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FCC TEST REPORT

REPORT NO.: RF110422C09

MODEL NO.: TRMH01SB

FCC ID: Y4FTRMH01SB

RECEIVED: Apr. 22, 2011

TESTED: Jul. 12 ~ 18, 2011

ISSUED: Jul. 29, 2011

APPLICANT: go-rock Technology Co., Ltd

ADDRESS: 7F., No. 7, Ln. 235, Baoqiao Rd., Xindian City,
Taipei County 231, Taiwan

ISSUED BY: Bureau Veritas Consumer Products Services (H.K.)
Ltd., Taoyuan Branch

LAB LOCATION: No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou Hsiang,
Taipei Hsien, 244 Taiwan

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RELEASE CONTROL RECORD

| ISSUE NO. | REASON FOR CHANGE | DATE ISSUED |
|-------------|-------------------|---------------|
| RF110422C09 | Original release | Jul. 29, 2011 |



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1. CERTIFICATION

PRODUCT: Bluetooth in-ear stereo headset

BRAND NAME: go-rock

MODEL NO.: TRMH01SB

APPLICANT: go-rock Technology Co., Ltd

TESTED: Jul. 12 ~ 18, 2011

TEST ITEM: ENGINEERING SAMPLE

STANDARDS: FCC Part 15, Subpart C (Section 15.247)

ANSI C63.4-2003

ANSI C63.10-2009

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : Celia Chen , DATE: Jul. 29, 2011
(Celia Chen / Senior Specialist)

APPROVED BY : Ken Liu , DATE: Jul. 29, 2011
(Ken Liu / Manager)



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2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

| APPLIED STANDARD: FCC Part 15, Subpart C | | | |
|--|---|--------|--|
| STANDARD SECTION | TEST TYPE AND LIMIT | RESULT | REMARK |
| 15.207 | AC Power Conducted Emission | PASS | Meet the requirement of limit. Minimum passing margin is -19.04dB at 0.505MHz |
| 15.247(a)(1) (iii) | Number of Hopping Frequency Used Spec.: At least 15 channels | PASS | Meet the requirement of limit. |
| 15.247(a)(1) (iii) | Dwell Time on Each Channel Spec.: Max. 0.4 second within 31.6 second | PASS | Meet the requirement of limit. |
| 15.247(a)(1) | 1. Hopping Channel Separation Spec. : Min. 25 kHz or 20 dB bandwidth, whichever is greater (see Note) 2. Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System | PASS | Meet the requirement of limit. |
| 15.247(b) | Maximum Peak Output Power Spec.: max. 21dBm (see Note) | PASS | Meet the requirement of limit. |
| 15.247(d) | Transmitter Radiated Emissions Spec.: Table 15.209 | PASS | Meet the requirement of limit. Minimum passing margin is -5.1dB at 63.89MHz. |
| 15.247(d) | Band Edge Measurement | PASS | Meet the requirement of limit. |
| 15.203 | Antenna Requirement | PASS | No antenna connector is used. |

NOTE: If The Frequency Hopping System operating in 2400-2483.5MHz band and the output power less than 125mW. The hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of the 20dB bandwidth of hopping channel whichever is greater.



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2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

| MEASUREMENT | FREQUENCY | UNCERTAINTY |
|---------------------|----------------|-------------|
| Conducted emissions | 150kHz ~ 30MHz | 2.41 dB |
| Radiated emissions | 30MHz ~ 1GHz | 3.87 dB |
| | Above 1GHz | 3.36 dB |



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3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

| | |
|-----------------------|---|
| PRODUCT | Bluetooth in-ear stereo headset |
| MODEL NO. | TRMH01SB |
| FCC ID | Y4FTRMH01SB |
| NOMINAL VOLTAGE | 5.0Vdc from host equipment (for charging only) or 3.7Vdc from battery |
| MODULATION TYPE | GFSK, $\pi/4$ -DQPSK, 8DPSK |
| MODULATION TECHNOLOGY | FHSS |
| TRANSFER RATE | 1/2/3Mbps |
| OPERATING FREQUENCY | 2402 ~ 2480MHz |
| NUMBER OF CHANNEL | 79 |
| OUTPUT POWER | 3.3mW |
| ANTENNA TYPE | Chip antenna with 1.53dBi gain |
| ANTENNA CONNECTER | NA |
| DATA CABLE | Non-shielded USB cable (0.6m) |
| I/O PORTS | USB port |
| ACCESSORY DEVICES | NA |

NOTE:

1. The EUT is a headset with Bluetooth function.
2. The USB function on this product is for battery charging only, no data transmitting and/or receiving function involved.
3. For more detailed features description, please refer to the manufacturer's specifications or User's Manual.



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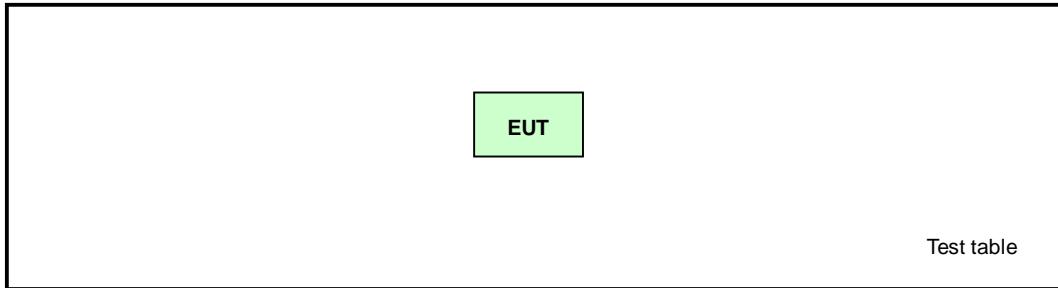
3.2 DESCRIPTION OF TEST MODES

79 channels are provided to this EUT:

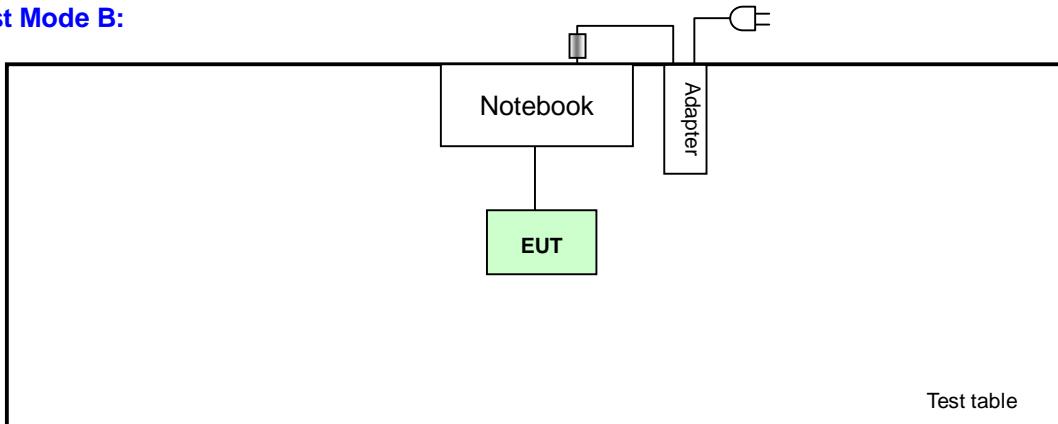
| CHANNEL | FREQ. (MHz) | CHANNEL | FREQ. (MHz) | CHANNEL | FREQ. (MHz) | CHANNEL | FREQ. (MHz) |
|---------|----------------|---------|----------------|---------|----------------|---------|----------------|
| 0 | 2402 | 20 | 2422 | 40 | 2442 | 60 | 2462 |
| 1 | 2403 | 21 | 2423 | 41 | 2443 | 61 | 2463 |
| 2 | 2404 | 22 | 2424 | 42 | 2444 | 62 | 2464 |
| 3 | 2405 | 23 | 2425 | 43 | 2445 | 63 | 2465 |
| 4 | 2406 | 24 | 2426 | 44 | 2446 | 64 | 2466 |
| 5 | 2407 | 25 | 2427 | 45 | 2447 | 65 | 2467 |
| 6 | 2408 | 26 | 2428 | 46 | 2448 | 66 | 2468 |
| 7 | 2409 | 27 | 2429 | 47 | 2449 | 67 | 2469 |
| 8 | 2410 | 28 | 2430 | 48 | 2450 | 68 | 2470 |
| 9 | 2411 | 29 | 2431 | 49 | 2451 | 69 | 2471 |
| 10 | 2412 | 30 | 2432 | 50 | 2452 | 70 | 2472 |
| 11 | 2413 | 31 | 2433 | 51 | 2453 | 71 | 2473 |
| 12 | 2414 | 32 | 2434 | 52 | 2454 | 72 | 2474 |
| 13 | 2415 | 33 | 2435 | 53 | 2455 | 73 | 2475 |
| 14 | 2416 | 34 | 2436 | 54 | 2456 | 74 | 2476 |
| 15 | 2417 | 35 | 2437 | 55 | 2457 | 75 | 2477 |
| 16 | 2418 | 36 | 2438 | 56 | 2458 | 76 | 2478 |
| 17 | 2419 | 37 | 2439 | 57 | 2459 | 77 | 2479 |
| 18 | 2420 | 38 | 2440 | 58 | 2460 | 78 | 2480 |
| 19 | 2421 | 39 | 2441 | 59 | 2461 | | |

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST

Test Mode A:



Test Mode B:





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3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

| EUT CONFIGURE MODE | Applicable to | | | | Description |
|--------------------------|---------------|-------|--------------------|------|---|
| | PLC | RE<1G | RE ³ 1G | APCM | |
| A | Note | √ | √ | √ | EUT powered from battery |
| B | √ | √ | - | - | EUT powered from Notebook (for charging only) |

Where PLC: Power Line Conducted Emission

RE<1G: Radiated Emission below 1GHz

RE³1G: Radiated Emission above 1GHz

APCM: Antenna Port Conducted Measurement

NOTE: No need to concern of Conducted Emission due to the EUT is powered by battery.

POWER LINE CONDUCTED EMISSION TEST:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

| EUT CONFIGURE MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | PACKET TYPE | DATE RATE |
|--------------------------|----------------------|-------------------|--------------------------|--------------------|----------------|--------------|
| B | 0 to 78 | 0 | FHSS | 8DPSK | DH5 | 3 |

RADIATED EMISSION TEST (BELOW 1 GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, packet types data rate, XYZ axis and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

| EUT CONFIGURE MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | PACKET TYPE | DATE RATE | AXIS |
|--------------------------|----------------------|-------------------|--------------------------|--------------------|----------------|-----------|------|
| A & B | 0 to 78 | 0 | FHSS | 8DPSK | DH5 | 3 | X |



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RADIATED EMISSION TEST (ABOVE 1 GHz):

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, packet types data rate, XYZ axis and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

| EUT CONFIGURE MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | PACKET TYPE | DATE RATE | AXIS |
|--------------------|-------------------|----------------|-----------------------|-----------------|-------------|-----------|------|
| A | 0 to 78 | 0, 39, 78 | FHSS | GFSK | DH5 | 1 | X |
| A | 0 to 78 | 0, 39, 78 | FHSS | 8DPSK | DH5 | 3 | X |

BANDEDGE MEASUREMENT:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types of the antenna and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

| EUT CONFIGUR E MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | PACKET TYPE | DATE RATE |
|---------------------|-------------------|----------------|-----------------------|-----------------|-------------|-----------|
| A | 0 to 78 | 0, 78 | FHSS | GFSK | DH5 | 1 |
| A | 0 to 78 | 0, 78 | FHSS | 8DPSK | DH5 | 3 |

ANTENNA PORT CONDUCTED MEASUREMENT:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and packet types of the antenna and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

| EUT CONFIGUR E MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | PACKET TYPE | DATE RATE |
|---------------------|-------------------|----------------|-----------------------|-----------------|-------------|-----------|
| A | 0 to 78 | 0, 39, 78 | FHSS | GFSK | DH5 | 1 |
| A | 0 to 78 | 0, 39, 78 | FHSS | 8DPSK | DH5 | 3 |



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TEST CONDITION:

| APPLICABLE TO | EUT CONFIGURE MODE | ENVIRONMENTAL CONDITIONS | INPUT POWER | TESTED BY |
|--------------------|--------------------|---------------------------|-----------------------|-----------|
| PLC | B | 26deg. C, 77% RH, 999hPa | 120Vac, 60Hz (System) | Nick Chen |
| RE<1G | A | 26deg. C, 79% RH, 1005hPa | 3.7Vdc | Chad Lee |
| RE ³ 1G | A | 25deg. C, 57% RH, 1003hPa | 3.7Vdc | Chad Lee |
| APCM | A | 23deg. C, 71% RH, 1006hPa | 3.7Vdc | Chad Lee |



3.2.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart C. (15.247)

ANSI C63.4- 2003

ANSI C63.10-2009

All test items have been performed and recorded as per the above standards.

NOTE: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

3.2.4 DESCRIPTION OF SUPPORT UNITS

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

| NO. | PRODUCT | BRAND | MODEL NO. | SERIAL NO. | FCC ID |
|-----|-------------------|-------|-----------|-------------|------------------|
| 1 | NOTEBOOK COMPUTER | DELL | PP05L | 19227741184 | FCC DoC Approved |

| NO. | SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS |
|-----|---|
| 1 | N/A |

NOTE: All power cords of the above support units are non-shielded (1.8m).



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4. TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

| FREQUENCY OF EMISSION (MHz) | CONDUCTED LIMIT (dB μ V) | |
|-----------------------------|------------------------------|----------|
| | Quasi-peak | Average |
| 0.15 ~ 0.5 | 66 to 56 | 56 to 46 |
| 0.5 ~ 5 | 56 | 46 |
| 5 ~ 30 | 60 | 50 |

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50 MHz.
3. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.1.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|--|-----------------|--------------|-----------------|------------------|
| ROHDE & SCHWARZ Test Receiver | ESCS 30 | 100276 | Dec. 31, 2010 | Dec. 30, 2011 |
| ROHDE & SCHWARZ Artificial Mains Network (for EUT) | ESH3-Z5 | 100219 | Nov. 24, 2010 | Nov. 23, 2011 |
| LISN With Adapter (for EUT) | AD10 | C10Ada-001 | Nov. 24, 2010 | Nov. 23, 2011 |
| ROHDE & SCHWARZ Artificial Mains Network (for peripherals) | ESH3-Z5 | 100218 | Nov. 24, 2010 | Nov. 23, 2011 |
| Software | ADT_Cond_V7.3.7 | NA | NA | NA |
| Software | ADT_ISN_V7.3.7 | NA | NA | NA |
| RF cable (JYEBAO) | 5D-FB | Cable-C10.01 | Feb. 22, 2011 | Feb. 21, 2012 |
| SUHNER Terminator (For ROHDE & SCHWARZ LISN) | 65BNC-5001 | E1-010773 | Feb. 26, 2011 | Feb. 25, 2012 |

NOTE:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. 10.
3. The VCCI Site Registration No. C-1852.



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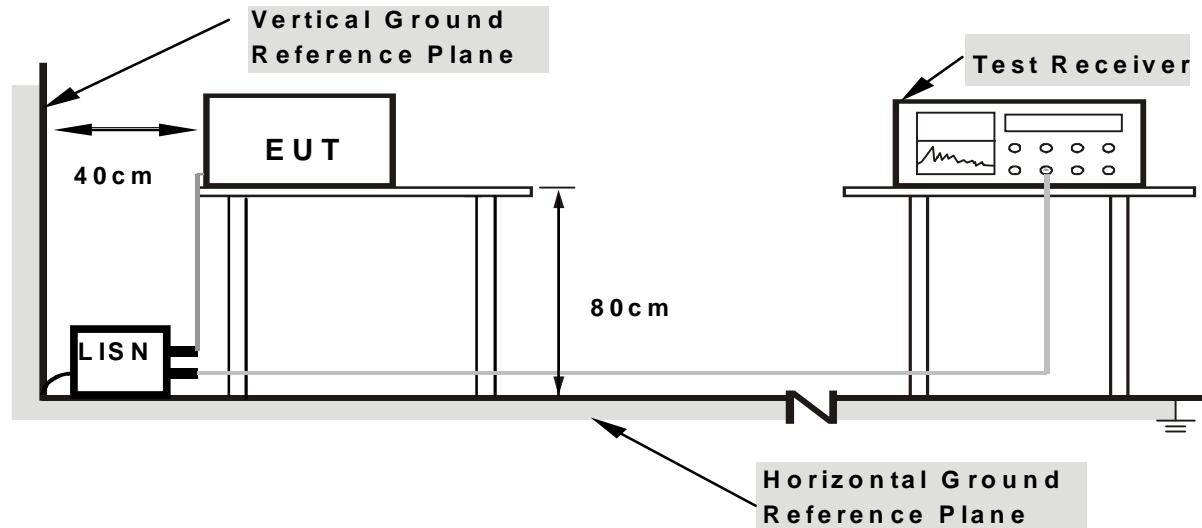
4.1.3 TEST PROCEDURES

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) were not recorded.

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



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

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.1.6 EUT OPERATING CONDITIONS

- Connected the EUT (via USB cable) to a notebook placed on testing table.
- Set the EUT under charging condition.

4.1.7 TEST RESULTS

| | | | |
|---------------|--------|---------|-----------|
| TEST MODE | Mode B | CHANNEL | Channel 0 |
| 6dB BANDWIDTH | 9kHz | PHASE | Line 1 |

| No | Freq. [MHz] | Corr. Factor (dB) | Reading Value | | Emission Level | | Limit | | Margin | |
|----|----------------|-------------------------|---------------|-----------|-------------------|-----------|-----------|-----------|-----------|-----------|
| | | | [dB (uV)] | [dB (uV)] | [dB (uV)] | [dB (uV)] | [dB (uV)] | [dB (uV)] | [dB (uV)] | [dB (uV)] |
| | | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.173 | 0.17 | 45.16 | - | 45.33 | - | 64.79 | 54.79 | -19.47 | - |
| 2 | 0.308 | 0.21 | 35.05 | - | 35.26 | - | 60.04 | 50.04 | -24.78 | - |
| 3 | 0.541 | 0.25 | 34.33 | - | 34.58 | - | 56.00 | 46.00 | -21.42 | - |
| 4 | 0.904 | 0.27 | 35.86 | - | 36.13 | - | 56.00 | 46.00 | -19.87 | - |
| 5 | 2.793 | 0.39 | 29.20 | - | 29.59 | - | 56.00 | 46.00 | -26.41 | - |
| 6 | 17.793 | 1.23 | 33.92 | - | 35.15 | - | 60.00 | 50.00 | -24.85 | - |

REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.

