



**中认信通**

CHINA CERTIFICATION ICT CO., LTD (DONGGUAN)



## TEST REPORT

**Applicant:** Flir Belgium Bvba

**Address:** Luxemburgstraat 2 Meer 2321Belgium

**FCC ID:** PJ5-RAY901

**Product Name:** RAY91 VHF Black Box with AIS Rx

**Standard(s):** FCC Part 80  
FCC Part 1.1307 & 2.1091

The above equipment has been tested and found compliance with the requirement of the relative standards by China Certification ICT Co., Ltd (Dongguan)

**Report Number:** CR21120033-00

**Date Of Issue:** 2022-05-10

**Reviewed By:** Sun Zhong

*Sun Zhong*

**Title:** Manager

**Test Laboratory:** China Certification ICT Co., Ltd (Dongguan)

No. 113, Pingkang Road, Dalang Town, Dongguan, Guangdong, China

Tel: +86-769-82016888

## Test Facility

The Test site used by *China Certification ICT Co., Ltd (Dongguan)* to collect test data is located on the No. 113, Pingkang Road, Dalang 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. : 442868, the FCC Designation No. : CN1314.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0123.

## Declarations

*China Certification ICT Co., Ltd (Dongguan)* 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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## 1. GENERAL INFORMATION

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

|                                                                                                                                                      |                                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| <b>Product Name:</b>                                                                                                                                 | RAY91 VHF Black Box with AIS Rx                      |
| <b>Test Model:</b>                                                                                                                                   | R70625                                               |
| <b>Multiple Model:</b>                                                                                                                               | R70624                                               |
| <b>Product Category:</b>                                                                                                                             | Ship Station                                         |
| <b>AIS Class:</b>                                                                                                                                    | Class B (Receive only)                               |
| <b>Rated Input Voltage:</b>                                                                                                                          | DC 12V                                               |
| <b>Serial Number:</b>                                                                                                                                | R70625: CR21120033-RF-S1<br>R70624: CR21120033-RF-S2 |
| <b>EUT Received Date:</b>                                                                                                                            | 2021.12.20                                           |
| <b>EUT Received Status:</b>                                                                                                                          | Good                                                 |
| Note: The Multiple models are identical with Test model, please refer to the declaration letter for more detail, which was provided by manufacturer. |                                                      |

### Technical Specification

|                                               |                                                                                 |                 |
|-----------------------------------------------|---------------------------------------------------------------------------------|-----------------|
| <b>Operation Frequency Range (MHz):</b>       | <b>Transmit:</b>                                                                | 156.025-157.425 |
|                                               | <b>Receive:</b>                                                                 | 156.050-163.275 |
| <b>Rated RF Output Power (Conducted) (W):</b> | High power level: 25<br>Low power level: 1                                      |                 |
| <b>Modulation Type:</b>                       | FM, DSC                                                                         |                 |
| <b>Channel Spacing (kHz):</b>                 | 25                                                                              |                 |
| <b>Antenna ▲ :</b>                            | External antenna, 50 Ohm input impedance, 9dBi(Max), with a 1.0dB loss RF Cable |                 |

## 1.2 Description of Test Configuration

### 1.3.1 EUT Operation Condition:

|                                 |                                                                                                                  |
|---------------------------------|------------------------------------------------------------------------------------------------------------------|
| <b>EUT Operation Mode:</b>      | The system was configured for testing in Engineering Mode, which was provided by the manufacturer <sup>▲</sup> . |
| <b>Equipment Modifications:</b> | No                                                                                                               |
| <b>EUT Exercise Software:</b>   | No                                                                                                               |

### 1.3.2 Support Equipment List and Details

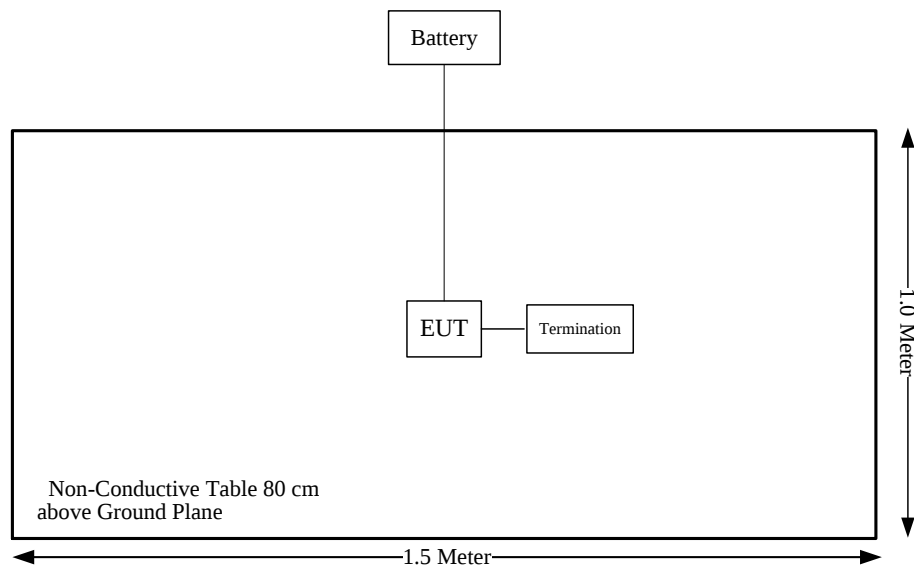
| Manufacturer | Description      | Model     | Serial Number |
|--------------|------------------|-----------|---------------|
| FENGFAN      | Battery          | 46B24L-H  | /             |
| BEW          | Coaxial Terminal | TF300-6-B | /             |

### 1.3.3 Support Cable List and Details

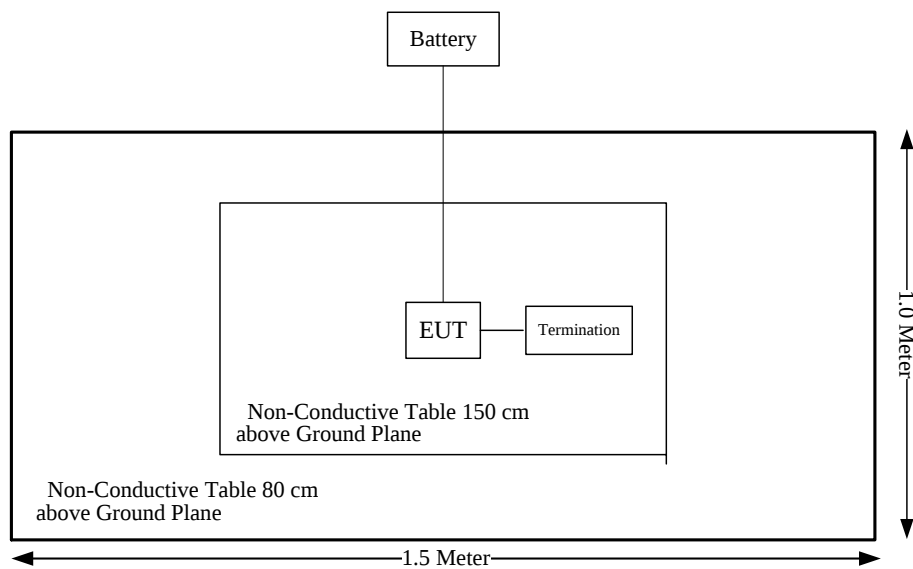
| Cable Description | Shielding Type | Ferrite Core | Length (m) | From Port | To          |
|-------------------|----------------|--------------|------------|-----------|-------------|
| DC Cable          | No             | No           | 2          | Battery   | EUT         |
| Coaxial Cable     | Yes            | No           | 0.5        | EUT       | Termination |

### 1.3.4 Block Diagram of Test Setup

RE Below 1GHz



## RE Above 1GHz



### 1.3 Measurement Uncertainty

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.

| Parameter                         | Measurement Uncertainty                                                                                                 |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| Occupied Channel Bandwidth        | ±5 %                                                                                                                    |
| RF output power, conducted        | ±0.61dB                                                                                                                 |
| Power Spectral Density, conducted | ±0.61 dB                                                                                                                |
| Unwanted Emissions, radiated      | 30M~200MHz: 4.15 dB, 200M~1GHz: 5.61 dB, 1G~6GHz: 5.14 dB,<br>6G~18GHz: 5.93 dB, 18G~26.5G: 5.47 dB, 26.5G~40G: 5.63 dB |
| Unwanted Emissions, conducted     | ±1.26 dB                                                                                                                |
| Temperature                       | ±1 °C                                                                                                                   |
| Humidity                          | ±5%                                                                                                                     |
| DC and low frequency voltages     | ±0.4%                                                                                                                   |
| Duty Cycle                        | 1%                                                                                                                      |
| AC Power Lines Conducted Emission | 2.8 dB (150 kHz to 30 MHz)                                                                                              |

## 2. SUMMARY OF TEST RESULTS

| FCC Rules                   | Description of Test                      | Results    |
|-----------------------------|------------------------------------------|------------|
| §2.1046; §80.215;           | Transmitter Power                        | Compliance |
| §2.1047; §80.213;           | Modulation Requirements                  | Compliance |
| §2.1049; §80.205;           | Bandwidth                                | Compliance |
| §2.1051; §80.211(f);        | Emission Limitations                     | Compliance |
| §80.217;                    | Suppression of Interference Aboard Ships | Compliance |
| §2.1053; §80.211;           | Spurious Radiated Emissions              | Compliance |
| §2.1055; §80.209(a)(5)(ii); | Transmitter Frequency Tolerances         | Compliance |
| §1.1307(b); §2.1091;        | Maximum Permissible Exposure (MPE)       | Compliance |

### 3. REQUIREMENTS AND TEST PROCEDURES

#### 3.1 Transmitter Power

##### Applicable Standard

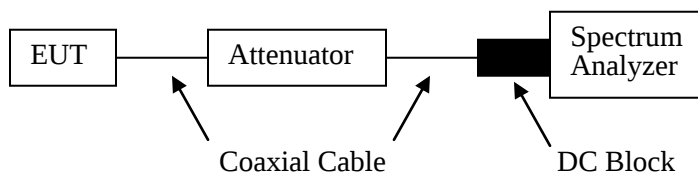
FCC §80.215.

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

(1) Ship stations 156-162 MHz - 25W

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

##### Block Diagram of Test Setup



Note: Path loss from EUT to Spectrum Analyzer is 40.2 dB.

##### 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:

|         |         |
|---------|---------|
| RBW     | VBW     |
| 100 kHz | 300 kHz |

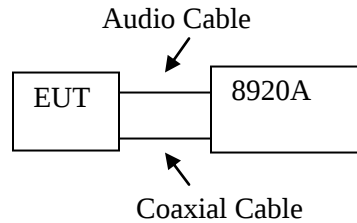
#### 3.2 Modulation Requirements

##### Applicable Standard

FCC §80.213.

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.

### Block Diagram of Test Setup



### Test Procedure

Test Method: TIA-603-E 2.2.3

### 3.3 Bandwidth

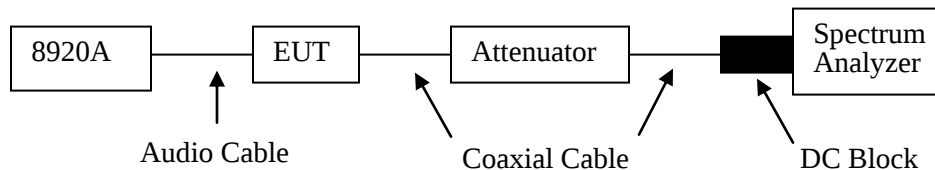
#### Applicable Standard

FCC §80.205.

(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 class of emission and corresponding emission designator and authorized bandwidth can refer to §80.205

### Block Diagram of Test Setup



*Note: Path loss from EUT to Spectrum Analyzer is 40.2 dB.*

### 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 300 Hz and the spectrum was recorded in the appropriate frequency span from the carrier frequency.

### 3.4 Emission Limitations

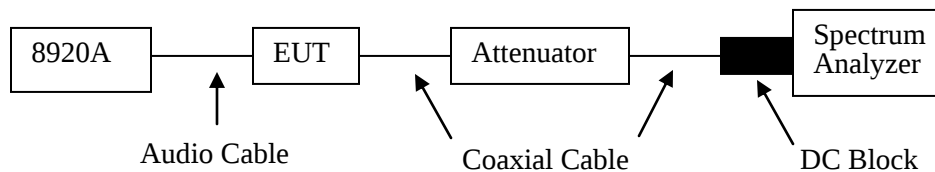
#### Applicable Standard

FCC §80.211(f).

- (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.

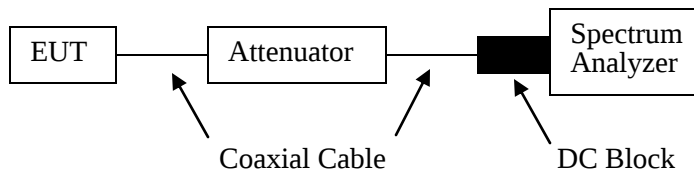
#### Block Diagram of Test Setup

For Mask Test:



*Note: Path loss from EUT to Spectrum Analyzer is 40.2 dB.*

For Conducted Emission Test:



*Note: Path loss from EUT to Spectrum Analyzer is 40.2 dB.*

#### Test Procedure

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation.

For Mask test, the resolution bandwidth of the spectrum analyzer was set at 300 Hz and the spectrum was recorded in the frequency band more than  $\pm 50$  kHz from the carrier frequency.

For Conducted Emission test, 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.

### 3.5 Suppression of Interference Aboard Ships

#### Applicable Standard

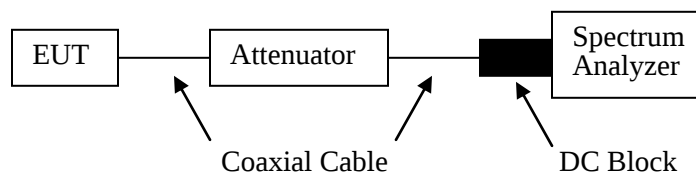
FCC §80.217.

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

(b) 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 | Power to artificial antenna in dBm |
|------------------------------------|-------------------------------------------|------------------------------------|
| Below 30 MHz                       | 400                                       | -3.98                              |
| 30 to 100 MHz                      | 4000                                      | 6.02                               |
| 100 to 300 MHz                     | 40000                                     | 16.02                              |
| Over 300 MHz                       | 400000                                    | 26.02                              |

#### Block Diagram of Test Setup



*Note: Path loss from EUT to Spectrum Analyzer is 40.2 dB.*

#### Test Procedure

The EUT was connected to a spectrum analyzer via a appropriate attenuator. The spectrum was measured between 9 kHz to 2 GHz. The traces were recorded as shown on the following pages.

### 3.6 Spurious Radiated Emissions

#### Applicable Standard

FCC §80.211.

(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.

## Block Diagram of Test Setup

Please refer to section 1.3.4.

## 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 =  $10 \cdot \lg(TX_{pwr} \text{ in Watts}/0.001)$  - the absolute level

Spurious attenuation limit in dB =  $43 + 10 \cdot \lg(\text{power out in Watts})$

## 3.7 Transmitter Frequency Tolerances

### Applicable Standard

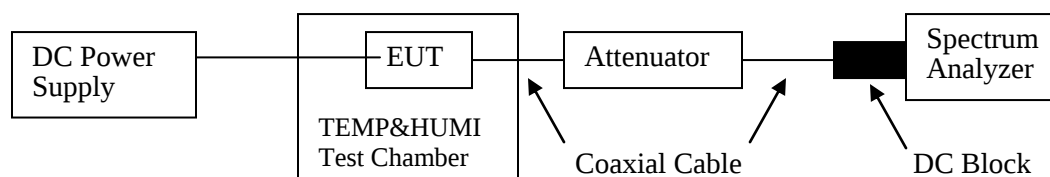
FCC §80.209(a)(5)(ii).

(a) The frequency tolerance requirements applicable to transmitters in the maritime services are shown in the following table. Tolerances are given as parts in  $10^6$  unless shown in Hz.

(5) Band 156-162 MHz:

(ii) Ship stations 10ppm.

## Block Diagram of Test Setup



Note: Path loss from EUT to Spectrum Analyzer is 40.2 dB.

## Test Procedure

### Frequency Stability vs. Temperature:

From  $-20^{\circ}$  to  $+60^{\circ}$  centigrade for equipment to be licensed for use in the Maritime Services under part 80 of this chapter, except for Class A, B, and S Emergency Position Indicating Radiobeacons (EPIRBS), and equipment to be licensed for use above 952 MHz at operational fixed stations in all services, stations in the Local Television Transmission Service and Point-to-Point Microwave Radio Service under part 21 of this chapter, equipment licensed for use aboard aircraft in the Aviation Services under part 87 of this chapter, and equipment authorized for use in the Family Radio Service under part 95 of this chapter.

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.

The frequency stability shall be measured with variation of primary supply voltage as follows:

- (1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
- (2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.
- (3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

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

## 4. TEST DATA AND RESULTS

### 4.1 Test Environmental Conditions & Test Equipment List and Details

#### 4.1.1 Radiation Emission Below 1GHz Test

|                           |           |                           |       |                        |             |
|---------------------------|-----------|---------------------------|-------|------------------------|-------------|
| Test Date:                |           | 2022-01-22~2022-04-01     |       |                        |             |
| Tester:                   |           | Great Qiao                |       |                        |             |
| Environmental Conditions: |           |                           |       |                        |             |
| Temperature:<br>(°C)      | 19.7~21.7 | Relative Humidity:<br>(%) | 51~55 | ATM Pressure:<br>(kPa) | 101.4~101.5 |

| Manufacturer    | Description               | Model                 | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|---------------------------|-----------------------|---------------|------------------|----------------------|
| Sunol Sciences  | Antenna                   | JB6                   | A082520-5     | 2020-10-19       | 2023-10-18           |
| R&S             | EMI Test Receiver         | ESR3                  | 102724        | 2021-07-22       | 2022-07-21           |
| TIMES MICROWAVE | Coaxial Cable             | LMR-600-UltraFlex     | C-0470-02     | 2021-07-18       | 2022-07-17           |
| TIMES MICROWAVE | Coaxial Cable             | LMR-600-UltraFlex     | C-0780-01     | 2021-07-18       | 2022-07-17           |
| Sonoma          | Amplifier                 | 310N                  | 186165        | 2021-07-18       | 2022-07-17           |
| EMCO            | Adjustable Dipole Antenna | 3121C                 | 9109-753      | N/A              | N/A                  |
| MICRO-COAX      | Coaxial Cable             | UFA210B-0-0720-300300 | 99G1448       | 2021-07-25       | 2022-07-24           |
| Agilent         | Signal Generator          | E8247C                | MY43321350    | 2021-04-25       | 2022-04-24           |

**Statement of Traceability:** China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

#### 4.1.2 Radiation Emission Above 1GHz Test

|                           |           |                           |       |                        |             |
|---------------------------|-----------|---------------------------|-------|------------------------|-------------|
| Test Date:                |           | 2022-01-24~2022-04-02     |       |                        |             |
| Tester:                   |           | Tommy Luo                 |       |                        |             |
| Environmental Conditions: |           |                           |       |                        |             |
| Temperature:<br>(°C)      | 20.1~20.8 | Relative Humidity:<br>(%) | 56~70 | ATM Pressure:<br>(kPa) | 100.8~101.8 |

| Manufacturer | Description                     | Model                 | Serial Number | Calibration Date | Calibration Due Date |
|--------------|---------------------------------|-----------------------|---------------|------------------|----------------------|
| ETS-Lindgren | Horn Antenna                    | 3115                  | 9912-5985     | 2020-10-13       | 2023-10-12           |
| R&S          | Spectrum Analyzer               | FSV40                 | 101591        | 2021-07-22       | 2022-07-21           |
| MICRO-COAX   | Coaxial Cable                   | UFA210A-1-1200-70U300 | 217423-008    | 2021-08-08       | 2022-08-07           |
| MICRO-COAX   | Coaxial Cable                   | UFA210A-1-2362-300300 | 235780-001    | 2021-08-08       | 2022-08-07           |
| Mini         | Pre-amplifier                   | ZVA-183-S+            | 5969001149    | 2021-11-10       | 2022-11-09           |
| AH           | Double Ridge Guide Horn Antenna | SAS-571               | 1396          | 2021-10-18       | 2024-10-17           |
| MICRO-COAX   | Coaxial Cable                   | UFA210B-0-0720-300300 | 99G1448       | 2021-07-25       | 2022-07-24           |
| Agilent      | Signal Generator                | E8247C                | MY43321352    | 2021-04-25       | 2022-04-24           |

