# Test Report

**FCC Part15 Subpart C**

| | | |
|---|---|---|
| Product Name | : | Zipp Mini |
| Model No. | : | LTH200 |
| FCC ID | : | Y2SLTH200 |
| IC | : | 9452A-LTH200 |

| | | |
|---|---|---|
| Applicant | : | LIBRATONE A/S |
| Address | : | Marielundvej 43A, DK-2730 Herlev, Denmark |

| | | |
|---|---|---|
| Date of Receipt | : | Jun. 25, 2015 |
| Test Date | : | Jun. 25, 2015~ Aug. 14, 2015 |
| Issued Date | : | Aug. 21, 2015 |
| Report No. | : | 1560642R-RF-US-P06V01 |
| Report Version | : | V 1.1 |

# Test Report Certification

Issued Date : Aug. 21, 2015
Report No. : 1560642R-RF-US-P06V01

QuieTek
a DEKRA company

| | | |
|---|---|---|
| Product Name | : | Zipp Mini |
| Applicant | : | LIBRATONE A/S |
| Address | : | Marielundvej 43A, DK-2730 Herlev, Denmark |
| Manufacturer | : | Goertek Inc |
| Address | : | No 268 Dongfang Rd., New&high-tech Industry Development Zone Weifang Shandong Province 261031, PRC. |
| Model No. | : | LTH200 |
| FCC ID | : | Y2SLTH200 |
| IC | : | 9452A-LTH200 |
| EUT Voltage | : | AC 100~240V, 50/60Hz, 1.0A |
| Brand Name | : | LIBRATONE |
| Applicable Standard | : | FCC CFR Title 47 Part 15 Subpart C: 2015<br>ANSI C63.4: 2014; ANSI C63.10: 2013<br>Industry Canada RSS-Gen Issue 4/RSS-247 Issue 1 |
| Test Result | : | Complied |
| Performed Location | : | Suzhou EMC Laboratory<br>No.99 Hongye Rd., Suzhou Industrial Park Loufeng Hi-Tech Development Zone., Suzhou, China<br>TEL: +86-512-6251-5088 / FAX: +86-512-6251-5098<br>FCC Registration Number: 800392; IC Lab Code: 4075B |

| | | |
|---|---|---|
| Documented By | : | Elaine Wang Senior Engineer |
| Reviewed By | : | Harry Zhao RF Engineering Manager |
| Approved By | : | Dream Cao Director |

## Laboratory Information

We, **QuieTek Corporation,** are an independent EMC and safety consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted(audited or listed) by the following related bodies in compliance with ISO 17025, EN 45001 and specified testing scope:

| | | |
|---|---|---|
| **Taiwan R.O.C.** | **:** | **BSMI, NCC** |
| **USA** | **:** | **FCC** |
| **Japan** | **:** | **VCCI** |
| **China** | **:** | **CNAS** |

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If you have any comments, Please don't hesitate to contact us. Our contact information is as below:

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## History of This Test Report

| REPORT NO. | VERSION | DESCRIPTION | ISSUED DATE |
|---|---|---|---|
| 1560642R-RF-US-P06V01 | V1.0 | Initial Issued Report | Aug. 17, 2015 |
| 1560642R-RF-US-P06V01 | V1.1 | Changed EUT voltage | Aug. 21, 2015 |
| | | | |
| | | | |

# 1. General Information

## 1.1. EUT Description

| | |
|---|---|
| Product Name | Zipp Mini |
| Brand Name | LIBRATONE |
| Model No. | LTH200 |
| Working Voltage | AC 100~240V, 50/60Hz, 1.0A |
| Bluetooth Specification | 3.0 + Version 4.0 |
| Frequency Range | 2402- 2480 MHz |
| Channel Number | V3.0+HS: 79<br>V4.0: 40 |
| Channel Separation | V3.0+HS: 1MHz<br>V4.0: 2MHz |
| Type of Modulation | V3.0: GFSK, Pi/4 DQPSK, 8DPSK<br>V4.0: GFSK |
| Data Rate | V3.0: 1Mbps(GFSK), 2Mbps(Pi/4 DQPSK), 3Mbps (8DPSK)<br>V4.0: 1Mbps |
| Antenna Type | Reference to Antenna List |
| Peak Antenna Gain | Reference to Antenna List |

| Bluetooth Working Frequency of Each Channel: (For V3.0) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
| 00 | 2402 MHz | 01 | 2403 MHz | 02 | 2404 MHz | 03 | 2405 MHz |
| 04 | 2406 MHz | 05 | 2407 MHz | 06 | 2408 MHz | 07 | 2409 MHz |
| 08 | 2410 MHz | 09 | 2411 MHz | 10 | 2412 MHz | 11 | 2413 MHz |
| 12 | 2414 MHz | 13 | 2415 MHz | 14 | 2416 MHz | 15 | 2417 MHz |
| 16 | 2418 MHz | 17 | 2419 MHz | 18 | 2420 MHz | 19 | 2421 MHz |
| 20 | 2422 MHz | 21 | 2423 MHz | 22 | 2424 MHz | 23 | 2425 MHz |
| 24 | 2426 MHz | 25 | 2427 MHz | 26 | 2428 MHz | 27 | 2429 MHz |
| 28 | 2430 MHz | 29 | 2431 MHz | 30 | 2432 MHz | 31 | 2433 MHz |
| 32 | 2434 MHz | 33 | 2435 MHz | 34 | 2436 MHz | 35 | 2437 MHz |
| 36 | 2438 MHz | 37 | 2439 MHz | 38 | 2440 MHz | 39 | 2441 MHz |
| 40 | 2442 MHz | 41 | 2443 MHz | 42 | 2444 MHz | 43 | 2445 MHz |
| 44 | 2446 MHz | 45 | 2447 MHz | 46 | 2448 MHz | 47 | 2449 MHz |
| 48 | 2450 MHz | 49 | 2451 MHz | 50 | 2452 MHz | 51 | 2453 MHz |
| 52 | 2454 MHz | 53 | 2455 MHz | 54 | 2456 MHz | 55 | 2457 MHz |
| 56 | 2458 MHz | 57 | 2459 MHz | 58 | 2460 MHz | 59 | 2461 MHz |
| 60 | 2462 MHz | 61 | 2463 MHz | 62 | 2464 MHz | 63 | 2465 MHz |
| 64 | 2466 MHz | 65 | 2467 MHz | 66 | 2468 MHz | 67 | 2469 MHz |
| 68 | 2470 MHz | 69 | 2471 MHz | 70 | 2472 MHz | 71 | 2473 MHz |
| 72 | 2474 MHz | 73 | 2475 MHz | 74 | 2476 MHz | 75 | 2477 MHz |
| 76 | 2478 MHz | 77 | 2479 MHz | 78 | 2480 MHz | N/A | N/A |

| Bluetooth Working Frequency of Each Channel: (For V4.0) | | | | | | | |
|---|---|---|---|---|---|---|---|
| Channel | Frequency | Channel | Frequency | Channel | Frequency | Channel | Frequency |
| 00 | 2402 MHz | 01 | 2404 MHz | 02 | 2406 MHz | 03 | 2408 MHz |
| 04 | 2410 MHz | 05 | 2412 MHz | 06 | 2414 MHz | 07 | 2416 MHz |
| 08 | 2418 MHz | 09 | 2420 MHz | 10 | 2422 MHz | 11 | 2424 MHz |
| 12 | 2426 MHz | 13 | 2428 MHz | 14 | 2430 MHz | 15 | 2432 MHz |
| 16 | 2434 MHz | 17 | 2436 MHz | 18 | 2438 MHz | 19 | 2440 MHz |
| 20 | 2442 MHz | 21 | 2444 MHz | 22 | 2446 MHz | 23 | 2448 MHz |
| 24 | 2450 MHz | 25 | 2452 MHz | 26 | 2454 MHz | 27 | 2456 MHz |
| 28 | 2458 MHz | 29 | 2460 MHz | 30 | 2462 MHz | 31 | 2464 MHz |
| 32 | 2466 MHz | 33 | 2468 MHz | 34 | 2470 MHz | 35 | 2472 MHz |
| 36 | 2474 MHz | 37 | 2476 MHz | 38 | 2478 MHz | 39 | 2480 MHz |

**Bluetooth Antenna List**

| Antenna | Manufacturer | Model No. | Peak Gain |
|---|---|---|---|
| PIFA Antenna | Goertek | N/A | 1.2dBi for 2.4GHz |

## 1.1. Mode of Operation

QuieTek has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

| Test Mode |
|---|
| Mode 1: Transmitter-1Mbps(GFSK_DH5) |
| Mode 2: Transmitter-2Mbps(Pi/4 DQPSK_DH5) |
| Mode 3: Transmitter-3Mbps(8DPSK_DH5) |

Note:

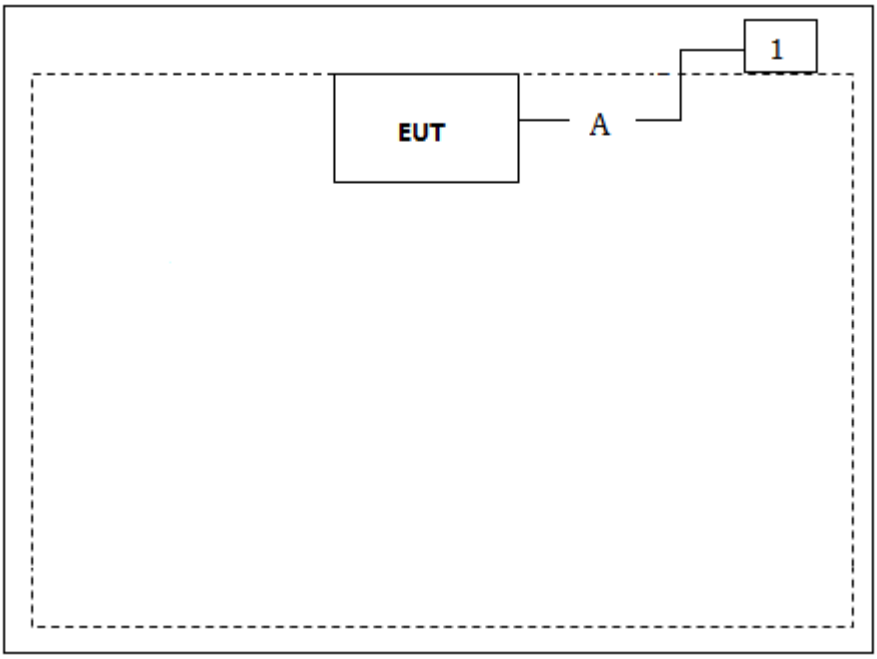
1. Regards to the frequency band operation: the lowest、middle and highest frequency of channel were selected to perform the test, then shown on this report.
2. For portable device, radiated spurious emission was verified over X, Y, Z axis, and shown the worst case on this report.

## 1.2. Tested System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

| | Product | Manufacturer | Model No. | Serial No. | Power Cord |
|---|---|---|---|---|---|
| 1 | Notebook | Asus | N80V | 8BN0AS226971468 | N/A |

## 1.3. Configuration of Tested System

| Connection Diagram |
|---|
|  |



| Signal Cable Type | | Signal cable Description |
|---|---|---|
| A | Serial Cable | Control cable via test jig board |

## 1.4. EUT Exercise Software

| | |
|---|---|
| 1 | Setup the EUT and simulators as shown on above. |
| 2 | Turn on the power of all equipment. |
| 3 | Input the RF commands, and set the test mode and channel, then press OK to start continue Transmit. |

## 2. Technical Test

### 2.1. Summary of Test Result

☒ No deviations from the test standards

☐ Deviations from the test standards as below description:

| Performed Test Item | Normative References | Test Performed | Deviation |
|---|---|---|---|
| Conducted Emission | FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.207 | Yes | No |
| Radiated Emission | FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.209 | Yes | No |
| 20dB Bandwidth | FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.247(a)(1) | Yes | No |
| Carrier Frequency Separation | FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.247(a)(1) | Yes | No |
| Number of Hopping Frequencies | FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.247(a)(1)(iii) | Yes | No |
| Time of Occupancy (Dwell Time) | FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.247(a)(1)(iii) | Yes | No |
| Peak Output Power | FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.247(b)(1) | Yes | No |
| Band-edge Compliance of RF Conducted Emissions | FCC CFR Title 47 Part 15 Subpart C: 2015 Section 15.215(c), 15.247(d) | Yes | No |
| Spurious RF Conducted Emissions | FCC CFR Title 47 Part 15 Subpart C: 2015 15.247(d) | Yes | No |
| Radiated Emission Band Edge | FCC CFR Title 47 Part 15 Subpart C: 2015 15.247(d) | Yes | No |

| Performed Test Item | Normative References | Test Performed | Deviation |
|---|---|---|---|
| Conducted Emission | RSS-Gen Issue 4 November 2014<br>Section 8.8 | Yes | No |
| Radiated Emission | RSS-247 Issue 1 May 2015<br>Section 5.5 | Yes | No |
| RF Antenna Conducted Spurious | RSS-247 Issue 1 May 2015<br>Section 5.5 | Yes | No |
| Radiated Emission Band Edge | RSS-Gen Issue 4 November 2014<br>Section 8.10 | Yes | No |
| Occupied Bandwidth | RSS-Gen Issue 4 November 2014<br>Section 6.6<br>RSS-247 Issue 1 May 2015<br>Section 5.2 | Yes | No |
| Power Output | RSS-247 Issue 1 May 2015<br>Section 5.4 | Yes | No |

## 2.2. Test Environment

| Items | Required (IEC 68-1) | Actual |
|---|---|---|
| Temperature (°C) | 15-35 | 21 |
| Humidity (%RH) | 25-75 | 50 |
| Barometric pressure (mbar) | 860-1060 | 950-1000 |

# 3. Conducted Emission

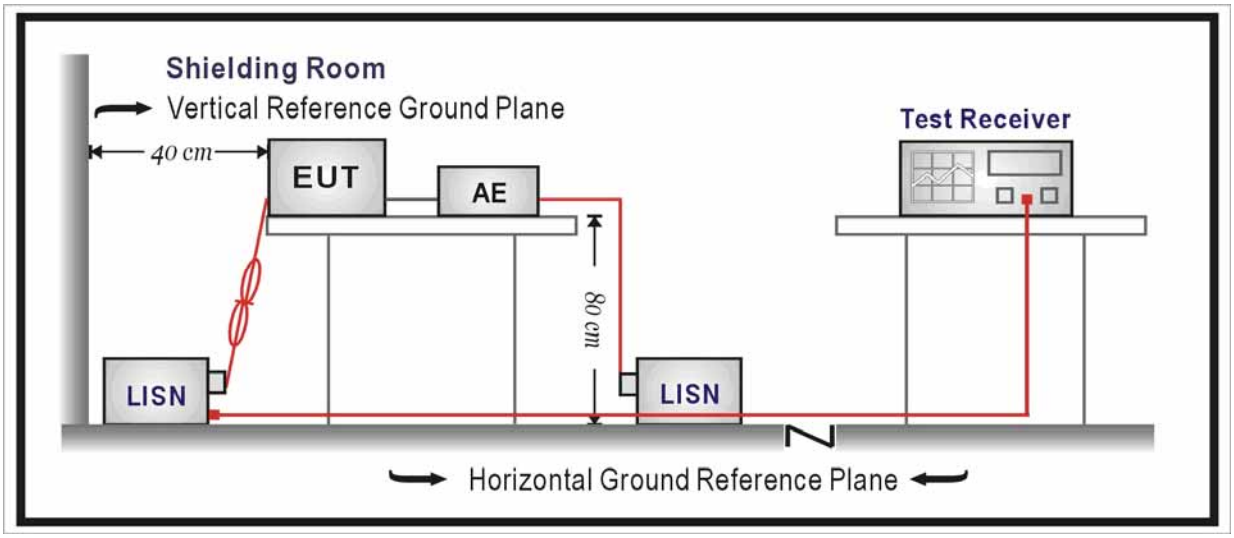
## 3.1. Test Equipment

Conducted Emission / TR-1

| Instrument | Manufacturer | Type No. | Serial No. | Cal. Due Date |
|---|---|---|---|---|
| EMI Test Receiver | R&S | ESCI | 100726 | 2016.03.10 |
| Two-Line V-Network | R&S | ENV216 | 100043 | 2016.03.10 |
| Two-Line V-Network | R&S | ENV216 | 100044 | 2015.09.16 |
| 50ohm Coaxial Switch | Anritsu | MP59B | 6200464462 | 2016.03.01 |
| 50ohm Termination | SHX | TF2 | 07081401 | 2015.09.16 |
| Temperature/Humidity Meter | zhicheng | ZC1-2 | TR1-TH | 2016.01.07 |

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

## 3.2. Test Setup



## 3.3. Limit

| FCC Part 15 Subpart C Paragraph 15.207 Limits | | |
|---|---|---|
| Frequency (MHz) | QP (dBuV) | AV (dBuV) |
| 0.15 - 0.50 | 66 - 56 | 56 - 46 |
| 0.50 - 5.0 | 56 | 46 |
| 5.0 - 30 | 60 | 50 |

Note 1: The lower limit shall apply at the transition frequencies.

Note 2: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.

## 3.4. Test Procedure

According to FCC ANSI C63.4: 2014 & ANSI C63.10: 2013.