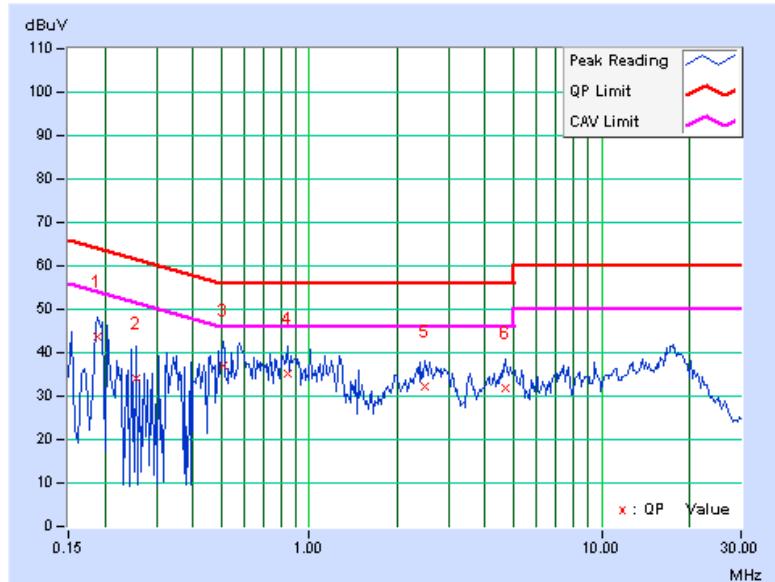


| | | | |
|---------------|--------|---------|-----------|
| TEST MODE | Mode B | CHANNEL | Channel 0 |
| 6dB BANDWIDTH | 9kHz | PHASE | Line 2 |

| No | Freq. | Corr. | Reading Value | | Emission Level | | Limit | | Margin | |
|----------|--------------|-------------|---------------|-----------|----------------|-----------|--------------|--------------|---------------|-----|
| | | | Factor | [dB (uV)] | [dB (uV)] | [dB (uV)] | (dB) | | | |
| | [MHz] | (dB) | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.188 | 0.18 | 43.69 | - | 43.87 | - | 64.13 | 54.13 | -20.27 | - |
| 2 | 0.254 | 0.20 | 34.04 | - | 34.24 | - | 61.62 | 51.62 | -27.38 | - |
| 3 | 0.505 | 0.26 | 36.70 | - | 36.96 | - | 56.00 | 46.00 | -19.04 | - |
| 4 | 0.849 | 0.27 | 35.04 | - | 35.31 | - | 56.00 | 46.00 | -20.69 | - |
| 5 | 2.488 | 0.36 | 31.92 | - | 32.28 | - | 56.00 | 46.00 | -23.72 | - |
| 6 | 4.687 | 0.49 | 31.31 | - | 31.80 | - | 56.00 | 46.00 | -24.20 | - |

REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.





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4.2 RADIATED EMISSION MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

| FREQUENCIES (MHz) | FIELD STRENGTH (microvolts/meter) | MEASUREMENT DISTANCE (meters) |
|-------------------|-----------------------------------|-------------------------------|
| 0.009 ~ 0.490 | 2400/F(kHz) | 300 |
| 0.490 ~ 1.705 | 24000/F(kHz) | 30 |
| 1.705 ~ 30.0 | 30 | 30 |
| 30 ~ 88 | 100 | 3 |
| 88 ~ 216 | 150 | 3 |
| 216 ~ 960 | 200 | 3 |
| Above 960 | 500 | 3 |

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dB_uV/m) = 20 log Emission level (uV/m).
3. As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



4.2.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|--|---------------------------|------------|-----------------|------------------|
| HP Preamplifier | 8447D | 2432A03504 | Mar. 04, 2011 | Mar. 03, 2012 |
| HP Preamplifier | 8449B | 3008A01924 | Mar. 04, 2011 | Mar. 03, 2012 |
| HP Preamplifier | 8449B | 3008A01292 | Mar. 04, 2011 | Mar. 03, 2012 |
| Agilent Spectrum Analyzer | E4446A | MY46180403 | Jun. 22, 2011 | Jun. 21, 2012 |
| ROHDE & SCHWARZ TEST RECEIVER | ESCS30 | 838251/021 | Oct. 01, 2010 | Sep. 30, 2011 |
| Schwarzbeck Antenna | VULB 9168 | 137 | Apr. 12, 2011 | Apr. 11, 2012 |
| Schwarzbeck Antenna | VHBA 9123 | 480 | May 06, 2011 | May 05, 2012 |
| ADT. Turn Table | TT100 | 0306 | NA | NA |
| ADT. Tower | AT100 | 0306 | NA | NA |
| Software | ADT_Radiated_V 7.6.15.9.2 | NA | NA | NA |
| SUHNER RF cable | SF102 | CABLE-CH6 | Aug. 20, 2010 | Aug. 19, 2011 |
| EMCO Horn Antenna | 3115 | 6714 | Oct. 26, 2010 | Oct. 25, 2011 |
| EMCO Horn Antenna | 3115 | 9312-4192 | Apr. 22, 2011 | Apr. 21, 2012 |
| Highpass filter Wainwright Instruments | WHK 3.1/18G-10SS | SN 8 | NA | NA |

NOTE: 1. The calibration interval of the above test instruments is 12 months. And the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Chamber No. 6.
4. The Industry Canada Reference No. IC 7450E-6.
5. The FCC Site Registration No. is 447212.



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4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

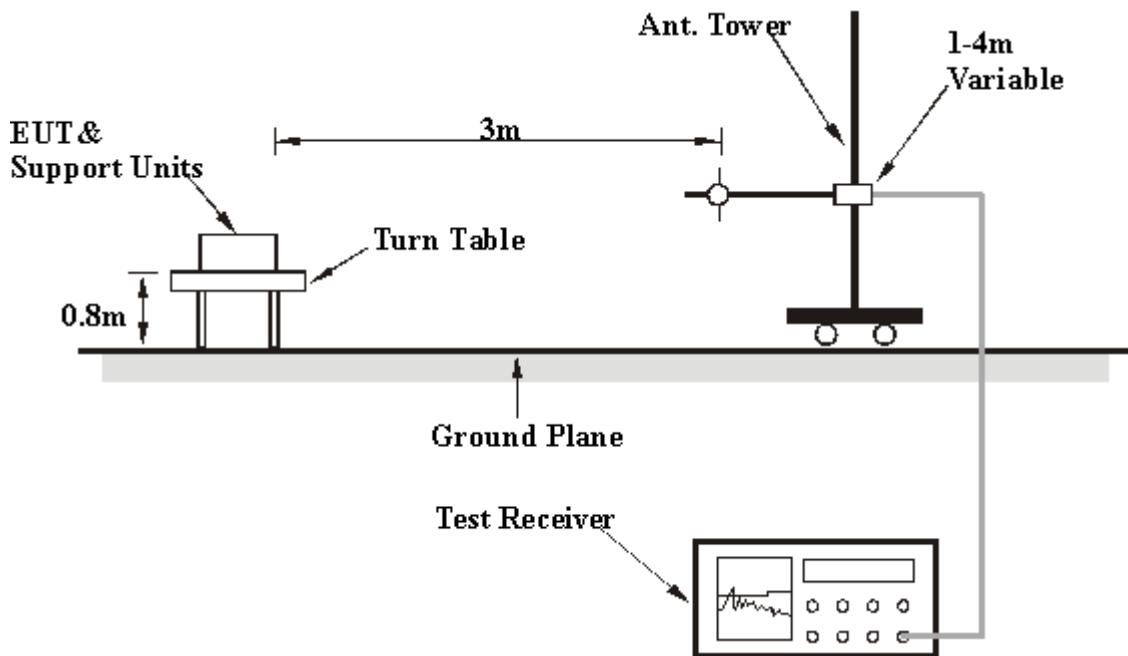
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.2.4 DEVIATION FROM TEST STANDARD

No deviation

4.2.5 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.2.6 EUT OPERATING CONDITIONS

Same as item 4.1.6.



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4.2.7 TEST RESULTS

GFSK MODULATION

| EUT TEST CONDITION | | MEASUREMENT DETAIL | | | |
|--------------------------|--|-----------------------------|--|---|--|
| CHANNEL | | Channel 0 | | FREQUENCY RANGE 1 ~ 25GHz | |
| INPUT POWER | | 3.7Vdc | | DETECTOR FUNCTION Peak (PK) Average (AV) | |
| ENVIRONMENTAL CONDITIONS | | 25deg. C, 57%RH 1003 hPa | | TESTED BY Chad Lee | |
| TEST MODE | | A | | | |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | 2390.00 | 53.7 PK | 74.0 | -20.3 | 1.18 H | 168 | 21.59 | 32.15 |
| 2 | 2390.00 | 43.7 AV | 54.0 | -10.3 | 1.18 H | 168 | 11.53 | 32.15 |
| 3 | #2400.00 | 51.4 PK | 72.6 | -21.2 | 1.18 H | 168 | 19.19 | 32.19 |
| 4 | #2400.00 | 21.3 AV | 42.5 | -21.2 | 1.18 H | 168 | -10.91 | 32.19 |
| 5 | *2402.00 | 92.6 PK | | | 1.18 H | 168 | 60.38 | 32.20 |
| 6 | *2402.00 | 62.5 AV | | | 1.18 H | 168 | 30.28 | 32.20 |
| 7 | 4804.00 | 52.8 PK | 74.0 | -21.2 | 1.04 H | 343 | 14.18 | 38.61 |
| 8 | 4804.00 | 22.7 AV | 54.0 | -31.3 | 1.04 H | 343 | -15.92 | 38.61 |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | 2390.00 | 52.3 PK | 74.0 | -21.7 | 1.00 V | 181 | 20.16 | 32.15 |
| 2 | 2390.00 | 42.4 AV | 54.0 | -11.6 | 1.00 V | 181 | 10.25 | 32.15 |
| 3 | #2400.00 | 48.3 PK | 69.5 | -21.2 | 1.00 V | 181 | 16.14 | 32.19 |
| 4 | #2400.00 | 18.2 AV | 39.4 | -21.2 | 1.00 V | 181 | -13.96 | 32.19 |
| 5 | *2402.00 | 89.5 PK | | | 1.00 V | 181 | 57.33 | 32.20 |
| 6 | *2402.00 | 59.4 AV | | | 1.00 V | 181 | 27.23 | 32.20 |
| 7 | 4804.00 | 55.0 PK | 74.0 | -19.0 | 1.00 V | 156 | 16.37 | 38.61 |
| 8 | 4804.00 | 24.9 AV | 54.0 | -29.1 | 1.00 V | 156 | -13.73 | 38.61 |

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “*”: Fundamental frequency.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1$ dB.
7. Average value = peak reading + $20\log(\text{duty cycle})$.
8. "#": The radiated frequency is out the restricted band.



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| EUT TEST CONDITION | | MEASUREMENT DETAIL | | |
|--------------------------|--|--------------------|--|---------------------------|
| CHANNEL | | FREQUENCY RANGE | | 1 ~ 25GHz |
| INPUT POWER | | DETECTOR FUNCTION | | Peak (PK) Average (AV) |
| ENVIRONMENTAL CONDITIONS | | TESTED BY | | Chad Lee |
| TEST MODE | | A | | |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | *2441.00 | 90.9 PK | | | 1.19 H | 176 | 58.51 | 32.35 |
| 2 | *2441.00 | 60.8 AV | | | 1.19 H | 176 | 28.41 | 32.35 |
| 3 | 4882.00 | 52.7 PK | 74.0 | -21.3 | 1.00 H | 16 | 13.86 | 38.80 |
| 4 | 4882.00 | 22.6 AV | 54.0 | -31.4 | 1.00 H | 16 | -16.24 | 38.80 |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | *2441.00 | 89.0 PK | | | 1.00 V | 178 | 56.65 | 32.35 |
| 2 | *2441.00 | 58.9 AV | | | 1.00 V | 178 | 26.55 | 32.35 |
| 3 | 4882.00 | 54.2 PK | 74.0 | -19.8 | 1.00 V | 144 | 15.43 | 38.80 |
| 4 | 4882.00 | 24.1 AV | 54.0 | -29.9 | 1.00 V | 144 | -14.67 | 38.80 |

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “*”: Fundamental frequency.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1$ dB.
7. Average value = peak reading + $20\log(\text{duty cycle})$.



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| EUT TEST CONDITION | | MEASUREMENT DETAIL | | |
|--------------------------|--|--------------------|--|---------------------------|
| CHANNEL | | FREQUENCY RANGE | | 1 ~ 25GHz |
| INPUT POWER | | DETECTOR FUNCTION | | Peak (PK) Average (AV) |
| ENVIRONMENTAL CONDITIONS | | TESTED BY | | Chad Lee |
| TEST MODE | | A | | |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | *2480.00 | 89.4 PK | | | 1.12 H | 174 | 56.94 | 32.49 |
| 2 | *2480.00 | 59.3 AV | | | 1.12 H | 174 | 26.84 | 32.49 |
| 3 | 2483.50 | 43.6 PK | 74.0 | -30.4 | 1.12 H | 174 | 11.12 | 32.51 |
| 4 | 2483.50 | 13.5 AV | 54.0 | -40.5 | 1.12 H | 174 | -18.98 | 32.51 |
| 5 | 4960.00 | 50.5 PK | 74.0 | -23.5 | 1.00 H | 16 | 11.50 | 38.98 |
| 6 | 4960.00 | 20.4 AV | 54.0 | -33.6 | 1.00 H | 16 | -18.60 | 38.98 |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | *2480.00 | 87.7 PK | | | 1.00 V | 176 | 55.24 | 32.49 |
| 2 | *2480.00 | 57.6 AV | | | 1.00 V | 176 | 25.14 | 32.49 |
| 3 | 2483.50 | 41.9 PK | 74.0 | -32.1 | 1.00 V | 176 | 9.42 | 32.51 |
| 4 | 2483.50 | 11.8 AV | 54.0 | -42.2 | 1.00 V | 176 | -20.68 | 32.51 |
| 5 | 4882.00 | 54.2 PK | 74.0 | -19.8 | 1.00 V | 144 | 15.43 | 38.80 |
| 6 | 4882.00 | 24.1 AV | 54.0 | -29.9 | 1.00 V | 144 | -14.67 | 38.80 |

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “*”: Fundamental frequency.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1$ dB.
7. Average value = peak reading + $20\log(\text{duty cycle})$.



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8DPSK MODULATION

| EUT TEST CONDITION | | MEASUREMENT DETAIL | | | |
|--------------------------|--|-----------------------------|--|---|--|
| CHANNEL | | Channel 0 | | FREQUENCY RANGE 1 ~ 25GHz | |
| INPUT POWER | | 3.7Vdc | | DETECTOR FUNCTION Peak (PK) Average (AV) | |
| ENVIRONMENTAL CONDITIONS | | 25deg. C, 57%RH 1003 hPa | | TESTED BY Chad Lee | |
| TEST MODE | | A | | | |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | 2390.00 | 53.4 PK | 74.0 | -20.6 | 1.20 H | 170 | 21.29 | 32.15 |
| 2 | 2390.00 | 43.5 AV | 54.0 | -10.5 | 1.20 H | 170 | 11.36 | 32.15 |
| 3 | #2400.00 | 49.6 PK | 73.8 | -24.2 | 1.20 H | 170 | 17.39 | 32.19 |
| 4 | #2400.00 | 19.5 AV | 43.7 | -24.2 | 1.20 H | 170 | -12.71 | 32.19 |
| 5 | *2402.00 | 93.8 PK | | | 1.20 H | 170 | 61.58 | 32.20 |
| 6 | *2402.00 | 63.7 AV | | | 1.20 H | 170 | 31.48 | 32.20 |
| 7 | 4804.00 | 52.7 PK | 74.0 | -21.3 | 1.00 H | 6 | 14.05 | 38.61 |
| 8 | 4804.00 | 22.6 AV | 54.0 | -31.4 | 1.00 H | 6 | -16.05 | 38.61 |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | 2390.00 | 52.2 PK | 74.0 | -21.8 | 1.00 V | 184 | 20.05 | 32.15 |
| 2 | 2390.00 | 42.5 AV | 54.0 | -11.5 | 1.00 V | 184 | 10.36 | 32.15 |
| 3 | #2400.00 | 46.9 PK | 71.1 | -24.2 | 1.00 V | 184 | 14.75 | 32.19 |
| 4 | #2400.00 | 16.8 AV | 41.0 | -24.2 | 1.00 V | 184 | -15.35 | 32.19 |
| 5 | *2402.00 | 91.1 PK | | | 1.00 V | 184 | 58.94 | 32.20 |
| 6 | *2402.00 | 61.0 AV | | | 1.00 V | 184 | 28.84 | 32.20 |
| 7 | 4804.00 | 56.2 PK | 74.0 | -17.8 | 1.00 V | 159 | 17.57 | 38.61 |
| 8 | 4804.00 | 26.1 AV | 54.0 | -27.9 | 1.00 V | 159 | -12.53 | 38.61 |

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “*”: Fundamental frequency.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1$ dB.
7. Average value = peak reading + $20\log(\text{duty cycle})$.
8. "#": The radiated frequency is out the restricted band.



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| EUT TEST CONDITION | | MEASUREMENT DETAIL | | |
|--------------------------|--|--------------------|--|---------------------------|
| CHANNEL | | FREQUENCY RANGE | | 1 ~ 25GHz |
| INPUT POWER | | DETECTOR FUNCTION | | Peak (PK) Average (AV) |
| ENVIRONMENTAL CONDITIONS | | TESTED BY | | Chad Lee |
| TEST MODE | | A | | |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | *2441.00 | 91.7 PK | | | 1.00 H | 261 | 59.33 | 32.35 |
| 2 | *2441.00 | 61.6 AV | | | 1.00 H | 261 | 29.23 | 32.35 |
| 3 | 4882.00 | 51.0 PK | 74.0 | -23.0 | 1.00 H | 6 | 12.19 | 38.80 |
| 4 | 4882.00 | 20.9 AV | 54.0 | -33.1 | 1.00 H | 6 | -17.91 | 38.80 |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | *2441.00 | 90.5 PK | | | 1.00 V | 178 | 58.16 | 32.35 |
| 2 | *2441.00 | 60.4 AV | | | 1.00 V | 178 | 28.06 | 32.35 |
| 3 | 4882.00 | 55.4 PK | 74.0 | -18.7 | 1.00 V | 291 | 16.55 | 38.80 |
| 4 | 4882.00 | 25.3 AV | 54.0 | -28.8 | 1.00 V | 291 | -13.55 | 38.80 |

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “*”: Fundamental frequency.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1$ dB.
7. Average value = peak reading + $20\log(\text{duty cycle})$.



