

JAPAN MIC
TEST REPORT

For

SZ DJI TECHNOLOGY CO., LTD

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Nanshan, Shenzhen, Guangdong, China

Tested Model: M210 RTK V2
Multiple Models: M200 V2, M210 V2

| | | |
|---|---|---|
| This Report Concerns: <input checked="" type="checkbox"/> Original Report | | Equipment Type: Remote Aircraft |
| Report Number: | RDG181113003-07B | |
| Report Date: | 2018-11-28 | |
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Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan).

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

| | | |
|--------------------------------|-------------------|---|
| Equipment Type | | Remote Aircraft |
| Product Name | | Matrice 200 V2, Matrice 210 V2, Matrice 210 RTK V2 |
| Tested Model Number | | M210 RTK V2 |
| Multiple Model Number | | M200 V2, M210 V2 |
| Radio Type | | 1.4M/10M/20M Mode |
| SDR Technical Parameters | Support Technical | 1.4M/10M/20M Mode |
| | Modulation Type | GFSK, OFDM |
| | Emission Type | G1D, D1D, X7W |
| | Frequency Range | 1.4M: 2403.5-2477.5MHz, 10M: 2406.5-2476.5MHz, 20M: 2411.5-2471.5MHz |
| | Output Power | 1.4M: 0.1mW/MHz 10M: 1.4mW/MHz for 2411.5-2476.5MHz, 0.3mW/MHz for 2406.5-2410.5MHz 20M : 0.95mW/MHz |
| | Antenna Gain | 2.29dBi |
| Nominal Power Supply: | | DC 22.8V from battery |
| Voltage Range | | 20.5V to 25.1V DC |
| External Dimension | | 883mm (L) x 886mm (W) x 427mm (H) |
| Serial Number | | 181113003 (Assigned by BACL, Dongguan) |
| Received Date | | 2018-11-13 |

Note: The series product, Matrice 200 V2(Model: M200 V2), Matrice 210 V2(Model: M210 V2) are electrically identical with Matrice 210 RTK V2(Model: M210 RTK V2), we selected M210 RTK V2 for full testing. The difference between them was explained in the declaration letter.

Objective

The objective of the manufacturer is to demonstrate compliance with Radio Law of Japan item 19 of Article 2 Paragraph 1

Test Methodology

All measurements contained in this report were conducted with technical regulations of the Radio Law of Japan.

EUT TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in engineering mode which provide by manufacturer. The EUT has 2 antennas, the system configure 1T1R depending on better performance by the system automatically recognizes.

For 1.4M mode, 38 channels are provided to testing:

| Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---------|-----------------|---------|-----------------|
| 1 | 2403.5 | 20 | 2441.5 |
| 2 | 2405.5 | ... | ... |
| ... | ... | ... | ... |
| ... | ... | ... | ... |
| ... | ... | 37 | 2475.5 |
| 19 | 2439.5 | 38 | 2477.5 |

3channels were tested: 2403.5MHz, 2441.5MHz and 2477.5MHz

The extreme voltage test conditions which were declared by the manufacturer and the normal conditions are as below:

NV: Normal Voltage 22.8V_{DC}

LV: Low Voltage 20.5V_{DC}

HV: High Voltage 25.1V_{DC}

EUT Exercise Software

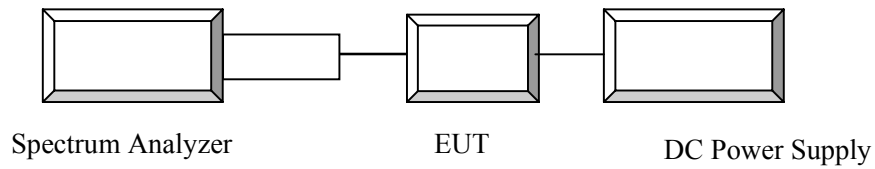
For 1.4M mode, the software “DjiSdrConsole_1.3.1.50.exe” was used which was provided by manufacturer. The maximum power with maximum duty cycle was configured as default setting.

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

| Manufacturer | Description | Model | Serial Number |
|----------------|-----------------|---------|---------------|
| Pro instrument | DC Power Supply | pps3300 | 3300012 |

Configuration of Test Setup**Test Equipment List and Details**

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|----------------|---------------------------|-------------|---------------|------------------|----------------------|
| R&S | Spectrum Analyzer | FSU 26 | 200256 | 2018-01-04 | 2019-01-04 |
| Unknown | Coaxial Cable | C-SJ00-0010 | C0010/02 | Each time | N/A |
| narda | Attenuator | 6dB | 04270 | 2018-09-06 | 2019-09-06 |
| Agilent | USB Wideband Power Sensor | U2021XA | MY5425009 | 2018-03-21 | 2019-03-21 |
| UNI-T | Multimeter | UT39A | M130199938 | 2018-07-24 | 2019-07-24 |
| Pro instrument | DC Power Supply | pps3300 | 3300012 | N/A | N/A |

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

SUMMARY OF TEST RESULTS

| MIC Notice No.88 Appendix No.43 Article 2, Paragraph 1, Item 19 Rules Section | Description of Test | Result |
|--|--|----------------|
| 3 | Frequency Error | Compliance |
| 4 | Occupied Bandwidth and Spreading Bandwidth | Compliance |
| 5 | Transmitter Spurious Emission and Unwanted Emission Intensity | Compliance |
| 6 | Antenna Output Power and Output Power Tolerance | Compliance |
| 7 | Receiver Spurious Emission and Unwanted Emission Intensity | Compliance |
| 8 | Transmission Antenna Gain | Not Applicable |
| 9 | Transmission Radiation Angle Width | Not Applicable |
| 10 | Frequency Hopping Dwell Time | Compliance |
| 11 | Interference Prevention Function | Compliance |
| Note 1 | Construction Protection Confirmation | Compliance |

Not Applicable: Please refer to 'Note 2' of Antenna Output Power and Output Power Tolerance section.

FREQUENCY ERROR

Limit

50ppm or below

Test Procedure

Set the EUT to the measurement frequency without modulation.
Setting of SA is following as: RB: 30 kHz / VB: 30 kHz / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold.
Record the peak spot frequency.

If the EUT can't set at un-modulation mode, measure the 10dBc center frequency.

Test Data

Environmental Conditions

| | |
|---------------------------|-----------------|
| Temperature: | 25.5~25.8°C |
| Relative Humidity: | 40~45 % |
| ATM Pressure: | 100.6~100.8 kPa |

The testing was performed by Elena Lei on 2018-11-22~2018-11-23.

Test Result: Compliance

For 1.4M mode:

Chain 0

| Frequency (MHz) | Voltage | Measure Frequency (MHz) | | Result MHz | Tolerance ppm | Limit |
|-----------------|---------|-------------------------|----------|------------|---------------|--------|
| | | F1 | F2 | | | |
| 2403.5 | LV | 2402.924 | 2404.109 | 2403.517 | 6.86 | <50ppm |
| | NV | 2402.918 | 2404.082 | 2403.500 | 0.00 | |
| | HV | 2402.939 | 2404.041 | 2403.490 | -4.16 | |
| 2441.5 | LV | 2440.952 | 2442.032 | 2441.492 | -3.28 | |
| | NV | 2440.923 | 2442.071 | 2441.497 | -1.23 | |
| | HV | 2440.910 | 2442.064 | 2441.487 | -5.32 | |
| 2477.5 | LV | 2476.947 | 2478.086 | 2477.517 | 6.66 | |
| | NV | 2476.918 | 2478.076 | 2477.497 | -1.21 | |
| | HV | 2476.934 | 2478.045 | 2477.490 | -4.24 | |

Chain 1

| Frequency (MHz) | Voltage | Measure Frequency (MHz) | | Result MHz | Tolerance ppm | Limit |
|-----------------|---------|-------------------------|----------|------------|---------------|--------|
| | | F1 | F2 | | | |
| 2403.5 | LV | 2402.917 | 2404.091 | 2403.504 | 1.66 | <50ppm |
| | NV | 2402.924 | 2404.077 | 2403.501 | 0.21 | |
| | HV | 2402.913 | 2404.069 | 2403.491 | -3.74 | |
| 2441.5 | LV | 2440.907 | 2442.050 | 2441.479 | -8.81 | |
| | NV | 2440.919 | 2442.067 | 2441.493 | -2.87 | |
| | HV | 2440.906 | 2442.071 | 2441.489 | -4.71 | |
| 2477.5 | LV | 2476.932 | 2478.067 | 2477.500 | -0.20 | |
| | NV | 2476.931 | 2478.077 | 2477.504 | 1.61 | |
| | HV | 2476.897 | 2478.124 | 2477.511 | 4.24 | |

Note:

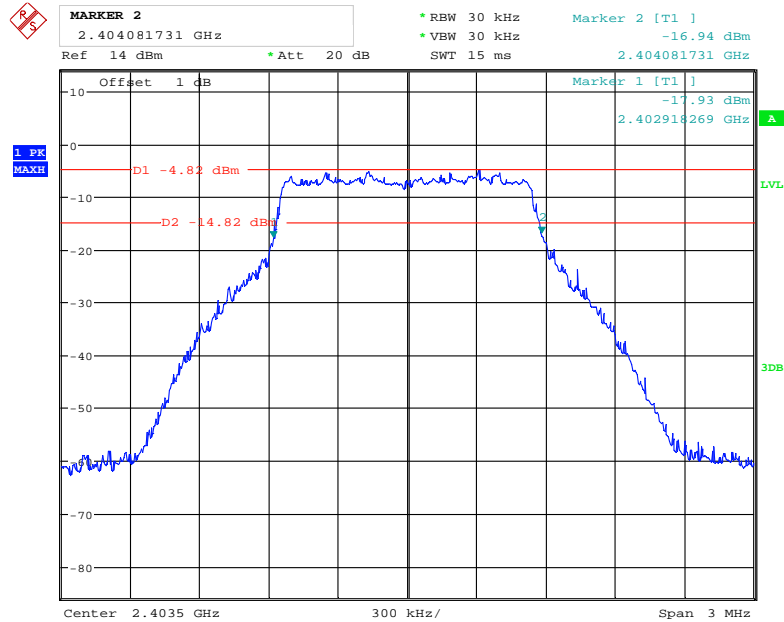
$$\text{Result} = (F1+F2)/2$$

$$\text{Tolerance} = (\text{Result}-\text{Test Frequency})/\text{Test Frequency} \times 10^6$$

Please refer to the plots for normal voltage test.

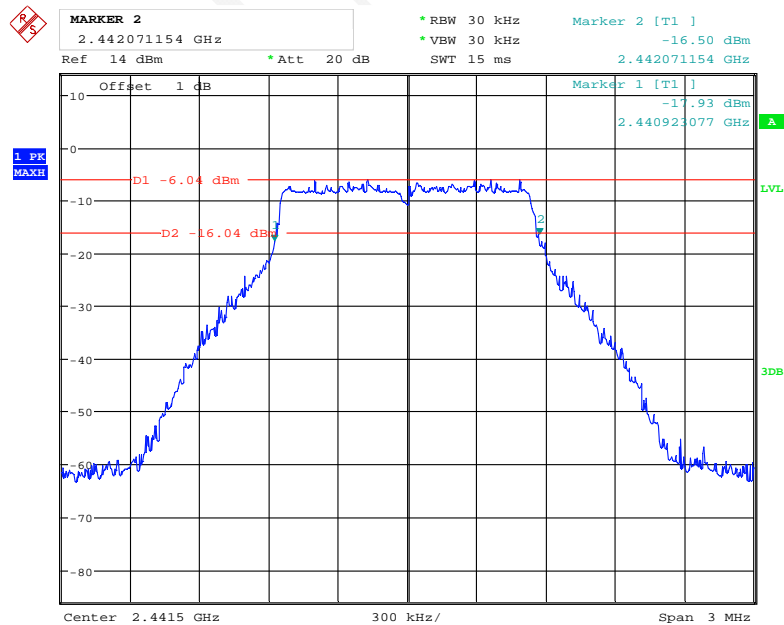
Chain 0

Low Channel



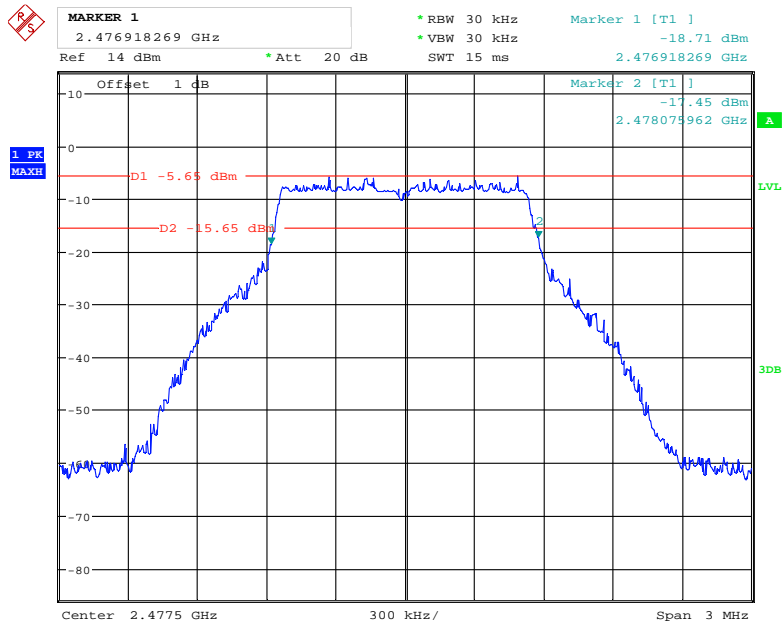
Date: 23.NOV.2018 17:40:57

Middle Channel



Date: 23.NOV.2018 17:41:47

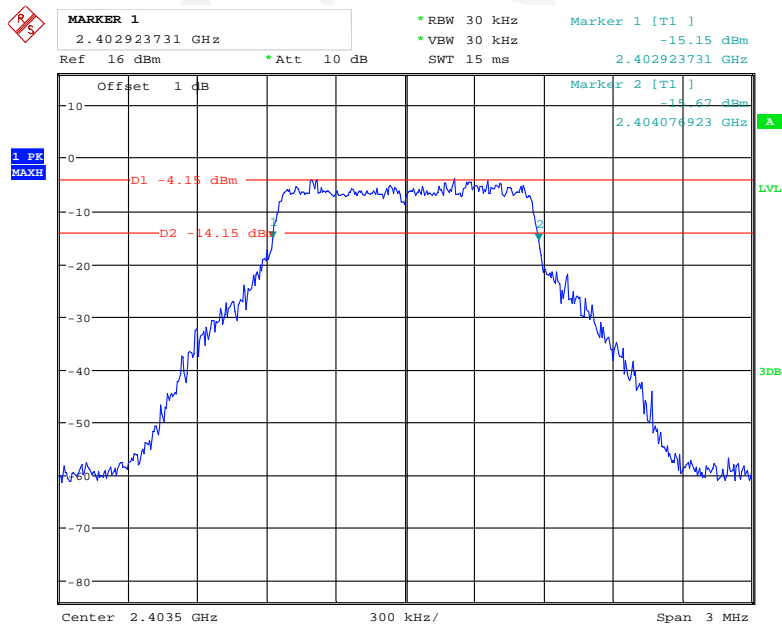
High Channel



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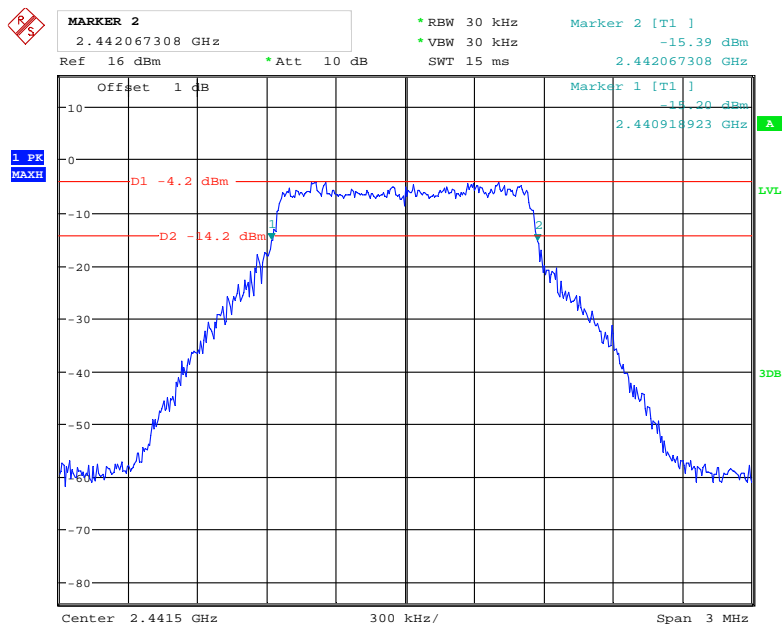
Chain 1