The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs)

Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

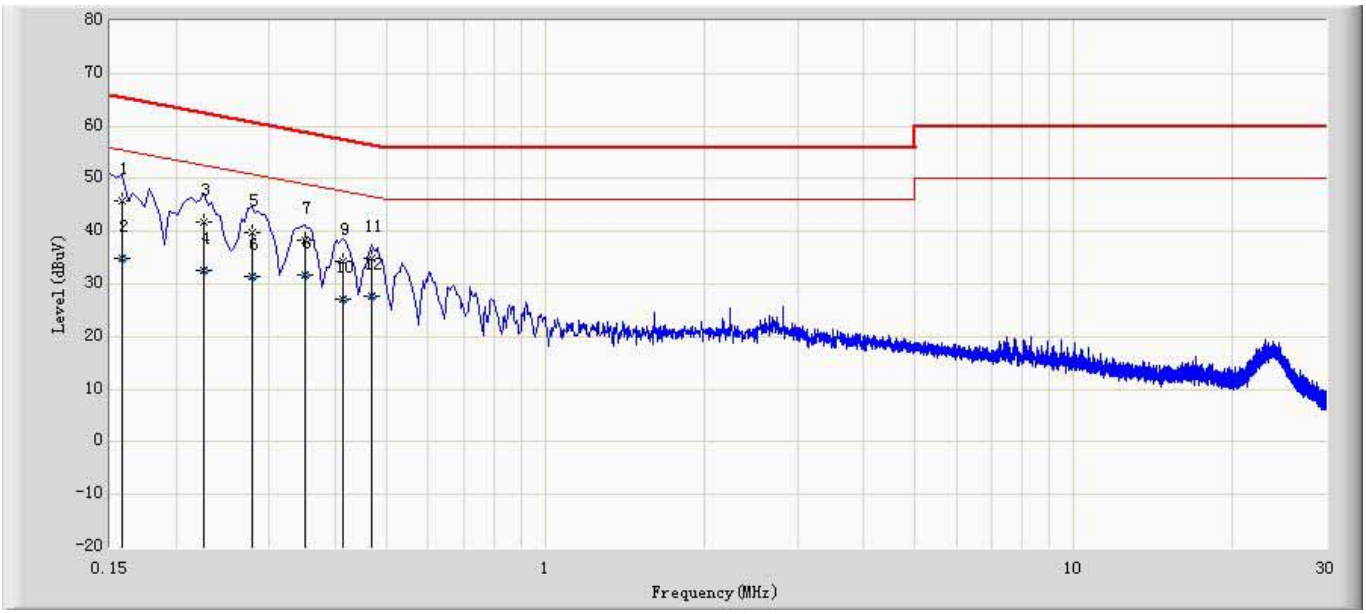
Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

## 3.5. Uncertainty

The measurement uncertainty is defined as ± 2.02 dB

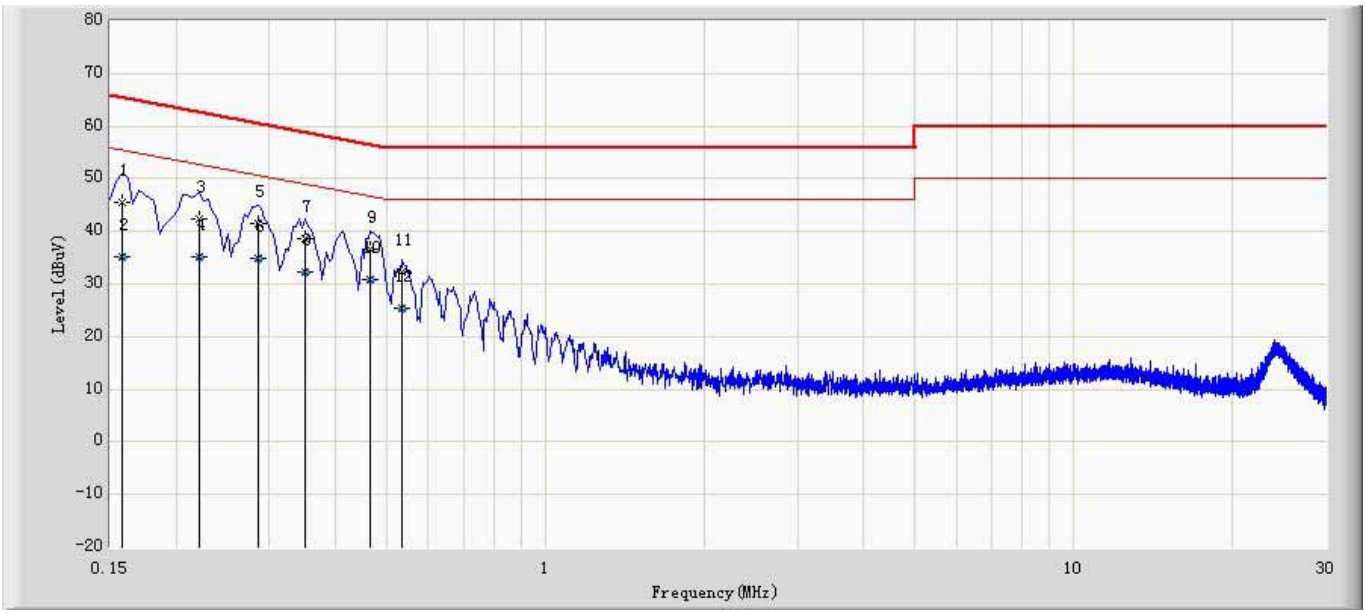
## 3.6. Test Result

| | |
|---|---|
| Engineer: Scott | |
| Site: TR5 | Time: 2015/07/05 - 10:25 |
| Limit: FCC_Part15.207_CE_AC Power_ClassB | Margin: 0 |
| Probe: ENV216_101044(0.009-30MHz) | Polarity: Line |
| EUT: Zipp Mini | Power: AC 120V/60Hz |
| Note: Mode 1 | |




| No | Mark | Frequency (MHz) | Measure Level (dBuV) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV) | Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | * | 0.158 | 45.878 | 36.147 | -19.690 | 65.568 | 9.731 | QP |
| 2 | | 0.158 | 35.026 | 25.295 | -20.542 | 55.568 | 9.731 | AV |
| 3 | | 0.226 | 41.807 | 32.097 | -20.788 | 62.595 | 9.710 | QP |
| 4 | | 0.226 | 32.474 | 22.764 | -20.121 | 52.595 | 9.710 | AV |
| 5 | | 0.278 | 39.742 | 30.042 | -21.133 | 60.875 | 9.700 | QP |
| 6 | | 0.278 | 31.413 | 21.713 | -19.462 | 50.875 | 9.700 | AV |
| 7 | | 0.350 | 38.360 | 28.660 | -20.602 | 58.962 | 9.700 | QP |
| 8 | | 0.350 | 31.843 | 22.143 | -17.119 | 48.962 | 9.700 | AV |
| 9 | | 0.414 | 34.291 | 24.588 | -23.277 | 57.568 | 9.703 | QP |
| 10 | | 0.414 | 27.224 | 17.521 | -20.344 | 47.568 | 9.703 | AV |
| 11 | | 0.470 | 34.744 | 25.044 | -21.770 | 56.514 | 9.700 | QP |
| 12 | | 0.470 | 27.797 | 18.097 | -18.717 | 46.514 | 9.700 | AV |

| | |
|---|---|
| Engineer: Scott | |
| Site: TR5 | Time: 2015/07/05 - 10:31 |
| Limit: FCC_Part15.207_CE_AC Power_ClassB | Margin: 0 |
| Probe: ENV216_101044(0.009-30MHz) | Polarity: Neutral |
| EUT: Zipp Mini | Power: AC 120V/60Hz |
| Note: Mode 1 | |




| No | Mark | Frequency (MHz) | Measure Level (dBuV) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV) | Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | * | 0.158 | 45.637 | 35.906 | -19.931 | 65.568 | 9.731 | QP |
| 2 | | 0.158 | 35.275 | 25.544 | -20.293 | 55.568 | 9.731 | AV |
| 3 | | 0.222 | 42.216 | 32.496 | -20.528 | 62.744 | 9.720 | QP |
| 4 | | 0.222 | 35.195 | 25.475 | -17.549 | 52.744 | 9.720 | AV |
| 5 | | 0.286 | 41.441 | 31.731 | -19.199 | 60.640 | 9.710 | QP |
| 6 | | 0.286 | 34.955 | 25.245 | -15.685 | 50.640 | 9.710 | AV |
| 7 | | 0.350 | 38.602 | 28.896 | -20.360 | 58.962 | 9.706 | QP |
| 8 | | 0.350 | 32.237 | 22.531 | -16.725 | 48.962 | 9.706 | AV |
| 9 | | 0.466 | 36.704 | 27.004 | -19.881 | 56.585 | 9.700 | QP |
| 10 | | 0.466 | 30.764 | 21.064 | -15.821 | 46.585 | 9.700 | AV |
| 11 | | 0.534 | 32.360 | 22.660 | -23.640 | 56.000 | 9.700 | QP |
| 12 | | 0.534 | 25.341 | 15.641 | -20.659 | 46.000 | 9.700 | AV |

Note: All the test modes are pretested and mode 1 was found to be the worst mode, so the data of this test mode was recorded.

# 4. Radiated Emission

## 4.1. Test Equipment

Radiated Emission / AC-2

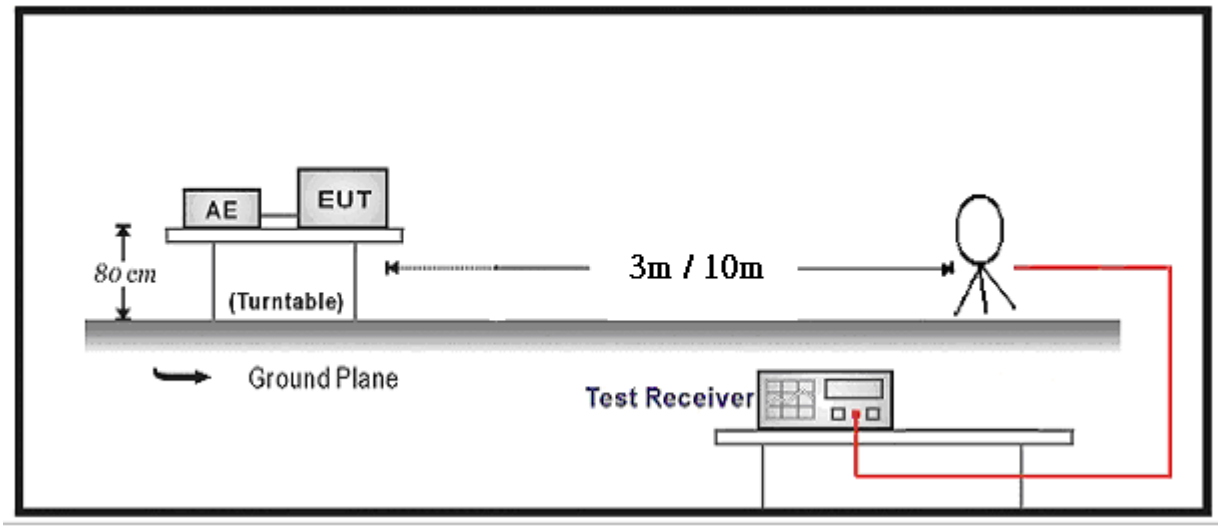
| Instrument | Manufacturer | Type No. | Serial No. | Cal. Due Date |
|---|---|---|---|---|
| EMI Test Receiver | R&S | ESCI | 100573 | 2016.03.10 |
| Loop Antenna | R&S | HFH2-Z2 | 833799/003 | 2015.11.25 |
| Bilog Antenna | Teseq GmbH | CBL6112D | 27611 | 2015.10.10 |
| Coaxial Cable | Huber+Suhner | SUCOFLEX 106 | AC2-C | 2016.03.01 |
| Temperature/Humidity Meter | Zhicheng | ZC1-2 | AC2-TH | 2016.01.07 |

Radiated Emission / AC-5

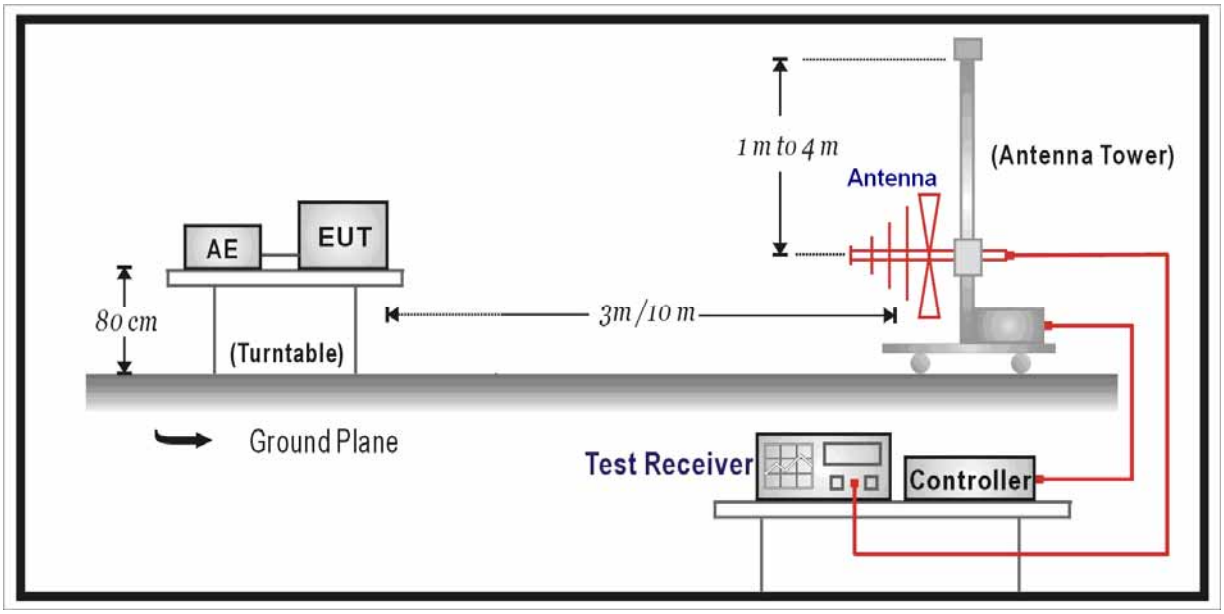
| Instrument | Manufacturer | Type No. | Serial No. | Cal. Due Date |
|---|---|---|---|---|
| Spectrum Analyzer | Agilent | N9010A | MY48030494 | 2016.03.10 |
| Preamplifier | Miteq | NSP1800-25 | 1364185 | 2016.05.03 |
| Preamplifier | QuieTek | AP-040G | CHM-0906001 | 2016.05.03 |
| Bilog Antenna | Teseq GmbH | CBL6112D | 27612 | 2015.10.15 |
| Broad-Band Horn Antenna | Schwarzbeck | BBHA9120D | 499 | 2015.06.08 |
| Broad-Band Horn Antenna | Schwarzbeck | BBHA9170 | 294 | 2016.04.10 |
| Coaxial Cable | Huber+Suhner | SUCOFLEX 106 | AC5-C1 | 2016.03.01 |
| Coaxial Cable | Huber+Suhner | SUCOFLEX 106 | AC5-C2 | 2016.03.01 |
| Coaxial Cable | Huber+Suhner | SUCOFLEX 102 | AC5-C3 | 2016.03.01 |
| Temperature/Humidity Meter | Zhicheng | ZC1-2 | AC5-TH | 2016.01.07 |

## 4.2. Test Setup

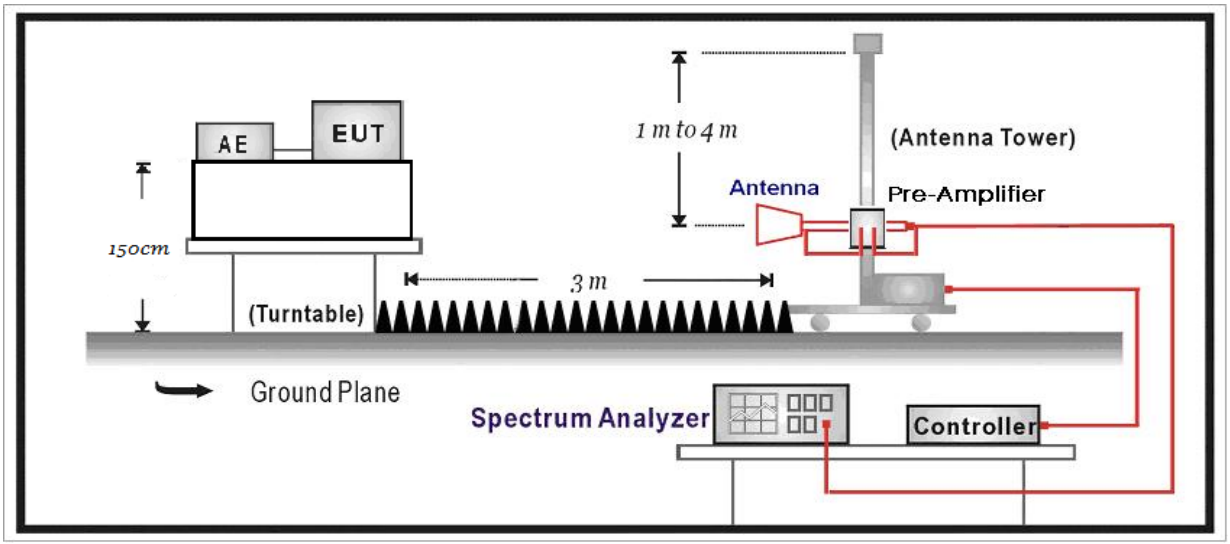
Below 30MHz Test Setup:




Below 1GHz Test Setup:



Above 1GHz Test Setup:




## 4.3. Limit

| FCC Part 15 Subpart C Paragraph 15.209 | | |
|---|---|---|
| Frequency (MHz) | Distance (m) | Level (dBuV/m) |
| 30 - 88 | 3 | 40 |
| 88 - 216 | 3 | 43.5 |
| 216 - 960 | 3 | 46 |
| Above 960 | 3 | 54 |

Note 1: The lower limit shall apply at the transition frequency.

Note 2: Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

Note 3: E field strength (dBuV/m) = 20 log E field strength (uV/m)

## 4.4. Test Procedure

According to ANSI C63.4: 2014; ANSI C63.10: 2013.

The EUT is placed on a turn table which is 1.5 meter for above 1G and 0.8 meter for below 1G above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level.

This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4: 2014 on radiated measurement.

The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

The frequency range from 30MHz to 10th harmonic is checked.

Note: When doing emission measurement above 1GHz, the horn antenna will be bended down a little (as horn antenna has the narrow beamwidth) in order to keeping the antenna in the “cone of radiation” of EUT. The 3dB beamwidth is 60~10 degrees for H-plane and 90~10 degrees for E-plane.

## 4.5. Uncertainty

The measurement uncertainty above 1G is defined as ± 3.9 dB

below 1G is defined as ± 3.8 dB

## 4.6. Test Result

All of the test result shown indicates the worst case, and spectrum analyzer parameters setting as shown below:

Peak detector: RBW = 1MHz, VBW = 3MHz, sweep time = 200ms;

Average detector: RBW = 1MHz, VBW = 10Hz, sweep time = auto.

Measure Level = Reading Level + Cable Loss + Antenna Factor – Preamplifier Gain

Mode 1: Transmitter-1Mbps(GFSK_DH5)

| CH | Antenna | Frequency (MHz) | Reading Level (dBuV/m) | Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|---|
| 0 | H | 4799.5 | 37.4 | 7.7 | 45.1 | 54(Note3) | -8.9 | PK |
| | V | 4799.5 | 39.3 | 7.7 | 47.0 | 54(Note3) | -7.0 | PK |
| | H | 7206.0 | 29.9 | 12.6 | 42.6 | 54(Note3) | -11.4 | PK |
| | V | 7206.0 | 28.2 | 12.6 | 40.8 | 54(Note3) | -13.2 | PK |
| | H | 9608.0 | 26.5 | 15.1 | 41.6 | 54(Note3) | -12.4 | PK |
| | V | 9608.0 | 26.6 | 15.1 | 41.7 | 54(Note3) | -12.3 | PK |
| 39 | H | 4884.5 | 37.0 | 7.8 | 44.8 | 54(Note3) | -9.2 | PK |
| | V | 4884.5 | 37.7 | 7.8 | 45.5 | 54(Note3) | -8.5 | PK |
| | H | 7323.0 | 28.8 | 12.9 | 41.7 | 54(Note3) | -12.3 | PK |
| | V | 7323.0 | 28.9 | 12.9 | 41.8 | 54(Note3) | -12.2 | PK |
| | H | 9764.0 | 26.7 | 15.4 | 42.1 | 54(Note3) | -11.9 | PK |
| | V | 9764.0 | 27.2 | 15.4 | 42.6 | 54(Note3) | -11.4 | PK |
| 78 | H | 4961.0 | 33.9 | 7.9 | 41.8 | 54(Note3) | -12.2 | PK |
| | V | 4961.0 | 35.6 | 7.9 | 43.5 | 54(Note3) | -10.5 | PK |
| | H | 7440.0 | 29.7 | 13.3 | 43.0 | 54(Note3) | -11.0 | PK |
| | V | 7440.0 | 28.9 | 13.3 | 42.2 | 54(Note3) | -11.8 | PK |
| | H | 9920.0 | 26.0 | 14.9 | 40.9 | 54(Note3) | -13.1 | PK |
| | V | 9920.0 | 26.6 | 14.9 | 41.5 | 54(Note3) | -12.5 | PK |

Note: 1. Measure Level = Reading Level + Factor.

2. The test frequency range, 9kHz~30MHz, 18GHz~25GHz, both of the worst case are at least 6dB below the limits, therefore no data appear in the report.

