

Radio Testing of the

Nextivity Inc.

Public Safety Communication Unit

Model Name: SOLO RED

Model Numbers: L41-7E

In accordance with

FCC CFR 47 Part 90

RSS-119 Issue 12 (May 2015)

RSS-131 issue 3 (May 2017)

Nextivity Inc.

16550 West Bernardo Drive, Bldg 5, Suite 550,
San Diego, CA 92127, USA

Date: March 2022

Document Number: 72173170A Issue 01 | Version Number: 01



Product Service

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Authorized Signatory	Ferdinand S. Custodio	April 08, 2022	

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EXECUTIVE SUMMARY

The EUT in general was confirmed to be in compliance with FCC CFR 47 Part 90, RSS-119 Issue 12 (May 2015) and RSS-131 issue 3 (May 2017).



A2LA Cert. No. 2955.13

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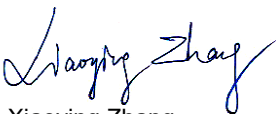
REPORT ON Radio Testing of the
Nextivity Inc.
SOLO RED Public Safety Communication Unit

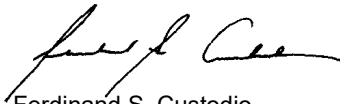
TEST REPORT NUMBER 72173170A

REPORT DATE March 2022

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Revision History

72173170A Nextivity Inc. SOLO RED Public Safety Communication Unit					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
04/08/2022	—	Initial Release			Ferdinand S. Custodio

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SECTION 1

REPORT SUMMARY

Radio Testing of the
Nextivity Inc.
SOLO RED Public Safety Communication Unit

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Nextivity Inc. SOLO RED to the requirements of FCC CFR 47 Part 90, RSS-119 Issue 12 (May 2015) and RSS-131 issue 3 (May 2017).

Objective	To perform Radio Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Nextivity Inc.
Model Name	SOLO RED
Model Number(s)	L41-7E (Class A)
EUT	Public Safety Communication Unit
FCC ID	YETL41-7EA
IC ID	9298A-L417E
Serial Number(s)	226141000048 and 226141000161
Number of Samples Tested	2
Date sample(s) received	November 29, 2021
Test Specification/Issue/Date	• FCC CFR 47 Part 90 (October 1, 2020) • RSS-119 – Land Mobile and Fixed Equipment Operating in the Frequency Range 27.41-960 MHz (issue 12, May 2015) • RSS-131 – Zone Enhancers (issue 3, Updated May 2017) • SRSP-511 - Technical Requirements for Land Mobile Radio Services Operating in the Bands 768-776 MHz and 798-806 MHz (issue 2, December 2017) • RSS-Gen - General Requirements for Compliance of Radio Apparatus (Issue 5, November 2019 Amendment 1) • ANSI C63.26-2015: American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
Start of Test	December 01, 2021
Finish of Test	April 05, 2022
Name of Engineer(s)	Xiaoying Zhang
Related Document(s)	• KDB971168 D01 Power Meas License Digital Systems v03r01 (Measurement Guidance for Certification of Licensed Digital Transmitters) • KDB412172 D01 Determining ERP and EIRP v01r01 (Guidelines for Determining the Effective Radiated Power (ERP) and Equivalent Isotropically Radiated Power (EIRP) of a RF Transmitting System) • Supporting documents for EUT certification are separate exhibits.

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 90 is shown below:

Section	Part 2	Part 90	RSS-119	KDB 935210 D05/ RSS-131	Test Description	Result
2.1	2.1046	-	-	-	Transmitter Conducted Output Power	Compliant
2.2	2.1046	90.219(e)(1) 90.541(a) 90.635(a)	5.4	-	Effective Radiated Power	Compliant
2.3	2.1049	90.219(e)(4)(ii)	5.5 RSS-Gen 6.7	-	Occupied Bandwidth	Compliant
2.4	2.1051	90.219(e)(3) 90.543(c)(f)	5.8.9.2	4.7.3	Conducted Spurious Emissions	Compliant
2.5	2.1053	90.219(e)(3) 90.543(c)(f)	5.8.9.2	4.9	Field Strength of Spurious Radiation	Compliant
2.6	2.1055	90.213(a) 90.539(b)	5.9	4.8/ 5.2.4	Frequency Stability	Compliant
-	-	-	RSS-Gen 7.1	-	Receiver Spurious Emissions	N/A
2.7	-	-	-	4.2	ACG Threshold Level	Compliant
2.8	-	-	-	4.3/ 5.2.1	Out of Band Rejection	Compliant
2.9	-	90.219(e)(4)(ii)	-	4.4/ 5.2.2	Input-versus-output signal comparison	Compliant
2.10	-	90.210 90.219 (e)(4)(iii) 90.543(a)	5.8.9	4.4	Emission Mask and Adjacent Channel Power	Compliant
2.11	-	90.219(e)(1)	-	4.5/ 5.2.3	Input / Output Power and Amplifier / Booster Gain	Compliant
2.12	-	90.219(e)(2)	-	4.6	Noise Figure	Compliant
2.13	2.1051	90.219(e)(3) 90.543(c)	5.8.9.2	4.7	Out-of-band/out-of-block (Intermodulation) and Spurious Emissions	Compliant

N/A Not required as per RSS-GEN 5.3. EUT is not a Stand-alone receiver.

1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) was a Nextivity Inc. SOLO RED Public Safety Communication Unit. The EUT is a Two-Boxes solution Signal Booster system designed to enhance in-building Public Safety coverage for public safety use. SOLO RED contains a high gain, high power band-selective Bi-Directional Amplifier (BDA) that has been specifically designed for UL2524 In-building 2-Way Emergency Radio Communication Enhancement Systems Standard.

Class A device support up to 56 carriers.

The System consists of two NEMA4 designed Enclosures:

- Cel-Fi SOLO RED Enclosure includes: RF amplifier (BDA), Monitor Unit (MU), Bluetooth LE module, Connectors for External antennas, Remote Annunciator (RA), Emergency Stop Switch (EPO)
- Battery Backup Unit (BBU) Enclosure includes: UL Listed Power Supply, Battery charger, 12VDC Battery.

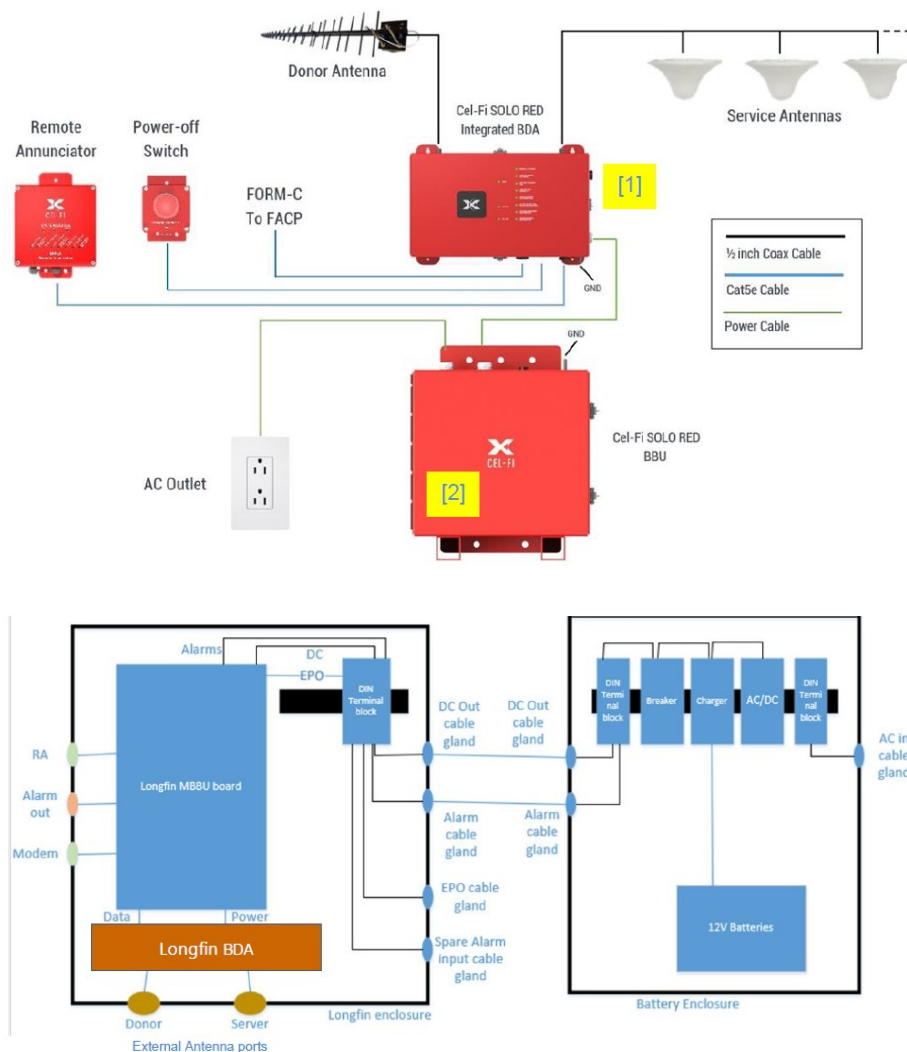


Figure 1: System Overview

1.3.2 EUT General Description

EUT Description	Public Safety Communication Unit
Trade Name	Cel-Fi™
Model Name	SOLO RED
Model Number(s)	L41-7E (Class A)
Rated Voltage	12V DC from internal power supply
Mode Verified	700 MHz Narrowband Public Safety 800 MHz NPSPAC Public Safety
Frequency Bands	700 MHz Narrowband Public Safety: Uplink: 799 - 805 MHz Downlink: 769 - 775 MHz 800 MHz NPSPAC Public Safety: Uplink: 806 - 816 MHz Downlink: 851 - 861 MHz

Signal Bandwidth (kHz)/ Max Carriers	700 MHz Narrowband Public Safety		800 MHz NPSPAC Public Safety	
	DL (dBm)	UL (dBm)	DL (dBm)	UL (dBm)
12.5 / 56	Max. 27	Max. 26	Max. 27	Max. 26

Capability 700MHz Narrowband Public Safety and 800MHz/NPSPAC Public Safety

Primary Unit (EUT) ☐ Production
☒ Pre-Production
☐ Engineering

Environment Fixed, Indoor

Manufacturer Declared Temperature Range -20°C to 50°C

Antenna Type External Antenna

Antenna Model A62-V44-200 (Donor)
F42-10A-100 (Server)

Antenna gain Refer to the Antenna information supplied by the manufacture

Maximum allowed Antenna System (Antenna + Cable) Gain

Radio	Uplink (Donor)	Downlink (Server)
700 MHz Narrowband Public Safety	12 dBi	1.1 dBi*
800 MHz NPSPAC Public Safety	12 dBi	1.1 dBi*

**This antenna has a max peak antenna gain of 2.5dBi, however when deployed with the EUT, a cable loss of 1.4dB is considered as declared by the manufacturer.*

1.3.3 Transmit Frequency Table

Mode	Channel Bandwidth	Tx Frequency (MHz)	Emission Designator	ERP	
				Max. Power Avg (dBm)	Max. Power Avg (W)
700 MHz Narrowband Public Safety Downlink	12.5 kHz	769 - 775	9K90F9W	36.99	5.0
	12.5 kHz	769 - 775	5K00F9W	36.99	5.0
	12.5 kHz	769 - 775	9K80F9W	36.99	5.0
700 MHz Narrowband Public Safety Uplink	12.5 kHz	799 - 805	9K90F9W	36.99	5.0
	12.5 kHz	799 - 805	4K99F9W	36.99	5.0
	12.5 kHz	799 - 805	8K15F9W	36.99	5.0
800 MHz NPSPAC Public Safety Downlink	12.5 kHz	851 - 861	9K96F9W	36.99	5.0
	12.5 kHz	851 - 861	4K90F9W	36.99	5.0
	12.5 kHz	851 - 861	9K75F9W	36.99	5.0
800 MHz NPSPAC Public Safety Uplink	12.5 kHz	806 - 816	9K94F9W	36.99	5.0
	12.5 kHz	806 - 816	4K99F9W	36.99	5.0
	12.5 kHz	806 - 816	8K15F9W	36.99	5.0

1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
A	Conducted test setup. Downlink. Naked RF Amplifier board (BDA) with conducted RF Ports. Input signal is applied to the antenna port of Donor (NU). Output is monitored from the antenna port of Server (CU).
B	Conducted test setup. Uplink. Naked RF Amplifier board (BDA) with conducted RF Ports. Input signal is applied to the antenna port of Server (CU). Output is monitored from the antenna port of Donor (NU).
C	Radiated test setup. Downlink. System with MBBU, Remote Annunciator and Emergency Switch. Input signal is applied to the antenna port of Donor (NU). The antenna port of Server (CU) is terminated with a 50Ω load.
D	Radiated test setup. Uplink. System with MBBU, Remote Annunciator and Emergency Switch. Input signal is applied to the antenna port of Server (CU). The antenna port of Donor (NU) is terminated with a 50Ω load.
E	Conducted test setup. Downlink. System with MBBU, Remote Annunciator and Emergency Switch. Input signal is applied to the antenna port of Donor (NU). Output is monitored from the antenna port of Server (CU).
F	Conducted test setup. Uplink. System with MBBU, Remote Annunciator and Emergency Switch. Input signal is applied to the antenna port of Server (CU). Output is monitored from the antenna port of Donor (NU).

1.4.2 EUT Exercise Software

Manufacturer provided Nextivity Chart Interface v1.0.0.69 running from a support laptop connected via USB.

1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
Lenovo	Support Laptop	M/N: 2912-3VU, S/N: R9-92MH0 10/11
Lenovo	Support Laptop AC Adapter	M/N: 42T4430 S/N: 11S42T4430Z1ZGWE27AA9X
Nextivity	Support USB cable x 1	Custom 1.0 meter shielded USB Type A to Micro B cable
HON-KWANG	AC/DC Power Supply	M/N: HK-BE-120A330-US Input: 100-240V 50/60Hz, Output: 12V DC 3.30A S/N: IB0000031
Mini Circuits	30dB SMA attenuator x 2	M/N: BW-S30W5+

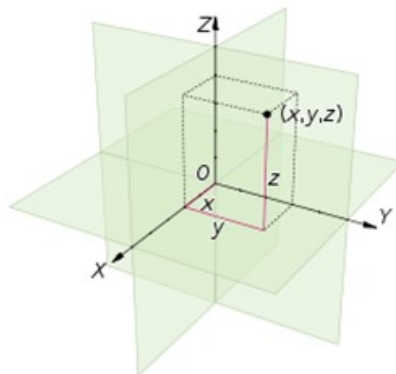
Mini Circuits	50 ohm SMA terminators x 2	M/N: ANNE-50L
Agilent	ESG Vector Signal Generator	M/N: E4438C, S/N MY49071335
MCL	DC Block	M/N: BLK-89-S+, 50 OHM, S/N: 15542
Nextivity	Monitor & Battery Unit	Model: GST160A48, IP: 100-240VAC, 50/60Hz, OP: 48VDC, 3.34A S/N: EB8BE99865, ECO65E6134
Nextivity	Emergency Switch	-
Nextivity	Remote Annunciator	M/N: F42-10R-100
Nextivity	Support Ethernet cable x 1	Custom 2.0 meter unshielded CAT 5e Ethernet Cables

1.4.4 Worst Case Configuration

Worst-case configuration used in this test report per Transmitter Conducted Output Power (Section 2.1 of this test report). This is for single channel verification. Otherwise, all three channels (Low, Middle and High) are verified: All test case not related to gain settings were performed with worst case 100dB gain settings, otherwise normal settings are 100dB for 700MHz and 90dB for 800MHz.

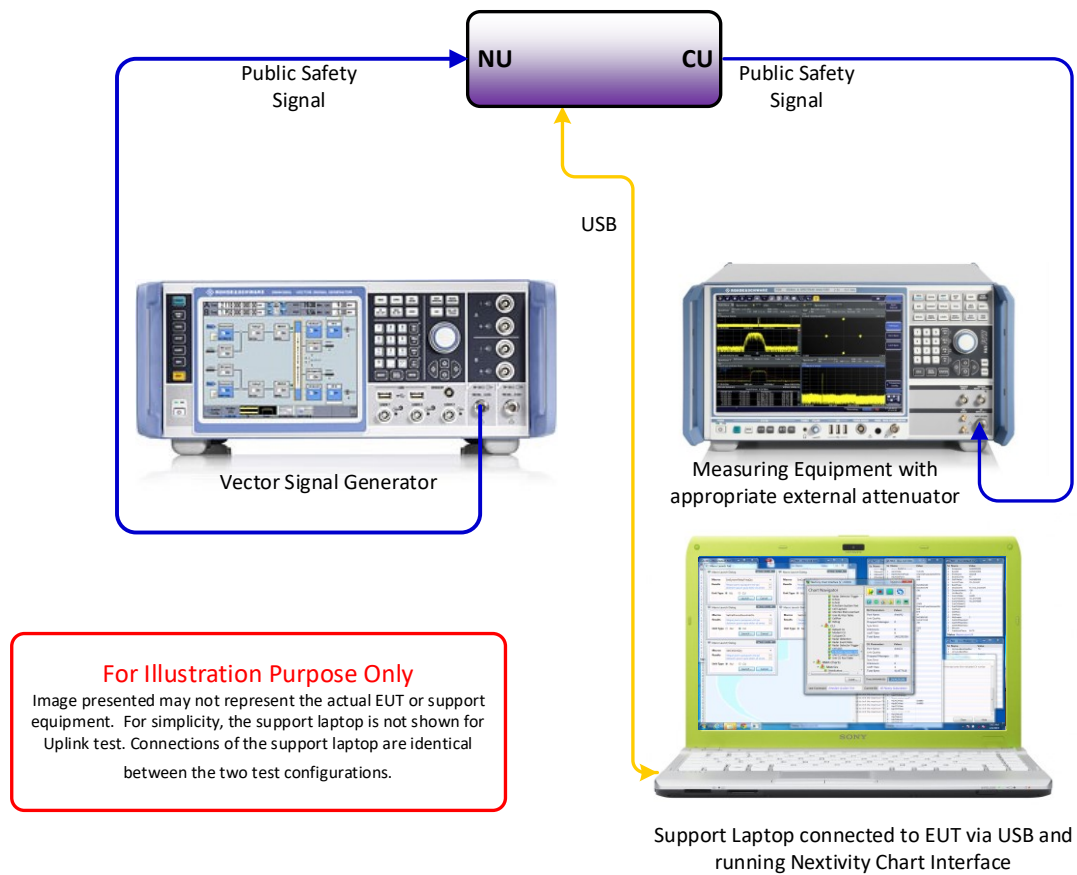
Mode	Bandwidth	Channel No.	Frequency
700 MHz Narrowband Public Safety Downlink	12.5 kHz	Low Channel CQPSK	769.00625 MHz
700 MHz Narrowband Public Safety Uplink	12.5 kHz	Middle Channel C4FM	801.875 MHz
800 MHz NPSPAC Public Safety Downlink	12.5 kHz	Middle Channel CQPSK	855.884375 MHz
800 MHz NPSPAC Public Safety Downlink	12.5 kHz	Middle Channel CQPSK	810.884375 MHz

Final installation position is unknown at the time of verification. For radiated measurements X and Z orientations were verified since the EUT won't work on Y orientation. No major variation in emissions observed between the three (3) orientations. Verifications performed using "Y" configuration.

