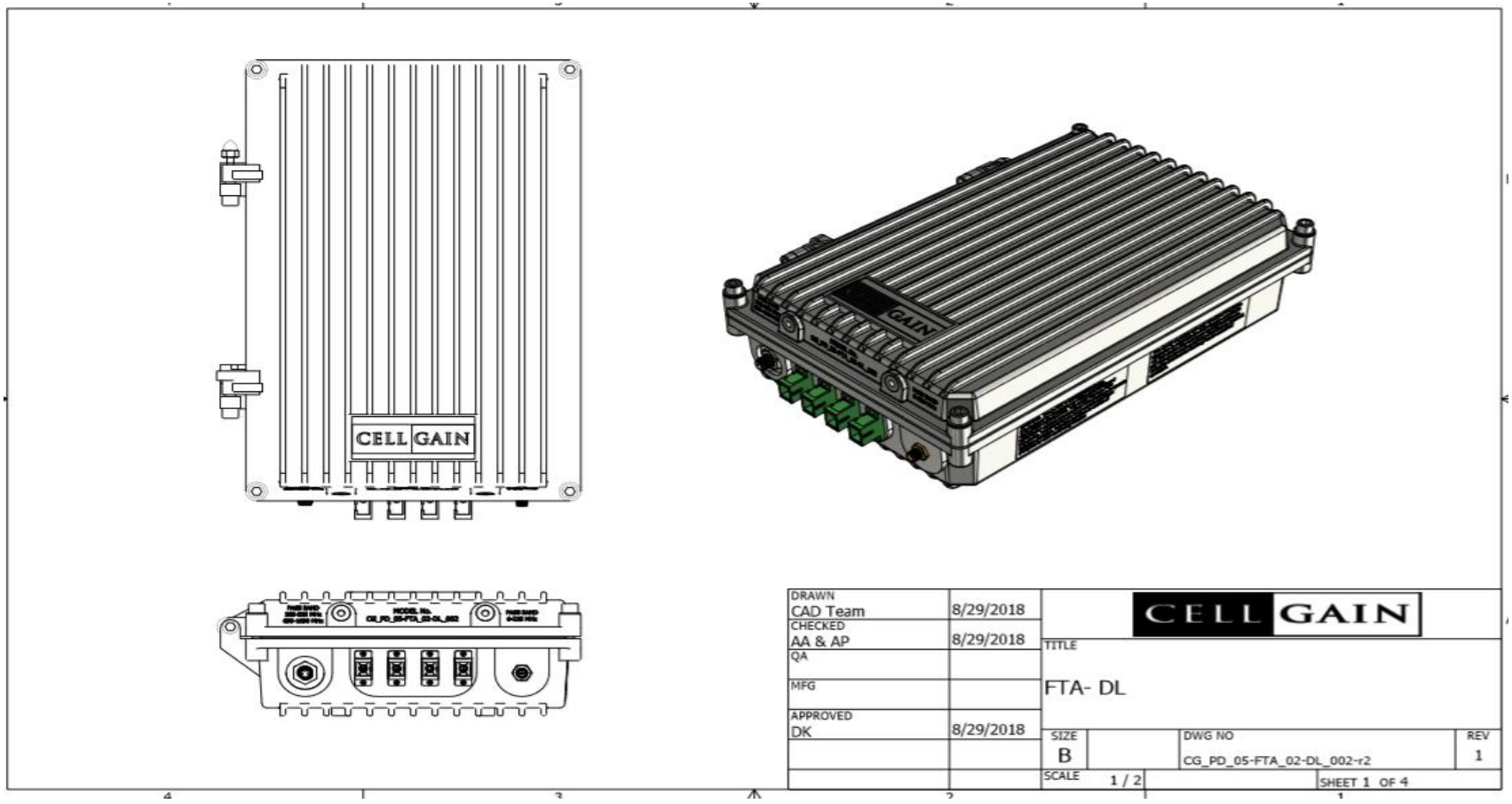
FTA Front View



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FTA Specifications

FTA	
Fiber receiver sensitivity:	> - 12 dBm Optical
Wavelength:	1310 / 1550 nm
IIP3:	0 dBm per band
Unconditionally Stable:	Yes
Noise Figure overall:	< 7 dB
VHF (Channel 1):	151.115 to 196.2 MHz
UHF (channel 2):	355 to 535 MHz
UHF (channel 3):	690 to 1096 MHz
RF Gain:	49 dB / Band
RF Output Power:	+ 3 dBm
Alarming :	All key parameters are monitored and alarms programmed via window for correct operation.
Connectors:	RF: SMA Female
	Optical: SC/APC or as Requested
	Power: NorComp Inc. 855-004-103R004
Operating Temperature:	-20 ºC to +50 ºC
Storage Temperature:	-50 ºC to +85 ºC
Humidity:	90% non-condensing
Duty cycle	Continuous
Power Input	+ 48 vdc reverse polarity protected
	< 5 watts nominal
The equipment is design to operate within Down-Link bands FILTERED by FCC approved Base Station	

