

FCC / IC Radio Test Report

Applicant : Qualcomm Atheros, Inc.
Manufacturer : 1700 Technology Drive, San Jose, CA95110
Equipment : 1X1 802.11b/g/n-BT4.0 Combo PCIe MoB Module
Brand Name : Qualcomm Atheros
Model No. : QCMD335
FCC ID : PPD-QCMD335
IC ID : 4104A-QCMD335
Standard : 47 CFR FCC Part 15.247
RSS-210 Issue 8
Operating Band : 2400 MHz – 2483.5 MHz

The product sample received on Apr. 25, 2013 and completely tested on May 27, 2013. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2009 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by:

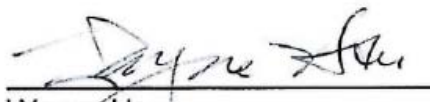

Wayne Hsu



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Summary of Test Result

| Conformance Test Specifications | | | | | |
|---------------------------------|--|---|---|--|----------|
| Report Clause | Ref. Std. Clause | Description | Measured | Limit | Result |
| 1.1.4 | 15.203 | Antenna Requirement | Antenna connector mechanism complied | According to FCC 15.203 | Complied |
| 3.1 | 15.247(a) / RSS-210 A8.1 / RSS-Gen 4.6.1 | 20dB Bandwidth | EDR: 1.3936 MHz | N/A | Complied |
| | | 99% Bandwidth | EDR: 1.2243 MHz | | |
| | | Carrier Frequency Separation (ChS) | EDR: 1.000 MHz | ChS \geq BW _{20dB} x2/3. | Complied |
| 3.2 | 15.247(a) / RSS-210 A8.1 | Number of Hopping Frequencies (N) | Max: 79 Min: 20 | N \geq 15 | Complied |
| 3.3 | 15.247(a) / RSS-210 A8.1 | Time of Occupancy (Dwell Time) | EDR: 0.316 sec | 0.4 s within 0.4 x N | Complied |
| 3.4 | 15.247(b) / RSS-210 A8.4 | RF Output Power (Maximum Peak Conducted Output Power) | BR: 4.45 dBm EDR: 7.41 dBm | BR:21 dBm EDR:21 dBm | Complied |
| 3.5 | 15.247(d) / RSS-210 A8.5 | Emission in Non-Restricted Frequency Bands | Non Restricted Bands: 2396.800MHz: 38.27dB | Non-Restricted Bands: > 20 dBc | Complied |
| 3.6.5 | 15.247(d) / RSS-210 A8.5 | Emission in Restricted Frequency Bands | Restricted Bands 7320.000 MHz 49.04 dBuV/m @ 3 m - PK | Restricted Bands: According to FCC 15.209 / RSS-Gen 6.1 | Complied |
| 3.7 | 15.207 / RSS-Gen 7.2.4 | AC Power-line Conducted Emissions | 0.1524030 MHz 30.94 dBuV - AV 50.53 dBuV - QP | According to FCC 15.207 / RSS-Gen 7.2.4 | Complied |

Revision History

[illegible]

1 General Description

1.1 Information

1.1.1 RF General Information (Bluetooth)

| RF General Information | | | | | |
|---|--|----------------|----------------|-----------------------|-------------|
| Frequency Range (MHz) | Ch. Freq. (MHz) | Channel Number | Bluetooth Mode | RF Output Power (dBm) | Co-location |
| 2400~2483.5 | 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480 | 0-78 [79] | BR-1Mbps | 4.45 | Yes |
| | | | EDR-2Mbps | 6.94 | |
| | | | EDR-3Mbps | 7.41 | |
| Note 1: Bluetooth BR uses a GFSK (1Mbps). Note 2: Bluetooth EDR uses a combination of $\pi/4$ -DQPSK (2Mbps) and 8DPSK (3Mbps). Note 3: RF output power specifies that Maximum Peak Conducted Output Power. Note 4: Co-location, Co-location is generally defined as simultaneously transmitting (co-transmitting) antennas within 20 cm of each other. (i.e., EUT has simultaneously co-transmitting that operating 2.4GHz and 5GHz.) | | | | | |

1.1.2 WLAN/ BT coexistence mode

- ♦ 1X1 WLAN + BT: WLAN/BT concurrent at different antenna port and 18MHz separation between WLAN and BT fundamental.

1.1.3 The HW Variants

There are two HW variants to this module. The pretesting is conducted and test data from worst case is recorded in test report.

- ♦ HW version 032: Single module - Antenna port on module.
- ♦ HW version 132: Limited module - Micro-strip trace and antenna port on host printed circuit board to antenna ports.

1.1.4 Antenna Information

| Antenna Category | |
|-------------------------------------|---|
| <input checked="" type="checkbox"/> | External antenna (dedicated antennas) |
| <input checked="" type="checkbox"/> | RF connector provided |
| <input checked="" type="checkbox"/> | Unique antenna connector. (e.g., MMCX, U.FL, IPX, and RP-SMA, RP-N type...) |
| <input type="checkbox"/> | Standard antenna connector. (e.g., SMA, N, BNC, and TNC type...) |

| Antenna General Information | | | |
|-----------------------------|-----------|----------------|--------------------|
| No. | Ant. Type | Frequency Band | Maximum Gain (dBi) |
| 1 | PIFA | 2400~2483.5MHz | 3.60 |

1.1.5 Type of EUT

| Identify EUT | |
|-------------------------------------|---|
| EUT Serial Number | N/A |
| Presentation of Equipment | <input checked="" type="checkbox"/> Production ; <input type="checkbox"/> Pre-Production ; <input type="checkbox"/> Prototype |
| Type of EUT | |
| <input checked="" type="checkbox"/> | Stand-alone |
| <input type="checkbox"/> | Combined (EUT where the radio part is fully integrated within another device) Combined Equipment - Brand Name / Model No.: ... |
| <input type="checkbox"/> | Plug-in radio (EUT intended for a variety of host systems) Host System - Brand Name / Model No.: ... |
| <input type="checkbox"/> | Other: |

1.1.6 Test Signal Duty Cycle

| Operated Mode for Worst Duty Cycle | |
|--|---------------------------------------|
| <input checked="" type="checkbox"/> Operated test mode for worst duty cycle | |
| Test Signal Duty Cycle (x) | Power Duty Factor [dB] – (10 log 1/x) |
| <input checked="" type="checkbox"/> 78.72% - test mode single channel - DH5 | 1.04 |
| Bluetooth ACL packets can be 1, 3, or 5 time slots. The DH1 packet can cover a single time slot. The DH3 packet can cover up to 3 time slots. The DH5 packet can cover up to 5 time slots. Operate DH5 at maximum dwell time and maximum duty cycle. | |

1.1.7 EUT Operational Condition

| | | | |
|-------------------|---|--|----------------------------------|
| Supply Voltage | <input type="checkbox"/> AC mains | <input checked="" type="checkbox"/> DC | |
| Type of DC Source | <input type="checkbox"/> Internal DC supply | <input checked="" type="checkbox"/> Host | <input type="checkbox"/> Battery |

1.2 Support Equipment

| Support Equipment - Conducted Emissions | | | | |
|---|-------------------------------------|------------|------------|------------|
| No. | Equipment | Brand Name | Model Name | Serial No. |
| 1 | Notebook | DELL | E6320 | DoC |
| 2 | (USB) Mouse | Microsoft | 1113 | DoC |
| 3 | (USB) Printer | EPSON | C61 | DoC |
| 4 | Bluetooth Earphone | SONY | HBH-PV702 | -- |
| 5 | Test Fixture | -- | -- | -- |
| 6 | Wireless AP (Remote Workstation) | D-LINK | DNS-G120 | DoC |

| Support Equipment - Radiated Emissions | | | | |
|--|--------------|------------|---------------|------------|
| No. | Equipment | Brand Name | Model Name | Serial No. |
| 1 | Notebook | DELL | INSPIRON 6400 | DoC |
| 2 | Test Fixture | -- | -- | -- |

1.3 Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ 47 CFR FCC Part 15 Subpart C 15.247
- ♦ RSS-210 Issue 8
- ♦ RSS-GEN Issue 3
- ♦ ANSI C63.10-2009
- ♦ FCC KDB 558074
- ♦ FCC DA 00-0705

1.4 Testing Location Information

| Testing Location | | | | |
|-------------------------------------|---------------|--|------------------|----------------------------|
| <input checked="" type="checkbox"/> | HWA YA | ADD : No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. | | |
| | | TEL : 886-3-327-3456 FAX : 886-3-327-0973 | | |
| Test Condition | Test Site No. | Test Engineer | Test Environment | Test Date |
| AC Conduction | CO04-HY | Zeus | 19.6°C / 60% | May 17, 2013 |
| RF Conducted | TH01-HY | Ian | 22.7°C / 47.6% | May 27, 2013 |
| Radiated Emission | 03CH02-HY | Hsiao | 24.6°C / 63% | May 03, 2013~ May 13, 2013 |

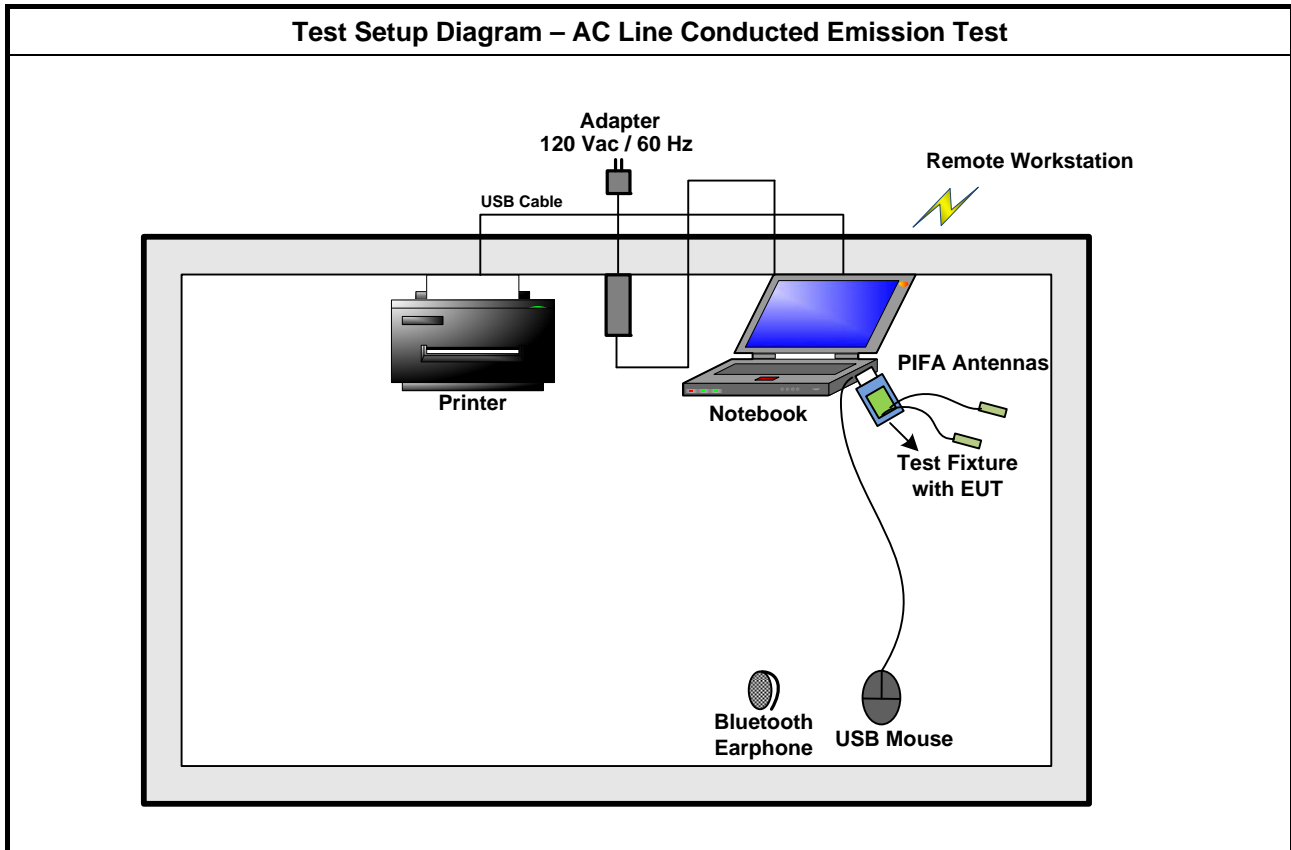
1.5 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))

