# ENGINEERING TEST REPORT

## UHF P25 Transceiver
## Model No.: IC-F7040T/S
## FCC ID: AFJ399000

*Applicant:*

**ICOM Incorporated**
*1-1-32, Kamiminami, Hirano-ku*
*Osaka, Japan, 547-0003*

***Tested in Accordance With***

**Federal Communications Commission (FCC)**
**47 CFR, Parts 2, 22 and 90 (Subpart I)**

**UltraTech's File No.: 18ICOM485_FCC90**

| | |
|---|---|
| This Test report is Issued under the Authority of<br>Tri M. Luu, BASc,<br>Vice President of Engineering<br>UltraTech Group of Labs<br><br>Date: June 26, 2018 | |
| Report Prepared by: Santhosh Fernandez<br><br>Issued Date: June 26, 2018 | Tested by: Nimisha Desai<br><br>Test Dates: May 24-June 26, 2018 |

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91038 1309 46390-2049 AT-1945 SL2-IN-E-1119R Korea KCC-RRA CA2049

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# EXHIBIT 1. INTRODUCTION

## 1.1. SCOPE

| | |
|---|---|
| **Reference:** | FCC Parts 2, 22, 74,and 90 (Subpart I) |
| **Title:** | Code of Federal Regulations (CFR), Title 47 Telecommunication – Parts 2, 22, and 90 (Subpart I) |
| **Purpose of Test:** | To obtain FCC Certification Authorization for Radio operating in the Frequency Band 400-406 & 406.1-470 MHz (25 kHz, 12.5 kHz Channel Spacing). |
| **Test Procedures:** | Both conducted and radiated emissions measurements were conducted in accordance with TIA/EIA Standard TIA/EIA-603-E – Land Mobile FM or PM Communications Equipment Measurement and performance Standards. |

## 1.2. REVISION HISTORY

| Document | Issue Date | Description |
|---|---|---|
| 18ICOM485_FCC90 | June 26, 2018 | Original Report |
| | | |

## 1.3. RELATED SUBMITTAL(S)/GRANT(S)

None

## 1.4. NORMATIVE REFERENCES

| Publication | Year | Title |
|---|---|---|
| FCC CFR Parts 0-19, 80-End | 2017 | Code of Federal Regulations – Telecommunication |
| ANSI C63.4 | 2014 | American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz |
| ANSI/TIA-603-E | 2016 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| ANSI C63.26 | 2015 | American National Standard for Compliance Testing of Transmitters used in Licensed Radio Services |
| CISPR 22 | 2008-09 Ed 6 | Information Technology Equipment - Radio Disturbance Characteristics - Limits and Methods of Measurement |
| CISPR 16-1-1<br>+A1<br>+A2 | 2006<br>2006<br>2007 | Specification for radio disturbance and immunity measuring apparatus and methods. Part 1-1: Measuring Apparatus |
| CISPR 16-1-2<br>+A1<br>+A2 | 2003<br>2004<br>2006 | Specification for radio disturbance and immunity measuring apparatus and methods.<br>Part 1-2: Conducted disturbances |

# EXHIBIT 2. PERFORMANCE ASSESSMENT

## 2.1. CLIENT INFORMATION

| APPLICANT | |
|---|---|
| **Name:** | Icom Incorporated |
| **Address:** | 1-1-32, Kamiminami<br>Hirano-ku, Osaka<br>Japan, 547-0003 |
| **Contact Person:** | Mr. Atsushi Tomiyama<br>Phone #: +81 6 6793 5302<br>Fax #: +81 6 6793 0013<br>Email Address: world_support@icom.co.jp |

| MANUFACTURER | |
|---|---|
| **Name:** | Icom Incorporated |
| **Address:** | 1-1-32, Kamiminami<br>Hirano-ku, Osaka<br>Japan, 547-0003 |
| **Contact Person:** | Mr. Atsushi Tomiyama<br>Phone #: +81 6 6793 5302<br>Fax #: +81 6 6793 0013<br>Email Address: world_support@icom.co.jp |

## 2.2. EQUIPMENT UNDER TEST (EUT) INFORMATION

The applicant has supplied the following information (with the exception of the Date of Receipt).

| | |
|---|---|
| **Brand Name:** | ICOM Incorporated |
| **Product Name:** | UHF P25 Transceiver |
| **Model Name or Number:** | IC-F7040T |
| **Serial Number:** | 00000309 |
| **Type of Equipment:** | Licensed Non-Broadcast Station Transmitter |
| **Power Supply Requirement:** | 7.5 VDC nominal |
| **Transmitting/Receiving Antenna Type:** | Non-integral |
| **Primary User Functions of EUT:** | 2-Way Wireless Voice & Data Communication |

## 2.3. EUT'S TECHNICAL SPECIFICATIONS

| TRANSMITTER | |
|---|---|
| **Equipment Type:** | Portable |
| **Intended Operating Environment:** | Restricted to Occupational Use only |
| **Power Supply Requirement:** | 7.5 VDC Nominal |
| **RF Output Power Rating:** | 3 Watts(High) / 1 Watts (Low) |
| **Operating Frequency Range:** | 769-775 MHz, 799-805 MHz & 806-824 MHz and 851-869 MHz |
| **RF Output Impedance:** | 50 Ω |
| **Channel Spacing:** | 25 kHz, 20 kHz, 12.5 kHz |
| **Occupied Bandwidth (99%):** | 15.82 kHz (25 kHz Analog) F3E<br>10.385 kHz (20 kHz Analog) F3E<br>5.689 kHz (12.5 kHz Analog) F3E<br>7.93 kHz (12.5 kHz Digital) F1D/F1E<br>8.09 kHz (12.5 kHz Digital) F1W |
| **Emission Designation*:** | Analog: 16K0F3E**, 14K0F3E, 11K0F3E,<br>Digital: 8K10F1E, 8K10F1D, 8K10F1W |

* For an average case of commercial telephony, the Necessary Bandwidth is calculated as follows:
For FM Voice Modulation:
Channel Spacing = 25 KHz, D = 5 KHz max, K = 1, M = 3 KHz
$B_n$ = 2M + 2DK = 2(3) + 2(5)(1) = **16 KHz**
Emission designation: 16K0F3E

Channel Spacing = 20 KHz, D = 4 KHz max, K = 1, M = 3 KHz
$B_n$ = 2M + 2DK = 2(3) + 2(4)(1) = **14 KHz**
Emission designation: 14K0F3E

Channel Spacing = 12.5 KHz, D = 2.5 KHz max, K = 1, M = 3 KHz
$B_n$ = 2M + 2DK = 2(3) + 2(2.5)(1) = **11 KHz**
Emission designation: 11K0F3E
****Note:** The emission designation 16K0F3E with 25 KHz Channel bandwidth is only applied to the device operated in FCC Rules Part 22, 74 & 80 frequencies. The operation of 16K0F3E emission will be disabled in the firmware by the manufacturer for device that operates in FCC Rules Part 90 frequencies (Private Land Mobile) as declared by the applicant.

## 2.4. LIST OF EUT'S PORTS

| Port Number | EUT's Port Description | Number of Identical Ports | Connector Type | Terminated with |
|---|---|---|---|---|
| 1 | Speaker-Microphone Connector | 1 | ICOM Multi-connector Jack | Speaker-Microphone |
| 2 | Antenna Connector | 1 | Special type | 50 Ohm Load/Antenna |
| 3. | USB | 1 | Micro USB connector | Micro USB Cable |

## 2.5. ANCILLARY EQUIPMENT

The EUT was tested while connected to the following representative configuration of ancillary equipment necessary to exercise the ports during tests:

| **Ancillary Equipment # 1** | |
|---|---|
| Description: | Speaker Microphone |
| Brand name: | ICOM |
| Model Name or Number: | HM-222 |
| Connected to EUT's Port: | Speaker-Microphone Connector |

# EXHIBIT 3. EUT OPERATING CONDITIONS AND CONFIGURATIONS DURING TESTS

## 3.1. CLIMATE TEST CONDITIONS

The climate conditions of the test environment are as follows:

| | |
|---|---|
| **Temperature:** | 21°C - 24°C |
| **Humidity:** | 45% to 58% |
| **Pressure:** | 102 kPa |
| **Power Input Source:** | 7.5 VDC Nominal |

## 3.2. OPERATIONAL TEST CONDITIONS & ARRANGEMENT FOR TEST SIGNALS

| | |
|---|---|
| **Operating Modes:** | The transmitter was operated in a continuous transmission mode with the carrier modulated as specified in the Test Data. |
| **Special Test Software:** | N/A |
| **Special Hardware Used:** | N/A |
| **Transmitter Test Antenna:** | The EUT is tested with the antenna port terminated to a 50 Ohm RF Load. |

| **Transmitter Test Signals** | |
|---|---|
| **Frequency Band(s):** | 769-775 MHz, 799-805 MHz & 806-824 MHz and 851-869 MHz |
| **Test Frequencies:**<br>(Near lowest, near middle & near highest frequencies in the frequency range of operation of applicable band) | 769.1 MHz, 774.9 MHz, 799.1 MHz, 804.9 MHz, 806.1 MHz, 808.9 MHz, 815.1 MHz, 823.9 MHz, 851.1 MHz,853.9 MHz, 860.1 MHz, 868.9 MHz |
| **Transmitter Wanted Output Test Signals:**<br>Transmitter Power (measured maximum output power):<br>Normal Test Modulation:<br>Modulating signal source: | <br>3.10 W High<br>FM Voice/Digital<br>External |

# EXHIBIT 4. SUMMARY OF TEST RESULTS

## 4.1. LOCATION OF TESTS

All of the measurements described in this report were performed at Ultratech Group of Labs located in the city of Oakville, Province of Ontario, Canada.

Radiated Emissions were performed at the Ultratech's 3-10 TDK Semi-Anechoic Chamber situated in the Town of Oakville, province of Ontario. This test site been calibrated in accordance with ANSI C63.4, and found to be in compliance with the requirements of Sec. 2.948 of the FCC Rules. The descriptions and site measurement data of the Oakville 3-10 TDK Semi-Anechoic Chamber has been filed with ANAB File No.: AT-1945.

## 4.2. APPLICABILITY & SUMMARY OF EMISSION TEST RESULTS

| FCC Section(s) | Test Requirements | Applicability (Yes/No) |
|---|---|---|
| 1.1307, 1.1310, 2.1091 & 2.1093 | RF Exposure Limit | Yes, Refer to SAR Report |
| 2.1046, 22.565, 90.205, 90.541 (d) | RF Power Output | Yes |
| 90.543(f) | GNSS (EIRP) | Yes for 769-805MHz Band |
| 2.1047(a), & 90.242(b)(8) | Audio Frequency Response | Not applicable to new standard. However, tests are conducted under FCC's recommendation. |
| 2.1047(b) & 90.210 | Modulation Limiting | Yes |
| 2.1049 90.209, 90.210, 90.691 | Emission Limitation & Emission Mask | Yes |
| 2.1051, 2.1057, 90.210, 90.543 | Emission Limits - Spurious Emissions at Antenna Terminal | Yes |
| 2.1053, 2.1057, 22.359, 90.210, 90.543 | Emission Limits - Field Strength of Spurious Emissions | Yes |
| 90.543 | Adjacent Channel Power | Yes for 769-805MHz Band |
| 2.1055, 22.355, 90.213 & 90.539 | Frequency Stability | Yes |
| 90.214 | Transient Frequency Behavior | N/A |
| UHF P25 Transceiver, Model No.: IC-F7040T, by ICOM Incorporated has also been tested and found to comply with FCC Part 15, Subpart B - Radio Receivers and Class B Digital Devices. The engineering test report has been documented and kept on file and is available upon request. | | |

## 4.3. MODIFICATIONS INCORPORATED IN THE EUT FOR COMPLIANCE PURPOSES

None

### 4.3.1. DEVIATION OF STANDARD TEST PROCEDURES

None

# EXHIBIT 5. MEASUREMENTS, EXAMINATIONS & TEST DATA FOR EMC EMISSIONS

## 5.1. TEST PROCEDURES

This section contains test results only. Details of test methods and procedures can be found in EXHIBIT 8 of this report.

## 5.2. MEASUREMENT UNCERTAINTIES

The measurement uncertainties stated were calculated in accordance with the requirements of CISPR 16-4-2 @ IEC:2003 and JCGM 100:2008 (GUM 1995) – Guide to the Expression of Uncertainty in Measurement.
Refer to Exhibit 7 for Measurement Uncertainties.

## 5.3. MEASUREMENT EQUIPMENT USED

The measurement equipment used complied with the requirements of the Standards referenced in the Methods & Procedures ANSI C63.4 and CISPR 16-1-1.

## 5.4. ESSENTIAL/PRIMARY FUNCTIONS AS DECLARED BY THE MANUFACTURER

The essential function of the EUT is to communicate to and from radios over RF link.

## 5.5. RF POWER OUTPUT [§§ 2.1046, 22.565, 90.205, 90.541& 90.543]

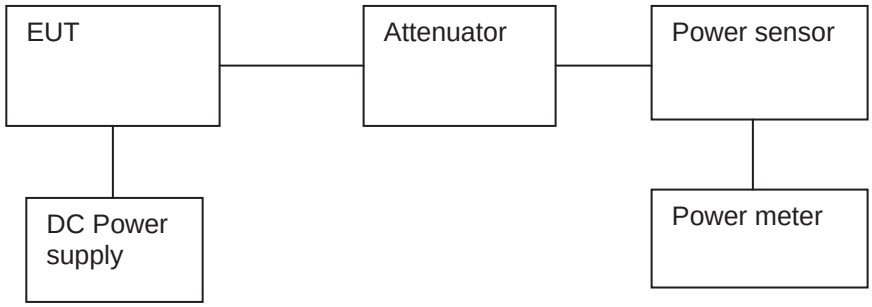
### 5.5.1. Limits

Please refer to FCC 47 CFR 90.205, 90.541, 90.543 & 22.565 for specification details.

### 5.5.2. Method of Measurements

Refer to Section 8.1 (Conducted) and 8.2 (Radiated) of this report for measurement details

### 5.5.3. Test Arrangement

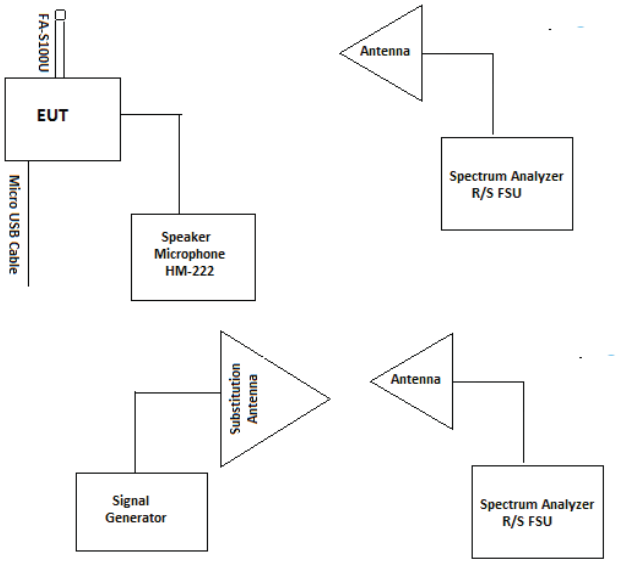



### 5.5.4. Test Data

769-805 MHz band Conducted power

| Frequencies | Power Rating | Power Rating | Power | Actual Power |
|---|---|---|---|---|
| MHz | Watts | dBm | dBm | Watts |
| 769.100 | 3.0 | 34.77 | 34.51 | 2.82 |
| 774.900 | 3.0 | 34.77 | 34.51 | 2.82 |
| 799.100 | 3.0 | 34.77 | 34.52 | 2.83 |
| 804.900 | 3.0 | 34.77 | 34.52 | 2.83 |
| 769.100 | 1.0 | 30.00 | 30.83 | 1.21 |
| 774.900 | 1.0 | 30.00 | 30.83 | 1.21 |
| 799.100 | 1.0 | 30.00 | 30.82 | 1.21 |
| 804.900 | 1.0 | 30.00 | 30.81 | 1.21 |

769-805 MHz band Radiated power ERP with Antenna @ 90.541(d)



| Frequency (MHz) | Antenna Polatrization | Measured (dBuV) | ERP (dBm) | ERP Limit (dBm) | Margin |
|---|---|---|---|---|---|
| 769.1 | V | 133.94 | 34.20 | 34.77 | -0.6 |
| 769.1 | H | 120.16 | 19.84 | 34.77 | -14.9 |
| 774.9 | V | 131.24 | 33.59 | 34.77 | -1.2 |
| 774.9 | H | 121.65 | 21.50 | 34.77 | -13.3 |
| 799.1 | V | 131.4 | 33.15 | 34.77 | -1.6 |
| 799.1 | H | 119.48 | 19.95 | 34.77 | -14.8 |
| 804.9 | V | 130.15 | 32.59 | 34.77 | -2.2 |
| 804.9 | H | 122.13 | 22.61 | 34.77 | -12.2 |

**806-869MHz Band Conducted power**

| Frequencies | Power Rating | Power Rating | Actual Power | Actual Power |
|---|---|---|---|---|
| MHz | Watts | dBm | dBm | Watts |
| 806.100 | 3.0 | 34.77 | 34.91 | 3.10 |
| 808.900 | 3.0 | 34.77 | 34.83 | 3.04 |
| 815.100 | 3.0 | 34.77 | 34.91 | 3.10 |
| 823.900 | 3.0 | 34.77 | 34.90 | 3.09 |
| 851.100 | 3.0 | 34.77 | 34.87 | 3.07 |
| 853.900 | 3.0 | 34.77 | 34.81 | 3.03 |
| 860.100 | 3.0 | 34.77 | 34.88 | 3.08 |
| 868.900 | 3.0 | 34.77 | 34.87 | 3.07 |
| 806.100 | 1.0 | 30.00 | 30.76 | 1.19 |
| 808.900 | 1.0 | 30.00 | 30.65 | 1.16 |
| 815.100 | 1.0 | 30.00 | 30.78 | 1.20 |
| 823.900 | 1.0 | 30.00 | 30.79 | 1.20 |
| 851.100 | 1.0 | 30.00 | 30.79 | 1.20 |
| 853.900 | 1.0 | 30.00 | 30.71 | 1.18 |
| 860.100 | 1.0 | 30.00 | 30.80 | 1.20 |
| 868.900 | 1.0 | 30.00 | 30.81 | 1.21 |

## 5.6. AUDIO FREQUENCY RESPONSE [§ 2.1047(a) & 90.242(b)(8)]

### 5.6.1. Limits

§ **2.1047(a):** Voice modulated communication equipment. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 to 5000 Hz shall be submitted. For equipment required to have an audio low-pass filter, a curve showing the frequency response of the filter or of all circuitry installed between the modulation limiter and the modulated stage shall be submitted.

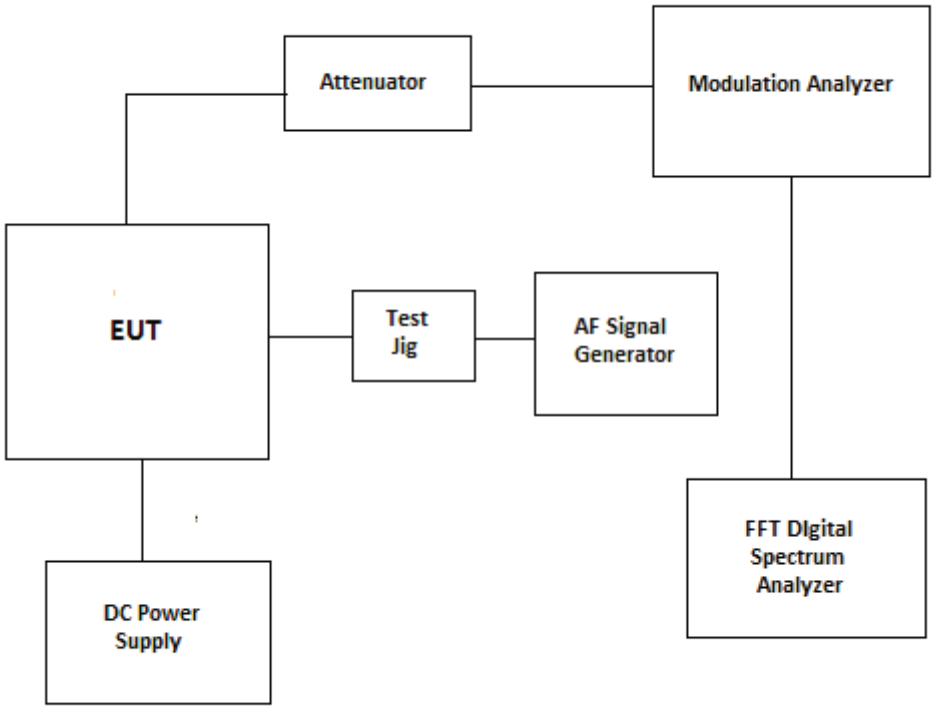
§ **90.242(b)(8):** Recommended audio filter attenuation characteristics are given below:

| Audio band | Minimum Attenuation Rel. to 1 kHz Attenuation |
|---|---|
| 3 –20 KHz<br>20 – 30 KHz | 60 $\log_{10}$(f/3) dB where f is in kHz<br>50dB |

### 5.6.2. Method of Measurements

The rated audio input signal was applied to the input of the audio low-pass filter (or of all modulation stages) using an audio oscillator, this input signal level and its corresponding output signal were then measured and recorded using the FFT Digital Spectrum Analyzer. Tests were repeated at different audio signal frequencies from 0 to 50 KHz.

### 5.6.3. Test Arrangement



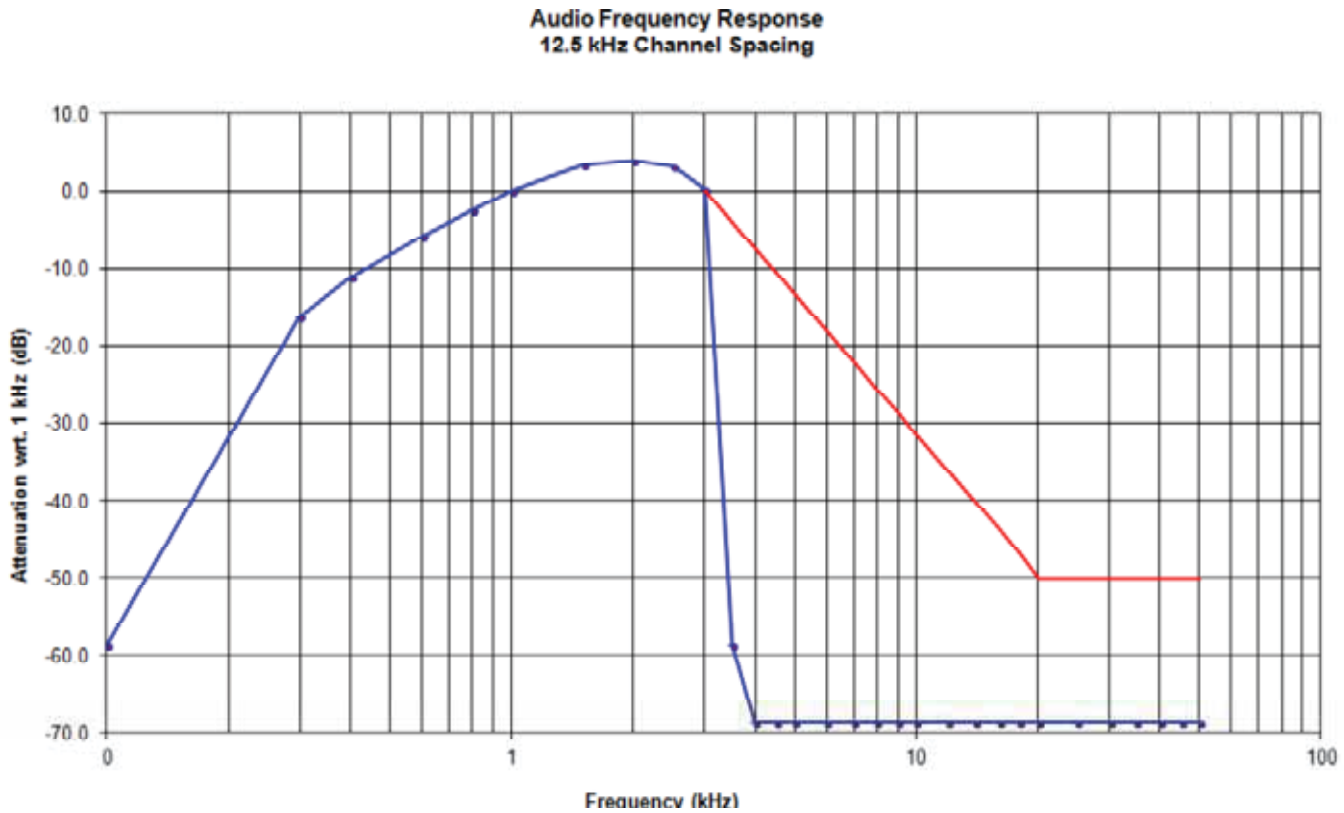
### 5.6.4. Test Data

**Note:** Audio Freq Response and Modulation limiting tests were performed only for 12.5 , 20 & 25 kHz channel spacing. These tests were not performed for 6.25 kHz ch spacing as there is no FM voice capability for this device.

#### 5.6.4.1. 12.5 KHz Channel Spacing, F3E, Frequency of All Modulation States (769-775 MHz band)

**Remark:** Due to the difficulty of measuring the Frequency Response of the internal low-pass filter, the Frequency Response of All Modulation States is performed to show the roll-off at 3 kHz in comparison with the recommended audio filter attenuation.

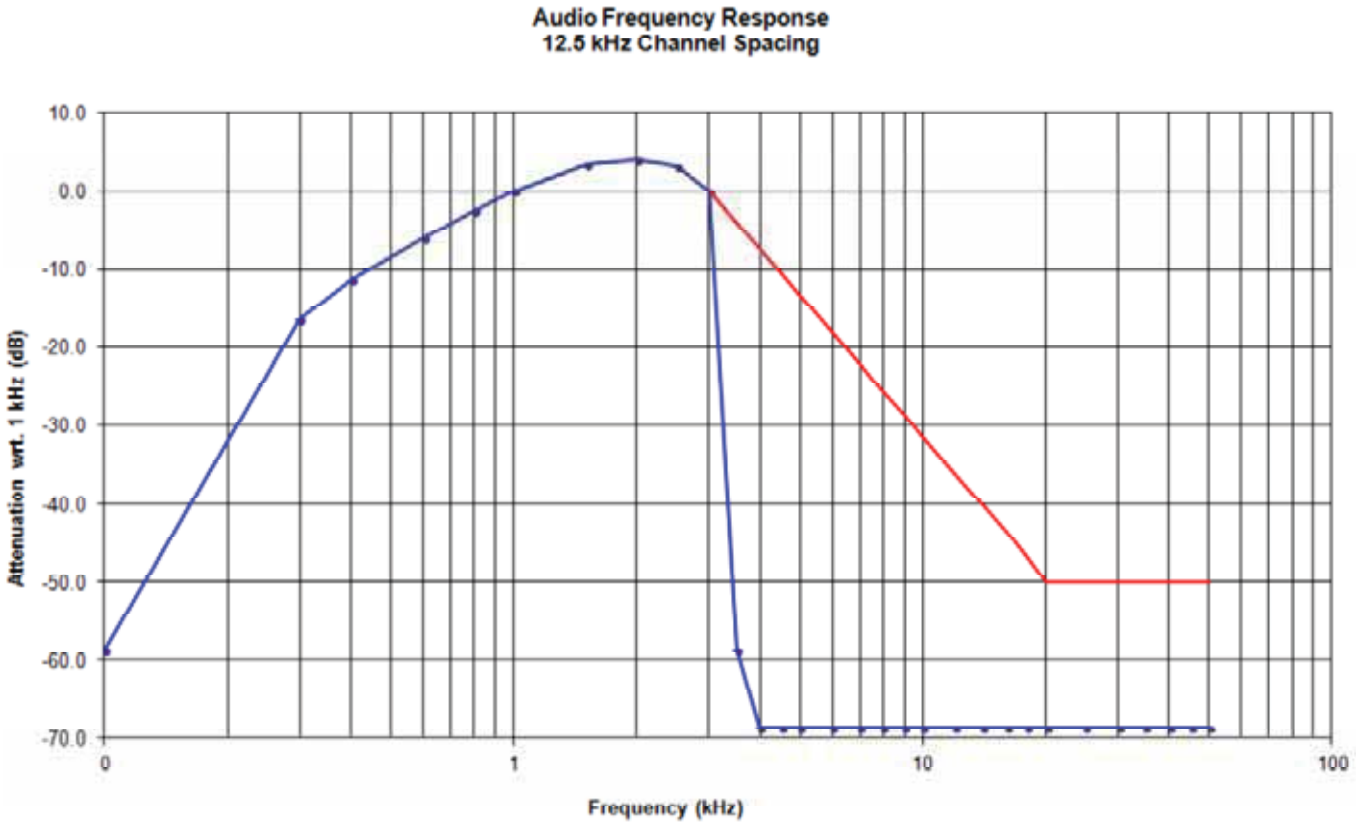
| Frequency (KHz) | Audio In (dBV) | Audio Out (dBV) | Attenuation (Out - In) (dB) | Attenuation Rel. to 1 KHz (dB) | Recommended Attenuation (dB) |
|---|---|---|---|---|---|
| 0.1 | -38.42 | -60.00 | -21.6 | -58.7 | -- |
| 0.3 | -38.42 | -17.60 | 20.8 | -16.3 | -- |
| 0.4 | -38.42 | -12.57 | 25.9 | -11.2 | -- |
| 0.6 | -38.42 | -7.22 | 31.2 | -5.9 | -- |
| 0.8 | -38.42 | -3.78 | 34.6 | -2.4 | -- |
| 1.0 | -38.42 | -1.35 | 37.1 | 0.0 | -- |
| 1.5 | -38.42 | 2.04 | 40.5 | 3.4 | -- |
| 2.0 | -38.42 | 2.58 | 41.0 | 3.9 | -- |
| 2.5 | -38.42 | 1.78 | 40.2 | 3.1 | -- |
| 3.0 | -38.42 | -1.12 | 37.3 | 0.2 | 0 |
| 3.5 | -38.42 | -60.00 | -21.6 | -58.7 | -4 |
| 4.0 | -38.42 | -70.00 | -31.6 | -68.7 | -7 |
| 4.5 | -38.42 | -70.00 | -31.6 | -68.7 | -11 |
| 5.0 | -38.42 | -70.00 | -31.6 | -68.7 | -13 |
| 6.0 | -38.42 | -70.00 | -31.6 | -68.7 | -18 |
| 7.0 | -38.42 | -70.00 | -31.6 | -68.7 | -22 |
| 8.0 | -38.42 | -70.00 | -31.6 | -68.7 | -26 |
| 9.0 | -38.42 | -70.00 | -31.6 | -68.7 | -29 |
| 10.0 | -38.42 | -70.00 | -31.6 | -68.7 | -31 |
| 12.0 | -38.42 | -70.00 | -31.6 | -68.7 | -36 |
| 14.0 | -38.42 | -70.00 | -31.6 | -68.7 | -40 |
| 16.0 | -38.42 | -70.00 | -31.6 | -68.7 | -44 |
| 18.0 | -38.42 | -70.00 | -31.6 | -68.7 | -47 |
| 20.0 | -38.42 | -70.00 | -31.6 | -68.7 | -50 |
| 25.0 | -38.42 | -70.00 | -31.6 | -68.7 | -50 |
| 30.0 | -38.42 | -70.00 | -31.6 | -68.7 | -50 |
| 35.0 | -38.42 | -70.00 | -31.6 | -68.7 | -50 |
| 40.0 | -38.42 | -70.00 | -31.6 | -68.7 | -50 |
| 45.0 | -38.42 | -70.00 | -31.6 | -68.7 | -50 |
| 50.0 | -38.42 | -70.00 | -31.6 | -68.7 | -50 |



### 5.6.4.2. 12.5 KHz Channel Spacing, F3E, Frequency of All Modulation States (799-805 MHz band)

**Remark:** Due to the difficulty of measuring the Frequency Response of the internal low-pass filter, the Frequency Response of All Modulation States is performed to show the roll-off at 3 kHz in comparison with the recommended audio filter attenuation.

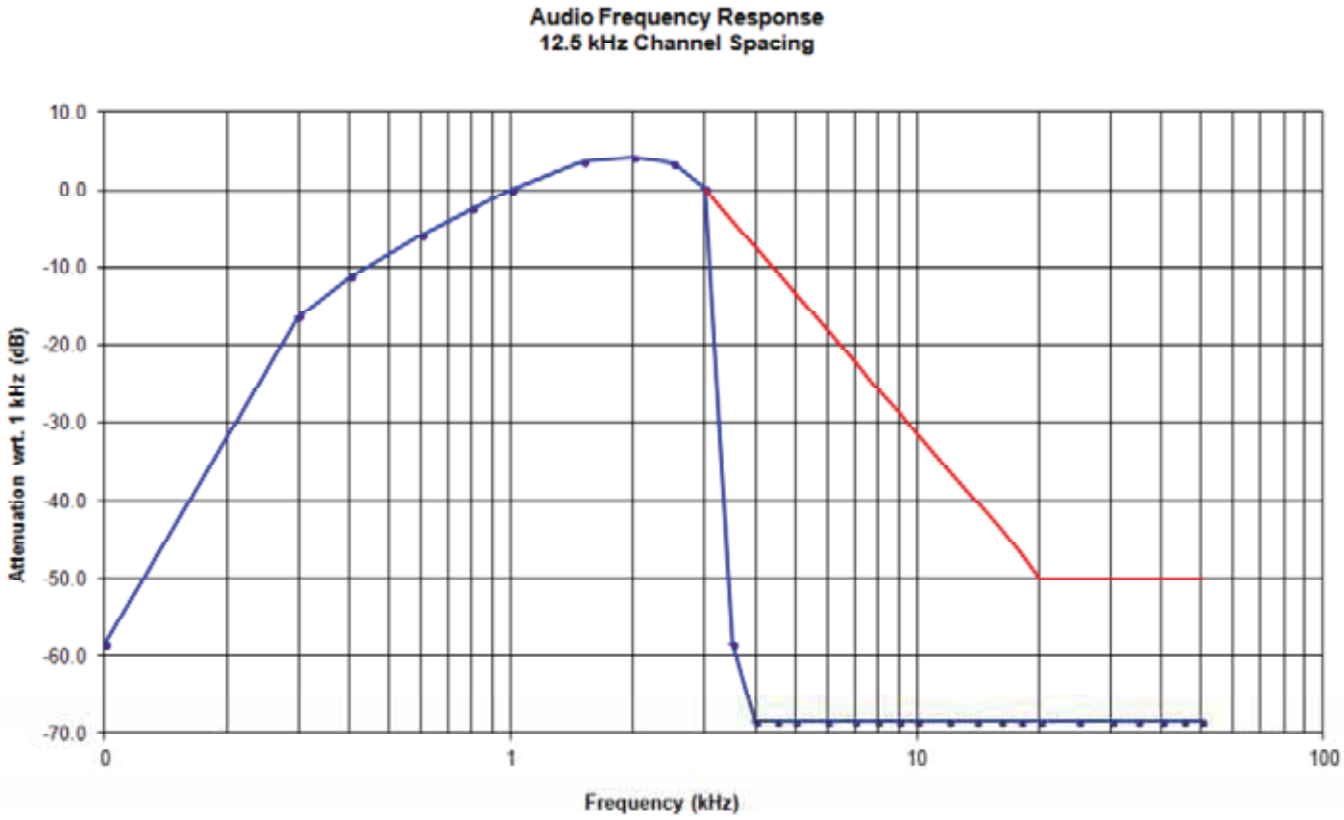
| Frequency (KHz) | Audio In (dBV) | Audio Out (dBV) | Attenuation (Out - In) (dB) | Attenuation Rel. to 1 KHz (dB) | Recommended Attenuation (dB) |
|---|---|---|---|---|---|
| 0.1 | -38.42 | -60.00 | -21.6 | -58.7 | -- |
| 0.3 | -38.42 | -17.74 | 20.7 | -16.4 | -- |
| 0.4 | -38.42 | -12.71 | 25.7 | -11.4 | -- |
| 0.6 | -38.42 | -7.33 | 31.1 | -6.0 | -- |
| 0.8 | -38.42 | -3.90 | 34.5 | -2.6 | -- |
| 1.0 | -38.42 | -1.32 | 37.1 | 0.0 | -- |
| 1.5 | -38.42 | 2.01 | 40.4 | 3.3 | -- |
| 2.0 | -38.42 | 2.56 | 41.0 | 3.9 | -- |
| 2.5 | -38.42 | 1.77 | 40.2 | 3.1 | -- |
| 3.0 | -38.42 | -1.28 | 37.1 | 0.0 | 0 |
| 3.5 | -38.42 | -60.00 | -21.6 | -58.7 | -4 |
| 4.0 | -38.42 | -70.00 | -31.6 | -68.7 | -7 |
| 4.5 | -38.42 | -70.00 | -31.6 | -68.7 | -11 |
| 5.0 | -38.42 | -70.00 | -31.6 | -68.7 | -13 |
| 6.0 | -38.42 | -70.00 | -31.6 | -68.7 | -18 |
| 7.0 | -38.42 | -70.00 | -31.6 | -68.7 | -22 |
| 8.0 | -38.42 | -70.00 | -31.6 | -68.7 | -26 |
| 9.0 | -38.42 | -70.00 | -31.6 | -68.7 | -29 |
| 10.0 | -38.42 | -70.00 | -31.6 | -68.7 | -31 |
| 12.0 | -38.42 | -70.00 | -31.6 | -68.7 | -36 |
| 14.0 | -38.42 | -70.00 | -31.6 | -68.7 | -40 |
| 16.0 | -38.42 | -70.00 | -31.6 | -68.7 | -44 |
| 18.0 | -38.42 | -70.00 | -31.6 | -68.7 | -47 |
| 20.0 | -38.42 | -70.00 | -31.6 | -68.7 | -50 |
| 25.0 | -38.42 | -70.00 | -31.6 | -68.7 | -50 |
| 30.0 | -38.42 | -70.00 | -31.6 | -68.7 | -50 |
| 35.0 | -38.42 | -70.00 | -31.6 | -68.7 | -50 |
| 40.0 | -38.42 | -70.00 | -31.6 | -68.7 | -50 |
| 45.0 | -38.42 | -70.00 | -31.6 | -68.7 | -50 |
| 50.0 | -38.42 | -70.00 | -31.6 | -68.7 | -50 |



### 5.6.4.3. 12.5 KHz Channel Spacing, F3E, Frequency of All Modulation States (806-824 MHz band)

**Remark:** Due to the difficulty of measuring the Frequency Response of the internal low-pass filter, the Frequency Response of All Modulation States is performed to show the roll-off at 3 kHz in comparison with the recommended audio filter attenuation.

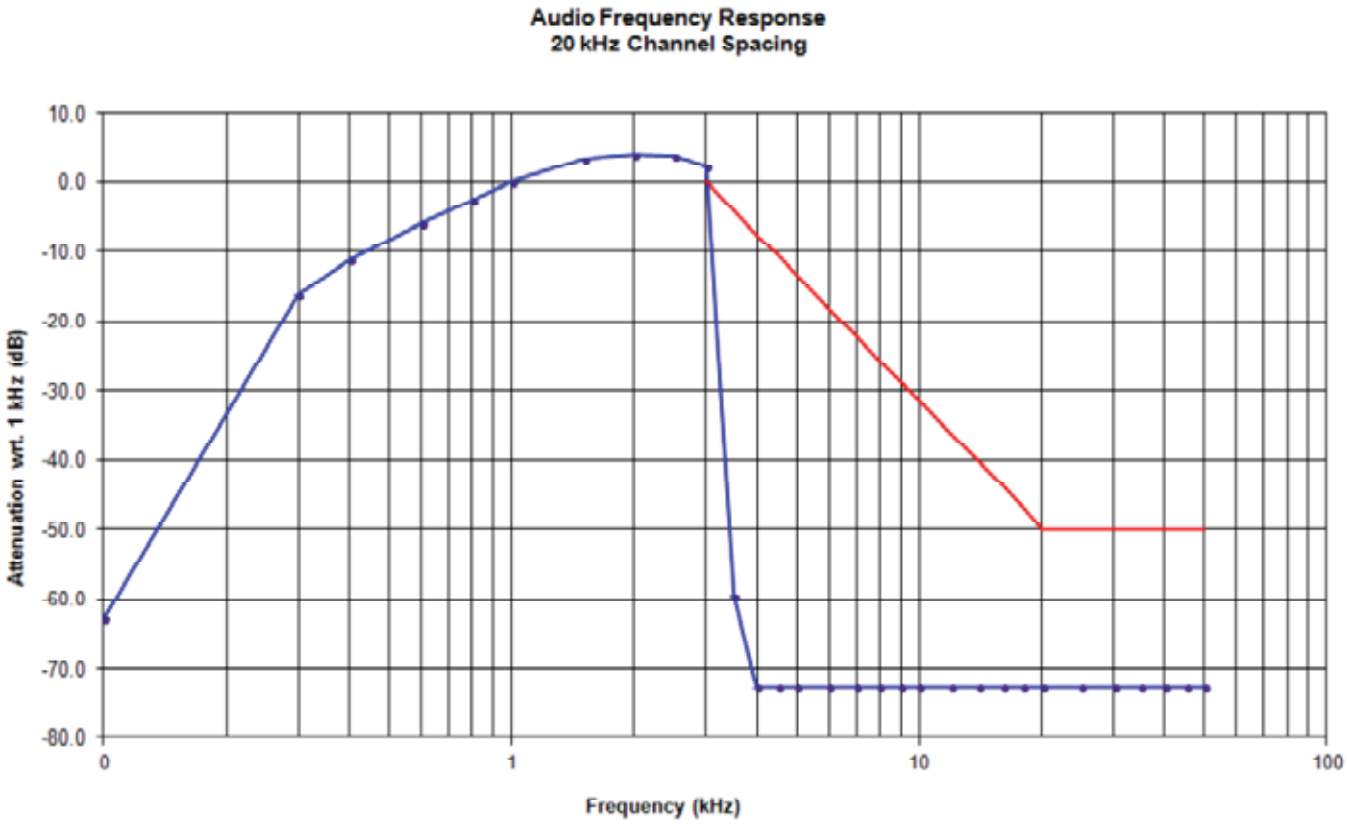
| Frequency (KHz) | Audio In (dBV) | Audio Out (dBV) | Attenuation (Out - In) (dB) | Attenuation Rel. to 1 KHz (dB) | Recommended Attenuation (dB) |
|---|---|---|---|---|---|
| 0.1 | -38.42 | -60.00 | -21.6 | -58.5 | -- |
| 0.3 | -38.42 | -17.88 | 20.5 | -16.4 | -- |
| 0.4 | -38.42 | -12.79 | 25.6 | -11.3 | -- |
| 0.6 | -38.42 | -7.40 | 31.0 | -5.9 | -- |
| 0.8 | -38.42 | -3.96 | 34.5 | -2.5 | -- |
| 1.0 | -38.42 | -1.50 | 36.9 | 0.0 | -- |
| 1.5 | -38.42 | 1.99 | 40.4 | 3.5 | -- |
| 2.0 | -38.42 | 2.55 | 41.0 | 4.1 | -- |
| 2.5 | -38.42 | 1.76 | 40.2 | 3.3 | -- |
| 3.0 | -38.42 | -1.29 | 37.1 | 0.2 | 0 |
| 3.5 | -38.42 | -60.00 | -21.6 | -58.5 | -4 |
| 4.0 | -38.42 | -70.00 | -31.6 | -68.5 | -7 |
| 4.5 | -38.42 | -70.00 | -31.6 | -68.5 | -11 |
| 5.0 | -38.42 | -70.00 | -31.6 | -68.5 | -13 |
| 6.0 | -38.42 | -70.00 | -31.6 | -68.5 | -18 |
| 7.0 | -38.42 | -70.00 | -31.6 | -68.5 | -22 |
| 8.0 | -38.42 | -70.00 | -31.6 | -68.5 | -26 |
| 9.0 | -38.42 | -70.00 | -31.6 | -68.5 | -29 |
| 10.0 | -38.42 | -70.00 | -31.6 | -68.5 | -31 |
| 12.0 | -38.42 | -70.00 | -31.6 | -68.5 | -36 |
| 14.0 | -38.42 | -70.00 | -31.6 | -68.5 | -40 |
| 16.0 | -38.42 | -70.00 | -31.6 | -68.5 | -44 |
| 18.0 | -38.42 | -70.00 | -31.6 | -68.5 | -47 |
| 20.0 | -38.42 | -70.00 | -31.6 | -68.5 | -50 |
| 25.0 | -38.42 | -70.00 | -31.6 | -68.5 | -50 |
| 30.0 | -38.42 | -70.00 | -31.6 | -68.5 | -50 |
| 35.0 | -38.42 | -70.00 | -31.6 | -68.5 | -50 |
| 40.0 | -38.42 | -70.00 | -31.6 | -68.5 | -50 |
| 45.0 | -38.42 | -70.00 | -31.6 | -68.5 | -50 |
| 50.0 | -38.42 | -70.00 | -31.6 | -68.5 | -50 |



### 5.6.4.4. 20 KHz Channel Spacing, F3E, Frequency of All Modulation States (806-824 MHz band)

**Remark:** Due to the difficulty of measuring the Frequency Response of the internal low-pass filter, the Frequency Response of All Modulation States is performed to show the roll-off at 3 kHz in comparison with the recommended audio filter attenuation.

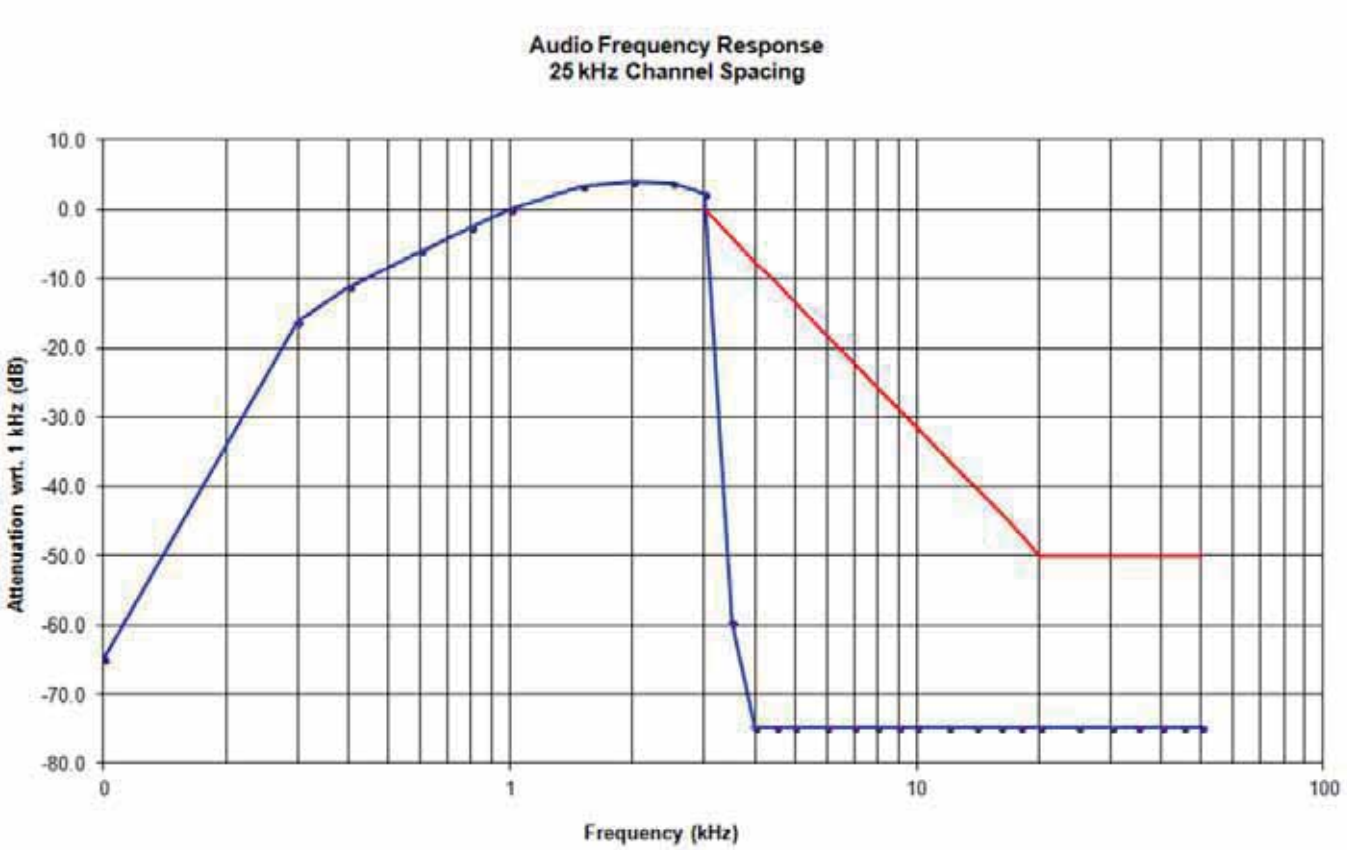
| Frequency (KHz) | Audio In (dBV) | Audio Out (dBV) | Attenuation (Out - In) (dB) | Attenuation Rel. to 1 KHz (dB) | Recommended Attenuation (dB) |
|---|---|---|---|---|---|
| 0.1 | -38.06 | -60.00 | -21.9 | -62.9 | -- |
| 0.3 | -38.06 | -13.41 | 24.7 | -16.3 | -- |
| 0.4 | -38.06 | -8.18 | 29.9 | -11.1 | -- |
| 0.6 | -38.06 | -2.96 | 35.1 | -5.8 | -- |
| 0.8 | -38.06 | 0.36 | 38.4 | -2.5 | -- |
| 1.0 | -38.06 | 2.87 | 40.9 | 0.0 | -- |
| 1.5 | -38.06 | 6.28 | 44.3 | 3.4 | -- |
| 2.0 | -38.06 | 6.89 | 45.0 | 4.0 | -- |
| 2.5 | -38.06 | 6.70 | 44.8 | 3.8 | -- |
| 3.0 | -38.06 | 5.08 | 43.1 | 2.2 | 0 |
| 3.5 | -38.06 | -56.70 | -18.6 | -59.6 | -4 |
| 4.0 | -38.06 | -70.00 | -31.9 | -72.9 | -7 |
| 4.5 | -38.06 | -70.00 | -31.9 | -72.9 | -11 |
| 5.0 | -38.06 | -70.00 | -31.9 | -72.9 | -13 |
| 6.0 | -38.06 | -70.00 | -31.9 | -72.9 | -18 |
| 7.0 | -38.06 | -70.00 | -31.9 | -72.9 | -22 |
| 8.0 | -38.06 | -70.00 | -31.9 | -72.9 | -26 |
| 9.0 | -38.06 | -70.00 | -31.9 | -72.9 | -29 |
| 10.0 | -38.06 | -70.00 | -31.9 | -72.9 | -31 |
| 12.0 | -38.06 | -70.00 | -31.9 | -72.9 | -36 |
| 14.0 | -38.06 | -70.00 | -31.9 | -72.9 | -40 |
| 16.0 | -38.06 | -70.00 | -31.9 | -72.9 | -44 |
| 18.0 | -38.06 | -70.00 | -31.9 | -72.9 | -47 |
| 20.0 | -38.06 | -70.00 | -31.9 | -72.9 | -50 |
| 25.0 | -38.06 | -70.00 | -31.9 | -72.9 | -50 |
| 30.0 | -38.06 | -70.00 | -31.9 | -72.9 | -50 |
| 35.0 | -38.06 | -70.00 | -31.9 | -72.9 | -50 |
| 40.0 | -38.06 | -70.00 | -31.9 | -72.9 | -50 |
| 45.0 | -38.06 | -70.00 | -31.9 | -72.9 | -50 |
| 50.0 | -38.06 | -70.00 | -31.9 | -72.9 | -50 |



### 5.6.4.5. 25 KHz Channel Spacing, F3E, Frequency of All Modulation States (806-824 MHz band)

**Remark:** Due to the difficulty of measuring the Frequency Response of the internal low-pass filter, the Frequency Response of All Modulation States is performed to show the roll-off at 3 kHz in comparison with the recommended audio filter attenuation.

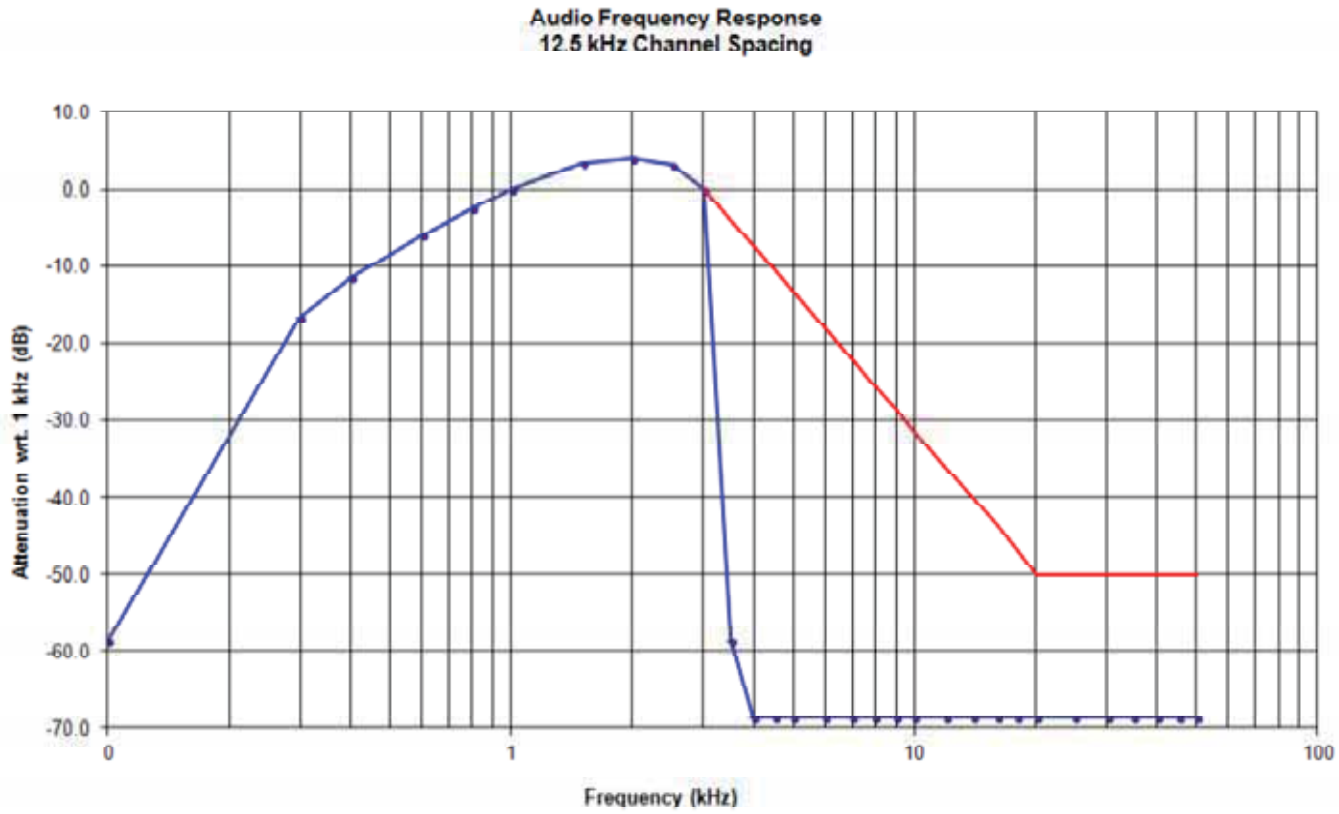
| Frequency (KHz) | Audio In (dBV) | Audio Out (dBV) | Attenuation (Out - In) (dB) | Attenuation Rel. to 1 KHz (dB) | Recommended Attenuation (dB) |
|---|---|---|---|---|---|
| 0.1 | -38.06 | -60.00 | -21.9 | -64.8 | -- |
| 0.3 | -38.06 | -11.36 | 26.7 | -16.2 | -- |
| 0.4 | -38.06 | -6.29 | 31.8 | -11.1 | -- |
| 0.6 | -38.06 | -1.18 | 36.9 | -6.0 | -- |
| 0.8 | -38.06 | 2.27 | 40.3 | -2.6 | -- |
| 1.0 | -38.06 | 4.82 | 42.9 | 0.0 | -- |
| 1.5 | -38.06 | 8.21 | 46.3 | 3.4 | -- |
| 2.0 | -38.06 | 8.83 | 46.9 | 4.0 | -- |
| 2.5 | -38.06 | 8.64 | 46.7 | 3.8 | -- |
| 3.0 | -38.06 | 7.01 | 45.1 | 2.2 | 0 |
| 3.5 | -38.06 | -54.70 | -16.6 | -59.5 | -4 |
| 4.0 | -38.06 | -70.00 | -31.9 | -74.8 | -7 |
| 4.5 | -38.06 | -70.00 | -31.9 | -74.8 | -11 |
| 5.0 | -38.06 | -70.00 | -31.9 | -74.8 | -13 |
| 6.0 | -38.06 | -70.00 | -31.9 | -74.8 | -18 |
| 7.0 | -38.06 | -70.00 | -31.9 | -74.8 | -22 |
| 8.0 | -38.06 | -70.00 | -31.9 | -74.8 | -26 |
| 9.0 | -38.06 | -70.00 | -31.9 | -74.8 | -29 |
| 10.0 | -38.06 | -70.00 | -31.9 | -74.8 | -31 |
| 12.0 | -38.06 | -70.00 | -31.9 | -74.8 | -36 |
| 14.0 | -38.06 | -70.00 | -31.9 | -74.8 | -40 |
| 16.0 | -38.06 | -70.00 | -31.9 | -74.8 | -44 |
| 18.0 | -38.06 | -70.00 | -31.9 | -74.8 | -47 |
| 20.0 | -38.06 | -70.00 | -31.9 | -74.8 | -50 |
| 25.0 | -38.06 | -70.00 | -31.9 | -74.8 | -50 |
| 30.0 | -38.06 | -70.00 | -31.9 | -74.8 | -50 |
| 35.0 | -38.06 | -70.00 | -31.9 | -74.8 | -50 |
| 40.0 | -38.06 | -70.00 | -31.9 | -74.8 | -50 |
| 45.0 | -38.06 | -70.00 | -31.9 | -74.8 | -50 |
| 50.0 | -38.06 | -70.00 | -31.9 | -74.8 | -50 |



### 5.6.4.6. 12.5 KHz Channel Spacing, F3E, Frequency of All Modulation States (851-869 MHz band)

**Remark:** Due to the difficulty of measuring the Frequency Response of the internal low-pass filter, the Frequency Response of All Modulation States is performed to show the roll-off at 3 kHz in comparison with the recommended audio filter attenuation.

