

Test Report for FCC Part 15 Subpart B & C

of

Product Name

WLAN a+b+g mini-PCI Module

Model

CM9

Applied by:

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U. S. A

Test Performed by:

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ISL-T10-R29-1

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1. General

1.1 Certification of Accuracy of Test Data

Standards:	CFR 47 Part 15 Subpart B Class B CFR 47 Part 15 Subpart C (Section 15.247) CFR 47 Part 15 Subpart E (Section 15.407)
Test Procedure:	ANSI C63.4:2003
Equipment Tested:	WLAN a+b+g mini-PCI Module
Model:	CM9
Applied by:	3e Technologies International Inc.
Sample received Date:	2005/04/15
Final test Date :	2005/05/16-2005/05/27
Test Result	PASS
Test Site:	Chamber 02, Conduction 02
Temperature	Refer to each site test data
Humidity:	Refer to each site test data
 Test Engineer:	 Mailes Hsieh

All the tests in this report have been performed and recorded in accordance with the standards described above and performed by an independent electromagnetic compatibility consultant, International Standards Laboratory.

The test results contained in this report accurately represent the measurements of the characteristics and the energy generated by sample equipment under test at the time of the test. The sample equipment tested as described in this report is in compliance with the limits of above standards.

Approve & Signature



Eddy Hsiung/Director

Test results given in this report apply only to the specific sample(s) tested under stated test conditions. This report shall not be reproduced other than in full without the explicit written consent of ISL. This report totally contains 91 pages, including 1 cover page , 3 contents page, and 87 pages for the test description. This report must not be use to claim product endorsement by NVLAP or any agency of the U.S. Government.

This test data shown below is traceable to NIST or national or international standard. International Standards Laboratory certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 853(a).
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2. Test Results Summary

The 802.11b functions of EUT has been tested according to the FCC regulations listed below:

Tested Standards: 47 CFR Part 15 Subpart C			
Standard Section	Test Type	Result	Remarks
15.207	AC Power Line Emissions	Pass	
15.247(a)(2)	Spectrum Bandwidth Of DSSS device	Pass	
15.247(b)	Max. Peak Output Power	Pass	
15.247(c)	Radiated Emissions 30MHz – 25 GHz	Pass	
15.247 (c)	Band Edge Measurement	Pass	
15.247(b)(4)	Radiation Exposure	Pass	MPE report attached
15.247 (d)	Power Spectral Density	Pass	

The 802.11g functions of EUT has been tested according to the FCC regulations listed below:

Tested Standards: 47 CFR Part 15 Subpart C			
Standard Section	Test Type	Result	Remarks
15.207	AC Power Line Emissions	Pass	
15.247(a)(2)	Spectrum Bandwidth Of DSSS device	Pass	
15.247(b)	Max. Peak Output Power	Pass	
15.247(c)	Radiated Emissions 30MHz – 25 GHz	Pass	
15.247 (c)	Band Edge Measurement	Pass	
15.247(b)(4)	Radiation Exposure	Pass	MPE report attached
15.247 (d)	Power Spectral Density	Pass	

The 802.11a functions of EUT has been tested to the FCC regulations listed below:

Tested Standards: 47 CFR Part 15 Subpart C			
Standard Section	Test Type	Result	Remarks
15.207	AC Power Line Emissions	Pass	
15.247(a)(2)	Spectrum Bandwidth Of DSSS device	Pass	
15.247(b)	Max. Peak Output Power	Pass	
15.247(c)	Radiated Emissions 30MHz – 25 GHz	Pass	
15.247 (c)	Band Edge Measurement	Pass	
15.247(b)(4)	Radiation Exposure	Pass	MPE report attached
15.247 (d)	Power Spectral Density	Pass	

3. Description of Equipment Under Test (EUT)

Description:	WLAN a+b+g Mini- PCI module
Model No.:	CM9
FCC ID:	QVT-WLAN-MP2
Frequency Range 802.11a:	5725~5825 MHz
Frequency Range 802.11b/g:	2400~2483.5 MHz
Support channel:	
802.11a Normal mode	4 Channels
802.11a Turbo mode	2 Channels
802.11b/g	11 Channels
Modulation Skill:	
802.11a Normal mode	OFDM (6 Mbps – 54 Mbps)
802.11a Turbo mode	OFDM (12 Mbps – 108 MBps)
802.11b	DBPSK(1Mbps), DQPSK(2Mbps), CCK(5.5/11Mbps)
802.11g	OFDM (6M - 54Mbps)
Antennas Type:	
Antenna 1: Corner Ant.	(4010 , made by Nearson Co.)
Antenna 2: Directional	(HG5822G,made by HyperLink Technologies, Inc)
Antenna Connected:	The antenna is connected to the RF connector of the WLAN adapter.
Antenna peak Gain:	
Antenna 1:	12 dBi (11b/g)
Antenna 2:	22 dBi (5725MHz~5850MHz)
WLAN Power Type :	3.3V DC from the EUT

The channel and the operation frequency of 802.11b and 802.11g is listed below:

Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	2412	07	2442
02	2417	08	2447
03	2422	09	2452
04	2427	10	2457
05	2432	11	2462
06	2437		

The channel and the operation frequency of 802.11a Normal Mode is listed below:

Channel	Frequency(MHz)
09	5745
10	5765
11	5785
12	5805

The channel and the operation frequency of 802.11a Turbo Mode is listed below:

Channel	Frequency(MHz)
04	5760
05	5800

The cable between WLAN adapter and antenna 1 is 480cm in length .

The cable between WLAN adapter and antenna 2 is 330cm in length .

During the test, the EUT was tested as a modular device of a notebook PC using a PCMCIA extender board to extend the EUT outside the notebook PC enclosure.

4. TEST RESULTS (802.11a)

4.1 Powerline Conducted Emissions [Section 15.207]

4.1.1 EUT Configuration

The conducted emission test setups are in accordance with Figs 9, 10(a) and 10(b) of ANSI C63.4-2001, CFR 47 Part 15 Subpart B; or EN55022:1994/ A1:1995/A2:1997; CISPR 22:1993/A1:1995/A2:1996.

The EUT was set up on the non-conductive table that is 1.0 by 1.5 meter, 80cm above ground. The wall of the shielded room was located 40cm to the rear of the EUT.

Power to the EUT was provided through the LISN. The impedance vs. frequency characteristic of the LISN is complied with the limit shown on the figure 1 of ANSI C63.4-2001.

Both lines (neutral and hot) were connected to the LISN in series at testing. A coaxial-type connector which provides one 50 ohms terminating impedance was provided for connecting the test instrument. The excess length of the power cord was folded back and forth at the center of the lead so as to form a bundle not exceeding 40cm in length.

Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.

If the EUT is a Personal Computer or a peripheral of personal computer, and the personal computer has an auxiliary AC outlet which can be used for providing power to an external monitor, then all measurements will be made with the monitor power from first the computer-mounted AC outlet and then a floor-mounted AC outlet.

4.1.2 Test Procedure

The system was set up as described above, with the EMI diagnostic software running. The main power line conducted EMI tests were run on the hot and neutral conductors of the power cord and the results were recorded. The effect of varying the position of the interface cables has been investigated to find the configuration that produces maximum emission.

At the frequencies where the peak values of the emissions were higher than 6dB below the applicable limits, the emissions were also measured with the quasi-peak detectors. At the frequencies where the quasi-peak values of the emissions were higher than 6dB below the applicable average limits, the emissions were also measured with the average detectors.

The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

4.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range:	150 KHz--30MHz
Detector Function:	Quasi-Peak/Average
Bandwidth (RBW):	9KHz

4.1.4 Test Data:

Power Line Conducted Emissions (Hot)