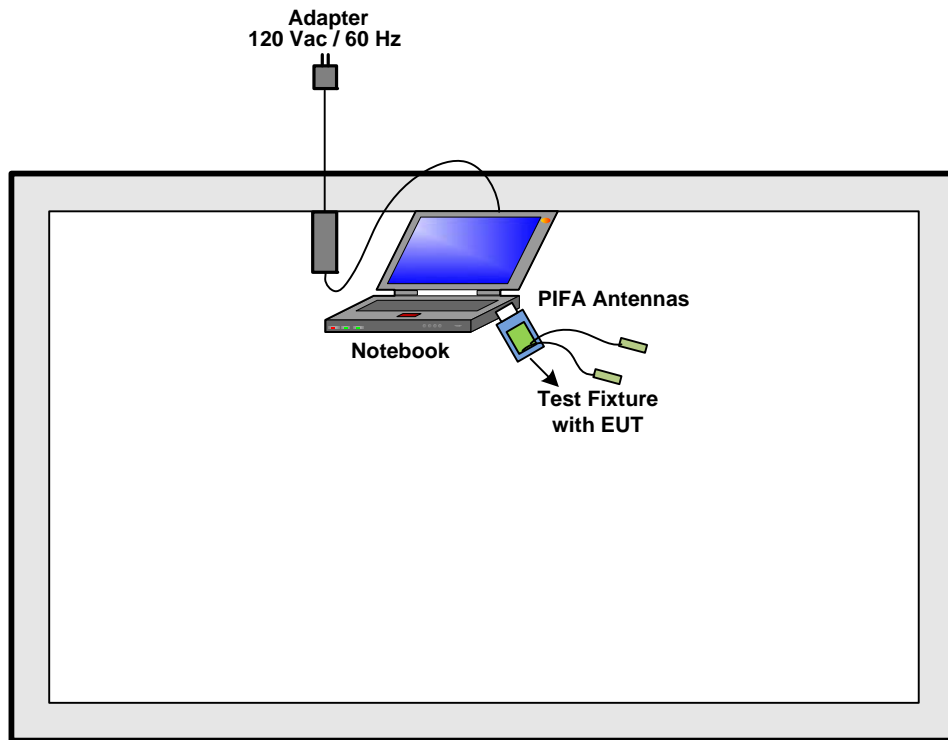
| Measurement Uncertainty | | | |
|-----------------------------------|---------------|-------------|-------|
| Test Item | | Uncertainty | Limit |
| AC power-line conducted emissions | | ±2.26 dB | N/A |
| Emission bandwidth, 6dB bandwidth | | ±1.42 % | N/A |
| RF output power, conducted | | ±0.63 dB | N/A |
| Power density, conducted | | ±0.81 dB | N/A |
| Unwanted emissions, conducted | 30 – 1000 MHz | ±0.51 dB | N/A |
| | 1 – 18 GHz | ±0.67 dB | N/A |
| | 18 – 40 GHz | ±0.83 dB | N/A |
| | 40 – 200 GHz | N/A | N/A |
| All emissions, radiated | 30 – 1000 MHz | ±2.56 dB | N/A |
| | 1 – 18 GHz | ±3.59 dB | N/A |
| | 18 – 40 GHz | ±3.82 dB | N/A |
| | 40 – 200 GHz | N/A | N/A |
| Temperature | | ±0.8 °C | N/A |
| Humidity | | ±3 % | N/A |
| DC and low frequency voltages | | ±3 % | N/A |
| Time | | ±1.42 % | N/A |
| Duty Cycle | | ±1.42 % | N/A |

2 Test Configuration of EUT

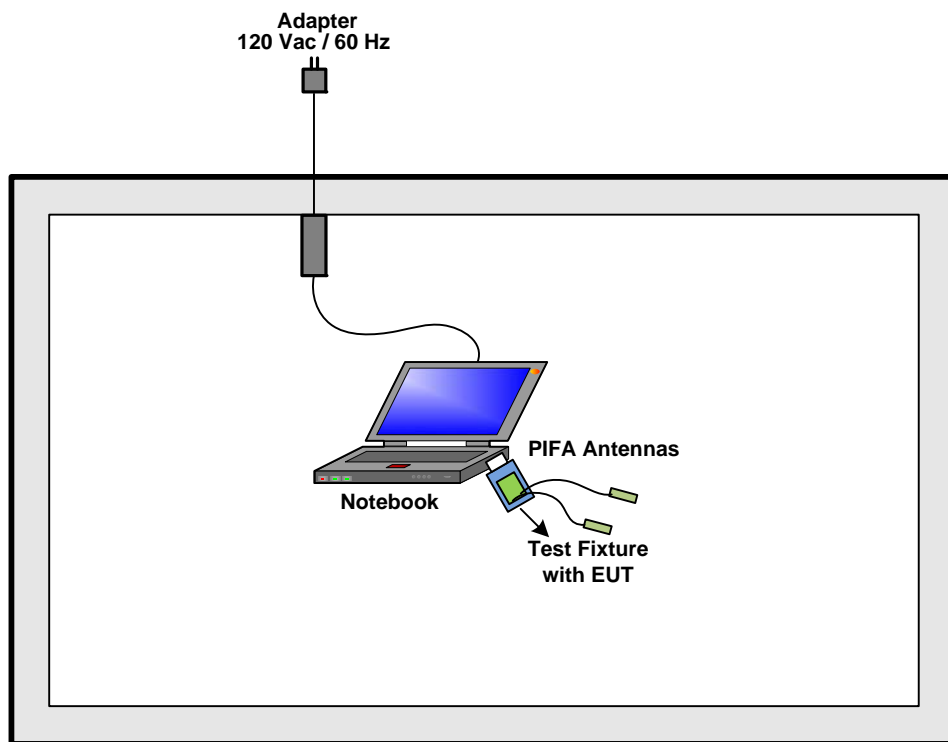
2.1 Test Setup Diagram



Test Setup Diagram - Radiated Test (Below 1GHz)



Test Setup Diagram - Radiated Test (Above 1GHz)



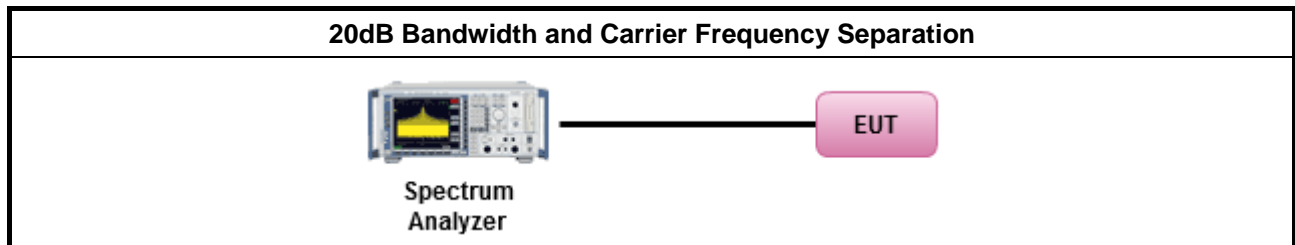
3 Transmitter Test Result

3.1 20dB Bandwidth and Carrier Frequency Separation

3.1.1 Test Procedures

| Test Method | |
|-------------------------------------|---|
| <input checked="" type="checkbox"/> | Refer as FCC KDB 558074, clause 6.9.1 for 20 dB bandwidth measurement. |
| <input checked="" type="checkbox"/> | Refer as FCC KDB 558074, clause 7.7.2 for carrier frequency separation measurement. |
| <input checked="" type="checkbox"/> | For conducted measurement. |
| <input checked="" type="checkbox"/> | The EUT supports single transmit chain and measurements performed on this transmit chain. |
| <input checked="" type="checkbox"/> | The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case. |

3.1.2 Test Setup

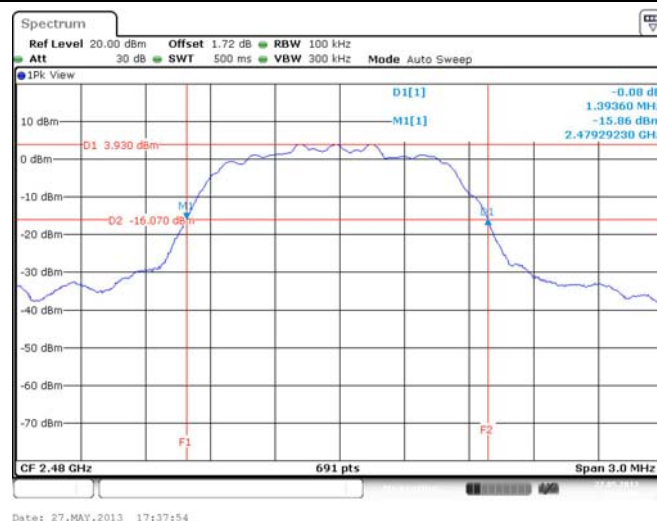


3.1.3 Test Result of 20dB Bandwidth and Carrier Frequency Separation

| 20dB Bandwidth and Carrier Frequency Separation Result | | | | | |
|--|-------------|----------------------|---------------------|--------------------------|---------------------------------|
| Modulation Mode | Freq. (MHz) | 20dB Bandwidth (MHz) | 99% Bandwidth (MHz) | Channel Separation (MHz) | Channel Separation Limits (MHz) |
| EDR-3Mbps | 2402 | 1.3849 | 1.2199 | 1.00 | 0.823 |
| EDR-3Mbps | 2440 | 1.3849 | 1.2199 | 1.00 | 0.823 |
| EDR-3Mbps | 2480 | 1.3936 | 1.2243 | 1.00 | 0.823 |
| Result | | Complied | | | |

