FCC RF Test Report

APPLICANT	:	Honeywell International Inc.
EQUIPMENT	:	CN75LAN mobile computer
BRAND NAME	:	Honeywell
MODEL NAME	:	CN75LAN
MARKETING NAME	:	CN75
FCC ID	:	HD5-CN75LAN
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DSS) Spread Spectrum Transmitter

The product was received on Dec. 28, 2016 and testing was completed on Feb. 08, 2017. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in 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: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager

SPORTON INTERNATIONAL INC.
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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR6D2819-01A	Rev. 01	Initial issue of report	Mar. 08, 2017

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(b)(1)	Peak Output Power	≤ 125 mW	Pass	-
3.2	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 11.14 dB at 36.480 MHz
3.3	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 7.50 dB at 0.702 MHz
3.4	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Honeywell International Inc.
9680 Old Bailes Road, Fort Mill, SC 29707 USA

1.2 Manufacturer

Honeywell International Inc.
9680 Old Bailes Road, Fort Mill, SC 29707 USA

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	CN75LAN mobile computer
Brand Name	Honeywell
Model Name	CN75LAN
Marketing Name	CN75
FCC ID	HD5-CN75LAN
Sample 1	CN75 non-WWAN-Q5 non-WWAN_Q5 keypad
Sample 2	CN75 non-WWAN-N5 non-WWAN_N5 keypad
Sample 3	CN75E non-WWAN-N7 non-WWAN_N7 keypad
Sample 4	CN75E non-WWAN-Q6 non-WWAN_Q6 keypad
EUT supports Radios application	WLAN 11a/b/g/n HT20 Bluetooth BR/EDR/LE
HW Version	v1.1
SW Version	3.00.05.0075
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Re-use of Measured Data

1.4.1 Introduction Section

The original model (FCC ID: HD5-CN75WAN) and the variant model (FCC ID: HD5-CN75LAN) has identical PCB layout, antenna, SW implementation for Bluetooth/Wi-Fi/GPS. Based on their similarity, the FCC Part 15C & 15E (equipment class: DTS, DSS, NII) test data issued for original model also apply for the variant model.

The applicant takes full responsibility that the test data as referenced in section 4 below represent compliance for this FCC ID (FCC ID: HD5-CN75LAN).

1.4.2 Difference Section

The original model (FCC ID: HD5-CN75WAN) and the variant model (FCC ID: HD5-CN75LAN) has identical PCB layout, antenna, SW implementation for Bluetooth/Wi-Fi/GPS. The details of similarity and difference can be found in the Operating Description.

The product specification is outlined in the following table:

FCC ID			HD5-CN75WAN	HD5-CN75LAN
Wireless Tech	**Mode**		**Frequency (MHz)**	
GSM	GSM Voice GPRS (GMSK) EDGE (8PSK)	Multi-Slot Class 12 DTM: No	850/1900	NA
UMTS	AMR/RCM12.2Kbps HSDPA/HSUPA/DC-HSDPA		B5/B4/B2	NA
CDMA2000	1xRTT/1xEV-DO		BC0/BC1/BC10	NA
Wi-Fi	11b/11g/11n(HT20)		2412-2462 MHz/	
	11a/11n(HT20)		5180-5240 MHz 5260-5320 MHz 5500-5700 MHz 5745-5825 MHz *5600-5650MHz notched	
Bluetooth	BR/EDR/LE		2402-2480 MHz	

1.4.3 Spot Check Verification Data Section

Summary of the spot check:

Test Item	Mode	HD5-CN75WAN Worst Result	HD5-CN75LAN Worst Result	Difference (dB)
Average Conducted Power (dBm)	802.11b	17.27	17.18	0.09
	802.11g	13.50	13.33	0.17
	11n HT20	13.50	13.33	0.17
	5150-5250MHz	13.43	13.10	0.33
	5250-5350MHz	13.40	13.06	0.34
	5470-5725MHz	13.19	13.12	0.07
	5725-5850MHz	13.48	13.12	0.36
	BT (1Mbps)	7.11	6.50	0.61
	BT (2Mbps)	5.86	5.35	0.51
	BT (3Mbps)	5.84	5.30	0.54
	BT-LE	6.74	6.73	0.01
	S/N of test sample			
	Test date	2016/12/28 – 2017/02/02	2016/12/28 – 2017/02/14	
Peak Radiated Spurious Emission (Band Edge) (dBuV/m)	802.11b	55.65	55.77	-0.74
	11n HT20	57.82	60.17	-2.35
	5150-5250MHz	62.25	59.61	2.64
	5250-5350MHz	62.65	60.05	2.6
	5470-5725MHz	63.72	62.24	1.48
	5725-5850MHz	74.27	71.82	2.45
	S/N of test sample			
	Test date	2016/12/28 – 2017/02/02	2016/12/28 – 2017/02/14	
Average Radiated Spurious Emission (Band Edge) (dBuV/m)	802.11b	46.82	45.94	-0.35
	11n HT20	46.38	47.98	-1.6
	5150-5250MHz	50.99	48.90	2.09
	5250-5350MHz	50.65	47.91	2.74
	5470-5725MHz	NA	NA	NA
	5725-5850MHz	NA	NA	NA
	S/N of test sample			
	Test date	2016/12/28 – 2017/02/02	2016/12/28 – 2017/02/14	
Peak Radiated Spurious Emission (Harmonic) (dBuV/m)	802.11b	36.66	37.70	-0.54
	11n HT20	37.80	36.58	1.22
	5150-5250MHz	40.81	41.66	-0.85
	5250-5350MHz	39.27	41.17	-1.9
	5470-5725MHz	44.50	46.36	-1.86
	5725-5850MHz	45.34	46.65	-1.31
	S/N of test sample			
	Test date	2016/12/28 – 2017/02/02	2016/12/28 – 2017/02/14	

Conclusion:

WLAN Radiated spurious emission test against the variant model for non-cellular part based on the worst-case condition from the original model was performed in this filing to demonstrate the test data from original model remains representative for the variant model.

Based on the spot check test result (power levels measured are within 1dB, and the worst case of RSE spot check verification based on the worst condition from the original model is within 3dB, and are compliance with the limits), the test data from the original model is representative for the variant model.

The unwanted, harmonics, radiated spurious emission is reported peak measurement only due to spurious lower than 20dB than the limit.

The detail test results can be found in this document, Appendix A, hereafter.

1.4.4 Reference detail Section:

Equipment Class	Reference FCC ID	Type Grant/Permissive Change	Reference Application	Folder Test/RF Exposure	Report Title
DTS	HD5-CN75WAN	Original Grant	FR6D2819B	Part 15C	Conducted sections applicable
			FR6D2819C	Part 15C	All sections applicable
			FA6D2819	RF Exposure	All sections applicable
DSS	HD5-CN75WAN	Original Grant	FR6O1802A	Part 15C	Conducted sections applicable
			FA6D2819	RF Exposure	All sections applicable
NII	HD5-CN75WAN	Original Grant	FR6D2819D FR6D2819E	Part 15E	All sections applicable
			FA6D2819	RF Exposure	All sections applicable

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1022 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.	
Test Site Location	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	**Sporton Site No.**	
	TH05-HY	CO05-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd. Guishan Dist, Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	**Sporton Site No.**
	03CH11-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

1.7 Applicable 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
- ANSI C63.10-2013

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.

2 Test Configuration of Equipment Under Test

2.1 Descriptions of Test Mode

Preliminary tests were performed in different data rates 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	6.58 dBm	7.68 dBm	**8.21 dBm**
Ch39	2441MHz	6.57 dBm	7.67 dBm	8.20 dBm
Ch78	2480MHz	6.44 dBm	7.63 dBm	8.16 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 3Mbps for all the test items due to the highest RF output power.

a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction (150 kHz to 30 MHz), radiation (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). Pre-scanned tests, X, Y, Z in three orthogonal panels, and different data rates were conducted to determine the final configuration (Y plane as worst plane) from all possible combinations, and the worst mode of radiated spurious emissions is Bluetooth 3Mbps mode, and recorded in this report.

b. AC power line Conducted Emission was tested under maximum output power.