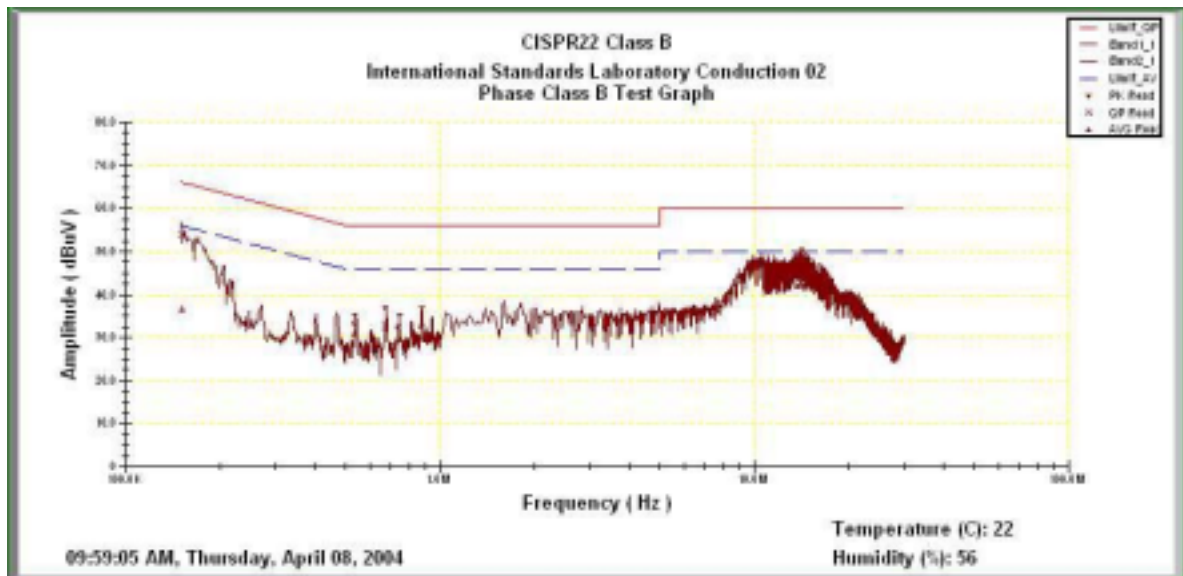
Operator: Mailles Hsieh

Temperature (C): 22

Humidity (%): 56

09:59:05 AM, Thursday, April 08, 2004

Frequency	LISN Loss	Cable Loss	QP Corrt.	QP Limit	QP Margin	AVE Corrt.	AVE Limit	AVE Margin
MHz	(dB)	(dB)	Amp.(dBuV)	(dBuV)	(dB)	Amp.(dBuV)	(dBuV)	(dB)
0.1508	0.10	0.02	53.93	65.98	-12.05	36.56	55.98	-19.42
0.53551	0.12	0.03	33.22	56.00	-22.78	30.90	46.00	-15.10
0.66915	0.14	0.04	33.12	56.00	-22.88	31.95	46.00	-14.05
0.73568	0.16	0.05	32.59	56.00	-23.41	29.86	46.00	-16.14
0.87393	0.18	0.06	32.63	56.00	-23.37	29.75	46.00	-16.25
13.6684	0.65	0.27	47.11	60.00	-12.89	41.91	50.00	-8.09
13.8672	0.66	0.27	47.59	60.00	-12.41	42.17	50.00	-7.83
14.135	0.67	0.28	47.48	60.00	-12.52	42.13	50.00	-7.87
14.1998	0.67	0.28	47.70	60.00	-12.30	42.30	50.00	-7.70
14.4688	0.68	0.29	46.39	60.00	-13.61	41.46	50.00	-8.54



Power Line Conducted Emissions (Neutral)

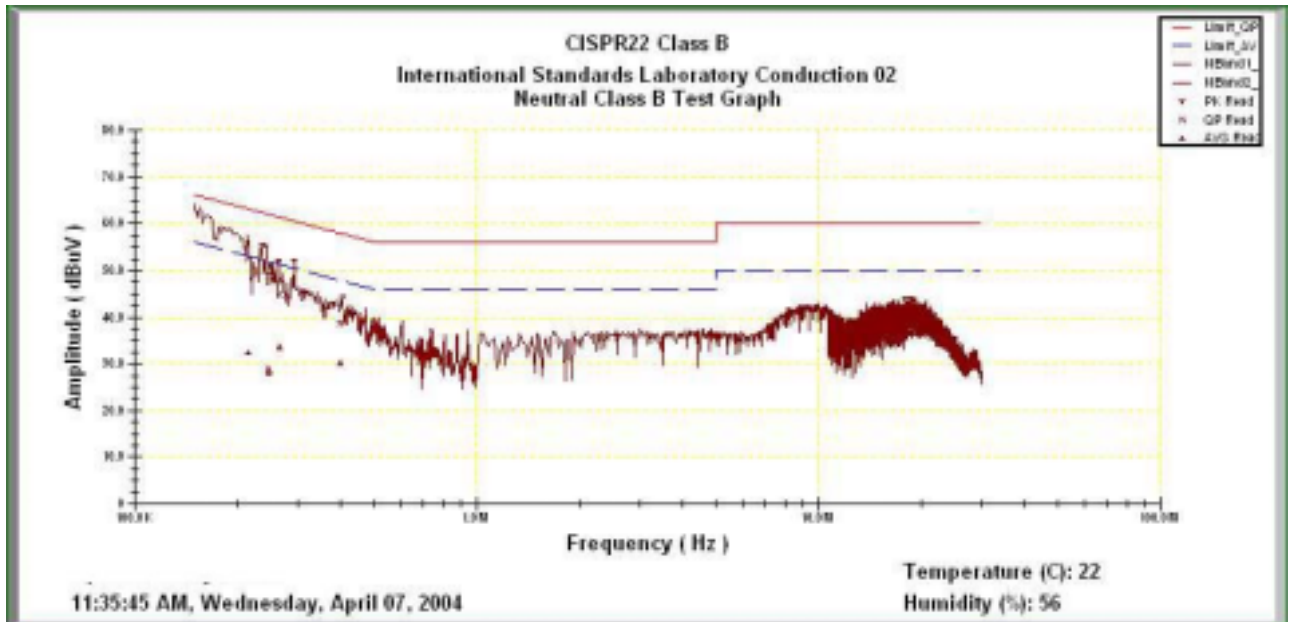
Operator: Mailies Hsieh

Temperature (C): 22

11:35:45 AM, Wednesday, April 07, 2004

Humidity (%): 56

Frequency	LISN Loss	Cable Loss	QP Corrt.	QP Limit	QP Margin	AVE Corrt.	AVE Limit	AVE Margin
MHz	(dB)	(dB)	Amp.(dBuV)	(dBuV)	(dB)	Amp.(dBuV)	(dBuV)	(dB)
0.21491	0.10	0.02	52.58	64.15	-11.57	32.33	54.15	-21.81
0.24515	0.10	0.02	48.89	63.28	-14.39	28.78	53.28	-24.50
0.24625	0.10	0.02	47.46	63.25	-15.79	28.09	53.25	-25.16
0.26493	0.10	0.02	44.88	62.72	-17.84	33.61	52.72	-19.11
0.39818	0.10	0.02	38.72	58.91	-20.18	30.20	48.91	-18.70
17.9458	0.46	0.28	40.33	60.00	-19.67	35.98	50.00	-14.02
18.4834	0.47	0.27	41.39	60.00	-18.61	37.52	50.00	-12.48
18.6165	0.47	0.27	41.39	60.00	-18.61	37.48	50.00	-12.52
18.6831	0.47	0.27	41.38	60.00	-18.62	37.32	50.00	-12.68
19.1486	0.48	0.27	41.32	60.00	-18.68	36.52	50.00	-13.48



- * NOTE: During the test, the EMI receiver was set to Max. Hold then switch the EUT between Main antenna, Aux antenna Channel 9,10,12 of Normal Mode and Channel 4,5 of Turbo Mode to get the maximum reading of all these channels.
Margin = Amplitude + Insertion Loss- Limit
A margin of -8dB means that the emission is 8dB below the limit

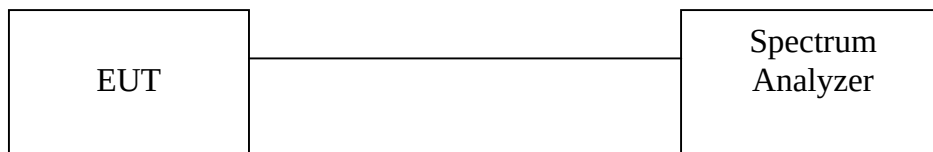
4.2 Bandwidth for DSSS [Section 15.247 (a)(2)]

4.2.1 Test Procedure

The Transmitter output of EUT was connected to the spectrum analyzer. The 6 dB bandwidth of the fundamental frequency was measured. The setting of spectrum analyzer is as follows

Equipment mode	Spectrum analyzer
Detector function	Peak mode
RBW	100KHz
VBW	100KHz

