

FCC PART 22, 74, 80 and 90

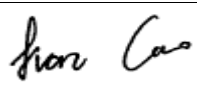
## TEST REPORT

For

### Hytera Communications Corporation Limited

Hytera Tower, Hi-Tech Industrial Park North, 9108# Beihuan Road, Nanshan District, Shenzhen,  
518057 China

**FCC ID:YAMHM78XU2**

|                                        |                                                                                                                                                                                                                                                             |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Report Type:</b><br>Original Report | <b>Product Type:</b><br>DIGITAL MOBILE RADIO                                                                                                                                                                                                                |
| <b>Report Number:</b> RDG201022008-00A |                                                                                                                                                                                                                                                             |
| <b>Report Date:</b> 2020-12-24         |                                                                                                                                                                                                                                                             |
| <b>Reviewed By:</b>                    | Ivan Cao<br>Assistant Manager<br>                                                                                                                                       |
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## **TABLE OF CONTENTS**

|                                                                                                                                                                  |           |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>GENERAL INFORMATION.....</b>                                                                                                                                  | <b>4</b>  |
| PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) .....                                                                                                         | 4         |
| OBJECTIVE .....                                                                                                                                                  | 4         |
| RELATED SUBMITTAL(S)/GRANT(S) .....                                                                                                                              | 4         |
| TEST METHODOLOGY .....                                                                                                                                           | 4         |
| MEASUREMENT UNCERTAINTY .....                                                                                                                                    | 5         |
| TEST FACILITY .....                                                                                                                                              | 5         |
| DECLARATIONS.....                                                                                                                                                | 5         |
| <b>SYSTEM TEST CONFIGURATION.....</b>                                                                                                                            | <b>6</b>  |
| DESCRIPTION OF TEST CONFIGURATION .....                                                                                                                          | 6         |
| EUT EXERCISE SOFTWARE .....                                                                                                                                      | 6         |
| SPECIAL ACCESSORIES ANTENNA .....                                                                                                                                | 6         |
| EQUIPMENT MODIFICATIONS .....                                                                                                                                    | 6         |
| SUPPORT EQUIPMENT LIST AND DETAILS .....                                                                                                                         | 6         |
| SUPPORT CABLE LIST AND DETAILS .....                                                                                                                             | 6         |
| BLOCK DIAGRAM OF TEST SETUP .....                                                                                                                                | 7         |
| <b>SUMMARY OF TEST RESULTS.....</b>                                                                                                                              | <b>8</b>  |
| <b>TEST EQUIPMENT LIST .....</b>                                                                                                                                 | <b>9</b>  |
| <b>FCC §2.1046 &amp; § 22.727 &amp; §74.461 &amp; §80.215&amp; §90.205 - RF OUTPUT POWER.....</b>                                                                | <b>10</b> |
| APPLICABLE STANDARD .....                                                                                                                                        | 10        |
| TEST PROCEDURE .....                                                                                                                                             | 10        |
| TEST DATA .....                                                                                                                                                  | 10        |
| <b>FCC §2.1047 - MODULATION CHARACTERISTIC .....</b>                                                                                                             | <b>17</b> |
| APPLICABLE STANDARD .....                                                                                                                                        | 17        |
| TEST PROCEDURE .....                                                                                                                                             | 17        |
| TEST DATA .....                                                                                                                                                  | 17        |
| <b>FCC §2.1049 &amp; §22.357 &amp; § 22.731 &amp; §74.462 &amp; 80.205&amp; §80.207&amp; §90.209 &amp; §90.210 – OCCUPIED BANDWIDTH &amp; EMISSION MASK.....</b> | <b>24</b> |
| APPLICABLE STANDARD .....                                                                                                                                        | 24        |
| TEST PROCEDURE .....                                                                                                                                             | 24        |
| TEST DATA .....                                                                                                                                                  | 24        |
| <b>FCC §2.1051 &amp; §22.861 &amp; §74.462 &amp; § 80.211 &amp; §90.210 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS.....</b>                                       | <b>36</b> |
| APPLICABLE STANDARD .....                                                                                                                                        | 36        |
| TEST PROCEDURE .....                                                                                                                                             | 36        |
| TEST DATA .....                                                                                                                                                  | 36        |
| <b>FCC §2.1053 &amp; §22.861 &amp; §74.462 &amp; §80.211 &amp; §90.210 - RADIATED SPURIOUS EMISSIONS.....</b>                                                    | <b>42</b> |
| APPLICABLE STANDARD .....                                                                                                                                        | 42        |
| TEST PROCEDURE .....                                                                                                                                             | 42        |
| TEST DATA .....                                                                                                                                                  | 42        |
| <b>FCC §2.1055 &amp; § 22.355 &amp; §74.464&amp; §80.209 &amp; §90.213 - FREQUENCY STABILITY .....</b>                                                           | <b>52</b> |
| APPLICABLE STANDARD .....                                                                                                                                        | 52        |
| TEST PROCEDURE .....                                                                                                                                             | 52        |

TEST DATA .....52

**FCC §90.214 - TRANSIENT FREQUENCY BEHAVIOR.....56**

APPLICABLE STANDARD .....56

TEST PROCEDURE .....56

TEST DATA .....57

## GENERAL INFORMATION

### Product Description for Equipment under Test (EUT)

|                                            |                                              |
|--------------------------------------------|----------------------------------------------|
| <b>EUT Name:</b>                           | DIGITAL MOBILE RADIO                         |
| <b>EUT Model:</b>                          | HM782 U2                                     |
| <b>Mutiple Models:</b>                     | HM780 U2,HM786 U2,HM788 U2,HM785 U2          |
| <b>Modulation Type:</b>                    | FM,4FSK                                      |
| <b>Channel Spacing:</b>                    | 12.5 kHz /25 kHz                             |
| <b>Frequency Range:</b>                    | 450-527 MHz                                  |
| <b>Rated Output Power:<br/>(Conducted)</b> | High Power Level: 50W<br>Low Power Level: 1W |
| <b>Rated Input Voltage:</b>                | DC 10.8~15.6V                                |
| <b>Serial Number:</b>                      | RDG201022008-RF-S1                           |
| <b>EUT Received Date:</b>                  | 2020.10.23                                   |
| <b>EUT Received Status:</b>                | Good                                         |

*Note: The series product, models HM780 U2,HM786 U2,HM788 U2,HM785 U2 and HM782 U2 are electrically identical, The difference between them please refer to the declaration letter for details. Model HM782 U2 was performed full test.*

### Objective

This test report is prepared on behalf of *Hytera Communications Corporation Limited* in accordance with Part 2, and Part 22,74, 80 and 90 of the Federal Communication Commissions rules.

### Related Submittal(s)/Grant(s)

FCC Part 15C DSS submissions with FCC ID:YAMHM78XU2  
FCC Part 15C DTS submissions with FCC ID:YAMHM78XU2

### Test Methodology

All tests and measurements indicated in this document were performed in accordance with:

the Code of federal Regulations Title 47, Part 2, Part 22, Part 74, Part 80 and Part 90

ANSI C63.26-2015, American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

TIA-603-E-2016, Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Dongguan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

## Measurement Uncertainty

| Parameter                     | Measurement Uncertainty                      |
|-------------------------------|----------------------------------------------|
| Occupied Channel Bandwidth    | ±5 %                                         |
| RF output power, conducted    | ±0.61dB                                      |
| Unwanted Emissions, radiated  | 30MHz ~ 1GHz: 5.85 dB<br>1G~26.5GHz: 5.23 dB |
| Unwanted Emissions, conducted | ±1.5 dB                                      |
| Temperature                   | ±1 °C                                        |
| Humidity                      | ±5%                                          |
| DC and low frequency voltages | ±0.4%                                        |
| Duty Cycle                    | 1%                                           |

*Note: Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty. The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval.*

## Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.12, Pulong East 1<sup>st</sup> Road, Tangxia Town, Dongguan, Guangdong, China.

The lab has been recognized as the FCC accredited lab under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No. : 897218, the FCC Designation No. : CN1220.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0022.

## Declarations

BACL is not responsible for the authenticity of any test data provided by the applicant. Data included from the applicant that may affect test results are marked with a triangle symbol “△”. Customer model name, addresses, names, trademarks etc. are not considered data.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested.

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This report may contain data that are not covered by the accreditation scope and shall be marked with an asterisk “★”.

## SYSTEM TEST CONFIGURATION

### Description of Test Configuration

The system was configured for testing in a test mode which has been done in the factory.

### EUT Exercise Software

No exercise software was used.

### Special Accessories Antenna

| Manufacturer | Antenna Type     | Model No.   | Antenna Gain (dBi) | Antenna Cable Loss (dB) |
|--------------|------------------|-------------|--------------------|-------------------------|
| Hytera       | Monopole Antenna | TQC-400FG-W | 1.0 dBi            | 2.0                     |

### Equipment Modifications

No modification was made to the EUT tested.

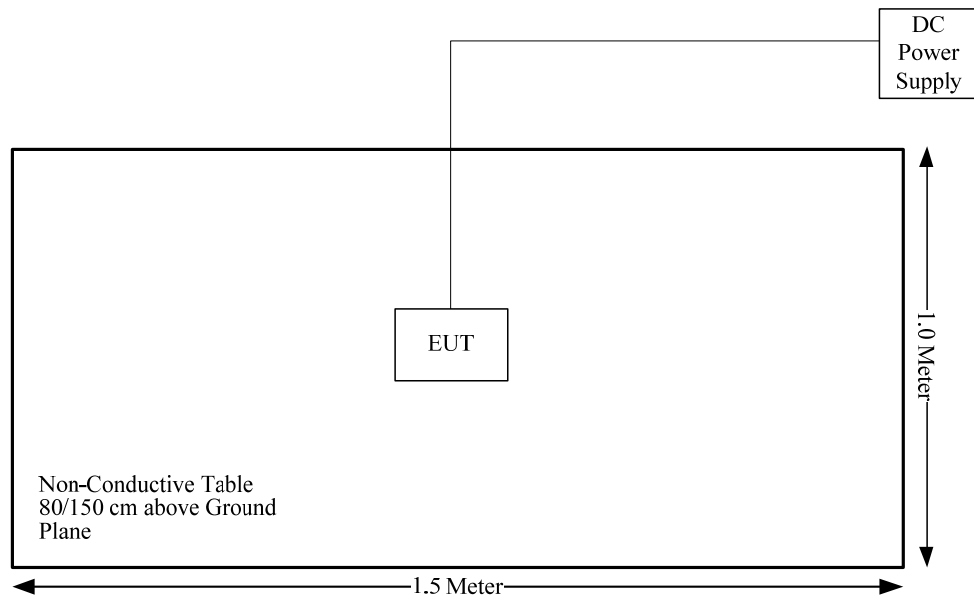
### Support Equipment List and Details

| Manufacturer    | Description     | Model   | Serial Number |
|-----------------|-----------------|---------|---------------|
| Pro instrument  | DC Power Supply | pps3300 | 3300012       |
| WEINSCHTEL Corp | Load            | 50oml   | 50oml Load    |

### Support Cable List and Details

| Cable Description | Shielding Type | Ferrite Core | Length (m) | From Port | To           |
|-------------------|----------------|--------------|------------|-----------|--------------|
| DC Cable          | No             | No           | 1.0        | Adapter   | Charger Base |

## Block Diagram of Test Setup



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**SUMMARY OF TEST RESULTS**

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| FCC Rules                                                                 | Description of Test                   | Results    |
|---------------------------------------------------------------------------|---------------------------------------|------------|
| §2.1046; § 22.727;<br>§80.215; §74.461; §90.205                           | RF Output Power                       | Compliance |
| §2.1047                                                                   | Modulation Characteristic             | Compliance |
| §2.1049;§22.357;§ 22.731;<br>§74.462;§80.205; §80.207<br>§90.209; §90.210 | Occupied Bandwidth & Emission Mask    | Compliance |
| §2.1051; §22.861; §74.462;<br>§80.211;§90.210                             | Spurious Emission at Antenna Terminal | Compliance |
| §2.1053;§22.861;<br>§74.462;§80.211;§90.210                               | Spurious Radiated Emissions           | Compliance |
| §2.1055; § 22.355;<br>§74.464; §80.209; §90.213                           | Frequency Stability                   | Compliance |
| §90.214                                                                   | Transient Frequency Behavior          | Compliance |

## TEST EQUIPMENT LIST

| Manufacturer                         | Description                              | Model             | Serial Number      | Calibration Date | Calibration Due Date |
|--------------------------------------|------------------------------------------|-------------------|--------------------|------------------|----------------------|
| <b>Radiated emissions below 1GHz</b> |                                          |                   |                    |                  |                      |
| Sunol Sciences                       | Antenna                                  | JB3               | A060611-1          | 2017-11-10       | 2020-11-10           |
| R&S                                  | EMI Test Receiver                        | ESR3              | 102453             | 2020-09-12       | 2021-09-12           |
| Unknown                              | Coaxial Cable                            | C-NJNJ-50         | C-0075-01          | 2020-09-05       | 2021-09-05           |
| Unknown                              | Coaxial Cable                            | C-NJNJ-50         | C-0400-01          | 2020-09-05       | 2021-09-05           |
| Unknown                              | Coaxial Cable                            | C-NJNJ-50         | C-1400-01          | 2020-05-06       | 2021-05-06           |
| HP                                   | Amplifier                                | 8447D             | 2727A05902         | 2020-09-05       | 2021-09-05           |
| EMCO                                 | Adjustable Dipole Antenna                | 3121C             | 9109-753           | N/A              | N/A                  |
| Unknown                              | Coaxial Cable                            | C-NJNJ-50         | C-0200-02          | 2020-09-05       | 2021-09-05           |
| Agilent                              | Signal Generator                         | E8247C            | MY43321350         | 2019-12-10       | 2020-12-10           |
| Ouli                                 | Band Rejector Filter                     | 400-520M          | 087                | 2020-01-23       | 2021-01-23           |
| <b>Radiated emissions above 1GHz</b> |                                          |                   |                    |                  |                      |
| TDK RF                               | Horn Antenna                             | HRN-0118          | 130 084            | 2018-10-12       | 2021-10-12           |
| Ducommun Technologies                | Horn Antenna                             | ARH-4223-02       | 1007726-01<br>1304 | 2017-12-06       | 2020-12-05           |
| R&S                                  | Spectrum Analyzer                        | FSP 38            | 100478             | 2020-07-07       | 2021-07-07           |
| HUBER+SUHNER                         | Coaxial Cable                            | SUCOFLEX<br>126EA | MY369/26/26EA      | 2020-09-25       | 2021-09-25           |
| Mini                                 | Pre-amplifier                            | ZVA-183-S+        | 5969001149         | 2020-09-05       | 2021-09-05           |
| Unknown                              | Coaxial Cable                            | C-NJNJ-50         | C-0200-02          | 2020-09-05       | 2021-09-05           |
| Agilent                              | Signal Generator                         | E8247C            | MY43321350         | 2019-12-10       | 2020-12-10           |
| <b>RF Conducted Test</b>             |                                          |                   |                    |                  |                      |
| R&S                                  | Spectrum Analyzer                        | FSU 26            | 200256             | 2020-07-07       | 2021-07-07           |
| Rohde & Schwarz                      | Signal Analyzer                          | FSIQ26            | 831929/005         | 2020-09-12       | 2021-09-12           |
| Unknown                              | Coaxial Cable                            | C-SJ00-0010       | C0010/02           | Each time        | N/A                  |
| Weinschel                            | Coaxial Attenuators                      | 53-20-34          | LN749              | Each time        | N/A                  |
| HP                                   | RF Communications Test Set               | 8920A             | 3438A05201         | 2020-07-07       | 2021-07-07           |
| ESPEC                                | Constant temperature and humidity Tester | ESX-4CA           | 018 463            | 2020-03-26       | 2021-03-26           |
| UNI-T                                | Multimeter                               | UT39A             | M130199938         | 2019-07-23       | 2021-07-23           |
| Ouli                                 | Band Rejector Filter                     | 400-520M          | 087                | 2020-01-23       | 2021-01-23           |

**\* Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

**FCC §2.1046 & § 22.727 & §74.461 & §80.215& §90.205 - RF OUTPUT POWER**

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**Applicable Standard**

FCC §2.1046, § 22.727, §74.461, §80.215 and §90.205

**Test Procedure**

Conducted RF Output Power:

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

Spectrum Analyzer Setting:

|         |           |
|---------|-----------|
| R B/W   | Video B/W |
| 100 kHz | 300 kHz   |

**Test Data****Environmental Conditions**

|                           |                      |
|---------------------------|----------------------|
| <b>Temperature:</b>       | 21.5~25.8°C          |
| <b>Relative Humidity:</b> | 35~47 %              |
| <b>ATM Pressure:</b>      | 100.9~102.5 kPa      |
| <b>Tester:</b>            | James Chen           |
| <b>Test Date:</b>         | 2020-11-24~202012-24 |

**Test Mode:** Transmitting

**Test Result:** Compliance. Please refer to following table.

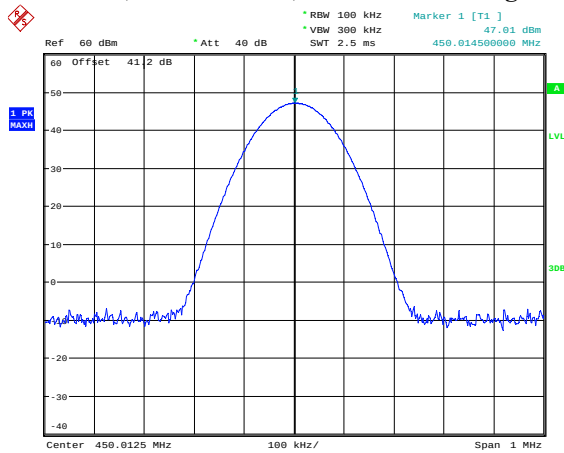
| Channel Separation | Test Modulation | Test Channel | Test Frequency (MHz) | Conducted Output Power (dBm) |                 | Limit (dBm)      |                 | Note        |
|--------------------|-----------------|--------------|----------------------|------------------------------|-----------------|------------------|-----------------|-------------|
|                    |                 |              |                      | High Power Level             | Low Power Level | High Power Level | Low Power Level |             |
| 12.5kHz            | FM              | Low          | 450.0125             | 47.01                        | 30.75           | 47.78            | 30.79           | FCC part 90 |
|                    |                 | Additional   | 453.2125             | 47.08                        | 29.34           | 47.78            | 30.79           |             |
|                    |                 | Middle       | 481.0000             | 47.19                        | 29.54           | 47.78            | 30.79           |             |
|                    |                 | High         | 526.9875             | 47.02                        | 29.36           | 47.78            | 30.79           | For federal |
|                    |                 | Additional   | 455.0125             | 47.06                        | 29.32           | 47.78            | 30.79           | FCC part 74 |
|                    |                 | Additional   | 454.0125             | 46.94                        | 30.77           | 47.78            | 30.79           | FCC part 22 |
|                    | 4FSK            | Low          | 450.0125             | 47.02                        | 30.70           | 47.78            | 30.79           | FCC part 90 |
|                    |                 | Additional   | 453.2125             | 47.10                        | 29.22           | 47.78            | 30.79           |             |
|                    |                 | Middle       | 481.0000             | 47.20                        | 29.50           | 47.78            | 30.79           |             |
|                    |                 | High         | 526.9875             | 47.03                        | 29.28           | 47.78            | 30.79           | For federal |
|                    |                 | Additional   | 455.0125             | 47.04                        | 29.27           | 47.78            | 30.79           | FCC part 74 |
|                    |                 | Additional   | 454.0125             | 47.06                        | 30.76           | 47.78            | 30.79           | FCC part 22 |
| 25kHz              | FM              | Additional   | 459.9875             | 47.02                        | 30.70           | 47.78            | 30.79           | FCC part 80 |
|                    |                 | Additional   | 455.0125             | 47.05                        | 29.34           | 47.78            | 30.79           | FCC part 74 |
|                    |                 | Additional   | 454.0125             | 46.95                        | 30.75           | 47.78            | 30.79           | FCC part 22 |

*Note: The high rated power level is 50W(47dBm), and low rated power level is 1 W(30dBm).*

*The output power shall not exceed by more than 20 percent the manufacturer's rated output power for the particular transmitter specifically listed on the authorization.*

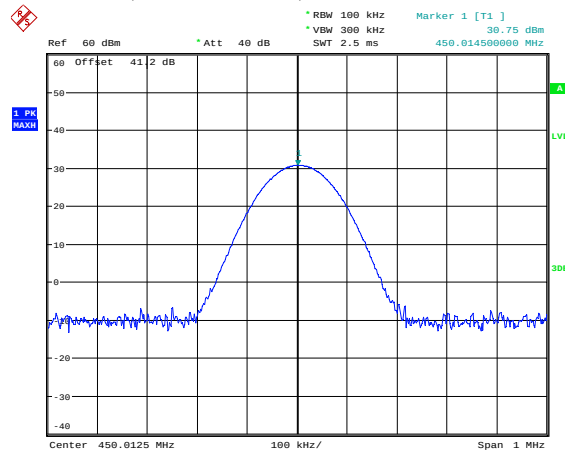
FM, 12.5kHz:

Part 90, Low Channel, 450.0125 MHz High Power



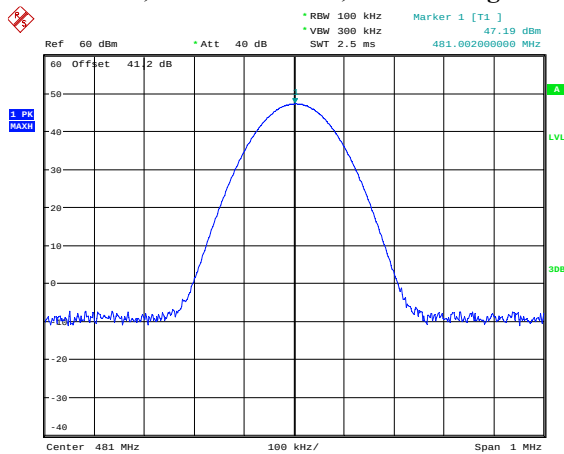
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Part 90, Low Channel, 450.0125 MHz Low Power



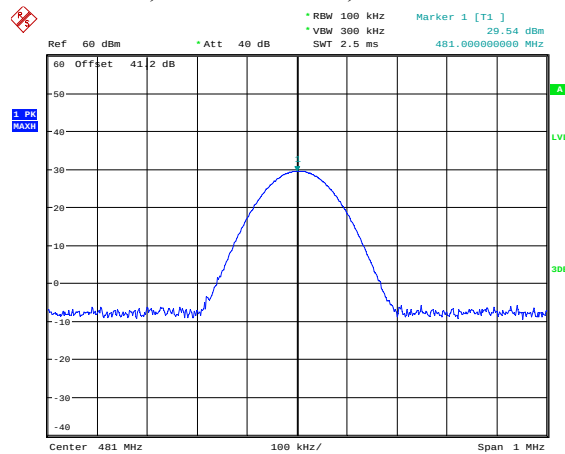
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Part 90, Middle Channel, 481 MHz High Power



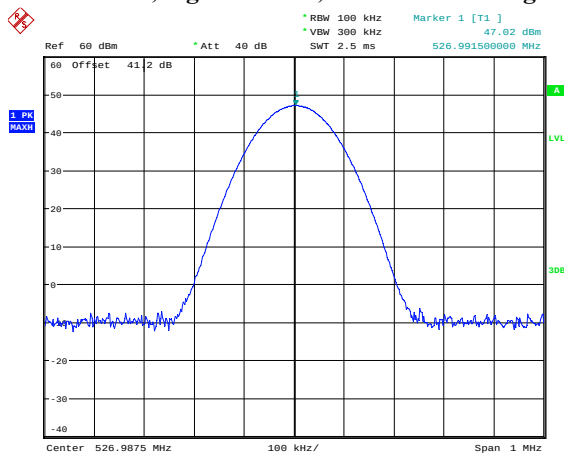
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Part 90, Middle Channel, 481 MHz Low Power



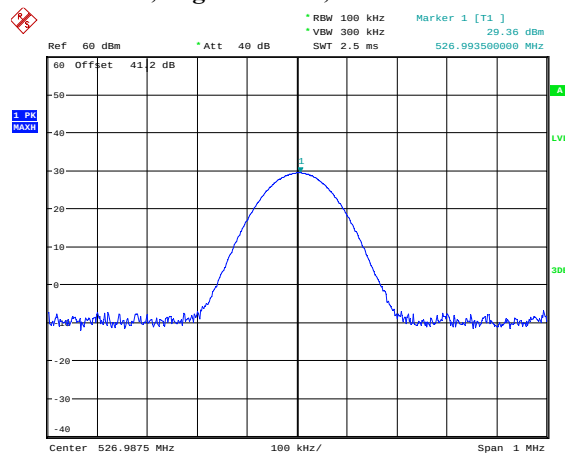
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For federal, High Channel, 526.9875 MHz High Power

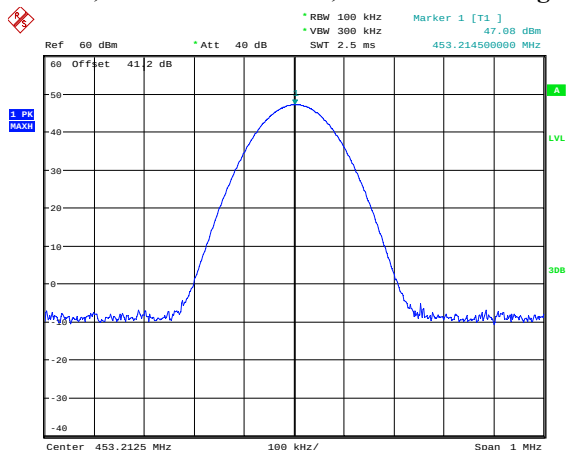


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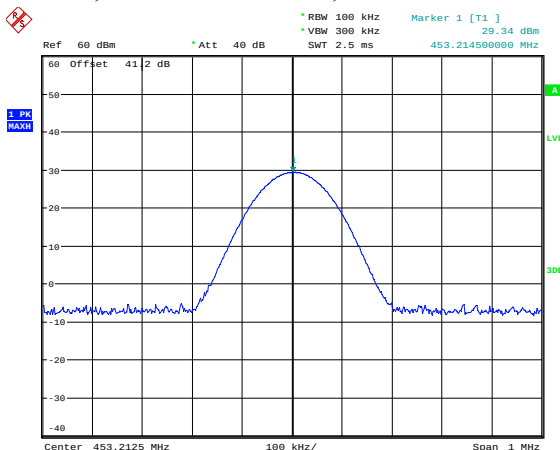
For federal, High Channel, 526.9875 MHz Low Power



