



Report No.: SZEM210300242103

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## TEST REPORT

**Application No.:** SZEM2103002421CR  
**Applicant:** Uniden America Corporation  
**Address of Applicant:** 6225 N. State Highway 161 Suite 300, Irving, Texas 75038 United States  
**Manufacturer:** Uniden Holding Corporation  
**Address of Manufacturer:** 2-12-7, Hacchobori, Chuo-ku, Tokyo, Japan, 104-8512  
**Factory:** Uniden Vietnam Limited  
**Address of Factory:** Lot 5. 1, Tan Truong Industrial Zone, Cam Giang District, Hai Duong Province, Vietnam  
**Equipment Under Test (EUT):**  
**EUT Name:** VHF Marine Radio with GPS and Bluetooth  
**Model No.:** UM725GBT  
**Trade mark:** Uniden  
**FCC ID:** AMWUT662  
**Standards:** 47 CFR Part 80  
**Date of Receipt:** 2021-03-05  
**Date of Test:** 2021-03-08 to 2021-04-03  
**Date of Issue:** 2021-04-06

|                     |              |
|---------------------|--------------|
| <b>Test Result:</b> | <b>Pass*</b> |
|---------------------|--------------|

\* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu

Keny Xu  
EMC Laboratory Manager



SGS-CSTC Standards Technical Services Co., Ltd.  
Shenzhen Branch EMC Laboratory

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| Revision Record |         |            |          |          |
|-----------------|---------|------------|----------|----------|
| Version         | Chapter | Date       | Modifier | Remark   |
| 01              |         | 2021-04-06 |          | Original |
|                 |         |            |          |          |
|                 |         |            |          |          |

|                          |  |                            |  |  |
|--------------------------|--|----------------------------|--|--|
| Authorized for issue by: |  |                            |  |  |
|                          |  | Edison Li                  |  |  |
|                          |  | Edison Li/Project Engineer |  |  |
|                          |  | Eric Fu                    |  |  |
|                          |  | Eric Fu/Reviewer           |  |  |



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## 1 Test Summary

| Radio Spectrum Technical Requirement |                |        |                      |        |
|--------------------------------------|----------------|--------|----------------------|--------|
| Item                                 | Standard       | Method | Requirement          | Result |
| Antenna Requirement                  | 47 CFR Part 80 | N/A    | 47 CFR Part 80.3(e), | Pass   |

| Item                                     | Standard       | Method                                  | Requirement                         | Result |
|--|----------------|---|-------------------------------------|--------|
| Bandwidths                               | 47 CFR Part 80 | ANSI/TIA-603-E-2016<br>ANSI C63.26:2015 | 47 CFR Part 2.1049, 80.205(a)       | Pass   |
| Transmitter frequency tolerances         | 47 CFR Part 80 |   | 47 CFR Part 2.1055, 80.209(a)       | Pass   |
| Emission Mask                            | 47 CFR Part 80 |   | 47 CFR Part 2.1047, 80.211(f)(1)(2) | Pass   |
| Spurious Emissions at antenna Terminals  | 47 CFR Part 80 |   | 47 CFR Part 2.1047, 80.211(f)(3)    | Pass   |
| Modulation requirements                  | 47 CFR Part 80 |   | 47 CFR Part 2.1047, 80.213          | Pass   |
| Transmitter frequency Deviation          | 47 CFR Part 80 |   | 47 CFR Part .1047, 80.213           | Pass   |
| Transmitter power                        | 47 CFR Part 80 |   | 47 CFR Part 2.1046, 80.215          | Pass   |
| Transmitter Carrier Power Reduction      | 47 CFR Part 80 |   | 47 CFR Part 80.215(e)(f)            | Pass   |
| Suppression of interference aboard ships | 47 CFR Part 80 |   | 47 CFR Part 80.217                  | Pass   |



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### 3 General Information

#### 3.1 Details of E.U.T.

|                                  |  |
|----------------------------------|--|
| Power supply:                    | DC 13.8V   |
| Cable(s):                        | DC Cable: 150cm Unshielded;<br>NMEA0183+Ext Speaker Cable: 100cm Unshielded; |
| Sample Type:                     | Mobile device  |
| Internal Source:                 | More than 108MHz   |
| Transceiver frequency Range:     | 156.025MHz-161.60MHz(TX)<br>156.050MHz-163.275MHz(RX, includes WX band)      |
| DSC Transmitter Frequency Range: | 156.525MHz(CH70), Meets Global DSC Class D standards.                        |
| Modulation Type:                 | VHF:FM for Analog<br>DSC:FSK   |
| Frequency Spacing:               | VHF: 25KHz   |
| Emission Type:                   | 16K0G3E for VHF<br>16K0G2B for DSC   |
| Rated Output Power:              | 25W/1W for VHF/DSC;  |
| VHF/DSC Antenna Connectors:      | SO-239(50 ohm, External Antenna)   |
| VHF/DSC Antenna Gain:            | 3dBi   |
| Type of Equipment:               | Ship stations  |

#### 3.2 Description of Support Units

| Description        | Manufacturer       | Model No. | Serial No.      |
|--------------------|--------------------|-----------|-----------------|
| DC power           | ZHAOXIN            | RXN-305D  | REF. No.SEA2700 |
| Coaxial Attenuator | Provided by client | TS4       | HYT168793       |



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### 3.3 Measurement Uncertainty

| No. | Item                            | Measurement Uncertainty         |
|-----|---------------------------------|---------------------------------|
| 1   | Radio Frequency                 | $\pm 7.25 \times 10^{-8}$       |
| 2   | Occupied Bandwidth              | $\pm 3\%$                       |
| 3   | RF conducted power              | $\pm 0.75\text{dB}$             |
| 4   | Conducted Spurious emissions    | $\pm 0.75\text{dB}$             |
| 5   | Radiated Spurious emission test | $\pm 4.5\text{dB}$ (30MHz-1GHz) |
|     |                                 | $\pm 4.8\text{dB}$ (1GHz-18GHz) |
| 6   | Temperature test                | $\pm 1^\circ\text{C}$           |
| 7   | Humidity test                   | $\pm 3\%$                       |
| 8   | Supply voltages                 | $\pm 1.5\%$                     |



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No tests were sub-contracted.

### 3.5 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

- **VCCI**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

- **FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

### 3.6 Deviation from Standards

None

### 3.7 Abnormalities from Standard Conditions

None



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## 4 Equipment List

| RF test system                                    |                                    |                    |               |            |               |
|---|------------------------------------|--------------------|---------------|------------|---------------|
| Test Equipment                                    | Manufacturer                       | Model No.          | Inventory No. | Cal. Date  | Cal. Due date |
| Shielding Room                                    | SAEMC                              | MSR733             | SEM001-09     | 2019-06-13 | 2022-06-12    |
| MXA Signal Analyzer<br>(10Hz-26.5GHz)             | KEYSIGHT                           | N9020A             | SEM004-17     | 2020-05-21 | 2021-05-20    |
| Signal Generator<br>(9kHz-40GHz)                  | KEYSIGHT                           | N5173B             | SEM006-05     | 2020-09-23 | 2021-09-22    |
| MXG Vector Signal<br>Generator                    | KEYSIGHT                           | N5182A             | SEM006-14     | 2021-03-24 | 2022-03-23    |
| ESG Vector Signal<br>Generator                    | KEYSIGHT                           | E4438C             | SEM006-15     | 2020-09-23 | 2021-09-22    |
| DC Power Supply                                   | Rohde & Schwarz                    | NGSM 32/10         | SEM011-04     | 2021-03-24 | 2022-03-23    |
| Manual Step<br>Attenuator                         | KEYSIGHT                           | 8494B              | SEM021-05     | 2020-04-09 | 2021-04-08    |
| Manual Step<br>Attenuator                         | KEYSIGHT                           | 8496B              | SEM021-06     | 2020-04-09 | 2021-04-08    |
| Power Sensor                                      | KEYSIGHT                           | U2021XA            | SEM009-20     | 2020-05-21 | 2021-05-20    |
| Power Sensor                                      | KEYSIGHT                           | U2021XA            | SEM009-21     | 2020-05-21 | 2021-05-20    |
| Programmable<br>Temperature &<br>Humidity Chamber | Votsch<br>Industrietechnik<br>GmbH | VT 4002            | SEM002-15     | 2021-03-23 | 2022-03-22    |
| Universal Radio<br>Communication<br>Tester        | Rohde & Schwarz                    | CMW 500            | SEM010-03     | 2021-03-24 | 2022-03-23    |
| Measurement<br>Software                           | TST                                | TST PASS<br>V1.0.5 | N/A           | N/A        | N/A           |
| Coaxial Cable                                     | SGS                                | N/A                | SEM031-03     | 2020-07-10 | 2021-07-09    |



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| Radiated Spurious Emissions(Below 1GHz) |                      |                 |               |            |               |
|---|----------------------|-----------------|---------------|------------|---------------|
| Test Equipment                          | Manufacturer         | Model No.       | Inventory No. | Cal. Date  | Cal. Due date |
| 3m Semi-Anechoic Chamber                | ETS-LINDGREN         | N/A             | SEM001-01     | 2020-07-19 | 2023-07-18    |
| MXE EMI receiver (3Hz-3.6GHz)           | KEYSIGHT             | N9038A          | SEM004-15     | 2020-11-02 | 2021-11-01    |
| BiConiLog Antenna (26-3000MHz)          | ETS-LINDGREN         | 3142C           | SEM003-02     | 2019-05-24 | 2022-05-23    |
| Pre-amplifier (0.1-1300MHz)             | Agilent Technologies | 8447D           | SEM005-01     | 2021-03-24 | 2022-03-23    |
| Measurement Software                    | AUDIX                | e3 V8.2014-6-27 | N/A           | N/A        | N/A           |
| Coaxial Cable                           | SGS                  | N/A             | SEM025-01     | 2020-07-10 | 2021-07-09    |
| Substitution Antenna                    | ETS-Lindgren         | 3142C           | SEM003-01     | 2020-06-26 | 2023-06-25    |
| Signal Generator                        | R&S                  | SMA100A         | 102174        | 2020-07-10 | 2021-07-09    |

| Radiated Spurious Emissions          |                                    |                   |               |            |               |
|--------------------------------------|------------------------------------|-------------------|---------------|------------|---------------|
| Test Equipment                       | Manufacturer                       | Model No.         | Inventory No. | Cal. Date  | Cal. Due date |
| Fully-Anechoic Chamber 1             | SAEMC                              | MFAC              | SEM001-04     | 2018-04-14 | 2021-04-13    |
| Signal Analyzer (10Hz-40GHz)         | Rohde & Schwarz                    | FSV40             | SEM008-04     | 2021-03-24 | 2022-03-23    |
| BiConiLog Antenna (30MHz-3GHz)       | Schwarzbeck                        | VULB9163          | SEM003-05     | 2018-09-14 | 2021-09-13    |
| Horn Antenna (800MHz-18GHz)          | Rohde & Schwarz                    | HF907             | SEM003-06     | 2018-06-08 | 2021-06-07    |
| Pre-amplifier (100MHz-18GHz)         | Black Diamond Series               | BDLNA-0118-352810 | SEM005-06     | 2020-09-23 | 2021-09-22    |
| Signal Conditioning Unit(1GHz-18GHz) | Rohde & Schwarz                    | SCU-18            | SEM005-18     | 2021-03-24 | 2022-03-23    |
| Pre-Amplifier (0.1-26.5GHz)          | Compliance Directions Systems Inc. | PAP-0126          | SEM004-11     | 2020-09-23 | 2021-09-22    |
| Measurement Software                 | Rohde & Schwarz                    | EMC32 V9.21.00    | N/A           | N/A        | N/A           |
| Coaxial Cable                        | SGS                                | N/A               | SEM027-01     | 2020-07-10 | 2021-07-09    |
| Substitution Antenna                 | ETS-Lindgren                       | 3142C             | SEM003-01     | 2020-06-26 | 2023-06-25    |
| Signal Generator                     | R&S                                | SMA100A           | 102174        | 2020-07-10 | 2021-07-09    |





| General used equipment          |   |          |              |            |              |
|---------------------------------|---|----------|--------------|------------|--------------|
| Equipment                       | Manufacturer                              | Model No | Inventory No | Cal Date   | Cal Due Date |
| Humidity/ Temperature Indicator | Shanghai Meteorological Industry Factory  | ZJ1-2B   | SEM002-04    | 2020-09-15 | 2021-09-14   |
| Humidity/ Temperature Indicator | Mingle                                    | N/A      | SEM002-08    | 2020-09-15 | 2021-09-14   |
| Barometer                       | Changchun Meteorological Industry Factory | DYM3     | SEM002-01    | 2020-04-07 | 2021-04-06   |



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## 5 Radio Spectrum Technical Requirement

### 5.1 Antenna Requirement

#### 5.1.1 Test Requirement:

47 CFR Part Part 80.81

#### 5.1.2 Conclusion

##### 80.81 Requirements:

All telephony emissions of a ship station or a marine utility station on board ship within the frequency band 30-200 MHz must be vertically polarized.

EUT Antenna:

Antenna location: Refer to Internal photos.



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## 6 Radio Spectrum Matter Test Results

### 6.1 Bandwidths

Test Requirement: 47 CFR FCC Part2.1049 & FCC Part 80.205(a)  
Test Method: ANSI/TIA-603-E:2016  
Limit:

(a).An emission designator shows the necessary bandwidth for each class of emission of a station except that in ship earth stations it shows the occupied or necessary bandwidth, whichever is greater. The following table gives the class of emission and corresponding emission designator and authorized bandwidth:

| emission          | Emission designator | Authorized bandwidth (kHz) |
|-------------------|---------------------|----------------------------|
| A1A               | 160HA1A             | 0.4                        |
| A1B <sup>1</sup>  | 160HA1B             | 0.4                        |
| A1D <sup>12</sup> | 16K0A1D             | 20.0                       |
| A2A               | 2K66A2A             | 2.8                        |
| A2B <sup>1</sup>  | 2K66A2B             | 2.8                        |
| A2D <sup>12</sup> | 16K0A2D             | 20.0                       |
| A3E               | 6K00A3E             | 8.0                        |
| A3N <sup>2</sup>  | 2K66A3N             | 2.8                        |
| A3X <sup>3</sup>  | 3K20A3X             | 25.0                       |
| F1B <sup>4</sup>  | 280HF1B             | 0.3                        |
| F1B <sup>5</sup>  | 300HF1B             | 0.5                        |
| F1B <sup>6</sup>  | 16KOF1B             | 20.0                       |
| F1C               | 2K80F1C             | 3.0                        |
| F1D <sup>12</sup> | 16K0F1D             | 20.0                       |
| F2B <sup>6</sup>  | 16KOF2B             | 20.0                       |
| F2C <sup>7</sup>  | 16KOF2C             | 20.0                       |
| F2D <sup>12</sup> | 16K0F2D             | 20.0                       |
| F3C               | 2K80F3C             | 3.0                        |
| F3C <sup>7</sup>  | 16KOF3C             | 20.0                       |
| F3E <sup>8</sup>  | 16KOF3E             | 20.0                       |



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|                     |                   |                   |
|---------------------|-------------------|-------------------|
| F3N <sup>9</sup>    | 20MOF3N           | 20,000.0          |
| G1D <sup>12</sup>   | 16K0G1D           | 20.0              |
| G2D <sup>12</sup>   | 16K0G2D           | 20.0              |
| G3D <sup>10</sup>   | 16KOG3D           | 20.0              |
| G3E <sup>8</sup>    | 16KOG3E           | 20.0              |
| G3N <sup>3 13</sup> | 16KOG3N           | 20.0              |
| H2A                 | 1K40H2A           | 2.8               |
| H2B <sup>1</sup>    | 1K40H2B           | 2.8               |
| H3E <sup>11</sup>   | 2K80H3E           | 3.0               |
| H3N                 | 2K66H3N           | 2.8               |
| J2A                 | 160HJ2A           | 0.4               |
| J2B <sup>4</sup>    | 280HJ2B           | 0.3               |
| J2B <sup>5</sup>    | 300HJ2B           | 0.5               |
| J2B                 | 2K80J2B           | 3.0               |
| J2C                 | 2K80J2C           | 3.0               |
| J2D <sup>14</sup>   | 2K80J2D           | 3.0               |
| J3C                 | 2K80J3C           | 3.0               |
| J3E <sup>11</sup>   | 2K80J3E           | 3.0               |
| J3N                 | 160HJ3N           | 0.4               |
| NON                 | NON               | 0.4               |
| PON                 | ( <sup>12</sup> ) | ( <sup>12</sup> ) |
| R3E <sup>11</sup>   | 2K80R3E           | 3.0               |

<sup>1</sup>On 500 kHz and 2182 kHz A1B, A2B, H2B and J2B emissions indicate transmission of the auto alarm signals.

<sup>2</sup>Applicable only to transmissions in the 405-525 kHz band for direction finding.

<sup>3</sup>Applicable only to EPIRB's.

<sup>4</sup>Radioprinter transmissions for communications with private coast stations.

<sup>5</sup>NB-DP radiotelegraph and data transmissions for communications with public coast stations.

<sup>6</sup>Applicable only to radioprinter and data in the 156-162 MHz band and radioprinter in the 216-220 MHz band.

<sup>7</sup>Applicable only to facsimile in the 156-162 MHz and 216-220 MHz bands.



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<sup>8</sup>Applicable only when maximum frequency deviation is 5 kHz. See also paragraph (b) of this section.

<sup>9</sup>Applicable only to marine hand-held radar.

<sup>10</sup>Applicable only to on-board frequencies for maneuvering or navigation.

<sup>11</sup>Transmitters approved prior to December 31, 1969, for emission H3E, J3E and R3E and an authorized bandwidth of 3.5 kHz may continue to be operated. These transmitters will not be authorized in new installations.

<sup>12</sup>Applicable to radiolocation and associated telecommand ship stations operating on 154.585 MHz, 159.480 MHz, 160.725 MHz, 160.785 MHz, 454.000 MHz, and 459.000 MHz; emergency position indicating radiobeacons operating in the 406.000-406.1000 MHz frequency bank; and data transmissions in the 156-162 MHz band.

<sup>13</sup>[Reserved]

<sup>14</sup>The information is contained in multiple very low level subcarriers.

(b) For land stations the maximum authorized frequency deviation for F3E or G3E emission is as follows:

(1) 5 kHz in the 72.0-73.0 MHz, 75.4-76.0 MHz and 156-162 MHz bands;

(2) 15 kHz for stations which were authorized for operation before December 1, 1961, in the 73.0-74.6 MHz band.

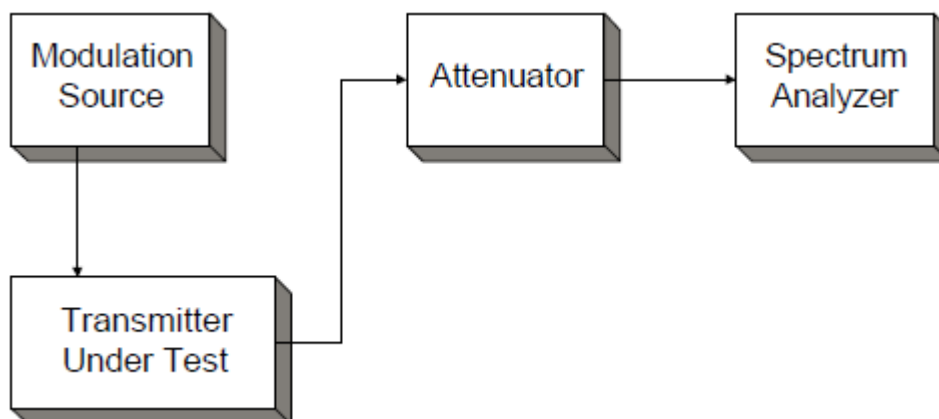
The bandwidth of the AIS station is 25KHz as per FCC Part 80.393.

### 6.1.1 E.U.T. Operation

Operating Environment:

Temperature: 25.1 °C Humidity: 53.8 % RH Atmospheric Pressure: 1010 mbar  
Test mode: 02: TX mode, Keep the EUT in transmitting mode.

### 6.1.2 E.U.T. Operation



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### 6.1.3 Measurement Data

The detailed test data see: Appendix FCC data.



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## 6.2 Transmitter Frequency Tolerances.

Test Requirement 47 CFR FCC Part2.1055 & FCC Part 80.209(a)  
Test Method: ANSI/TIA-603-E:2016  
Limit:

(a). The frequency tolerance requirements applicable to transmitters in the maritime services are shown in the following table. Tolerances are given as parts in 106 unless shown in Hz.

| Frequency bands and categories of stations                           | Tolerances <sup>1</sup> |
|--|-------------------------|
| (1) Band 100-525 kHz:  |                         |
| (i) Coast stations:  |                         |
| For single sideband emissions  | 20 Hz.                  |
| For transmitters with narrow-band direct printing and data emissions | 10 Hz <sup>2</sup>      |
| For transmitters with digital selective calling emissions            | 10 Hz.                  |
| For all other emissions  | 100.                    |
| (ii) Ship stations:  |                         |
| For transmitters with narrow-band direct printing and data emissions | 20 Hz.                  |
| For transmitters with digital selective calling emissions            | 10 Hz <sup>2</sup>      |
| For all other transmitters   | 10 Hz.                  |
| (iii) Ship stations for emergency only:                              |                         |
| For all emissions  | 20 Hz.                  |
| (iv) Survival craft stations:  |                         |
| For all emissions  | 20 Hz.                  |
| (v) Radiodetermination stations:                                     |                         |
| For all emissions  | 100.                    |
| (2) Band 1600-4000 kHz:  |                         |
| (i) Coast stations and Alaska fixed stations:                        |                         |
| For single sideband and facsimile                                    | 20 Hz.                  |
| For narrow-band direct printing and data emissions                   | 10 Hz. <sup>2</sup>     |
| For transmitters with digital selective calling emissions            | 10 Hz. <sup>2</sup>     |
| For all other emissions  | 50 Hz.                  |
| (ii) Ship stations:  |                         |
| For transmitters with narrow-band direct printing and data emissions | 10 Hz. <sup>2</sup>     |



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|  |                     |
|--|---------------------|
| For transmitters with digital selective calling emissions            | 10 Hz. <sup>3</sup> |
| For all other transmitters   | 20 Hz.              |
| (iii) Survival craft stations:                                       | 20 Hz.              |
| (iv) Radiodetermination stations:                                    |                     |
| With power 200W or less  | 20.                 |
| With power above 200W  | 10.                 |
| (3) Band 4000-27500 kHz:   |                     |
| (i) Coast stations and Alaska fixed stations:                        |                     |
| For single sideband and facsimile emissions                          | 20 Hz.              |
| For narrow-band direct printing and data emissions                   | 10 Hz. <sup>2</sup> |
| For digital selective calling emissions                              | 10 Hz.              |
| For Morse telegraphy emissions                                       | 10.                 |
| For all other emissions  | 15 Hz.              |
| (ii) Ship stations:  |                     |
| For transmitters with narrow-band direct printing and data emissions | 10 Hz. <sup>2</sup> |
| For transmitters with digital selective calling emissions            | 10 Hz. <sup>3</sup> |
| For all other transmitters   | 20 Hz.              |
| (iii) Survival craft stations:                                       | 50 Hz.              |
| (4) Band 72-76 MHz:  |                     |
| (i) Fixed stations:  |                     |
| Operating in the 72.0-73.0 and 75.4-76.0 MHz bands                   | 5.                  |
| Operating in the 73.74.6 MHz band                                    | 50.                 |
| (5) Band 156-162 MHz:  |                     |
| (i) Coast stations:  |                     |
| For carriers licensed to operate with a carrier power:               |                     |
| Below 3 watts  | 10.                 |
| 3 to 100 watts   | 5. <sup>7</sup>     |
| (ii) Ship stations   | 10. <sup>4</sup>    |
| (iii) Survival craft stations operating on 121.500 MHz               | 50.                 |
| (iv) EPIRBs:   |                     |



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|  |     |
|--|-----|
| Operating on 121.500 and 243.000 MHz               | 50. |
| Operating on 156.750 and 156.800 MHz. <sup>6</sup> | 10. |
| (6) Band 216-220 MHz:                              |     |
| (i) Coast stations:                                |     |
| For all emissions                                  | 5.  |
| (ii) Ship stations:                                |     |
| For all emissions                                  | 5.  |
| (7) Band 400-466 MHz:                              |     |
| (i) EPIRBs operating on 406-406.1 MHz              | 5.  |
| (ii) On-board stations                             | 5.  |
| (iii) Radiolocation and telecommand stations.      | 5.  |
| (8) Band 1626.5-1646.5 MHz:                        |     |
| (i) Ship earth stations                            | 5.  |

<sup>1</sup>Transmitters authorized prior to January 2, 1990, with frequency tolerances equal to or better than those required after this date will continue to be authorized in the maritime services provided they retain approval and comply with the applicable standards in this part.

<sup>2</sup>The frequency tolerance for narrow-band direct printing and data transmitters installed before January 2, 1992, is 15 Hz for coast stations and 20 Hz for ship stations. The frequency tolerance for narrow-band direct printing and data transmitters approved or installed after January 1, 1992, is 10 Hz.

<sup>3</sup>[Reserved]

<sup>4</sup>For transmitters in the radiolocation and associated telecommand service operating on 154.584 MHz, 159.480 MHz, 160.725 MHz and 160.785 MHz the frequency tolerance is 15 parts in 10<sup>6</sup>.

<sup>5</sup>[Reserved]

<sup>6</sup>[Reserved]

<sup>7</sup>For transmitters operated at private coast stations with antenna heights less than 6 meters (20 feet) above ground and output power of 25 watts or less the frequency tolerance is 10 parts in 10<sup>6</sup>.

(b) When pulse modulation is used in land and ship radar stations operating in the bands above 2.4 GHz the frequency at which maximum emission occurs must be within the authorized bandwidth and must not be closer than 1.5/T MHz to the upper and lower limits of the authorized bandwidth where "T" is the pulse duration in microseconds. In the band 14.00-14.05 GHz the center frequency must not vary more than 10 MHz from 14.025 GHz.

(c) For stations in the maritime radiodetermination service, other than ship radar stations, the authorized frequency tolerance will be specified on the license when it is not specified in this part.



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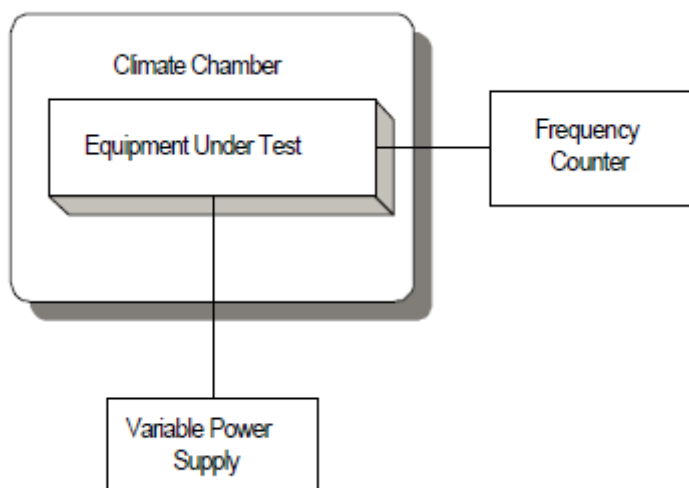
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## 6.2.1 E.U.T. Operation

Operating Environment:

Temperature: 25.1 °C Humidity: 53.8 % RH Atmospheric Pressure: 1010 mbar  
Test mode: 02: TX mode, Keep the EUT in transmitting mode.

