Lake County Courts Complex

700/800 MHz Public Safety

In-Building Distributed Antenna System

April 3, 2025

Scope of Work

Replace end of life headend unit located in radio room atop Lake County Admin Building with new ADRF headend. Replace 15 end of life remote units with new ADRF remote units throughout the courts complex, admin building, and jail. Replace Bi-Directional Amplifier and donor antenna for secondary source signal. Removal of old equipment post installation.

New equipment allows for the use of 700 MHz public safety frequencies as well as 800 MHz.

The indoor coverage will be provided by a system of existing cables, power-dividers and antennas extended from each remote. All ½" coaxial cable will be plenum rated any chases or new floor or wall penetrations will be fire sealed to return to the previous state. All materials will be PIM and PIP rated and installation will follow R56 guidelines.

Installation of all equipment will follow the building code for the City of Waukegan, County of Lake and State of Illinois.

Once the system is installed all passive components will be re-tested at each remote unit location with a network analyzer to ensure proper return loss (connector workmanship) and system isolation. System tests will be performed with portable radios provided by the customer and handheld spectrum analyzer to ensure proper coverage throughout the newly installed areas. Spot checks will be made throughout the facilities to ensure adequate level of coverage.

Material lead time   6-8 Weeks

Installation   1 Week

System Commissioning   2 days

System Testing   2 days

*Price assumes that all work to be done during 1st shift. Installation plan is to install new headend & remote units adjacent to existing equipment, then cutover once everything is installed. Cutover should take less than 2 hours.

