# BT Test Report

| | | |
|---|---|---|
| **Application Purpose** | : | Original grant |
| **Applicant Name:** | : | Shenzhen SKY DRAGON Audio-video Technology Co.,LTD |
| **FCC ID** | : | ZJPCK128 |
| **Equipment Type** | : | Bluetooth Speaker |
| **Model Name** | : | CK128 |
| **Report Number** | : | FCC16104053A |
| **Standard(S)** | : | FCC Part 15 Subpart C |
| **Date Of Receipt** | : | October 17, 2016 |
| **Date Of Issue** | : | October 25, 2016 |

**Test By** :

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**Registration Number: 588523**

## REPORT REVISE RECORD

| Report Version | Revise Time | Issued Date | Valid Version | Notes |
|---|---|---|---|---|
| V1.0 | / | October 25, 2016 | Valid | Original Report |
| V1.1 | / | November 07, 2016 | Valid | Original Report |

**Table of Contents** **Page**


1. GENERAL INFORMATION 5

2. TEST DESCRIPTION 7

2.1 MEASUREMENT UNCERTAINTY 7

2.2 DESCRIPTION OF TEST MODES 8

2.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING 9

2.4 CONFIGURATION OF SYSTEM UNDER TEST 9

2.5 DESCRIPTION OF SUPPORT UNITS (CONDUCTED MODE) 10

3. SUMMARY OF TEST RESULTS 11

4. MEASUREMENT INSTRUMENTS 12

5. EMC EMISSION TEST 13

5.1 CONDUCTED EMISSION MEASUREMENT 13

5.1.1 POWER LINE CONDUCTED EMISSION LIMITS 13

5.1.2 TEST PROCEDURE 14

5.1.3 DEVIATION FROM TEST STANDARD 14

5.1.4 TEST SETUP 14

5.1.5 EUT OPERATING CONDITIONS 14

5.1.6 TEST RESULTS 15

5.2 RADIATED EMISSION MEASUREMENT 17

5.2.1 RADIATED EMISSION LIMITS 17

5.2.2 TEST PROCEDURE 18

5.2.3 DEVIATION FROM TEST STANDARD 18

5.2.4 TEST SETUP 19

5.2.5 EUT OPERATING CONDITIONS 20

5.2.5.1 RESULTS (BELOW 30 MHZ) 21

5.2.5.2 TEST RESULTS (BETWEEN 30M – 1000 MHZ) 22

5.2.5.3 TEST RESULTS (1GHZ TO 25GHZ) 24

6.2 TEST PROCEDURE 35

6.3 DEVIATION FROM STANDARD 35

6.4 TEST SETUP 35

6.5 EUT OPERATION CONDITIONS 35

6.6 TEST RESULTS 36

7. AVERAGE TIME OF OCCUPANCY

7.1 APPLIED PROCEDURES / LIMIT 37

7.2 TEST PROCEDURE 37

7.3 DEVIATION FROM STANDARD 37

7.4 TEST SETUP 38

7.5 EUT OPERATION CONDITIONS 38

Table of Contents Page

7.6 TEST RESULTS 39

8. HOPPING CHANNEL SEPARATION MEASUREMENT

8.1 APPLIED PROCEDURES / LIMIT 45
8.2 TEST PROCEDURE 45
8.3 DEVIATION FROM STANDARD 45
8.4 TEST SETUP 45
8.5 EUT OPERATION CONDITIONS 45
8.6 TEST RESULTS 46

9. BANDWIDTH TEST

9.1 APPLIED PROCEDURES / LIMIT 52
9.2 TEST PROCEDURE 52
9.3 DEVIATION FROM STANDARD 52
9.4 TEST SETUP 52
9.5 EUT OPERATION CONDITIONS 52
9.6 TEST RESULTS 53

10. PEAK OUTPUT POWER TEST

10.1 APPLIED PROCEDURES / LIMIT 59
10.2 TEST PROCEDURE 59
10.3 DEVIATION FROM STANDARD 59
10.4 TEST SETUP 59
10.5 EUT OPERATION CONDITIONS 59
10.6 TEST RESULTS 60

11. 100KHZ BAND EDGES MEASUREMENT

11.1 APPLIED PROCEDURES / LIMIT 66
11.2 TEST PROCEDURE 66
11.3 DEVIATION FROM STANDARD 66
11.4 TEST RESULTS 67

12. ANTENNA APPLICATION 78

13. EUT TEST PHOTO 80

14. PHOTOGRAPHS OF EUT 82

# 1. GENERAL INFORMATION

GENERAL DESCRIPTION OF EUT

| | |
|---|---|
| Test Model | CK128 |
| Applicant | Shenzhen SKY DRAGON Audio-video Technology Co.,LTD |
| Address | B16,Laneway 3,Liuxian 2RD,District71,Baoan,shenzhen |
| Manufacturer | Shenzhen SKY DRAGON Audio-video Technology Co.,LTD |
| Address | B16,Laneway 3,Liuxian 2RD,District71,Baoan,shenzhen |
| Equipment Type | Bluetooth Speaker |
| Brand Name | CKY |
| Hardware version: | L7-JR-1.6-20160416 |
| Software version: | L7-JR-LED-V1.6-20160130 |
| Extreme Temp. Tolerance | -10℃ to +40℃ |
| Battery information: | Li-ion Battery<br>Voltage: 3.7V<br>Capacity: 2000mA |
| Adapter Information: | N/A |
| Operating Frequency | 2402-2480MHz |
| Channels | 79 |
| Channel Spacing | 1MHz |
| Modulation Type | GFSK, π /4-DQPSK, 8-DPSK |
| Version | V2.1+EDR |
| Antenna Type: | Integral Antenna |
| Antenna gain: | 1.9dBi |
| Data of receipt | October 17, 2016 |
| Date of test | October 17, 2016 to October 24, 2016 |
| Deviation | None |
| Condition of Test Sample | Normal |

**We hereby certify that:**

The above equipment was tested by QTC Certification & Testing Co., Ltd.
2nd Floor,Bl Building,Fengyeyuan Industrial Plant,, Liuxian 2st. Road, Xin'an Street, Bao'an District,,Shenzhen,518000
Registration Number: 588523
The data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C 63.4:2014. The sample tested as described in this report is in compliance with the FCC Rules Part15 Subpart C.
ALL the testing were referenced KDB NO.453039
The test results of this report relate only to the tested sample identified in this report.

# 2. TEST DESCRIPTION

## 2.1 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y ± U**，where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**，providing a level of confidence of approximately **95** %。

| No. | Item | Uncertainty |
|---|---|---|
| 1 | Conducted Emission Test | ±3.2dB |
| 2 | RF power, conducted | ±0.16dB |
| 3 | Spurious emissions, conducted | ±0.21dB |
| 4 | All emissions, radiated(<1G) | ±4.7dB |
| 5 | All emissions, radiated(>1G) | ±4.7dB |
| 6 | Temperature | ±0.5°C |
| 7 | Humidity | ±2% |

## 2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

| Pretest Mode | Description |
|---|---|
| Mode 1 | CH00 |
| Mode 2 | CH39 |
| Mode 3 | CH78 |
| Mode 4 | Normal Hopping |

| **For Conducted Emission** | |
|---|---|
| Final Test Mode | Description |
| Mode 4 | Normal Hopping |

| **For Radiated Emission** | |
|---|---|
| Final Test Mode | Description |
| Mode 1 | CH00 |
| Mode 2 | CH39 |
| Mode 3 | CH78 |
| Mode 4 | Normal Hopping |

Note:

***(1) The measurements are performed at the highest, middle, lowest available channels.***

***(2)The data rate was set in 1Mbps, 2 Mbps, 3 Mbps for radiated emission due to the highest RF output power.***

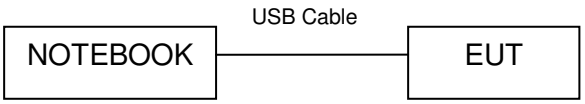
***(3) Record the worst case of each test item in this report.***

## 2.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of FHSS

| Test software Version | N/A | | |
|---|---|---|---|
| Frequency | 2402 MHz | 2441 MHz | 2480 MHz |
| Parameters(1Mbps) | DEF | DEF | DEF |
| Parameters(2Mbps) | DEF | DEF | DEF |
| Parameters(3Mbps) | DEF | DEF | DEF |

## 2.4 CONFIGURATION OF SYSTEM UNDER TEST




(EUT: Bluetooth Speaker)

## 2.5 DESCRIPTION OF SUPPORT UNITS (CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| Item | Equipment | Mfr/Brand | Model/Type No. | Series No. | Note |
|---|---|---|---|---|---|
| 1 | USB Cable | / | N/A | / | 1m shielded |
| 2 | The notebook | ThinkPad | ThinkPadE450 | | |

Note:

(1) The support equipment was authorized by Declaration of Confirmation.
(2) For detachable type I/O cable should be specified the length in cm in『Length』column.
(3) “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.

## 3. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

| FCC Part15 (15.247) , Subpart C | | | |
|---|---|---|---|
| Standard Section | Test Item | Judgment | Remark |
| 15.207 | Conducted Emission | PASS | |
| 15.247(a)(1) | Hopping Channel Separation | PASS | |
| 15.247(b)(1) | Peak Output Power | PASS | |
| 15.247(c) | Radiated Spurious Emission | PASS | |
| 15.247(a)(iii) | Number of Hopping Frequency | PASS | |
| 15.247(a)(iii) | Dwell Time | PASS | |
| 15.247(a)(1) | Bandwidth | PASS | |
| 15.247(d) | 100kHz Band Edges | PASS | |
| 15.205 | Band Edge Emission | PASS | |
| 15.203 | Antenna Requirement | PASS | |

NOTE:

(1)” N/A” denotes test is not applicable in this test report.

## 4. MEASUREMENT INSTRUMENTS

| NAME OF EQUIPMENT | MANUFACTURER | MODEL | SERIAL NUMBER | **Calibration Date** | **Calibration Due.** |
|---|---|---|---|---|---|
| EMI Test Receiver | R&S | ESCI | 100005 | 08/19/2016 | 08/18/2017 |
| LISN | AFJ | LS16 | 16010222119 | 08/19/2016 | 08/18/2017 |
| LISN(EUT) | Mestec | AN3016 | 04/10040 | 08/19/2016 | 08/18/2017 |
| Universal Radio Communication Tester | R&S | CMU 200 | 1100.0008.02 | 08/19/2016 | 08/18/2017 |
| Coaxial cable | Megalon | LMR400 | N/A | 08/12/2016 | 08/11/2017 |
| GPIB cable | Megalon | GPIB | N/A | 08/12/2016 | 08/11/2017 |
| Spectrum Analyzer | R&S | FSU | 100114 | 08/19/2016 | 08/18/2017 |
| Pre Amplifier | H.P. | HP8447E | 2945A02715 | 10/13/2016 | 10/12/2017 |
| Pre-Amplifier | CDSI | PAP-1G18-38 | -- | 10/13/2016 | 10/12/2017 |
| Bi-log Antenna | SUNOL Sciences | JB3 | A021907 | 09/13/2016 | 09/12/2017 |
| 9*6*6 Anechoic | -- | -- | -- | 08/21/2016 | 08/20/2017 |
| Horn Antenna | COMPLIANCE ENGINEERING | CE18000 | -- | 09/13/2016 | 09/12/2017 |
| Horn Antenna | SCHWARZBECK | BBHA9120D | 9120D-631 | 08/23/2016 | 08/22/2017 |
| Cable | TIME MICROWAVE | LMR-400 | N-TYPE04 | 04/25/2016 | 04/24/2017 |
| System-Controller | CCS | N/A | N/A | N.C.R | N.C.R |
| Turn Table | CCS | N/A | N/A | N.C.R | N.C.R |
| Antenna Tower | CCS | N/A | N/A | N.C.R | N.C.R |
| RF cable | Murata | MXHQ87WA3000 | - | 08/21/2016 | 08/20/2017 |
| Loop Antenna | EMCO | 6502 | 00042960 | 08/22/2016 | 08/21/2017 |
| Horn Antenna | SCHWARZBECK | BBHA 9170 | 1123 | 08/19/2016 | 08/18/2017 |
| Power meter | Anritsu | ML2487A | 6K00003613 | 08/23/2016 | 08/22/2017 |
| Power sensor | Anritsu | MX248XD | -- | 08/19/2016 | 08/18/2017 |

# 5. EMC EMISSION TEST

## 5.1 CONDUCTED EMISSION MEASUREMENT

### 5.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

| FREQUENCY (MHz) | Class A (dBuV) | | Class B (dBuV) | | Standard |
|---|---|---|---|---|---|
| | Quasi-peak | Average | Quasi-peak | Average | |
| 0.15 -0.5 | 79.00 | 66.00 | 66 - 56 * | 56 - 46 * | FCC |
| 0.50 -5.0 | 73.00 | 60.00 | 56.00 | 46.00 | FCC |
| 5.0 -30.0 | 73.00 | 60.00 | 60.00 | 50.00 | FCC |

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

| Receiver Parameters | Setting |
|---|---|
| Attenuation | 10 dB |
| Start Frequency | 0.15 MHz |
| Stop Frequency | 30 MHz |
| IF Bandwidth | 9 kHz |

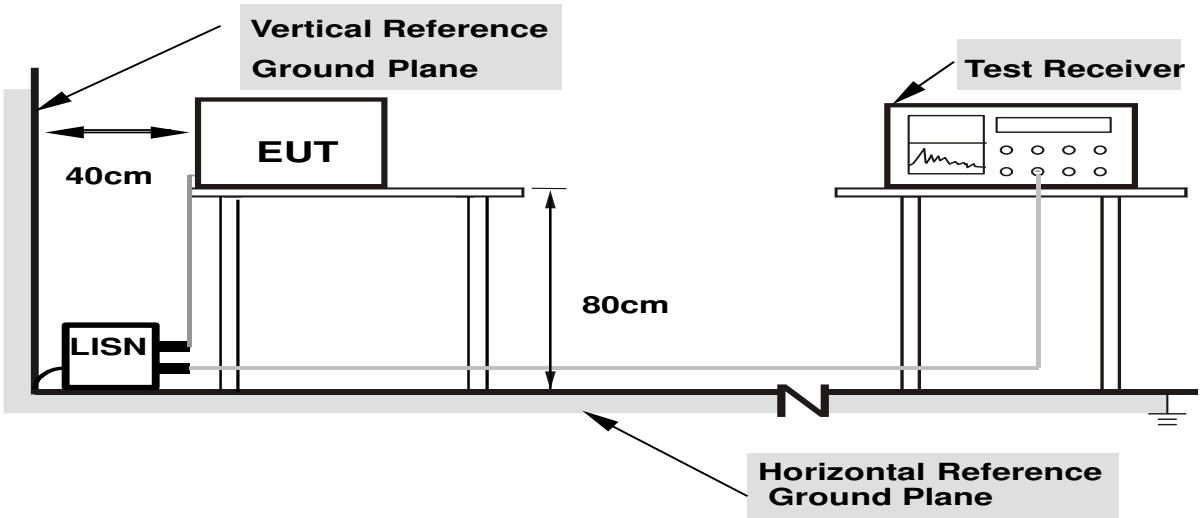
### 5.1.2 TEST PROCEDURE

a. The EUT was placed 0.4 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 5.1.3 DEVIATION FROM TEST STANDARD

No deviation

### 5.1.4 TEST SETUP



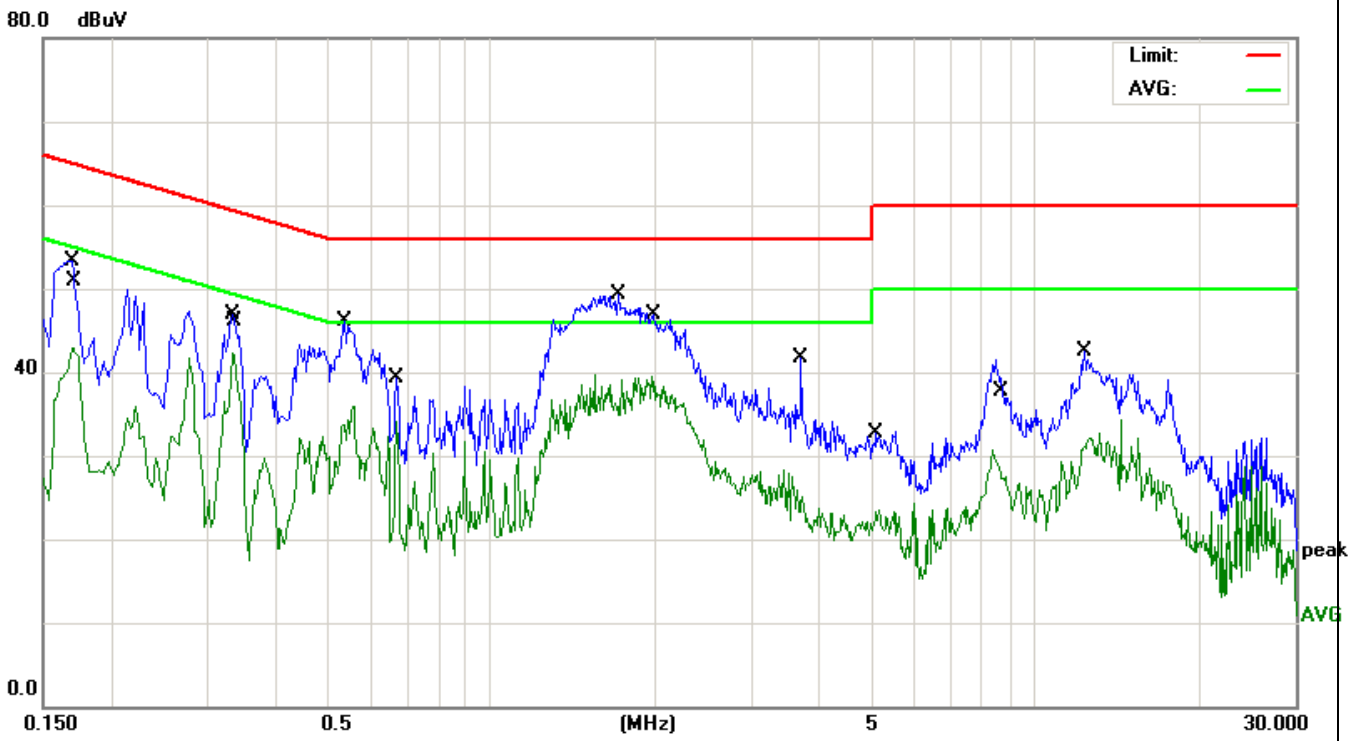

**Note: 1.Support units were connected to second LISN.**
**2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes**

### 5.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

### 5.1.6 TEST RESULTS

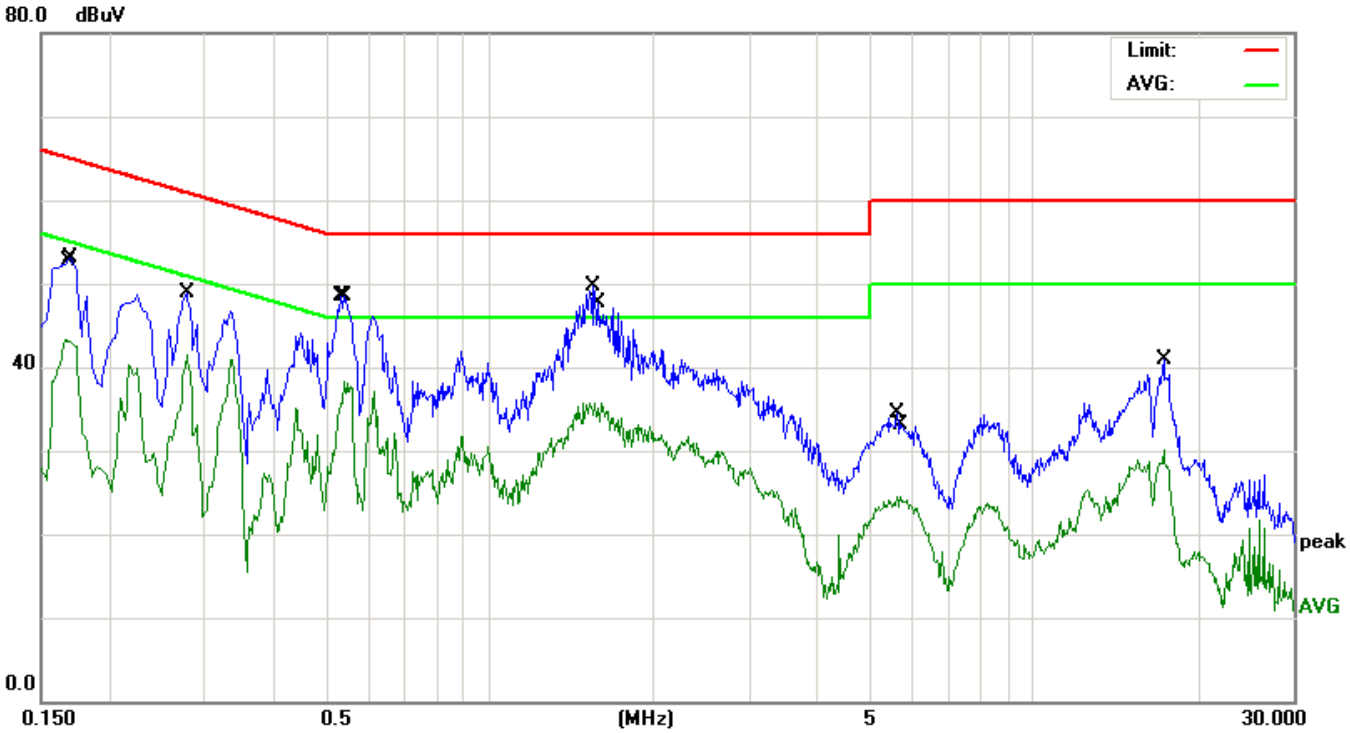
| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 26 ℃ | Relative Humidity | 54% |
| Pressure | 1010hPa | Phase | L |
| Test Date | October 19, 2016 | Test Mode | Mode 4 |
| Voltage | 120V/60Hz | | |




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector |
| 1 | | 0.1700 | 37.91 | 10.44 | 48.35 | 64.96 | -16.61 | QP |
| 2 | | 0.1731 | 31.66 | 10.44 | 42.10 | 54.81 | -12.71 | AVG |
| 3 | | 0.3339 | 31.55 | 10.42 | 41.97 | 59.35 | -17.38 | QP |
| 4 | | 0.3420 | 27.23 | 10.42 | 37.65 | 49.15 | -11.50 | AVG |
| 5 | | 0.5380 | 30.62 | 10.40 | 41.02 | 56.00 | -14.98 | QP |
| 6 | | 0.6700 | 23.63 | 10.38 | 34.01 | 46.00 | -11.99 | AVG |
| 7 | | 1.7100 | 34.02 | 10.30 | 44.32 | 56.00 | -11.68 | QP |
| 8 | * | 1.9740 | 29.27 | 10.29 | 39.56 | 46.00 | -6.44 | AVG |
| 9 | | 3.7100 | 26.41 | 10.26 | 36.67 | 56.00 | -19.33 | QP |
| 10 | | 5.1579 | 13.28 | 10.23 | 23.51 | 50.00 | -26.49 | AVG |
| 11 | | 8.7780 | 17.33 | 10.20 | 27.53 | 50.00 | -22.47 | AVG |
| 12 | | 12.2780 | 27.38 | 10.17 | 37.55 | 60.00 | -22.45 | QP |

Remark: All the modes have been investigated, and only worst mode is presented in this report.

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 26 ℃ | Relative Humidity | 54% |
| Pressure | 1010hPa | Phase | N |
| Test Date | October 19, 2016 | Test Mode | Mode 4 |
| Voltage | 120V/60Hz | | |




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV | dBuV | dB | Detector |
| 1 | | 0.1660 | 32.90 | 10.44 | 43.34 | 55.15 | -11.81 | AVG |
| 2 | | 0.1700 | 37.63 | 10.44 | 48.07 | 64.96 | -16.89 | QP |
| 3 | | 0.2779 | 33.55 | 10.43 | 43.98 | 60.88 | -16.90 | QP |
| 4 | | 0.2779 | 31.04 | 10.43 | 41.47 | 50.88 | -9.41 | AVG |
| 5 | | 0.5340 | 33.13 | 10.40 | 43.53 | 56.00 | -12.47 | QP |
| 6 | * | 0.5420 | 27.82 | 10.39 | 38.21 | 46.00 | -7.79 | AVG |
| 7 | | 1.5540 | 34.42 | 10.31 | 44.73 | 56.00 | -11.27 | QP |
| 8 | | 1.6019 | 25.45 | 10.31 | 35.76 | 46.00 | -10.24 | AVG |
| 9 | | 5.5939 | 19.18 | 10.23 | 29.41 | 60.00 | -30.59 | QP |
| 10 | | 5.6940 | 14.31 | 10.22 | 24.53 | 50.00 | -25.47 | AVG |
| 11 | | 17.3740 | 25.71 | 10.14 | 35.85 | 60.00 | -24.15 | QP |
| 12 | | 17.3740 | 19.88 | 10.14 | 30.02 | 50.00 | -19.98 | AVG |

Remark: All the modes have been investigated, and only worst mode is presented in this report.

