

# FCC PART 15.249 TEST REPORT

For

**TelergyHD BV**

6 1217 AP Hilversum, Netherlands

**FCC ID: 2AA9TTHD601DC0002**

|                                        |                                                                                                                                                                                                                                                                                              |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Report Type:</b><br>Original Report | <b>Product Type:</b><br>RF Remote Control                                                                                                                                                                                                                                                    |
| <b>Test Engineer:</b> Candy Li         |                                                                                                                                                                                                          |
| <b>Report Number:</b> RSZ140418551-00  |                                                                                                                                                                                                                                                                                              |
| <b>Report Date:</b> 2014-04-24         |                                                                                                                                                                                                                                                                                              |
| <b>Reviewed By:</b> RF Leader          |                                                                                                                                                                                                          |
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**Note:** This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

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## GENERAL INFORMATION

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

The *TelergyHD BV* 's product, model number: *THD-AIR1 (FCC ID: 2AA9TTHD601DC0002)* or the "EUT" in this report was a *RF Remote control*, which was measured approximately: 17.32 cm (L) x 5.41 cm (W) x 1.87 cm (H), rated input voltage: DC 2\*1.5V battery.

*\*All measurement and test data in this report was gathered from production sample serial number: 1404005 (Assigned by BACL, Shenzhen). The EUT supplied by the applicant was received on 2014-04-18.*

### Objective

This type approval report is prepared on behalf of *TelergyHD BV* in accordance with Part 2-Subpart J, and Part 15-Subparts A, B and C of the Federal Communication Commissions rules.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.209 and 15.249 rules.

### Related Submittal(s)/Grant(s)

No related submittal.

### Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement uncertainty with radiated emission is 5.91 dB for 30MHz-1GHz.and 4.92 dB for above 1GHz, 1.95dB for conducted measurement.

### Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China.

Test site at Bay Area Compliance Laboratories Corp. (Shenzhen) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on December 06, 2010. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2009.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

## SYSTEM TEST CONFIGURATION

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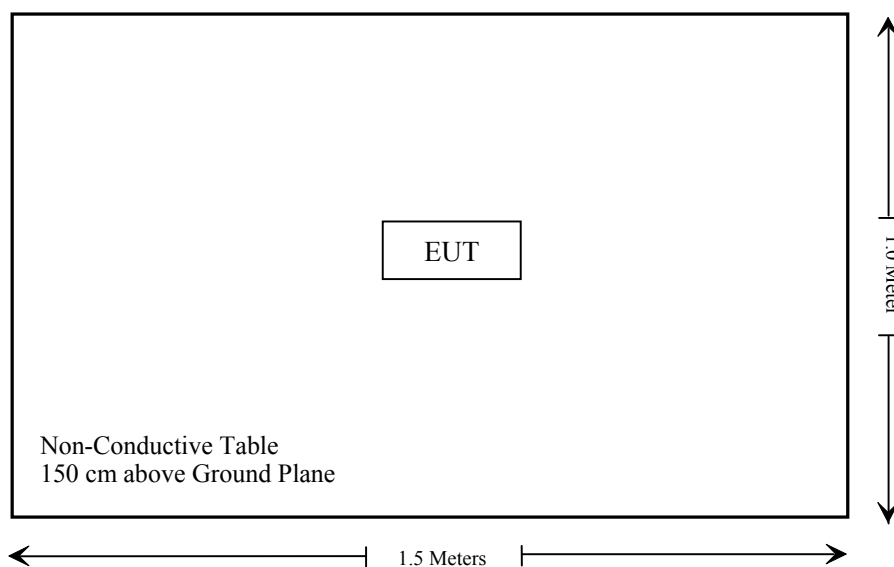
### Justification

The system was configured in a testing mode which provided by manufacturer.

### Equipment Modifications

No modifications were made to the unit tested.