Downlink Fiber to Antenna (FTA) User's Manual rev 2.5
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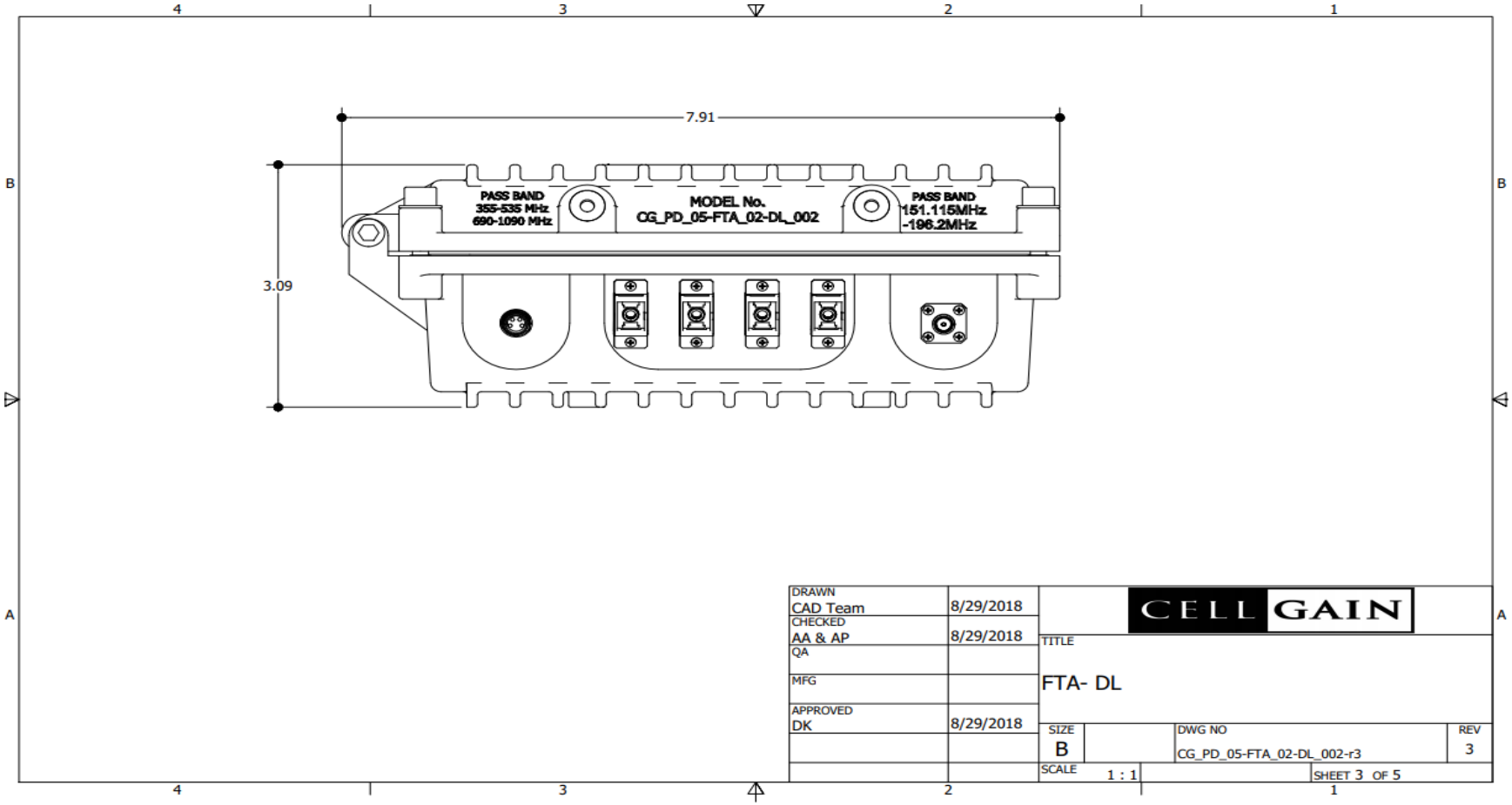
Mechanical Views



