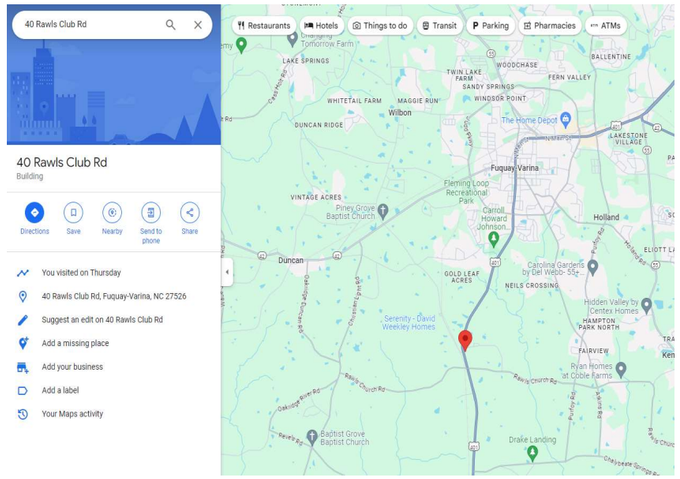
Public Safety Repeater System

PROJECT

The Springs of Ballentine
40 Rawls Club Rd
Fuquay-Varina, NC 27526

PROXIMITY MAP w/ LATITUDE & LONGITUDE



AZIMUTH

DESIGNER AND INSTALLER

TRACY RICHARDSON
130 MAPLEWOOD DR
GRIFFIN, GA 30224
P: (404) 645-5422
E: STRUCTUREDWIRELESS@GMAIL.COM
GENERAL RADIOTELEPHONE OPERATOR LICENSE NO.0021221999

COMBA CERTIFIED INSTALLER
IBWAVE DESIGN CERTIFIED LEVEL II
NICET LEVEL II
PCTEL IBFLEX CERTIFIED TESTER

SCOPE OF WORK

TO PROVIDE AN EMERGENCY RESPONDER RADIO COVERAGE SYSTEM THAT MEETS STATE AND LOCAL CODES AND REQUIREMENTS. THIS IS ACCOMPLISHED BY AMPLIFYING THE EXISTING OUTDOOR NETWORKS AND DISTRIBUTING THE COVERAGE THROUGHOUT THE BUILDING USING A SERIES OF SPLITTERS AND COUPLERS INTERCONNECTED WITH COAXIAL CABLE.

THE SYSTEM SHALL NEVER BE ENERGIZED FOR TESTING OR OPERATION UNTIL WRITTEN, OR ON SITE, APPROVAL IS OBTAINED FROM THE FCC LICENSE HOLDER. FCC RULES IN 47 CFR § 90.219

RESPONSIBILITIES OF THE INSTALLER

GENERAL

1. PREPARE AND SUBMIT ALL DOCUMENTS NEEDED FOR BDA PERMIT IN HARNETT COUNTY, NC
2. INSTALL THE ERRCS/DAS TO MEET OR EXCEED THE REQUIREMENTS OF ALL APPLICABLE CODES AND GUIDELINES SET FORTH BY THE STATE, COUNTY, CITY, AND AHJ.
3. PROCURE ALL EQUIPMENT (PASSIVE AND ACTIVE) INCLUDING BUT NOT LIMITED TO; CONDUIT, JUNCTION BOXES, SUPPORT SYSTEMS, WIRE, ALARM WIRE, FIBER (IF APPLICABLE), AND WATERPROOFING MATERIAL.
4. PROPERLY INSTALL ALL CABLES CONNECTORS, WEATHERPROOF WHEN APPLICABLE.
5. TEST CABLE SEGMENTS TO ENSURE RF LOSSES MEET MANUFACTURER SPECIFICATIONS PRIOR TO COMMISSIONING.
6. VERIFY ALL PASSIVE DEVICES ARE INSTALLED ON THE CORRECT PORTS FOR INPUT AND OUTPUT.
7. ENSURE ALL RISER CABLES (TYPICALLY VERTICAL, BUT SOMETIMES HORIZONTAL) ARE ROUTED THROUGH ENCLOSURE MATCHING BUIDLING FIRE RESISTANCE.
8. ENSURE ALL ROOMS HOUSING ACTIVE EQUIPMENT HAVE PROPER VENTILATION AND AIR CONDITIONING.
9. SIZE ALL WIRE GUAGE FOR BDA POWER, RELAY, EPO, AND ALARMING CONNECTIONS.

ALARMING

1. ENSURE THAT THE FIRE ALARMING COMPLIES WITH NFPA 72.
2. THE IN-BUILDING 2-WAY EMERGENCY RESPONDER COMMUNICATION COVERAGE SYSTEM SHALL BE MONITORED BY A LISTED FIRE ALARM CONTROL UNIT, OR WHERE APPROVED BY THE FIRE CODE OFFICIAL, SHALL SOUND AN AUDIBLE SIGNAL AT A CONSTANTLY ATTENDED ON-SITE LOCATION. AUTOMATIC SUPERVISORY SIGNAL SHOULD INCLUDE THE FOLLOWING:
    1. LOSS OF NORMAL AC POWER
    2. BATTERY CHARGER FAILURE
    3. LOW BATTERY CAPACITY (70% DEPLETION)
    4. DONOR ANTENNA MALFUNCTION
    5. ACTIVE RF EMITTING DEVICE MALFUNCTION
    6. SYSTEM COMPONENT MALFUNCTION
    7. OSCILLATION OF ACTIVE RF-EMITTING DEVICE(S)

FREQUENCIES

North Carolina VIPER

Site: Cokesbury

Back to system

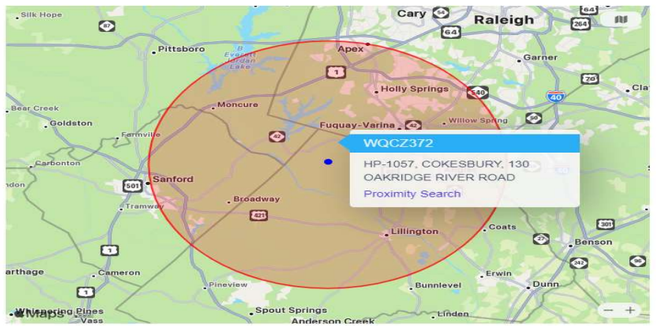
Site Number:	Decimal: 014 / Hex: e
RFSS:	1
Description:	Cokesbury
Unique DB ID:	23778
NAC:	1F0
County Location:	Harnett
Neighbors:	28 68 69 70
Location:	*N/A*
Modulation:	*N/A*
Notes:	*N/A*
FCC Callsigns:	WQCZ372
Updated:	2017-11-02

Site Frequencies

769.18125	770.10625	770.40625	772.55625	772.80625	773.28125
773.78125c	774.55625c				

Site Location Data

Latitude:	35.5231	**Longitude:**	-78.9069	**Range:**	15	**Type:**	Defined Coverage



BBU CALCULATIONS

Electrical Specifications

Main power input	110 VAC (88-264VAC)
AC power consumption (max.)	1/2W = 140 Watts, 2W = 165 watts
Battery charger output	27.8VDC
DC input range	24 - 30VDC
DC power consumption	1/2W = 45 Watts 2W = 75 watts

I = P / E
I = 45W / 24 V
1.88 A x 24 hours = 45.12 Ah

STRUCTURED WIRELESS

Structured Wireless, Inc
130 Maplewood Dr
Griffin, GA 30224

Revision history

Rev	Date	Author
1.1	8/16/2024	Tracy Richardson
	Details per AHJ	

Project name
The Springs of Ballentine
Designer name
Tracy Richardson
Cover
9/2/2024

Design Plan

62.55 ft

R-20N

0.88 ft

CS14-720-820 PS51080E

61.40 ft

SPT2
[3.28 ft]
0dB

SPT1-F1
3-Way

59.96 ft

112.23 ft

96.79 ft

[3.28 ft]

SPT3-F1
3-Way

95.09 ft

27.79 ft

114.65 ft

CS19-BBC-003

ANT4-F1 -6.13 CFSA69383P1-30NF

ANT6-F1 -7.75 CFSA69383P1-30NF

ANT2-F1 -8.06 CFSA69383P1-30NF

ANT3-F1 2.28 CFSA69383P1-30NF

ANT1-F1 0.56 CFSA69383P1-30NF

ANT5-F1 0.95 CFSA69383P1-30NF

Roof

Floor 1

STRUCTURED WIRELESS

Structured Wireless, Inc
130 Maplewood Dr
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Revision history