### Block Diagram of Test Setup



**SUMMARY OF TEST RESULTS**

| FCC Rules                  | Description of Test     | Result          |
|----------------------------|-------------------------|-----------------|
| § 15.203                   | Antenna Requirement     | Compliance      |
| § 15.207(a)                | Conduction Emissions    | Not Applicable* |
| 15.205, § 15.209, § 15.249 | Radiated Emissions      | Compliance      |
| § 15.215(c)                | 20dB Emission Bandwidth | Compliance      |

Not Applicable\*: Battery power supply only.

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## **FCC§15.203 - ANTENNA REQUIREMENT**

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### **Applicable Standard**

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used.

### **Antenna Connector Construction**

The EUT has a PCB antenna arrangement, which was permanently attached, fulfill the requirement of this section. Please refer to the internal photos.

**Result:** Compliant.

**FCC §15.205, §15.209 & §15.249 - RADIATED EMISSIONS****Applicable Standard**

As per FCC §15.249 (a), except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

| Fundamental frequency | Field strength of fundamental (millivolts/meter) | Field strength of harmonics (microvolts/meter) |
|-----------------------|--------------------------------------------------|------------------------------------------------|
| 902–928 MHz           | 50                                               | 500                                            |
| 2400–2483.5 MHz       | 50                                               | 500                                            |
| 5725–5875 MHz         | 50                                               | 500                                            |
| 24.0–24.25 GHz        | 250                                              | 2500                                           |

As per FCC§15.249 (c), Field strength limits are specified at a distance of 3 meters.

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

**Measurement Uncertainty**

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on CISPR 16-4-2:2011, the expended combined standard uncertainty of radiation emissions at Bay Area Compliance Laboratories Corp. (Shenzhen) is 5.91 dB for 30MHz-1GHz, 4.92 dB for above 1GHz, and it will not be taken into consideration for the test data recorded in the report

**Test Equipment Setup**

The spectrum analyzer or receiver is set as:

Below 1000MHz:

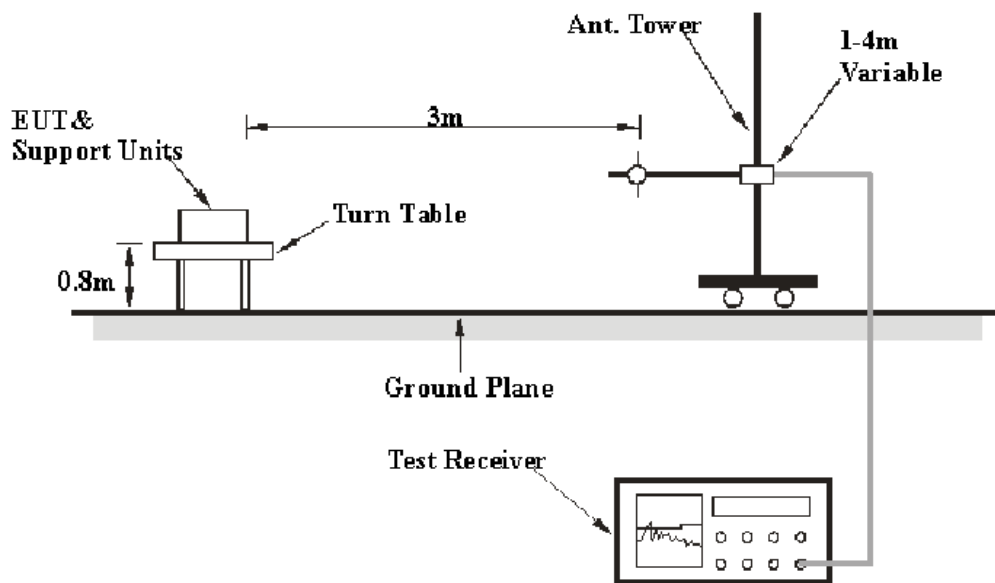
RBW = 100 kHz / VBW = 300 kHz / Sweep = Auto

Above 1000MHz:

Peak: RBW = 1MHz / VBW = 1MHz / Sweep = Auto

Average: RBW = 1MHz / VBW = 10Hz / Sweep = Auto

## EUT Setup



The radiated emission and out of band emission tests were performed in the 3 meters chamber test site, using the setup accordance with the ANSI C63.4-2009. The specification used was the FCC 15.209/15.205 and FCC 15.249 limits.

## Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

The EUT is set 3 meter away from the testing antenna, which is varied from 1-4 meter, and the EUT is placed on a turntable, which is 0.8 meter above ground plane, the table shall be rotated for 360 degrees to find out the highest emission. The receiving antenna should be changed the polarization both of horizontal and vertical.

## Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

$$\text{Corrected Amplitude} = \text{Meter Reading} + \text{Antenna Factor} + \text{Cable Loss} - \text{Amplifier Gain}$$

The “**Margin**” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Limit} - \text{Corrected Amplitude}$$

**Test Equipment List and Details**

| Manufacturer    | Description       | Model      | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-------------------|------------|---------------|------------------|----------------------|
| HP              | Amplifier         | 8447E      | 1937A01046    | 2013-09-30       | 2014-09-30           |
| Rohde & Schwarz | EMI Test Receiver | ESCI       | 101122        | 2013-09-25       | 2014-09-25           |
| Sunol Sciences  | Broadband Antenna | JB1        | A040904-2     | 2011-11-28       | 2014-11-27           |
| Mini-Circuits   | Pre-amplifier     | ZVA-183-S+ | 5969001149    | 2014-04-03       | 2015-04-03           |
| Sunol Sciences  | Horn Antenna      | DRH-118    | A052304       | 2011-12-01       | 2014-11-30           |
| Rohde & Schwarz | Signal Analyzer   | FSIQ26     | 8386001028    | 2013-11-12       | 2014-11-12           |

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

**Test Results Summary**

According to the data in the following table, the worst margin reading as below:

**8.29 dB at 2369.8 MHz in the Horizontal polarization**

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cisp\text{r}}$$

in BACL,  $U_{(Lm)}$  is less than  $U_{cisp\text{r}}$ , if  $L_m$  is less than  $L_{lim}$ , it implies that the EUT complies with the limit.

**Test Data****Environmental Conditions**

|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 25 °C     |
| <b>Relative Humidity:</b> | 56 %      |
| <b>ATM Pressure:</b>      | 101.0 kPa |

