



4.6 BAND EDGES MEASUREMENT

4.6.1 LIMITS OF BAND EDGES MEASUREMENT

Below -20dB of the highest emission level of operating band (in 100KHz 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 +/- 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.

4.6.3 TEST PROCEDURE

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

The spectrum plots (Peak RBW=VBW=100kHz ; Average RBW=1MHz, VBW=10Hz) are attached on the following pages.

4.6.4 EUT OPERATING CONDITION

Same as Item 4.3.5



4.6.5 TEST RESULTS (Mode 1 - MAIN Antenna Connector – ANTENNA 2 – 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):

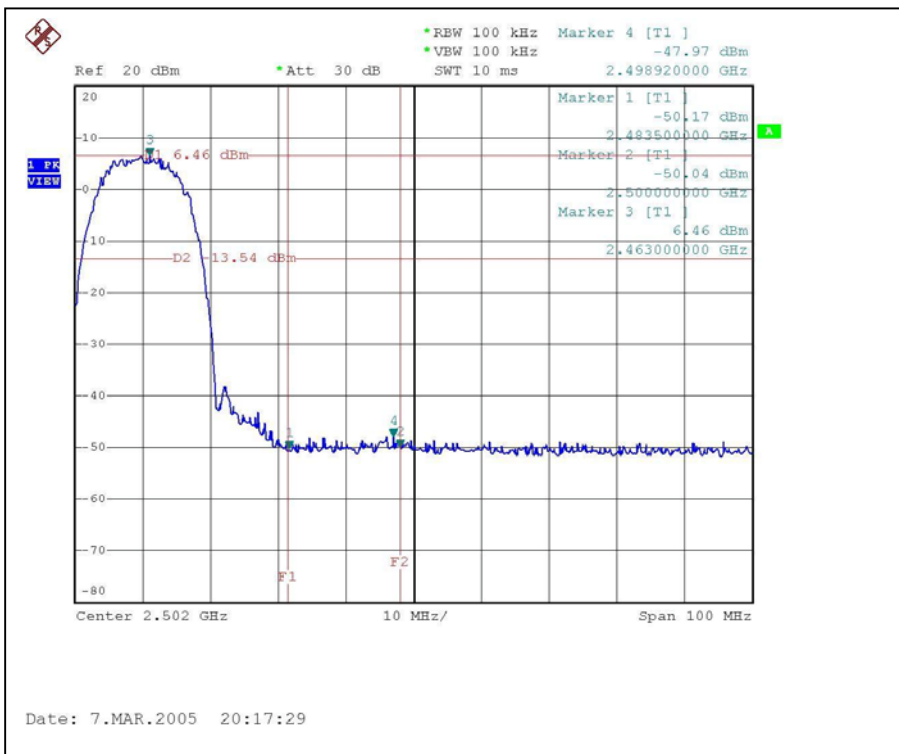
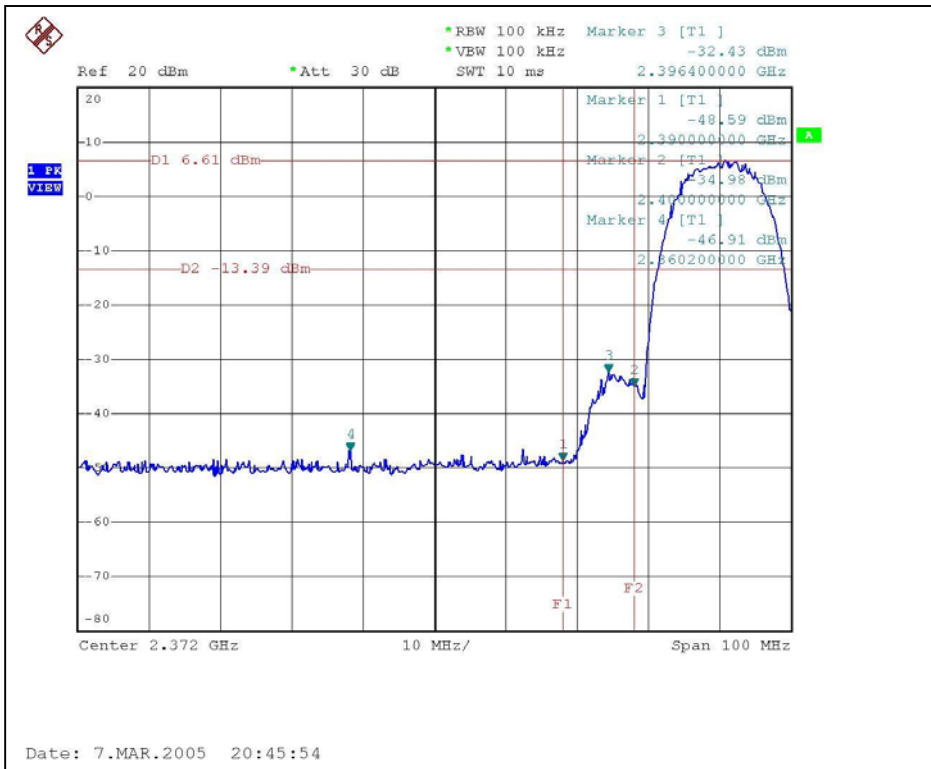
The band edge emission plot of DSSS technique on page 88 show 55.2dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2 is 115.10dBuV/m (Peak), so the maximum field strength in restrict band is $115.10 - 55.2 = 59.90$ dBuV/m which is under 74 dBuV/m limit.

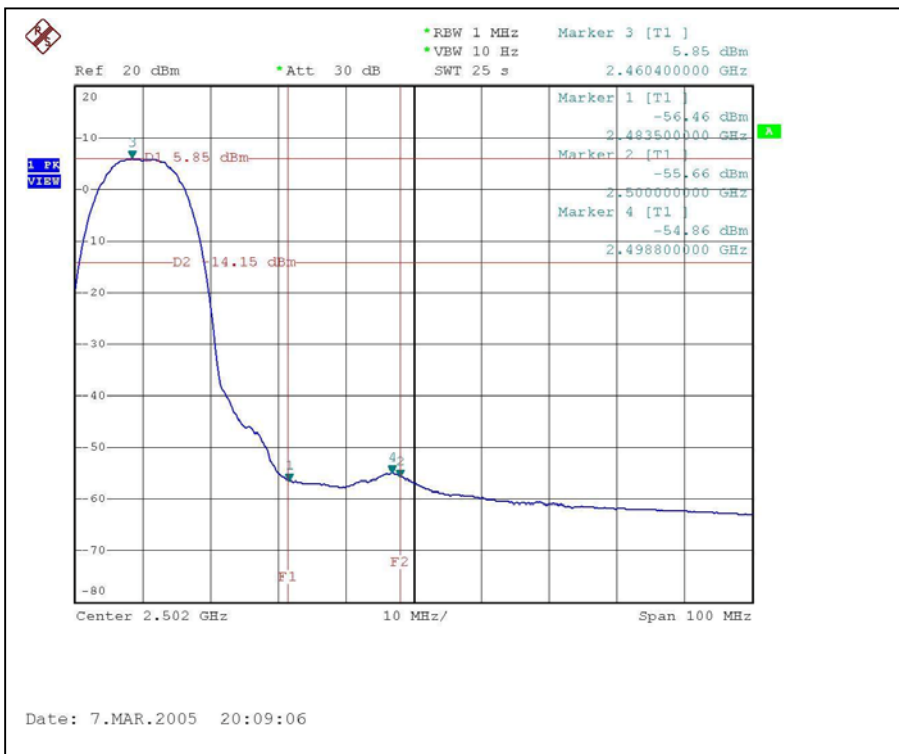
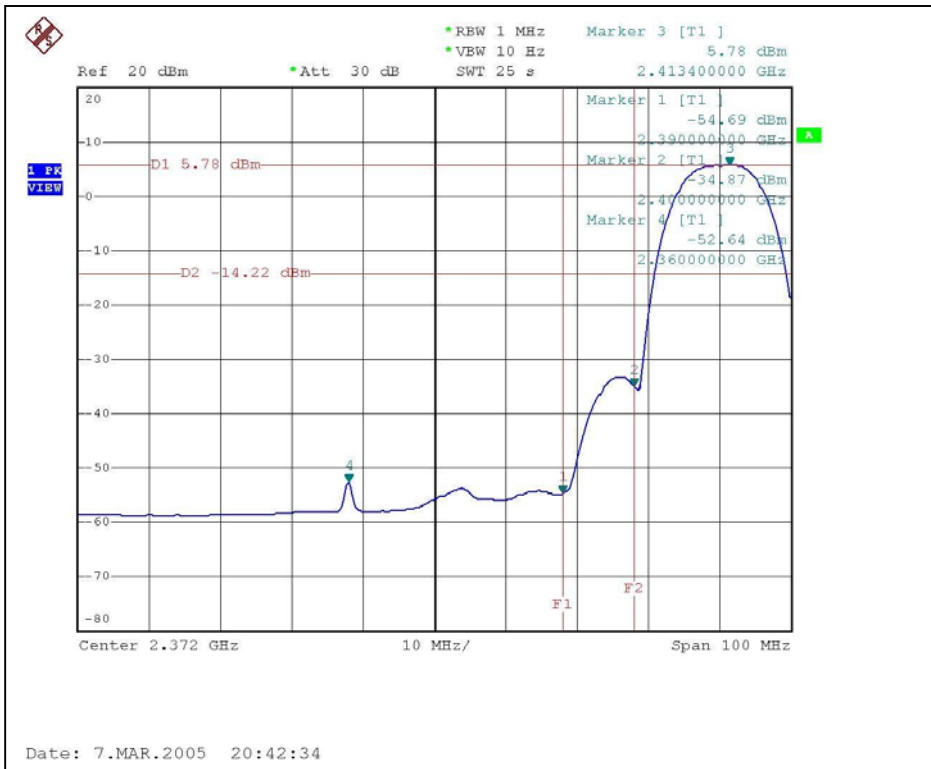
The band edge emission plot of DSSS technique on page 89 show 60.47dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2 is 108.10dBuV/m (Average), so the maximum field strength in restrict band is $108.10 - 60.47 = 47.63$ dBuV/m which is under 54 dBuV/m limit.

NOTE (2):

The band edge emission plot of DSSS on page 88 shows 56.63dB 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 112.90dBuV/m (Peak), so the maximum field strength in restrict band is $112.90 - 56.63 = 56.27$ dBuV/m which is under 74 dBuV/m limit.

The band edge emission plot of DSSS on page 89 shows 62.31dB 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 107.0dBuV/m (Average), so the maximum field strength in restrict band is $107.0 - 62.31 = 44.69$ dBuV/m which is under 54 dBuV/m limit.







