Report No.: CD11120011W01

# FCC Part 90 RF TEST REPORT

*Issued to*

XIAMEN PUXING Electronics Science & Technology Co., Ltd.

*For*

**FM VHF/UHF Two Way Radio**

| | | |
|---|---|---|
| Model Name | : | PX-888K |
| Trade Name | : | PUXING |
| Brand Name | : | PUXING |
| FCC ID | : | AUJPXDZ888K001 |
| Standard | : | 47 CFR Part 90 |
| Test date | : | February 20,2012 – March 24, 2012 |
| Issue date | : | March 24, 2012 |

*by*

Shenzhen MORLAB Communication Technology Co., Ltd

| | | |
|---|---|---|
| *Tested by* | *Approved by* | *Review by* |
| Zhu shichao | Wei Yanquan | Wang wei |
| *Date* 2012.3.26 | *Date* | *Date* 2012.3.26 |

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# DIRECTORY

# 1. General Information

## 1.1. EUT Description

| | |
|---|---|
| EUT Type .....: | FM VHF/UHF Two Way Radio |
| Serial No.....: | 120209B00006 |
| Hardware Version .....: | FC-13501-04 |
| Software Version.....: | PX888_UV V1.0.3 |
| Applicant .....: | Xiamen Puxing Electronics Science & Technology CO.,LTD<br>NO.11 Xianghong Road Xiang'an District Xiamen Fujian China |
| Manufacturer .....: | Xiamen Puxing Electronics Science & Technology CO.,LTD<br>NO.11 Xianghong Road Xiang'an District Xiamen Fujian China |
| Operating Frequency Range.: | 136.025MHz-173.95MHz, 400.025MHz-469.95MHz |
| Channel Information……: | Low channel in VHF band: 136.025MHz<br>Middle channel in VHF band: 145.025MHz<br>High channel in VHF band: 173.95MHz<br>Low channel in UHF band: 400.025MHz<br>Middle channel in UHF band: 435.025MHz<br>High channel in UHF band: 469.95MHz |
| Modulation Type .....: | FM Modulation |
| RF Output Impedance ….....: | 5 W (High) and 1 W (Low) |
| Channel Separation……..: | 25 KHz, 12.5 KHz |
| Antenna Description …… | Manufacturer: ZM Antenna<br>Model Number: SJ-136-174/400-470-888<br>Operating Freq: 136-174/400-470 MHz<br>Gain: 2.15dBi |
| Power Supply.....: | Battery<br>Brand Name: PUXING<br>Model No.: PX-888K<br>Serial No.: (n.a. marked #1 by test site)<br>Capacitance: 1200mAh<br>Rated Voltage: 7.4V<br>Charge Limit: 8.5V<br>Manufacturer: Xiamen Puxing Electronics Science & Technology CO.,LTD |
| Ancillary Equipment 1 .....: | AC Adapter (Charger for Battery)<br>Brand Name: PUXING<br>Model Name: NLA050120W1U<br>Serial No.: (n.a. marked #1 by test site)<br>Rated Input: ~ 100-240V, 50/60Hz, 0.2A<br>Rated Output: ⎓ 8.4V, 400~450mA<br>Manufacturer: Xiamen Puxing Electronics Science & Technology CO.,LTD |

Note 1: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

## 1.2. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 90 (PRIVATE LAND MOBILE RADIO SERVICES) for the EUT FCC ID Certification:

| No. | Identity | Document Title |
|---|---|---|
| 1 | 47 CFR Part 90 | Private Land Mobile Radio Services |

Test detailed items/section required by FCC rules and results are as below:

| No. | Section in CFR 47 | Description | Result |
|---|---|---|---|
| 1 | 2.1046、90.205 | Maximum Transmitter Power | Pass |
| 2 | 2.1047、90.207 | Modulation Characteristics | Pass |
| 3 | 2.1046、90.209 | Occupied Bandwidth Of Emissions | Pass |
| 4 | 2.1046、90.210 | Emission Mask | Pass |
| 5 | 2.1053、90.210 | Radiated Spurious Emission | Pass |
| 6 | 2.1053、90.210 | Spurious Emission At Antenna Terminals | Pass |
| 7 | 2.1055、90.213 | Frequency Stability | Pass |
| 8 | 90.214 | Transient Frequency Behavior | Pass |

NOTE:

The tests were performed according to the method of measurements prescribed in TIA- 603 -D.

## 1.3. Facilities and Accreditations

### 1.3.1. Facilities

Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L3572.

All measurement facilities used to collect the measurement data are located at 3/F, Electronic Testing Building, Shahe Road, Xili, Nanshan District, Shenzhen, 518055 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22; the FCC registration number is 741109.

### 1.3.2. Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

| | |
|---|---|
| Temperature (°C): | 15 - 35 |
| Relative Humidity (%): | 30 -60 |
| Atmospheric Pressure (kPa): | 86-106 |

### 1.3.3. Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.

| | |
|---|---|
| Uncertainty of Conducted Emission: | ±1.8dB |
| Uncertainty of Radiated Emission: | ±4.0dB |

# 2. 47 CFR Part 90 Requirements

## 2.1. Maximum Transmitter Power

### 2.1.1. Provisions Applicable

Per FCC §2.1046 and §90.205: Maximum ERP is dependent upon the station's antenna HAAT and required service area.

### 2.1.2. Test Procedure

#### 2.1.2.1. Conducted Output Power

The RF output of Two-way Radio was conducted to a power meter through an appropriate attenuator

#### 2.1.2.2. Radiated Output Power

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

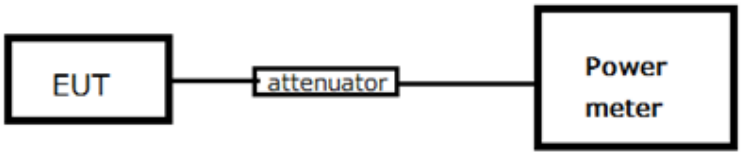
2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT .The test was performed by placing the EUT on 3-orthogonal axis.

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

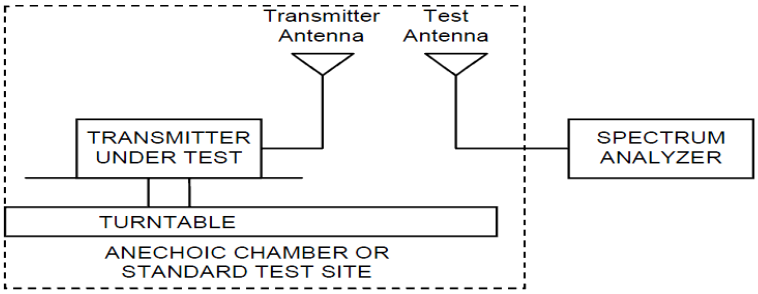
4. Absolute level = substituted level + Antenna gain – Cable Loss

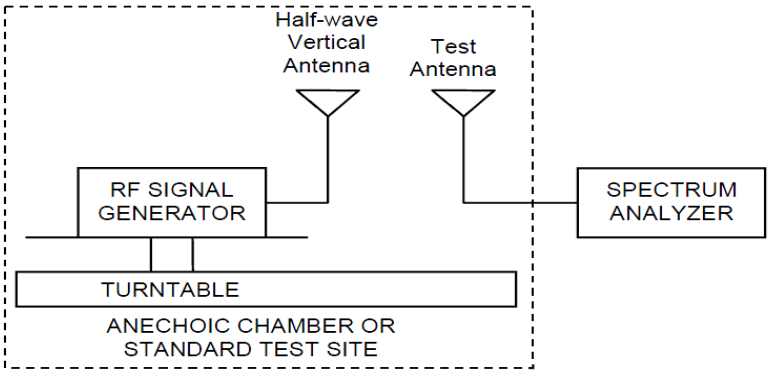
### 2.1.3. Test Setup Block Diagram

Conducted Output Power



Radiated Output Power (E.R.P)




## 2.1.4. Test Instruments

| Name Of Equipment | Manufacturer | Model | S/N | Cal. Due Date |
|---|---|---|---|---|
| Power meter | Agilent | E4418B | MY45100845 | 2013.1.9 |
| Attenuator | SHX | DC-13 | N.A | N.A |
| Signal Generator | Agilent | N5181A | MY50140888 | 2013.1.20 |
| Spectrum Analyzer | R&S | FSU-8 | 200034 | 2012.6.2 |
| Chamber | Albatross | 9*6*6 | 4771011001 | 2012.04.07 |
| Test Antenna | Schaffner | CBLY12B | 2529 | 2012.05.30 |

## 2.1.5. Test Result

### 2.1.5.1. Conducted Output Power Test Result

The maximum Conducted Power (CP) is
High power level:

5 W for 12.5 KHz Channel Separation
5 W for 25.0 KHz Channel Separation

Low power level:

1 W for 12.5 KHz Channel Separation
1 W for 25.0 KHz Channel Separation

Calculation Formula: CP = R + A + L

* Note:
CP: The final Conducted Power

R : The reading value from power meter
A : The attenuation value of the used attenuator
L : The loss of all connection cables

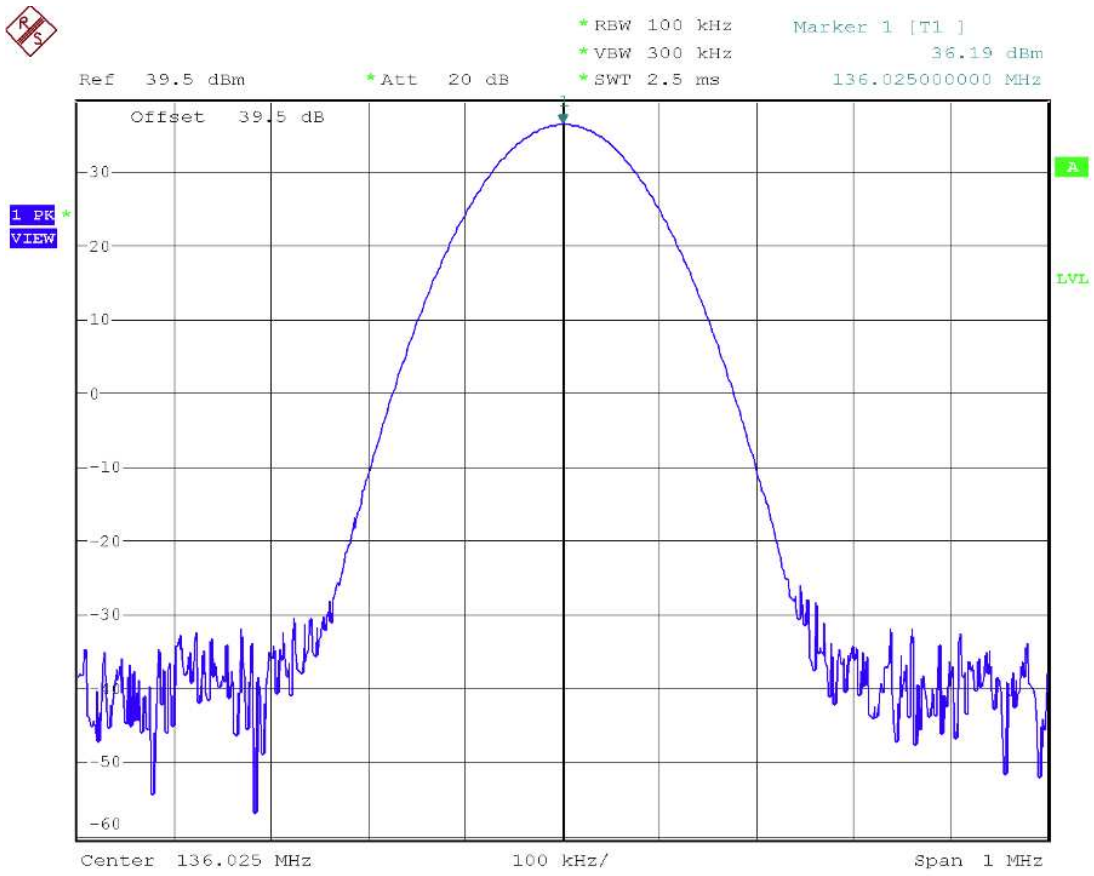
High power level:

| Frequency (MHz) | 12.5KHz Channel Separation | | 25KHz Channel Separation | |
|---|---|---|---|---|
| | In dBm | In W | In dBm | In W |
| 136.025 | 36.19 | 4.16 | 36.19 | 4.16 |
| 145.025 | 36.47 | 4.44 | 36.47 | 4.44 |
| 173.950 | 36.12 | 4.09 | 36.12 | 4.09 |
| 400.025 | 35.99 | 3.97 | 35.98 | 3.96 |
| 435.025 | 35.94 | 3.93 | 35.94 | 3.93 |
| 469.950 | 35.64 | 3.66 | 35.64 | 3.66 |

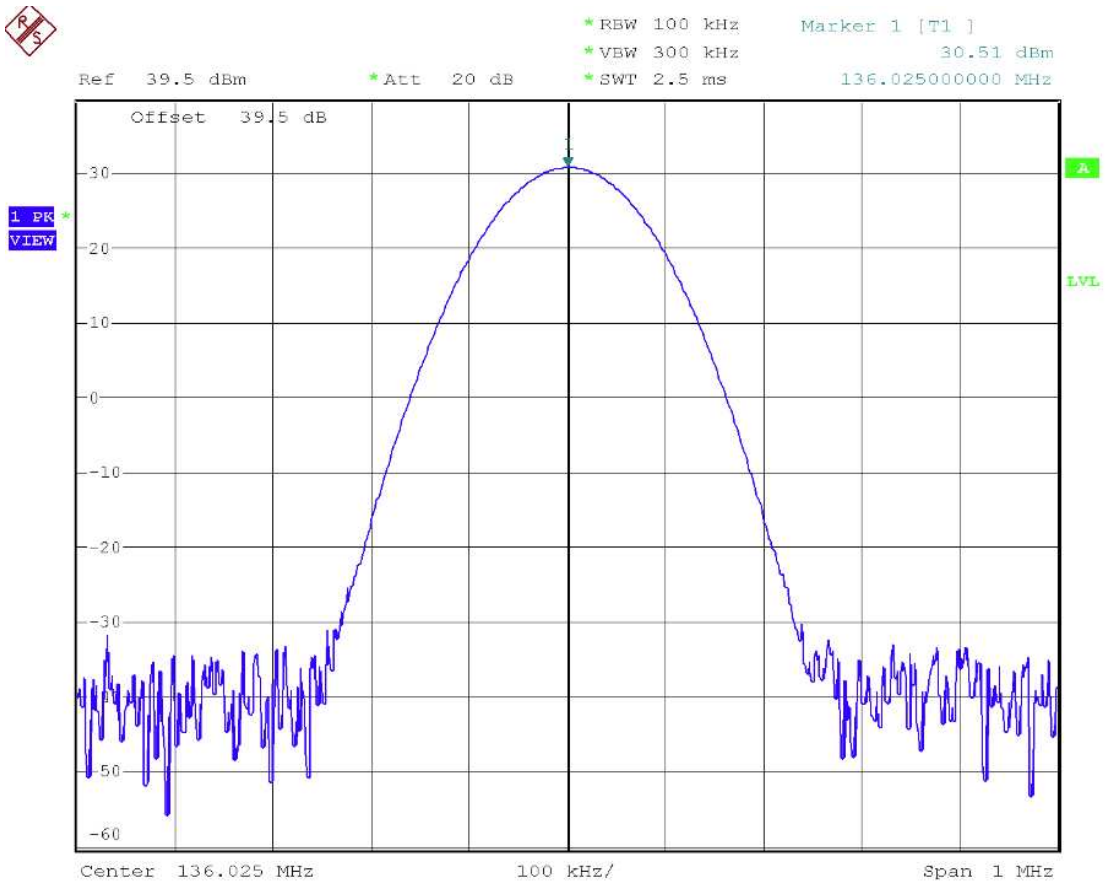
Low power level:

| Frequency (MHz) | 12.5KHz Channel Separation | | 25KHz Channel Separation | |
|---|---|---|---|---|
| | In dBm | In W | In dBm | In W |
| 136.025 | 30.51 | 1.12 | 30.51 | 1.12 |
| 145.025 | 30.77 | 1.19 | 30.76 | 1.19 |
| 173.950 | 28.37 | 0.69 | 28.37 | 0.69 |
| 400.025 | 29.74 | 0.94 | 29.72 | 0.94 |
| 435.025 | 29.60 | 0.91 | 29.60 | 0.91 |
| 469.950 | 31.14 | 1.30 | 31.11 | 1.29 |

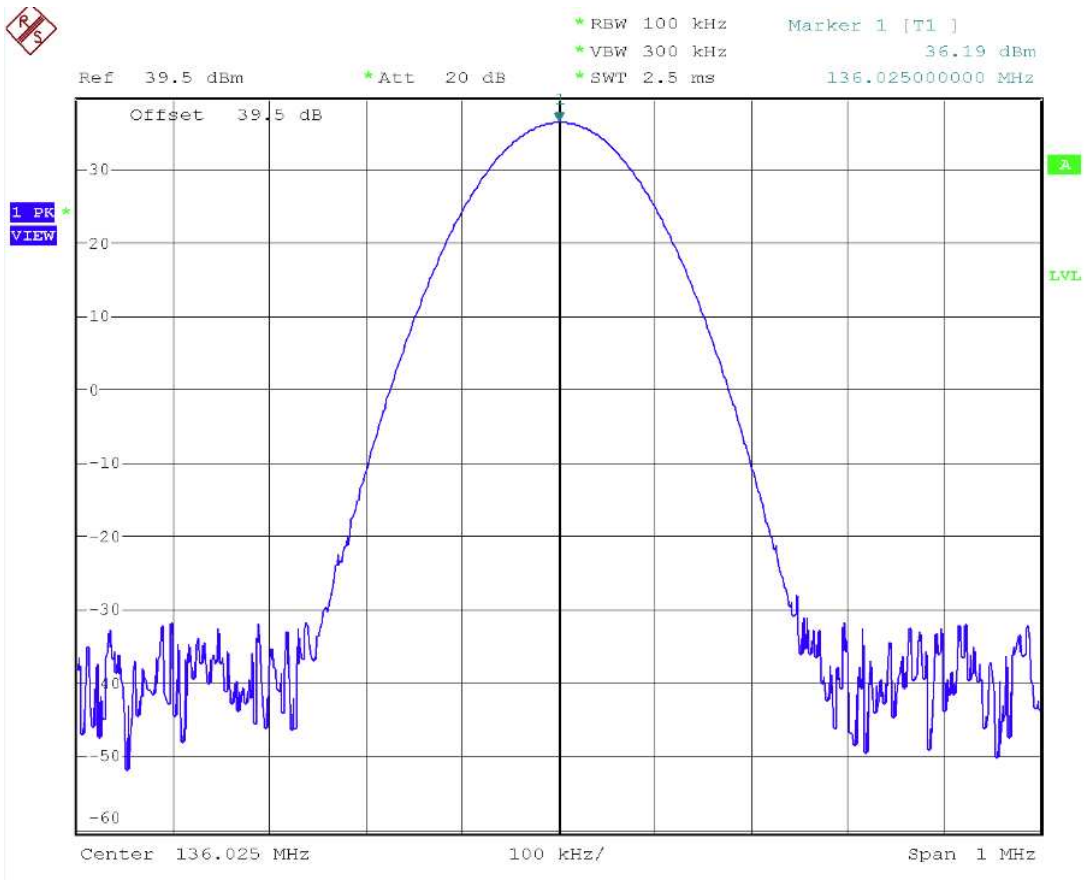
136.025MHz @ 12.5 KHz Channel Separations- High power level



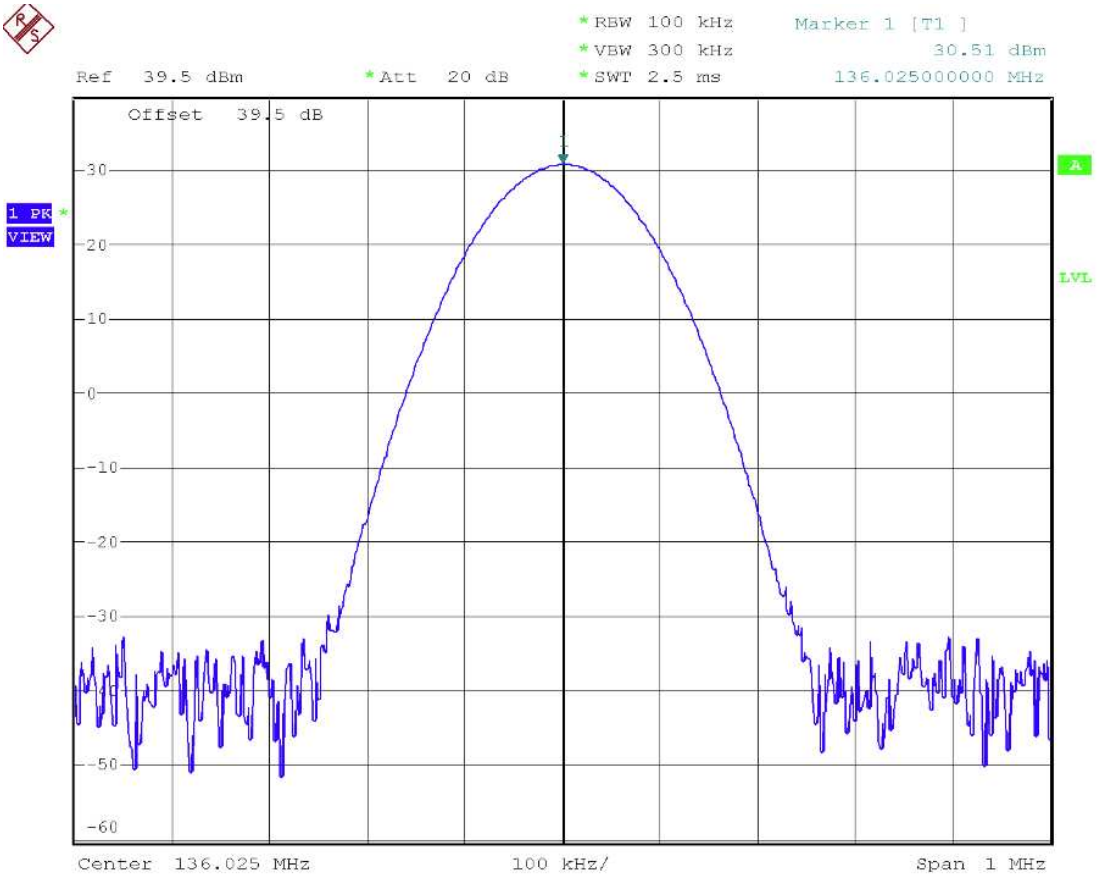

136.025MHz @ 12.5 KHz Channel Separations- Low power level



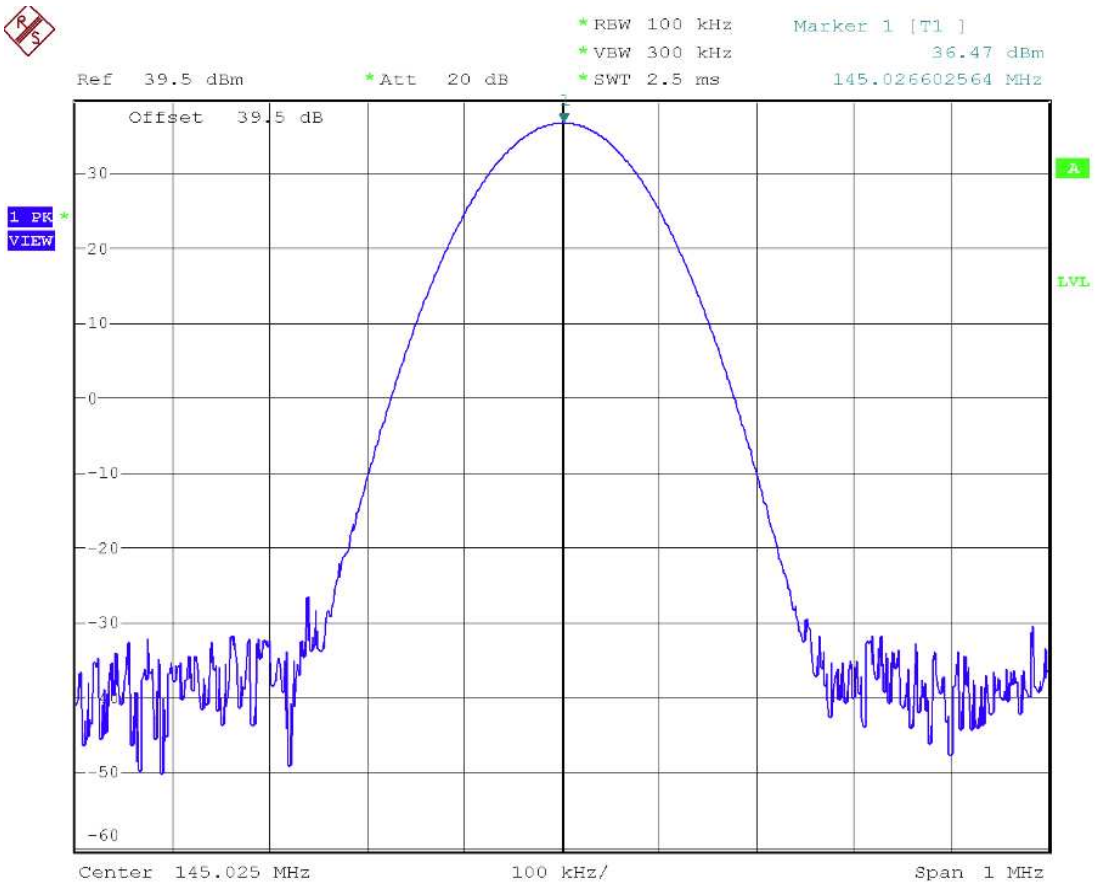
136.025MHz @ 25 KHz Channel Separations- High power level



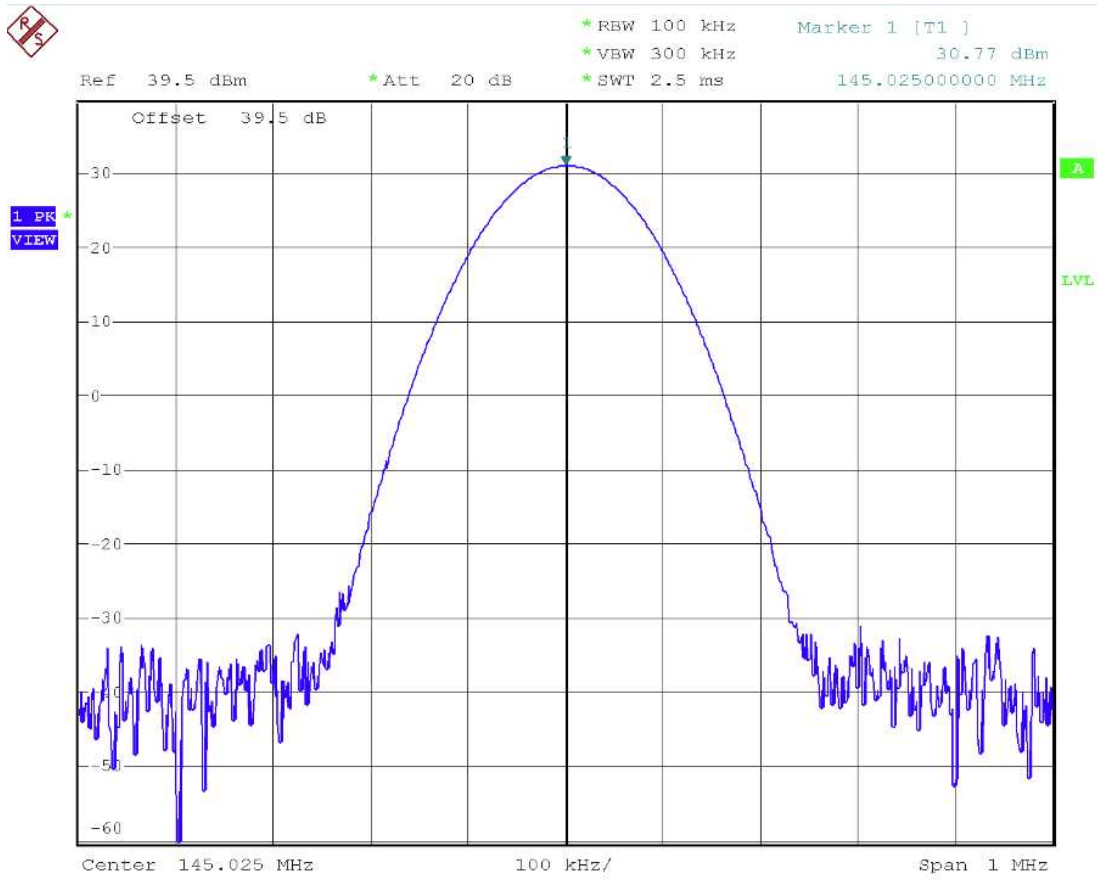

136.025MHz @ 25 KHz Channel Separations- Low power level



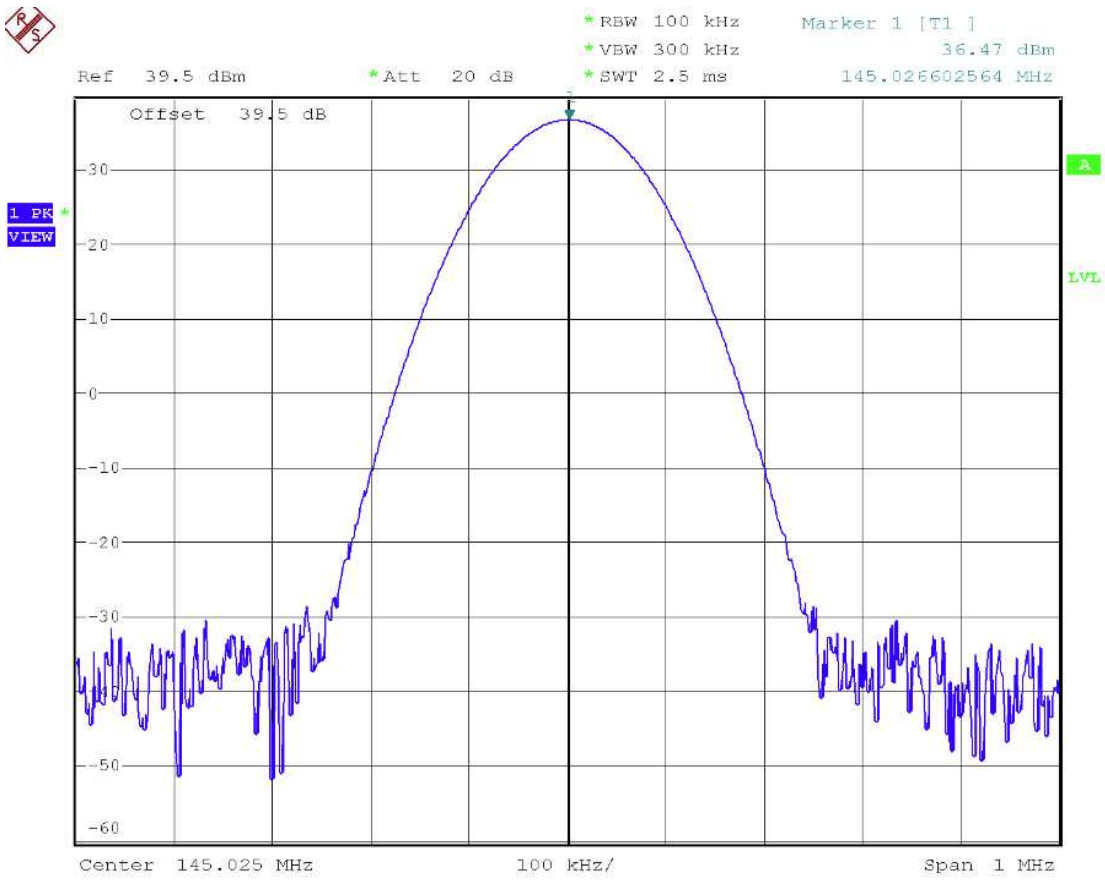
145.025MHz @ 12.5 KHz Channel Separations- High power level



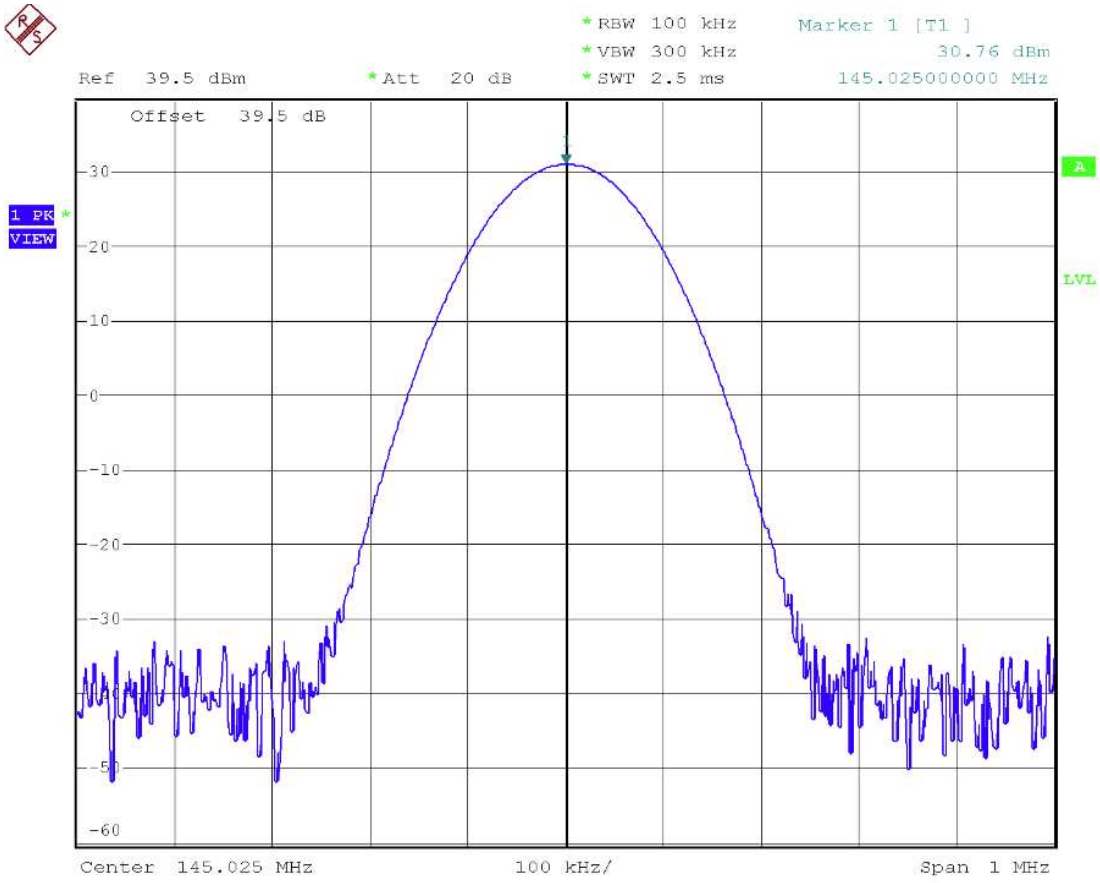

145.025MHz @ 12.5 KHz Channel Separations- Low power level



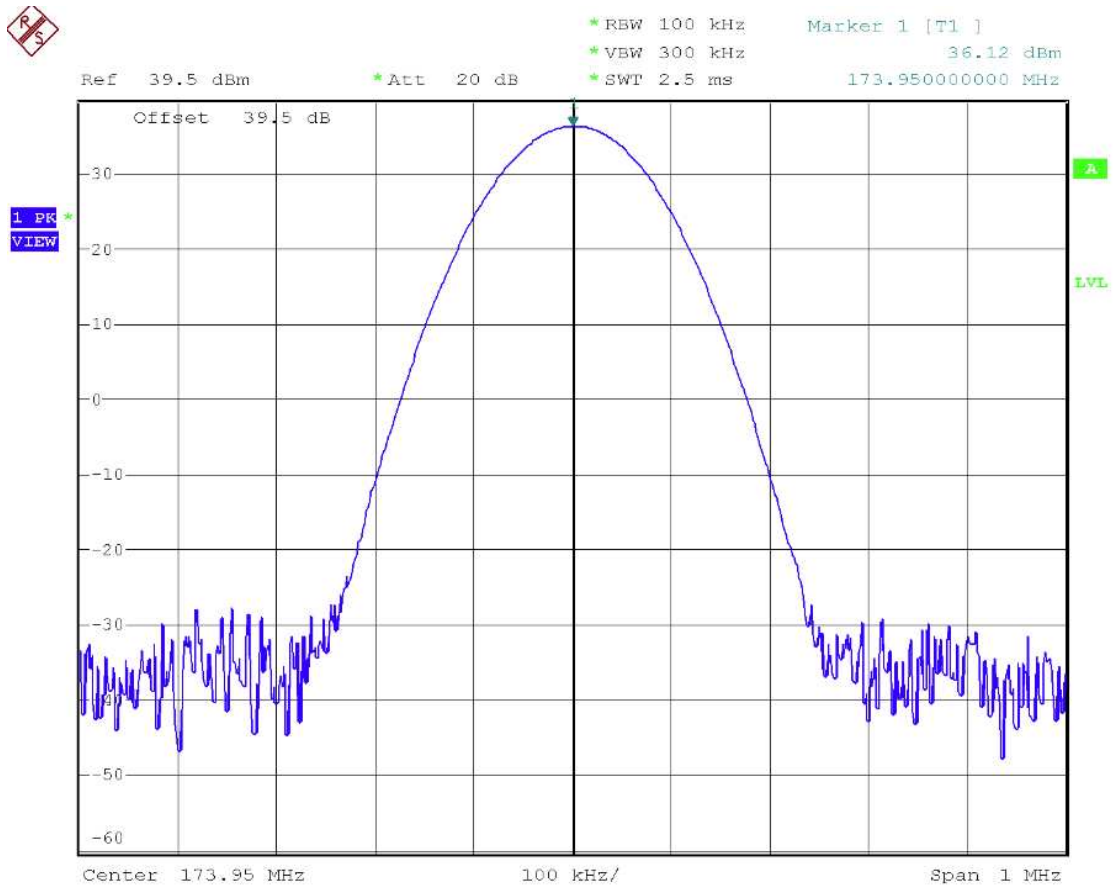
145.025MHz @ 25 KHz Channel Separations- High power level