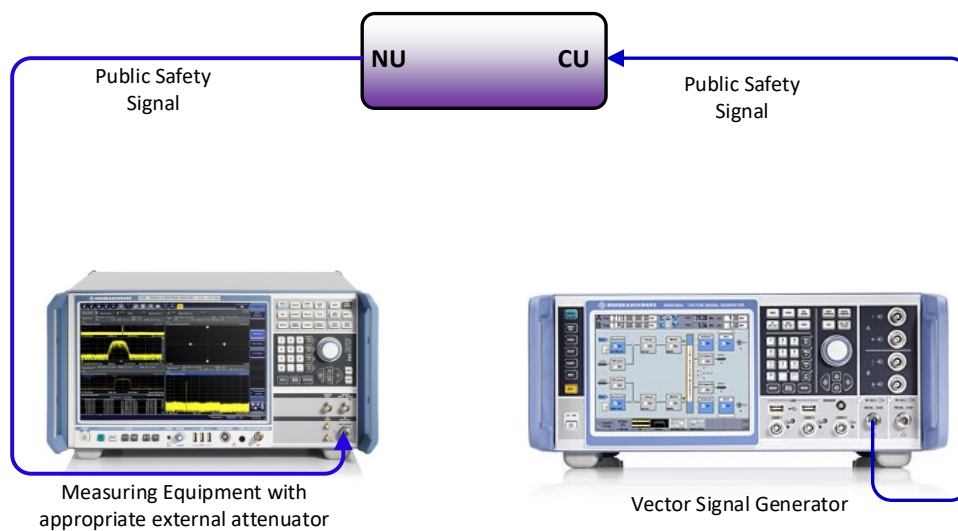


1.4.5 Simplified Test Configuration Diagram

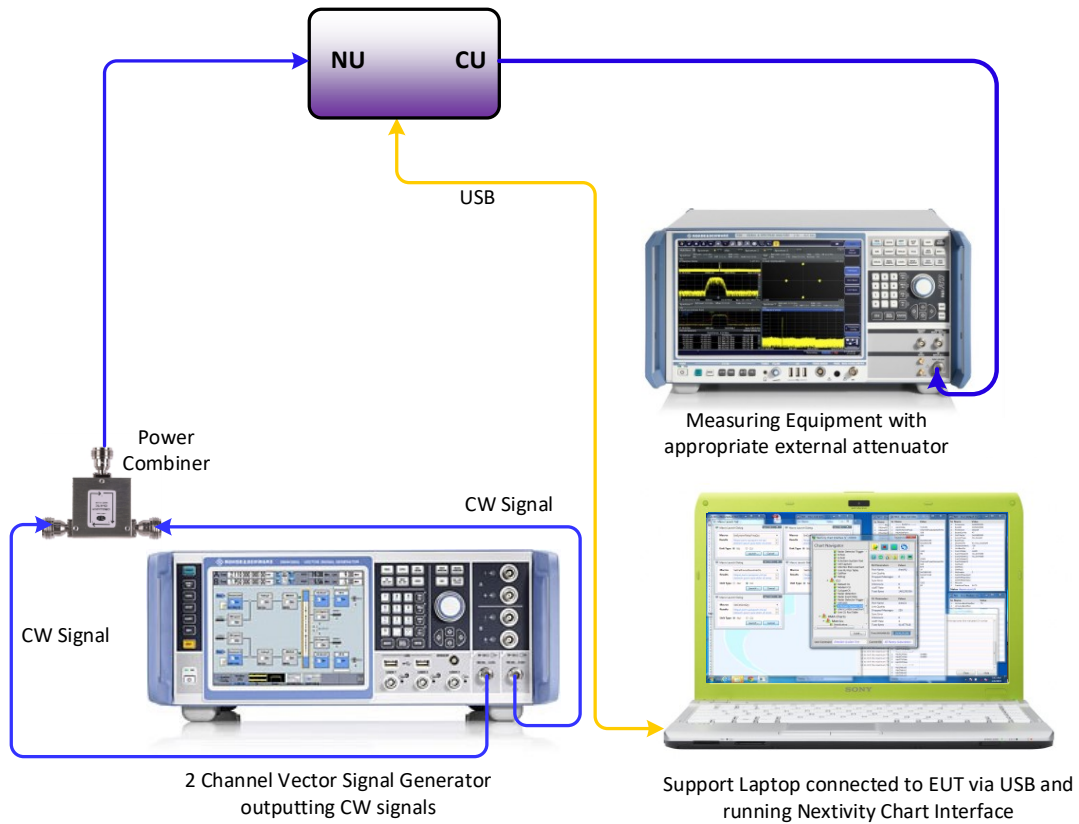
Downlink Conducted Test



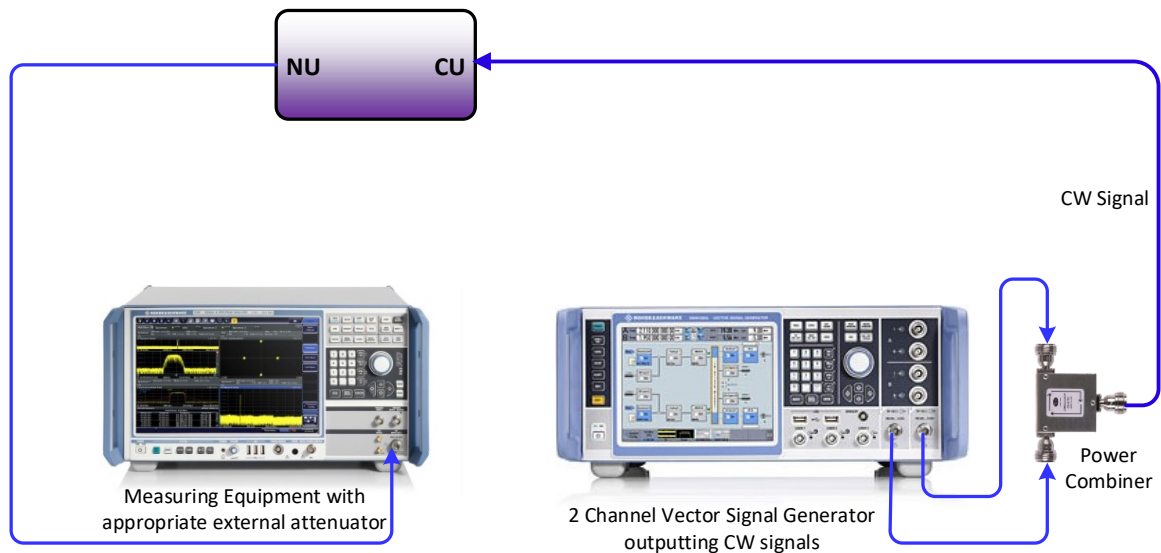
Uplink Conducted Test



Input Intermodulation Test (Downlink)



Input Intermodulation Test (Uplink)





1.5 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.6 MODIFICATION RECORD

Description of Modification	Modification Fitted By	Date Modification Fitted
Serial Number: 226141000048 and 226141000161		
None	-	-

The table above details modifications made to the EUT during the test program. The modifications incorporated during each test (if relevant) are recorded on the appropriate test pages.

1.7 TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.26 2015, American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

For AC conducted (if applicable) and radiated emissions the equipment under test (EUT) was configured to measure its highest possible emission level. This level was based on the maximized cable configuration from exploratory testing per ANSI C63.26-2015. The test modes were adapted according to the Operating Instructions provided by the manufacturer/client.

1.8 TEST FACILITY LOCATION

1.8.1 TÜV SÜD America Inc. (Mira Mesa)

10040 Mesa Rim Road, San Diego, CA 92121-2912 (32.901268,-117.177681). Phone: (858) 678 1400 Fax: (858) 546 0364.

1.8.2 TÜV SÜD America Inc. (Rancho Bernardo)

16936 Via Del Campo, San Diego, CA 92127-1708 (33.018644,-117.092409). Phone: (858) 678 1400 Fax: (858) 546 0364.

1.9 TEST FACILITY REGISTRATION

1.9.1 FCC – Designation No.: US1146

TÜV SÜD America Inc. (San Diego), is an accredited test facility with the site description report on file and has met all the requirements specified in §2.948 of the FCC rules. The acceptance letter from the FCC is maintained in our files and the Designation is US1146.



1.9.2 Innovation, Science and Economic Development Canada (IC) Registration No.: 3067A-1 & 22806-1

The 10m Semi-anechoic chamber of TÜV SÜD America Inc. (San Diego Rancho Bernardo) has been registered by Certification and Engineering Bureau of Innovation, Science and Economic Development Canada for radio equipment testing with Registration No. 3067A-1.

The 3m Semi-anechoic chamber of TÜV SÜD America Inc. (San Diego Mira Mesa) has been registered by Certification and Engineering Bureau of Innovation, Science and Economic Development Canada for radio equipment testing with Registration No. 22806-1.

1.9.3 BSMI – Laboratory Code: SL2-IN-E-028R (US0102)

TÜV Product Service Inc. (San Diego) is a recognized EMC testing laboratory by the BSMI under the MRA (Mutual Recognition Arrangement) with the United States. Accreditation includes CNS 13438 up to 6GHz.

1.9.4 NCC (National Communications Commission - US0102)

TÜV SÜD America Inc. (San Diego) is listed as a Foreign Recognized Telecommunication Equipment Testing Laboratory and is accredited to ISO/IEC 17025 (A2LA Certificate No.2955.13) which under APEC TEL MRA Phase 1 was designated as a Conformity Assessment Body competent to perform testing of equipment subject to the Technical Regulations covered under its scope of accreditation including RTTE01, PLMN01 and PLMN08 for TTE type of testing and LP002 for Low-Power RF Device type of testing.

1.9.5 VCCI – Registration No. A-0280 and A-0281

TÜV SÜD America Inc. (San Diego) is a VCCI registered measurement facility which includes radiated field strength measurement, radiated field strength measurement above 1GHz, mains port interference measurement and telecommunication port interference measurement.

1.9.6 RRA – Identification No. US0102

TÜV SÜD America Inc. (San Diego) is National Radio Research Agency (RRA) recognized laboratory under Phase I of the APEC Tel MRA.

1.9.7 OFCA – U.S. Identification No. US0102

TÜV SÜD America Inc. (San Diego) is recognized by Office of the Communications Authority (OFCA) under Appendix B, Phase I of the APEC Tel MRA.



SECTION 2

TEST DETAILS

Radio Test of the
Nextivity Inc.
SOLO RED Public Safety Communication Unit

2.1 TRANSMITTER CONDUCTED OUTPUT POWER

2.1.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1046

2.1.2 Standard Applicable

The conducted power measurements were made in accordance to FCC Part 2 Clause 2.1046:

(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in §2.1033(c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

(c) For measurements conducted pursuant to paragraphs (a) and (b) of this section, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output terminals shall be shown. Under the test conditions specified, no components of the emission spectrum shall exceed the limits specified in the applicable rule parts as necessary for meeting occupied bandwidth or emission limitations.

2.1.3 Equipment Under Test and Modification State

Serial No: 226141000048 / Test Configuration A and B

2.1.4 Date of Test/Initial of test personnel who performed the test

December 02, 2021 / XYZ

2.1.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	23.2 °C
Relative Humidity	43.2 %
ATM Pressure	99.5 kPa

2.1.7 Additional Observations

- This is a conducted test using power meter.
- The path loss was measured and entered as a level offset.
- Both Peak and Average measurements presented.
- 700MHz Narrowband Public Safety and 800 MHz NPSPAC Public Safety supports 12.5kHz bandwidth.
- Both one channel and maximum channels (56 channels) were verified, and one channel test results were presented as worst-case configuration.
- Low, Middle and High channels for supporting modulations were verified and reported.

2.1.8 Test Results

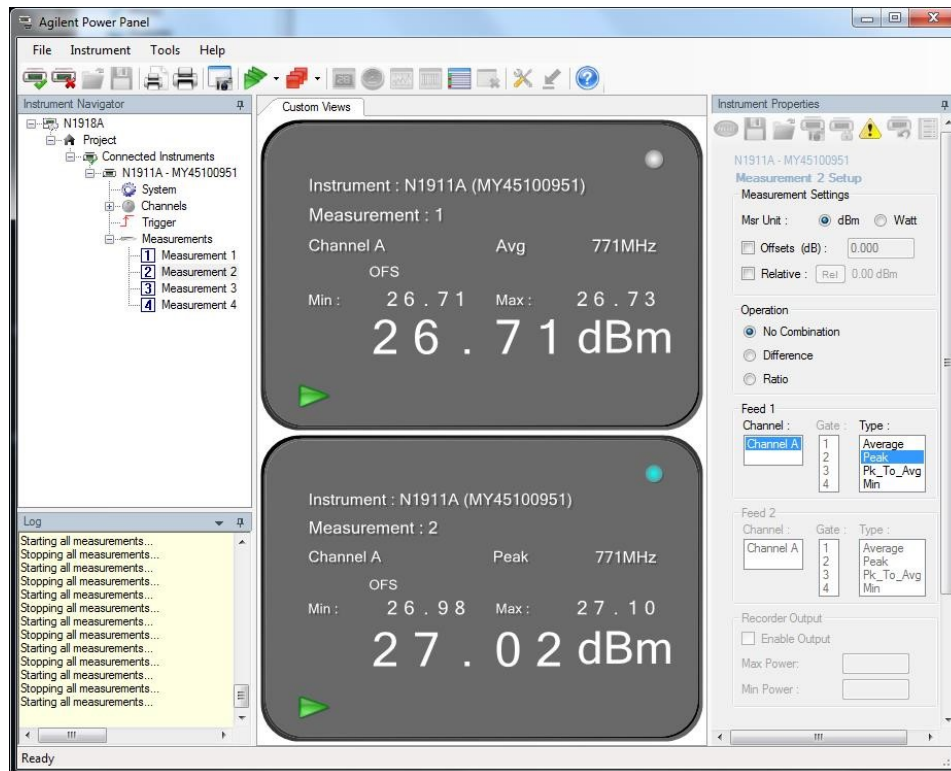
700MHz Narrowband Public Safety Downlink					
Modulation	Channels/ Bandwidth	Channels	Frequency (MHz)	Average Power (dBm)	Peak Power (dBm)
C4FM	1 Ch / 12.5 kHz	Low	769.00625	26.79	27.08
		Middle	771.875	26.73	27.10
		High	774.99375	26.16	26.50
CQPSK	1 Ch / 12.5 kHz	Low	769.00625	26.84	34.61
		Middle	771.875	26.84	32.92
		High	774.99375	26.10	32.44
H-DQPSK	1 Ch / 12.5 kHz	Low	769.00625	26.74	30.42
		Middle	771.875	26.80	29.87
		High	774.99375	26.13	30.31

700MHz Narrowband Public Safety Uplink					
Modulation	Channels/ Bandwidth	Channels	Frequency (MHz)	Average Power (dBm)	Peak Power (dBm)
C4FM	1 Ch / 12.5 kHz	Low	799.00625	24.85	25.38
		Middle	801.875	26.07	26.85
		High	804.99375	25.66	26.32
CQPSK	1 Ch / 12.5 kHz	Low	799.00625	24.88	30.84
		Middle	801.875	26.01	31.44
		High	804.99375	25.75	31.46
H-CPM	1 Ch / 12.5 kHz	Low	799.00625	25.24	25.65
		Middle	801.875	25.89	26.66
		High	804.99375	25.75	26.47

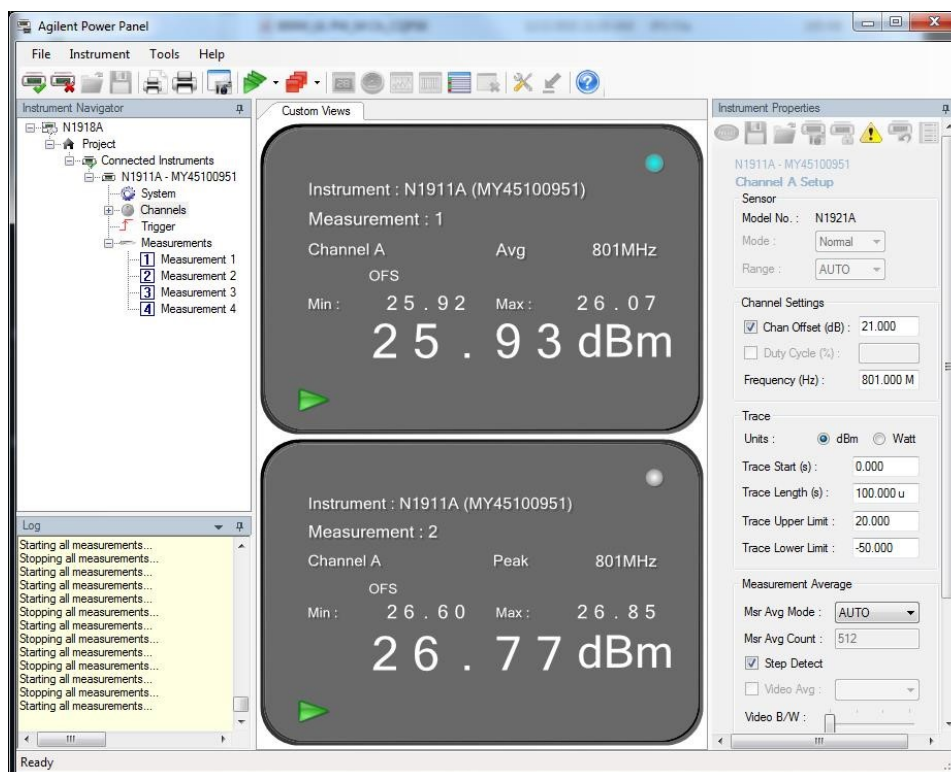
800 MHz NPSPAC Public Safety Downlink					
Modulation	Channels/ Bandwidth	Channels	Frequency (MHz)	Average Power (dBm)	Peak Power (dBm)
C4FM	1 Ch / 12.5 kHz	Low	851.025	26.13	26.55
		Middle	855.884375	26.91	27.24
		High	860.99375	26.95	27.34
CQPSK	1 Ch / 12.5 kHz	Low	851.025	26.12	32.54
		Middle	855.884375	27.02	33.0
		High	860.99375	26.93	32.42
H-DQPSK	1 Ch / 12.5 kHz	Low	851.025	26.15	30.39
		Middle	855.884375	26.99	31.05
		High	860.99375	26.90	31.04

800 MHz NPSPAC Public Safety Uplink					
Modulation	Channels/ Bandwidth	Channels	Frequency (MHz)	Average Power (dBm)	Peak Power (dBm)
C4FM	1 Ch / 12.5 kHz	Low	806.025	26.01	26.49
		Middle	810.884375	26.09	26.44
		High	815.99375	24.59	25.20
CQPSK	1 Ch / 12.5 kHz	Low	806.025	26.11	31.71
		Middle	810.884375	26.28	32.04
		High	815.99375	24.62	30.66
H-CPM	1 Ch / 12.5 kHz	Low	806.025	25.95	26.41
		Middle	810.884375	26.02	26.37
		High	815.99375	24.51	25.04

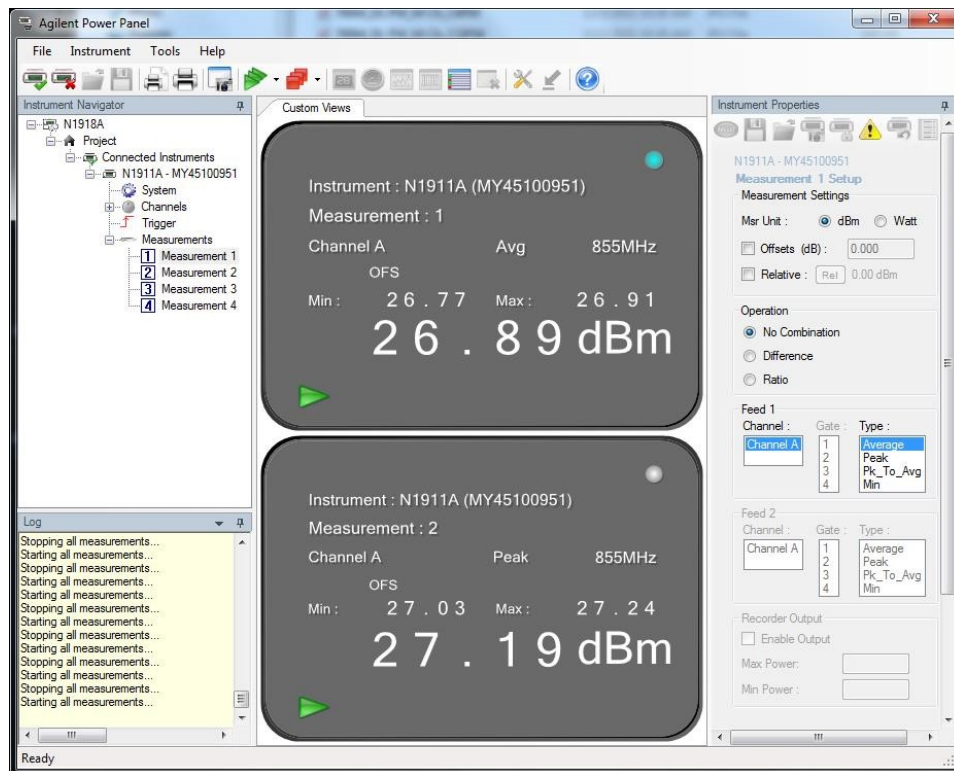
2.1.9 Sample Test Plot



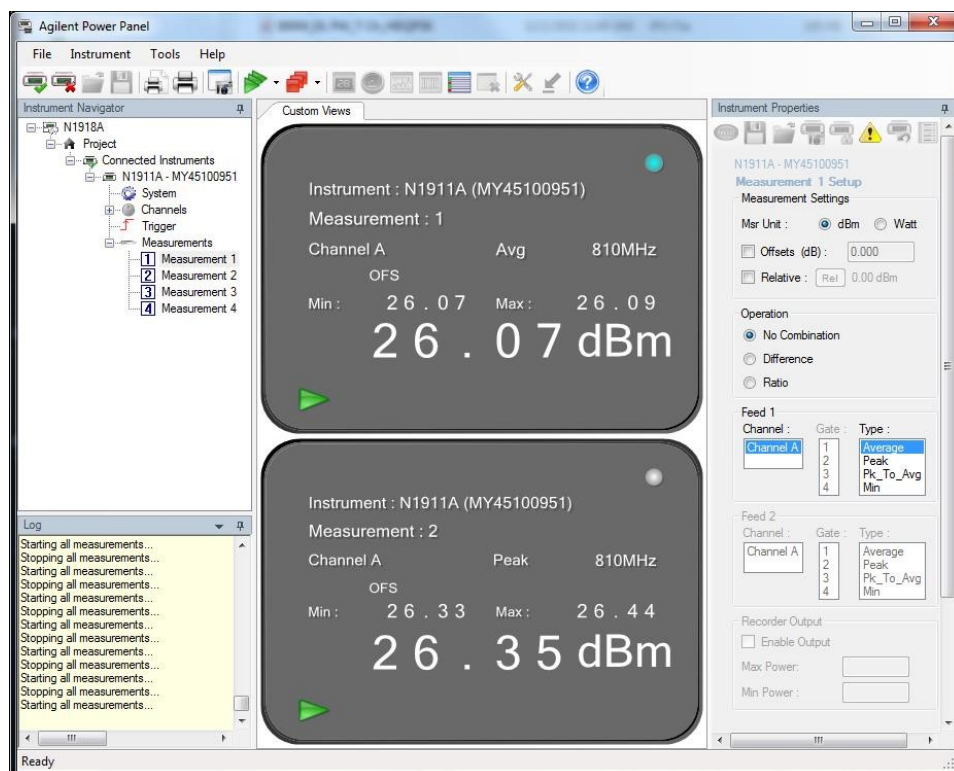
700MHz Narrowband Public Safety DL C4FM 12.5 kHz Bandwidth Middle Channel



700MHz Narrowband Public Safety UL C4FM 12.5 kHz Bandwidth Middle Channel



800 MHz NPSPAC Public Safety DL CQPSK 12.5 kHz Bandwidth Middle Channel



800 MHz NPSPAC Public Safety UL CQPSK 12.5 kHz Bandwidth Middle Channel

2.2 EFFECTIVE RADIATED POWER

2.2.1 Specification Reference

FCC 47 CFR Part 90, Clause 90.219(e)(1),
 FCC 47 CFR Part 90, Clause 90.541(a),
 FCC 47 CFR Part 90, Clause 90.635(a)
 RSS-119 Issue 12, Clause 5.1

2.2.2 Standard Applicable

FCC 47 CFR Part 90, Clause 90.219(e):

- 1) The output power capability of a signal booster must be designed for deployments providing a radiated power not exceeding 5 Watts ERP for each retransmitted channel.

FCC 47 CFR Part 90, Clause 90.541:

The transmitting power and antenna height of base, mobile, portable and control stations operating in the 769–775 MHz and 799–805 MHz frequency bands must not exceed the maximum limits in this section. Power limits are listed in effective radiated power (ERP).

