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FCC TEST REPORT

REPORT NO.: RF110907E02-2 R1

MODEL NO.: AR5B22

FCC ID: PPD-AR5B22

IC: 4104A-AR5B22

RECEIVED: Sep. 06, 2011

TESTED: Sep. 13 to Nov. 21, 2011

ISSUED: Jan. 19, 2012

APPLICANT: Qualcomm Atheros, Inc.

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ISSUED BY: Bureau Veritas Consumer Products Services (H.K.)
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RELEASE CONTROL RECORD

| ISSUE NO. | REASON FOR CHANGE | DATE ISSUED |
|------------------|---|---------------|
| RF110907E02-2 | Original release | Dec. 15, 2011 |
| RF110907E02-2 R1 | <ol style="list-style-type: none">1. Added "hopping function" mode on section 4.8.62. Separated DTS and DSSS test result in this test report.3. Revised test data of "Radiated emission (Above 1GHz) for transmitter part".4. Added detail information of combination mode on section 3.1. | Jan. 19, 2012 |



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1 CERTIFICATION

PRODUCT : PCIE 802.11a/b/g/n 2.4GHz/5GHz + USB BT 4.0 card
BRAND NAME : Atheros
MODEL NO. : AR5B22
TEST SAMPLE : R&D SAMPLE
APPLICANT : Qualcomm Atheros, Inc.
TESTED : Sep. 13 to Nov. 21, 2011
STANDARDS : FCC Part 15, Subpart C (Section 15.247)
ANSI C63.4-2003
ANSI C63.10-2009
Canada RSS-210 Issue 8 (2010-12)
Canada RSS-Gen Issue 3 (2010-12)

The above equipment (Model: AR5B22) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and was in 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 : Midoli Peng, **DATE:** Jan. 19, 2012
(Midoli Peng, Specialist)

APPROVED BY : May Chen, **DATE:** Jan. 19, 2012
(May Chen, Deputy Manager)

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

| APPLIED STANDARD: FCC Part 15, Subpart C, Canada RSS-210/ RSS-GEN | | | | | |
|--|----------------|----------------------|--|---------------|--|
| Standard Section | | | Test Type and Limit | Result | REMARK |
| RSS-210 | RSS-Gen | FCC Part 15 | | | |
| - | 7.2.4 | 15.207 | AC Power Conducted Emission | PASS | Meet the requirement of limit Minimum passing margin is -11.61dB at 0.185MHz |
| A8.1(d) | - | 15.247(a)(1)(I)-(ii) | Number of Hopping Frequency Used Spec.: At least 15 channels | PASS | Meet the requirement of limit |
| A8.1(d) | - | 15.247(a)(1)(ii) | Dwell Time on Each Channel Spec. : Max. 0.4 second within 30 second | PASS | Meet the requirement of limit |
| A8.1(b) | - | 15.247(a)(1)(I)-(ii) | Hopping Channel Separation Spec. : Min. 25 kHz or two-thirds of 20 dB bandwidth, which ever is greater | PASS | Meet the requirement of limit |
| - | 4.6 | 15.247(a)(2) | Spectrum Bandwidth of a Frequency Hopping Spread Spectrum System | PASS | Meet the requirement of limit |
| A8.4(2) | - | 15.247(b) | Maximum Peak Output Power Spec.: max. 125mW | PASS | Meet the requirement of limit |
| A8.2(b) | - | 15.247(e) | Power Spectral Density Limit: max. 8dBm | PASS | Meet the requirement of limit |
| A8.5 | 4.9 | 15.247(c) | Transmitter Radiated Emissions FCC Limit: Table 15.209 RSS-Gen Limit: Table 5, 6 | PASS | Meet the requirement of limit Minimum passing margin is -1.9dB at 199.91MHz |
| - | 6.1 | - | Receiver Radiated Emissions RSS-Gen Limit: Table 2 | PASS | Meet the requirement of limit Minimum passing margin is -1.9dB at 199.91MHz |
| A8.5 | - | 15.247(c) | Conducted Out-Band Emission Measurement | PASS | Meet the requirement of limit |
| | 7.1.4 | 15.203 | Antenna Requirement | PASS | Antenna connector is IPEX not a standard connector. |



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 | Value |
|-----------------------------------|---------|
| Conducted emissions | 2.45 dB |
| Radiated emissions (30MHz-1GHz) | 3.89 dB |
| Radiated emissions (1GHz -18GHz) | 2.19 dB |
| Radiated emissions (18GHz -40GHz) | 2.56 dB |

3 GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

| | |
|-----------------------|---|
| PRODUCT | PCIE 802.11a/b/g/n 2.4GHz/5GHz + USB BT 4.0 card |
| MODEL NO. | AR5B22 |
| FCC ID | PPD-AR5B22 |
| IC | 4104A-AR5B22 |
| POWER SUPPLY | DC 3.3V from host equipment |
| MODULATION TYPE | GFSK, $\pi/4$ -DQPSK, 8DPSK, GFSK(LE mode) |
| MODULATION TECHNOLOGY | For LE mode: DTS & FHSS Others: FHSS |
| OPRTAING FREQUENCY | 2402MHz ~ 2480MHz |
| NUMBER OF CHANNEL | For Bluetooth 2.1+ EDR: 79 For Bluetooth LE: 40 (37 hopping + 3 advertising channel) |
| MAXIMUM OUTPUT POWER | GFSK: 2.5 mW 8DPSK: 4.8 mW GFSK(LE mode): 2.5 mW |
| ANTENNA TYPE | See item 3.2 |
| ANTENNA CONNECTOR | See item 3.2 |
| DATA CABLE | NA |
| I/O PORTS | NA |
| ASSOCIATED DEVICES | NA |

NOTE:

1. There are Bluetooth technology and WLAN technology used for the EUT. < the WLAN test data please refer to Report No. "RF110907E02 R1& RF110907E02-1 R1">
2. The Bluetooth supports version 4.0.
3. The device has three configurations (working mode)
 - a. WLAN only (2x2 MIMO)
 - b. BT+WLAN (2x2 MIMO) with reduced power on WLAN
 - c. BT+WLAN (1x1 mode on a/b/g only, chain 0 is used for BT and chain 1 is used for WLAN)

4. Spurious Emission (radiated emission) of the simultaneous operation (WiFi & Bluetooth) have been evaluated and no non-compliance found. The detail combinations of transmitters / frequencies / modes as below table

| Mode | Available Channel | Tested Channel | Modulation Technology | Modulation Type |
|---|-------------------|----------------|-----------------------|-----------------|
| 2.4 GHz (802.11g) + Bluetooth | 1 to 11 | 6 | OFDM | BPSK |
| | 0 to 78 | 78 | FHSS | 8DPSK |
| 5 GHz (802.11n (20MHz)) + Bluetooth | 149 to 165 | 165 | OFDM | BPSK |
| | 0 to 78 | 78 | FHSS | 8DPSK |

5. For radiated : The EUT's antenna was pre-tested under the following modes:

| Test Mode | Description |
|-----------|-------------|
| Mode A | X-Y axis |
| Mode B | Y-Z axis |
| Mode C | X-Z axis |

From the above modes, the worst case was found in **Mode A**. Therefore only the test data of the mode was recorded in this report.

6. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

3.2 DESCRIPTION OF ANTENNA

There is one set of antenna provided to this EUT, please refer to the following table:

| No. | Brand | Model | Antenna Type | Connector | Antenna Gain (dBi)< included cable loss> | | | |
|-----|-------|--------------|--------------|-----------|--|----------------------|-----------------------|------------------------|
| | | | | | For 2.4GHz | For 5GHz (5.15~5.35) | For 5GHz (5.47~5.725) | For 5GHz (5.725~5.850) |
| 1&2 | WNC | 81.EBJ15.005 | PIFA | IPEX | 3.62 | 3.08 | 4.76 | 4.76 |

Cable Loss:

| No. | Brand | Model | Cable Loss(dB) | | | | Cable Length |
|-----|-------|--------------|----------------|----------------------|-----------------------|------------------------|--------------|
| | | | For 2.4GHz | For 5GHz (5.15~5.35) | For 5GHz (5.47~5.725) | For 5GHz (5.725~5.850) | |
| 1&2 | WNC | 81-EBJ15.005 | 1.15 | 1.70 | 1.74 | 1.79 | 300 |

Note: Above antenna gains of antenna are Total (H+V).

3.3 DESCRIPTION OF TEST MODES

For Bluetooth 2.1+ EDR: 79

Seventy-nine 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 | | |

For Bluetooth LE: 40 (37 hopping + 3 advertising channel)

Forty channels are provided to this EUT.

| Channel | Freq. (MHz) | Channel | Freq. (MHz) | Channel | Freq. (MHz) | Channel | Freq. (MHz) |
|---------|-------------|---------|-------------|---------|-------------|---------|-------------|
| 0 | 2402 | 10 | 2422 | 20 | 2442 | 30 | 2462 |
| 1 | 2404 | 11 | 2424 | 21 | 2444 | 31 | 2464 |
| 2 | 2406 | 12 | 2426 | 22 | 2446 | 32 | 2466 |
| 3 | 2408 | 13 | 2428 | 23 | 2448 | 33 | 2468 |
| 4 | 2410 | 14 | 2430 | 24 | 2450 | 34 | 2470 |
| 5 | 2412 | 15 | 2432 | 25 | 2452 | 35 | 2472 |
| 6 | 2414 | 16 | 2434 | 26 | 2454 | 36 | 2474 |
| 7 | 2416 | 17 | 2436 | 27 | 2456 | 37 | 2476 |
| 8 | 2418 | 18 | 2438 | 28 | 2458 | 38 | 2478 |
| 9 | 2420 | 19 | 2440 | 29 | 2460 | 39 | 2480 |

3.4 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:

| EUT CONFIGURE MODE | APPLICABLE TO | | | | | DESCRIPTION |
|--------------------------|---------------|---------|---------|------|----|-------------|
| | PLC | RE < 1G | RE ≥ 1G | APCM | OB | |
| - | √ | √ | √ | √ | √ | - |

Where **PLC**: Power Line Conducted Emission **RE < 1G**: Radiated Emission below 1GHz
RE ≥ 1G: Radiated Emission above 1GHz **APCM**: Antenna Port Conducted Measurement
OB: Conducted Out-Band Emission Measurement

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.

| Available Channel | Tested Channel | Modulation Technology | Modulation Type | Packet Type |
|-------------------|----------------|-----------------------|-----------------|-------------|
| 0 to 78 | 78 | FHSS | 8DPSK | DH5 |

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 and antenna ports (if EUT with antenna diversity architecture).
- ☒ Radiated Emission Test Below 1GHz: The receiving mode has shown equal or better performance than Tx mode during the pre-scan and hence the Tx mode data is re-used for.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| Available Channel | Tested Channel | Modulation Technology | Modulation Type | Packet Type |
|-------------------|----------------|-----------------------|-----------------|-------------|
| 0 to 78 | 78 | FHSS | 8DPSK | DH5 |
| 0 to 39 | 39 | FHSS | GFSK (LE mode) | DH1 |

**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 and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

| Available Channel | Tested Channel | Modulation Technology | Modulation Type | Packet Type |
|-------------------|----------------|-----------------------|-----------------|-------------|
| 0 to 78 | 0, 39, 78 | FHSS | GFSK | DH5 |
| 0 to 78 | 0, 39, 78 | FHSS | 8DPSK | DH5 |
| 0 to 39 | 0, 19, 39 | FHSS | GFSK (LE mode) | DH1 |
| Receiver | 0, 39, 78 | FHSS | - | - |

Conducted Out-Band Measurement:

- ☒ 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.

| Available Channel | Tested Channel | Modulation Technology | Modulation Type | Packet Type |
|-------------------|----------------|-----------------------|-----------------|-------------|
| 0 to 78 | 0, 78 | FHSS | GFSK | DH5 |
| 0 to 78 | 0, 78 | FHSS | 8DPSK | DH5 |
| 0 to 39 | 0, 39 | FHSS | GFSK (LE mode) | DH1 |

Antenna Port Conducted Measurement:

- ☒ 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.

| Available Channel | Tested Channel | Modulation Technology | Modulation Type | Packet Type |
|-------------------|----------------|-----------------------|-----------------|-------------|
| 0 to 78 | 0, 39, 78 | FHSS | GFSK | DH5 |
| 0 to 78 | 0, 39, 78 | FHSS | 8DPSK | DH5 |
| 0 to 39 | 0, 19, 39 | FHSS | GFSK (LE mode) | DH1 |



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TEST CONDITION:

| APPLICABLE TO | ENVIRONMENTAL CONDITIONS | INPUT POWER (SYSTEM) | TESTED BY |
|--------------------|--------------------------|----------------------|-------------|
| PLC | 27deg. C, 62%RH | 120Vac, 60Hz | Mike Hsieh |
| RE ³ 1G | 24deg. C, 64%RH | 120Vac, 60Hz | Amos Chuang |
| RE<1G | 23deg. C, 69%RH | 120Vac, 60Hz | Evan Huang |
| APCM | 25deg. C, 60%RH | 120Vac, 60Hz | Rex Huang |
| OB | 25deg. C, 60%RH | 120Vac, 60Hz | Rex Huang |

3.5 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

Canada RSS-210 Issue 8 (2010-12)

Canada RSS-Gen Issue 3 (2010-12)

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

NOTE: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.



3.6 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.

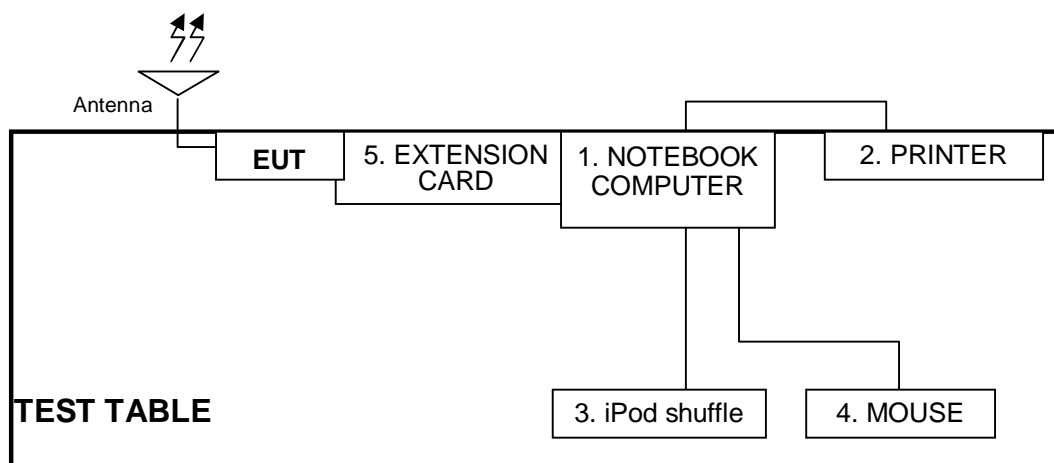
| For conducted emission test | | | | | |
|-----------------------------|-------------------|---------|-----------|---------------------------|-----------------|
| No. | Product | Brand | Model No. | Serial No. | FCC ID |
| 1 | NOTEBOOK COMPUTER | DELL | PP21L | CN-0GD366-70166-5B3-09ZX | QDS-BRCM1016 |
| 2 | PRINTER | EPSON | LQ-300+II | G88Y074083 | FCC DoC |
| 3 | iPod shuffle | Apple | MC749TA/A | CC4DN25WDFDM | FCC DoC |
| 4 | MOUSE | DELL | MOC5UO | I14066PK | FCC DoC |
| 5 | extension card | Atheros | NA | NA | NA |
| For other test items | | | | | |
| No. | Product | Brand | Model No. | Serial No. | FCC ID |
| 1 | NOTEBOOK COMPUTER | DELL | PP19L | CN-OHC416-70166-5C A-0448 | PIW632500516610 |
| 2 | EXTENSION CARD | Atheros | NA | NA | NA |

| For conducted emission test | |
|-----------------------------|--------------------------|
| No. | Signal cable description |
| 1 | NA |
| 2 | USB cable(1.8m) |
| 3 | USB cable(0.1m) |
| 4 | USB cable(1.8m) |
| 5 | NA |
| For other test items | |
| No. | Signal cable description |
| 1 | NA |
| 2 | NA |

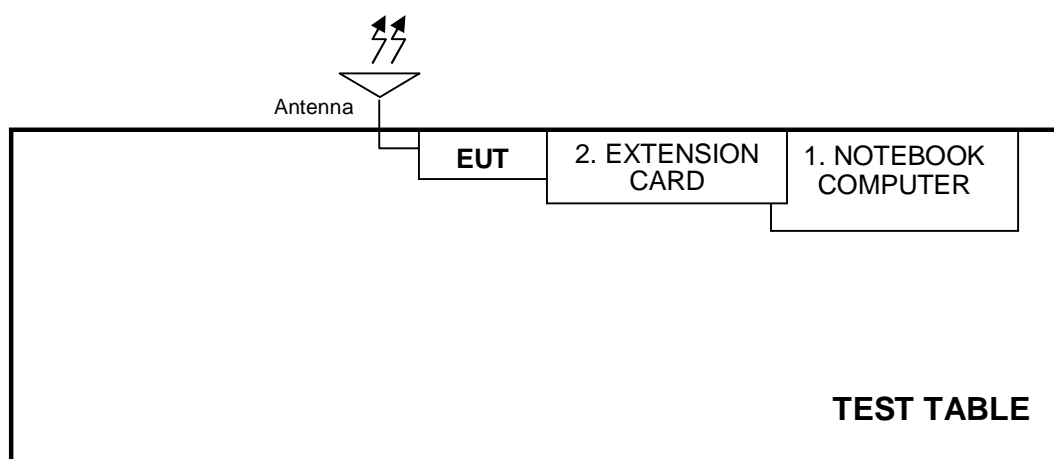
Note: The power cords of the above support units were unshielded (1.8m).

3.7 CONFIGURATION OF SYSTEM UNDER TEST

For conducted emission test



For other test items



4 TEST PROCEDURES AND RESULTS(FHSS)

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. All emanations from a class 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

Test date: Oct. 11, 2011

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|---|-----------------------|------------|-----------------|------------------|
| Test Receiver | ESCS 30 | 100375 | Mar. 09, 2011 | Mar. 08, 2012 |
| Line-Impedance Stabilization Network (for EUT) | NSLK8127 | 8127-522 | Sep. 07, 2011 | Sep. 06, 2012 |
| Line-Impedance Stabilization Network (for Peripheral) | ESH3-Z5 | 848773/004 | Nov. 03, 2010 | Nov. 02, 2011 |
| RF Cable (JYEBAO) | 5DFB | COCCAB-002 | Aug. 29, 2011 | Aug. 28, 2012 |
| 50 ohms Terminator | 50 | 3 | Nov. 03, 2010 | Nov. 02, 2011 |
| Software | BV ADT_Cond_V7.3.7 | NA | NA | NA |

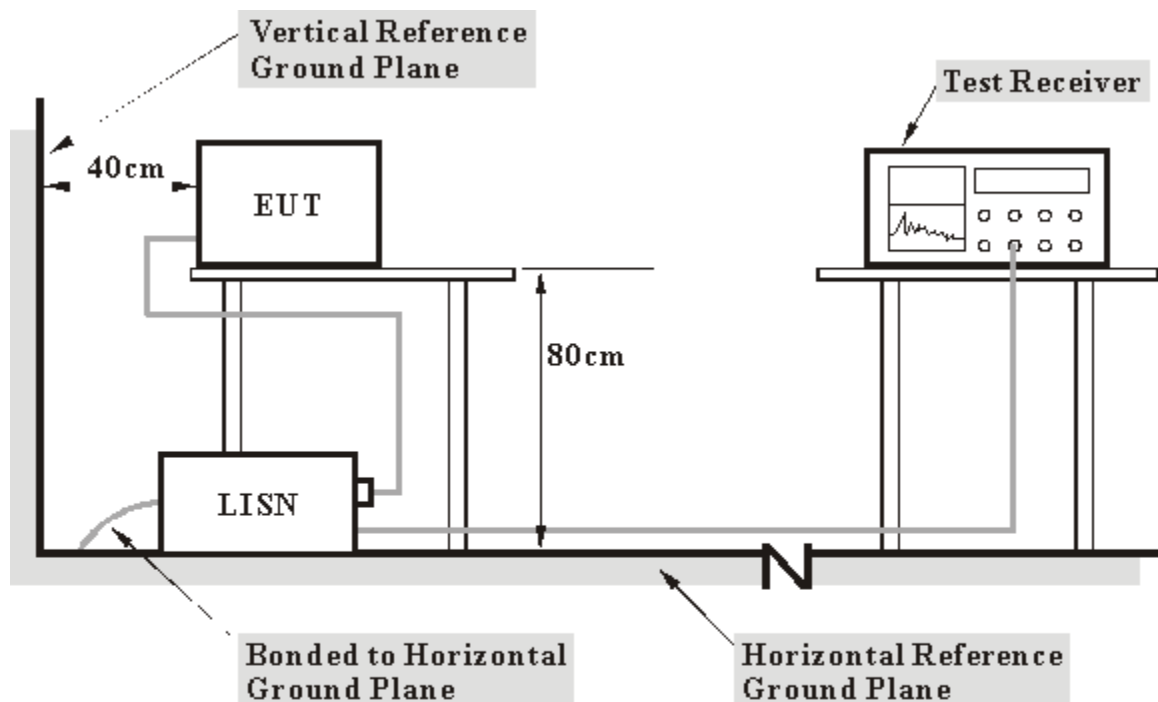
Note:

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 test was performed in Shielded Room No. C.
- 3 The VCCI Con C Registration No. is C-3611.

4.1.3 TEST PROCEDURES

- The EUT/HOST was placed 0.4 meters from the conducting wall of the shielded room with EUT/HOST 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.
- Both lines of the power mains connected to the EUT/HOST were checked for maximum conducted interference.
- The frequency range from 150 kHz to 30 MHz was searched. Emission levels over 10dB under the prescribed limits could not be reported

4.1.4 TEST SETUP



- Note:**
- Support units were connected to second LISN.
 - Both of LISNs (AMN) 80 cm from EUT and at the 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.

4.1.5 EUT OPERATING CONDITIONS

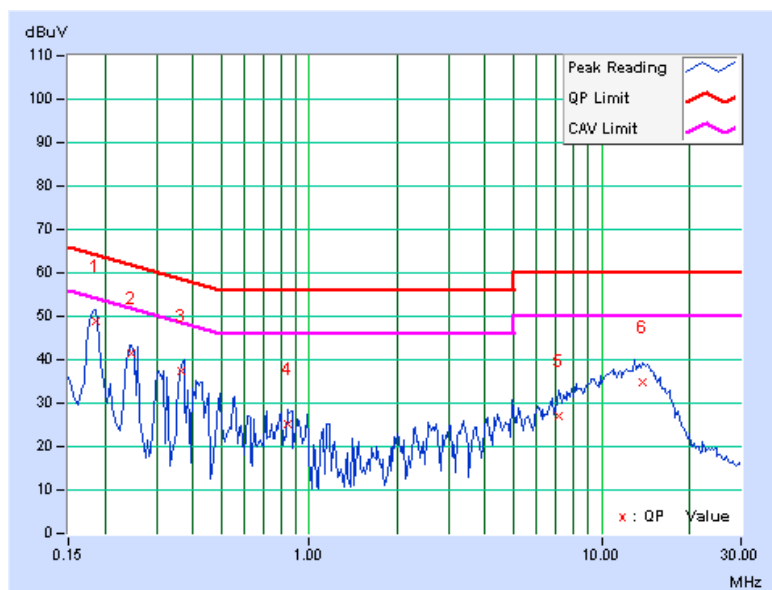
1. Connect the EUT with the support unit 1 (Notebook Computer) which is placed on a testing table.
2. The communication partner run test program “artgui.exe” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

4.1.6 TEST RESULTS

| | | | |
|-------|----------|---------------|-------|
| PHASE | Line (L) | 6dB BANDWIDTH | 9 kHz |
|-------|----------|---------------|-------|

| No | Freq. | Corr. | Reading Value | | Emission Level | | Limit | | Margin | |
|----|--------|--------|---------------|-------|----------------|-------|-----------|-------|--------|--------|
| | [MHz] | Factor | [dB (uV)] | | [dB (uV)] | | [dB (uV)] | | (dB) | |
| | | (dB) | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.185 | 0.10 | 48.71 | 42.54 | 48.81 | 42.64 | 64.25 | 54.25 | -15.44 | -11.61 |
| 2 | 0.245 | 0.10 | 41.26 | 33.76 | 41.36 | 33.86 | 61.93 | 51.93 | -20.56 | -18.06 |
| 3 | 0.363 | 0.11 | 37.36 | 33.81 | 37.47 | 33.92 | 58.66 | 48.66 | -21.19 | -14.74 |
| 4 | 0.849 | 0.14 | 25.18 | 22.56 | 25.32 | 22.70 | 56.00 | 46.00 | -30.68 | -23.30 |
| 5 | 7.125 | 0.44 | 26.71 | 17.05 | 27.15 | 17.49 | 60.00 | 50.00 | -32.85 | -32.51 |
| 6 | 13.863 | 0.64 | 34.15 | 27.62 | 34.79 | 28.26 | 60.00 | 50.00 | -25.21 | -21.74 |

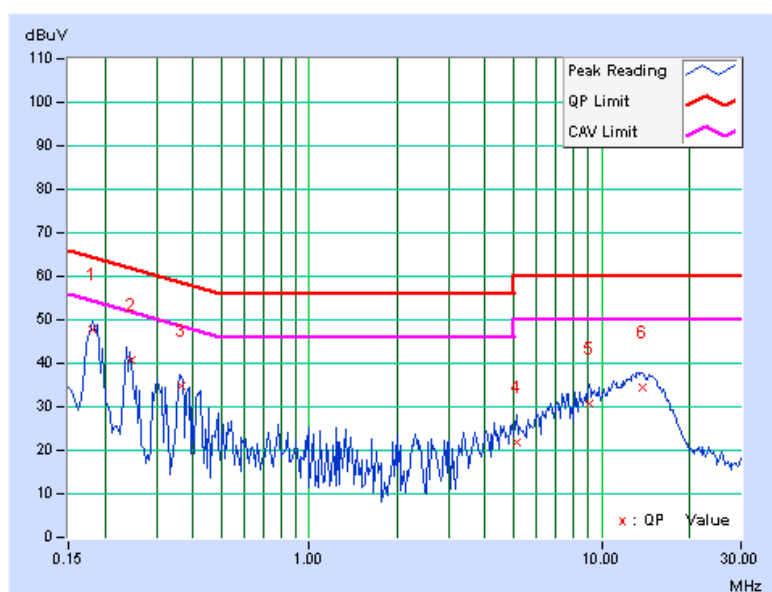
- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. The emission levels of other frequencies were very low against the limit.
 3. Margin value = Emission level - Limit value
 4. Correction factor = Insertion loss + Cable loss
 5. Emission Level = Correction Factor + Reading Value.



| | | | |
|-------|-------------|---------------|-------|
| PHASE | Neutral (N) | 6dB BANDWIDTH | 9 kHz |
|-------|-------------|---------------|-------|

| 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 | 0.181 | 0.08 | 47.69 | 41.77 | 47.77 | 41.85 | 64.43 | 54.43 | -16.65 | -12.57 |
| 2 | 0.246 | 0.09 | 40.83 | 34.56 | 40.92 | 34.65 | 61.90 | 51.90 | -20.98 | -17.25 |
| 3 | 0.367 | 0.11 | 34.85 | 31.84 | 34.96 | 31.95 | 58.57 | 48.57 | -23.61 | -16.62 |
| 4 | 5.148 | 0.27 | 21.45 | 8.93 | 21.72 | 9.20 | 60.00 | 50.00 | -38.28 | -40.80 |
| 5 | 9.078 | 0.38 | 30.25 | 21.46 | 30.63 | 21.84 | 60.00 | 50.00 | -29.37 | -28.16 |
| 6 | 13.883 | 0.51 | 33.91 | 26.95 | 34.42 | 27.46 | 60.00 | 50.00 | -25.58 | -22.54 |

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
 2. The emission levels of other frequencies were very low against the limit.
 3. Margin value = Emission level - Limit value
 4. Correction factor = Insertion loss + Cable loss
 5. Emission Level = Correction Factor + Reading Value.



4.2 RADIATED EMISSION MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

For transmitter part:

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209(RSS-Gen table 5, 6) 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 (dBuV/m) = 20 log Emission level (uV/m).
3. 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.
4. Section 15.205 restricted bands of operation shall compliance with the limits in Section 15.209.

For receiver part:

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in RSS-Gen table 2 as following:

| Frequencies (MHz) | Field strength (microvolts/meter) | Measurement distance (meters) |
|-------------------|-----------------------------------|-------------------------------|
| 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 (dBuV/m) = 20 log Emission level (uV/m).
3. 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.

**A D T**

4.2.2 TEST INSTRUMENTS

Below 1GHz<Test date: Sep. 13, 2011>

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|--------------------------------------|----------------------|-------------------------------------|-----------------|------------------|
| Agilent Spectrum Analyzer | E4446A | MY48250253 | Aug. 29, 2011 | Aug. 28, 2012 |
| Agilent Pre-Selector | N9039A | MY46520310 | Aug. 29, 2011 | Aug. 28, 2012 |
| Agilent Signal Generator | N5181A | MY49060347 | July 25, 2011 | July 24, 2012 |
| LIG NEX1 Test Receiver | ER-265 | L09068005 | Oct. 25, 2010 | Oct. 24, 2011 |
| Mini-Circuits Pre-Amplifier | ZFL-1000VH2B | AMP-ZFL-04 | Nov. 16, 2010 | Nov. 15, 2011 |
| Agilent Pre-Amplifier | 8449B | 3008A02465 | Feb. 28, 2011 | Feb. 27, 2012 |
| SPACEK LABS | SLKKa-48-6 | 9K16 | Nov. 16, 2010 | Nov. 15, 2011 |
| SCHWARZBECK Trilog Broadband Antenna | VULB 9168 | 9168-361 | Apr. 14, 2011 | Apr. 13, 2012 |
| AISI Horn_Antenna | AIH.8018 | 0000220091110 | Nov. 22, 2010 | Nov. 21, 2011 |
| SCHWARZBECK Horn_Antenna | BBHA 9170 | 9170-424 | Oct. 08, 2010 | Oct. 07, 2011 |
| RF CABLE | NA | RF104-205 RF104-207 RF104-202 | Dec. 28, 2010 | Dec. 27, 2011 |
| RF Cable | NA | CHHCAB_001 | Oct. 08, 2010 | Oct. 07, 2011 |
| Software | ADT_Radiated_V8.7.05 | NA | NA | NA |
| CT Antenna Tower & Turn Table | NA | NA | 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, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

3. The test was performed in 966 Chamber No. H.

4. The FCC Site Registration No. is 797305.

5. The CANADA Site Registration No. is IC 7450H-3.



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Above 1GHz<Test date: Oct. 20, 2011>:

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|--------------------------------------|----------------------|-------------------------------------|-----------------|------------------|
| Agilent Spectrum Analyzer | E4446A | MY48250254 | July 12, 2011 | July 11, 2012 |
| Agilent Pre-Selector | N9039A | MY46520311 | July 12, 2011 | July 11, 2012 |
| Agilent Signal Generator | N5181A | MY49060517 | July 12, 2011 | July 11, 2012 |
| Mini-Circuits Pre-Amplifier | ZFL-1000VH2B | AMP-ZFL-03 | Nov. 16, 2010 | Nov. 15, 2011 |
| Agilent Pre-Amplifier | 8449B | 3008A02578 | July 04, 2011 | July 03, 2012 |
| SPACEK LABS | SLKKa-48-6 | 9K16 | Nov. 16, 2010 | Nov. 15, 2011 |
| SCHWARZBECK Trilog Broadband Antenna | VULB 9168 | 9168-360 | Apr. 14, 2011 | Apr. 13, 2012 |
| AISI Horn_Antenna | AIH.8018 | 0000320091110 | Nov. 22, 2010 | Nov. 21, 2011 |
| SCHWARZBECK Horn_Antenna | BBHA 9170 | 9170-424 | Oct. 07, 2011 | Oct. 06, 2012 |
| RF CABLE | NA | RF104-201 RF104-203 RF104-204 | Dec. 27, 2010 | Dec. 26, 2011 |
| RF Cable | NA | CHGCAB_001 | Oct. 07, 2011 | Oct. 06, 2012 |
| Software | ADT_Radiated_V8.7.05 | NA | NA | NA |
| CT Antenna Tower & Turn Table | NA | NA | 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, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.

3. The test was performed in 966 Chamber No. G.

4. The FCC Site Registration No. is 966073.

5. The VCCI Site Registration No. is G-137.

6. The CANADA Site Registration No. is IC 7450H-2.

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 10 meter open area test site. 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 antenna is a broadband antenna, and its height 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. The test-receiver system was set to peak detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz.

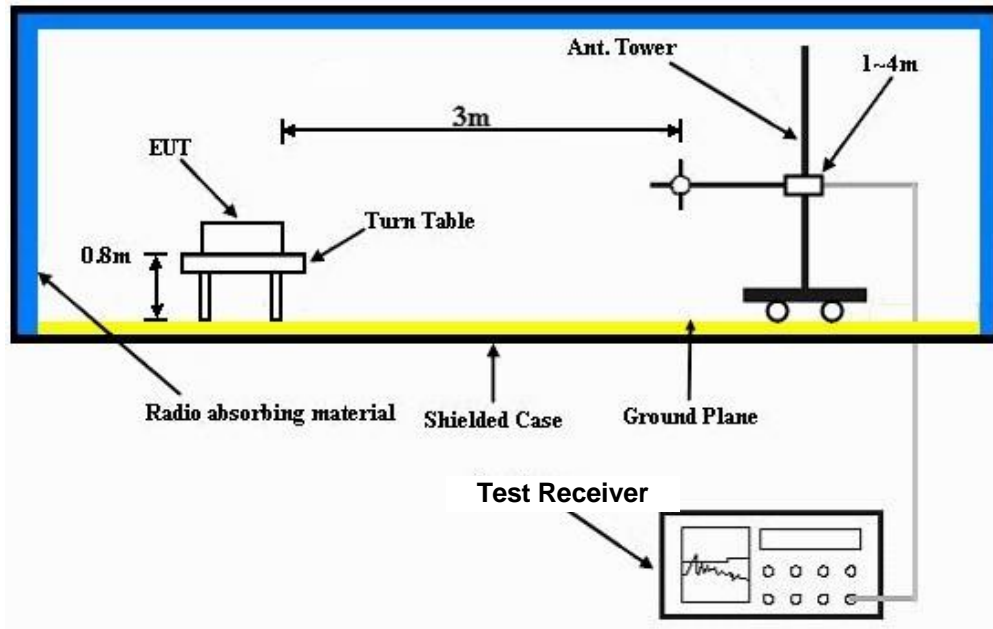
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth is 1MHz and video bandwidth of test receiver/spectrum analyzer is 3MHz for Peak detection at frequency above 1GHz.