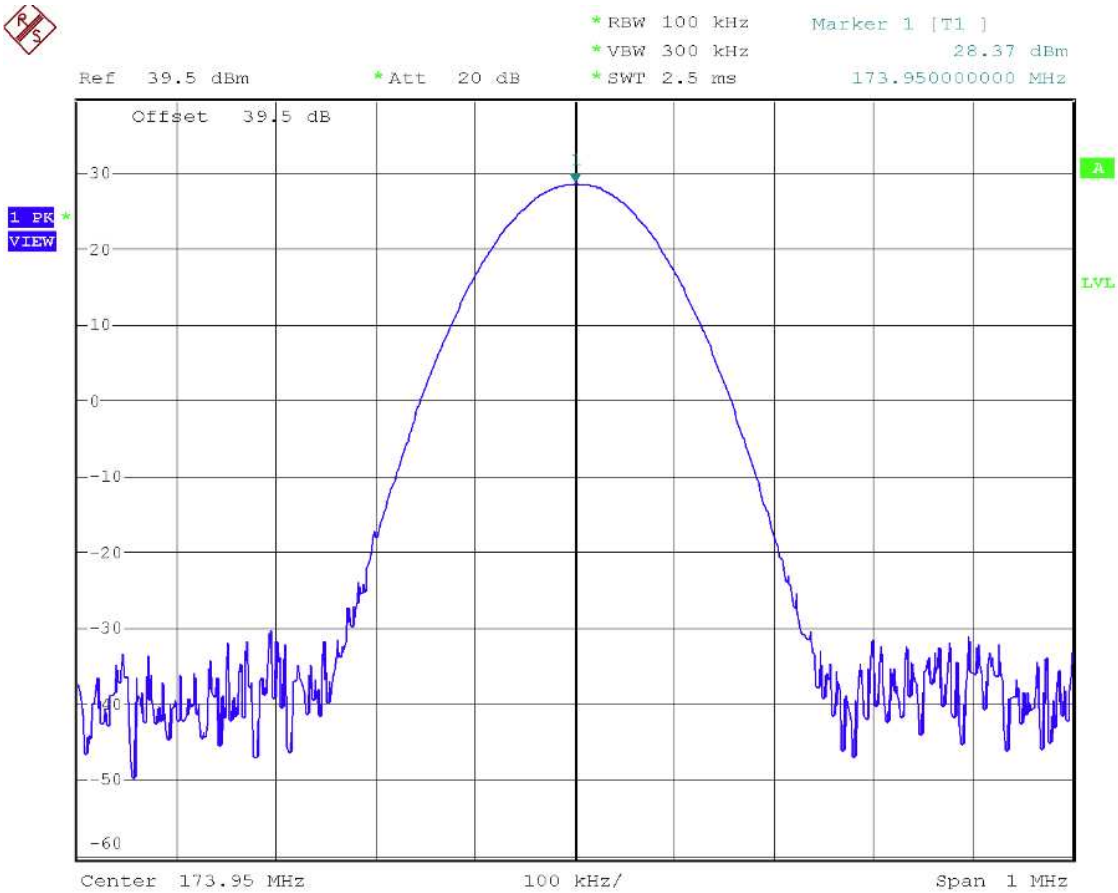

145.025MHz @ 25 KHz Channel Separations- Low power level



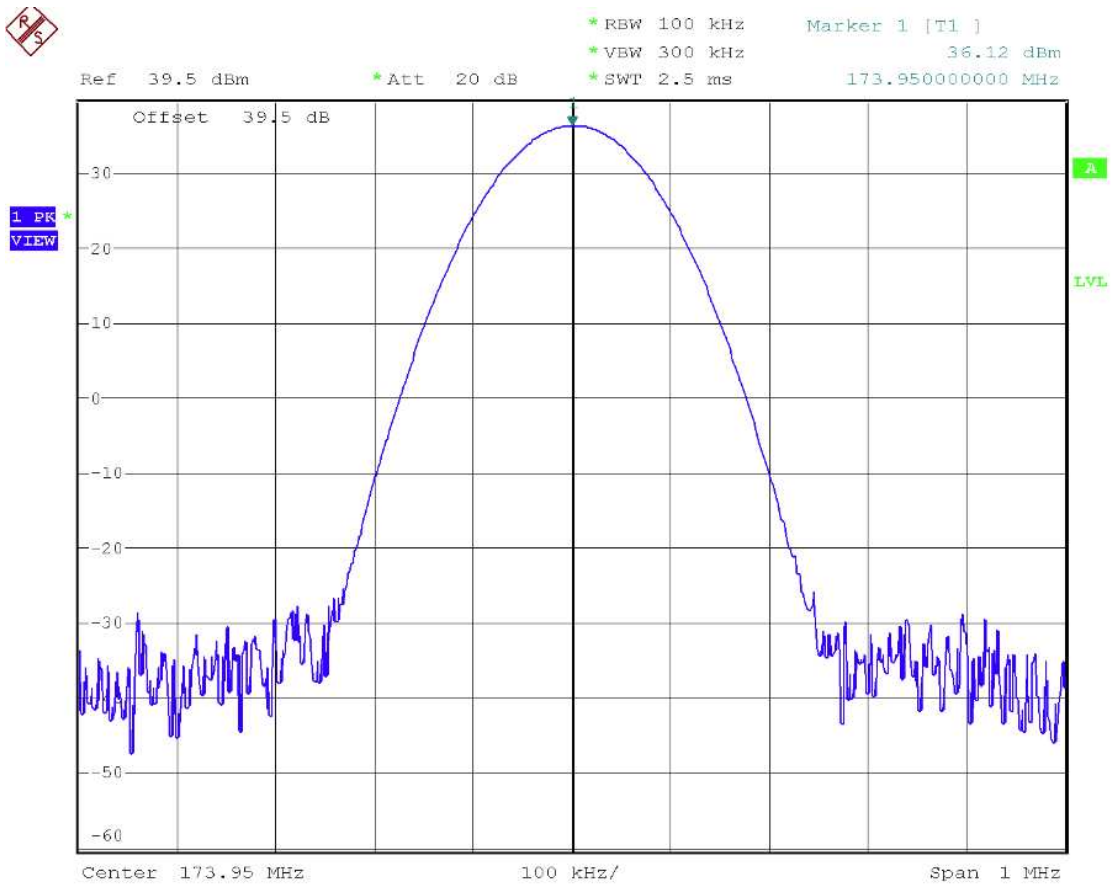
173.95MHz @ 12.5 KHz Channel Separations- High power level



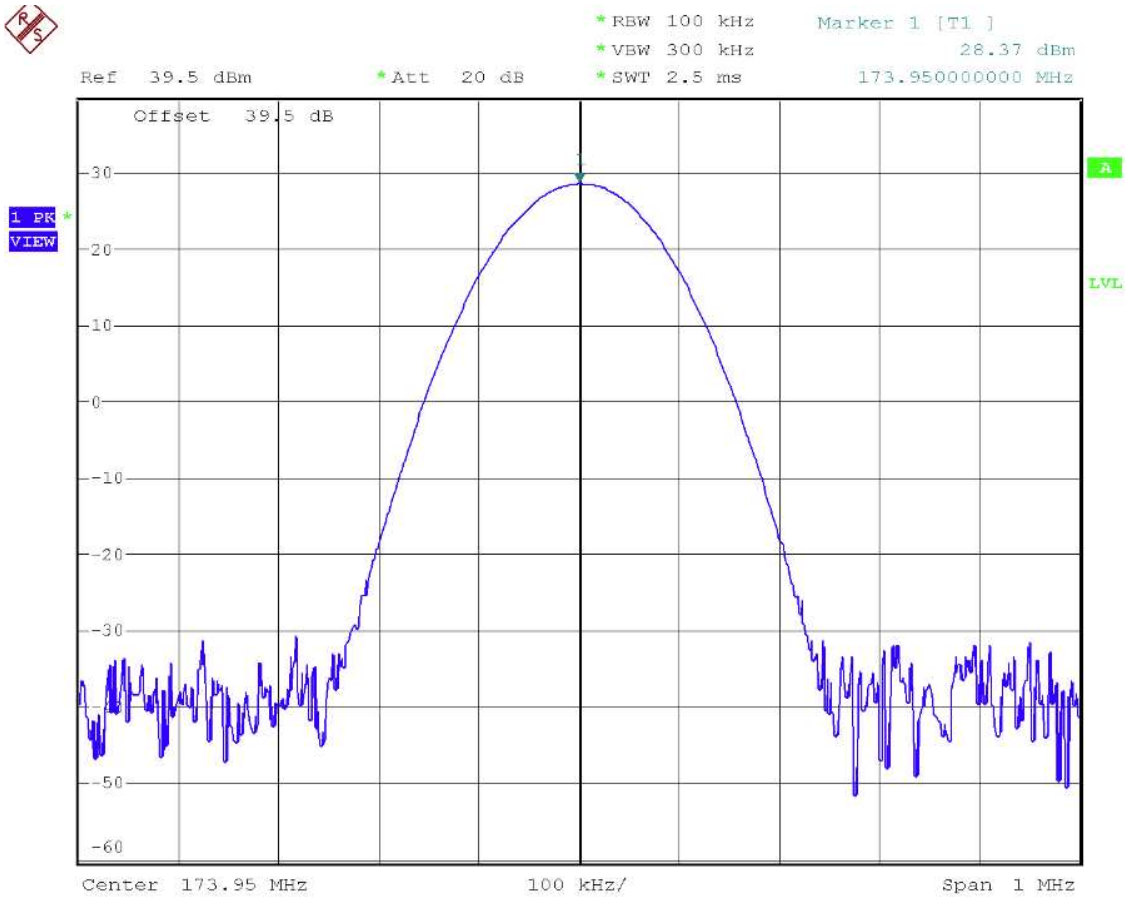

173.95MHz @ 12.5 KHz Channel Separations- Low power level



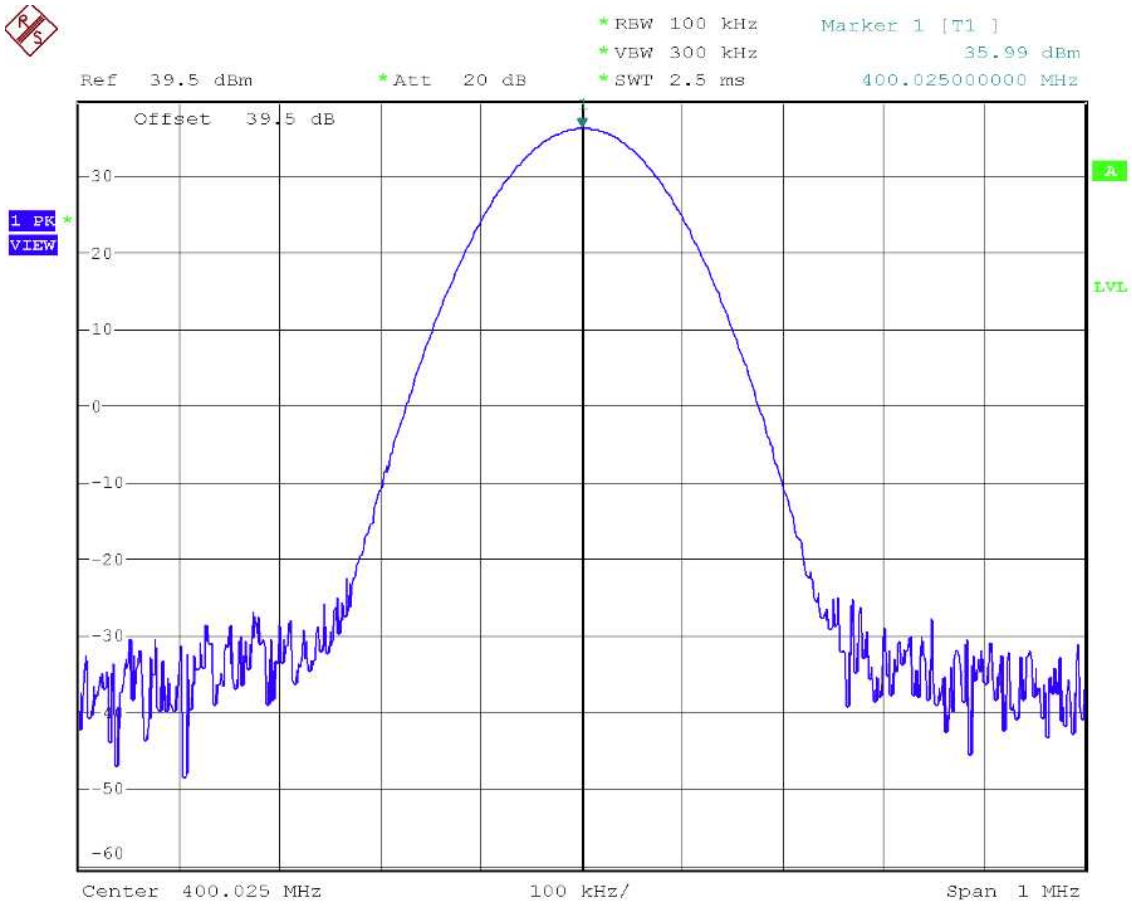
173.95MHz @ 25 KHz Channel Separations- High power level



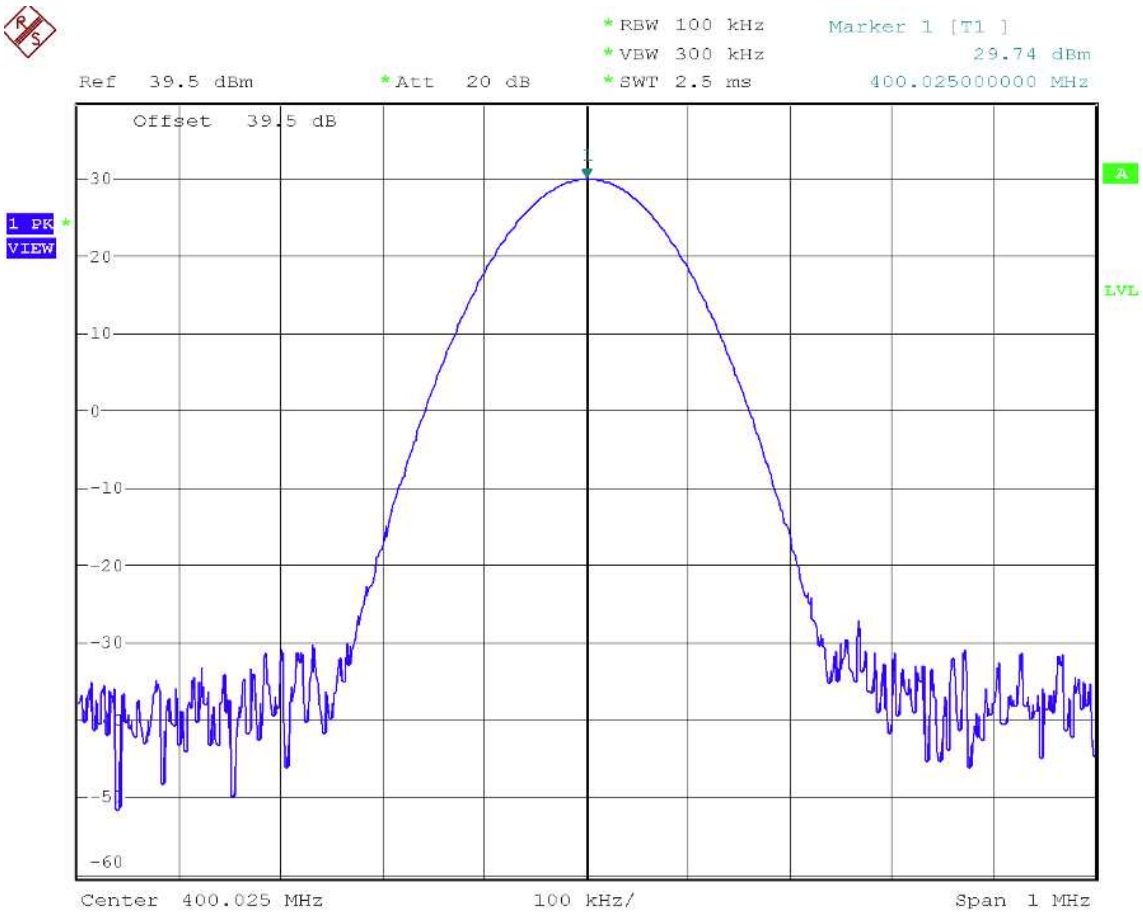

173.95MHz @ 25 KHz Channel Separations- Low power level



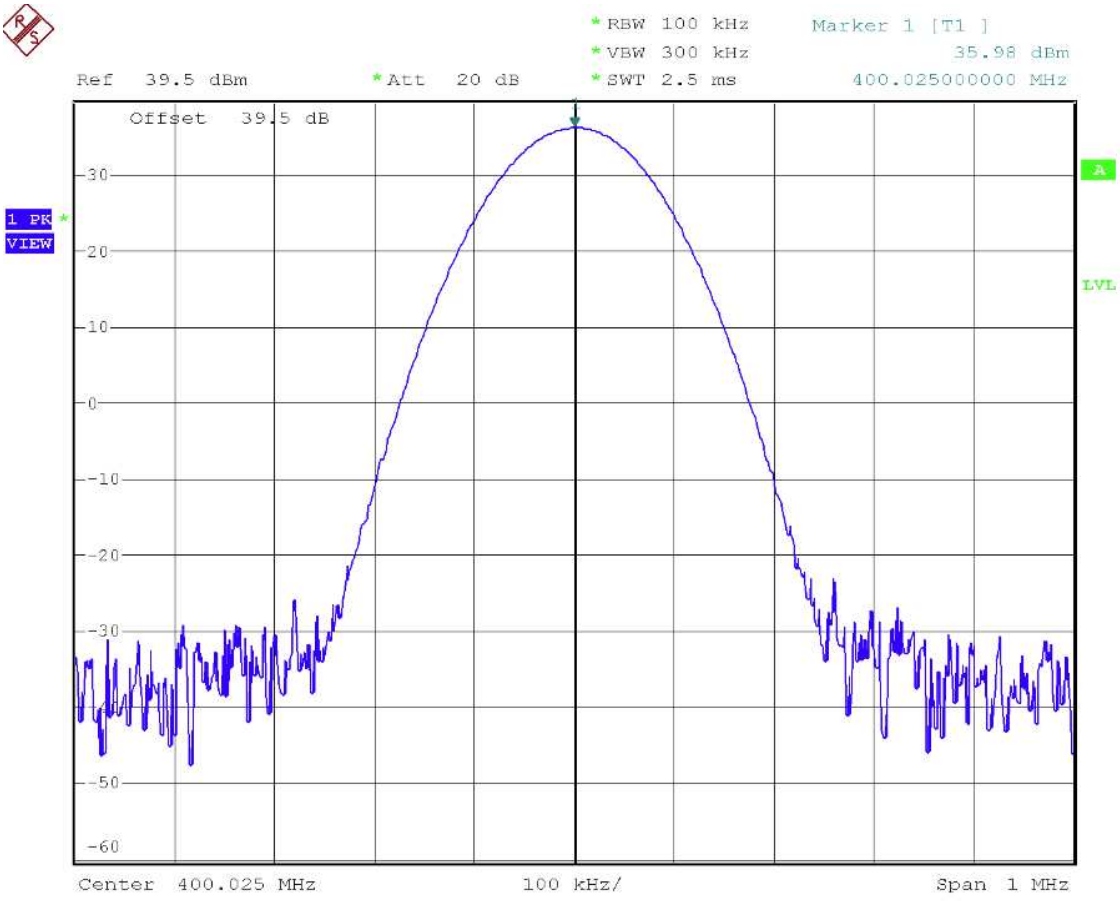
400.025MHz @ 12.5 KHz Channel Separations- High power level



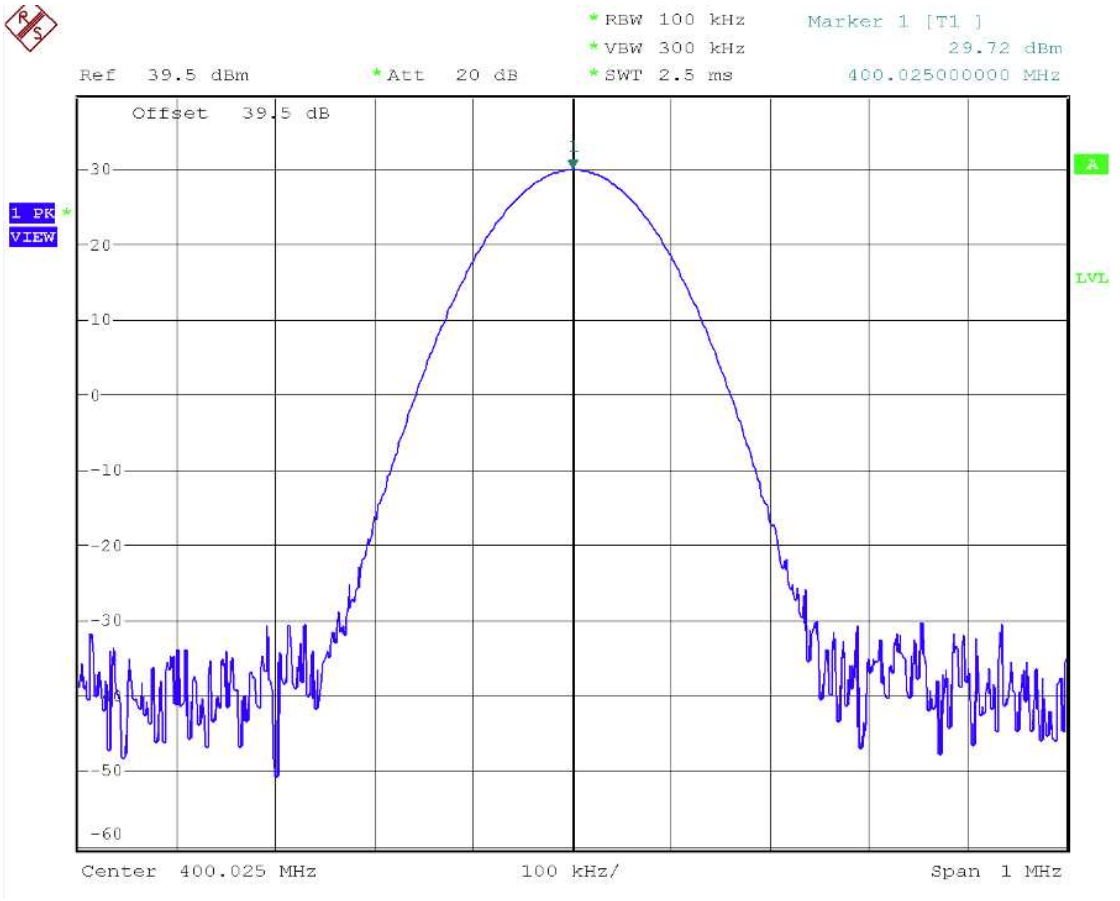

400.025MHz @ 12.5 KHz Channel Separations- Low power level



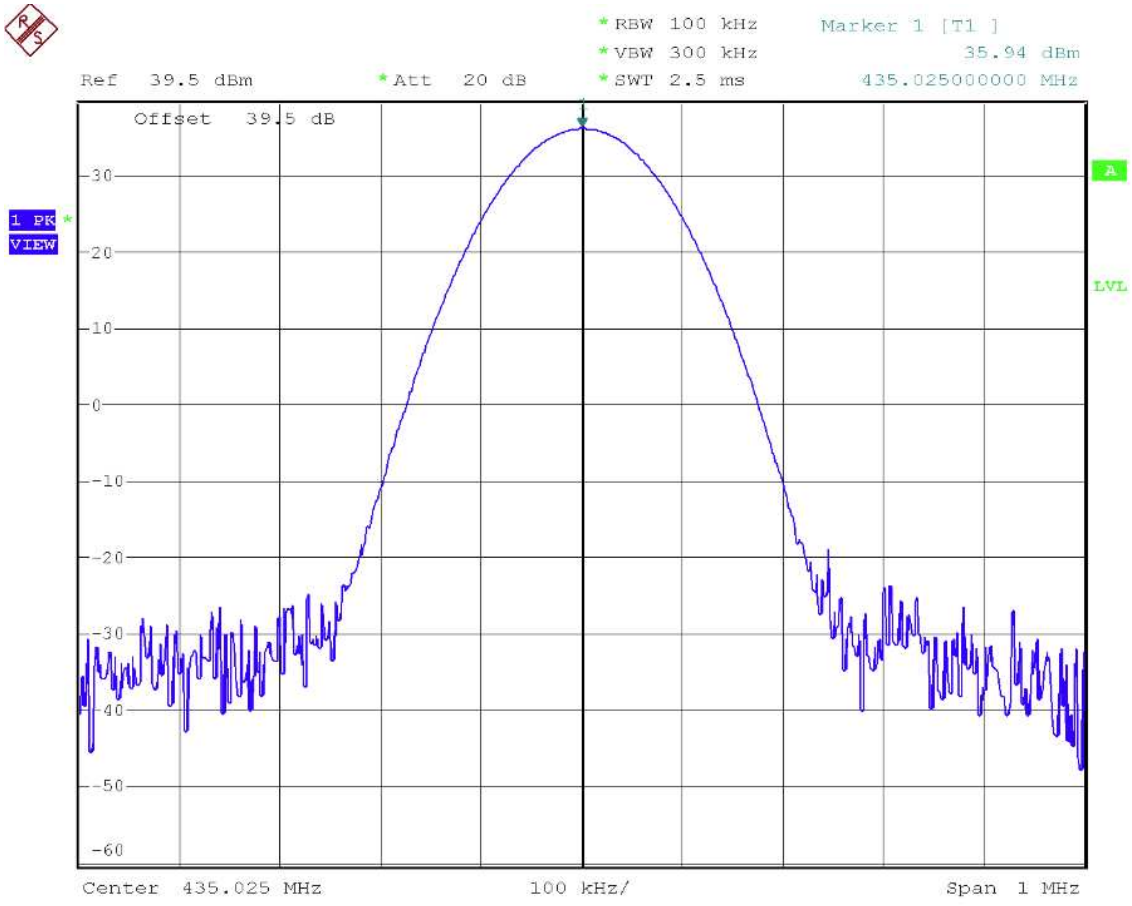
400.025MHz @ 25 KHz Channel Separations- High power level



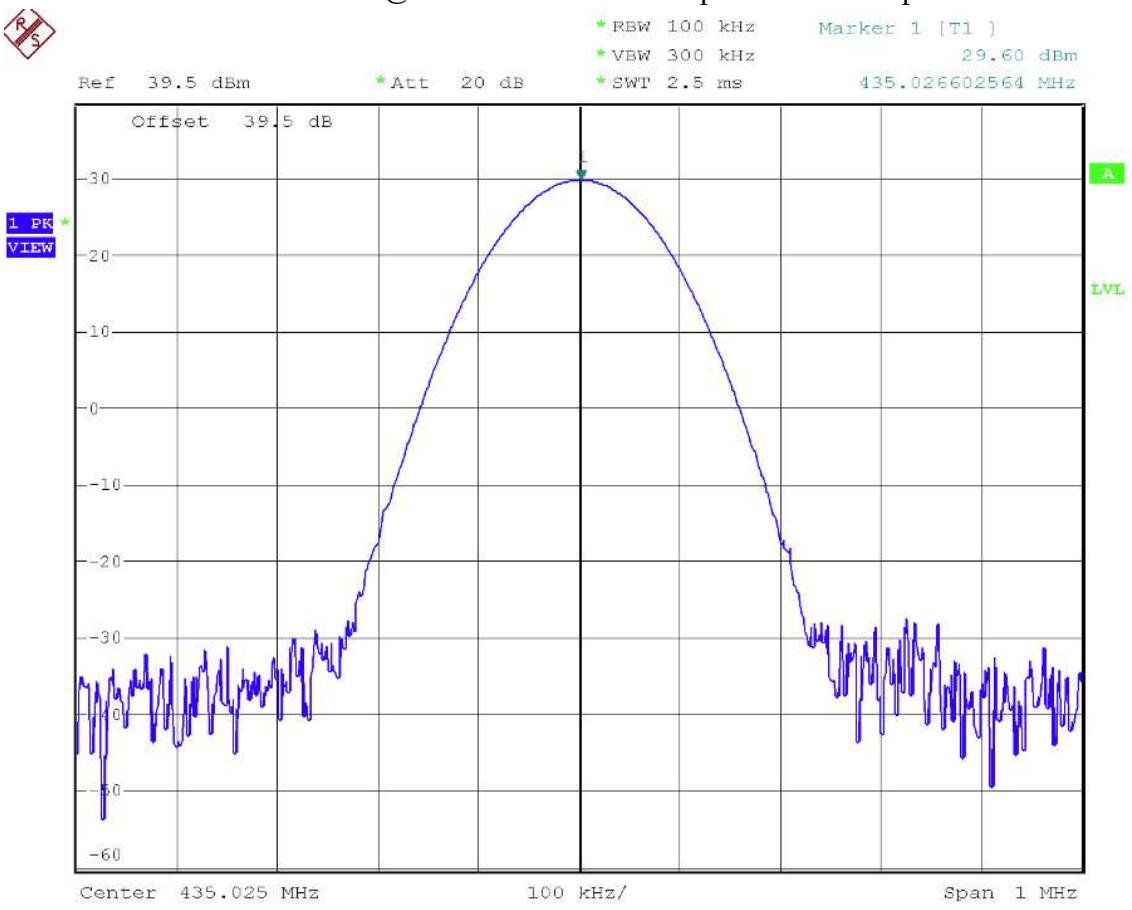

400.025MHz @ 25 KHz Channel Separations- Low power level



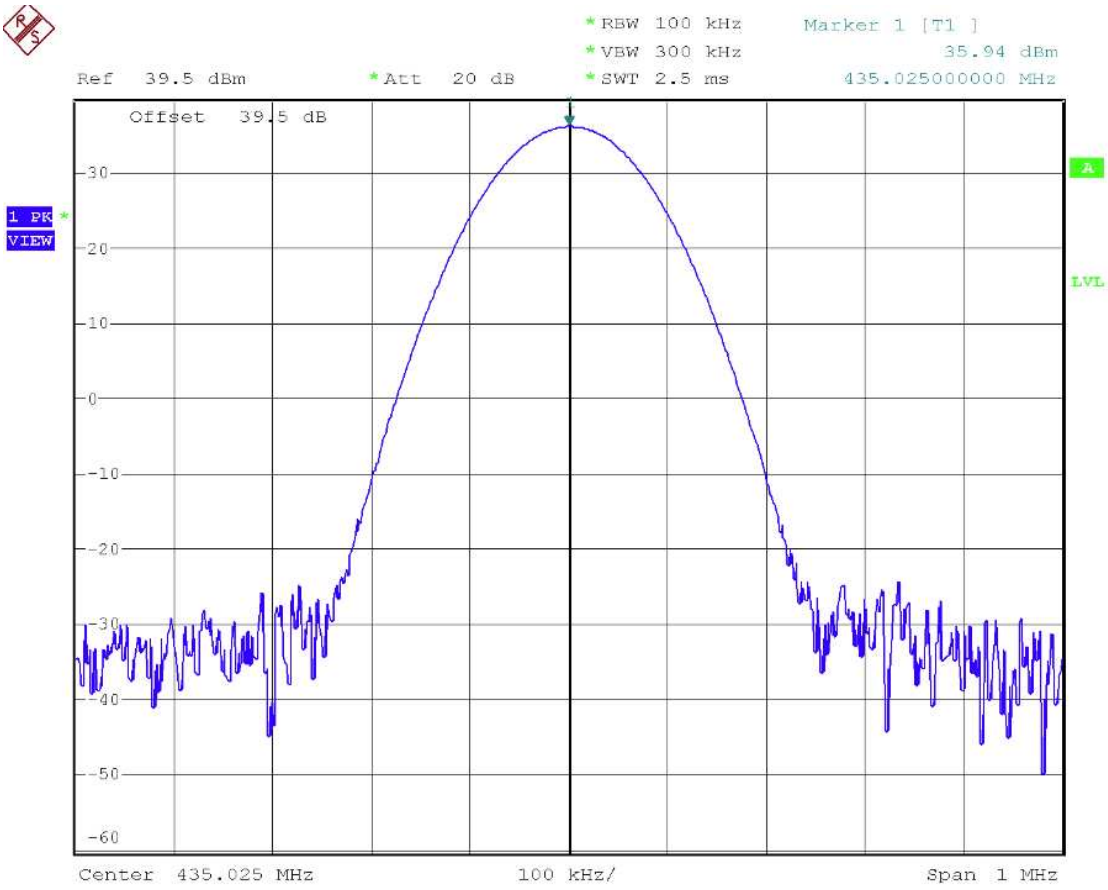
435.025MHz @ 12.5 KHz Channel Separations- High power level



