



4.4 MAXIMUM PEAK OUTPUT POWER

4.4.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 30dBm.

4.4.2 TEST INSTRUMENTS

| Description & Manufacturer | Model No. | Serial No. | Calibrated Until |
|----------------------------|-----------|------------|------------------|
| R&S SPECTRUM ANALYZER | FSP40 | 100036 | Nov. 23, 2005 |
| Agilent SIGNAL GENERATOR | E8257C | MY43321031 | May. 06, 2005 |
| TEKTRONIX OSCILLOSCOPE | TDS 220 | B027241 | Jun. 30, 2005 |
| NARDA DETECTOR | 4503A | FSCM99899 | NA |

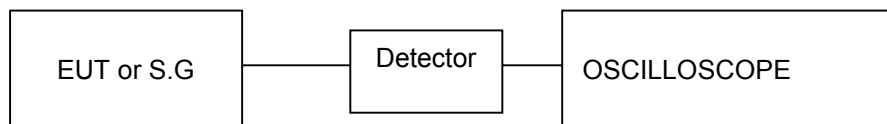
NOTE:

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. A detector was used on the output port of the EUT. An oscilloscope was used to read the peak response of the detector.
2. Replaced the EUT by the signal generator. The center frequency of the S.G was adjusted to the center frequency of the measured channel.
3. Adjusted the power to have the same peak reading on oscilloscope. Record the power level.

4.4.4 TEST SETUP



4.4.5 EUT OPERATING CONDITIONS

Same as Item 4.3.5



4.4.6 TEST RESULTS - DSSS

| | | | |
|-----------------------------|------------------------------------|---------------------------------|------------------------------|
| EUT | IEEE 802.11g Wireless Access Point | | |
| MODEL | DWL-3200AP | ENVIRONMENTAL CONDITIONS | 20 deg. C, 65%RH, 977 hPa |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | TESTED BY | Wen Yu |

Antenna 3 (Gain : 7.61 dBi)

| CHANNEL | CHANNEL FREQUENCY (MHz) | PEAK POWER OUTPUT (dBm) | PEAK POWER LIMIT (dBm) | PASS/FAIL |
|---------|-------------------------|-------------------------|------------------------|-----------|
| 1 | 2412 | 19.55 | 28.39 | PASS |
| 6 | 2437 | 22.10 | 28.39 | PASS |
| 11 | 2462 | 19.39 | 28.39 | PASS |

Antenna 5 (Gain : 5.89 dBi)

| CHANNEL | CHANNEL FREQUENCY (MHz) | PEAK POWER OUTPUT (dBm) | PEAK POWER LIMIT (dBm) | PASS/FAIL |
|---------|-------------------------|-------------------------|------------------------|-----------|
| 1 | 2412 | 19.55 | 30 | PASS |
| 6 | 2437 | 22.10 | 30 | PASS |
| 11 | 2462 | 19.39 | 30 | PASS |

Antenna 9 (Gain : 12 dBi, Cable lose : 3.2dB)

| CHANNEL | CHANNEL FREQUENCY (MHz) | PEAK POWER OUTPUT (dBm) | PEAK POWER LIMIT (dBm) | PASS/FAIL |
|---------|-------------------------|-------------------------|------------------------|-----------|
| 1 | 2412 | 19.55 | 27.2 | PASS |
| 6 | 2437 | 22.10 | 27.2 | PASS |
| 11 | 2462 | 19.39 | 27.2 | PASS |

Antenna 10 (Gain : 5 dBi)

| CHANNEL | CHANNEL FREQUENCY (MHz) | PEAK POWER OUTPUT (dBm) | PEAK POWER LIMIT (dBm) | PASS/FAIL |
|---------|-------------------------|-------------------------|------------------------|-----------|
| 1 | 2412 | 19.55 | 30 | PASS |
| 6 | 2437 | 22.10 | 30 | PASS |
| 11 | 2462 | 19.39 | 30 | PASS |



4.4.7 TEST RESULTS - OFDM

| | | | |
|-----------------------------|------------------------------------|---------------------------------|---------------------------|
| EUT | IEEE 802.11g Wireless Access Point | | |
| MODEL | DWL-3200AP | ENVIRONMENTAL CONDITIONS | 20 deg. C, 65%RH, 977 hPa |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | TESTED BY | Wen Yu |

Antenna 3 (Gain : 7.61 dBi)

| CHANNEL | CHANNEL FREQUENCY (MHz) | PEAK POWER OUTPUT (dBm) | PEAK POWER LIMIT (dBm) | PASS/FAIL |
|---------|-------------------------|-------------------------|------------------------|-----------|
| 1 | 2412 | 18.00 | 28.39 | PASS |
| 6 | 2437 | 23.00 | 28.39 | PASS |
| 11 | 2462 | 18.00 | 28.39 | PASS |
| Turbo 6 | 2437 | 17.80 | 28.39 | PASS |

Antenna 5 (Gain : 5.89 dBi)

| CHANNEL | CHANNEL FREQUENCY (MHz) | PEAK POWER OUTPUT (dBm) | PEAK POWER LIMIT (dBm) | PASS/FAIL |
|---------|-------------------------|-------------------------|------------------------|-----------|
| 1 | 2412 | 18.00 | 30 | PASS |
| 6 | 2437 | 23.00 | 30 | PASS |
| 11 | 2462 | 18.00 | 30 | PASS |
| Turbo 6 | 2437 | 17.80 | 30 | PASS |



Antenna 9 (Gain : 12 dBi, Cable lose : 3.2dB)

| CHANNEL | CHANNEL FREQUENCY (MHz) | PEAK POWER OUTPUT (dBm) | PEAK POWER LIMIT (dBm) | PASS/FAIL |
|---------|-------------------------|-------------------------|------------------------|-----------|
| 1 | 2412 | 18.00 | 27.2 | PASS |
| 6 | 2437 | 23.00 | 27.2 | PASS |
| 11 | 2462 | 18.00 | 27.2 | PASS |
| Turbo 6 | 2437 | 17.80 | 27.2 | PASS |

Antenna 10 (Gain : 5 dBi)

| CHANNEL | CHANNEL FREQUENCY (MHz) | PEAK POWER OUTPUT (dBm) | PEAK POWER LIMIT (dBm) | PASS/FAIL |
|---------|-------------------------|-------------------------|------------------------|-----------|
| 1 | 2412 | 18.00 | 30 | PASS |
| 6 | 2437 | 23.00 | 30 | PASS |
| 11 | 2462 | 18.00 | 30 | PASS |
| Turbo 6 | 2437 | 17.80 | 30 | PASS |



4.5 POWER SPECTRAL DENSITY MEASUREMENT

4.5.1 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum of Power Spectral Density Measurement is 8dBm.

4.5.2 TEST INSTRUMENTS

| Description & Manufacturer | Model No. | Serial No. | Calibrated Until |
|----------------------------|-----------|------------|------------------|
| R&S SPECTRUM ANALYZER | FSP40 | 100036 | Nov. 23, 2005 |

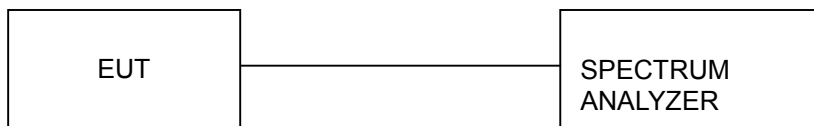
NOTE:

- 1.The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
- 2.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

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 3 kHz RBW and 30 kHz 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.

4.5.4 TEST SETUP



4.5.5 EUT OPERATING CONDITIONS

Same as 4.3.5



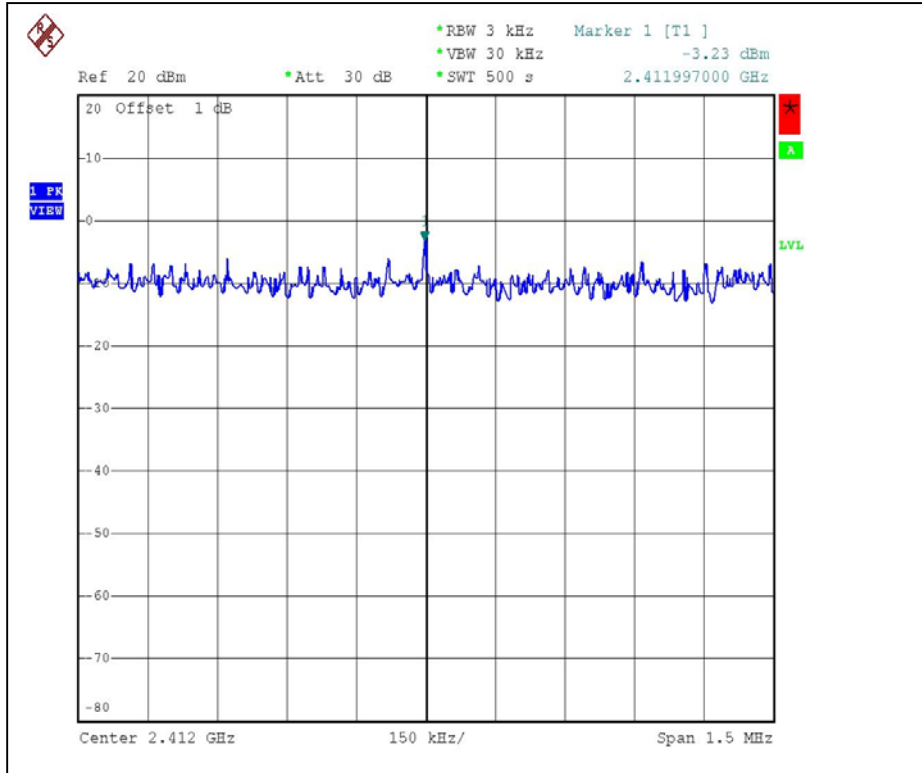
4.5.6 TEST RESULTS – DSSS

| | | | |
|-----------------------------|------------------------------------|---------------------------------|------------------------------|
| EUT | IEEE 802.11g Wireless Access Point | | |
| MODEL | DWL-3200AP | ENVIRONMENTAL CONDITIONS | 20 deg. C, 60%RH, 977 hPa |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | TESTED BY | Wen Yu |