## 6.2.2 E.U.T. Operation



## 6.2.3 Measurement Data

The detailed test data see: Appendix FCC data.



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## 6.3 Emissions Mask

Test Requirement: 47 CFR FCC Part2.1047 & FCC Part 80.211(f) (1) (2)  
Test Method: ANSI/TIA-603-E:2016  
Limit:

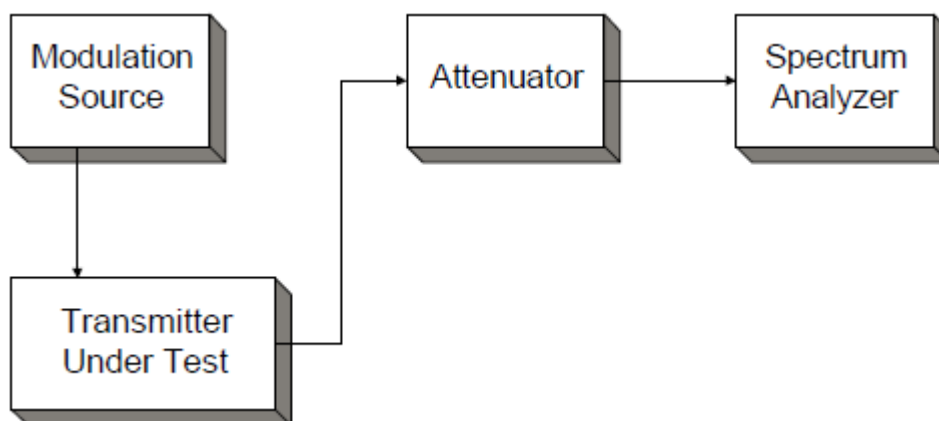
- (f) The mean power when using emissions other than those in paragraphs (a), (b), (c) and (d) of this section:
- (1) On any frequency removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: At least 25 dB;
  - (2) On any frequency removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: At least 35 dB;

Note: As required by FCC part 80.211(f), the limit value of the Emission Mask is calculated based on the measured maximum carrier power minus the corresponding value defined by the standard.

### 6.3.1 E.U.T. Operation

Operating Environment:  
Temperature: 25.1 °C Humidity: 53.8 % RH Atmospheric Pressure: 1010 mbar  
Test mode: 02: TX mode, Keep the EUT in transmitting mode.

### 6.3.2 E.U.T. Operation



### 6.3.3 Measurement Data

The detailed test data see: Appendix FCC data.



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## 6.4 Spurious Emissions at Antenna Terminals

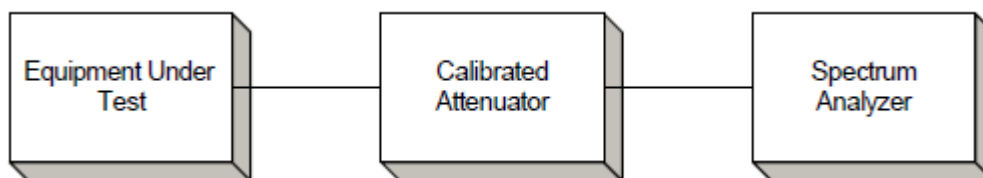
Test Requirement: 47 CFR FCC Part2.1047 & FCC Part 80.211(f) (3)  
Test Method: ANSI/TIA-603-E:2016  
Limit:

- (f) The mean power when using emissions other than those in paragraphs (a), (b), (c) and (d) of this section:  
(3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 plus  $10\log_{10}$  (mean power in watts) dB.

### 6.4.1 E.U.T. Operation

Operating Environment:  
Temperature: 25.1 °C Humidity: 53.8 % RH Atmospheric Pressure: 1010 mbar  
Test mode: 02: TX mode, Keep the EUT in transmitting mode.

### 6.4.2 E.U.T. Operation



### 6.4.3 Measurement Data

The detailed test data see: Appendix FCC data.



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## 6.5 Transmitter Unwanted Emissions(Radiated)

Test Requirement: 47 CFR FCC Part2.1047 & FCC Part 80.211(f)  
Test Method: ANSI/TIA-603-E:2016  
Limit:

- (f) The mean power when using emissions other than those in paragraphs (a), (b), (c) and (d) of this section:
- (1) On any frequency removed from the assigned frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: At least 25 dB;
  - (2) On any frequency removed from the assigned frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: At least 35 dB; and
  - (3) On any frequency removed from the assigned frequency by more than 250 percent of the authorized bandwidth: At least 43 plus  $10\log_{10}$  (mean power in watts) dB.



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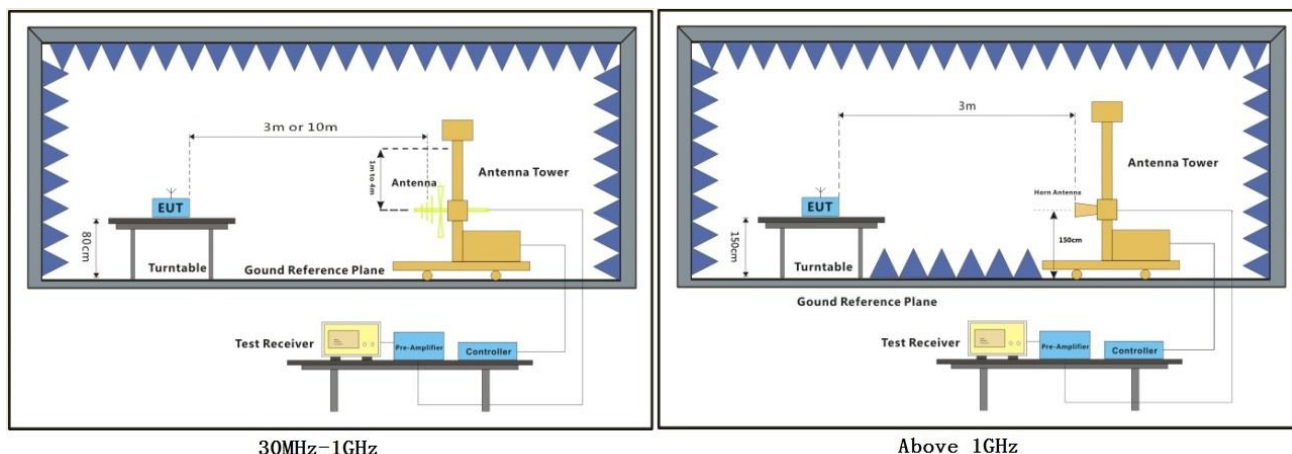


## 6.5.1 E.U.T. Operation

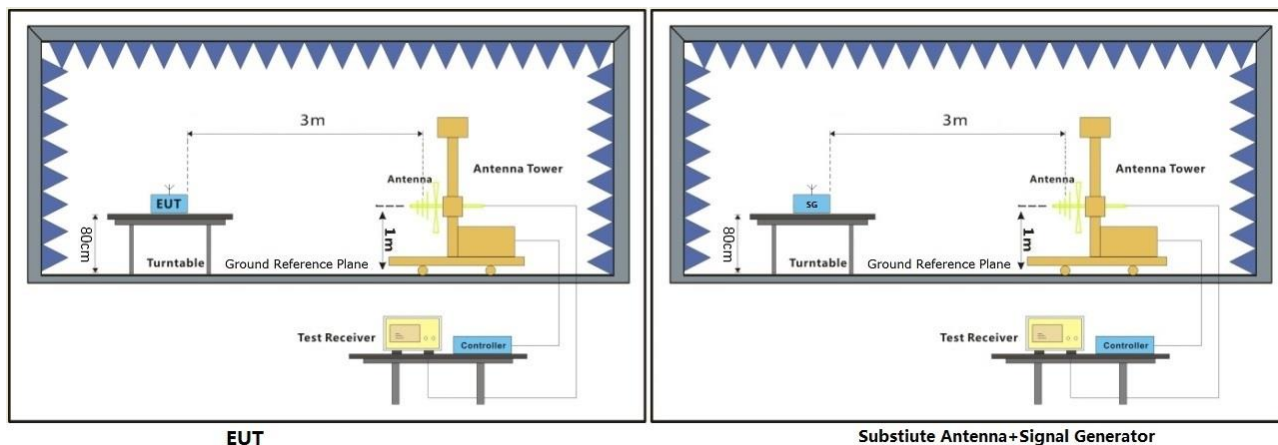
Operating Environment:

Temperature: 25.1 °C Humidity: 53.8 % RH Atmospheric Pressure: 1010 mbar  
Test mode: 02: TX mode, Keep the EUT in transmitting mode.

## 6.5.2 E.U.T. Operation



Radiation Emission Test Setup



Substitution Test Setup



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### 6.5.3 Measurement Data

#### Test Procedure:

- (1) On a test site, the EUT shall be placed on a turntable and in the position closest to the normal use as declared by the user.
- (2) The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the transmitter.
- (3) The output of the antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.
- (4) The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.
- (5) The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.
- (6) The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
- (7) The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.
- (8) The maximum signal level detected by the measuring receiver shall be noted.
- (9) The measurement shall be repeated with the test antenna set to horizontal polarization.
- (10) Replace the antenna with a proper Antenna (substitution antenna).
- (11) The substitution antenna shall be oriented for vertical polarization and, if necessary, the length of the substitution antenna shall be adjusted to correspond to the frequency of transmitting.
- (12) The substitution antenna shall be connected to a calibrated signal generator.
- (13) If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
- (14) The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.
- (15) The input signal to substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.
- (16) The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.
- (17) The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

The detailed test data see: Appendix FCC data.

Note: The disturbance below 1GHz was very low and the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.



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## 6.6 Modulation Requirements

Test Requirement: 47 CFR FCC Part2.1047 & FCC Part 80.213(a)  
Test Method: ANSI/TIA-603-E:2016  
Limit:

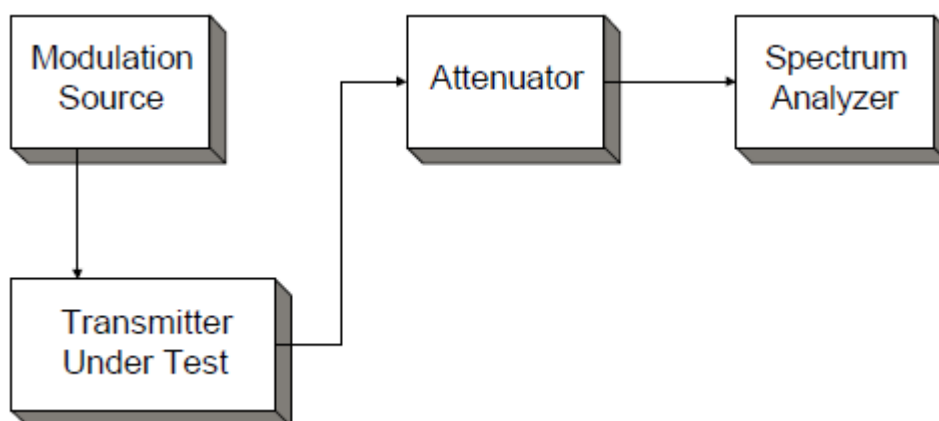
(a) Transmitters must meet the following modulation requirements:

- (1) When double sideband emission is used the peak modulation must be maintained between 75 and 100 percent;
- (2) When phase or frequency modulation is used in the 156-162 MHz band the peak modulation must be maintained between 75 and 100 percent. A frequency deviation of  $\pm 5$  kHz is defined as 100 percent peak modulation; and
- (3) In single sideband operation the upper sideband must be transmitted. Single sideband transmitters must automatically limit the peak envelope power to their authorized operating power and meet the requirements in §80.207(c).

### 6.6.1 E.U.T. Operation

Operating Environment:  
Temperature: 25.1 °C Humidity: 53.8 % RH Atmospheric Pressure: 1010 mbar  
Test mode: 02: TX mode, Keep the EUT in transmitting mode.

### 6.6.2 Test Setup Diagram



### 6.6.3 Measurement Data

The detailed test data see: Appendix FCC data.



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## 6.7 Transmitter Frequency Deviation

Test Requirement: 47 CFR FCC Part2.1047 & FCC Part 80.213(d)  
Test Method: ANSI/TIA-603-E:2016  
Limit:

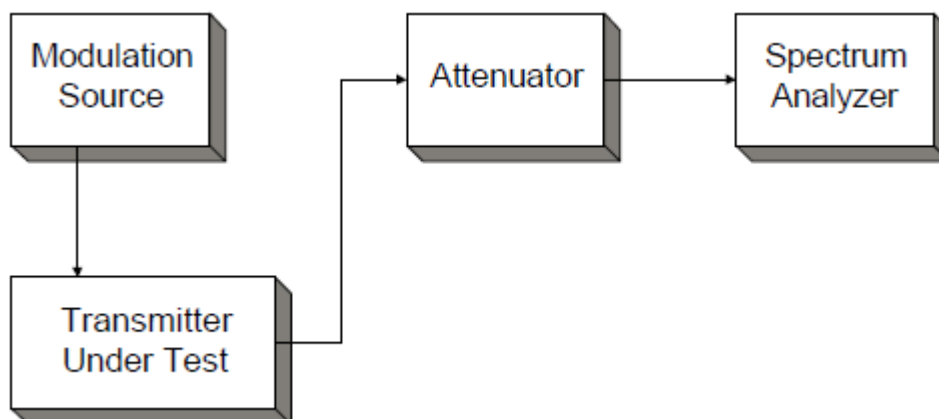
(d) Ship and coast station transmitters operating in the 156-162 MHz and 216-220 bands must be capable of proper operation with a frequency deviation that does not exceed  $\pm 5$  kHz when using any emission authorized by §80.207.

### 6.7.1 E.U.T. Operation

Operating Environment:

Temperature: 25.1 °C Humidity: 53.8 % RH Atmospheric Pressure: 1010 mbar  
Test mode: 02: TX mode, Keep the EUT in transmitting mode.

### 6.7.2 Test Setup Diagram



### 6.7.3 Measurement Data

The detailed test data see: Appendix FCC data.



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## 6.8 Transmitter Power

Test Requirement: 47 CFR FCC Part2.1046 & FCC Part 80.215  
Test Method: ANSI/TIA-603-E:2016  
Limit:

e) Ship stations frequencies above 27500 kHz. The maximum power must not exceed the values listed below.

(1) Ship stations 156-162 MHz—25W<sup>6</sup>

<sup>6</sup>Reducible to 1 watt or less, except for transmitters limited to public correspondence channels and used in an automated system.

(g) The carrier power of ship station radiotelephone transmitters, except portable transmitters, operating in the 156-162 MHz band must be at least 8 but not more than 25 watts. Transmitters that use 12 volt lead acid storage batteries as a primary power source must be measured with a primary voltage between 12.2 and 13.7 volts DC. Additionally, unless otherwise indicated, equipment in radiotelephone ship stations operating in the 156-162 MHz band must meet the following requirements:

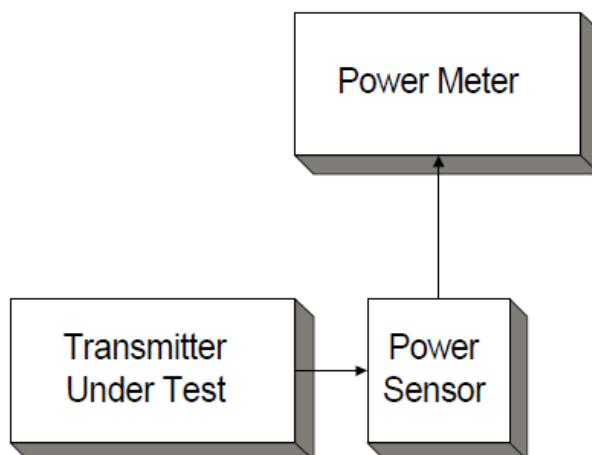
- (1) All transmitters and remote control units must be capable of reducing the carrier power to one watt or less;
- (2) Except as indicated in (g)(4) of this section, all transmitters manufactured after January 21, 1987, or in use after January 21, 1997, must automatically reduce the carrier power to one watt or less when the transmitter is tuned to 156.375 MHz or 156.650 MHz, and must be provided with a manual override switch which when held by an operator will permit full carrier power operation on 156.375 MHz and 156.650 MHz;

### 6.8.1 E.U.T. Operation

Operating Environment:

Temperature: 25.1 °C Humidity: 53.8 % RH Atmospheric Pressure: 1010 mbar  
Test mode: 02: TX mode, Keep the EUT in transmitting mode.

### 6.8.2 Test Setup Diagram



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### 6.8.3 Measurement Data

The detailed test data see: Appendix FCC data.



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## 6.9 Transmitter Carrier Power Reduction

Test Requirement 47 CFR FCC Part 80.215

Test Method: ANSI/TIA-603-E:2016

Limit:

e) Ship stations frequencies above 27500 kHz. The maximum power must not exceed the values listed below.

(1) Ship stations 156-162 MHz—25W6

6Reducible to 1 watt or less, except for transmitters limited to public correspondence channels and used in an automated system.

(g) The carrier power of ship station radiotelephone transmitters, except portable transmitters, operating in the 156-162 MHz band must be at least 8 but not more than 25 watts. Transmitters that use 12 volt lead acid storage batteries as a primary power source must be measured with a primary voltage between 12.2 and 13.7 volts DC. Additionally, unless otherwise indicated, equipment in radiotelephone ship stations operating in the 156-162 MHz band must meet the following requirements:

(1) All transmitters and remote control units must be capable of reducing the carrier power to one watt or less;

(2) Except as indicated in (g)(4) of this section, all transmitters manufactured after January 21, 1987, or in use after January 21, 1997, must automatically reduce the carrier power to one watt or less when the transmitter is tuned to 156.375 MHz or 156.650 MHz, and must be provided with a manual override switch which when held by an operator will permit full carrier power operation on 156.375 MHz and 156.650 MHz;

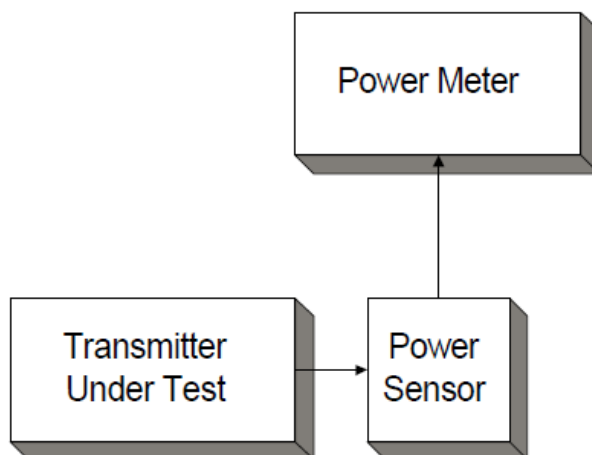
### 6.9.1 E.U.T. Operation

Operating Environment:

Temperature: 25.1 °C Humidity: 53.8 % RH Atmospheric Pressure: 1010 mbar

Test mode: 02: TX mode, Keep the EUT in transmitting mode.

### 6.9.2 Test Setup Diagram



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### 6.9.3 Measurement Data

The detailed test data see: Appendix FCC data.



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## 6.10 Suppression of interference aboard ships

Test Requirement 47 CFR FCC Part 80.217

Test Method: ANSI/TIA-603-E:2016

Limit:

(a) A voluntarily equipped ship station receiver must not cause harmful interference to any receiver required by statute or treaty.

(b) The electromagnetic field from receivers required by statute or treaty must not exceed the following value at a distance over sea water of one nautical mile from the receiver:

| Frequency of interfering emissions | Field intensity in microvolts per meter |
|------------------------------------|---|
| Below 30 MHz                       | 0.1                                     |
| 30 to 100 MHz                      | 0.3                                     |
| 100 to 300 MHz                     | 1.0                                     |
| Over 300 MHz                       | 3.0                                     |

Or Deliver not more than the following amounts of power, to an artificial antenna having electrical characteristics equivalent to those of the average receiving antenna(s) use on shipboard:

| Frequency of interfering emissions | Power to artificial antenna in microwatts |
|------------------------------------|---|
| Below 30 MHz                       | 400(-3.98dBm)                             |
| 30 to 100 MHz                      | 4,000(6.02dBm)                            |
| 100 to 300 MHz                     | 40,000(16.02dBm)                          |
| Over 300 MHz                       | 400,000(36.02dBm)                         |

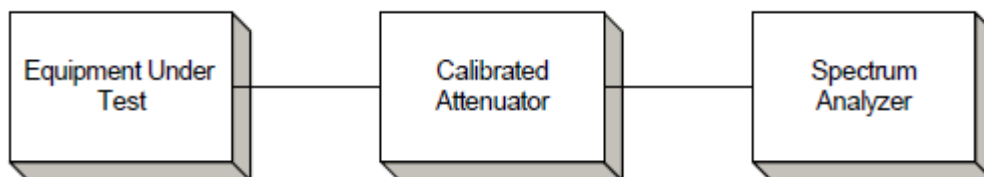
### 6.10.1 E.U.T. Operation

Operating Environment:

Temperature: 25.1 °C Humidity: 53.8 % RH Atmospheric Pressure: 1010 mbar

Test mode: 02: TX mode, Keep the EUT in transmitting mode.

### 6.10.2 E.U.T. Operation



### 6.10.3 Measurement Data

The detailed test data see: Appendix FCC data.



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## 7 Photographs

### 7.1 Test Setup

Please refer to setup photos.

### 7.2 EUT Constructional Details

Please Refer to external and internal photos for details.



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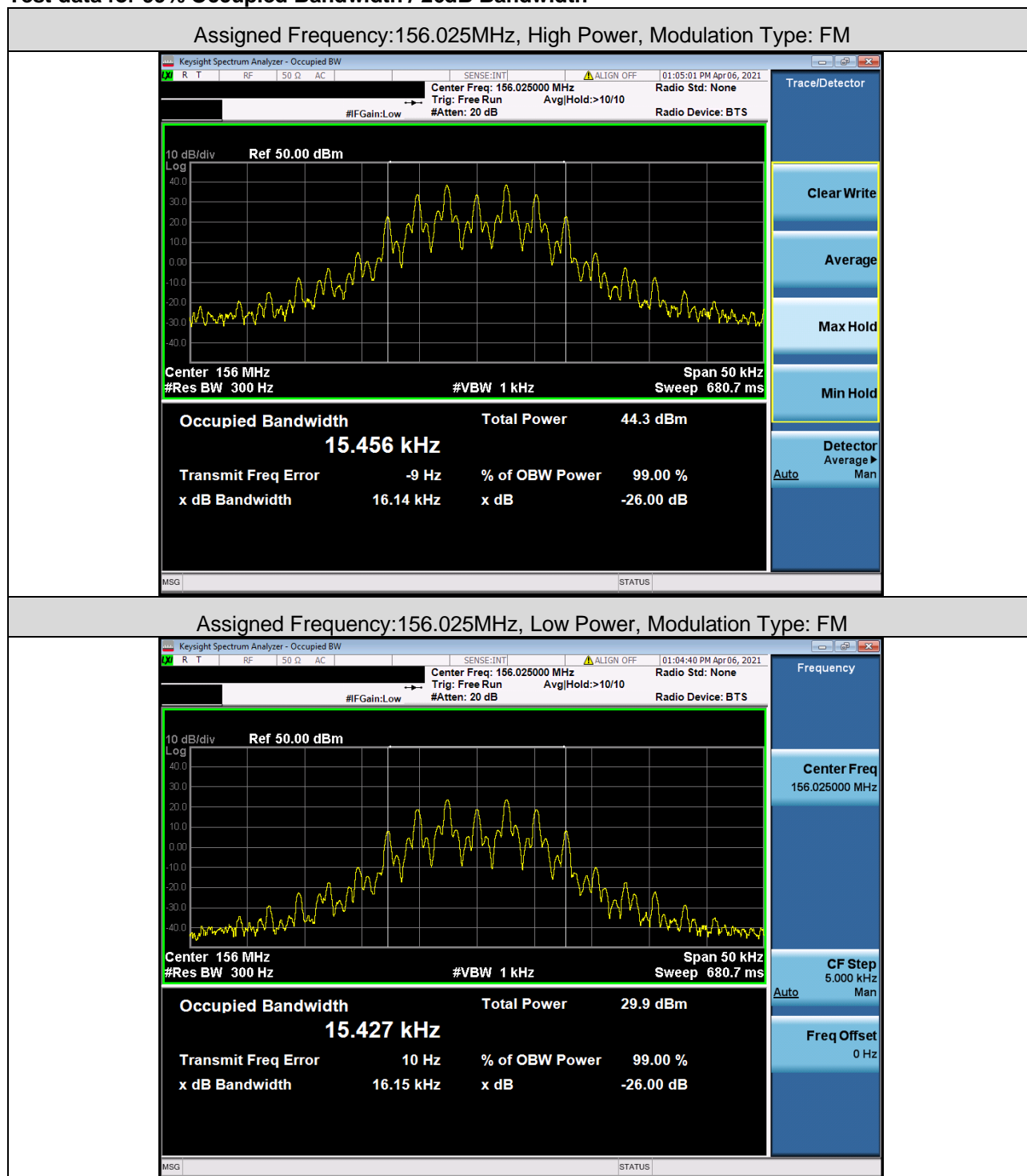
## 8 Appendix

### 8.1 Appendix FCC data.

#### 1.Occupied Bandwidth

| Test Frequency (MHz) | Modulation Type         | Power Level | 99% Occupied Bandwidth (kHz) | 26dB Bandwidth (kHz) | Limit (kHz) |
|----------------------|-------------------------|-------------|------------------------------|----------------------|-------------|
| 156.025              | FM/G3E                  | Max         | 15.456                       | 16.14                | N/A         |
|                      |                         | Low         | 15.427                       | 16.15                | N/A         |
| 156.3                |                         | Max         | 15.432                       | 16.12                | N/A         |
|                      |                         | Low         | 15.429                       | 16.12                | N/A         |
| 156.8                |                         | Max         | 15.425                       | 16.16                | N/A         |
|                      |                         | Low         | 15.435                       | 16.18                | N/A         |
| 156.65               |                         | Max         | 15.432                       | 16.13                | N/A         |
|                      |                         | Low         | 15.434                       | 16.13                | N/A         |
| 157.425              |                         | Max         | 15.404                       | 16.12                | N/A         |
|                      |                         | Low         | 15.396                       | 16.13                | N/A         |
| 161.6                |                         | Max         | 14.920                       | 15.76                | N/A         |
|                      |                         | Low         | 14.928                       | 15.75                | N/A         |
| 156.525              | FSK/G2B<br>(dsc-1300Hz) | Max         | 8.014                        | 10.64                | N/A         |
|                      |                         | Low         | 8.003                        | 10.62                | N/A         |
|                      | FSK/G2B<br>dsc-2100Hz   | Max         | 12.759                       | 16.92                | N/A         |
|                      |                         | Low         | 12.771                       | 16.95                | N/A         |

