| | | | | |
|---|---|---|---|---|
| **Prüfbericht-Nr.:**<br>*Test Report No.*: | **50144044 001** | **Auftrags-Nr.:**<br>*Order No.*: | 114076719 | Seite 1 von 32<br>*Page 1 of 32* |
| **Kunden-Referenz-Nr.:**<br>*Client Reference No.*: | N/A | **Auftragsdatum:**<br>*Order date*: | 13-April-2018 | |
| **Auftraggeber:**<br>*Client*: | Audeze LLC<br>3410 S Susan St., Santa Ana CA, USA, Zip Code: 92704 | | | |
| **Prüfgegenstand:**<br>*Test item*: | Immersive Cinematic 3D Audio Headphone | | | |
| **Bezeichnung / Typ-Nr.:**<br>*Identification / Type No.*: | MOBIUS | | | |
| **Auftrags-Inhalt:**<br>*Order content*: | NCC Test report | | | |
| **Prüfgrundlage:**<br>*Test specification*: | NCC Low-power Radio-frequency Devices Technical Regulations LP0002(2018) Section 3.10.1 | | | |

| | |
|---|---|
| **Wareneingangsdatum:**<br>*Date of receipt*: | 22-April-2018 |
| **Prüfmuster-Nr.:**<br>*Test sample No.*: | A000728303-006 Rad<br>A000728303-005 Cond |
| **Prüfzeitraum:**<br>*Testing period*: | 25-Apr-2018 – 14-May-2018 |
| **Ort der Prüfung:**<br>*Place of testing*: | EMC/RF Laboratory Taipei |
| **Prüflaboratorium:**<br>*Testing laboratory*: | TUV Rheinland Taiwan Ltd. |
| **Prüfergebnis*:**<br>*Test result**: | Pass |

| **geprüft von** / *tested by*: | | | **kontrolliert von** / *reviewed by*: | | |
|---|---|---|---|---|---|
| 2018-05-18 | Mars Y.J. Lin / Project Engineer | | 2018-05-21 | Arvin Ho/Vice General Manager | |
| **Datum**<br>*Date* | **Name / Stellung**<br>*Name / Position* | **Unterschrift**<br>*Signature* | **Datum**<br>*Date* | **Name / Stellung**<br>*Name / Position* | **Unterschrift**<br>*Signature* |

**Sonstiges** / *Other*:
They are two chips of this MOBIUS, the chip is same, only the item number is different. They just put different marking for paying loyalty.Please refer the APPENDIXP for detailed information.

| | |
|---|---|
| **Zustand des Prüfgegenstandes bei Anlieferung:**<br>*Condition of the test item at delivery*: | Prüfmuster vollständig und unbeschädigt<br>*Test item complete and undamaged* |

| | | | | | |
|---|---|---|---|---|---|
| * Legende: | 1 = sehr gut<br>P(ass) = entspricht o.g. Prüfgrundlage(n) | 2 = gut | 3 = befriedigend<br>F(ail) = entspricht nicht o.g. Prüfgrundlage(n) | 4 = ausreichend<br>N/A = nicht anwendbar | 5 = mangelhaft<br>N/T = nicht getestet |
| *Legend:* | *1 = very good*<br>*P(ass) = passed a.m. test specification(s)* | *2 = good* | *3 = satisfactory*<br>*F(ail) = failed a.m. test specification(s)* | *4 = sufficient*<br>*N/A = not applicable* | *5 = poor*<br>*N/T = not tested* |

**Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.**
*This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.*

# TEST SUMMARY

**5.1.1 ANTENNA REQUIREMENT**
*RESULT: Passed*

**5.1.2 PEAK OUTPUT POWER**
*RESULT: Passed*

**5.1.3 6DB BANDWIDTH AND 99% BANDWIDTH**
*RESULT: Passed*

**5.1.4 POWER DENSITY**
*RESULT: Passed*

**5.1.5 CONDUCTED SPURIOUS EMISSIONS AND FREQUENCY BAND EDGE MEASURED IN 100KHZ BANDWIDTH**
*RESULT: Passed*

**5.1.6 SPURIOUS EMISSION**
*RESULT: Passed*

**5.2.1 MAINS CONDUCTED EMISSIONS**
*RESULT: Passed*

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# 1. General Remarks

## 1.1 Complementary Materials

The following attachments are integral parts of this test report:

**Appendix P: Photo Documentation internal view**
**(File Name: 50144044APPENDIX P)**

**Appendix D: Test Result of Radiated Emissions**
**(File Name: 50144044APPENDIX D)**

Test Specifications

The following standards were applied.

### Table 1: Applied Standard and Test Levels

| **Radio** |
|---|
| NCC Low-power Radio-frequency Devices Technical Regulations LP0002(2018)(107 年 1 月 10 日) |

# 2. Test Sites

## 2.1 Test Laboratory

TUV Rheinland Taiwan Ltd.
Taichung Branch Office

No.9, Lane 36, Minsheng Rd., Sec. 3, Daya District,
Taichung City 428
Taiwan (R.O.C.)

## 2.2 Test Facility

TUV Rheinland Taiwan Ltd.
Taipei Office

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)

FCC RegistrationNo.: 340738
IC Canada Registration No.: 9465A-1
TAF Accredited NCC Test Lab. No.:0759
TAF ISO17025 Certification effective period: 2016-Jul-1st to 2019-Jun-30th

Testing Laboratory
0759

## 2.3 List of Test and Measurement Instruments

### Table 2: List of Test and Measurement Equipment

| Kind of Equipment | Manu-facturer | Type | S/N | Last Calibration | Next Calibration |
|---|---|---|---|---|---|
| Test Software | Farad | EZ_EMC | Ver. TUV3A1 | N/A | N/A |
| EMI Test Receiver | R&S | ESR 7 | 101549 | 2017/11/10 | 2018/11/10 |
| Spectrum Analyzer | R&S | FSV 40 | 100921 | 2018/05/02 | 2019/05/01 |
| Spectrum Analyzer | Agilent | N9010A | MY53470241 | 2018/05/22 | 2019/05/22 |
| Preamplifier (30MHz -1GHz) | HP | 8447F | 2805A03335 | 2017/08/14 | 2018/08/14 |
| Preamplifier (18 GHz -40 GHz) | COM-POWER | PAM-840 | 461257 | 2018/01/18 | 2019/01/18 |
| Pre-Amplifier (1GHz~18GHz) | EM Electronics | EM01G18G | 60558 | 2017/11/21 | 2018/11/21 |
| Bilog Antenna | TESEQ | CBL6111D | 29804 | 2017/08/18 | 2018/08/18 |
| Horn Antenna | ETS-Lindgren | 3117 | 201918 | 2017/08/18 | 2018/08/18 |
| Horn Antenna (18GHz~40GHz) | COM-POWER | AH-840 | 101029 | 2017/11/28 | 2018/11/28 |
| Loop Antenna | Schwarzbeck | FMZB 1513 | 1513-076 | 2017/06/14 | 2018/06/14 |
| EMI Test Receiver | R&S | ESR 7 | 101549 | 2017/11/10 | 2018/11/10 |
| Spectrum Analyzer | R&S | FSL3 | 101943 | 2015/09/07 | 2018/09/07 |
| Temp. & Humid. Chamber | Giant Force | GCT-099-40-S | MAF0103-007 | 2017/03/09 | 2019/03/09 |
| LISN (1 phase) | R&S | ENV216 | 101243 | 2017/06/18 | 2018/06/18 |
| LISN | R&S | ENV216 | 101262 | 2017/06/22 | 2018/06/21 |

## 2.4 Traceability

All measurement equipment calibrations are traceable to NML(Taiwan)/NIST(USA) or where calibration is performed outside Taiwan, to equivalent nationally recognized standards organizations.

## 2.5 Calibration

Equipment requiring calibration is calibrated periodically in a suitably accredited Calibration Lab. Additionally all equipment is verified for proper performance on a regular schedule using in house standards or comparisons.