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| EUT TEST CONDITION | | MEASUREMENT DETAIL | | |
|--------------------------|--|--------------------|--|---------------------------|
| CHANNEL | | FREQUENCY RANGE | | 1 ~ 25GHz |
| INPUT POWER | | DETECTOR FUNCTION | | Peak (PK) Average (AV) |
| ENVIRONMENTAL CONDITIONS | | TESTED BY | | Chad Lee |
| TEST MODE | | A | | |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | *2480.00 | 90.9 PK | | | 1.13 H | 172 | 58.37 | 32.49 |
| 2 | *2480.00 | 60.8 AV | | | 1.13 H | 172 | 28.27 | 32.49 |
| 3 | 2483.50 | 45.1 PK | 74.0 | -28.9 | 1.13 H | 172 | 12.55 | 32.51 |
| 4 | 2483.50 | 15.0 AV | 54.0 | -39.0 | 1.13 H | 172 | -17.55 | 32.51 |
| 5 | 4960.00 | 49.9 PK | 74.0 | -24.1 | 1.00 H | 6 | 10.91 | 38.98 |
| 6 | 4960.00 | 19.8 AV | 54.0 | -34.2 | 1.00 H | 6 | -19.19 | 38.98 |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | *2480.00 | 89.9 PK | | | 1.00 V | 177 | 57.41 | 32.49 |
| 2 | *2480.00 | 59.8 AV | | | 1.00 V | 177 | 27.31 | 32.49 |
| 3 | 2483.50 | 44.1 PK | 74.0 | -29.9 | 1.00 V | 177 | 11.59 | 32.51 |
| 4 | 2483.50 | 14.0 AV | 54.0 | -40.0 | 1.00 V | 177 | -18.51 | 32.51 |
| 5 | 4960.00 | 53.2 PK | 74.0 | -20.9 | 1.00 V | 343 | 14.17 | 38.98 |
| 6 | 4960.00 | 23.1 AV | 54.0 | -31.0 | 1.00 V | 343 | -15.93 | 38.98 |

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “*”: Fundamental frequency.
6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle correlation factor be equal to: $20\log(3.125 / 100) = -30.1$ dB.
7. Average value = peak reading + $20\log(\text{duty cycle})$.



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BELOW 1GHz WORST-CASE DATA : 8DPSK MODULATION

| EUT TEST CONDITION | | MEASUREMENT DETAIL | | | |
|--------------------------|--|-----------------------------|--|-------------------|--|
| CHANNEL | | Channel 0 | | FREQUENCY RANGE | |
| INPUT POWER | | 3.7Vdc | | DETECTOR FUNCTION | |
| ENVIRONMENTAL CONDITIONS | | 26deg. C, 79%RH 1003 hPa | | TESTED BY | |
| TEST MODE | | A | | | |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | 262.41 | 30.7 QP | 46.0 | -15.3 | 1.55 H | 112 | 16.60 | 14.06 |
| 2 | 399.60 | 29.8 QP | 46.0 | -16.2 | 1.69 H | 253 | 11.17 | 18.63 |
| 3 | 651.38 | 30.6 QP | 46.0 | -15.4 | 1.84 H | 277 | 6.82 | 23.81 |
| 4 | 711.10 | 32.0 QP | 46.0 | -14.0 | 1.17 H | 277 | 7.50 | 24.49 |
| 5 | 796.64 | 27.2 QP | 46.0 | -18.8 | 1.12 H | 292 | 0.70 | 26.53 |
| 6 | 836.99 | 28.6 QP | 46.0 | -17.5 | 1.05 H | 289 | 1.47 | 27.08 |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | 63.89 | 34.9 QP | 40.0 | -5.1 | 1.15 V | 226 | 21.87 | 13.04 |
| 2 | 205.92 | 32.8 QP | 43.5 | -10.7 | 1.69 V | 262 | 21.16 | 11.60 |
| 3 | 399.60 | 34.1 QP | 46.0 | -11.9 | 1.84 V | 268 | 15.44 | 18.63 |
| 4 | 798.25 | 34.0 QP | 46.0 | -12.0 | 1.36 V | 313 | 7.41 | 26.57 |
| 5 | 838.60 | 36.3 QP | 46.0 | -9.7 | 1.17 V | 292 | 9.22 | 27.10 |
| 6 | 878.95 | 37.4 QP | 46.0 | -8.7 | 1.25 V | 313 | 9.80 | 27.55 |

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



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| EUT TEST CONDITION | | MEASUREMENT DETAIL | |
|--------------------------|-----------------------------|--------------------|---------------|
| CHANNEL | Channel 0 | FREQUENCY RANGE | Below 1000MHz |
| INPUT POWER (SYSTEM) | 120Vac, 60Hz | DETECTOR FUNCTION | Quasi-Peak |
| ENVIRONMENTAL CONDITIONS | 26deg. C, 79%RH 1003 hPa | TESTED BY | Chad Lee |
| TEST MODE | B | | |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M | | | | | | | | |
|---|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | 770.82 | 25.4 QP | 46.0 | -20.6 | 1.12 H | 25 | -0.53 | 25.92 |
| 2 | 790.18 | 26.0 QP | 46.0 | -20.0 | 1.35 H | 10 | -0.40 | 26.38 |
| 3 | 827.30 | 26.7 QP | 46.0 | -19.3 | 1.75 H | 205 | -0.25 | 26.95 |
| 4 | 866.04 | 27.9 QP | 46.0 | -18.1 | 1.69 H | 193 | 0.52 | 27.41 |
| 5 | 899.93 | 27.9 QP | 46.0 | -18.1 | 1.77 H | 58 | 0.12 | 27.78 |
| 6 | 938.67 | 28.2 QP | 46.0 | -17.8 | 1.50 H | 127 | -0.07 | 28.29 |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M | | | | | | | | |
| NO. | FREQ. (MHz) | EMISSION LEVEL (dBuV/m) | LIMIT (dBuV/m) | MARGIN (dB) | ANTENNA HEIGHT (m) | TABLE ANGLE (Degree) | RAW VALUE (dBuV) | CORRECTION FACTOR (dB/m) |
| 1 | 42.91 | 29.0 QP | 40.0 | -11.1 | 1.55 V | 328 | 14.80 | 14.15 |
| 2 | 76.81 | 27.1 QP | 40.0 | -12.9 | 1.68 V | 145 | 16.14 | 11.00 |
| 3 | 736.92 | 25.3 QP | 46.0 | -20.7 | 1.74 V | 181 | 0.22 | 25.11 |
| 4 | 769.20 | 26.1 QP | 46.0 | -19.9 | 1.82 V | 145 | 0.25 | 25.88 |
| 5 | 790.18 | 26.3 QP | 46.0 | -19.7 | 1.66 V | 355 | -0.05 | 26.38 |
| 6 | 827.30 | 26.9 QP | 46.0 | -19.1 | 1.00 V | 202 | -0.05 | 26.95 |

REMARKS:

1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.



4.3 NUMBER OF HOPPING FREQUENCY USED

4.3.1 LIMIT OF HOPPING FREQUENCY USED

At least 15 channels frequencies, and should be equally spaced.

4.3.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|----------------------------|-----------|------------|-----------------|------------------|
| SPECTRUM ANALYZER | FSP 40 | 100036 | Apr. 29, 2011 | Apr. 28, 2012 |

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.3.3 TEST PROCEDURES

- a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- c. Set the SA on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
- d. Set the SA on View mode and then plot the result on SA screen.
- e. Repeat above procedures until all frequencies measured were complete.

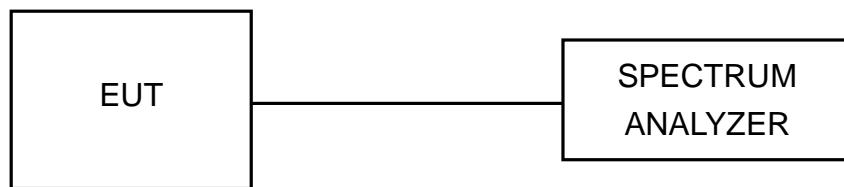


A D T

4.3.4 DEVIATION FROM TEST STANDARD

No deviation.

4.3.5 TEST SETUP



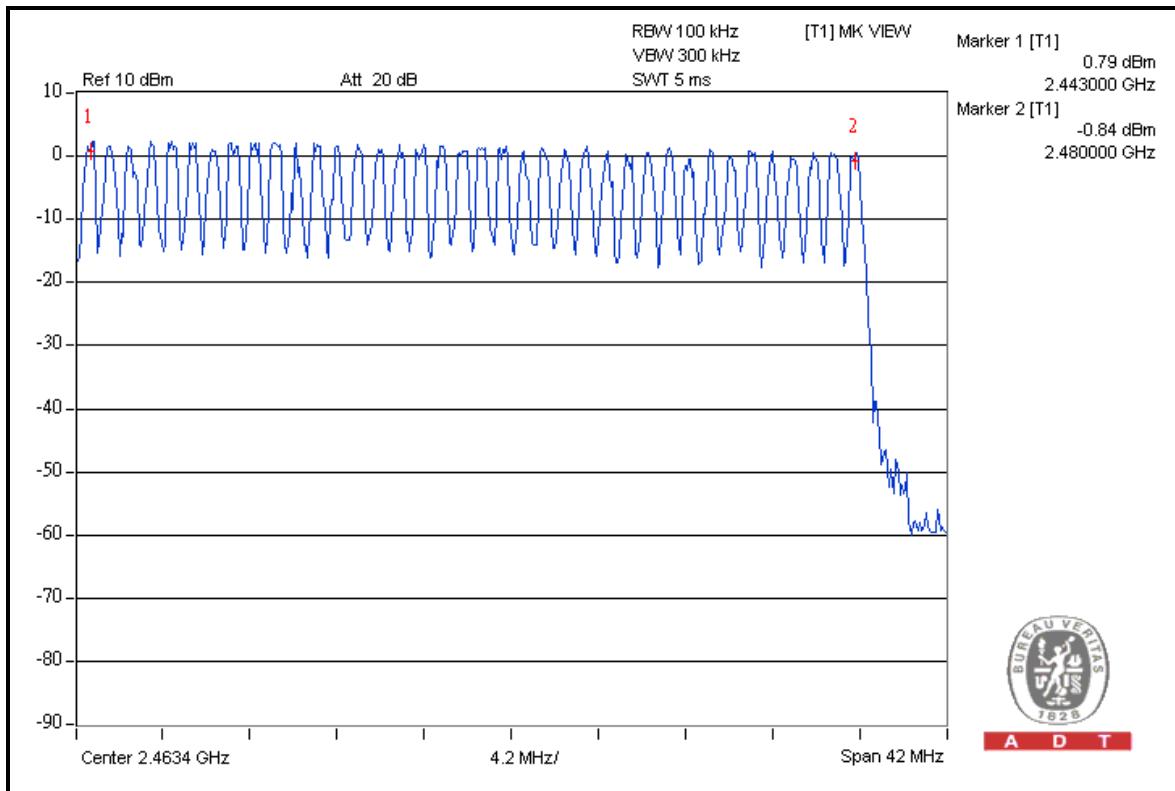
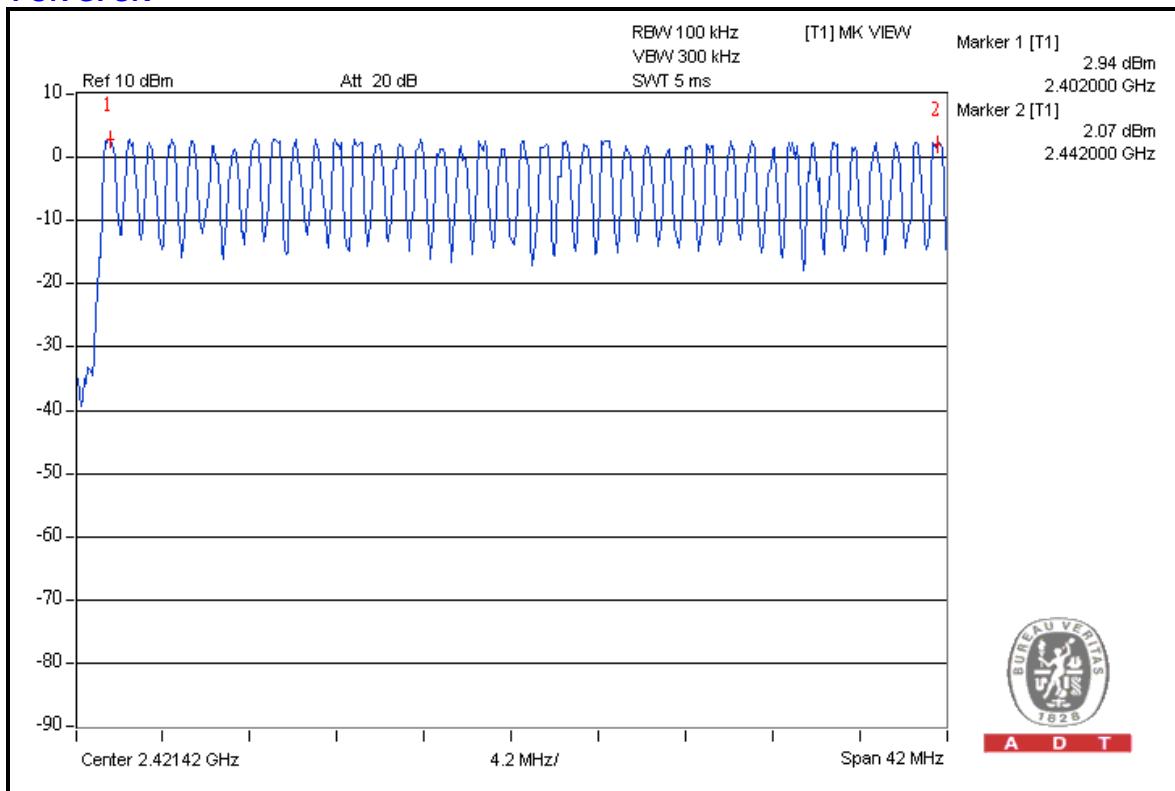
4.3.6 TEST RESULTS

There are 79 hopping frequencies in the hopping mode. Please refer to next two pages for the test result. On the plots, it shows that the hopping frequencies are equally spaced.



A D T

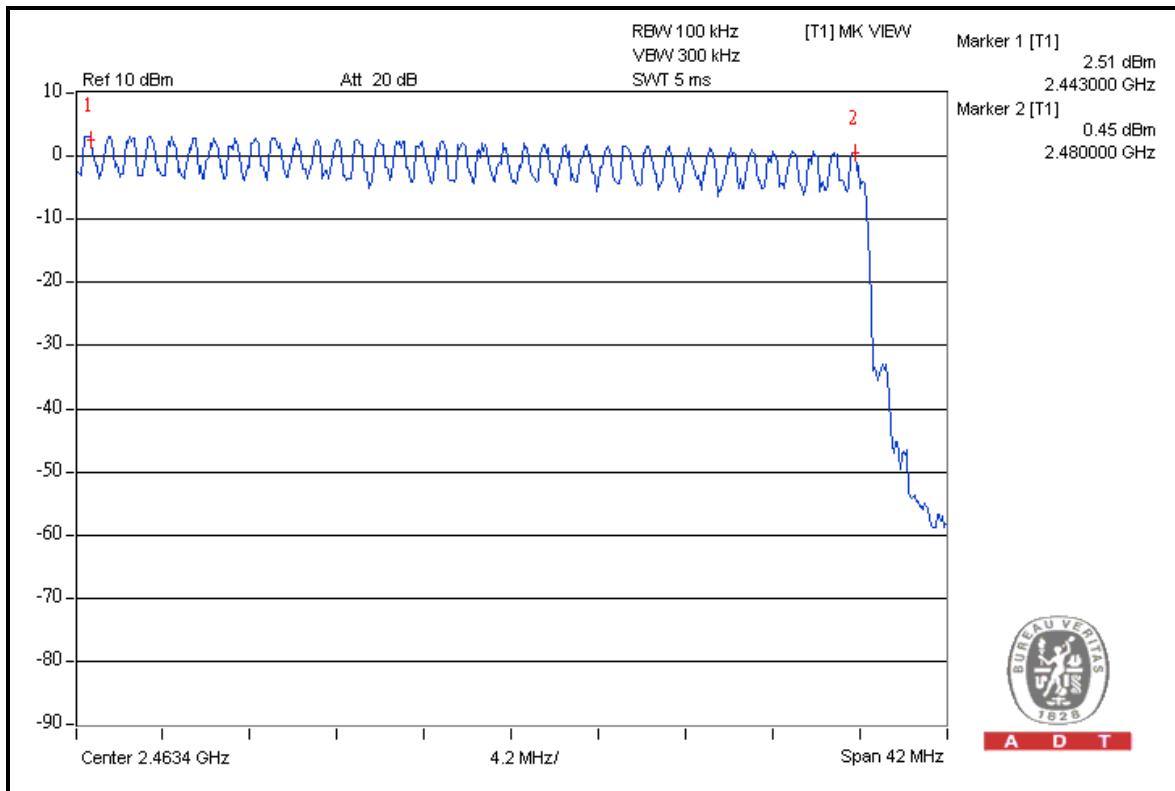
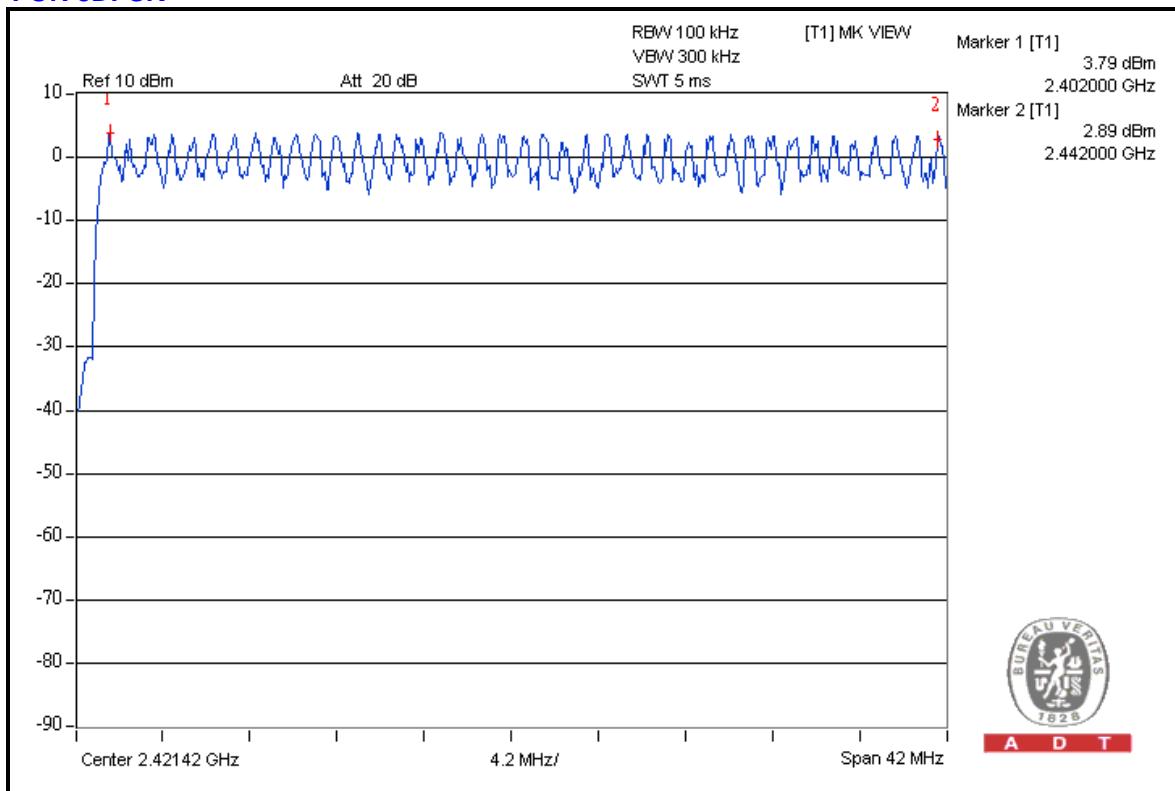
**MODE A
FOR GFSK**





A D T

**MODE A
FOR 8DPSK**





4.4 DWELL TIME ON EACH CHANNEL

4.4.1 LIMIT OF DWELL TIME USED

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

4.4.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|----------------------------|-----------|------------|-----------------|------------------|
| SPECTRUM ANALYZER | FSP 40 | 100036 | Apr. 29, 2011 | Apr. 28, 2012 |

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.4.3 TEST PROCEDURES

- a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
- c. Adjust the center frequency of SA on any frequency to be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
- d. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
- e. Repeat above procedures until all different time-slot modes have been completed.