## 5.2 RADIATED EMISSION MEASUREMENT

### 5.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

| Frequencies (MHz) | Field Strength (micorvolts/meter) | Measurement Distance (meters) |
|---|---|---|
| 0.009~0.490 | 2400/F(KHz) | 300 |
| 0.490~1.705 | 24000/F(KHz) | 30 |
| 1.705~30.0 | 30 | 30 |
| 30~88 | 100 | 3 |
| 88~216 | 150 | 3 |
| 216~960 | 200 | 3 |
| Above 960 | 500 | 3 |

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

| FREQUENCY (MHz) | Limit (dBuV/m) (at 3M) | |
|---|---|---|
| | PEAK | AVERAGE |
| Above 1000 | 74 | 54 |

Notes:

(1) The limit for radiated test was performed according to FCC PART 15C.
(2) The tighter limit applies at the band edges.
(3) Emission level (dBuV/m)=20log Emission level (uV/m).

| Spectrum Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Start Frequency | 1000 MHz |
| Stop Frequency | 10th carrier harmonic |
| RB / VB (emission in restricted band) | 1 MHz / 1 MHz for Peak, 1 MHz / 1Hz for Average |

| Receiver Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Start ~ Stop Frequency | 9kHz~150kHz / RB 200Hz for QP |
| Start ~ Stop Frequency | 150kHz~30MHz / RB 9kHz for QP |
| Start ~ Stop Frequency | 30MHz~1000MHz / RB 120kHz for QP |

### 5.2.2 TEST PROCEDURE

a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 meters for frequency form 9kHz to 1GHz and 1.5 meters for frequency above 1GHz above the ground at a 3 meter anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna shall be 0.8 meters for frequency form 9kHz to 1GHz and 1.5 meters for frequency above 1GHz; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

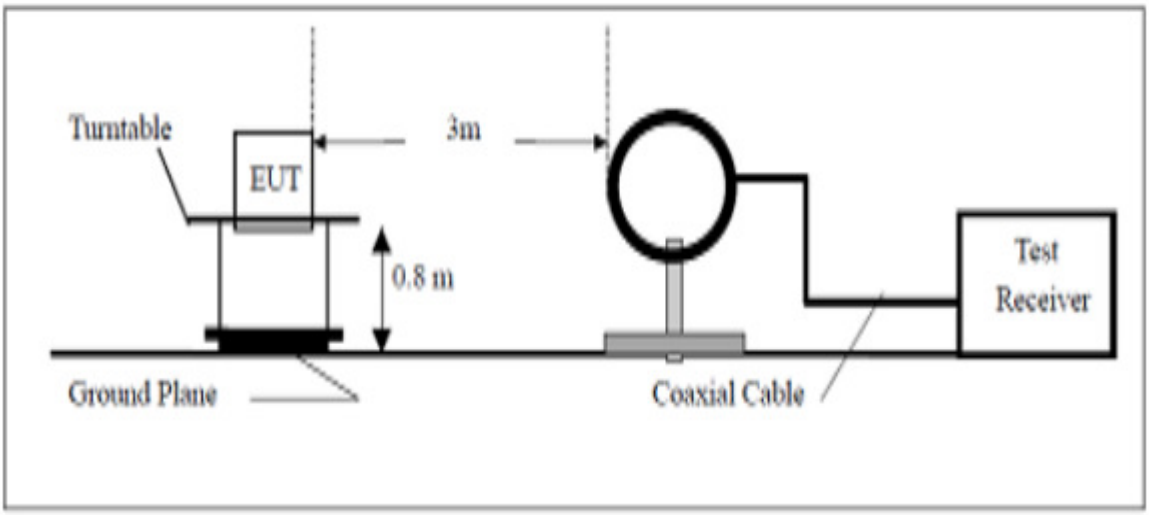
***Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported***

### 5.2.3 DEVIATION FROM TEST STANDARD

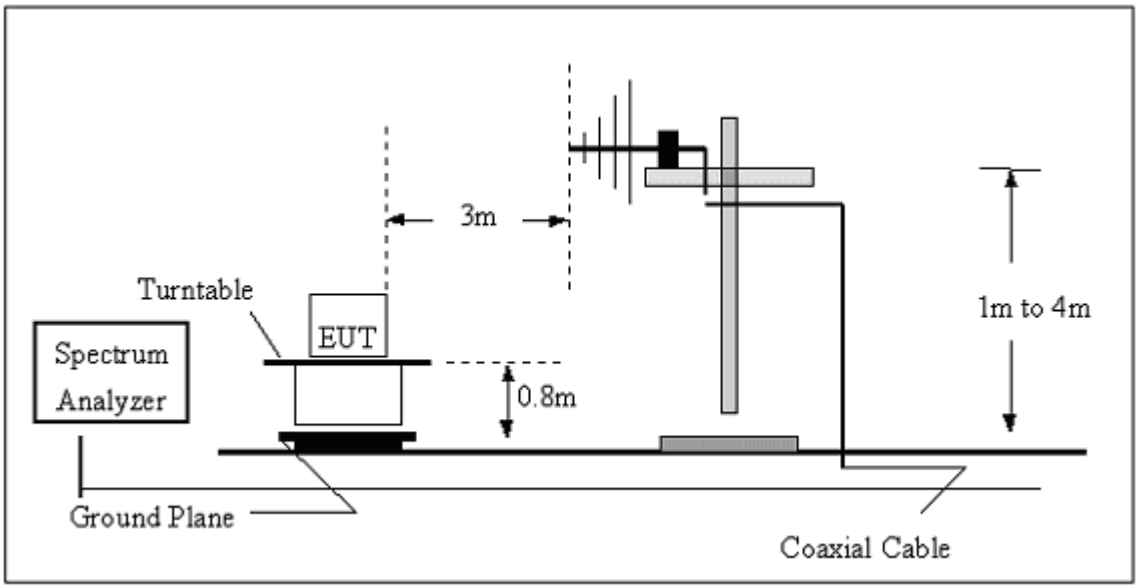
No deviation

### 5.2.4 TEST SETUP

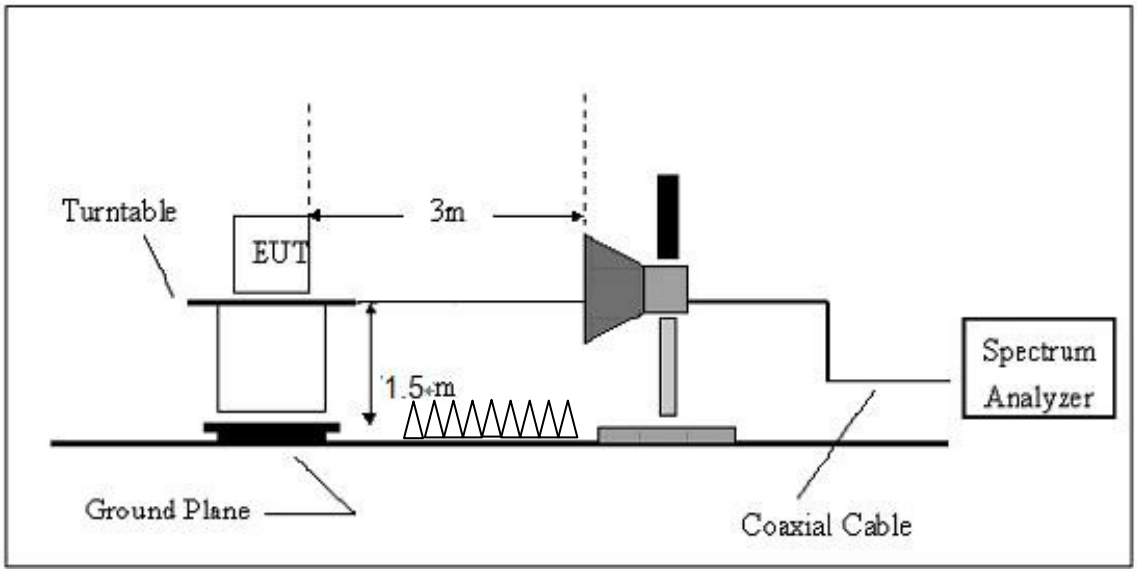
（A）Radiated Emission Test-Up Frequency Below 30MHz




（B）Radiated Emission Test-Up Frequency 30MHz~1GHz



（C）Radiated Emission Test-Up Frequency Above 1GHz




**5.2.5 EUT OPERATING CONDITIONS**

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

### 5.2.5.1 RESULTS (BELOW 30 MHZ)

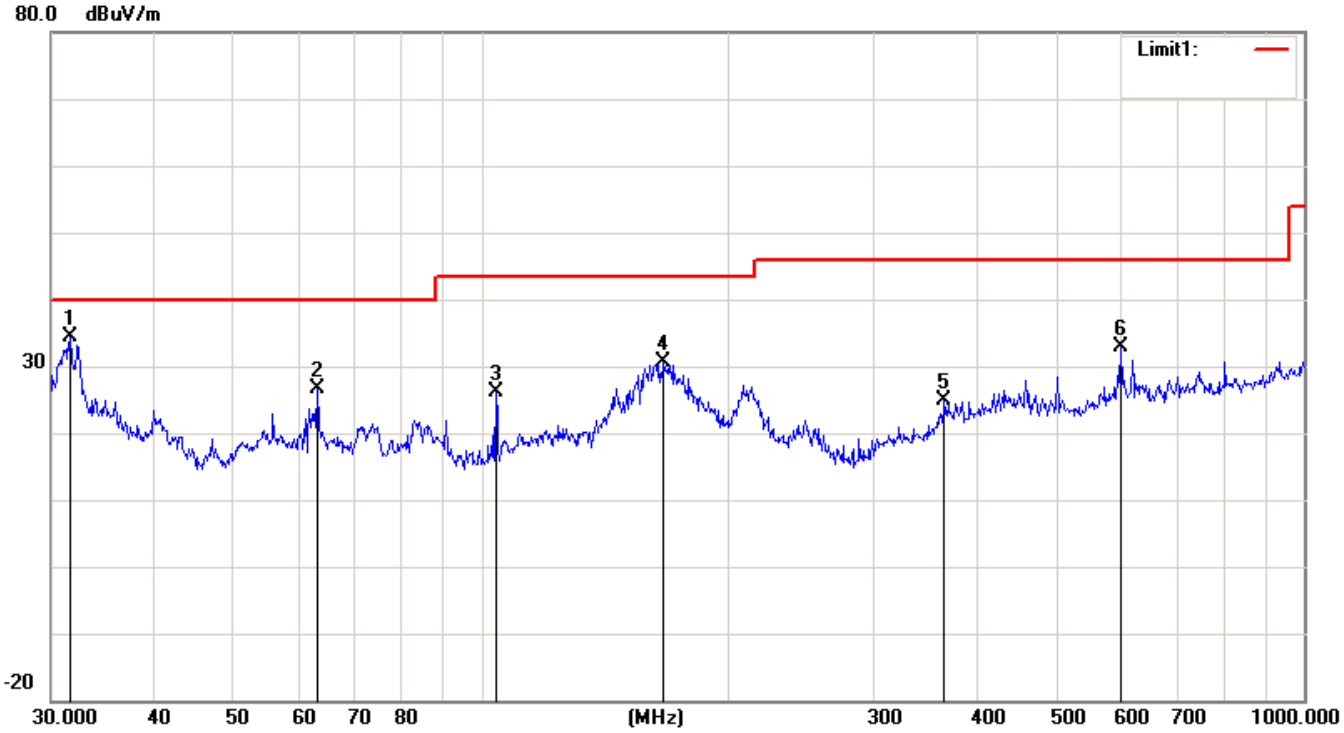
| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 20 ℃ | Relative Humidity | 48% |
| Pressure | 1010 hPa | Polarization | Horizontal / Vertical |
| Test Mode | Mode 1/ Mode 2/ Mode 3 | Test Date | October 19, 2016 |

| Freq. | Reading | Limit | Margin | State |
|---|---|---|---|---|
| (MHz) | (dBuV/m) | (dBuV/m) | (dB) | P/F |
| -- | -- | -- | -- | P |
| -- | -- | -- | -- | P |

**NOTE:**
No result in this part for margin above 20dB.
Distance extrapolation factor =20 log (specific distance/test distance)(dB);
Limit line = specific limits (dBuV) + distance extrapolation factor.
All the x/y/z orientation has been investigated, and only worst case is presented in this report.

### 5.2.5.2 TEST RESULTS (BETWEEN 30M – 1000 MHZ)

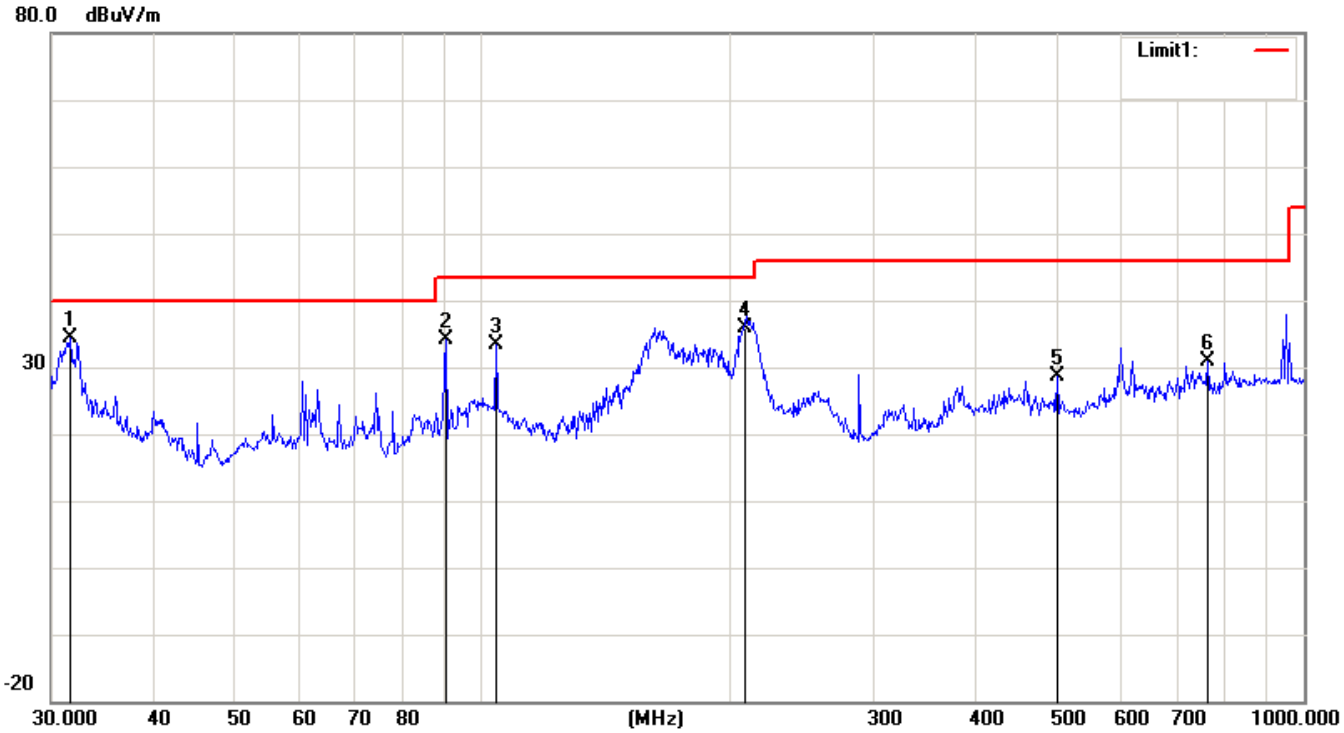
| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 20 ℃ | Relative Humidity | 48% |
| Pressure | 1010 hPa | Polarization : | Horizontal |
| Test Mode | Mode 1 with GFSK modulation | Test Date | October 19, 2016 |




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | * | 31.6202 | 31.99 | 2.40 | 34.39 | 40.00 | -5.61 | QP |
| 2 | | 63.3132 | 35.51 | -9.00 | 26.51 | 40.00 | -13.49 | QP |
| 3 | | 104.1701 | 31.29 | -5.18 | 26.11 | 43.50 | -17.39 | QP |
| 4 | | 166.6514 | 35.24 | -4.58 | 30.66 | 43.50 | -12.84 | QP |
| 5 | | 365.5391 | 28.54 | -3.74 | 24.80 | 46.00 | -21.20 | QP |
| 6 | | 599.3212 | 31.94 | 1.01 | 32.95 | 46.00 | -13.05 | QP |

Remark: All the modes have been investigated, and only worst mode is presented in this report.

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 20 ℃ | Relative Humidity | 48% |
| Pressure | 1010 hPa | Polarization : | Vertical |
| Test Mode | Mode 1 with GFSK modulation | Test Date | October 19, 2016 |




| No. | Mk. | Freq. | Reading Level | Correct Factor | Measure-ment | Limit | Over | |
|---|---|---|---|---|---|---|---|---|
| | | MHz | dBuV | dB | dBuV/m | dBuV/m | dB | Detector |
| 1 | * | 31.6202 | 31.99 | 2.40 | 34.39 | 40.00 | -5.61 | QP |
| 2 | | 90.5374 | 42.07 | -7.92 | 34.15 | 43.50 | -9.35 | QP |
| 3 | | 104.1701 | 38.67 | -5.18 | 33.49 | 43.50 | -10.01 | QP |
| 4 | | 208.5803 | 40.89 | -5.13 | 35.76 | 43.50 | -7.74 | QP |
| 5 | | 501.1790 | 29.55 | -1.00 | 28.55 | 46.00 | -17.45 | QP |
| 6 | | 763.3757 | 27.24 | 3.59 | 30.83 | 46.00 | -15.17 | QP |

Remark: All the modes have been investigated, and only worst mode is presented in this report.

### 5.2.5.3 TEST RESULTS (1GHZ TO 25GHZ)

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 20 ℃ | Relative Humidity | 48% |
| Pressure | 1010 hPa | Test Mode | Mode 1 TX(1Mbps) |

| Freq. (MHz) | Ant. Pol. | Emission Level(dBuV) | | Limit 3m(dBuV/m) | | Over(dB) | |
|---|---|---|---|---|---|---|---|
| | H/V | PK | AV | PK | AV | PK | AV |
| 4804 | V | 60.97 | 39.19 | 74 | 54 | -13.03 | -14.81 |
| 7206 | V | 58.80 | 40.69 | 74 | 54 | -15.20 | -13.31 |
| 4804 | H | 58.79 | 39.51 | 74 | 54 | -15.21 | -14.49 |
| 7206 | H | 58.27 | 39.27 | 74 | 54 | -15.73 | -14.73 |

Remark:
All emissions not reported were more than 20dB below the specified limit or in the noise floor.
All the x/y/z orientation has been investigated, and only worst case is presented in this report.

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 20 ℃ | Relative Humidity | 48% |
| Pressure | 1010 hPa | Test Mode | Mode 2 TX(2Mbps) |

| Freq. (MHz) | Ant.Pol. | Emission Level(dBuV) | | Limit 3m(dBuV/m) | | Over(dB) | |
|---|---|---|---|---|---|---|---|
| | H/V | PK | AV | PK | AV | PK | AV |
| 4882 | V | 60.61 | 41.73 | 74 | 54 | -13.39 | -12.27 |
| 7323 | V | 59.64 | 40.56 | 74 | 54 | -14.36 | -13.44 |
| 4882 | H | 59.61 | 39.31 | 74 | 54 | -14.39 | -14.69 |
| 7323 | H | 59.85 | 40.85 | 74 | 54 | -14.15 | -13.15 |

Remark:
All emissions not reported were more than 20dB below the specified limit or in the noise floor.
All the x/y/z orientation has been investigated, and only worst case is presented in this report.

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 20 ℃ | Relative Humidity | 48% |
| Pressure | 1010 hPa | Test Mode | Mode 3 TX(3Mbps) |

| Freq. (MHz) | Ant.Pol. | Emission Level(dBuV) | | Limit 3m(dBuV/m) | | Over(dB) | |
|---|---|---|---|---|---|---|---|
| | H/V | PK | AV | PK | AV | PK | AV |
| 4960 | V | 60.83 | 41.16 | 74 | 54 | -13.17 | -12.84 |
| 7440 | V | 59.36 | 40.99 | 74 | 54 | -14.64 | -13.01 |
| 4960 | H | 59.37 | 39.14 | 74 | 54 | -14.63 | -14.86 |
| 7440 | H | 59.13 | 40.13 | 74 | 54 | -14.87 | -13.87 |

Remark:
All emissions not reported were more than 20dB below the specified limit or in the noise floor.
All the x/y/z orientation has been investigated, and only worst case is presented in this report.

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 20 ℃ | Relative Humidity | 48% |
| Pressure | 1010 hPa | Test Mode | Mode 4 TX(Normal Hopping) |

| Freq. (MHz) | Ant.Pol. | Emission Level(dBuV) | | Limit 3m(dBuV/m) | | Over(dB) | |
|---|---|---|---|---|---|---|---|
| | H/V | PK | AV | PK | AV | PK | AV |
| 4723 | V | 60.51 | 39.48 | 74 | 54 | -13.49 | -14.52 |
| 5234 | V | 59.35 | 39.03 | 74 | 54 | -14.65 | -14.97 |
| 4942 | H | 58.31 | 40.84 | 74 | 54 | -15.69 | -13.16 |
| 7155 | H | 59.63 | 40.63 | 74 | 54 | -14.37 | -13.37 |

Remark:
All emissions not reported were more than 20dB below the specified limit or in the noise floor.
All the x/y/z orientation has been investigated, and only worst case is presented in this report.

### 5.2.5.4 TEST RESULTS (Restricted Bands Requirements)

**Test result for 1Mbps Mode:**

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 20 ℃ | Relative Humidity | 48% |
| Pressure | 1010 hPa | Test Date | October 19, 2016 |
| Test Mode | TX /Mode1-1Mbps | Polarization | Vertical |

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 2387 | 64.99 | -8.76 | 56.23 | 74 | 17.77 | peak |
| 2387 | 55.12 | -8.76 | 46.36 | 54 | 7.64 | AVG |
| 2390 | 63.74 | -8.73 | 55.01 | 74 | 18.99 | peak |
| 2390 | 54.45 | -8.73 | 45.72 | 54 | 8.28 | AVG |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
All the x/y/z orientation has been investigated, and only worst case is presented in this report.

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 20 ℃ | Relative Humidity | 48% |
| Pressure | 1010 hPa | Test Date | October 19, 2016 |
| Test Mode | TX /Mode1-1Mbps | Polarization | Horizontal |

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 2384 | 61.97 | -8.76 | 53.21 | 74 | 20.79 | peak |
| 2384 | 54.58 | -8.76 | 45.82 | 54 | 8.18 | AVG |
| 2390 | 61.93 | -8.73 | 53.20 | 74 | 20.80 | peak |
| 2390 | 55.25 | -8.73 | 46.52 | 54 | 7.48 | AVG |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
All the x/y/z orientation has been investigated, and only worst case is presented in this report.

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 20 ℃ | Relative Humidity | 48% |
| Pressure | 1010 hPa | Test Date | October 19, 2016 |
| Test Mode | TX /Mode 1-1Mbps | Polarization | Vertical |

| Frequency | Meter Reading | Factor | Emission Level | Limits | Margin | Detector Type |
|---|---|---|---|---|---|---|
| (MHz) | (dBμV) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | |
| 2483.5 | 60.63 | -8.17 | 52.46 | 74 | 21.54 | peak |
| 2483.5 | 54.89 | -8.17 | 46.72 | 54 | 7.28 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
All the x/y/z orientation has been investigated, and only worst case is presented in this report.

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 20 ℃ | Relative Humidity | 48% |
| Pressure | 1010 hPa | Test Date | October 19, 2016 |
| Test Mode | TX /Mode 1-1Mbps | Polarization | Horizontal |

| Frequency | Meter Reading | Factor | Emission Level | Limits | Margin | Detector Type |
|---|---|---|---|---|---|---|
| (MHz) | (dBμV) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | |
| 2483.5 | 63.79 | -8.17 | 55.62 | 74 | 18.38 | peak |
| 2483.5 | 53.11 | -8.17 | 44.94 | 54 | 9.06 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
All the x/y/z orientation has been investigated, and only worst case is presented in this report.

**Test result for 2Mbps Mode:**

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 20 ℃ | Relative Humidity | 48% |
| Pressure | 1010 hPa | Test Date | October 19, 2016 |
| Test Mode | TX /Mode2-2Mbps | Polarization | Vertical |

| Frequency | Meter Reading | Factor | Emission Level | Limits | Margin | Detector Type |
|---|---|---|---|---|---|---|
| (MHz) | (dBμV) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | |
| 2387 | 62.82 | -8.76 | 54.06 | 74 | 19.94 | peak |
| 2387 | 56.78 | -8.76 | 48.02 | 54 | 5.98 | AVG |
| 2390 | 60.88 | -8.73 | 52.15 | 74 | 21.85 | peak |
| 2390 | 55.87 | -8.73 | 47.14 | 54 | 6.86 | AVG |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
All the x/y/z orientation has been investigated, and only worst case is presented in this report.