## 2.6 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements .

**Table 3: Emission Measurement Uncertainty**

| Parameter | Uncertainty |
|---|---|
| Radio Frequency | ± 0.1 ppm |
| RF power, conducted | ± 1.5 dB |
| RF power density, conducted | ± 3 dB |
| spurious emissions, conducted | ± 3 dB |
| all emissions, radiated | ± 6 dB |
| Temperature | ± 1 ºC |
| Humidity | ± 5 % |
| DC and low frequency voltages | ±3 % |

# 3. General Product Information

## 3.1 Product Function and Intended Use

The EUT is a Bluetooth Headphone. It contains a Bluetooth 4.2 compatible module enabling the user to communicate data through a Wireless interface.
For details refer to the User Guide, Data Sheet and Circuit Diagram.

## 3.2 System Details and Ratings

### Table 4: Basic Information of EUT

| Item | EUT information |
|---|---|
| Kind of Equipment/Test Item | Immersive Cinematic 3D Audio Headphone |
| Type Identification | MOBIUS |
| Brand Name | Audeze |

### Table 5: Technical Specification of EUT

| Technical Specification | Value |
|---|---|
| Operating Frequencies | 2402MHz-2480MHz |
| Channel Spacing | 2 MHz |
| Channel number | 40 |
| Operation Voltage | 5Vdc |
| Modulation | GFSK |
| Antenna gain | 2.459 dBi |

## 3.3 Independent Operation Modes

Basic operation modes are:

A. Transmitting
    1. Low channel
    2. Middle channel
    3. High channel
B. Receiving
C. Standby
D. Off

## 3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

## 3.5 Submitted Documents

- Circuit Diagram
- Instruction Manual
- Rating Label
- Technical Description

# 4. Test Set-up and Operation Modes

## 4.1 Principle of Configuration Selection

The equipment under test (EUT) was configured to measure its maximum power level. The test modes were adapted accordingly in reference to the instructions for use.

## 4.2 Test Operation and Test Software

Setup for testing: Test samples are provided with a USB interface which makes it possible to control them through a test software installed on a notebook computer.

This software, Bluetooth RF test tool ISRT-5145 provided by manufacturer was running on the laptop computer connected to the EUT. It was used to enable the operation modes listed in section 3.3 as appropriate.

The samples were used as follows:
Conducted: A000728303-005 Cond
Radiation: A000728303-006 Rad

Full test was applied on all test modes, but only worst case was shown

### 4.3 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

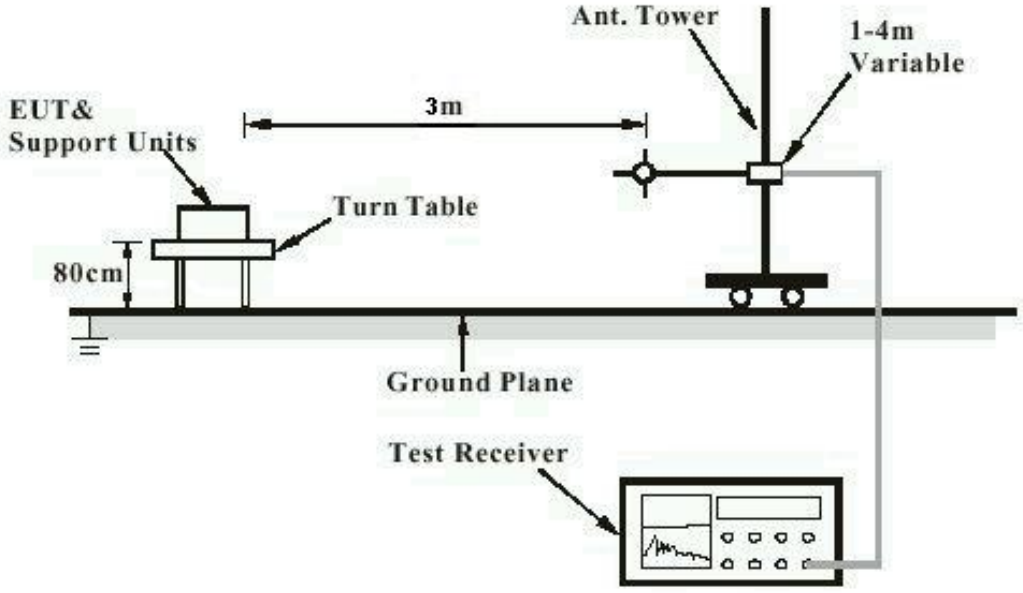
| Kind of Equipment | Manufacturer | Model Name | Serial No. |
|---|---|---|---|
| Notebook(EMC-06) | Lenovo | TP00048A | PB-0F8B2 |