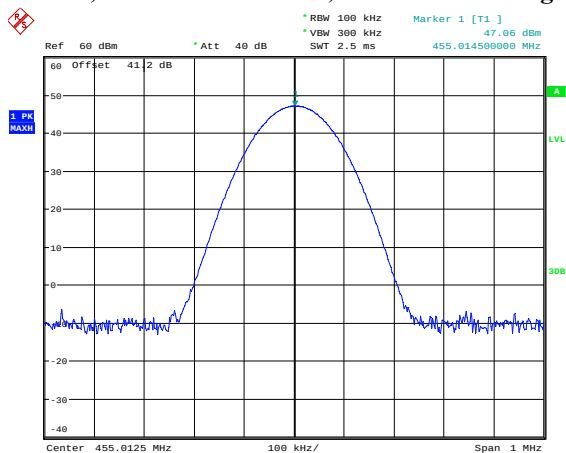
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**Part 90, Additional Channel, 453.2125 MHz High Power**

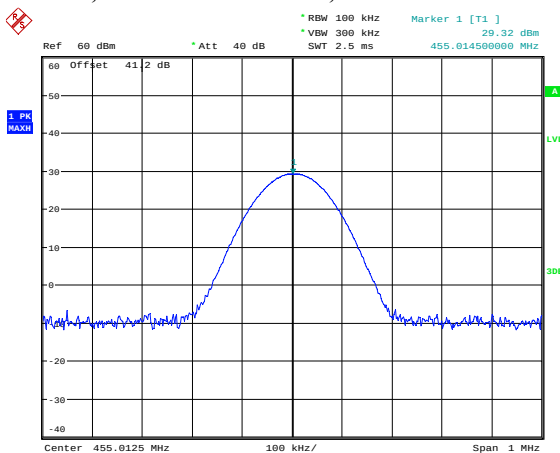
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**Part 90, Additional Channel, 453.2125 MHz Low Power**

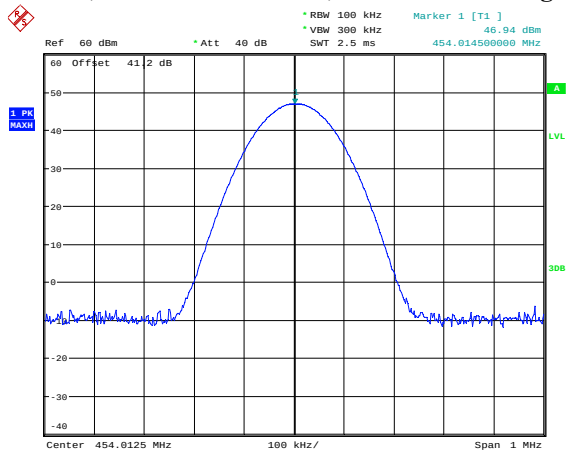
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**Part 74, Additional Channel, 455.0125 MHz High Power**

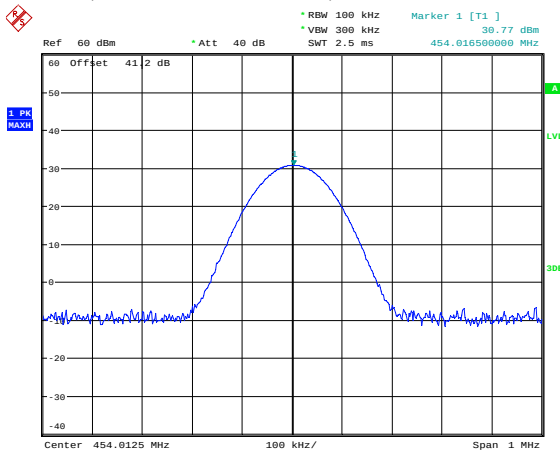
Date: 24.NOV.2020 18:28:37

**Part 74, Additional Channel, 455.0125 MHz Low Power**

Date: 23.DEC.2020 21:49:54

**Part 22, Additional Channel, 454.0125 MHz High Power**

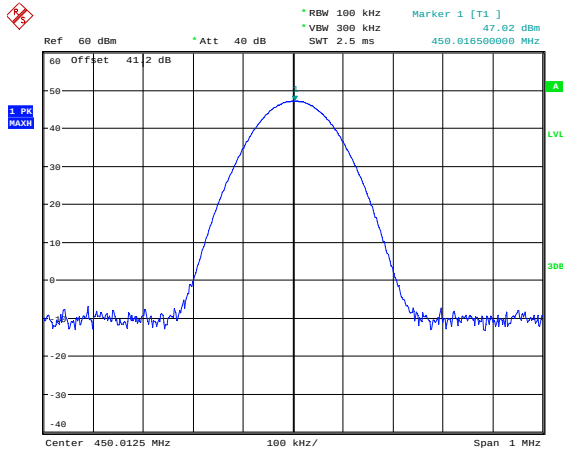
Date: 24.NOV.2020 18:32:15

**Part 22, Additional Channel, 454.0125 MHz Low Power**

Date: 24.NOV.2020 18:33:00

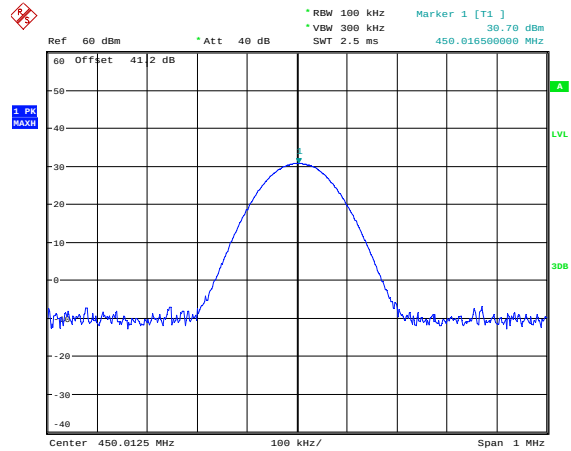
4FSK, 12.5kHz:

Part 90, Low Channel, 450.0125 MHz High Power



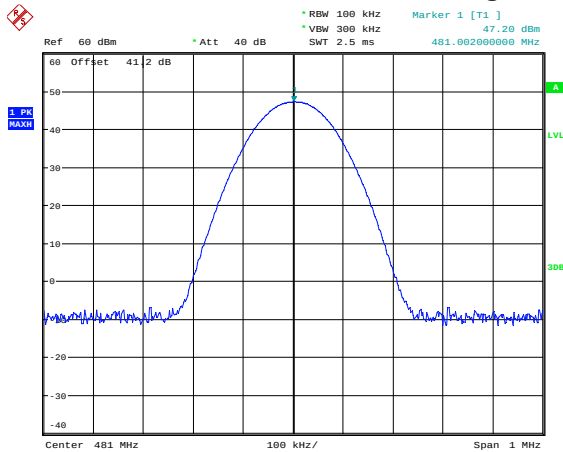
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Part 90, Low Channel, 450.0125 MHz Low Power



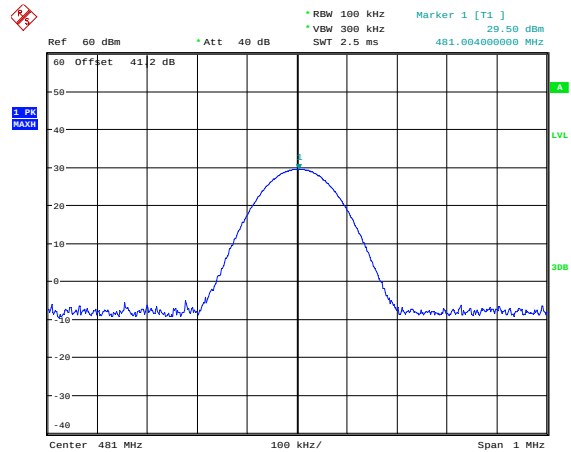
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Part 90, Middle Channel, 481 MHz High Power



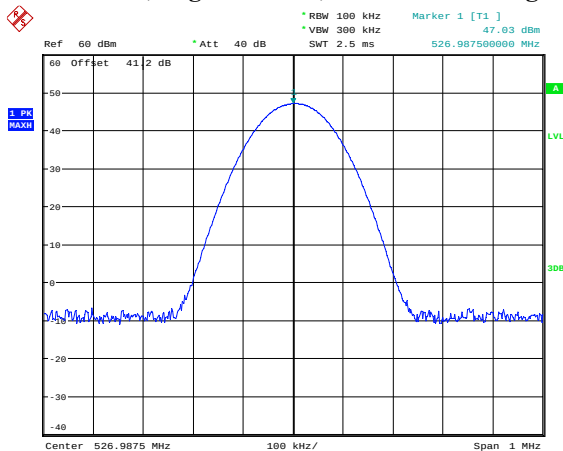
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Part 90, Middle Channel, 481 MHz Low Power



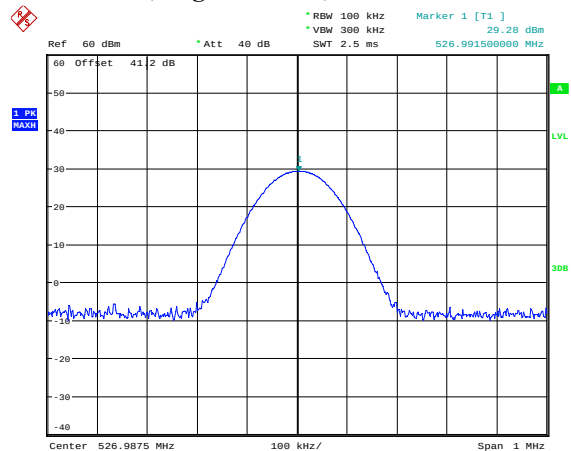
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For federal, High Channel, 526.9875 MHz High Power



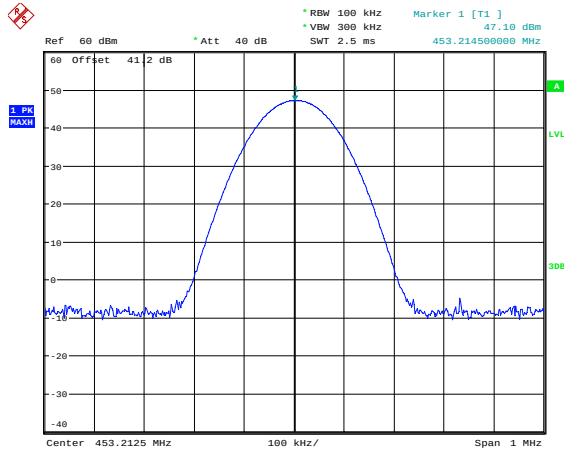
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For federal, High Channel, 526.9875 MHz Low Power



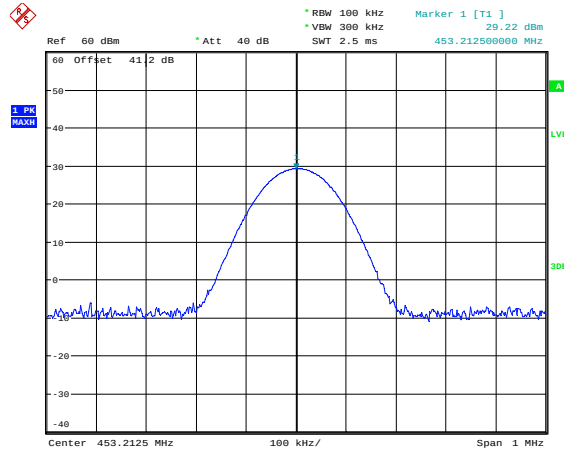
Date: 23.DEC.2020 21:49:11

**Part 90, Additional Channel, 453.2125 MHz High Power**



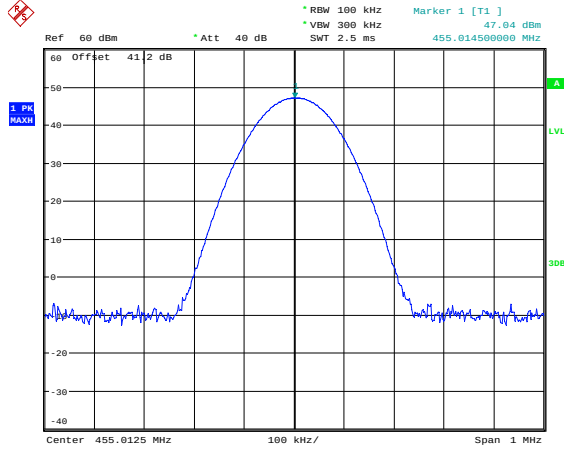
Date: 24.NOV.2020 18:12:55

**Part 90, Additional Channel, 453.2125 MHz Low Power**



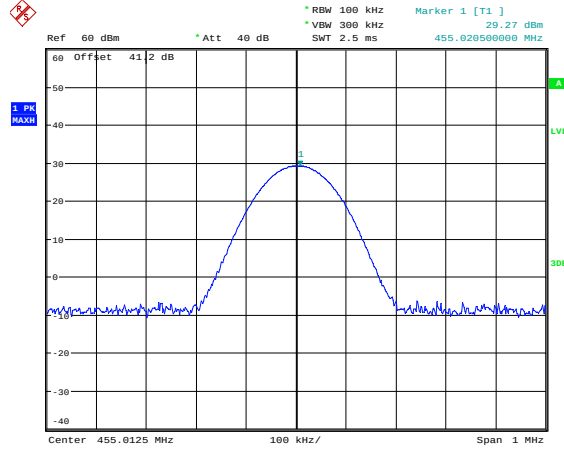
Date: 23.DEC.2020 21:48:13

**Part 74, Additional Channel, 455.0125 MHz High Power**



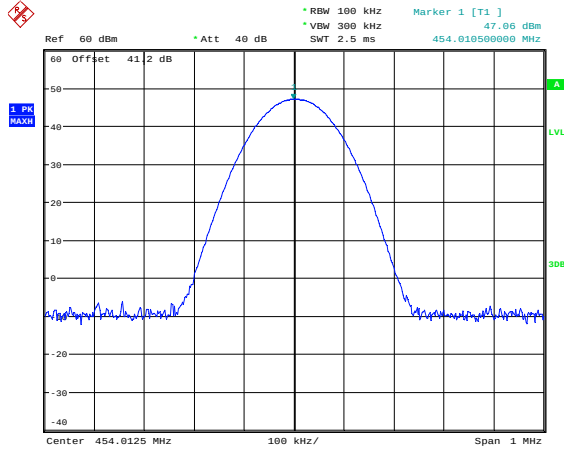
Date: 24.NOV.2020 18:30:57

**Part 74, Additional Channel, 455.0125 MHz Low Power**



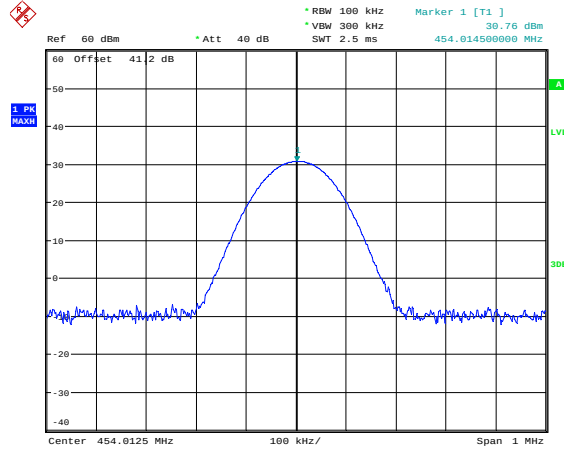
Date: 23.DEC.2020 21:50:40

**Part 22, Additional Channel, 454.0125 MHz High Power**



Date: 24.NOV.2020 18:34:52

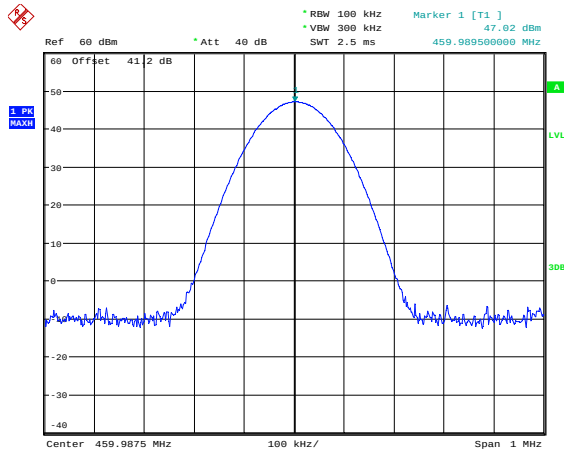
**Part 22, Additional Channel, 454.0125 MHz Low Power**



Date: 24.NOV.2020 18:35:04

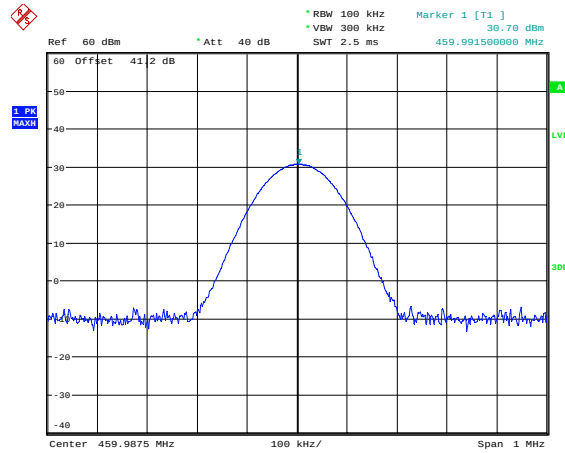
FM, 25kHz:

Part 80, Additional Channel, 459.9875 MHz High Power



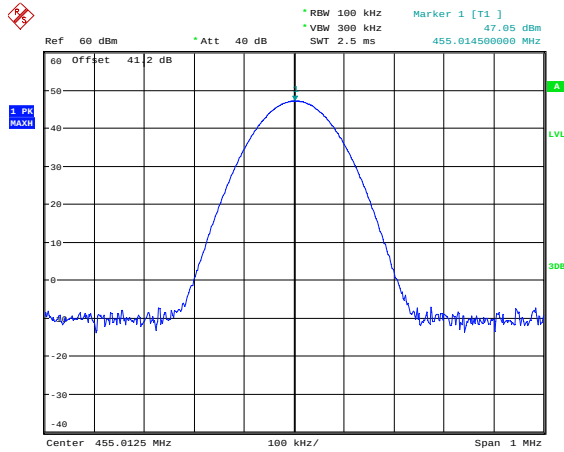
Date: 24.NOV.2020 18:27:12

Part 80, Additional Channel, 459.9875 MHz Low Power



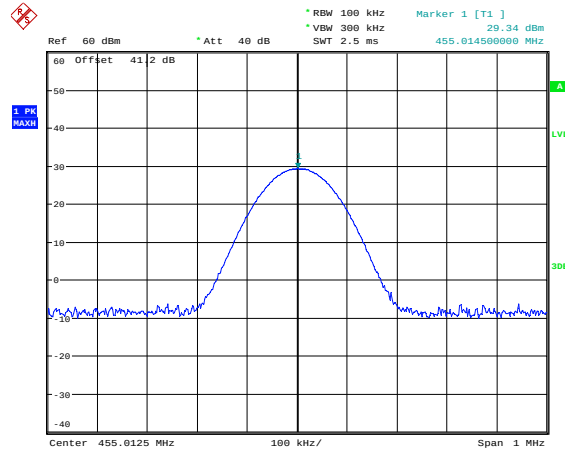
Date: 24.NOV.2020 18:28:02

Part 74, Additional Channel, 455.0125 MHz High Power



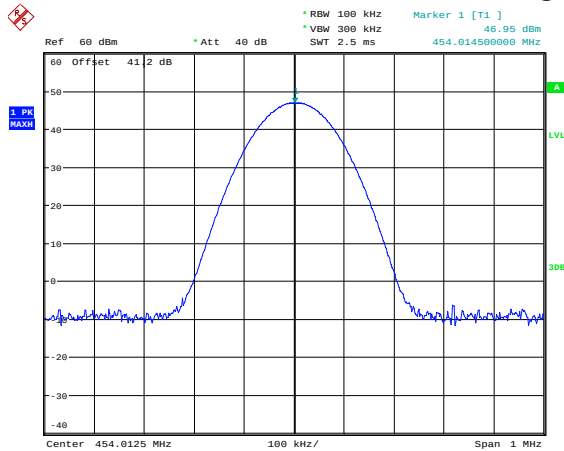
Date: 24.NOV.2020 18:29:52

Part 74, Additional Channel, 455.0125 MHz Low Power



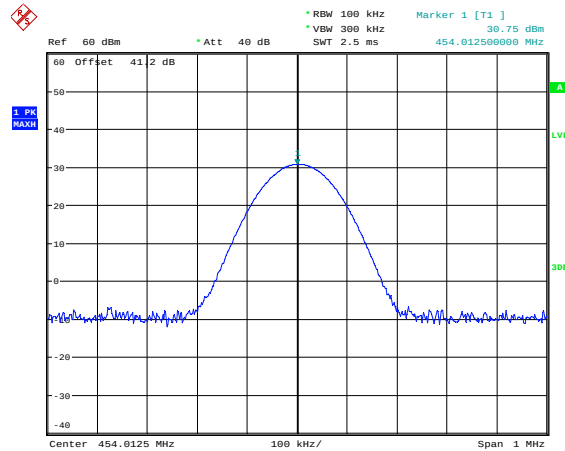
Date: 23.DEC.2020 21:50:21

Part 22, Additional Channel, 454.0125 MHz High Power



Date: 24.NOV.2020 18:34:06

Part 22, Additional Channel, 454.0125 MHz Low Power



Date: 24.NOV.2020 18:34:30

## FCC §2.1047 - MODULATION CHARACTERISTIC

### Applicable Standard

FCC §2.1047

- (a) Equipment which utilizes voice modulated communication shall show the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz. for equipment which is required to have a low pass filter, the frequency response of the filter, or all of the circuitry installed between the modulation limited and the modulated stage shall be supplied.
- (b) Equipment which employs modulation limiting, a curve showing the percentage of modulation versus the modulation input voltage shall be supplied.

### Test Procedure

Test Method: TIA-603-E 2.2.3

### Test Data

#### Environmental Conditions

|                    |            |
|--------------------|------------|
| Temperature:       | 25.5°C     |
| Relative Humidity: | 42 %       |
| ATM Pressure:      | 100.9 kPa  |
| Tester:            | James Chen |
| Test Date:         | 2020-11-24 |

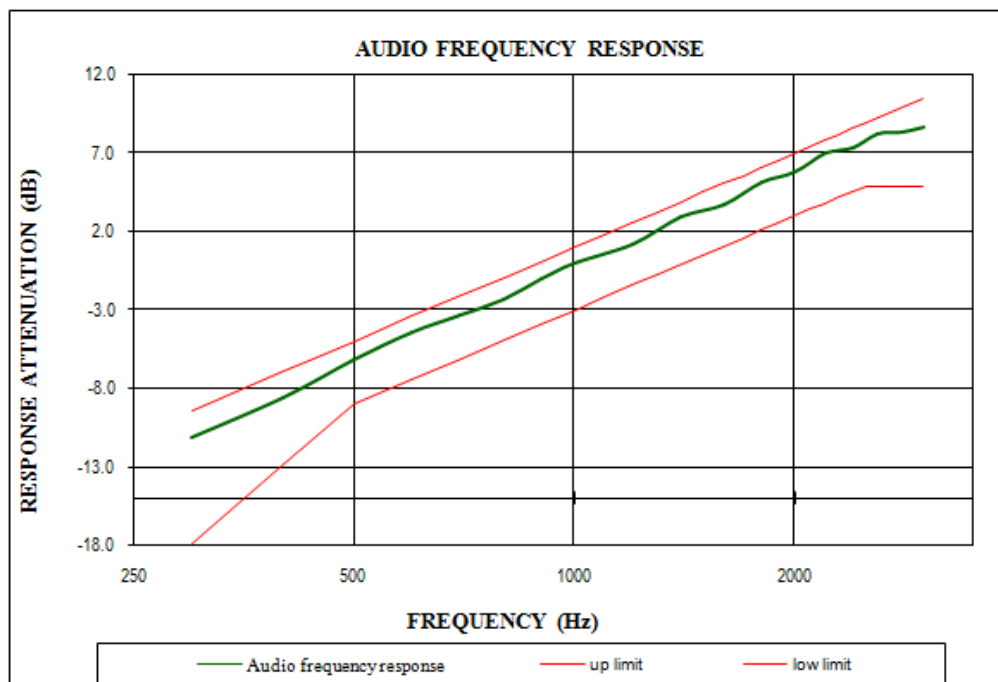
Test Mode: Transmitting

Test Result: Compliance. *please refer to the following tables.*

**Audio Frequency Response – High Power****12.5kHz:**

Carrier Frequency: 453.2125 MHz

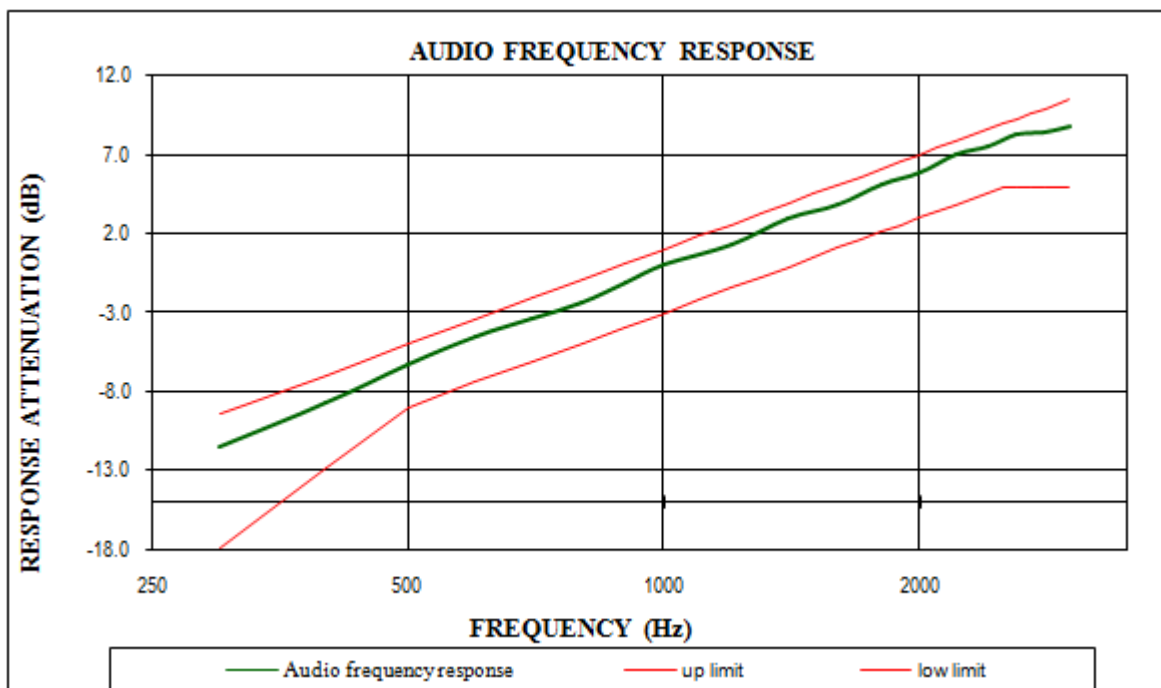
| Modulation Frequency (Hz) | Response data (dB) |
|---------------------------|--------------------|
| 300                       | -11.12             |
| 400                       | -8.55              |
| 500                       | -6.18              |
| 600                       | -4.43              |
| 700                       | -3.37              |
| 800                       | -2.31              |
| 900                       | -1.06              |
| 1000                      | 0.00               |
| 1200                      | 1.23               |
| 1400                      | 2.94               |
| 1600                      | 3.78               |
| 1800                      | 5.17               |
| 2000                      | 5.78               |
| 2200                      | 7.00               |
| 2400                      | 7.40               |
| 2600                      | 8.26               |
| 2800                      | 8.35               |
| 3000                      | 8.68               |