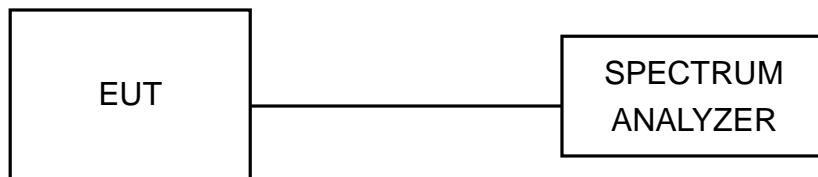
4.4.4 DEVIATION FROM TEST STANDARD

No deviation.



A D T

4.4.5 TEST SETUP



4.4.6 TEST RESULTS

MODE A FOR GFSK

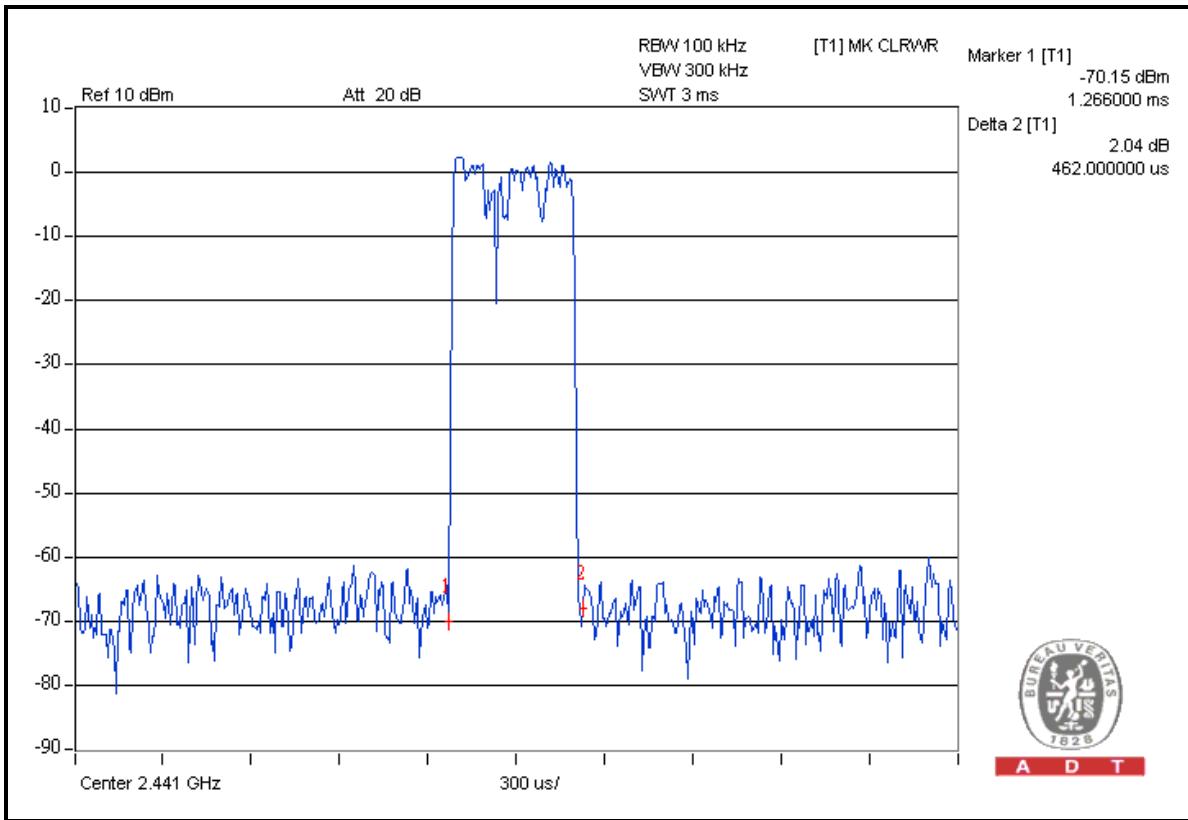
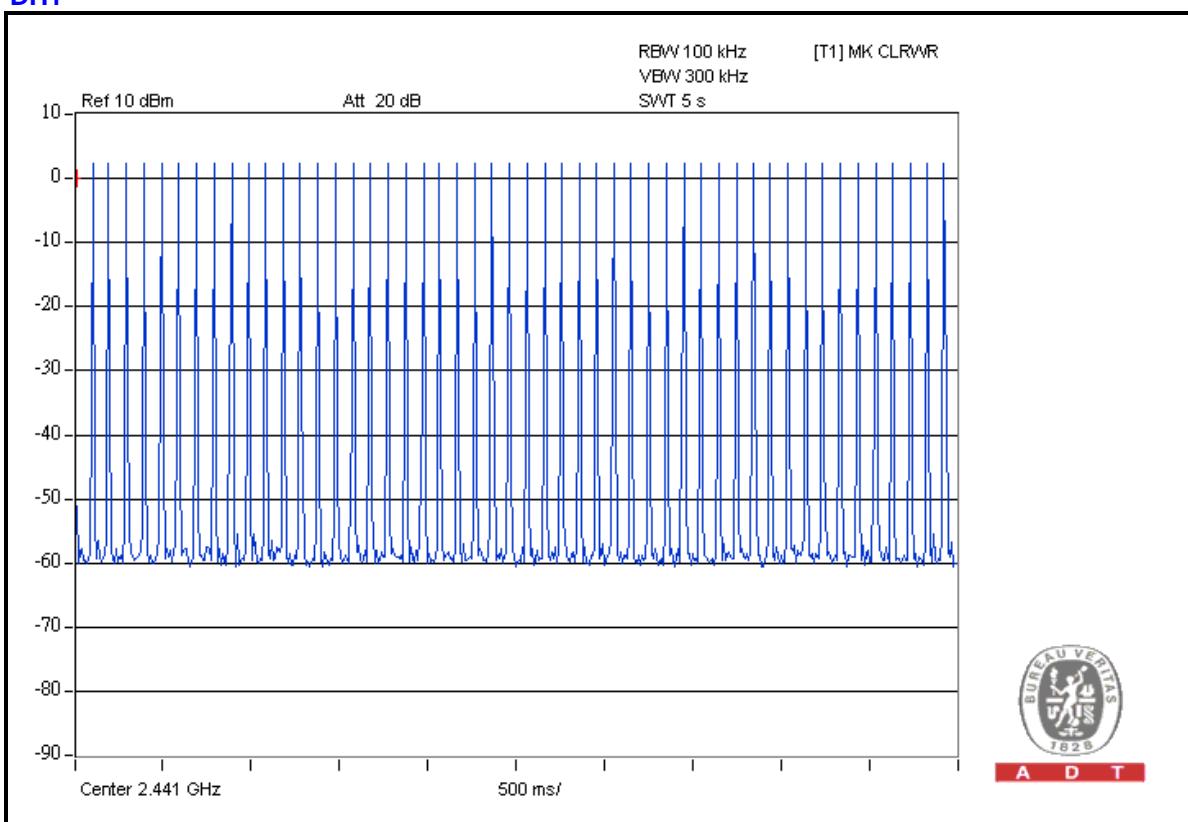
| Mode | Number of transmission in a 31.6 (79Hopping*0.4) | Length of transmission time (msec) | Result (msec) | Limit (msec) |
|------|--|------------------------------------|---------------|--------------|
| DH1 | 50 (times / 5 sec) *6.32=316.00 times | 0.462 | 145.9920 | 400 |
| DH3 | 25 (times / 5 sec) *6.32=158.00 times | 1.740 | 274.9200 | 400 |
| DH5 | 17 (times / 5 sec) *6.32=107.44 times | 3.040 | 326.6176 | 400 |

NOTE: Test plots of the transmitting time slot are shown on next 3 pages.



A D T

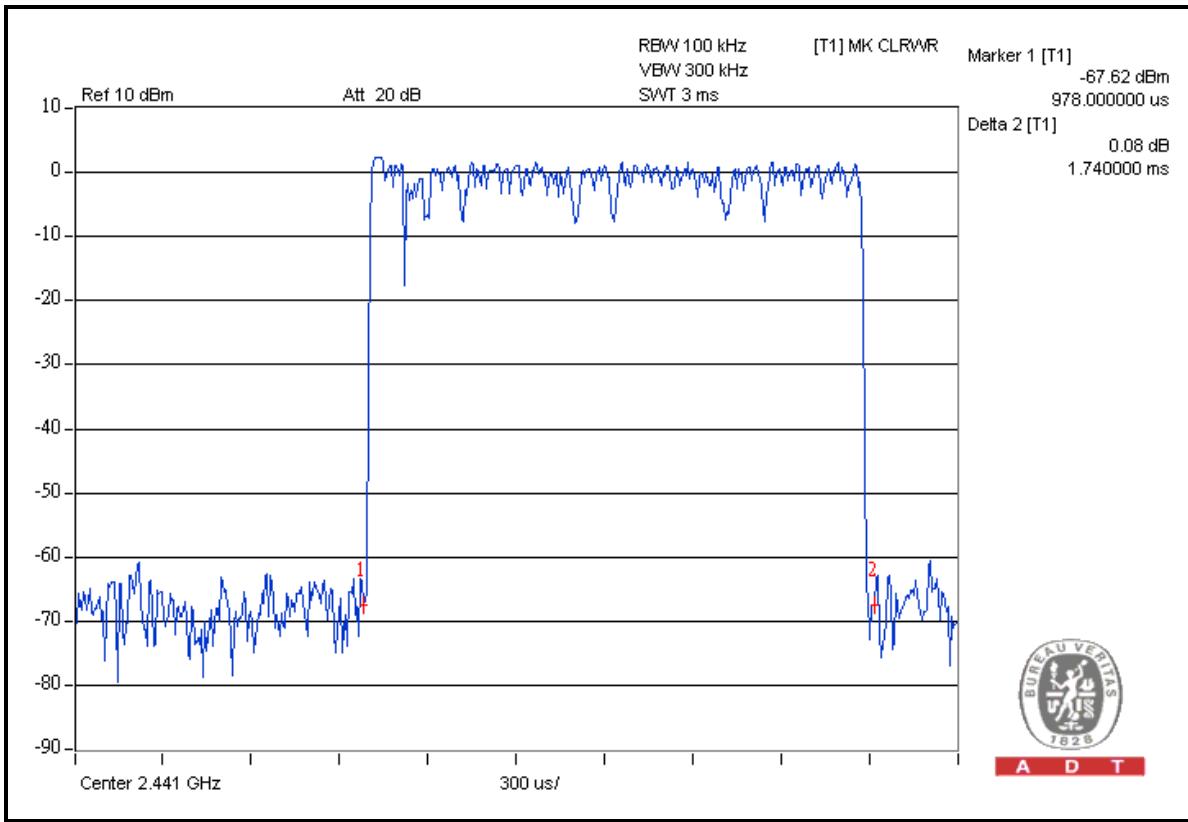
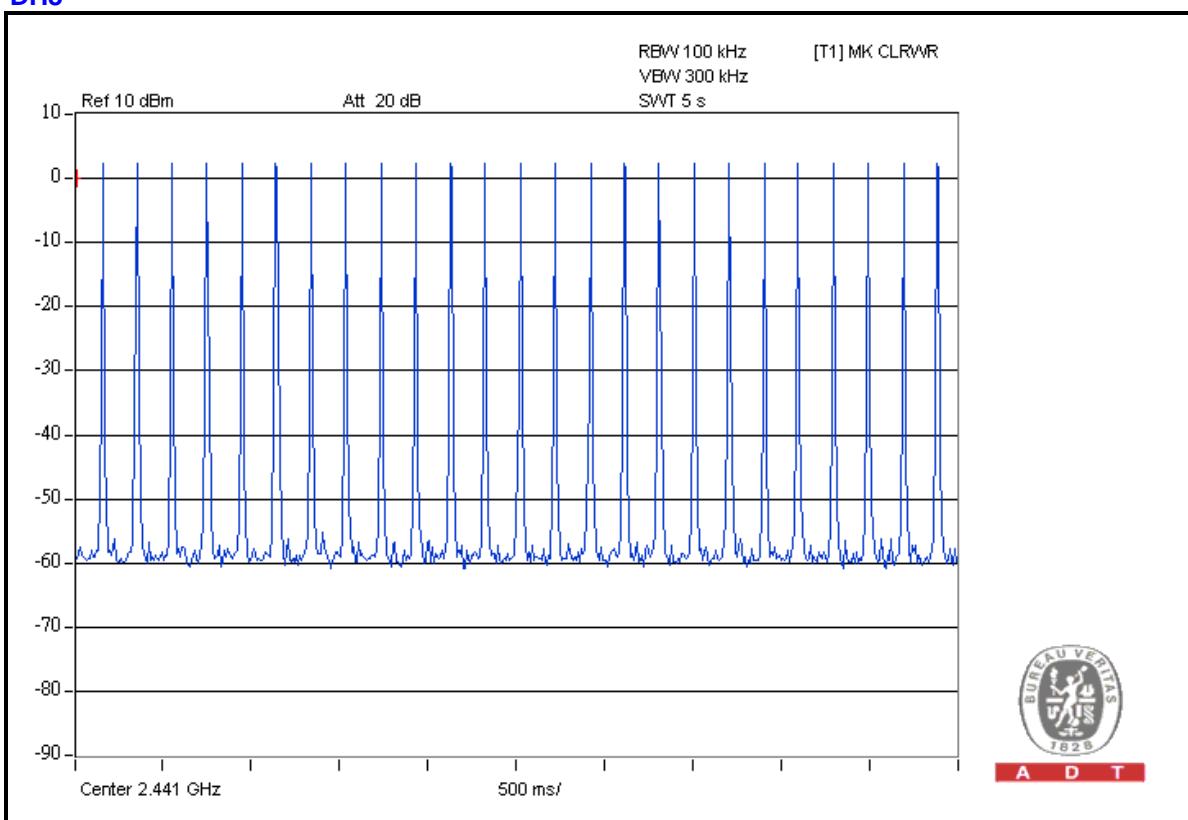
DH1





A D T

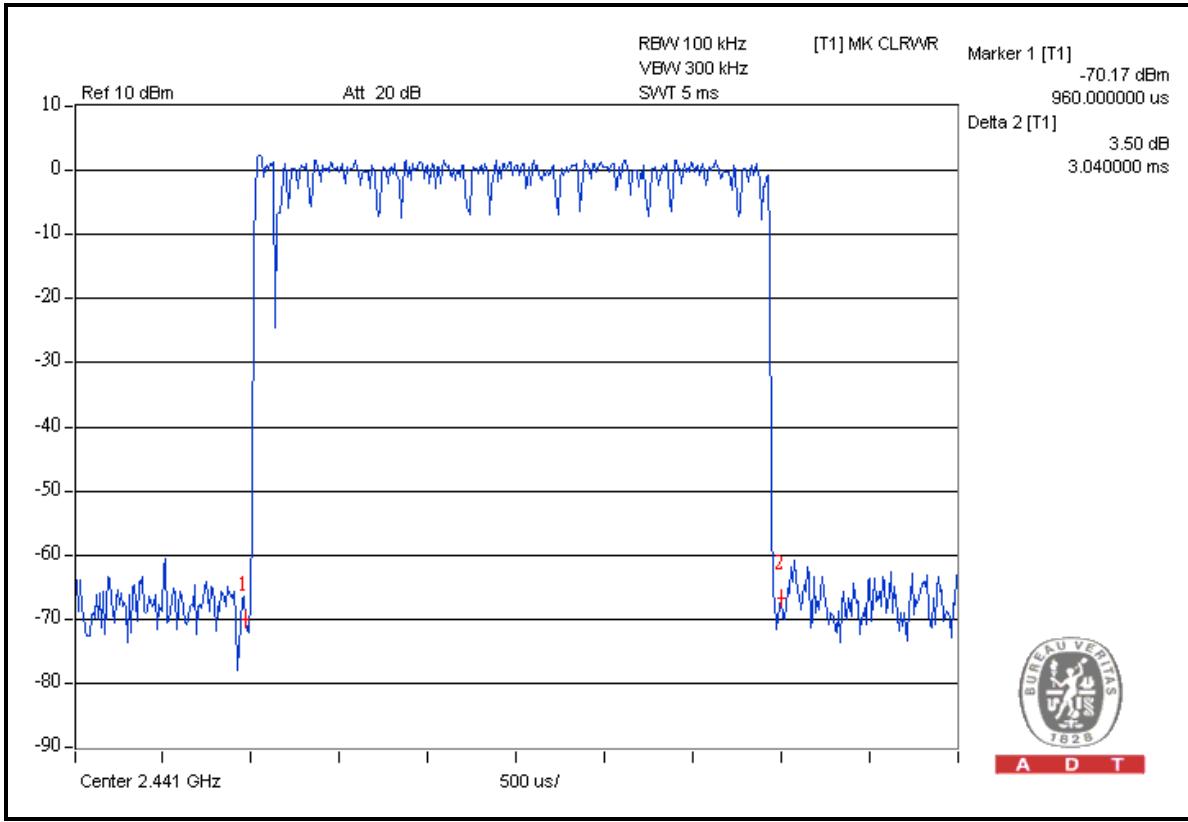
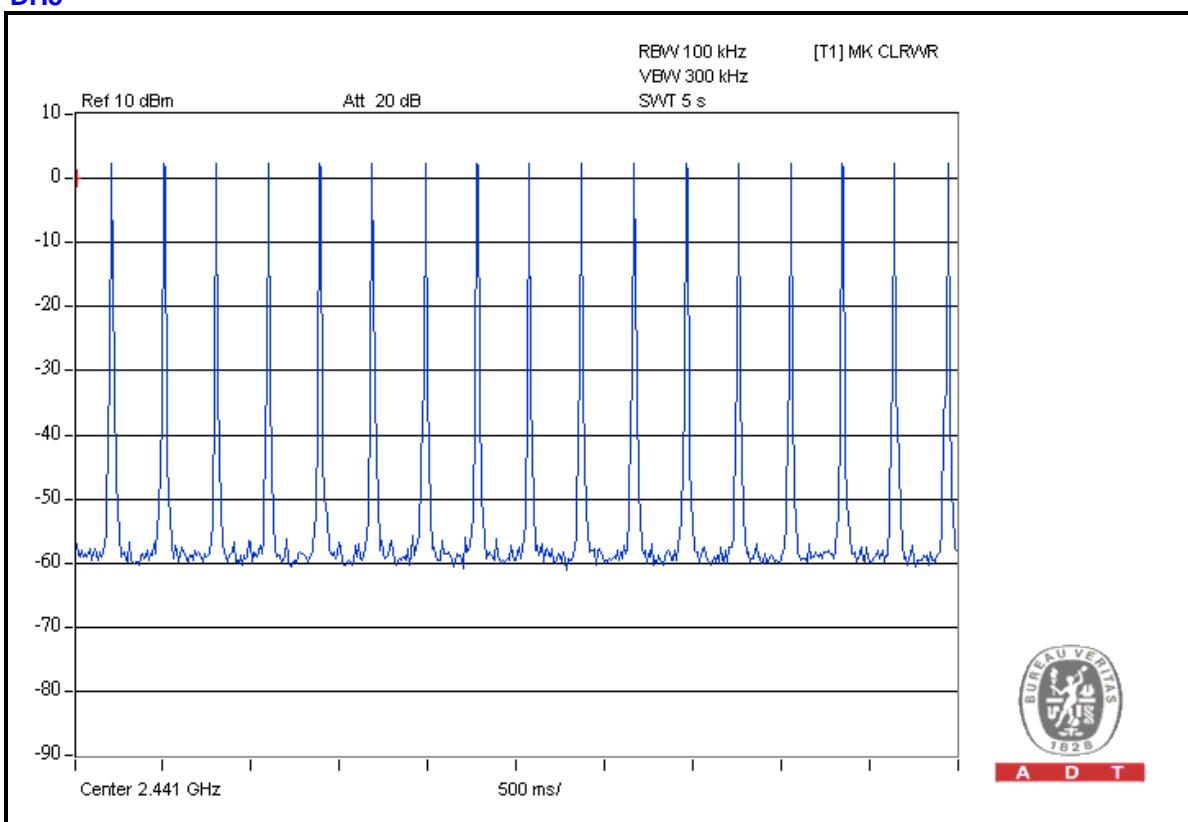
DH3