*The testing was performed by Candy Li on 2014-04-22.*

*Test Mode: Transmitting*

**30 MHz to 25 GHz:**

| Frequency<br>(MHz)        | Receiver          |                          | Turntable<br>Degree | Rx Antenna    |                | Corrected<br>Factor<br>(dB) | Corrected<br>Amplitude<br>(dBμV/m) | FCC Part<br>15.249/15.205/15.209 |                |
|---------------------------|-------------------|--------------------------|---------------------|---------------|----------------|-----------------------------|------------------------------------|----------------------------------|----------------|
|                           | Reading<br>(dBμV) | Detector<br>(PK/QP/Ave.) |                     | Height<br>(m) | Polar<br>(H/V) |                             |                                    | Limit<br>(dBμV/m)                | Margin<br>(dB) |
| Low Channel (2402 MHz)    |                   |                          |                     |               |                |                             |                                    |                                  |                |
| 352.0                     | 39.27             | QP                       | 142                 | 2.0           | H              | 12.7                        | 26.57                              | 46                               | 19.43          |
| 2402.0                    | 83.52             | PK                       | 165                 | 2.0           | H              | 5.48                        | 89.00                              | 114                              | 25             |
| 2402.0                    | 83.02             | Ave.                     | 165                 | 2.0           | H              | 5.48                        | 88.50                              | 94                               | 5.5            |
| 2402.0                    | 85.83             | PK                       | 103                 | 1.9           | V              | 5.48                        | 91.31                              | 114                              | 22.69          |
| 2402.0                    | 85.15             | Ave.                     | 103                 | 1.9           | V              | 5.48                        | 90.63                              | 94                               | 3.37           |
| 2337.8                    | 40.97             | PK                       | 25                  | 2.4           | H              | 4.99                        | 45.96                              | 74                               | 28.04          |
| 2337.8                    | 36.70             | Ave.                     | 25                  | 2.4           | H              | 4.99                        | 41.69                              | 54                               | 12.31          |
| 2369.8                    | 43.58             | PK                       | 113                 | 1.2           | H              | 5.48                        | 49.06                              | 74                               | 24.94          |
| 2369.8                    | 40.23             | Ave.                     | 113                 | 1.2           | H              | 5.48                        | 45.71                              | 54                               | 8.29           |
| 2498.2                    | 38.94             | PK                       | 253                 | 2.1           | V              | 7.21                        | 46.15                              | 74                               | 27.85          |
| 2498.2                    | 32.56             | Ave.                     | 253                 | 2.1           | V              | 7.21                        | 39.77                              | 54                               | 14.23          |
| 4804.0                    | 37.86             | PK                       | 207                 | 2.3           | V              | 12.44                       | 50.30                              | 74                               | 23.70          |
| 4804.0                    | 22.52             | Ave.                     | 207                 | 2.3           | V              | 12.44                       | 34.96                              | 54                               | 19.04          |
| 7206.0                    | 36.02             | PK                       | 7                   | 2.0           | H              | 17.06                       | 53.08                              | 74                               | 20.92          |
| 7206.0                    | 20.06             | Ave.                     | 7                   | 2.0           | H              | 17.06                       | 37.12                              | 54                               | 16.88          |
| 9608.0                    | 34.66             | PK                       | 83                  | 2.1           | H              | 19.28                       | 53.94                              | 74                               | 20.06          |
| 9608.0                    | 20.33             | Ave.                     | 83                  | 2.1           | H              | 19.28                       | 39.61                              | 54                               | 14.39          |
| Middle Channel (2436 MHz) |                   |                          |                     |               |                |                             |                                    |                                  |                |
| 352.0                     | 38.88             | QP                       | 213                 | 1.8           | H              | 12.7                        | 26.18                              | 46                               | 19.82          |
| 2436.0                    | 85.70             | PK                       | 127                 | 1.4           | H              | 6.13                        | 91.83                              | 114                              | 22.17          |
| 2436.0                    | 85.41             | Ave.                     | 127                 | 1.4           | H              | 6.13                        | 91.54                              | 94                               | 2.46           |
| 2436.0                    | 81.30             | PK                       | 166                 | 1.6           | V              | 6.13                        | 87.43                              | 114                              | 26.57          |
| 2436.0                    | 81.03             | Ave.                     | 166                 | 1.6           | V              | 6.13                        | 87.16                              | 94                               | 6.84           |
| 2339.9                    | 40.04             | PK                       | 102                 | 1.7           | V              | 5.48                        | 45.52                              | 74                               | 28.48          |
| 2339.9                    | 35.92             | Ave.                     | 102                 | 1.7           | V              | 5.48                        | 41.40                              | 54                               | 12.60          |
| 2371.9                    | 41.90             | PK                       | 316                 | 2.4           | H              | 5.48                        | 47.38                              | 74                               | 26.62          |
| 2371.9                    | 38.46             | Ave.                     | 316                 | 2.4           | H              | 5.48                        | 43.94                              | 54                               | 10.06          |
| 2500.0                    | 41.40             | PK                       | 298                 | 2.3           | H              | 7.21                        | 48.61                              | 74                               | 25.39          |
| 2500.0                    | 37.14             | Ave.                     | 298                 | 2.3           | H              | 7.21                        | 44.35                              | 54                               | 9.65           |
| 4872.0                    | 35.76             | PK                       | 347                 | 2.1           | H              | 12.4                        | 48.16                              | 74                               | 25.84          |
| 4872.0                    | 21.74             | Ave.                     | 347                 | 2.1           | H              | 12.4                        | 34.14                              | 54                               | 19.86          |
| 7308.0                    | 35.11             | PK                       | 217                 | 1.9           | V              | 16.62                       | 51.73                              | 74                               | 22.27          |
| 7308.0                    | 20.59             | Ave.                     | 217                 | 1.9           | V              | 16.62                       | 37.21                              | 54                               | 16.79          |
| 9744.0                    | 35.87             | PK                       | 353                 | 1.8           | H              | 19.4                        | 55.27                              | 74                               | 18.73          |
| 9744.0                    | 19.82             | Ave.                     | 353                 | 1.8           | H              | 19.4                        | 39.22                              | 54                               | 14.78          |

