FCC RF Test Report

APPLICANT	:	Advantech Co., Ltd.
EQUIPMENT	:	computer
BRAND NAME	:	Advantech
MODEL NAME	:	TREK-722, TREK-723
FCC ID	:	M82-TREK-72X-HB
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DSS) Spread Spectrum Transmitter

The product was received on Sep. 14, 2012 and completely tested on Nov. 22, 2012. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown the compliance with the applicable technical standards.

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

Reviewed by:

Jones Tsai / Manager

Testing Laboratory 1190

SPORTON INTERNATIONAL INC.
No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR291425	Rev. 01	Initial issue of report	Jan. 08, 2013
FR291425	Rev. 02	Update report, The model TREK-722 and TREK-723 under this FCC ID, hardware are electronically identical; the main difference between these two models is the size of the LCD display (TREK-722: 5" and TREK-723: 7")	Jan. 14, 2013

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(1)	A8.4(2)	Number of Channels	≥ 15Chs	Pass	-
3.2	15.247(a)(1)	A8.1(b)	Hopping Channel Separation	≥ 2/3 of 20dB BW	Pass	-
3.3	15.247(a)(1)	A8.1(d)	Dwell Time of Each Channel	≤ 0.4sec in 31.6sec period	Pass	-
3.4	15.247(a)(1)	A8.1(a)	20dB Bandwidth	NA	Pass	-
3.5	15.247(b)(1)	A8.1(b)	Peak Output Power	≤ 1 w for 1Mbps ≤ 125 Mw for 2, 3Mbps	Pass	-
3.6	15.247(d)	A8.5	Conducted Band Edges	≤ 20dBc	Pass	-
3.7	15.247(d)	A8.5	Conducted Spurious Emission	≤ 20dBc	Pass	-
3.8	15.247(d)	A8.5	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 3.18 dB at 150.420 MHz
3.9	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Advantech Co., Ltd.
No. 1, Alley 20, Lane 26, Rueiguang Road NeiHu District, Taipei 114, R.O.C.

1.2 Manufacturer

Advantech Co., Ltd.
No. 1, Alley 20, Lane 26, Rueiguang Road NeiHu District, Taipei 114, R.O.C.

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	computer
Brand Name	Advantech
Model Name	TREK-722, TREK-723
Sample 1	TREK-722
Sample 2	TREK-723
FCC ID	M82-TREK-72X-HB
EUT supports Radios application	GSM/EGPRS/WCDMA/HSPA/Bluetooth
HW Version	PCM-8405 A101-3
SW Version	02.02.56
EUT Stage	Identical Prototype

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. The models TREK-722 and TREK-723 under this FCC ID are hardware electronically identical. The main difference between these two models is the size of the LCD display (TREK-722: 5" and TREK-723: 7")

Product Specification subjective to this standard	
Tx/Rx Frequency Range	2402 MHz ~ 2480 MHz
Number of Channels	79
Carrier Frequency of Each Channel	2402+n*1 MHz; n=0~78
Maximum Output Power to Antenna	Bluetooth (1Mbps) : 0.48 dBm (0.0011 W) Bluetooth EDR (2Mbps) : -1.42 dBm (0.0007 W) Bluetooth EDR (3Mbps) : -1.05 dBm (0.0008 W)
Antenna Type	PCB Antenna type with gain -1.22 dBi
Type of Modulation	Bluetooth (1Mbps) : GFSK Bluetooth 2.1 EDR (2Mbps) : π/4-DQPSK Bluetooth 2.1 EDR (3Mbps) : 8-DPSK

1.4 Testing Site

Test Site	SPORTON INTERNATIONAL INC.		
Test Site Location	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-3273456 / FAX: +886-3-3284978		
Test Site No.	Sporton Site No.		FCC/IC Registration No.
	TH02-HY	03CH07-HY	722060/4086B-1

1.5 Applied Standards

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

- FCC Part 15 Subpart C §15.247
- FCC Public Notice DA 00-705
- ANSI C63.4-2003 and ANSI C63.10-2009
- IC RSS-210 Issue 8
- IC RSS-Gen Issue 3

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

1.6 Ancillary Equipment List

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Car Battery	GS	GTH60LS(55B24LS)	N/A	N/A	N/A

2 Test Configuration of Equipment Under Test

2.1 RF Output Power

Preliminary tests were performed in different data rate and recorded the RF output power in the following table:

Channel	Frequency	Bluetooth RF Output Power		
		Data Rate / Modulation		
		GFSK	π/4-DQPSK	8-DPSK
		1Mbps	2Mbps	3Mbps
Ch00	2402MHz	-0.80 dBm	-2.48 dBm	-2.19 dBm
Ch39	2441MHz	**0.48** dBm	-1.42 dBm	-1.05 dBm
Ch78	2480MHz	-2.70 dBm	-4.73 dBm	-4.38 dBm

Remark:

1. All the test data for each data rate were verified, but only the worst case was reported.
2. The data rate was set in 1Mbps for all the test items due to the highest RF output power.
3. The EUT is programmed to transmit signals continuously for all testing.

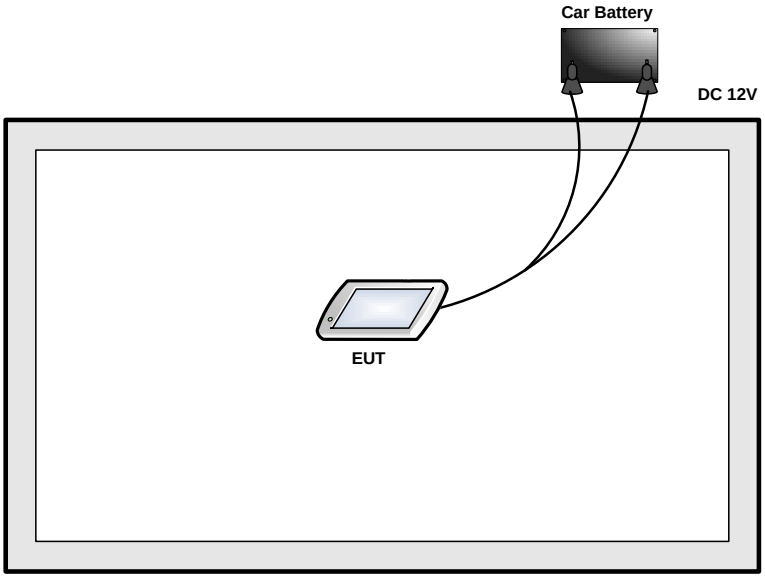
2.2 Test Mode

The EUT has been associated with peripherals pursuant to ANSI C63.4-2003 and ANSI C63.10-2009 and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation (9 KHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

The following tables are showing the test modes as the worst cases and recorded in this report.

Test Cases			
Test Item	**Data Rate / Modulation**		
	Bluetooth 1Mbps GFSK	**Bluetooth EDR 2Mbps π/4-DQPSK**	**Bluetooth EDR 3Mbps 8-DPSK**
Conducted TCs	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz	Mode 4: CH00_2402 MHz Mode 5: CH39_2441 MHz Mode 6: CH78_2480 MHz	Mode 7: CH00_2402 MHz Mode 8: CH39_2441 MHz Mode 9: CH78_2480 MHz
Radiated TCs	Mode 1: CH00_2402 MHz for Sample 1 Mode 2: CH39_2441 MHz for Sample 1 Mode 3: CH78_2480 MHz for Sample 1 Mode 4: CH00_2402 MHz for Sample 2 Mode 5: CH39_2441 MHz for Sample 2 Mode 6: CH78_2480 MHz for Sample 2	Pretest	Pretest
Remark: For radiated TCs, the data rate was set in 1Mbps due to the highest RF output power; only the data of these modes was reported.			

2.3 Connection Diagram of Test System



2.4 RF Utility

For Bluetooth function, RF utility, “BLUETEST 3” installed in the notebook make the EUT provides functions like channel selection and power level for continuous transmitting and receiving signals.

3 Test Result

3.1 Number of Channel Measurement

3.1.1 Limits of Number of Hopping Frequency

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedure

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings: Span = the frequency band of operation; RBW ≥ 1% of the span; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
6. The number of hopping frequency used is defined as the number of total channel.
7. Record the measurement data derived from spectrum analyzer.

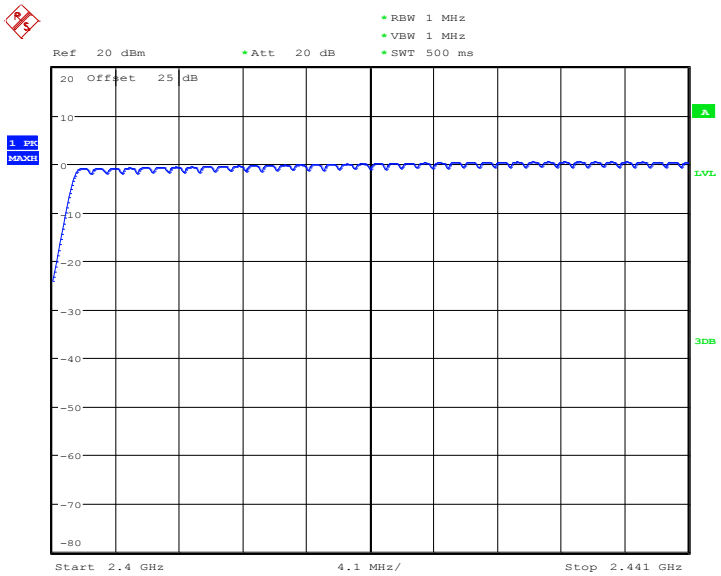
3.1.4 Test Setup

3.1.5 Test Result of Number of Hopping Frequency

Test Mode :	1Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	50~53%

Number of Hopping (Channel)	Adaptive Frequency Hopping (Channel)	Limits (Channel)	Pass/Fail
79	>= 20	> 15	Pass

Number of Hopping Channel Plot on Channel 00 - 78



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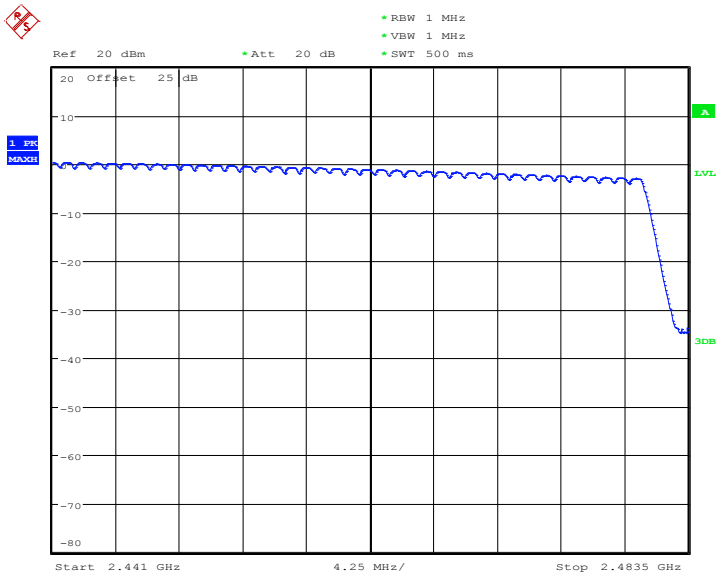

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Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

3.2 Hopping Channel Separation Measurement

3.2.1 Limit of Hopping Channel Separation

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 KHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings:
   Span = wide enough to capture the peaks of two adjacent channels; RBW ≥ 1% of the span; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
6. Measure and record the results in the test report.

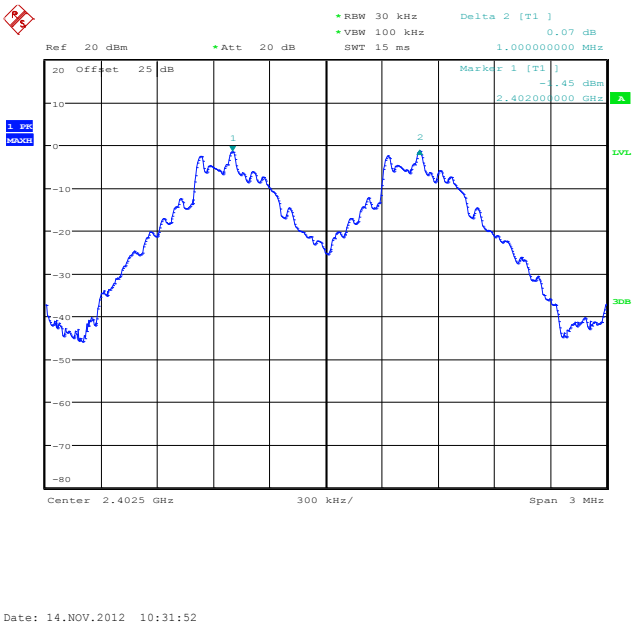
3.2.4 Test Setup

3.2.5 Test Result of Hopping Channel Separation

Test Mode :	1Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	50~53%

Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.000	0.5555	Pass
39	2441	1.000	0.5406	Pass
78	2480	1.000	0.5663	Pass

Channel Separation Plot on Channel 00 - 01

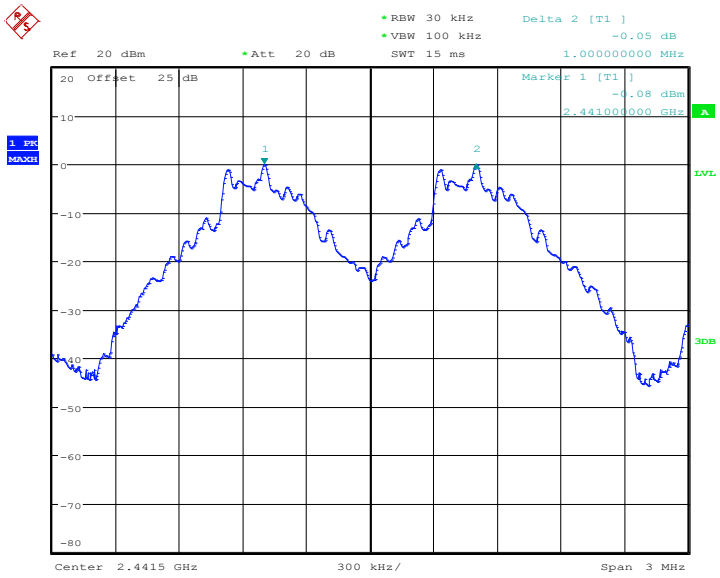


Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

Example: the Hopping Channel Separation test item, the peak point of fundamental signal is -1.45dBm, has added (offset) with the total loss = attenuator factor + cable loss = 25dB, where, cable loss = 5dB and 20dB attenuator, and then the Hopping Channel Separation is measured and compliance with the limit line. Hereafter, each plot of spectrum analyzer has been added the total loss respectively and to demonstrate in compliance with the limit line.