**Statement of Traceability:** China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## 4.1.3 RF Conducted Test

|                           |           |                           |       |                        |             |
|---------------------------|-----------|---------------------------|-------|------------------------|-------------|
| Test Date:                |           | 2022-01-22~2022-05-09     |       |                        |             |
| Tester:                   |           | Morpheus Shi              |       |                        |             |
| Environmental Conditions: |           |                           |       |                        |             |
| Temperature:<br>(°C)      | 20.4~24.5 | Relative Humidity:<br>(%) | 51~62 | ATM Pressure:<br>(kPa) | 101.4~101.6 |

| Manufacturer  | Description                | Model             | Serial Number   | Calibration Date | Calibration Due Date |
|---------------|----------------------------|-------------------|-----------------|------------------|----------------------|
| R&S           | Spectrum Analyzer          | FSV40             | 101943          | 2021/7/22        | 2022/7/21            |
| R&S           | Spectrum Analyzer          | FSV40             | 101474          | 2021-07-22       | 2022-07-21           |
| YINSAIGE      | Coaxial Cable              | SS402             | SJ0100004       | 2021/8/8         | 2022/8/7             |
| YINSAIGE      | Coaxial Cable              | LMR300            | NJ0100001       | 2021/8/8         | 2022/8/7             |
| Mini-Circuits | DC Block                   | BLK-18-S+         | 1554404         | 2021/8/8         | 2022/8/7             |
| BEW           | Coaxial Attenuator         | TS300-6-40        | 213311          | 2021/8/8         | 2022/8/7             |
| HP            | RF Communications Test Set | 8920A             | 3438A05209      | 2021/7/22        | 2022/7/21            |
| BACL          | TEMP&HUMI Test Chamber     | BTH-150           | 30026           | 2021/7/22        | 2022/7/21            |
| UNI-T         | Multimeter                 | UT39A+            | C210582554      | 2021/9/30        | 2022/9/29            |
| ZHAOXIN       | DC Power Supply            | RXN-6010D         | 21R6010D0912386 | N/A              | N/A                  |
| E-Microwave   | Band Rejection Filter      | OBF-ZP-136-174-NF | OE02214427      | 2021-04-23       | 2022-04-22           |
| E-Microwave   | Band Rejection Filter      | OBF-ZP-136-174-NF | OE02214427      | 2022-04-23       | 2023-04-22           |

**Statement of Traceability:** China Certification ICT Co., Ltd (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## 4.2 Transmitter Power

Test Mode: Transmitting

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

### General:

| Modulation Mode | Channel Separation | $f_c$   | High Power Level (dBm) |       | Low Power Level (dBm) |       |
|-----------------|--------------------|---------|------------------------|-------|-----------------------|-------|
|                 |                    | MHz     | Reading                | Limit | Reading               | Limit |
| FM              | 25kHz              | 156.025 | 43.63                  | 43.98 | 29.43                 | 30    |
|                 |                    | 156.375 | 43.75                  | 43.98 | 29.66                 | 30    |
|                 |                    | 156.650 | 43.63                  | 43.98 | 29.43                 | 30    |
|                 |                    | 156.800 | 43.63                  | 43.98 | 29.37                 | 30    |
|                 |                    | 157.425 | 43.67                  | 43.98 | 29.67                 | 30    |
| DSC 1300        | 25kHz              | 156.525 | 43.63                  | 43.98 | 29.84                 | 30    |
| DSC 2100        |                    | 156.525 | 43.64                  | 43.98 | 29.83                 | 30    |

### Low Power Only:

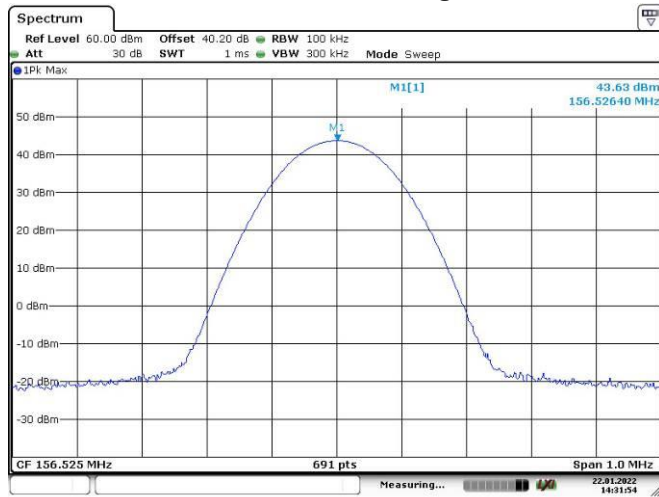
| Modulation Mode | Channel Separation | $f_c$   | Low Power Level (dBm) |       |
|-----------------|--------------------|---------|-----------------------|-------|
|                 |                    | MHz     | Reading               | Limit |
| FM              | 25kHz              | 156.850 | 29.66                 | 30    |
|                 |                    | 156.875 | 29.80                 | 30    |

Note:

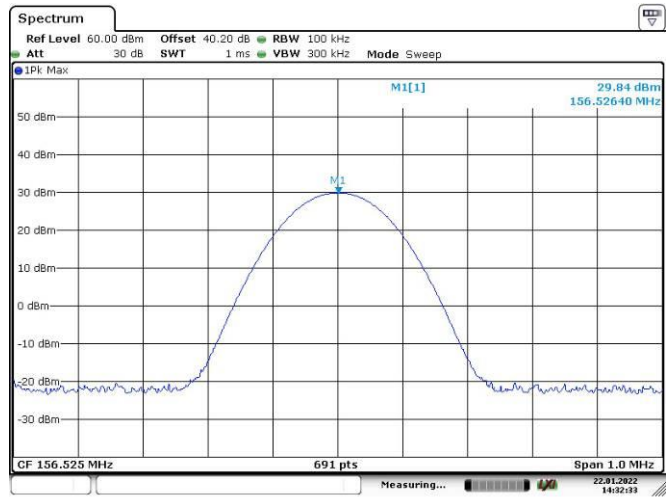
The high rated power level is 25W(43.98dBm), and low rated power level is 1W(30dBm).