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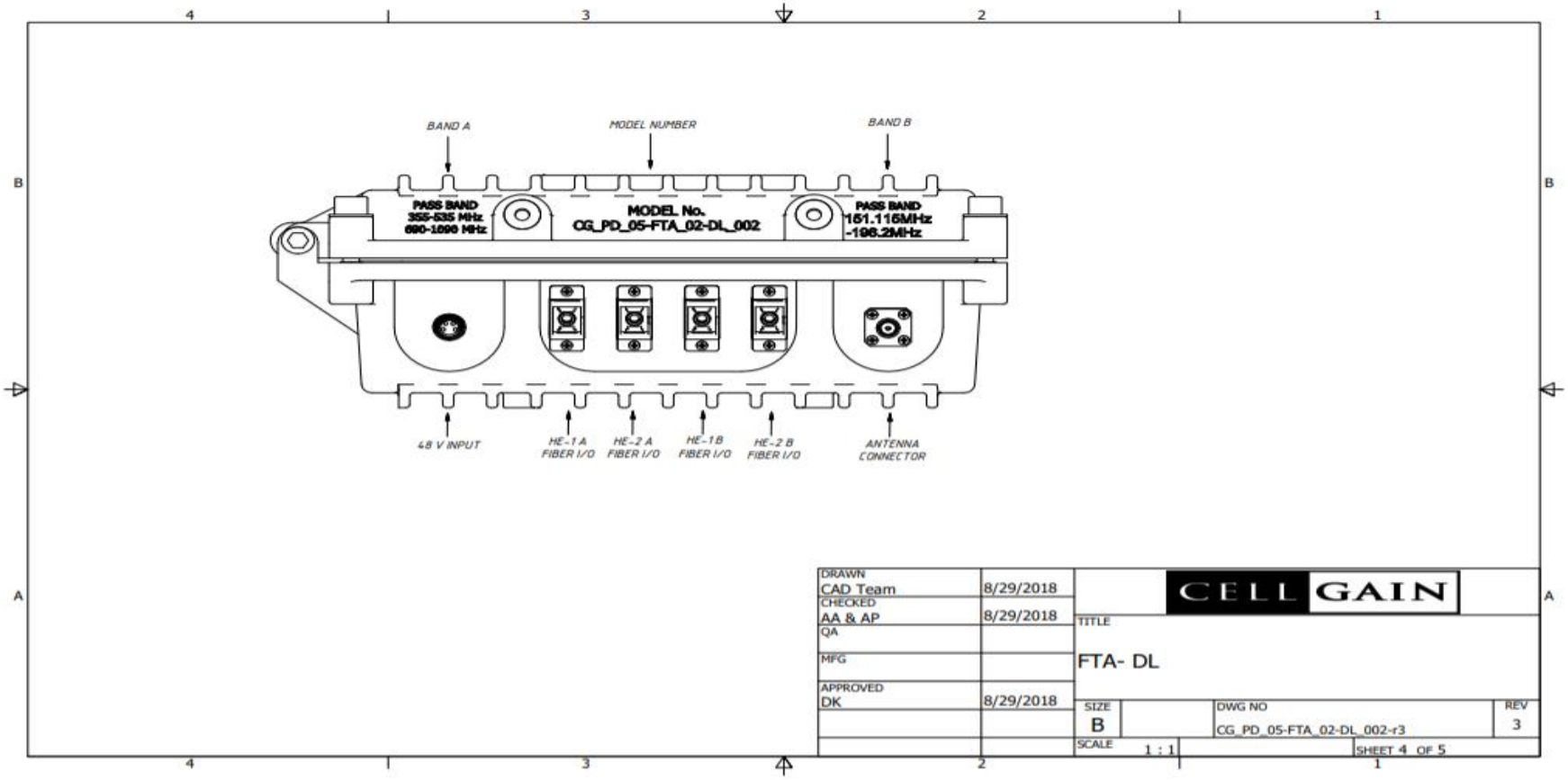
FTA Connections



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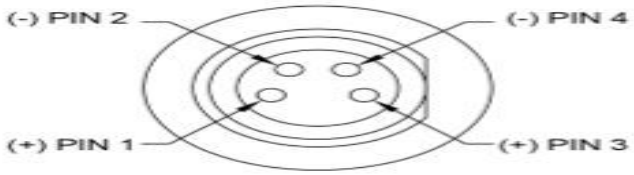
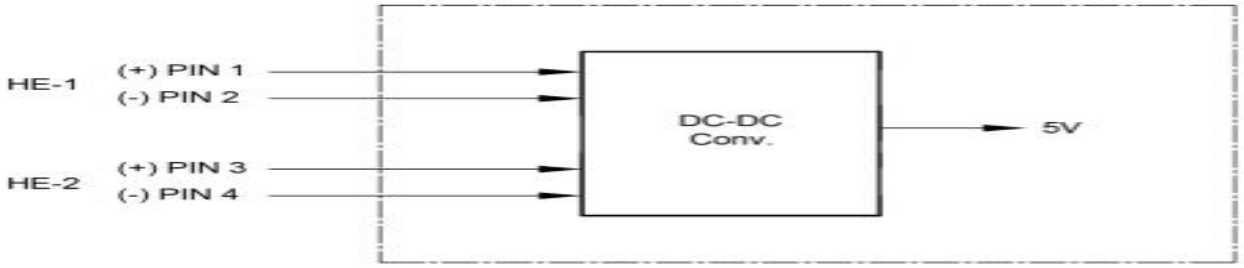
DC Power Wiring