| Frequency<br>(MHz)      | Receiver          |                          | Turntable<br>Degree | Rx Antenna    |                | Corrected<br>Factor<br>(dB) | Corrected<br>Amplitude<br>(dBμV/m) | FCC Part<br>15.249/15.205/15.209 |                |
|-------------------------|-------------------|--------------------------|---------------------|---------------|----------------|-----------------------------|------------------------------------|----------------------------------|----------------|
|                         | Reading<br>(dBμV) | Detector<br>(PK/QP/Ave.) |                     | Height<br>(m) | Polar<br>(H/V) |                             |                                    | Limit<br>(dBμV/m)                | Margin<br>(dB) |
| High Channel (2479 MHz) |                   |                          |                     |               |                |                             |                                    |                                  |                |
| 352.0                   | 39.05             | QP                       | 139                 | 1.7           | H              | 12.7                        | 26.35                              | 46                               | 19.65          |
| 2479.0                  | 86.49             | PK                       | 216                 | 2.4           | H              | 7.21                        | 93.70                              | 114                              | 20.3           |
| 2479.0                  | 85.98             | Ave.                     | 216                 | 2.4           | H              | 7.21                        | 93.19                              | 94                               | 0.81           |
| 2479.0                  | 86.90             | PK                       | 314                 | 2.1           | V              | 7.21                        | 94.11                              | 114                              | 19.89          |
| 2479.0                  | 85.71             | Ave.                     | 314                 | 2.1           | V              | 7.21                        | 92.92                              | 94                               | 1.08           |
| 2350.9                  | 39.62             | PK                       | 236                 | 2.4           | H              | 5.48                        | 45.10                              | 74                               | 28.90          |
| 2350.9                  | 34.73             | Ave.                     | 236                 | 2.4           | H              | 5.48                        | 40.21                              | 54                               | 13.79          |
| 2383.3                  | 41.39             | PK                       | 274                 | 1.5           | H              | 5.48                        | 46.87                              | 74                               | 27.13          |
| 2383.3                  | 37.78             | Ave.                     | 274                 | 1.5           | H              | 5.48                        | 43.26                              | 54                               | 10.74          |
| 2483.5                  | 42.81             | PK                       | 251                 | 1.5           | V              | 7.21                        | 50.02                              | 74                               | 23.98          |
| 2483.5                  | 27.95             | Ave.                     | 251                 | 1.5           | V              | 7.21                        | 35.16                              | 54                               | 18.84          |
| 4958.0                  | 37.53             | PK                       | 31                  | 2.1           | H              | 12.5                        | 50.03                              | 74                               | 23.97          |
| 4958.0                  | 22.01             | Ave.                     | 31                  | 2.1           | H              | 12.5                        | 34.51                              | 54                               | 19.49          |
| 7437.0                  | 34.83             | PK                       | 80                  | 1.8           | H              | 15.91                       | 50.74                              | 74                               | 23.26          |
| 7437.0                  | 21.38             | Ave.                     | 80                  | 1.8           | H              | 15.91                       | 37.29                              | 54                               | 16.71          |
| 9916.0                  | 35.35             | PK                       | 161                 | 2.3           | V              | 19.39                       | 54.74                              | 74                               | 19.26          |
| 9916.0                  | 20.44             | Ave.                     | 161                 | 2.3           | V              | 19.39                       | 39.83                              | 54                               | 14.17          |