## DSC:

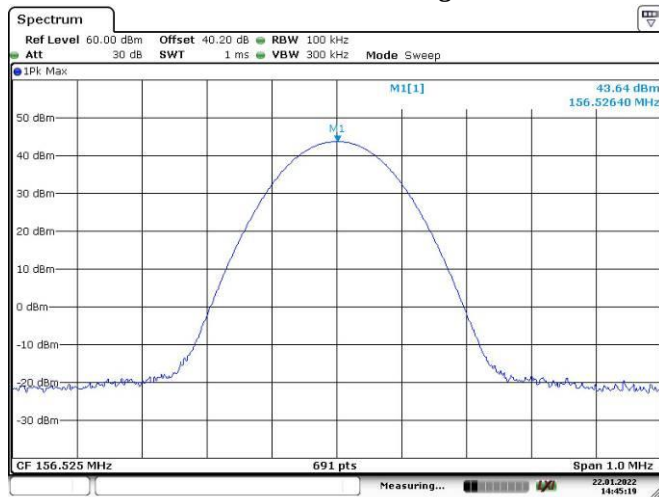
## DSC 1300, 156.525 MHz High Power



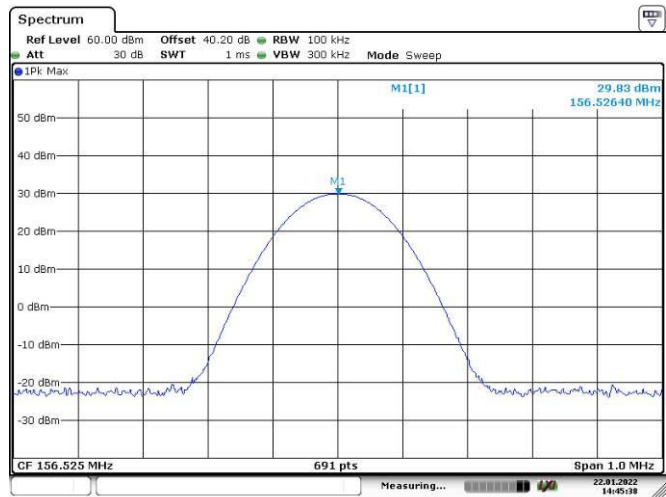
## DSC 1300, 156.525 MHz Low Power



## DSC 2100, 156.525 MHz High Power

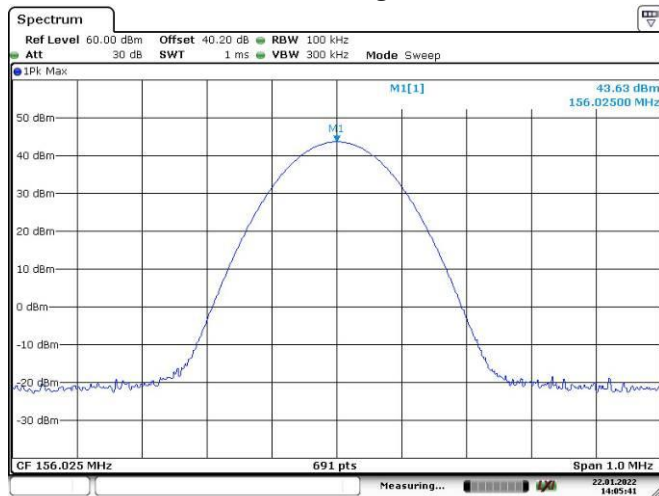


## DSC 2100, 156.525 MHz Low Power

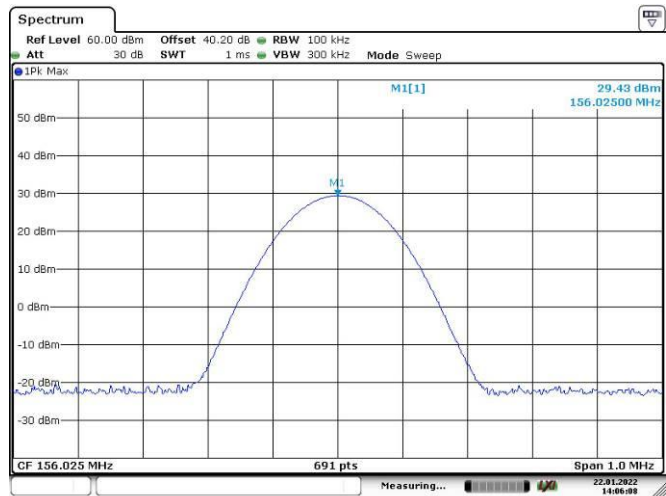


## FM, 25kHz (General):

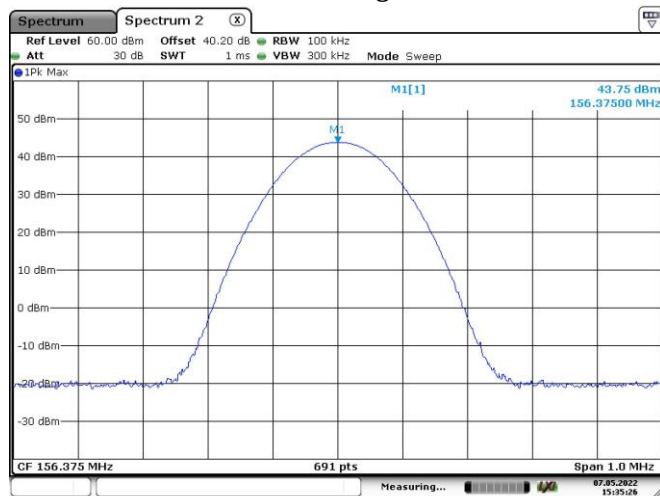
## 156.025 MHz High Power



## 156.025 MHz Low Power

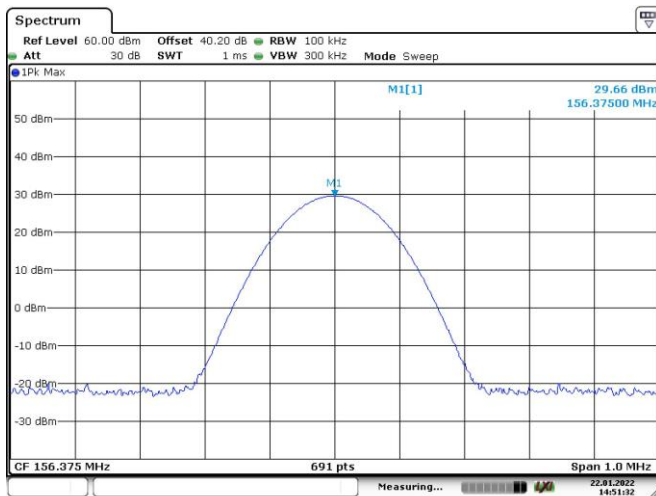


## 156.375 MHz High Power



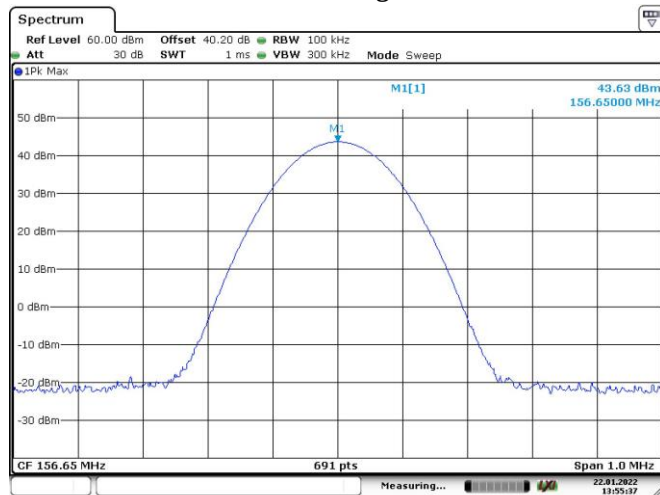
Date: 7.MAY.2022 15:35:27

## 156.375 MHz Low Power



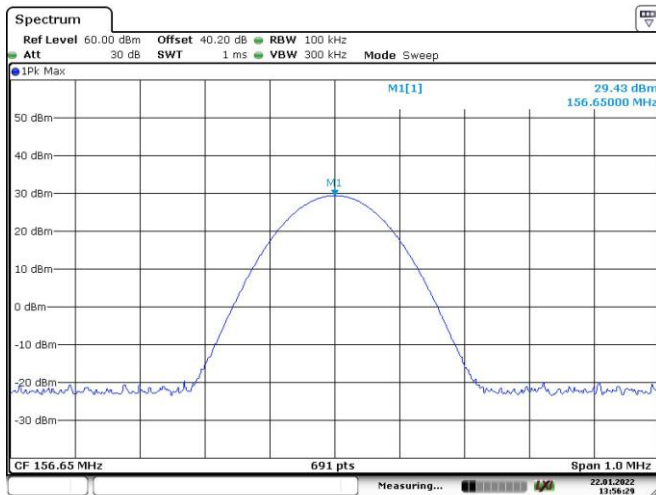
Date: 22.JAN.2022 14:51:32

## 156.650 MHz High Power



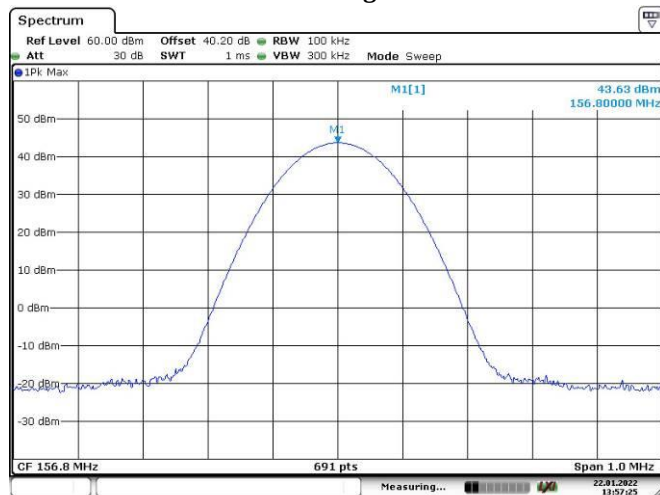
Date: 22.JAN.2022 13:55:38

## 156.650 MHz Low Power



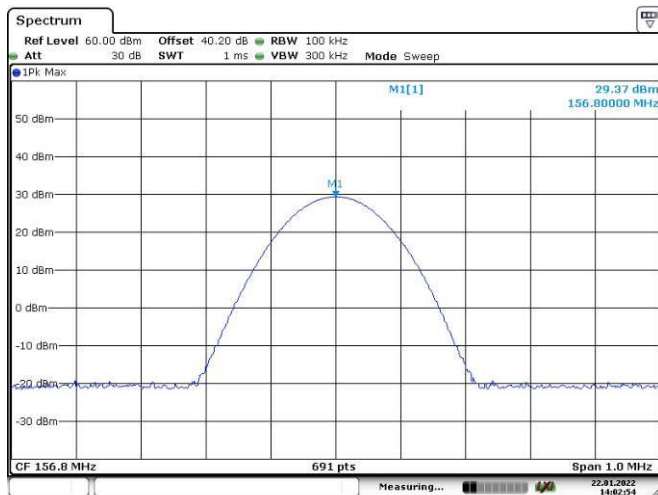
Date: 22.JAN.2022 13:56:30

## 156.8 MHz High Power



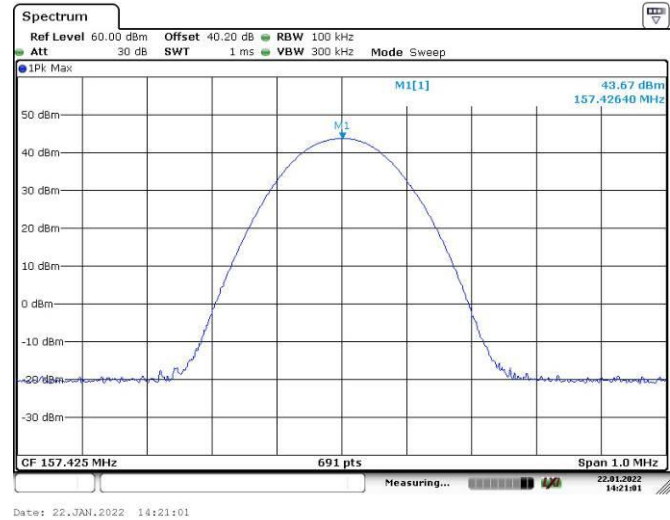
Date: 22.JAN.2022 13:57:26

## 156.8 MHz Low Power

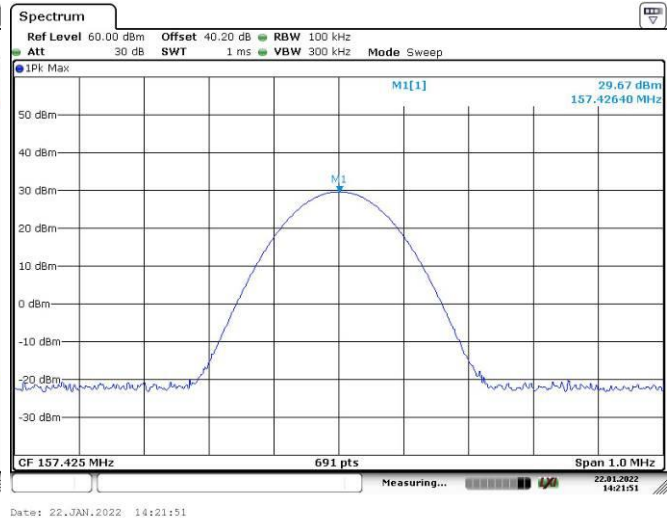


Date: 22.JAN.2022 14:02:55

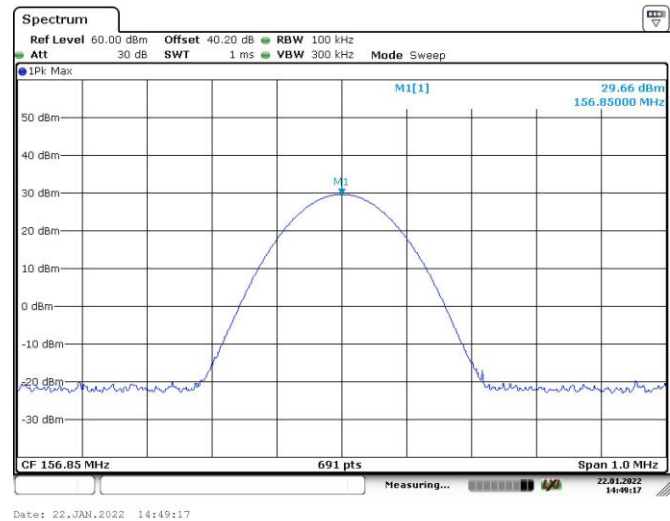
157.425 MHz High Power



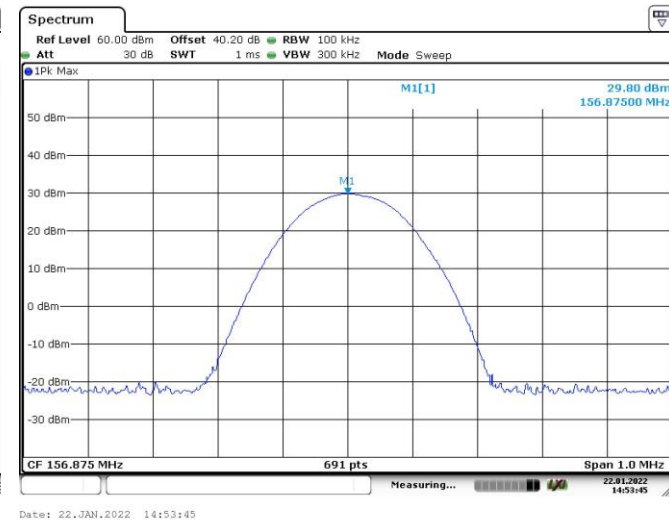
157.425 MHz Low Power



FM, 25kHz (Low Power Only):  
156.850 MHz



156.875 MHz



### 4.3 Modulation Requirements

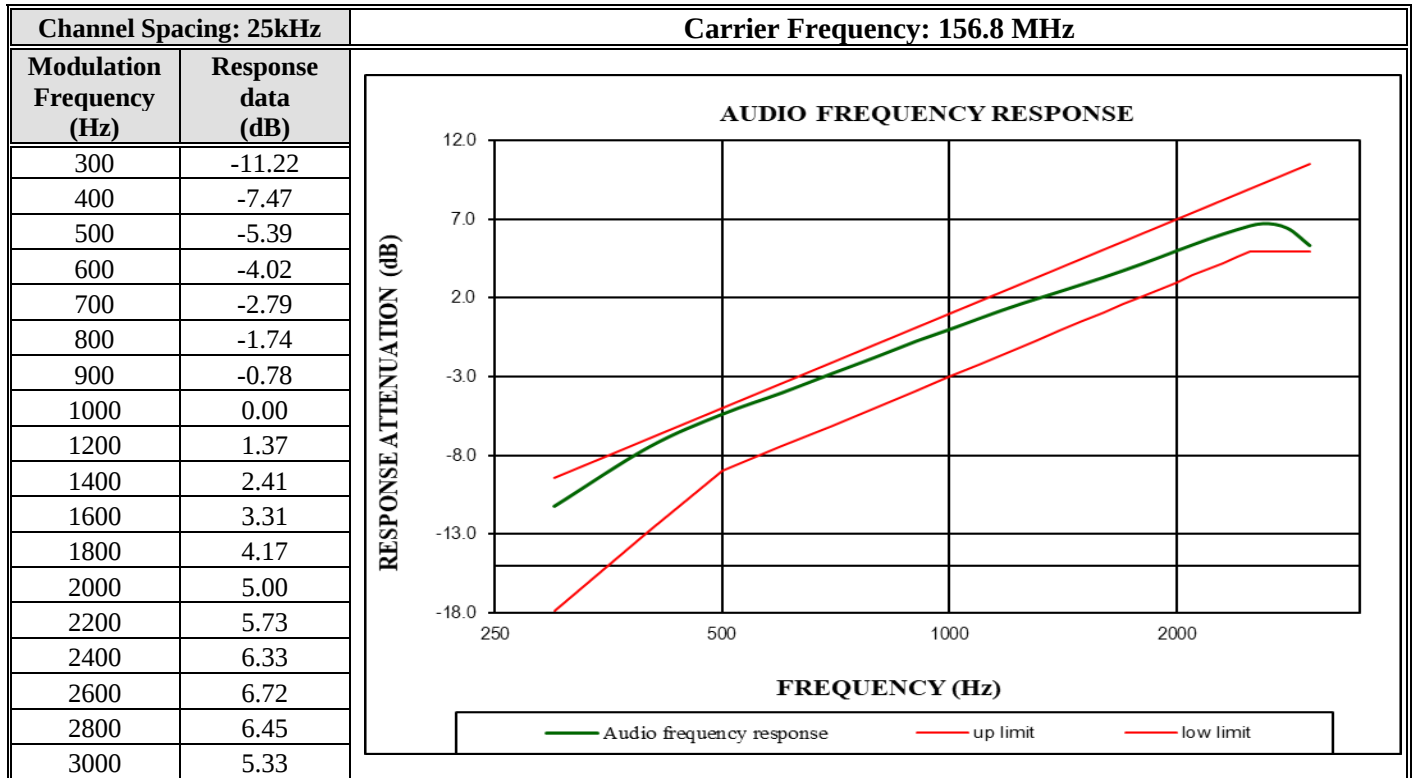
Test Mode: Transmitting

**Test Result: Compliance.**

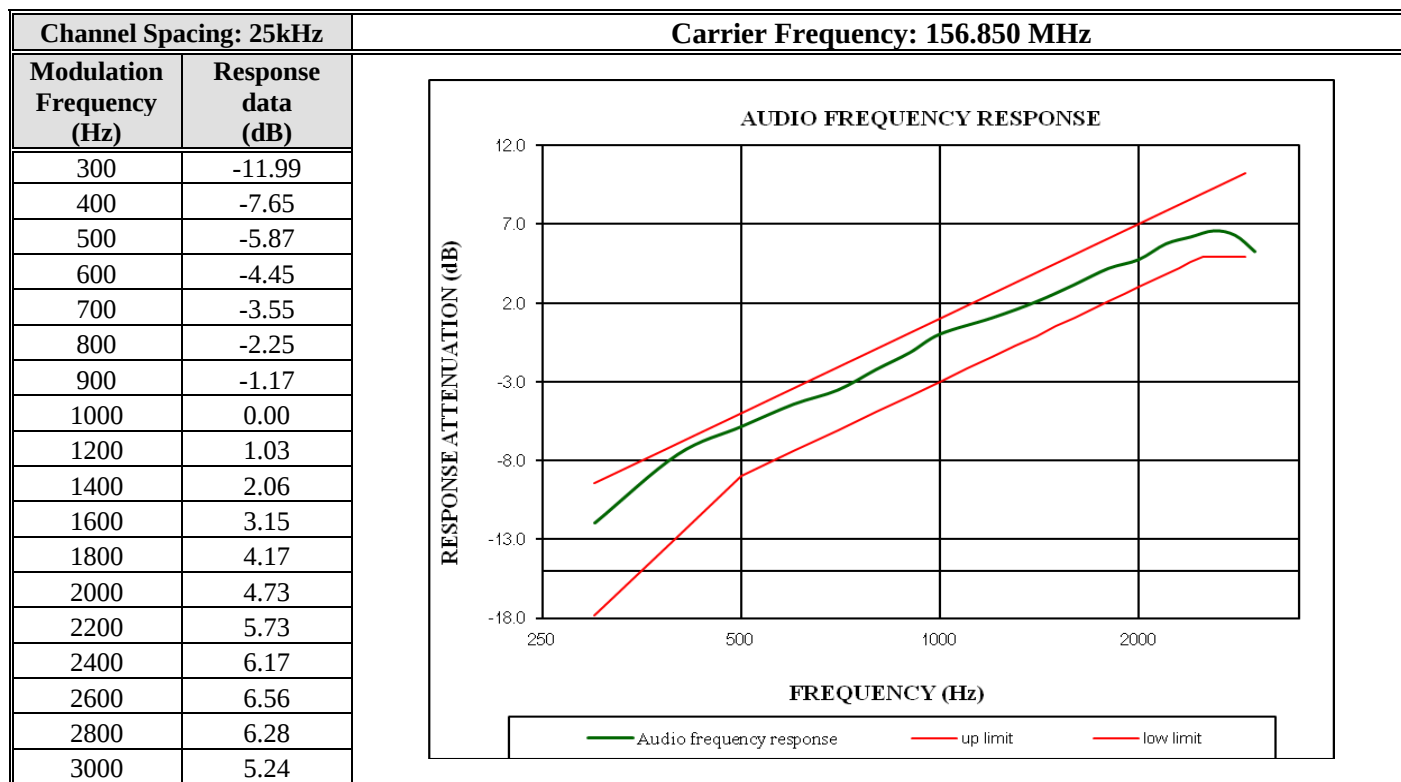
Please refer to the following tables and plots.

#### Audio Frequency Response – General

Note: Test performed at high power level.



## Audio Frequency Response – Low Power Only

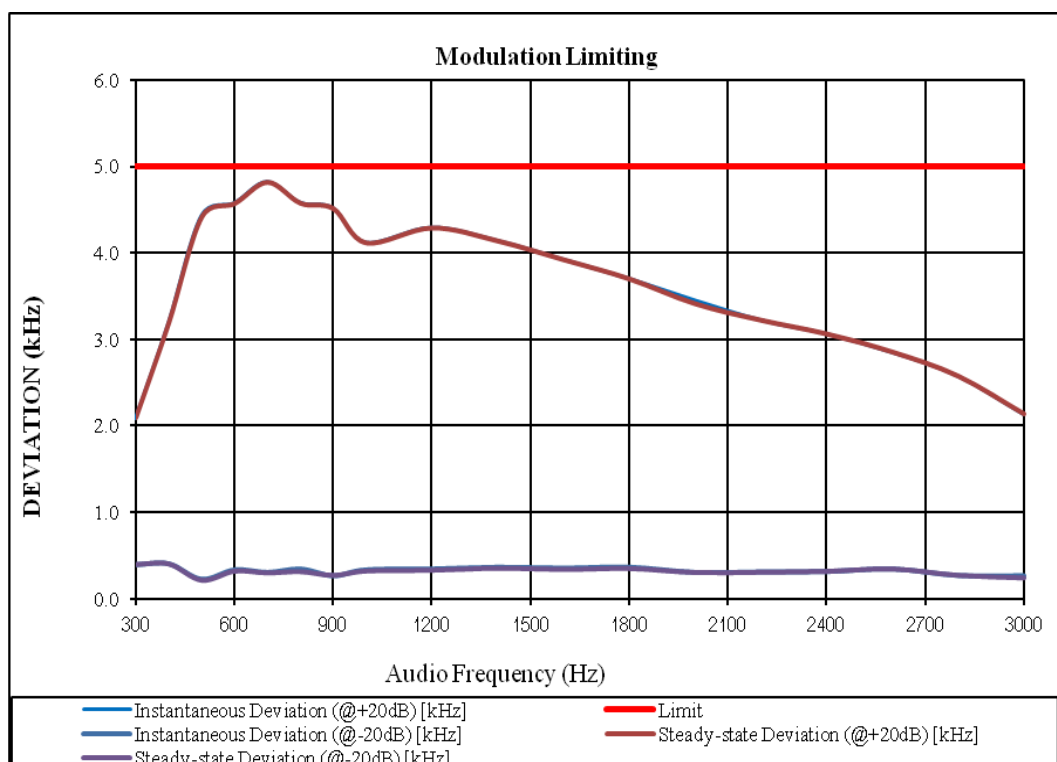


## Modulation Limiting – General

Note: Test performed at high power level.

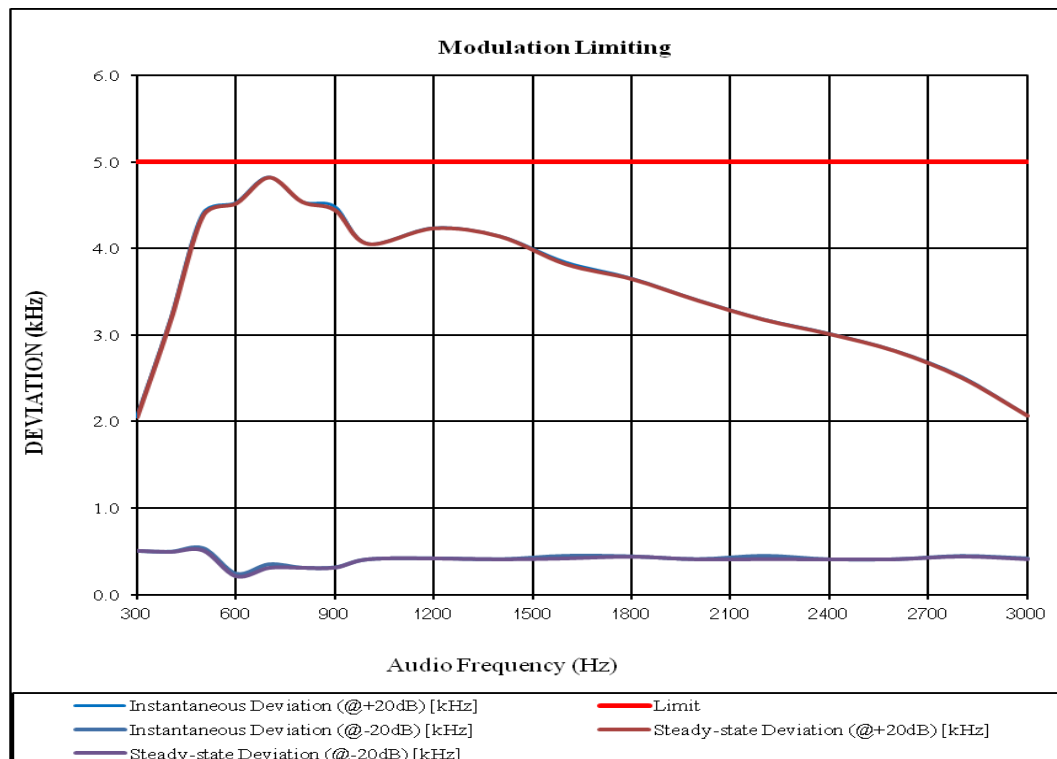
| DSC Mode   | Maximum Deviation (kHz) | Limit (kHz) |
|------------|-------------------------|-------------|
| DSC 1300Hz | 2.493                   | 5           |
| DSC 2100Hz | 3.137                   | 5           |

| FM 25kHz             | Carrier Frequency: 156.8 MHz |                          |                          |                          |             |
|----------------------|------------------------------|--------------------------|--------------------------|--------------------------|-------------|
| Audio Frequency (Hz) | Instantaneous-state          |                          | Steady-state             |                          | Limit [kHz] |
|                      | Deviation (@+20dB) [kHz]     | Deviation (@-20dB) [kHz] | Deviation (@+20dB) [kHz] | Deviation (@-20dB) [kHz] |             |
| 300                  | 2.088                        | 0.400                    | 2.087                    | 0.399                    | 5           |
| 400                  | 3.193                        | 0.410                    | 3.192                    | 0.405                    | 5           |
| 500                  | 4.430                        | 0.230                    | 4.420                    | 0.212                    | 5           |
| 600                  | 4.579                        | 0.340                    | 4.576                    | 0.320                    | 5           |
| 700                  | 4.825                        | 0.310                    | 4.824                    | 0.300                    | 5           |
| 800                  | 4.585                        | 0.350                    | 4.581                    | 0.314                    | 5           |
| 900                  | 4.521                        | 0.270                    | 4.518                    | 0.271                    | 5           |
| 1000                 | 4.123                        | 0.340                    | 4.120                    | 0.321                    | 5           |
| 1200                 | 4.296                        | 0.350                    | 4.294                    | 0.331                    | 5           |
| 1400                 | 4.144                        | 0.370                    | 4.142                    | 0.354                    | 5           |
| 1600                 | 3.926                        | 0.360                    | 3.924                    | 0.340                    | 5           |
| 1800                 | 3.706                        | 0.371                    | 3.701                    | 0.351                    | 5           |
| 2000                 | 3.455                        | 0.310                    | 3.412                    | 0.304                    | 5           |
| 2200                 | 3.225                        | 0.315                    | 3.221                    | 0.307                    | 5           |
| 2400                 | 3.066                        | 0.320                    | 3.061                    | 0.317                    | 5           |
| 2600                 | 2.853                        | 0.350                    | 2.851                    | 0.346                    | 5           |
| 2800                 | 2.578                        | 0.274                    | 2.571                    | 0.271                    | 5           |
| 3000                 | 2.136                        | 0.271                    | 2.131                    | 0.240                    | 5           |



**Modulation Limiting – Low Power Only**

| FM 25kHz             | Carrier Frequency: 156.85 MHz |                          |                          |                          |             |
|----------------------|-------------------------------|--------------------------|--------------------------|--------------------------|-------------|
| Audio Frequency (Hz) | Instantaneous-state           |                          | Steady-state             |                          | Limit [kHz] |
|                      | Deviation (@+20dB) [kHz]      | Deviation (@-20dB) [kHz] | Deviation (@+20dB) [kHz] | Deviation (@-20dB) [kHz] |             |
| 300                  | 2.053                         | 0.510                    | 2.052                    | 0.510                    | 5           |
| 400                  | 3.157                         | 0.500                    | 3.154                    | 0.497                    | 5           |
| 500                  | 4.400                         | 0.541                    | 4.384                    | 0.513                    | 5           |
| 600                  | 4.528                         | 0.244                    | 4.523                    | 0.214                    | 5           |
| 700                  | 4.825                         | 0.354                    | 4.824                    | 0.312                    | 5           |
| 800                  | 4.543                         | 0.314                    | 4.543                    | 0.312                    | 5           |
| 900                  | 4.487                         | 0.318                    | 4.447                    | 0.314                    | 5           |
| 1000                 | 4.057                         | 0.412                    | 4.057                    | 0.411                    | 5           |
| 1200                 | 4.238                         | 0.423                    | 4.237                    | 0.421                    | 5           |
| 1400                 | 4.144                         | 0.413                    | 4.143                    | 0.410                    | 5           |
| 1600                 | 3.843                         | 0.453                    | 3.823                    | 0.421                    | 5           |
| 1800                 | 3.657                         | 0.446                    | 3.651                    | 0.441                    | 5           |
| 2000                 | 3.406                         | 0.414                    | 3.403                    | 0.410                    | 5           |
| 2200                 | 3.184                         | 0.453                    | 3.181                    | 0.413                    | 5           |
| 2400                 | 3.018                         | 0.412                    | 3.015                    | 0.410                    | 5           |
| 2600                 | 2.820                         | 0.413                    | 2.817                    | 0.411                    | 5           |
| 2800                 | 2.523                         | 0.451                    | 2.512                    | 0.443                    | 5           |
| 3000                 | 2.074                         | 0.423                    | 2.071                    | 0.412                    | 5           |



#### 4.4 Bandwidth

Test Mode: Transmitting

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

| Modulation Mode | Channel Separation | $f_c$   | High Power Level       |                 | Low Power Level        |                 |
|-----------------|--------------------|---------|------------------------|-----------------|------------------------|-----------------|
|                 |                    |         | 99% Occupied Bandwidth | 26 dB Bandwidth | 99% Occupied Bandwidth | 26 dB Bandwidth |
|                 |                    | MHz     | kHz                    | kHz             | kHz                    | kHz             |
| FM              | 25kHz              | 156.025 | 10.420                 | 11.000          | 10.420                 | 11.000          |
|                 |                    | 156.800 | 10.420                 | 11.000          | 10.420                 | 11.000          |
|                 |                    | 157.425 | 10.420                 | 11.000          | 10.420                 | 11.000          |
| DSC 1300        |                    | 156.525 | 7.959                  | 10.560          | 7.959                  | 10.560          |
| DSC 2100        |                    | 156.525 | 8.973                  | 13.310          | 9.117                  | 13.310          |

##### Low Power Only:

| Modulation Mode | Channel Separation | $f_c$   | 99% Occupied Bandwidth | 26 dB Bandwidth |
|-----------------|--------------------|---------|------------------------|-----------------|
|                 |                    | MHz     | kHz                    | kHz             |
| FM              | 25kHz              | 156.850 | 10.275                 | 11.000          |
|                 |                    | 156.875 | 10.275                 | 11.000          |

Note 1: Authorized bandwidth for this device is 20 kHz.