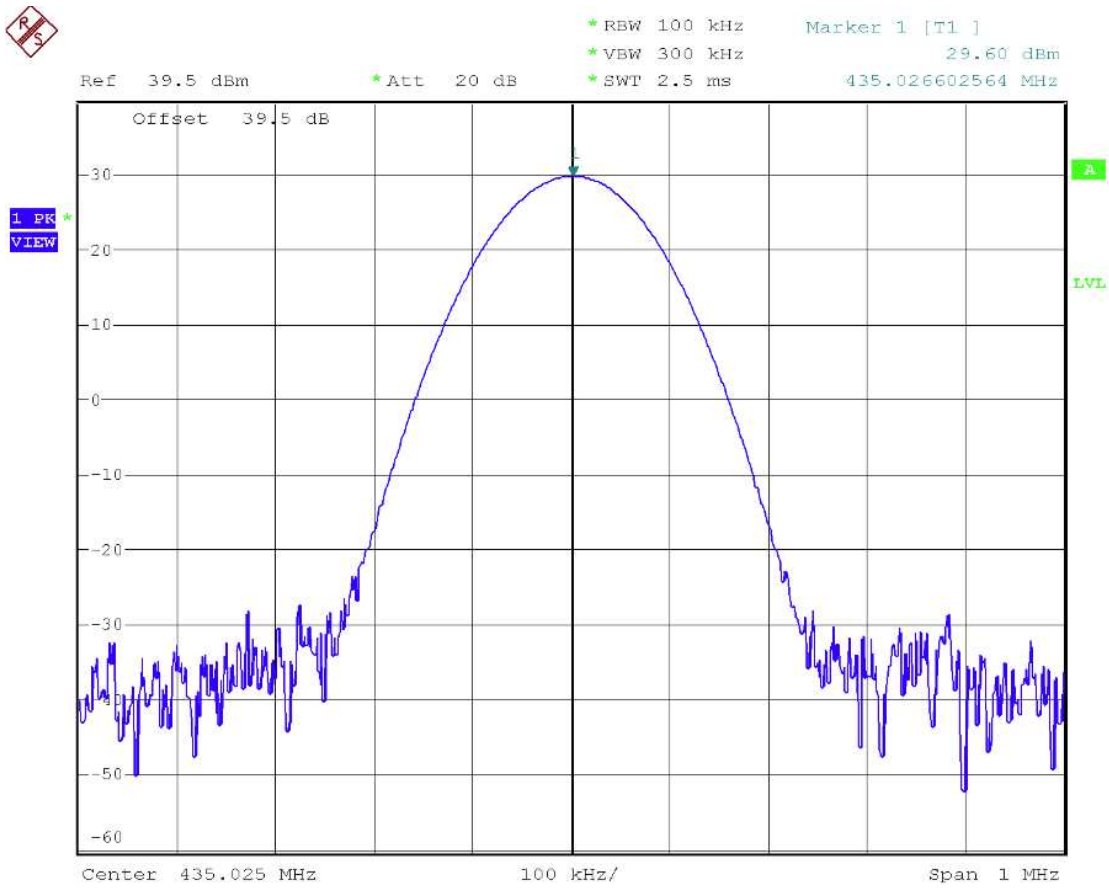

435.025MHz @ 12.5 KHz Channel Separations- Low power level



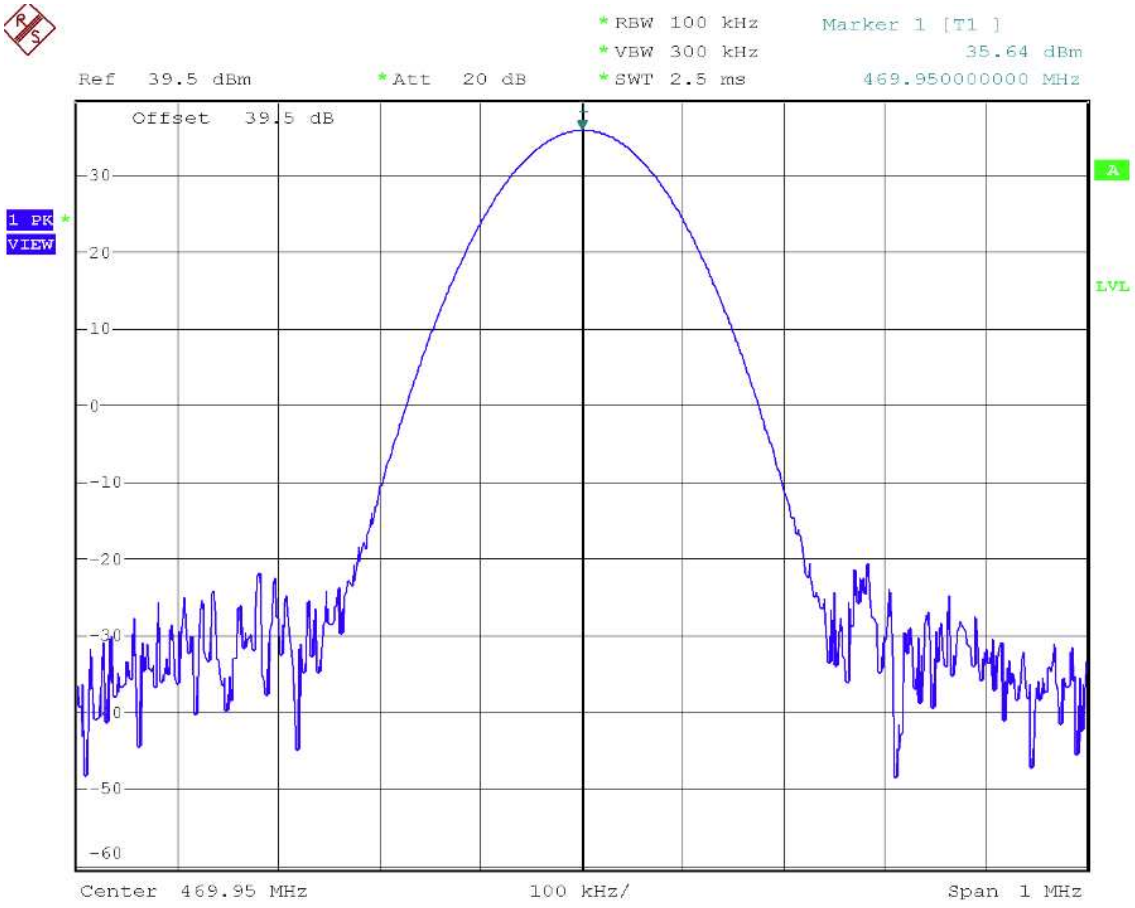
435.025MHz @ 25 KHz Channel Separations- High power level



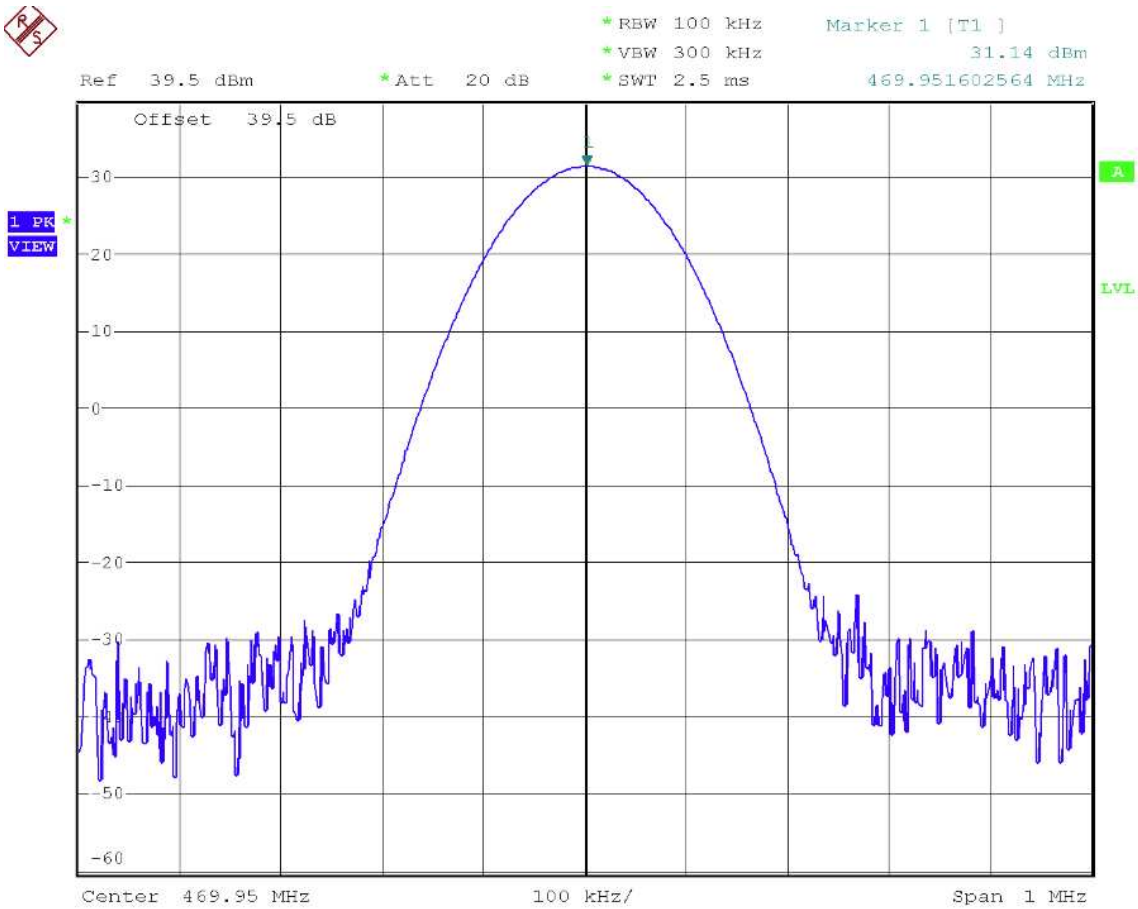

435.025MHz @ 25 KHz Channel Separations- Low power level



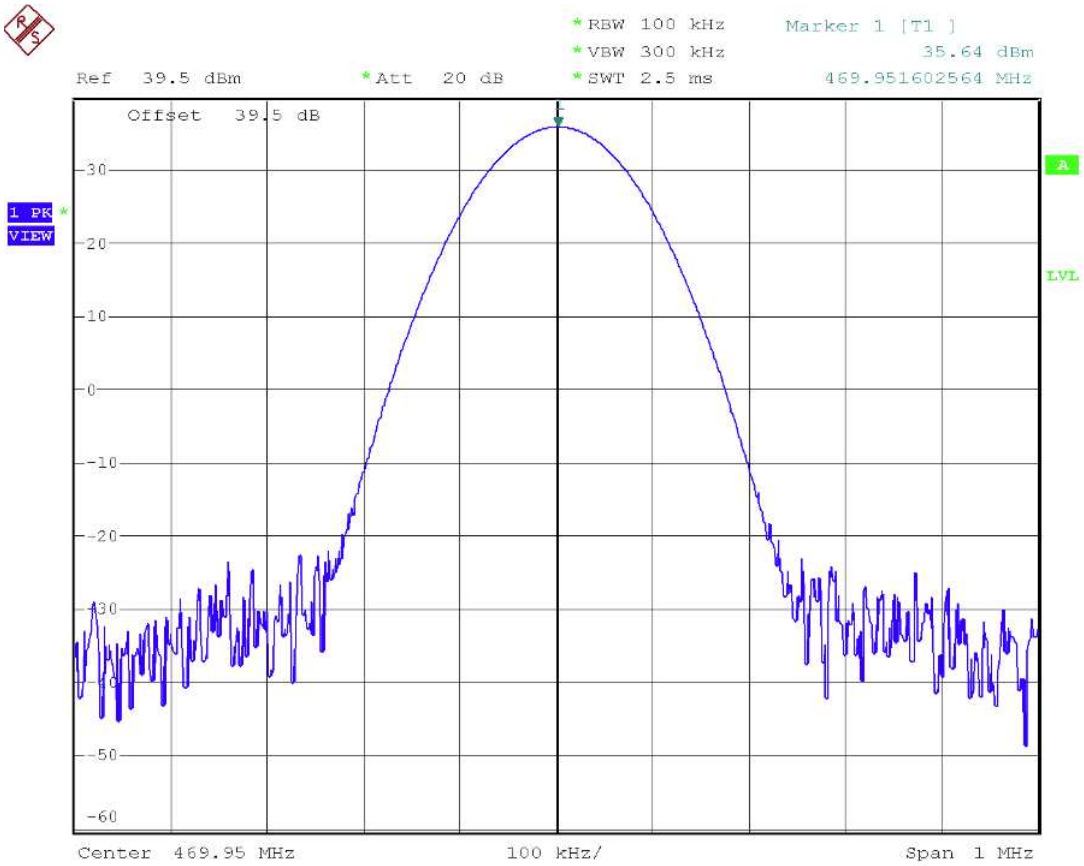
469.95MHz @ 12.5 KHz Channel Separations- High power level



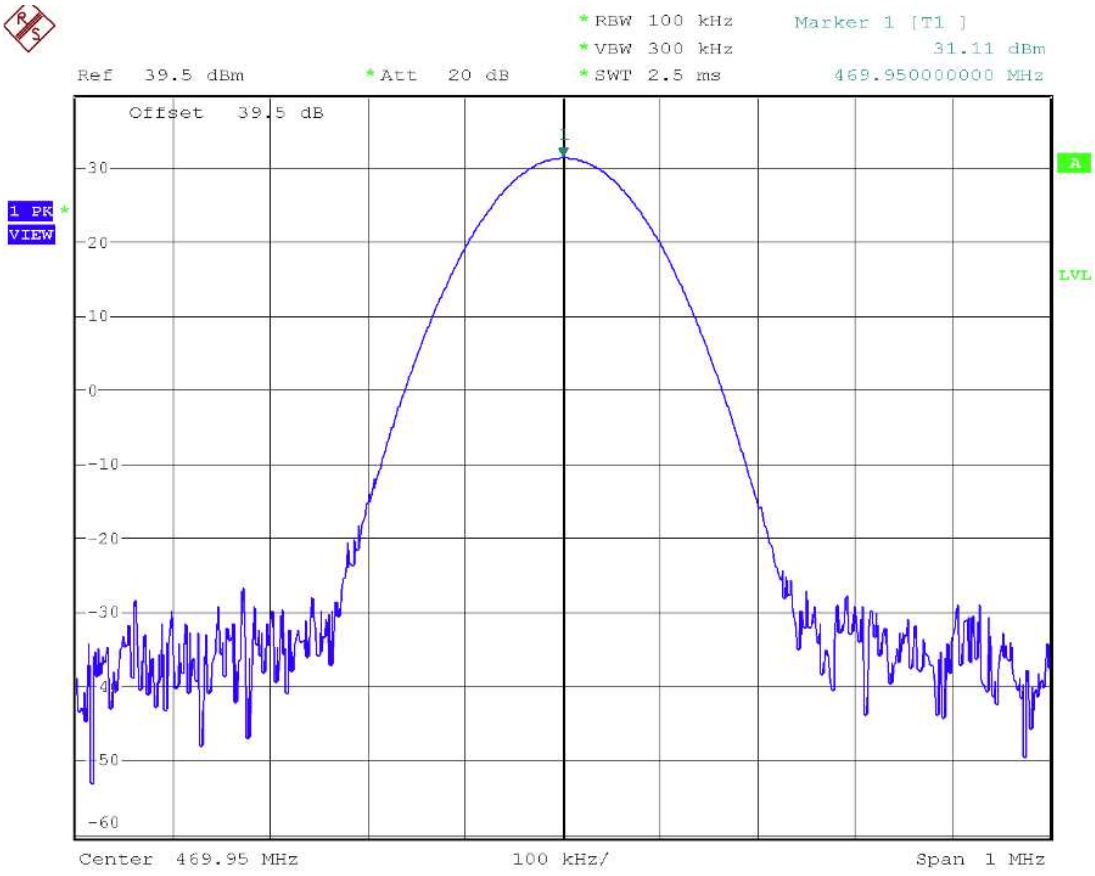

469.95MHz @ 12.5 KHz Channel Separations- Low power level



469.95MHz @ 25 KHz Channel Separations- High power level




469.95MHz @ 25 KHz Channel Separations- Low power level




**Test Result: PASS**

### 2.1.5.2. Radiated Output Power Test Result

| Frequency MHz | SG+PA Reading dBm | Height Meter | Table Degree | Polar H/V | Antenna Gain Db | Cable loss Db | Corrected Ampl. dBm | ERP W |
|---|---|---|---|---|---|---|---|---|
| 12.5 KHz Channel Separation-High Power Level | | | | | | | | |
| 136.025 | 22.30 | 1.50 | 150 | H | 0 | 4.40 | 17.90 | 0.06 |
| 136.025 | 38.50 | 1.40 | 260 | V | 0 | 4.40 | 34.10 | 2.57 |
| 145.025 | 23.00 | 1.50 | 170 | H | 0 | 4.70 | 18.30 | 0.07 |
| 145.025 | 39.90 | 1.40 | 0 | V | 0 | 4.70 | 35.20 | 3.31 |
| 173.95 | 20.90 | 1.50 | 20 | H | 0 | 4.70 | 16.20 | 0.04 |
| 173.95 | 38.50 | 1.50 | 20 | V | 0 | 4.70 | 33.80 | 2.40 |
| 400.025 | 24.00 | 1.50 | 50 | H | 0 | 4.90 | 19.10 | 0.08 |
| 400.025 | 39.70 | 1.40 | 0 | V | 0 | 4.90 | 34.80 | 3.02 |
| 435.025 | 23.40 | 1.20 | 180 | H | 0 | 5.00 | 18.40 | 0.07 |
| 435.025 | 38.60 | 1.30 | 30 | V | 0 | 5.00 | 33.60 | 2.29 |
| 469.95 | 23.70 | 1.70 | 70 | H | 0 | 5.20 | 18.50 | 0.07 |
| 469.95 | 39.00 | 1.60 | 110 | V | 0 | 5.20 | 33.80 | 2.40 |
| 25 KHz Channel Separation-High Power Level | | | | | | | | |
| 136.025 | 22.60 | 1.60 | 0 | H | 0 | 4.40 | 18.20 | 0.07 |
| 136.025 | 38.80 | 1.40 | 40 | V | 0 | 4.40 | 34.40 | 2.75 |
| 145.025 | 23.30 | 1.50 | 160 | H | 0 | 4.70 | 18.60 | 0.07 |
| 145.025 | 40.00 | 1.60 | 70 | V | 0 | 4.70 | 35.30 | 3.39 |
| 173.95 | 21.80 | 1.50 | 20 | H | 0 | 4.70 | 17.10 | 0.05 |
| 173.95 | 38.90 | 1.40 | 310 | V | 0 | 4.70 | 34.20 | 2.63 |
| 400.025 | 23.80 | 1.70 | 120 | H | 0 | 4.90 | 18.90 | 0.08 |
| 400.025 | 40.00 | 1.20 | 80 | V | 0 | 4.90 | 35.10 | 3.24 |
| 435.025 | 23.30 | 1.60 | 40 | H | 0 | 5.00 | 18.30 | 0.07 |
| 435.025 | 39.20 | 1.60 | 30 | V | 0 | 5.00 | 34.20 | 2.63 |
| 469.95 | 24.20 | 1.60 | 180 | H | 0 | 5.20 | 19.00 | 0.08 |
| 469.95 | 39.40 | 1.30 | 240 | V | 0 | 5.20 | 34.20 | 2.63 |

| Frequency MHz | SG+PA Reading dBm | Height Meter | Table Degree | Polar H/V | Antenna Gain Db | Cable loss Db | Corrected Ampl. dBm | ERP W |
|---|---|---|---|---|---|---|---|---|
| 12.5 KHz Channel Separation-Low Power Level | | | | | | | | |
| 136.025 | 18.70 | 1.50 | 180 | H | 0 | 4.40 | 14.30 | 0.03 |
| 136.025 | 33.20 | 1.60 | 0 | V | 0 | 4.40 | 28.80 | 0.76 |
| 145.025 | 20.30 | 1.40 | 150 | H | 0 | 4.70 | 15.60 | 0.04 |
| 145.025 | 33.10 | 1.40 | 0 | V | 0 | 4.70 | 28.40 | 0.69 |
| 173.95 | 17.30 | 1.50 | 320 | H | 0 | 4.70 | 12.60 | 0.02 |
| 173.95 | 31.50 | 1.60 | 340 | V | 0 | 4.70 | 26.80 | 0.48 |
| 400.025 | 18.10 | 1.50 | 10 | H | 0 | 4.90 | 13.20 | 0.02 |
| 400.025 | 32.30 | 1.40 | 50 | V | 0 | 4.90 | 27.40 | 0.55 |
| 435.025 | 20.30 | 1.50 | 180 | H | 0 | 5.00 | 15.30 | 0.03 |
| 435.025 | 32.60 | 1.40 | 40 | V | 0 | 5.00 | 27.60 | 0.58 |
| 469.95 | 22.50 | 1.60 | 80 | H | 0 | 5.20 | 17.30 | 0.05 |
| 469.95 | 34.40 | 1.60 | 100 | V | 0 | 5.20 | 29.20 | 0.83 |
| 25 KHz Channel Separation-Low Power Level | | | | | | | | |
| 136.025 | 20.00 | 1.50 | 10 | H | 0 | 4.40 | 15.60 | 0.04 |
| 136.025 | 33.40 | 1.40 | 60 | V | 0 | 4.40 | 29.00 | 0.79 |
| 145.025 | 21.10 | 1.50 | 20 | H | 0 | 4.70 | 16.40 | 0.04 |
| 145.025 | 33.60 | 1.40 | 90 | V | 0 | 4.70 | 28.90 | 0.78 |
| 173.95 | 19.00 | 1.50 | 20 | H | 0 | 4.70 | 14.30 | 0.03 |
| 173.95 | 31.90 | 1.40 | 110 | V | 0 | 4.70 | 27.20 | 0.52 |
| 400.025 | 20.50 | 1.60 | 180 | H | 0 | 4.90 | 15.60 | 0.04 |
| 400.025 | 33.20 | 1.50 | 60 | V | 0 | 4.90 | 28.30 | 0.68 |
| 435.025 | 21.20 | 1.60 | 30 | H | 0 | 5.00 | 16.20 | 0.04 |
| 435.025 | 32.20 | 1.50 | 20 | V | 0 | 5.00 | 27.20 | 0.52 |
| 469.95 | 22.10 | 1.60 | 220 | H | 0 | 5.20 | 16.90 | 0.05 |
| 469.95 | 34.40 | 1.50 | 290 | V | 0 | 5.20 | 29.20 | 0.83 |

**Test Result: PASS**

## 2.2. Modulation Characteristics

### 2.2.1. Provisions Applicable

According to CFR 47 section 2.1047(a) and 90.207, for Voice Modulation Communication Equipment, the frequency response of the audio modulation circuit over a range of 100 to 5000Hz shall be measured.

### 2.2.2. Measurement Method

#### 2.2.2.1 Modulation Limit

(1). Configure the EUT as shown in figure 1, adjust the audio input for 60% of rated system deviation at 1 KHz using this level as a reference (0dB) and vary the input level from –20 to +20dB. Record the frequency deviation obtained as a function of the input level.

(2). Repeat step 1 with input frequency changing to 300, 1000, 1500 and 3000Hz in sequence.

#### 2.2.2.2 Audio Frequency Response

(1). Configure the EUT as shown in figure 1.

(2). Adjust the audio input for 20% of rated system deviation at 1 KHz using this level as a reference (0dB).

(3). Vary the Audio frequency from 100 Hz to 10 KHz and record the frequency deviation.

(4). Audio Frequency Response = 20log10 (Deviation of test frequency/Deviation of 1 KHz reference).

#### 2.2.2.3Audio Low Pass Filter Response

(1)Connect the equipment in figure 2.

(2)Connect the audio frequency generator as close as possible the input of the post limiter low pass filter within the transmitter under test.

(3)Connect the audio spectrum analyzer to the output of the post limiter low pass filter within the transmitter under test.

(4)Apply a 1000 Hz tone from the audio frequency generator and adjust the level per manufacturer's specifications.

(5)Record the dB level of the 1000 Hz spectral line on the audio spectrum analyzer as LEV1 .

(6)Set the audio frequency generator to the desired test frequency between 3000 Hz and the upper low pass filter limit.

(7)Record audio spectrum analyzer levels, at the test frequency in step (6).

(8)Record the dB level on the audio spectrum analyzer as LEV2 . Method of Measurement for Transmitters .

(9)Calculate the audio frequency response at the test frequency as:low pass frequency response = LEV1-LEV2.

(10)Repeat steps (6) through (9) for all the desired test frequencies.

### 2.2.3. Test Setup Block Diagram

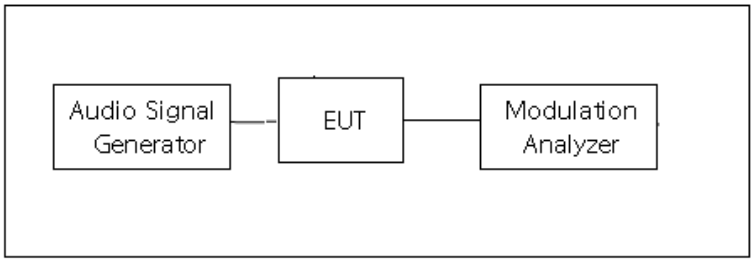



figure 1

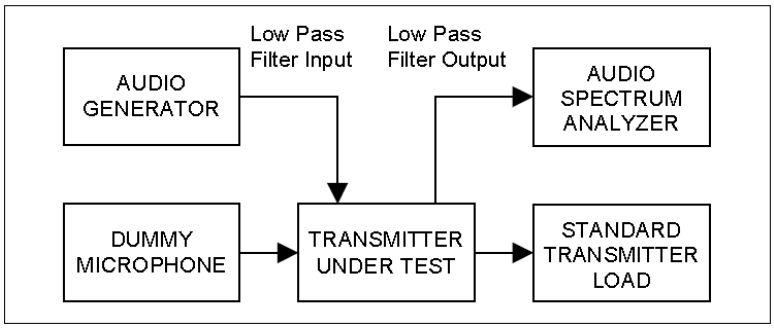



figure 2

### 2.2.4. Measurement Instruments

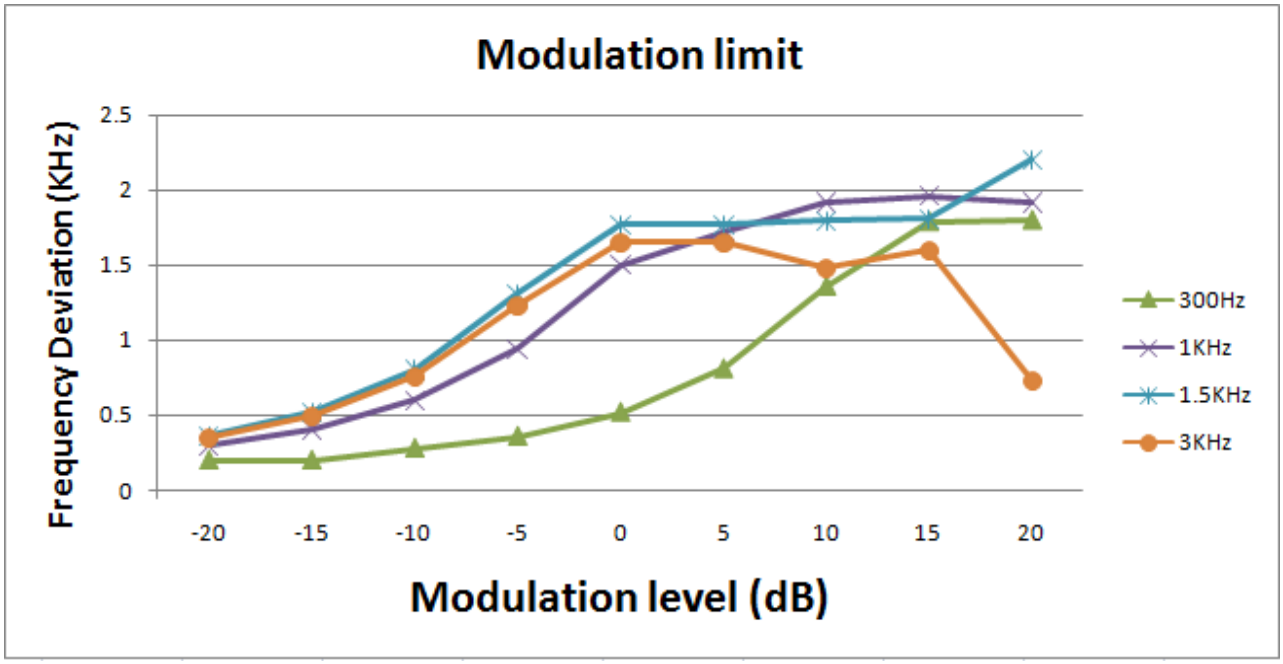
| Name Of Equipment | Manufacturer | Model | S/N | Cal. Due Date |
|---|---|---|---|---|
| Audio Signal Generator | R&S | UPV | 17-253527 | 2012.9.8 |
| Modulation Analyzer | Agilent | 8901B | 2920A02186 | 2012.9.8 |

## 2.2.5. Test Result

a. Modulation Limit:

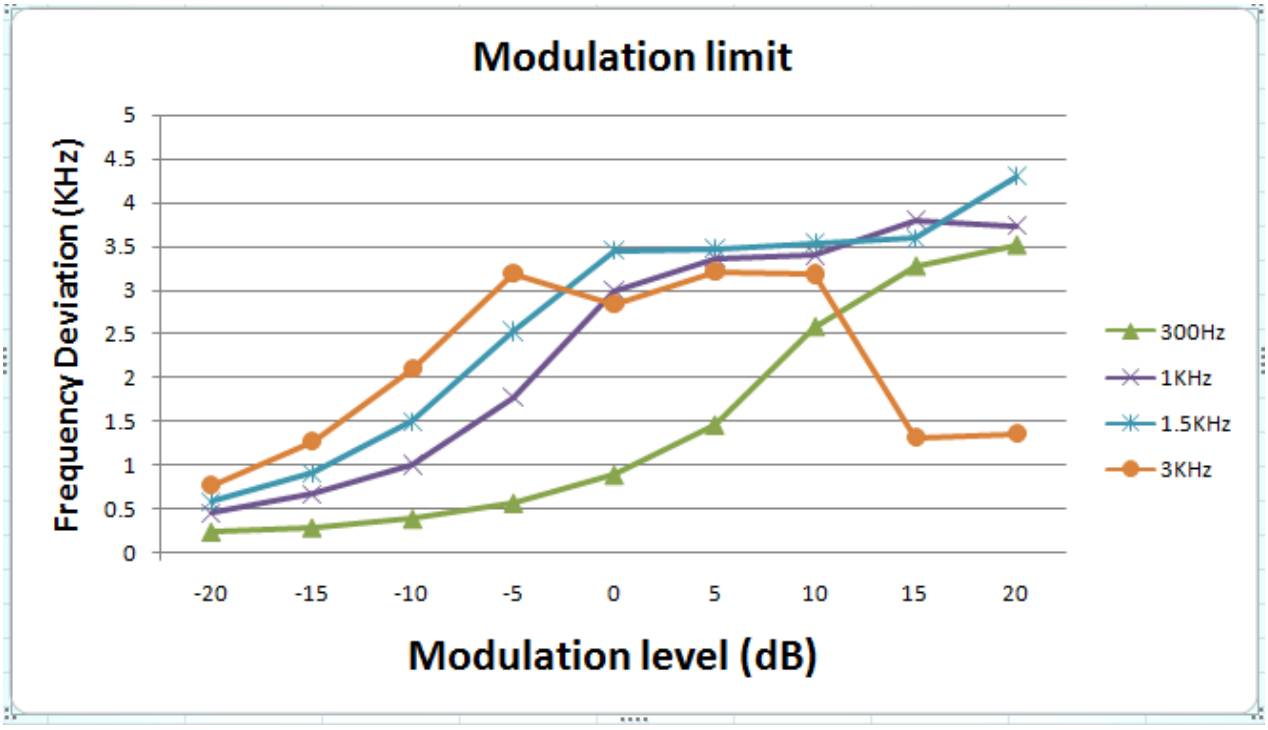
145.025MHz @ 12.5 KHz Channel Separations

| Modulation level (dB) | Peak freq dev at 300Hz | Peak freq dev at 1000Hz | Peak freq dev at 1500Hz | Peak freq dev at 3000Hz | Limit(KHz) |
|---|---|---|---|---|---|
| -20 | 0.20 | 0.30 | 0.36 | 0.35 | 2.50 |
| -15 | 0.20 | 0.41 | 0.52 | 0.49 | 2.50 |
| -10 | 0.28 | 0.59 | 0.80 | 0.76 | 2.50 |
| -5 | 0.36 | 0.94 | 1.31 | 1.23 | 2.50 |
| 0 | 0.52 | 1.50 | 1.77 | 1.65 | 2.50 |
| 5 | 0.81 | 1.72 | 1.77 | 1.65 | 2.50 |
| 10 | 1.36 | 1.91 | 1.79 | 1.48 | 2.50 |
| 15 | 1.79 | 1.96 | 1.81 | 1.60 | 2.50 |
| 20 | 1.80 | 1.91 | 2.20 | 0.73 | 2.50 |



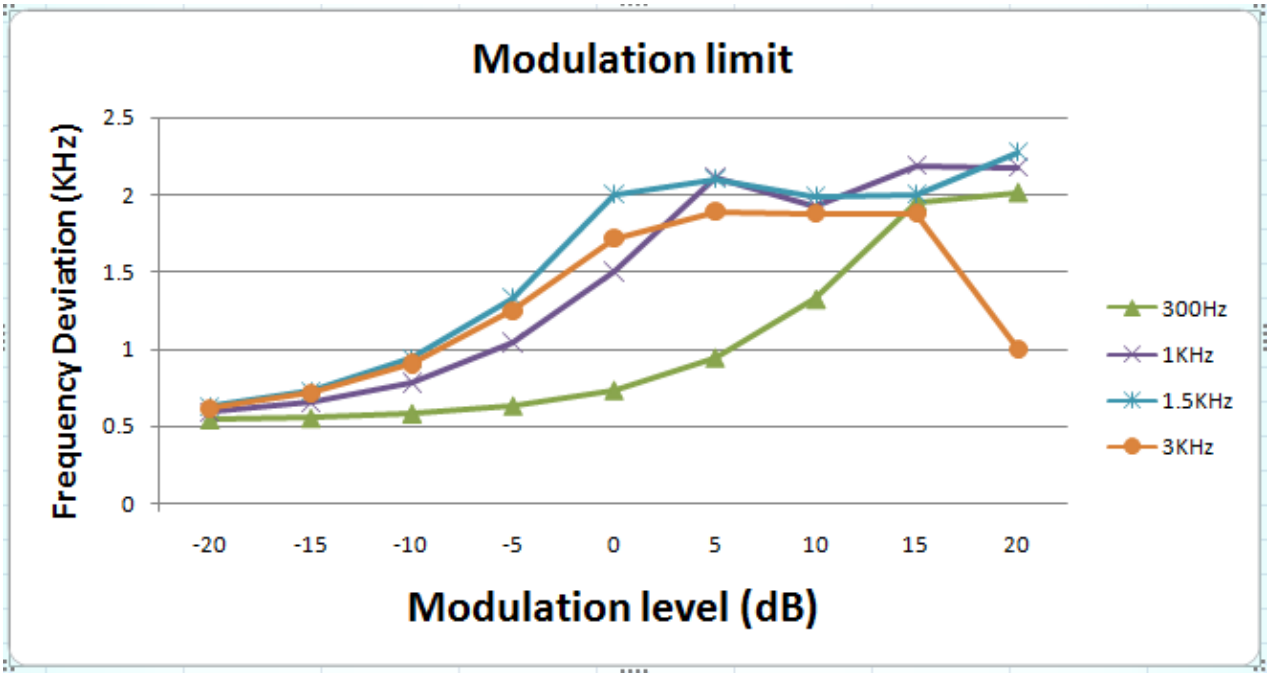
145.025MHz @ 25 KHz Channel Separations

| Modulation level (dB) | Peak freq dev at 300Hz | Peak freq dev at 1000Hz | Peak freq dev at 1500Hz | Peak freq dev at 3000Hz | Limit(KHz) |
|---|---|---|---|---|---|
| -20 | 0.24 | 0.45 | 0.58 | 0.77 | 5.00 |
| -15 | 0.29 | 0.67 | 0.91 | 1.26 | 5.00 |
| -10 | 0.39 | 1.00 | 1.49 | 2.10 | 5.00 |
| -5 | 0.57 | 1.77 | 2.53 | 3.18 | 5.00 |
| 0 | 0.89 | 3.00 | 3.45 | 2.83 | 5.00 |
| 5 | 1.46 | 3.37 | 3.47 | 3.20 | 5.00 |
| 10 | 2.58 | 3.40 | 3.54 | 3.17 | 5.00 |
| 15 | 3.27 | 3.80 | 3.59 | 1.31 | 5.00 |
| 20 | 3.51 | 3.74 | 4.30 | 1.36 | 5.00 |