- (a) The transmitting power and antenna height of base stations must not exceed the limits given in paragraph (a) of § 90.635.

FCC 47 CFR Part 90, Clause 90.635(a):

- (a) The effective radiated power and antenna height for base stations may not exceed 1 kilowatt (30 dBw) and 304 m. (1,000 ft.) above average terrain (AAT), respectively, or the equivalent thereof as determined from the Table.

TABLE—EQUIVALENT POWER AND ANTENNA HEIGHTS FOR BASE STATIONS IN THE 851–869 MHz AND 935–940 MHz BANDS WHICH HAVE A REQUIREMENT FOR A 32 KM (20 MI) SERVICE AREA RADIUS

Antenna height (ATT) meters (feet)	Effective radiated power (watts) ^{1 2 4}
Above 1,372 (4,500)	65
Above 1,220 (4,000) to 1,372 (4,500)	70
Above 1,067 (3,500) to 1,220 (4,000)	75
Above 915 (3,000) to 1,067 (3,500)	100
Above 763 (2,500) to 915 (3,000)	140
Above 610 (2,000) to 763 (2,500)	200
Above 458 (1,500) to 610 (2,000)	350
Above 305 (1,000) to 458 (1,500)	600
Up to 305 (1,000)	³ 1,000

¹ Power is given in terms of effective radiated power (ERP).

² Applicants in the Los Angeles, CA, area who demonstrate a need to serve both the downtown and fringe areas will be permitted to utilize an ERP of 1 kw at the following mountaintop sites: Santiago Park, Sierra Peak, Mount Lukens, and Mount Wilson.

³ Stations with antennas below 305 m (1,000 ft) (AAT) will be restricted to a maximum power of 1 kw (ERP).

⁴ Licensees in San Diego, CA, will be permitted to utilize an ERP of 500 watts at the following mountaintop sites: Palomar, Otay, Woodson and Miguel.

RSS-119 Clause 5.4 Transmitter Output Power:

The output power shall be within ± 1 dB of the manufacturer's rated power listed in the equipment specifications.

The transmitter output power limits set forth in Table 2 will come into force upon the publication of Issue 12 of this standard and will apply to newly certified equipment.

Table 2 – Transmitter Output Power

Frequency Bands (MHz)	Transmitter Output Power (W)	
	Base/Fixed Equipment	Mobile Equipment
27.41-28 and 29.7-50	300	30
72-76	No limit	1
138-174	110	60
217-218 and 219-220	110	30*
220-222	See SRSP-512 for ERP limit	50
406.1-430 and 450-470	110	60
768-776 and 798-806	See SRSP-511 for ERP limit	30 3 W ERP for portable equipment
806-821/851-866 and 821-824/866-869	110	30
896-901/935-940	110	60
929-930/931-932	110	30
928-929/952-953 and 932-932.5/941-941.5	110	30
932.5-935/941.5-944	110	30

*Equipment is generally authorized for effective radiated power (ERP) of less than 5 W.

2.2.3 Equipment Under Test and Modification State

Serial No: 226141000048 (Calculation only)

2.2.4 Date of Test/Initial of test personnel who performed the test

December 02, 2021 / XYZ

2.2.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature 23.2 °C
Relative Humidity 43.2 %
ATM Pressure 99.5 kPa

2.2.7 Additional Observations

- ERP and EIRP were calculated as per Section 1.2 and 1.3 of KDB412172 D01 (Determining ERP and EIRP v01).
- Calculation formula in logarithmic terms:

$$\text{ERP or EIRP} = P_T + G_T - L_C$$

Where:

P_T = transmitter output power, expressed in dBm (Section 2.1 of this test report)

G_T = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

$G_T(\text{dBd}) = G_T(\text{dBi}) - 2.15 \text{ dB}$

L_C = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

2.2.8 Sample Computation

$$\begin{aligned} \text{ERP} &= P_T + G_T - L_C - 2.15\text{dB} \\ &= 29.87 \text{ (Peak)} + 0.13 \text{ (max. gain)} - 3.84 \text{ (cable loss)} - 2.15 \\ &= 24.01 \text{ dBm} \end{aligned}$$

2.2.9 Test Results

700MHz Narrowband Public Safety Downlink (12.5 kHz Bandwidth)					
Modulation	Frequency (MHz)	Max Power Average (dBm)	Maximum Allowed Antenna System Gain (dBi)	ERP (dBm)	Limit (dBm)
C4FM	769.00625	26.79	12.35	36.99	36.99
	771.875	26.73	12.41	36.99	36.99
	774.99375	26.16	12.98	36.99	36.99
CQPSK	769.00625	26.84	12.3	36.99	36.99
	771.875	26.84	12.3	36.99	36.99
	774.99375	26.10	13.04	36.99	36.99
H-CPM	769.00625	26.74	12.4	36.99	36.99
	771.875	26.80	12.34	36.99	36.99
	774.99375	26.13	13.01	36.99	36.99

700MHz Narrowband Public Safety Uplink (12.5 kHz Bandwidth)					
Modulation	Frequency (MHz)	Max Power Average (dBm)	Maximum Allowed Antenna System Gain (dBi)	ERP (dBm)	Limit (dBm)
C4FM	799.00625	24.85	14.29	36.99	36.99
	801.875	26.07	13.07	36.99	36.99
	804.99375	25.66	13.48	36.99	36.99
CQPSK	799.00625	24.88	14.26	36.99	36.99
	801.875	26.01	13.13	36.99	36.99
	804.99375	25.75	13.39	36.99	36.99
H-DQPSK	799.00625	25.24	13.9	36.99	36.99
	801.875	25.89	13.25	36.99	36.99
	804.99375	25.75	13.39	36.99	36.99

800 MHz NPSPAC Public Safety Downlink (12.5 kHz Bandwidth)					
Modulation	Frequency (MHz)	Max Power Average (dBm)	Maximum Allowed Antenna System Gain (dBi)	ERP (dBm)	Limit (dBm)
C4FM	851.025	26.13	13.01	36.99	36.99
	855.884375	26.91	12.23	36.99	36.99
	860.99375	26.95	12.19	36.99	36.99
CQPSK	851.025	26.12	13.02	36.99	36.99
	855.884375	27.02	12.12	36.99	36.99
	860.99375	26.93	12.21	36.99	36.99
H-CPM	851.025	26.15	12.99	36.99	36.99
	855.884375	26.99	12.15	36.99	36.99
	860.99375	26.90	12.24	36.99	36.99

800 MHz NPSPAC Public Safety Uplink (12.5 kHz Bandwidth)					
Modulation	Frequency (MHz)	Max Power Average (dBm)	Maximum Allowed Antenna System Gain (dBi)	ERP (dBm)	Limit (dBm)
C4FM	806.025	26.01	13.13	36.99	36.99
	810.884375	26.09	13.05	36.99	36.99
	815.99375	24.59	14.55	36.99	36.99
CQPSK	806.025	26.11	13.03	36.99	36.99
	810.884375	26.28	12.86	36.99	36.99
	815.99375	24.62	14.52	36.99	36.99
H-DQPSK	806.025	25.95	13.19	36.99	36.99
	810.884375	26.02	13.12	36.99	36.99
	815.99375	24.51	14.63	36.99	36.99

2.3 OCCUPIED BANDWIDTH

2.3.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1049
FCC 47 CFR Part 90, Clause 90.219(e)(4)(ii)
RSS-119 Issue 12, Clause 5.5
RSS-GEN Issue 5, Clause 6.7

2.3.2 Standard Applicable

The transmitted signal bandwidth shall be reported as the 99% emission bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

Using the occupied bandwidth measurement function in the spectrum analyzer, the 99% occupied bandwidth was measured.

2.3.3 Equipment Under Test and Modification State

Serial No: 226141000048 / Test Configuration A and B

2.3.4 Date of Test/Initial of test personnel who performed the test

December 01, 2021 / XYZ

2.3.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.8 °C
Relative Humidity	33.9 %
ATM Pressure	99.0 kPa

2.3.7 Additional Observations

- This is a conducted test.
- Using the occupied bandwidth measurement function in the spectrum analyzer, the 99% occupied bandwidth was measured.
- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
- The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
- The RBW is set to 1% of the OBW while the VBW is $\geq 3 \times$ RBW.
- The detector is peak and the trace mode is max hold.
- All low, middle and high channels were verified. Only test plots for middle channel presented in this test report as the representative configuration.

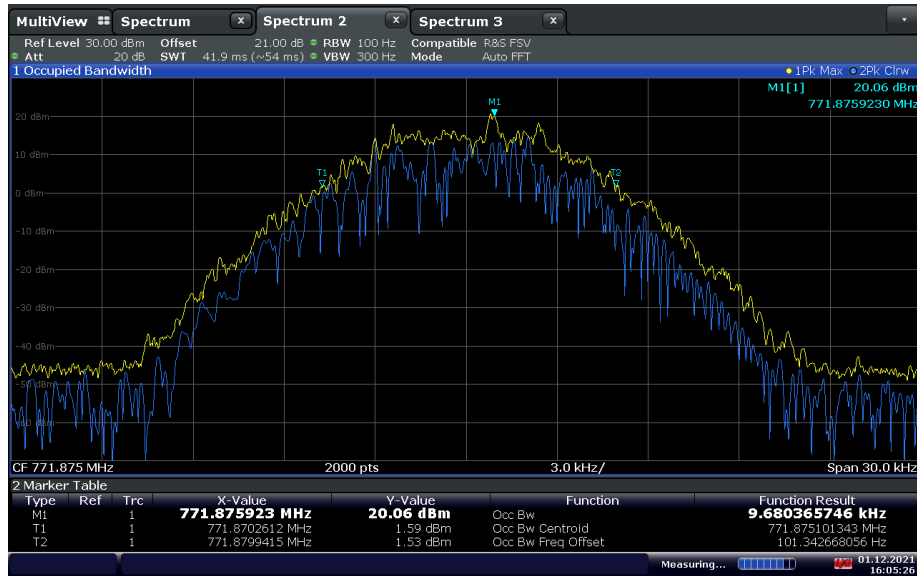
2.3.8 Test Results and Sample Test Plot

700MHz Narrowband Public Safety Downlink					
Bandwidth (kHz)	Modulation	Channel	Frequency (MHz)	OBW (kHz)	26dB BW (kHz)
12.5	C4FM	Low	769.00625	9.90	12.15
		Middle	771.875	9.68	12.15
		High	774.99375	9.80	12.18
	CQPSK	Low	769.00625	5.0	5.42
		Middle	771.875	4.89	5.46
		High	774.99375	4.89	5.43
	H-DQPSK	Low	769.00625	9.78	11.74
		Middle	771.875	9.80	11.98
		High	774.99375	9.80	11.69

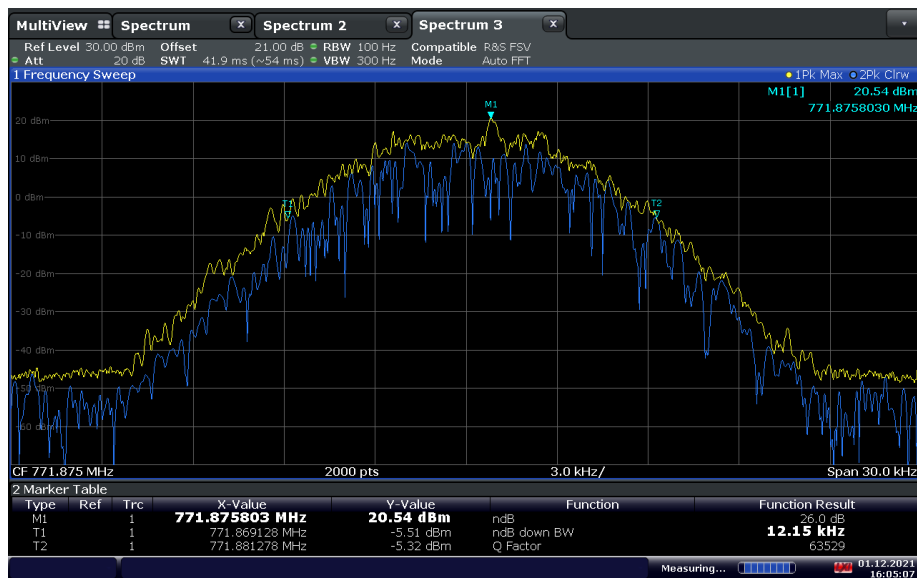
700MHz Narrowband Public Safety Uplink					
Bandwidth (kHz)	Modulation	Channel	Frequency (MHz)	OBW (kHz)	26dB BW (kHz)
12.5	C4FM	Low	799.00625	9.78	11.84
		Middle	801.875	9.86	11.82
		High	804.99375	9.90	12.45
	CQPSK	Low	799.00625	4.96	5.47
		Middle	801.875	4.99	5.47
		High	804.99375	4.91	5.45
	H-CPM	Low	799.00625	8.05	10.77
		Middle	801.875	8.15	10.77
		High	804.99375	8.13	10.52

800 MHz NPSPAC Public Safety Downlink					
Bandwidth (kHz)	Modulation	Channel	Frequency (MHz)	OBW (kHz)	26dB BW (kHz)
12.5	C4FM	Low	851.025	9.87	12.16
		Middle	855.884375	9.82	11.71
		High	860.99375	9.96	12.12
	CQPSK	Low	851.025	4.89	5.43
		Middle	855.884375	4.89	5.42
		High	860.99375	4.90	5.45
	H-DQPSK	Low	851.025	9.74	11.96
		Middle	855.884375	9.70	11.73
		High	860.99375	9.75	11.98

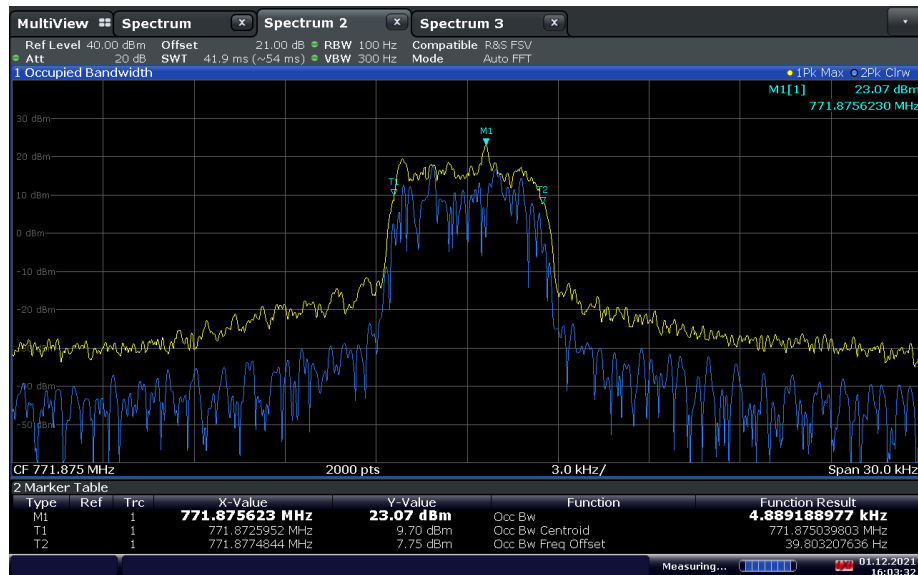
800 MHz NPSPAC Public Safety Uplink					
Bandwidth (kHz)	Modulation	Channel	Frequency (MHz)	OBW (kHz)	26dB BW (kHz)
12.5	C4FM	Low	806.025	9.84	11.80
		Middle	810.884375	9.91	12.12
		High	815.99375	9.94	11.84
	CQPSK	Low	806.025	4.95	5.49
		Middle	810.884375	4.99	5.47
		High	815.99375	4.93	5.47
	H-CPM	Low	806.025	8.15	10.54
		Middle	810.884375	8.09	10.37
		High	815.99375	8.12	10.65

700MHz Narrowband Public Downlink (CF4M 12.5 kHz BW) / Middle Channel 771.875 MHz / 99%OBW

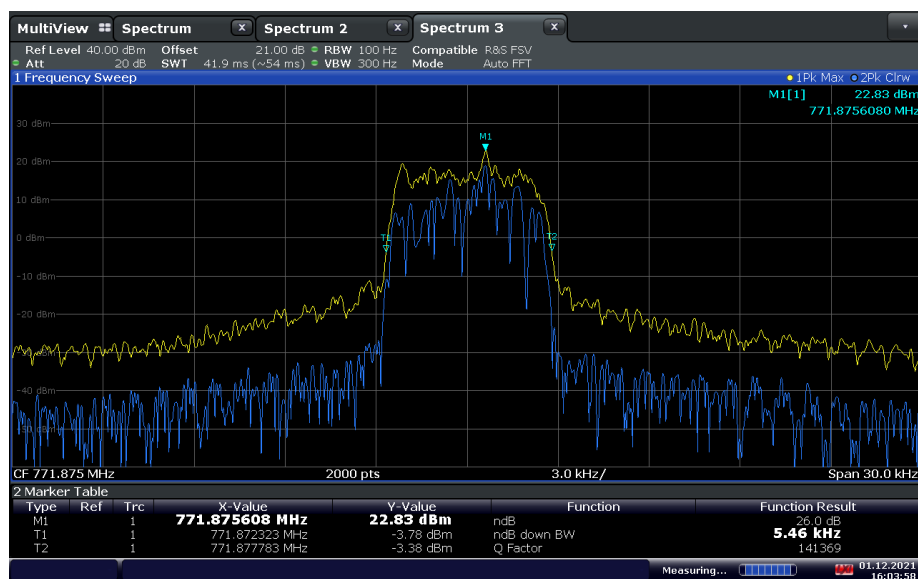
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700MHz Narrowband Public Downlink (CF4M 12.5 kHz BW) / Middle Channel 771.875 MHz / 26dB BW

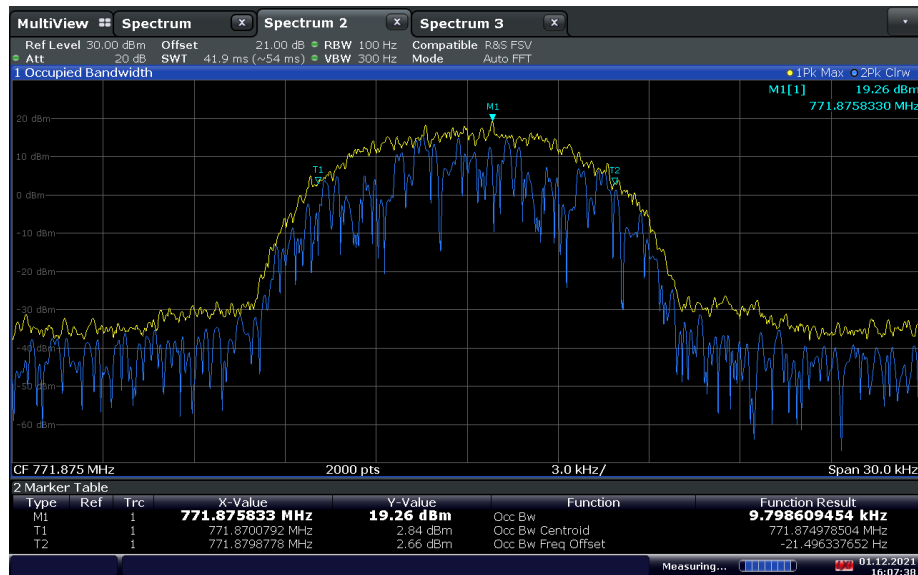
16:05:08 01.12.2021

700MHz Narrowband Public Downlink (CQPSK 12.5 kHz BW) / Middle Channel 771.875 MHz / 99%OBW

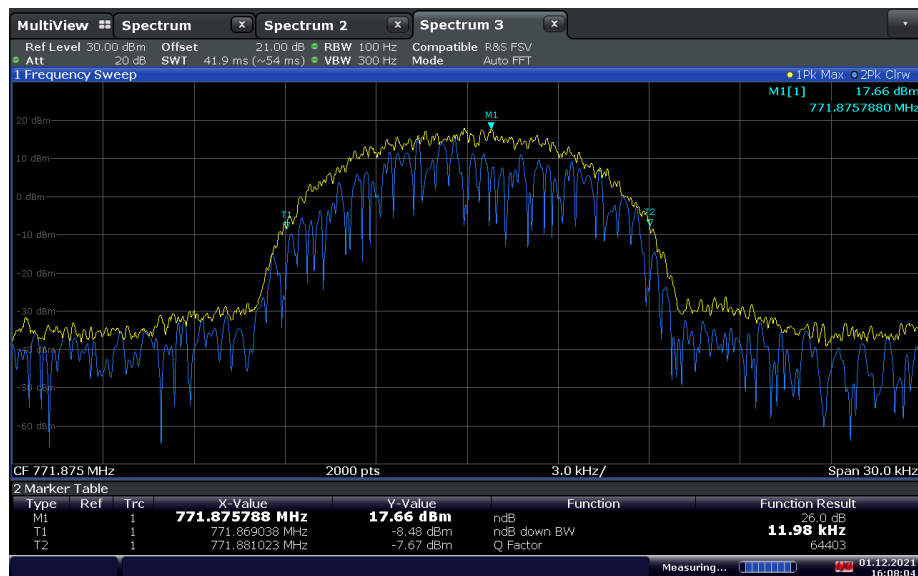
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700MHz Narrowband Public Downlink (CQPSK 12.5 kHz BW) / Middle Channel 771.875 MHz / 26dB BW