Note 2:

Emission bandwidth was based on calculation method instead of measurement.

Emission Designator: BW = 2M + 2D

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

Emission Designator 16K0G3E

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

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

G3E portion of the designator represents an voice transmission

Therefore, the entire designator for 25 kHz channel spacing voice mode is 16K0G3E.

##### For DSC Mode (Channel Spacing: 25 kHz)

Emission Designator 20K0G2B

The 99% energy rule was used for DSC mode. It basically states that 99% of the modulation energy falls within X kHz, in this case, 20 kHz.

G2B portion of the designator indicates DSC information.

Therefore, the entire designator for 25 kHz channel spacing DSC mode is 20K0G2B.

### 156.025 MHz-High Power Level



Date: 27.JAN.2022 11:50:18

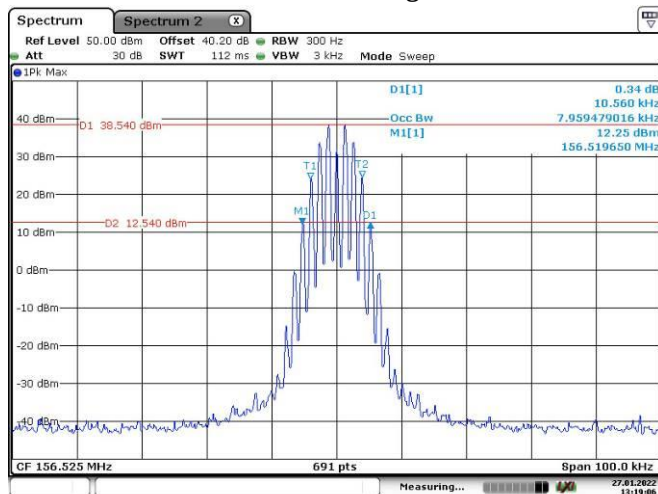
## Date: 27.JAN.2022 11:42:37

## Date: 27.JAN.2022 11:44:08

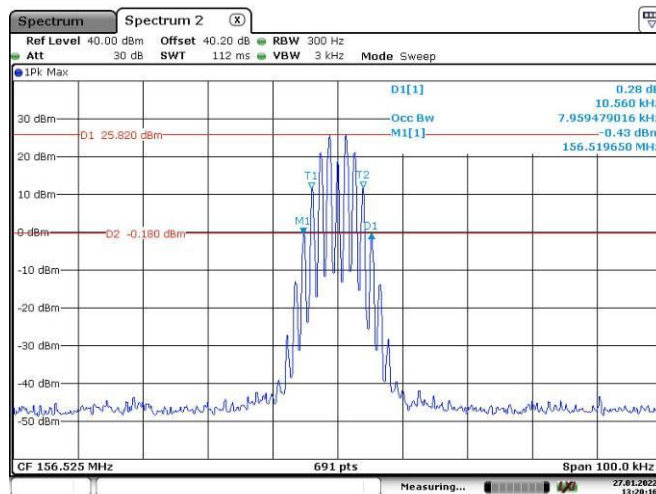
Date: 27.JAN.2022 11:54:47

Date: 27.JAN.2022 11:57:43

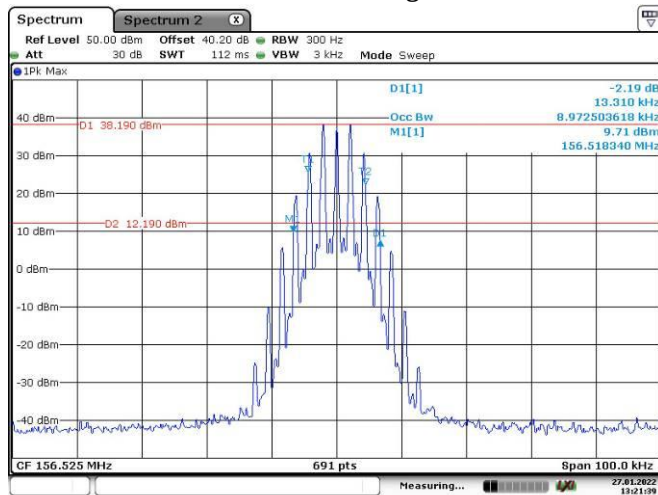
## DSC 1300, 156.525 MHz-High Power Level



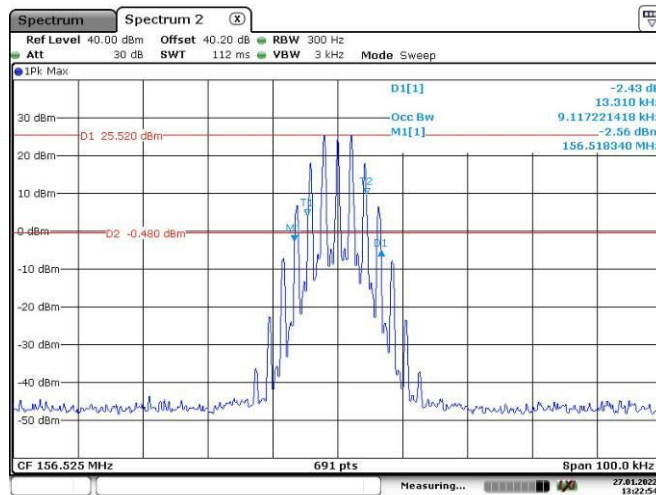
## DSC 1300, 156.525 MHz- Low Power Level



## DSC 2100, 156.525 MHz-High Power Level

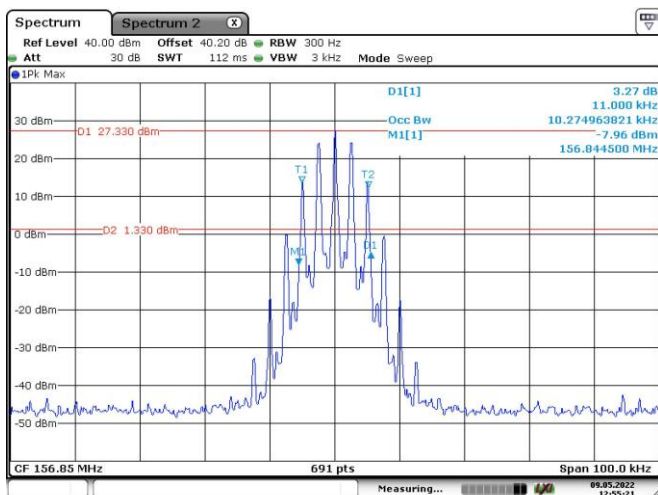


## DSC 2100, 156.525 MHz- Low Power Level

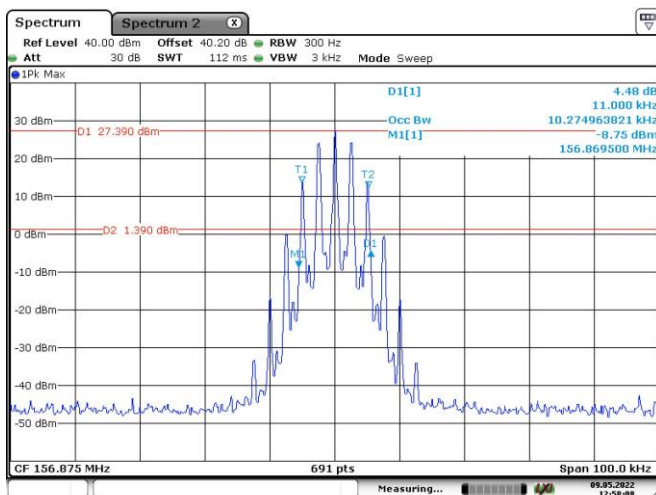


## Low Power Only:

156.850 MHz



156.875 MHz



## 4.5 Emission Limitations

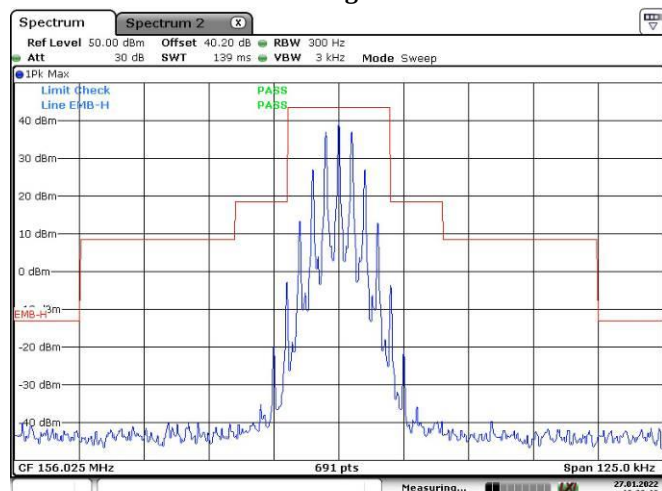
Test Mode: Transmitting

Test Result: Compliance. Please refer to following plots.

Mask:

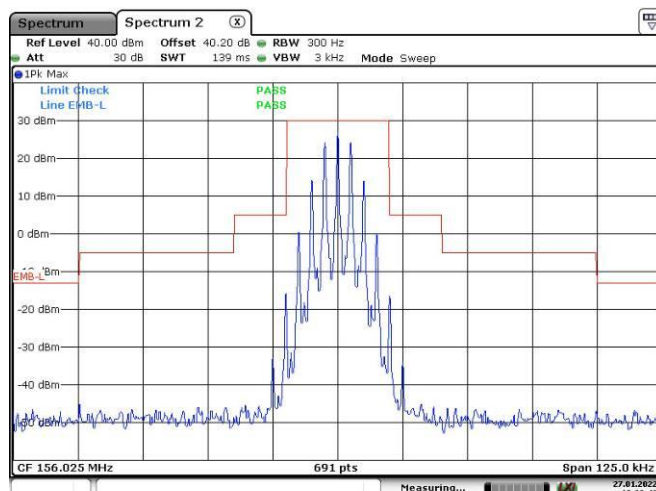
General:

156.025 MHz-High Power Level



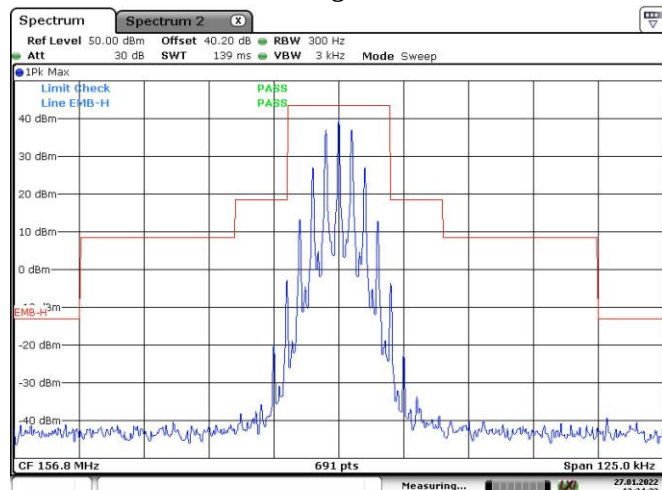
Date: 27.JAN.2022 13:32:13

156.025 MHz-Low Power Level



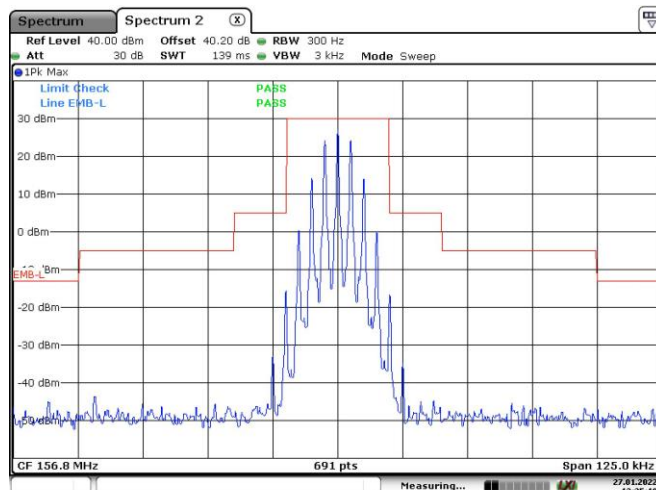
Date: 27.JAN.2022 13:32:43

156.8 MHz-High Power Level



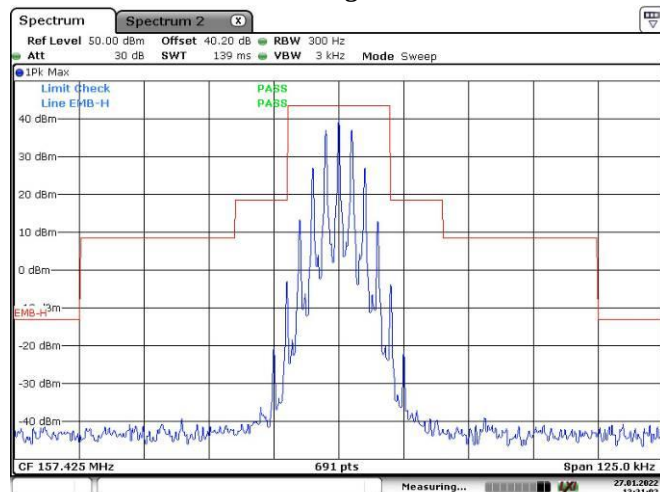
Date: 27.JAN.2022 13:34:34

156.8 MHz- Low Power Level



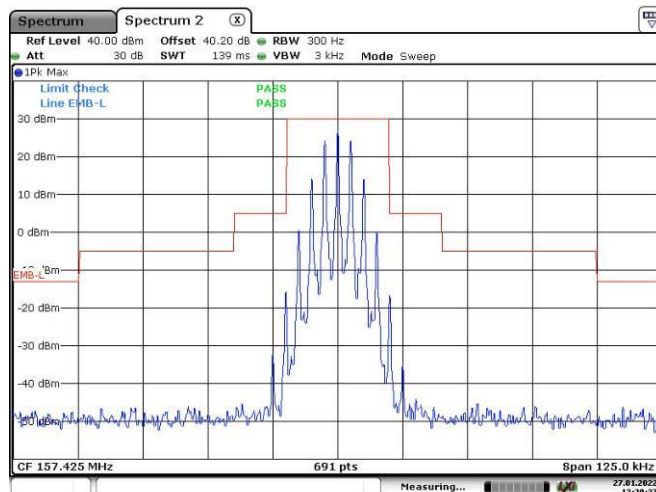
Date: 27.JAN.2022 13:35:18

## 157.425 MHz-High Power Level



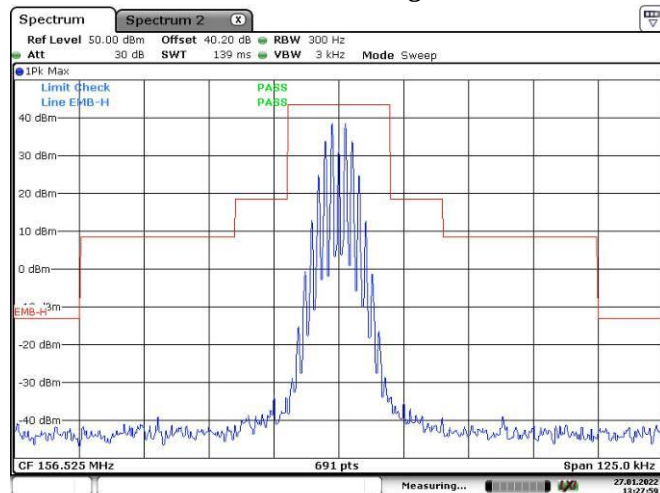
Date: 27.JAN.2022 13:31:02

## 157.425 MHz- Low Power Level



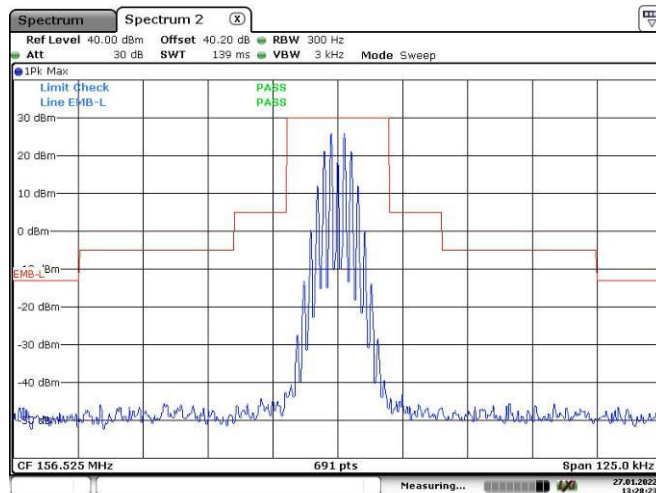
Date: 27.JAN.2022 13:30:37

## DSC 1300, 156.525 MHz-High Power Level



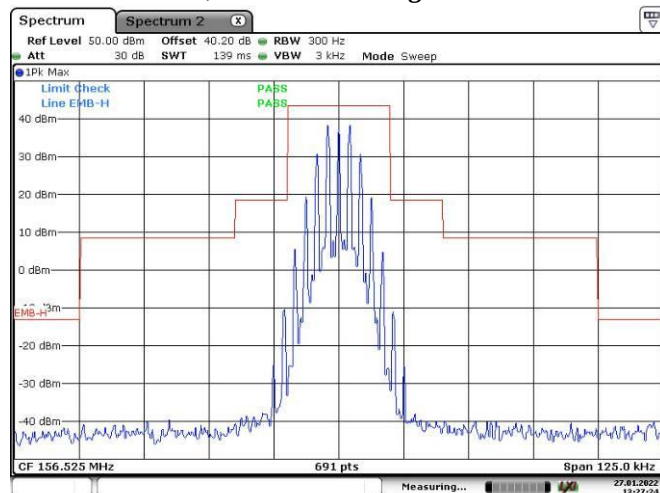
Date: 27.JAN.2022 13:27:59

## DSC 1300, 156.525 MHz- Low Power Level



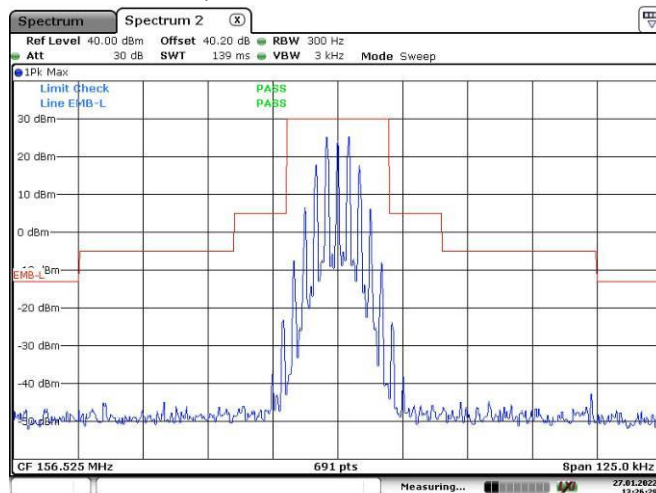
Date: 27.JAN.2022 13:28:24

## DSC 2100, 156.525 MHz-High Power Level



Date: 27.JAN.2022 13:27:25

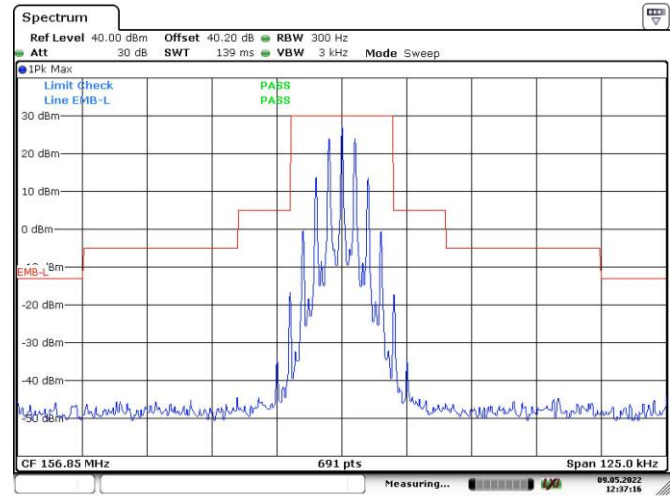
## DSC 2100, 156.525 MHz- Low Power Level