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 20 ℃ | Relative Humidity | 48% |
| Pressure | 1010 hPa | Test Date | October 19, 2016 |
| Test Mode | TX /Mode2-2Mbps | Polarization | Horizontal |

| Frequency | Meter Reading | Factor | Emission Level | Limits | Margin | Detector Type |
|---|---|---|---|---|---|---|
| (MHz) | (dBμV) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | |
| 2384 | 61.27 | -8.76 | 52.51 | 74 | 21.49 | peak |
| 2384 | 55.34 | -8.76 | 46.58 | 54 | 7.42 | AVG |
| 2390 | 62.28 | -8.73 | 53.55 | 74 | 20.45 | peak |
| 2390 | 57.06 | -8.73 | 48.33 | 54 | 5.67 | AVG |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
All the x/y/z orientation has been investigated, and only worst case is presented in this report.

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 20 ℃ | Relative Humidity | 48% |
| Pressure | 1010 hPa | Test Date | October 19, 2016 |
| Test Mode | TX /Mode2-2Mbps | Polarization | Vertical |

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 2483.5 | 62.19 | -8.17 | 54.02 | 74 | 19.98 | peak |
| 2483.5 | 53.65 | -8.17 | 45.48 | 54 | 8.52 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
All the x/y/z orientation has been investigated, and only worst case is presented in this report.

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 20 ℃ | Relative Humidity | 48% |
| Pressure | 1010 hPa | Test Date | October 19, 2016 |
| Test Mode | TX /Mode2-2Mbps | Polarization | Horizontal |

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 2483.5 | 62.20 | -8.17 | 54.03 | 74 | 19.97 | peak |
| 2483.5 | 53.51 | -8.17 | 45.34 | 54 | 8.66 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
All the x/y/z orientation has been investigated, and only worst case is presented in this report.

**Test result for 3Mbps Mode:**

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 20 ℃ | Relative Humidity | 48% |
| Pressure | 1010 hPa | Test Date | October 19, 2016 |
| Test Mode | TX /Model 3-3Mbps | Polarization | Vertical |

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 2387 | 64.90 | -8.76 | 56.14 | 74 | 17.86 | peak |
| 2387 | 53.76 | -8.76 | 45.00 | 54 | 9.00 | AVG |
| 2390 | 59.56 | -8.73 | 50.83 | 74 | 23.17 | peak |
| 2390 | 54.35 | -8.73 | 45.62 | 54 | 8.38 | AVG |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
All the x/y/z orientation has been investigated, and only worst case is presented in this report.

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 20 ℃ | Relative Humidity | 48% |
| Pressure | 1010 hPa | Test Date | October 19, 2016 |
| Test Mode | TX /Mode 3-3Mbps | Polarization | Horizontal |

| Frequency (MHz) | Meter Reading (dBμV) | Factor (dB) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector Type |
|---|---|---|---|---|---|---|
| 2384 | 61.77 | -8.76 | 53.01 | 74 | 20.99 | peak |
| 2384 | 53.35 | -8.76 | 44.59 | 54 | 9.41 | AVG |
| 2390 | 62.00 | -8.73 | 53.27 | 74 | 20.73 | peak |
| 2390 | 55.24 | -8.73 | 46.51 | 54 | 7.49 | AVG |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
All the x/y/z orientation has been investigated, and only worst case is presented in this report.

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 20 ℃ | Relative Humidity | 48% |
| Pressure | 1010 hPa | Test Date | October 19, 2016 |
| Test Mode | TX /Model 3-3Mbps | Polarization | Vertical |

| Frequency | Meter Reading | Factor | Emission Level | Limits | Margin | Detector Type |
|---|---|---|---|---|---|---|
| (MHz) | (dBμV) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | |
| 2483.5 | 60.80 | -8.17 | 52.63 | 74 | 21.37 | peak |
| 2483.5 | 53.13 | -8.17 | 44.96 | 54 | 9.04 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
All the x/y/z orientation has been investigated, and only worst case is presented in this report.

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 20 ℃ | Relative Humidity | 48% |
| Pressure | 1010 hPa | Test Date | October 19, 2016 |
| Test Mode | TX /Model 3-3Mbps | Polarization | Horizontal |

| Frequency | Meter Reading | Factor | Emission Level | Limits | Margin | Detector Type |
|---|---|---|---|---|---|---|
| (MHz) | (dBμV) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | |
| 2483.5 | 64.37 | -8.17 | 56.20 | 74 | 17.80 | peak |
| 2483.5 | 53.48 | -8.17 | 45.31 | 54 | 8.69 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
All the x/y/z orientation has been investigated, and only worst case is presented in this report.

**Test result for hopping mode:**

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 20 ℃ | Relative Humidity | 48% |
| Pressure | 1010 hPa | Test Date | October 19, 2016 |
| Test Mode | hopping mode-1Mbps | Polarization | Vertical |

| Frequency | Meter Reading | Factor | Emission Level | Limits | Margin | Detector Type |
|---|---|---|---|---|---|---|
| (MHz) | (dBμV) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | |
| 2387 | 61.33 | -8.76 | 52.57 | 74 | 21.43 | peak |
| 2387 | 56.90 | -8.76 | 48.14 | 54 | 5.86 | AVG |
| 2390 | 62.56 | -8.73 | 53.83 | 74 | 20.17 | peak |
| 2390 | 54.69 | -8.73 | 45.96 | 54 | 8.04 | AVG |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
All the x/y/z orientation has been investigated, and only worst case is presented in this report.

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 20 ℃ | Relative Humidity | 48% |
| Pressure | 1010 hPa | Test Date | October 19, 2016 |
| Test Mode | Hopping mode-1Mbps | Polarization | Horizontal |

| Frequency | Meter Reading | Factor | Emission Level | Limits | Margin | Detector Type |
|---|---|---|---|---|---|---|
| (MHz) | (dBμV) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | |
| 2387 | 62.26 | -8.76 | 53.50 | 74 | 20.50 | peak |
| 2387 | 56.31 | -8.76 | 47.55 | 54 | 6.45 | AVG |
| 2390 | 60.09 | -8.73 | 51.36 | 74 | 22.64 | peak |
| 2390 | 56.80 | -8.73 | 48.07 | 54 | 5.93 | AVG |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
All the x/y/z orientation has been investigated, and only worst case is presented in this report.

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 20 ℃ | Relative Humidity | 48% |
| Pressure | 1010 hPa | Test Date | October 19, 2016 |
| Test Mode | Hopping mode-1Mbps | Polarization | Vertical |

| Frequency | Meter Reading | Factor | Emission Level | Limits | Margin | Detector Type |
|---|---|---|---|---|---|---|
| (MHz) | (dBμV) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | |
| 2483.5 | 62.19 | -8.17 | 54.02 | 74 | 19.98 | peak |
| 2483.5 | 54.22 | -8.17 | 46.05 | 54 | 7.95 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
All the x/y/z orientation has been investigated, and only worst case is presented in this report.

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 20 ℃ | Relative Humidity | 48% |
| Pressure | 1010 hPa | Test Date | October 19, 2016 |
| Test Mode | Hopping mode-1Mbps | Polarization | Horizontal |

| Frequency | Meter Reading | Factor | Emission Level | Limits | Margin | Detector Type |
|---|---|---|---|---|---|---|
| (MHz) | (dBμV) | (dB) | (dBμV/m) | (dBμV/m) | (dB) | |
| 2483.5 | 62.95 | -8.17 | 54.78 | 74 | 19.22 | peak |
| 2483.5 | 53.97 | -8.17 | 45.80 | 54 | 8.20 | AVG |
| | | | | | | |
| | | | | | | |

Remark:
Factor = Antenna Factor + Cable Loss – Pre-amplifier.
All the x/y/z orientation has been investigated, and only worst case is presented in this report.

## 6. NUMBER OF HOPPING CHANNEL 6.1

**Applied procedures / limit**

| FCC Part15 (15.247) , Subpart C | | | | |
|---|---|---|---|---|
| Section | Test Item | Limit | Frequency Range (MHz) | Result |
| 15.247 (a)(1)(iii) | Number of Hopping Channel | ≥15 | 2400-2483.5 | PASS |

| Spectrum Parameters | Setting |
|---|---|
| Attenuation | Auto |
| Span Frequency | > Operating Frequency Range |
| RB | 1MHz |
| VB | 3MHz |
| Detector | Peak |
| Trace | Max Hold |
| Sweep Time | Auto |

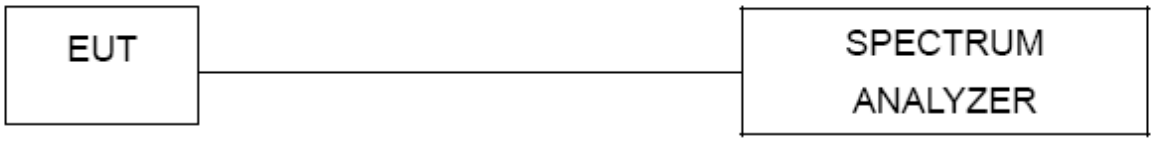
### 6.2 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting: RBW= 1MHz, VBW=3MHz, Sweep time = Auto.

### 6.3 DEVIATION FROM STANDARD

No deviation.

### 6.4 TEST SETUP



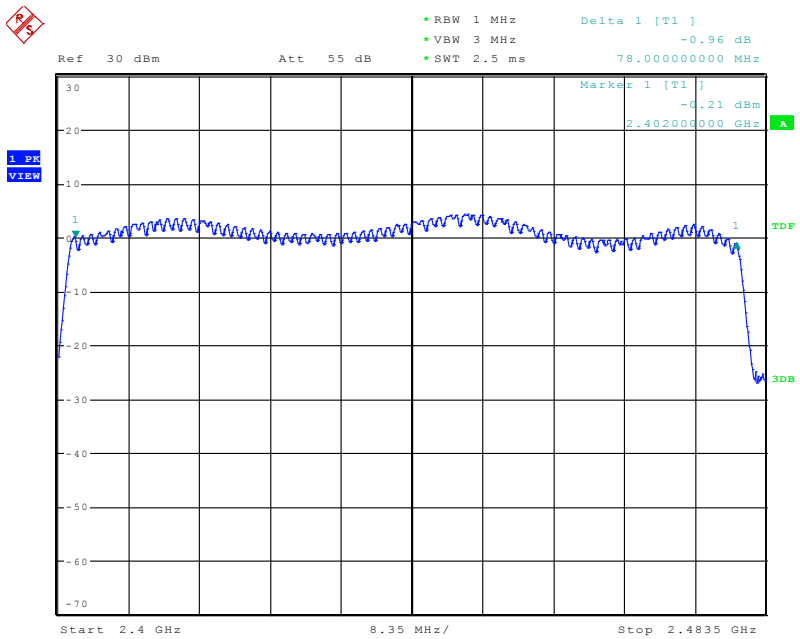

### 6.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

## 6.6 TEST RESULTS

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 25 ℃ | Relative Humidity | 60% |
| Pressure | 1015 hPa | Test Date | October 19, 2016 |
| Test Mode | Hopping Mode | Number of Hopping Channel | 79 |

**2400MHz-2483.5MHz**




Date: 20.OCT.2016 09:41:35

# 7. AVERAGE TIME OF OCCUPANCY

## 7.1 APPLIED PROCEDURES / LIMIT

| FCC Part15 (15.247) , Subpart C | | | | |
|---|---|---|---|---|
| Section | Test Item | Limit | Frequency Range (MHz) | Result |
| 15.247 (a)(1)(iii) | Average Time of Occupancy | 0.4sec | 2400-2483.5 | PASS |

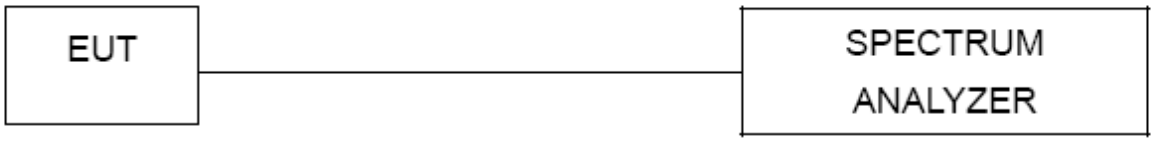
## 7.2 TEST PROCEDURE

a. The EUT test port was connected to the spectrum analyzer with RF cable and antenna connector.
b. Set RBW of spectrum analyzer to 1MHz and VBW to 3MHz.
c. Use a video trigger with the trigger level set to enable triggering only on full pulses.
d. Sweep Time is more than once pulse time.
e. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
f. Measure the maximum time duration of one single pulse.
g. Set the EUT for DH5, DH3 and DH1 packet transmitting.
h. Measure the maximum time duration of one single pulse.
i. DH1 Dwell time = Pulse time*(1600/2/79)*31.6S
DH3 Dwell time = Pulse time*(1600/4/79)*31.6S
DH5 Dwell time = Pulse time*(1600/6/79)*31.6S

## 7.3 DEVIATION FROM STANDARD

No deviation.

## 7.4 TEST SETUP




## 7.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

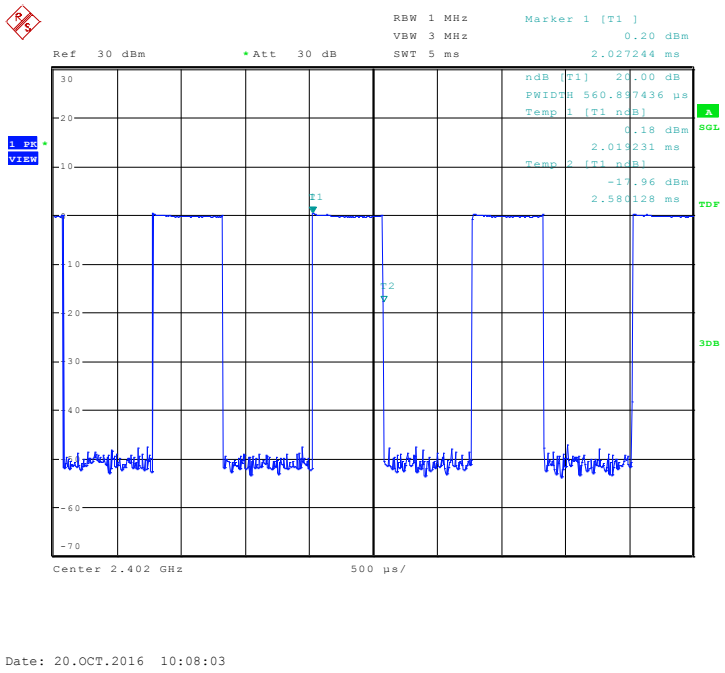
## 7.6 TEST RESULTS

Note: ***the worst case is 1Mbps as result in this part.***

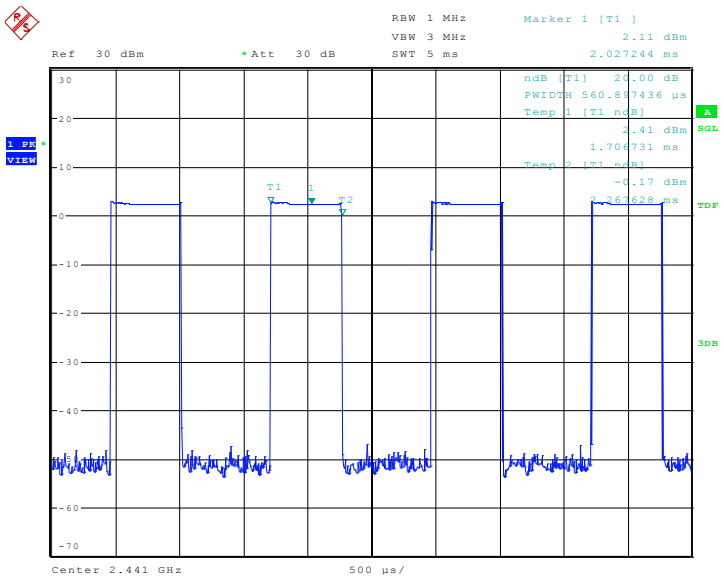
| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 25 ℃ | Relative Humidity | 60% |
| Pressure | 1012 hPa | Test Date | October 19, 2016 |
| Test Mode | DH1-1Mbps | | |

| Data Packet | Frequency | Pulse time(ms) | Dwell Time(S) | Limits（S） |
|---|---|---|---|---|
| DH1 | 2402MHz | 0.560 | 0.179 | 0.4 |
| DH1 | 2441MHz | 0.560 | 0.179 | 0.4 |
| DH1 | 2480MHz | 0.552 | 0.176 | 0.4 |

**CH00-DH1**

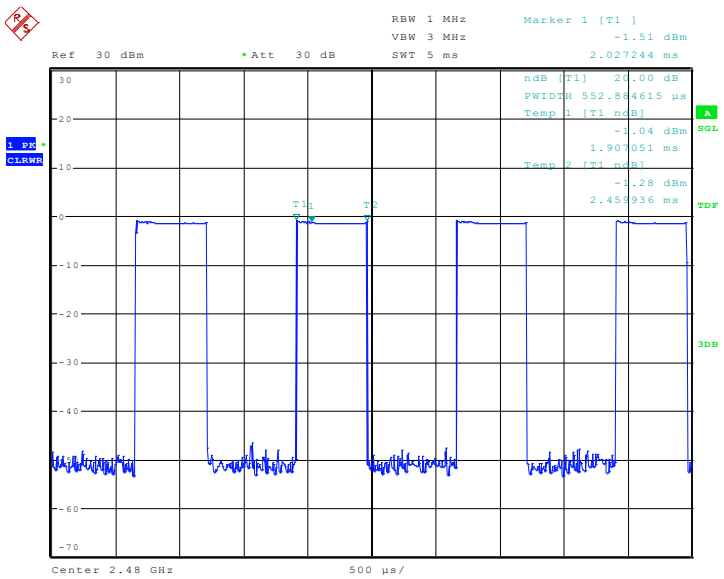


## CH39-DH1




Date: 20.OCT.2016 10:08:41

## CH78-DH1

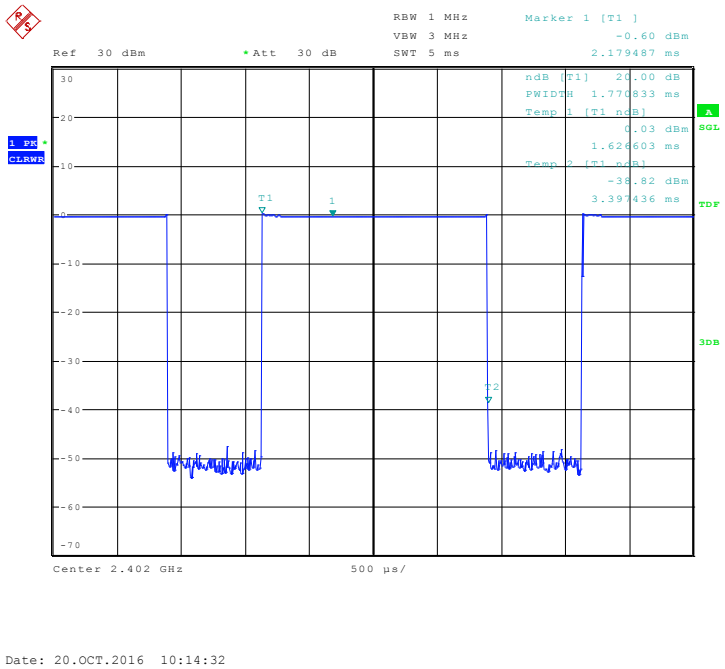



Date: 20.OCT.2016 10:11:18

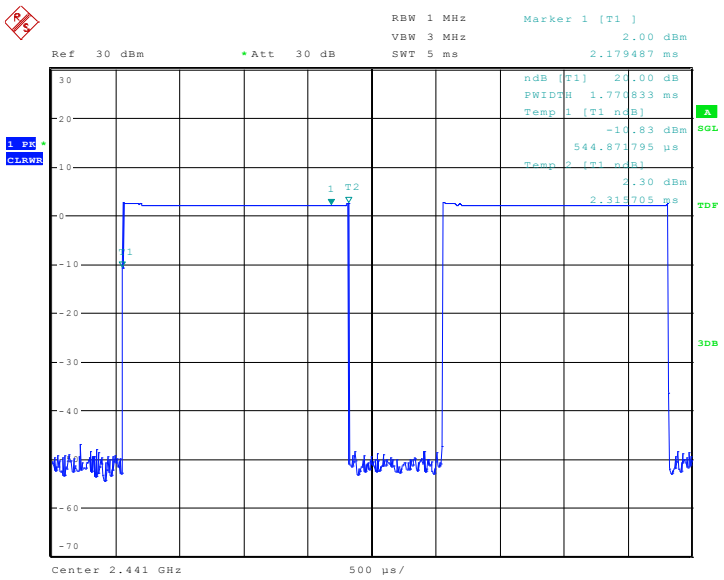
| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 25 ℃ | Relative Humidity | 60% |
| Pressure | 1012 hPa | Test Date | October 19, 2016 |
| Test Mode | DH3-1Mbps | | |

| Data Packet | Frequency | Pulse time(ms) | Dwell Time(S) | Limits（S） |
|---|---|---|---|---|
| DH3 | 2402MHz | 1.77 | 0.283 | 0.4 |
| DH3 | 2441MHz | 1.77 | 0.283 | 0.4 |
| DH3 | 2480MHz | 1.77 | 0.282 | 0.4 |

**CH00-DH3**

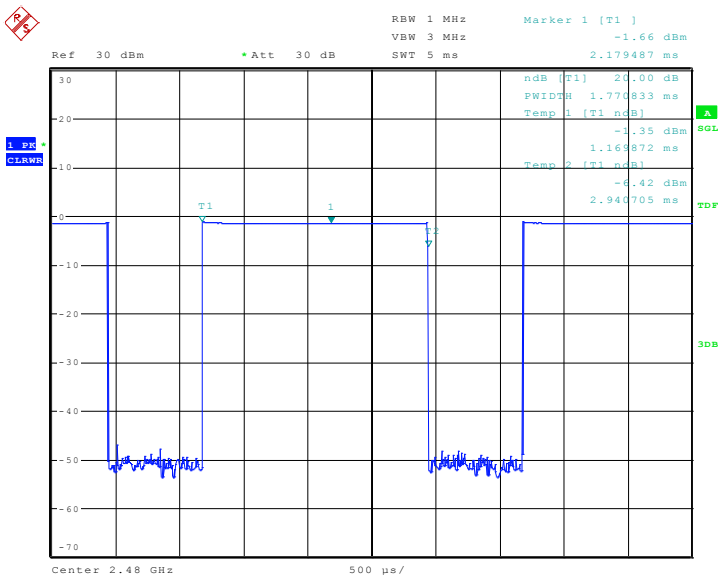


## CH39-DH3




Date: 20.OCT.2016 10:15:56

## CH78-DH3

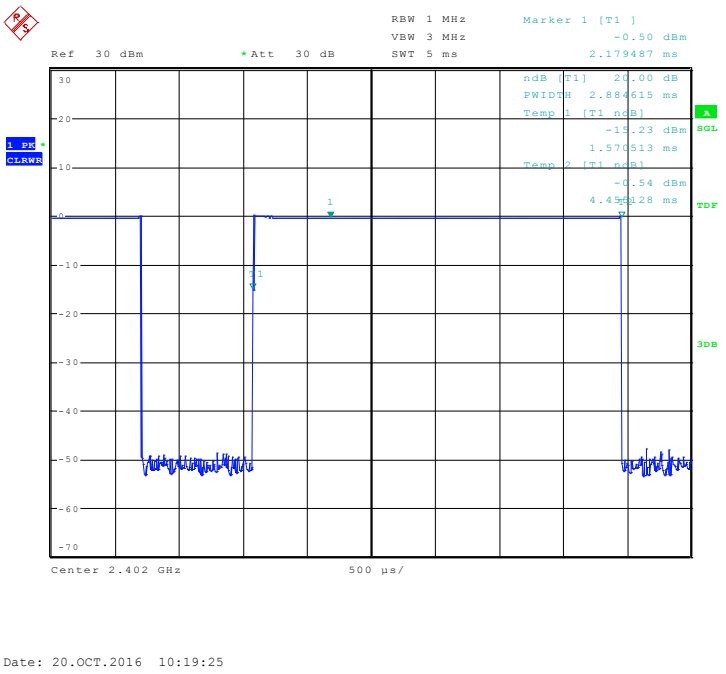



Date: 20.OCT.2016 10:16:36

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 25 ℃ | Relative Humidity | 60% |
| Pressure | 1012 hPa | Test Date | October 19, 2016 |
| Test Mode | DH5-1Mbps | | |