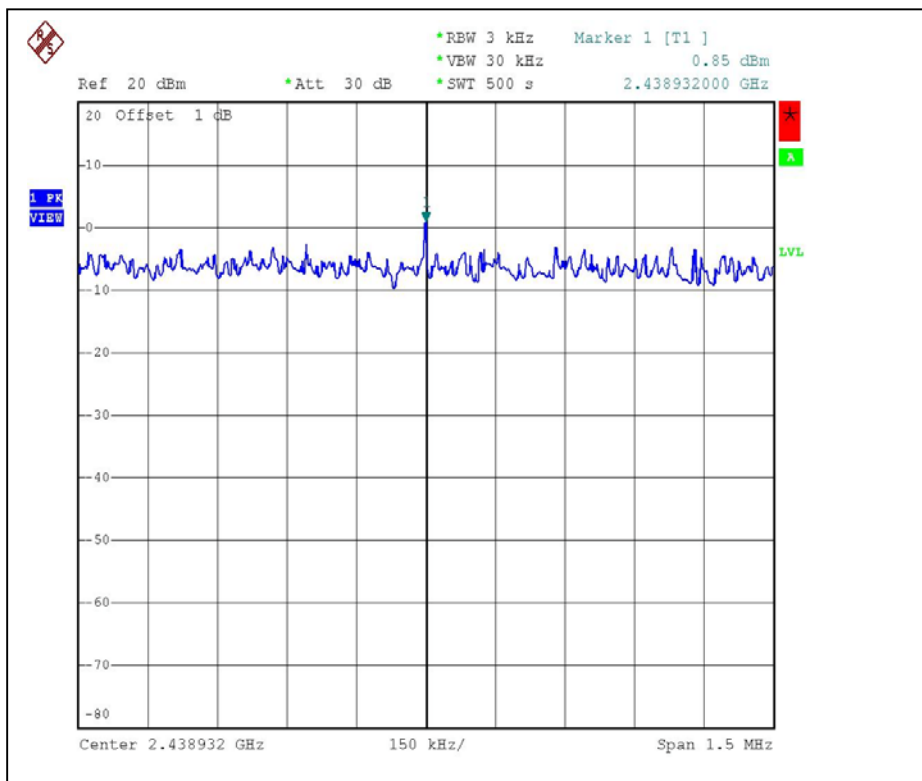
| CHANNEL NUMBER | CHANNEL FREQUENCY (MHz) | RF POWER LEVEL IN 3 KHz BW (dBm) | MAXIMUM LIMIT (dBm) | PASS/FAIL |
|-----------------------|--------------------------------|---|----------------------------|------------------|
| 1 | 2412 | -3.23 | 8 | PASS |
| 6 | 2437 | 0.85 | 8 | PASS |
| 11 | 2462 | -3.37 | 8 | PASS |



CH1

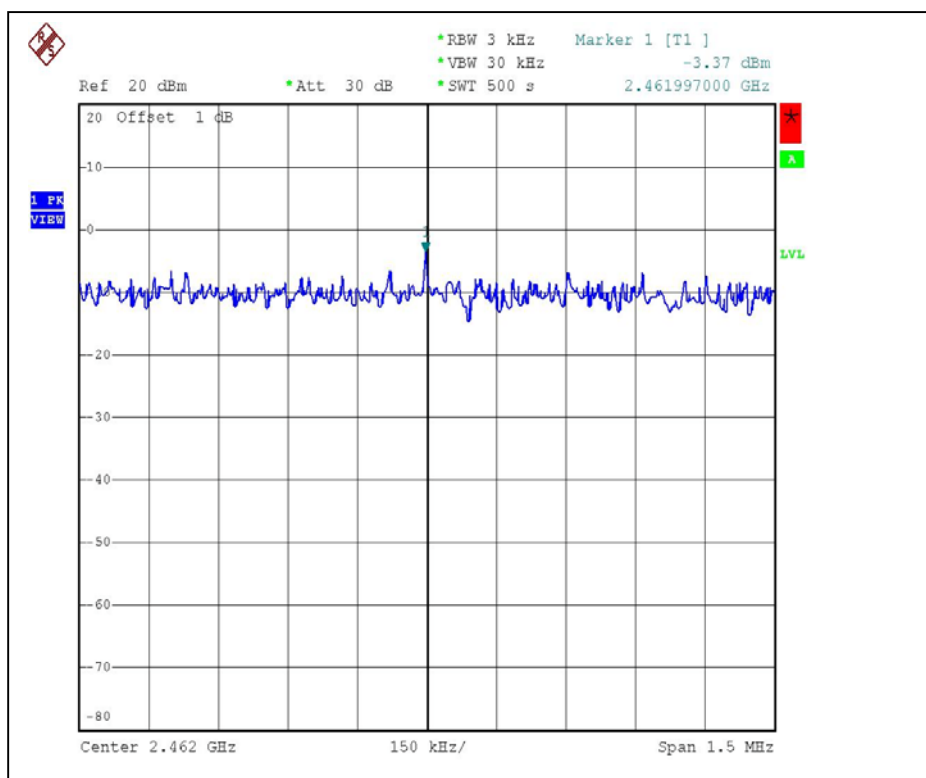


CH6





CH11





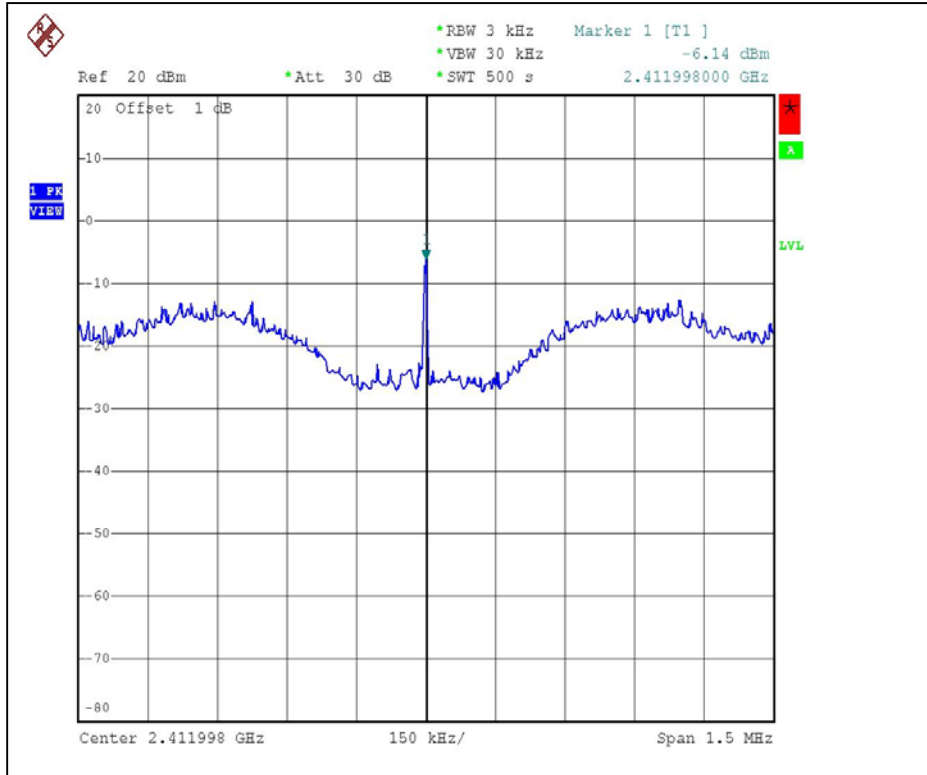
4.5.7 TEST RESULTS – OFDM

| | | | |
|-----------------------------|------------------------------------|---------------------------------|------------------------------|
| EUT | IEEE 802.11g Wireless Access Point | | |
| MODEL | DWL-3200AP | ENVIRONMENTAL CONDITIONS | 26 deg. C, 60%RH, 977 hPa |
| INPUT POWER (SYSTEM) | 120Vac, 60 Hz | TESTED BY | Wen Yu |