Date: 27.JAN.2022 13:26:29

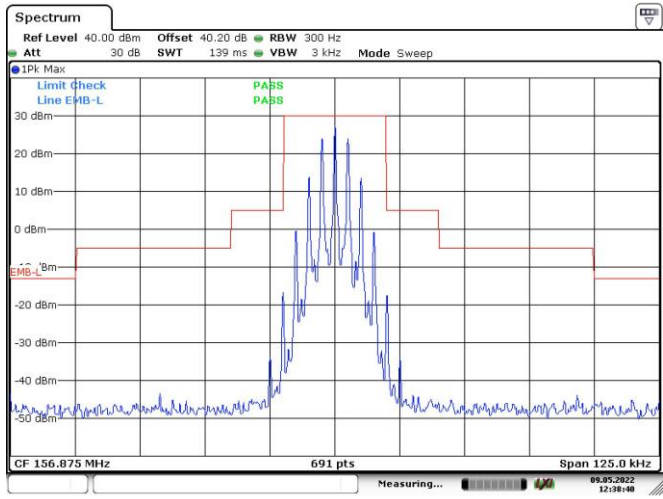
Low Power Only:

156.850 MHz



Date: 9.MAY.2022 12:37:17

156.875 MHz



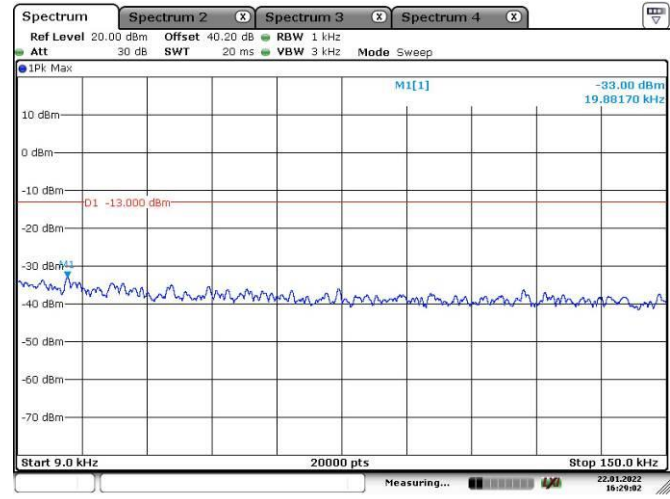
Date: 9.MAY.2022 12:38:41

Conducted Emission:

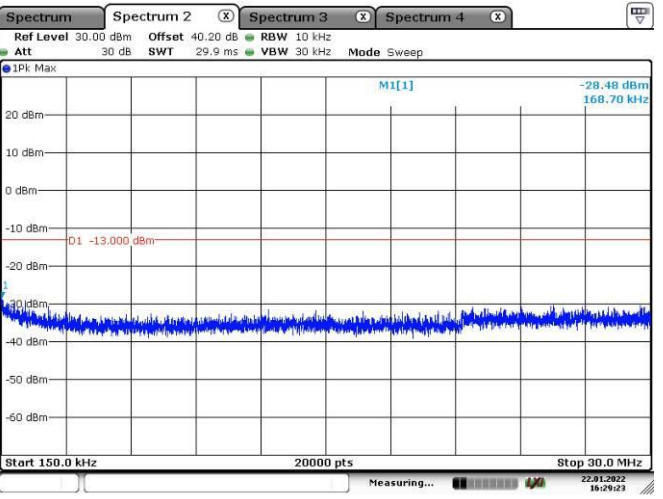
General:

Note: Test performed at high power level with Band Rejecter Filter, please refer to the following plots.

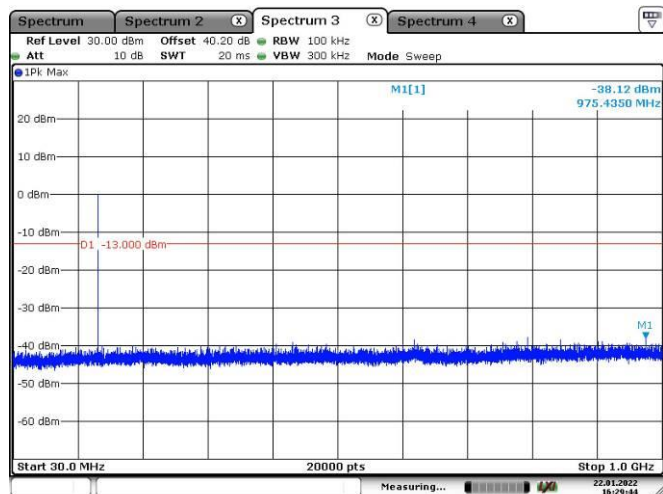
156.025 MHz



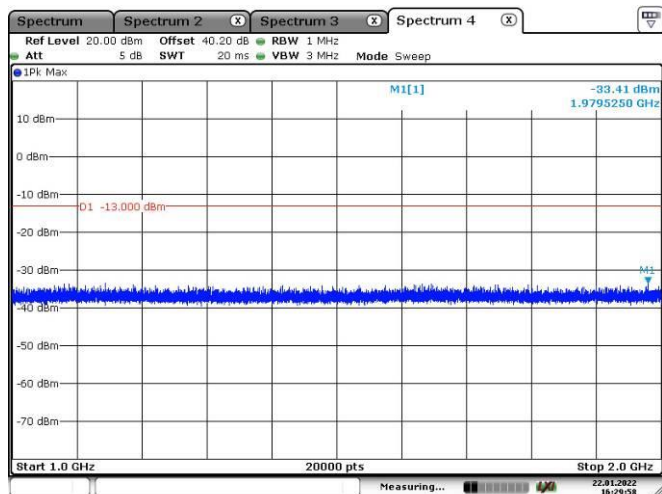
Date: 22.JAN.2022 16:29:03



Date: 22.JAN.2022 16:29:24

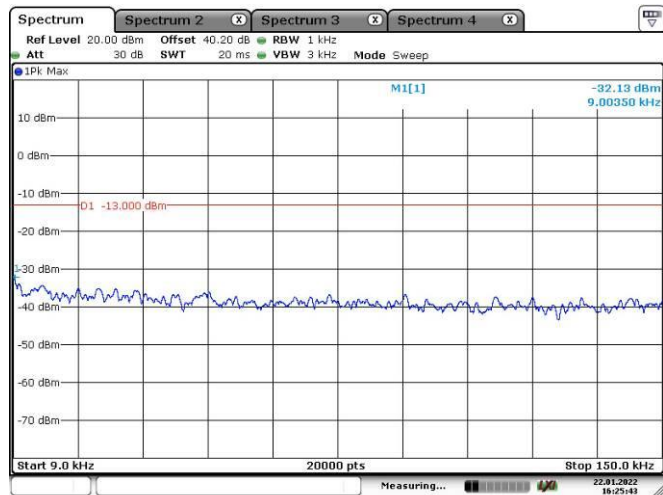


Date: 22.JAN.2022 16:29:45

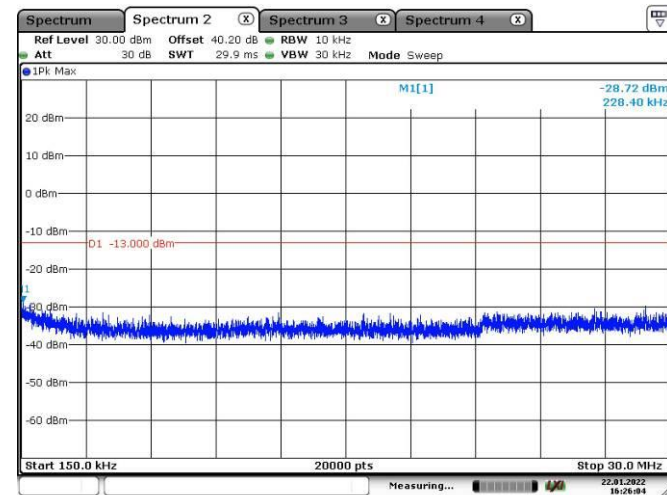


Date: 22.JAN.2022 16:29:58

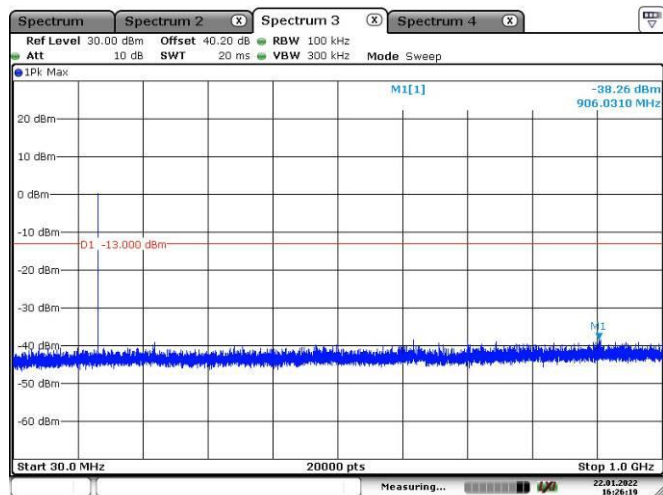
156.8 MHz



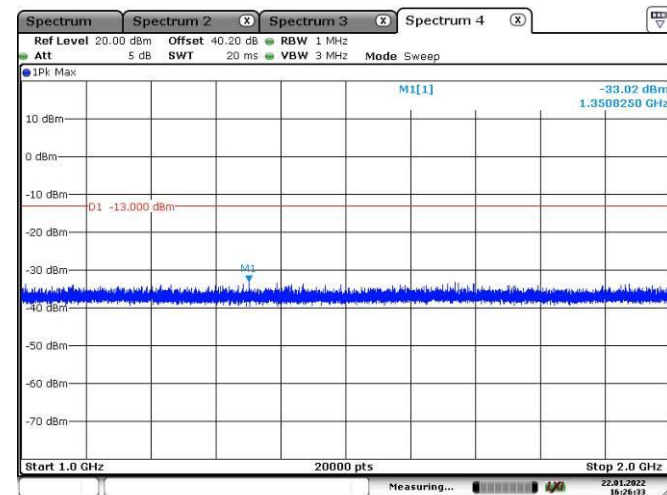
Date: 22.JAN.2022 16:25:43



Date: 22.JAN.2022 16:26:05

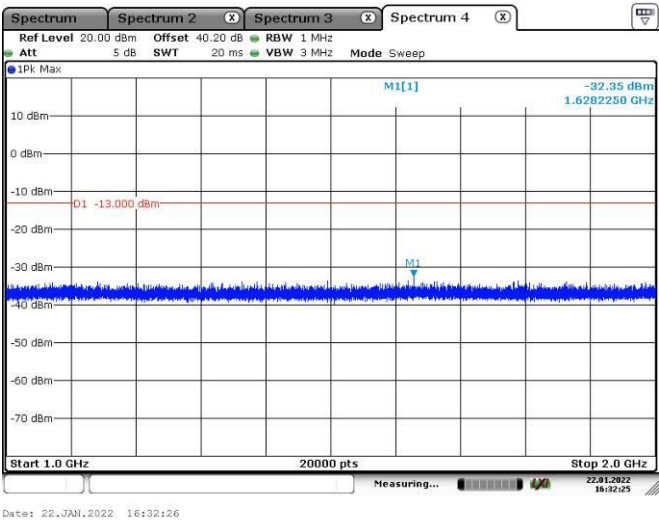
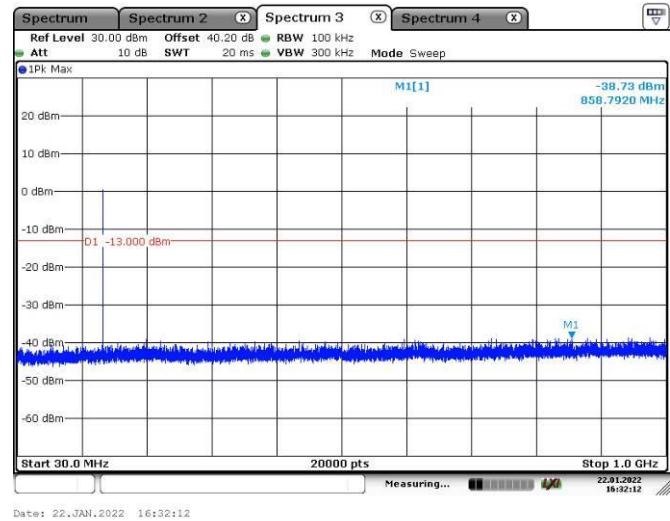
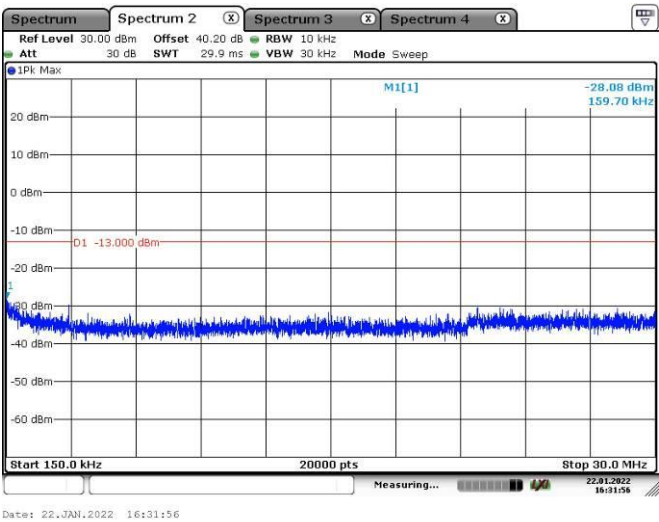
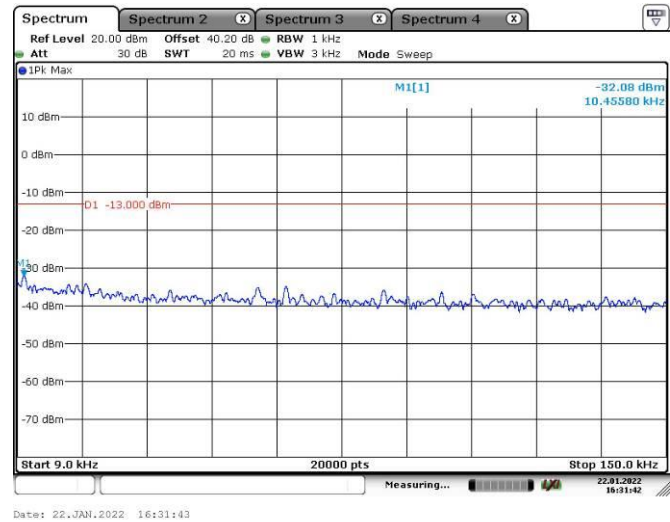


Date: 22.JAN.2022 16:26:20

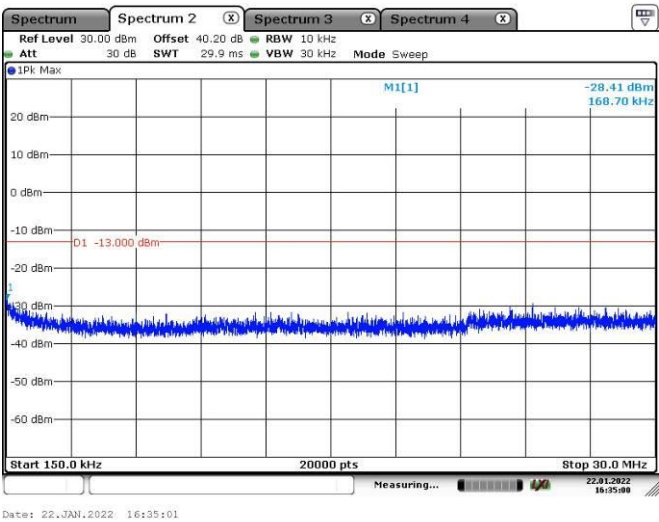
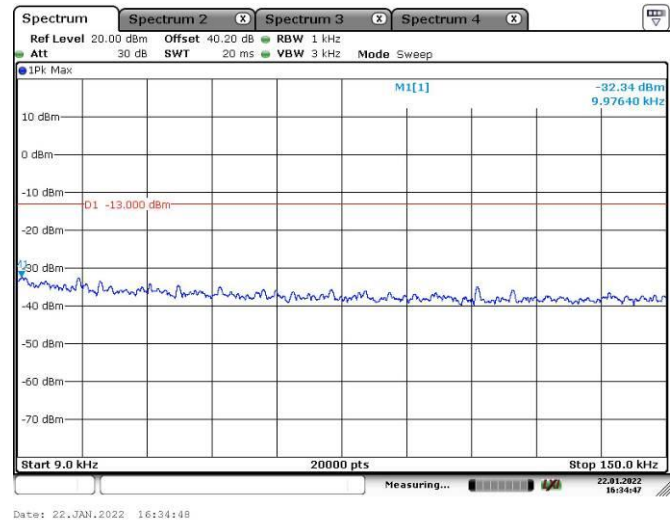