A D T

DH5





A D T

MODE A FOR 8DPSK

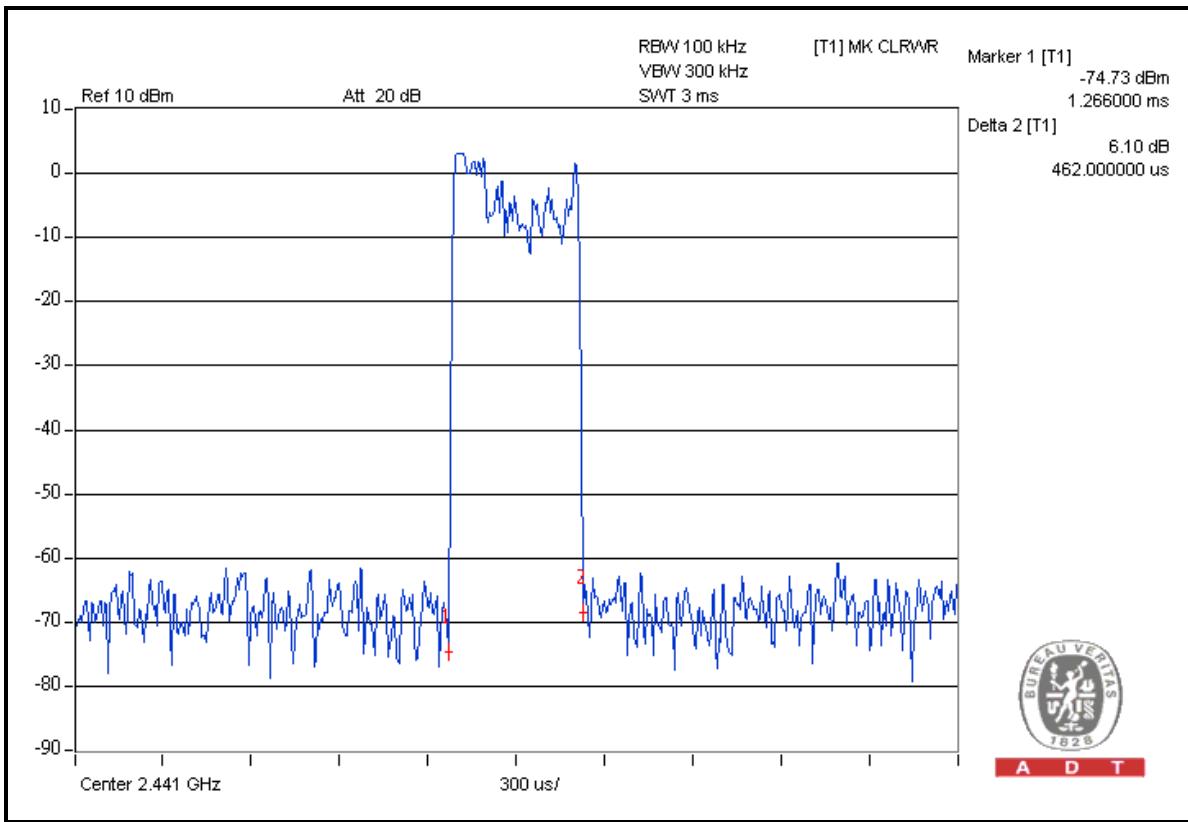
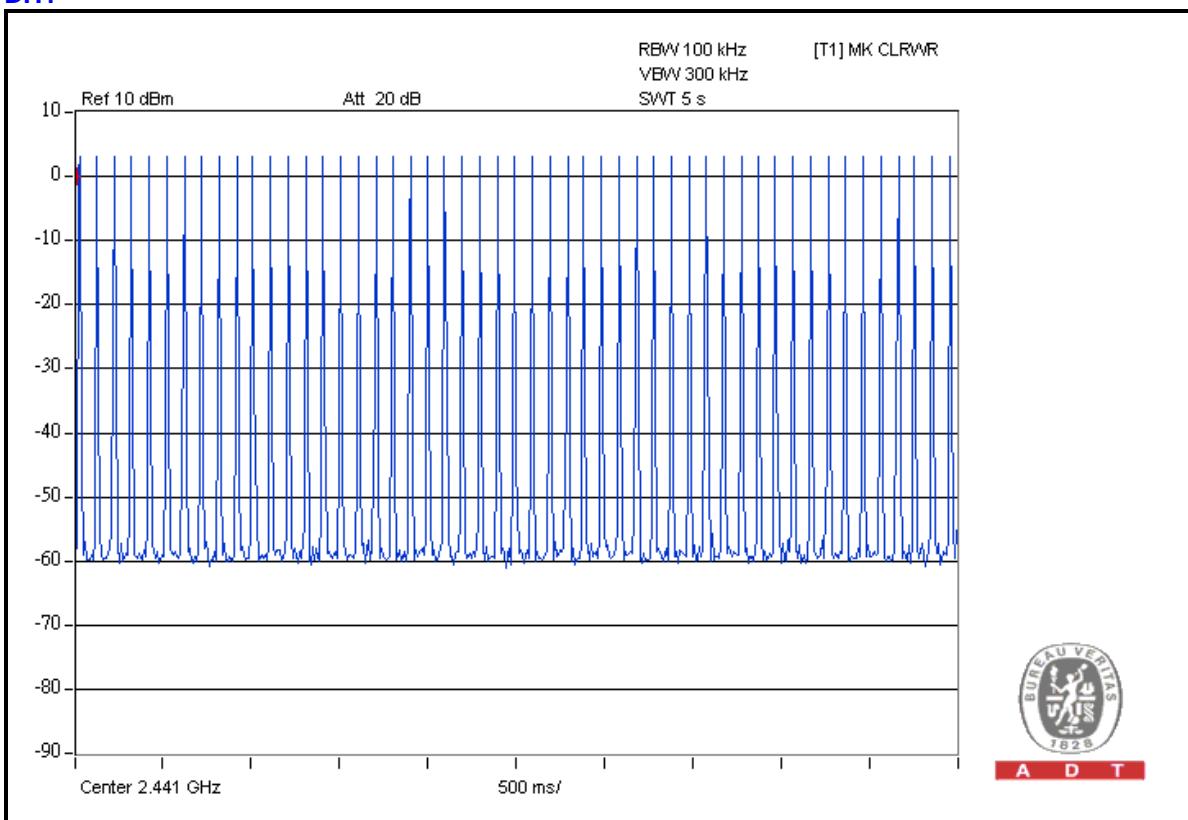
| Mode | Number of transmission in a 31.6 (79Hopping*0.4) | Length of transmission time (msec) | Result (msec) | Limit (msec) |
|------|--|------------------------------------|---------------|--------------|
| DH1 | 51 (times / 5 sec) *6.32=322.32 times | 0.462 | 148.91184 | 400 |
| DH3 | 25 (times / 5 sec) *6.32=158.00 times | 1.728 | 273.02400 | 400 |
| DH5 | 17 (times / 5 sec) *6.32=107.44 times | 3.000 | 322.32000 | 400 |

NOTE: Test plots of the transmitting time slot are shown on next 3 pages.



A D T

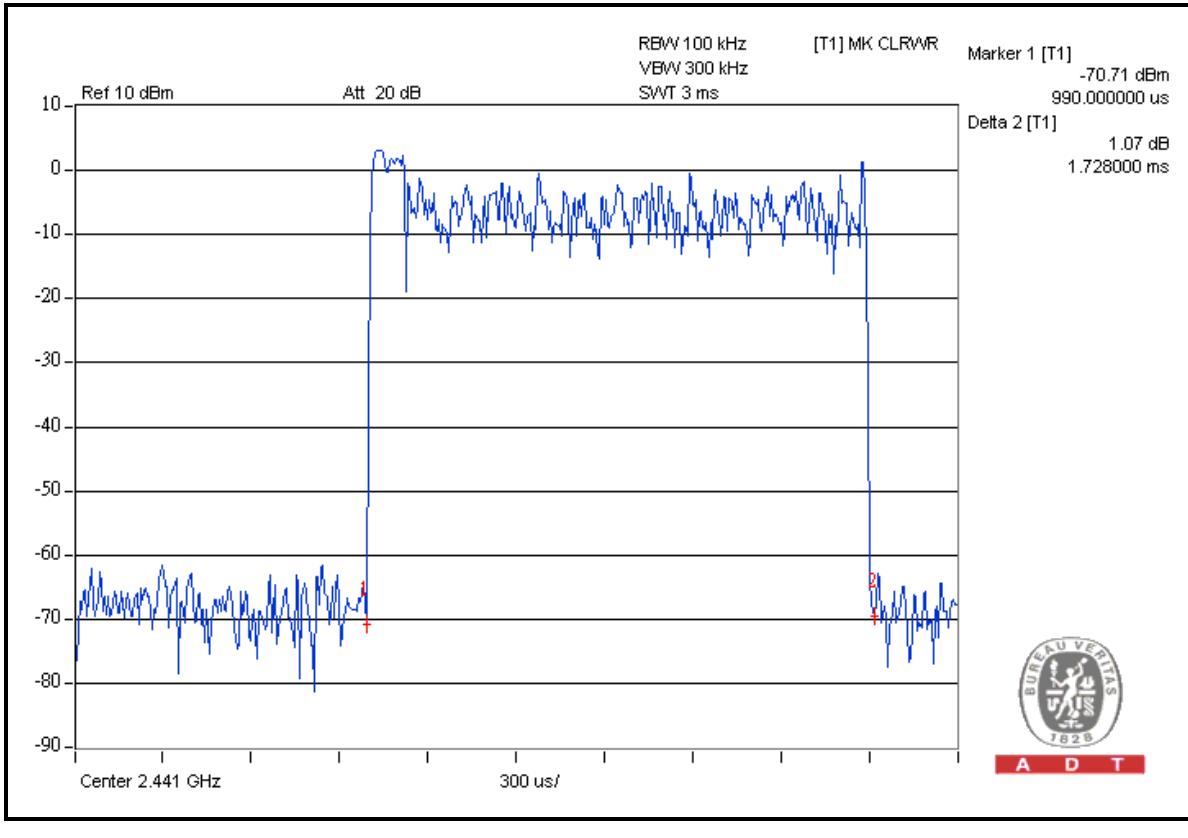
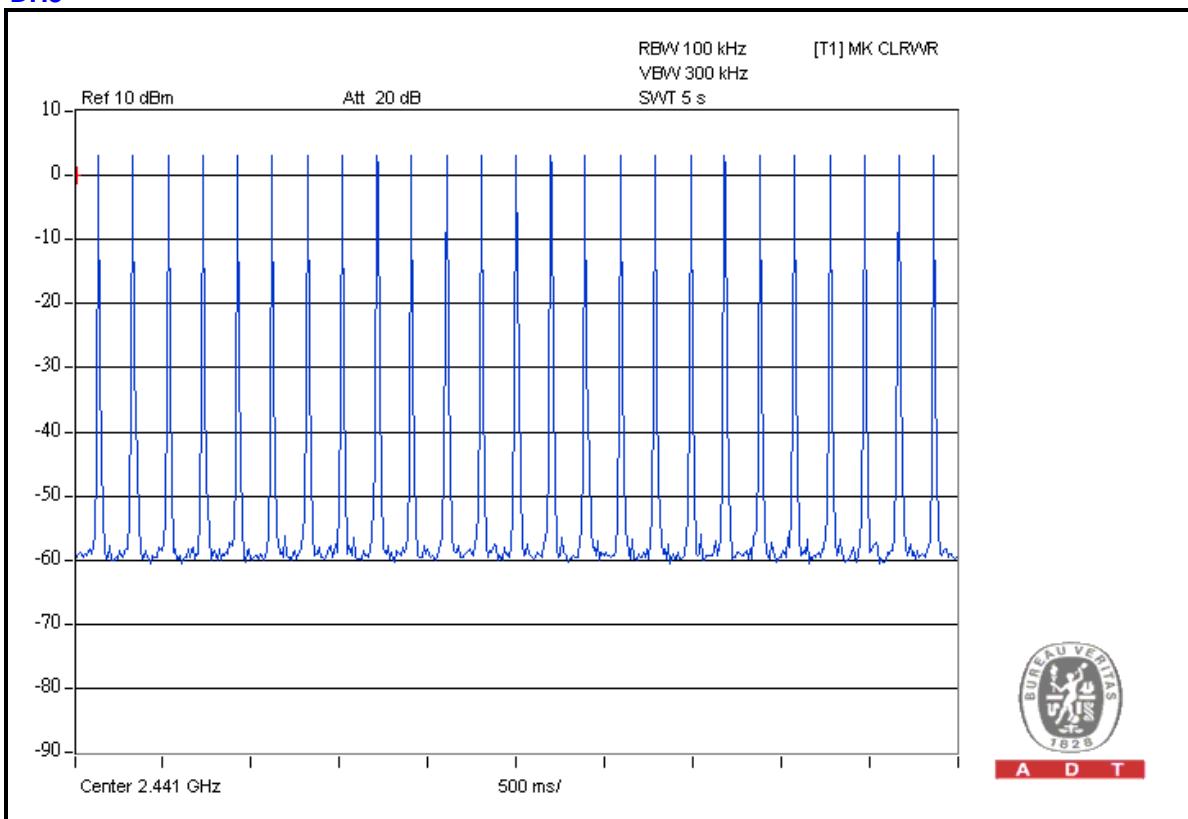
DH1





A D T

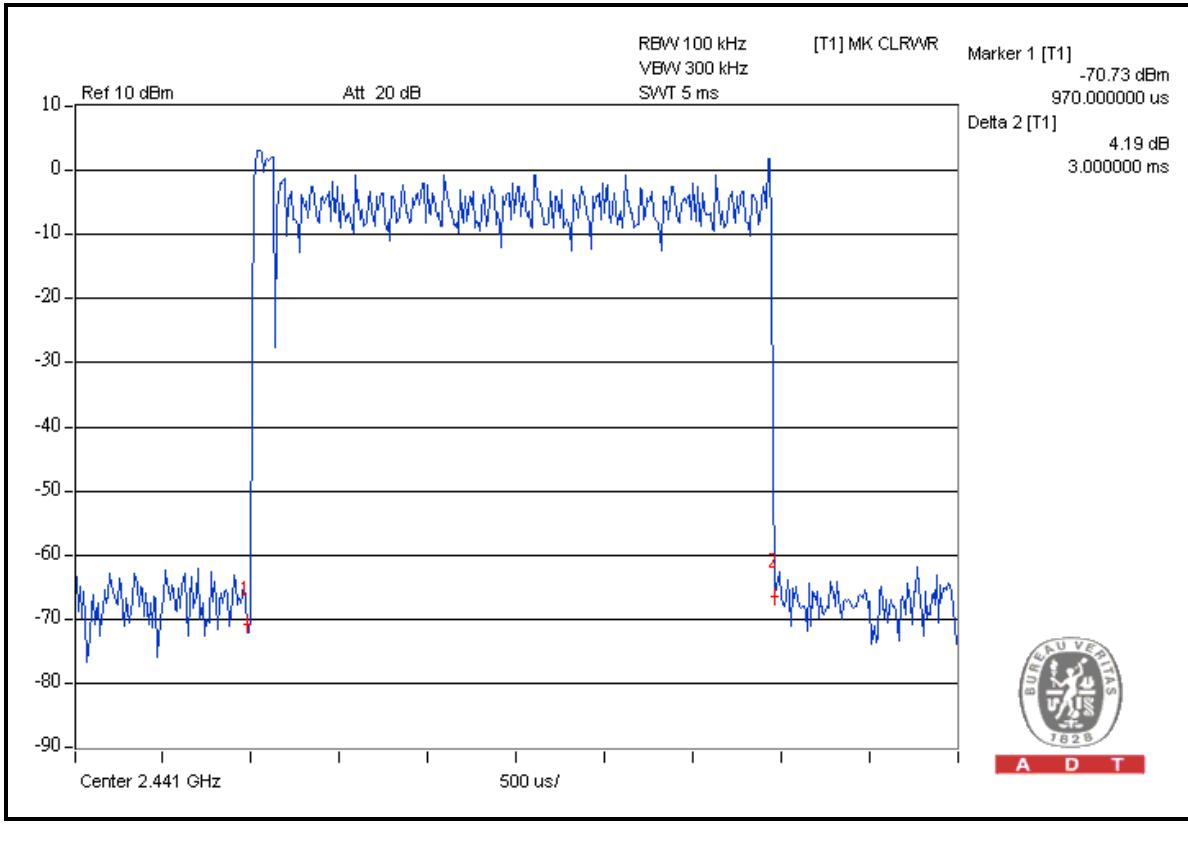
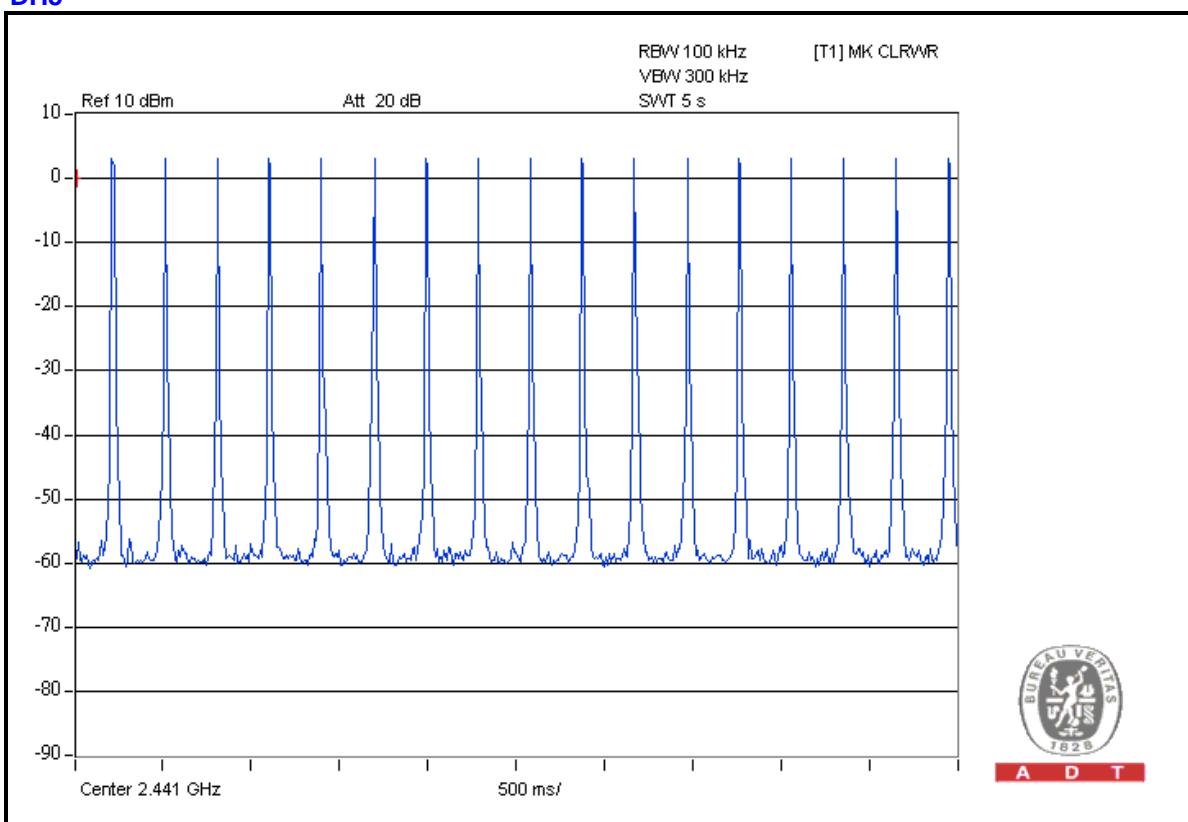
DH3