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 TEST RESULTS (FOR TRANSMITTER PART)

4.2.6.1 TEST RESULTS (GFSK / 8DPSK)

BELOW 1GHz WORST-CASE DATA : 8DPSK MODULATION

| EUT TEST CONDITION | | MEASUREMENT DETAIL | |
|--------------------------|-----------------|--------------------|---------------|
| CHANNEL | Channel 78 | FREQUENCY RANGE | Below 1000MHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION | Quasi-Peak |
| ENVIRONMENTAL CONDITIONS | 23deg. C, 69%RH | TESTED BY | Even Huang |

| 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 | 99.99 | 39.2 QP | 43.5 | -4.3 | 2.00 H | 113 | 29.93 | 9.31 |
| 2 | 199.91 | 41.6 QP | 43.5 | -1.9 | 1.00 H | 46 | 30.41 | 11.22 |
| 3 | 300.00 | 37.6 QP | 46.0 | -8.4 | 1.00 H | 328 | 22.38 | 15.18 |
| 4 | 497.65 | 34.1 QP | 46.0 | -11.9 | 1.00 H | 211 | 14.64 | 19.48 |
| 5 | 600.32 | 40.3 QP | 46.0 | -5.7 | 1.00 H | 243 | 18.69 | 21.60 |
| 6 | 799.87 | 38.8 QP | 46.0 | -7.2 | 1.00 H | 13 | 14.36 | 24.48 |
| 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 | 35.92 | 34.7 QP | 40.0 | -5.3 | 1.00 V | 282 | 21.22 | 13.45 |
| 2 | 99.99 | 32.4 QP | 43.5 | -11.1 | 2.00 V | 243 | 23.12 | 9.31 |
| 3 | 199.94 | 36.2 QP | 43.5 | -7.3 | 2.00 V | 267 | 25.02 | 11.21 |
| 4 | 299.89 | 34.3 QP | 46.0 | -11.7 | 1.00 V | 212 | 19.13 | 15.18 |
| 5 | 799.87 | 38.7 QP | 46.0 | -7.3 | 1.00 V | 133 | 14.19 | 24.48 |
| 6 | 939.01 | 40.5 QP | 46.0 | -5.5 | 1.00 V | 167 | 14.28 | 26.24 |

- 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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ABOVE 1GHz WORST-CASE DATA :

GFSK MODULATION

| EUT TEST CONDITION | | MEASUREMENT DETAIL | |
|--------------------------|-----------------|--------------------|-------------|
| CHANNEL | Channel 0 | FREQUENCY RANGE | 1 ~ 25GHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION | Peak (PK) |
| ENVIRONMENTAL CONDITIONS | 24deg. C, 69%RH | TESTED BY | Amos Chuang |

| 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 | 52.0 PK | 74.0 | -22.0 | 1.00 H | 109 | 20.12 | 31.88 |
| 2 | 2390.00 | 28.7 AV | 54.0 | -25.3 | 1.00 H | 109 | -3.18 | 31.88 |
| 3 | *2402.00 | 96.2 PK | | | 1.00 H | 109 | 64.28 | 31.92 |
| 4 | *2402.00 | 72.9 AV | | | 1.00 H | 109 | 40.98 | 31.92 |
| 5 | 4804.00 | 49.0 PK | 74.0 | -25.0 | 1.10 H | 104 | 7.83 | 41.17 |
| 6 | 4804.00 | 25.7 AV | 54.0 | -28.3 | 1.10 H | 104 | -15.47 | 41.17 |
| 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 | 52.9 PK | 74.0 | -21.1 | 1.00 V | 259 | 21.02 | 31.88 |
| 2 | 2390.00 | 29.6 AV | 54.0 | -24.4 | 1.00 V | 259 | -2.28 | 31.88 |
| 3 | *2402.00 | 97.9 PK | | | 1.00 V | 256 | 65.98 | 31.92 |
| 4 | *2402.00 | 74.6 AV | | | 1.00 V | 256 | 42.68 | 31.92 |
| 5 | 4804.00 | 48.6 PK | 74.0 | -25.4 | 1.05 V | 115 | 7.43 | 41.17 |
| 6 | 4804.00 | 25.3 AV | 54.0 | -28.7 | 1.05 V | 115 | -15.87 | 41.17 |

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 average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:
 $20 \log (\text{Duty cycle}) = 20 \log (3.4 * 2 \text{ ms} / 100 \text{ ms}) = -23.3 \text{ dB}$
 Please see page 33 for plotted duty.



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| EUT TEST CONDITION | | MEASUREMENT DETAIL | |
|--------------------------|-----------------|--------------------|-------------|
| CHANNEL | Channel 39 | FREQUENCY RANGE | 1 ~ 25GHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION | Peak (PK) |
| ENVIRONMENTAL CONDITIONS | 24deg. C, 69%RH | TESTED BY | Amos Chuang |

| 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 | 100.7 PK | | | 1.12 H | 144 | 68.65 | 32.05 |
| 2 | *2441.00 | 77.4 AV | | | 1.12 H | 144 | 45.35 | 32.05 |
| 3 | 4882.00 | 48.6 PK | 74.0 | -25.4 | 1.00 H | 95 | 7.22 | 41.38 |
| 4 | 4882.00 | 25.3 AV | 54.0 | -28.7 | 1.00 H | 95 | -16.08 | 41.38 |
| 5 | 7323.00 | 52.3 PK | 74.0 | -21.7 | 1.00 H | 72 | 6.60 | 45.70 |
| 6 | 7323.00 | 29.0 AV | 54.0 | -25.0 | 1.00 H | 72 | -16.70 | 45.70 |
| 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 | 100.3 PK | | | 1.01 V | 169 | 68.25 | 32.05 |
| 2 | *2441.00 | 77.0 AV | | | 1.01 V | 169 | 44.95 | 32.05 |
| 3 | 4882.00 | 47.7 PK | 74.0 | -26.3 | 1.06 V | 115 | 6.32 | 41.38 |
| 4 | 4882.00 | 24.4 AV | 54.0 | -29.6 | 1.06 V | 115 | -16.98 | 41.38 |
| 5 | 7323.00 | 55.5 PK | 74.0 | -18.5 | 1.00 V | 189 | 9.80 | 45.70 |
| 6 | 7323.00 | 32.2 AV | 54.0 | -21.8 | 1.00 V | 189 | -13.50 | 45.70 |

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 average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:
 $20 \log (\text{Duty cycle}) = 20 \log (3.4 * 2 \text{ ms} / 100 \text{ ms}) = -23.3 \text{ dB}$
Please see page 33 for plotted duty.

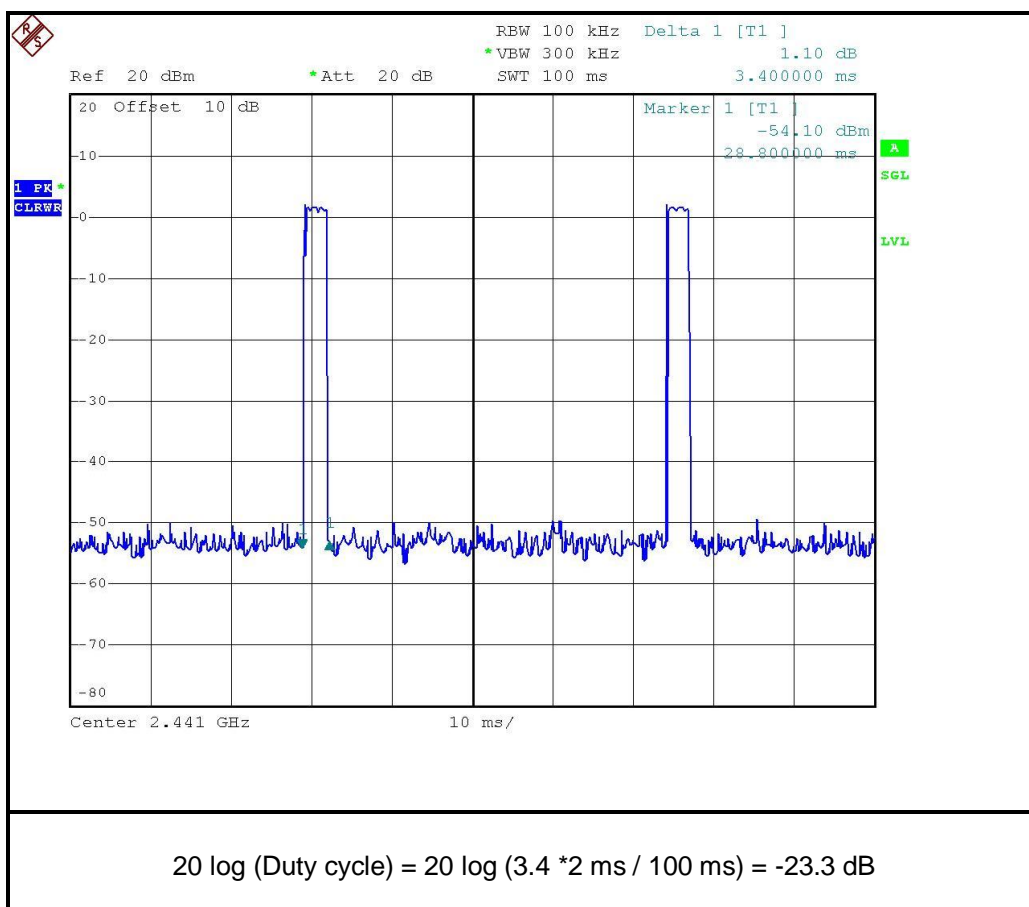


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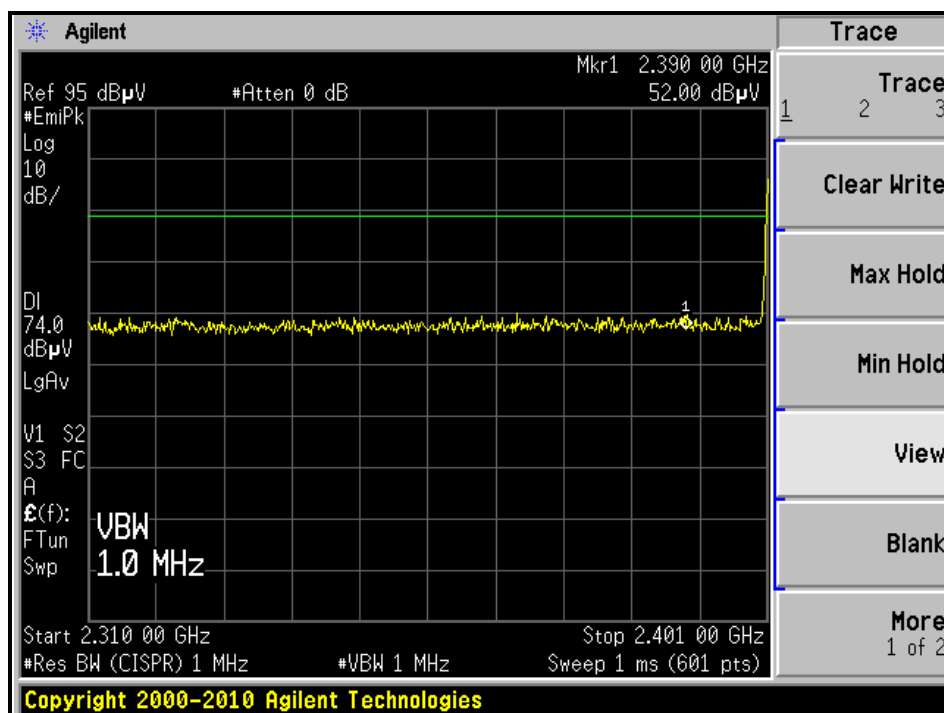
| EUT TEST CONDITION | | MEASUREMENT DETAIL | |
|--------------------------|-----------------|--------------------|-------------|
| CHANNEL | Channel 78 | FREQUENCY RANGE | 1 ~ 25GHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION | Peak (PK) |
| ENVIRONMENTAL CONDITIONS | 24deg. C, 69%RH | TESTED BY | Amos Chuang |

| 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 | 95.1 PK | | | 1.08 H | 113 | 62.92 | 32.18 |
| 2 | *2480.00 | 71.8 AV | | | 1.08 H | 113 | 39.62 | 32.18 |
| 3 | 2483.50 | 53.3 PK | 74.0 | -20.7 | 1.08 H | 114 | 21.11 | 32.19 |
| 4 | 2483.50 | 30.0 AV | 54.0 | -24.0 | 1.08 H | 114 | -2.19 | 32.19 |
| 5 | 4960.00 | 48.9 PK | 74.0 | -25.1 | 1.06 H | 88 | 7.35 | 41.55 |
| 6 | 4960.00 | 25.6 AV | 54.0 | -28.4 | 1.06 H | 88 | -15.95 | 41.55 |
| 7 | 7440.00 | 52.5 PK | 74.0 | -21.5 | 1.04 H | 88 | 6.43 | 46.07 |
| 8 | 7440.00 | 29.2 AV | 54.0 | -24.8 | 1.04 H | 88 | -16.87 | 46.07 |
| 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 | 99.6 PK | | | 1.00 V | 169 | 67.42 | 32.18 |
| 2 | *2480.00 | 76.3 AV | | | 1.00 V | 169 | 44.12 | 32.18 |
| 3 | 2483.50 | 53.9 PK | 74.0 | -20.1 | 1.00 V | 169 | 21.71 | 32.19 |
| 4 | 2483.50 | 30.6 AV | 54.0 | -23.4 | 1.00 V | 169 | -1.59 | 32.19 |
| 5 | 4960.00 | 48.3 PK | 74.0 | -25.7 | 1.08 V | 119 | 6.75 | 41.55 |
| 6 | 4960.00 | 25.0 AV | 54.0 | -29.0 | 1.08 V | 119 | -16.55 | 41.55 |
| 7 | 7440.00 | 55.3 PK | 74.0 | -18.7 | 1.00 V | 198 | 9.23 | 46.07 |
| 8 | 7440.00 | 32.0 AV | 54.0 | -22.0 | 1.00 V | 198 | -14.07 | 46.07 |

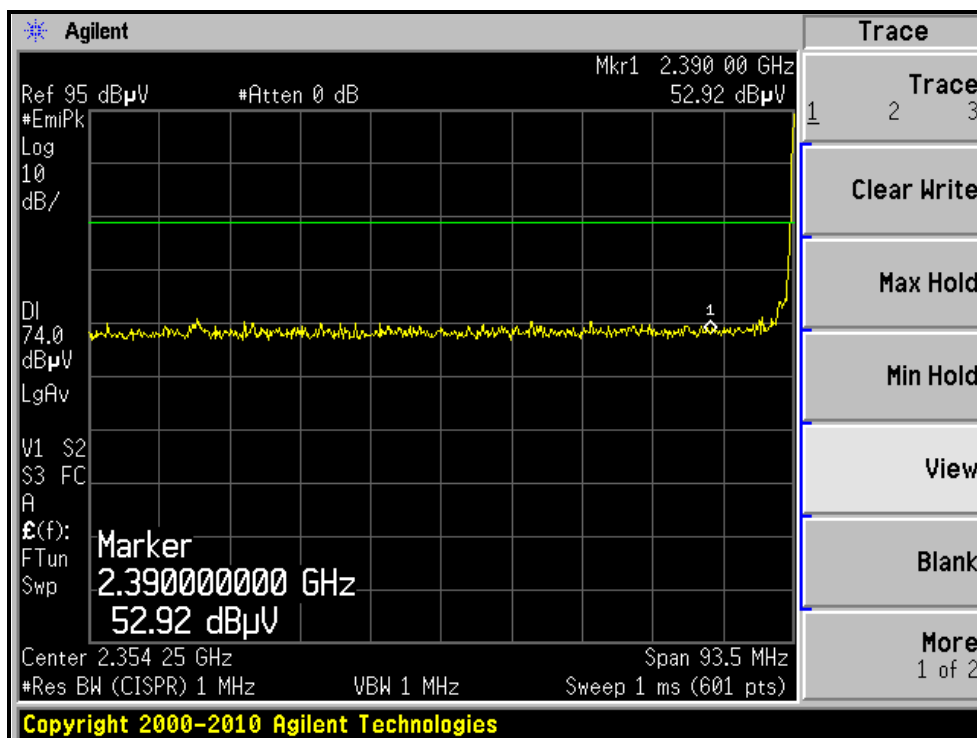
REMARKS: 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * “: Fundamental frequency.
6. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:
 $20 \log (\text{Duty cycle}) = 20 \log (3.4 * 2 \text{ ms} / 100 \text{ ms}) = -23.3 \text{ dB}$
Please see page 33 for plotted duty.



RESTRICTED BANDEDGE (GFSK MODE, CH0, HORIZONTAL)

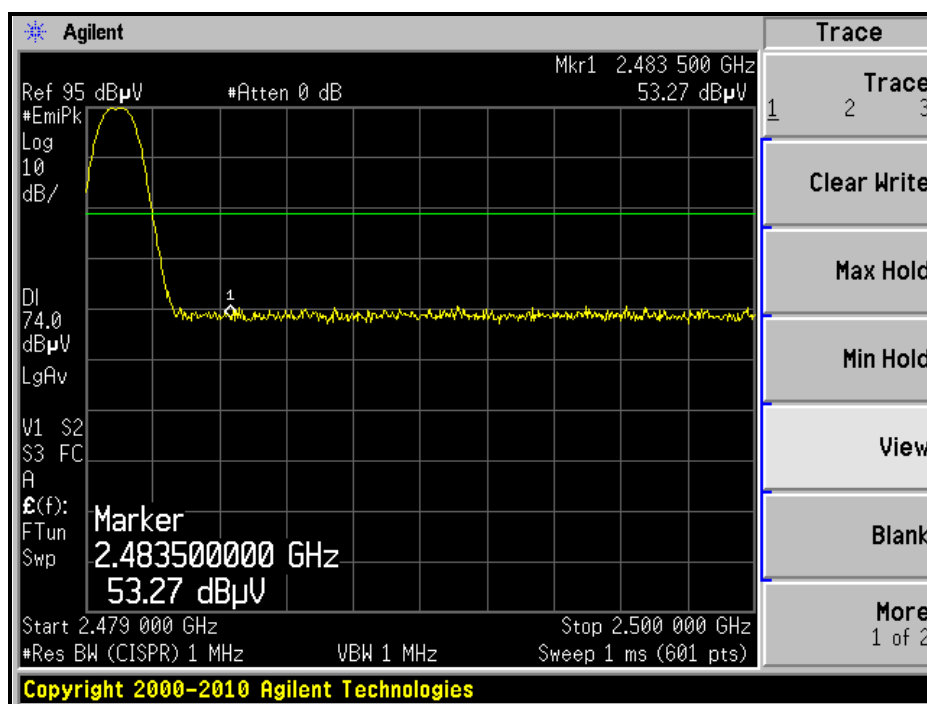


RESTRICTED BANDEDGE (GFSK MODE, CH0, VERTICAL)

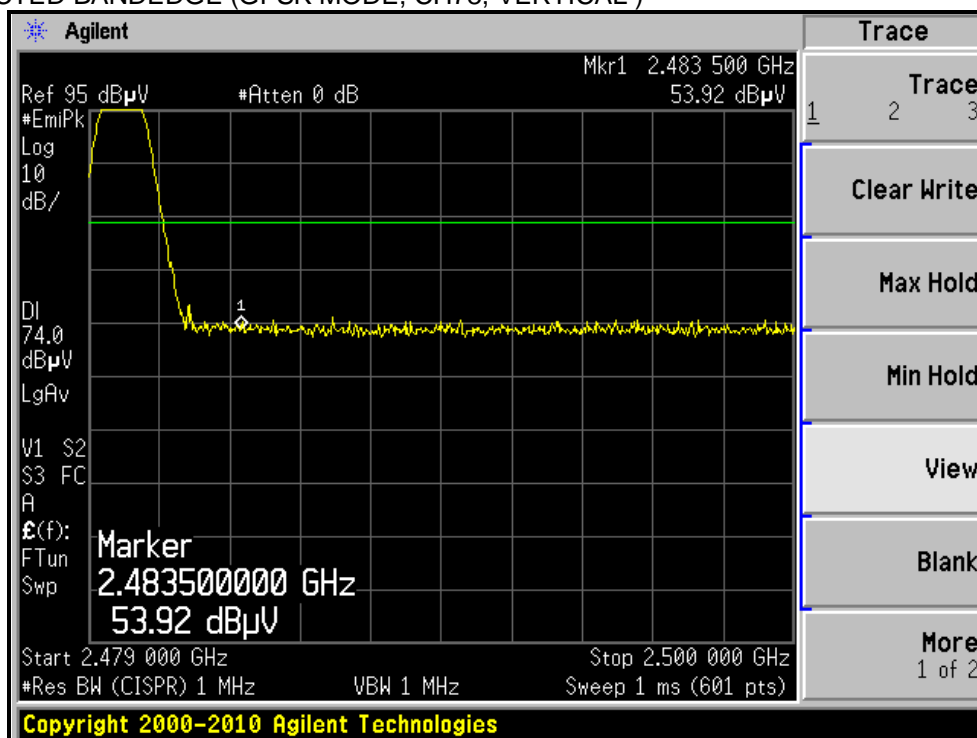


* The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle). And it meets the requirement of limit.

RESTRICTED BANDEDGE (GFSK MODE, CH78, HORIZONTAL)



RESTRICTED BANDEDGE (GFSK MODE, CH78, VERTICAL)



* The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle). And it meets the requirement of limit.



A D T

8DPSK MODULATION

| EUT TEST CONDITION | | MEASUREMENT DETAIL | |
|--------------------------|-----------------|--------------------|-------------|
| CHANNEL | Channel 0 | FREQUENCY RANGE | 1 ~ 25GHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION | Peak (PK) |
| ENVIRONMENTAL CONDITIONS | 24deg. C, 69%RH | TESTED BY | Amos Chuang |

| 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 | 52.9 PK | 74.0 | -21.1 | 1.14 H | 145 | 21.02 | 31.88 |
| 2 | 2390.00 | 29.6 AV | 54.0 | -24.4 | 1.14 H | 145 | -2.28 | 31.88 |
| 3 | *2402.00 | 102.6 PK | | | 1.14 H | 146 | 70.68 | 31.92 |
| 4 | *2402.00 | 79.3 AV | | | 1.14 H | 146 | 47.38 | 31.92 |
| 5 | 4804.00 | 47.8 PK | 74.0 | -26.2 | 1.00 H | 91 | 6.63 | 41.17 |
| 6 | 4804.00 | 24.5 AV | 54.0 | -29.5 | 1.00 H | 91 | -16.67 | 41.17 |
| 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 | 53.4 PK | 74.0 | -20.6 | 1.00 V | 179 | 21.52 | 31.88 |
| 2 | 2390.00 | 30.1 AV | 54.0 | -23.9 | 1.00 V | 179 | -1.78 | 31.88 |
| 3 | *2402.00 | 101.0 PK | | | 1.00 V | 180 | 69.08 | 31.92 |
| 4 | *2402.00 | 77.7 AV | | | 1.00 V | 180 | 45.78 | 31.92 |
| 5 | 4804.00 | 48.2 PK | 74.0 | -25.8 | 1.00 V | 122 | 7.03 | 41.17 |
| 6 | 4804.00 | 24.9 AV | 54.0 | -29.1 | 1.00 V | 122 | -16.27 | 41.17 |

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 average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:
 $20 \log (\text{Duty cycle}) = 20 \log (3.4 * 2 \text{ ms} / 100 \text{ ms}) = -23.3 \text{ dB}$
Please see page 39 for plotted duty.



A D T

| EUT TEST CONDITION | | MEASUREMENT DETAIL | |
|--------------------------|-----------------|--------------------|-------------|
| CHANNEL | Channel 39 | FREQUENCY RANGE | 1 ~ 25GHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION | Peak (PK) |
| ENVIRONMENTAL CONDITIONS | 24deg. C, 69%RH | TESTED BY | Amos Chuang |

| 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 | 101.9 PK | | | 1.13 H | 143 | 69.85 | 32.05 |
| 2 | *2441.00 | 78.6 AV | | | 1.13 H | 143 | 46.55 | 32.05 |
| 3 | 4882.00 | 47.9 PK | 74.0 | -26.1 | 1.00 H | 85 | 6.52 | 41.38 |
| 4 | 4882.00 | 24.6 AV | 54.0 | -29.4 | 1.00 H | 85 | -16.78 | 41.38 |
| 5 | 7323.00 | 51.8 PK | 74.0 | -22.2 | 1.00 H | 60 | 6.10 | 45.70 |
| 6 | 7323.00 | 28.5 AV | 54.0 | -25.5 | 1.00 H | 60 | -17.20 | 45.70 |
| 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 | 101.4 PK | | | 1.00 V | 168 | 69.35 | 32.05 |
| 2 | *2441.00 | 78.1 AV | | | 1.00 V | 168 | 46.05 | 32.05 |
| 3 | 4882.00 | 48.4 PK | 74.0 | -25.6 | 1.00 V | 106 | 7.02 | 41.38 |
| 4 | 4882.00 | 25.1 AV | 54.0 | -28.9 | 1.00 V | 106 | -16.28 | 41.38 |
| 5 | 7323.00 | 50.3 PK | 74.0 | -23.7 | 1.00 V | 93 | 4.60 | 45.70 |
| 6 | 7323.00 | 27.0 AV | 54.0 | -27.0 | 1.00 V | 93 | -18.70 | 45.70 |

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 average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:
 $20 \log (\text{Duty cycle}) = 20 \log (3.4 * 2 \text{ ms} / 100 \text{ ms}) = -23.3 \text{ dB}$
Please see page 39 for plotted duty.

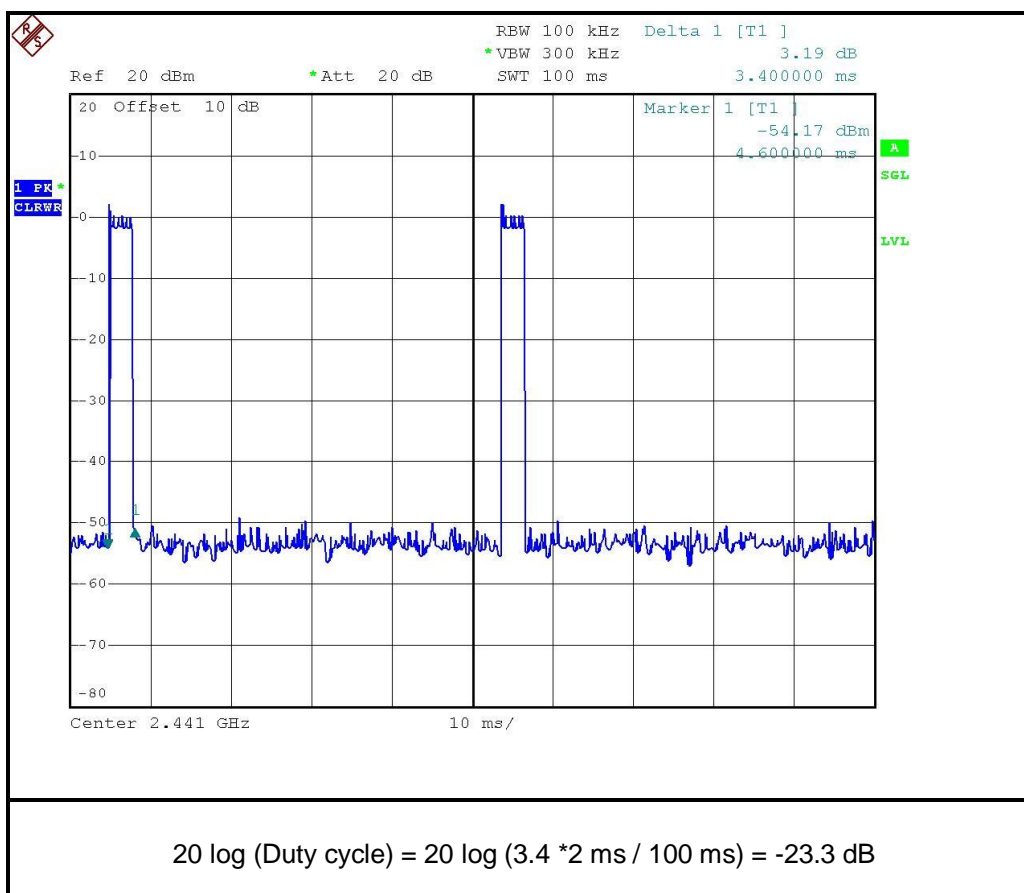


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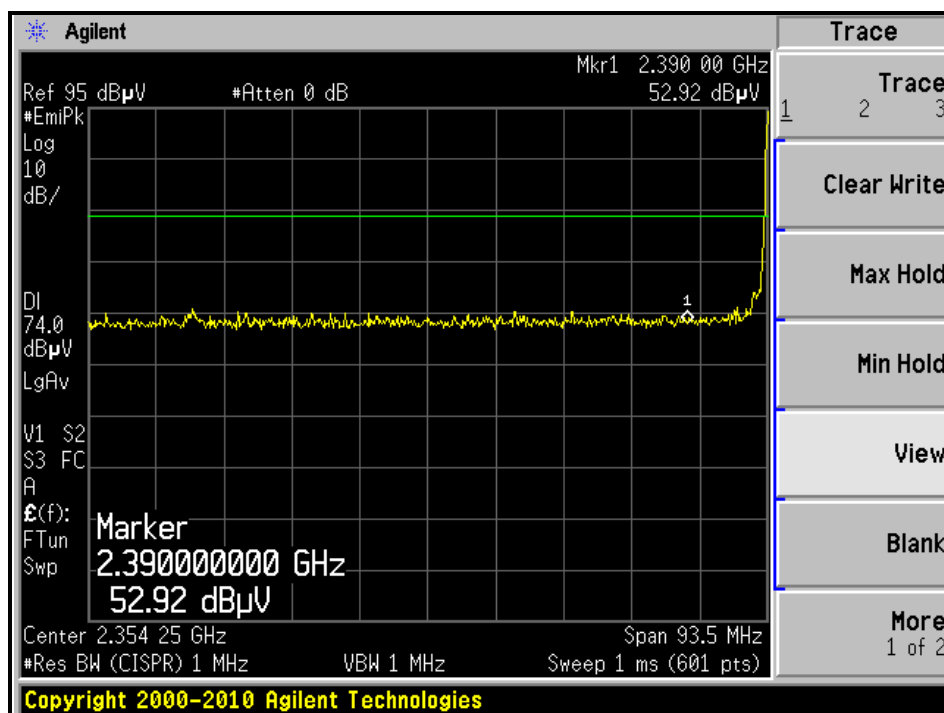
| EUT TEST CONDITION | | MEASUREMENT DETAIL | |
|--------------------------|-----------------|--------------------|-------------|
| CHANNEL | Channel 78 | FREQUENCY RANGE | 1 ~ 25GHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION | Peak (PK) |
| ENVIRONMENTAL CONDITIONS | 24deg. C, 69%RH | TESTED BY | Amos Chuang |

| 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 | 101.9 PK | | | 1.12 H | 152 | 69.72 | 32.18 |
| 2 | *2480.00 | 78.6 AV | | | 1.12 H | 152 | 46.42 | 32.18 |
| 3 | 2483.50 | 57.2 PK | 74.0 | -16.8 | 1.11 H | 153 | 25.01 | 32.19 |
| 4 | 2483.50 | 33.9 AV | 54.0 | -20.1 | 1.11 H | 153 | 1.71 | 32.19 |
| 5 | 4960.00 | 48.0 PK | 74.0 | -26.0 | 1.00 H | 95 | 6.45 | 41.55 |
| 6 | 4960.00 | 24.7 AV | 54.0 | -29.3 | 1.00 H | 95 | -16.85 | 41.55 |
| 7 | 7440.00 | 52.5 PK | 74.0 | -21.5 | 1.00 H | 72 | 6.43 | 46.07 |
| 8 | 7440.00 | 29.2 AV | 54.0 | -24.8 | 1.00 H | 72 | -16.87 | 46.07 |
| 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 | 100.9 PK | | | 1.00 V | 177 | 68.72 | 32.18 |
| 2 | *2480.00 | 77.6 AV | | | 1.00 V | 177 | 45.42 | 32.18 |
| 3 | 2483.50 | 55.5 PK | 74.0 | -18.5 | 1.00 V | 176 | 23.31 | 32.19 |
| 4 | 2483.50 | 32.2 AV | 54.0 | -21.8 | 1.00 V | 176 | 0.01 | 32.19 |
| 5 | 4960.00 | 47.8 PK | 74.0 | -26.2 | 1.06 V | 115 | 6.25 | 41.55 |
| 6 | 4960.00 | 24.5 AV | 54.0 | -29.5 | 1.06 V | 115 | -17.05 | 41.55 |
| 7 | 7440.00 | 55.4 PK | 74.0 | -18.6 | 1.00 V | 189 | 9.33 | 46.07 |
| 8 | 7440.00 | 32.1 AV | 54.0 | -21.9 | 1.00 V | 189 | -13.97 | 46.07 |

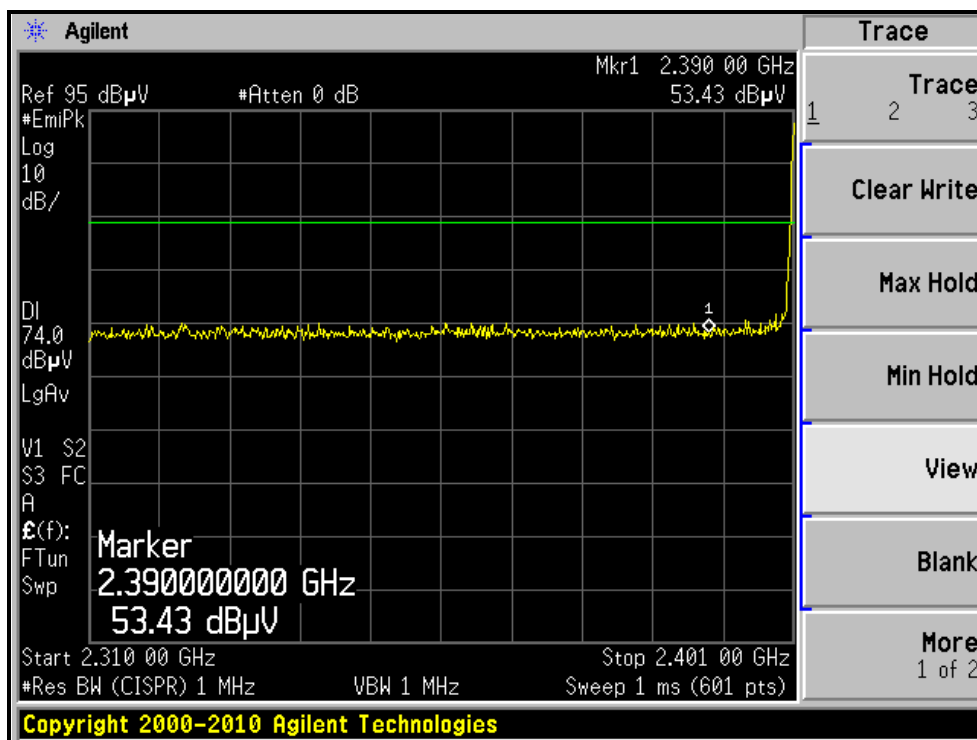
REMARKS: 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * ”: Fundamental frequency.
6. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:
 $20 \log (\text{Duty cycle}) = 20 \log (3.4 * 2 \text{ ms} / 100 \text{ ms}) = -23.3 \text{ dB}$
Please see page 39 for plotted duty.



RESTRICTED BANDEDGE (8DPSK MODE, CH0, HORIZONTAL)

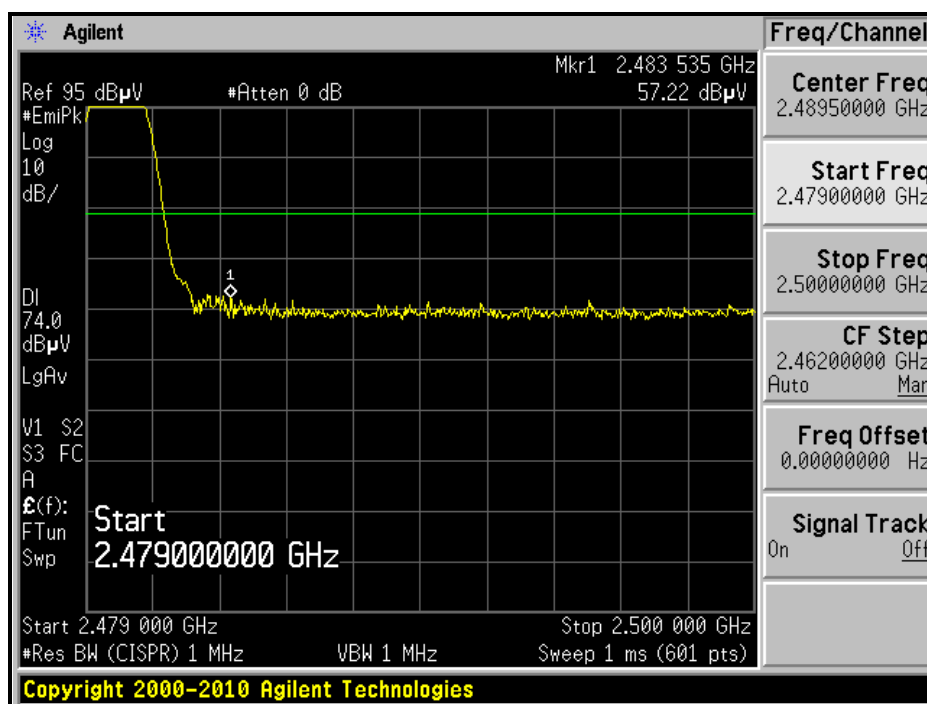


RESTRICTED BANDEDGE (8DPSK MODE, CH0, VERTICAL)

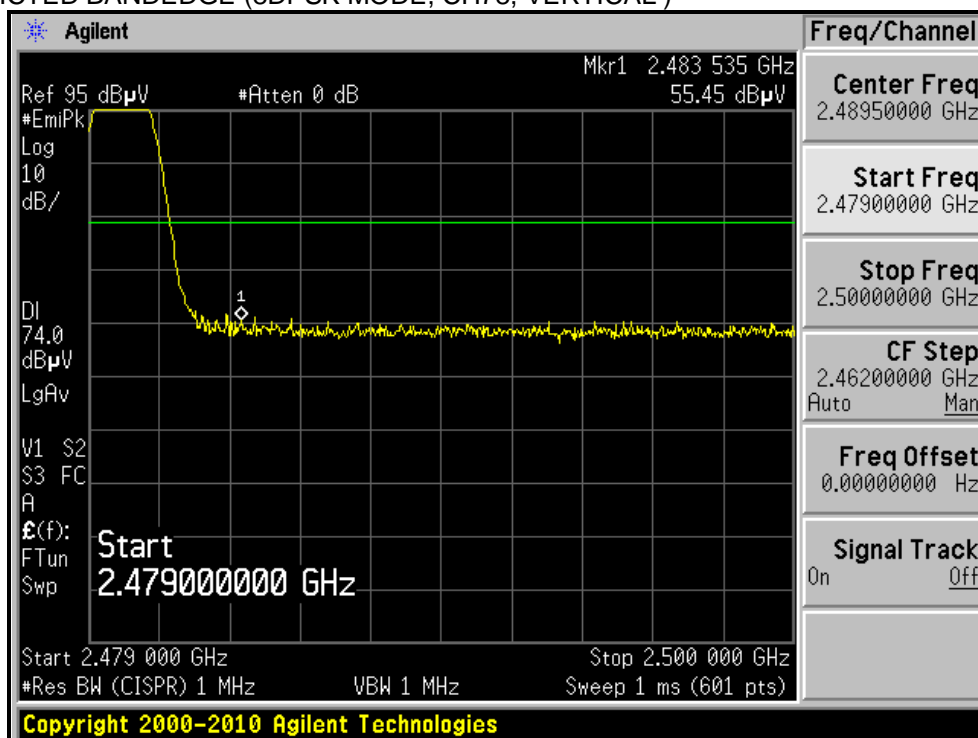


* The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle).
And it meets the requirement of limit.