Note:

Corrected Amplitude = Corrected Factor + Reading

Corrected Factor=Antenna factor (RX) + Cable Loss – Amplifier Factor

Margin = Limit – Corr. Amplitude

**FCC §15.215(c) - 20 dB EMISSION BANDWIDTH****Applicable Standard**

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

**Test Procedure**

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that indicated 20dB bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

**Test Equipment List and Details**

| Manufacturer    | Description     | Model  | Serial Number | Calibration Date | Calibration Due Date |
|-----------------|-----------------|--------|---------------|------------------|----------------------|
| Rohde & Schwarz | Signal Analyzer | FSIQ26 | 8386001028    | 2013-11-12       | 2014-11-12           |

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

**Test Data****Environmental Conditions**

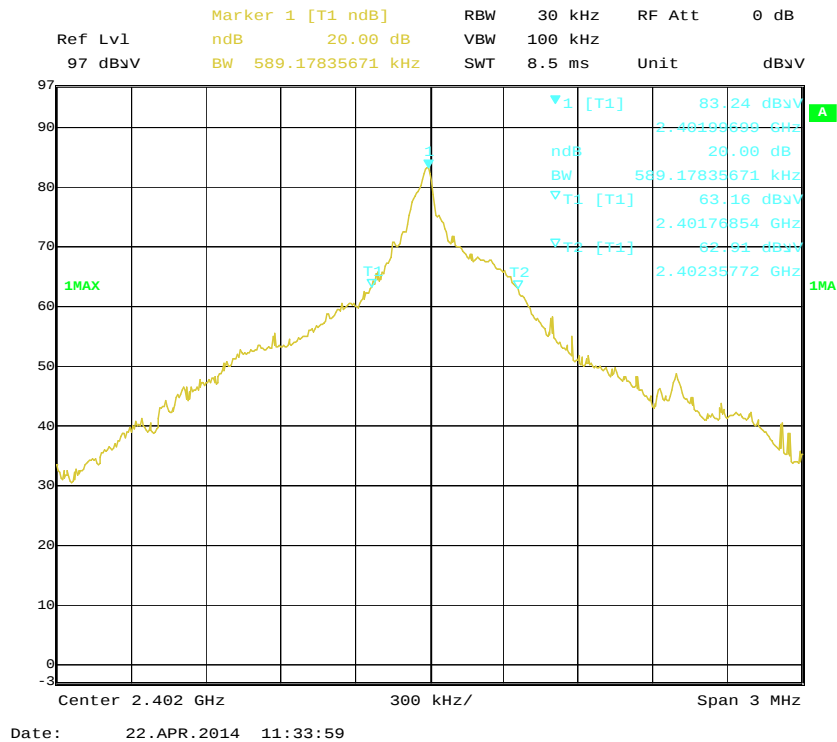
|                    |           |
|--------------------|-----------|
| Temperature:       | 25 °C     |
| Relative Humidity: | 56 %      |
| ATM Pressure:      | 101.0 kPa |