Rev	Date	Author
1.1	8/7/2024	Tracy Richardson

Details per AHJ

Project name

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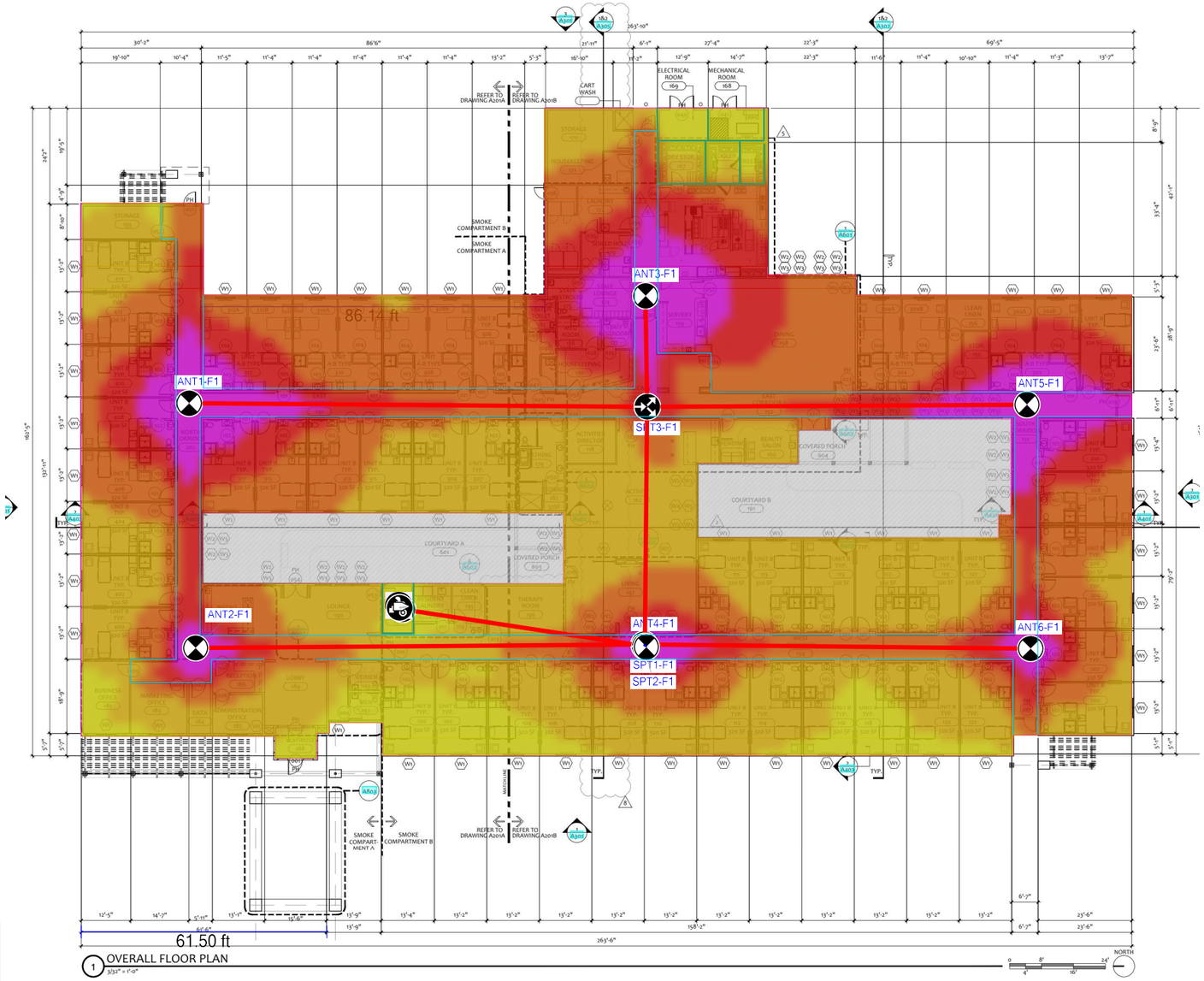
Designer name

Tracy Richardson

Design plan

9/2/2024



1 OVERALL FLOOR PLAN
3/32" = 1'-0"

Pictograms legend

- Antenna
- BDA
- Miscellaneous
- Riser
- Splitter
- Via

Indoor prediction legend

Power [dBm]

- >-40.00 (1.1%)
- >-50.00 (10.0%)
- >-55.00 (26.1%)
- >-60.00 (59.2%)
- >-65.00 (92.7%)
- >-75.00 (100.0%)
- >-80.00 (100.0%)
- >-85.00 (100.0%)
- >-95.00 (100.0%)
- >-100.00 (100.0%)

Public Safety 800 MHz - 800 MHz - SMR - P25

Min -95.00 dBm: 100.0 % >= 95.0 %

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1.1	9/16/2024	Tracy Richardson

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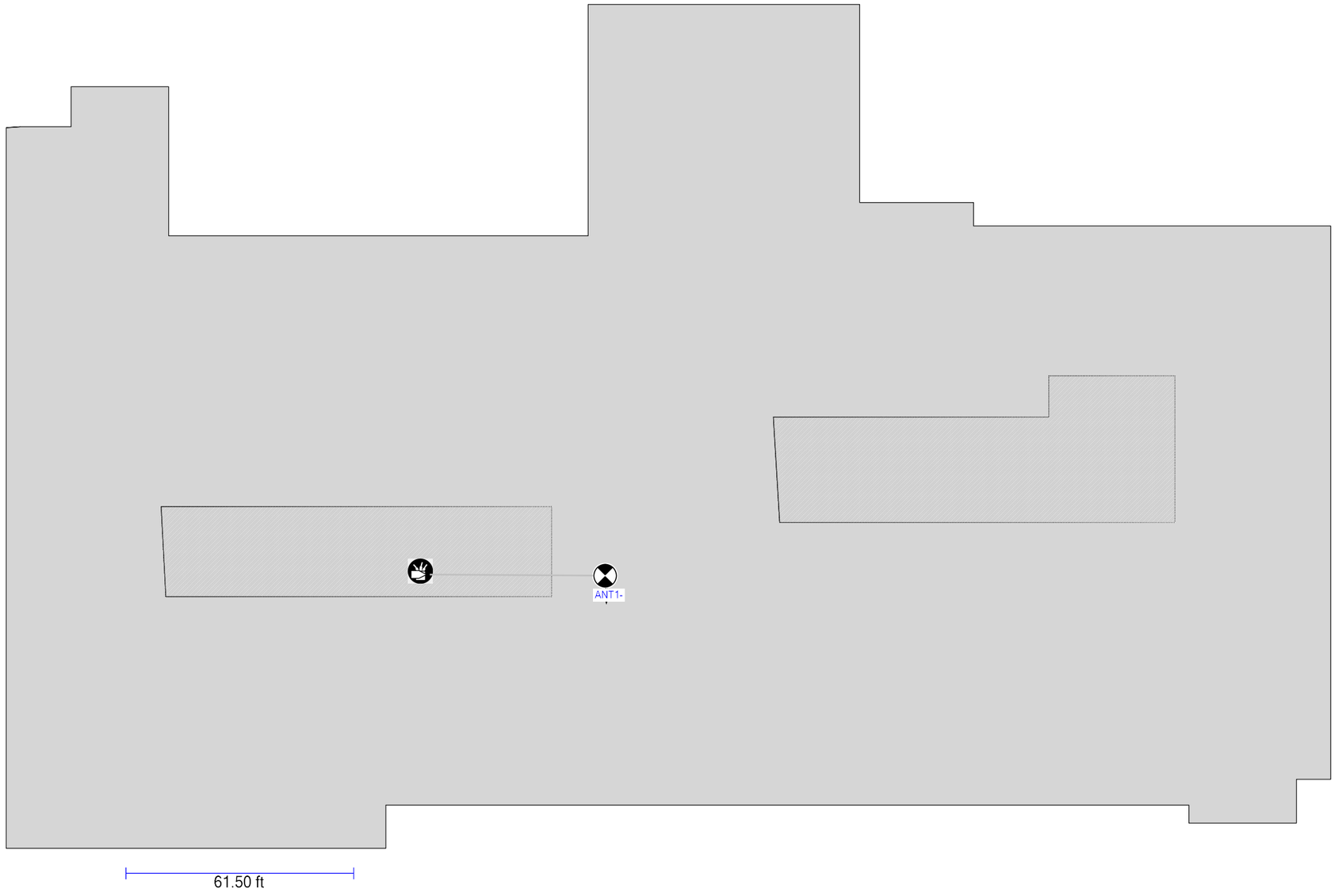
Tracy Richardson

Floor 1

9/2/2024



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1.1	9/16/2024	Tracy Richardson