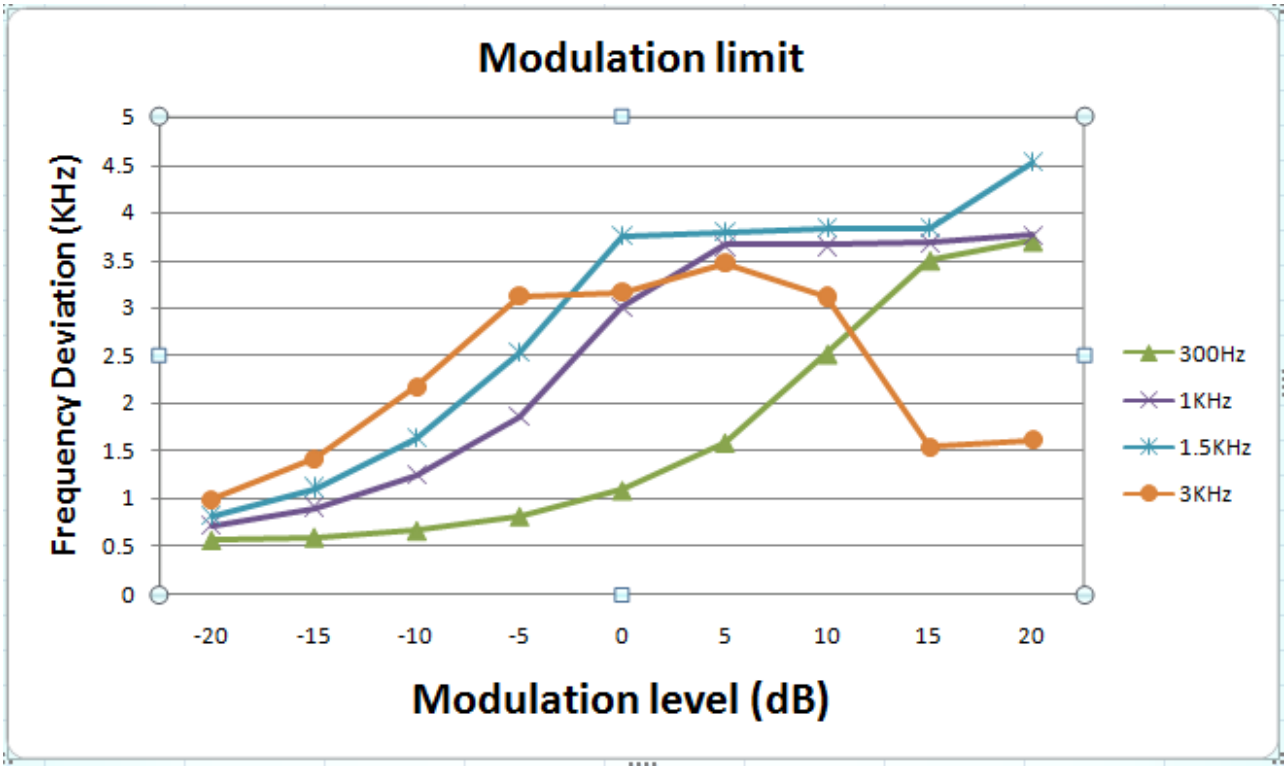
435.025MHz @ 12.5 KHz Channel Separations

| Modulation level (dB) | Peak freq dev at 300Hz | Peak freq dev at 1000Hz | Peak freq dev at 1500Hz | Peak freq dev at 3000Hz | Limit(KHz) |
|---|---|---|---|---|---|
| -20 | 0.54 | 0.59 | 0.63 | 0.62 | 2.50 |
| -15 | 0.55 | 0.65 | 0.73 | 0.72 | 2.50 |
| -10 | 0.58 | 0.78 | 0.94 | 0.91 | 2.50 |
| -5 | 0.63 | 1.04 | 1.33 | 1.25 | 2.50 |
| 0 | 0.73 | 1.50 | 2.00 | 1.72 | 2.50 |
| 5 | 0.94 | 2.12 | 2.10 | 1.89 | 2.50 |
| 10 | 1.32 | 1.93 | 1.99 | 1.88 | 2.50 |
| 15 | 1.95 | 2.19 | 2.00 | 1.88 | 2.50 |
| 20 | 2.01 | 2.18 | 2.27 | 1.00 | 2.50 |



435.025MHz @ 12.5 KHz Channel Separations

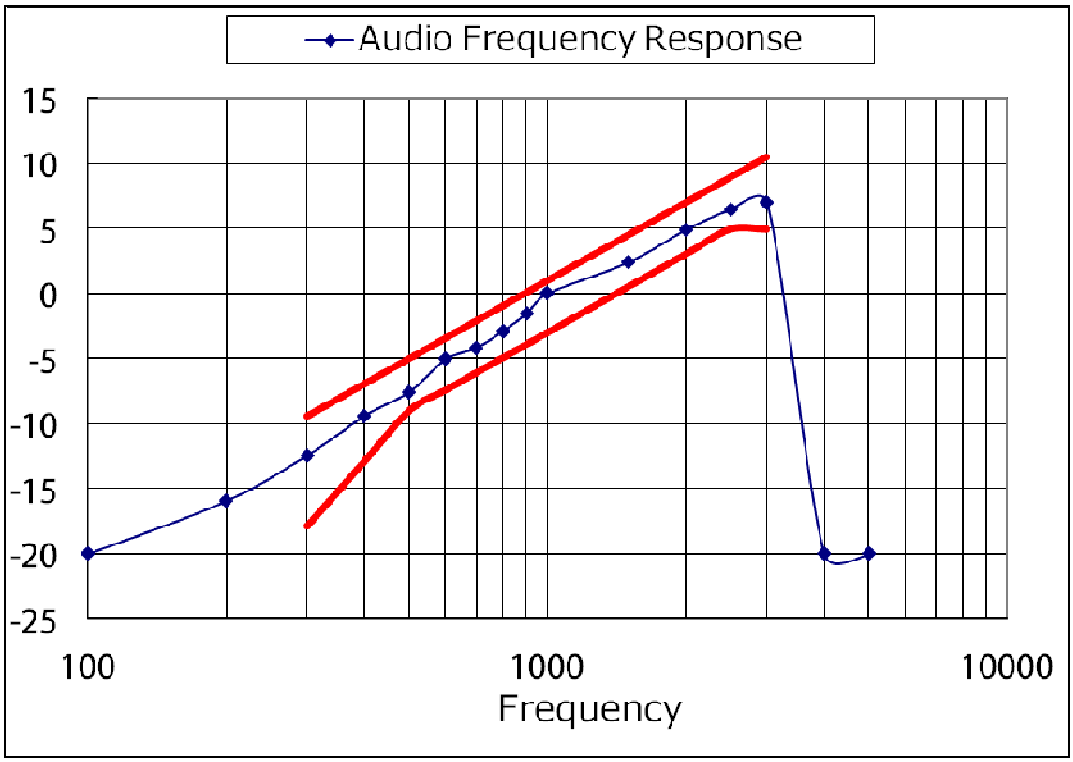
| Modulation level (dB) | Peak freq dev at 300Hz | Peak freq dev at 1000Hz | Peak freq dev at 1500Hz | Peak freq dev at 3000Hz | Limit(KHz) |
|---|---|---|---|---|---|
| -20 | 0.57 | 0.72 | 0.82 | 1.00 | 5.00 |
| -15 | 0.60 | 0.91 | 1.11 | 1.42 | 5.00 |
| -10 | 0.67 | 1.25 | 1.63 | 2.18 | 5.00 |
| -5 | 0.82 | 1.86 | 2.53 | 3.13 | 5.00 |
| 0 | 1.09 | 3.00 | 3.75 | 3.17 | 5.00 |
| 5 | 1.59 | 3.65 | 3.79 | 3.47 | 5.00 |
| 10 | 2.52 | 3.65 | 3.83 | 3.12 | 5.00 |
| 15 | 3.50 | 3.68 | 3.83 | 1.55 | 5.00 |
| 20 | 3.70 | 3.76 | 4.52 | 1.62 | 5.00 |



b. Audio Frequency Response -Transmitter:

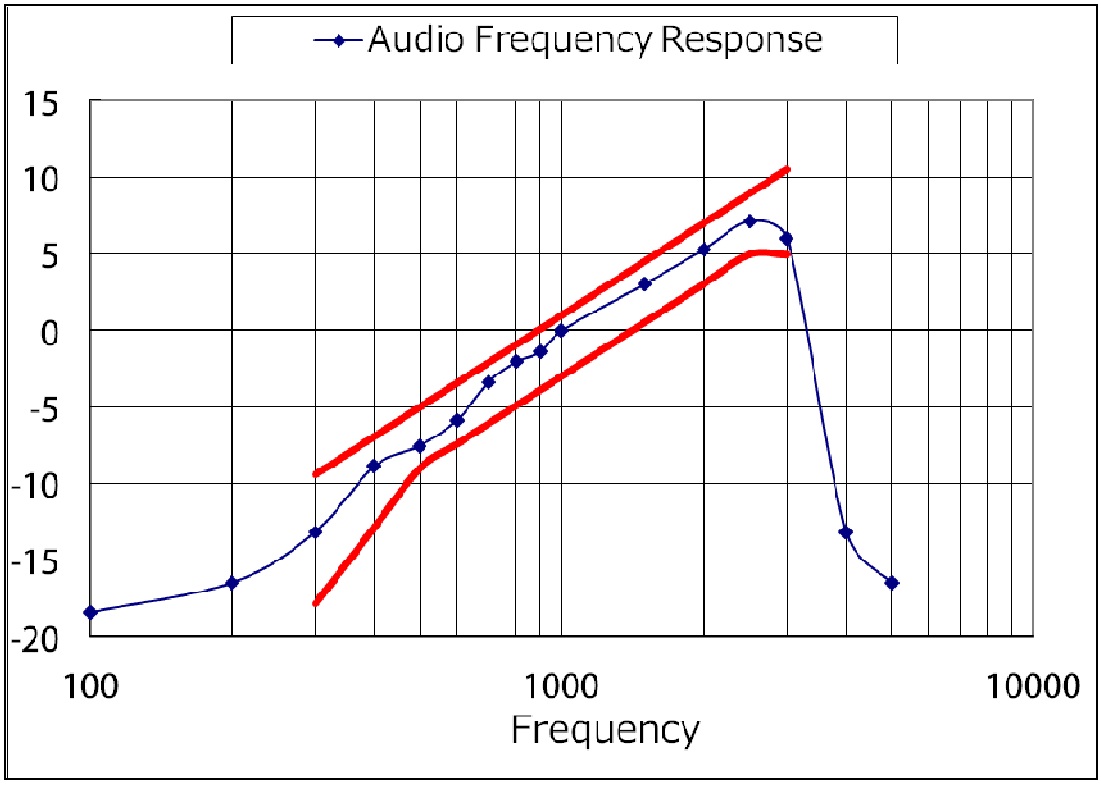
145.025MHz @ 12.5 KHz Channel Separations

| Audio frequency (Hz) | Deviation (KHz) | Response |
|---|---|---|
| 100 | 0.05 | -20.00 |
| 200 | 0.08 | -15.92 |
| 300 | 0.12 | -12.39 |
| 400 | 0.17 | -9.37 |
| 500 | 0.21 | -7.54 |
| 600 | 0.28 | -5.04 |
| 700 | 0.31 | -4.15 |
| 800 | 0.36 | -2.85 |
| 900 | 0.42 | -1.51 |
| 1000 | 0.5 | 0.00 |
| 1500 | 0.66 | 2.41 |
| 2000 | 0.88 | 4.91 |
| 2500 | 1.05 | 6.44 |
| 3000 | 1.12 | 7.00 |
| 4000 | 0.05 | -20.00 |
| 5000 | 0.05 | -20.00 |



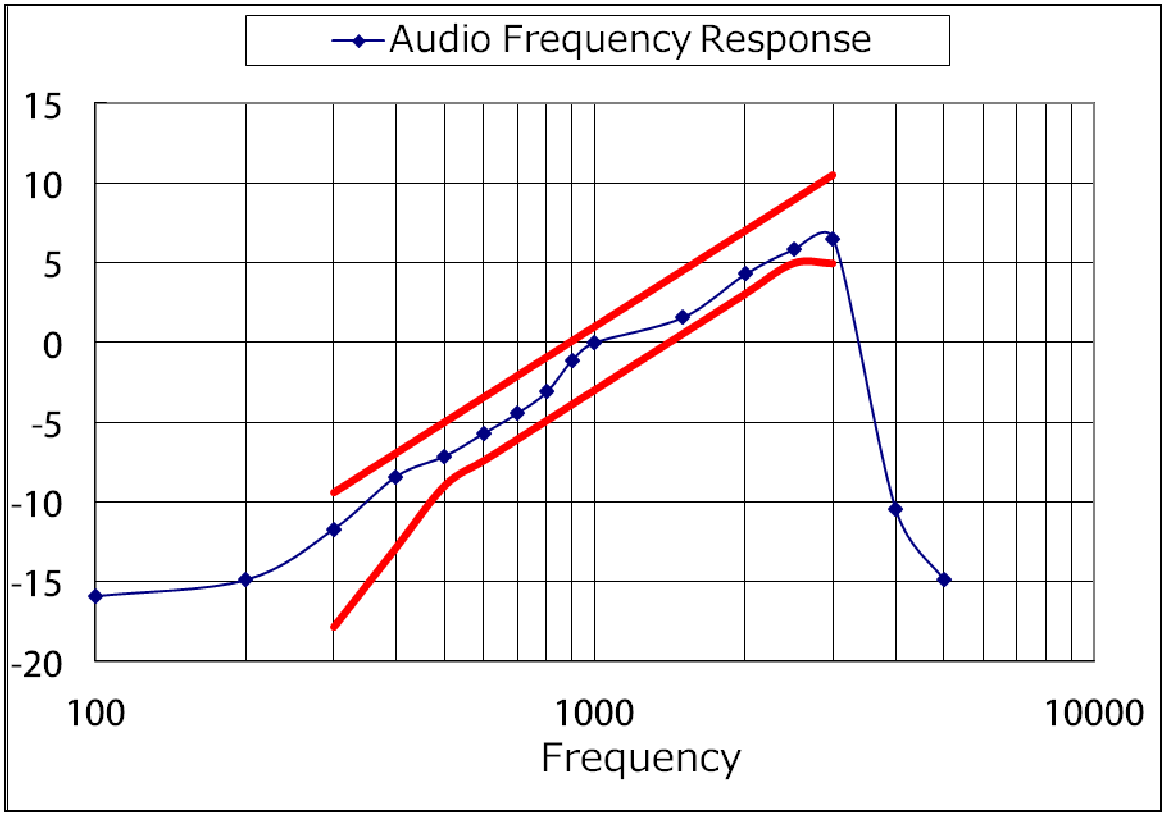
145.025MHz @ 25 KHz Channel Separations

| Audio frequency (Hz) | Deviation (KHz) | Response |
|---|---|---|
| 100 | 0.12 | -18.41 |
| 200 | 0.15 | -16.47 |
| 300 | 0.22 | -13.15 |
| 400 | 0.36 | -8.87 |
| 500 | 0.42 | -7.53 |
| 600 | 0.51 | -5.84 |
| 700 | 0.68 | -3.35 |
| 800 | 0.79 | -2.05 |
| 900 | 0.85 | -1.41 |
| 1000 | 1 | 0 |
| 1500 | 1.42 | 3.04 |
| 2000 | 1.84 | 5.29 |
| 2500 | 2.28 | 7.15 |
| 3000 | 1.99 | 5.97 |
| 4000 | 0.22 | -13.15 |
| 5000 | 0.15 | -16.47 |



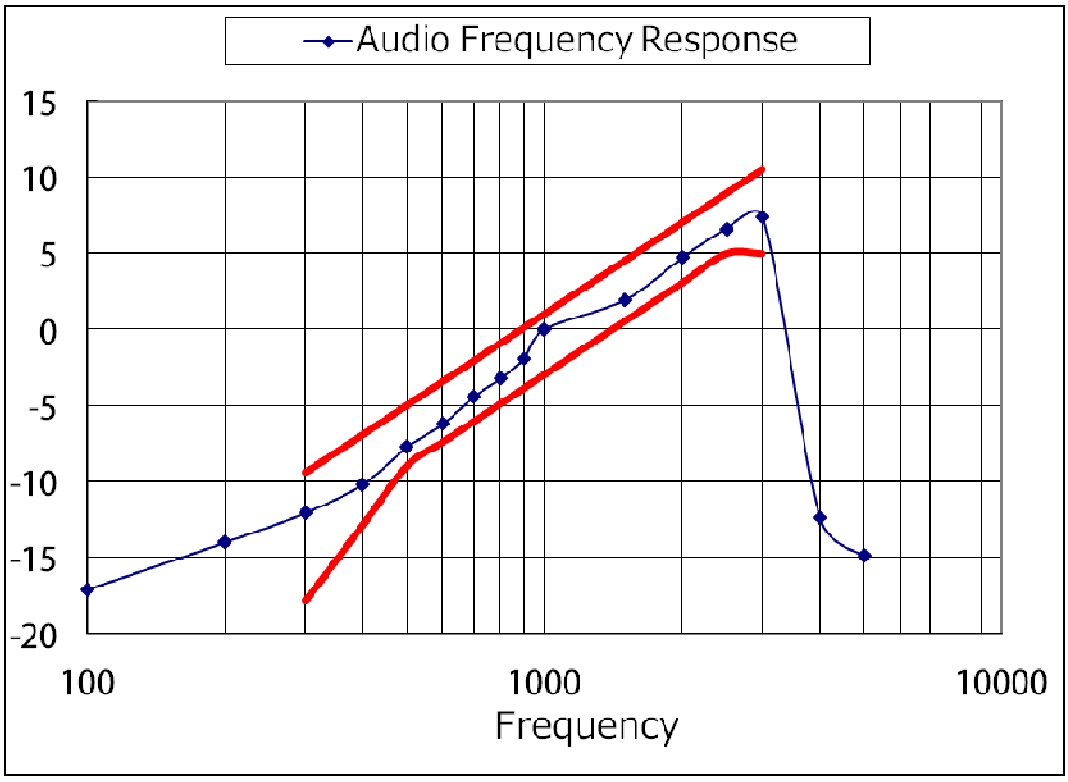
435.025MHz @ 12.5 KHz Channel Separations

| Audio frequency (Hz) | Deviation (KHz) | Response |
|---|---|---|
| 100 | 0.08 | -15.91 |
| 200 | 0.09 | -14.89 |
| 300 | 0.13 | -11.70 |
| 400 | 0.19 | -8.40 |
| 500 | 0.22 | -7.13 |
| 600 | 0.26 | -5.67 |
| 700 | 0.30 | -4.43 |
| 800 | 0.35 | -3.09 |
| 900 | 0.44 | -1.11 |
| 1000 | 0.50 | 0.00 |
| 1500 | 0.60 | 1.58 |
| 2000 | 0.82 | 4.29 |
| 2500 | 0.98 | 5.84 |
| 3000 | 1.06 | 6.52 |
| 4000 | 0.15 | -10.45 |
| 5000 | 0.09 | -14.89 |



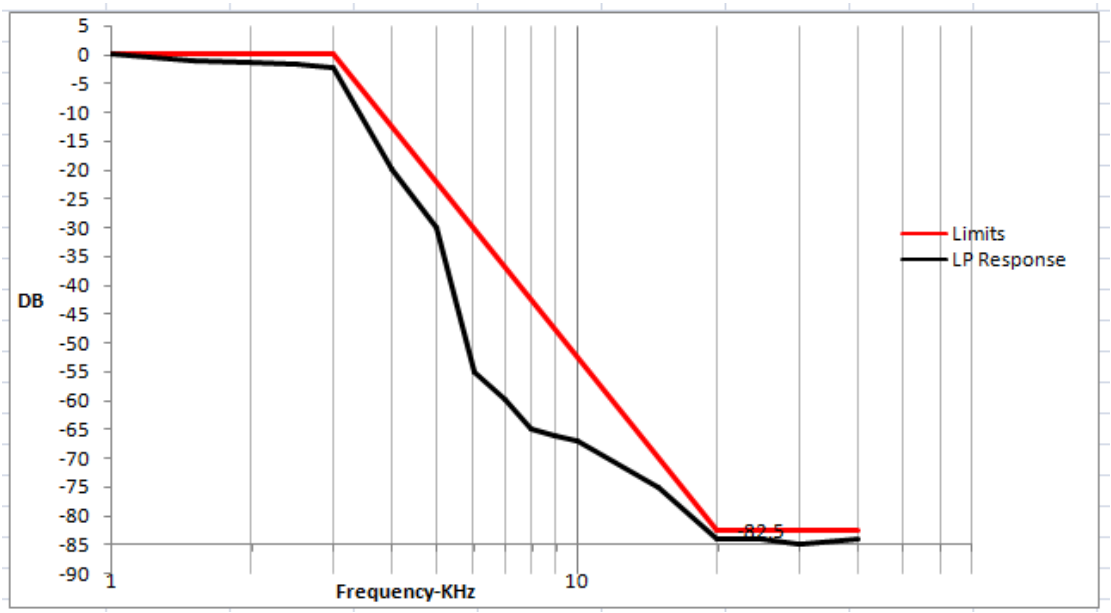
435.025MHz @ 25 KHz Channel Separations

| Audio frequency (Hz) | Deviation (KHz) | Response |
|---|---|---|
| 100 | 0.14 | -17.07 |
| 200 | 0.20 | -13.97 |
| 300 | 0.25 | -12.04 |
| 400 | 0.31 | -10.17 |
| 500 | 0.41 | -7.74 |
| 600 | 0.49 | -6.19 |
| 700 | 0.6 | -4.43 |
| 800 | 0.69 | -3.22 |
| 900 | 0.80 | -1.93 |
| 1000 | 1.00 | 0.00 |
| 1500 | 1.25 | 1.93 |
| 2000 | 1.72 | 4.71 |
| 2500 | 2.14 | 6.60 |
| 3000 | 2.33 | 7.34 |
| 4000 | 0.24 | -12.39 |
| 5000 | 0.18 | -14.89 |



c. Audio Low Pass Filter Response

| Frequency(KHz) | Response (dB) |
|---|---|
| 1 | 0 |
| 1.5 | -1 |
| 2 | -1.5 |
| 2.5 | -1.8 |
| 3 | -2.2 |
| 4 | -20 |
| 5 | -30 |
| 6 | -55 |
| 7 | -60 |
| 8 | -65 |
| 9 | -66 |
| 10 | -67 |
| 15 | -75 |
| 20 | -84 |
| 25 | -84 |
| 30 | -85 |
| 40 | -84 |




**Test Result: PASS**

## 2.3. Occupied Bandwidth Of Emissions

### 2.3.1. Provisions Applicable

According to FCC §2.1049, §90.209 and §90.210, the necessary attenuation requirements need to meet as the following:

1). Emission Mask B For 25kHz bandwidth:

For any frequency removed from the center of the assigned channel by more than 50 percent up to and including 100 percent of the authorized bandwidth, at least 25 dB. On any frequency removed from the center of the assigned channel by more than 100 percent up to and including 250 percent, at least 35 dB. On any frequency removed from the center of the assigned channel by more than 250 percent at least:

43+10logP=43+10log (5) =50dB

2). Emission Mask D For 12.5kHz bandwidth:

On any frequency from the center of the authorized bandwidth f0 to 5.625 kHz removed from f0: Zero dB. On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 5.625 kHz but no more than12.5 kHz: At least 7.27(fd–2.88 kHz) dB. On any frequency removed from the center of the authorized bandwidth by a displacement frequency (fd in kHz) of more than 12.5 kHz: At least 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation.

### 2.3.2. Measurement Procedure

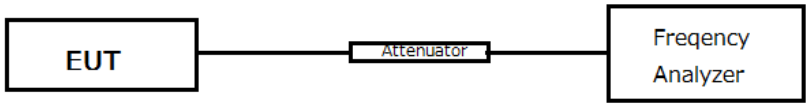
1). The EUT was placed on a turn table which is 0.8m above ground plane.

2). The EUT was modulated by 2.5 KHz Sine wave audio signal, The level of the audio signal employed is 16 dB greater than that necessary to produce 50% of rated system deviation. Rated system deviation is 2.5 kHz (12.5 kHz channel spacing) and 5 kHz (25 kHz channel spacing).

3). Set SPA Center Frequency = fundamental frequency, RBW=VBW= 300 Hz, Span =50 KHz.

4). Set SPA Max hold. Mark peak, -26 dB.

### 2.3.3. Test Setup Block Diagram




### 2.3.4. Test Instruments

| Name Of Equipment | Manufacturer | Model | S/N | Cal. Due Date |
|---|---|---|---|---|
| Spectrum Analyzer | R&S | FSU-8 | 200034 | 2012.6.2 |
| Modulation Analyzer | Agilent | 8901B | 2920A02186 | 2012.9.8 |
| Attenuator | SHX | DC-13 | N.A | N.A |

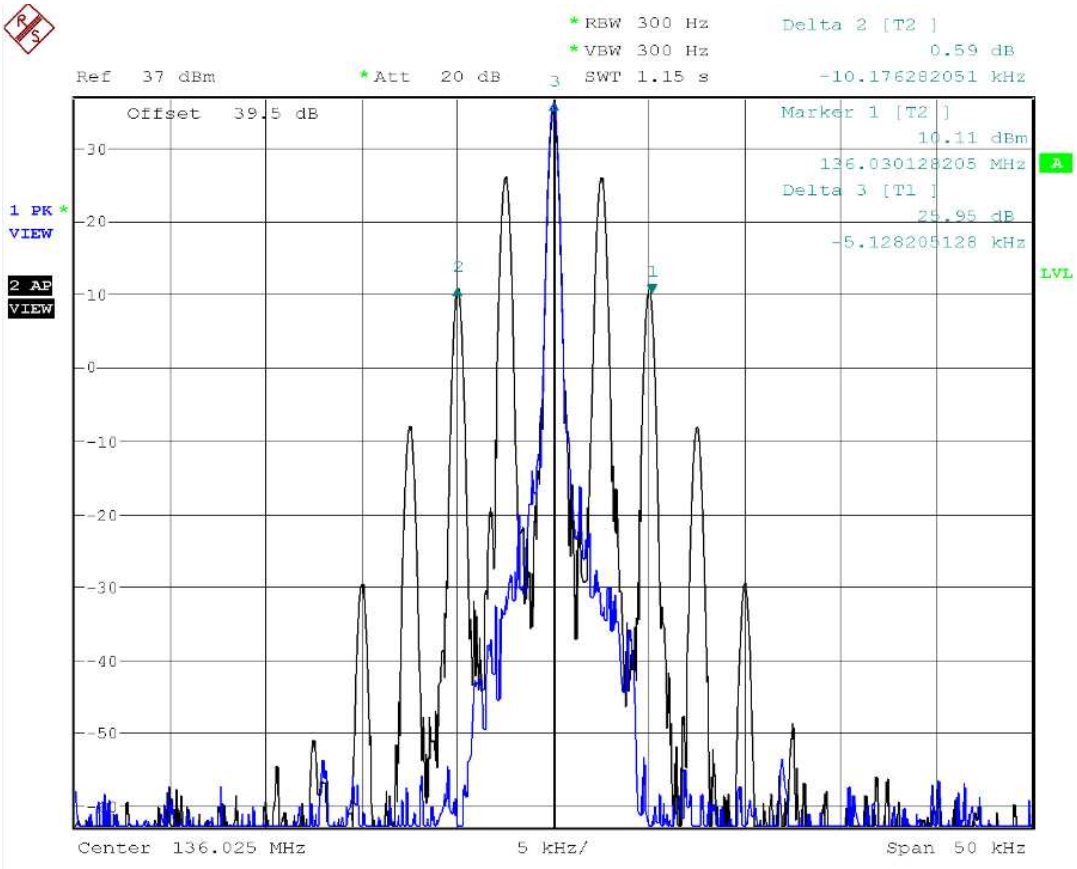
### 2.3.5. Test Result

#### 2.3.5.1. 26 dB Bandwidth Measurement Result

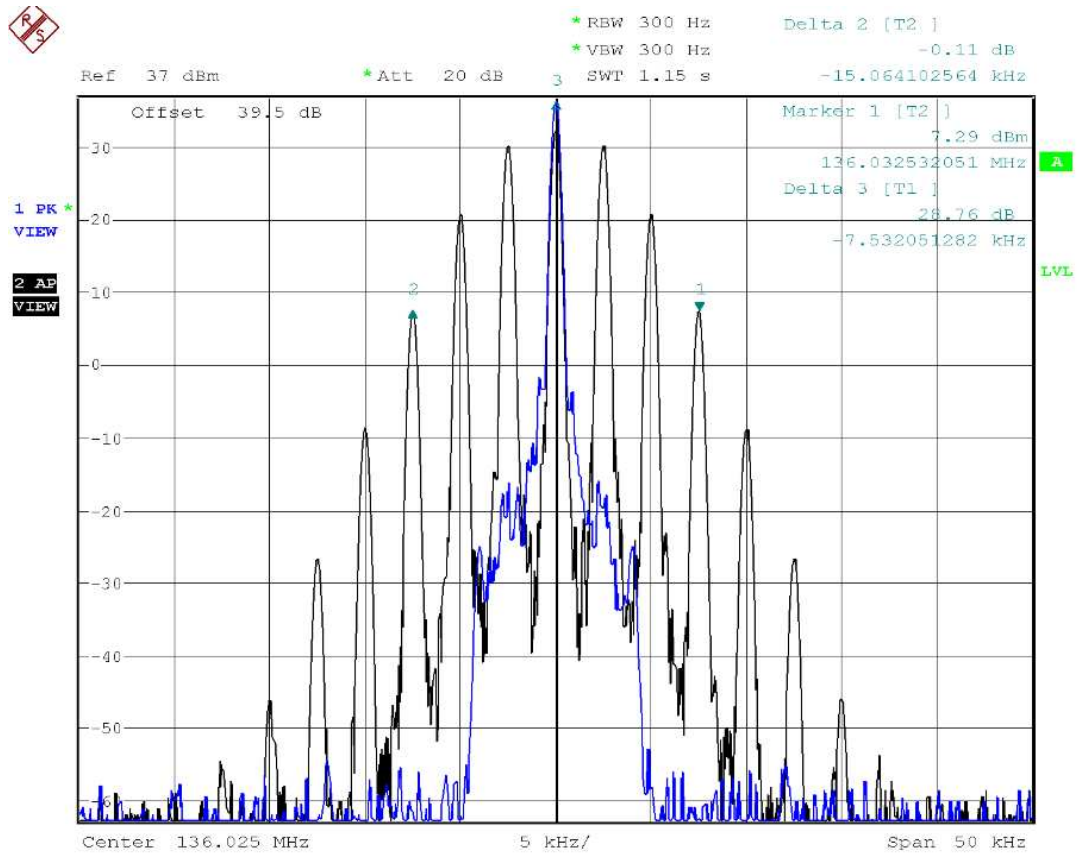
| 26 dB Bandwidth Measurement Result | | | | | | |
|---|---|---|---|---|---|---|
| Operating Frequency (MHz) | 12.5 KHz Channel Separation (KHz) | | | 25 KHz Channel Separation (KHz) | | |
| | Test Data | Limits | Result | Test Data | Limits | Result |
| 136.025 | 10.18 | 11.25 | PASS | 15.06 | 20 | PASS |
| 145.025 | 10.02 | 11.25 | PASS | 15.06 | 20 | PASS |
| 173.950 | 10.18 | 11.25 | PASS | 15.06 | 20 | PASS |
| 400.025 | 10.02 | 11.25 | PASS | 15.14 | 20 | PASS |
| 435.025 | 10.10 | 11.25 | PASS | 15.22 | 20 | PASS |
| 469.950 | 10.02 | 11.25 | PASS | 15.06 | 20 | PASS |

**Test Result: PASS**

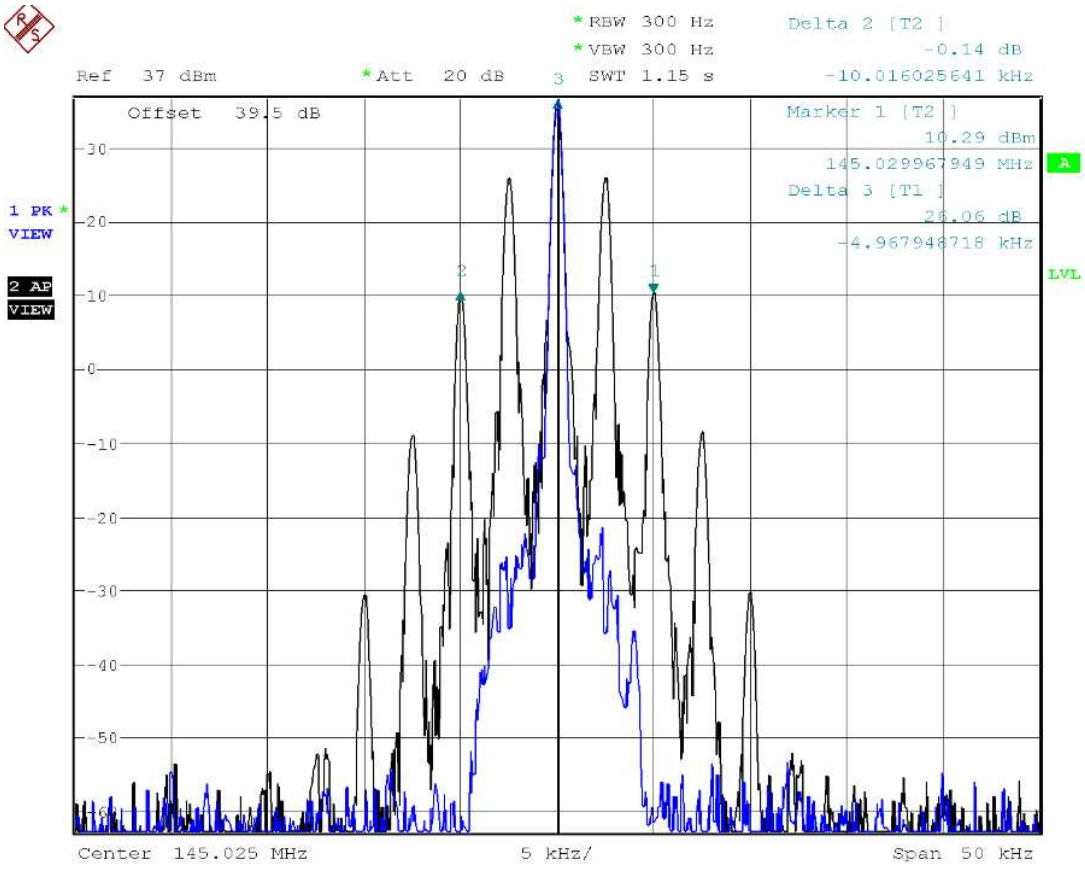
**Occupied bandwidth of 136.025MHz (Maximum) @ 12.5KHz Channel Separation**