4.2.2 Test Setup



4.2.3 Test Data:

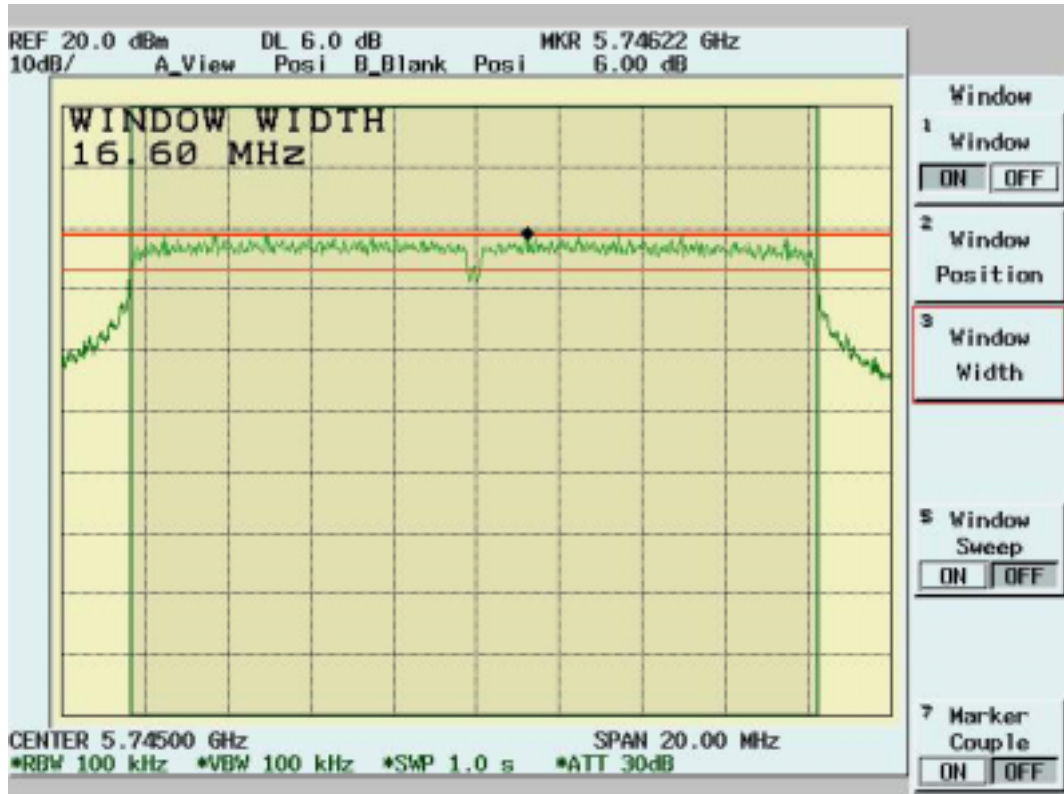
6dB Bandwidth

Temp. (deg. C): 25
Humidity (%): 50

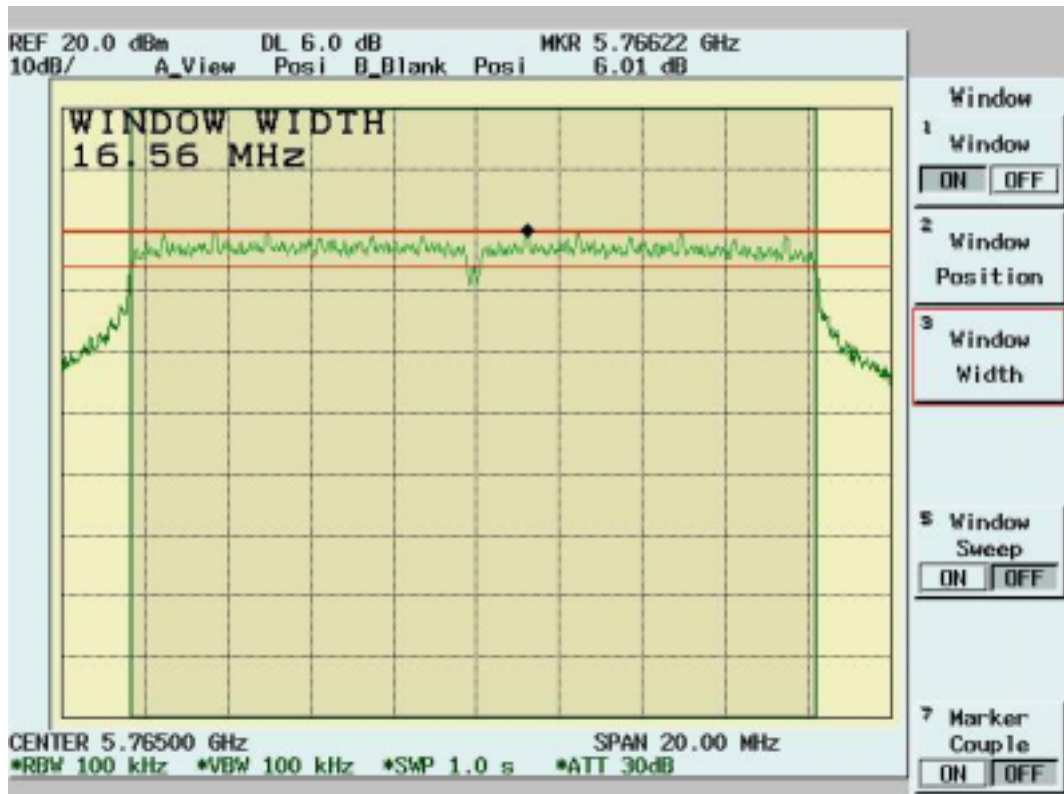
Test Engr: Mailes Hsieh

Channel	Frequency	6dB Bandwidth	Limit	Pass/Fail
Normal	(MHz)	(MHz)	(MHz)	
9	5745	16.60	0.5	Pass
10	5765	16.56	0.5	Pass
12	5805	16.56	0.5	Pass
Channel	Frequency	6dB Bandwidth	Limit	Pass/Fail
Turbo	(MHz)	(MHz)	(MHz)	
4	5760	32.80	0.5	Pass
5	5800	32.72	0.5	Pass

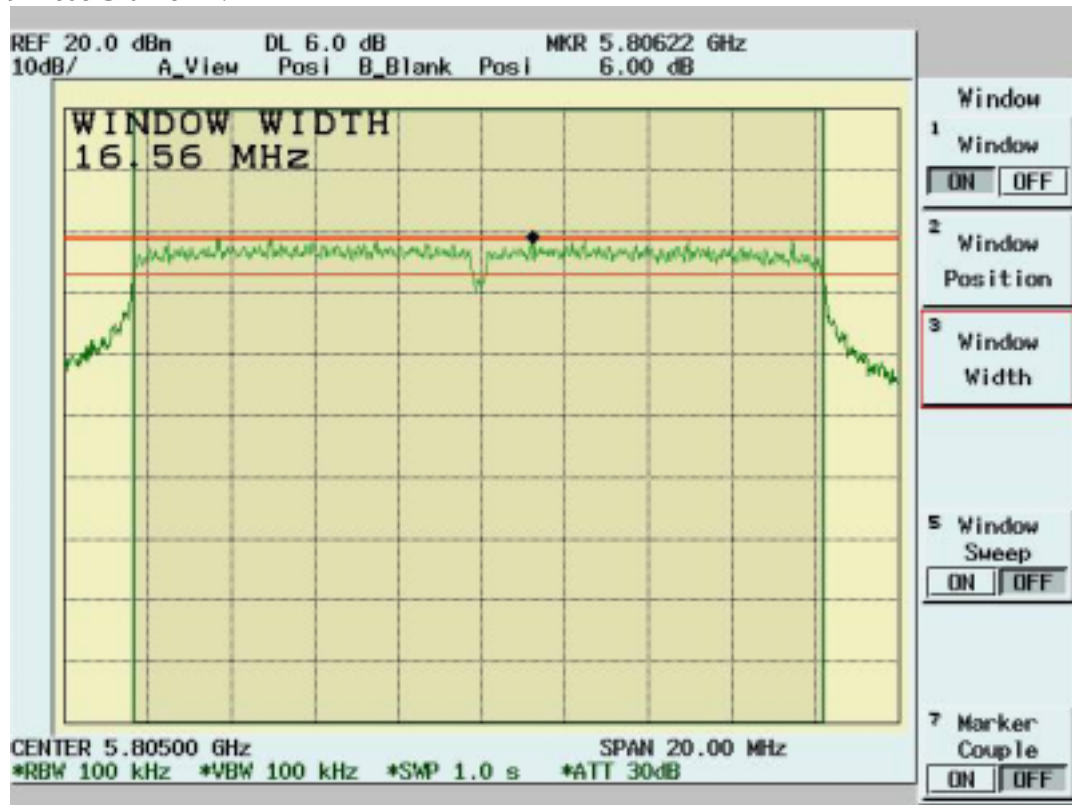
Normal mode Channel 9:



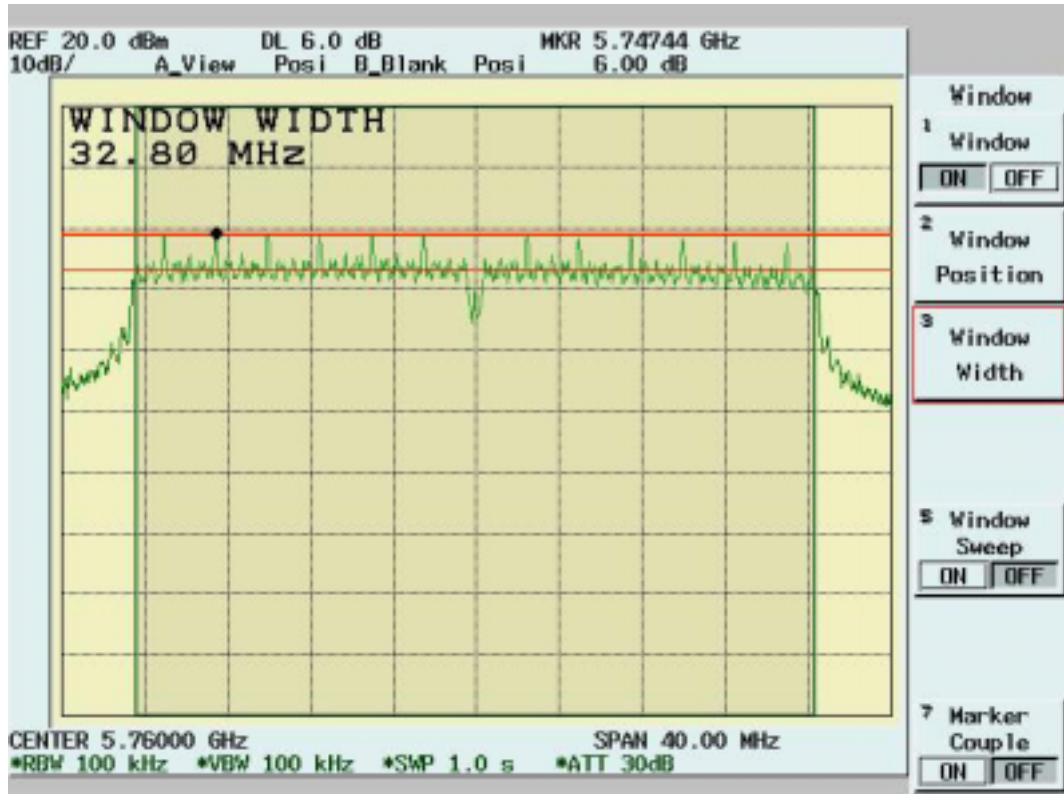
Normal mode Channel 10:



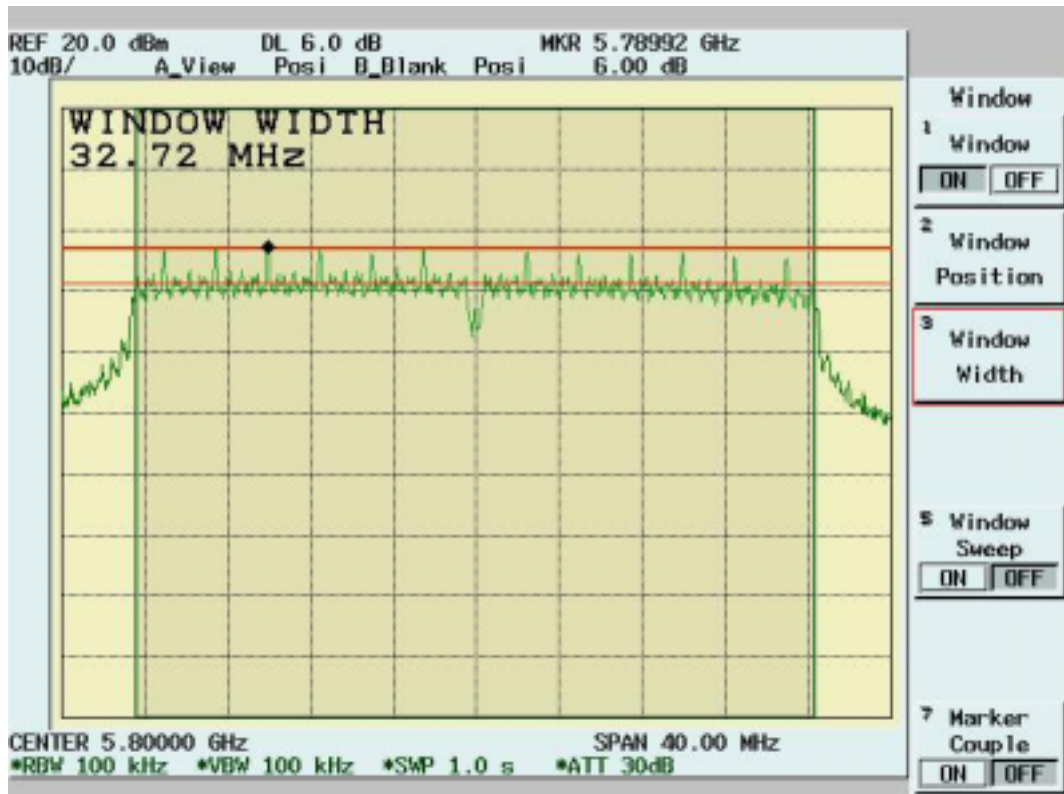
Normal mode Channel 12:



Turbo mode Channel 4:



Turbo mode Channel 5:

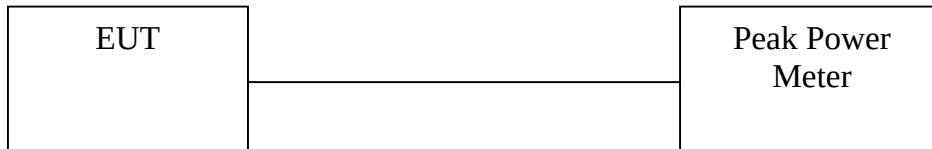


4.3 DSSS Maximum Peak Output Power [Section 15.247 (b)(1)]

4.3.1 Test Procedure

The Transmitter output of EUT was connected to the peak power meter(RBW=150MHz).

4.3.2 Test Setup



4.3.3 Test Data

Maximum Peak Output Power

Temperature (°C):22

Test Engineer:Mailes Hsieh

Humidity (%):25

Channel	Frequency	Analyzer Reading	Cable Loss	Peak Power Output	Peak Power Output	Limit	Pass/Fail
Normal	(Mhz)	(dBm)	(dB)	(mW)	(dBm)	(dBm)	
9	5745	18.81	1.20	100.28	20.01	30	Pass
10	5765	19.07	1.20	106.46	20.27	30	Pass
12	5805	18.84	1.20	101.00	20.04	30	Pass
Channel	Frequency	Analyzer Reading	Cable Loss	Peak Power Output	Peak Power Output	Limit	Pass/Fail
Turbo	(Mhz)	(dBm)	(dB)	(mW)	(dBm)	(dBm)	
4	5760	18.09	1.20	84.98	19.29	30	Pass
5	5800	16.06	1.20	53.24	17.26	30	Pass

Note: According to Section 15.247 (c)(1)(ii) Systems operating in the 5725-5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted output power.

4.4 Radiated Emission Measurement [Section [15.247(c)(4)]

4.4.1 EUT Configuration

The equipment under test was set up on the 10 meter chamber with measurement distance of 3 meters. The EUT was placed on a non-conductive table 80cm above ground.

Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.

4.4.2 Test Procedure

The system was set up as described above, with the EMI diagnostic software running. We found the maximum readings by varying the height of antenna and then rotating the turntable. Both polarization of antenna, horizontal and vertical, are measured.

30M to 1GHz: The highest emissions between 30 MHz to 1000 MHz were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in quasi-peak mode to determine the precise amplitude of the emissions. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was varied between vertical and horizontal, and the turntable was slowly rotated, to maximize the emission.

1GHz – 25GHz: The highest emissions were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in peak mode to determine the precise amplitude of the emission. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was varied between vertical and horizontal, and the turntable was slowly rotated, to maximize the emission. During test the EMI receiver and spectrum was setup according to *EMI Receiver/Spectrum Analyzer Configuration*.

For the test of 2nd to 10th harmonics frequencies, the equipment setup was also refer to *EMI Receiver/Spectrum Analyzer Configuration*. The frequencies were tested using Peak mode first, if the test data is higher than the emissions limit, an additional measurement using Average mode will be performed and the average reading will be compared to the limit and record in test report.

4.4.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range Tested:	30MHz~1000MHz
Detector Function:	Quasi-Peak Mode
Resolution Bandwidth (RBW):	120KHz
Video Bandwidth (VBW)	1MHz
Frequency Range Tested:	1GHz – 25 GHz
Detector Function:	Peak Mode
Resolution Bandwidth (RBW):	1MHz
Video Bandwidth (VBW)	3MHz
Frequency Range Tested:	1GHz – 25 GHz
Detector Function:	Average Mode
Resolution Bandwidth (RBW):	1MHz
Video Bandwidth (VBW)	10 Hz

4.4.4 Test Data (30MHz – 1GHz) .**30M – 1GHz Open Field Radiated Emissions (Horizontal)**

Operator:MailesHsieh

Temperature(C):22

Humidity(%):49

Frequency	RxAmp.	AntFact	CableLoss	PreAmpGain	Corrct.Emi.	Limit	Margin	Ant.Pos.	TablePos.
MHz	(dBuV)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg)
99.84	22.05	10.27	3.02	0.00	35.33	43.50	-8.17	100.00	200.00
198.78	25.06	8.86	4.18	0.00	38.10	43.50	-5.40	100.00	7.00
232.73	27.45	9.33	4.50	0.00	41.28	46.00	-4.72	100.00	65.00
298.69	21.75	13.57	4.69	0.00	40.02	46.00	-5.98	100.00	237.00
398.6	21.52	15.95	5.31	0.00	42.79	46.00	-3.21	100.00	303.00
431.58	19.00	16.25	5.61	0.00	40.86	46.00	-5.14	100.00	237.00
464.56	15.20	16.78	5.87	0.00	37.85	46.00	-8.15	100.00	65.00
563.5	13.17	19.05	6.56	0.00	38.78	46.00	-7.22	100.00	161.00
864.2	7.29	20.54	8.24	0.00	36.07	46.00	-9.93	100.00	181.00

30M – 1GHz Open Field Radiated Emissions (Vertical)

Operator:MailesHsieh

Temperature(C):22

Humidity(%):49

Frequency	RxAmp.	AntFact	CableLoss	PreAmpGain	Corrct.Emi.	Limit	Margin	Ant.Pos.	TablePos.
MHz	(dBuV)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg)
138.64	18.12	10.54	3.55	0.00	32.21	43.50	-11.29	100.00	330.00
231.76	21.00	9.21	4.48	0.00	34.70	46.00	-11.30	100.00	223.00
364.65	14.87	14.80	5.07	0.00	34.73	46.00	-11.27	100.00	223.00
431.58	13.17	16.25	5.61	0.00	35.03	46.00	-10.97	100.00	260.00
497.54	13.12	17.64	6.04	0.00	36.80	46.00	-9.20	100.00	346.00
643.04	8.42	19.07	7.00	0.00	34.50	46.00	-11.50	100.00	280.00
651.77	14.02	19.10	7.04	0.00	40.16	46.00	-5.84	100.00	297.00
661.47	9.30	19.08	7.07	0.00	35.45	46.00	-10.55	100.00	297.00
815.7	8.72	20.19	7.93	0.00	36.83	46.00	-9.17	100.00	96.00
866.14	6.48	20.54	8.26	0.00	35.28	46.00	-10.72	100.00	41.00

* NOTE:

During the pre-test, the EUT has been tested for Channel 9, 10,12 of Normal Mode and Channel 4, 5 of Turbo mode and transmit from Main and Aux antenna respectively to get all the critical emission frequencies. In the final test all the critical emission frequencies has been tested and the test data are listed above.

