FCC Test Report

FCC Part 15 Subpart C §15.247

Product Name	:	GSM MOBILE PHONE
Model No.	:	M4TEL SS220
FCC ID	:	CLNSS220G

Prepared By:	:	Inventec Appliances(Pudong) Corporation
Address:	:	No.789 Pu Xing Road,Shanghai,PRC
Date of Receipt	:	2012.03.8
Date of Test	:	2012.03.8-2012.03.16
Report No.	:	20120308FCC-B

Test Report Certification

Date of Issue : Mar.08.2012

Report No. : 20120308FCC-B

Product Name	: GSM MOBILE PHONE
Model No.	: M4TEL SS220
Trade Name	: M4TEL
Applicant	: MFOURTEL MEXICO S.A. DE C.V.
Address	: Montecito 38, Piso 23, Oficina 15. Colonia Nápoles. C.P. 03810 Mexico
Standard	: FCC Part 15 Subpart C §15.247
Classification	: Bluetooth: Digital Transmission System (DTS)
TX/RX Frequency Range	Bluetooth (2400 MHz ~ 2483.5 MHz)
Test Result	: Complied

The Test Results relate only to the samples tested.
The test report shall not be reproduced except in full without the written approval of Inventec Appliances(Pudong) Corporation

Documented By : Kelly Lin Mar. 16.2012
Kelly Lin/Engineer

Tested By : Byran Hung Mar. 16.2012
Byran Hung/Senior Engineer

Approved By : Jeff Huang Mar. 16.2012
Jeff Huang/Director of Operations

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SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
4.1	15.247(a)(1)	A8.4(2)	Number of Channels	≥ 15Chs	Pass	-
4.2	15.247(a)(1)	A8.1(a)	20dB Bandwidth	NA	Pass	-
4.2	-	Gen 4.4.1	99% Bandwidth	-	Pass	-
4.3	15.247(a)(1)	A8.1(b)	Channel Separation	≥ 2/3 of 20dB BW	Pass	-
4.4	15.247(a)(1)	A8.1(d)	Dwell Time of Each Channel	≤ 0.4sec in 31.6sec period	Pass	-
4.5	15.247(b)(1)	A8.1(b)	Peak Output Power	≤ 1W	Pass	-
4.6	15.247(d)	A8.5	Frequency Band Edges	≤ 20dBc	Pass	-
4.7	15.247(d)	A8.5	Spurious Emission	< 20 dBc	Pass	-
4.8	15.207	Gen 7.2.2	AC Conducted Emission	Section 15.207(a)	Pass	-
4.9	15.247(d)	A8.5	Radiated Emission	FCC 47 CFR Part 15 Subpart **C**/ Section 15.209(a) &15.247(d)	Pass	-
4.10	15.203 &15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-

1. GENERAL INFORMATION

1.1 Applicant

Company Name:MFOURTEL MEXICO S.A. DE C.V.

Address: Montecito 38, Piso 23, Oficina 15. Colonia Nápoles. C.P. 03810 Mexico

1.2 Manufacturer

Company Name:CK Telecom Limited

Address: Technology Road.High-Tech Development Zone. Heyuan, Guangdong,P.R.China.

1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	GSM MOBILE PHONE
Brand Name	M4TEL
Model Name	M4TEL SS220
FCC ID	CLNSS220G
Tx/Rx Frequency Range	Bluetooth (2400 MHz ~ 2483.5 MHz)
Number of Channels	BT： CH00 CH39 CH78
Carrier Frequency of Each Channel	BT： 2402MHz 2441MHz 2480MHz
Channel Spacing	BT： 1MHz
Maximum Output Power to Antenna	BT： 8.31 (dBm)
Antenna Type	Monopole Antenna
HW Version	NICOLE-V2.0
SW Version	NICOLE-S03A_M4TEL_L2EN_100_111111
Type of Modulation	BT(1Mbps):GFSK BT EDR(2Mbps):π /4-DQPSK BT EDR(3Mbps):8-DPSK

Remark:

1. For other wireless features of this EUT, test report will be issued separately.
2. This test report recorded only product characteristics and test results of Digital Transmission System (DTS) and Digital Spread Spectrum(DSS).
3. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description

1.4 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

Remark:

1. All test items were verified and recorded according to the standards and without any deviationduring 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.

2. Test Configuration of Equipment Under Test

2.1 RF 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 (dBm)		
		Data Rate / Modulation		
		GFSK	π /4-DQPSK	8-DPSK
		1Mbps	2Mbps	3Mbps
Ch00	2402MHz	8.31	7.74	7.82
Ch39	2441MHz	8.09	7.31	7.53
Ch78	2480MHz	7.92	7.13	7.23

Remark:

The EUT is programmed to transmit signal continuously for all testing.

2.2 Test Modes

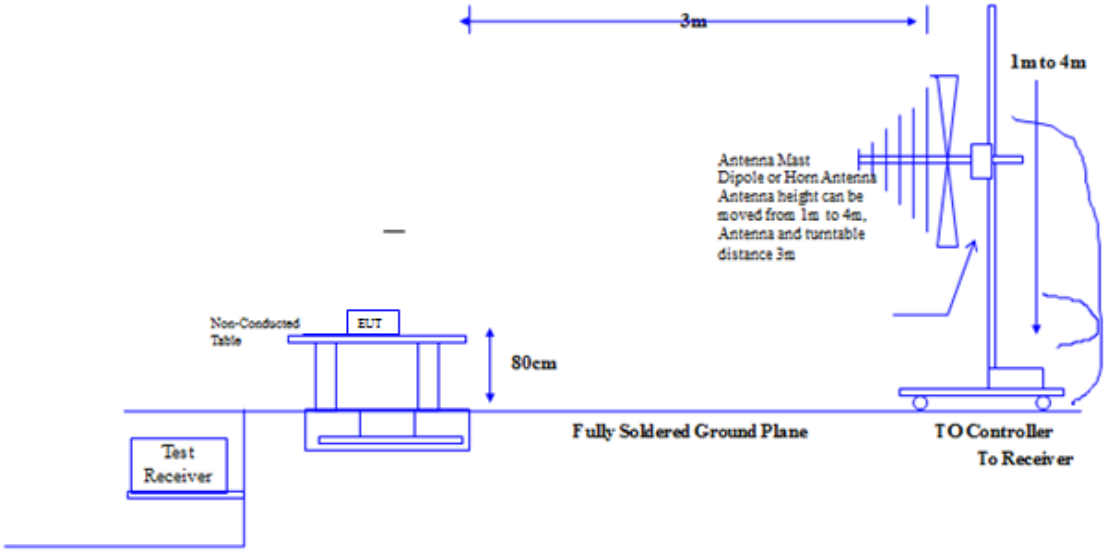
The EUT has been associated with peripherals pursuant to ANSI C63.4-2003 and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conducted emission (150 kHz to 30 MHz), radiated emission (30MHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

Pre-scanned tests were conducted to determine the final configuration from all possible combinations. The following tables are showing the test modes as the worst cases and recorded in this report.

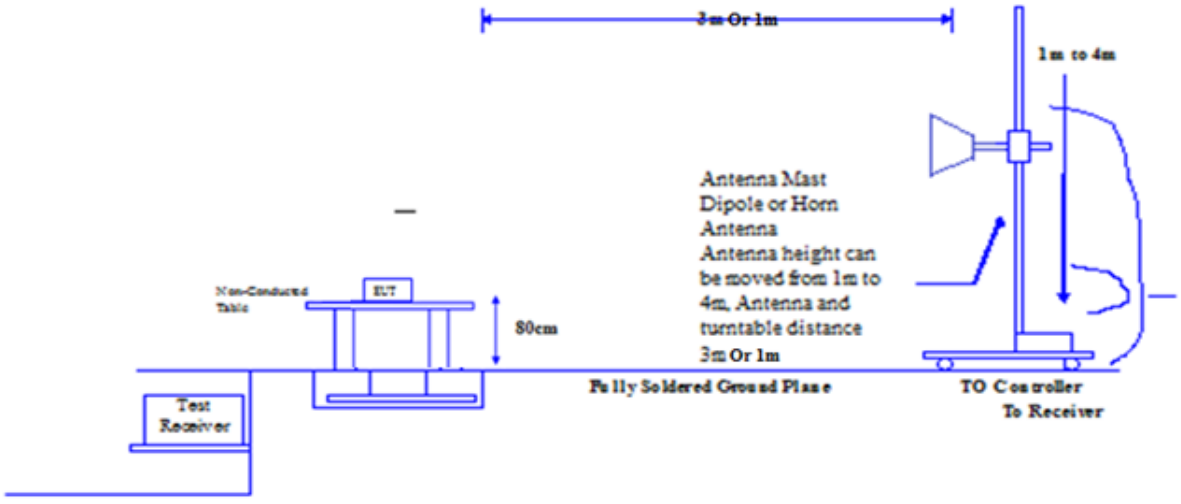
Test Cases			
Test Item	**Data Rate / Modulation**		
	Bluetooth 1Mbps GFSK	**Bluetooth EDR 2Mbps π /4-DQPSK**	**Bluetooth EDR 3Mbps 8-DPSK**
Conducted TCs	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz	Mode 4: CH00_2402 MHz Mode 5: CH39_2441 MHz Mode 6: CH78_2480 MHz	Mode 7: CH00_2402 MHz Mode 8: CH39_2441 MHz Mode 9: CH78_2480 MHz
Radiated TCs	N/A	N/A	Mode 1: CH00_2402 MHz + Battery Mode 2: CH39_2441 MHz + Battery Mode 3: CH78_2480 MHz + Battery
AC Conducted Emission	Mode 1 : GSM 850 Idle + WLAN Link (2.4G) + Bluetooth Link + Adapter + Battery + Earphone Mode 2 : GSM 1900 Idle + WLAN Link (2.4G) + Bluetooth Link +Adapter + Battery + Earphone		

2.3 Connection Diagram of Test System

30MHz~1GHz



Above 1GHz



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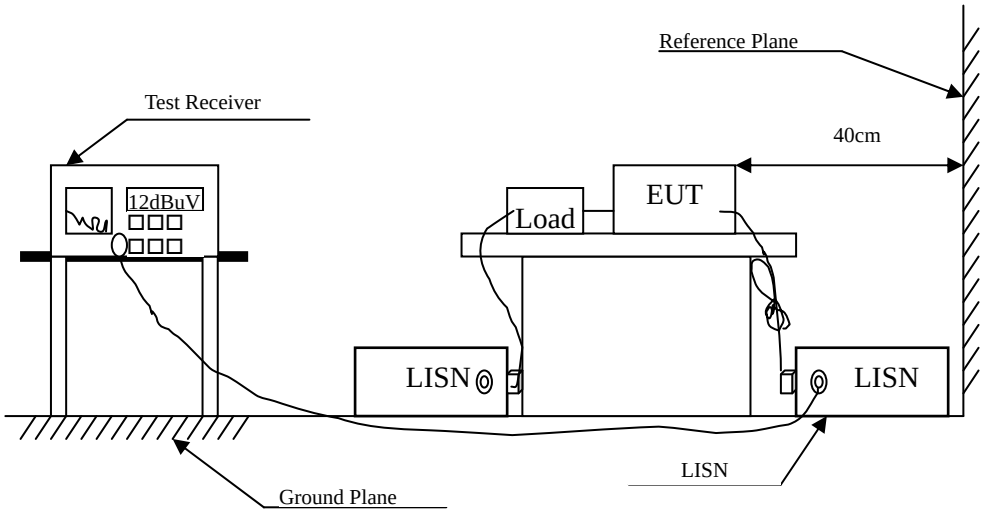


3. Test Result

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.

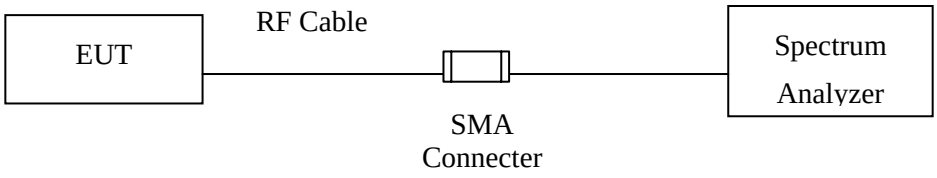
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test 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 a low loss cable.
3. The modulation types of EUT are irrelevant to number of hopping channels deviation.
4. The EUT must have its hopping function enabled. 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.
5. The number of hopping frequency used is defined as the device has the numbers of total channel.

3.1.4 Test Setup

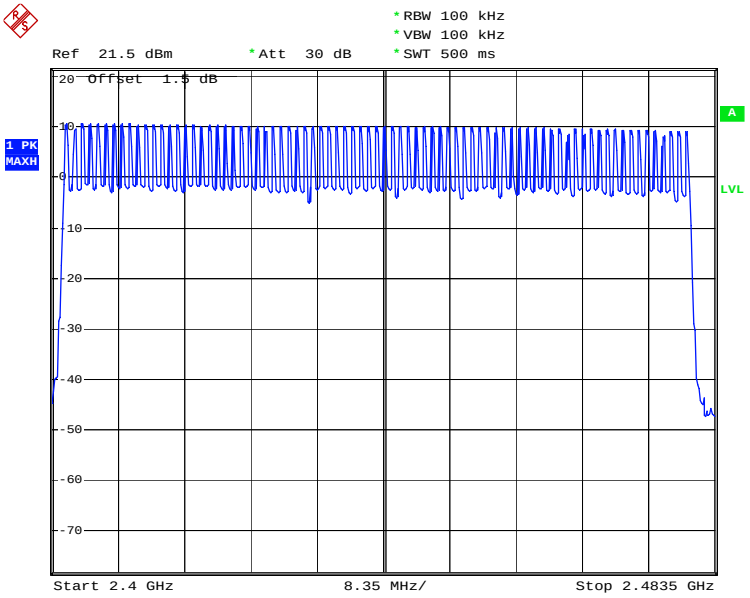


3.1.5 Test Result of Number of Hopping Frequency

Test Mode :	Mode 1~3	Temperature :	23℃~26℃
Test Engineer :	Hogan He	Relative Humidity :	40%~60%

Number of Hopping Channels (Channel)	Limits (Channel)	Pass/Fail
79	> 15	Pass

Number of Hopping Channel Plot on Channel 00 - 78

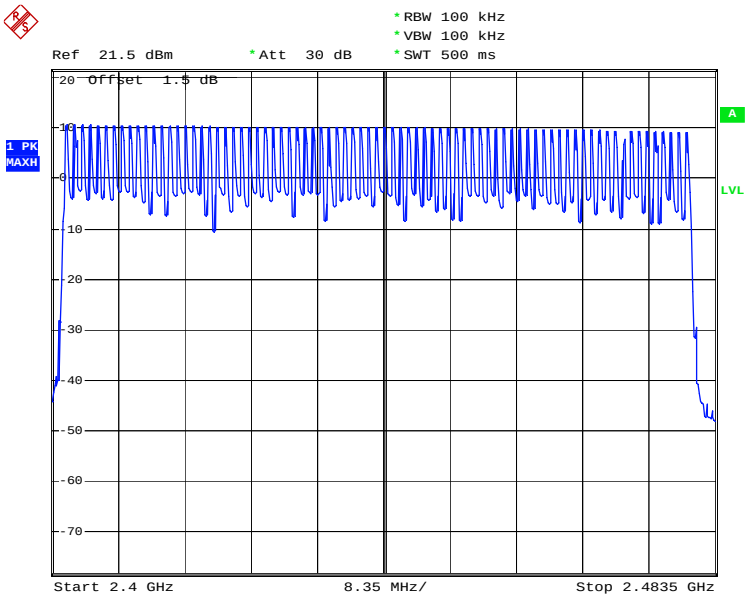


Date: 12.MAR.2012 02:26:32

Test Mode :	Mode 4~6	Temperature :	23℃~26℃
Test Engineer :	Hogan He	Relative Humidity :	40%~60%

Number of Hopping Channels (Channel)	Limits (Channel)	Pass/Fail
79	> 15	Pass

Number of Hopping Channel Plot on Channel 00 - 78



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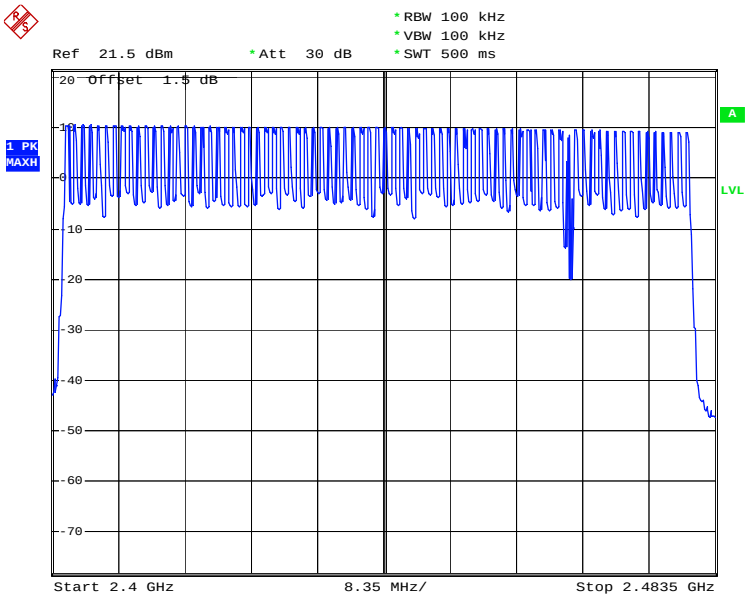
Test Mode :	Mode 7~9	Temperature :	23℃~26℃
Test Engineer :	Hogan He	Relative Humidity :	40%~60%

Number of Hopping Channels (Channel)	Limits (Channel)	Pass/Fail
79	> 15	Pass

Number of Hopping Channel Plot on Channel 00 - 78



Date: 12.MAR.2012 03:06:53

3.2 20dB and 99% Bandwidth Measurement

3.2.1 Limit of 20dB Bandwidth

N/A

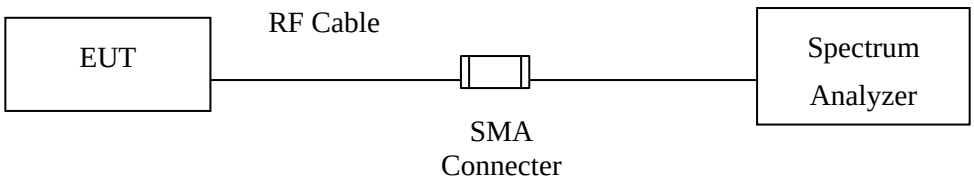
3.2.2 Measuring Instruments

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 a low loss cable.
3. The EUT should be transmitting at its maximum data rate as the worst cases.
4. Use the following spectrum analyzer settings:
   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. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

3.2.4 Test Setup

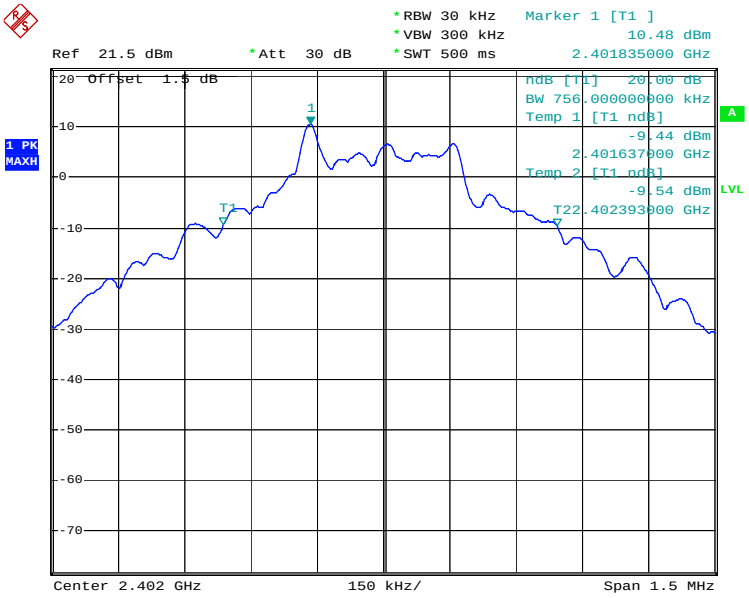


3.2.5 Test Result of 20dB Bandwidth

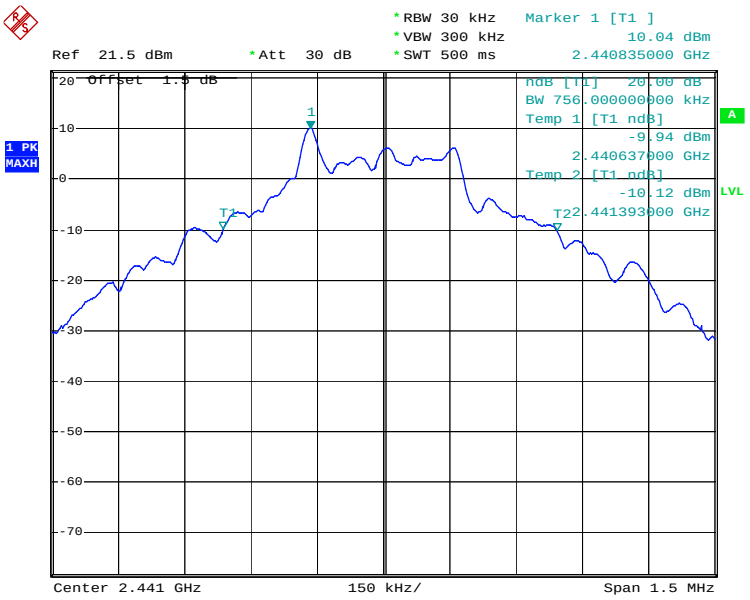
Test Mode :	Mode 1,2,3	Temperature :	23℃~26℃
Test Engineer :	Hogan He	Relative Humidity :	40%~60%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	0.756
39	2441	0.756
78	2480	0.756

20 dB Bandwidth Plot on Channel 00



20 dB Bandwidth Plot on Channel 39



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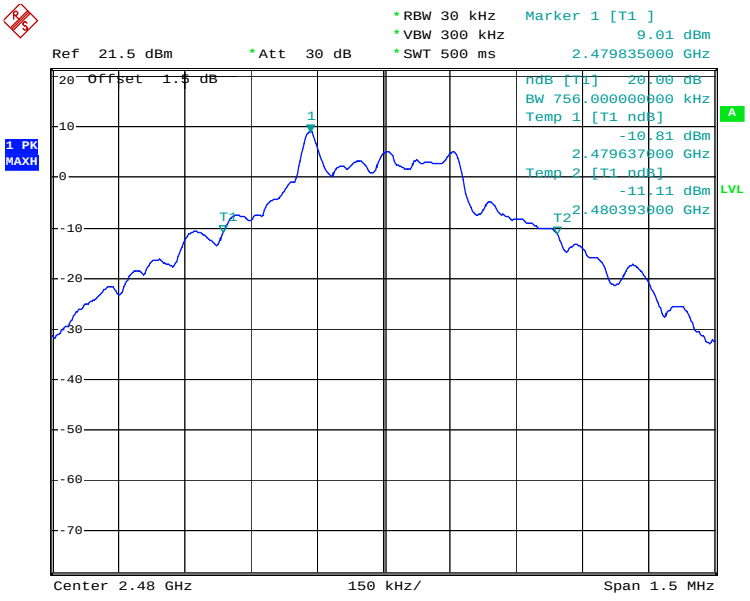
20 dB Bandwidth Plot on Channel 78