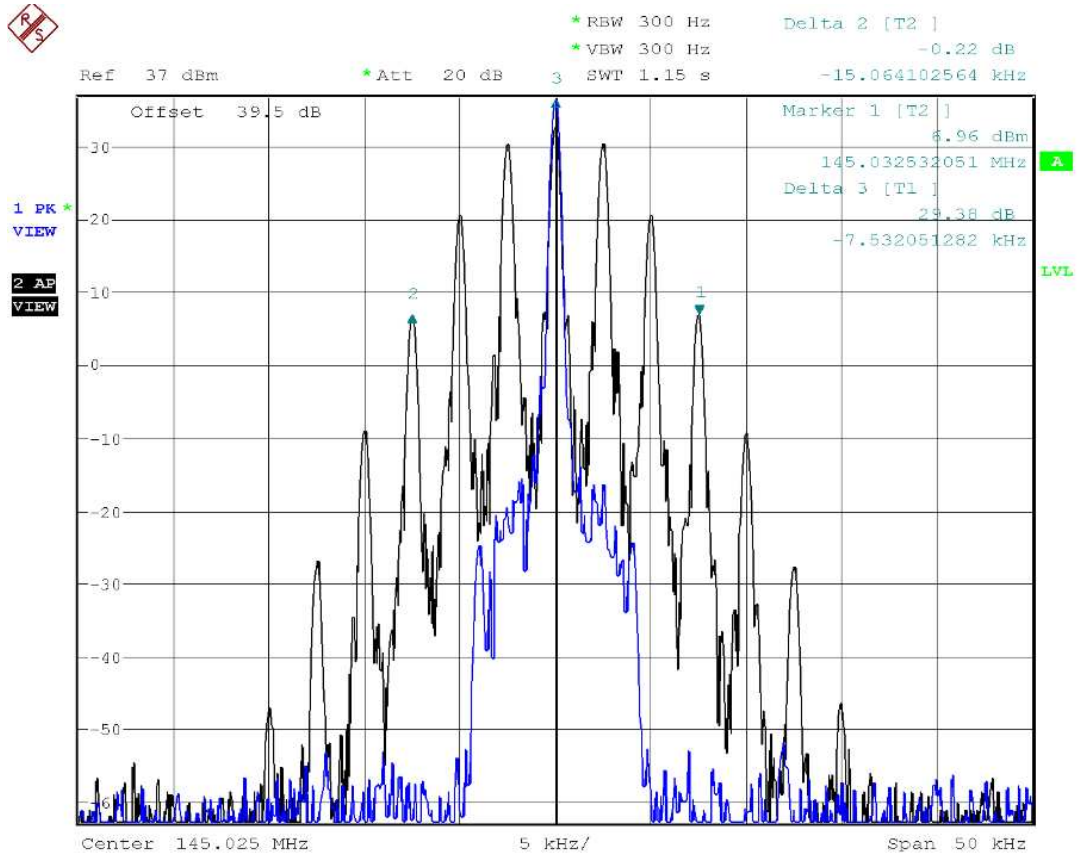

**Occupied bandwidth of 136.025MHz (Maximum) @ 25KHz Channel Separation**



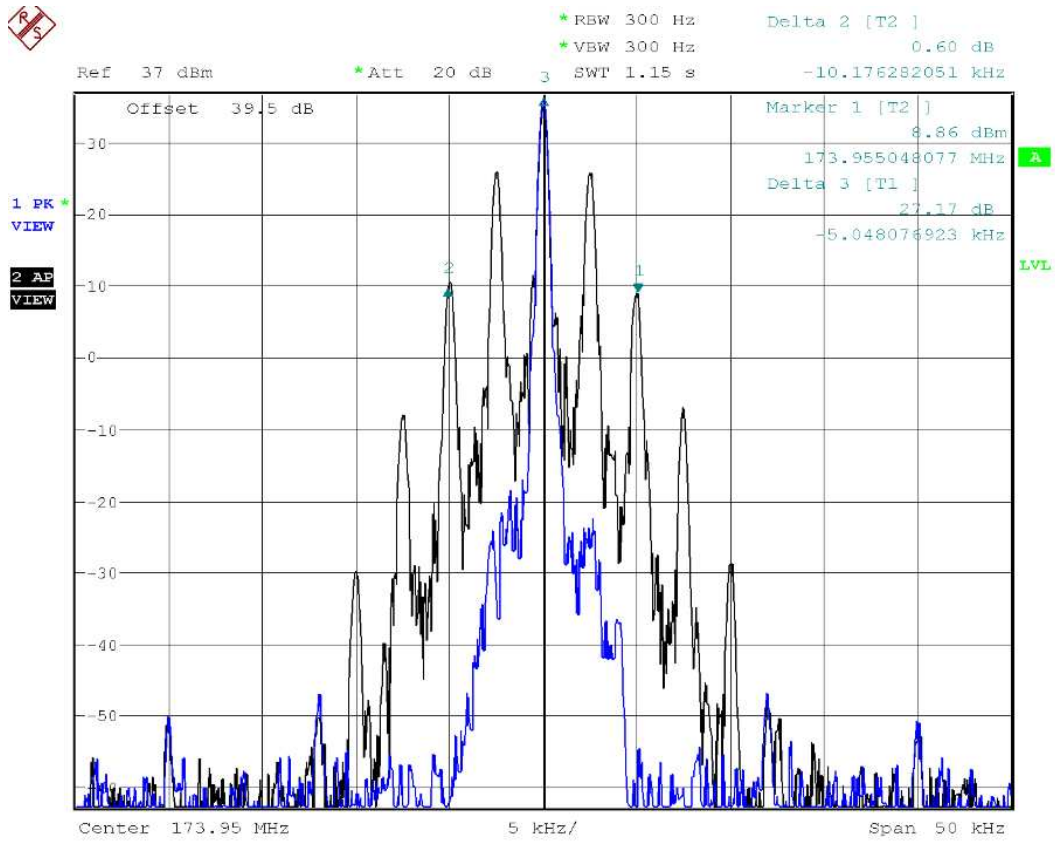

**Occupied bandwidth of 145.025MHz (Maximum) @ 12.5KHz Channel Separation**



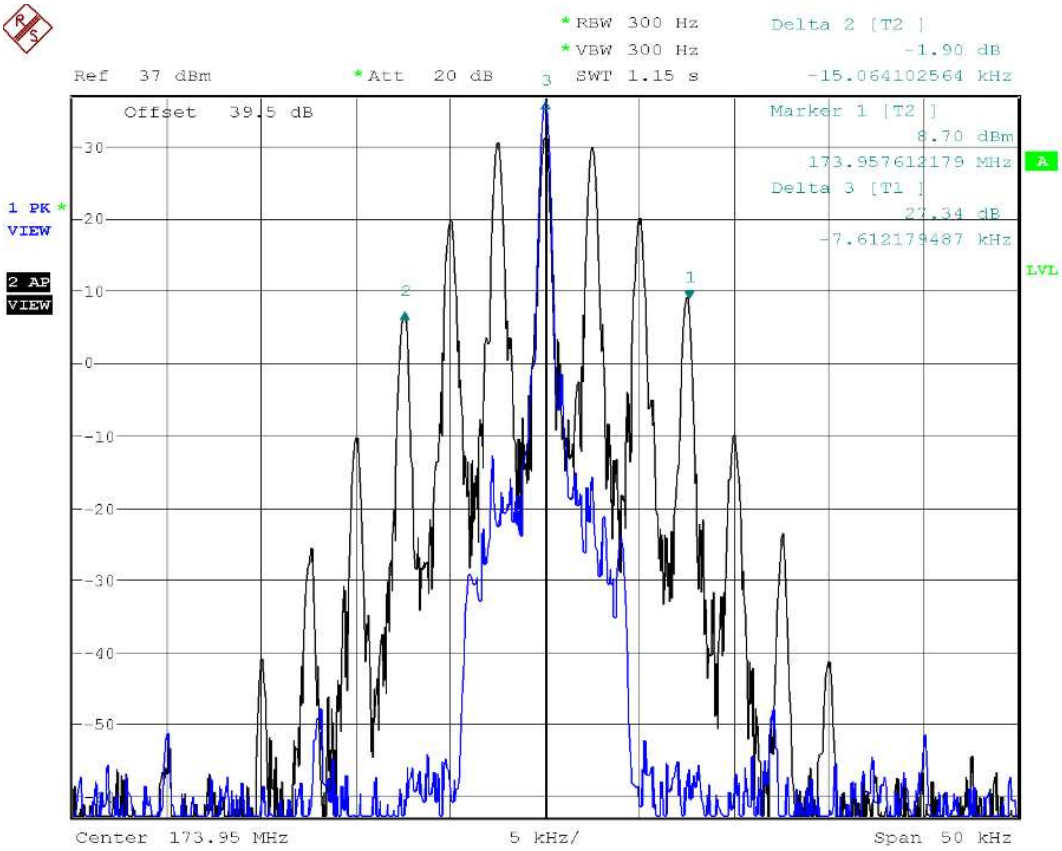

**Occupied bandwidth of 145.025MHz (Maximum) @ 25KHz Channel Separation**



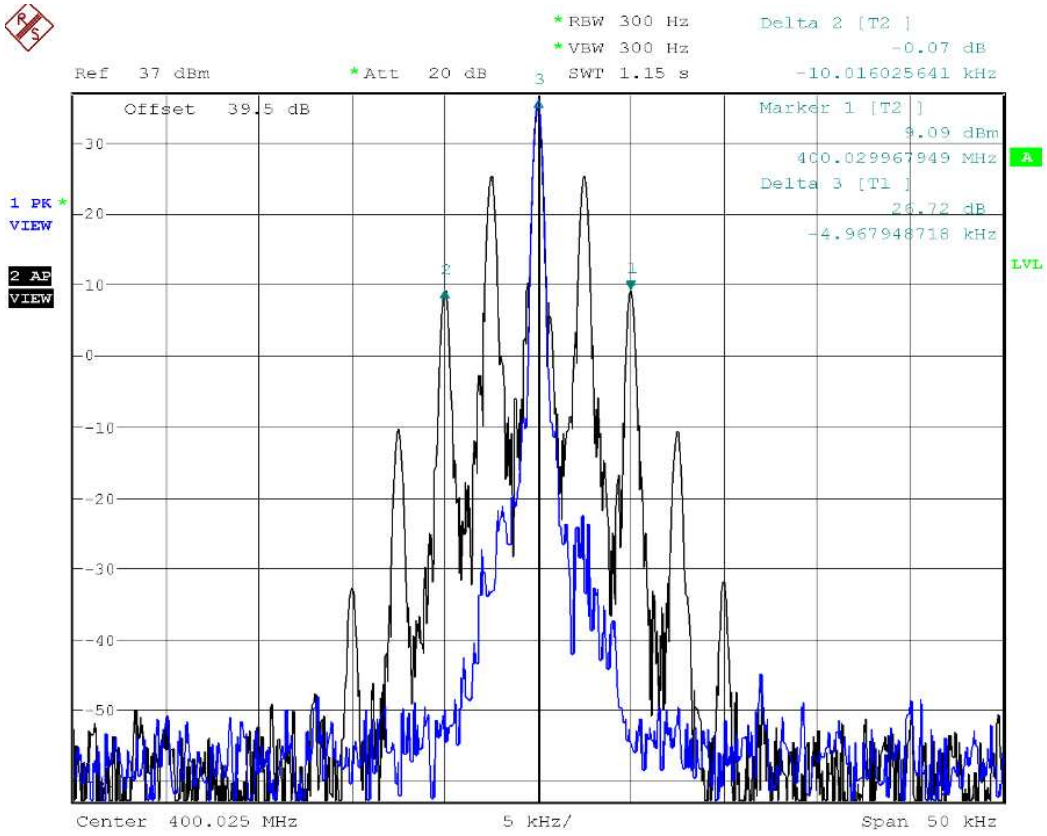

**Occupied bandwidth of 173.95MHz (Maximum) @ 12.5KHz Channel Separation**



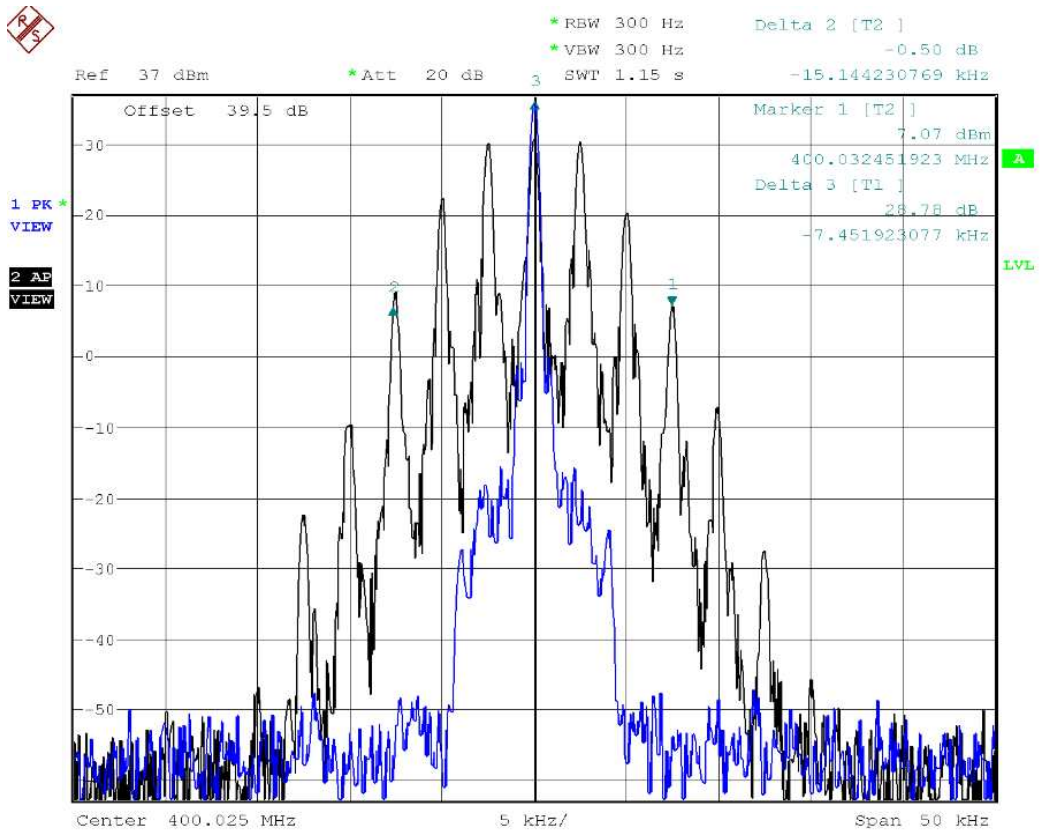

**Occupied bandwidth of 173.95MHz (Maximum) @ 25KHz Channel Separation**



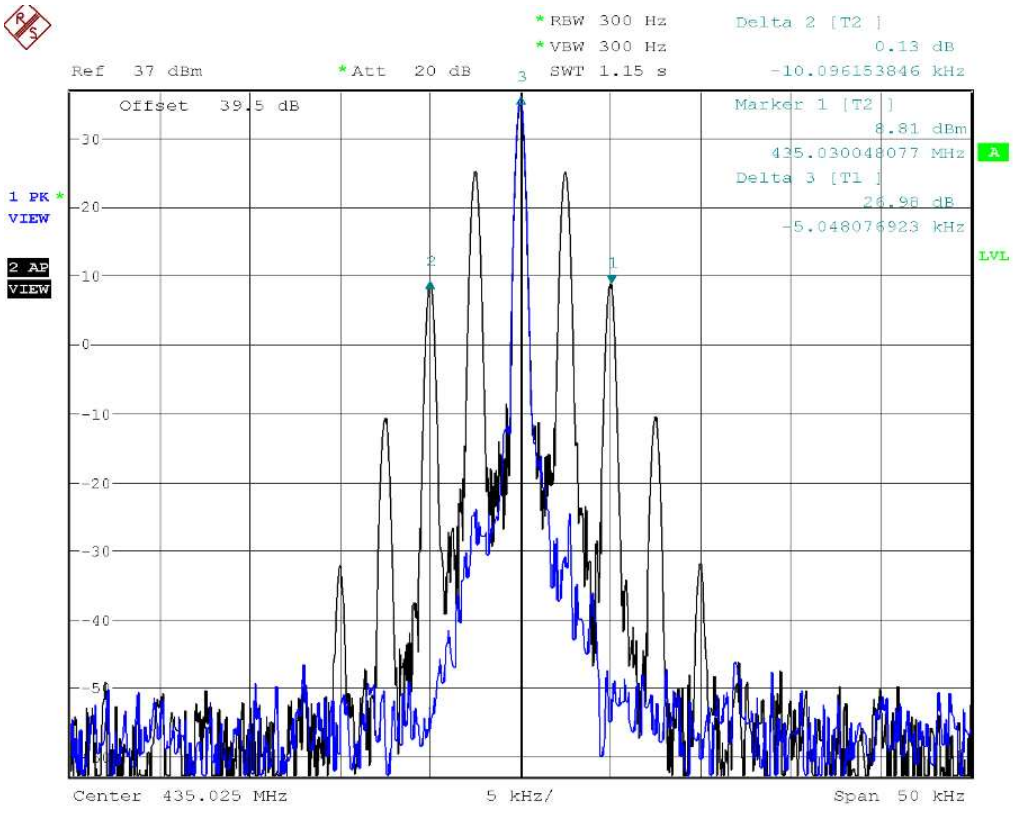

**Occupied bandwidth of 400.025MHz (Maximum) @ 12.5KHz Channel Separation**



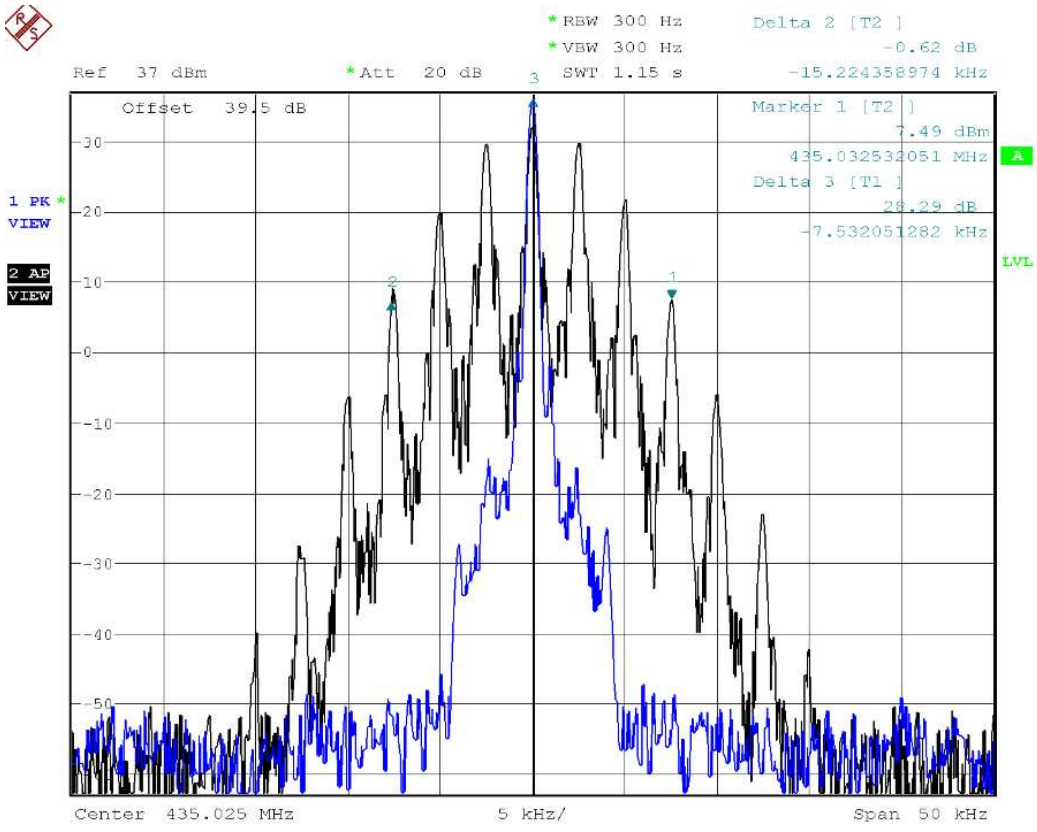

**Occupied bandwidth of 400.025MHz (Maximum) @ 25KHz Channel Separation**



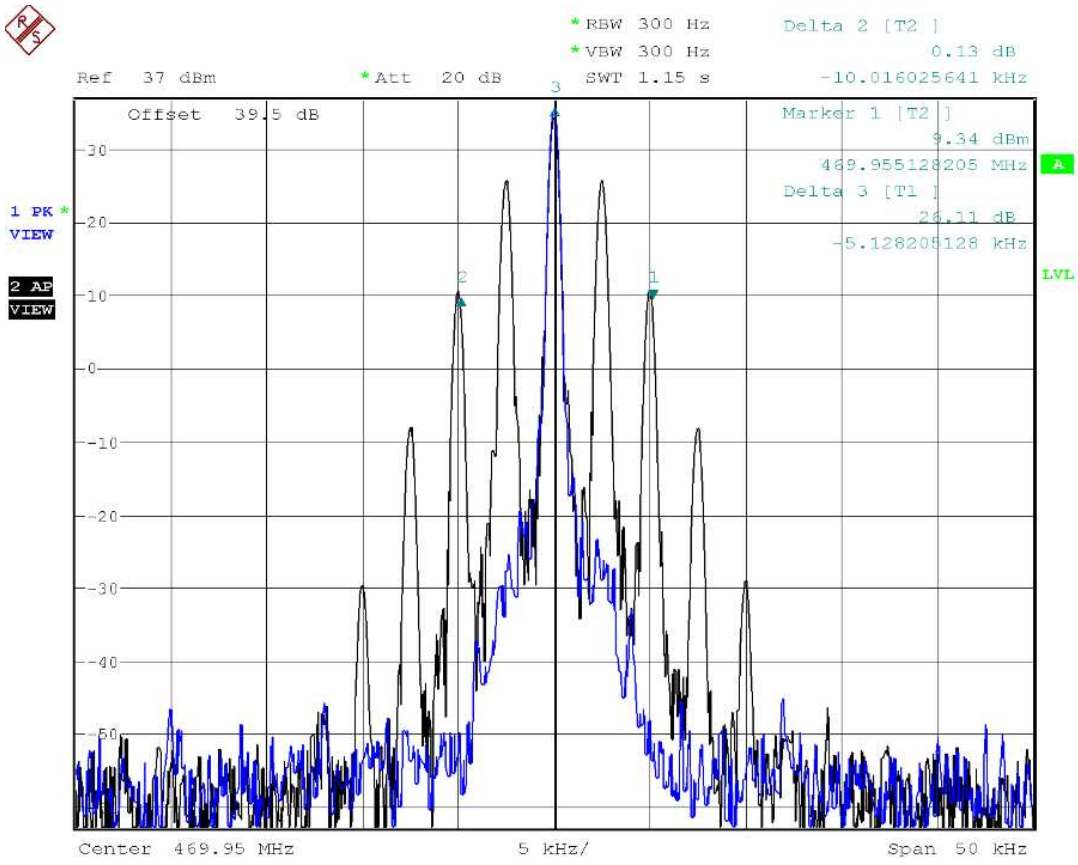

**Occupied bandwidth of 435.025MHz (Maximum) @ 12.5KHz Channel Separation**



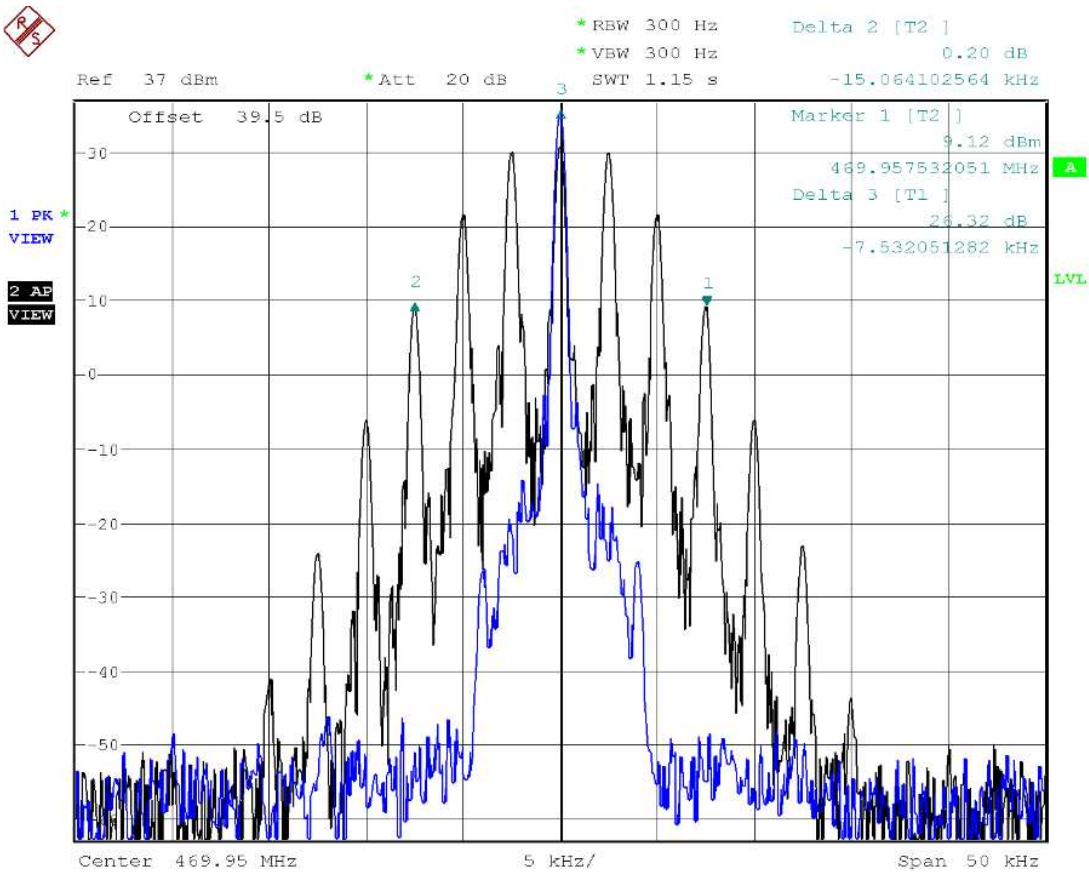

**Occupied bandwidth of 435.025MHz (Maximum) @ 25KHz Channel Separation**




**Occupied bandwidth of 469.95MHz (Maximum) @ 12.5KHz Channel Separation**

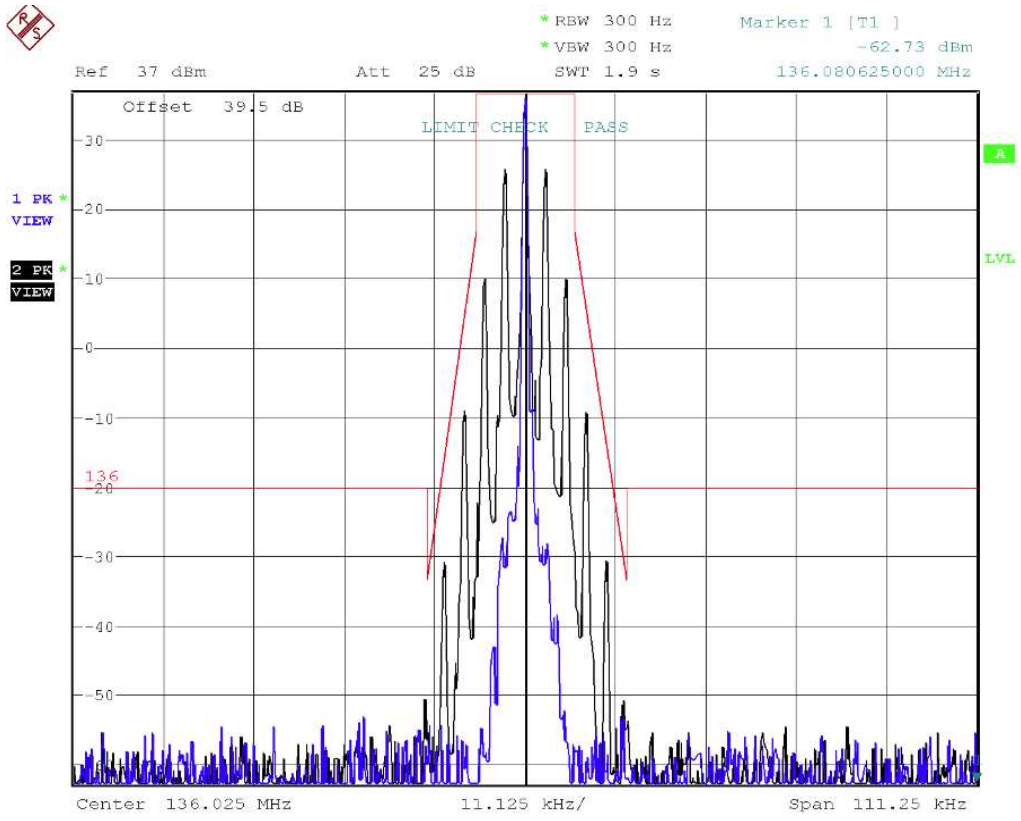



**Occupied bandwidth of 469.95MHz (Maximum) @ 25KHz Channel Separation**

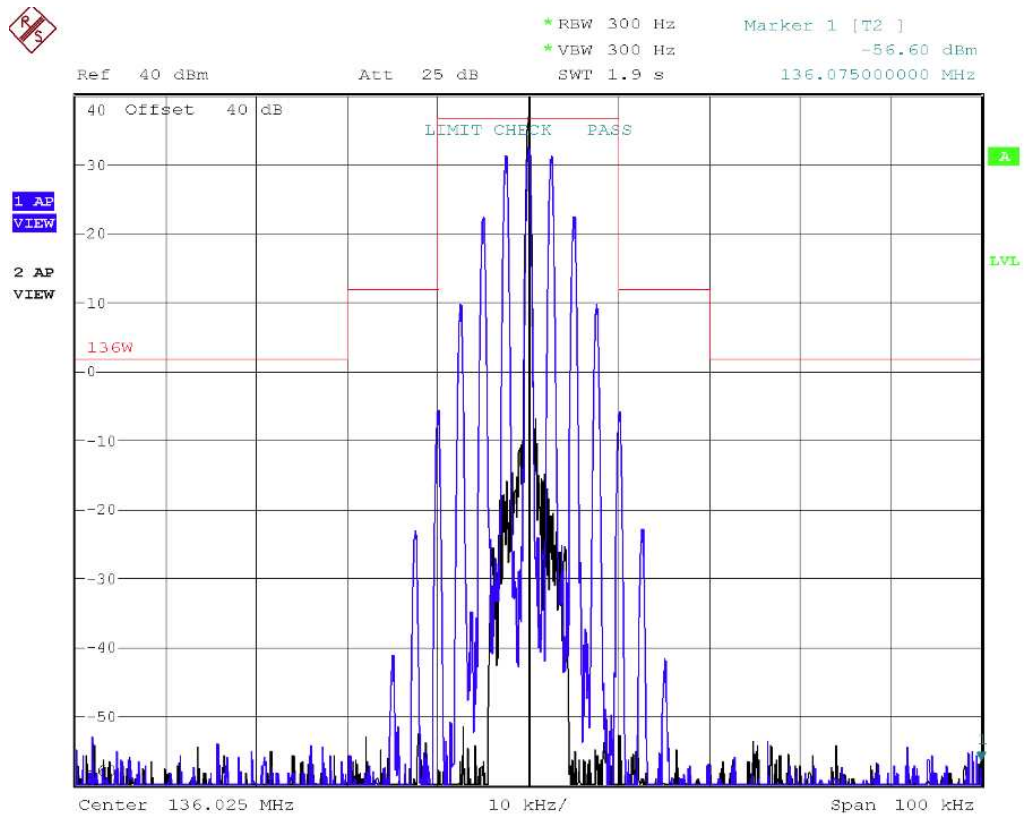


## 2.3.5.2. EMISSION MASK PLOT

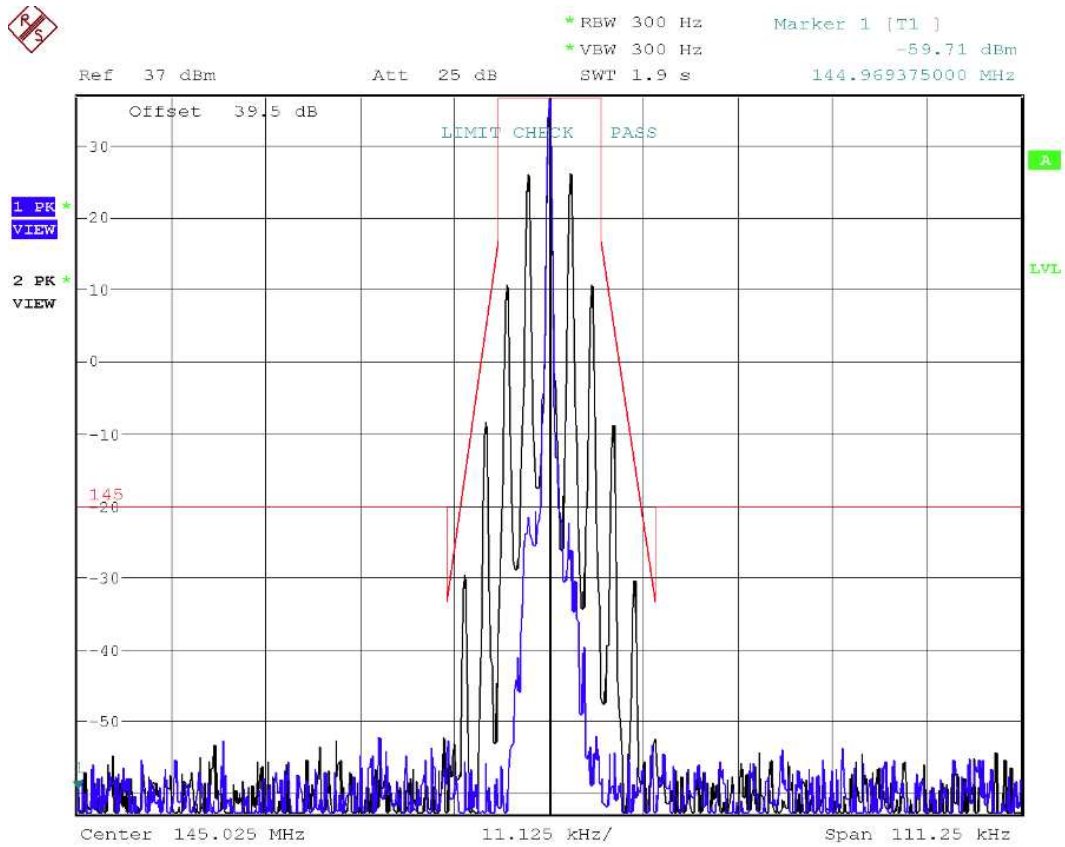
**136.025MHz @ 12.5 KHz Channel Separation**