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Designer name

Tracy Richardson

Roof

9/2/2024

ERCES Requirements

CODE REQUIREMENTS**	NFPA*			IFC		
	NFPA 72 - 2013	NFPA 1221 - 2016	NFPA 1221 - 2019	IFC 510 - 2015	IFC 510 - 2018	IFC 510 - 2021
In-Building Solution Required	Section 24.5.2	Section 9.6	Section 9.6	Section 510.1	Section 510.1	Section 510.1
Pathway Survivability for Coaxial Cable Required	2 Hour for Riser Coaxial Cable Section 24.3.6.8.1	2-Hour for Riser Coaxial Cable Section 9.6.2.1.1	Backbone Cable Routed Through Enclosure Matching Bldgs. Fire Rating Section 9.6.2.3	Not Addressed in Section 510. Referenced in 24.3.6.8.1 of NFPA 72-2013	Yes, Section 510.4.2. Reference to NFPA 1221***	Yes, Section 510.4.2. Reference to NFPA 1221
Plenum Rated Coaxial Cable Required	Yes, Riser & Feeder Coaxial Cable Section 24.3.6.8.1.1	Yes, Riser & Feeder Coaxial Cable Section 9.6.2.1.1.1	Yes, Backbone & Antenna Distribution Cables Section 9.6.2.1	Not Addressed in Section 510. Referenced in 24.3.6.8.1.1 of NFPA 72-2013	Yes, Section 510.4.2. Reference to NFPA 1221	Yes, Section 510.4.2 Reference to NFPA 1221
Lightning Protection Required	Not addressed in Section 24.5.2	Yes, In accordance with NFPA 780 Section 9.6.3	Yes, Section 9.6.3 Installed per NFPA 780	Not Specifically Addressed in Section 510	Yes, Section 510.4.2 Per NFPA 780 as Referenced in NFPA 1221	Yes, Section 510.4.2 Per NFPA 1221 Section 9.6.3 Installed per NFPA 780
Isolation of Donor Antenna Required	Yes, 15 dB Section 24.5.2.3.3	Yes, 20 dB Section 9.6.9	Yes, 20 dB Above System Gain Section 9.6.9	Not Specifically Addressed in Section 510	Yes, 20 dB Section 510.4.2.4 (4)	Yes, 20 dB Section 510.4.2.4 (4)
Battery Backup Required	12 Hours Section 24.5.2.5.5.2	12 Hours Section 9.6.12.2	12 Hours Battery or Generator Section 9.6.12.2	24 Hours Section 510.4.2.3	12 Hours Section 510.4.2.3 or 2-Hours Battery with Emergency Generator	12 Hours Section 510.4.2.3 or 2- Hours Battery with Emergency Generator
Signal Strength and Area Coverage Required	-95 dBm Section 24.5.2.3 90% General Section 24.5.2.2.2 99% Critical Section 24.5.2.2.1	DAQ 3.0 Section 9.6.8 90% General Section 9.6.7.5 99% Critical Section 9.6.7.4	DAQ 3.0 Section 9.6.8 90% General Section 9.6.7.4 99% Critical Section 9.6.7.3	-95 dBm Section 510.4.1 95% General Section 510.4.1 99% Critical - Not Specifically Addressed in Section 510	DAQ 3.0 Section 510.4.1.1 95% General Section 510.4.1 99% Critical Section 510.4.2 Ref. to NFPA 1221	DAQ 3.0 Section 510.4.1.1 95% General Section 510.4.1 99% Critical Section 510.4.1
Monitoring by Fire Alarm Required	Yes, Section 24.5.2.6	Yes, Section 9.6.13	Yes, Section 9.6.13 & Chapter 10 of NFPA 72	Yes, Section 24.5.2.6 NFPA 72 -2013	Yes, Section 510.4.2.5	Yes, Section 510.4.2.5
Cabinets for Equipment and Battery Backup Required	Yes, NEMA 4/NEMA 4X Section 24.5.2.5.2	Yes, NEMA 4/NEMA 4X Section 9.6.11.2	Yes, NEMA 4/4X & NEMA 3R for Batteries Section 9.6.11.2	Yes, NEMA 4 Section 510.4.2.4 (1) & (2)	Yes, NEMA 4/NEMA 3R Section 510.4.2.4 (1) & (2)	Yes, NEMA 4/NEMA 3R Section 510.4.2.4 (1) & (2)
Monitor Antenna Malfunction Required	Yes, Donor Antenna Section 24.5.2.6(2)(a)	Yes, Donor Antenna Section 9.6.13.1(2)(a)	Yes, Donor Antenna Section 9.6.13.2.1(5)	Yes, Section 24.5.2.6(2)(a) NFPA 72-2013	Yes, Donor Antenna Section 510.4.2.4(4)	Yes, Donor Antenna Section 510.4.2.4(4)
System Acceptance/Testing	Section 24.5.2.1.2 & 14.4.10	Section 9.6.4, 11.3.9 & 11.3.9.1	Section 9.6.4, 11.3.9 & 11.3.9.1	Section 510.5.3	Section 510.5.3	New Section 510.5.4 Annual Section 510.6.1
Listing of Equipment	Not specifically addressed	Not specifically addressed	Specific Listing Requirement TBD by the AHJ	Not Required by Section 510	Not Required by Section 510	Yes, Section 510.4 (UL2524)
Mounting of Donor Antenna	Not specifically addressed	Not specifically addressed	Not specifically addressed	Not specifically addressed	Not specifically addressed	Section 510.5.1

STRUCTURED WIRELESS

Structured Wireless, Inc
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Griffin, GA 30224

Revision history

Rev	Date	Author
1.1	8/16/2024	Tracy Richardson

Details per AHJ

Project name

The Springs of Ballentine

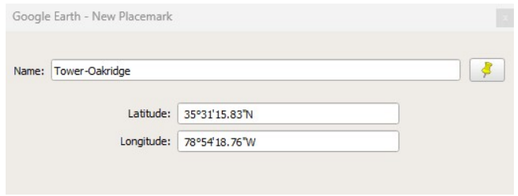
Designer name

Tracy Richardson

ERCES

9/2/2024

UL Summary



Uplink Link Budget Report

Project name: The Springs of Ballentine **Design company:** Structured Wireless, Inc
Project creation date: 9/2/2024 **Designer:** Tracy Richardson

Antenna ID	Operator	System ID	Coupler				Splitter		Cable			Other			Summary					
			Thru Loss		Tap Loss		Loss								MS EIRP	BS RSSI	BS Range	Antenna Gain *	Total DAS Gain/Loss	System Input Pow
			Generic		Generic		Generic					Microlab/FXR	Westell							
			10dB		10dB		3-Way		AC012/50	AP0012/50		HR-20N	CS03-003-430 (AY/746-896/11)							
			-10.10 dB		-0.55 dB		-4.77 dB					-0.08 dB	11.00 dB							
			Qty	Subtotal (dB)	Qty	Subtotal (dB)	Qty	Subtotal (dB)	Length (feet)	Length (feet)	Subtotal (dB)	Qty	Qty	Subtotal (dB)	(dBm)	(dBm)	(feet)	(dBd)	(dB)	(dBm)
ANT1-F1	Public Safety 800 MHz	800 MHz - SMR - P25 - Sector N/A			1	-0.55	1	-4.77	62.55	236.89	-7.04	1	1	10.92	26.10	-39.74	15886.25	1.99	9.01	-28.1
ANT2-F1	Public Safety 800 MHz	800 MHz - SMR - P25 - Sector N/A	1	-10.10			1	-4.77	62.55	174.51	-5.60	1	1	10.92	26.10	-39.74	15886.25	1.99	9.01	-28.1
ANT3-F1	Public Safety 800 MHz	800 MHz - SMR - P25 - Sector N/A			1	-0.55	1	-4.77	62.55	150.03	-5.32	1	1	10.92	26.10	-39.74	15886.25	1.99	9.01	-28.1
ANT4-F1	Public Safety 800 MHz	800 MHz - SMR - P25 - Sector N/A	1	-10.10			1	-4.77	62.55	62.28	-3.18	1	1	10.92	26.10	-39.74	15886.25	1.99	9.01	-28.1
ANT5-F1	Public Safety 800 MHz	800 MHz - SMR - P25 - Sector N/A			1	-0.55	1	-4.77	62.55	217.33	-6.65	1	1	10.92	26.10	-39.74	15886.25	1.99	9.01	-28.1
ANT6-F1	Public Safety 800 MHz	800 MHz - SMR - P25 - Sector N/A	1	-10.10			1	-4.77	62.55	159.07	-5.30	1	1	10.92	26.10	-39.74	15886.25	1.99	9.01	-28.1