### Test data for 99% Occupied Bandwidth / 26dB Bandwidth



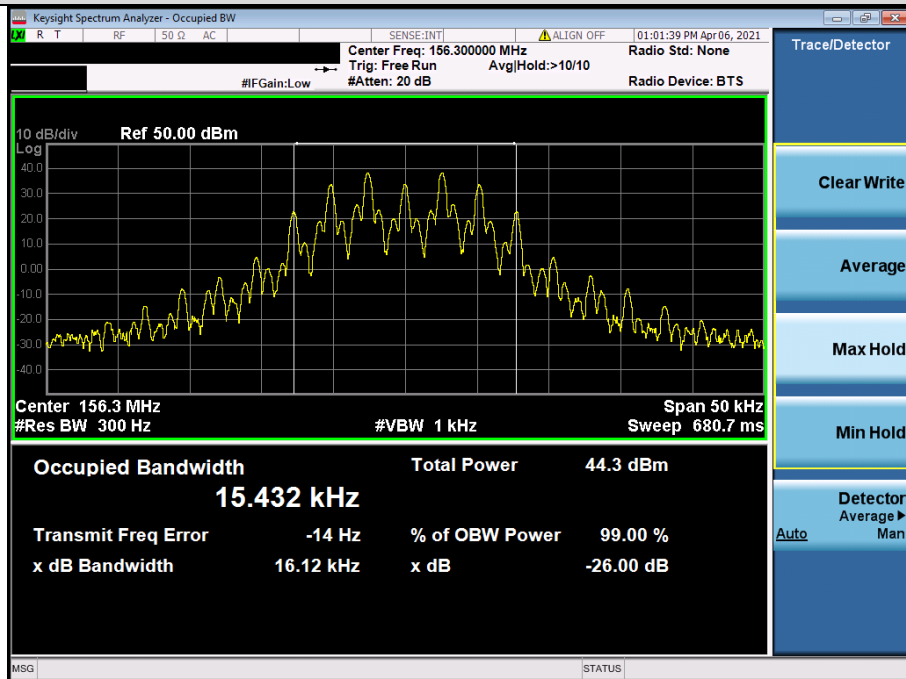
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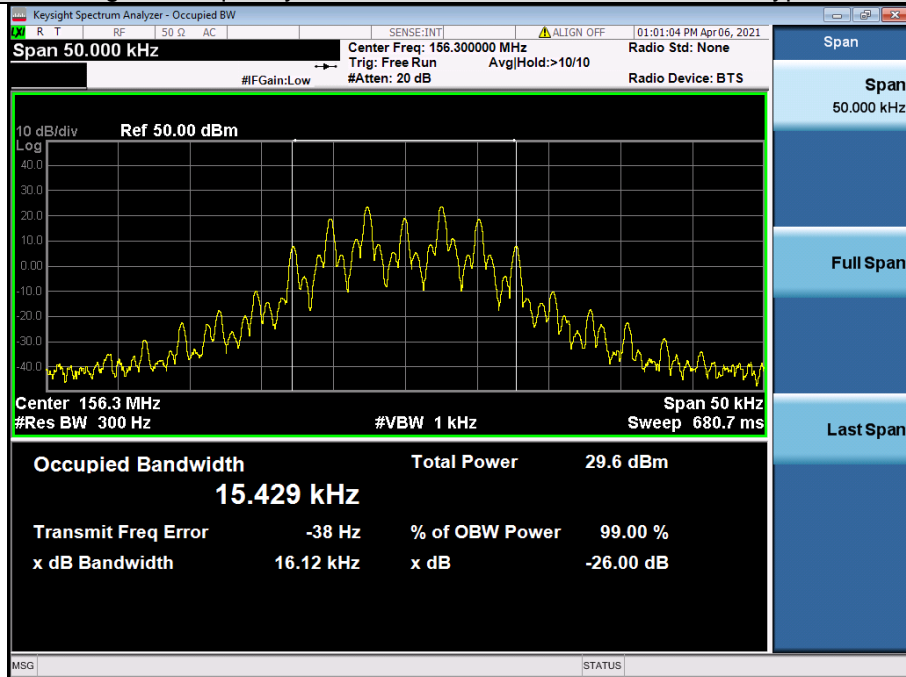
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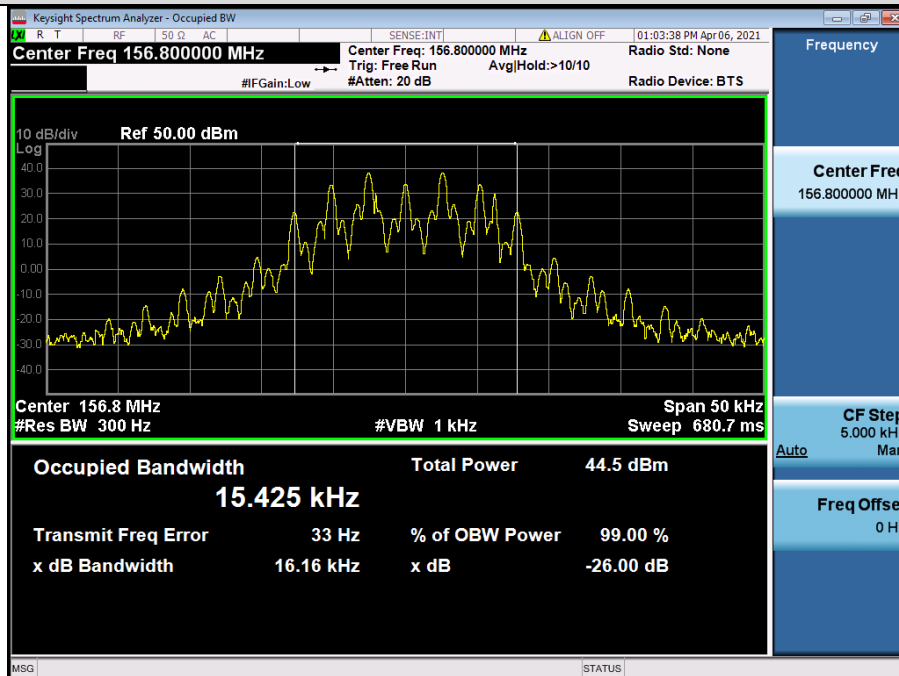
### Assigned Frequency: 156.300MHz, High Power, Modulation Type: FM



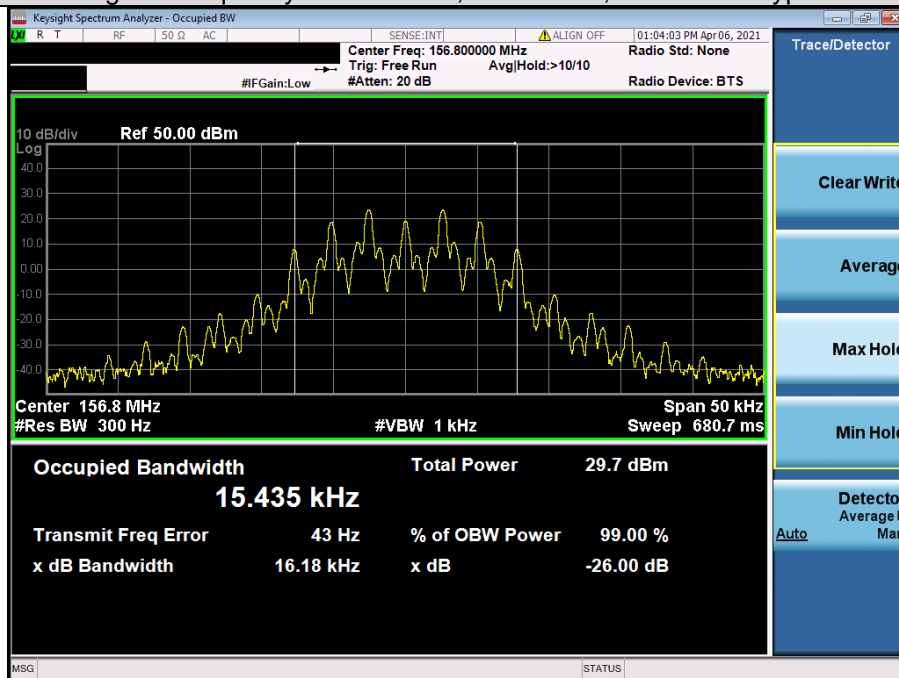
### Assigned Frequency: 156.300MHz, Low Power, Modulation Type: FM



### Assigned Frequency: 156.800MHz, High Power, Modulation Type: FM

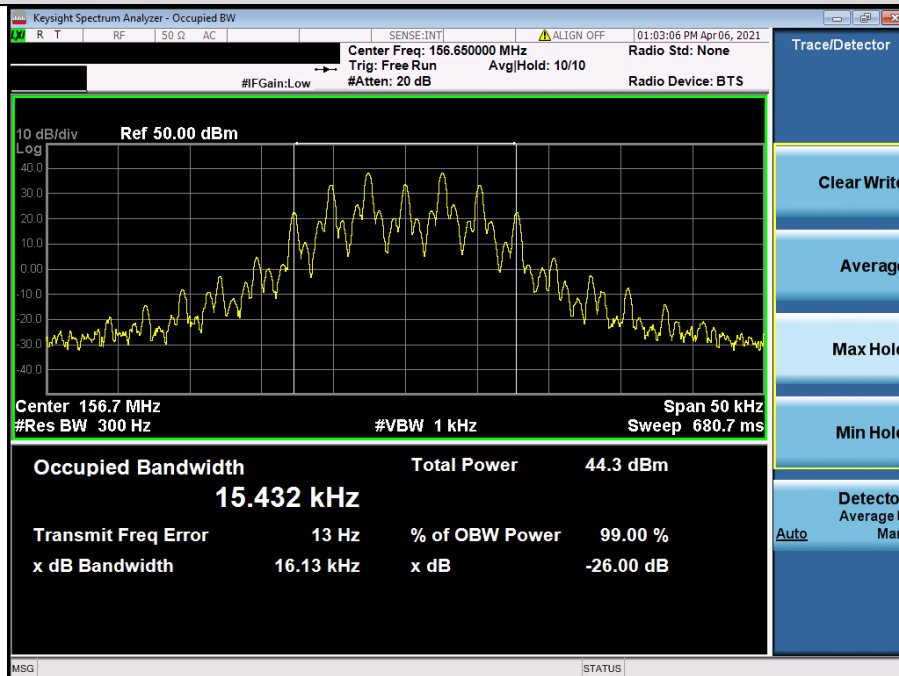


### Assigned Frequency: 156.800MHz, Low Power, Modulation Type: FM

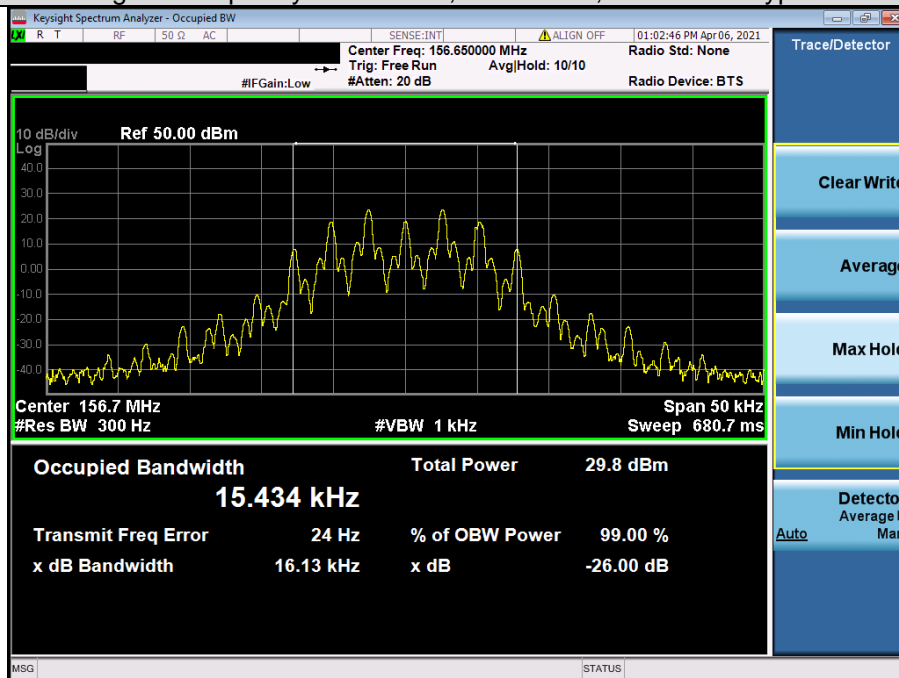




### Assigned Frequency:156.65MHz, High Power, Modulation Type: FM

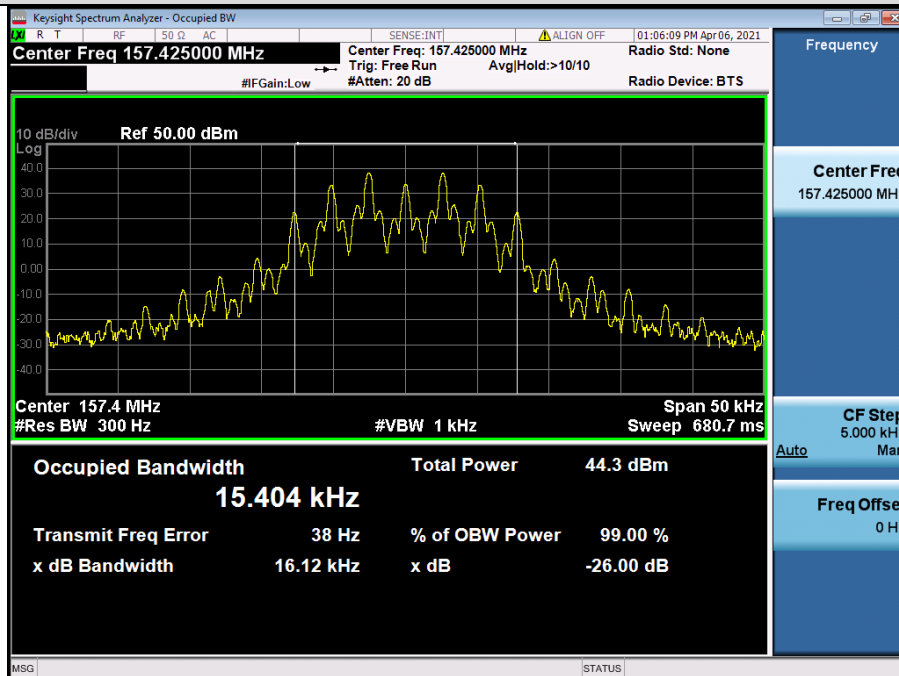


### Assigned Frequency:156.65MHz, Low Power, Modulation Type: FM

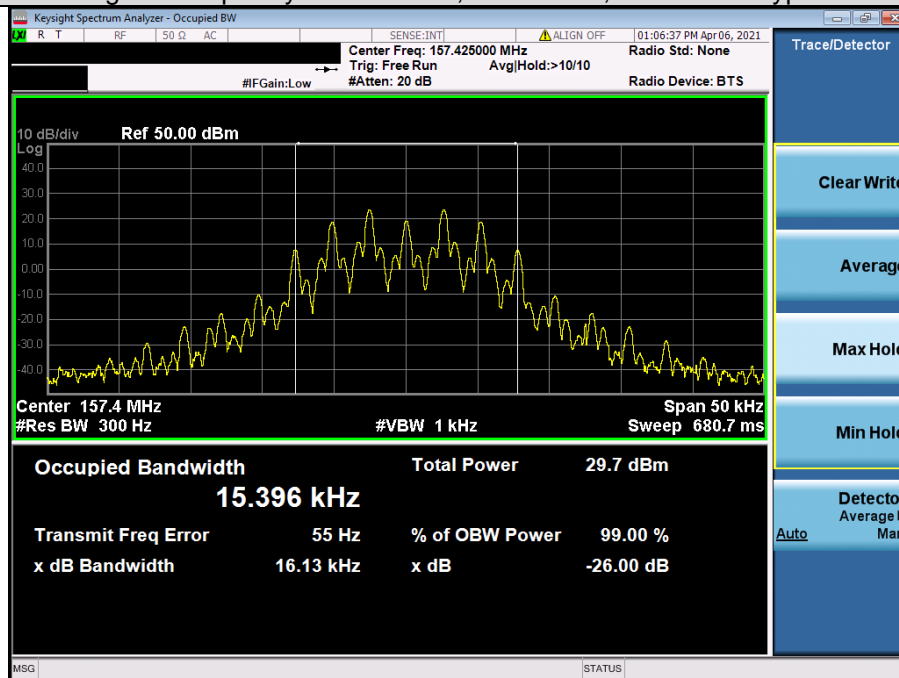




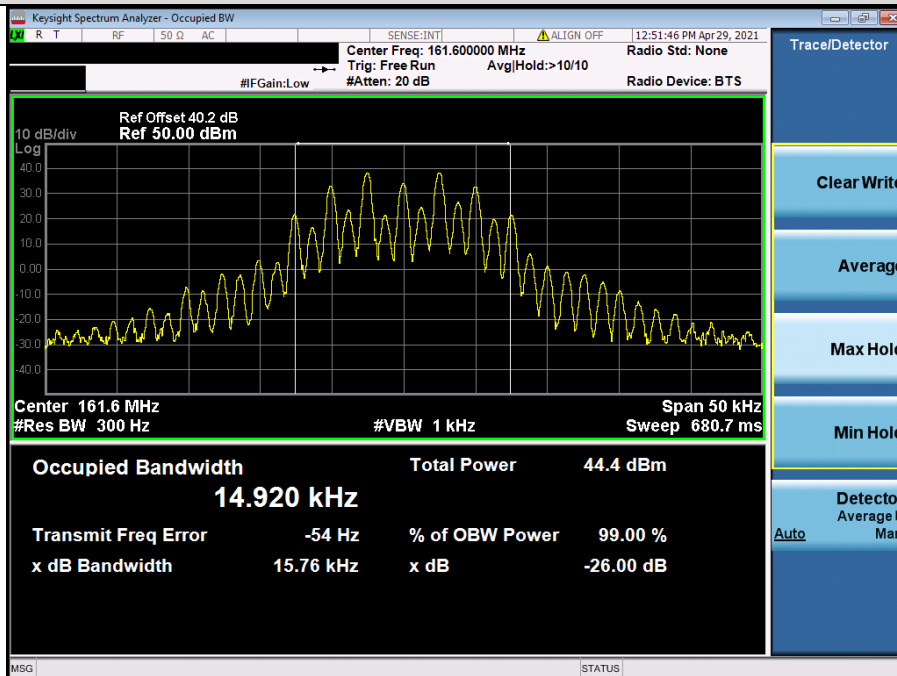
### Assigned Frequency: 157.425MHz, High Power, Modulation Type: FM



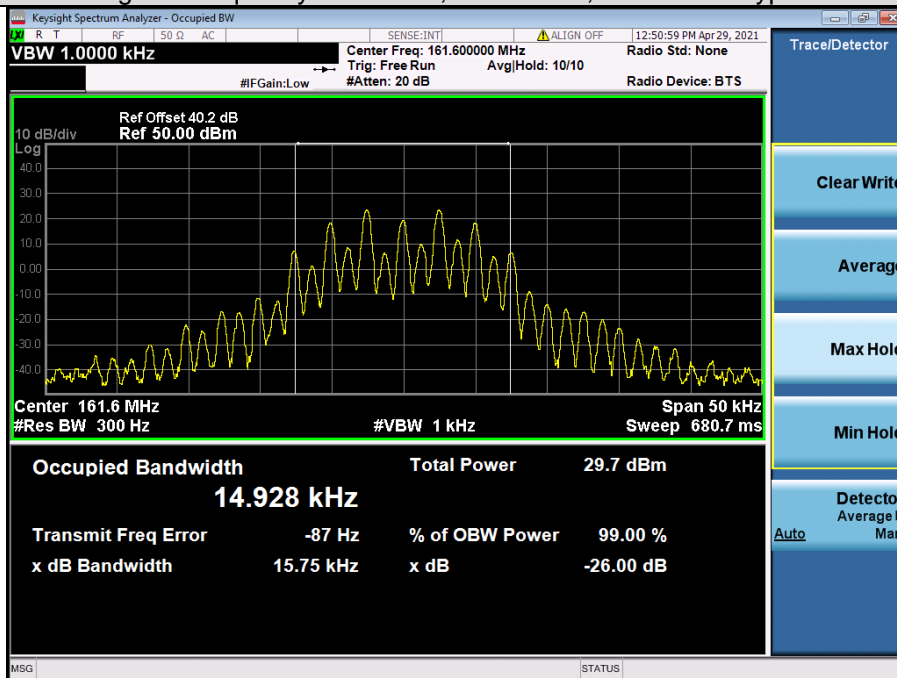
### Assigned Frequency: 157.425MHz, Low Power, Modulation Type: FM



### Assigned Frequency:161.6MHz, High Power, Modulation Type: FM

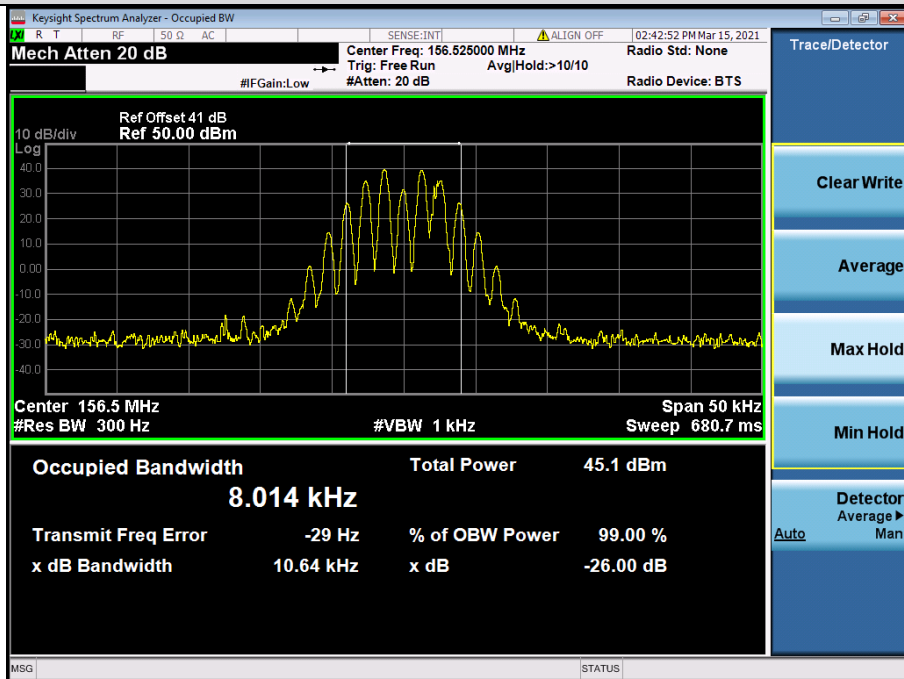


### Assigned Frequency:161.6MHz, Low Power, Modulation Type: FM

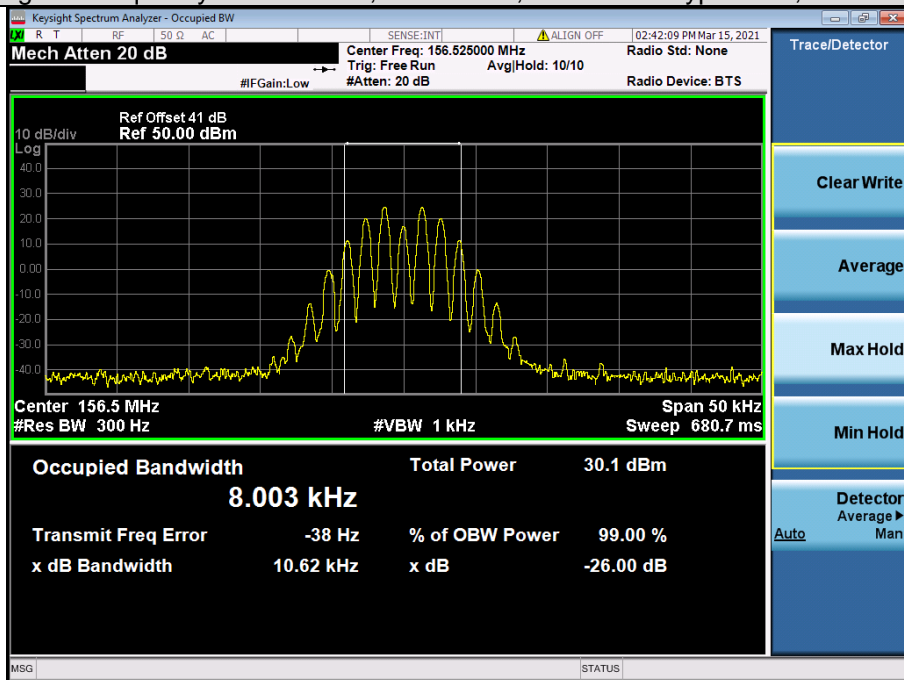


### 99% Occupied Bandwidth / 26dB Bandwidth for DSC mode

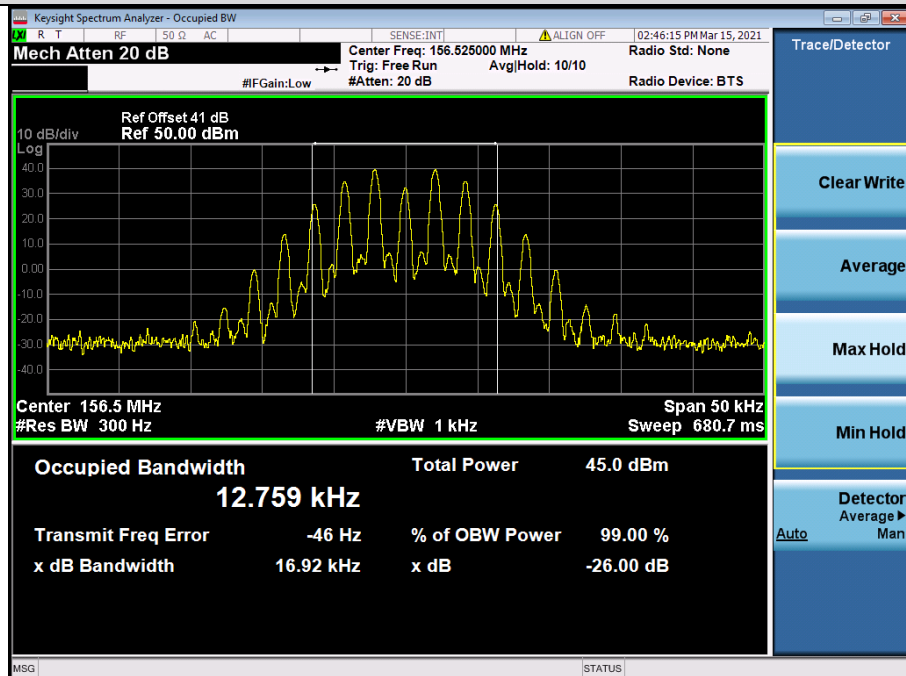
Assigned Frequency: 156.525MHz, High Power, Modulation Type: FSK, dsc-1300Hz