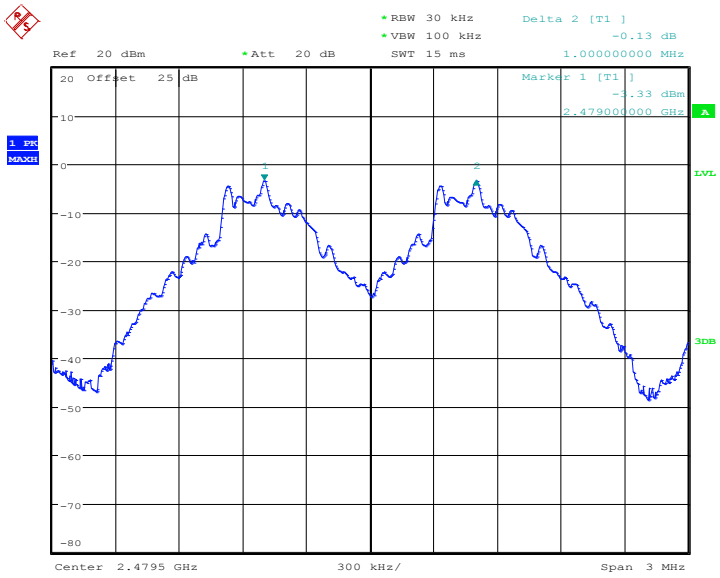
Channel Separation Plot on Channel 39 - 40



Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

Channel Separation Plot on Channel 77 - 78



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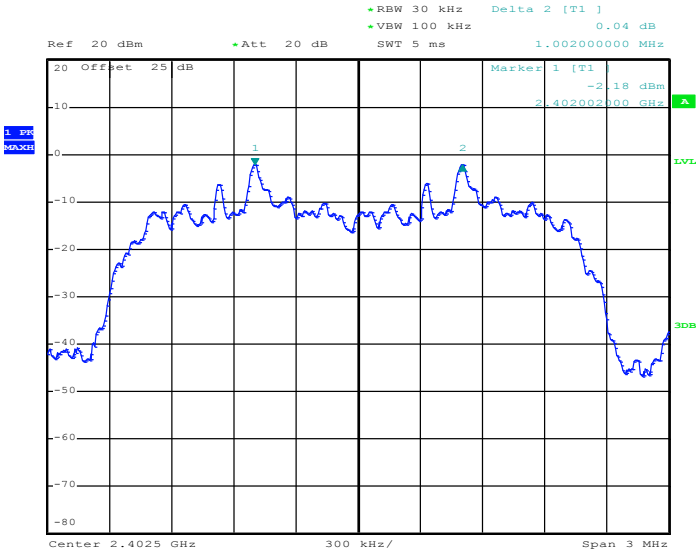
Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

Test Mode :	2Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	50~53%

Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.002	0.8160	Pass
39	2441	1.002	0.8160	Pass
78	2480	1.002	0.8120	Pass

Channel Separation Plot on Channel 00 - 01

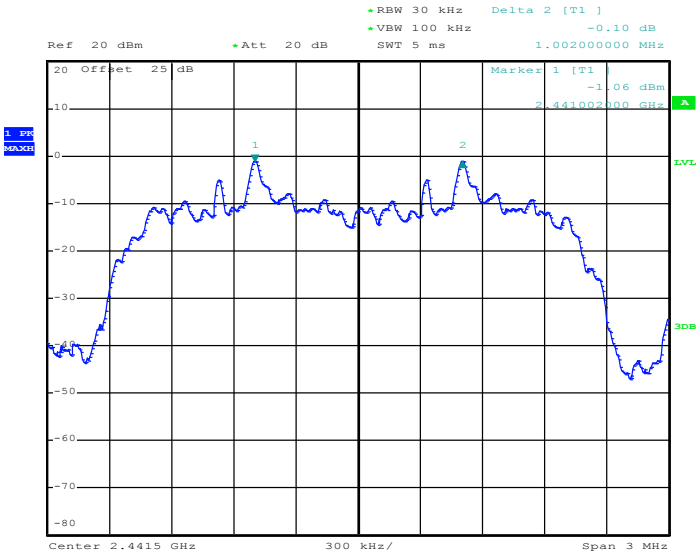


Date: 14.NOV.2012 13:36:26

Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

Channel Separation Plot on Channel 39 - 40

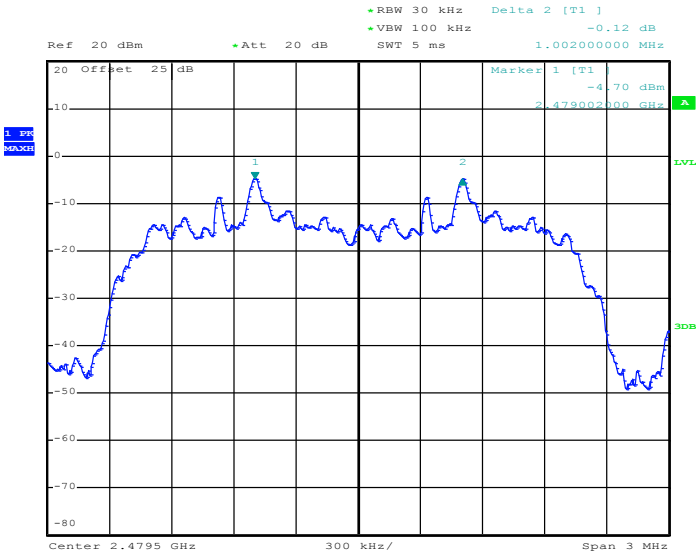


Date: 14.NOV.2012 13:38:35

Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

Channel Separation Plot on Channel 77 - 78



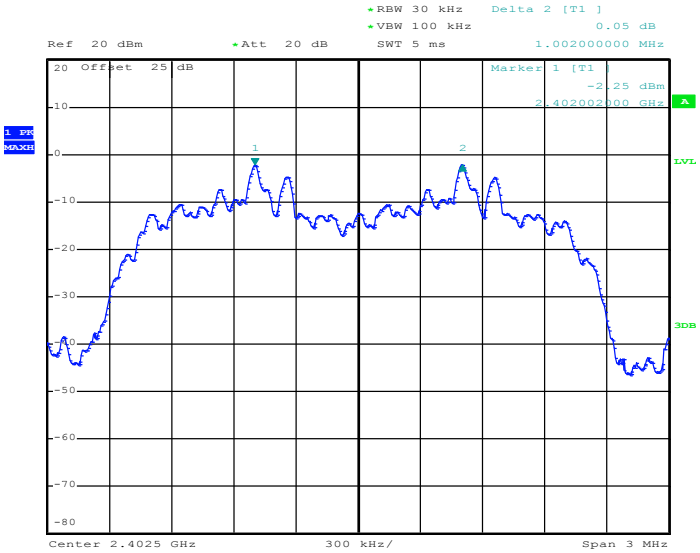
Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

Test Mode :	3Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	50~53%

Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.002	0.8000	Pass
39	2441	1.002	0.8040	Pass
78	2480	1.002	0.8080	Pass

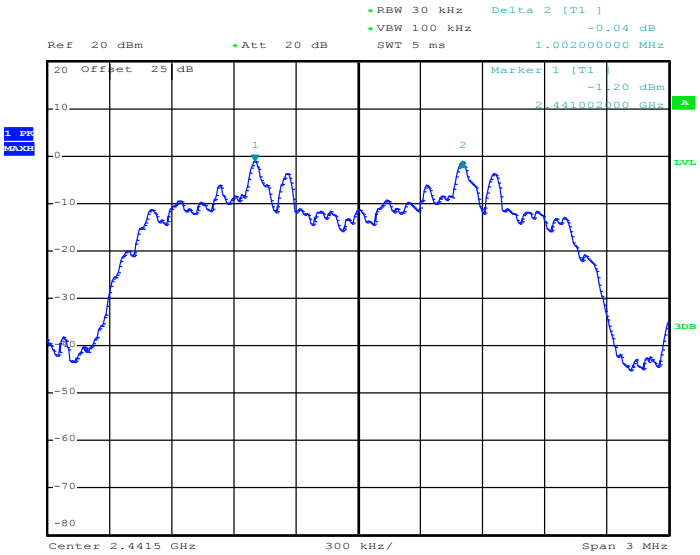
Channel Separation Plot on Channel 00 - 01



Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

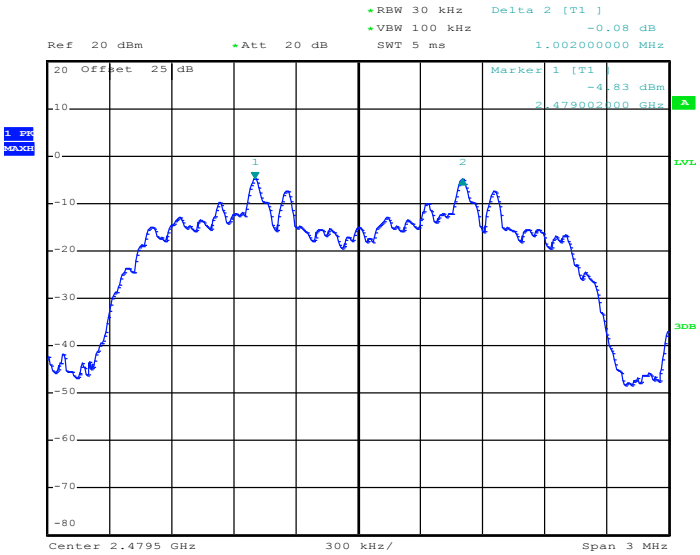
Channel Separation Plot on Channel 39 - 40



Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

Channel Separation Plot on Channel 77 - 78



Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

3.3 Dwell Time Measurement

3.3.1 Limit of Dwell Time

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.

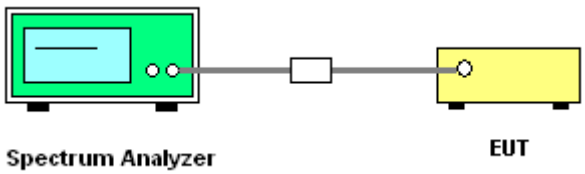
3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Enable the EUT hopping function.
5. Use the following spectrum analyzer settings: Span = zero span, centered on a hopping channel; RBW = 1 MHz; VBW ≥ RBW; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold.
6. Measure and record the results in the test report.

3.3.4 Test Setup



3.3.5 Test Result of Dwell Time

Test Mode :	DH5	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	50~53%

Mode	Hopping Channel Number	Hops Over Occupancy Time(hops)	Package Transfer Time (msec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
Normal	79	106.67	2.968	0.32	0.4	Pass
AFH	20	53.34	2.968	0.16	0.4	Pass

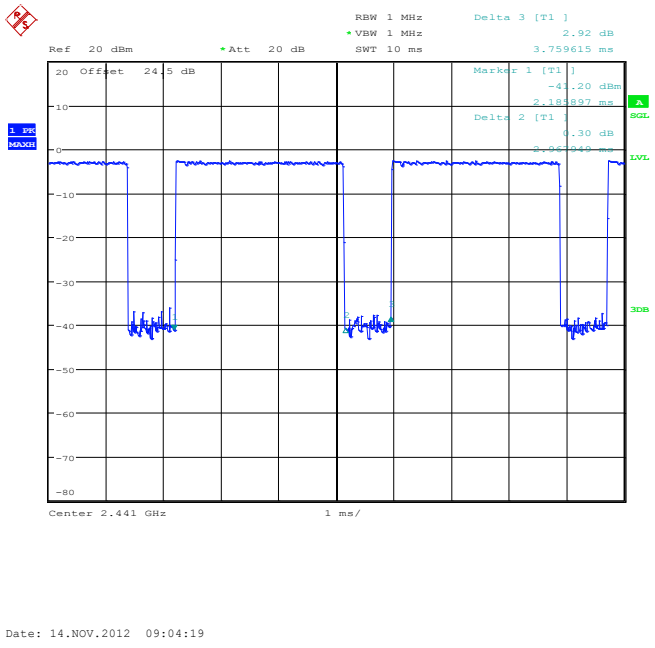
Remark:

1. In normal mode, hopping rate is 1600hops/s with 6 slots in 79 hopping channels.
With channel hopping rate (1600 / 6 / 79) in Occupancy Time Limit (0.4 x 79) (s),
Hops Over Occupancy Time comes to (1600 / 6 / 79) x (0.4 x 79) = 106.67 hops.