Total number of antennas: 6

Page1

Page2

Page3

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1.1	8/16/2024	Tracy Richardson
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Project name

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Designer name

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UL

9/2/2024

Bill of Materials

Equipment List Report

Project name: The Springs of Ballentine
Project creation date: 9/2/2024
Design company: Structured Wireless, Inc
Designer: Tracy Richardson

Type	Manufacturer	Model	Description	Inventory#	Qty
Cable	AirCell-Trilogy	AC012J50	AirCell® In-Conduit, 1/2", 50 Ohm, Black, Corrugated, UV Rated Polyethylene Jacket	N/A	62.55 feet
Cable	AirCell-Trilogy	APC012J50	AirCell® Plenum, 1/2", 50 Ohm, Corrugated, Copper Outer Conductor, Jacketed CMP, Conforms to NFPA-262, UL-444, Canadian CSA 22.2/FT6	N/A	568.79 feet
Connector	AirCell-Trilogy	NMP01250	N Type, Male Connector for 1/2" AirCell® Plenum & In-Conduit Cables, 50 Ohm	N/A	18
Splitter	Generic	3-Way	3-Way Splitter / Combiner - 0-2700 MHz	N/A	2
Splitter	Generic	10dB	10 dB Directional Coupler	N/A	1
Antenna	Laird Connectivity	CFSA69383P1-30NF	1-Port Ceiling-flushed Ultra Low Profile Low PIM Omni-directional Antenna - 698-960 MHz/ 1350-1550 MHz/ 1690-2700 MHz/ 3300-4000 MHz - N-Female	N/A	6
Miscellaneous	Microlab/FXR	HR-20N	DC Block (Surge Suppression), Inner Block, 380 - 2700 MHz, 500W, Type N Connectors, Low PIM -164dBc, IP65 <Last Modified: 06-17-21>	N/A	1
Cable	Microlab/FXR	JA-10MN	Jumper Cable 0.141 - Length 1.0 m - Coaxial, PIM <-158 dBc, Straight N-Male to Straight N Male <Last Modified: 01-04-15>	N/A	2
Antenna	Westell	CS03-003-430 (AY/746-896/11)	Yagi Antenna Public Safety 700/800 (746-896MHz) 11 dBi	CS03-003-430	1
BDA	Westell	CS14-720-820 PS51080E	Enhanced Public Safety 700+FirstNet/800 MHz 1/2 Watt, 80dB gain Signal Booster with front panel annunciator, built-in battery charging and alarms and improved interface for power and alarm connections. Listed to UL2524 and NFPA1221 complaint.	CS14-720-820	1
Miscellaneous	Westell	CS19-BBC-003	NEMA3R battery cabinet designed to work with PS-Enhanced Series Class B BDAs or CS40 series ProtectLink BDAs and DAS. Order CS19-PYL Series batteries separately. Comes with flewtight waterproof conduit fittings and 14 gauge red/black wire.	CS19-BBC-003	1

STRUCTURED WIRELESS

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Griffin, GA 30224

Revision history

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1.1	9/16/2024	Tracy Richardson
Details per AHJ		

Project name
The Springs of Ballentine

Designer name
Tracy Richardson

BOM

9/2/2024

Datasheets

Model PS71090-P8
2W NFPA 72 Public Safety Signal Booster

Model Number
- PS71090-P8

Item Number
- CS14-000-802

Frequency Range
- Uplink 806-809 / 806-816 / 806-824 MHz
- Downlink 851-854 / 851-861 / 851-869 MHz

Product Features
- Supports Sub-Bands in 800 MHz
- Passband Options - *(Can be turned on/off independantley)*
  - UL 806-809/DL 851-854 MHz (3 MHz)
  - UL 806-816/DL 851-861 MHz (10MHz)
  - UL 806-824/DL 851-869 MHz (18 MHz)
- NFPA 72 (2016) Compliant Class B Amplifier
- 33 dBm (2W) Power Output DL/UL
- 90 dB Gain
- UL Listed
- Low Power Consumption
- Sharp SAW Filtering Reduces Interference from Competing Signals
- Easy to Install and Maintain
- Dry Contacts for Fire panel connection

Oscillation Detection and Automatic Gain Control (AGC)
- Built-in Oscillation Control and Self-healing
- Shutdown in the Event of Non-Correctable Conditions

PS71090-P8 PS-2MR 800

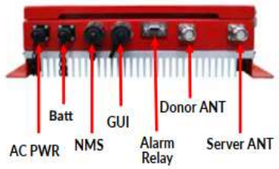
Supported Alarms via NMS
- System (PLL)
- Isolation
- PA Shutdown (UL/DL)
- Power Failure
- Antenna UL/DL VSWR *(Can be disabled)*
- Manual Amp Off
- Single Summary Alarm

Supported LED Status
- Power
- Isolation
- Oscillation (OSC)
- Alarm

PS71090 P8: 2W NFPA 72 Public Safety Signal Booster

Electrical Specifications

Main Power Input	110 VAC
Battery Power Input	24 VDC to 30 VDC
Power Consumption	AC: <0.9A, <10W Max DC: <2.7A, 65W Max (24 VDC)
Output Power (UL/DL)	+33 dBm (2W)
Gain	90 dB
Propagation Delay	<4µ
Noise Figure @ Max Gain	<5 dB Typ.
AGC Dynamic Range	25 dB
Gain Adjustment Range	30 dB ±1 dB
VSWR	<2:1



Mechanical Specifications

Dimensions (H x W x D)	17.7 x 14.1 x 4.7 in
Approximate Weight	37 lbs.
Mounting	Wall-mount
Weatherproofing	IP65/NEMA Type 4
Connectors	
Antenna Ports	4.3-10 (F)
User Interface: GUI & SNMP	RJ-45
Alarm Relay	9-Pin D-SUB, Female
Operating Temperature	-30° to 50° C

Dry Contact Alarms

Alarm One	AC/DC Power/System
Alarm Two	Active RF Emitting Device Malfunction/Power Amplifier System Failure
Alarm Three	Donor/Server Antenna Malfunction VSWR

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Rev	Date	Author
1.1	8/16/2024	Tracy Richardson

Details per AHJ

Project name:

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Designer name:

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DS2

9/2/2024

Datasheets

Laird

Smart Technology. Delivered.

CFSA69383P

698-960 MHz/1350-1550 MHz/1690-3800 MHz Ultra Low Profile / Low PIM Ceiling Mount Antenna

Patent Pending CFSA69383P

MULTI-BAND LOW PIM CEILING MOUNTED OMNIDIRECTIONAL ANTENNA

The CFSA69383P is a Low PIM indoor wideband omnidirectional low profile ceiling mount antenna. It is designed to provide pattern coverage that is optimized for indoor coverage requirements at 698-960 MHz, and 1690-3800 MHz for the GSM, DCS, UMTS, AWS-3 and LTE/WiMAX frequency bands. The CFSA69383P is applicable for environments where aesthetics and wide angle coverage are necessary for successful wireless deployment. The surprisingly small size and extreme low profile enables maximum mounting flexibility while maintaining desired in-building aesthetics.

FEATURES

- Ultra Low profile aesthetically neutral housing
- Mounts directly and easily to ceiling tile
- Performance optimized using Laird proprietary optimization tools
- Supports AWS-3 Frequency Band

APPLICATIONS

- Small Cells
- Meeting Rooms
- Offices
- Hotels
- Museums
- iDAS
- Libraries
- Retail Malls
- Bus Terminals & Train Stations
- Other In-Building Areas

PARAMETER	SPECIFICATIONS										
Model	CFSA69383P										
Frequency Bands, MHz	698-806	824-894	880-960	1350-1550	1690-1880	1850-1990	1910-2170	2300-2500	2500-2700	3300-3800	3800-4000
Peak Gain, dBi (Typ)	3.2	2.6	3.4	4.2	4.0	4.4	4.2	4.3	5.4	2.4	3.0
Peak Gain, dBi (Max)	3.5	3.1	4.1	5.6	4.3	4.7	4.7	5.1	5.8	3.0	3.2
VSWR, Typ	<1.2:1	<1.2:1	<1.2:1	<1.7:1	<1.3:1	<1.3:1	<1.3:1	<1.2:1	<1.2:1	<1.7:1	<1.7:1
VSWR, Max	<1.5:1	<1.5:1	<1.5:1	<2.0:1	<1.5:1	<1.5:1	<1.5:1	<1.5:1	<1.5:1	<1.8:1	<2.0:1
PIM, 3rd Order, 2x20 W (Typ)	<-160 dBc (LTE Low Band)				<-158 dBc (LTE High Band)						
PIM, 3rd Order, 2x20 W (Max)	<-150 dBc				<-150 dBc						
Nominal Impedance	50Ω										
Polarization	Linear Horizontal										
Azimuth 3 dB Beamwidth	360°										
Max Power (Ambient 25°C)	50 Watts										
Antenna Dimension (H x Dia)	7.6 x 180 mm (0.3" x 7.1")										
Weight	0.23 kg (0.5 lbs)										
Antenna Color	White										
Radome	PC, UL94-V0										
Operating Temperature	-30°C to +70°C (-22°F to +158°F)										
Storage Temperature	-40°C to +85°C (-40°F to +185°F)										
Material Stubstance Compliance	RoHS										

CONFIGURATION

PART NUMBER	CABLE LENGTH	CONNECTOR
CFSA69383P-30NF	30 cm (12")	Type N- female
CFSA69383P-30D43F	30 cm (12")	4.3-10 female

Americas: +1.847 839.6925
IAS-AmericasSales@lairdtech.com
Europe: +44.1628.858941
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Asia:
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Middle East and Africa: +44.1628.858941
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www.lairdtech.com

Westell® | 746-896 MHz Yagi Antenna

General Information

Westell's 746-896 MHz Yagi Antenna is excellent for Public Safety applications. The eight-element construction provides exceptional performance and durability and is useful for directional point-to-point, or point-to-multipoint applications.