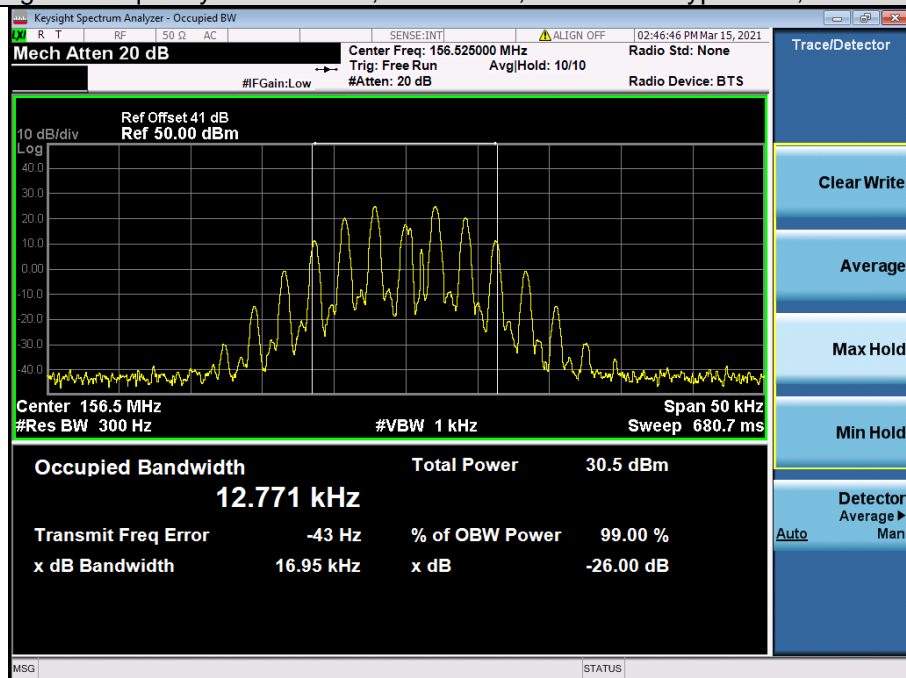
Assigned Frequency: 156.525MHz, Low Power, Modulation Type: FSK, dsc-1300Hz



### Assigned Frequency:156.525MHz, High Power, Modulation Type: FSK, dsc-2100Hz



### Assigned Frequency:156.525MHz, Low Power, Modulation Type: FSK, dsc-2100Hz





**2. Transmitter Frequency Tolerances.**

| Unmodulated, Assigned Frequency:156.025MHz |                  |                         |                      |                 |        |
|--|------------------|-------------------------|----------------------|-----------------|--------|
| Voltage(V)                                 | Temperature (°C) | Measured Frequency(MHz) | Frequency Error(ppm) | FCC Limit (ppm) | Result |
| 13.8                                       | -20              | 156.025035              | 0.2219               | ±10             | Pass   |
|  | -15              | 156.025021              | 0.1366               |                 |        |
|  | -10              | 156.025027              | 0.1750               |                 |        |
|  | 0                | 156.025036              | 0.2334               |                 |        |
|  | 10               | 156.025041              | 0.2603               |                 |        |
|  | 20               | 156.025028              | 0.1799               |                 |        |
|  | 30               | 156.025035              | 0.2240               |                 |        |
|  | 40               | 156.025048              | 0.3091               |                 |        |
|  | 50               | 156.025026              | 0.1683               |                 |        |
|  | 55               | 156.025038              | 0.2444               |                 |        |
| 10.8                                       | 25               | 156.025032              | 0.2035               |                 |        |
| 15.6                                       | 25               | 156.025020              | 0.1283               |                 |        |

| Unmodulated, Assigned Frequency:156.525MHz |                  |                         |                      |                 |        |
|--|------------------|-------------------------|----------------------|-----------------|--------|
| Voltage(V)                                 | Temperature (°C) | Measured Frequency(MHz) | Frequency Error(ppm) | FCC Limit (ppm) | Result |
| 13.8                                       | -20              | 156.025049              | 0.3154               | ±10             | Pass   |
|  | -15              | 156.025022              | 0.1392               |                 |        |
|  | -10              | 156.025041              | 0.2629               |                 |        |
|  | 0                | 156.025045              | 0.2901               |                 |        |
|  | 10               | 156.025041              | 0.2636               |                 |        |
|  | 20               | 156.025023              | 0.1466               |                 |        |
|  | 30               | 156.025046              | 0.2971               |                 |        |
|  | 40               | 156.025021              | 0.1321               |                 |        |
|  | 50               | 156.025022              | 0.1433               |                 |        |
|  | 55               | 156.025047              | 0.3026               |                 |        |
| 10.8                                       | 25               | 156.025049              | 0.3146               |                 |        |
| 15.6                                       | 25               | 156.025040              | 0.2539               |                 |        |

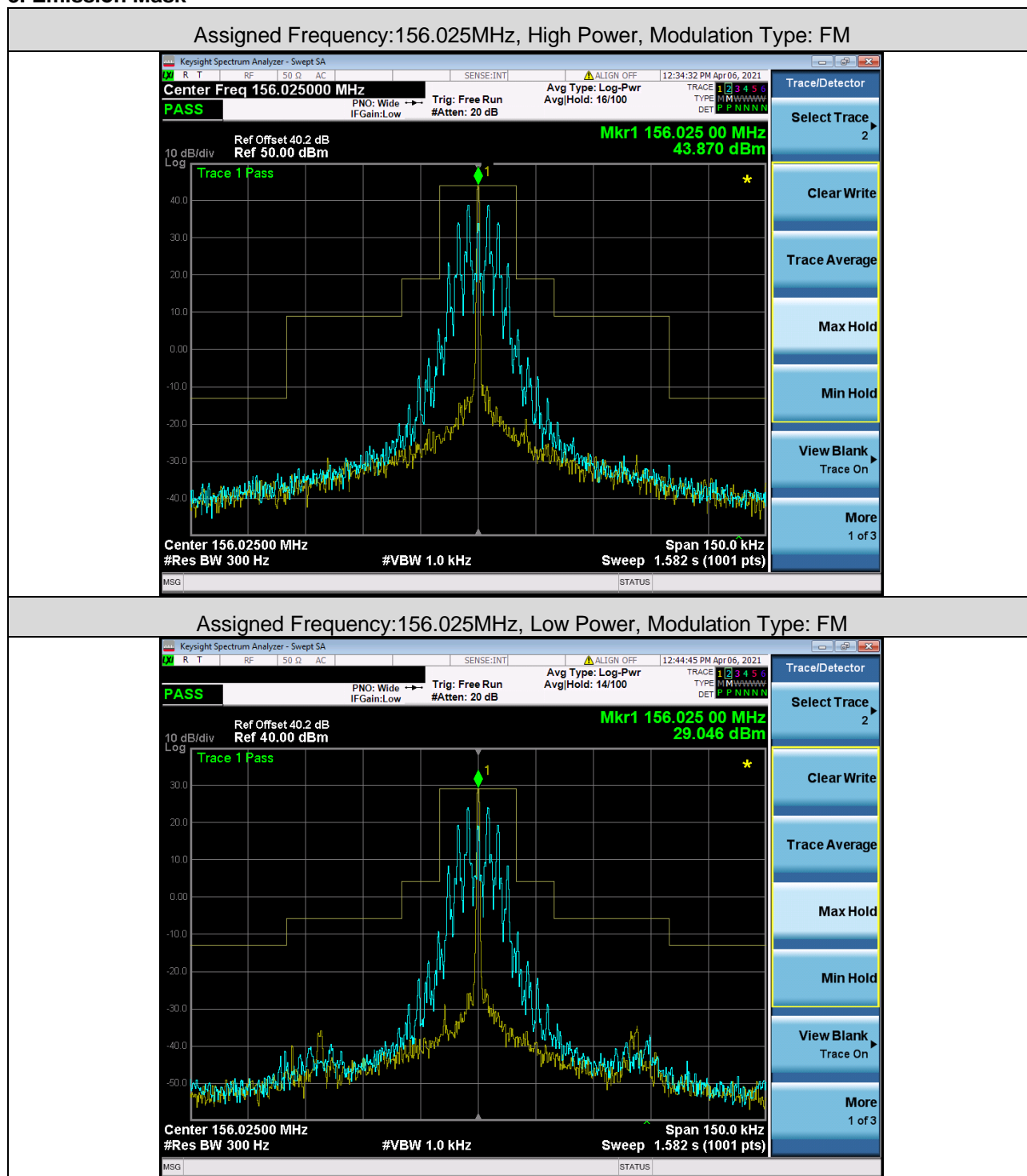


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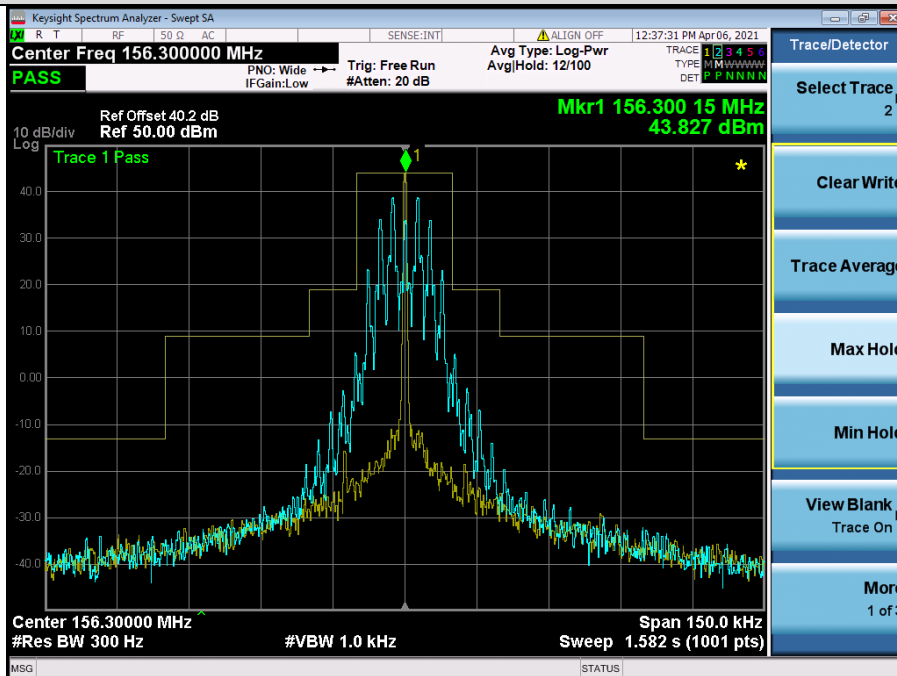
### 3. Emission Mask



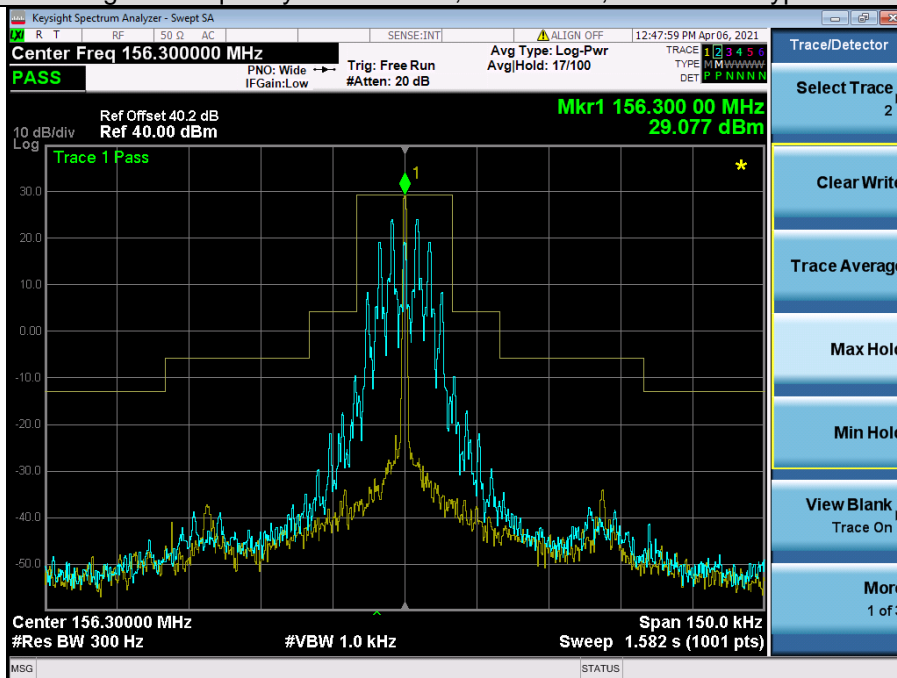
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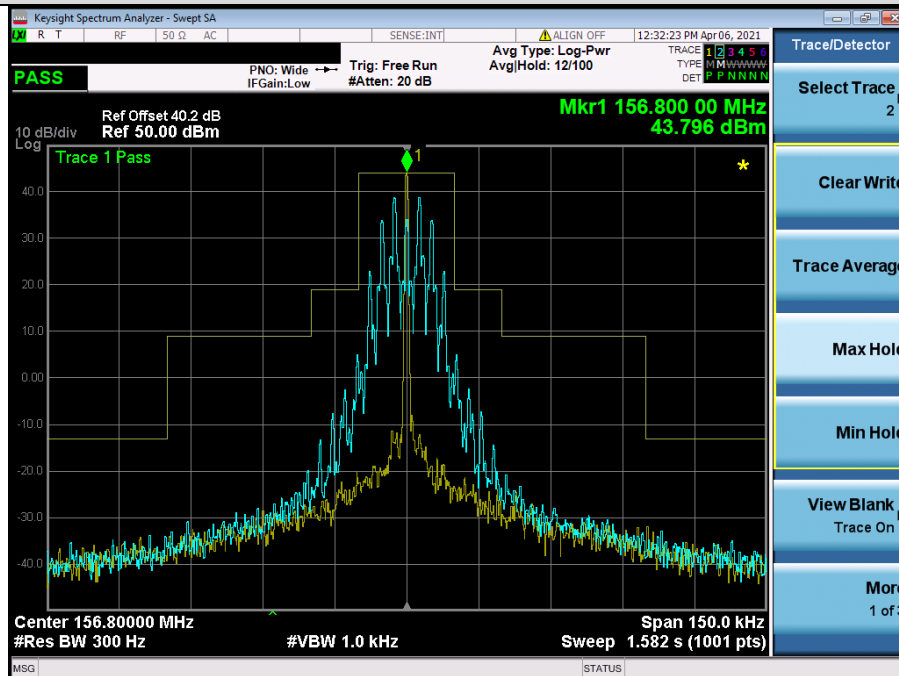
### Assigned Frequency: 156.300MHz, High Power, Modulation Type: FM



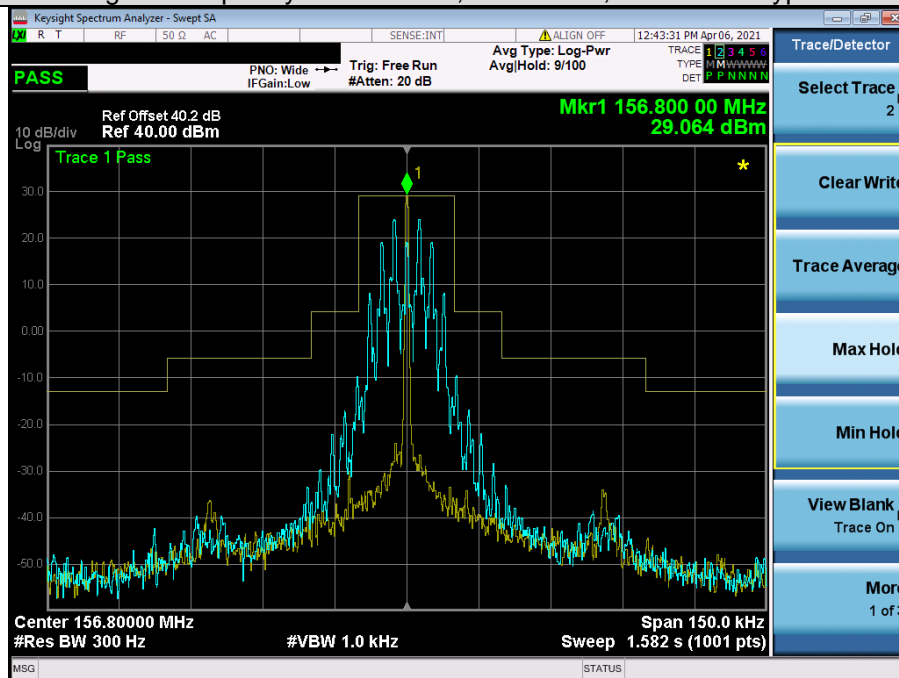
### Assigned Frequency: 156.300MHz, Low Power, Modulation Type: FM



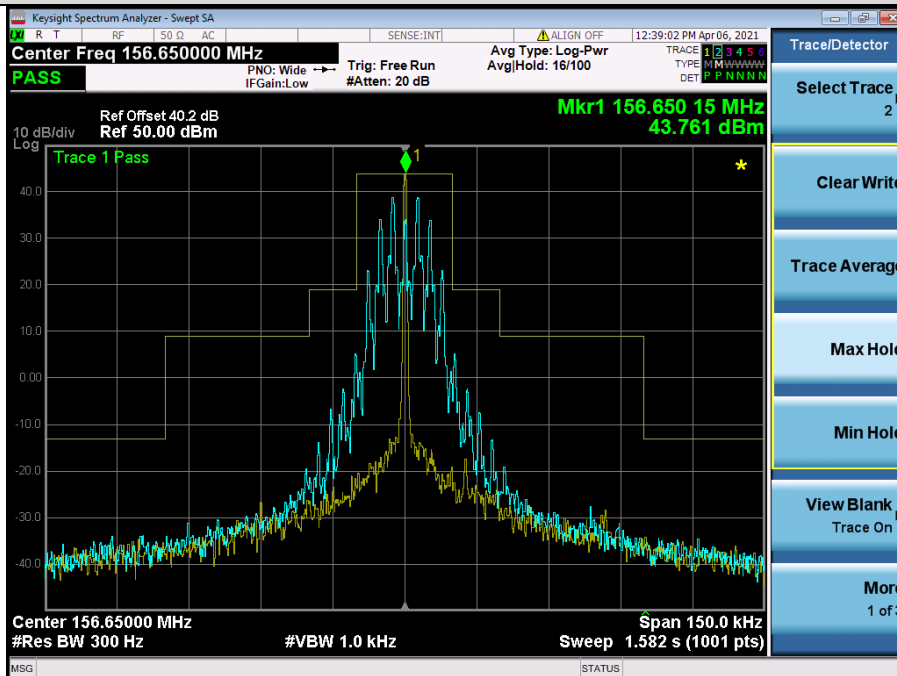
### Assigned Frequency: 156.800MHz, High Power, Modulation Type: FM



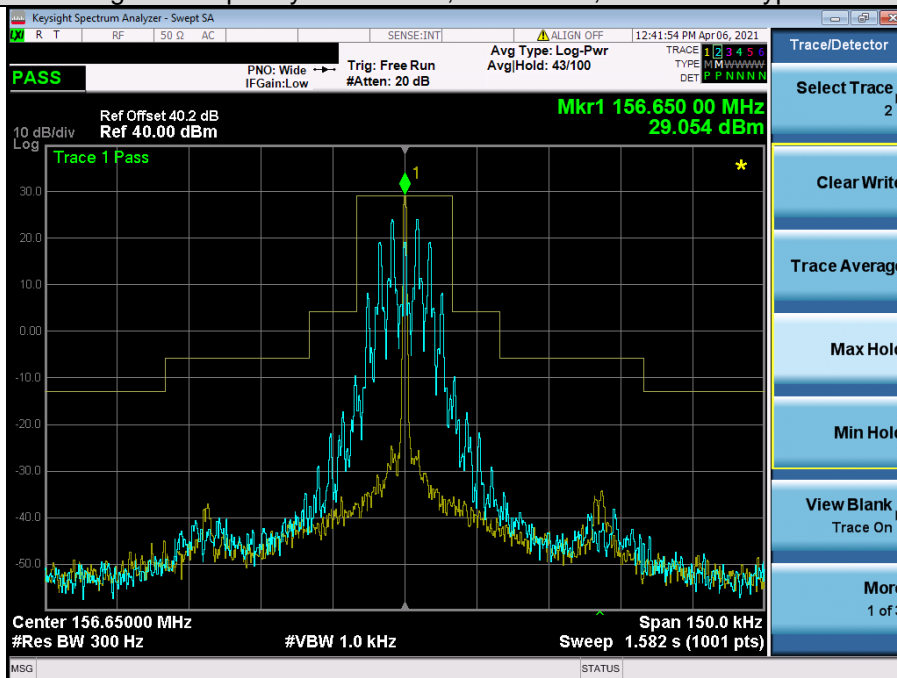
### Assigned Frequency: 156.800MHz, Low Power, Modulation Type: FM