## 4.4 Countermeasures to achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

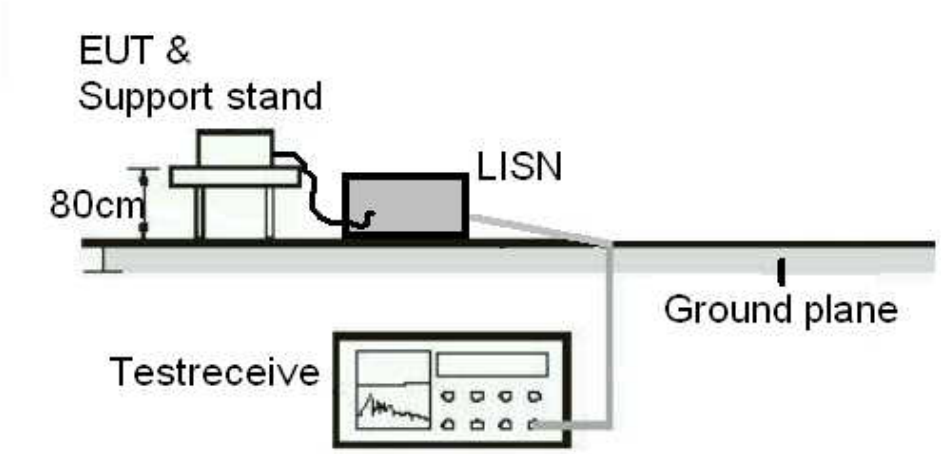
## 4.5 Test Setup Diagram

**Diagram of Measurement Configuration for Radiation Test**

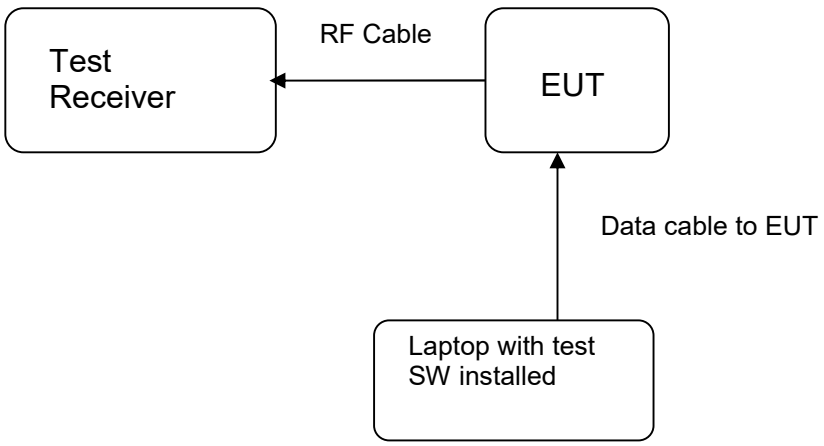



Note: Measurements above 1 GHz are done with a table height of 1.5m

## Diagram of Measurement Equipment Configuration for Mains Conduction Measurement (if applicable)




## Diagram of Measurement Equipment Configuration for Conducted Transmitter Measurement



# 5. Test Results

## 5.1 Transmitter Requirement & Test Suites

### 5.1.1 Antenna Requirement

**RESULT:** **Passed**

| | | |
|---|---|---|
| Test standard | : | LP0002(2018): 2.2, 3.10.1.3, 3.10.1.4 |
| Requirement | : | use of approved antennas only with directional gains that do not exceed 6 dBi |

According to the manufacturer declaration, the EUT has an antenna with a directional gain of 2.459 dBi. The antenna is a printed PCB trace with no possibility of replacement with a non-approved antenna by the end-user. Therefore, the EUT is considered to comply with this provision.