A D T

DH5





4.5 CHANNEL BANDWIDTH

4.5.1 LIMITS OF CHANNEL BANDWIDTH

For frequency hopping system operating in the 2400-2483.5MHz, If the 20dB bandwidth of hopping channel is greater than 25kHz, two-thirds 20dB bandwidth of hopping channel shall be a minimum limit for the hopping channel separation.

4.5.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|----------------------------|-----------|------------|-----------------|------------------|
| SPECTRUM ANALYZER | FSP 40 | 100036 | Apr. 29, 2011 | Apr. 28, 2012 |

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.5.3 TEST PROCEDURE

- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- c. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
- d. Repeat above procedures until all frequencies measured were complete.



A D T

4.5.4 DEVIATION FROM TEST STANDARD

No deviation.

4.5.5 TEST SETUP



4.5.6 EUT OPERATING CONDITION

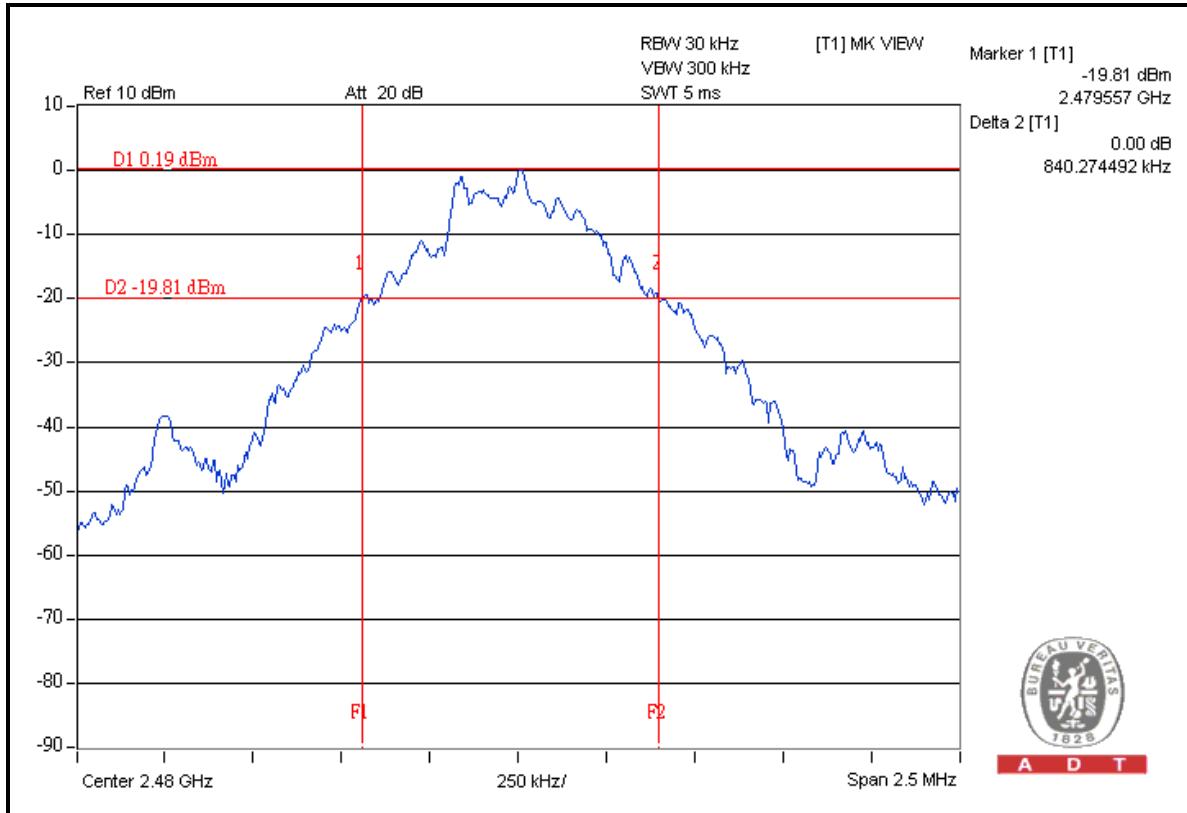
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.5.7 TEST RESULTS

MODE A FOR GFSK

| CHANNEL | CHANNEL FREQUENCY (MHz) | 20dB BANDWIDTH (MHz) |
|---------|-------------------------|----------------------|
| 0 | 2402 | 0.83 |
| 39 | 2441 | 0.83 |
| 78 | 2480 | 0.84 |

CH 78



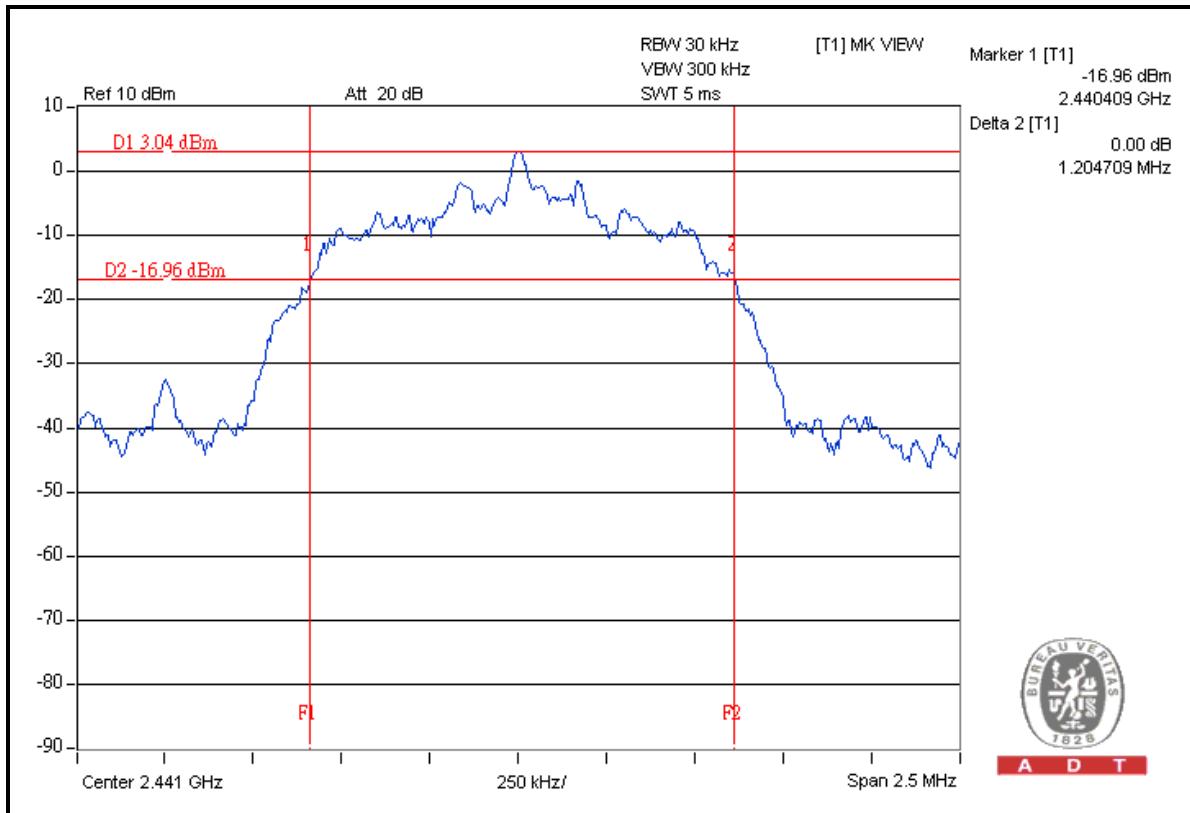


A D T

MODE A FOR 8DPSK

| CHANNEL | CHANNEL FREQUENCY (MHz) | 20dB BANDWIDTH (MHz) |
|---------|-------------------------|----------------------|
| 0 | 2402 | 1.19 |
| 39 | 2441 | 1.20 |
| 78 | 2480 | 1.20 |

CH 39





A D T

4.6 HOPPING CHANNEL SEPARATION

4.6.1 LIMIT OF HOPPING CHANNEL SEPARATION

At least 25kHz or two-third of 20dB hopping channel bandwidth (whichever is greater).

4.6.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|----------------------------|-----------|------------|-----------------|------------------|
| SPECTRUM ANALYZER | FSP 40 | 100036 | Apr. 29, 2011 | Apr. 28, 2012 |

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.6.3 TEST PROCEDURES

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
3. By using the MaxHold function record the separation of two adjacent channels.
4. Measure the frequency difference of these two adjacent channels by SA MARK function. And then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.



A D T

4.6.4 DEVIATION FROM TEST STANDARD

No deviation.

4.6.5 TEST SETUP





A D T

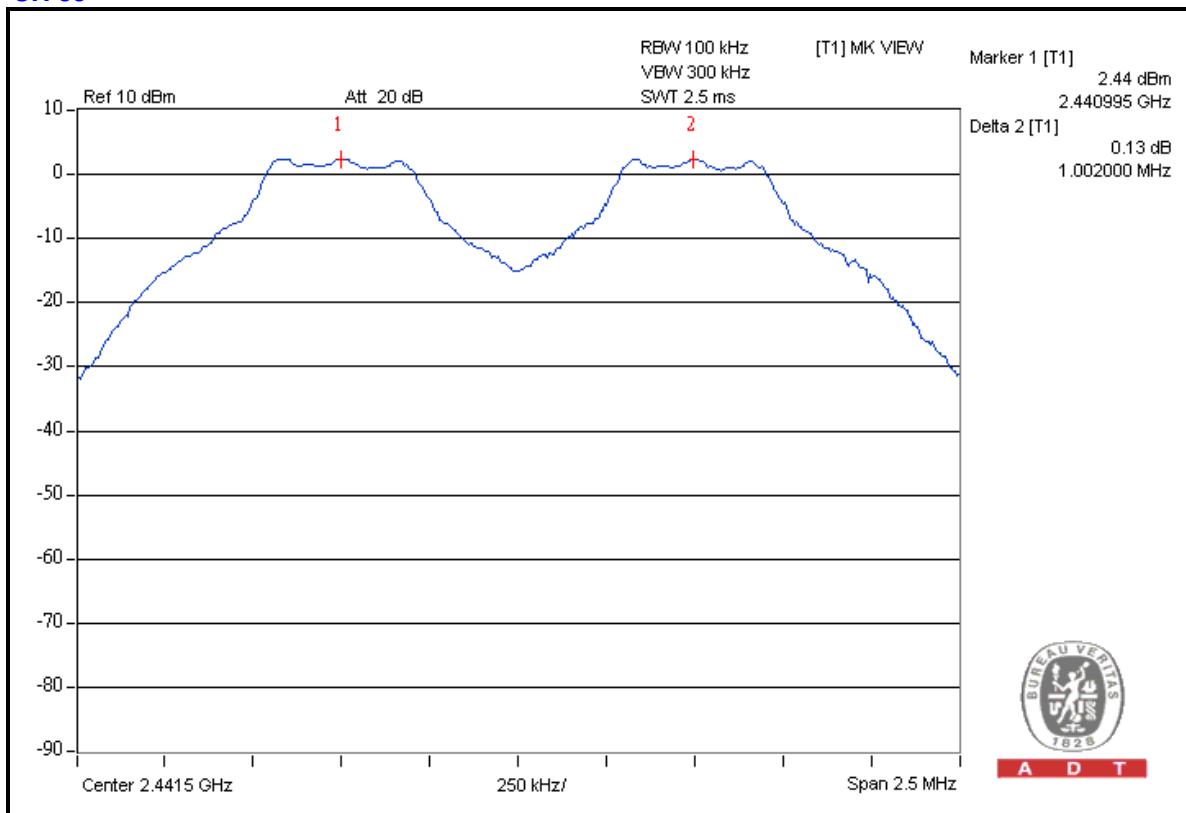
4.6.6 TEST RESULTS

MODE A FOR GFSK

| CHANNEL | FREQUENCY (MHz) | ADJACENT CHANNEL SEPARATION (MHz) | 20dB BANDWIDTH (MHz) | MINIMUM LIMIT (MHz) | PASS / FAIL |
|---------|-----------------|-----------------------------------|----------------------|---------------------|-------------|
| 0 | 2402 | 1.00 | 0.83 | 0.55 | PASS |
| 39 | 2441 | 1.00 | 0.83 | 0.55 | PASS |
| 78 | 2480 | 1.00 | 0.84 | 0.56 | PASS |

NOTE: The minimum limit is two-third 20dB bandwidth. Test results please refer to following plot.

CH 39





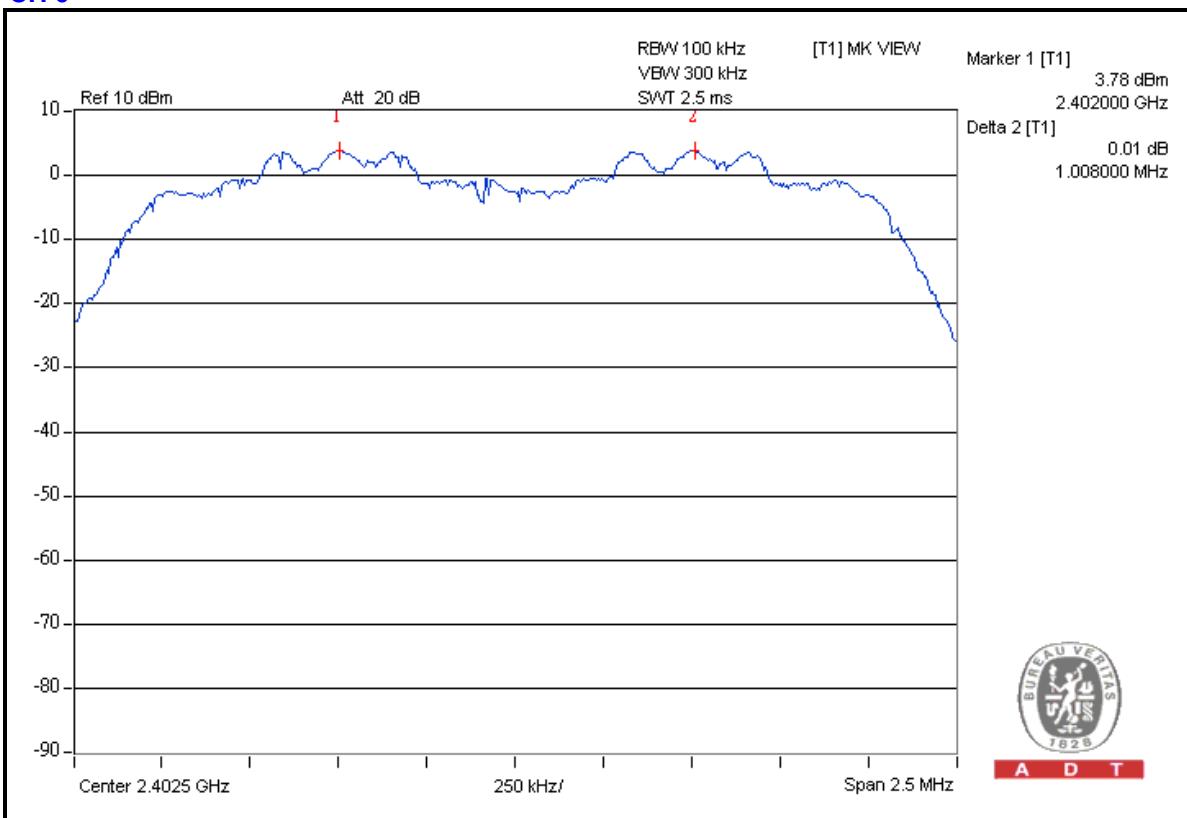
A D T

MODE A FOR 8DPSK

| CHANNEL | FREQUENCY (MHz) | ADJACENT CHANNEL SEPARATION (MHz) | 20dB BANDWIDTH (MHz) | MINIMUM LIMIT (MHz) | PASS / FAIL |
|---------|-----------------|-----------------------------------|----------------------|---------------------|-------------|
| 0 | 2402 | 1.01 | 1.19 | 0.79 | PASS |
| 39 | 2441 | 1.00 | 1.20 | 0.80 | PASS |
| 78 | 2480 | 1.01 | 1.20 | 0.80 | PASS |

NOTE: The minimum limit is two-third 20dB bandwidth. Test results please refer to following plot.