Margin=Corrected Amplitude-Limit

Corrected Amplitude = Radiated Amplitude + Antenna Correction Factor + Cable Loss - Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit

All frequencies from 30MHz to 1GHz have been tested

4.4.5 Test Data (1GHz – 40 GHz, Transmitting) .**1GHz~ 40 GHz (Horizontal), Normal Mode, Channel 9: 5745 MHz**

Operator: Mailes Hsieh

RBW: 1MHz

Humidity (%): 43

Temperature (C): 25

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Average Limit	Average Margin	Peak Limit	Peak Margin	Ant. Tower	Turn Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	dBuV/m	dB	cm	deg
1125.87	51.98 pk	25.08	2.19	34	45.24 pk	54.00	-8.76	74.00	--	102	103
1197.8	51.67 pk	25.41	2.19	34.04	45.24 pk	54.00	-8.76	74.00	--	102	98
1258.94	52.21 pk	25.69	2.2	34.07	46.03 pk	54.00	-7.97	74.00	--	101	94
4549.65	47.83 pk	33.89	2.05	37.41	46.36 pk	54.00	-7.64	74.00	--	101	45
4582.02	48.23 pk	34.01	2.06	37.45	46.85 pk	54.00	-7.15	74.00	--	101	42
4740.26	58.00 pk	34.61	2.1	37.62	57.09 pk	54.00	--	74.00	-16.91	101	24
4740.26	43.08 av	34.61	2.1	37.62	42.17 av	54.00	-11.83	74.00	--	101	24
11479.5	52.66 pk	40.67	3.08	34.87	61.55 pk	54.00	--	74.00	-12.45	101	24
11479.7	36.43 av	40.65	3.08	34.86	45.30 av	54.00	-8.70	74.00	--	101	24
17226.6	46.45 pk	45.2	3.44	32.14	63.95 pk	54.00	--	74.00	-11.05	100	24
17221.7	31.89 av	45.19	3.44	32.13	48.39 av	54.00	-5.61	74.00	--	100	24

1GHz~ 40 GHz (Vertical), Normal Mode, Channel 9: 5745 MHz

Operator: Mailes Hsieh

RBW: 1MHz

Humidity (%): 43

Temperature (C): 25

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Average Limit	Average Margin	Peak Limit	Peak Margin	Ant. Tower	Turn Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	dBuV/m	dB	cm	deg
2068.13	47.48 pk	30.99	2.39	35.18	45.67 pk	54.00	-8.33	74.00	--	100	64
2877.32	48.54 pk	31.05	1.43	34.86	46.16 pk	54.00	-7.84	74.00	--	103	318
3139.86	48.03 pk	31.21	1.52	35.05	45.71 pk	54.00	-8.29	74.00	--	103	321
3287.31	47.55 pk	31.33	1.6	35.38	45.10 pk	54.00	-8.9	74.00	--	103	283
4538.86	47.34 pk	33.85	2.05	37.4	45.84 pk	54.00	-8.16	74.00	--	101	46
8038.16	40.06 pk	40.68	2.58	35.04	48.29 pk	54.00	-5.71	74.00	--	100	246
11479.7	51.67 pk	40.65	3.08	34.86	60.54 pk	54.00	--	74.00	-13.46	101	24
11479.7	38.06 av	40.65	3.08	34.86	46.93 av	54.00	-7.07	74.00	--	101	24
17221.7	45.50 pk	45.2	3.44	32.14	62.00 pk	54.00	--	74.00	-12.00	100	24
17221.7	32.37 av	45.19	3.44	32.13	48.87 av	54.00	-5.13	74.00	--	100	24

Note:

“pk”: peak reading

“av”: average reading

The Spectrum noise level+Correction Factor<Limit-6 dB

Margin = Corrected Amplitude – Limit

Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit.

All frequencies from 1GHz to 40 GHz have been tested.

1GHz~ 40 GHz (Horizontal), Normal Mode, Channel 10: 5765 MHz

Operator: Mailes Hsieh

RBW: 1MHz

Humidity (%): 43

Temperature (C): 25

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Average Limit	Average Margin	Peak Limit	Peak Margin	Ant. Tower	Turn Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	dBuV/m	dB	cm	deg
1125.87	51.98 pk	25.08	2.19	34	45.24 pk	54.00	-8.76	74.00	--	102	103
1197.8	51.67 pk	25.41	2.19	34.04	45.24 pk	54.00	-8.76	74.00	--	102	98
1258.94	52.21 pk	25.69	2.2	34.07	46.03 pk	54.00	-7.97	74.00	--	101	94
4549.65	47.83 pk	33.89	2.05	37.41	46.36 pk	54.00	-7.64	74.00	--	101	45
4582.02	48.23 pk	34.01	2.06	37.45	46.85 pk	54.00	-7.15	74.00	--	101	42
11491.8	51.88 pk	40.67	3.08	34.87	60.76 pk	54.00	--	74.00	-13.32	101	24
11491.8	36.16 av	40.67	3.08	34.87	45.04 av	54.00	-8.96	74.00	--	101	24
17286.4	41.34 pk	45.33	3.39	32.22	57.84 pk	54.00	--	74.00	-8.3	101	24
17286.4	27.74 av	45.33	3.39	32.22	44.24 av	54.00	-9.76	74.00	--	101	24

1GHz~ 40 GHz (Vertical), Normal Mode, Channel 10: 5765 MHz

Operator: Mailes Hsieh

RBW: 1MHz

Humidity (%): 43

Temperature (C): 25

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Average Limit	Average Margin	Peak Limit	Peak Margin	Ant. Tower	Turn Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	dBuV/m	dB	cm	deg
2298.3	47.29 pk	30.94	1.69	35.19	44.73 pk	54.00	-9.27	74.00	--	101	137
2399	47.16 pk	30.92	1.46	35.2	44.34 pk	54.00	-9.66	74.00	--	101	168
2877.32	46.55 pk	31.05	1.43	34.86	44.17 pk	54.00	-9.83	74.00	--	103	318
2913.29	46.47 pk	31.07	1.43	34.83	44.14 pk	54.00	-9.86	74.00	--	103	330
2974.43	48.16 pk	31.09	1.45	34.77	45.93 pk	54.00	-8.07	74.00	--	103	349
7933.87	41.16 pk	40.51	2.51	35.24	48.93 pk	54.00	-5.07	74.00	--	101	352
11492.1	48.58 pk	40.67	3.08	34.87	57.46 pk	54.00	--	74.00	-16.54	101	24
11492.1	34.06 av	40.67	3.08	34.87	49.94 av	54.00	-11.06	74.00	--	101	24
17286.4	42.84 pk	45.33	3.39	32.22	59.34 pk	54.00	--	74.00	-14.66	101	24
17286.4	28.94 av	45.33	3.39	32.22	45.44 av	54.00	-8.56	74.00	--	101	24

Note:

“pk”: peak reading

“av”: average reading

The Spectrum noise level+Correction Factor<Limit-6 dB

Margin = Corrected Amplitude – Limit

Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit.

All frequencies from 1GHz to 40 GHz have been tested.

1GHz~ 40 GHz (Horizontal), Normal Mode, Channel 12: 5805 MHz

Operator: Mailes Hsieh

RBW: 1MHz

Humidity (%): 43

Temperature (C): 25

Frequency	Rx_R.	Ant_F	Cab_L.	PreAmpl	Emission	Average Limit	Average Margin	Peak Limit	Peak Margin	Ant. Tower	Turn Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	dBuV/m	dB	cm	deg
1125.87	52.72 pk	25.08	2.19	34	45.98 pk	54.00	-8.02	74.00	--	102	103
1197.8	52.69 pk	25.41	2.19	34.04	46.25 pk	54.00	-7.75	74.00	--	102	98
1258.94	52.30 pk	25.69	2.2	34.07	46.13 pk	54.00	-7.87	74.00	--	101	94
4546.05	47.45 pk	33.88	2.05	37.41	45.97 pk	54.00	-8.03	74.00	--	101	45
4596.4	47.76 pk	34.07	2.07	37.47	46.42 pk	54.00	-7.58	74.00	--	101	40
4743.86	59.45 pk	34.63	2.1	37.63	58.55 pk	54.00	--	74.00	-15.45	101	26
4743.86	44.43 av	34.63	2.1	37.63	43.52 av	54.00	-10.48	74.00	--	101	24
11607	58.53 pk	41.04	3.19	34.97	57.80 pk	54.00	--	74.00	-16.2	101	24
11607	33.13 av	41.03	3.19	34.96	42.38 av	54.00	-11.62	74.00	--	101	24
17397.9	43.80 pk	45.6	3.29	32.38	60.30 pk	54.00	--	74.00	-13.7	101	24
17397.9	28.20 av	45.58	3.3	32.37	44.70 av	54.00	-9.3	74.00	--	101	24

1GHz~ 40 GHz (Vertical), Normal Mode, Channel 12: 5805 MHz

Operator: Mailes Hsieh

RBW: 1MHz

Humidity (%): 43

Temperature (C): 25

Frequency	Rx_R.	Ant_F	Cab_L.	PreAmpl	Emission	Average Limit	Average Margin	Peak Limit	Peak Margin	Ant. Tower	Turn Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	dBuV/m	dB	cm	deg
2298.3	47.29 pk	30.94	1.69	35.19	44.73 pk	54.00	-9.27	74.00	--	101	137
2399	47.16 pk	30.92	1.46	35.2	44.34 pk	54.00	-9.66	74.00	--	101	168
2877.32	46.55 pk	31.05	1.43	34.86	44.17 pk	54.00	-9.83	74.00	--	103	318
2913.29	46.47 pk	31.07	1.43	34.83	44.14 pk	54.00	-9.86	74.00	--	103	330
2974.43	48.16 pk	31.09	1.45	34.77	45.93 pk	54.00	-8.07	74.00	--	103	349
7933.87	41.16 pk	40.51	2.51	35.24	48.93 pk	54.00	-5.07	74.00	--	100	245
11607	51.83 pk	41.04	3.19	34.97	61.10 pk	54.00	--	74.00	-12.9	101	24
11607	35.91 av	41.04	3.19	34.97	45.18 av	54.00	-8.82	74.00	--	101	24
17409.7	45.30 pk	45.6	3.28	32.38	61.80 pk	54.00	--	74.00	-12.2	101	24
17409.7	30.69 av	45.61	3.28	32.38	47.19 av	54.00	-6.81	74.00	--	101	24

Note:

“pk”: peak reading

“av”: average reading

The Spectrum noise level+Correction Factor<Limit-6 dB

Margin = Corrected Amplitude – Limit

Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit.