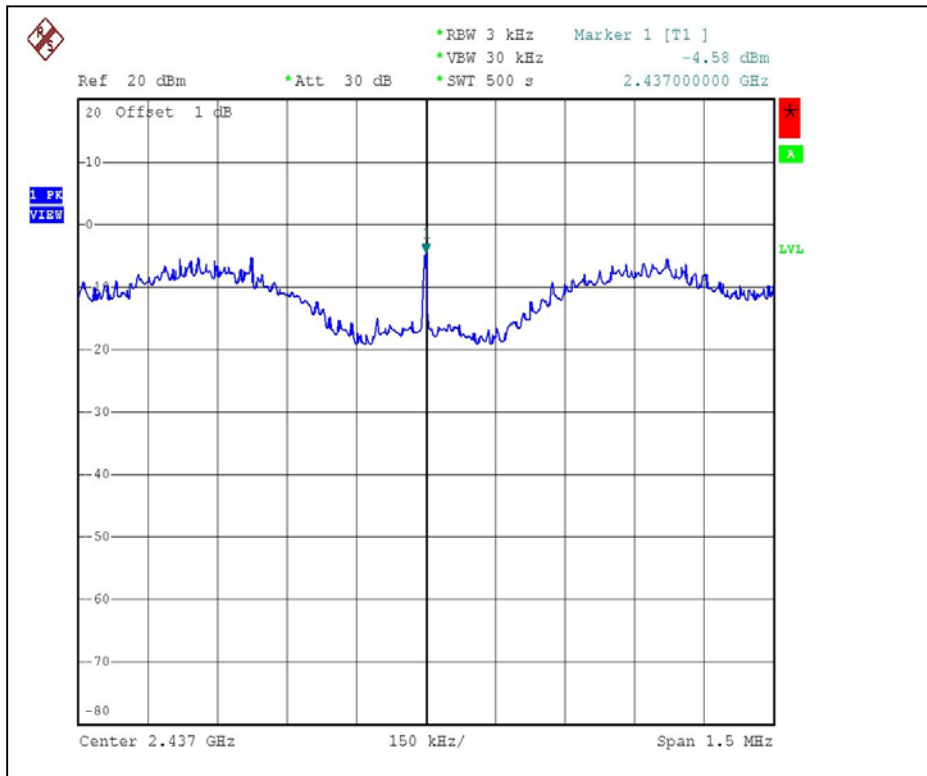
| CHANNEL NUMBER | CHANNEL FREQUENCY (MHz) | RF POWER LEVEL IN 3 KHz BW (dBm) | MAXIMUM LIMIT (dBm) | PASS/FAIL |
|-----------------------|--------------------------------|---|----------------------------|------------------|
| 1 | 2412 | -6.14 | 8 | PASS |
| 6 | 2437 | -4.58 | 8 | PASS |
| 11 | 2462 | -6.77 | 8 | PASS |
| Turbo 6 | 2437 | -9.61 | 8 | PASS |



CH1

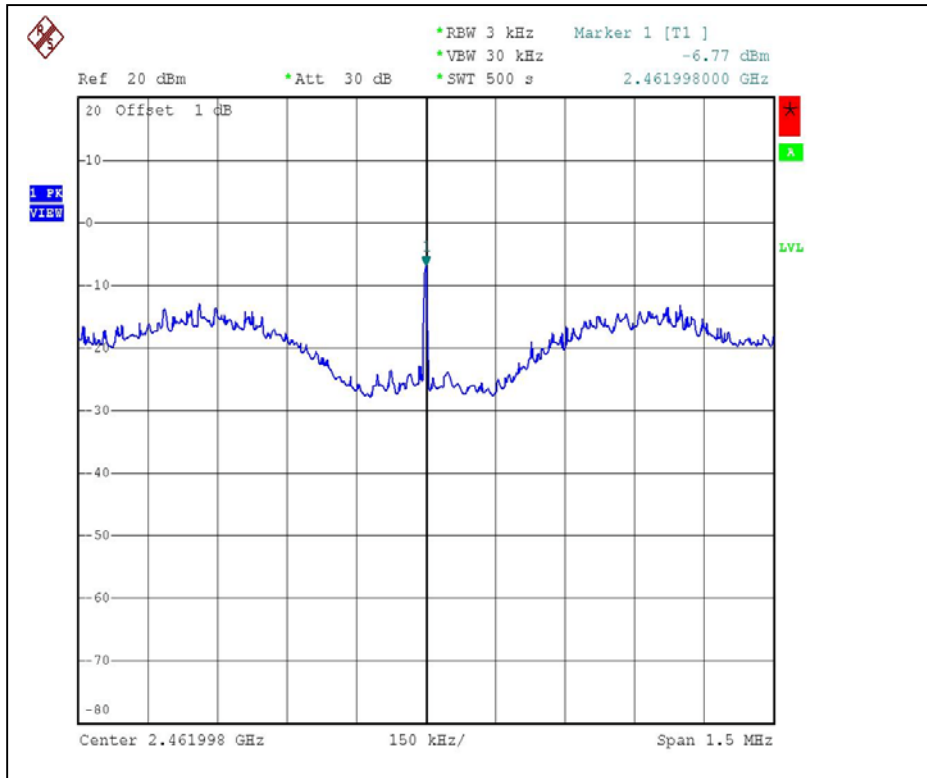


CH6

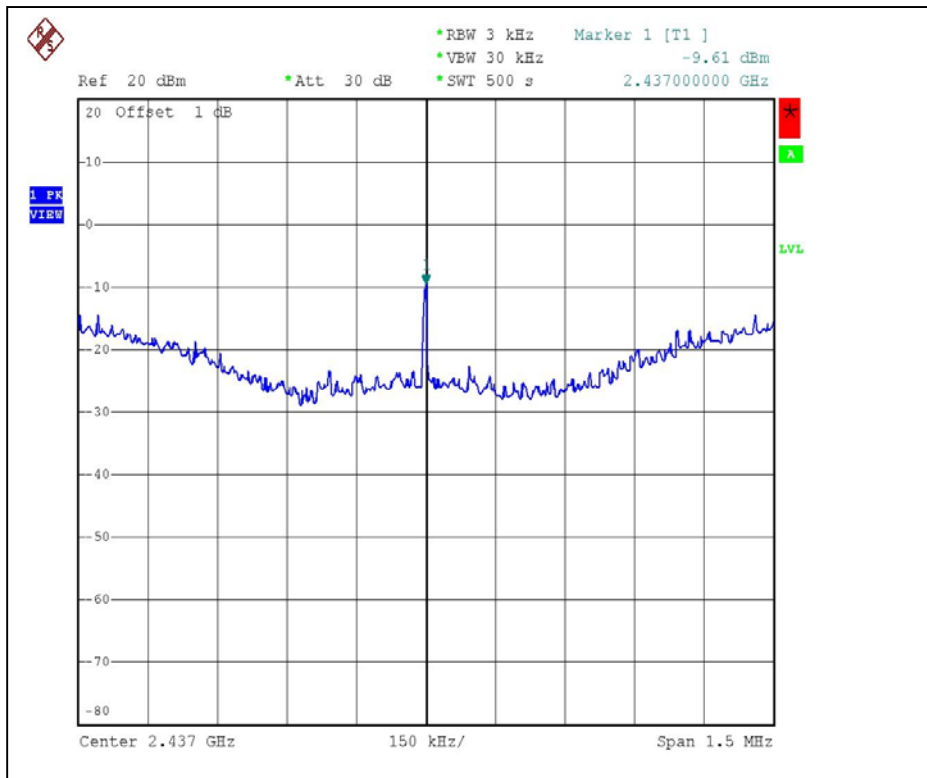




CH11



Turbo 6





4.6 BAND EDGES MEASUREMENT

4.6.1 LIMITS OF BAND EDGES MEASUREMENT

Below -20dB of the highest emission level of operating band (in 1MHz Resolution Bandwidth).

4.6.2 TEST INSTRUMENTS

| Description & Manufacturer | Model No. | Serial No. | Calibrated Until |
|----------------------------|-----------|------------|------------------|
| R&S SPECTRUM ANALYZER | FSP40 | 100036 | Nov. 23, 2005 |

NOTE:

- 1.The measurement uncertainty is less than $\pm 2.6\text{dB}$, which is calculated as per the NAMAS document NIS81.
- 2.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 PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set RBW spectrum analyzer to 1 MHz and set VBW spectrum analyzer to 10 Hz with suitable frequency span including 1 MHz bandwidth from band edge. The band edges was measured and recorded.