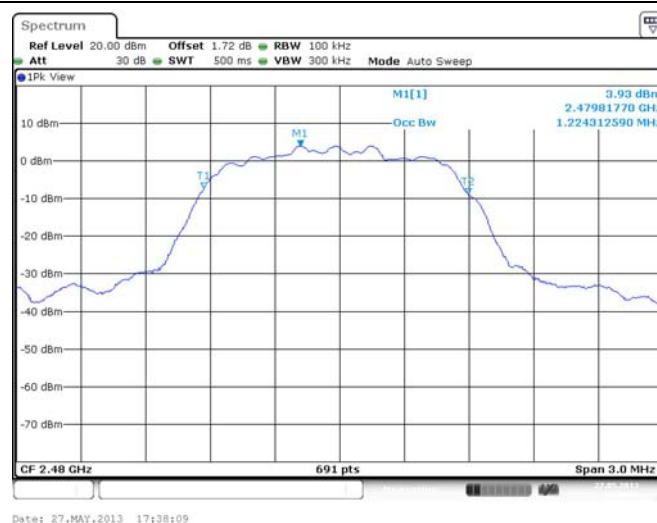
Worst 20dB Bandwidth Plots

EDR-3Mbps



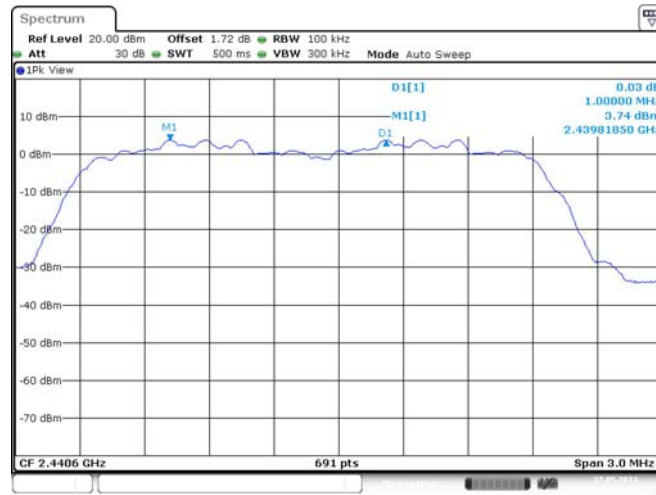
Worst 99% Bandwidth Plots

EDR-3Mbps



Worst Carrier Frequency Separation Plots

EDR-3Mbps

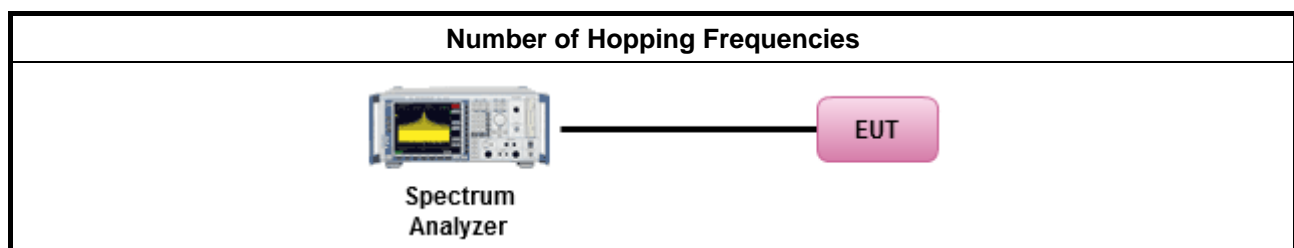


3.2 Number of Hopping Frequencies

3.2.1 Test Procedures

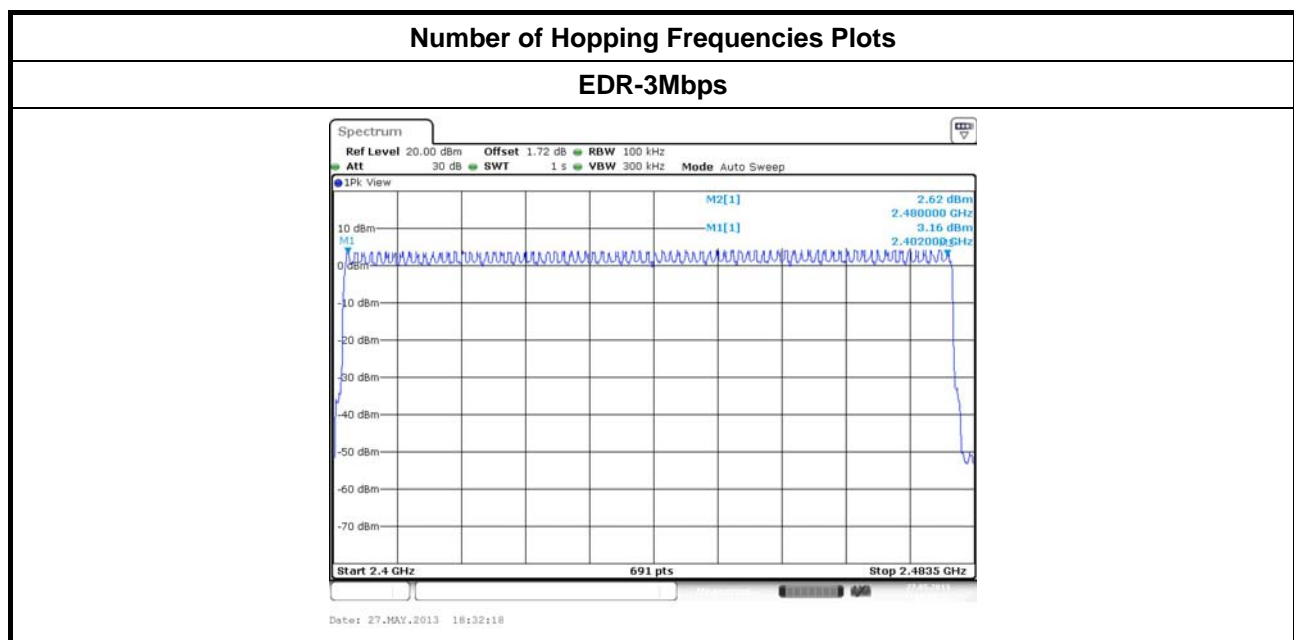
| Test Method | |
|-------------------------------------|---|
| <input checked="" type="checkbox"/> | Refer as FCC KDB 558074 clause 7.7.3 for number of hopping frequencies measurement. |
| <input checked="" type="checkbox"/> | For conducted measurement. |
| <input checked="" type="checkbox"/> | The EUT supports single transmit chain and measurements performed on this transmit chain. |
| <input checked="" type="checkbox"/> | The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case. |

3.2.2 Test Setup



3.2.3 Test Result of Number of Hopping Frequencies

| Number of Hopping Frequencies Result | | | |
|--------------------------------------|-----------------|----------------------------|-------------------------------|
| Modulation Mode | Freq. (MHz) | Hopping Channel Number (N) | Hopping Channel Number Limits |
| EDR-3Mbps | 2402-2480 | 79 | 15 |
| Result | Complied | | |

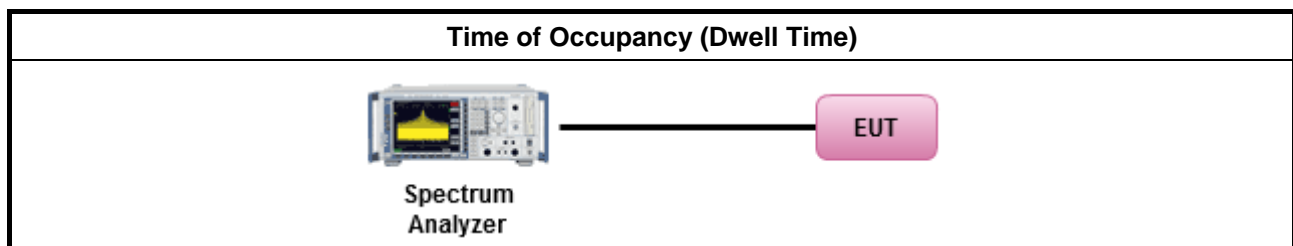


3.3 Time of Occupancy (Dwell Time)

3.3.1 Test Procedures

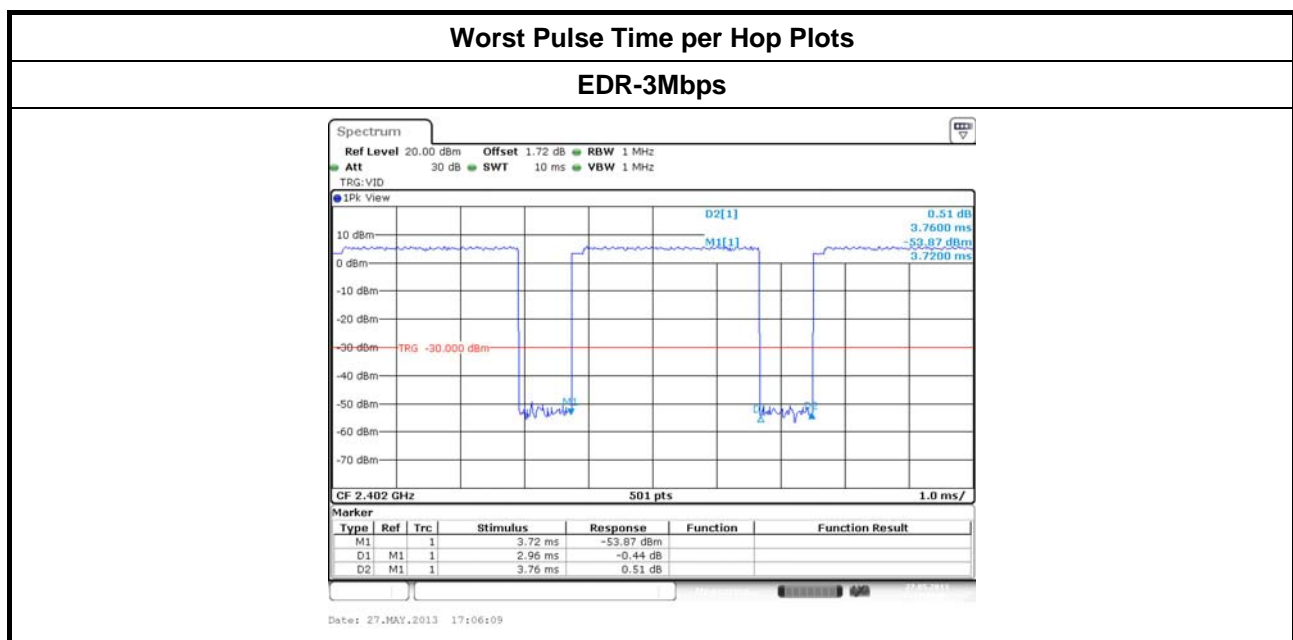
| Test Method | |
|-------------------------------------|--|
| <input checked="" type="checkbox"/> | Refer as FCC KDB 558074, clause 7.7.4 for dwell time measurement. |
| <input checked="" type="checkbox"/> | Bluetooth ACL packets can be 1, 3, or 5 time slots. Following as dwell time. Operate DH5 at maximum dwell time and maximum duty cycle. |
| <input checked="" type="checkbox"/> | The DH1 packet can cover a single time slot. A maximum length packet has duration of 1 time slot. The hopping rate is 1600 hops/second so the maximum dwell time is 1/1600 seconds, or 0.625ms. DH1 Packet permit maximum $1600 / 79 / 2 = 10.12$ hops per second in each channel (1 time slot RX, 1 time slot TX). So, the dwell time is the time duration of the pulse times $10.12 \times 31.6 = 320$ within 31.6 seconds. |
| <input checked="" type="checkbox"/> | The DH3 packet can cover up to 3 time slots. A maximum length packet has duration of 3 time slots. The hopping rate is 1600 hops/second so the maximum dwell time is 3/1600 seconds, or 1.875ms. DH3 Packet permit maximum $1600 / 79 / 4 = 5.06$ hops per second in each channel (3 time slots RX, 1 time slot TX). So, the dwell time is the time duration of the pulse times $5.06 \times 31.6 = 160$ within 31.6 seconds. |
| <input checked="" type="checkbox"/> | The DH5 packet can cover up to 5 time slots. Operate DH5 at maximum dwell time and maximum duty cycle. A maximum length packet has duration of 5 time slots. The hopping rate is 1600 hops/second so the maximum dwell time is 5/1600 seconds, or 3.125ms. DH5 Packet permit maximum $1600 / 79 / 6 = 3.37$ hops per second in each channel (5 time slots RX, 1 time slot TX). So, the dwell time is the time duration of the pulse times $3.37 \times 31.6 = 106.5$ within 31.6 seconds |
| <input checked="" type="checkbox"/> | For conducted measurement. |
| <input checked="" type="checkbox"/> | The EUT supports single transmit chain and measurements performed on this transmit chain. |
| <input checked="" type="checkbox"/> | The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case. |

3.3.2 Test Setup



3.3.3 Test Result of Time of Occupancy (Dwell Time)

| Time of Occupancy (Dwell Time) Result | | | | | |
|--|-------------|-------------------------|----------------------------------|---------------------------------|-----------------------|
| Modulation Mode | Freq. (MHz) | Pulse Time per Hop (ms) | Number of Pulse in [0.4 x N sec] | Dwell Time in [0.4 x N sec] (s) | Dwell Time Limits (s) |
| EDR-3Mbps | 2402 | 2.96 | 106.7 | 0.316 | 0.4 |
| Result | | Complied | | | |
| Bluetooth ACL packets can be 1, 3, or 5 time slots. The DH1 packet can cover a single time slot. The DH3 packet can cover up to 3 time slots. The DH5 packet can cover up to 5 time slots. Operate DH5 at maximum dwell time and maximum duty cycle. A maximum length packet has duration of 5 time slots. The hopping rate is 1600 hops/second so the maximum dwell time is 5/1600 seconds, or 3.125ms. | | | | | |