4.6.6 TEST RESULTS (Mode1 - MAIN Antenna Connector – ANTENNA 2 – 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):

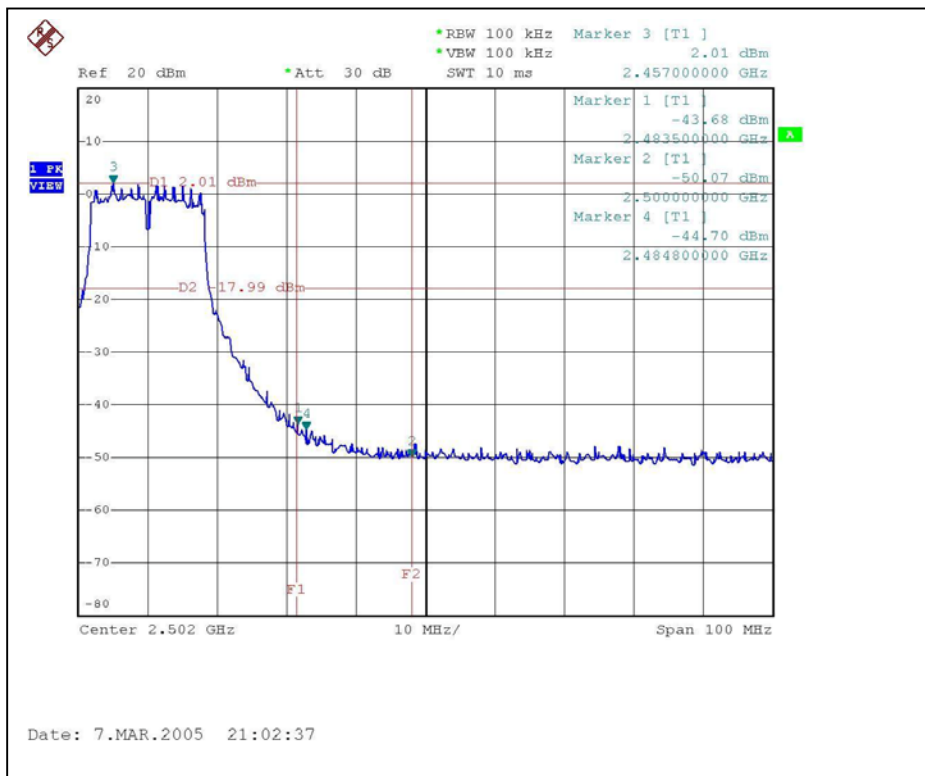
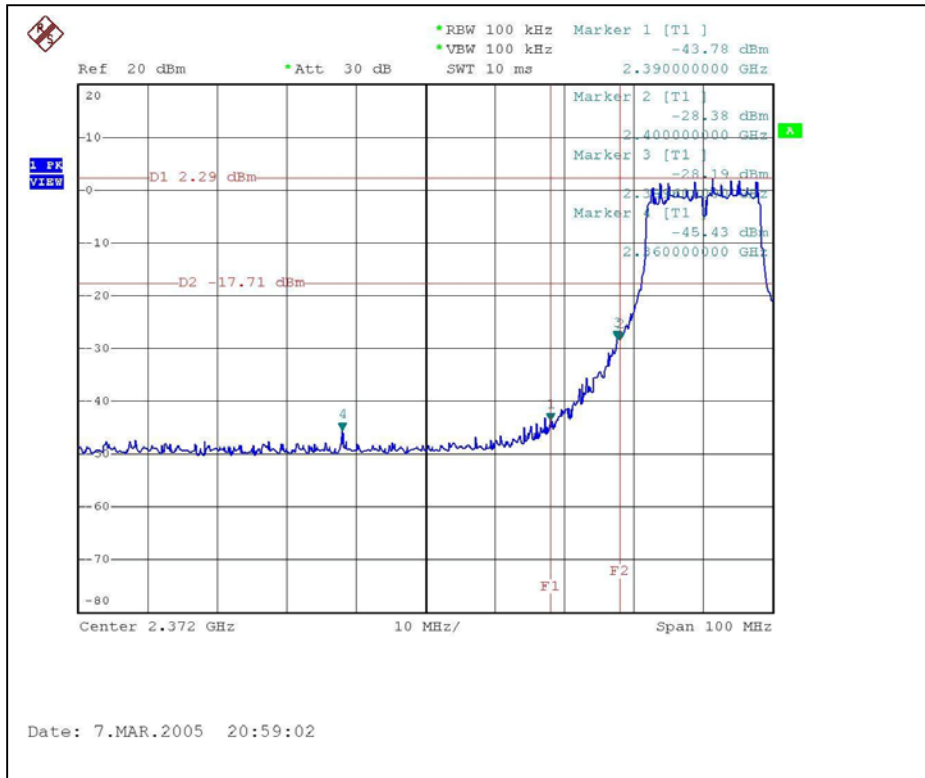
The band edge emission plot of OFDM on page 91 shows 46.07dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2. is 109.30dBuV/m (Peak), so the maximum field strength in restrict band is $109.30 - 46.07 = 63.23$ dBuV/m which is under 74 dBuV/m limit.

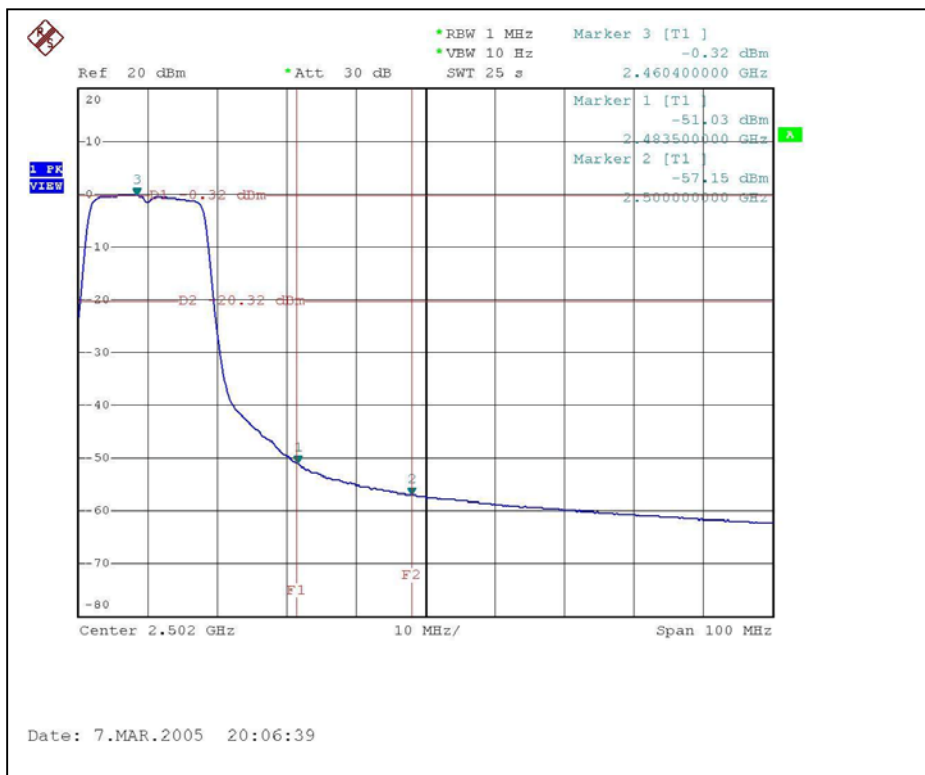
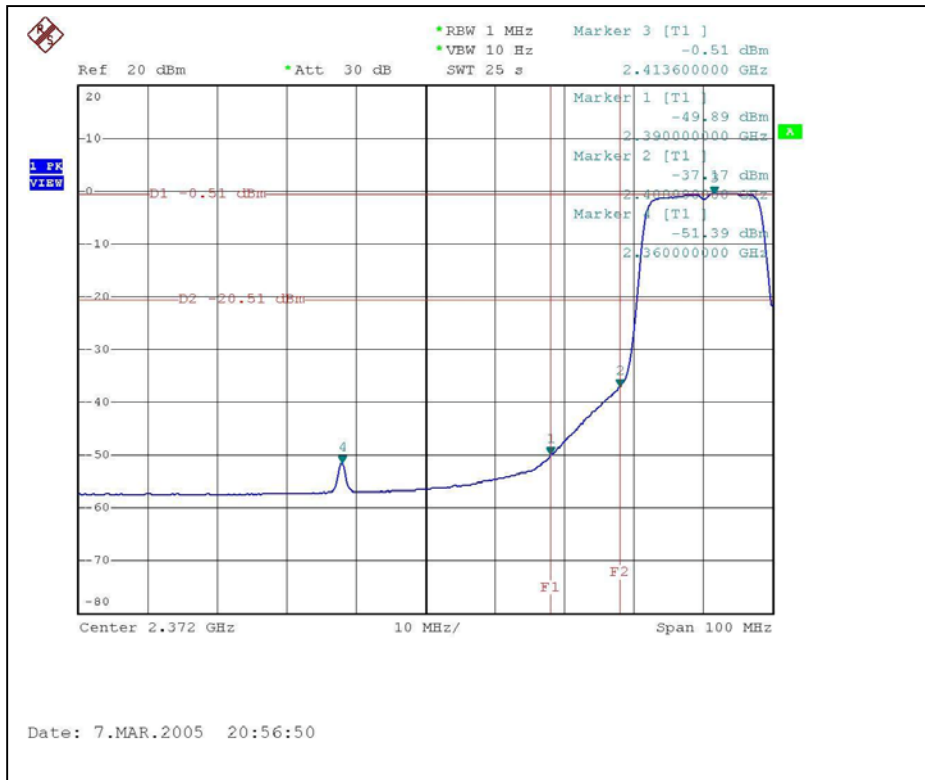
The band edge emission plot of OFDM on page 92 shows 49.38dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2. is 101.60dBuV/m (Average), so the maximum field strength in restrict band is $101.60 - 49.38 = 52.22$ dBuV/m which is under 54 dBuV/m limit.

NOTE (2):

The band edge emission plot of OFDM on page 91 shows 45.69dB 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 107.90dBuV/m (Peak), so the maximum field strength in restrict band is $107.90 - 45.69 = 62.21$ dBuV/m which is under 74 dBuV/m limit.

The band edge emission plot of OFDM on page 92 shows 50.71dB 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 99.50dBuV/m (Average), so the maximum field strength in restrict band is $99.50 - 50.71 = 48.79$ dBuV/m which is under 54 dBuV/m limit.







4.6.7 TEST RESULTS (Mode 1 - AUX Antenna Connector – 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):

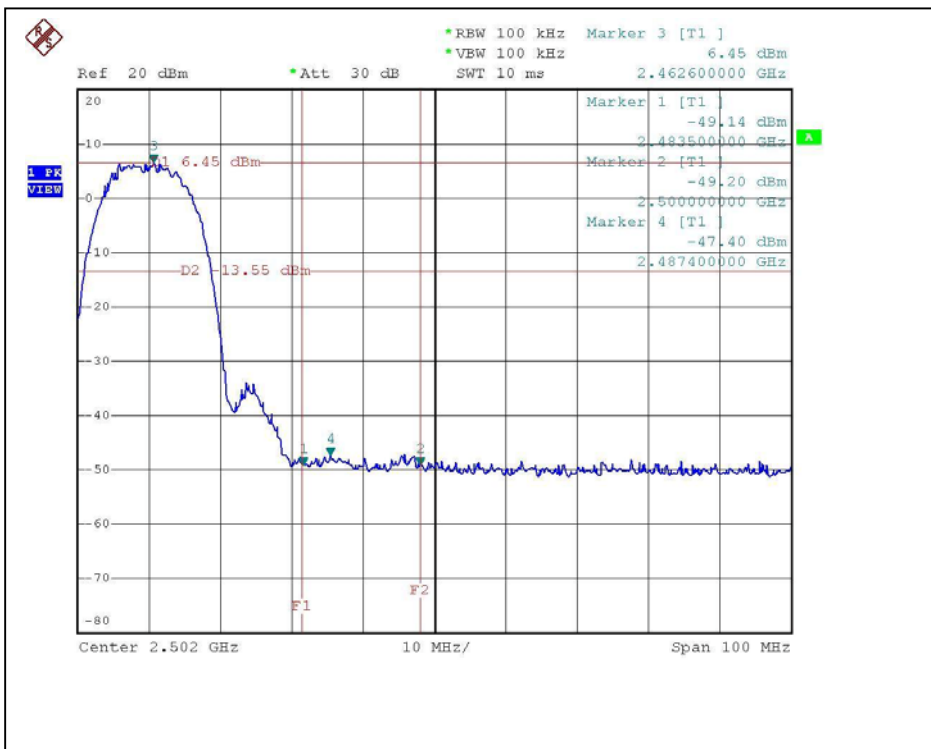
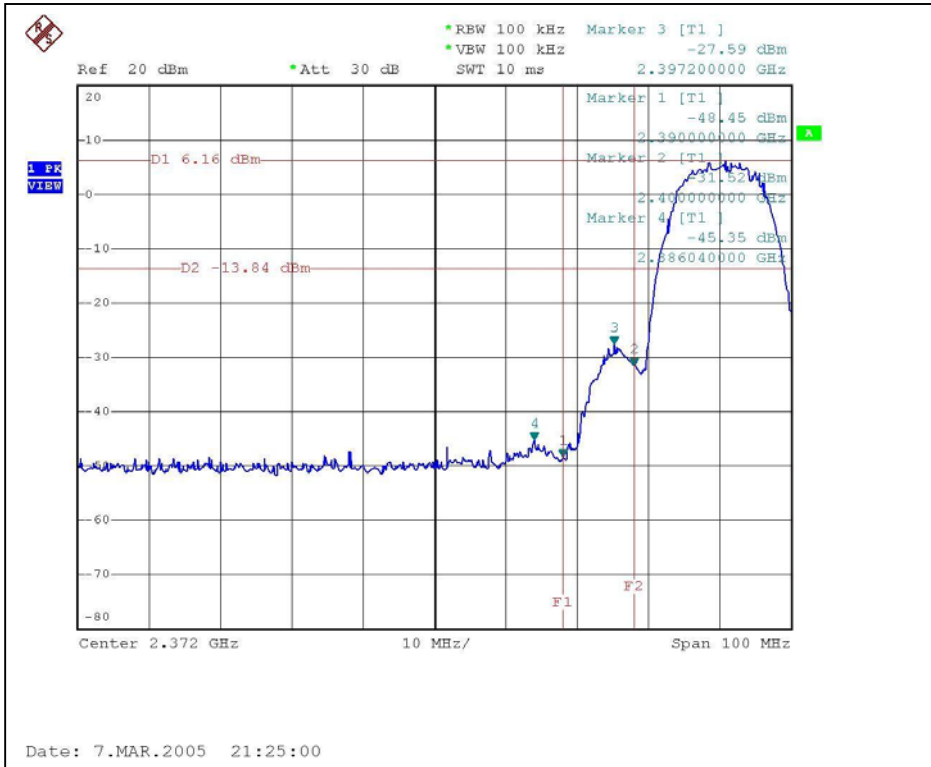
The band edge emission plot of DSSS technique on page 94 show 54.61dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2 is 112.10dBuV/m (Peak), so the maximum field strength in restrict band is $112.10 - 54.61 = 57.49$ dBuV/m which is under 74 dBuV/m limit.