4.6.4 EUT OPERATING CONDITION

Same as Item 4.3.5



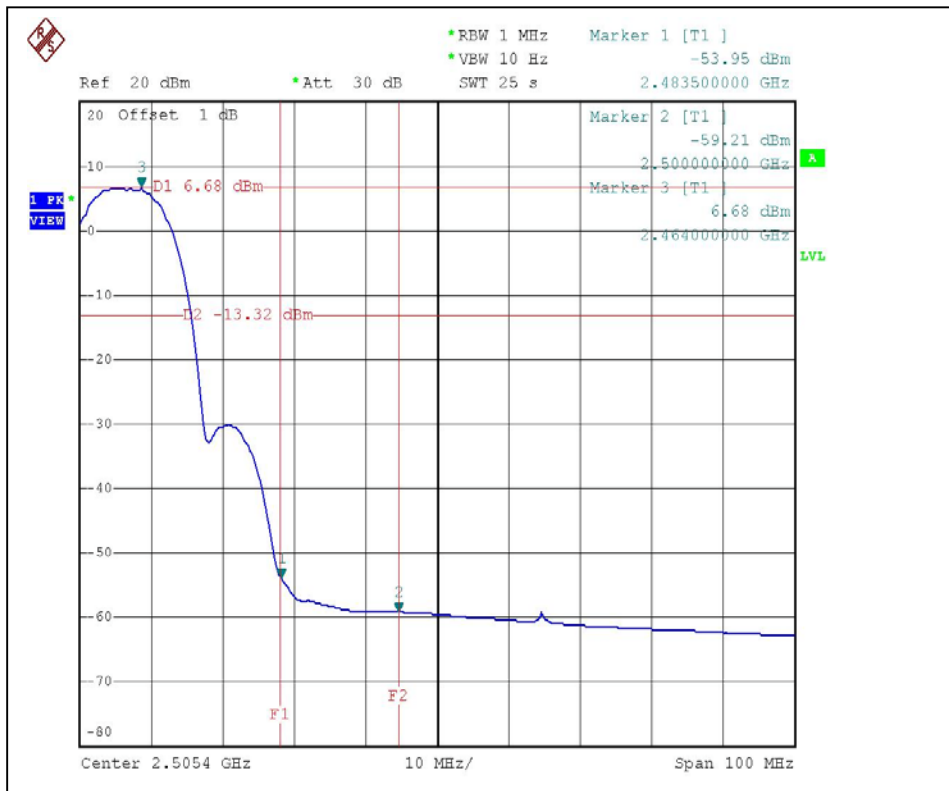
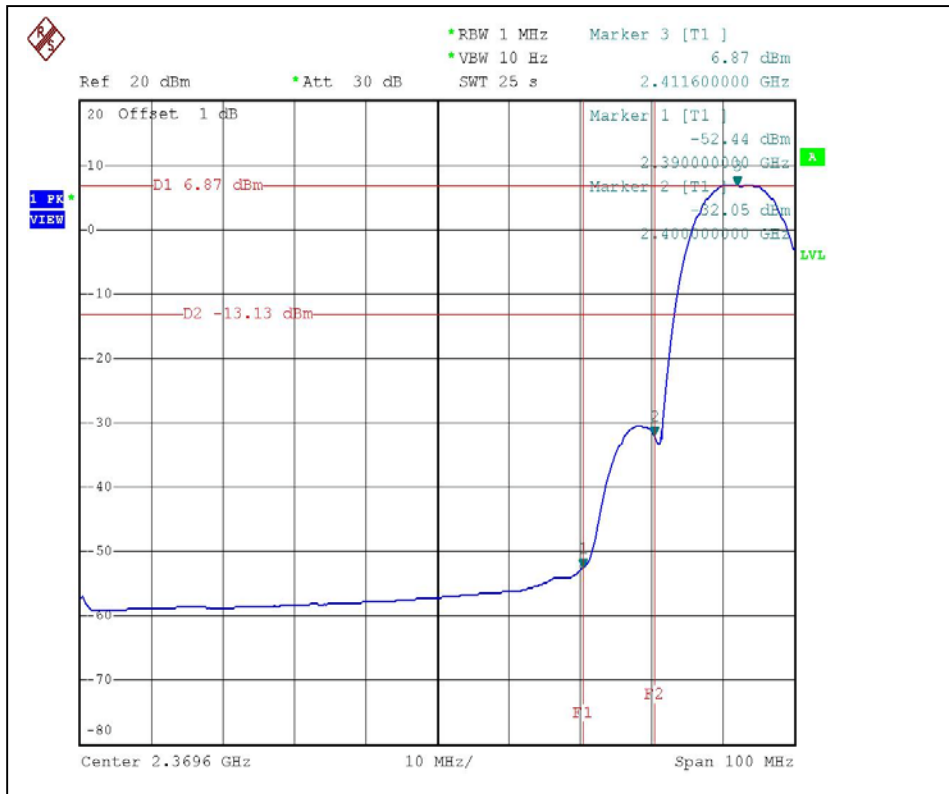
4.6.5 TEST RESULTS (ANTENNA 3 – DSSS)

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

Note - The delta method is only used up to 2 MHz away from the restricted bandage, The radiated emissions which located in other restricted frequency band, the result, please refer to 4.2.

NOTE (1): The band edge emission plot on the following first page shows 59.31dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2 is 110.90dBuV/m, so the maximum field strength in restrict band is $110.90-59.31=51.59$ dBuV/m which is under 54 dBuV/m limit.

NOTE (2): The band edge emission plot on the following second page shows 60.63 dB delta between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2. is 111.10dBuV/m, so the maximum field strength in restrict band is $111.10-60.63=50.47$ dBuV/m which is under 54 dBuV/m limit.





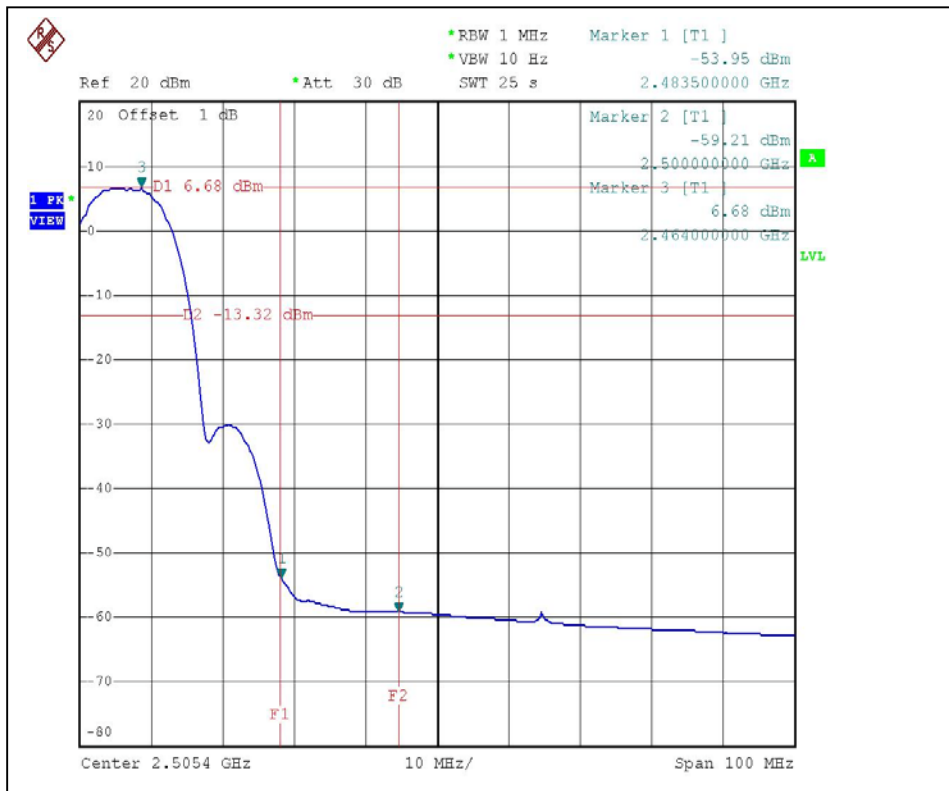
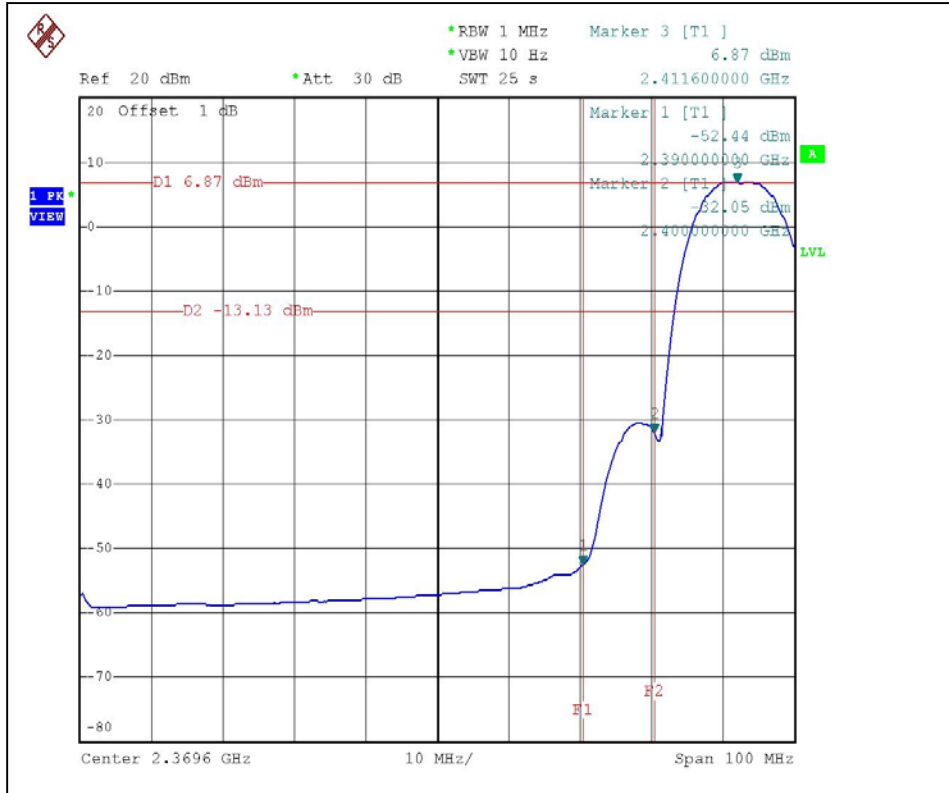
4.6.6 TEST RESULTS (ANTENNA 5 – DSSS)

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

Note - The delta method is only used up to 2 MHz away from the restricted bandage, The radiated emissions which located in other restricted frequency band, the result, please refer to 4.2.