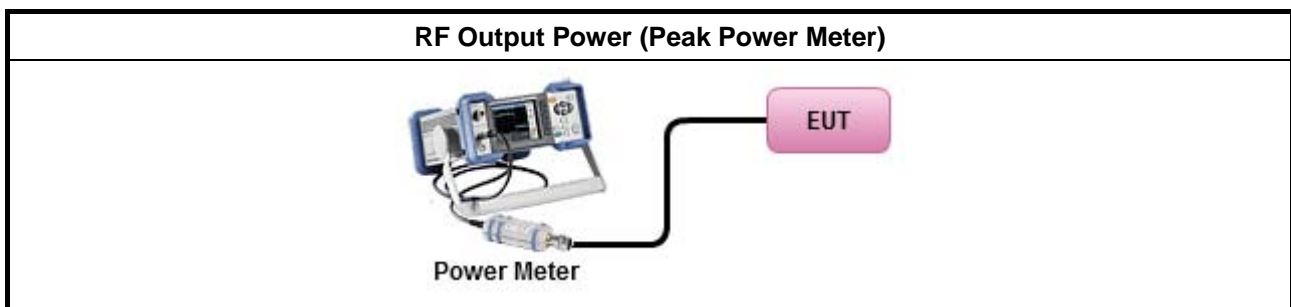


3.4 RF Output Power

3.4.1 Test Procedures

| Test Method | |
|-------------------------------------|---|
| <input checked="" type="checkbox"/> | Maximum Peak Conducted Output Power |
| <input type="checkbox"/> | Refer as FCC DA 00-0705, spectrum analyzer for peak power. |
| <input checked="" type="checkbox"/> | Refer as FCC DA 00-0705, peak power meter for peak power. |
| <input type="checkbox"/> | Refer as ANSI C63.10, clause 6.10.2.1 a) for peak power meter. |
| <input type="checkbox"/> | Refer as ANSI C63.10, clause 6.10.2.1 a) for spectrum analyzer - (RBW \geq EBW). |
| <input checked="" type="checkbox"/> | For conducted measurement. |
| <input checked="" type="checkbox"/> | The EUT supports single transmit chain and measurements performed on this transmit chain. |
| <input checked="" type="checkbox"/> | The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case. |

3.4.2 Test Setup



3.4.3 Test Result of Maximum Peak Conducted Output Power

| Maximum Peak Conducted Output Power Result | | | | | | |
|--|-------------|-----------------------|-------------|--------------------|------------|------------|
| Condition | | RF Output Power (dBm) | | | | |
| Modulation Mode | Freq. (MHz) | RF Output Power | Power Limit | Antenna Gain (dBi) | EIRP Power | EIRP Limit |
| BR-1Mbps | 2402 | 3.95 | 21 | 3.60 | 7.55 | 27 |
| BR-1Mbps | 2440 | 4.14 | 21 | 3.60 | 7.74 | 27 |
| BR-1Mbps | 2480 | 4.45 | 21 | 3.60 | 8.05 | 27 |
| EDR-3Mbps | 2402 | 6.99 | 21 | 3.60 | 10.59 | 27 |
| EDR-3Mbps | 2440 | 7.15 | 21 | 3.60 | 10.75 | 27 |
| EDR-3Mbps | 2480 | 7.41 | 21 | 3.60 | 11.01 | 27 |
| Result | | Complied | | | | |

3.4.4 Test Result of Maximum Average Conducted Output Power

| Maximum Average Conducted Output Power Result | | | | |
|---|-------------|-----------------------|--------------------|------------|
| Condition | | RF Output Power (dBm) | | |
| Modulation Mode | Freq. (MHz) | RF Output Power | Antenna Gain (dBi) | EIRP Power |
| BR-1Mbps | 2402 | 3.73 | 3.60 | 7.33 |
| BR-1Mbps | 2440 | 3.88 | 3.60 | 7.48 |
| BR-1Mbps | 2480 | 4.22 | 3.60 | 7.82 |
| EDR-3Mbps | 2402 | 3.95 | 3.60 | 7.55 |
| EDR-3Mbps | 2440 | 4.17 | 3.60 | 7.77 |
| EDR-3Mbps | 2480 | 4.46 | 3.60 | 8.06 |
| Result | | Complied | | |

3.5 Emission in Non-Restricted Frequency Bands

3.5.1 Test Procedures

| Test Method – General Information | |
|-------------------------------------|--|
| <input checked="" type="checkbox"/> | The average emission levels shall be measured in [duty cycle \geq 98 or duty factor]. |
| <input checked="" type="checkbox"/> | Refer as ANSI C63.10, clause 6.9.2.2 bandedge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band. |
| <input checked="" type="checkbox"/> | For the transmitter unwanted emissions shall be measured using following options below: |
| <input checked="" type="checkbox"/> | For unwanted emissions into non-restricted bands. Peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak PSD level. |
| <input checked="" type="checkbox"/> | For unwanted emissions into restricted bands. |
| <input checked="" type="checkbox"/> | Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). VBW \geq 1/T, where T is pulse time. |
| <input checked="" type="checkbox"/> | Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions. |
| <input checked="" type="checkbox"/> | Refer as ANSI C63.10, clause 4.2.3.2.2 measurement procedure peak limit. |
| <input checked="" type="checkbox"/> | For the transmitter bandedge emissions shall be measured using following options below: |
| <input checked="" type="checkbox"/> | Refer as ANSI C63.10, clause 6.9.2 for band-edge testing. |
| <input type="checkbox"/> | Refer as ANSI C63.10, clause 6.9.3 for marker-delta method for band-edge measurements. |
| <input checked="" type="checkbox"/> | Refer as ANSI C63.10, clause 7.7.9 for band-edge testing into non-restricted bands. |
| <input checked="" type="checkbox"/> | For radiated measurement, refer as ANSI C63.10, clause 6.6 for radiated emissions from above 1 GHz. |

3.5.2 Emission in non-restricted frequency bands

| EDR-3Mbps | | | | | | |
|------------------|-------------------------------|-------------|--------------------------------|----------------|------------|------|
| Test Freq. (MHz) | In-band PSD [i] (dBuV/100kHz) | Freq. (MHz) | Out-band PSD [o] (dBuV/100kHz) | [i] – [o] (dB) | Limit (dB) | Pol. |
| 2402 | 101.73 | 2396.800 | 63.46 | 38.27 | 20 | H |
| 2480 | 103.59 | 2535.440 | 63.80 | 39.79 | 20 | H |

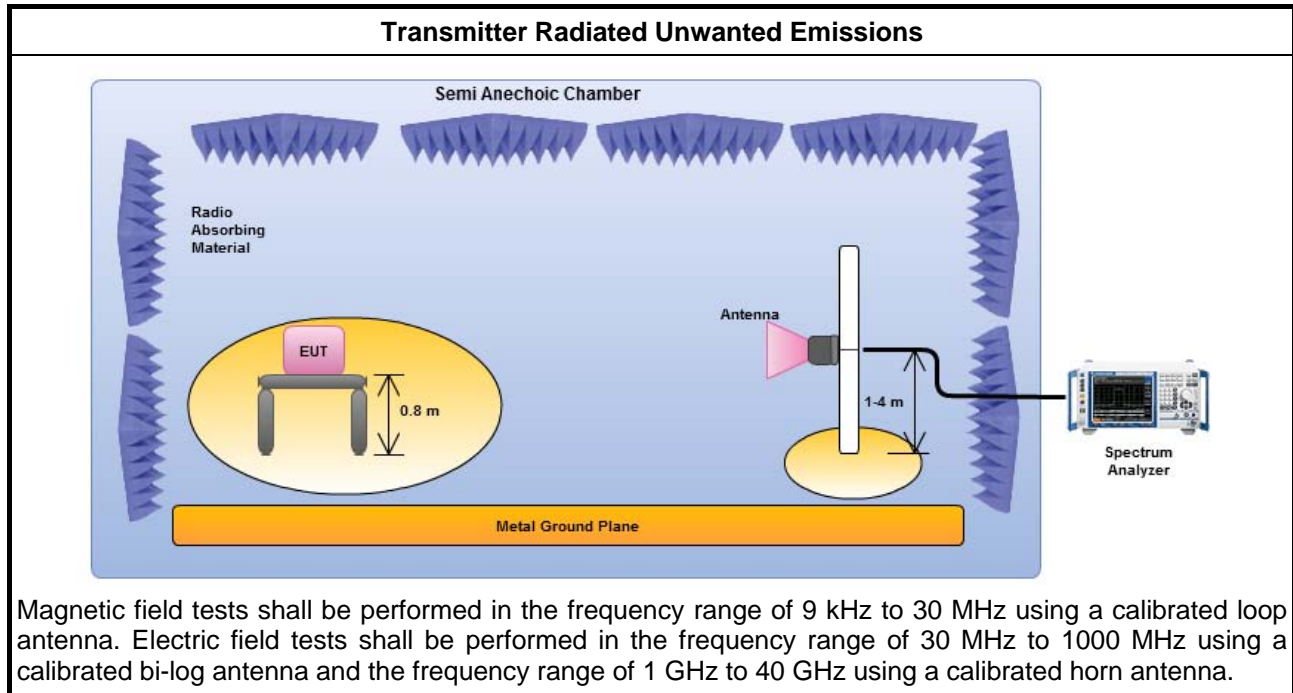
Note 1: Measurement worst emissions of receive antenna polarization

3.6 Emission in Restricted Frequency Bands

3.6.1 Test Procedures

| Test Method – General Information | |
|-------------------------------------|---|
| <input checked="" type="checkbox"/> | Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements). |
| <input checked="" type="checkbox"/> | Measurements in the frequency range 10 GHz - 18GHz are typically made at a closer distance 1m, because the instrumentation noise floor is typically close to the radiated emission limit. |
| <input checked="" type="checkbox"/> | Measurements in the frequency range above 18 GHz - 25GHz are typically made at a closer distance 0.5m, because the instrumentation noise floor is typically close to the radiated emission limit. |
| <input checked="" type="checkbox"/> | The average emission levels shall be measured in [duty cycle \geq 98 or duty factor]. |
| <input checked="" type="checkbox"/> | For the transmitter unwanted emissions shall be measured using following options below: |
| <input checked="" type="checkbox"/> | Refer as FCC DA 00-0705, for spurious radiated emissions. 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 $20\log(\text{dwell time}/100 \text{ ms})$ |
| <input checked="" type="checkbox"/> | For unwanted emissions into non-restricted bands. Peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak PSD level. |
| <input checked="" type="checkbox"/> | For unwanted emissions into restricted bands. |
| <input type="checkbox"/> | Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). $\text{VBW} \geq 1/T$, where T is pulse time. |
| <input checked="" type="checkbox"/> | Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions. |
| <input checked="" type="checkbox"/> | Refer as ANSI C63.10, clause 4.2.3.2.2 measurement procedure peak limit. |
| <input checked="" type="checkbox"/> | For radiated measurement. |
| <input checked="" type="checkbox"/> | Refer as ANSI C63.10, clause 6.4 for radiated emissions from below 30 MHz. |
| <input checked="" type="checkbox"/> | Refer as ANSI C63.10, clause 6.5 for radiated emissions from 30 MHz to 1000 MHz. |
| <input checked="" type="checkbox"/> | Refer as ANSI C63.10, clause 6.6 for radiated emissions from above 1 GHz. |

3.6.2 Test Setup



3.6.3 Emission in Restricted Frequency Bands (Below 30MHz)

All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

3.6.4 Emission in Restricted Frequency Bands (Below 1GHz)

| | | | |
|--------------------|-----------|------------------|------|
| Modulation Mode | EDR-2Mbps | Test Freq. (MHz) | 2440 |
| Operating Function | Transmit | Polarization | V |

Level (dBuV/m)

80

30

-20

30

224.