7-6-896 MHz Yagi Antenna, 11 dBi

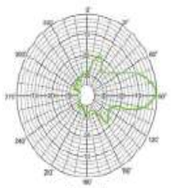
Product Highlights

- 11 dBi Gain
- 746-896 frequency range
- 8 elements
- Hermetically sealed driven element
- Rugged anodized aluminum lightweight design
- Stainless-steel mounting hardware

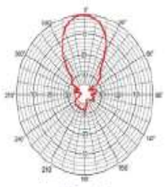
Ordering information

Part Number	Descriptions
C503-003-430	CSI-AY/746-896/11

Radiation Patterns



Vertical



Horizontal

Electrical Specifications

Gain	11 dBi
VSWR	<1.7:1
Horizontal beamwidth	48°
Vertical beamwidth	40°
Polarization	Vertical
Maximum input power	100 Watts
Electrical downtilt	0°
Front-back ratio	>16 dB

Specifications subject to change without notice.

Mechanical Specifications

Number of elements	8
Connector	N-Female
Lightning protection	Direct ground
Rated wind speed	134 mph
Frontal wind load	11.2 lbf
Lateral windload	8.2 lbf
Dimensions	33.1 x 8 x 2.2 in
Antenna weight	1.76 lbs
Mounting hardware	U-Bolt
Included mounting hardware fits 1.18"-2.36" inch OD pipe	

WESTELL

WESTELL.COM

IBW-C503-003-430_746-896MHzYagi-DS-033121

STRUCTURED WIRELESS

Structured Wireless, Inc
130 Maplewood Dr
Griffin, GA 30224

Revision history

Rev	Date	Author
1.1	8/16/2024	Tracy Richardson

Details per AHJ

Project name

The Springs of Ballentine

Designer name

Tracy Richardson

DS4

9/2/2024

Datasheets

AirCell® Plenum Cable

TRILOGY Communications

Product Specification

50 Ohm Plenum Cable, 1/2" - AP6012J50

Description	Product Number
Plenum Rated Cable	
1/2", Corrugated (6 GHz), Jacketed CMP, Conforms to NFPA-262, UL-444, Canadian CSA 22.2/FT6	AP6012J50
Physical Dimensions	
Center Diameter, in (mm)	0.188 (4.78)
Diameter Over Outer Conductor, in (mm)	0.550 (13.97)
Maximum Diameter Over Jacket, in (mm)	0.63 (16.00)
Center Conductor	Copper-Clad Aluminum
Outer Conductor	Corrugated Aluminum
Jacket Color	Off White
Electrical Characteristics	
Maximum Frequency, GHz	10
Peak Power Rating, KW	35
DC Resistance, Ohms/1,000 ft (1,000 m)	
Center	0.46 (1.51)
Outer	0.51 (1.67)
DC Breakdown, kV	2
Capacitance, pF/ft (m)	22 (72.12)
Inductance, mH/ft (m)	0.057 (0.187)
Jacket Spark, kV RMS	8
VSWR min, (dB)	1.25 (19.0)
VSWR typical, 700-960 / 1700-2200 MHz (dB)	1.13 (24.3)
Impedance, Ohms	50 ± 2
Velocity of Propagation	94%
Mechanical Characteristics	
Minimum Bend Radius, in (mm) - Single	2 (50.8)
Minimum Bend Radius, in (mm) - Multiple	5 (127)
Cable Weight, lb/ft (kg/m)	0.13 (0.20)
Bending Moment, ft lb (N m)	1 (1.4)
Tensile Strength, lb (kg)	250 (114)
Flat Plate Crush, lb/in (kg/mm)	78 (1.39)
Number of Bends, minimum	15
Recommended Install Temp., °F (°C)	+5° to 194° (-15° to 90°)
Recommended Storage Temp., °F (°C)	+5° to 194° (-15° to 90°)
Recommended Operating Temp., °F (°C)	+5° to 194° (-15° to 90°)
Standard Conditions	
For Attenuation: VSWR 1.0, Ambient Temperature 20°C (68°F)	
For Average Power: VSWR 1.0, Ambient Temperature 40°C (104°F), Inner Conductor Temperature 100°C (212°F), No Solar Loading	
Regulatory Compliance/Certifications	
RoHS 2011/65/EU Compliant	
TL 9000 H-V - All Cables designed and manufactured under this quality management system	

Attenuation and Average Power			
Frequency, MHz	Attenuation dB/100 ft	dB/100 m	Average Power kW
100	0.70	2.30	3.98
450	1.50	4.92	1.85
500	1.59	5.22	1.75
600	1.75	5.74	1.58
700	1.87	6.14	1.47
800	1.96	6.43	1.37
900	2.14	7.02	1.29
960	2.23	7.32	1.24
1000	2.30	7.55	1.21
1500	2.85	9.35	0.98
1700	3.05	10.01	0.98
1800	3.14	10.30	0.93
1950	3.24	10.63	0.85
2000	3.33	10.93	0.84
2100	3.42	11.22	0.82
2200	3.50	11.48	0.80
2300	3.59	11.78	0.78
2400	3.67	12.04	0.77
2500	3.75	12.30	0.75
2700	3.90	12.80	0.72
3000	4.14	13.58	0.68
3300	4.33	14.21	0.61
3400	4.45	14.60	0.60
4000	4.91	16.11	0.55
4900	5.61	18.41	0.50
5000	5.69	18.67	0.49
5200	5.92	19.42	0.48
5300	6.03	19.78	0.47
5600	6.37	20.90	0.46
5825	6.83	22.41	0.45

Trilogy AirCell® Cable

Proud to be 100% Made in the USA

MADE IN USA

AirCell® In-Conduit Cable

TRILOGY Communications

Product Specification

50 Ohm In-Conduit Cable, 1/2" - AC012J50

Description	Product Number
Standard Cable	
1/2", Corrugated, Black Polyethylene Jacket	AC012J50
Physical Dimensions	
Center Diameter, in (mm)	0.188 (4.78)
Diameter Over Outer Conductor, in (mm)	0.550 (13.97)
Maximum Diameter Over Jacket, in (mm)	0.63 (16.00)
Center Conductor	Copper-Clad Aluminum
Outer Conductor	Corrugated Aluminum
Jacket Color	Black
Electrical Characteristics	
Maximum Frequency, GHz	10
Peak Power Rating, KW	35
DC Resistance, Ohms/1,000 ft (1,000 m)	
Center	0.46 (1.51)
Outer	0.51 (1.67)
DC Breakdown, kV	2
Capacitance, pF/ft (m)	22 (72.12)
Inductance, mH/ft (m)	0.057 (0.187)
Jacket Spark, kV RMS	8
VSWR min, (dB)	1.25 (19.0)
VSWR typical, 700-960 / 1700-2200 MHz (dB)	1.13 (24.3)
Impedance, Ohms	50 ± 2
Velocity of Propagation	94%
Mechanical Characteristics	
Minimum Bend Radius, in (mm) - Single	2 (50.8)
Minimum Bend Radius, in (mm) - Multiple	5 (127)
Cable Weight, lb/ft (kg/m)	0.11 (0.16)
Bending Moment, ft lb (N m)	1 (1.4)
Tensile Strength, lb (kg)	250 (114)
Flat Plate Crush, lb/in (kg/mm)	78 (1.39)
Number of Bends, minimum	15
Recommended Install Temp., °F (°C)	+5° to 194° (-15° to 90°)
Recommended Storage Temp., °F (°C)	+5° to 194° (-15° to 90°)
Recommended Operating Temp., °F (°C)	+5° to 194° (-15° to 90°)
Standard Conditions	
For Attenuation: VSWR 1.0, Ambient Temperature 20°C (68°F)	
For Average Power: VSWR 1.0, Ambient Temperature 40°C (104°F), Inner Conductor Temperature 100°C (212°F), No Solar Loading	
Regulatory Compliance/Certifications	
RoHS 2011/65/EU Compliant	
TL 9000 H-V - All Cables designed and manufactured under this quality management system	