All frequencies from 1GHz to 40 GHz have been tested.

1GHz~ 40 GHz (Horizontal), Turbo Mode, Channel 4 : 5760 MHz

Operator: Mailes Hsieh

RBW: 1MHz

Humidity (%): 43

Temperature (C): 25

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Average Limit	Average Margin	Peak Limit	Peak Margin	Ant. Tower	Turn Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	dBuV/m	dB	cm	deg
1197.8	53.70 pk	25.41	2.19	34.04	47.27 pk	54.00	-6.73	74.00	--	102	98
4513.69	48.16 pk	33.75	2.04	37.38	46.58 pk	54.00	-7.42	74.00	--	101	49
4546.05	48.83 pk	33.88	2.05	37.41	47.34 pk	54.00	-6.66	74.00	--	101	45
4578.42	48.68 pk	34	2.06	37.45	47.29 pk	54.00	-6.71	74.00	--	101	42
4743.86	59.45 pk	34.63	2.1	37.63	58.55 pk	54.00	--	74.00	-15.45	101	26
4740.26	44.43 av	34.61	2.1	37.62	43.52 av	54.00	-10.48	74.00	--	101	24
4804.56	57.88 pk	35.01	2.13	37.74	57.27 pk	54.00	--	74.00	-16.73	100	24
4808.59	43.95 av	34.87	2.12	37.7	43.24 av	54.00	-10.76	74.00	--	100	24
11523.8	43.03 pk	40.78	3.1	34.89	52.01 pk	54.00	-1.99	74.00	--	101	24
17285.3	48.45 pk	45.33	3.39	32.22	64.95 pk	54.00	-9.05	74.00	--	101	24

1GHz~ 40 GHz (Vertical), Turbo Mode, Channel 4: 5760 MHz

Operator: Mailes Hsieh

RBW: 1MHz

Humidity (%): 43

Temperature (C): 25

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Average Limit	Average Margin	Peak Limit	Peak Margin	Ant. Tower	Turn Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	dBuV/m	dB	cm	deg
2129.27	46.25 pk	30.97	2.21	35.19	44.24 pk	54.00	-9.76	74.00	--	100	84
3067.93	46.36 pk	31.15	1.49	34.9	44.10 pk	54.00	-9.9	74.00	--	103	340
3121.88	46.71 pk	31.2	1.51	35.02	44.41 pk	54.00	-9.59	74.00	--	103	326
3139.86	47.22 pk	31.21	1.52	35.05	44.90 pk	54.00	-9.1	74.00	--	103	321
3298.1	46.87 pk	31.34	1.61	35.4	44.41 pk	54.00	-9.59	74.00	--	103	280
7923.08	40.70 pk	40.49	2.5	35.27	48.42 pk	54.00	-5.58	74.00	--	100	244
11520	50.08 pk	40.78	3.1	34.9	59.06 pk	54.00	--	74.00	-14.94	101	24
11520	35.05 av	40.78	3.1	34.9	44.03 av	54.00	-9.97	74.00	--	101	24
17280	39.95 pk	45.3	3.4	32.2	56.45 pk	54.00	--	74.00	-17.55	101	24
17280	26.26 av	45.3	3.4	32.2	42.76 av	54.00	-11.24	74.00	--	101	24

Note:

“pk”: peak reading

“av”: average reading

The Spectrum noise level+Correction Factor<Limit-6 dB

Margin = Corrected Amplitude – Limit

Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit.

All frequencies from 1GHz to 40 GHz have been tested.

1GHz~ 40 GHz (Horizontal) , Turbo Mode, Channel 5 : 5800 MHZ

Operator: Mailes Hsieh

 RBW: 1MHz
 Humidity (%): 43
 Temperature (C): 25

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Average Limit	Average Margin	Peak Limit	Peak Margin	Ant. Tower	Turn Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	dBuV/m	dB	cm	deg
1129.47	53.23 pk	25.1	2.19	34	46.51 pk	54.00	-7.49	74.00	--	102	103
1194.21	52.63 pk	25.39	2.19	34.03	46.18 pk	54.00	-7.82	74.00	--	102	99
4546.05	48.06 pk	33.88	2.05	37.41	46.58 pk	54.00	-7.42	74.00	--	101	45
4578.42	48.00 pk	34	2.06	37.45	46.61 pk	54.00	-7.39	74.00	--	101	42
4739.08	59.55 pk	34.52	2.1	37.6	58.57 pk	54.00	--	74.00	-15.43	101	24
4743.86	44.20 av	34.63	2.1	37.63	43.30 av	54.00	-10.7	74.00	--	101	24
4810.22	57.13 pk	34.75	2.11	37.66	56.33 pk	54.00	--	74.00	-17.67	100	24
4808.59	42.88 av	34.87	2.12	37.7	42.17 av	54.00	-11.83	74.00	--	100	24
11592.3	40.90 pk	41	3.18	34.95	50.12 pk	54.00	-3.88	74.00	--	101	24
17388.1	45.05 pk	45.55	3.3	32.35	61.55 pk	54.00	-12.45	74.00	--	101	24

1GHz~ 40 GHz (Vertical), Turbo Mode, Channel 5: 5800 MHZ

Operator: Mailes Hsieh

 RBW: 1MHz
 Humidity (%): 43
 Temperature (C): 25

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Average Limit	Average Margin	Peak Limit	Peak Margin	Ant. Tower	Turn Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	dBuV/m	dB	cm	deg
2006.99	45.50 pk	31	2.58	35.18	43.90 pk	54.00	-10.1	74.00	--	100	45
2096.9	45.65 pk	30.98	2.3	35.18	43.75 pk	54.00	-10.25	74.00	--	100	73
3057.14	46.45 pk	31.15	1.48	34.87	44.20 pk	54.00	-9.8	74.00	--	103	342
3075.13	46.98 pk	31.16	1.49	34.91	44.71 pk	54.00	-9.29	74.00	--	103	338
3139.86	47.36 pk	31.21	1.52	35.05	45.04 pk	54.00	-8.96	74.00	--	103	321
7926.67	40.05 pk	40.5	2.5	35.26	47.79 pk	54.00	-6.21	74.00	--	100	244
11589.9	47.55 pk	40.9	3.14	34.93	56.66 pk	54.00	--	74.00	-17.34	101	24
11592.3	32.09 av	41	3.18	34.95	41.31 av	54.00	-12.69	74.00	--	101	24
17388.1	40.25 pk	45.55	3.3	32.35	56.75 pk	54.00	--	74.00	-17.25	101	24
17397.9	24.89 av	45.58	3.3	32.37	41.40 av	54.00	-12.6	74.00	--	101	24

Note:

“pk”: peak reading

“av”: average reading

The Spectrum noise level+Correction Factor<Limit-6 dB

Margin = Corrected Amplitude – Limit

Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit.

All frequencies from 1GHz to 40 GHz have been tested.

4.5 Band Edge Measurement (Section 15.247 (d))

4.5.1 Test Procedure (Conducted)

1. The transmitter output of EUT was connected to the spectrum analyzer.
Equipment mode: Spectrum analyzer
Detector function: Peak mode
SPAN: 100MHz
RBW: 100KHz
VBW: 100KHz
Center frequency: 5705MHz, 5845MHz.
2. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed
3. Find the next peak frequency outside the operation frequency band

4.5.2 Test Setup (Conducted)



4.5.3 Test Data (conducted):

Band Edge measurement (Conducted)