# Equipment List Report

Project name: Lake County IL   **Design company:** Alive Telecom

Project creation date: 7/31/2018   **Designer:** Dan Barton

Component Group : New Equipment

Type	Manufacturer	Model	Description	Qty
Antenna	Alive Telecom	ATC-WPI78	Directional Antenna, 698-870 MHz, 65° horizontal beamwidth, 8 dBi gain	1
Cable	Andrew	AL4RPV50	HELIAX® Plenum Rated Air Dielectric Coaxial Cable - Corrugated Aluminum - 1/2 in - Off White PVC Jacket	500 feet
Connector	CommScope	L4PNM	N for LDF4-50A, Low Density Foam Dielectric Cable	32
Fiber BDA	Advanced RF Technologies	ADXV-R-3378P-U	ADXV: 2W Dual Band 700/800 MHz Remote Unit (Public Safety)	16
Fiber BDA Hub	Advanced RF Technologies	ADXV-H-ODU-4-X	ADXV: 5dBo Optic Module (4 Ports) (supports C-Band)	4
Filter	Advanced RF Technologies	ADXV-H-POIL-78P	ADXV: 700 MHz & 800 MHz Public Safety Point of Interface (Low Power)	1
Filter	Advanced RF Technologies	ADXV-H-CHC-88-DL-X	ADXV: Head-end Channel Combiner - DL (supports C-Band)	1
Filter	Advanced RF Technologies	ADXV-H-CHC-88-UL-X	ADXV: Head-end Channel Combiner - UL (supports C-Band)	1
Miscellaneous	Advanced RF Technologies	ADXV-H-NMS-AC	ADXV: Head End Chassis, NMS, PSU (AC)	1
Repeater	Advanced RF Technologies	PSR-78-9533-U-27	95 dB Gain Digital Dual-Band Channelized Public Safety Repeater - 700 MHz / 800 MHz (32 channels, 5 modes) - 4.3-10 Female Connectors (0.5W) (UL2524 Listed)	1
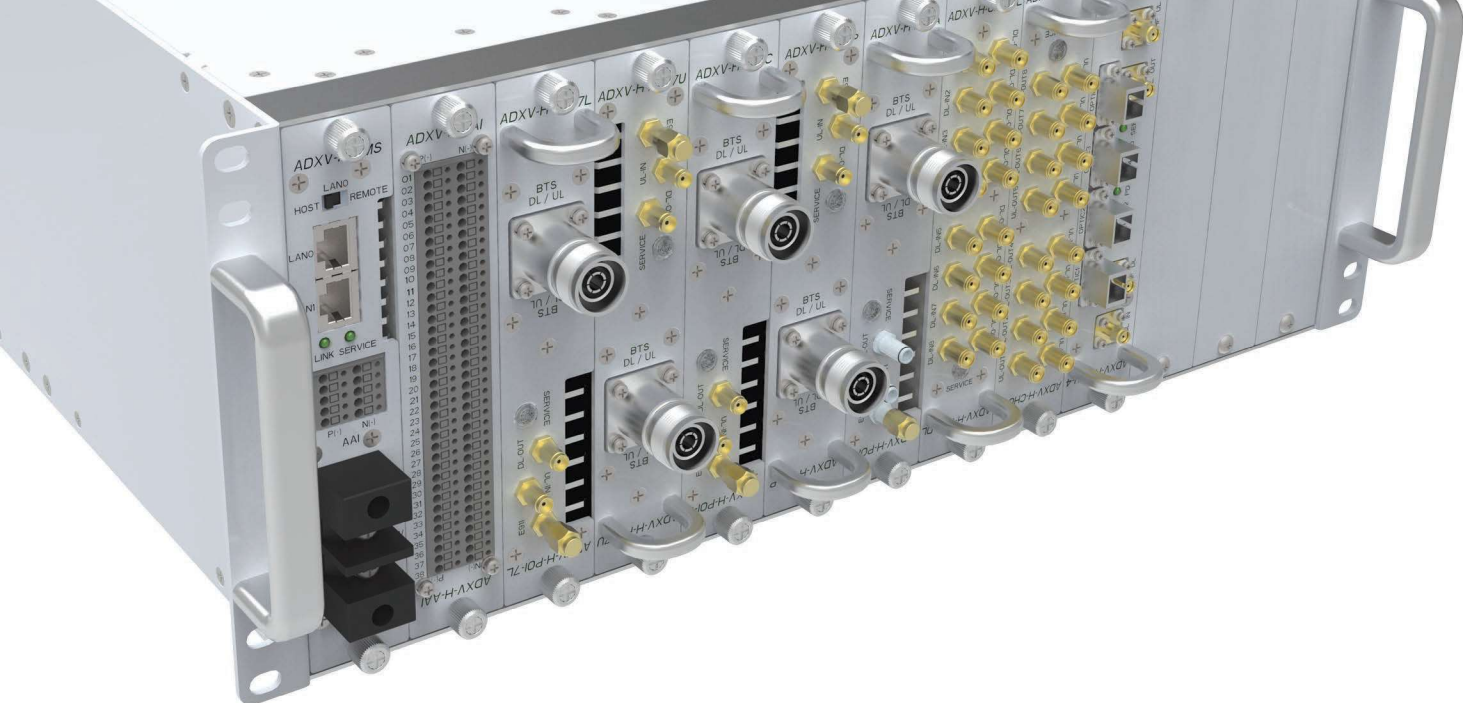
ADX V Series DAS

Simply Incredible, Incredibly Simple™

With the increasing user demand for better coverage and additional capacity, Distributed Antenna Systems (DAS) have become a key element of carrier networks. ADRF's ADX V Series DAS is the leading optical distribution system that covers the full range of power levels, sending signals loss-free for both indoor and outdoor applications.

ADX V Series meets all distribution needs from the simplest to the most complex venues. It is capable of transporting frequencies from 600 MHz to 28 GHz regardless of protocol or modulation. ADX V has two main components: the Head End (HE) and the Remote Unit (RU). The Head End is collocated with the base station or bi-directional amplifier and connected via an RF interface. The RF signals are transported to the Remote Units via single mode fiber.

ADX V DAS Benefits:

• Innovation: Leverages patented Auto Commissioning Routine™ and built-in Spectrum Analyzer and Signal Generator to expedite commissioning and optimization
• Reliability: Carrier-grade, NEBS Level 3 compliant platform ensures lowest OpEx as well as CapEx
• Cost Efficiency: Best-in-class modularity and flexibility enables pay as you grow to add other carriers or overlay new bands without dreaded rip and replace
• Ease: Famed ADRF web-based GUI simplifies turn-up as well as remote troubleshooting
• Availability: ADRF's vertically integrated supply chain allows our commitment to the industry's shortest lead times
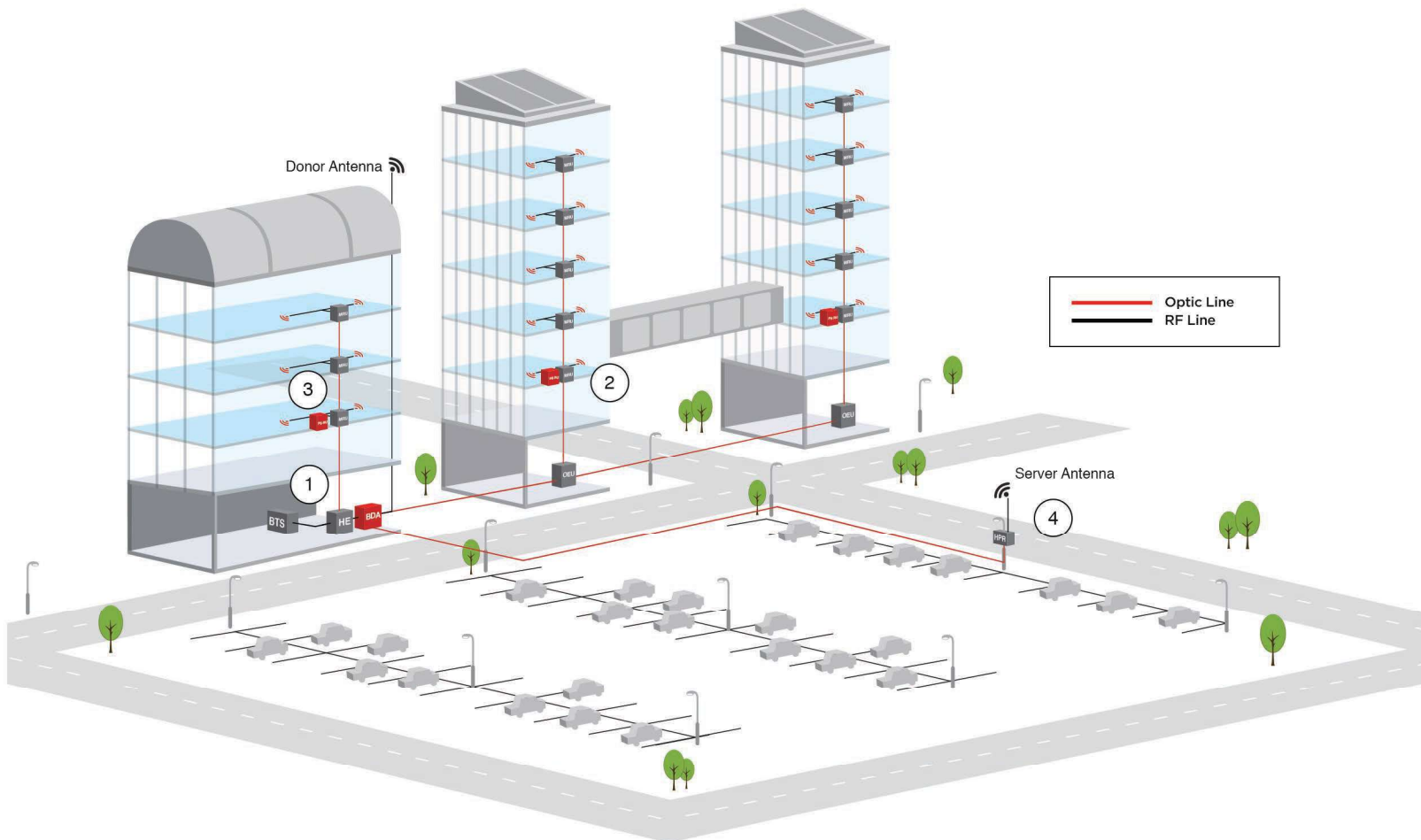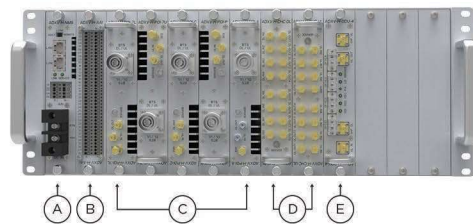
ADRF THE SIGNAL FOR SUCCESS™

ADX **V** Series DAS

Simply Incredible, Incredibly Simple™

ADX V Series DAS meets all distribution needs from the simplest to the most complex venues.