2.2 Test Mode

The following summary table is showing all test modes to demonstrate in compliance with the standard.

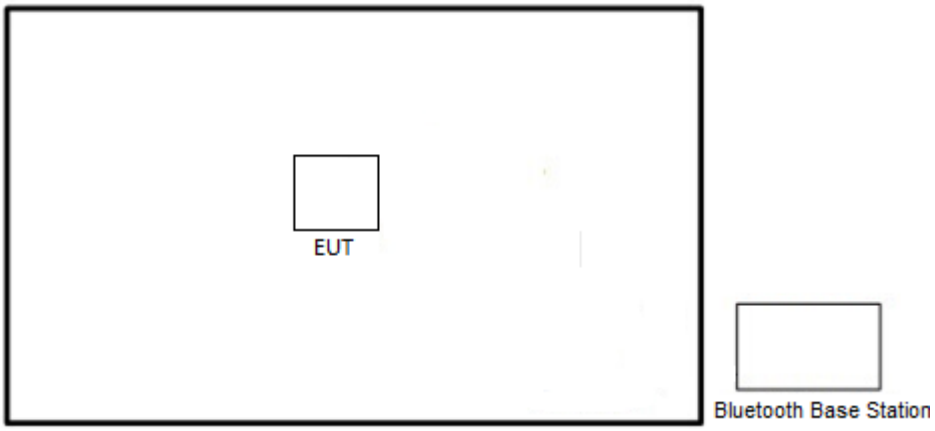
Summary table of Test Cases	
	Bluetooth EDR 3Mbps 8-DPSK
Radiated Test Cases	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz
AC Conducted Emission	Mode 1 :Bluetooth Link + WLAN (2.4GHz) Link + MPEG4 + Scanner + Snap-on 1 + RJ-45 Cable Link with Notebook + Adapter + SD Card for Sample 2

Remark:

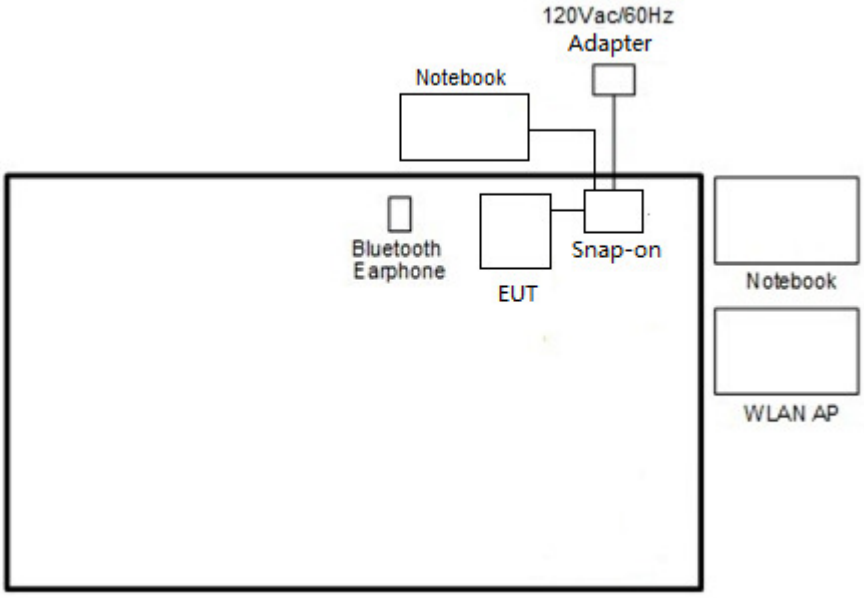
1. For radiated test cases, the worst mode data rate 3Mbps was reported only, because this data rate has the highest RF output power at preliminary tests.
2. Snap-on 1: Ethernet Snap-On 1000AA01
3. Adapter :Level V (for Snap-on)
4. All the radiation tests were performed with sample 2.