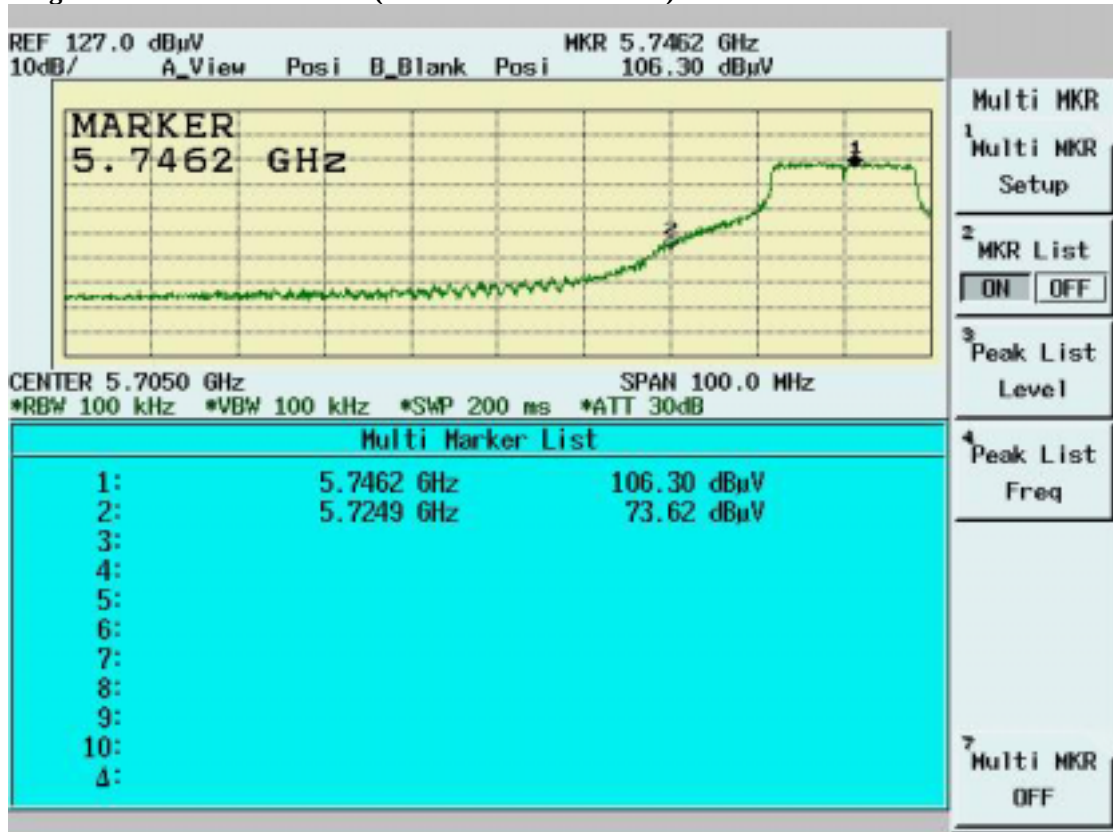
Temperature (°C):22

Test Engineer:Mailies Hsieh

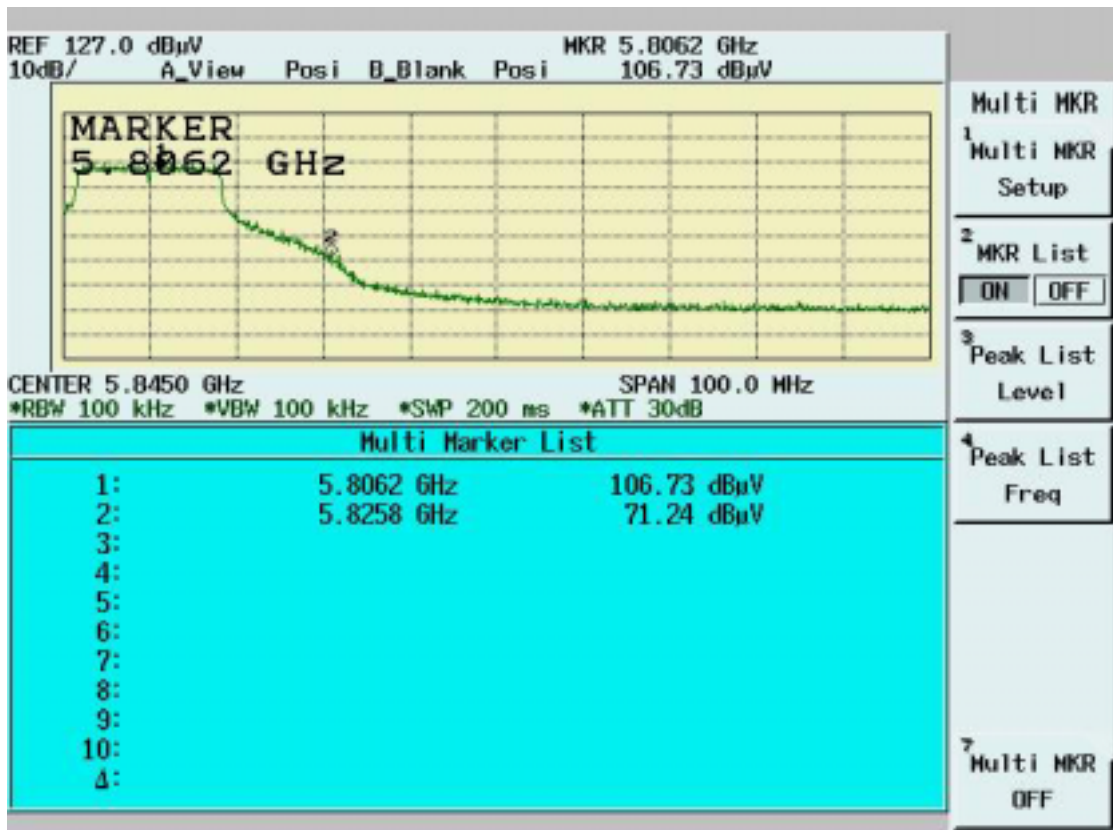
Humidity (%):25

Channel	Frequency	Spectrum Reading	Carrier - Outsideband Limit: >20dB	Pass/Fail
Normal	(MHz)	(dBuV)	(dB)	
9	5746.2	106.30	---	---
Outside band	5724.9	73.62	32.68	Pass
12	5806.2	106.73	---	---
Outside band	5825.8	71.24	35.49	Pass
Channel	Frequency	Spectrum Reading	Carrier - Outsideband Limit: >20dB	Pass/Fail
Turbo	(MHz)	(dBuV)	(dB)	
4	5750.00	105.89	---	---
Outside band	5722.50	71.84	34.05	Pass
5	5802.50	103.91	---	---
Outside band	5825.00	72.35	31.56	Pass

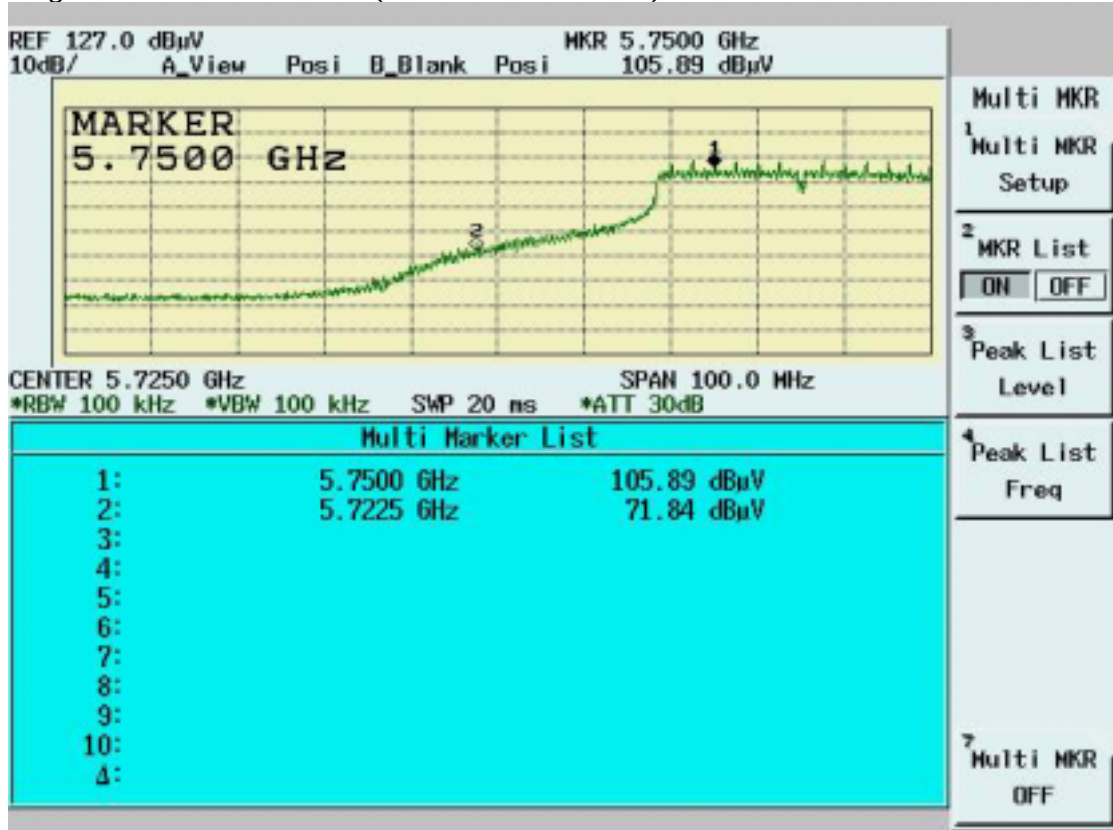
Band Edge Conducted measurement (Normal Mode Channel 9)