3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

Mode 2: Transmitter-2Mbps(Pi/4 DQPSK _DH5)

| CH | Antenna | Frequency (MHz) | Reading Level (dBuV/m) | Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|---|
| 0 | H | 4799.5 | 38.3 | 7.7 | 46.0 | 54(Note3) | -8.0 | PK |
| | V | 4808.0 | 36.3 | 7.7 | 44.0 | 54(Note3) | -10.0 | PK |
| | H | 7206.0 | 29.1 | 12.6 | 41.7 | 54(Note3) | -12.3 | PK |
| | V | 7206.0 | 28.0 | 12.6 | 40.6 | 54(Note3) | -13.4 | PK |
| | H | 9608.0 | 26.4 | 15.1 | 41.5 | 54(Note3) | -12.5 | PK |
| | V | 9608.0 | 26.3 | 15.1 | 41.4 | 54(Note3) | -12.6 | PK |
| 39 | H | 4884.5 | 33.9 | 7.8 | 41.7 | 54(Note3) | -12.3 | PK |
| | V | 4884.5 | 36.1 | 7.8 | 43.9 | 54(Note3) | -10.1 | PK |
| | H | 7323.0 | 28.7 | 12.9 | 41.6 | 54(Note3) | -12.4 | PK |
| | V | 7323.0 | 28.6 | 12.9 | 41.5 | 54(Note3) | -12.5 | PK |
| | H | 9764.0 | 27.1 | 15.4 | 42.5 | 54(Note3) | -11.5 | PK |
| | V | 9764.0 | 27.8 | 15.4 | 43.2 | 54(Note3) | -10.8 | PK |
| 78 | H | 4961.0 | 33.0 | 7.9 | 40.9 | 54(Note3) | -13.1 | PK |
| | V | 4961.0 | 34.5 | 7.9 | 42.4 | 54(Note3) | -11.6 | PK |
| | H | 7440.0 | 29.3 | 13.3 | 42.6 | 54(Note3) | -11.4 | PK |
| | V | 7440.0 | 28.8 | 13.3 | 42.1 | 54(Note3) | -11.9 | PK |
| | H | 9920.0 | 26.6 | 14.9 | 41.5 | 54(Note3) | -12.5 | PK |
| | V | 9920.0 | 26.3 | 14.9 | 41.2 | 54(Note3) | -12.8 | PK |

Note: 1. Measure Level = Reading Level + Factor.

2. The test frequency range, 9kHz~30MHz, 18GHz~25GHz, both of the worst case are at least 6dB below the limits, therefore no data appear in the report.

3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

Mode 3: Transmitter-3Mbps(8DPSK_DH5)

| CH | Antenna | Frequency (MHz) | Reading Level (dBuV/m) | Factor (dB) | Measure Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Detector |
|---|---|---|---|---|---|---|---|---|
| 0 | H | 4808.0 | 36.2 | 7.7 | 43.9 | 54(Note3) | -10.1 | PK |
| | V | 4799.5 | 38.5 | 7.7 | 46.2 | 54(Note3) | -7.8 | PK |
| | H | 7206.0 | 28.2 | 12.6 | 40.8 | 54(Note3) | -13.2 | PK |
| | V | 7206.0 | 28.1 | 12.6 | 40.7 | 54(Note3) | -13.3 | PK |
| | H | 9608.0 | 25.9 | 15.1 | 41.0 | 54(Note3) | -13.0 | PK |
| | V | 9608.0 | 26.4 | 15.1 | 41.5 | 54(Note3) | -12.5 | PK |
| 39 | H | 4884.5 | 34.4 | 7.8 | 42.2 | 54(Note3) | -11.8 | PK |
| | V | 4884.5 | 36.1 | 7.8 | 43.9 | 54(Note3) | -10.1 | PK |
| | H | 7323.0 | 27.9 | 12.9 | 40.8 | 54(Note3) | -13.2 | PK |
| | V | 7323.0 | 28.0 | 12.9 | 40.9 | 54(Note3) | -13.1 | PK |
| | H | 9764.0 | 26.3 | 15.4 | 41.7 | 54(Note3) | -12.3 | PK |
| | V | 9764.0 | 27.5 | 15.4 | 42.9 | 54(Note3) | -11.1 | PK |
| 78 | H | 4960.0 | 32.5 | 8.0 | 40.5 | 54(Note3) | -13.5 | PK |
| | V | 4961.0 | 34.1 | 7.9 | 42.0 | 54(Note3) | -12.0 | PK |
| | H | 7440.0 | 28.9 | 13.3 | 42.2 | 54(Note3) | -11.8 | PK |
| | V | 7440.0 | 28.7 | 13.3 | 42.0 | 54(Note3) | -12.0 | PK |
| | H | 9920.0 | 26.6 | 14.9 | 41.5 | 54(Note3) | -12.5 | PK |
| | V | 9920.0 | 26.5 | 14.9 | 41.4 | 54(Note3) | -12.6 | PK |

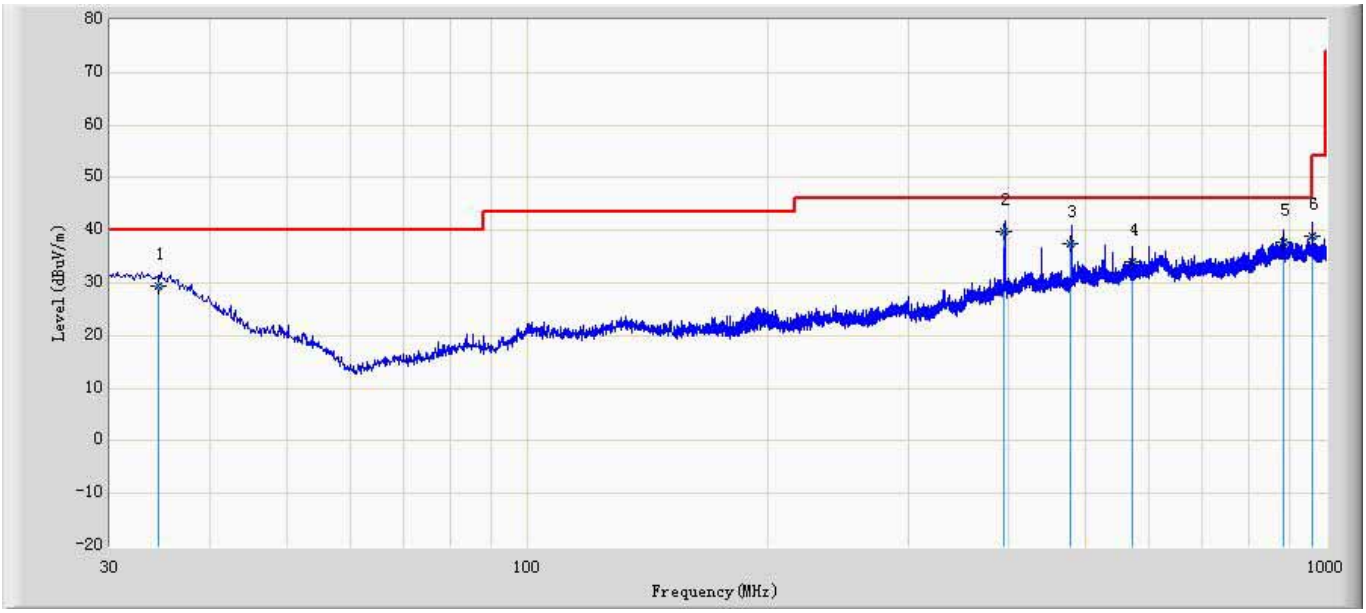
Note: 1. Measure Level = Reading Level + Factor.

2. The test frequency range, 9kHz~30MHz, 18GHz~25GHz, both of the worst case are at least 6dB below the limits, therefore no data appear in the report.

3. This limit applies for using average detector, if the test result on peak is lower than average limit, then average measurement needn't be performed.

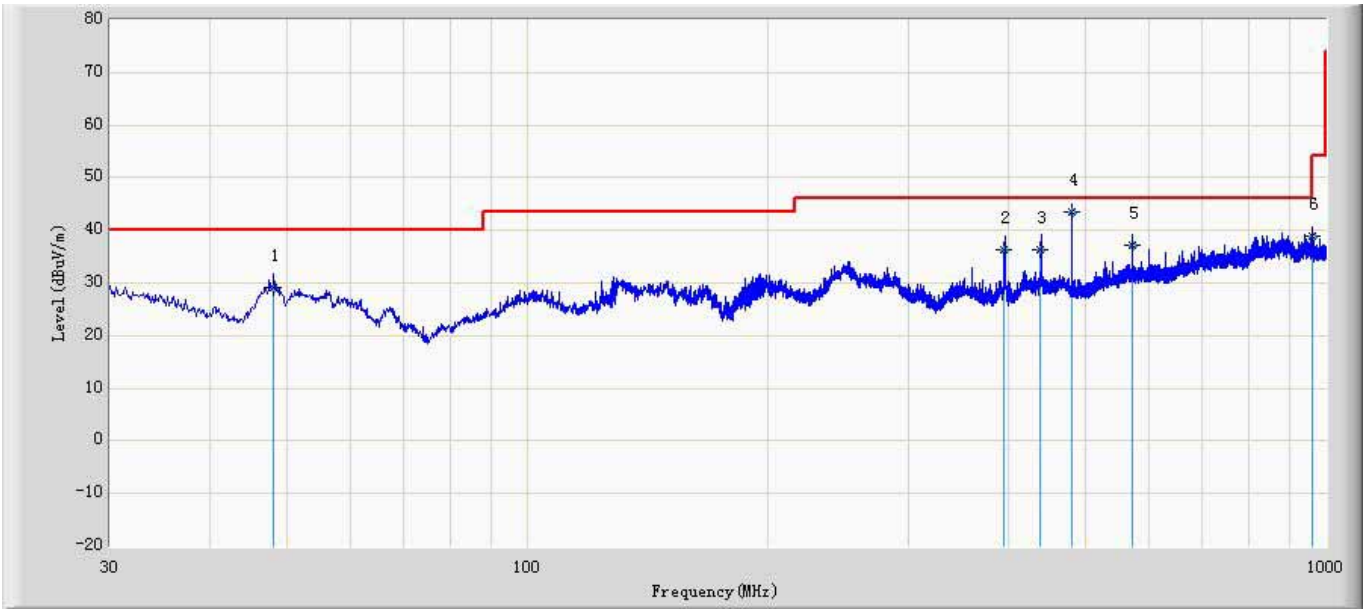
**The worst case of Radiated Emission below 1GHz:**

| | |
|---|---|
| Engineer: Scott | |
| Site: AC2 | Time: 2015/07/13 - 09:57 |
| Limit: FCC_Part15.209_RE(3m)_ClassB | Margin: 0 |
| Probe: AC2_10M(30-1000M)20150408 | Polarity: Horizontal |
| EUT: Zipp Mini | Power: AC 120V/60Hz |
| Note: Mode 1 | |




| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | | 34.525 | 29.360 | 35.711 | -10.640 | 40.000 | -6.351 | QP |
| 2 | | 395.222 | 39.765 | 44.709 | -6.235 | 46.000 | -4.944 | QP |
| 3 | | 479.220 | 37.528 | 40.440 | -8.472 | 46.000 | -2.912 | QP |
| 4 | * | 571.215 | 34.003 | 35.183 | -11.997 | 46.000 | -1.180 | QP |
| 5 | | 883.210 | 37.624 | 36.594 | -8.376 | 46.000 | 1.030 | QP |
| 6 | | 960.101 | 38.812 | 36.701 | -15.188 | 54.000 | 2.111 | QP |

| | |
|---|---|
| Engineer: Scott | |
| Site: AC2 | Time: 2015/07/13 - 09:57 |
| Limit: FCC_Part15.209_RE(3m)_ClassB | Margin: 0 |
| Probe: AC2_10M(30-1000M)20150408 | Polarity: Vertical |
| EUT: Zipp Mini | Power: AC 120 V/60Hz |
| Note: Mode 1 | |




| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | * | 48.101 | 29.235 | 42.639 | -10.765 | 40.000 | -13.404 | QP |
| 2 | | 395.615 | 36.221 | 41.155 | -9.779 | 46.000 | -4.934 | QP |
| 3 | | 439.250 | 36.359 | 40.106 | -9.641 | 46.000 | -3.747 | QP |
| 4 | | 479.991 | 43.621 | 46.521 | -2.379 | 46.000 | -2.900 | QP |
| 5 | | 571.010 | 37.184 | 38.364 | -8.816 | 46.000 | -1.180 | QP |
| 6 | | 960.215 | 38.816 | 36.704 | -15.184 | 54.000 | 2.112 | QP |

# 5. 20dB Bandwidth

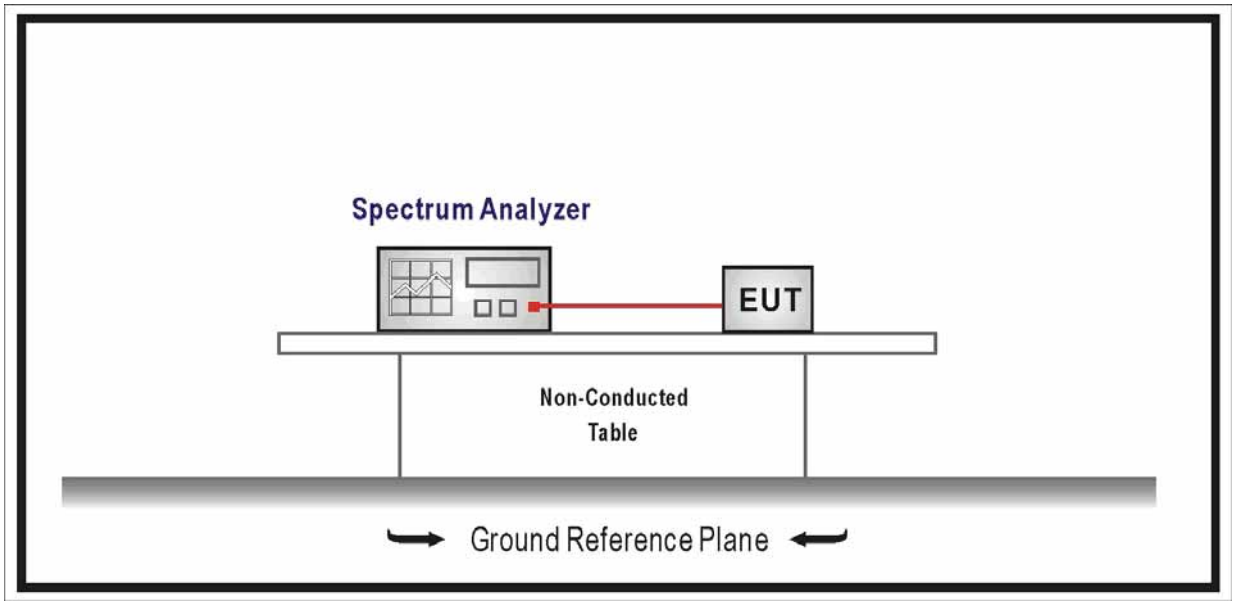
## 5.1 Test Equipment

20dB Bandwidth / TR8

| Instrument | Manufacturer | Type No. | Serial No. | Cal. Due Date |
|---|---|---|---|---|
| Spectrum Analyzer | Agilent | N9010A | MY48030494 | 2016.03.10 |
| Temperature/Humidity Meter | Zhicheng | ZC1-2 | TR8-TH | 2016.04.09 |

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

## 5.2 Test Setup




## 5.3 Limit

- For frequency hopping systems operating in 2400-2483.5 MHz band, no limitation.
- For frequency hopping systems operating in 902-928 MHz band, the maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.
- For frequency hopping systems operating in 5725-5850 MHz band, the maximum 20 dB bandwidth of the hopping channel is 1 MHz.

## 5.4 Test Procedure

According to ANSI C63.10: 2013& ANSI C63.4: 2014

Use the following spectrum analyzer settings:
Span = approximately 2 to 3 times the 20dB bandwidth, centered on a hopping channel
RBW ≧ 1% of the 20dB bandwidth
VBW ≧ RBW
Sweep = auto
Detector function = peak
Trace = max hold
The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize.
Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-Zipp Mini function to measure 20 dB down one side of the emission. Reset the marker-Zipp Mini function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-Zipp Mini reading at this point is the 20 dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

## 5.5 Uncertainty

The measurement uncertainty is defined as ± 1 kHz

## 5.6 Test Result

| | | |
|---|---|---|
| Product | : | Zipp Mini |
| Test Item | : | Occupied Bandwidth |
| Test Site | : | TR-8 |
| Test Mode | : | Mode 1: Transmitter-1Mbps (GFSK_DH5) |

| Channel No. | Frequency (MHz) | 20dB Bandwidth (kHz) | 99% Bandwidth (kHz) |
|---|---|---|---|
| 00 | 2402 | 923.8 | 866.64 |
| 39 | 2441 | 925.4 | 864.15 |
| 78 | 2480 | 927.5 | 865.25 |

**Channel 00 (2402MHz)**

**Channel 39 (2441MHz)**


**Channel 78 (2480MHz)**

| | | |
|---|---|---|
| Product | : | Zipp Mini |
| Test Item | : | Occupied Bandwidth |
| Test Site | : | TR-8 |
| Test Mode | : | Mode 2: Transmitter-2Mbps (Pi/4 DQPSK_DH5) |

| Channel No. | Frequency (MHz) | 20dB Bandwidth (kHz) | 99% Bandwidth (kHz) |
|---|---|---|---|
| 00 | 2402 | 1237 | 1169.8 |
| 39 | 2441 | 1230 | 1170.8 |
| 78 | 2480 | 1313 | 1179.0 |

**Channel 00 (2402MHz)**

**Channel 39 (2441MHz)**


**Channel 78 (2480MHz)**

| | | |
|---|---|---|
| Product | : | Zipp Mini |
| Test Item | : | Occupied Bandwidth |
| Test Site | : | TR-8 |
| Test Mode | : | Mode 3: Transmitter-3Mbps (8DPSK_DH5) |

| Channel No. | Frequency (MHz) | 20dB Bandwidth (kHz) | 99% Bandwidth (kHz) |
|---|---|---|---|
| 00 | 2402 | 1281 | 1183.6 |
| 39 | 2441 | 1262 | 1168.1 |
| 78 | 2480 | 1278 | 1194.1 |

**Channel 00 (2402MHz)**

**Channel 39 (2441MHz)**


**Channel 78 (2480MHz)**

# 6. Carrier Frequency Separation

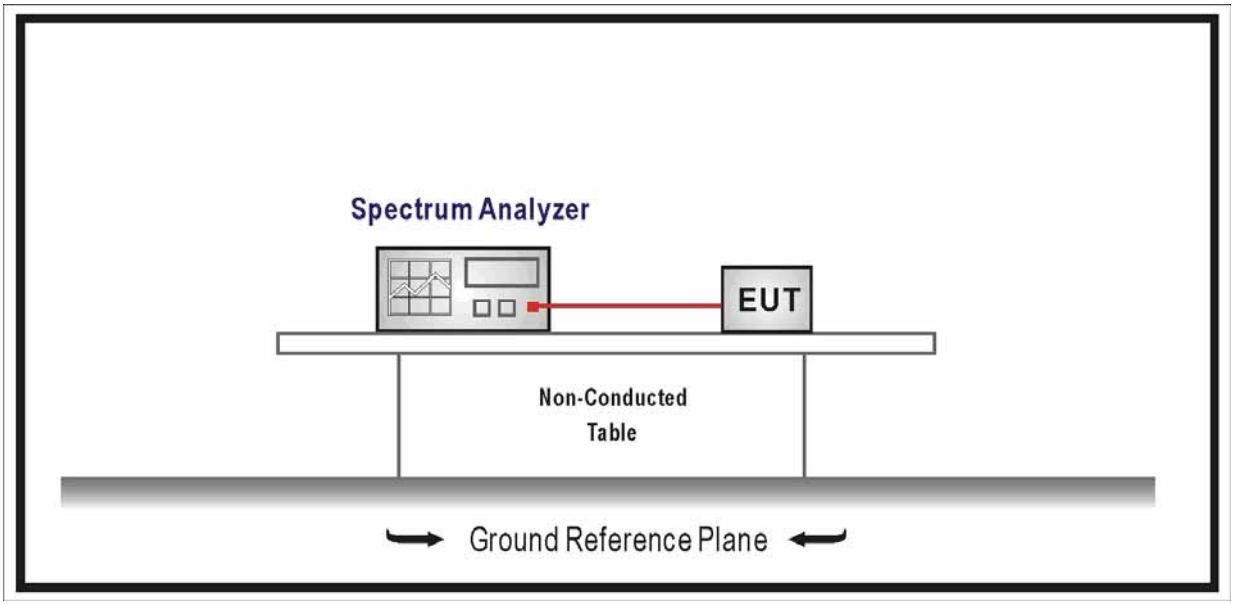
## 6.1. Test Equipment

Carrier Frequency Separation / TR-8

| Instrument | Manufacturer | Type No. | Serial No. | Cal. Due Date |
|---|---|---|---|---|
| Spectrum Analyzer | Agilent | N9010A | MY48030494 | 2016.03.10 |
| Temperature/Humidity Meter | Zhicheng | ZC1-2 | TR8-TH | 2016.04.09 |

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

## 6.2. Test Setup




## 6.3. Limit

- Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, 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, provided the systems operate with an output power no greater than 125mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudorandomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping

channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

- For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; If the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.
- Frequency hopping systems operating in the 5725-5850 MHz band shall use at least 75 hopping frequencies. The maximum 20 dB bandwidth of the hopping channel is 1 MHz. The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

## 6.4. Test Procedure

According to ANSI C63.10: 2013& ANSI C63.4: 2014

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:
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
Allow the trace to stabilize. Use the marker-Zipp Mini function to determine the separation between the peaks of the adjacent channels.