RESTRICTED BANDEDGE (8DPSK MODE, CH78, HORIZONTAL)



RESTRICTED BANDEDGE (8DPSK MODE, CH78, VERTICAL)



* The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle). And it meets the requirement of limit.



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4.2.6.2 TEST RESULTS (GFSK (LE mode))

BELOW 1GHz WORST-CASE DATA :

| EUT TEST CONDITION | | MEASUREMENT DETAIL | |
|--------------------------|-----------------|--------------------|---------------|
| CHANNEL | Channel 39 | FREQUENCY RANGE | Below 1000MHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION | Quasi-Peak |
| ENVIRONMENTAL CONDITIONS | 23deg. C, 69%RH | TESTED BY | Evan Huang |

| 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 | 99.99 | 39.71 QP | 43.50 | -3.79 | 2.00 H | 150 | 30.40 | 9.31 |
| 2 | 199.93 | 40.14 QP | 43.50 | -3.36 | 1.50 H | 113 | 28.92 | 11.22 |
| 3 | 300.00 | 37.38 QP | 46.00 | -8.62 | 1.75 H | 344 | 22.20 | 15.18 |
| 4 | 497.60 | 35.43 QP | 46.00 | -10.57 | 1.00 H | 177 | 15.95 | 19.48 |
| 5 | 600.32 | 41.63 QP | 46.00 | -4.37 | 1.25 H | 84 | 20.03 | 21.60 |
| 6 | 799.98 | 40.02 QP | 46.00 | -5.98 | 1.00 H | 303 | 15.54 | 24.48 |
| 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 | 35.95 | 36.41 QP | 40.00 | -3.59 | 1.00 V | 153 | 22.96 | 13.45 |
| 2 | 100.00 | 33.97 QP | 43.50 | -9.53 | 1.25 V | 312 | 24.66 | 9.31 |
| 3 | 199.98 | 36.15 QP | 43.50 | -7.35 | 1.00 V | 114 | 24.94 | 11.21 |
| 4 | 299.99 | 35.33 QP | 46.00 | -10.67 | 1.00 V | 54 | 20.15 | 15.18 |
| 5 | 799.98 | 37.65 QP | 46.00 | -8.35 | 1.50 V | 76 | 13.17 | 24.48 |
| 6 | 939.02 | 42.20 QP | 46.00 | -3.80 | 2.00 V | 328 | 15.96 | 26.24 |

- 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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ABOVE 1GHz WORST-CASE DATA :

| EUT TEST CONDITION | | MEASUREMENT DETAIL | |
|--------------------------|-----------------|--------------------|-------------|
| CHANNEL | Channel 0 | FREQUENCY RANGE | 1 ~ 25GHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION | Peak (PK) |
| ENVIRONMENTAL CONDITIONS | 24deg. C, 69%RH | TESTED BY | Amos Chuang |

| 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 | 54.0 PK | 74.0 | -20.0 | 1.29 H | 66 | 22.12 | 31.88 |
| 2 | 2390.00 | 15.6 AV | 54.0 | -38.4 | 1.29 H | 66 | -16.28 | 31.88 |
| 3 | *2402.00 | 101.2 PK | | | 1.24 H | 79 | 69.28 | 31.92 |
| 4 | *2402.00 | 62.8 AV | | | 1.24 H | 79 | 30.88 | 31.92 |
| 5 | 4804.00 | 47.2 PK | 74.0 | -26.8 | 1.00 H | 113 | 6.03 | 41.17 |
| 6 | 4804.00 | 8.8 AV | 54.0 | -45.2 | 1.00 H | 113 | -32.37 | 41.17 |
| 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 | 2389.85 | 54.4 PK | 74.0 | -19.6 | 1.00 V | 196 | 22.52 | 31.88 |
| 2 | 2389.85 | 16.0 AV | 54.0 | -38.0 | 1.00 V | 196 | -15.88 | 31.88 |
| 3 | *2402.00 | 100.8 PK | | | 1.00 V | 184 | 68.88 | 31.92 |
| 4 | *2402.00 | 62.4 AV | | | 1.00 V | 184 | 30.48 | 31.92 |
| 5 | 4804.00 | 48.4 PK | 74.0 | -25.6 | 1.00 V | 131 | 7.23 | 41.17 |
| 6 | 4804.00 | 10.0 AV | 54.0 | -44.0 | 1.00 V | 131 | -31.17 | 41.17 |

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 average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:
 $20 \log (\text{Duty cycle}) = 20 \log (1.2 \text{ ms} / 100 \text{ ms}) = -38.4 \text{ dB}$
 Please see page 46 for plotted duty.



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| EUT TEST CONDITION | | MEASUREMENT DETAIL | |
|--------------------------|-----------------|--------------------|-------------|
| CHANNEL | Channel 19 | FREQUENCY RANGE | 1 ~ 25GHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION | Peak (PK) |
| ENVIRONMENTAL CONDITIONS | 24deg. C, 69%RH | TESTED BY | Amos Chuang |

| 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 | *2440.00 | 101.7 PK | | | 1.21 H | 73 | 69.65 | 32.05 |
| 2 | *2440.00 | 63.3 AV | | | 1.21 H | 73 | 31.25 | 32.05 |
| 3 | 4880.00 | 47.3 PK | 74.0 | -26.7 | 1.00 H | 85 | 5.92 | 41.38 |
| 4 | 4880.00 | 8.9 AV | 54.0 | -45.1 | 1.00 H | 85 | -32.48 | 41.38 |
| 5 | 7320.00 | 51.9 PK | 74.0 | -22.1 | 1.00 H | 73 | 6.21 | 45.69 |
| 6 | 7320.00 | 13.5 AV | 54.0 | -40.5 | 1.00 H | 73 | -32.19 | 45.69 |
| 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 | *2440.00 | 100.6 PK | | | 1.00 V | 181 | 68.55 | 32.05 |
| 2 | *2440.00 | 62.2 AV | | | 1.00 V | 181 | 30.15 | 32.05 |
| 3 | 4880.00 | 48.9 PK | 74.0 | -25.1 | 1.00 V | 101 | 7.52 | 41.38 |
| 4 | 4880.00 | 10.5 AV | 54.0 | -43.5 | 1.00 V | 101 | -30.88 | 41.38 |
| 5 | 7320.00 | 51.2 PK | 74.0 | -22.8 | 1.00 V | 73 | 5.51 | 45.69 |
| 6 | 7320.00 | 12.8 AV | 54.0 | -41.2 | 1.00 V | 73 | -32.89 | 45.69 |

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.
6. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:
 $20 \log (\text{Duty cycle}) = 20 \log (1.2 \text{ ms} / 100 \text{ ms}) = -38.4 \text{ dB}$
Please see page 46 for plotted duty.

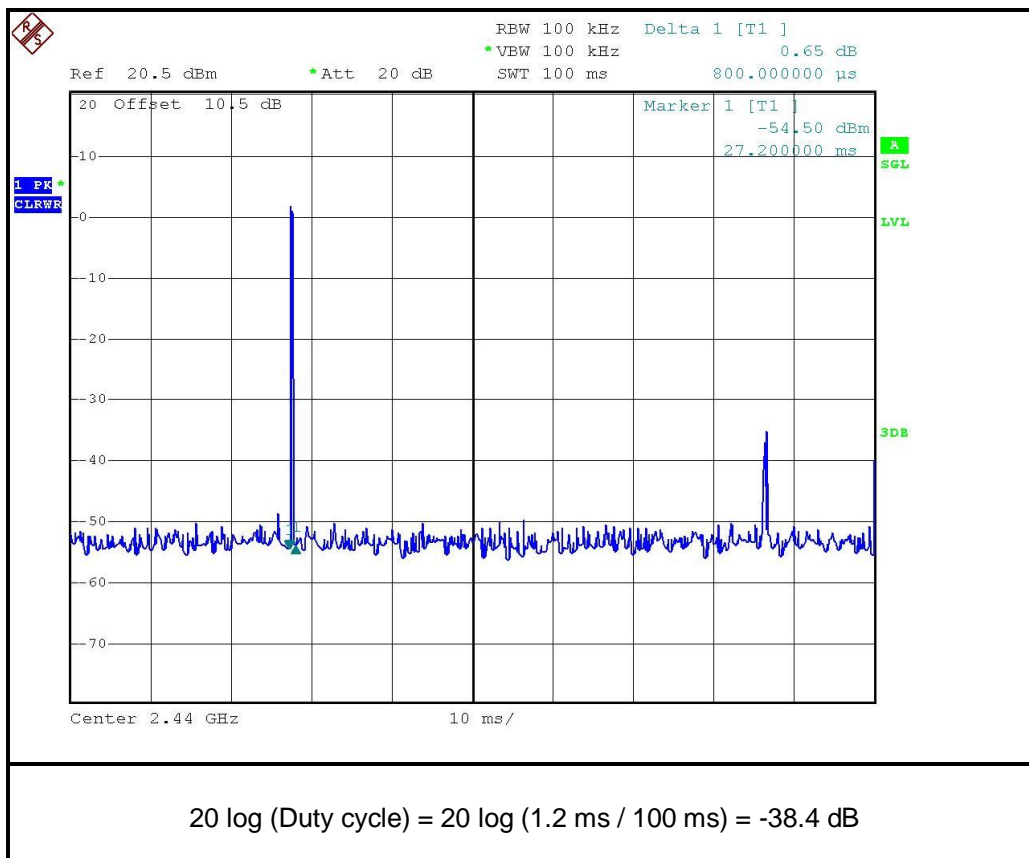
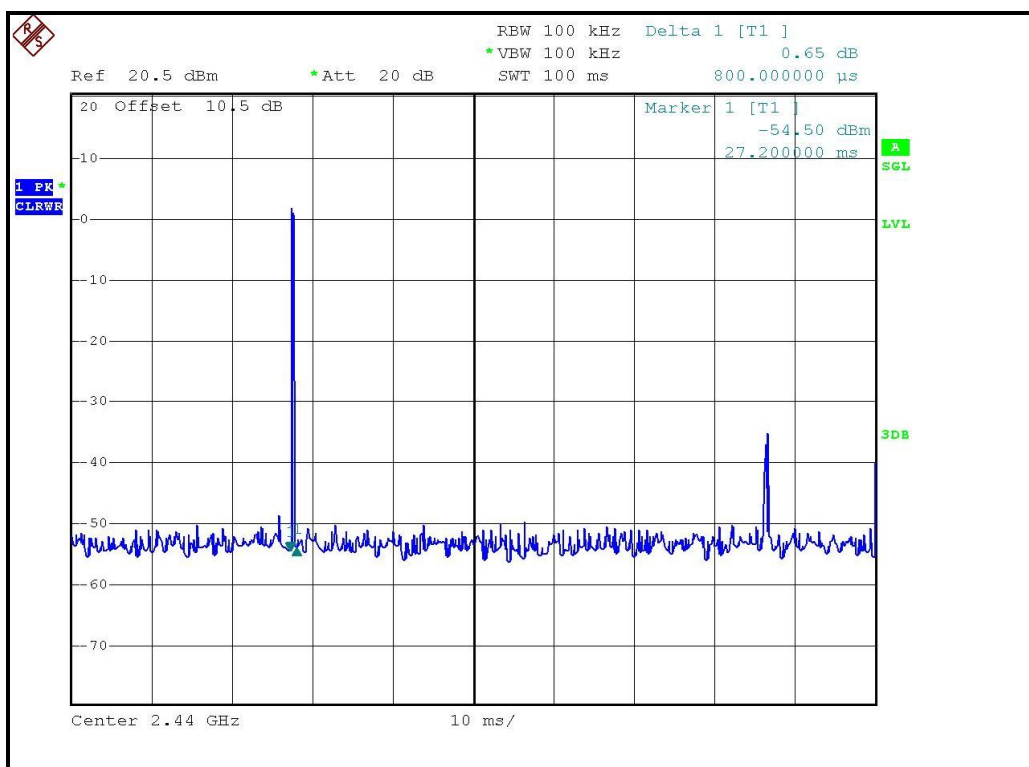


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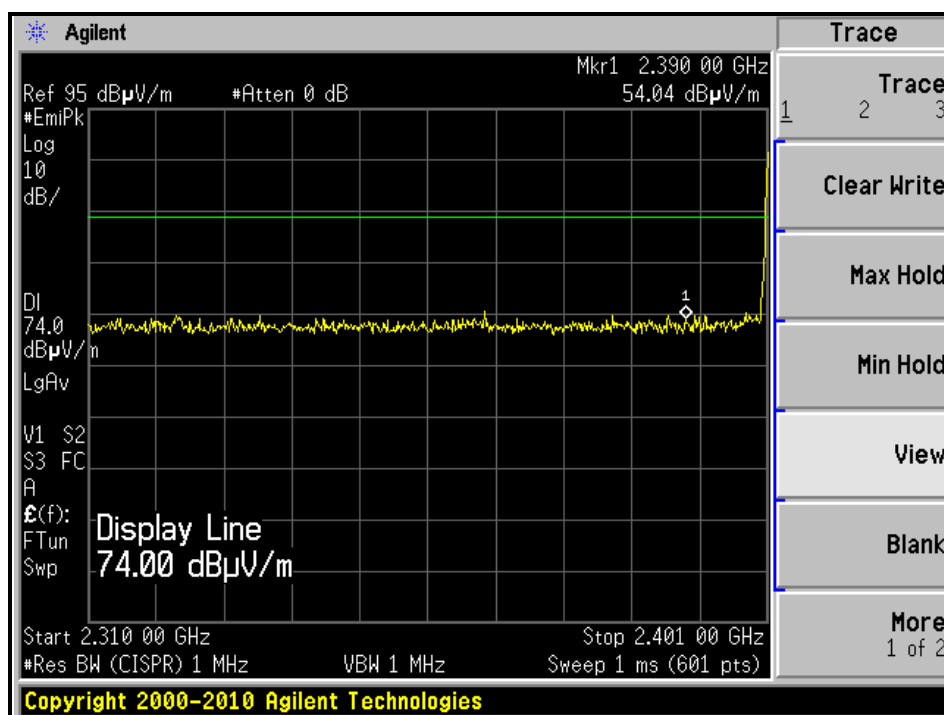
| EUT TEST CONDITION | | MEASUREMENT DETAIL | |
|--------------------------|-----------------|--------------------|-------------|
| CHANNEL | Channel 39 | FREQUENCY RANGE | 1 ~ 25GHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION | Peak (PK) |
| ENVIRONMENTAL CONDITIONS | 24deg. C, 69%RH | TESTED BY | Amos Chuang |

| 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 | 102.0 PK | | | 1.24 H | 70 | 69.82 | 32.18 |
| 2 | *2480.00 | 63.6 AV | | | 1.24 H | 70 | 31.42 | 32.18 |
| 3 | 2483.50 | 53.9 PK | 74.0 | -20.1 | 1.21 H | 71 | 21.71 | 32.19 |
| 4 | 2483.50 | 15.5 AV | 54.0 | -38.5 | 1.21 H | 71 | -16.69 | 32.19 |
| 5 | 4960.00 | 47.0 PK | 74.0 | -27.0 | 1.00 H | 133 | 5.45 | 41.55 |
| 6 | 4960.00 | 8.6 AV | 54.0 | -45.4 | 1.00 H | 133 | -32.95 | 41.55 |
| 7 | 7440.00 | 52.4 PK | 74.0 | -21.6 | 1.00 H | 69 | 6.33 | 46.07 |
| 8 | 7440.00 | 14.0 AV | 54.0 | -40.0 | 1.00 H | 69 | -32.07 | 46.07 |
| 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 | 100.9 PK | | | 1.00 V | 197 | 68.72 | 32.18 |
| 2 | *2480.00 | 62.5 AV | | | 1.00 V | 197 | 30.32 | 32.18 |
| 3 | 2483.50 | 54.9 PK | 74.0 | -19.1 | 1.00 V | 183 | 22.71 | 32.19 |
| 4 | 2483.50 | 16.5 AV | 54.0 | -37.5 | 1.00 V | 183 | -15.69 | 32.19 |
| 5 | 4960.00 | 47.2 PK | 74.0 | -26.8 | 1.00 V | 113 | 5.65 | 41.55 |
| 6 | 4960.00 | 8.8 AV | 54.0 | -45.2 | 1.00 V | 113 | -32.75 | 41.55 |
| 7 | 7440.00 | 54.3 PK | 74.0 | -19.7 | 1.00 V | 179 | 8.23 | 46.07 |
| 8 | 7440.00 | 15.9 AV | 54.0 | -38.1 | 1.00 V | 179 | -30.17 | 46.07 |

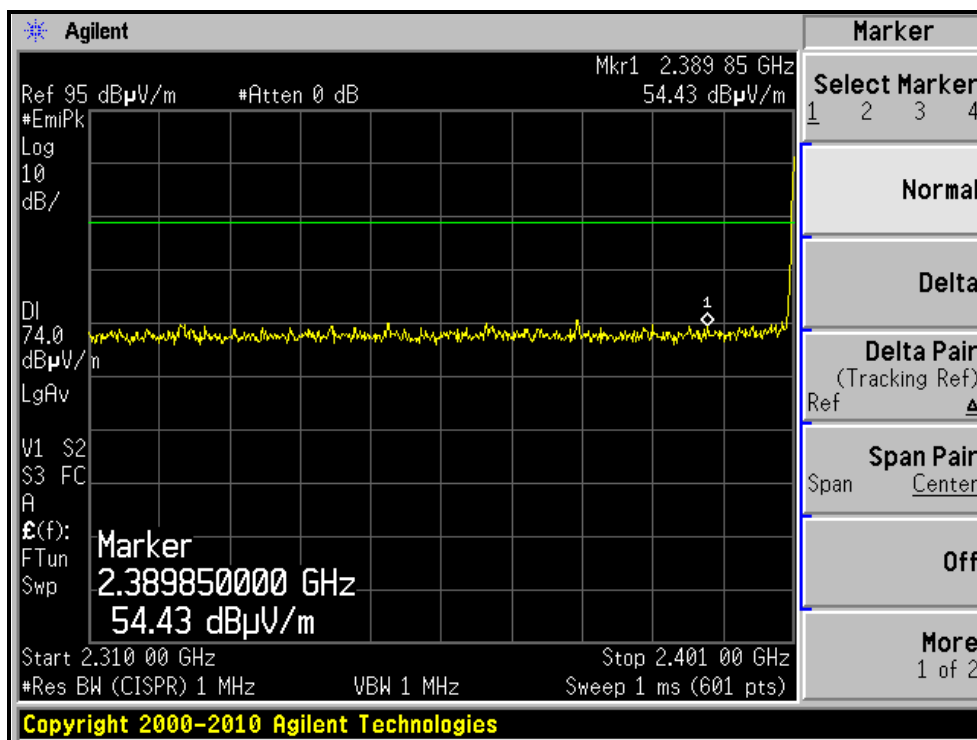
REMARKS: 1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “ * ”: Fundamental frequency.
6. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:
20 log (Duty cycle) = 20 log (1.2 ms / 100 ms) = -38.4 dB
Please see page 46 for plotted duty.



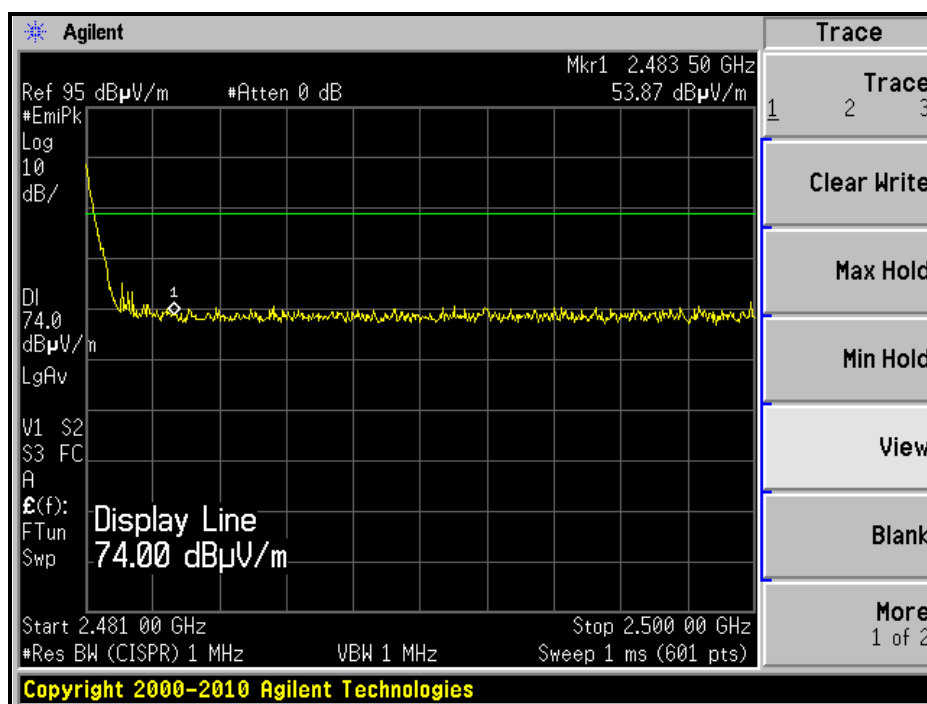
RESTRICTED BANDEDGE (GFSK(LE mode) MODE, CH0, HORIZONTAL)



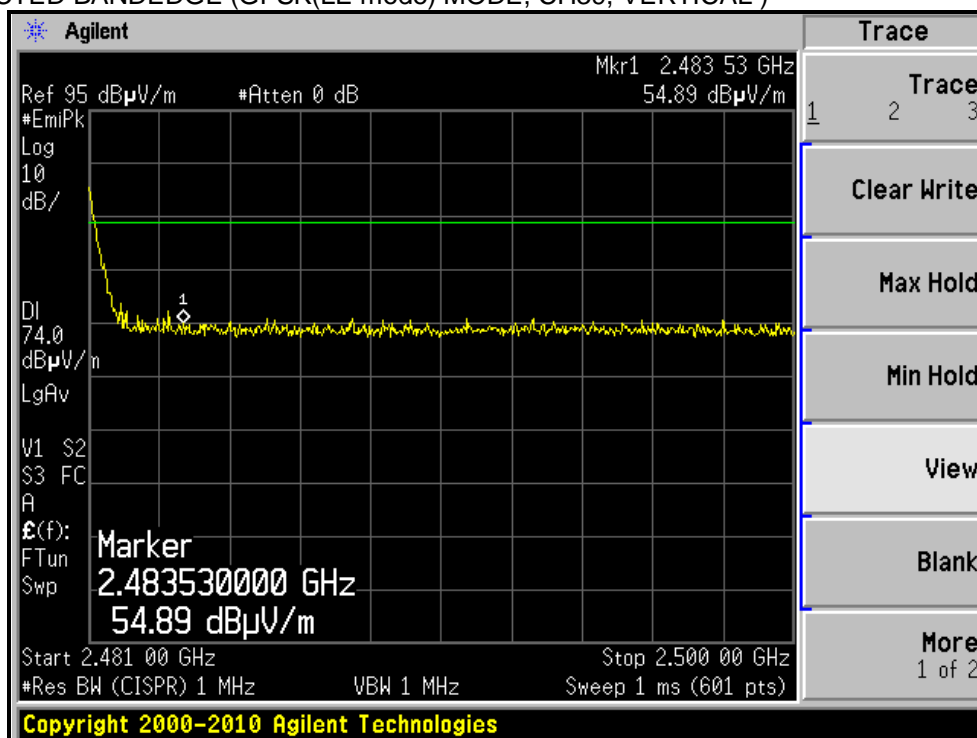
RESTRICTED BANDEDGE (GFSK(LE mode) MODE, CH0, VERTICAL)



RESTRICTED BANDEDGE (GFSK(LE mode) MODE, CH39, HORIZONTAL)



RESTRICTED BANDEDGE (GFSK(LE mode) MODE, CH39, VERTICAL)





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4.2.7 TEST RESULTS (FOR RECEIVER PART)

BELOW 1GHz WORST-CASE DATA :

| EUT TEST CONDITION | | MEASUREMENT DETAIL | |
|--------------------------|-----------------|--------------------|---------------|
| CHANNEL | Channel 78 | FREQUENCY RANGE | Below 1000MHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION | Quasi-Peak |
| ENVIRONMENTAL CONDITIONS | 23deg. C, 69%RH | TESTED BY | Even Huang |

| 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 | 99.99 | 39.2 QP | 43.5 | -4.3 | 2.00 H | 113 | 29.93 | 9.31 |
| 2 | 199.91 | 41.6 QP | 43.5 | -1.9 | 1.00 H | 46 | 30.41 | 11.22 |
| 3 | 300.00 | 37.6 QP | 46.0 | -8.4 | 1.00 H | 328 | 22.38 | 15.18 |
| 4 | 497.65 | 34.1 QP | 46.0 | -11.9 | 1.00 H | 211 | 14.64 | 19.48 |
| 5 | 600.32 | 40.3 QP | 46.0 | -5.7 | 1.00 H | 243 | 18.69 | 21.60 |
| 6 | 799.87 | 38.8 QP | 46.0 | -7.2 | 1.00 H | 13 | 14.36 | 24.48 |
| 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 | 35.92 | 34.7 QP | 40.0 | -5.3 | 1.00 V | 282 | 21.22 | 13.45 |
| 2 | 99.99 | 32.4 QP | 43.5 | -11.1 | 2.00 V | 243 | 23.12 | 9.31 |
| 3 | 199.94 | 36.2 QP | 43.5 | -7.3 | 2.00 V | 267 | 25.02 | 11.21 |
| 4 | 299.89 | 34.3 QP | 46.0 | -11.7 | 1.00 V | 212 | 19.13 | 15.18 |
| 5 | 799.87 | 38.7 QP | 46.0 | -7.3 | 1.00 V | 133 | 14.19 | 24.48 |
| 6 | 939.01 | 40.5 QP | 46.0 | -5.5 | 1.00 V | 167 | 14.28 | 26.24 |

- 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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ABOVE 1GHz WORST-CASE DATA :

| EUT TEST CONDITION | | MEASUREMENT DETAIL | |
|--------------------------|-----------------|--------------------|---------------------------|
| CHANNEL | Channel 0 | FREQUENCY RANGE | 1 ~ 7.5GHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION | Peak (PK) Average (AV) |
| ENVIRONMENTAL CONDITIONS | 24deg. C, 69%RH | TESTED BY | Amos Chuang |

| 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 | 1601.30 | 43.5 PK | 74.0 | -30.5 | 1.00 H | 20 | 14.60 | 28.90 |
| 2 | 1601.30 | 29.1 AV | 54.0 | -24.9 | 1.00 H | 20 | 0.20 | 28.90 |
| 3 | 3202.60 | 41.7 PK | 74.0 | -32.3 | 1.00 H | 0 | 7.26 | 34.44 |
| 4 | 3202.60 | 29.3 AV | 54.0 | -24.7 | 1.00 H | 0 | -5.14 | 34.44 |
| 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 | 1601.30 | 43.2 PK | 74.0 | -30.8 | 1.00 V | 221 | 14.30 | 28.90 |
| 2 | 1601.30 | 30.7 AV | 54.0 | -23.3 | 1.00 V | 221 | 1.80 | 28.90 |
| 3 | 3202.60 | 41.9 PK | 74.0 | -32.1 | 1.00 V | 0 | 7.46 | 34.44 |
| 4 | 3202.60 | 29.3 AV | 54.0 | -24.7 | 1.00 V | 0 | -5.14 | 34.44 |

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 39 | FREQUENCY RANGE | 1 ~ 7.5GHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION | Peak (PK) Average (AV) |
| ENVIRONMENTAL CONDITIONS | 24deg. C, 69%RH | TESTED BY | Amos Chuang |

| 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 | 1627.30 | 43.2 PK | 74.0 | -30.8 | 1.01 H | 20 | 14.18 | 29.02 |
| 2 | 1627.30 | 28.7 AV | 54.0 | -25.3 | 1.01 H | 20 | -0.32 | 29.02 |
| 3 | 3254.60 | 41.4 PK | 74.0 | -32.6 | 1.05 H | 10 | 6.83 | 34.57 |
| 4 | 3254.60 | 29.1 AV | 54.0 | -24.9 | 1.05 H | 10 | -5.47 | 34.57 |
| 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 | 1627.30 | 43.0 PK | 74.0 | -31.0 | 1.06 V | 226 | 13.98 | 29.02 |
| 2 | 1627.30 | 30.6 AV | 54.0 | -23.4 | 1.06 V | 226 | 1.58 | 29.02 |
| 3 | 3254.60 | 42.4 PK | 74.0 | -31.6 | 1.00 V | 9 | 7.83 | 34.57 |
| 4 | 3254.60 | 29.7 AV | 54.0 | -24.3 | 1.00 V | 9 | -4.87 | 34.57 |

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 78 | FREQUENCY RANGE | 1 ~ 7.5GHz |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | DETECTOR FUNCTION | Peak (PK) Average (AV) |
| ENVIRONMENTAL CONDITIONS | 24deg. C, 69%RH | TESTED BY | Amos Chuang |

| 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 | 1653.30 | 43.2 PK | 74.0 | -30.8 | 1.00 H | 9 | 14.05 | 29.15 |
| 2 | 1653.30 | 28.8 AV | 54.0 | -25.2 | 1.00 H | 9 | -0.35 | 29.15 |
| 3 | 3306.60 | 41.6 PK | 74.0 | -32.4 | 1.04 H | 11 | 6.90 | 34.70 |
| 4 | 3306.60 | 29.2 AV | 54.0 | -24.8 | 1.04 H | 11 | -5.50 | 34.70 |
| 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 | 1653.30 | 42.3 PK | 74.0 | -31.7 | 1.02 V | 226 | 13.15 | 29.15 |
| 2 | 1653.30 | 30.7 AV | 54.0 | -23.3 | 1.02 V | 226 | 1.55 | 29.15 |
| 3 | 3306.60 | 42.6 PK | 74.0 | -31.4 | 1.00 V | 11 | 7.90 | 34.70 |
| 4 | 3306.60 | 30.1 AV | 54.0 | -23.9 | 1.00 V | 11 | -4.60 | 34.70 |

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 hopping frequencies, and should be equally spaced.

4.3.2 TEST INSTRUMENTS

Test date: Nov. 21, 2011

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|----------------------------|-----------|------------|-----------------|------------------|
| R&S Spectrum Analyzer | FSP 40 | 100060 | May 11, 2011 | May 10, 2012 |

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

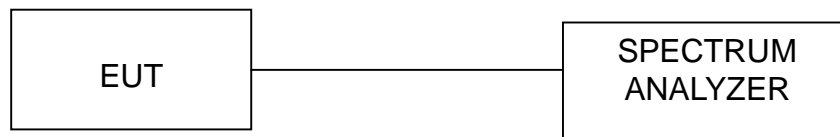
4.3.3 TEST PROCEDURES

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. 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.
3. 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.
4. Set the SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP



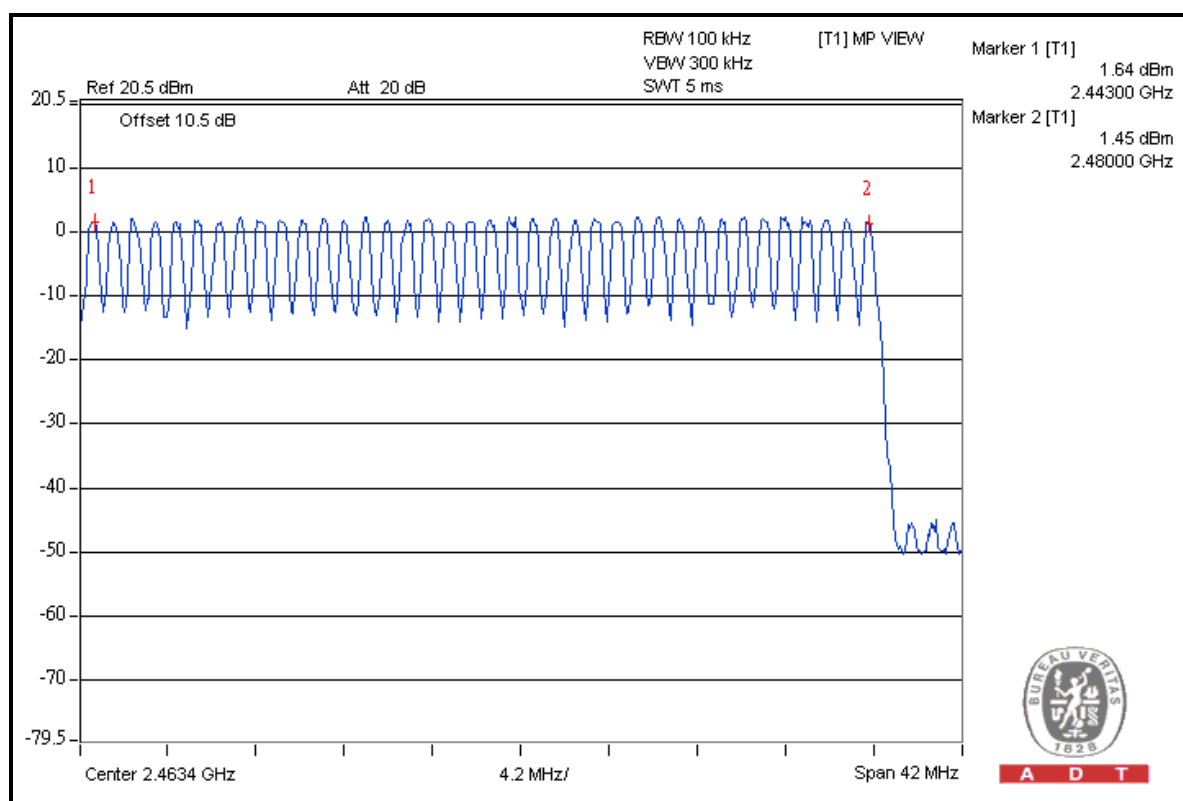
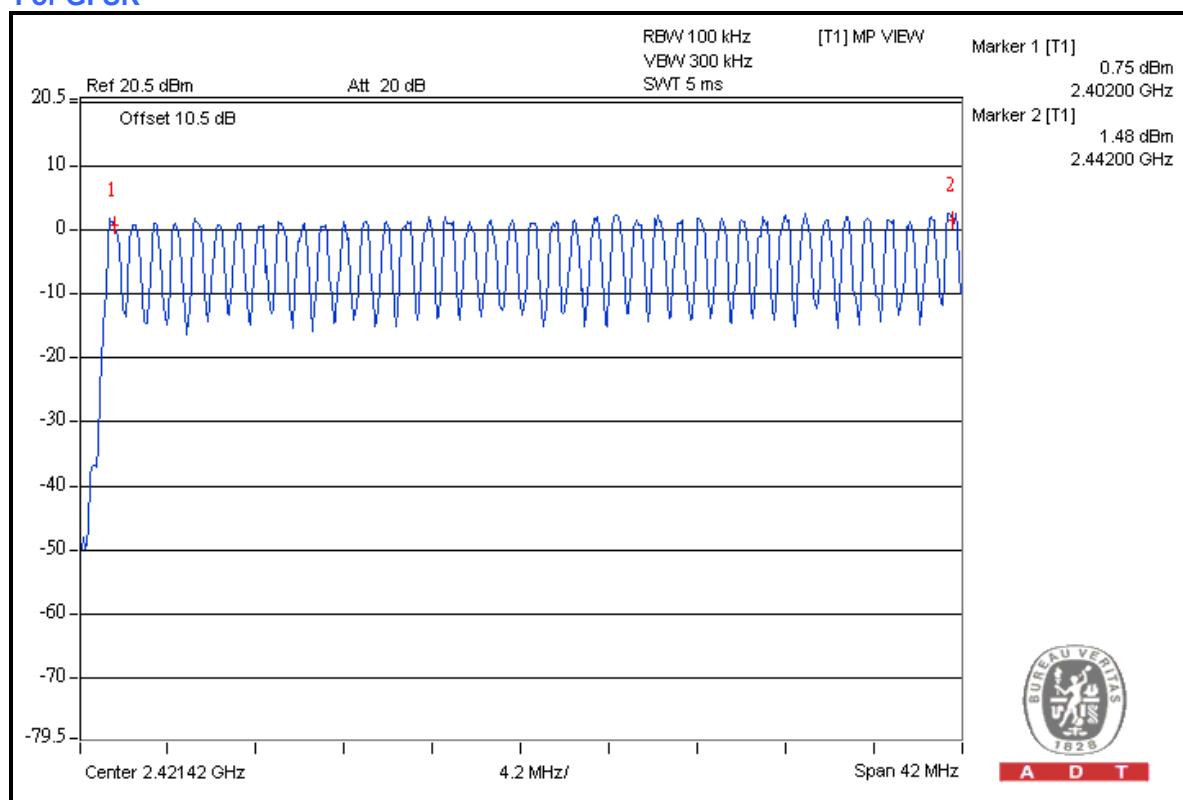
4.3.6 TEST RESULTS

There are 79 hopping frequencies for Bluetooth 2.1+ EDR and 40 hopping frequencies for Bluetooth 4.0 in the hopping mode. Please refer to next pages for the test result. On the plots, it shows that the hopping frequencies are equally spaced.