Refer to EUT photo for details.

## 5.1.2 Peak Output Power

**RESULT:** **Passed**

Test standard : LP0002(2018): 3.10.1.2 (1)(C)

Limit : 1 Watt
Kind of test site : Shielded room

**Test setup**

Test Channel : Low/ Middle/ High
Operation Mode : A

Ambient temperature : 20-24 °C
Relative humidity : 50-65 %
Atmospheric pressure : 100-103 kPa

### Table 6: Test result of Peak Output Power

| Channel | Channel Frequency (MHz) | Output Power | | Limit |
|---|---|---|---|---|
| | | (dBm) | (W) | (W) |
| Low Channel | 2402 | -4.81 | 0.00033 | 1 |
| Middle Channel | 2440 | -4.84 | 0.00033 | 1 |
| High Channel | 2480 | -4.85 | 0.00033 | 1 |

Pmax: 0.3304 mW

## 5.1.3 6dB Bandwidth and 99% Bandwidth

**RESULT:** **Passed**

Test standard : LP0002(2018): 3.10.1.6 (2)(A)

Kind of test site : Shielded room

**Test setup**

Test Channel : Low/ Middle/ High
Operation Mode : A

Ambient temperature : 20-24°C
Relative humidity : 50-65%
Atmospheric pressure : 100-103 kPa

### Table 7: Test result of 6dB Bandwidth

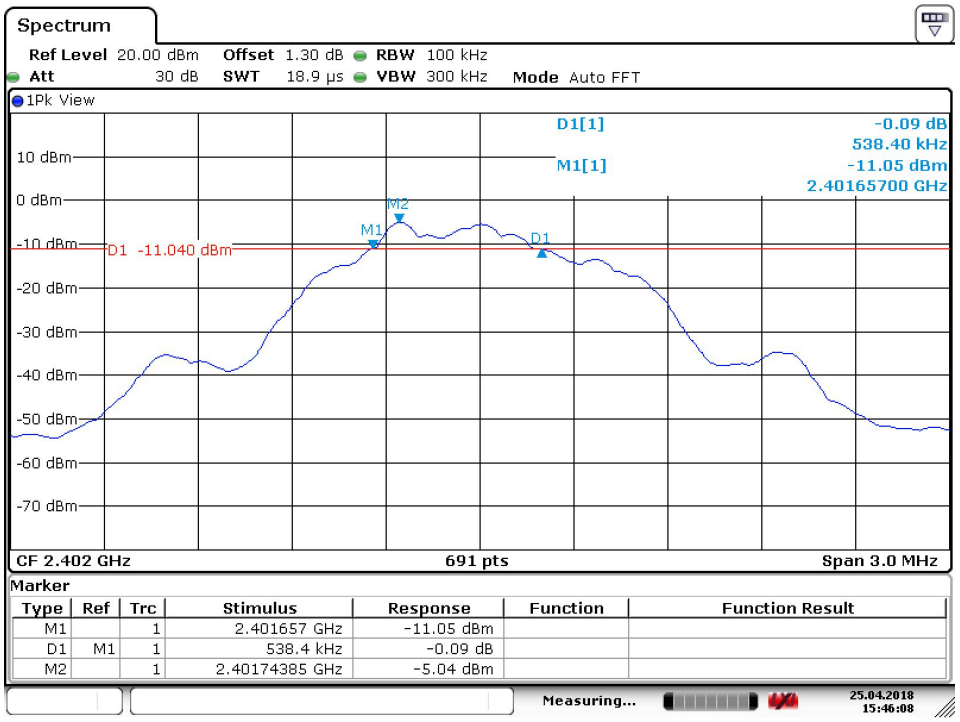
| Channel | Channel Frequency (MHz) | 6dB Bandwidth (kHz) | Limit (kHz) | Result |
|---|---|---|---|---|
| Low Channel | 2402 | 538.4 | >500 | Pass |
| Mid Channel | 2440 | 542.7 | >500 | Pass |
| High Channel | 2480 | 542.7 | >500 | Pass |