## 6.5. Uncertainty

The measurement uncertainty is defined as ± 1 kHz

## 6.6. Test Result

| | | |
|---|---|---|
| Product | : | Zipp Mini |
| Test Item | : | Carrier Frequency Separation |
| Test Site | : | TR-8 |
| Test Mode | : | Mode 1: Transmitter-1Mbps (GFSK_DH5) |

| Channel No. | Frequency (MHz) | Carrier Frequency Separation (kHz) | Limit (kHz) | Result |
|---|---|---|---|---|
| 00 | 2402 | 1000 | >25 kHz or 2/3 of 20 dB BW | Pass |
| 39 | 2441 | 1000 | >25 kHz or 2/3 of 20 dB BW | Pass |
| 78 | 2480 | 1000 | >25 kHz or 2/3 of 20 dB BW | Pass |

**Channel 00 (2402MHz)**

**Channel 39 (2441MHz)**


**Channel 78 (2480MHz)**

| | | |
|---|---|---|
| Product | : | Zipp Mini |
| Test Item | : | Carrier Frequency Separation |
| Test Site | : | TR-8 |
| Test Mode | : | Mode 2: Transmitter-2Mbps (Pi/4 DQPSK_DH5) |

| Channel No. | Frequency (MHz) | Carrier Frequency Separation (kHz) | Limit (kHz) | Result |
|---|---|---|---|---|
| 00 | 2402 | 1000 | >25 kHz or 2/3 of 20 dB BW | Pass |
| 39 | 2441 | 1000 | >25 kHz or 2/3 of 20 dB BW | Pass |
| 78 | 2480 | 1000 | >25 kHz or 2/3 of 20 dB BW | Pass |

**Channel 00 (2402MHz)**

**Channel 39 (2441MHz)**


**Channel 78 (2480MHz)**

| | | |
|---|---|---|
| Product | : | Zipp Mini |
| Test Item | : | Carrier Frequency Separation |
| Test Site | : | TR-8 |
| Test Mode | : | Mode 3: Transmitter-3Mbps (8DPSK_DH5) |

| Channel No. | Frequency (MHz) | Carrier Frequency Separation (kHz) | Limit (kHz) | Result |
|---|---|---|---|---|
| 00 | 2402 | 1000 | >25 kHz or 2/3 of 20 dB BW | Pass |
| 39 | 2441 | 1000 | >25 kHz or 2/3 of 20 dB BW | Pass |
| 78 | 2480 | 1000 | >25 kHz or 2/3 of 20 dB BW | Pass |

**Channel 00 (2402MHz)**

**Channel 39 (2441MHz)**


**Channel 78 (2480MHz)**

# 7. Number of Hopping Frequencies

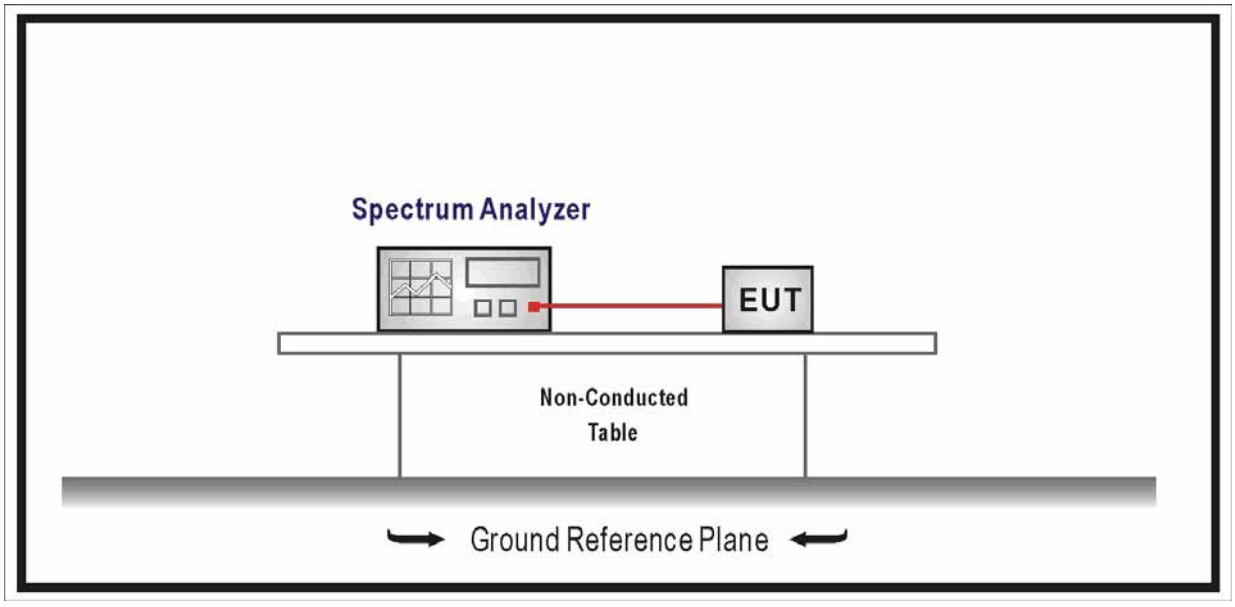
## 7.1. Test Equipment

Number of Hopping Frequencies / TR-8

| Instrument | Manufacturer | Type No. | Serial No. | Cal. Due Date |
|---|---|---|---|---|
| Spectrum Analyzer | Agilent | N9010A | MY48030494 | 2016.03.10 |
| Temperature/Humidity Meter | Zhicheng | ZC1-2 | TR8-TH | 2016.04.09 |

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

## 7.2. Test Setup




## 7.3. Limit

- For frequency hopping systems operating in the 2400-2483.5 MHz band shall use at least 15 hopping frequencies.
- For frequency hopping systems operating in 902-928 MHz band shall use at least 50 hopping frequencies.
- For frequency hopping systems operating in the 5725-5850 MHz band shall use at least 75 hopping frequencies.

## 7.4. Test Procedure

According to ANSI C63.10: 2013& ANSI C63.4: 2014

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:

Span = the frequency band of operation

RBW ≧ 1% of the span

VBW ≧ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Allow the trace to stabilize. It may prove necessary to bread the span up to sections, in order to clearly show all of the hopping frequencies.

## 7.5. Uncertainty

The measurement uncertainty is defined as ± 1 kHz

## 7.6. Test Result

| | | |
|---|---|---|
| Product | : | Zipp Mini |
| Test Item | : | Number of Hopping Frequencies |
| Test Site | : | TR-8 |
| Test Mode | : | Mode 1: Transmitter-1Mbps (GFSK_DH5) |

| Frequency Band (MHz) | Number of Hopping Frequencies | Limit | Result |
|---|---|---|---|
| 2400 - 2483.5 | 79 | >15 | Pass |

**2400 - 2441 MHz**

**2441 - 2482 MHz**

| | | |
|---|---|---|
| Product | : | Zipp Mini |
| Test Item | : | Number of Hopping Frequencies |
| Test Site | : | TR-8 |
| Test Mode | : | Mode 2: Transmitter-2Mbps (Pi/4 DQPSK_DH5) |

| Frequency Band (MHz) | Number of Hopping Frequencies | Limit | Result |
|---|---|---|---|
| 2400 - 2483.5 | 79 | >15 | Pass |

**2400 - 2441 MHz**

**2441- 2482MHz**

| | | |
|---|---|---|
| Product | : | Zipp Mini |
| Test Item | : | Number of Hopping Frequencies |
| Test Site | : | TR-8 |
| Test Mode | : | Mode 3: Transmitter-3Mbps (8DPSK_DH5) |

| Frequency Band (MHz) | Number of Hopping Frequencies | Limit | Result |
|---|---|---|---|
| 2400 - 2483.5 | 79 | >15 | Pass |

**2400 - 2441 MHz**

**2441 - 2482 MHz**

# 8. Time of Occupancy (Dwell Time)

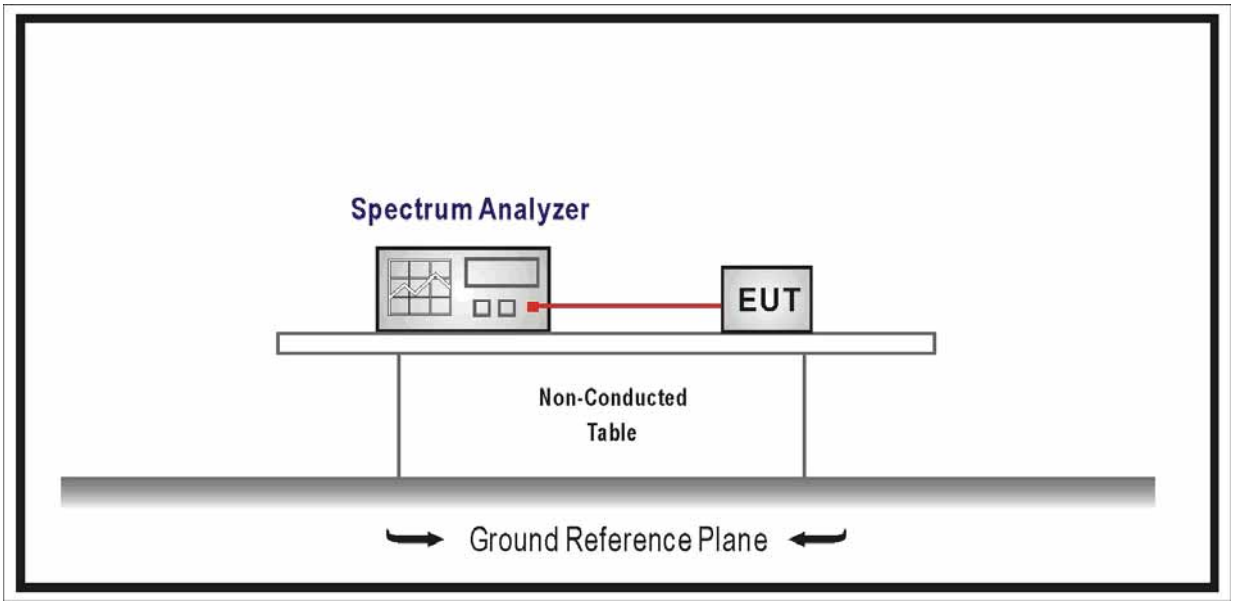
## 8.1. Test Equipment

Time of Occupancy (Dwell Time) / TR-8

| Instrument | Manufacturer | Type No. | Serial No. | Cal. Due Date |
|---|---|---|---|---|
| Spectrum Analyzer | Agilent | E4446A | MY45300103 | 2016.01.07 |
| Temperature/Humidity Meter | Zhicheng | ZC1-2 | TR8-TH | 2016.04.09 |

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

## 8.2. Test Setup




## 8.3. Limit

- For frequency hopping systems operating in the 902-928 MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; If the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.
- Frequency hopping systems operating in the 5725-5850 MHz band shall use at least 75

hopping frequencies. The maximum 20 dB bandwidth of the hopping channel is 1 MHz. The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 30 second period.

- Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater then 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

## 8.4. Test Procedure

According to ANSI C63.10: 2013& ANSI C63.4: 2014

The EUT must have its hopping function enabled. Use the following spectrum analyzer settings:
Span = zero span, centered on a hopping channel
RBW = 1MHz
VBW ≧ RBW
Sweep = as necessary to capture the entire dwell time per hopping channel
Detector function = peak
Trace = max hold
If possible, use the marker-Zipp Mini function to determine the dwell time. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

## 8.5. Uncertainty

The measurement uncertainty is defined as ± 0.1 us

## 8.6. Test Result

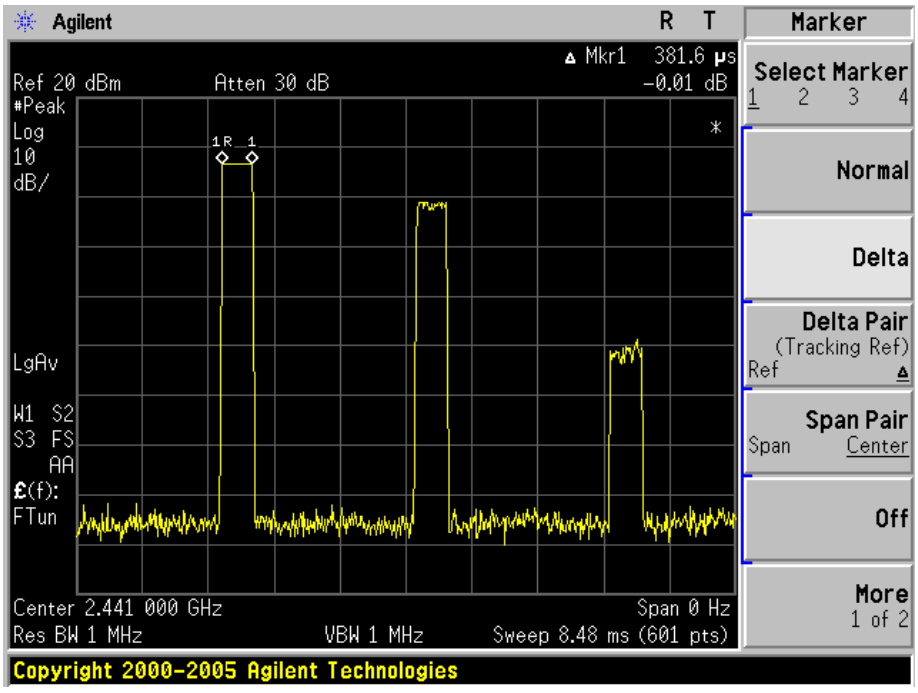
| | | |
|---|---|---|
| Product | : | Zipp Mini |
| Test Item | : | Time of Occupancy (Dwell Time) |
| Test Site | : | TR-8 |
| Test Mode | : | Transmitter-1Mbps (GFSK_DH1) |

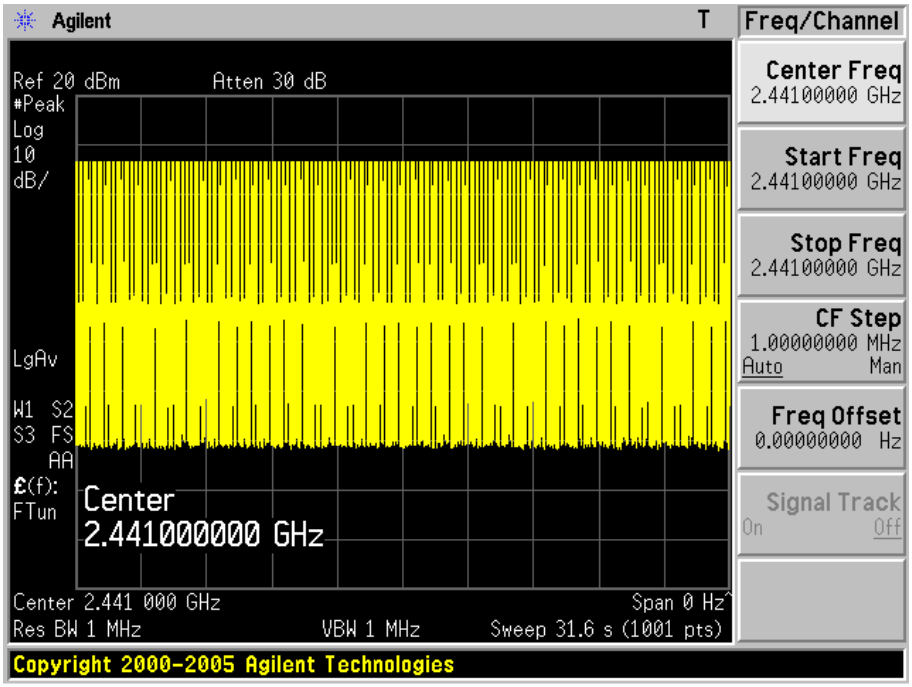
| Channel No. | Frequency (MHz) | Time of Occupancy (ms) | Limit (ms) | Result |
|---|---|---|---|---|
| 39 | 2441 | 123.26 | < 400 | Pass |

Test Time Period: 0.4*79=31.6sec.