418.

612.

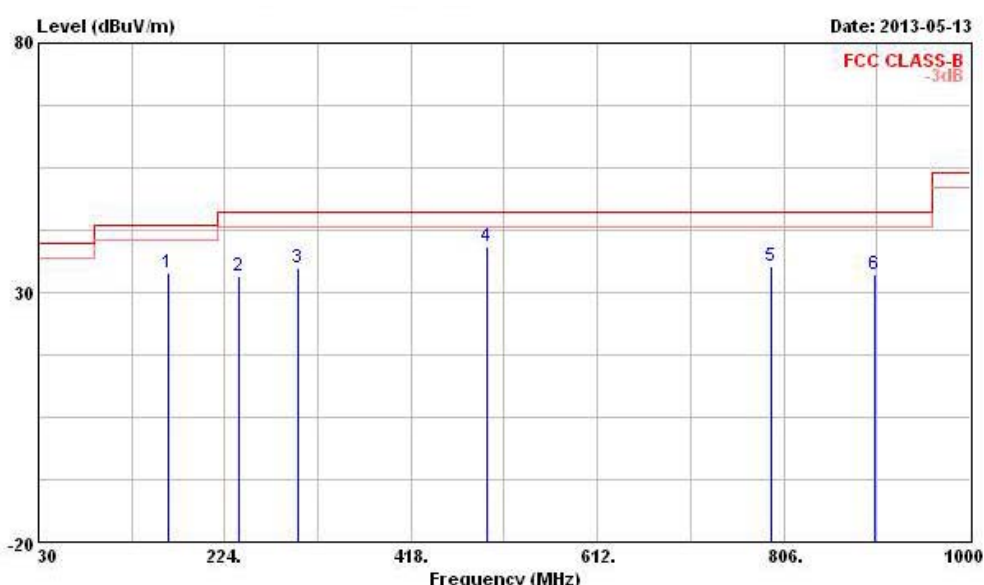
806.

1000

Frequency (MHz)

Date: 2013-05-13

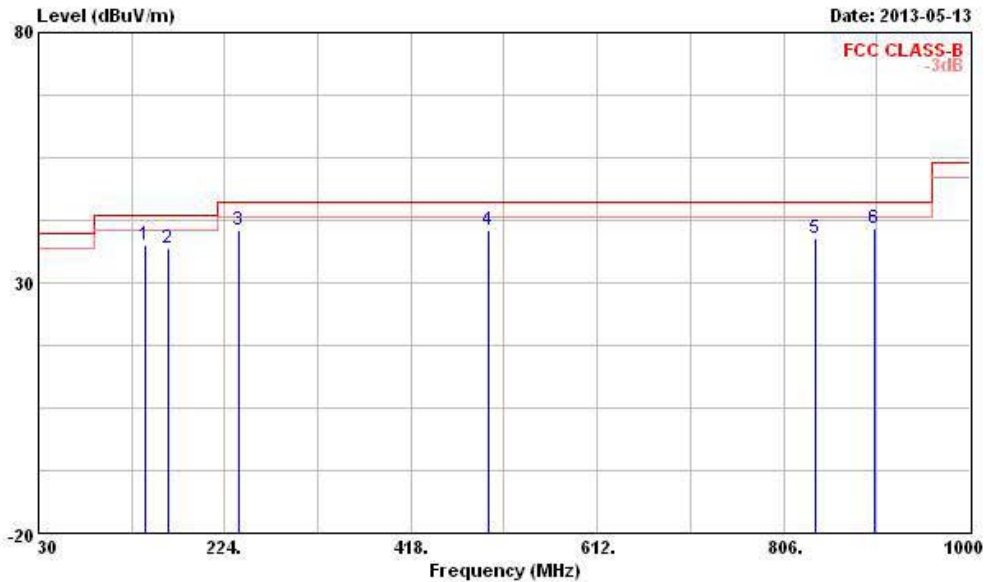
FCC CLASS-B
-3dB



| | Freq | Level | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamplifier | Remark | Ant Pos | Table Pos |
|---|---------|--------|------------|------------|-------------------|----------------|------------|--------------|--------|---------|-----------|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 | 164.830 | 34.03 | -9.47 | 43.50 | 49.51 | 10.34 | 1.82 | 27.64 | Peak | --- | --- |
| 2 | 238.550 | 33.14 | -12.86 | 46.00 | 45.59 | 12.62 | 2.32 | 27.39 | Peak | --- | --- |
| 3 | 299.660 | 34.81 | -11.19 | 46.00 | 45.77 | 13.70 | 2.55 | 27.21 | Peak | --- | --- |
| 4 | 497.540 | 39.07 | -6.93 | 46.00 | 46.89 | 17.24 | 3.41 | 28.47 | Peak | --- | --- |
| 5 | 792.420 | 35.19 | -10.81 | 46.00 | 38.76 | 20.16 | 4.38 | 28.11 | Peak | --- | --- |
| 6 | 901.060 | 33.68 | -12.32 | 46.00 | 36.75 | 20.08 | 4.61 | 27.76 | Peak | --- | --- |

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

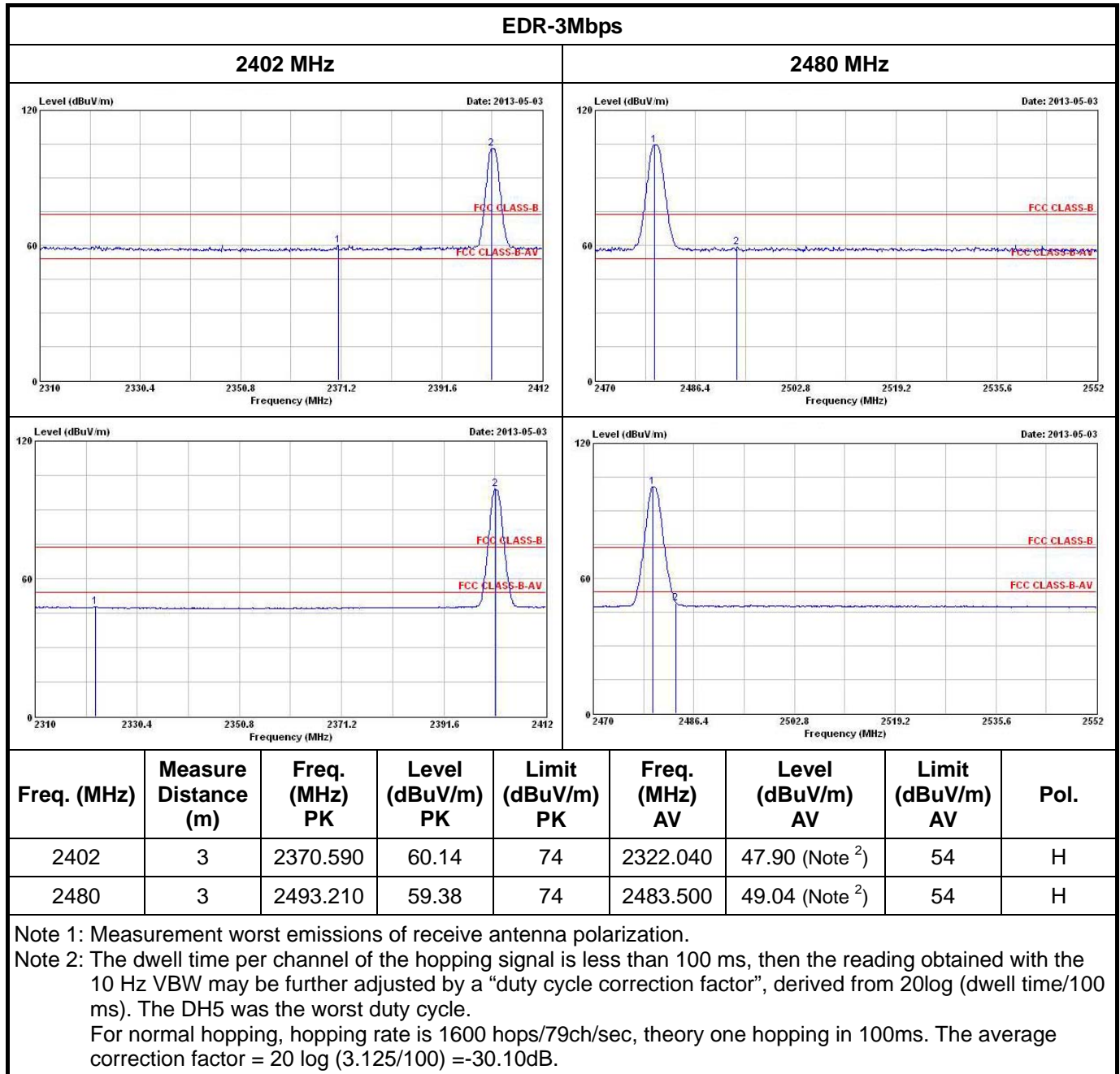
| | | | |
|--------------------|-----------|------------------|------|
| Modulation Mode | EDR-2Mbps | Test Freq. (MHz) | 2440 |
| Operating Function | Transmit | Polarization | H |



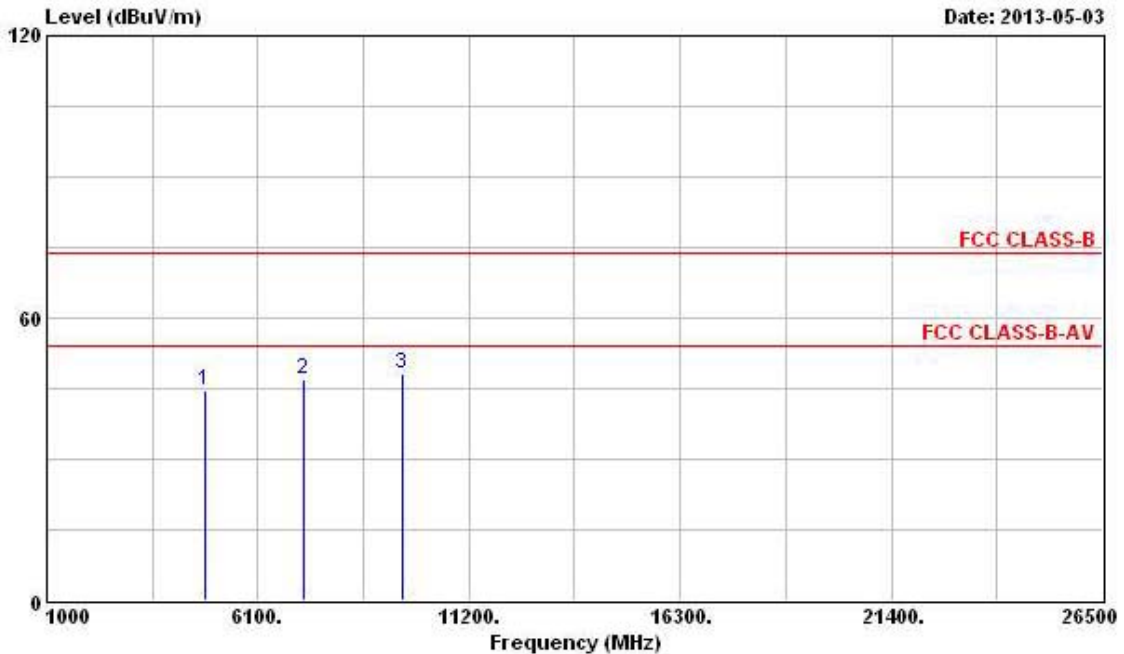
| | Freq | Level | Over | Limit | ReadAntenna | Cable | Preamp | | Ant | Table |
|---|---------|--------|-------|--------|-------------|-------|--------|------------|-----|-------|
| | MHz | dBuV/m | Limit | Line | Level | Loss | Factor | Remark | Pos | Pos |
| | | | dB | dBuV/m | dBuV | dB/m | dB | dB | cm | deg |
| 1 | 141.550 | 37.55 | -5.95 | 43.50 | 51.79 | 11.78 | 1.71 | 27.73 Peak | --- | --- |
| 2 | 164.830 | 37.00 | -6.50 | 43.50 | 52.48 | 10.34 | 1.82 | 27.64 Peak | --- | --- |
| 3 | 238.550 | 40.67 | -5.33 | 46.00 | 53.12 | 12.62 | 2.32 | 27.39 Peak | --- | --- |
| 4 | 498.510 | 40.50 | -5.50 | 46.00 | 48.30 | 17.26 | 3.41 | 28.47 Peak | --- | --- |
| 5 | 839.950 | 38.75 | -7.25 | 46.00 | 42.04 | 20.17 | 4.50 | 27.96 Peak | --- | --- |
| 6 | 901.060 | 40.90 | -5.10 | 46.00 | 43.97 | 20.08 | 4.61 | 27.76 Peak | --- | --- |