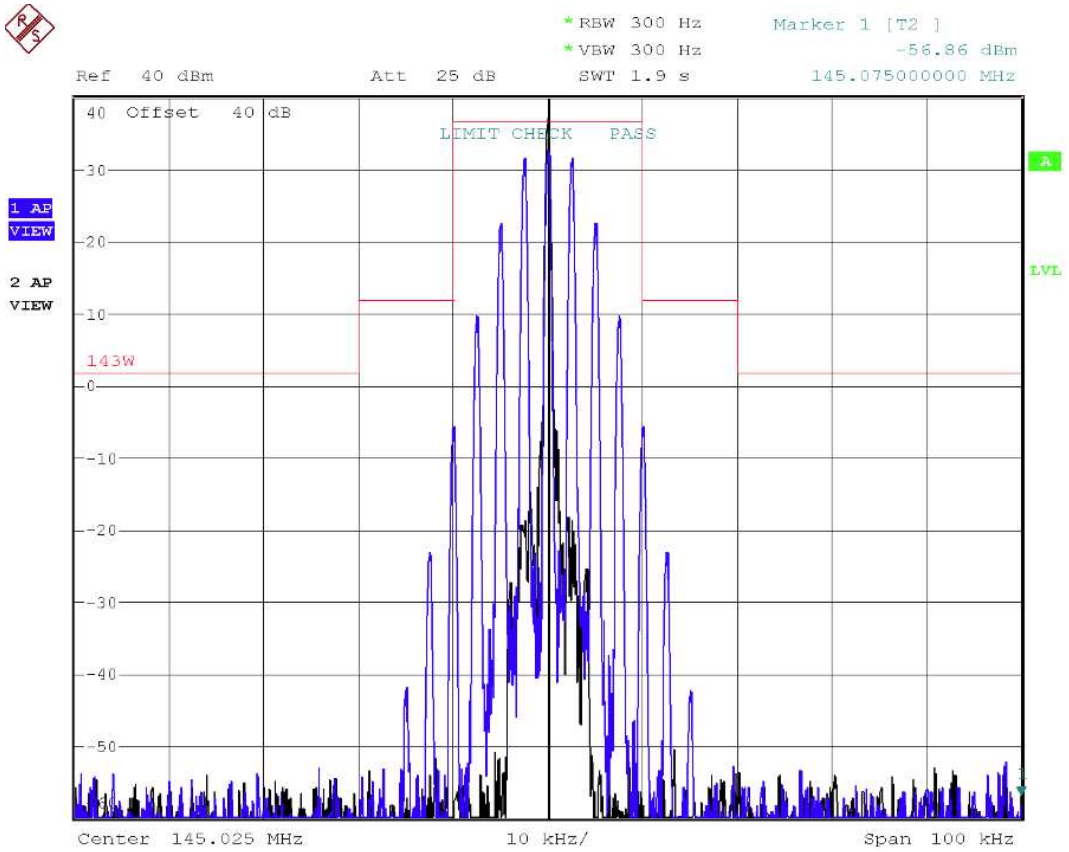

**136.025MHz @ 25 KHz Channel Separation**



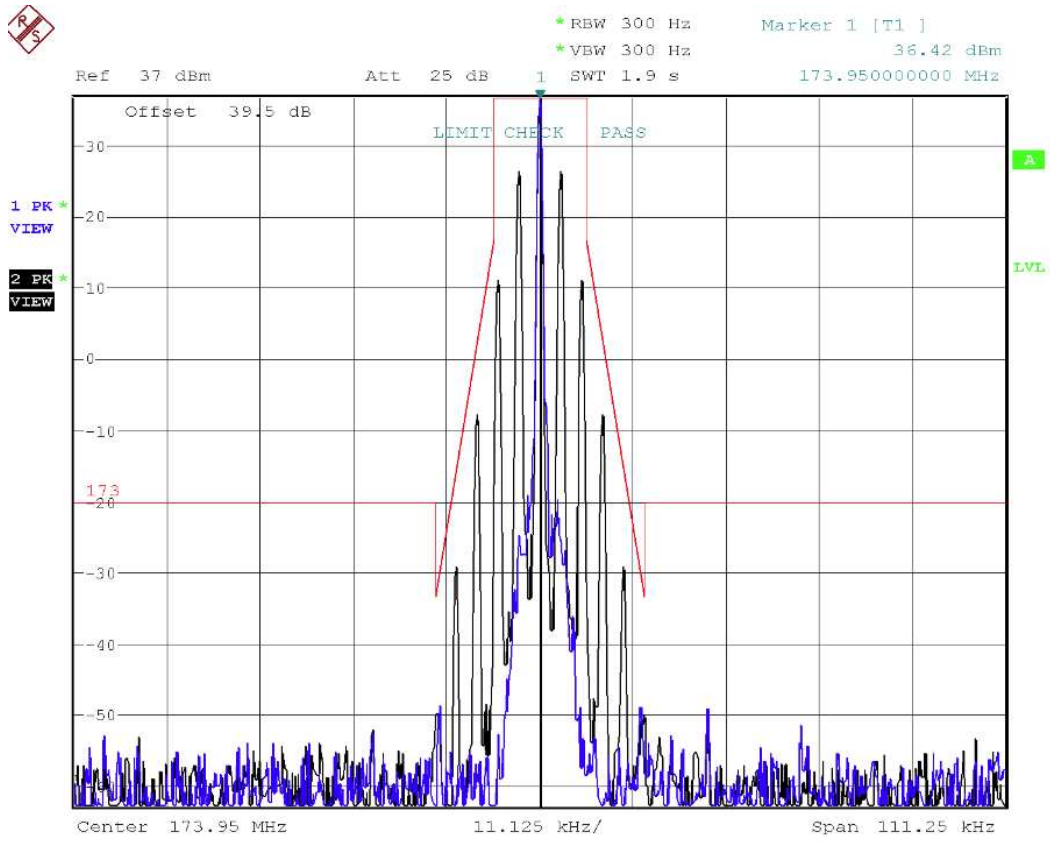

**145.025MHz @ 12.5 KHz Channel Separation**



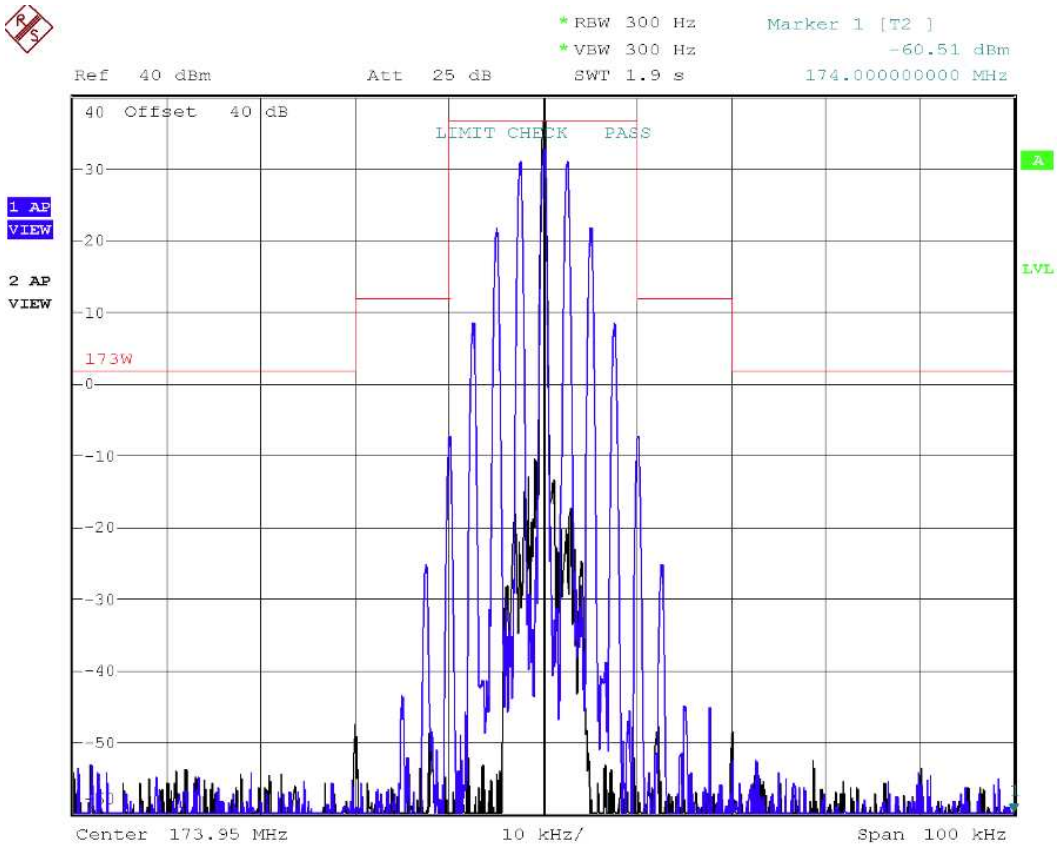

**145.025MHz @ 25 KHz Channel Separation**



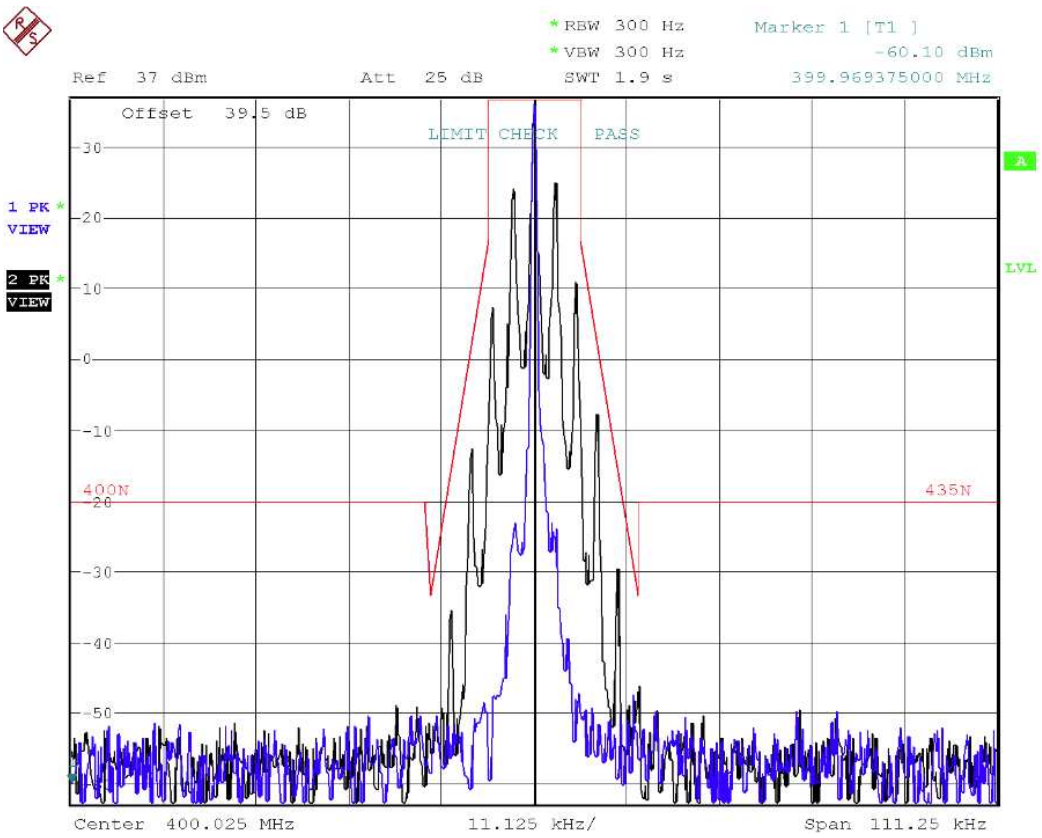

**173.95MHz @ 12.5 KHz Channel Separation**



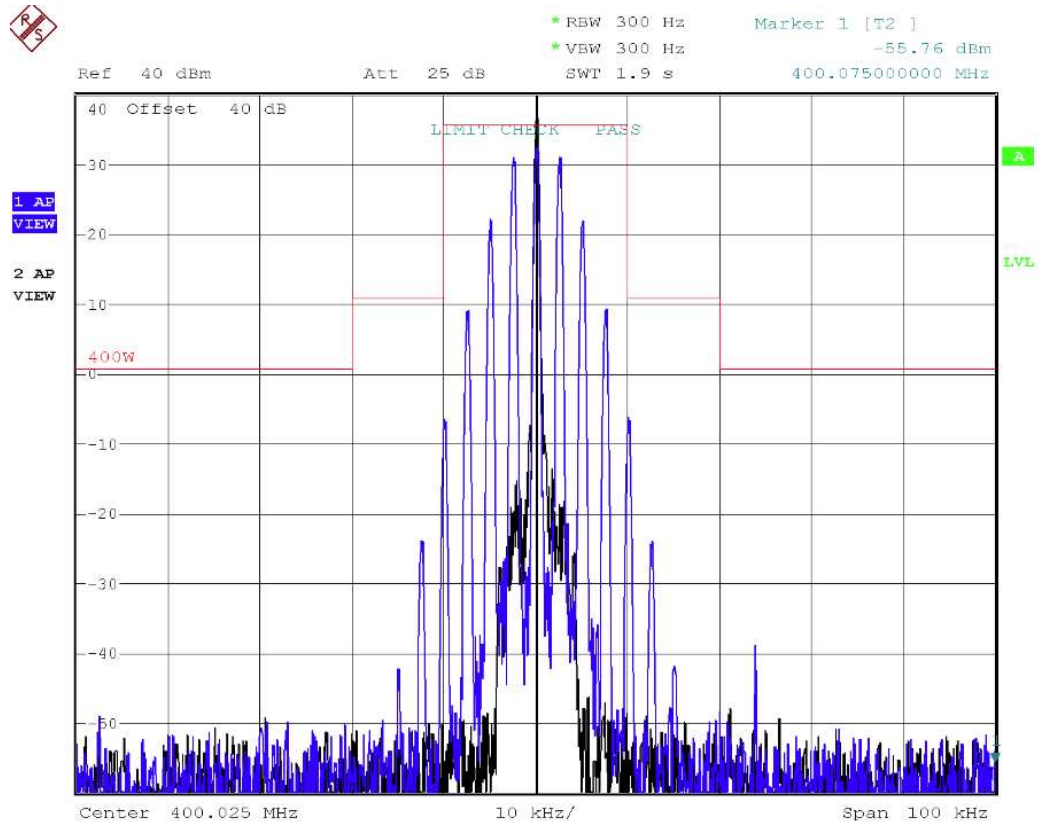

**173.95MHz @ 25 KHz Channel Separation**



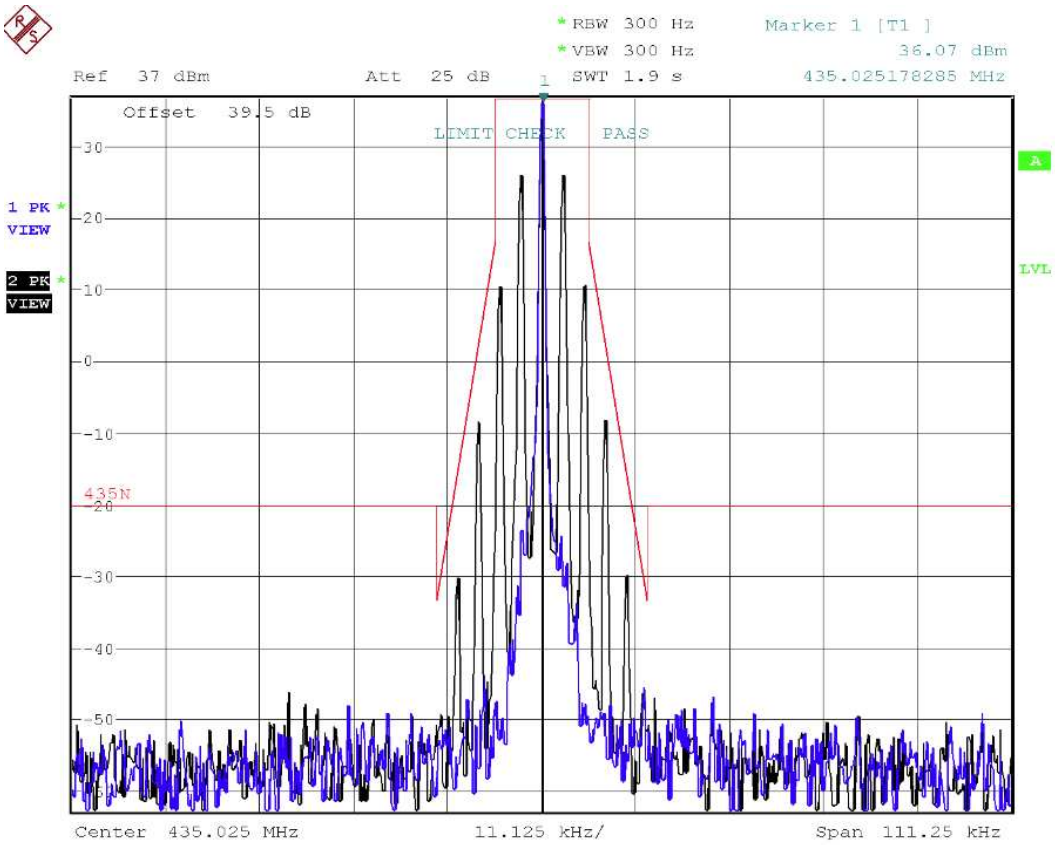

**400.025MHz @ 12.5 KHz Channel Separation**



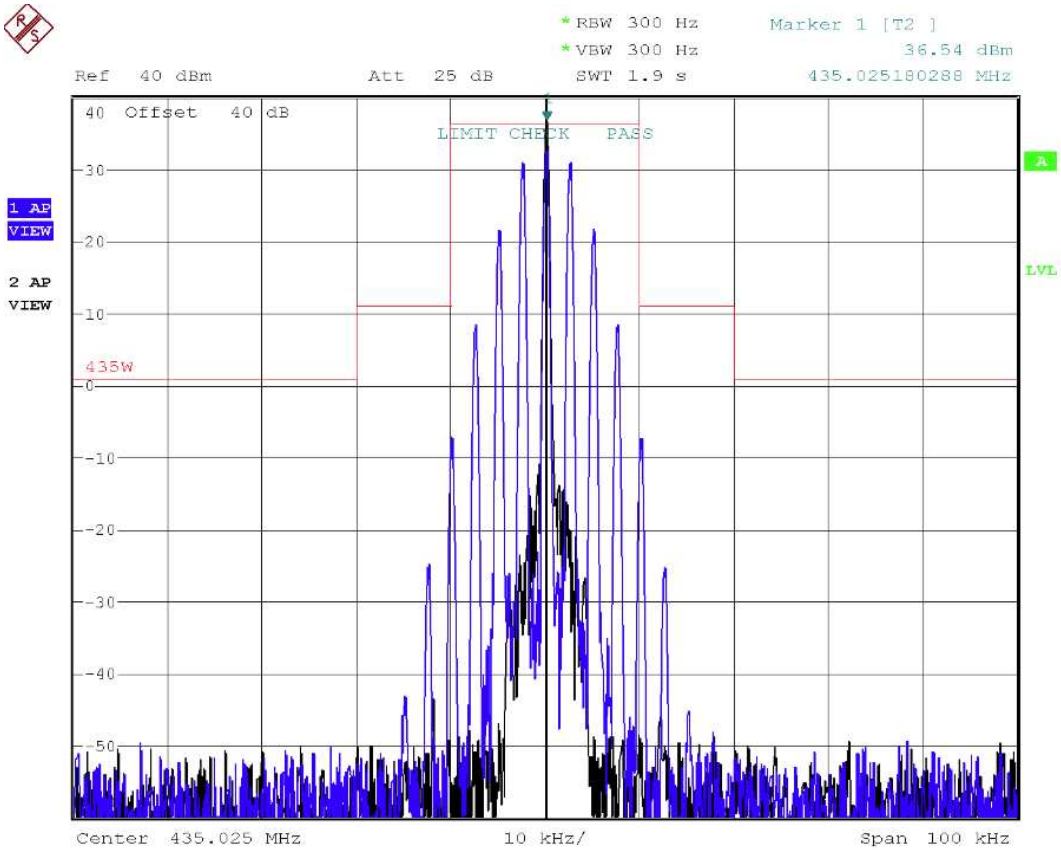

**400.025MHz @ 25 KHz Channel Separation**



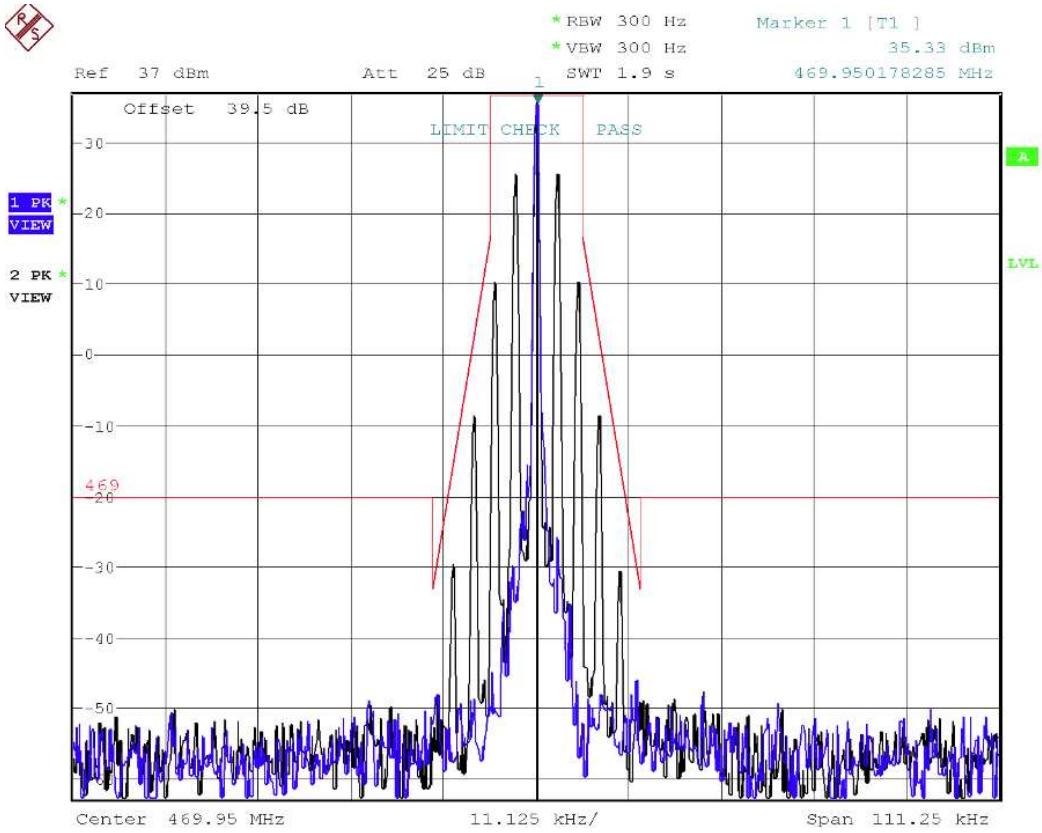

**435.025MHz @ 12.5 KHz Channel Separation**



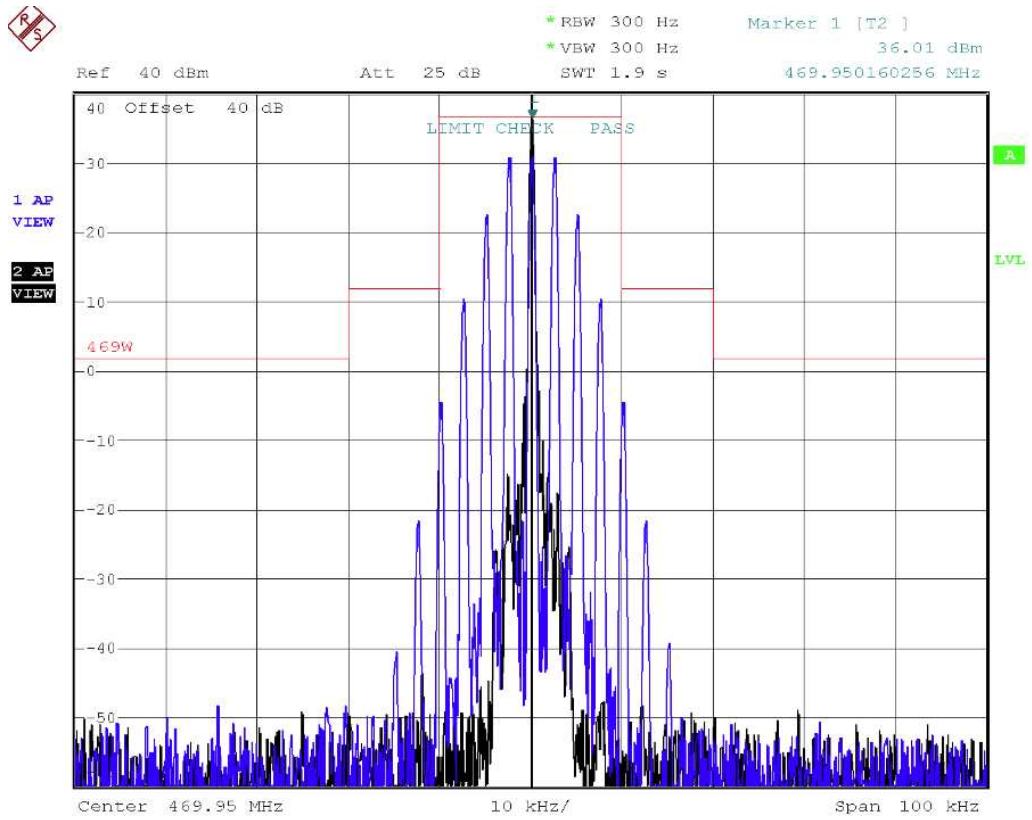

**435.025MHz @ 25 KHz Channel Separation**




**469.95MHz @ 12.5 KHz Channel Separation**




**469.95MHz @ 25 KHz Channel Separation**




Test Result: PASS

## 2.4. Radiated Spurious Emission

### 2.4.1. Provisions Applicable

According to FCC section 2.1053 and FCC section 90.210. For 12.5 KHz channel separation, the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 50+10*log(P)dB. This calculated to be -20dBm. For 25 KHz channel separation, the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10*log(P)dB. This calculated to be -13dBm.

### 2.4.2. Measurement Procedure

(1)On a test site, the EUT shall be placed on a turntable and in the position closest to the normal use as declared by the user.

(2)The test antenna shall be oriented initially for vertical polarization located 3m from the EUT to correspond to the transmitter.

(3)The output of the antenna shall be connected to the measuring receiver and either a peak or quasi-peak detector was used for the measurement as indicated on the report. The detector selection is based on how close the emission level was approaching the limit.

(4)The transmitter shall be switched on; if possible, without the modulation and the measurement receiver shall be tuned to the frequency of the transmitter under test.

(5)The test antenna shall be raised and lowered through the specified range of height until the measuring receiver detects a maximum signal level.

(6)The transmitter shall than be rotated through 360°in the horizontal plane, until the maximum signal level is detected by the measuring receiver.

(7)The test antenna shall be raised and lowered again through the specified range of height until the measuring receiver detects a maximum signal level.

(8)The maximum signal level detected by the measuring receiver shall be noted.

(9)The measurement shall be repeated with the test antenna set to horizontal polarization.

(10) Replace the antenna with a proper Antenna (substitution antenna).

(11)The substitution antenna shall be oriented for vertical polarization and, if necessary, the length of the substitution antenna shall be adjusted to correspond to the frequency of transmitting.

(12)The substitution antenna shall be connected to a calibrated signal generator.

(13)If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.

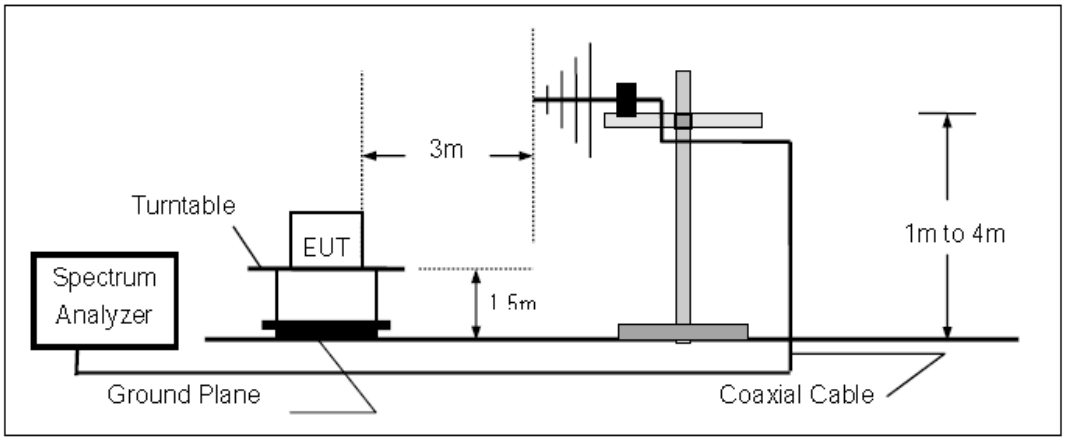
(14)The test antenna shall be raised and lowered through the specified range of the height to ensure that the maximum signal is received.

(15)The input signal to substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuation setting of the measuring receiver.

(16)The input level to the substitution antenna shall be recorded as power level in dBm, corrected for any change of input attenuator setting of the measuring receiver.

(17)The measurement shall be repeated with the test antenna and the substitution antenna oriented for horizontal polarization.

### 2.4.3. Test Setup Block Diagram




### 2.4.4. Measurement Instruments

| Name Of Equipment | Manufacturer | Model | S/N | Cal. Due Date |
|---|---|---|---|---|
| Test Antenna - Bi-Log | Schaffner | CBL6112B | 2529 | 2012.05 |
| Test Antenna - Bi-Log | Schaffner | Dvulp9118 | 2529 | 2012.05 |
| Receiver | R&S | ESU | 100204 | 2012.04 |
| Semi-Anechoic Chamber | ALBATROSS | 9m*6m*6m | 4771011001 | 2012.04 |
| Test Antenna - Horn | Dahua | DH610-2 | 0911120001 | 2012.05 |
| Test Antenna - Horn | Dahua | DH610-2 | 89010 | 2012.05 |

## 2.4.5. Test Result

| Frequency | SG Reading | Height | Polar | Cable loss | Antenna Gain | Corrected Ampl. | FCC Part 90 Limit | FCC Part 90 Margin |
|---|---|---|---|---|---|---|---|---|
| MHz | dBm | Meter | H / V | dB | dB | dBm | dBm | dB |
| 145.025MHz @ 12.5 KHz Channel Separation – High Power Level | | | | | | | | |
| 435.70 | -33.60 | 1.50 | V | 1.50 | 0.00 | -35.10 | -20.00 | 15.10 |
| 435.70 | -36.30 | 1.50 | H | 1.50 | 0.00 | -37.80 | -20.00 | 17.80 |
| 580.69 | -42.56 | 1.30 | V | 2.20 | 0.00 | -44.76 | -20.00 | 24.76 |
| 580.69 | -42.05 | 1.40 | H | 2.20 | 0.00 | -44.25 | -20.00 | 24.25 |
| 2899.00 | -54.70 | 1.50 | V | 6.80 | 3.50 | -58.00 | -20.00 | 38.00 |
| 2899.00 | -57.40 | 1.50 | H | 6.80 | 3.50 | -60.70 | -20.00 | 40.70 |
| 145.025MHz @ 25 KHz Channel Separation – High Power Level | | | | | | | | |
| 289.60 | -55.38 | 1.40 | V | 1.50 | 0.00 | -56.88 | -13.00 | 43.88 |
| 289.60 | -56.82 | 1.50 | H | 1.50 | 0.00 | -58.32 | -13.00 | 45.32 |
| 435.72 | -39.55 | 1.50 | V | 2.20 | 0.00 | -41.75 | -13.00 | 28.75 |
| 435.72 | -41.69 | 1.50 | H | 2.20 | 0.00 | -43.89 | -13.00 | 30.89 |
| 2899.10 | -53.45 | 1.60 | V | 6.80 | 3.50 | -56.75 | -13.00 | 43.75 |
| 2899.10 | -55.14 | 1.40 | H | 6.80 | 3.50 | -58.44 | -13.00 | 45.44 |
| 435.025 MHz @ 12.5 KHz Channel Separation – High Power Level | | | | | | | | |
| 870.81 | -50.60 | 1.50 | V | 2.20 | 0.00 | -52.80 | -20.00 | 32.80 |
| 870.81 | -51.70 | 1.30 | H | 2.20 | 0.00 | -53.90 | -20.00 | 33.90 |
| 1304.50 | -42.04 | 1.60 | V | 3.00 | 2.80 | -42.24 | -20.00 | 22.24 |
| 1304.50 | -44.67 | 1.50 | H | 3.00 | 2.80 | -44.87 | -20.00 | 24.87 |
| 1737.20 | -49.81 | 1.40 | V | 3.60 | 3.10 | -50.31 | -20.00 | 30.31 |
| 1737.20 | -52.71 | 1.50 | H | 3.60 | 3.10 | -53.21 | -20.00 | 33.21 |
| 435.025MHz @ 25 KHz Channel Separation – High Power Level | | | | | | | | |
| 870.98 | -53.42 | 1.40 | V | 2.20 | 0.00 | -55.62 | -13.00 | 42.62 |
| 870.98 | -56.10 | 1.50 | H | 2.20 | 0.00 | -58.30 | -13.00 | 45.30 |
| 1304.50 | -41.40 | 1.20 | V | 3.00 | 2.80 | -41.60 | -13.00 | 28.60 |
| 1304.50 | -43.69 | 1.60 | H | 3.00 | 2.80 | -43.89 | -13.00 | 30.89 |
| 1737.20 | -49.40 | 1.50 | V | 3.60 | 3.10 | -49.90 | -13.00 | 36.90 |
| 1737.20 | -49.50 | 1.50 | H | 3.60 | 3.10 | -50.00 | -13.00 | 37.00 |

| Frequency | SG Reading | Height | Polar | Cable loss | Antenna Gain | Corrected Ampl. | FCC Part 90 Limit | FCC Part 90 Margin |
|---|---|---|---|---|---|---|---|---|
| MHz | dBm | Meter | H / V | dB | dB | dBm | dBm | dB |
| 145.025MHz @ 12.5 KHz Channel Separation – Low Power Level | | | | | | | | |
| 289.60 | -37.30 | 1.40 | V | 1.50 | 0.00 | -38.80 | -20.00 | 15.10 |
| 289.60 | -38.70 | 1.50 | H | 1.50 | 0.00 | -40.20 | -20.00 | 17.80 |
| 580.69 | -46.70 | 1.50 | V | 2.20 | 0.00 | -48.90 | -20.00 | 24.76 |
| 580.69 | -44.10 | 1.30 | H | 2.20 | 0.00 | -46.30 | -20.00 | 24.25 |
| 3596.30 | -56.60 | 1.50 | V | 6.00 | 4.20 | -58.40 | -20.00 | 38.00 |
| 3596.30 | -59.50 | 1.60 | H | 6.00 | 4.20 | -61.30 | -20.00 | 40.70 |
| 145.025MHz @ 25 KHz Channel Separation – Low Power Level | | | | | | | | |
| 289.60 | -55.38 | 1.60 | V | 1.50 | 0.00 | -37.20 | -13.00 | 24.20 |
| 289.60 | -56.82 | 1.50 | H | 1.50 | 0.00 | -39.40 | -13.00 | 26.40 |
| 435.72 | -39.55 | 1.50 | V | 2.20 | 0.00 | -46.20 | -13.00 | 33.20 |
| 435.72 | -41.69 | 1.40 | H | 2.20 | 0.00 | -48.70 | -13.00 | 35.70 |
| 1307.70 | -53.45 | 1.60 | V | 6.80 | 2.80 | -31.60 | -13.00 | 18.60 |
| 1307.70 | -55.14 | 1.50 | H | 6.80 | 2.80 | -34.80 | -13.00 | 21.80 |
| 435.025 MHz @ 12.5 KHz Channel Separation – Low Power Level | | | | | | | | |
| 870.97 | -41.90 | 1.40 | V | 2.20 | 0.00 | -44.10 | -20.00 | 24.10 |
| 870.97 | -44.60 | 1.30 | H | 2.20 | 0.00 | -46.80 | -20.00 | 26.80 |
| 1307.50 | -32.60 | 1.50 | V | 3.00 | 2.80 | -32.80 | -20.00 | 12.80 |
| 1307.50 | -34.70 | 1.50 | H | 3.00 | 2.80 | -34.90 | -20.00 | 14.90 |
| 2177.30 | -48.80 | 1.50 | V | 4.30 | 3.30 | -49.80 | -20.00 | 29.80 |
| 2177.30 | -52.40 | 1.60 | H | 4.30 | 3.30 | -53.40 | -20.00 | 33.40 |
| 435.025MHz @ 25 KHz Channel Separation – Low Power Level | | | | | | | | |
| 870.98 | -40.10 | 1.50 | V | 2.20 | 0.00 | -42.30 | -13.00 | 29.30 |
| 870.98 | -43.40 | 1.50 | H | 2.20 | 0.00 | -45.60 | -13.00 | 32.60 |
| 1304.50 | -41.40 | 1.30 | V | 3.00 | 2.80 | -41.60 | -13.00 | 28.60 |
| 1304.50 | -43.69 | 1.50 | H | 3.00 | 2.80 | -43.89 | -13.00 | 30.89 |
| 4171.30 | -45.70 | 1.60 | V | 3.60 | 3.10 | -46.20 | -13.00 | 33.20 |
| 4171.30 | -47.80 | 1.50 | H | 3.60 | 3.10 | -48.30 | -13.00 | 35.30 |

Test Result: PASS

## 2.5. Spurious Emission At Antenna Terminals

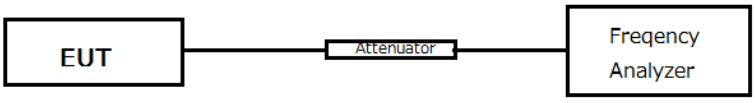
### 2.5.1. Provisions Applicable

According to FCC section 90.210. For 12.5 KHz channel separation, the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 50+10*log(P)dB. This calculated to be -20dBm. For 25 KHz channel separation, the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10*log(P)dB. This calculated to be -13dBm.

### 2.5.2. Measurement Procedure

The EUT, which is powered by the Battery, is coupled to the Spectrum Analyzer (SA) with a Attenuator; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is operate at the maximum output power.