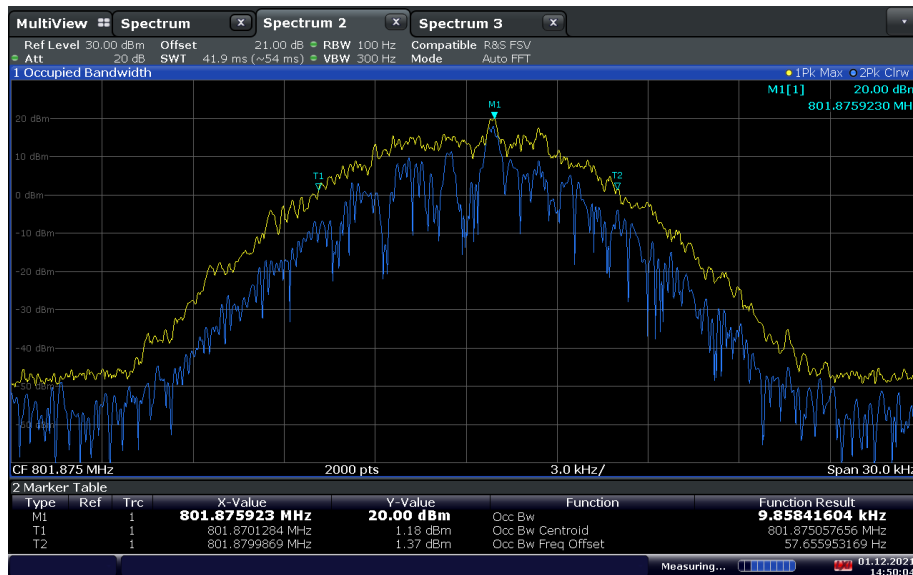
16:03:59 01.12.2021

700MHz Narrowband Public Downlink (H-DQPSK 12.5 kHz BW) / Middle Channel 771.875 MHz / 99%OBW

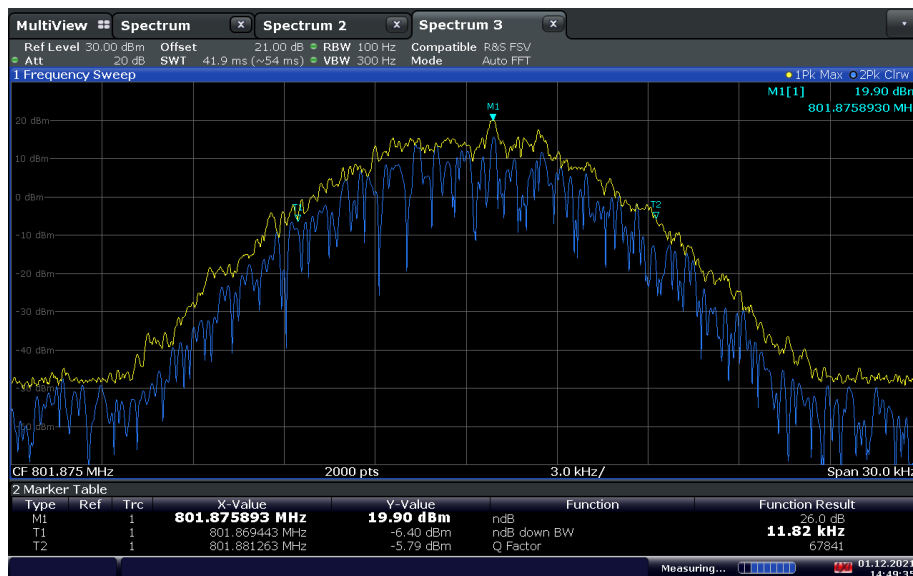
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700MHz Narrowband Public Downlink (H-DQPSK 12.5 kHz BW) / Middle Channel 771.875 MHz / 26dB BW

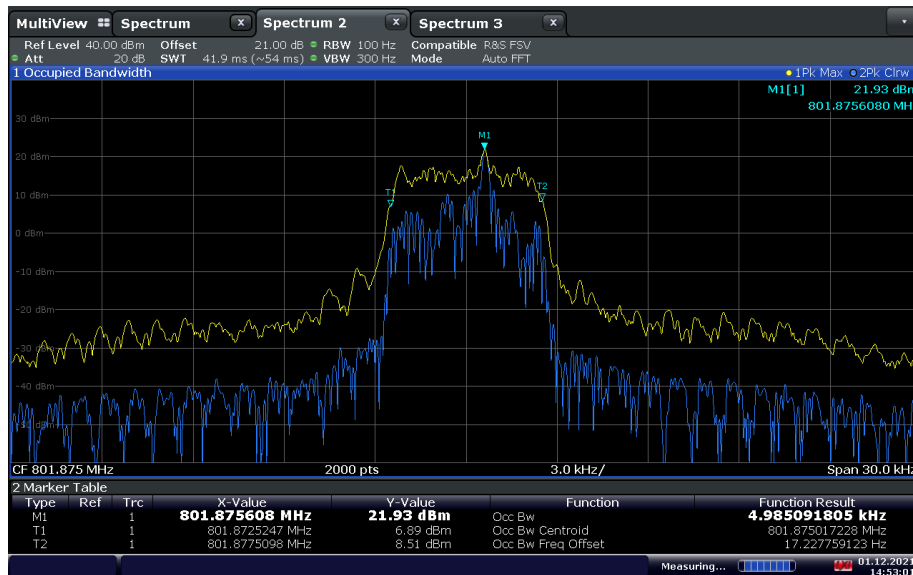
16:08:04 01.12.2021

700MHz Narrowband Public Uplink (CF4M 12.5 kHz BW) / Middle Channel 801.875 MHz / 99%OBW

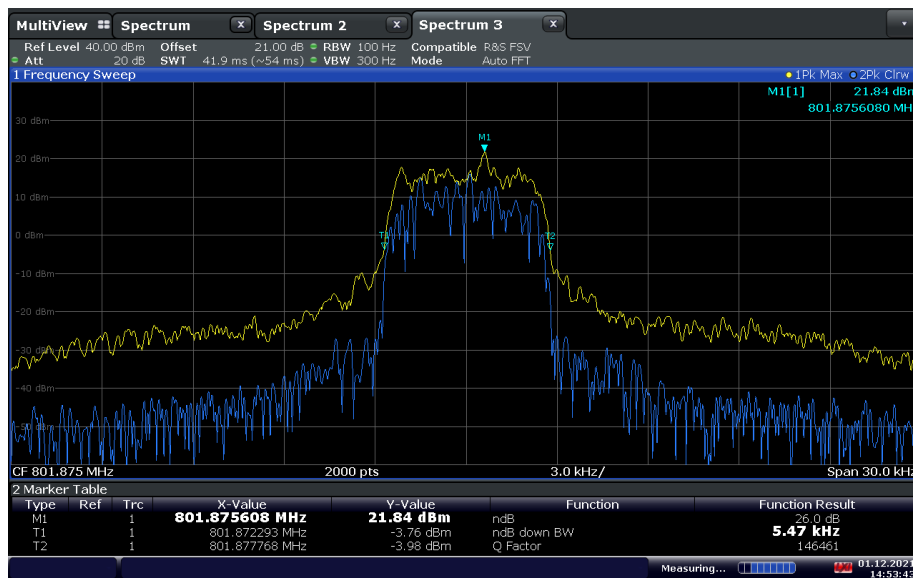
14:50:04 01.12.2021

700MHz Narrowband Public Uplink (CF4M 12.5 kHz BW) / Middle Channel 801.875 MHz / 26dB BW

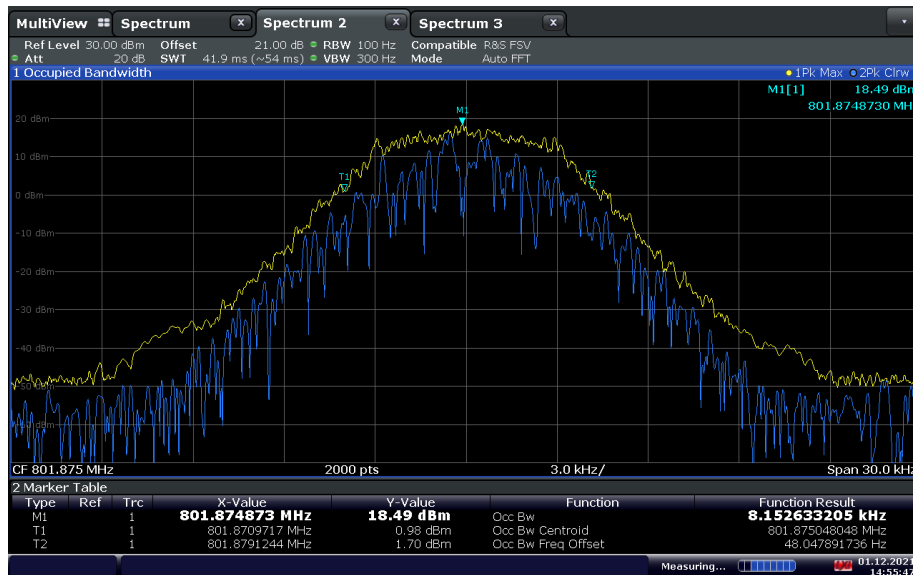
14:49:35 01.12.2021

700MHz Narrowband Public Uplink (CQPSK 12.5 kHz BW) / Middle Channel 801.875 MHz / 99%OBW

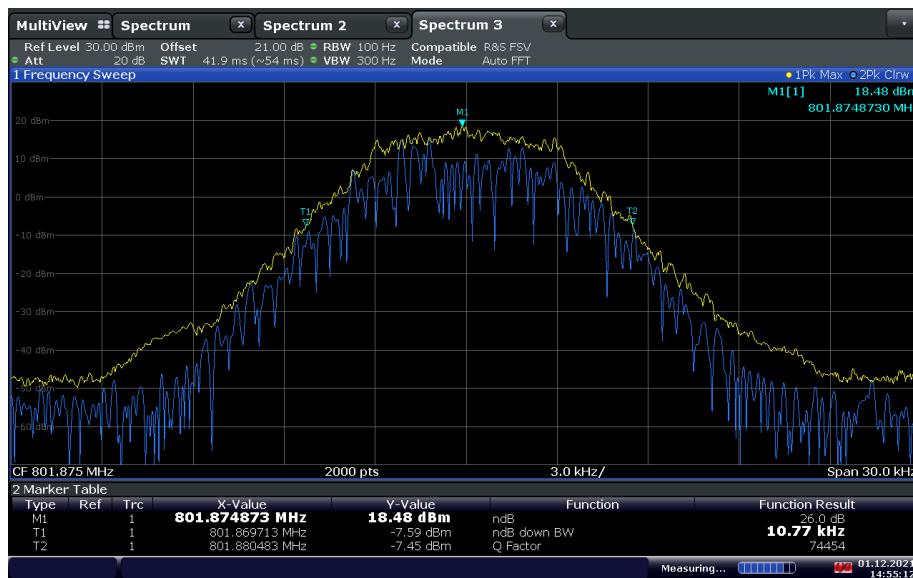
14:53:02 01.12.2021

700MHz Narrowband Public Uplink (CQPSK 12.5 kHz BW) / Middle Channel 801.875 MHz 26dB BW

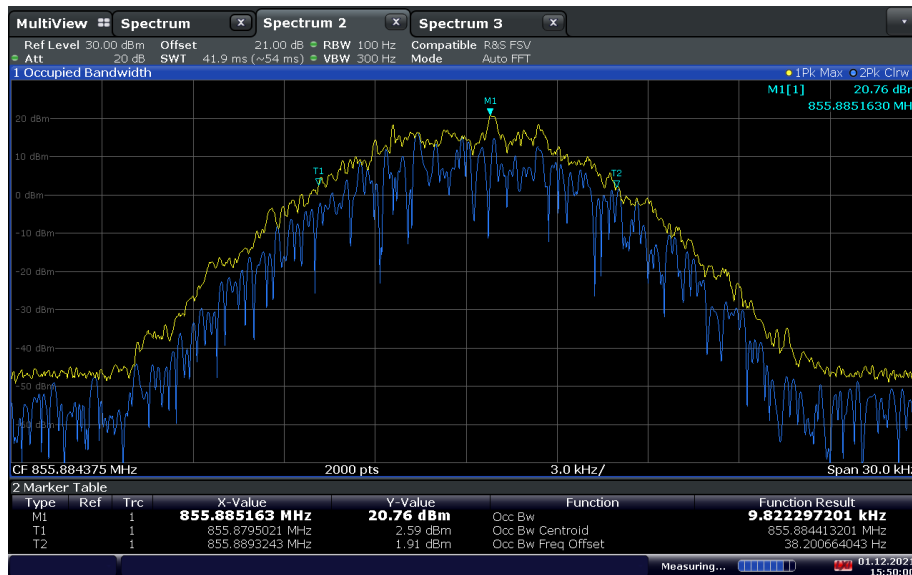
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700MHz Narrowband Public Uplink (H-CPM 12.5 kHz BW) / Middle Channel 801.875 MHz / 99%OBW

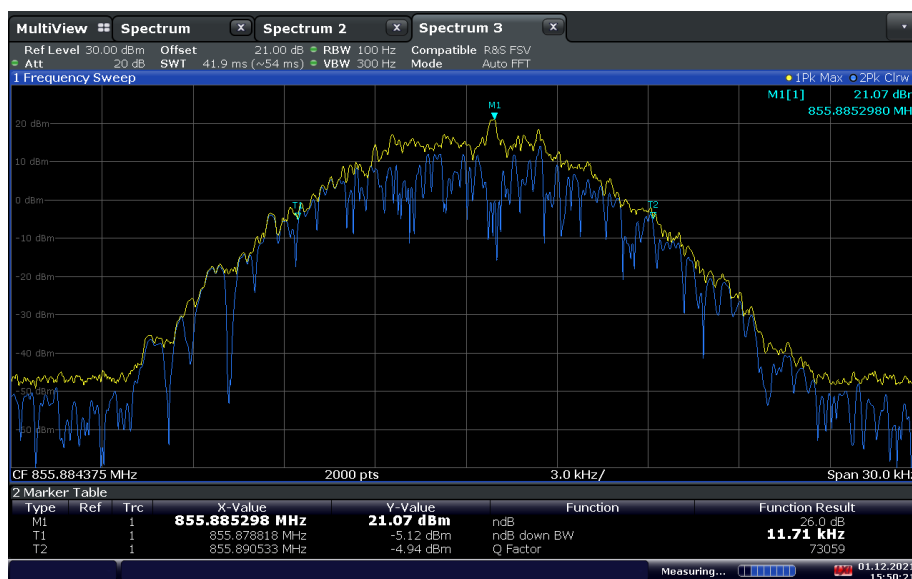
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700MHz Narrowband Public Uplink (H-CPM 12.5 kHz BW) / Middle Channel 801.875 MHz 26dB BW

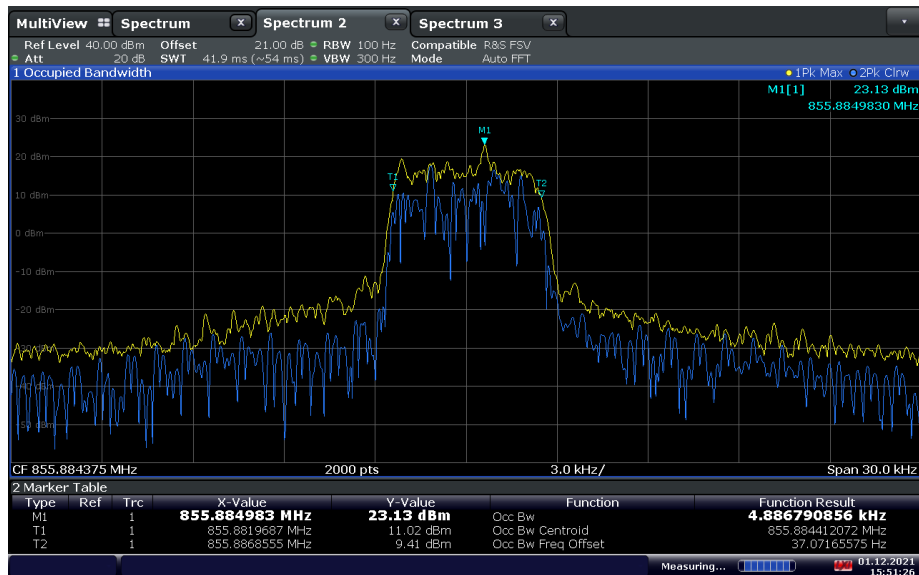
14:55:13 01.12.2021

800 MHz NPSPAC Public Safety Downlink (C4FM 12.5 kHz BW) / Middle Channel 855.884375 MHz / 99%OBW

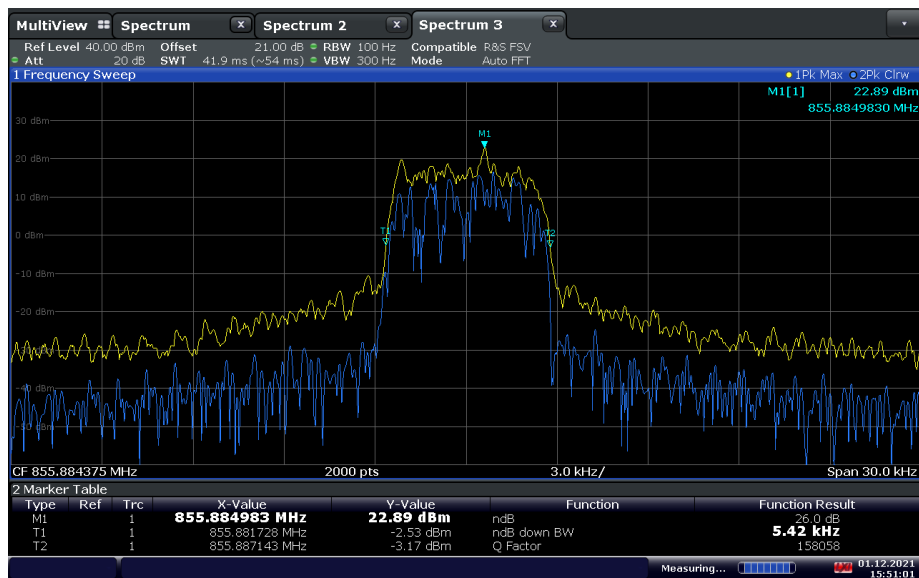
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800 MHz NPSPAC Public Safety Downlink (C4FM 12.5 kHz BW) / Middle Channel 855.884375 MHz / 26dB BW

15:50:22 01.12.2021

800 MHz NPSPAC Public Safety Downlink (CQPSK 12.5 kHz BW) / Middle Channel 855.884375 MHz / 99%OBW

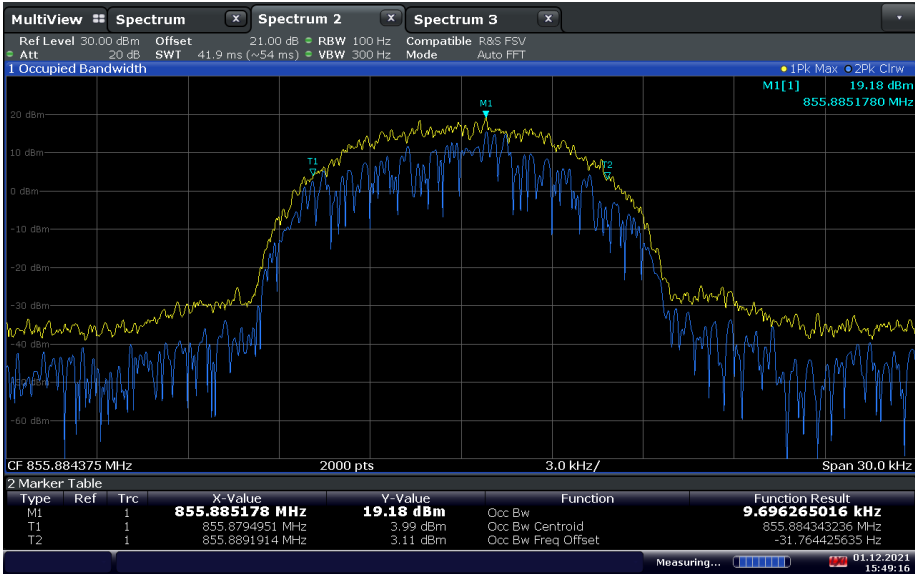
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800 MHz NPSPAC Public Safety Downlink (CQPSK 12.5 kHz BW) / Middle Channel 855.884375 MHz / 26dB BW