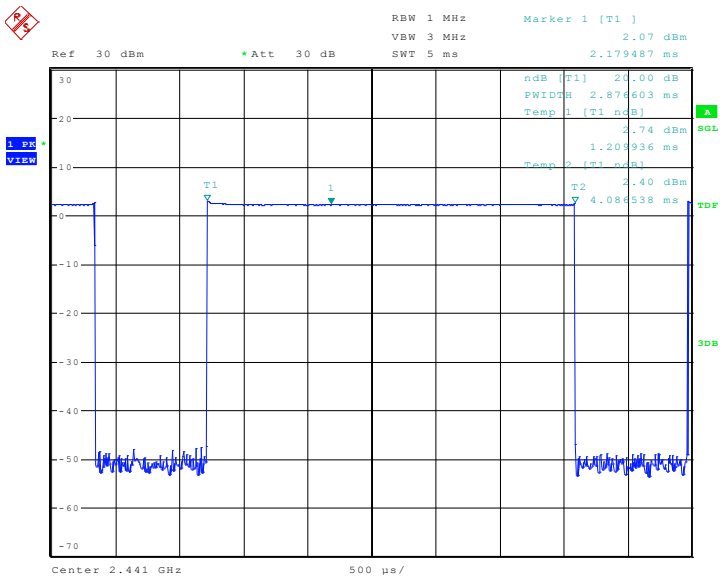
| Data Packet | Frequency | Pulse time(ms) | Dwell Time(S) | Limits（S） |
|---|---|---|---|---|
| DH5 | 2402MHz | 2.88 | 0.307 | 0.4 |
| DH5 | 2441MHz | 2.87 | 0.306 | 0.4 |
| DH5 | 2480MHz | 2.87 | 0.306 | 0.4 |

**CH00-DH5**



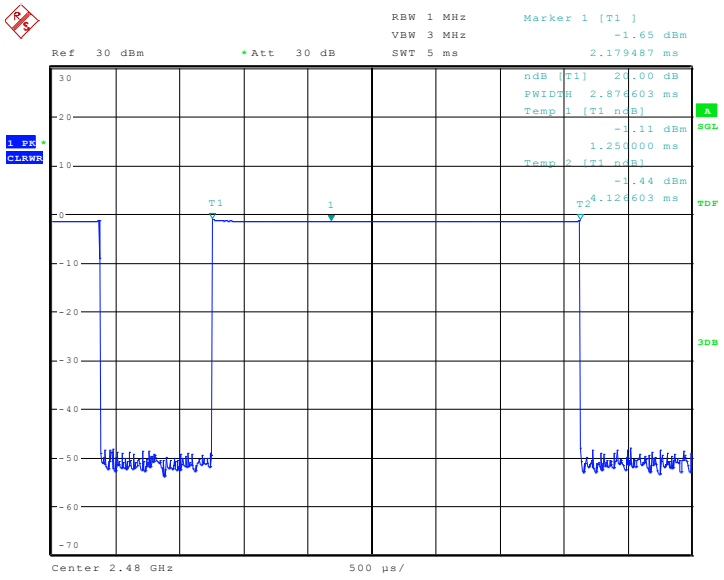

Date: 20.OCT.2016 10:19:25

## CH39-DH5




Date: 20.OCT.2016 10:20:02

## CH78-DH5




Date: 20.OCT.2016 10:21:44

# 8. HOPPING CHANNEL SEPARATION MEASUREMENT

## 8.1 APPLIED PROCEDURES / LIMIT

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

| Spectrum Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Span Frequency | > Measurement Bandwidth or Channel Separation |
| RB | Resolution (or IF) Bandwidth (RBW) ⩾ 1% of the span |
| VB | Video (or Average) Bandwidth (VBW) ⩾ RBW |
| Detector | Peak |
| Trace | Max hold |
| Sweep Time | Auto |

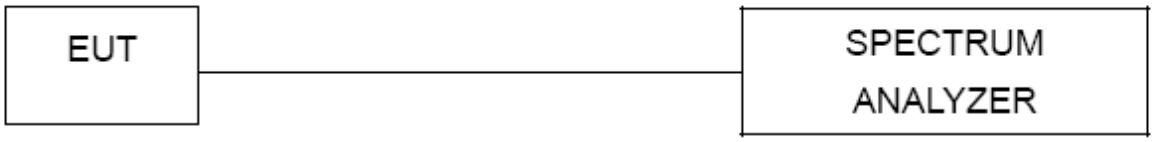
## 8.2 TEST PROCEDURE

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Set the spectrum analyzer as follows: Span = wide enough to capture the peaks of two adjacent channels: Resolution (or IF) Bandwidth (RBW) ⩾ 1% of the span; Video (or Average) Bandwidth (VBW) ⩾ RBW; Sweep = auto; Detector function = peak; Trace = max hold
3. Measure the separation between the peaks of the adjacent channels using the marker-delta function.
4. Repeat above procedures until all frequencies measured were complete.

## 8.3 DEVIATION FROM STANDARD

No deviation.

## 8.4 TEST SETUP




## 8.5 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

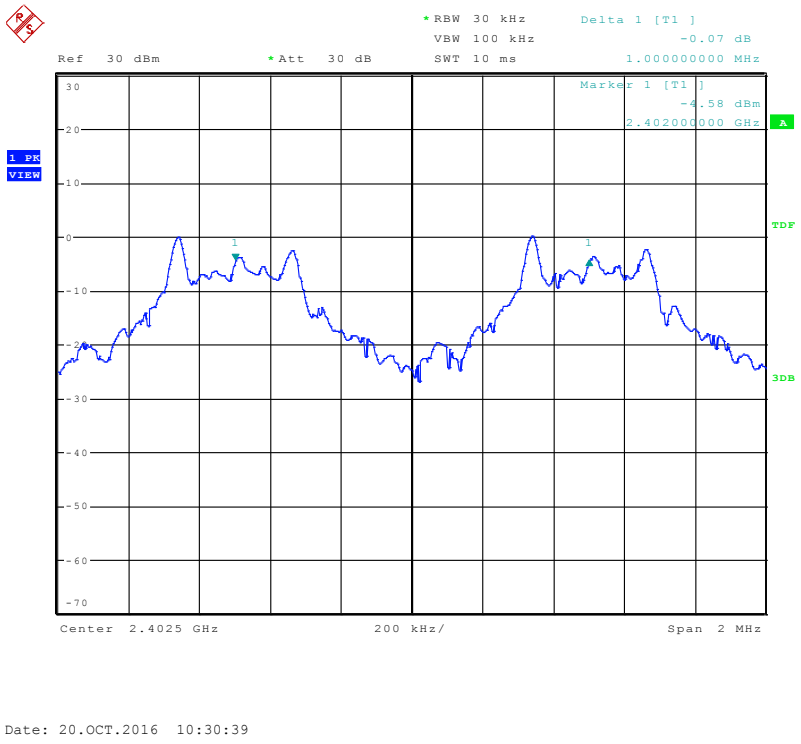
## 8.6 TEST RESULTS

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 25 ℃ | Relative Humidity | 60% |
| Pressure | 1012 hPa | Test Result | Pass |
| Test Mode | CH00 / CH39 /CH78 (1Mbps Mode) | Test Date | October 19, 2016 |

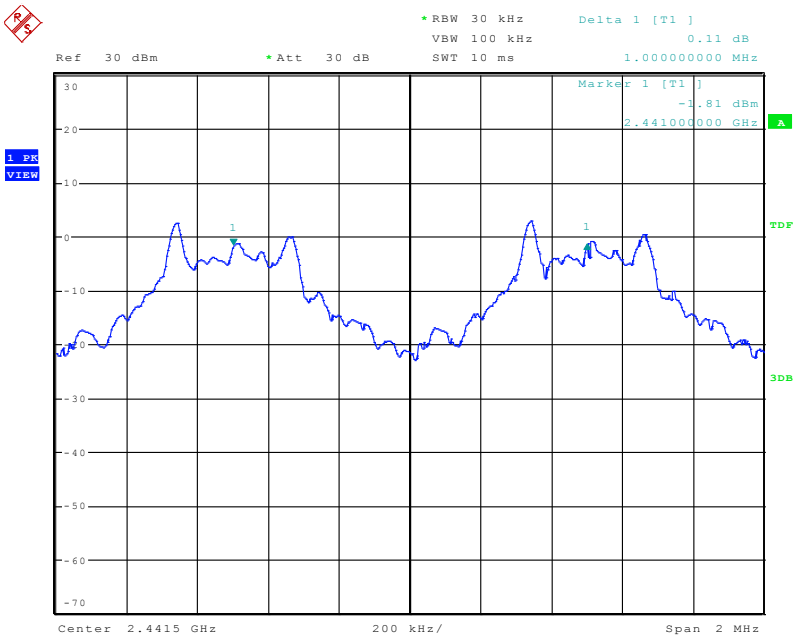
| Channel number | Channel frequency (MHz) | Separation Read value (KHz) | Separation limit (KHz) |
|---|---|---|---|
| 00 | 2402 | 1000 | 20dB BW |
| 39 | 2441 | 1000 | 20dB BW |
| 78 | 2480 | 1000 | 20dB BW |

*Note: 20db bandwidth refer to section 9.6*

**CH00 -1Mbps**

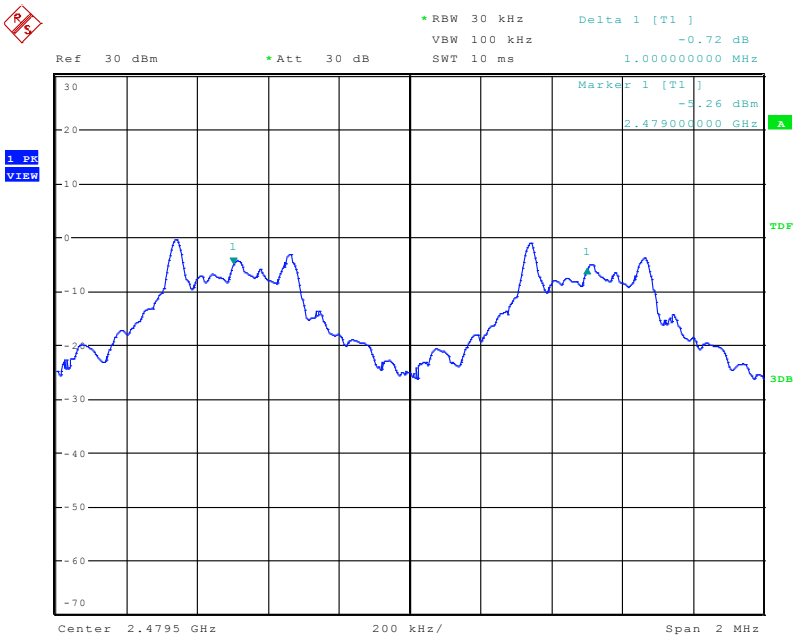


## CH39 -1Mbps




Date: 20.OCT.2016 10:31:43

## CH78 -1Mbps



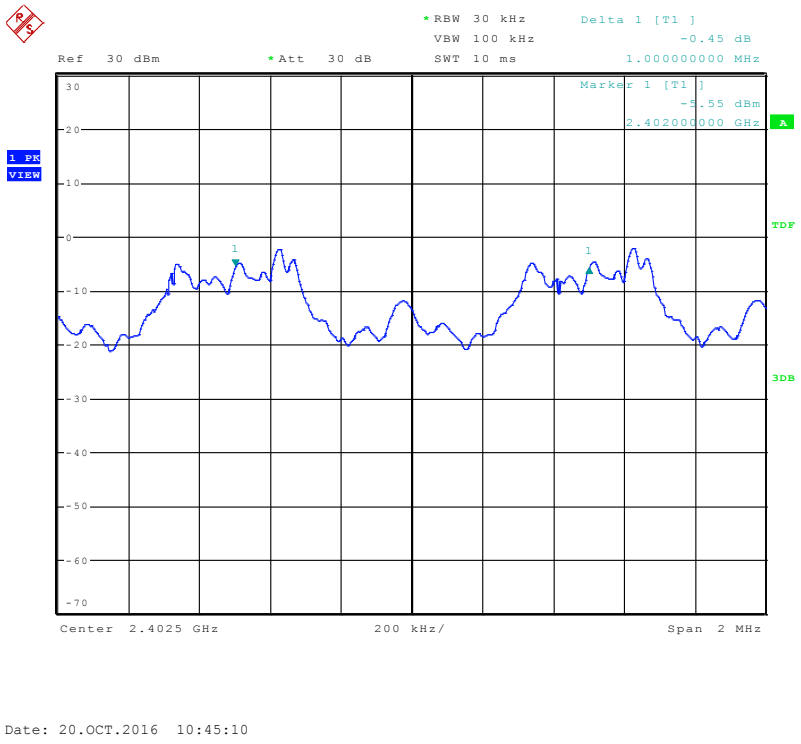

Date: 20.OCT.2016 10:32:46

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 25 ℃ | Relative Humidity | 60% |
| Pressure | 1012 hPa | Test Result | Pass |
| Test Mode | CH00 / CH39 /CH78 (2Mbps Mode) | Test Date | October 19, 2016 |

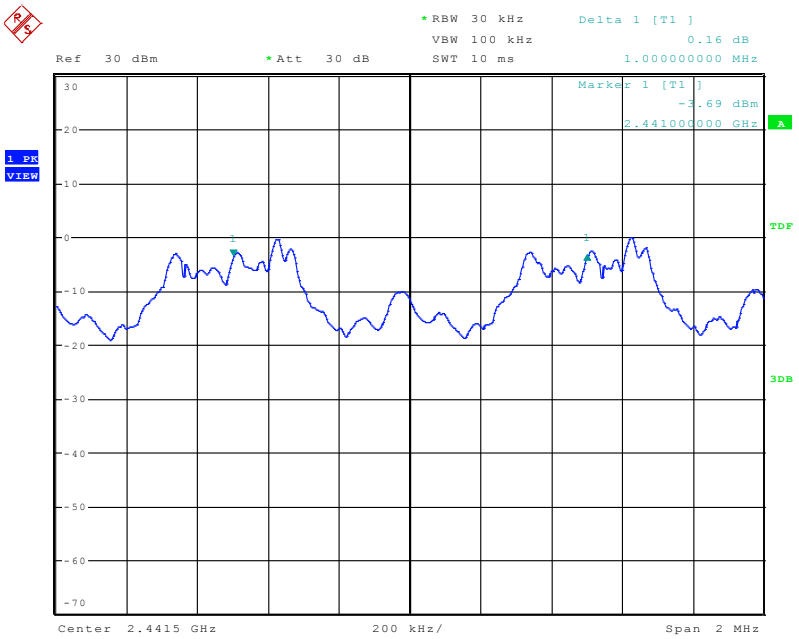
| Channel number | Channel frequency (MHz) | Separation Read value (KHz) | Separation limit (KHz) |
|---|---|---|---|
| 00 | 2402 | 1000 | 2/3*20dB BW |
| 39 | 2441 | 1000 | 2/3*20dB BW |
| 78 | 2480 | 1000 | 2/3*20dB BW |

*Note: 20db bandwidth refer to section 9.6*

**CH00 -2Mbps**

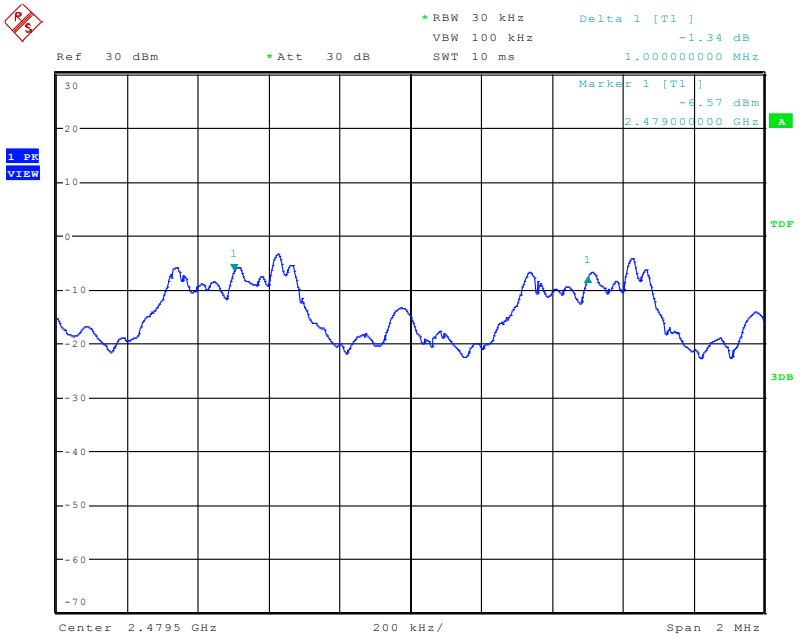


## CH39 -2Mbps




Date: 20.OCT.2016 10:46:38

## CH78 -2Mbps



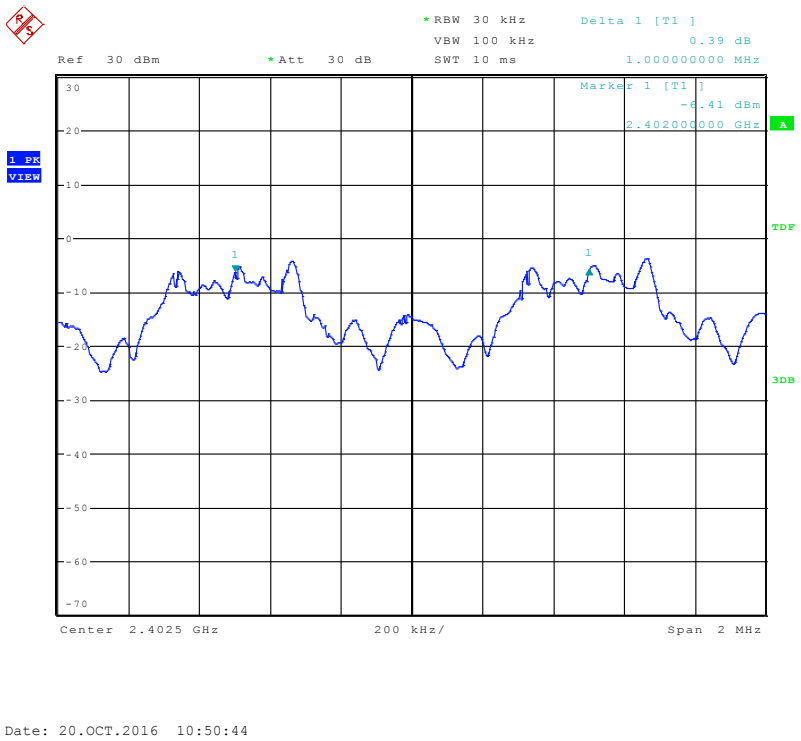

Date: 20.OCT.2016 10:48:12

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 25 ℃ | Relative Humidity | 60% |
| Pressure | 1012 hPa | Test Result | Pass |
| Test Mode | CH00 / CH39 /CH78 (3Mbps Mode) | Test Date | October 19, 2016 |

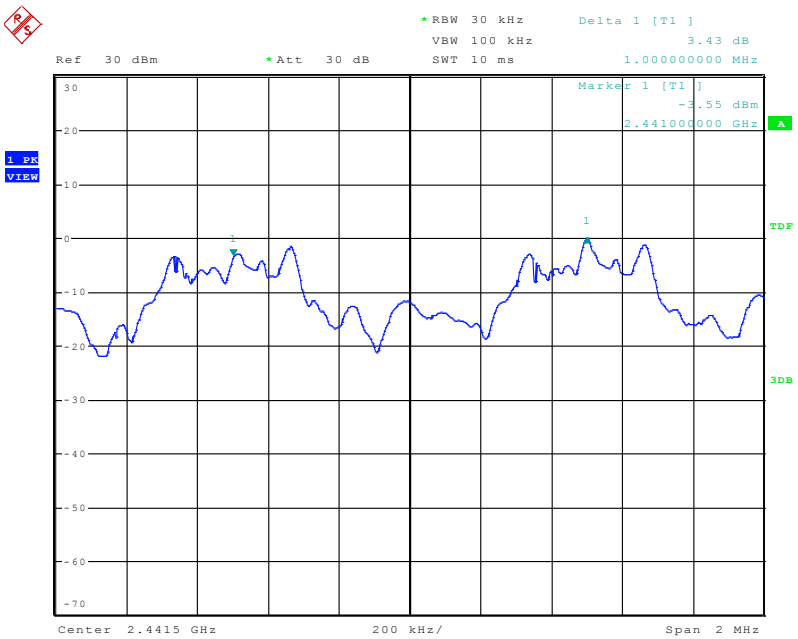
| Channel number | Channel frequency (MHz) | Separation Read value (KHz) | Separation limit (KHz) |
|---|---|---|---|
| 00 | 2402 | 1000 | 2/3*20dB BW |
| 39 | 2441 | 1000 | 2/3*20dB BW |
| 78 | 2480 | 1000 | 2/3*20dB BW |

*Note: 20db bandwidth refer to section 9.6*

**CH00 -3Mbps**

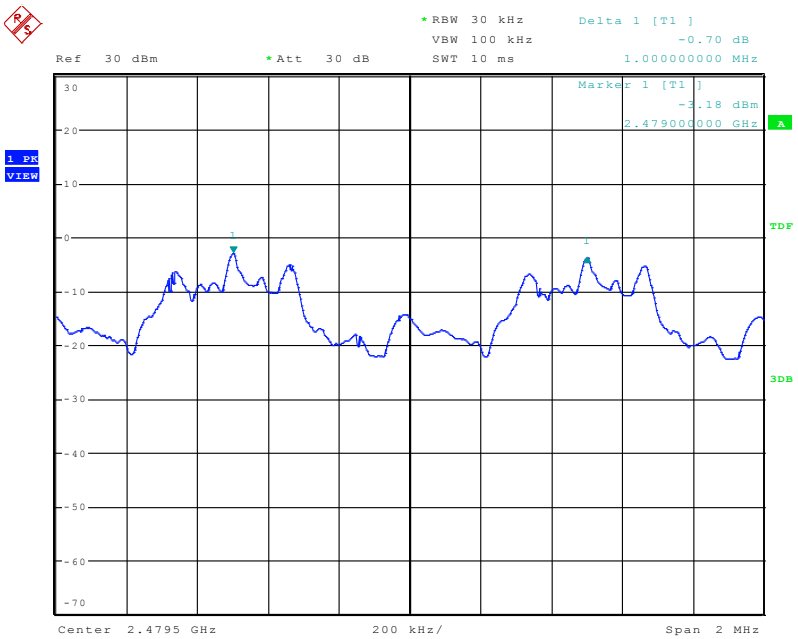


## CH39 -3Mbps




Date: 20.OCT.2016 10:53:21

## CH78 -3Mbps




Date: 20.OCT.2016 10:55:21

# 9. BANDWIDTH TEST

## 9.1 APPLIED PROCEDURES / LIMIT

| FCC Part15 (15.247) , Subpart C | | | | |
|---|---|---|---|---|
| Section | Test Item | Limit | Frequency Range (MHz) | Result |
| 15.247 (a)(1) | Bandwidth | (20dB bandwidth) | 2400-2483.5 | PASS |

| Spectrum Parameter | Setting |
|---|---|
| Attenuation | Auto |
| Span Frequency | > Measurement Bandwidth or Channel Separation |
| RB | 30kHz |
| VB | 100 kHz |
| Detector | Peak |
| Trace | Max hold |
| Sweep Time | Auto |

## 9.2 TEST PROCEDURE

1. Check the calibration of the measuring instrument (spectrum analyzer) using either an internal calibrator or a known signal from an external generator.
2. Set the spectrum analyzer as follows: VBW =30kHz, RBW=100kHz, Sweep = auto Detector function = peak ,Trace = max hold
3. Measure the highest amplitude appearing on spectral display and record the level to calculate results.
4. Repeat above procedures until all frequencies measured were complete.

## 9.3 DEVIATION FROM STANDARD

No deviation.