Low Channel



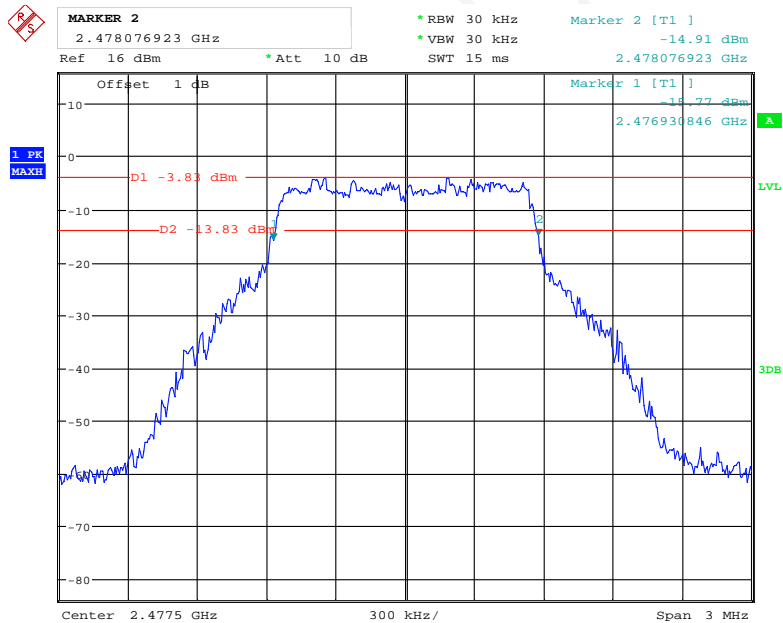
Date: 22.NOV.2018 15:07:48

Middle Channel



Date: 22.NOV.2018 15:07:01

High Channel



Date: 22.NOV.2018 15:08:54

OCCUPIED BANDWIDTH AND SPREADING BANDWIDTH

Limit

- Occupied bandwidth: FH \leq 83.5 MHz; DS \leq 26 MHz; OFDM \leq 38 MHz, Others \leq 26 MHz
- Spread Bandwidth: \geq 500 kHz(FH,DS), Spread factor $>$ 5.

Test Procedure

❖ Conditions of Application Equipment (EUT)

- The modulation state shall be “continuous frequency-hopping mode” by spread spectrum.

❖ Spectrum Analyzer Conditions

- Span: 200 MHz
- RBW: 300 kHz
- VBW: 300 kHz
- Sweep time: Auto, Marker: Marker Off
- Log scale : 10dB/Div, Data points : 501points (400 points or more)
- Detection: Positive Peak, Sweep mode: Continuous

Spread Factor= Spread Bandwidth/modulation rate. The modulation rate: MR=1.

Test Data

Environmental Conditions

| | |
|--------------------|-----------------|
| Temperature: | 25.5~25.9 °C |
| Relative Humidity: | 40~45 % |
| ATM Pressure: | 100.5~100.8 kPa |

The testing was performed by Elena Lei on 2018-11-22~2018-11-24.

Test Result: Compliance*Test Mode: Transmitting*

Chain 0

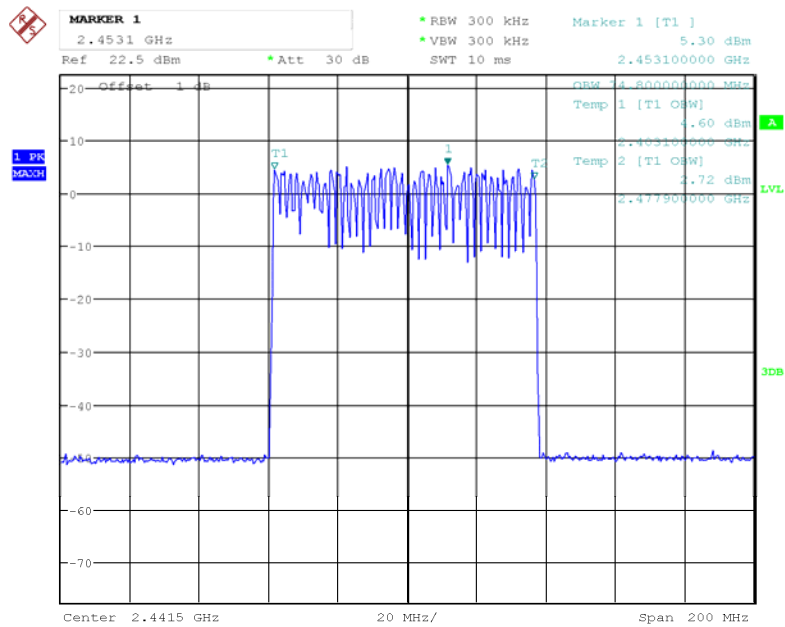
| Voltage | LV | NV | HV | Limit |
|--------------------------|-------|-------|-------|-----------------------|
| Occupied Bandwidth(MHz) | 75.15 | 74.80 | 73.69 | $\leq 83.5\text{MHz}$ |
| Spreading Bandwidth(MHz) | 68.46 | 68.40 | 68.26 | $\geq 500\text{kHz}$ |
| Spreading Factor | 68.46 | 68.40 | 68.26 | >5 |

Chain 1

| Voltage | LV | NV | HV | Limit |
|--------------------------|-------|-------|-------|-----------------------|
| Occupied Bandwidth(MHz) | 76.21 | 75.00 | 74.89 | $\leq 83.5\text{MHz}$ |
| Spreading Bandwidth(MHz) | 69.10 | 68.80 | 68.26 | $\geq 500\text{kHz}$ |
| Spreading Factor | 69.10 | 68.80 | 68.26 | >5 |

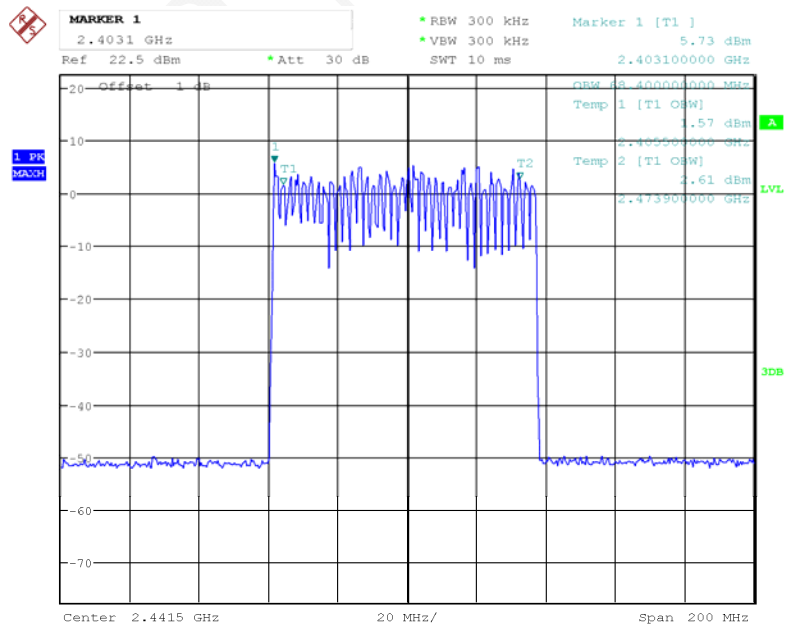
Please refer to the below plots for normal voltage test.
Chain 0

Occupied bandwidth



Date: 24.NOV.2018 16:17:49

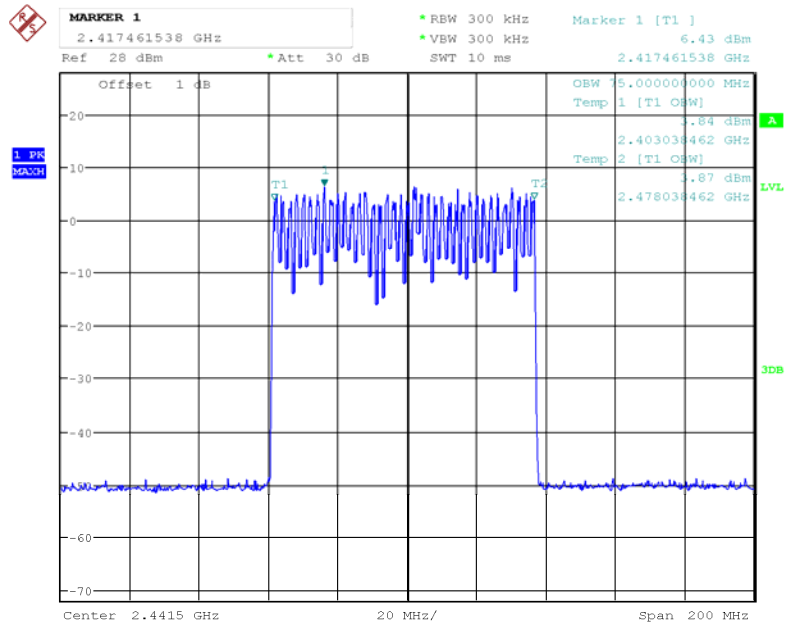
Spreading bandwidth



Date: 24.NOV.2018 16:19:54

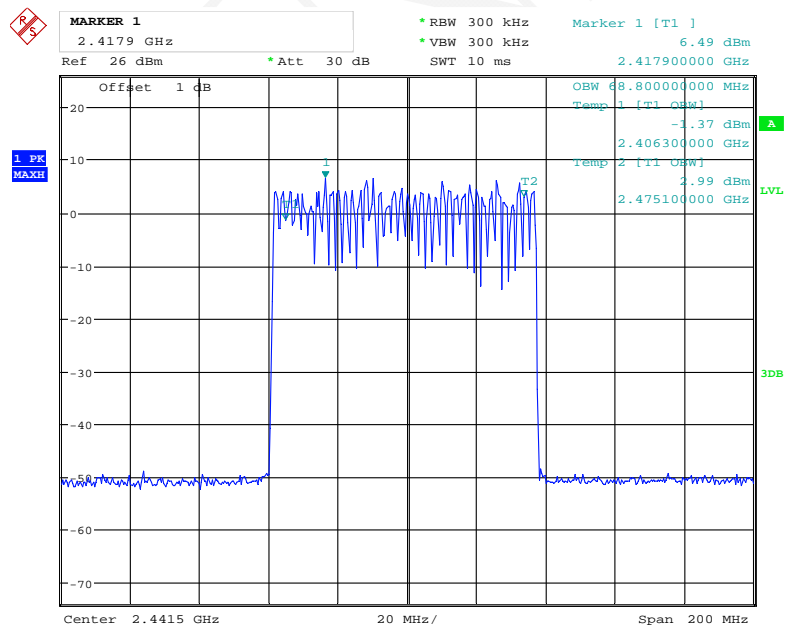
Chain 1

Occupied bandwidth



Date: 24.NOV.2018 16:51:22

Spreading bandwidth



Date: 22.NOV.2018 15:35:11

TRANSMITTER SPURIOUS EMISSION STRENGTH AND UNWANTED EMISSION INTENSITY

Limit

- $f < 1000 \text{ MHz}$: $\leq 0.25 \mu\text{W}/100\text{kHz}$
- $f < 2387 \text{ MHz}$, $f > 2496.5 \text{ MHz}$: $\leq 2.5 \mu\text{W}/\text{MHz}$
- $2387 \text{ MHz} \leq f \leq 2400 \text{ MHz}$; $2483.5 \text{ MHz} < f \leq 2496.5 \text{ MHz}$: $\leq 25 \mu\text{W}/\text{MHz}$

Test Procedure

❖ Conditions of Application Equipment (EUT)

- The modulation state shall be in continuously transmitting mode.

❖ Spectrum Analyzer Conditions

- Setting of SA start 30MHz and stop frequency 1000MHz, RB:100kHz/VB:100kHz, Sweep time: Auto. Sweep mode: continuous sweep .Detect mode: Positive peak/Trace mode: max hold. Then to mark peak. reading value + cable loss shall be less than $0.25 \mu\text{W}/100\text{kHz}$.
- Setting of SA start 1000MHz and stop frequency 2387MHz, RBW: 1MHz/VBW: 1MHz, Sweep time: Auto. Sweep mode: continuous sweep .Detect mode: Positive peak/Trace mode: max hold. Then to mark peak. Reading value + cable loss shall be less than $2.5 \mu\text{W}/\text{MHz}$.
- Setting of SA start 2387MHz and stop frequency 2400MHz, RBW: 1MHz/VBW: 1MHz, Sweep time: Auto. Sweep mode: continuous sweep .Detect mode: Positive peak/Trace mode: max hold. Then to mark peak. Reading value + cable loss shall be less than $25 \mu\text{W}/\text{MHz}$.
- Setting of SA start 2483.5MHz and stop frequency 2496.5MHz, RBW: 1MHz/VBW: 1MHz, Sweep time: Auto. Sweep mode: continuous sweep .Detect mode: Positive peak/Trace mode: max hold. Then to mark peak. Reading value + cable loss shall be less than $25 \mu\text{W}/\text{MHz}$.
- Setting of SA start 2496.5MHz and stop frequency 12500MHz, RBW: 1MHz/VBW: 1MHz, Sweep time: Auto. Sweep mode: continuous sweep .Detect mode: Positive peak/Trace mode: max hold. Then to mark peak. Reading value + cable loss shall be less than $2.5 \mu\text{W}/\text{MHz}$.

Test Data**Environmental Conditions**

| | |
|---------------------------|-----------------|
| Temperature: | 25.5~25.8 °C |
| Relative Humidity: | 40~45 % |
| ATM Pressure: | 100.6~100.8 kPa |

The testing was performed by Elena Lei on 2018-11-22~2018-11-23.