2.3 Connection Diagram of Test System

<Bluetooth Tx Mode>



<AC Conducted Emission Mode>



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Bluetooth Base Station	R&S	CBT32	N/A	N/A	Unshielded, 1.8 m
2.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded,1.8m
3.	Notebook	DELL	Latitude E6320	FCC DoC/ Contains FCC ID: QDS-BRCM1054	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
5.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A
6.	CN75A/CN75E Vehicle dock	intermec technologies corp	1000AV01	FCC DoC	NA	NA
7.	CK75 Vehicle dock	intermec technologies corp	1001AV01	FCC DoC	NA	NA
8.	car charger	intermec technologies corp	852-057-005	Verification	NA	Unshielded, 1.2m
9.	Snap-on(LAN)	intermec technologies corp	1000AA01	FCC DoC	NA	NA
10.	Snap-on(RS232)	intermec technologies corp	1000AA03	FCC DoC	NA	NA
11.	Snap-On (VoCollect)	intermec technologies corp	1000AA05	FCC DoC	NA	NA
12.	Snap-on (USB)	intermec technologies corp	1000AA07	FCC DoC	NA	NA
13.	Snap-on adapter	intermec technologies corp	9001AE01	FCC DoC	NA	AC IP: Unshielded, 1.8m DC OP: Shielded, 1.8m
14.	Earphone	Honeywell	Vocollect SR-20	FCC DoC	1.1 meter, shielded cable	NA
15.	USB Cable	intermec technologies corp	VE011-2018	FCC DoC	NA	1.4 meter, shielded cable, w/t ferrite core
16.	Battery	intermec technologies corp	1000AB02	NA	NA	NA

2.5 EUT Operation Test Setup

For Bluetooth function, the RF utility, “rtt-adv-usr v21” was installed in EUT which was programmed in order to make the EUT get into the engineering modes to contact with Bluetooth base station for continuous transmitting and receiving signals.

3 Test Result

3.1 Peak Output Power Measurement

3.1.1 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, 2Mbps, 3Mbps and AFH modes are 0.125 watts.

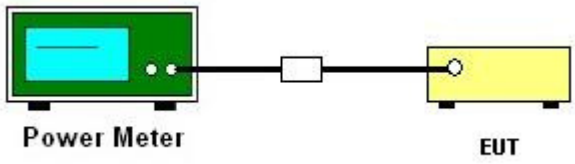
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 7.8.5.
1. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Measure the conducted output power with cable loss and record the results in the test report.
4. Measure and record the results in the test report.

3.1.4 Test Setup



3.2 Radiated Band Edges and Spurious Emission Measurement

3.2.1 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

3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

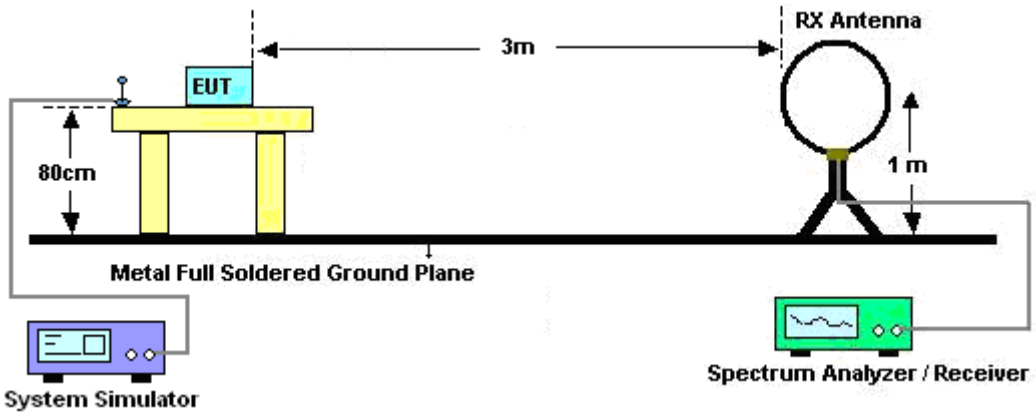
3.2.3 Test Procedures

1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. 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.
4. Set to the maximum power setting and enable the EUT transmit continuously.
5. 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 Emission Level = Peak Emission Level + 20*log(Duty cycle)
6. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