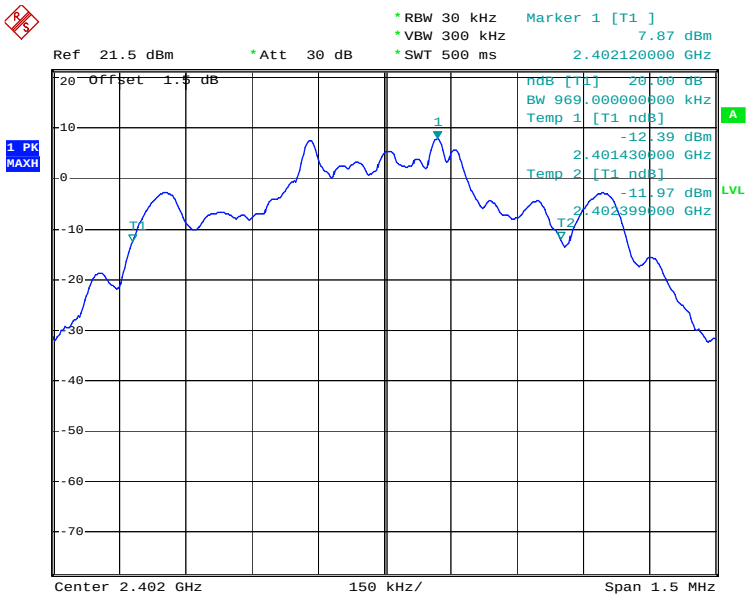


Date: 12.MAR.2012 03:36:05

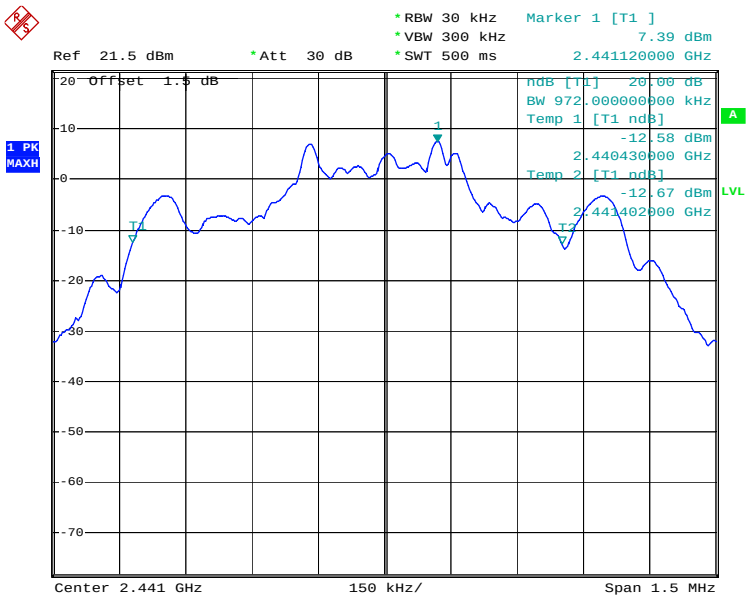
Test Mode :	Mode 4,5,6	Temperature :	23℃~26℃
Test Engineer :	Hogan He	Relative Humidity :	40%~60%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	0.969
39	2441	0.972
78	2480	1.125

20 dB Bandwidth Plot on Channel 00



20 dB Bandwidth Plot on Channel 39



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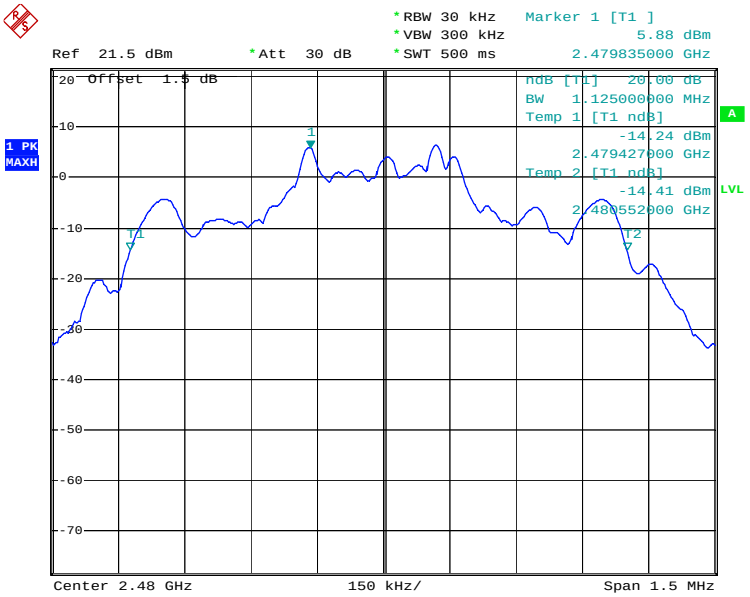
20 dB Bandwidth Plot on Channel 78

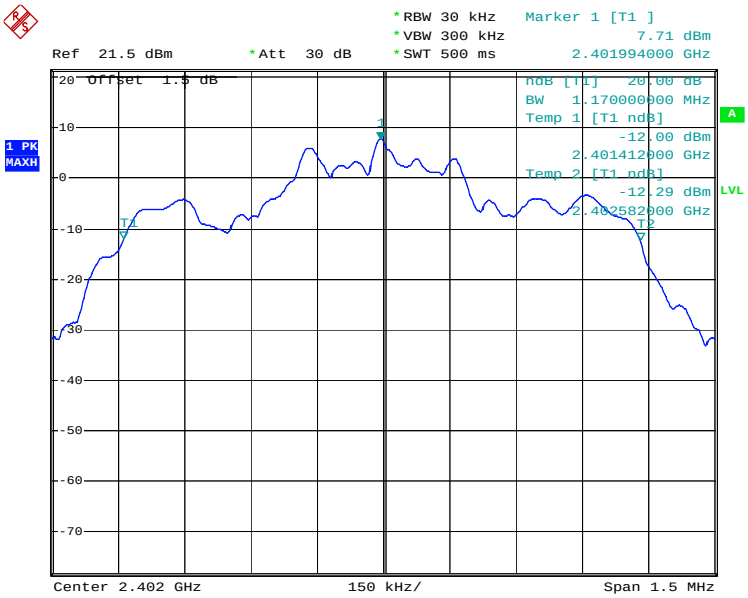


Date: 12.MAR.2012 03:40:45

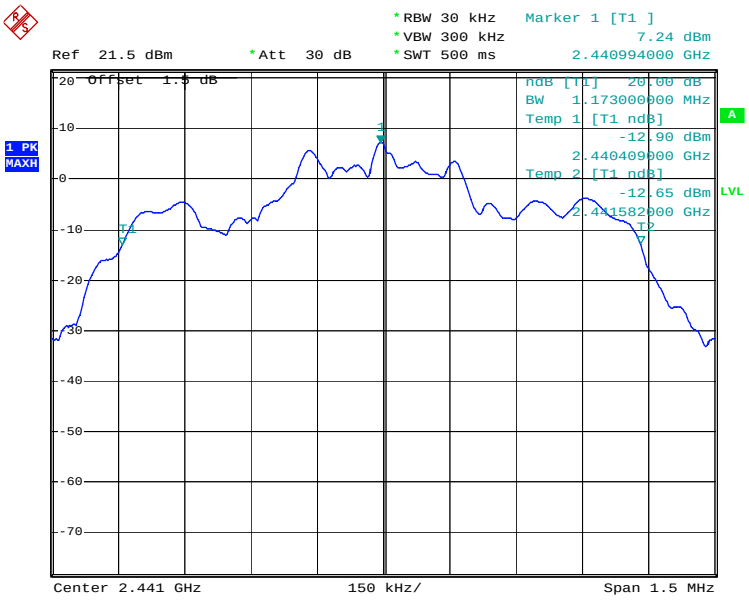
Test Mode :	Mode 7,8,9	Temperature :	23℃~26℃
Test Engineer :	Hogan He	Relative Humidity :	40%~60%

Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.170
39	2441	1.173
78	2480	1.173

20 dB Bandwidth Plot on Channel 00



20 dB Bandwidth Plot on Channel 39



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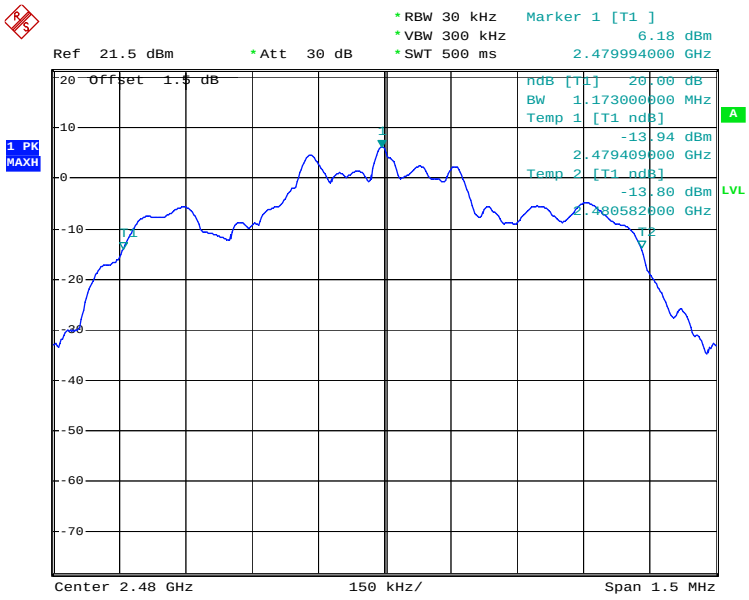
20 dB Bandwidth Plot on Channel 78



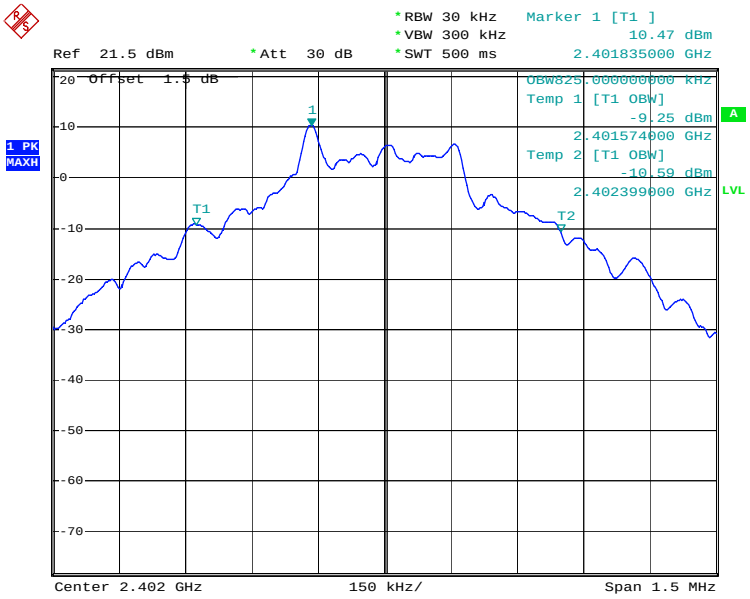
Date: 12.MAR.2012 03:51:41

3.2.6 Test Result of 99% Occupied Bandwidth

Test Mode :	Mode 1,2,3	Temperature :	23℃~26℃
Test Engineer :	Hogan He	Relative Humidity :	40%~60%

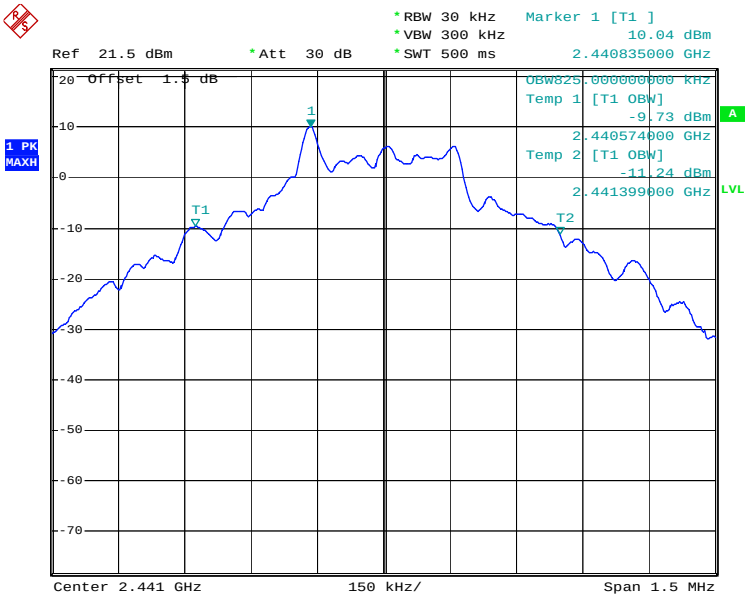
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	0.825
39	2441	0.825
78	2480	0.825

99% Bandwidth Plot on Channel 00



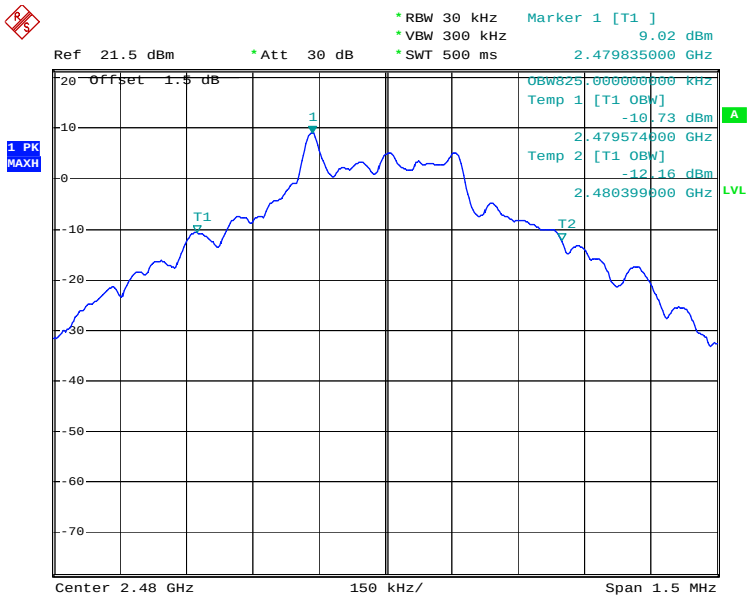
Date: 12.MAR.2012 03:59:48

99% Occupied Bandwidth Plot on Channel 39



Date: 12.MAR.2012 03:58:56

99% Occupied Bandwidth Plot on Channel 78

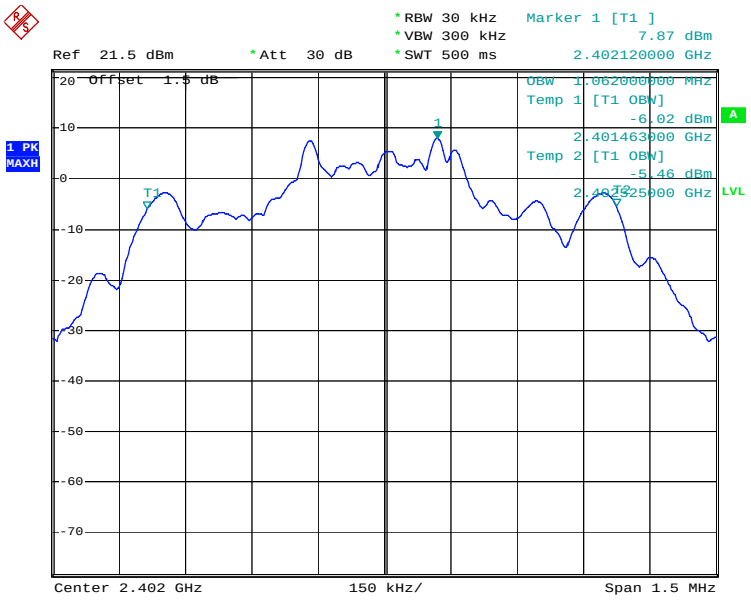


Date: 12.MAR.2012 03:58:21

Test Mode :	Mode 4,5,6	Temperature :	23℃~26℃
Test Engineer :	Hogan He	Relative Humidity :	40%~60%

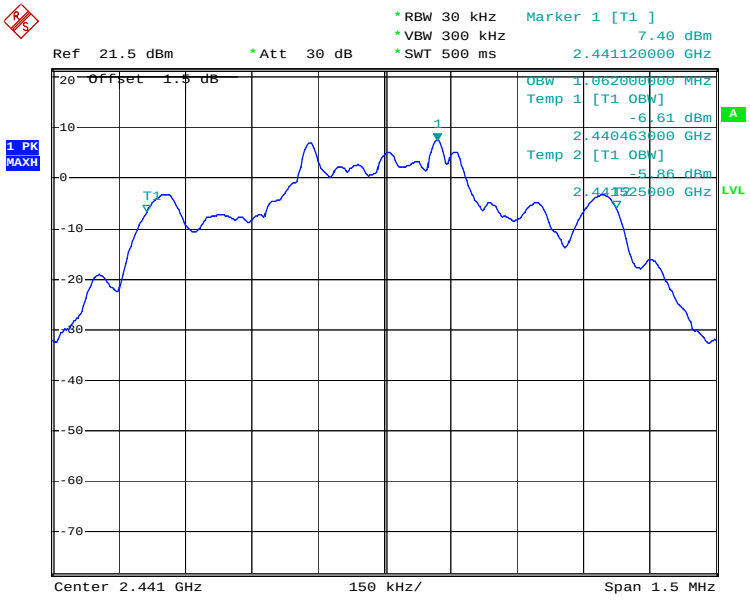
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	1. 062
39	2441	1. 062
78	2480	1. 062

99% Bandwidth Plot on Channel 00



Date: 12.MAR.2012 03:55:21

99% Occupied Bandwidth Plot on Channel 39



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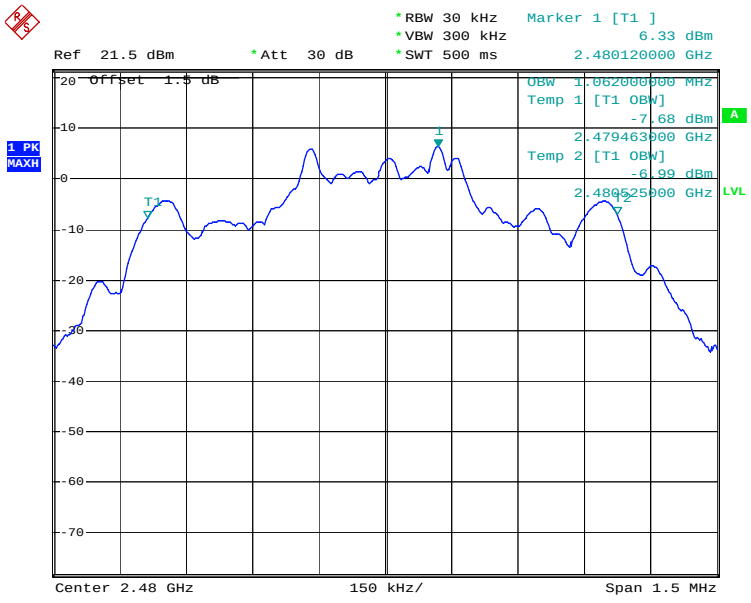
99% Occupied Bandwidth Plot on Channel 78



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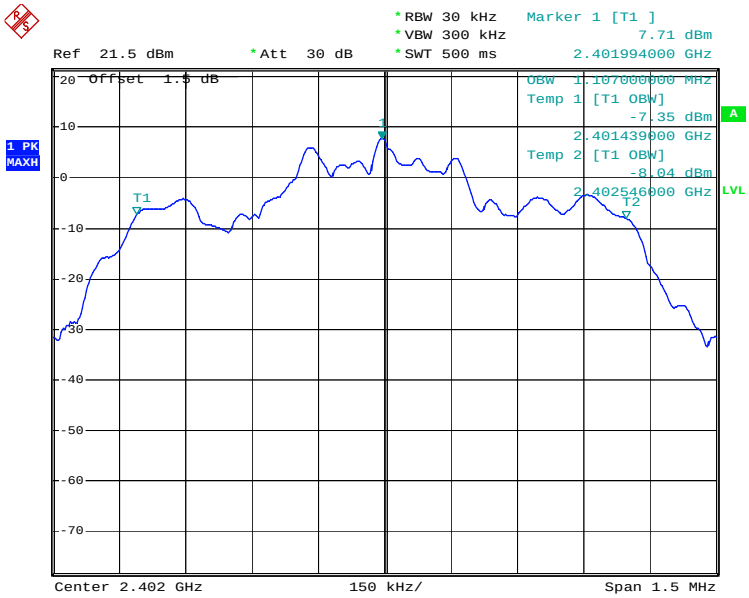
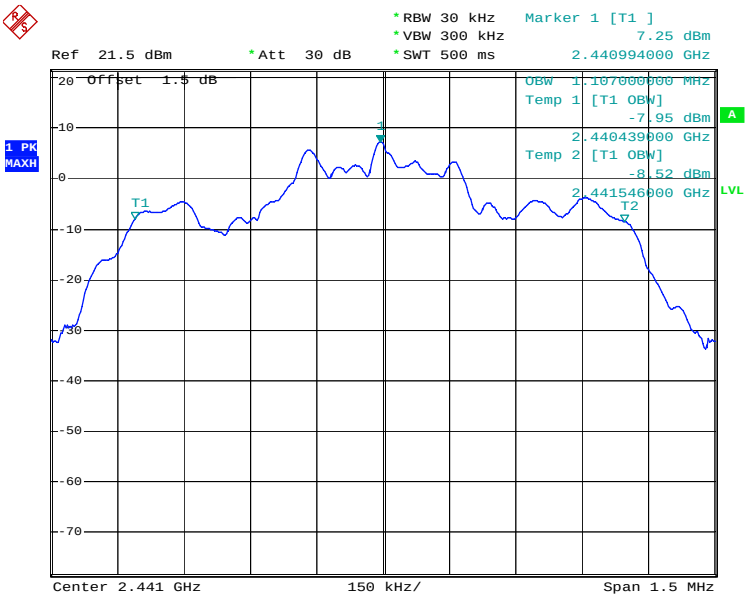
Test Mode :	Mode 7,8,9	Temperature :	23℃~26℃
Test Engineer :	Hogan He	Relative Humidity :	40%~60%

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	1.107
39	2441	1.107
78	2480	1.107

99% Bandwidth Plot on Channel 00

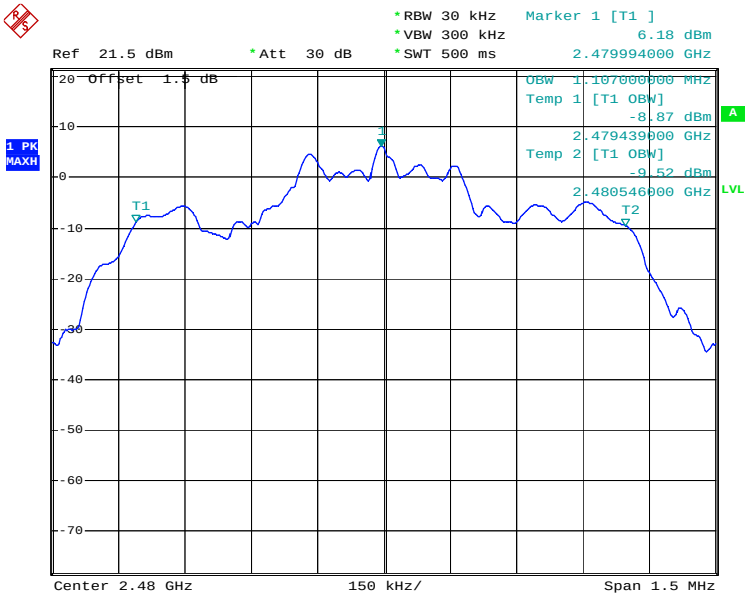


99% Occupied Bandwidth Plot on Channel 39



Date: 12.MAR.2012 03:53:59

99% Occupied Bandwidth Plot on Channel 78



Date: 12.MAR.2012 03:53:23

3.3 Hopping Channel Separation Measurement

3.3.1 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.