Test Result: Compliance

Test Mode: Transmitting

Chain 0:

| | Frequency Band | 2403.5 MHz | | | 2441.5 MHz | | | 2477.5 MHz | | | Limit |
|------------------------------------|---------------------|------------|--------|--------|------------|--------|--------|------------|--------|--------|----------------|
| | | LV | NV | HV | LV | NV | HV | LV | NV | HV | |
| Raw data | Band I (dBm/100kHz) | -54.82 | -54.58 | -54.47 | -54.71 | -55.07 | -54.96 | -55.76 | -56.06 | -56.34 | -36dBm/100kHz |
| | Band II (dBm/MHz) | -45.14 | -45.19 | -45.43 | -45.73 | -45.92 | -45.45 | -50.37 | -50.24 | -50.19 | -26dBm/MHz |
| | Band III (dBm/MHz) | -38.23 | -38.50 | -38.35 | -47.35 | -47.96 | -47.67 | -48.43 | -48.18 | -48.72 | -16dBm/MHz |
| | Band IV (dBm/MHz) | -47.54 | -47.88 | -48.14 | -47.73 | -47.81 | -47.66 | -47.74 | -47.58 | -47.46 | -16dBm/MHz |
| | Band V (dBm/MHz) | -45.08 | -45.80 | -45.69 | -47.79 | -47.84 | -48.11 | -46.31 | -46.90 | -46.73 | -26dBm/MHz |
| Unwanted Emission Intensity | Band I (μW/100kHz) | 0.0033 | 0.0035 | 0.0036 | 0.0034 | 0.0031 | 0.0032 | 0.0027 | 0.0025 | 0.0023 | 0.25 μW/100kHz |
| | Band II (μW/MHz) | 0.0306 | 0.0303 | 0.0286 | 0.0267 | 0.0256 | 0.0285 | 0.0092 | 0.0095 | 0.0096 | 2.5 μW/MHz |
| | Band III (μW/MHz) | 0.1503 | 0.1413 | 0.1462 | 0.0184 | 0.0160 | 0.0171 | 0.0144 | 0.0152 | 0.0134 | 25 μW/MHz |
| | Band IV (μW/MHz) | 0.0176 | 0.0163 | 0.0153 | 0.0169 | 0.0166 | 0.0171 | 0.0168 | 0.0175 | 0.0179 | 25 μW/MHz |
| | Band V (μW/MHz) | 0.0310 | 0.0263 | 0.0270 | 0.0166 | 0.0164 | 0.0155 | 0.0234 | 0.0204 | 0.0212 | 2.5 μW/MHz |

Chain 1:

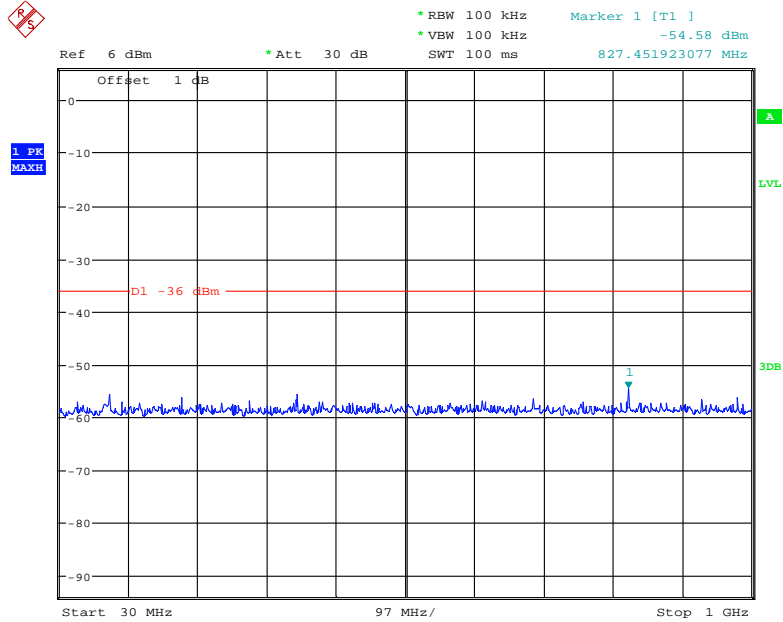
| | Frequency Band | 2403.5 MHz | | | 2441.5 MHz | | | 2477.5 MHz | | | Limit |
|------------------------------------|-----------------------------|------------|--------|--------|------------|--------|--------|------------|--------|--------|---------------------|
| | | LV | NV | HV | LV | NV | HV | LV | NV | HV | |
| Raw data | Band I (dBm/100kHz) | -55.33 | -55.75 | -55.65 | -56.19 | -56.34 | -56.25 | -56.70 | -56.49 | -56.24 | -36dBm/100kHz |
| | Band II (dBm/MHz) | -48.54 | -48.94 | -48.71 | -49.26 | -49.41 | -49.70 | -50.09 | -49.79 | -49.48 | -26dBm/MHz |
| | Band III (dBm/MHz) | -36.46 | -36.66 | -36.80 | -48.41 | -48.57 | -48.83 | -47.41 | -47.21 | -47.14 | -16dBm/MHz |
| | Band IV (dBm/MHz) | -47.29 | -47.64 | -47.40 | -47.68 | -47.96 | -48.08 | -47.91 | -47.78 | -47.50 | -16dBm/MHz |
| | Band V (dBm/MHz) | -46.77 | -46.96 | -47.23 | -47.40 | -47.61 | -47.79 | -48.21 | -48.04 | -48.12 | -26dBm/MHz |
| Unwanted Emission Intensity | Band I (μ W/100kHz) | 0.0029 | 0.0027 | 0.0027 | 0.0024 | 0.0023 | 0.0024 | 0.0021 | 0.0022 | 0.0024 | 0.25 μ W/100kHz |
| | Band II (μ W/MHz) | 0.0140 | 0.0128 | 0.0135 | 0.0119 | 0.0115 | 0.0107 | 0.0098 | 0.0105 | 0.0113 | 2.5 μ W/MHz |
| | Band III (μ W/MHz) | 0.2259 | 0.2158 | 0.2089 | 0.0144 | 0.0139 | 0.0131 | 0.0182 | 0.0190 | 0.0193 | 25 μ W/MHz |
| | Band IV (μ W/MHz) | 0.0187 | 0.0172 | 0.0182 | 0.0171 | 0.0160 | 0.0156 | 0.0162 | 0.0167 | 0.0178 | 25 μ W/MHz |
| | Band V (μ W/MHz) | 0.0210 | 0.0201 | 0.0189 | 0.0182 | 0.0173 | 0.0166 | 0.0151 | 0.0157 | 0.0154 | 2.5 μ W/MHz |

Note: Band I: 30MHz~1000MHz
 Band II: 1000MHz~2387MHz
 Band III: 2387MHz~2400MHz
 Band IV: 2483.5MHz~2496.5MHz
 Band V: 2496.5MHz~12500MHz

Please refer to the below plots for normal voltage test.

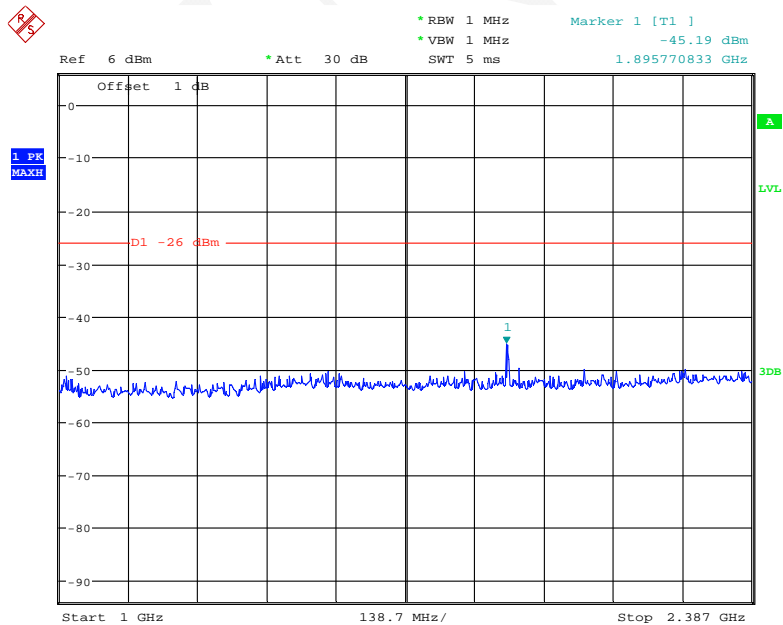
Chain 0
Low Channel

30MHz~1GHz



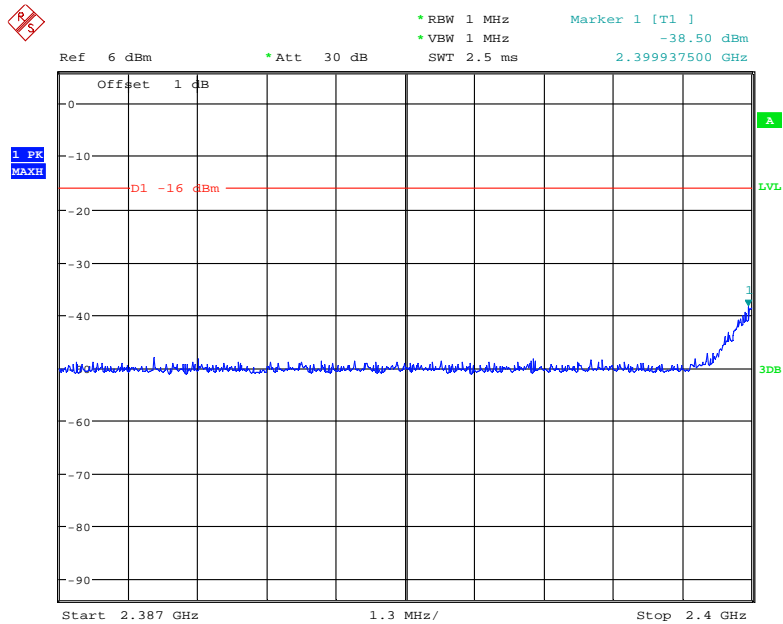
Date: 23.NOV.2018 09:16:35

1GHz~2.387GHz



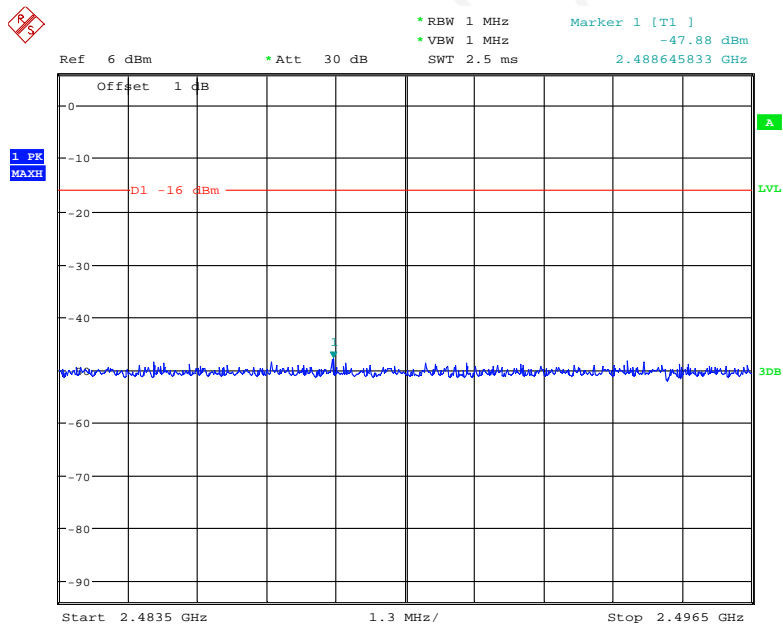
Date: 23.NOV.2018 09:19:46

2.387GHz~2.4GHz

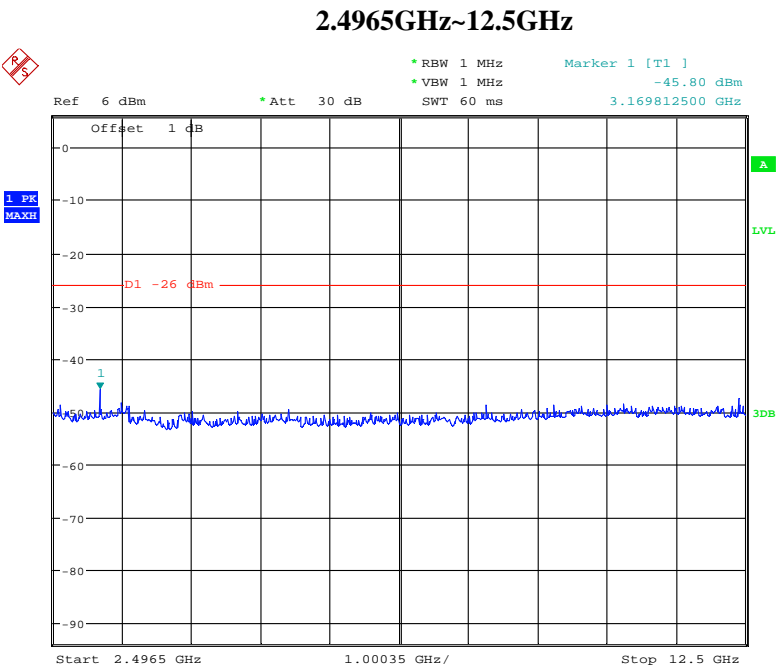


Date: 23.NOV.2018 10:21:15

2.4835GHz~2.4965GHz

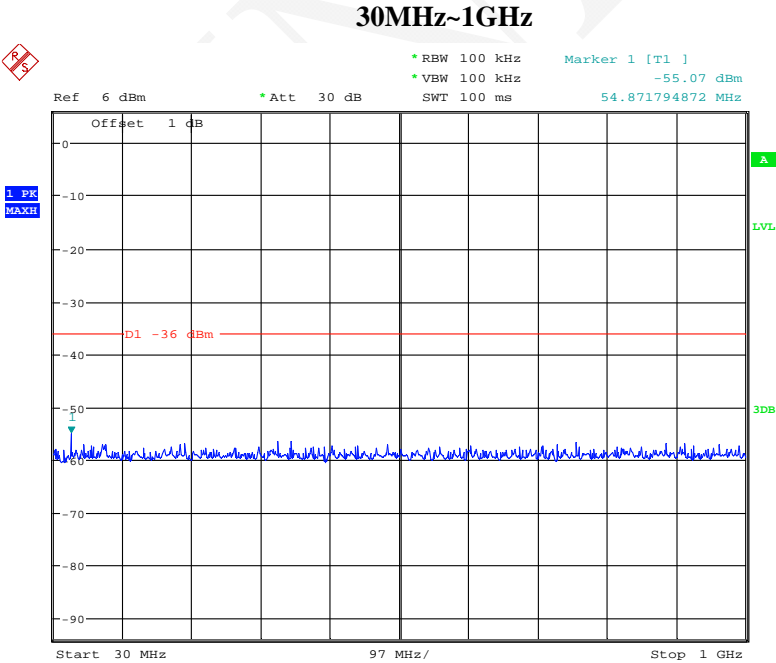


Date: 23.NOV.2018 09:19:00



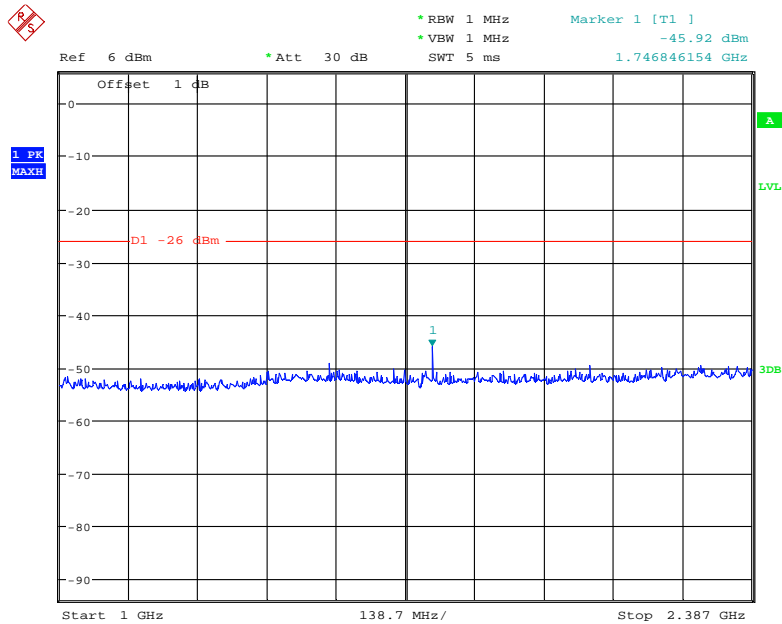
Date: 23.NOV.2018 09:20:05

Middle Channel:



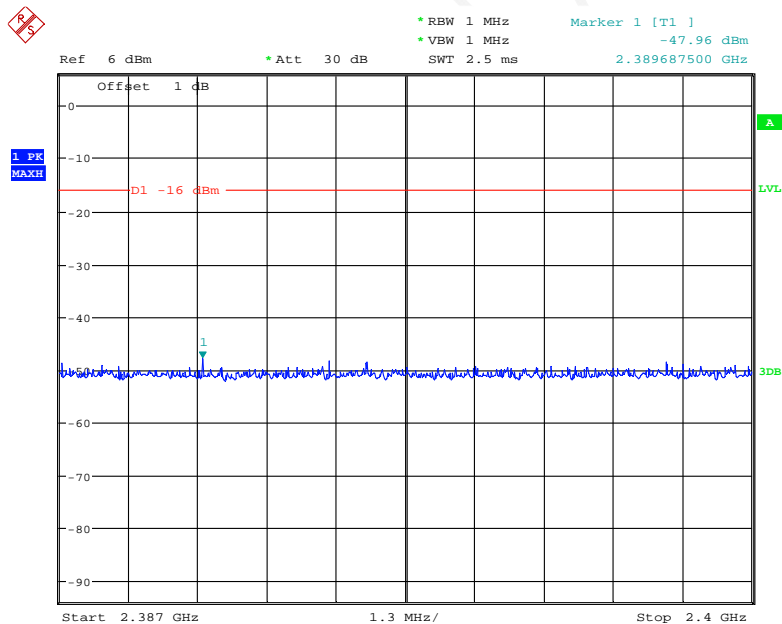
Date: 23.NOV.2018 09:16:53

1GHz~2.387GHz



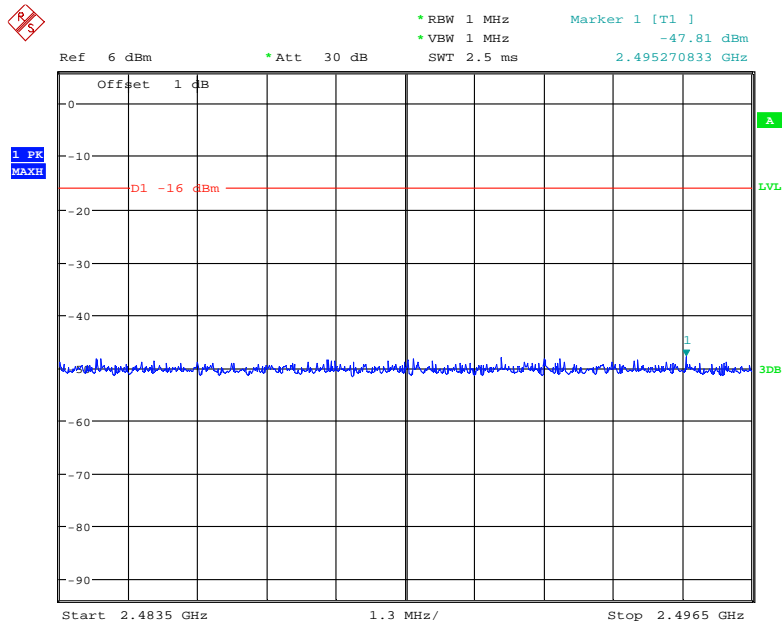
Date: 23.NOV.2018 09:20:40

2.387GHz~2.4GHz



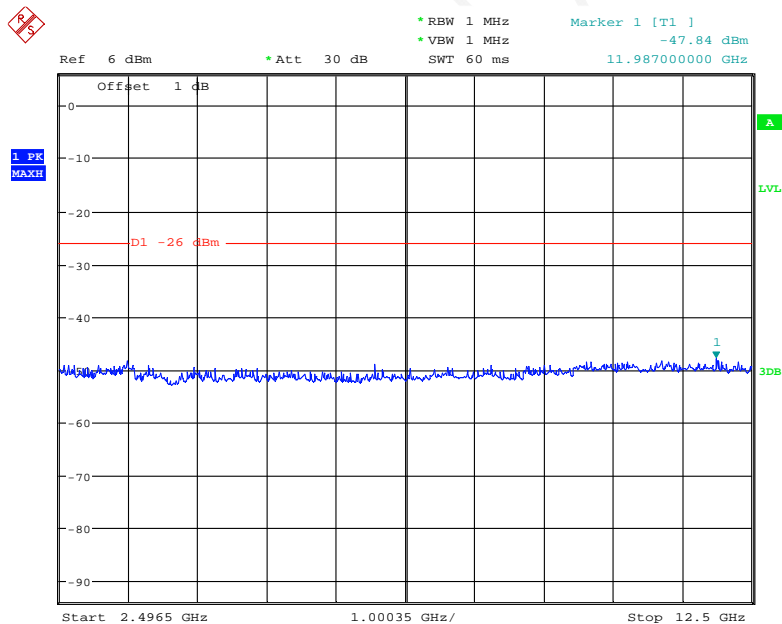
Date: 23.NOV.2018 09:20:54

2.4835GHz~2.4965GHz



Date: 23.NOV.2018 09:21:08

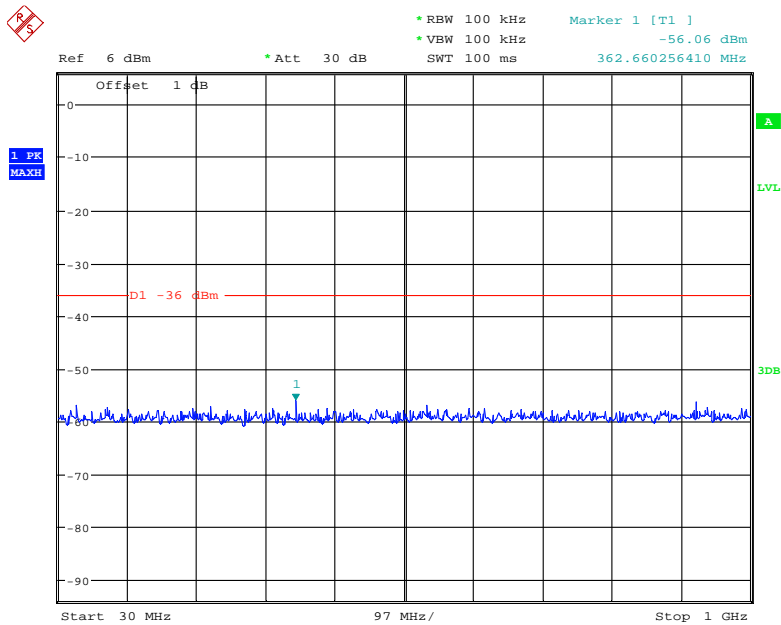
2.4965GHz~12.5GHz



Date: 23.NOV.2018 09:20:25

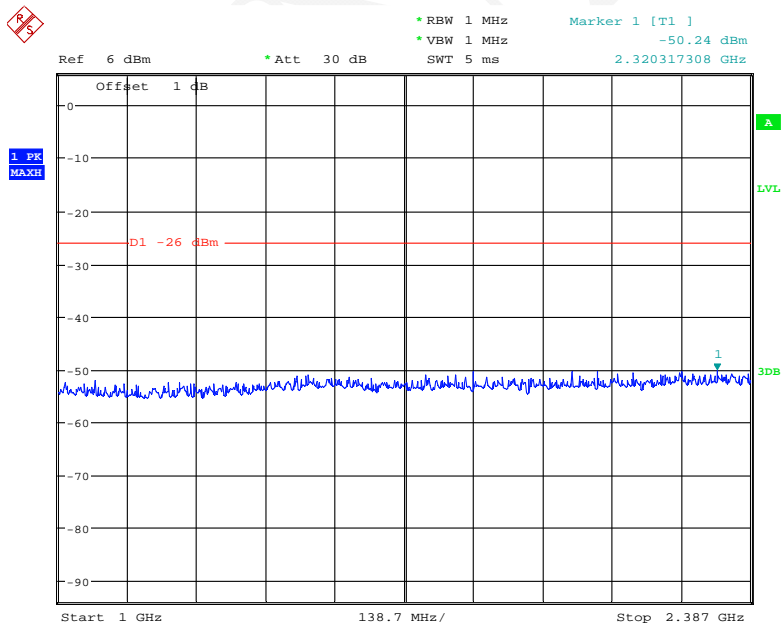
High Channel:

30MHz~1GHz



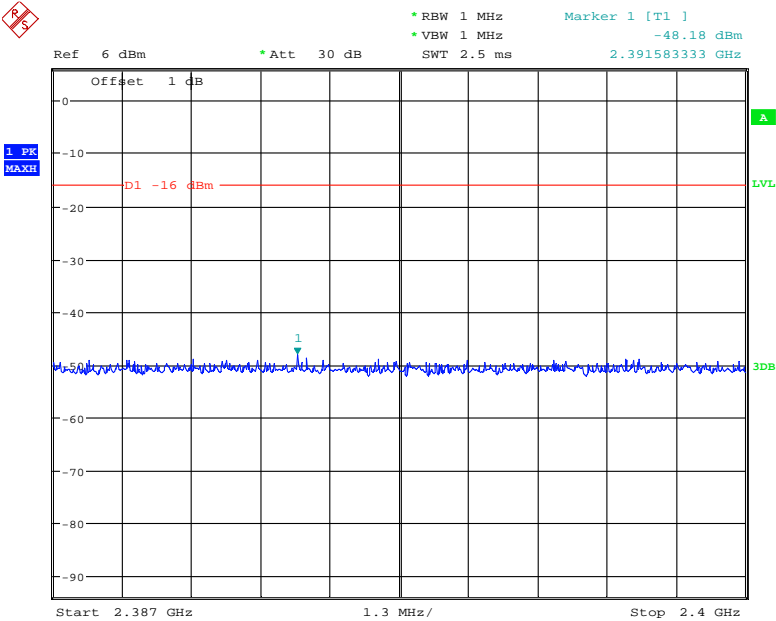
Date: 23.NOV.2018 09:17:08

1GHz~2.387GHz



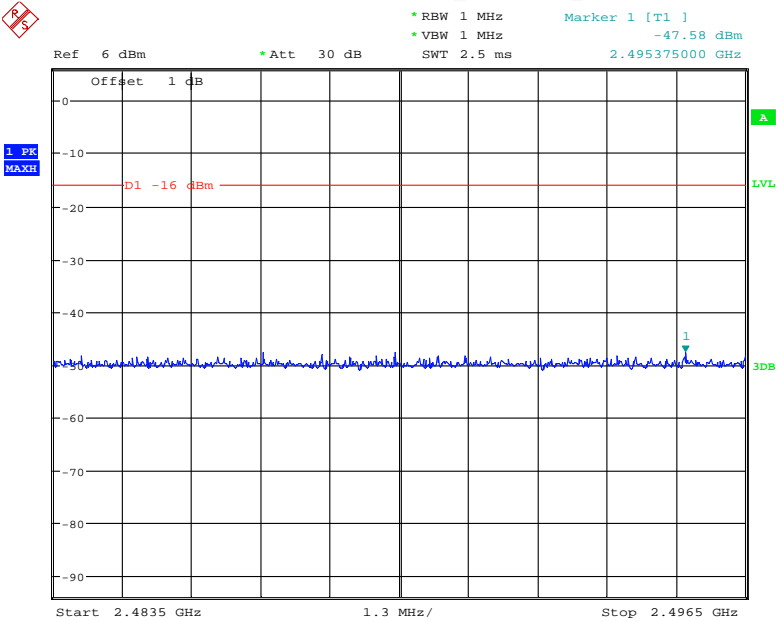
Date: 23.NOV.2018 09:17:40

2.387GHz~2.4GHz



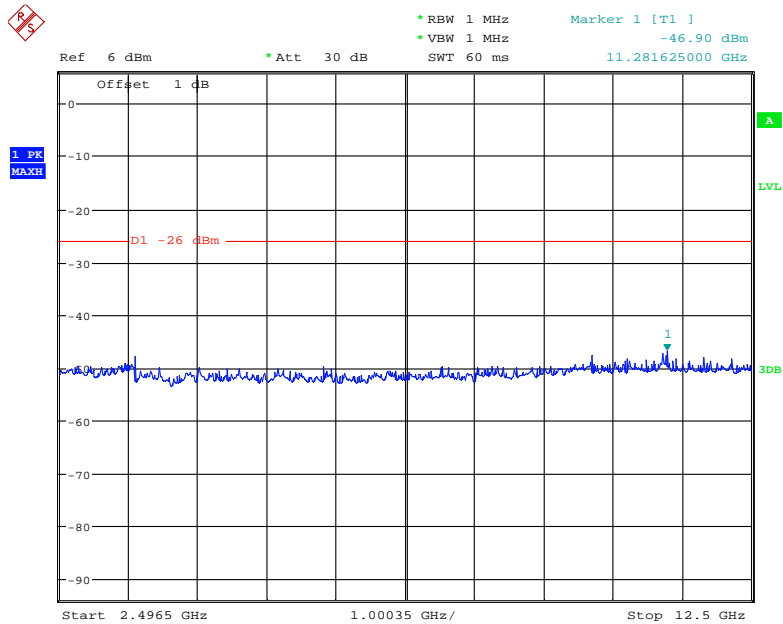
Date: 23.NOV.2018 09:18:15

2.4835GHz~2.4965GHz



Date: 23.NOV.2018 09:18:46

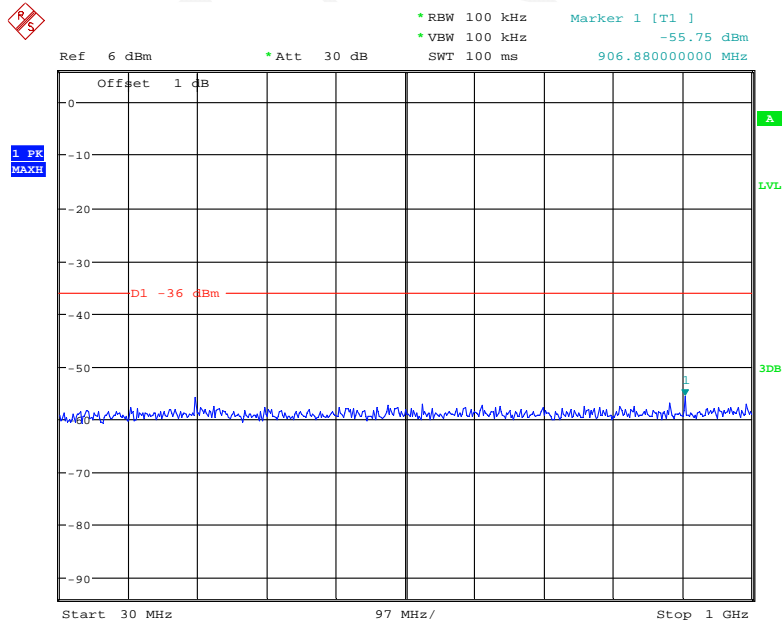
2.4965GHz~12.5GHz



Date: 23.NOV.2018 09:18:00

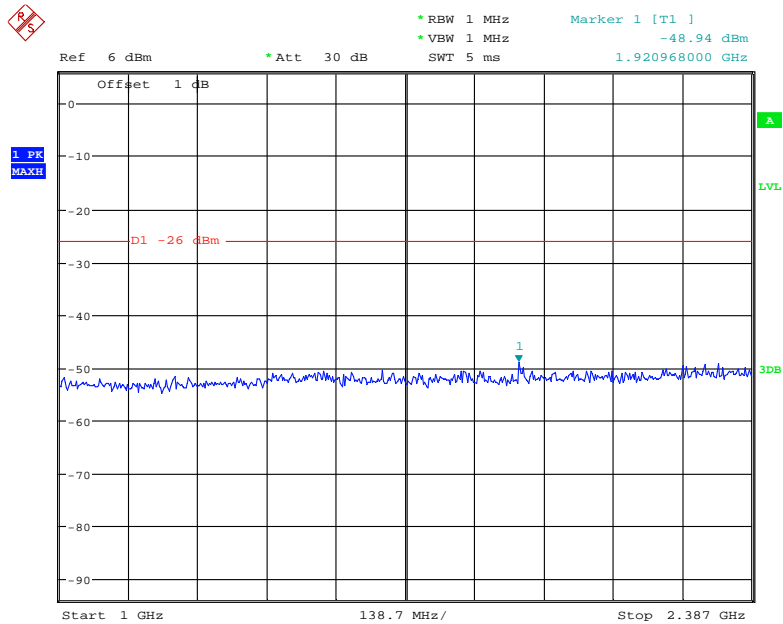
Chain 1
Low Channel:

30MHz~1GHz



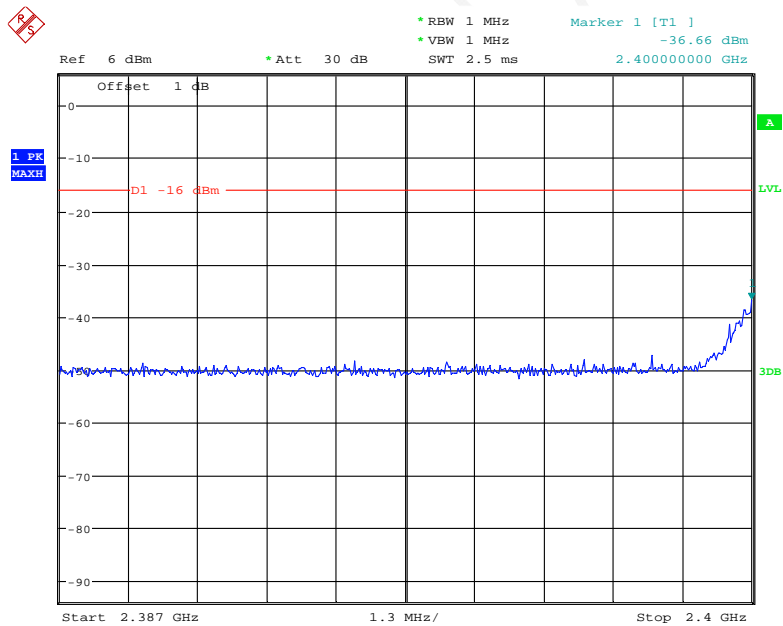
Date: 22.NOV.2018 15:37:31

1GHz~2.387GHz



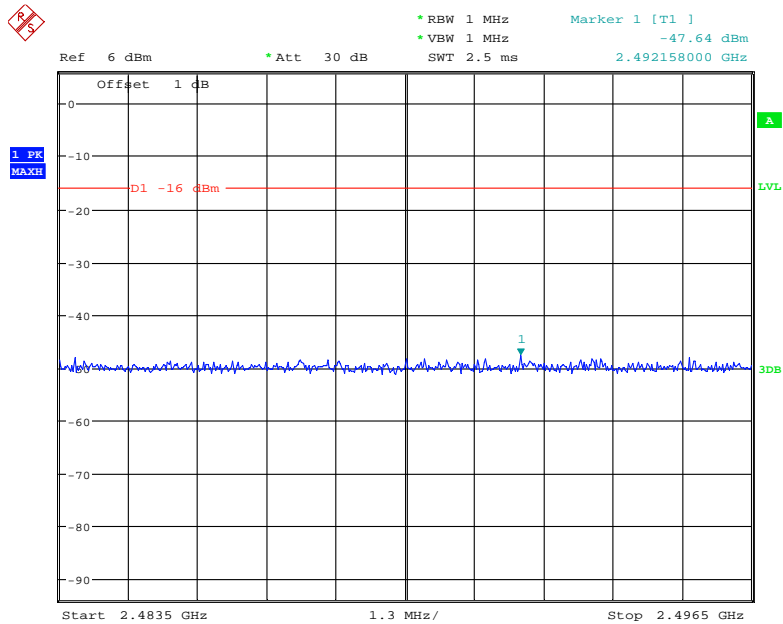
Date: 22.NOV.2018 15:46:55

2.387GHz~2.4GHz



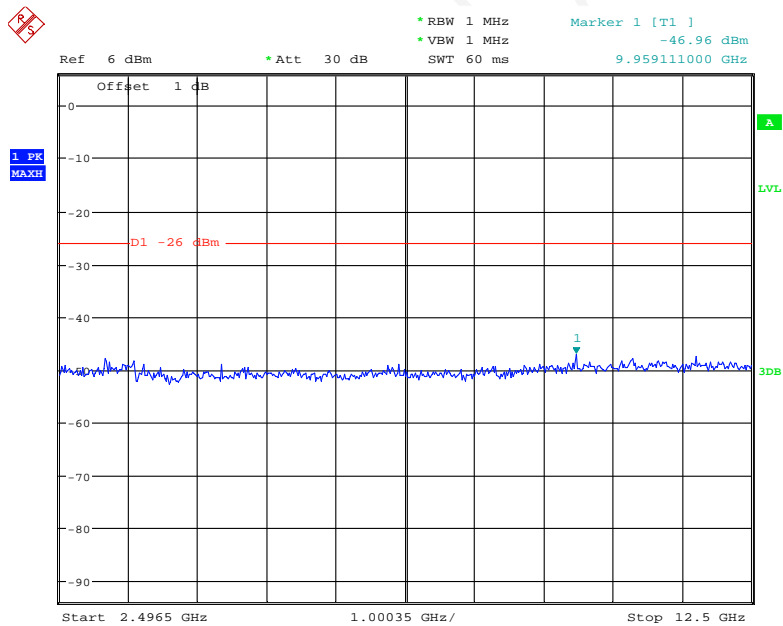
Date: 22.NOV.2018 15:48:06

2.4835GHz~2.4965GHz



Date: 22.NOV.2018 15:47:45

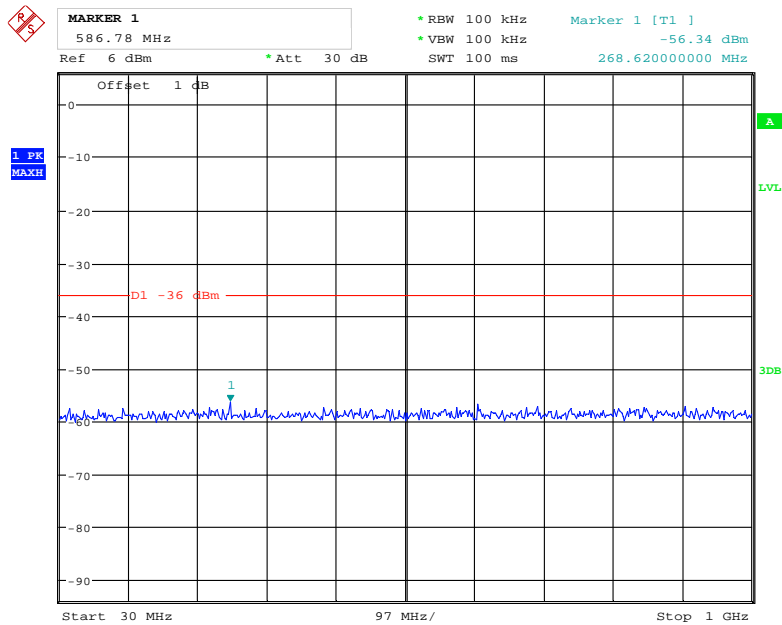
2.4965GHz~12.5GHz



Date: 22.NOV.2018 15:47:12

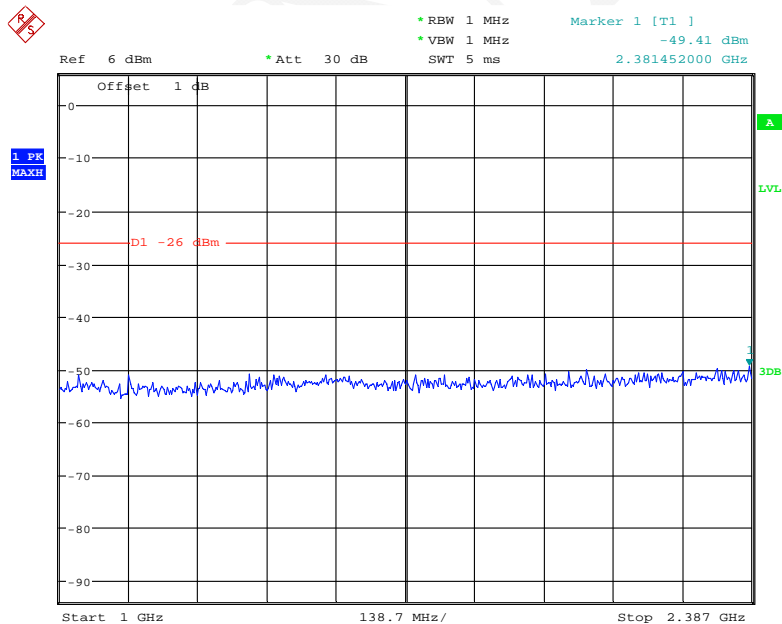
Middle Channel:

30MHz~1GHz



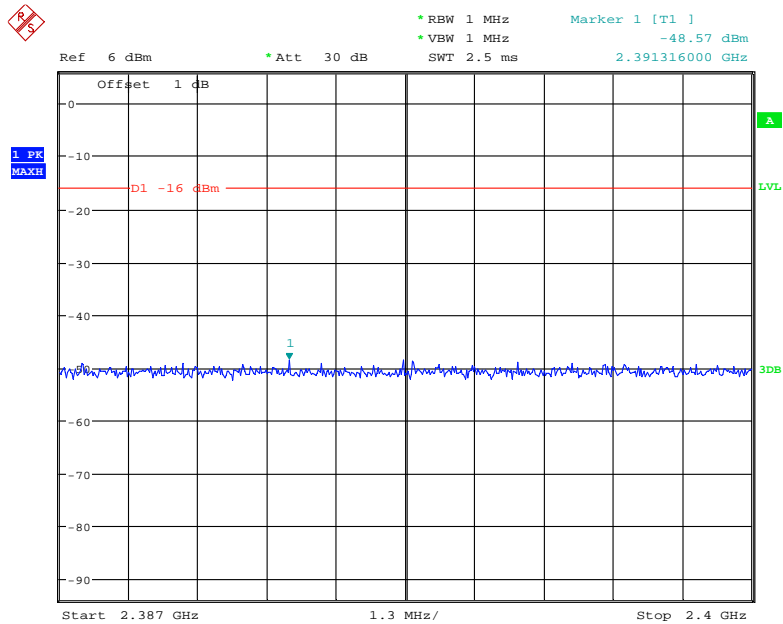
Date: 22.NOV.2018 15:45:51

1GHz~2.387GHz



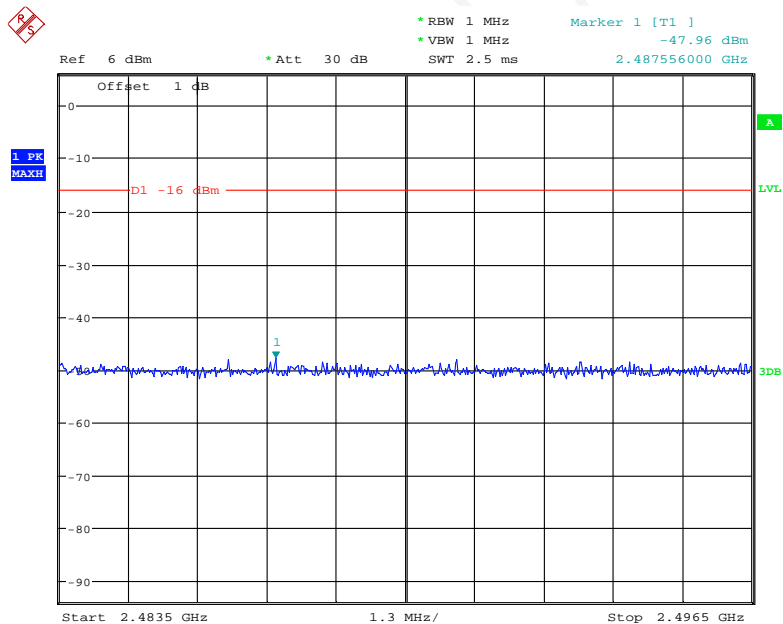
Date: 22.NOV.2018 15:44:13

2.387GHz~2.4GHz

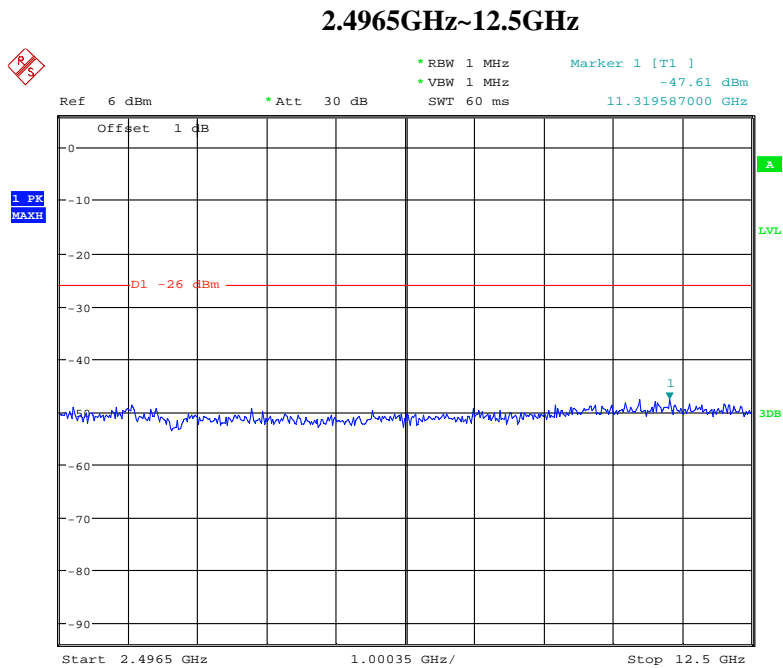


Date: 22.NOV.2018 15:44:34

2.4835GHz~2.4965GHz

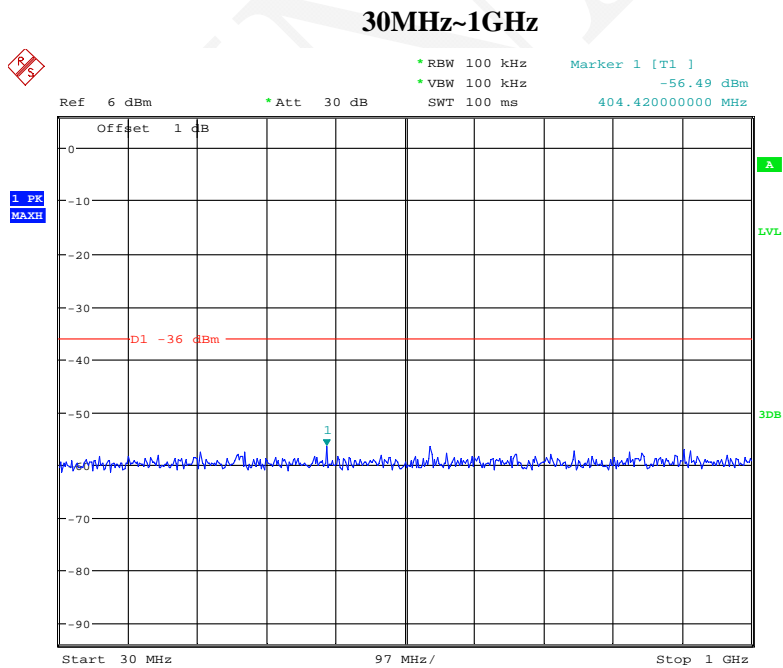


Date: 22.NOV.2018 15:45:18



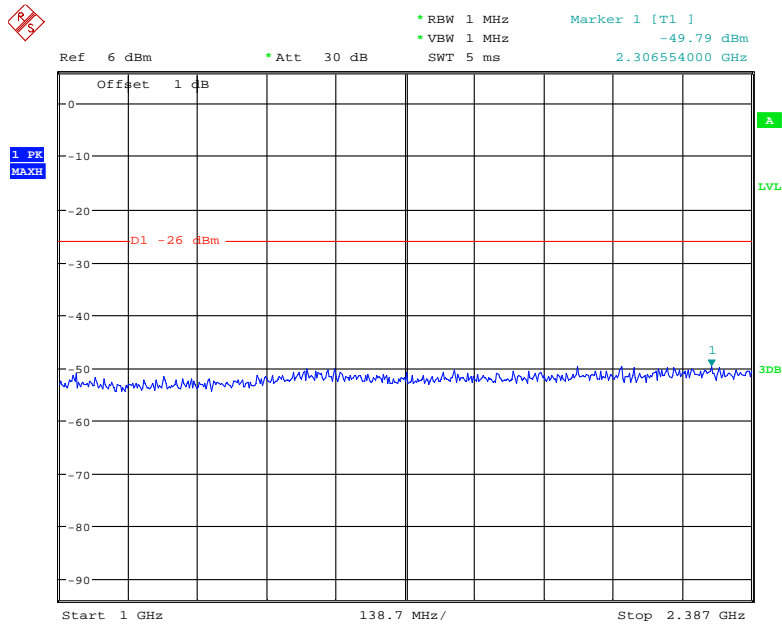
Date: 22.NOV.2018 15:43:24

High Channel:



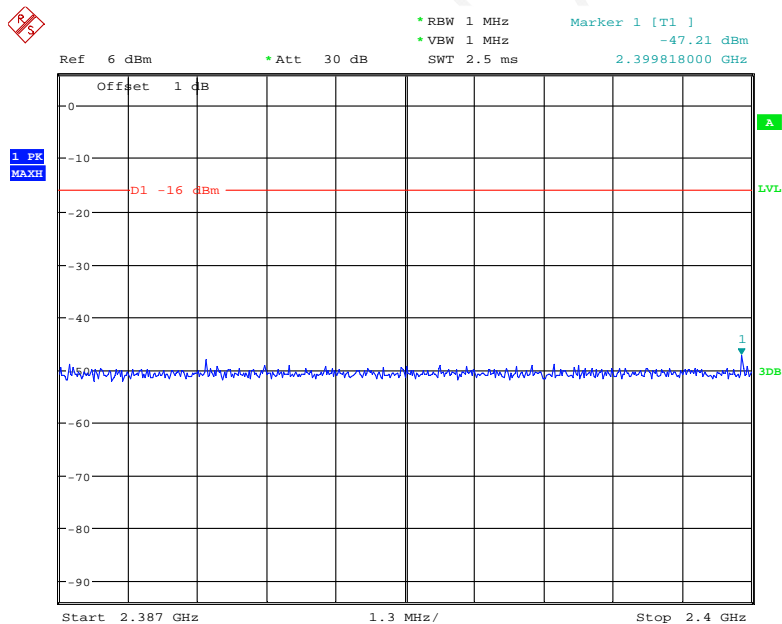
Date: 22.NOV.2018 15:46:03

1GHz~2.387GHz



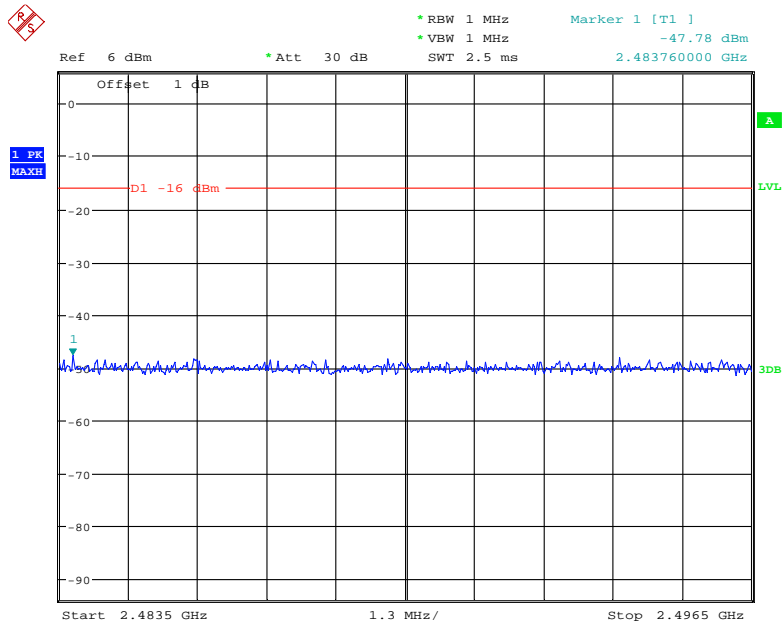
Date: 22.NOV.2018 15:43:58

2.387GHz~2.4GHz



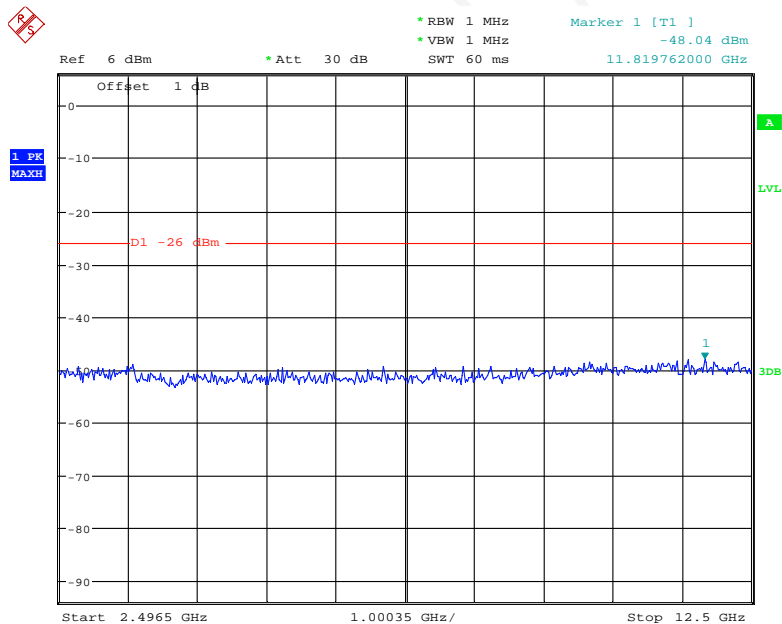
Date: 22.NOV.2018 15:44:49

2.4835GHz~2.4965GHz



Date: 22.NOV.2018 15:45:07

2.4965GHz~12.5GHz



Date: 22.NOV.2018 15:43:41

ANTENNA OUTPUT POWER AND ANTENNA POWER TOLERANCE

Limit

- $\leq 3 \text{ mW /MHz}$ (FHSS from 2402-2480 MHz which contains 2427-2470.75MHz)
- $\leq 10 \text{ mW/MHz}$ (OFDM, DSSS from 2400-2483.5 MHz)
- $\leq 10 \text{ mW}$ (other from 2400-2483.5 MHz)

The Output Power Tolerance must be within +20%, -80%.

- $\text{EIRP} \leq 6.91 \text{ dBm/MHz}$ (FHSS from 2402-2480 MHz)

Test Procedure

For FHSS UUT:

Connect the UUT to the power meter in a state of hopping mode.

For OFDM, DSSS UUT:

Step 1:

Connect the UUT to the spectrum analyser and use the following settings:

- Centre Frequency: The centre frequency of the channel under test.
- RBW: 1 MHz.
- VBW: 1 MHz.
- Span: Wide enough to cover the complete power envelope of the signal of the UUT.
- Detector: Peak.
- Trace Mode: Max Hold.

Step 2:

When the trace is complete, find the peak value of the power envelope and record the frequency.

Step 3:

Make the following changes to the settings of the spectrum analyser:

- Centre Frequency: Equal to the frequency recorded in step 2.
- Span: 3 MHz.
- RBW: 1 MHz.
- VBW: 1 MHz.
- Detector: Average (see note).
- Trace Mode: Max Hold.

For other UUT:

Make the following changes to the settings of the spectrum analyser:

- Centre Frequency: The centre frequency of the channel under test.
- Span: 5MHz.
- RBW: 3 MHz.
- VBW: 10 MHz.
- Detector: Peak
- Trace Mode: Max Hold.

NOTE: The detector mode "Average" is often referred to as "RMS Average" or "Sample" but do not use Video Average.

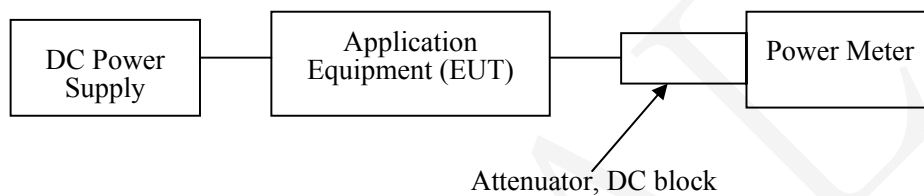
When the trace is complete, capture the trace, for example using the "View" option on the spectrum analyser. For Find the peak value of the trace and place the analyser marker on this peak. This level is recorded as D.

D shall be recorded in the test report.

The maximum PD, which is e.i.r.p. PSD (spectral density power) or power, is calculated from the above measured value D, and the applicable antenna assembly gain "G" in dBi, according to the formula below. If more than one antenna assembly is intended for this power setting, the gain of the antenna assembly with the highest gain shall be used.

$$PD = D + G$$

Test Setup Block diagram



Test Data

Environmental Conditions

| | |
|--------------------|-----------|
| Temperature: | 25.5°C |
| Relative Humidity: | 45 % |
| ATM Pressure: | 100.6 kPa |

The testing was performed by Elena Lei on 2018-11-22.

Test Result: Compliance

*Test Mode: Transmitting**Chain 0*

| Mode | Hopping | | | Limit |
|-------------------------|---------|--------|--------|-------------|
| Voltage | LV | NV | HV | |
| Reading (dBm) | -6.07 | -6.03 | -6.01 | |
| Reading (mW) | 0.25 | 0.25 | 0.25 | |
| Spread Bandwidth (MHz) | 68.46 | 68.40 | 68.26 | |
| Duty Cycle (%) | 11.47 | 11.47 | 11.47 | |
| Antenna Power (mW/MHz) | 0.0318 | 0.0319 | 0.0319 | 3mW/MHz |
| Antenna Power Error (%) | -68.20 | -68.10 | -68.10 | +20% ~ -80% |
| EIRP (dBm/MHz) | -12.69 | -12.67 | -12.67 | 6.91dBm/MHz |

Chain 1

| Mode | Hopping | | | Limit |
|-------------------------|---------|--------|--------|-------------|
| Voltage | LV | NV | HV | |
| Reading (dBm) | -4.21 | -4.58 | -4.33 | |
| Reading (mW) | 0.38 | 0.35 | 0.37 | |
| Spread Bandwidth (MHz) | 69.10 | 68.80 | 68.26 | |
| Duty Cycle (%) | 13.37 | 13.37 | 13.37 | |
| Antenna Power (mW/MHz) | 0.0411 | 0.0380 | 0.0405 | 3mW/MHz |
| Antenna Power Error (%) | -58.90 | -62.00 | -59.50 | +20% ~ -80% |
| EIRP (dBm/MHz) | -11.57 | -11.91 | -11.64 | 6.91dBm/MHz |

Note:

- 1) Antenna Output power (mW/MHz) = Reading (mW)/Duty cycle (%)/Spread Bandwidth (MHz)
- 2) Antenna Output Power Tolerance = (Antenna Output power -Declared Power)/ Declared Power*100%
- 3) Declared Power: 0.1mW/MHz for 1.4M.

Note 2: Transmission Antenna Gain and Transmission Radiation Angle Width are not required since EIRP less than 6.91dBm/MHz.

RECEIVER SPURIOUS EMISSION AND UNWANTED EMISSION INTENSITY

Limit

- $\leq 4 \text{ nW}$ ($30 \text{ MHz} \leq f \leq 1000 \text{ MHz}$)
- $\leq 20 \text{ nW}$ ($1 \text{ GHz} \leq f \leq 12.5 \text{ GHz}$)

Test Procedure

❖ Conditions of Application Equipment (EUT)

- The modulation state shall be “continuous receiving mode”.

❖ Spectrum Analyzer Conditions

- Start Frequency: Start Frequency of frequency range to measure (30MHz or 1GHz)
- Stop Frequency: Stop Frequency of frequency range to measure (1GHz or 12.5GHz)
- Span: AUTO (Measurement Range)
- RBW: 100 kHz, VBW: 100 kHz for Frequency < 1 GHz
- RBW: 1MHz, VBW: 1MHz for Frequency > 1 GHz
- Sweep time: AUTO or more
- Sweep mode: Auto Sweep
- Detection: Positive Peak
- Reference Level: Enough level for maximum dynamic range

Measurement Result

Environmental Conditions

| | |
|--------------------|-----------|
| Temperature: | 25.5°C |
| Relative Humidity: | 45 % |
| ATM Pressure: | 100.6 kPa |

The testing was performed by Elena Lei on 2018-11-22.

Test Result: Compliance, please see the below tables and plots

Test Mode: Receiving

Chain 0

| | Frequency band | 2403.5 MHz | | | 2441.5 MHz | | | 2477.5 MHz | | | Limit |
|--|----------------|------------|---------|---------|------------|---------|---------|------------|---------|---------|--------|
| | | LV | NV | HV | LV | NV | HV | LV | NV | HV | |
| Raw data Chain 0 | Band VI dBm | -69.85 | -69.51 | -69.65 | -70.82 | -70.50 | -70.25 | -70.38 | -70.42 | -70.61 | -54dBm |
| | Band VII dBm | -69.16 | -69.33 | -69.59 | -66.75 | -66.58 | -66.81 | -70.36 | -70.47 | -70.61 | -47dBm |
| Unwanted Emission Intensity Chain 0 | Band VI nW | 0.10351 | 0.11194 | 0.10839 | 0.08279 | 0.08913 | 0.09441 | 0.09162 | 0.09078 | 0.08690 | -54dBm |
| | Band VII nW | 0.12134 | 0.11668 | 0.10990 | 0.21135 | 0.21979 | 0.20845 | 0.09204 | 0.08974 | 0.08690 | -47dBm |

Chain 1

| | Frequency band | 2403.5 MHz | | | 2441.5 MHz | | | 2477.5 MHz | | | Limit |
|--|----------------|------------|---------|---------|------------|---------|---------|------------|---------|---------|--------|
| | | LV | NV | HV | LV | NV | HV | LV | NV | HV | |
| Raw data Chain 1 | Band VI dBm | -70.00 | -70.09 | -69.89 | -70.22 | -70.62 | -70.71 | -70.86 | -70.57 | -70.30 | -54dBm |
| | Band VII dBm | -70.64 | -70.35 | -70.13 | -70.58 | -70.29 | -70.43 | -70.73 | -70.09 | -70.25 | -47dBm |
| Unwanted Emission Intensity Chain 1 | Band VI nW | 0.10000 | 0.09795 | 0.10257 | 0.09506 | 0.08670 | 0.08492 | 0.08204 | 0.08770 | 0.09333 | -54dBm |
| | Band VII nW | 0.08630 | 0.09226 | 0.09705 | 0.08750 | 0.09354 | 0.09057 | 0.08453 | 0.09795 | 0.09441 | -47dBm |

Note:

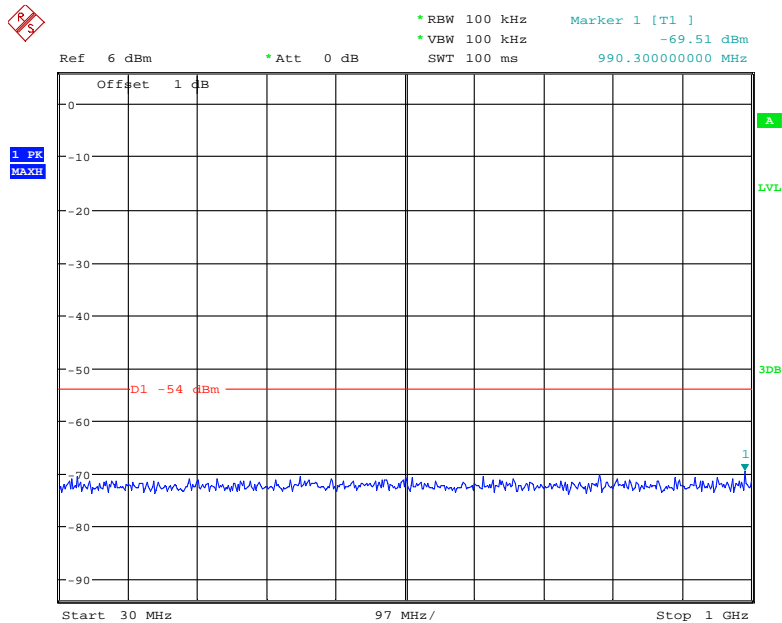
Band VI: 30MHz~1000MHz

Band VII: 1000MHz~12500MHz

Please refer to the below plots for normal voltage test.