CH 0





4.7 MAXIMUM PEAK OUTPUT POWER

4.7.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 125mW.

4.7.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|----------------------------|-----------|------------|-----------------|------------------|
| SPECTRUM ANALYZER | FSP 40 | 100036 | Apr. 29, 2011 | Apr. 28, 2012 |

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.7.3 TEST PROCEDURES

- a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- c. The center frequency of the spectrum analyzer is set to the fundamental frequency and using 3MHz RBW and 10 MHz VBW.
- d. Measure the captured power within the band and recording the plot.
- e. Repeat above procedures until all frequencies required were complete.

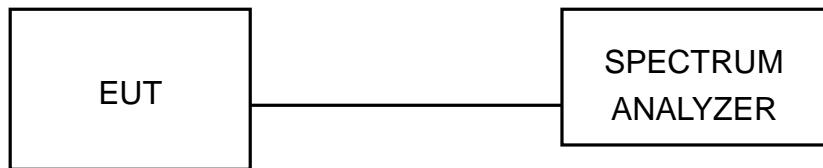
4.7.4 DEVIATION FROM TEST STANDARD

No deviation



A D T

4.7.5 TEST SETUP



For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

4.7.6 EUT OPERATING CONDITION

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.



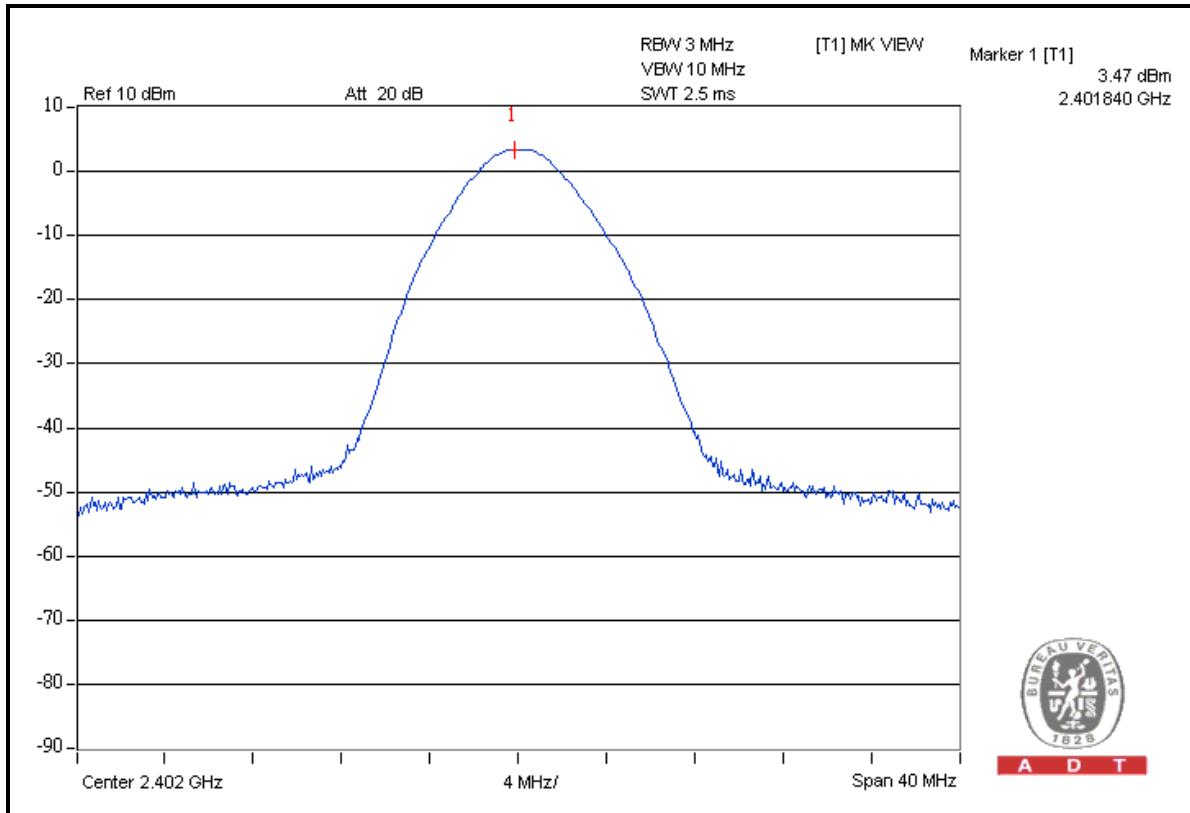
A D T

4.7.7 TEST RESULTS

MODE A FOR GFSK

| CHANNEL | CHANNEL FREQUENCY (MHz) | PEAK POWER OUTPUT (dBm) | PEAK POWER OUTPUT (mW) | PEAK POWER LIMIT (mW) | PASS/FAIL |
|---------|-------------------------|-------------------------|------------------------|-----------------------|-----------|
| 0 | 2402 | 3.5 | 2.2 | 125 | PASS |
| 39 | 2441 | 2.8 | 1.9 | 125 | PASS |
| 78 | 2480 | 1.1 | 1.3 | 125 | PASS |

CH 0



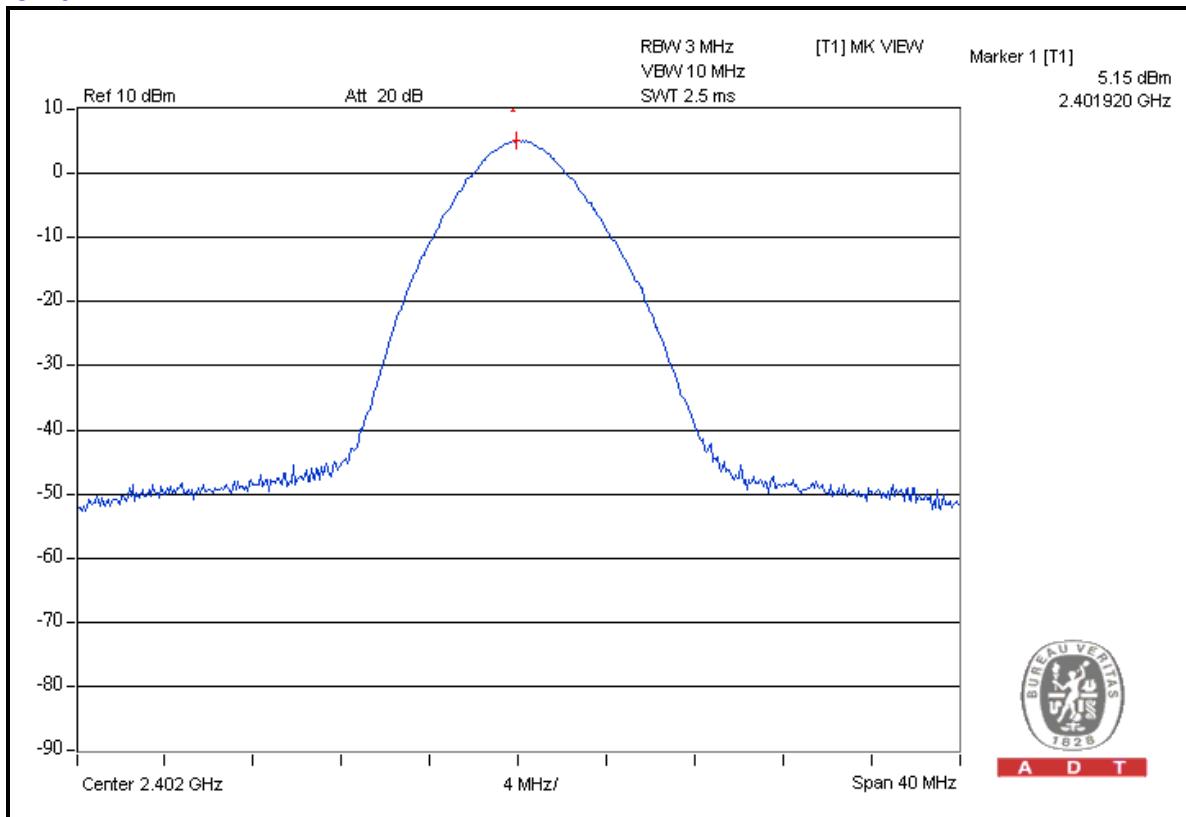


A D T

MODE A FOR 8DPSK

| CHANNEL | CHANNEL FREQUENCY (MHz) | PEAK POWER OUTPUT (dBm) | PEAK POWER OUTPUT (mW) | PEAK POWER LIMIT (mW) | PASS/FAIL |
|---------|-------------------------|-------------------------|------------------------|-----------------------|-----------|
| 0 | 2402 | 5.2 | 3.3 | 125 | PASS |
| 39 | 2441 | 4.5 | 2.8 | 125 | PASS |
| 78 | 2480 | 1.4 | 1.4 | 125 | PASS |

CH 0





4.8 BAND EDGES MEASUREMENT

4.8.1 LIMITS OF BAND EDGES MEASUREMENT

Below –20dB of the highest emission level of operating band (in 100KHz RBW).

4.8.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|----------------------------|-----------|------------|-----------------|------------------|
| SPECTRUM ANALYZER | FSP 40 | 100036 | Apr. 29, 2011 | Apr. 28, 2012 |

NOTE: The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

4.8.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low loss cable. Set both RBW and VBW of spectrum analyzer to 100 kHz and 300 kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

The spectrum plots are attached on the following pages.

4.8.4 DEVIATION FROM TEST STANDARD

No deviation.

4.8.5 EUT OPERATING CONDITION

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.



A D T

4.8.6 TEST RESULTS

The spectrum plots are attached on the following 8 images. D1 line indicates the highest level, D2 line indicates the 20dB offset below D1. It shows compliance with the requirement in part 15.247(d).

MODE A FOR GFSK

RESTRICT BAND (2310 ~ 2390 MHz)

| FREQUENCY (MHz) | FUNDAMENTAL EMISSION (dBuV/m) | DELTA (dB) | MAXIMUM FIELD STRENGTH IN RESTRICT BAND (dBuV/m) | LIMIT (dBuV/m) |
|-----------------|-------------------------------|------------|--|----------------|
| 2402.00 (PK) | 92.6 | 60.5 | 32.1 | 74.00 |
| 2402.00 (AV) | - | - | 2.0 | 54.00 |

RESTRICT BAND (2483.5 ~ 2500 MHz)

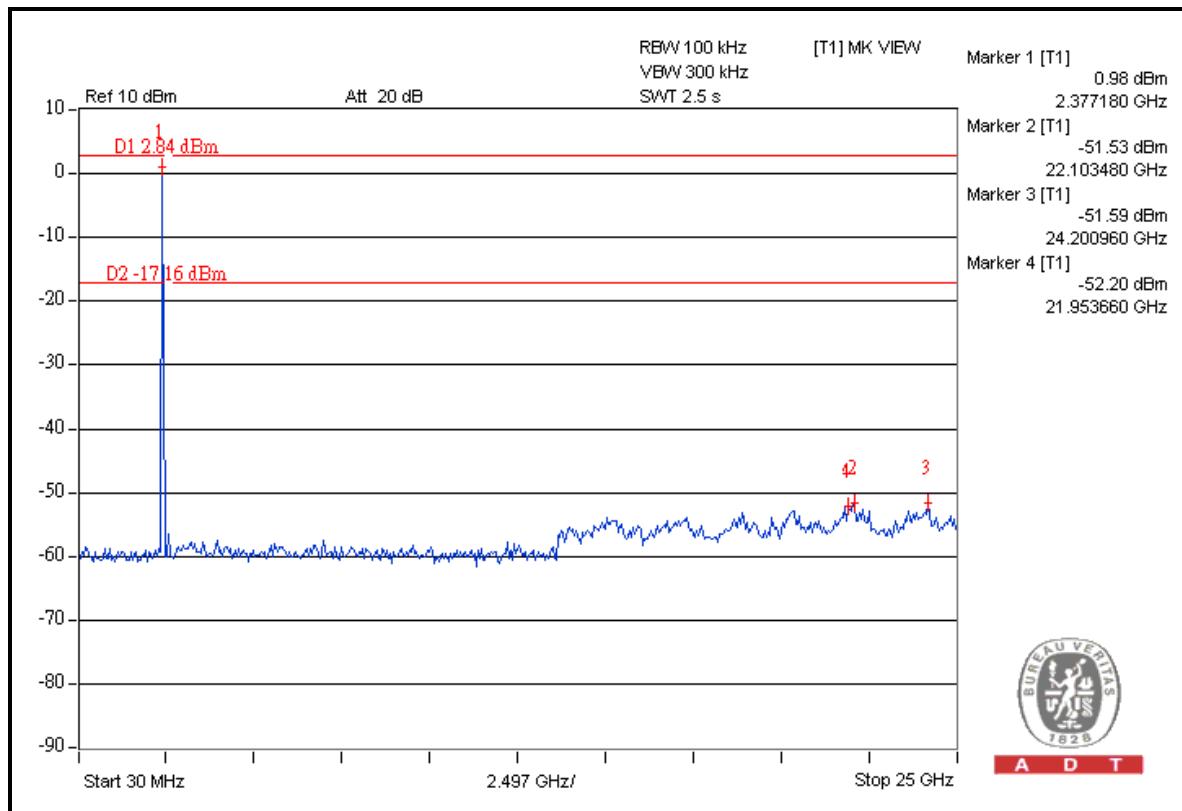
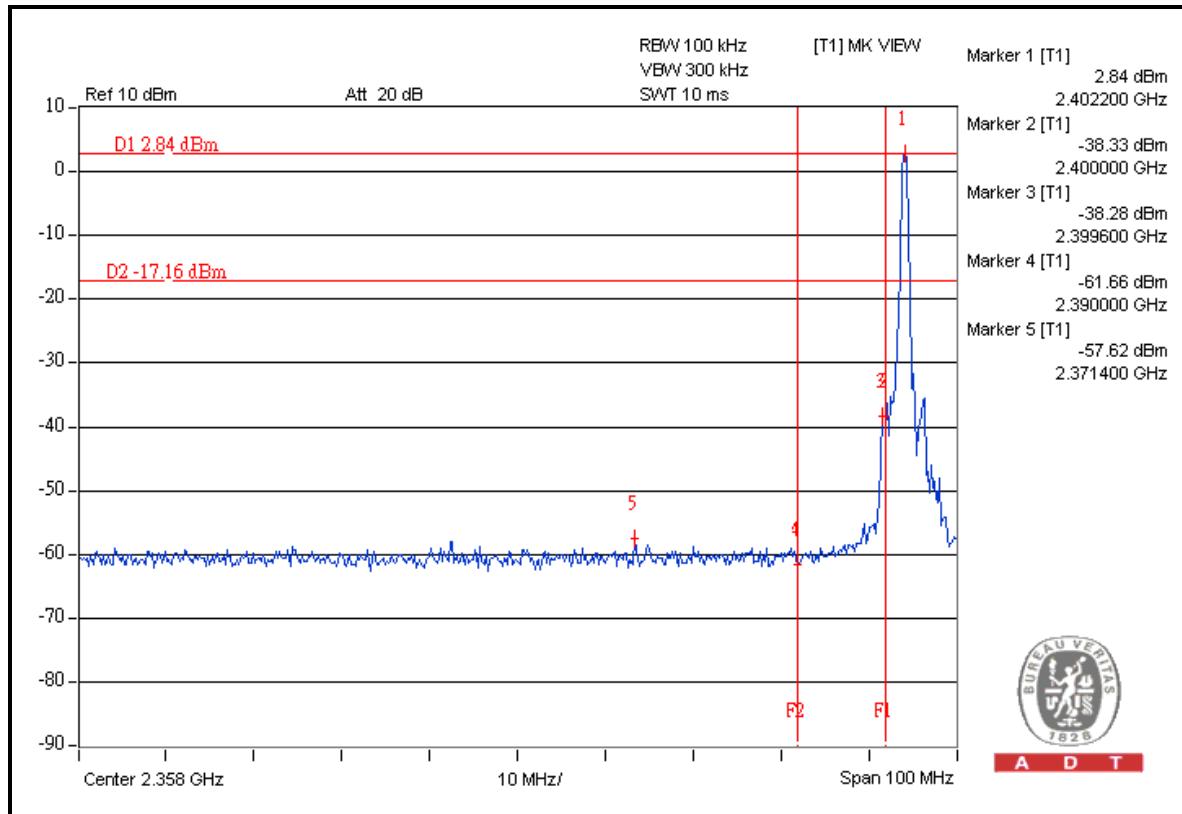
| FREQUENCY (MHz) | FUNDAMENTAL EMISSION (dBuV/m) | DELTA (dB) | MAXIMUM FIELD STRENGTH IN RESTRICT BAND (dBuV/m) | LIMIT (dBuV/m) |
|-----------------|-------------------------------|------------|--|----------------|
| 2480.00 (PK) | 89.4 | 57.5 | 31.9 | 74.00 |
| 2480.00 (AV) | - | - | 1.8 | 54.00 |

NOTE:

1. Delta = Amplitude between the peak of the fundamental and the peak of the band edge emission. Please check following 2 pages.
2. Maximum field strength in restrict band (PK value) = Fundamental emission (PK value) – Delta.
3. Average value =Peak value + 20 Log (duty cycle) = Peak value –30.1dB.
4. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle be equal to: $20\log(3.125/100) = -30.1 \text{ dB}$.