2. In AFH mode, hopping rate is 800hops/s with 6 slots in 20 hopping channels.
With channel hopping rate (800 / 6 / 20) in Occupancy Time Limit (0.4 x 20) (s),
Hops Over Occupancy Time comes to (800 / 6 / 20) x (0.4 x 20) = 53.34 hops.

3. Dwell Time(s) = Hops Over Occupancy Time (hops) x Package Transfer Time

Package Transfer Time Plot



Note:

The total loss is 24.5 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

3.4 20dB Bandwidth Measurement

3.4.1 Limit of 20dB Bandwidth

Reporting only

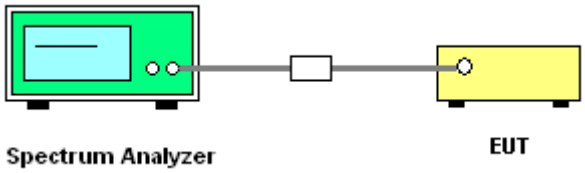
3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

3.4.3 Test Procedures

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Use the following spectrum analyzer settings for 20dB Bandwidth measurement.
   Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel;
   RBW ≥ 1% of the 20 dB bandwidth; VBW ≥ RBW; Sweep = auto; Detector function = peak;
   Trace = max hold.
5. Measure and record the results in the test report.

3.4.4 Test Setup

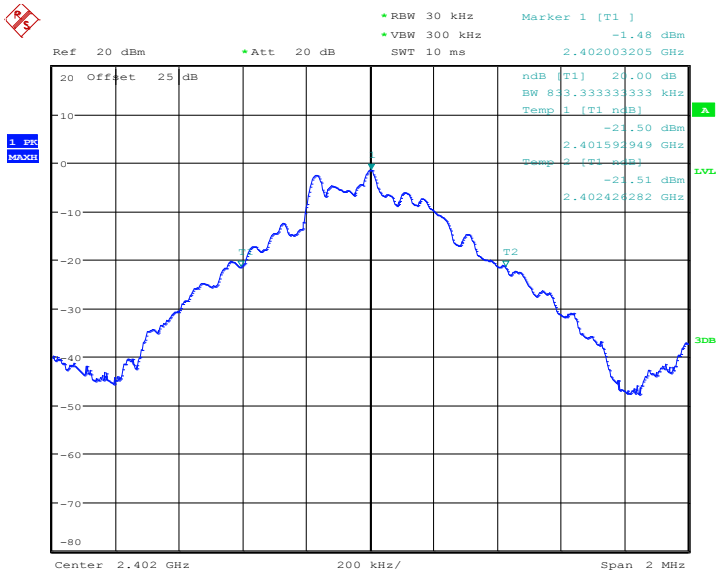


3.4.5 Test Result of 20dB Bandwidth

Test Mode :	1Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	50~53%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	0.833
39	2441	0.811
78	2480	0.849

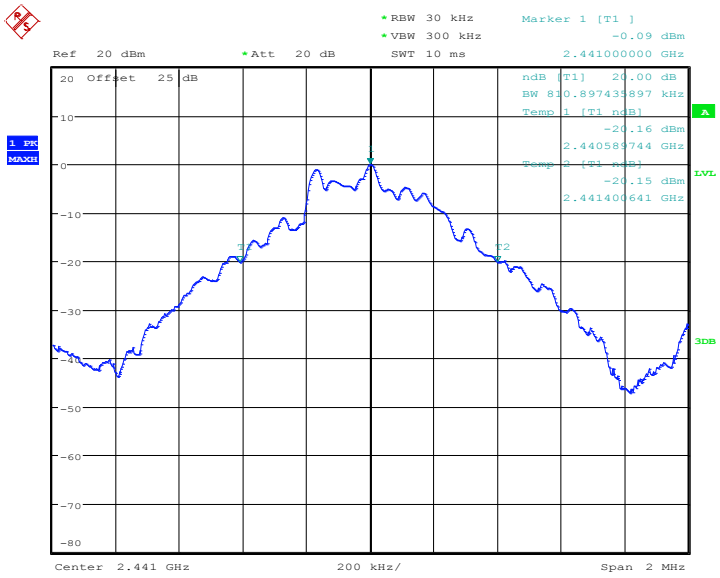
20 dB Bandwidth Plot on Channel 00



Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

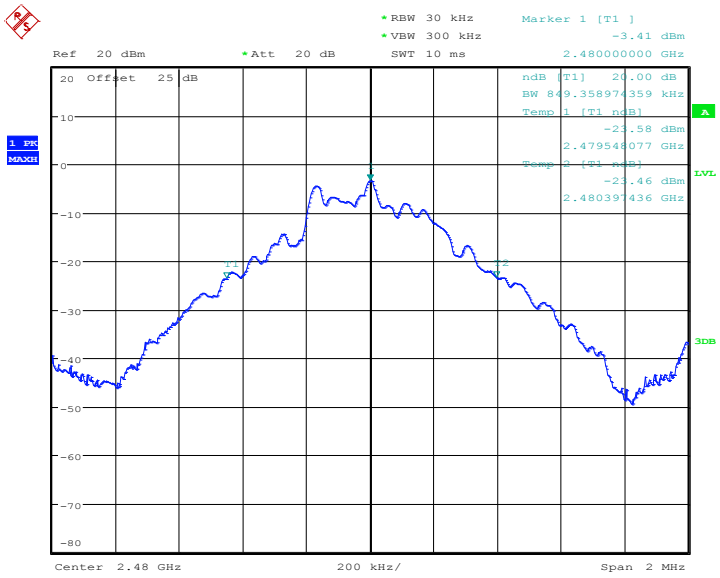
20 dB Bandwidth Plot on Channel 39



Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

20 dB Bandwidth Plot on Channel 78



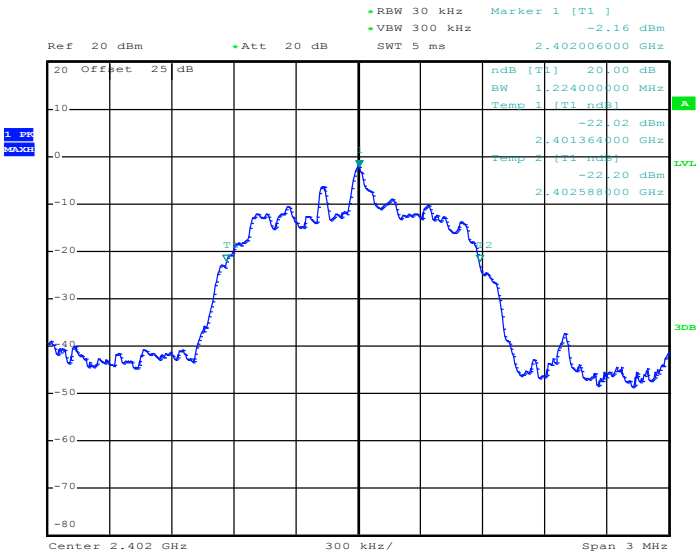
Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

Test Mode :	2Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	50~53%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.224
39	2441	1.224
78	2480	1.218

20 dB Bandwidth Plot on Channel 00



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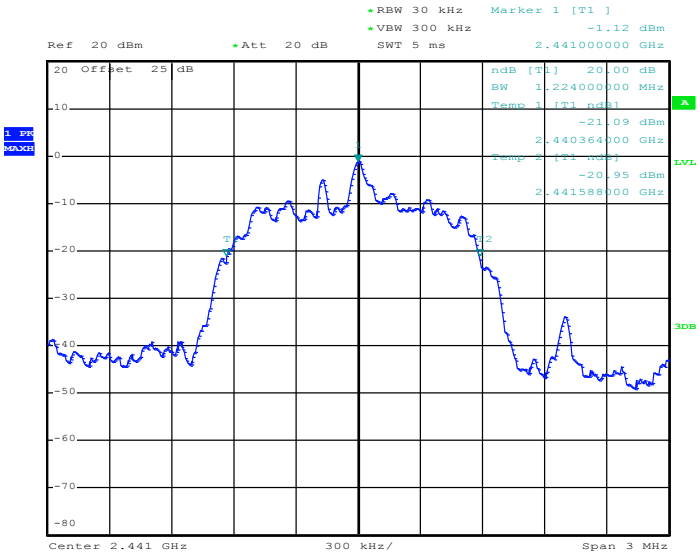
Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

20 dB Bandwidth Plot on Channel 39

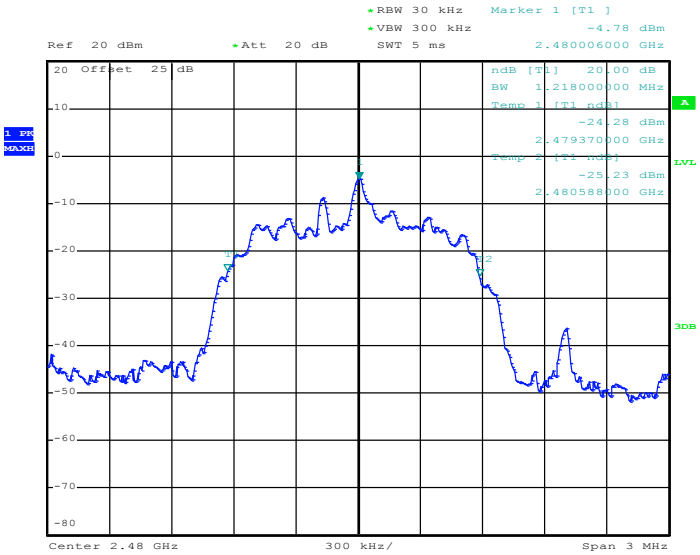


Date: 14.NOV.2012 13:52:59

Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

20 dB Bandwidth Plot on Channel 78



Date: 14.NOV.2012 13:53:39

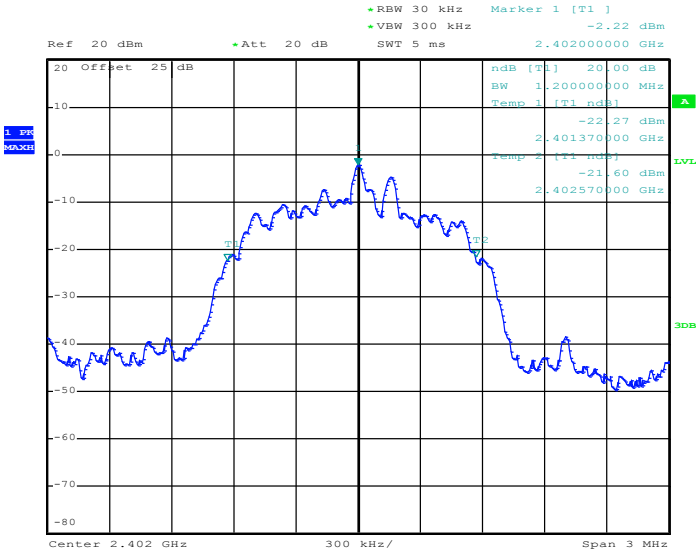
Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

Test Mode :	3Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	50~53%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.200
39	2441	1.206
78	2480	1.212

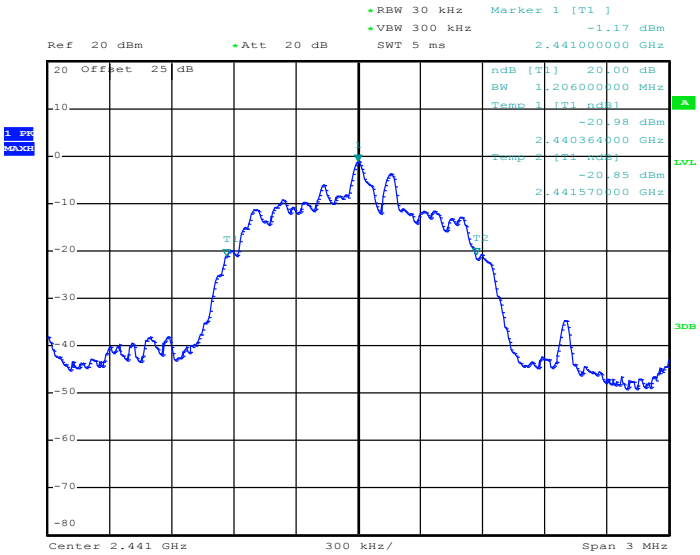
20 dB Bandwidth Plot on Channel 00



Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

20 dB Bandwidth Plot on Channel 39

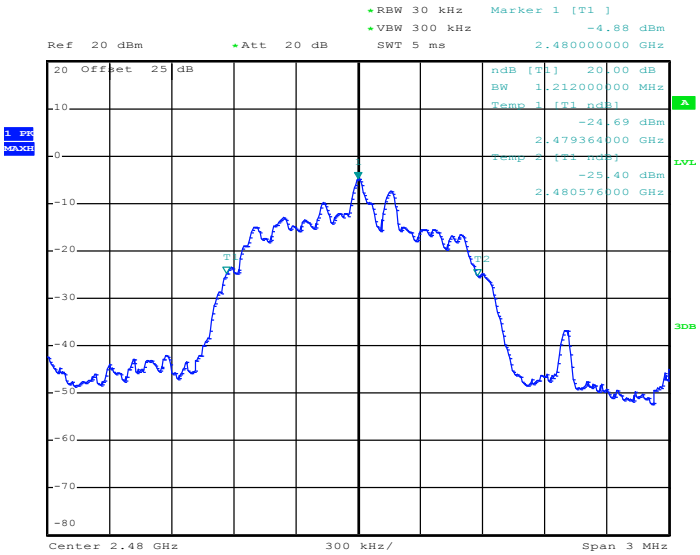


Date: 14.NOV.2012 14:26:51

Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

20 dB Bandwidth Plot on Channel 78



Date: 14.NOV.2012 14:27:26

Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

3.5 Peak Output Power Measurement

3.5.1 Limit of Peak Output Power

Section 15.247 (b) The maximum peak conducted output power of the intentional radiator shall not exceed the following: (1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band 0.125 watts. The power limit for 1Mbps is 1watt, and for 2Mbps, and 3Mbps are 0.125 watts.