### 2.5.3. Test Setup Block Diagram

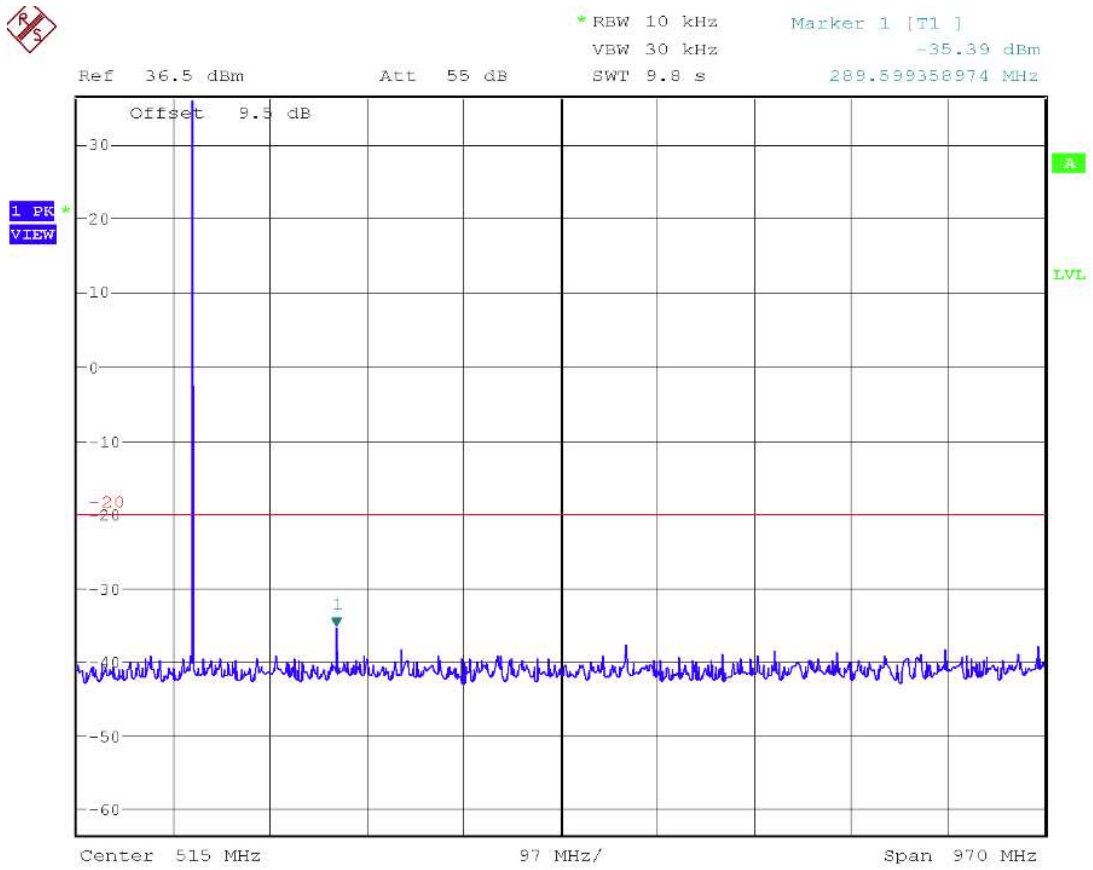


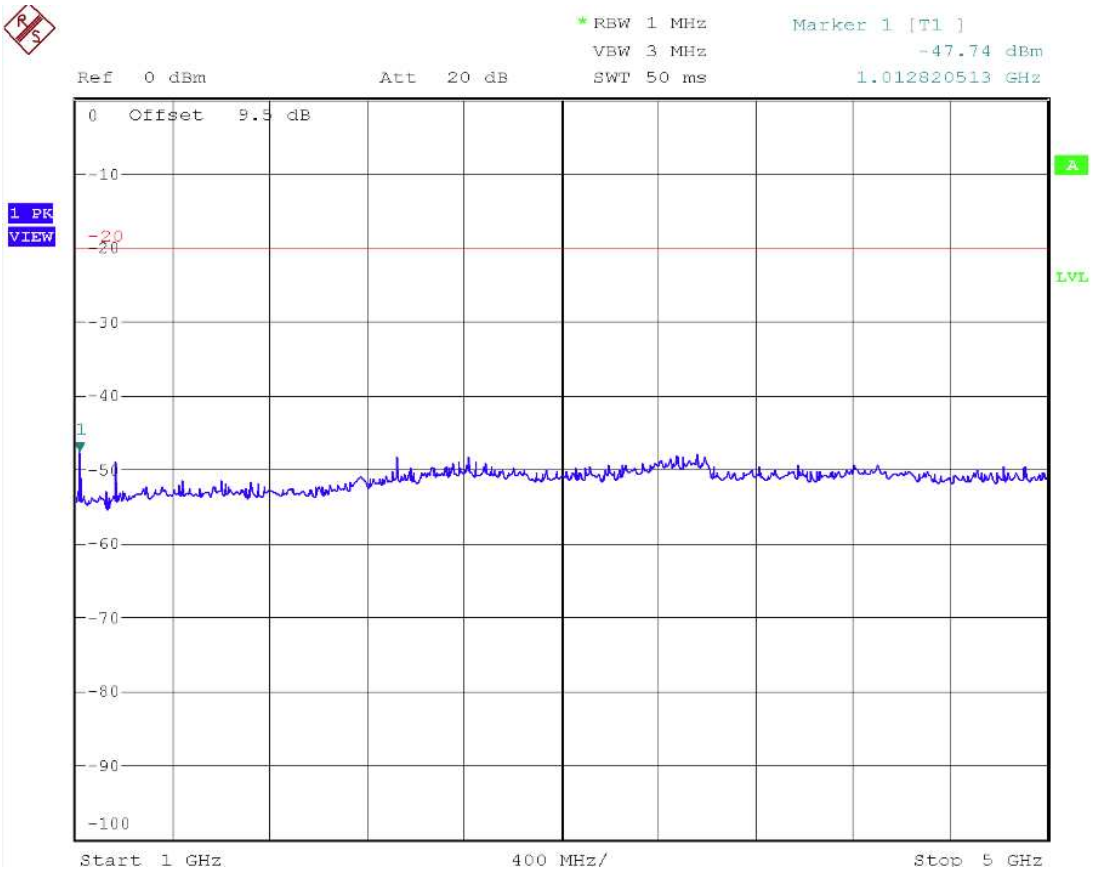

### 2.5.4. Measurement Instruments

| Name Of Equipment | Manufacturer | Model | S/N | Cal. Due Date |
|---|---|---|---|---|
| Spectrum Analyzer | R&S | FSU-8 | 200034 | 2012.6.2 |
| Attenuator | SHX | DC-13 | N.A | N.A |

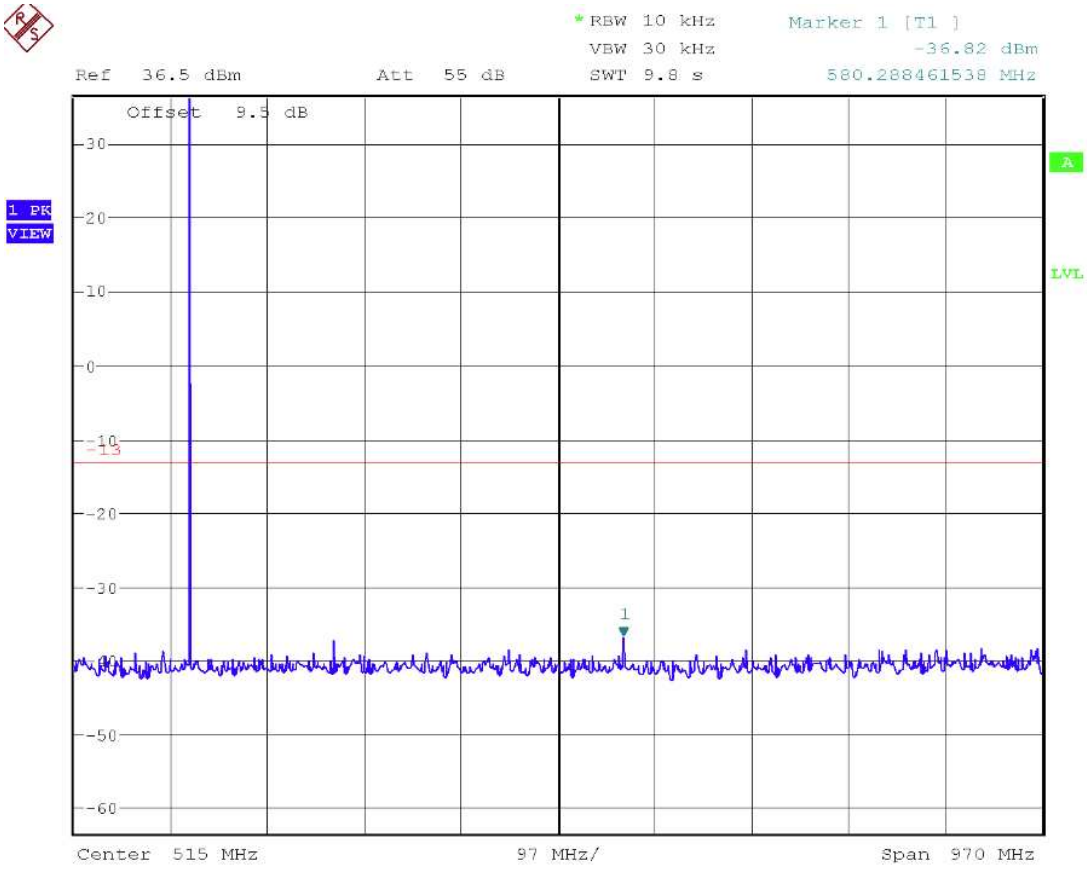
## 2.5.5. Test result

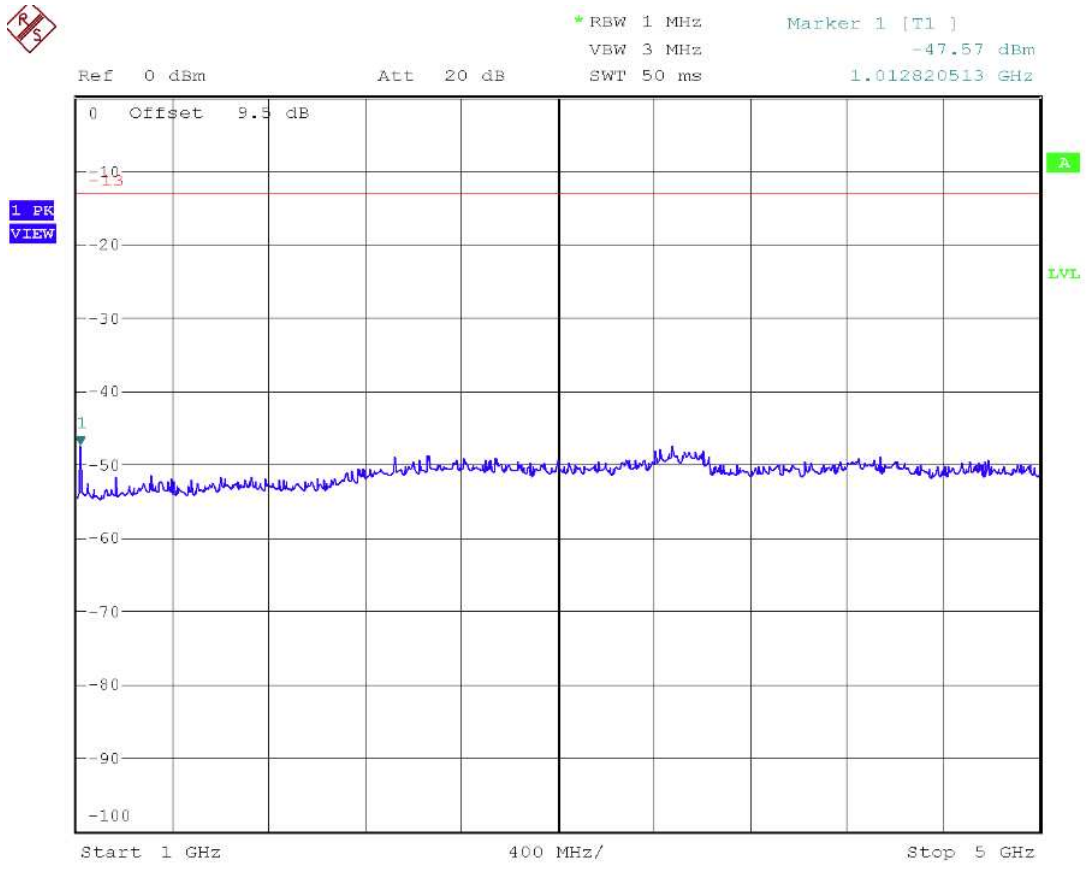
145.025 MHz @ 12.5 KHz Channel Separations – High Power Level



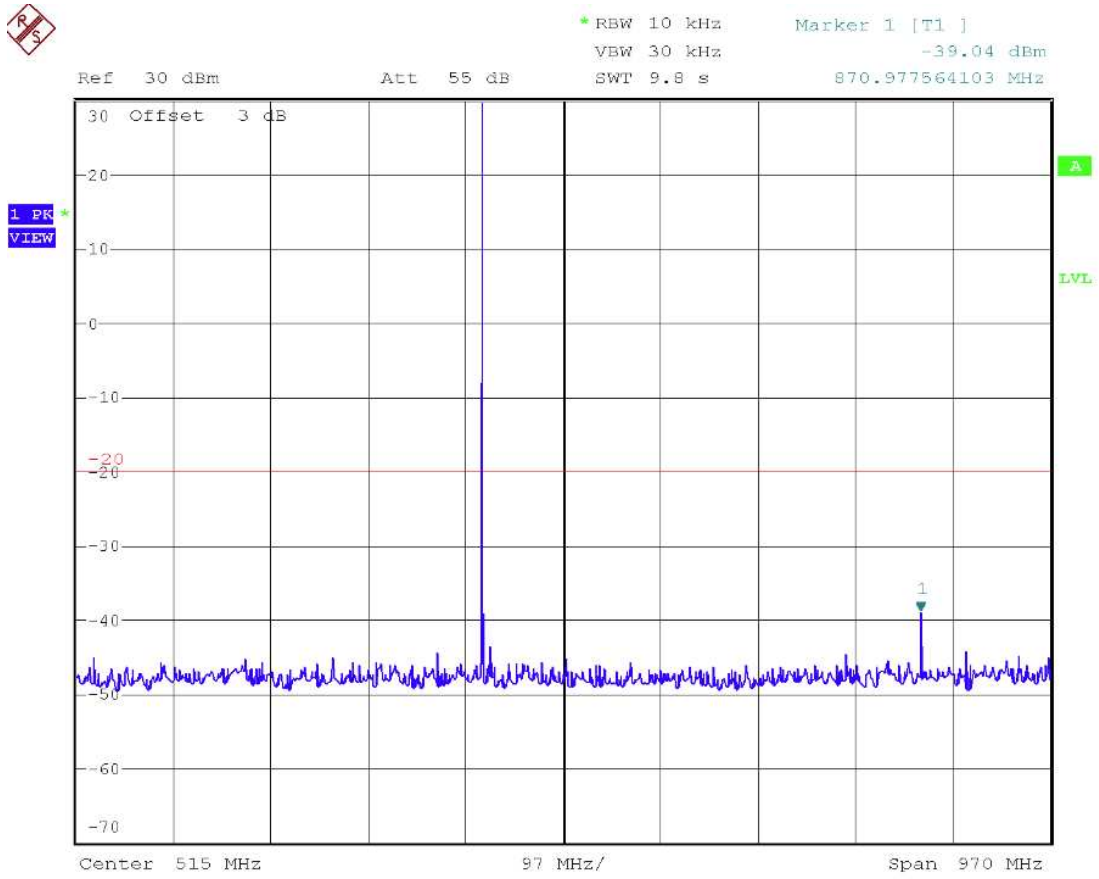



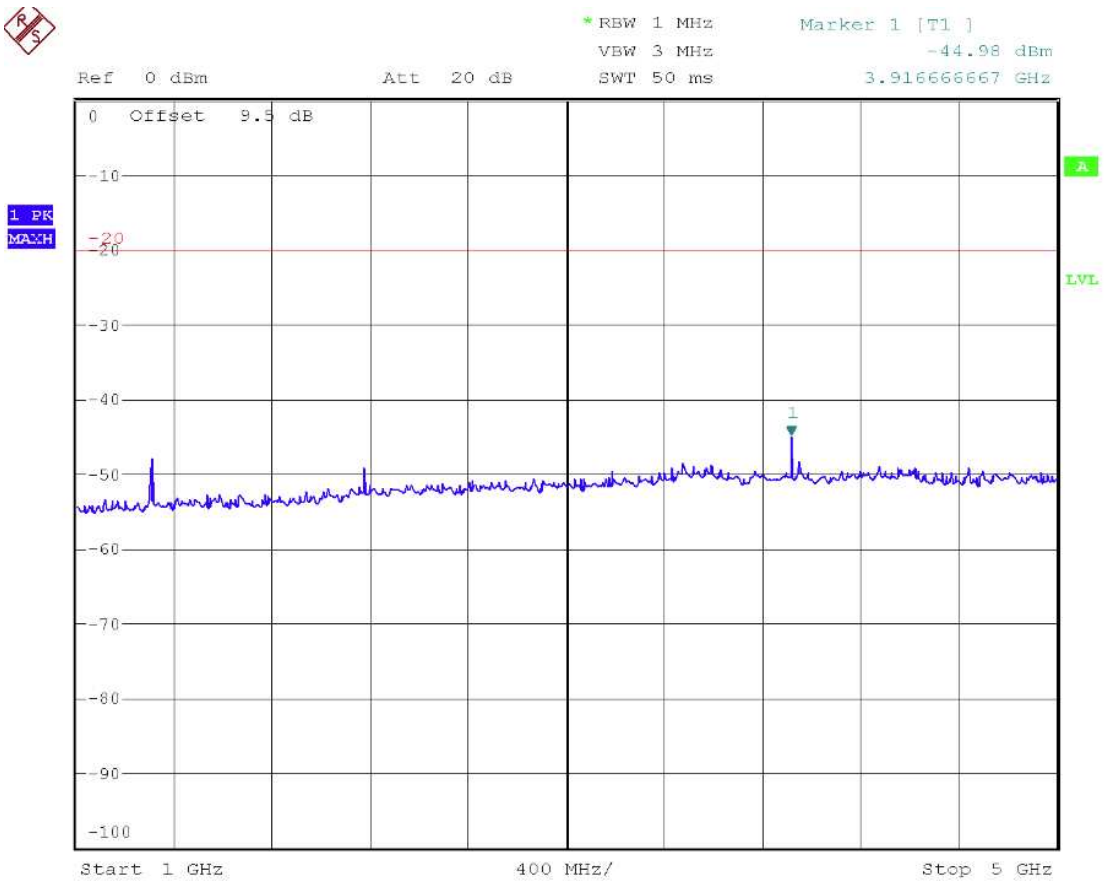
145.025MHz @ 25 KHz Channel Separations – High Power Level



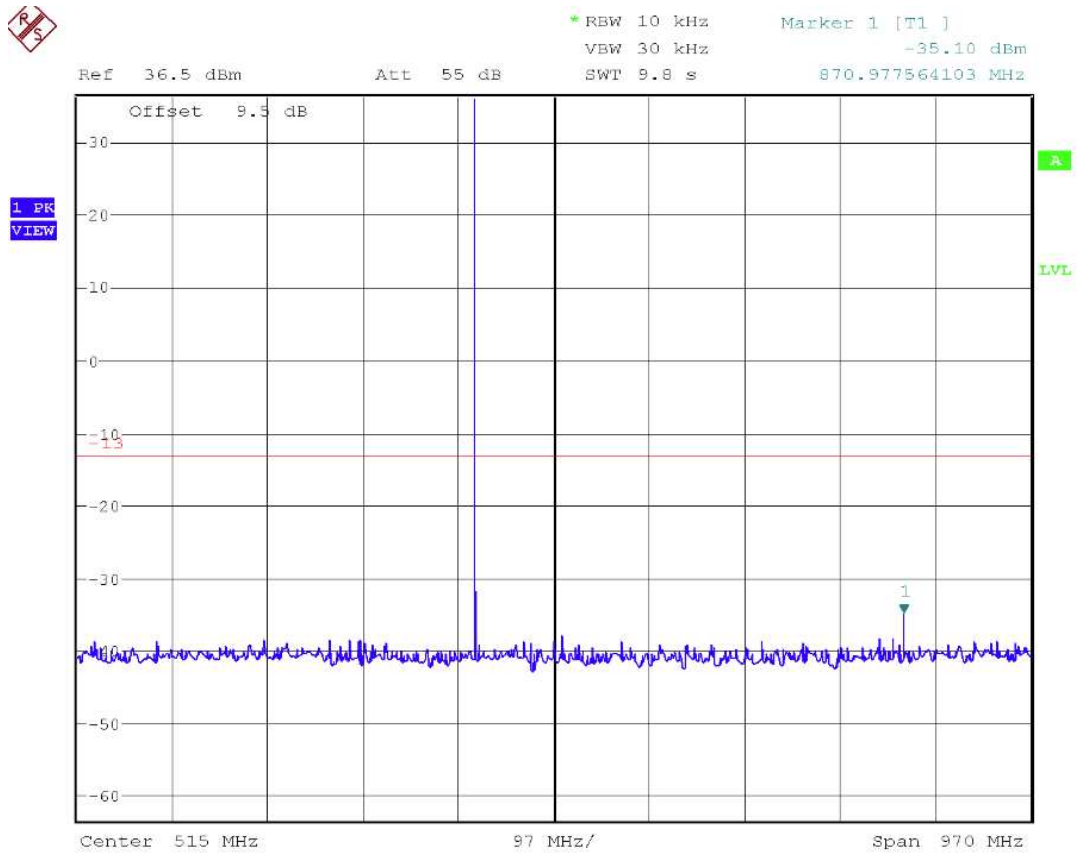



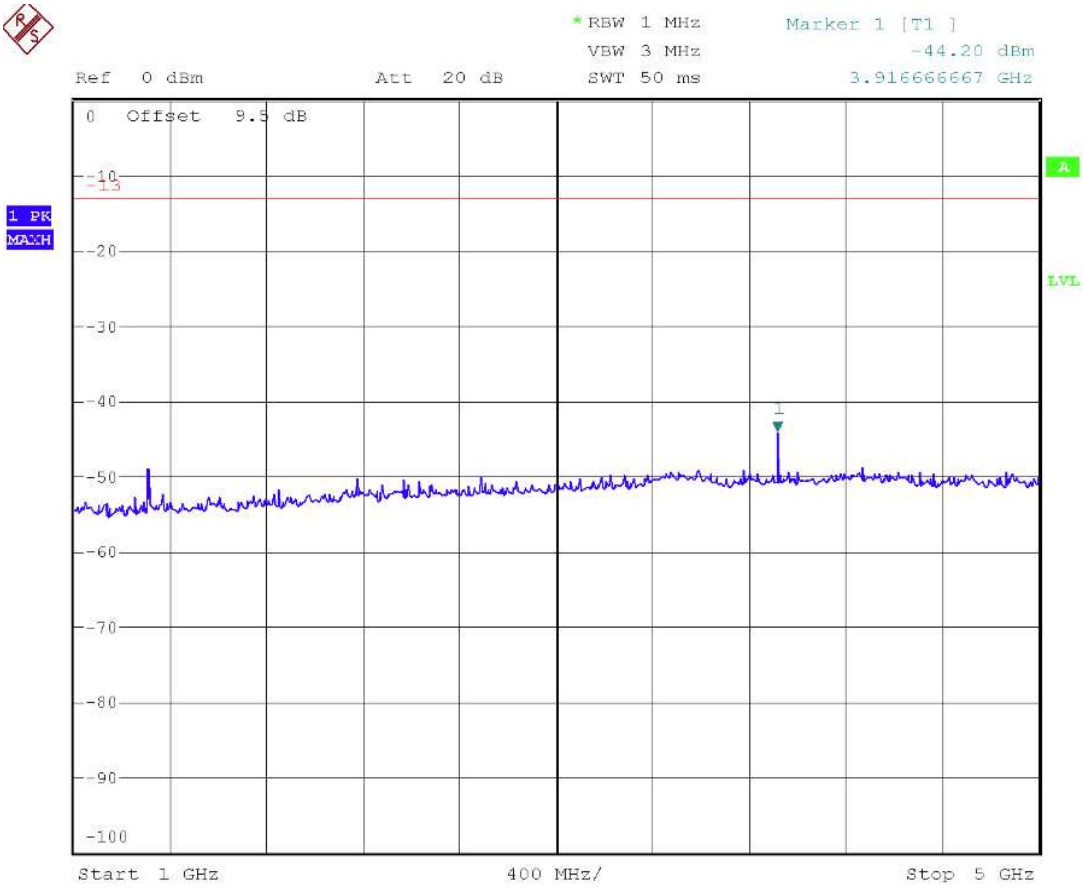
435.025 MHz @ 12.5 KHz Channel Separations – High Power Level



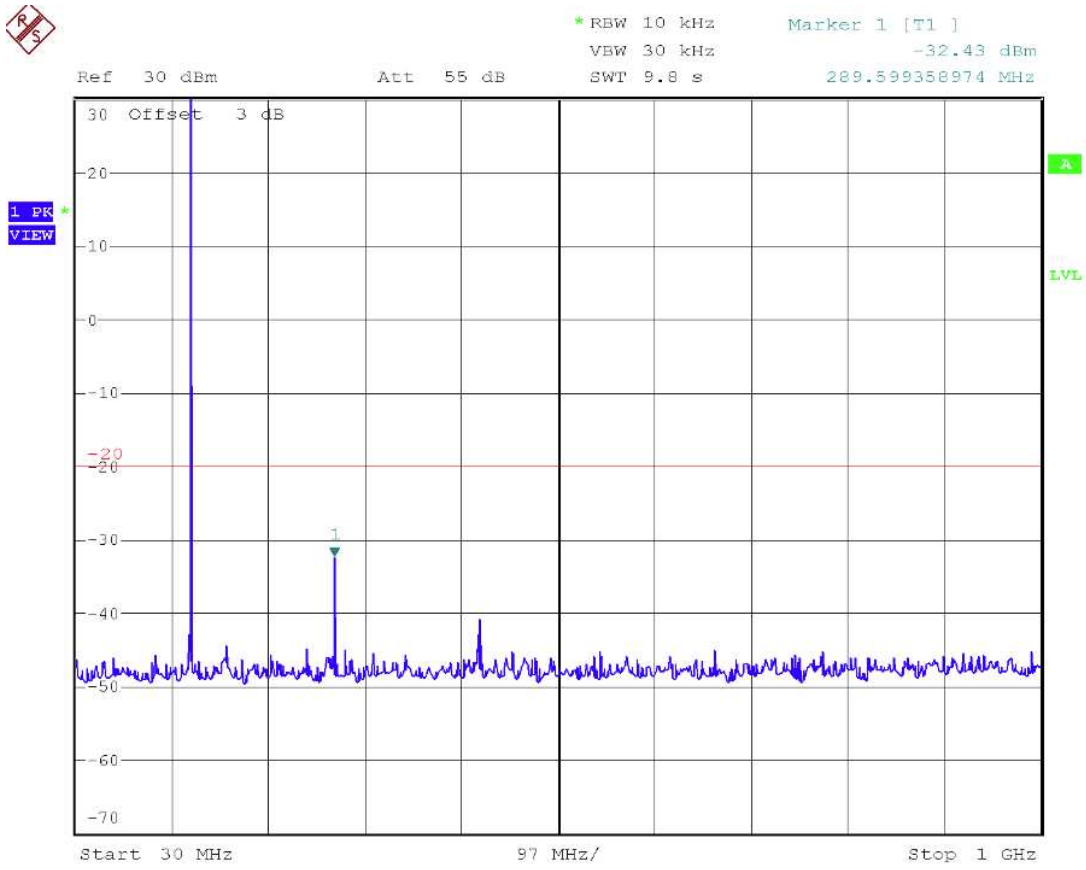



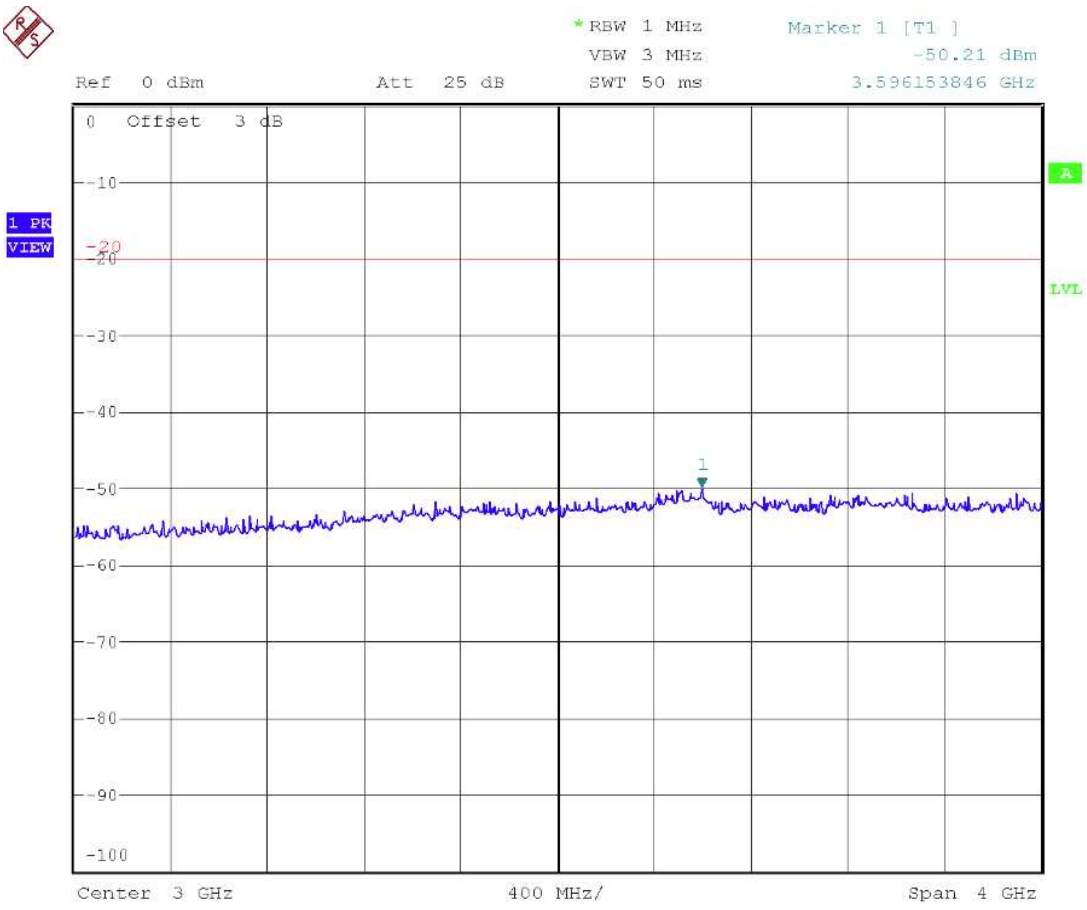
435.025 MHz @ 25 KHz Channel Separations – High Power Level



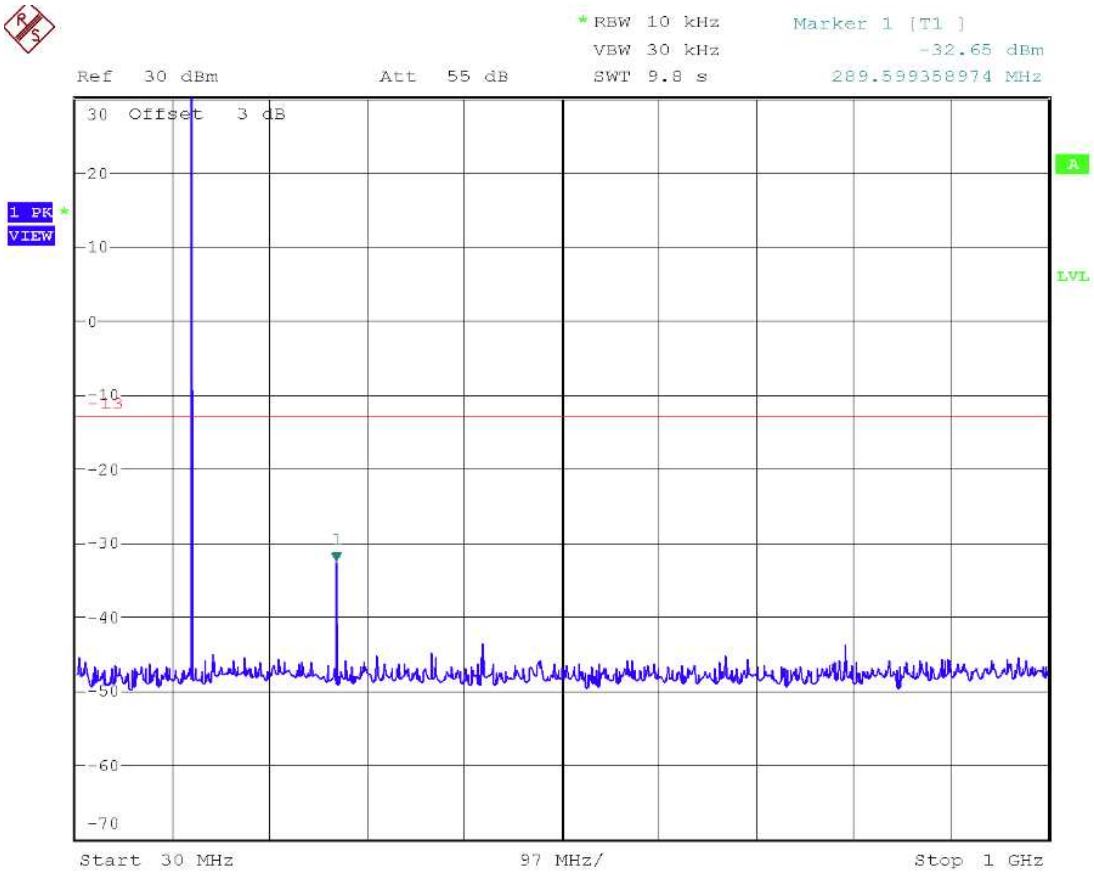



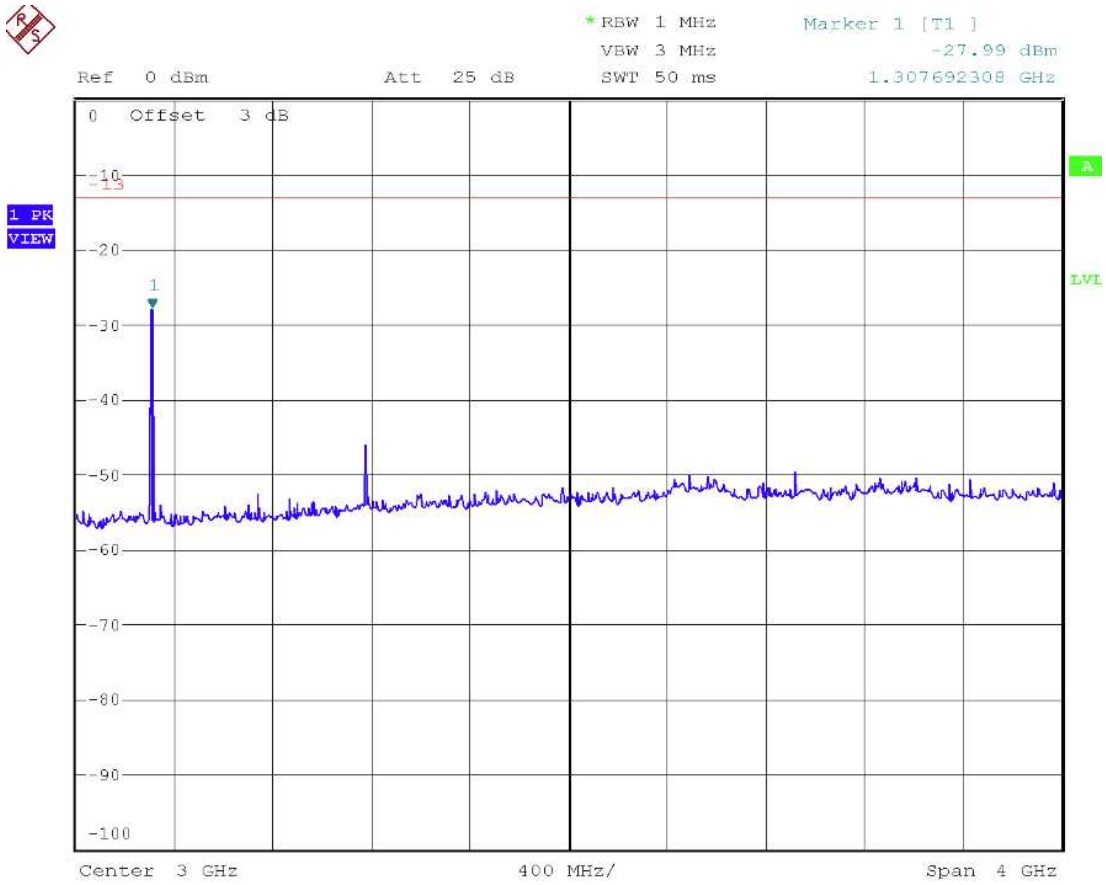
145.025 MHz @ 12.5 KHz Channel Separations – Low Power Level