- 2441MHz, The Maximum Occupancy Time Within 31.6sec: 0.3816ms*323 =123.26msec

**Channel 39 (2441MHz)-(DH1)**




Agilent
T
Freq/Channel
Ref 20 dBm
Atten 30 dB
#Peak
Log
10
dB/
LgAv
W1 S2
S3 FS
AA
£(f):
FTun
Center
2.441000000 GHz
Center 2.441 000 GHz
Span 0 Hz
Res BW 1 MHz
VBW 1 MHz
Sweep 31.6 s (1001 pts)
Center Freq
2.44100000 GHz
Start Freq
2.44100000 GHz
Stop Freq
2.44100000 GHz
CF Step
1.00000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Copyright 2000-2005 Agilent Technologies

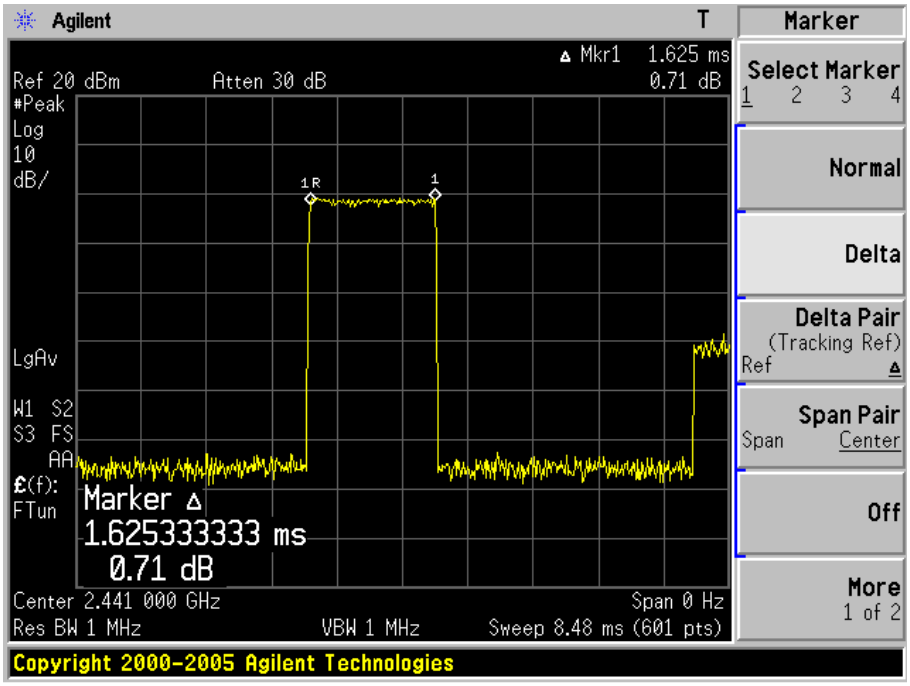
| | | |
|---|---|---|
| Product | : | Zipp Mini |
| Test Item | : | Time of Occupancy (Dwell Time) |
| Test Site | : | TR-8 |
| Test Mode | : | Transmitter-1Mbps (GFSK_DH3) |

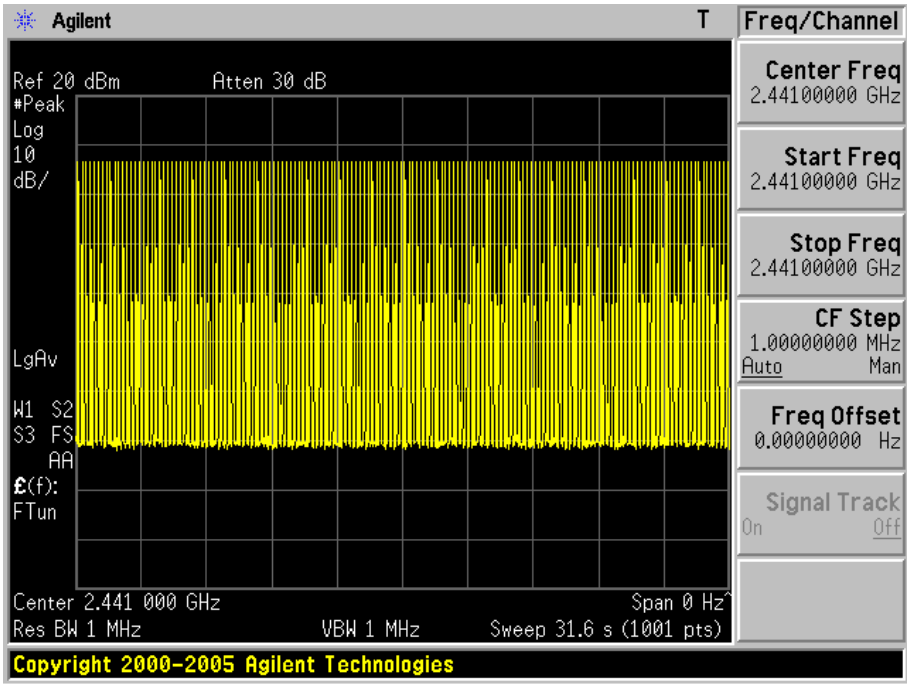
| Channel No. | Frequency (MHz) | Time of Occupancy (ms) | Limit (ms) | Result |
|---|---|---|---|---|
| 39 | 2441 | 263.25 | < 400 | Pass |

Test Time Period: 0.4*79=31.6sec.

- 2441MHz, The Maximum Occupancy Time Within 31.6sec: 1.625ms*162=263.25msec

**Channel 39 (2441MHz) - (DH3)**




Agilent
T
Freq/Channel
Ref 20 dBm
Atten 30 dB
#Peak
Log
10
dB/
LgAv
W1 S2
S3 FS
AA
£(f):
FTun
Center Freq
2.44100000 GHz
Start Freq
2.44100000 GHz
Stop Freq
2.44100000 GHz
CF Step
1.00000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Center 2.441 000 GHz
Span 0 Hz
Res BW 1 MHz
VBW 1 MHz
Sweep 31.6 s (1001 pts)
Copyright 2000-2005 Agilent Technologies

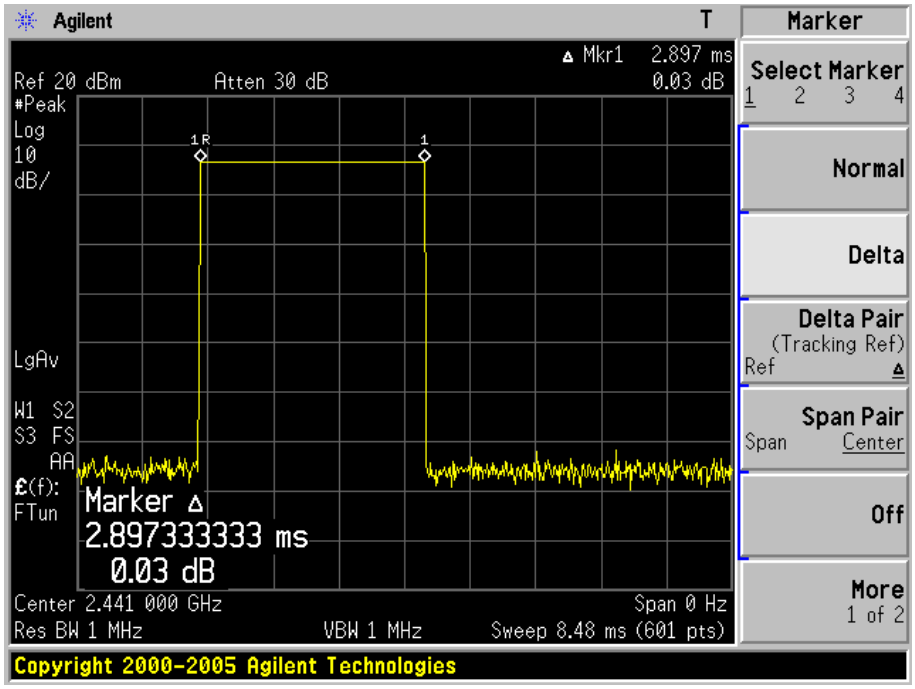
| | | |
|---|---|---|
| Product | : | Zipp Mini |
| Test Item | : | Time of Occupancy (Dwell Time) |
| Test Site | : | TR-8 |
| Test Mode | : | Transmitter-1Mbps (GFSK_DH5) |

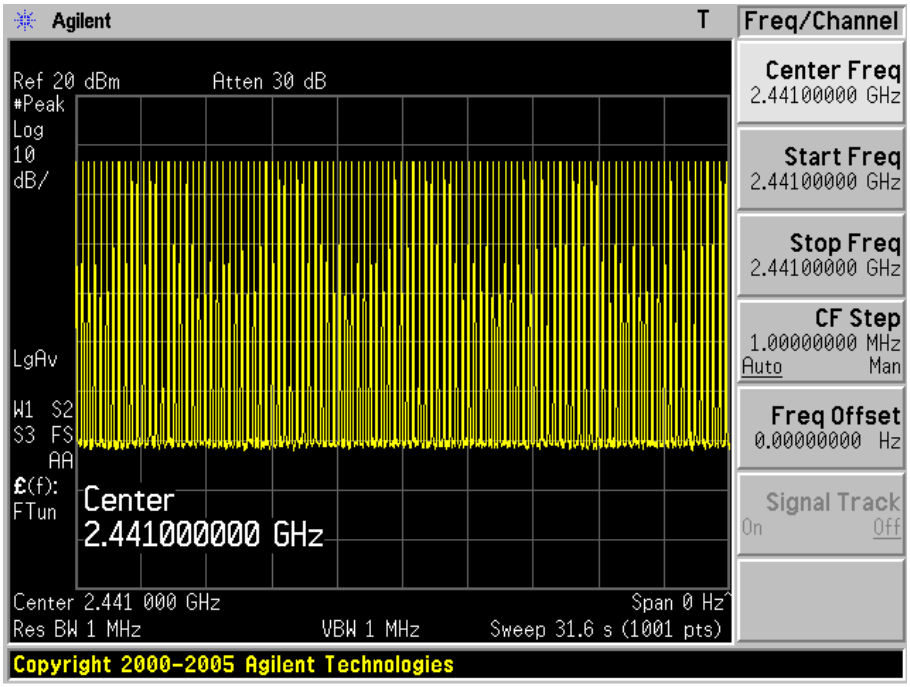
| Channel No. | Frequency (MHz) | Time of Occupancy (ms) | Limit (ms) | Result |
|---|---|---|---|---|
| 39 | 2441 | 333.16 | < 400 | Pass |

Test Time Period: 0.4*79=31.6sec.

- 2441MHz, The Maximum Occupancy Time Within 31.6sec: 2.897ms*115= 333.16msec

**Channel 39 (2441MHz) - (DH5)**




Agilent
T
Freq/Channel
Ref 20 dBm
Atten 30 dB
#Peak
Log
10
dB/
LgAv
W1 S2
S3 FS
AA
£(f):
FTun
Center
2.441000000 GHz
Center 2.441 000 GHz
Span 0 Hz
Res BW 1 MHz
VBW 1 MHz
Sweep 31.6 s (1001 pts)
Center Freq
2.44100000 GHz
Start Freq
2.44100000 GHz
Stop Freq
2.44100000 GHz
CF Step
1.00000000 MHz
Auto
Man
Freq Offset
0.00000000 Hz
Signal Track
On
Off
Copyright 2000-2005 Agilent Technologies

# 9. Peak Output Power

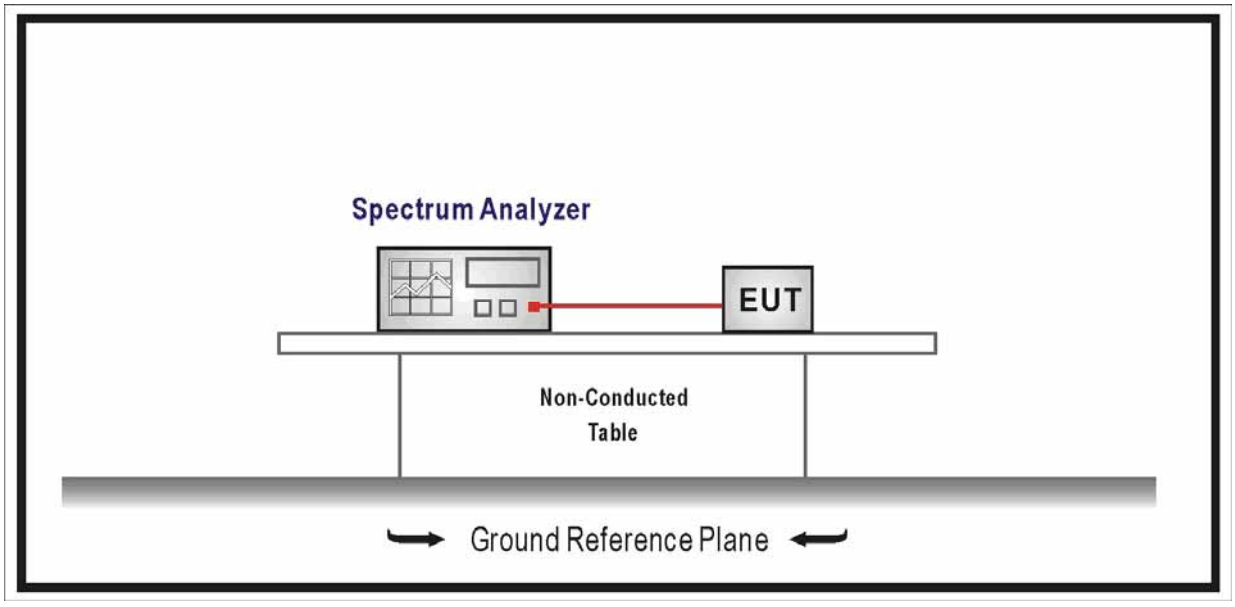
## 9.1. Test Equipment

Peak Output Power / TR-8

| Instrument | Manufacturer | Type No. | Serial No. | Cal. Due Date |
|---|---|---|---|---|
| Spectrum Analyzer | Agilent | N9010A | MY48030494 | 2016.03.10 |
| Temperature/Humidity Meter | Zhicheng | ZC1-2 | TR8-TH | 2016.04.09 |

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

## 9.2. Test Setup




## 9.3. Limit

- For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.
- For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels.

Note: the conducted output power limit specified above is based on the use the antennas with

directional gains that do not exceed 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values above, as appropriate, by the amount in dB that the directional gain of antenna exceeds 6 dBi.

## 9.4. Test Procedure

According to ANSI C63.10: 2013& ANSI C63.4: 2014

Use the following spectrum analyzer settings:
Span = approximately 5 times the 20dB bandwidth, centered on a hopping channel
RBW ＞ the 20 dB bandwidth of the emission being measured.
VBW ≧ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power (don't forget added the external attenuation and cable loss).

## 9.5. Uncertainty

The measurement uncertainty is defined as ± 1.0 dB

## 9.6. Test Result

| | | |
|---|---|---|
| Product | : | Zipp Mini |
| Test Item | : | Power Output |
| Test Mode | : | Mode 1: Transmitter-1Mbps (GFSK_DH5) |

| Channel No. | Frequency (MHz) | Measurement Power Output (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|
| 0 | 2402 | 7.416 | 30.00 | Pass |
| 39 | 2441 | 7.826 | 30.00 | Pass |
| 78 | 2480 | 8.233 | 30.00 | Pass |

**DH5 2402MHz**

**DH5 2441MHz**


**DH5 2480MHz**

| | | |
|---|---|---|
| Product | : | Zipp Mini |
| Test Item | : | Power Output |
| Test Mode | : | Mode 2: Transmitter-2Mbps (Pi/4 DQPSK_DH5) |

| Channel No. | Frequency (MHz) | Measurement Power Output (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|
| 0 | 2402 | 6.143 | 30.00 | Pass |
| 39 | 2441 | 6.523 | 30.00 | Pass |
| 78 | 2480 | 6.739 | 30.00 | Pass |

**2DH5 2402MHz**

**2DH5 2441MHz**


**2DH5 2480MHz**

| | | |
|---|---|---|
| Product | : | Zipp Mini |
| Test Item | : | Power Output |
| Test Mode | : | Mode 3: Transmitter-3Mbps (8DPSK_DH5) |

| Channel No. | Frequency (MHz) | Measurement Power Output (dBm) | Limit (dBm) | Result |
|---|---|---|---|---|
| 0 | 2402 | 6.465 | 30.00 | Pass |
| 39 | 2441 | 6.853 | 30.00 | Pass |
| 78 | 2480 | 7.061 | 30.00 | Pass |

**3DH5 2402MHz**

**3DH5 2441MHz**


**3DH5 2480MHz**

# 10. Band-edge Compliance of RF Conducted Emissions

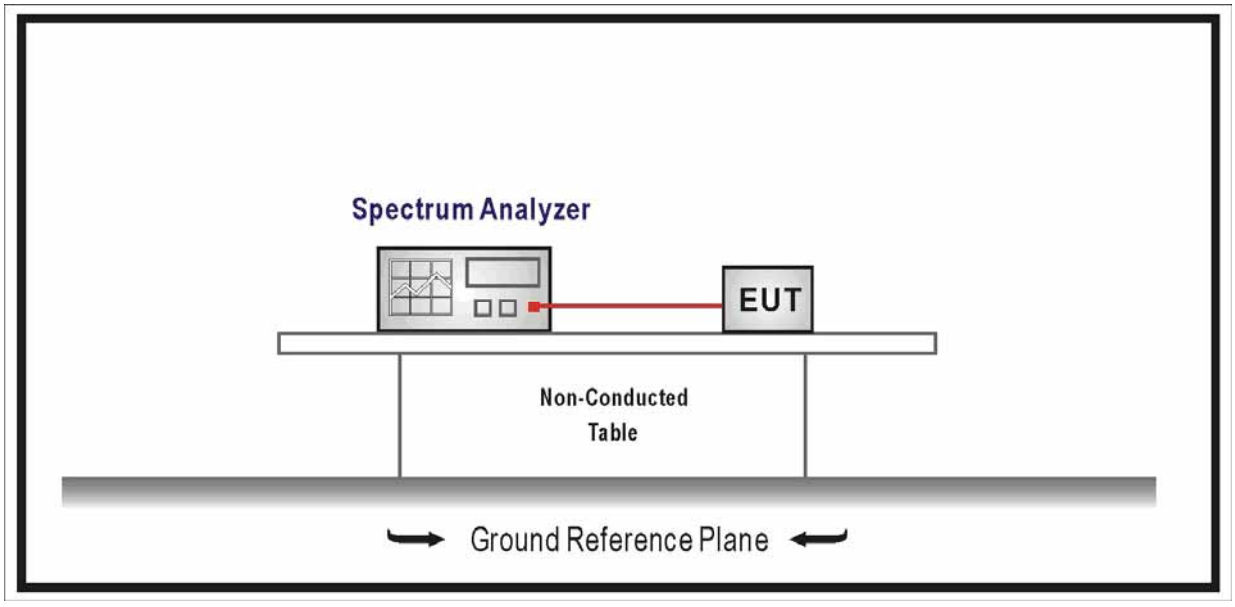
## 10.1. Test Equipment

Band-edge Compliance of RF Conducted Emissions / TR-8

| Instrument | Manufacturer | Type No. | Serial No. | Cal. Due Date |
|---|---|---|---|---|
| Spectrum Analyzer | Agilent | N9010A | MY48030494 | 2016.03.10 |
| Temperature/Humidity Meter | Zhicheng | ZC1-2 | TR8-TH | 2016.04.09 |

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

## 10.2. Test Setup




## 10.3. Limit

- 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 FCC part 15, must be designed to ensure that 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.
- 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 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, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) of FCC part 15 is not required.

## 10.4. Test Procedure

According to ANSI C63.10: 2013& ANSI C63.4: 2014

Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation.
RBW ≧ 1% of the span
VBW ≧ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize. Set the marker on the emission at the bandedge, or on the highest modulation product outside of the band, if this level is greater than that at the bandedge. Enable the marker-Zipp Mini function, then use the marker-to-peak function to move the marker to the peak of the in-band emission. The marker-Zipp Mini value now displayed must comply with the limit specified in this Section.
Now, using the same instrument settings, enable the hopping function of the EUT. Allow the trace to stabilize. Follow the same procedure listed above to determine if any spurious emissions caused by the hopping function also comply with the specified limit.