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

3.6.5 Emission in Restricted Frequency Bands (Above 1GHz)



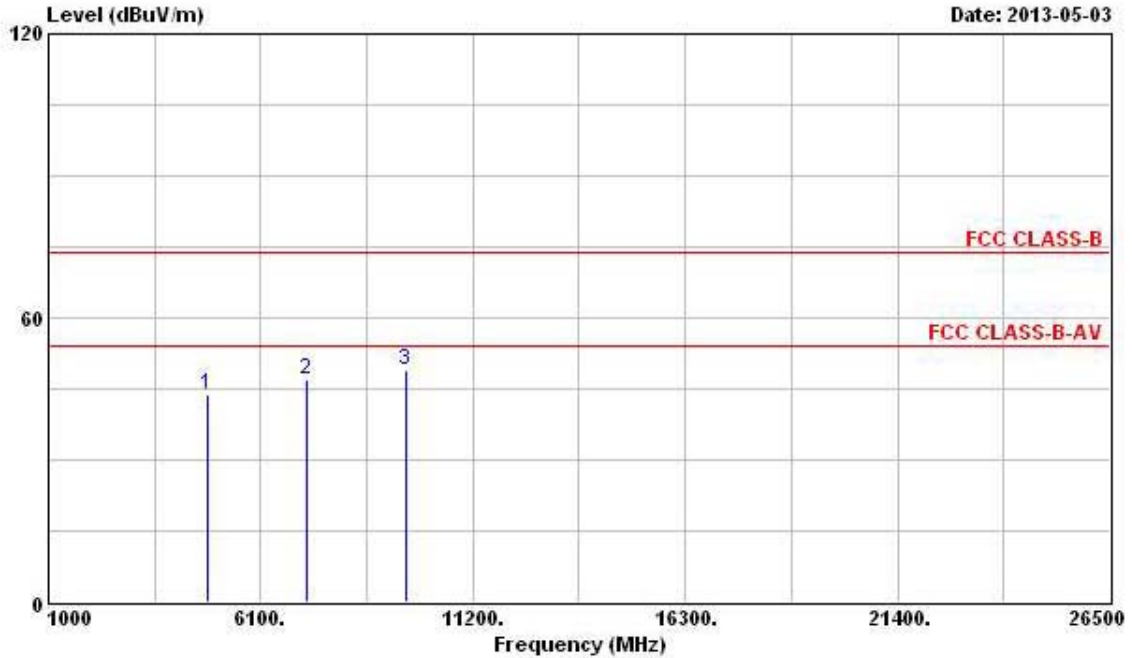
| | | | |
|--------------------|-----------|------------------|------|
| Modulation Mode | EDR-2Mbps | Test Freq. (MHz) | 2402 |
| Operating Function | Transmit | Polarization | V |



| | Freq | Level | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|----------|--------|------------|------------|-------------------|----------------|------------|---------------|--------|---------|-----------|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 | 4804.000 | 44.57 | -9.43 | 54.00 | 40.32 | 34.81 | 4.32 | 34.88 | PK | --- | --- |
| 2 | 7206.000 | 46.82 | | | 40.36 | 35.90 | 5.70 | 35.14 | Peak | --- | --- |
| 3 | 9608.000 | 48.28 | | | 40.53 | 36.87 | 6.45 | 35.57 | Peak | --- | --- |

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
 Note 3: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
 Note 4: For un-restricted bands, unwanted emissions (item 2 and 3) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.
 Note 5: Average emission obtained from the worst average correction factor = $20 \log (3.125 \times 4 / 100) = -18.1 \text{ dB}$.

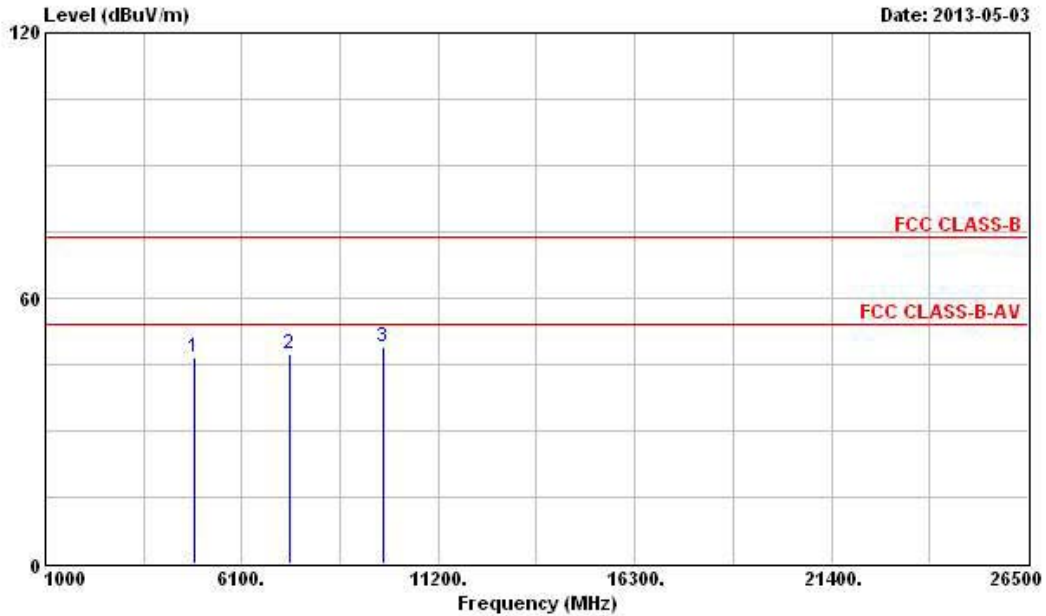
| | | | |
|--------------------|-----------|------------------|------|
| Modulation Mode | EDR-2Mbps | Test Freq. (MHz) | 2402 |
| Operating Function | Transmit | Polarization | H |



| | Freq | Level | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|----------|--------|------------|------------|-------------------|----------------|------------|---------------|--------|---------|-----------|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 | 4804.000 | 43.65 | -10.35 | 54.00 | 39.40 | 34.81 | 4.32 | 34.88 | PK | --- | --- |
| 2 | 7206.000 | 47.05 | | | 40.59 | 35.90 | 5.70 | 35.14 | Peak | --- | --- |
| 3 | 9608.000 | 48.91 | | | 41.16 | 36.87 | 6.45 | 35.57 | Peak | --- | --- |

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
 Note 3: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
 Note 4: For un-restricted bands, unwanted emissions (item 2 and 3) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.
 Note 5: Average emission obtained from the worst average correction factor = $20 \log (3.125 \times 4 / 100) = -18.1 \text{ dB}$.

| | | | |
|--------------------|-----------|------------------|------|
| Modulation Mode | EDR-2Mbps | Test Freq. (MHz) | 2440 |
| Operating Function | Transmit | Polarization | V |



| | Freq | Level | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamplifier Factor | Remark | Ant Pos | Table Pos |
|---|----------|--------|------------|------------|-------------------|----------------|------------|---------------------|--------|---------|-----------|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 | 4880.000 | 46.63 | -7.37 | 54.00 | 42.41 | 34.77 | 4.31 | 34.86 | PK | --- | --- |
| 2 | 7320.000 | 47.27 | -6.73 | 54.00 | 40.83 | 35.90 | 5.71 | 35.17 | PK | --- | --- |
| 3 | 9760.000 | 48.82 | | | 40.99 | 37.11 | 6.30 | 35.58 | Peak | --- | --- |

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

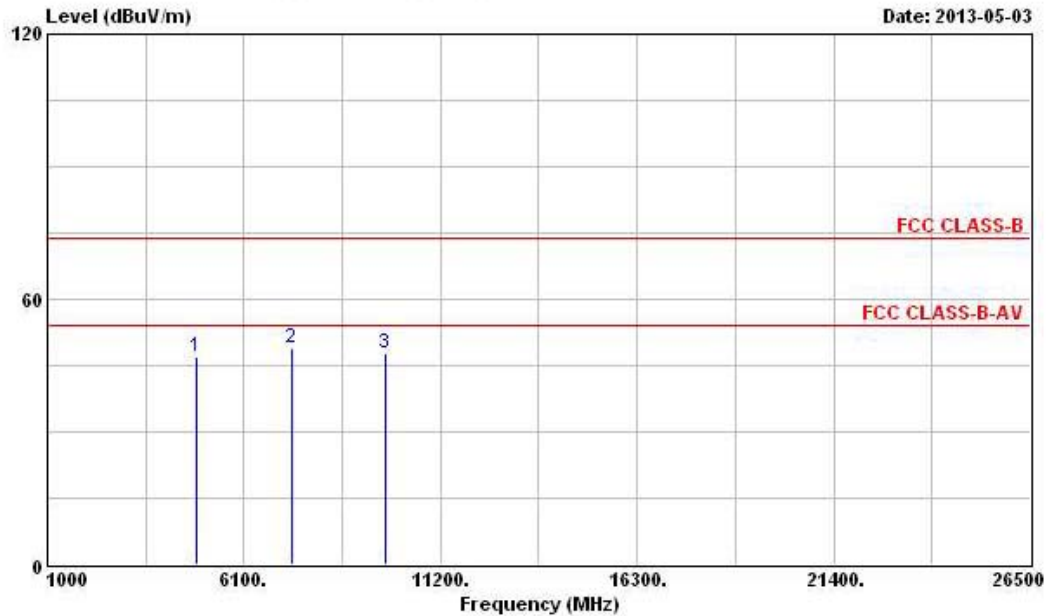
Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

Note 3: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 4: For un-restricted bands, unwanted emissions (item 3) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

Note 5: Average emission obtained from the worst average correction factor = $20 \log (3.125 \times 4 / 100) = -18.1 \text{ dB}$.

| | | | |
|--------------------|-----------|------------------|------|
| Modulation Mode | EDR-2Mbps | Test Freq. (MHz) | 2441 |
| Operating Function | Transmit | Polarization | H |



| | Freq | Level | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|----------|--------|------------|------------|-------------------|----------------|------------|---------------|--------|---------|-----------|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 | 4880.000 | 46.83 | -7.17 | 54.00 | 42.61 | 34.77 | 4.31 | 34.86 | PK | --- | --- |
| 2 | 7320.000 | 49.04 | -4.96 | 54.00 | 42.60 | 35.90 | 5.71 | 35.17 | PK | --- | --- |
| 3 | 9760.000 | 47.71 | | | 39.88 | 37.11 | 6.30 | 35.58 | Peak | --- | --- |