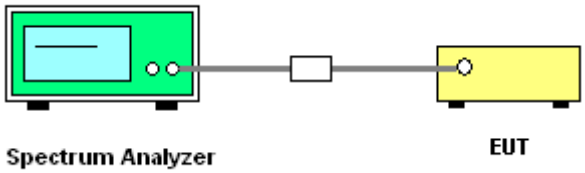
3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

3.5.3 Test Procedures

1. The testing follows FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power with cable loss and record the results in the test report.
5. Measure and record the results in the test report.

3.5.4 Test Setup

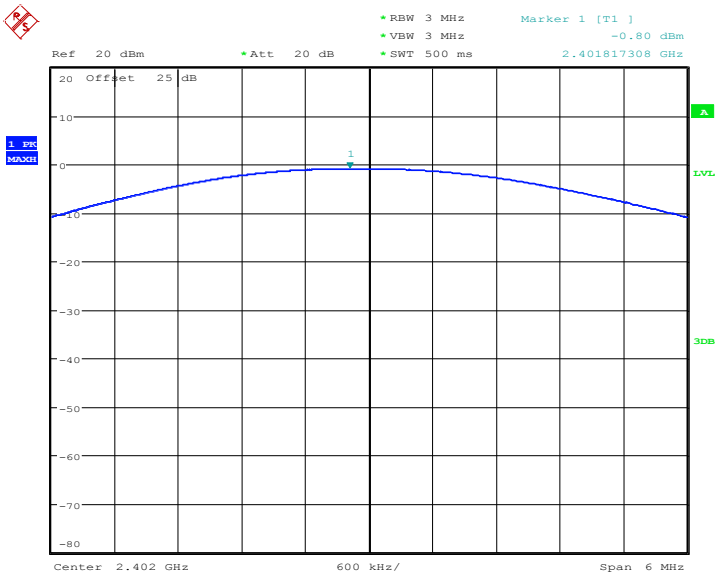


3.5.5 Test Result of Peak Output Power

Test Mode :	1Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	50~53%

Channel	Frequency (MHz)	RF Power (dBm)		
		GFSK	Max. Limits (dBm)	Pass/Fail
		1 Mbps		
00	2402	-0.80	30.00	Pass
39	2441	0.48	30.00	Pass
78	2480	-2.70	30.00	Pass

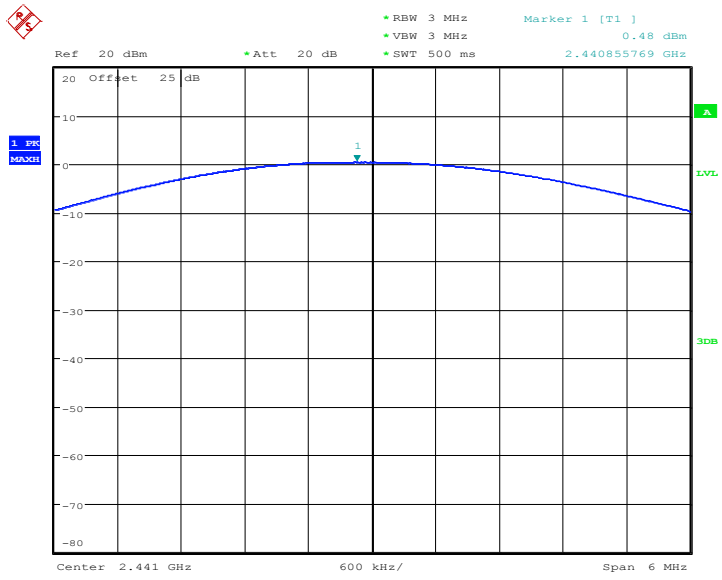
Peak Output Power Plot on Channel 00



Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

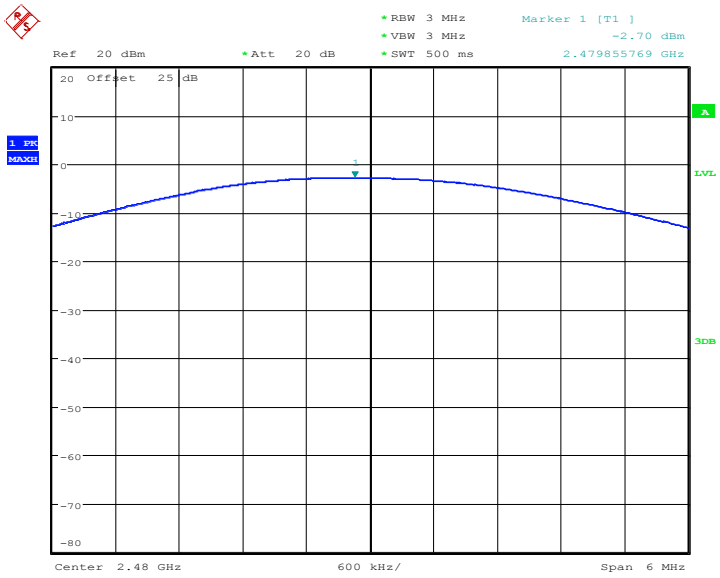
Peak Output Power Plot on Channel 39



Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

Peak Output Power Plot on Channel 78



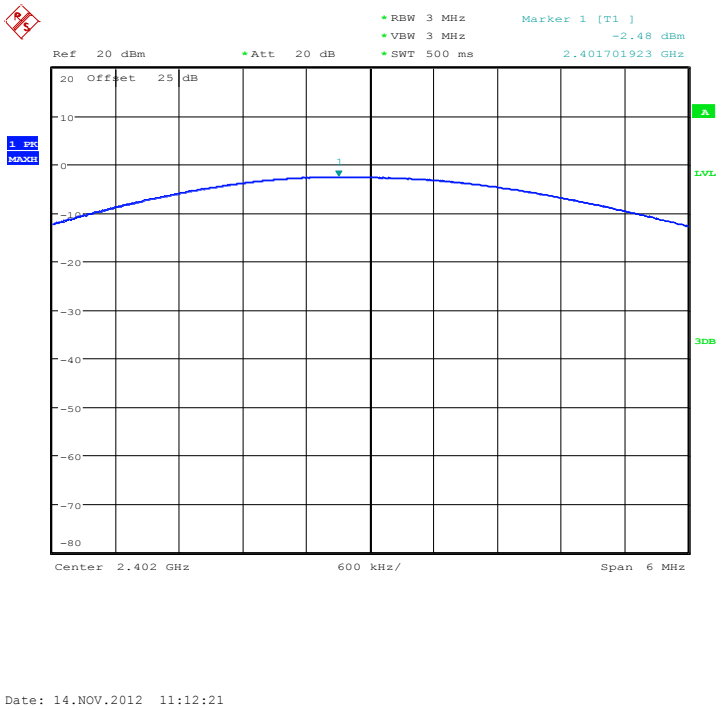
Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

Test Mode :	2Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	50~53%

Channel	Frequency (MHz)	RF Power (dBm)		
		π/4-DQPSK 2 Mbps	Max. Limits (dBm)	Pass/Fail
00	2402	-2.48	20.97	Pass
39	2441	-1.42	20.97	Pass
78	2480	-4.73	20.97	Pass

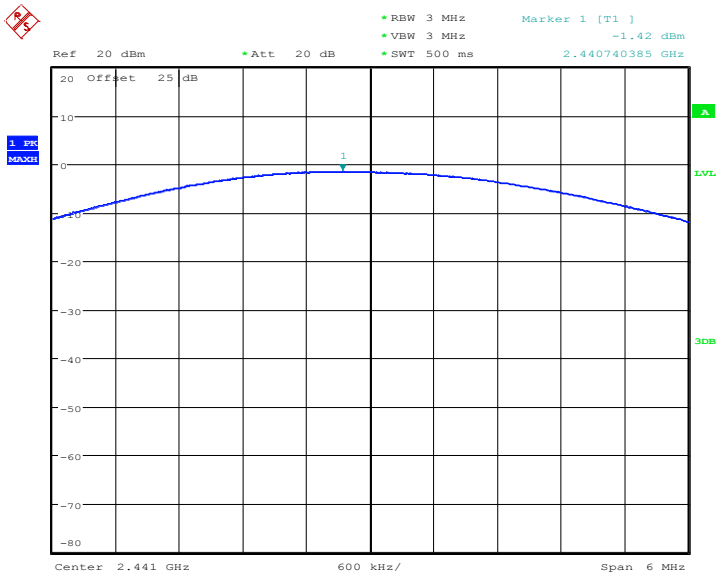
Peak Output Power Plot on Channel 00



Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

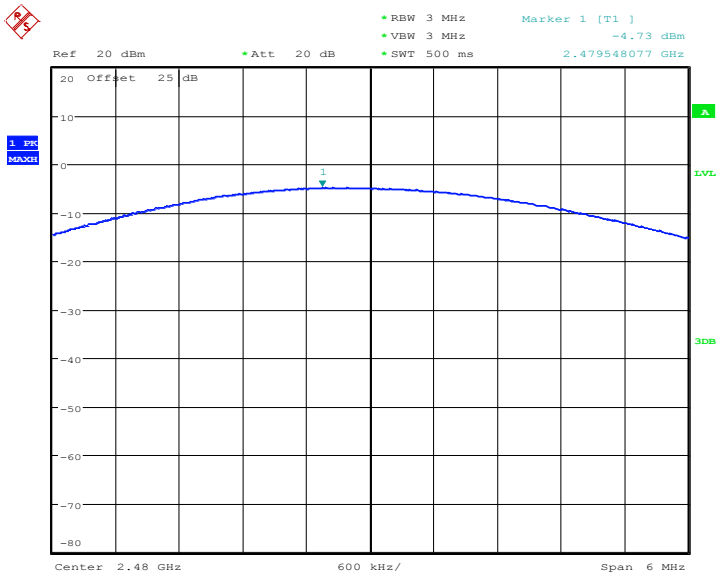
Peak Output Power Plot on Channel 39



Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

Peak Output Power Plot on Channel 78



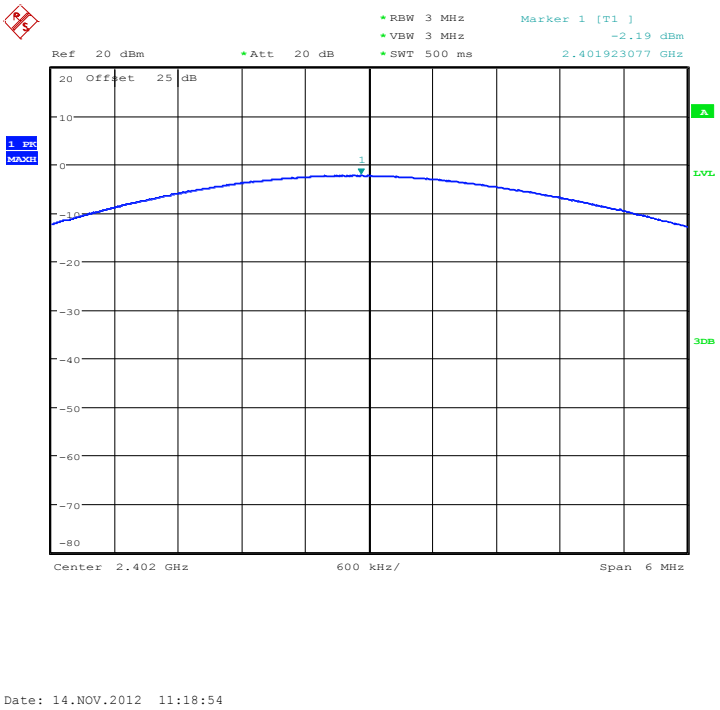
Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