## 9.4 TEST SETUP

## 9.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

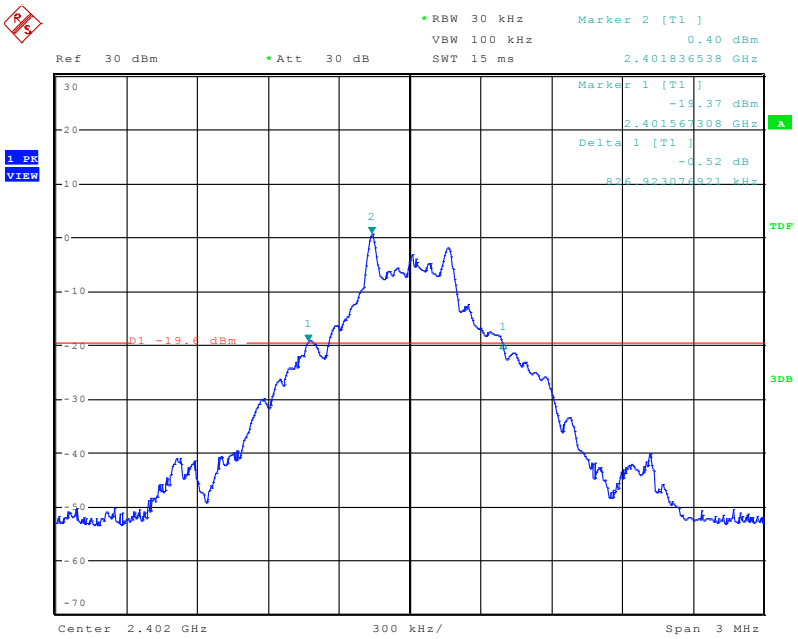
## 9.6 TEST RESULTS

Note: ***the worst case is DH5 as result in this part.***

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 25 ℃ | Relative Humidity | 60% |
| Pressure | 1012 hPa | Test Mode | CH00/CH39/C78(1Mbps) |
| Test Date | October 19, 2016 | | |

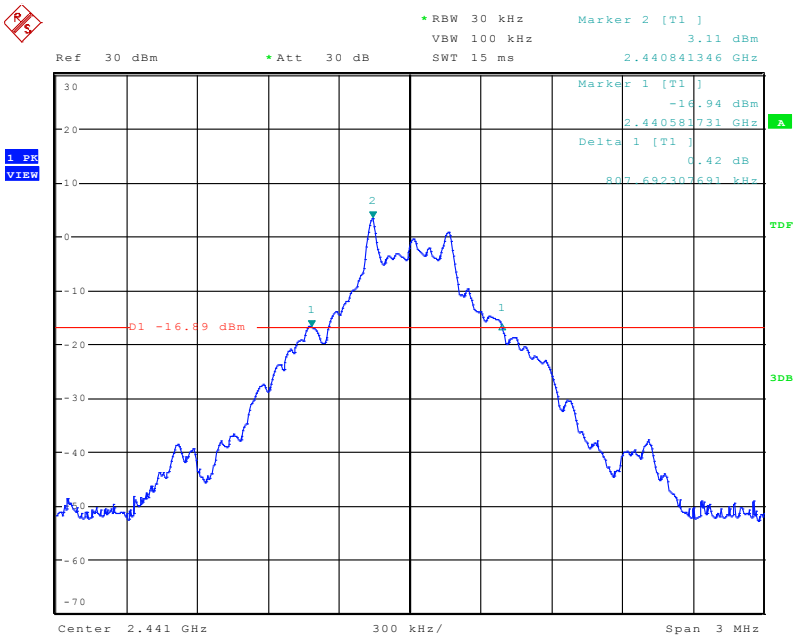
| Frequency | 20dB Bandwidth (kHz) | Result |
|---|---|---|
| 2402 MHz | 826 | PASS |
| 2441 MHz | 807 | PASS |
| 2480 MHz | 836 | PASS |

**CH00 -1Mbps**



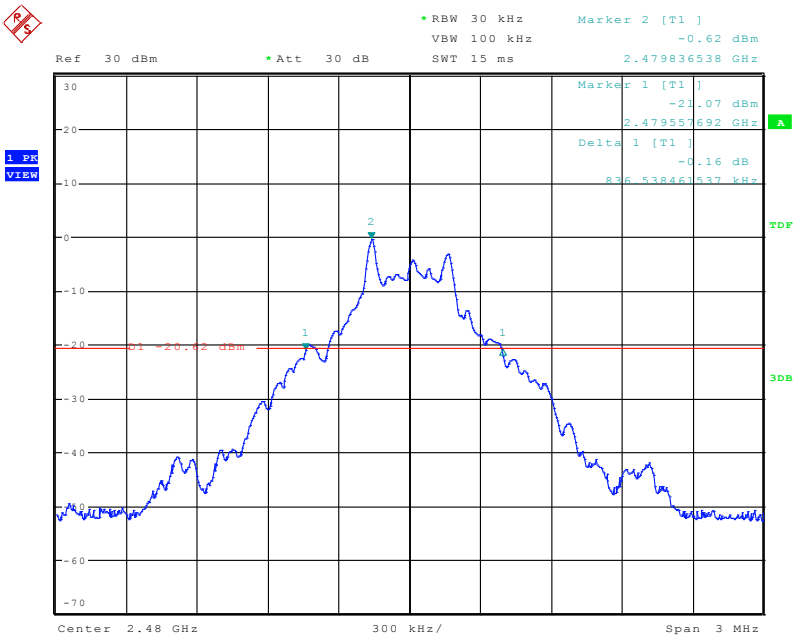

Date: 20.OCT.2016 11:13:16

## CH39 -1Mbps




Date: 20.OCT.2016 11:15:08

## CH78 -1Mbps



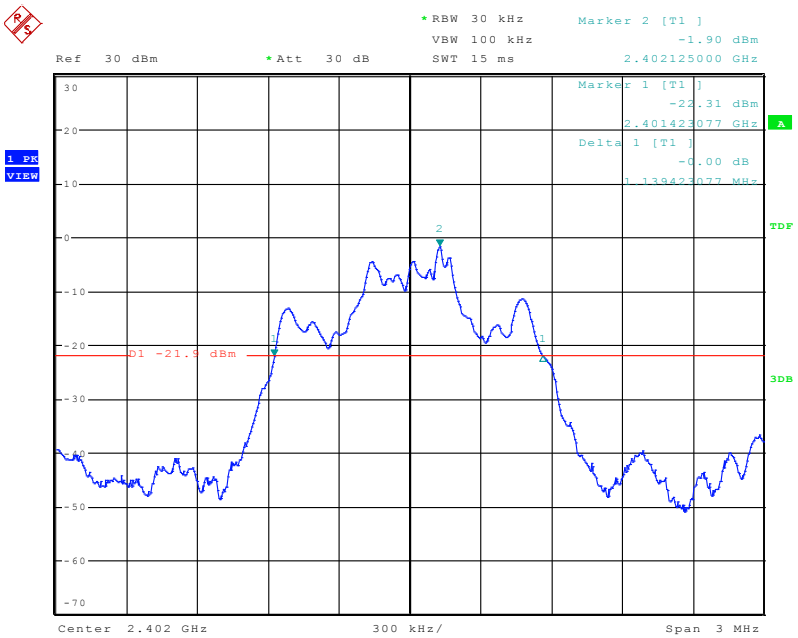

Date: 20.OCT.2016 11:20:22

Note: ***the worst case is DH5 as result in this part.***

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 25 ℃ | Relative Humidity | 60% |
| Pressure | 1012 hPa | Test Mode | CH00/CH39/C78(2Mbps) |
| Test Date | October 19, 2016 | | |

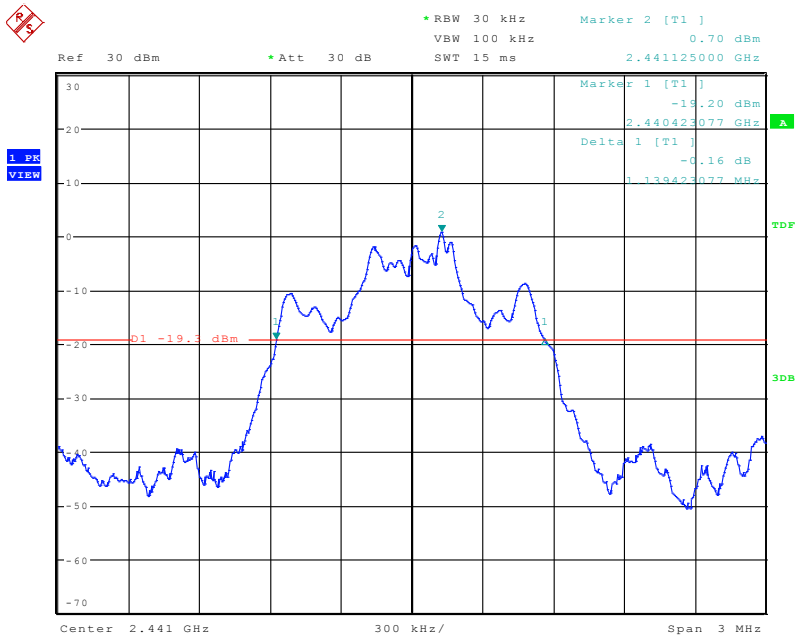
| Frequency | 20dB Bandwidth (kHz) | Result |
|---|---|---|
| 2402 MHz | 1139 | PASS |
| 2441 MHz | 1139 | PASS |
| 2480 MHz | 1134 | PASS |

**CH00 -2Mbps**



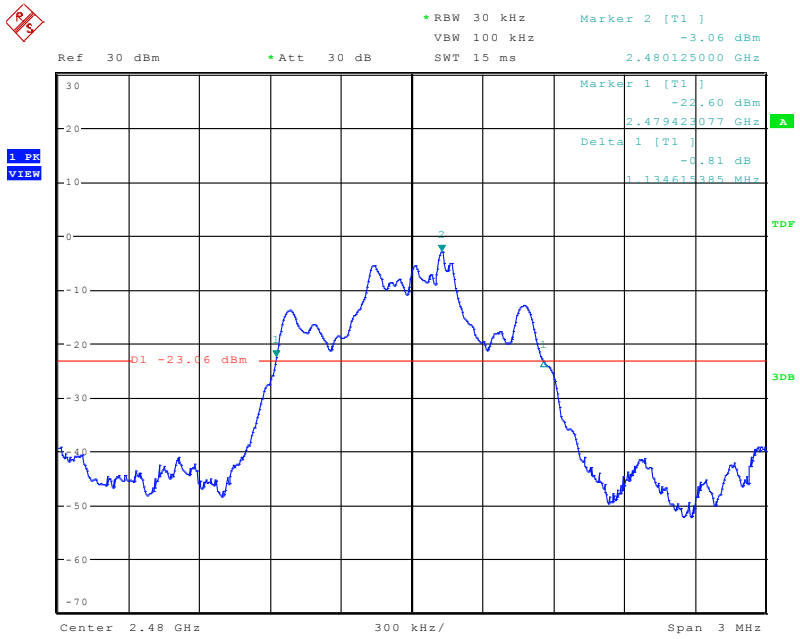

Date: 20.OCT.2016 11:24:09

## CH39 -2Mbps




Date: 20.OCT.2016 11:41:45

## CH78 -2Mbps



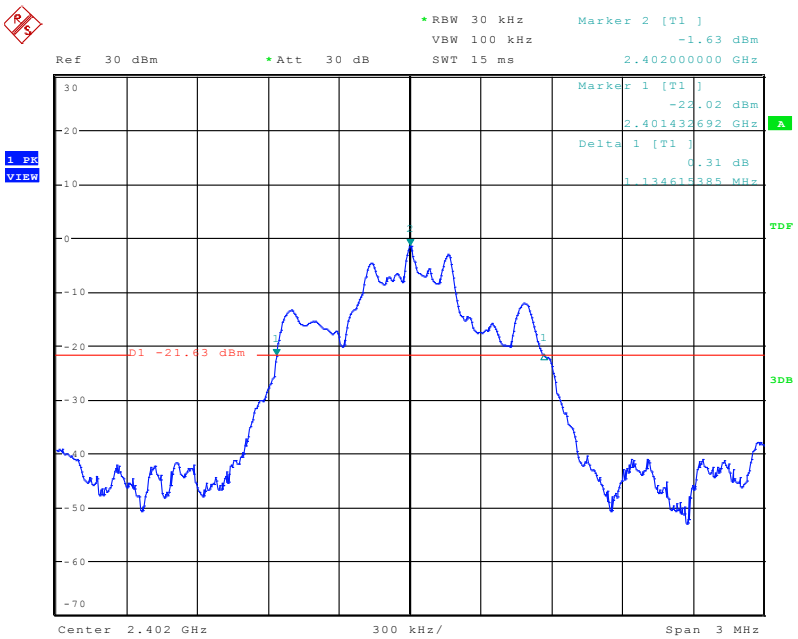

Date: 20.OCT.2016 11:44:56

Note: ***the worst case is DH5 as result in this part.***

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 25 ℃ | Relative Humidity | 60% |
| Pressure | 1012 hPa | Test Mode | CH00/CH39/C78(3Mbps) |
| Test Date | October 19, 2016 | | |

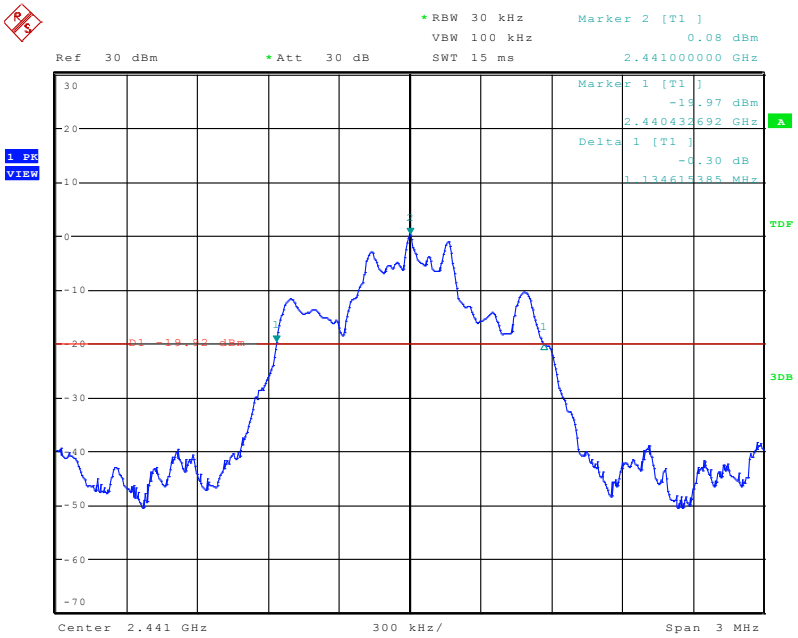
| Frequency | 20dB Bandwidth (kHz) | Result |
|---|---|---|
| 2402 MHz | 1134 | PASS |
| 2441 MHz | 1134 | PASS |
| 2480 MHz | 1134 | PASS |

**CH00 -3Mbps**



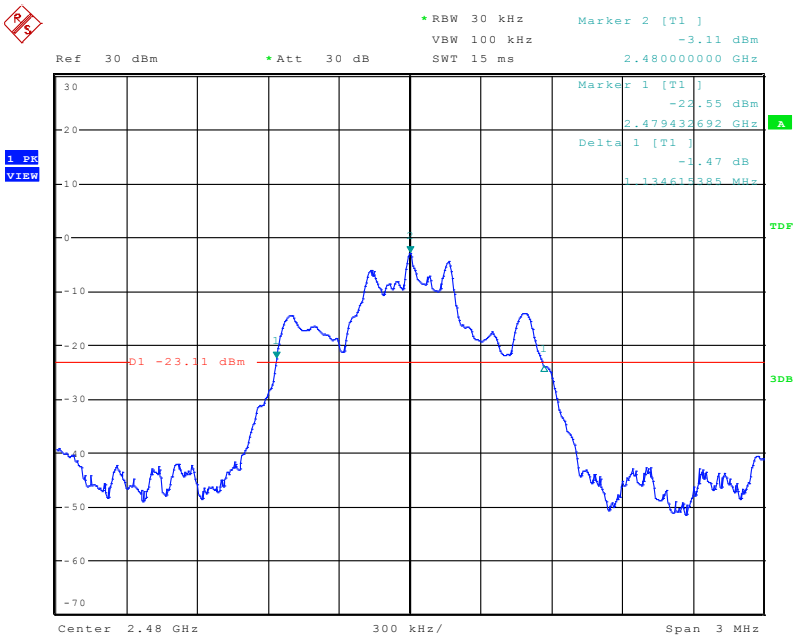

Date: 20.OCT.2016 11:57:34

## CH39 -3Mbps




Date: 20.OCT.2016 12:00:15

## CH78 -3Mbps




Date: 20.OCT.2016 12:01:41

# 10. PEAK OUTPUT POWER TEST

## 10.1 APPLIED PROCEDURES / LIMIT

| FCC Part15 (15.247) , Subpart C | | | | |
|---|---|---|---|---|
| Section | Test Item | Limit | Frequency Range (MHz) | Result |
| 15.247 (b)(i) | Peak Output Power | 1W for 1Mbps 0.125W for 2/3Mbps | 2400-2483.5 | PASS |

## 10.2 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,

b. Setting : RBW ≥ the 20 dB bandwidth of the emission being measured

Span ≥ approximately 3 times the 20 dB bandwidth, centered on a hopping channel
VBW ≥ RBW

Sweep = auto

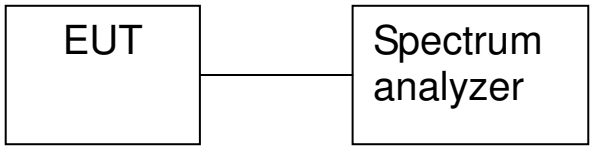
Detector function = peak

Trace = max hold

## 10.3 DEVIATION FROM STANDARD

No deviation.

## 10.4 TEST SETUP




## 10.5 EUT OPERATION CONDITIONS

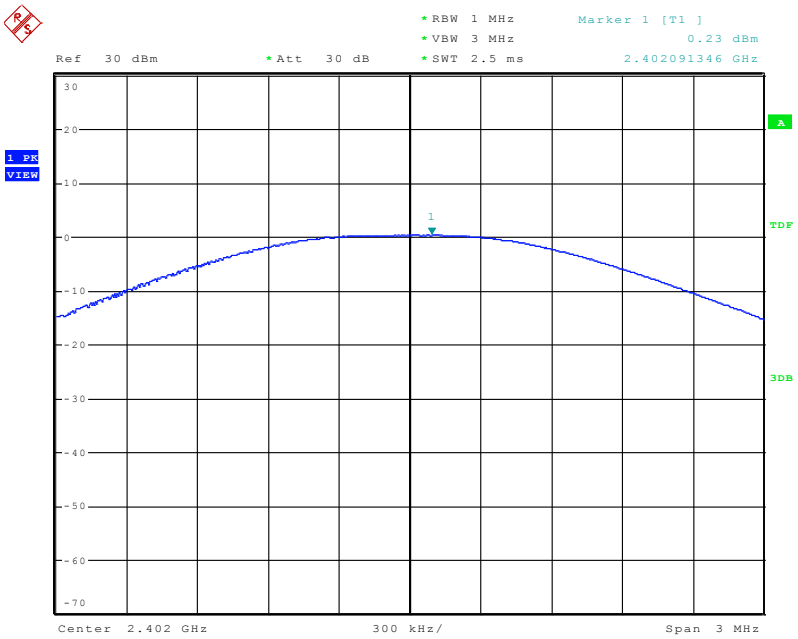
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

## 10.6 TEST RESULTS

| | | | |
|---|---|---|---|
| EUT | Bluetooth Speaker | Model Name | CK128 |
| Temperature | 25 ℃ | Relative Humidity | 60% |
| Pressure | 1012 hPa | Test Mode | CH00/ CH39 /CH78 (1M/2M/3Mbps Mode) |
| Test Date | August 23, 2015 | | |

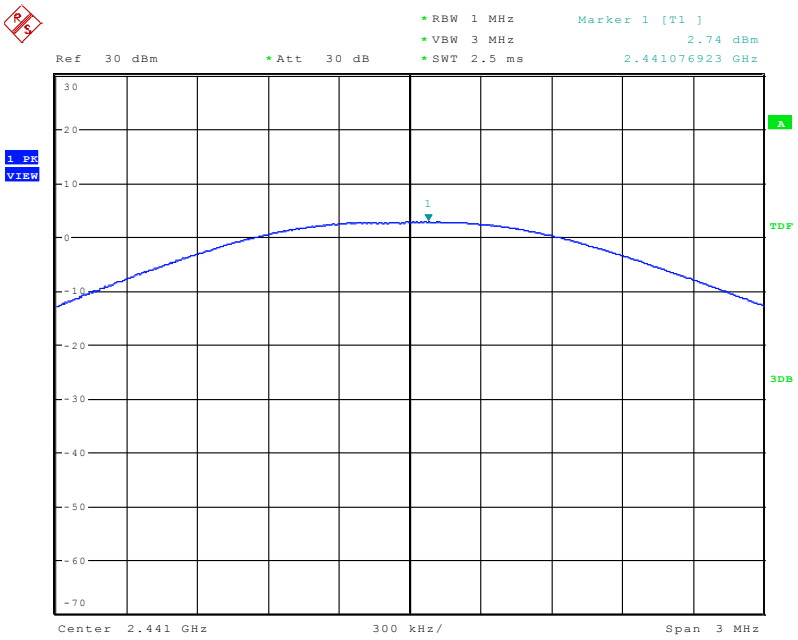
| Test Channel | Frequency (MHz) | Peak Output Power (dBm) | LIMIT(dBm) | Result |
|---|---|---|---|---|
| **1Mbps** | | | | |
| CH00 | 2402 | 0.23 | 30 | Pass |
| CH39 | 2441 | **2.74** | 30 | Pass |
| CH78 | 2480 | -0.05 | 30 | Pass |
| **2Mbps** | | | | |
| CH00 | 2402 | 1.68 | 20.97 | Pass |
| CH39 | 2441 | **4.36** | 20.97 | Pass |
| CH78 | 2480 | 0.44 | 20.97 | Pass |
| **3Mbps** | | | | |
| CH00 | 2402 | 1.66 | 20.97 | Pass |
| CH39 | 2441 | **4.36** | 20.97 | Pass |
| CH78 | 2480 | 0.40 | 20.97 | Pass |