Attenuation and Average Power			
Frequency, MHz	Attenuation dB/100 ft	dB/100 m	Average Power kW
100	0.70	2.30	3.98
450	1.50	4.92	1.85
500	1.59	5.22	1.75
600	1.75	5.74	1.58
700	1.87	6.14	1.47
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900	2.14	7.02	1.29
960	2.23	7.32	1.24
1000	2.30	7.55	1.21
1500	2.85	9.35	0.98
1700	3.05	10.01	0.98
1800	3.14	10.30	0.93
1950	3.24	10.63	0.85
2000	3.33	10.93	0.84
2100	3.42	11.22	0.82
2200	3.50	11.48	0.80
2300	3.59	11.78	0.78
2400	3.67	12.04	0.77
2500	3.75	12.30	0.75
2700	3.90	12.80	0.72
3000	4.14	13.58	0.68
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3400	4.45	14.60	0.60
4000	4.91	16.11	0.55
4900	5.61	18.41	0.50
5000	5.69	18.67	0.49
5200	5.92	19.42	0.48
5300	6.03	19.78	0.47
5600	6.37	20.90	0.46
5825	6.83	22.41	0.45

Trilogy AirCell® Cable

Proud to be 100% Made in the USA

MADE IN USA

STRUCTURED WIRELESS

Structured Wireless, Inc
130 Maplewood Dr
Griffin, GA 30224

Revision history

Rev	Date	Author
1.1	8/16/2024	Tracy Richardson

Details per AHJ

Project name

The Springs of Ballentine

Designer name

Tracy Richardson

DS5

9/2/2024

AirCell® Connectors & Tools TRILOGY Communications

Connector Specification

NFP01250 AirCell® 50 Ohm Connectors

For use with AirCell® 1/2" 50 Ohm Plenum, Conduit and In-Conduit Cables

Description	NFP01250
General Specifications	
Interface	N Female
Body Style	Straight
Electrical Specifications	
Impedance, Ohms	50
Operating Frequency Band	0.3 MHz to 6 GHz
Dielectric Withstand Voltage	2 kV DC
3rd Order IMD	-140 dBc minimum, -150 typical
3rd Order IMD, Test Method	2 x 20 Watt carriers
Average Power	0.6 kW
Peak Power, maximum	10 kW
Insertion Loss, typical	0.05
Shielding Effectiveness	-130 dB
Return Loss (VSWR)	
DC to 1 GHz	30 dB (1.06)
1 GHz to 2 GHz	31 dB (1.06)
2 GHz to 3 GHz	32 dB (1.06)
3 GHz to 4 GHz	25 dB (1.12)
4 GHz to 5 GHz	20 dB (1.22)
5 GHz to 6 GHz	15 dB (1.43)
Mechanical Specifications	
Outer Contact Plating	Silver
Inner Contact Plating	Silver
Interface Durability	500 cycles
Interface Durability Test Method	IEC 16916
Minimum Connector Pull-off Force	200 lbs
Environmental Specifications	
Operating Temperature, °F (°C)	-40° to 158° (-40° to 70°)
Storage Temperature, °F (°C)	-40° to 158° (-40° to 70°)
Installation Temperature, °F (°C)	23° to 122° (-5° to 50°)
Immersion Test Method	IEC60529:2001 IP68
Corrosion Test Method	MIL-STD-1344A
Thermal Shock Test Method	MIL-STD-202F
Vibration Test Method	MIL-STD-202F
Regulatory Compliance/Certifications	
RoHS 2011/65/EU Compliant	
TL 9000 H-V - All Cables designed and manufactured under this quality management system	

Notice: Trilogy disclaims any liability or responsibility for the results of improper or unsafe installation, inspection, maintenance or removal practices

AirCell® Connectors & Tools TRILOGY Communications

Connector Specification

NMP01250 AirCell® 50 Ohm Connectors

For use with AirCell® 1/2" 50 Ohm Plenum, Conduit and In-Conduit Cables

Description	NMP01250
General Specifications	
Interface	N Male
Body Style	Straight
Electrical Specifications	
Impedance, Ohms	50
Operating Frequency Band	0.3 MHz to 6 GHz
Dielectric Withstand Voltage	2 kV DC
3rd Order IMD	-140 dBc minimum, -150 typical
3rd Order IMD, Test Method	2 x 20 Watt carriers
Average Power	0.6 kW
Peak Power, maximum	10 kW
Insertion Loss, typical	0.05
Shielding Effectiveness	-130 dB
Return Loss (VSWR)	
DC to 1 GHz	30 dB (1.06)
1 GHz to 2 GHz	31 dB (1.06)
2 GHz to 3 GHz	32 dB (1.06)
3 GHz to 4 GHz	25 dB (1.12)
4 GHz to 5 GHz	20 dB (1.22)
5 GHz to 6 GHz	15 dB (1.43)
Mechanical Specifications	
Outer Contact Plating	Silver
Inner Contact Plating	Silver
Interface Durability	500 cycles
Interface Durability Test Method	IEC 16916
Minimum Connector Pull-off Force	200 lbs
Environmental Specifications	
Operating Temperature, °F (°C)	-40° to 158° (-40° to 70°)
Storage Temperature, °F (°C)	-40° to 158° (-40° to 70°)
Installation Temperature, °F (°C)	23° to 122° (-5° to 50°)
Immersion Test Method	IEC60529:2001 IP68
Corrosion Test Method	MIL-STD-1344A
Thermal Shock Test Method	MIL-STD-202F
Vibration Test Method	MIL-STD-202F
Regulatory Compliance/Certifications	
RoHS 2011/65/EU Compliant	
TL 9000 H-V - All Cables designed and manufactured under this quality management system	

Notice: Trilogy disclaims any liability or responsibility for the results of improper or unsafe installation, inspection, maintenance or removal practices

STRUCTURED WIRELESS

Structured Wireless, Inc
130 Maplewood Dr
Griffin, GA 30224

Revision history

Rev	Date	Author
1.1	9/16/2024	Tracy Richardson
Details per AHJ		

Project name

The Springs of Ballentine

Designer name

Tracy Richardson

DS6

9/2/2024

Datasheets

SC-C | Full Band Coupler

N/A | Ideal for large buildings and warehouses.

- Insertion Loss: 0.4dB
- Admeasure Loss: 0.15dB
- Coupling Port Loss: 20±0.5DB
- VSWR: ≤1.30
- Maximum Power: 100W
- Connector: N Female

Click to Enlarge

These couplers allow 2 inside antennas to be used with a single amplifier with the ability to focus more signal to a specific area. This full band couplers cover PCS, Cellular, AWS and LTE band systems from 698MHz to 2700 MHz.

Model No.	CM-C-10			CM-C-6		
Type	10dB Couple			6dB Couple		
Frequency range	800-2500MHZ	700-800MHZ	2500-2700MHZ	800-2500MHZ	700-800MHZ	2500-2700MHZ
Insertion Loss	0.4dB	0.5dB	0.5dB	0.4dB	0.5dB	0.5dB
Admeasure Loss	1dB			1.25dB		
Coupling port Loss	10±0.5DB	10±1DB	10±1DB	6±0.5DB	6±1DB	6±1DB
Impedance	50Ω					
VSWR	≤1.30					
Maximum Power	100W					
Connector	N Female					
Work Temperature	-30～+65 degree C					

Wide-Band Splitter

Prod. No: SC-WS-2 / SC-WS-3 / SC-WS-4

Wide-band cellular signal distribution device

Overview

These splitters allow from 2 to 4 inside antennas to be used with a single amplifier. Each inside antenna connection has ≤ 0.4 dB signal loss. The full band splitters cover PCS, Cellular, AWS and LTE band systems from 698 MHz to 2700 MHz.

How it Works

These splitters transmit and receive signal and distribute equal amounts of signal sent to two to four interior antennas for similarly sized areas.