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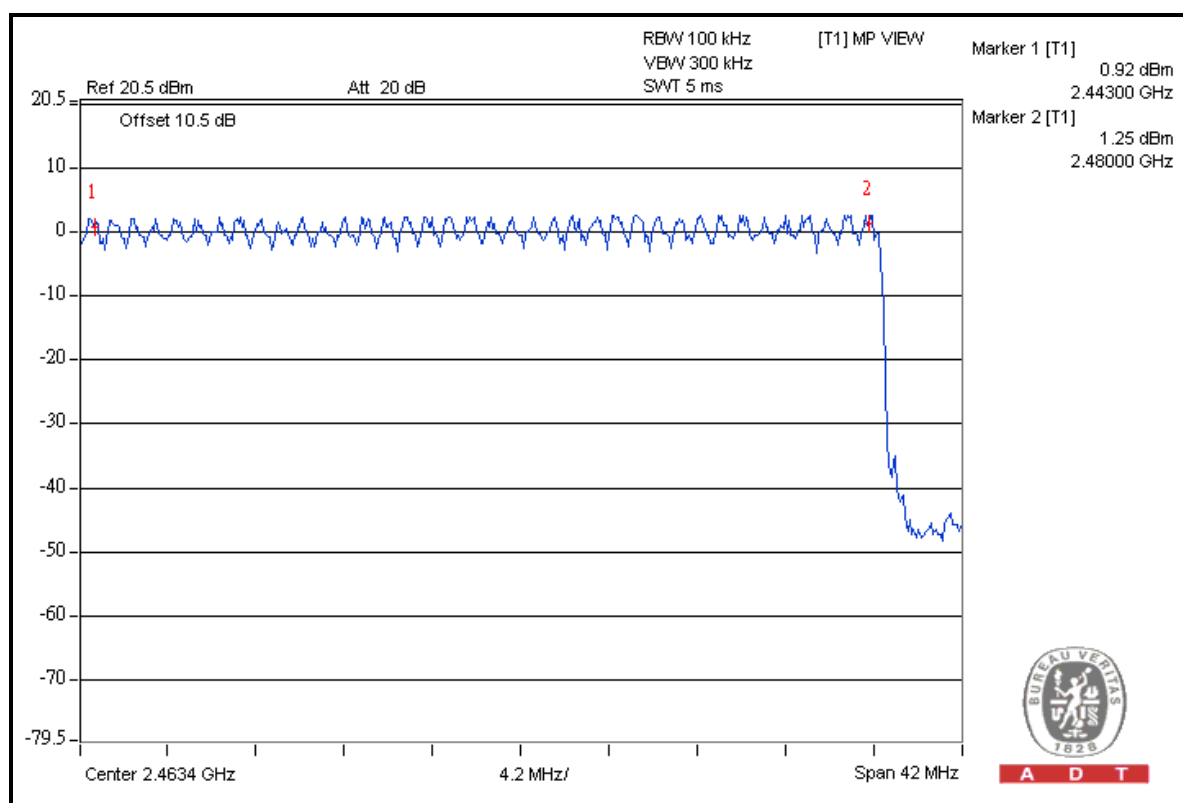
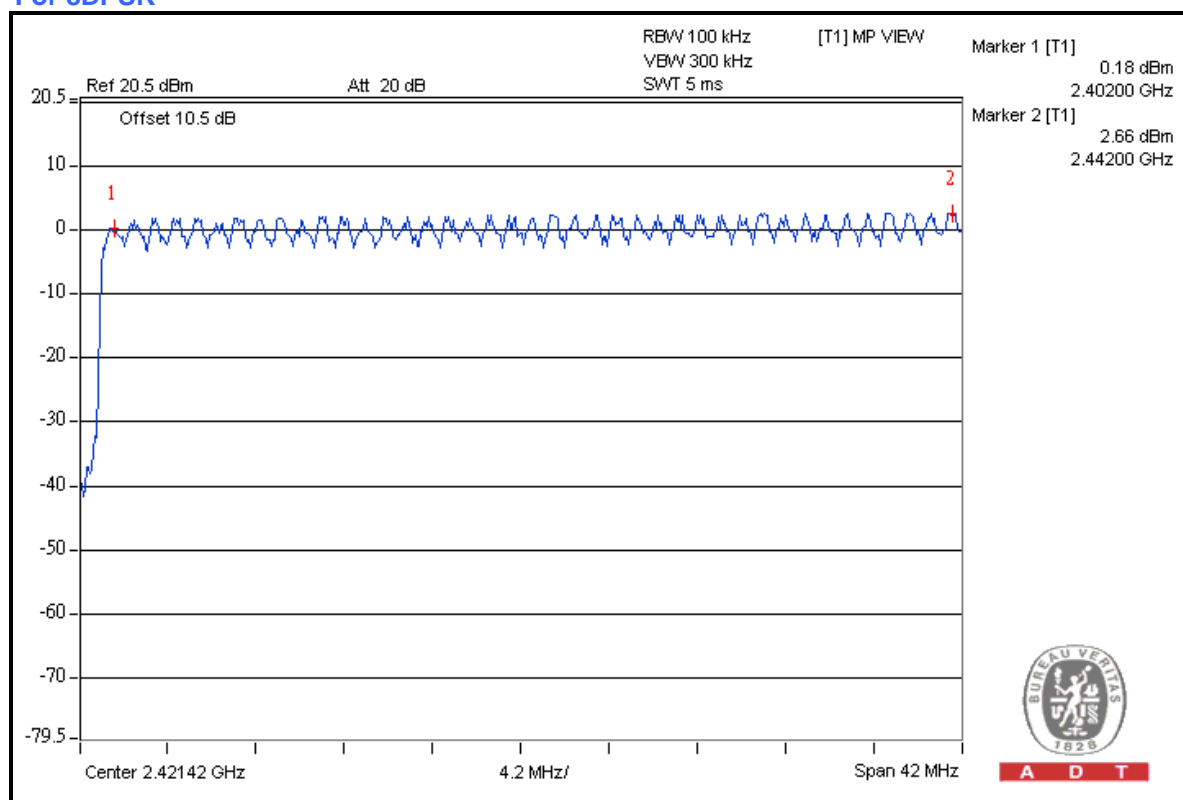
For GFSK





A D T

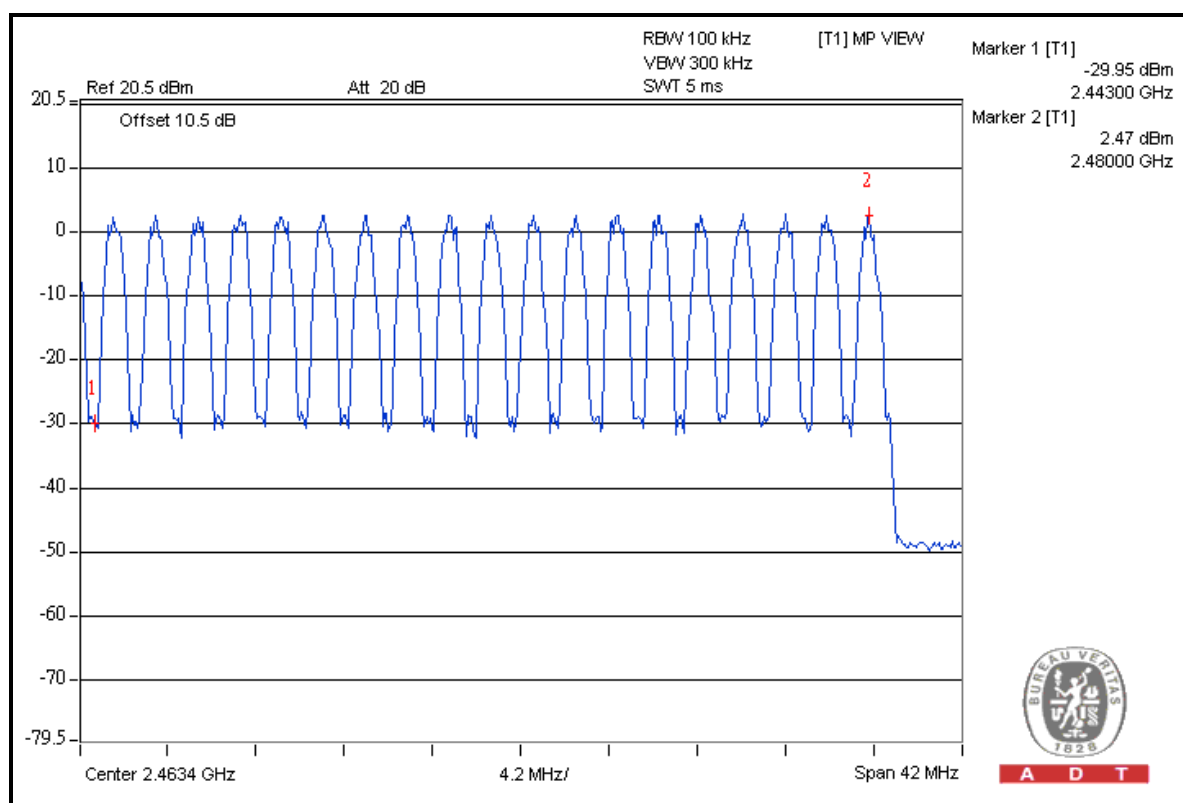
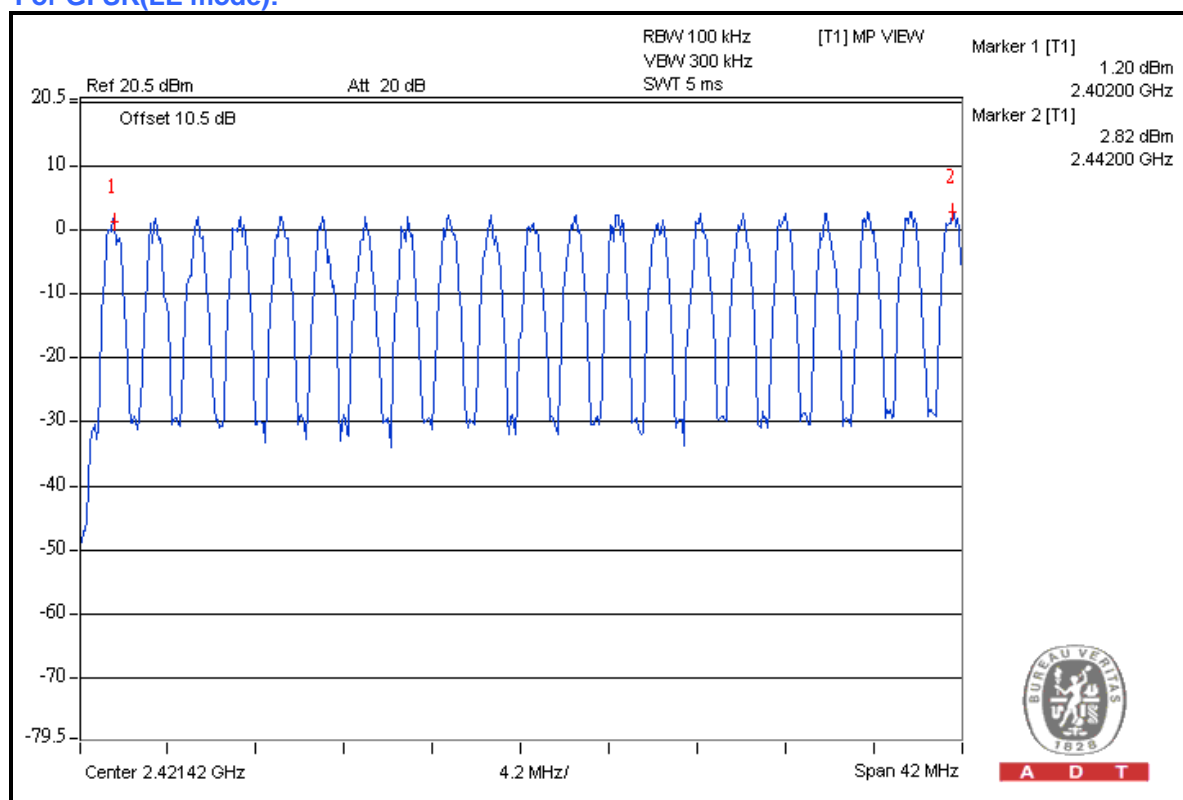
For 8DPSK





A D T

For GFSK(LE mode):





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4.4 DWELL TIME ON EACH CHANNEL

4.4.1 LIMIT OF DWELL TIME USED

For FHSS, 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.

Note:

The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 31.6 second period for traditional GFSK/($\pi/4$ -DQPSK) /8DPSK. The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 16 second period for GFSK(LE mode)

4.4.2 TEST INSTRUMENTS

Test date: Nov. 21, 2011

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|----------------------------|-----------|------------|-----------------|------------------|
| R&S Spectrum Analyzer | FSP 40 | 100060 | May 11, 2011 | May 10, 2012 |

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

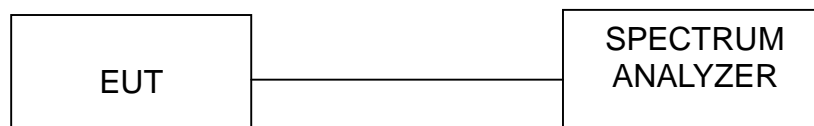
4.4.3 TEST PROCEDURES

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. 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.
3. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all frequencies measured were complete.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation

4.4.5 TEST SETUP





4.4.6 TEST RESULTS

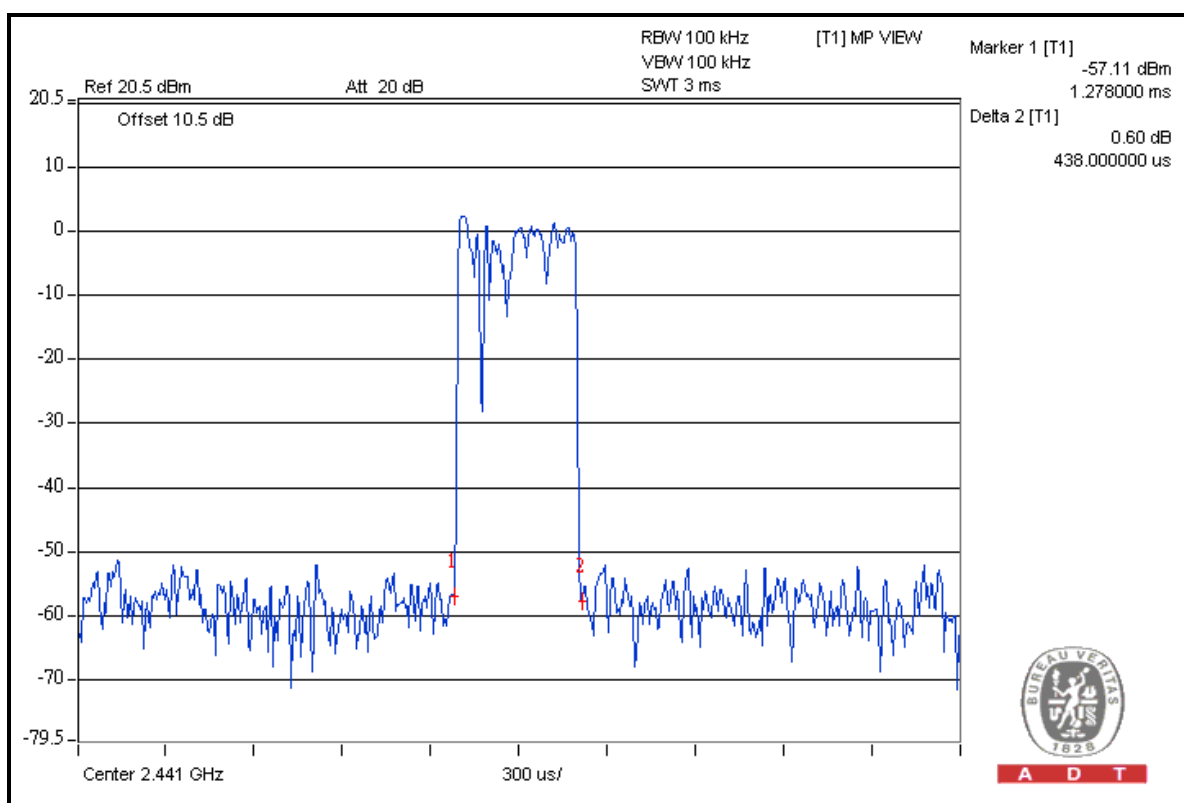
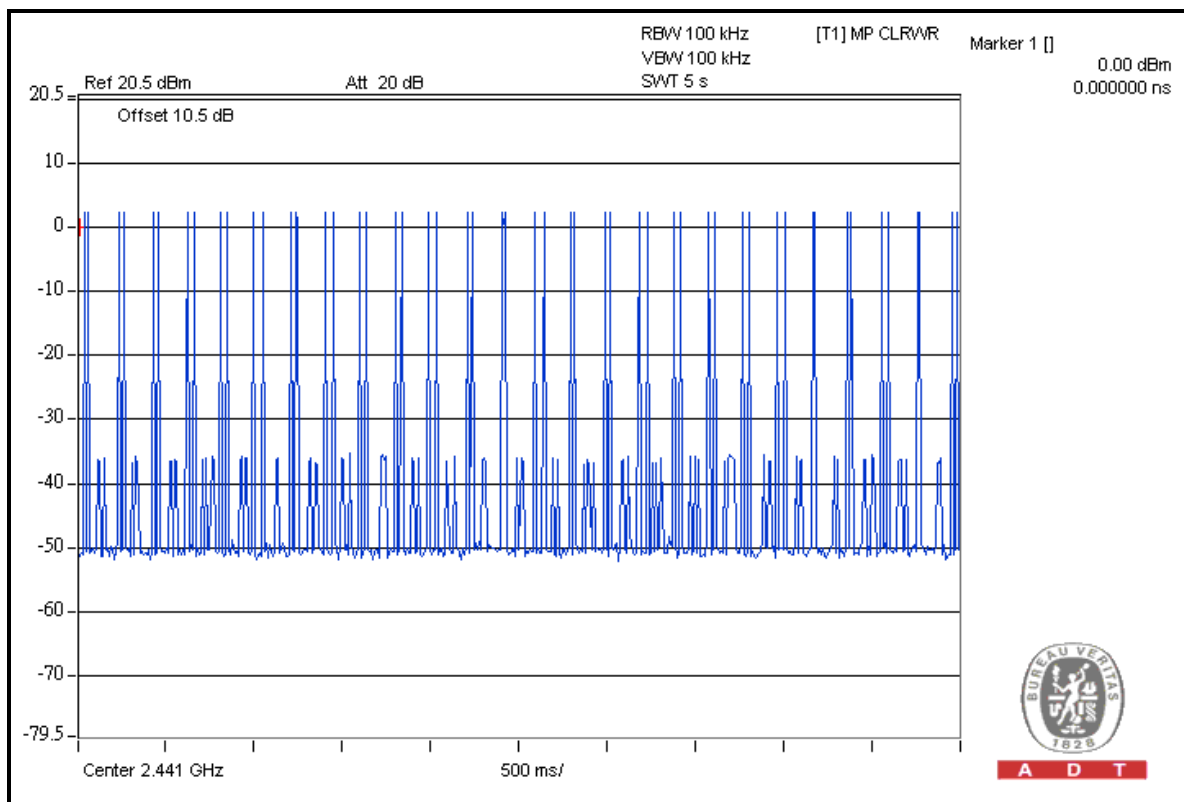
For GFSK:

| 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 times | 0.438 | 138.41 | 400 |
| DH3 | 26 (times / 5 sec) *6.32=164.32 times | 1.692 | 278.03 | 400 |
| DH5 | 16 (times / 5 sec) *6.32=101.12 times | 2.97 | 300.33 | 400 |



A D T

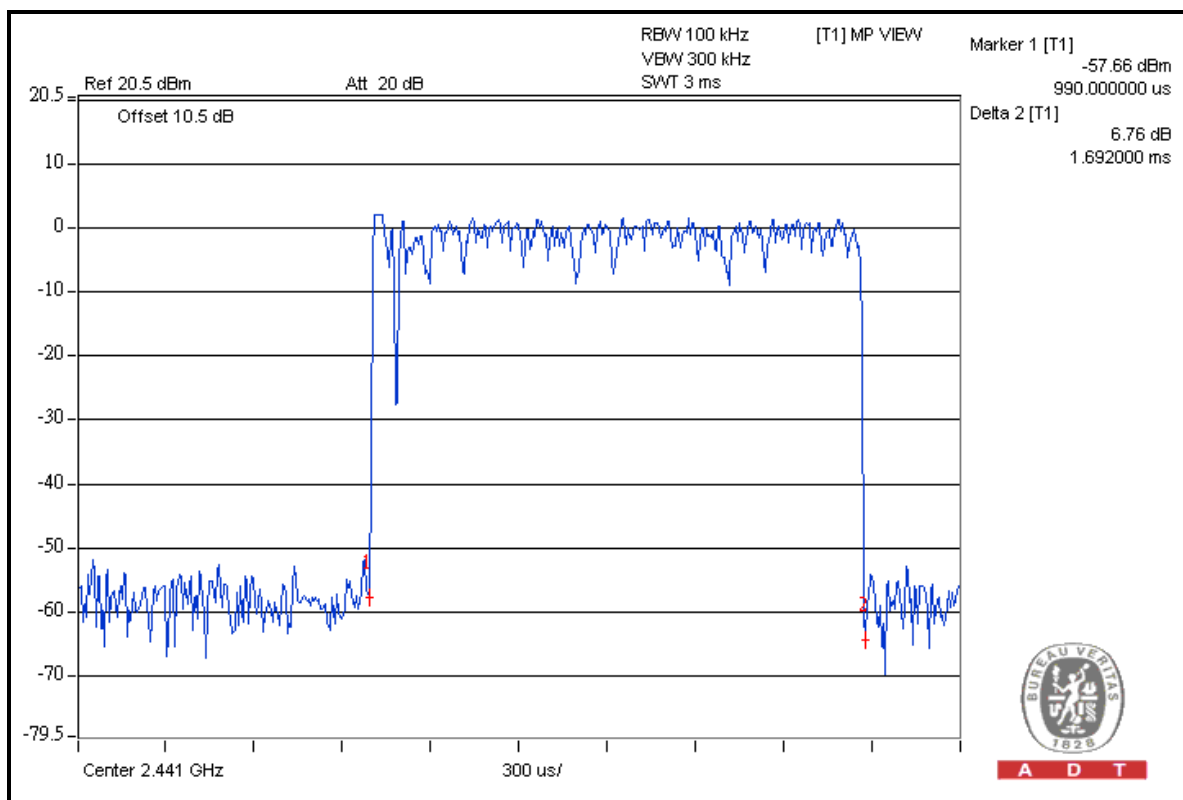
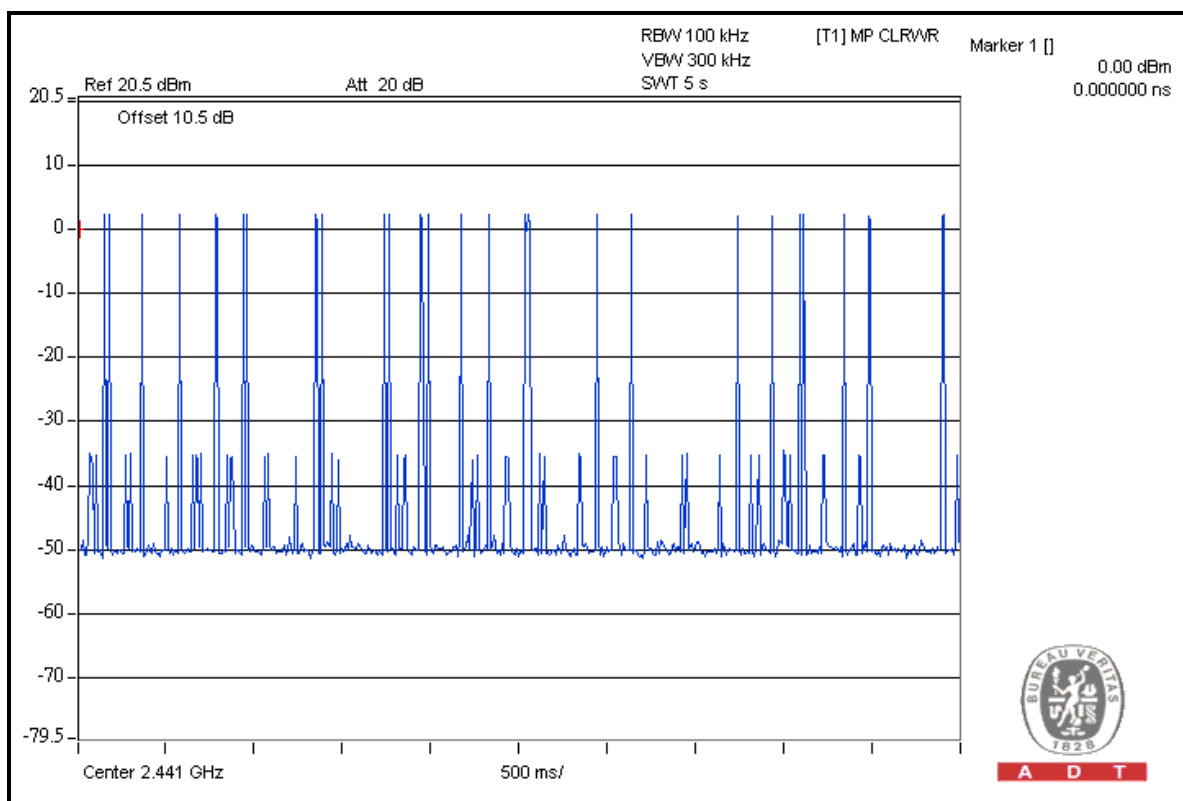
DH1





A D T

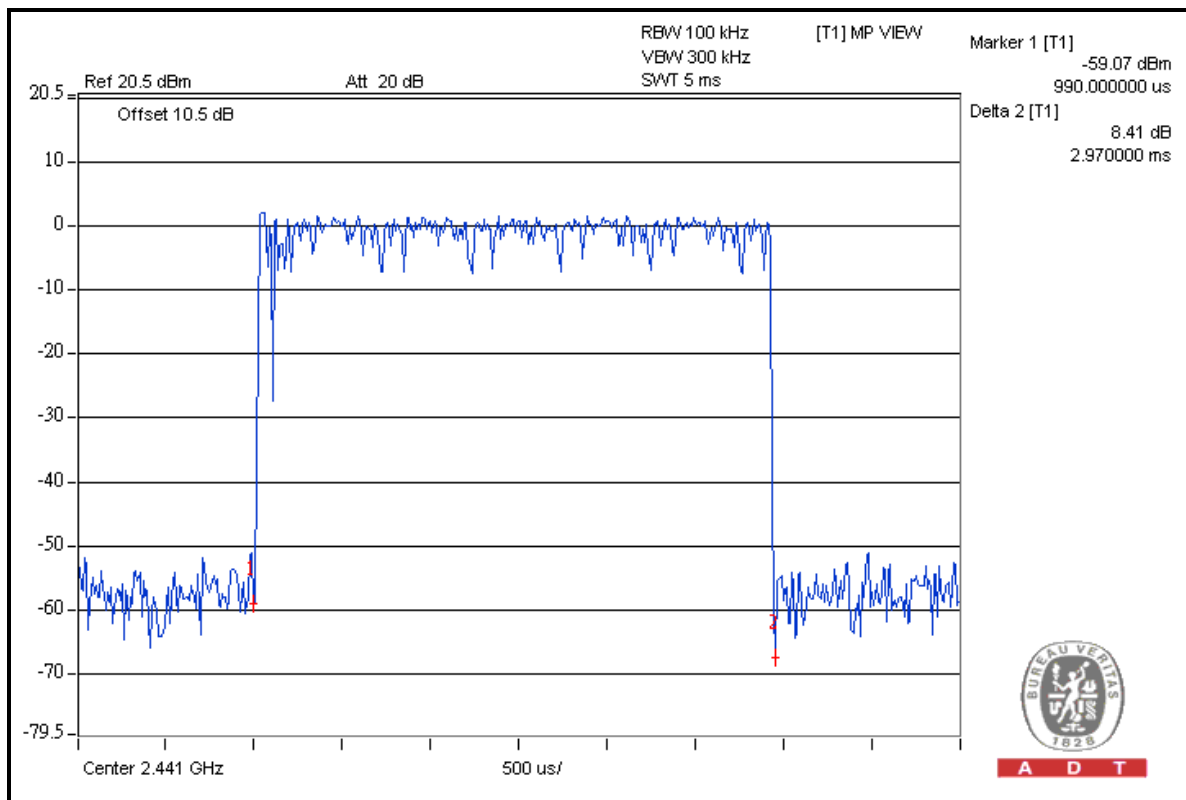
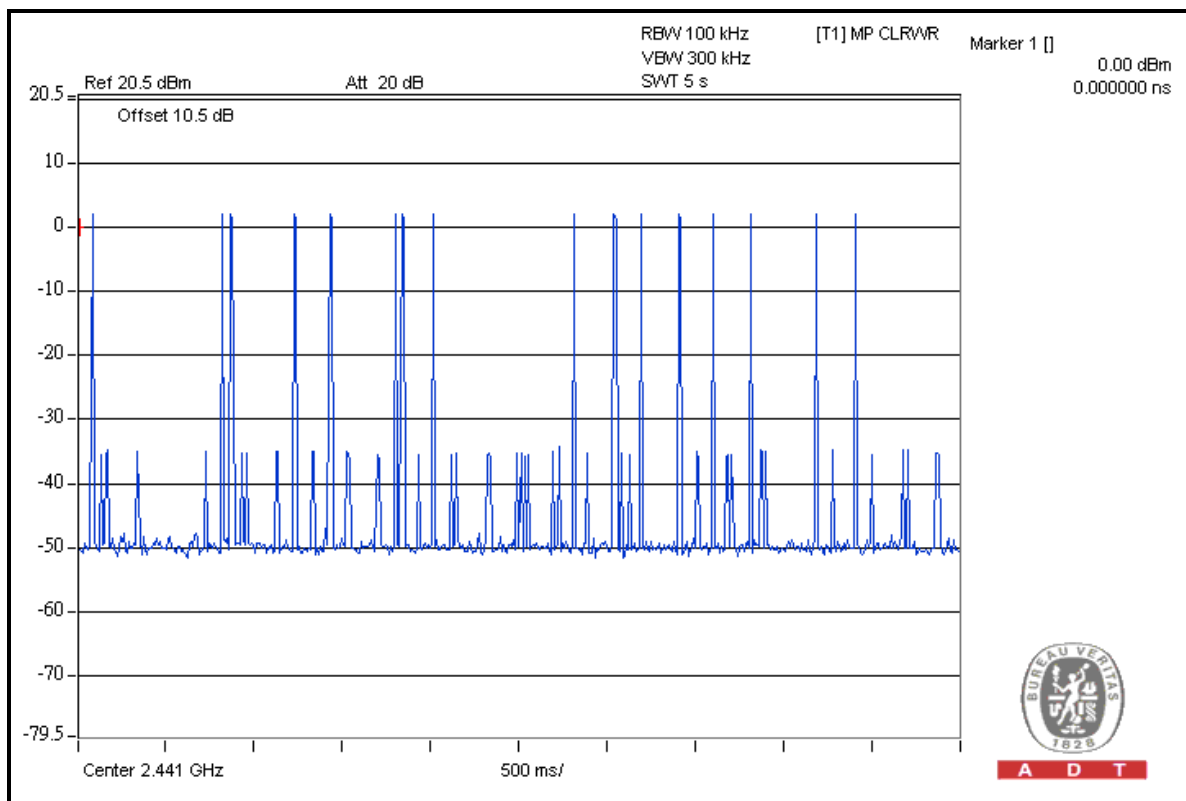
DH3