### Table 8: Test result of 99% Bandwidth,

| Channel | Channel Frequency (MHz) | 99% Bandwidth (kHz) |
|---|---|---|
| Mid Channel | 2440 | 1041.9 |

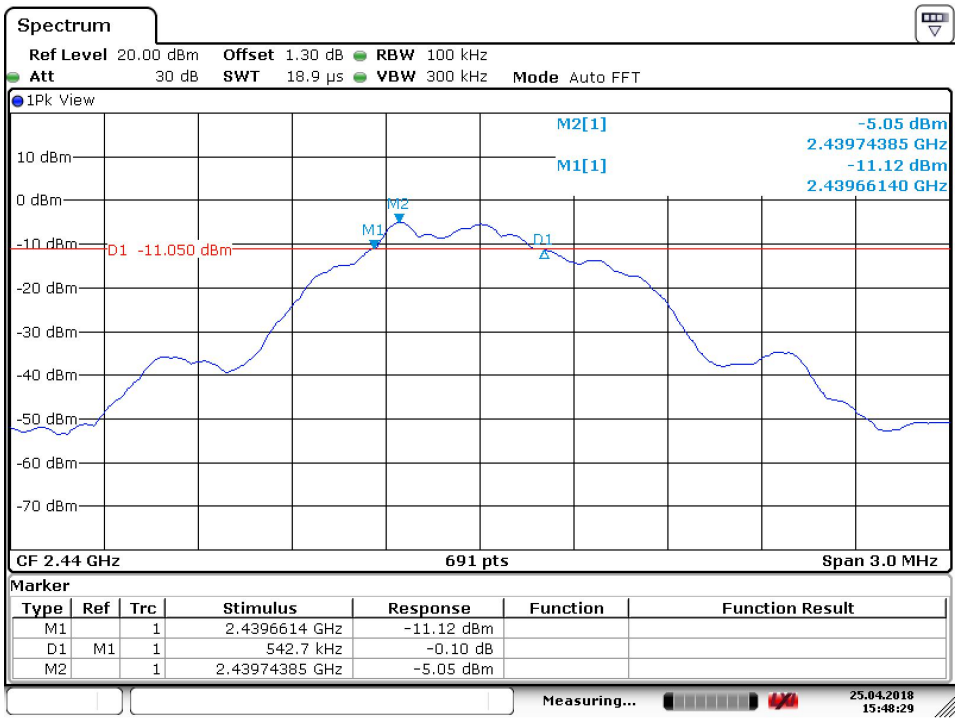
# Test Plot of 6dB Bandwidth

## Low Channel



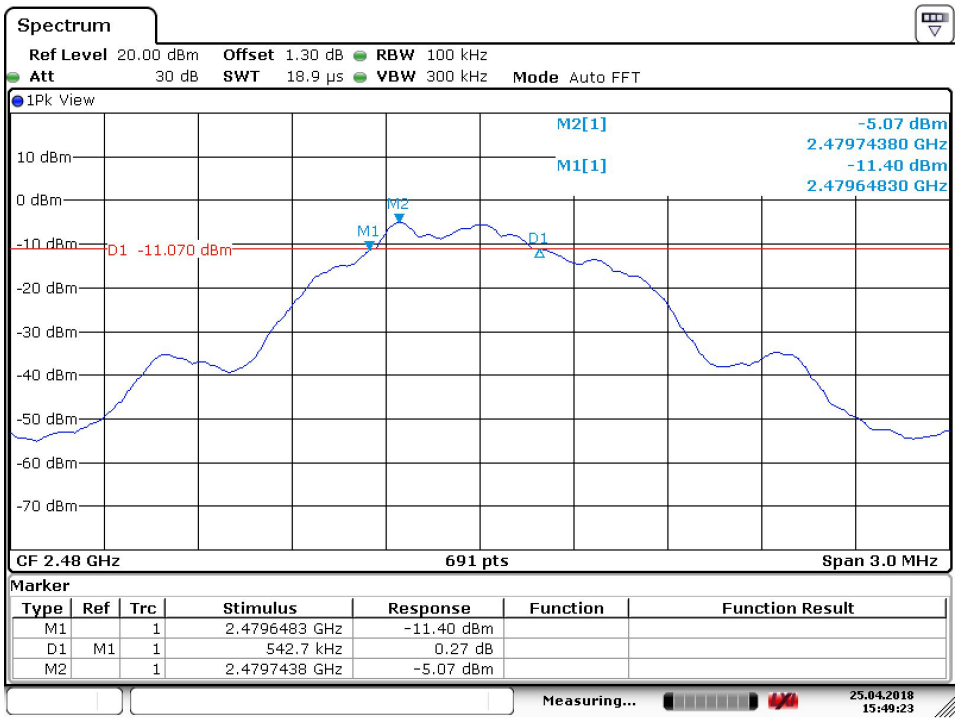