Test Mode :	3Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	50~53%

Channel	Frequency (MHz)	RF Power (dBm)		
		8-DPSK	Max. Limits	Pass/Fail
		3 Mbps	(dBm)	
00	2402	-2.19	20.97	Pass
39	2441	-1.05	20.97	Pass
78	2480	-4.38	20.97	Pass

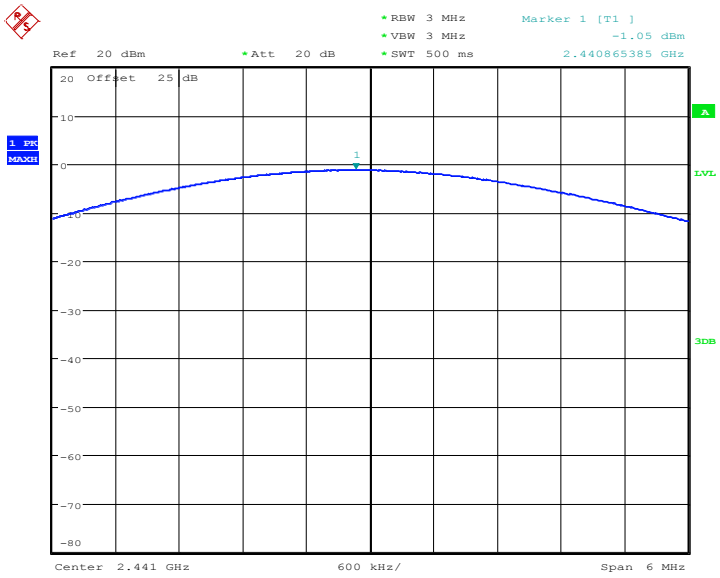
Peak Output Power Plot on Channel 00



Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

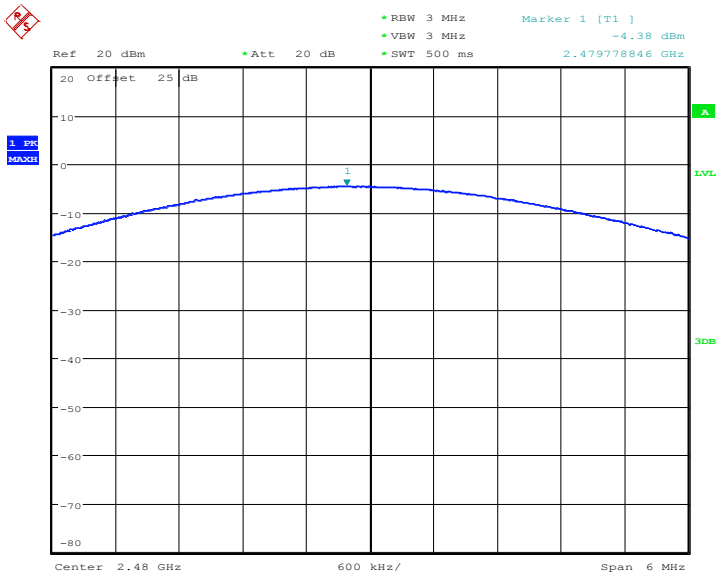
Peak Output Power Plot on Channel 39



Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

Peak Output Power Plot on Channel 78



Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

3.6 Conducted Band Edges Measurement

3.6.1 Limit of Band Edges

In any 100 KHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

3.6.3 Test Procedures

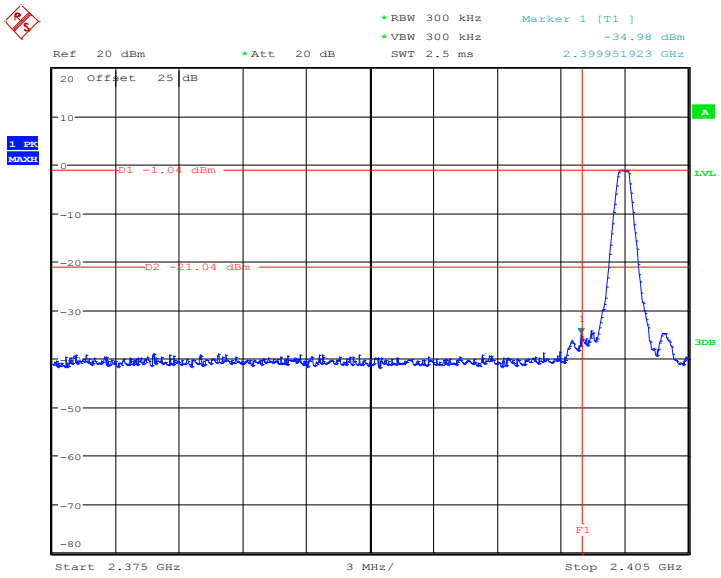
1. The testing follows the guidelines in Band-edge Compliance of RF Conducted Emissions of FCC Public Notice DA 00-705 Measurement Guidelines.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Set RBW = 300KHz (≥ 1% span=30MHz), VBW = 300KHz (≥ RBW). Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 300KHz RBW. The attenuation shall be 30 dB instead of 20 dB when RMS conducted output power procedure is used.
4. Enable hopping function of the EUT and then repeat step 2. and 3.
5. Measure and record the results in the test report.

3.6.4 Test Setup

3.6.5 Test Result of Conducted Band Edges

Test Mode :	1Mbps	**Temperature :**	24~26℃
Test Channel :	00 and 78	**Relative Humidity :**	50~53%
		Test Engineer :	Coyote Lin

Low Band Edge Plot on Channel 00

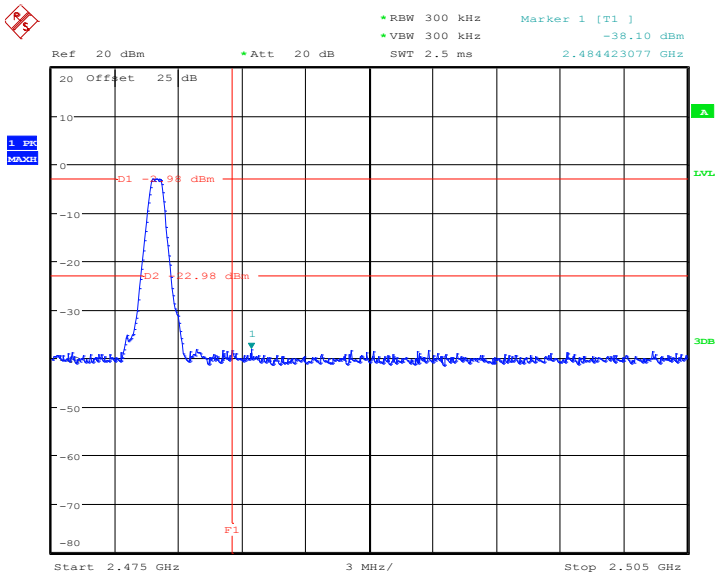


Date: 14.NOV.2012 11:59:13

Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

High Band Edge Plot on Channel 78



Date: 14.NOV.2012 11:58:40

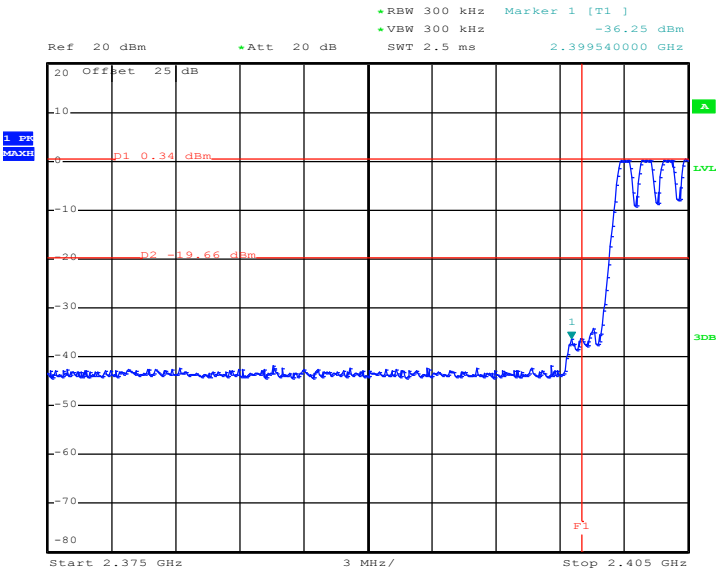
Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

3.6.6 Test Result of Conducted Hopping Mode Band Edges

Test Mode :	1Mbps	Temperature :	24~26℃
Test Engineer :	Coyote Lin	Relative Humidity :	50~53%

Hopping Mode Low Band Edge Plot

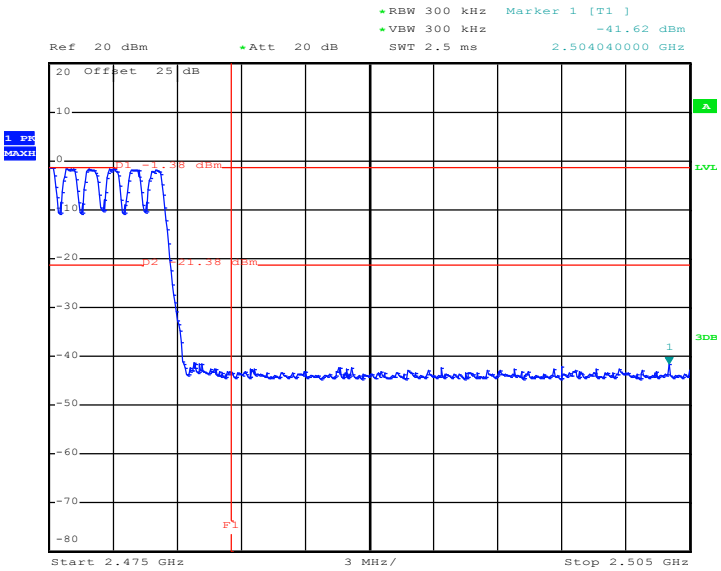


Date: 14.NOV.2012 16:33:37

Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

Hopping Mode High Band Edge Plot



Date: 14.NOV.2012 16:36:18

Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

3.7 Conducted Spurious Emission Measurement

3.7.1 Limit of Spurious Emission Measurement

In any 100 KHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. In addition, radiated emissions which fall in the restricted bands must also comply with the radiated emission limits.

3.7.2 Measuring Instruments

See list of measuring instruments of this test report.

3.7.3 Test Procedure

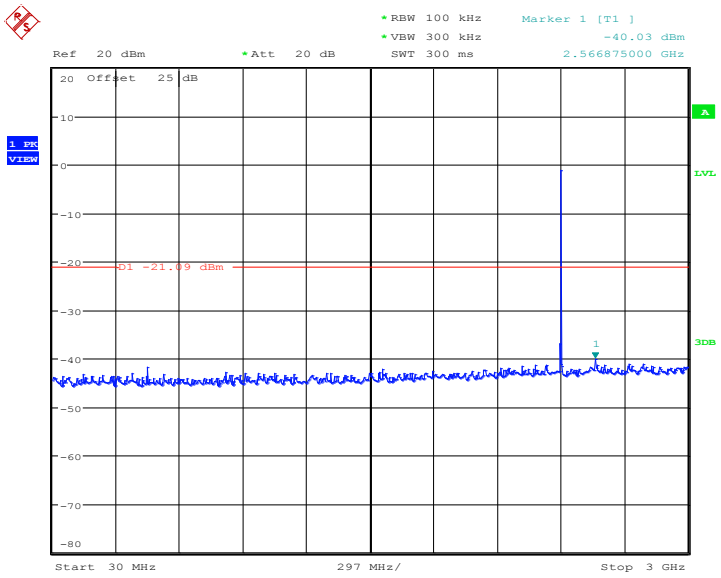
1. The testing follows the guidelines in Spurious RF Conducted Emissions of FCC Public Notice DA 00-705 Measurement Guidelines
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 KHz, VBW = 300KHz, scan up through 10th harmonic. All harmonics / spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 KHz RBW.
5. Measure and record the results in the test report.