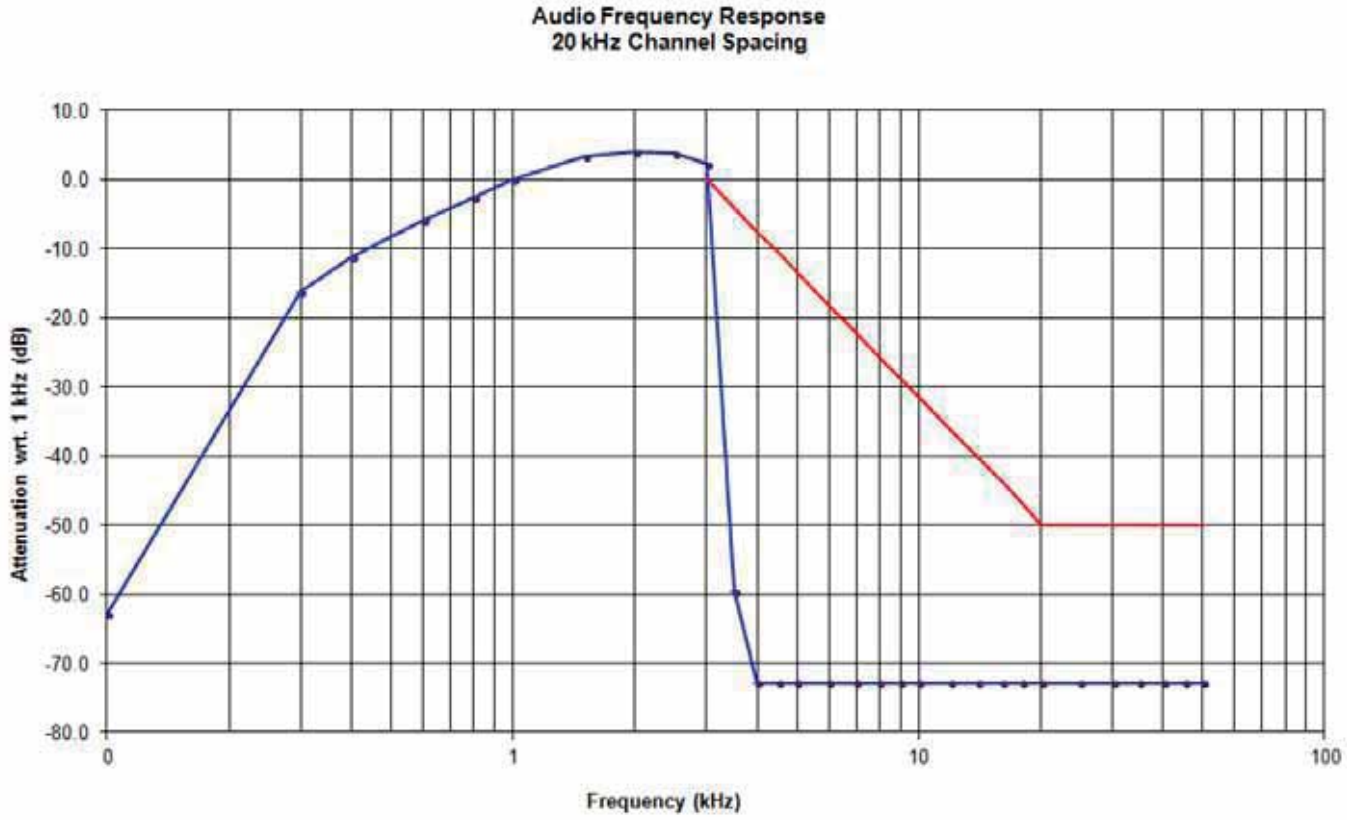
| Frequency (KHz) | Audio In (dBV) | Audio Out (dBV) | Attenuation (Out - In) (dB) | Attenuation Rel. to 1 KHz (dB) | Recommended Attenuation (dB) |
|---|---|---|---|---|---|
| 0.1 | -38.42 | -60.00 | -21.6 | -58.6 | -- |
| 0.3 | -38.42 | -17.92 | 20.5 | -16.5 | -- |
| 0.4 | -38.42 | -12.83 | 25.6 | -11.4 | -- |
| 0.6 | -38.42 | -7.42 | 31.0 | -6.0 | -- |
| 0.8 | -38.42 | -3.97 | 34.4 | -2.6 | -- |
| 1.0 | -38.42 | -1.39 | 37.0 | 0.0 | -- |
| 1.5 | -38.42 | 1.98 | 40.4 | 3.4 | -- |
| 2.0 | -38.42 | 2.54 | 41.0 | 3.9 | -- |
| 2.5 | -38.42 | 1.76 | 40.2 | 3.1 | -- |
| 3.0 | -38.42 | -1.29 | 37.1 | 0.1 | 0 |
| 3.5 | -38.42 | -60.00 | -21.6 | -58.6 | -4 |
| 4.0 | -38.42 | -70.00 | -31.6 | -68.6 | -7 |
| 4.5 | -38.42 | -70.00 | -31.6 | -68.6 | -11 |
| 5.0 | -38.42 | -70.00 | -31.6 | -68.6 | -13 |
| 6.0 | -38.42 | -70.00 | -31.6 | -68.6 | -18 |
| 7.0 | -38.42 | -70.00 | -31.6 | -68.6 | -22 |
| 8.0 | -38.42 | -70.00 | -31.6 | -68.6 | -26 |
| 9.0 | -38.42 | -70.00 | -31.6 | -68.6 | -29 |
| 10.0 | -38.42 | -70.00 | -31.6 | -68.6 | -31 |
| 12.0 | -38.42 | -70.00 | -31.6 | -68.6 | -36 |
| 14.0 | -38.42 | -70.00 | -31.6 | -68.6 | -40 |
| 16.0 | -38.42 | -70.00 | -31.6 | -68.6 | -44 |
| 18.0 | -38.42 | -70.00 | -31.6 | -68.6 | -47 |
| 20.0 | -38.42 | -70.00 | -31.6 | -68.6 | -50 |
| 25.0 | -38.42 | -70.00 | -31.6 | -68.6 | -50 |
| 30.0 | -38.42 | -70.00 | -31.6 | -68.6 | -50 |
| 35.0 | -38.42 | -70.00 | -31.6 | -68.6 | -50 |
| 40.0 | -38.42 | -70.00 | -31.6 | -68.6 | -50 |
| 45.0 | -38.42 | -70.00 | -31.6 | -68.6 | -50 |
| 50.0 | -38.42 | -70.00 | -31.6 | -68.6 | -50 |



### 5.6.4.7. 20 KHz Channel Spacing, F3E, Frequency of All Modulation States (851-869 MHz band)

**Remark:** Due to the difficulty of measuring the Frequency Response of the internal low-pass filter, the Frequency Response of All Modulation States is performed to show the roll-off at 3 kHz in comparison with the recommended audio filter attenuation.

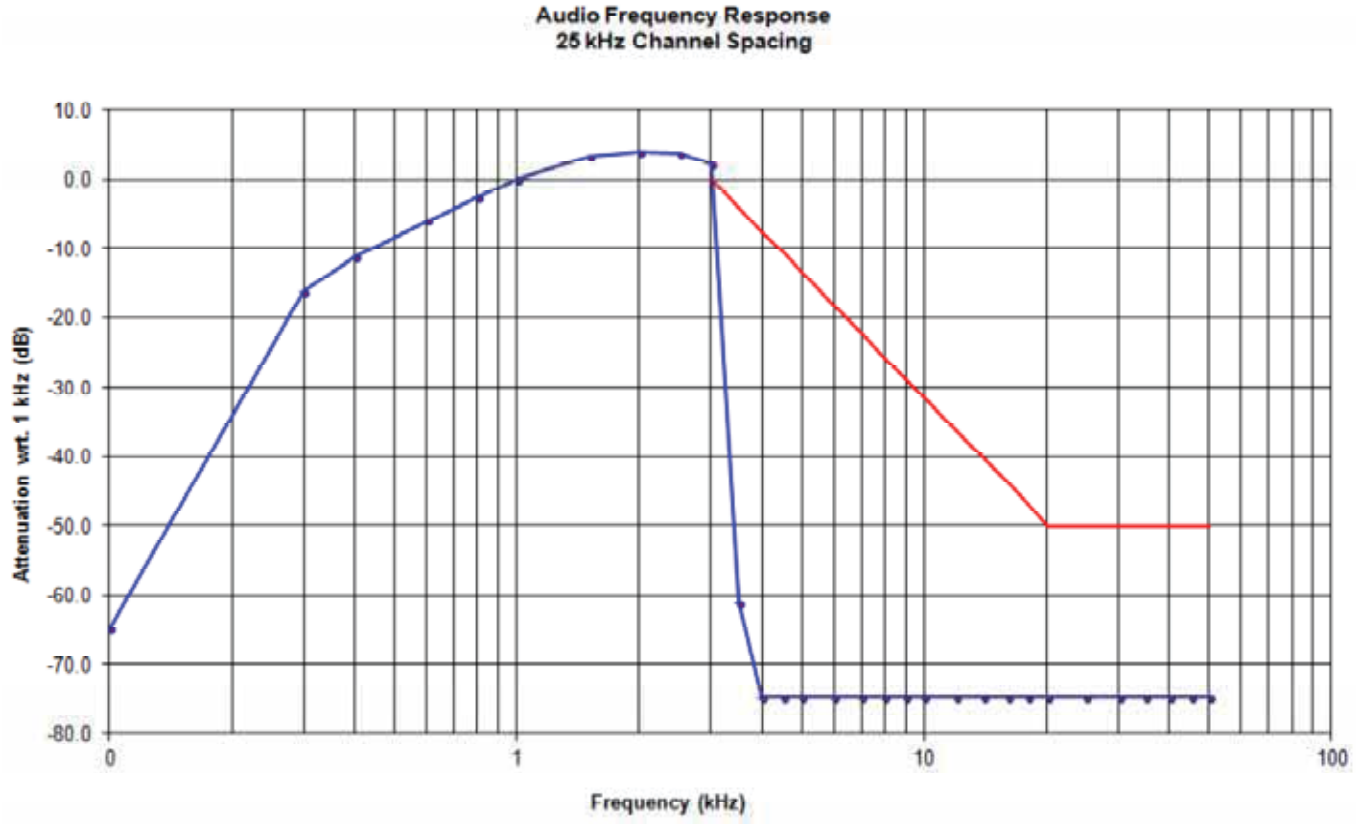
| Frequency (KHz) | Audio In (dBV) | Audio Out (dBV) | Attenuation (Out - In) (dB) | Attenuation Rel. to 1 KHz (dB) | Recommended Attenuation (dB) |
|---|---|---|---|---|---|
| 0.1 | -38.06 | -60.00 | -21.9 | -62.9 | -- |
| 0.3 | -38.06 | -13.41 | 24.7 | -16.3 | -- |
| 0.4 | -38.06 | -8.18 | 29.9 | -11.1 | -- |
| 0.6 | -38.06 | -2.96 | 35.1 | -5.8 | -- |
| 0.8 | -38.06 | 0.36 | 38.4 | -2.5 | -- |
| 1.0 | -38.06 | 2.87 | 40.9 | 0.0 | -- |
| 1.5 | -38.06 | 6.28 | 44.3 | 3.4 | -- |
| 2.0 | -38.06 | 6.89 | 45.0 | 4.0 | -- |
| 2.5 | -38.06 | 6.70 | 44.8 | 3.8 | -- |
| 3.0 | -38.06 | 5.08 | 43.1 | 2.2 | 0 |
| 3.5 | -38.06 | -56.70 | -18.6 | -59.6 | -4 |
| 4.0 | -38.06 | -70.00 | -31.9 | -72.9 | -7 |
| 4.5 | -38.06 | -70.00 | -31.9 | -72.9 | -11 |
| 5.0 | -38.06 | -70.00 | -31.9 | -72.9 | -13 |
| 6.0 | -38.06 | -70.00 | -31.9 | -72.9 | -18 |
| 7.0 | -38.06 | -70.00 | -31.9 | -72.9 | -22 |
| 8.0 | -38.06 | -70.00 | -31.9 | -72.9 | -26 |
| 9.0 | -38.06 | -70.00 | -31.9 | -72.9 | -29 |
| 10.0 | -38.06 | -70.00 | -31.9 | -72.9 | -31 |
| 12.0 | -38.06 | -70.00 | -31.9 | -72.9 | -36 |
| 14.0 | -38.06 | -70.00 | -31.9 | -72.9 | -40 |
| 16.0 | -38.06 | -70.00 | -31.9 | -72.9 | -44 |
| 18.0 | -38.06 | -70.00 | -31.9 | -72.9 | -47 |
| 20.0 | -38.06 | -70.00 | -31.9 | -72.9 | -50 |
| 25.0 | -38.06 | -70.00 | -31.9 | -72.9 | -50 |
| 30.0 | -38.06 | -70.00 | -31.9 | -72.9 | -50 |
| 35.0 | -38.06 | -70.00 | -31.9 | -72.9 | -50 |
| 40.0 | -38.06 | -70.00 | -31.9 | -72.9 | -50 |
| 45.0 | -38.06 | -70.00 | -31.9 | -72.9 | -50 |
| 50.0 | -38.06 | -70.00 | -31.9 | -72.9 | -50 |



### 5.6.4.8. 25 KHz Channel Spacing, F3E, Frequency of All Modulation States (851-869 MHz band)

**Remark:** Due to the difficulty of measuring the Frequency Response of the internal low-pass filter, the Frequency Response of All Modulation States is performed to show the roll-off at 3 kHz in comparison with the recommended audio filter attenuation.

| Frequency (KHz) | Audio In (dBV) | Audio Out (dBV) | Attenuation (Out - In) (dB) | Attenuation Rel. to 1 KHz (dB) | Recommended Attenuation (dB) |
|---|---|---|---|---|---|
| 0.1 | -38.06 | -60.00 | -21.9 | -64.8 | -- |
| 0.3 | -38.06 | -11.35 | 26.7 | -16.2 | -- |
| 0.4 | -38.06 | -6.28 | 31.8 | -11.1 | -- |
| 0.6 | -38.06 | -1.18 | 36.9 | -6.0 | -- |
| 0.8 | -38.06 | 2.28 | 40.3 | -2.5 | -- |
| 1.0 | -38.06 | 4.82 | 42.9 | 0.0 | -- |
| 1.5 | -38.06 | 8.22 | 46.3 | 3.4 | -- |
| 2.0 | -38.06 | 8.82 | 46.9 | 4.0 | -- |
| 2.5 | -38.06 | 8.64 | 46.7 | 3.8 | -- |
| 3.0 | -38.06 | 7.07 | 45.1 | 2.2 | 0 |
| 3.5 | -38.06 | -56.30 | -18.2 | -61.1 | -4 |
| 4.0 | -38.06 | -70.00 | -31.9 | -74.8 | -7 |
| 4.5 | -38.06 | -70.00 | -31.9 | -74.8 | -11 |
| 5.0 | -38.06 | -70.00 | -31.9 | -74.8 | -13 |
| 6.0 | -38.06 | -70.00 | -31.9 | -74.8 | -18 |
| 7.0 | -38.06 | -70.00 | -31.9 | -74.8 | -22 |
| 8.0 | -38.06 | -70.00 | -31.9 | -74.8 | -26 |
| 9.0 | -38.06 | -70.00 | -31.9 | -74.8 | -29 |
| 10.0 | -38.06 | -70.00 | -31.9 | -74.8 | -31 |
| 12.0 | -38.06 | -70.00 | -31.9 | -74.8 | -36 |
| 14.0 | -38.06 | -70.00 | -31.9 | -74.8 | -40 |
| 16.0 | -38.06 | -70.00 | -31.9 | -74.8 | -44 |
| 18.0 | -38.06 | -70.00 | -31.9 | -74.8 | -47 |
| 20.0 | -38.06 | -70.00 | -31.9 | -74.8 | -50 |
| 25.0 | -38.06 | -70.00 | -31.9 | -74.8 | -50 |
| 30.0 | -38.06 | -70.00 | -31.9 | -74.8 | -50 |
| 35.0 | -38.06 | -70.00 | -31.9 | -74.8 | -50 |
| 40.0 | -38.06 | -70.00 | -31.9 | -74.8 | -50 |
| 45.0 | -38.06 | -70.00 | -31.9 | -74.8 | -50 |
| 50.0 | -38.06 | -70.00 | -31.9 | -74.8 | -50 |



## 5.7. MODULATION LIMITING [§§ 2.1047 (b) & 90.210]

### 5.7.1. Limits

§ **2.1047(b):** Equipment which employs modulation limiting. A curve or family of curves showing the percentage of modulation versus the modulation input voltage shall be supplied. The information submitted shall be sufficient to show modulation limiting capability throughout the range of modulating frequencies and input modulating signal levels employed.

Recommended frequency deviation characteristics are given below:

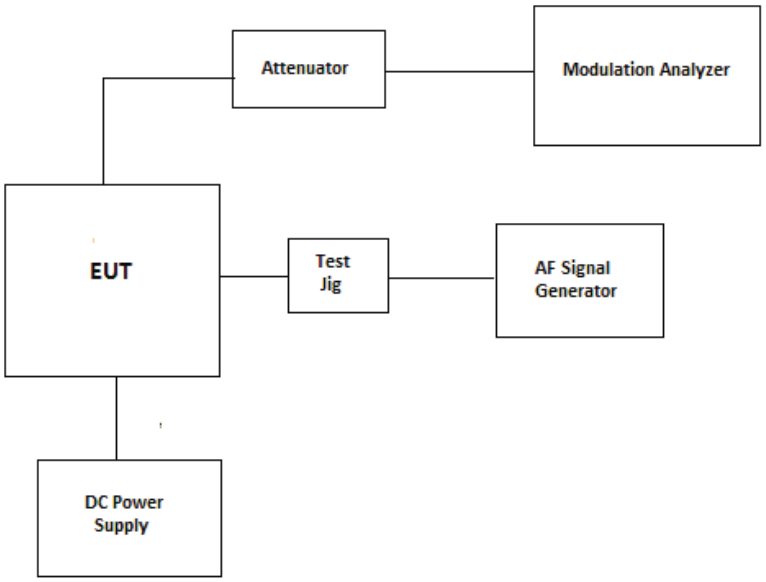
- 1.25 kHz for 6.25 kHz Channel Spacing System
- 2.5 KHz for 12.5 kHz Channel Spacing System

### 5.7.2. Method of Measurements

**For Audio Transmitter**: The carrier frequency deviation was measured with the tone input signal level varied from 0 Vp to audio input rating level plus 16 dB at frequencies 0.1, 0.5, 1.0, 3.0 and 5.0 kHz. The maximum deviation was recorded at each test condition.

**For Data Transmitter with Maximum Frequency Deviation set by Factory**: The EUT was set at maximum frequency deviation, and its peak frequency deviation was then measured using EUT's internal random data source.

### 5.7.3. Test Arrangement



### 5.7.4. Test Data

#### 5.7.4.1. Voice Modulation Limiting for 12.5 KHz Channel Spacing Operation (769-775 MHz band)

| Modulating Signal Level | Peak Frequency Deviation (kHz) | | | | | Maximum Limit |
|---|---|---|---|---|---|---|
| (mVrms) | 0.1 kHz | 0.5 kHz | 1.0 kHz | 3.0 kHz | 5.0 kHz | (kHz) |
| 2 | 0.089 | 0.15 | 0.28 | 0.60 | 0.093 | 2.5 |
| 4 | 0.096 | 0.22 | 0.51 | 1.02 | 0.099 | 2.5 |
| 6 | 0.098 | 0.31 | 0.70 | 1.23 | 0.095 | 2.5 |
| 8 | 0.099 | 0.39 | 0.93 | 1.30 | 0.097 | 2.5 |
| 10 | 0.097 | 0.46 | 1.09 | 1.34 | 0.096 | 2.5 |
| 15 | 0.096 | 0.63 | 1.48 | 1.39 | 0.096 | 2.5 |
| 20 | 0.087 | 0.83 | 1.76 | 1.40 | 0.103 | 2.5 |
| 25 | 0.106 | 0.99 | 1.87 | 1.40 | 0.101 | 2.5 |
| 30 | 0.092 | 1.16 | 1.93 | 1.40 | 0.101 | 2.5 |
| 35 | 0.093 | 1.30 | 1.97 | 1.40 | 0.105 | 2.5 |
| 40 | 0.102 | 1.42 | 2.00 | 1.40 | 0.118 | 2.5 |
| 45 | 0.101 | 1.53 | 2.02 | 1.39 | 0.107 | 2.5 |
| 50 | 0.097 | 1.61 | 2.03 | 1.40 | 0.103 | 2.5 |
| 60 | 0.096 | 1.70 | 2.01 | 1.40 | 0.103 | 2.5 |
| 70 | 0.096 | 1.73 | 2.03 | 1.40 | 0.103 | 2.5 |
| 80 | 0.096 | 1.69 | 2.03 | 1.40 | 0.102 | 2.5 |
| 90 | 0.096 | 1.70 | 2.03 | 1.40 | 0.103 | 2.5 |
| 100 | 0.096 | 1.72 | 2.03 | 1.40 | 0.103 | 2.5 |

| **Voice Signal Input Level** | = STD MOD Level + 16 dB<br>= 12 mV+ 16 dB<br>= 37.58 dB(mVrms)<br>= 75.71 mVrms | |
|---|---|---|
| **Modulation Frequency (kHz)** | **Peak Deviation (kHz)** | **Maximum Limit (kHz)** |
| 0.1 | 0.10 | 2.5 |
| 0.2 | 0.09 | 2.5 |
| 0.3 | 1.13 | 2.5 |
| 0.4 | 1.65 | 2.5 |
| 0.6 | 1.78 | 2.5 |
| 0.8 | 1.98 | 2.5 |
| 1.0 | 2.01 | 2.5 |
| 1.2 | 2.04 | 2.5 |
| 1.4 | 2.05 | 2.5 |
| 1.6 | 2.10 | 2.5 |
| 1.8 | 2.09 | 2.5 |
| 2.0 | 2.10 | 2.5 |
| 2.5 | 1.97 | 2.5 |
| 3.0 | 1.39 | 2.5 |
| 3.5 | 0.09 | 2.5 |
| 4.0 | 0.10 | 2.5 |
| 4.5 | 0.10 | 2.5 |
| 5.0 | 0.10 | 2.5 |
| 6.0 | 0.10 | 2.5 |
| 7.0 | 0.10 | 2.5 |
| 8.0 | 0.10 | 2.5 |
| 9.0 | 0.10 | 2.5 |
| 10.0 | 0.10 | 2.5 |

### 5.7.4.2. Voice Modulation Limiting for 12.5 KHz Channel Spacing Operation (799-805 MHz band)

| Modulating Signal Level | Peak Frequency Deviation (kHz) | | | | | Maximum Limit |
|---|---|---|---|---|---|---|
| (mVrms) | 0.1 kHz | 0.5 kHz | 1.0 kHz | 3.0 kHz | 5.0 kHz | (kHz) |
| 2 | 0.090 | 0.16 | 0.29 | 0.59 | 0.091 | 2.5 |
| 4 | 0.089 | 0.23 | 0.49 | 1.02 | 0.093 | 2.5 |
| 6 | 0.086 | 0.30 | 0.70 | 1.23 | 0.092 | 2.5 |
| 8 | 0.096 | 0.38 | 0.91 | 1.30 | 0.093 | 2.5 |
| 10 | 0.096 | 0.45 | 1.06 | 1.32 | 0.093 | 2.5 |
| 15 | 0.088 | 0.63 | 1.46 | 1.34 | 0.094 | 2.5 |
| 20 | 0.086 | 0.81 | 1.74 | 1.36 | 0.099 | 2.5 |
| 25 | 0.087 | 0.99 | 1.87 | 1.39 | 0.098 | 2.5 |
| 30 | 0.097 | 1.13 | 1.93 | 1.39 | 0.095 | 2.5 |
| 35 | 0.095 | 1.28 | 1.97 | 1.40 | 0.095 | 2.5 |
| 40 | 0.094 | 1.41 | 2.00 | 1.39 | 0.096 | 2.5 |
| 45 | 0.094 | 1.50 | 2.03 | 1.39 | 0.098 | 2.5 |
| 50 | 0.094 | 1.59 | 2.03 | 1.40 | 0.099 | 2.5 |
| 60 | 0.094 | 1.70 | 2.02 | 1.40 | 0.098 | 2.5 |
| 70 | 0.094 | 1.73 | 2.04 | 1.40 | 0.098 | 2.5 |
| 80 | 0.094 | 1.73 | 2.04 | 1.40 | 0.098 | 2.5 |
| 90 | 0.094 | 1.73 | 2.04 | 1.40 | 0.098 | 2.5 |
| 100 | 0.094 | 1.73 | 2.04 | 1.40 | 0.098 | 2.5 |

| **Voice Signal Input Level** | = STD MOD Level + 16 dB<br>= 12 mV+ 16 dB<br>= 37.58 dB(mVrms)<br>= 75.71 mVrms | |
|---|---|---|
| **Modulation Frequency (kHz)** | **Peak Deviation (kHz)** | **Maximum Limit (kHz)** |
| 0.1 | 0.09 | 2.5 |
| 0.2 | 0.10 | 2.5 |
| 0.3 | 1.64 | 2.5 |
| 0.4 | 1.77 | 2.5 |
| 0.6 | 1.94 | 2.5 |
| 0.8 | 2.05 | 2.5 |
| 1.0 | 2.06 | 2.5 |
| 1.2 | 2.05 | 2.5 |
| 1.4 | 2.09 | 2.5 |
| 1.6 | 2.09 | 2.5 |
| 1.8 | 2.10 | 2.5 |
| 2.0 | 1.96 | 2.5 |
| 2.5 | 1.40 | 2.5 |
| 3.0 | 0.10 | 2.5 |
| 3.5 | 0.10 | 2.5 |
| 4.0 | 0.09 | 2.5 |
| 4.5 | 0.10 | 2.5 |
| 5.0 | 0.09 | 2.5 |
| 6.0 | 0.09 | 2.5 |
| 7.0 | 0.09 | 2.5 |
| 8.0 | 0.09 | 2.5 |
| 9.0 | 0.09 | 2.5 |
| 10.0 | 0.09 | 2.5 |

### 5.7.4.3. Voice Modulation Limiting for 12.5 KHz Channel Spacing Operation (806-824 MHz band)

| Modulating Signal Level | Peak Frequency Deviation (kHz) | | | | | Maximum Limit |
|---|---|---|---|---|---|---|
| (mVrms) | 0.1 kHz | 0.5 kHz | 1.0 kHz | 3.0 kHz | 5.0 kHz | (kHz) |
| 2 | 0.096 | 0.14 | 0.29 | 0.59 | 0.094 | 2.5 |
| 4 | 0.090 | 0.23 | 0.49 | 1.01 | 0.094 | 2.5 |
| 6 | 0.098 | 0.30 | 0.69 | 1.24 | 0.097 | 2.5 |
| 8 | 0.094 | 0.38 | 0.91 | 1.30 | 0.097 | 2.5 |
| 10 | 0.089 | 0.45 | 1.06 | 1.33 | 0.095 | 2.5 |
| 15 | 0.095 | 0.63 | 1.46 | 1.38 | 0.097 | 2.5 |
| 20 | 0.094 | 0.82 | 1.75 | 1.39 | 0.098 | 2.5 |
| 25 | 0.094 | 0.97 | 1.86 | 1.39 | 0.095 | 2.5 |
| 30 | 0.091 | 1.14 | 1.92 | 1.40 | 0.095 | 2.5 |
| 35 | 0.092 | 1.28 | 1.96 | 1.39 | 0.099 | 2.5 |
| 40 | 0.092 | 1.41 | 2.00 | 1.39 | 0.099 | 2.5 |
| 45 | 0.093 | 1.51 | 2.02 | 1.39 | 0.099 | 2.5 |
| 50 | 0.094 | 1.59 | 2.03 | 1.39 | 0.095 | 2.5 |
| 60 | 0.096 | 1.69 | 2.03 | 1.40 | 0.095 | 2.5 |
| 70 | 0.094 | 1.72 | 2.04 | 1.39 | 0.095 | 2.5 |
| 80 | 0.094 | 1.72 | 2.03 | 1.40 | 0.095 | 2.5 |
| 90 | 0.094 | 1.72 | 2.04 | 1.39 | 0.095 | 2.5 |
| 100 | 0.094 | 1.70 | 2.01 | 1.40 | 0.095 | 2.5 |

| **Voice Signal Input Level** | = STD MOD Level + 16 dB<br>= 12 mV+ 16 dB<br>= 37.58 dB(mVrms)<br>= 75.71 mVrms | |
|---|---|---|
| **Modulation Frequency (kHz)** | **Peak Deviation (kHz)** | **Maximum Limit (kHz)** |
| 0.1 | 0.09 | 2.5 |
| 0.2 | 0.10 | 2.5 |
| 0.3 | 1.63 | 2.5 |
| 0.4 | 1.77 | 2.5 |
| 0.6 | 1.93 | 2.5 |
| 0.8 | 2.04 | 2.5 |
| 1.0 | 2.06 | 2.5 |
| 1.2 | 2.05 | 2.5 |
| 1.4 | 2.07 | 2.5 |
| 1.6 | 2.08 | 2.5 |
| 1.8 | 2.10 | 2.5 |
| 2.0 | 1.96 | 2.5 |
| 2.5 | 1.40 | 2.5 |
| 3.0 | 0.10 | 2.5 |
| 3.5 | 0.09 | 2.5 |
| 4.0 | 0.09 | 2.5 |
| 4.5 | 0.10 | 2.5 |
| 5.0 | 0.09 | 2.5 |
| 6.0 | 0.09 | 2.5 |
| 7.0 | 0.10 | 2.5 |
| 8.0 | 0.10 | 2.5 |
| 9.0 | 0.10 | 2.5 |
| 10.0 | 0.10 | 2.5 |

### 5.7.4.4. Voice Modulation Limiting for 20 KHz Channel Spacing Operation (806-824 MHz band)

| Modulating Signal Level | Peak Frequency Deviation (kHz) at the following modulating frequency: | | | | | Maximum Limit |
|---|---|---|---|---|---|---|
| (mVrms) | 0.1 kHz | 0.5 kHz | 1.0 kHz | 3.0 kHz | 5.0 kHz | (kHz) |
| 2 | 0.107 | 0.21 | 0.41 | 1.18 | 0.103 | 4.0 |
| 4 | 0.108 | 0.31 | 0.76 | 2.04 | 0.101 | 4.0 |
| 6 | 0.097 | 0.44 | 1.08 | 2.49 | 0.104 | 4.0 |
| 8 | 0.098 | 0.57 | 1.42 | 2.62 | 0.097 | 4.0 |
| 10 | 0.097 | 0.67 | 1.69 | 2.71 | 0.099 | 4.0 |
| 15 | 0.098 | 0.98 | 2.31 | 2.83 | 0.095 | 4.0 |
| 20 | 0.095 | 1.28 | 2.75 | 2.83 | 0.102 | 4.0 |
| 25 | 0.097 | 1.56 | 2.93 | 2.83 | 0.104 | 4.0 |
| 30 | 0.102 | 1.79 | 3.05 | 2.83 | 0.104 | 4.0 |
| 35 | 0.102 | 2.03 | 3.13 | 2.83 | 0.118 | 4.0 |
| 40 | 0.101 | 2.23 | 3.17 | 2.83 | 0.121 | 4.0 |
| 45 | 0.098 | 2.41 | 3.23 | 2.83 | 0.114 | 4.0 |
| 50 | 0.096 | 2.55 | 3.25 | 2.83 | 0.114 | 4.0 |
| 60 | 0.098 | 2.71 | 3.21 | 2.83 | 0.121 | 4.0 |
| 70 | 0.098 | 2.74 | 3.25 | 2.83 | 0.124 | 4.0 |
| 80 | 0.095 | 2.72 | 3.25 | 2.83 | 0.124 | 4.0 |
| 90 | 0.094 | 2.75 | 3.26 | 2.83 | 0.124 | 4.0 |
| 100 | 0.094 | 2.70 | 3.18 | 2.83 | 0.122 | 4.0 |

| **Voice Signal Input Level** | = STD MOD Level + 16 dB<br>= 12.5 mV+ 16 dB<br>= 37.94 dB(mVrms)<br>= 78.87 mVrms | |
|---|---|---|
| **Modulation Frequency (KHz)** | **Peak Deviation (KHz)** | **Maximum Limit (KHz)** |
| 0.1 | 0.11 | 4.0 |
| 0.2 | 0.10 | 4.0 |
| 0.3 | 1.84 | 4.0 |
| 0.4 | 2.64 | 4.0 |
| 0.6 | 2.82 | 4.0 |
| 0.8 | 3.06 | 4.0 |
| 1.0 | 3.28 | 4.0 |
| 1.2 | 3.31 | 4.0 |
| 1.4 | 3.30 | 4.0 |
| 1.6 | 3.33 | 4.0 |
| 1.8 | 3.35 | 4.0 |
| 2.0 | 3.39 | 4.0 |
| 2.5 | 3.36 | 4.0 |
| 3.0 | 2.83 | 4.0 |
| 3.5 | 0.10 | 4.0 |
| 4.0 | 0.09 | 4.0 |
| 4.5 | 0.09 | 4.0 |
| 5.0 | 0.10 | 4.0 |
| 6.0 | 0.10 | 4.0 |
| 7.0 | 0.10 | 4.0 |
| 8.0 | 0.10 | 4.0 |
| 9.0 | 0.10 | 4.0 |
| 10.0 | 0.10 | 4.0 |

### 5.7.4.5. Voice Modulation Limiting for 25 KHz Channel Spacing Operation (806-824 MHz band)

| Modulating Signal Level | Peak Frequency Deviation (kHz) at the following modulating frequency: | | | | | Maximum Limit |
|---|---|---|---|---|---|---|
| (mVrms) | 0.1 kHz | 0.5 kHz | 1.0 kHz | 3.0 kHz | 5.0 kHz | (kHz) |
| 2 | 0.092 | 0.24 | 0.52 | 1.45 | 0.105 | 5.0 |
| 4 | 0.094 | 0.39 | 0.95 | 2.54 | 0.101 | 5.0 |
| 6 | 0.098 | 0.55 | 1.37 | 3.11 | 0.100 | 5.0 |
| 8 | 0.097 | 0.73 | 1.79 | 3.27 | 0.101 | 5.0 |
| 10 | 0.098 | 0.85 | 2.13 | 3.38 | 0.109 | 5.0 |
| 15 | 0.097 | 1.23 | 2.91 | 3.48 | 0.110 | 5.0 |
| 20 | 0.105 | 1.61 | 3.45 | 3.52 | 0.102 | 5.0 |
| 25 | 0.101 | 1.96 | 3.66 | 3.52 | 0.111 | 5.0 |
| 30 | 0.110 | 2.27 | 3.80 | 3.52 | 0.113 | 5.0 |
| 35 | 0.108 | 2.57 | 3.90 | 3.52 | 0.124 | 5.0 |
| 40 | 0.101 | 2.82 | 3.98 | 3.52 | 0.130 | 5.0 |
| 45 | 0.113 | 3.02 | 4.02 | 3.53 | 0.136 | 5.0 |
| 50 | 0.109 | 3.18 | 4.06 | 3.53 | 0.120 | 5.0 |
| 60 | 0.102 | 3.37 | 3.98 | 3.52 | 0.136 | 5.0 |
| 70 | 0.102 | 3.41 | 4.05 | 3.52 | 0.132 | 5.0 |
| 80 | 0.102 | 3.35 | 4.03 | 3.52 | 0.131 | 5.0 |
| 90 | 0.102 | 3.38 | 4.07 | 3.52 | 0.130 | 5.0 |
| 100 | 0.102 | 3.41 | 4.01 | 3.52 | 0.127 | 5.0 |

| **Voice Signal Input Level** | = STD MOD Level + 16 dB<br>= 12.5 mV+ 16 dB<br>= 37.94 dB(mVrms)<br>= 78.87 mVrms | |
|---|---|---|
| **Modulation Frequency (KHz)** | **Peak Deviation (KHz)** | **Maximum Limit (KHz)** |
| 0.1 | 0.11 | 5.0 |
| 0.2 | 0.11 | 5.0 |
| 0.3 | 3.31 | 5.0 |
| 0.4 | 3.82 | 5.0 |
| 0.6 | 4.08 | 5.0 |
| 0.8 | 4.09 | 5.0 |
| 1.0 | 4.09 | 5.0 |
| 1.2 | 4.13 | 5.0 |
| 1.4 | 4.18 | 5.0 |
| 1.6 | 4.22 | 5.0 |
| 1.8 | 4.21 | 5.0 |
| 2.0 | 3.53 | 5.0 |
| 2.5 | 0.10 | 5.0 |
| 3.0 | 0.10 | 5.0 |
| 3.5 | 0.10 | 5.0 |
| 4.0 | 0.12 | 5.0 |
| 4.5 | 0.11 | 5.0 |
| 5.0 | 0.10 | 5.0 |
| 6.0 | 0.10 | 5.0 |
| 7.0 | 0.10 | 5.0 |
| 8.0 | 0.10 | 5.0 |
| 9.0 | 0.10 | 5.0 |

### 5.7.4.6. Voice Modulation Limiting for 12.5 KHz Channel Spacing Operation (851-869 MHz band)

| Modulating Signal Level | Peak Frequency Deviation (kHz) | | | | | Maximum Limit |
|---|---|---|---|---|---|---|
| (mVrms) | 0.1 kHz | 0.5 kHz | 1.0 kHz | 3.0 kHz | 5.0 kHz | (kHz) |
| 2 | 0.095 | 0.16 | 0.29 | 0.59 | 0.098 | 2.5 |
| 4 | 0.089 | 0.23 | 0.50 | 1.02 | 0.094 | 2.5 |
| 6 | 0.096 | 0.31 | 0.70 | 1.24 | 0.097 | 2.5 |
| 8 | 0.094 | 0.39 | 0.92 | 1.30 | 0.094 | 2.5 |
| 10 | 0.096 | 0.44 | 1.07 | 1.37 | 0.097 | 2.5 |
| 15 | 0.098 | 0.63 | 1.46 | 1.38 | 0.096 | 2.5 |
| 20 | 0.099 | 0.82 | 1.75 | 1.39 | 0.093 | 2.5 |
| 25 | 0.093 | 0.98 | 1.87 | 1.39 | 0.098 | 2.5 |
| 30 | 0.093 | 1.14 | 1.93 | 1.40 | 0.099 | 2.5 |
| 35 | 0.097 | 1.29 | 1.97 | 1.40 | 0.099 | 2.5 |
| 40 | 0.096 | 1.40 | 2.00 | 1.39 | 0.099 | 2.5 |
| 45 | 0.098 | 1.52 | 2.02 | 1.40 | 0.099 | 2.5 |
| 50 | 0.097 | 1.59 | 2.04 | 1.41 | 0.098 | 2.5 |
| 60 | 0.097 | 1.70 | 2.01 | 1.40 | 0.098 | 2.5 |
| 70 | 0.098 | 1.75 | 2.04 | 1.40 | 0.098 | 2.5 |
| 80 | 0.098 | 1.73 | 2.03 | 1.40 | 0.098 | 2.5 |
| 90 | 0.098 | 1.73 | 2.04 | 1.40 | 0.098 | 2.5 |
| 100 | 0.098 | 1.73 | 2.00 | 1.40 | 0.098 | 2.5 |

| **Voice Signal Input Level** | = STD MOD Level + 16 dB<br>= 12 mV+ 16 dB<br>= 37.58 dB(mVrms)<br>= 75.71 mVrms | |
|---|---|---|
| **Modulation Frequency (kHz)** | **Peak Deviation (kHz)** | **Maximum Limit (kHz)** |
| 0.1 | 0.10 | 2.5 |
| 0.2 | 0.10 | 2.5 |
| 0.3 | 1.12 | 2.5 |
| 0.4 | 1.64 | 2.5 |
| 0.6 | 1.78 | 2.5 |
| 0.8 | 1.93 | 2.5 |
| 1.0 | 2.03 | 2.5 |
| 1.2 | 2.04 | 2.5 |
| 1.4 | 2.06 | 2.5 |
| 1.6 | 2.08 | 2.5 |
| 1.8 | 2.10 | 2.5 |
| 2.0 | 2.11 | 2.5 |
| 2.5 | 1.97 | 2.5 |
| 3.0 | 1.40 | 2.5 |
| 3.5 | 0.09 | 2.5 |
| 4.0 | 0.10 | 2.5 |
| 4.5 | 0.10 | 2.5 |
| 5.0 | 0.09 | 2.5 |
| 6.0 | 0.10 | 2.5 |
| 7.0 | 0.09 | 2.5 |
| 8.0 | 0.09 | 2.5 |
| 9.0 | 0.09 | 2.5 |
| 10.0 | 0.09 | 2.5 |

### 5.7.4.7. Voice Modulation Limiting for 20 KHz Channel Spacing Operation (851-869 MHz band)

| Modulating Signal Level | Peak Frequency Deviation (kHz) at the following modulating frequency: | | | | | Maximum Limit |
|---|---|---|---|---|---|---|
| (mVrms) | 0.1 kHz | 0.5 kHz | 1.0 kHz | 3.0 kHz | 5.0 kHz | (kHz) |
| 2 | 0.107 | 0.20 | 0.42 | 1.17 | 0.105 | 4.0 |
| 4 | 0.101 | 0.33 | 0.76 | 2.04 | 0.099 | 4.0 |
| 6 | 0.100 | 0.45 | 1.09 | 2.50 | 0.097 | 4.0 |
| 8 | 0.098 | 0.57 | 1.43 | 2.62 | 0.107 | 4.0 |
| 10 | 0.096 | 0.68 | 1.69 | 2.70 | 0.101 | 4.0 |
| 15 | 0.096 | 0.98 | 2.31 | 2.83 | 0.104 | 4.0 |
| 20 | 0.098 | 1.27 | 2.75 | 2.84 | 0.105 | 4.0 |
| 25 | 0.096 | 1.55 | 2.93 | 2.84 | 0.108 | 4.0 |
| 30 | 0.103 | 1.81 | 3.04 | 2.83 | 0.110 | 4.0 |
| 35 | 0.100 | 2.03 | 3.13 | 2.84 | 0.121 | 4.0 |
| 40 | 0.102 | 2.24 | 3.19 | 2.84 | 0.125 | 4.0 |
| 45 | 0.106 | 2.42 | 3.23 | 2.84 | 0.129 | 4.0 |
| 50 | 0.102 | 2.54 | 3.26 | 2.84 | 0.126 | 4.0 |
| 60 | 0.103 | 2.71 | 3.26 | 2.83 | 0.127 | 4.0 |
| 70 | 0.100 | 2.74 | 3.26 | 2.83 | 0.126 | 4.0 |
| 80 | 0.101 | 2.77 | 3.25 | 2.83 | 0.125 | 4.0 |
| 90 | 0.103 | 2.75 | 3.25 | 2.83 | 0.127 | 4.0 |
| 100 | 0.103 | 2.74 | 3.18 | 2.83 | 0.129 | 4.0 |

| **Voice Signal Input Level** | = STD MOD Level + 16 dB<br>= 12.5 mV+ 16 dB<br>= 37.94 dB(mVrms)<br>= 78.87 mVrms | |
|---|---|---|
| **Modulation Frequency (KHz)** | **Peak Deviation (KHz)** | **Maximum Limit (KHz)** |
| 0.1 | 0.10 | 4.0 |
| 0.2 | 0.11 | 4.0 |
| 0.3 | 1.84 | 4.0 |
| 0.4 | 2.65 | 4.0 |
| 0.6 | 2.77 | 4.0 |
| 0.8 | 3.06 | 4.0 |
| 1.0 | 3.28 | 4.0 |
| 1.2 | 3.31 | 4.0 |
| 1.4 | 3.31 | 4.0 |
| 1.6 | 3.32 | 4.0 |
| 1.8 | 3.34 | 4.0 |
| 2.0 | 3.35 | 4.0 |
| 2.5 | 3.37 | 4.0 |
| 3.0 | 2.84 | 4.0 |
| 3.5 | 0.10 | 4.0 |
| 4.0 | 0.10 | 4.0 |
| 4.5 | 0.12 | 4.0 |
| 5.0 | 0.10 | 4.0 |
| 6.0 | 0.10 | 4.0 |
| 7.0 | 0.10 | 4.0 |
| 8.0 | 0.10 | 4.0 |
| 9.0 | 0.10 | 4.0 |
| 10.0 | 0.10 | 4.0 |

### 5.7.4.8. Voice Modulation Limiting for 25 KHz Channel Spacing Operation (851-869 MHz band)

| Modulating Signal Level | Peak Frequency Deviation (kHz) at the following modulating frequency: | | | | | Maximum Limit |
|---|---|---|---|---|---|---|
| (mVrms) | 0.1 kHz | 0.5 kHz | 1.0 kHz | 3.0 kHz | 5.0 kHz | (kHz) |
| 2 | 0.108 | 0.25 | 0.52 | 1.45 | 0.098 | 5.0 |
| 4 | 0.106 | 0.40 | 0.93 | 2.53 | 0.100 | 5.0 |
| 6 | 0.105 | 0.55 | 1.34 | 3.10 | 0.098 | 5.0 |
| 8 | 0.102 | 0.71 | 1.76 | 3.27 | 0.109 | 5.0 |
| 10 | 0.110 | 0.84 | 2.10 | 3.35 | 0.108 | 5.0 |
| 15 | 0.112 | 1.21 | 2.89 | 3.49 | 0.107 | 5.0 |
| 20 | 0.102 | 1.59 | 3.42 | 3.51 | 0.121 | 5.0 |
| 25 | 0.105 | 1.93 | 3.66 | 3.52 | 0.115 | 5.0 |
| 30 | 0.109 | 2.24 | 3.80 | 3.52 | 0.122 | 5.0 |
| 35 | 0.110 | 2.52 | 3.89 | 3.53 | 0.125 | 5.0 |
| 40 | 0.107 | 2.79 | 3.96 | 3.53 | 0.131 | 5.0 |
| 45 | 0.103 | 3.00 | 4.01 | 3.53 | 0.148 | 5.0 |
| 50 | 0.106 | 3.16 | 4.06 | 3.52 | 0.136 | 5.0 |
| 60 | 0.107 | 3.38 | 4.02 | 3.52 | 0.132 | 5.0 |
| 70 | 0.106 | 3.41 | 4.06 | 3.53 | 0.138 | 5.0 |
| 80 | 0.103 | 3.42 | 4.05 | 3.52 | 0.132 | 5.0 |
| 90 | 0.103 | 3.43 | 4.05 | 3.52 | 0.124 | 5.0 |
| 100 | 0.103 | 3.41 | 3.97 | 3.52 | 0.124 | 5.0 |

| **Voice Signal Input Level** | = STD MOD Level + 16 dB<br>= 12.5 mV+ 16 dB<br>= 37.94 dB(mVrms)<br>= 78.87 mVrms | |
|---|---|---|
| **Modulation Frequency (KHz)** | **Peak Deviation (KHz)** | **Maximum Limit (KHz)** |
| 0.1 | 0.10 | 5.0 |
| 0.2 | 0.11 | 5.0 |
| 0.3 | 2.29 | 5.0 |
| 0.4 | 3.30 | 5.0 |
| 0.6 | 3.51 | 5.0 |
| 0.8 | 3.82 | 5.0 |
| 1.0 | 4.10 | 5.0 |
| 1.2 | 4.13 | 5.0 |
| 1.4 | 4.12 | 5.0 |
| 1.6 | 4.14 | 5.0 |
| 1.8 | 4.19 | 5.0 |
| 2.0 | 4.23 | 5.0 |
| 2.5 | 4.20 | 5.0 |
| 3.0 | 3.54 | 5.0 |
| 3.5 | 0.10 | 5.0 |
| 4.0 | 0.11 | 5.0 |
| 4.5 | 0.11 | 5.0 |
| 5.0 | 0.12 | 5.0 |
| 6.0 | 0.11 | 5.0 |
| 7.0 | 0.10 | 5.0 |
| 8.0 | 0.10 | 5.0 |
| 9.0 | 0.10 | 5.0 |

### 5.7.4.9. Digital Modulation

Max Deviation measured for 6.25 KHz Channel Spacing Digital Mod = 1.56 kHz

| | | | |
|---|---|---|---|
| Phase 1( Digital) | Channel 21 | 769.1 MHz | ±2.83 kHz |
| Phase 1( Digital) | Channel 24 | 799.1 MHz | ±2.86 kHz |
| Phase 1( Digital) | Channel 27 | 806.1 MHz | ±2.87 kHz |
| Phase 1( Digital) | Channel 30 | 851.1 MHz | ±2.88 kHz |

## 5.8. OCCUPIED BANDWIDTH & EMISSION MASK [§§ 2.1049, 90.209, 90.210, 90.210 & 90.691]

### 5.8.1. Limits

STANDARD CHANNEL SPACING/BANDWIDTH

| Frequency band (MHz) | Channel spacing (kHz) | Authorized bandwidth (kHz) |
|---|---|---|
| Below 25[2]. | | |
| 25–50 | 20 | 20 |
| 72–76 | 20 | 20 |
| 150–174 | [1]7.5 | [1,3]20/11.25/6 |
| 216–220[5] | 6.25 | 20/11.25/6 |
| 220–222 | 5 | 4 |
| 406–512[2] | [1]6.25 | [1,3]20/11.25/6 |
| 806–809/851–854 | 12.5 | 20 |
| 809–824/854–869 | 25 | 20 |
| 896–901/935–940 | 12.5 | 13.6 |
| 902–928[4]. | | |
| 929–930 | 25 | 20 |
| 1427–1432[5] | 12.5 | 12.5 |
| [3]2450–2483.5[2]. | | |
| Above 2500[2]. | | |

Emissions shall be attenuated below the mean output power of the transmitter as follows:

**Emission Mask Requirement- FCC**

Reference: 90.210 and 90.691

APPLICABLE EMISSION MASKS

| Frequency band (MHz) | Mask for equipment with Audio low pass filter | Mask for equipment without audio low pass filter |
|---|---|---|
| Below 25[1] | A or B | A or C |
| 25–50 | B | C |
| 72–76 | B | C |
| 150–174[2] | B, D, or E | C, D, or E |
| 150 Paging-only | B | C |
| 220–222 | F | F |
| 421–512[2] | B, D, or E | C, D, or E |
| 450 Paging-only | B | G |
| 806–809/851–854 | B | H |
| 809–824/854–869[3] | B | G |
| 896–901/935–940 | I | J |
| 902–928 | K | K |
| 929–930 | B | G |
| 4940–4990 MHz | L or M | L or M. |
| 5850–5925[4] | | |
| All other bands | B | C |

[1]Equipment using single sideband J3E emission must the requirements of Emission Mask A. Equipment using other emissions must meet the requirements of Emission Mask B or C, as applicable.

[2]Equipment designed to operate with a 25 kHz channel bandwidth must meet the requirements of Emission Mask B or C, as applicable. Equipment designed to operate with a 12.5 kHz channel bandwidth must meet the requirements of Emission Mask D, and equipment designed to operate with a 6.25 kHz channel bandwidth Must meet the requirements of Emission Mask E.

[3]Equipment used in this licensed to EA or non-EA systems shall comply with the emission mask provisions of § 90.691.

[4]DSRCS Roadside Units equipment in the 5850–5925 MHz band is governed under subpart M of this part.

§ 90.691 Emission mask requirements for EA-based systems. (a) Out-of-band emission requirement shall apply only to the ''outer'' channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows: (1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 116 Log10(f/6.1) decibels or 50 + 10 Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz. (2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least 43 + 10Log10(P) decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz. (b) When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

### 5.8.2. Method of Measurements

Refer to Section 8.4 of this report for measurement details.

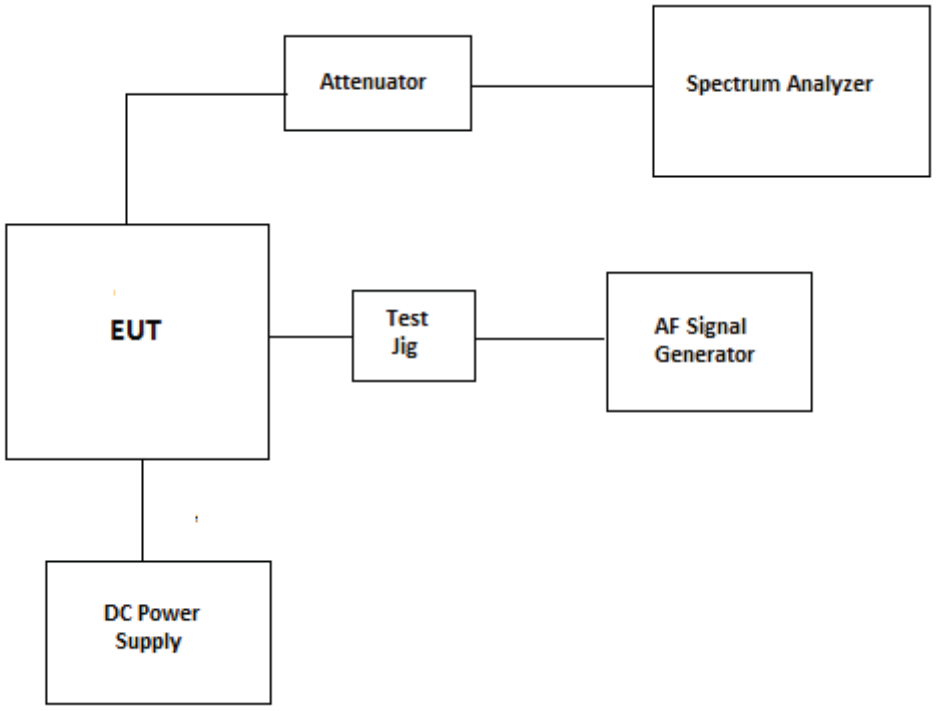
Masks selected
Channel Bandwidth 12.5KHz, 20KHz & 25KHz

| **Frequency** | | Analog | Digital |
|---|---|---|---|
| 806-809 | 851-854 | B | H |
| 809-824 | 854-869 | B | G |

| **Frequency** | **Analog** | **Mask** |
|---|---|---|
| 806.1 | 12.5, 20 & 25kHz | B |
| 808.9 | 20KHz | B |
| 815.1 | 12.5 & 25kHz | B, 90.691 |
| 823.9 | 12.5 & 25kHz | B, 90.691 |
| 851.1 | 12.5, 20 & 25kHz | B |
| 853.9 | 20KHz | B |
| 860.1 | 12.5 & 25kHz | B, 90.691 |
| 868.9 | 12.5 & 25kHz | B, 90.691 |

| **Frequency** | **Digital** | **Mask** |
|---|---|---|
| 806.1 | Phase 1&2 | H |
| 815.1 | Phase 1&2 | G, 90.691 |
| 823.9 | Phase 1&2 | G, 90.691 |
| 851.1 | Phase 1&2 | H |
| 860.1 | Phase 1&2 | G, 90.691 |
| 868.9 | Phase 1&2 | G, 90.691 |

### 5.8.3. Test Arrangement



## 5.8.4. Test Data- OCCUPIED BANDWIDTH

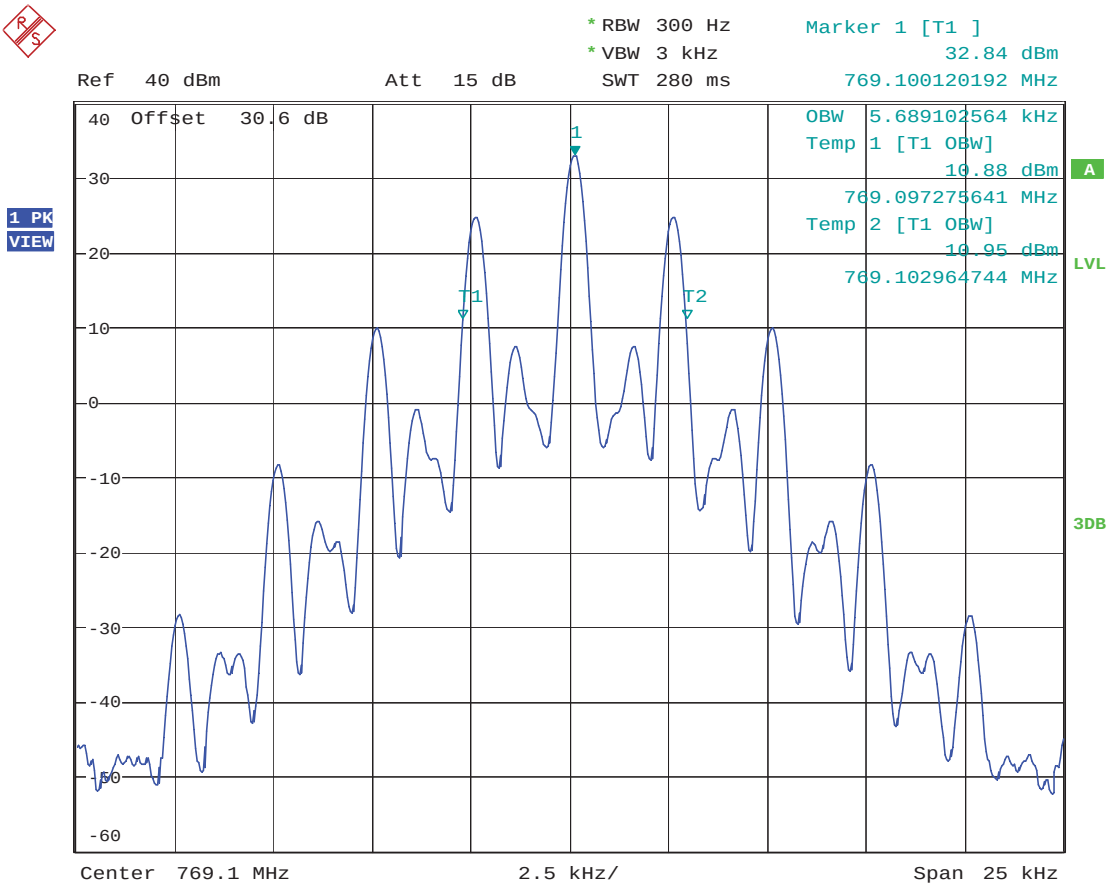
### 5.8.4.1. 99% Occupied Bandwidth (kHz)

| Frequency (MHz) | Channel Spacing (kHz) | Analog FM with 2.5 KHz sine wave signal | Digital F1D/F1E | Digital F1W | Maximum Authorized Bandwidth (kHz) |
|---|---|---|---|---|---|
| 769.1 | 12.5 | 5.689 | 7.93 | 8.05 | 11.25 |
| 774.9 | 12.5 | 5.689 | 7.93 | 7.89 | 11.25 |
| 799.1 | 12.5 | 5.689 | 8.01 | 8.05 | 11.25 |
| 804.9 | 12.5 | 5.689 | 7.89 | 8.05 | 11.25 |
| 806.1 | 12.5 | 5.689 | 7.89 | 8.05 | 20 |
| 815.1 | 12.5 | 5.689 | 7.81 | 8.09 | 20 |
| 823.9 | 12.5 | 5.689 | 7.81 | 8.05 | 20 |
| 806.1 | 20 | 10.336 | N/A | N/A | 20 |
| 808.9 | 20 | 10.385 | N/A | N/A | 20 |
| 806.1 | 25 | 15.65 | N/A | N/A | 20 |
| 815.1 | 25 | 15.82 | N/A | N/A | 20 |
| 823.9 | 25 | 15.705 | N/A | N/A | 20 |
| 851.1 | 12.5 | 5.689 | 7.81 | 8.05 | 20 |
| 860.1 | 12.5 | 5.689 | 7.93 | 8.01 | 20 |
| 868.9 | 12.5 | 5.689 | 7.97 | 7.85 | 20 |
| 851.1 | 20 | 10.385 | N/A | N/A | 20 |
| 853.9 | 20 | 10.385 | N/A | N/A | 20 |
| 851.1 | 25 | 15.705 | N/A | N/A | 20 |
| 860.1 | 25 | 15.761 | N/A | N/A | 20 |
| 868.9 | 25 | 15.705 | N/A | N/A | 20 |