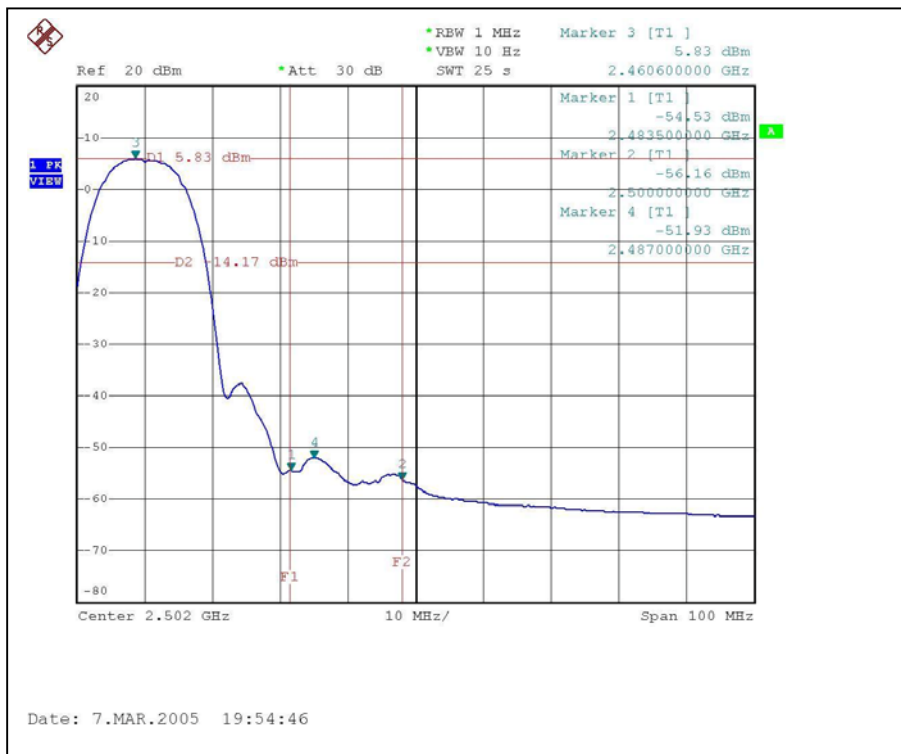
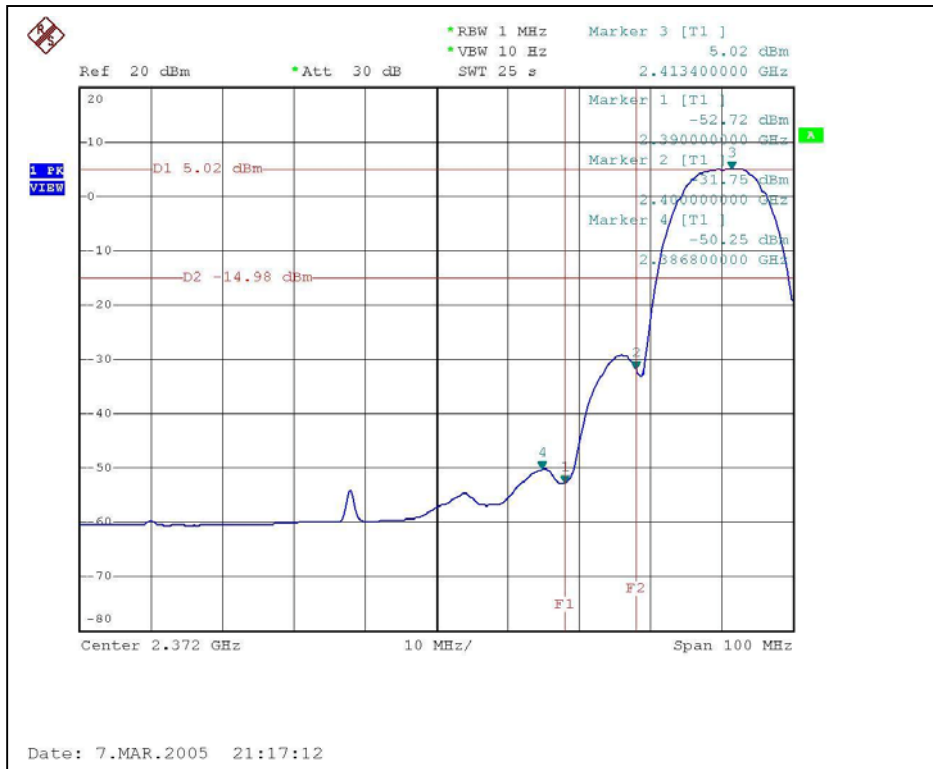
The band edge emission plot of DSSS technique on page 95 show 57.74dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2 is 105.90dBuV/m (Average), so the maximum field strength in restrict band is $105.90 - 57.74 = 48.16$ dBuV/m which is under 54 dBuV/m limit.

NOTE (2):

The band edge emission plot of DSSS on page 94 shows 55.59dB 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 113.10dBuV/m (Peak), so the maximum field strength in restrict band is $113.10 - 55.59 = 57.51$ dBuV/m which is under 74 dBuV/m limit.

The band edge emission plot of DSSS on page 95 shows 60.36dB 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 106.40dBuV/m (Average), so the maximum field strength in restrict band is $106.40 - 60.36 = 46.04$ dBuV/m which is under 54 dBuV/m limit.







4.6.8 TEST RESULTS (Mode1 - AUX Antenna Connector – 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):

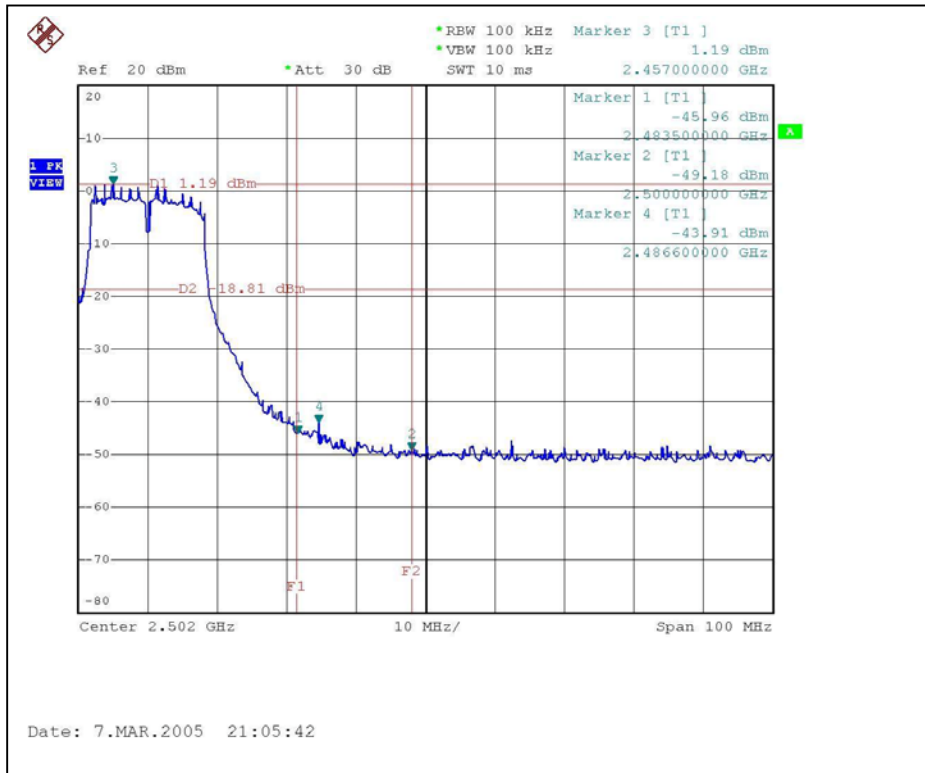
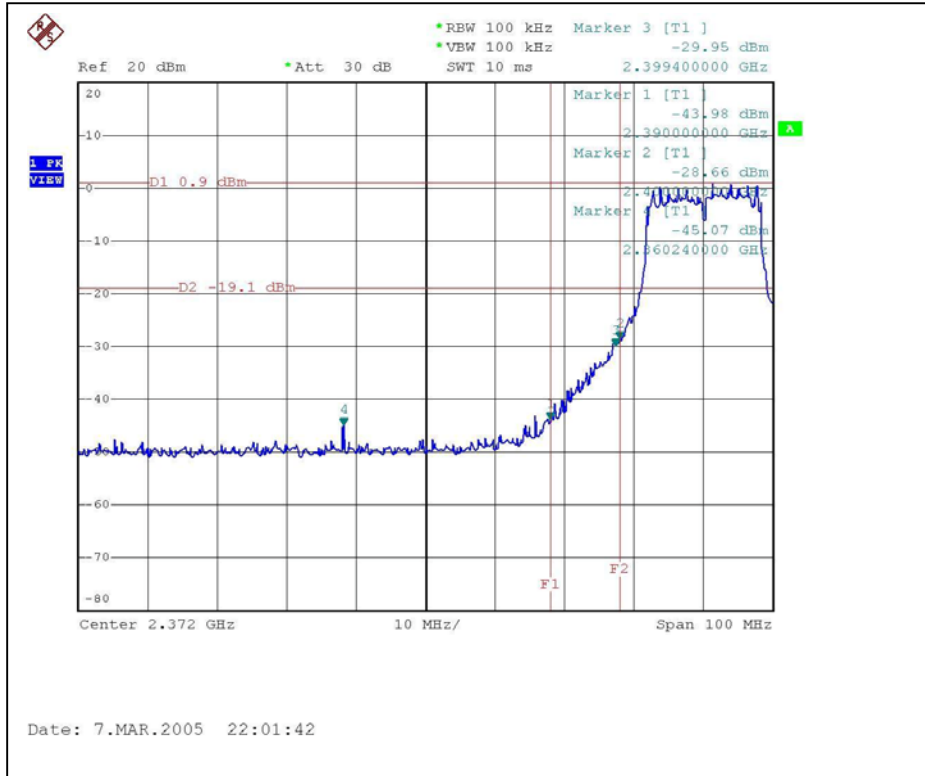
The band edge emission plot of OFDM on page 97 shows 44.88dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2. is 110.0dBuV/m (Peak), so the maximum field strength in restrict band is $110.0 - 44.88 = 65.12$ dBuV/m which is under 74 dBuV/m limit.

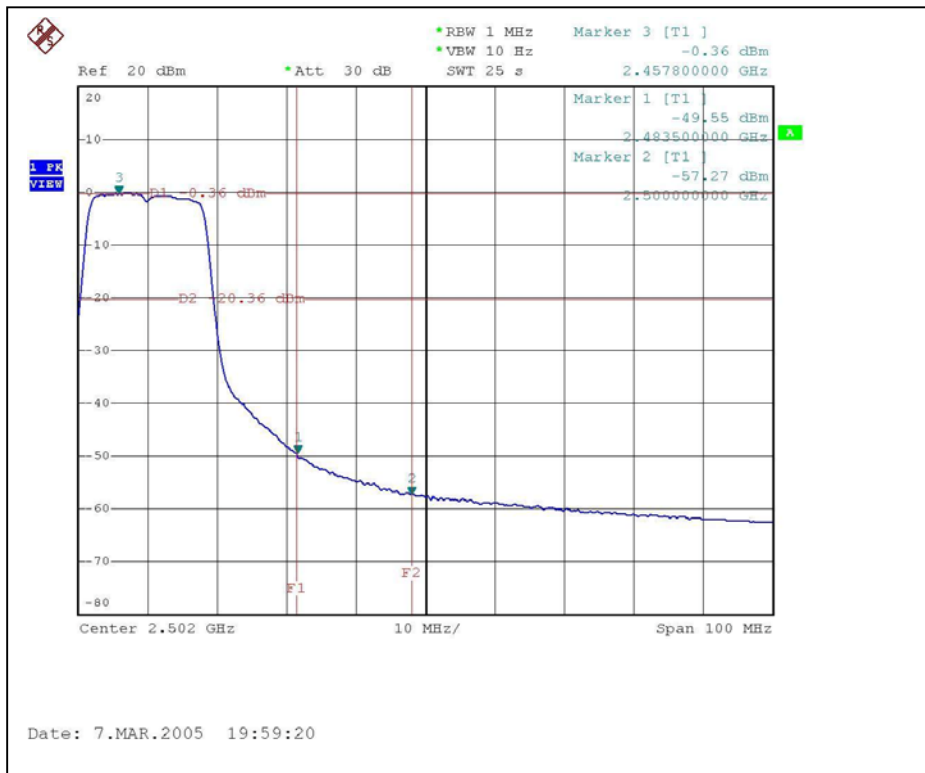
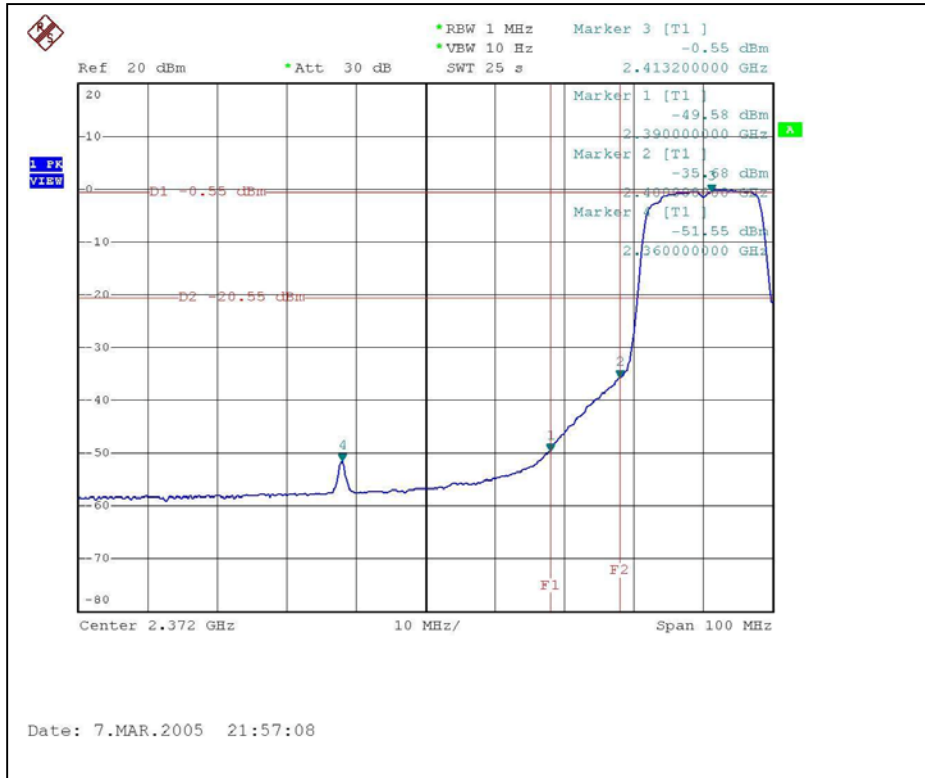
The band edge emission plot of OFDM on page 98 shows 49.03dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2. is 101.60dBuV/m (Average), so the maximum field strength in restrict band is $101.60 - 49.03 = 52.57$ dBuV/m which is under 54 dBuV/m limit.