3.7.4 Test Setup

3.7.5 Test Result

Test Mode :	1Mbps	Temperature :	24~26℃
Test Channel :	00	Relative Humidity :	50~53%
		Test Engineer :	Coyote Lin

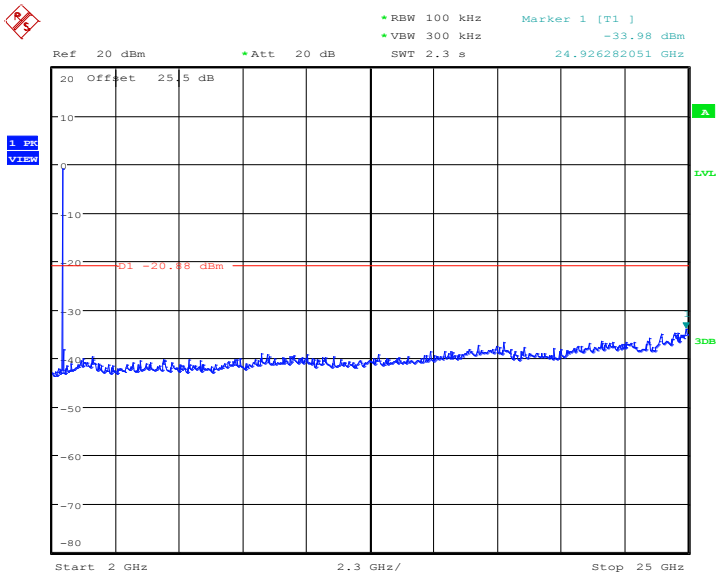
Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

Conducted Spurious Emission Plot between 2 GHz ~ 25 GHz

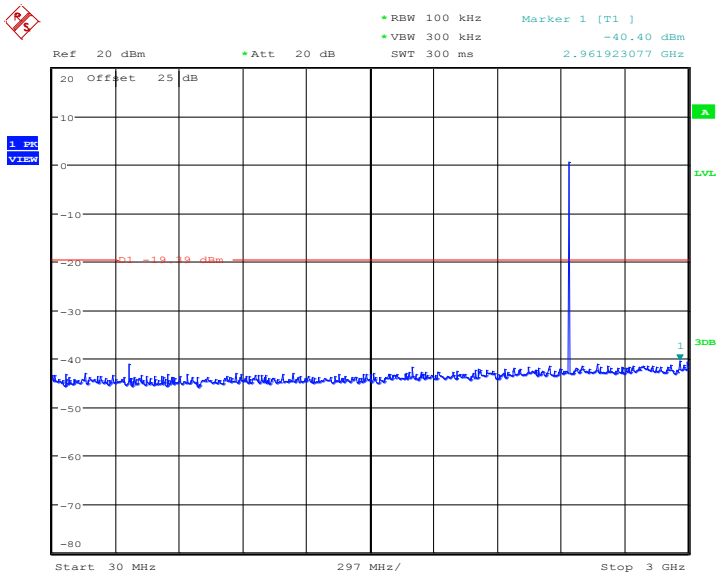


Note:

The total loss is 25.5 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

Test Mode :	1Mbps	**Temperature :**	24~26℃
Test Channel :	39	**Relative Humidity :**	50~53%
		Test Engineer :	Coyote Lin

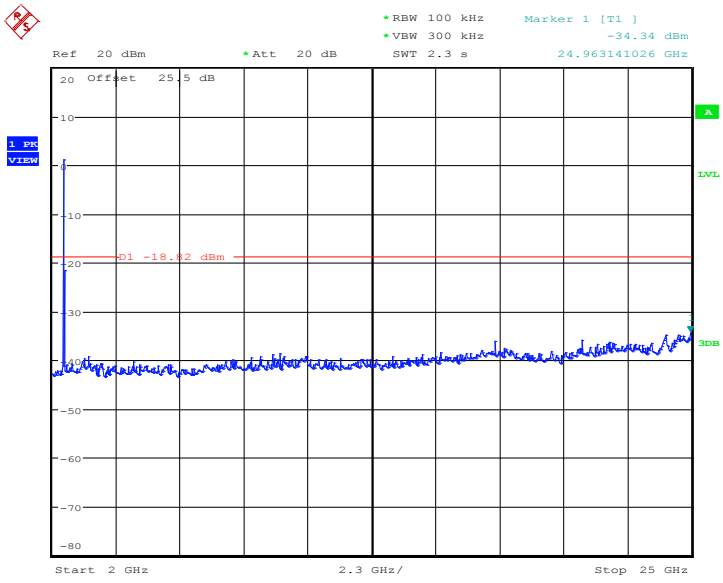
Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

Conducted Spurious Emission Plot between 2 GHz ~ 25 GHz

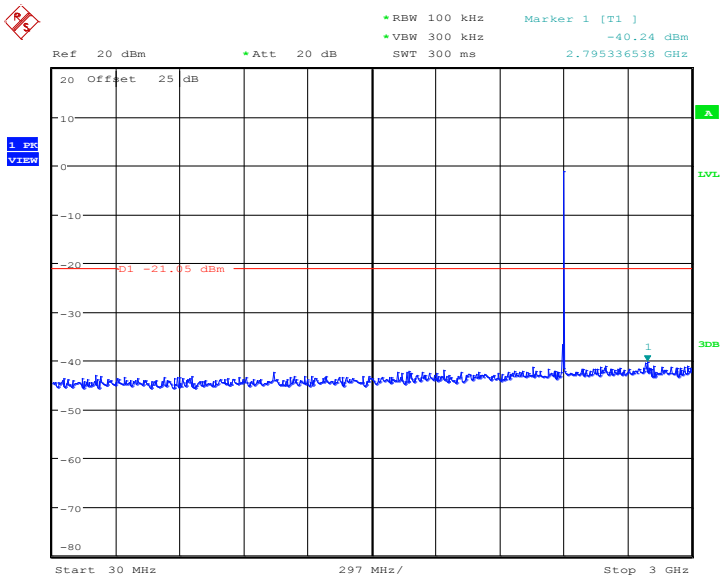


Note:

The total loss is 25.5 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

Test Mode :	1Mbps	**Temperature :**	24~26℃
Test Channel :	78	**Relative Humidity :**	50~53%
		Test Engineer :	Coyote Lin

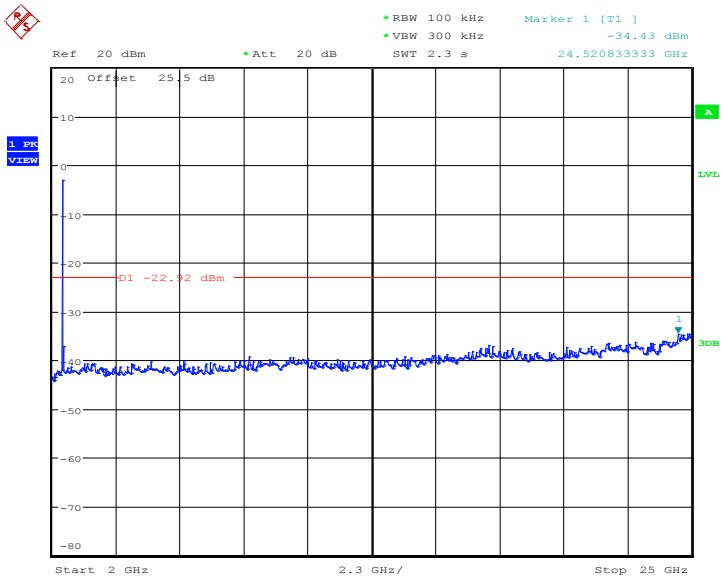
Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Note:

The total loss is 25.0 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

Conducted Spurious Emission Plot between 2 GHz ~ 25 GHz



Date: 14.NOV.2012 12:03:30

Note:

The total loss is 25.5 dB of the RF cable and attenuator, and has been compensated to the spectrum analyzer by setting into the amplitude level offset. That means the measured result shown on the spectrum analyzer has added the total loss and been compliance with the limit line.

3.8 Radiated Band Edges and Spurious Emission Measurement

3.8.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 KHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

Frequency (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

3.8.2 Measuring Instruments

See list of measuring instruments of this test report.

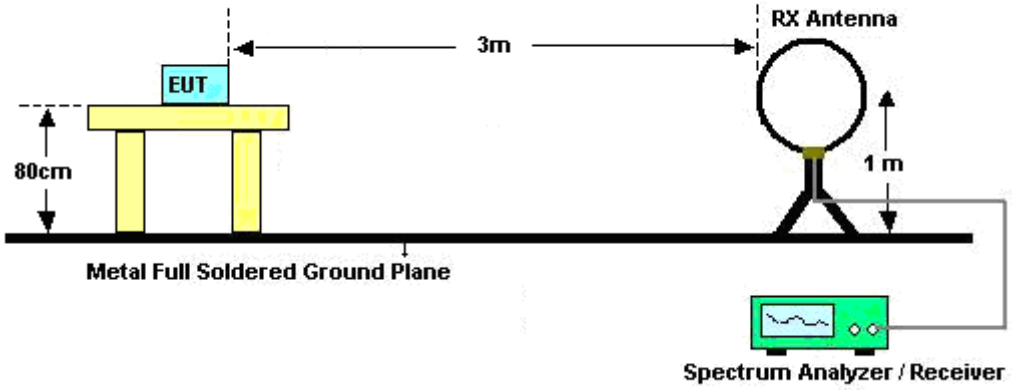
3.8.3 Test Procedures

1. The testing follows the guidelines in Spurious Radiated Emissions of FCC Public Notice DA 00-705 Measurement Guidelines and fulfills ANSI C63.4-2003 and the guidelines in ANSI C63.10-2009 test site requirement.
2. The EUT was placed on a turntable with 0.8 meter above ground.
3. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
4. For each suspected emission, the EUT was arranged to its worst case and then tune the Antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines.
5. Set to the maximum power setting and enable the EUT transmit continuously.
6. Use the following spectrum analyzer settings:
   (1) Span shall wide enough to fully capture the emission being measured;
   (2) Set RBW=100 KHz for f < 1 GHz, RBW=1MHz for f>1GHz ; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold for peak
   (3) For average measurement: use duty cycle correction factor method per 15.35(c).
   Duty cycle = On time/100 milliseconds
   On time = $N_1*L_1+N_2*L_2+...+N_{n-1}*LN_{n-1}+N_n*L_n$
   Where N_1 is number of type 1 pulses, L_1 is length of type 1 pulses, etc.
   Average Level = Peak Level + 20*log(Duty cycle)
7. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

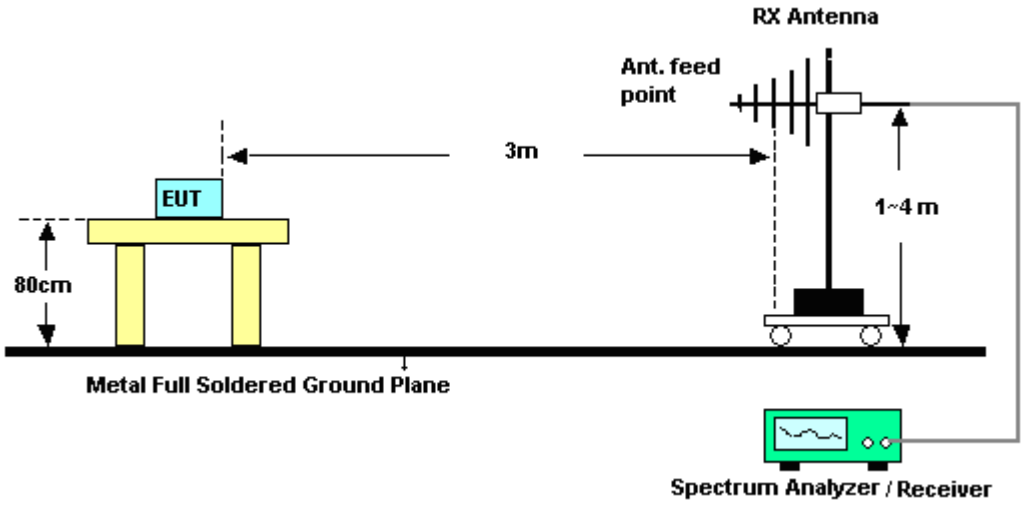
Note: The average levels were calculated from the peak level corrected with duty cycle correction factor (30.69dB) derived from 20log (dwell time/100ms).
For example: Average level = 50.56dBuV/m – 30.69 (dB) = 19.87dBuV/m.

3.8.4 Test Setup

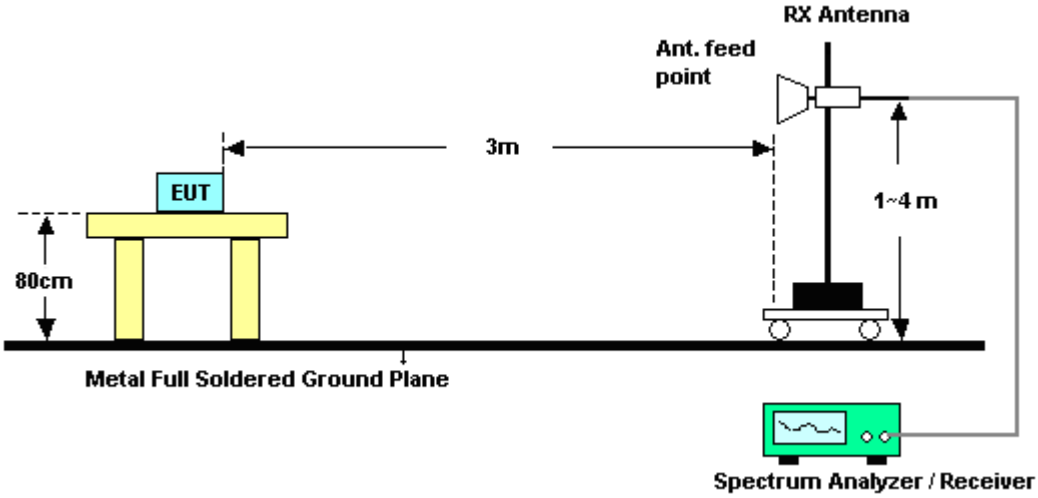
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



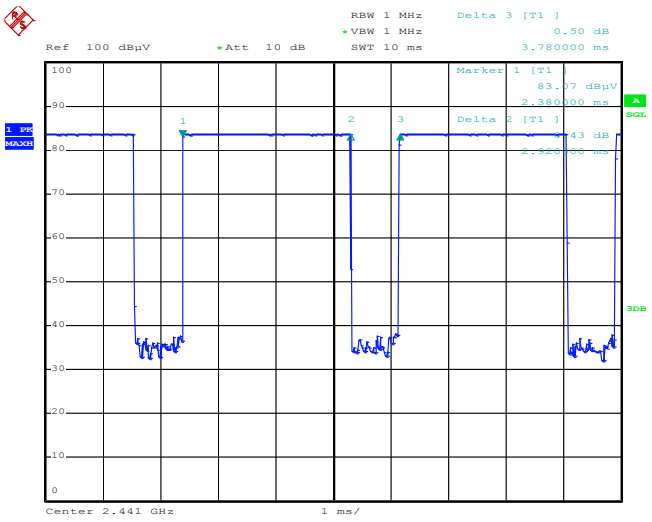
3.8.5 Test Results of Radiated Emissions (9 KHz ~ 30 MHz)

The low frequency, which started from 9 KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.