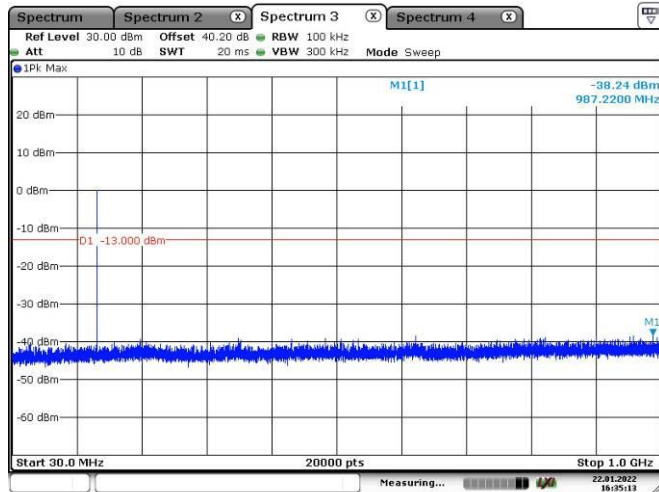
Date: 22.JAN.2022 16:26:33

157.425 MHz

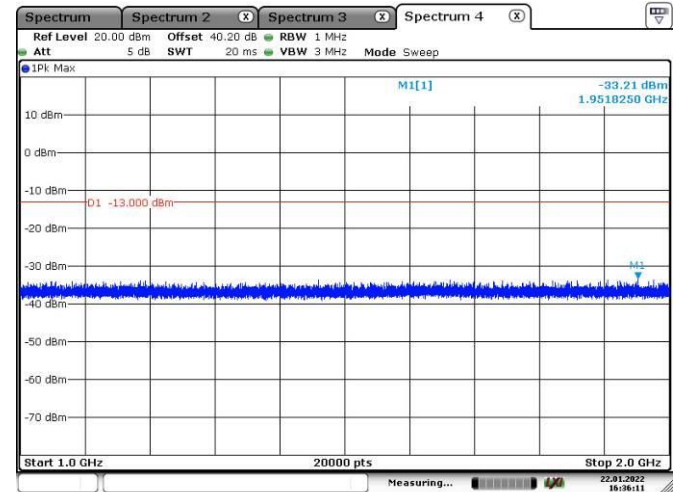


DSC 1300, 156.525MHz



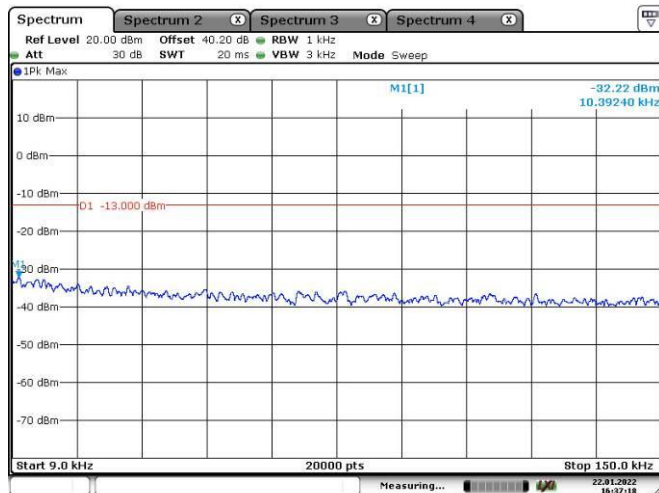


Date: 22.JAN.2022 16:35:14

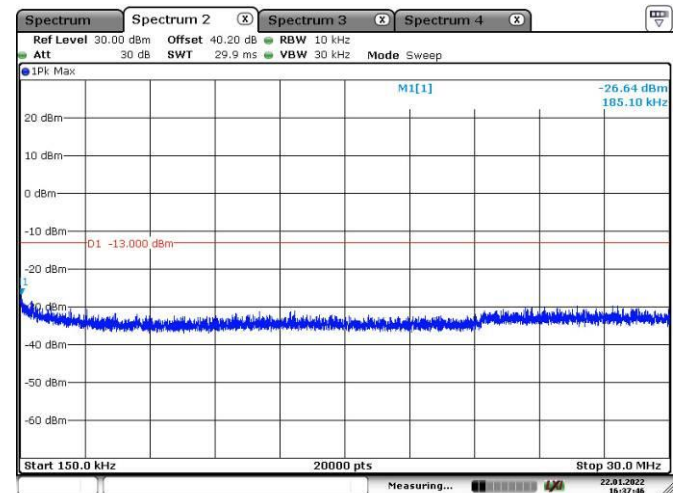


Date: 22.JAN.2022 16:36:12

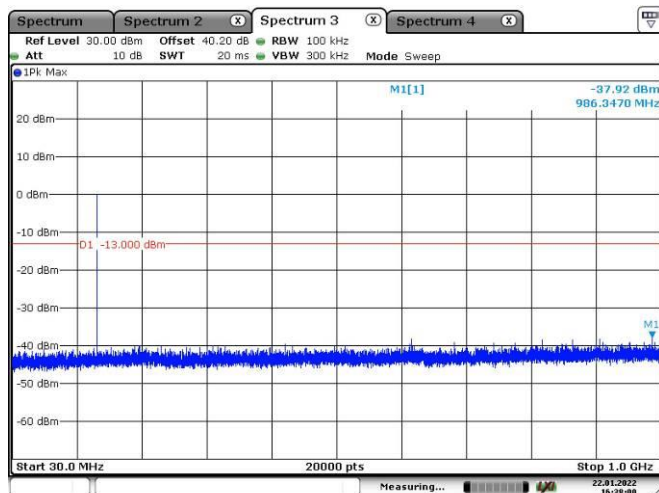
## DSC 2100, 156.525 MHz



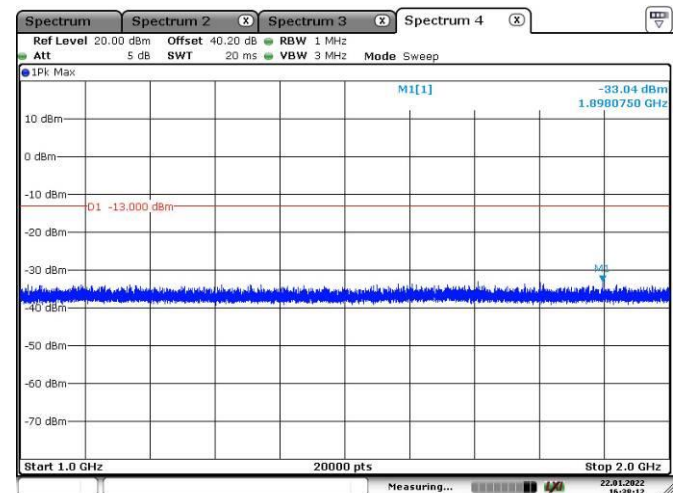
Date: 22.JAN.2022 16:37:19



Date: 22.JAN.2022 16:37:47



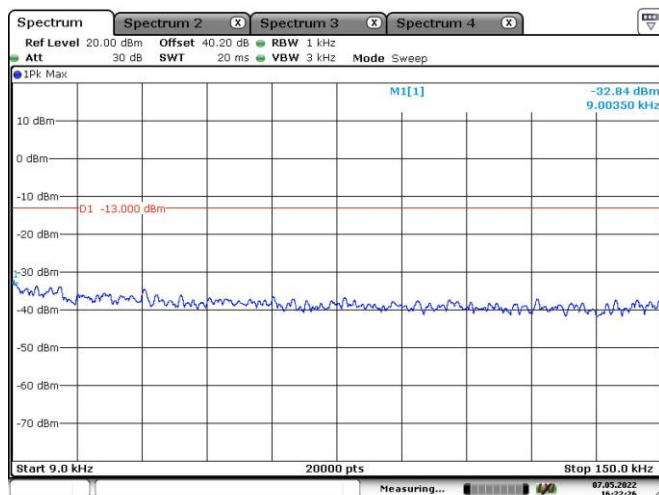
Date: 22.JAN.2022 16:38:01



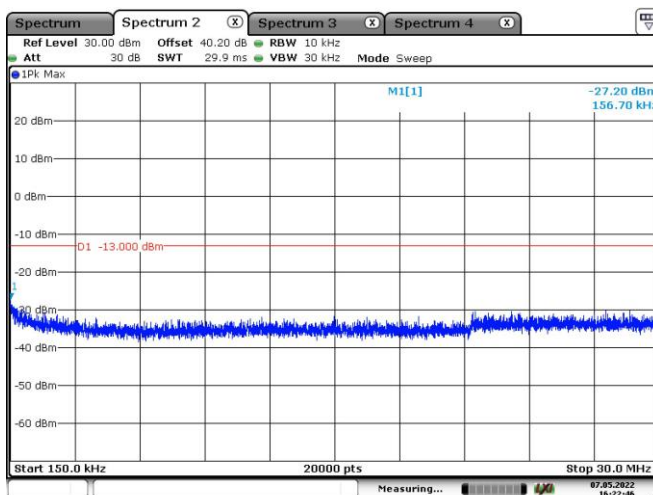
Date: 22.JAN.2022 16:38:13

**Low Power Only:**

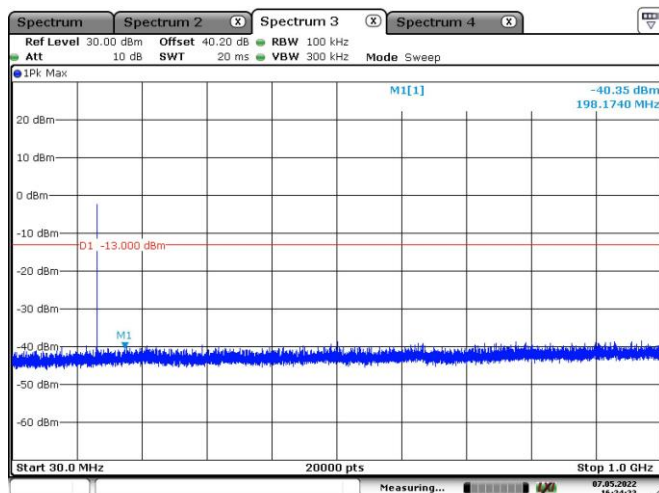
Please refer to the following plots.

**156.850 MHz**

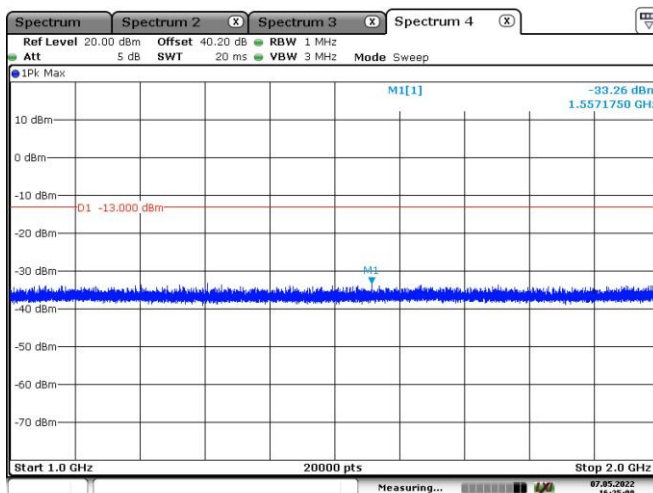
Date: 7.MAY.2022 16:22:27



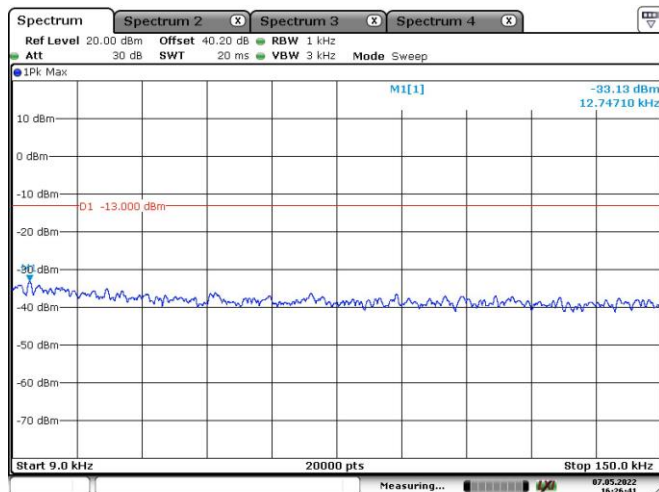
Date: 7.MAY.2022 16:22:47



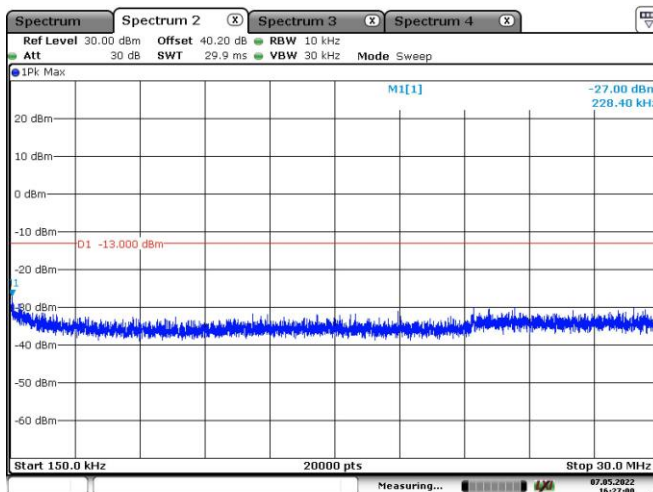
Date: 7.MAY.2022 16:24:24



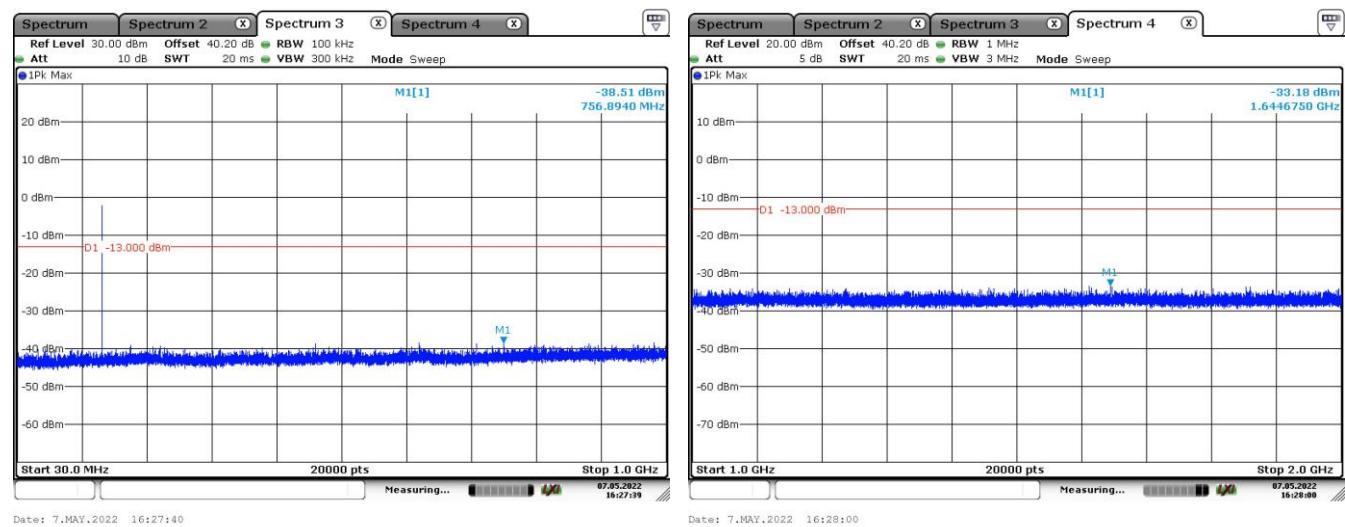
Date: 7.MAY.2022 16:25:09

**156.875 MHz**

Date: 7.MAY.2022 16:26:40



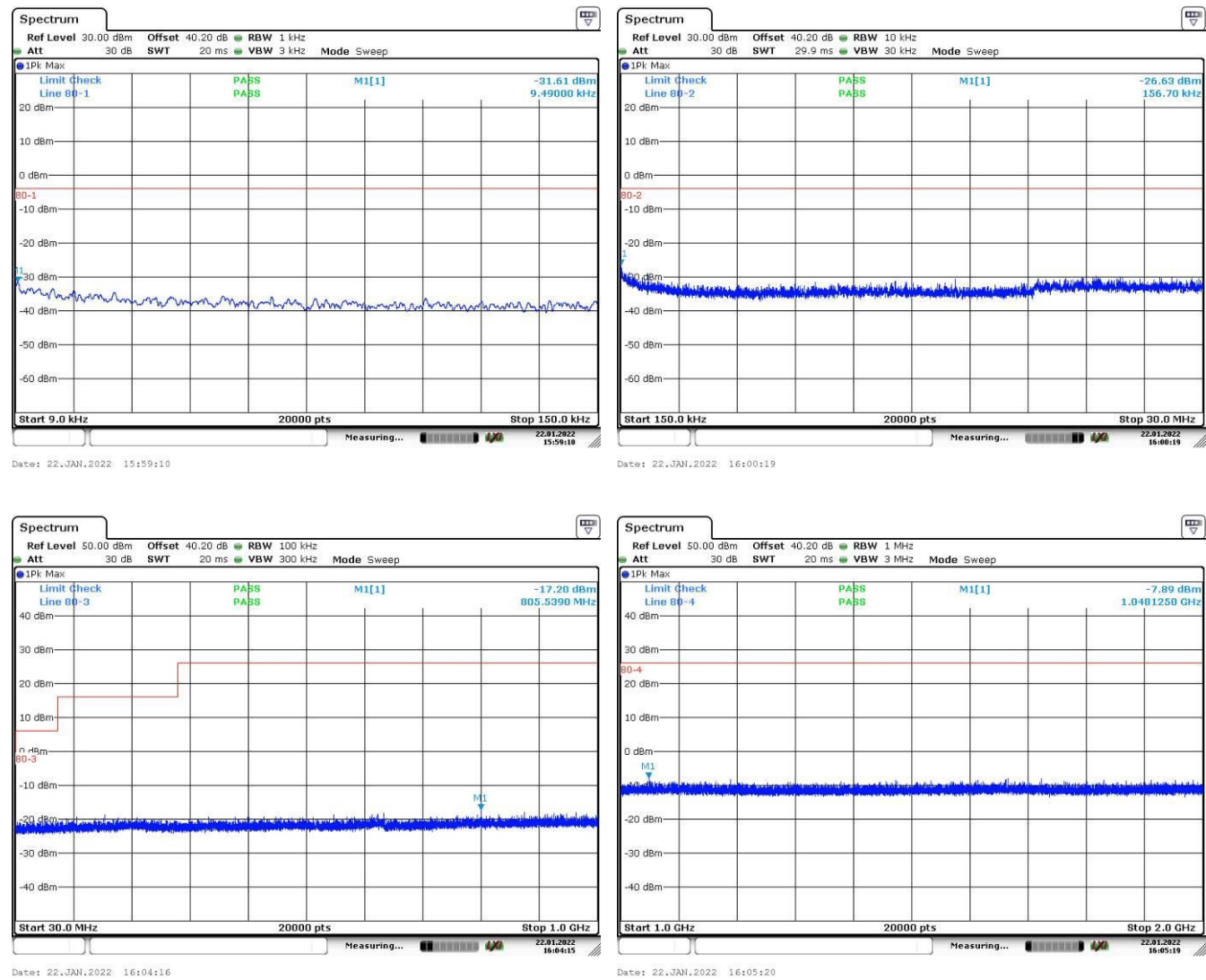
Date: 7.MAY.2022 16:27:01



4.6 Suppression of Interference Aboard Ships

Test Mode: Transmitting

Test Result: Compliance. Please refer to following plots (worst case).



## 4.7 Spurious Radiated Emissions

Test Mode: Transmitting

**Test Result: Compliance.**

**General:**

Note: Test performed at high power level with Band Rejecter Filter, *please refer to the following table.*