**Note**: 99% Occupied Bandwidth measurements were done using the built-in auto function of the analyzer.

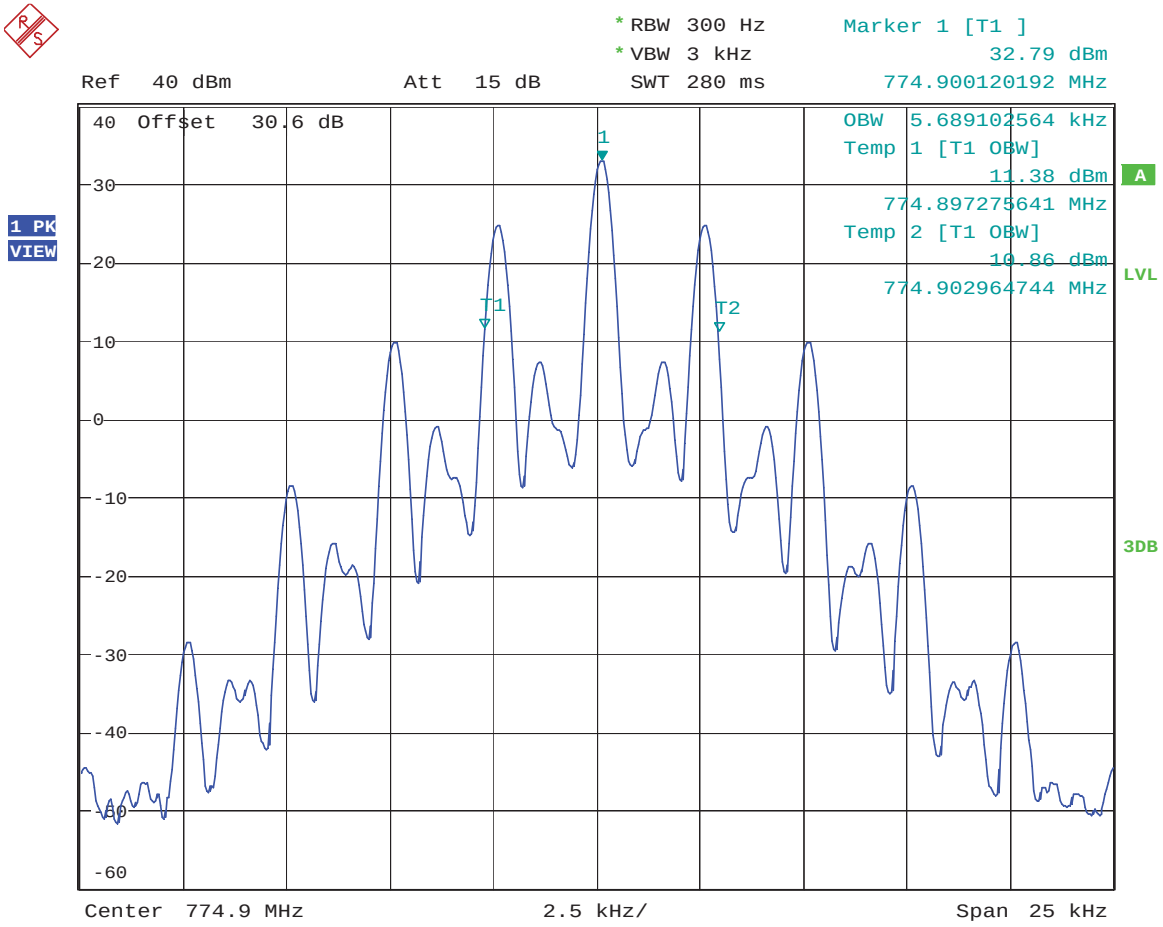
### 5.8.4.2. Configuration: 99% OBW, Band 1: 769-775MHz, 769.1MHz, 12.5 KHz, Analog, High power

OBW: 5.689 KHz



### 5.8.4.3. Configuration: 99% OBW, Band 1: 769-775MHz, 774.9MHz, 12.5 KHz, Analog, High power

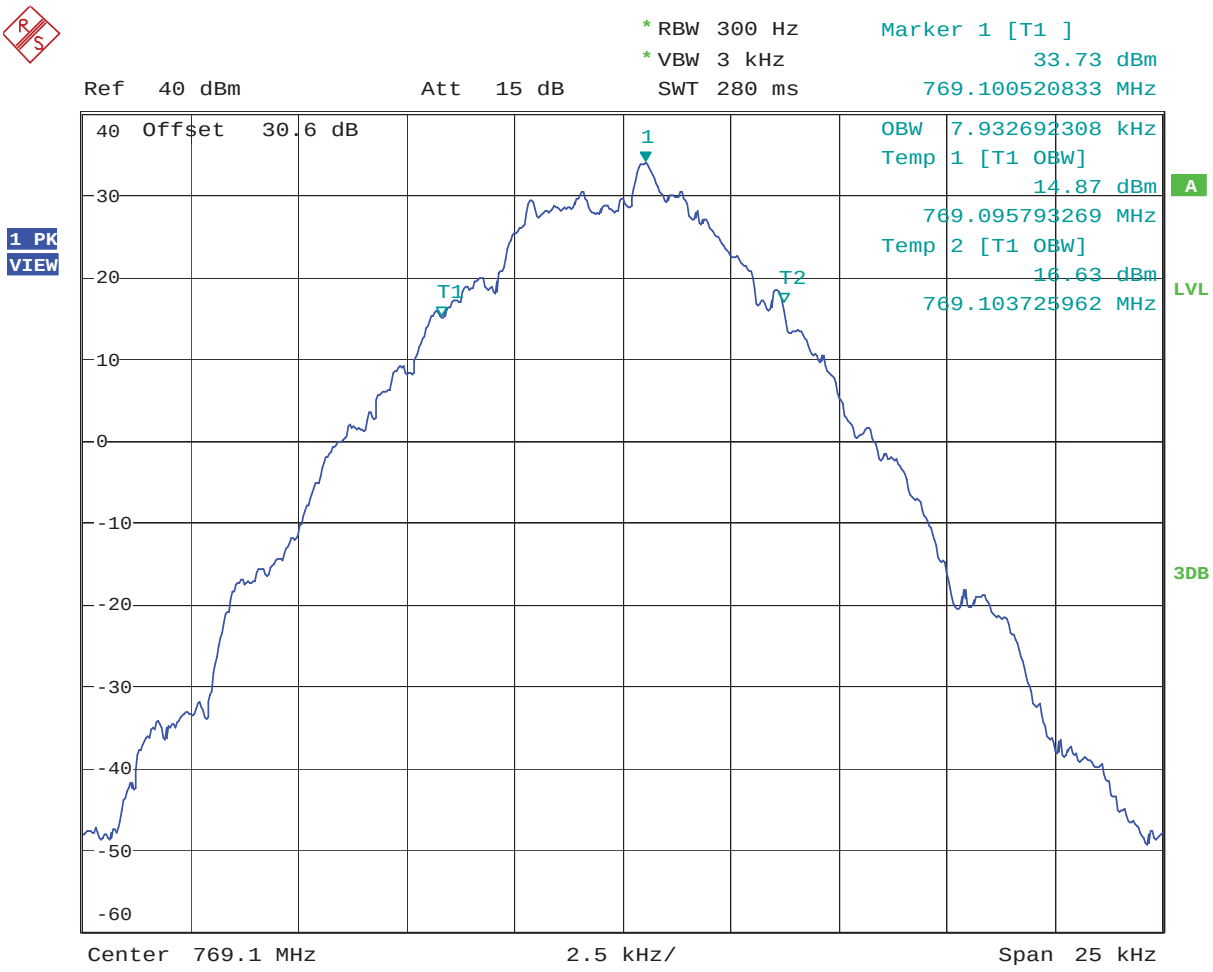
OBW: 5.689 KHz




Date: 29.MAY.2018 10:11:23

### 5.8.4.4. Configuration: 99% OBW, Band 1: 769-775MHz, 769.1MHz, 12.5 KHz, Digital, F1E& F1D, High power

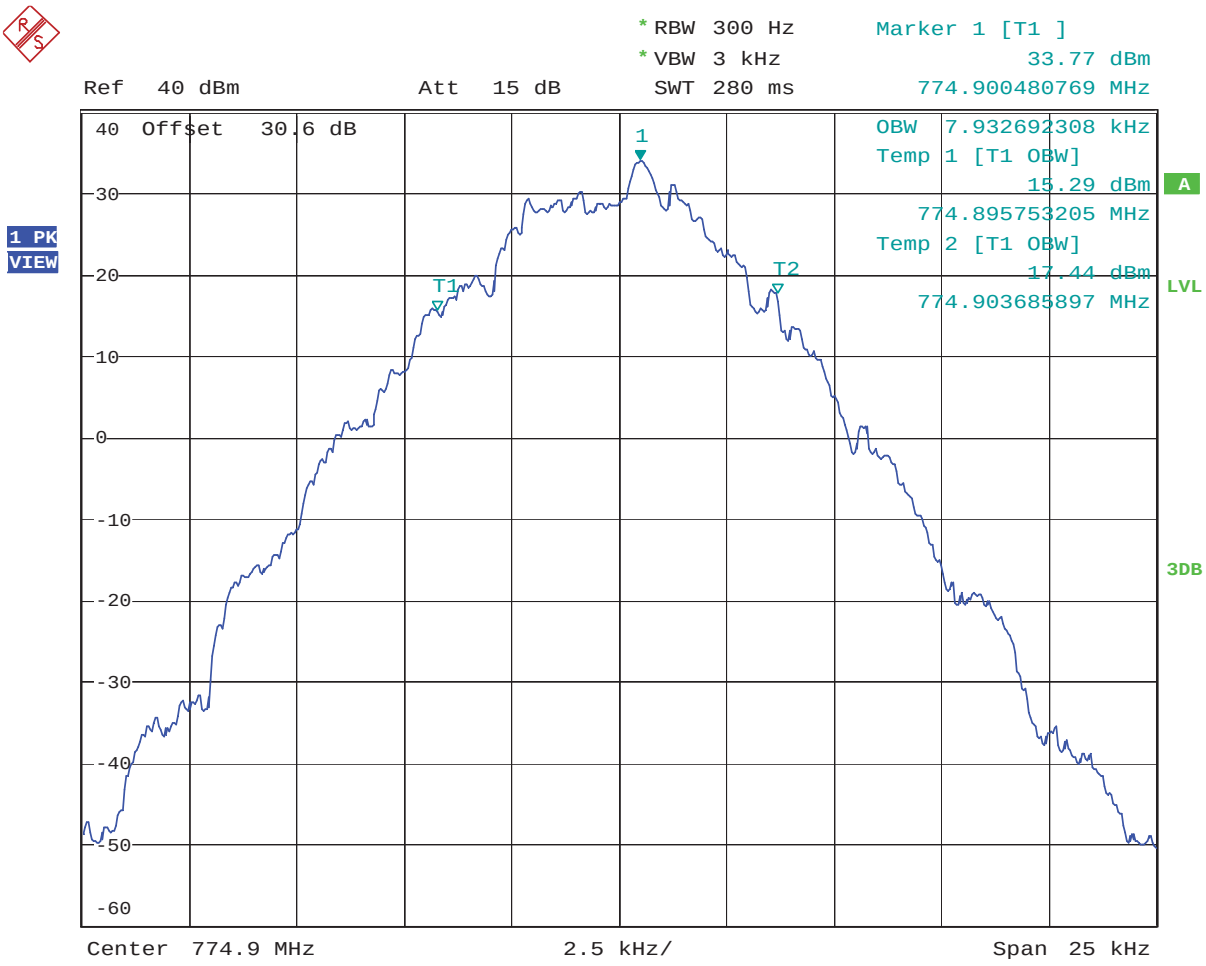
OBW: 7.93 KHz




Date: 29.MAY.2018 10:59:23

### 5.8.4.5. Configuration: 99% OBW, Band 1: 769-775MHz, 774.9MHz, 12.5 KHz, Digital, F1E& F1D, High power

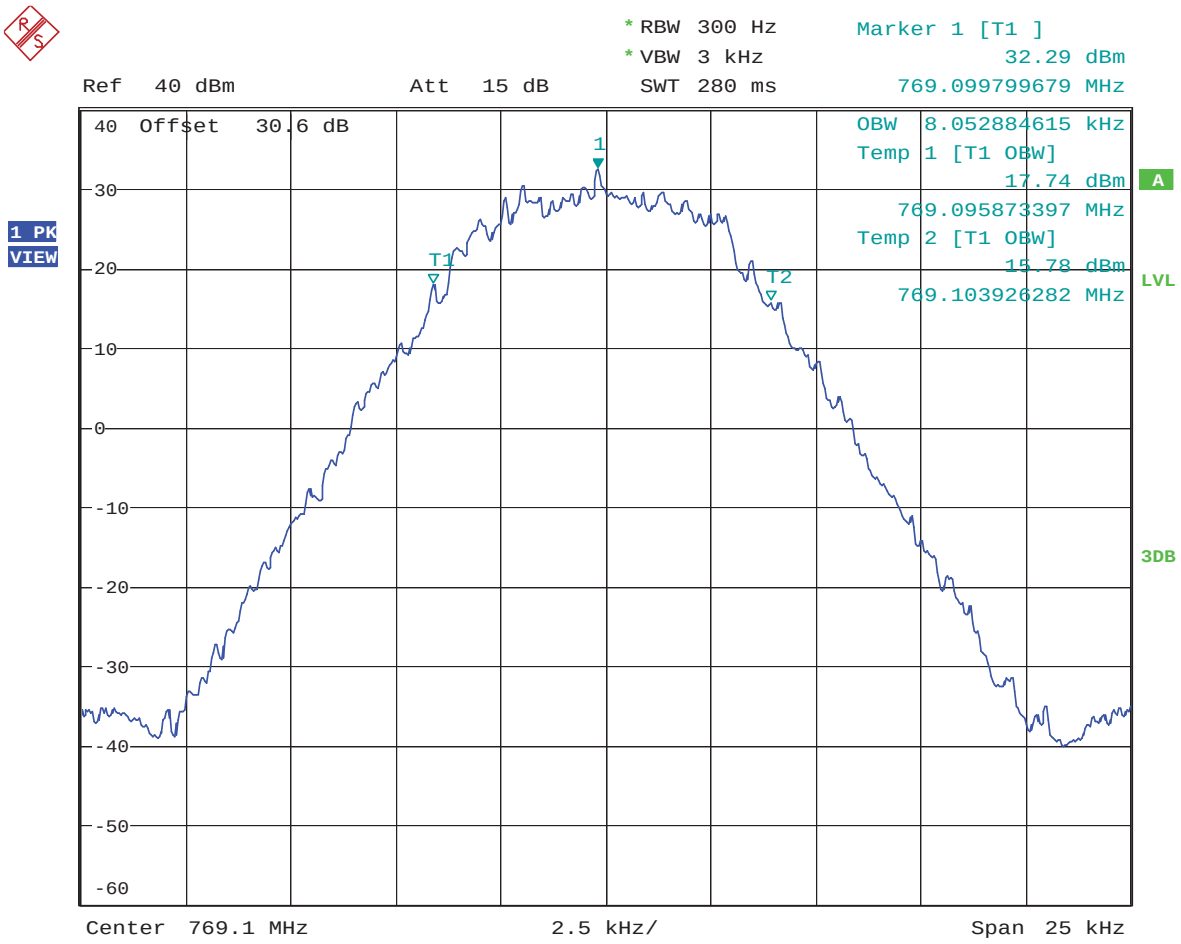
OBW: 7.93 KHz




Date: 29.MAY.2018 11:01:19

### 5.8.4.6. Configuration: 99% OBW, Band 1: 769-775MHz, 769.1MHz, 12.5 KHz, Digital, F1W, High power

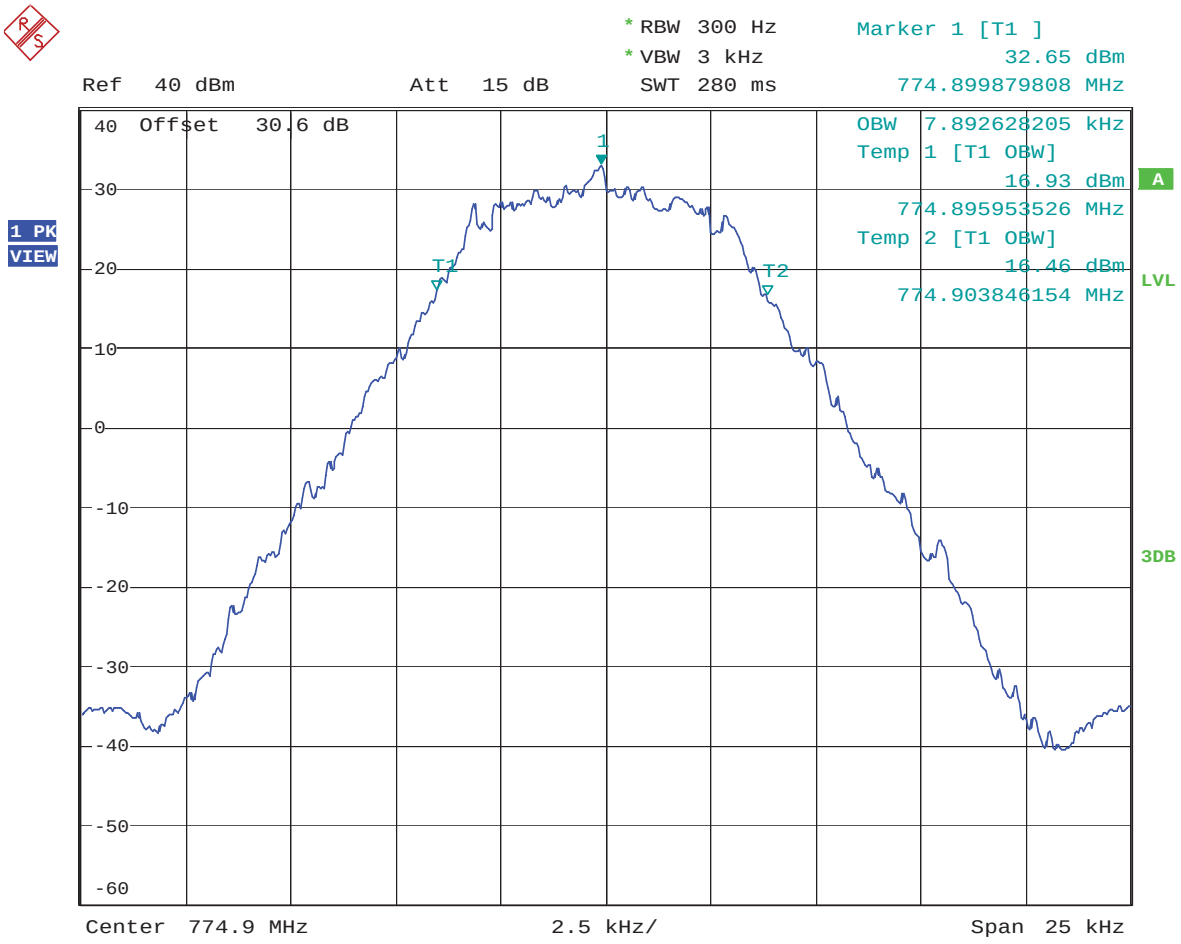
OBW: 8.05 KHz




Date: 29.MAY.2018 11:19:29

### 5.8.4.7. Configuration: 99% OBW, Band 1: 769-775MHz, 774.9MHz, 12.5 KHz, Digital, F1W, High power

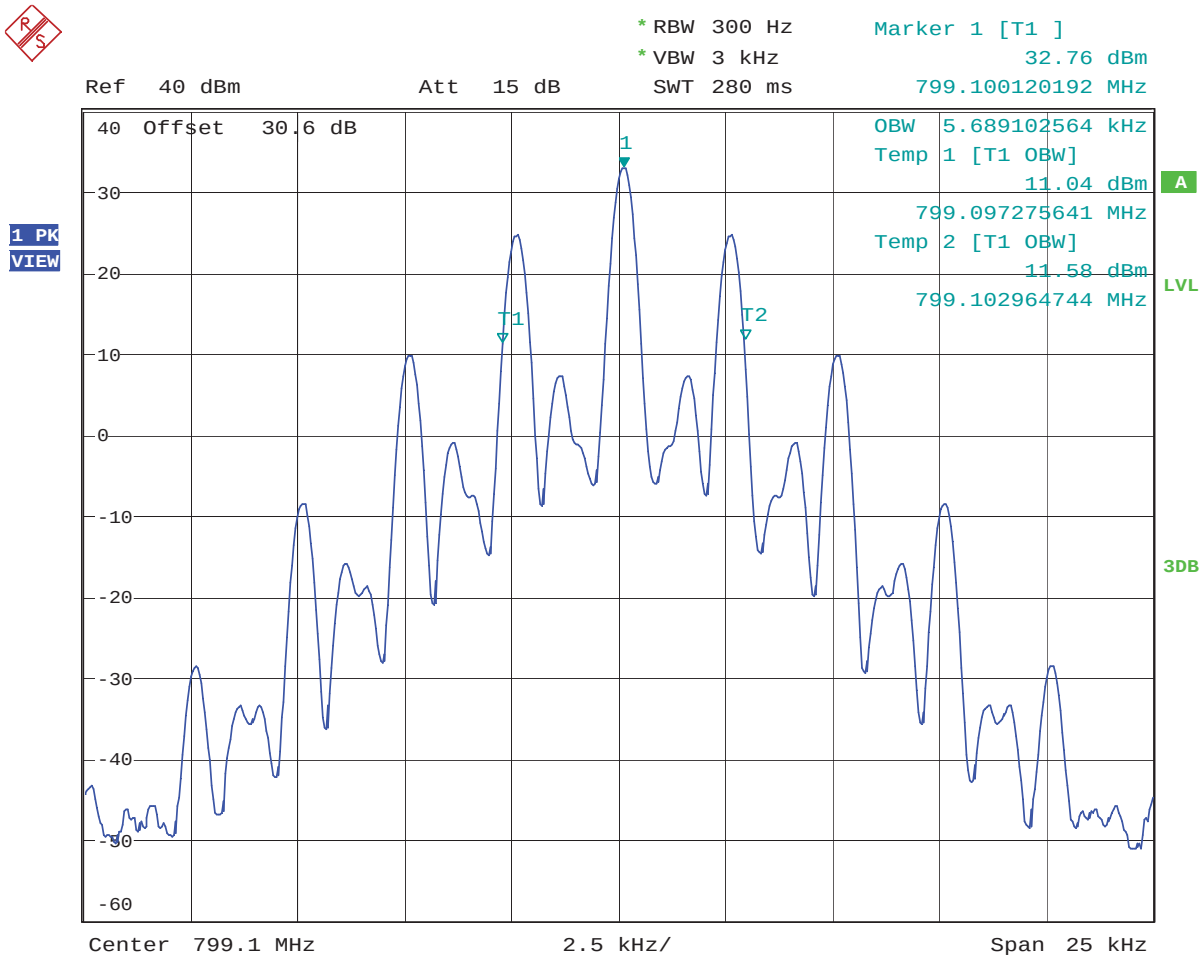
OBW: 7.89 KHz




Date: 29.MAY.2018 11:22:30

### 5.8.4.8. Configuration: 99% OBW, Band 2: 799-805MHz, 799.1MHz, 12.5 KHz, Analog, High power

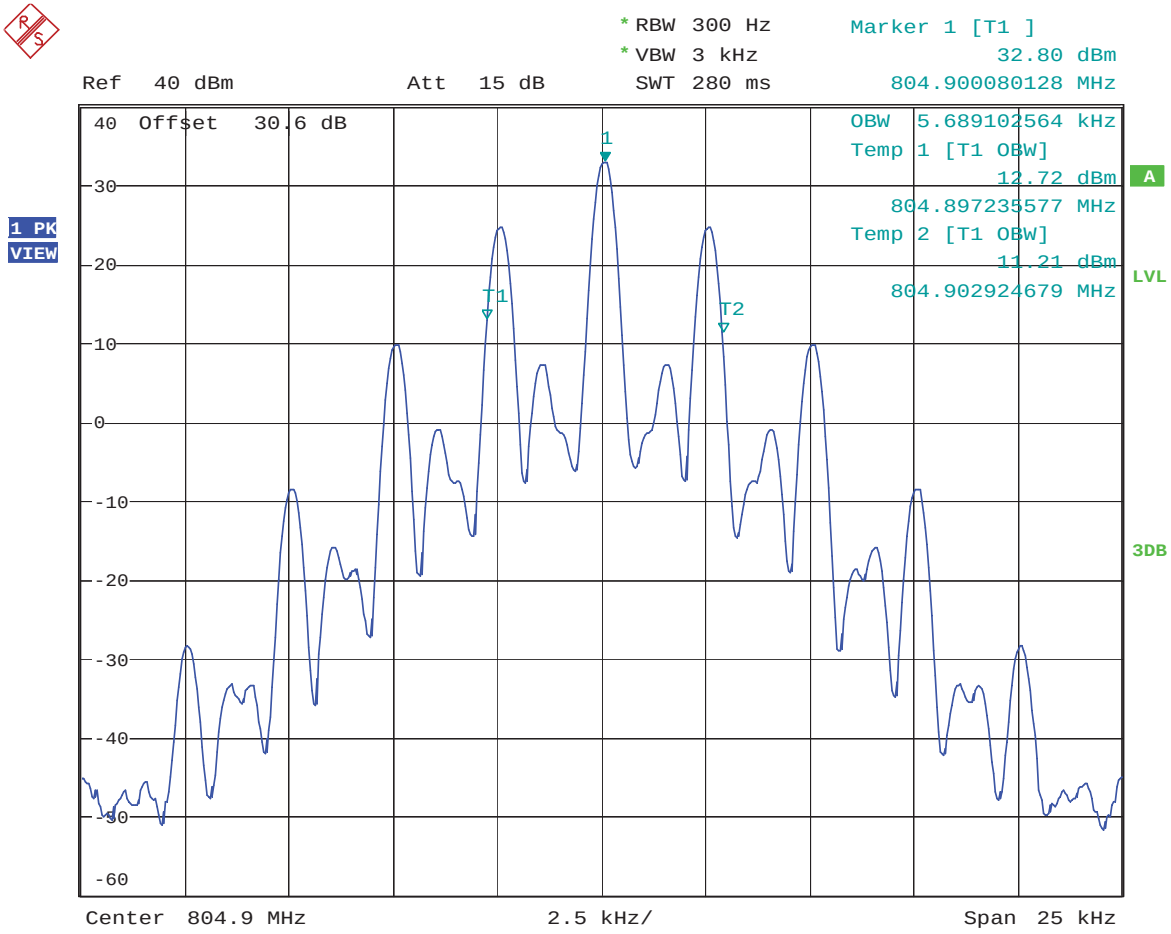
OBW: 5.689 KHz




Date: 29.MAY.2018 10:18:43

### 5.8.4.9. Configuration: 99% OBW, Band 2: 799-805MHz, 804.9MHz, 12.5 KHz, Analog, High power

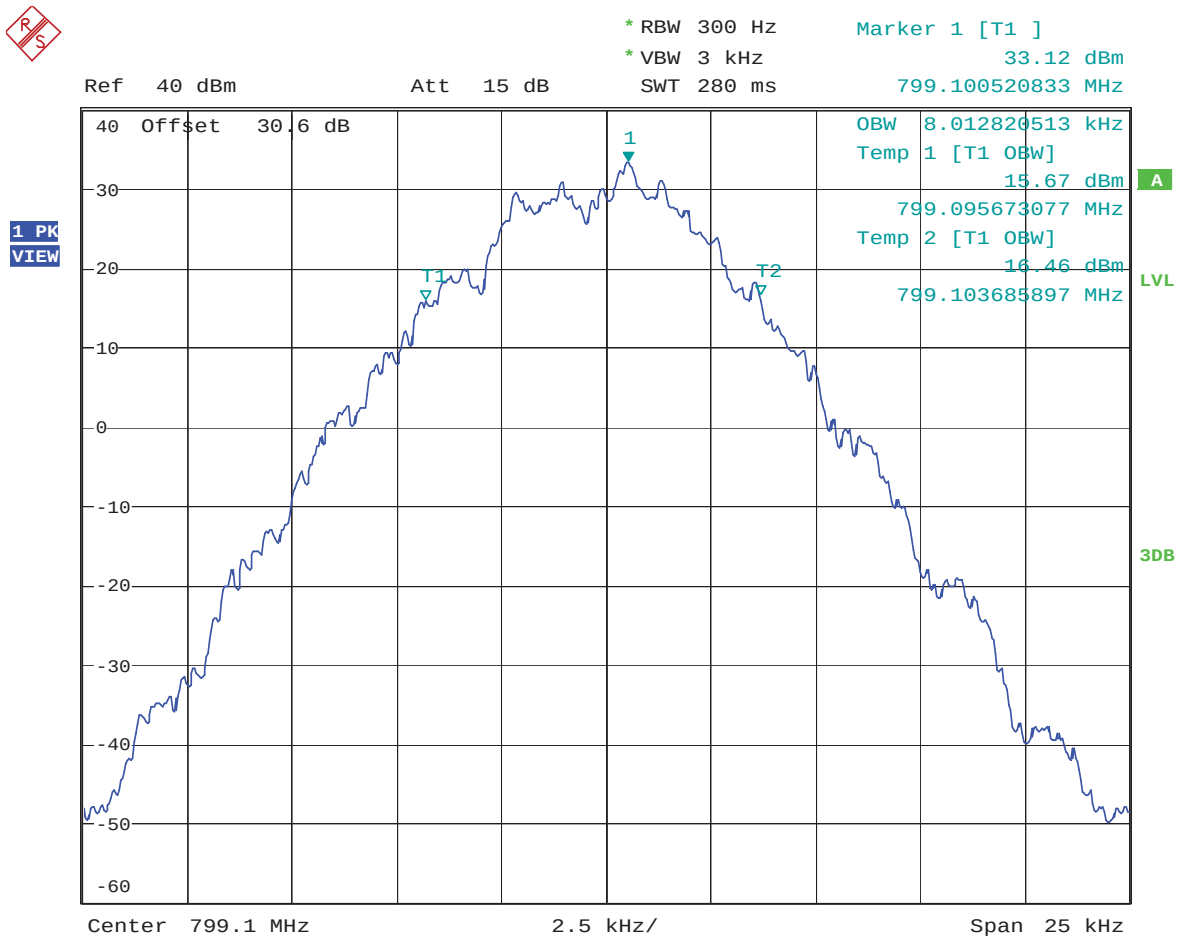
OBW: 5.689 KHz




Date: 29.MAY.2018 10:20:18

### 5.8.4.10. Configuration: 99% OBW, Band 2: 799-805MHz, 799.1MHz, 12.5 KHz, Digital, F1E& F1D, High power

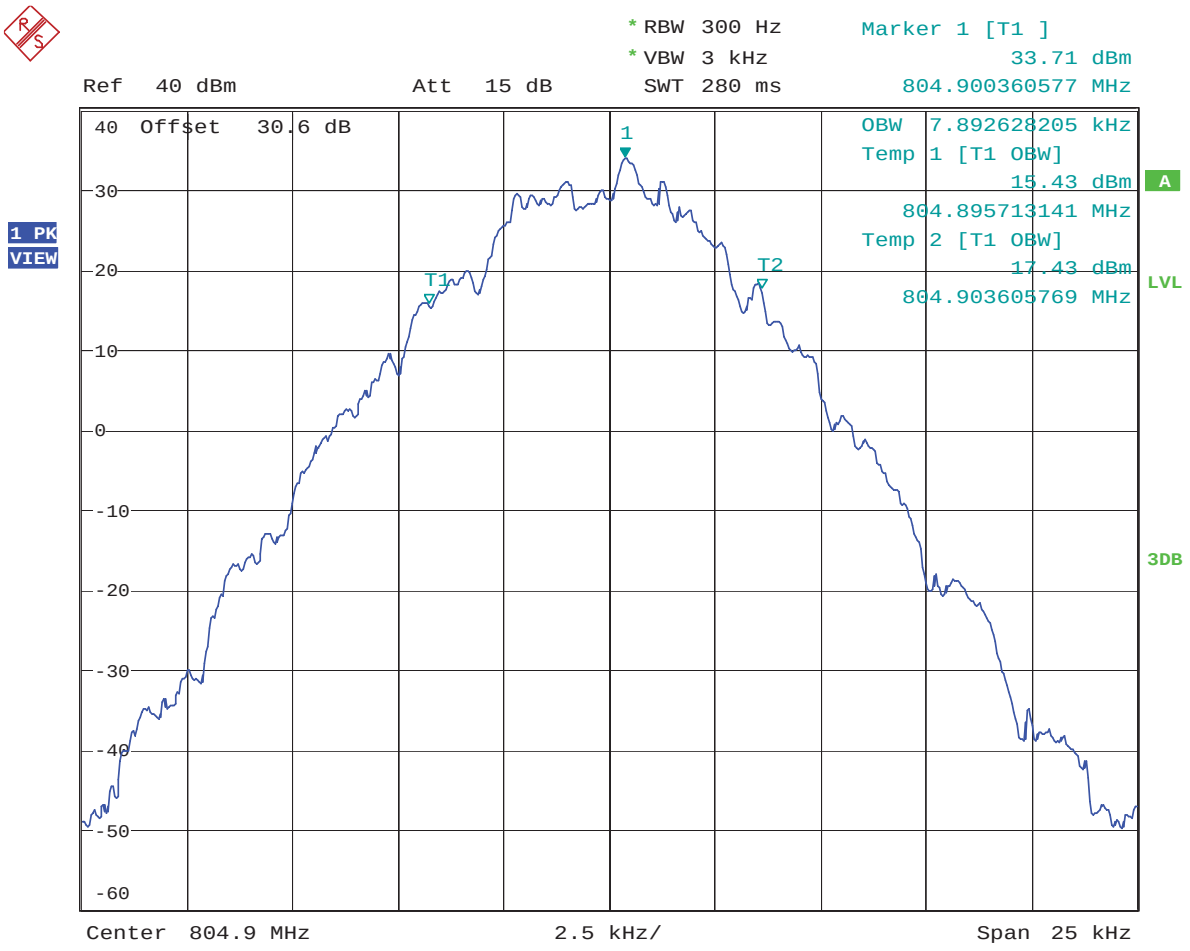
OBW: 8.01 KHz




Date: 29.MAY.2018 11:03:19

### 5.8.4.11. Configuration: 99% OBW, Band 2: 799-805MHz, 804.9MHz, 12.5 KHz, Digital, F1E& F1D, High power

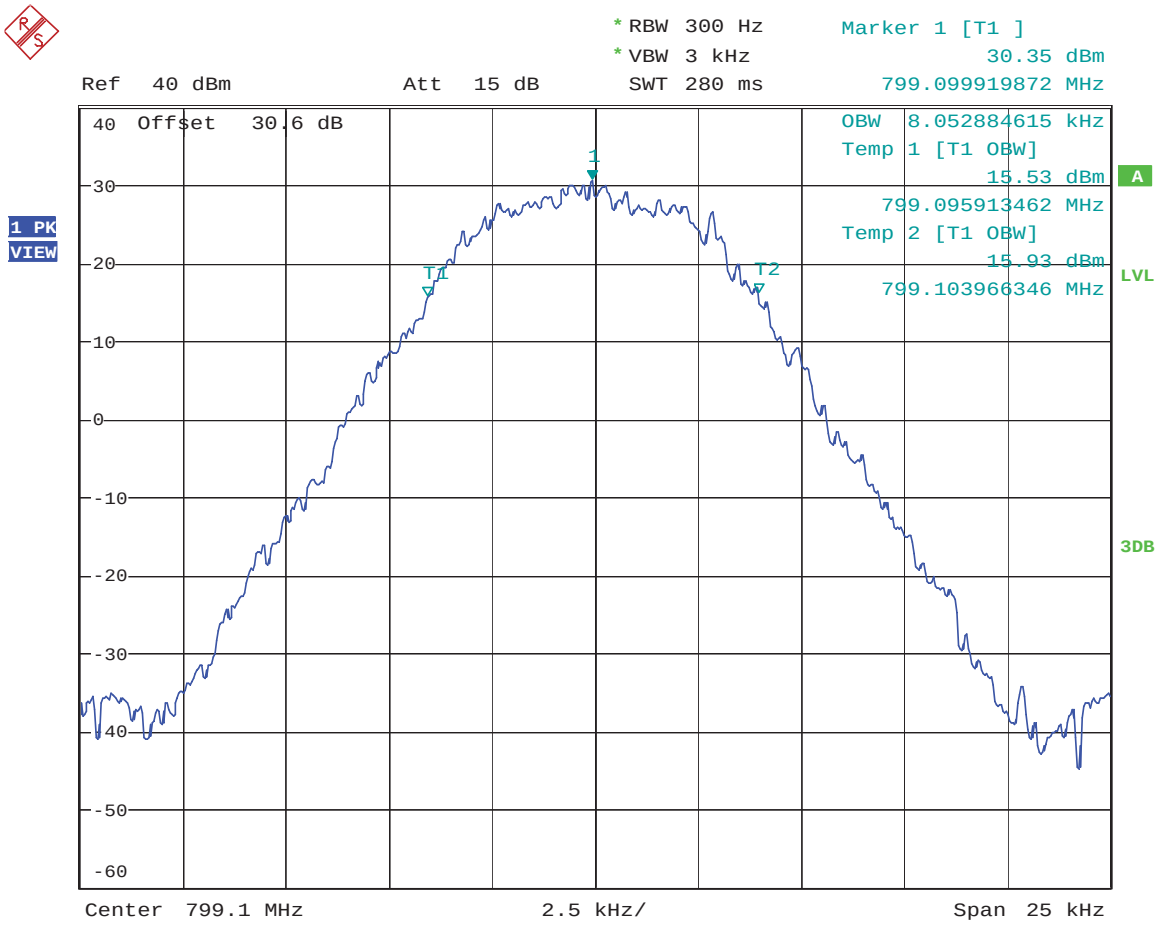
OBW: 7.89 KHz




Date: 29.MAY.2018 11:05:21

### 5.8.4.12. Configuration: 99% OBW, Band 2: 799-805MHz, 799.1MHz, 12.5 KHz, Digital, F1W, High power

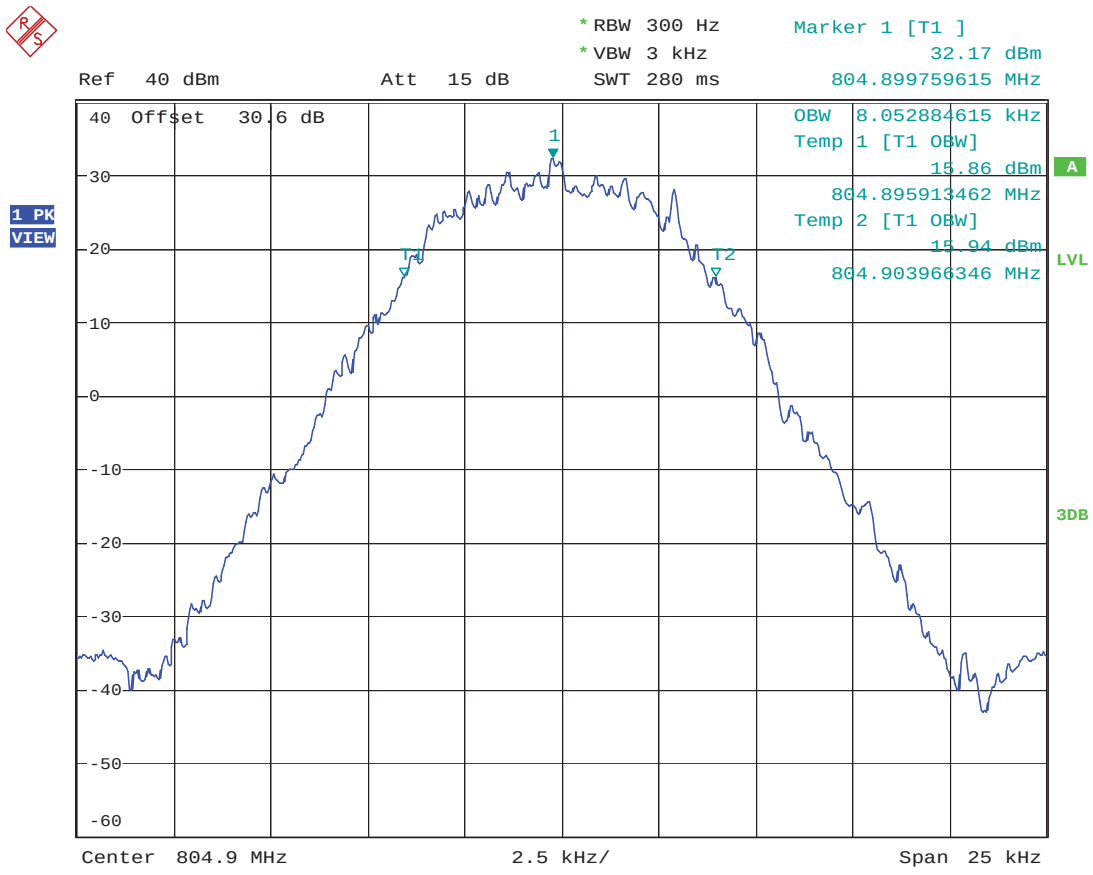
OBW: 8.05 KHz




Date: 29.MAY.2018 11:24:20

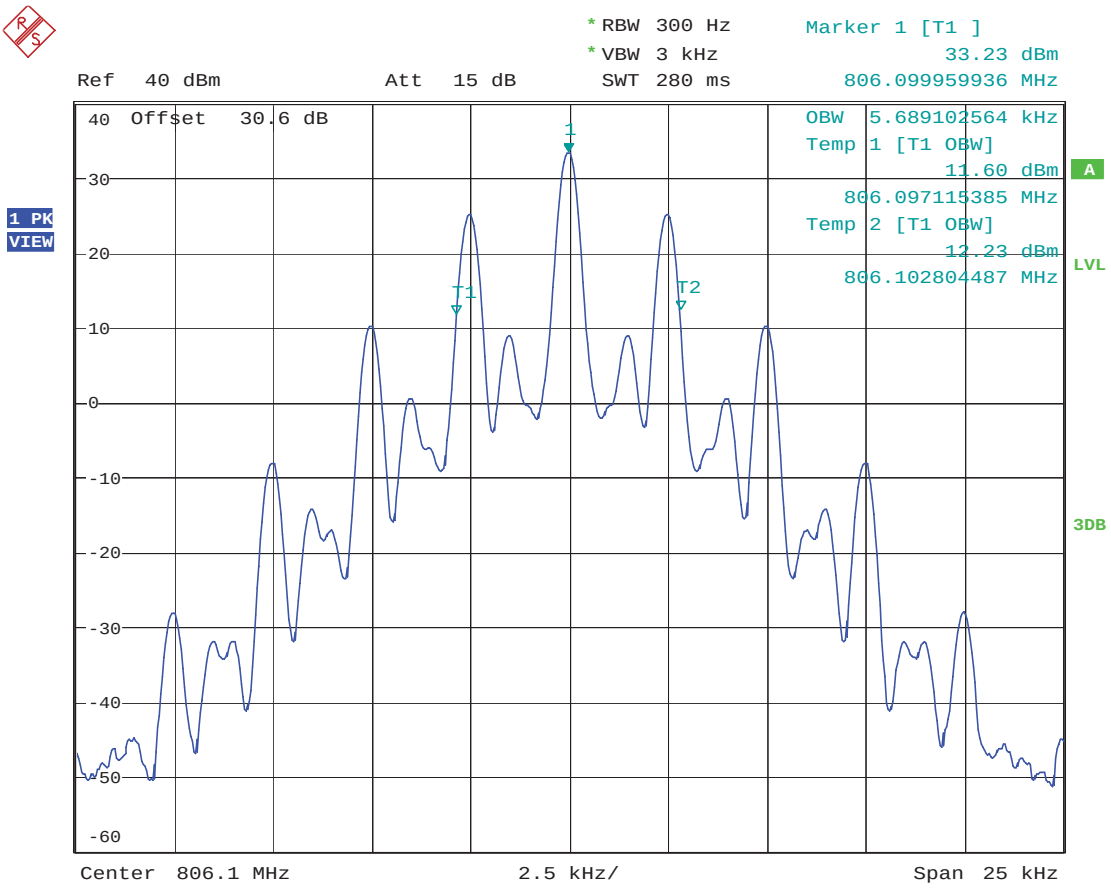
### 5.8.4.13. Configuration: 99% OBW, Band 2: 799-805MHz, 804.9MHz, 12.5 KHz, Digital, F1W, High power

OBW: 8.05 KHz



### 5.8.4.14. Configuration: 99% OBW, Band 3: 806-824MHz, 806.1MHz, 12.5 KHz, Analog, High power

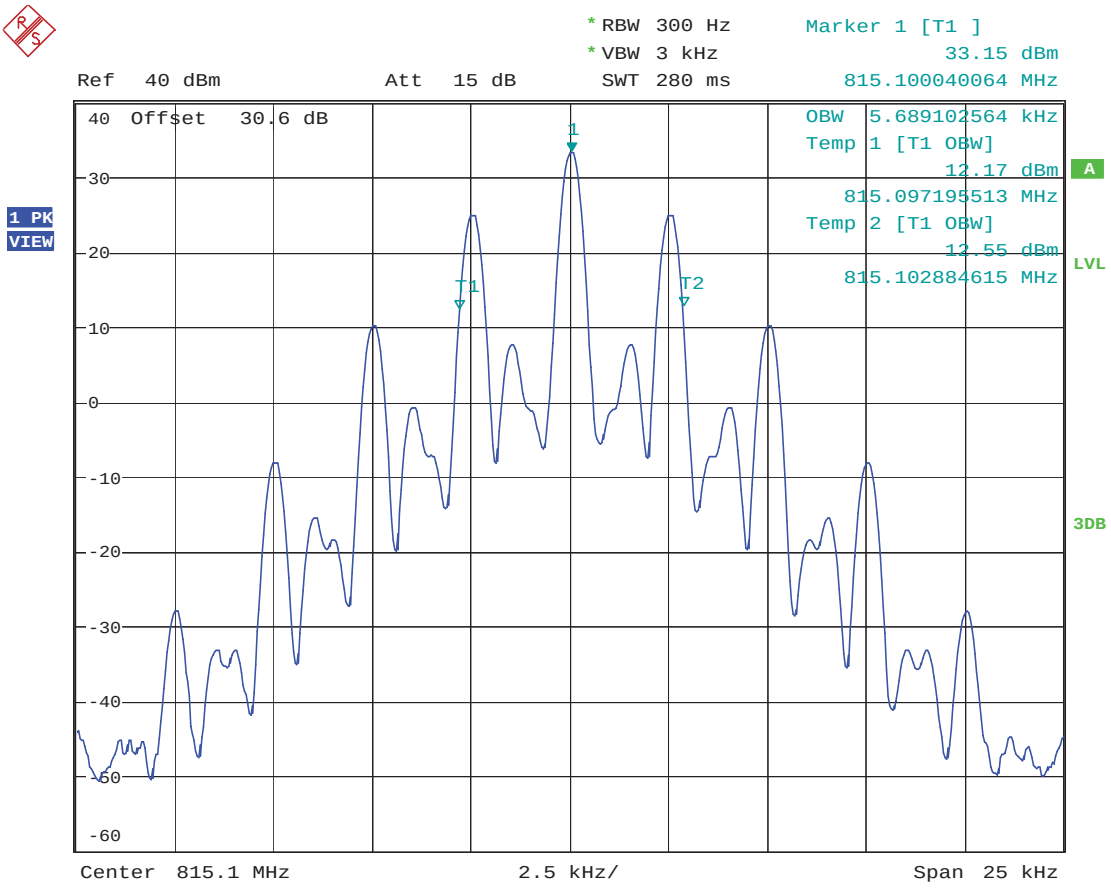
OBW: 5.689 KHz




Date: 29.MAY.2018 10:22:31

### 5.8.4.15. Configuration: 99% OBW, Band 3: 806-824MHz MHz, 815.1MHz, 12.5 KHz, Analog, High power

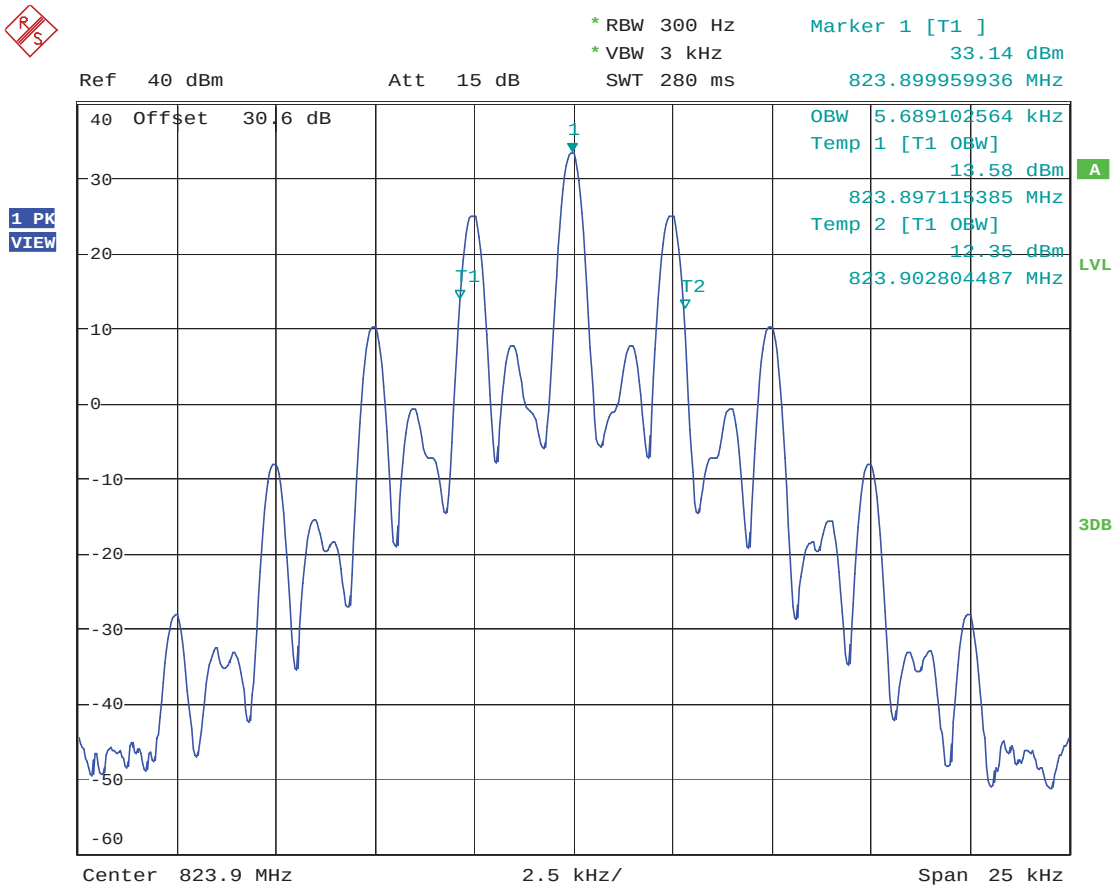
OBW: 5.689 KHz




Date: 29.MAY.2018 10:23:53

### 5.8.4.16. Configuration: 99% OBW, Band 3: 806-824MHz MHz, 823.9MHz, 12.5 KHz, Analog, High power

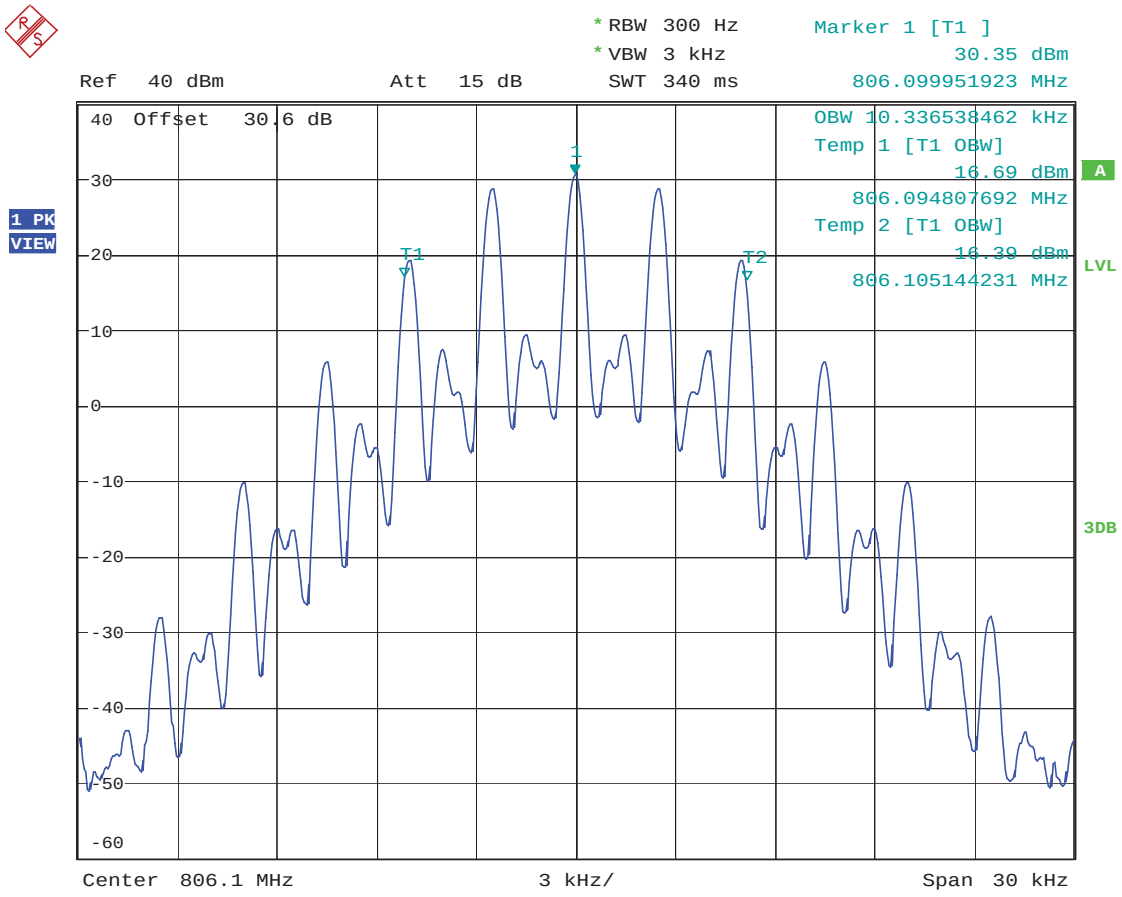
OBW: 5.689 KHz




Date: 29.MAY.2018 11:51:52

### 5.8.4.17. Configuration: 99% OBW, Band 3: 806-809MHz, 806.1MHz, 20 KHz, Analog, High power

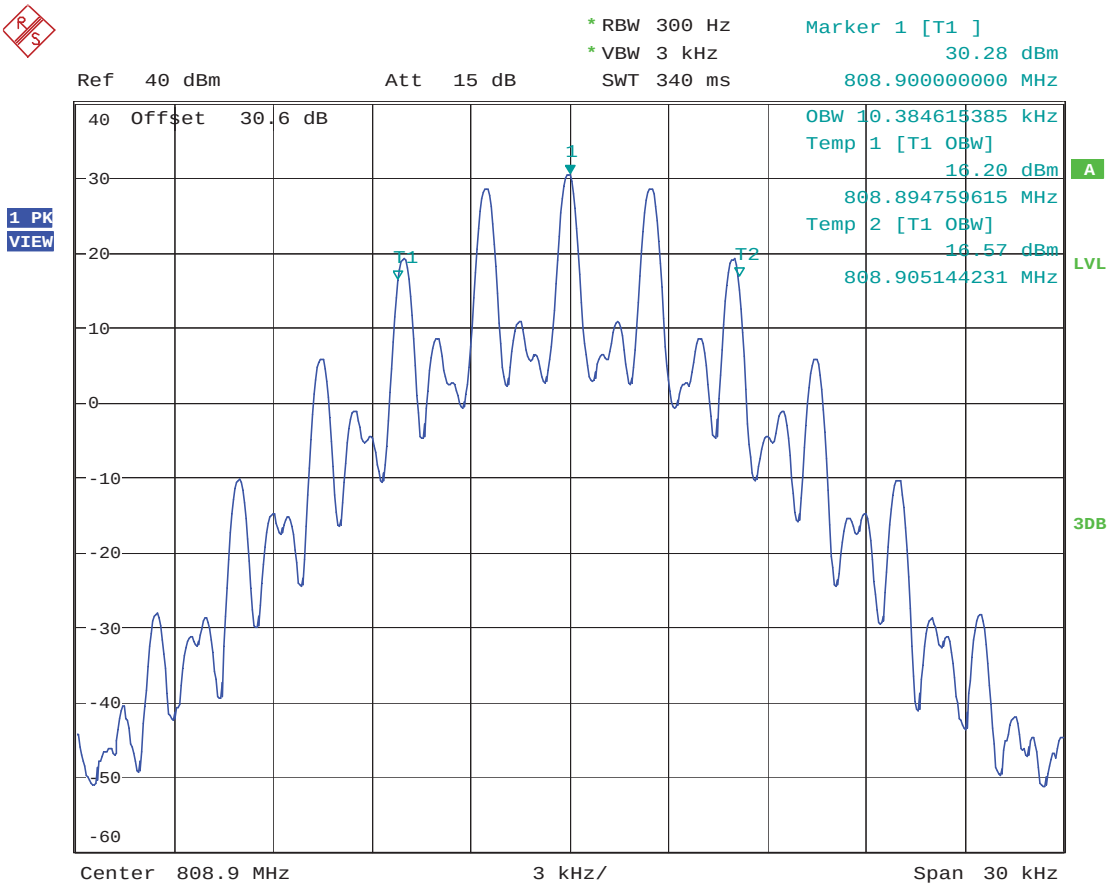
OBW: 10.336 KHz




Date: 29.MAY.2018 10:32:13

### 5.8.4.18. Configuration: 99% OBW, Band 3: 806-809MHz MHz, 808.9MHz, 20 KHz, Analog, High power

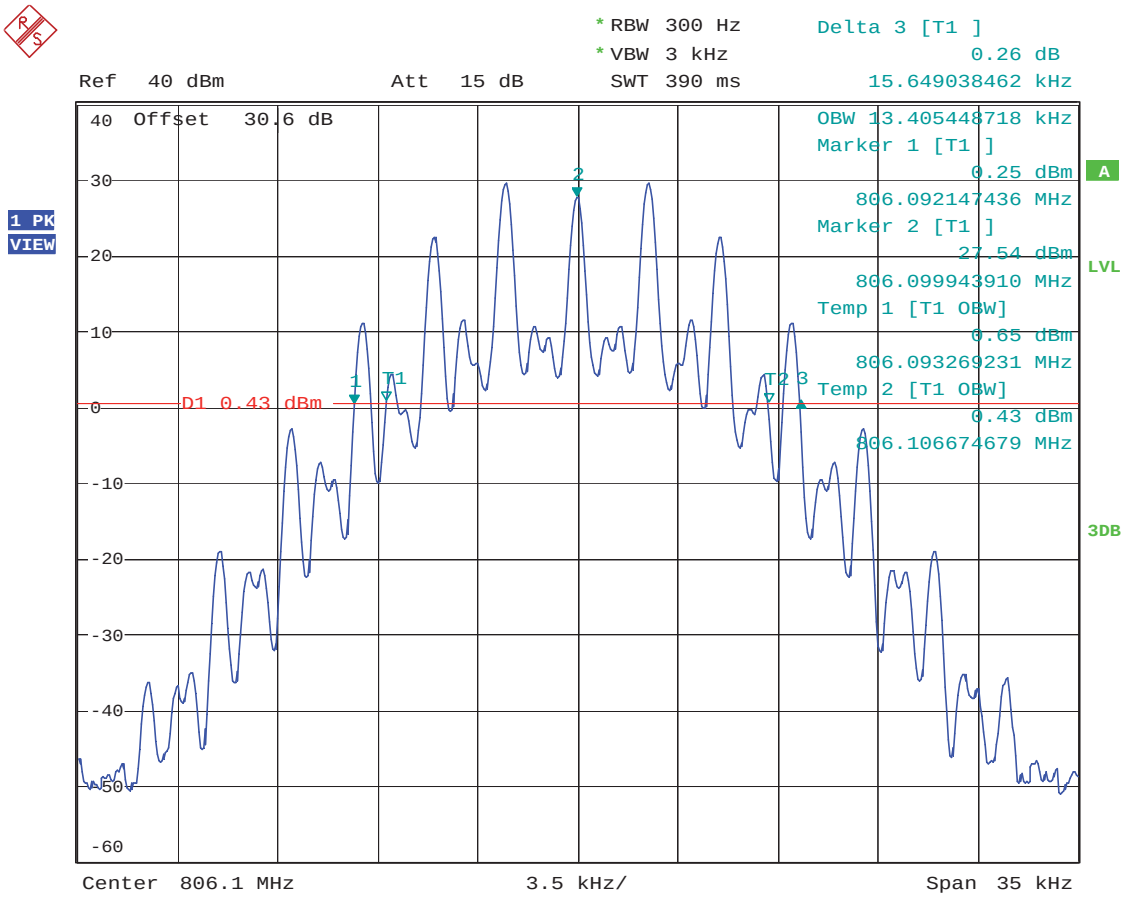
OBW: 10.385 KHz




Date: 29.MAY.2018 10:36:22

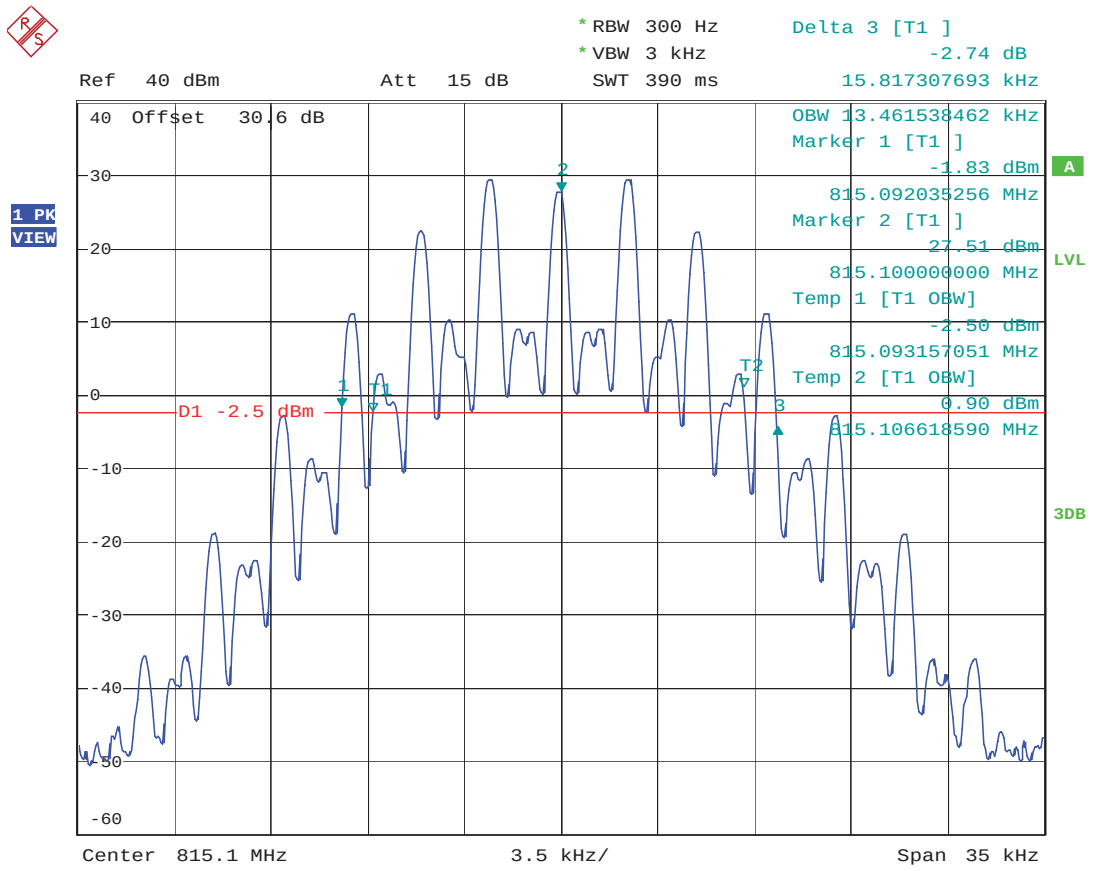
### 5.8.4.19. Configuration: 99% OBW, Band 3: 806-824MHz, 806.1MHz, 25 KHz, Analog, High power