Power Connector Front View



Power Connector Diagram

PIN 1	+ 48V
PIN 2	- 48V
PIN 3	+ 48V
PIN 4	- 48V

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Recommended Antenna or Equal

OA-0.15-0.90V/2468

COBHAM

Omni Antenna

Provisional Specification

The most important thing we build is trust

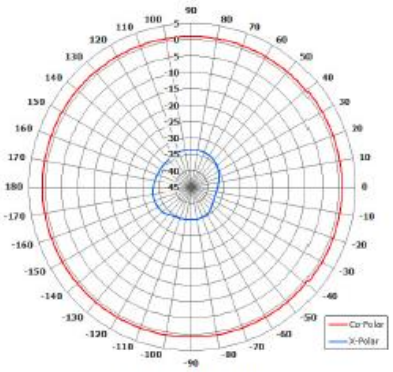
Key Features

Emergency Service Band

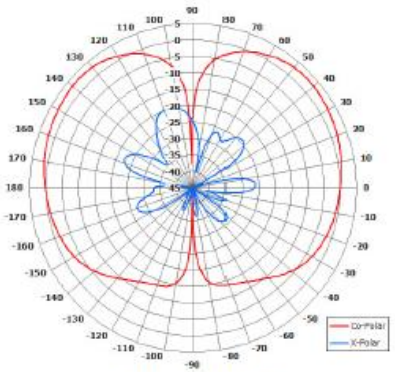
Rugged Glass Fibre Radome

Electrical Tilt

Low Ripple Omni Patterns



Azimuth Polar Plot
at 380-950 MHz typ.
Similar Product



Elevation Polar Plot
at 380-950 MHz typ.
Similar Product

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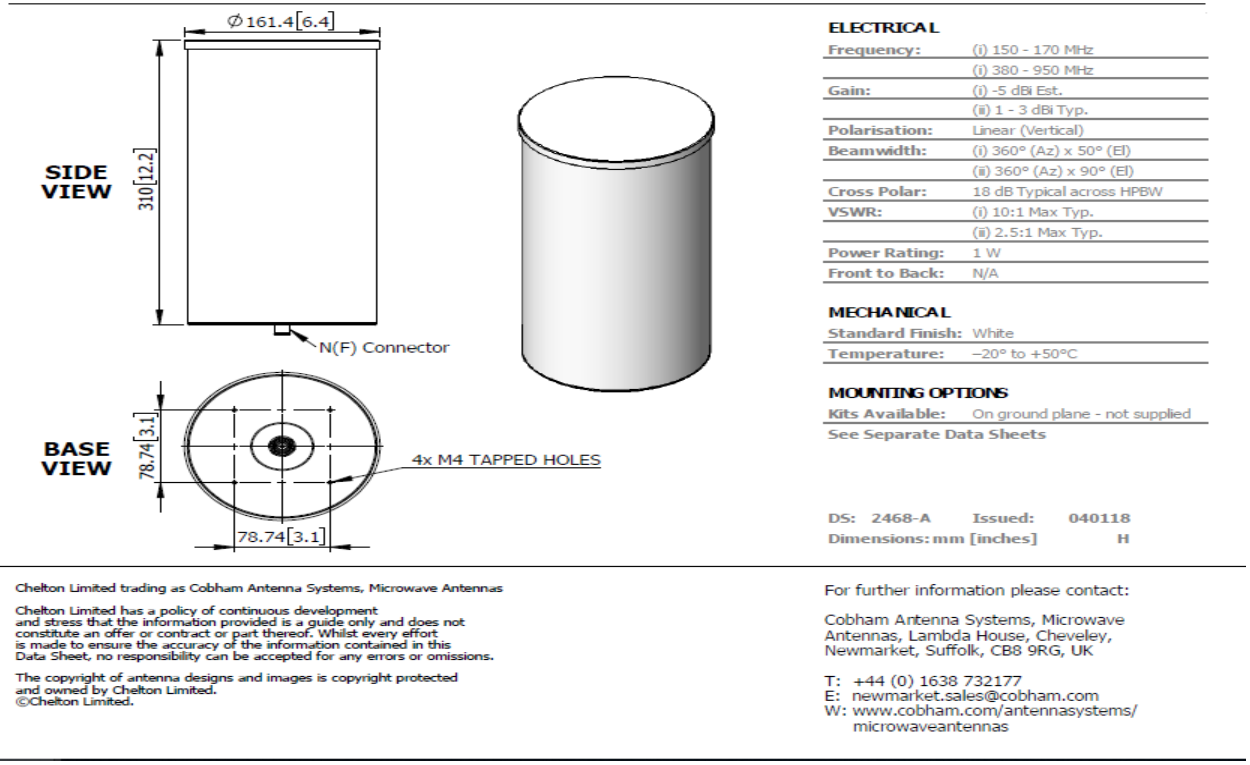
Recommended Antenna or Equal