### Assigned Frequency:156.65MHz, High Power, Modulation Type: FM

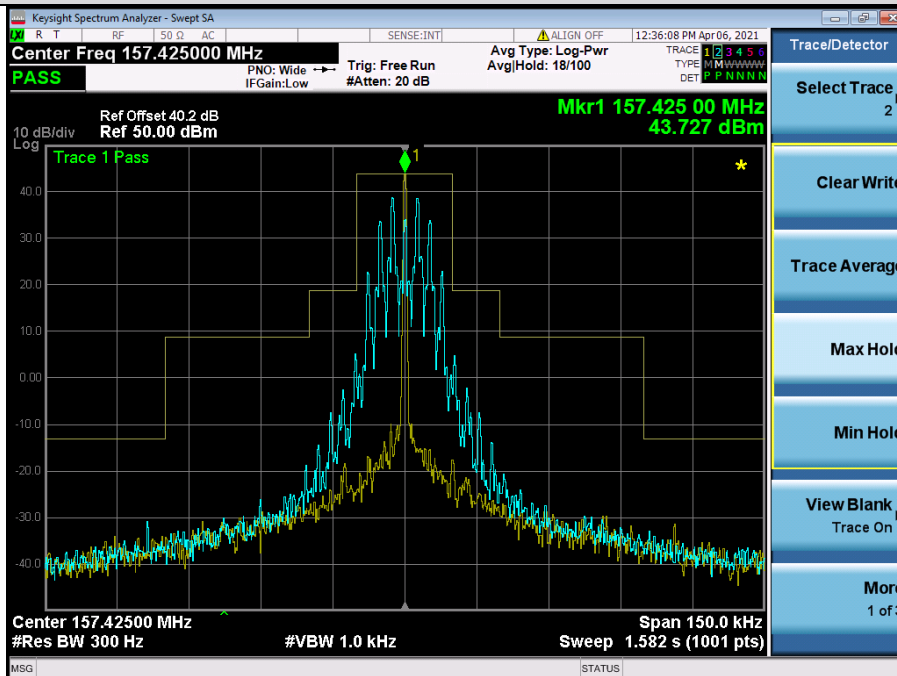


### Assigned Frequency:156.65MHz, Low Power, Modulation Type: FM

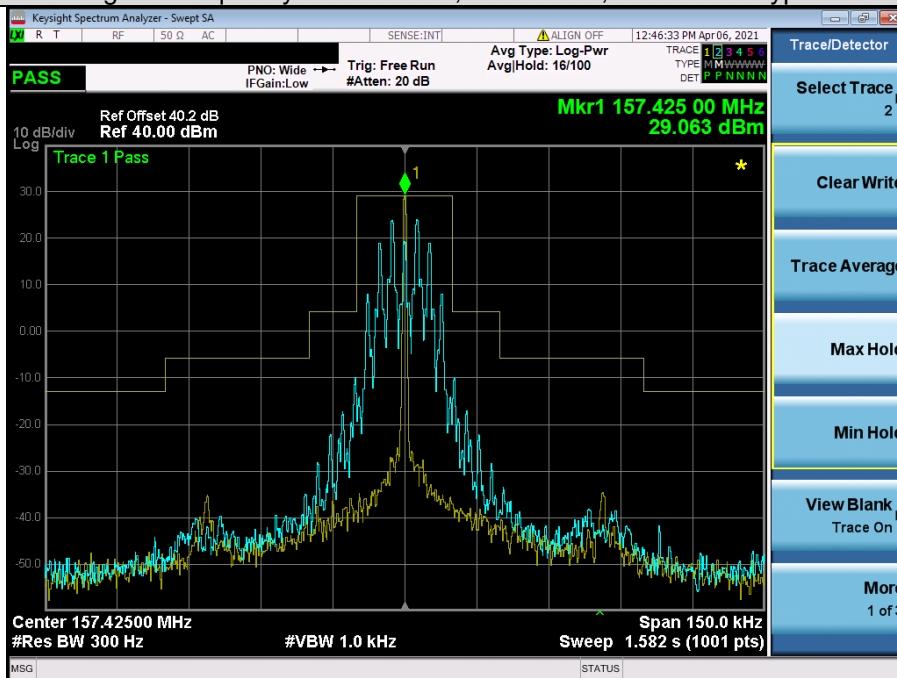




### Assigned Frequency: 157.425MHz, High Power, Modulation Type: FM

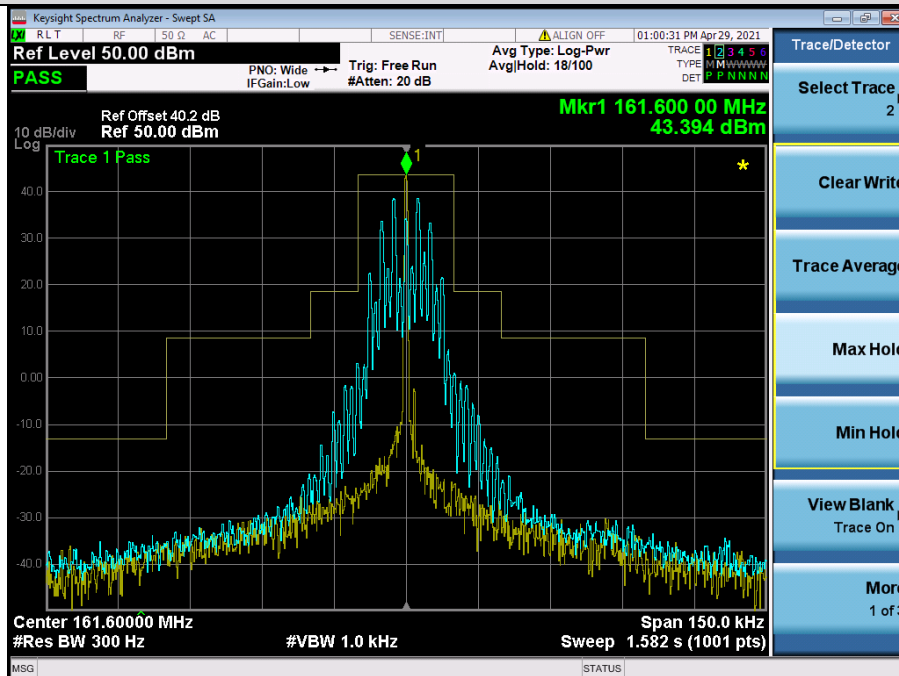


### Assigned Frequency: 157.425MHz, Low Power, Modulation Type: FM

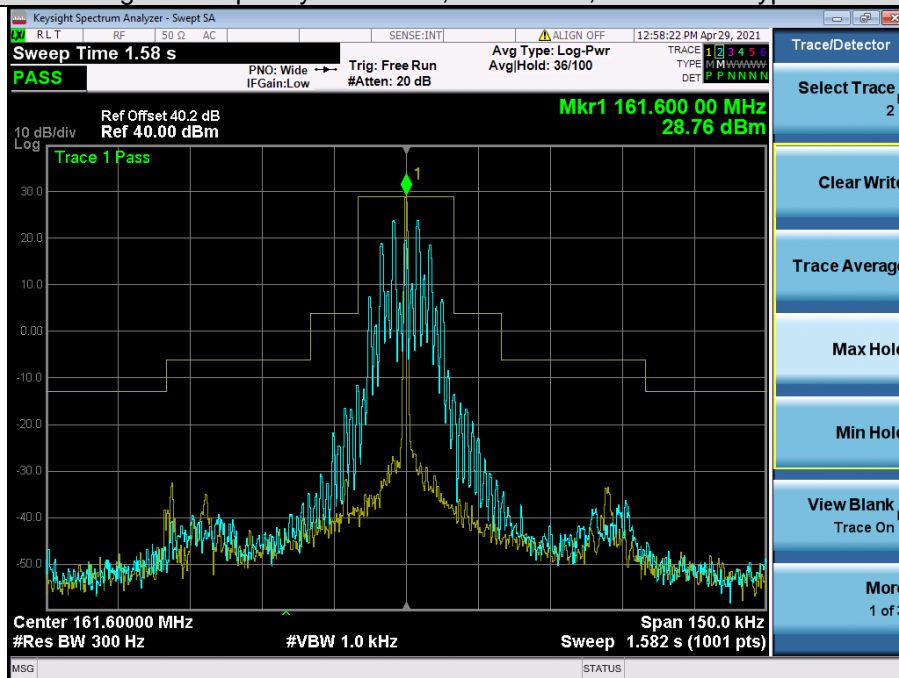




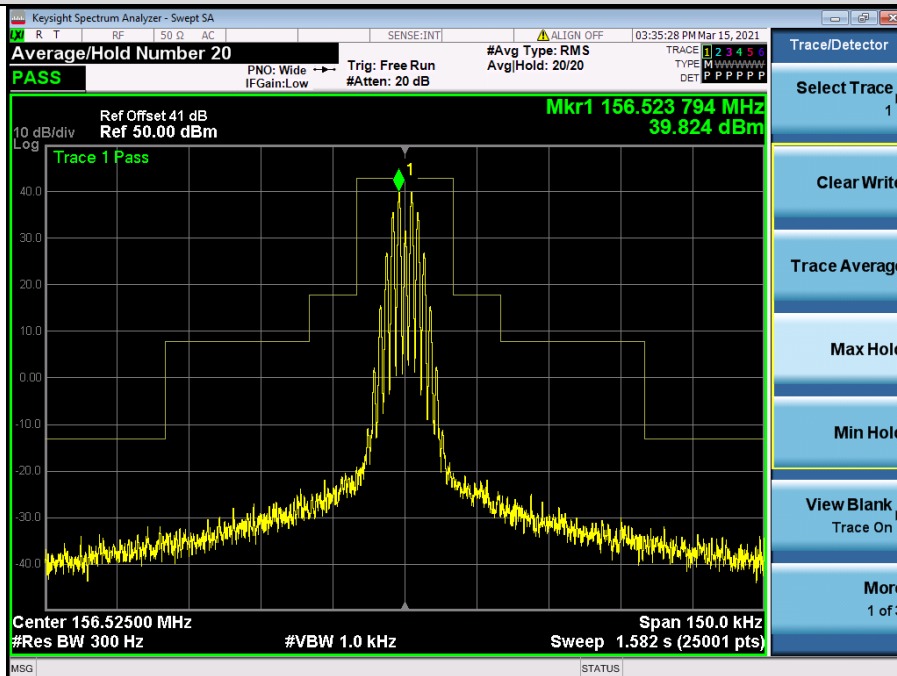
### Assigned Frequency: 161.6MHz, High Power, Modulation Type: FM



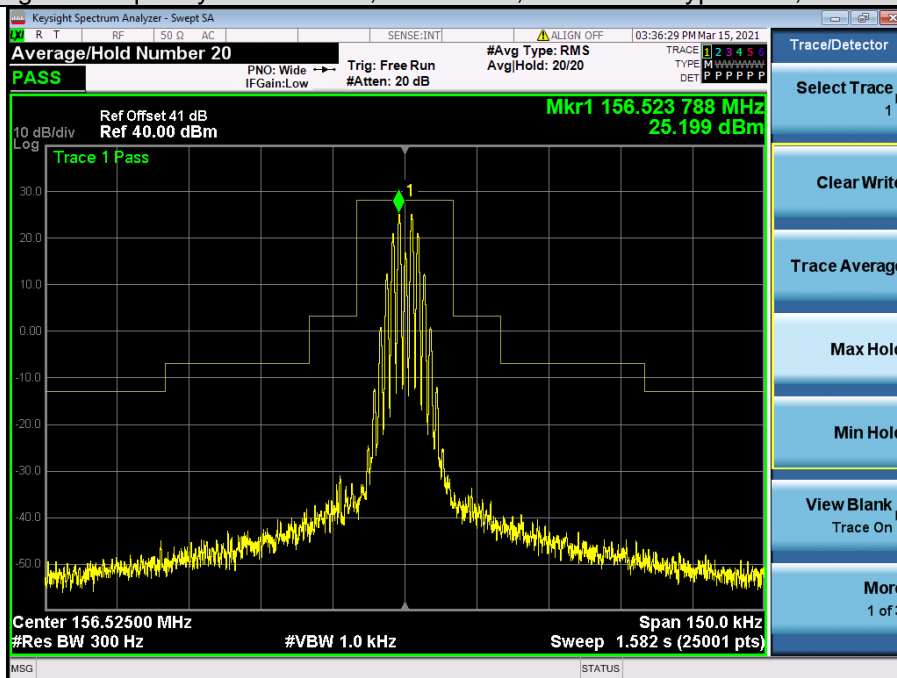
### Assigned Frequency: 161.6MHz, Low Power, Modulation Type: FM



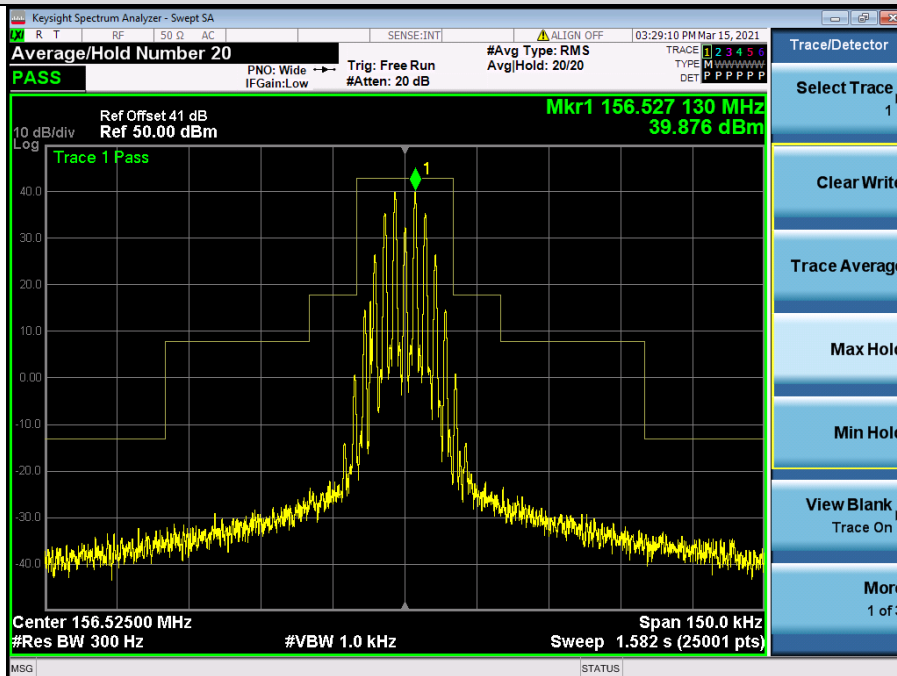
Assigned Frequency:156.525MHz, High Power, Modulation Type: FSK, dsc-1300Hz



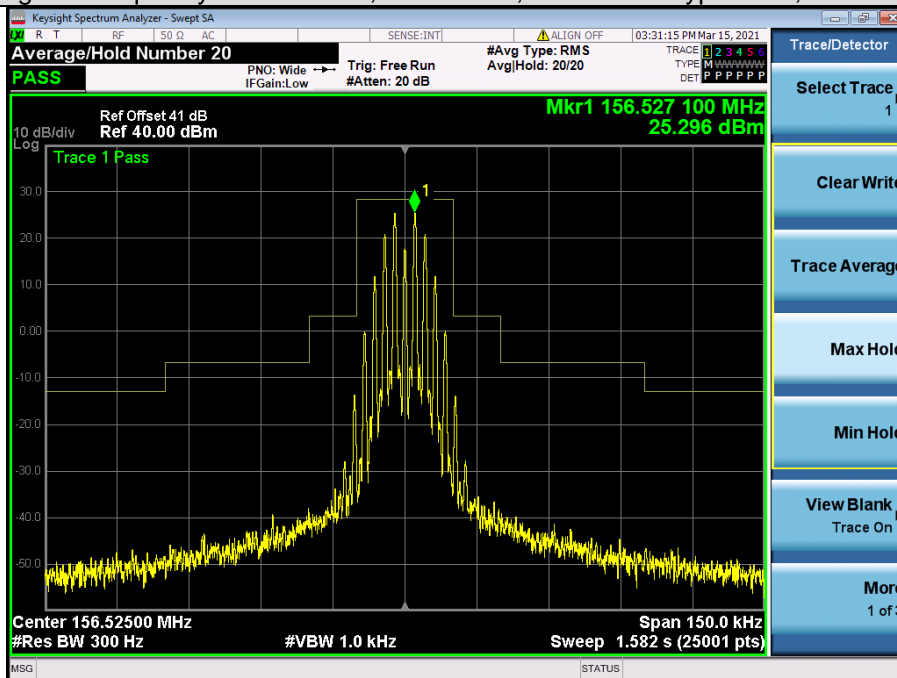
Assigned Frequency:156.525MHz, Low Power, Modulation Type: FSK, dsc-1300Hz



Assigned Frequency:156.525MHz, High Power, Modulation Type: FSK, dsc-2100Hz

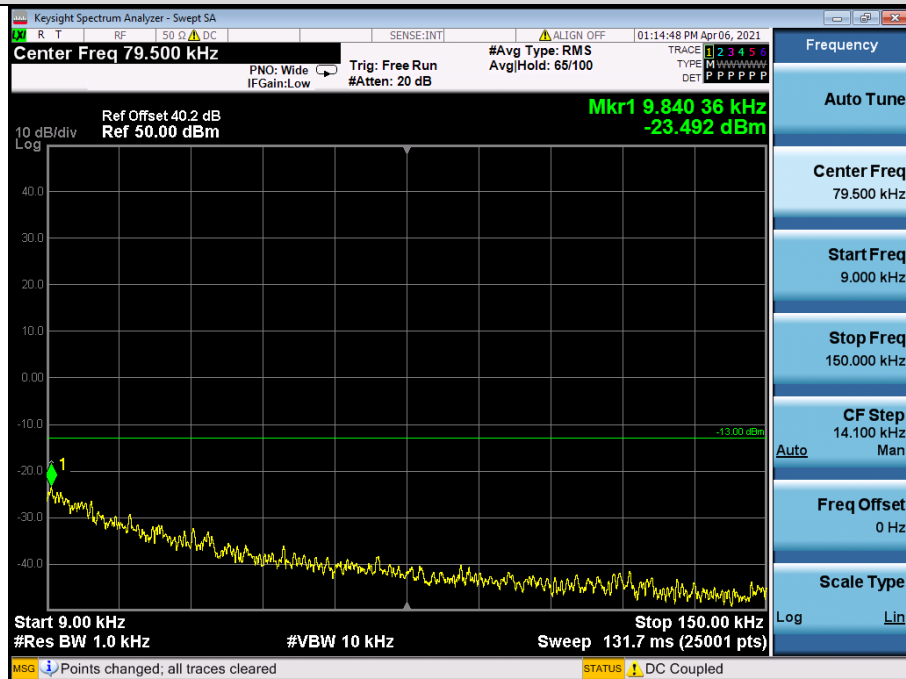


Assigned Frequency:156.525MHz, Low Power, Modulation Type: FSK, dsc-2100Hz

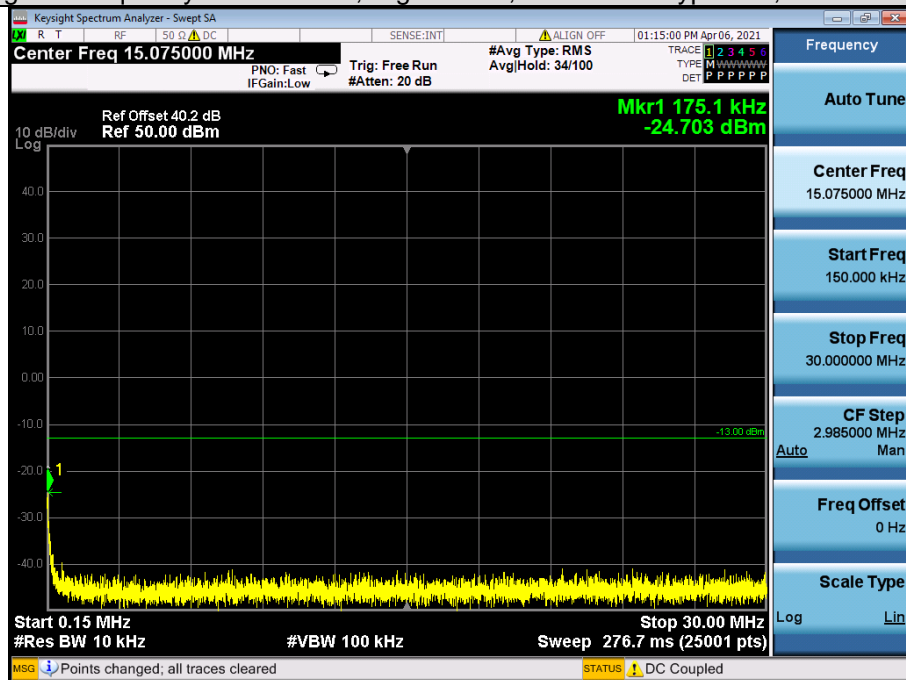


### 4. Conducted Spurious Emission

Assigned Frequency: 156.025 MHz, High Power, Modulation Type: FM, 9 KHz-150 KHz

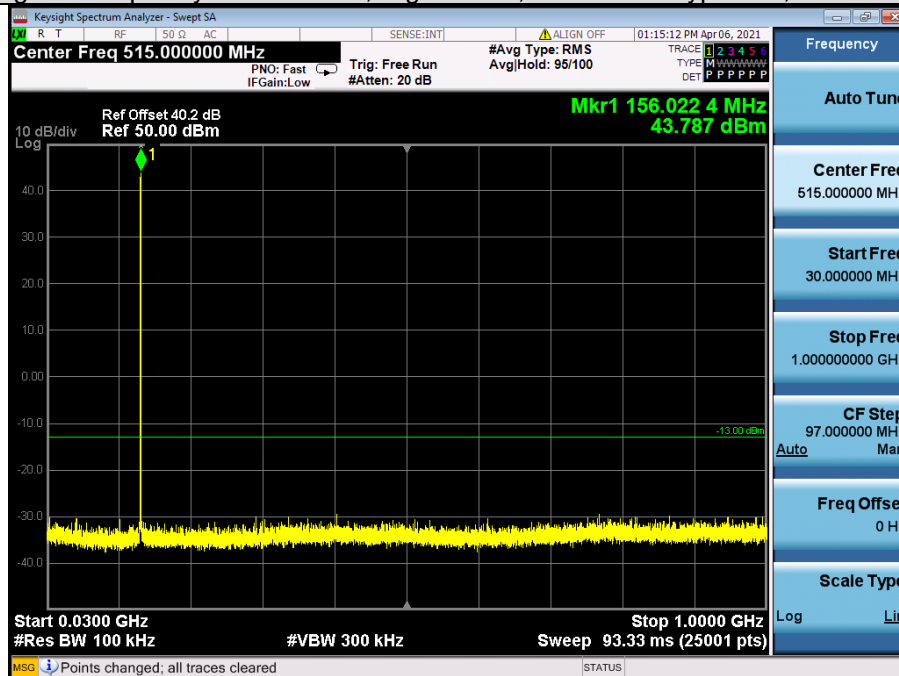


Assigned Frequency: 156.025 MHz, High Power, Modulation Type: FM, 150 KHz-30 MHz

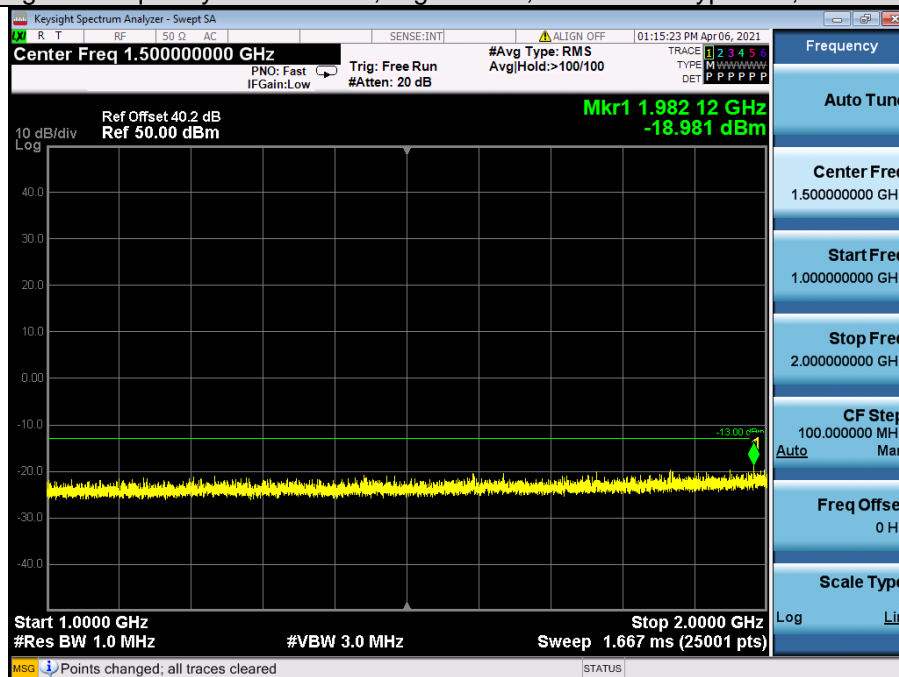




Assigned Frequency: 156.025 MHz, High Power, Modulation Type: FM, 30 MHz-1 GHz



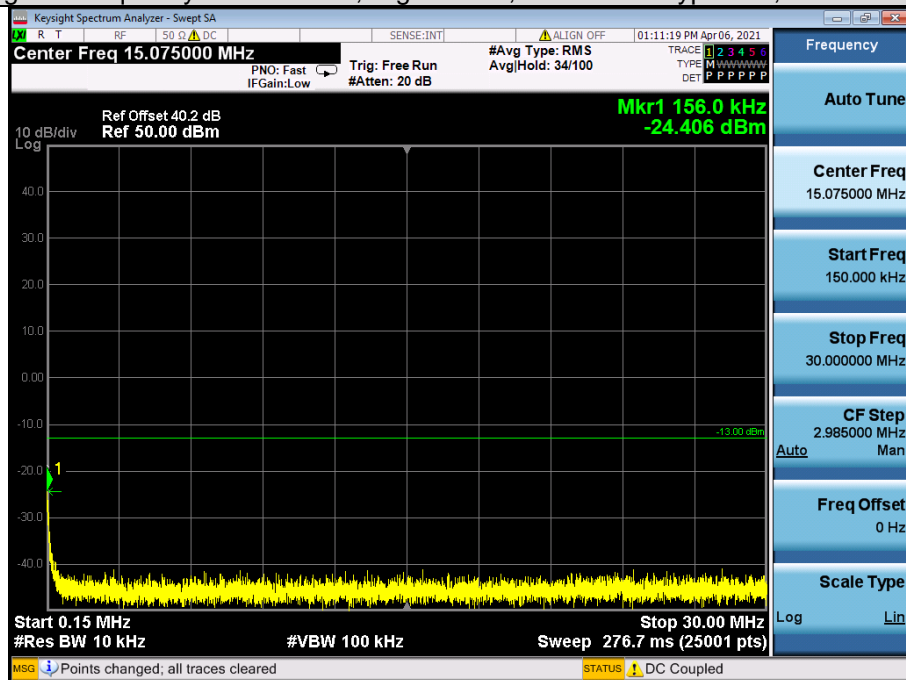
Assigned Frequency: 156.025 MHz, High Power, Modulation Type: FM, 1 GHz-2 GHz



Assigned Frequency: 156.300 MHz, High Power, Modulation Type: FM, 9 KHz-150 KHz



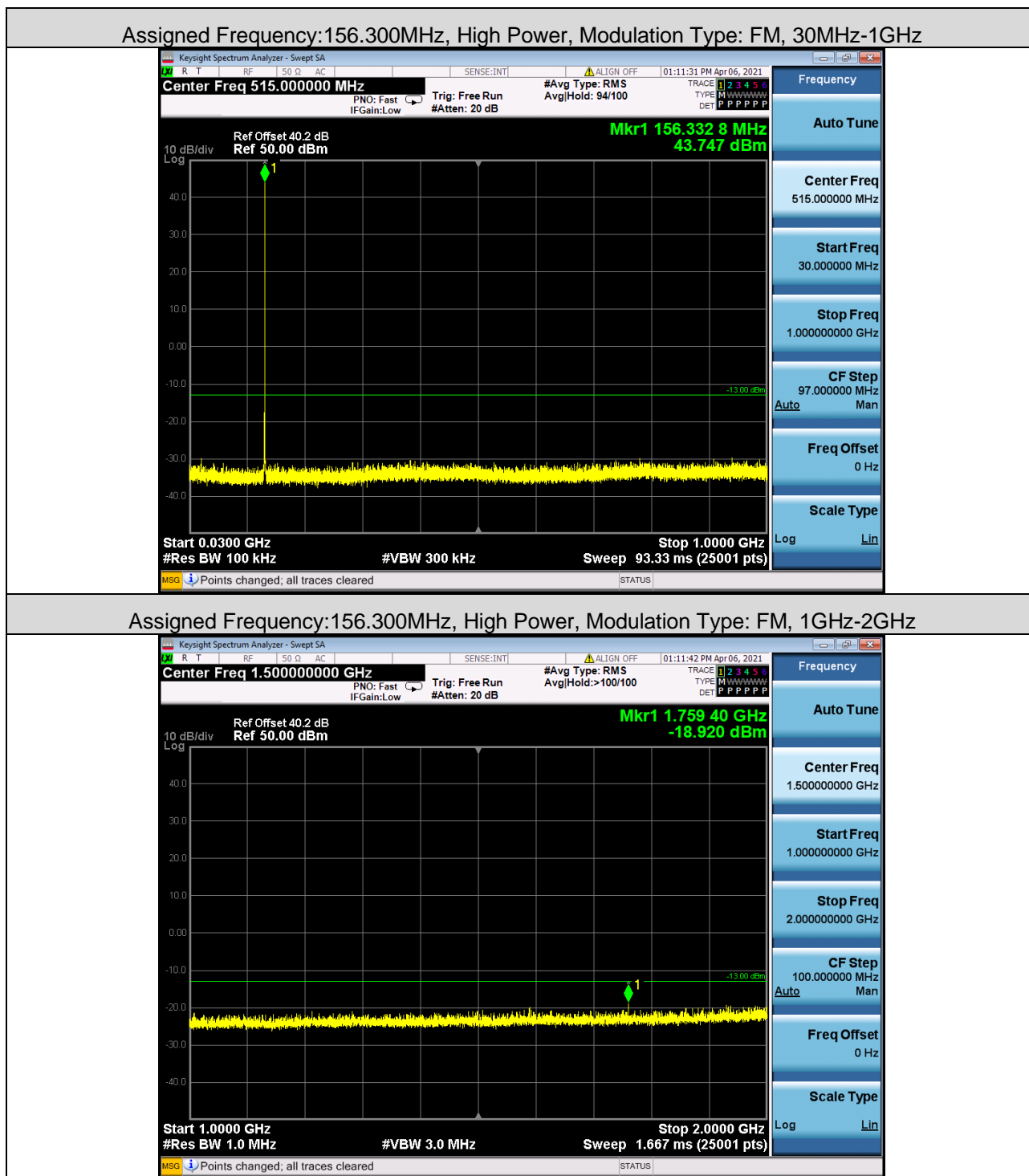
Assigned Frequency: 156.300 MHz, High Power, Modulation Type: FM, 150 KHz-30 MHz