OBW: 15.65 KHz



### 5.8.4.20. Configuration: 99% OBW, Band 3: 806-824MHz MHz, 815.1MHz, 25 KHz, Analog, High power

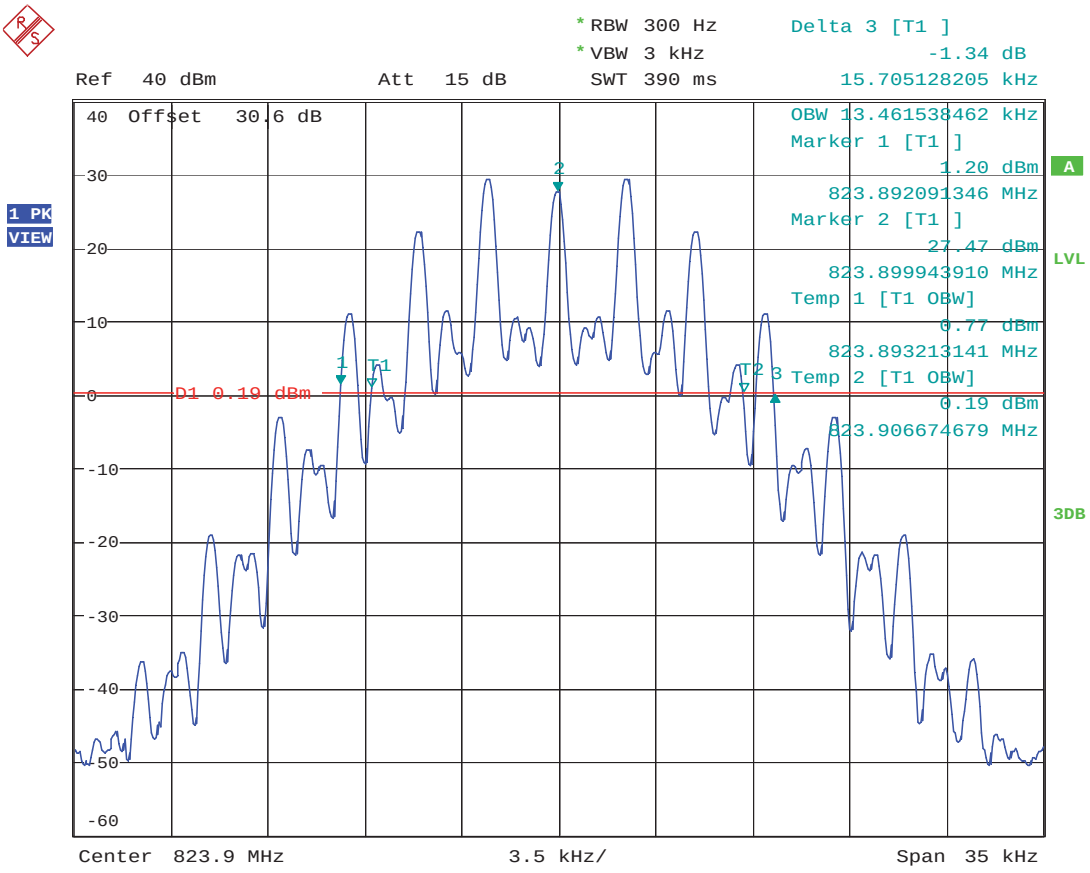
OBW: 15.82 KHz




Date: 29.MAY.2018 10:46:12

### 5.8.4.21. Configuration: 99% OBW, Band 3: 806-824MHz MHz, 823.9MHz, 25 KHz, Analog, High power

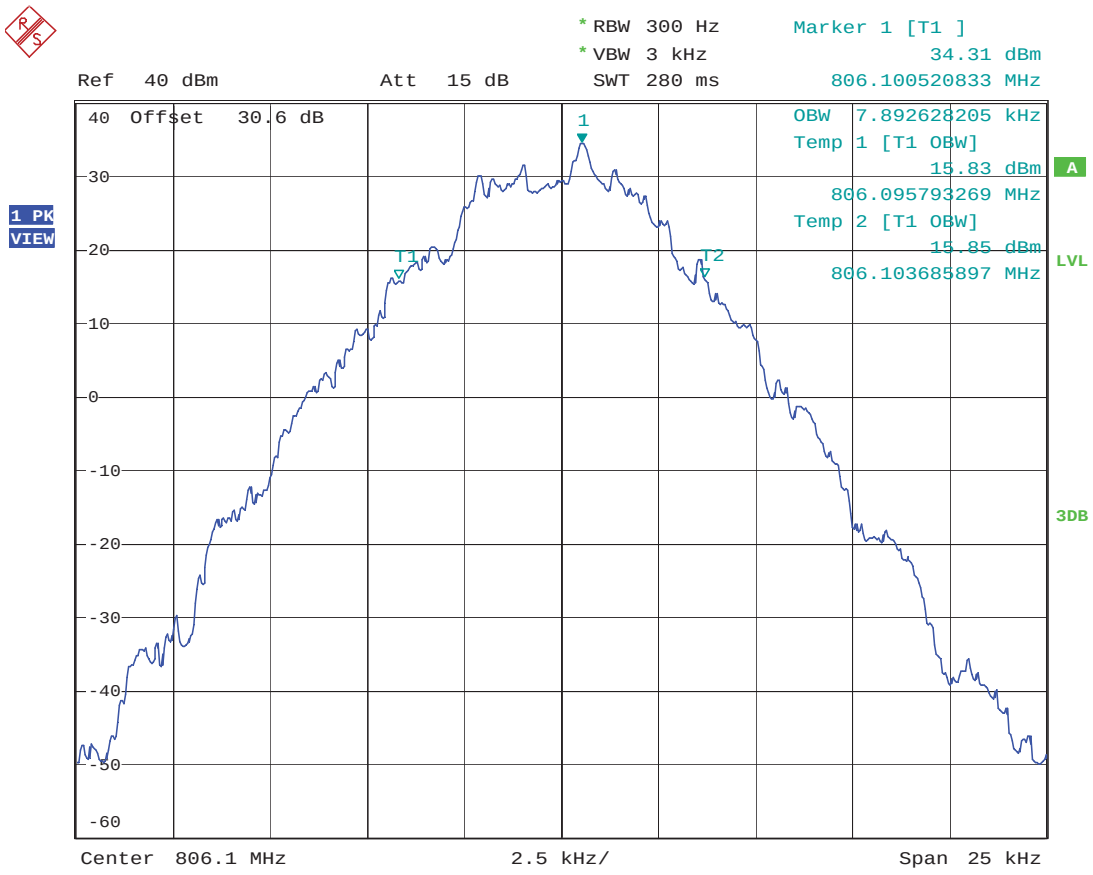
OBW: 15.705 KHz




Date: 29.MAY.2018 10:48:35

### 5.8.4.22. Configuration: 99% OBW, Band 3: 806-824MHz MHz, 806.1MHz, 12.5 KHz, Digital, F1E& F1D, High power

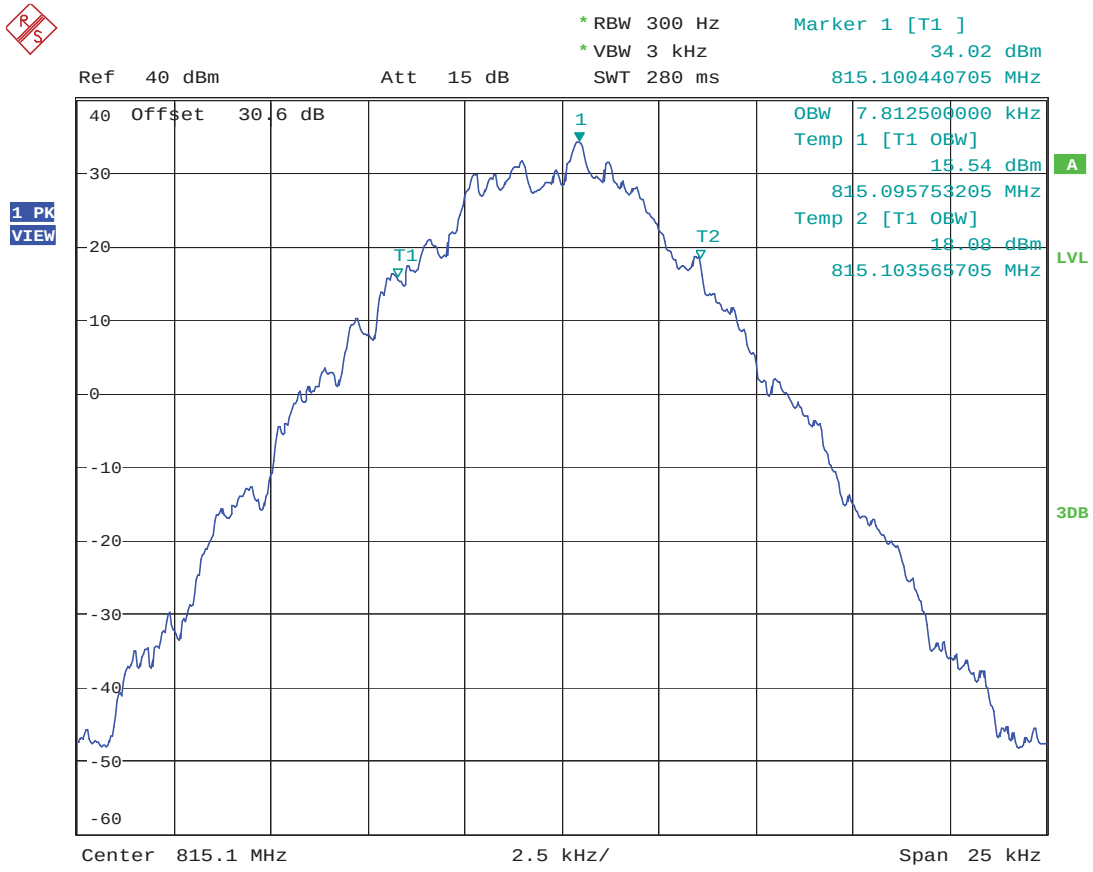
OBW: 7.89 KHz




Date: 29.MAY.2018 11:07:24

### 5.8.4.23. Configuration: 99% OBW, Band 3: 806-824MHz MHz, 815.1MHz, 12.5 KHz, Digital, F1E& F1D, High power

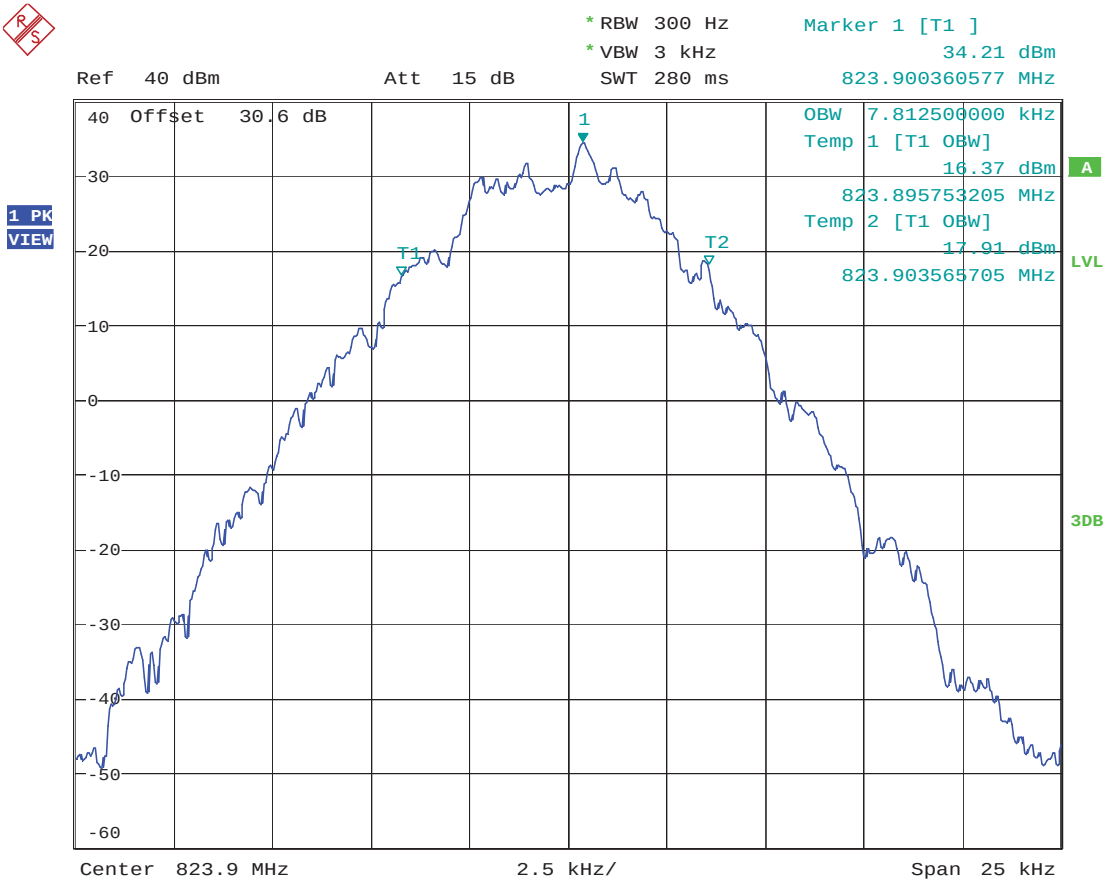
OBW: 7.81 KHz




Date: 29.MAY.2018 11:09:02

### 5.8.4.24. Configuration: 99% OBW, Band 3: 806-824MHz MHz, 823.9MHz, 12.5 KHz, Digital, F1E& F1D, High power

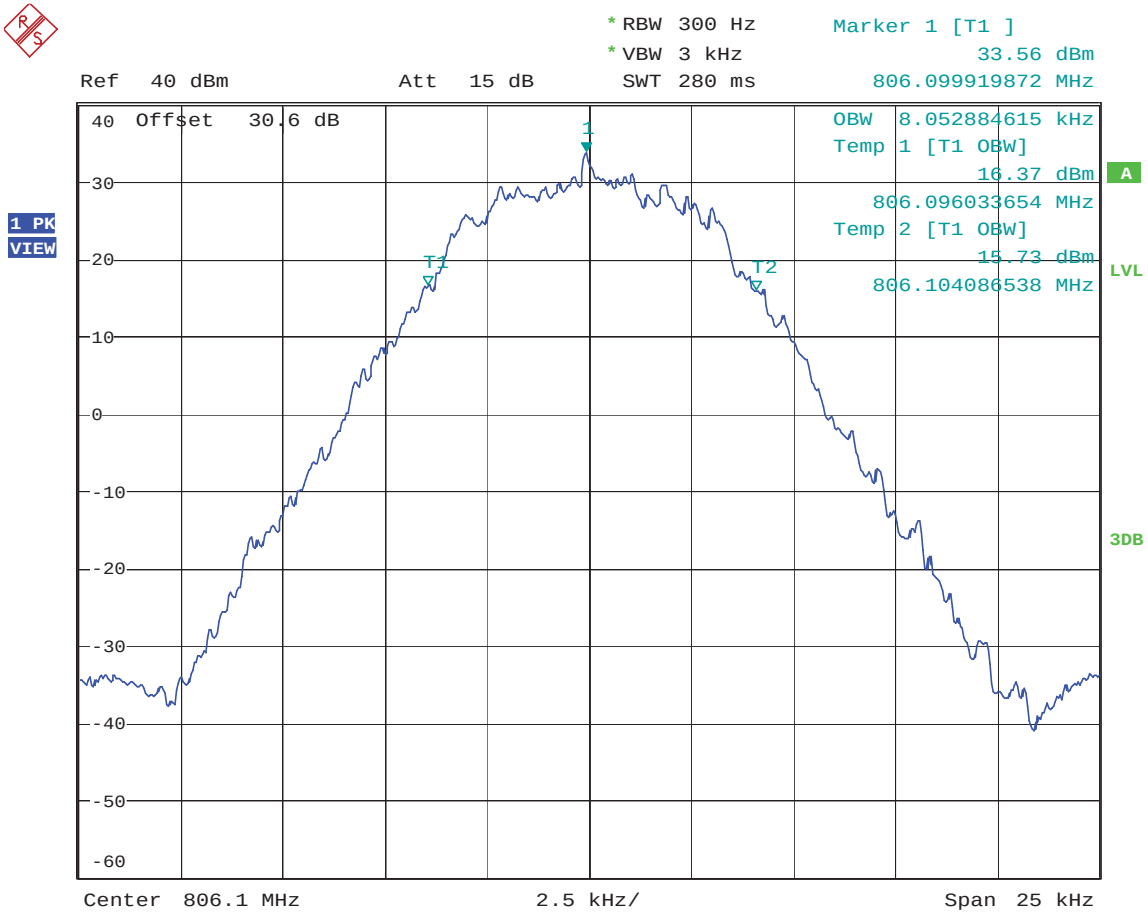
OBW: 7.81 KHz




Date: 29.MAY.2018 11:10:30

### 5.8.4.25. Configuration: 99% OBW, Band 3: 806-824MHz MHz, 806.1MHz, 12.5 KHz, Digital, F1W, High power

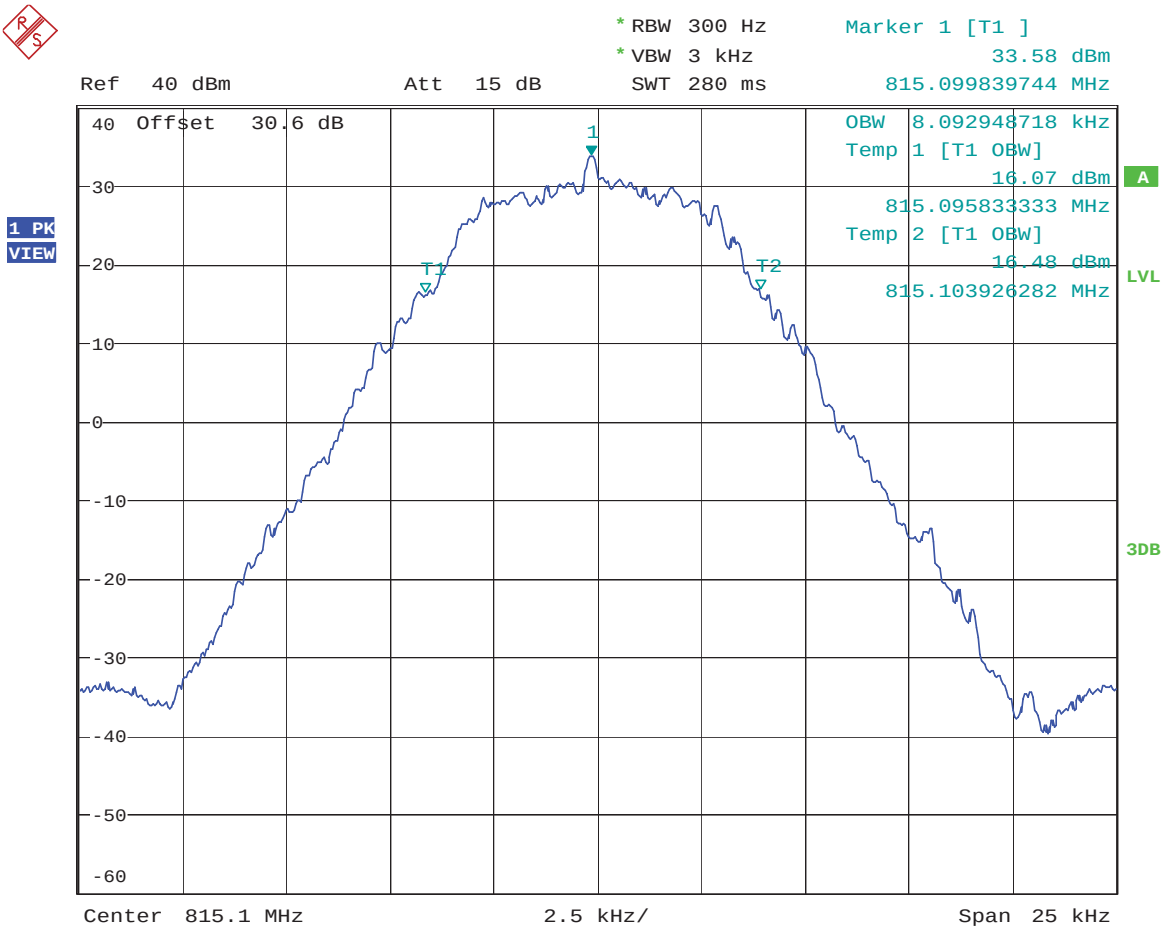
OBW: 8.05 KHz




Date: 29.MAY.2018 11:28:05

### 5.8.4.26. Configuration: 99% OBW, Band 3: 806-824MHz MHz, 815.1MHz, 12.5 KHz, Digital, F1W, High power

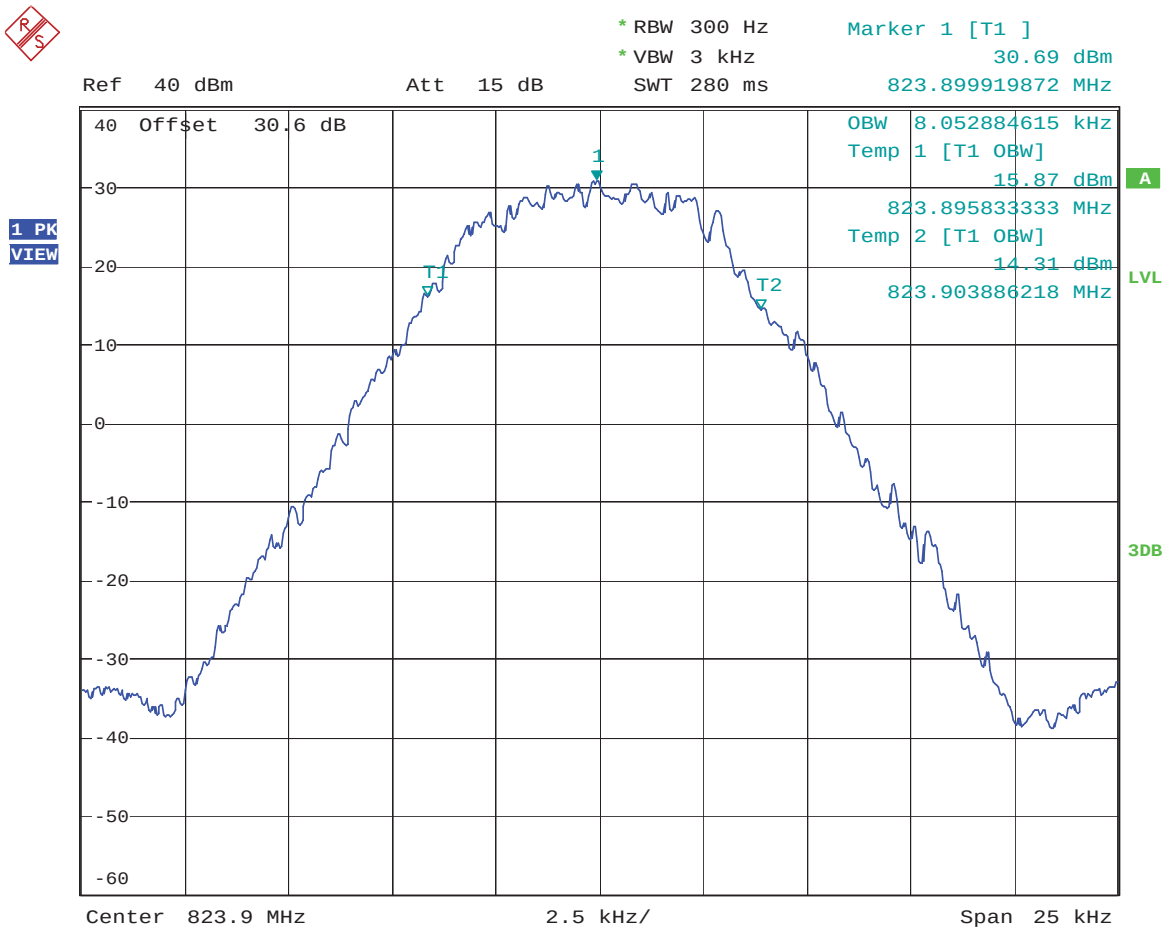
OBW: 8.09




Date: 29.MAY.2018 11:32:41

### 5.8.4.27. Configuration: 99% OBW, Band 3: 806-824MHz MHz, 823.9MHz, 12.5 KHz, Digital, F1W, High power

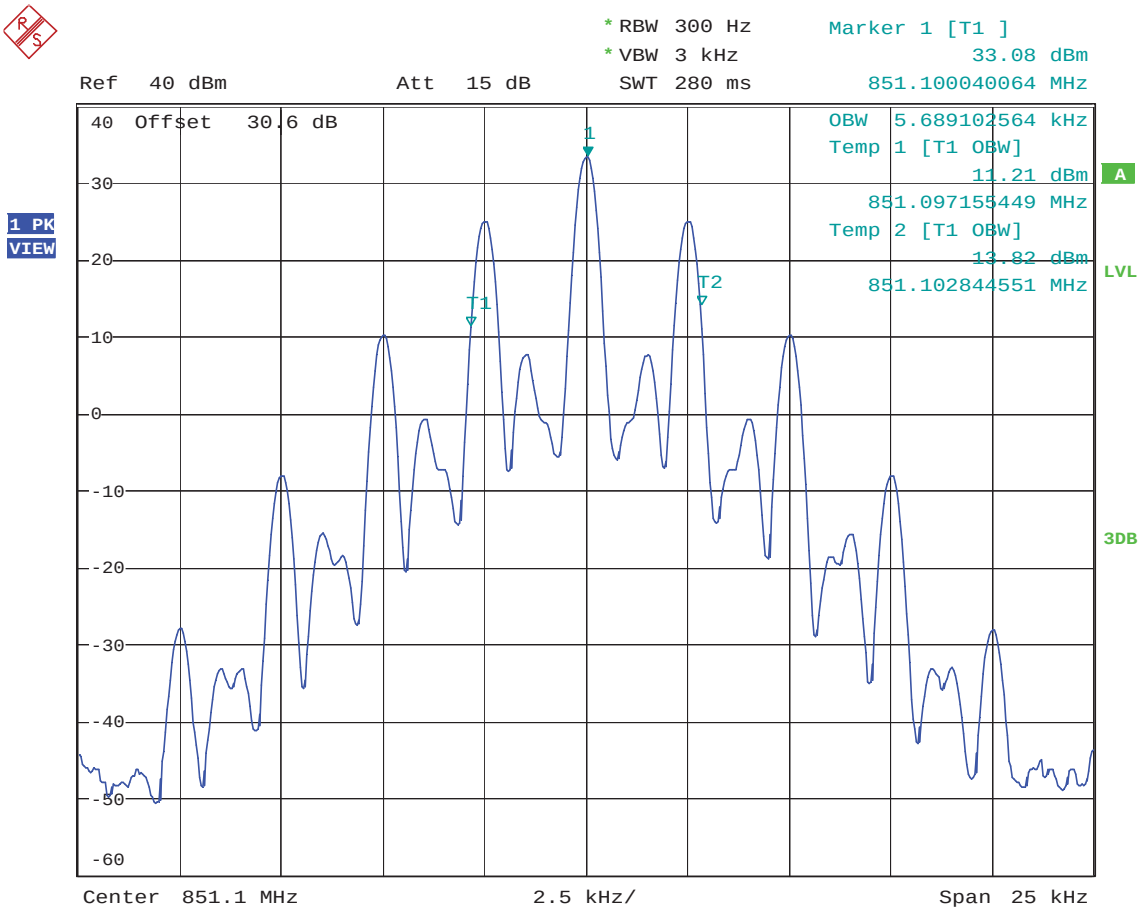
OBW: 8.05 KHz




Date: 29.MAY.2018 11:34:13

### 5.8.4.28. Configuration: 99% OBW, Band 4: 851-869MHz, 851.1MHz, 12.5 KHz, Analog, High power

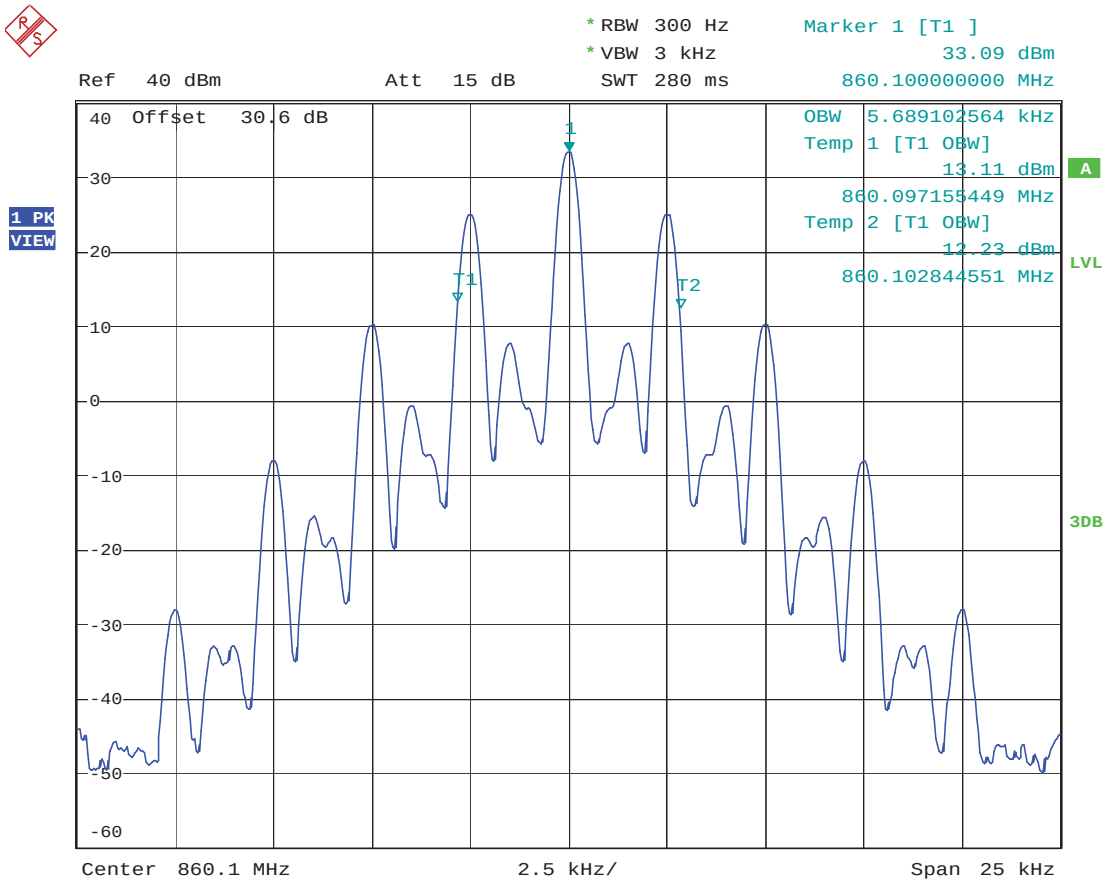
OBW: 5.689 KHz




Date: 29.MAY.2018 10:26:53

### 5.8.4.29. Configuration: 99% OBW, Band 4: 851-869MHz, 860.1MHz, 12.5 KHz, Analog, High power

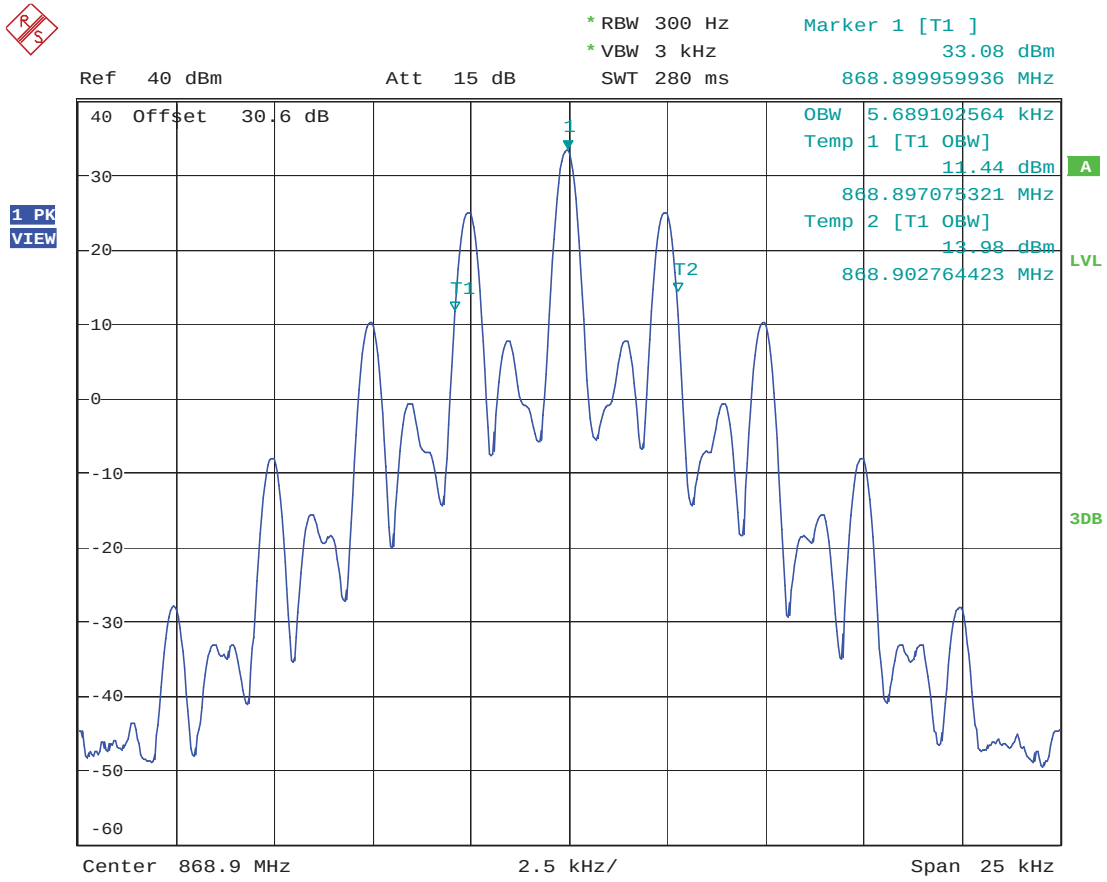
OBW: 5.689 KHz




Date: 29.MAY.2018 10:28:12

### 5.8.4.30. Configuration: 99% OBW, Band 4: 851-869MHz, 868.9MHz, 12.5 KHz, Analog, High power

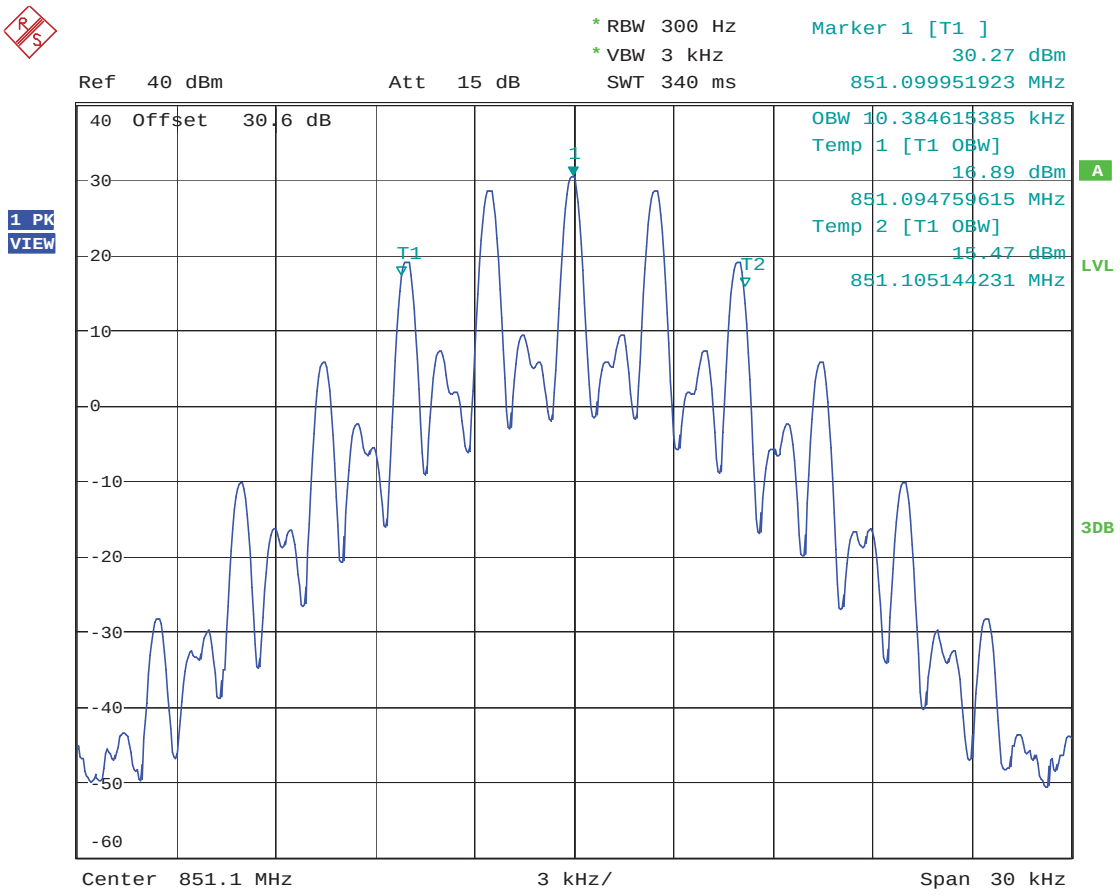
OBW: 5.689 KHz




Date: 29.MAY.2018 10:30:01

### 5.8.4.31. Configuration: 99% OBW, Band 4: 851-854MHz, 851.1MHz, 20 KHz, Analog, High power

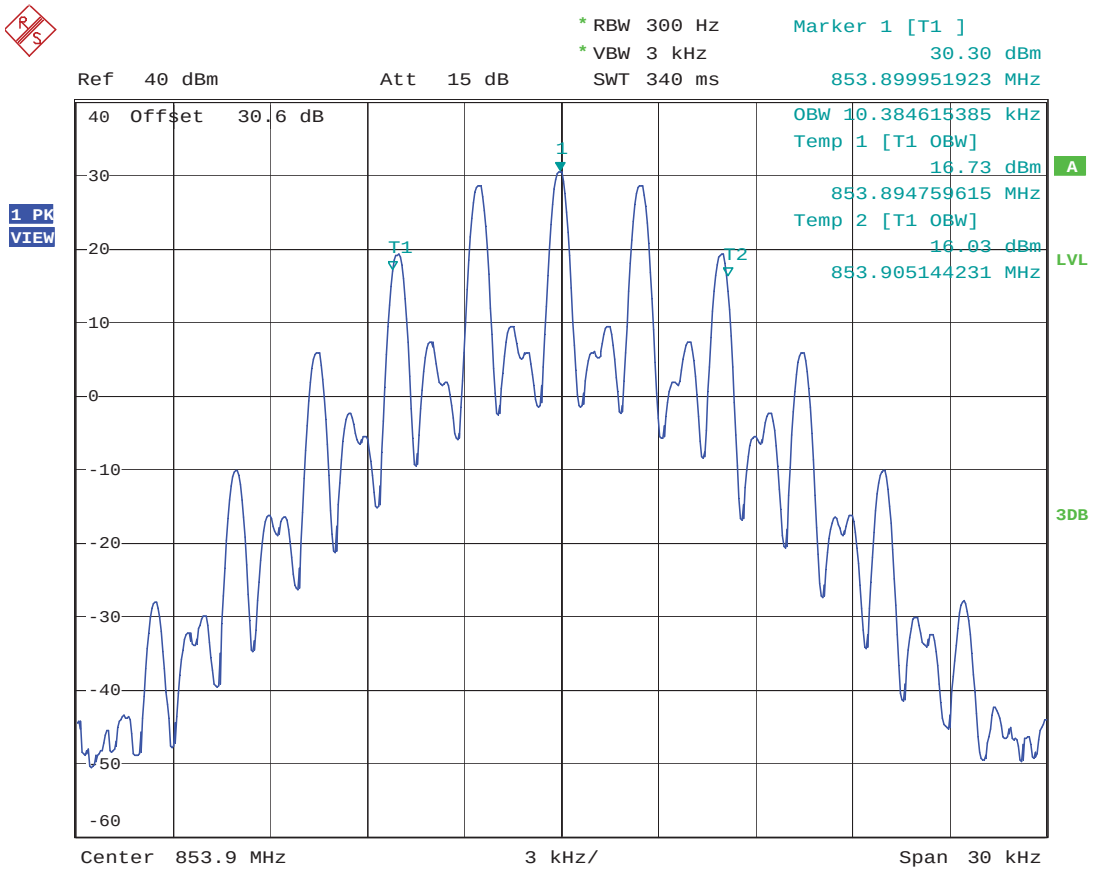
OBW: 10.385 KHz




Date: 29.MAY.2018 10:33:49

### 5.8.4.32. Configuration: 99% OBW, Band 4: 851-854MHz, 853.9MHz, 20 KHz, Analog, High power

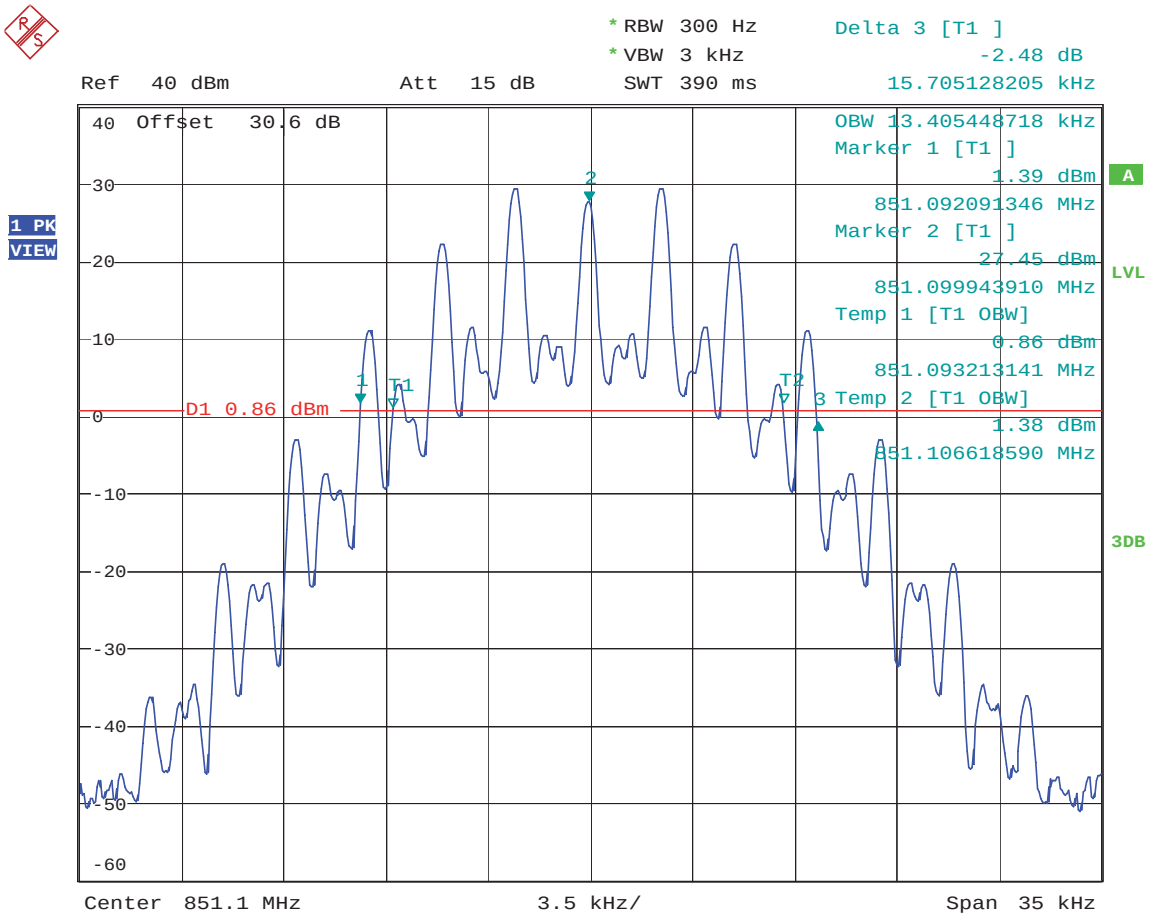
OBW: 10.385 KHz




Date: 29.MAY.2018 10:37:51

### 5.8.4.33. Configuration: 99% OBW, Band 4: 851-869MHz, 851.1MHz, 25 KHz, Analog, High power

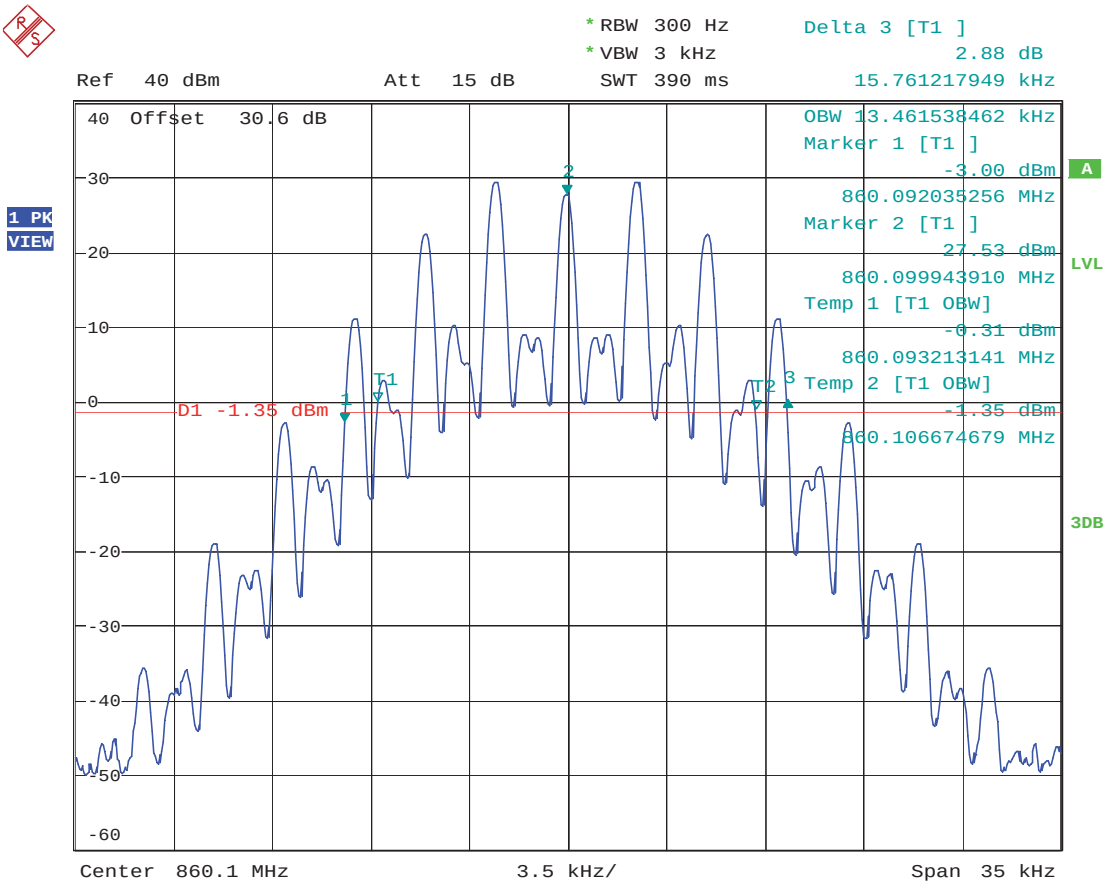
OBW: 15.705 KHz




Date: 29.MAY.2018 10:50:47

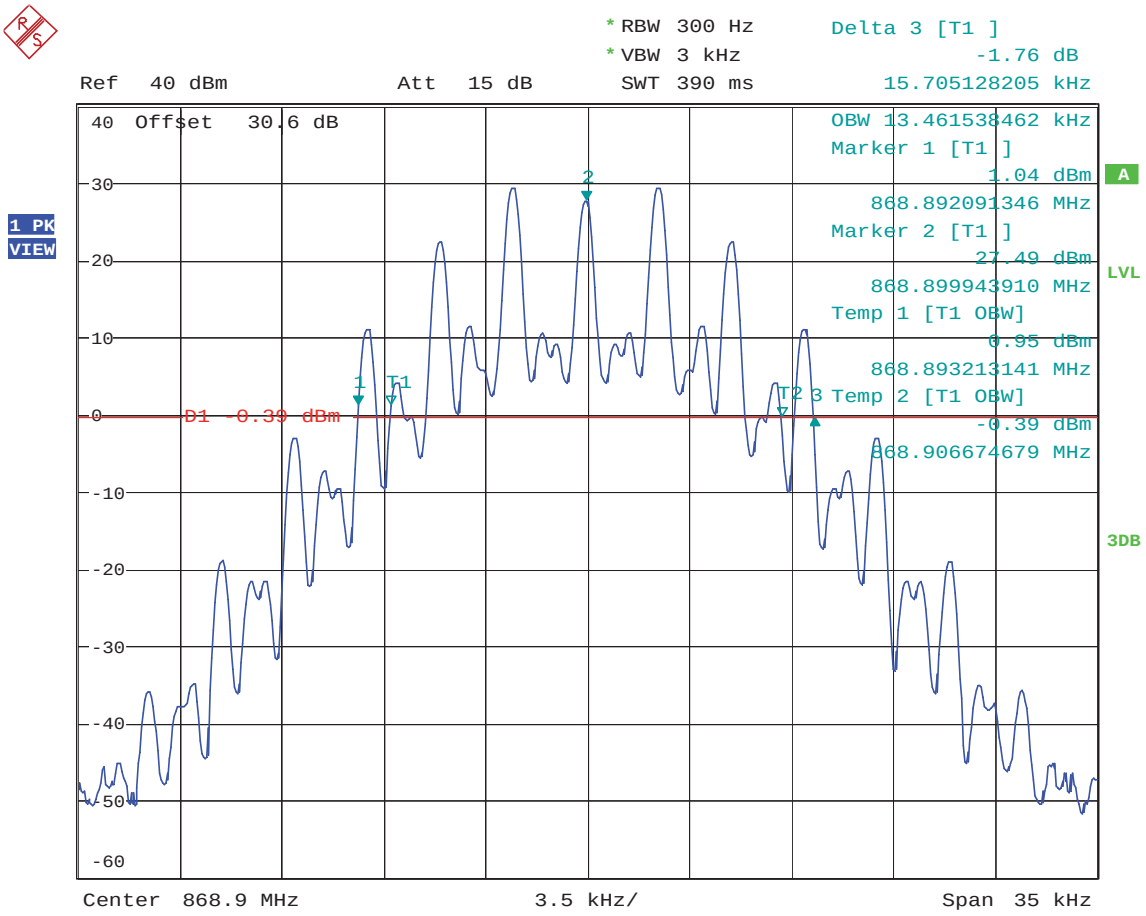
### 5.8.4.34. Configuration: 99% OBW, Band 4: 851-869MHz, 860.1MHz, 25 KHz, Analog, High power

OBW: 15.76 KHz



### 5.8.4.35. Configuration: 99% OBW, Band 4: 851-869MHz, 868.9MHz, 25 KHz, Analog, High power

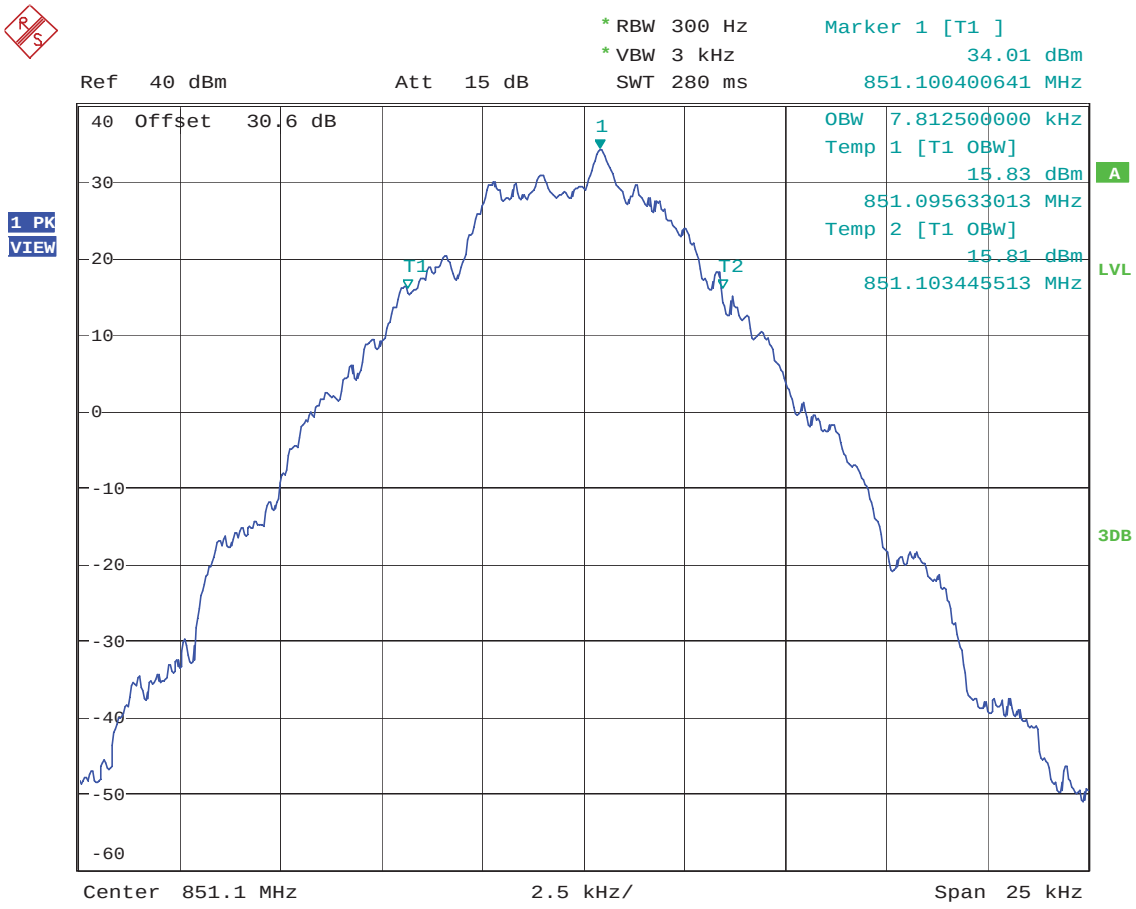
OBW: 15.705 KHz




Date: 29.MAY.2018 10:56:01

### 5.8.4.36. Configuration: 99% OBW, Band 4: 851-869MHz, 851.1MHz, 12.5 KHz, Digital, F1E& F1D, High power

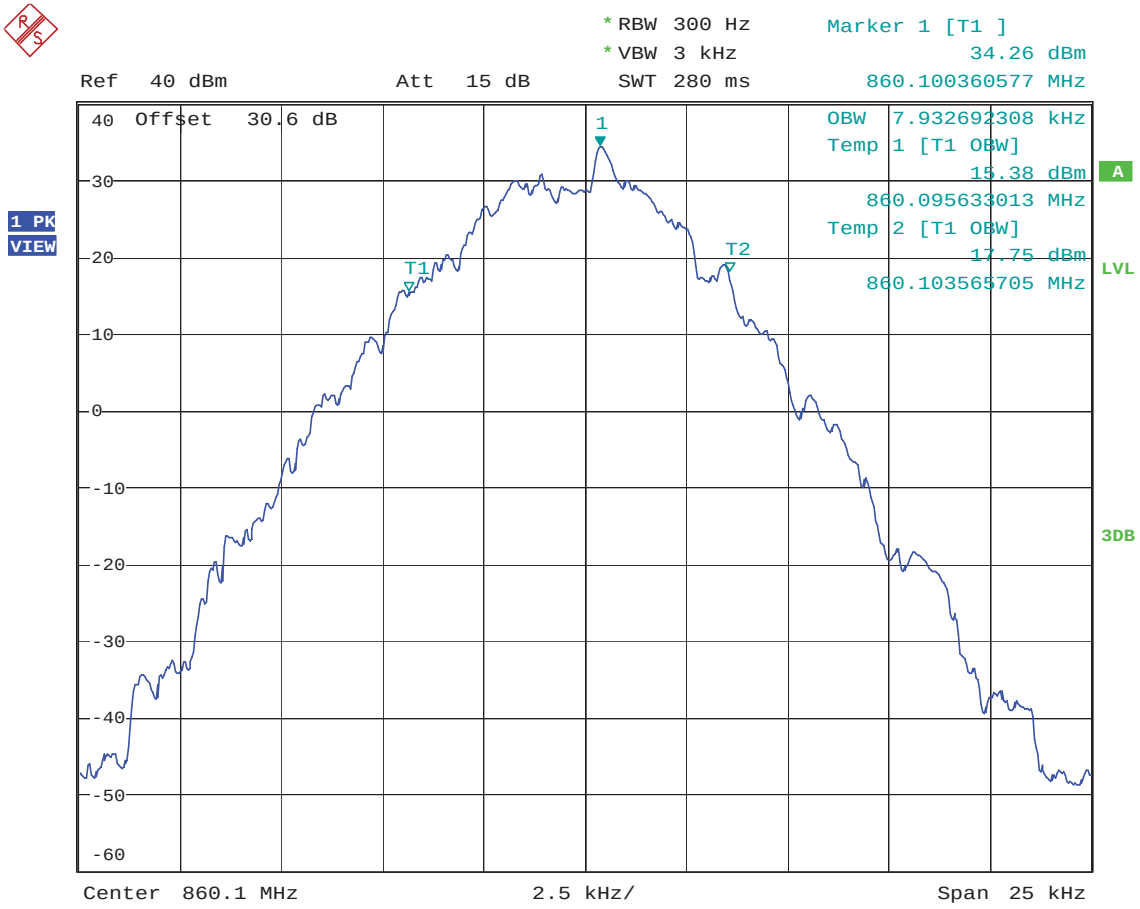
OBW: 7.81 KHz




Date: 29.MAY.2018 11:12:10

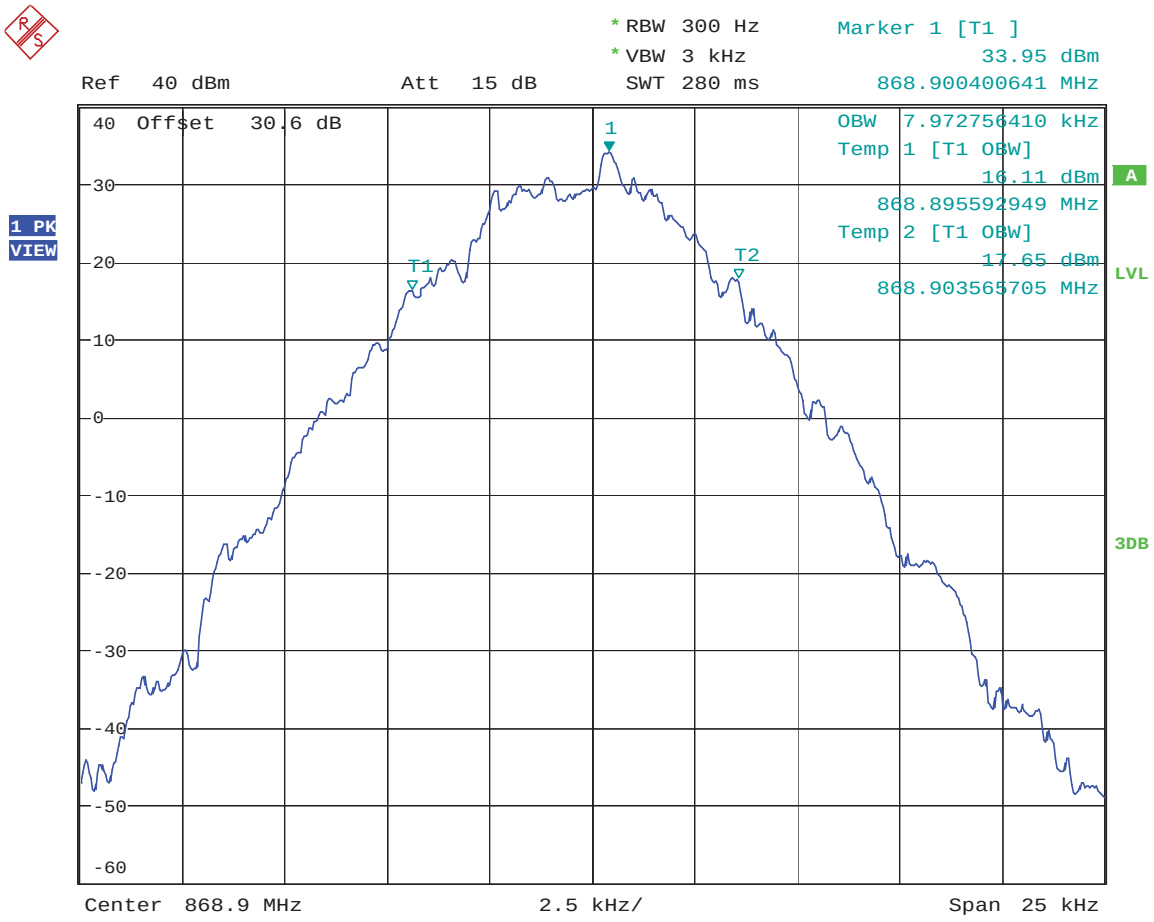
### 5.8.4.37. Configuration: 99% OBW, Band 4: 851-869MHz, 860.1MHz, 12.5 KHz, Digital, F1E& F1D, High power