## 10.5. Uncertainty

The measurement uncertainty is defined as ± 1.0 dB

## 10.6. Test Result

| | | |
|---|---|---|
| Product | : | Zipp Mini |
| Test Item | : | Band-edge Compliance of RF Conducted Emissions |
| Test Site | : | TR-8 |
| Test Mode | : | Mode 1: Transmitter-1Mbps (GFSK_DH5) |

**Channel 00 (2402MHz)**


**Channel 78 (2480MHz)**

| | | |
|---|---|---|
| Product | : | Zipp Mini |
| Test Item | : | Band-edge Compliance of RF Conducted Emissions |
| Test Site | : | TR-8 |
| Test Mode | : | Mode 2: Transmitter-2Mbps (Pi/4 DQPSK_DH5) |

**Channel 00 (2402MHz)**

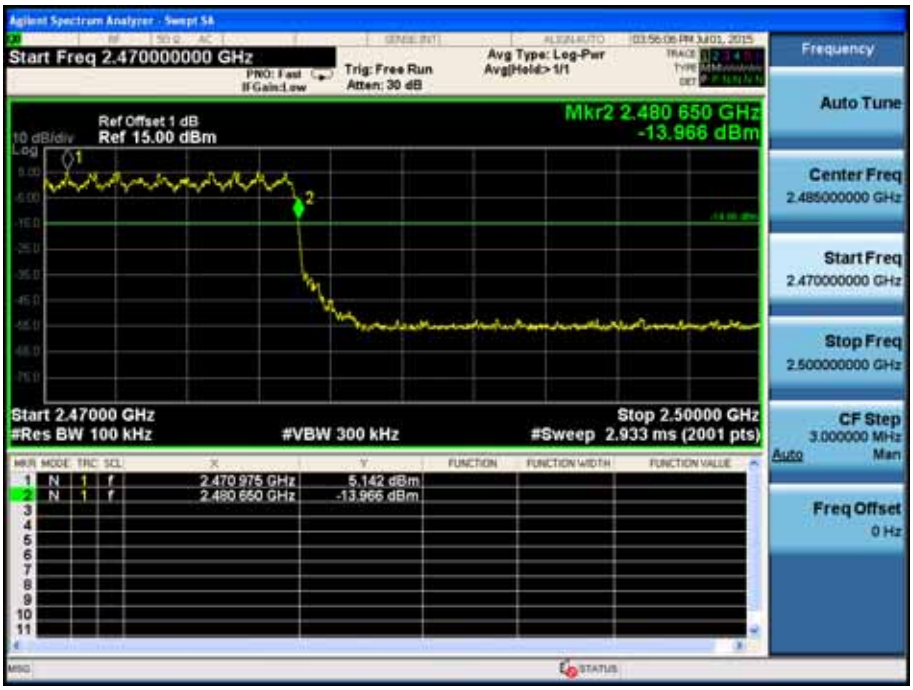

**Channel 78 (2480MHz)**

| | | |
|---|---|---|
| Product | : | Zipp Mini |
| Test Item | : | Band-edge Compliance of RF Conducted Emissions |
| Test Site | : | TR-8 |
| Test Mode | : | Mode 3: Transmitter-3Mbps (8DPSK_DH5) |

**Channel 00 (2402MHz)**


**Channel 78 (2480MHz)**

| | | |
|---|---|---|
| Product | : | Zipp Mini |
| Test Item | : | Band-edge Compliance of RF Conducted Emissions |
| Test Site | : | TR-8 |
| Test Mode | : | Mode: Hopping Mode |

# 11. Spurious RF Conducted Emissions

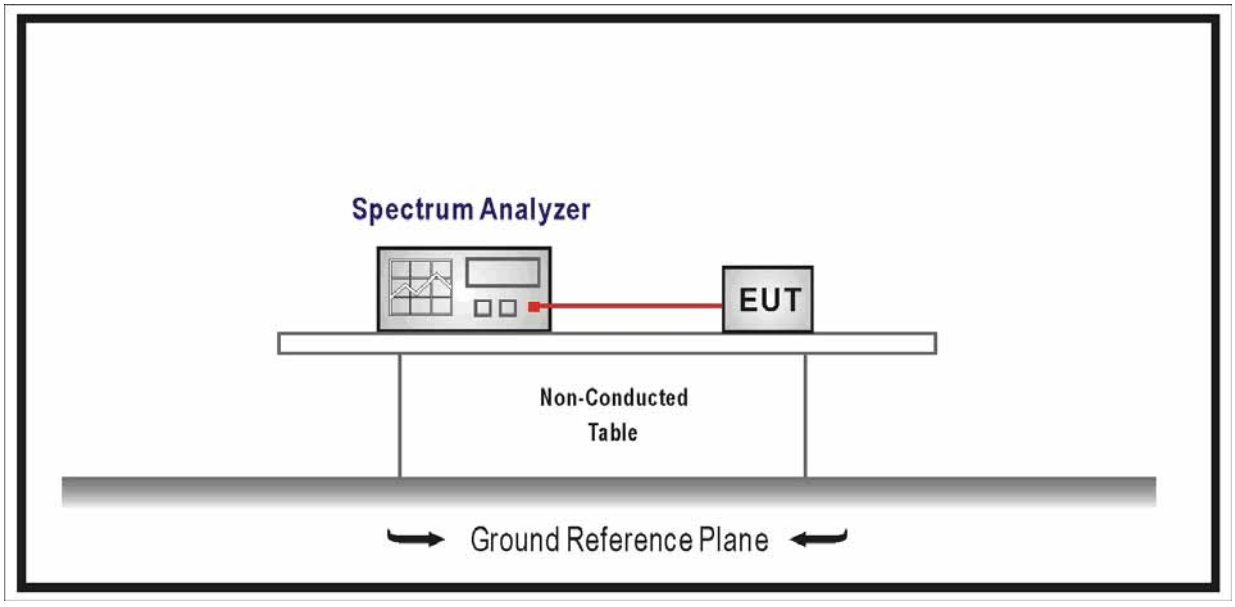
## 11.1. Test Equipment

Spurious RF Conducted Emissions / TR-8

| Instrument | Manufacturer | Type No. | Serial No. | Cal. Due Date |
|---|---|---|---|---|
| Spectrum Analyzer | Agilent | N9010A | MY48030494 | 2016.03.10 |
| Temperature/Humidity Meter | Zhicheng | ZC1-2 | TR8-TH | 2016.04.09 |

Note: All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

## 11.2. Test Setup




## 11.3. Limit

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 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, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in

Section 15.209(a) of FCC part 15 is not required.

## 11.4. Test Procedure

According to ANSI C63.10: 2013.
Use the following spectrum analyzer settings:
Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the $10^{th}$ harmonic. Typically, several plots are required to cover this entire span.
RBW = 100 kHz
VBW ≧ RBW
Sweep = auto
Detector function = peak
Trace = max hold
Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded. The level displayed must comply with the limit specified in this section.

## 11.5. Uncertainty

The measurement uncertainty is defined as ± 1.0 dB

## 11.6. Test Result

| | | |
|---|---|---|
| Product | : | Zipp Mini |
| Test Item | : | Spurious RF Conducted Emissions |
| Test Mode | : | Mode 1: Transmitter-1Mbps (GFSK_DH5) |

**Channel 00 (2402MHz)**


**Channel 39 (2441MHz)**


**Channel 78 (2480MHz)**


| | | |
|---|---|---|
| Product | : | Zipp Mini |
| Test Item | : | Spurious RF Conducted Emissions |
| Test Mode | : | Mode 2: Transmitter-2Mbps (Pi/4 DQPSK_DH5) |

**Channel 00 (2402MHz)**


**Channel 39 (2441MHz)**


**Channel 78 (2480MHz)**


| | | |
|---|---|---|
| Product | : | Zipp Mini |
| Test Item | : | Spurious RF Conducted Emissions |
| Test Mode | : | Mode 3: Transmitter-3Mbps (8DPSK_DH5) |

**Channel 00 (2402MHz)**


**Channel 39 (2441MHz)**


**Channel 78 (2480MHz)**

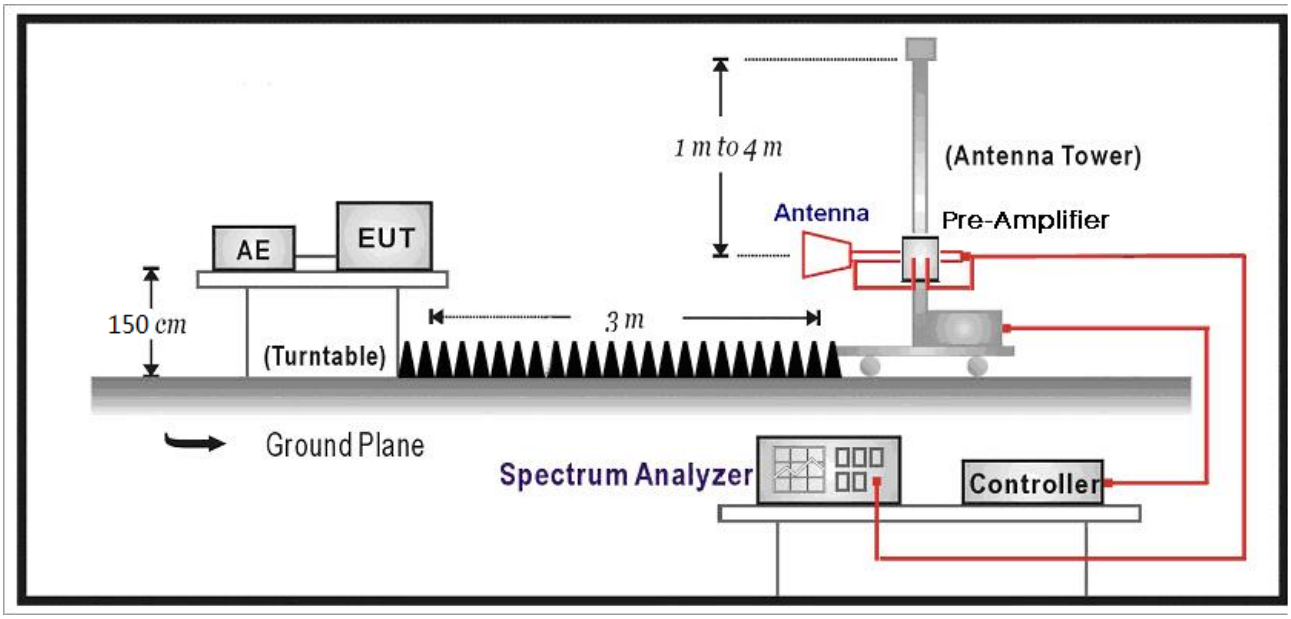

# 12. Radiated Emission Band Edge

## 12.1. Test Equipment

☒Radiated Emission Band Edge / AC-5

| Instrument | Manufacturer | Type No. | Serial No. | Cal. Due Date |
|---|---|---|---|---|
| Spectrum Analyzer | Agilent | N9010A | MY48030494 | 2016.03.10 |
| Preamplifier | Miteq | NSP1800-25 | 1364185 | 2016.05.03 |
| Preamplifier | QuieTek | AP-040G | CHM-0906001 | 2016.05.03 |
| Bilog Antenna | Teseq GmbH | CBL6112D | 27612 | 2015.10.15 |
| Broad-Band Horn Antenna | Schwarzbeck | BBHA9120D | 733 | 2016.02.26 |
| DRG Horn | ETS-Lindgren | 3117 | 00167055 | 2015.07.16 |
| Broad-Band Horn Antenna | Schwarzbeck | BBHA9170 | 294 | 2016.03.01 |
| Coaxial Cable | Huber+Suhner | SUCOFLEX 106 | AC5-C1 | 2016.03.01 |
| Coaxial Cable | Huber+Suhner | SUCOFLEX 106 | AC5-C2 | 2016.03.01 |
| Coaxial Cable | Huber+Suhner | SUCOFLEX 102 | AC5-C3 | 2015.08.07 |
| Temperature/Humidity Meter | Zhicheng | ZC1-2 | AC5-TH | 2016.01.07 |

## 12.2. Test Setup




## 12.3. Limit

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part 15, must also comply with the radiated emission limits specified in Section 15.209(a) of FCC part 15.

## 12.4. Test Procedure

According to ANSI C63.10: 2013& ANSI C63.4: 2014

This test is required for any spurious emission or modulation product that falls in a Restricted Band, as defined in Section 15.205 of FCC part 15. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for f ≧ 1 GHz, 100 kHz for f < 1GHz

VBW ≧ RBW

Sweep = auto

Detector function = peak

Trace = max hold

Follow the guidelines in ANSI C63.4 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with

sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35(b) of FCC part 15.
Now set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209 of FCC Part 15. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a “duty cycle correction factor”, derived from 20log (dwell time/100 ms), in an effort to demonstrate compliance with the 15.209 limit of FCC part 15.
If the emission on which a radiated measurement must be made is located at the edge of the authorized band of operation, then the alternative “marker-Zipp Mini” method may be employed.

## 12.5. Uncertainty

The measurement uncertainty above 1G is defined as ± 3.9 dB
below 1G is defined as ± 3.8 dB

## 12.6. Test Result

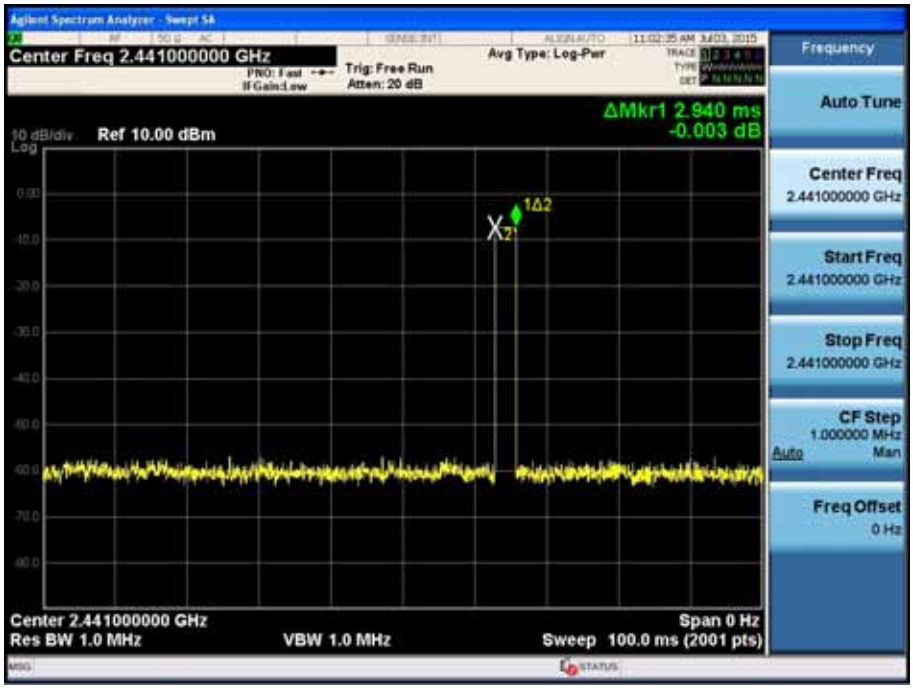
All of the test result shown indicates the worst case, and spectrum analyzer parameters setting as shown below:

Peak detector: RBW = 1MHz, VBW = 3MHz, sweep time = 100ms;

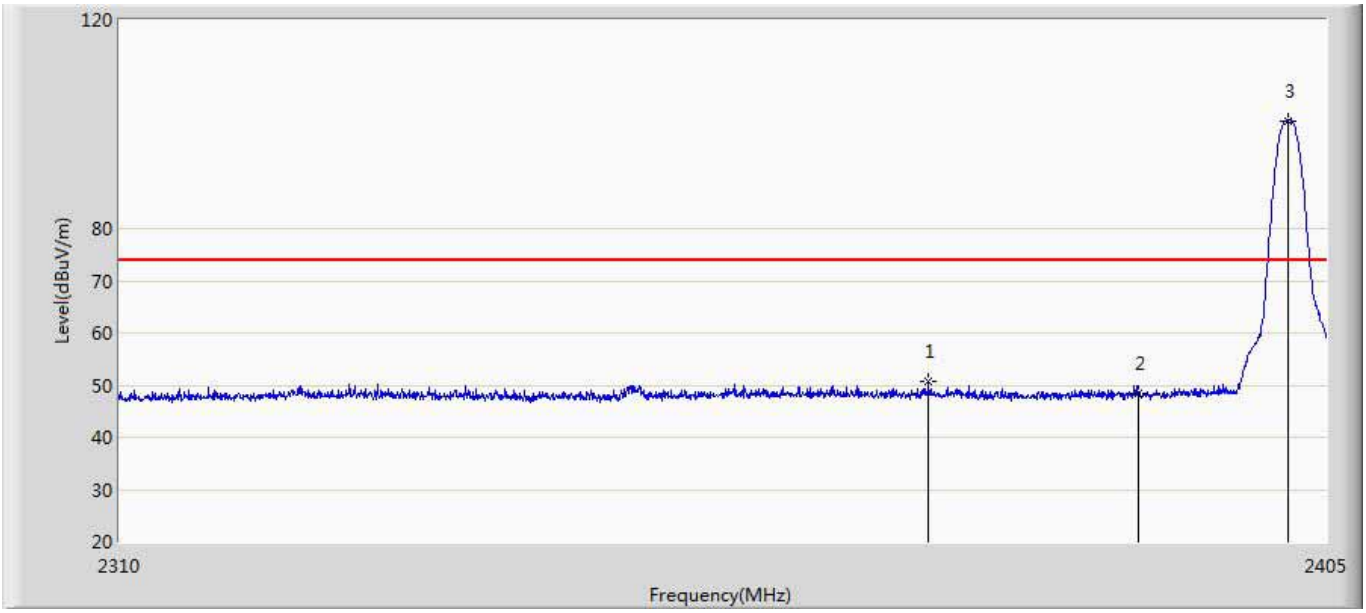
Average = Peak Measure Level+ Duty Factor

Duty Factor= 20*LOG(Pulse Number*On Time/100)= -30.63dB in worst condition in normal use.

Pulse Number



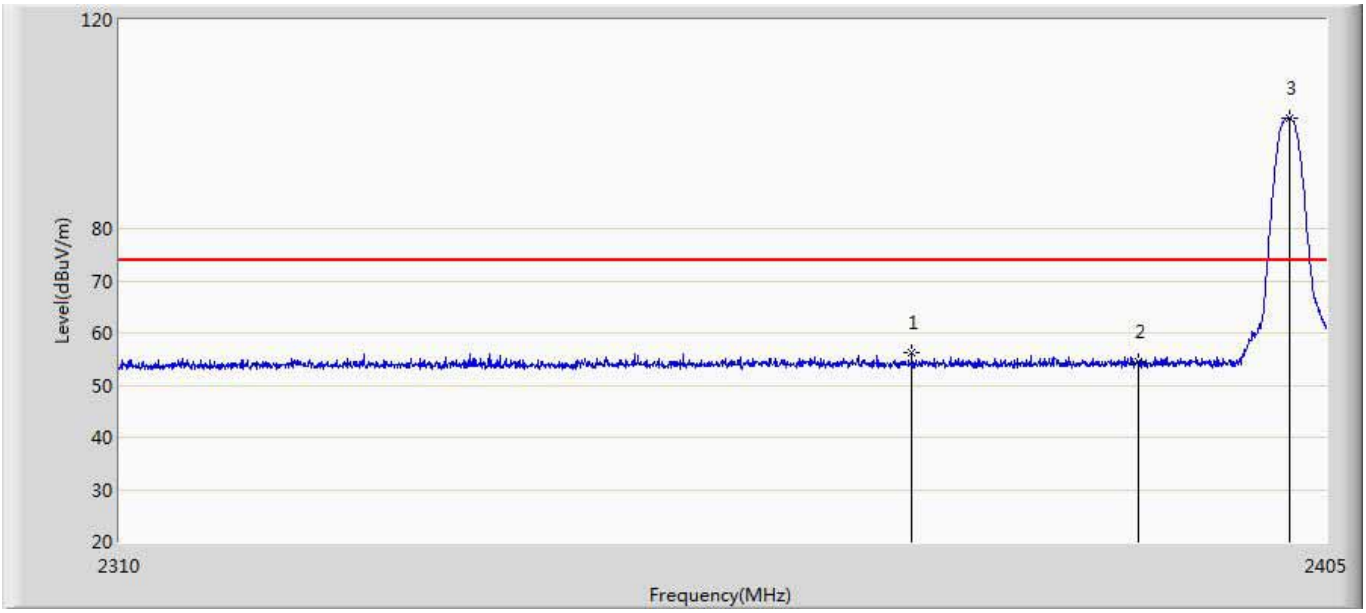
| | |
|---|---|
| Site: AC5 | Time: 2015/06/26 - 11:09 |
| Limit: FCC_Part15.209_RE(3m) | Margin: 0 |
| Probe: Horn_3117_00167055(1-18GHz) | Polarity: Vertical |
| EUT: Zipp Mini | Power: AC 120V/60Hz |
| Note: Mode 1: Transmit at CH2402 by DH5 | |




| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | | 2373.270 | 50.739 | 13.803 | -23.261 | 74.000 | 36.937 | PK |
| 2 | | 2390.000 | 48.304 | 11.313 | -25.696 | 74.000 | 36.991 | PK |
| 3 | * | 2401.913 | 100.702 | 63.696 | N/A | N/A | 37.007 | PK |

| No | Mark | Frequency (MHz) | Peak Level (dBuV/m) | AV Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Duty Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | | 2373.270 | 50.739 | 20.109 | -33.891 | 54.000 | -30.63 | AV |
| 2 | | 2390.000 | 48.304 | 17.674 | -36.326 | 54.000 | -30.63 | AV |
| 3 | * | 2401.913 | 100.702 | 70.072 | N/A | N/A | -30.63 | AV |