A D T

DH5





A D T

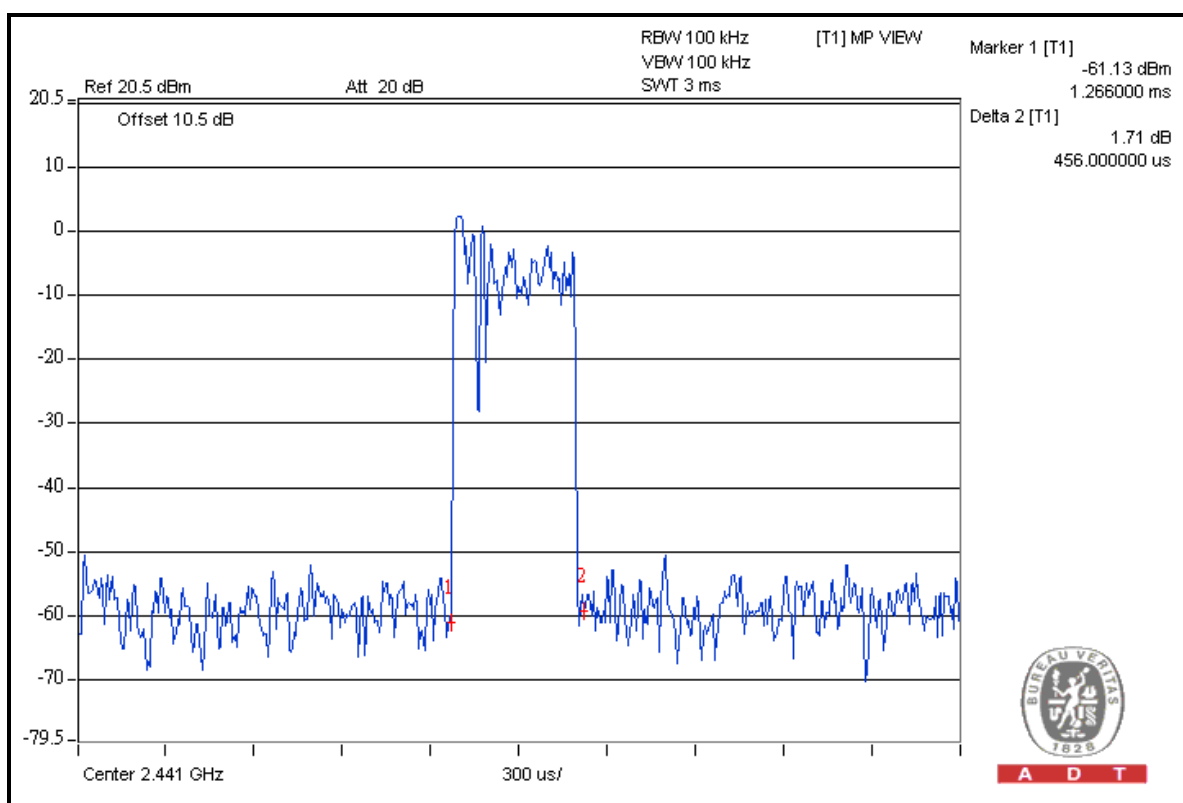
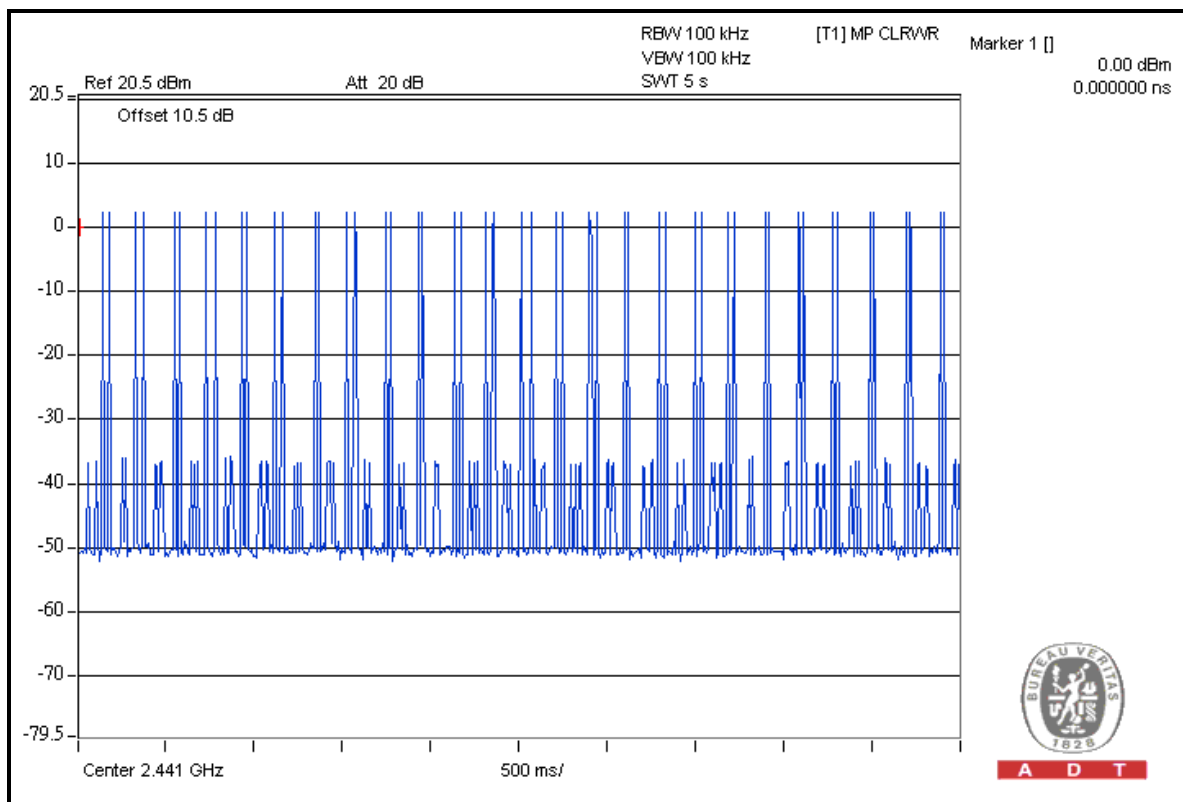
For 8DPSK :

| 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 times | 0.456 | 144.1 | 400 |
| DH3 | 25 (times / 5 sec) *6.32=158 times | 1.692 | 267.34 | 400 |
| DH5 | 18 (times / 5 sec) *6.32=113.76 times | 3.02 | 343.56 | 400 |



A D T

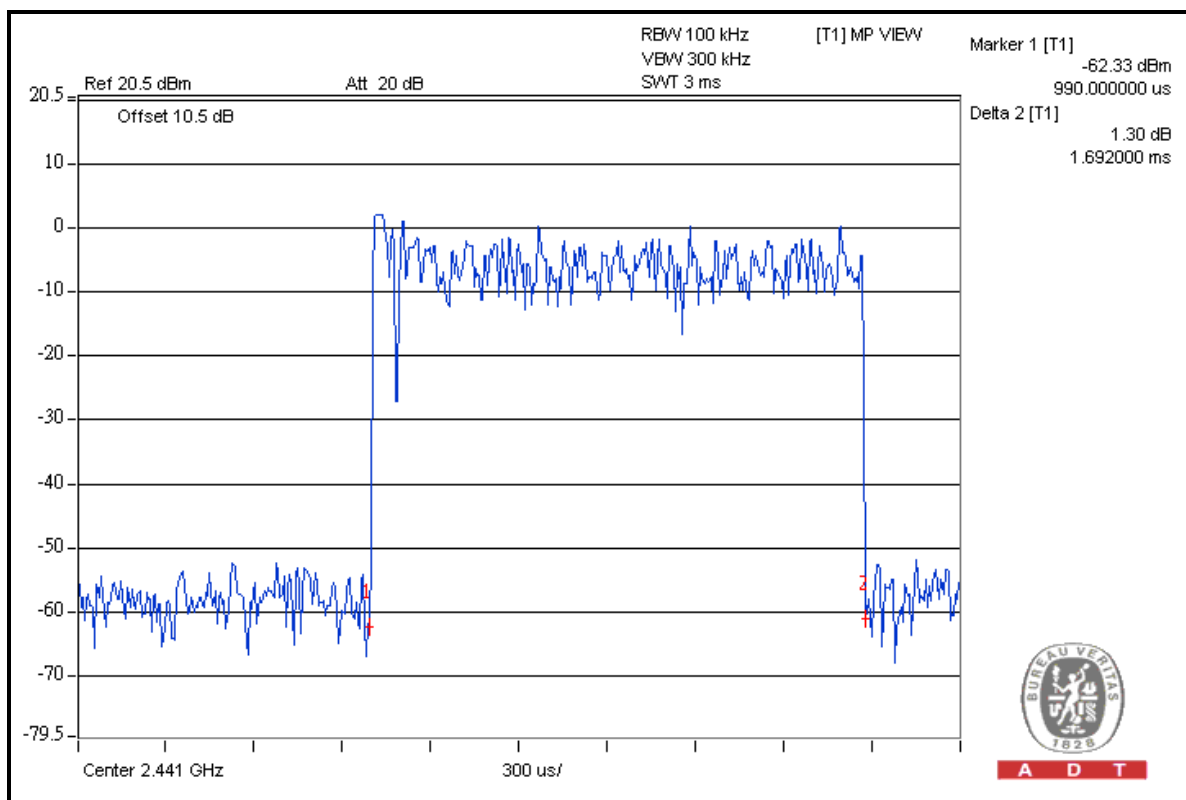
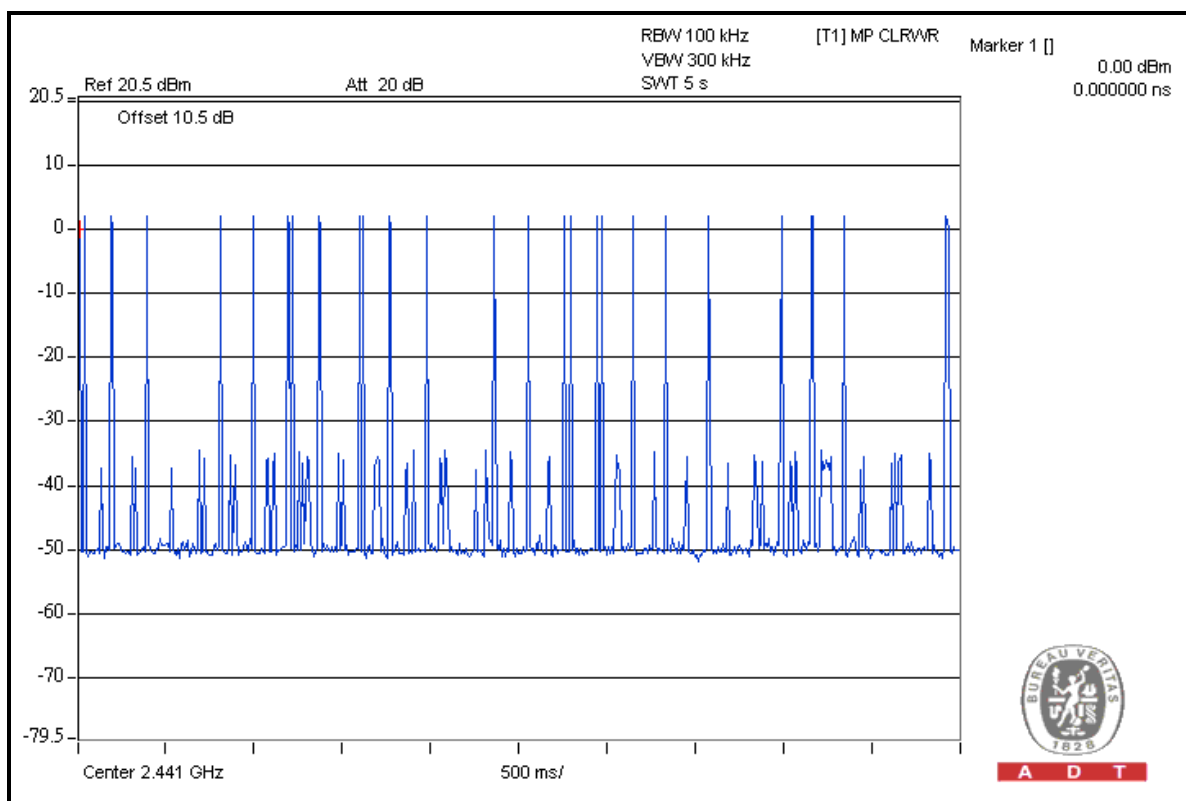
DH1





A D T

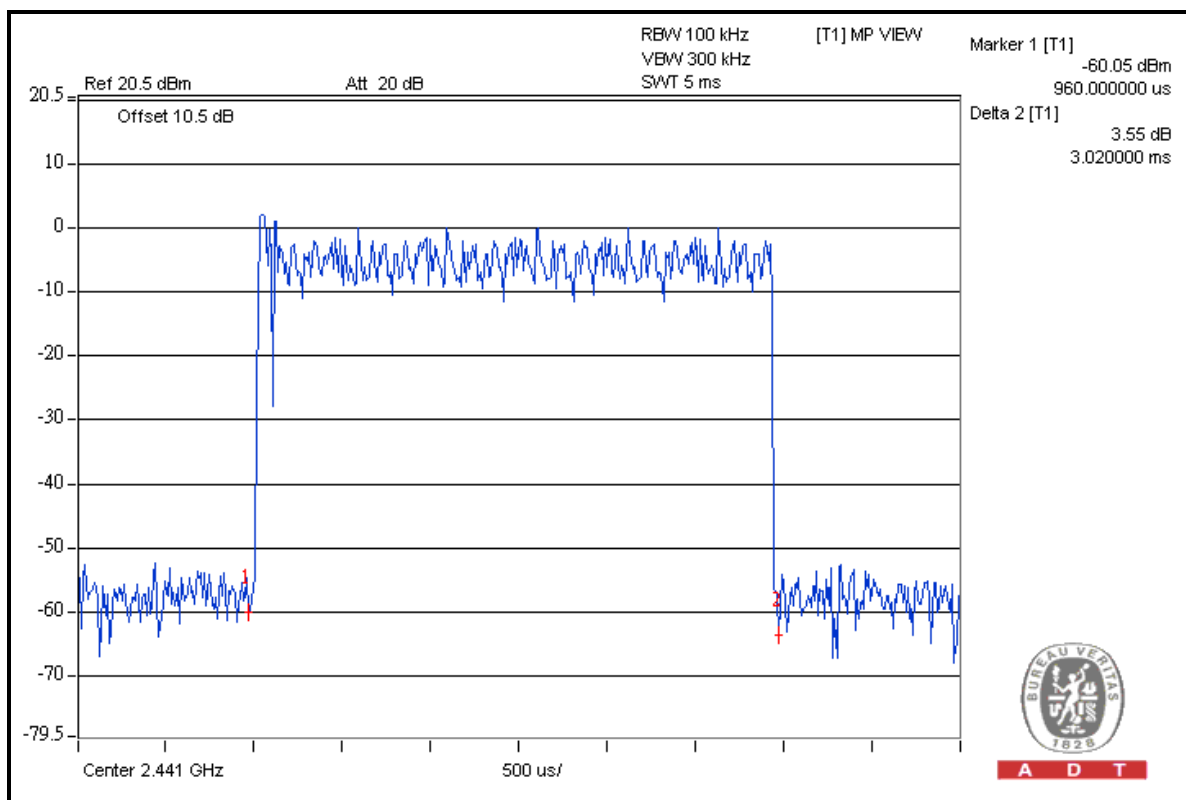
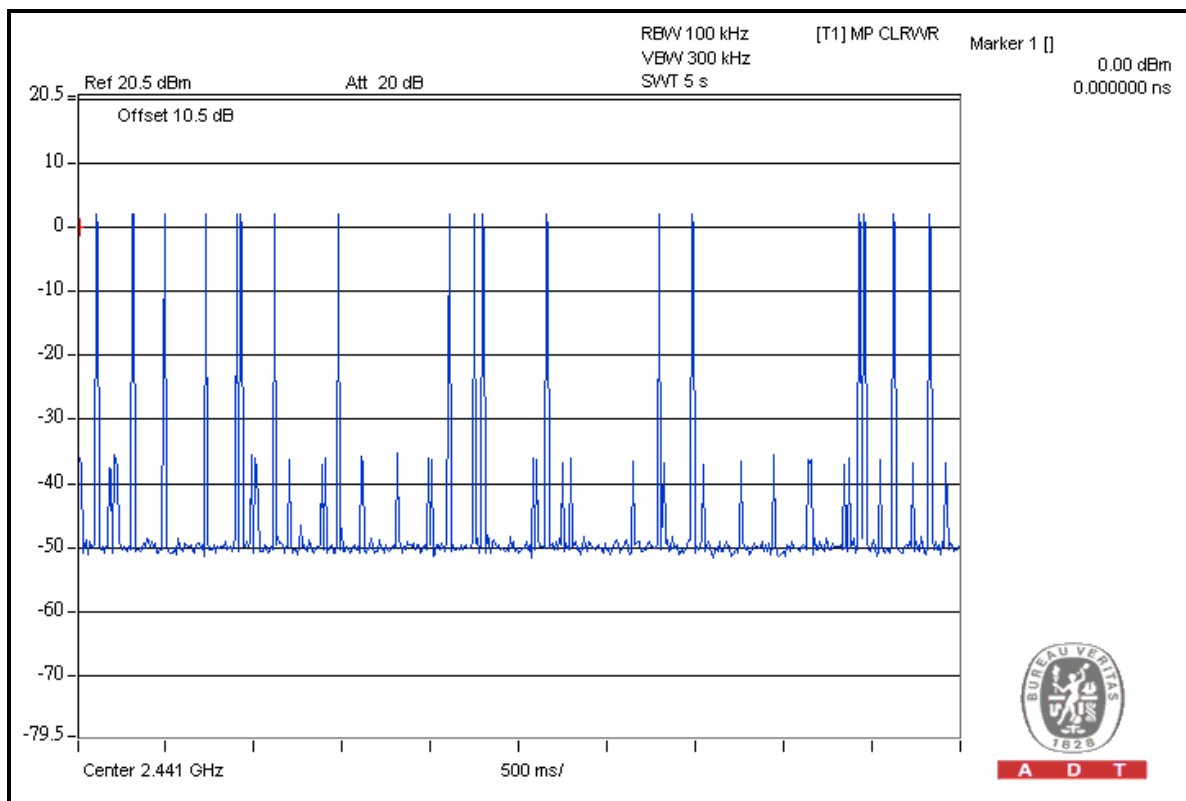
DH3





A D T

DH5





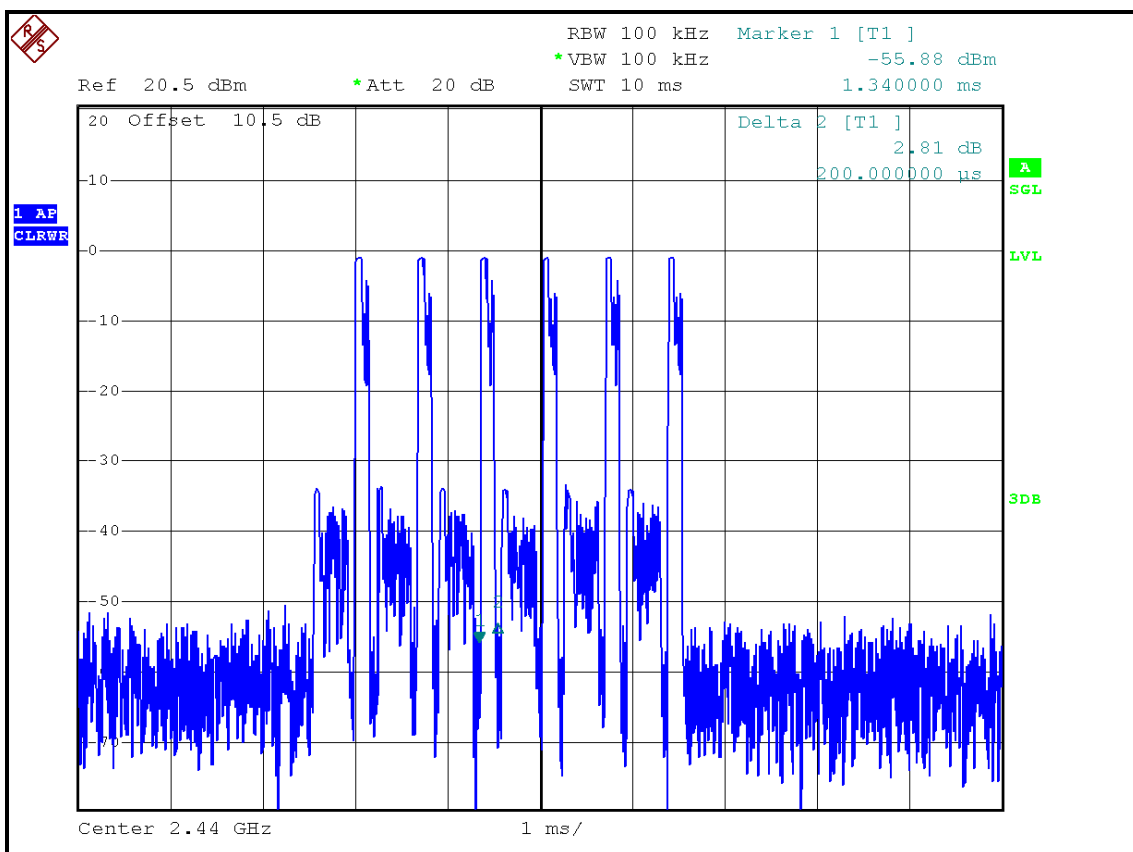
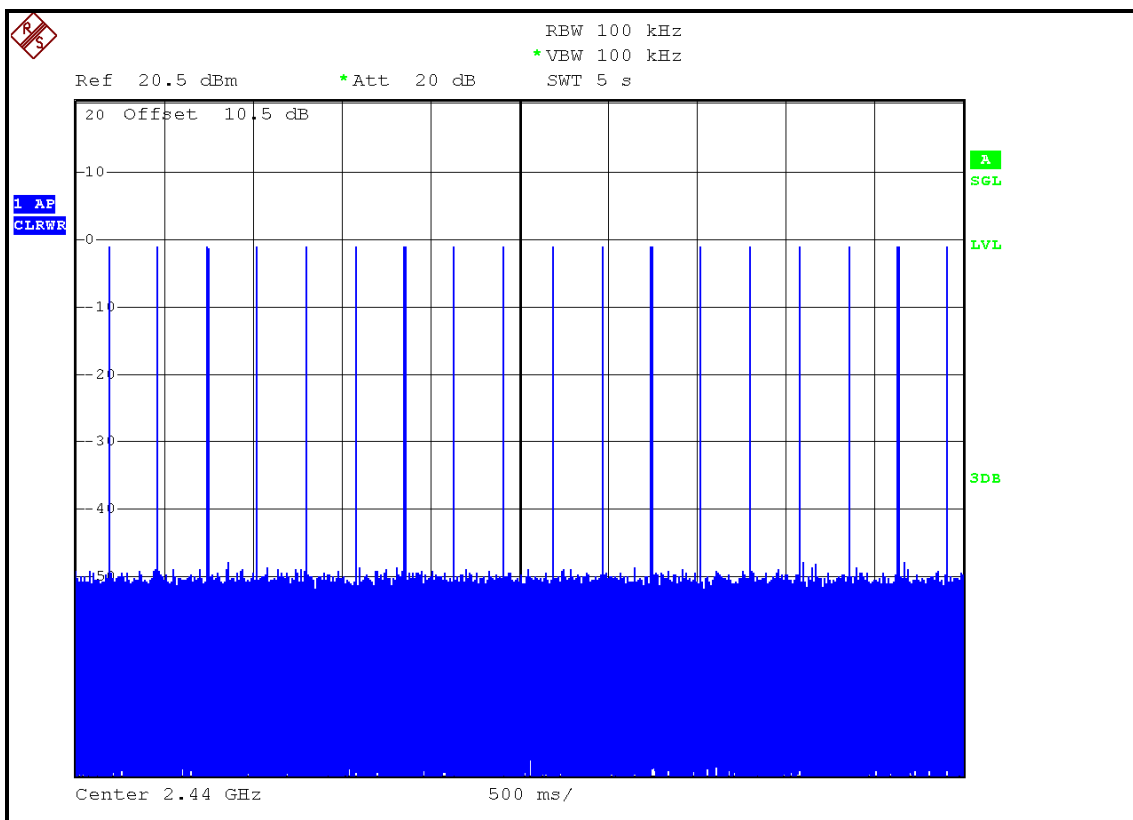
A D T

For GFSK(LE mode):

| Mode | Number of transmission in a 16 (40Hopping*0.4) | Length of transmission time (msec)* | Result (msec) | Limit (msec) |
|------|--|-------------------------------------|---------------|--------------|
| DH1 | 18 (times / 5 sec) *3.2=57.6 times | 1.2 | 69.12 | 400 |

*There are two burst signal during transmission time period.

DH1





4.5 20dB BANDWIDTH MEASUREMENT

4.5.1 LIMITS OF CHANNEL BANDWIDTH

For frequency hopping system operating in the 2400-2483.5MHz, If the two-thirds 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

Test date: Nov. 21, 2011

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|----------------------------|-----------|------------|-----------------|------------------|
| R&S Spectrum Analyzer | FSP 40 | 100060 | May 11, 2011 | May 10, 2012 |

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

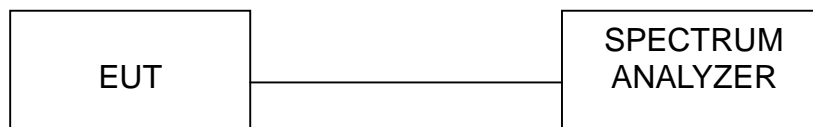
4.5.3 TEST PROCEDURE

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. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



4.5.6 EUT OPERATING CONDITION

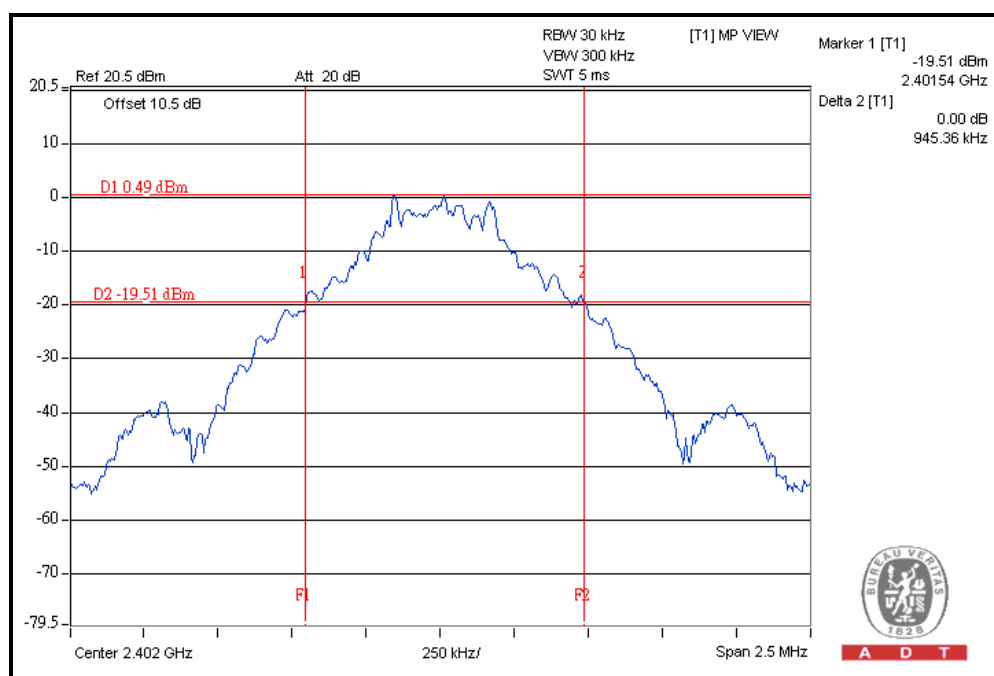
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.5.7 TEST RESULTS

For GFSK:

| CHANNEL | CHANNEL FREQUENCY (MHz) | 20dB BANDWIDTH (MHz) |
|---------|-------------------------|----------------------|
| 0 | 2402 | 0.94 |
| 39 | 2441 | 0.94 |
| 78 | 2480 | 0.94 |

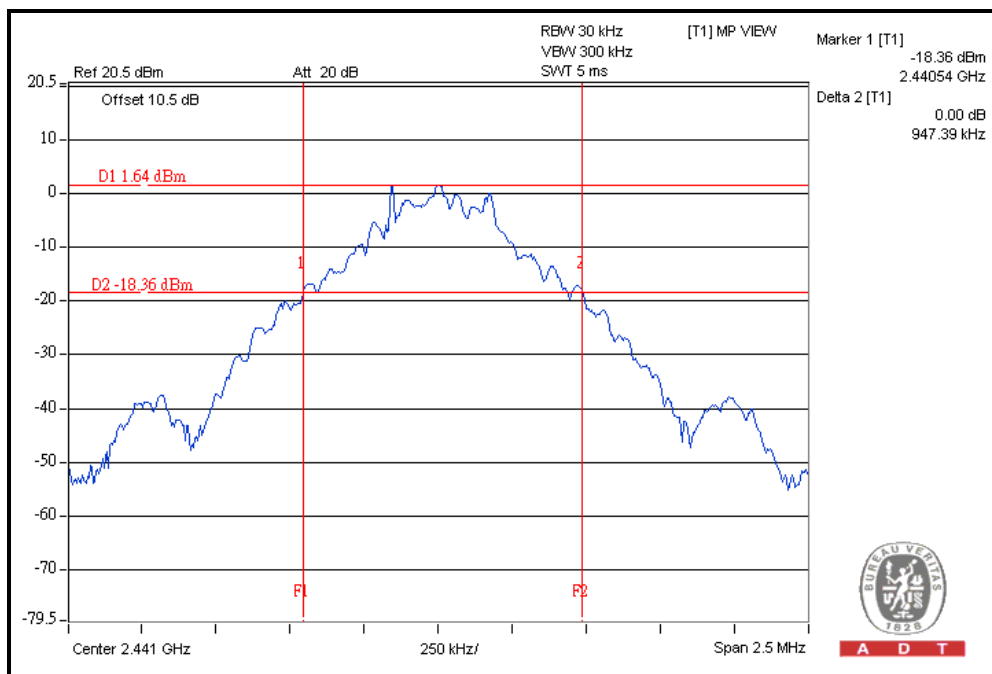
CH 0



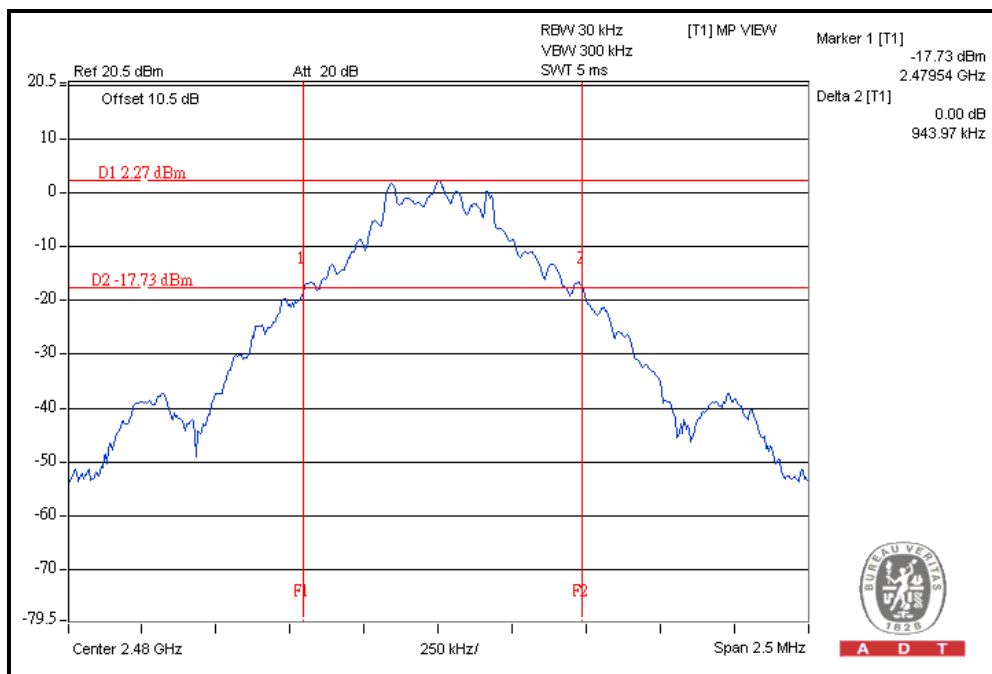


A D T

CH 39



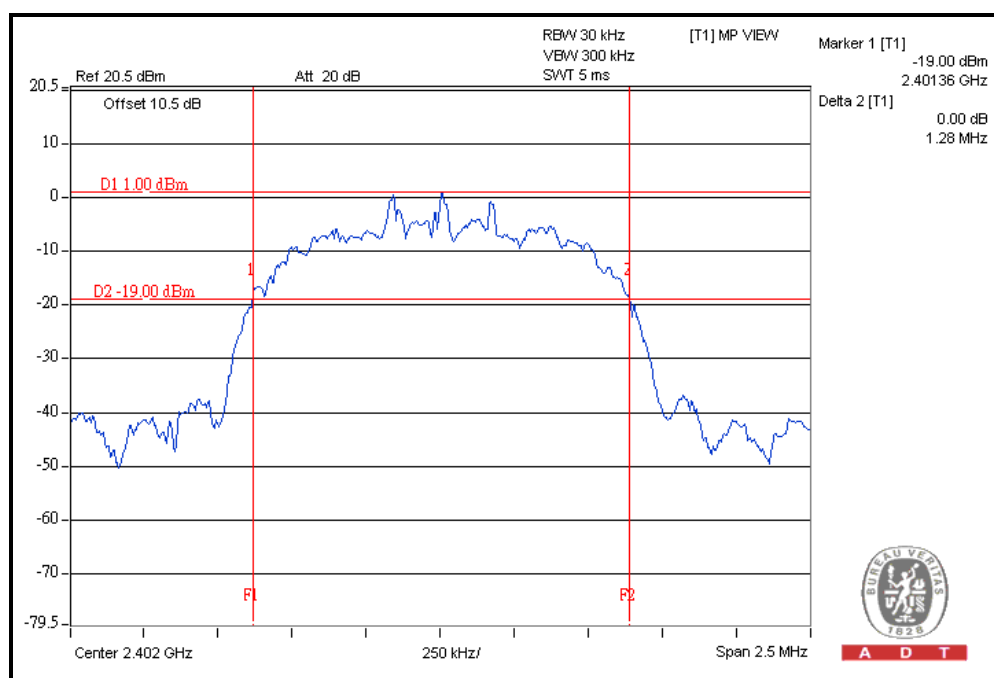
CH 78



For 8DPSK:

| CHANNEL | CHANNEL FREQUENCY (MHz) | 20dB BANDWIDTH (MHz) |
|---------|-------------------------|----------------------|
| 0 | 2402 | 1.28 |
| 39 | 2441 | 1.27 |
| 78 | 2480 | 1.29 |

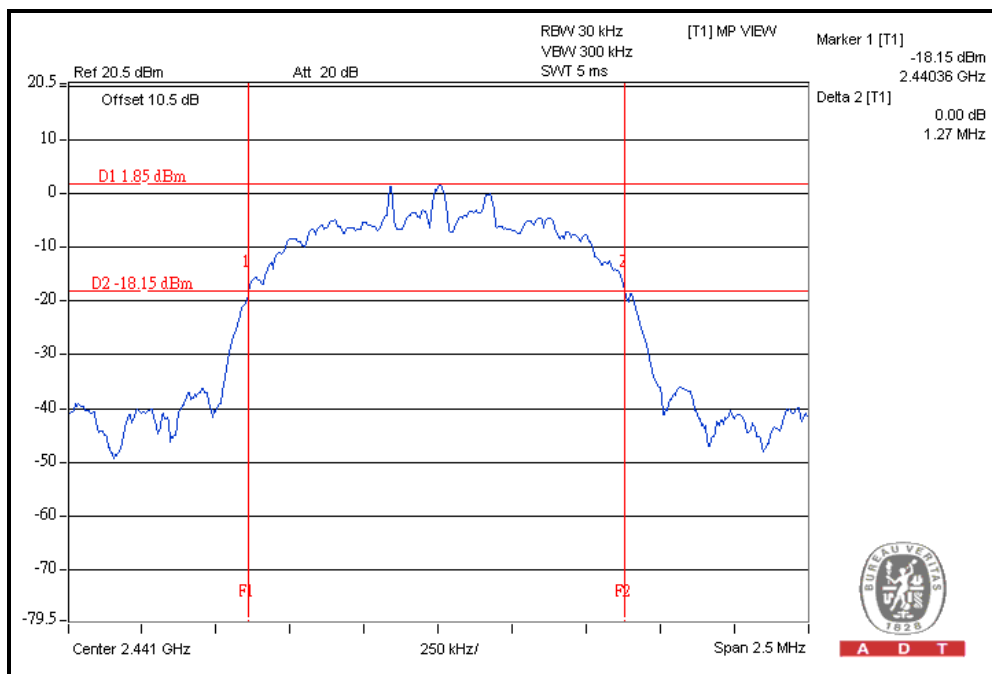
CH 0



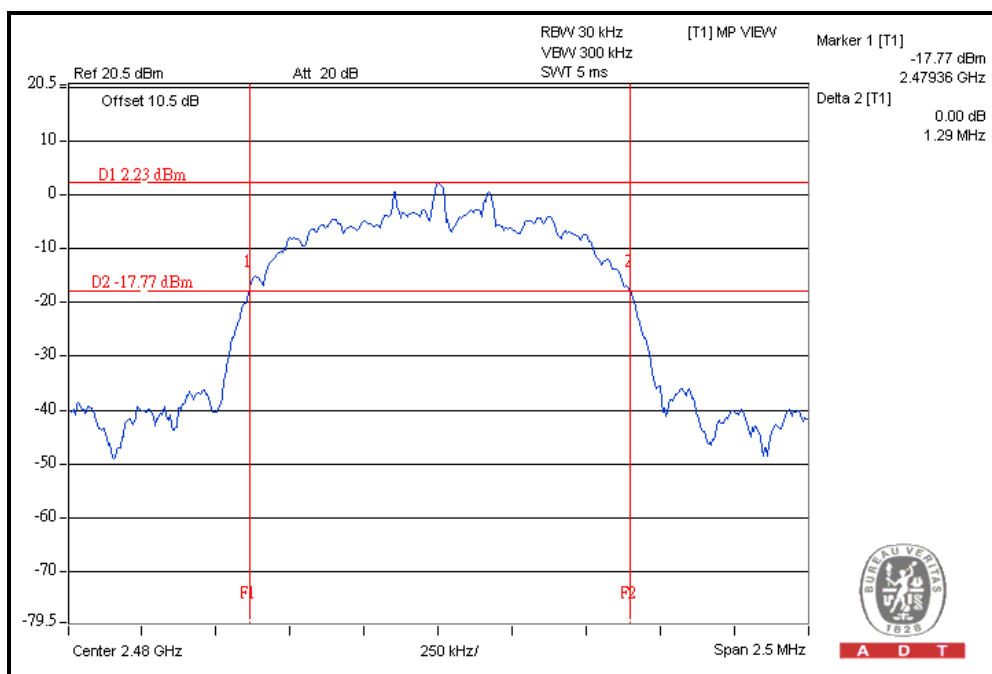


A D T

CH 39



CH 78



For GFSK(LE mode):

| CHANNEL | CHANNEL FREQUENCY (MHz) | 20dB BANDWIDTH (MHz) |
|---------|-------------------------|----------------------|
| 0 | 2402 | 1.08 |
| 19 | 2440 | 1.08 |
| 39 | 2480 | 1.08 |