NOTE (1): The band edge emission plot on the following first page shows 59.31dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2 is 110.80dBuV/m, so the maximum field strength in restrict band is $110.80 - 59.31 = 51.49$ dBuV/m which is under 54 dBuV/m limit.

NOTE (2): The band edge emission plot on the following second page shows 60.63dB delta between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2. is 110.60dBuV/m, so the maximum field strength in restrict band is $110.60 - 60.63 = 49.97$ dBuV/m which is under 54 dBuV/m limit.





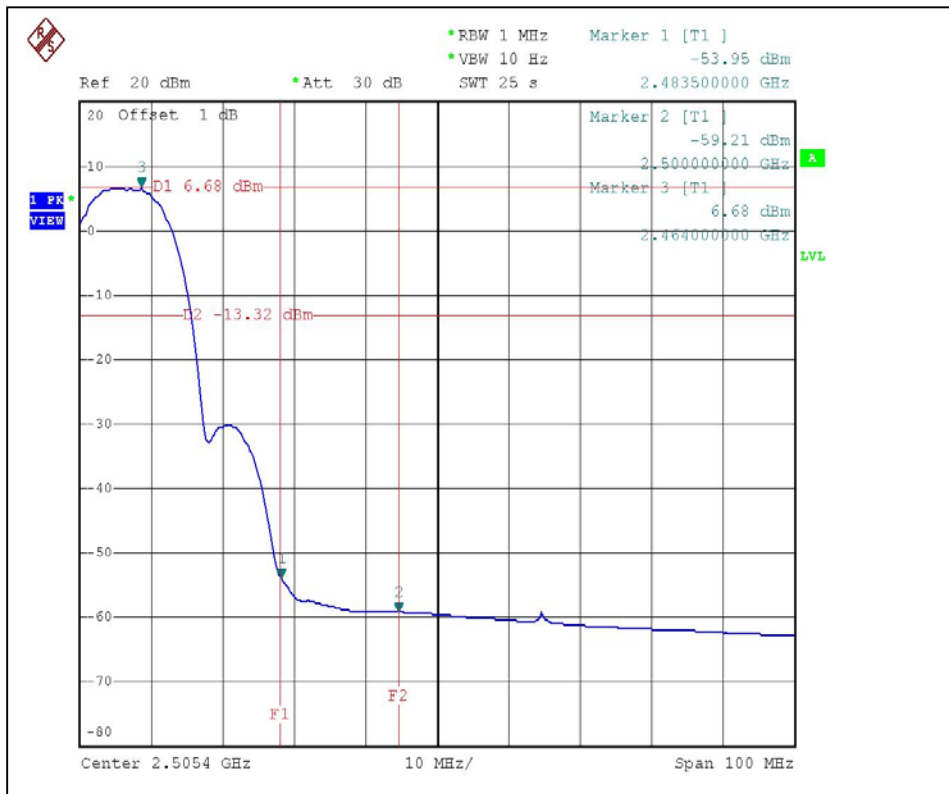
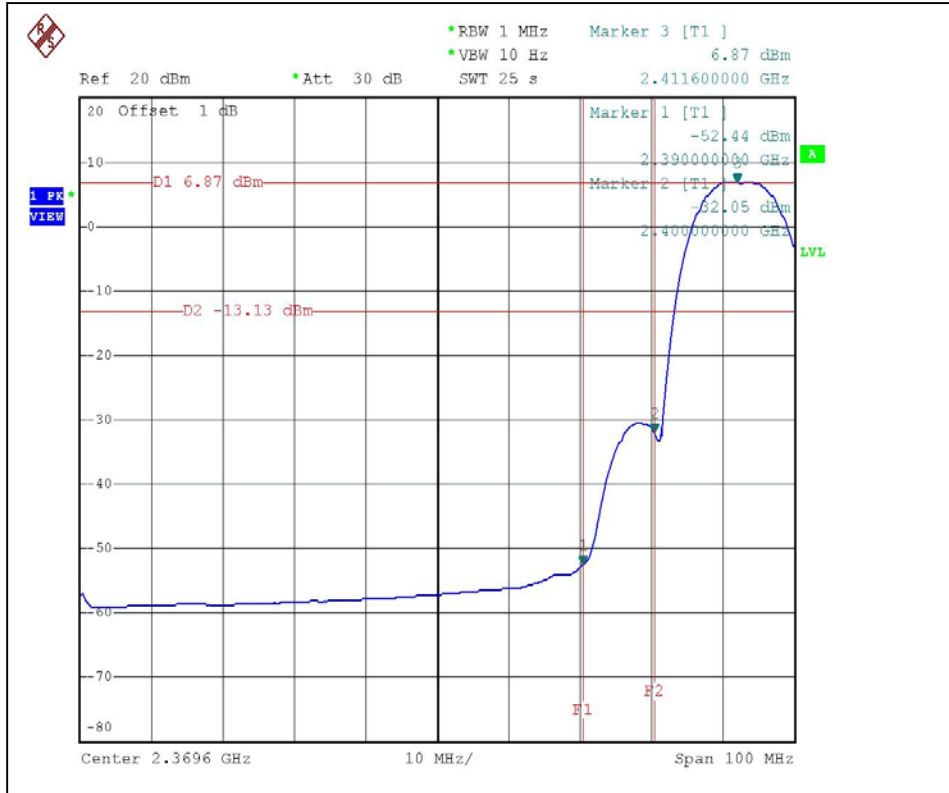
4.6.7 TEST RESULTS (ANTENNA 9 – DSSS)

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

Note - The delta method is only used up to 2 MHz away from the restricted bandage, The radiated emissions which located in other restricted frequency band, the result, please refer to 4.2.

NOTE (1): The band edge emission plot on the following first page shows 59.31dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2 is 111.60dBuV/m, so the maximum field strength in restrict band is $111.60 - 59.31 = 52.29$ dBuV/m which is under 54 dBuV/m limit.

NOTE (2): The band edge emission plot on the following second page shows 60.63dB delta between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2. is 111.90dBuV/m, so the maximum field strength in restrict band is $111.90 - 60.63 = 51.27$ dBuV/m which is under 54 dBuV/m limit.





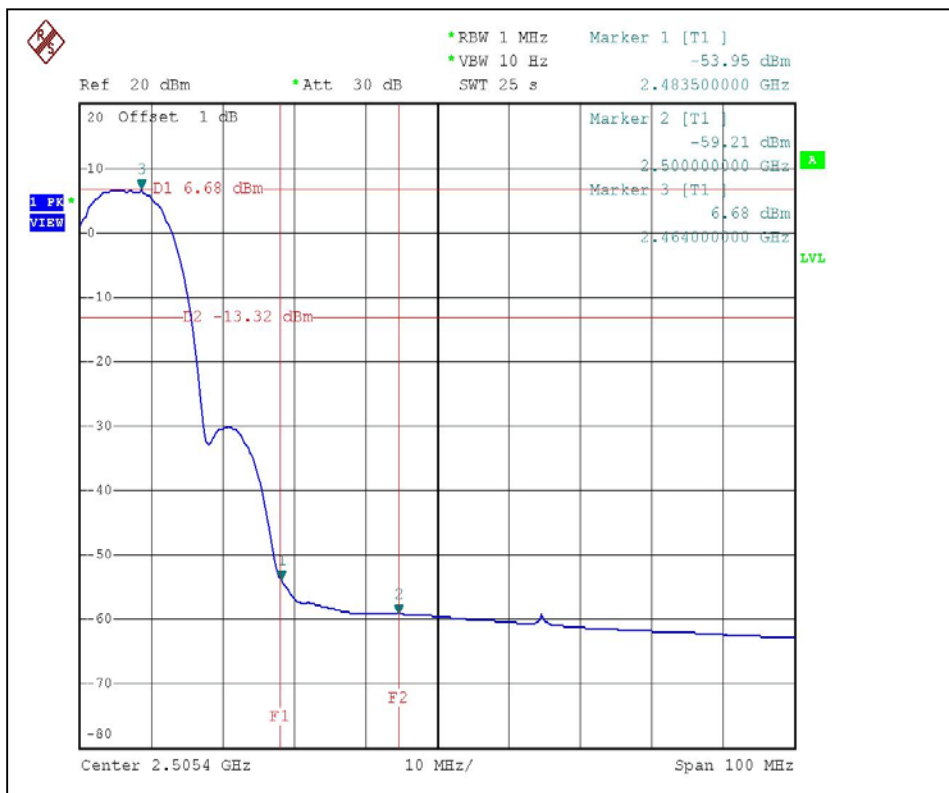
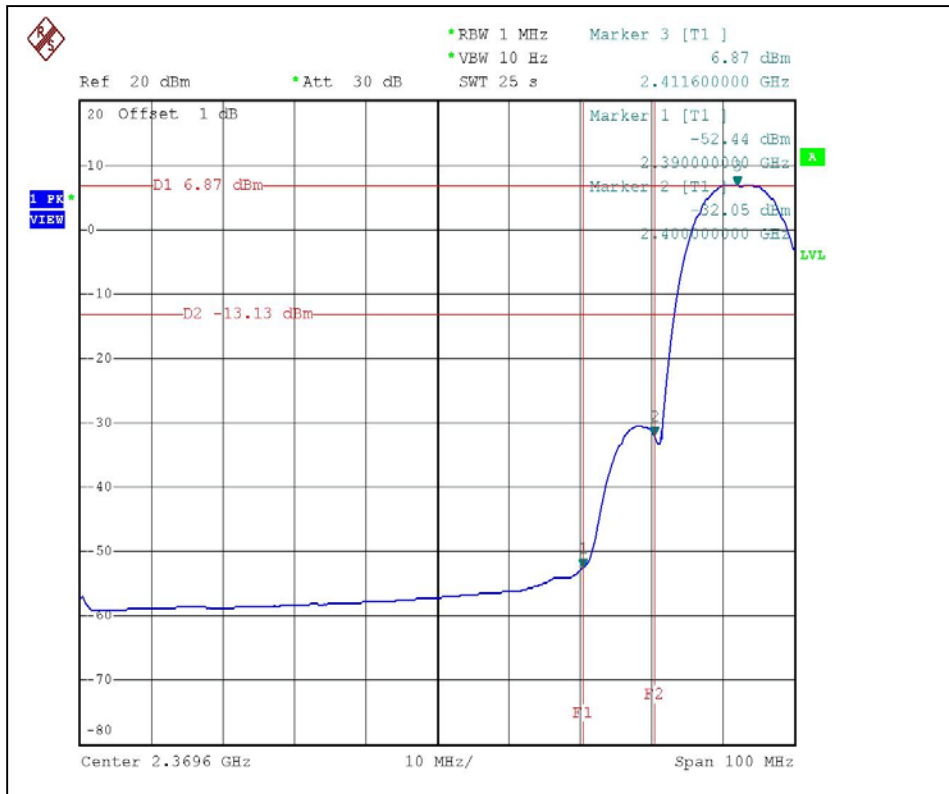
4.6.8 TEST RESULTS (ANTENNA 10 – DSSS)