25 kHz:

Carrier Frequency: 459.9875 MHz

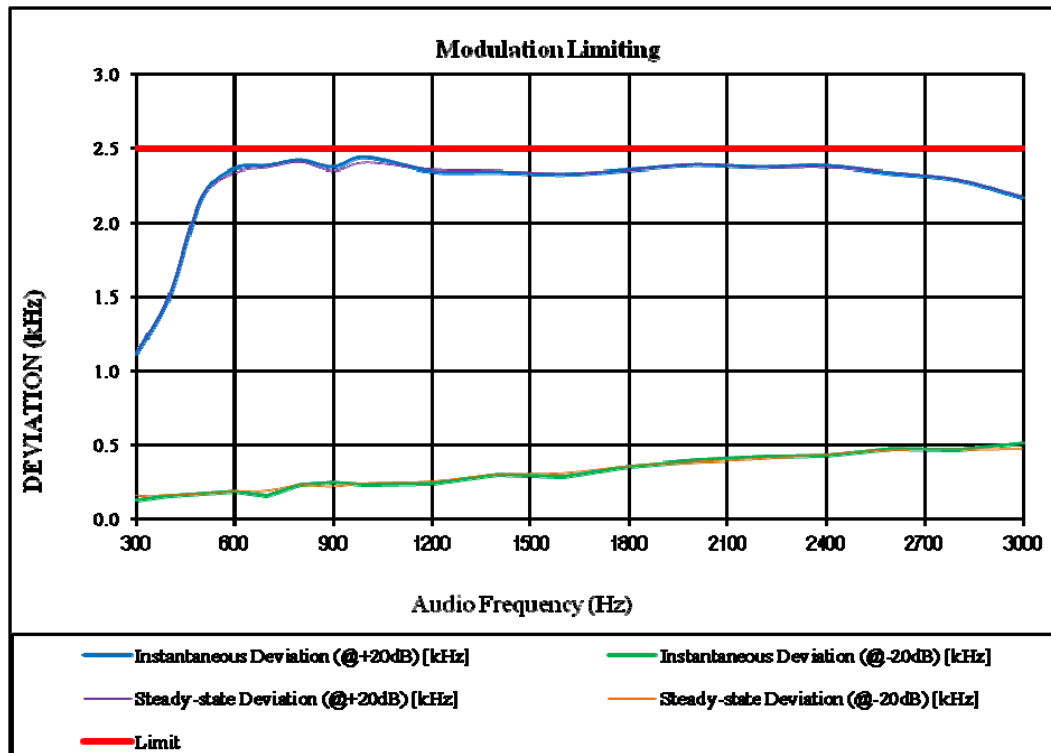
| Modulation Frequency (Hz) | Response data (dB) |
|---------------------------|--------------------|
| 300                       | -11.44             |
| 400                       | -8.76              |
| 500                       | -6.24              |
| 600                       | -4.46              |
| 700                       | -3.41              |
| 800                       | -2.38              |
| 900                       | -1.07              |
| 1000                      | 0.00               |
| 1200                      | 1.32               |
| 1400                      | 2.98               |
| 1600                      | 3.81               |
| 1800                      | 5.18               |
| 2000                      | 5.84               |
| 2200                      | 7.01               |
| 2400                      | 7.48               |
| 2600                      | 8.29               |
| 2800                      | 8.46               |
| 3000                      | 8.74               |



**MODULATION LIMITING – High Power****12.5kHz**

Carrier Frequency: 453.2125 MHz

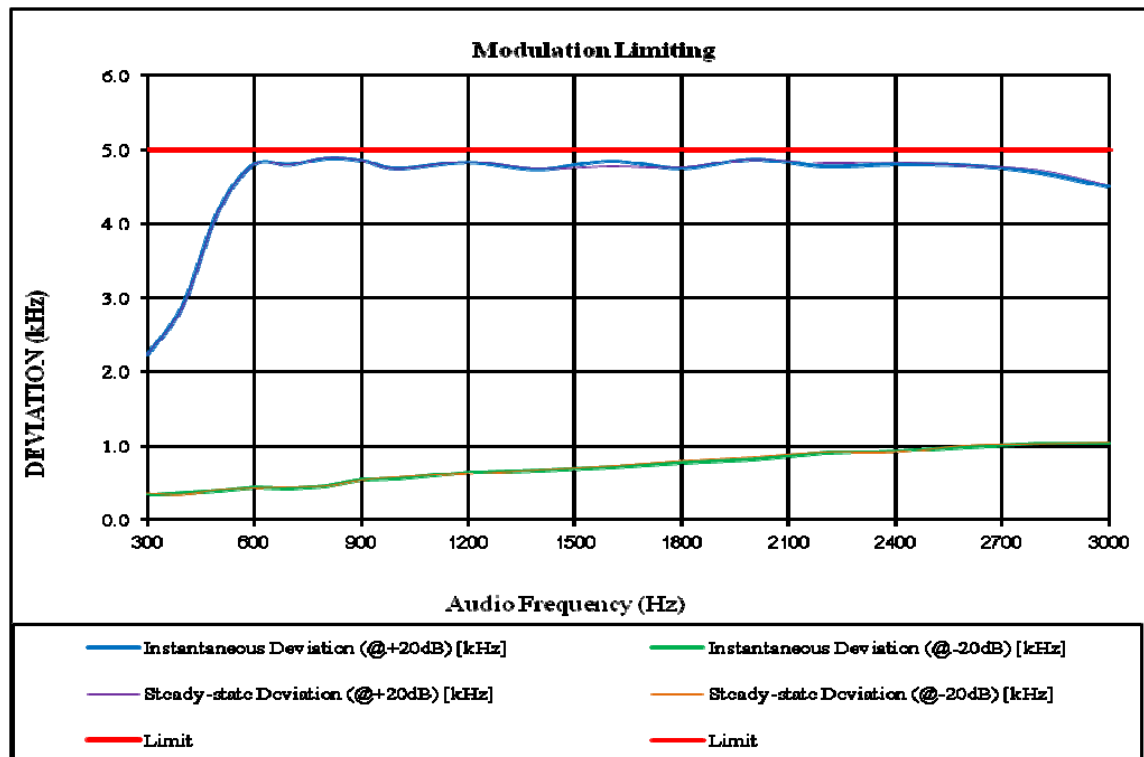
| Audio Frequency (Hz) | Instantaneous            |                          | Steady-state             |                          | Limit [KHz] |
|----------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------|
|                      | Deviation (@+20dB) [KHz] | Deviation (@-20dB) [KHz] | Deviation (@+20dB) [KHz] | Deviation (@-20dB) [KHz] |             |
| 300                  | 1.110                    | 0.125                    | 1.110                    | 0.155                    | 2.5         |
| 400                  | 1.493                    | 0.152                    | 1.497                    | 0.161                    | 2.5         |
| 500                  | 2.161                    | 0.169                    | 2.161                    | 0.167                    | 2.5         |
| 600                  | 2.360                    | 0.186                    | 2.333                    | 0.186                    | 2.5         |
| 700                  | 2.379                    | 0.158                    | 2.369                    | 0.193                    | 2.5         |
| 800                  | 2.416                    | 0.233                    | 2.406                    | 0.231                    | 2.5         |
| 900                  | 2.369                    | 0.246                    | 2.345                    | 0.222                    | 2.5         |
| 1000                 | 2.437                    | 0.232                    | 2.401                    | 0.244                    | 2.5         |
| 1200                 | 2.343                    | 0.237                    | 2.355                    | 0.257                    | 2.5         |
| 1400                 | 2.338                    | 0.299                    | 2.346                    | 0.304                    | 2.5         |
| 1600                 | 2.323                    | 0.284                    | 2.328                    | 0.314                    | 2.5         |
| 1800                 | 2.351                    | 0.358                    | 2.348                    | 0.362                    | 2.5         |
| 2000                 | 2.384                    | 0.397                    | 2.384                    | 0.385                    | 2.5         |
| 2200                 | 2.369                    | 0.421                    | 2.367                    | 0.405                    | 2.5         |
| 2400                 | 2.379                    | 0.427                    | 2.369                    | 0.435                    | 2.5         |
| 2600                 | 2.329                    | 0.475                    | 2.339                    | 0.465                    | 2.5         |
| 2800                 | 2.286                    | 0.469                    | 2.287                    | 0.469                    | 2.5         |
| 3000                 | 2.162                    | 0.510                    | 2.172                    | 0.474                    | 2.5         |



25kHz:

Carrier Frequency: 459.9875 MHz

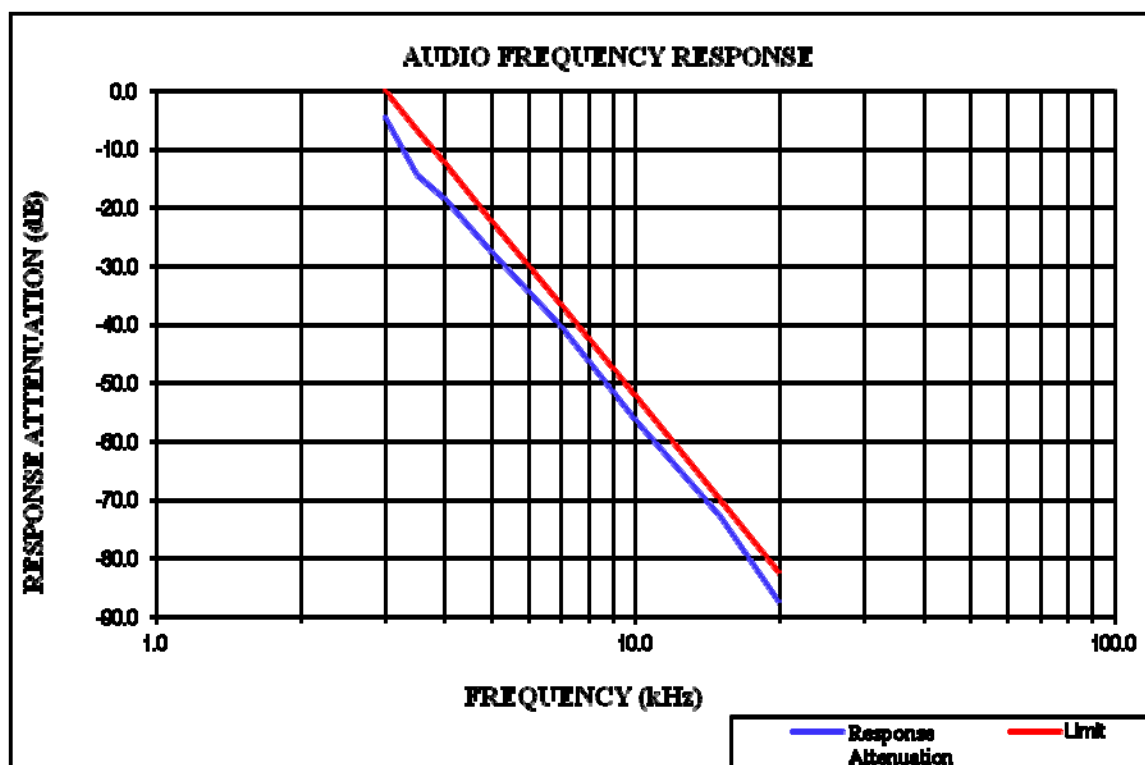
| Audio Frequency (Hz) | Instantaneous            |                          | Steady-state             |                          | Limit [KHz] |
|----------------------|--------------------------|--------------------------|--------------------------|--------------------------|-------------|
|                      | Deviation (@+20dB) [KHz] | Deviation (@-20dB) [KHz] | Deviation (@+20dB) [KHz] | Deviation (@-20dB) [KHz] |             |
| 300                  | 2.230                    | 0.341                    | 2.234                    | 0.368                    | 5           |
| 400                  | 2.904                    | 0.377                    | 2.888                    | 0.351                    | 5           |
| 500                  | 4.184                    | 0.398                    | 4.169                    | 0.412                    | 5           |
| 600                  | 4.806                    | 0.448                    | 4.802                    | 0.432                    | 5           |
| 700                  | 4.802                    | 0.426                    | 4.798                    | 0.450                    | 5           |
| 800                  | 4.893                    | 0.458                    | 4.900                    | 0.459                    | 5           |
| 900                  | 4.867                    | 0.540                    | 4.867                    | 0.534                    | 5           |
| 1000                 | 4.752                    | 0.559                    | 4.748                    | 0.579                    | 5           |
| 1200                 | 4.835                    | 0.649                    | 4.840                    | 0.624                    | 5           |
| 1400                 | 4.740                    | 0.681                    | 4.750                    | 0.679                    | 5           |
| 1600                 | 4.852                    | 0.721                    | 4.784                    | 0.729                    | 5           |
| 1800                 | 4.754                    | 0.783                    | 4.768                    | 0.800                    | 5           |
| 2000                 | 4.880                    | 0.826                    | 4.878                    | 0.848                    | 5           |
| 2200                 | 4.780                    | 0.903                    | 4.828                    | 0.908                    | 5           |
| 2400                 | 4.807                    | 0.941                    | 4.833                    | 0.913                    | 5           |
| 2600                 | 4.791                    | 0.997                    | 4.786                    | 1.012                    | 5           |
| 2800                 | 4.700                    | 1.036                    | 4.734                    | 1.025                    | 5           |
| 3000                 | 4.504                    | 1.036                    | 4.532                    | 1.049                    | 5           |



**Audio Frequency Low Pass Filter Response – High Power****12.5kHz:**

Carrier Frequency: 453.2125 MHz

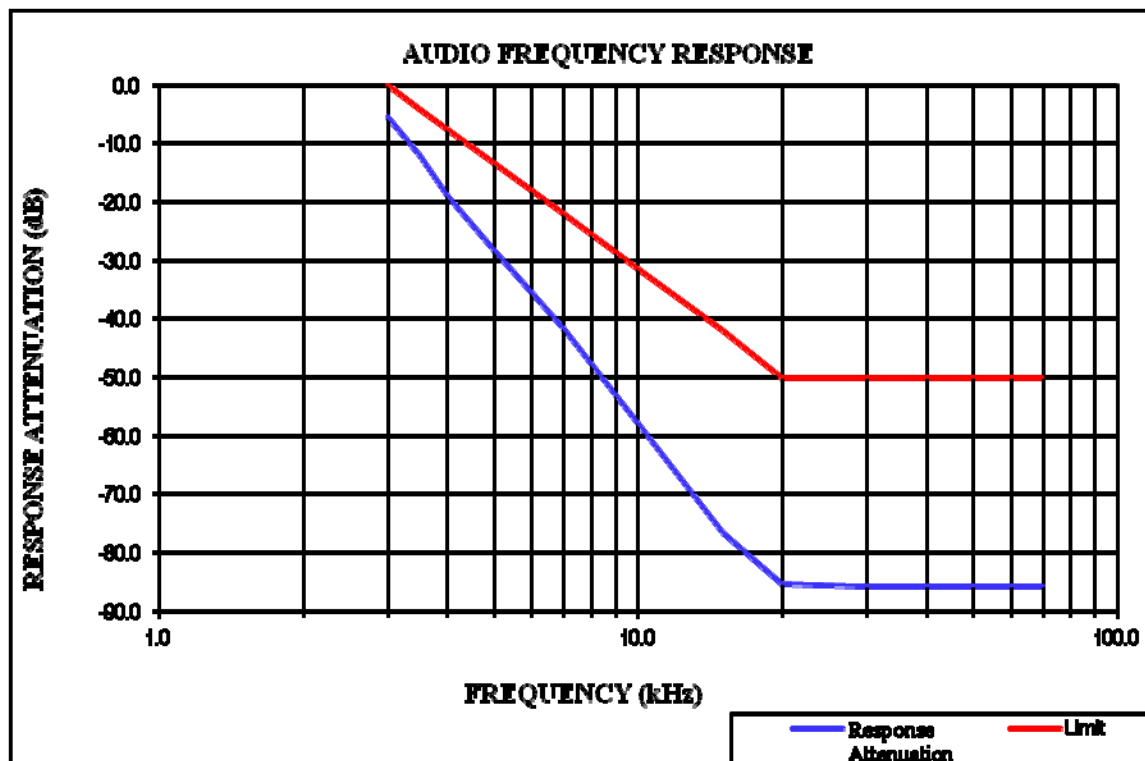
| Audio Frequency (kHz) | Response Attenuation (dB) | Limit (dB) |
|-----------------------|---------------------------|------------|
| 3.0                   | -4.5                      | 0.0        |
| 3.5                   | -14.4                     | -6.7       |
| 4.0                   | -18.6                     | -12.5      |
| 5.0                   | -27.5                     | -22.2      |
| 7.0                   | -40.3                     | -36.8      |
| 10.0                  | -56.5                     | -52.3      |
| 15.0                  | -72.9                     | -69.9      |
| 20.0                  | -87.6                     | -82.5      |



25kHz:

Carrier Frequency: 459.9875 MHz

| Audio Frequency (kHz) | Response Attenuation (dB) | Limit (dB) |
|-----------------------|---------------------------|------------|
| 3.0                   | -5.3                      | 0.0        |
| 3.5                   | -12.0                     | -4.0       |
| 4.0                   | -19.1                     | -7.5       |
| 5.0                   | -28.1                     | -13.3      |
| 7.0                   | -41.8                     | -22.1      |
| 10.0                  | -57.9                     | -31.4      |
| 15.0                  | -76.5                     | -41.9      |
| 20.0                  | -85.4                     | -50.0      |
| 30.0                  | -85.7                     | -50.0      |
| 50.0                  | -85.8                     | -50.0      |
| 70.0                  | -85.7                     | -50.0      |



**FCC §2.1049 & §22.357 & § 22.731 & §74.462 & 80.205& §80.207& §90.209 & §90.210 – OCCUPIED BANDWIDTH & EMISSION MASK****Applicable Standard**

FCC §2.1049, §22.357, § 22.731, §74.462, §80.205, §80.207, §90.209 and §90.210

**Test Procedure**

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 100 Hz or 300 Hz and the spectrum was recorded in the frequency band  $\pm 50$  kHz from the carrier frequency.

**Test Data****Environmental Conditions**

|                           |            |
|---------------------------|------------|
| <b>Temperature:</b>       | 25.5°C     |
| <b>Relative Humidity:</b> | 42 %       |
| <b>ATM Pressure:</b>      | 100.9 kPa  |
| <b>Tester:</b>            | James Chen |
| <b>Test Date:</b>         | 2020-11-24 |

**Test Mode:** Transmitting

**Test Result:** Compliance. *Please refer to following table and plots.*

*Test mode: transmitting*

| Test Mode       | Test Channel | Test Frequency (MHz) | High Power Level             |                               | Low Power Level              |                               | Note        |
|-----------------|--------------|----------------------|------------------------------|-------------------------------|------------------------------|-------------------------------|-------------|
|                 |              |                      | 99% Occupied Bandwidth (kHz) | 26dB Emission Bandwidth (kHz) | 99% Occupied Bandwidth (kHz) | 26dB Emission Bandwidth (kHz) |             |
| FM<br>12.5kHz   | Low          | 450.0125             | 9.856                        | 10.337                        | 9.856                        | 10.337                        | FCC part 90 |
|                 | Middle       | 481.0000             | 10.016                       | 10.337                        | 9.856                        | 10.337                        |             |
|                 | High         | 526.9875             | 9.856                        | 10.385                        | 9.936                        | 10.385                        | For federal |
|                 | Additional   | 453.2125             | 9.936                        | 10.417                        | 9.936                        | 10.337                        | FCC part 90 |
|                 | Additional   | 455.0125             | 9.856                        | 10.369                        | 9.936                        | 10.369                        | FCC part 74 |
|                 | Additional   | 454.0125             | 9.856                        | 10.419                        | 9.936                        | 10.339                        | FCC part 22 |
| 4FSK<br>12.5kHz | Low          | 450.0125             | 7.292                        | 9.215                         | 7.532                        | 8.814                         | FCC part 90 |
|                 | Middle       | 481.0000             | 7.692                        | 9.776                         | 7.682                        | 9.375                         |             |
|                 | High         | 526.9875             | 7.292                        | 9.343                         | 7.612                        | 9.744                         | For federal |
|                 | Additional   | 453.2125             | 7.532                        | 9.3.75                        | 7.292                        | 9.054                         | FCC part 90 |
|                 | Additional   | 455.0125             | 7.853                        | 9.327                         | 7.372                        | 9.487                         | FCC part 74 |
|                 | Additional   | 454.0125             | 7.292                        | 9.217                         | 7.212                        | 9.057                         | FCC part 22 |
| FM<br>25kHz     | Additional   | 459.9875             | 15.064                       | 15.865                        | 14.904                       | 16.026                        | FCC part 80 |
|                 | Additional   | 455.0125             | 14.904                       | 15.929                        | 15.064                       | 16.090                        | FCC part 74 |
|                 | Additional   | 454.0125             | 7.292                        | 9.217                         | 7.212                        | 9.057                         | FCC part 22 |

Note: Emission bandwidth was based on calculation method instead of measurement.

Emission Designator

Per CFR 47 §2.201& §2.202, BW = 2M + 2D

#### **For FM Mode (Channel Spacing: 12.5 kHz)**

Emission Designator 11K0F3E

In this case, the maximum modulating frequency is 3.0 kHz with a 2.5 kHz deviation.

$BW = 2(M+D) = 2*(3.0 \text{ kHz} + 2.5 \text{ kHz}) = 11 \text{ kHz} = 11K0$

F3E portion of the designator represents an FM voice transmission

Therefore, the entire designator for 12.5 kHz channel spacing FM mode is 11K0F3E.

#### **For FM Mode (Channel Spacing: 25 kHz)**

Emission Designator 16K0F3E

In this case, the maximum modulating frequency is 3.0 kHz with a 5.0 kHz deviation.

$BW = 2(M+D) = 2*(3.0 \text{ kHz} + 5.0 \text{ kHz}) = 16 \text{ kHz} = 16K0$

F3E portion of the designator represents an FM voice transmission

Therefore, the entire designator for 25 kHz channel spacing FM mode is 16K0F3E.

#### **For Digital Mode (Channel Spacing: 12.5 kHz)**

Emission Designator 7K60F1D and 7K60F1E

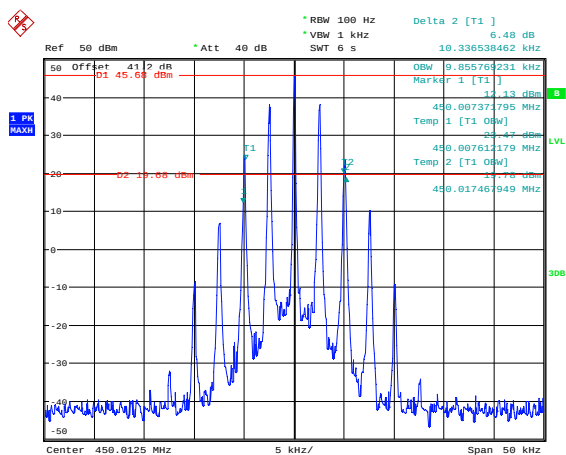
The 99% energy rule (title 47CFR 2.1049) was used for digital mode. It basically states that 99% of the modulation energy falls within X kHz, in this case, 7.60 kHz. The emission mask was obtained from 47CFR 90.210(d).

F1D and F1E portion of the designator indicates digital information.

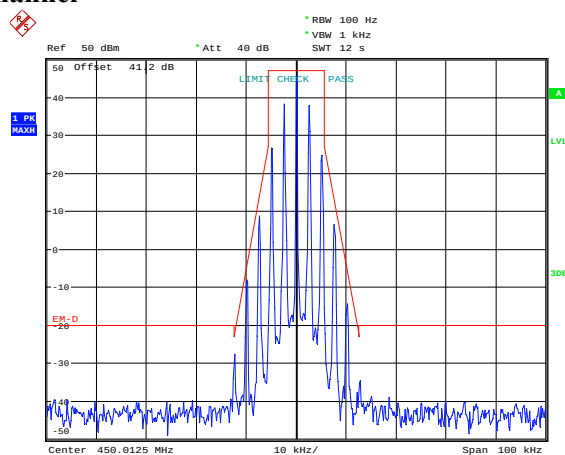
Therefore, the entire designator for 12.5 kHz channel spacing digital mode is 7K60F1D and 7K60F1E.