## 1Mbps
### Channel: Low



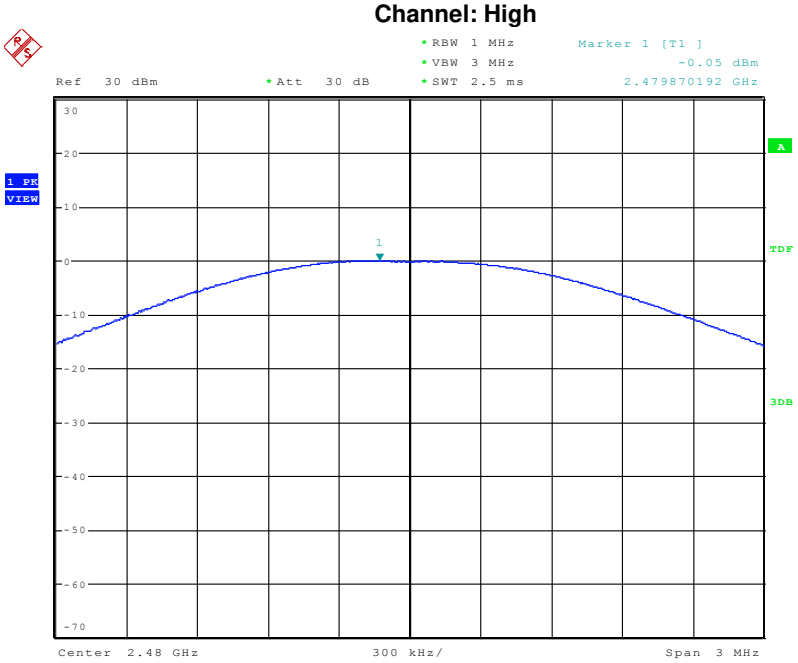

Date: 20.OCT.2016 09:43:25

### Channel: Middle




Date: 20.OCT.2016 09:43:53

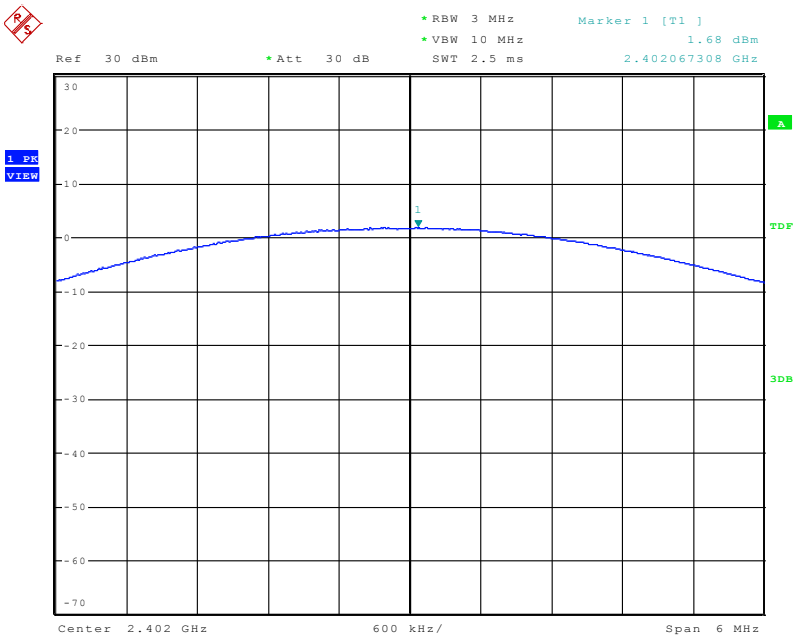
**Channel: High**




Date: 20.OCT.2016 09:44:38

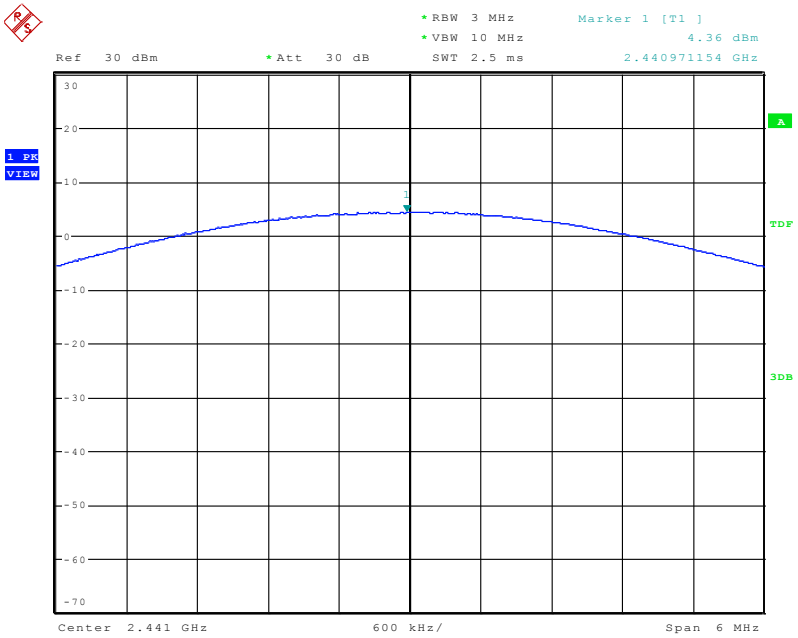
2Mbps

**Channel: Low**



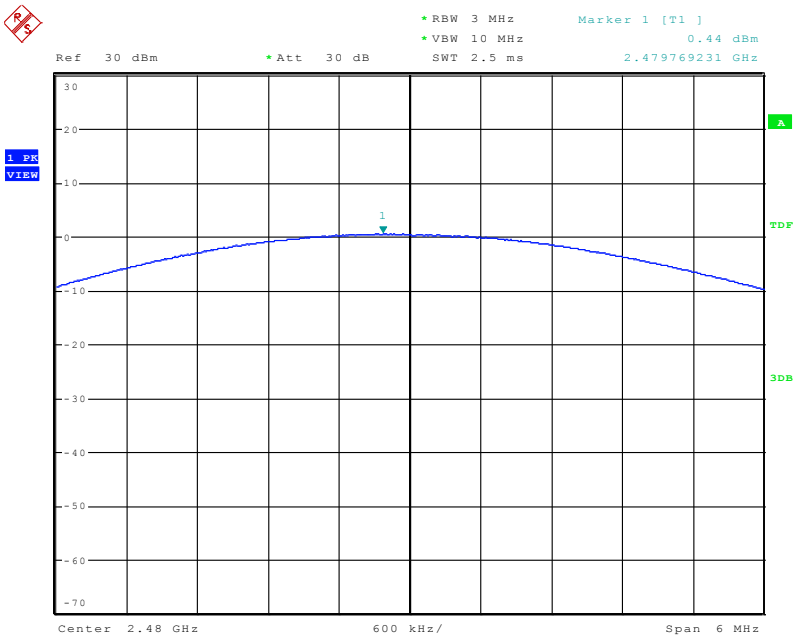

Date: 21.OCT.2016 11:48:38

## Channel: Middle




Date: 21.OCT.2016 11:49:00

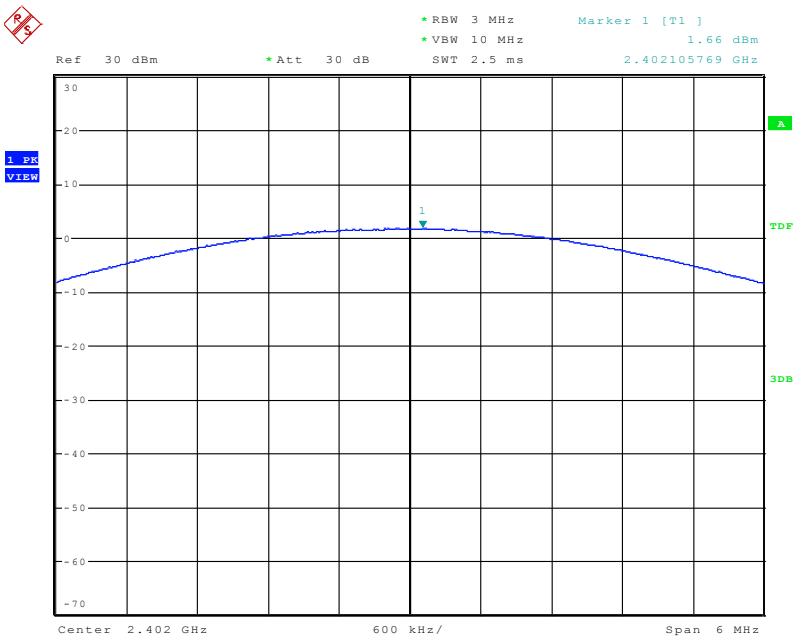
## Channel: High




Date: 21.OCT.2016 11:49:26

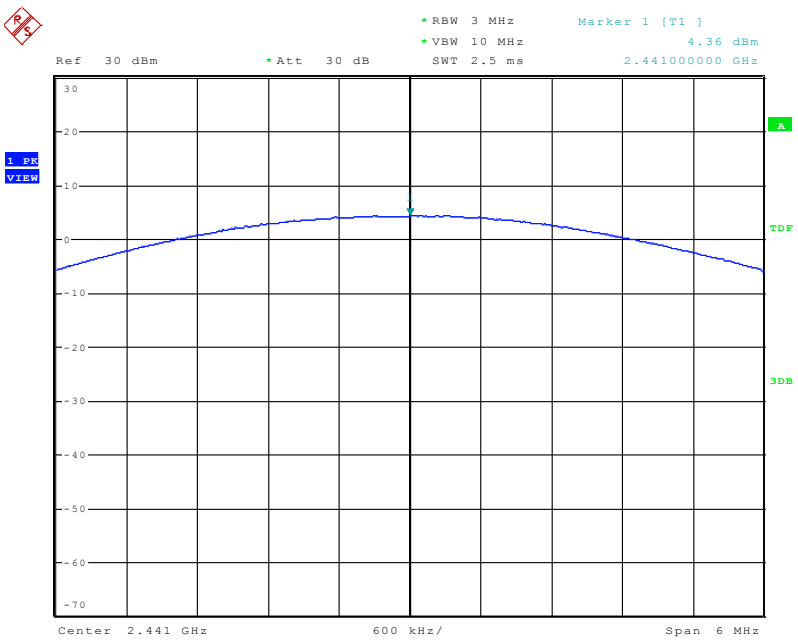
3Mbps

**Channel: Low**



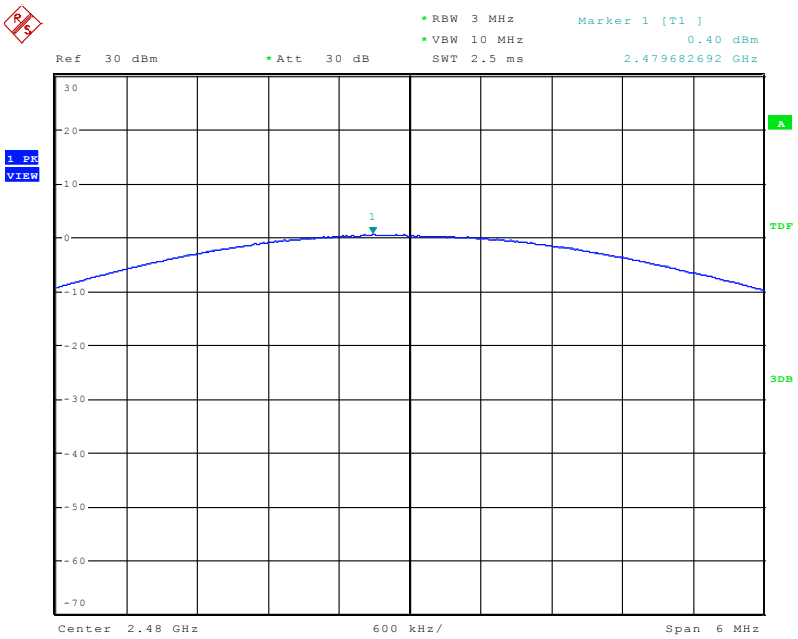

Date: 21.OCT.2016 11:50:06

**Channel: Middle**




Date: 21.OCT.2016 11:50:26

**Channel: High**




Date: 21.OCT.2016 11:50:49

## 11. 100KHZ BAND EDGES MEASUREMENT

### 11.1 APPLIED PROCEDURES / LIMIT

| FCC Part15 (15.247) , Subpart C | | | | |
|---|---|---|---|---|
| Section | Test Item | Limit | Frequency Range (MHz) | Result |
| 15.247 (d) | Band Edges Measurement | (20dB bandwidth) | 2400-2483.5 | PASS |

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

### 11.2 TEST PROCEDURE

Radiated Emission:

1. The EUT is placed on a turntable, which is 1.5m above the ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.
4. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission: RBW=VBW=100kHz / Sweep=AUTO/Detector function = peak/ Trace = max hold.
5. Repeat the procedures until horizontal and vertical polarization are measured.

Conducted Emission:

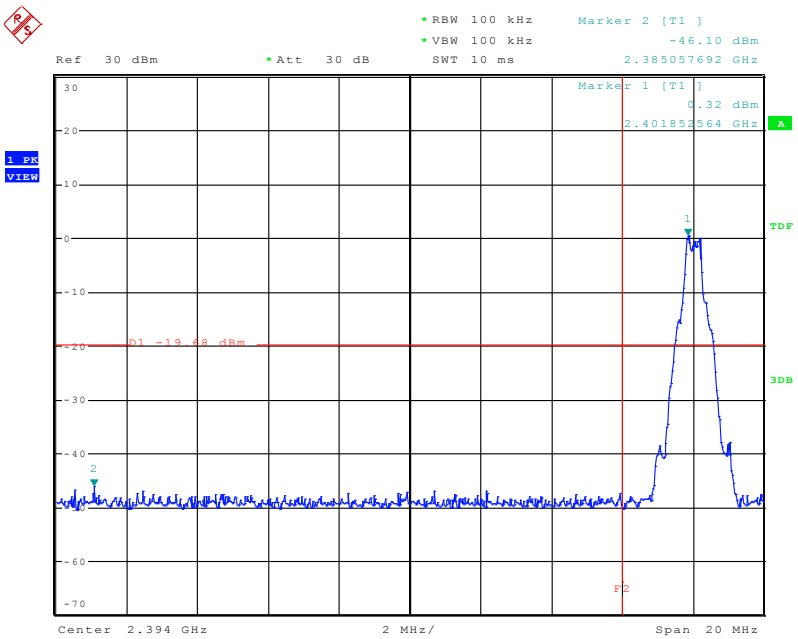
1. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below.
2. Setting: RBW =100kHz; VBW ≥ 3RBW; Sweep = auto; Detector function = peak; Trace = max hold, Frequency range: 30MHz ~ 25GHz.

### 11.3 DEVIATION FROM STANDARD

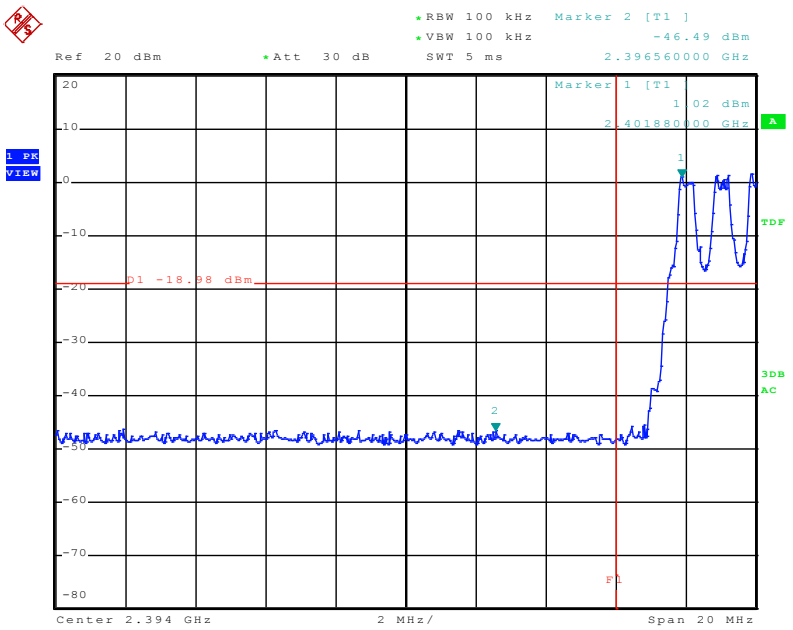
No deviation.

## 11.4 TEST RESULTS

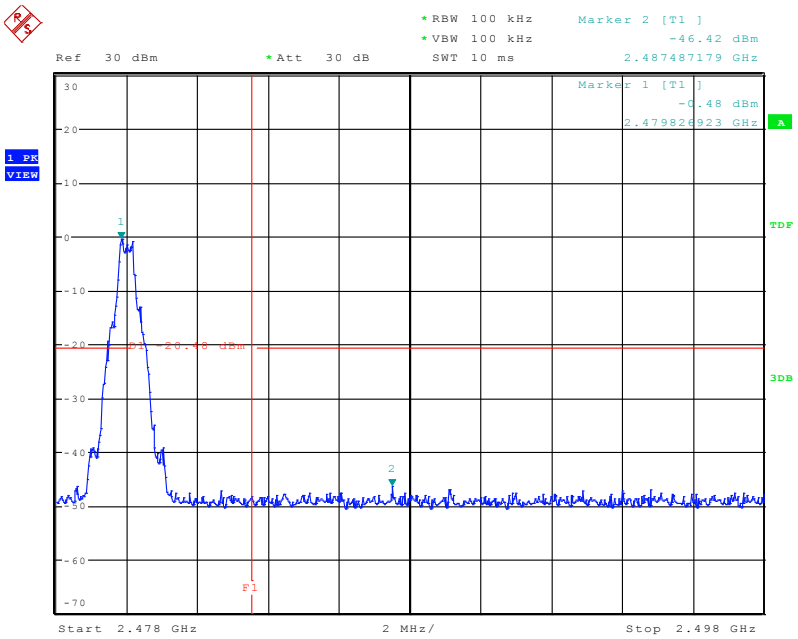
**1Mbps**
**Channel: Low**



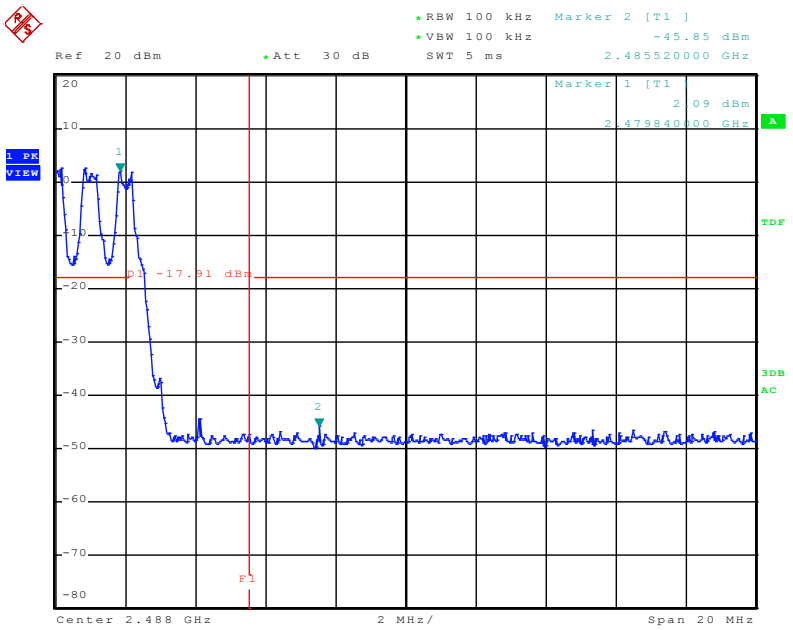

Date: 20.OCT.2016 12:04:09



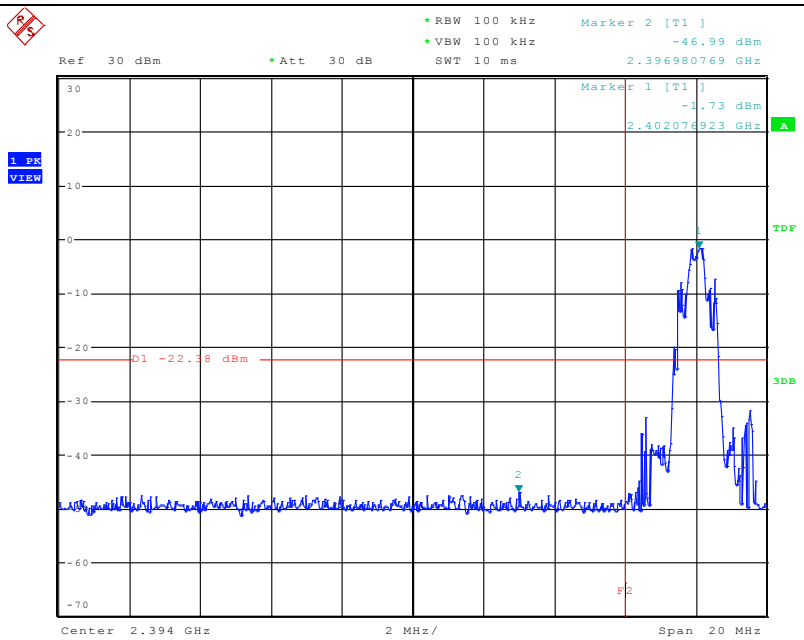
**Channel: High**




Date: 20.OCT.2016 12:05:32




**2Mbps**
**Channel: Low**

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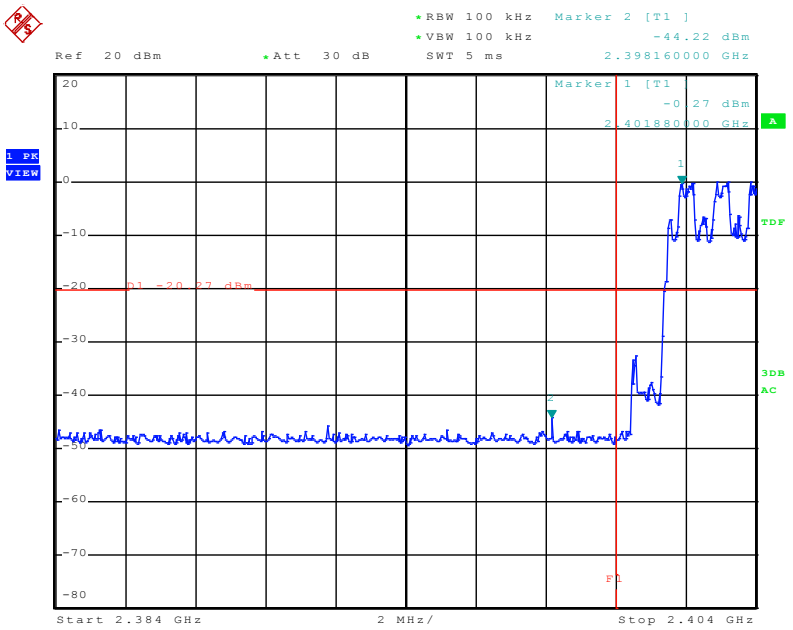
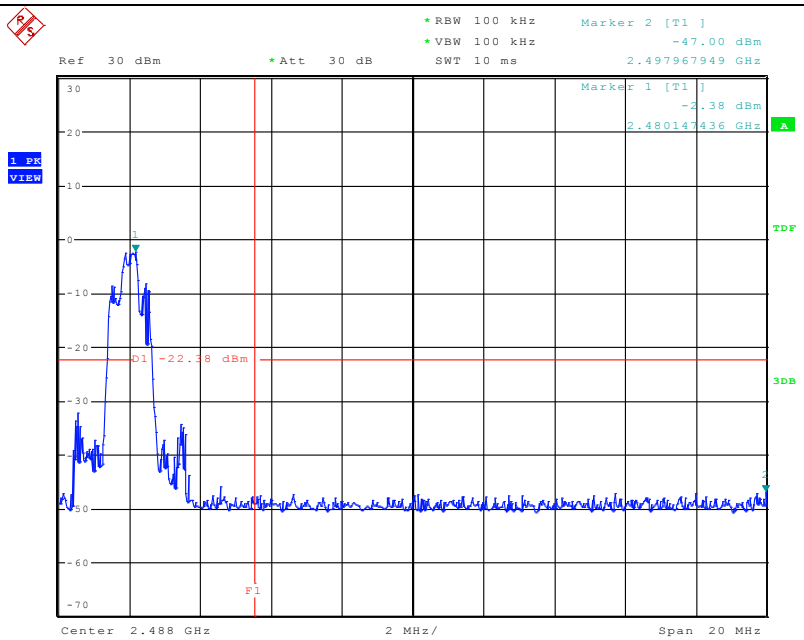



**Channel: High**

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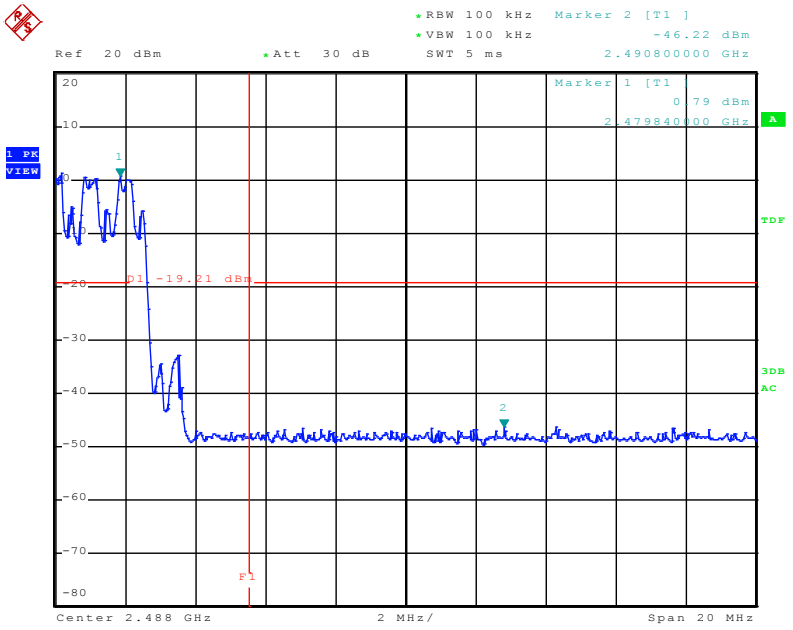
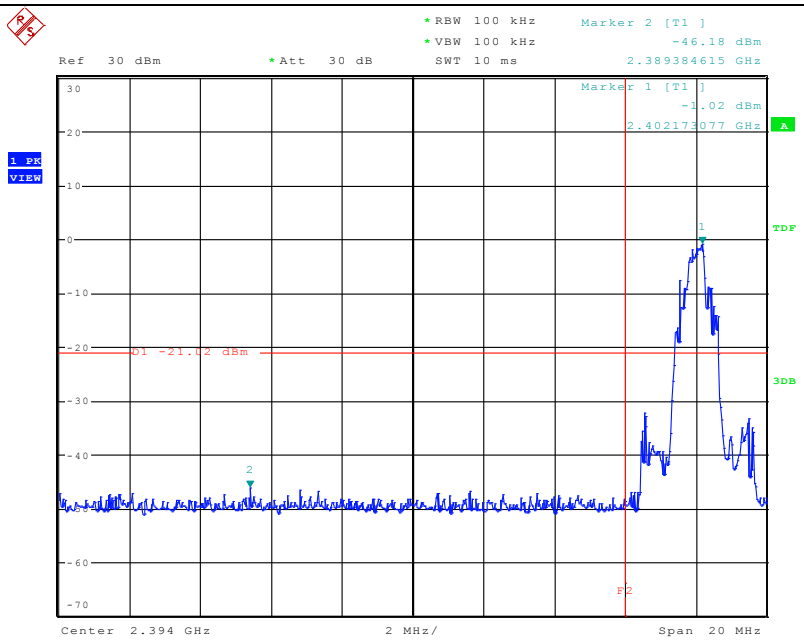