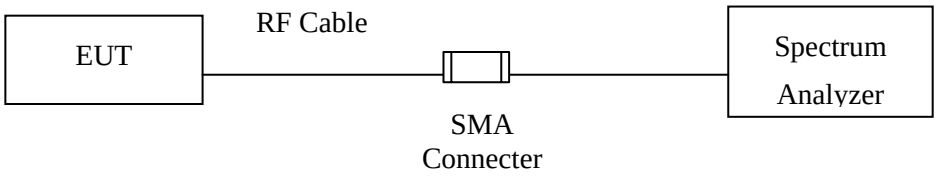
3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

1. Please refer FCC Public Notice DA 00-705 Measurement Guidelines.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. The EUT should be transmitting at its maximum data rate as the worst cases.
4. 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.
5. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

3.3.4 Test Setup

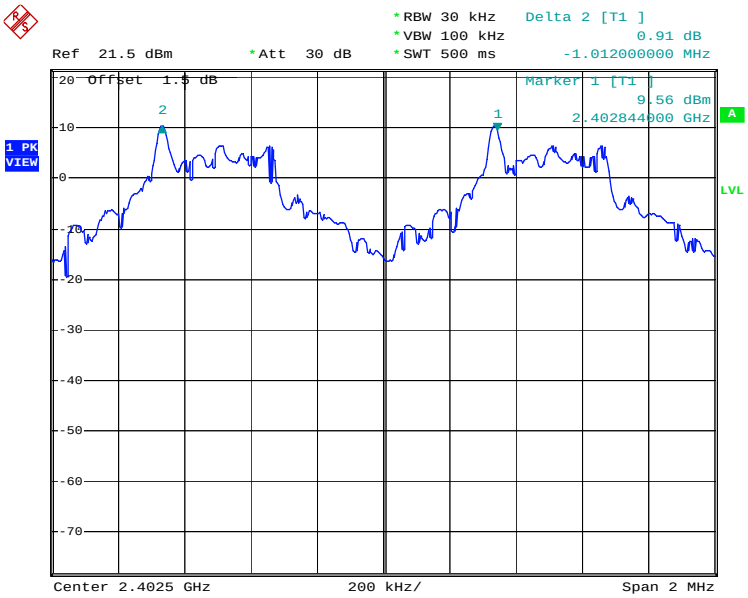


3.3.5 Test Result of Hopping Channel Separation

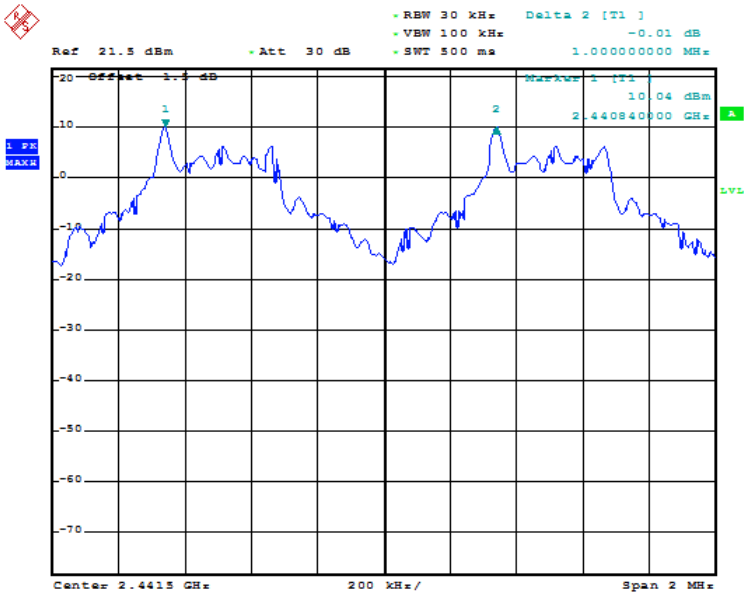
Test Mode :	Mode 1,2,3	Temperature :	23℃~26℃
Test Engineer :	Hogan He	Relative Humidity :	40%~60%

Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.012	0.504	Pass
39	2441	1.000	0.504	Pass
78	2480	1.000	0.504	Pass

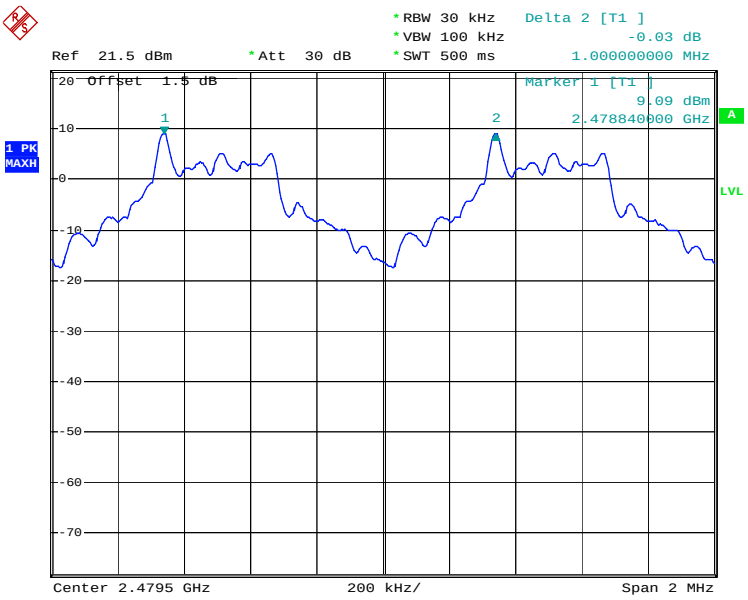
Channel Separation Plot on Channel 00 - 01



Channel Separation Plot on Channel 39 - 40



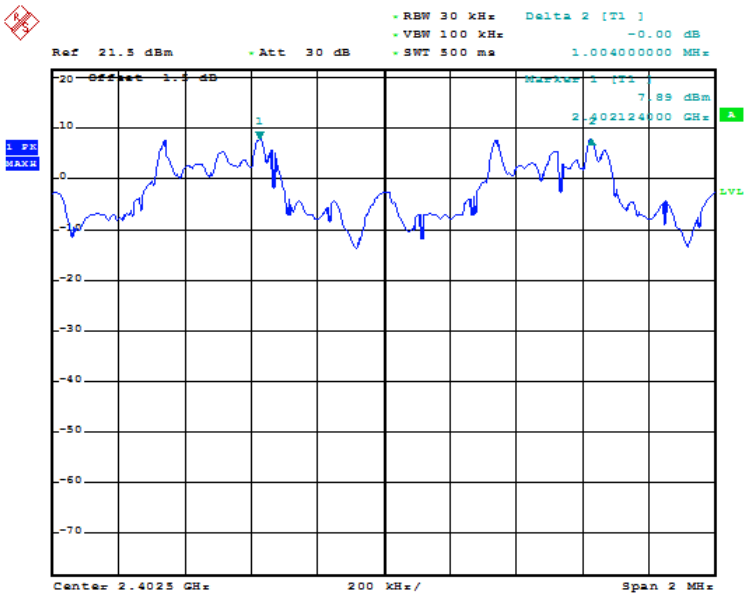
Channel Separation Plot on Channel 77 - 78



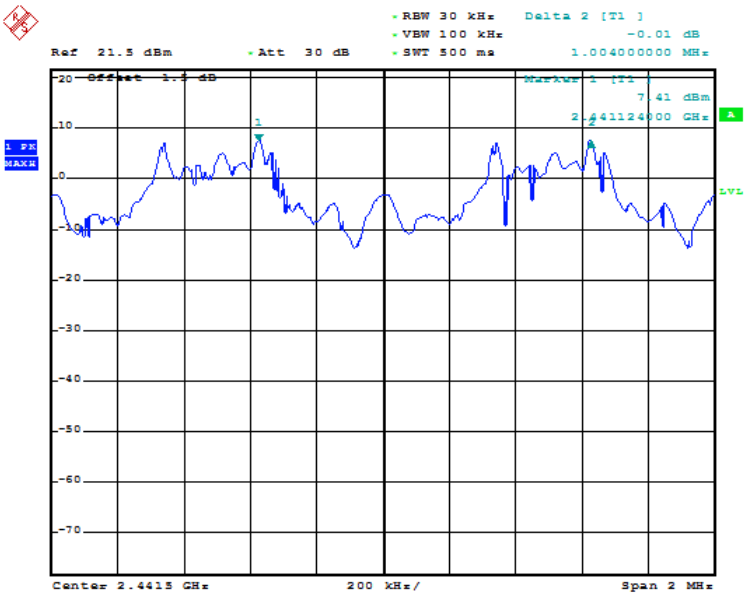
Test Mode :	Mode 4,5,6	Temperature :	23℃~26℃
Test Engineer :	Hogan He	Relative Humidity :	40%~60%

Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.004	0.646	Pass
39	2441	1.004	0.648	Pass
78	2480	1.004	0.750	Pass

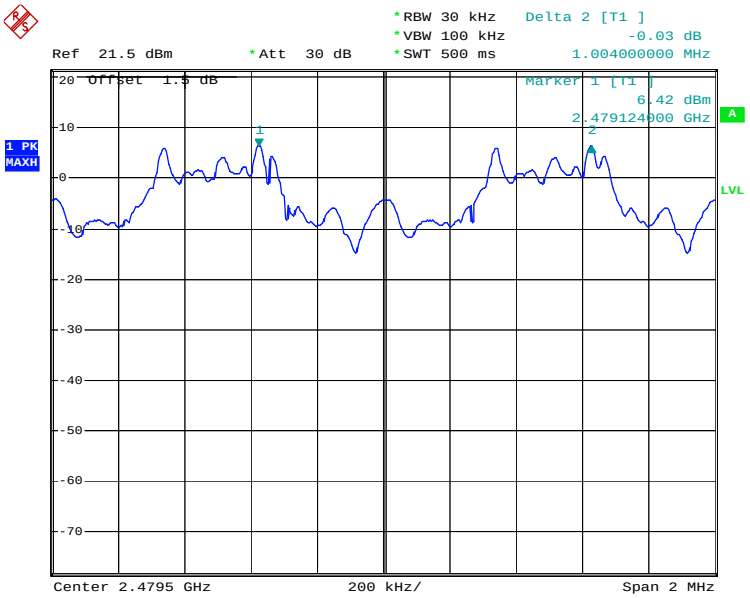
Channel Separation Plot on Channel 00 - 01



Channel Separation Plot on Channel 39 - 40



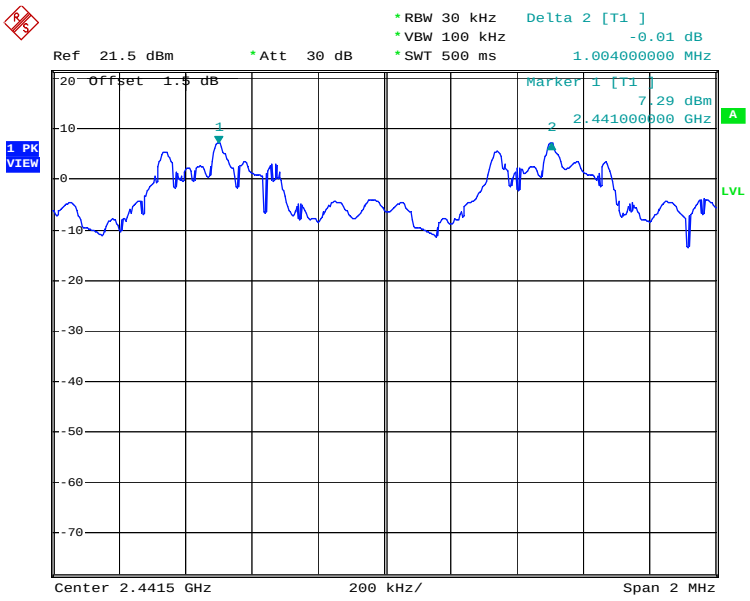
Channel Separation Plot on Channel 77 - 78



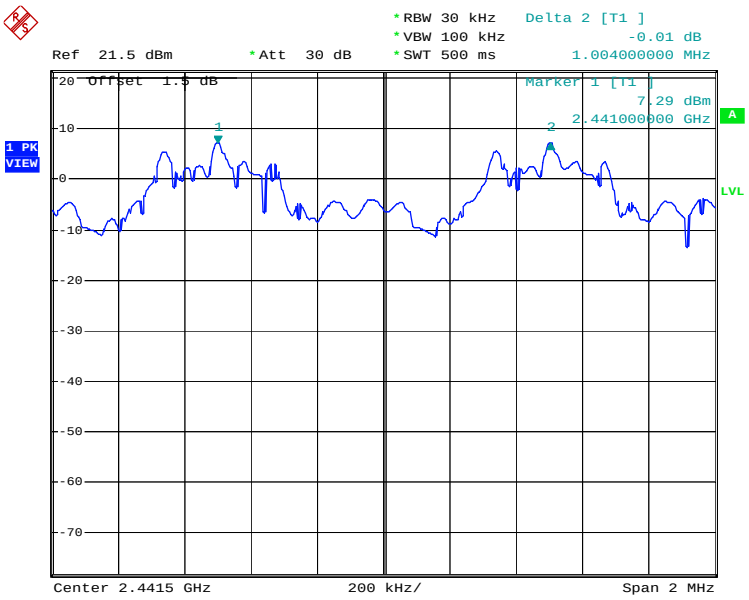
Test Mode :	Mode 7,8,9	Temperature :	23℃~26℃
Test Engineer :	Hogan He	Relative Humidity :	40%~60%

Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.004	0.780	Pass
39	2441	1.004	0.782	Pass
78	2480	1.000	0.782	Pass

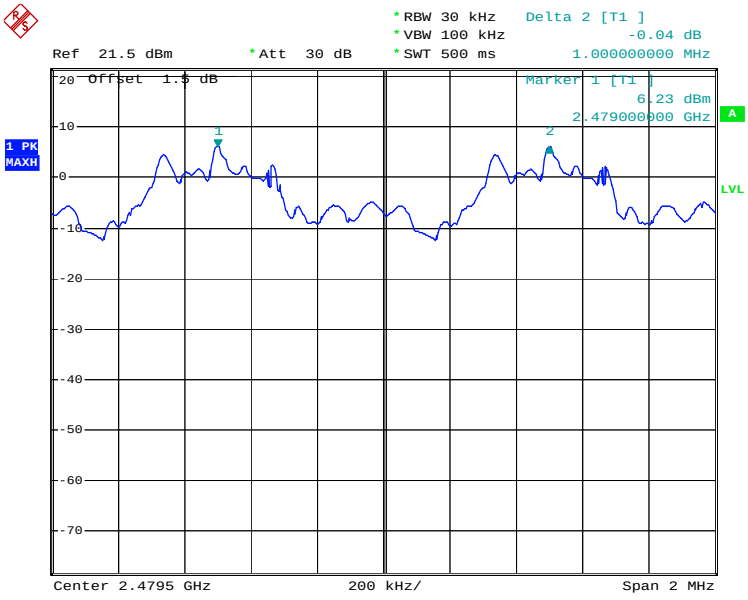
Channel Separation Plot on Channel 00 - 01



Channel Separation Plot on Channel 39 - 40



Channel Separation Plot on Channel 77 - 78



3.4 Dwell Time Measurement

3.4.1 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.

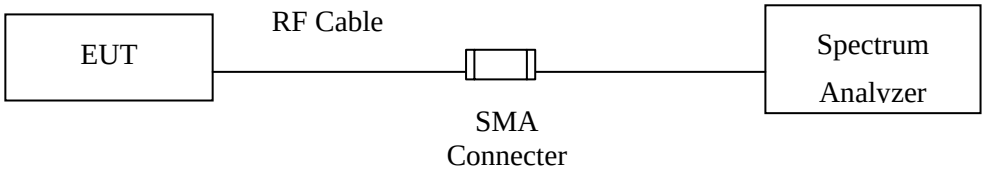
3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

3.4.3 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 a low loss cable.
3. The EUT should be transmitting at its maximum data rate as the worst cases.
4. The EUT must have its hopping function enabled. 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.
5. Use the marker-delta function to calculate the dwell time.

3.4.4 Test Setup



3.4.5 Test Result of Dwell Time

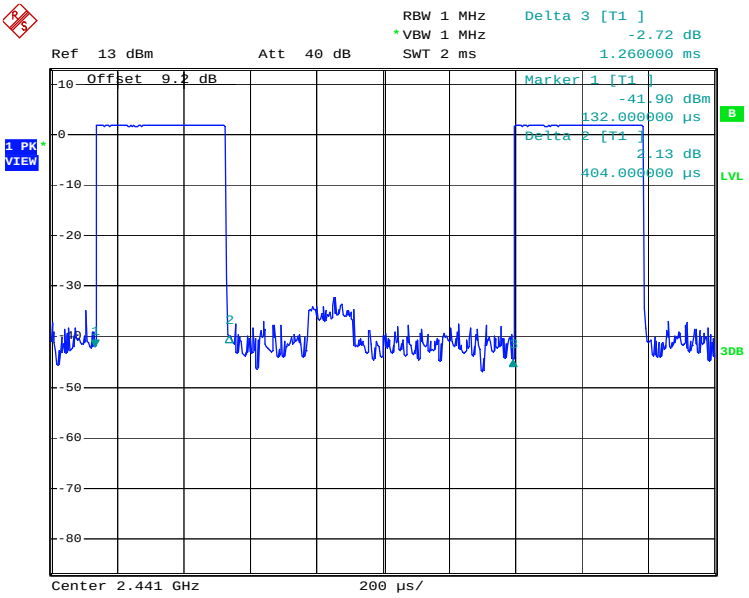
Test Mode :	Mode 2	Temperature :	23℃~26℃
Test Engineer :	Hogan He	Relative Humidity :	40%~60%

Package Mode	Average Hopping Channel	Package Transfer Time (usec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
DH1	10.1	404	0.129	0.4	Pass
DH3	5.1	1684	0.269	0.4	Pass
DH5	3.4	2954	0.315	0.4	Pass

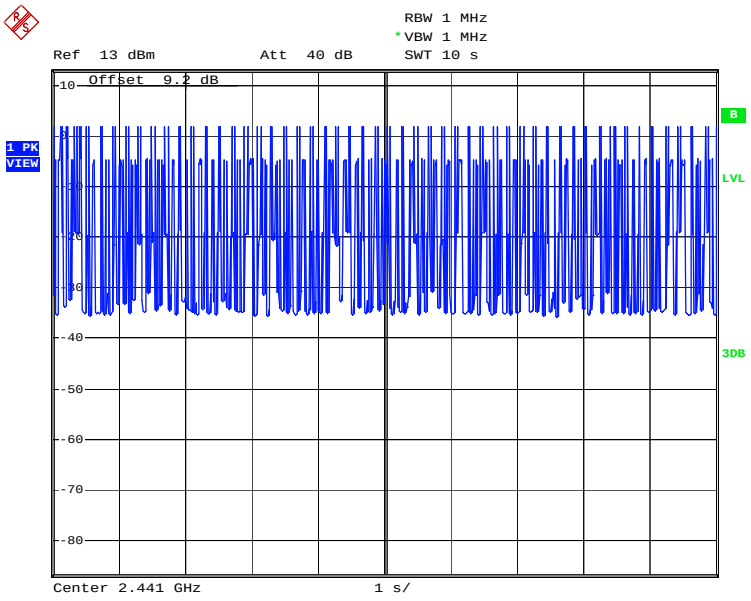
Remark:

1. Dwell Time=79(channels) x 0.4(s) x average hopping channel x package transfer time
2. 79 channels come from the Hopping Channel number.
3. Average Hopping Channel = hops/sweep time
4. t: Package Transfer Time(us)

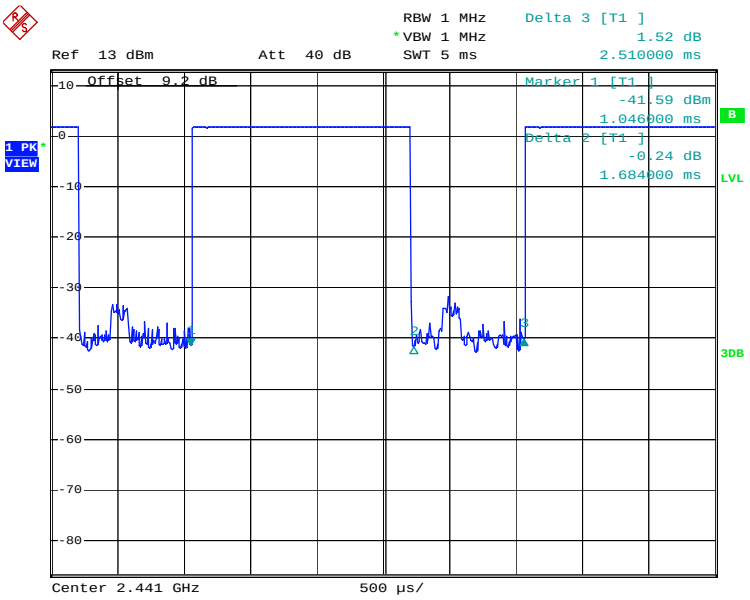
DH1 Dwell Time (One Pulse) Plot on Channel 39



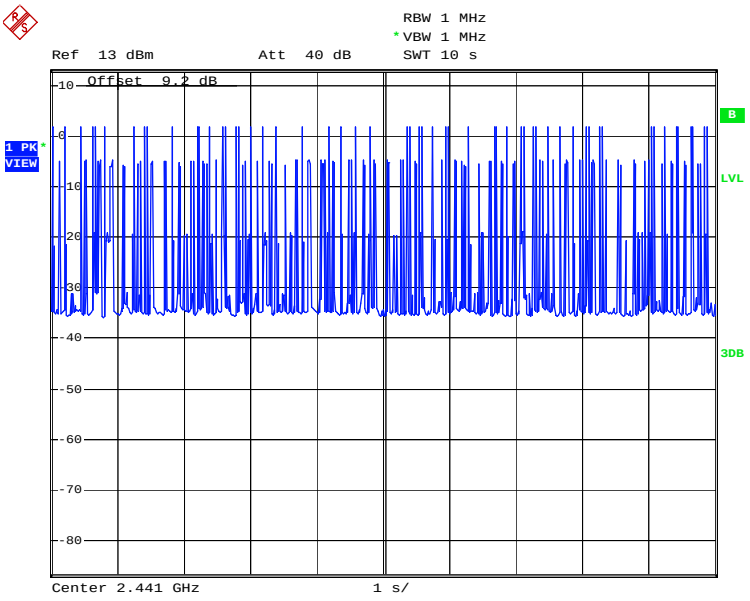
DH1 Dwell Time (Count Pulses) Plot on Channel 39



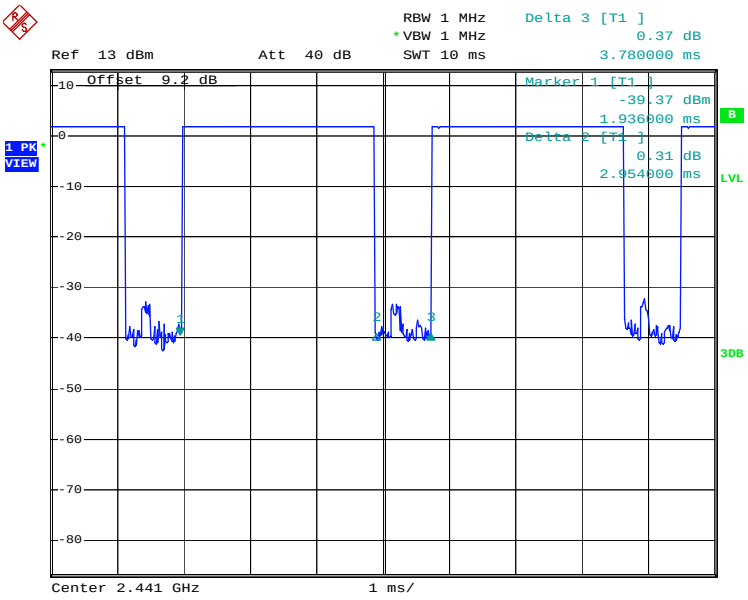
DH3 Dwell Time (One Pulse) Plot on Channel 39