Date: 25.APR.2018 15:46:08

## Middle Channel




Date: 25.APR.2018 15:48:29

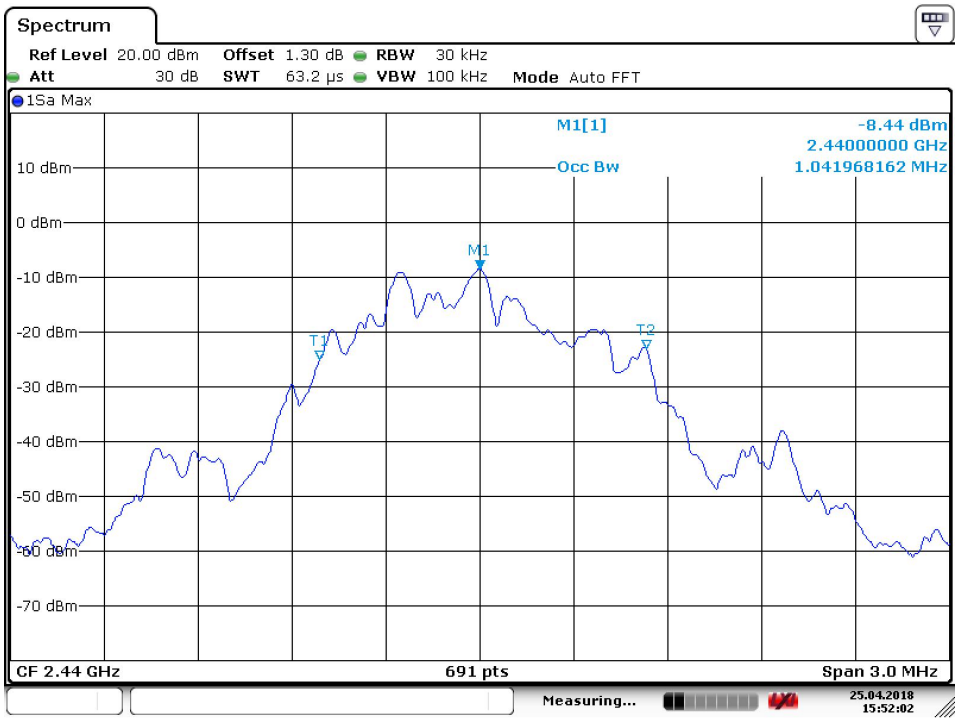
**High Channel**




Date: 25.APR.2018 15:49:23

# Test Plot of 99% Bandwidth

## Middle Channel




Date: 25.APR.2018 15:52:02