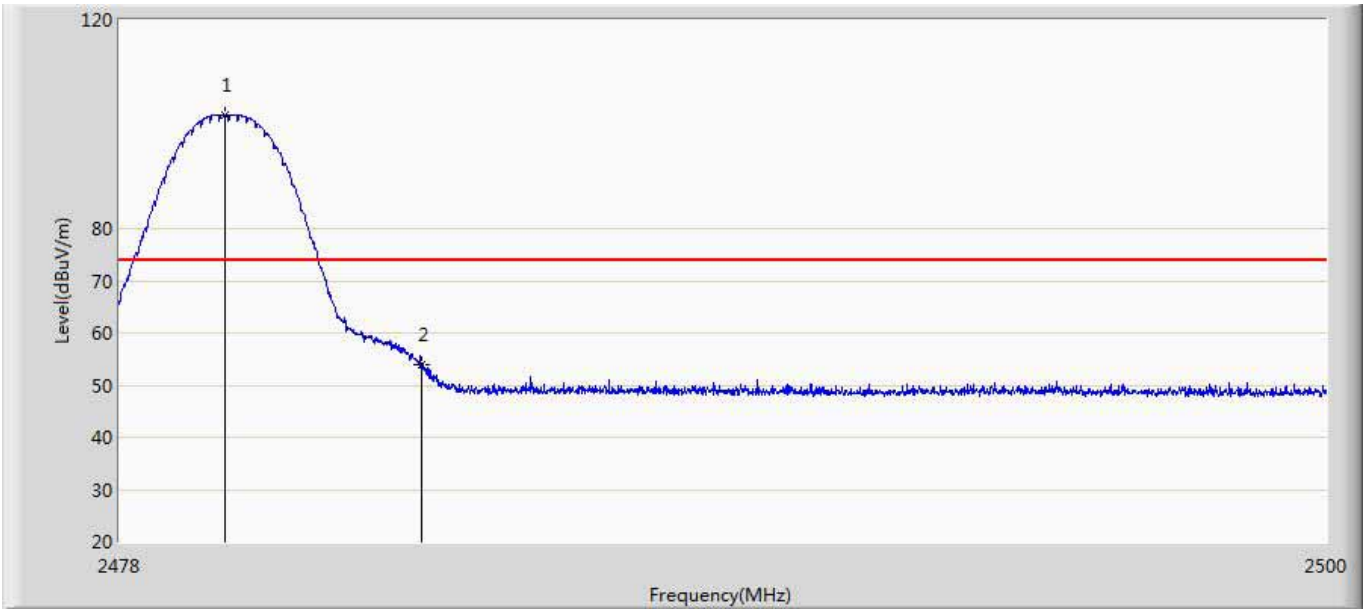
| | |
|---|---|
| Site: AC5 | Time: 2015/06/26 - 11:12 |
| Limit: FCC_Part15.209_RE(3m) | Margin: 0 |
| Probe: Horn_3117_00167055(1-18GHz) | Polarity: Horizontal |
| EUT: Zipp Mini | Power: AC 120V/60Hz |
| Note: Mode 1: Transmit at CH2402 by DH5 | |




| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | | 2371.940 | 56.208 | 19.281 | -17.792 | 74.000 | 36.927 | PK |
| 2 | | 2390.000 | 54.350 | 17.359 | -19.650 | 74.000 | 36.991 | PK |
| 3 | * | 2402.055 | 101.240 | 64.233 | N/A | N/A | 37.006 | PK |

| No | Mark | Frequency (MHz) | Peak Level (dBuV/m) | AV Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Duty Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | | 2371.940 | 56.208 | 25.578 | -28.422 | 54.000 | -30.63 | AV |
| 2 | | 2390.000 | 54.350 | 23.720 | -30.280 | 54.000 | -30.63 | AV |
| 3 | * | 2402.055 | 101.240 | 70.610 | N/A | N/A | -30.63 | AV |

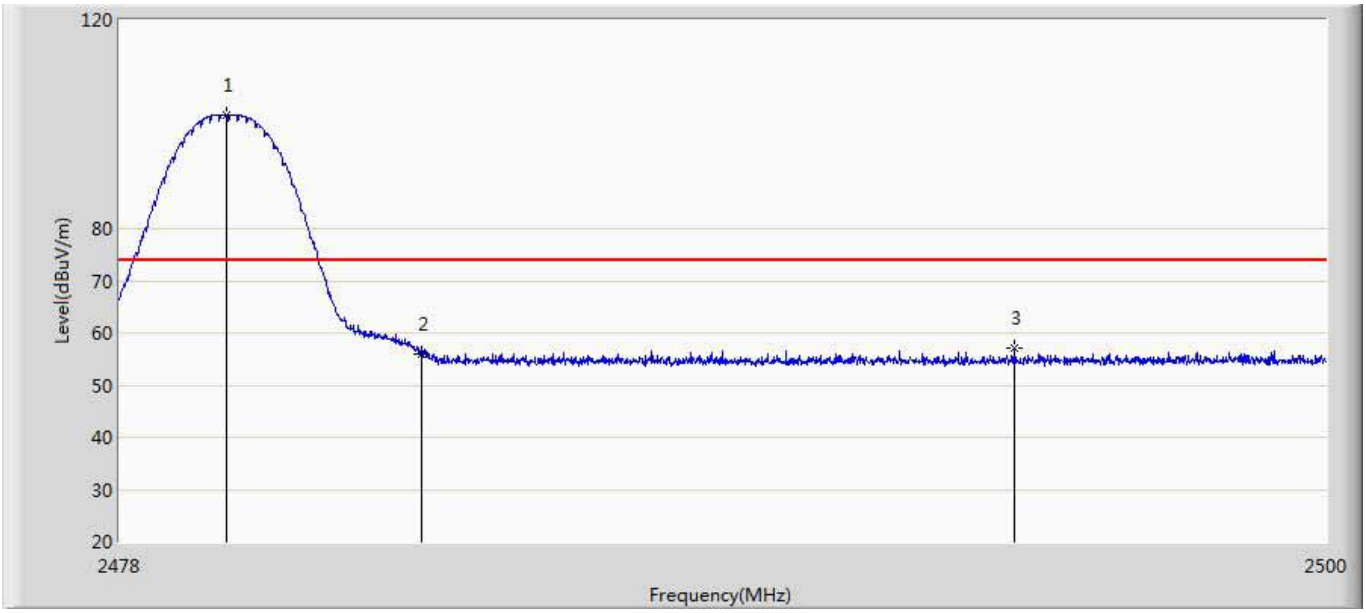
| | |
|---|---|
| Site: AC5 | Time: 2015/06/26 - 11:15 |
| Limit: FCC_Part15.209_RE(3m) | Margin: 0 |
| Probe: Horn_3117_00167055(1-18GHz) | Polarity: Vertical |
| EUT: Zipp Mini | Power: AC 120V/60Hz |
| Note: Mode 1: Transmit at CH2480 by DH5 | |




| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | * | 2479.914 | 101.746 | 64.409 | N/A | N/A | 37.336 | PK |
| 2 | | 2483.500 | 53.824 | 16.453 | -20.176 | 74.000 | 37.371 | PK |

| No | Mark | Frequency (MHz) | Peak Level (dBuV/m) | AV Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Duty Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | * | 2479.914 | 101.746 | 71.116 | N/A | N/A | -30.63 | AV |
| 2 | | 2483.500 | 53.824 | 23.194 | -30.806 | 54.000 | -30.63 | AV |

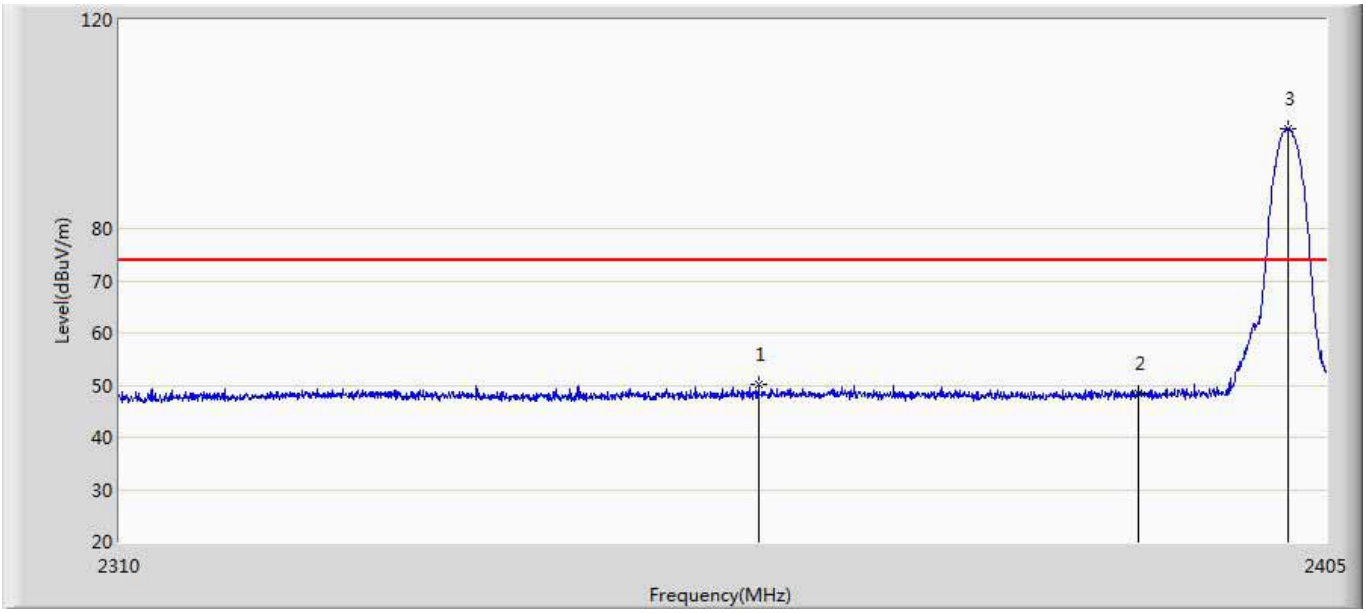
| | |
|---|---|
| Site: AC5 | Time: 2015/06/26 - 11:17 |
| Limit: FCC_Part15.209_RE(3m) | Margin: 0 |
| Probe: Horn_3117_00167055(1-18GHz) | Polarity: Horizontal |
| EUT: Zipp Mini | Power: AC 120V/60Hz |
| Note: Mode 1: Transmit at CH2480 by DH5 | |




| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | * | 2479.947 | 101.711 | 64.374 | N/A | N/A | 37.337 | PK |
| 2 | | 2483.500 | 56.076 | 18.705 | -17.924 | 74.000 | 37.371 | PK |
| 3 | | 2494.313 | 57.122 | 19.646 | -16.878 | 74.000 | 37.476 | PK |

| No | Mark | Frequency (MHz) | Peak Level (dBuV/m) | AV Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Duty Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | * | 2479.947 | 101.711 | 71.081 | N/A | N/A | -30.63 | AV |
| 2 | | 2483.500 | 56.076 | 25.446 | -28.554 | 54.000 | -30.63 | AV |
| 3 | | 2494.313 | 57.122 | 26.492 | -27.508 | 54.000 | -30.63 | AV |

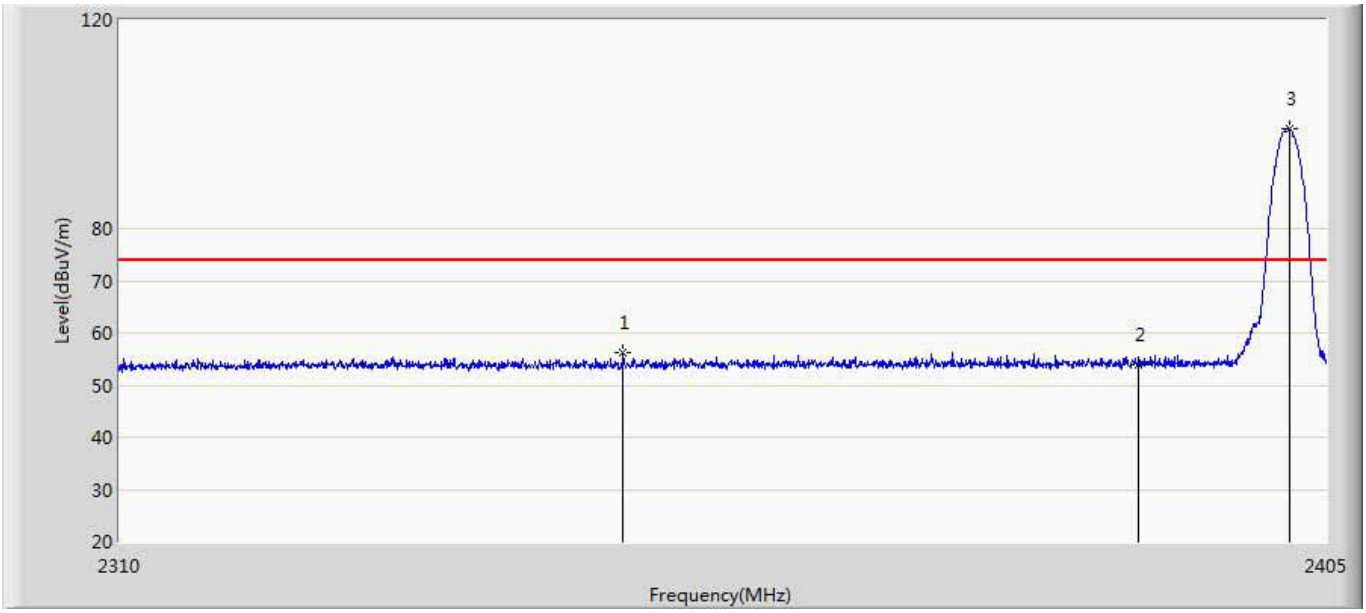
| | |
|---|---|
| Site: AC5 | Time: 2015/06/26 - 11:21 |
| Limit: FCC_Part15.209_RE(3m) | Margin: 0 |
| Probe: Horn_3117_00167055(1-18GHz) | Polarity: Vertical |
| EUT: Zipp Mini | Power: AC 120V/60Hz |
| Note: Mode 2: Transmit at CH2402 by 2DH5 | |




| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | | 2359.827 | 50.103 | 13.265 | -23.897 | 74.000 | 36.838 | PK |
| 2 | | 2390.000 | 48.485 | 11.494 | -25.515 | 74.000 | 36.991 | PK |
| 3 | * | 2402.008 | 99.074 | 62.067 | N/A | N/A | 37.006 | PK |

| No | Mark | Frequency (MHz) | Peak Level (dBuV/m) | AV Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Duty Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | | 2359.827 | 50.103 | 19.473 | -34.527 | 54.000 | -30.63 | AV |
| 2 | | 2390.000 | 48.485 | 17.855 | -36.145 | 54.000 | -30.63 | AV |
| 3 | * | 2402.008 | 99.074 | 68.444 | N/A | N/A | -30.63 | AV |

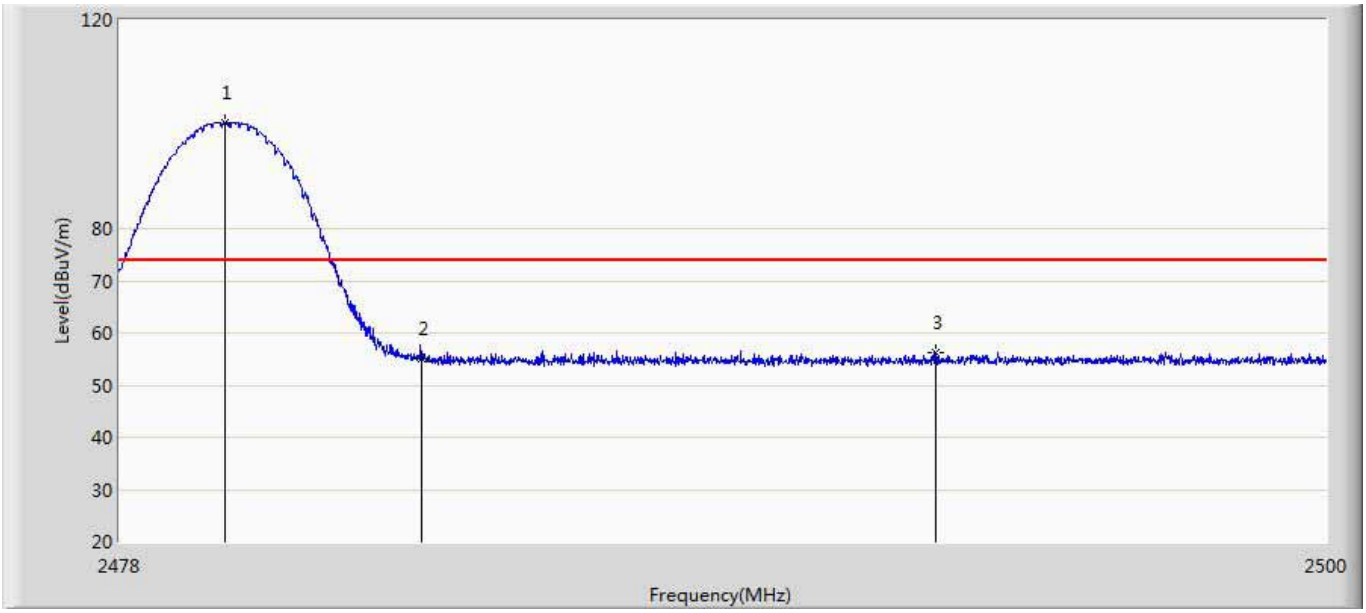
| | |
|---|---|
| Site: AC5 | Time: 2015/06/26 - 11:23 |
| Limit: FCC_Part15.209_RE(3m) | Margin: 0 |
| Probe: Horn_3117_00167055(1-18GHz) | Polarity: Horizontal |
| EUT: Zipp Mini | Power: AC 120V/60Hz |
| Note: Mode 2: Transmit at CH2402 by 2DH5 | |




| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | | 2349.235 | 56.200 | 19.417 | -17.800 | 74.000 | 36.783 | PK |
| 2 | | 2390.000 | 53.946 | 16.955 | -20.054 | 74.000 | 36.991 | PK |
| 3 | * | 2402.103 | 99.040 | 62.033 | N/A | N/A | 37.007 | PK |

| No | Mark | Frequency (MHz) | Peak Level (dBuV/m) | AV Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Duty Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | | 2349.235 | 56.200 | 25.570 | -28.430 | 54.000 | -30.63 | AV |
| 2 | | 2390.000 | 53.946 | 23.316 | -30.684 | 54.000 | -30.63 | AV |
| 3 | * | 2402.103 | 99.040 | 68.410 | N/A | N/A | -30.63 | AV |