NOTE (2):

The band edge emission plot of OFDM on page 97 shows 47.15dB 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 109.90dBuV/m (Peak), so the maximum field strength in restrict band is $109.90 - 47.15 = 62.75$ dBuV/m which is under 74 dBuV/m limit.

The band edge emission plot of OFDM on page 98 shows 49.19dB 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 101.30dBuV/m (Average), so the maximum field strength in restrict band is $101.30 - 49.19 = 52.11$ dBuV/m which is under 54 dBuV/m limit.







4.6.9 TEST RESULTS (Mode 2 - AUX Antenna Connector – ANTENNA 2 – 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):

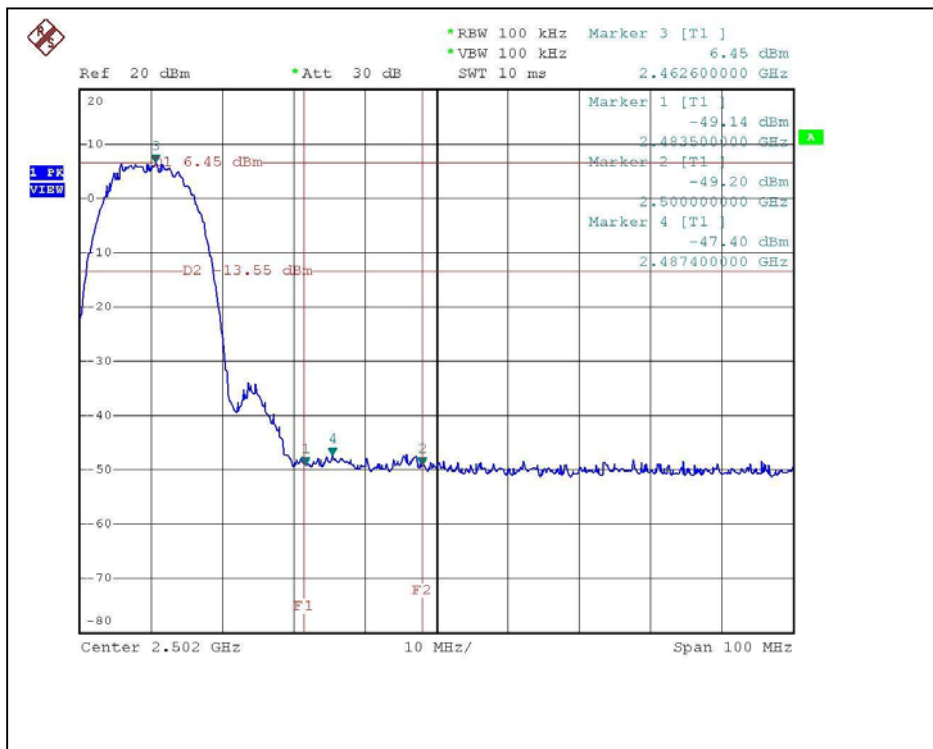
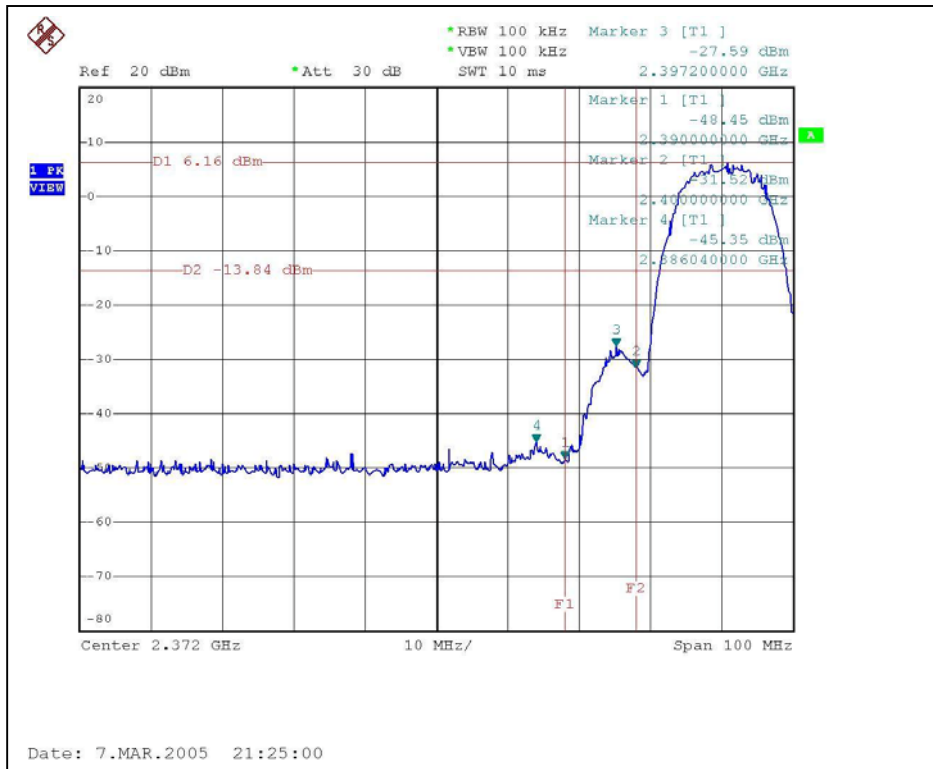
The band edge emission plot of DSSS technique on page 100 show 54.61dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2 is 113.30dBuV/m (Peak), so the maximum field strength in restrict band is $113.30-54.61=58.69$ dBuV/m which is under 74 dBuV/m limit.

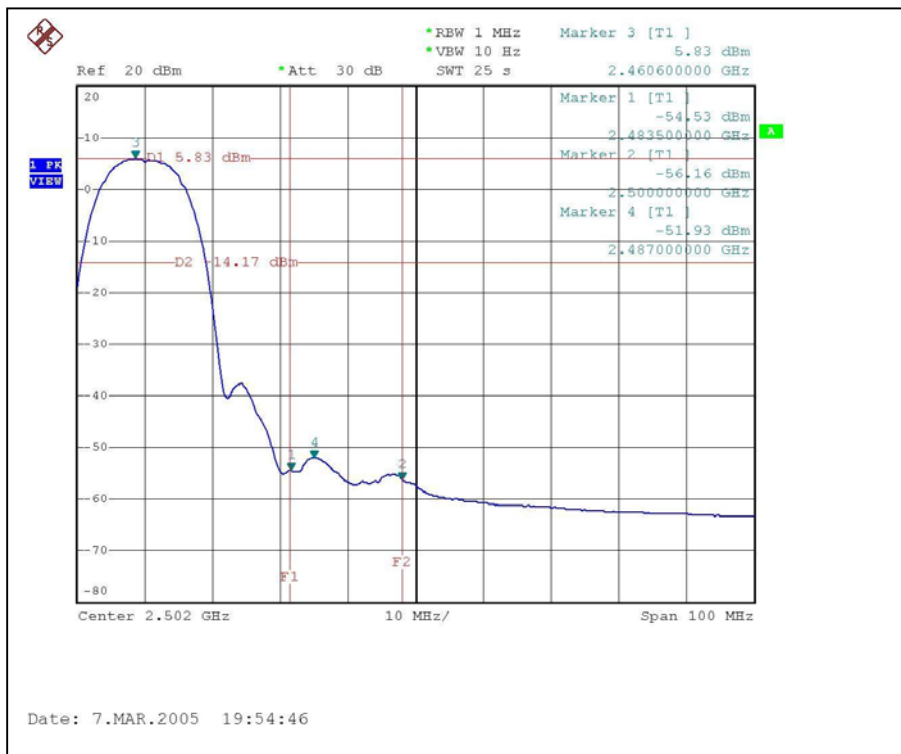
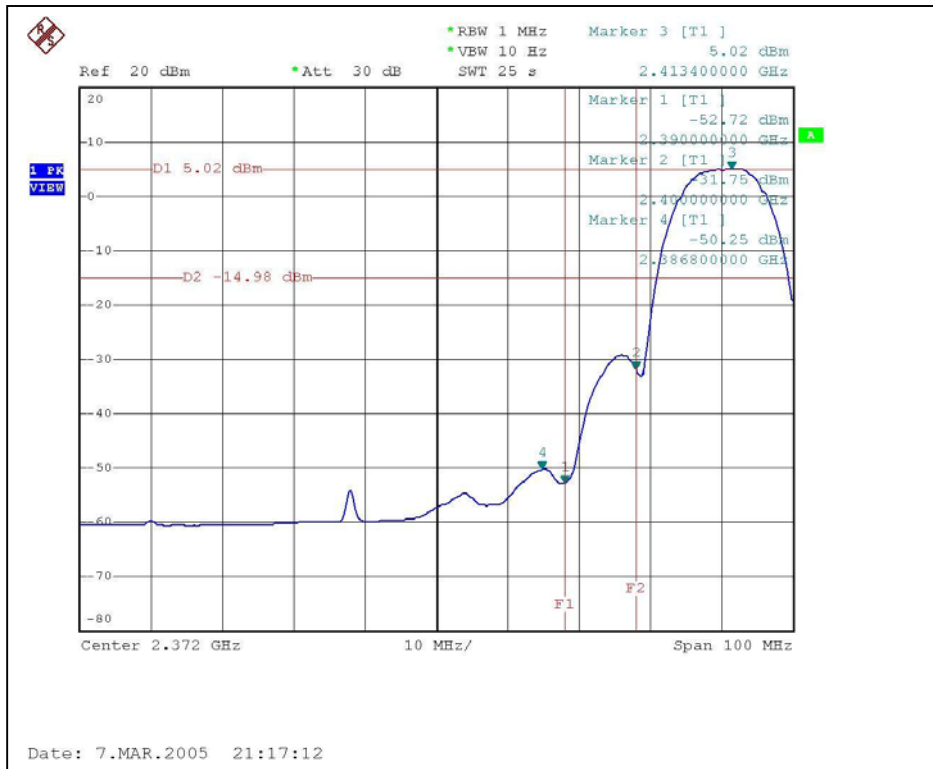
The band edge emission plot of DSSS technique on page 101 show 57.74dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2 is 106.20dBuV/m (Average), so the maximum field strength in restrict band is $106.20-57.74=48.46$ dBuV/m which is under 54 dBuV/m limit.

NOTE (2):

The band edge emission plot of DSSS on page 100 shows 55.59dB 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 112.20dBuV/m (Peak), so the maximum field strength in restrict band is $112.20-55.59=56.61$ dBuV/m which is under 74 dBuV/m limit.

The band edge emission plot of DSSS on page 101 shows 60.36dB 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 105.20dBuV/m (Average), so the maximum field strength in restrict band is $105.20-60.36=44.84$ dBuV/m which is under 54 dBuV/m limit.