15:51:02 01.12.2021

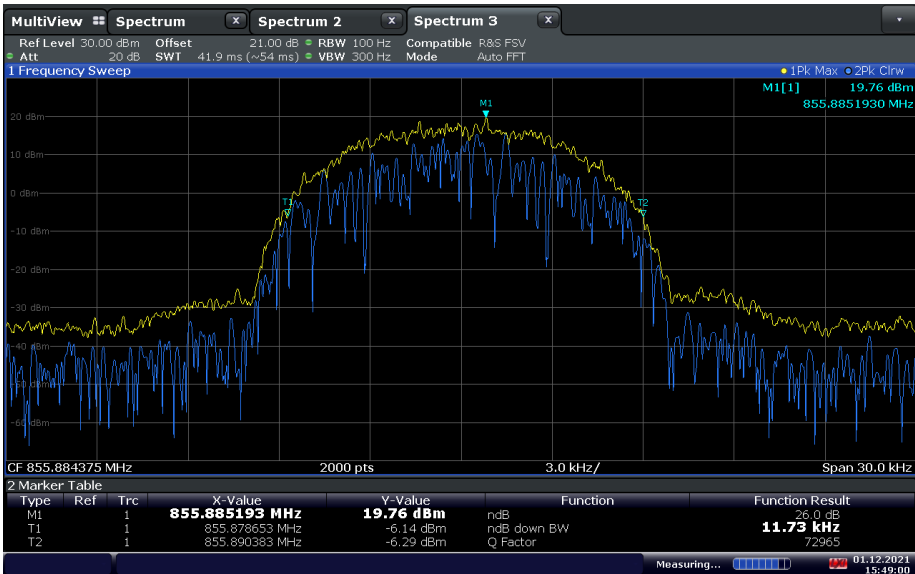


800 MHz NPSPAC Public Safety Downlink (H-DQPSK 12.5 kHz BW) / Middle Channel 855.884375 MHz / 99%OBW

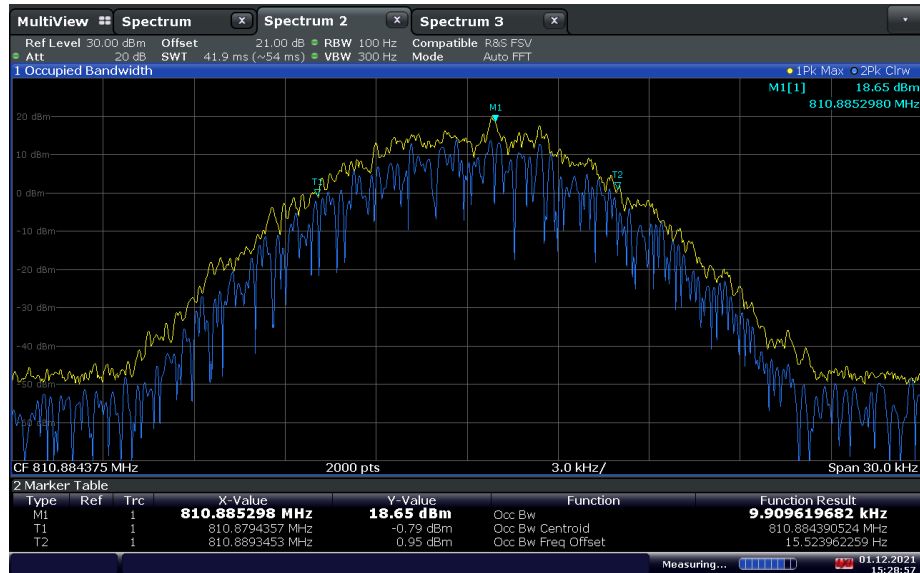


15:49:17 01.12.2021

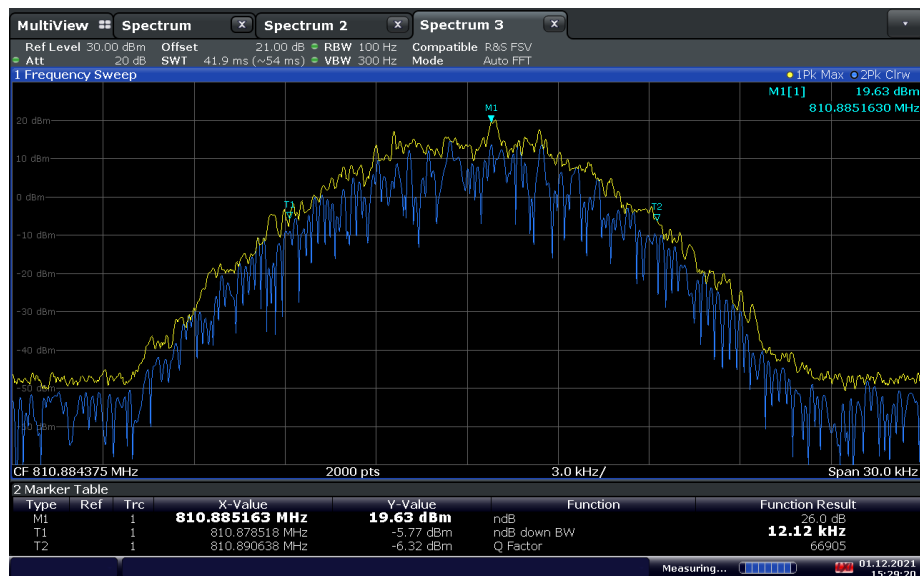
800 MHz NPSPAC Public Safety Downlink (H-DQPSK 12.5 kHz BW) / Middle Channel 855.884375 MHz / 26dB BW



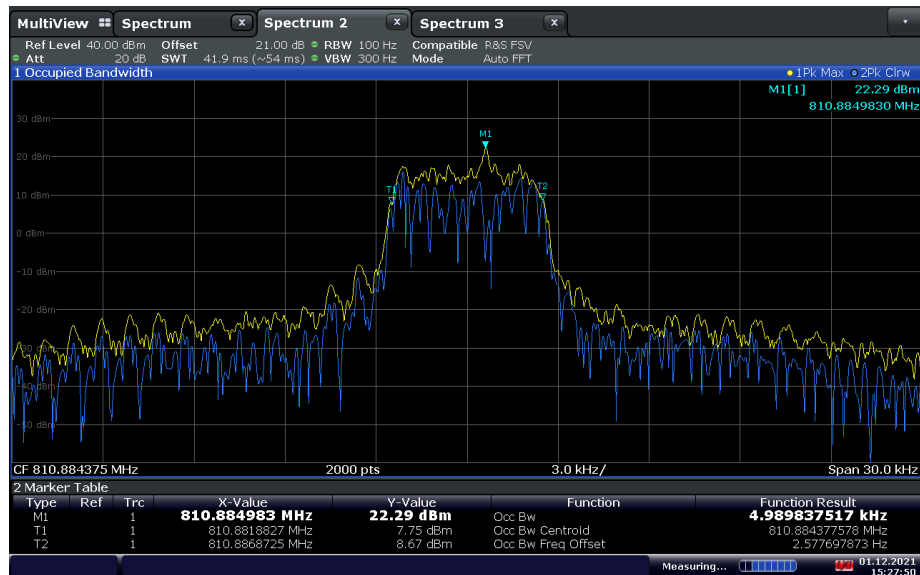
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800 MHz NPSPAC Public Safety Uplink (C4FM 12.5 kHz BW) / Middle Channel 810.884375 MHz / 99%OBW

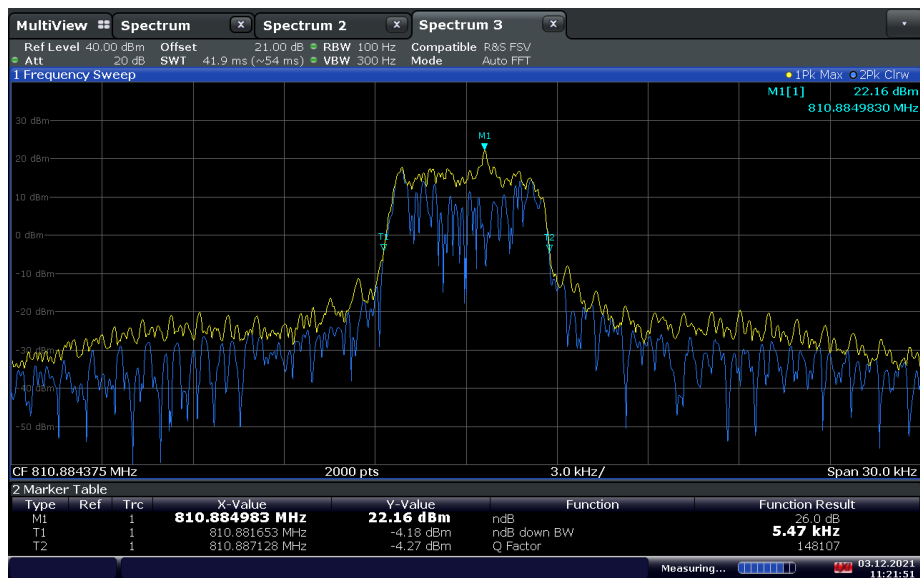
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800 MHz NPSPAC Public Safety Uplink (C4FM 12.5 kHz BW) / Middle Channel 810.884375 MHz / 26dB BW

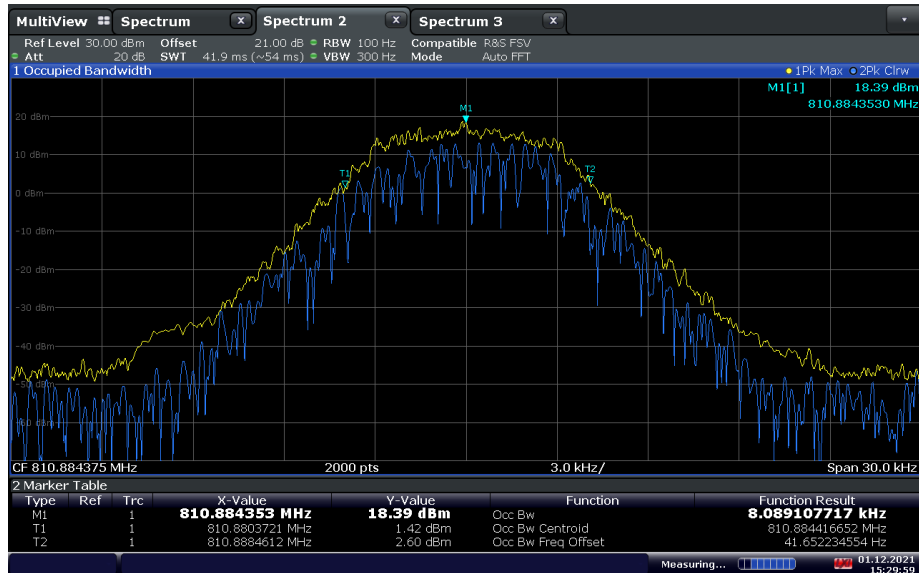
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800 MHz NPSPAC Public Safety Uplink (CQPSK 12.5 kHz BW) / Middle Channel 810.884375 MHz / 99%OBW

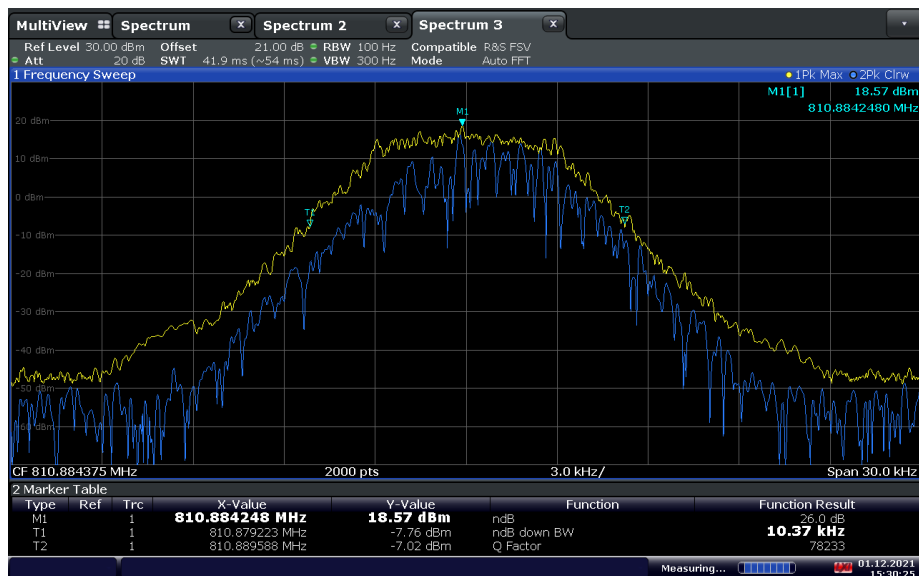
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800 MHz NPSPAC Public Safety Uplink (CQPSK 12.5 kHz BW) / Middle Channel 810.884375 MHz / 26dB BW

11:21:52 03.12.2021

800 MHz NPSPAC Public Safety Uplink (H-CPM 12.5 kHz BW) / Middle Channel 810.884375 MHz / 99%OBW

15:29:59 01.12.2021

800 MHz NPSPAC Public Safety Uplink (H-CPM 12.5 kHz BW) / Middle Channel 810.884375 MHz / 26dB BW

15:30:26 01.12.2021

2.4 CONDUCTED SPURIOUS EMISSIONS

2.4.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1051
FCC 47 CFR Part 90, Clause 90.219(e)(3)
FCC 47 CFR Part 90, Clause 90.543(c) (f)
RSS-119, Clause 5.8.9.2
KDB935210 D05, Clause 4.7.3

2.4.2 Standard Applicable

FCC 47 CFR Part 90, Clause 90.219(e):
(3) Spurious emissions from a signal booter must not exceed -13 dBm within any 100 kHz measurement bandwidth.

FCC 47 CFR Part 90, Clause 90.543:

(c) *Out-of-band emission limit.* On any frequency outside of the frequency ranges covered by the ACP tables in this section, the power of any emission must be reduced below the mean output power (P) by at least $43 + 10 \log_{10}(p)$ dB measured in a 100 kHz bandwidth for frequencies less than 1 GHz, and in a 1 MHz bandwidth for frequencies greater than 1 GHz.

(f) For operations in the 758–775 MHz and 788–805 MHz bands, all emissions including harmonics in the band 1559–1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

RSS-119, Clause 5.8.9.2:

On any frequency outside of the ranges specified in the ACP tables 13 to 16, the power of any emission shall be attenuated below the mean output power P (dBW) by at least $43 + 10 \log_{10}(p)$, measured in a 100 kHz bandwidth for frequencies less than or equal to 1 GHz, and in a 1 MHz bandwidth for frequencies greater than 1 GHz.

In addition, for operations in the bands 768-776 MHz and 798-806 MHz, all emissions (including harmonics in the band 1559-1610 MHz), shall not exceed:

- -70 dBW/MHz equivalent isotropically radiated power (e.i.r.p.) for wideband emissions, and
- -80 dBW/kHz e.i.r.p. for discrete emissions of less than 700 Hz bandwidth.

2.4.3 Equipment Under Test and Modification State

Serial No: 226141000048 / Test Configuration A and B

2.4.4 Date of Test/Initial of test personnel who performed the test

December 07, 2021 / XYZ

2.4.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.



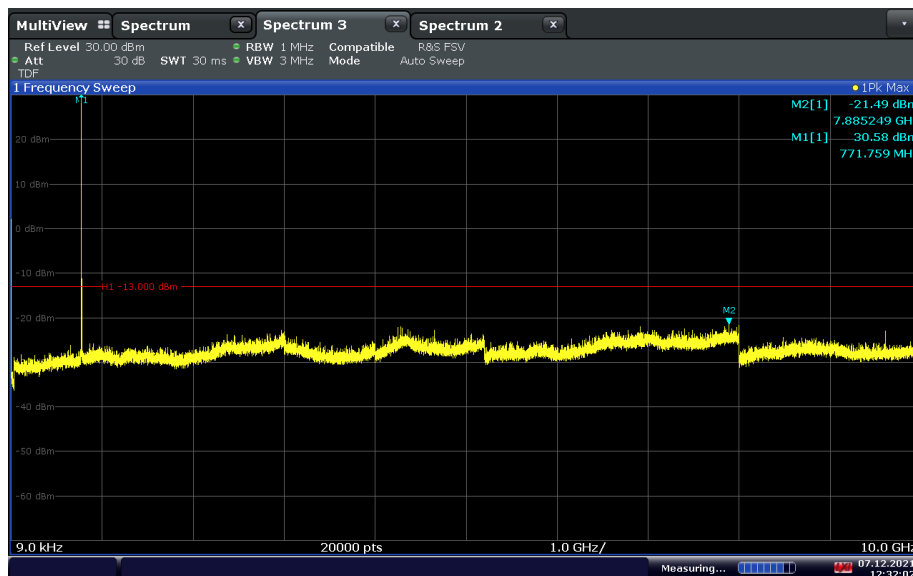
2.4.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

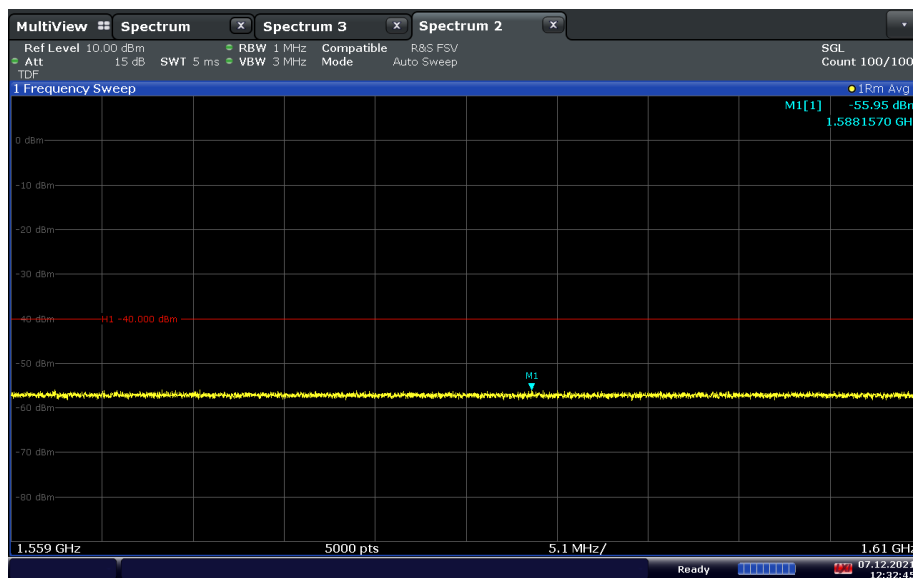
Ambient Temperature	23.2 °C
Relative Humidity	45.3 %
ATM Pressure	98.9 kPa

2.4.7 Additional Observations

- This is a conducted test. Test guidance is per Section 6.1 of KDB971168 (D01 Power Meas License Digital Systems v03r01).
- The transducer factor (TDF) used is from the external attenuators and cables used.
- RBW is set to 1MHz and RBW is set to 3 x RBW for both below and above 1GHz as worst case setting.
- Detector is peak and trace is set to max hold for spurious emissions from 9kHz to 10GHz.
- The spectrum was searched from 9 kHz to up to the 10th harmonic
- All low, middle and high channels for all supporting modulations were verified and only middle channel presented in this test report as representative configuration.

**700MHz Narrowband Public Safety Downlink CQPSK 12.5 kHz Bandwidth Middle Channel
Spurious Emissions**

12:32:03 07.12.2021

**700MHz Narrowband Public Safety Downlink CQPSK 12.5 kHz Middle Channel
Spurious Emissions 1559 – 1610 MHz (EIRP)**

12:32:45 07.12.2021

MultiView Spectrum 3 Spectrum 2

Ref Level 30.00 dBm
Att 30 dB
TDF

RBW 1 MHz
VBW 3 MHz

Compatible Mode
R&S FSV
Auto Sweep

1 Frequency Sweep

• 1PK Max

M2[1] -22.20 dBm
7.915249 GHz

M1[1] -29.51 dBm
771.759 MHz

M1 -13.000 dBm

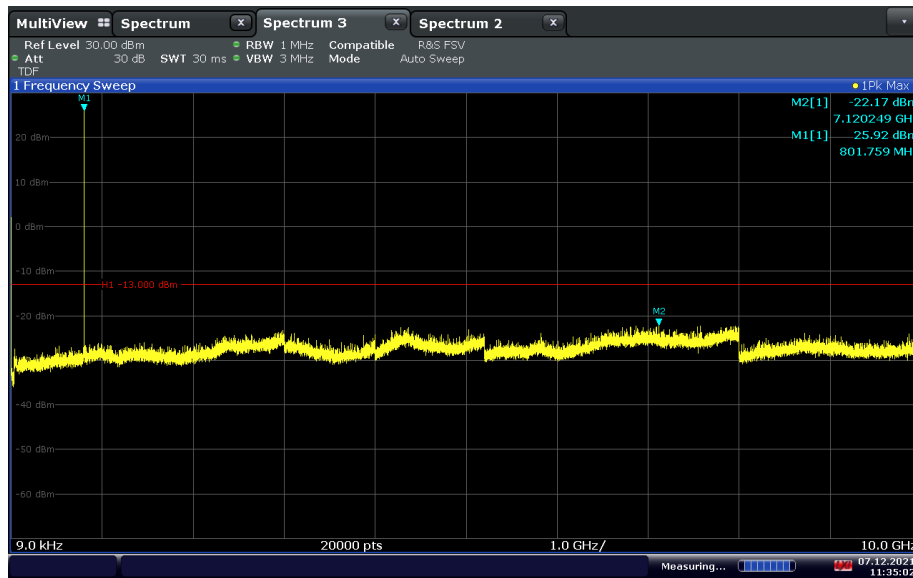
9.0 kHz 20000 pts 1.0 GHz/ 10.0 GHz

Measuring... 07.12.2021 12:30:26

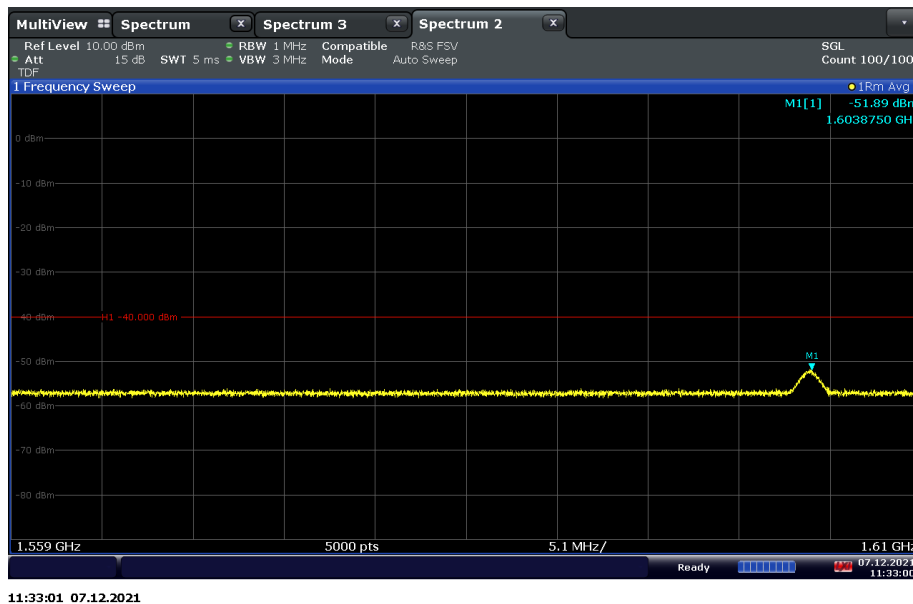
The screenshot displays a Spectrum Analyzer interface with the following details:

- Top Panel:**
 - Buttons: MultiView, Spectrum, Spectrum 3, Spectrum 2.
 - Parameters: Ref Level 10.00 dBm, Att 15 dB, SWT 5 ms, RBW 1 MHz, VBW 3 MHz, Compatible Mode, R&S FSV, Auto Sweep, SGL, Count 100/1000.
- Plot Area:**
 - Title: 1 Frequency Sweep.
 - Y-axis: Power in dBm, ranging from -80 to 0.
 - X-axis: Frequency in GHz, ranging from 1.559 to 1.61.
 - Trace: A yellow noise floor is visible around -56 dBm. A red horizontal line indicates a reference level at -40.000 dBm.
 - Measurements:
 - M1: -56.11 dBm (noise floor).
 - M1[1]: -56.11 dBm (noise floor).
 - M1: 1.5667470 GHz (frequency marker).
- Bottom Panel:**
 - Frequency: 1.559 GHz.
 - Resolution: 5000 pts.
 - Span: 5.1 MHz.
 - Status: Ready.
 - Timestamp: 07.12.2021 12:30:57.