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

Note - The delta method is only used up to 2 MHz away from the restricted bandage, The radiated emissions which located in other restricted frequency band, the result, please refer to 4.2.

NOTE (1): The band edge emission plot on the following first page shows 59.31dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2 is 107.80dBuV/m, so the maximum field strength in restrict band is $107.80 - 59.31 = 48.49$ dBuV/m which is under 54 dBuV/m limit.

NOTE (2): The band edge emission plot on the following second page shows 60.63dB delta between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2. is 109.8dBuV/m, so the maximum field strength in restrict band is $109.8 - 60.63 = 49.17$ dBuV/m which is under 54 dBuV/m limit.





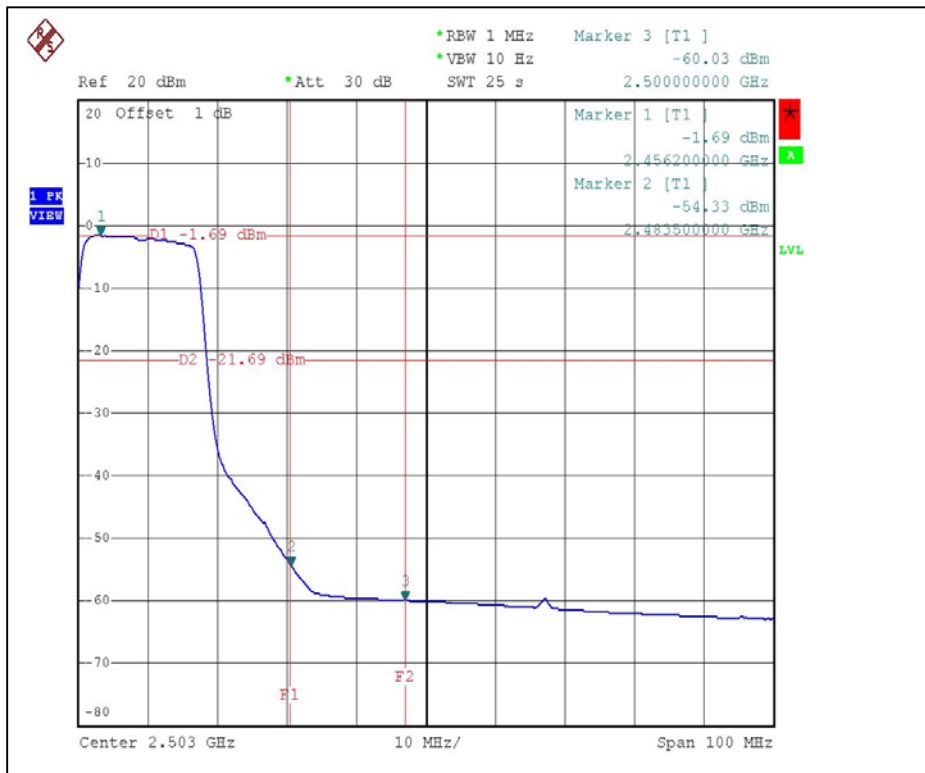
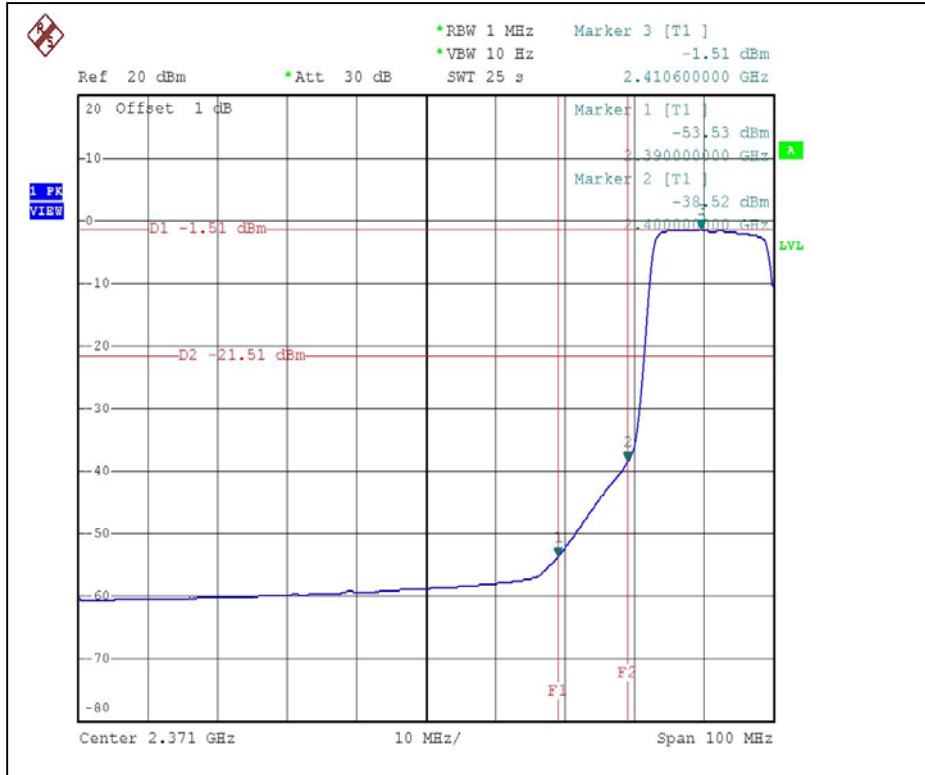
4.6.9 TEST RESULTS (ANTENNA 3 – OFDM)

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

Note - The delta method is only used up to 2 MHz away from the restricted bandage, The radiated emissions which located in other restricted frequency band, the result, please refer to 4.2.

NOTE (1): The band edge emission plot on the following first page shows 55.04dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2. is 103.40dBuV/m, so the maximum field strength in restrict band is $103.40-55.04=48.36$ dBuV/m which is under 54 dBuV/m limit.

NOTE (2): The band edge emission plot on the following second page shows 56.02dB delta between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2. is 103.10dBuV/m, so the maximum field strength in restrict band is $103.10-56.02=47.08$ dBuV/m which is under 54 dBuV/m limit.