*The testing was performed by Candy Li on 2014-04-22.*

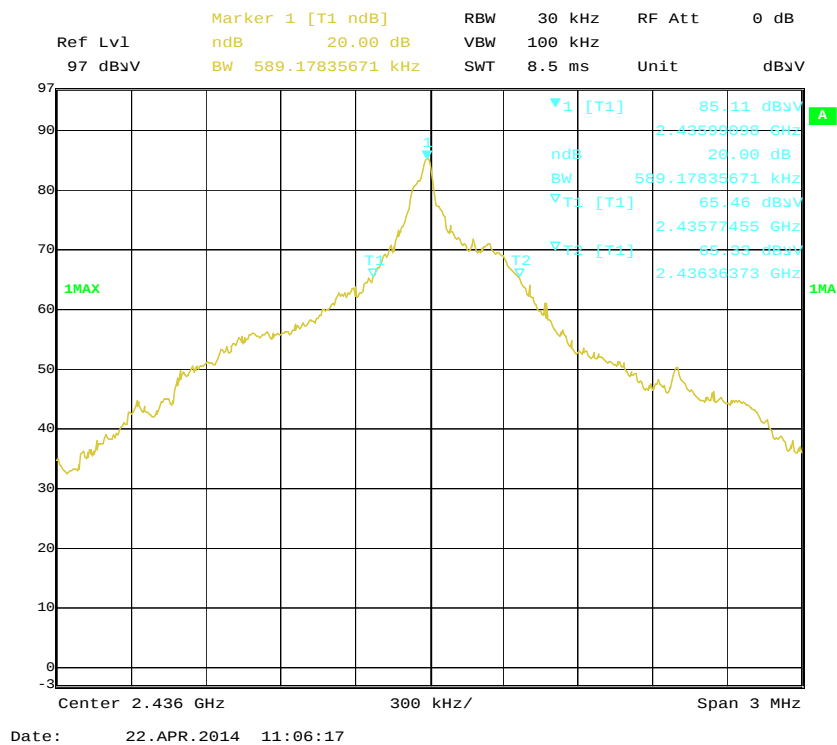
*Test Mode: Transmitting*

Pleas refer to the following plots.

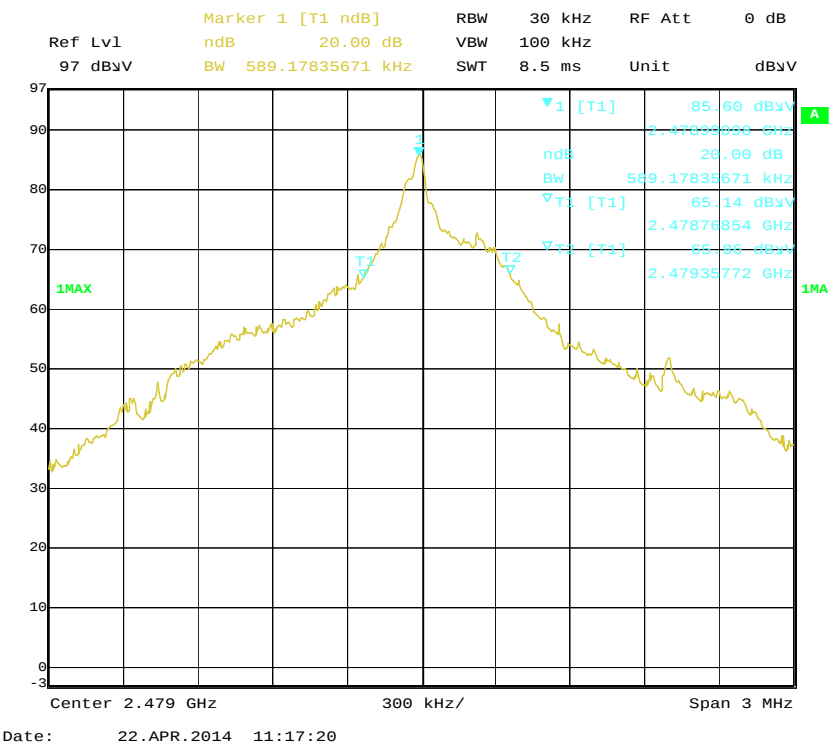
### Low Channel



### Middle Channel



High Channel



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