Features

- Full Band 698-2700Mhz
- 2,3 or 4 way splitters
- Meets international standards
- Stainless steel

Technical specifications

Item#	2 Way Splitter	3 Way Splitter	4 Way Splitter
Model#	SC -WS-2	SC -WS-3	SC -WS-4
Frequency Range	698-2700Mhz	698-2700Mhz	698-2700Mhz
Insertion Loss	≤0.4dB	≤0.5dB	≤0.6dB
Isolation	≥22dB	≥22dB	≥22dB
VSWR	≤1.5:1	≤1.5:1	≤1.5:1
Maximum Power	20W	20W	20W
Dimension (with connector)	3.5X3.9 inch	4.3X4.8 inch	4.3X4.8 inch
Weight	8.4 oz	12.5 oz	13.0 oz

PolyPhaser
an INFINITE brand

Type N F/F Bulkhead Coaxial RF Surge Protector, 698MHz - 2.7GHz, DC Block, 500W, IP67, .005uJ, 40kA, Filter

TSX-NFF

Features

- Surge current of 40kA
- Max Power 500W
- Frequency range from 698 MHz to 2700 MHz
- Waterproof IP67 rated
- N-type Female connectors
- DC Block
- VSWR <1.1:1
- Low insertion loss
- CE & RoHS compliant
- Bidirectional

Applications

- Cellular communication systems
- Public safety systems
- Emergency response systems
- Industrial Communications

Description

RF surge protector (also known as lightning arrester) TSX-NFF from PolyPhaser utilizing a patented spiral inductor design enables an almost instantaneous response to a lightning surge to protect critical hardware while maintaining the RF performance. This RF surge protector component is manufactured in a coaxial in-line design with wide operating frequency range. All PolyPhaser RF surge protector products are available in stock with same day shipping.

Electrical Specifications

Surge Protector Type — Surge Filter
DC Handling — DC Block

Description	Minimum	Typical	Maximum	Units
Frequency Range	0.698		2.7	GHz
Impedance		50		Ohms
VSWR			1.1:1	
Return Loss			26	dB
Insertion Loss			0.1	dB
Input Power, CW 500W @ 920MHz 750W @ 50°C			500	Watts
Surge Current IEC 61000-4-5 8/20µs WAVEFORM		20	40	kA
Throughput Energy FOR 3kA @ 8/20µs WAVEFORM			5	nJ

Click the following link (or enter part number in "SEARCH" on website) to obtain additional part information including price, inventory and certifications:
Type N F/F Bulkhead Coaxial RF Surge Protector, 698MHz - 2.7GHz, DC Block, 500W, IP67, .005uJ, 40kA, Filter TSX-NFF

STRUCTURED WIRELESS

Structured Wireless, Inc
130 Maplewood Dr
Griffin, GA 30224

Revision history

Rev	Date	Author
1.1	8/16/2024	Tracy Richardson

Details per AHJ

Project name
The Springs of Ballentine

Designer name
Tracy Richardson

DS7

9/2/2024

STRUCTURED WIRELESS

Structured Wireless, Inc
130 Maplewood Dr
Griffin, GA 30224

Revision history

Rev	Date	Author
1.1	8/16/2024	Tracy Richardson

Details per AHJ

Project name: The Springs of Ballentine

Designer name: Tracy Richardson

DS8

9/2/2024

Microlab

Coaxial Cable Assemblies, JA series

Low PIM cables with straight connectors, DC - 6 GHz
4.3-10, N-type and 7-16 DIN
Rev. J

- Ultra-wideband for C-band & NR-U applications
- Guaranteed Low PIM
- 100W Average Power Rating
- Minimal RF Insertion Loss
- 4.3-10, 7-16 DIN, or N-type connector combinations
- Plenum rated class CMP
- RoHS compliant

Microlab JA series coaxial cable assemblies are built for reliability and guaranteed low PIM performance. Designed for use in all systems where low loss and mechanical flexibility are crucial. Low PIM cable and tri-metal plated connectors ensure good intermodulation performance. All cables are fully interchangeable with connectors made to the MIL-C-39012 specification.

JA series (Straight to Straight) Model Numbers

JA-xxMX	4.3-10(m)	to	4.3-10(m)
JA-xxMY	4.3-10(m)	to	7-16(m)
JA-xxMZ	4.3-10(m)	to	N-type(m)
JA-xxTX	4.3-10(m)	to	4.3-10(f)
JA-xxTZ	4.3-10(m)	to	N-type(f)
JA-xxFZ	4.3-10(f)	to	N-type(m)
JA-xxTY	4.3-10(f)	to	7-16(m)
JA-xxMA	N-type(m)	to	7-16(m)
JA-xxMN	N-type(m)	to	N-type(m)
JA-xxTA	N-type(m)	to	7-16(f)
JA-xxTN	N-type(m)	to	N-type(f)
JA-xxFA	N-type(f)	to	7-16(m)
JA-xxFN	N-type(f)	to	N-type(f)
JA-xxND	N-type(f)	to	7-16(f)
JA-xxMD	7-16(m)	to	7-16(m)
JA-xxTD	7-16(m)	to	7-16(f)
JA-xxFD	7-16(f)	to	7-16(f)

xx specifies the cable length in decimeters(<30 dm)
E.g.: JA-10MX: 10 decimeters (1 meter) 4.3-10 (m-m) cable

Loss Specifications per meter (~39") cable

Frequency	Loss/m
380 MHz	<0.3 dB
960 MHz	<0.5 dB
1700 MHz	<0.6 dB
2700 MHz	<0.8 dB
6000 MHz	<1.2 dB.

Electrical Specifications

Frequency:	DC to 6,000 MHz
Shielding:	>90 dB
VSWR:	<1.22:1
DWV:	750 VAC max.
Impedance:	50Ω nominal
RoHS:	Compliant
PIM:	-164 dBc (-121 dBm) typ. <-158 dBc(-115 dBm)
(Tested with 2x 1900 MHz, +43 dBm tones @ ambient)	
Power Rating:	100 W avg., 3 kW pk.

Connector Specifications

Finish:	Albaloy plated brass body
Contacts:	Ag/Cu plated BeCu
Dielectrics:	PTFE
Gaskets:	Si Rubber
Interface:	per MIL-STD-348
Coupling Proof Torque:	15 in*lbs
Coupling Retention:	60 lbs axial

Cable Specifications

Diameter:	Jacketed .141" Rigid Type
Conductor (ø.037"):	Silver Plated Copper
Dielectric: (ø.113)	Microporous PTFE
Braid (ø.121):	Ag Plated Flat Copper
Outer Braid (ø.138):	Ag Plated Copper Wire
Jacket (ø.160):	Extruded FEP
Major Diameter:	ø.165" max
Static Bend Radius:	0.75" R
Temperature:	-40°C to +125°C

Note: Specifications are subject to change without prior notification. 16SEP2021

Microlab, A Wireless Telecom Group Company, 25 Eastmans Road, Parsippany, NJ 07054
Tel: (973) 386-9696 • sales@microlabtech.com • www.microlabtech.com • Fax: (973) 386-9191

LMR-400

Flexible Communications Cable

Ideal for…

- Drop-in replacement for RG-8/9913 Air-Dielectric type Cable
- Jumper Assemblies in Wireless Communications Systems
- Short Antenna Feeder runs
- Any application (e.g. WLL, GPS, LMR, Mobile Antennas, 802.11, WLAN) requiring an easily routed, low loss RF cable

• **Flexible:** With a 1-inch minimum bend radius, LMR-400 cable can be easily routed into and through tight spaces without kinking. The LMR bonded-tape outer conductor provides superior flexibility and ease of bending compared to corrugated copper or smooth wall copper hard-line cables.
• **Low Loss:** LMR-400 has the lowest loss of any RG8/RG213 'type' cable. This is achieved through the use of a high velocity gas-injected closed cell foam dielectric and bonded aluminum tape outer conductor.
• **Weatherproof:** The UV protected black polyethylene jacket makes the cable rugged and resistant to the full range of outdoor environments. The DB version of the cable includes a water blocking material within the braid to protect the cable from moisture ingress and eliminate any potential for corrosion in harsh environments or should the jacket become damaged. Various jacket materials are available to address other indoor and outdoor requirements.
• **RF Shielding:** The bonded aluminum tape outer conductor is overlapped to provide 100% coverage, resulting in >90 dB RF shielding (>180 dB crosstalk) and excellent interference immunity (ingress and egress).
• **Phase Stability:** The intimately bonded structure and foam dielectric of LMR cables provide excellent phase stability over temperature and with bending. The high velocity dielectric results in superior phase stability as compared with solid and air-spaced dielectric cables.
•**Connectors and Assemblies:** Times Microwave provides ***FlexTech***™ jumper cable assemblies fabricated with LMR-400-DB watertight cable and a variety of connector interface combinations (ref: FlexTech pages). Custom assemblies with phase matching, insertion loss matching, and other special electrical or marking requirements can also be provided. A full range of connectors, including 'EZ' install (non-solder) types, is available for

Part Description

Part Number	Designation	Jacket	Stock Code
LMR-400	Standard outdoor cable	Polyethylene	54001
LMR-400-DB	Watertight cable	Polyethylene	54091
LMR-400-FR	CMR/MPR (PCC-FT4)	Non-Halogen	54030
* LMR-400-LLPL	CMP/MPP (PCC-FT6)	Plenum	54070
LMR-400-PVC	Indoor cable (CATVR)	PVC	54073
LMR-400-UltraFlex	UltraFlex cable	TPE	54040
LMR-400-FR-W	CMR/MPR (PCC FT4)	White Non-Halogen	54188
LMR-400-75	75 Ohm outdoor cable	Polyethylene	54147

* See LMR in-building communications catalog on web site for Plenum connectors.