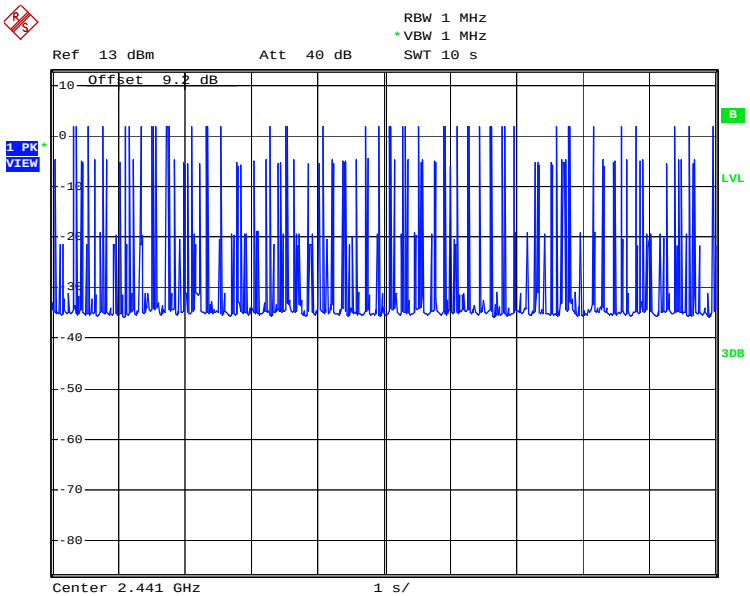
DH3 Dwell Time (Count Pulses) Plot on Channel 39



DH5 Dwell Time (One Pulse) Plot on Channel 39



DH5 Dwell Time (Count Pulses) Plot on Channel 39



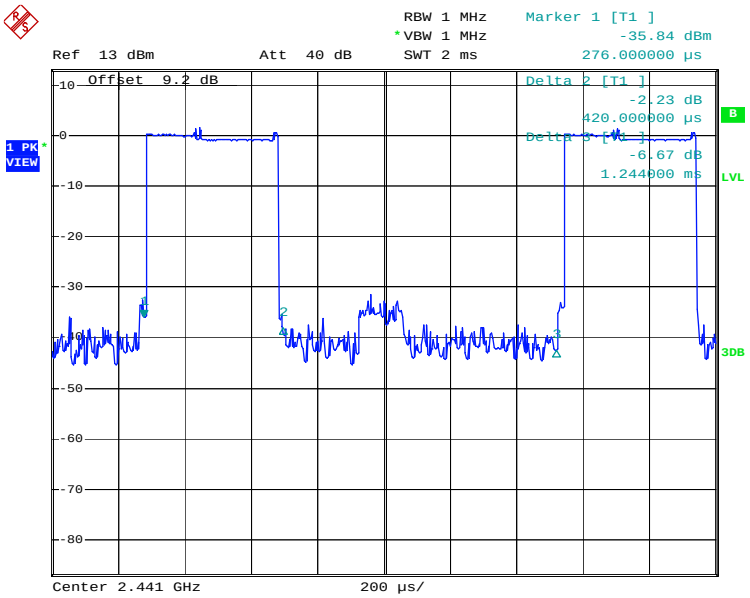
Test Mode :	Mode 5	Temperature :	23℃~26℃
Test Engineer :	Hogan He	Relative Humidity :	40%~60%

Package Mode	Average Hopping Channel	Package Transfer Time (usec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
2DH1	10.1	420	0.134	0.4	Pass
2DH3	5.1	1704	0.273	0.4	Pass
2DH5	3.4	2974	0.317	0.4	Pass

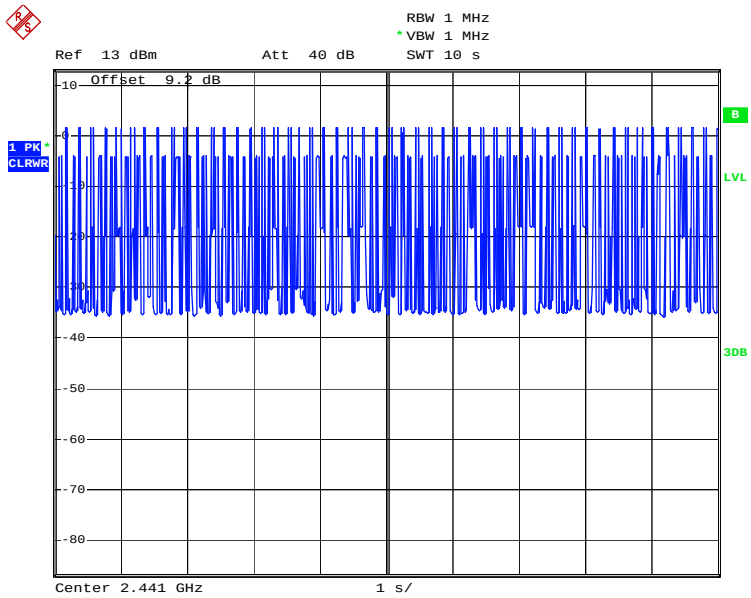
Remark:

5. Dwell Time=79(channels) x 0.4(s) x average hopping channel x package transfer time
6. 79 channels come from the Hopping Channel number.
7. Average Hopping Channel = hops/sweep time
8. t: Package Transfer Time(us)

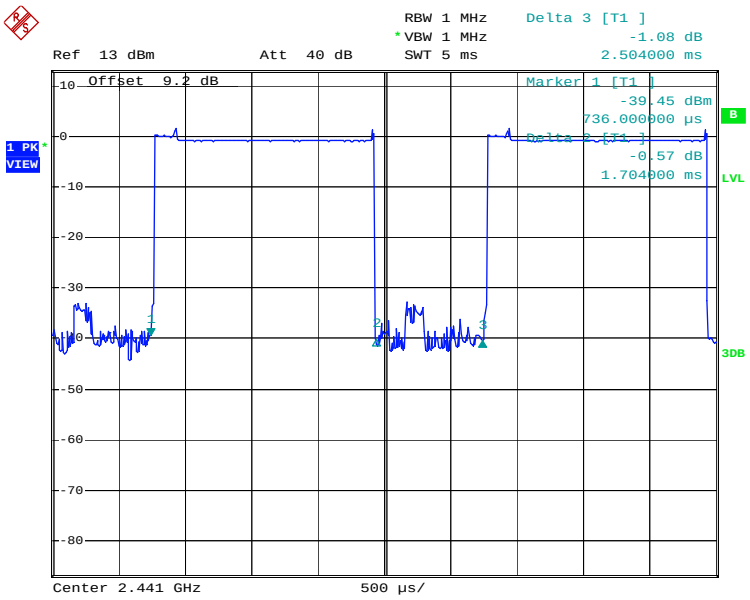
2DH1 Dwell Time (One Pulse) Plot on Channel 39



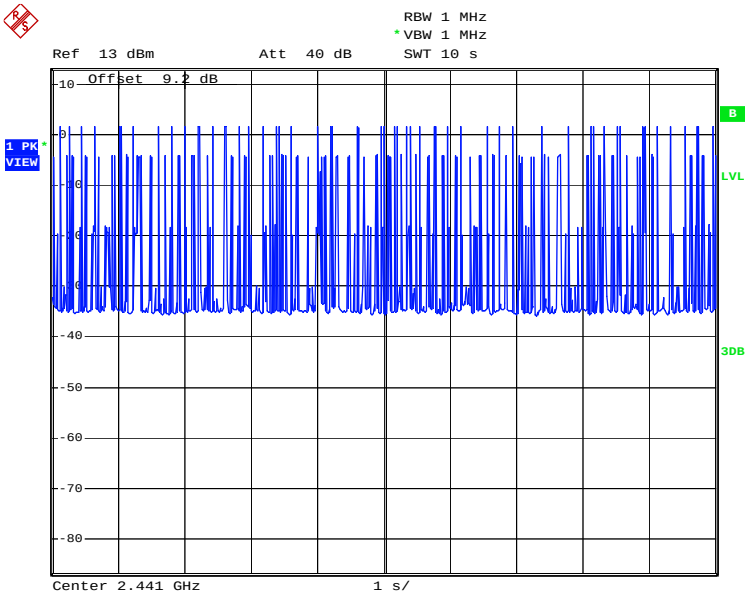
2DH1 Dwell Time (Count Pulses) Plot on Channel 39



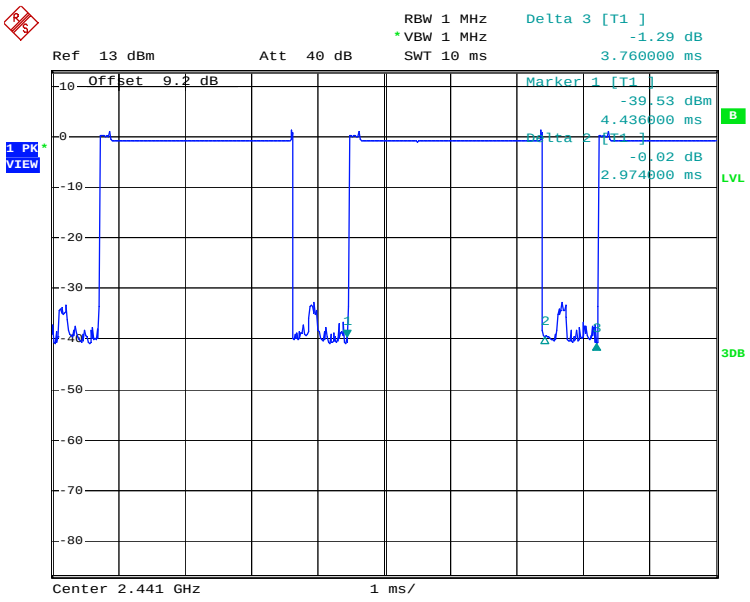
2DH3 Dwell Time (One Pulse) Plot on Channel 39



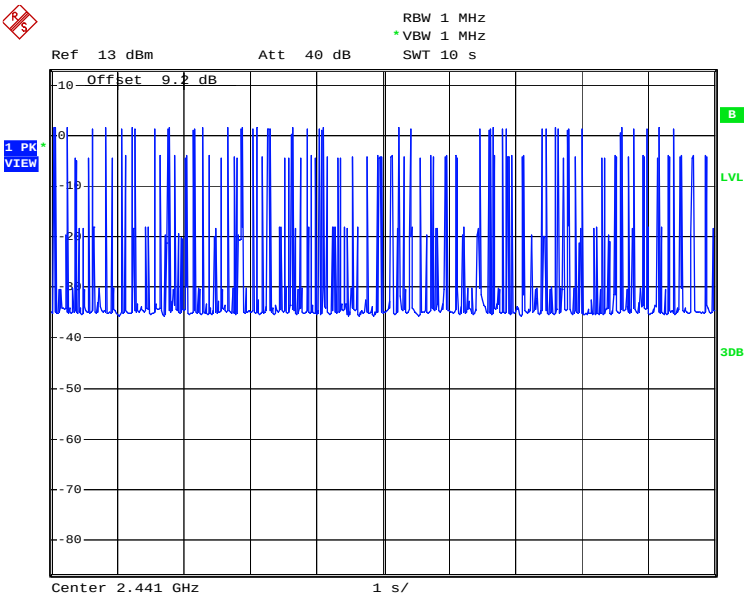
2DH3 Dwell Time (Count Pulses) Plot on Channel 39



2DH5 Dwell Time (One Pulse) Plot on Channel 39



2DH5 Dwell Time (Count Pulses) Plot on Channel 39



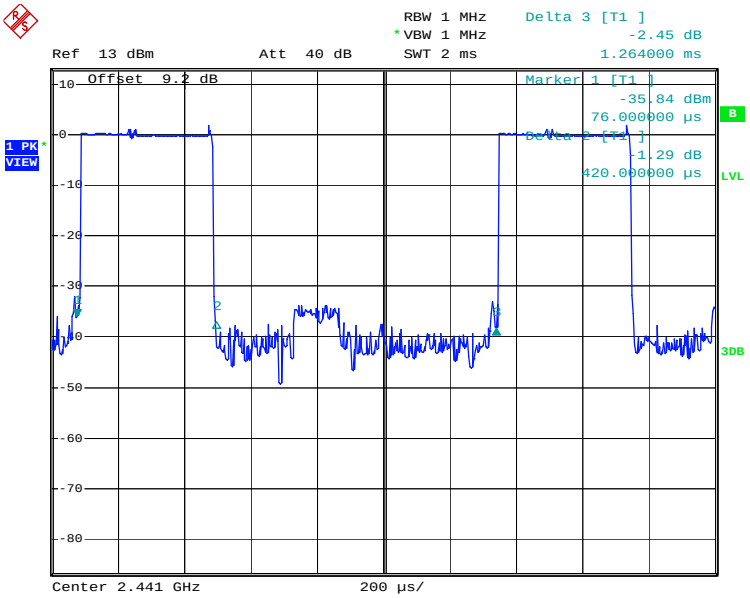
Test Mode :	Mode 8	Temperature :	23℃~26℃
Test Engineer :	Hogan He	Relative Humidity :	40%~60%

Package Mode	Average Hopping Channel	Package Transfer Time (usec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
3DH1	10.1	420	0.134	0.4	Pass
3DH3	5.1	1704	0.273	0.4	Pass
3DH5	3.4	2964	0.316	0.4	Pass

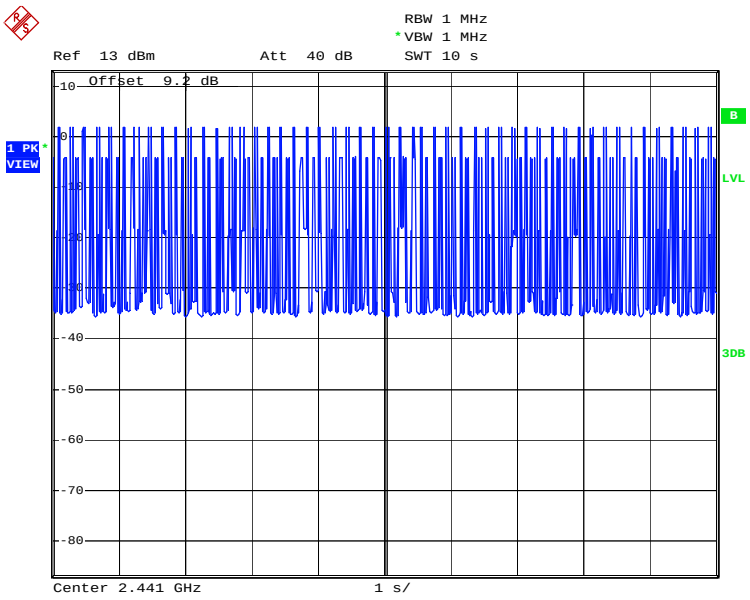
Remark:

9. Dwell Time=79(channels) x 0.4(s) x average hopping channel x package transfer time
10. 79 channels come from the Hopping Channel number.
11. Average Hopping Channel = hops/sweep time
12. t: Package Transfer Time(us)

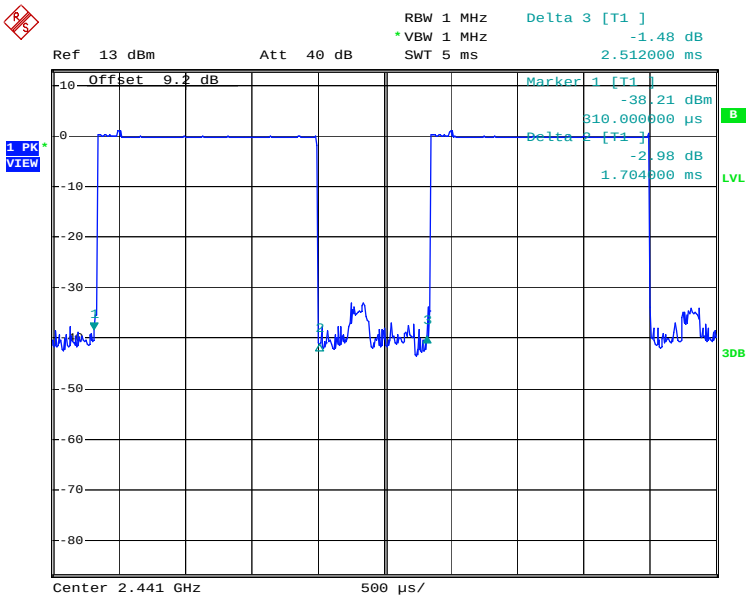
3DH1 Dwell Time (One Pulse) Plot on Channel 39



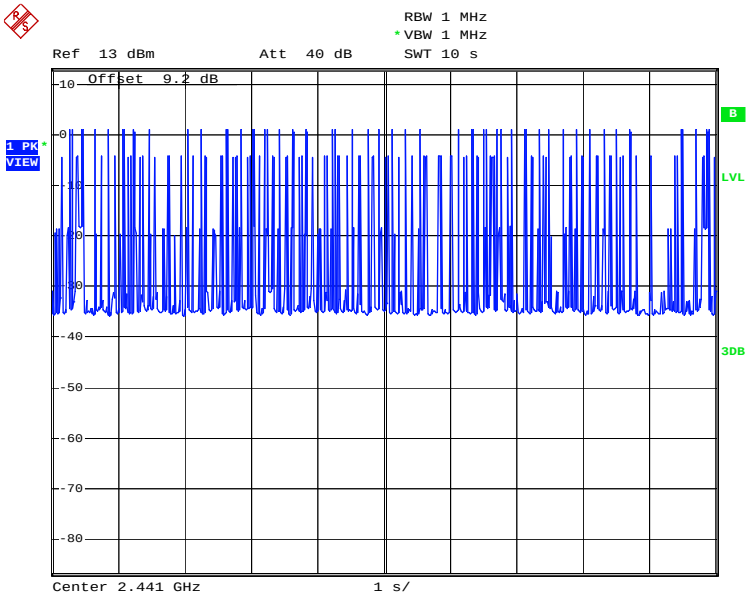
3DH1 Dwell Time (Count Pulses) Plot on Channel 39



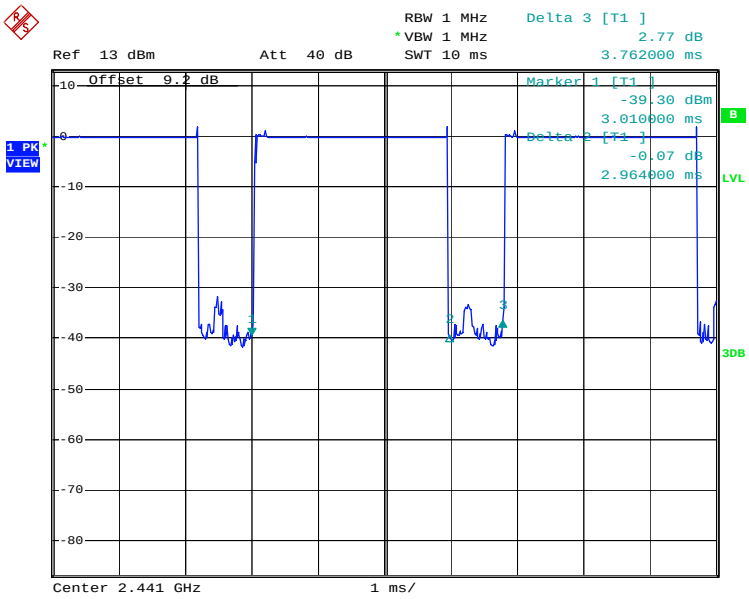
3DH3 Dwell Time (One Pulse) Plot on Channel 39



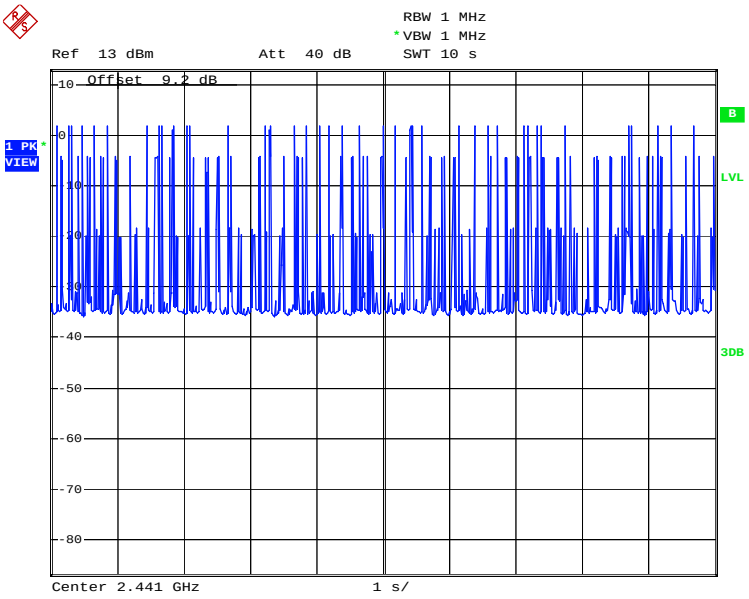
3DH3 Dwell Time (Count Pulses) Plot on Channel 39



3DH5 Dwell Time (One Pulse) Plot on Channel 39



3DH5 Dwell Time (Count Pulses) Plot on Channel 39



3.5 Peak Output Power Measurement

3.5.1 Limit of Peak Output Power

Frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels: 1W (30 dBm).

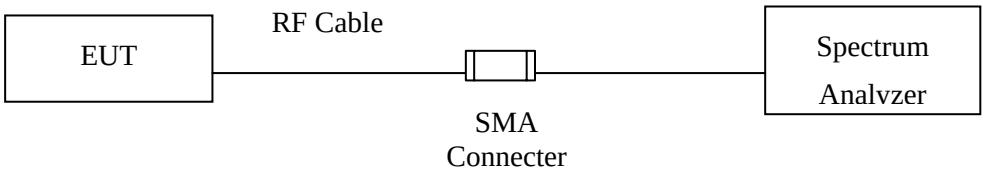
3.5.2 Measuring Instruments

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 a low loss cable.