## FM, 12.5kHz High Power:

## Low Channel

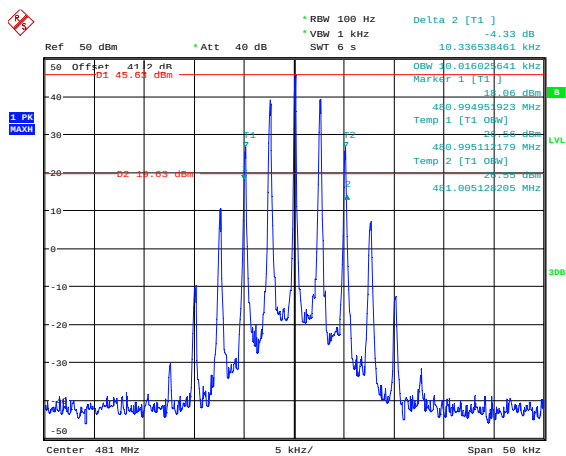


Date: 24.NOV.2020 19:12:08

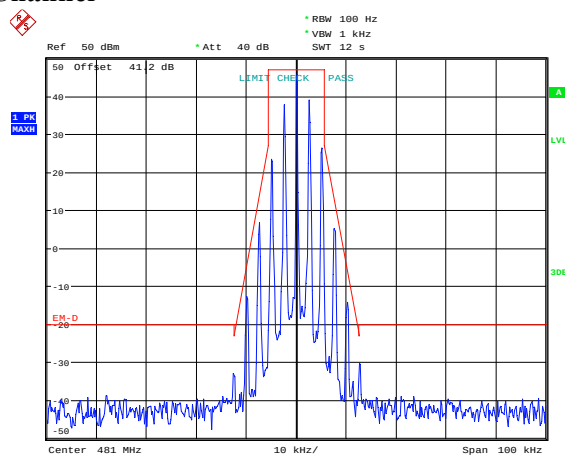


Date: 24.NOV.2020 19:18:53

## Middle Channel

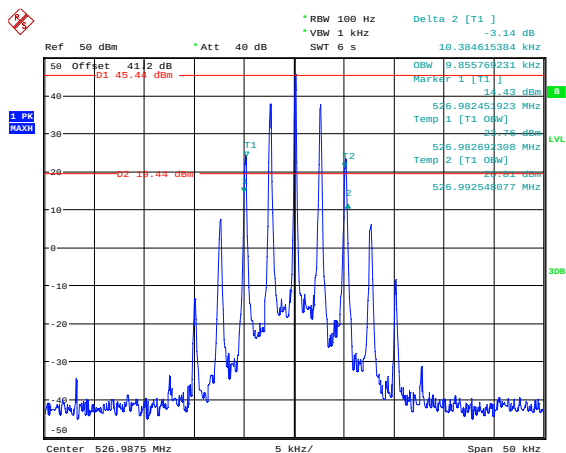


Date: 24.NOV.2020 19:48:15

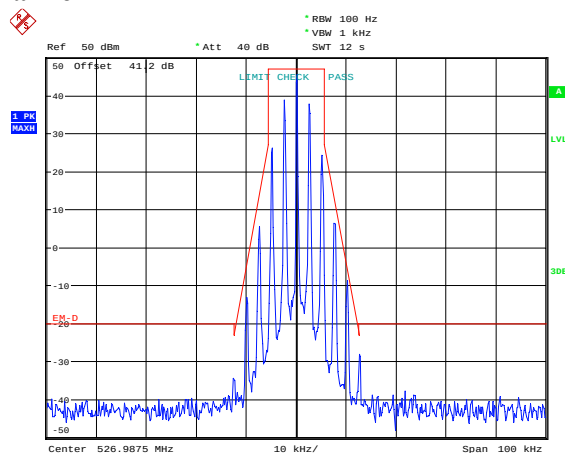


Date: 24.NOV.2020 19:49:12

## High Channel

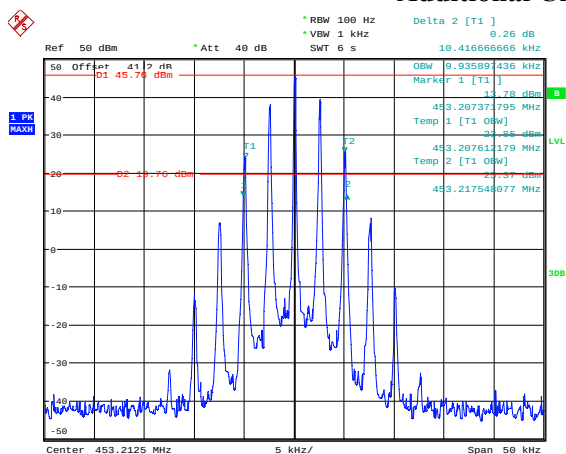


Date: 24.NOV.2020 20:01:34

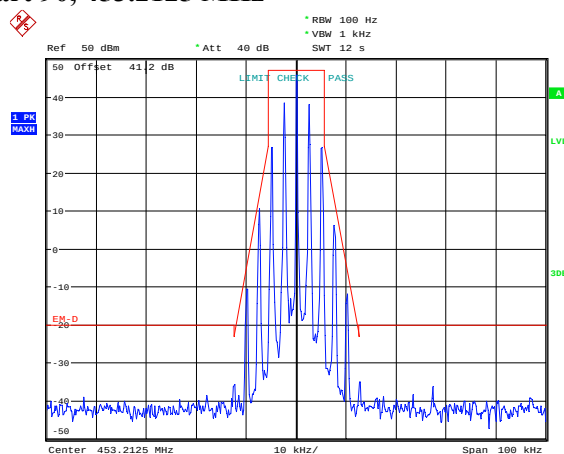


Date: 24.NOV.2020 20:02:31

## Additional Channel Part 90, 453.2125 MHz

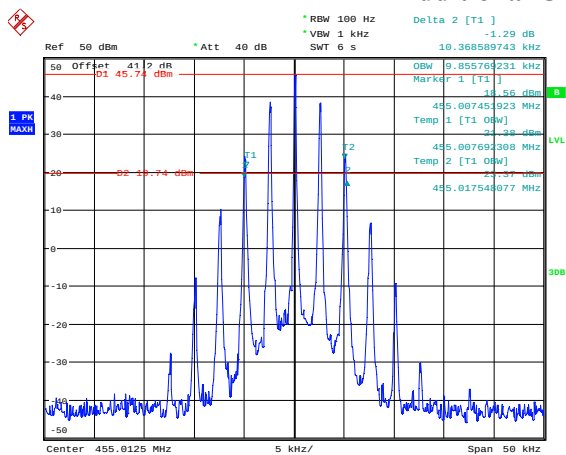


Date: 24.NOV.2020 19:32:16

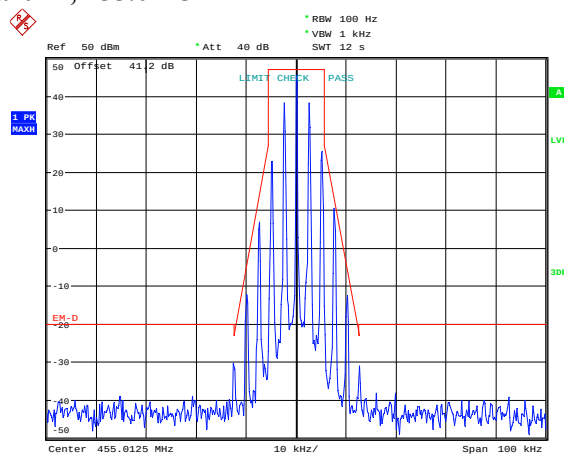


Date: 24.NOV.2020 19:33:49

## Additional Channel Part 74, 455.0125 MHz

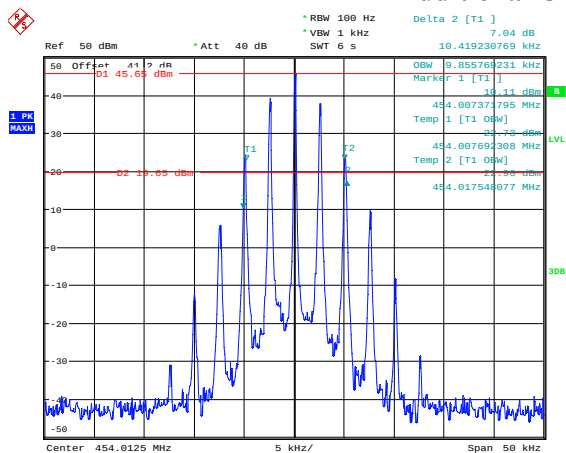


Date: 24.NOV.2020 20:11:22

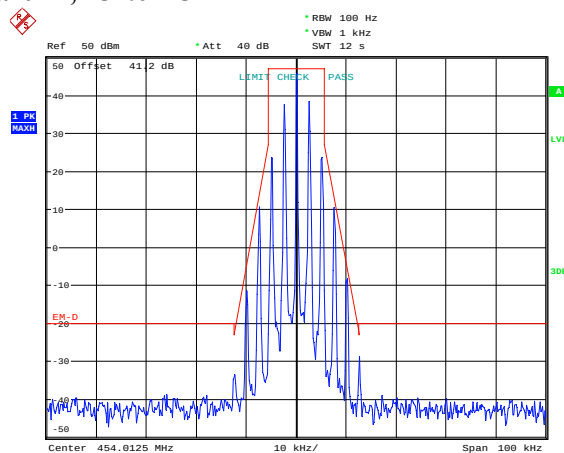


Date: 24.NOV.2020 20:12:00

## Additional Channel Part 22, 454.0125 MHz

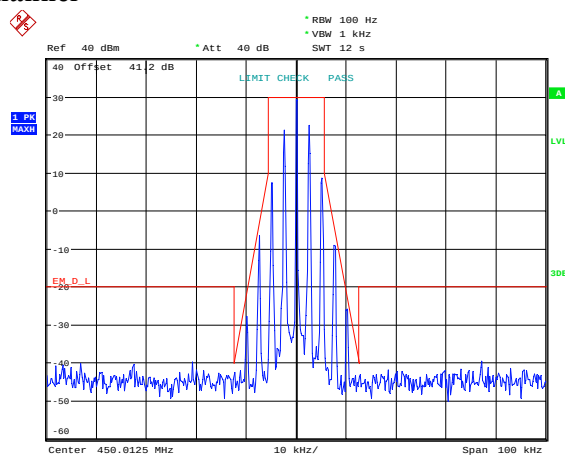


Date: 24.NOV.2020 20:21:04



Date: 24.NOV.2020 20:21:59

## Low Channel



Date: 24.NOV.2020 19:17:49

Ref 40 dBm

\* REM 100 Hz

\* Att 40 dB

\* VMW 1 kHz

SWT 12 s

40 Offset 41.2 dB

LEMIT CHECK PASS

1 PA

MAX

EM\_D\_L

Center 481 MHz

10 kHz/

Span 100 kHz

Date: 24.NOV.2020 19:51:14

Ref 40 dBm Att 40 dB BW 100 Hz VBW 1 kHz SWT 12 s

40 Offset 41.2 dB

1 PR MAX

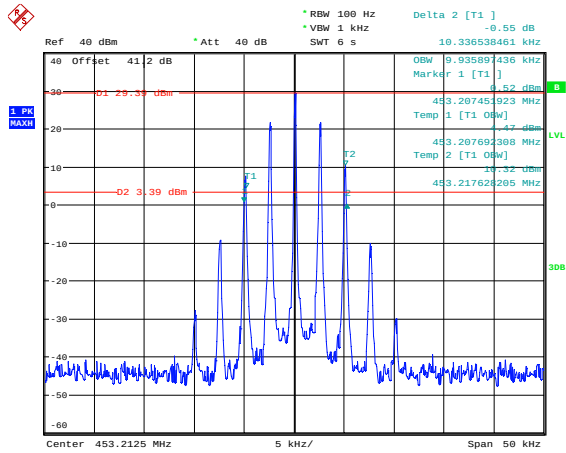
LIMIT CHECK PASS

EQU D L

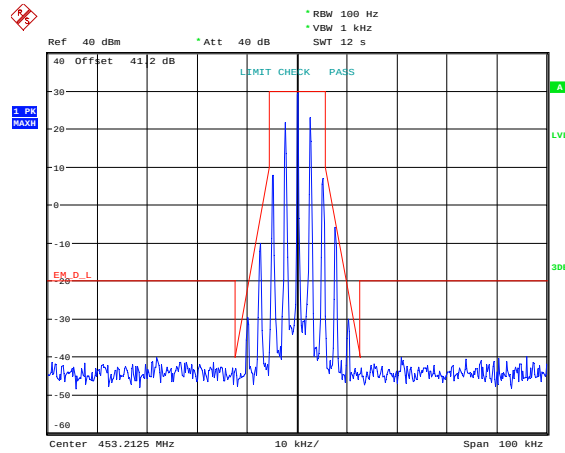
Center 526.9875 MHz 10 kHz/ Span 100 kHz

Date: 24.NOV.2020 20:04:29

## Additional Channel Part 90, 453.2125 MHz

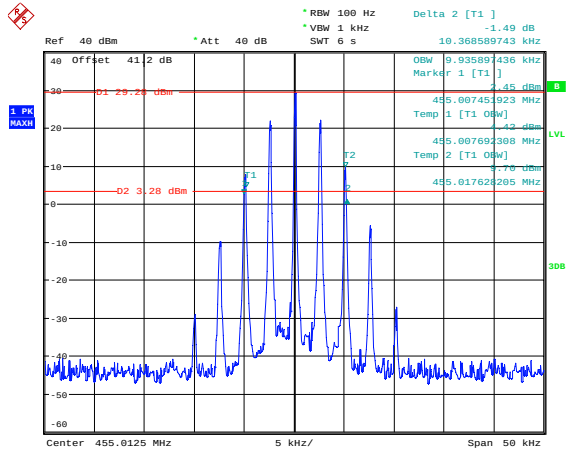


Date: 24.NOV.2020 19:35:19

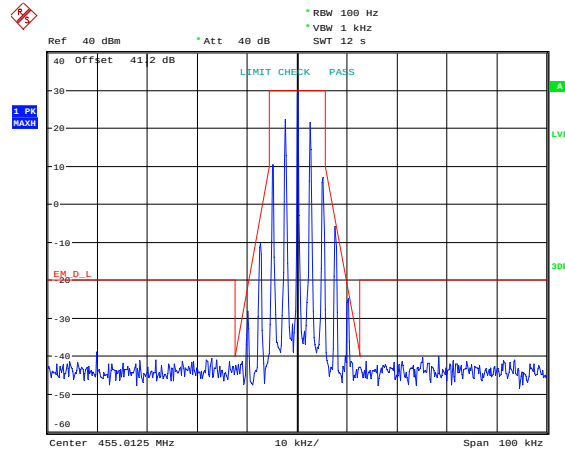


Date: 24.NOV.2020 19:36:13

## Additional Channel Part 74, 455.0125 MHz

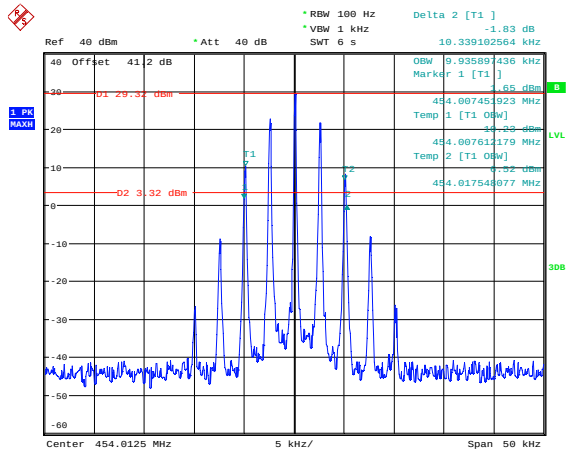


Date: 24.NOV.2020 20:13:32

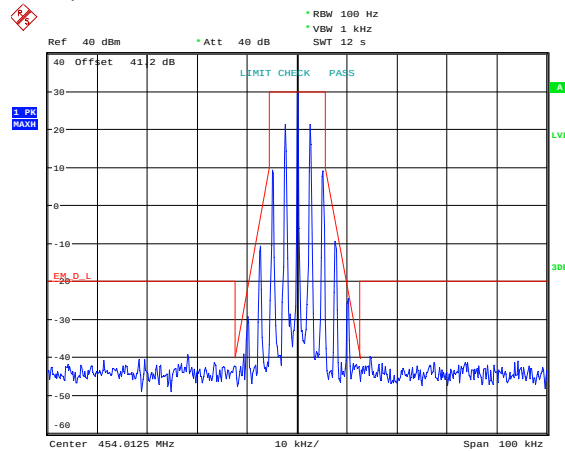


Date: 24.NOV.2020 20:14:25

## Additional Channel Part 22, 454.0125 MHz



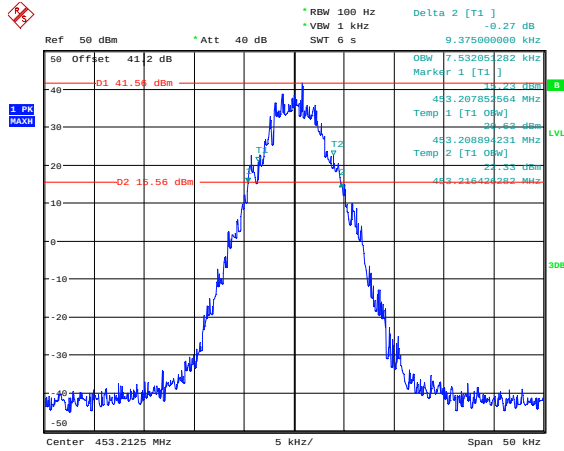
Date: 24.NOV.2020 20:23:07



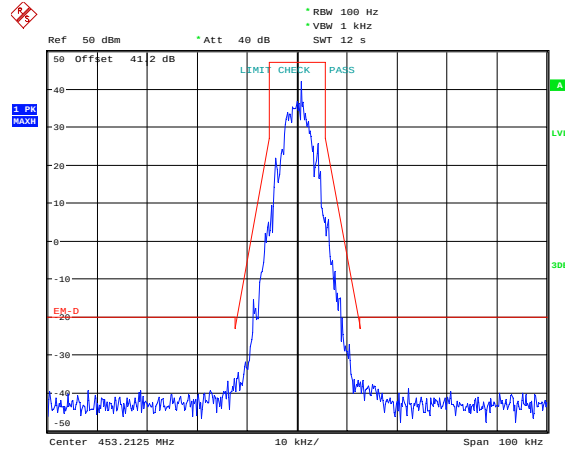
Date: 24.NOV.2020 20:23:59



### Additional Channel Part 90, 453.2125 MHz

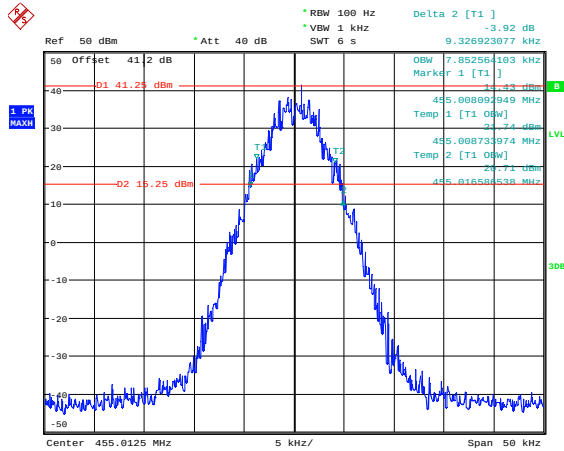


Date: 24.NOV.2020 19:38:31

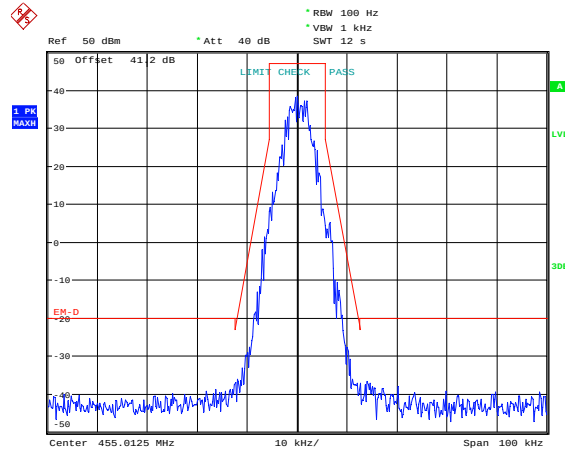


Date: 24.NOV.2020 19:39:25

### Additional Channel Part 74, 455.0125 MHz

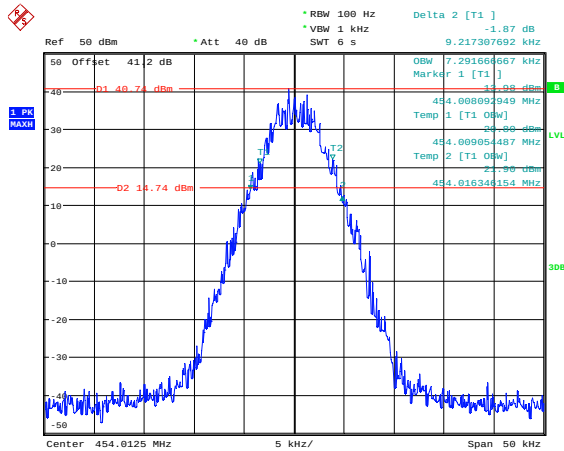


Date: 24.NOV.2020 20:16:16

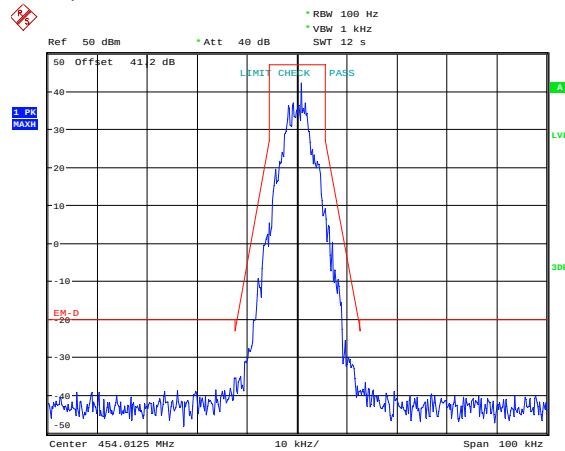


Date: 24.NOV.2020 20:17:11

### Additional Channel Part 22, 454.0125 MHz



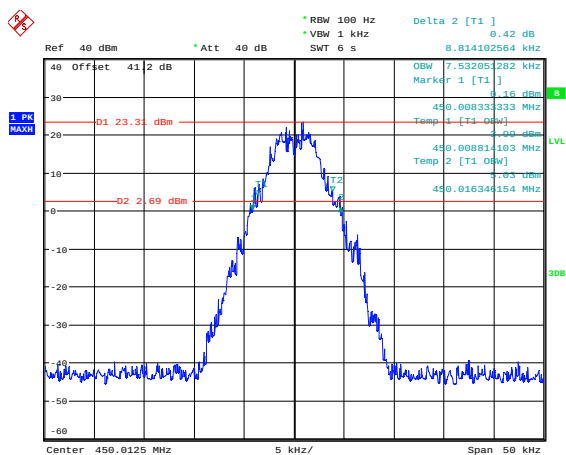
Date: 24.NOV.2020 20:25:46



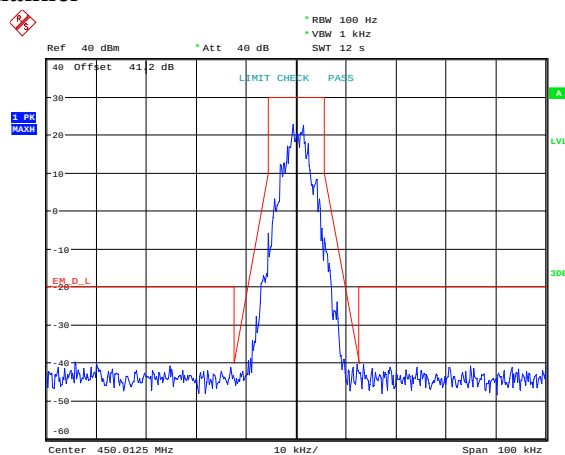
Date: 24.NOV.2020 20:26:35

# Low Power:

## Low Channel

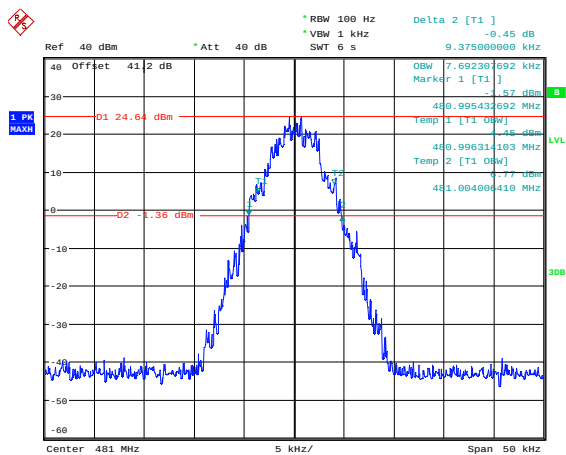


Date: 24.NOV.2020 19:23:54

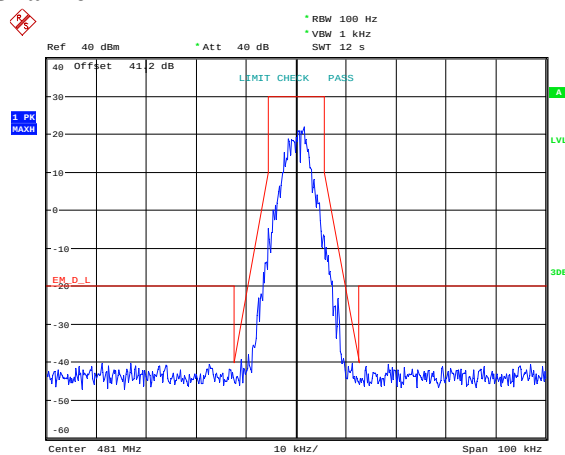


Date: 24.NOV.2020 19:24:55

## Middle Channel

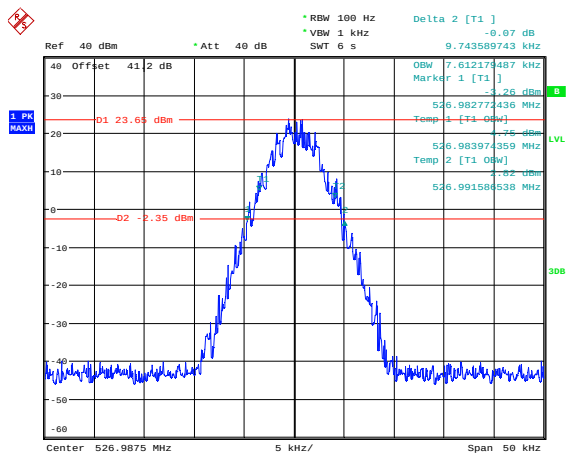


Date: 24.NOV.2020 19:58:46

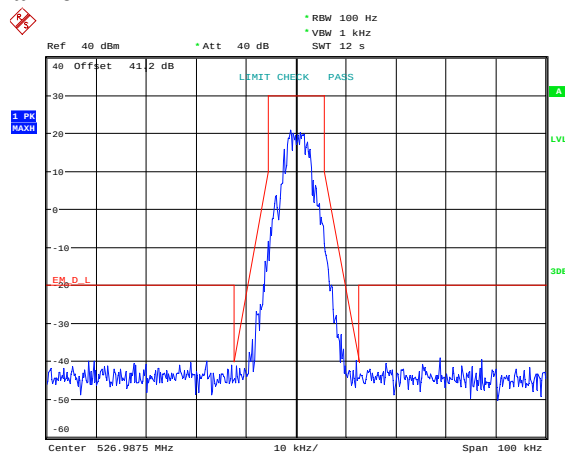


Date: 24.NOV.2020 19:59:51

## High Channel



Date: 24.NOV.2020 20:08:47



Date: 24.NOV.2020 20:09:39

Ref 35 dBm • Att 40 dB • RBW 100 Hz • VMW 1 kHz • SMT 6 # • Delta 1 [T1] 1.24 dB • 9.054487379 kHz