3.8.6 Duty cycle correction factor for average measurement

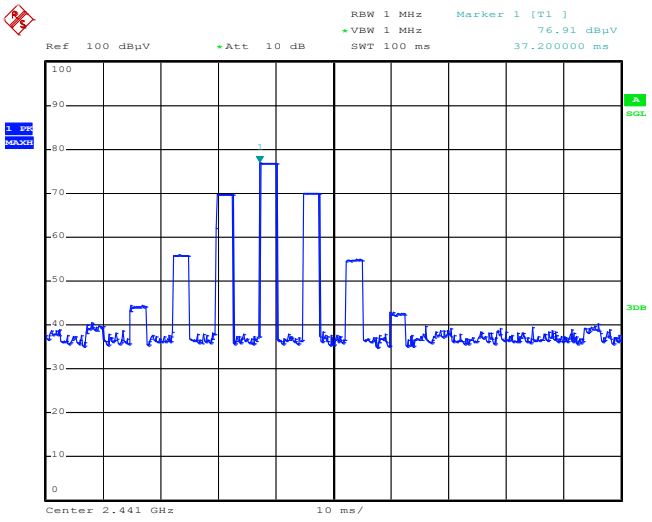
<Sample 1>

DH5 on time/100ms (One Pulse) Plot on Channel 39



Date: 22.NOV.2012 01:57:21

DH5 on time/100ms (Count Pulses) Plot on Channel 39



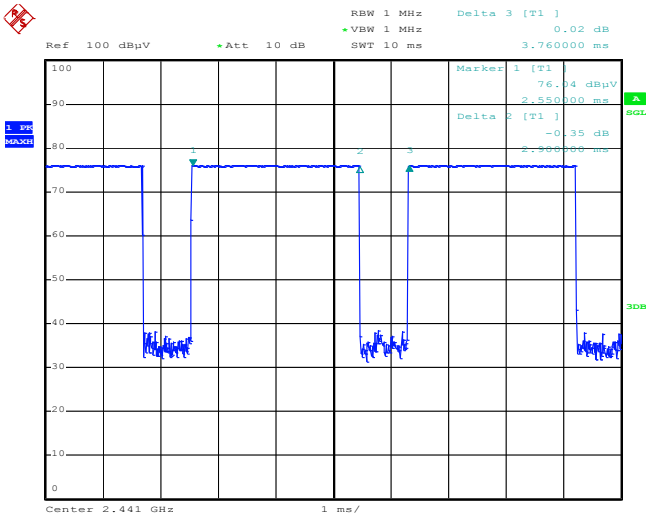
Date: 22.NOV.2012 02:02:40

Note:

1. Duty cycle = on time/100 milliseconds = 1 * 2.92 / 100 = 2.92 %
2. Duty cycle correction factor = 20*log(Duty cycle) = -30.69 dB
3. DH5 has the highest duty cycle and is reported.

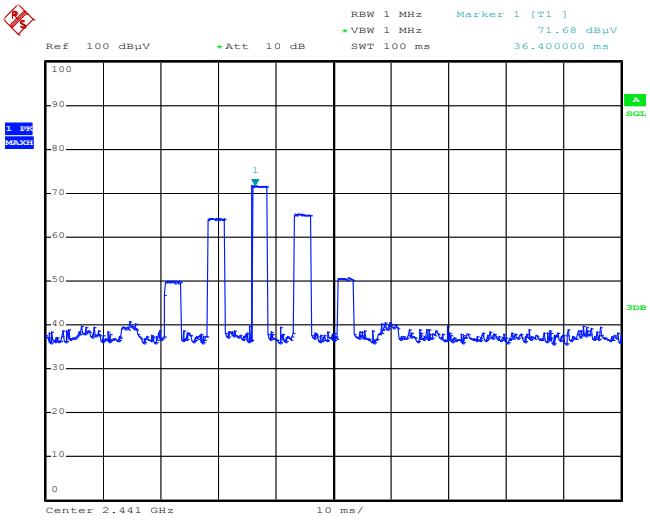
<Sample 2>

DH5 on time/100ms (One Pulse) Plot on Channel 39



Date: 21.NOV.2012 20:58:54

DH5 on time/100ms (Count Pulses) Plot on Channel 39



Date: 21.NOV.2012 21:05:04

Note:

1. Duty cycle = on time/100 milliseconds = 1 * 2.90 / 100 = 2.90 %
2. Duty cycle correction factor = 20*log(Duty cycle) = -30.75 dB
3. DH5 has the highest duty cycle and is reported.

3.8.7 Test Result of Radiated Band Edges

<Sample 1>

Test Mode :	1Mbps	**Temperature :**	23~24°C
Test Channel :	00	**Relative Humidity :**	50~52%
		Test Engineer :	Gavin Wu

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2389.74	50.56	-23.44	74	46.19	32.3	6.03	33.96	107	306	Peak
2389.74	19.87	-34.13	54	-	-	-	-	-	-	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2389.2	45.67	-28.33	74	41.3	32.3	6.03	33.96	122	156	Peak
2389.2	14.98	-39.02	54	-	-	-	-	-	-	Average

Note: The average levels were calculated from the peak level corrected with duty cycle correction factor (30.69dB) derived from 20log (dwell time/100ms).

For example: Average level = 50.56dBuV/m – 30.69 (dB) = 19.87dBuV/m.

Test Mode :	3Mbps	**Temperature :**	23~24°C
Test Channel :	78	**Relative Humidity :**	50~52%
		Test Engineer :	Gavin Wu

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.5	58.14	-15.86	74	53.58	32.38	6.18	34	130	318	Peak
2483.5	27.45	-26.55	54	-	-	-	-	-	-	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2486.3	52.01	-21.99	74	47.45	32.38	6.18	34	126	132	Peak
2486.3	21.32	-32.68	54	-	-	-	-	-	-	Average

<Sample 2>

Test Mode :	1Mbps	**Temperature :**	23~24°C
Test Channel :	00	**Relative Humidity :**	50~52%
		Test Engineer :	Gavin Wu

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	**Level (dBµV/m)**	**Over Limit (dB)**	**Limit Line (dBµV/m)**	**Read Level (dBµV)**	**Antenna Factor (dB)**	**Cable Loss (dB)**	**Preamp Factor (dB)**	**Ant Pos (cm)**	**Table Pos (deg)**	**Remark**
2390	51.84	-22.16	74	47.47	32.3	6.03	33.96	193	276	Peak
2390	21.09	-32.91	54	-	-	-	-	-	-	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	**Level (dBµV/m)**	**Over Limit (dB)**	**Limit Line (dBµV/m)**	**Read Level (dBµV)**	**Antenna Factor (dB)**	**Cable Loss (dB)**	**Preamp Factor (dB)**	**Ant Pos (cm)**	**Table Pos (deg)**	**Remark**
2369.94	46.83	-27.17	74	42.51	32.28	5.99	33.95	100	234	Peak
2369.94	16.08	-37.92	54	-	-	-	-	-	-	Average

Note: The average levels were calculated from the peak level corrected with duty cycle correction factor (30.75dB) derived from 20log (dwell time/100ms).

For example: Average level = 51.84dBuV/m – 30.75 (dB) = 21.09dBuV/m.

Test Mode :	3Mbps	**Temperature :**	23~24°C
Test Channel :	78	**Relative Humidity :**	50~52%
		Test Engineer :	Gavin Wu

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	**Level (dBµV/m)**	**Over Limit (dB)**	**Limit Line (dBµV/m)**	**Read Level (dBµV)**	**Antenna Factor (dB)**	**Cable Loss (dB)**	**Preamp Factor (dB)**	**Ant Pos (cm)**	**Table Pos (deg)**	**Remark**
2483.52	58.39	-15.61	74	53.83	32.38	6.18	34	185	295	Peak
2483.52	27.64	-26.36	54	-	-	-	-	-	-	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	**Level (dBµV/m)**	**Over Limit (dB)**	**Limit Line (dBµV/m)**	**Read Level (dBµV)**	**Antenna Factor (dB)**	**Cable Loss (dB)**	**Preamp Factor (dB)**	**Ant Pos (cm)**	**Table Pos (deg)**	**Remark**
2483.5	50.6	-23.4	74	46.04	32.38	6.18	34	100	24	Peak
2483.5	19.85	-34.15	54	-	-	-	-	-	-	Average

3.8.8 Test Result of Radiated Emission (30 MHz ~ 10th Harmonic)

<Sample 1>

Test Mode :	1Mbps	**Temperature :**	23~24°C
Test Channel :	00	**Relative Humidity :**	50~52%
Test Engineer :	Gavin Wu	**Polarization :**	Horizontal
Remark :	1. 2402 MHz is fundamental signal which can be ignored. 2. 3201 MHz, 7206MHz and 9606MHz are not within a restricted band, and its limit line is 20dB below the highest emission level. For example, 94.55 dBuV/m - 20dB = 74.55 dBuV/m.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2402	94.55	-	-	90.18	32.3	6.03	33.96	107	306	Peak
2402	63.86	-	-	-	-	-	-	-	-	Average
3201	44.24	-30.31	74.55	61.08	32.76	7.19	56.79	100	0	Peak
4803	69.37	-4.63	74	83.75	33.98	9.11	57.47	100	0	Peak
4803	38.68	-15.32	54	-	-	-	-	-	-	Average
7206	43.98	-30.57	74.55	56.36	35.56	10.02	57.96	100	0	Peak
9606	44.52	-30.03	74.55	54.3	36.44	12.01	58.23	100	0	Peak

Note: The average levels were calculated from the peak level corrected with duty cycle correction factor (30.69dB) derived from 20log (dwell time/100ms).

For example: Average level = 94.55 dBuV/m – 30.69 (dB) = 63.86 dBuV/m.

Test Mode :	1Mbps	**Temperature :**	23~24°C
Test Channel :	00	**Relative Humidity :**	50~52%
Test Engineer :	Gavin Wu	**Polarization :**	Vertical
Remark :	1. 2402 MHz is fundamental signal which can be ignored. 2. 7206MHz and 9606MHz are not within a restricted band, and its limit line is 20dB below the highest emission level.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2402	84.33	-	-	79.96	32.3	6.03	33.96	122	156	Peak
2402	53.64	-	-	-	-	-	-	-	-	Average
4803	61.17	-12.83	74	75.55	33.98	9.11	57.47	100	0	Peak
4803	30.48	-23.52	54	-	-	-	-	-	-	Average
7206	41.96	-22.37	64.33	54.34	35.56	10.02	57.96	100	0	Peak
9606	43.8	-20.53	64.33	53.58	36.44	12.01	58.23	100	0	Peak

Test Mode :	1Mbps	Temperature :	23~24°C
Test Channel :	39	Relative Humidity :	50~52%
Test Engineer :	Gavin Wu	Polarization :	Horizontal
Remark :	1. 2441 MHz is fundamental signal which can be ignored. 2. 3255 MHz and 9765MHz are not within a restricted band, and its limit line is 20dB below the highest emission level.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
87.24	33.16	-6.84	40	55.6	8.33	0.92	31.69	-	-	Peak
148.26	39.51	-3.99	43.5	58.46	11.24	1.21	31.4	-	-	Peak
150.42	40.32	-3.18	43.5	59.3	11.2	1.21	31.39	100	175	Peak
456.1	38.18	-7.82	46	49.86	17.17	2.31	31.16	-	-	Peak
820.8	38.23	-7.77	46	43.06	22.3	3.19	30.32	-	-	Peak
830.6	40.57	-5.43	46	45.35	22.4	3.22	30.4	-	-	Peak
2441	95.44	-	-	90.96	32.35	6.11	33.98	103	300	Peak
2441	64.75	-	-	-	-	-	-	-	-	Average
3255	44.19	-31.25	75.44	61.01	32.75	7.29	56.86	100	0	Peak
4881	67.35	-6.65	74	81.74	33.95	9.14	57.48	100	0	Peak
4881	36.66	-17.34	54	-	-	-	-	-	-	Average
7323	41.97	-32.03	74	54.42	35.53	10.06	58.04	100	0	Peak
7323	11.28	-42.72	54	-	-	-	-	-	-	Average
9765	43.81	-31.63	75.44	53.43	36.69	11.93	58.24	100	0	Peak