Head End (HE) Features:

- Supports up to 12 modules (excluding NMS slot in the 19" rack, 4U)
- Supports daisy chaining of up to 8 HE units
- Supports up to 8 expansion racks (1U) to support an additional 16 ODUs or CHC-44M/CHC-88 modules
- Built-in CW Generator, Spectrum Analyzer, Programmable Power Sharing, Noise/Channel Power Level detection
- Supports direct BTS interface, max 48dBm input (DIN) per Point of Interface (POI) card
- PIM Rated Performance @ > 153 dBc
- Automatic Level Control (ALC) of input RF power to user set value
- System-wide firmware update from the HE

- Remote monitoring and control capability using our famed Web-based GUI
- Supports Dry Contact Alarming and SNMP v1, v2 c, v3 protocols

Head End (HE) Components:

- Ⓐ Head End Network Management System (ADXV-H-NMS-AC, ADXV-H-NMS-DC)
- Ⓑ Head End Auxiliary Alarm Interface Module (ADXV-H-AAI)
- Ⓒ Head End Point of Interface Module (ADXV-H-POI-xx)
- Ⓓ Head End Channel Combiner Unit (ADXV-H-CHC-xx)
- Ⓔ Head End Optical Donor Unit Module (ADXV-H-ODU)
- Ⓕ Head End Point of Interface Module - Low-Power (ADXV-H-POIL-xx)
  not shown

② MPR
(Mid-Power Remote Unit)
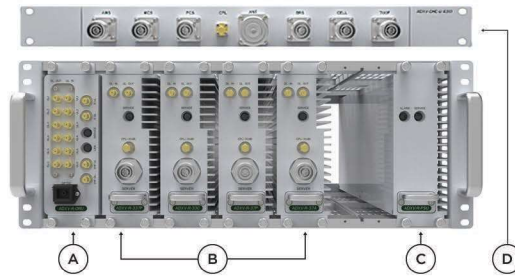
Mid-Power Remote Unit (MPR) Features:

- Supports up to 6 Band Specific Remote Modules (excluding ORU slot in the 19" rack, 4U)
- Built-in Spectrum Analyzer, PIMD Level Test Function
- System-Wide Commissioning of all remotes to user set value
- Local Ethernet interface to the MPR
- Optional expansion rack (1.5U) to support additional 2 MPR modules
- Automatic Level Control (ALC) of output RF power to user set value
- Noise/Channel Power Level detection
- Band Specific Remote Modules available in 2W/5W

- 30dB test ports at each Remote Module
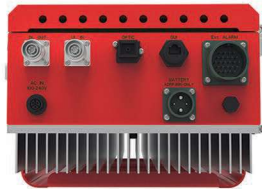- PIM Rated 4.3-10 RF Output Connectorsa

Mid-Power Remote Unit (MPR) Components:

Ⓐ Mid-Power Remote Optical Remote Unit Module (ADXV-R-ORU)
Ⓑ Mid-Power Remote Amplifier Module (ADXV-R-33xx, ADXV-R-37xx)
Ⓒ Mid-Power Remote Power Supply Unit Module (ADXV-R-PSU-AC, ADXV-R-PSU-DC)
Ⓓ Mid-Power/High-Power Remote Universal Channel Combiner (ADXV-R-CHC-U)

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③ PS-MPR
(Public Safety Mid-Power Remote Unit)

Public Safety Remote Features:

- Available for Public Safety 700MHz/800MHz and VHF/UHF
- Built-in Spectrum Analyzer
- NEMA-4X Compliant Enclosure
- Dry Contact Alarming
- Optional Battery Backup Support
- PIM Rated 4.3-10 RF Output Connectors

- Available External Filter ports
- Local Ethernet interface to the Remote Unit
- Automatic Level Control (ALC) of output RF power to user set value
- Noise/Channel Power Level detection
- 33dBm Composite Output Power for Public Safety 700MHz/800MHz
- 25dBm Composite Output Power for Public Safety VHF/UHF

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④ HPR
(High-Power Remote Unit)
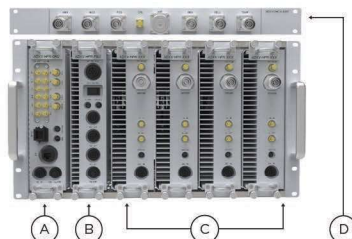
### High-Power Remote (HPR) Features:

- Supports up to 6 Band Specific HPR Modules
- Built-in Spectrum Analyzer
- System-Wide Commissioning of all remotes to user set value
- Local Ethernet interface to the HPR
- Optional expansion rack (2U) to support one additional HPR module
- Automatic Level Control (ALC) of output RF power to user set value
- Noise/Channel Power Level detection
- Band Specific Modules available in 20W/40W
- 40dB test ports at each HPR module

- PIM Rated 4.3-10 RF Output Connectors
- IP66 Rating
- Optional Pole Mount Kit

High-Power Remote Unit (HPR) Components:

Ⓐ High-Power Remote Optical Remote Unit Module (ADXV-HPR-ORU)
Ⓑ High-Power Remote Power Supply Unit Module (ADXV-HPR-PSU)
Ⓒ High-Power Remote Amplifier Module (ADXV-HPR-xxx)
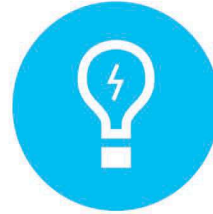Ⓓ Mid-Power/High-Power Remote Universal Channel Combiner (ADXV-R-CHC-U)

ADX V Series DAS
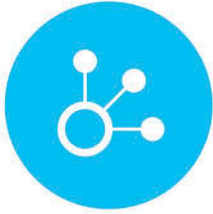
Modular
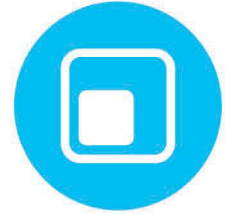Discrete cards for each band enable cost-optimized and future-proof solutions
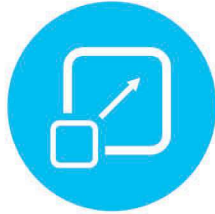
Flexible
Wide range of output power ideal for single carrier and neutral host applications
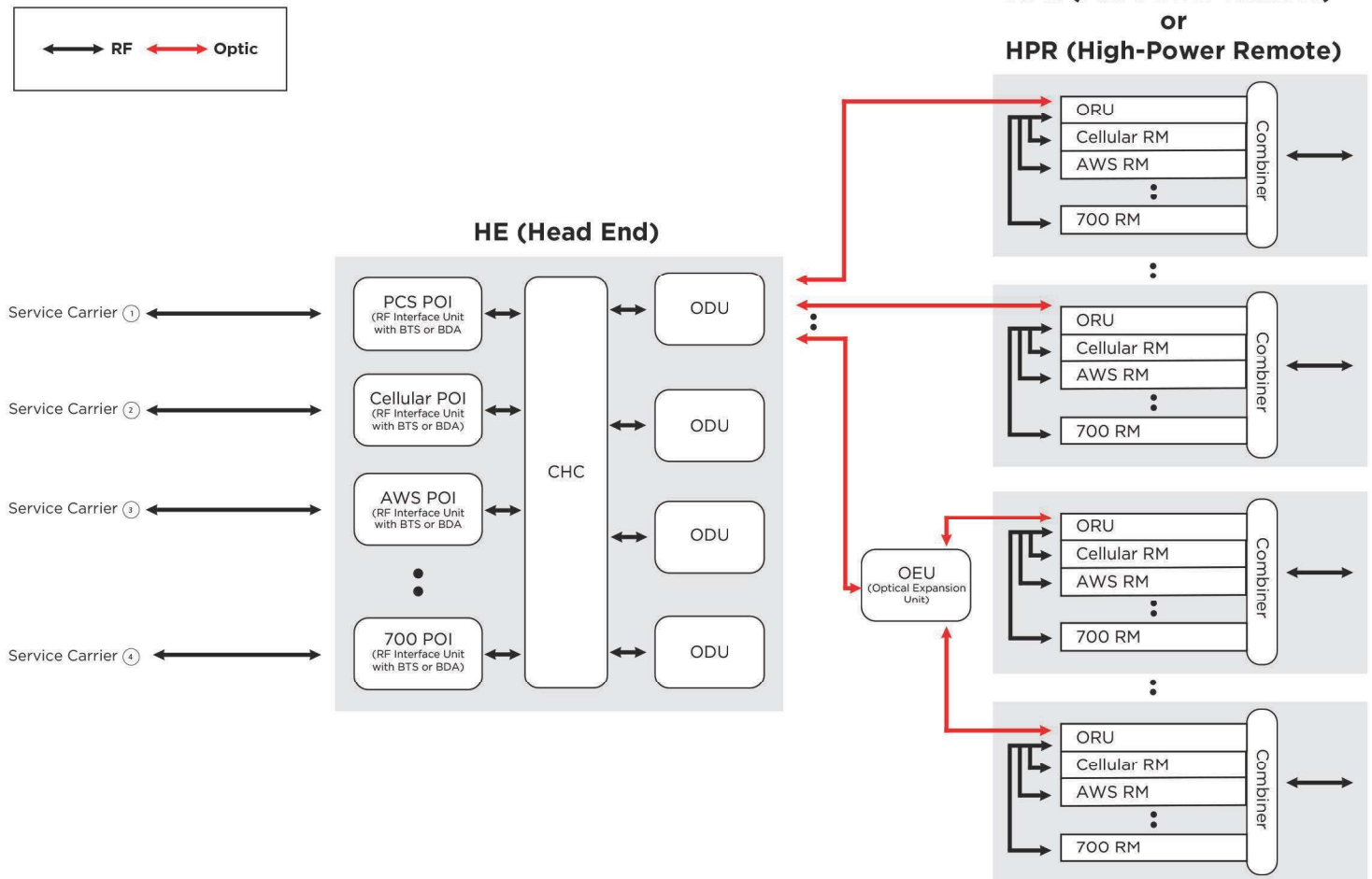
Simple
Simple to design, commission, and maintain