4.6.10 TEST RESULTS (Mode2 - AUX Antenna Connector – ANTENNA 2 – 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):

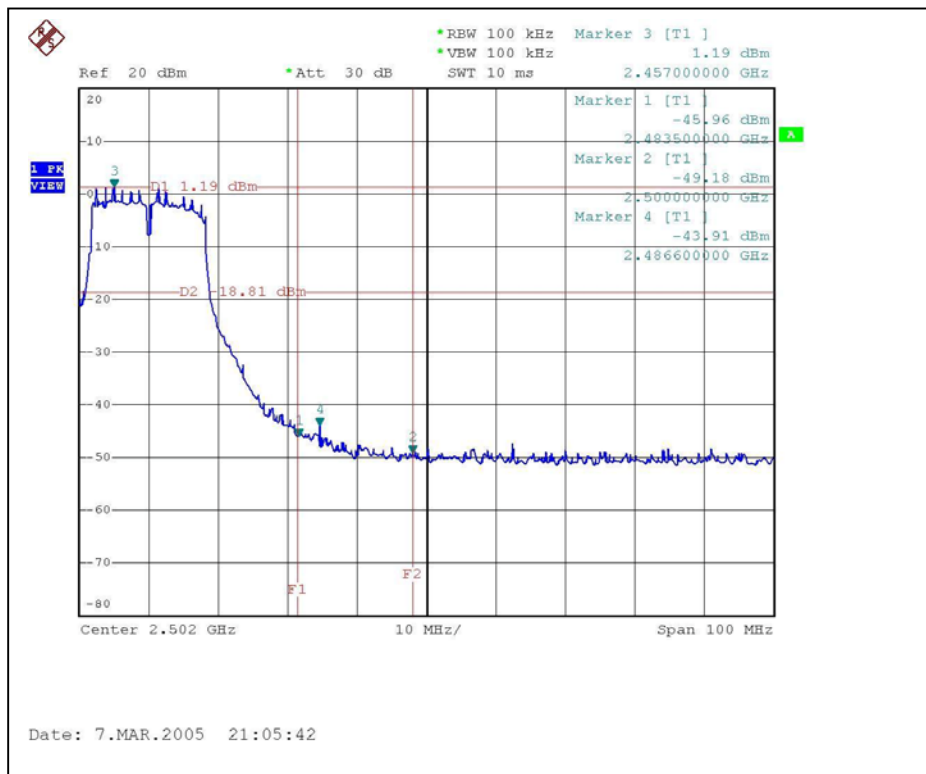
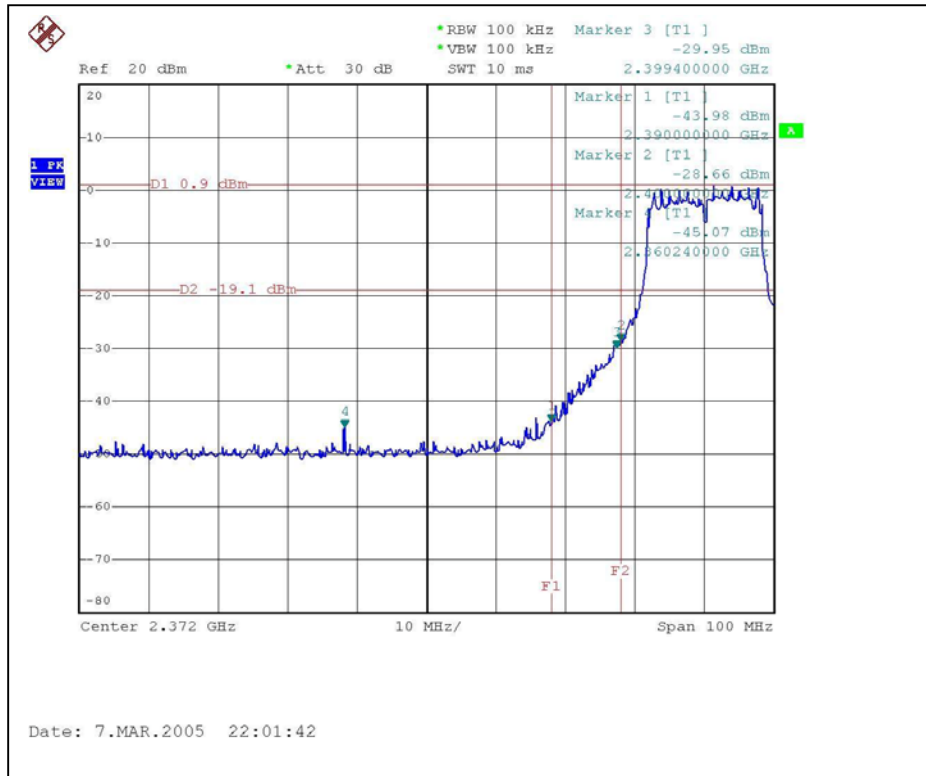
The band edge emission plot of OFDM on page 103 shows 44.88dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2. is 108.80dBuV/m (Peak), so the maximum field strength in restrict band is $108.80 - 44.88 = 63.92$ dBuV/m which is under 74 dBuV/m limit.

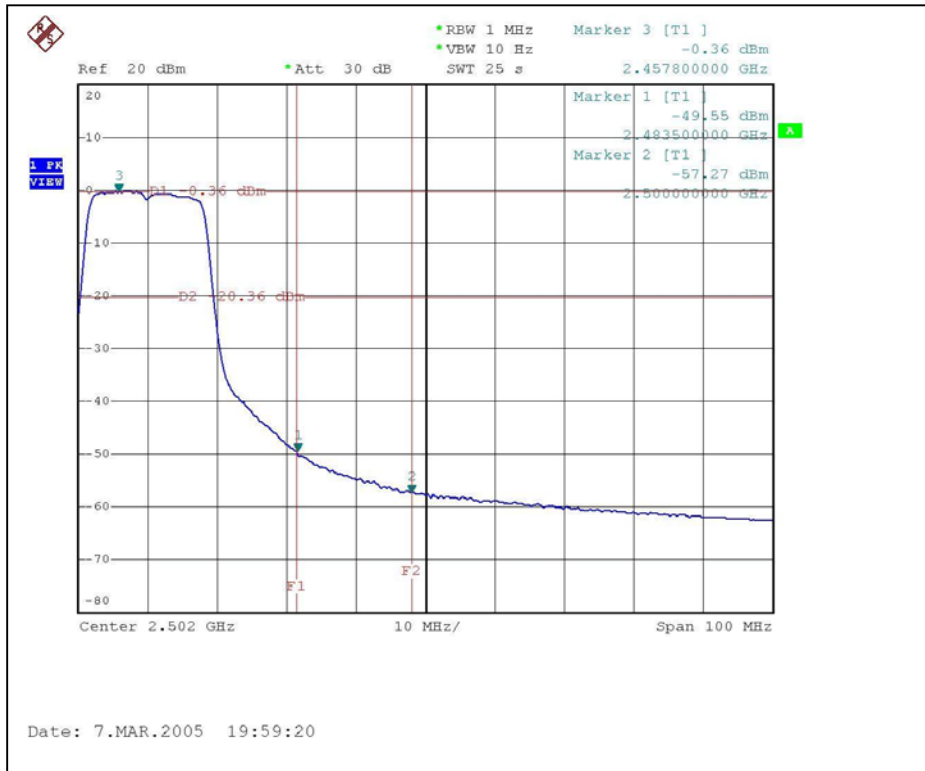
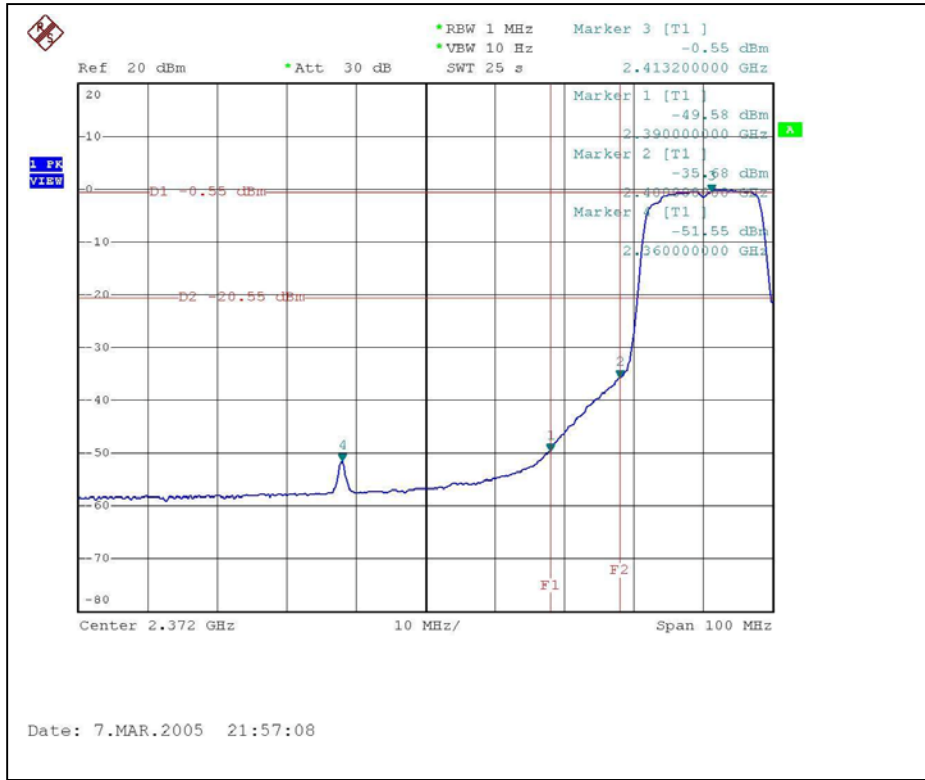
The band edge emission plot of OFDM on page 104 shows 49.03dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2. is 99.80dBuV/m (Average), so the maximum field strength in restrict band is $99.80 - 49.03 = 50.77$ dBuV/m which is under 54 dBuV/m limit.

NOTE (2):

The band edge emission plot of OFDM on page 103 shows 47.15dB 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 108.80dBuV/m (Peak), so the maximum field strength in restrict band is $108.80 - 47.15 = 61.65$ dBuV/m which is under 74 dBuV/m limit.

The band edge emission plot of OFDM on page 104 shows 49.19dB 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 99.80dBuV/m (Average), so the maximum field strength in restrict band is $99.80 - 49.19 = 50.61$ dBuV/m which is under 54 dBuV/m limit.







4.6.11 TEST RESULTS (Mode 3 - MAIN Antenna Connector – ANTENNA 6 – 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):

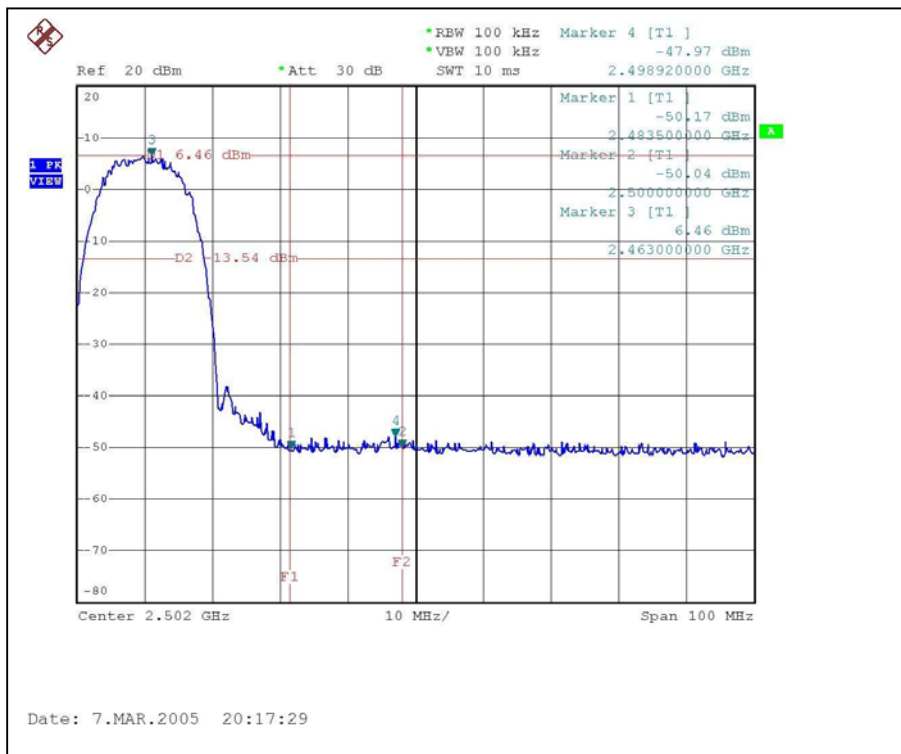
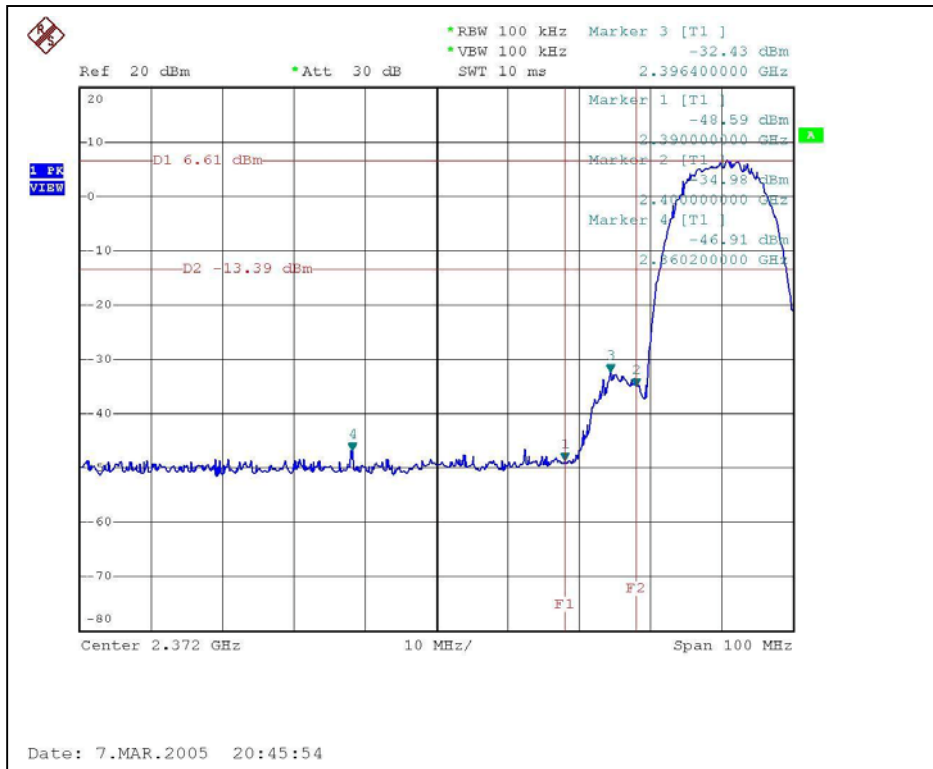
The band edge emission plot of DSSS technique on page 106 show 55.2dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2 is 114.50dBuV/m (Peak), so the maximum field strength in restrict band is $114.50-55.2=59.30$ dBuV/m which is under 74 dBuV/m limit.