ELECTRICAL

Frequency:	(i) 150 - 170 MHz
	(i) 380 - 950 MHz
Gain:	(i) -5 dBi Est.
	(ii) 1 - 3 dBi Typ.
Polarisation:	Linear (Vertical)
Beamwidth:	(i) 360° (Az) x 50° (El)
	(ii) 360° (Az) x 90° (El)
Cross Polar:	18 dB Typical across HPBW
VSWR:	(i) 10:1 Max Typ.
	(ii) 2.5:1 Max Typ.
Power Rating:	1 W
Front to Back:	N/A

MECHANICAL

Standard Finish:	White
Temperature:	–20° to +50°C

MOUNTING OPTIONS

Kits Available:	On ground plane - not supplied

See Separate Data Sheets

DS: 2468-A **Issued: 040118**
Dimensions: mm [inches] **H**

Chelton Limited trading as Cobham Antenna Systems, Microwave Antennas

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For further information please contact:

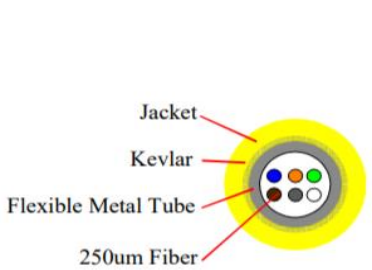
Cobham Antenna Systems, Microwave Antennas, Lambda House, Cheveley, Newmarket, Suffolk, CB8 9RG, UK

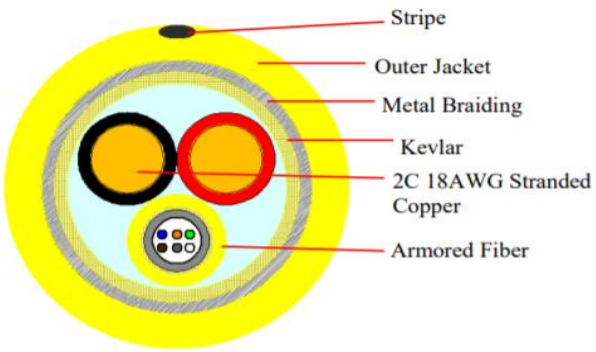
T: +44 (0) 1638 732177
E: newmarket.sales@cobham.com
W: www.cobham.com/antennasystems/microwaveantennas

Recommended Fiber / Copper cabling or Equal

TINFIBER

Micro Armor Fiber ™ The Original Stainless Steel Armor
SingleMode 6 Core 250um OS2 Armored Plenum with 2x18AWG Conductors
Model# PTF6-OS2-18/2-PL





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Recommended Fiber / Copper cabling or Equal

Cable Structure

S/N	Description	Model	Specifications
1	Optical Fiber	G.657.A2	Φ0.25±0.015mm
2	Sub Jacket	OFCP	Φ2.0±0.1mm
3	2C 18 AWG Stranded Copper	/	1.84±0.2mm
4	Kevlar	Dupont	2x1100 dtx
5	Metal Braiding	Stainless steel	0.07*6*16
6	Outer Jacket	OFCP Yellow	Φ7.0±0.5mm

Fiber Parameters

No.	Items		unit	Specification
				G.657.A2
1	Mode Field Diameter	1310nm	μm	8.6~9.5±0.4
		1550nm	μm	10.4±0.5
2	Coating Diameter		μm	245±10
	Cladding Diameter		μm	125.0±0.7
3	Cladding Non-Circularity		%	≤1.0
4	Cable Cutoff Wavelength		nm	λcc≤1260
5	Attenuation Coefficient	1310nm	dB/km	≤0.4
		1550nm	dB/km	≤0.3