TIMES MICROWAVE SYSTEMS
A Smiths Group plc company
358 Hall Ave., Wallingford, CT, 06492-5039 U.S.A.
Phone: 203-949-8400 Fax: 203-949-8423

LMR-400 cable as shown on the next page.
• **LMR-LLPL Low Loss Plenum:** Refer to LMR In-Building Communications catalog on web site for details.

Mechanical Specifications

Minimum bend radius	1.0 in	25.4 mm
Bending moment	0.5 ft lb	0.68 N-m
Weight	0.068 lb/ft	0.10 kG/m
Tensile strength	160 lb	72.6 kG
Flat plate crush	40 lb/in	0.71 g/mm

Construction Specifications

Part Designation	Material	Inches	mm
Inner conductor	Solid BCCAl	0.108	2.74
Dielectric	Foam polyethylene	0.285	7.24
Outer conductor	Aluminum tape	0.291	7.39
Overall braid	Tinned copper	0.320	8.13
Standard jacket	Black polyethylene	0.405	10.29

Environmental Specifications

	°F	°C
Installation temperature range	-40/+185	-40/+85
Storage temperature range	-94/+185	-70/+85
Operating temperature range	-40/+185	-40/+85

Electrical Specifications

Cutoff frequency	16.2 GHz*	
Velocity of propagation	85%	
Voltage withstand	2,500 VDC	
Peak power	16 kW	
DC resistance		
Inner conductor, ohms	1.39/1,000'	4.56/km
Outer conductor, ohms	1.65 /1,000'	5.41/km
Jacket spark	8,000 VRMS	
Impedance	50 ohms	
Capacitance	23.9 pF/ft	78.40 pF/m
Inductance	0.060 uH/ft	0.20 uH/m
Shielding effectiveness	>90 dB	
Phase stability	<10 ppm/ °C	

*Consult factory for applications over 6 GHz.

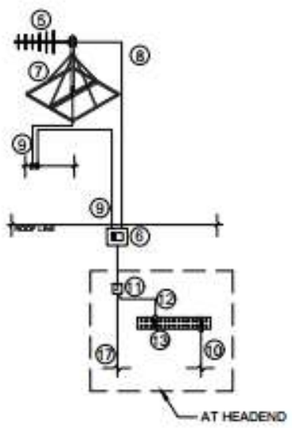
Frequency MHz	Attenuation dB/100 ft	dB/100 m	Avg. Power kW
30 MHz	0.7	2.2	3.3
50 MHz	0.9	2.9	2.6
150 MHz	1.5	5.0	1.5
220 MHz	1.9	6.1	1.2
450 MHz	2.7	8.9	0.83
900 MHz	3.9	12.8	0.58
1500 MHz	5.1	16.8	0.44
1800 MHz	5.7	18.6	0.40
2000 MHz	6.0	19.6	0.37
2500 MHz	6.8	22.2	0.33
5800 MHz	10.8	35.5	0.21

Add 15% to tabulated attenuation for LMR-UltraFlex
Attenuation (db/100 ft) = (0.12229) • $\sqrt{FMHz}$ + (0.00026) • FMHz
(db/100 m) = (0.40123) • $\sqrt{FMHz}$ + (0.00085) • FMHz
(interactive calculator available at http://www.timesmicrowave.com)
Attenuation: VSWR=1.0 ; Ambient = +25°C (77°F)
Power: VSWR=1.0; Ambient = +40°C; Inner Conductor = 100°C (212°F); Sea Level; dry air; atmospheric pressure; no solar loading

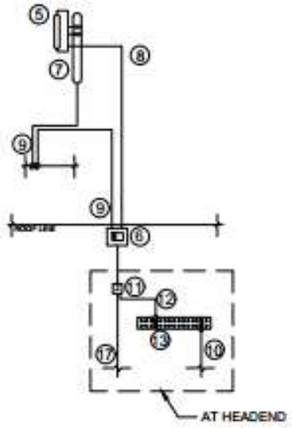
Grounding

DONOR ANTENNA GROUNDING (TYP)

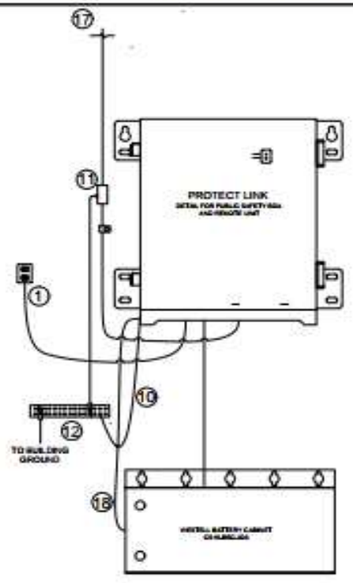
NON-PENETRATING ROOF MOUNT



ROOF MOUNT



BDA AND REMOTE UNIT GROUNDING DETAIL



Planned - Final config TBD

Structured Wireless, Inc
130 Maplewood Dr
Griffin, GA 30224

Revision history

Rev	Date	Author
1.1	8/16/2024	Tracy Richardson

Details per AHJ

Project name

The Springs of Ballentine

Designer name

Tracy Richardson

Grounding

9/2/2024

Licenses

CERTIFICATE

OF COMPLETION

iBwave Certification Program

iBwave Design

This Certificate is attributed to

Tracy Richardson

Congratulations on successfully completing the **iBwave Design Level 2 Certification**.

2021-11-30 — Date Issued

2024-11-29 — Expiry Date

iBwave DESIGN CERTIFIED LEVEL 2

François Barbeau, CEO, iBwave Solutions Inc.

iBwave 400, Sainte-Croix Ave., Suite 2100, Montreal, Quebec, H4N 3L4 Canada +1 514-397-0606 - www.ibwave.com

NATIONAL INSTITUTE FOR CERTIFICATION IN ENGINEERING TECHNOLOGIES®

sponsored by the National Society of Professional Engineers
1420 King Street • Alexandria, Virginia 22314-2794 • 1-888-IS-NICET

Official Examination Score Report

8/8/2023

Tracy Richardson — NICET ID: 71019524
Test Date: 2023-08-08 — Pearson Candidate ID: 290279581

On behalf of NICET, I wish to extend my sincere congratulations on your successful completion of the In-Building Public Safety Communications - Level II exam. While this success means you are one step closer to joining the elite of your profession, you are not yet fully certified.

Certification requires meeting all examination plus experience and performance requirements. If you haven't already done so, make sure you are logged in to the NICET Candidate Management System and submit the full certification application. See https://www.nicet.org/work-experience/ for details on the other certification requirements and the evaluation process.

Once again, congratulations on your success!

Sincerely,

Chip Hollis
Senior Director

UNITED STATES OF AMERICA
FEDERAL COMMUNICATIONS COMMISSION

General Radiotelephone Operator License

ATTN: TRACY
RICHARDSON, TRACY
2897 MANITOBA COURT
MARIETTA, GA 30062

FCC Registration Number (FRN): 0021221999

Special Conditions / Endorsements

Ship Radar Endorsement. This license confers authority to operate licensed radio stations in the Aviation, Marine and International Fixed Public Radio Services only. This license does not confer any authority to operate broadcast stations. It is not assignable or transferable. Refer to CFR Title 47 Section 13.7(c)(5).

Grant Date	Effective Date	Print Date	Expiration Date
07-25-2012	07-25-2012	07-26-2012	

File Number	Serial Number	Date of Birth
0005324677	PG00038331	03-30-1964

THIS LICENSE IS NOT TRANSFERABLE

(Licensee's Signature)

FCC 605-FRC - May 2007

STRUCTURED WIRELESS

Structured Wireless, Inc
130 Maplewood Dr
Griffin, GA 30224

Revision history

Rev	Date	Author
1.1	9/16/2024	Tracy Richardson

Details per AHJ

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