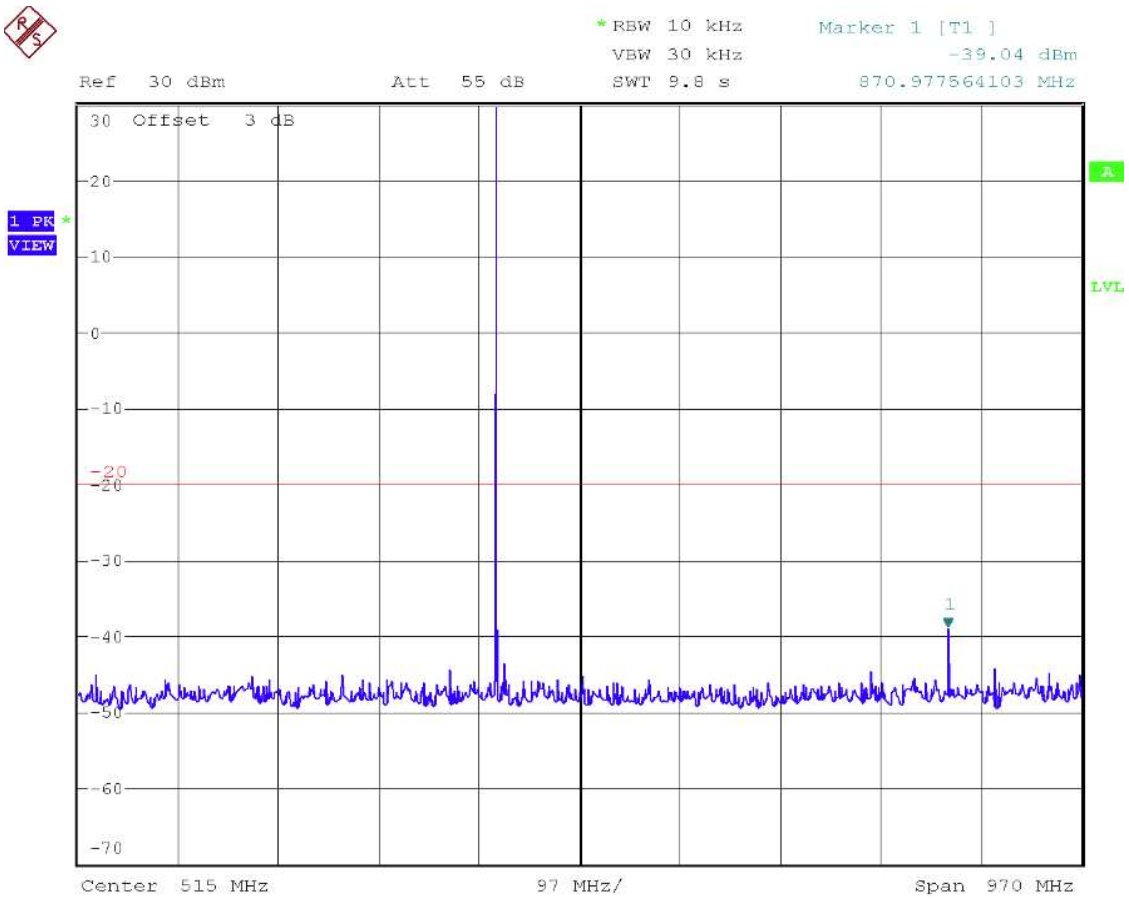



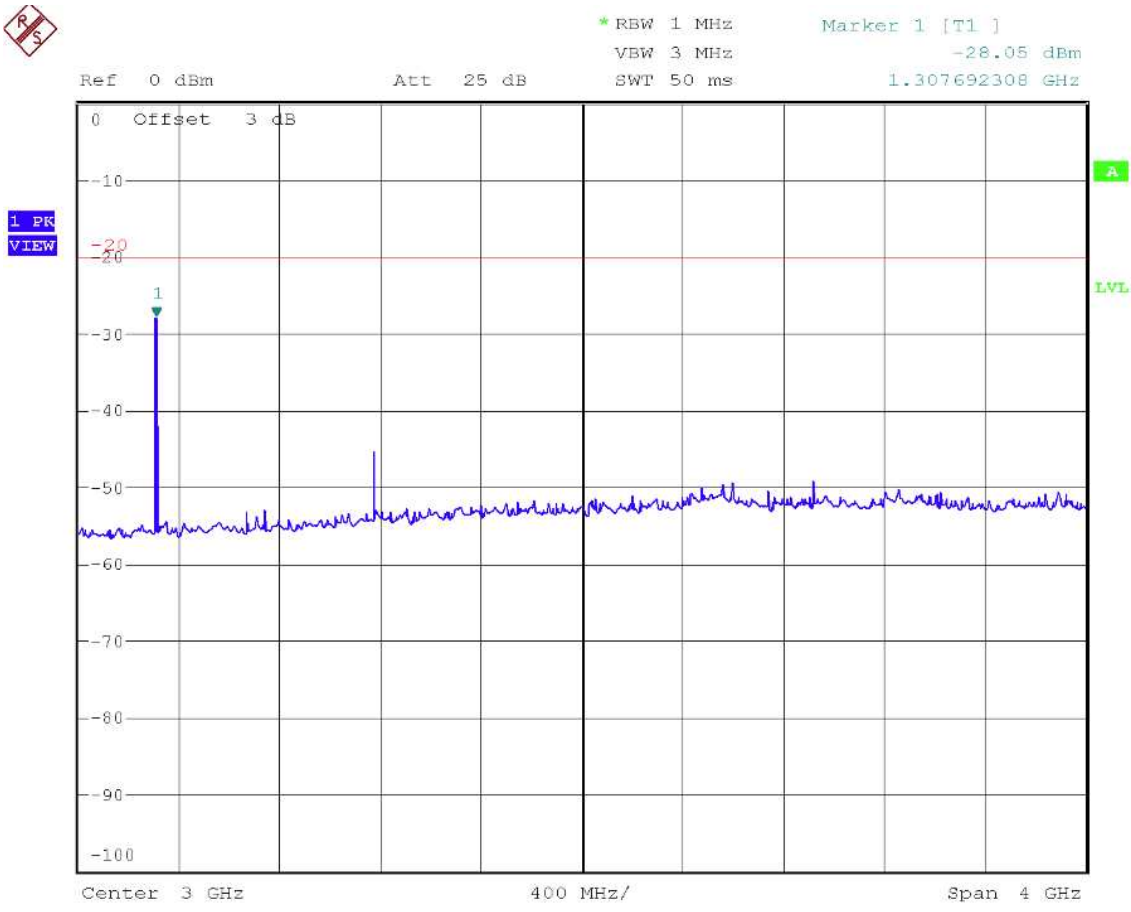
145.025 MHz @ 25 KHz Channel Separations – Low Power Level



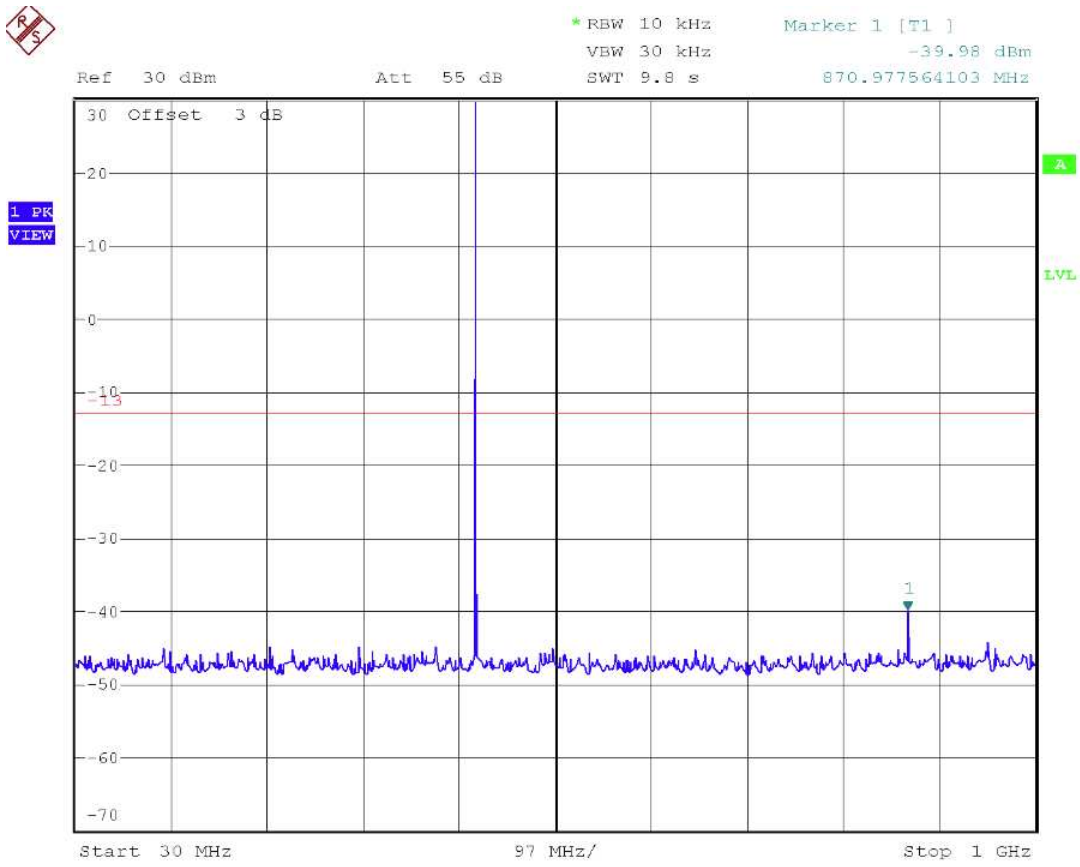



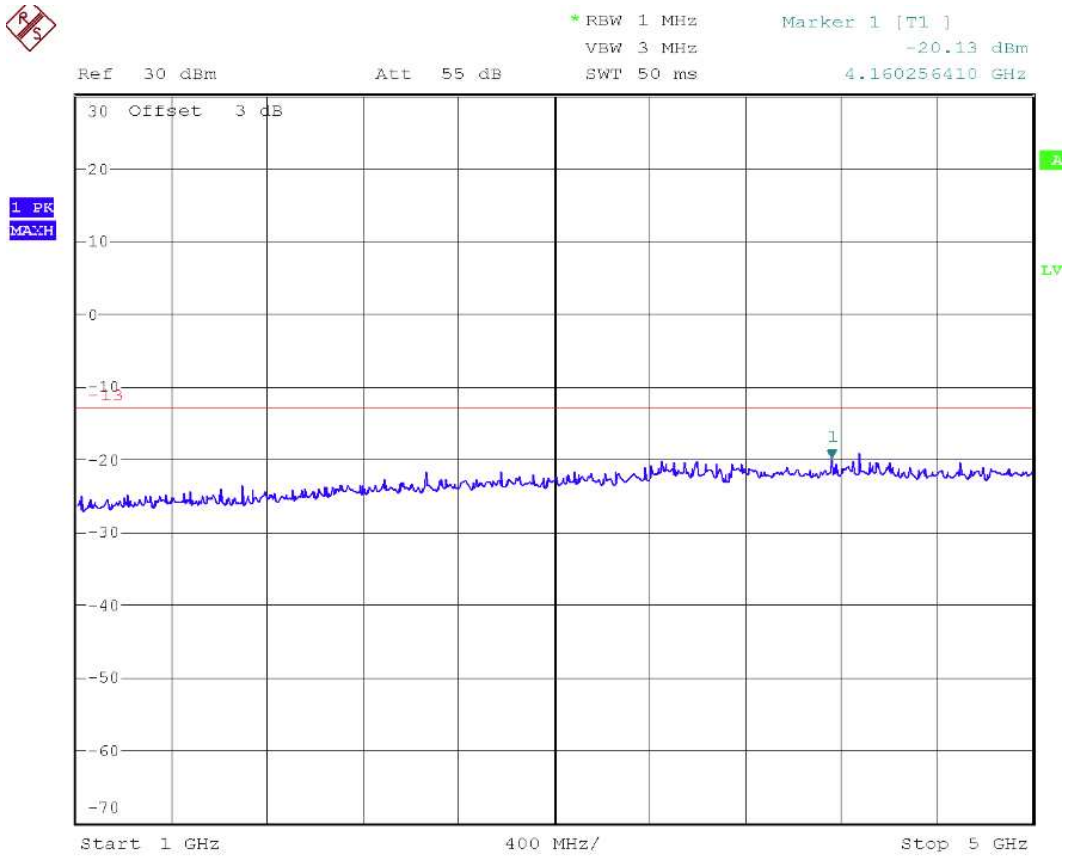
435.025 MHz @ 12.5 KHz Channel Separations – Low Power Level



435.025 MHz @ 25 KHz Channel Separations – Low Power Level




Test Result: PASS

## 2.6. Frequency Stability

### 2.6.1. Provisions Applicable

a). According to FCC Part 2 Section 2.1055(a)(1), the frequency stability shall be measured with variation of ambient temperature from –30℃ to +50℃ centigrade.

b). According to FCC Part 2 Section 2.1055(d)(2), for battery powered equipment, the frequency stability shall be measured with reducing primary supply voltage to the battery normal operating status, which is specified by the manufacturer.

c). According to FCC Part 90 Section 90.213, the frequency tolerance must be maintained within ±5ppm for 12.5/25KHz channel separation in 150-174MHz and 25KHz channel separation in 421-512 MHz, while ±2.5ppm for 12.5KHz channel separation in 421-512 MHz .

### 2.6.2. Measurement Procedure

**2.5.2.1 Frequency stability versus environmental temperature**

1. Setup the configuration per figure 1 for frequencies measurement inside an environment chamber, Install new battery in the EUT.

2. Turn on EUT and set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 1KHz and Video Resolution Bandwidth to 1KHz and Frequency Span to 50KHz.Record this frequency as reference frequency.

3. Set the temperature of chamber to 50℃. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize. While maintaining a constant temperature inside the chamber, turn the EUT on and measure the EUT operating frequency.

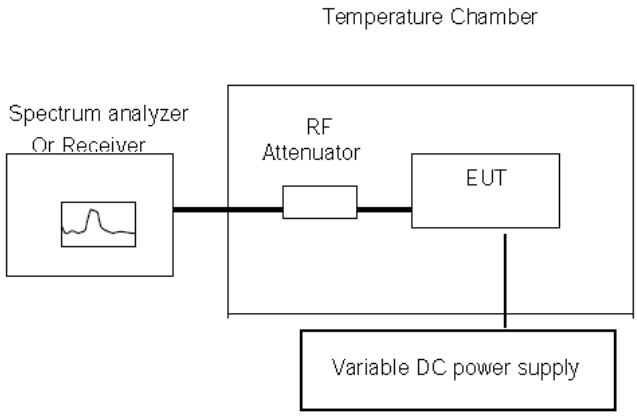
4. Repeat step 2 with a 10℃ decreased per stage until the lowest temperature -30℃ is measured, record all measured frequencies on each temperature step.

**2.5.2.2 Frequency stability versus input voltage**

1. Setup the configuration of the ambient temperature form -30ºC to 50ºC with sufficient time. And measure the different frequencies of the EUT with an artificial power from highest to end point voltage.

2. Set SA center frequency to the EUT radiated frequency. Set SA Resolution Bandwidth to 300Hz and Video Resolution Bandwidth to 300Hz. Record this frequency as reference frequency.

### 2.6.3. Test Setup Block Diagram




### 2.6.4. Measurement Instruments

| Name Of Equipment | Manufacturer | Model | S/N | Cal. Due Date |
|---|---|---|---|---|
| Spectrum Analyzer | R&S | FSU-8 | 200034 | 2012.6.2 |
| Power Supply | Agilent | 66319D | MY43000556 | 2012.6.2 |
| Climate Chamber | Votsch | VT4002 | 58566087750080 | 2013.1.8 |

### 2.6.5. Test result

12.5 KHz channel separation:

| Voltage (V) | Temperature (℃) | Transmit Frequency (MHz) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 136.025 | 145.025 | 173.95 | 400.025 | 435.025 | 469.95 |
| | | Frequency error (ppm) | | | | | |
| 7.4 | -30 | 0.40 | 0.59 | 0.31 | 0.19 | 0.37 | 0.41 |
| | -20 | 0.24 | 0.32 | 0.39 | 0.43 | 0.51 | 0.29 |
| | -10 | 0.21 | 0.27 | 0.31 | 0.21 | 0.28 | 0.17 |
| | 0 | 0.08 | 0.35 | 0.02 | 0.34 | 0.33 | 0.24 |
| | 10 | 0.01 | 0.3 | 0.01 | 0.39 | 0.16 | 0.37 |
| | 20 | 0.37 | 0.14 | 0.17 | 0.39 | 0.31 | 0.11 |
| | 30 | 0.13 | 0.02 | 0.37 | 0.02 | 0.35 | -0.05 |
| | 40 | -0.08 | -0.08 | 0.01 | -0.06 | 0.09 | -0.07 |
| | 50 | -0.31 | -0.23 | -0.4 | -0.05 | -0.11 | -0.07 |
| 6.3 | 20 | 0.36 | 0.18 | 0.21 | 0.37 | 0.33 | 0.14 |
| 8.5 | 20 | 0.34 | 0.20 | 0.21 | 0.36 | 0.33 | 0.18 |
| Max. frequency error (ppm) | | 0.4 | 0.59 | 0.39 | 0.43 | 0.51 | 0.41 |
| Limit (ppm) | | ±5.00 | | | ±2.50 | | |
| Result | | Pass | Pass | Pass | Pass | Pass | Pass |

25 KHz channel separation:

| Voltage (V) | Temperature (℃) | Transmit Frequency (MHz) | | | | | |
|---|---|---|---|---|---|---|---|
| | | 136.025 | 145.025 | 173.95 | 400.025 | 435.025 | 469.95 |
| | | Frequency error (ppm) | | | | | |
| 7.4 | -30 | 0.47 | 0.33 | 0.38 | 0.34 | 0.55 | 0.37 |
| | -20 | 0.24 | 0.07 | 0.45 | 0.71 | 0.74 | 0.29 |
| | -10 | 0.35 | 0.11 | 0.19 | 0.44 | 0.41 | 0.23 |
| | 0 | 0.24 | 0.33 | 0.14 | 0.56 | 0.08 | 0.28 |
| | 10 | 0.12 | 0.35 | 0.23 | 0.37 | 0.33 | 0.31 |
| | 20 | 0.29 | 0.21 | 0.16 | 0.45 | 0.65 | 0.07 |
| | 30 | 0.35 | -0.12 | 0.06 | 0.07 | 0.34 | 0.01 |
| | 40 | 0.12 | -1.38 | 0.17 | -0.04 | 0.08 | -0.04 |
| | 50 | -0.12 | -0.12 | 0.1 | -0.1 | -0.18 | -0.13 |
| 6.3 | 20 | 0.30 | 0.24 | 0.18 | 0.39 | 0.52 | 0.14 |
| 8.5 | 20 | 0.32 | 0.21 | 0.20 | 0.38 | 0.50 | 0.14 |
| Max. frequency error (ppm) | | 0.47 | -1.38 | 0.45 | 0.71 | 0.74 | 0.37 |
| Limit (ppm) | | ±5.00 | | | | | |
| Result | | Pass | Pass | Pass | Pass | Pass | Pass |

Test Result: PASS

## 2.7. Transient Frequency Behavior

### 2.7.1. Provisions Applicable

According to FCC Part 90 Section 90.214, the EUT must maintain transient frequencies within the maximum frequency difference limits during the time intervals indicated:

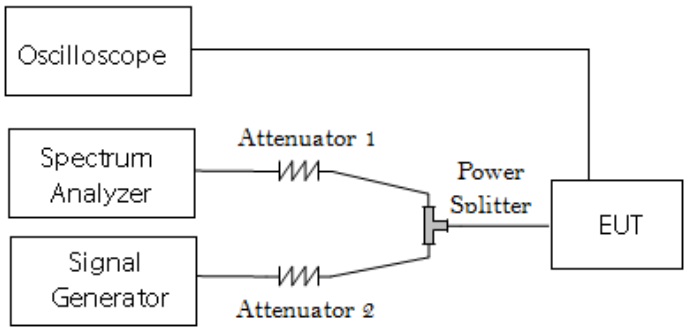
| Time intervals [1,2] | Maximum frequency difference [3] | All equipment | |
|---|---|---|---|
| | | 150 to 174 MHz | 421 to 512 MHz |
| Transient Frequency Behavior for Equipment Designed to Operate on 25 kHz Channels | | | |
| $t_1$ [4] ..... | ±25.0 kHz | 5.0 ms | 10.0 ms |
| $t_2$ ..... | ±12.5 kHz | 20.0 ms | 25.0 ms |
| $t_3$ [4] ..... | ±25.0 kHz | 5.0 ms | 10.0 ms |

### 2.7.2. Measurement Procedure

1. Connect the transmitter under tests as shown in the above block diagram
2. Set the signal generator to the assigned frequency and modulate with a 1 KHz tone at +12.5 KHz deviation and its output level to be 50 dB below the transmitter RF output at the test receiver end.
3. Set the horizontal sweep rate on the storage scope to 10 milliseconds per division and adjust the display to continuously view the 1000 Hz tone from the Demodulator Output Port (DOP) of the Test Receiver. Adjust the vertical scale amplitude control of the scope to display the 1000 Hz at +4 divisions vertical Center at the display.
4. Adjust the scope so it will trigger on an increasing magnitude from the RF trigger signal of the transmitter under test when the transmitter was turned on. Set the controls to store the display.
5. The output at the DOP, due to the change in the ratio of the power between the signal generator input power and transmitter output power will, because of the capture effect of the test receiver, produce a change in display: For the first part of the sweep it will show the 1 KHz test signal. Then once the receiver's demodulator has been captured by the transmitter power, the display will show the frequency difference from the assigned frequency to the actual transmitter frequency versus time. The instant when the 1 KHz test signal is completely suppressed (including any capture time due to phasing) is considered to be ton. The trace should be maintained within the allowed divisions during the period t1 and t2.

6. During the time from the end of t2 to the beginning of t3 the frequency difference should not exceed the limits set by the FCC in Part 90.214 and the outlined in the Carrier Frequency Stability sections. The allowed limit is equal to FCC frequency tolerance limits specified in FCC 90.213.
7. Repeat the above steps when the transmitter was turned off for measuring t3.

### 2.7.3. Test Setup Block Diagram



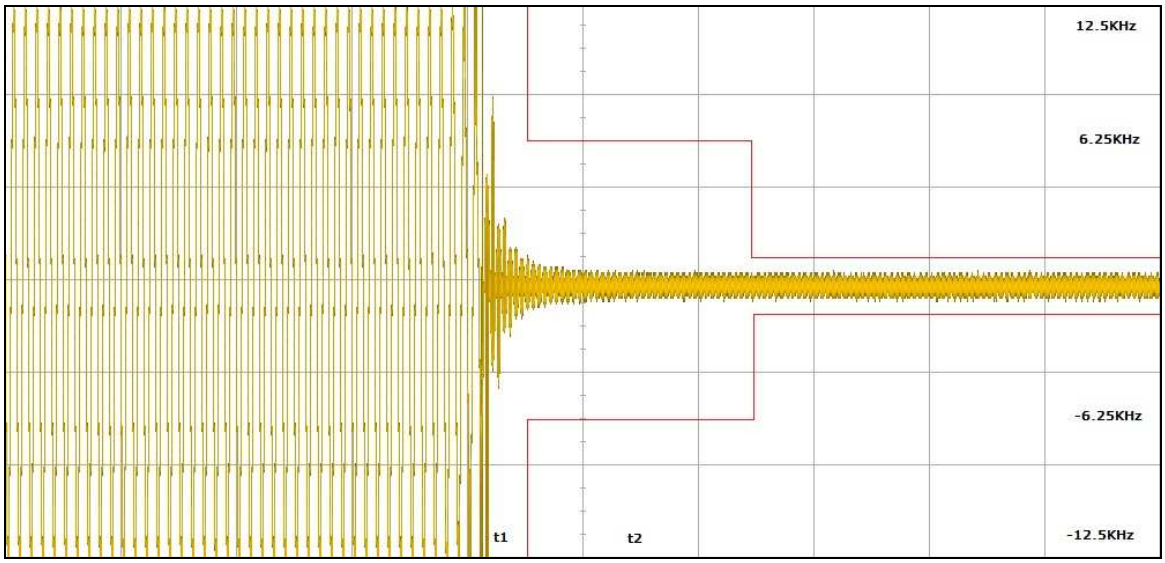

### 2.7.4. Measurement Instruments

| Name Of Equipment | Manufacturer | Model | S/N | Cal. Due Date |
|---|---|---|---|---|
| Signal Generator | Agilent | E4418B | MY45100845 | 2013.1.9 |
| Oscilloscope | Agilent | MS6034A | MY44002532 | 2013.2.18 |
| Modulation Analyzer | Agilent | 8901B | 2920A02186 | 2012.9.8 |

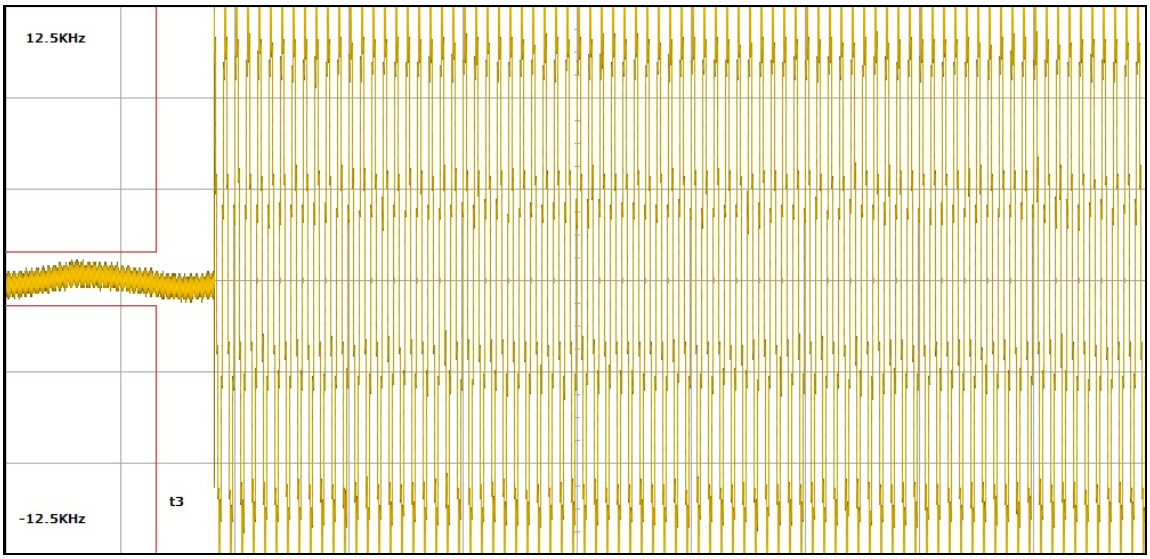
### 2.7.5. Test result

Test Result: PASS

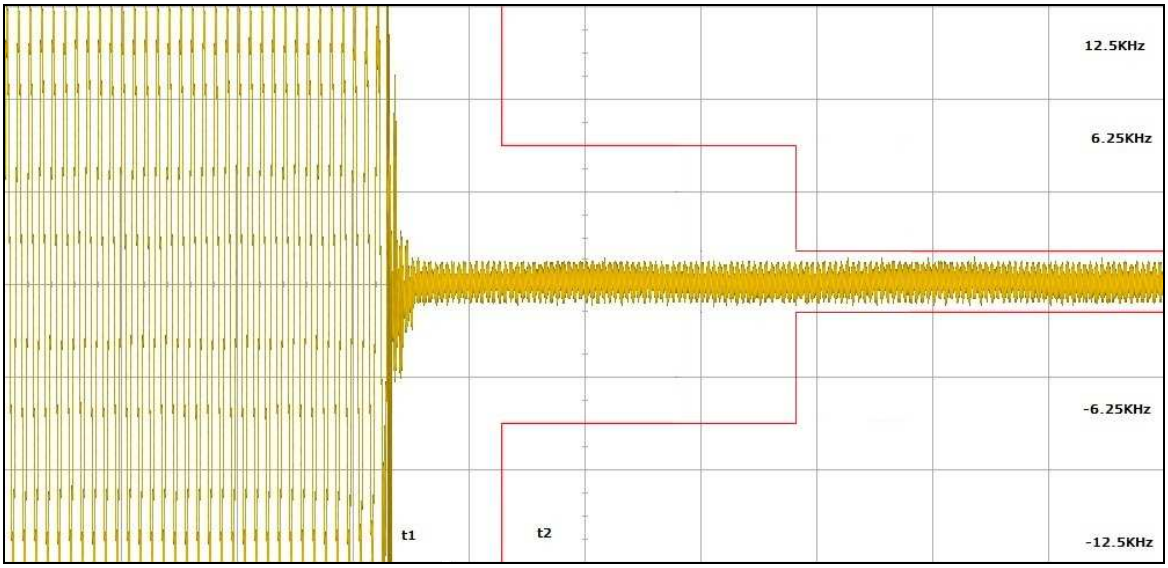
**145.025MHz @ 12.5 KHz Channel Separation –Off to On**



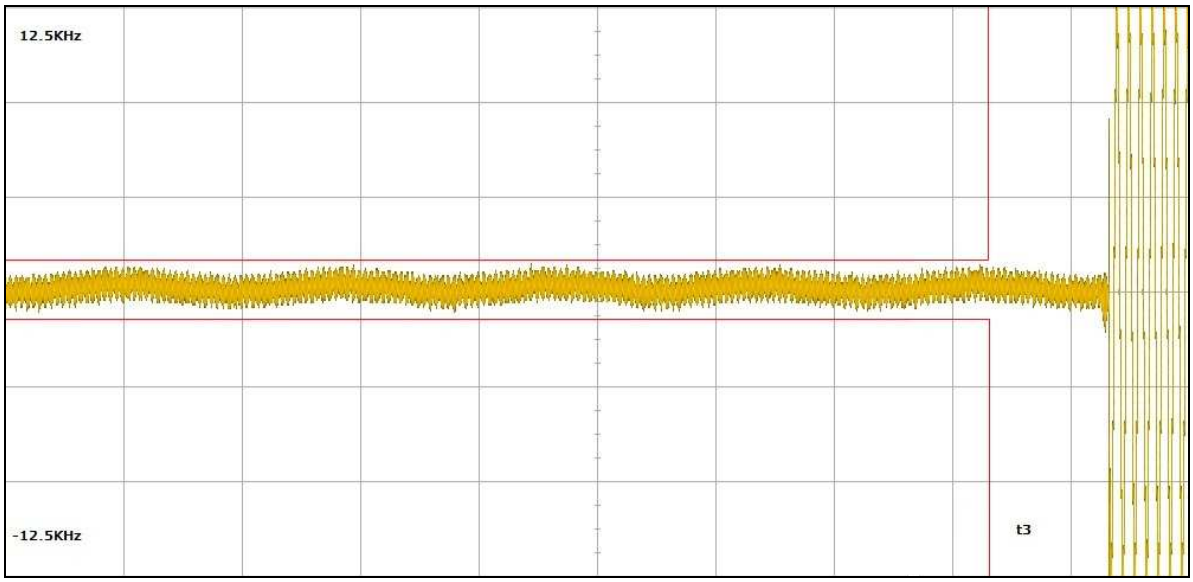

**145.025MHz @ 12.5 KHz Channel Separation –On to Off**



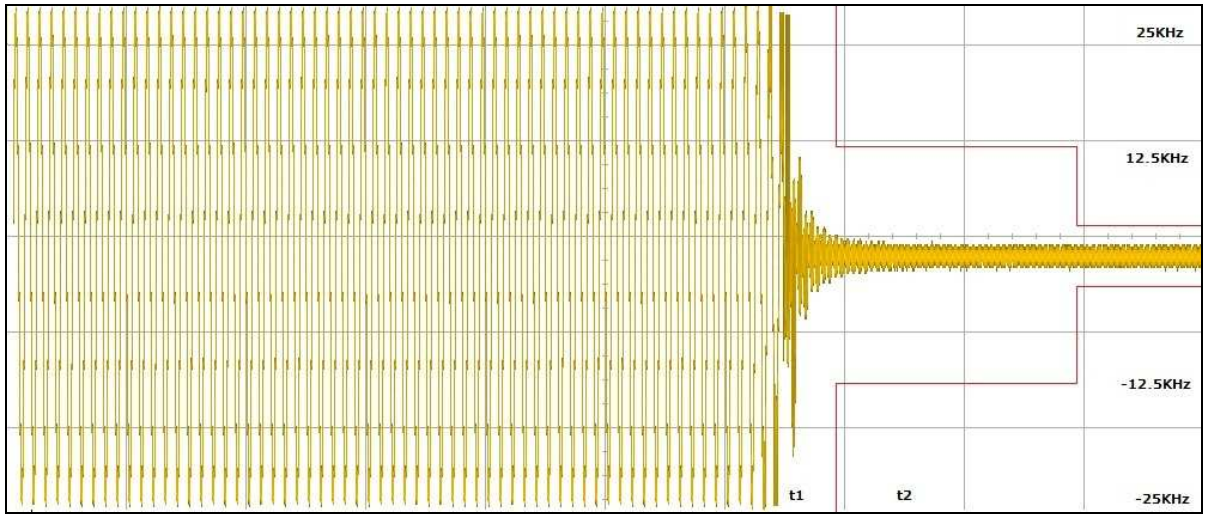
**435.025MHz @ 12.5 KHz Channel Separation –Off to On**



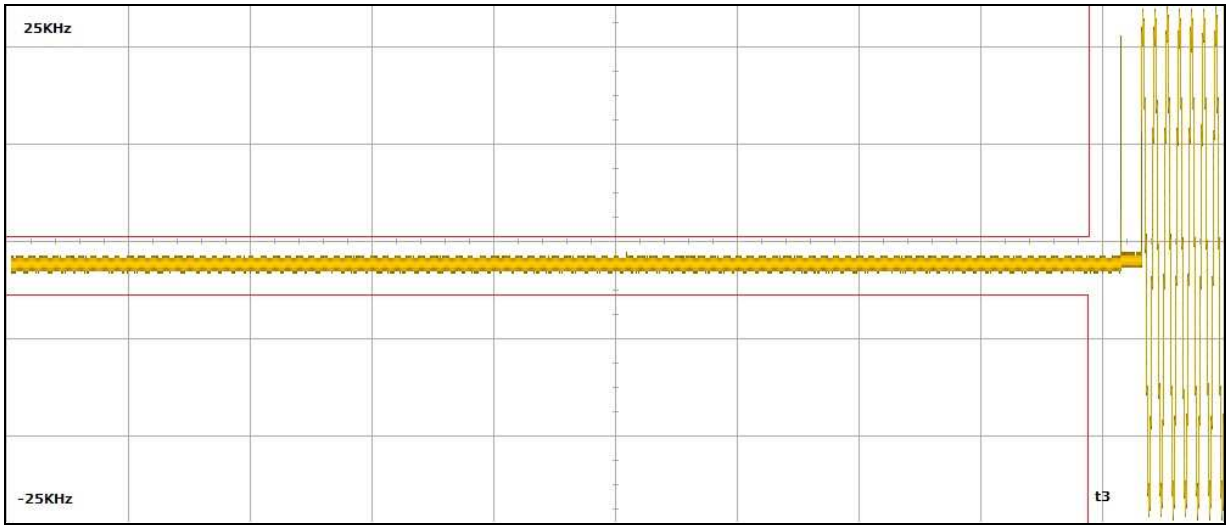

**435.025MHz @ 12.5 KHz Channel Separation –On to Off**



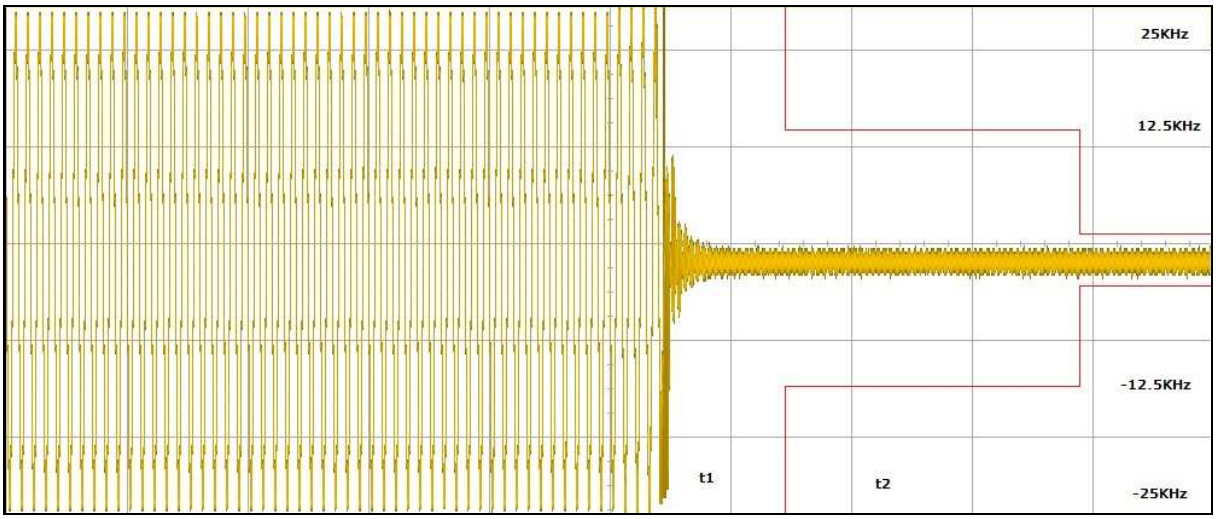
**145.025MHz @ 25 KHz Channel Separation –Off to On**



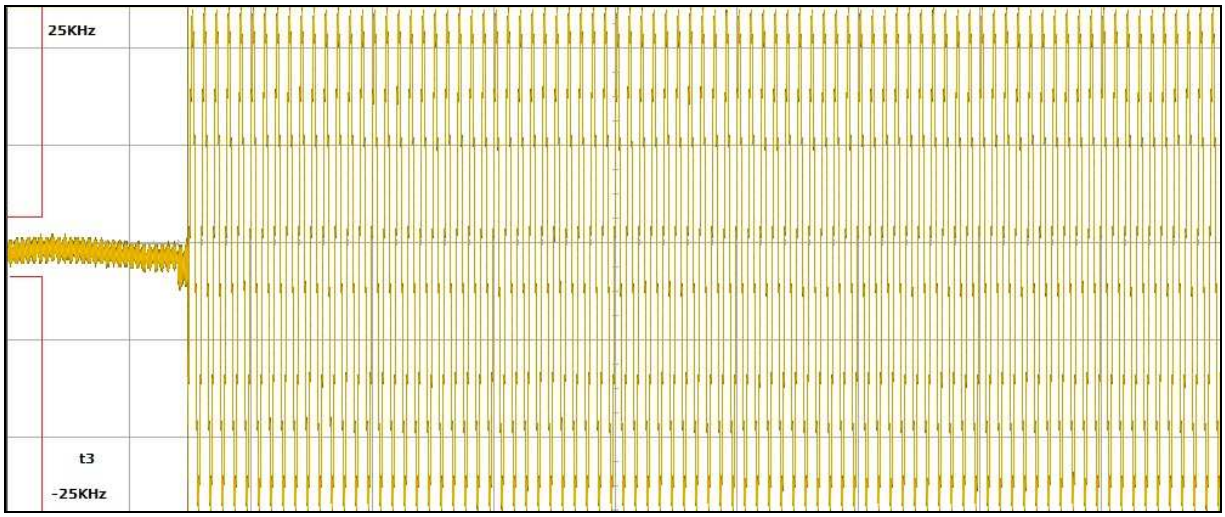

**145.025MHz @ 25 KHz Channel Separation –On to Off**



**435.025MHz @ 25 KHz Channel Separation –Off to On**




**435.025MHz @ 25 KHz Channel Separation –On to Off**




** END OF REPORT **