**Model: R70625**

**30MHz - 2GHz:**

| 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 25k, Frequency: 156.025MHz |                |                               |                               |                              |                       |                            |                |                |
| 312.05                        | H              | 50.26                         | -60.28                        | 0.00                         | 0.34                  | -60.62                     | -13.00         | 47.62          |
| 312.05                        | V              | 43.33                         | -65.17                        | 0.00                         | 0.34                  | -65.51                     | -13.00         | 52.51          |
| 468.08                        | H              | 45.70                         | -61.91                        | 0.00                         | 0.43                  | -62.34                     | -13.00         | 49.34          |
| 468.08                        | V              | 42.28                         | -61.53                        | 0.00                         | 0.43                  | -61.96                     | -13.00         | 48.96          |
| 624.10                        | H              | 34.03                         | -70.73                        | 0.00                         | 0.48                  | -71.21                     | -13.00         | 58.21          |
| 624.10                        | V              | 45.18                         | -57.94                        | 0.00                         | 0.48                  | -58.42                     | -13.00         | 45.42          |
| 780.13                        | H              | 37.35                         | -65.43                        | 0.00                         | 0.54                  | -65.97                     | -13.00         | 52.97          |
| 780.13                        | V              | 34.26                         | -64.98                        | 0.00                         | 0.54                  | -65.52                     | -13.00         | 52.52          |
| 936.15                        | H              | 32.02                         | -66.19                        | 0.00                         | 0.66                  | -66.85                     | -13.00         | 53.85          |
| 936.15                        | V              | 30.96                         | -64.68                        | 0.00                         | 0.66                  | -65.34                     | -13.00         | 52.34          |
| 1092.18                       | H              | 36.27                         | -65.55                        | 7.36                         | 0.67                  | -58.86                     | -13.00         | 45.86          |
| 1092.18                       | V              | 36.75                         | -65.54                        | 7.36                         | 0.67                  | -58.85                     | -13.00         | 45.85          |
| 1248.20                       | H              | 36.90                         | -65.90                        | 7.79                         | 0.68                  | -58.79                     | -13.00         | 45.79          |
| 1248.20                       | V              | 36.91                         | -66.49                        | 7.79                         | 0.68                  | -59.38                     | -13.00         | 46.38          |
| 1404.23                       | H              | 35.46                         | -68.24                        | 8.23                         | 0.71                  | -60.72                     | -13.00         | 47.72          |
| 1404.23                       | V              | 35.01                         | -68.73                        | 8.23                         | 0.71                  | -61.21                     | -13.00         | 48.21          |
| 1560.25                       | H              | 35.15                         | -68.85                        | 8.57                         | 0.80                  | -61.08                     | -13.00         | 48.08          |
| 1560.25                       | V              | 34.60                         | -69.46                        | 8.57                         | 0.80                  | -61.69                     | -13.00         | 48.69          |
| FM 25k, Frequency: 156.8MHz   |                |                               |                               |                              |                       |                            |                |                |
| 313.60                        | H              | 50.09                         | -60.42                        | 0.00                         | 0.34                  | -60.76                     | -13.00         | 47.76          |
| 313.60                        | V              | 42.39                         | -66.07                        | 0.00                         | 0.34                  | -66.41                     | -13.00         | 53.41          |
| 470.40                        | H              | 44.05                         | -63.51                        | 0.00                         | 0.43                  | -63.94                     | -13.00         | 50.94          |
| 470.40                        | V              | 41.37                         | -62.36                        | 0.00                         | 0.43                  | -62.79                     | -13.00         | 49.79          |
| 627.20                        | H              | 34.12                         | -70.64                        | 0.00                         | 0.48                  | -71.12                     | -13.00         | 58.12          |
| 627.20                        | V              | 33.33                         | -69.72                        | 0.00                         | 0.48                  | -70.20                     | -13.00         | 57.20          |
| 784.00                        | H              | 41.52                         | -61.17                        | 0.00                         | 0.56                  | -61.73                     | -13.00         | 48.73          |
| 784.00                        | V              | 32.72                         | -66.43                        | 0.00                         | 0.56                  | -66.99                     | -13.00         | 53.99          |
| 940.80                        | H              | 33.24                         | -64.83                        | 0.00                         | 0.63                  | -65.46                     | -13.00         | 52.46          |
| 940.80                        | V              | 31.63                         | -63.91                        | 0.00                         | 0.63                  | -64.54                     | -13.00         | 51.54          |

|                                 |   |       |        |      |      |        |        |       |
|---------------------------------|---|-------|--------|------|------|--------|--------|-------|
| 1097.60                         | H | 37.68 | -64.03 | 7.37 | 0.67 | -57.33 | -13.00 | 44.33 |
| 1097.60                         | V | 36.35 | -65.84 | 7.37 | 0.67 | -59.14 | -13.00 | 46.14 |
| 1254.40                         | H | 36.21 | -66.58 | 7.81 | 0.68 | -59.45 | -13.00 | 46.45 |
| 1254.40                         | V | 35.92 | -67.46 | 7.81 | 0.68 | -60.33 | -13.00 | 47.33 |
| 1411.20                         | H | 36.18 | -67.50 | 8.25 | 0.72 | -59.97 | -13.00 | 46.97 |
| 1411.20                         | V | 35.99 | -67.74 | 8.25 | 0.72 | -60.21 | -13.00 | 47.21 |
| 1568.00                         | H | 34.28 | -69.79 | 8.58 | 0.80 | -62.01 | -13.00 | 49.01 |
| 1568.00                         | V | 35.05 | -69.07 | 8.58 | 0.80 | -61.29 | -13.00 | 48.29 |
| FM 25k, Frequency: 157.425MHz   |   |       |        |      |      |        |        |       |
| 314.85                          | H | 49.58 | -60.92 | 0.00 | 0.34 | -61.26 | -13.00 | 48.26 |
| 314.85                          | V | 42.25 | -66.17 | 0.00 | 0.34 | -66.51 | -13.00 | 53.51 |
| 472.28                          | H | 43.36 | -64.15 | 0.00 | 0.43 | -64.58 | -13.00 | 51.58 |
| 472.28                          | V | 40.09 | -63.58 | 0.00 | 0.43 | -64.01 | -13.00 | 51.01 |
| 629.70                          | H | 32.25 | -72.50 | 0.00 | 0.48 | -72.98 | -13.00 | 59.98 |
| 629.70                          | V | 32.19 | -70.80 | 0.00 | 0.48 | -71.28 | -13.00 | 58.28 |
| 787.13                          | H | 42.36 | -60.26 | 0.00 | 0.58 | -60.84 | -13.00 | 47.84 |
| 787.13                          | V | 31.68 | -67.39 | 0.00 | 0.58 | -67.97 | -13.00 | 54.97 |
| 944.55                          | H | 33.99 | -63.96 | 0.00 | 0.60 | -64.56 | -13.00 | 51.56 |
| 944.55                          | V | 32.80 | -62.66 | 0.00 | 0.60 | -63.26 | -13.00 | 50.26 |
| 1101.98                         | H | 37.53 | -64.15 | 7.39 | 0.67 | -57.43 | -13.00 | 44.43 |
| 1101.98                         | V | 36.67 | -65.51 | 7.39 | 0.67 | -58.79 | -13.00 | 45.79 |
| 1259.40                         | H | 36.94 | -65.84 | 7.83 | 0.68 | -58.69 | -13.00 | 45.69 |
| 1259.40                         | V | 37.45 | -65.91 | 7.83 | 0.68 | -58.76 | -13.00 | 45.76 |
| 1416.83                         | H | 35.74 | -67.92 | 8.27 | 0.72 | -60.37 | -13.00 | 47.37 |
| 1416.83                         | V | 35.44 | -68.27 | 8.27 | 0.72 | -60.72 | -13.00 | 47.72 |
| 1574.25                         | H | 34.30 | -69.83 | 8.59 | 0.81 | -62.05 | -13.00 | 49.05 |
| 1574.25                         | V | 35.17 | -69.01 | 8.59 | 0.81 | -61.23 | -13.00 | 48.23 |
| Frequency: 156.525MHz, DSC 1300 |   |       |        |      |      |        |        |       |
| 313.05                          | H | 52.29 | -58.23 | 0.00 | 0.34 | -58.57 | -13.00 | 45.57 |
| 313.05                          | V | 42.71 | -65.76 | 0.00 | 0.34 | -66.10 | -13.00 | 53.10 |
| 469.58                          | H | 40.16 | -67.41 | 0.00 | 0.43 | -67.84 | -13.00 | 54.84 |
| 469.58                          | V | 41.68 | -62.08 | 0.00 | 0.43 | -62.51 | -13.00 | 49.51 |
| 626.10                          | H | 31.23 | -73.53 | 0.00 | 0.48 | -74.01 | -13.00 | 61.01 |
| 626.10                          | V | 31.07 | -72.01 | 0.00 | 0.48 | -72.49 | -13.00 | 59.49 |
| 782.63                          | H | 40.18 | -62.55 | 0.00 | 0.55 | -63.10 | -13.00 | 50.10 |
| 782.63                          | V | 34.24 | -64.94 | 0.00 | 0.55 | -65.49 | -13.00 | 52.49 |
| 939.15                          | H | 34.48 | -63.64 | 0.00 | 0.64 | -64.28 | -13.00 | 51.28 |
| 939.15                          | V | 29.42 | -66.16 | 0.00 | 0.64 | -66.80 | -13.00 | 53.80 |
| 1095.68                         | H | 36.49 | -65.26 | 7.37 | 0.67 | -58.56 | -13.00 | 45.56 |
| 1095.68                         | V | 37.43 | -64.80 | 7.37 | 0.67 | -58.10 | -13.00 | 45.10 |
| 1252.20                         | H | 36.01 | -66.78 | 7.81 | 0.68 | -59.65 | -13.00 | 46.65 |
| 1252.20                         | V | 37.27 | -66.12 | 7.81 | 0.68 | -58.99 | -13.00 | 45.99 |
| 1408.73                         | H | 36.34 | -67.35 | 8.24 | 0.72 | -59.83 | -13.00 | 46.83 |
| 1408.73                         | V | 36.14 | -67.59 | 8.24 | 0.72 | -60.07 | -13.00 | 47.07 |
| 1565.25                         | H | 35.20 | -68.85 | 8.58 | 0.80 | -61.07 | -13.00 | 48.07 |
| 1565.25                         | V | 35.68 | -68.42 | 8.58 | 0.80 | -60.64 | -13.00 | 47.64 |

| Frequency: 156.525MHz, DSC 2100 |   |       |        |      |      |        |        |       |
|---------------------------------|---|-------|--------|------|------|--------|--------|-------|
| 313.05                          | H | 52.43 | -58.09 | 0.00 | 0.34 | -58.43 | -13.00 | 45.43 |
| 313.05                          | V | 43.85 | -64.62 | 0.00 | 0.34 | -64.96 | -13.00 | 51.96 |
| 469.58                          | H | 40.11 | -67.46 | 0.00 | 0.43 | -67.89 | -13.00 | 54.89 |
| 469.58                          | V | 41.31 | -62.45 | 0.00 | 0.43 | -62.88 | -13.00 | 49.88 |
| 626.10                          | H | 32.33 | -72.43 | 0.00 | 0.48 | -72.91 | -13.00 | 59.91 |
| 626.10                          | V | 29.94 | -73.14 | 0.00 | 0.48 | -73.62 | -13.00 | 60.62 |
| 782.63                          | H | 39.78 | -62.95 | 0.00 | 0.55 | -63.50 | -13.00 | 50.50 |
| 782.63                          | V | 33.99 | -65.19 | 0.00 | 0.55 | -65.74 | -13.00 | 52.74 |
| 939.15                          | H | 32.06 | -66.06 | 0.00 | 0.64 | -66.70 | -13.00 | 53.70 |
| 939.15                          | V | 29.19 | -66.39 | 0.00 | 0.64 | -67.03 | -13.00 | 54.03 |
| 1095.68                         | H | 37.91 | -63.84 | 7.37 | 0.67 | -57.14 | -13.00 | 44.14 |
| 1095.68                         | V | 37.83 | -64.40 | 7.37 | 0.67 | -57.70 | -13.00 | 44.70 |
| 1252.20                         | H | 37.53 | -65.26 | 7.81 | 0.68 | -58.13 | -13.00 | 45.13 |
| 1252.20                         | V | 36.64 | -66.75 | 7.81 | 0.68 | -59.62 | -13.00 | 46.62 |
| 1408.73                         | H | 35.37 | -68.32 | 8.24 | 0.72 | -60.80 | -13.00 | 47.80 |
| 1408.73                         | V | 35.45 | -68.28 | 8.24 | 0.72 | -60.76 | -13.00 | 47.76 |
| 1565.25                         | H | 35.58 | -68.47 | 8.58 | 0.80 | -60.69 | -13.00 | 47.69 |
| 1565.25                         | V | 34.71 | -69.39 | 8.58 | 0.80 | -61.61 | -13.00 | 48.61 |

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

### Model: R70624

### 30MHz - 2GHz:

| 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 25k, Frequency: 156.025MHz |                |                               |                               |                              |                       |                            |                |                |
| 312.05                        | H              | 52.47                         | -58.07                        | 0.00                         | 0.34                  | -58.41                     | -13.00         | 45.41          |
| 312.05                        | V              | 45.82                         | -62.68                        | 0.00                         | 0.34                  | -63.02                     | -13.00         | 50.02          |
| 468.08                        | H              | 56.71                         | -50.90                        | 0.00                         | 0.43                  | -51.33                     | -13.00         | 38.33          |
| 468.08                        | V              | 57.82                         | -45.99                        | 0.00                         | 0.43                  | -46.42                     | -13.00         | 33.42          |
| 624.10                        | H              | 33.19                         | -71.57                        | 0.00                         | 0.48                  | -72.05                     | -13.00         | 59.05          |
| 624.10                        | V              | 32.67                         | -70.45                        | 0.00                         | 0.48                  | -70.93                     | -13.00         | 57.93          |
| 780.13                        | H              | 32.54                         | -70.24                        | 0.00                         | 0.54                  | -70.78                     | -13.00         | 57.78          |
| 780.13                        | V              | 31.73                         | -67.51                        | 0.00                         | 0.54                  | -68.05                     | -13.00         | 55.05          |
| 936.15                        | H              | 32.85                         | -65.36                        | 0.00                         | 0.66                  | -66.02                     | -13.00         | 53.02          |
| 936.15                        | V              | 29.41                         | -66.23                        | 0.00                         | 0.66                  | -66.89                     | -13.00         | 53.89          |
| 1092.18                       | H              | 35.89                         | -65.93                        | 7.36                         | 0.67                  | -59.24                     | -13.00         | 46.24          |
| 1092.18                       | V              | 36.69                         | -65.60                        | 7.36                         | 0.67                  | -58.91                     | -13.00         | 45.91          |
| 1248.20                       | H              | 37.22                         | -65.58                        | 7.79                         | 0.68                  | -58.47                     | -13.00         | 45.47          |
| 1248.20                       | V              | 37.26                         | -66.14                        | 7.79                         | 0.68                  | -59.03                     | -13.00         | 46.03          |

|                                 |   |       |        |      |      |        |        |       |
|---------------------------------|---|-------|--------|------|------|--------|--------|-------|
| 1404.23                         | H | 35.68 | -68.02 | 8.23 | 0.71 | -60.50 | -13.00 | 47.50 |
| 1404.23                         | V | 35.15 | -68.59 | 8.23 | 0.71 | -61.07 | -13.00 | 48.07 |
| 1560.25                         | H | 34.80 | -69.20 | 8.57 | 0.80 | -61.43 | -13.00 | 48.43 |
| 1560.25                         | V | 34.85 | -69.21 | 8.57 | 0.80 | -61.44 | -13.00 | 48.44 |
| FM 25k, Frequency: 156.8MHz     |   |       |        |      |      |        |        |       |
| 313.60                          | H | 51.81 | -58.70 | 0.00 | 0.34 | -59.04 | -13.00 | 46.04 |
| 313.60                          | V | 45.49 | -62.97 | 0.00 | 0.34 | -63.31 | -13.00 | 50.31 |
| 470.40                          | H | 59.34 | -48.22 | 0.00 | 0.43 | -48.65 | -13.00 | 35.65 |
| 470.40                          | V | 56.35 | -47.38 | 0.00 | 0.43 | -47.81 | -13.00 | 34.81 |
| 627.20                          | H | 32.56 | -72.20 | 0.00 | 0.48 | -72.68 | -13.00 | 59.68 |
| 627.20                          | V | 30.38 | -72.67 | 0.00 | 0.48 | -73.15 | -13.00 | 60.15 |
| 784.00                          | H | 30.06 | -72.63 | 0.00 | 0.56 | -73.19 | -13.00 | 60.19 |
| 784.00                          | V | 29.68 | -69.47 | 0.00 | 0.56 | -70.03 | -13.00 | 57.03 |
| 940.80                          | H | 29.51 | -68.56 | 0.00 | 0.63 | -69.19 | -13.00 | 56.19 |
| 940.80                          | V | 28.99 | -66.55 | 0.00 | 0.63 | -67.18 | -13.00 | 54.18 |
| 1097.60                         | H | 36.71 | -65.00 | 7.37 | 0.67 | -58.30 | -13.00 | 45.30 |
| 1097.60                         | V | 36.01 | -66.18 | 7.37 | 0.67 | -59.48 | -13.00 | 46.48 |
| 1254.40                         | H | 36.68 | -66.11 | 7.81 | 0.68 | -58.98 | -13.00 | 45.98 |
| 1254.40                         | V | 36.29 | -67.09 | 7.81 | 0.68 | -59.96 | -13.00 | 46.96 |
| 1411.20                         | H | 36.05 | -67.63 | 8.25 | 0.72 | -60.10 | -13.00 | 47.10 |
| 1411.20                         | V | 35.73 | -68.00 | 8.25 | 0.72 | -60.47 | -13.00 | 47.47 |
| 1568.00                         | H | 35.75 | -68.32 | 8.58 | 0.80 | -60.54 | -13.00 | 47.54 |
| 1568.00                         | V | 36.05 | -68.07 | 8.58 | 0.80 | -60.29 | -13.00 | 47.29 |
| FM 25k, Frequency: 157.425MHz   |   |       |        |      |      |        |        |       |
| 314.85                          | H | 50.49 | -60.01 | 0.00 | 0.34 | -60.35 | -13.00 | 47.35 |
| 314.85                          | V | 45.76 | -62.66 | 0.00 | 0.34 | -63.00 | -13.00 | 50.00 |
| 472.28                          | H | 51.84 | -55.67 | 0.00 | 0.43 | -56.10 | -13.00 | 43.10 |
| 472.28                          | V | 54.74 | -48.93 | 0.00 | 0.43 | -49.36 | -13.00 | 36.36 |
| 629.70                          | H | 30.39 | -74.36 | 0.00 | 0.48 | -74.84 | -13.00 | 61.84 |
| 629.70                          | V | 33.59 | -69.40 | 0.00 | 0.48 | -69.88 | -13.00 | 56.88 |
| 787.13                          | H | 31.82 | -70.80 | 0.00 | 0.58 | -71.38 | -13.00 | 58.38 |
| 787.13                          | V | 32.78 | -66.29 | 0.00 | 0.58 | -66.87 | -13.00 | 53.87 |
| 944.55                          | H | 32.79 | -65.16 | 0.00 | 0.60 | -65.76 | -13.00 | 52.76 |
| 944.55                          | V | 31.16 | -64.30 | 0.00 | 0.60 | -64.90 | -13.00 | 51.90 |
| 1101.98                         | H | 37.44 | -64.24 | 7.39 | 0.67 | -57.52 | -13.00 | 44.52 |
| 1101.98                         | V | 36.67 | -65.51 | 7.39 | 0.67 | -58.79 | -13.00 | 45.79 |
| 1259.40                         | H | 36.48 | -66.30 | 7.83 | 0.68 | -59.15 | -13.00 | 46.15 |
| 1259.40                         | V | 37.28 | -66.08 | 7.83 | 0.68 | -58.93 | -13.00 | 45.93 |
| 1416.83                         | H | 35.37 | -68.29 | 8.27 | 0.72 | -60.74 | -13.00 | 47.74 |
| 1416.83                         | V | 35.37 | -68.34 | 8.27 | 0.72 | -60.79 | -13.00 | 47.79 |
| 1574.25                         | H | 34.52 | -69.61 | 8.59 | 0.81 | -61.83 | -13.00 | 48.83 |
| 1574.25                         | V | 35.31 | -68.87 | 8.59 | 0.81 | -61.09 | -13.00 | 48.09 |
| Frequency: 156.525MHz, DSC 1300 |   |       |        |      |      |        |        |       |
| 313.05                          | H | 53.49 | -57.03 | 0.00 | 0.34 | -57.37 | -13.00 | 44.37 |
| 313.05                          | V | 45.81 | -62.66 | 0.00 | 0.34 | -63.00 | -13.00 | 50.00 |
| 469.58                          | H | 52.60 | -54.97 | 0.00 | 0.43 | -55.40 | -13.00 | 42.40 |

|                                 |   |       |        |      |      |        |        |       |
|---------------------------------|---|-------|--------|------|------|--------|--------|-------|
| 469.58                          | V | 54.93 | -48.83 | 0.00 | 0.43 | -49.26 | -13.00 | 36.26 |
| 626.10                          | H | 31.51 | -73.25 | 0.00 | 0.48 | -73.73 | -13.00 | 60.73 |
| 626.10                          | V | 32.09 | -70.99 | 0.00 | 0.48 | -71.47 | -13.00 | 58.47 |
| 782.63                          | H | 31.94 | -70.79 | 0.00 | 0.55 | -71.34 | -13.00 | 58.34 |
| 782.63                          | V | 32.84 | -66.34 | 0.00 | 0.55 | -66.89 | -13.00 | 53.89 |
| 939.15                          | H | 31.68 | -66.44 | 0.00 | 0.64 | -67.08 | -13.00 | 54.08 |
| 939.15                          | V | 30.70 | -64.88 | 0.00 | 0.64 | -65.52 | -13.00 | 52.52 |
| 1095.68                         | H | 36.75 | -65.00 | 7.37 | 0.67 | -58.30 | -13.00 | 45.30 |
| 1095.68                         | V | 37.49 | -64.74 | 7.37 | 0.67 | -58.04 | -13.00 | 45.04 |
| 1252.20                         | H | 36.08 | -66.71 | 7.81 | 0.68 | -59.58 | -13.00 | 46.58 |
| 1252.20                         | V | 37.13 | -66.26 | 7.81 | 0.68 | -59.13 | -13.00 | 46.13 |
| 1408.73                         | H | 36.40 | -67.29 | 8.24 | 0.72 | -59.77 | -13.00 | 46.77 |
| 1408.73                         | V | 36.52 | -67.21 | 8.24 | 0.72 | -59.69 | -13.00 | 46.69 |
| 1565.25                         | H | 34.79 | -69.26 | 8.58 | 0.80 | -61.48 | -13.00 | 48.48 |
| 1565.25                         | V | 35.93 | -68.17 | 8.58 | 0.80 | -60.39 | -13.00 | 47.39 |
| Frequency: 156.525MHz, DSC 2100 |   |       |        |      |      |        |        |       |
| 313.05                          | H | 53.89 | -56.63 | 0.00 | 0.34 | -56.97 | -13.00 | 43.97 |
| 313.05                          | V | 46.71 | -61.76 | 0.00 | 0.34 | -62.10 | -13.00 | 49.10 |
| 469.58                          | H | 52.96 | -54.61 | 0.00 | 0.43 | -55.04 | -13.00 | 42.04 |
| 469.58                          | V | 53.49 | -50.27 | 0.00 | 0.43 | -50.70 | -13.00 | 37.70 |
| 626.10                          | H | 32.65 | -72.11 | 0.00 | 0.48 | -72.59 | -13.00 | 59.59 |
| 626.10                          | V | 30.62 | -72.46 | 0.00 | 0.48 | -72.94 | -13.00 | 59.94 |
| 782.63                          | H | 31.68 | -71.05 | 0.00 | 0.55 | -71.60 | -13.00 | 58.60 |
| 782.63                          | V | 32.15 | -67.03 | 0.00 | 0.55 | -67.58 | -13.00 | 54.58 |
| 939.15                          | H | 32.90 | -65.22 | 0.00 | 0.64 | -65.86 | -13.00 | 52.86 |
| 939.15                          | V | 30.77 | -64.81 | 0.00 | 0.64 | -65.45 | -13.00 | 52.45 |
| 1095.68                         | H | 38.10 | -63.65 | 7.37 | 0.67 | -56.95 | -13.00 | 43.95 |
| 1095.68                         | V | 37.40 | -64.83 | 7.37 | 0.67 | -58.13 | -13.00 | 45.13 |
| 1252.20                         | H | 37.91 | -64.88 | 7.81 | 0.68 | -57.75 | -13.00 | 44.75 |
| 1252.20                         | V | 37.03 | -66.36 | 7.81 | 0.68 | -59.23 | -13.00 | 46.23 |
| 1408.73                         | H | 35.34 | -68.35 | 8.24 | 0.72 | -60.83 | -13.00 | 47.83 |
| 1408.73                         | V | 35.08 | -68.65 | 8.24 | 0.72 | -61.13 | -13.00 | 48.13 |
| 1565.25                         | H | 35.33 | -68.72 | 8.58 | 0.80 | -60.94 | -13.00 | 47.94 |
| 1565.25                         | V | 35.07 | -69.03 | 8.58 | 0.80 | -61.25 | -13.00 | 48.25 |

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

**Low Power Only:**

Please refer to the following table.