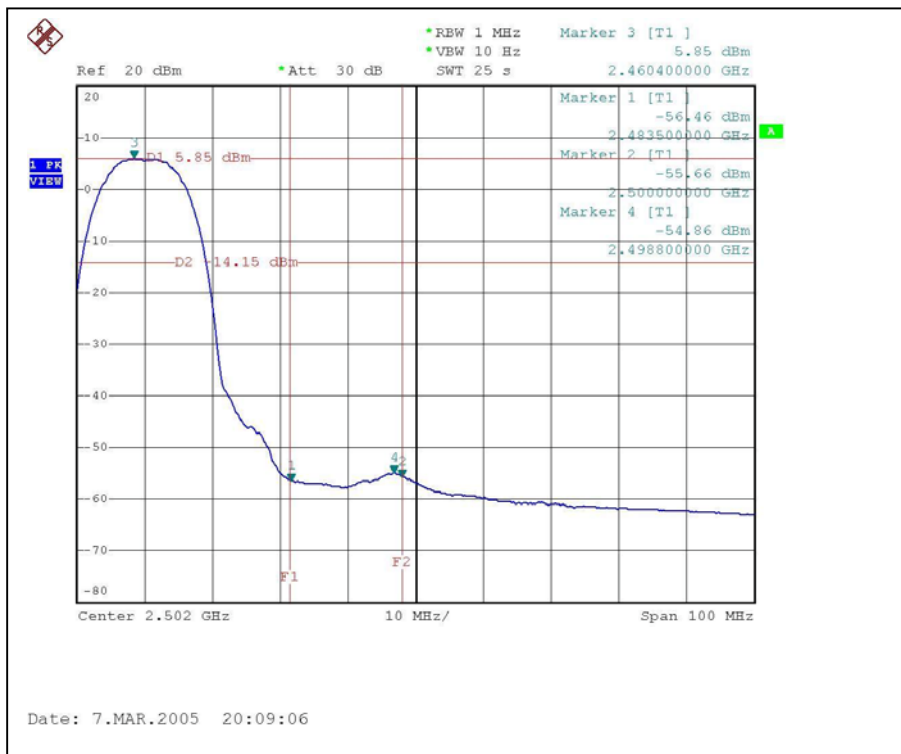
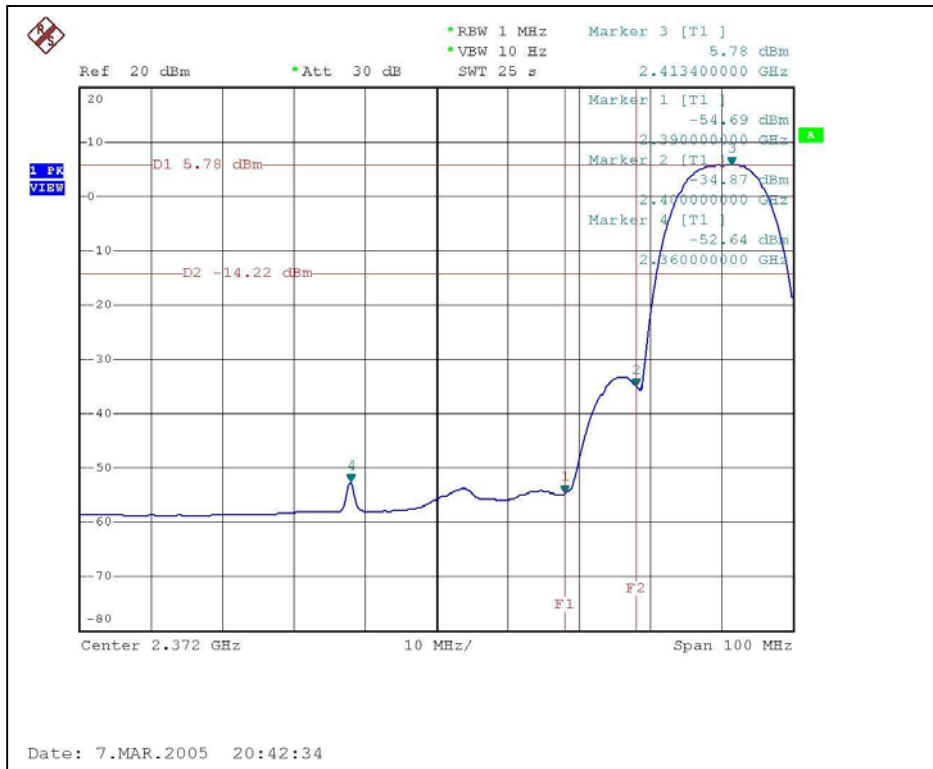
The band edge emission plot of DSSS technique on page 107 show 60.47dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2 is 107.10dBuV/m (Average), so the maximum field strength in restrict band is $107.10-60.47=46.63$ dBuV/m which is under 54 dBuV/m limit.

NOTE (2):

The band edge emission plot of DSSS on page 106 shows 56.63dB 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 114.50dBuV/m (Peak), so the maximum field strength in restrict band is $114.50-56.63=57.87$ dBuV/m which is under 74 dBuV/m limit.

The band edge emission plot of DSSS on page 107 shows 62.31dB 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 107.20dBuV/m (Average), so the maximum field strength in restrict band is $107.20-62.31=44.89$ dBuV/m which is under 54 dBuV/m limit.







4.6.12 TEST RESULTS (Mode3 - MAIN Antenna Connector – ANTENNA 6 – 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):

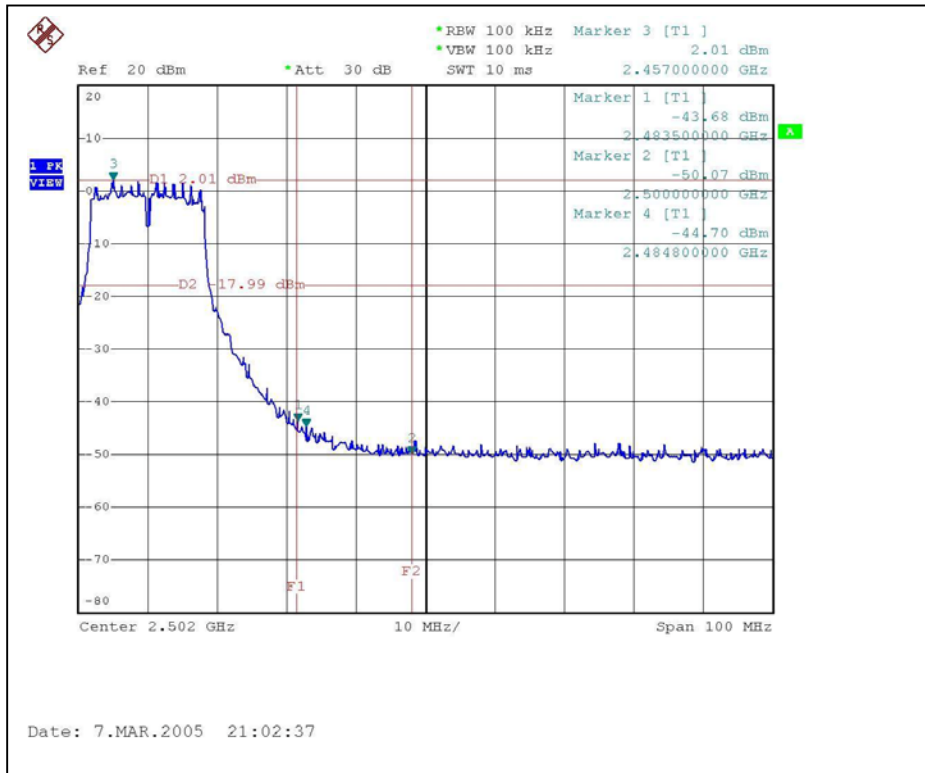
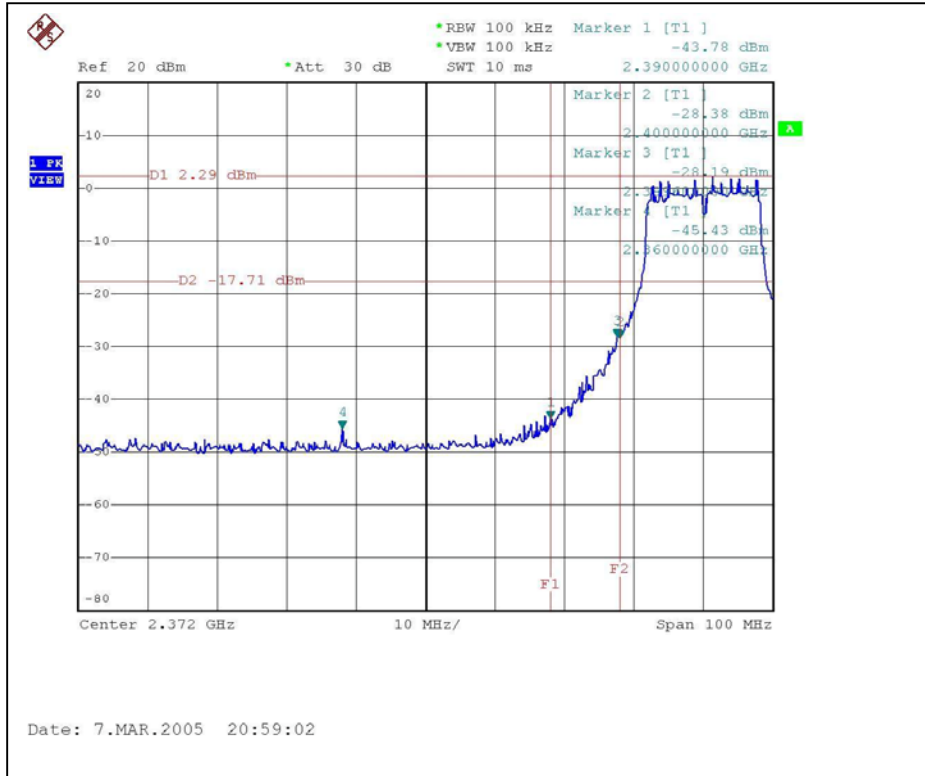
The band edge emission plot of OFDM on page 109 shows 46.07dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2. is 110.0dBuV/m (Peak), so the maximum field strength in restrict band is $110.0 - 46.07 = 63.93$ dBuV/m which is under 74 dBuV/m limit.