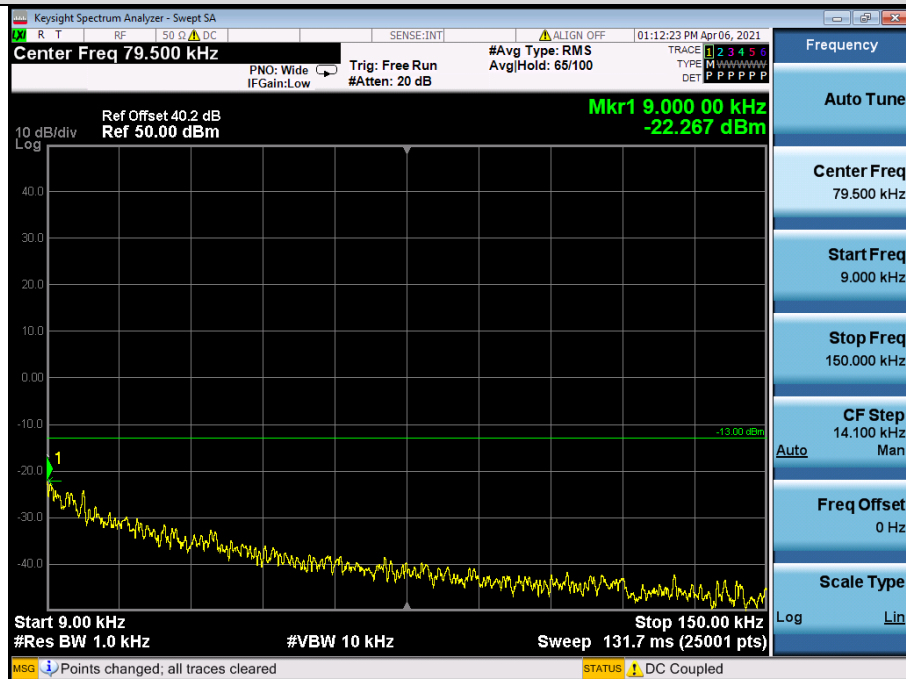
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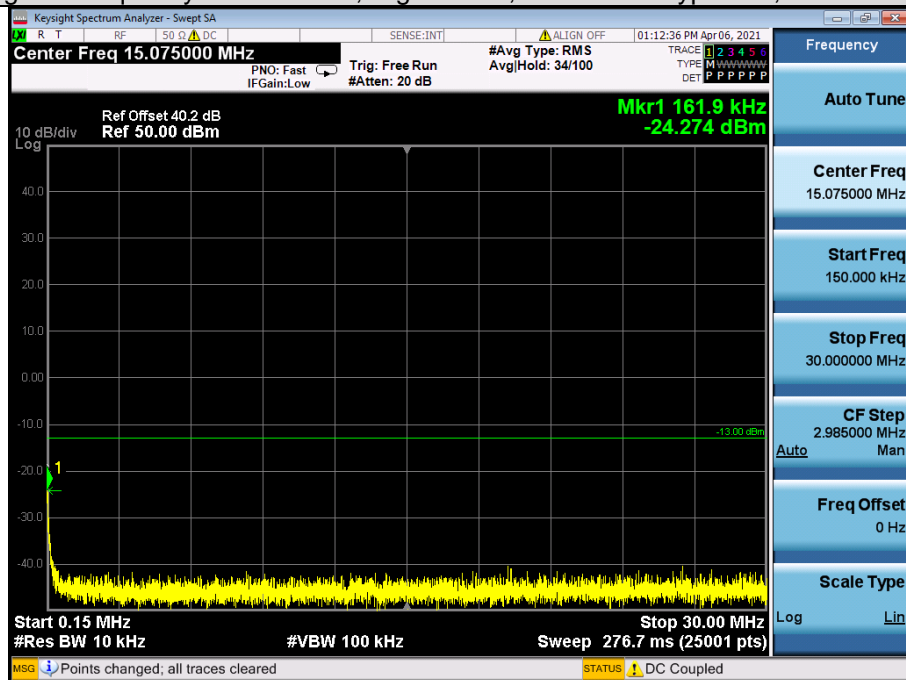
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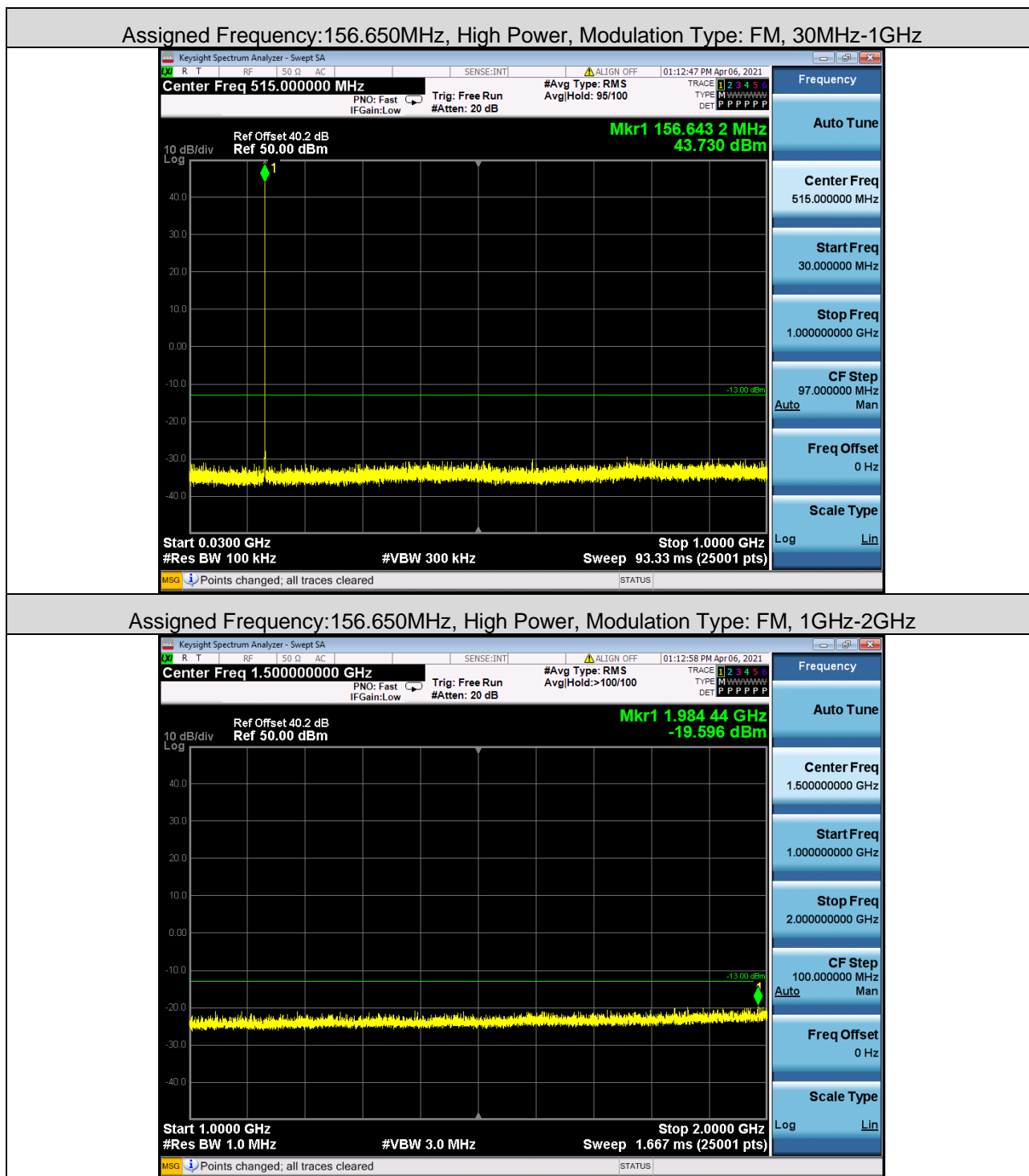
Assigned Frequency: 156.650 MHz, High Power, Modulation Type: FM, 9 KHz-150 KHz



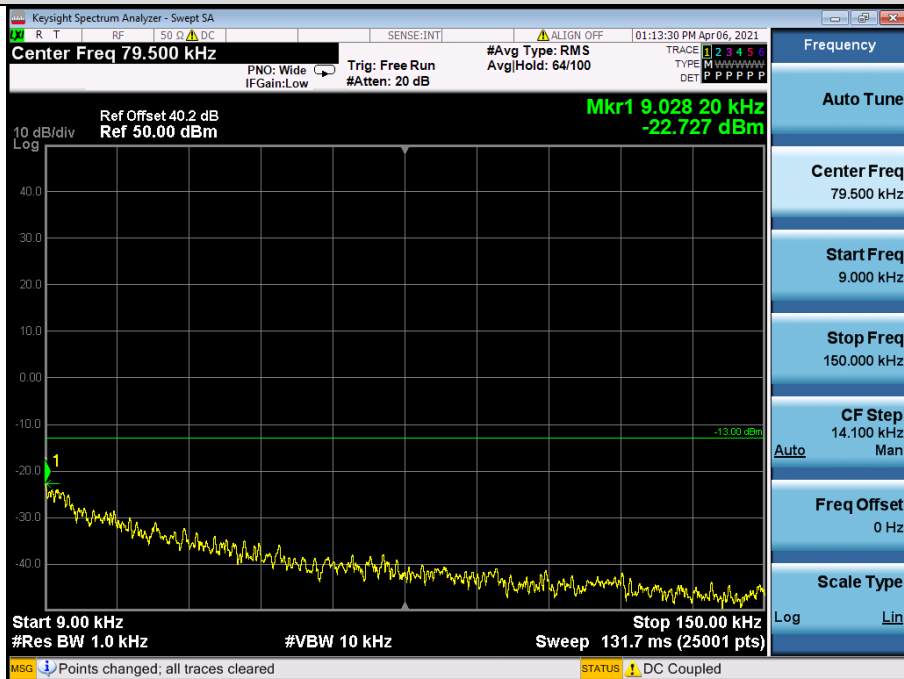
Assigned Frequency: 156.650 MHz, High Power, Modulation Type: FM, 150 KHz-30 MHz



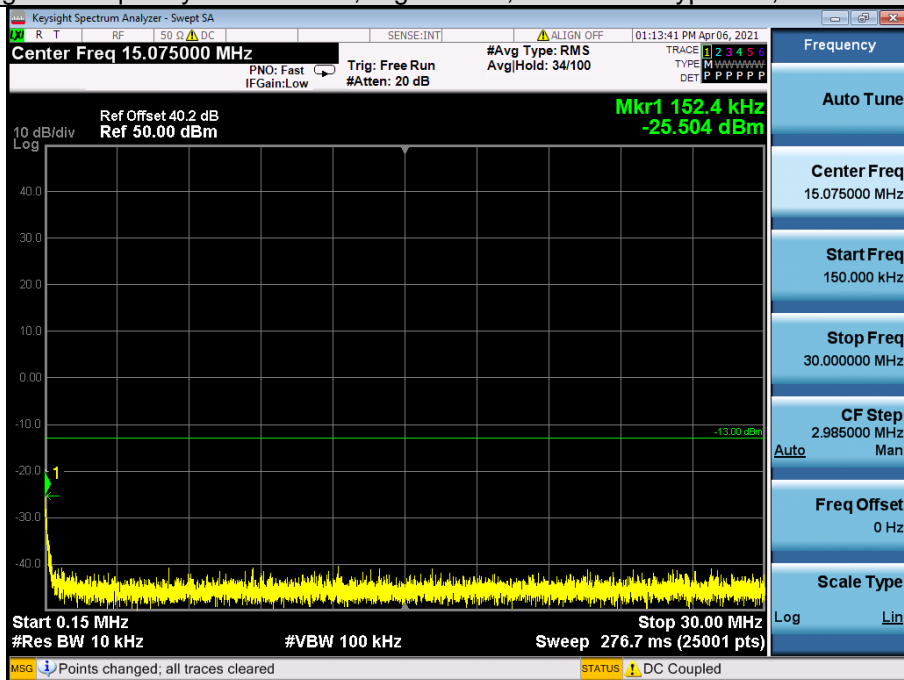




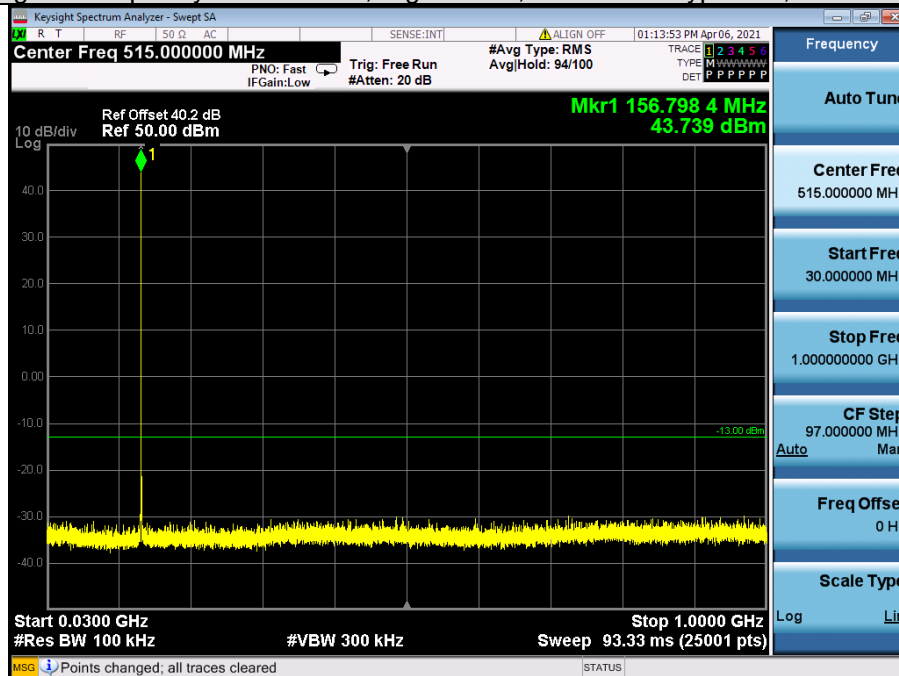
Assigned Frequency: 156.800 MHz, High Power, Modulation Type: FM, 9 KHz-150 KHz



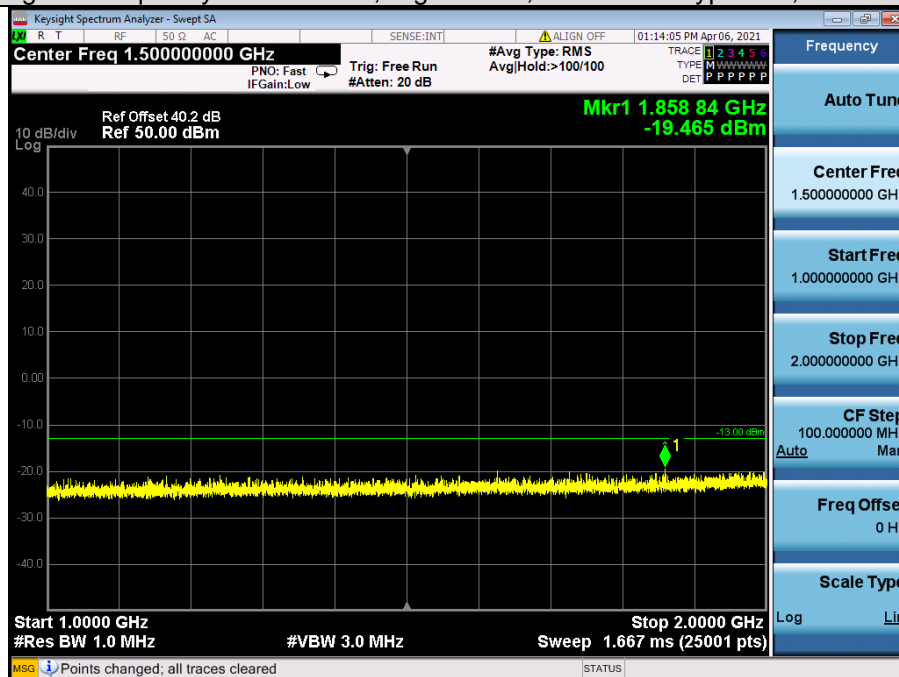
Assigned Frequency: 156.800 MHz, High Power, Modulation Type: FM, 150 KHz-30 MHz



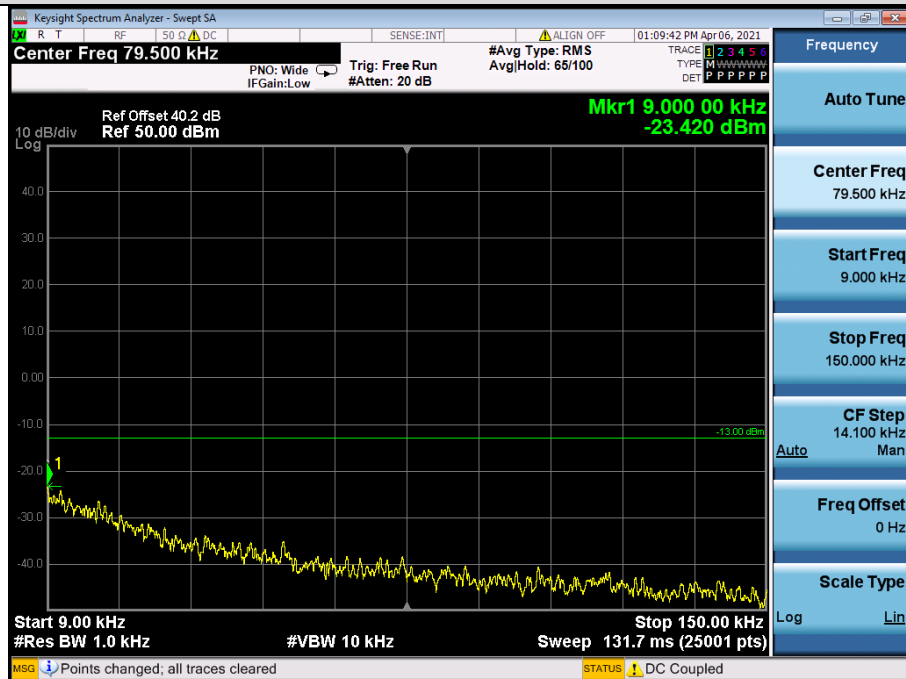
Assigned Frequency: 156.800 MHz, High Power, Modulation Type: FM, 30 MHz-1 GHz



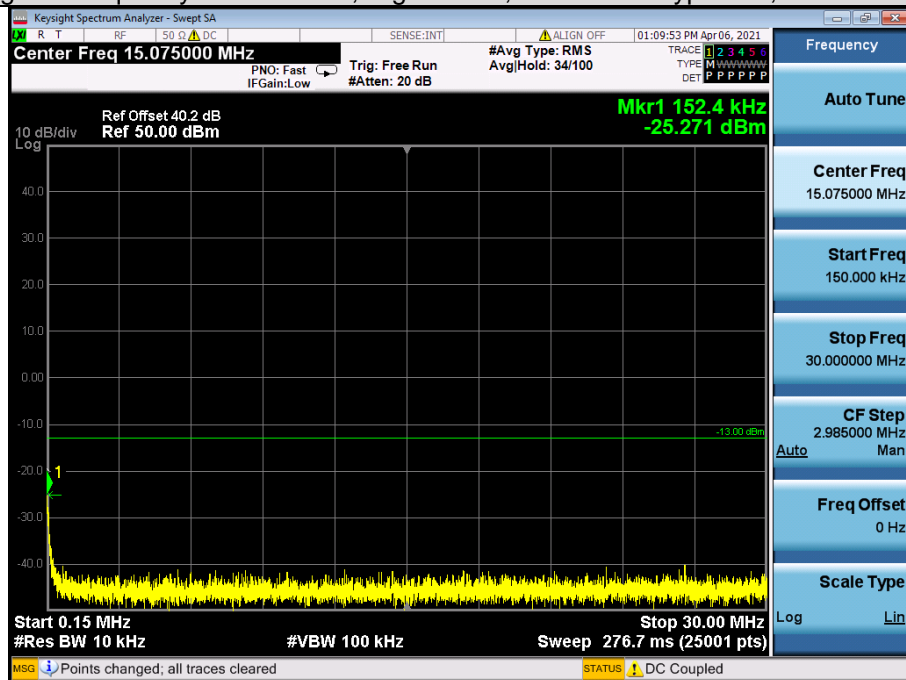
Assigned Frequency: 156.800 MHz, High Power, Modulation Type: FM, 1 GHz-2 GHz



Assigned Frequency: 157.425 MHz, High Power, Modulation Type: FM, 9 KHz-150 KHz



Assigned Frequency: 157.425 MHz, High Power, Modulation Type: FM, 150 KHz-30 MHz







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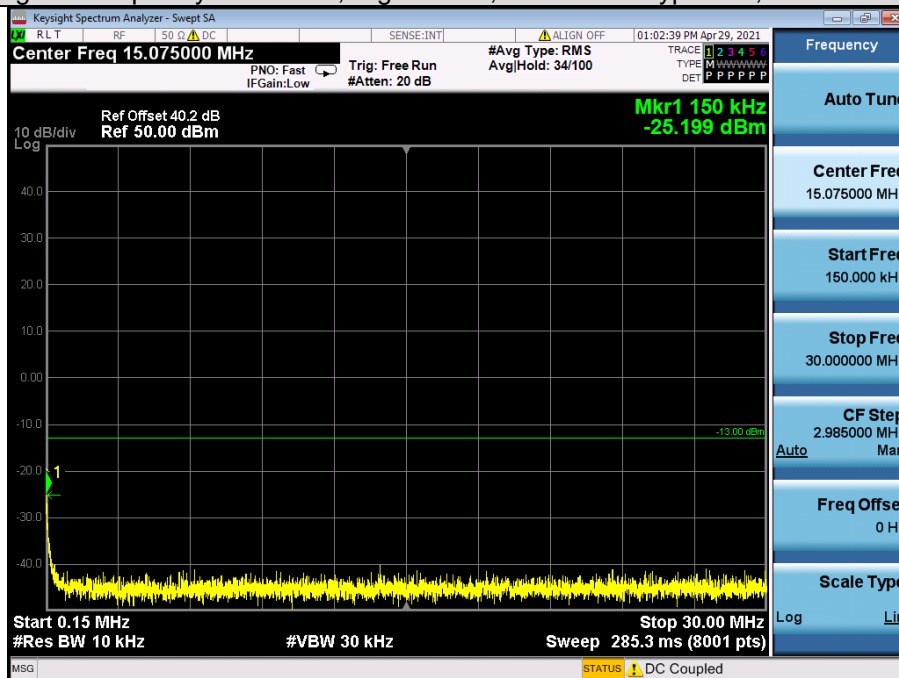
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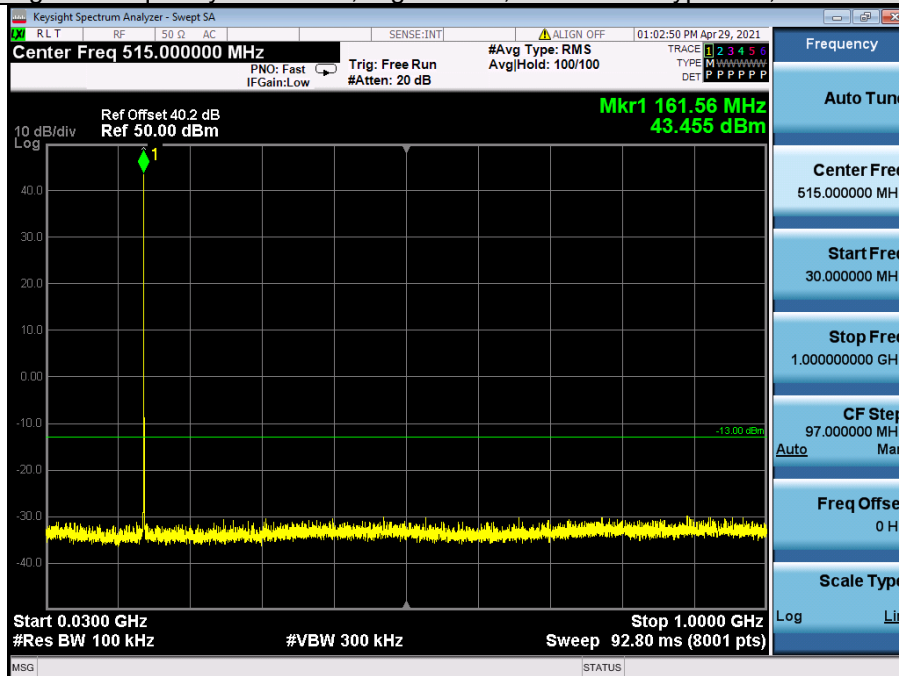
Assigned Frequency:161.6MHz, High Power, Modulation Type: FM, 9KHz-150KHz



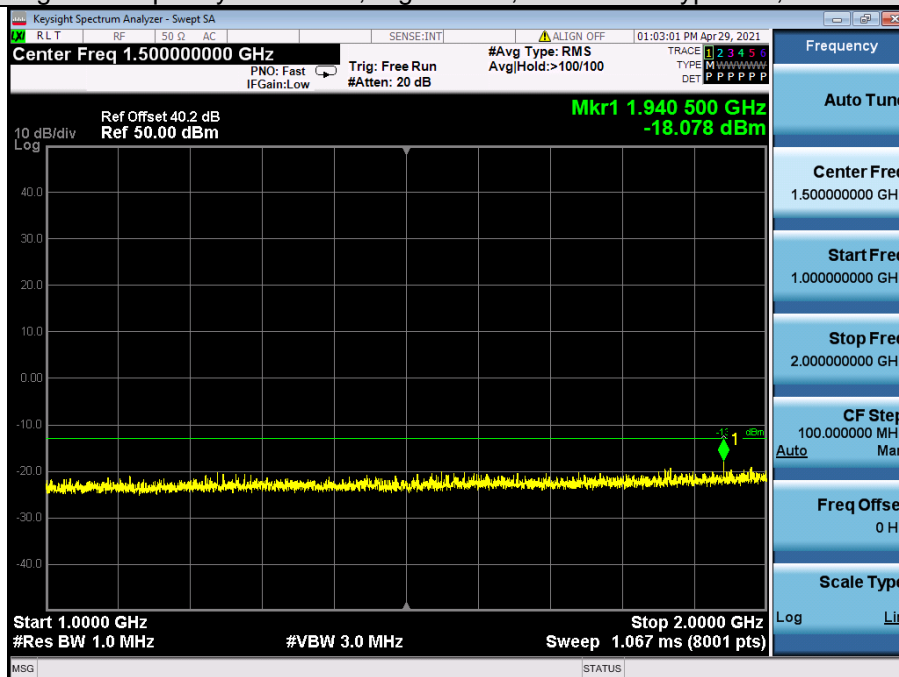
Assigned Frequency:161.6MHz, High Power, Modulation Type: FM, 150KHz-30MHz