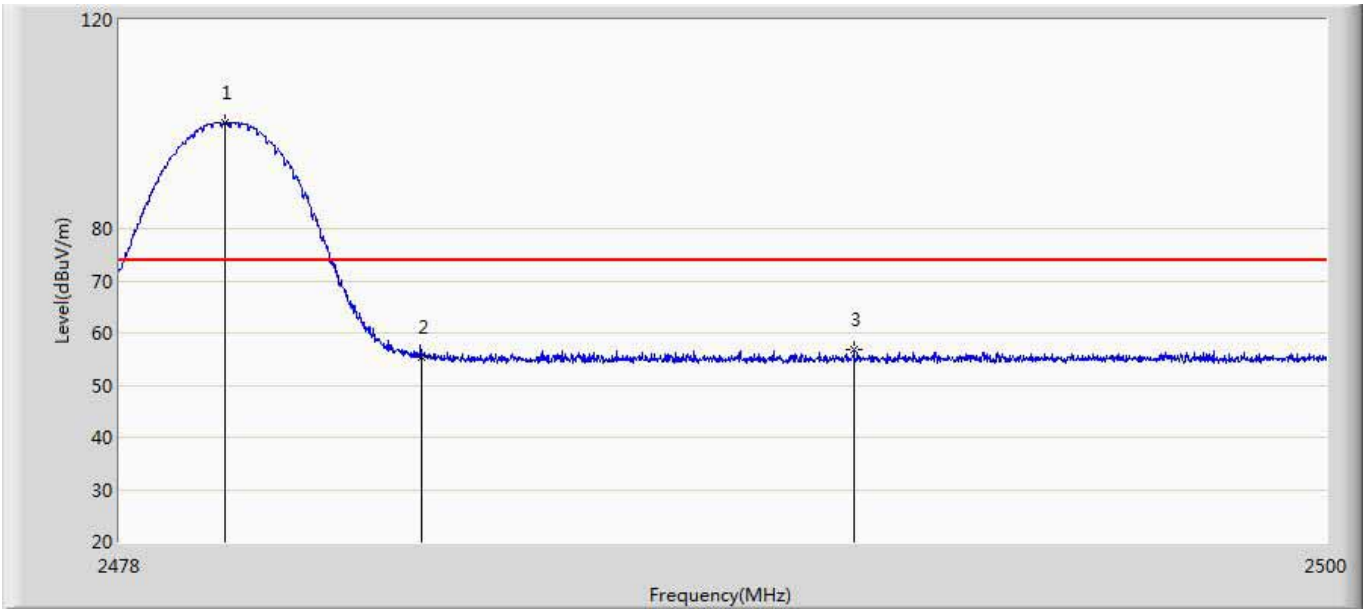
| | |
|---|---|
| Site: AC5 | Time: 2015/06/26 - 11:25 |
| Limit: FCC_Part15.209_RE(3m) | Margin: 0 |
| Probe: Horn_3117_00167055(1-18GHz) | Polarity: Vertical |
| EUT: Zipp Mini | Power: AC 120V/60Hz |
| Note: Mode 2: Transmit at CH2480 by 2DH5 | |




| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | * | 2479.914 | 100.344 | 63.007 | N/A | N/A | 37.336 | PK |
| 2 | | 2483.500 | 54.963 | 17.592 | -19.037 | 74.000 | 37.371 | PK |
| 3 | | 2492.872 | 56.272 | 18.810 | -17.728 | 74.000 | 37.463 | PK |

| No | Mark | Frequency (MHz) | Peak Level (dBuV/m) | AV Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Duty Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | * | 2479.914 | 100.344 | 69.714 | N/A | N/A | -30.63 | AV |
| 2 | | 2483.500 | 54.963 | 24.333 | -29.667 | 54.000 | -30.63 | AV |
| 3 | | 2492.872 | 56.272 | 25.642 | -28.358 | 54.000 | -30.63 | AV |

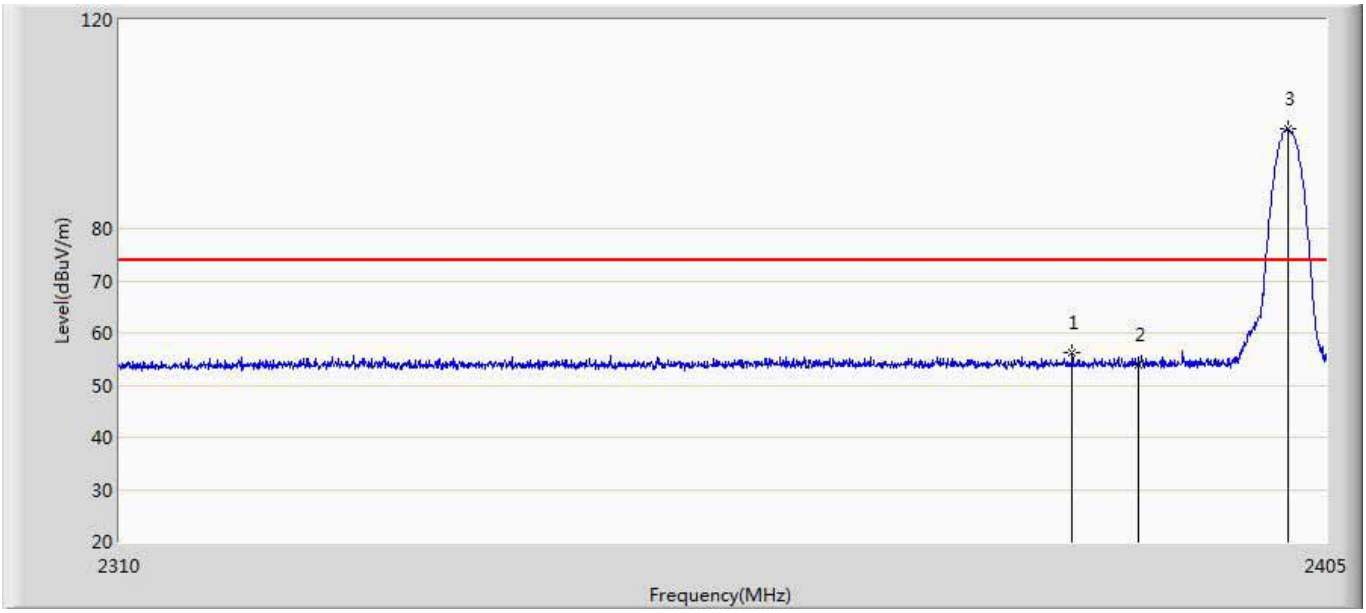
| | |
|---|---|
| Site: AC5 | Time: 2015/06/26 - 11:27 |
| Limit: FCC_Part15.209_RE(3m) | Margin: 0 |
| Probe: Horn_3117_00167055(1-18GHz) | Polarity: Horizontal |
| EUT: Zipp Mini | Power: AC 120V/60Hz |
| Note: Mode 2: Transmit at CH2480 by 2DH5 | |




| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | * | 2479.914 | 100.344 | 63.007 | N/A | N/A | 37.336 | PK |
| 2 | | 2483.500 | 55.341 | 17.970 | -18.659 | 74.000 | 37.371 | PK |
| 3 | | 2491.376 | 56.852 | 19.404 | -17.148 | 74.000 | 37.447 | PK |

| No | Mark | Frequency (MHz) | Peak Level (dBuV/m) | AV Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Duty Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | * | 2479.914 | 100.344 | 69.714 | N/A | N/A | -30.63 | AV |
| 2 | | 2483.500 | 55.341 | 24.711 | -29.289 | 54.000 | -30.63 | AV |
| 3 | | 2491.376 | 56.852 | 26.222 | -27.778 | 54.000 | -30.63 | AV |

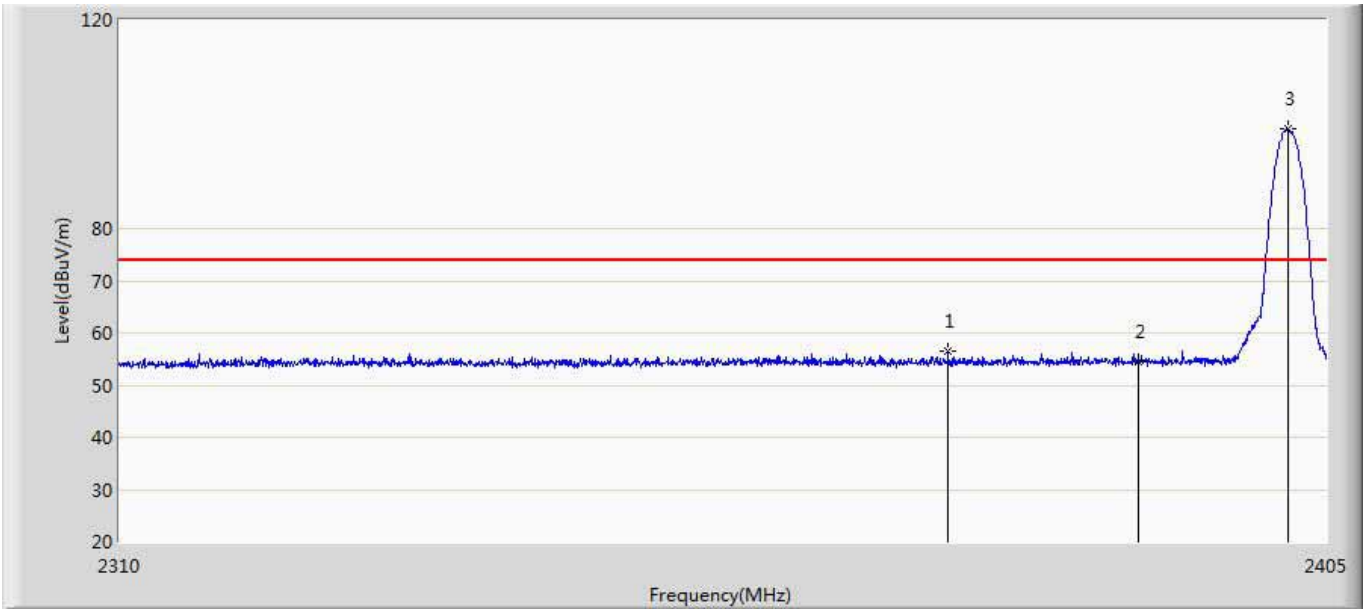
| | |
|---|---|
| Site: AC5 | Time: 2015/06/26 - 11:31 |
| Limit: FCC_Part15.209_RE(3m) | Margin: 0 |
| Probe: Horn_3117_00167055(1-18GHz) | Polarity: Vertical |
| EUT: Zipp Mini | Power: AC 120V/60Hz |
| Note: Mode 3: Transmit at CH2402 by 3DH5 | |




| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | | 2384.718 | 56.335 | 19.355 | -17.665 | 74.000 | 36.980 | PK |
| 2 | | 2390.000 | 53.873 | 16.882 | -20.127 | 74.000 | 36.991 | PK |
| 3 | * | 2401.913 | 99.245 | 62.239 | N/A | N/A | 37.007 | PK |

| No | Mark | Frequency (MHz) | Peak Level (dBuV/m) | AV Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Duty Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | | 2384.718 | 56.335 | 25.705 | -28.295 | 54.000 | -30.63 | AV |
| 2 | | 2390.000 | 53.873 | 23.243 | -30.757 | 54.000 | -30.63 | AV |
| 3 | * | 2401.913 | 99.245 | 68.615 | N/A | N/A | -30.63 | AV |

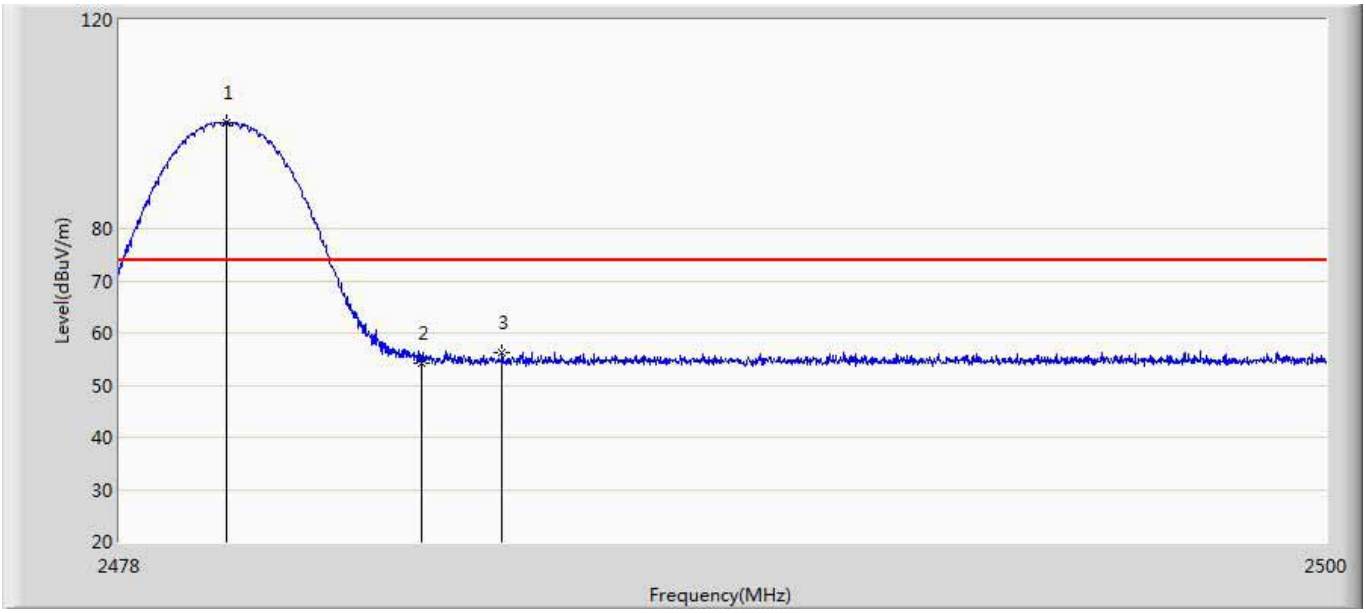
| | |
|---|---|
| Site: AC5 | Time: 2015/06/26 - 11:33 |
| Limit: FCC_Part15.209_RE(3m) | Margin: 0 |
| Probe: Horn_3117_00167055(1-18GHz) | Polarity: Horizontal |
| EUT: Zipp Mini | Power: AC 120V/60Hz |
| Note: Mode 3: Transmit at CH2402 by 3DH5 | |




| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | | 2374.837 | 56.610 | 19.662 | -17.390 | 74.000 | 36.948 | PK |
| 2 | | 2390.000 | 54.370 | 17.379 | -19.630 | 74.000 | 36.991 | PK |
| 3 | * | 2401.913 | 99.245 | 62.239 | N/A | N/A | 37.007 | PK |

| No | Mark | Frequency (MHz) | Peak Level (dBuV/m) | AV Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Duty Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | | 2374.837 | 56.610 | 25.980 | -28.020 | 54.000 | -30.63 | AV |
| 2 | | 2390.000 | 54.370 | 23.740 | -30.260 | 54.000 | -30.63 | AV |
| 3 | * | 2401.913 | 99.245 | 68.615 | N/A | N/A | -30.63 | AV |

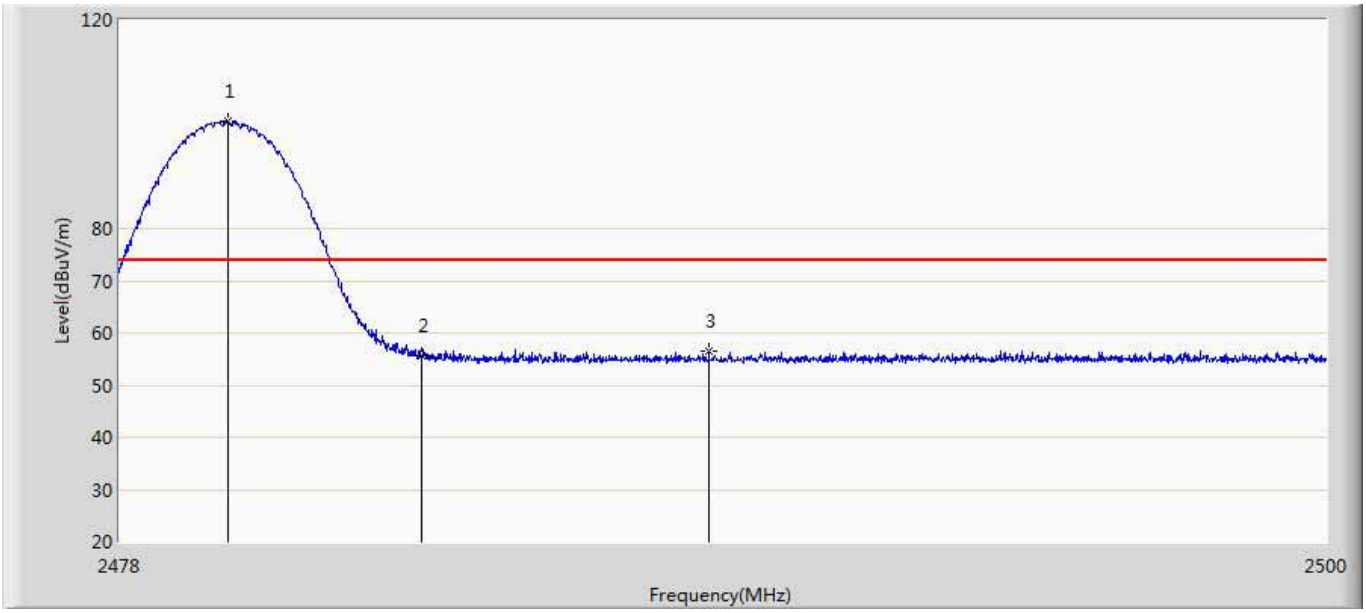
| | |
|---|---|
| Site: AC5 | Time: 2015/06/26 - 11:36 |
| Limit: FCC_Part15.209_RE(3m) | Margin: 0 |
| Probe: Horn_3117_00167055(1-18GHz) | Polarity: Vertical |
| EUT: Zipp Mini | Power: AC 120V/60Hz |
| Note: Mode 3: Transmit at CH2480 by 3DH5 | |




| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | * | 2479.947 | 100.337 | 63.000 | N/A | N/A | 37.337 | PK |
| 2 | | 2483.500 | 54.230 | 16.859 | -19.770 | 74.000 | 37.371 | PK |
| 3 | | 2484.952 | 56.364 | 18.979 | -17.636 | 74.000 | 37.386 | PK |

| No | Mark | Frequency (MHz) | Peak Level (dBuV/m) | AV Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Duty Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | * | 2479.947 | 100.337 | 69.707 | N/A | N/A | -30.63 | AV |
| 2 | | 2483.500 | 54.230 | 23.600 | -30.400 | 54.000 | -30.63 | AV |
| 3 | | 2484.952 | 56.364 | 25.734 | -28.266 | 54.000 | -30.63 | AV |

| | |
|---|---|
| Site: AC5 | Time: 2015/06/26 - 11:38 |
| Limit: FCC_Part15.209_RE(3m) | Margin: 0 |
| Probe: Horn_3117_00167055(1-18GHz) | Polarity: Horizontal |
| EUT: Zipp Mini | Power: AC 120V/60Hz |
| Note: Mode 3: Transmit at CH2480 by 3DH5 | |




| No | Mark | Frequency (MHz) | Measure Level (dBuV/m) | Reading Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | * | 2479.980 | 100.439 | 63.102 | N/A | N/A | 37.338 | PK |
| 2 | | 2483.500 | 55.654 | 18.283 | -18.346 | 74.000 | 37.371 | PK |
| 3 | | 2488.725 | 56.516 | 19.094 | -17.484 | 74.000 | 37.422 | PK |

| No | Mark | Frequency (MHz) | Peak Level (dBuV/m) | AV Level (dBuV) | Over Limit (dB) | Limit (dBuV/m) | Duty Factor (dB) | Type |
|---|---|---|---|---|---|---|---|---|
| 1 | * | 2479.980 | 100.439 | 69.809 | N/A | N/A | -30.63 | AV |
| 2 | | 2483.500 | 55.654 | 25.024 | -28.976 | 54.000 | -30.63 | AV |
| 3 | | 2488.725 | 56.516 | 25.886 | -28.114 | 54.000 | -30.63 | AV |

The End