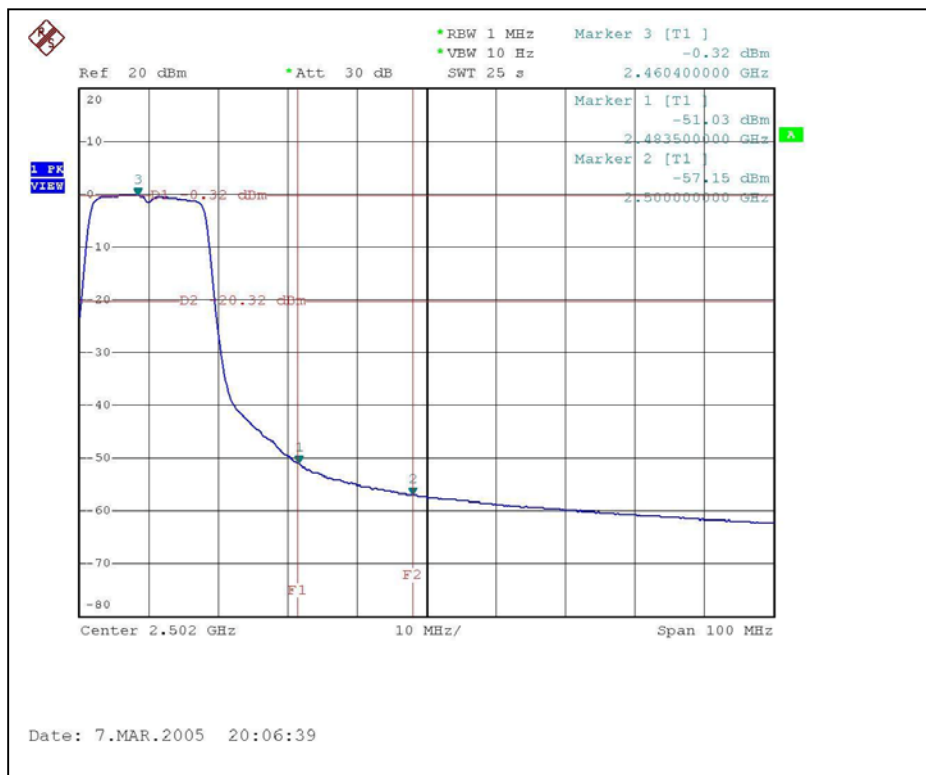
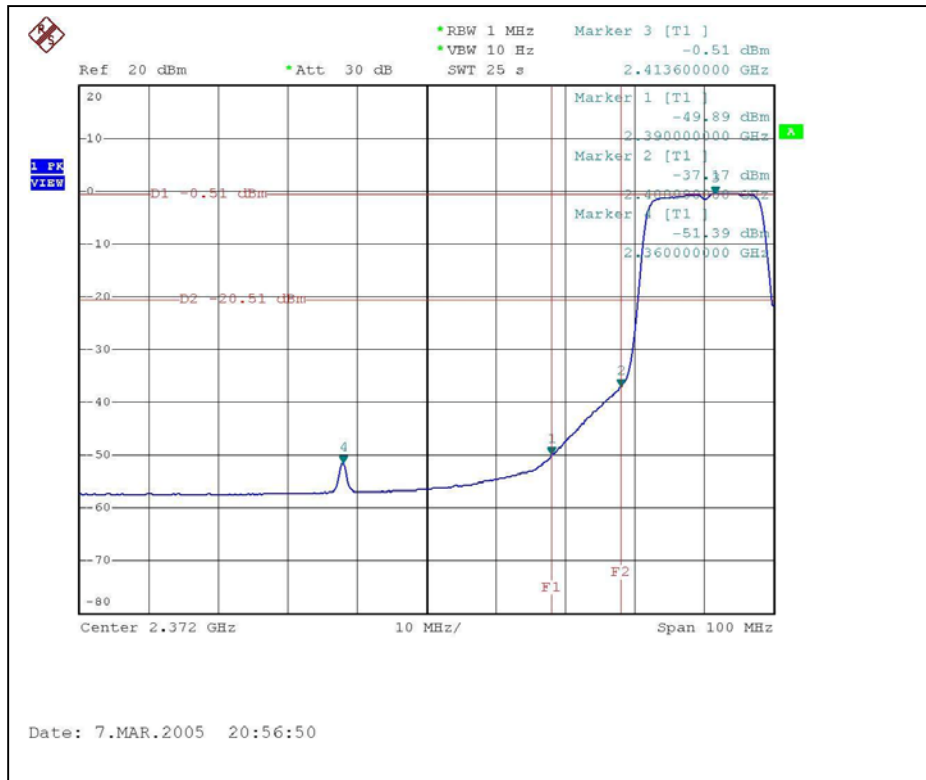
The band edge emission plot of OFDM on page 110 shows 49.38dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2. is 101.30dBuV/m (Average), so the maximum field strength in restrict band is $101.30 - 49.38 = 51.92$ dBuV/m which is under 54 dBuV/m limit.

NOTE (2):

The band edge emission plot of OFDM on page 109 shows 45.69dB 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 (Peak), so the maximum field strength in restrict band is $110.60 - 45.69 = 64.91$ dBuV/m which is under 74 dBuV/m limit.

The band edge emission plot of OFDM on page 110 shows 50.71dB 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 101.80dBuV/m (Average), so the maximum field strength in restrict band is $101.80 - 50.71 = 51.09$ dBuV/m which is under 54 dBuV/m limit.







4.6.13 TEST RESULTS (Mode 3 - AUX Antenna Connector – 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):

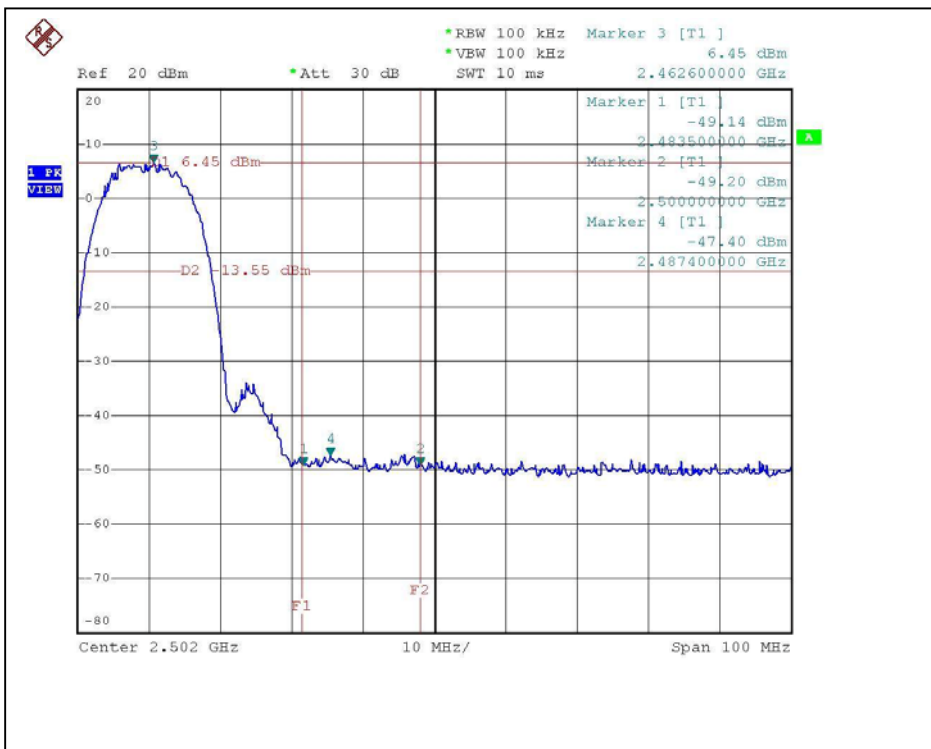
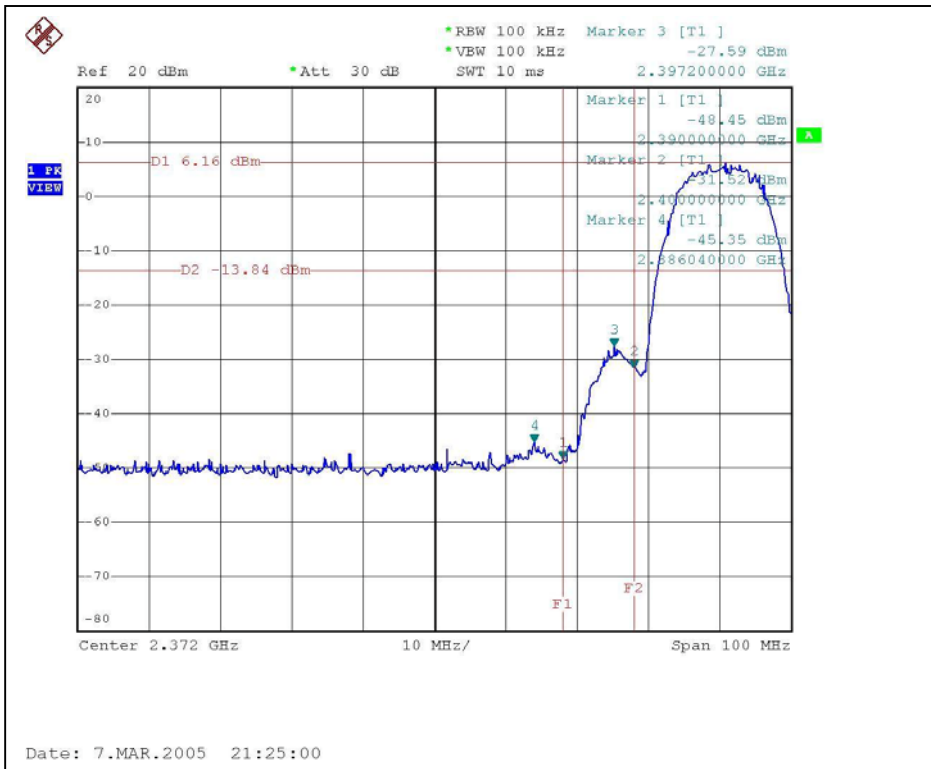
The band edge emission plot of DSSS technique on page 112 show 54.61dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2 is 112.30dBuV/m (Peak), so the maximum field strength in restrict band is $112.30-54.61=57.69$ dBuV/m which is under 74 dBuV/m limit.

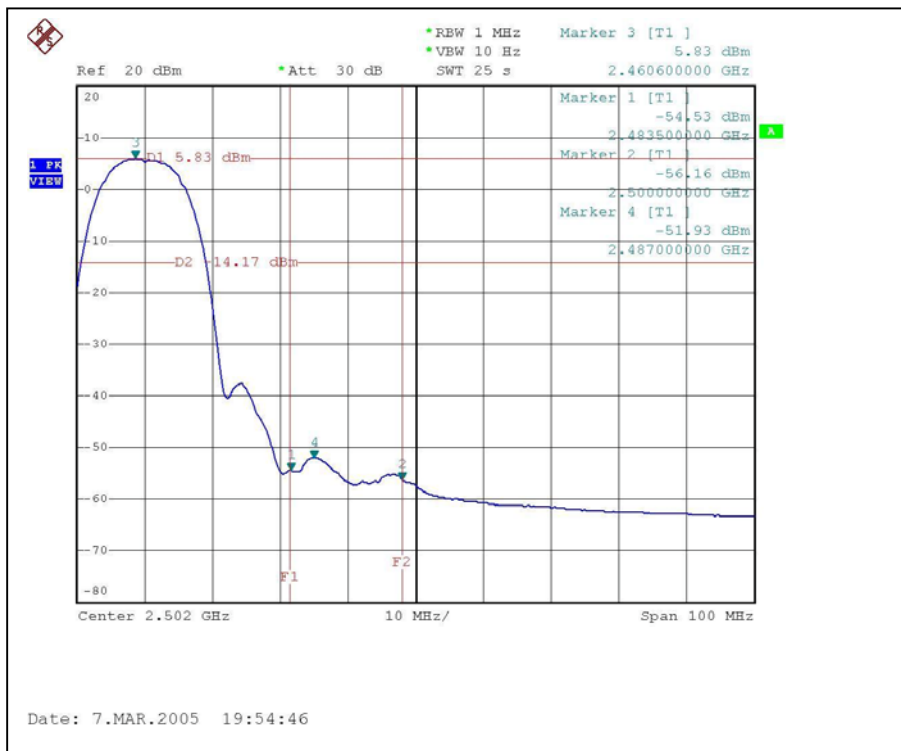
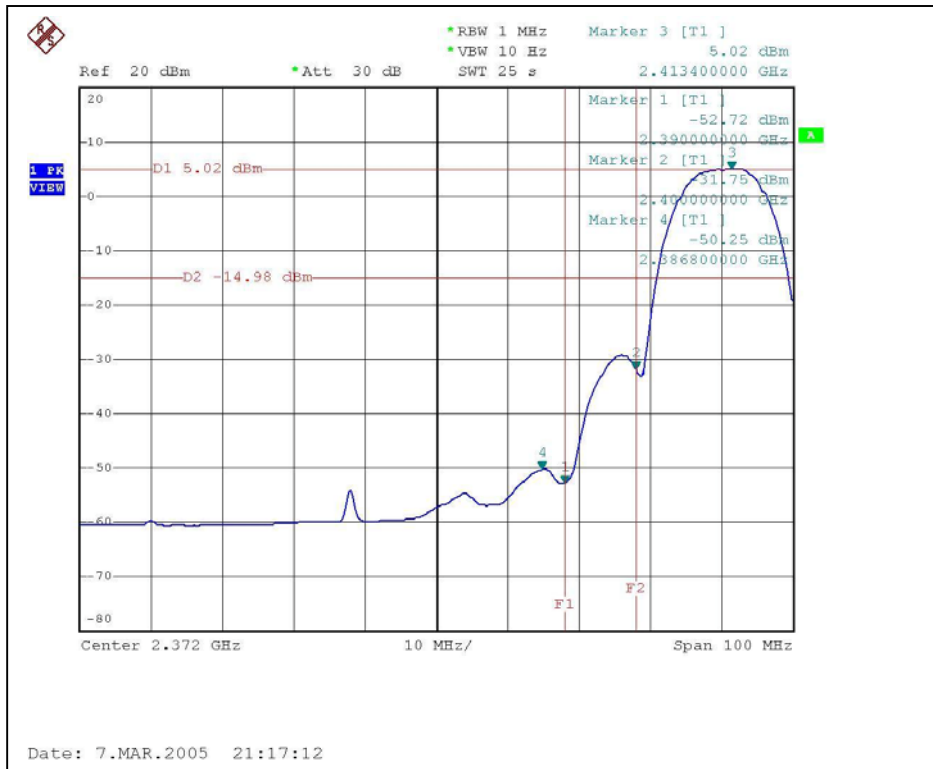
The band edge emission plot of DSSS technique on page 113 show 57.74dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2 is 106.20dBuV/m (Average), so the maximum field strength in restrict band is $106.20-57.74=48.46$ dBuV/m which is under 54 dBuV/m limit.