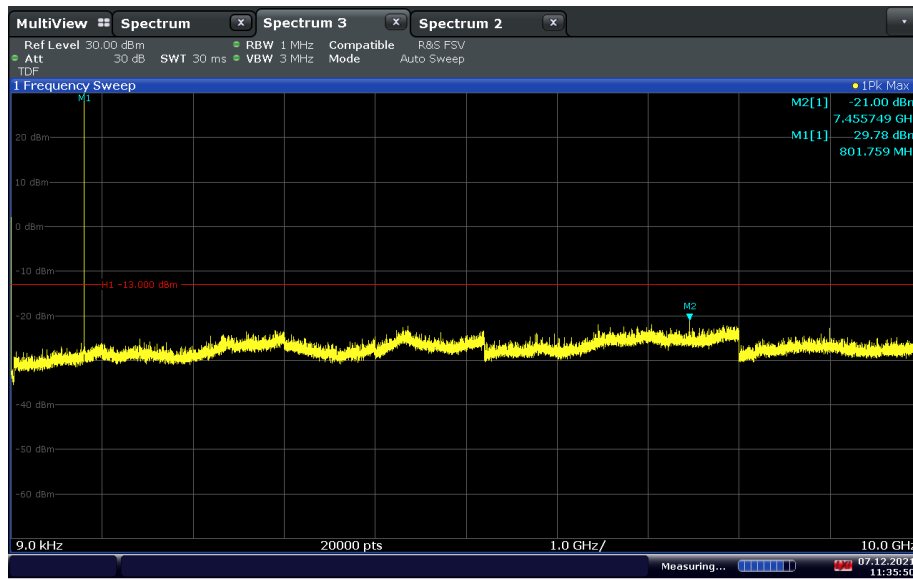
700MHz Narrowband Public Safety Uplink C4FM 12.5 kHz Middle Channel Spurious Emissions



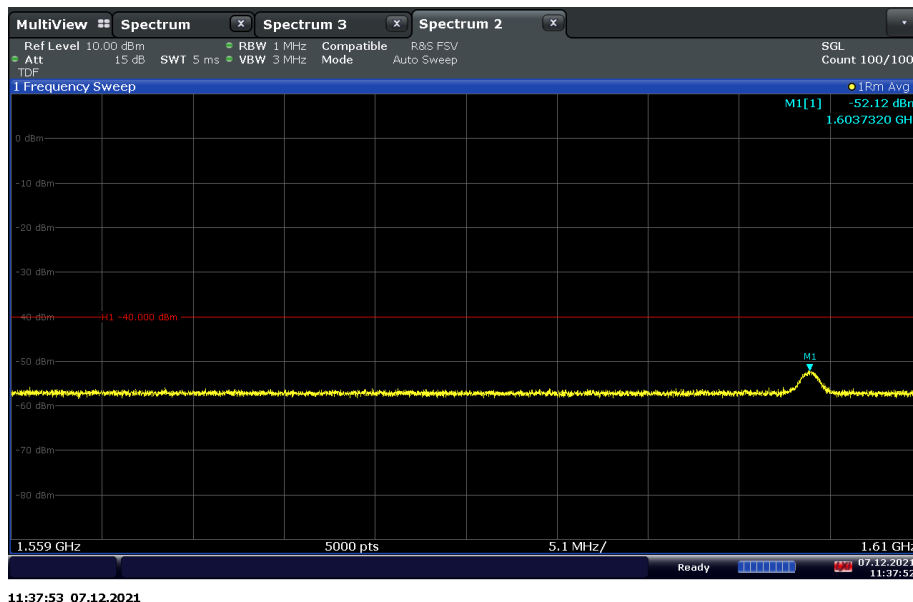
700MHz Narrowband Public Safety Uplink C4FM 12.5 kHz Middle Channel Spurious Emissions 1559 – 1610 MHz (EIRP)



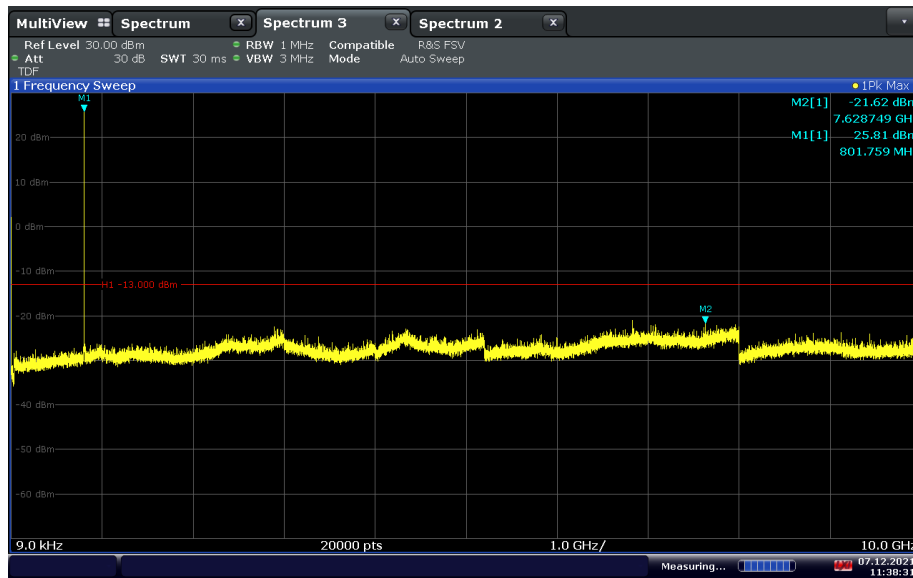
700MHz Narrowband Public Safety Uplink CQPSK 12.5 kHz Middle Channel Spurious Emissions



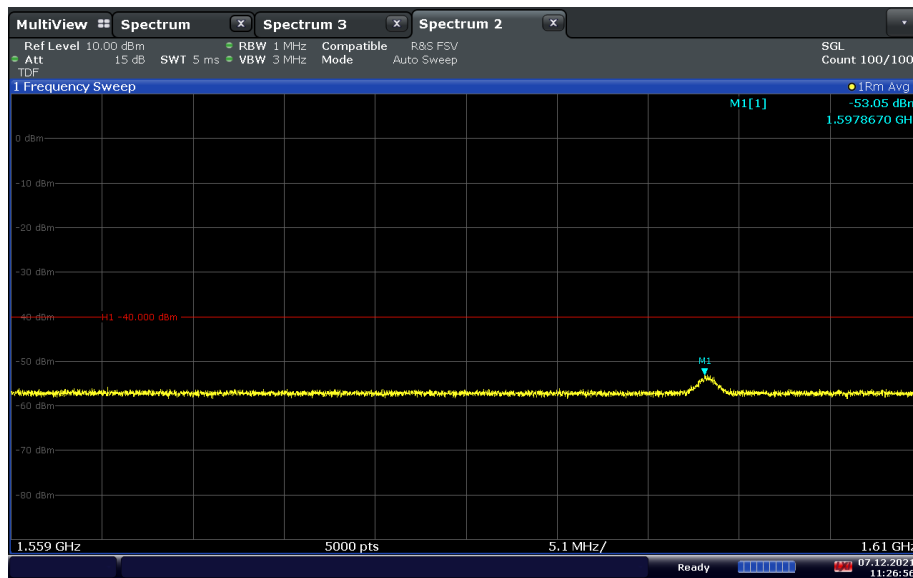
700MHz Narrowband Public Safety Uplink CQPSK 12.5 kHz Middle Channel Spurious Emissions 1559 – 1610 MHz (EIRP)



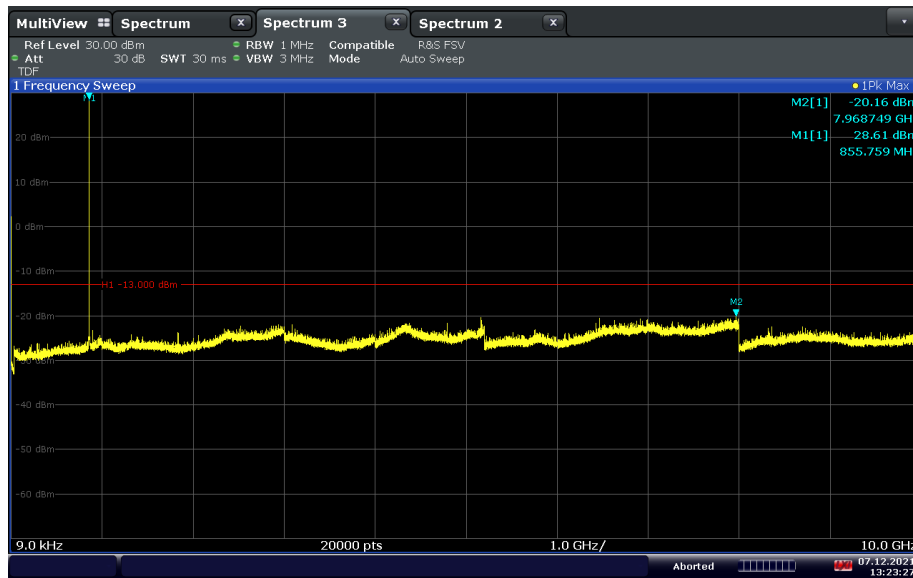
700MHz Narrowband Public Safety Uplink H-CPM 12.5 kHz Middle Channel Spurious Emissions



700MHz Narrowband Public Safety Uplink H-CPM 12.5 kHz Middle Channel Spurious Emissions 1559 – 1610 MHz (EIRP)

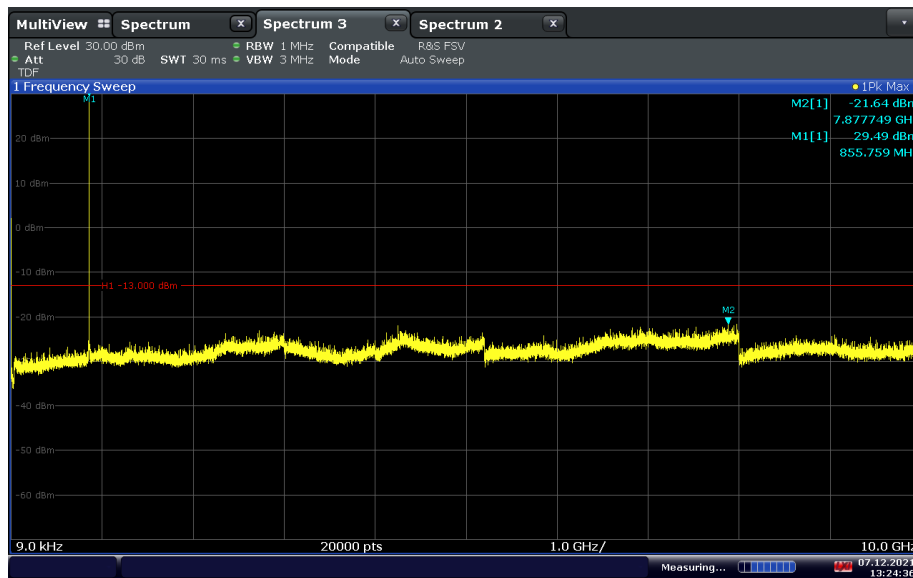


800 MHz NPSPAC Public Safety Downlink C4FM 12.5 kHz Middle Channel Spurious Emissions



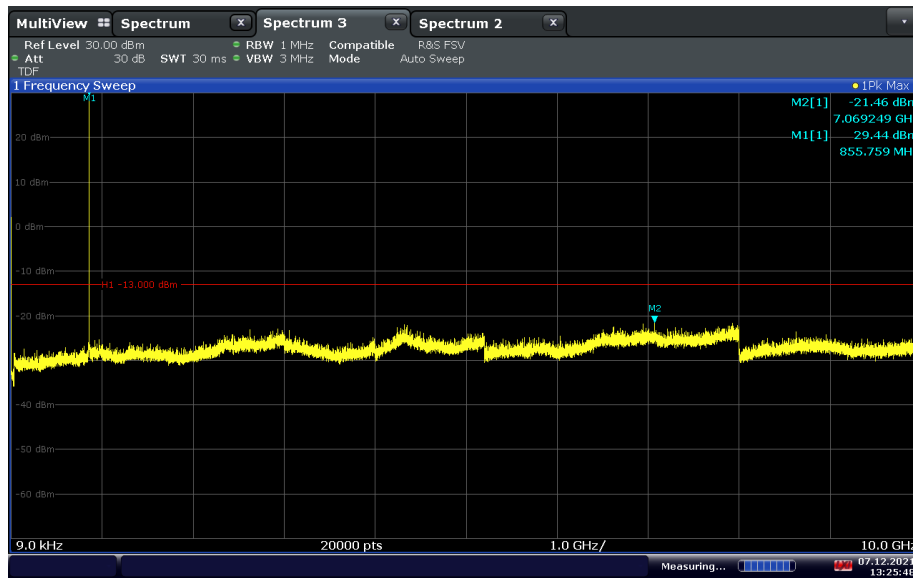
13:23:27 07.12.2021

800 MHz NPSPAC Public Safety Downlink CQPSK 12.5 kHz Middle Channel Spurious Emissions

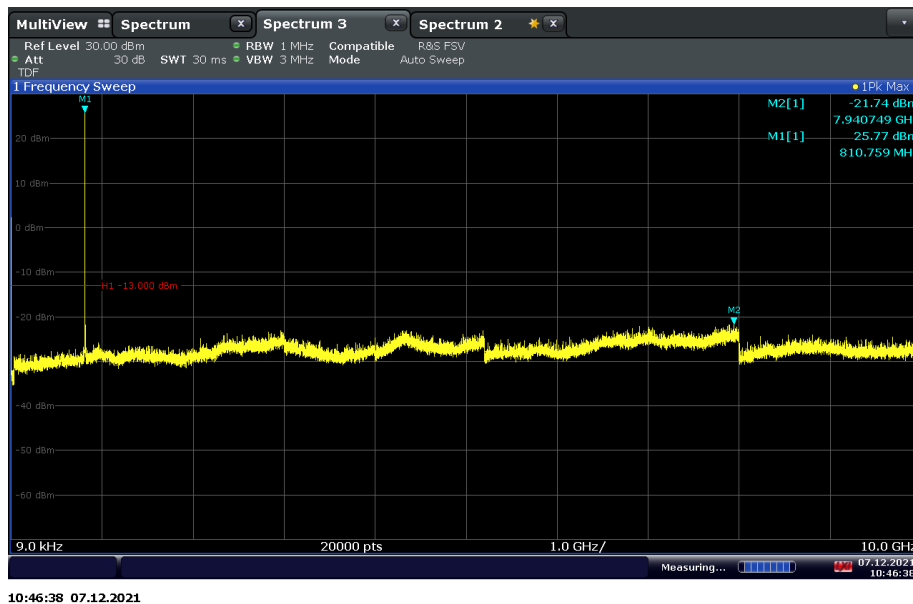


13:24:36 07.12.2021

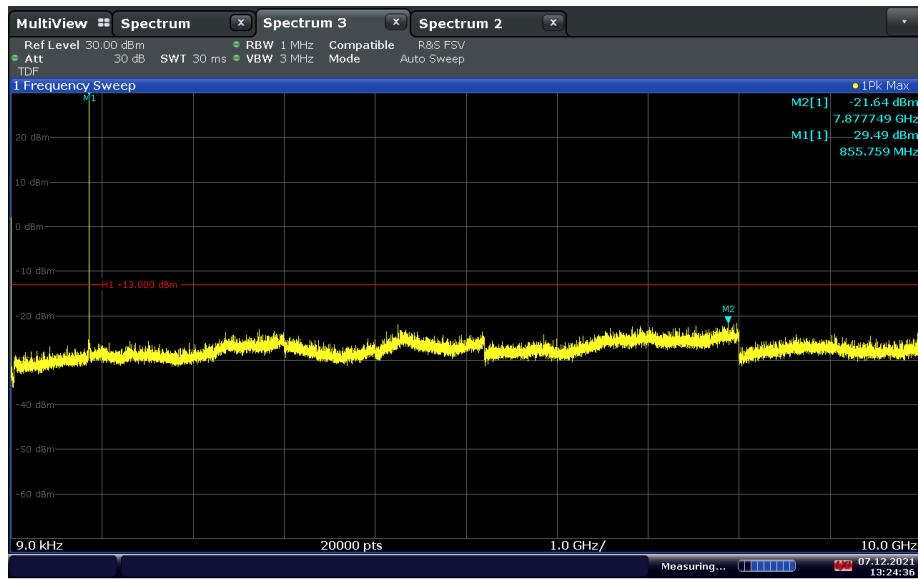
800 MHz NPSPAC Public Safety Downlink H-DQPSK 12.5 kHz Middle Channel Spurious Emissions



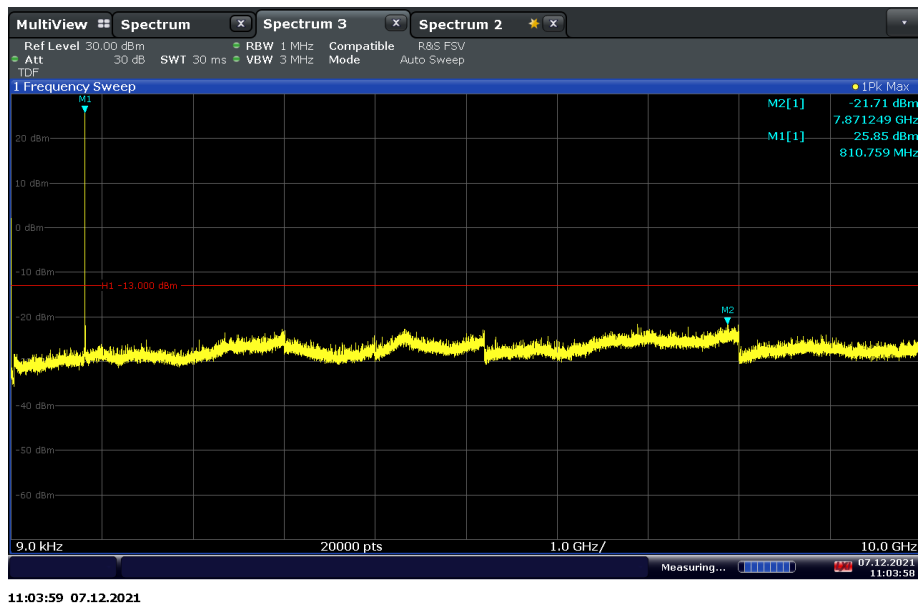
800 MHz NPSPAC Public Safety Uplink C4FM 12.5 kHz Middle Channel Spurious Emissions



800 MHz NPSPAC Public Safety Uplink CQPSK 12.5 kHz Middle Channel Spurious Emissions



800 MHz NPSPAC Public Safety Uplink H-CPM 12.5 kHz Middle Channel Spurious Emissions



2.5 FIELD STRENGTH OF SPURIOUS RADIATION

2.5.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1053
FCC 47 CFR Part 90, Clause 90.219(e)(3)
FCC 47 CFR Part 90, Clause 90.543(c)(f)
RSS-119, Clause 5.8.9.2
KDB935210 D05, Clause 4.9

2.5.2 Standard Applicable

FCC 47 CFR Part 90, Clause 90.219(e):

(3) Spurious emissions from a signal booter must not exceed -13 dBm within any 100 kHz measurement bandwidth.

FCC 47 CFR Part 90, Clause 90.543:

(c) *Out-of-band emission limit.* On any frequency outside of the frequency ranges covered by the ACP tables in this section, the power of any emission must be reduced below the mean output power (P) by at least $43 + 10\log_{10}(p)$ dB measured in a 100 kHz bandwidth for frequencies less than 1GHz, and in a 1 MHz bandwidth for frequencies greater than 1GHz.

(f) For operations in the 758–775 MHz and 788–805 MHz bands, all emissions including harmonics in the band 1559–1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

RSS-119, Clause 5.8.9.2:

On any frequency outside of the ranges specified in the ACP tables 13 to 16, the power of any emission shall be attenuated below the mean output power P (dBW) by at least $43 + 10\log_{10}(p)$, measured in a 100kHz bandwidth for frequencies less than or equal to 1GHz, and in a 1MHz bandwidth for frequencies greater than 1GHz.

In addition, for operations in the bands 768-776 MHz and 798-806 MHz, all emissions (including harmonics in the band 1559-1610 MHz), shall not exceed:

- -70dBW/MHz equivalent isotropically radiated power (e.i.r.p.) for wideband emissions, and
- -80dBW/kHz e.i.r.p. for discrete emissions of less than 700Hz bandwidth.

2.5.3 Equipment Under Test and Modification State

Serial No: 226141000161 / Test Configuration A and B

2.5.4 Date of Test/Initial of test personnel who performed the test

December 15 and 16, 2021 / XYZ

2.5.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility



Ambient Temperature	20.4 - 21.1 °C
Relative Humidity	34.0 - 39.6 %
ATM Pressure	99.6 - 99.8 kPa

2.5.7 Additional Observations

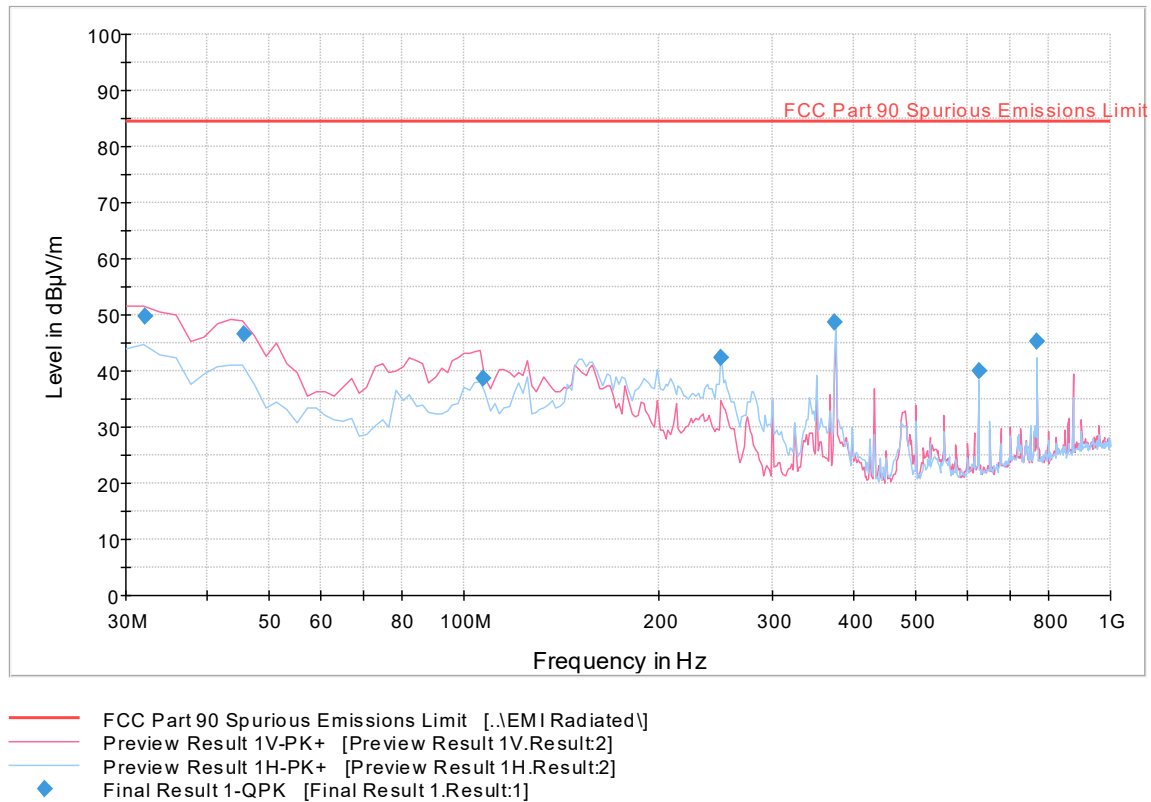
- This is a radiated test using the Direct Radiated Field Strength method of C63.26 2015.
- This is cabinet spurious emissions testing. Main antenna port was terminated during the test. Fundamental frequency measurement will be ignored for this test.
- Only the worst case configuration presented in this test report.
- Measurement was done using EMC32 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only.