OBW: 7.93 KHz



### 5.8.4.38. Configuration: 99% OBW, Band 4: 851-869MHz, 868.9MHz, 12.5 KHz, Digital, F1E& F1D, High power

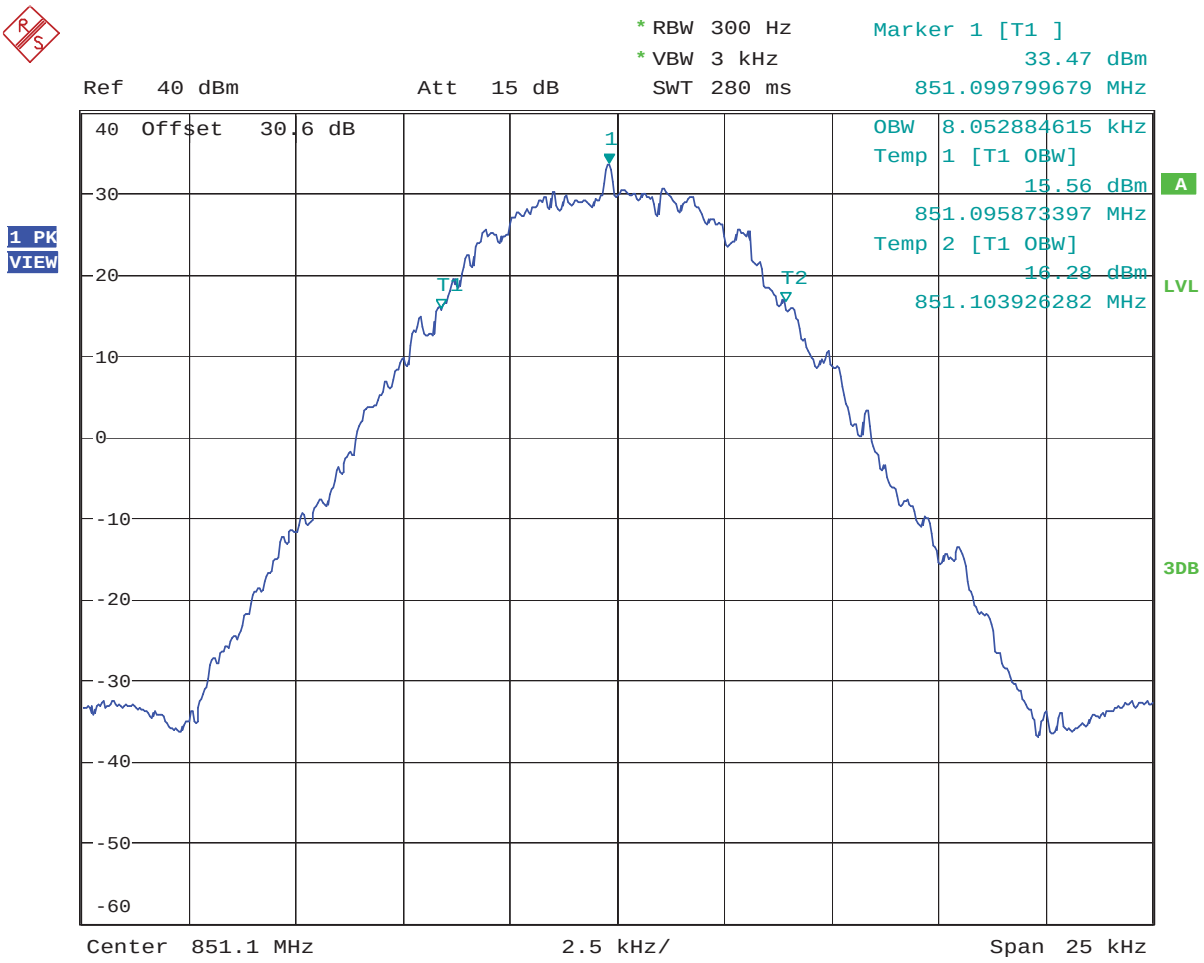
OBW: 7.97 KHz




Date: 29.MAY.2018 11:15:21

### 5.8.4.39. Configuration: 99% OBW, Band 4: 851-869MHz, 851.1MHz, 12.5 KHz, Digital, F1W, High power

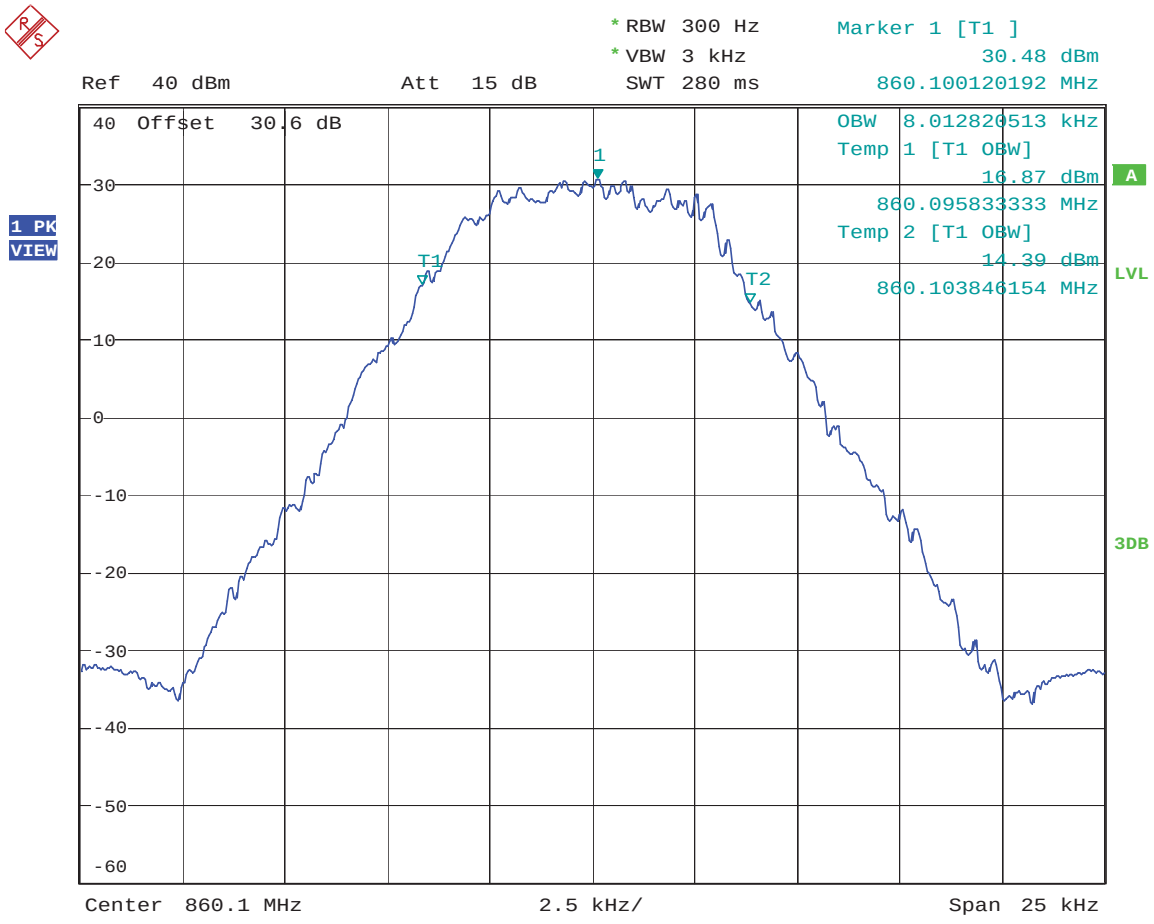
OBW: 8.05 KHz




Date: 29.MAY.2018 11:37:45

### 5.8.4.40. Configuration: 99% OBW, Band 4: 851-869MHz, 860.1MHz, 12.5 KHz, Digital, F1W, High power

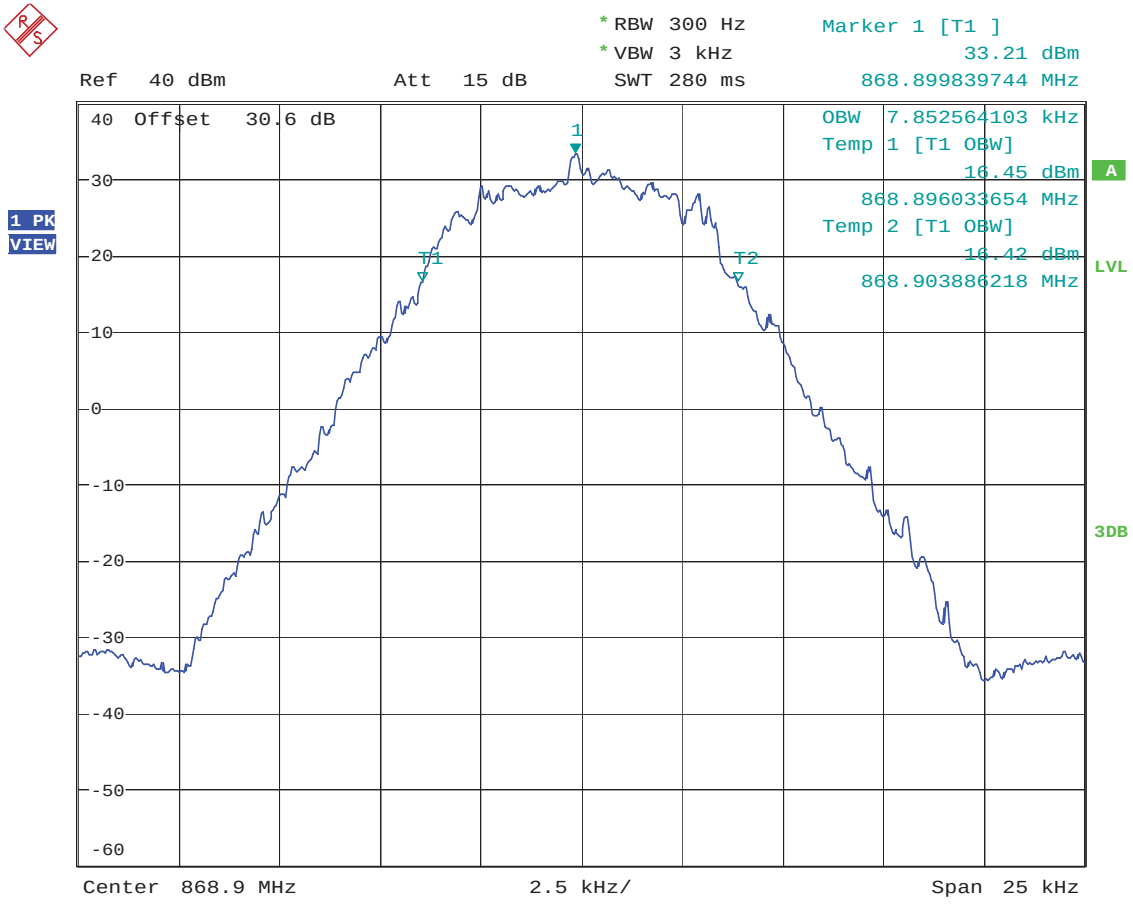
OBW: 8.01 KHz




Date: 29.MAY.2018 11:39:54

### 5.8.4.41. Configuration: 99% OBW, Band 4: 851-869MHz, 868.9MHz, 12.5 KHz, Digital, F1W, High power

OBW: 7.85 KHz

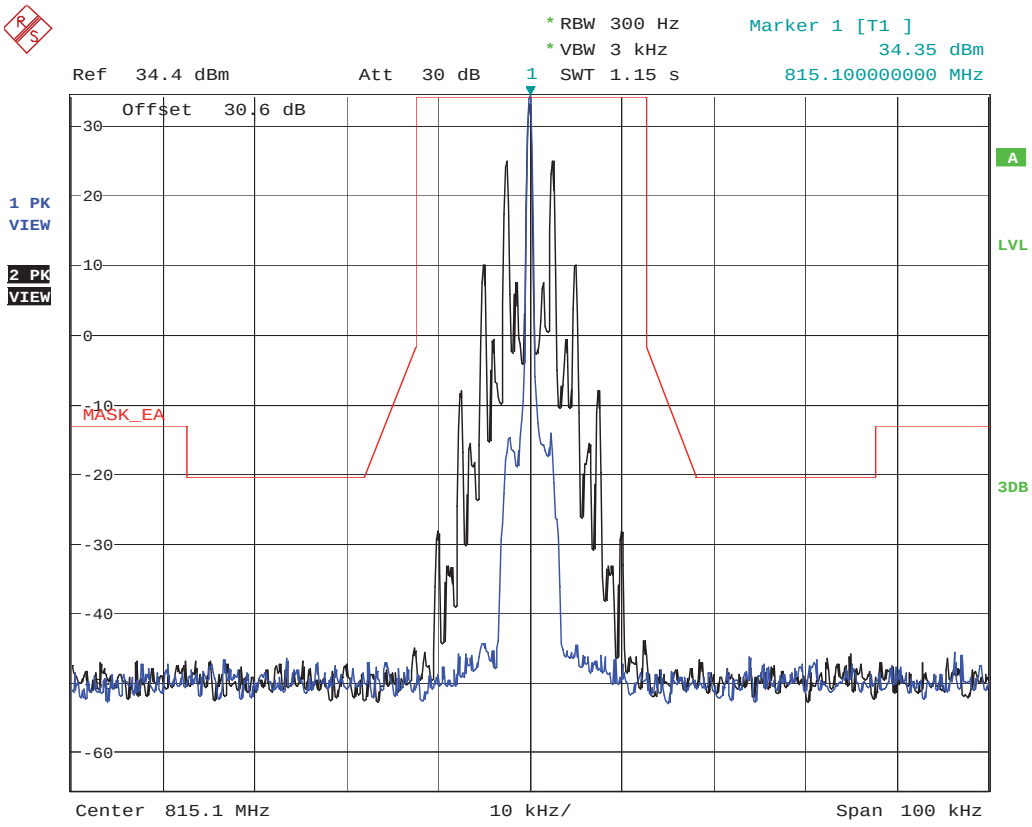



Date: 29.MAY.2018 11:42:01

## 5.8.5. Test Data- EMISSION MASKS- MASK 90.691

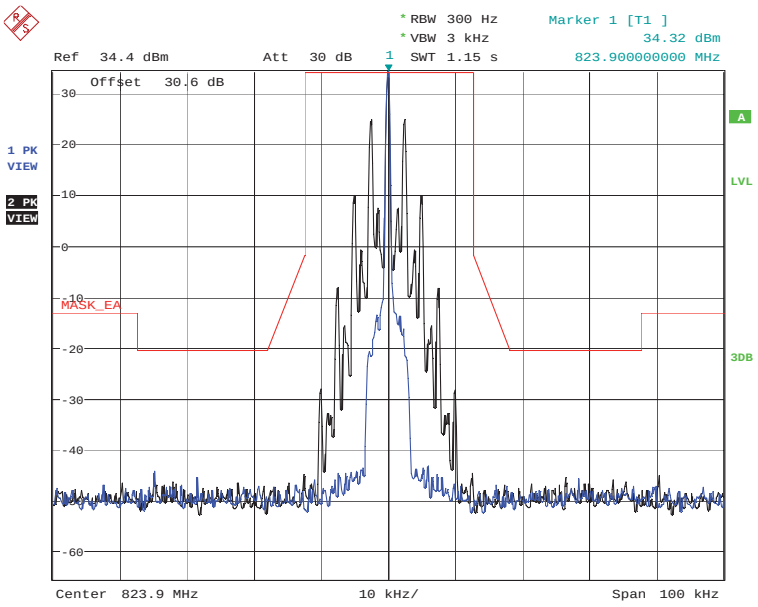
### High Power Analog

### 5.8.5.1. Configuration: Mask 90.691, Sub Band 3: 809-824MHz, 815.1MHz, 12.5 KHz, Analog, High power



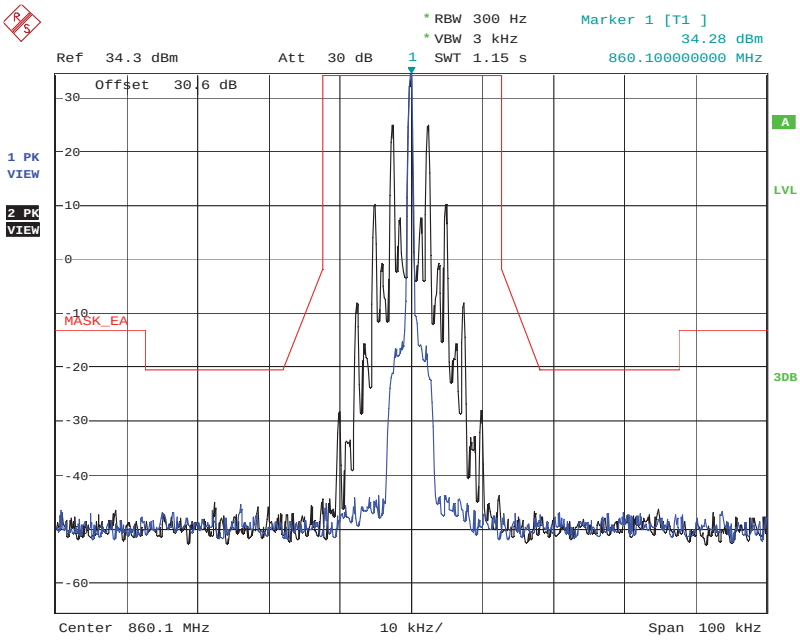

Date: 1.JUN.2018 10:39:33

## 5.8.5.2. Configuration: Mask 90.691, Sub Band 3: 809-824MHz, 823.9MHz, 12.5 KHz, Analog, High power



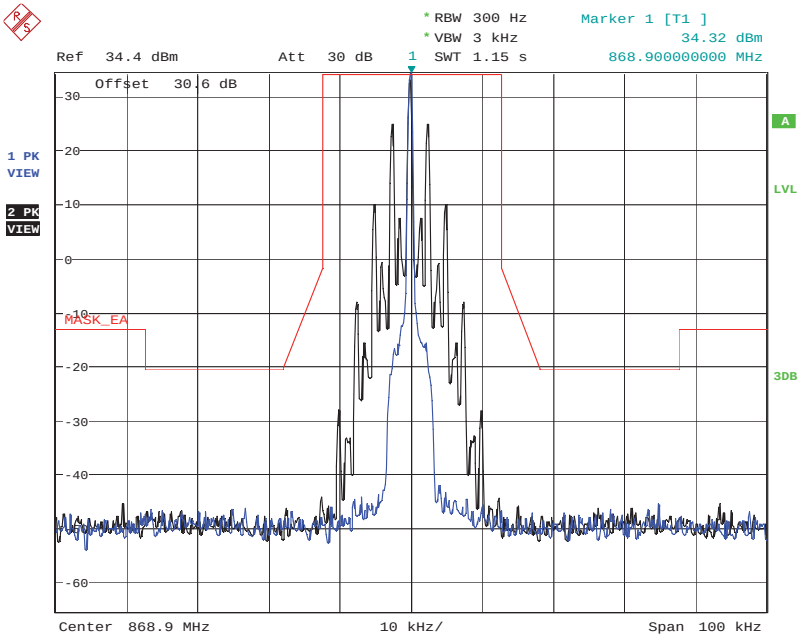

Date: 1.JUN.2018 10:49:58

## 5.8.5.3. Configuration: Mask 90.691, Sub Band 4: 854-869MHz, 860.1MHz, 12.5 KHz, Analog, High power



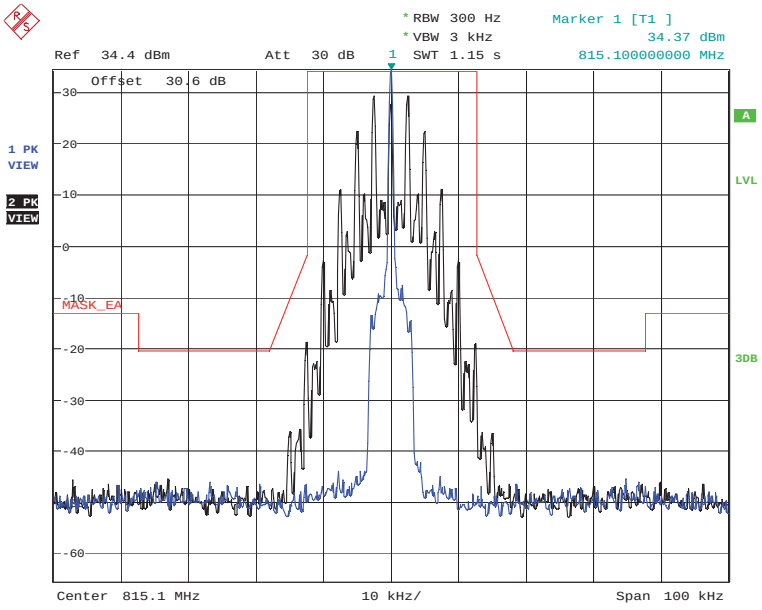

Date: 1.JUN.2018 10:57:03

## 5.8.5.4. Configuration: Mask 90.691, Sub Band 4: 854-869MHz, 868.9MHz, 12.5 KHz, Analog, High power




Date: 1.JUN.2018 11:05:46

## 5.8.5.5. Configuration: Mask 90.691, Sub Band 3: 809-824MHz, 815.1MHz, 25 KHz, Analog, High power

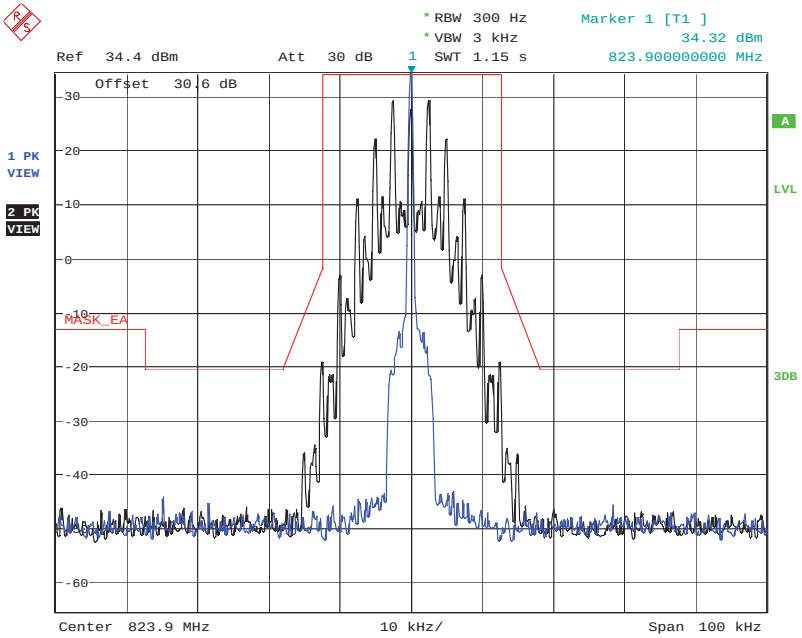



Date: 1.JUN.2018 10:46:50



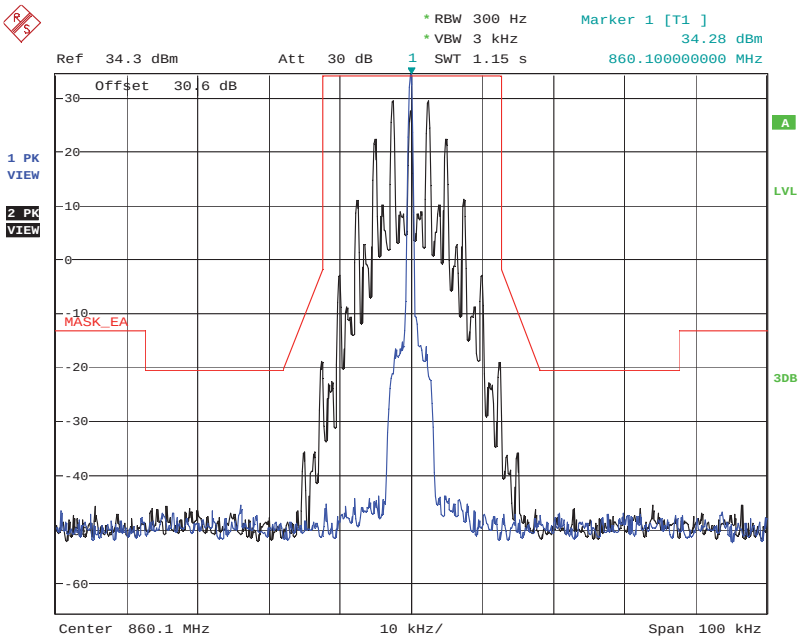
*All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

## 5.8.5.6. Configuration: Mask 90.691, Sub Band 3: 809-824MHz, 823.9MHz, 25 KHz, Analog, High power



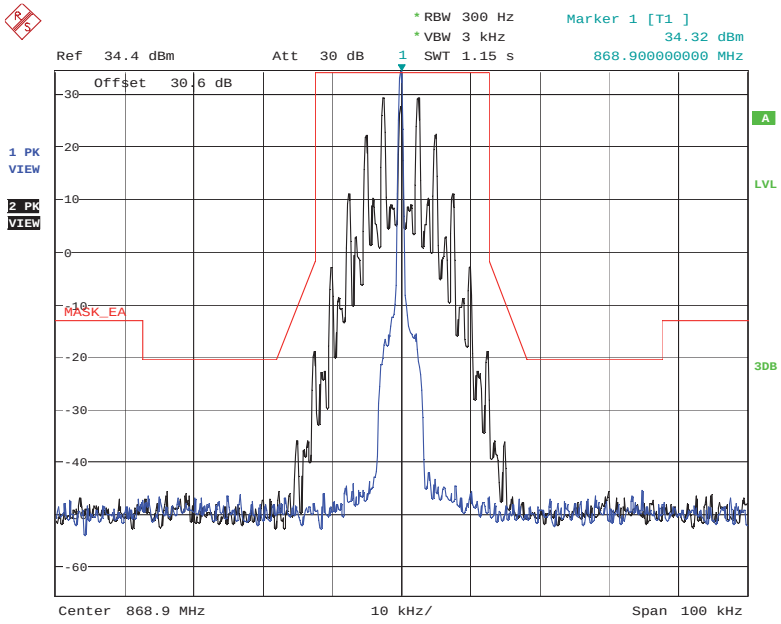

Date: 1.JUN.2018 10:51:11

## 5.8.5.7. Configuration: Mask 90.691, Sub Band 4: 854-869MHz, 860.1MHz, 25 KHz, Analog, High power




Date: 1.JUN.2018 10:58:19

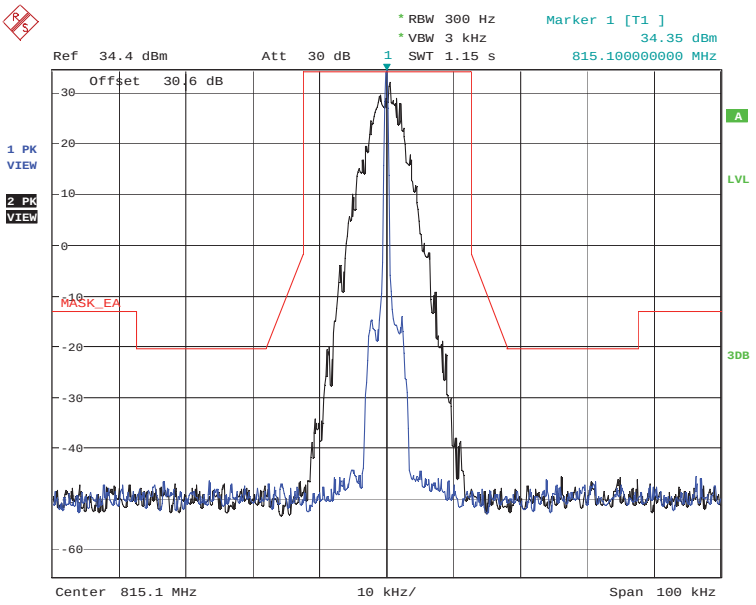
### 5.8.5.8. Configuration: Mask 90.691, Sub Band 4: 854-869MHz, 868.9MHz, 25 KHz, Analog, High power




Date: 1.JUN.2018 11:06:57

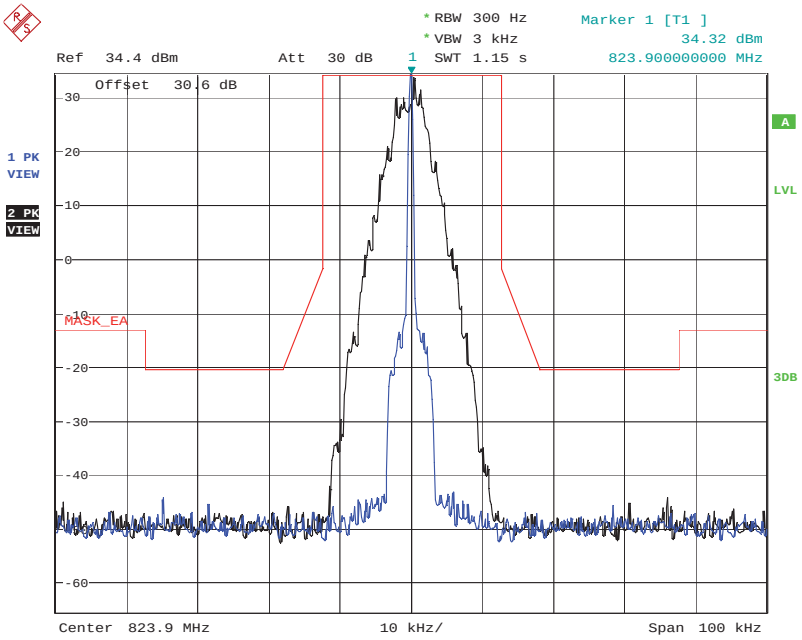
### High Power Digital

### 5.8.5.9. Configuration: Mask 90.691, Sub Band 3: 809-824MHz, 815.1MHz, F1E&F1D, Digital, High power



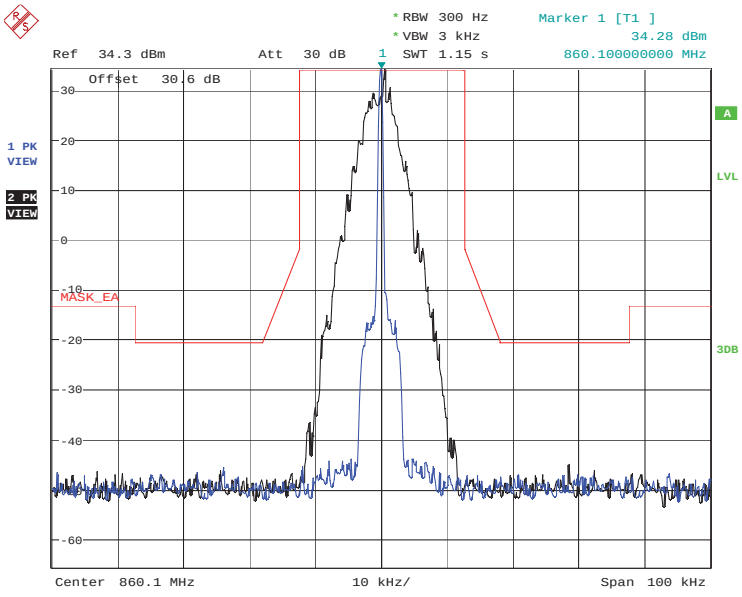

Date: 1.JUN.2018 10:41:28

### 5.8.5.10. Configuration: Mask 90.691, Sub Band 3: 809-824MHz, 823.9MHz, F1E&F1D, Digital, High power




Date: 1.JUN.2018 10:52:24

### 5.8.5.11. Configuration: Mask 90.691, Sub Band 4: 854-869MHz, 860.1MHz, F1E&F1D, Digital, High power

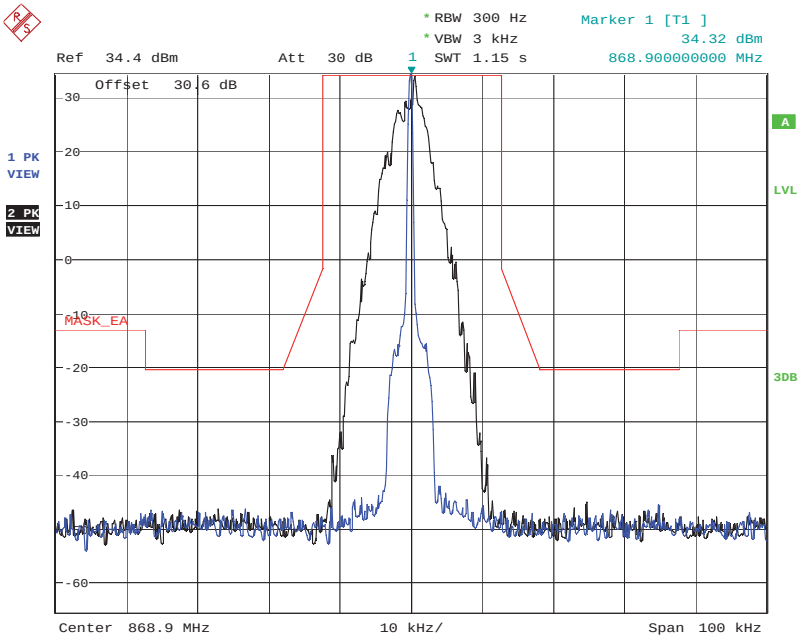



Date: 1.JUN.2018 10:59:33



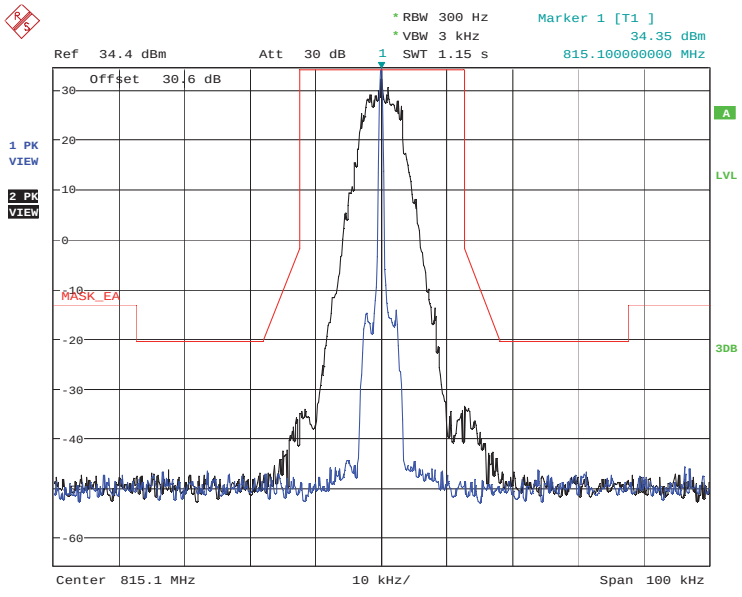
*All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

### 5.8.5.12. Configuration: Mask 90.691, Sub Band 4: 854-869MHz, 868.9MHz, F1E&F1D, Digital, High power



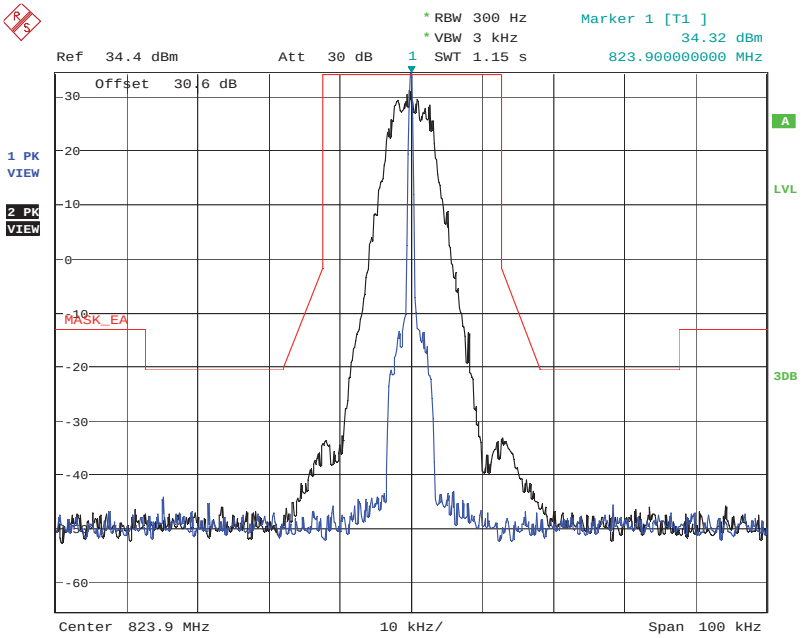

Date: 1.JUN.2018 11:09:08

### 5.8.5.13. Configuration: Mask 90.691, Sub Band 3: 809-824MHz, 815.1MHz, F1W, Digital, High power

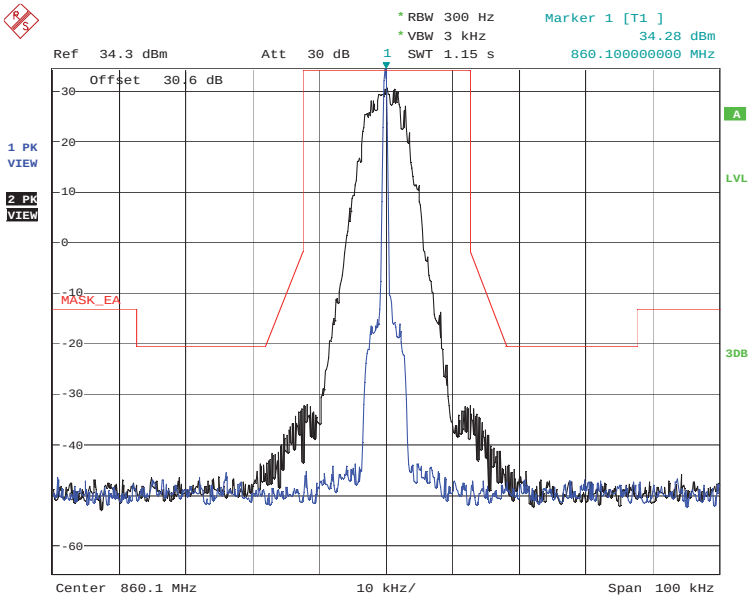



Date: 1.JUN.2018 10:43:13

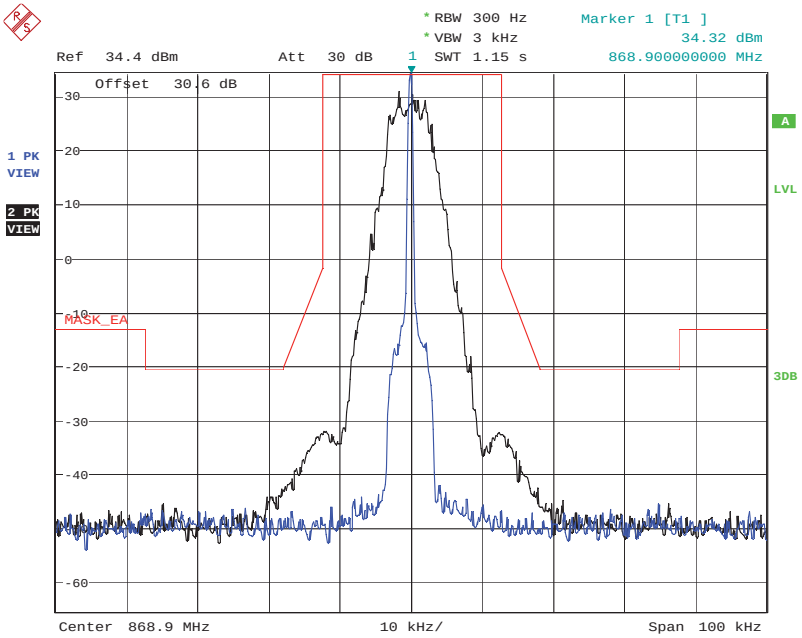
### 5.8.5.14. Configuration: Mask 90.691, Sub Band 3: 809-824MHz, 823.9MHz, F1W, Digital, High power




### 5.8.5.15. Configuration: Mask 90.691, Sub Band 4: 854-869MHz, 860.1MHz, F1W, Digital, High power



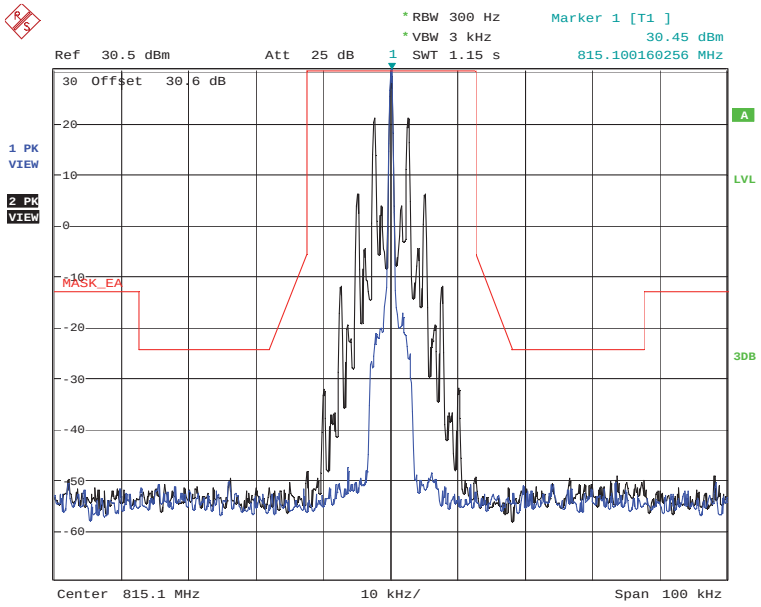
### 5.8.5.16. Configuration: Mask 90.691, Sub Band 4: 854-869MHz, 868.9MHz, F1W, Digital, High power




Date: 1.JUN.2018 11:10:37

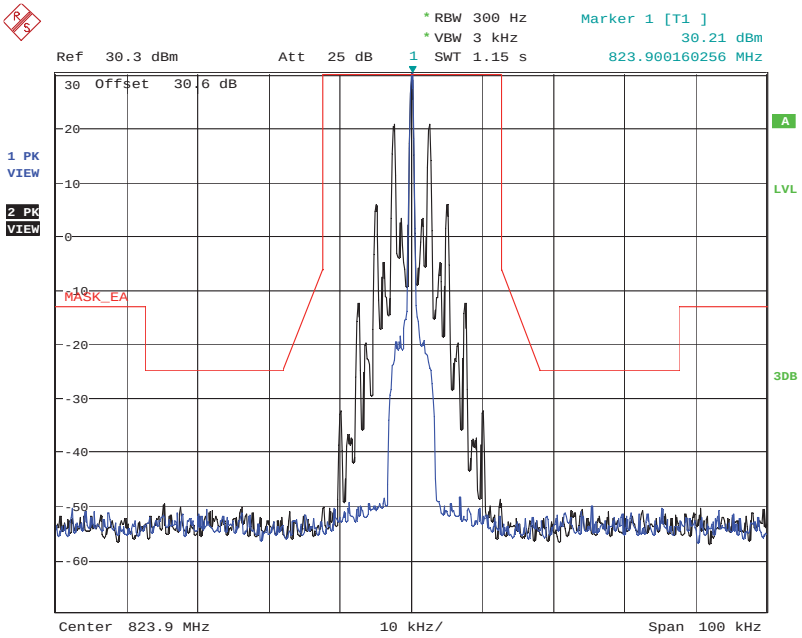
## Low Power Analog

### 5.8.5.17. Configuration: Mask 90.691, Sub Band 3: 809-824MHz, 815.1MHz, 12.5 KHz, Analog, Low power



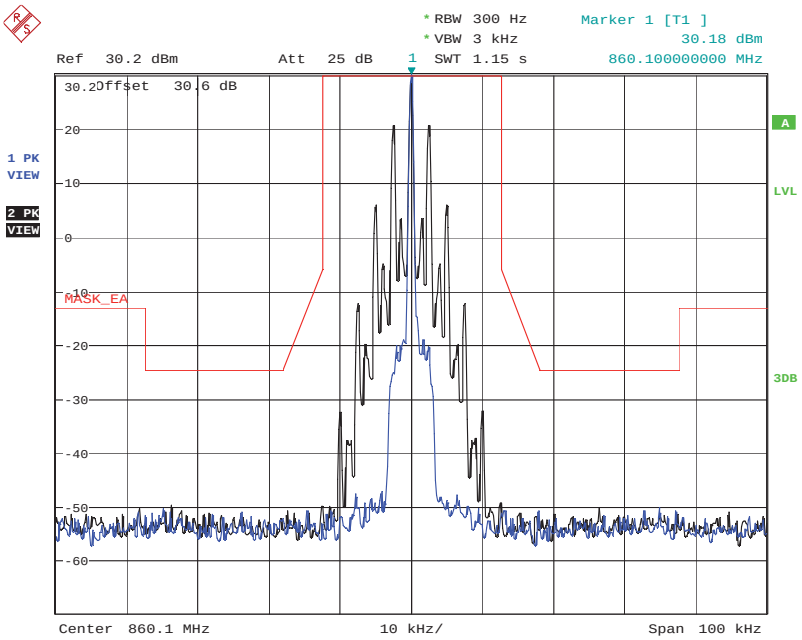

Date: 1.JUN.2018 12:23:00

### 5.8.5.18. Configuration: Mask 90.691, Sub Band 3: 809-824MHz, 823.9MHz, 12.5 KHz, Analog, Low power



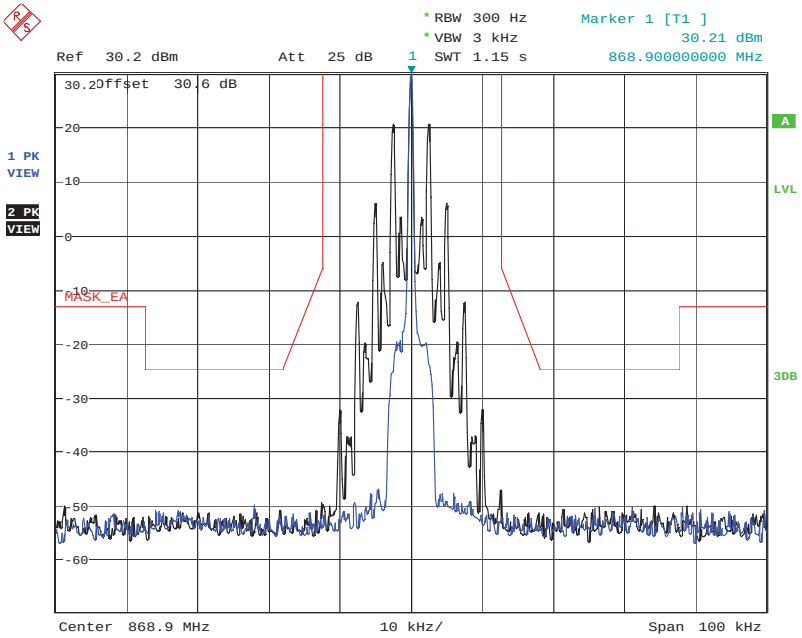

Date: 1.JUN.2018 12:30:59

### 5.8.5.19. Configuration: Mask 90.691, Sub Band 4: 854-869MHz, 860.1MHz, 12.5 KHz, Analog, Low power



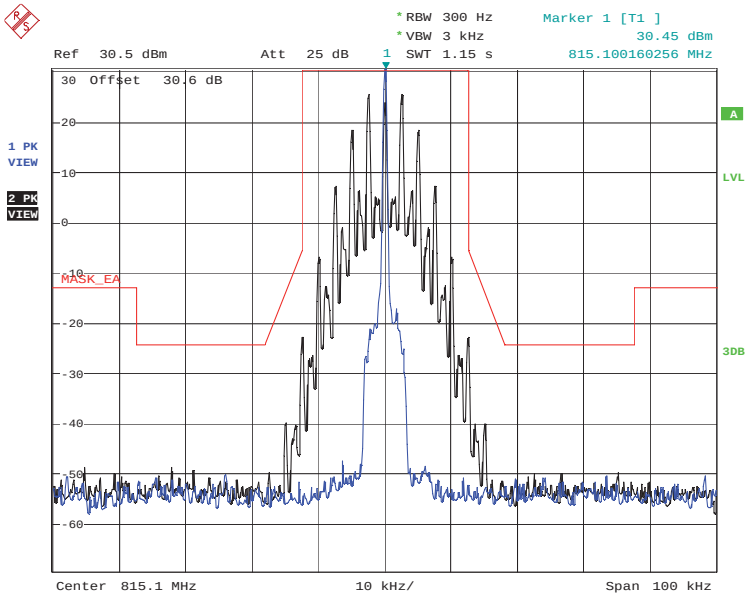

Date: 1.JUN.2018 12:38:31

## 5.8.5.20. Configuration: Mask 90.691, Sub Band 4: 854-869MHz, 868.9MHz, 12.5 KHz, Analog, Low power



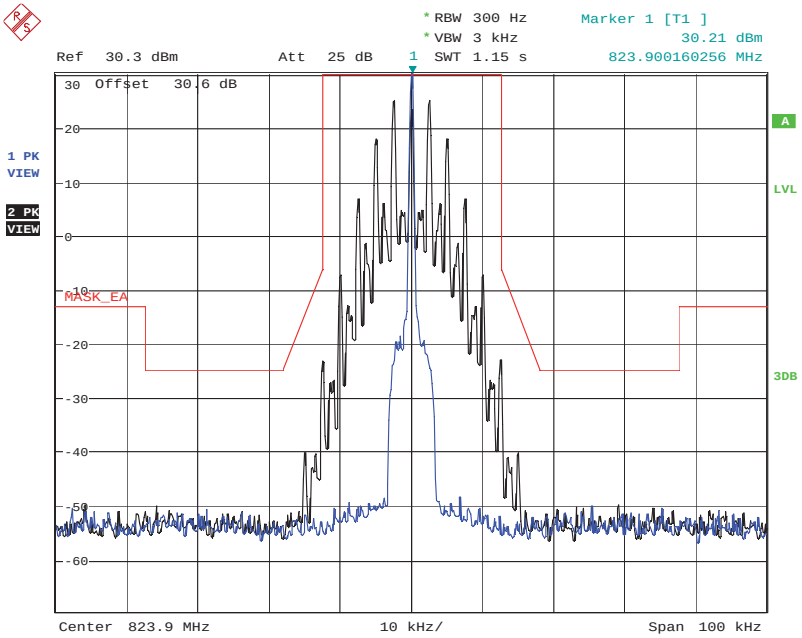

Date: 1.JUN.2018 12:50:24

## 5.8.5.21. Configuration: Mask 90.691, Sub Band 3: 809-824MHz, 815.1MHz, 25 KHz, Analog, Low power



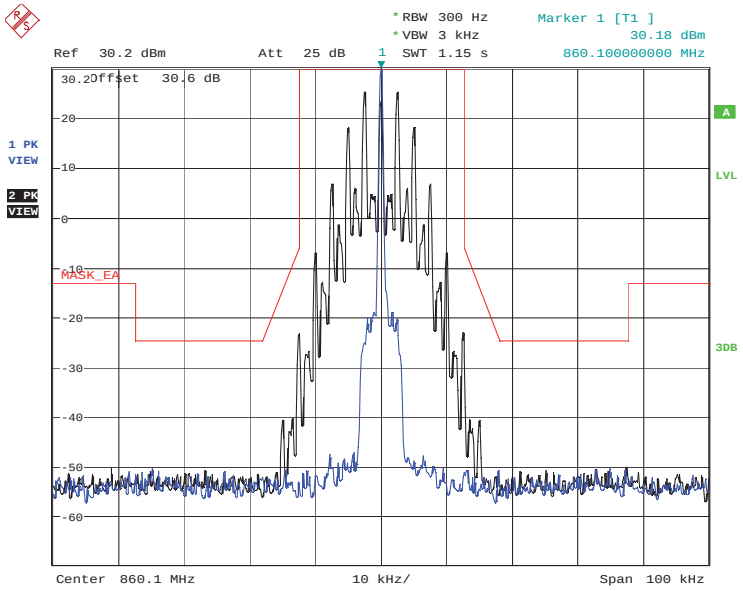

Date: 1.JUN.2018 12:24:24

### 5.8.5.22. Configuration: Mask 90.691, Sub Band 3: 809-824MHz, 823.9MHz, 25 KHz, Analog, Low power



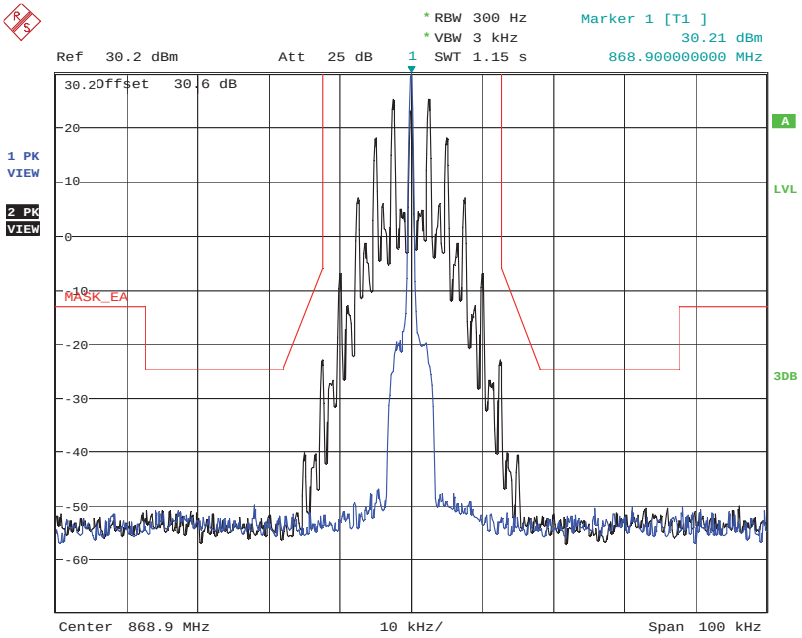

Date: 1.JUN.2018 12:32:15

### 5.8.5.23. Configuration: Mask 90.691, Sub Band 4: 854-869MHz, 860.1MHz, 25 KHz, Analog, Low power




Date: 1.JUN.2018 12:39:53

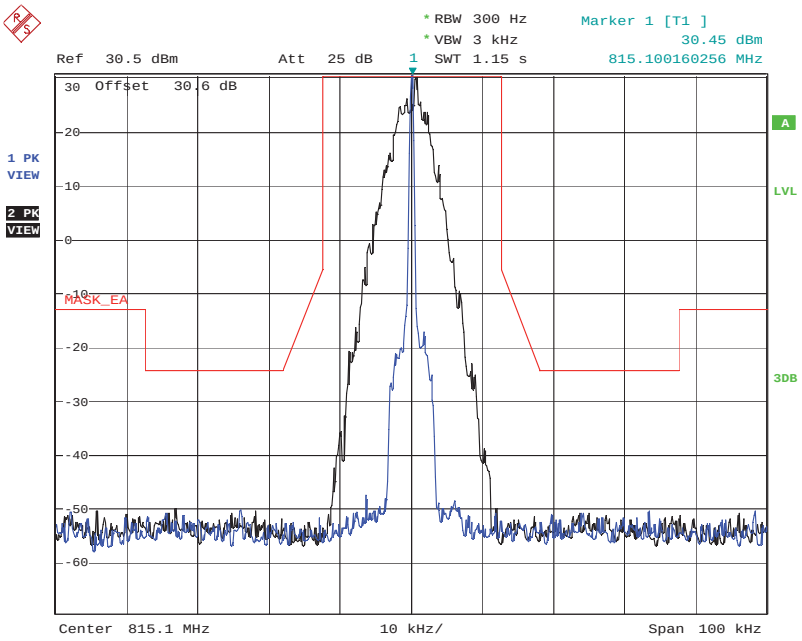
### 5.8.5.24. Configuration: Mask 90.691, Sub Band 4: 854-869MHz, 868.9MHz, 25 KHz, Analog, Low power