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

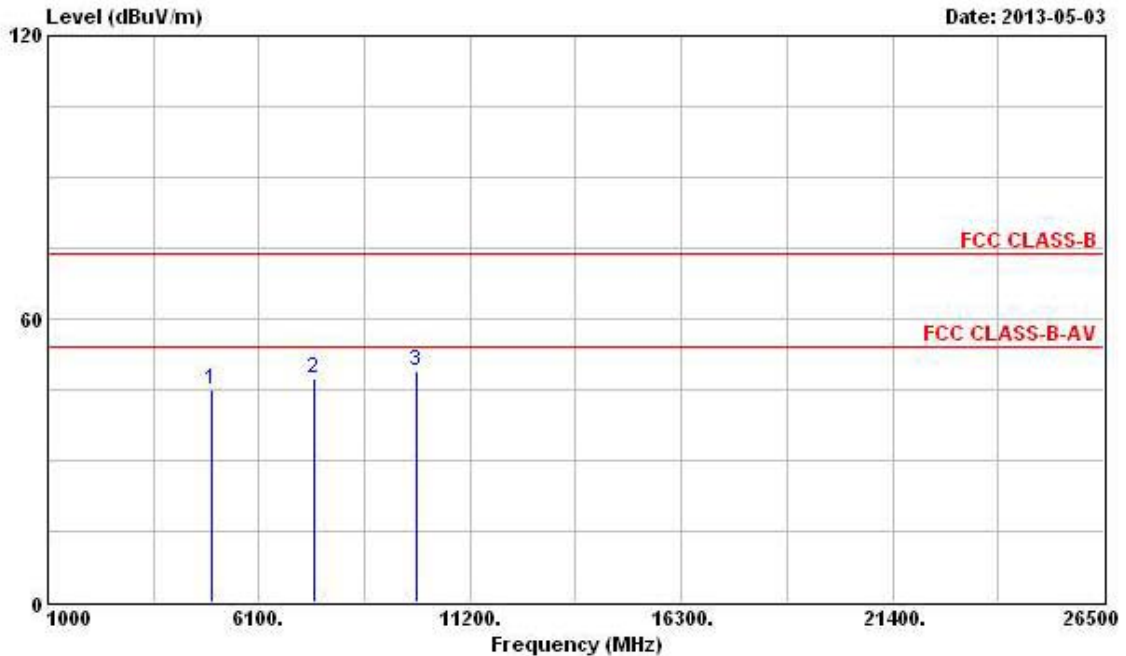
Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

Note 3: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 4: For un-restricted bands, unwanted emissions (item 3) shall be attenuated by at least 20dB relative to the maximum measured in-band level.

Note 5: Average emission obtained from the worst average correction factor = $20 \log (3.125 \times 4 / 100) = -18.1 \text{ dB}$.

| | | | |
|--------------------|-----------|------------------|------|
| Modulation Mode | EDR-2Mbps | Test Freq. (MHz) | 2480 |
| Operating Function | Transmit | Polarization | V |



| | Freq | Level | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|----------|--------|------------|------------|-------------------|----------------|------------|---------------|--------|---------|-----------|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 | 4960.000 | 45.01 | -8.99 | 54.00 | 40.86 | 34.72 | 4.27 | 34.84 | PK | --- | --- |
| 2 | 7440.000 | 47.54 | -6.46 | 54.00 | 41.14 | 35.90 | 5.71 | 35.21 | PK | --- | --- |
| 3 | 9920.000 | 48.95 | | | 41.01 | 37.39 | 6.14 | 35.59 | Peak | --- | --- |

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.

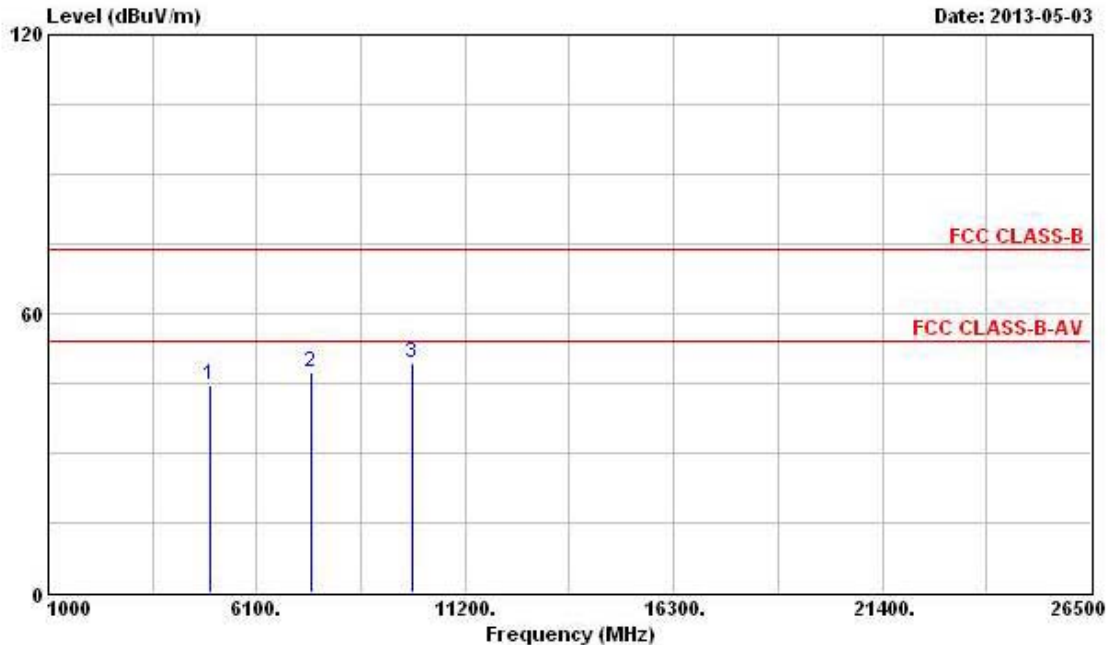
Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)

Note 3: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.

Note 4: For un-restricted bands, unwanted emissions (item 3) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.

Note 5: Average emission obtained from the worst average correction factor = $20 \log (3.125 \times 4 / 100) = -18.1 \text{ dB}$.

| | | | |
|--------------------|-----------|------------------|------|
| Modulation Mode | EDR-2Mbps | Test Freq. (MHz) | 2480 |
| Operating Function | Transmit | Polarization | H |



| | Freq | Level | Over Limit | Limit Line | ReadAntenna Level | Antenna Factor | Cable Loss | Preamp Factor | Remark | Ant Pos | Table Pos |
|---|----------|--------|------------|------------|-------------------|----------------|------------|---------------|--------|---------|-----------|
| | MHz | dBuV/m | dB | dBuV/m | dBuV | dB/m | dB | dB | | cm | deg |
| 1 | 4960.000 | 44.73 | -9.27 | 54.00 | 40.58 | 34.72 | 4.27 | 34.84 | PK | --- | --- |
| 2 | 7440.000 | 47.41 | -6.59 | 54.00 | 41.01 | 35.90 | 5.71 | 35.21 | PK | --- | --- |
| 3 | 9920.000 | 49.38 | | | 41.44 | 37.39 | 6.14 | 35.59 | Peak | --- | --- |

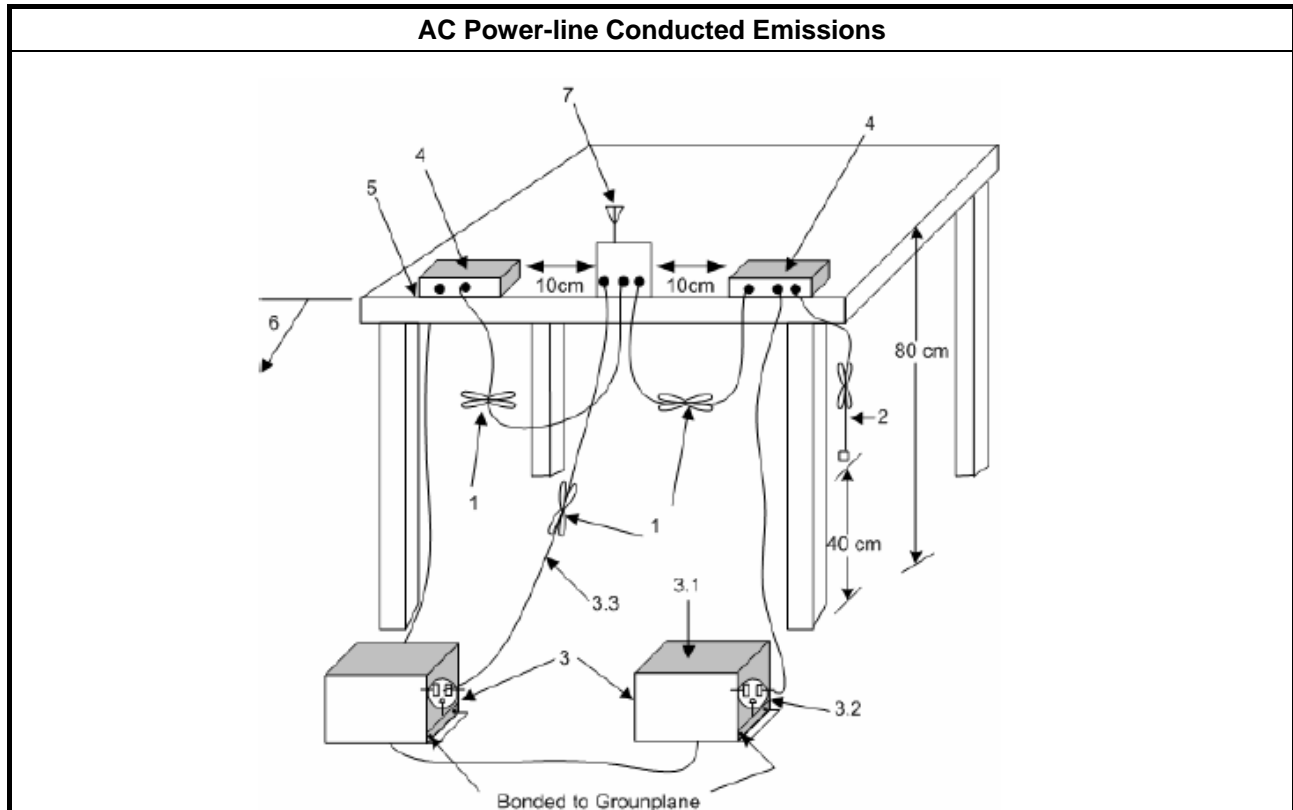
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
 Note 3: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
 Note 4: For un-restricted bands, unwanted emissions (item 3) shall be attenuated by at least 20 dB relative to the maximum measured in-band level.
 Note 5: Average emission obtained from the worst average correction factor = $20 \log (3.125 \times 4 / 100) = -18.1 \text{ dB}$.