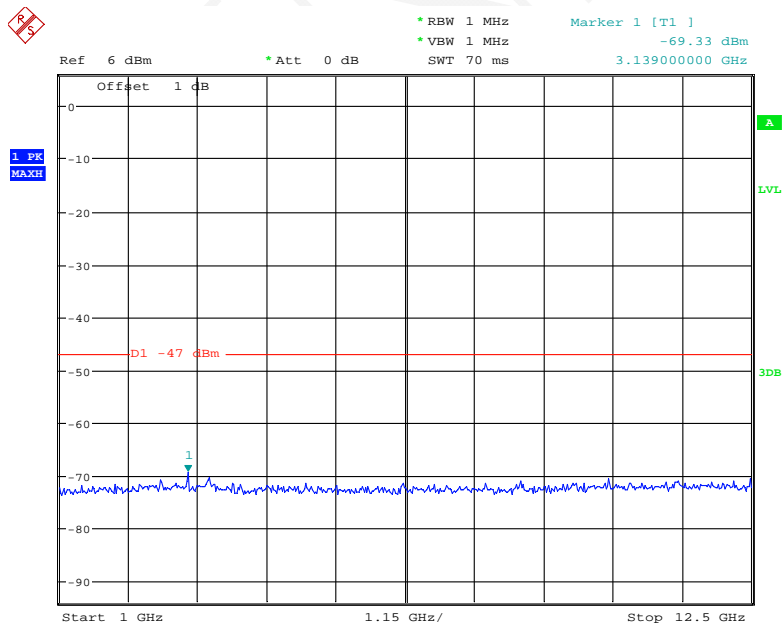
Chain 0
Test Frequency: 2403.5MHz

30MHz~1000MHz



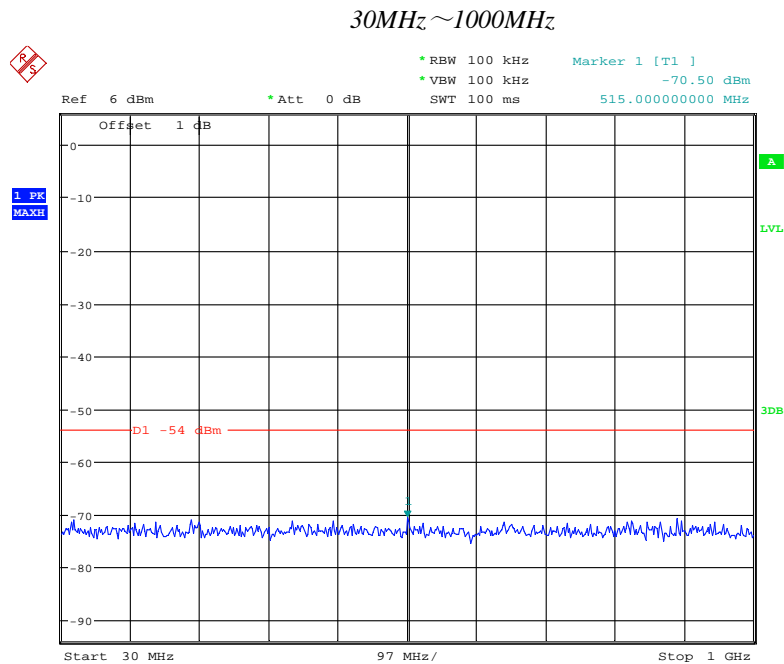
Date: 22.NOV.2018 15:51:04

1000MHz~12500MHz

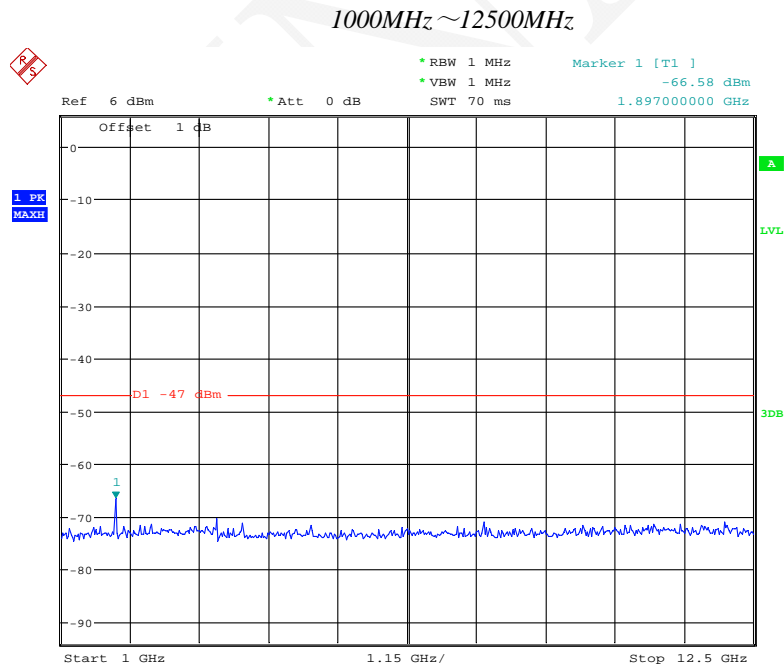


Date: 22.NOV.2018 15:51:37

Test Frequency: 2441.5MHz:



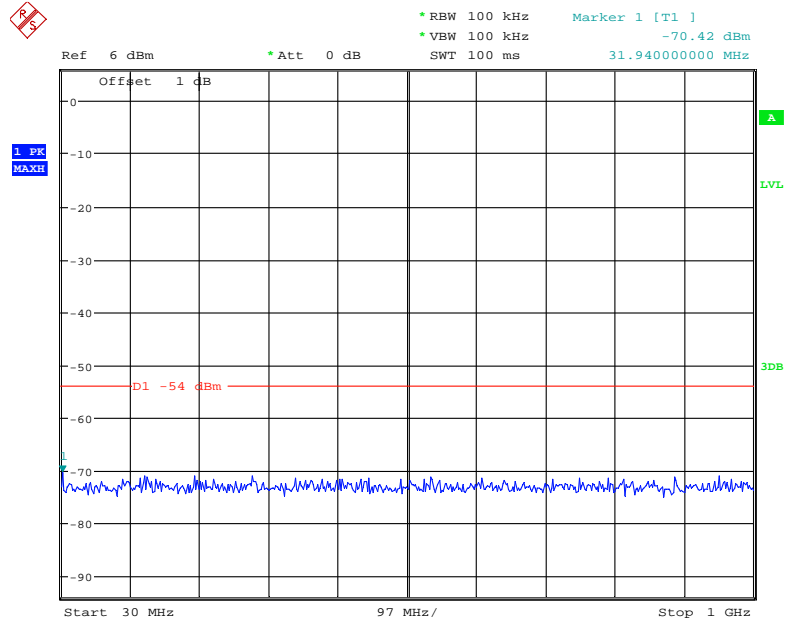
Date: 22.NOV.2018 15:50:57



Date: 22.NOV.2018 15:51:51

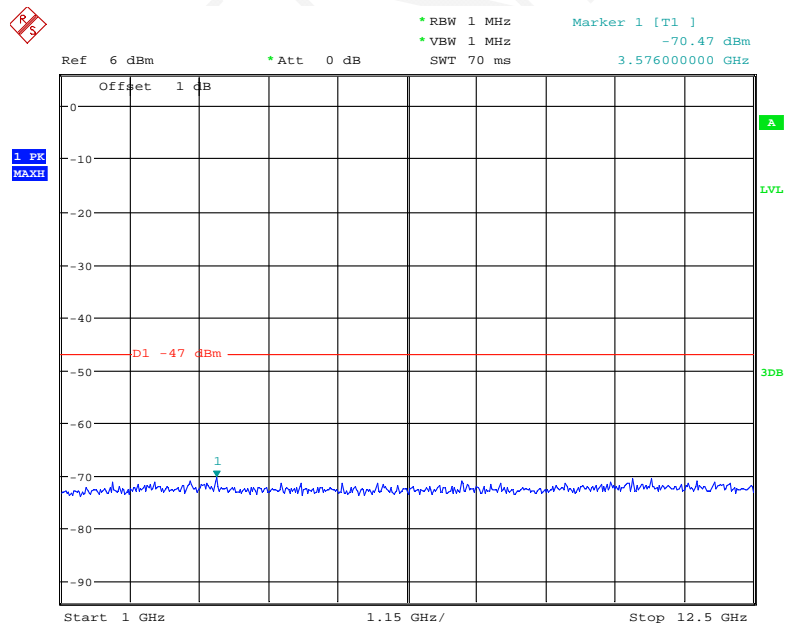
Test Frequency: 2477.5MHz:

30MHz~1000MHz



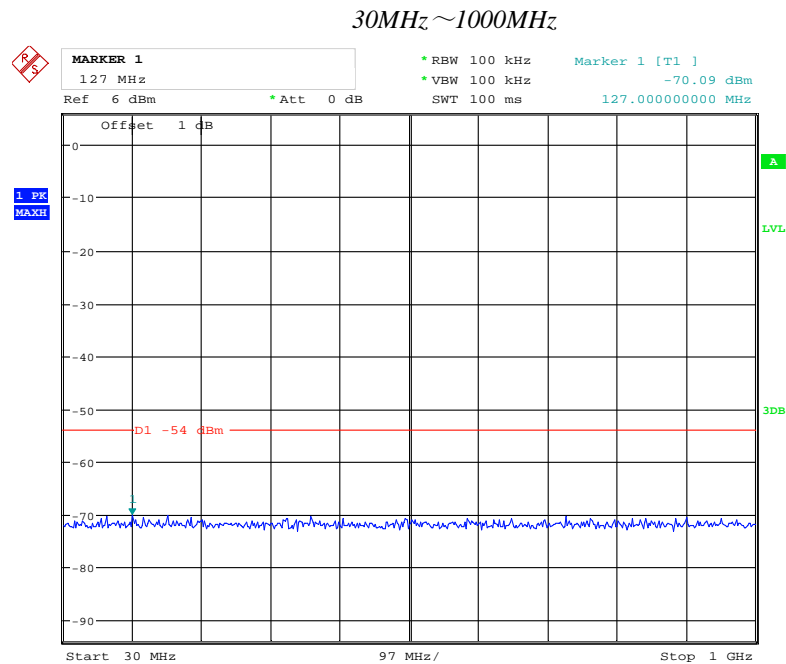
Date: 22.NOV.2018 15:50:49

1000MHz~12500MHz

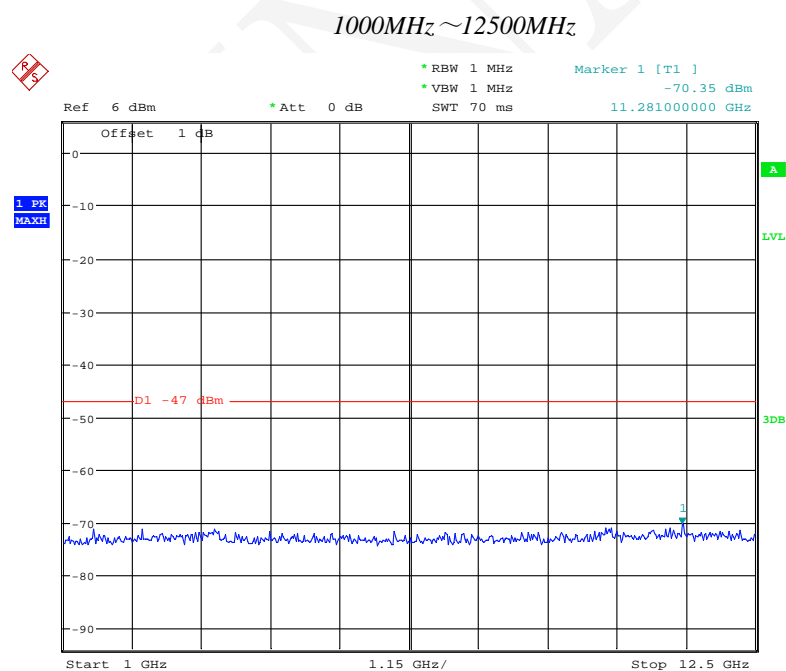


Date: 22.NOV.2018 15:52:01

Chain 1
Test Frequency: 2403.5MHz

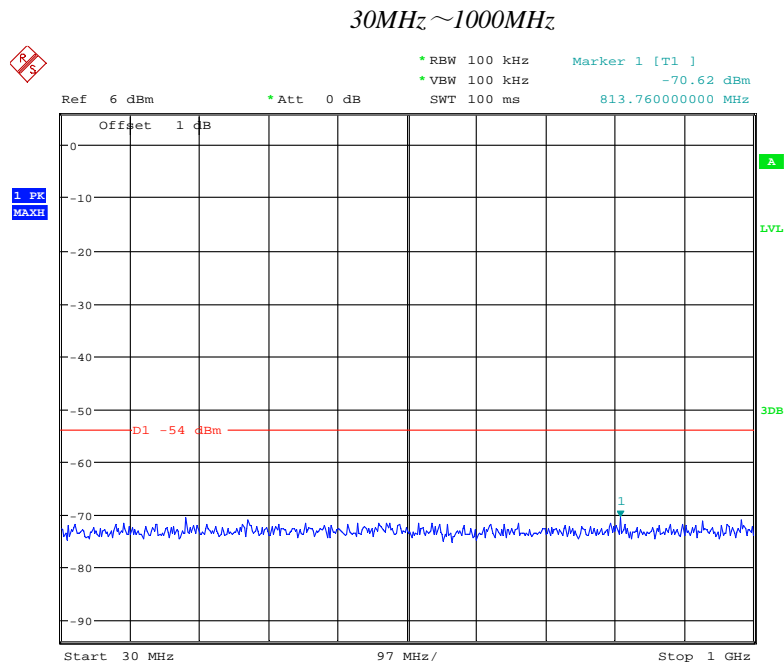


Date: 22.NOV.2018 15:49:57

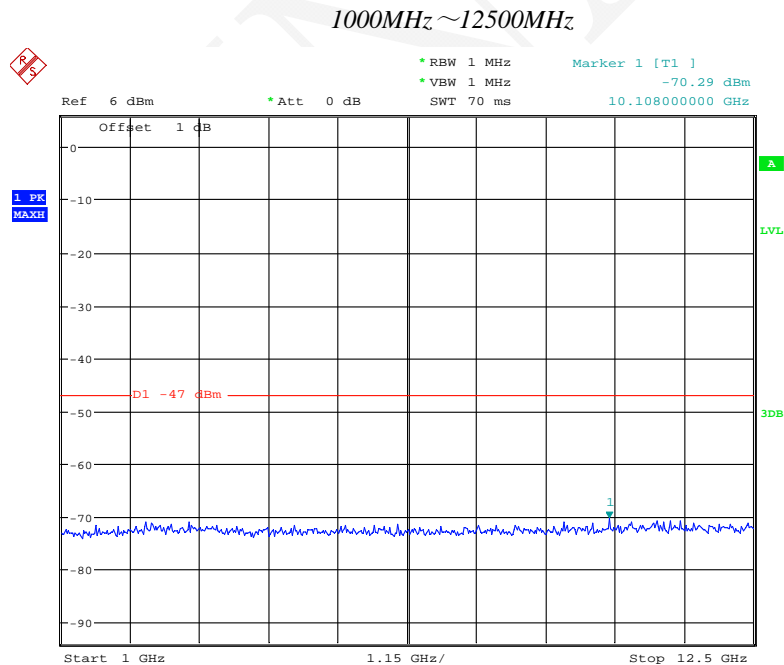


Date: 22.NOV.2018 15:52:45

Test Frequency: 2441.5MHz:



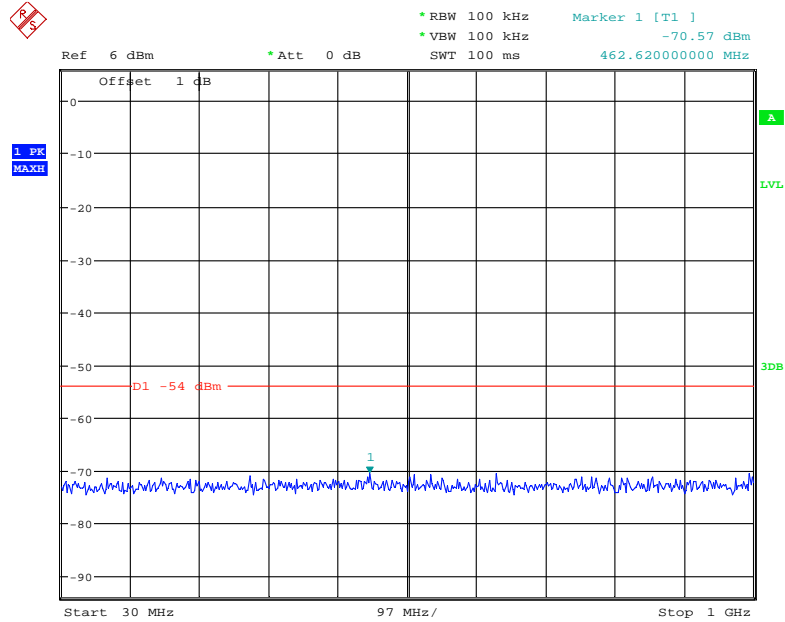
Date: 22.NOV.2018 15:50:18



Date: 22.NOV.2018 15:52:33

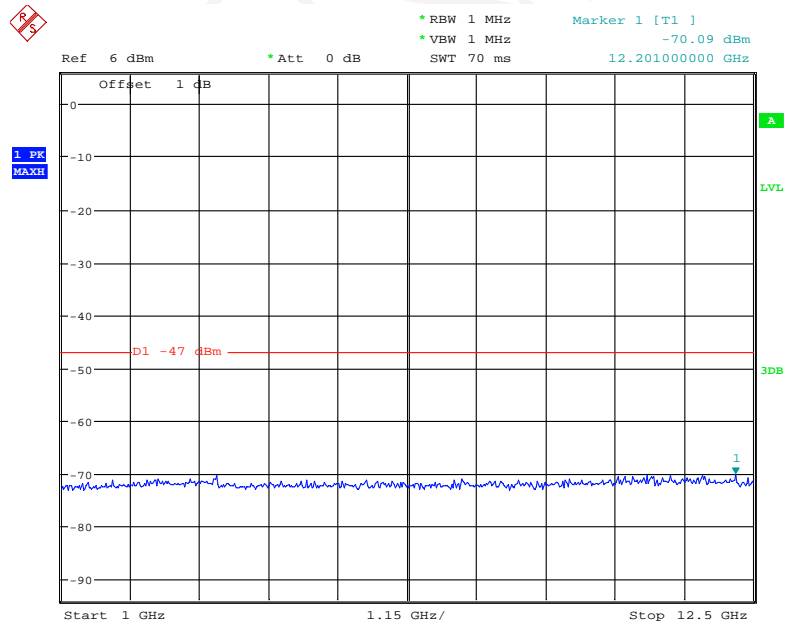
Test Frequency: 2477.5MHz:

30MHz~1000MHz



Date: 22.NOV.2018 15:50:31

1000MHz~12500MHz



Date: 22.NOV.2018 15:52:25

FREQUENCY HOPPING DWELL TIME

Applicable Standard

According to Radio Law Radio Equipment Regulations Article 49-20, frequency dwell time is 0.4 seconds or below.

Test Procedure

❖ Conditions of Application Equipment (EUT)

- Set the application equipment (EUT) to the measurement frequency.
- The modulation state shall be “continuous (burst) transmission mode”. If impossible, it shall be “continuous frequency-hopping mode”.

❖ Spectrum Analyzer Conditions

For spreading bandwidth:

- Span: 200MHz
- RBW: 300kHz, VBW: 300kHz
- Log scale: 10dB/Div, Data points: 501points (400 points or more)
- Detection: Positive Peak, Sweep mode: Continuous

For duty cycle and hopping number:

- Center Frequency: 2441.0 MHz
- RBW/VBW: ≥ 1 MHz
- Log scale: 10dB/Div, Data points: 501points (400 points or more)
- Detection: Sample, Sweep mode: Continuous

Test Data

Environmental Conditions

| | |
|--------------------|----------------|
| Temperature: | 25.5~26.4°C |
| Relative Humidity: | 40~51 % |
| ATM Pressure: | 99.9~100.8 kPa |

The testing was performed by Elena Lei on 2018-11-22~2018-11-26.

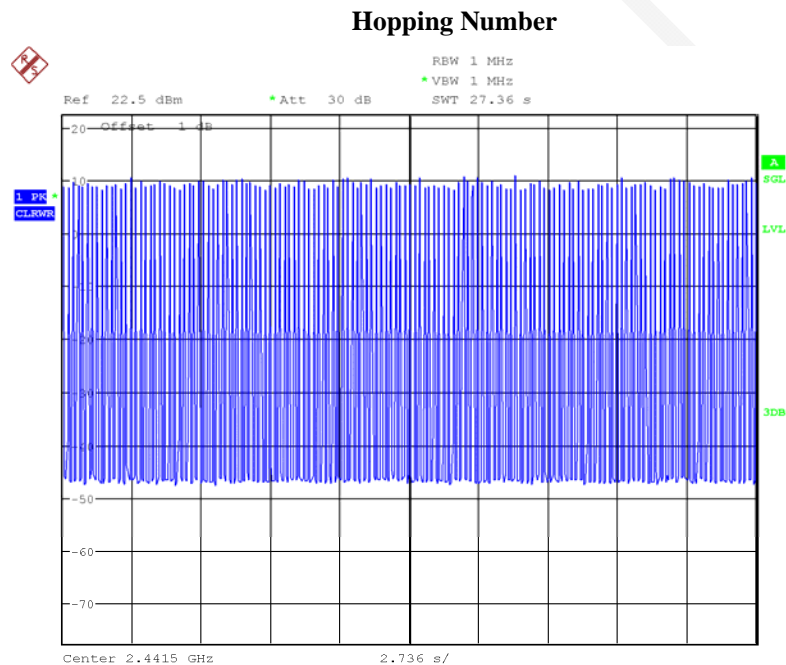
Test Result: Compliance

1.4M mode:

| Chain | Spreading bandwidth (MHz) | duty cycle | | | Observed Period (s) | Hops in Observed Period | Dwell Time (s) | Limit (s) | Result |
|---------|---------------------------|----------------------|--|---|---------------------|-------------------------|----------------|-----------|--------|
| | | T _{on} (ms) | T _{on} +T _{off} (ms) | T _{on} /(T _{on} +T _{off}) (%) | | | | | |
| Chain 0 | 68.40 | 1.154 | 10.064 | 11.47 | 27.36 | 150 | 0.17 | 0.4 | Pass |
| Chain 1 | 68.80 | 1.346 | 10.064 | 13.37 | 27.52 | 148 | 0.20 | 0.4 | Pass |

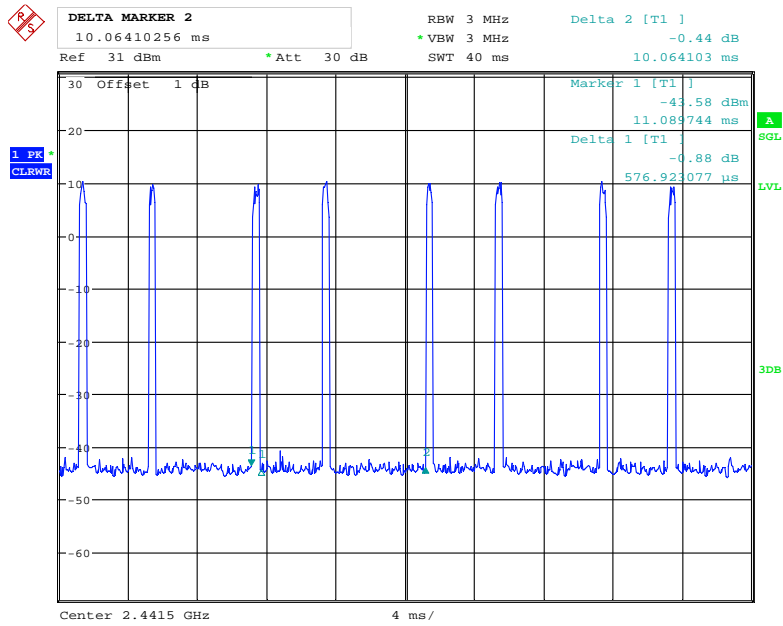
Note: Dwell time = Time per one hopping (On time) * hopping number (within the time obtained by multiplying the spread rate by 0.4s)

Chain 0:



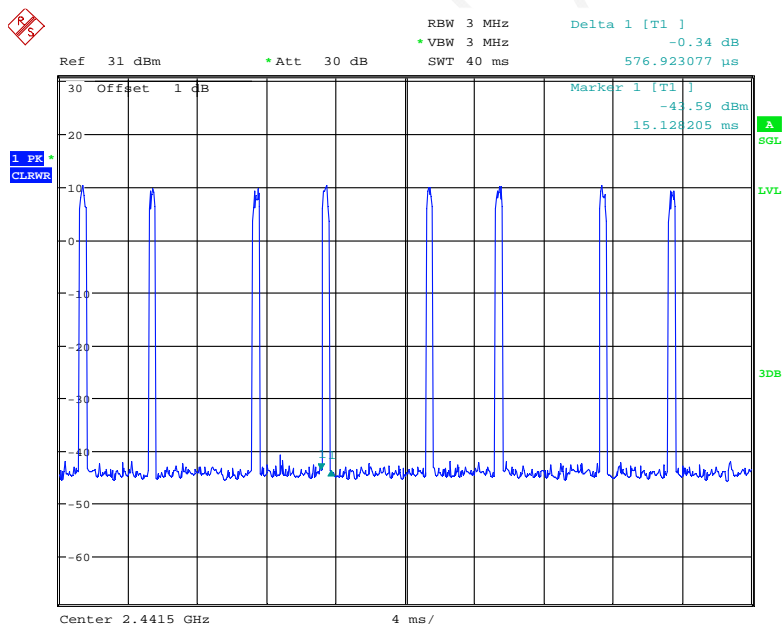
Date: 24.NOV.2018 16:25:58

Duty Cycle-1



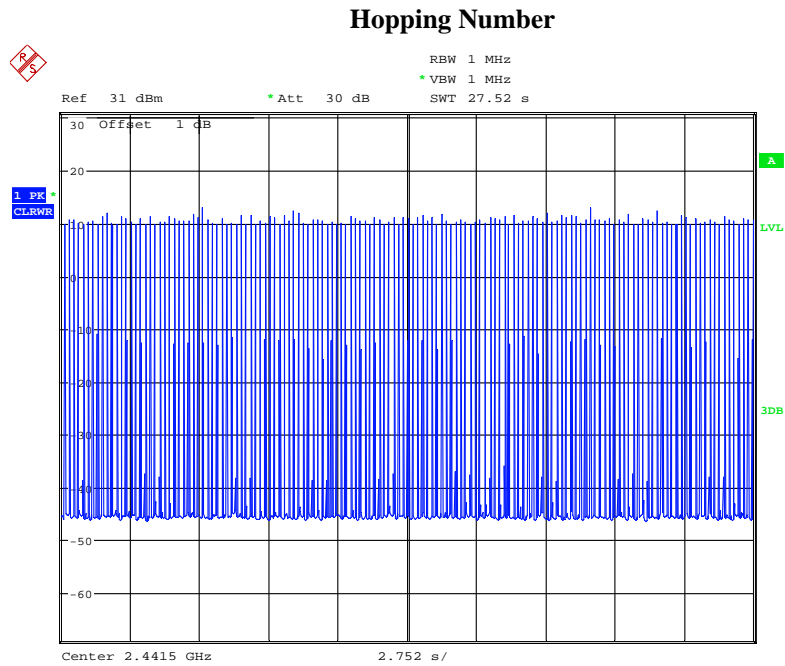
Date: 23.NOV.2018 17:25:43

Duty Cycle-2

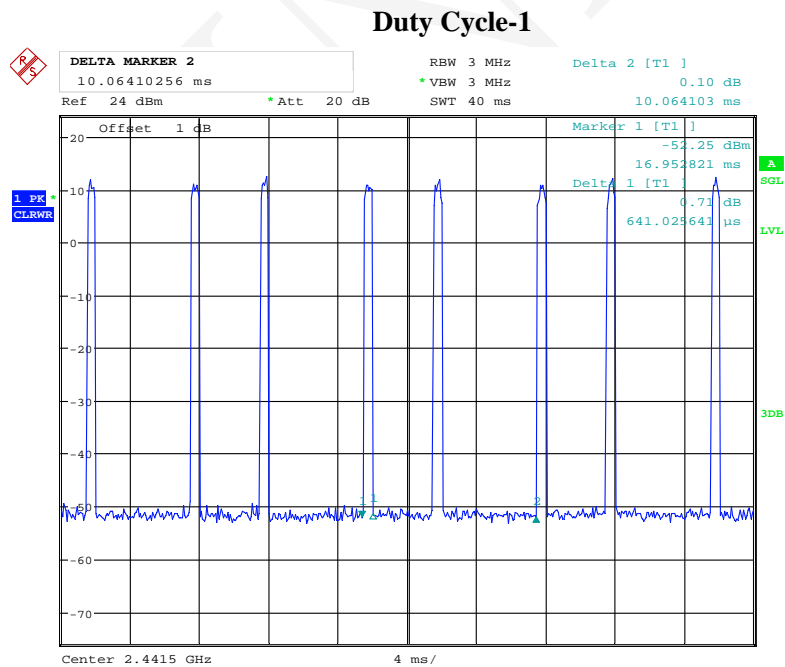


Date: 23.NOV.2018 17:25:22

Chain 1:

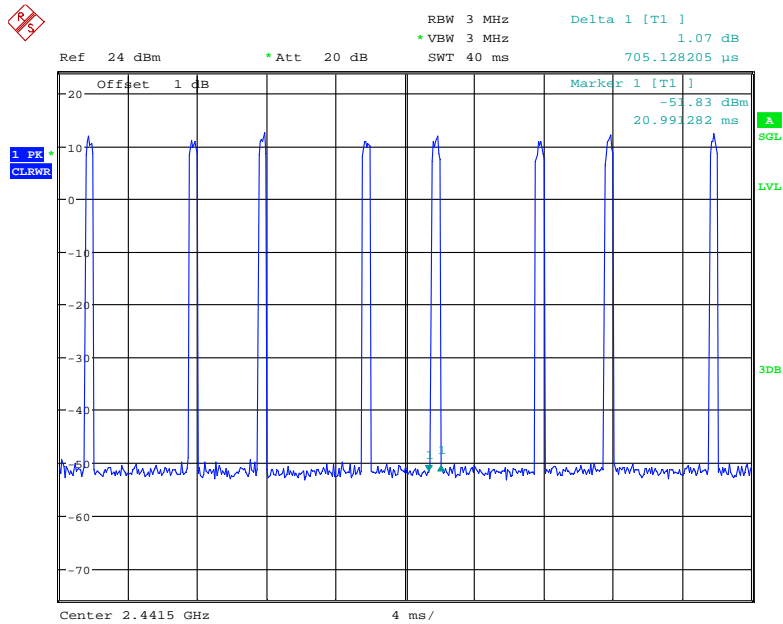


Date: 26.NOV.2018 08:15:02



Date: 22.NOV.2018 14:09:00

Duty Cycle-2



Date: 22.NOV.2018 14:09:22

INTERFERENCE PREVENTION FUNCTION

Requirement

The EUT shall have the interference prevention capability to transmit or to receive the identification automatically, so that sender and receiver shall exclude other equipment.

Test Procedure

In the case that the EUT has the function of automatically transmitting the identification code:

1. Transmit the predetermined identification codes from EUT
2. Check the transmitted identification codes with the demodulator.

In the case of receiving the identification codes:

1. Transmit the predetermined identification codes from the counterpart.
2. Check if communication is normal
3. Transmit the signal other than predetermined ID codes from the counterpart.
4. Check if the EUT stops the transmission, or if it displays that identification codes are different from the predetermined ones.

Measurement Result

Environmental Conditions

| | |
|--------------------|-----------|
| Temperature: | 25.5°C |
| Relative Humidity: | 45 % |
| ATM Pressure: | 100.6 kPa |

The testing was performed by Elena Lei on 2018-11-22.

Test Result: Good

CONSTRUCTION PROTECTION CONFIRMATION

Limit

The high-frequency section and modulation section of the radio equipment except for the antenna system shall not be capable of being opened easily.

Confirmation Method

The EUT has shielding cover the high-frequency section except for the antenna system, the shielding can't be opened easily. Please refer the EUT photo.



****END OF REPORT****