NOTE (2):

The band edge emission plot of DSSS on page 112 shows 55.59dB 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 112.80dBuV/m (Peak), so the maximum field strength in restrict band is $112.80-55.59=57.21$ dBuV/m which is under 74 dBuV/m limit.

The band edge emission plot of DSSS on page 113 shows 60.36dB 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 106.50dBuV/m (Average), so the maximum field strength in restrict band is $106.50-60.36=46.14$ dBuV/m which is under 54 dBuV/m limit.







4.6.14 TEST RESULTS (Mode3 - AUX Antenna Connector – 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):

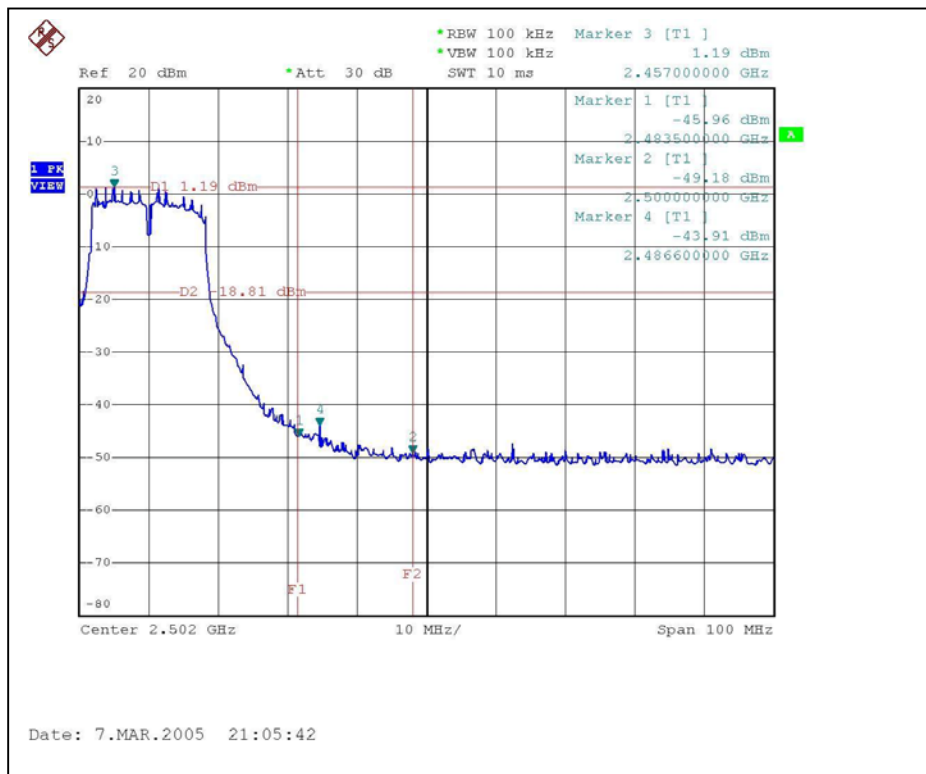
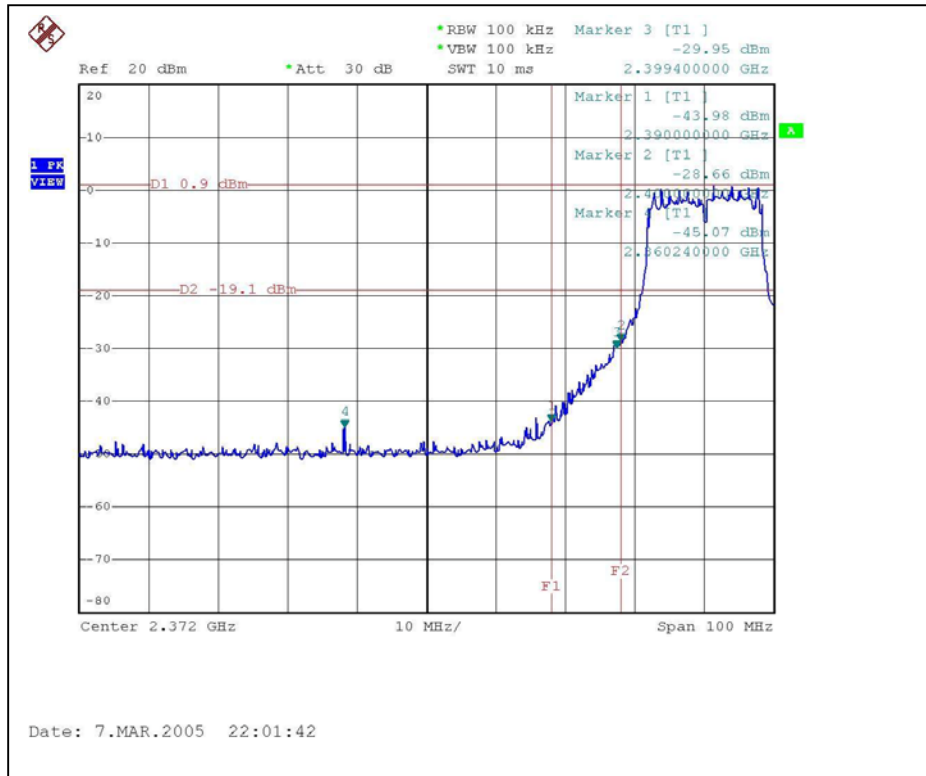
The band edge emission plot of OFDM on page 115 shows 44.88dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2. is 110.2dBuV/m (Peak), so the maximum field strength in restrict band is $110.2 - 44.88 = 65.32$ dBuV/m which is under 74 dBuV/m limit.

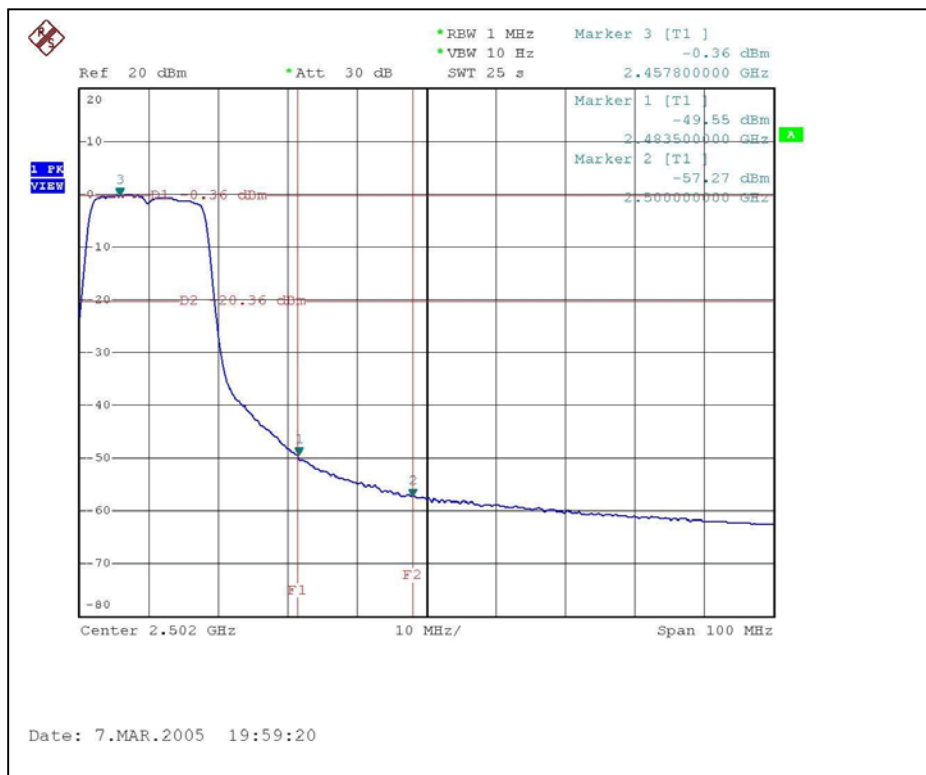
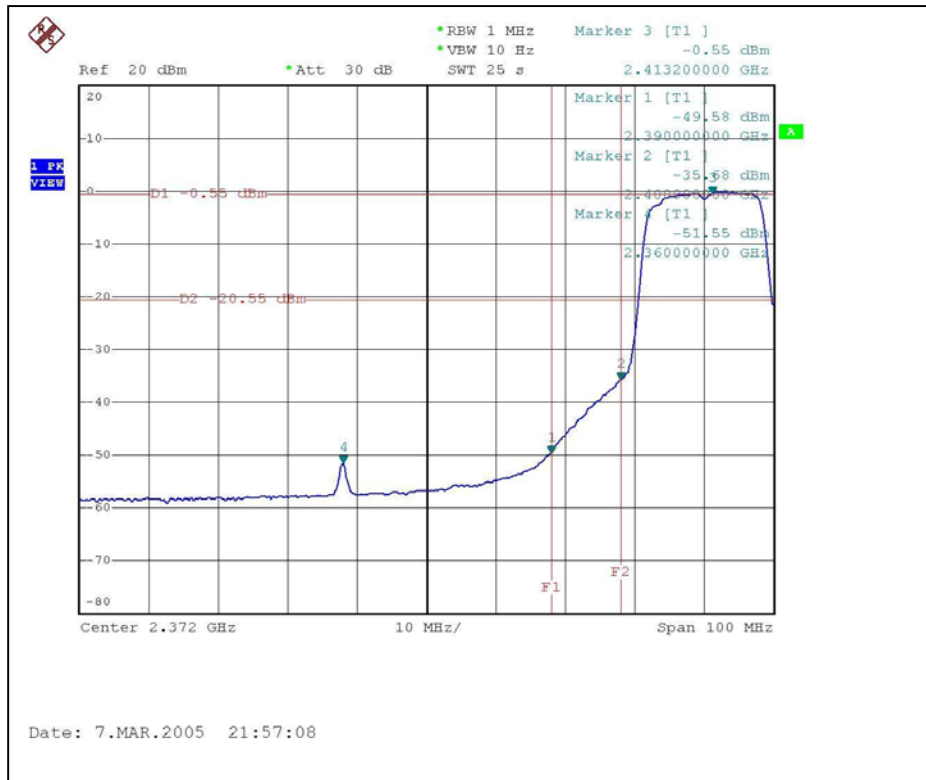
The band edge emission plot of OFDM on page 116 shows 49.03dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 1 at the item 4.2. is 101.70dBuV/m (Average), so the maximum field strength in restrict band is $101.70 - 49.03 = 52.67$ dBuV/m which is under 54 dBuV/m limit.

NOTE (2):

The band edge emission plot of OFDM on page 115 shows 47.15dB 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 110.30dBuV/m (Peak), so the maximum field strength in restrict band is $110.30 - 47.15 = 63.15$ dBuV/m which is under 74 dBuV/m limit.

The band edge emission plot of OFDM on page 116 shows 49.19dB 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 101.80dBuV/m (Average), so the maximum field strength in restrict band is $101.80 - 49.19 = 52.61$ 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.	Antenna Model No.	Antenna Type	Antenna Connector	Gain (dBi)
1	AN4021	Dipole	RPSMA	2dBi
2	120300009100J	Dipole	RPSMA	2dBi
3	120300009200J	Dipole	RPSMA	2dBi
4	Sleeve Dipole Antenna	Dipole	NA	2dBi
5	Butterfly Antenna type 3	PCB Dipole	NA	2dBi
6	PIFA	PIFA	NA	2dBi

5 PHOTOGRAPHS OF THE TEST CONFIGURATION CONDUCTED EMISSION TEST





RADIATED EMISSION TEST (Mode 1)





RADIATED EMISSION TEST (Mode 2)





RADIATED EMISSION TEST (Mode 3)







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.

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