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Copper Wire Parameters

No.	Items		unit	Specification
1	Conductor	AWG	/	18
		NO.	mm	1/1.024
		OD	mm	1.024
2	Insulation	Thick	mm	0.41
		OD	mm	1.84
3	MAX Resistance At20℃		Ω/km	21.4

Mechanical and Environmental Characteristics

No.of Fibers .	Size(mm)	Tensile(N)	Crush Resistance (N/100mm)		Bending Radius (mm)		Temperature(°C)
		Short Term	Long Term	Short Term	Dynamic	Static	
6	Φ7.0±0.5mm	800	2000	3000	20D	10D	-20~+75

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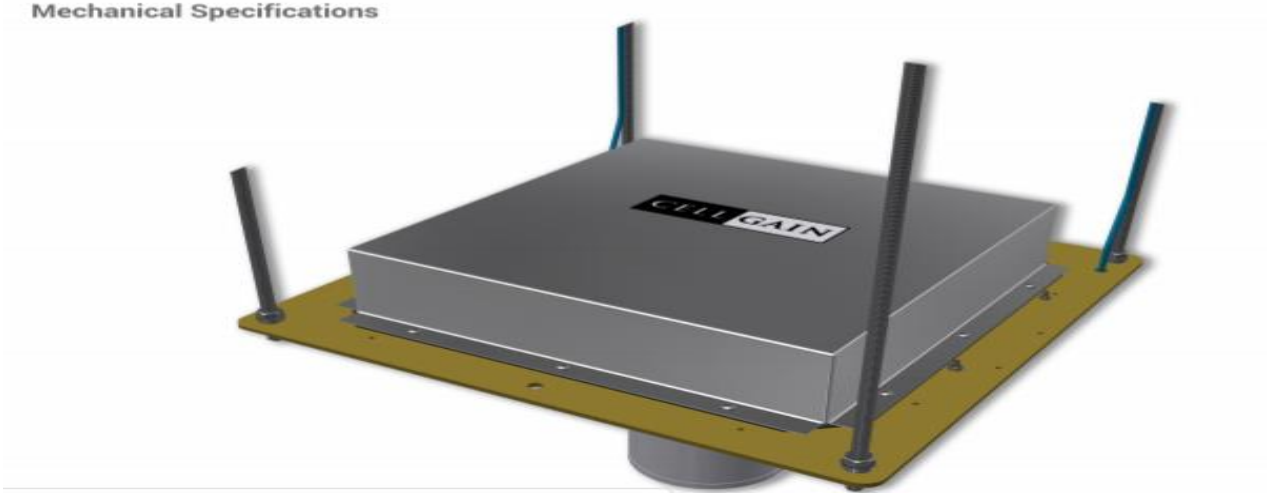
FTA Installation

FTAS can be configured as separate transmit and receive units as well as full duplex operation. The FTAS product line has built in alarm capabilities that provides a user with remote monitoring and control. CGW's FTA design is an integrated and water-resistant form factor of 20" x 20" x 12.5" with low DC power consumption (< 4 watts), featuring low IM, quad-band amplification/filtering stages, making it ideal for PSLS associated communication, environments, functionality, and installations.
This product is a result of extensive experience in the system design of DAS systems in the IBW market, which covers high rise buildings as well as tunnels, airports and other facilities. CGW has designed and deployed numerous RF cable and fiber optics based DAS systems. CGW specializes in unique innovations to enhance Public Safety DAS systems;

FTA is the latest in this line of products.

Mechanical Specifications



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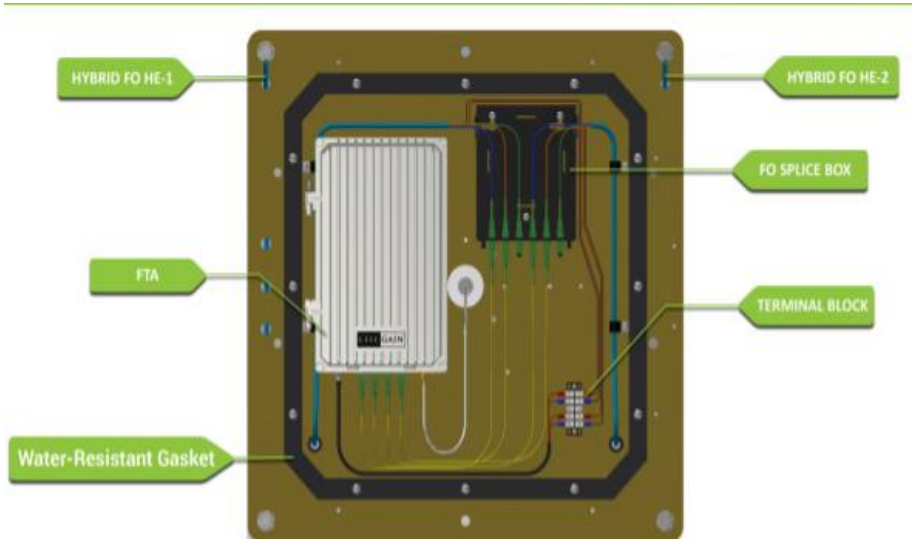
FTA Installation / Typical Layout