Assigned Frequency: 161.6 MHz, High Power, Modulation Type: FM, 30 MHz-1 GHz



Assigned Frequency: 161.6 MHz, High Power, Modulation Type: FM, 1 GHz-2 GHz

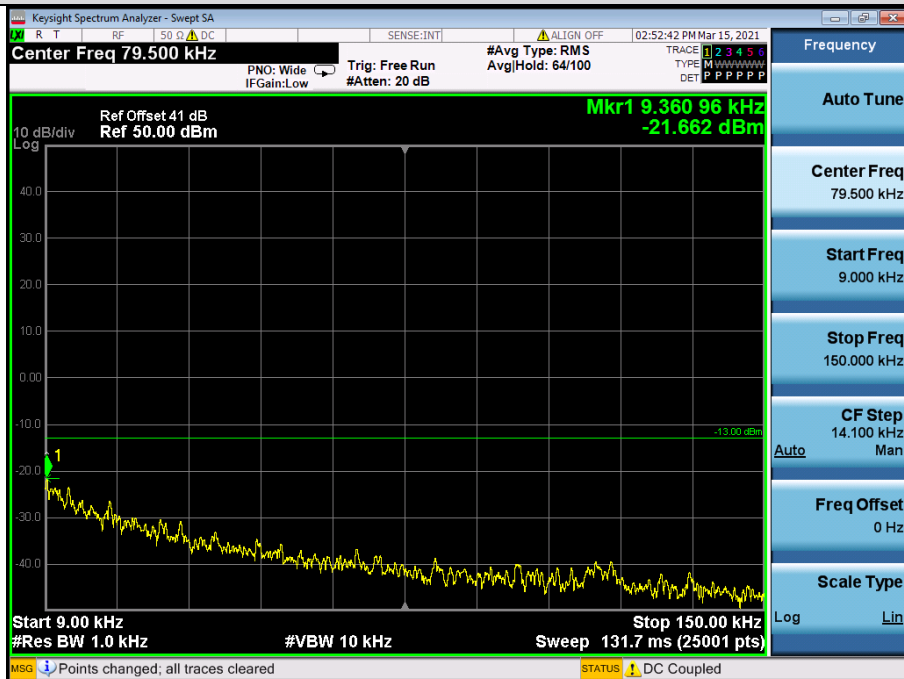


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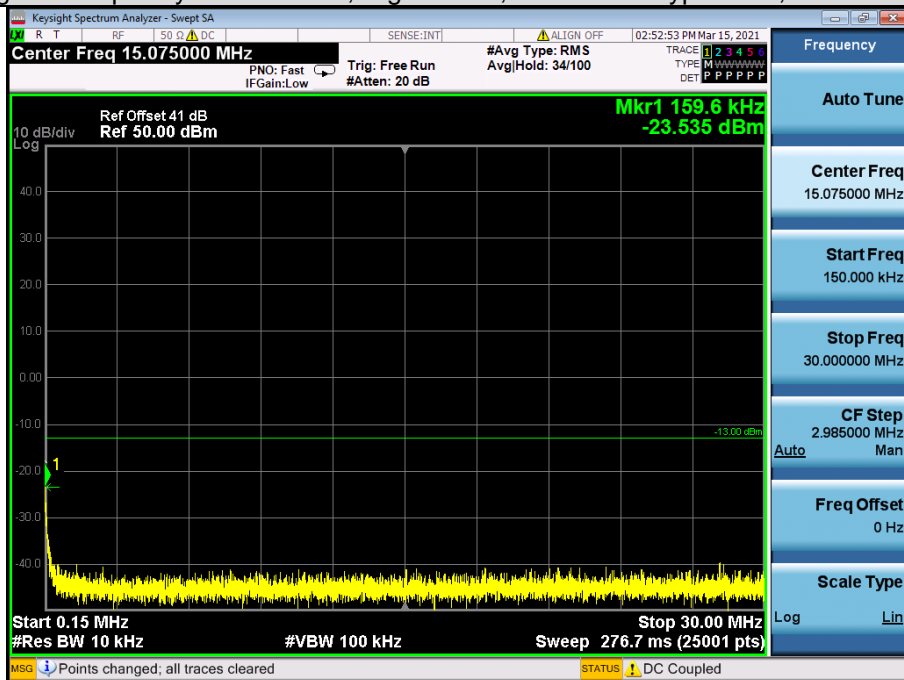
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Assigned Frequency:156.525MHz, High Power, Modulation Type: FSK, 9KHz-150KHz

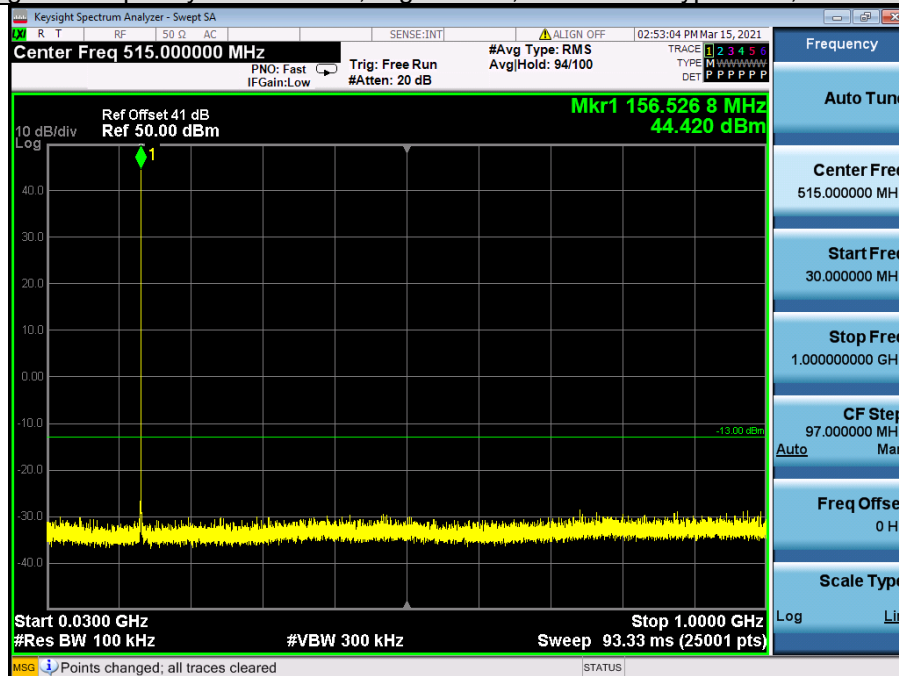


Assigned Frequency:156.525MHz, High Power, Modulation Type: FSK,150KHz-30MHz

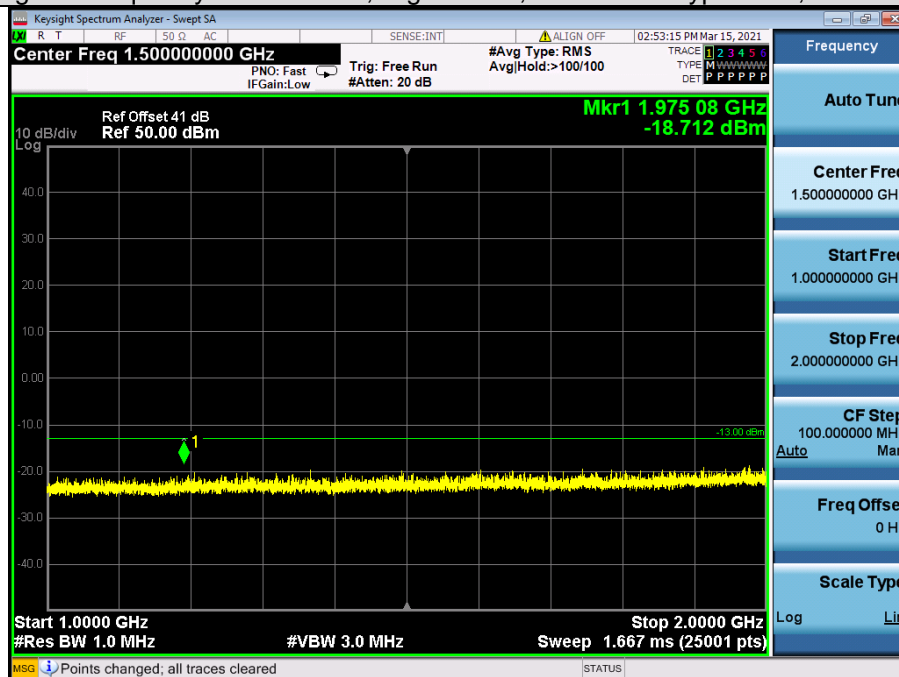




Assigned Frequency: 156.525MHz, High Power, Modulation Type: FSK, 30MHz-1GHz



Assigned Frequency: 156.525MHz, High Power, Modulation Type: FSK, 1GHz-2GHz



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## 5. Transmitter Unwanted Emission(Radiated)

| Assigned Frequency:156.025MHz, Modulation Type: FM |                     |                    |                      |               |                |                   |                       |        |
|--|---------------------|--------------------|----------------------|---------------|----------------|-------------------|-----------------------|--------|
| Frequency<br>(MHz)                                 | S.G. Power<br>(dBm) | Cable loss<br>(dB) | Antenna<br>Gain(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Over<br>Limit(dB) | Polarization<br>(H/V) | Result |
| 1092.555   | -53.09              | 0.43               | 1.9                  | -51.62        | -13            | -38.62            | Horizontal            | Pass   |
| 1248.699   | -52.29              | 0.43               | 1.9                  | -50.82        | -13            | -37.82            | Horizontal            | Pass   |
| 1404.374   | -54.73              | 0.43               | 1.9                  | -53.26        | -13            | -40.26            | Horizontal            | Pass   |
| 1092.555   | -51.19              | 0.43               | 1.9                  | -49.72        | -13            | -36.72            | Vertical              | Pass   |
| 1248.699   | -46.81              | 0.43               | 1.9                  | -45.34        | -13            | -32.34            | Vertical              | Pass   |
| 1404.374   | -53.54              | 0.43               | 1.9                  | -52.07        | -13            | -39.07            | Vertical              | Pass   |

| Assigned Frequency:161.6MHz, Modulation Type: FM |                     |                    |                      |               |                |                   |                       |        |
|--|---------------------|--------------------|----------------------|---------------|----------------|-------------------|-----------------------|--------|
| Frequency<br>(MHz)                               | S.G. Power<br>(dBm) | Cable loss<br>(dB) | Antenna<br>Gain(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Over<br>Limit(dB) | Polarization<br>(H/V) | Result |
| 1094.315   | -52.29              | 0.43               | 1.9                  | -50.82        | -13            | -37.82            | Horizontal            | Pass   |
| 1250.711   | -51.66              | 0.43               | 1.9                  | -50.19        | -13            | -37.19            | Horizontal            | Pass   |
| 1406.636   | -54.21              | 0.43               | 1.9                  | -52.74        | -13            | -39.74            | Horizontal            | Pass   |
| 1094.315   | -50.35              | 0.43               | 1.9                  | -48.88        | -13            | -35.88            | Vertical              | Pass   |
| 1250.711   | -46.77              | 0.43               | 1.9                  | -45.3         | -13            | -32.3             | Vertical              | Pass   |
| 1406.636   | -52.58              | 0.43               | 1.9                  | -51.11        | -13            | -38.11            | Vertical              | Pass   |

| Assigned Frequency:156.525MHz, Modulation Type: FSK |                     |                    |                      |               |                |                   |                       |        |
|---|---------------------|--------------------|----------------------|---------------|----------------|-------------------|-----------------------|--------|
| Frequency<br>(MHz)                                  | S.G. Power<br>(dBm) | Cable loss<br>(dB) | Antenna<br>Gain(dBi) | EIRP<br>(dBm) | Limit<br>(dBm) | Over<br>Limit(dB) | Polarization<br>(H/V) | Result |
| 1097.843  | -51.37              | 0.43               | 1.9                  | -49.9         | -13            | -36.9             | Horizontal            | Pass   |
| 1254.743  | -50.49              | 0.43               | 1.9                  | -49.02        | -13            | -36.02            | Horizontal            | Pass   |
| 1411.171  | -53.91              | 0.43               | 1.9                  | -52.44        | -13            | -39.44            | Horizontal            | Pass   |
| 1097.843  | -49.45              | 0.43               | 1.9                  | -47.98        | -13            | -34.98            | Vertical              | Pass   |
| 1254.743  | -45.66              | 0.43               | 1.9                  | -44.19        | -13            | -31.19            | Vertical              | Pass   |
| 1411.171  | -51.61              | 0.43               | 1.9                  | -50.14        | -13            | -37.14            | Vertical              | Pass   |

Note: All modes and modulation have been tested worst test result, All harmonics and spurious emissions are more than 20 dB below the specified attenuation limit. Only record the worst test result.



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## 6. Modulation Characteristics

| Test Frequency (MHz) | Modulation Frequency (Hz) | Upper Limit | Lower Limit | Modulation Index(dB)<br>Relative. To 1KHz | Verdict |
|----------------------|---------------------------|-------------|-------------|---|---------|
| 156.025              | 300                       | -9.5        | -13.5       | -12.6                                     | Pass    |
|                      | 500                       | -5          | -9          | -7.8                                      | Pass    |
|                      | 800                       | -0.9        | -4.9        | -2.5                                      | Pass    |
|                      | 1000                      | 1           | -3          | 0.3                                       | Pass    |
|                      | 1500                      | 4.5         | 0.5         | +3.4                                      | Pass    |
|                      | 1800                      | 6.1         | 2.1         | +4.9                                      | Pass    |
|                      | 2000                      | 7           | 3           | +5.8                                      | Pass    |
|                      | 2500                      | 9           | 5           | +6.7                                      | Pass    |
|                      | 3000                      | 10.5        | 6.5         | +8.4                                      | Pass    |
| 156.525              | 300                       | -9.5        | -13.5       | -12.1                                     | Pass    |
|                      | 500                       | -5          | -9          | -7.7                                      | Pass    |
|                      | 800                       | -0.9        | -4.9        | -2.4                                      | Pass    |
|                      | 1000                      | 1           | -3          | 0.7                                       | Pass    |
|                      | 1500                      | 4.5         | 0.5         | +3.5                                      | Pass    |
|                      | 1800                      | 6.1         | 2.1         | +4.9                                      | Pass    |
|                      | 2000                      | 7           | 3           | +5.7                                      | Pass    |
|                      | 2500                      | 9           | 5           | +8.1                                      | Pass    |
|                      | 3000                      | 10.5        | 6.5         | +9.3                                      | Pass    |



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| Test Frequency (MHz) | Modulation Frequency (Hz) | Input level | Maximum Deviation(KHz) |           | Limit (KHz) | Verdict |
|----------------------|---------------------------|-------------|------------------------|-----------|-------------|---------|
|                      |                           |             | High Power             | Low Power |             |         |
| 156.025              | 100                       | 20dB 3KHz   | 2.4                    | 2.2       | ≤5.0        | Pass    |
|                      | 200                       | 20dB 3KHz   | 3.1                    | 3.1       | ≤5.0        | Pass    |
|                      | 300                       | 20dB 3KHz   | 3.4                    | 3.3       | ≤5.0        | Pass    |
|                      | 400                       | 20dB 3KHz   | 3.1                    | 3.1       | ≤5.0        | Pass    |
|                      | 500                       | 20dB 3KHz   | 3.6                    | 3.5       | ≤5.0        | Pass    |
|                      | 1000                      | 20dB 3KHz   | 3.5                    | 3.5       | ≤5.0        | Pass    |
|                      | 1500                      | 20dB 3KHz   | 3.2                    | 3.2       | ≤5.0        | Pass    |
|                      | 2000                      | 20dB 3KHz   | 2.9                    | 3.0       | ≤5.0        | Pass    |
|                      | 2500                      | 20dB 3KHz   | 3.3                    | 3.2       | ≤5.0        | Pass    |
|                      | 3000                      | 20dB 3KHz   | 3.5                    | 3.4       | ≤5.0        | Pass    |
| 156.525              | 100                       | 20dB 3KHz   | 2.5                    | 2.3       | ≤5.0        | Pass    |
|                      | 200                       | 20dB 3KHz   | 3.0                    | 3.0       | ≤5.0        | Pass    |
|                      | 300                       | 20dB 3KHz   | 3.2                    | 3.0       | ≤5.0        | Pass    |
|                      | 400                       | 20dB 3KHz   | 3.0                    | 3.0       | ≤5.0        | Pass    |
|                      | 500                       | 20dB 3KHz   | 3.5                    | 3.6       | ≤5.0        | Pass    |
|                      | 1000                      | 20dB 3KHz   | 3.1                    | 3.0       | ≤5.0        | Pass    |
|                      | 1500                      | 20dB 3KHz   | 3.2                    | 3.1       | ≤5.0        | Pass    |
|                      | 2000                      | 20dB 3KHz   | 3.1                    | 3.0       | ≤5.0        | Pass    |
|                      | 2500                      | 20dB 3KHz   | 3.2                    | 3.1       | ≤5.0        | Pass    |
|                      | 3000                      | 20dB 3KHz   | 3.6                    | 3.5       | ≤5.0        | Pass    |

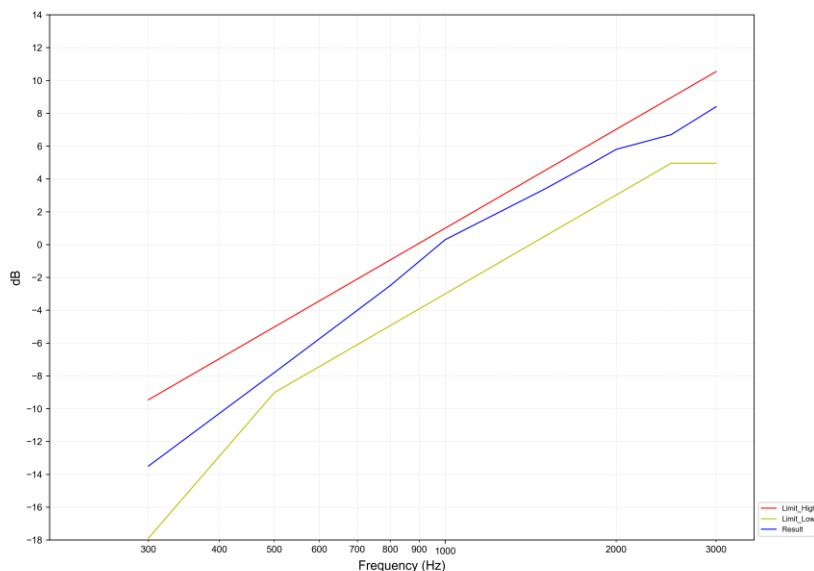


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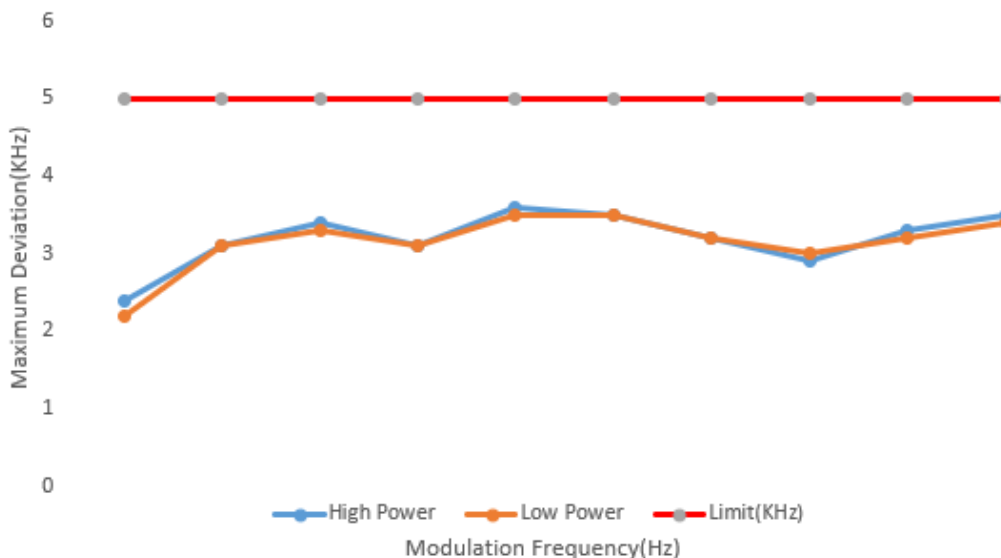
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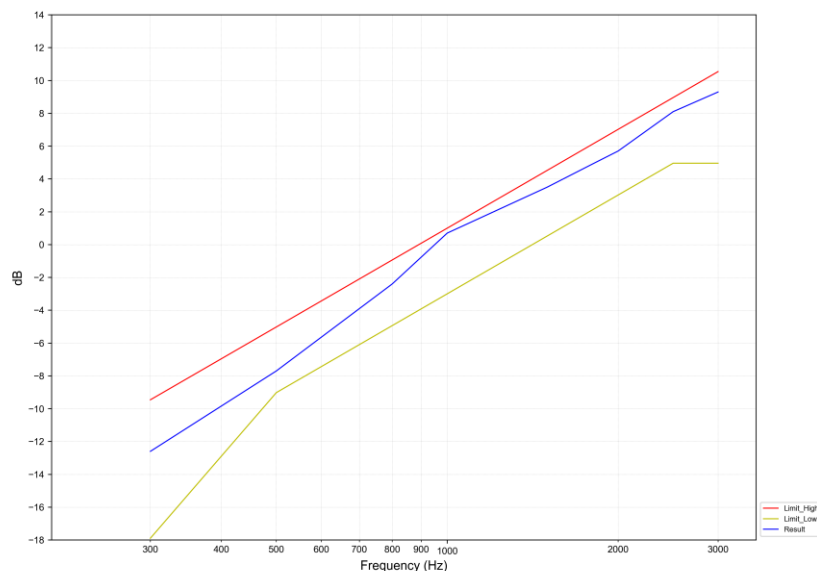
Assigned Frequency:156.025MHz, High Power, Modulation Type: FM



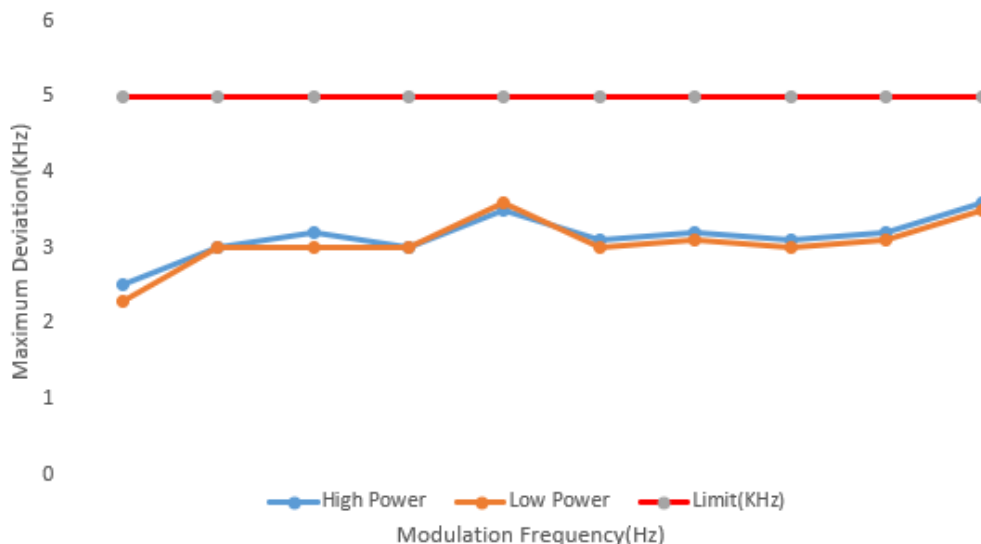
Assigned Frequency:156.025MHz, High Power, Modulation Type: FM



Assigned Frequency:156.525MHz, Modulation Type: FSK

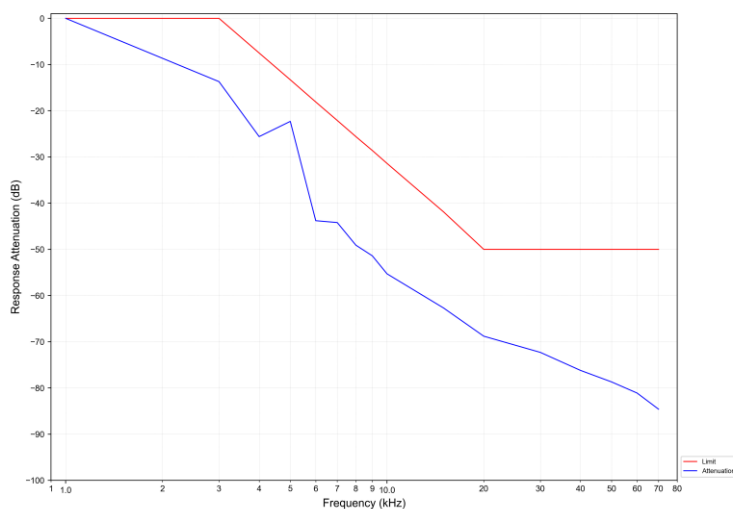


Assigned Frequency:156.525MHz, Modulation Type: FSK



### Low Pass Filter Response

| Assigned Frequency:156.025MHz, High Power, Modulation Type: FM |                         |            |
|--|-------------------------|------------|
| Audio Frequency(KHz)   | ResponseAttenuation(dB) | Limit (dB) |
| 1  | 0                       | /          |
| 3  | -13.7                   | 0          |
| 4  | -25.6                   | -7.5       |
| 5  | -22.3                   | -13.3      |
| 6  | -43.8                   | -18.1      |
| 7  | -44.2                   | -22.1      |
| 8  | -49.1                   | -25.6      |
| 9  | -51.4                   | -28.6      |
| 10   | -55.3                   | -31.4      |
| 15   | -62.7                   | -41.9      |
| 20   | -68.8                   | -50.0      |
| 30   | -72.3                   | -50.0      |
| 40   | -76.2                   | -50.0      |
| 50   | -78.7                   | -50.0      |
| 60   | -81.1                   | -50.0      |
| 70   | -84.6                   | -50.0      |



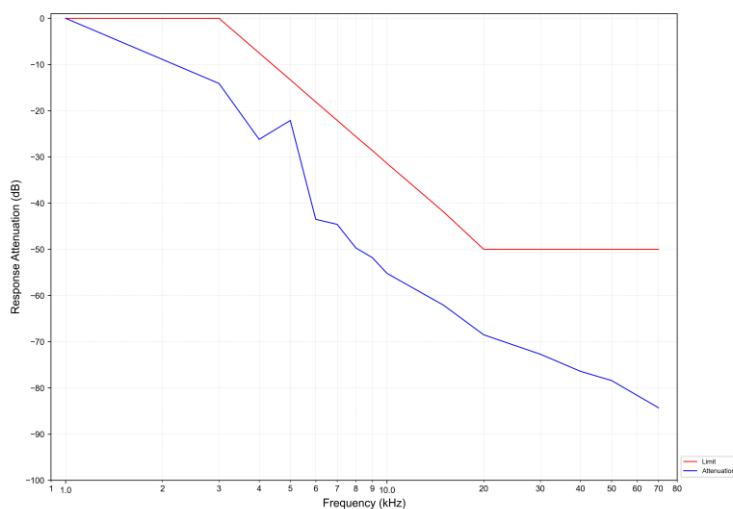
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| Assigned Frequency:156.525MHz, High Power, Modulation Type: FSK |                         |            |
|---|-------------------------|------------|
| Audio Frequency(KHz)  | ResponseAttenuation(dB) | Limit (dB) |
| 1   | 0                       | /          |
| 3   | -14.1                   | 0          |
| 4   | -26.2                   | -7.5       |
| 5   | -22.1                   | -13.3      |
| 6   | -43.5                   | -18.1      |
| 7   | -44.6                   | -22.1      |
| 8   | -49.7                   | -25.6      |
| 9   | -51.8                   | -28.6      |
| 10  | -55.2                   | -31.4      |
| 15  | -62.1                   | -41.9      |
| 20  | -68.5                   | -50.0      |
| 30  | -72.7                   | -50.0      |
| 40  | -76.4                   | -50.0      |
| 50  | -78.4                   | -50.0      |
| 60  | -81.6                   | -50.0      |
| 70  | -84.3                   | -50.0      |



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## 7. Transmitter Power

| Test Voltage<br>(V Dc) | Test<br>Frequency<br>(MHz) | Power Level | Output<br>Power(dBm) | Output<br>Power(W) | Limit |
|------------------------|----------------------------|-------------|----------------------|--------------------|-------|
| 13.8                   | 156.025                    | Max         | 43.63                | 23.07              | 25W   |
|                        |                            | Low         | 28.98                | 0.79               | 1W    |
|                        | 156.300                    | Max         | 43.64                | 23.12              | 25W   |
|                        |                            | Low         | 28.96                | 0.79               | 1W    |
|                        | 156.650                    | Max         | 43.63                | 23.07              | 25W   |
|                        |                            | Low         | 28.95                | 0.79               | 1W    |
|                        | 156.800                    | Max         | 43.63                | 23.07              | 25W   |
|                        |                            | Low         | 28.95                | 0.79               | 1W    |
|                        | 157.425                    | Max         | 43.60                | 22.91              | 25W   |
|                        |                            | Low         | 28.92                | 0.78               | 1W    |
|                        | 156.525                    | Max         | 43.86                | 24.34              | 25W   |
|                        |                            | Low         | 29.36                | 0.86               | 1W    |
|                        | 161.6                      | Max         | 43.88                | 24.43              | 25W   |
|                        |                            | Low         | 29.47                | 0.89               | 1W    |

Note:

- 1). The high power is 25W, the low power is 1W for VHF/DSC that declared by manufacturer.