**3Mbps**
**Channel: Low**

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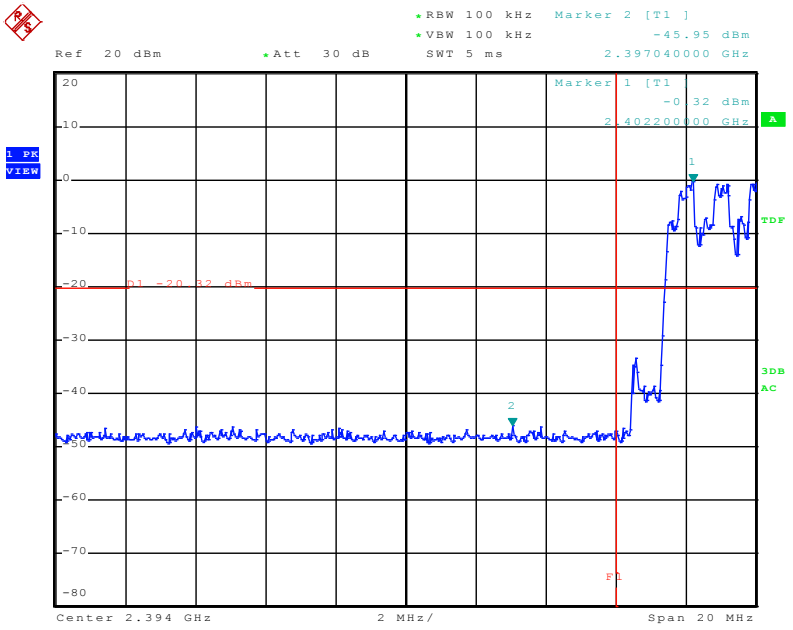
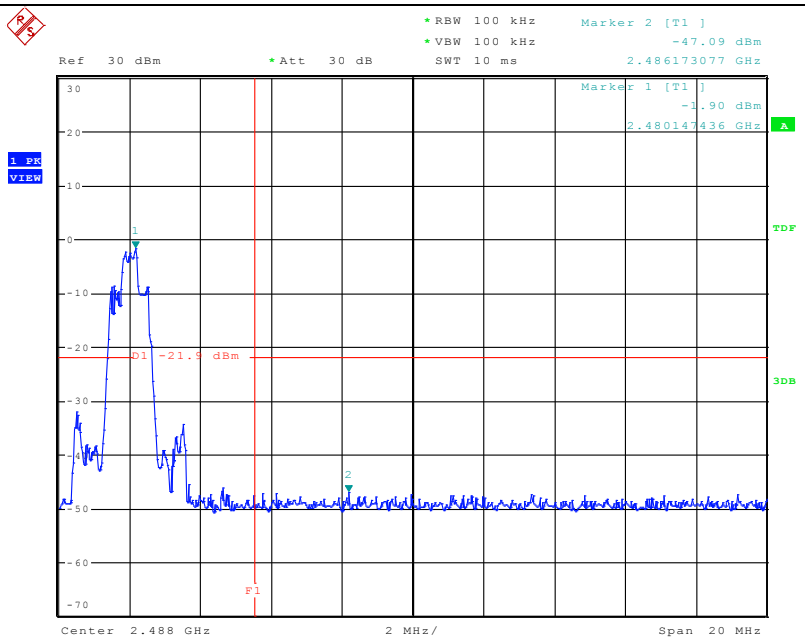



**Channel: High**

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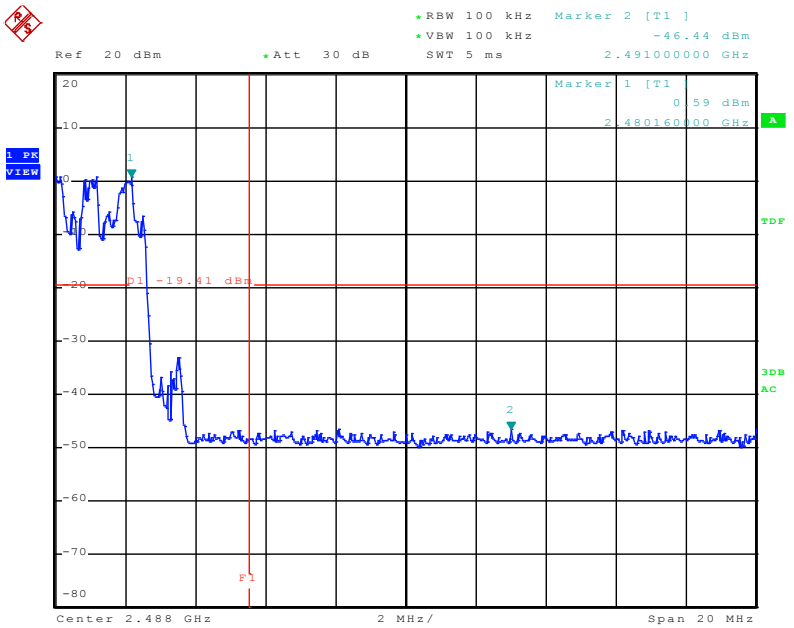
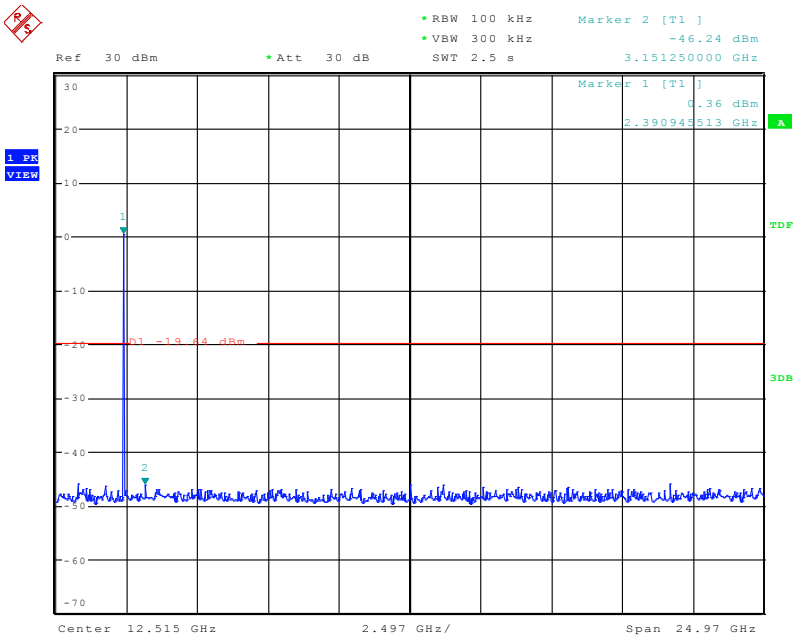


**1Mbps**
**Channel: Low**




Date: 20.OCT.2016 12:24:39

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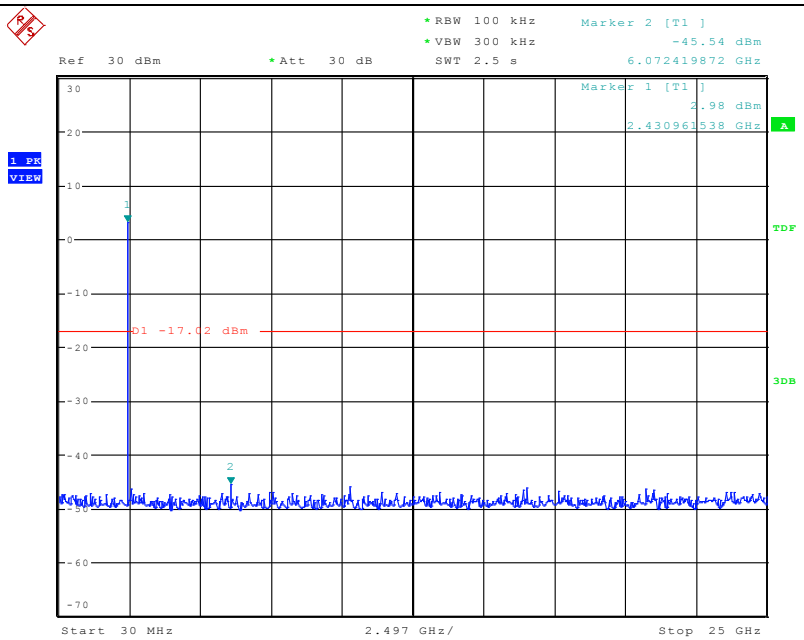
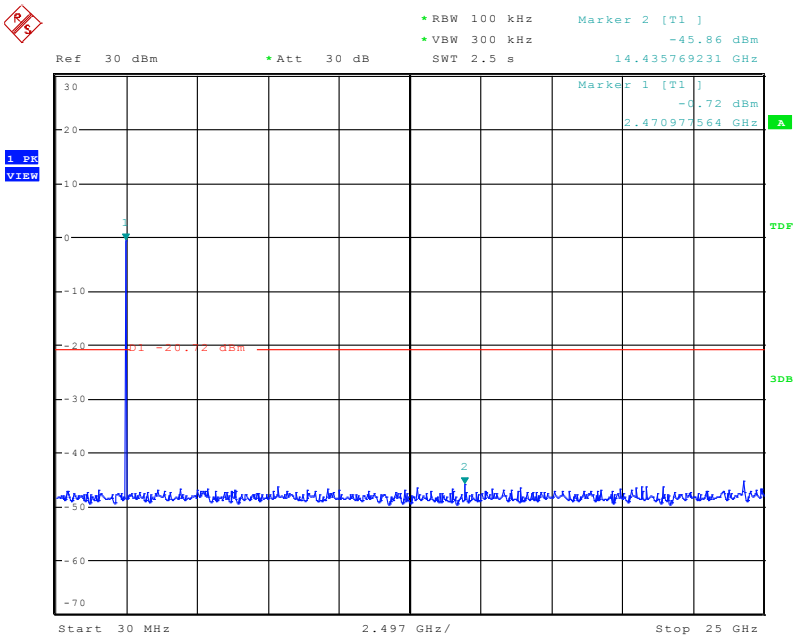



Date: 20.OCT.2016 12:25:25

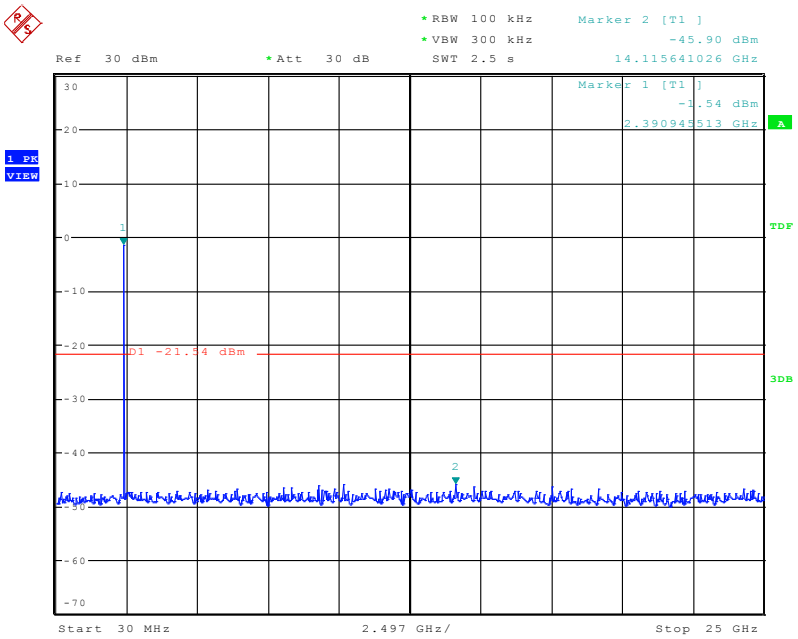
**Channel: High**




Date: 20.OCT.2016 12:26:18

## 2Mbps

### Channel: Low

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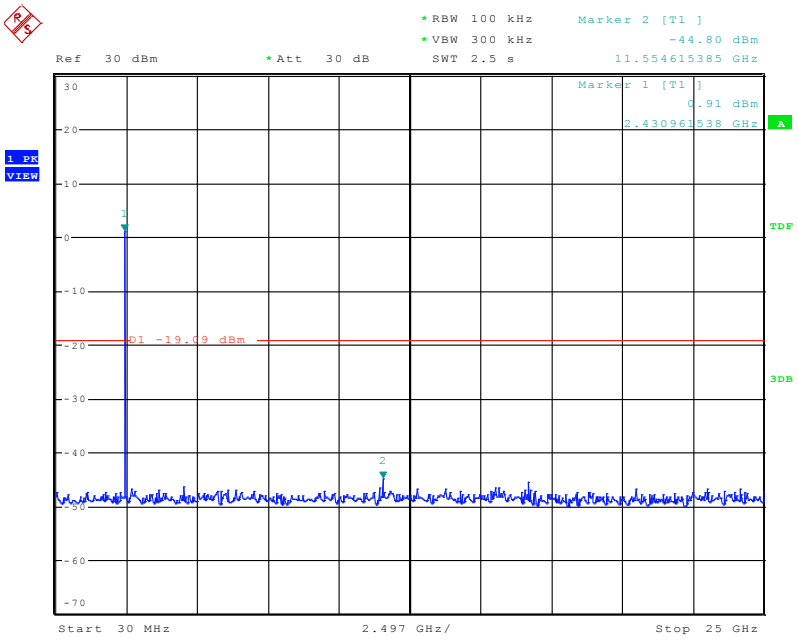
### Channel: Middle

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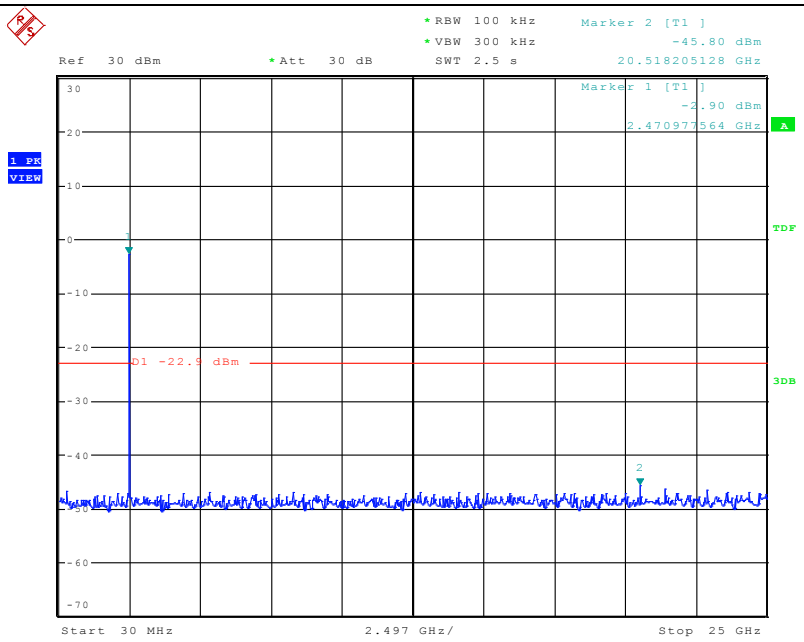
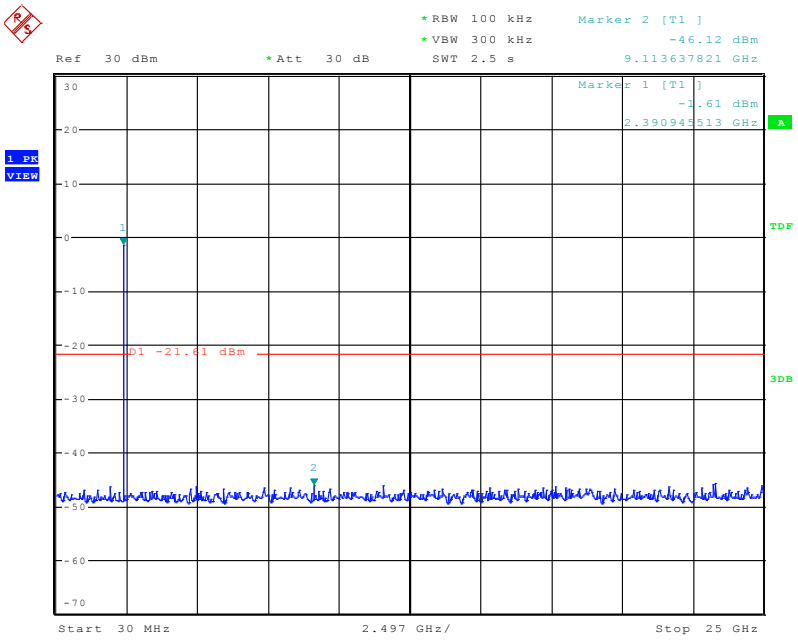



Date: 20.OCT.2016 12:28:29

**3Mbps**

**Channel: Low**

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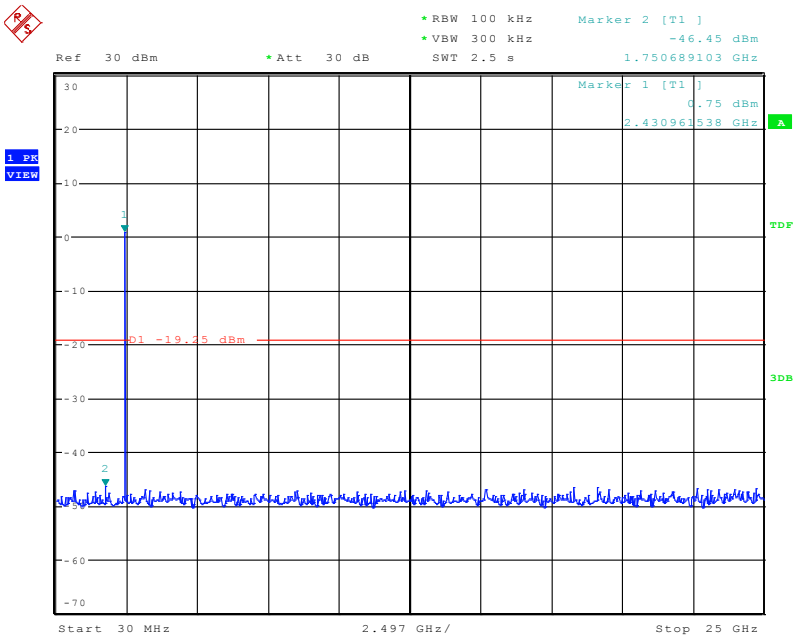
## Channel: Middle




Date: 20.OCT.2016 12:29:52

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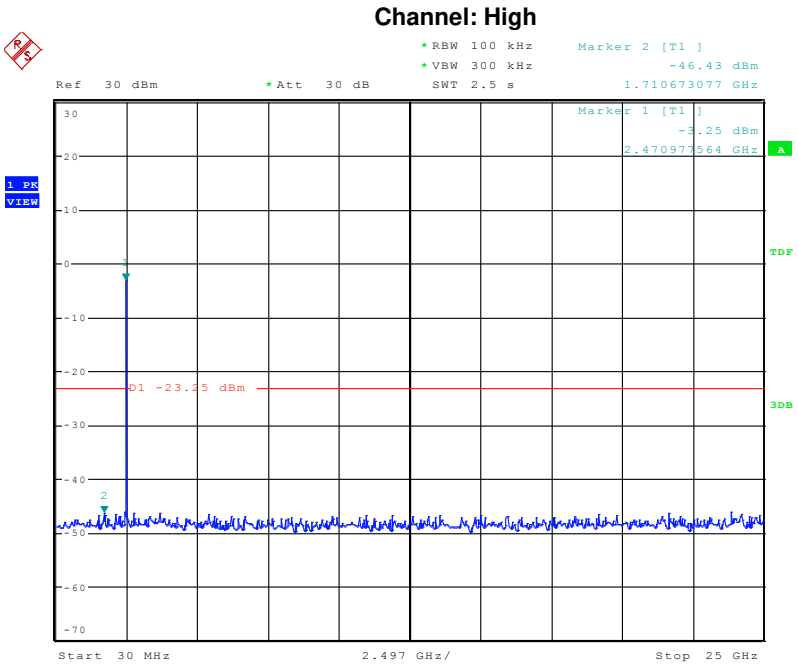



Date: 20.OCT.2016 12:30:32

## 12. ANTENNA APPLICATION

### 12.1 Antenna requirement

The EUT'S antenna is met the requirement of FCC part 15C section 15.203 and 15.247

FCC part 15C section 15.247 requirements: Systems operating in the 2402-2480MHz band that are used exclusively for fixed.

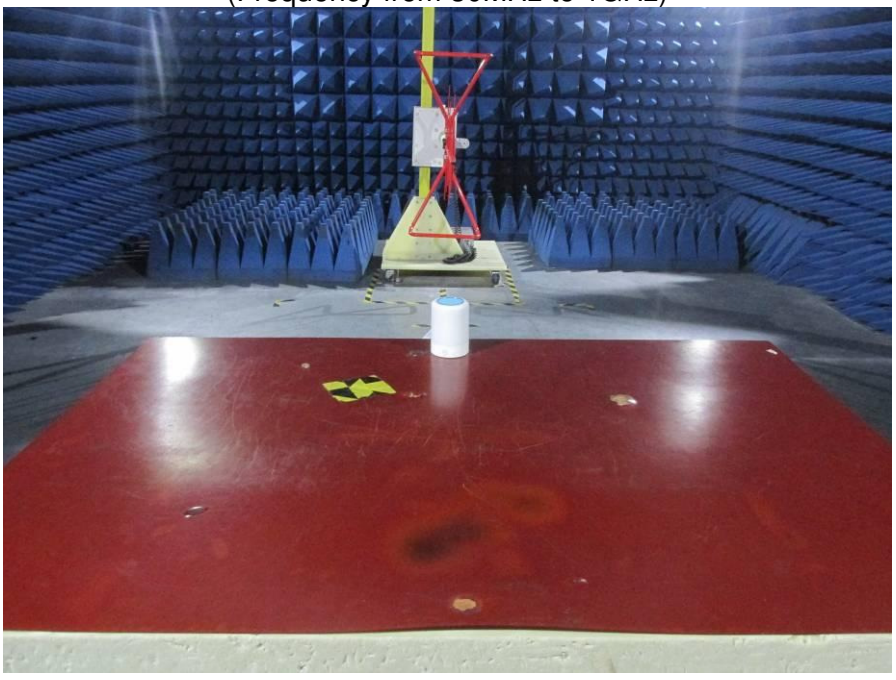
### 12.2 Result

The EUT's antenna integrated on PCB, The antenna's gain is 1.9dBi and meets the requirement.