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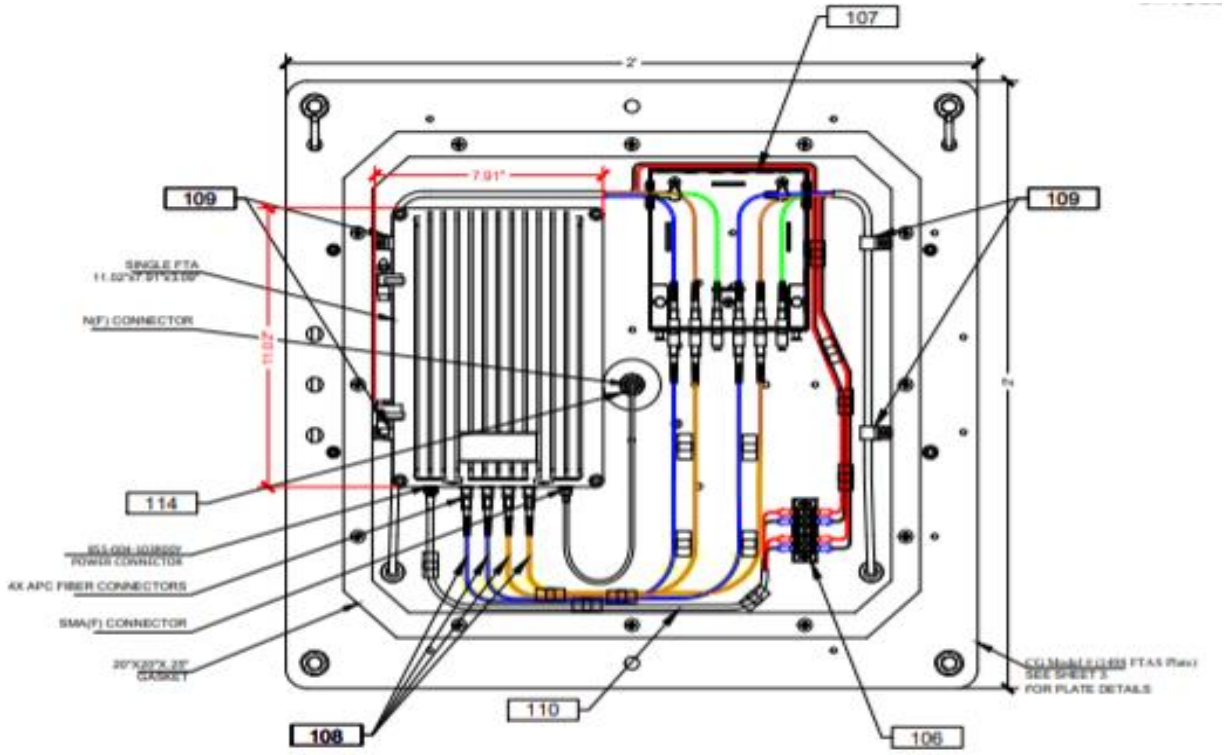