3.7 AC Power-line Conducted Emissions

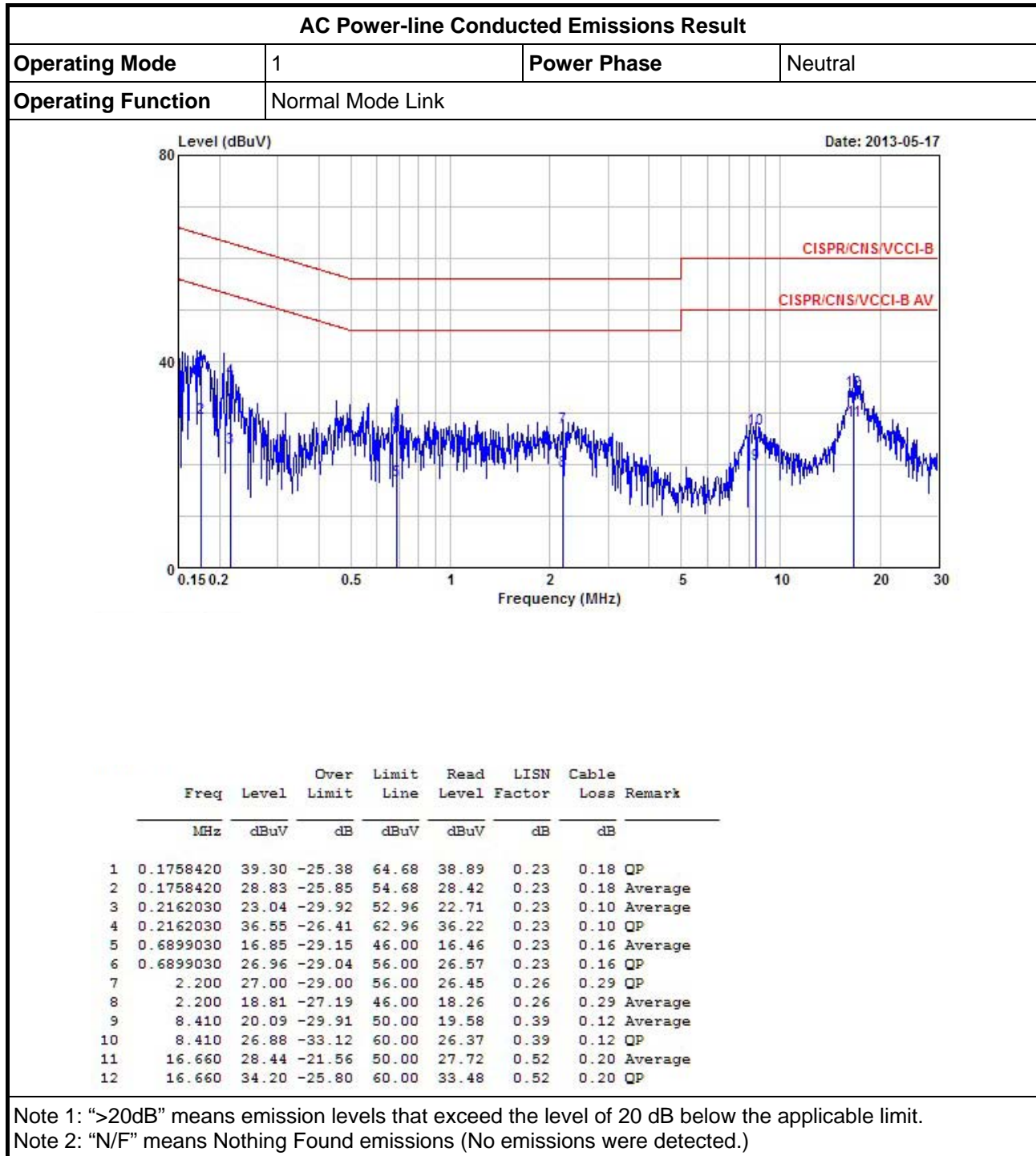
3.7.1 Test Procedures

| Test Method |
|--|
| <input checked="" type="checkbox"/> Refer as ANSI C63.10-2009, clause 6.2 for AC power-line conducted emissions. |

3.7.2 Test Setup

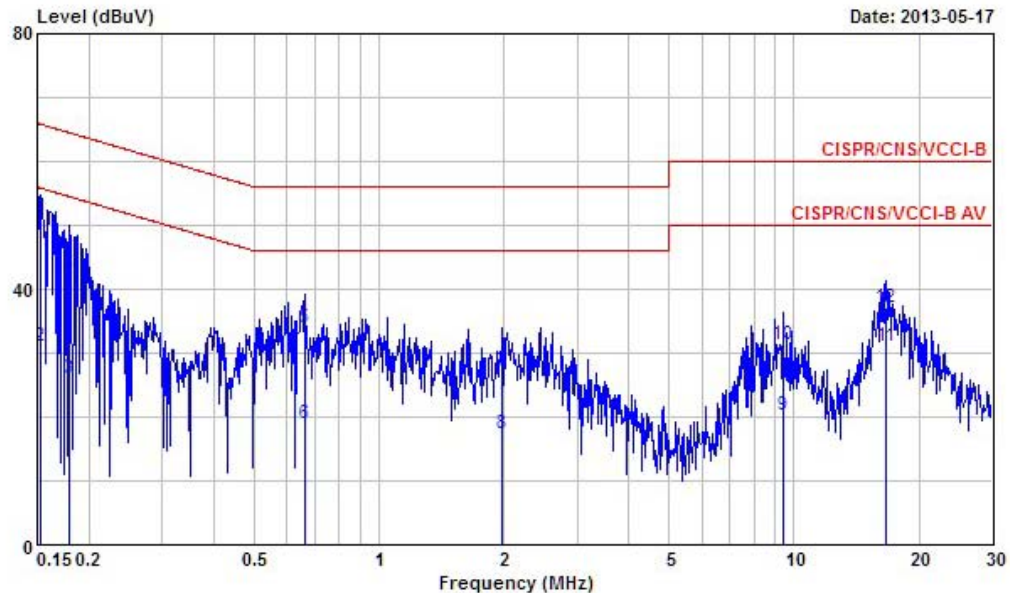


3.7.3 Test Result of AC Power-line Conducted Emissions



AC Power-line Conducted Emissions Result

| | | | |
|--------------------|------------------|-------------|------|
| Operating Mode | 1 | Power Phase | Line |
| Operating Function | Normal Mode Link | | |



| | Freq | Level | Over | Limit | Read | LISN | Cable | |
|----|-----------|-------|--------|-------|-------|--------|-------|---------|
| | MHz | dBuV | Limit | Line | Level | Factor | Loss | Remark |
| | | | dB | dBuV | dBuV | dB | dB | |
| 1 | 0.1524030 | 50.53 | -15.34 | 65.87 | 50.16 | 0.11 | 0.26 | QP |
| 2 | 0.1524030 | 30.94 | -24.93 | 55.87 | 30.57 | 0.11 | 0.26 | Average |
| 3 | 0.1796080 | 25.93 | -28.57 | 54.50 | 25.66 | 0.11 | 0.16 | Average |
| 4 | 0.1796080 | 42.48 | -22.02 | 64.50 | 42.21 | 0.11 | 0.16 | QP |
| 5 | 0.6612710 | 33.88 | -22.12 | 56.00 | 33.62 | 0.11 | 0.15 | QP |
| 6 | 0.6612710 | 18.98 | -27.02 | 46.00 | 18.72 | 0.11 | 0.15 | Average |
| 7 | 1.980 | 27.02 | -28.98 | 56.00 | 26.59 | 0.13 | 0.30 | QP |
| 8 | 1.980 | 17.36 | -28.64 | 46.00 | 16.93 | 0.13 | 0.30 | Average |
| 9 | 9.400 | 20.29 | -29.71 | 50.00 | 19.95 | 0.23 | 0.11 | Average |
| 10 | 9.400 | 31.20 | -28.80 | 60.00 | 30.86 | 0.23 | 0.11 | QP |
| 11 | 16.660 | 31.01 | -18.99 | 50.00 | 30.52 | 0.29 | 0.20 | Average |
| 12 | 16.660 | 37.05 | -22.95 | 60.00 | 36.56 | 0.29 | 0.20 | QP |

Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)

4 Test Equipment and Calibration Data

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Remark |
|------------------------|--------------------------------|-----------|-----------------|-----------------|------------------|----------------------|
| EMC Receiver | R&S | ESCS 30 | 100174 | 9kHz ~ 2.75GHz | Mar. 26, 2013 | Conduction (CO04-HY) |
| LISN | SCHWARZBECK MESS-ELEKTRONIK | NSLK 8127 | 8127-477 | 9kHz ~ 30MHz | Jan. 21, 2013 | Conduction (CO04-HY) |
| LISN (Support Unit) | EMCO | 3810/2NM | 9703-1839 | 9kHz ~ 30MHz | Apr. 18, 2013 | Conduction (CO04-HY) |
| RF Cable-CON | HUBER+SUHNER | RG213/U | 7.61183201e+012 | 9kHz ~ 30MHz | Nov. 09, 2012 | Conduction (CO04-HY) |

Note: Calibration Interval of instruments listed above is one year.

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Remark |
|----------------------------|--------------|------------------|-------------|-----------------|------------------|---------------------|
| Spectrum Analyzer | R&S | FSP 30 | 100023/030 | 9kHz ~ 30GHz | Apr. 27, 2012 | Conducted (TH01-HY) |
| AC Power Source | G.W | APS-9102 | EL920581 | AC 0V ~ 300V | Jul. 02, 2012 | Conducted (TH01-HY) |
| Temp. and Humidity Chamber | Giant Force | GTH-225-20-SP-SD | MAA1112-007 | -20 ~ 100℃ | Nov. 21, 2012 | Conducted (TH01-HY) |
| Signal Generator | R&S | SMR40 | 100116 | 10MHz ~ 40GHz | Jun. 26, 2012 | Conducted (TH01-HY) |
| Power Sensor | Anritsu | MA2411B | 0917017 | 300MHz ~ 40GHz | Feb. 02, 2013 | Conducted (TH01-HY) |
| Power Meter | Anritsu | ML2495A | 0949003 | 300MHz ~ 40GHz | Feb. 02, 2013 | Conducted (TH01-HY) |
| RF Cable-2m | HUBER+SUHNER | SUCOFLEX_104 | SN 345675/4 | 1GHz ~ 26.5GHz | NA | Conducted (TH01-HY) |
| RF Cable-3m | HUBER+SUHNER | SUCOFLEX_104 | SN 345669/4 | 1GHz ~ 26.5GHz | NA | Conducted (TH01-HY) |

Note: Calibration Interval of instruments listed above is one year.

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Remark |
|--------------------------|----------------|-------------|-------------|--------------------|------------------|-----------------------|
| Spectrum Analyzer | R&S | FSP40 | 100593 | 9kHz ~ 40GHz | Sep. 14, 2012 | Radiation (03CH02-HY) |
| 3m Semi Anechoic Chamber | SIDT FRANKONIA | SAC-3M | 03CH02-HY | 30MHz ~ 1GHz 3m | May 09, 2013 | Radiation (03CH02-HY) |
| Amplifier | Agilent | 8447D | 2944A11146 | 100kHz ~ 1.3GHz | Jul. 23, 2012 | Radiation (03CH02-HY) |
| Amplifier | Agilent | 8449B | 3008A02373 | 1GHz ~ 26.5GHz | Aug. 10, 2012 | Radiation (03CH02-HY) |
| Horn Antenna | ETS-LINDGREN | 3117 | 00091920 | 1GHz ~ 18GHz | Nov. 16, 2012 | Radiation (03CH02-HY) |
| Horn Antenna | SCHWARZBECK | BBHA9170 | BBHA9170154 | 15GHz ~ 40GHz | Jan. 08, 2013 | Radiation (03CH02-HY) |
| RF Cable-R03m | Jye Bao | RG142 | CB021 | 9kHz ~ 1GHz | Nov. 10, 2012 | Radiation (03CH02-HY) |
| RF Cable-high | SUHNER | SUCOFLEX106 | 03CH02-HY | 1GHz ~ 40GHz | Mar. 05, 2013 | Radiation (03CH02-HY) |
| Bilog Antenna | SCHAFFNER | CBL61128 | 2723 | 30MHz ~ 2GHz | Oct. 22, 2012 | Radiation (03CH02-HY) |
| Turn Table | HD | DS 420 | 420/649/00 | 0~ 360 degree | N/A | Radiation (03CH02-HY) |
| Antenna Mast | HD | MA 240 | 240/559/00 | 1 ~ 4 m | N/A | Radiation (03CH02-HY) |

Note: Calibration Interval of instruments listed above is one year.

| Instrument | Manufacturer | Model No. | Serial No. | Characteristics | Calibration Date | Remark |
|--------------|--------------|-----------|------------|-----------------|------------------|-----------------------|
| Loop Antenna | TESEQ | HLA 6120 | 31244 | 9 kHz - 30 MHz | Dec. 02, 2012 | Radiation (03CH02-HY) |

Note: Calibration Interval of instruments listed above is two year.