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## 8. Transmitter Carrier Power Reduction

| Test Voltage<br>(V Dc) | Test<br>Frequency<br>(MHz) | Power Level | Default<br>Power<br>(W) | Limit            | Result |
|------------------------|----------------------------|-------------|-------------------------|------------------|--------|
| 13.8                   | 156.375                    | Low         | 0.77                    | one watt or less | Pass   |
|                        | 156.525                    | Low         | 0.79                    | one watt or less | Pass   |
|                        | 156.650                    | Low         | 0.81                    | one watt or less | Pass   |

Note:

- 1).All transmitters units must be capable of reducing the carrier power to one watt or less;
- 2).All transmitters must automatically reduce the carrier power to one watt or less when transmitting on 156.375 MHz or 156.650 MHz, and must be provided with a manual override switch which when held by an operator will permit full carrier power operation on 156.375 MHz and 156.650 MHz;



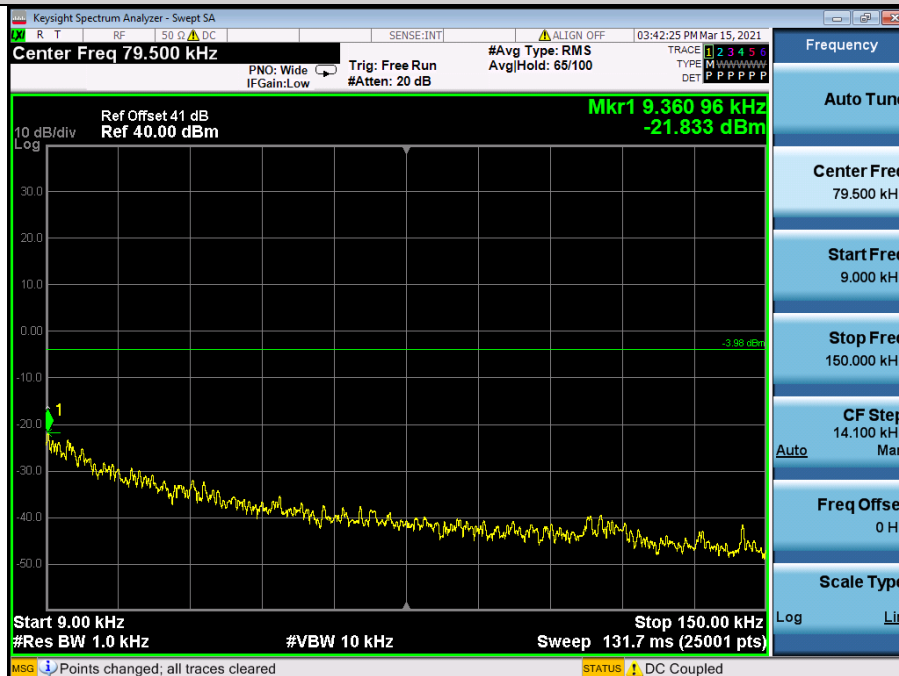
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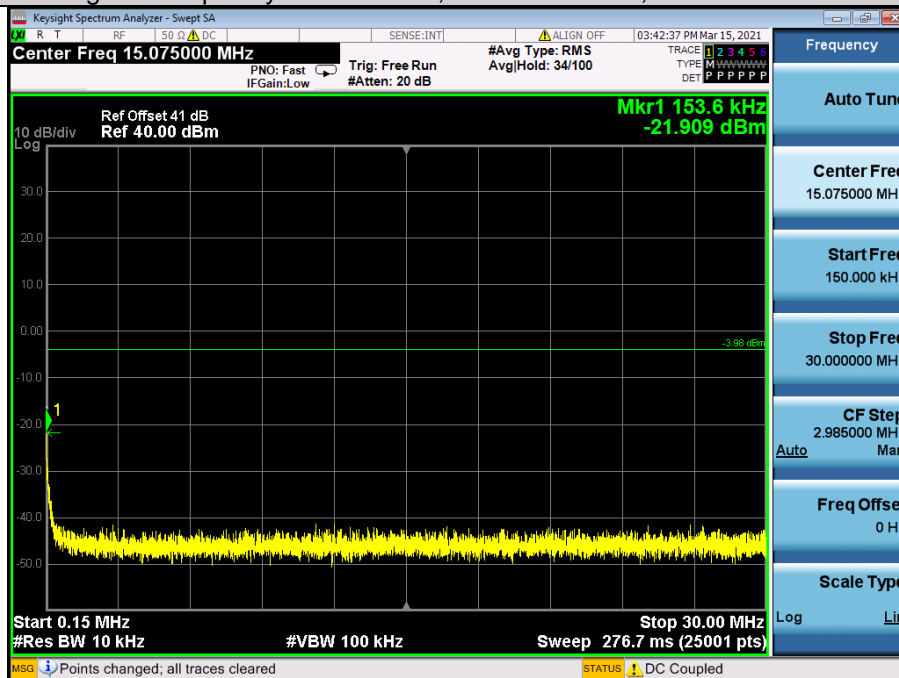
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### 9. Suppression of interference aboard ships

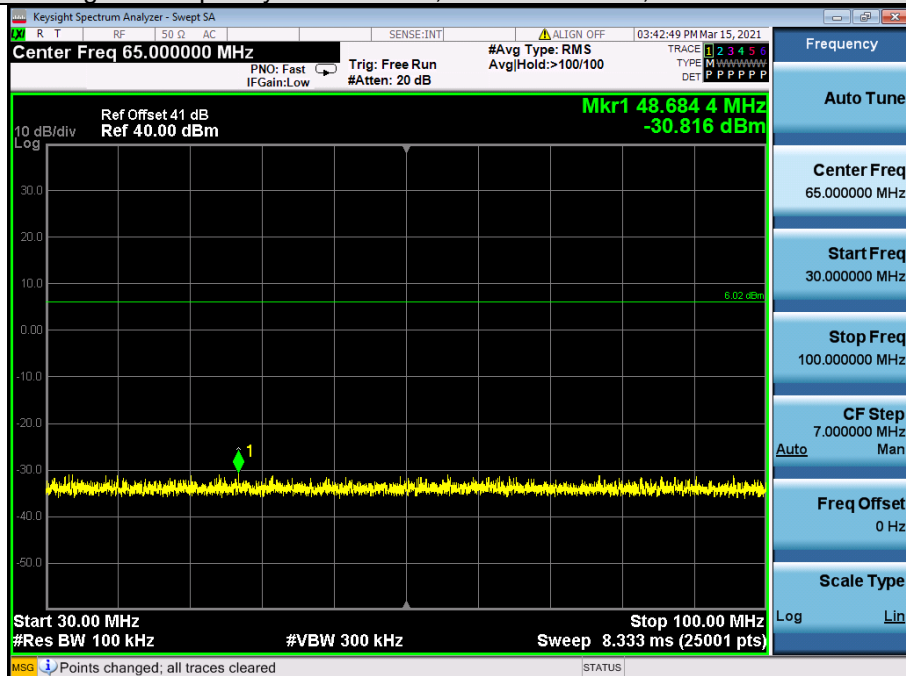
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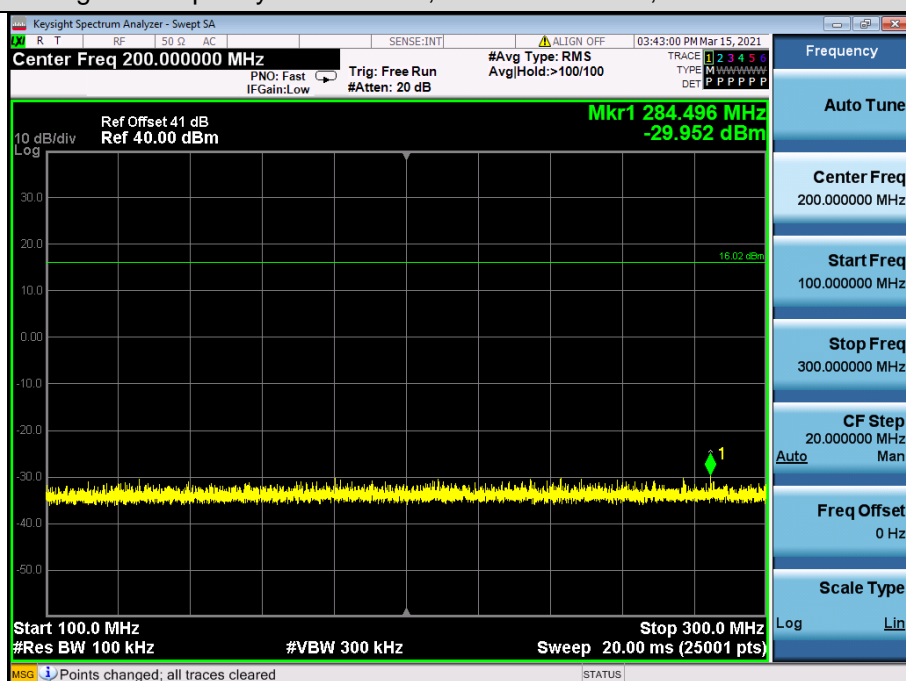
Assigned Frequency: 156.525 MHz, 150 kHz-30 MHz, DSC receiver mode



### Assigned Frequency:156.525MHz, 30MHz-100MHz, DSC receiver mode

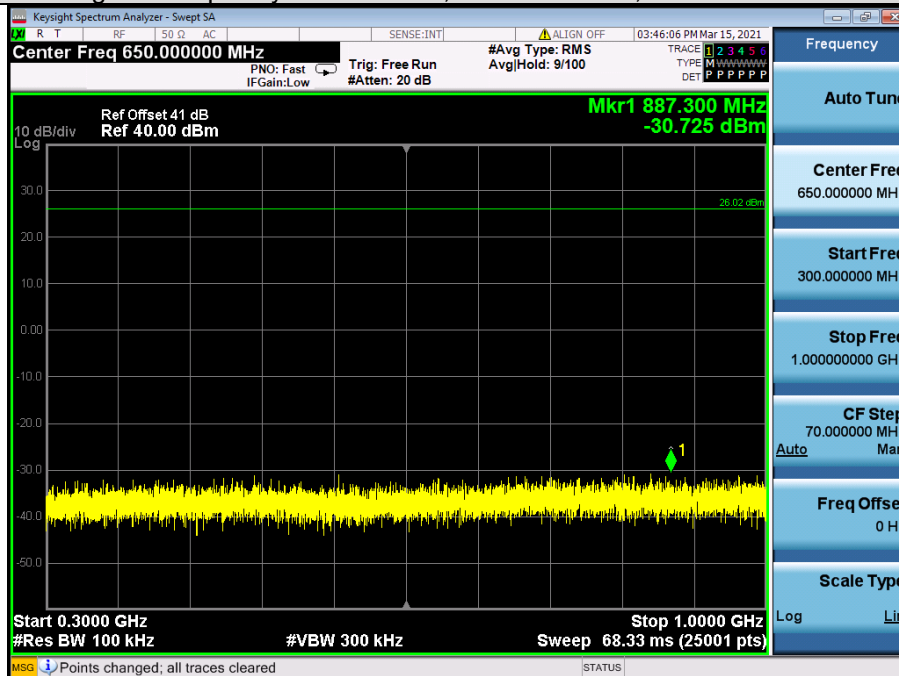


### Assigned Frequency:156.525MHz, 100MHz-300MHz, DSC receiver mode

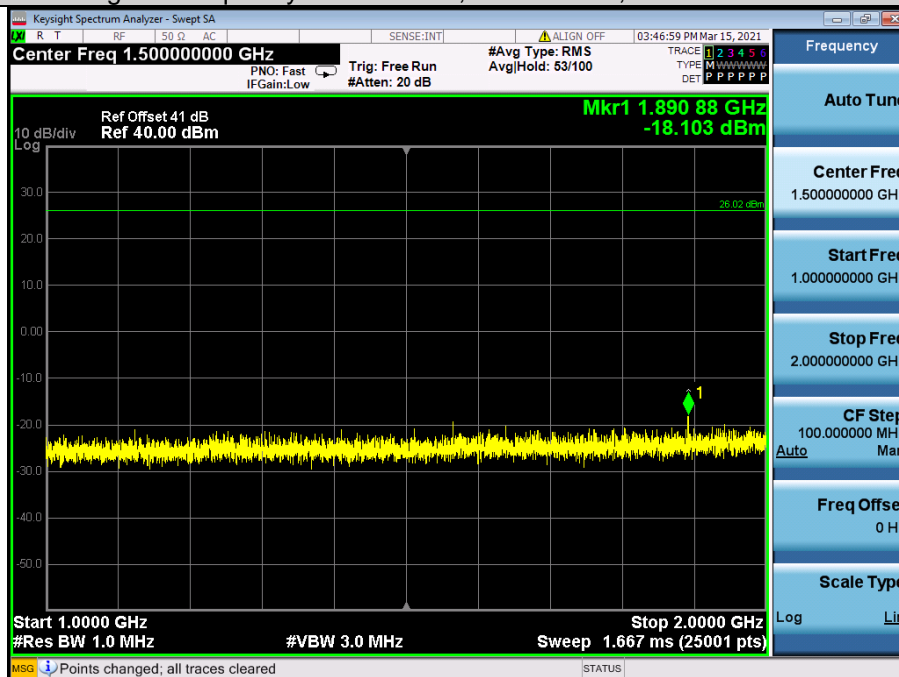




### Assigned Frequency:156.525MHz, 300MHz-1GHz, DSC receiver mode



### Assigned Frequency:156.525MHz, 1GHz-2GHz, DSC receiver mode



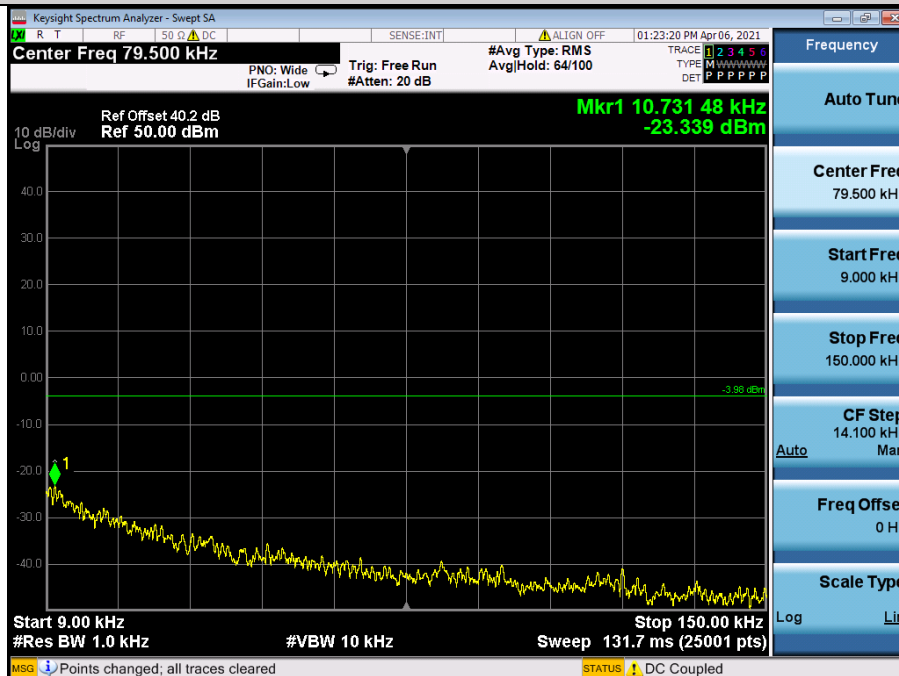
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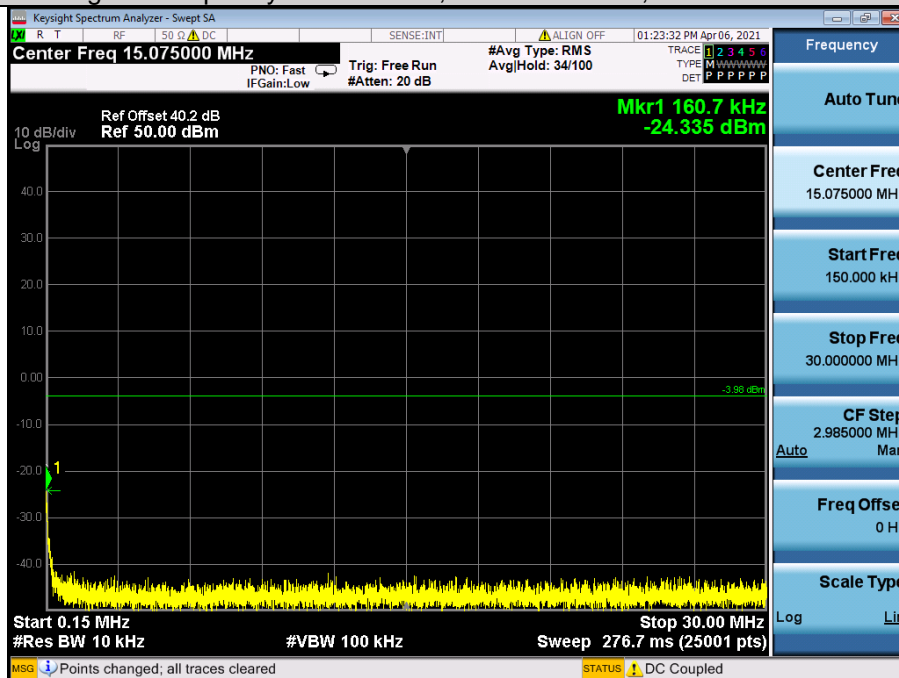
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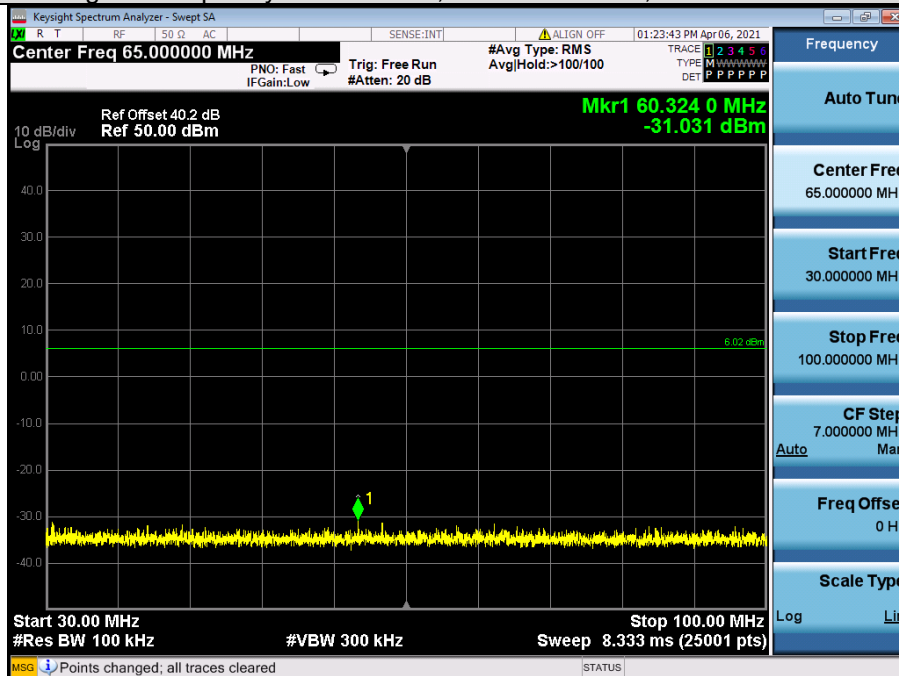
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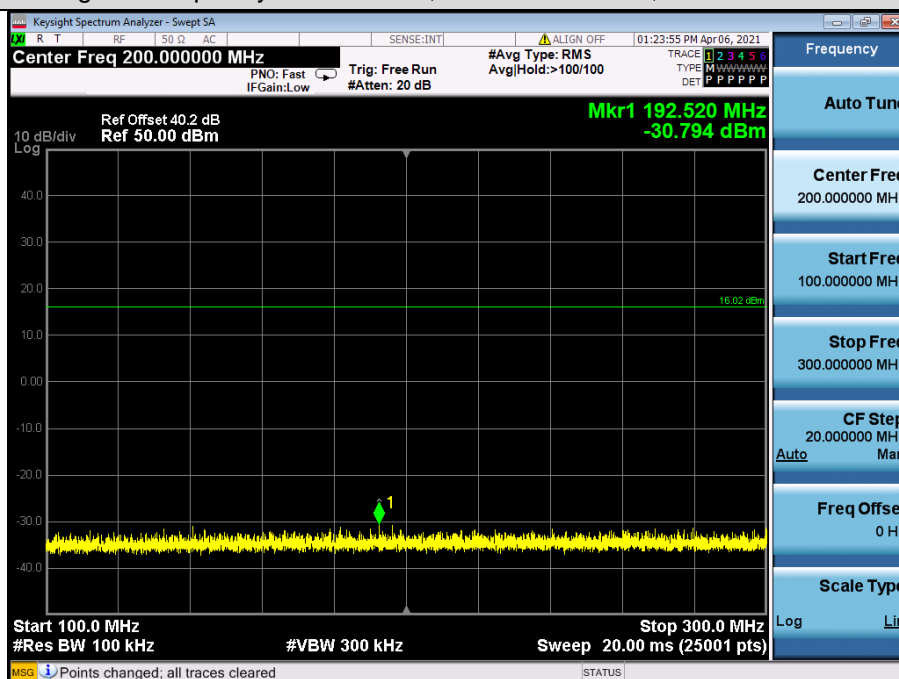
### Assigned Frequency:156.025MHz, 150KHz-30MHz, VHF receiver mode



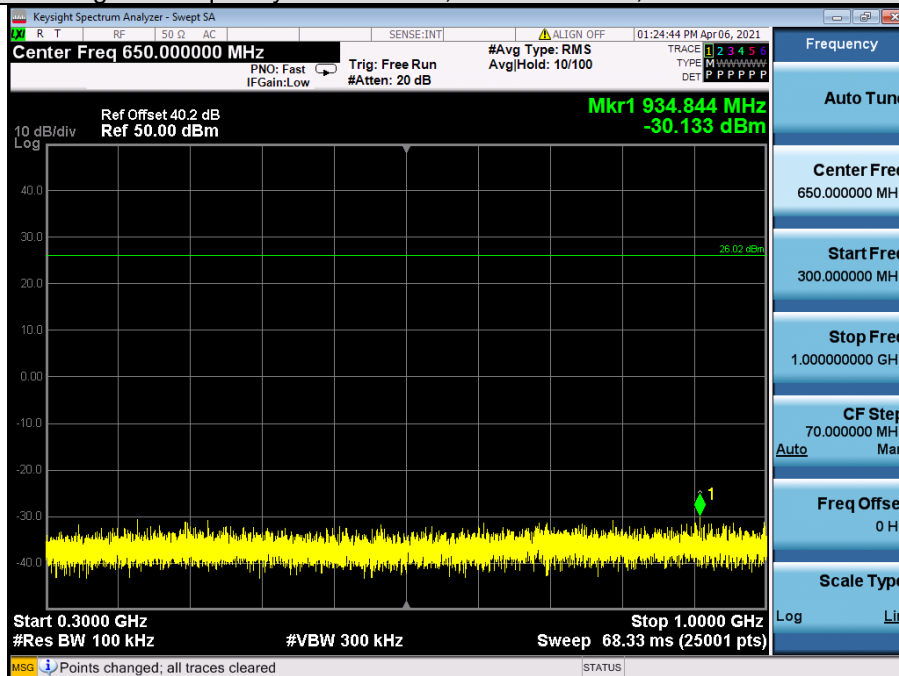
### Assigned Frequency:156.025MHz, 30MHz-100MHz, VHF receiver mode



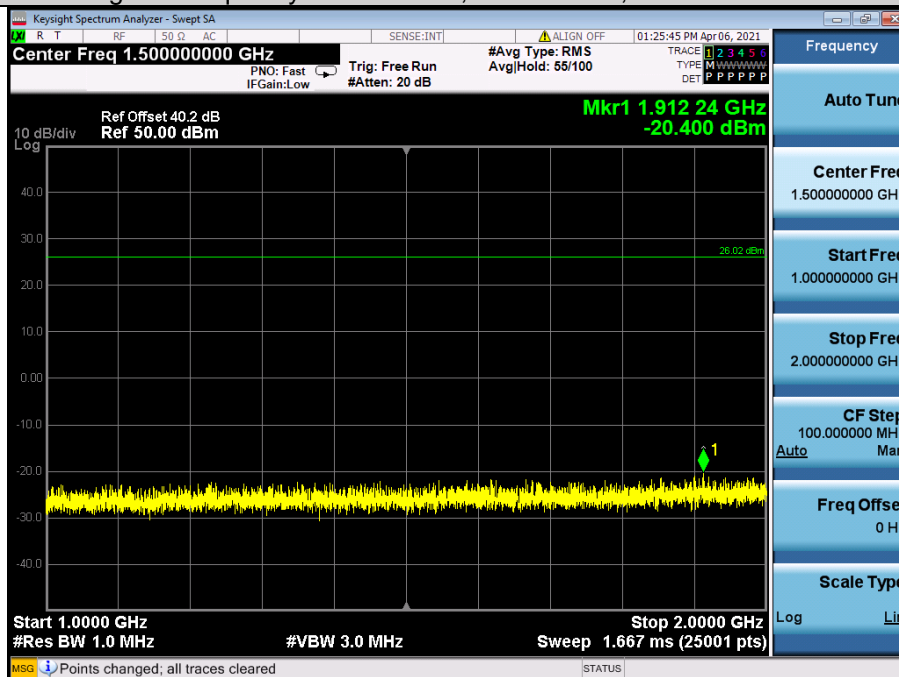
### Assigned Frequency:156.025MHz, 100MHz-300MHz, VHF receiver mode



### Assigned Frequency:156.025MHz, 300MHz-1GHz, VHF receiver mode



### Assigned Frequency:156.025MHz, 1GHz-2GHz, VHF receiver mode



Only record the worst test result.



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No.1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgsgroup.com.cn  
中国·深圳·科技园中区M-10栋一号厂房 邮编: 518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com