Test Mode :	1Mbps	Temperature :	23~24°C
Test Channel :	39	Relative Humidity :	50~52%
Test Engineer :	Gavin Wu	Polarization :	Vertical
Remark :	1. 2441 MHz is fundamental signal which can be ignored. 2. 9765MHz is not within a restricted band, and its limit line is 20dB below the highest emission level.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
50.79	30.69	-9.31	40	53.52	8.1	0.7	31.63	-	-	Peak
108.03	40.24	-3.26	43.5	60.41	10.52	1.04	31.73	105	229	Peak
131.79	39.06	-4.44	43.5	57.89	11.56	1.16	31.55	-	-	Peak
456.1	34.19	-11.81	46	45.87	17.17	2.31	31.16	-	-	Peak
552	36.73	-9.27	46	46.43	18.97	2.56	31.23	-	-	Peak
829.2	40.52	-5.48	46	45.29	22.39	3.22	30.38	-	-	Peak
2441	85.15	-	-	80.67	32.35	6.11	33.98	100	142	Peak
2441	54.46	-	-	-	-	-	-	-	-	Average
4881	61.93	-12.07	74	76.32	33.95	9.14	57.48	100	0	Peak
4881	31.24	-22.76	54	-	-	-	-	-	-	Average
7323	42.69	-31.31	74	55.14	35.53	10.06	58.04	100	0	Peak
7323	12	-42	54	-	-	-	-	-	-	Average
9765	45.06	-20.09	65.15	54.68	36.69	11.93	58.24	100	0	Peak

Test Mode :	1Mbps	**Temperature :**	23~24°C
Test Channel :	78	**Relative Humidity :**	50~52%
Test Engineer :	Gavin Wu	**Polarization :**	Horizontal
Remark :	1. 2480 MHz is fundamental signal which can be ignored. 2. 3306 MHz and 9918MHz are not within a restricted band, and its limit line is 20dB below the highest emission level.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2480	96.79	-	-	92.23	32.38	6.18	34	130	318	Peak
2480	66.1	-	-	-	-	-	-	-	-	Average
3306	44.83	-31.96	76.79	61.62	32.74	7.39	56.92	100	0	Peak
4962	63.03	-10.97	74	77.45	33.91	9.16	57.49	100	0	Peak
4962	32.34	-21.66	54	-	-	-	-	-	-	Average
7440	42.05	-31.95	74	54.54	35.51	10.12	58.12	100	0	Peak
7440	11.36	-42.64	54	-	-	-	-	-	-	Average
9918	45.92	-30.87	76.79	55.43	36.9	11.84	58.25	100	0	Peak

Test Mode :	1Mbps	Temperature :	23~24°C
Test Channel :	78	Relative Humidity :	50~52%
Test Engineer :	Gavin Wu	Polarization :	Vertical
Remark :	1. 2480 MHz is fundamental signal which can be ignored. 2. 9918MHz is not within a restricted band, and its limit line is 20dB below the highest emission level.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2480	85.89	-	-	81.33	32.38	6.18	34	126	132	Peak
2480	55.2	-	-	-	-	-	-	-	-	Average
4962	59.76	-14.24	74	74.18	33.91	9.16	57.49	100	0	Peak
4962	29.07	-24.93	54	-	-	-	-	-	-	Average
7440	41.76	-32.24	74	54.25	35.51	10.12	58.12	100	0	Peak
7440	11.07	-42.93	54	-	-	-	-	-	-	Average
9918	45.45	-20.44	65.89	54.96	36.9	11.84	58.25	100	0	Peak

<Sample 2>

Test Mode :	1Mbps	**Temperature :**	23~24°C
Test Channel :	00	**Relative Humidity :**	50~52%
Test Engineer :	Gavin Wu	**Polarization :**	Horizontal
Remark :	1. 2402 MHz is fundamental signal which can be ignored. 2. 3201 MHz, 7206 MHz and 9609 MHz are not within a restricted band, and its limit line is 20dB below the highest emission level.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2402	97.64	-	-	93.27	32.3	6.03	33.96	193	276	Peak
2402	66.89	-	-	-	-	-	-	-	-	Average
3201	45.67	-32	77.67	62.51	32.76	7.19	56.79	100	0	Peak
4803	63.77	-10.23	74	78.15	33.98	9.11	57.47	100	0	Peak
4803	33.02	-20.98	54	-	-	-	-	-	-	Average
7206	42.06	-35.61	77.67	54.44	35.56	10.02	57.96	100	0	Peak
9609	44.22	-33.45	77.67	54	36.44	12.01	58.23	100	0	Peak

Note: The average levels were calculated from the peak level corrected with duty cycle correction factor (30.75dB) derived from 20log (dwell time/100ms).

For example: Average level = 97.64 dBuV/m – 30.75 (dB) = 66.89 dBuV/m.

Test Mode :	1Mbps	**Temperature :**	23~24°C
Test Channel :	00	**Relative Humidity :**	50~52%
Test Engineer :	Gavin Wu	**Polarization :**	Vertical
Remark :	1. 2402 MHz is fundamental signal which can be ignored. 2. 3201 MHz, 7209 MHz and 9609 MHz are not within a restricted band, and its limit line is 20dB below the highest emission level.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2402	89.6	-	-	85.23	32.3	6.03	33.96	100	234	Peak
2402	58.85	-	-	-	-	-	-	-	-	Average
3201	40.5	-29.1	69.6	57.34	32.76	7.19	56.79	100	0	Peak
4803	66.27	-7.73	74	80.65	33.98	9.11	57.47	100	0	Peak
4803	35.52	-18.48	54	-	-	-	-	-	-	Average
7209	40.84	-28.76	69.6	53.22	35.56	10.02	57.96	100	0	Peak
9606	43.94	-25.66	69.6	53.72	36.44	12.01	58.23	100	0	Peak

Test Mode :	1Mbps	**Temperature :**	23~24°C
Test Channel :	39	**Relative Humidity :**	50~52%
Test Engineer :	Gavin Wu	**Polarization :**	Horizontal
Remark :	1. 2441 MHz is fundamental signal which can be ignored. 2. 3255 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
112.08	22.5	-21	43.5	42.18	10.98	1.06	31.72	-	-	Peak
156.09	24.72	-18.78	43.5	44.11	10.78	1.22	31.39	-	-	Peak
184.17	37.18	-6.32	43.5	58.22	8.94	1.26	31.24	100	56	Peak
400.1	27.61	-18.39	46	40.97	16.02	2.14	31.52	-	-	Peak
498.1	26.47	-19.53	46	36.87	18.06	2.44	30.9	-	-	Peak
814.5	34.29	-11.71	46	39.13	22.25	3.18	30.27	-	-	Peak
2441	100	-	-	95.52	32.35	6.11	33.98	186	291	Peak
2441	69.25	-	-	-	-	-	-	-	-	Average
3255	48.76	-31.24	80	65.58	32.75	7.29	56.86	100	0	Peak
4881	59.4	-14.6	74	73.79	33.95	9.14	57.48	100	0	Peak
4881	28.65	-25.35	54	-	-	-	-	-	-	Average
7323	42.88	-31.12	74	55.33	35.53	10.06	58.04	100	0	Peak
7323	12.13	-41.87	54	-	-	-	-	-	-	Average

Test Mode :	1Mbps	Temperature :	23~24°C
Test Channel :	39	Relative Humidity :	50~52%
Test Engineer :	Gavin Wu	Polarization :	Vertical
Remark :	1. 2441 MHz is fundamental signal which can be ignored. 2. 3255 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
112.08	32.35	-11.15	43.5	52.03	10.98	1.06	31.72	-	-	Peak
160.14	34.5	-9	43.5	54.17	10.5	1.22	31.39	-	-	Peak
184.17	40.3	-3.2	43.5	61.34	8.94	1.26	31.24	100	98	Peak
456.1	20.7	-25.3	46	32.38	17.17	2.31	31.16	-	-	Peak
728.4	24.65	-21.35	46	31.13	21.02	3.01	30.51	-	-	Peak
814.5	26.49	-19.51	46	31.33	22.25	3.18	30.27	-	-	Peak
2441	90.34	-	-	85.86	32.35	6.11	33.98	100	24	Peak
2441	59.59	-	-	-	-	-	-	-	-	Average
3255	41.86	-28.48	70.34	58.68	32.75	7.29	56.86	100	0	Peak
4881	59.55	-14.45	74	73.94	33.95	9.14	57.48	100	0	Peak
4881	28.8	-25.2	54	-	-	-	-	-	-	Average
7323	42.28	-31.72	74	54.73	35.53	10.06	58.04	100	0	Peak
7323	11.53	-42.47	54	-	-	-	-	-	-	Average

Test Mode :	1Mbps	Temperature :	23~24°C
Test Channel :	78	Relative Humidity :	50~52%
Test Engineer :	Gavin Wu	Polarization :	Horizontal
Remark :	1. 2480 MHz is fundamental signal which can be ignored. 2. 3306 MHz and 9918 MHz are not within a restricted band, and its limit line is 20dB below the highest emission level.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2480	96.86	-	-	92.3	32.38	6.18	34	185	295	Peak
2480	66.11	-	-	-	-	-	-	-	-	Average
3306	50.78	-26.08	76.86	67.57	32.74	7.39	56.92	100	0	Peak
4962	55.33	-18.67	74	69.75	33.91	9.16	57.49	100	0	Peak
4962	24.58	-29.42	54	-	-	-	-	-	-	Average
9918	47.35	-29.51	76.86	56.86	36.9	11.84	58.25	100	0	Peak

Test Mode :	1Mbps	Temperature :	23~24°C
Test Channel :	78	Relative Humidity :	50~52%
Test Engineer :	Gavin Wu	Polarization :	Vertical
Remark :	1. 2480 MHz is fundamental signal which can be ignored. 2. 3306 MHz and 9918 MHz are not within a restricted band, and its limit line is 20dB below the highest emission level.		

Frequency (MHz)	Level (dBµV/m)	Over Limit (dB)	Limit Line (dBµV/m)	Read Level (dBµV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2480	88.28	-	-	83.72	32.38	6.18	34	100	24	Peak
2480	57.53	-	-	-	-	-	-	-	-	Average
3306	42.48	-31.52	68.28	59.27	32.74	7.39	56.92	100	0	Peak
4962	59.9	-14.1	74	74.32	33.91	9.16	57.49	100	0	Peak
4962	29.15	-24.85	54	-	-	-	-	-	-	Average
9918	47.63	-26.37	68.28	57.14	36.9	11.84	58.25	100	0	Peak

3.9 Antenna Requirements

3.9.1 Standard Applicable

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

3.9.2 Antenna Connected Construction

Non-standard connector used.

3.9.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100055	9kHz~40GHz	Jun. 06, 2012	Nov. 14, 2012 ~ Nov. 16, 2012	Jun. 05, 2013	Conducted (TH02-HY)
Bilog Antenna	Schaffner	CBL6111C	2726	30MHz ~ 1GHz	Oct. 06, 2012	Nov. 21, 2012 ~ Nov. 22, 2012	Oct. 05, 2013	Radiation (03CH07-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP30	101067	9KHz ~ 30GHz	Dec. 06, 2011	Nov. 21, 2012 ~ Nov. 22, 2012	Dec. 05, 2012	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 22, 2012	Nov. 21, 2012 ~ Nov. 22, 2012	Aug. 21, 2013	Radiation (03CH07-HY)
Pre Amplifier	Agilent	8449B	3008A02362	1GHz ~ 26.5GHz	Dec. 05, 2011	Nov. 21, 2012 ~ Nov. 22, 2012	Dec. 04, 2012	Radiation (03CH07-HY)
Pre Amplifier	MITEQ	AMF-7D-00101800-30-10P	159088	1GHz ~ 18GHz	Mar. 10, 2012	Nov. 21, 2012 ~ Nov. 22, 2012	Mar. 09, 2013	Radiation (03CH07-HY)
Pre Amplifier	COM-POWER	PA-103A	161241	10-1000MHz.32 dB.GAIN	Feb. 27, 2012	Nov. 21, 2012 ~ Nov. 22, 2012	Feb. 26, 2013	Radiation (03CH07-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz~7GHz	Sep. 03, 2012	Nov. 21, 2012 ~ Nov. 22, 2012	Sep. 02, 2013	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz ~ 40GHz	Sep. 28, 2012	Nov. 21, 2012 ~ Nov. 22, 2012	Sep. 27, 2013	Radiation (03CH07-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz~30 MHz	Jul. 29, 2010	Nov. 21, 2012 ~ Nov. 22, 2012	Jul. 28, 2012	Radiation (03CH07-HY)

5 Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.54**

Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**4.72**

Appendix A. Photographs of EUT

Please refer to Sporton report number EP291425 as below.