3.5.4 Test Setup

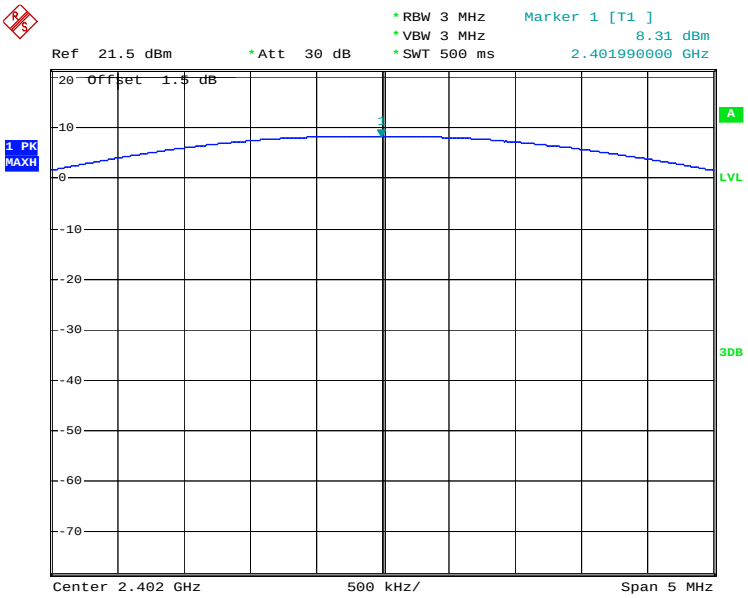


3.5.5 Test Result of Peak Output Power

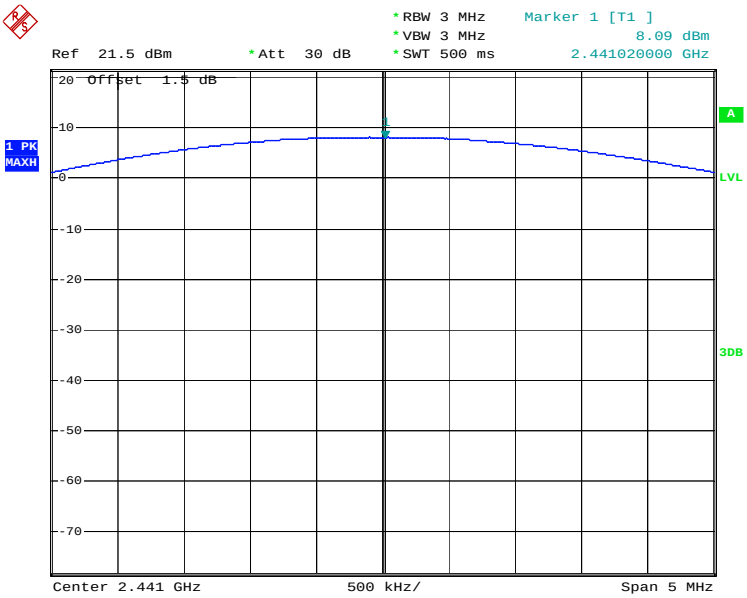
Test Mode :	Mode 7, 8, 9	Temperature :	23℃~26℃
Test Engineer :	Hogan He	Relative Humidity :	40%~60%

Channel	Frequency (MHz)	RF Power (dBm)		
		8-DPSK	Max. Limits (dBm)	Pass/Fail
		1 Mbps		
00	2402	8.31	30	Pass
39	2441	8.09	30	Pass
78	2480	7.92	30	Pass

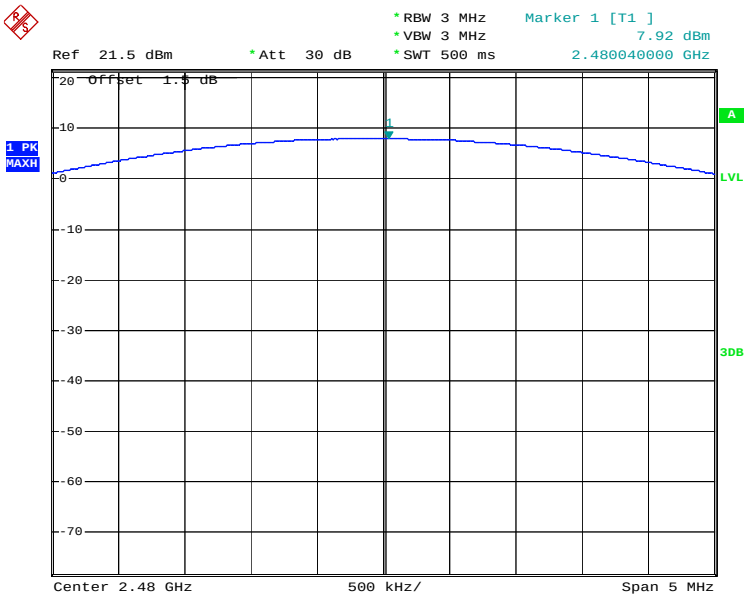
Peak Output Power Plot on Channel 00



Peak Output Power Plot on Channel 39



Peak Output Power Plot on Channel 78



3.6 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

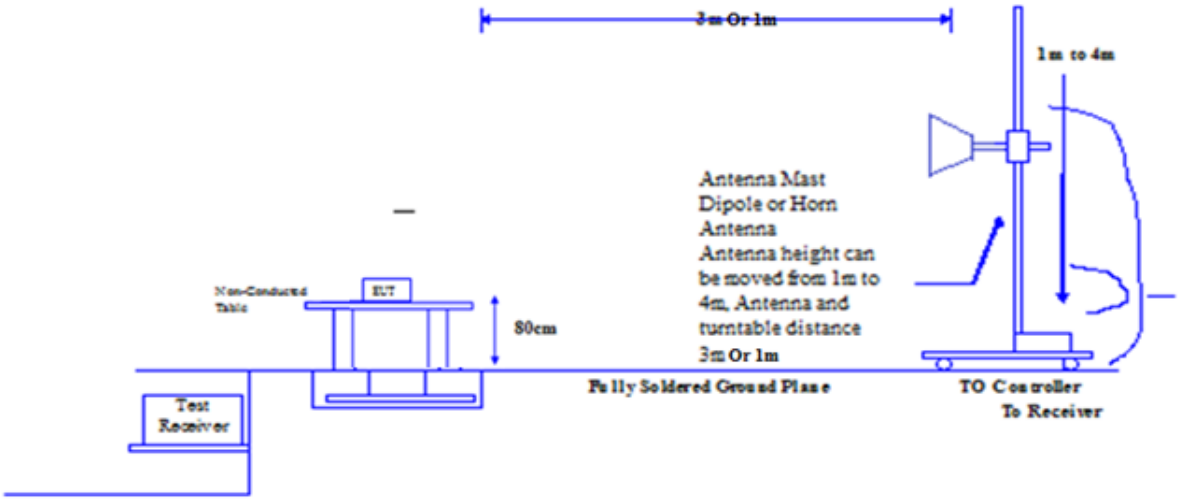
See list of measuring instruments of this test report.

3.6.3 Test Procedures

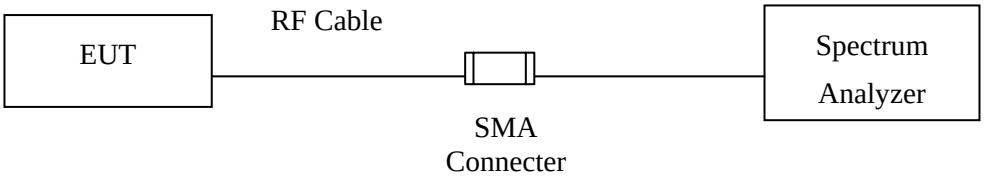
1. The testing follows the guidelines in ANSI C63.4-2003 and FCC Public Notice DA 00-705 Measurement Guidelines.
2. RF antenna conducted test: Set RBW = 300kHz, Video bandwidth (VBW) ≥ RBW. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 300k Hz RBW. Note: If the device complies with the use of power option 2 the attenuation under this paragraph shall be 30 dB instead of 20 dB.
3. Radiated emission test: Applies to band edge emissions that fall in the restricted bands listed in FCC Section 15.205. The maximum permitted average field strength is listed in FCC Section 15.209. A pre-amp is necessary for this measurement. For measurements above 1 GHz, set RBW = 1MHz, VBW = 1MHz, Sweep: Auto for Peak; set RBW = 1MHz, VBW = 10 Hz, Sweep: Auto for Average. If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation. See FCC Section 15.35(b) and (c).
4. In case the emission is fail due to the used RBW / VBW is too wide, marker-delta method of FCC Public Notice DA 00-705 will be followed.

3.6.4 Test Setup

<Radiated Band Edges>



<Conducted Band Edges>



3.6.5 Test Result of Radiated Band Edges

Test Band :	Mode 1
Test Channel	00

Frequency GHz	Level dBuv/m	Over Limit dB	Limit Line dBuv/m	Read Level dBuv	Antenna Factor dB	Cable Loss dB	Preamp Factor dB	Remark	Polarity
2.4	56.77	-17.23	74	46.28	27.5	6.99	24	Peak	Vertical
2.4	51.4	-2.6	54	40.91	27.5	6.99	24	Average	Vertical
2.4	71.3	-2.7	74	60.81	27.5	6.99	24	Peak	Horizontal
2.4	66.98	12.98	54	56.49	27.5	6.99	24	Average	Horizontal

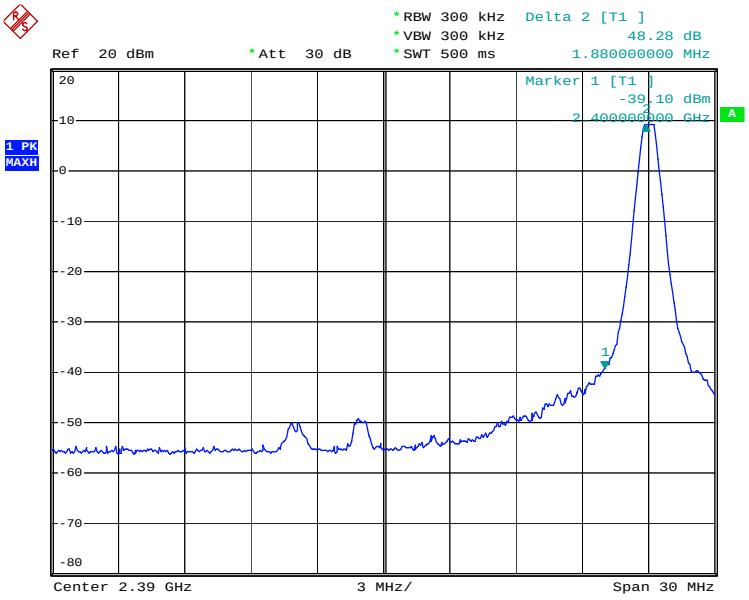
Test Band :	Mode 2
Test Channel	78

Frequency GHz	Level dBuv/m	Over Limit dB	Limit Line dBuv/m	Read Level dBuv	Antenna Factor dB	Cable Loss dB	Preamp Factor dB	Remark	Polarity
2.4835	58.61	-15.39	74	47.33	27.5	6.99	24	Peak	Vertical
2.4835	48.48	-5.52	54	37.2	27.5	6.99	24	Average	Vertical
2.4835	57.9	-16.1	74	46.62	27.5	6.99	24	Peak	Horizontal
2.4835	46.86	-7.14	54	35.58	27.5	6.99	24	Average	Horizontal

3.6.6 Test Result of Conducted Band Edges

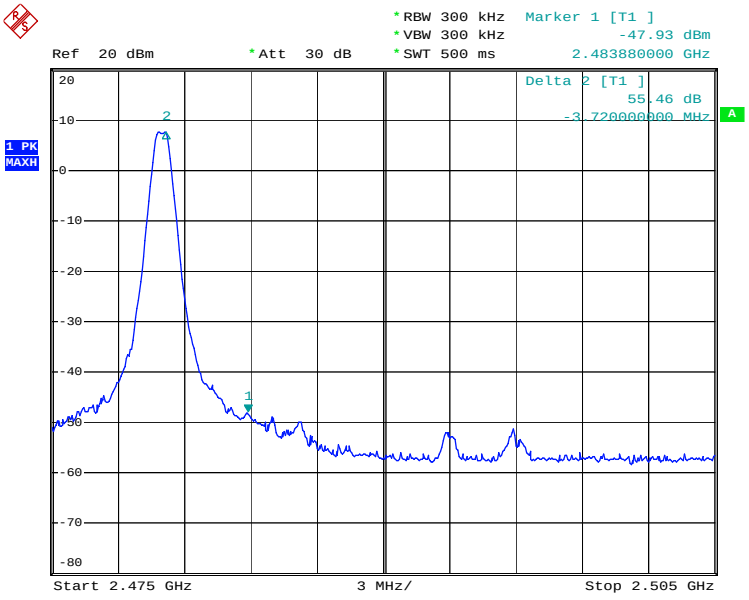
Test Mode :	Mode 1 and 3	**Temperature :**	23℃~26℃
Test Channel :	00 and 78	**Relative Humidity :**	40%~60%
		Test Engineer :	Hogan He

Low Band Edge Plot on Channel 00



Date: 14.MAR.2012 09:43:52

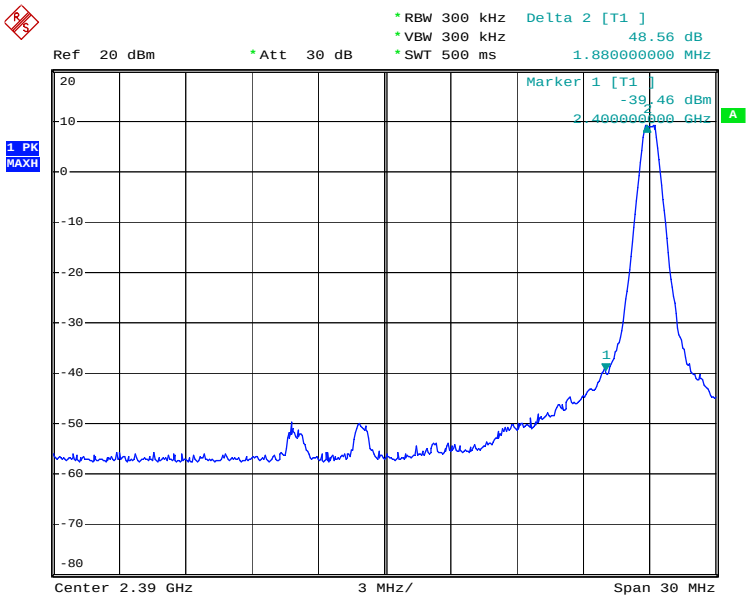
High Band Edge Plot on Channel 78



Date: 14.MAR.2012 09:55:23

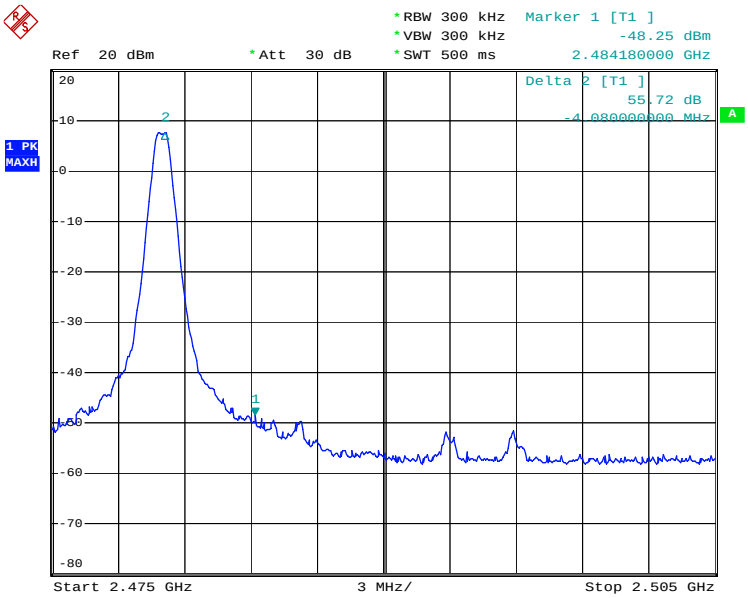
Test Mode :	Mode 4 and 6	Temperature :	23℃~26℃
Test Channel :	00 and 78	Relative Humidity :	40%~60%
		Test Engineer :	Hogan He

Low Band Edge Plot on Channel 00



Date: 14.MAR.2012 09:44:59

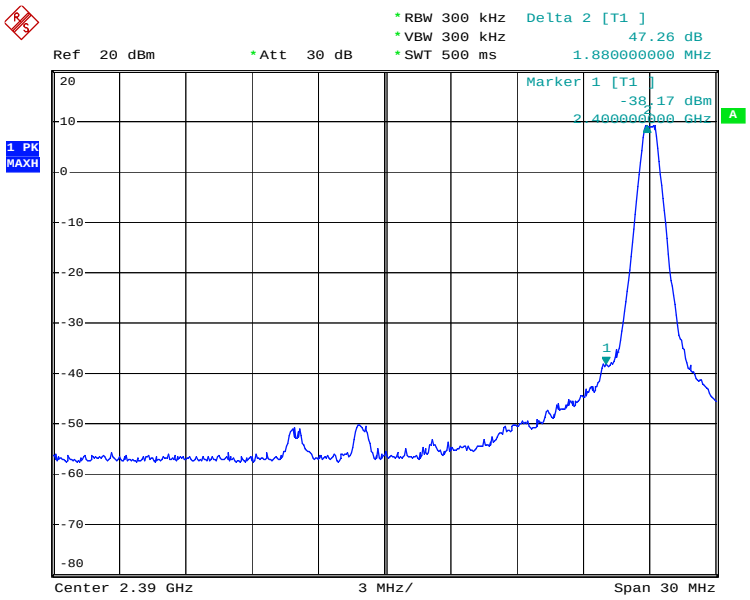
High Band Edge Plot on Channel 78



Date: 14.MAR.2012 09:54:05

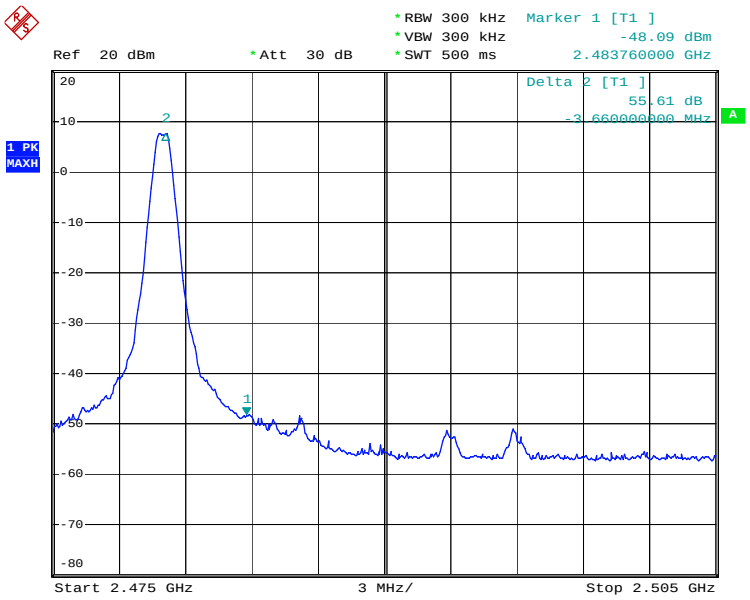
Test Mode :	Mode 7 and 9	Temperature :	23℃~26℃
Test Channel :	00 and 78	Relative Humidity :	40%~60%
		Test Engineer :	Hogan He

Low Band Edge Plot on Channel 00



Date: 14.MAR.2012 09:46:04

High Band Edge Plot on Channel 78



Date: 14.MAR.2012 09:53:05

3.7 Spurious Emission Measurement

3.7.1 Limit of Spurious Emission Measurement

All harmonics/spurs must be at least 20 dB down from the highest emission level within the authorized band.

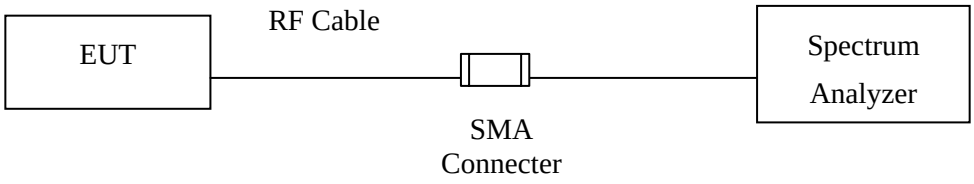
3.7.2 Measuring Instruments

See list of measuring instruments of this test report.

3.7.3 Test Procedures

1. The transmitter output was connected to the spectrum analyzer via a low lose cable.
2. Set RBW = 100 kHz, Video bandwidth (VBW) ≥ RBW, 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.

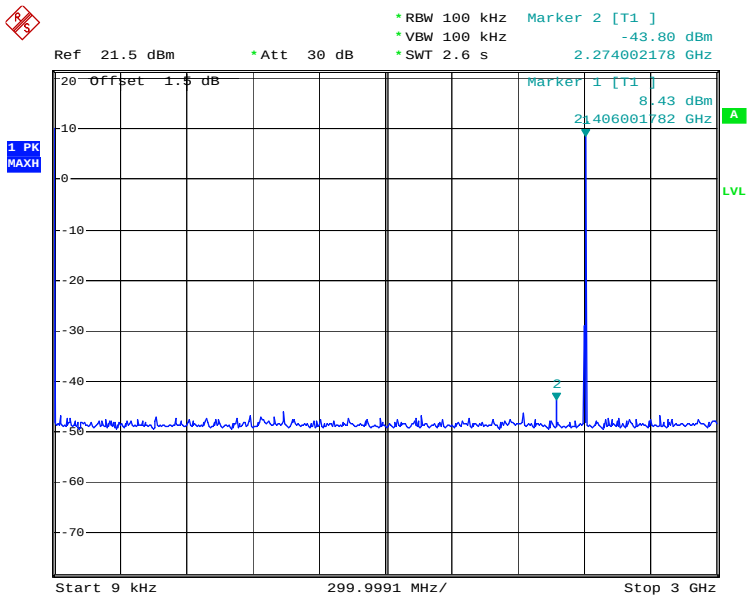
3.7.4 Test Setup



3.7.5 Test Result of Output Power

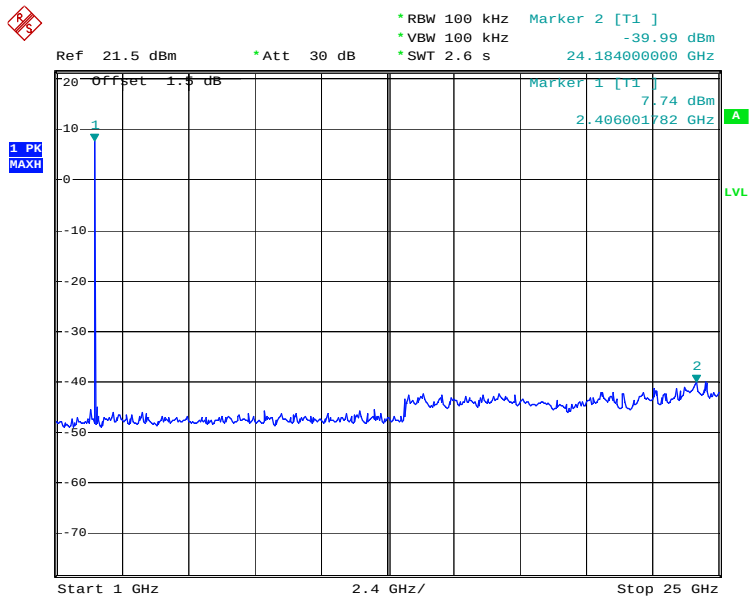
Test Mode :	Mode 7	Temperature :	23℃~26℃
Test Channel :	00	Relative Humidity :	40%~60%
		Test Engineer :	Hogan He

Conducted Spurious Emission Plot between 9 kHz ~ 3 GHz



Date: 15.MAR.2012 07:28:50

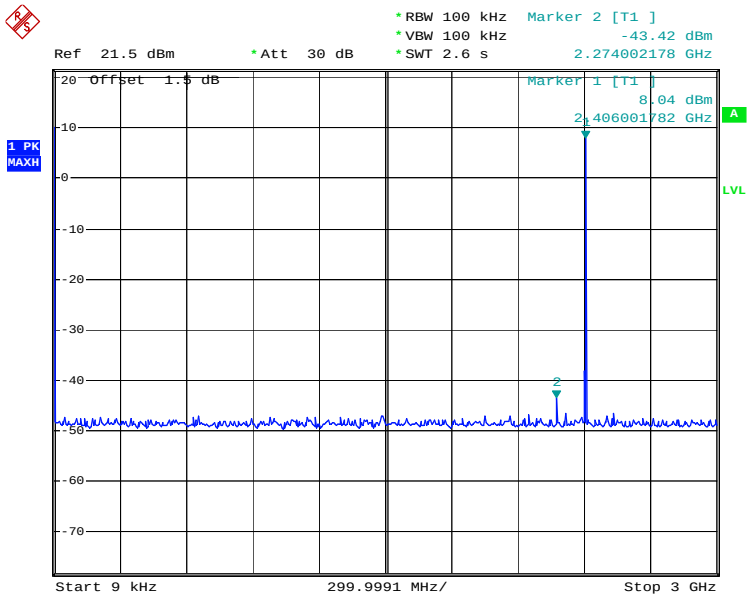
Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz



Date: 15.MAR.2012 07:41:27

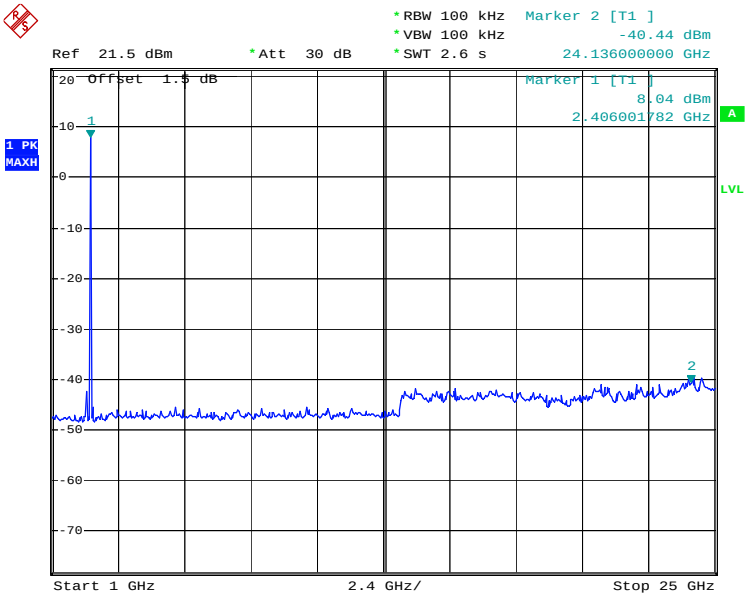
Test Mode :	Mode 8	Temperature :	23℃~26℃
Test Channel :	39	Relative Humidity :	40%~60%
		Test Engineer :	Hogan He

Conducted Spurious Emission Plot between 9 kHz ~ 3 GHz



Date: 15.MAR.2012 07:29:52

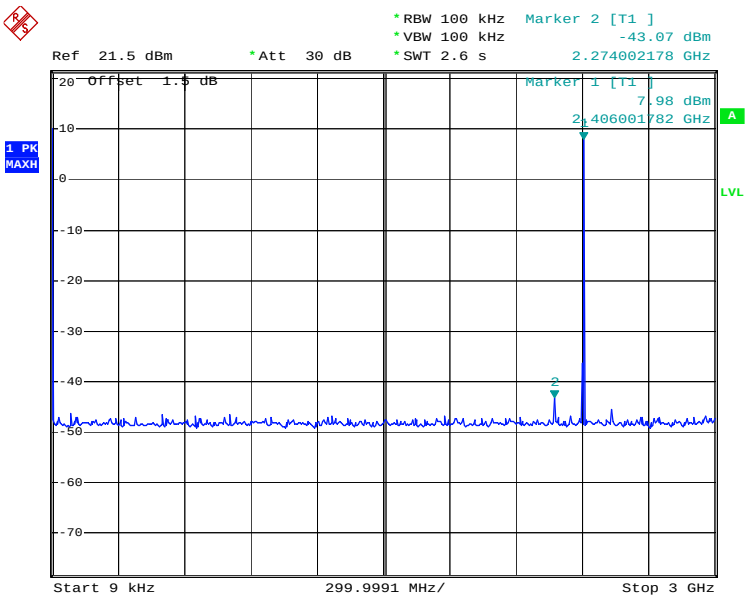
Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz



Date: 15.MAR.2012 07:38:18

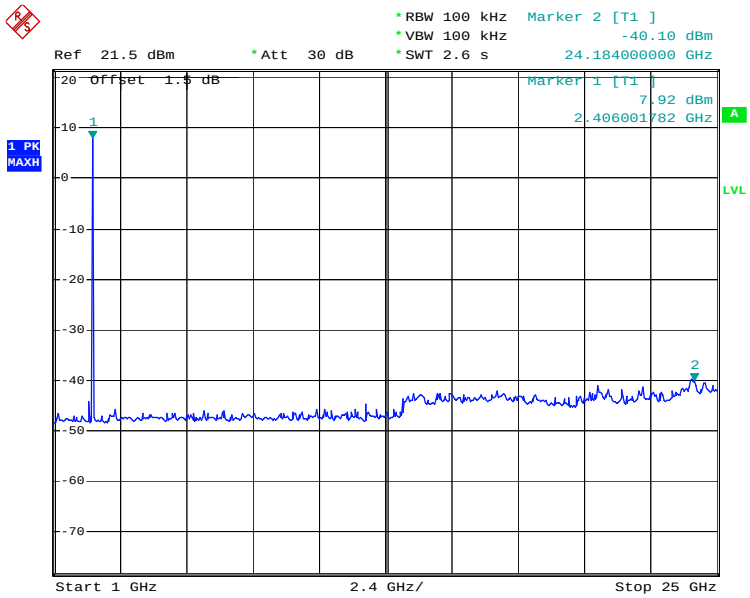
Test Mode :	Mode 9	Temperature :	23℃~26℃
Test Channel :	78	Relative Humidity :	40%~60%
		Test Engineer :	Hogan He

Conducted Spurious Emission Plot between 9 kHz ~ 3 GHz



Date: 15.MAR.2012 07:32:09

Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz



Date: 15.MAR.2012 07:44:18

3.8 AC Conducted Emission Measurement

3.8.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of emission (MHz)	Conducted limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

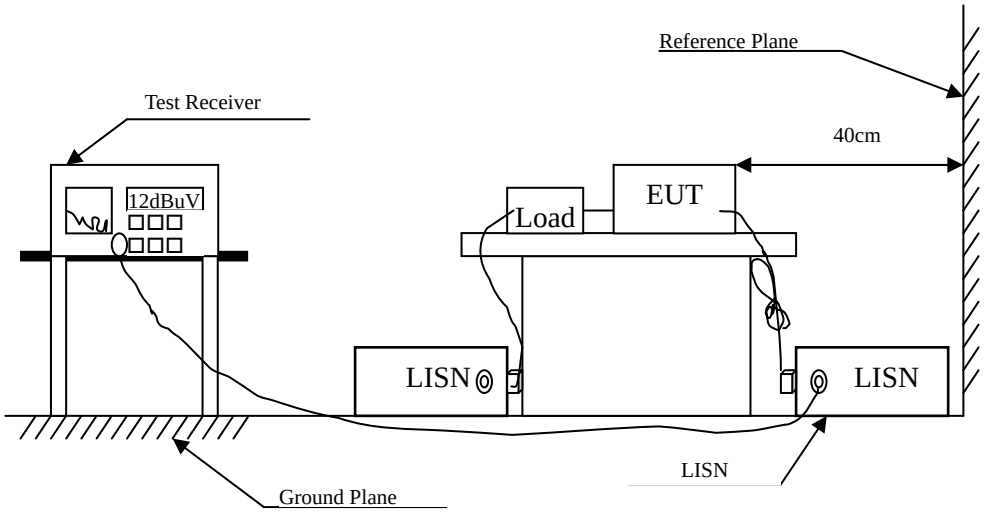
3.8.2 Measuring Instruments

See list of measuring instruments of this test report.

3.8.3 Test Procedures

1. Please follow the guidelines in ANSI C63.4-2003.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All the support units are connecting to the other LISN.
5. The LISN provides 50 ohm coupling impedance for the measuring instrument.
6. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
7. Both sides of AC line were checked for maximum conducted interference.
8. The frequency range from 150 kHz to 30 MHz was searched.
9. Set the test-receiver system to Peak Detect Function and specified bandwidth (RBW=9kHz and VBW=30kHz) with Maximum Hold Mode for QP limit measurement.
10. Set the test-receiver system to Average Detect Function and specified bandwidth (RBW=9kHz and VBW=30kHz) with Maximum Hold Mode for QP limit measurement.

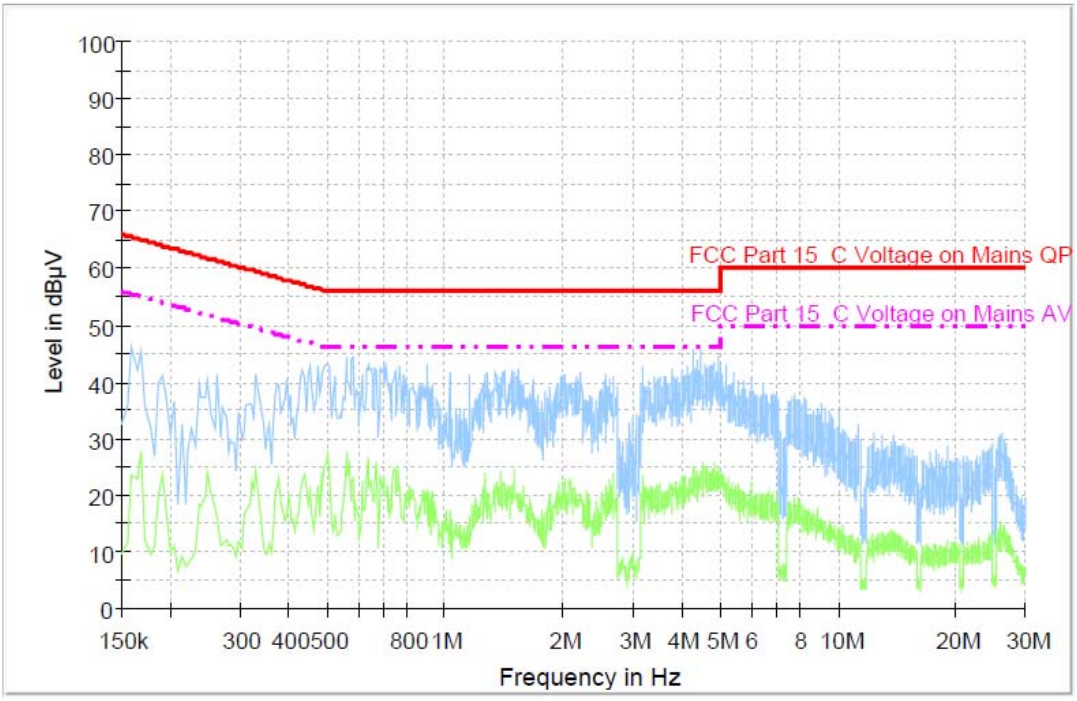
3.8.4 Test Setup



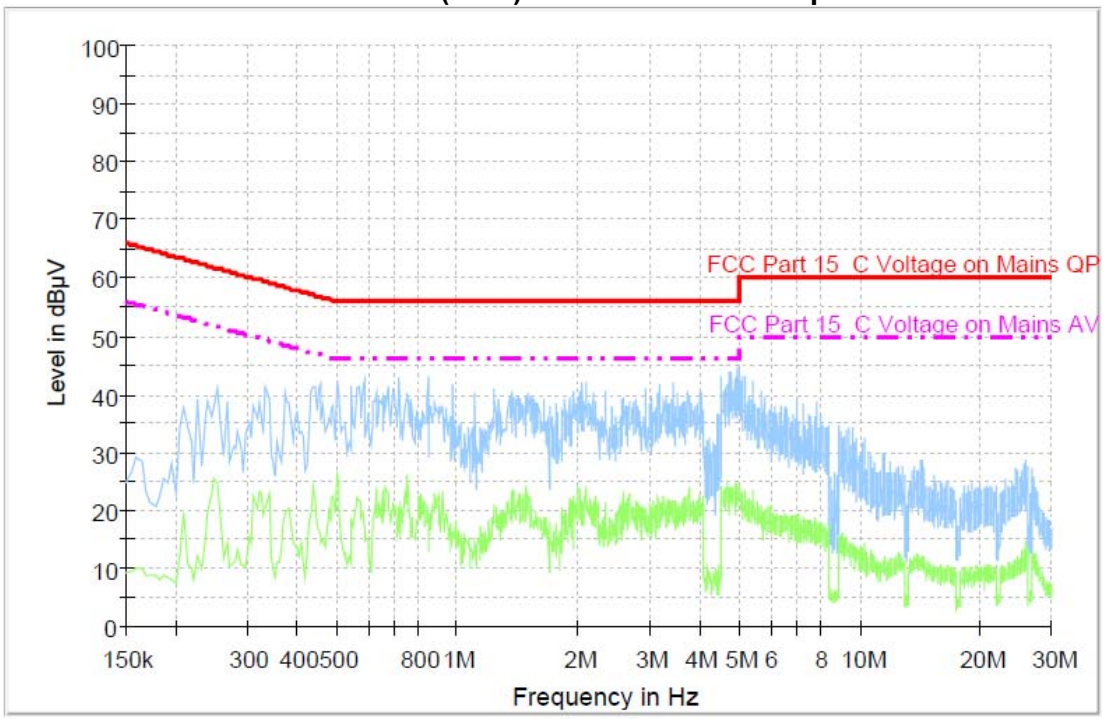
3.8.5 Test Result of AC Conducted Emission

Test Voltage:120V/60Hz

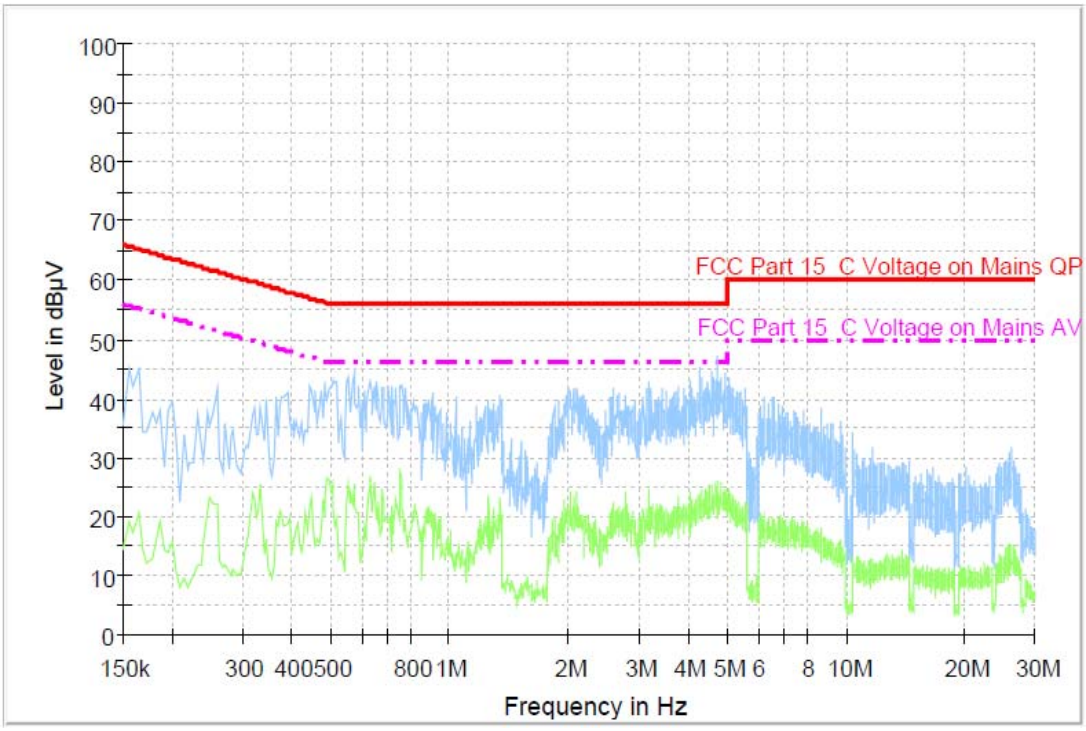
Test mode:GSM850+WLAN Link(2.4G)+Bluetooth Link+Earphone+Neutral



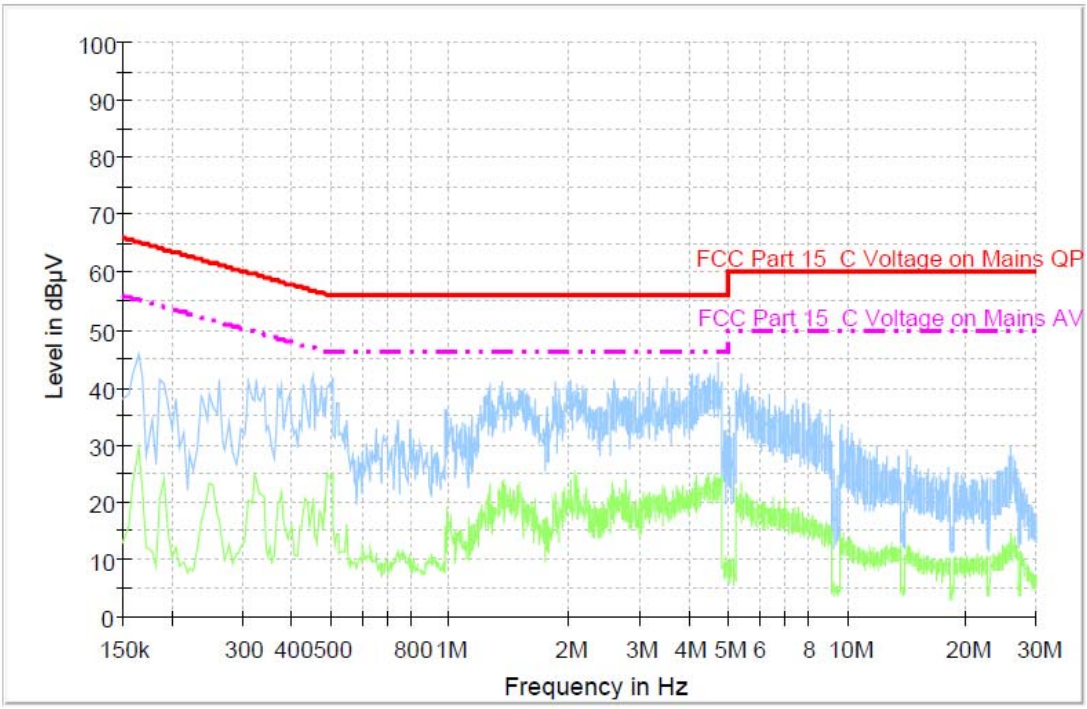
Test mode:GSM850+WLAN Link(2.4G)+Bluetooth Link+Earphone+Line



Test mode:GSM1900+WLAN Link(2.4G)+Bluetooth Link+Earphone+Neutral



Test mode:GSM1900+WLAN Link(2.4G)+Bluetooth Link+Earphone+Line



3.9 Radiated Emission Measurement

3.9.1 Limit of Radiated 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. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. 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)
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.9.2 Measuring Instruments

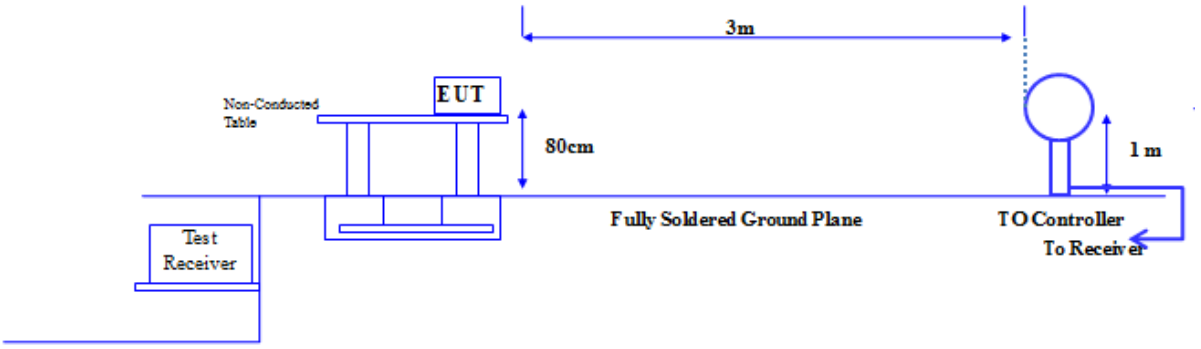
See list of measuring instruments of this test report.

3.9.3 Test Procedures

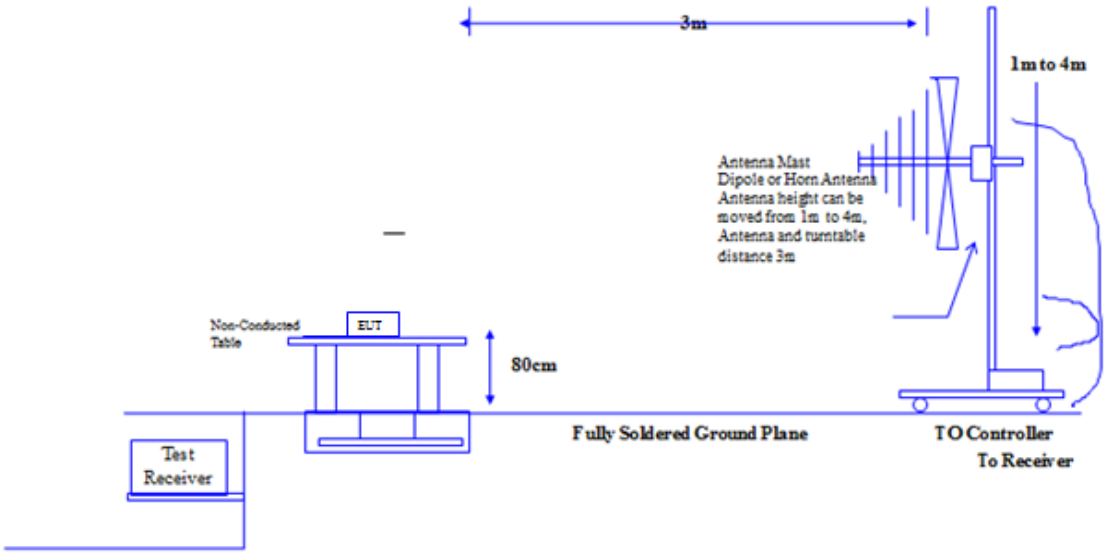
1. The testing follows the guidelines in FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
2. Use the following spectrum analyzer settings:
   (1) Span = wide enough to fully capture the emission being measured; RBW = 1 MHz for f ≥ 1 GHz, 100 kHz for f < 1 GHz; VBW ≥ RBW; Sweep = auto; Detector function = peak; Trace = max hold.
   (2) Above 18 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m.
   Distance extrapolation factor = 20 log (specific distance [3m] / test distance [1m]) (dB)
3. Follow the guidelines in ANSI C63.4-2003 with respect to maximizing the emission by rotating the EUT, measuring the emission for three EUT orthogonal planes, and adjusting the measurement antenna height and polarization. A pre-amp and a high pass filter are used for this test in order to get the good signal level.