Date: 1.JUN.2018 12:51:41

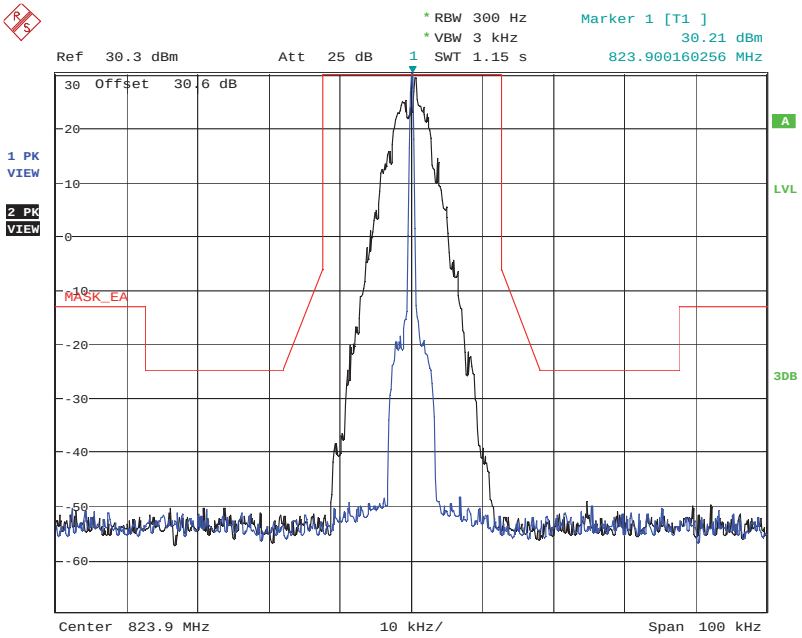
## Low Power Digital

### 5.8.5.25. Configuration: Mask 90.691, Sub Band 3: 809-824MHz, 815.1MHz, F1E&F1D, Digital, Low power

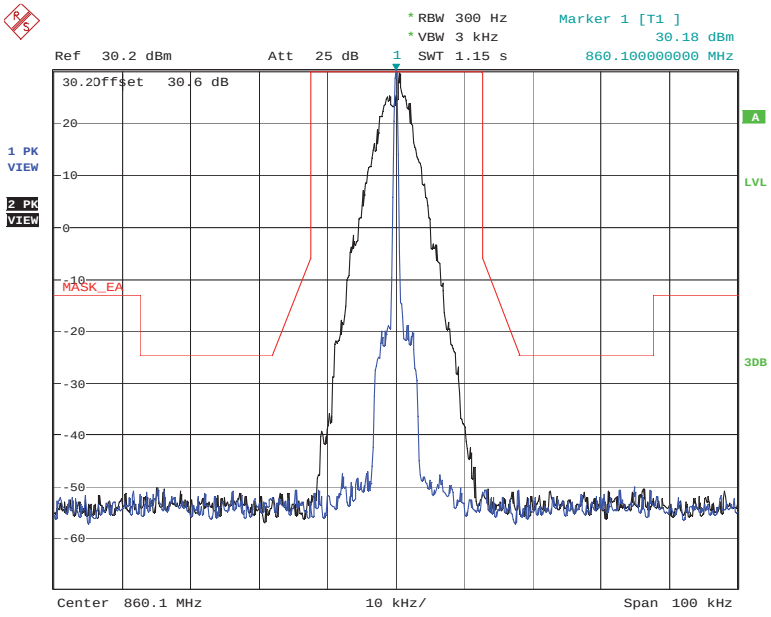



Date: 1.JUN.2018 12:25:41

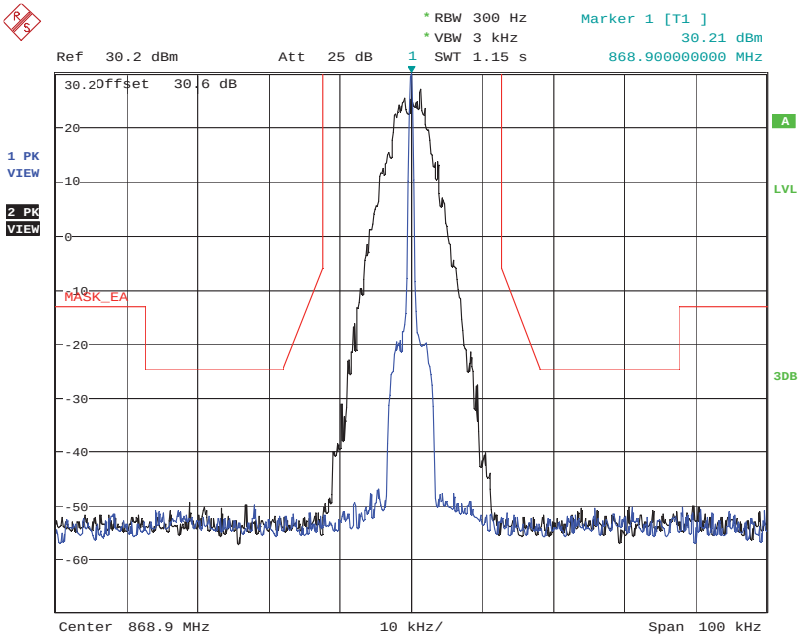
## 5.8.5.26. Configuration: Mask 90.691, Sub Band 3: 809-824MHz, 823.9MHz, F1E&F1D, Digital, Low power




## 5.8.5.27. Configuration: Mask 90.691, Sub Band 4: 854-869MHz, 860.1MHz, F1E&F1D, Digital, Low power

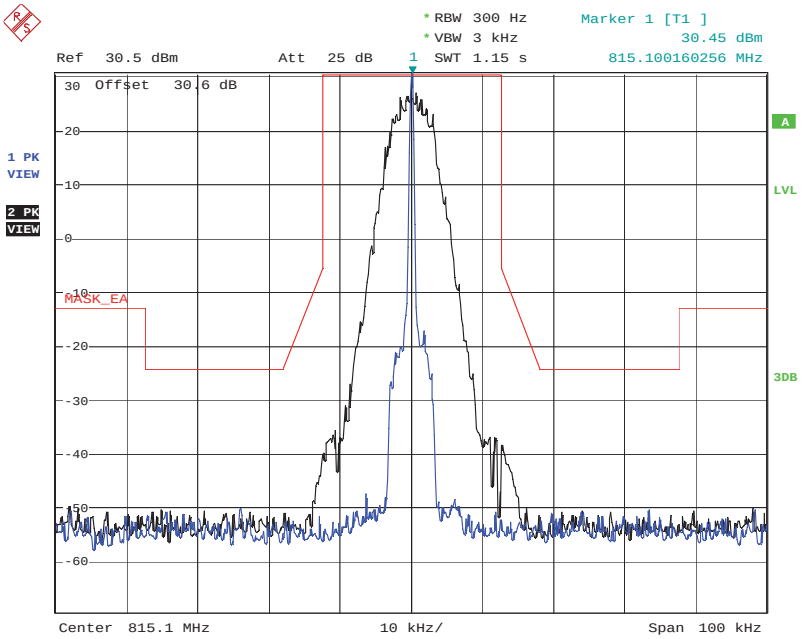


### 5.8.5.28. Configuration: Mask 90.691, Sub Band 4: 854-869MHz, 868.9MHz, F1E&F1D, Digital, Low power



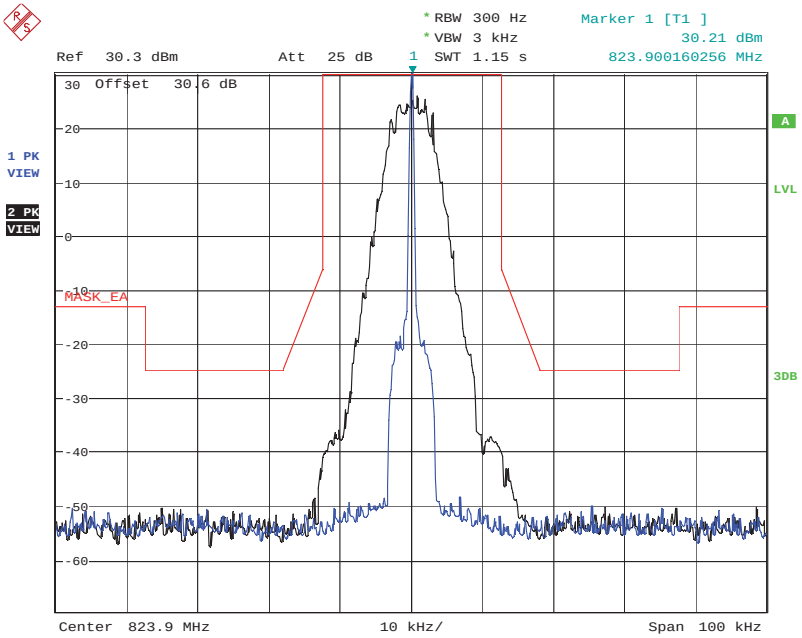

Date: 1.JUN.2018 12:52:55

### 5.8.5.29. Configuration: Mask 90.691, Sub Band 3: 809-824MHz, 815.1MHz, F1W, Digital, Low power



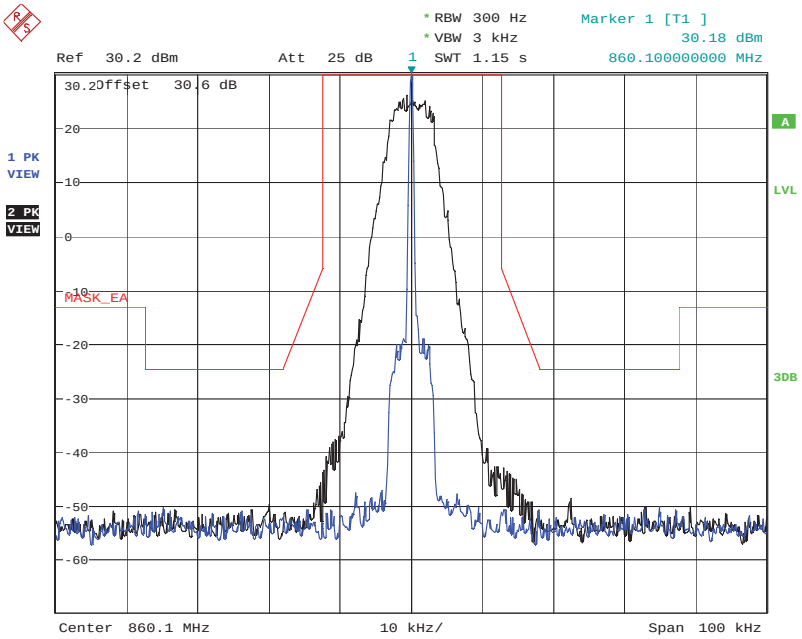

Date: 1.JUN.2018 12:27:38

## 5.8.5.30. Configuration: Mask 90.691, Sub Band 3: 809-824MHz, 823.9MHz, F1W, Digital, Low power



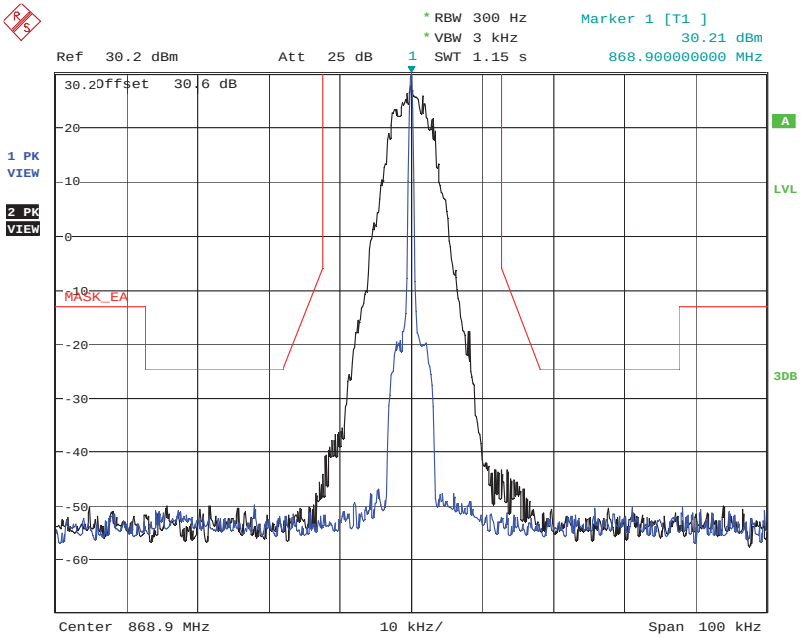

Date: 1.JUN.2018 12:34:52

## 5.8.5.31. Configuration: Mask 90.691, Sub Band 4: 854-869MHz, 860.1MHz, F1W, Digital, Low power




Date: 1.JUN.2018 12:42:57

## 5.8.5.32. Configuration: Mask 90.691, Sub Band 4: 854-869MHz, 868.9MHz, F1W, Digital, Low power

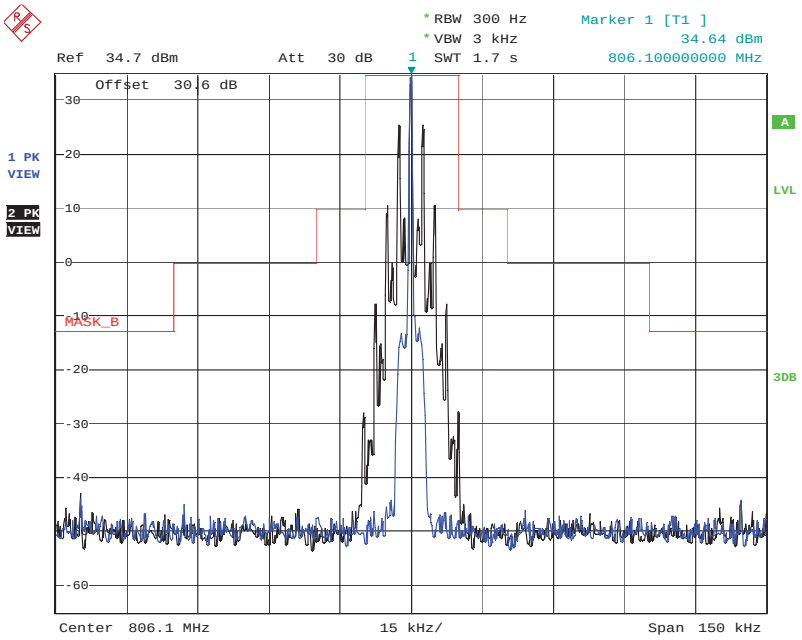



Date: 1.JUN.2018 12:54:41

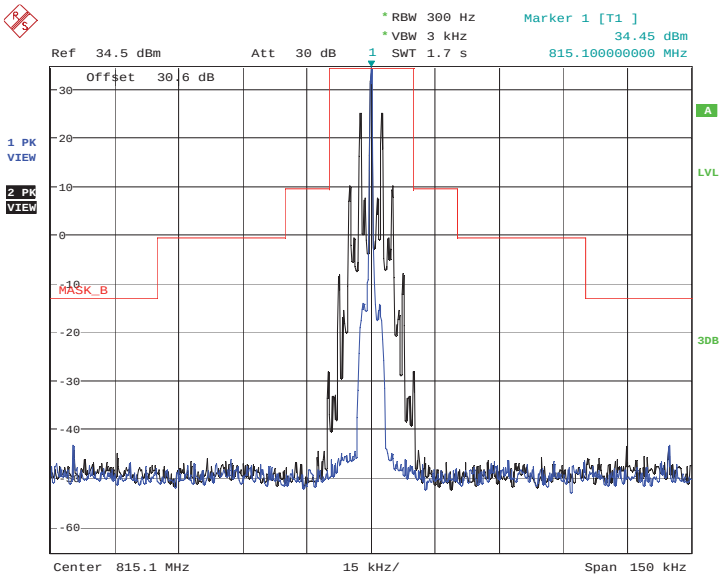
### 5.8.6. Test Data- EMISSION MASKS- MASK B

## High Power

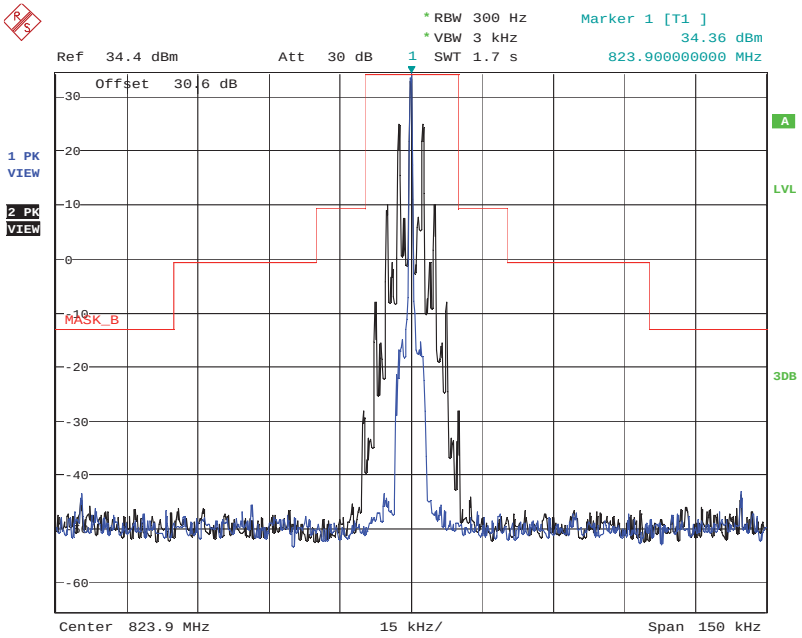
### 5.8.6.1. Configuration: Mask B, Band 3: 806-824MHz, 806.1MHz, 12.5 KHz, Analog, High power




### 5.8.6.2. Configuration: Mask B, Band 3: 806-824MHz, 815.1MHz, 12.5 KHz, Analog, High power

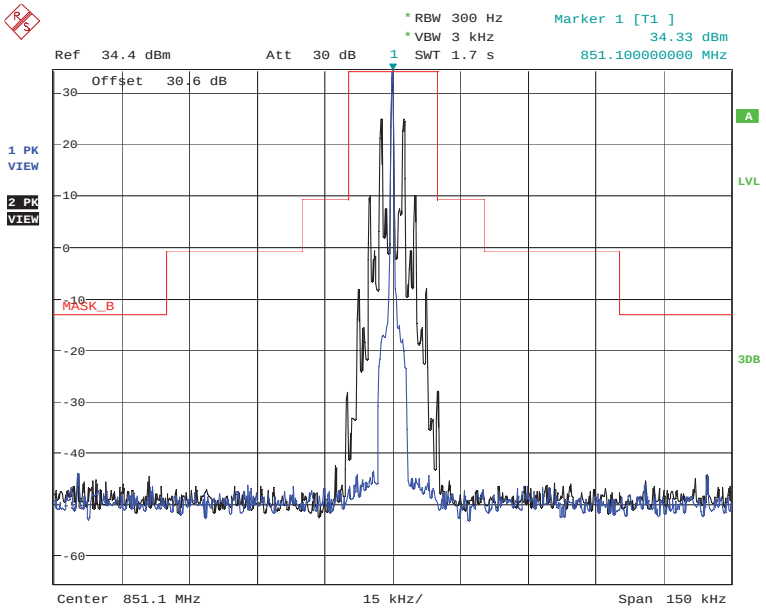


## 5.8.6.3. Configuration: Mask B, Band 3: 806-824MHz, 823.9MHz, 12.5 KHz, Analog, High power



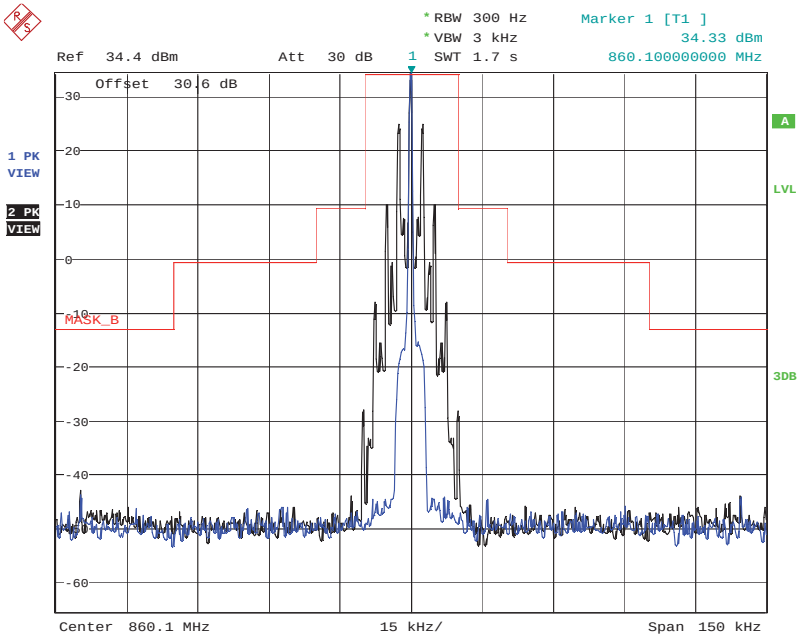

Date: 1.JUN.2018 08:48:43

## 5.8.6.4. Configuration: Mask B, Band 4: 851-869MHz, 851.1MHz, 12.5 KHz, Analog, High power



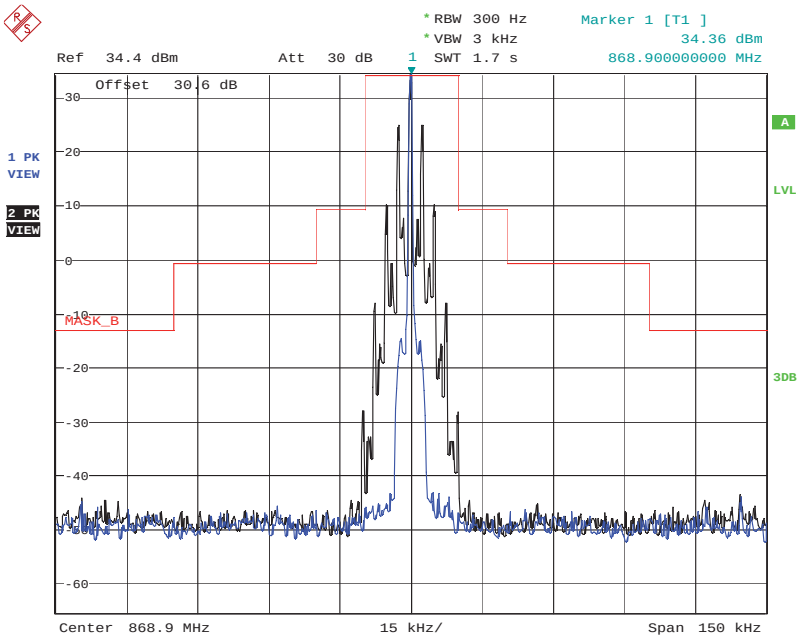

Date: 1.JUN.2018 08:53:37

## 5.8.6.5. Configuration: Mask B, Band 4: 851-869MHz, 860.1MHz, 12.5 KHz, Analog, High power



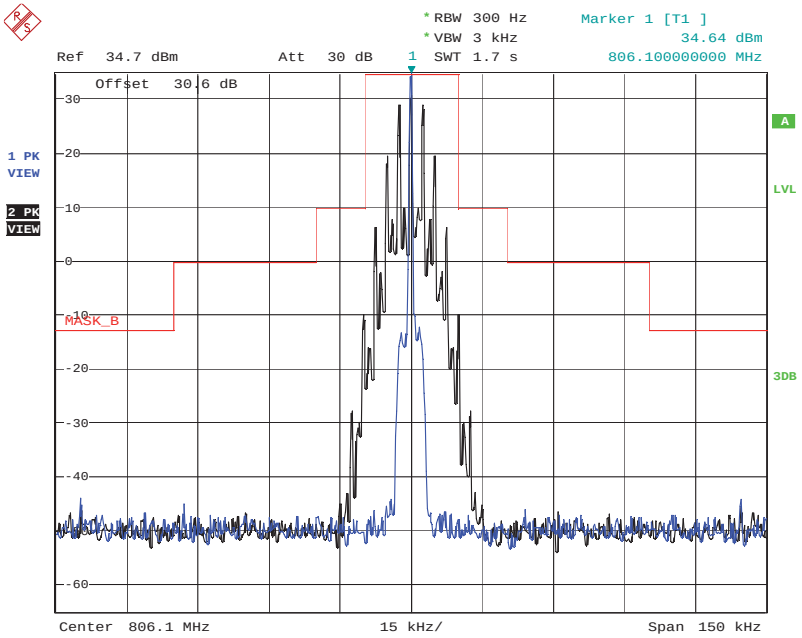

Date: 1.JUN.2018 09:01:26

## 5.8.6.6. Configuration: Mask B, Band 4: 851-869MHz, 868.9MHz, 12.5 KHz, Analog, High power



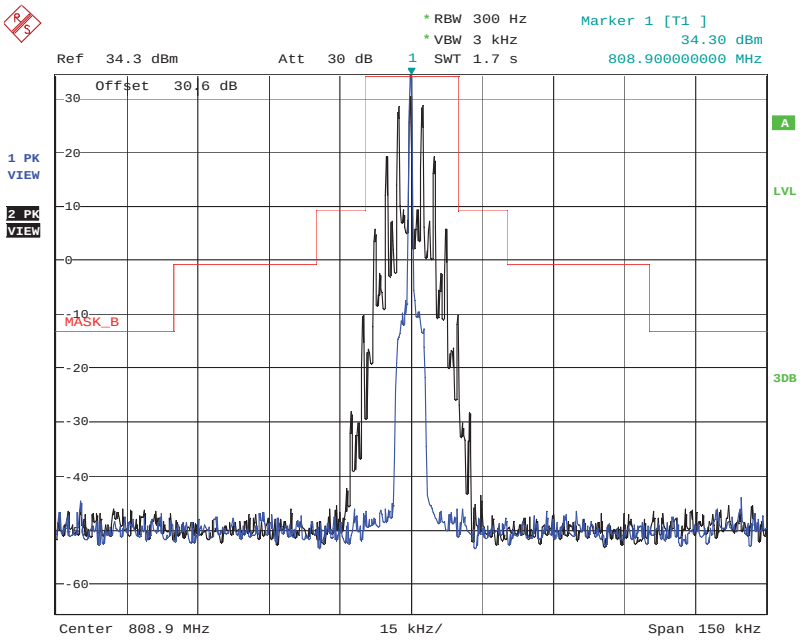

Date: 1.JUN.2018 09:06:47

## 5.8.6.7. Configuration: Mask B, Sub Band 3: 806-809MHz, 806.1MHz, 20 KHz, Analog, High power



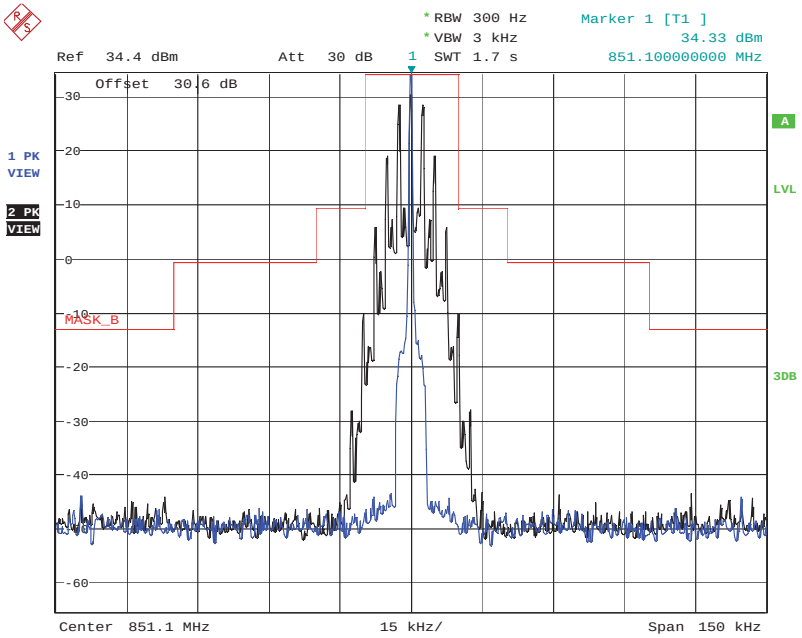

Date: 1.JUN.2018 08:37:31

## 5.8.6.8. Configuration: Mask B, Sub Band 3: 806-809MHz, 808.9MHz, 20 KHz, Analog, High power



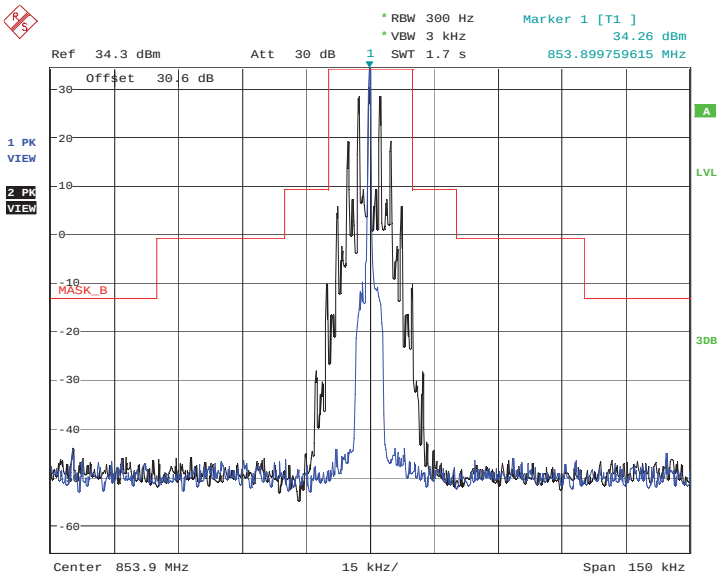

Date: 1.JUN.2018 09:16:24

## 5.8.6.9. Configuration: Mask B, Sub Band 4: 851-854MHz, 851.1MHz, 20 KHz, Analog, High power



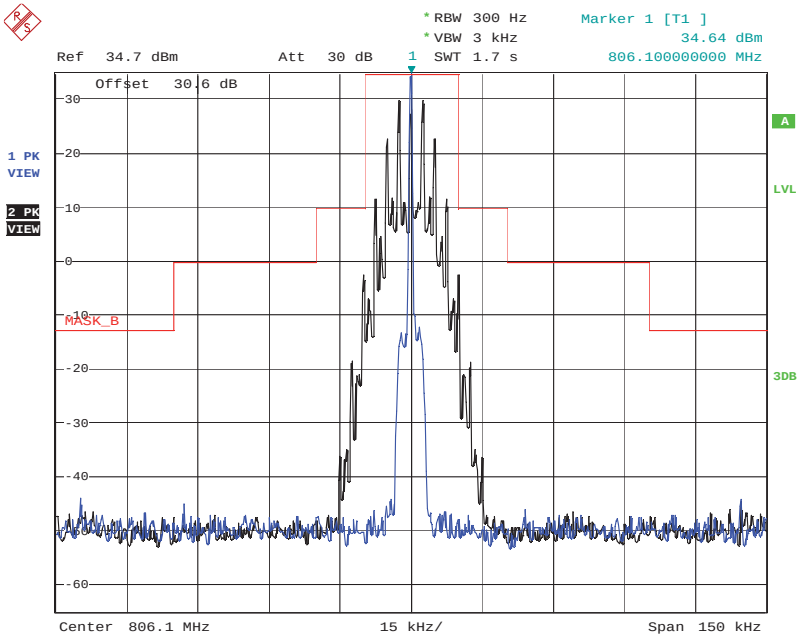

Date: 1.JUN.2018 08:55:20

## 5.8.6.10. Configuration: Mask B, Sub Band 4: 851-854MHz, 853.9MHz, 20 KHz, Analog, High power



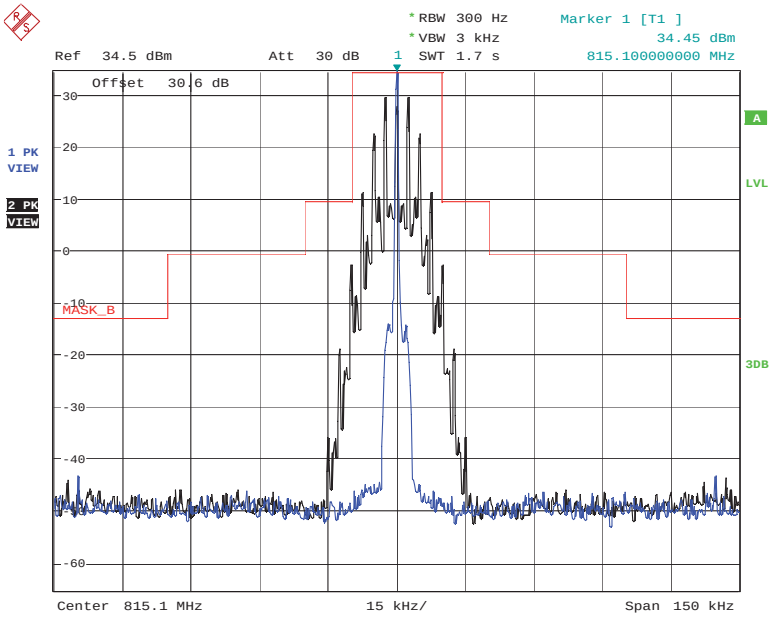

Date: 1.JUN.2018 09:18:53

## 5.8.6.11. Configuration: Mask B, Band 3: 806-824MHz, 806.1MHz, 25 KHz, Analog, High power



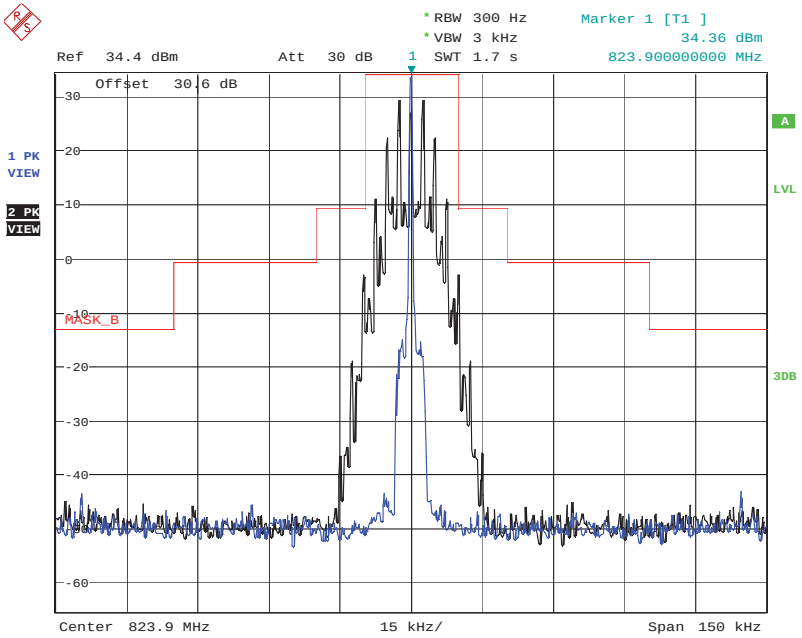

Date: 1.JUN.2018 08:39:20

## 5.8.6.12. Configuration: Mask B, Band 3: 806-824MHz, 815.1MHz, 25 KHz, Analog, High power



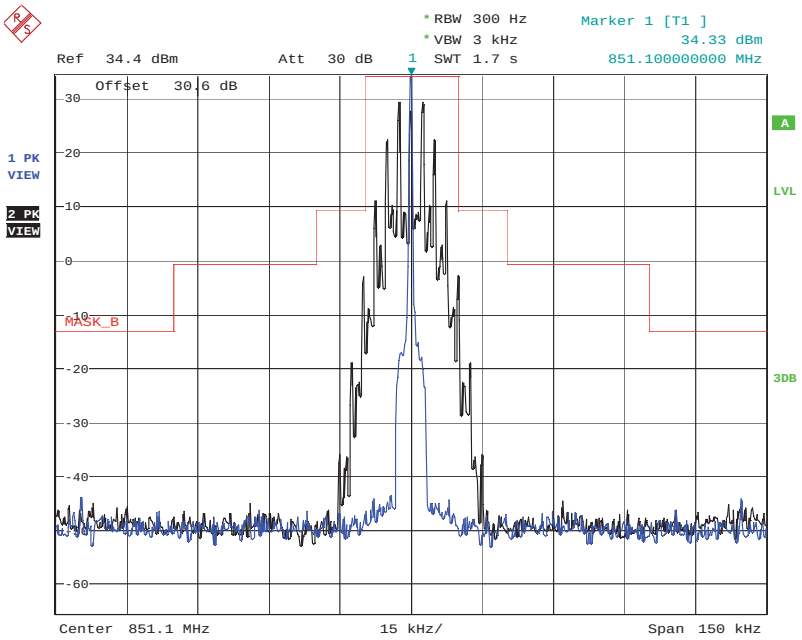

Date: 1.JUN.2018 08:44:51

### 5.8.6.13. Configuration: Mask B, Band 3: 806-824MHz, 823.9MHz, 25 KHz, Analog, High power



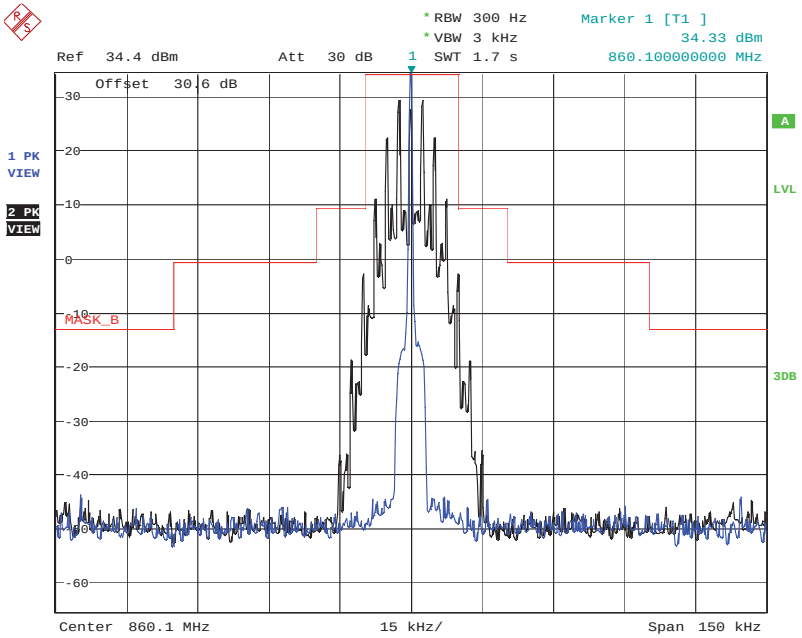

Date: 1.JUN.2018 08:50:15

### 5.8.6.14. Configuration: Mask B, Band 4: 851-869MHz, 851.1MHz, 25 KHz, Analog, High power



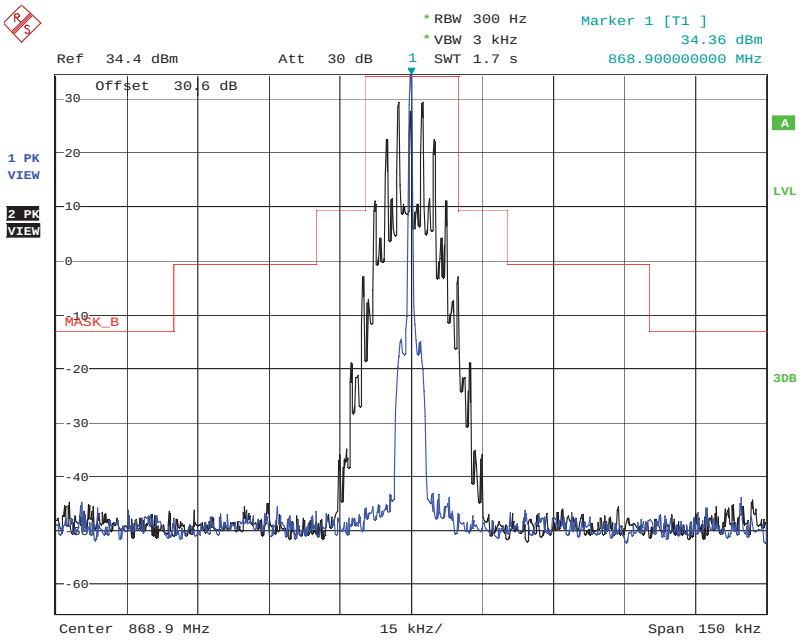

Date: 1.JUN.2018 08:57:15

### 5.8.6.15. Configuration: Mask B, Band 4: 851-869MHz, 860.1MHz, 25 KHz, Analog, High power




Date: 1.JUN.2018 09:03:18

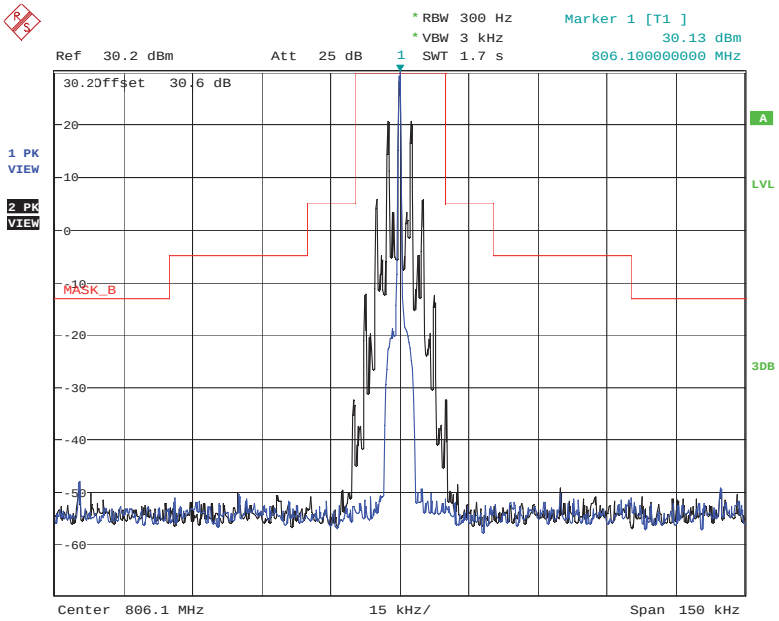
### 5.8.6.16. Configuration: Mask B, Band 4: 851-869MHz, 868.9MHz, 25 KHz, Analog, High power