2.5.8 Test Results

Compliant. See attached plots.

2.5.9 Test Results Below 1GHz (700MHz Narrowband Public Safety Downlink Worst Case Configuration) – CQPSK 12.5 kHz Bandwidth Low Channel

Continuous Rotation TUV 3m Radiated 30 to 1000MHz

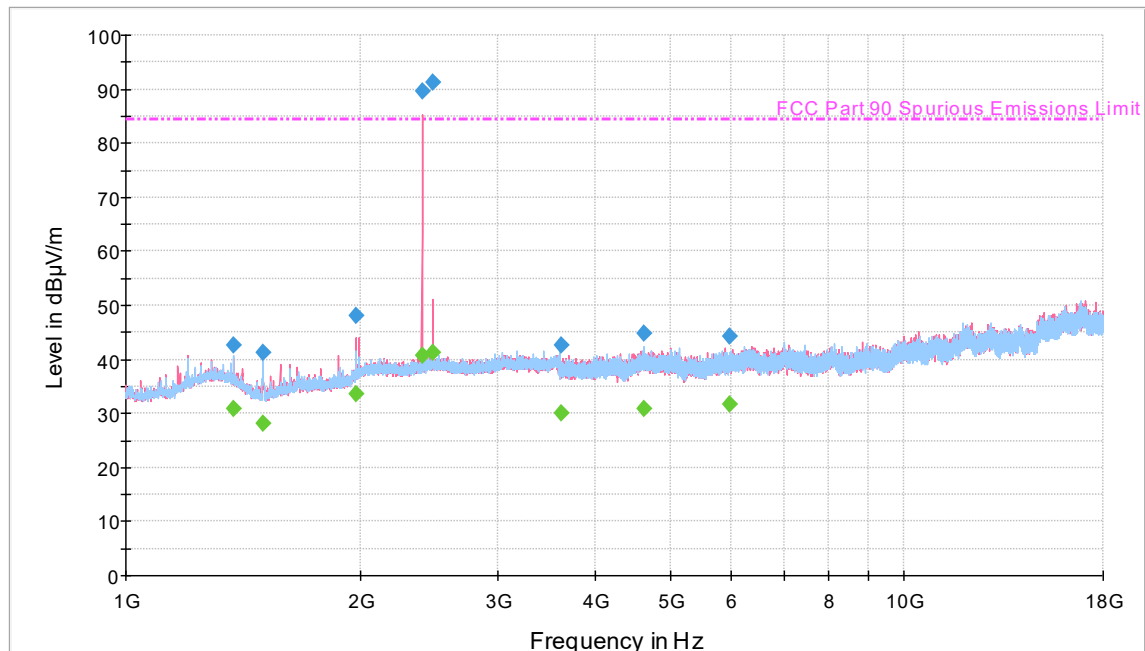


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
32.200000	49.6	1000.0	120.000	100.0	V	242.0	-10.1	34.8	84.4
45.607214	46.5	1000.0	120.000	100.0	V	174.0	-16.2	37.9	84.4
107.131623	38.6	1000.0	120.000	114.0	V	282.0	-15.1	45.8	84.4
249.979319	42.5	1000.0	120.000	105.0	H	59.0	-10.8	41.9	84.4
374.972024	48.6	1000.0	120.000	100.0	H	186.0	-7.0	35.8	84.4
624.989659	39.9	1000.0	120.000	121.0	H	126.0	-1.2	44.5	84.4
768.981242	45.1	1000.0	120.000	100.0	H	197.0	0.4	Fundamental Carrier	

2.5.10 Test Results Above 1GHz (700MHz Narrowband Public Safety Downlink Worst Case Configuration) – CQPSK 12.5 kHz Bandwidth Low Channel

Continuous Rotation TUV 3m Radiated 1000 to 18000MHz



- - - - - FCC Part 90 Spurious Emissions Limit [.\EMI Radiated\
 - - - - - Preview Result 1V-PK+ [Preview Result 1V.Result:2]
 - - - - - Preview Result 1H-PK+ [Preview Result 1H.Result:2]
 ◆ Final Result 1-PK+ [Final Result 1.Result:1]
 ◆ Final Result 2-AVG [Final Result 2.Result:1]

Peak Data

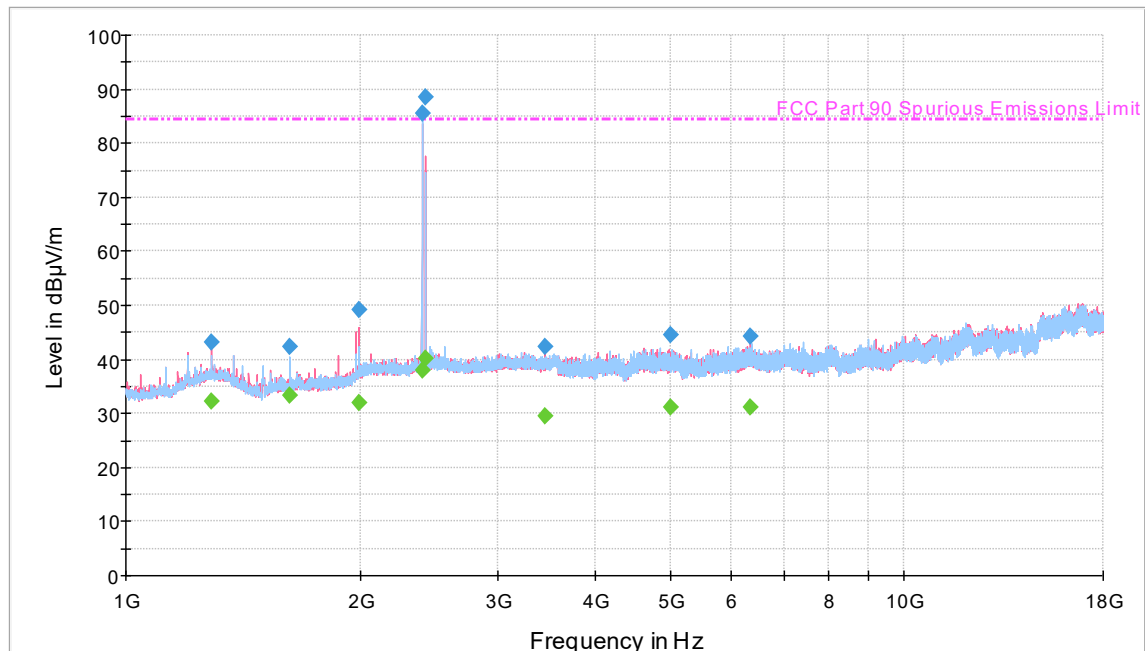
Frequency (MHz)	MaxPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1375.166667	42.6	1000.0	1000.000	113.7	H	173.0	-6.0	41.8	84.4
1499.800000	41.3	1000.0	1000.000	245.3	H	327.0	-7.0	43.1	84.4
1976.600000	48.2	1000.0	1000.000	151.6	V	190.0	-2.9	36.2	84.4
2402.133333	89.5	1000.0	1000.000	151.6	V	274.0	-1.1	BTLE Carrier	
2480.266667	91.2	1000.0	1000.000	252.3	V	149.0	-0.7	BTLE Carrier	
3617.866667	42.7	1000.0	1000.000	152.2	H	291.0	1.7	41.7	84.4
4622.366667	44.7	1000.0	1000.000	151.6	H	20.0	4.0	39.7	84.4
5974.066667	44.3	1000.0	1000.000	280.2	V	282.0	5.9	40.1	84.4

Average Data

Frequency (MHz)	Average (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
1375.166667	30.9	1000.0	1000.000	113.7	H	173.0	-6.0	53.5	84.4
1499.800000	28.1	1000.0	1000.000	245.3	H	327.0	-7.0	56.3	84.4
1976.600000	33.6	1000.0	1000.000	151.6	V	190.0	-2.9	50.8	84.4
2402.133333	40.8	1000.0	1000.000	151.6	V	274.0	-1.1	BTLE Carrier	
2480.266667	41.1	1000.0	1000.000	252.3	V	149.0	-0.7	BTLE Carrier	
3617.866667	30.0	1000.0	1000.000	152.2	H	291.0	1.7	54.4	84.4
4622.366667	31.0	1000.0	1000.000	151.6	H	20.0	4.0	53.4	84.4
5974.066667	31.6	1000.0	1000.000	280.2	V	282.0	5.9	52.8	84.4

2.5.11 Test Results Above 1GHz (700MHz Narrowband Public Safety Downlink Worst Case Configuration) – CQPSK 12.5 kHz Bandwidth Middle Channel

Continuous Rotation TUV 3m Radiated 1000 to 18000MHz



- - - - - FCC Part 90 Spurious Emissions Limit [.\EMI Radiated\
 - - - - - Preview Result 1V-PK+ [Preview Result 1V.Result:2]
 - - - - - Preview Result 1H-PK+ [Preview Result 1H.Result:2]
 ◆ Final Result 1-PK+ [Final Result 1.Result:1]
 ◆ Final Result 2-AVG [Final Result 2.Result:1]

Peak Data

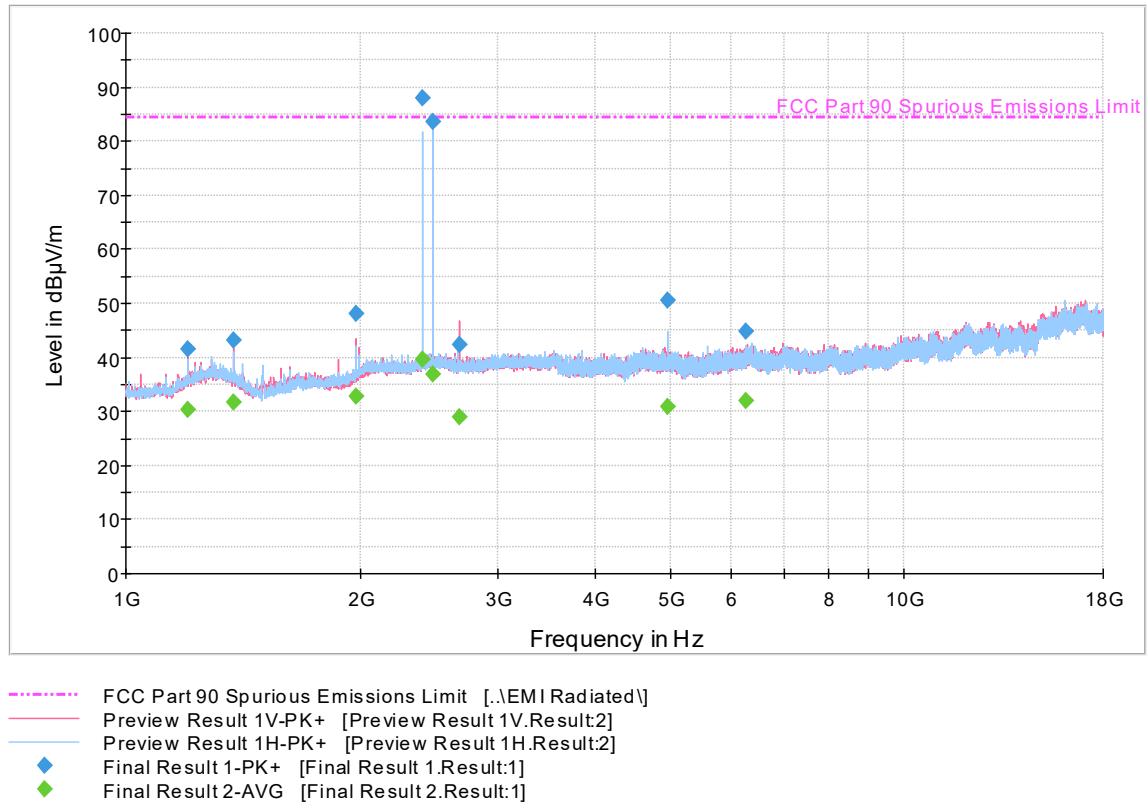
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1290.333333	43.1	1000.0	1000.000	182.6	V	179.0	-6.0	41.3	84.4
1625.233333	42.4	1000.0	1000.000	152.2	V	257.0	-6.2	42.0	84.4
1992.233333	49.2	1000.0	1000.000	300.2	V	154.0	-2.6	35.2	84.4
2402.133333	85.6	1000.0	1000.000	317.2	H	199.0	-1.1	BTLE Carrier	
2426.100000	88.5	1000.0	1000.000	306.2	V	310.0	-1.0	BTLE Carrier	
3456.466667	42.3	1000.0	1000.000	320.2	V	11.0	1.2	42.1	84.4
4997.666667	44.5	1000.0	1000.000	402.8	V	20.0	4.1	39.9	84.4
6335.966667	44.2	1000.0	1000.000	127.7	V	181.0	6.3	40.2	84.4

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1290.333333	32.2	1000.0	1000.000	182.6	V	179.0	-6.0	52.2	84.4
1625.233333	33.3	1000.0	1000.000	152.2	V	257.0	-6.2	51.1	84.4
1992.233333	31.9	1000.0	1000.000	300.2	V	154.0	-2.6	52.5	84.4
2402.133333	38.1	1000.0	1000.000	317.2	H	199.0	-1.1	BTLE Carrier	
2426.100000	40.3	1000.0	1000.000	306.2	V	310.0	-1.0	BTLE Carrier	
3456.466667	29.5	1000.0	1000.000	320.2	V	11.0	1.2	54.9	84.4
4997.666667	31.0	1000.0	1000.000	402.8	V	20.0	4.1	53.4	84.4
6335.966667	31.2	1000.0	1000.000	127.7	V	181.0	6.3	53.2	84.4

2.5.12 Test Results Above 1GHz (700MHz Narrowband Public Safety Downlink Worst Case Configuration) – CQPSK 12.5 kHz Bandwidth High Channel

Continuous Rotation TUV 3m Radiated 1000 to 18000MHz



Peak Data

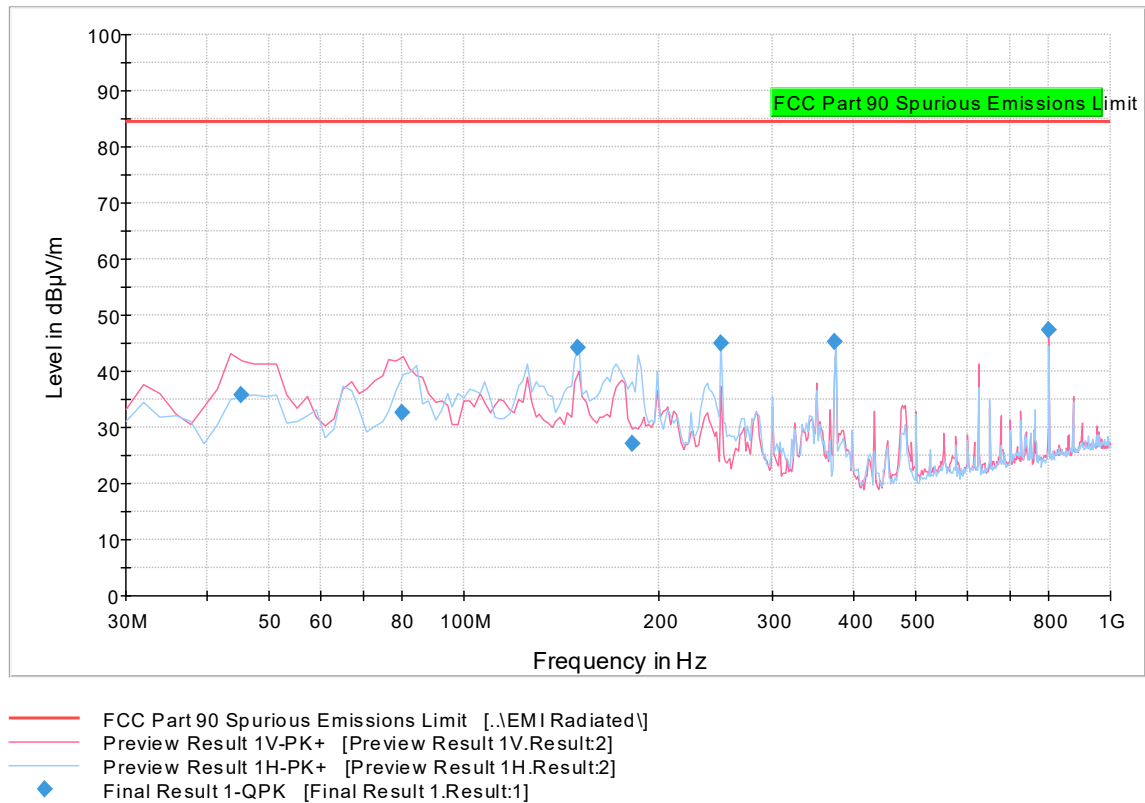
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1199.833333	41.5	1000.0	1000.000	285.3	V	319.0	-6.6	42.9	84.4
1375.366667	43.1	1000.0	1000.000	182.6	H	158.0	-6.0	41.3	84.4
1976.166667	48.2	1000.0	1000.000	151.6	V	190.0	-2.9	36.2	84.4
2402.133333	87.9	1000.0	1000.000	151.6	H	-13.0	-1.1	BTLE Carrier	
2479.933333	83.6	1000.0	1000.000	103.7	H	51.0	-0.7	BTLE Carrier	
2680.733333	42.3	1000.0	1000.000	112.7	V	107.0	-0.4	42.1	84.4
4960.466667	50.6	1000.0	1000.000	124.7	H	327.0	4.0	33.8	84.4
6260.333333	44.9	1000.0	1000.000	352.7	H	122.0	6.4	39.5	84.4

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1199.833333	30.3	1000.0	1000.000	285.3	V	319.0	-6.6	54.1	84.4
1375.366667	31.7	1000.0	1000.000	182.6	H	158.0	-6.0	52.7	84.4
1976.166667	32.7	1000.0	1000.000	151.6	V	190.0	-2.9	51.7	84.4
2402.133333	39.5	1000.0	1000.000	151.6	H	-13.0	-1.1	BTLE Carrier	
2479.933333	36.9	1000.0	1000.000	103.7	H	51.0	-0.7	BTLE Carrier	
2680.733333	28.9	1000.0	1000.000	112.7	V	107.0	-0.4	55.5	84.4
4960.466667	30.8	1000.0	1000.000	124.7	H	327.0	4.0	53.6	84.4
6260.333333	32.0	1000.0	1000.000	352.7	H	122.0	6.4	52.4	84.4

2.5.13 Test Results Below 1GHz (700MHz Narrowband Public Safety Uplink Worst Case Configuration) – C4FM 12.5 kHz Bandwidth Middle Channel

Continuous Rotation TUV 3m Radiated 30 to 1000MHz

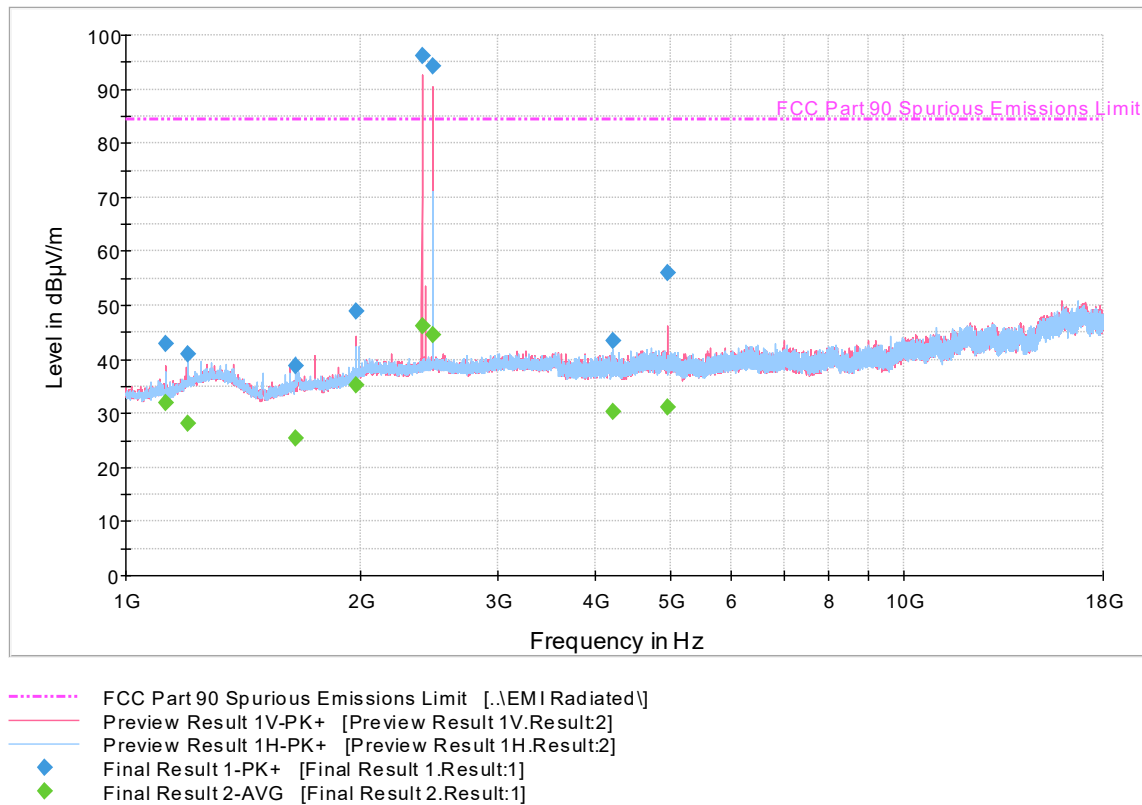


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
45.127214	35.8	1000.0	120.000	122.0	V	49.0	-16.0	48.6	84.4
80.021082	32.5	1000.0	120.000	105.0	V	314.0	-17.9	51.9	84.4
150.001042	44.3	1000.0	120.000	127.0	H	107.0	-14.9	40.1	84.4
182.351022	27.0	1000.0	120.000	145.0	H	136.0	-13.3	57.4	84.4
249.979319	45.0	1000.0	120.000	116.0	H	1.0	-10.8	39.4	84.4
374.972024	45.2	1000.0	120.000	212.0	H	175.0	-7.0	39.2	84.4
801.867335	47.3	1000.0	120.000	100.0	V	29.0	1.3	Fundamental Carrier	