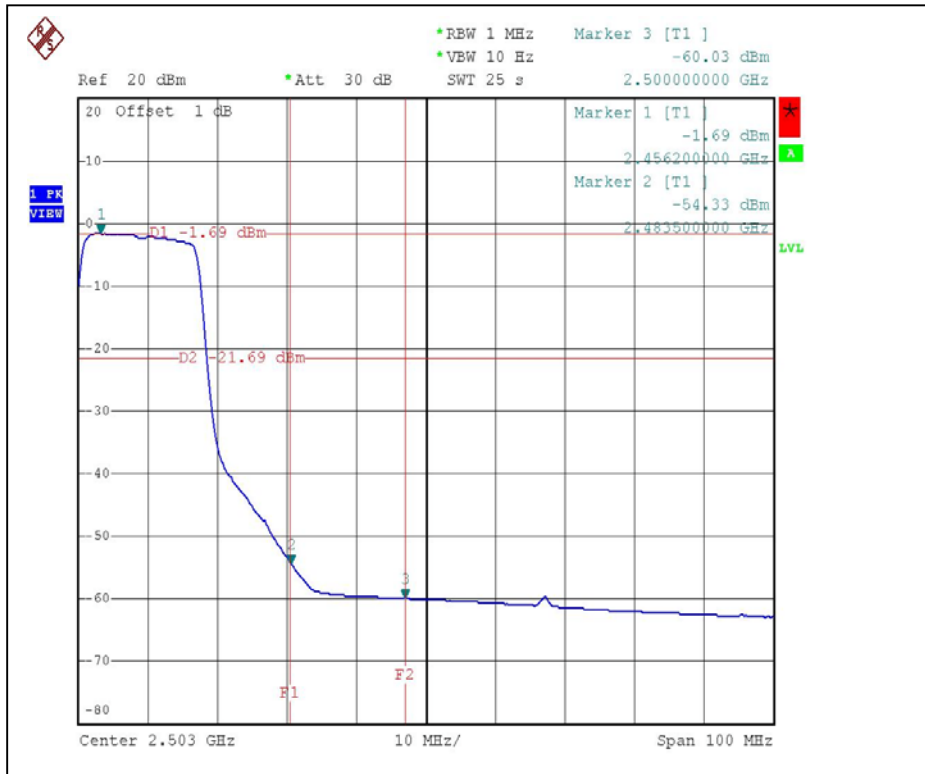
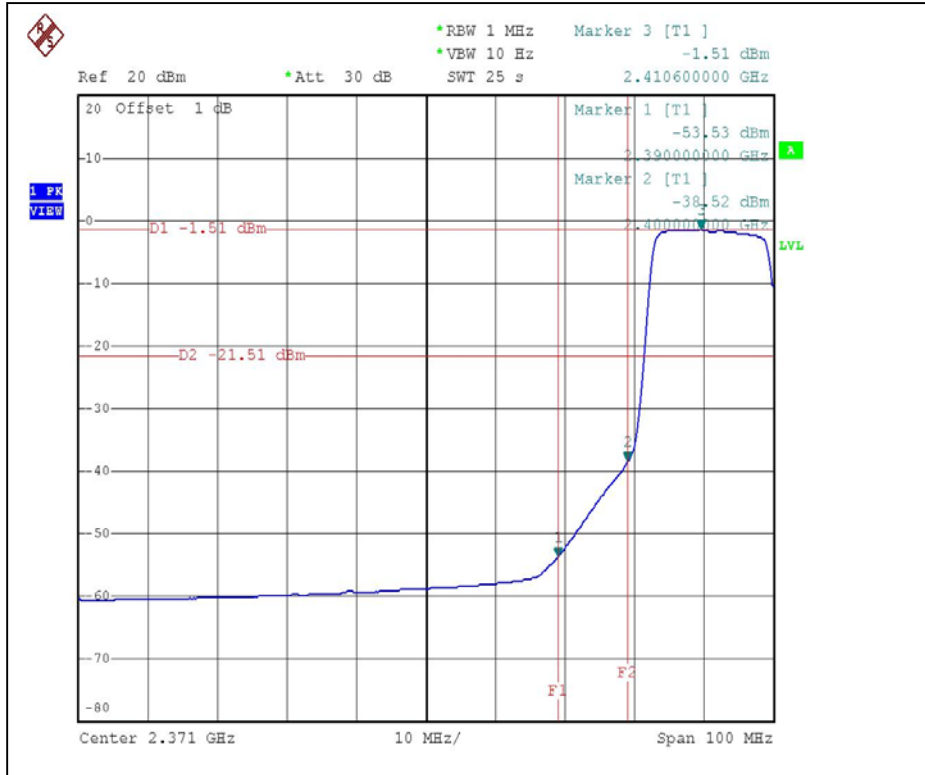
4.6.10 TEST RESULTS (ANTENNA 5 – OFDM)

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

Note - The delta method is only used up to 2 MHz away from the restricted bandage, The radiated emissions which located in other restricted frequency band, the result, please refer to 4.2.

NOTE (1): The band edge emission plot on the following first page shows 55.04dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2. is 102.90dBuV/m, so the maximum field strength in restrict band is $102.90-55.04=47.86$ dBuV/m which is under 54 dBuV/m limit.

NOTE (2): The band edge emission plot on the following second page shows 56.02dB delta between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2. is 102.90dBuV/m, so the maximum field strength in restrict band is $102.90-56.02=46.88$ dBuV/m which is under 54 dBuV/m limit.





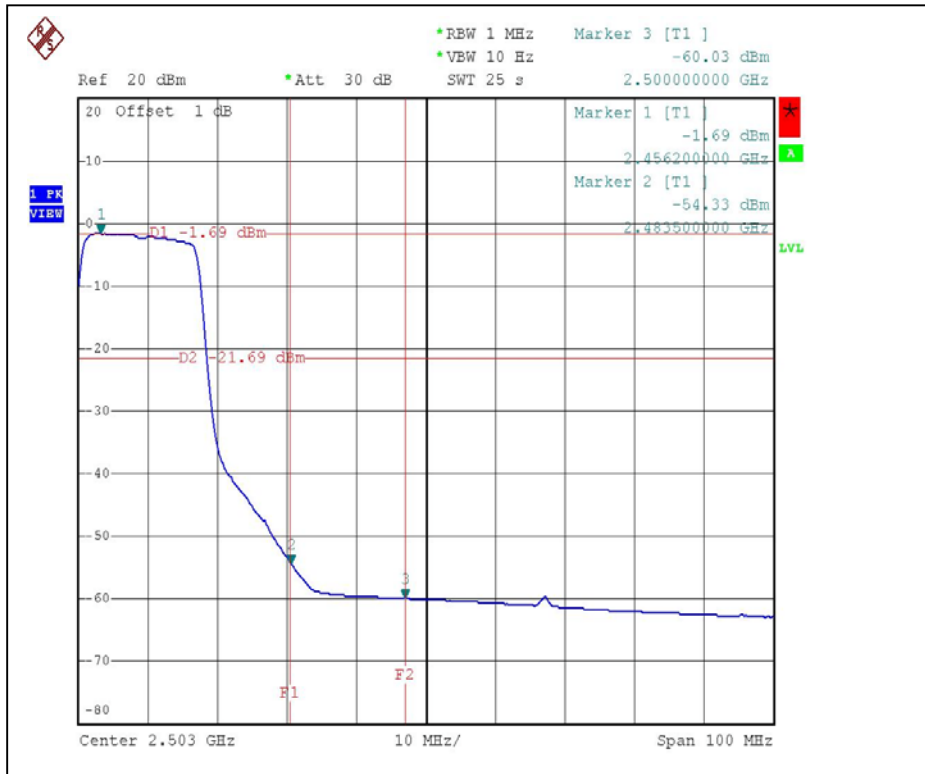
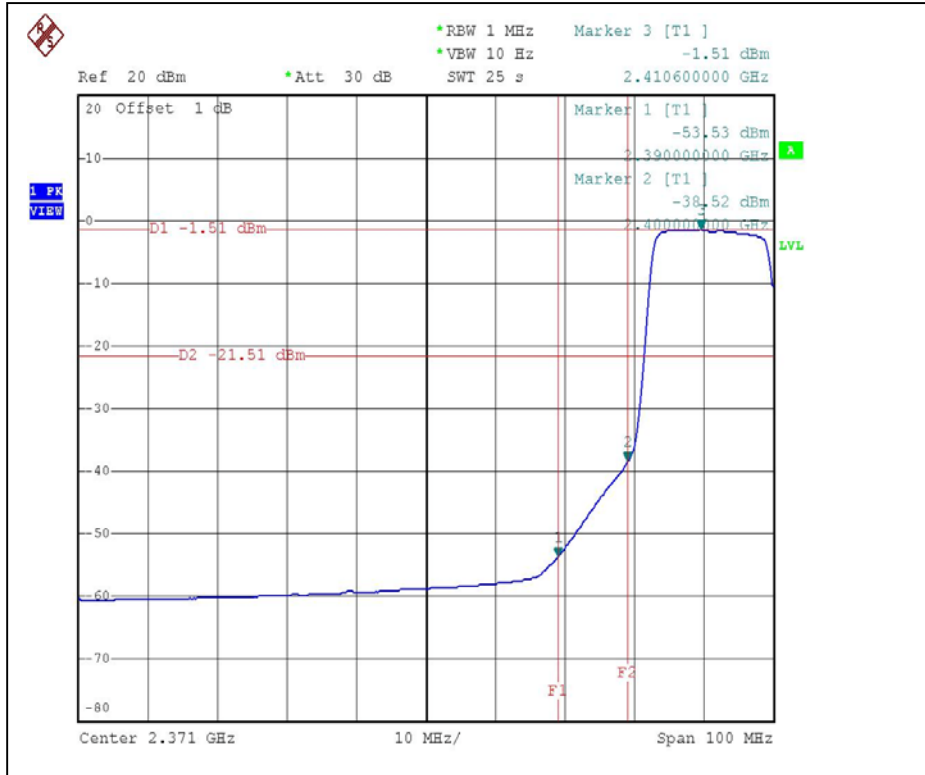
4.6.11 TEST RESULTS (ANTENNA 9 – OFDM)

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

Note - The delta method is only used up to 2 MHz away from the restricted bandage, The radiated emissions which located in other restricted frequency band, the result, please refer to 4.2.