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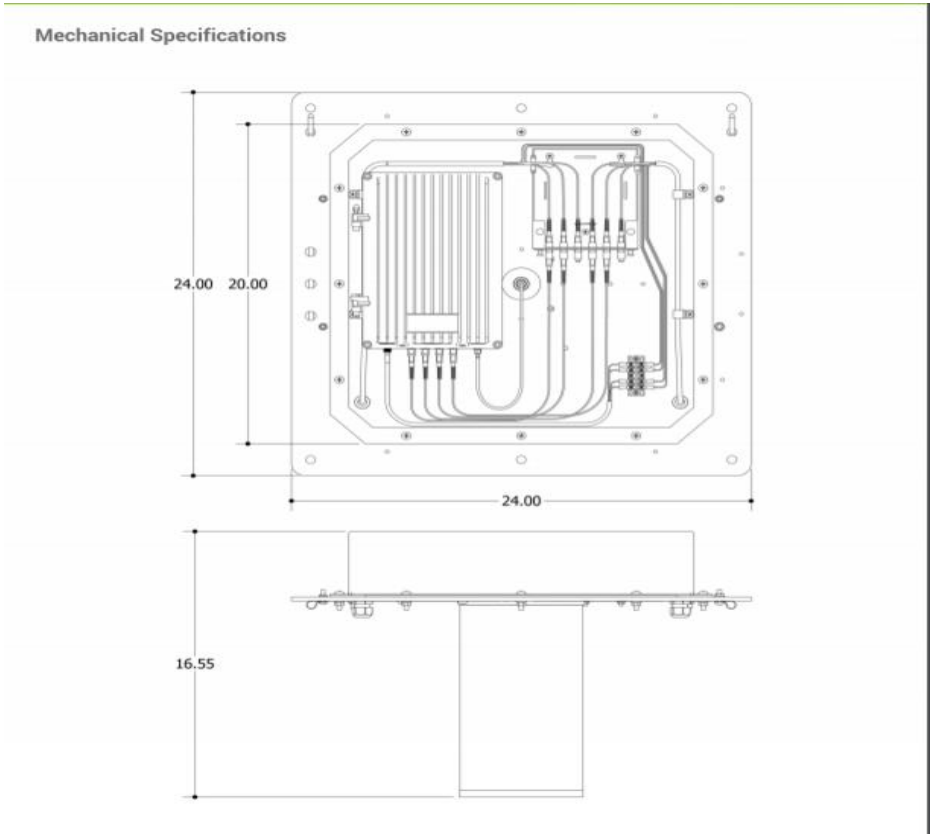
FTA Installation / Typical Layout with Antenna



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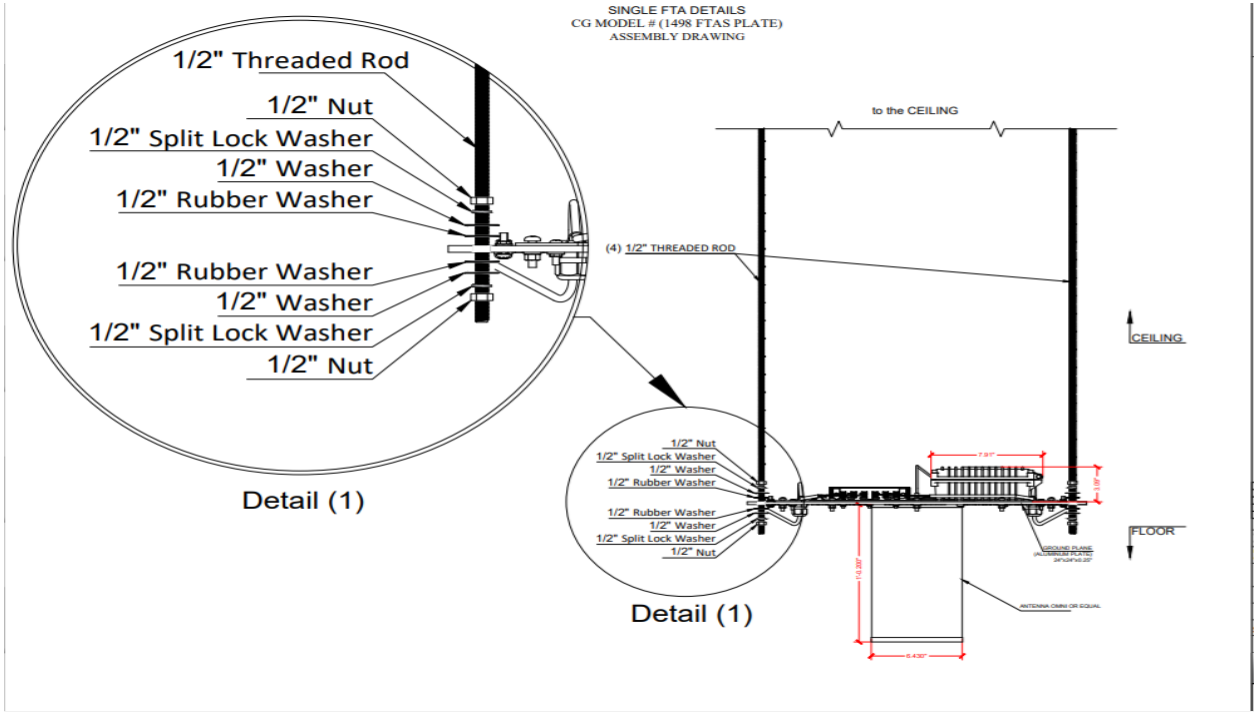

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Product information Contact:

David KHO

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Contact: FCC at (https://signalboosters.fcc.gov/signal-boosters/) for Class B devices.