Compact
Reduced size with all the features and benefits of ADX DAS

RF   Optic

MPR (Mid-Power Remote)
or
HPR (High-Power Remote)

ORU
Cellular RM
AWS RM
700 RM
Combiner

HE (Head End)

Service Carrier ①

PCS POI
(RF Interface Unit with BTS or BDA)

ODU

Service Carrier ②

Cellular POI
(RF Interface Unit with BTS or BDA)

ODU

CHC

Service Carrier ③

AWS POI
(RF Interface Unit with BTS or BDA)

ODU

OEU
(Optical Expansion Unit)

ORU
Cellular RM
AWS RM
700 RM
Combiner

Service Carrier ④

700 POI
(RF Interface Unit with BTS or BDA)

ODU

ORU
Cellular RM
AWS RM
700 RM
Combiner

ORU
Cellular RM
AWS RM
700 RM
Combiner

NORTHEAST DAS & small cell ASSOCIATION

HetNetForum

Dense

DASpedia

FC

UL

ISO

TL9000

ADRF

ADXV-R-3378P-U

2W Public Safety 700/800 MHz Fiber Remote Unit

Electronic Specifications

Frequency	UL	PS700 (Band 14 + PS700): 758 ~ 768 MHz, 769 ~ 775 MHz / PS800: 851 ~ 861 MHz
	DL	PS700 (Band 14 + PS700): 788 ~ 798 MHz, 799 ~ 805 MHz / PS800: 806 ~ 816 MHz
Input Power Range @ FiRe-78-8-U		-62 ~ -20 dBm
Gain	DL	32 ~ 57 dB
	UL	-4 ~ 36 dB
Composite Output Power	DL	33 dBm
	UL	2 dBm (Max)
Noise Figure		≤ 5 dB @ Max Gain (Center Frequency)
VSWR		≤ 1.5 : 1
Optical Loss		0 ~ 5 dBo
Spurious		Meet FCC Rules

Mechanical Specifications

Dimension (W x H x D)	9.9 x 15.8 x 6.6 in (251.5 x 401.3 x 167.6 mm)
Weight	28.6 lbs (13.0 kg)
Operating Temperature	-22°F ~ 131°F (-30°C ~ 55°C)
Weather Resistance	Type 4 / NEMA 4
Operating Humidity	5 ~ 90%
Power Supply	110 ~ 240 VAC, 50 / 60 Hz with battery backup function
Network Management System	Ethernet (RJ45)
RF Connector	4.3-10 (Female)
Dry Contacts	NFPA 1, 72, 1221, 1225, IFC Code / UL 2524 Compliant
Annunciator Support	Supports up to 2 PSR-ANN-L annunciators
Power Consumption	102 W
Certification	UL 2524 Certified, Second Edition by Underwriters Laboratories