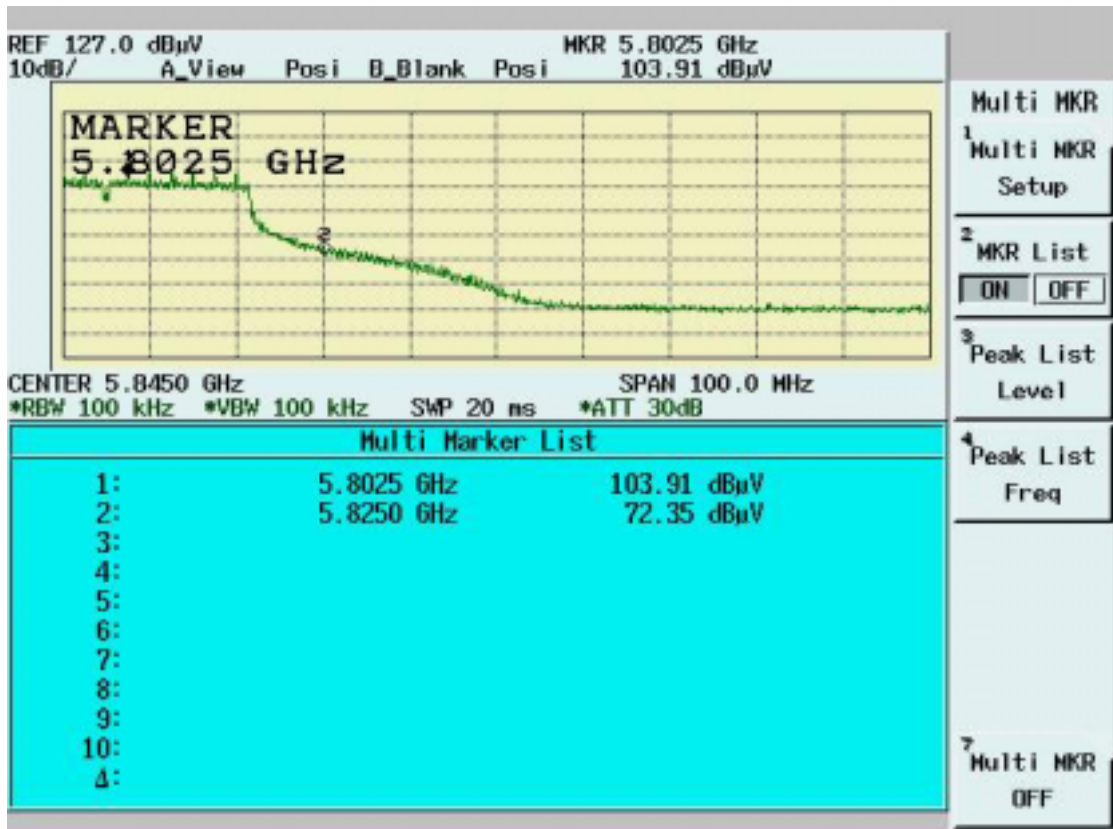
Band Edge Conducted Measurement (Normal Mode Channel 12)



Band Edge Conducted measurement (Turbo Mode Channel 4)



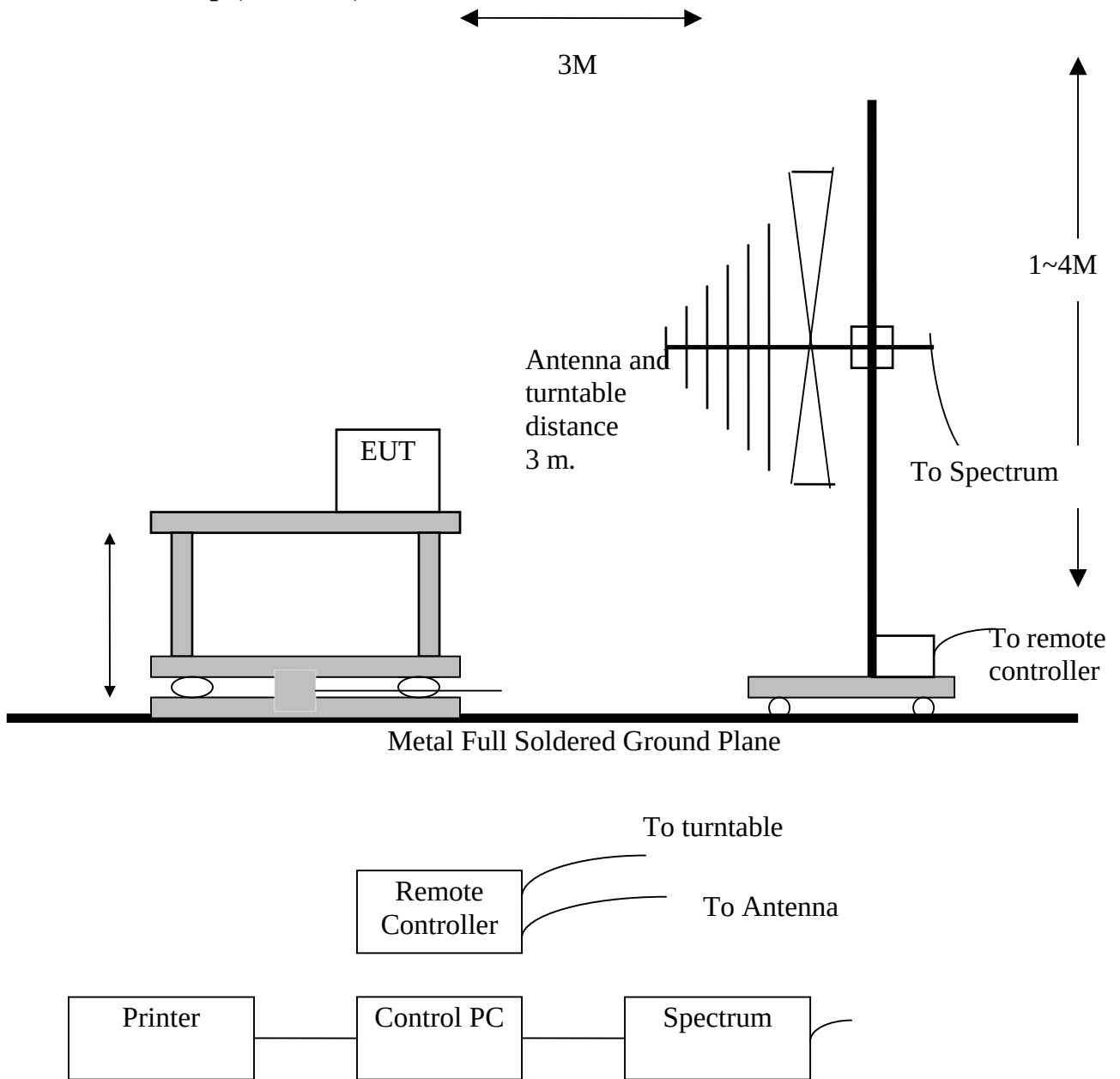
Band Edge Conducted Measurement (Turbo Mode Channel 5)



4.5.4 Bandedge Measurement Test Procedure (Radiated)

1. Antenna and Turntable test procedure same as Radiated Emission Measurement.
Equipment mode: Spectrum analyzer
Detector function: Peak mode
SPAN: 100MHz
RBW: 1MHz
VBW: 3MHz
Center frequency: 5705MHz, 5845MHz.
2. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed.
3. Find the next peak frequency outside the operation frequency band
4. For peak frequency emission level measurement in Restricted Band ,
Change RBW: 1MHz
VBW: 10Hz
Span: 100MHz.
5. Get the spectrum reading after Maximum Hold function is completed.

4.5.5 Test Setup (Radiated)



4.5.6 Test Data (Radiated):

Band Edge measurement (Radiated)

Temperature (°C):22

Test Engineer:Mailes Hsieh

Humidity (%):25

Description (Normal)	Frequency (MHz)	Spectrum Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	dBc (Limit: > 20dBc)	Limit (dBuV/m)	Equip. Setup VBW	Pass or Fail
Channel_9 (average mode)	5740.0	63.67	39.41	103.08	---	---	10Hz	---
Channel_9 (peak mode)	5738.8	74.72	39.41	114.13	---	---	3MHz	---
Outside band (peak mode)	5724.9	48.04	39.41	87.45	26.68	---	3MHz	Pass
Channel_12 (average mode)	5798.6	63.20	39.42	102.62	---	---	10Hz	---
Channel_12 (peak mode)	5798.7	74.58	39.42	114.00	---	---	3MHz	---
Outside band (peak mode)	5825.1	44.02	39.42	83.44	30.56	---	3MHz	Pass
Channel_9 Restricted band (peak mode)	5714.9	31.22	39.41	70.63	---	74	3MHz	Pass
Restricted band (average mode)	5714.7	11.50	39.41	50.91	---	54	10Hz	Pass
Channel_12 Restricted band (peak mode)	5838.0	29.34	39.42	68.76	---	74	3MHz	Pass
Restricted band (average mode)	5835.2	10.91	39.42	50.33	---	54	10Hz	Pass
Description (Turbo)	Frequency (MHz)	Spectrum Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	dBc (Limit: > 20dBc)	Limit (dBuV/m)	Equip. Setup VBW	Pass or Fail
Channel_4 (average mode)	5756.00	50.77	39.41	90.18	---	---	10Hz	---
Channel_4 (peak mode)	5765.60	61.38	39.41	100.79	---	---	3MHz	---
Outside band (peak mode)	5724.90	33.21	39.41	72.62	28.17	---	3MHz	Pass
Channel_5 (average mode)	5798.70	45.83	39.42	85.25	---	---	10Hz	---
Channel_5 (peak mode)	5797.40	62.40	39.42	101.82	---	---	3MHz	---

Outside band (peak mode)	5825.00	37.80	39.42	77.22	24.60	---	3MHz	Pass
Channel_4 Restricted band (peak mode)	5715.00	26.06	39.41	65.47	---	74	3MHz	Pass
Restricted band (average mode)	5715.00	9.95	39.41	49.36	---	54	10Hz	Pass
Channel_5 Restricted band (peak mode)	5835.10	31.37	39.42	70.79	---	74	3MHz	Pass
Restricted band (average mode)	5835.00	11.34	39.42	50.76	---	54	10Hz	Pass

Note:

Emission Level=Spectrum Reading+Correction Factor

Correction Factor =Antenna Factor+cable loss

Both Horizontal and Vertical polarization have been tested and the worst data is listed above.