3.9.4 Test Setup

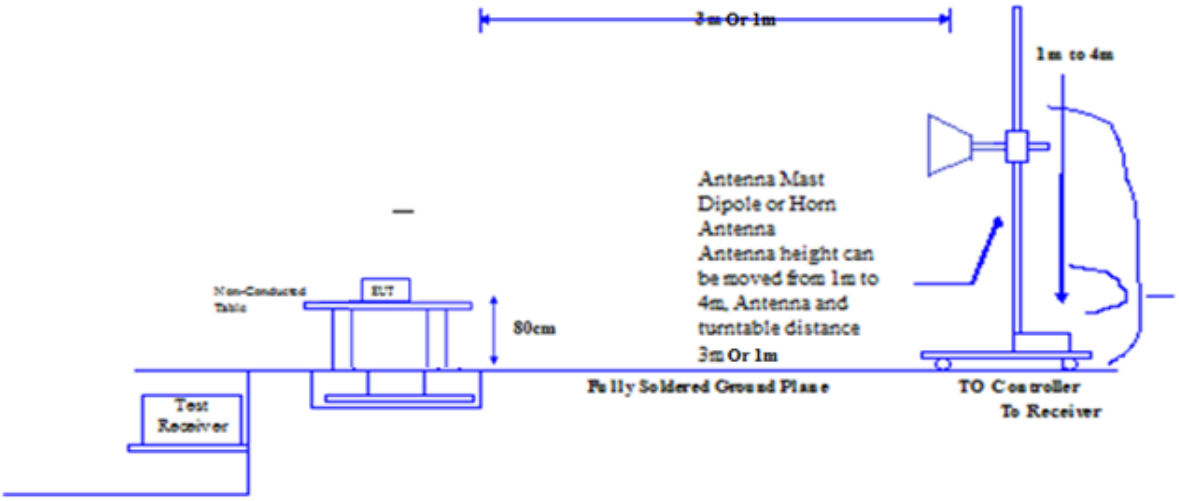
9kHz~30MHz



30MHz~1GHz



Above 1GHz


3m Or 1m
1m to 4m
Antenna Mast
Dipole or Horn
Antenna
Antenna height can
be moved from 1m to
4m, Antenna and
turntable distance
3m Or 1m
Non-Conducted
Table
EUT
80cm
Test
Receiver
Fully Soldered Ground Plane
TO Controller
To Receiver

3.9.5 Radiated Emission Measurement Results (9kHz ~ 30MHz)

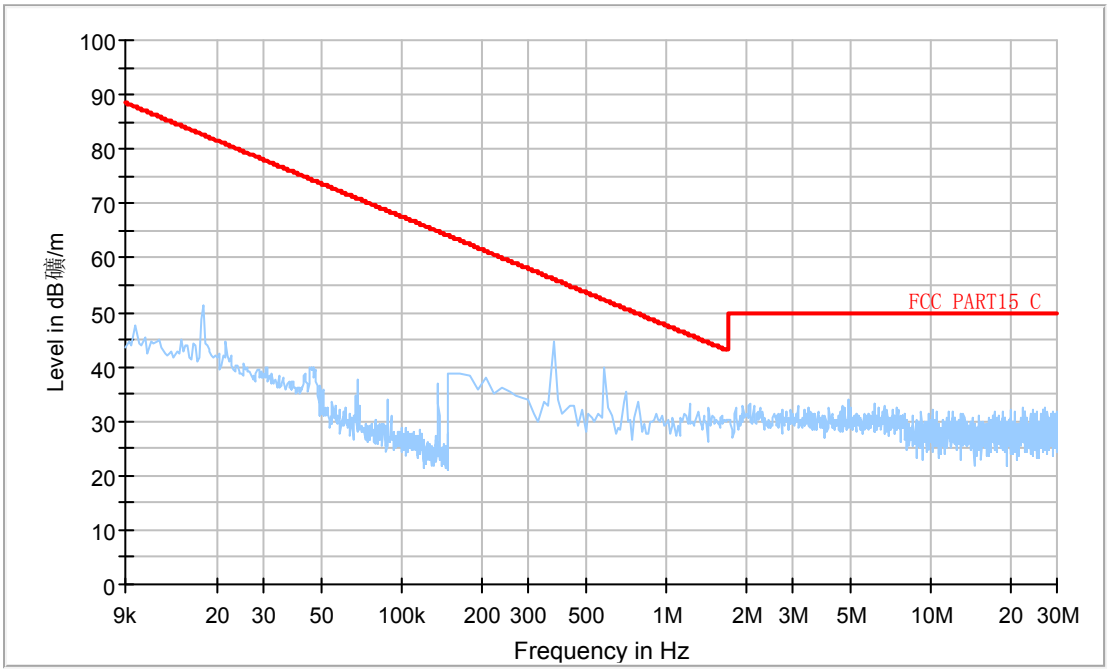
Test Engineer :	Hogan. He	**Temperature :**	23℃~26℃
		Relative Humidity :	40%~60%

Frequency (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Notes:
No emission found between lowest internal or generated frequency to 30MHz.

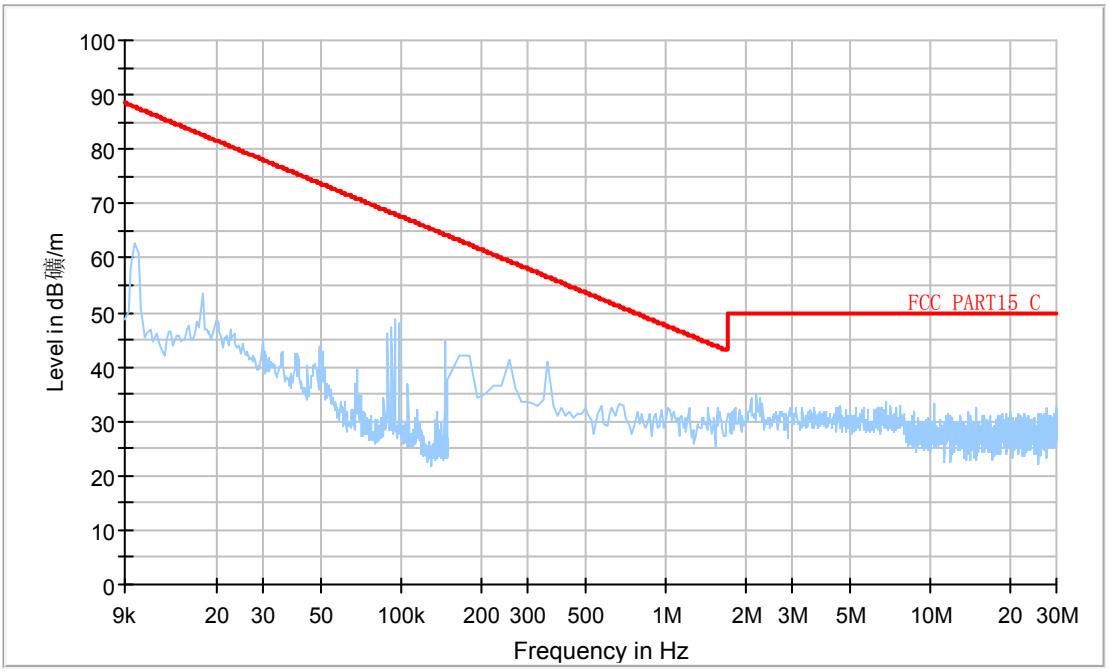
Radiated Emission Plot between 9 kHz ~ 30MHz（Horizontal）

20120419 FCC PART 15C 9K-30M



Radiated Emission Plot between 9 kHz ~ 30MHz（Vertical）

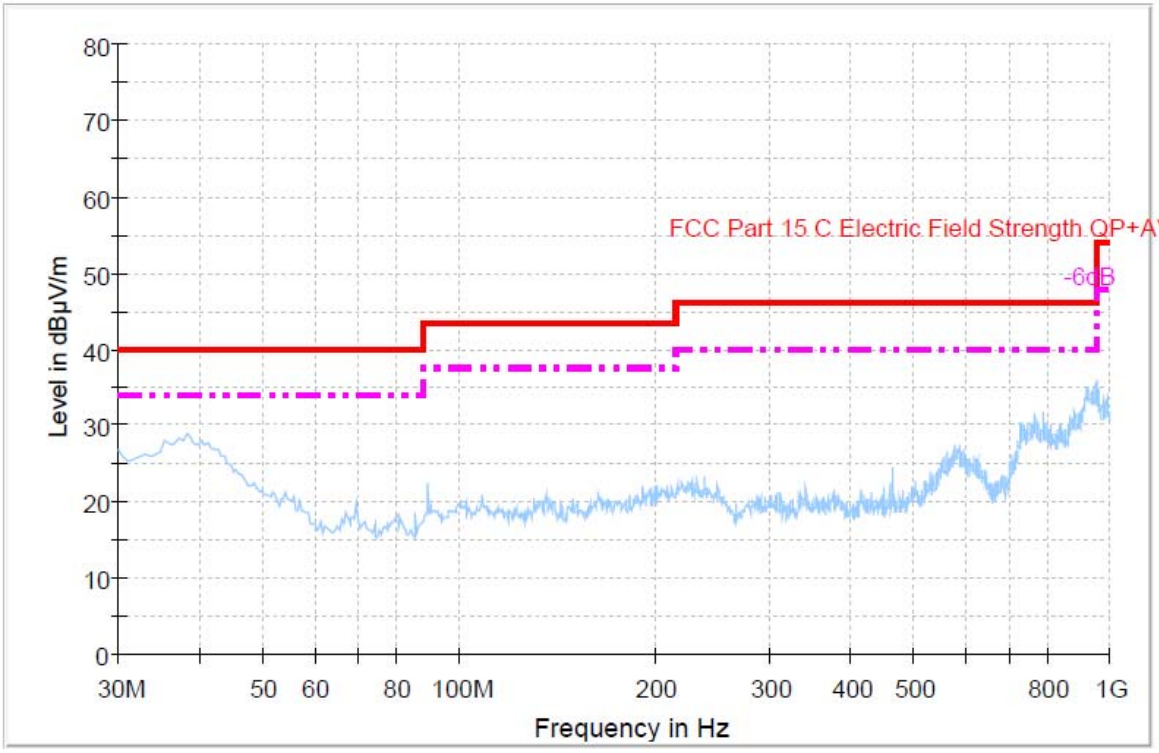
20120419 FCC PART 15C 9K-30M



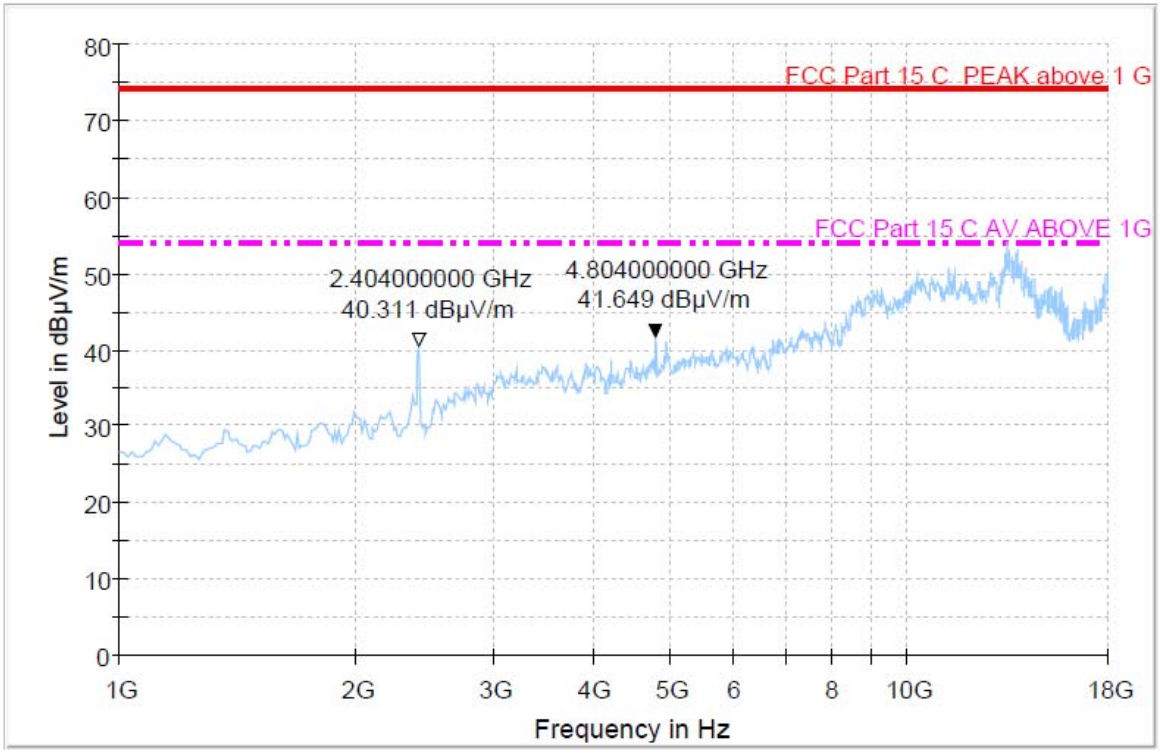
3.9.6 Radiated Emission Measurement Results (30MHz-18GHz)