NOTE (1): The band edge emission plot on the following first page shows 55.04dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2. is 104.50dBuV/m, so the maximum field strength in restrict band is $104.50-55.04=49.46$ dBuV/m which is under 54 dBuV/m limit.

NOTE (2): The band edge emission plot on the following second page shows 56.02dB delta between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2. is 104.30dBuV/m, so the maximum field strength in restrict band is $104.30-56.02=48.28$ dBuV/m which is under 54 dBuV/m limit.





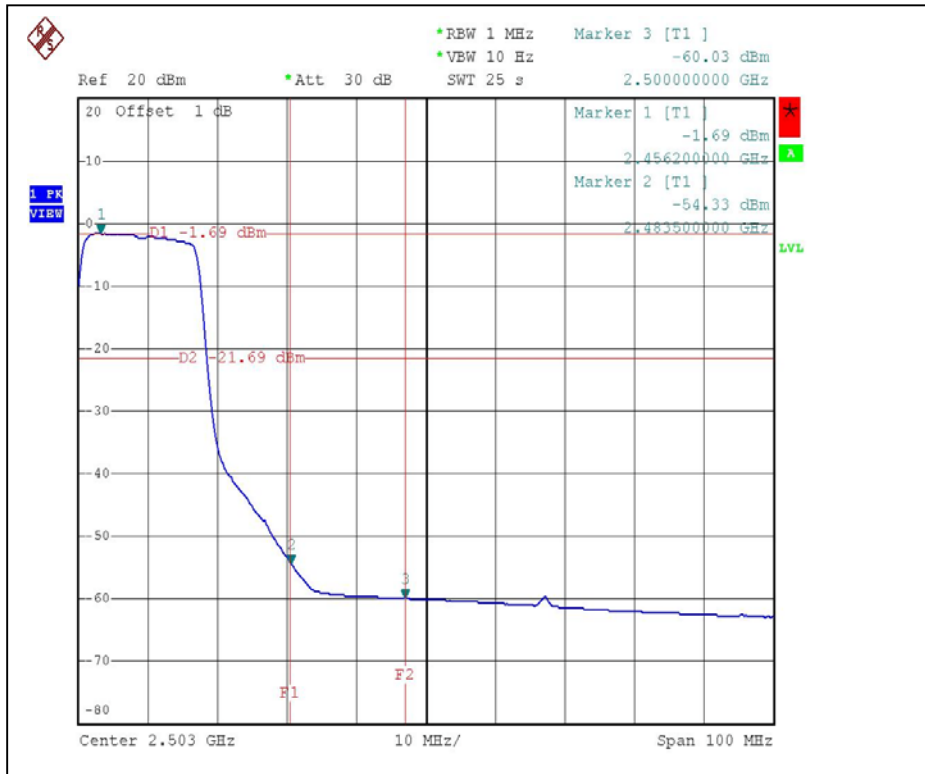
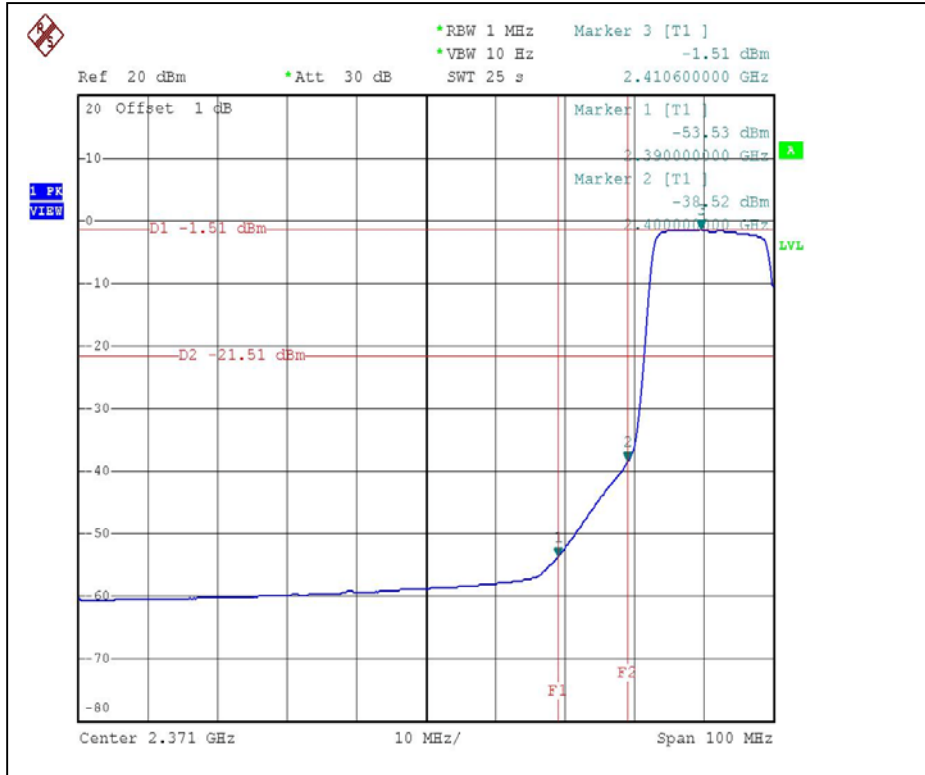
4.6.12 TEST RESULTS (ANTENNA 10 – OFDM)

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

Note - The delta method is only used up to 2 MHz away from the restricted bandage, The radiated emissions which located in other restricted frequency band, the result, please refer to 4.2.

NOTE (1): The band edge emission plot on the following first page shows 55.04dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2. is 98.70dBuV/m, so the maximum field strength in restrict band is $98.70 - 55.04 = 43.66$ dBuV/m which is under 54 dBuV/m limit.

NOTE (2): The band edge emission plot on the following second page shows 56.02dB delta between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 11 at the item 4.2. is 98.90dBuV/m, so the maximum field strength in restrict band is $98.90 - 56.02 = 42.88$ dBuV/m which is under 54 dBuV/m limit.





4.7 ANTENNA REQUIREMENT

4.7.1 STANDARD APPLICABLE

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

4.7.2 ANTENNA CONNECTED CONSTRUCTION

The antenna used in this product are as following.

| No. | Model | Antenna Type | Antenna Connector | Gain (dBi) | Cable loss(dB) |
|-----|---------------|----------------------|-------------------|------------|----------------|
| 1 | ANT24-0500 | Dipole | N female | 5.0 dBi | 2 |
| 2 | SAW0009A1 | Dipole | REVERSE SMA | 5.0 dBi | 0 |
| 3 | DWL-R60AT | MICRO-STRIP PATCH | REVERSE SMA | 7.61 dBi | 0 |
| 4 | SA2-05035G-A5 | Dipole | RP-SMA Plug | 5.0 dBi | 0 |
| 5 | ANT24-0700 | Dipole | REVERSE SMA | 5.89 dBi | 0 |
| 6 | ANT24-0501 | Dipole | N female | 5.0 dBi | 0 |
| 7 | ANT24-0401 | Dipole | SMA Female | 3.5 dBi | 1.5 |
| 8 | ANT24-0400 | Dipole | RP-SMA Plug | 4.0 dBi | 0 |
| 9 | ANT24-1200 | PATCH | SMA Female | 12.0 dBi | 3.2 |
| 10 | ANT24-0600 | 1/2 λ Dipole | SMA Plug Reverse | 5.0 dBi | 0 |

5 PHOTOGRAPHS OF THE TEST CONFIGURATION CONDUCTED EMISSION TEST (With Adapter)



CONDUCTED EMISSION TEST (With Adapter +POE)



RADIATED EMISSION TEST (With Antenna 3+Adapter)



RADIATED EMISSION TEST (With Antenna 3+Adapter+POE)



RADIATED EMISSION TEST (With Antenna 5+Adapter)



RADIATED EMISSION TEST (With Antenna 5+Adapter+POE)



RADIATED EMISSION TEST (With Antenna 9+Adapter)



RADIATED EMISSION TEST (With Antenna 9+Adapter+POE)



RADIATED EMISSION TEST (With Antenna 10+Adapter)



RADIATED EMISSION TEST (With Antenna 10+Adapter+POE)





6 INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025:

| | |
|--------------------|----------------------|
| USA | FCC, NVLAP, UL, A2LA |
| Germany | TUV Rheinland |
| Japan | VCCI |
| Norway | NEMKO |
| Canada | INDUSTRY CANADA, CSA |
| R.O.C. | CNLA, BSMI, DGT |
| Netherlands | Telefication |
| Singapore | PSB, GOST-ASIA (MOU) |
| Russia | CERTIS (MOU) |

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: www.adt.com.tw/index.5/phtml.

If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab:

Tel: 886-2-26052180

Fax: 886-2-26052943

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.