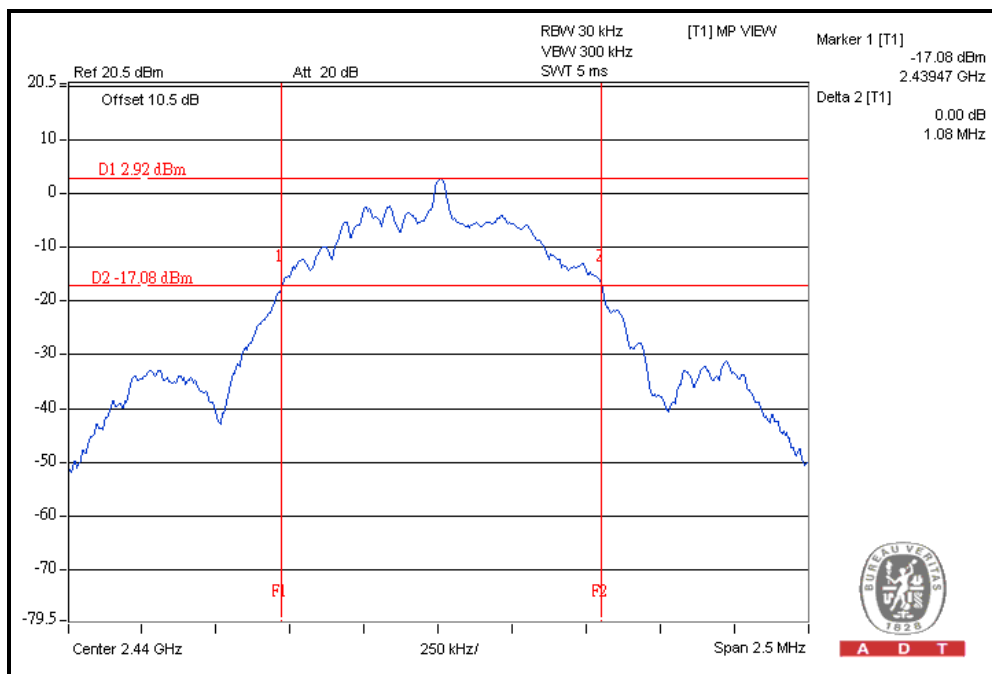
CH 0



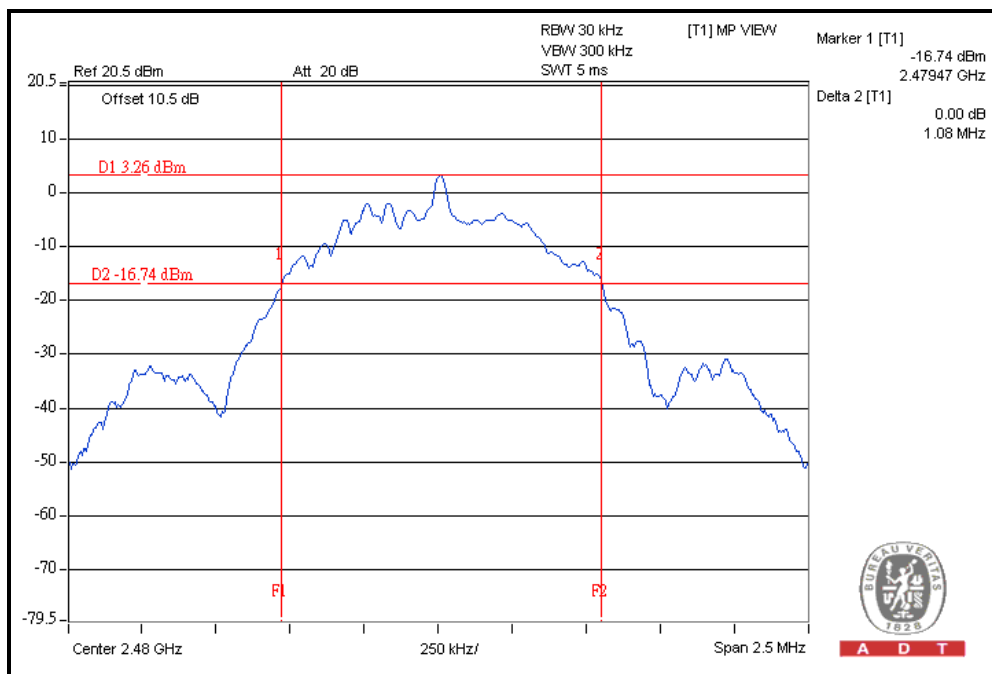


A D T

CH 19



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4.6 HOPPING CHANNEL SEPARATION

4.6.1 LIMIT OF HOPPING CHANNEL SEPARATION

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

4.6.2 TEST INSTRUMENTS

Test date: Oct. 18, 2011

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|----------------------------|-----------|------------|-----------------|------------------|
| R&S Spectrum Analyzer | FSP 40 | 100060 | May 11, 2011 | May 10, 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.

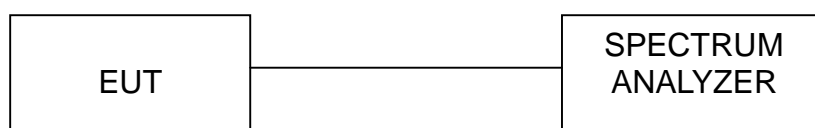


A D T

4.6.4 DEVIATION FROM TEST STANDARD

No deviation

4.6.5 TEST SETUP



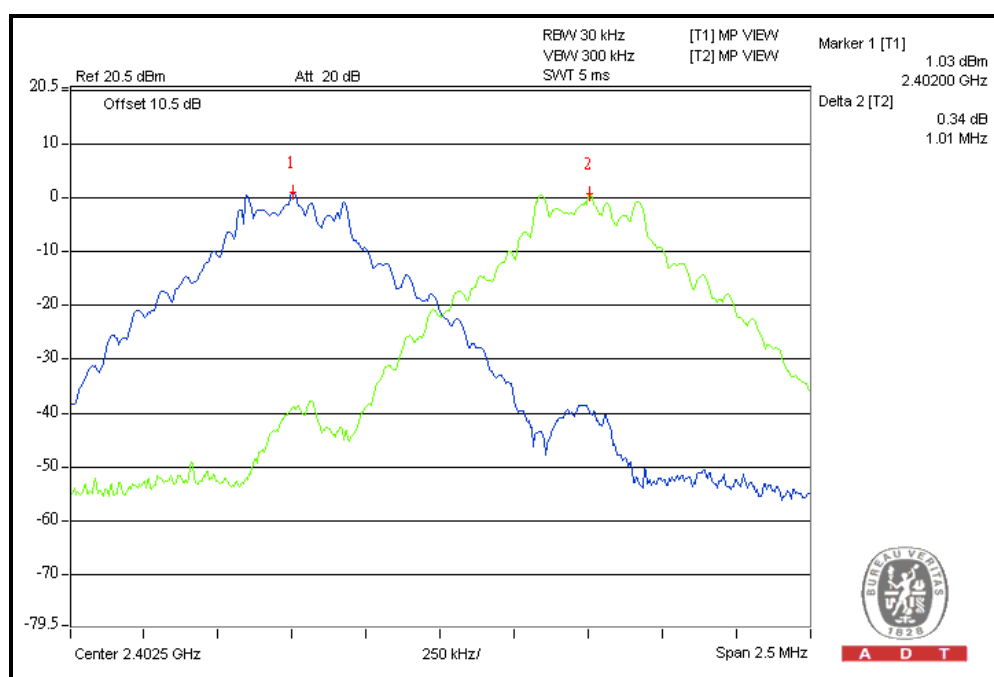
4.6.6 TEST RESULTS

For GFSK

| Channel | Frequency (MHz) | Adjacent Channel Separation (MHz) | Minimum Limit (MHz) | Pass / Fail |
|---------|-----------------|-----------------------------------|---------------------|-------------|
| 0 | 2402 | 1.010 | 0.63 | PASS |
| 39 | 2441 | 1.010 | 0.94 | PASS |
| 78 | 2480 | 1.010 | 0.94 | PASS |

NOTE: The minimum limit is two-third 20dB bandwidth.

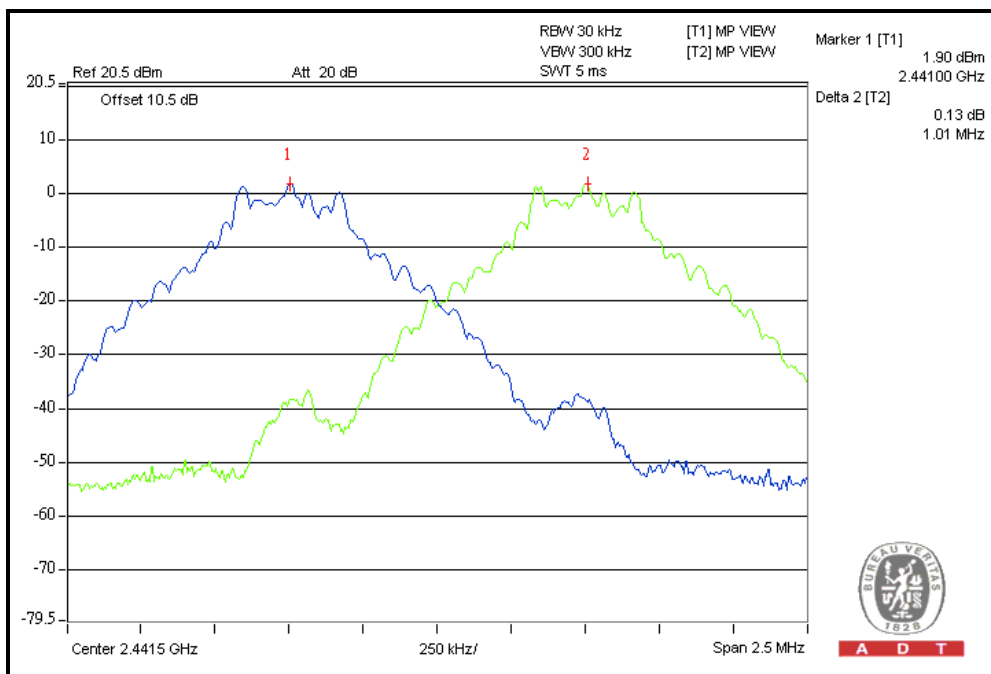
CH 0



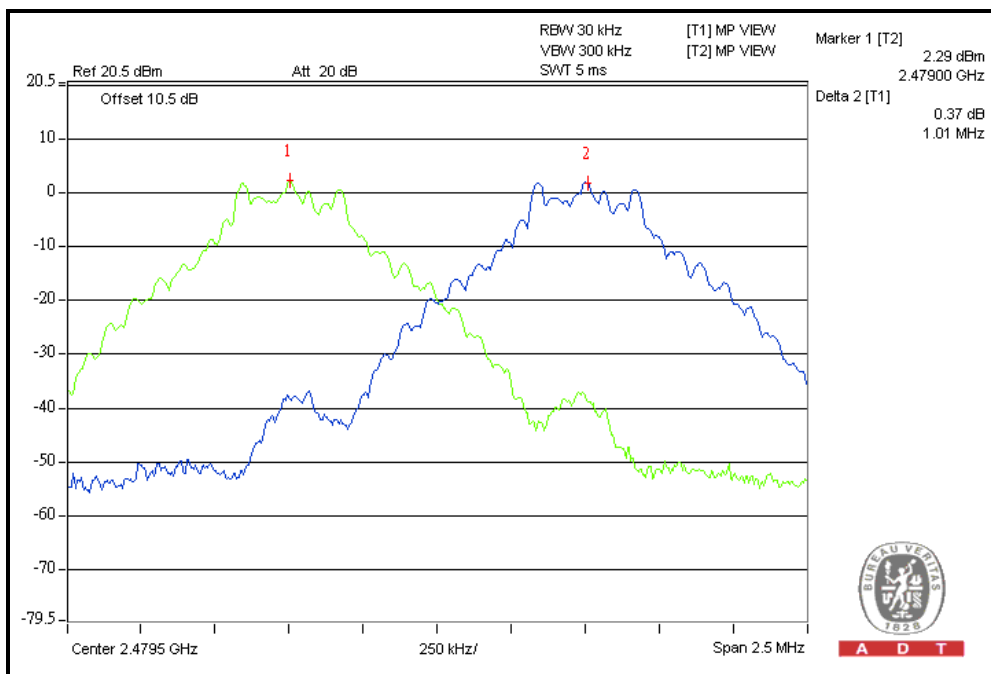


A D T

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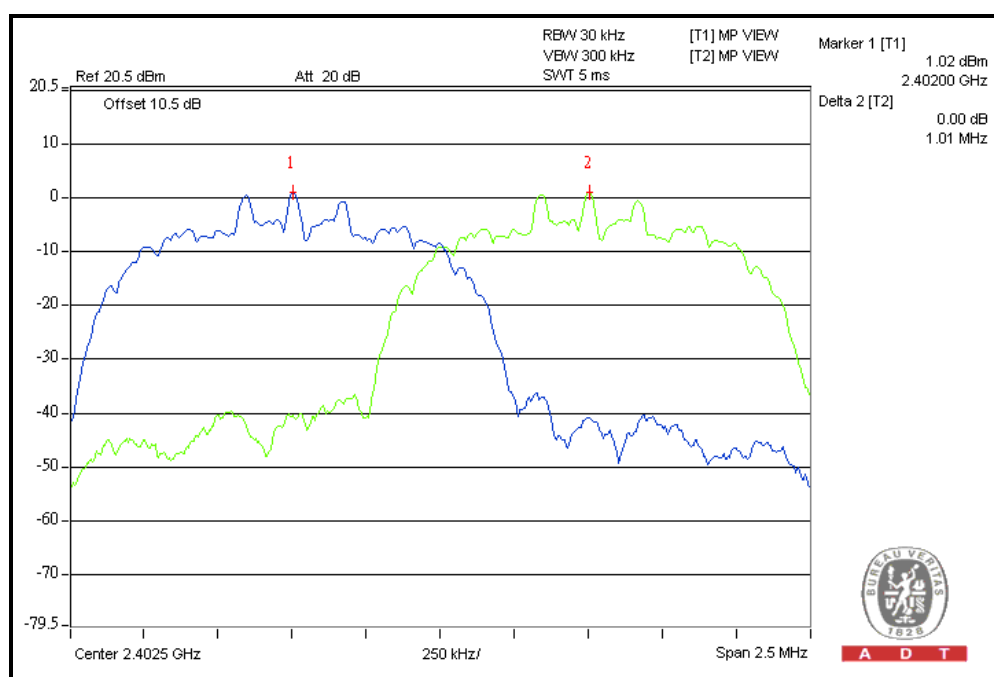
A D T

For 8DPSK

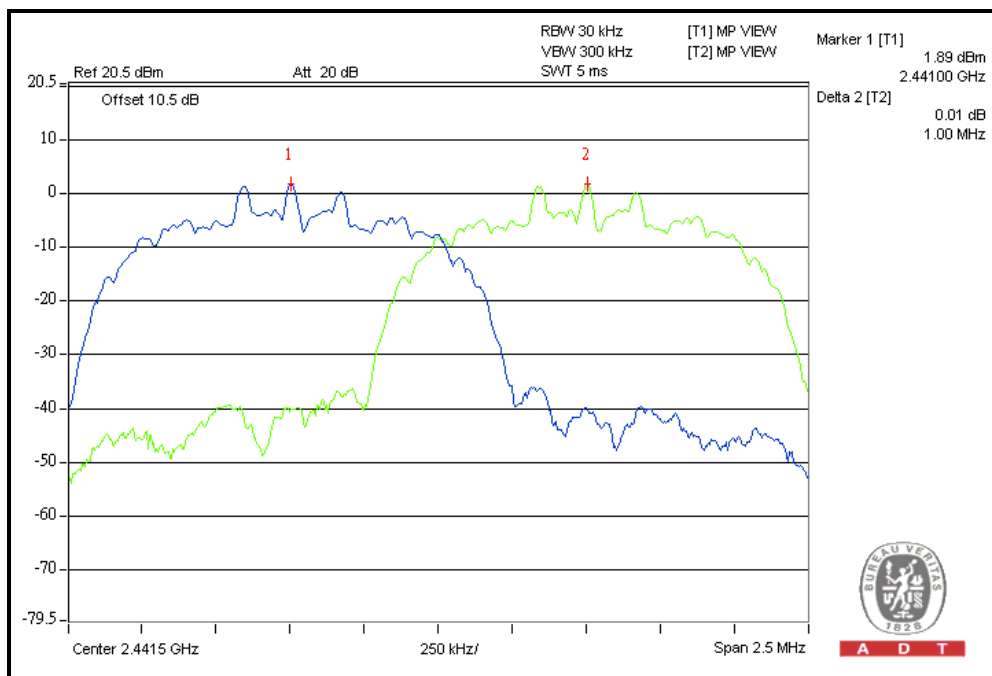
| Channel | Frequency (MHz) | Adjacent Channel Separation (MHz) | Minimum Limit (MHz) | Pass / Fail |
|---------|-----------------|-----------------------------------|---------------------|-------------|
| 0 | 2402 | 1.010 | 0.85 | PASS |
| 39 | 2441 | 1.000 | 0.85 | PASS |
| 78 | 2480 | 1.000 | 0.86 | PASS |

NOTE: The minimum limit is two-third 20dB bandwidth.

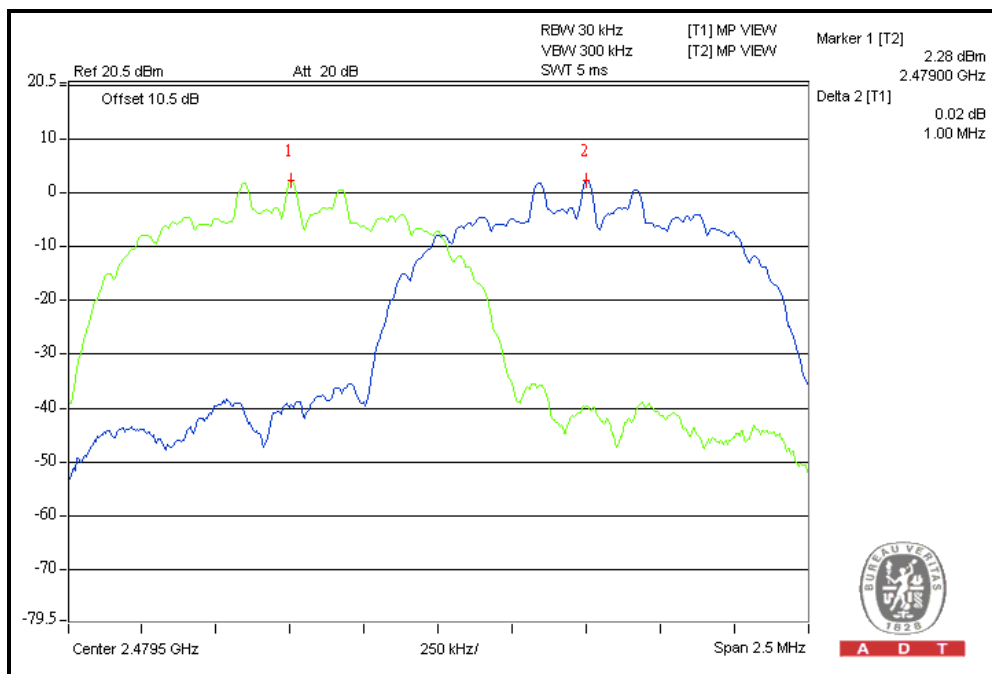
CH 0



CH 39



CH 78

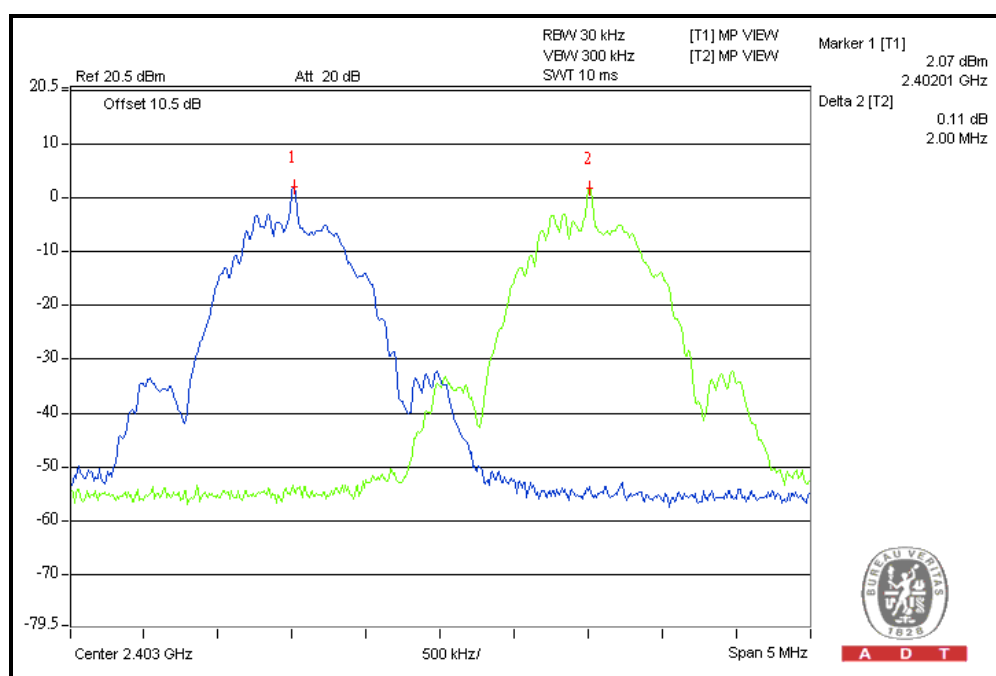


For GFSK(LE mode)

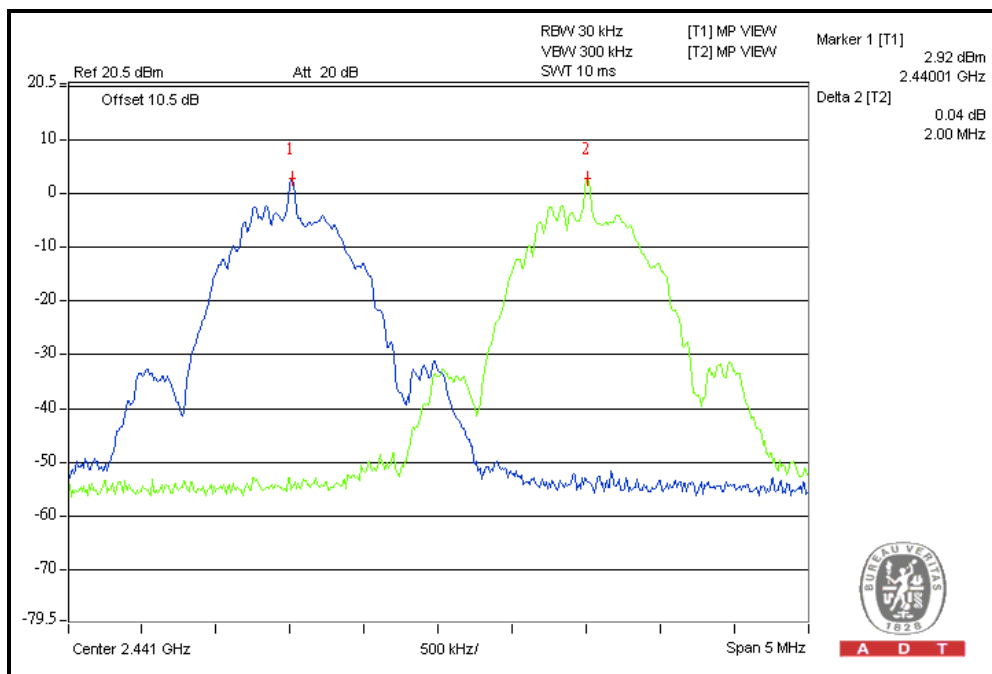
| Channel | Frequency (MHz) | Adjacent Channel Separation (MHz) | Minimum Limit (MHz) | Pass / Fail |
|---------|-----------------|-----------------------------------|---------------------|-------------|
| 0 | 2402 | 2.000 | 0.72 | PASS |
| 19 | 2440 | 2.000 | 0.72 | PASS |
| 39 | 2480 | 2.010 | 0.72 | PASS |

NOTE: The minimum limit is two-third 20dB bandwidth.

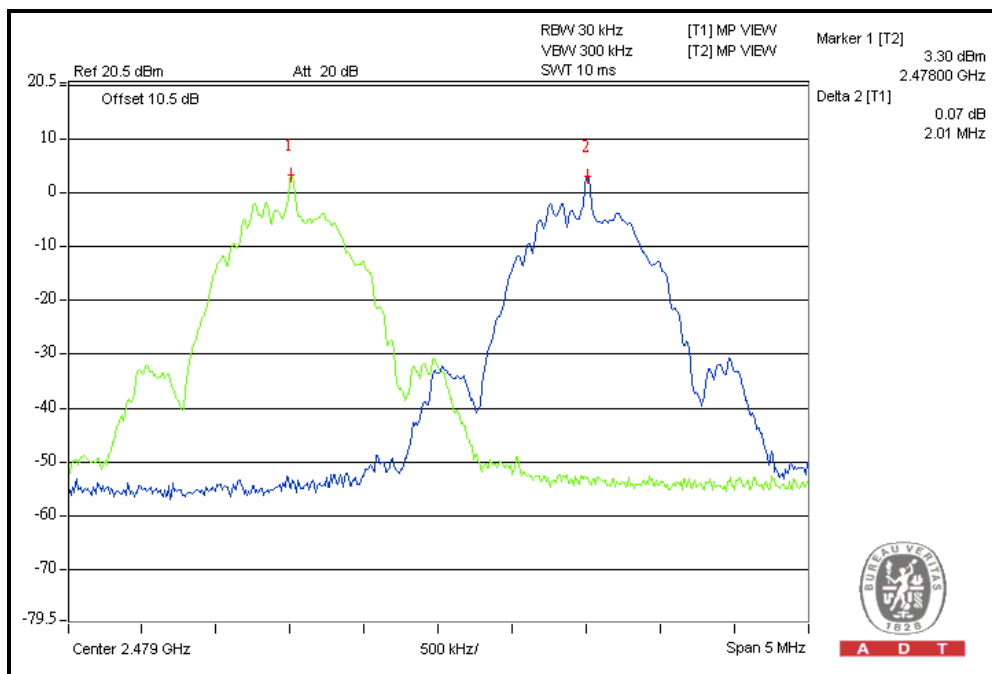
CH 0



CH 39



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4.7 MAXIMUM PEAK OUTPUT POWER

4.7.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Limit is 125mW.

4.7.2 INSTRUMENTS

Test date: Nov. 04, 2011

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|----------------------------|-----------|------------|-----------------|------------------|
| R&S Spectrum Analyzer | FSP 40 | 100060 | May 11, 2011 | May 10, 2012 |

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

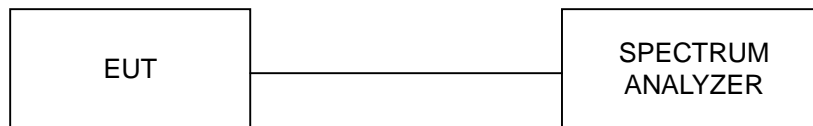
4.7.3 TEST PROCEDURES

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. Set a reference level on the measuring instrument equal to the highest peak value.
3. The center frequency of the spectrum analyzer is set to the fundamental frequency and using 3 MHz RBW and 10 MHz VBW.
4. Measure the captured power within the band and recording the plot.
5. Repeat above procedures until all frequencies measured were complete.

4.7.4 DEVIATION FROM TEST STANDARD

No deviation

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

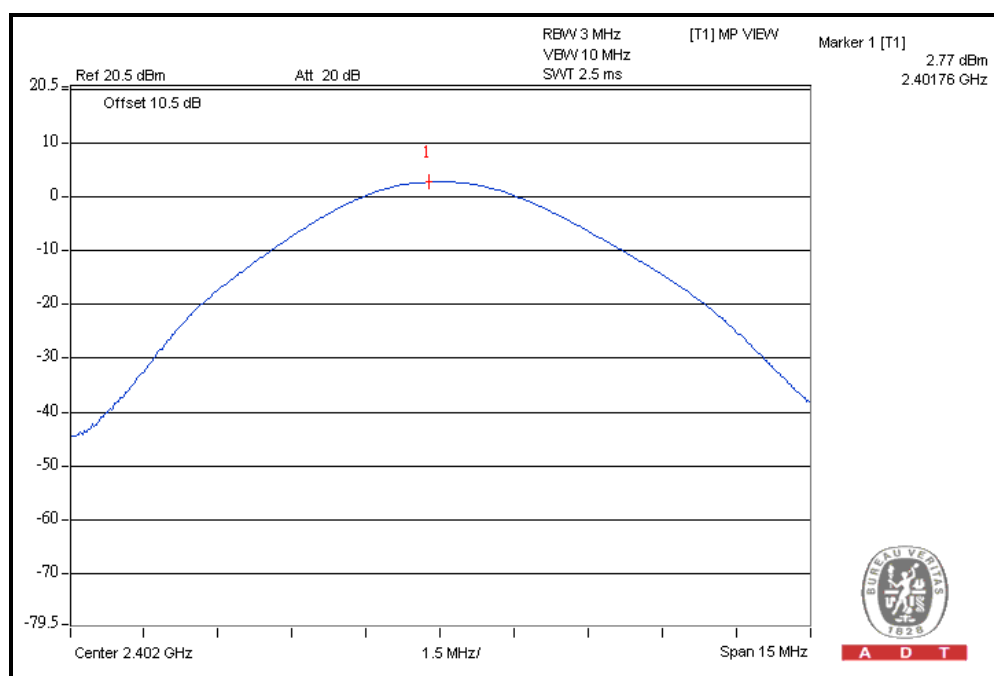
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.7.7 TEST RESULTS

For GFSK

| CHANNEL | CHANNEL FREQUENCY (MHz) | POWER OUTPUT (dBm) | POWER OUTPUT (mW) | POWER LIMIT (mW) | PASS/FAIL |
|---------|-------------------------|--------------------|-------------------|------------------|-----------|
| 0 | 2402 | 2.8 | 1.9 | 125 | PASS |
| 39 | 2441 | 3.4 | 2.2 | 125 | PASS |
| 78 | 2480 | 4.0 | 2.5 | 125 | PASS |

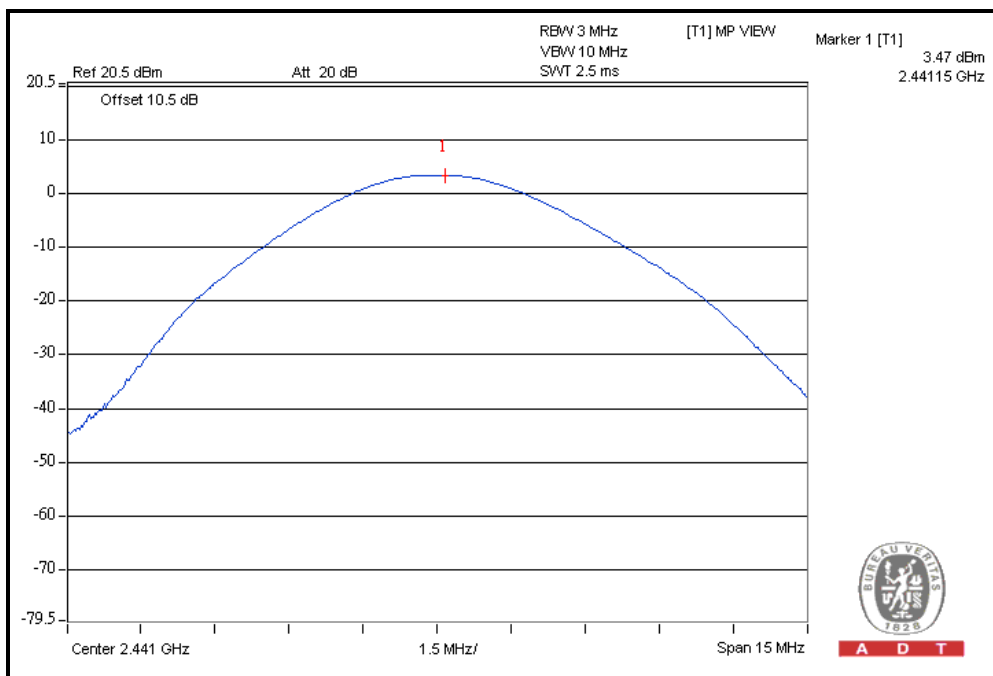
CH 0



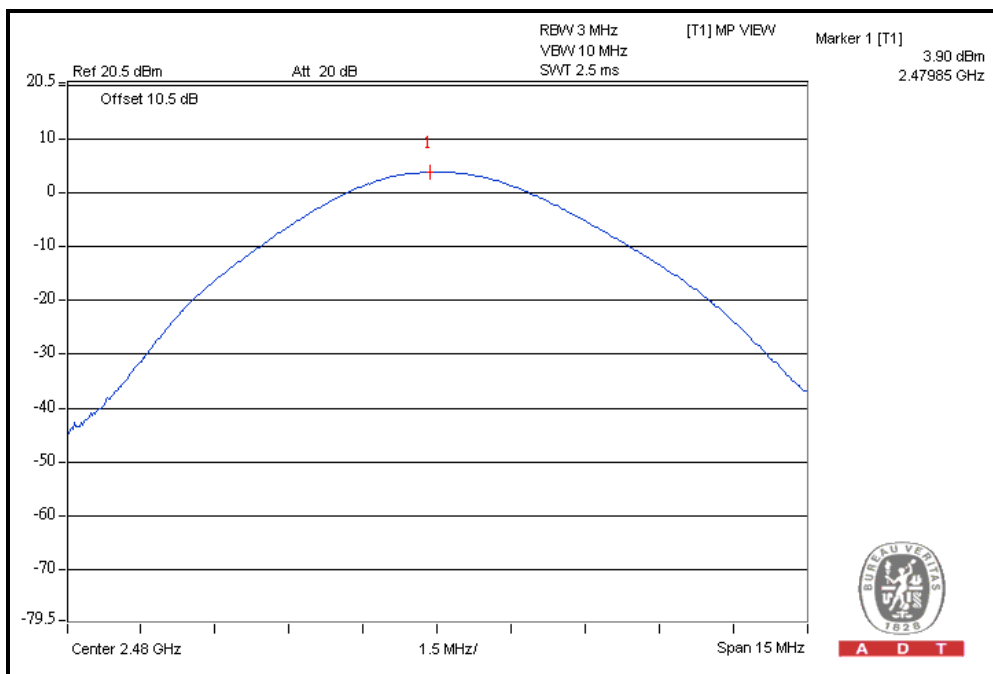


A D T

CH 39



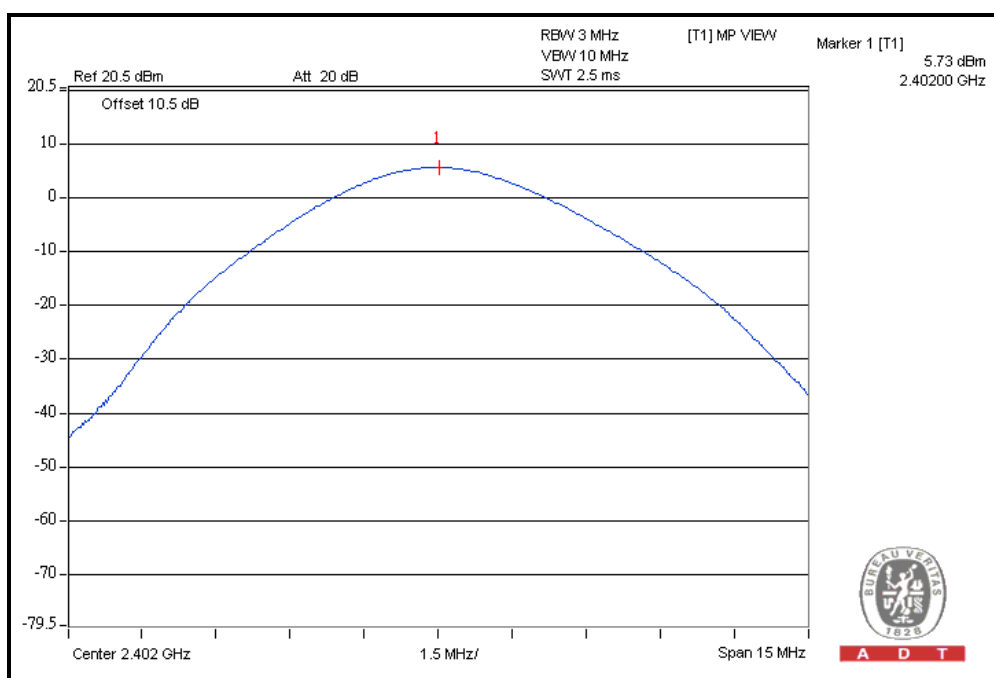
CH 78



For 8DPSK

| CHANNEL | CHANNEL FREQUENCY (MHz) | POWER OUTPUT (dBm) | POWER OUTPUT (mW) | POWER LIMIT (mW) | PASS/FAIL |
|---------|-------------------------------|--------------------------|-------------------------|---------------------|-----------|
| 0 | 2402 | 5.7 | 3.7 | 125 | PASS |
| 39 | 2441 | 6.4 | 4.4 | 125 | PASS |
| 78 | 2480 | 6.8 | 4.8 | 125 | PASS |