Test Channel :	00
Remark:	2412MHz is Fundamental signal which can be ignored

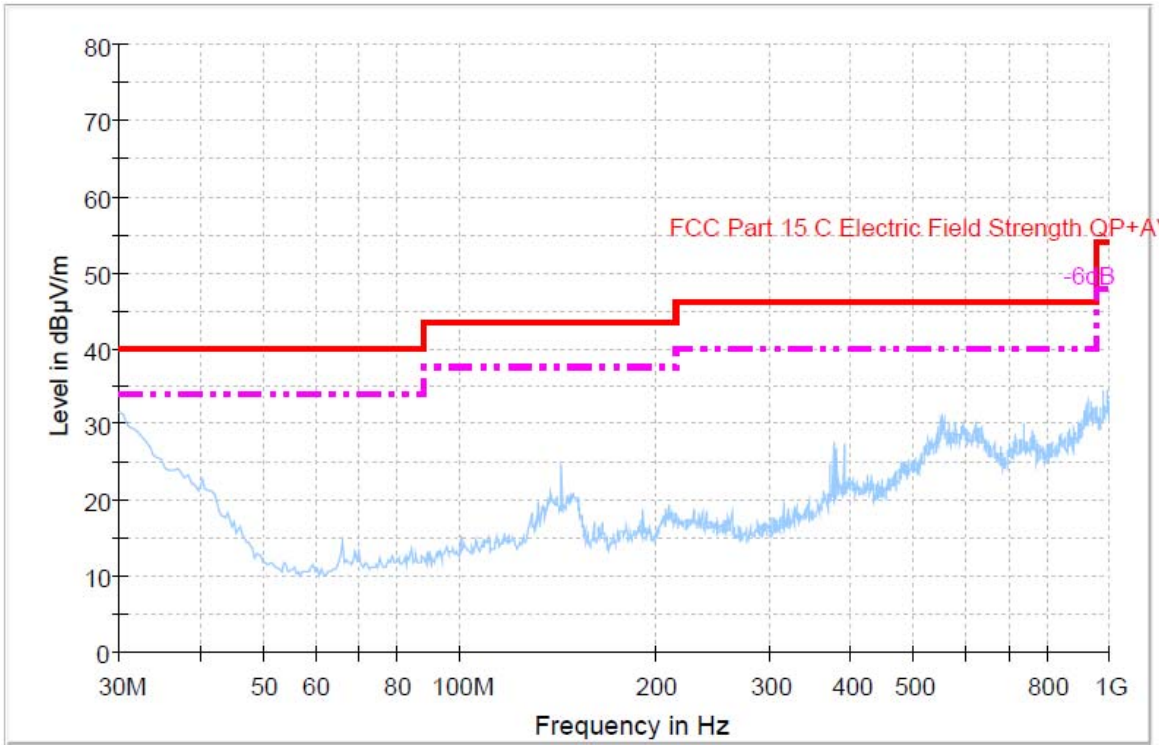
Radiated Emission 30MHz-1GHz Vertical



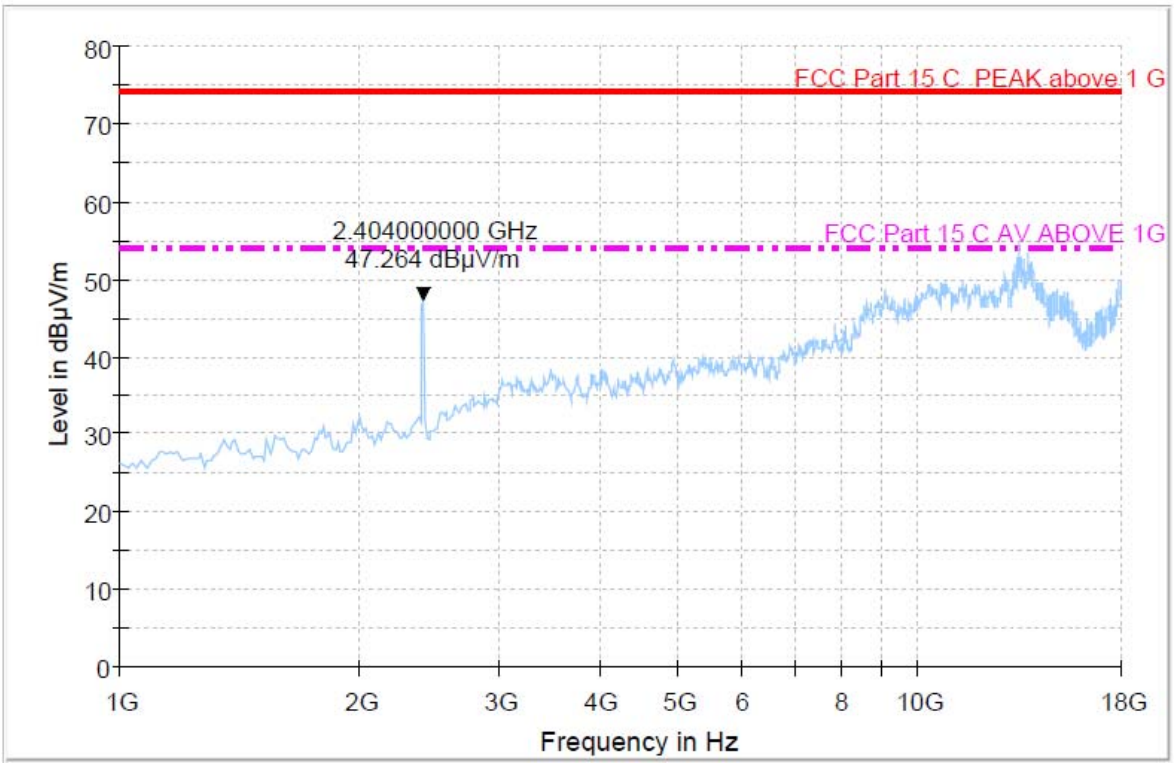
Radiated Emission 1GHz-18GHz Vertical



Radiated Emission 30MHz-1GHz Horizontal

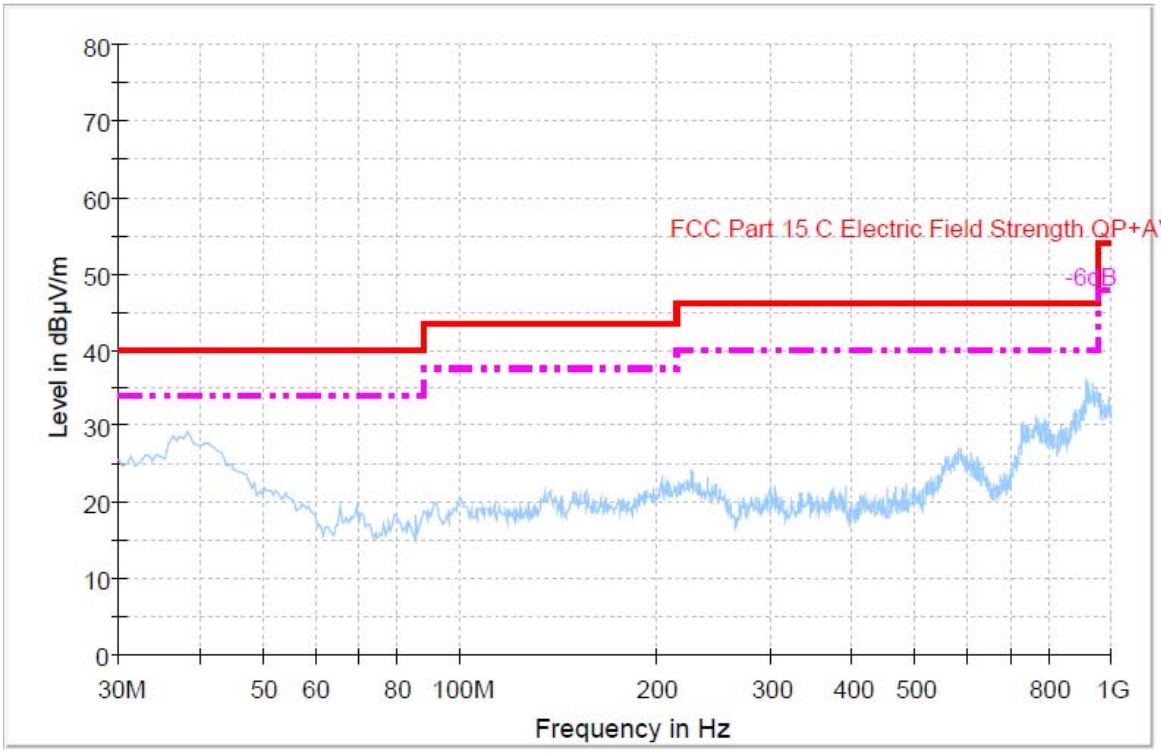


Radiated Emission 1GHz-18GHz Horizontal

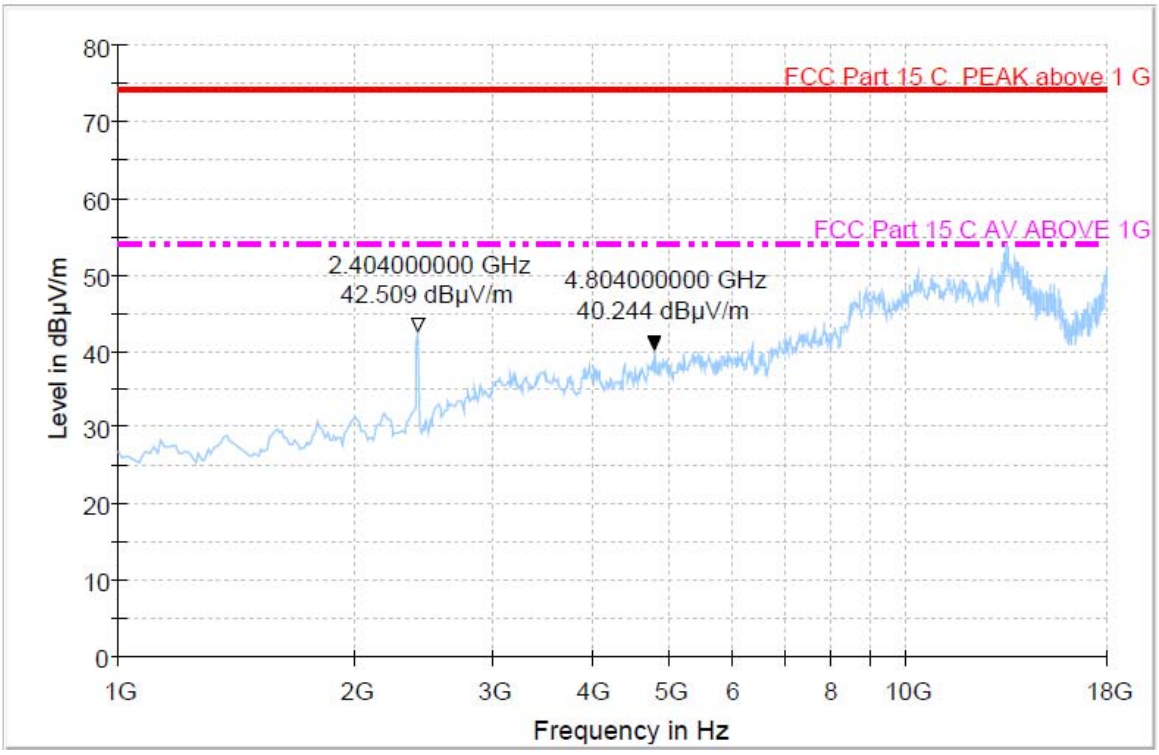


Test Channel :	39
Remark:	2412MHz is Fundamental signal which can be ignored

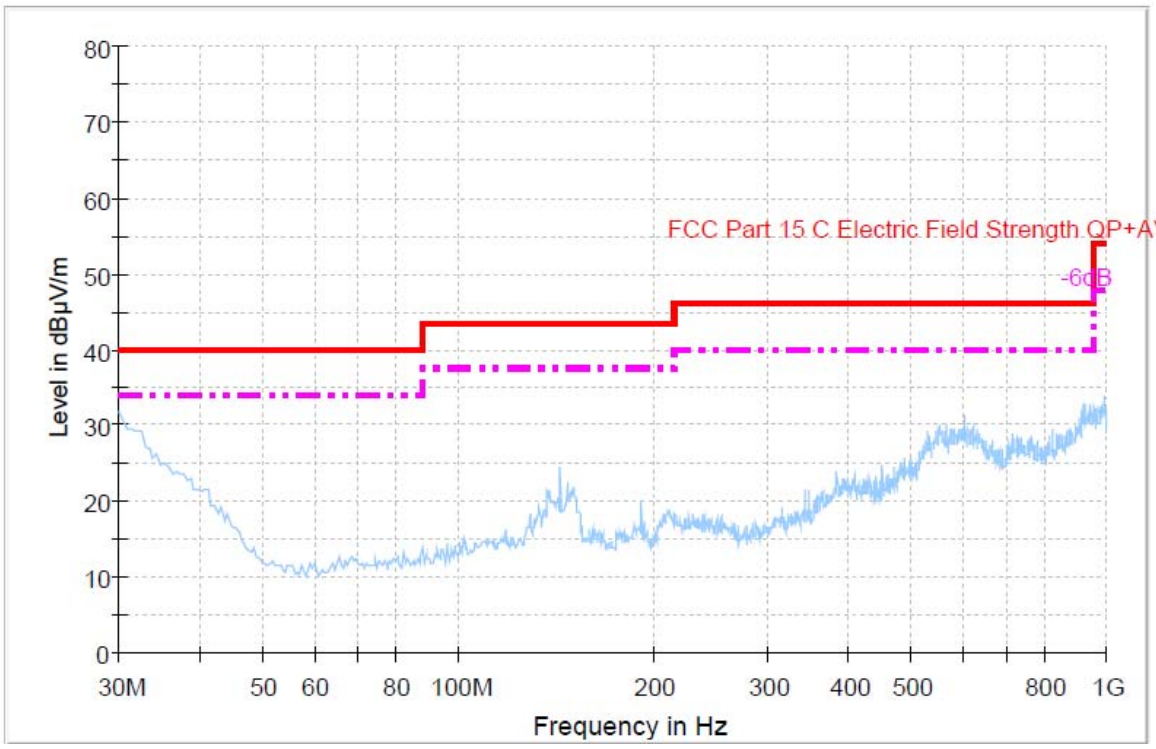
Radiated Emission 30MHz-1GHz Vertical



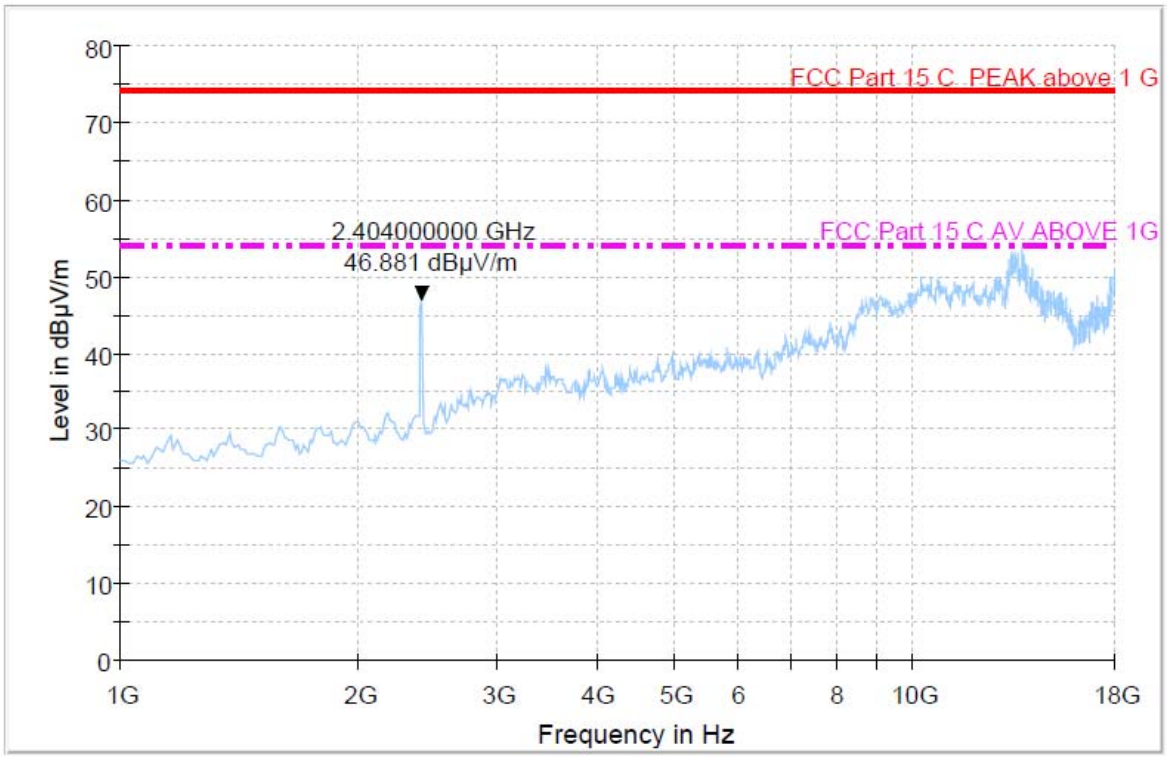
Radiated Emission 1GHz-18GHz Vertical



Radiated Emission 30MHz-1GHz Horizontal

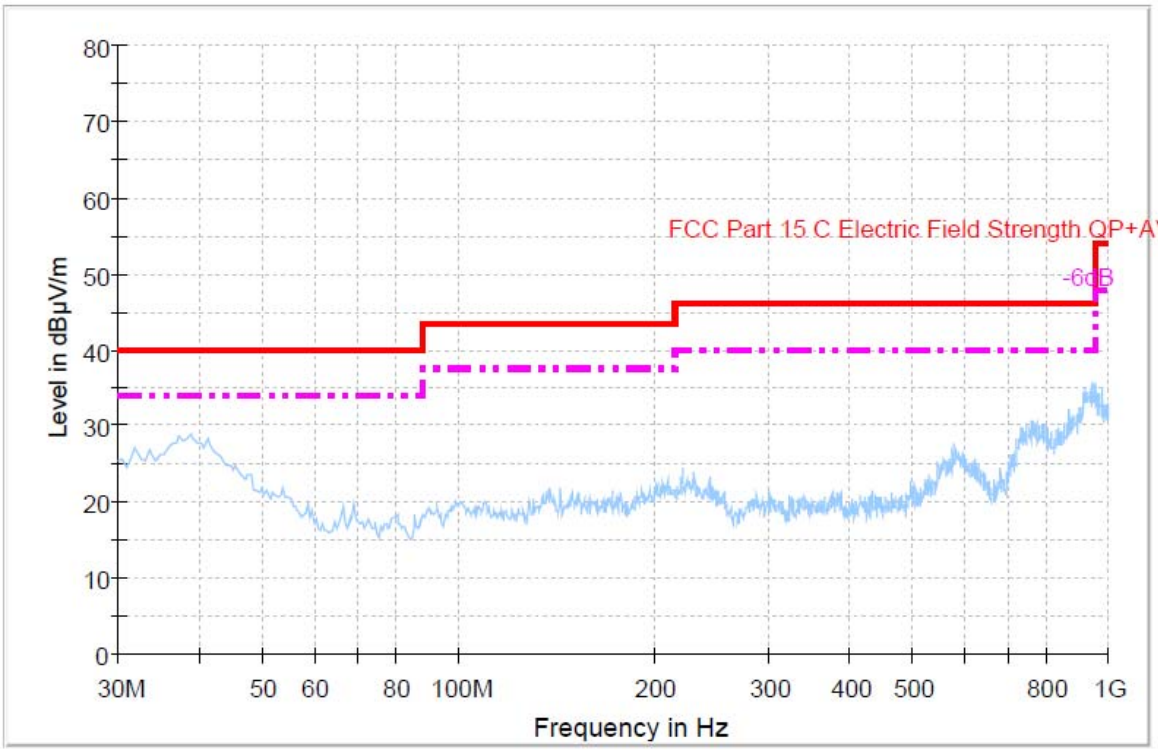


Radiated Emission 1GHz-18GHz Horizontal

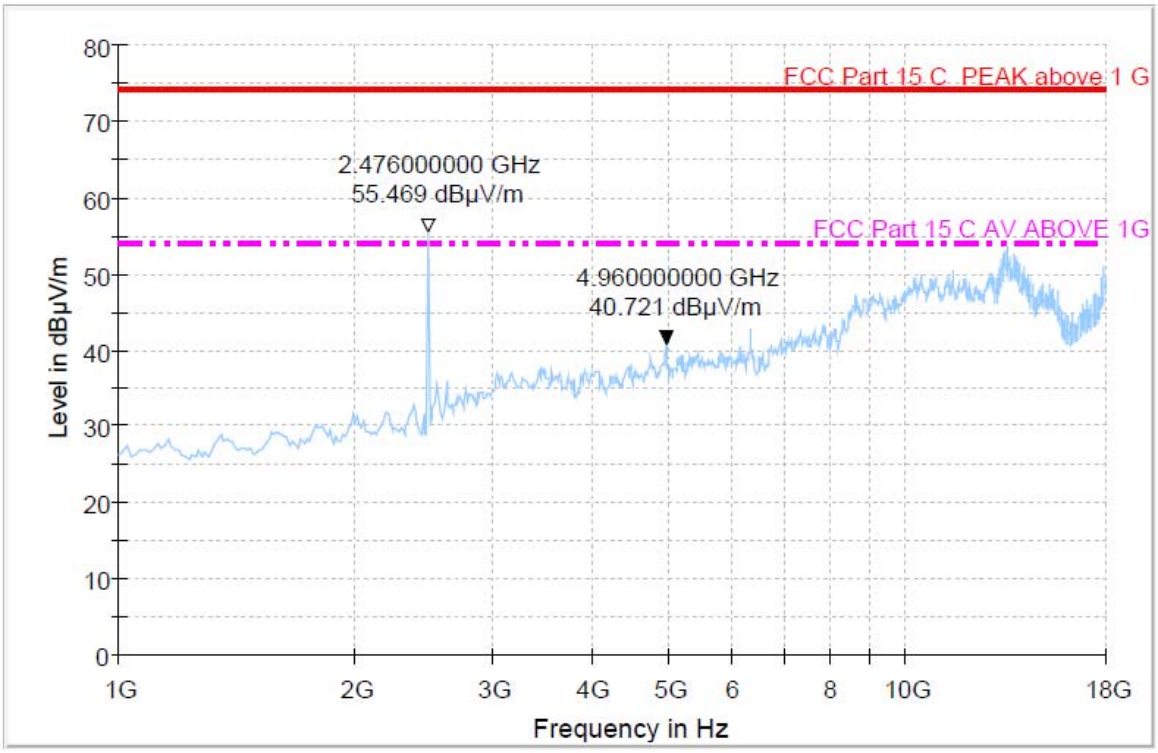


Test Channel :	78
Remark:	2412MHz is Fundamental signal which can be ignored

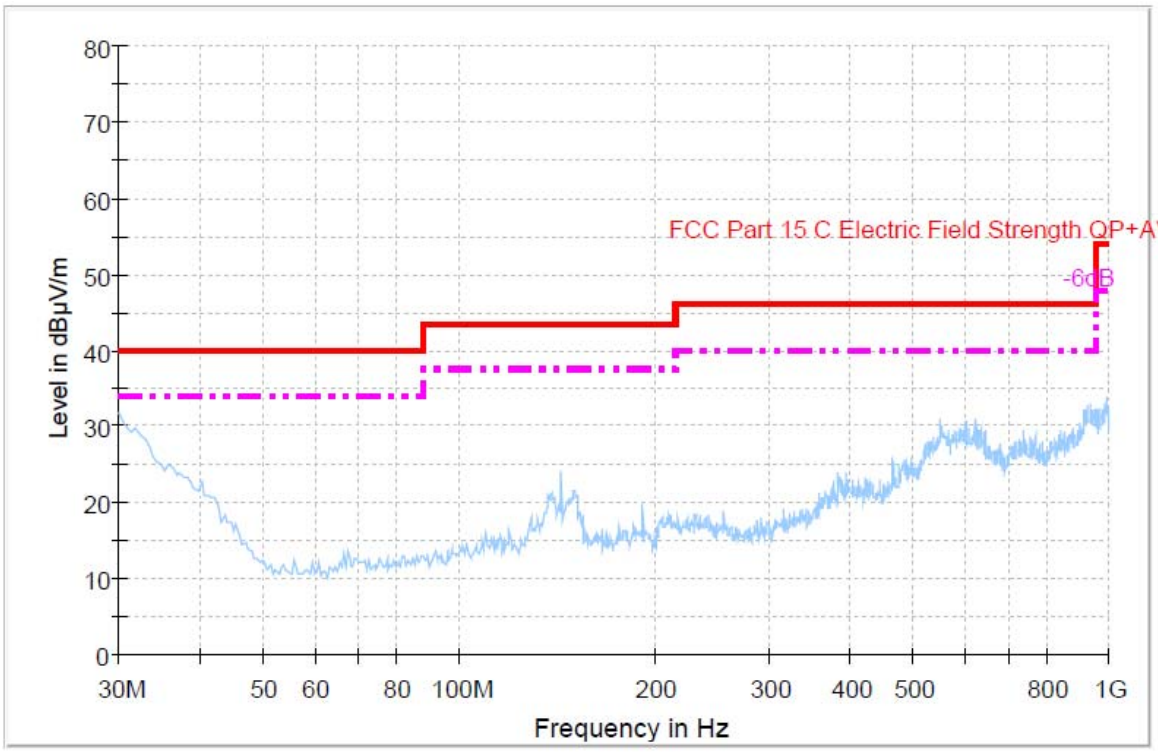
Radiated Emission 30MHz-1GHz Vertical



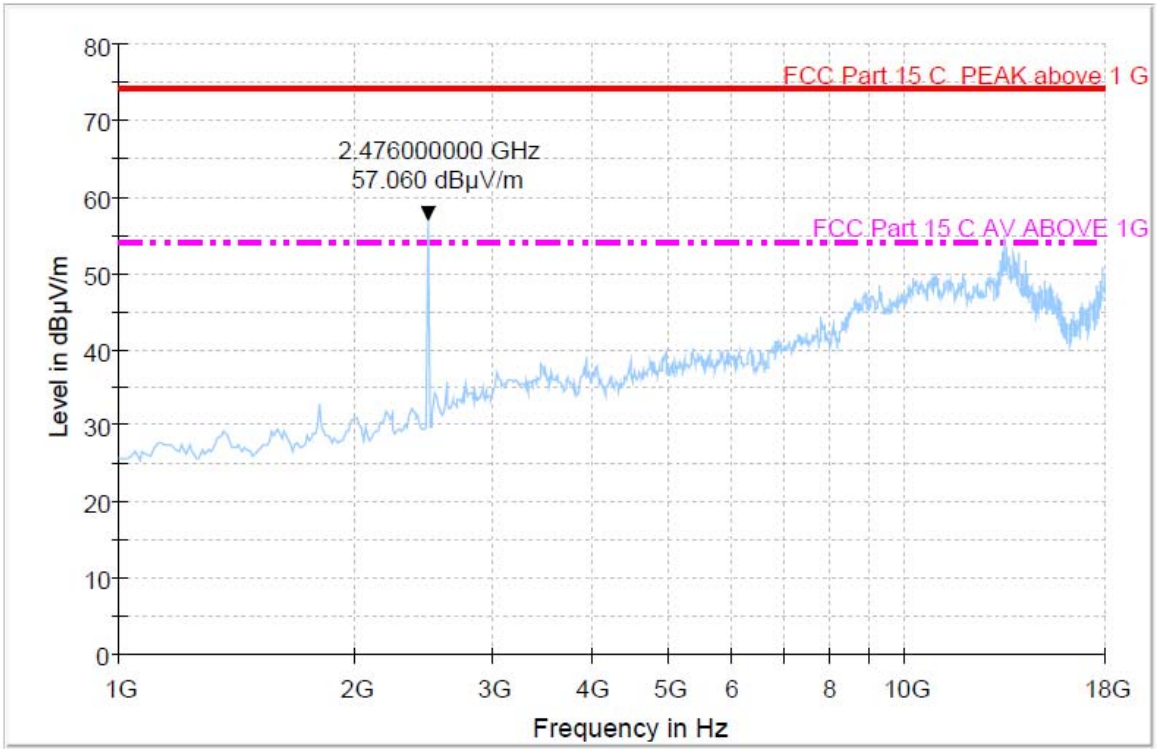
Radiated Emission 1GHz-18GHz Vertical



Radiated Emission 30MHz-1GHz Horizontal



Radiated Emission 1GHz-18GHz Horizontal



3.9.7 Radiated Emission Measurement Results (18GHz-25GHz)

Test Engineer :	Hogan. He	**Temperature :**	23℃~26℃
		Relative Humidity :	40%~60%

Frequency (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Notes:

The amplitude of radiated emissions that are attenuated by more than 20dB below the permissible value has no need to be reported. The measurement performed at 1meter distance from turn table to antenna.

3.10 Antenna Requirements

3.10.1 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.

3.10.2 Antenna Connected Construction

The antennas type used in this product is PIFA Antenna without connector and it is considered to meet antenna requirement.

3.10.3 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

No	Instrument/Ancillary	Provider	Type/Model	Cal. Date
1	RF Preseletor	Agilent	N9039A(9KHz-1GHz)	2011.10.12
2	Spectrum Analyzer	Agilent	E4440A(3Hz-26.5GHz)	2011.8.16
3	Spectrum Analyzer	Agilent	E4440A(3Hz-26.5GHz)	2011.8.16
4	Pre-Amplifier	Agilent	83006A(0.01GHz-26.5GHz)	2011.8.16
5	Pre-Amplifier	Agilent	83006A(0.01GHz-26.5GHz)	2011.8.16
6	Pre-Amplifier	Agilent	83006A(0.01GHz-26.5GHz)	2011.8.16
7	Pre-Amplifier	Agilent	8447D(0.1MHz-1300MHz)	2011.4.22
8	Pre-Amplifier	Agilent	8447D(0.1MHz-1300MHz)	2011.4.22
9	Loop Antenna	Schwarzbeck	FMZB1519(9KHz~30MHz)	2012.01.07
10	Antenna	Schwarzbeck	VULB9168(30MHz-1500MHz)	2012.2.22
11	Antenna	Schwarzbeck	VULB9168(30MHz-1500MHz)	2012.2.22
12	Antenna	Schwarzbeck	BBHA 9170 (15G-26.5G)	2011.11.09
13	Antenna	ETS-Lindgren	3117(1GHz-18GHz)	2012.2.22
14	Antenna	ETS-Lindgren	3117(1GHz-18GHz)	2012.2.22

5 Uncertainty Evaluation

5.1 Ucertainty of Radiated Spurious Emission evaluation (30MHz~1GHz)

Radiated Spurious Emission Measurement Uncertainty Evaluation					
Contribution		Probability Distribution	Partition Coefficient	u(xi)	
				Horizontal 30-1000MHz	Vertical 30-1000MHz
Cable Loss Calibration	U_{01}	U-Shape	1.41	0.17	0.17
Sine wave voltage accuracy of Spectrum analyzer	U02	Triangle	2.45	0.82	0.82
Impulse response of spectrum analyzer	U03	Triangle	2.45	0.61	0.61
Pulse repetition rate of spectrum analyzer	U04	Triangle	2.45	0.61	0.61
Spectrum analyzer noise level	U05	Normal	2.00	0.25	0.25
Measurement of the signal path mismatch	U06	U-Shape	1.41	0.13	0.13
Free-space antenna factor	U07	Normal	2.00	1.00	1.00
Antenna Factor Interpolation for Frequency	U08	Rectangular	1.73	0.17	0.17
Antenna factor with height in the correlation	U09	Rectangular	1.73	0.17	0.17
Measurement antenna and the absorbing material in the image of the mutual coupling effect	U10	Rectangular	1.73	0.50	0.50
Antenna phase center variation	U11	Rectangular	1.73	0.58	0.58
Antenna cross polarization response	U12	Rectangular	1.73	0.52	0.52
Antenna imbalance	U13	Rectangular	1.73	0.52	0.52
Test distance error	U14	Rectangular	1.73	0.17	0.17
Desktop terrain clearance variation	U15	Normal	2.00	0.05	0.05
Random uncertainty	U16	Standard deviation	1.00	0.20	0.19
Pre-Amplifier gain Calibration	U17	U-Shape	1.41	0.13	0.13
Combined Standard Uncertainty Uc(y)	Uc	Normal	1.00	1.95	1.95
Measuring Uncertainty for a level of Confidence of 95%(U= 2Uc(y))	U=kUc	Normal	2	3.90	3.89

5.2 Ucertainty of Radiated Spurious Emission evaluation (1GHz~26.5GHz)

Radiated Spurious Emission Measurement Uncertainty Evaluation					
Contribution		Probability Distribution	Partition Coefficient	u(xi)	
				Horizontal 1-25GHz	Vertical 1-25GHz
Cable Loss Calibration	U01	U-Shape	1.41	0.17	0.17
Sine wave voltage accuracy of Spectrum analyzer	U02	Triangle	2.45	0.82	0.82
Impulse response of spectrum analyzer	U03	Triangle	2.45	0.61	0.61
Pulse repetition rate of spectrum analyzer	U04	Triangle	2.45	0.61	0.61
Spectrum analyzer noise level	U05	Normal	2.00	0.25	0.25
Measurement of the signal path mismatch	U06	U-Shape	1.41	0.13	0.13
Free-space antenna factor	U07	Normal	2.00	1.00	1.00
Antenna Factor Interpolation for Frequency	U08	Rectangular	1.73	0.17	0.17
Antenna factor with height in the correlation	U09	Rectangular	1.73	NA	NA
Measurement antenna and the absorbing material in the image of the mutual coupling effect	U10	Rectangular	1.73	0.50	0.50
Antenna phase center variation	U11	Rectangular	1.73	0.58	0.58
Antenna cross polarization response	U12	Rectangular	1.73	0.52	0.52
Antenna imbalance	U13	Rectangular	1.73	0.52	0.52
Test distance error	U14	Rectangular	1.73	0.17	0.17
Desktop terrain clearance variation	U15	Normal	2.00	0.05	0.05
Random uncertainty	U16	Standard deviation	1.00	0.22	0.23
Pre-Amplifier gain Calibration	U17	U-Shape	1.41	0.13	0.13
Combined Standard Uncertainty Uc(y)	Uc	Normal	1.00	1.94	1.94
Measuring Uncertainty for a level of Confidence of 95%(U= 2Uc(y))	U=kUc	Normal	2	3.89	3.89