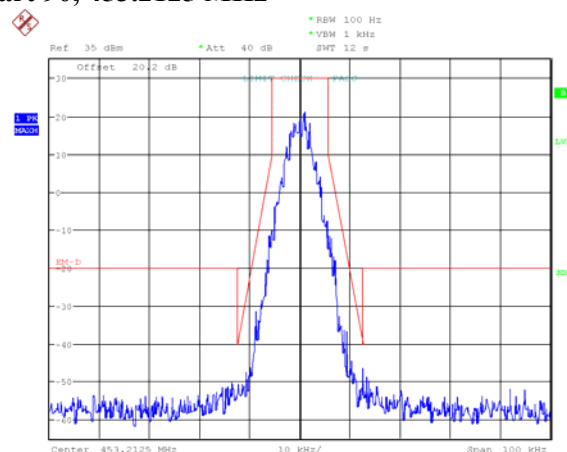
Offset 20.2 dB D1 24.4 dBm D2 -1.6 dBm

DBZ 100%

| Temp              | 1 [T1 GAW] | 2 [T1 GAW] |
|-------------------|------------|------------|
| 473.208114103 MHz | -2.59 dBm  | -4.79 dBm  |
| 473.209000000 MHz | -5.04 dBm  | -4.79 dBm  |
| 473.215920000 MHz | -4.79 dBm  | -4.79 dBm  |

Center 453.2125 MHz • 5 kHz • Span 5.0 kHz

Date: 13.SEP.2020 14:24:35



Date: 13.SEP.2020 14:25:39

Ref 35 dBm Att 40 dB BW 100 Hz Delta 1 [TI] 0.11 dB  
 YBW 1 kHz SMT 6 μs 5.535256410 kHz

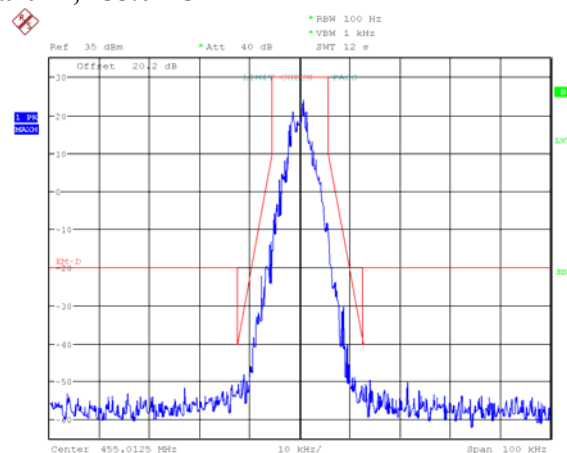
Offset 20.2 dB

D1 25.3 dBm

Temp 1 [T4 CW] 455.00767154 MHz -46 dBm  
 Temp 2 [T1 CW] 455.009401020 MHz -47.75 dBm  
 Temp 3 [T1 CW] 455.015281000 MHz -44.04 dBm

Center 455.0125 MHz Span 5.0 kHz

Date: 13,SEP,2020 14:32:26



Date: 13.SEP.2020 14:33:20

Ref 35 dBm Att 40 dB BW 100 kHz SWT 6 m Delta 1 [T1] 2.66 dB 10.336538461 kHz

Offset 20.2 dB

D1 21.95 dBm

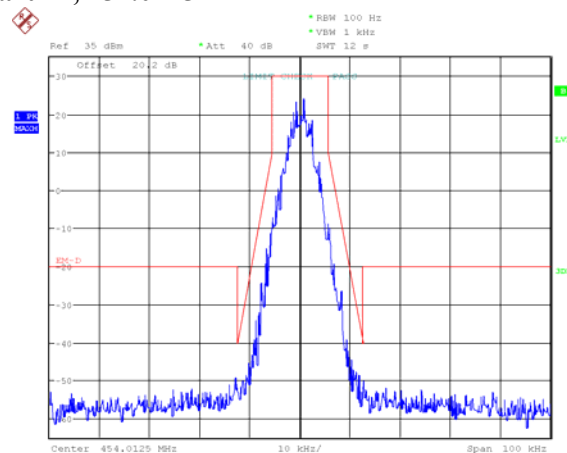
D2 -9.05 dBm

Temp 1 [T1] 0.00 kHz -0.99 dBm 454.003000000 MHz

Temp 2 [T1] 0.00 kHz -4.27 dBm 454.016000000 MHz

Center 454.0120 MHz 5 kHz/ Span 5.0 kHz

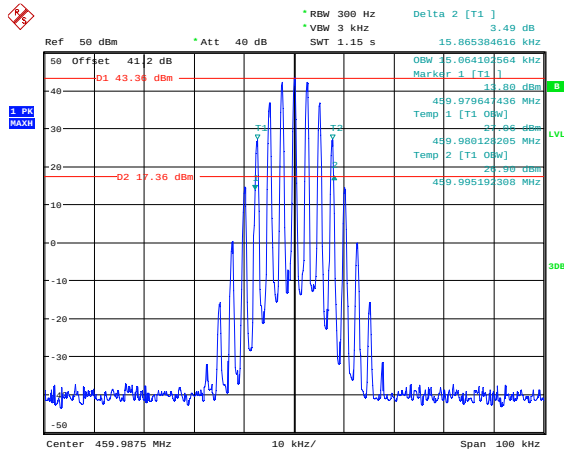
Date: 13,SEP,2020 14:34:42



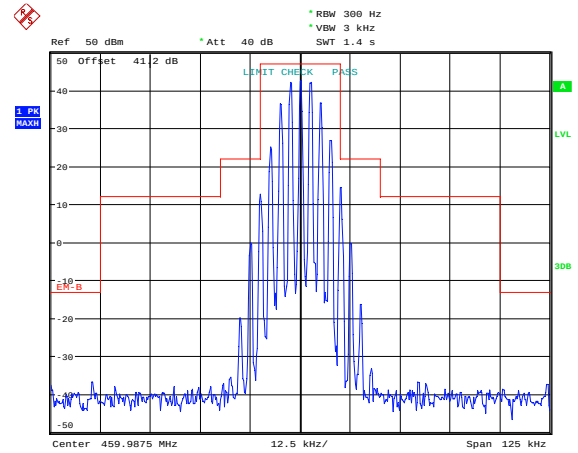
Date: 13.SEP.2020 14:35:50

## FM, 25 kHz, High Power:

## Additional Channel Part 80, 459.9875 MHz

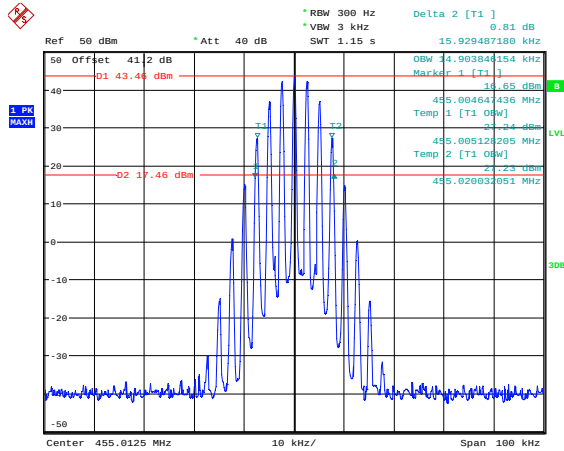


Date: 24.NOV.2020 20:57:25

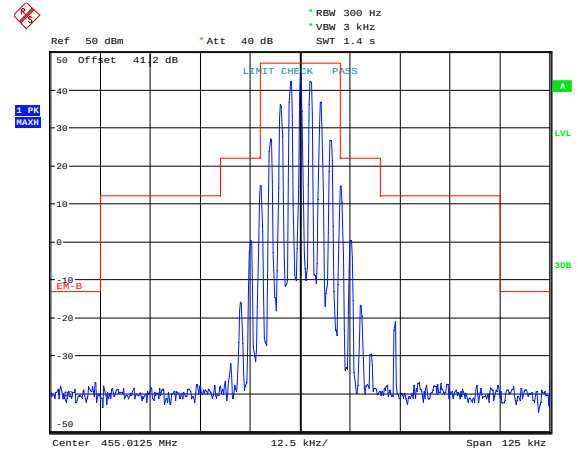


Date: 24.NOV.2020 20:57:55

## Additional Channel Part 74, 455.0125 MHz

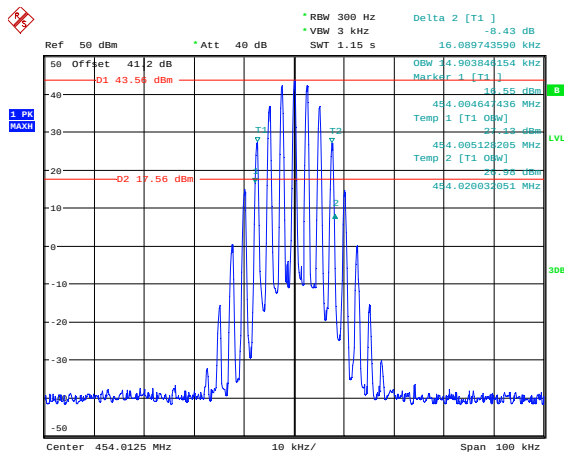


Date: 24.NOV.2020 21:00:50

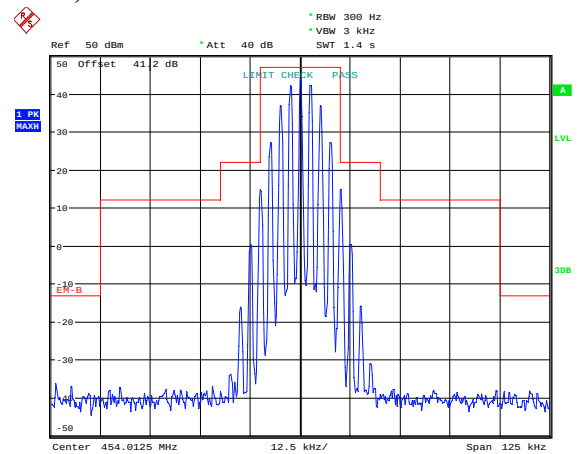


Date: 24.NOV.2020 21:01:39

## Additional Channel Part 22, 454.0125 MHz



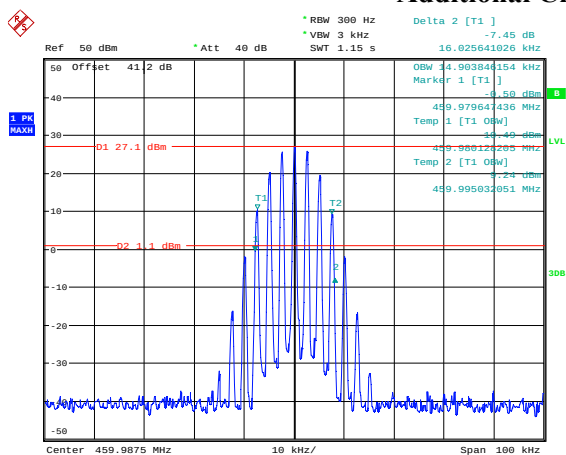
Date: 24.NOV.2020 21:04:23



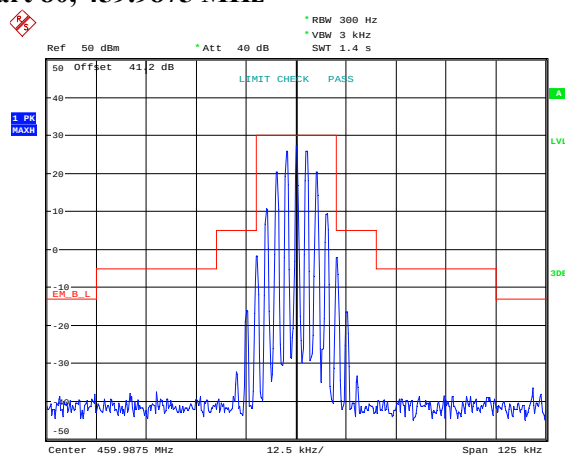
Date: 24.NOV.2020 21:05:04

## Low Power:

## Additional Channel Part 80, 459.9875 MHz

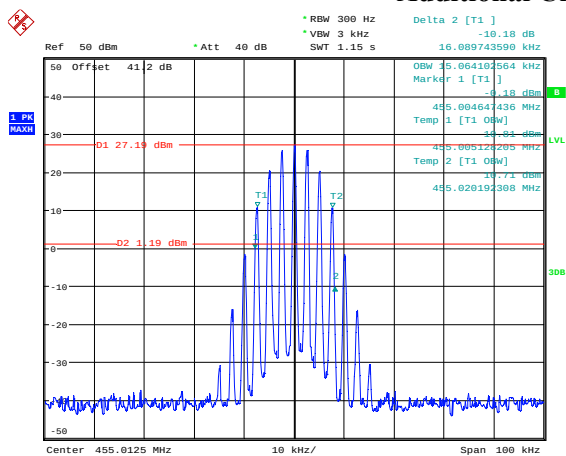


Date: 24.NOV.2020 20:58:44

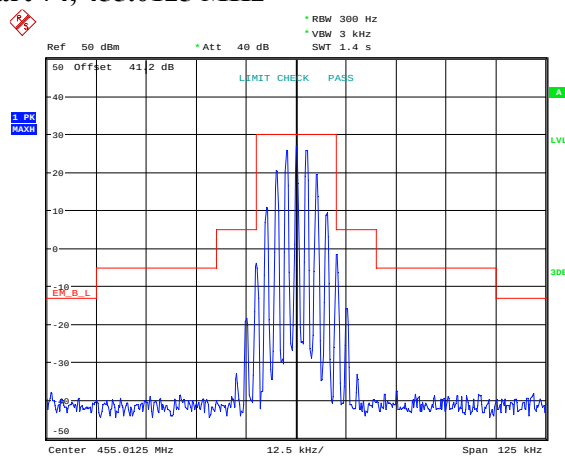


Date: 24.NOV.2020 20:59:13

## Additional Channel Part 74, 455.0125 MHz

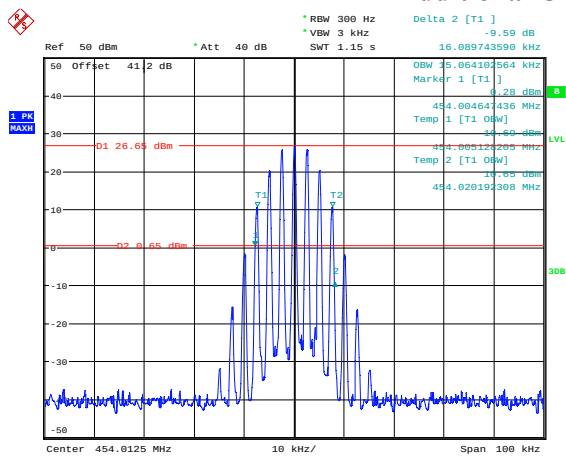


Date: 24.NOV.2020 21:02:36

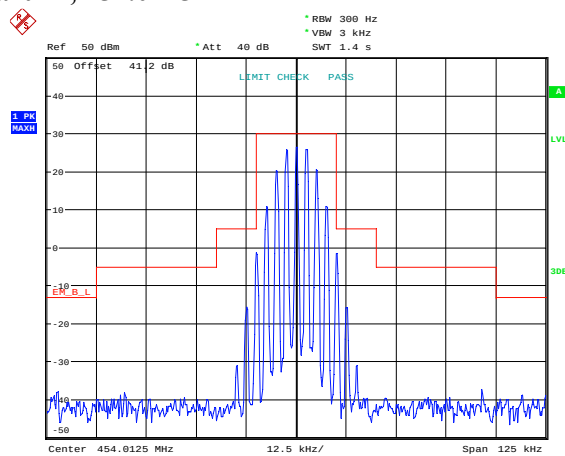


Date: 24.NOV.2020 21:03:08

## Additional Channel Part 22, 454.0125 MHz



Date: 24.NOV.2020 21:06:12



Date: 24.NOV.2020 21:06:38

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**FCC §2.1051 & §22.861 & §74.462 & § 80.211 & §90.210 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS**

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**Applicable Standard**

FCC §2.1051, §22.861, §74.462, §80.211, and §90.210

**Test Procedure**

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100kHz for below 1GHz, and 1MHz for above 1GHz. Sufficient scans were taken to show any out of band emissions up to 10<sup>th</sup> harmonic.

**Test Data****Environmental Conditions**

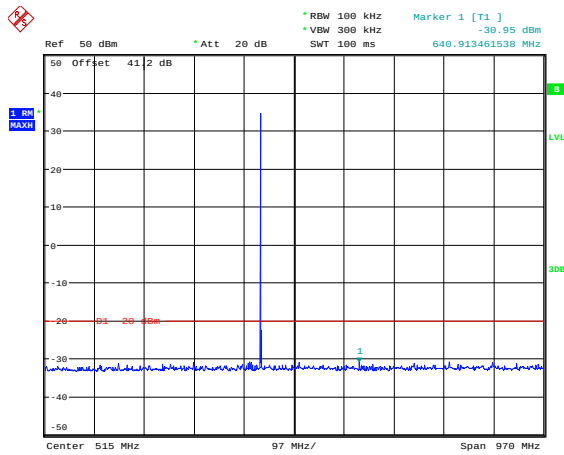
|                           |            |
|---------------------------|------------|
| <b>Temperature:</b>       | 25.5°C     |
| <b>Relative Humidity:</b> | 42 %       |
| <b>ATM Pressure:</b>      | 100.9 kPa  |
| <b>Tester:</b>            | James Chen |
| <b>Test Date:</b>         | 2020-11-24 |

**Test Mode: Transmitting**

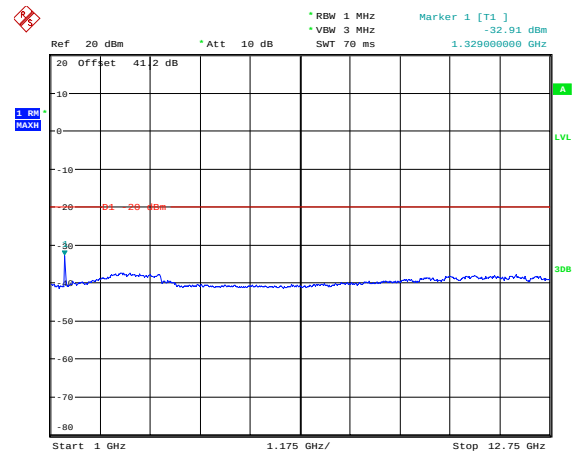
**Test Result: Compliance.** *Test performed at high power level with Band reject filter, please refer to the following plots.*

## FCC part 90, FM, 12.5kHz:

## Low Channel, 450.0125 MHz

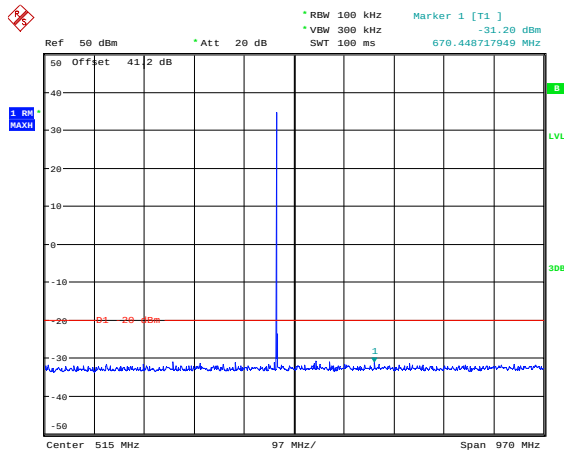


Date: 24.NOV.2020 21:47:09

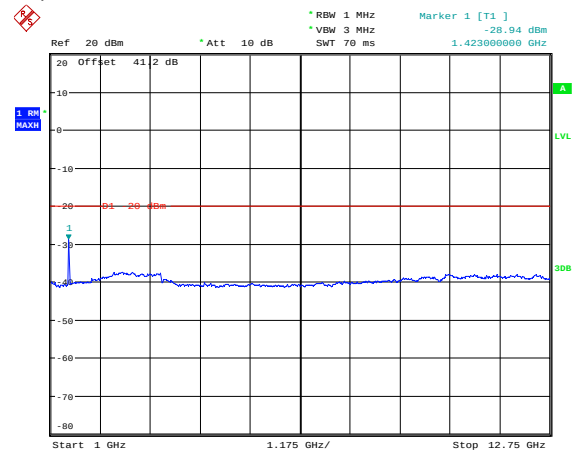


Date: 24.NOV.2020 21:47:20

## Middle Channel, 481 MHz

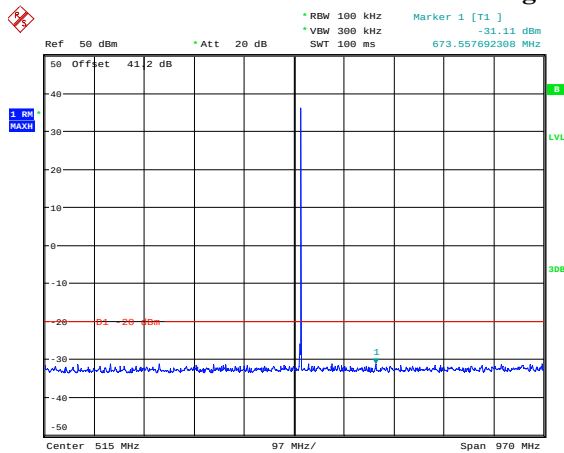


Date: 24.NOV.2020 22:03:28

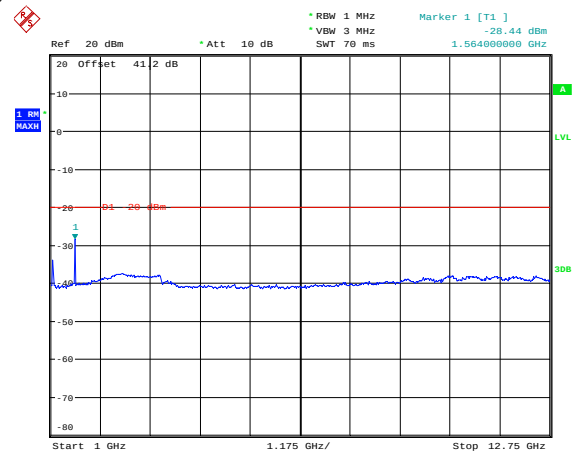


Date: 24.NOV.2020 22:03:39

## High Channel, 526.9875 MHz



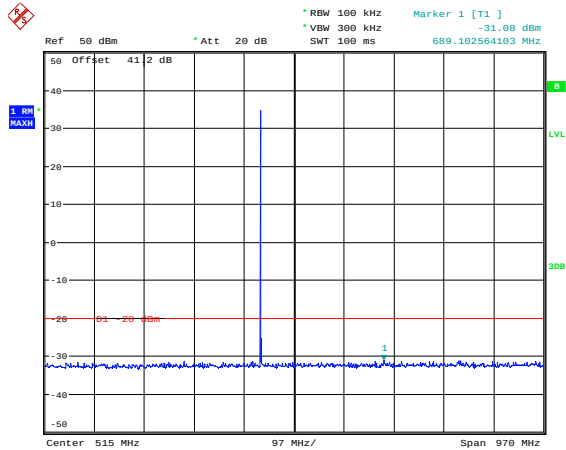
Date: 24.NOV.2020 22:15:16



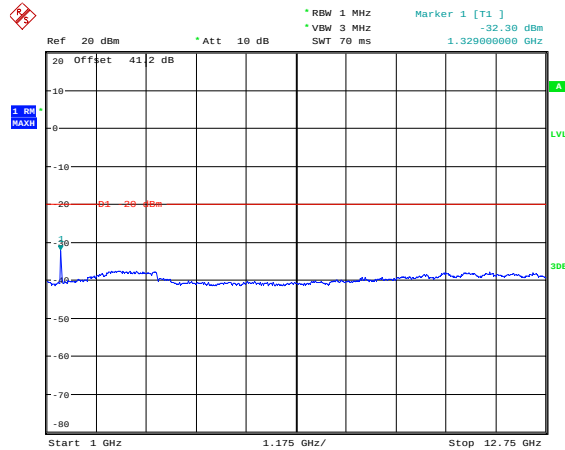
Date: 24.NOV.2020 22:15:26

4FSK, 12.5kHz:

Low Channel, 450.0125 MHz

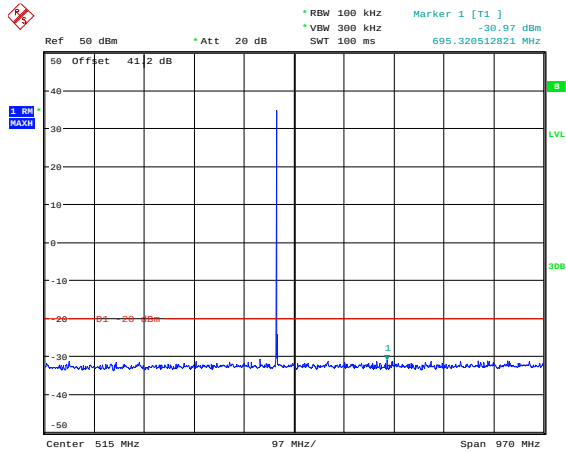


Date: 24.NOV.2020 21:44:16

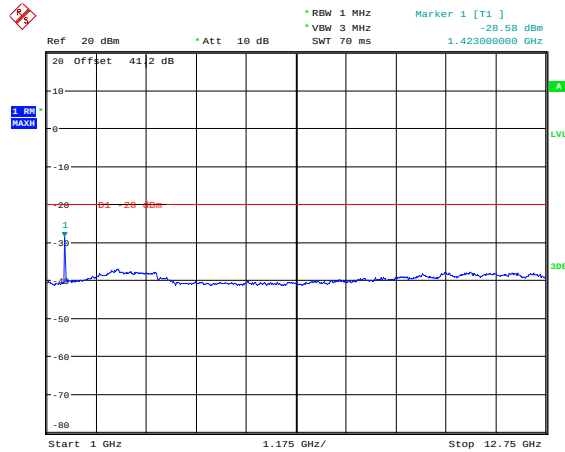


Date: 24.NOV.2020 21:44:29

Middle Channel, 481 MHz

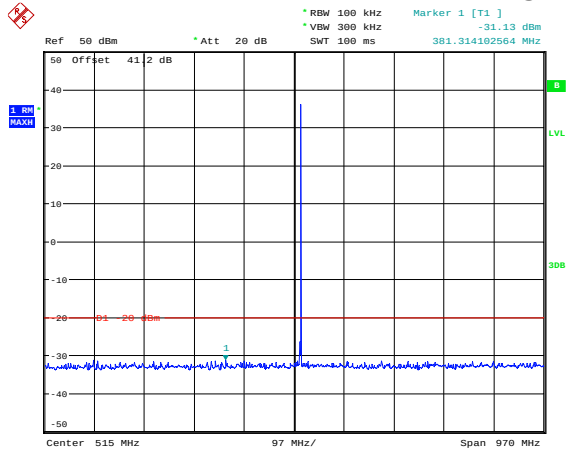


Date: 24.NOV.2020 22:05:30

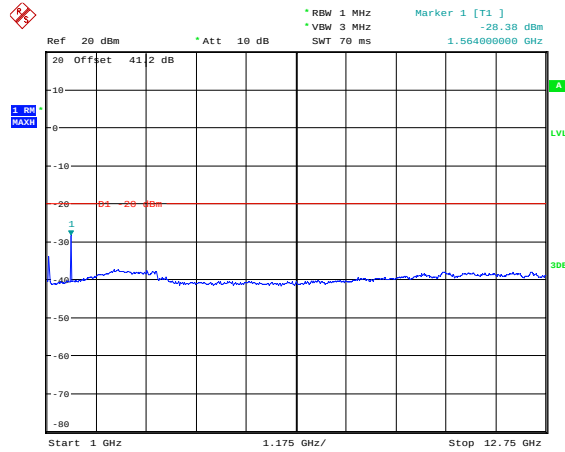


Date: 24.NOV.2020 22:05:41

High Channel, 526.9875 MHz



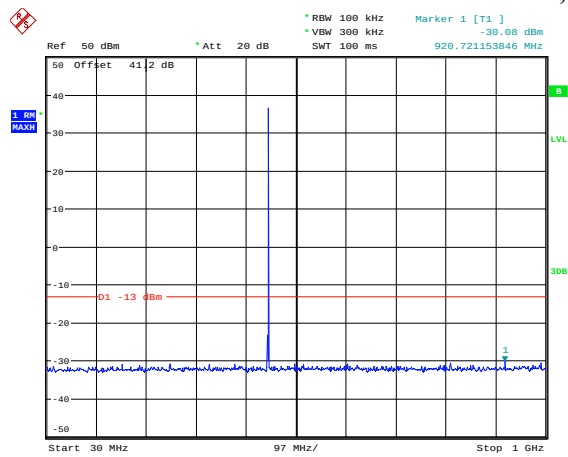
Date: 24.NOV.2020 22:16:05



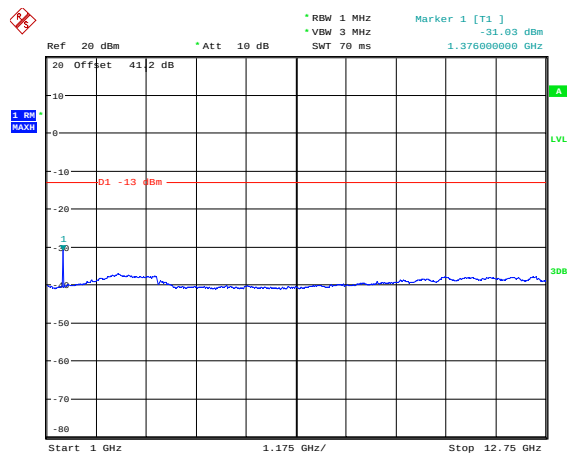
Date: 24.NOV.2020 22:16:14

Part 80:

FM,25kHz, 459.8875 MHz



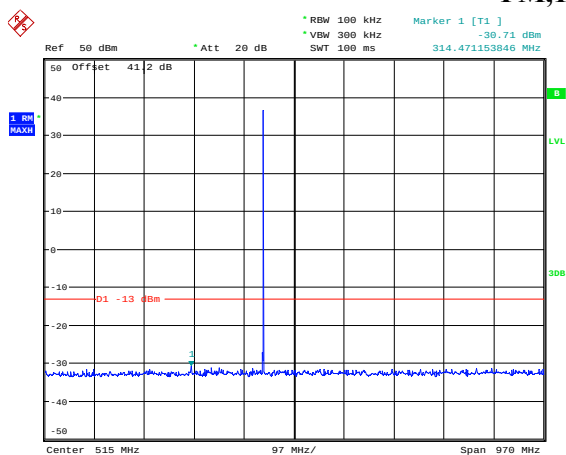
Date: 24.NOV.2020 21:38:19



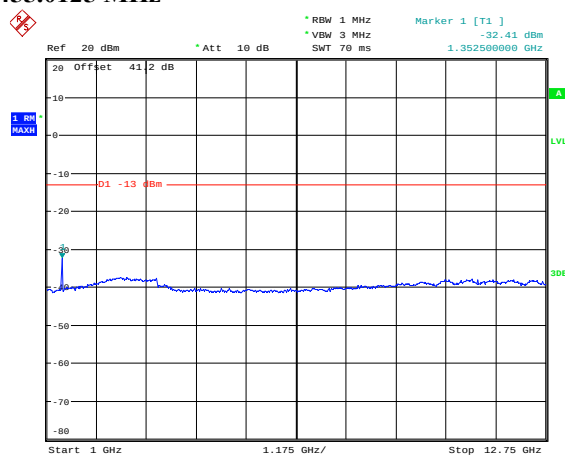
Date: 24.NOV.2020 21:38:44

## Part 74:

## FM,12.5kHz, 455.0125 MHz

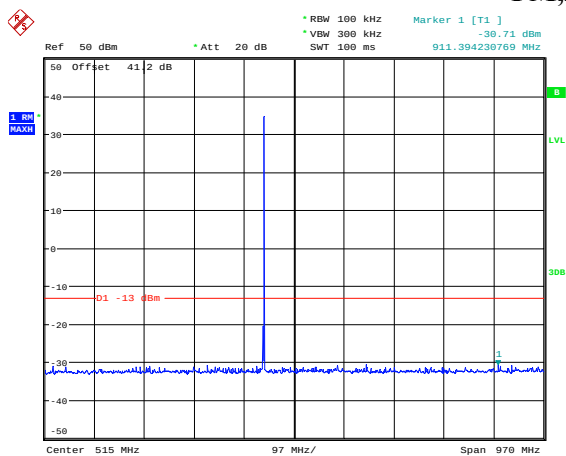


Date: 24.NOV.2020 21:51:22

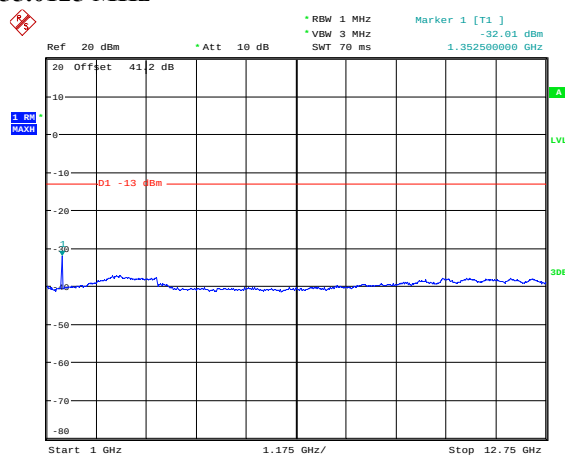


Date: 24.NOV.2020 21:51:35

## FM,25kHz, 455.0125 MHz

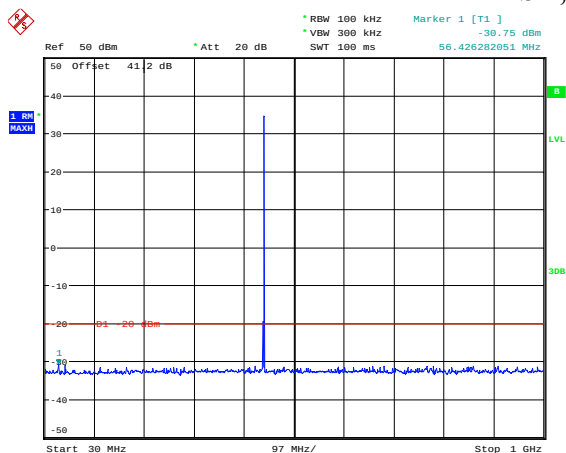


Date: 24.NOV.2020 21:50:01

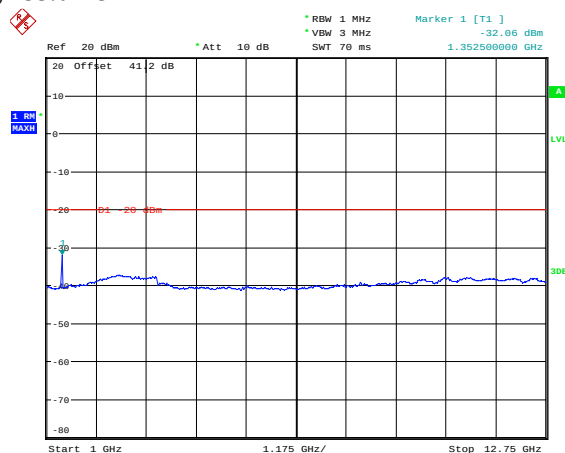


Date: 24.NOV.2020 21:50:14

## 4FSK,12.5kHz, 455.0125 MHz



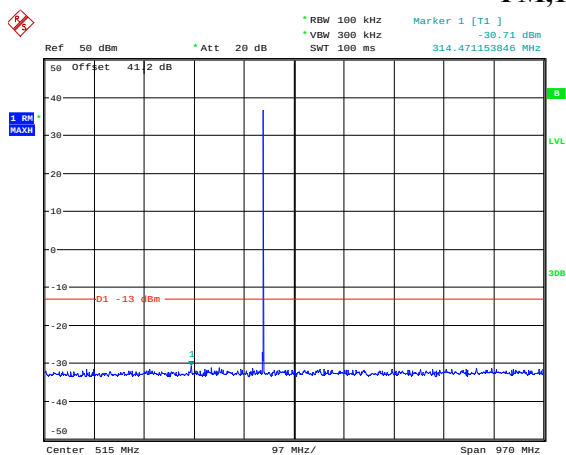
Date: 24.NOV.2020 21:39:58



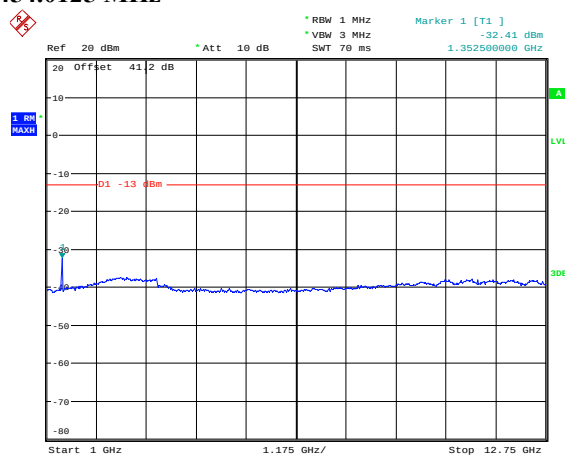
Date: 24.NOV.2020 21:40:24

## Part 22:

## FM,12.5kHz, 454.0125 MHz

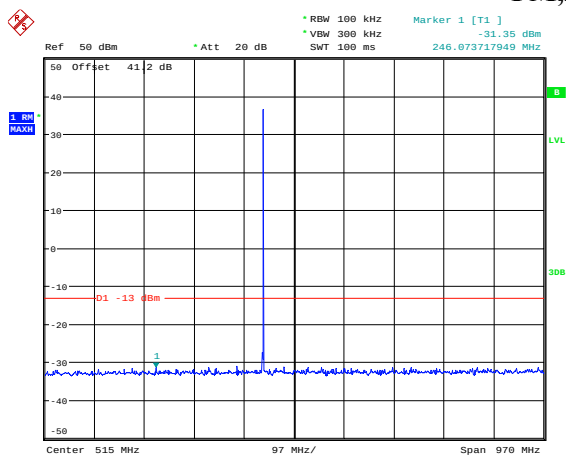


Date: 24.NOV.2020 21:51:22

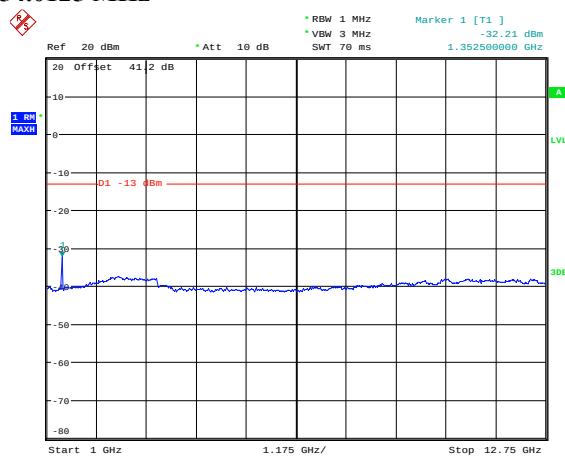


Date: 24.NOV.2020 21:51:35

## FM,25kHz, 454.0125 MHz

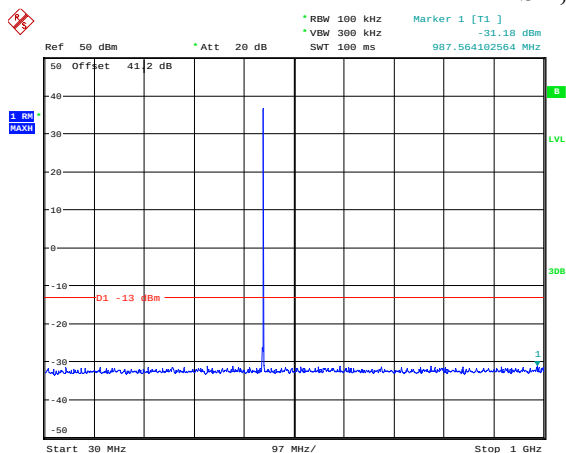


Date: 24.NOV.2020 22:01:39

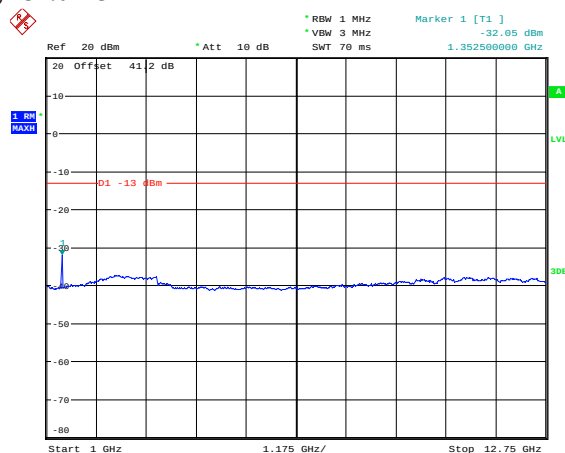


Date: 24.NOV.2020 22:01:50

## 4FSK,12.5kHz, 454.0125 MHz



Date: 24.NOV.2020 21:42:48



Date: 24.NOV.2020 21:43:08

## FCC §2.1053 & §22.861 & §74.462 & §80.211 & §90.210 - RADIATED SPURIOUS EMISSIONS

### Applicable Standard

FCC §2.1053, §22.861, §74.462, §80.211 and §90.210

### Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load, which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to teeth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = 10 lg (TXpwr in Watts/0.001)-the absolute level

### Test Data

#### Environmental Conditions

|                           |                       |
|---------------------------|-----------------------|
| <b>Temperature:</b>       | 25.4~26.3°C           |
| <b>Relative Humidity:</b> | 33~39 %               |
| <b>ATM Pressure:</b>      | 101~101.8kPa          |
| <b>Tester:</b>            | Jalon Liu             |
| <b>Test Date:</b>         | 2020-11-07~2020-11-09 |

**Test Mode:** Transmitting

**Test Result: Compliance.** *Test performed at high power level with Band Rejector Filter, please refer to the following table.*

**30MHz - 5GHz:  
Part 90**

| Frequency<br>(MHz)                   | Polar<br>(H/V) | Receiver<br>Reading<br>(dBμV) | Substituted Method            |                              |                       | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|--------------------------------------|----------------|-------------------------------|-------------------------------|------------------------------|-----------------------|----------------------------|----------------|----------------|
|                                      |                |                               | Substituted<br>Level<br>(dBm) | Antenna<br>Gain<br>(dBd/dBi) | Cable<br>Loss<br>(dB) |                            |                |                |
| FM,Frequency: 450.0125MHz-12.5 kHz   |                |                               |                               |                              |                       |                            |                |                |
| 900.025                              | H              | 45.75                         | -51.39                        | 0.00                         | 1.05                  | -52.44                     | -20.0          | 32.44          |
| 900.025                              | V              | 46.19                         | -52.96                        | 0.00                         | 1.05                  | -54.01                     | -20.0          | 34.01          |
| 1350.038                             | H              | 49.40                         | -53.98                        | 9.37                         | 1.17                  | -45.78                     | -20.0          | 25.78          |
| 1350.038                             | V              | 44.86                         | -58.69                        | 9.37                         | 1.17                  | -50.49                     | -20.0          | 30.49          |
| 1800.050                             | H              | 40.85                         | -63.40                        | 10.90                        | 1.22                  | -53.72                     | -20.0          | 33.72          |
| 1800.050                             | V              | 39.12                         | -65.06                        | 10.90                        | 1.22                  | -55.38                     | -20.0          | 35.38          |
| 2250.063                             | H              | 38.27                         | -65.14                        | 11.85                        | 1.19                  | -54.48                     | -20.0          | 34.48          |
| 2250.063                             | V              | 38.15                         | -65.95                        | 11.85                        | 1.19                  | -55.29                     | -20.0          | 35.29          |
| 2700.075                             | H              | 38.39                         | -64.02                        | 12.28                        | 1.34                  | -53.08                     | -20.0          | 33.08          |
| 2700.075                             | V              | 38.31                         | -64.91                        | 12.28                        | 1.34                  | -53.97                     | -20.0          | 33.97          |
| 3150.088                             | H              | 39.34                         | -62.22                        | 12.34                        | 1.53                  | -51.41                     | -20.0          | 31.41          |
| 3150.088                             | V              | 39.07                         | -61.96                        | 12.34                        | 1.53                  | -51.15                     | -20.0          | 31.15          |
| 3600.100                             | H              | 37.73                         | -62.90                        | 12.22                        | 1.58                  | -52.26                     | -20.0          | 32.26          |
| 3600.100                             | V              | 37.52                         | -62.08                        | 12.22                        | 1.58                  | -51.44                     | -20.0          | 31.44          |
| 4050.113                             | H              | 36.68                         | -62.74                        | 12.41                        | 1.46                  | -51.79                     | -20.0          | 31.79          |
| 4050.113                             | V              | 36.43                         | -63.75                        | 12.41                        | 1.46                  | -52.80                     | -20.0          | 32.80          |
| 4500.125                             | H              | 36.62                         | -61.45                        | 13.40                        | 1.54                  | -49.59                     | -20.0          | 29.59          |
| 4500.125                             | V              | 36.22                         | -62.21                        | 13.40                        | 1.54                  | -50.35                     | -20.0          | 30.35          |
| 4FSK,Frequency: 450.0125MHz-12.5 kHz |                |                               |                               |                              |                       |                            |                |                |
| 900.025                              | H              | 46.52                         | -50.62                        | 0.00                         | 1.05                  | -51.67                     | -20.0          | 31.67          |
| 900.025                              | V              | 46.31                         | -52.84                        | 0.00                         | 1.05                  | -53.89                     | -20.0          | 33.89          |
| 1350.038                             | H              | 46.76                         | -56.62                        | 9.37                         | 1.17                  | -48.42                     | -20.0          | 28.42          |
| 1350.038                             | V              | 45.53                         | -58.02                        | 9.37                         | 1.17                  | -49.82                     | -20.0          | 29.82          |
| 1800.050                             | H              | 39.84                         | -64.41                        | 10.90                        | 1.22                  | -54.73                     | -20.0          | 34.73          |
| 1800.050                             | V              | 44.51                         | -59.67                        | 10.90                        | 1.22                  | -49.99                     | -20.0          | 29.99          |
| 2250.063                             | H              | 38.81                         | -64.60                        | 11.85                        | 1.19                  | -53.94                     | -20.0          | 33.94          |
| 2250.063                             | V              | 38.50                         | -65.60                        | 11.85                        | 1.19                  | -54.94                     | -20.0          | 34.94          |
| 2700.075                             | H              | 38.77                         | -63.64                        | 12.28                        | 1.34                  | -52.70                     | -20.0          | 32.70          |
| 2700.075                             | V              | 38.47                         | -64.75                        | 12.28                        | 1.34                  | -53.81                     | -20.0          | 33.81          |
| 3150.088                             | H              | 39.66                         | -61.90                        | 12.34                        | 1.53                  | -51.09                     | -20.0          | 31.09          |
| 3150.088                             | V              | 39.22                         | -61.81                        | 12.34                        | 1.53                  | -51.00                     | -20.0          | 31.00          |
| 3600.100                             | H              | 37.77                         | -62.86                        | 12.22                        | 1.58                  | -52.22                     | -20.0          | 32.22          |
| 3600.100                             | V              | 37.81                         | -61.79                        | 12.22                        | 1.58                  | -51.15                     | -20.0          | 31.15          |
| 4050.113                             | H              | 37.07                         | -62.35                        | 12.41                        | 1.46                  | -51.40                     | -20.0          | 31.40          |
| 4050.113                             | V              | 37.41                         | -62.77                        | 12.41                        | 1.46                  | -51.82                     | -20.0          | 31.82          |
| 4500.125                             | H              | 36.67                         | -61.40                        | 13.40                        | 1.54                  | -49.54                     | -20.0          | 29.54          |
| 4500.125                             | V              | 37.25                         | -61.18                        | 13.40                        | 1.54                  | -49.32                     | -20.0          | 29.32          |

| Frequency<br>(MHz)                   | Polar<br>(H/V) | Receiver<br>Reading<br>(dBμV) | Substituted Method            |                              |                       | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|--------------------------------------|----------------|-------------------------------|-------------------------------|------------------------------|-----------------------|----------------------------|----------------|----------------|
|                                      |                |                               | Substituted<br>Level<br>(dBm) | Antenna<br>Gain<br>(dBd/dBi) | Cable<br>Loss<br>(dB) |                            |                |                |
| FM,Frequency: 453.2125MHz-12.5 kHz   |                |                               |                               |                              |                       |                            |                |                |
| 906.425                              | H              | 44.26                         | -52.61                        | 0.00                         | 1.03                  | -53.64                     | -20.0          | 33.64          |
| 906.425                              | V              | 44.31                         | -54.53                        | 0.00                         | 1.03                  | -55.56                     | -20.0          | 35.56          |
| 1359.638                             | H              | 45.77                         | -57.68                        | 9.41                         | 1.18                  | -49.45                     | -20.0          | 29.45          |
| 1359.638                             | V              | 48.71                         | -54.90                        | 9.41                         | 1.18                  | -46.67                     | -20.0          | 26.67          |
| 1812.850                             | H              | 38.48                         | -65.75                        | 10.94                        | 1.21                  | -56.02                     | -20.0          | 36.02          |
| 1812.850                             | V              | 38.71                         | -65.46                        | 10.94                        | 1.21                  | -55.73                     | -20.0          | 35.73          |
| 2266.063                             | H              | 37.29                         | -66.08                        | 11.87                        | 1.19                  | -55.40                     | -20.0          | 35.40          |
| 2266.063                             | V              | 37.58                         | -66.52                        | 11.87                        | 1.19                  | -55.84                     | -20.0          | 35.84          |
| 2719.275                             | H              | 38.61                         | -63.76                        | 12.29                        | 1.35                  | -52.82                     | -20.0          | 32.82          |
| 2719.275                             | V              | 39.12                         | -64.00                        | 12.29                        | 1.35                  | -53.06                     | -20.0          | 33.06          |
| 3172.488                             | H              | 38.11                         | -63.41                        | 12.33                        | 1.54                  | -52.62                     | -20.0          | 32.62          |
| 3172.488                             | V              | 38.27                         | -62.66                        | 12.33                        | 1.54                  | -51.87                     | -20.0          | 31.87          |
| 3625.700                             | H              | 37.20                         | -63.37                        | 12.23                        | 1.57                  | -52.71                     | -20.0          | 32.71          |
| 3625.700                             | V              | 37.30                         | -62.35                        | 12.23                        | 1.57                  | -51.69                     | -20.0          | 31.69          |
| 4078.913                             | H              | 36.29                         | -63.04                        | 12.47                        | 1.46                  | -52.03                     | -20.0          | 32.03          |
| 4078.913                             | V              | 36.35                         | -63.72                        | 12.47                        | 1.46                  | -52.71                     | -20.0          | 32.71          |
| 4532.125                             | H              | 36.72                         | -61.24                        | 13.37                        | 1.53                  | -49.40                     | -20.0          | 29.40          |
| 4532.125                             | V              | 37.03                         | -61.25                        | 13.37                        | 1.53                  | -49.41                     | -20.0          | 29.41          |
| 4FSK,Frequency: 453.2125MHz-12.5 kHz |                |                               |                               |                              |                       |                            |                |                |
| 906.425                              | H              | 45.86                         | -51.01                        | 0.00                         | 1.03                  | -52.04                     | -20.0          | 32.04          |
| 906.425                              | V              | 45.90                         | -52.94                        | 0.00                         | 1.03                  | -53.97                     | -20.0          | 33.97          |
| 1359.638                             | H              | 45.07                         | -58.38                        | 9.41                         | 1.18                  | -50.15                     | -20.0          | 30.15          |
| 1359.638                             | V              | 44.81                         | -58.80                        | 9.41                         | 1.18                  | -50.57                     | -20.0          | 30.57          |
| 1812.850                             | H              | 40.68                         | -63.55                        | 10.94                        | 1.21                  | -53.82                     | -20.0          | 33.82          |
| 1812.850                             | V              | 44.66                         | -59.51                        | 10.94                        | 1.21                  | -49.78                     | -20.0          | 29.78          |
| 2266.063                             | H              | 38.23                         | -65.14                        | 11.87                        | 1.19                  | -54.46                     | -20.0          | 34.46          |
| 2266.063                             | V              | 38.59                         | -65.51                        | 11.87                        | 1.19                  | -54.83                     | -20.0          | 34.83          |
| 2719.275                             | H              | 37.54                         | -64.83                        | 12.29                        | 1.35                  | -53.89                     | -20.0          | 33.89          |
| 2719.275                             | V              | 38.22                         | -64.90                        | 12.29                        | 1.35                  | -53.96                     | -20.0          | 33.96          |
| 3172.488                             | H              | 39.51                         | -62.01                        | 12.33                        | 1.54                  | -51.22                     | -20.0          | 31.22          |
| 3172.488                             | V              | 38.26                         | -62.67                        | 12.33                        | 1.54                  | -51.88                     | -20.0          | 31.88          |
| 3625.700                             | H              | 37.45                         | -63.12                        | 12.23                        | 1.57                  | -52.46                     | -20.0          | 32.46          |
| 3625.700                             | V              | 37.39                         | -62.26                        | 12.23                        | 1.57                  | -51.60                     | -20.0          | 31.60          |
| 4078.913                             | H              | 37.15                         | -62.18                        | 12.47                        | 1.46                  | -51.17                     | -20.0          | 31.17          |
| 4078.913                             | V              | 36.36                         | -63.71                        | 12.47                        | 1.46                  | -52.70                     | -20.0          | 32.70          |
| 4532.125                             | H              | 36.68                         | -61.28                        | 13.37                        | 1.53                  | -49.44                     | -20.0          | 29.44          |
| 4532.125                             | V              | 36.58                         | -61.70                        | 13.37                        | 1.53                  | -49.86                     | -20.0          | 29.86          |