2.5.14 Test Results Above 1GHz (700MHz Narrowband Public Safety Uplink Worst Case Configuration) – C4FM 12.5 kHz Bandwidth Low Channel

Continuous Rotation TUV 3m Radiated 1000 to 18000MHz



Peak Data

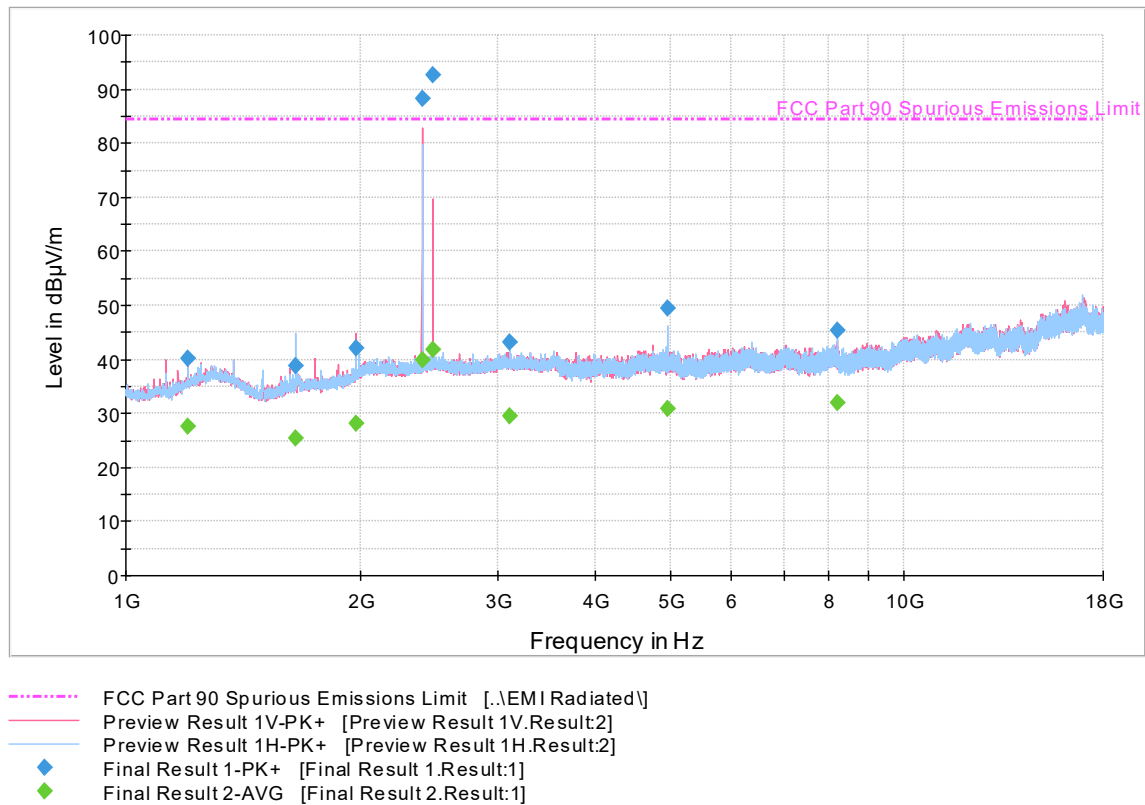
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1125.033333	42.9	1000.0	1000.000	124.7	V	189.0	-7.6	41.5	84.4
1199.866667	41.1	1000.0	1000.000	169.6	V	143.0	-6.6	43.3	84.4
1650.933333	38.7	1000.0	1000.000	151.2	H	120.0	-5.9	45.7	84.4
1976.800000	48.8	1000.0	1000.000	120.7	V	-7.0	-2.9	35.6	84.4
2402.133333	96.1	1000.0	1000.000	151.6	V	241.0	-1.1	BTLE Carrier	
2479.933333	94.4	1000.0	1000.000	198.5	V	54.0	-0.7	BTLE Carrier	
4218.900000	43.4	1000.0	1000.000	178.6	H	226.0	2.9	41.1	84.4
4960.466667	56.1	1000.0	1000.000	203.5	V	102.0	4.0	28.3	84.4

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1125.033333	31.9	1000.0	1000.000	124.7	V	189.0	-7.6	52.5	84.4
1199.866667	28.2	1000.0	1000.000	169.6	V	143.0	-6.6	56.2	84.4
1650.933333	25.5	1000.0	1000.000	151.2	H	120.0	-5.9	58.9	84.4
1976.800000	35.3	1000.0	1000.000	120.7	V	-7.0	-2.9	49.1	84.4
2402.133333	46.1	1000.0	1000.000	151.6	V	241.0	-1.1	BTLE Carrier	
2479.933333	44.7	1000.0	1000.000	198.5	V	54.0	-0.7	BTLE Carrier	
4218.900000	30.3	1000.0	1000.000	178.6	H	226.0	2.9	54.1	84.4
4960.466667	31.1	1000.0	1000.000	203.5	V	102.0	4.0	53.3	84.4

2.5.15 Test Results Above 1GHz (700MHz Narrowband Public Safety Uplink Worst Case Configuration) – C4FM 12.5 kHz Bandwidth Middle Channel

Continuous Rotation TUV 3m Radiated 1000 to 18000MHz



Peak Data

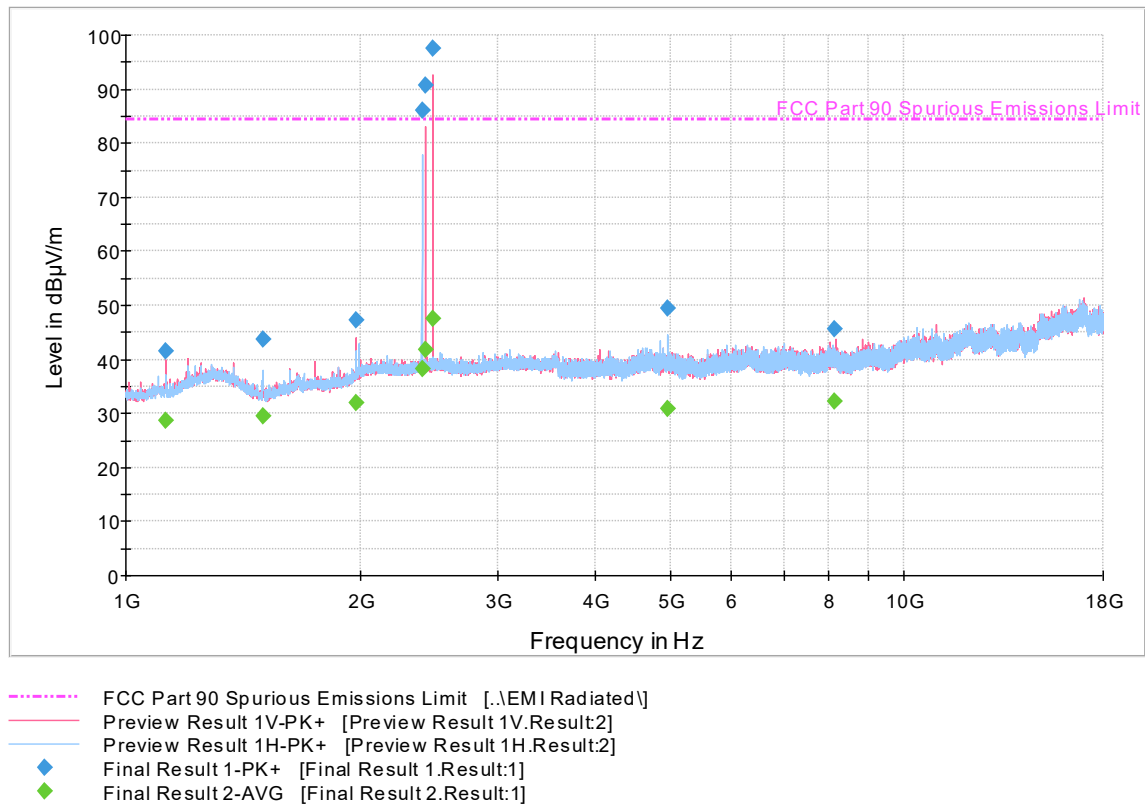
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1200.066667	40.3	1000.0	1000.000	166.6	V	290.0	-6.6	44.1	84.4
1655.066667	38.9	1000.0	1000.000	332.2	H	-13.0	-5.9	45.5	84.4
1976.200000	42.0	1000.0	1000.000	280.2	H	245.0	-2.9	42.4	84.4
2402.133333	88.3	1000.0	1000.000	240.4	V	-20.0	-1.1	BTLE Carrier	
2479.433333	92.6	1000.0	1000.000	205.5	V	103.0	-0.7	BTLE Carrier	
3115.333333	43.3	1000.0	1000.000	139.7	H	165.0	0.8	41.1	84.4
4960.266667	49.3	1000.0	1000.000	275.3	H	192.0	4.0	35.1	84.4
8185.133333	45.4	1000.0	1000.000	251.5	V	4.0	7.4	39.0	84.4

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1200.066667	27.7	1000.0	1000.000	166.6	V	290.0	-6.6	56.7	84.4
1655.066667	25.4	1000.0	1000.000	332.2	H	-13.0	-5.9	59.0	84.4
1976.200000	28.0	1000.0	1000.000	280.2	H	245.0	-2.9	56.4	84.4
2402.133333	39.9	1000.0	1000.000	240.4	V	-20.0	-1.1	BTLE Carrier	
2479.433333	41.7	1000.0	1000.000	205.5	V	103.0	-0.7	BTLE Carrier	
3115.333333	29.6	1000.0	1000.000	139.7	H	165.0	0.8	54.8	84.4
4960.266667	31.0	1000.0	1000.000	275.3	H	192.0	4.0	53.4	84.4
8185.133333	32.0	1000.0	1000.000	251.5	V	4.0	7.4	52.4	84.4

2.5.16 Test Results Above 1GHz (700MHz Narrowband Public Safety Uplink Worst Case Configuration) – C4FM 12.5 kHz Bandwidth High Channel

Continuous Rotation TUV 3m Radiated 1000 to 18000MHz



Peak Data

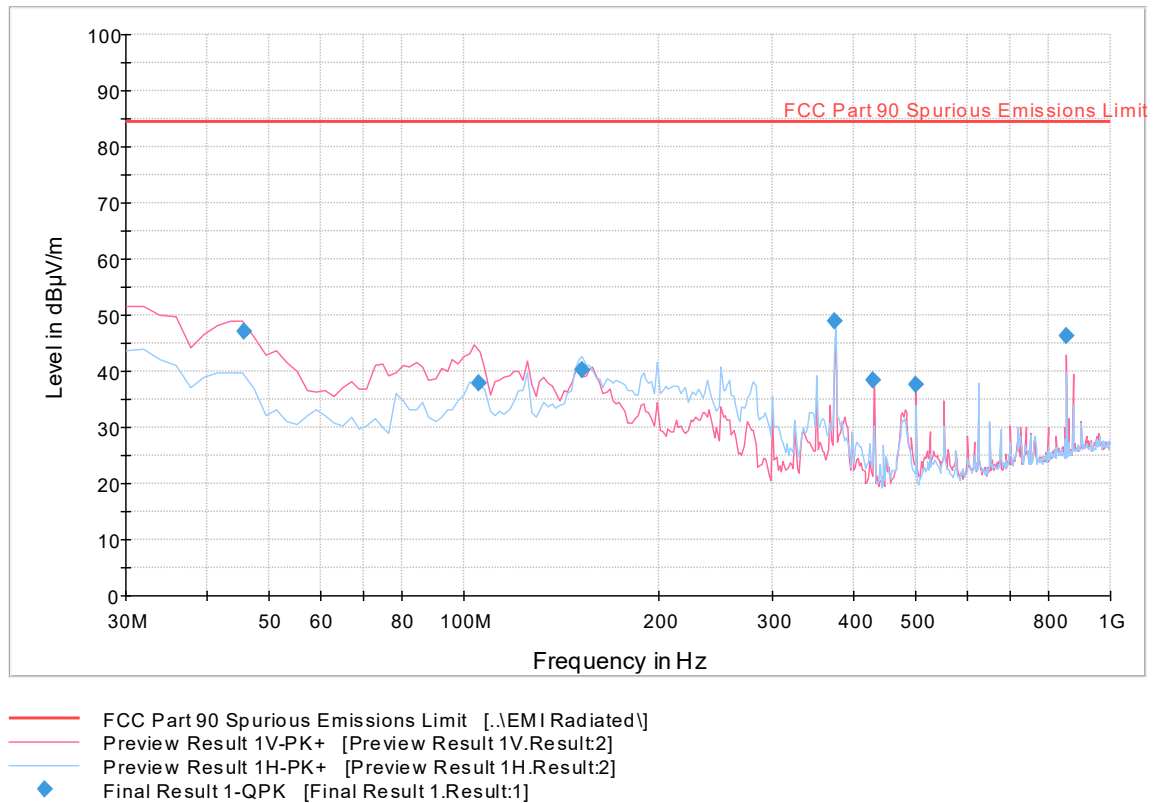
Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1124.866667	41.6	1000.0	1000.000	165.6	V	201.0	-7.6	42.8	84.4
1500.233333	43.7	1000.0	1000.000	165.6	H	160.0	-7.0	40.7	84.4
1976.033333	47.4	1000.0	1000.000	116.7	V	89.0	-2.9	37.0	84.4
2402.166667	86.1	1000.0	1000.000	307.2	H	176.0	-1.1	BTLE Carrier	
2425.933333	90.6	1000.0	1000.000	132.7	V	96.0	-1.0	BTLE Carrier	
2479.933333	97.6	1000.0	1000.000	173.6	V	256.0	-0.7	BTLE Carrier	
4960.833333	49.4	1000.0	1000.000	296.2	H	36.0	4.0	35.0	84.4
8129.633333	45.6	1000.0	1000.000	275.3	V	66.0	7.4	38.8	84.4

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1124.866667	28.8	1000.0	1000.000	165.6	V	201.0	-7.6	55.6	84.4
1500.233333	29.5	1000.0	1000.000	165.6	H	160.0	-7.0	54.9	84.4
1976.033333	32.1	1000.0	1000.000	116.7	V	89.0	-2.9	52.3	84.4
2402.166667	38.3	1000.0	1000.000	307.2	H	176.0	-1.1	BTLE Carrier	
2425.933333	41.7	1000.0	1000.000	132.7	V	96.0	-1.0	BTLE Carrier	
2479.933333	47.4	1000.0	1000.000	173.6	V	256.0	-0.7	BTLE Carrier	
4960.833333	31.0	1000.0	1000.000	296.2	H	36.0	4.0	53.4	84.4
8129.633333	32.1	1000.0	1000.000	275.3	V	66.0	7.4	52.3	84.4

2.5.17 Test Results Below 1GHz (800MHz NPSPAC Public Safety Downlink Worst Case Configuration) – CQPSK 12.5 kHz Bandwidth Middle Channel

Continuous Rotation TUV 3m Radiated 30 to 1000MHz

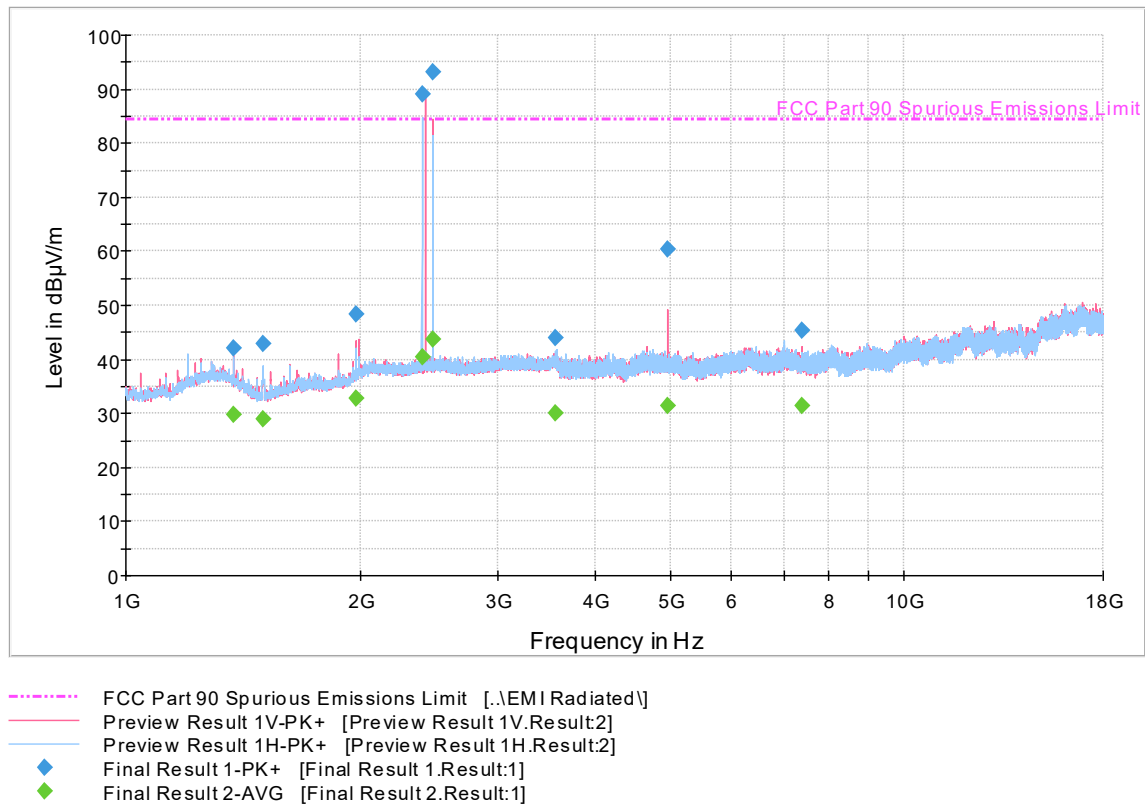


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
45.631102	47.1	1000.0	120.000	100.0	V	15.0	-16.2	37.3	84.4
105.347735	38.0	1000.0	120.000	105.0	V	258.0	-15.0	46.4	84.4
152.264930	40.3	1000.0	120.000	202.0	H	175.0	-14.7	44.1	84.4
374.972024	49.0	1000.0	120.000	100.0	H	183.0	-7.0	35.4	84.4
430.080882	38.4	1000.0	120.000	105.0	V	253.0	-5.6	46.0	84.4
499.980842	37.7	1000.0	120.000	100.0	V	28.0	-3.9	46.7	84.4
855.872305	46.3	1000.0	120.000	100.0	V	336.0	2.3	Fundamental Carrier	

2.5.18 Test Results Above 1GHz (800MHz NPSPAC Public Safety Downlink Worst Case Configuration) – CQPSK 12.5 kHz Bandwidth Low Channel

Continuous Rotation TUV 3m Radiated 1000 to 18000MHz



Peak Data

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1375.366667	42.0	1000.0	1000.000	152.2	V	148.0	-6.0	42.4	84.4
1500.233333	42.9	1000.0	1000.000	203.5	H	0.0	-7.0	41.5	84.4
1976.366667	48.3	1000.0	1000.000	151.6	V	273.0	-2.9	36.1	84.4
2402.166667	89.0	1000.0	1000.000	252.3	H	292.0	-1.1	BTLE Carrier	
2479.966667	93.0	1000.0	1000.000	203.5	V	-20.0	-0.7	BTLE Carrier	
3558.300000	44.1	1000.0	1000.000	339.1	H	4.0	1.8	40.3	84.4
4960.300000	60.3	1000.0	1000.000	252.3	V	206.0	4.0	24.1	84.4
7392.966667	45.3	1000.0	1000.000	103.7	V	20.0	7.3	39.1	84.4

Average Data

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
1375.366667	29.8	1000.0	1000.000	152.2	V	148.0	-6.0	54.6	84.4
1500.233333	29.0	1000.0	1000.000	203.5	H	0.0	-7.0	55.4	84.4
1976.366667	32.9	1000.0	1000.000	151.6	V	273.0	-2.9	51.5	84.4
2402.166667	40.3	1000.0	1000.000	252.3	H	292.0	-1.1	BTLE Carrier	
2479.966667	43.6	1000.0	1000.000	203.5	V	-20.0	-0.7	BTLE Carrier	
3558.300000	30.0	1000.0	1000.000	339.1	H	4.0	1.8	54.4	84.4
4960.300000	31.3	1000.0	1000.000	252.3	V	206.0	4.0	53.1	84.4
7392.966667	31.5	1000.0	1000.000	103.7	V	20.0	7.3	52.9	84.4