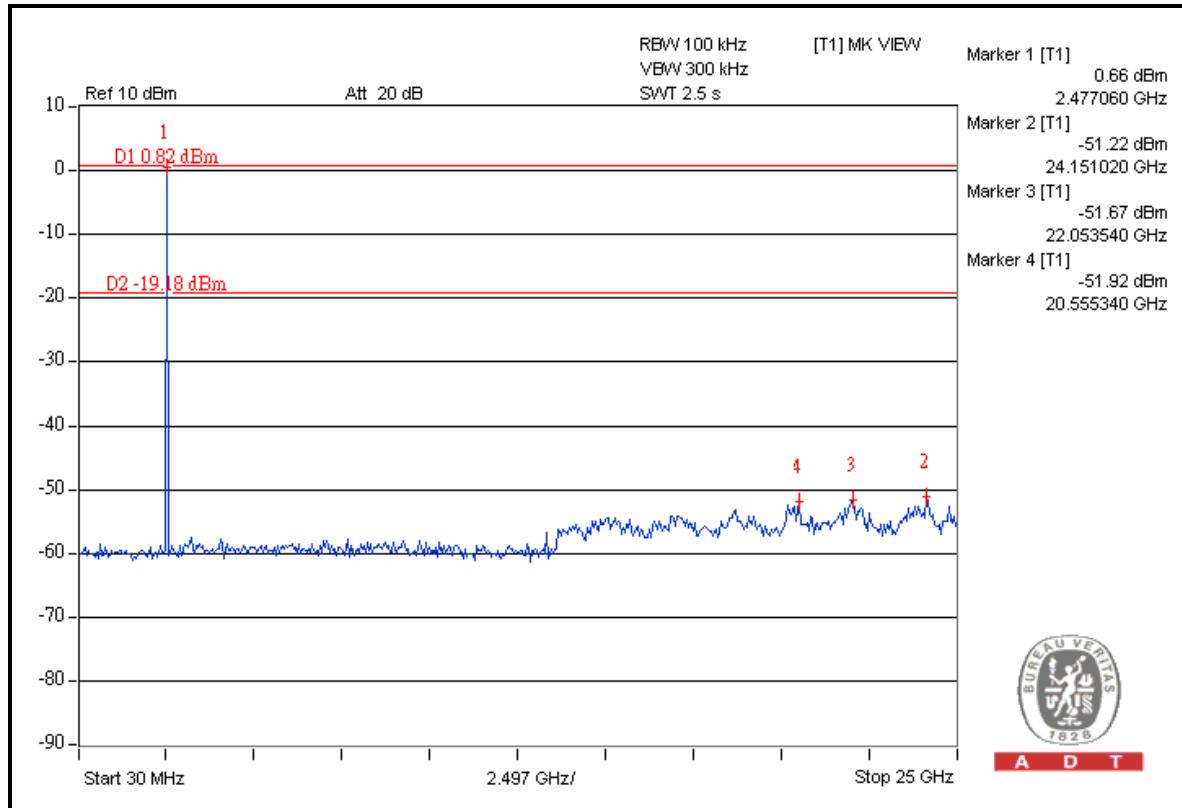
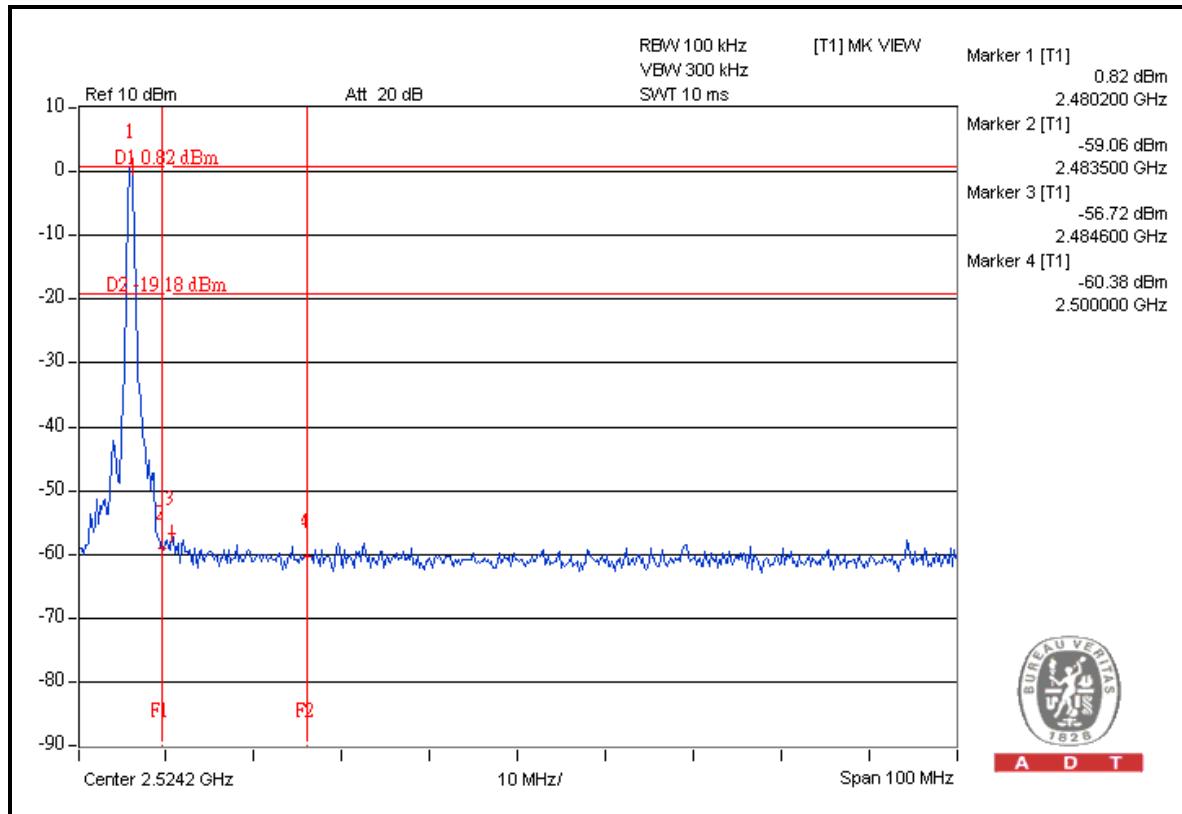


A D T





A D T





A D T

MODE A FOR 8DPSK**RESTRICT BAND (2310 ~ 2390 MHz)**

| FREQUENCY (MHz) | FUNDAMENTAL EMISSION (dBuV/m) | DELTA (dB) | MAXIMUM FIELD STRENGTH IN RESTRICT BAND (dBuV/m) | LIMIT (dBuV/m) |
|-----------------|-------------------------------|------------|--|----------------|
| 2402.00 (PK) | 93.8 | 61.0 | 32.8 | 74.00 |
| 2402.00 (AV) | - | - | 2.7 | 54.00 |

RESTRICT BAND (2483.5 ~ 2500 MHz)

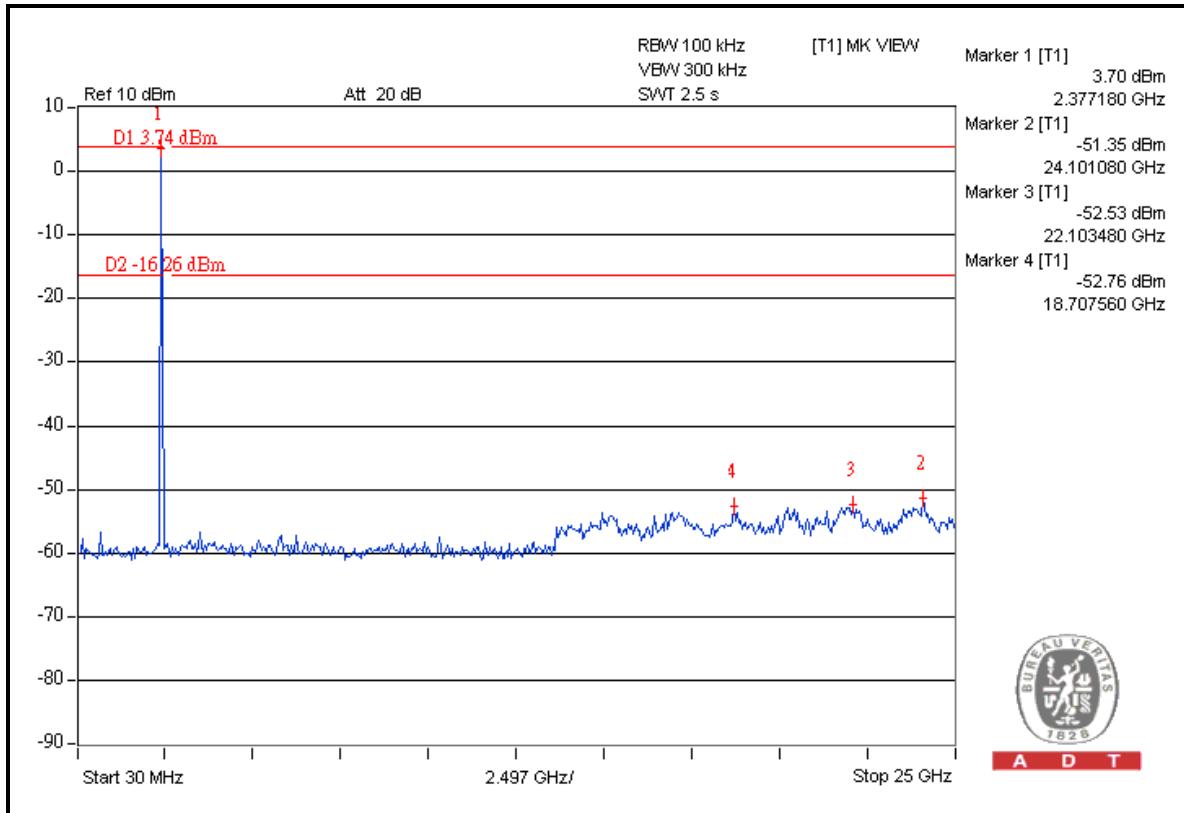
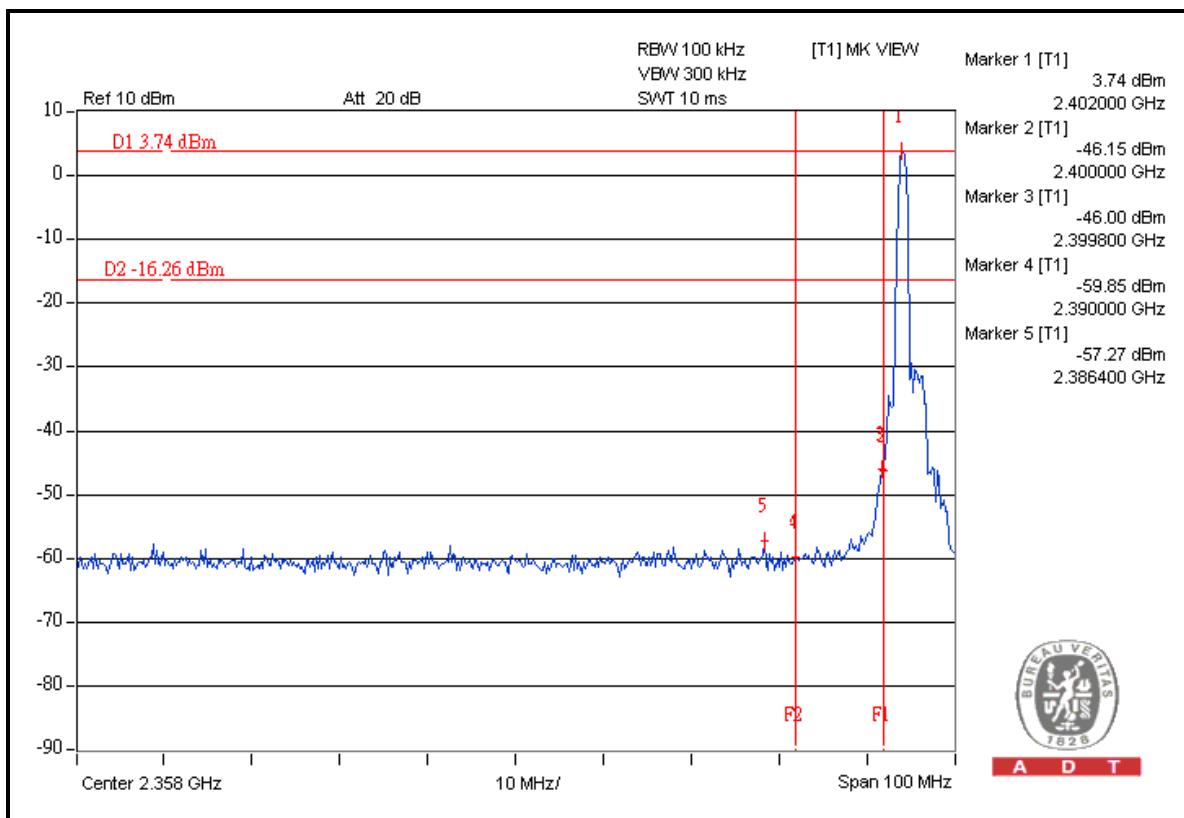
| FREQUENCY (MHz) | FUNDAMENTAL EMISSION (dBuV/m) | DELTA (dB) | MAXIMUM FIELD STRENGTH IN RESTRICT BAND (dBuV/m) | LIMIT (dBuV/m) |
|-----------------|-------------------------------|------------|--|----------------|
| 2480.00 (PK) | 90.9 | 56.6 | 34.3 | 74.00 |
| 2480.00 (AV) | - | - | 4.2 | 54.00 |

NOTE:

1. Delta = Amplitude between the peak of the fundamental and the peak of the band edge emission. Please check following 2 pages.
2. Maximum field strength in restrict band (PK value) = Fundamental emission (PK value) – Delta.
3. Average value = Peak value + 20 Log (duty cycle) = Peak value – 30.1dB.
4. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625 * 5 per 296.25 ms per channel. Therefore, the duty cycle be equal to: $20\log(3.125/100) = -30.1$ dB.

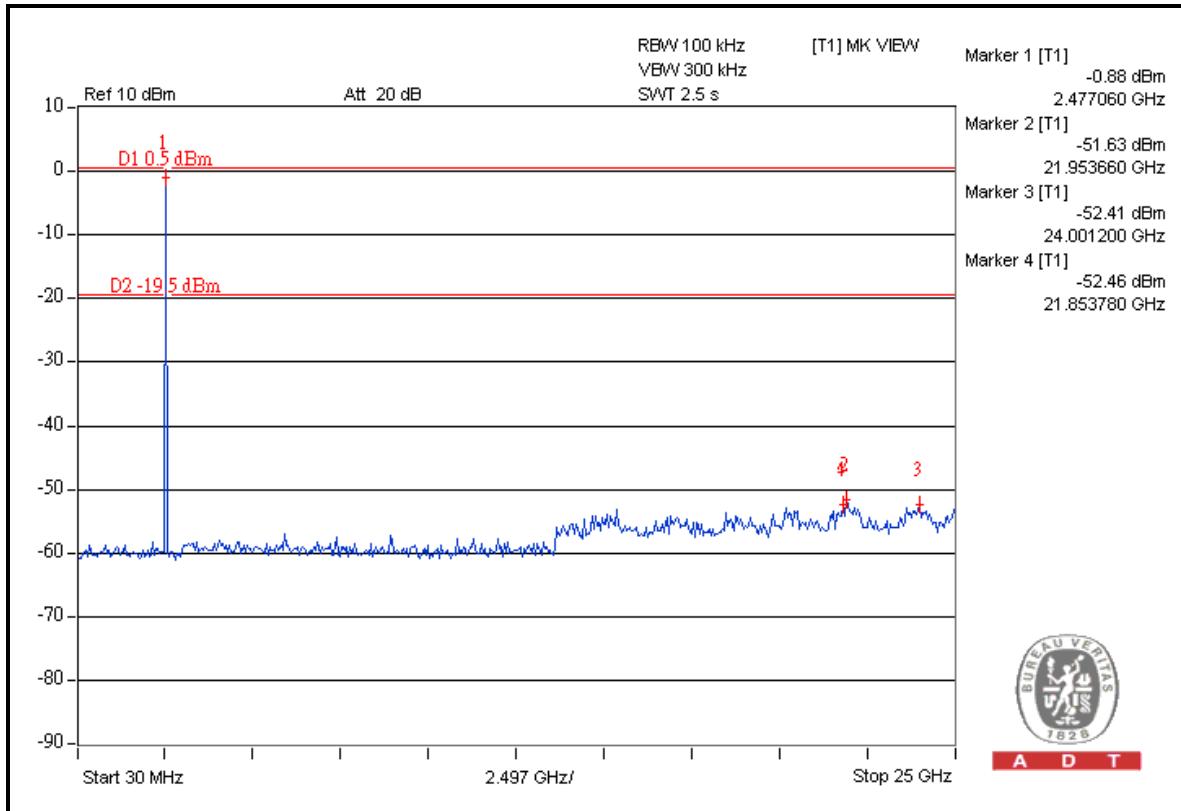
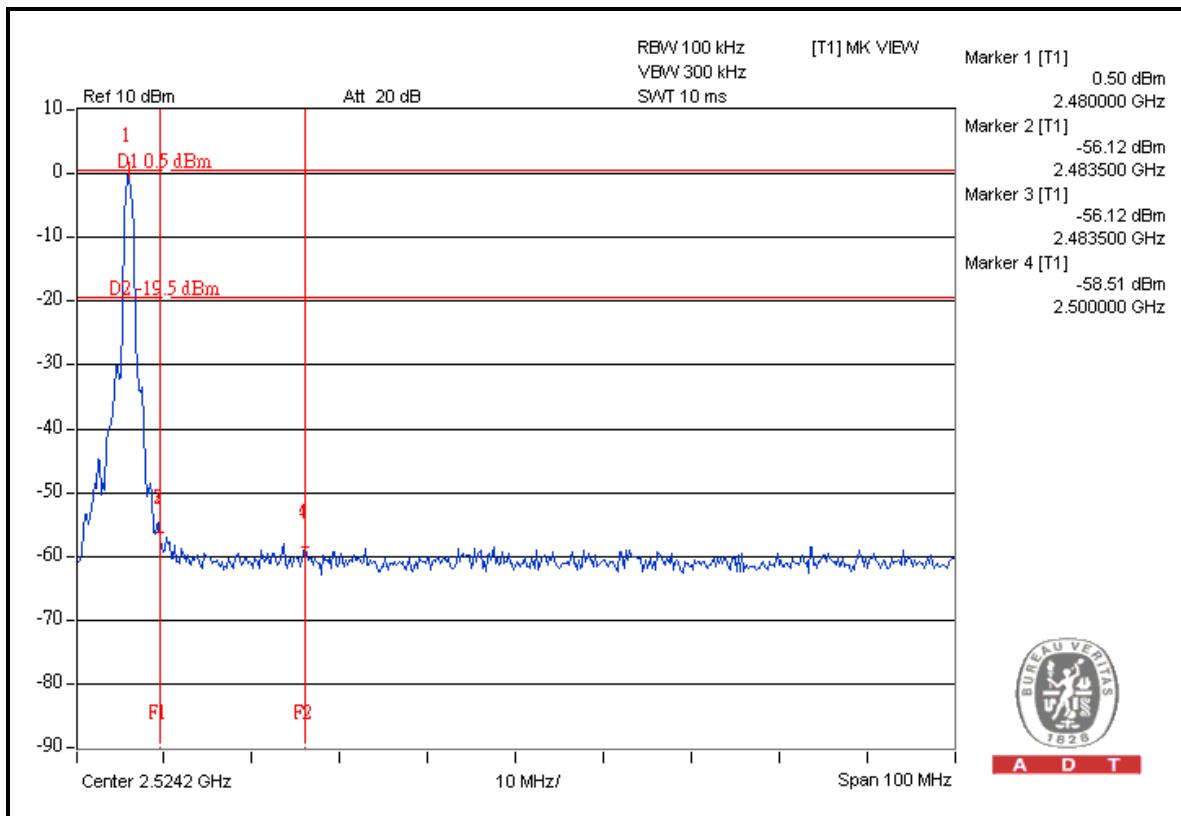


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5. PHOTOGRAPHS OF THE TEST CONFIGURATION

Please refer to the attached file (Test Setup Photo).



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6. INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: www.adt.com.tw/index.5.phtml. If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab:

Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF Lab:

Tel: 886-3-5935343
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Hwa Ya EMC/RF/Safety Telecom Lab:

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Email: service.adt@tw.bureauveritas.com

Web Site: www.adt.com.tw

The address and road map of all our labs can be found in our web site also.



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7. APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

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