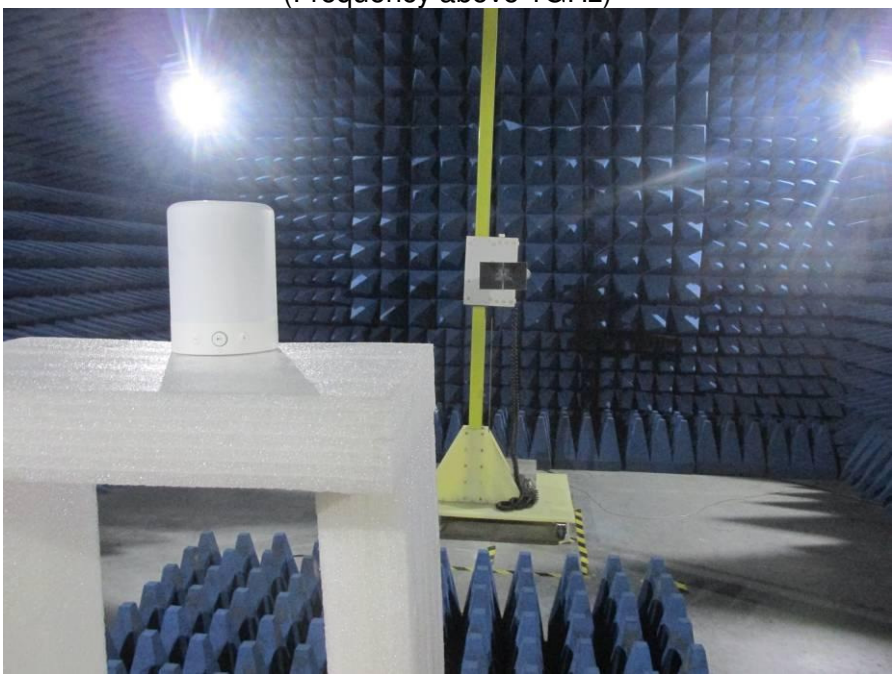
## 13. EUT TEST PHOTO

CONDUCTED EMISSION TEST

RADIATED EMISSION TEST
(Frequency from 30MHz to 1GHz)



RADIATED EMISSION TEST
(Frequency above 1GHz)



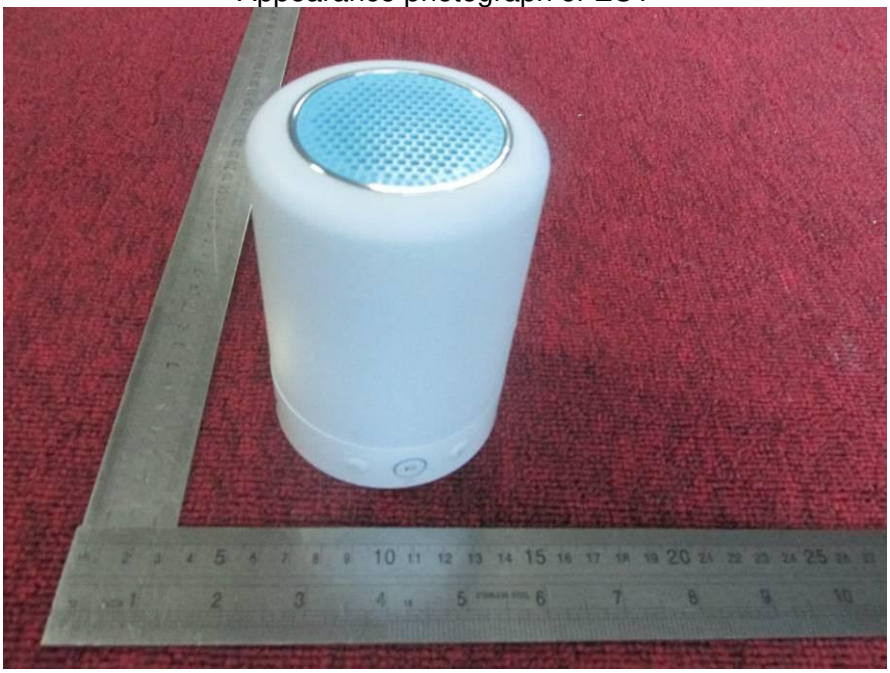
## 14. PHOTOGRAPHS OF EUT

Appearance photograph of EUT

Appearance photograph of EUT

Appearance photograph of EUT

Appearance photograph of EUT

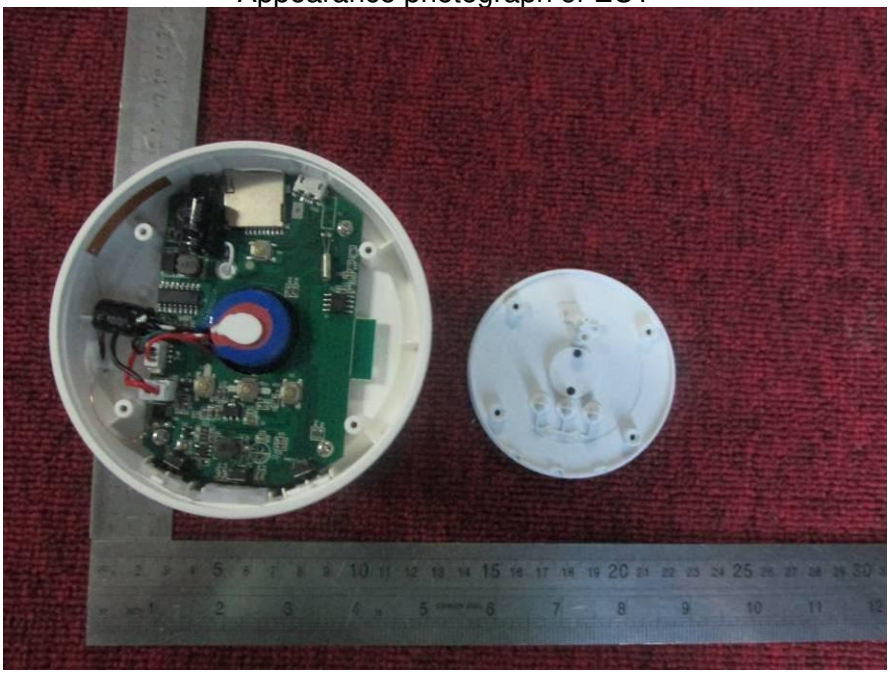


Appearance photograph of EUT

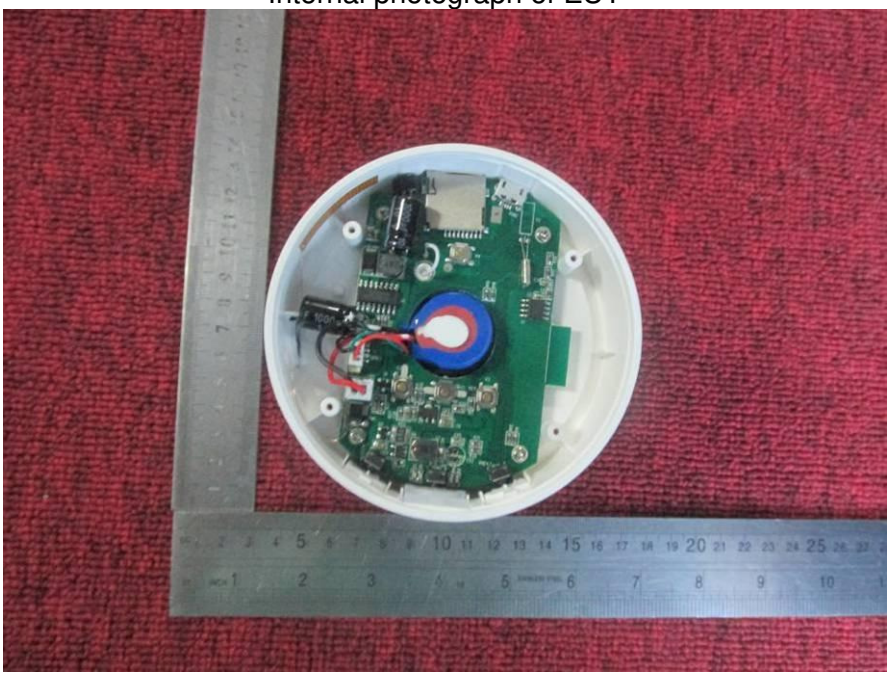
Appearance photograph of EUT

Appearance photograph of EUT

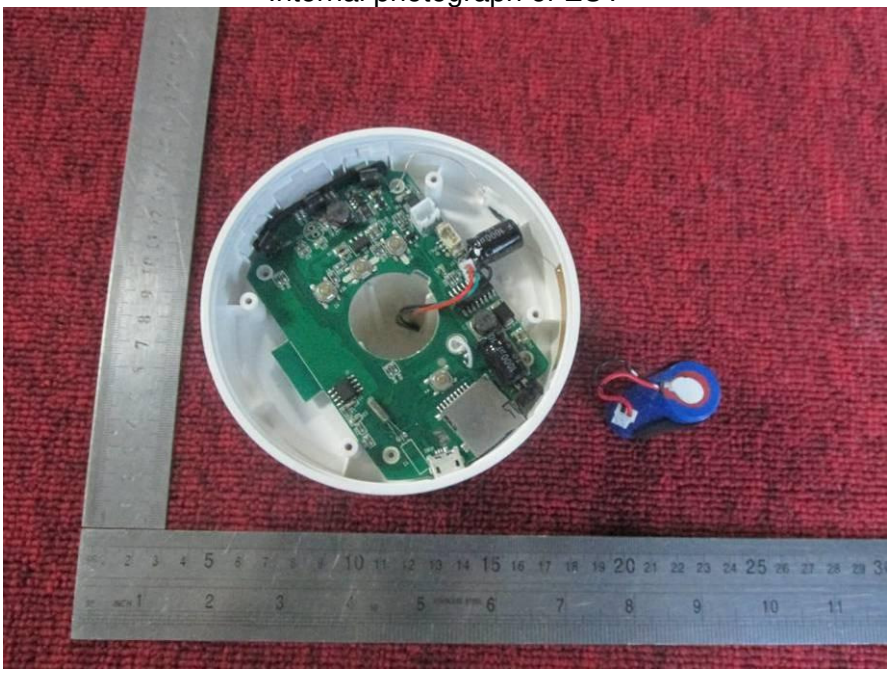
Appearance photograph of EUT



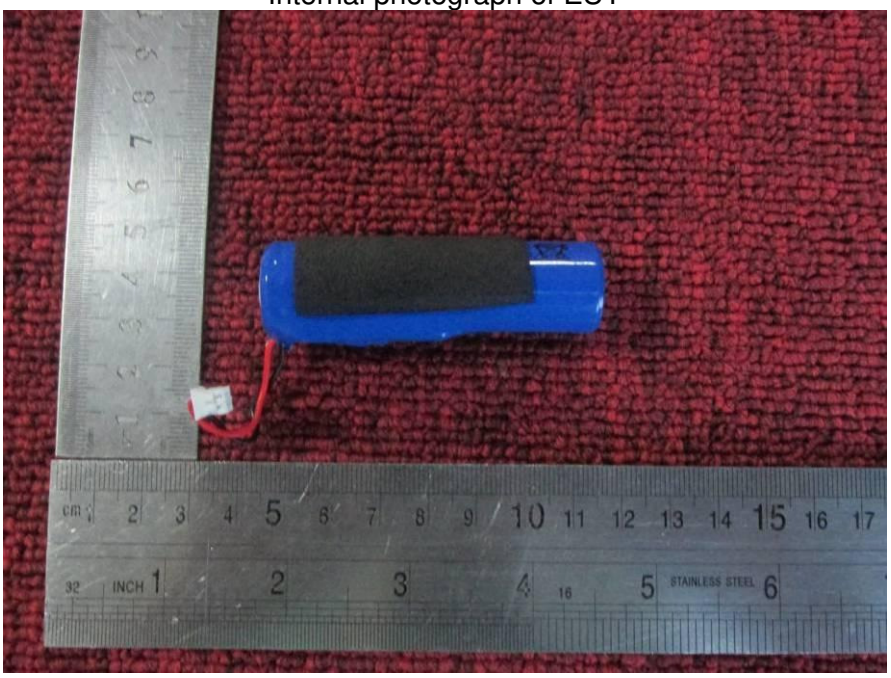
Internal photograph of EUT



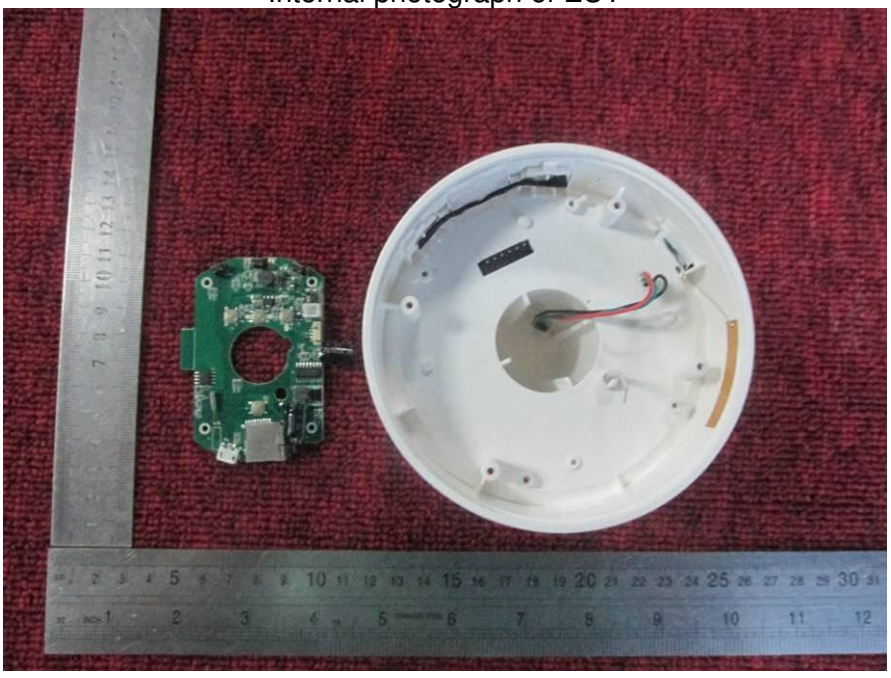
Internal photograph of EUT



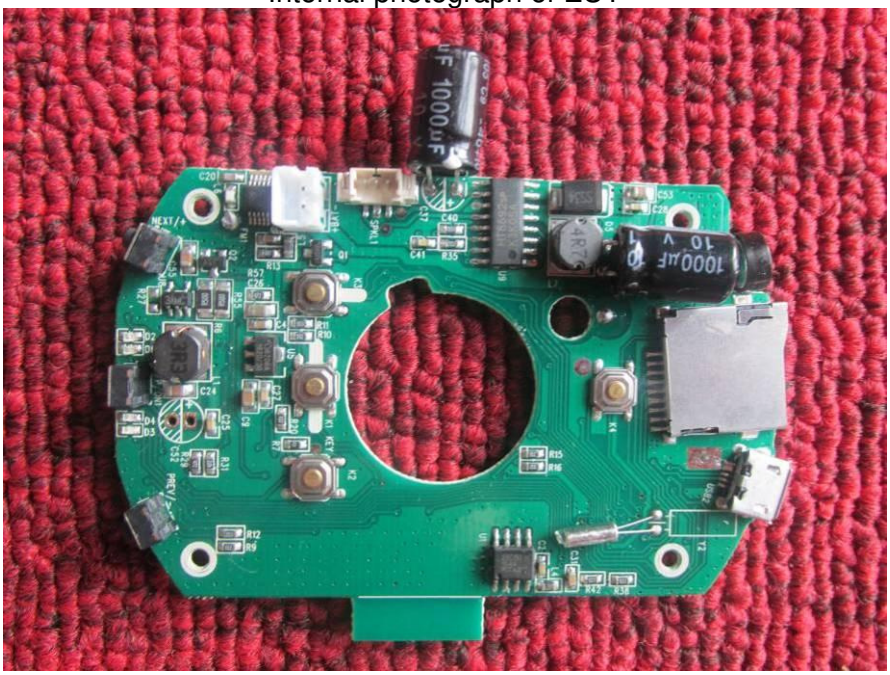
Internal photograph of EUT



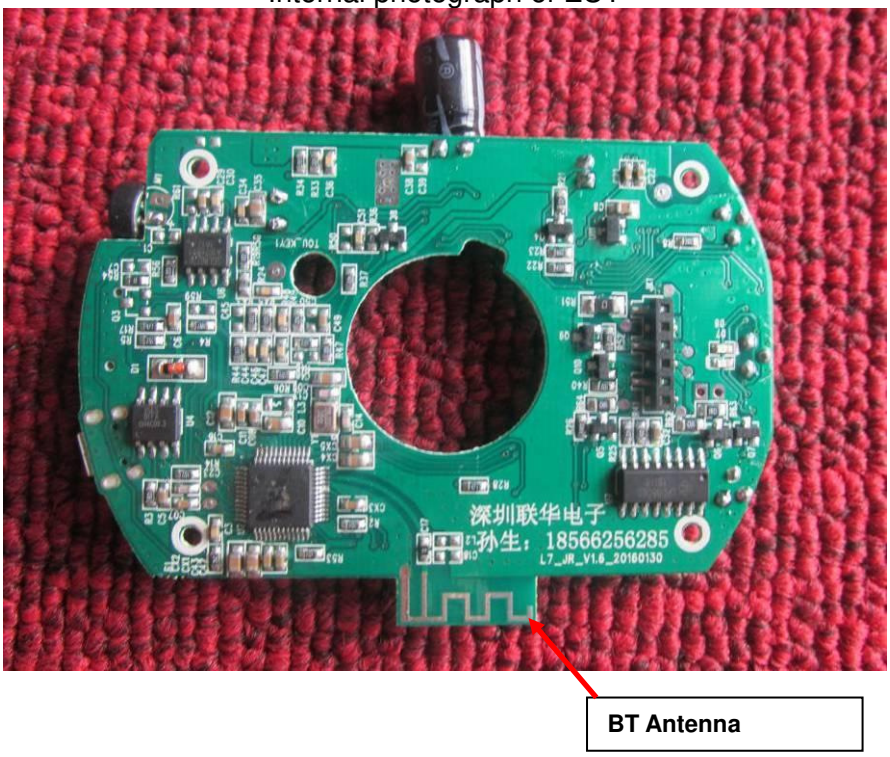
Internal photograph of EUT



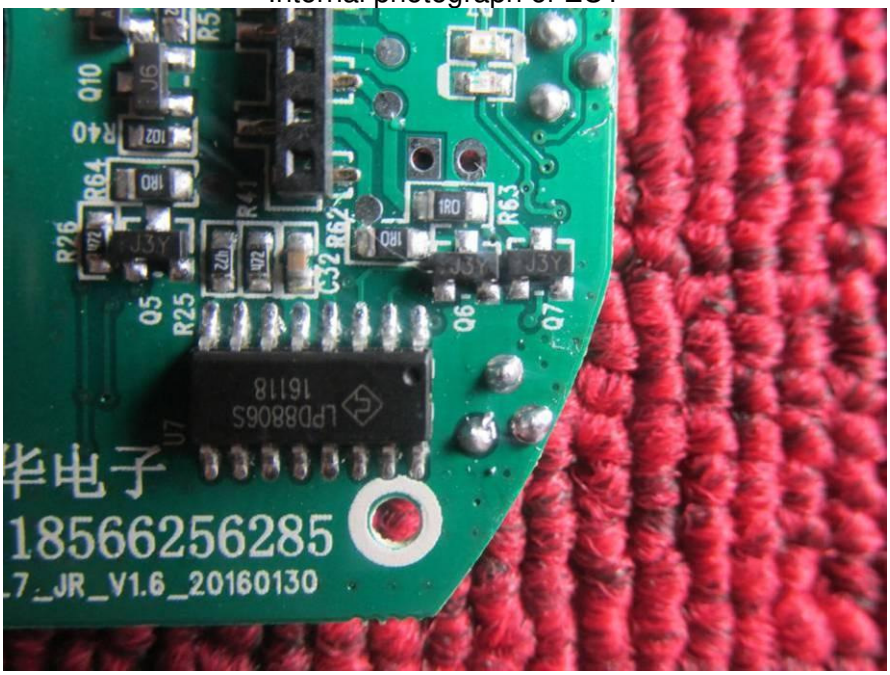
Internal photograph of EUT



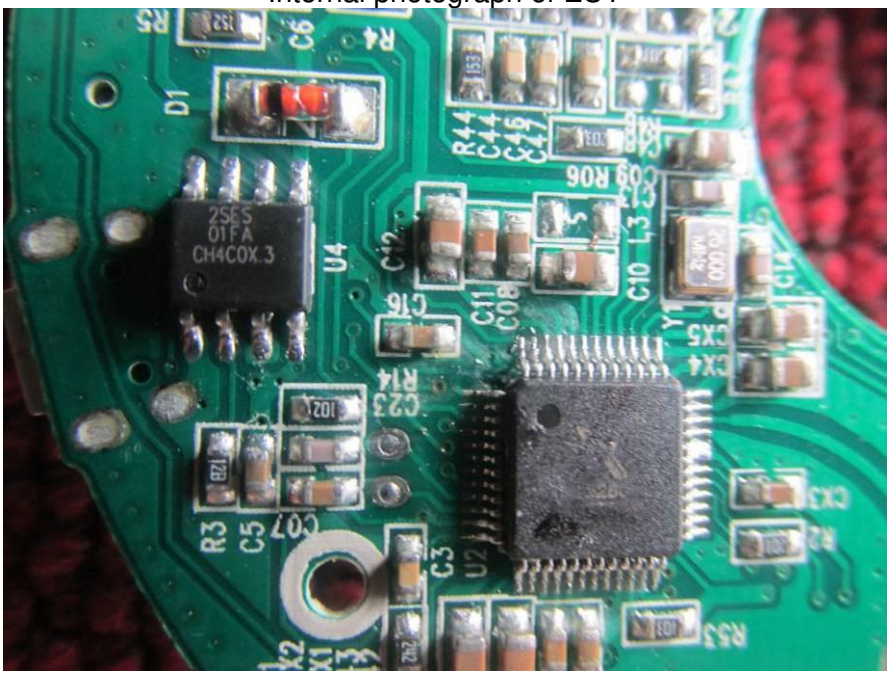
Internal photograph of EUT



Internal photograph of EUT




Internal photograph of EUT



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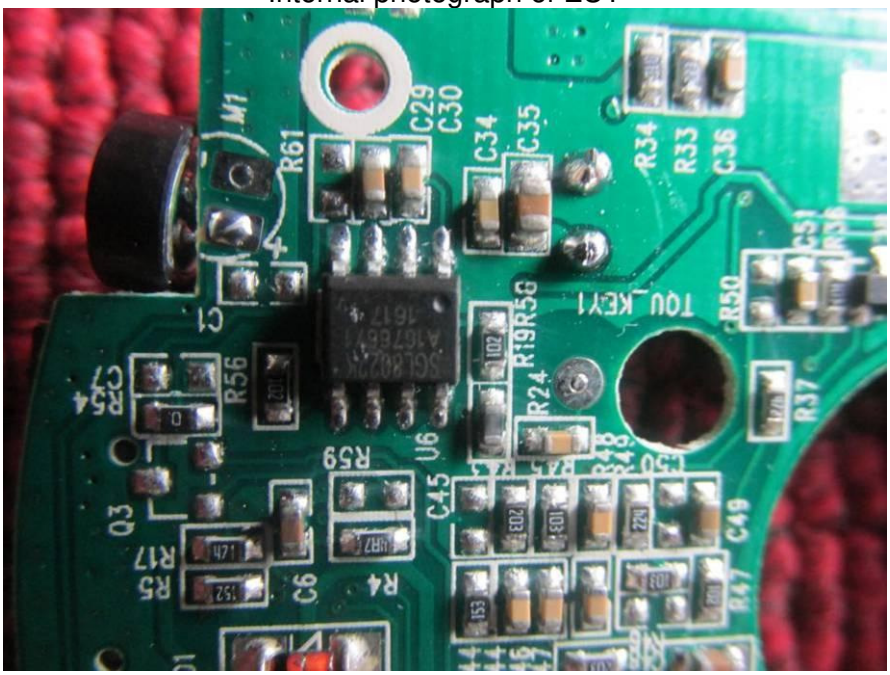
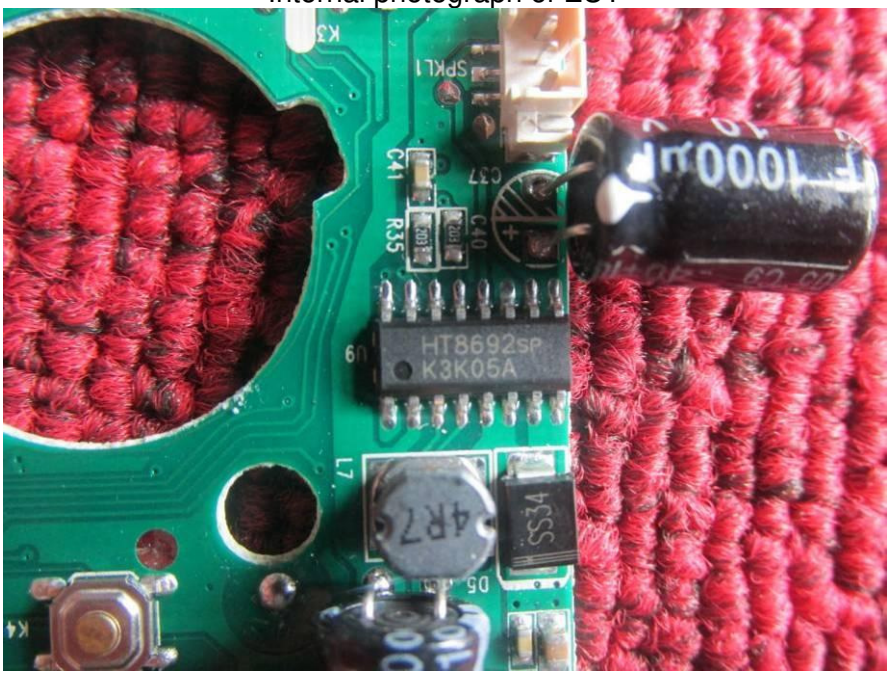
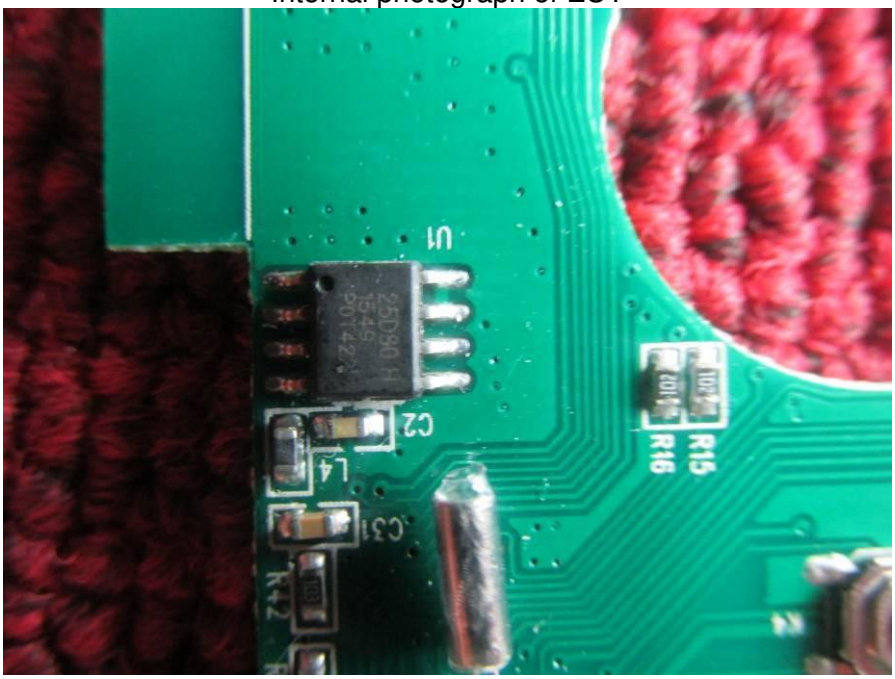



Internal photograph of EUT



Internal photograph of EUT




**---END OF REPORT---**