| Frequency<br>(MHz)              | Polar<br>(H/V) | Receiver<br>Reading<br>(dBμV) | Substituted Method            |                              |                       | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|---------------------------------|----------------|-------------------------------|-------------------------------|------------------------------|-----------------------|----------------------------|----------------|----------------|
|                                 |                |                               | Substituted<br>Level<br>(dBm) | Antenna<br>Gain<br>(dBd/dBi) | Cable<br>Loss<br>(dB) |                            |                |                |
| FM,Frequency: 481MHz-12.5 kHz   |                |                               |                               |                              |                       |                            |                |                |
| 962.000                         | H              | 41.16                         | -53.40                        | 0.00                         | 0.86                  | -54.26                     | -20.0          | 34.26          |
| 962.000                         | V              | 42.27                         | -53.86                        | 0.00                         | 0.86                  | -54.72                     | -20.0          | 34.72          |
| 1443.000                        | H              | 54.26                         | -49.85                        | 9.76                         | 1.28                  | -41.37                     | -20.0          | 21.37          |
| 1443.000                        | V              | 57.43                         | -46.70                        | 9.76                         | 1.28                  | -38.22                     | -20.0          | 18.22          |
| 1924.000                        | H              | 40.49                         | -63.63                        | 11.27                        | 1.16                  | -53.52                     | -20.0          | 33.52          |
| 1924.000                        | V              | 40.56                         | -63.50                        | 11.27                        | 1.16                  | -53.39                     | -20.0          | 33.39          |
| 2405.000                        | H              | 37.80                         | -65.23                        | 12.07                        | 1.22                  | -54.38                     | -20.0          | 34.38          |
| 2405.000                        | V              | 37.90                         | -66.27                        | 12.07                        | 1.22                  | -55.42                     | -20.0          | 35.42          |
| 2886.000                        | H              | 37.94                         | -64.12                        | 12.35                        | 1.44                  | -53.21                     | -20.0          | 33.21          |
| 2886.000                        | V              | 37.95                         | -64.35                        | 12.35                        | 1.44                  | -53.44                     | -20.0          | 33.44          |
| 3367.000                        | H              | 38.92                         | -62.23                        | 12.25                        | 1.58                  | -51.56                     | -20.0          | 31.56          |
| 3367.000                        | V              | 38.89                         | -61.13                        | 12.25                        | 1.58                  | -50.46                     | -20.0          | 30.46          |
| 3848.000                        | H              | 37.53                         | -62.44                        | 12.27                        | 1.50                  | -51.67                     | -20.0          | 31.67          |
| 3848.000                        | V              | 37.35                         | -62.73                        | 12.27                        | 1.50                  | -51.96                     | -20.0          | 31.96          |
| 4329.000                        | H              | 36.32                         | -62.26                        | 13.02                        | 1.51                  | -50.75                     | -20.0          | 30.75          |
| 4329.000                        | V              | 36.22                         | -62.88                        | 13.02                        | 1.51                  | -51.37                     | -20.0          | 31.37          |
| 4810.000                        | H              | 36.29                         | -60.76                        | 13.15                        | 1.48                  | -49.09                     | -20.0          | 29.09          |
| 4810.000                        | V              | 35.95                         | -61.03                        | 13.15                        | 1.48                  | -49.36                     | -20.0          | 29.36          |
| 4FSK,Frequency: 481MHz-12.5 kHz |                |                               |                               |                              |                       |                            |                |                |
| 962.000                         | H              | 42.69                         | -51.87                        | 0.00                         | 0.86                  | -52.73                     | -20.0          | 32.73          |
| 962.000                         | V              | 43.01                         | -53.12                        | 0.00                         | 0.86                  | -53.98                     | -20.0          | 33.98          |
| 1443.000                        | H              | 56.04                         | -48.07                        | 9.76                         | 1.28                  | -39.59                     | -20.0          | 19.59          |
| 1443.000                        | V              | 56.64                         | -47.49                        | 9.76                         | 1.28                  | -39.01                     | -20.0          | 19.01          |
| 1924.000                        | H              | 40.66                         | -63.46                        | 11.27                        | 1.16                  | -53.35                     | -20.0          | 33.35          |
| 1924.000                        | V              | 41.69                         | -62.37                        | 11.27                        | 1.16                  | -52.26                     | -20.0          | 32.26          |
| 2405.000                        | H              | 38.60                         | -64.43                        | 12.07                        | 1.22                  | -53.58                     | -20.0          | 33.58          |
| 2405.000                        | V              | 38.09                         | -66.08                        | 12.07                        | 1.22                  | -55.23                     | -20.0          | 35.23          |
| 2886.000                        | H              | 38.37                         | -63.69                        | 12.35                        | 1.44                  | -52.78                     | -20.0          | 32.78          |
| 2886.000                        | V              | 38.00                         | -64.30                        | 12.35                        | 1.44                  | -53.39                     | -20.0          | 33.39          |
| 3367.000                        | H              | 39.28                         | -61.87                        | 12.25                        | 1.58                  | -51.20                     | -20.0          | 31.20          |
| 3367.000                        | V              | 38.75                         | -61.27                        | 12.25                        | 1.58                  | -50.60                     | -20.0          | 30.60          |
| 3848.000                        | H              | 37.51                         | -62.46                        | 12.27                        | 1.50                  | -51.69                     | -20.0          | 31.69          |
| 3848.000                        | V              | 37.57                         | -62.51                        | 12.27                        | 1.50                  | -51.74                     | -20.0          | 31.74          |
| 4329.000                        | H              | 36.69                         | -61.89                        | 13.02                        | 1.51                  | -50.38                     | -20.0          | 30.38          |
| 4329.000                        | V              | 37.07                         | -62.03                        | 13.02                        | 1.51                  | -50.52                     | -20.0          | 30.52          |
| 4810.000                        | H              | 36.27                         | -60.78                        | 13.15                        | 1.48                  | -49.11                     | -20.0          | 29.11          |
| 4810.000                        | V              | 36.82                         | -60.16                        | 13.15                        | 1.48                  | -48.49                     | -20.0          | 28.49          |

| Frequency<br>(MHz)                   | Polar<br>(H/V) | Receiver<br>Reading<br>(dBμV) | Substituted Method            |                              |                       | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|--------------------------------------|----------------|-------------------------------|-------------------------------|------------------------------|-----------------------|----------------------------|----------------|----------------|
|                                      |                |                               | Substituted<br>Level<br>(dBm) | Antenna<br>Gain<br>(dBd/dBi) | Cable<br>Loss<br>(dB) |                            |                |                |
| FM,Frequency: 526.9875MHz-12.5 kHz   |                |                               |                               |                              |                       |                            |                |                |
| 1053.975                             | H              | 46.91                         | -54.13                        | 8.13                         | 0.81                  | -46.81                     | -20.0          | 26.81          |
| 1053.975                             | V              | 45.67                         | -56.01                        | 8.13                         | 0.81                  | -48.69                     | -20.0          | 28.69          |
| 1580.963                             | H              | 45.61                         | -58.87                        | 10.24                        | 1.31                  | -49.94                     | -20.0          | 29.94          |
| 1580.963                             | V              | 46.54                         | -57.87                        | 10.24                        | 1.31                  | -48.94                     | -20.0          | 28.94          |
| 2107.950                             | H              | 38.16                         | -65.61                        | 11.65                        | 1.15                  | -55.11                     | -20.0          | 35.11          |
| 2107.950                             | V              | 38.35                         | -65.68                        | 11.65                        | 1.15                  | -55.18                     | -20.0          | 35.18          |
| 2634.938                             | H              | 37.06                         | -65.47                        | 12.25                        | 1.31                  | -54.53                     | -20.0          | 34.53          |
| 2634.938                             | V              | 37.26                         | -66.28                        | 12.25                        | 1.31                  | -55.34                     | -20.0          | 35.34          |
| 3161.925                             | H              | 38.25                         | -63.29                        | 12.34                        | 1.54                  | -52.49                     | -20.0          | 32.49          |
| 3161.925                             | V              | 38.67                         | -62.31                        | 12.34                        | 1.54                  | -51.51                     | -20.0          | 31.51          |
| 3688.913                             | H              | 37.78                         | -62.62                        | 12.24                        | 1.55                  | -51.93                     | -20.0          | 31.93          |
| 3688.913                             | V              | 38.10                         | -61.67                        | 12.24                        | 1.55                  | -50.98                     | -20.0          | 30.98          |
| 4215.900                             | H              | 36.86                         | -62.06                        | 12.77                        | 1.49                  | -50.78                     | -20.0          | 30.78          |
| 4215.900                             | V              | 37.12                         | -62.42                        | 12.77                        | 1.49                  | -51.14                     | -20.0          | 31.14          |
| 4742.888                             | H              | 35.86                         | -61.41                        | 13.21                        | 1.49                  | -49.69                     | -20.0          | 29.69          |
| 4742.888                             | V              | 36.12                         | -61.17                        | 13.21                        | 1.49                  | -49.45                     | -20.0          | 29.45          |
| 5269.875                             | H              | 36.32                         | -59.64                        | 12.89                        | 1.33                  | -48.08                     | -20.0          | 28.08          |
| 5269.875                             | V              | 36.62                         | -59.42                        | 12.89                        | 1.33                  | -47.86                     | -20.0          | 27.86          |
| 4FSK,Frequency: 526.9875MHz-12.5 kHz |                |                               |                               |                              |                       |                            |                |                |
| 1053.975                             | H              | 46.94                         | -54.10                        | 8.13                         | 0.81                  | -46.78                     | -20.0          | 26.78          |
| 1053.975                             | V              | 44.18                         | -57.50                        | 8.13                         | 0.81                  | -50.18                     | -20.0          | 30.18          |
| 1580.963                             | H              | 44.12                         | -60.36                        | 10.24                        | 1.31                  | -51.43                     | -20.0          | 31.43          |
| 1580.963                             | V              | 43.19                         | -61.22                        | 10.24                        | 1.31                  | -52.29                     | -20.0          | 32.29          |
| 2107.950                             | H              | 38.41                         | -65.36                        | 11.65                        | 1.15                  | -54.86                     | -20.0          | 34.86          |
| 2107.950                             | V              | 38.52                         | -65.51                        | 11.65                        | 1.15                  | -55.01                     | -20.0          | 35.01          |
| 2634.938                             | H              | 37.81                         | -64.72                        | 12.25                        | 1.31                  | -53.78                     | -20.0          | 33.78          |
| 2634.938                             | V              | 38.43                         | -65.11                        | 12.25                        | 1.31                  | -54.17                     | -20.0          | 34.17          |
| 3161.925                             | H              | 37.17                         | -64.37                        | 12.34                        | 1.54                  | -53.57                     | -20.0          | 33.57          |
| 3161.925                             | V              | 38.01                         | -62.97                        | 12.34                        | 1.54                  | -52.17                     | -20.0          | 32.17          |
| 3688.913                             | H              | 39.07                         | -61.33                        | 12.24                        | 1.55                  | -50.64                     | -20.0          | 30.64          |
| 3688.913                             | V              | 38.06                         | -61.71                        | 12.24                        | 1.55                  | -51.02                     | -20.0          | 31.02          |
| 4215.900                             | H              | 37.25                         | -61.67                        | 12.77                        | 1.49                  | -50.39                     | -20.0          | 30.39          |
| 4215.900                             | V              | 36.99                         | -62.55                        | 12.77                        | 1.49                  | -51.27                     | -20.0          | 31.27          |
| 4742.888                             | H              | 36.90                         | -60.37                        | 13.21                        | 1.49                  | -48.65                     | -20.0          | 28.65          |
| 4742.888                             | V              | 36.08                         | -61.21                        | 13.21                        | 1.49                  | -49.49                     | -20.0          | 29.49          |
| 5269.875                             | H              | 36.23                         | -59.73                        | 12.89                        | 1.33                  | -48.17                     | -20.0          | 28.17          |
| 5269.875                             | V              | 36.24                         | -59.80                        | 12.89                        | 1.33                  | -48.24                     | -20.0          | 28.24          |

**Part 80**

| Frequency<br>(MHz)                | Polar<br>(H/V) | Receiver<br>Reading<br>(dBμV) | Substituted Method            |                              |                       | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|-----------------------------------|----------------|-------------------------------|-------------------------------|------------------------------|-----------------------|----------------------------|----------------|----------------|
|                                   |                |                               | Substituted<br>Level<br>(dBm) | Antenna<br>Gain<br>(dBd/dBi) | Cable<br>Loss<br>(dB) |                            |                |                |
| FM, Frequency: 459.9875MHz-25 kHz |                |                               |                               |                              |                       |                            |                |                |
| 919.975                           | H              | 44.24                         | -52.07                        | 0.00                         | 0.99                  | -53.06                     | -13.0          | 40.06          |
| 919.975                           | V              | 45.92                         | -52.26                        | 0.00                         | 0.99                  | -53.25                     | -13.0          | 40.25          |
| 1379.963                          | H              | 51.88                         | -51.73                        | 9.50                         | 1.20                  | -43.43                     | -13.0          | 30.43          |
| 1379.963                          | V              | 52.77                         | -50.96                        | 9.50                         | 1.20                  | -42.66                     | -13.0          | 29.66          |
| 1839.950                          | H              | 38.61                         | -65.60                        | 11.02                        | 1.20                  | -55.78                     | -13.0          | 42.78          |
| 1839.950                          | V              | 38.75                         | -65.39                        | 11.02                        | 1.20                  | -55.57                     | -13.0          | 42.57          |
| 2299.938                          | H              | 37.84                         | -65.45                        | 11.92                        | 1.20                  | -54.73                     | -13.0          | 41.73          |
| 2299.938                          | V              | 37.83                         | -66.29                        | 11.92                        | 1.20                  | -55.57                     | -13.0          | 42.57          |
| 2759.925                          | H              | 38.16                         | -64.14                        | 12.30                        | 1.38                  | -53.22                     | -13.0          | 40.22          |
| 2759.925                          | V              | 38.04                         | -64.88                        | 12.30                        | 1.38                  | -53.96                     | -13.0          | 40.96          |
| 3219.913                          | H              | 38.93                         | -62.50                        | 12.31                        | 1.55                  | -51.74                     | -13.0          | 38.74          |
| 3219.913                          | V              | 38.86                         | -61.85                        | 12.31                        | 1.55                  | -51.09                     | -13.0          | 38.09          |
| 3679.900                          | H              | 37.43                         | -62.99                        | 12.24                        | 1.55                  | -52.30                     | -13.0          | 39.3           |
| 3679.900                          | V              | 37.27                         | -62.48                        | 12.24                        | 1.55                  | -51.79                     | -13.0          | 38.79          |
| 4139.888                          | H              | 36.37                         | -62.78                        | 12.61                        | 1.48                  | -51.65                     | -13.0          | 38.65          |
| 4139.888                          | V              | 36.18                         | -63.65                        | 12.61                        | 1.48                  | -52.52                     | -13.0          | 39.52          |
| 4599.875                          | H              | 36.25                         | -61.49                        | 13.32                        | 1.52                  | -49.69                     | -13.0          | 36.69          |
| 4599.875                          | V              | 36.04                         | -61.92                        | 13.32                        | 1.52                  | -50.12                     | -13.0          | 37.12          |

**Part 74**

| Frequency<br>(MHz)                  | Polar<br>(H/V) | Receiver<br>Reading<br>(dBμV) | Substituted Method            |                              |                       | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|-------------------------------------|----------------|-------------------------------|-------------------------------|------------------------------|-----------------------|----------------------------|----------------|----------------|
|                                     |                |                               | Substituted<br>Level<br>(dBm) | Antenna<br>Gain<br>(dBd/dBi) | Cable<br>Loss<br>(dB) |                            |                |                |
| FM, Frequency: 455.0125MHz-12.5 kHz |                |                               |                               |                              |                       |                            |                |                |
| 910.025                             | H              | 43.29                         | -53.43                        | 0.00                         | 1.02                  | -54.45                     | -20.0          | 34.45          |
| 910.025                             | V              | 44.15                         | -54.51                        | 0.00                         | 1.02                  | -55.53                     | -20.0          | 35.53          |
| 1365.038                            | H              | 56.64                         | -46.85                        | 9.43                         | 1.19                  | -38.61                     | -20.0          | 18.61          |
| 1365.038                            | V              | 55.45                         | -48.19                        | 9.43                         | 1.19                  | -39.95                     | -20.0          | 19.95          |
| 1820.050                            | H              | 40.02                         | -64.21                        | 10.96                        | 1.21                  | -54.46                     | -20.0          | 34.46          |
| 1820.050                            | V              | 39.66                         | -64.50                        | 10.96                        | 1.21                  | -54.75                     | -20.0          | 34.75          |
| 2275.063                            | H              | 36.89                         | -66.46                        | 11.89                        | 1.19                  | -55.76                     | -20.0          | 35.76          |
| 2275.063                            | V              | 37.16                         | -66.95                        | 11.89                        | 1.19                  | -56.25                     | -20.0          | 36.25          |
| 2730.075                            | H              | 38.41                         | -63.94                        | 12.29                        | 1.36                  | -53.01                     | -20.0          | 33.01          |
| 2730.075                            | V              | 38.67                         | -64.40                        | 12.29                        | 1.36                  | -53.47                     | -20.0          | 33.47          |
| 3185.088                            | H              | 37.88                         | -63.61                        | 12.33                        | 1.54                  | -52.82                     | -20.0          | 32.82          |
| 3185.088                            | V              | 37.99                         | -62.88                        | 12.33                        | 1.54                  | -52.09                     | -20.0          | 32.09          |
| 3640.100                            | H              | 36.79                         | -63.74                        | 12.23                        | 1.57                  | -53.08                     | -20.0          | 33.08          |
| 3640.100                            | V              | 36.99                         | -62.68                        | 12.23                        | 1.57                  | -52.02                     | -20.0          | 32.02          |
| 4095.113                            | H              | 36.00                         | -63.28                        | 12.51                        | 1.47                  | -52.24                     | -20.0          | 32.24          |
| 4095.113                            | V              | 36.11                         | -63.90                        | 12.51                        | 1.47                  | -52.86                     | -20.0          | 32.86          |
| 4550.125                            | H              | 36.31                         | -61.60                        | 13.36                        | 1.53                  | -49.77                     | -20.0          | 29.77          |
| 4550.125                            | V              | 36.83                         | -61.37                        | 13.36                        | 1.53                  | -49.54                     | -20.0          | 29.54          |
| FM, Frequency: 455.0125MHz-25 kHz   |                |                               |                               |                              |                       |                            |                |                |
| 910.025                             | H              | 49.61                         | -47.11                        | 0.00                         | 1.02                  | -48.13                     | -13.0          | -35.13         |
| 910.025                             | V              | 51.29                         | -47.37                        | 0.00                         | 1.02                  | -48.39                     | -13.0          | -35.39         |
| 1365.038                            | H              | 51.52                         | -51.97                        | 9.43                         | 1.19                  | -43.73                     | -13.0          | -30.73         |
| 1365.038                            | V              | 51.49                         | -52.15                        | 9.43                         | 1.19                  | -43.91                     | -13.0          | -30.91         |
| 1820.050                            | H              | 39.04                         | -65.19                        | 10.96                        | 1.21                  | -55.44                     | -13.0          | -42.44         |
| 1820.050                            | V              | 38.40                         | -65.76                        | 10.96                        | 1.21                  | -56.01                     | -13.0          | -43.01         |
| 2275.063                            | H              | 38.44                         | -64.91                        | 11.89                        | 1.19                  | -54.21                     | -13.0          | -41.21         |
| 2275.063                            | V              | 38.08                         | -66.03                        | 11.89                        | 1.19                  | -55.33                     | -13.0          | -42.33         |
| 2730.075                            | H              | 38.50                         | -63.85                        | 12.29                        | 1.36                  | -52.92                     | -13.0          | -39.92         |
| 2730.075                            | V              | 38.21                         | -64.86                        | 12.29                        | 1.36                  | -53.93                     | -13.0          | -40.93         |
| 3185.088                            | H              | 39.48                         | -62.01                        | 12.33                        | 1.54                  | -51.22                     | -13.0          | -38.22         |
| 3185.088                            | V              | 38.89                         | -61.98                        | 12.33                        | 1.54                  | -51.19                     | -13.0          | -38.19         |
| 3640.100                            | H              | 37.61                         | -62.92                        | 12.23                        | 1.57                  | -52.26                     | -13.0          | -39.26         |
| 3640.100                            | V              | 37.51                         | -62.16                        | 12.23                        | 1.57                  | -51.50                     | -13.0          | -38.5          |
| 4095.113                            | H              | 36.76                         | -62.52                        | 12.51                        | 1.47                  | -51.48                     | -13.0          | -38.48         |
| 4095.113                            | V              | 37.19                         | -62.82                        | 12.51                        | 1.47                  | -51.78                     | -13.0          | -38.78         |
| 4550.125                            | H              | 36.42                         | -61.49                        | 13.36                        | 1.53                  | -49.66                     | -13.0          | -36.66         |
| 4550.125                            | V              | 36.84                         | -61.36                        | 13.36                        | 1.53                  | -49.53                     | -13.0          | -36.53         |

| Frequency<br>(MHz)                    | Polar<br>(H/V) | Receiver<br>Reading<br>(dBμV) | Substituted Method            |                              |                       | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|---------------------------------------|----------------|-------------------------------|-------------------------------|------------------------------|-----------------------|----------------------------|----------------|----------------|
|                                       |                |                               | Substituted<br>Level<br>(dBm) | Antenna<br>Gain<br>(dBd/dBi) | Cable<br>Loss<br>(dB) |                            |                |                |
| 4FSK, Frequency: 455.0125MHz-12.5 kHz |                |                               |                               |                              |                       |                            |                |                |
| 910.025                               | H              | 44.01                         | -52.71                        | 0.00                         | 1.02                  | -53.73                     | -20.0          | 33.73          |
| 910.025                               | V              | 45.99                         | -52.67                        | 0.00                         | 1.02                  | -53.69                     | -20.0          | 33.69          |
| 1365.038                              | H              | 55.00                         | -48.49                        | 9.43                         | 1.19                  | -40.25                     | -20.0          | 20.25          |
| 1365.038                              | V              | 53.87                         | -49.77                        | 9.43                         | 1.19                  | -41.53                     | -20.0          | 21.53          |
| 1820.050                              | H              | 40.70                         | -63.53                        | 10.96                        | 1.21                  | -53.78                     | -20.0          | 33.78          |
| 1820.050                              | V              | 43.50                         | -60.66                        | 10.96                        | 1.21                  | -50.91                     | -20.0          | 30.91          |
| 2275.063                              | H              | 37.98                         | -65.37                        | 11.89                        | 1.19                  | -54.67                     | -20.0          | 34.67          |
| 2275.063                              | V              | 38.31                         | -65.80                        | 11.89                        | 1.19                  | -55.10                     | -20.0          | 35.10          |
| 2730.075                              | H              | 37.12                         | -65.23                        | 12.29                        | 1.36                  | -54.30                     | -20.0          | 34.30          |
| 2730.075                              | V              | 37.92                         | -65.15                        | 12.29                        | 1.36                  | -54.22                     | -20.0          | 34.22          |
| 3185.088                              | H              | 39.29                         | -62.20                        | 12.33                        | 1.54                  | -51.41                     | -20.0          | 31.41          |
| 3185.088                              | V              | 37.90                         | -62.97                        | 12.33                        | 1.54                  | -52.18                     | -20.0          | 32.18          |
| 3640.100                              | H              | 37.14                         | -63.39                        | 12.23                        | 1.57                  | -52.73                     | -20.0          | 32.73          |
| 3640.100                              | V              | 36.93                         | -62.74                        | 12.23                        | 1.57                  | -52.08                     | -20.0          | 32.08          |
| 4095.113                              | H              | 36.80                         | -62.48                        | 12.51                        | 1.47                  | -51.44                     | -20.0          | 31.44          |
| 4095.113                              | V              | 36.11                         | -63.90                        | 12.51                        | 1.47                  | -52.86                     | -20.0          | 32.86          |
| 4550.125                              | H              | 36.29                         | -61.62                        | 13.36                        | 1.53                  | -49.79                     | -20.0          | 29.79          |
| 4550.125                              | V              | 36.29                         | -61.91                        | 13.36                        | 1.53                  | -50.08                     | -20.0          | 30.08          |