**Model: R70625**

| 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 25k, Frequency: 156.850MHz |                |                               |                               |                              |                       |                            |                |                |
| 313.70                        | H              | 43.88                         | -66.63                        | 0.00                         | 0.34                  | -66.97                     | -13.00         | 53.97          |
| 313.70                        | V              | 36.62                         | -71.83                        | 0.00                         | 0.34                  | -72.17                     | -13.00         | 59.17          |
| 470.55                        | H              | 42.31                         | -65.24                        | 0.00                         | 0.43                  | -65.67                     | -13.00         | 52.67          |
| 470.55                        | V              | 43.49                         | -60.24                        | 0.00                         | 0.43                  | -60.67                     | -13.00         | 47.67          |
| 627.40                        | H              | 31.09                         | -73.67                        | 0.00                         | 0.48                  | -74.15                     | -13.00         | 61.15          |
| 627.40                        | V              | 30.34                         | -72.70                        | 0.00                         | 0.48                  | -73.18                     | -13.00         | 60.18          |
| 784.25                        | H              | 30.58                         | -72.11                        | 0.00                         | 0.56                  | -72.67                     | -13.00         | 59.67          |
| 784.25                        | V              | 31.47                         | -67.67                        | 0.00                         | 0.56                  | -68.23                     | -13.00         | 55.23          |
| 941.10                        | H              | 31.69                         | -66.37                        | 0.00                         | 0.63                  | -67.00                     | -13.00         | 54.00          |
| 941.10                        | V              | 30.73                         | -64.80                        | 0.00                         | 0.63                  | -65.43                     | -13.00         | 52.43          |
| 1097.95                       | H              | 34.92                         | -66.78                        | 7.37                         | 0.67                  | -60.08                     | -13.00         | 47.08          |
| 1097.95                       | V              | 34.79                         | -67.40                        | 7.37                         | 0.67                  | -60.70                     | -13.00         | 47.70          |
| 1254.80                       | H              | 34.39                         | -68.40                        | 7.81                         | 0.68                  | -61.27                     | -13.00         | 48.27          |
| 1254.80                       | V              | 34.39                         | -68.99                        | 7.81                         | 0.68                  | -61.86                     | -13.00         | 48.86          |
| 1411.65                       | H              | 34.23                         | -69.45                        | 8.25                         | 0.72                  | -61.92                     | -13.00         | 48.92          |
| 1411.65                       | V              | 34.79                         | -68.94                        | 8.25                         | 0.72                  | -61.41                     | -13.00         | 48.41          |
| 1568.50                       | H              | 34.66                         | -69.42                        | 8.58                         | 0.80                  | -61.64                     | -13.00         | 48.64          |
| 1568.50                       | V              | 34.89                         | -69.24                        | 8.58                         | 0.80                  | -61.46                     | -13.00         | 48.46          |
| FM 25k, Frequency: 156.875MHz |                |                               |                               |                              |                       |                            |                |                |
| 313.75                        | H              | 43.59                         | -66.92                        | 0.00                         | 0.34                  | -67.26                     | -13.00         | 54.26          |
| 313.75                        | V              | 35.84                         | -72.61                        | 0.00                         | 0.34                  | -72.95                     | -13.00         | 59.95          |
| 470.63                        | H              | 43.10                         | -64.45                        | 0.00                         | 0.43                  | -64.88                     | -13.00         | 51.88          |
| 470.63                        | V              | 44.73                         | -58.99                        | 0.00                         | 0.43                  | -59.42                     | -13.00         | 46.42          |
| 627.50                        | H              | 30.76                         | -74.00                        | 0.00                         | 0.48                  | -74.48                     | -13.00         | 61.48          |
| 627.50                        | V              | 31.99                         | -71.05                        | 0.00                         | 0.48                  | -71.53                     | -13.00         | 58.53          |
| 784.38                        | H              | 32.29                         | -70.40                        | 0.00                         | 0.56                  | -70.96                     | -13.00         | 57.96          |
| 784.38                        | V              | 32.06                         | -67.08                        | 0.00                         | 0.56                  | -67.64                     | -13.00         | 54.64          |
| 941.25                        | H              | 30.49                         | -67.56                        | 0.00                         | 0.63                  | -68.19                     | -13.00         | 55.19          |
| 941.25                        | V              | 30.82                         | -64.71                        | 0.00                         | 0.63                  | -65.34                     | -13.00         | 52.34          |
| 1098.13                       | H              | 34.68                         | -67.02                        | 7.37                         | 0.67                  | -60.32                     | -13.00         | 47.32          |
| 1098.13                       | V              | 34.29                         | -67.89                        | 7.37                         | 0.67                  | -61.19                     | -13.00         | 48.19          |
| 1255.00                       | H              | 34.32                         | -68.47                        | 7.81                         | 0.68                  | -61.34                     | -13.00         | 48.34          |
| 1255.00                       | V              | 34.37                         | -69.00                        | 7.81                         | 0.68                  | -61.87                     | -13.00         | 48.87          |
| 1411.88                       | H              | 34.09                         | -69.59                        | 8.25                         | 0.72                  | -62.06                     | -13.00         | 49.06          |
| 1411.88                       | V              | 34.33                         | -69.40                        | 8.25                         | 0.72                  | -61.87                     | -13.00         | 48.87          |
| 1568.75                       | H              | 34.12                         | -69.96                        | 8.58                         | 0.81                  | -62.19                     | -13.00         | 49.19          |
| 1568.75                       | V              | 34.19                         | -69.94                        | 8.58                         | 0.81                  | -62.17                     | -13.00         | 49.17          |

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

**Model: R70624**

| 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 25k, Frequency: 156.850MHz |                |                               |                               |                              |                       |                            |                |                |
| 313.70                        | H              | 43.81                         | -66.70                        | 0.00                         | 0.34                  | -67.04                     | -13.00         | 54.04          |
| 313.70                        | V              | 36.10                         | -72.35                        | 0.00                         | 0.34                  | -72.69                     | -13.00         | 59.69          |
| 470.55                        | H              | 42.01                         | -65.54                        | 0.00                         | 0.43                  | -65.97                     | -13.00         | 52.97          |
| 470.55                        | V              | 43.50                         | -60.23                        | 0.00                         | 0.43                  | -60.66                     | -13.00         | 47.66          |
| 627.40                        | H              | 30.54                         | -74.22                        | 0.00                         | 0.48                  | -74.70                     | -13.00         | 61.70          |
| 627.40                        | V              | 30.10                         | -72.94                        | 0.00                         | 0.48                  | -73.42                     | -13.00         | 60.42          |
| 784.25                        | H              | 30.10                         | -72.59                        | 0.00                         | 0.56                  | -73.15                     | -13.00         | 60.15          |
| 784.25                        | V              | 31.50                         | -67.64                        | 0.00                         | 0.56                  | -68.20                     | -13.00         | 55.20          |
| 941.10                        | H              | 31.50                         | -66.56                        | 0.00                         | 0.63                  | -67.19                     | -13.00         | 54.19          |
| 941.10                        | V              | 30.54                         | -64.99                        | 0.00                         | 0.63                  | -65.62                     | -13.00         | 52.62          |
| 1098.13                       | H              | 34.10                         | -67.60                        | 7.37                         | 0.67                  | -60.90                     | -13.00         | 47.90          |
| 1098.13                       | V              | 34.00                         | -68.19                        | 7.37                         | 0.67                  | -61.49                     | -13.00         | 48.49          |
| 1255.00                       | H              | 34.40                         | -68.39                        | 7.81                         | 0.68                  | -61.26                     | -13.00         | 48.26          |
| 1255.00                       | V              | 34.60                         | -68.78                        | 7.81                         | 0.68                  | -61.65                     | -13.00         | 48.65          |
| 1411.88                       | H              | 34.11                         | -69.57                        | 8.25                         | 0.72                  | -62.04                     | -13.00         | 49.04          |
| 1411.88                       | V              | 34.03                         | -69.70                        | 8.25                         | 0.72                  | -62.17                     | -13.00         | 49.17          |
| 1568.75                       | H              | 34.44                         | -69.64                        | 8.58                         | 0.80                  | -61.86                     | -13.00         | 48.86          |
| 1568.75                       | V              | 34.10                         | -70.03                        | 8.58                         | 0.80                  | -62.25                     | -13.00         | 49.25          |
| FM 25k, Frequency: 156.875MHz |                |                               |                               |                              |                       |                            |                |                |
| 313.75                        | H              | 43.40                         | -67.11                        | 0.00                         | 0.34                  | -67.45                     | -13.00         | 54.45          |
| 313.75                        | V              | 35.50                         | -72.95                        | 0.00                         | 0.34                  | -73.29                     | -13.00         | 60.29          |
| 470.63                        | H              | 42.54                         | -65.01                        | 0.00                         | 0.43                  | -65.44                     | -13.00         | 52.44          |
| 470.63                        | V              | 44.45                         | -59.27                        | 0.00                         | 0.43                  | -59.70                     | -13.00         | 46.70          |
| 627.50                        | H              | 30.57                         | -74.19                        | 0.00                         | 0.48                  | -74.67                     | -13.00         | 61.67          |
| 627.50                        | V              | 31.80                         | -71.24                        | 0.00                         | 0.48                  | -71.72                     | -13.00         | 58.72          |
| 784.38                        | H              | 32.10                         | -70.59                        | 0.00                         | 0.56                  | -71.15                     | -13.00         | 58.15          |
| 784.38                        | V              | 31.87                         | -67.27                        | 0.00                         | 0.56                  | -67.83                     | -13.00         | 54.83          |
| 941.25                        | H              | 30.10                         | -67.95                        | 0.00                         | 0.63                  | -68.58                     | -13.00         | 55.58          |
| 941.25                        | V              | 30.71                         | -64.82                        | 0.00                         | 0.63                  | -65.45                     | -13.00         | 52.45          |
| 1097.95                       | H              | 34.40                         | -67.30                        | 7.37                         | 0.67                  | -60.60                     | -13.00         | 47.60          |
| 1097.95                       | V              | 34.50                         | -67.68                        | 7.37                         | 0.67                  | -60.98                     | -13.00         | 47.98          |
| 1254.80                       | H              | 34.40                         | -68.39                        | 7.81                         | 0.68                  | -61.26                     | -13.00         | 48.26          |
| 1254.80                       | V              | 34.40                         | -68.97                        | 7.81                         | 0.68                  | -61.84                     | -13.00         | 48.84          |
| 1411.65                       | H              | 34.30                         | -69.38                        | 8.25                         | 0.72                  | -61.85                     | -13.00         | 48.85          |
| 1411.65                       | V              | 34.54                         | -69.19                        | 8.25                         | 0.72                  | -61.66                     | -13.00         | 48.66          |
| 1568.50                       | H              | 34.10                         | -69.98                        | 8.58                         | 0.81                  | -62.21                     | -13.00         | 49.21          |
| 1568.50                       | V              | 34.40                         | -69.73                        | 8.58                         | 0.81                  | -61.96                     | -13.00         | 48.96          |

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

## 4.8 Transmitter Frequency Tolerances

Test Mode: Transmitting

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

**General:**

| FM,25kHz, Reference Frequency: 156.8MHz,Limit: ±10 ppm |                                     |                          |                       |
|--------------------------------------------------------|-------------------------------------|--------------------------|-----------------------|
| Temperature (°C)                                       | Voltage Supplied (V <sub>DC</sub> ) | Measured Frequency (MHz) | Frequency Error (ppm) |
| -30                                                    | 12                                  | 156.8000738              | 0.47                  |
| -20                                                    |                                     | 156.8000132              | 0.08                  |
| -10                                                    |                                     | 156.7999373              | -0.40                 |
| 0                                                      |                                     | 156.7999811              | -0.12                 |
| 10                                                     |                                     | 156.7999382              | -0.39                 |
| 20                                                     |                                     | 156.7999710              | -0.18                 |
| 30                                                     |                                     | 156.8000956              | 0.61                  |
| 40                                                     |                                     | 156.8000936              | 0.60                  |
| 50                                                     |                                     | 156.8000006              | 0.00                  |
| 20                                                     | 10.2                                | 156.7999446              | -0.35                 |
| 20                                                     | 16.0                                | 156.7999503              | -0.32                 |

| DSC B1300, Reference Frequency: 156.525MHz,Limit: ±10.0 ppm |                                     |                          |                       |
|-------------------------------------------------------------|-------------------------------------|--------------------------|-----------------------|
| Temperature (°C)                                            | Voltage Supplied (V <sub>DC</sub> ) | Measured Frequency (MHz) | Frequency Error (ppm) |
| -30                                                         | 12                                  | 156.5249456              | -0.35                 |
| -20                                                         |                                     | 156.5250548              | 0.35                  |
| -10                                                         |                                     | 156.5249681              | -0.20                 |
| 0                                                           |                                     | 156.5249184              | -0.52                 |
| 10                                                          |                                     | 156.5249347              | -0.42                 |
| 20                                                          |                                     | 156.5250000              | 0.00                  |
| 30                                                          |                                     | 156.5249824              | -0.11                 |
| 40                                                          |                                     | 156.5249704              | -0.19                 |
| 50                                                          |                                     | 156.5249191              | -0.52                 |
| 20                                                          | 10.2                                | 156.5249199              | -0.51                 |
| 20                                                          | 16.0                                | 156.5250665              | 0.42                  |

| DSC Y2100, Reference Frequency: 156.525MHz,Limit: ±10.0 ppm |                                     |                          |                       |
|-------------------------------------------------------------|-------------------------------------|--------------------------|-----------------------|
| Temperature (°C)                                            | Voltage Supplied (V <sub>DC</sub> ) | Measured Frequency (MHz) | Frequency Error (ppm) |
| -30                                                         | 12                                  | 156.5249426              | -0.37                 |
| -20                                                         |                                     | 156.5249209              | -0.51                 |
| -10                                                         |                                     | 156.5249447              | -0.35                 |
| 0                                                           |                                     | 156.5250436              | 0.28                  |
| 10                                                          |                                     | 156.5249789              | -0.13                 |
| 20                                                          |                                     | 156.5250000              | 0.00                  |
| 30                                                          |                                     | 156.5250738              | 0.47                  |
| 40                                                          |                                     | 156.5249411              | -0.38                 |
| 50                                                          |                                     | 156.5250316              | 0.20                  |
| 20                                                          | 10.2                                | 156.5250429              | 0.27                  |
| 20                                                          | 16.0                                | 156.5250059              | 0.04                  |

**Low Power Only:**

| FM,25kHz, Reference Frequency: 156.850MHz,Limit: ±10.0 ppm |                                           |                                |                             |
|------------------------------------------------------------|-------------------------------------------|--------------------------------|-----------------------------|
| Temperature<br>(°C)                                        | Voltage<br>Supplied<br>(V <sub>DC</sub> ) | Measured<br>Frequency<br>(MHz) | Frequency<br>Error<br>(ppm) |
| -30                                                        | 12                                        | 156.8500596                    | 0.38                        |
| -20                                                        |                                           | 156.8500503                    | 0.32                        |
| -10                                                        |                                           | 156.8500028                    | 0.02                        |
| 0                                                          |                                           | 156.8500348                    | 0.22                        |
| 10                                                         |                                           | 156.8500228                    | 0.15                        |
| 20                                                         |                                           | 156.8500290                    | 0.18                        |
| 30                                                         |                                           | 156.8500993                    | 0.63                        |
| 40                                                         |                                           | 156.8500715                    | 0.46                        |
| 50                                                         |                                           | 156.8500291                    | 0.19                        |
| 20                                                         | 10.2                                      | 156.8500402                    | 0.26                        |
| 20                                                         | 16.0                                      | 156.8500285                    | 0.18                        |

## 5. RF EXPOSURE EVALUATION

### 5.1 MAXIMUM PERMISSIBLE EXPOSURE (MPE)

#### 5.1.1 Applicable Standard

According to 1.1310, 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for Maximum Permissible Exposure (MPE)

| (B) Limits for General Population/Uncontrolled Exposure |                               |                               |                                     |                          |
|---------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| Frequency Range (MHz)                                   | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) | Power Density (mW/cm <sup>2</sup> ) | Averaging Time (minutes) |
| 0.3–1.34                                                | 614                           | 1.63                          | *(100)                              | 30                       |
| 1.34–30                                                 | 824/f                         | 2.19/f                        | *(180/f )                           | 30                       |
| 30–300                                                  | 27.5                          | 0.073                         | 0.2                                 | 30                       |
| 300–1500                                                | /                             | /                             | f/1500                              | 30                       |
| 1500–100,000                                            | /                             | /                             | 1.0                                 | 30                       |

f = frequency in MHz;

\* = Plane-wave equivalent power density;

#### 5.1.2 MPE Calculation

Prediction of power density at the distance of the applicable MPE limit

$$S = PG/4\pi R^2$$

Where: S = power density (in appropriate units, e.g. mW/cm<sup>2</sup>);

P = power input to the antenna (in appropriate units, e.g., mW);

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

#### 5.1.3 Calculated Result

| Frequency (MHz) | Maximum Average Output Power Including Tune-up Tolerance (dBm) | Maximum Allowable Antenna Gain (dBi) | Cable Loss (dB) | Operating Duty Cycle (%) | Evaluation Distance (cm) | Power Density (mW/cm <sup>2</sup> ) | Power Density Limit (mW/cm <sup>2</sup> ) |
|-----------------|----------------------------------------------------------------|--------------------------------------|-----------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------------|
| 156.025-157.425 | 43.98                                                          | 9                                    | 1               | 50                       | 221                      | 0.129                               | 0.2                                       |

Note: Maximum target power is 25 W

**Result:** Device meet MPE requirement at 221 cm distance away from Antenna to human body.

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