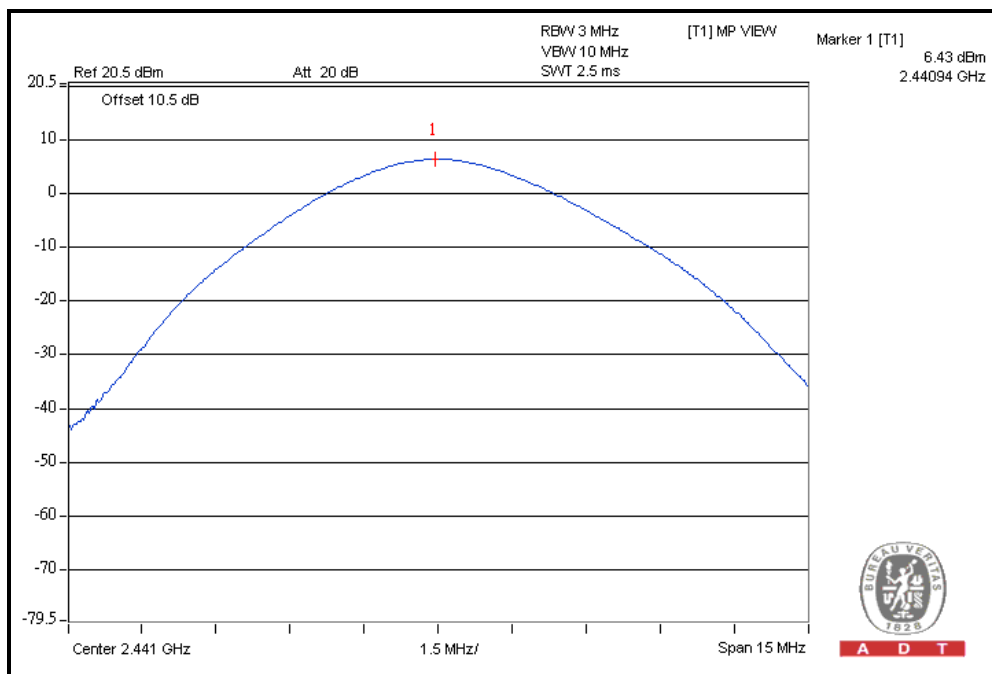
CH 0



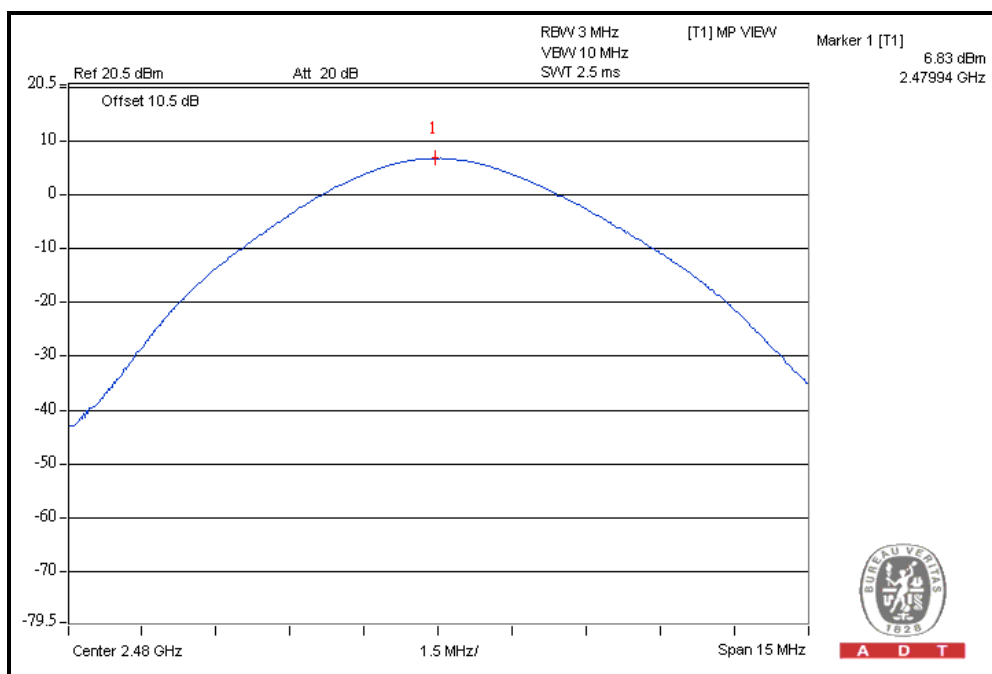


A D T

CH 39



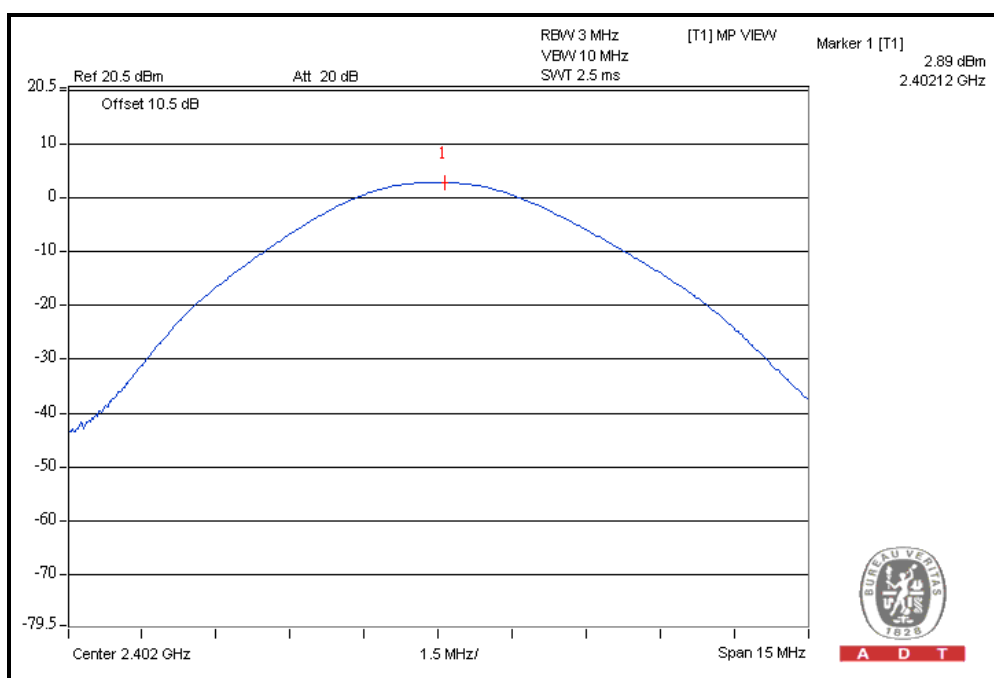
CH 78



For GFSK(LE mode)

| CHANNEL | CHANNEL FREQUENCY (MHz) | POWER OUTPUT (dBm) | POWER OUTPUT (mW) | POWER LIMIT (mW) | PASS/FAIL |
|---------|-------------------------|--------------------|-------------------|------------------|-----------|
| 0 | 2402 | 3.0 | 2.0 | 125 | PASS |
| 19 | 2440 | 3.6 | 2.3 | 125 | PASS |
| 39 | 2480 | 4.0 | 2.5 | 125 | PASS |

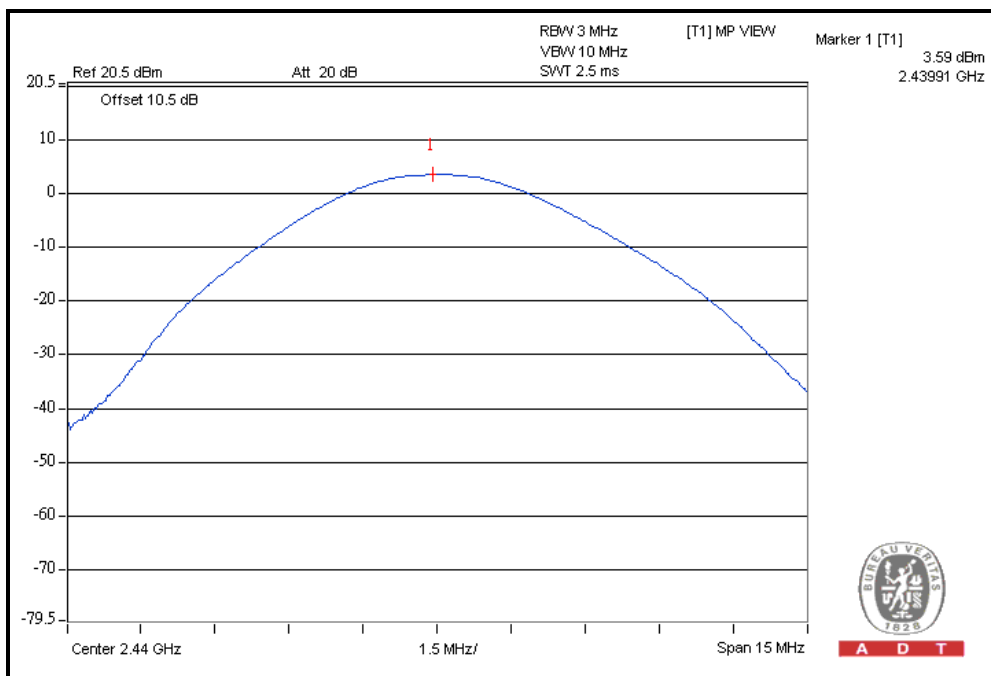
CH 0



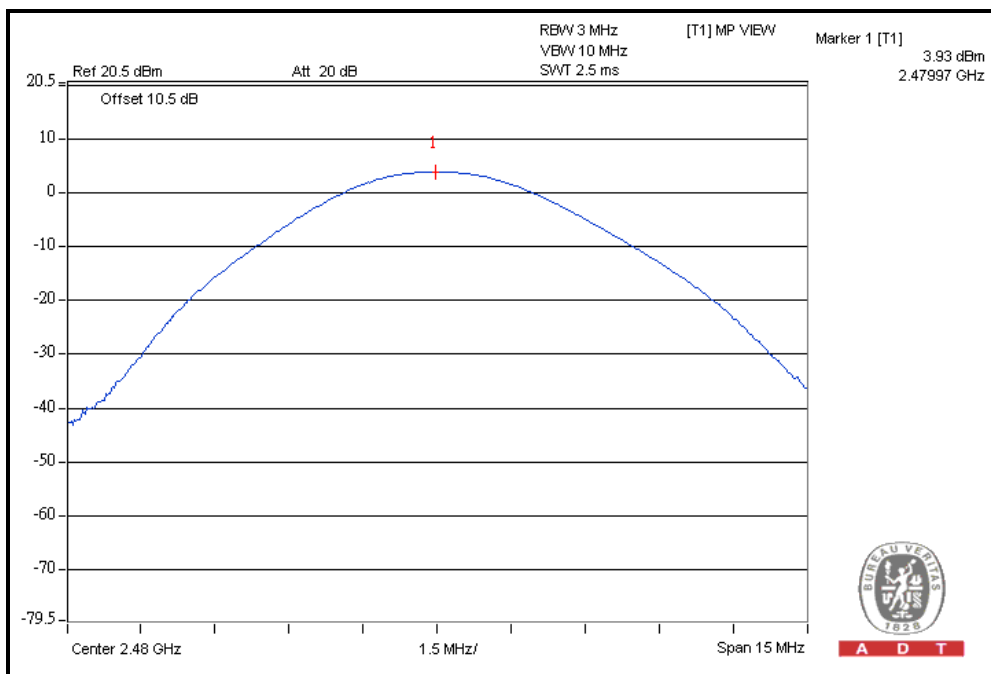


A D T

CH 19



CH 39



4.8 AVERAGE OUTPUT POWER

4.8.1 FOR REFERENCE.

4.8.2 INSTRUMENTS

Test date: Nov. 18, 2011

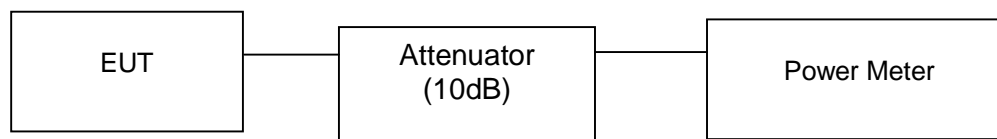
| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|----------------------------|-----------|------------|-----------------|------------------|
| Peak Power Meter | ML2495A | 0824006 | May 04, 2011 | May 03, 2012 |
| Power Sensor | MA2411B | 0738172 | May 03, 2011 | May 02, 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 PROCEDURES

1. The transmitter output was connected to the power meter through an attenuator, the bandwidth of the fundamental frequency was measured with the power meter.
2. Record the average power level.

4.8.4 TEST SETUP



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.

4.8.6 TEST RESULTS

For GFSK

| CHANNEL | CHANNEL FREQUENCY (MHz) | AVERAGE POWER OUTPUT (dBm) |
|---------|-------------------------|----------------------------|
| 0 | 2402 | 3.0 |
| 39 | 2441 | 3.6 |
| 78 | 2480 | 4.1 |

For 8DPSK

| CHANNEL | CHANNEL FREQUENCY (MHz) | AVERAGE POWER OUTPUT (dBm) |
|---------|-------------------------|----------------------------|
| 0 | 2402 | 3.2 |
| 39 | 2441 | 3.9 |
| 78 | 2480 | 4.4 |

For GFSK(LE mode)

| CHANNEL | CHANNEL FREQUENCY (MHz) | AVERAGE POWER OUTPUT (dBm) |
|---------|-------------------------|----------------------------|
| 0 | 2402 | 2.9 |
| 19 | 2440 | 3.6 |
| 39 | 2480 | 4.1 |

4.9 CONDUCTED OUT-BAND EMISSION MEASUREMENT

4.8.1 LIMITS OF CONDUCTED OUT-BAND EMISSION MEASUREMENT

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

4.8.2 TEST INSTRUMENTS

Test date: Nov. 04, 2011

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|----------------------------|-----------|------------|-----------------|------------------|
| R&S Spectrum Analyzer | FSP 40 | 100060 | May 11, 2011 | May 10, 2012 |

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

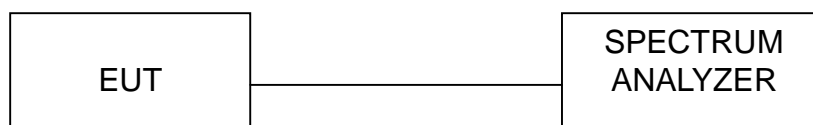
4.8.3 TEST PROCEDURE

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

4.8.4 DEVIATION FROM TEST STANDARD

No deviation

4.9.1 TEST SETUP



4.8.5 EUT OPERATING CONDITION

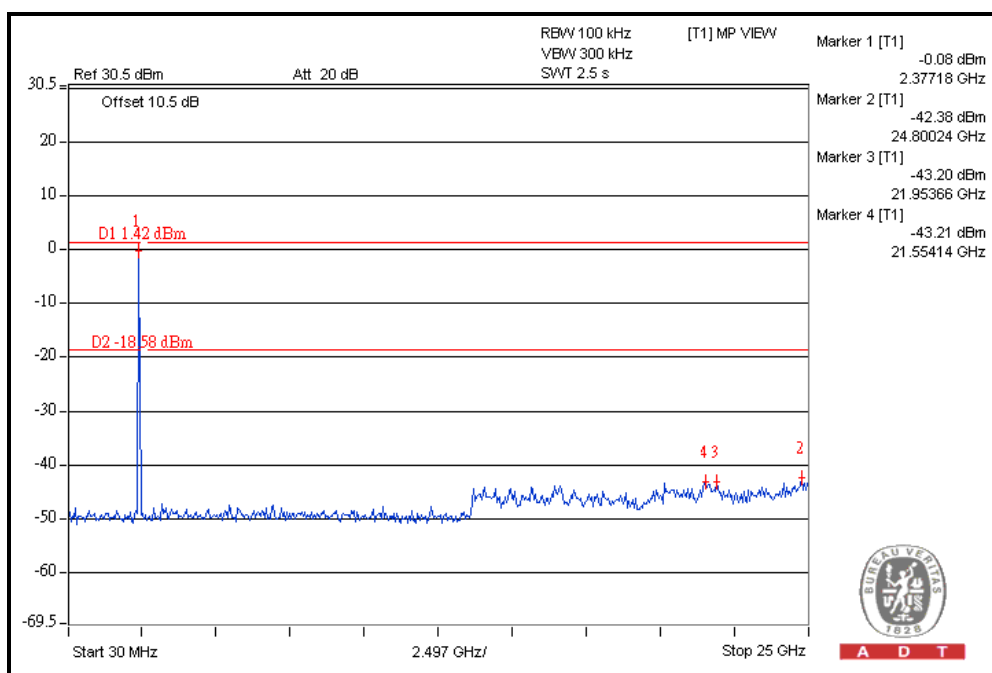
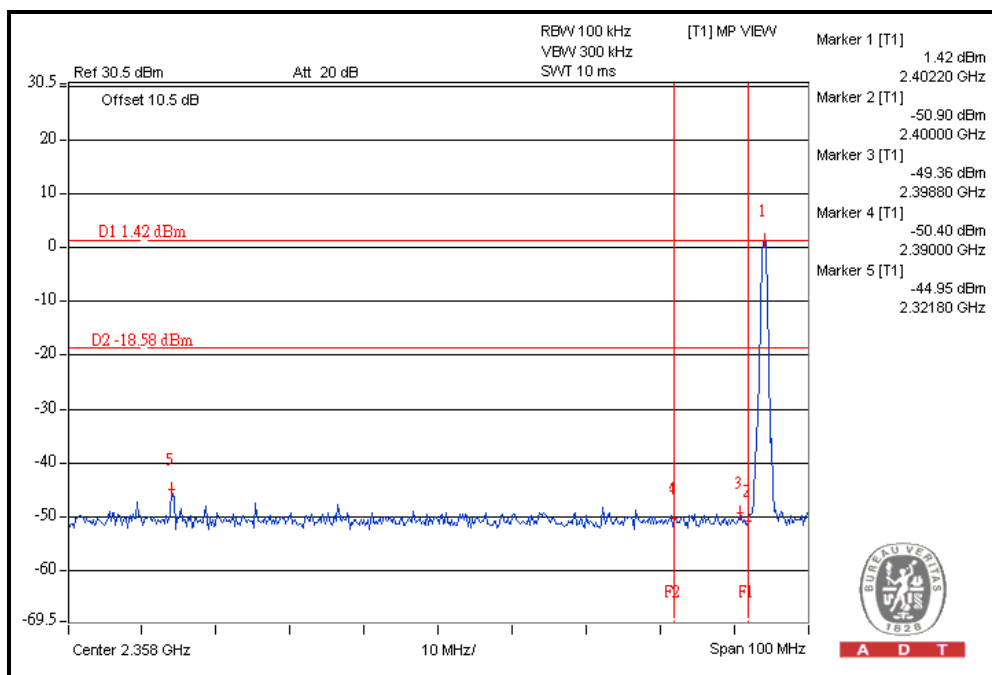
The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

4.8.6 TEST RESULTS

Emissions radiated outside of the specified frequency bands, please refer following pages for met the requirement of the general radiated emission limits in § 15.209.

For GFSK Modulation Type:

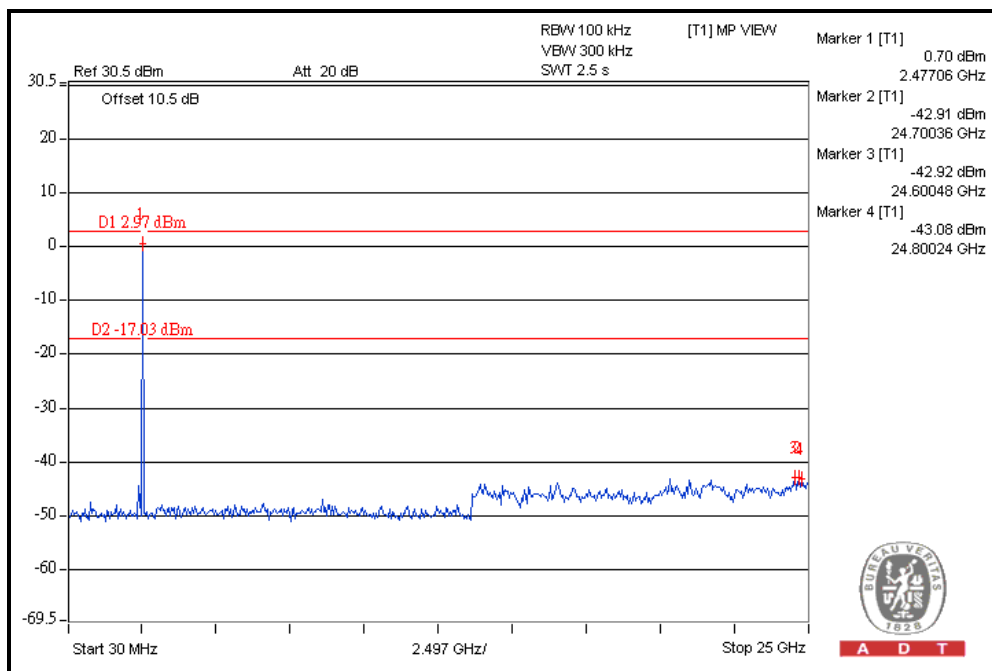
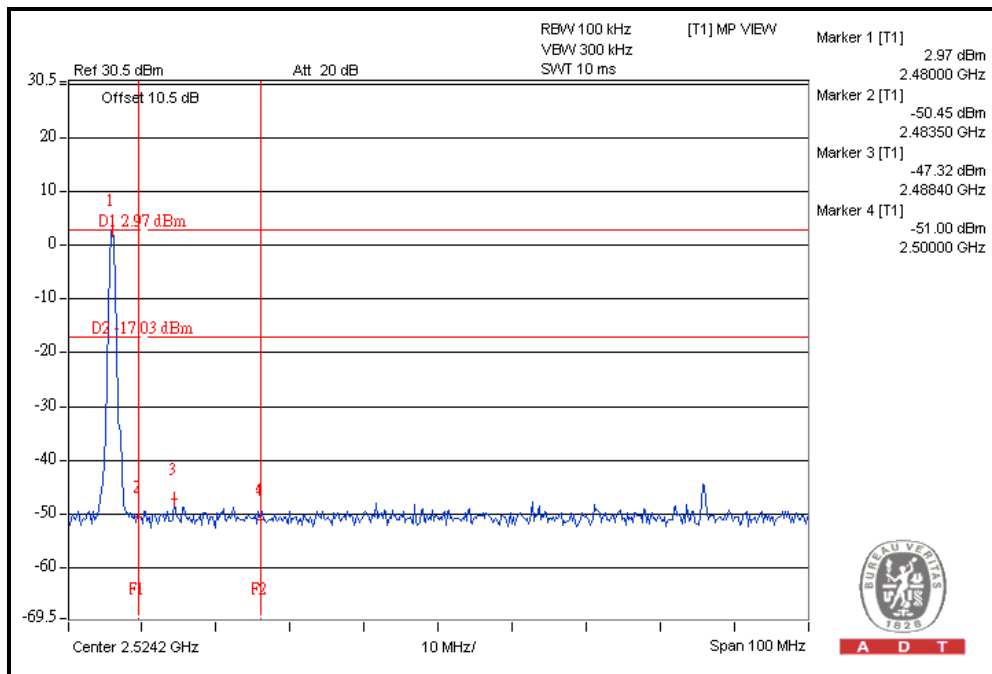
CH 0





A D T

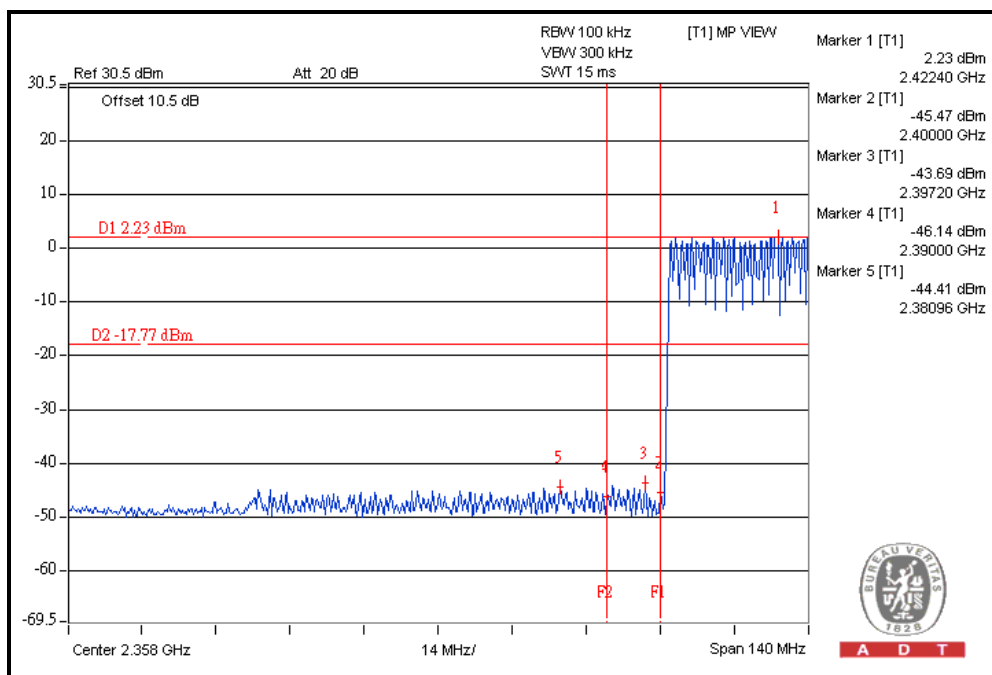
CH 78





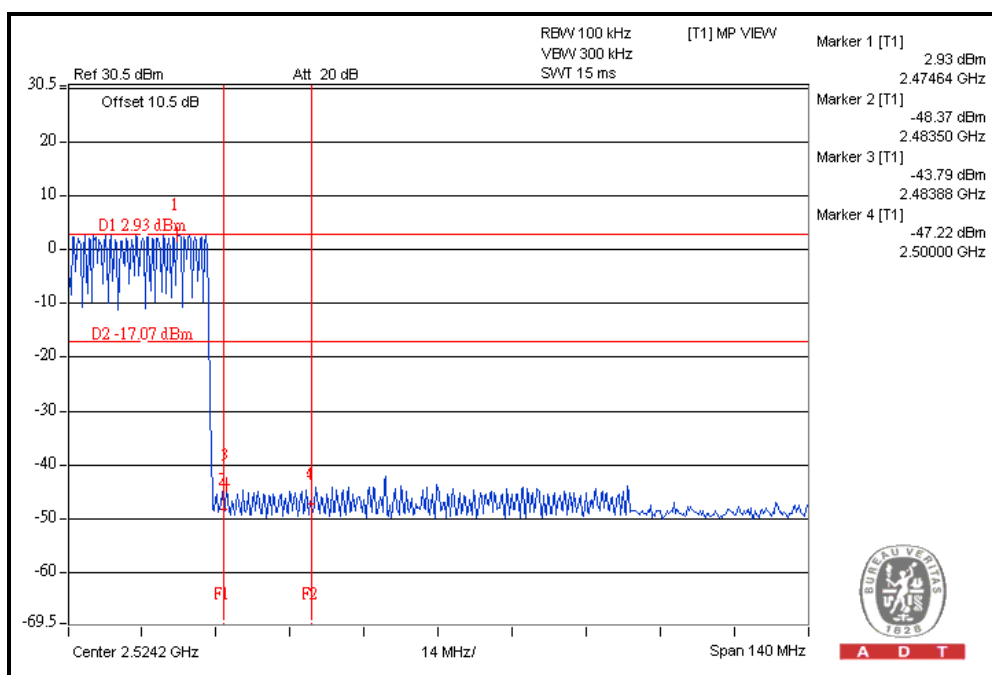
A D T

CH 0



A D T

CH 78



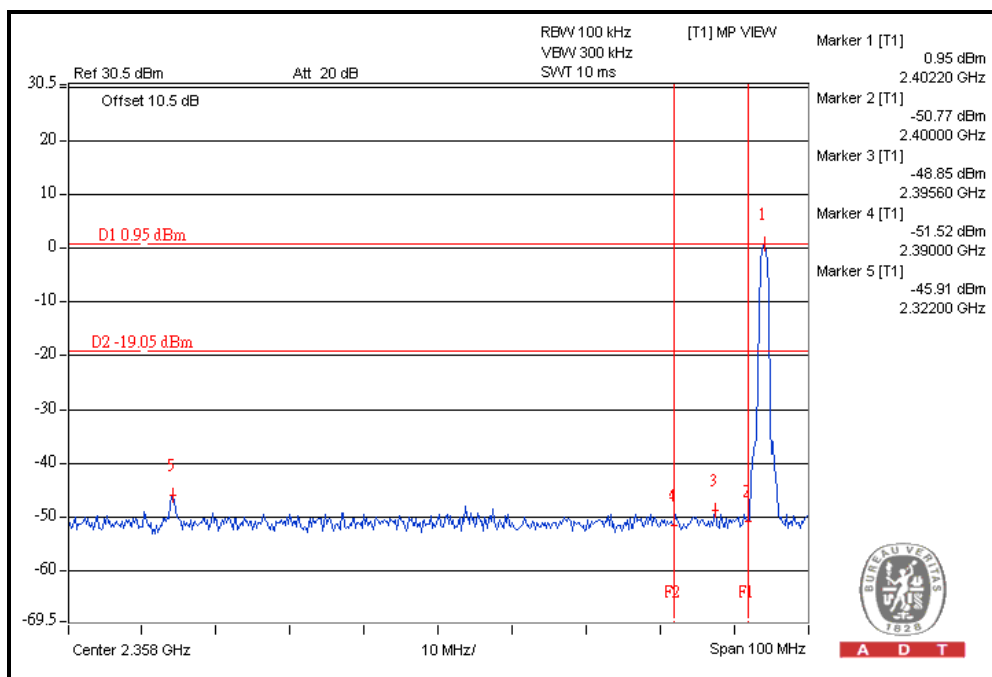
A D T



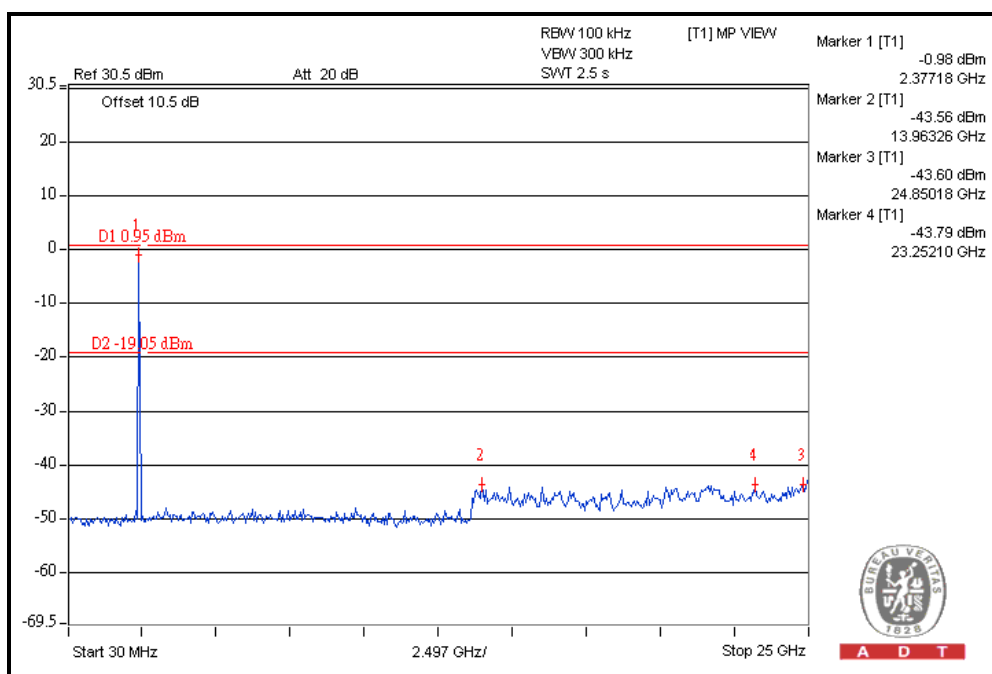
A D T

For 8DPSK Modulation Type:

CH 0



A D T

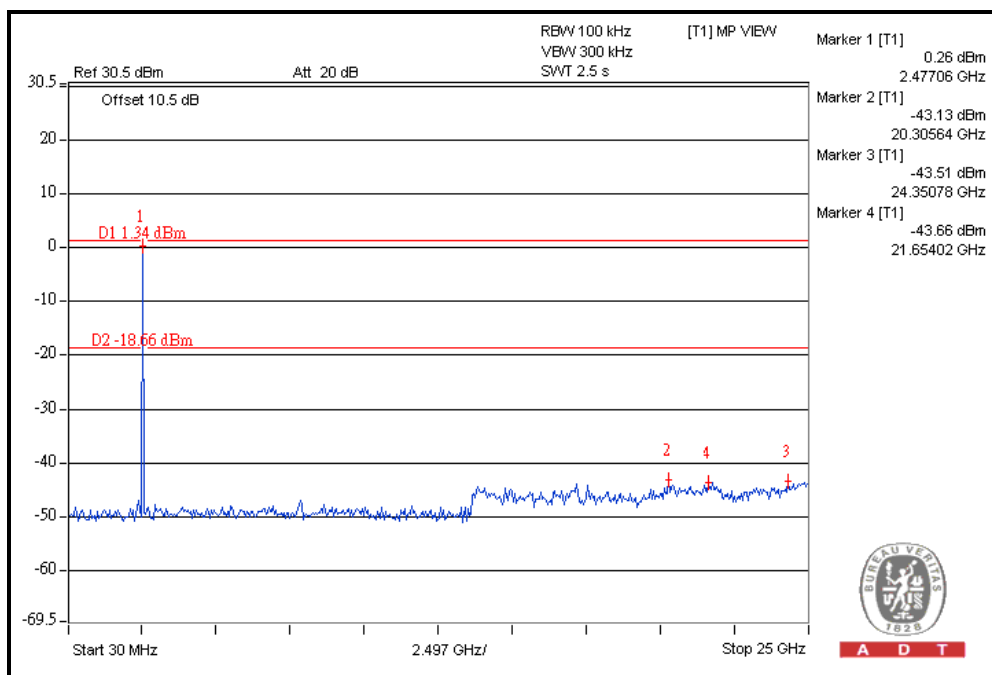
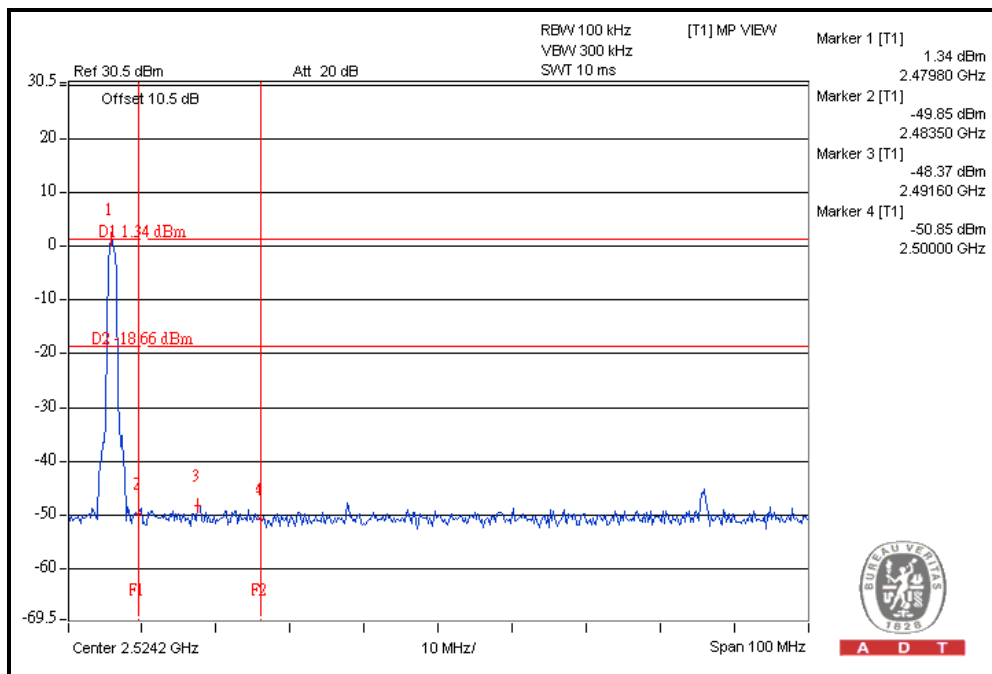


A D T



A D T

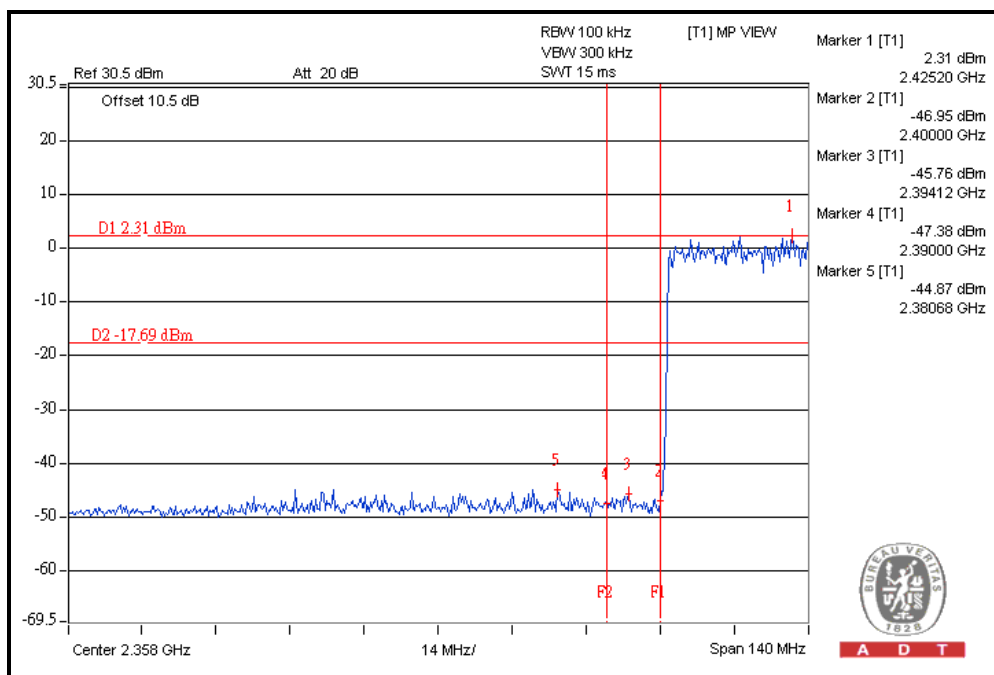
CH 78



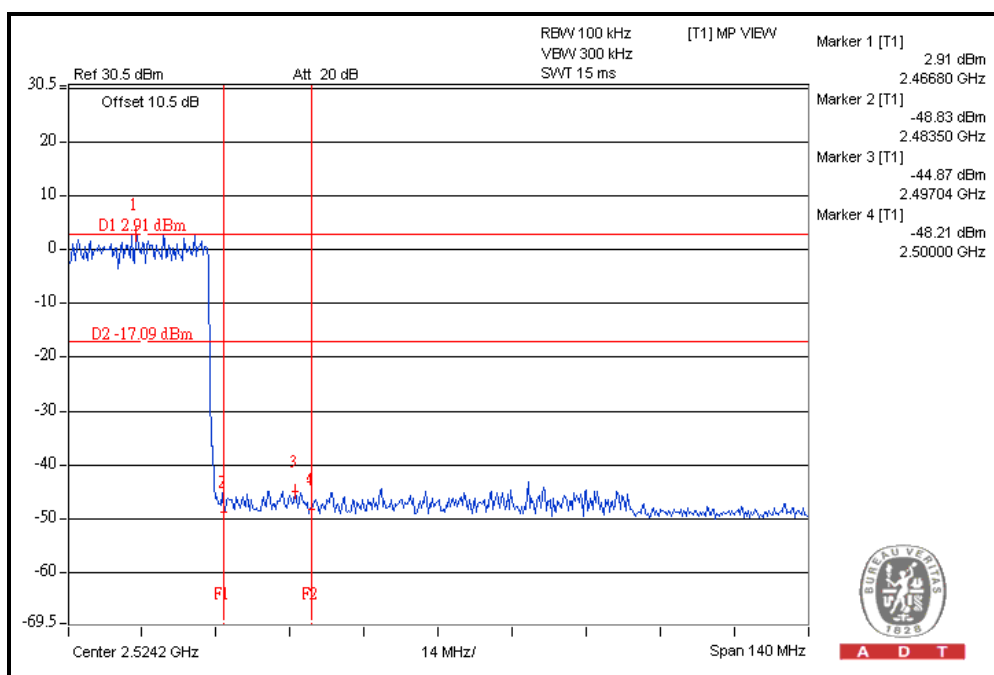


A D T

CH 0



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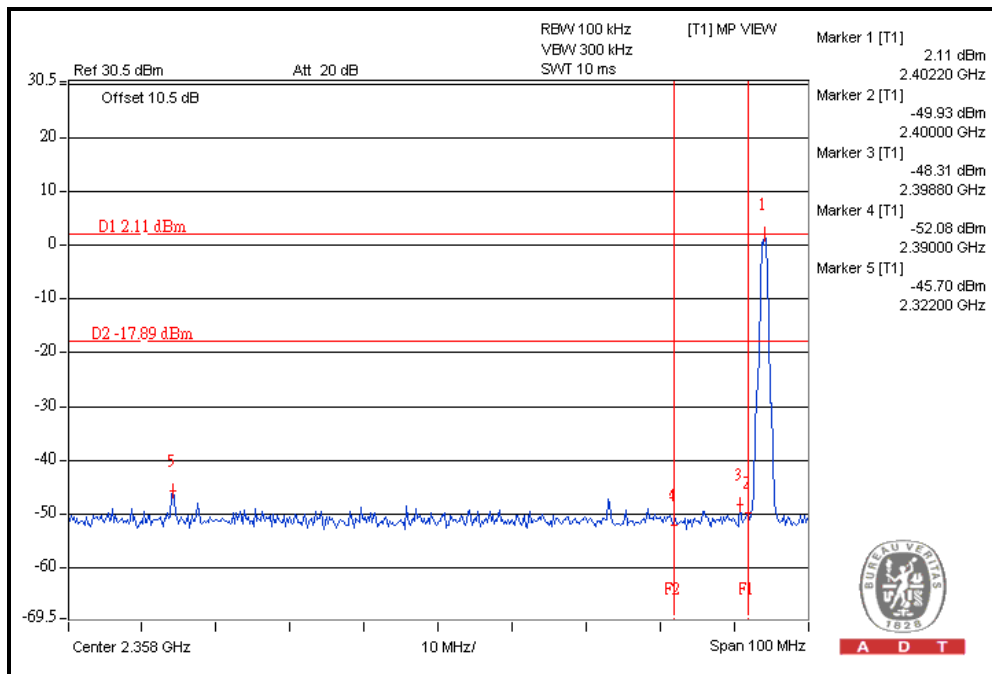




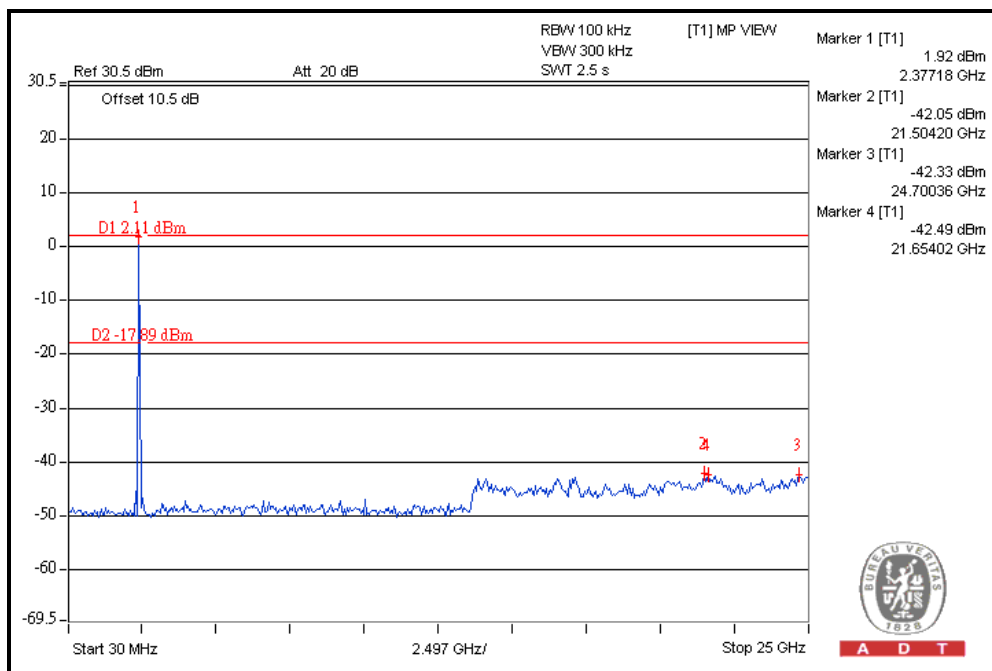
A D T

For GFSK(LE mode) Modulation Type:

CH 0



A D T

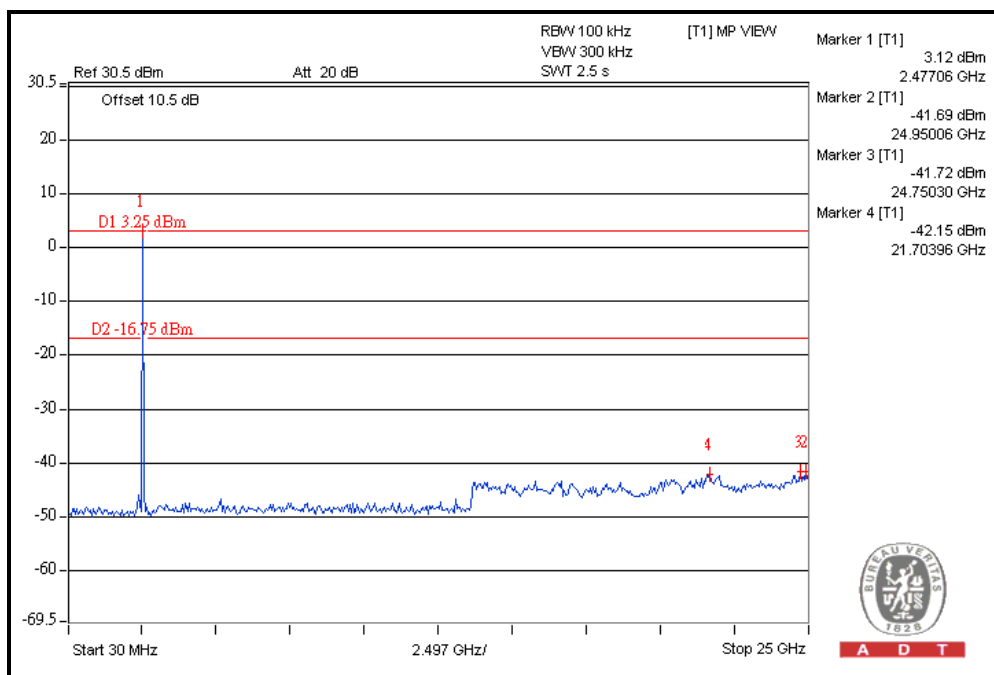
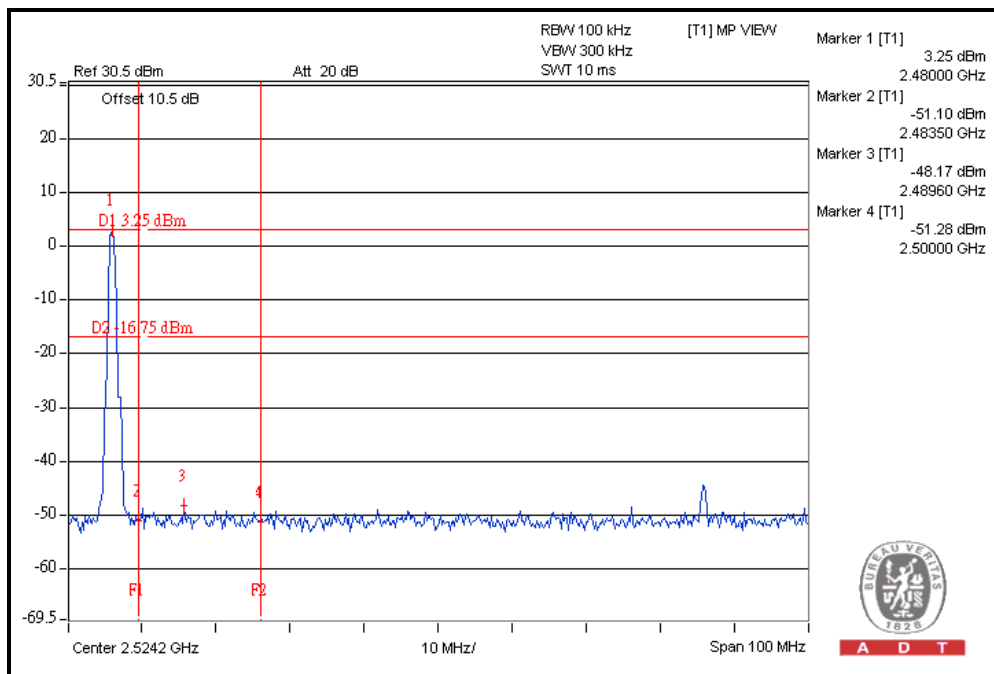


A D T



A D T

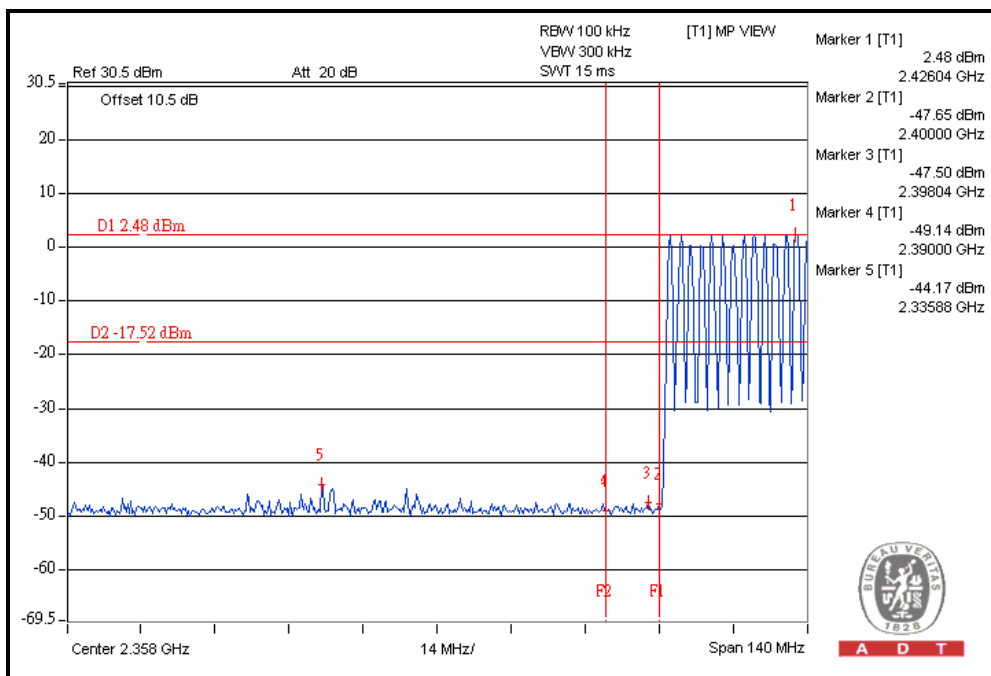
CH 39



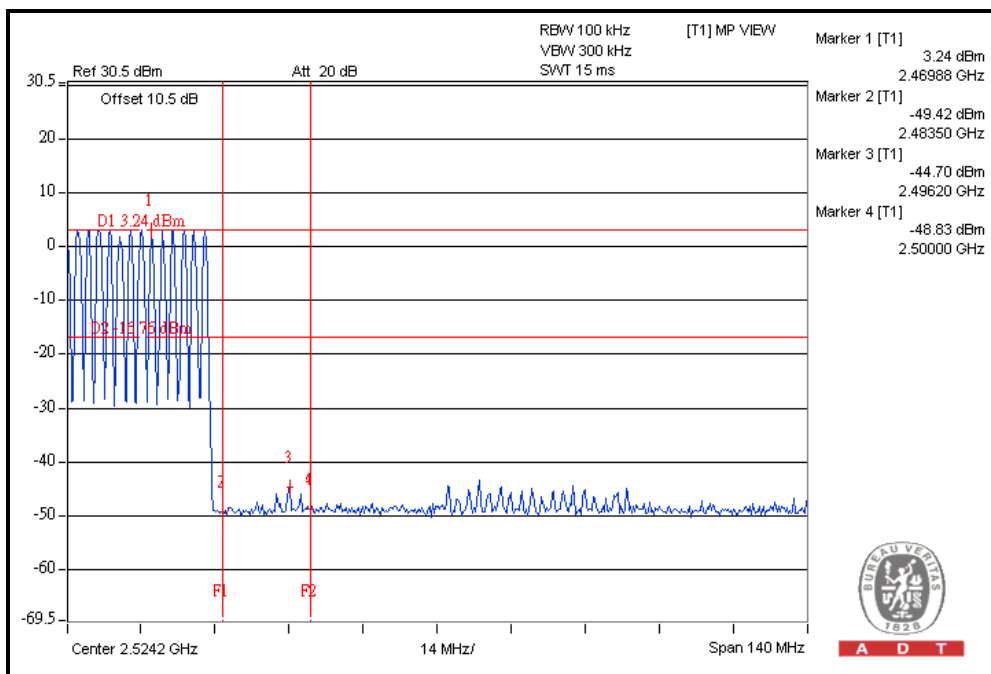


A D T

CH 0



CH 39



5 TEST PROCEDURES AND RESULTS(DTS)

5.1 6dB BANDWIDTH MEASUREMENT

5.1.1 LIMITS OF 6DB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

5.1.2 TEST PROCEDURE

The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 kHz RBW and 300kHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

5.1.3 DEVIATION FROM TEST STANDARD

No deviation.

5.1.4 TEST SETUP

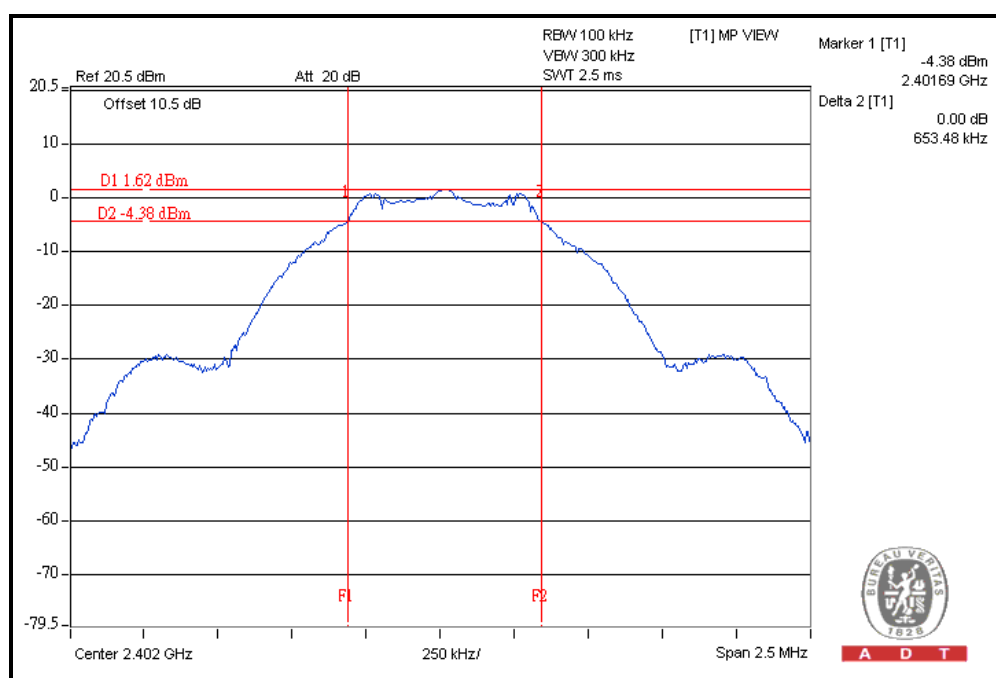
The test Setup has been constructed as the normal test conditions. In case of conducted measurements the transmitter shall be connected to the measuring equipment. Controlling software (artgui.exe) has been activated to set the EUT on specific status.

5.1.5 TEST RESULTS

For GFSK(LE mode):

| CHANNEL | CHANNEL FREQUENCY (MHz) | 6dB BANDWIDTH (MHz) |
|---------|-------------------------|---------------------|
| 0 | 2402 | 0.65 |
| 19 | 2440 | 0.65 |
| 39 | 2480 | 0.65 |

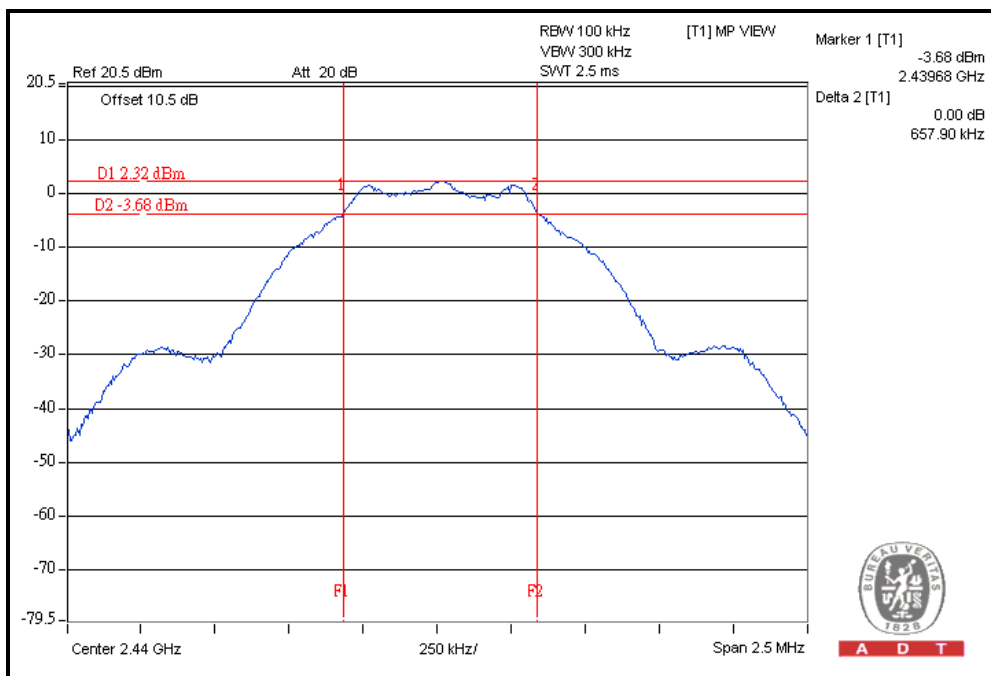
CH 0





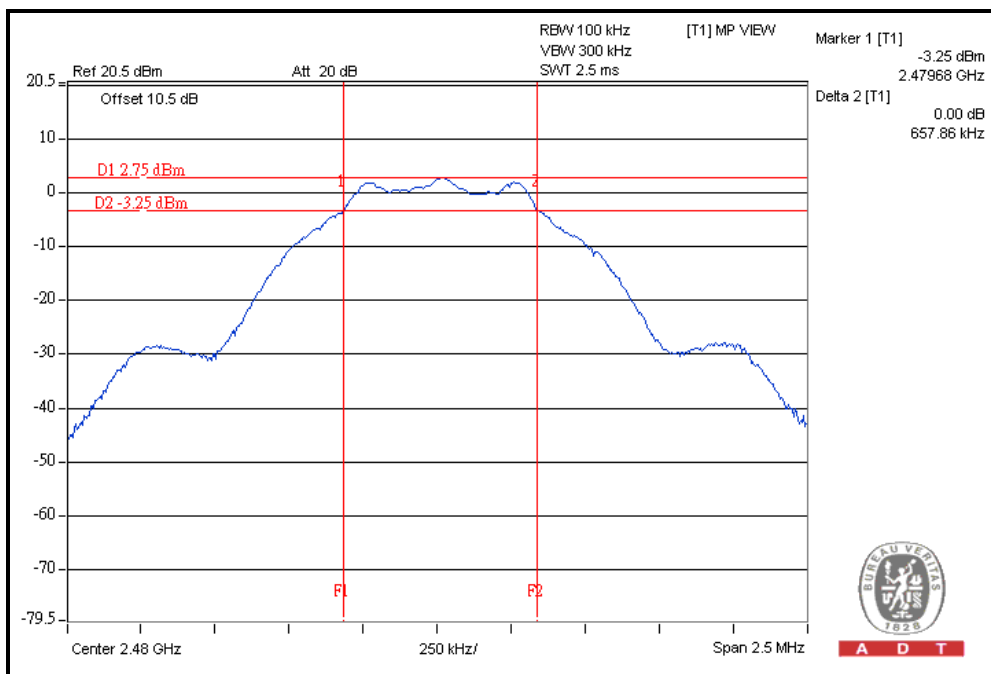
A D T

CH 19



A D T

CH 39



A D T



A D T

5.2 POWER SPECTRAL DENSITY MEASUREMENT

5.2.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

5.2.2 TEST INSTRUMENTS

Test date: Nov. 04, 2011

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|----------------------------|-----------|------------|-----------------|------------------|
| R&S Spectrum Analyzer | FSP 40 | 100060 | May 11, 2011 | May 10, 2012 |

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

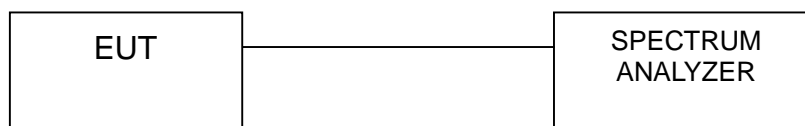
5.2.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer through an attenuator, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3kHz RBW and 30kHz VBW, set sweep time = span/3kHz. The power spectral density was measured and recorded. The sweep time is allowed to be longer than span/3kHz for a full response of the mixer in the spectrum analyzer.

5.2.4 DEVIATION FROM TEST STANDARD

No deviation

5.2.5 TEST SETUP



5.2.6 EUT OPERATING CONDITION

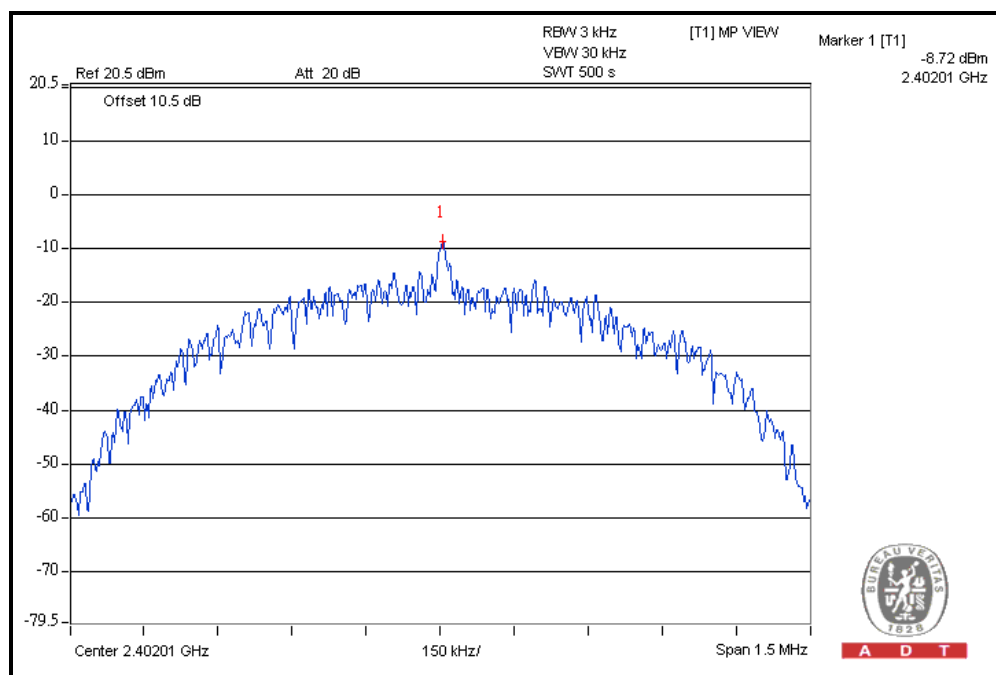
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

5.2.7 TEST RESULTS

For GFSK(LE mode)

| CHANNEL | CHANNEL FREQUENCY (MHz) | PSD (dBm/3kHz) | MAXIMUM LIMIT (dBm) | PASS / FAIL |
|---------|--------------------------|----------------|---------------------|-------------|
| 0 | 2402 | -8.7 | 8 | PASS |
| 19 | 2440 | -8.1 | 8 | PASS |
| 39 | 2480 | -7.6 | 8 | PASS |

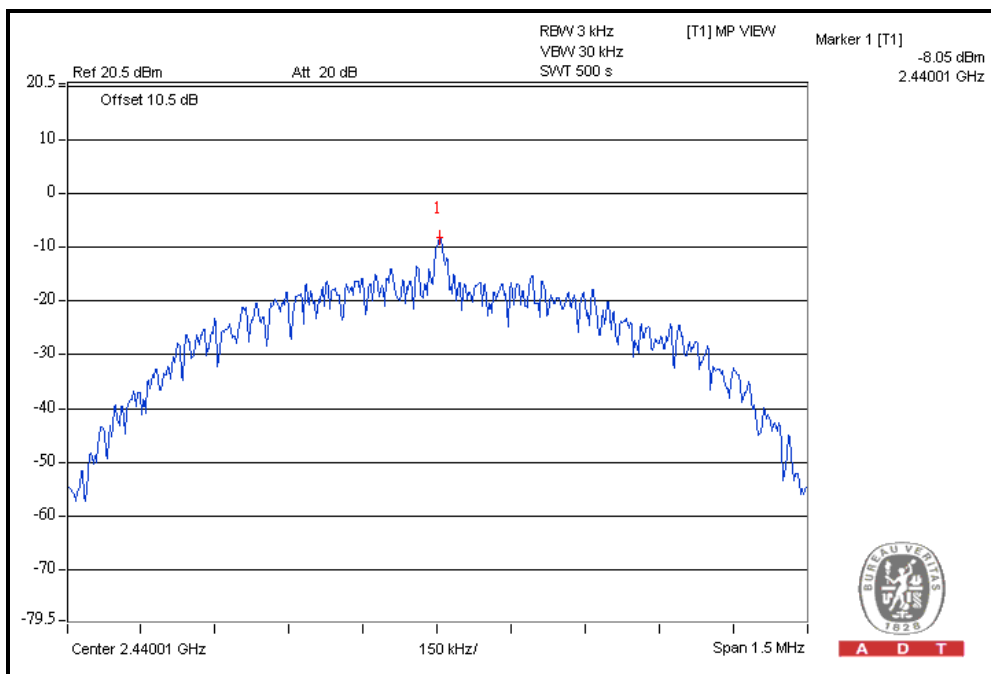
CH 0



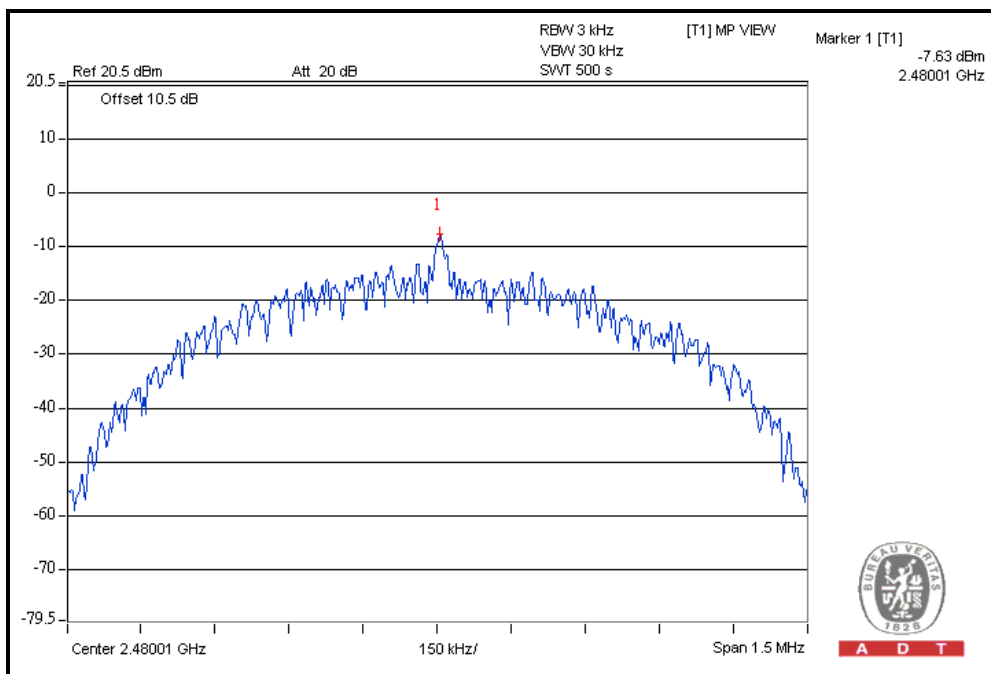


A D T

CH 19



CH 39





A D T

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 and authorization 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: 886-2-26052943

Hsin Chu EMC/RF Lab:

Tel: 886-3-5935343

Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety/Telecom Lab:

Tel: 886-3-3183232

Fax: 886-3-3185050

Email: service@adt.com.tw

Web Site: www.adt.com.tw

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

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

No modifications were made to the EUT by the lab during the test.

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