**Part 22**

| Frequency<br>(MHz)                 | Polar<br>(H/V) | Receiver<br>Reading<br>(dBμV) | Substituted Method            |                              |                       | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|------------------------------------|----------------|-------------------------------|-------------------------------|------------------------------|-----------------------|----------------------------|----------------|----------------|
|                                    |                |                               | Substituted<br>Level<br>(dBm) | Antenna<br>Gain<br>(dBd/dBi) | Cable<br>Loss<br>(dB) |                            |                |                |
| FM,Frequency: 454.0125MHz-12.5 kHz |                |                               |                               |                              |                       |                            |                |                |
| 908.025                            | H              | 45.15                         | -51.66                        | 0.00                         | 1.03                  | -52.69                     | -13.0          | 39.69          |
| 908.025                            | V              | 46.97                         | -51.79                        | 0.00                         | 1.03                  | -52.82                     | -13.0          | 39.82          |
| 1362.038                           | H              | 50.76                         | -52.71                        | 9.42                         | 1.18                  | -44.47                     | -13.0          | 31.47          |
| 1362.038                           | V              | 50.16                         | -53.46                        | 9.42                         | 1.18                  | -45.22                     | -13.0          | 32.22          |
| 1816.050                           | H              | 38.05                         | -66.18                        | 10.95                        | 1.21                  | -56.44                     | -13.0          | 43.44          |
| 1816.050                           | V              | 38.55                         | -65.62                        | 10.95                        | 1.21                  | -55.88                     | -13.0          | 42.88          |
| 2270.063                           | H              | 38.01                         | -65.35                        | 11.88                        | 1.19                  | -54.66                     | -13.0          | 41.66          |
| 2270.063                           | V              | 38.22                         | -65.88                        | 11.88                        | 1.19                  | -55.19                     | -13.0          | 42.19          |
| 2724.075                           | H              | 37.07                         | -65.29                        | 12.29                        | 1.36                  | -54.36                     | -13.0          | 41.36          |
| 2724.075                           | V              | 38.06                         | -65.04                        | 12.29                        | 1.36                  | -54.11                     | -13.0          | 41.11          |
| 3178.088                           | H              | 39.34                         | -62.17                        | 12.33                        | 1.54                  | -51.38                     | -13.0          | 38.38          |
| 3178.088                           | V              | 37.90                         | -63.00                        | 12.33                        | 1.54                  | -52.21                     | -13.0          | 39.21          |
| 3632.100                           | H              | 37.00                         | -63.55                        | 12.23                        | 1.57                  | -52.89                     | -13.0          | 39.89          |
| 3632.100                           | V              | 37.10                         | -62.56                        | 12.23                        | 1.57                  | -51.90                     | -13.0          | 38.9           |
| 4086.113                           | H              | 36.85                         | -62.46                        | 12.49                        | 1.47                  | -51.44                     | -13.0          | 38.44          |
| 4086.113                           | V              | 36.09                         | -63.95                        | 12.49                        | 1.47                  | -52.93                     | -13.0          | 39.93          |
| 4540.125                           | H              | 36.44                         | -61.50                        | 13.37                        | 1.53                  | -49.66                     | -13.0          | 36.66          |
| 4540.125                           | V              | 36.29                         | -61.95                        | 13.37                        | 1.53                  | -50.11                     | -13.0          | 37.11          |
| FM, Frequency: 454.0125MHz-25 kHz  |                |                               |                               |                              |                       |                            |                |                |
| 908.025                            | H              | 43.91                         | -52.90                        | 0.00                         | 1.03                  | -53.93                     | -13.0          | 40.93          |
| 908.025                            | V              | 44.61                         | -54.15                        | 0.00                         | 1.03                  | -55.18                     | -13.0          | 42.18          |
| 1362.038                           | H              | 51.68                         | -51.79                        | 9.42                         | 1.18                  | -43.55                     | -13.0          | 30.55          |
| 1362.038                           | V              | 50.03                         | -53.59                        | 9.42                         | 1.18                  | -45.35                     | -13.0          | 32.35          |
| 1816.050                           | H              | 38.22                         | -66.01                        | 10.95                        | 1.21                  | -56.27                     | -13.0          | 43.27          |
| 1816.050                           | V              | 38.91                         | -65.26                        | 10.95                        | 1.21                  | -55.52                     | -13.0          | 42.52          |
| 2270.063                           | H              | 38.09                         | -65.27                        | 11.88                        | 1.19                  | -54.58                     | -13.0          | 41.58          |
| 2270.063                           | V              | 37.91                         | -66.19                        | 11.88                        | 1.19                  | -55.50                     | -13.0          | 42.5           |
| 2724.075                           | H              | 38.18                         | -64.18                        | 12.29                        | 1.36                  | -53.25                     | -13.0          | 40.25          |
| 2724.075                           | V              | 38.15                         | -64.95                        | 12.29                        | 1.36                  | -54.02                     | -13.0          | 41.02          |
| 3178.088                           | H              | 38.99                         | -62.52                        | 12.33                        | 1.54                  | -51.73                     | -13.0          | 38.73          |
| 3178.088                           | V              | 38.77                         | -62.13                        | 12.33                        | 1.54                  | -51.34                     | -13.0          | 38.34          |
| 3632.100                           | H              | 37.34                         | -63.21                        | 12.23                        | 1.57                  | -52.55                     | -13.0          | 39.55          |
| 3632.100                           | V              | 37.36                         | -62.30                        | 12.23                        | 1.57                  | -51.64                     | -13.0          | 38.64          |
| 4086.113                           | H              | 36.41                         | -62.90                        | 12.49                        | 1.47                  | -51.88                     | -13.0          | 38.88          |
| 4086.113                           | V              | 36.27                         | -63.77                        | 12.49                        | 1.47                  | -52.75                     | -13.0          | 39.75          |
| 4540.125                           | H              | 36.31                         | -61.63                        | 13.37                        | 1.53                  | -49.79                     | -13.0          | 36.79          |
| 4540.125                           | V              | 35.93                         | -62.31                        | 13.37                        | 1.53                  | -50.47                     | -13.0          | 37.47          |

| Frequency<br>(MHz)                   | Polar<br>(H/V) | Receiver<br>Reading<br>(dBμV) | Substituted Method            |                              |                       | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|--------------------------------------|----------------|-------------------------------|-------------------------------|------------------------------|-----------------------|----------------------------|----------------|----------------|
|                                      |                |                               | Substituted<br>Level<br>(dBm) | Antenna<br>Gain<br>(dBd/dBi) | Cable<br>Loss<br>(dB) |                            |                |                |
| 4FSK,Frequency: 454.0125MHz-12.5 kHz |                |                               |                               |                              |                       |                            |                |                |
| 908.025                              | H              | 44.05                         | -52.76                        | 0.00                         | 1.03                  | -53.79                     | -13.0          | 40.79          |
| 908.025                              | V              | 45.97                         | -52.79                        | 0.00                         | 1.03                  | -53.82                     | -13.0          | 40.82          |
| 1362.038                             | H              | 47.89                         | -55.58                        | 9.42                         | 1.18                  | -47.34                     | -13.0          | 34.34          |
| 1362.038                             | V              | 48.06                         | -55.56                        | 9.42                         | 1.18                  | -47.32                     | -13.0          | 34.32          |
| 1816.050                             | H              | 39.90                         | -64.33                        | 10.95                        | 1.21                  | -54.59                     | -13.0          | 41.59          |
| 1816.050                             | V              | 42.80                         | -61.37                        | 10.95                        | 1.21                  | -51.63                     | -13.0          | 38.63          |
| 2270.063                             | H              | 38.94                         | -64.42                        | 11.88                        | 1.19                  | -53.73                     | -13.0          | 40.73          |
| 2270.063                             | V              | 39.02                         | -65.08                        | 11.88                        | 1.19                  | -54.39                     | -13.0          | 41.39          |
| 2724.075                             | H              | 38.33                         | -64.03                        | 12.29                        | 1.36                  | -53.10                     | -13.0          | 40.1           |
| 2724.075                             | V              | 38.69                         | -64.41                        | 12.29                        | 1.36                  | -53.48                     | -13.0          | 40.48          |
| 3178.088                             | H              | 37.88                         | -63.63                        | 12.33                        | 1.54                  | -52.84                     | -13.0          | 39.84          |
| 3178.088                             | V              | 37.96                         | -62.94                        | 12.33                        | 1.54                  | -52.15                     | -13.0          | 39.15          |
| 3632.100                             | H              | 36.89                         | -63.66                        | 12.23                        | 1.57                  | -53.00                     | -13.0          | 40             |
| 3632.100                             | V              | 37.06                         | -62.60                        | 12.23                        | 1.57                  | -51.94                     | -13.0          | 38.94          |
| 4086.113                             | H              | 36.06                         | -63.25                        | 12.49                        | 1.47                  | -52.23                     | -13.0          | 39.23          |
| 4086.113                             | V              | 36.02                         | -64.02                        | 12.49                        | 1.47                  | -53.00                     | -13.0          | 40             |
| 4540.125                             | H              | 36.43                         | -61.51                        | 13.37                        | 1.53                  | -49.67                     | -13.0          | 36.67          |
| 4540.125                             | V              | 36.82                         | -61.42                        | 13.37                        | 1.53                  | -49.58                     | -13.0          | 36.58          |

Note 1: The unit of antenna gain is dBd for frequency below 1GHz and is dBi for frequency above 1GHz.

Note 2:

Absolute Level = Substituted Level - Cable loss + Antenna Gain

Margin = Limit- Absolute Level

## FCC §2.1055 & § 22.355 & §74.464& §80.209 & §90.213 - FREQUENCY STABILITY

### Applicable Standard

FCC §2.1055, § 22.355, §74.464, §80.209 and §90.213

### Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to a frequency counter via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the counter.

### Test Data

#### Environmental Conditions

|                    |            |
|--------------------|------------|
| Temperature:       | 26°C       |
| Relative Humidity: | 49 %       |
| ATM Pressure:      | 101.4 kPa  |
| Tester:            | James Chen |
| Test Date:         | 2020-11-23 |

**Test Mode:** Transmitting

**Test Result:** Compliance. Please refer to the following Tables.

## FCC Part 90:

| FM,12.5kHz, Reference Frequency: 453.2125 MHz, Limit: $\pm 2.5$ ppm |                                     |                          |                       |
|---------------------------------------------------------------------|-------------------------------------|--------------------------|-----------------------|
| Temperature (°C)                                                    | Voltage Supplied (V <sub>DC</sub> ) | Measured Frequency (MHz) | Frequency Error (ppm) |
| -30                                                                 | 13.6                                | 453.2125721              | 0.16                  |
| -20                                                                 |                                     | 453.2126821              | 0.40                  |
| -10                                                                 |                                     | 453.2124521              | -0.11                 |
| 0                                                                   |                                     | 453.2125721              | 0.16                  |
| 10                                                                  |                                     | 453.2124121              | -0.19                 |
| 20                                                                  |                                     | 453.2125321              | 0.07                  |
| 30                                                                  |                                     | 453.2124521              | -0.11                 |
| 40                                                                  |                                     | 453.2126421              | 0.31                  |
| 50                                                                  |                                     | 453.2124221              | -0.17                 |
| 20                                                                  | 10.8                                | 453.2123021              | -0.44                 |
| 20                                                                  | 15.6                                | 453.2127021              | 0.45                  |

| 4FSK, 12.5kHz, Reference Frequency: 453.2125MHz, Limit: $\pm 2.5$ ppm |                                     |                          |                       |
|-----------------------------------------------------------------------|-------------------------------------|--------------------------|-----------------------|
| Temperature (°C)                                                      | Voltage Supplied (V <sub>DC</sub> ) | Measured Frequency (MHz) | Frequency Error (ppm) |
| -30                                                                   | 13.6                                | 453.2125101              | 0.02                  |
| -20                                                                   |                                     | 453.2125401              | 0.09                  |
| -10                                                                   |                                     | 453.2127501              | 0.55                  |
| 0                                                                     |                                     | 453.2127501              | 0.55                  |
| 10                                                                    |                                     | 453.2126301              | 0.29                  |
| 20                                                                    |                                     | 453.2125401              | 0.09                  |
| 30                                                                    |                                     | 453.2127901              | 0.64                  |
| 40                                                                    |                                     | 453.2123401              | -0.35                 |
| 50                                                                    |                                     | 453.2125501              | 0.11                  |
| 20                                                                    | 10.8                                | 453.2125101              | 0.02                  |
| 20                                                                    | 15.6                                | 453.2125701              | 0.15                  |

## FCC Part 80:

| FM,25kHz, Reference Frequency: 459.9875MHz,Limit: $\pm 5.0$ ppm |                                     |                          |                       |
|-----------------------------------------------------------------|-------------------------------------|--------------------------|-----------------------|
| Temperature (°C)                                                | Voltage Supplied (V <sub>DC</sub> ) | Measured Frequency (MHz) | Frequency Error (ppm) |
| -30                                                             | 13.6                                | 459.987382               | -0.26                 |
| -20                                                             |                                     | 459.987322               | -0.39                 |
| -10                                                             |                                     | 459.987382               | -0.26                 |
| 0                                                               |                                     | 459.987402               | -0.21                 |
| 10                                                              |                                     | 459.987402               | -0.21                 |
| 20                                                              |                                     | 459.987532               | 0.07                  |
| 30                                                              |                                     | 459.987542               | 0.09                  |
| 40                                                              |                                     | 459.987042               | -1.00                 |
| 50                                                              |                                     | 459.987402               | -0.21                 |
| 20                                                              | 10.8                                | 459.987402               | -0.21                 |
| 20                                                              | 15.6                                | 459.987182               | -0.69                 |

FCC Part 74:

| FM, 12.5kHz, Reference Frequency: 455.0125 MHz, Limit: $\pm 5.0$ ppm |                                     |                          |                       |
|----------------------------------------------------------------------|-------------------------------------|--------------------------|-----------------------|
| Temperature (°C)                                                     | Voltage Supplied (V <sub>DC</sub> ) | Measured Frequency (MHz) | Frequency Error (ppm) |
| -30                                                                  | 13.6                                | 455.0124121              | -0.19                 |
| -20                                                                  |                                     | 455.0125321              | 0.07                  |
| -10                                                                  |                                     | 455.0125121              | 0.03                  |
| 0                                                                    |                                     | 455.0126121              | 0.25                  |
| 10                                                                   |                                     | 455.0124821              | -0.04                 |
| 20                                                                   |                                     | 455.0125321              | 0.07                  |
| 30                                                                   |                                     | 455.0128121              | 0.69                  |
| 40                                                                   |                                     | 455.0123721              | -0.28                 |
| 50                                                                   |                                     | 455.0127621              | 0.58                  |
| 20                                                                   | 10.8                                | 455.0127121              | 0.47                  |
| 20                                                                   | 15.6                                | 455.0125321              | 0.07                  |

| 4FSK, 12.5kHz, Reference Frequency: 455.0125 MHz, Limit: $\pm 5.0$ ppm |                                     |                          |                       |
|------------------------------------------------------------------------|-------------------------------------|--------------------------|-----------------------|
| Temperature (°C)                                                       | Voltage Supplied (V <sub>DC</sub> ) | Measured Frequency (MHz) | Frequency Error (ppm) |
| -30                                                                    | 13.6                                | 455.0125402              | 0.09                  |
| -20                                                                    |                                     | 455.0125502              | 0.11                  |
| -10                                                                    |                                     | 455.0125802              | 0.18                  |
| 0                                                                      |                                     | 455.0125402              | 0.09                  |
| 10                                                                     |                                     | 455.0125802              | 0.18                  |
| 20                                                                     |                                     | 455.0126202              | 0.26                  |
| 30                                                                     |                                     | 455.0126602              | 0.35                  |
| 40                                                                     |                                     | 455.0126502              | 0.33                  |
| 50                                                                     |                                     | 455.0125602              | 0.13                  |
| 20                                                                     | 10.8                                | 455.0125402              | 0.09                  |
| 20                                                                     | 15.6                                | 455.0125502              | 0.11                  |

| FM, 25kHz, Reference Frequency: 455.0125 MHz, Limit: $\pm 5.0$ ppm |                                     |                          |                       |
|--------------------------------------------------------------------|-------------------------------------|--------------------------|-----------------------|
| Temperature (°C)                                                   | Voltage Supplied (V <sub>DC</sub> ) | Measured Frequency (MHz) | Frequency Error (ppm) |
| -30                                                                | 13.6                                | 455.0124721              | -0.06                 |
| -20                                                                |                                     | 455.0125021              | 0.00                  |
| -10                                                                |                                     | 455.0123821              | -0.26                 |
| 0                                                                  |                                     | 455.0121221              | -0.83                 |
| 10                                                                 |                                     | 455.0125221              | 0.05                  |
| 20                                                                 |                                     | 455.0125321              | 0.07                  |
| 30                                                                 |                                     | 455.0124721              | -0.06                 |
| 40                                                                 |                                     | 455.0125021              | 0.00                  |
| 50                                                                 |                                     | 455.0125121              | 0.03                  |
| 20                                                                 | 10.8                                | 455.0124721              | -0.06                 |
| 20                                                                 | 15.6                                | 455.0123221              | -0.39                 |

## FCC Part 22:

| FM, 12.5kHz, Reference Frequency: 454.0125MHz, Limit: $\pm 5.0$ ppm |                                     |                          |                       |
|---------------------------------------------------------------------|-------------------------------------|--------------------------|-----------------------|
| Temperature (°C)                                                    | Voltage Supplied (V <sub>DC</sub> ) | Measured Frequency (MHz) | Frequency Error (ppm) |
| -30                                                                 | 13.6                                | 454.0122521              | -0.55                 |
| -20                                                                 |                                     | 454.0123521              | -0.33                 |
| -10                                                                 |                                     | 454.0121321              | -0.81                 |
| 0                                                                   |                                     | 454.0121321              | -0.81                 |
| 10                                                                  |                                     | 454.0122021              | -0.66                 |
| 20                                                                  |                                     | 454.0125321              | 0.07                  |
| 30                                                                  |                                     | 454.0120521              | -0.99                 |
| 40                                                                  |                                     | 454.0122321              | -0.59                 |
| 50                                                                  |                                     | 454.0121621              | -0.74                 |
| 20                                                                  | 10.8                                | 454.0120121              | -1.07                 |
| 20                                                                  | 15.6                                | 454.0123221              | -0.39                 |

| 4FSK, 12.5kHz, Reference Frequency: 454.0125MHz, Limit: $\pm 5.0$ ppm |                                     |                          |                       |
|-----------------------------------------------------------------------|-------------------------------------|--------------------------|-----------------------|
| Temperature (°C)                                                      | Voltage Supplied (V <sub>DC</sub> ) | Measured Frequency (MHz) | Frequency Error (ppm) |
| -30                                                                   | 13.6                                | 454.0122440              | -0.56                 |
| -20                                                                   |                                     | 454.0124040              | -0.21                 |
| -10                                                                   |                                     | 454.0118940              | -1.33                 |
| 0                                                                     |                                     | 454.0123240              | -0.39                 |
| 10                                                                    |                                     | 454.0124640              | -0.08                 |
| 20                                                                    |                                     | 454.0125240              | 0.05                  |
| 30                                                                    |                                     | 454.0118440              | -1.44                 |
| 40                                                                    |                                     | 454.0121240              | -0.83                 |
| 50                                                                    |                                     | 454.0124440              | -0.12                 |
| 20                                                                    | 10.8                                | 454.0121240              | -0.83                 |
| 20                                                                    | 15.6                                | 454.0126740              | 0.38                  |

| FM, 25kHz, Reference Frequency: 454.0125MHz, Limit: $\pm 5.0$ ppm |                                     |                          |                       |
|-------------------------------------------------------------------|-------------------------------------|--------------------------|-----------------------|
| Temperature (°C)                                                  | Voltage Supplied (V <sub>DC</sub> ) | Measured Frequency (MHz) | Frequency Error (ppm) |
| -30                                                               | 13.6                                | 454.0121821              | -0.70                 |
| -20                                                               |                                     | 454.0125721              | 0.16                  |
| -10                                                               |                                     | 454.0122321              | -0.59                 |
| 0                                                                 |                                     | 454.0126321              | 0.29                  |
| 10                                                                |                                     | 454.0127521              | 0.56                  |
| 20                                                                |                                     | 454.0125321              | 0.07                  |
| 30                                                                |                                     | 454.0121821              | -0.70                 |
| 40                                                                |                                     | 454.0126621              | 0.36                  |
| 50                                                                |                                     | 454.0121821              | -0.70                 |
| 20                                                                | 10.8                                | 454.0127121              | 0.47                  |
| 20                                                                | 15.6                                | 454.0125321              | 0.07                  |

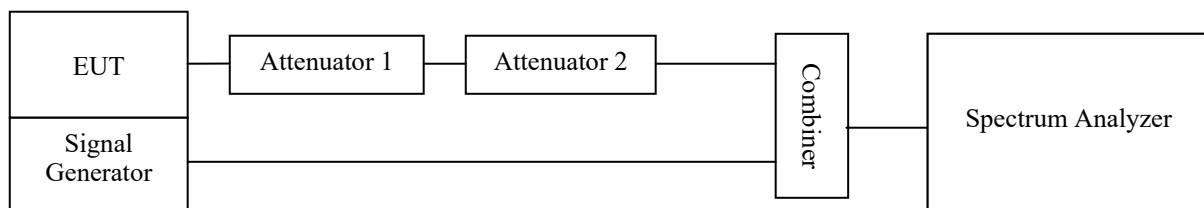
## FCC §90.214 - TRANSIENT FREQUENCY BEHAVIOR

### Applicable Standard

Regulations: FCC §90.214

### Test Procedure

- a) Connect the EUT and test equipment as shown on the following block diagram.
- b) Set the Spectrum Analyzer to measure FM deviation, and tune the RF frequency to the transmitter assigned frequency.
- c) Set the signal generator to the assigned transmitter frequency and modulate it with a 1 kHz tone at  $\pm 12.5$  kHz deviation and set its output level to -100dBm.
- d) Turn on the transmitter.
- e) Supply sufficient attenuation via the RF attenuator to provide an input level to the Spectrum Analyzer that is 40 dB below the maximum allowed input power when the transmitter is operating at its rated power level. Note this power level on the Spectrum Analyzer as  $P_0$ .
- f) Turn off the transmitter.
- g) Adjust the RF level of the signal generator to provide RF power equal to  $P_0$ . This signal generator RF level shall be maintained throughout the rest of the measurement.
- h) Remove the attenuation 1, so the input power to the Spectrum Analyzer is increased by 30 dB when the transmitter is turned on.
- i) Adjust the vertical amplitude control of the spectrum analyzer to display the 1000 Hz at  $\pm 4$  divisions vertically centered on the display. Set trigger mode of the Spectrum Analyzer to "Video", and tune the "trigger level" on suitable level. Then set the "trigger offset" to -10ms for turn on and -15ms for turn off.
- j) Turn on the transmitter and the transient wave will be captured on the screen of Spectrum Analyzer. Observe the stored display. The instant when the 1 kHz test signal is completely suppressed is considered to be  $t_{on}$ . The trace should be maintained within the allowed divisions during the period  $t_1$  and  $t_2$ .
- k) Then turn off the transmitter, and another transient wave will be captured on the screen of Spectrum Analyzer. The trace should be maintained within the allowed divisions during the period  $t_3$ .



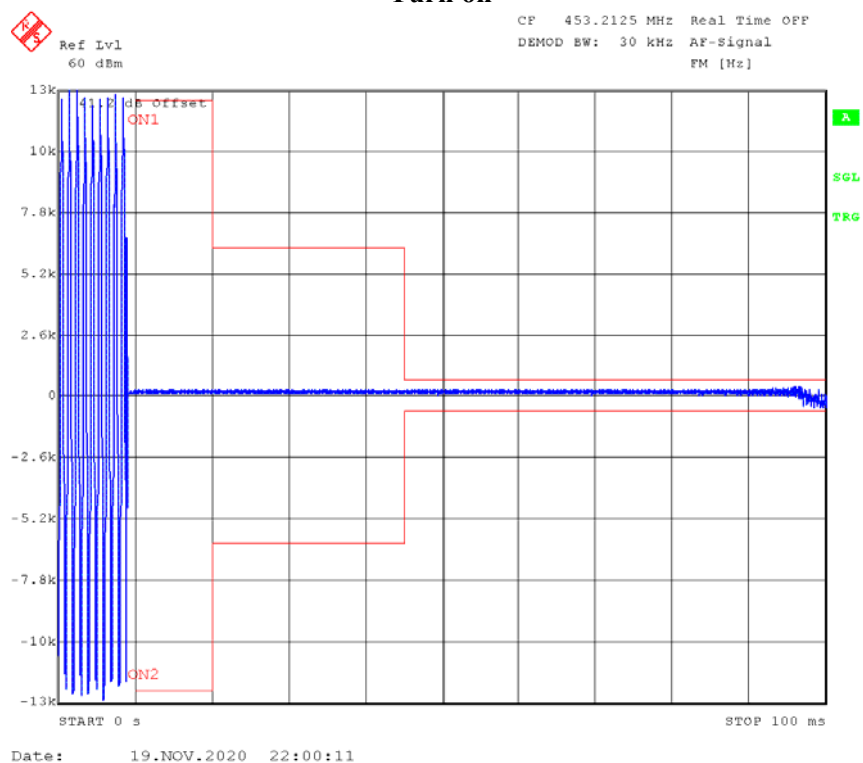
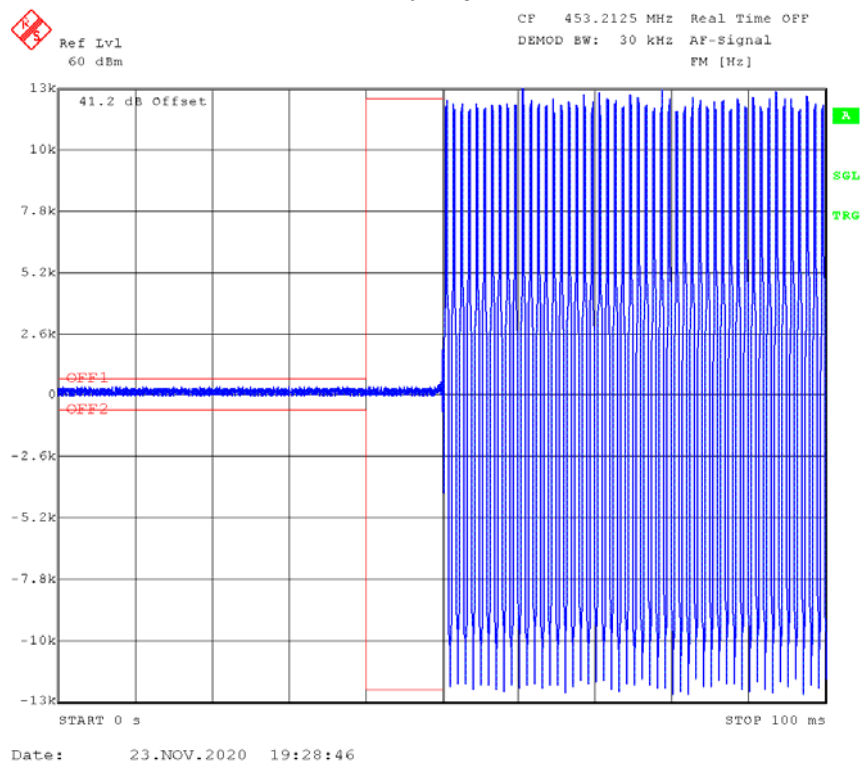
**Test Data****Environmental Conditions**

|                           |                       |
|---------------------------|-----------------------|
| <b>Temperature:</b>       | 26~26.7°C             |
| <b>Relative Humidity:</b> | 46~49 %               |
| <b>ATM Pressure:</b>      | 101.3~101.4 kPa       |
| <b>Tester:</b>            | James Chen            |
| <b>Test Date:</b>         | 2020-11-19~2020~11-23 |

**Test Mode: Transmitting**

**Test Result: Compliance.** *Please refer to the following table and plots.*

| <b>Channel Spacing<br/>(kHz)</b> | <b>Transient Period<br/>(ms)</b> | <b>Transient Frequency</b> | <b>Result</b> |
|----------------------------------|----------------------------------|----------------------------|---------------|
| 12.5                             | <10(t <sub>1</sub> )             | ±12.5 kHz                  | Pass          |
|                                  | <25(t <sub>2</sub> )             | ±6.25 kHz                  |               |
|                                  | <10(t <sub>3</sub> )             | ±12.5 kHz                  |               |

**High Power Channel: 453.2125 MHz****Turn on****Turn off**

\*\*\*\*\* END OF REPORT \*\*\*\*\*