Date: 1.JUN.2018 09:08:31

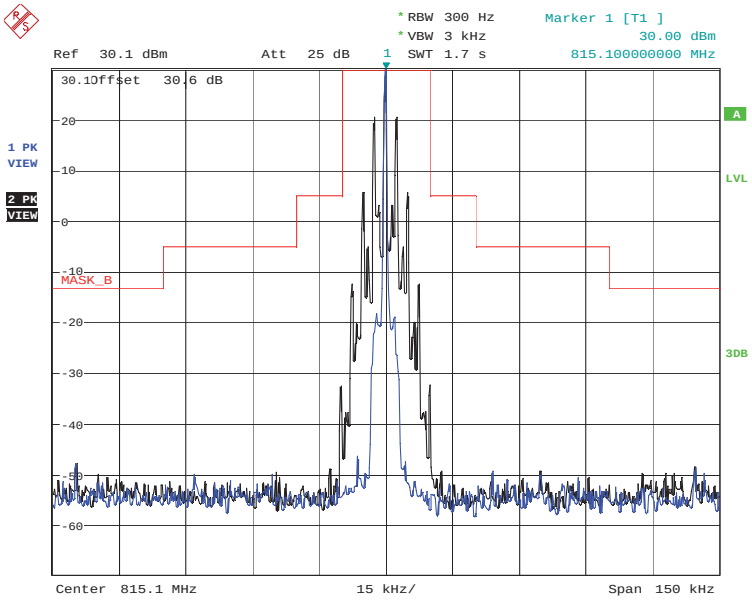
## Low Power

### 5.8.6.17. Configuration: Mask B, Band 3: 806-824MHz, 806.1MHz, 12.5 KHz, Analog, Low power



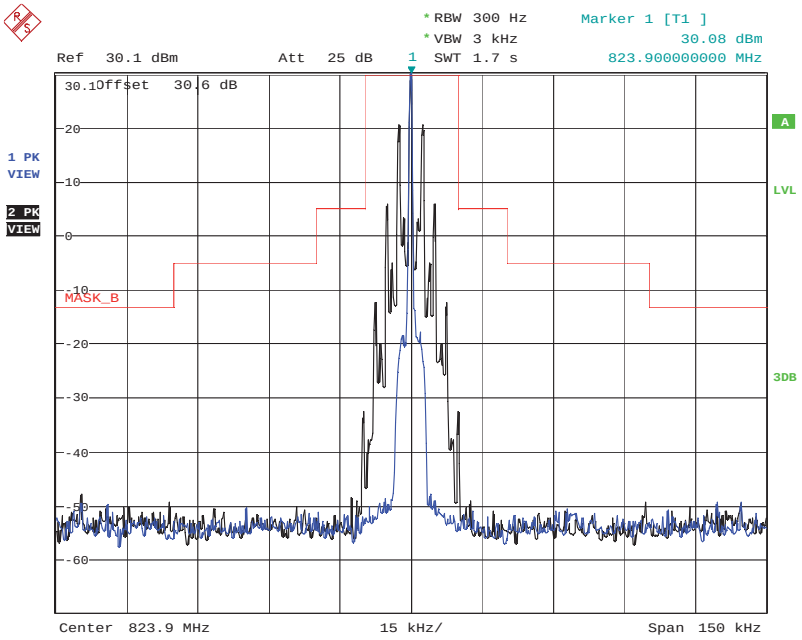

Date: 1.JUN.2018 09:27:46

### 5.8.6.18. Configuration: Mask B, Band 3: 806-824MHz, 815.1MHz, 12.5 KHz, Analog, Low power



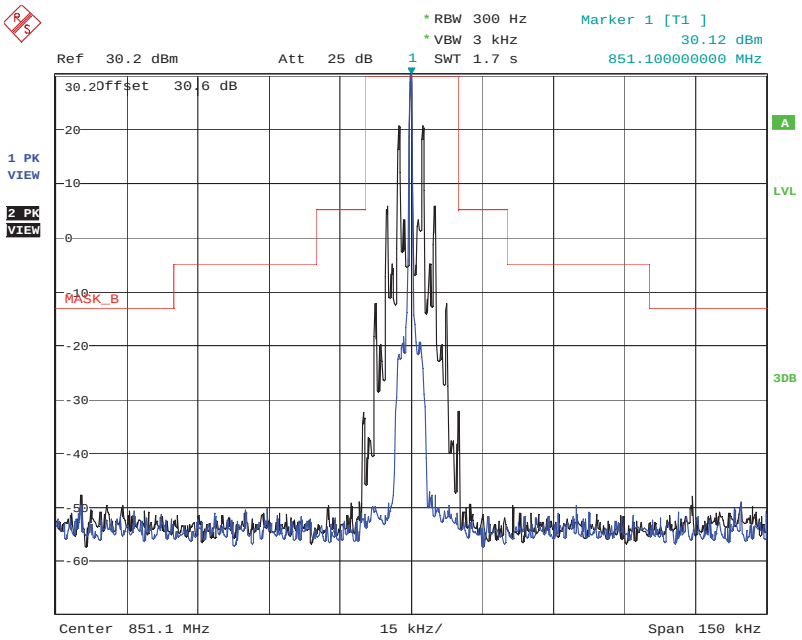

Date: 1.JUN.2018 09:34:32

### 5.8.6.19. Configuration: Mask B, Band 3: 806-824MHz, 823.9MHz, 12.5 KHz, Analog, Low power



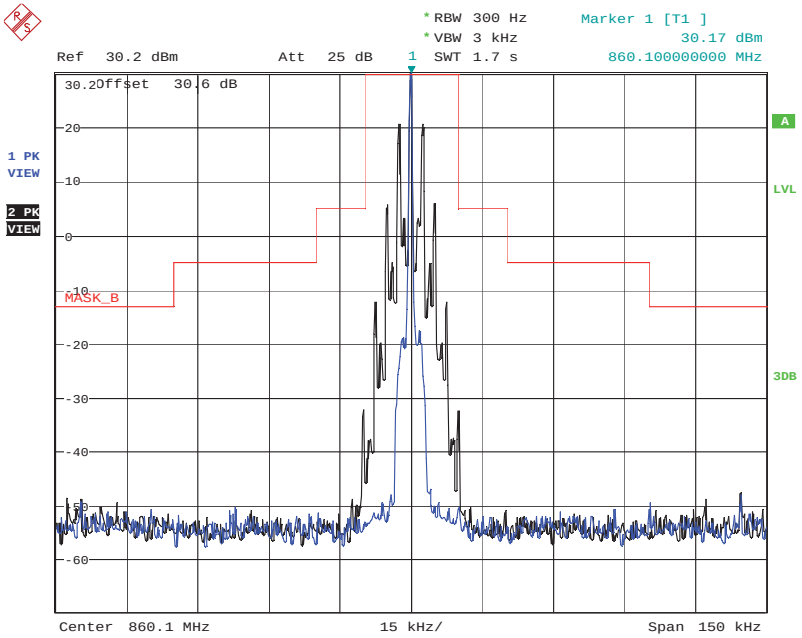

Date: 1.JUN.2018 09:43:58

### 5.8.6.20. Configuration: Mask B, Band 4: 851-869MHz, 851.1MHz, 12.5 KHz, Analog, Low power



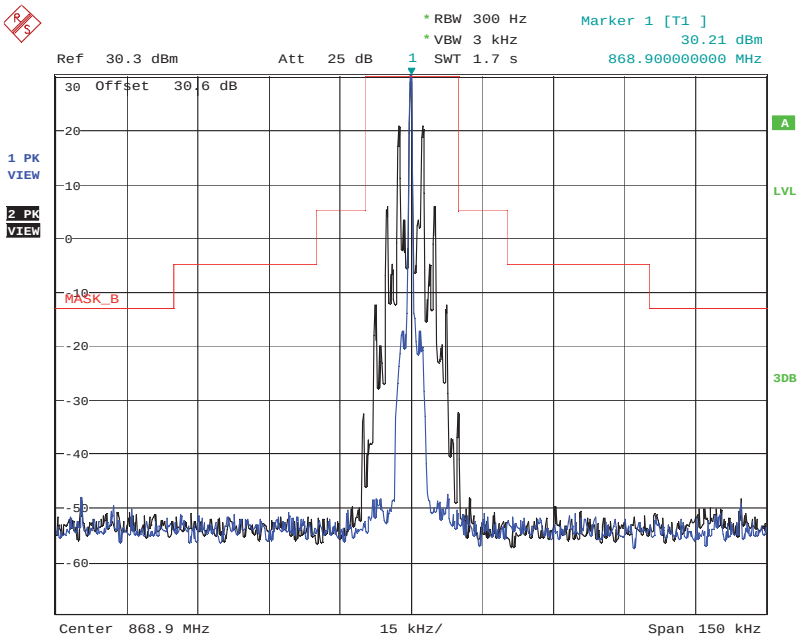

Date: 1.JUN.2018 09:48:57

## 5.8.6.21. Configuration: Mask B, Band 4: 851-869MHz, 860.1MHz, 12.5 KHz, Analog, Low power



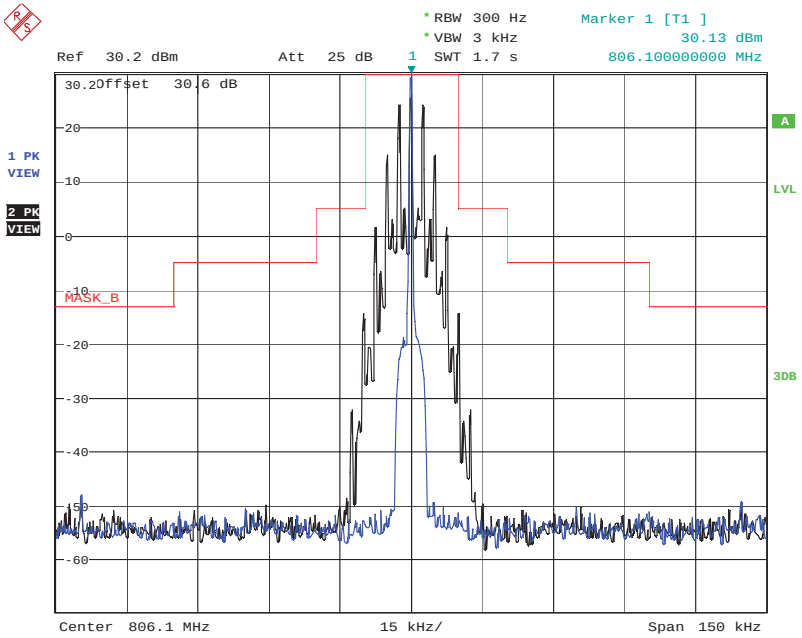

Date: 1.JUN.2018 09:54:48

## 5.8.6.22. Configuration: Mask B, Band 4: 851-869MHz, 868.9MHz, 12.5 KHz, Analog, Low power



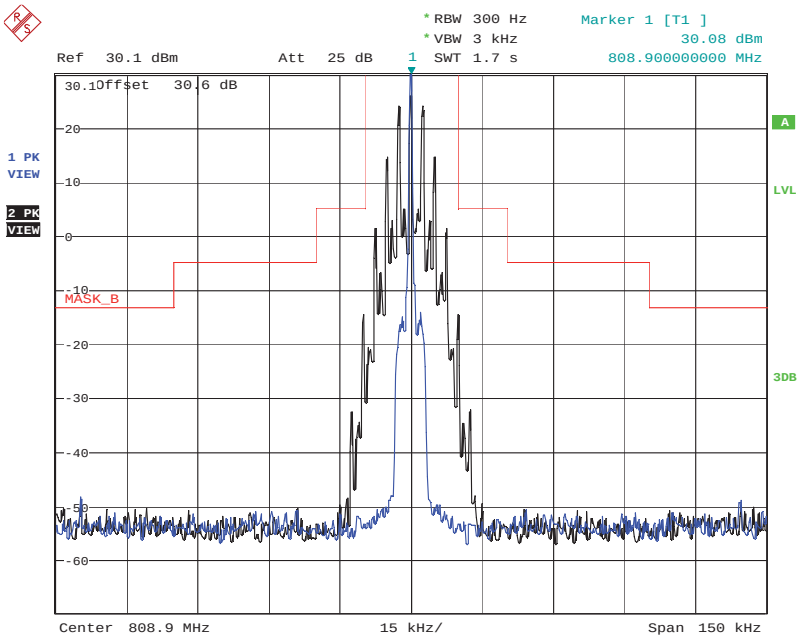

Date: 1.JUN.2018 09:58:46

### 5.8.6.23. Configuration: Mask B, Sub Band 3: 806-809MHz, 806.1MHz, 20 KHz, Analog, Low power



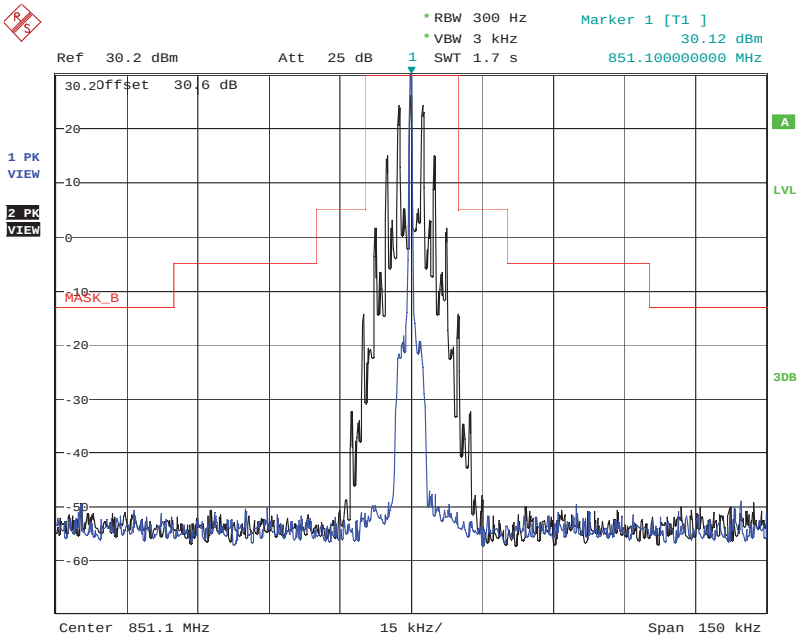

Date: 1.JUN.2018 09:29:15

### 5.8.6.24. Configuration: Mask B, Sub Band 3: 806-809MHz, 808.9MHz, 20 KHz, Analog, Low power



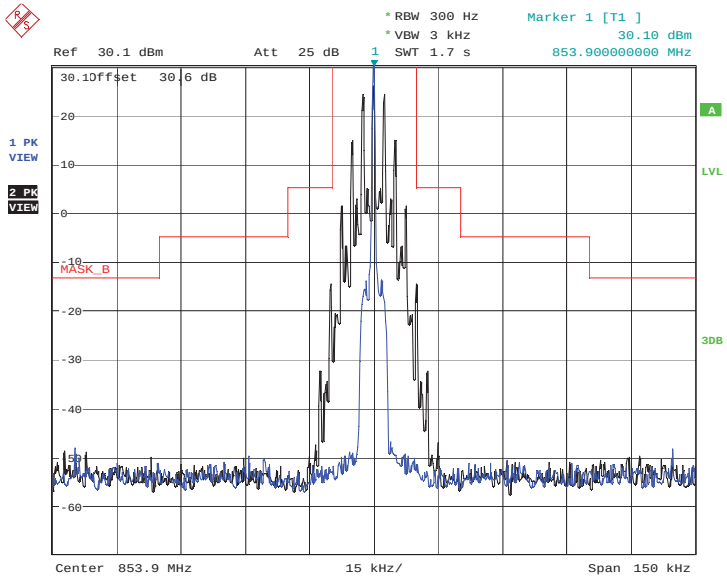

Date: 1.JUN.2018 10:03:06

## 5.8.6.25. Configuration: Mask B, Sub Band 4: 851-854MHz, 851.1MHz, 20 KHz, Analog, Low power



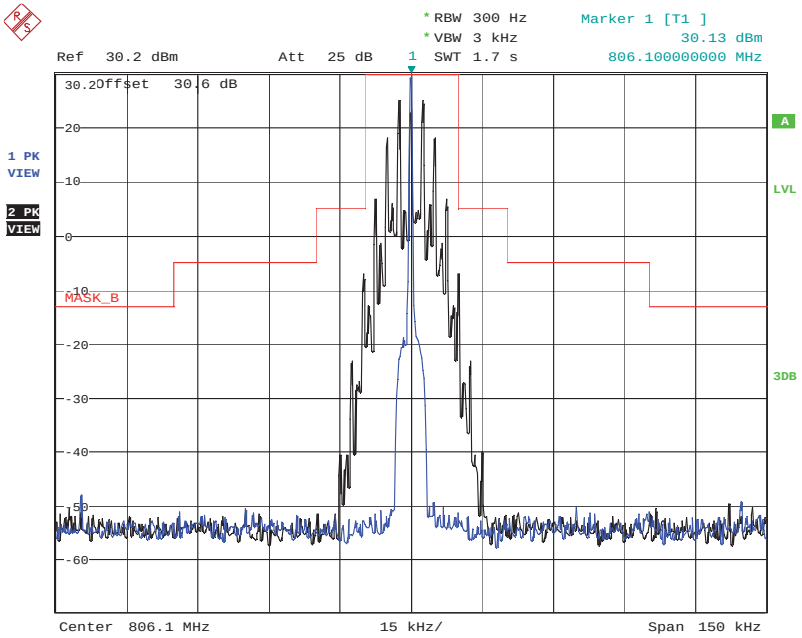

Date: 1.JUN.2018 09:50:03

## 5.8.6.26. Configuration: Mask B, Sub Band 4: 851-854MHz, 853.9MHz, 20 KHz, Analog, Low power



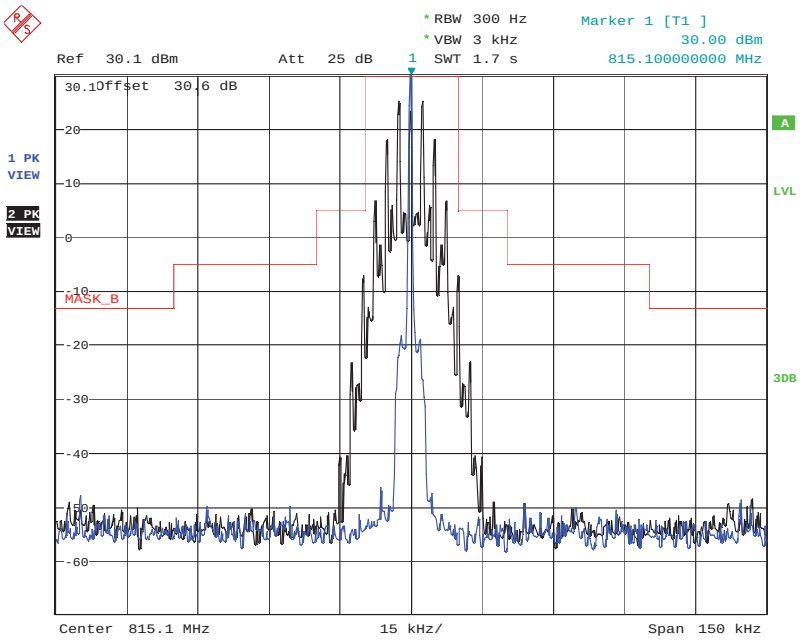

Date: 1.JUN.2018 10:05:28

## 5.8.6.27. Configuration: Mask B, Band 3: 806-824MHz, 806.1MHz, 25 KHz, Analog, Low power



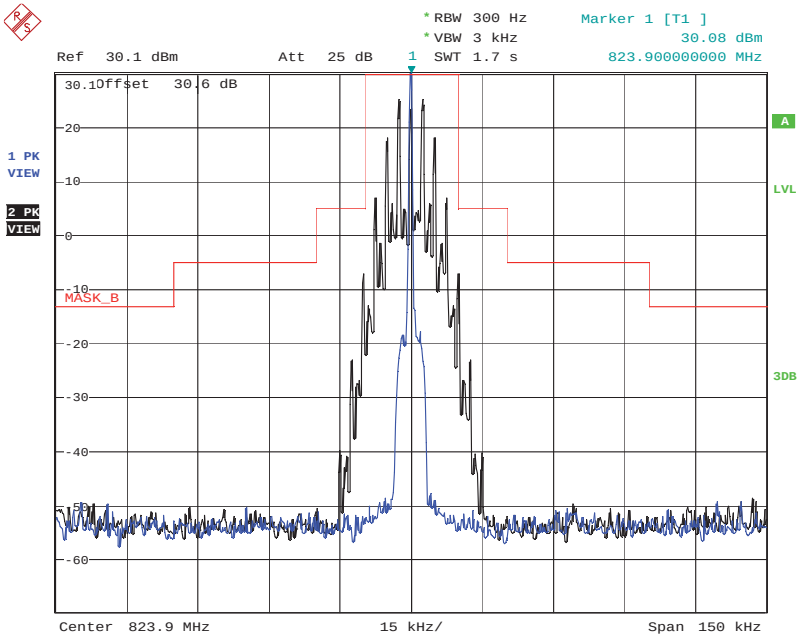

Date: 1.JUN.2018 09:30:30

## 5.8.6.28. Configuration: Mask B, Band 3: 806-824MHz, 815.1MHz, 25 KHz, Analog, Low power



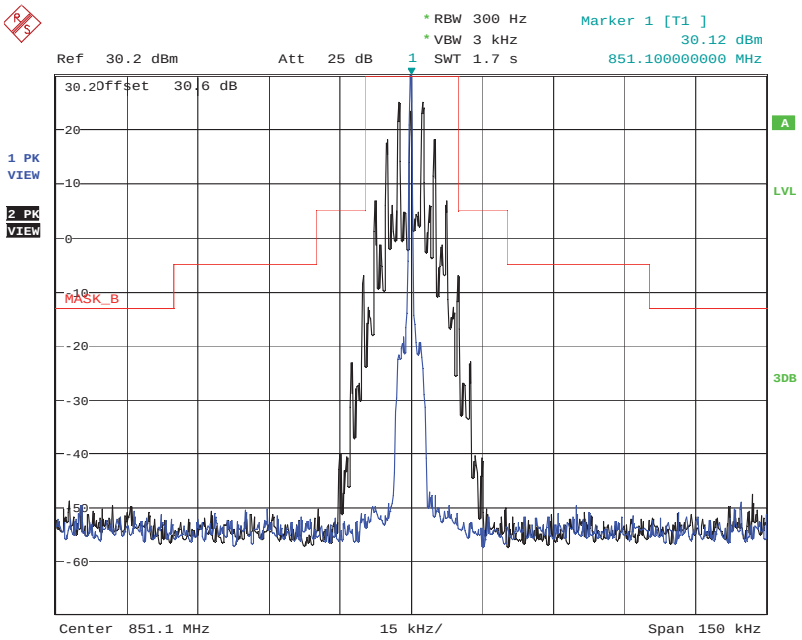

Date: 1.JUN.2018 09:35:49

## 5.8.6.29. Configuration: Mask B, Band 3: 806-824MHz, 823.9MHz, 25 KHz, Analog, Low power



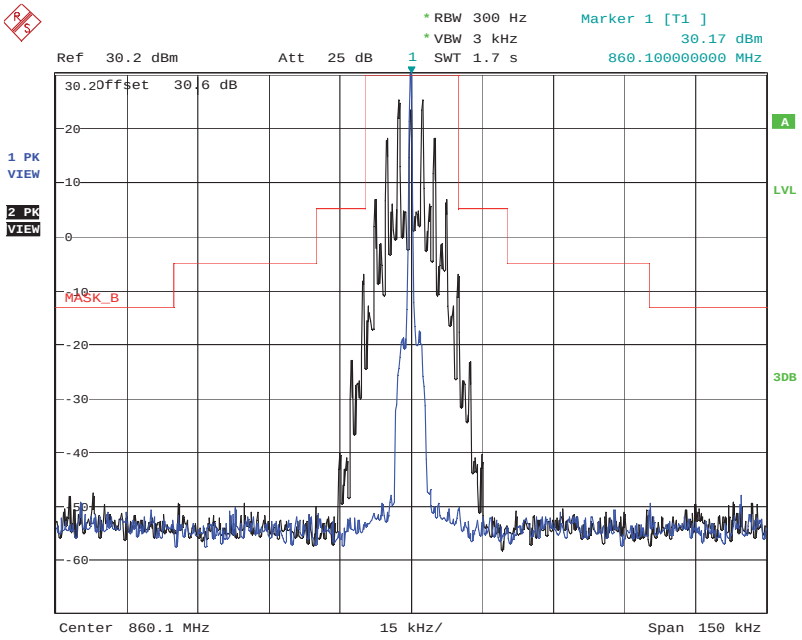

Date: 1.JUN.2018 09:45:22

## 5.8.6.30. Configuration: Mask B, Band 4: 851-869MHz, 851.1MHz, 25 KHz, Analog, Low power



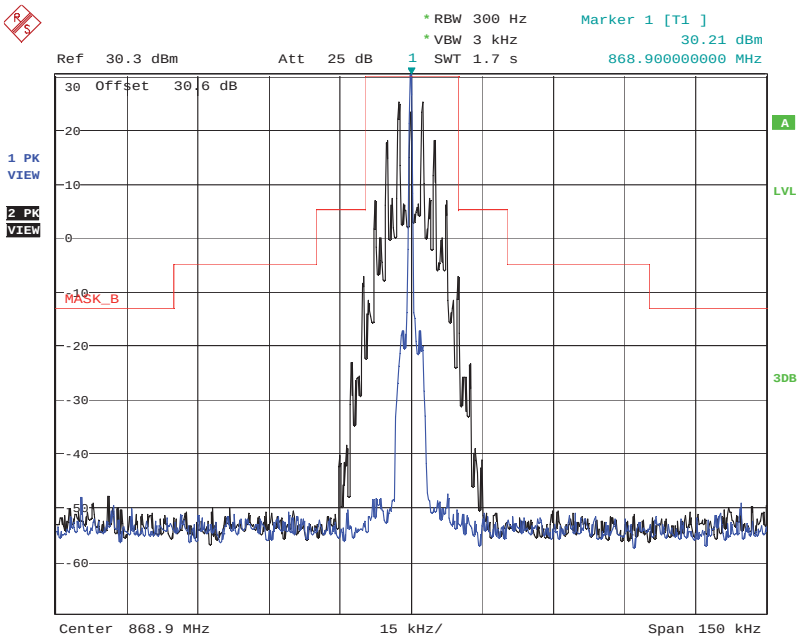

Date: 1.JUN.2018 09:51:41

### 5.8.6.31. Configuration: Mask B, Band 4: 851-869MHz, 860.1MHz, 25 KHz, Analog, Low power




Date: 1.JUN.2018 09:56:04

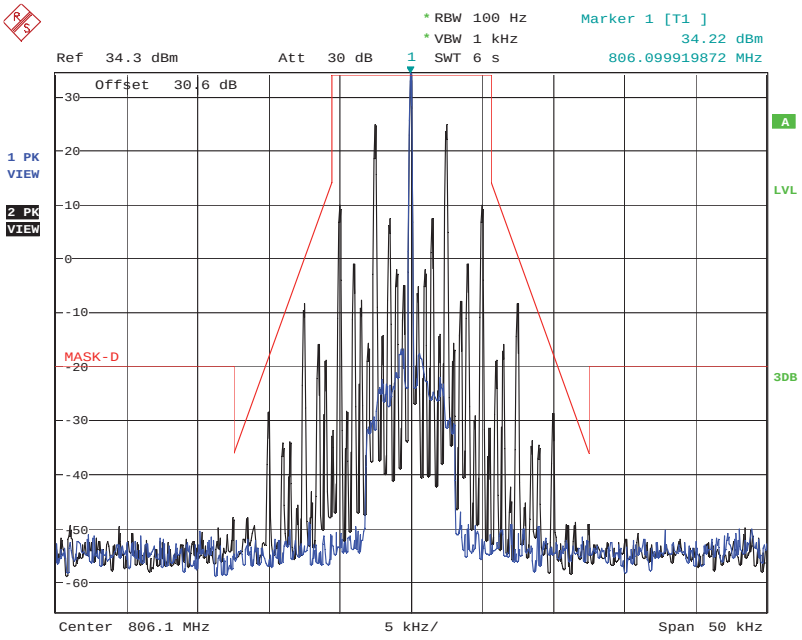
### 5.8.6.32. Configuration: Mask B, Band 4: 851-869MHz, 868.9MHz, 25 KHz, Analog, Low power




Date: 1.JUN.2018 10:00:13

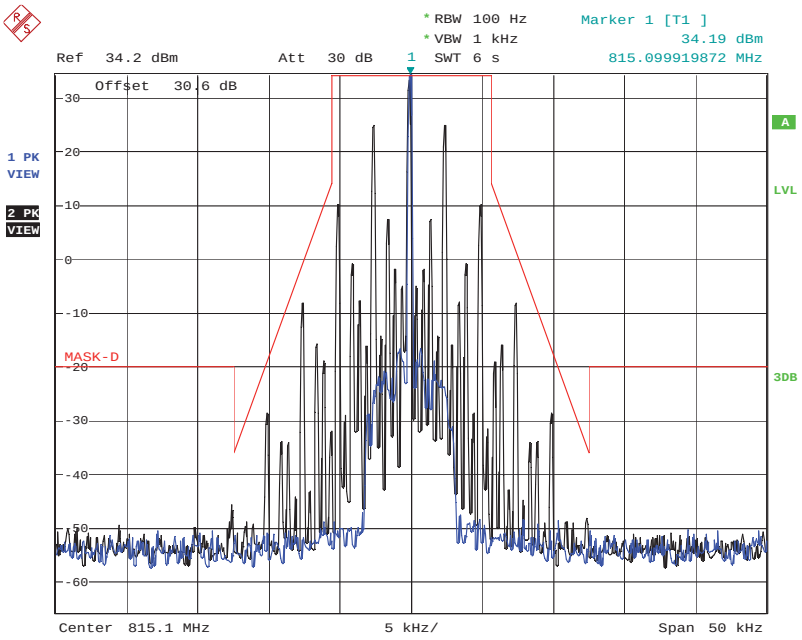
## 5.8.7. Test Data- EMISSION MASKS- MASK D (Not required for FCC)

### 5.8.7.1. Configuration: Mask D, Band 3: 806-824MHz, 806.1MHz, 12.5 KHz, Analog, High power



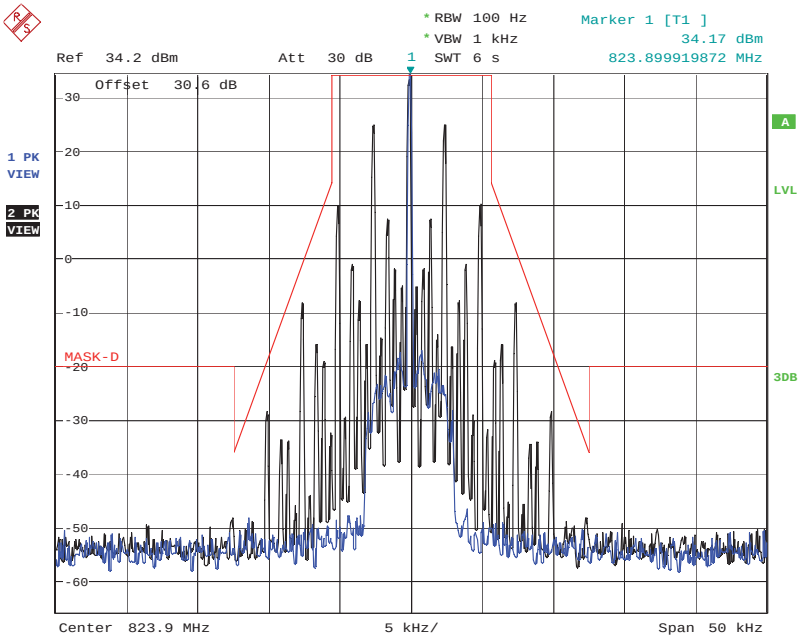

Date: 1.JUN.2018 15:20:24

### 5.8.7.2. Configuration: Mask D, Band 3: 806-824MHz, 815.1MHz, 12.5 KHz, Analog, High power



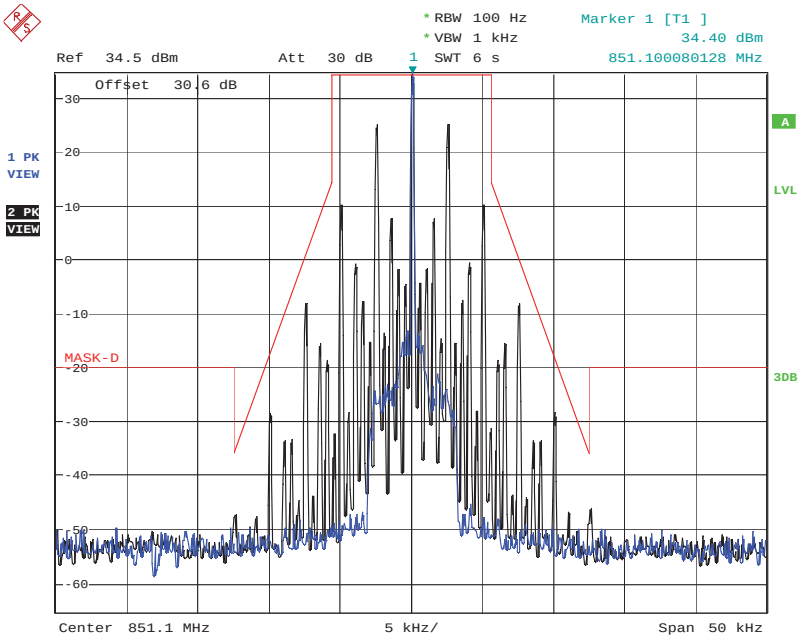

Date: 1.JUN.2018 15:32:29

### 5.8.7.3. Configuration: Mask D, Band 3: 806-824MHz, 823.9MHz, 12.5 KHz, Analog, High power



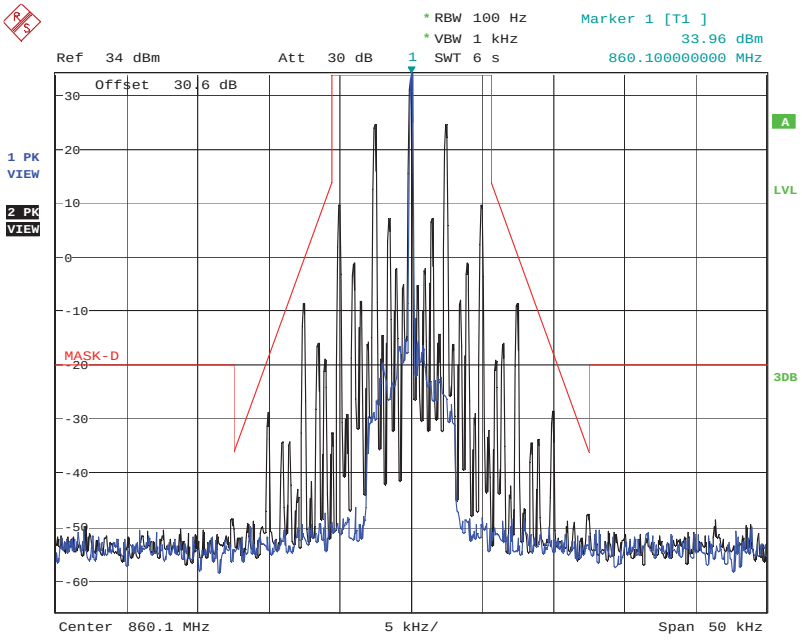

Date: 1.JUN.2018 15:40:12

### 5.8.7.4. Configuration: Mask D, Band 4: 851-869MHz, 851.1MHz, 12.5 KHz, Analog, High power



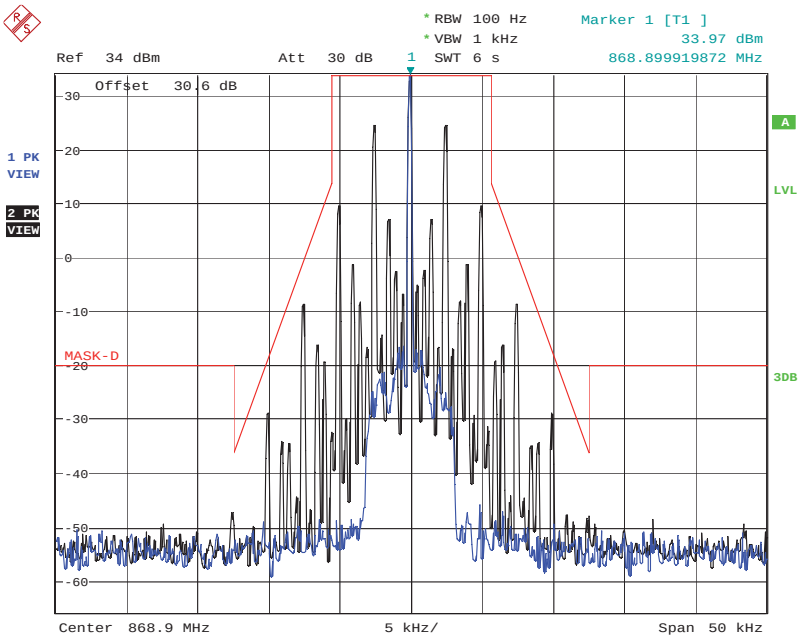

Date: 4.JUN.2018 14:37:04

### 5.8.7.5. Configuration: Mask D, Band 4: 851-869MHz, 860.1MHz, 12.5 KHz, Analog, High power




Date: 4.JUN.2018 14:52:37

### 5.8.7.6. Configuration: Mask D, Band 4: 851-869MHz, 868.9MHz, 12.5 KHz, Analog, High power

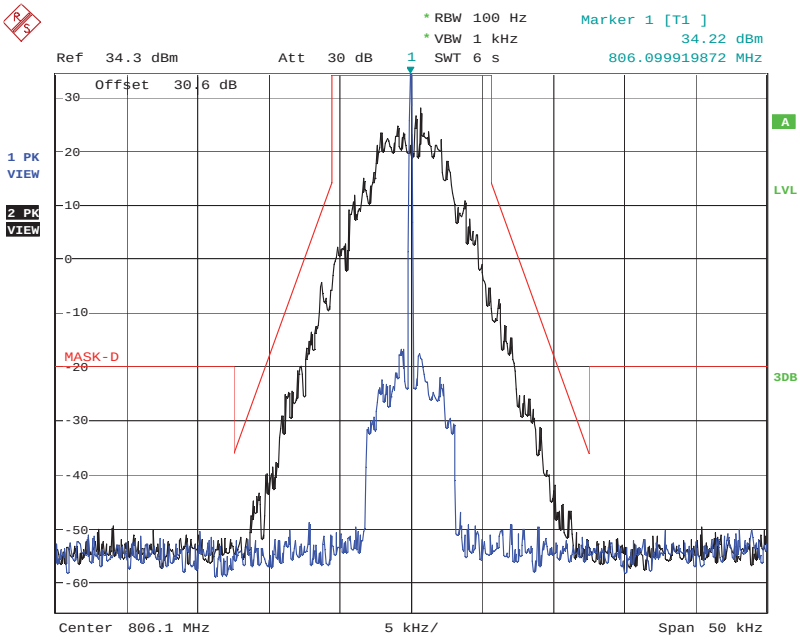



Date: 4.JUN.2018 14:59:38



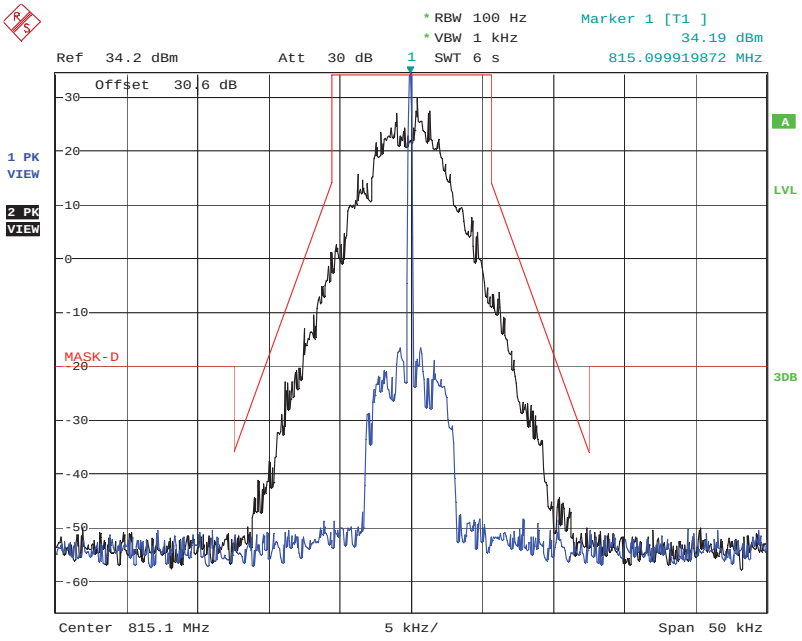
*All test results contained in this engineering test report are traceable to National Institute of Standards and Technology (NIST)*

## 5.8.7.7. Configuration: Mask D, Band 3: 806-824MHz, 806.1MHz, F1E&F1D, Digital, High power



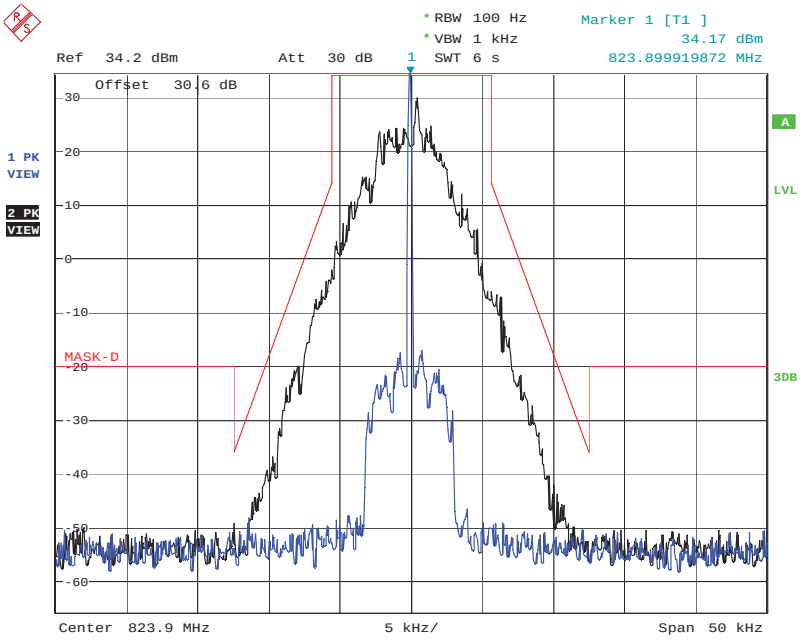

Date: 1.JUN.2018 15:22:24

## 5.8.7.8. Configuration: Mask D, Band 3: 806-824MHz, 815.1MHz, F1E&F1D, Digital, High power



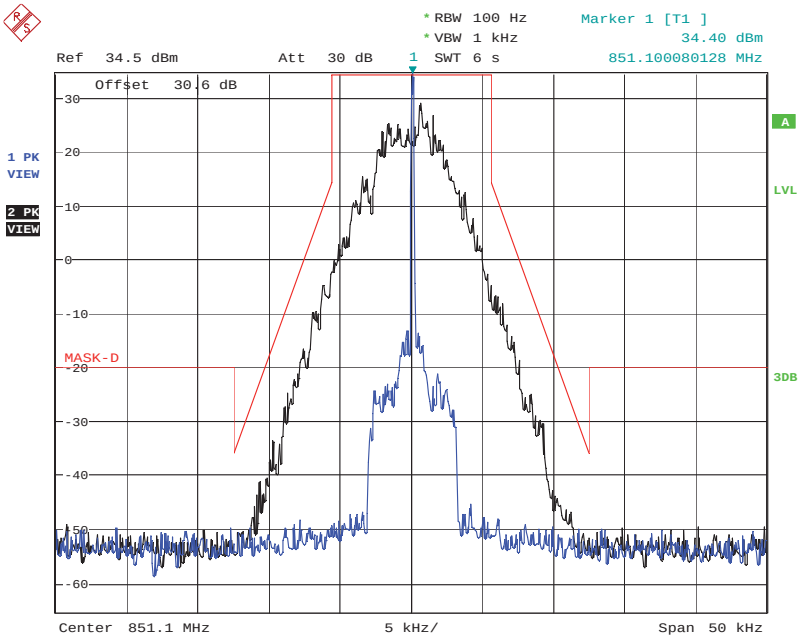

Date: 1.JUN.2018 15:34:20

### 5.8.7.9. Configuration: Mask D, Band 3: 806-824MHz, 823.9MHz, F1E&F1D, Digital, High power



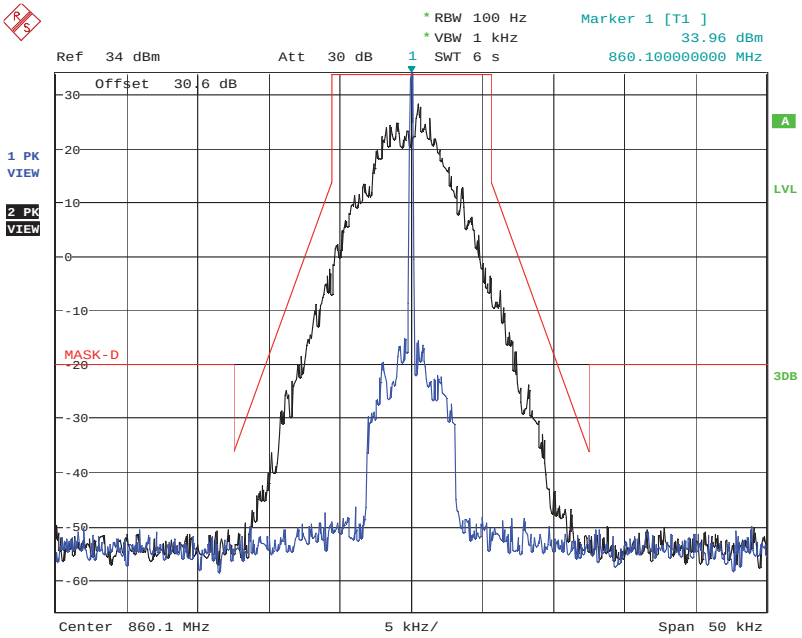

Date: 1.JUN.2018 15:41:39

### 5.8.7.10. Configuration: Mask D, Band 4: 851-869MHz, 851.1MHz, F1E&F1D, Digital, High power



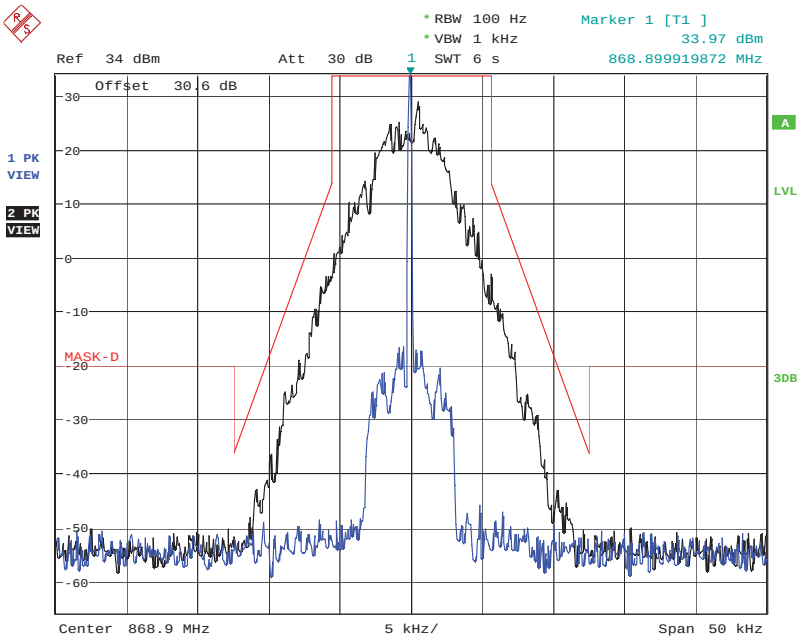

Date: 4.JUN.2018 14:39:48

## 5.8.7.11. Configuration: Mask D, Band 4: 851-869MHz, 860.1MHz, F1E&F1D, Digital, High power



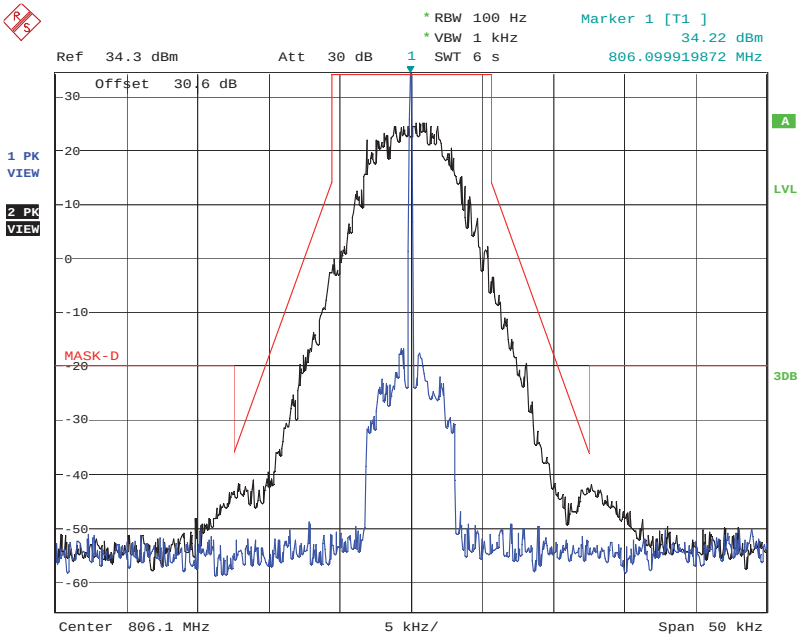

Date: 4.JUN.2018 14:54:07

## 5.8.7.12. Configuration: Mask D, Band 4: 851-869MHz, 868.9MHz, F1E&F1D, Digital, High power



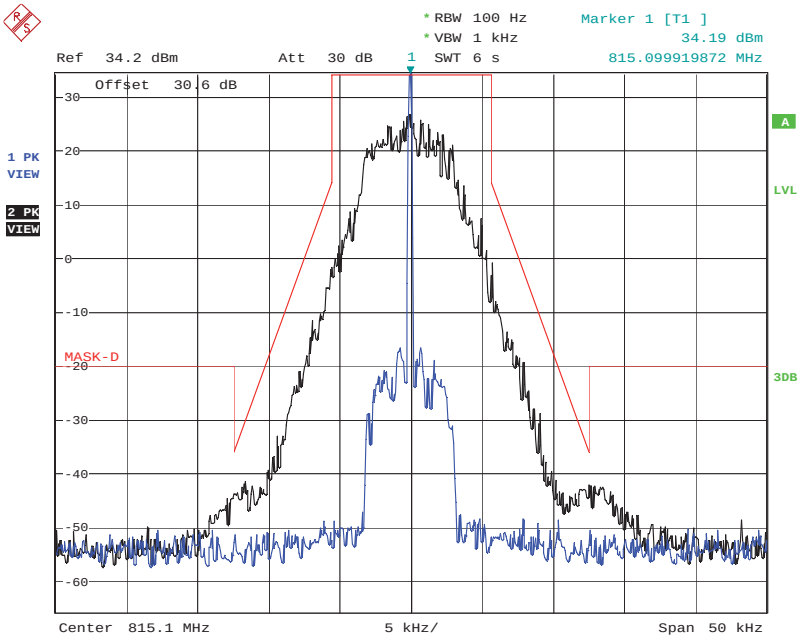

Date: 4.JUN.2018 15:00:58

## 5.8.7.13. Configuration: Mask D, Band 3: 806-824MHz, 806.1MHz, F1W, Digital, High power



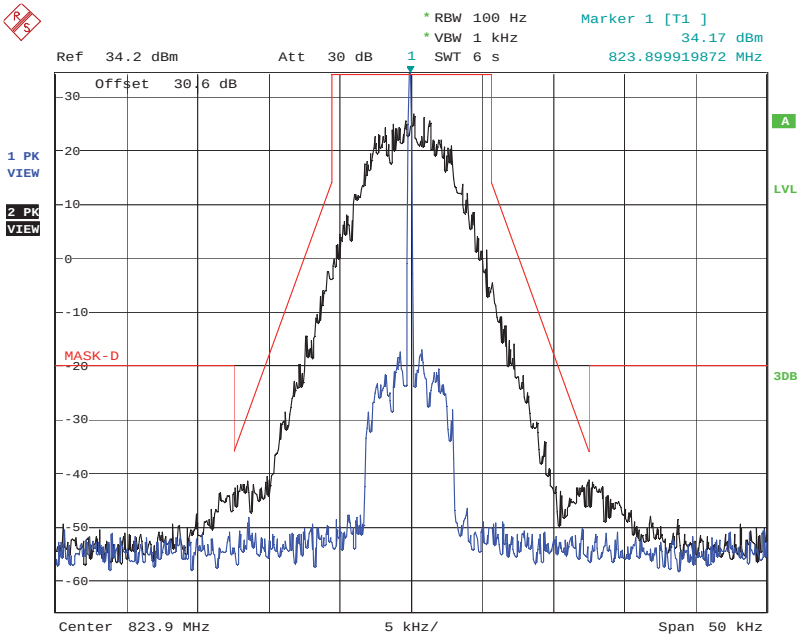

Date: 1.JUN.2018 15:27:49

## 5.8.7.14. Configuration: Mask D, Band 3: 806-824MHz, 815.1MHz, F1W, Digital, High power



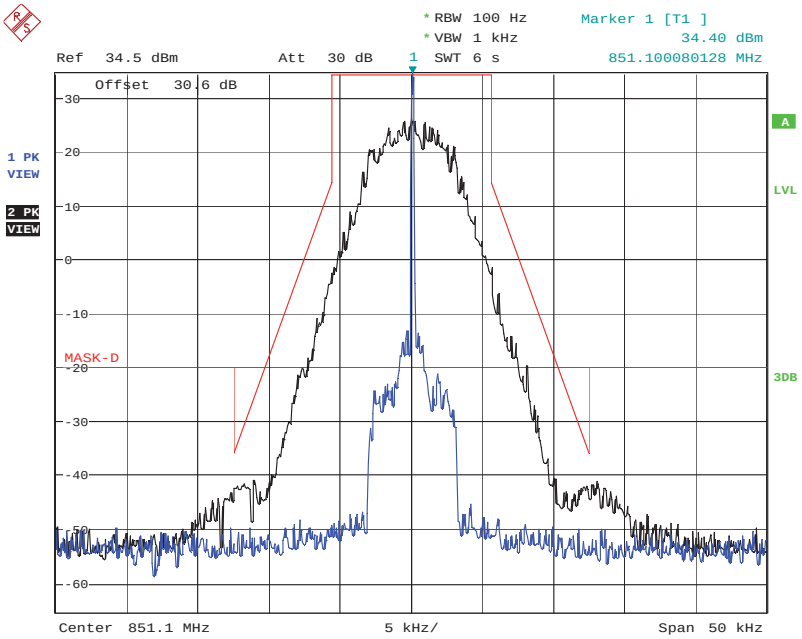

Date: 1.JUN.2018 15:36:42

## 5.8.7.15. Configuration: Mask D, Band 3: 806-824MHz, 823.9MHz, F1W, Digital, High power



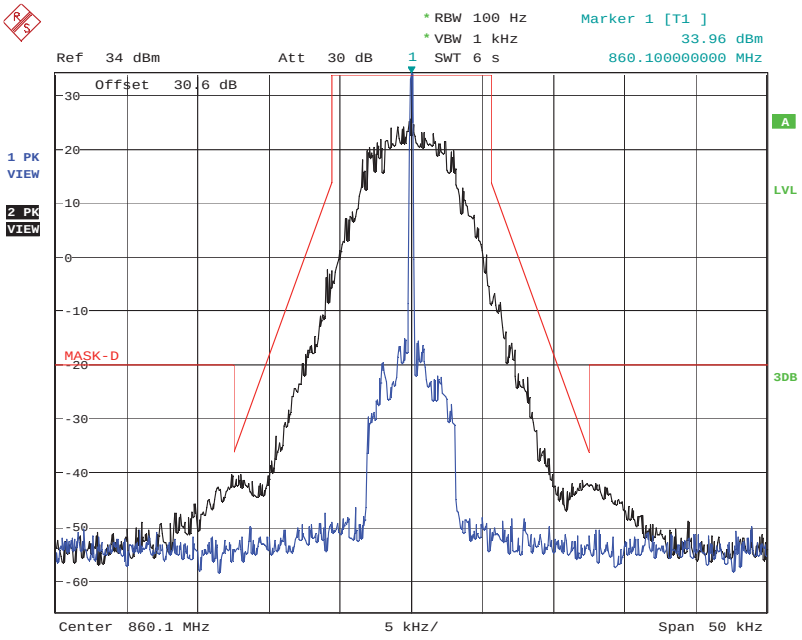

Date: 1.JUN.2018 15:43:39

## 5.8.7.16. Configuration: Mask D, Band 4: 851-869MHz, 851.1MHz, F1W, Digital, High power



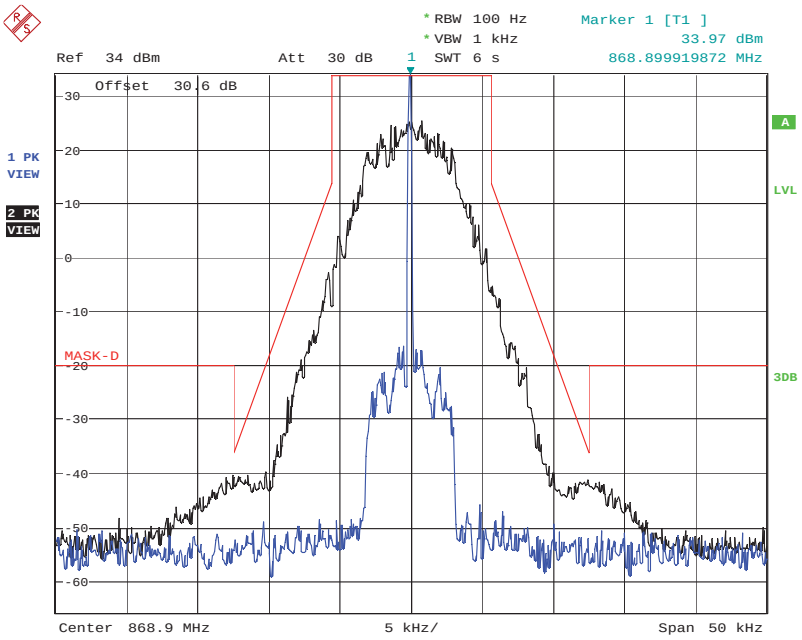

Date: 4.JUN.2018 14:43:13

### 5.8.7.17. Configuration: Mask D, Band 4: 851-869MHz, 860.1MHz, F1W, Digital, High power




Date: 4.JUN.2018 14:55:53

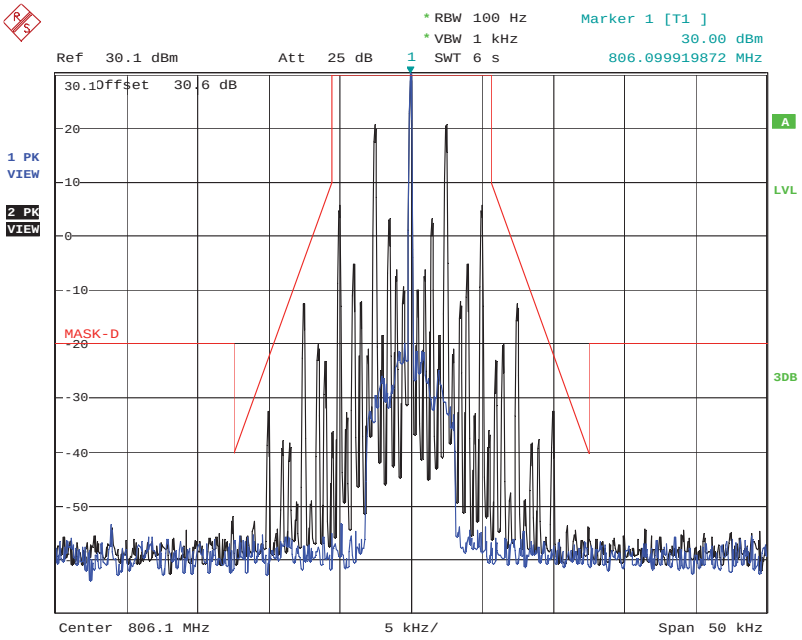
### 5.8.7.18. Configuration: Mask D, Band 4: 851-869MHz, 868.9MHz, F1W, Digital, High power




Date: 4.JUN.2018 15:03:02

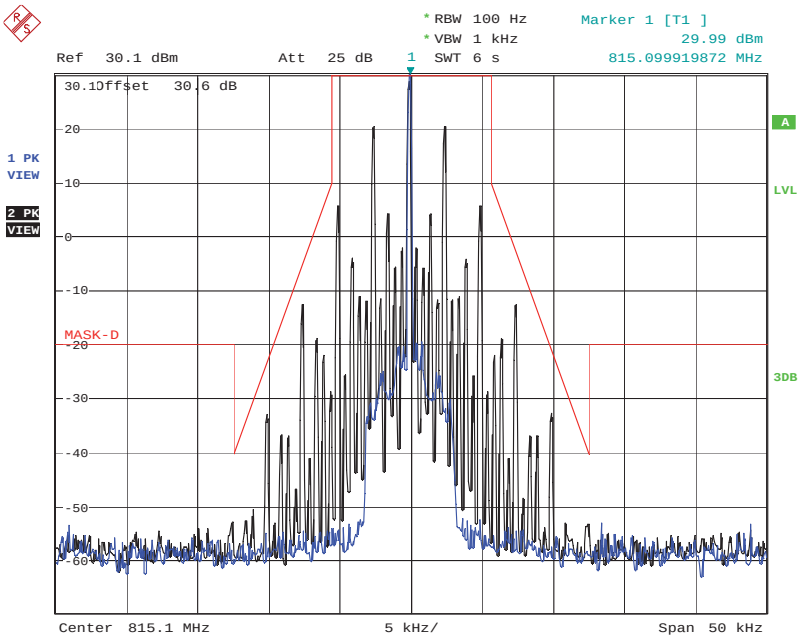
# Low Power

## 5.8.7.19. Configuration: Mask D, Band 3: 806-824MHz, 806.1MHz, 12.5 KHz, Analog, Low power



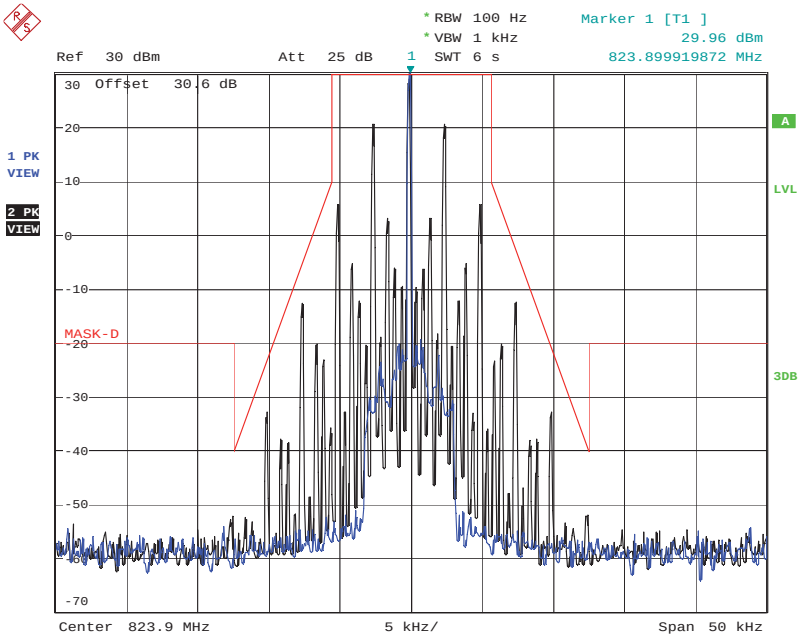

Date: 4.JUN.2018 15:10:11

## 5.8.7.20. Configuration: Mask D, Band 3: 806-824MHz, 815.1MHz, 12.5 KHz, Analog, Low power



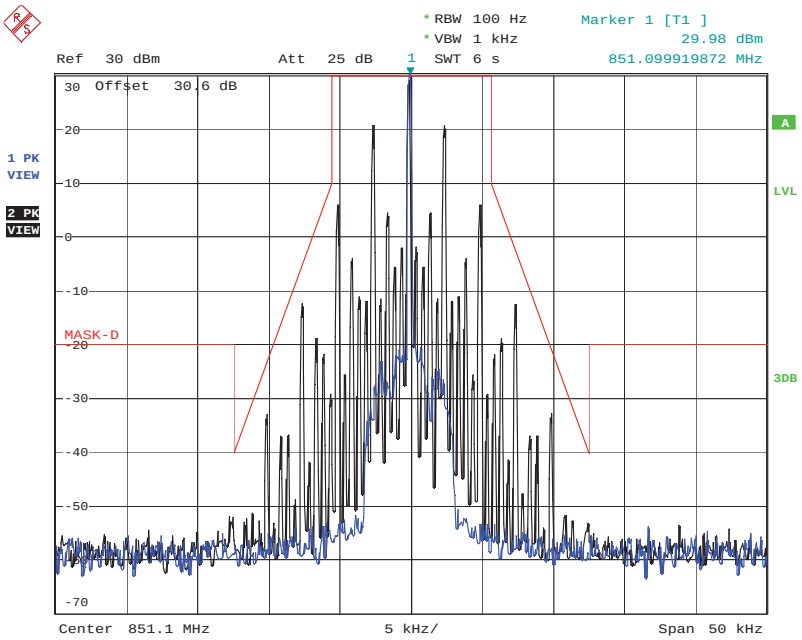

Date: 4.JUN.2018 15:17:11

## 5.8.7.21. Configuration: Mask D, Band 3: 806-824MHz, 823.9MHz, 12.5 KHz, Analog, Low power



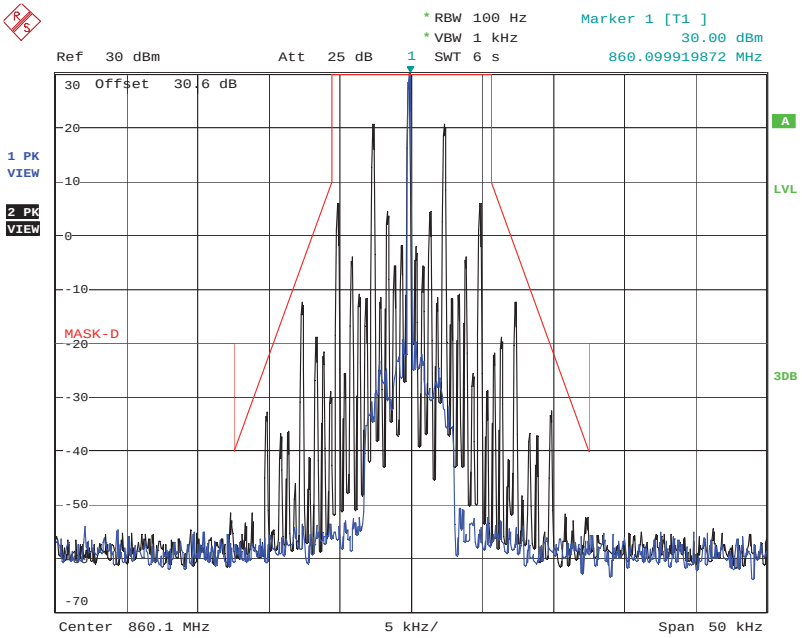

Date: 4.JUN.2018 15:22:36

## 5.8.7.22. Configuration: Mask D, Band 4: 851-869MHz, 851.1MHz, 12.5 KHz, Analog, Low power



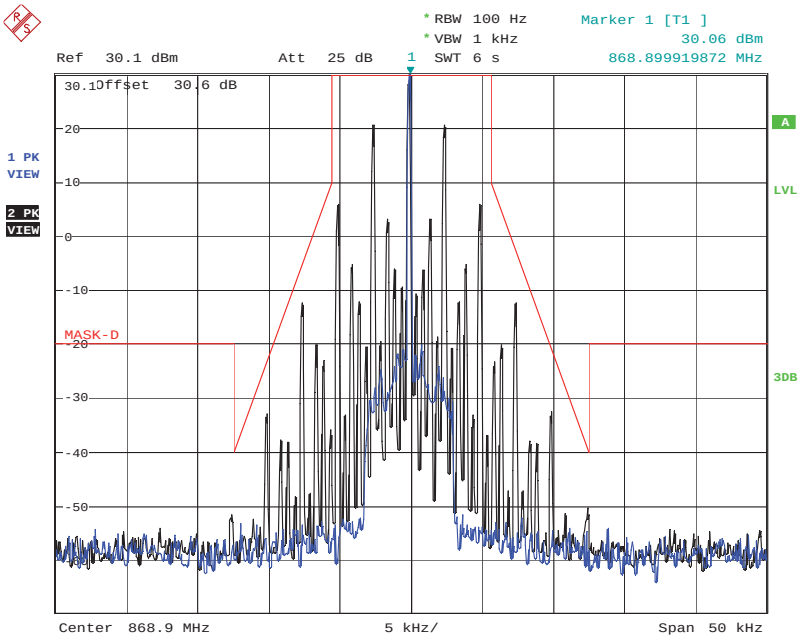

Date: 4.JUN.2018 15:28:09

## 5.8.7.23. Configuration: Mask D, Band 4: 851-869MHz, 860.1MHz, 12.5 KHz, Analog, Low power



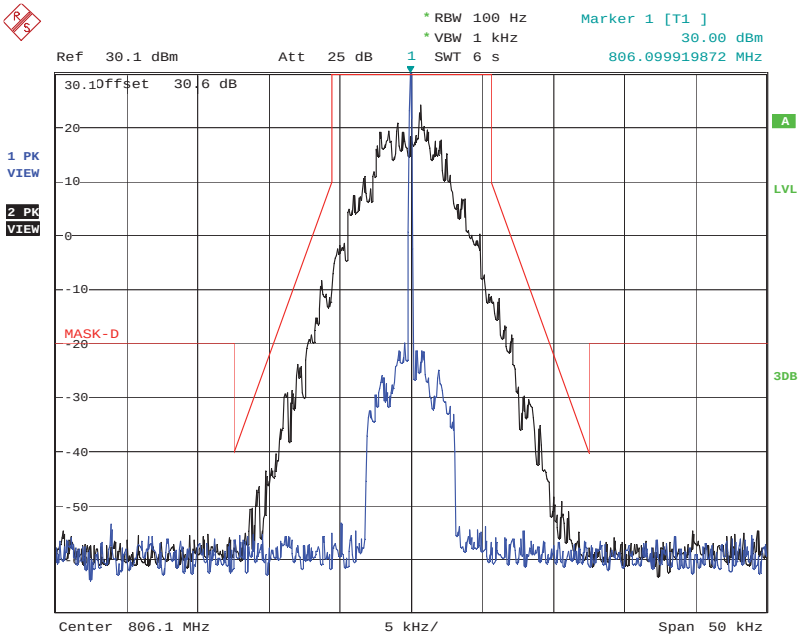

Date: 4.JUN.2018 15:34:20

## 5.8.7.24. Configuration: Mask D, Band 4: 851-869MHz, 868.9MHz, 12.5 KHz, Analog, Low power



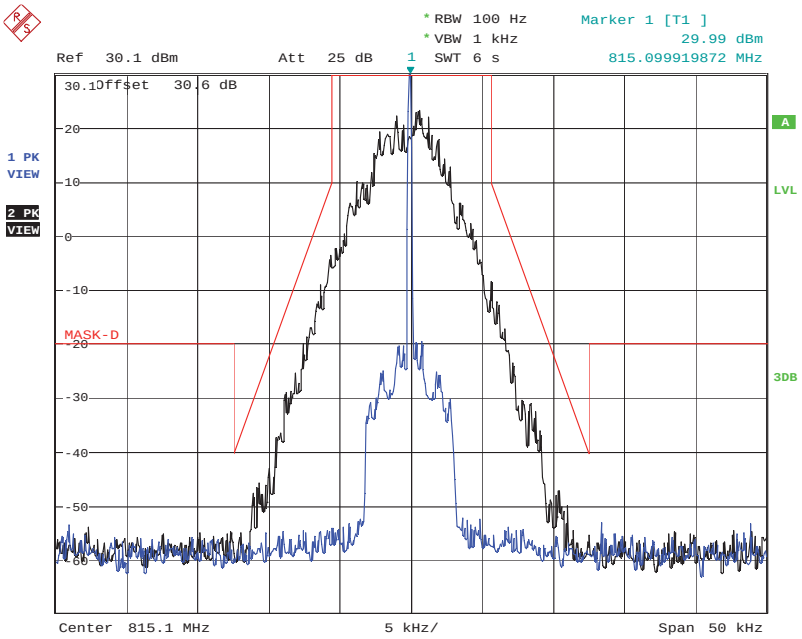

Date: 4.JUN.2018 15:40:29

## 5.8.7.25. Configuration: Mask D, Band 3: 806-824MHz, 806.1MHz, F1E&F1D, Digital, Low power



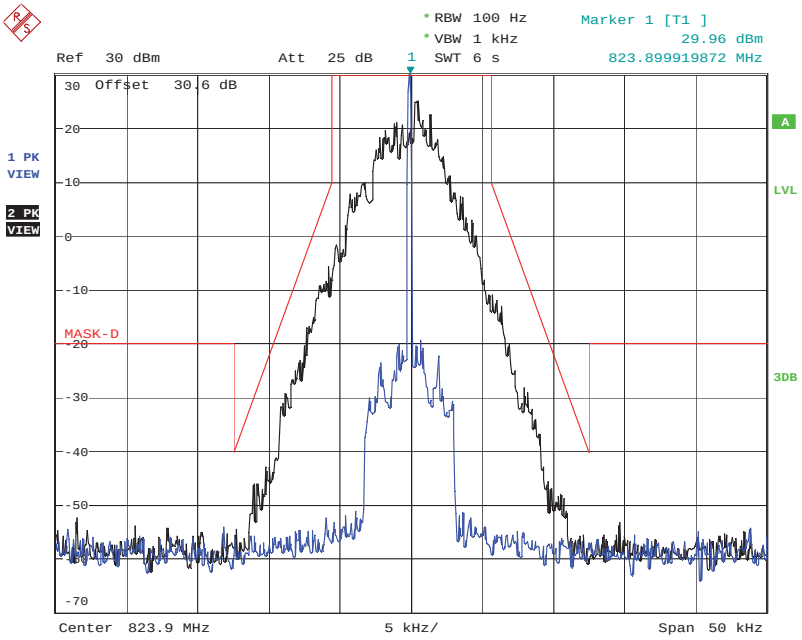

Date: 4.JUN.2018 15:12:10

## 5.8.7.26. Configuration: Mask D, Band 3: 806-824MHz, 815.1MHz, F1E&F1D, Digital, Low power



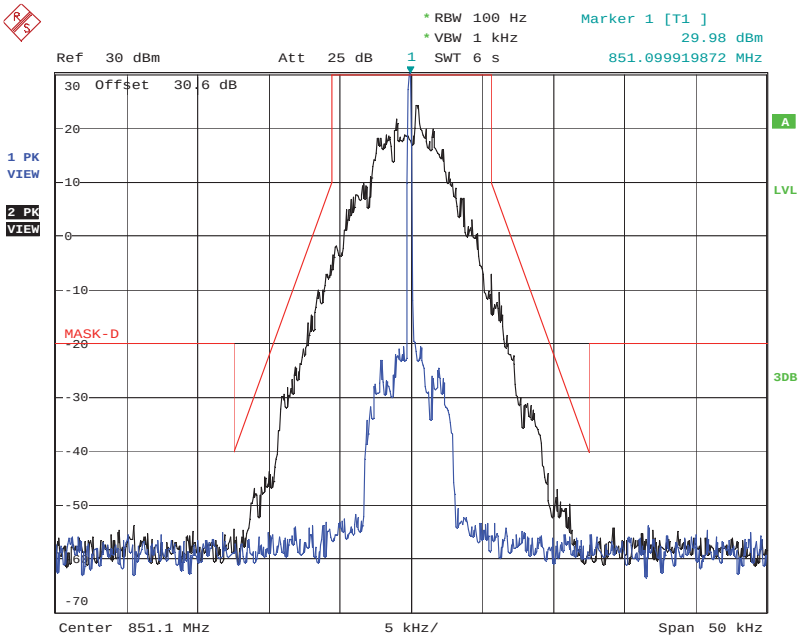

Date: 4.JUN.2018 15:18:28

## 5.8.7.27. Configuration: Mask D, Band 3: 806-824MHz, 823.9MHz, F1E&F1D, Digital, Low power



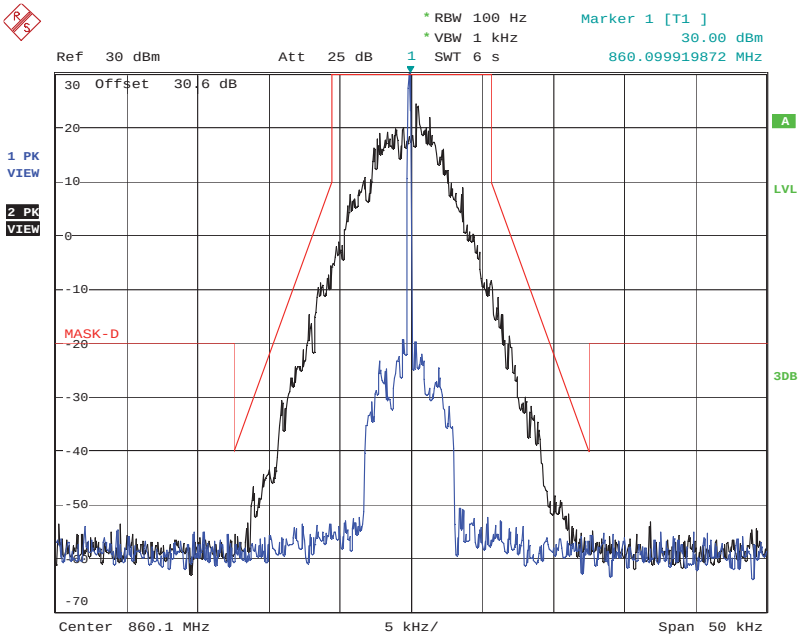

Date: 4.JUN.2018 15:24:04

## 5.8.7.28. Configuration: Mask D, Band 4: 851-869MHz, 851.1MHz, F1E&F1D, Digital, Low power



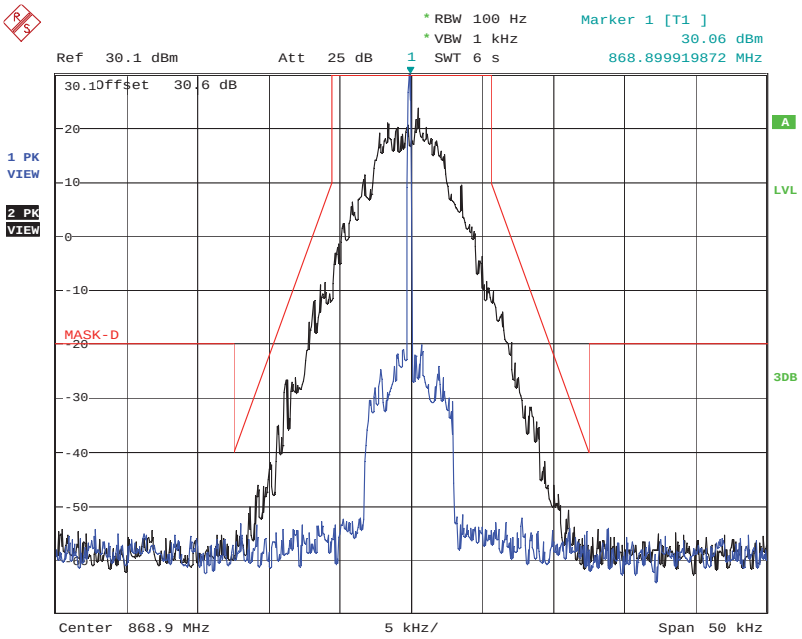

Date: 4.JUN.2018 15:29:39

## 5.8.7.29. Configuration: Mask D, Band 4: 851-869MHz, 860.1MHz, F1E&F1D, Digital, Low power



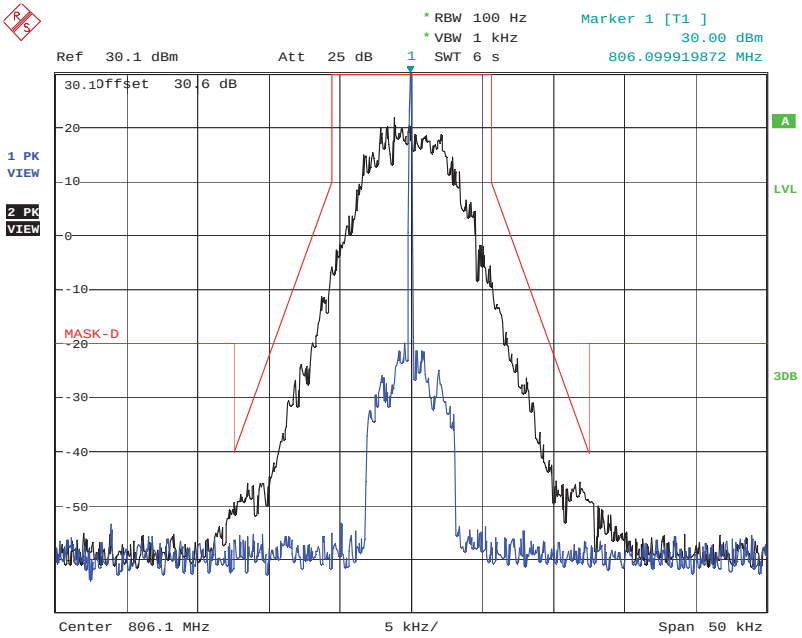

Date: 4.JUN.2018 15:35:31

## 5.8.7.30. Configuration: Mask D, Band 4: 851-869MHz, 868.9MHz, F1E&F1D, Digital, Low power



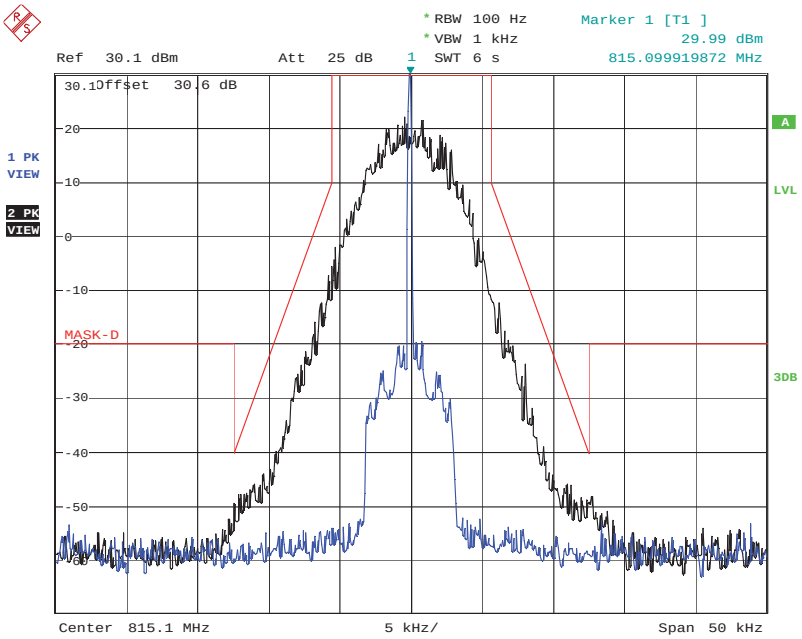

Date: 4.JUN.2018 15:41:44

## 5.8.7.31. Configuration: Mask D, Band 3: 806-824MHz, 806.1MHz, F1W, Digital, Low power



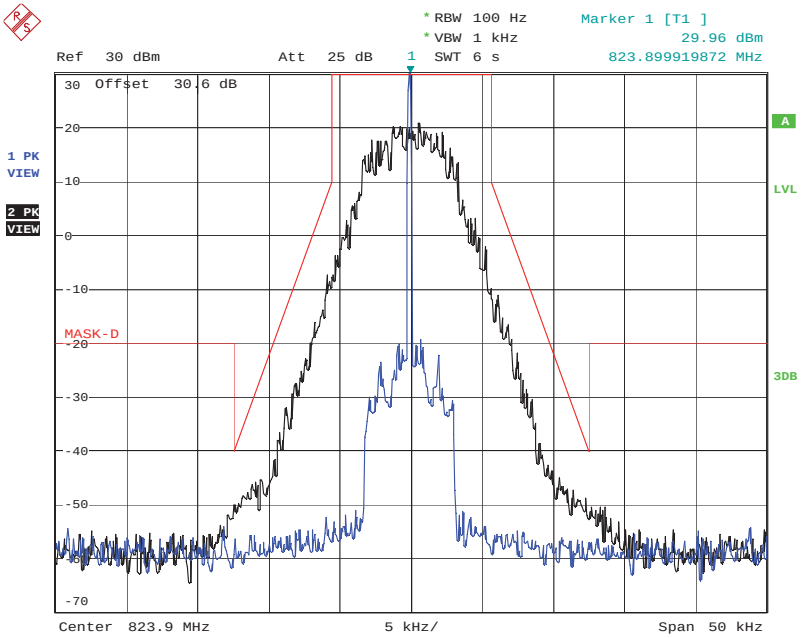

Date: 4.JUN.2018 15:14:07

## 5.8.7.32. Configuration: Mask D, Band 3: 806-824MHz, 815.1MHz, F1W, Digital, Low power



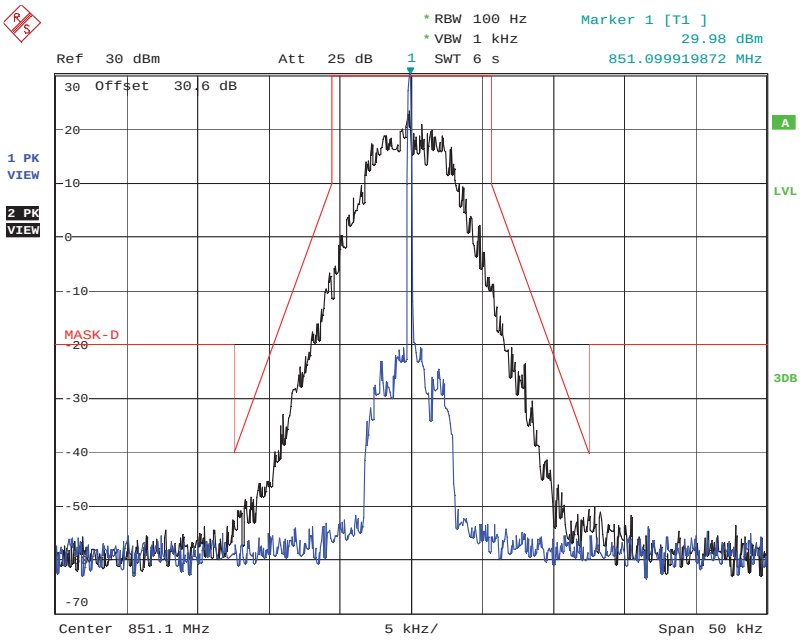

Date: 4.JUN.2018 15:19:45

### 5.8.7.33. Configuration: Mask D, Band 3: 806-824MHz, 823.9MHz, F1W, Digital, Low power



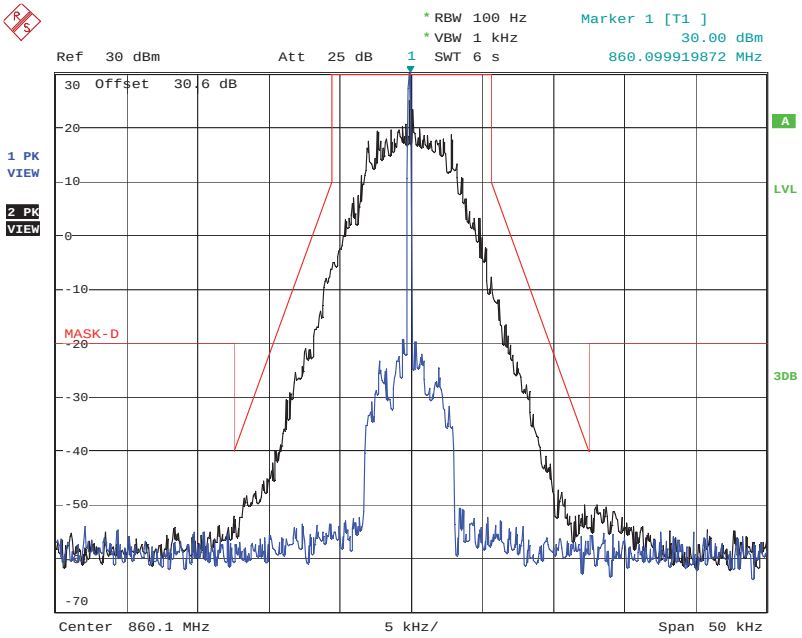

Date: 4.JUN.2018 15:25:26

### 5.8.7.34. Configuration: Mask D, Band 4: 851-869MHz, 851.1MHz, F1W, Digital, Low power



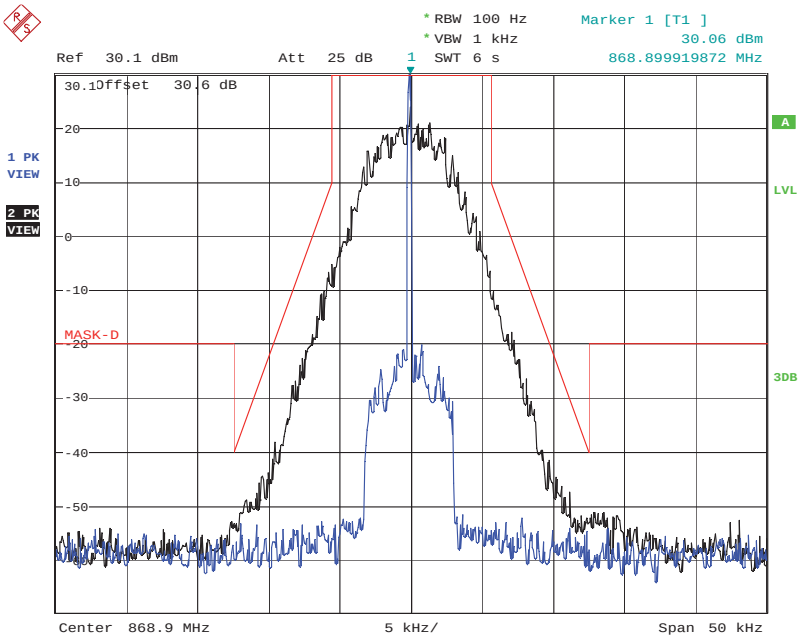

Date: 4.JUN.2018 15:31:09

## 5.8.7.35. Configuration: Mask D, Band 4: 851-869MHz, 860.1MHz, F1W, Digital, Low power




Date: 4.JUN.2018 15:37:22

## 5.8.7.36. Configuration: Mask D, Band 4: 851-869MHz, 868.9MHz, F1W, Digital, Low power

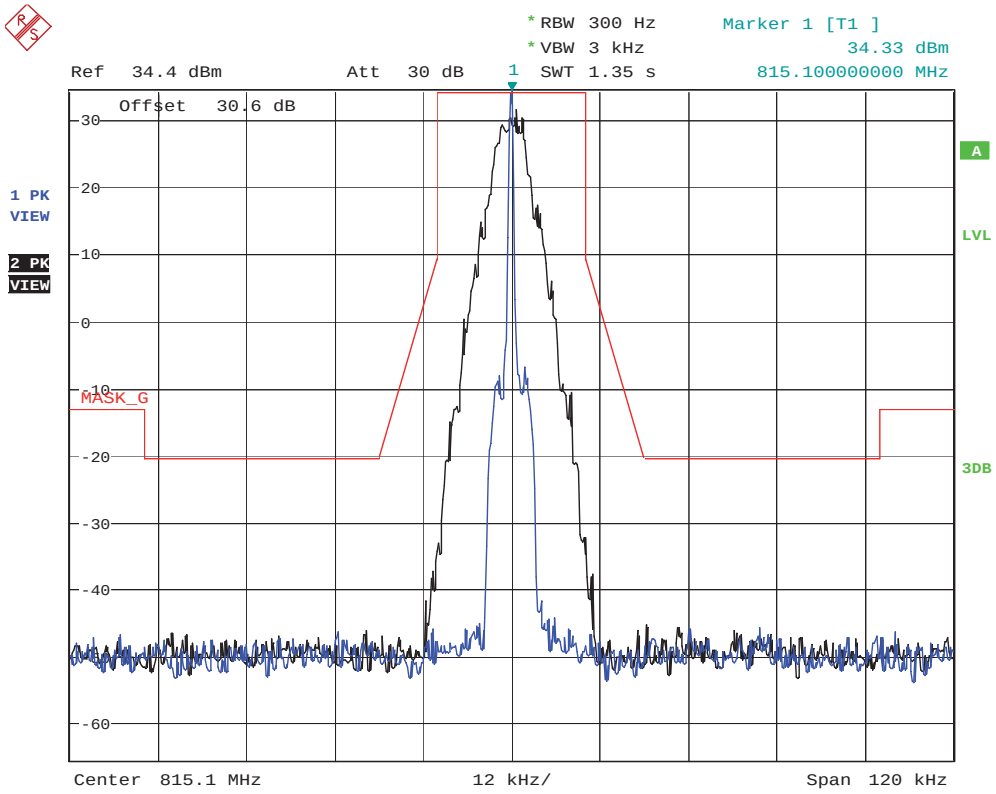



Date: 4.JUN.2018 15:43:32

### 5.8.8. Test Data- EMISSION MASKS- MASK G

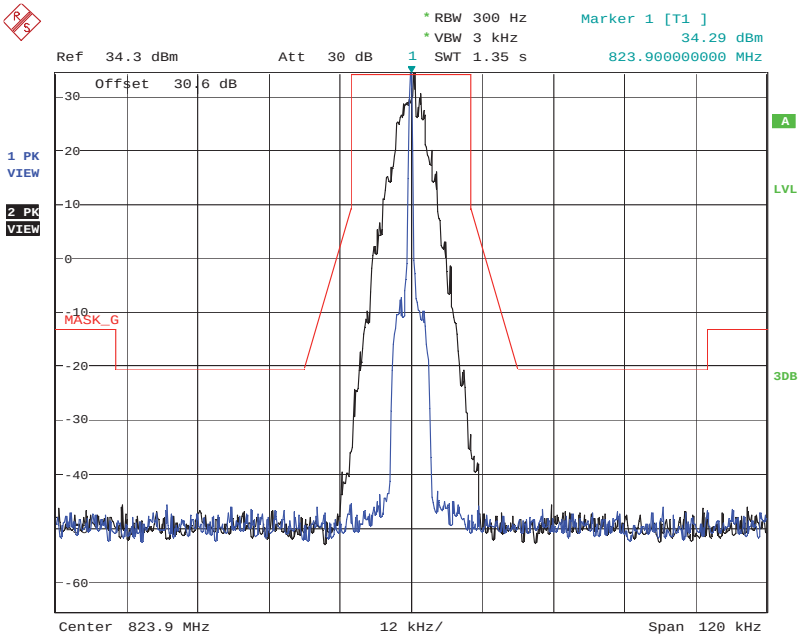
## High Power

#### 5.8.8.1. Configuration: Mask G, Sub Band 3: 809-824MHz, 815.1MHz, F1E&F1D, Digital, High power



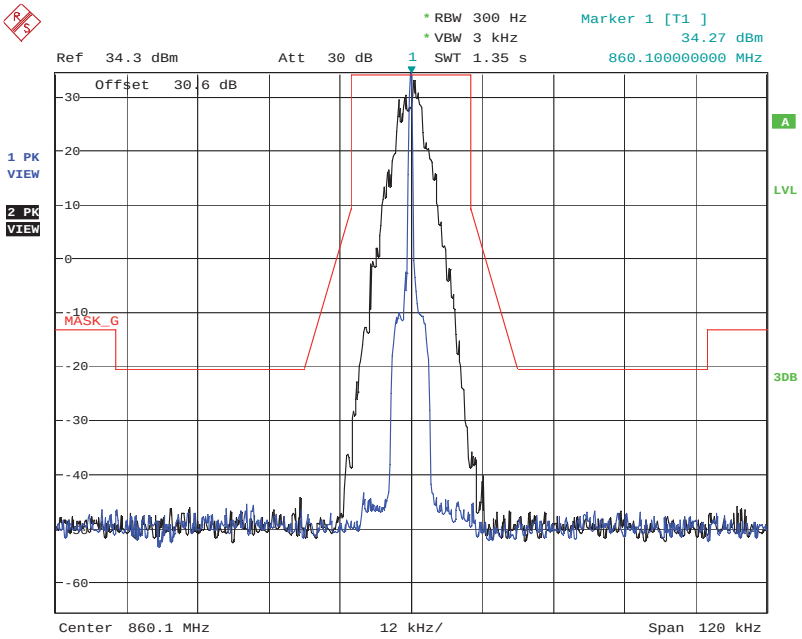

Date: 1.JUN.2018 13:30:33

### 5.8.8.2. Configuration: Mask G, Sub Band 3: 809-824MHz, 823.9MHz, F1E&F1D, Digital, High power



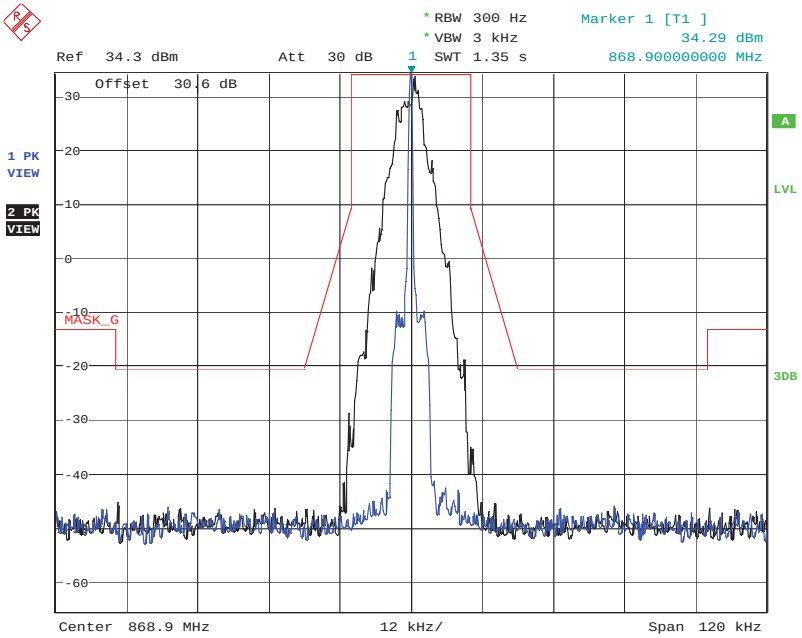

Date: 1.JUN.2018 13:35:27

### 5.8.8.3. Configuration: Mask G, Sub Band 4: 854-869MHz, 860.1MHz, F1E&F1D, Digital, High power



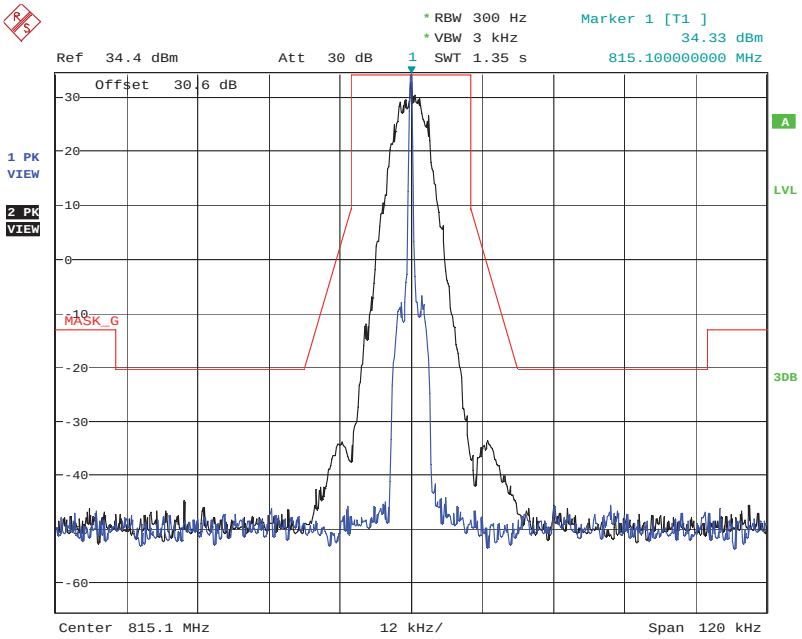

Date: 1.JUN.2018 13:39:29

## 5.8.8.4. Configuration: Mask G, Sub Band 4: 854-869MHz, 868.9MHz, F1E&F1D, Digital, High power



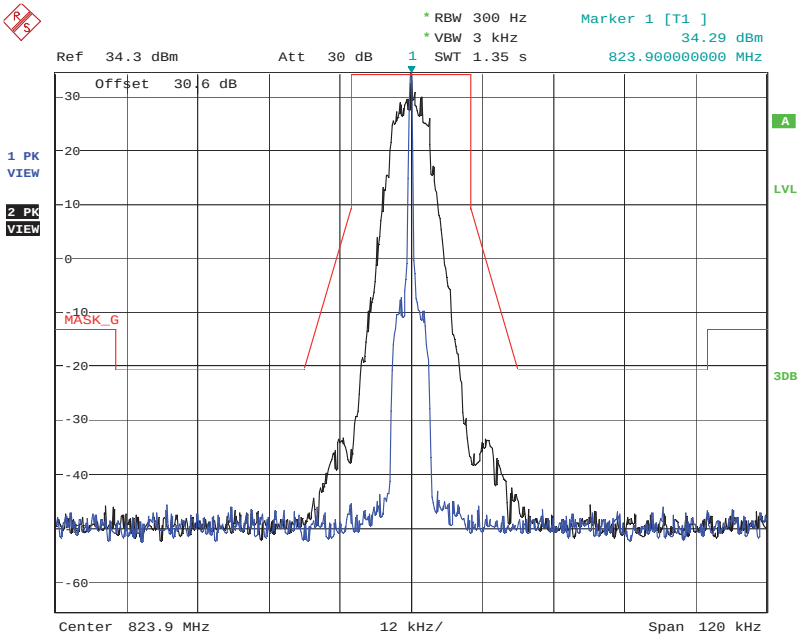

Date: 1.JUN.2018 13:43:31

## 5.8.8.5. Configuration: Mask G, Sub Band 3: 809-824MHz, 815.1MHz, F1W, Digital, High power



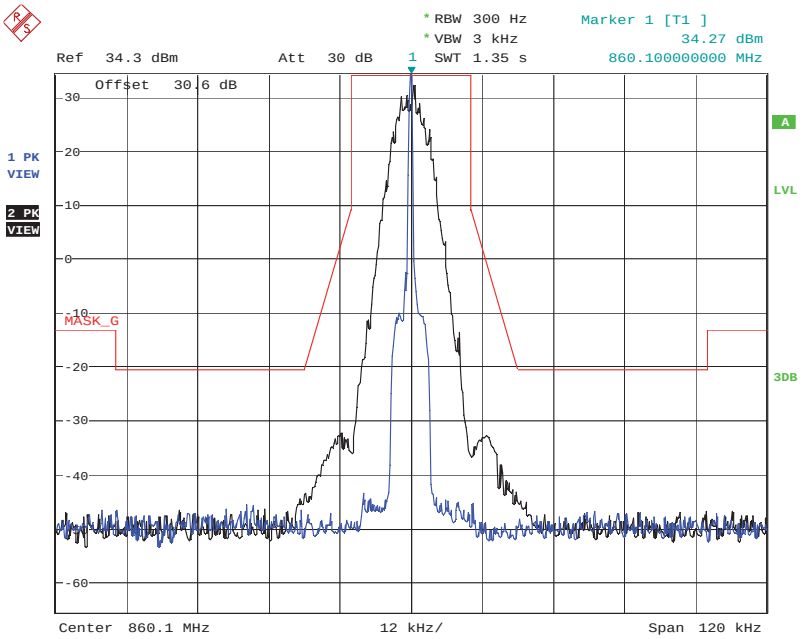

Date: 1.JUN.2018 13:32:30

## 5.8.8.6. Configuration: Mask G, Sub Band 3: 809-824MHz, 823.9MHz, F1W, Digital, High power



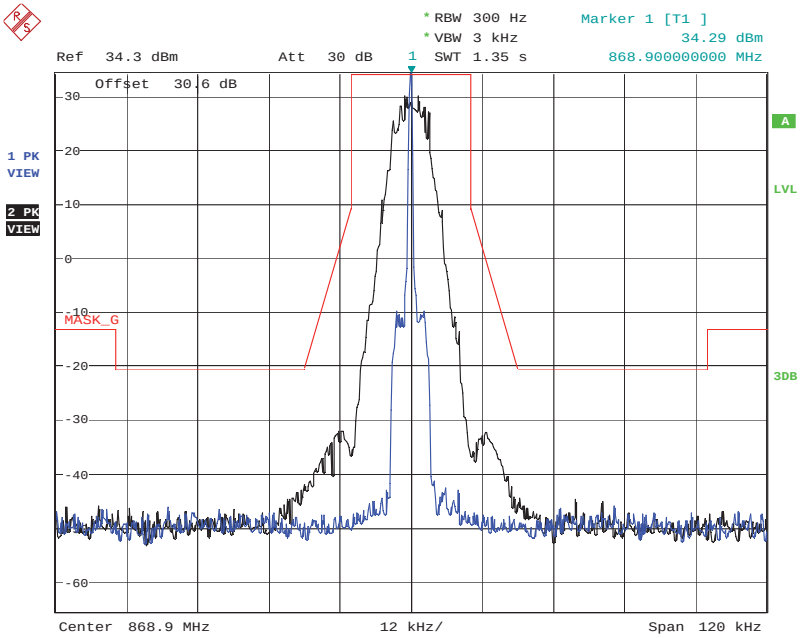

Date: 1.JUN.2018 13:37:03

## 5.8.8.7. Configuration: Mask G, Sub Band 4: 854-869MHz, 860.1MHz, F1W, Digital, High power




Date: 1.JUN.2018 13:40:50

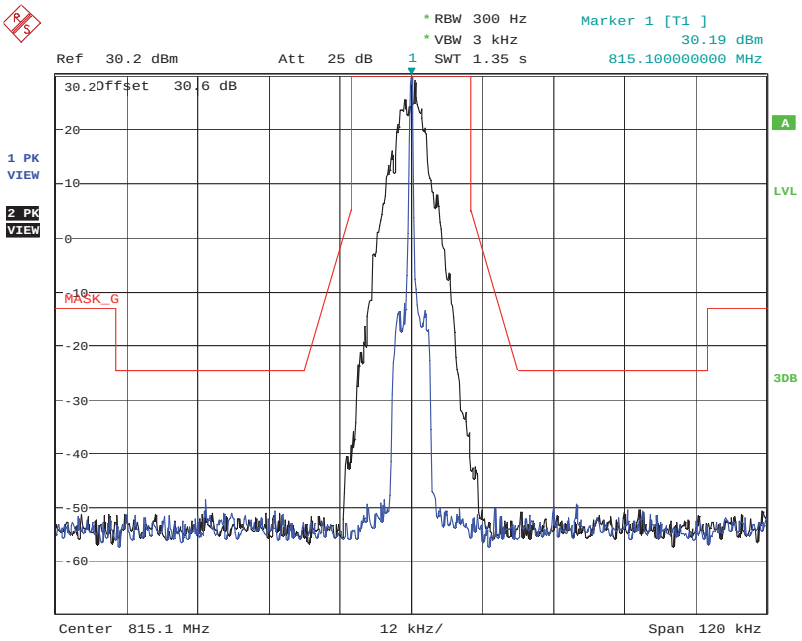
### 5.8.8.8. Configuration: Mask G, Sub Band 4: 854-869MHz, 868.9MHz, F1W, Digital, High power




Date: 1.JUN.2018 13:45:38

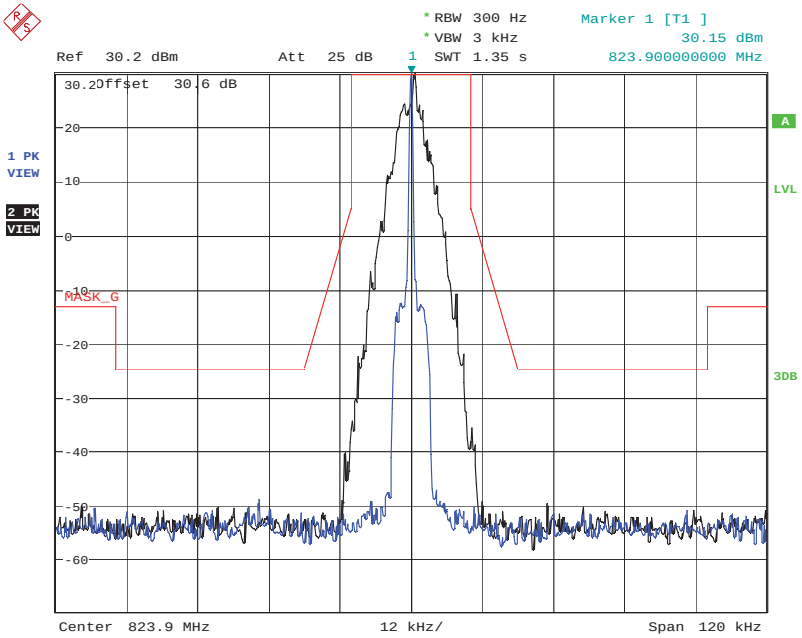
## Low Power

### 5.8.8.9. Configuration: Mask G, Sub Band 3: 809-824MHz, 815.1MHz, F1E&F1D, Digital, Low power



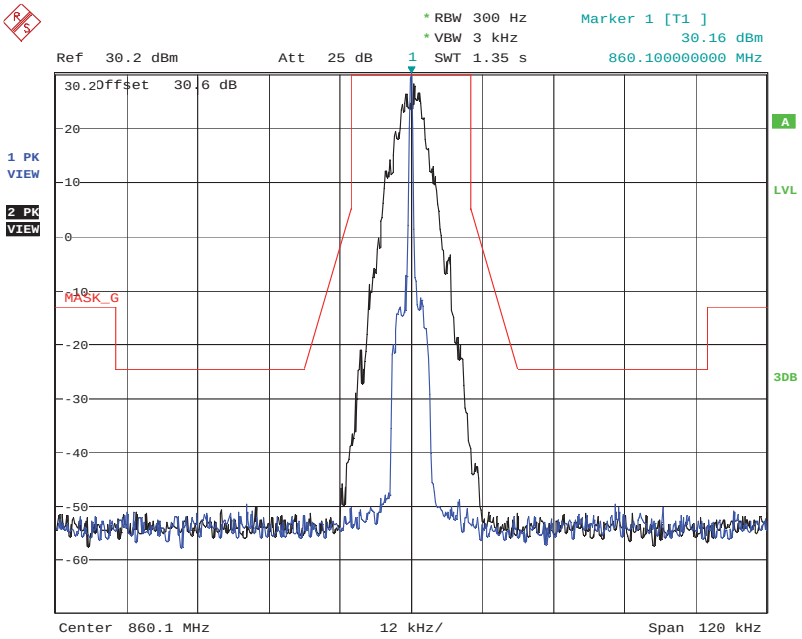

Date: 1.JUN.2018 13:09:48

### 5.8.8.10. Configuration: Mask G, Sub Band 3: 809-824MHz, 823.9MHz, F1E&F1D, Digital, Low power



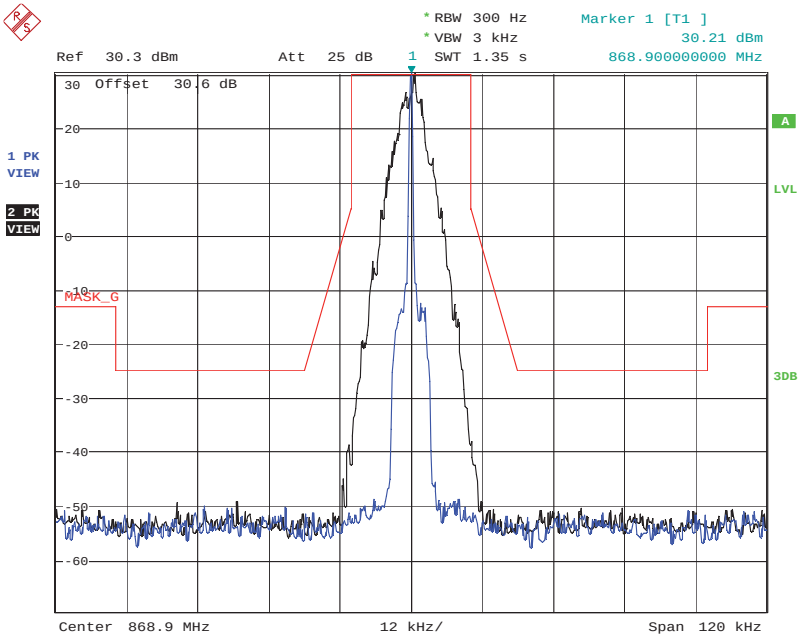

Date: 1.JUN.2018 13:14:25

### 5.8.8.11. Configuration: Mask G, Sub Band 4: 854-869MHz, 860.1MHz, F1E&F1D, Digital, Low power



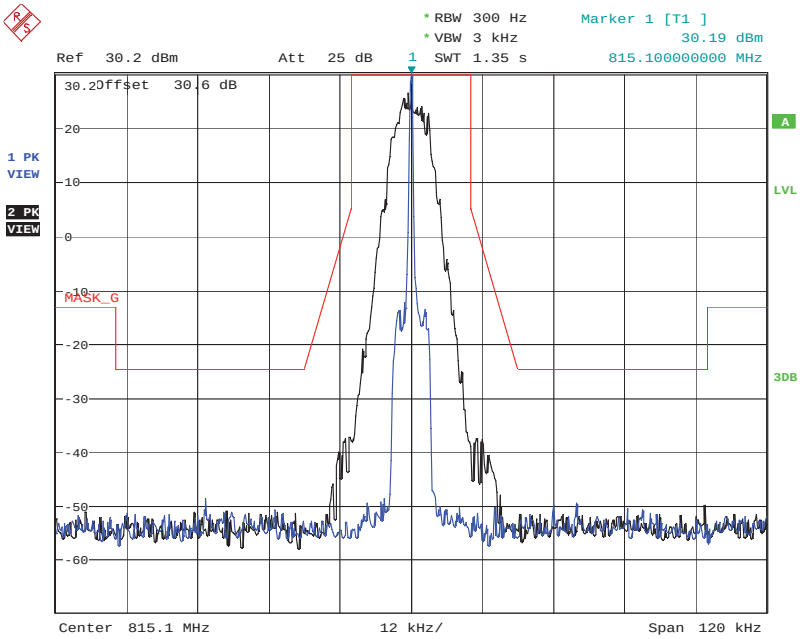

Date: 1.JUN.2018 13:19:05

### 5.8.8.12. Configuration: Mask G, Sub Band 4: 854-869MHz, 868.9MHz, F1E&F1D, Digital, Low power



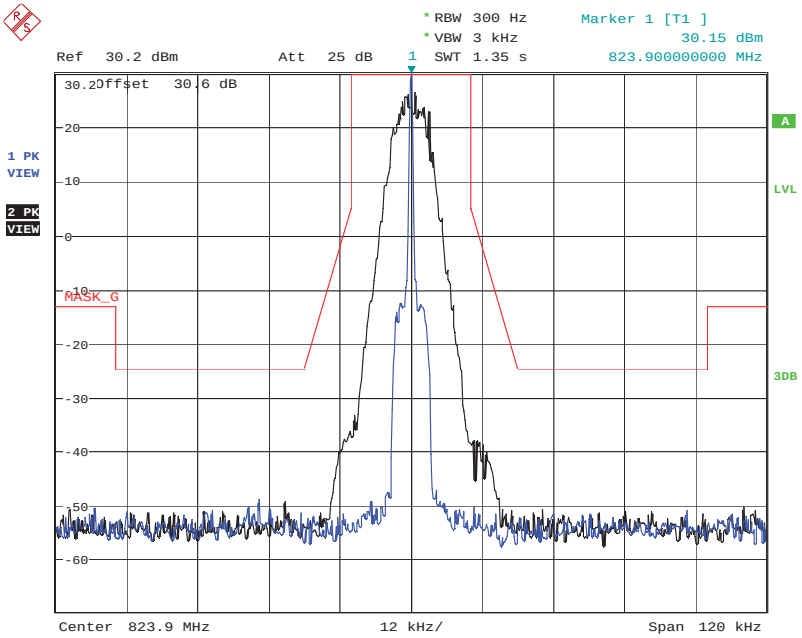

Date: 1.JUN.2018 13:24:27

### 5.8.8.13. Configuration: Mask G, Sub Band 3: 809-824MHz, 815.1MHz, F1W, Digital, Low power



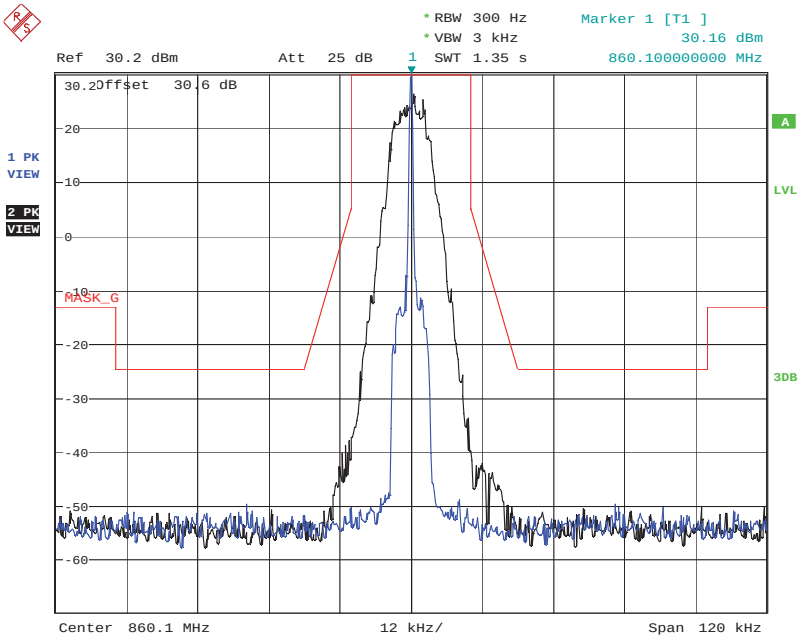

Date: 1.JUN.2018 13:11:33

### 5.8.8.14. Configuration: Mask G, Sub Band 3: 809-824MHz, 823.9MHz, F1W, Digital, Low power



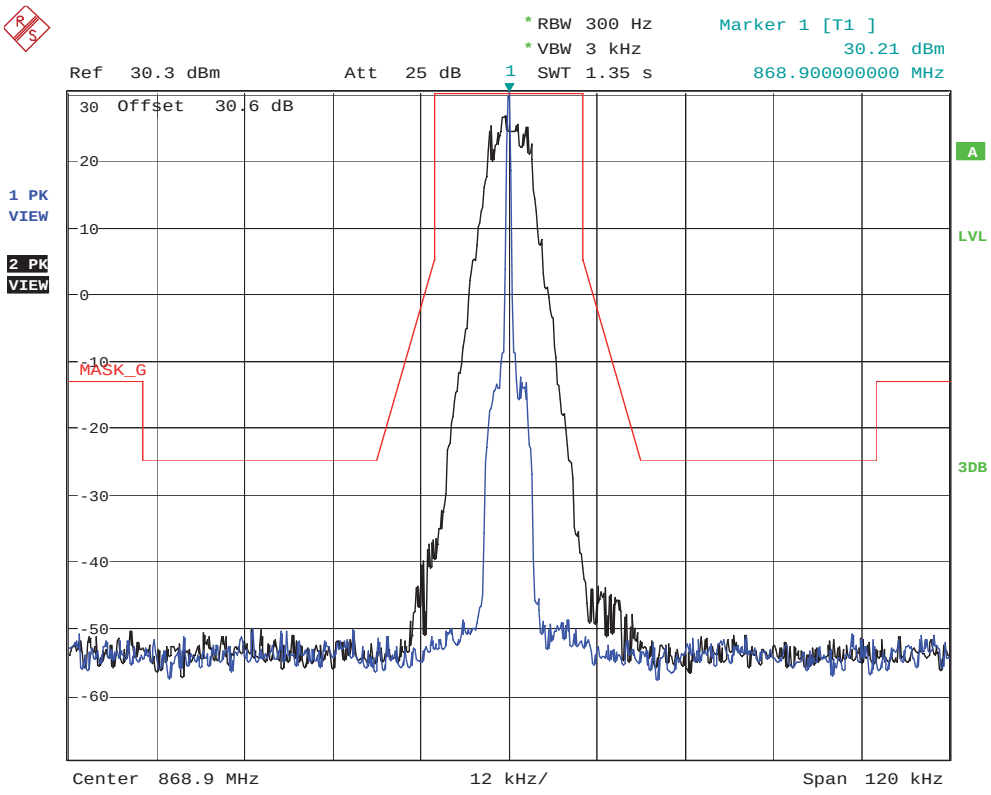

Date: 1.JUN.2018 13:15:50

### 5.8.8.15. Configuration: Mask G, Sub Band 4: 854-869MHz, 860.1MHz, F1W, Digital, Low power




Date: 1.JUN.2018 13:20:24

## 5.8.8.16. Configuration: Mask G, Sub Band 4: 854-869MHz, 868.9MHz, F1W, Digital, Low power

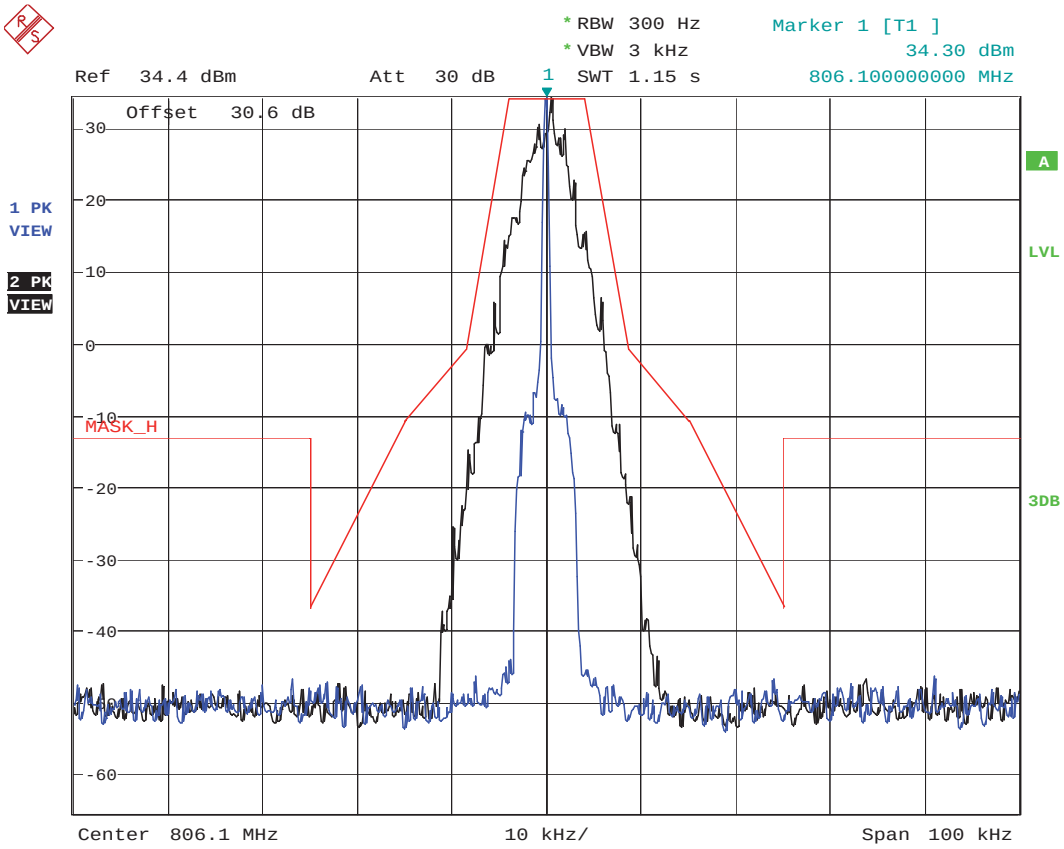



Date: 1.JUN.2018 13:26:16

### 5.8.9. Test Data- EMISSION MASKS- MASK H

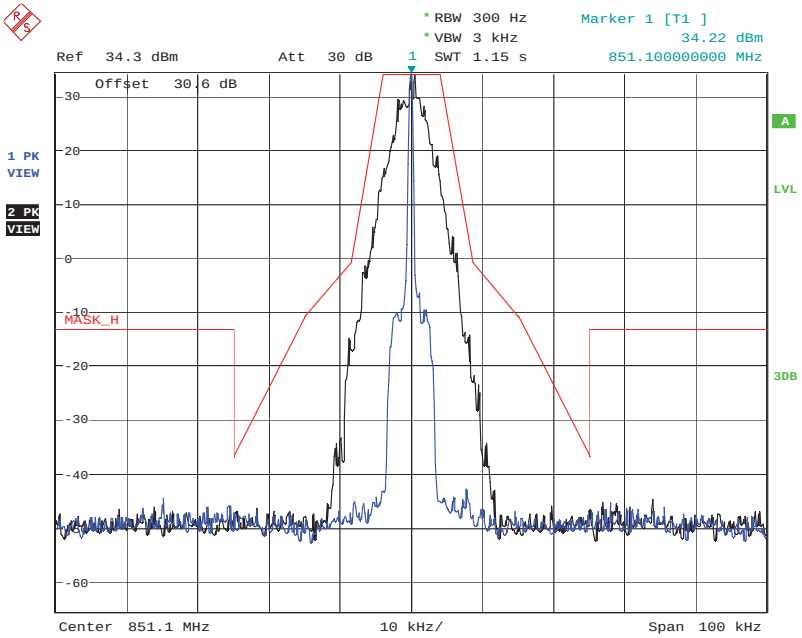
## High Power

### 5.8.9.1. Configuration: Mask H, Sub Band 3: 806-809MHz, 806.1MHz, F1E&F1D, Digital, High power



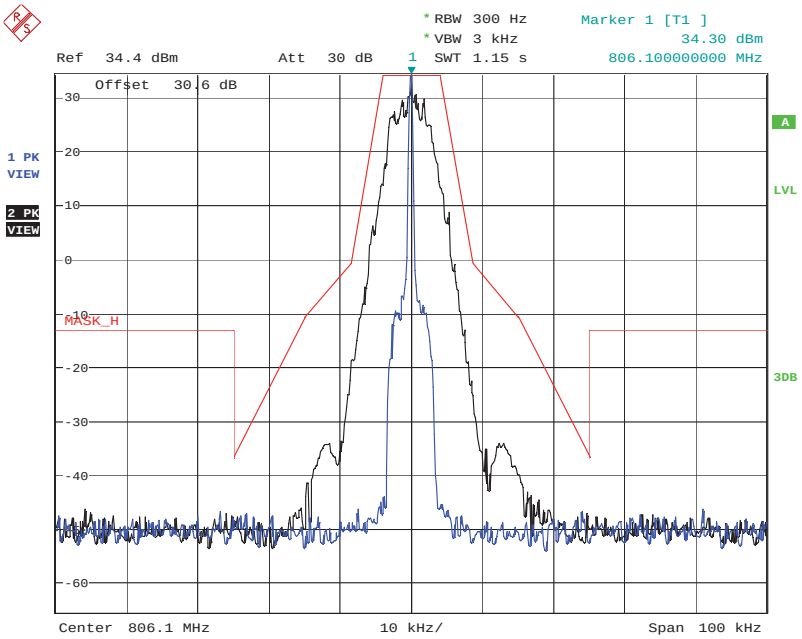

Date: 1.JUN.2018 14:32:36

## 5.8.9.2. Configuration: Mask H, Sub Band 4: 851-854MHz, 851.1MHz, F1E&F1D, Digital, High power



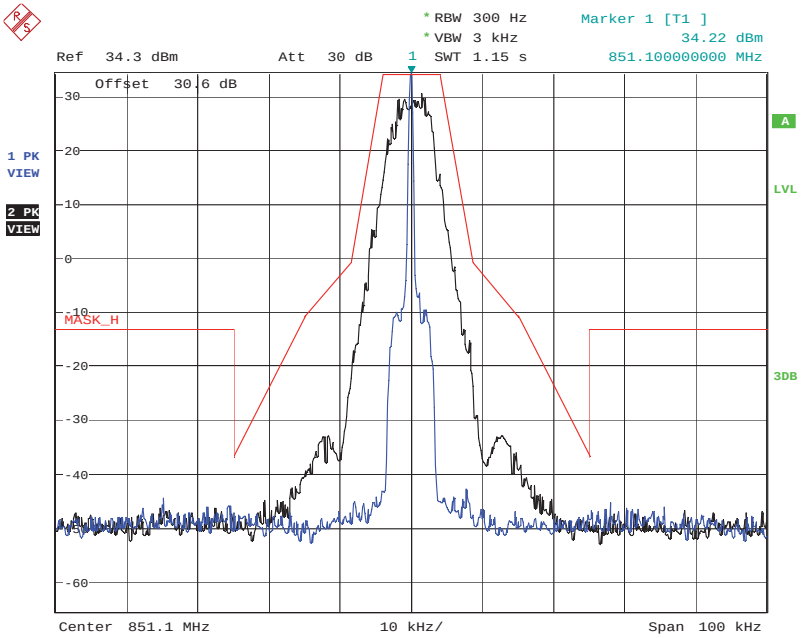

Date: 1.JUN.2018 14:40:19

## 5.8.9.3. Configuration: Mask H, Sub Band 3: 806-809MHz, 806.1MHz, F1W, Digital, High power




Date: 1.JUN.2018 14:35:15

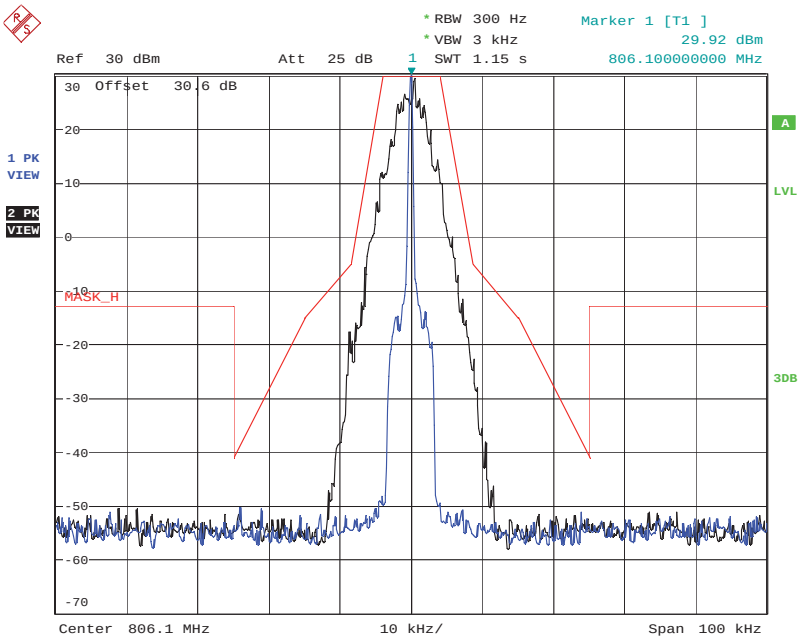
### 5.8.9.4. Configuration: Mask H, Sub Band 4: 851-854MHz, 851.1MHz, F1W, Digital, High power




Date: 1.JUN.2018 14:41:58

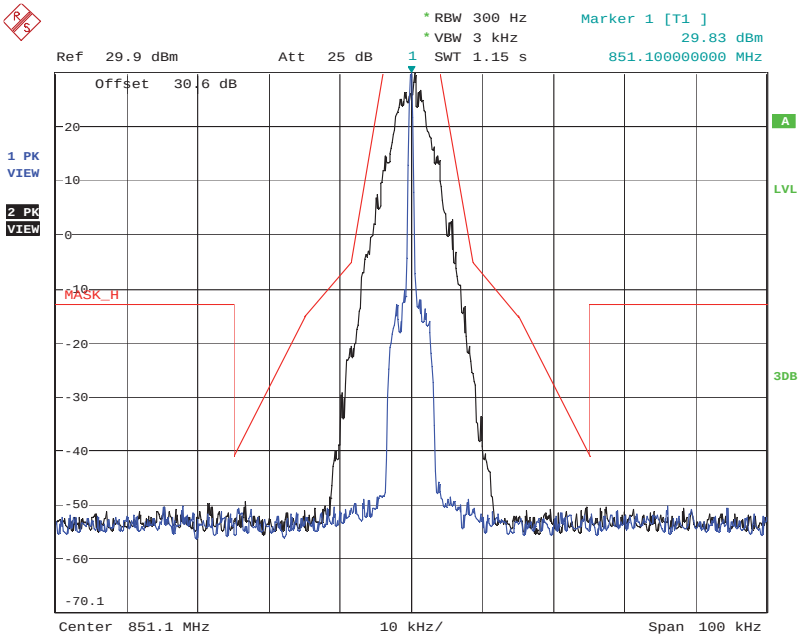
## Low Power

### 5.8.9.5. Configuration: Mask H, Sub Band 3: 806-809MHz, 806.1MHz, F1E&F1D, Digital, Low power



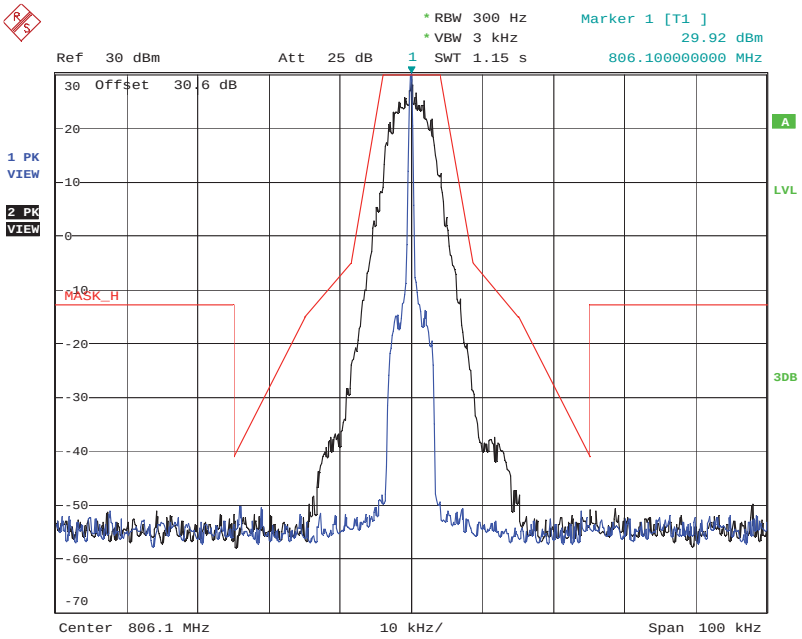

Date: 1.JUN.2018 14:45:53

## 5.8.9.6. Configuration: Mask H, Sub Band 4: 851-854MHz, 851.1MHz, F1E&F1D, Digital, Low power




Date: 1.JUN.2018 14:54:35

## 5.8.9.7. Configuration: Mask H, Sub Band 3: 806-809MHz, 806.1MHz, F1W, Digital, Low power

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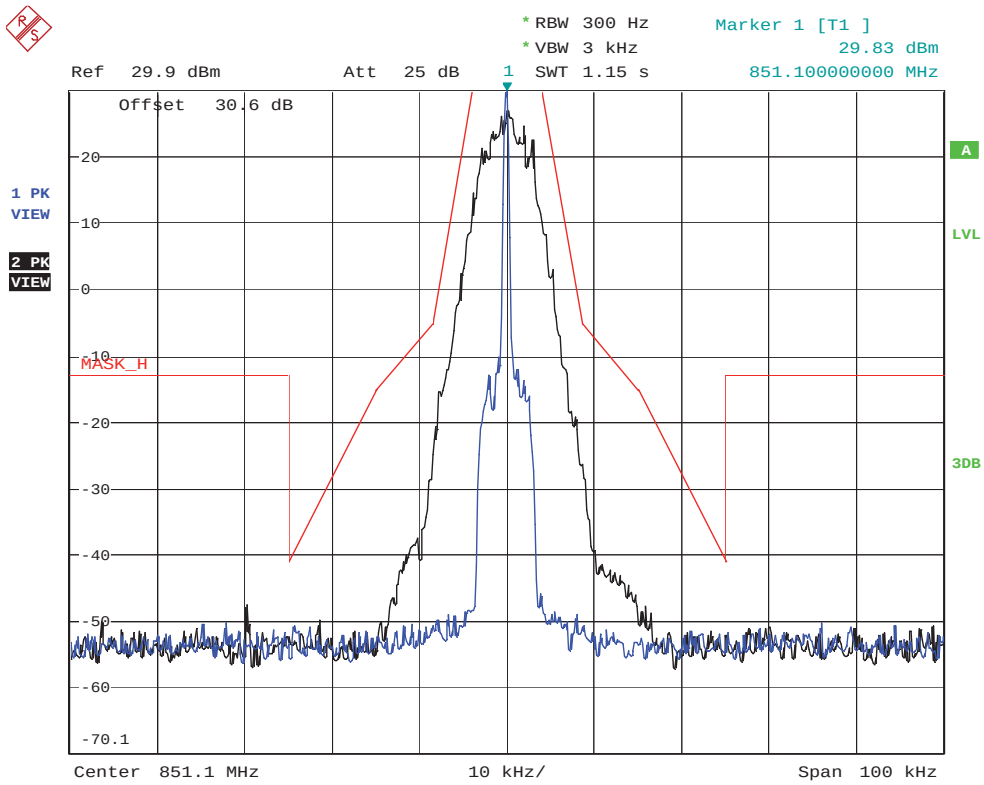
## 5.8.9.8. Configuration: Mask H, Sub Band 4: 851-854MHz, 851.1MHz, F1W, Digital, Low power




Date: 1.JUN.2018 14:56:15