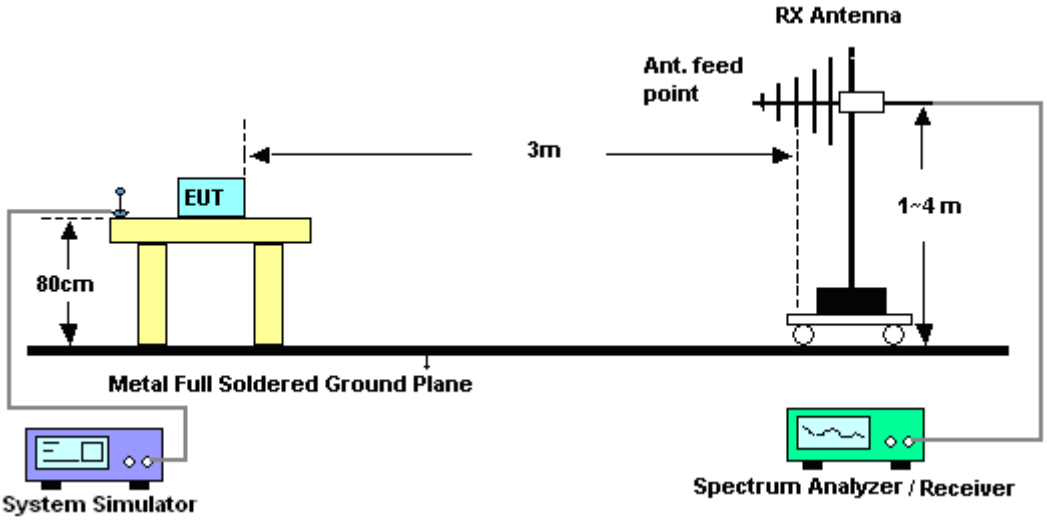
Note: The average levels were calculated from the peak level corrected with duty cycle correction factor (-24.73dB) derived from 20log (dwell time/100ms). This correction is only for signals that hop with the fundamental signal, such as band-edge and harmonic. Other spurious signals that are independent of the hopping signal would not use this correction.

3.2.4 Test Setup

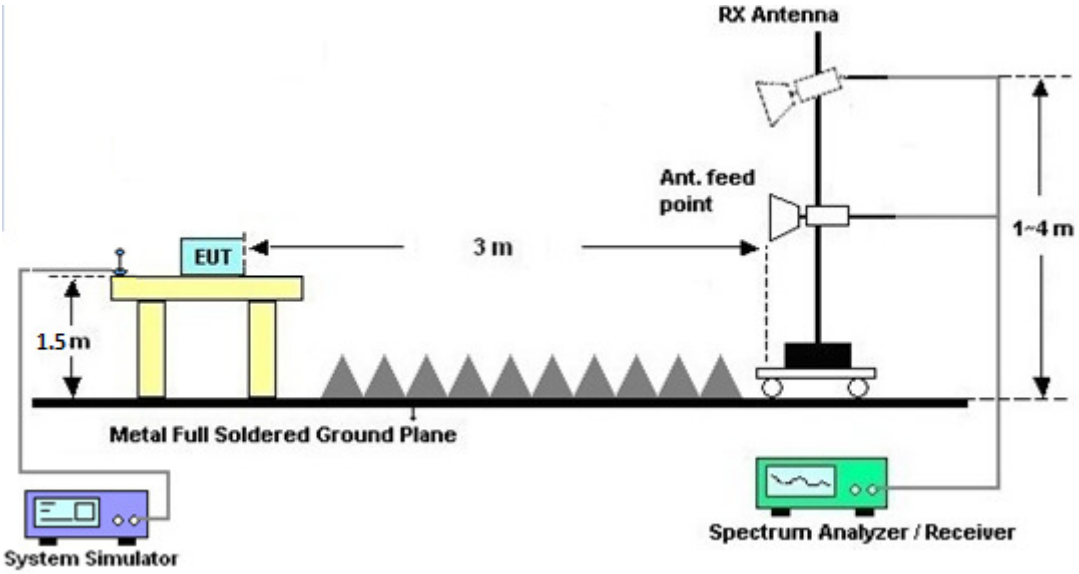
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz

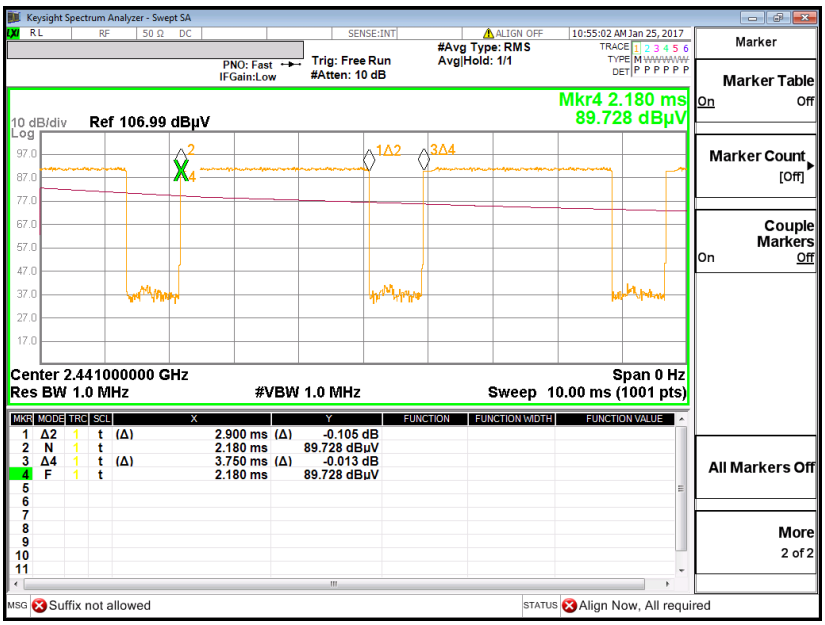


3.2.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

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.

3.2.6 Duty cycle correction factor for average measurement

3DH5 on time (One Pulse) Plot on Channel 39



3DH5 on time (Count Pulses) Plot on Channel 39

Note:

1. Worst case Duty cycle = on time/100 milliseconds = 2 * 2.90 / 100 = 5.80 %
2. Worst case Duty cycle correction factor = 20*log(Duty cycle) = -24.73 dB
3. 3DH5 has the highest duty cycle worst case and is reported.

Duty Cycle Correction Factor Consideration for AFH mode:

Bluetooth normal hopping rate is 1600Hz and reduced to 800Hz in AFH mode; due to the reduced number of hopping frequencies, with the same packet configuration the dwell time in each channel frequency within 100msec period is longer in AFH mode than normal mode.

In AFH mode, the minimum hopping frequencies are 20, to get the longest dwell time DH5 packet is observed; the period to have DH5 packet completing one hopping sequence is

2.90 ms x 20 channels = 58.0 ms

There cannot be 2 complete hopping sequences within 100ms period, considering the random hopping behavior, maximum 2 hops can be possibly observed within the period. [100ms / 57.6ms] = 2 hops

Thus, the maximum possible ON time:

2.90 ms x 2 = 5.80 ms

Worst case Duty Cycle Correction factor, which is derived from the maximum possible ON time,

20 x log(5.80 ms/100ms) = -24.73 dB

3.2.7 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix A and B.

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

Please refer to Appendix A and B.

3.3 AC Conducted Emission Measurement

3.3.1 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 (dBμV)	
	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.

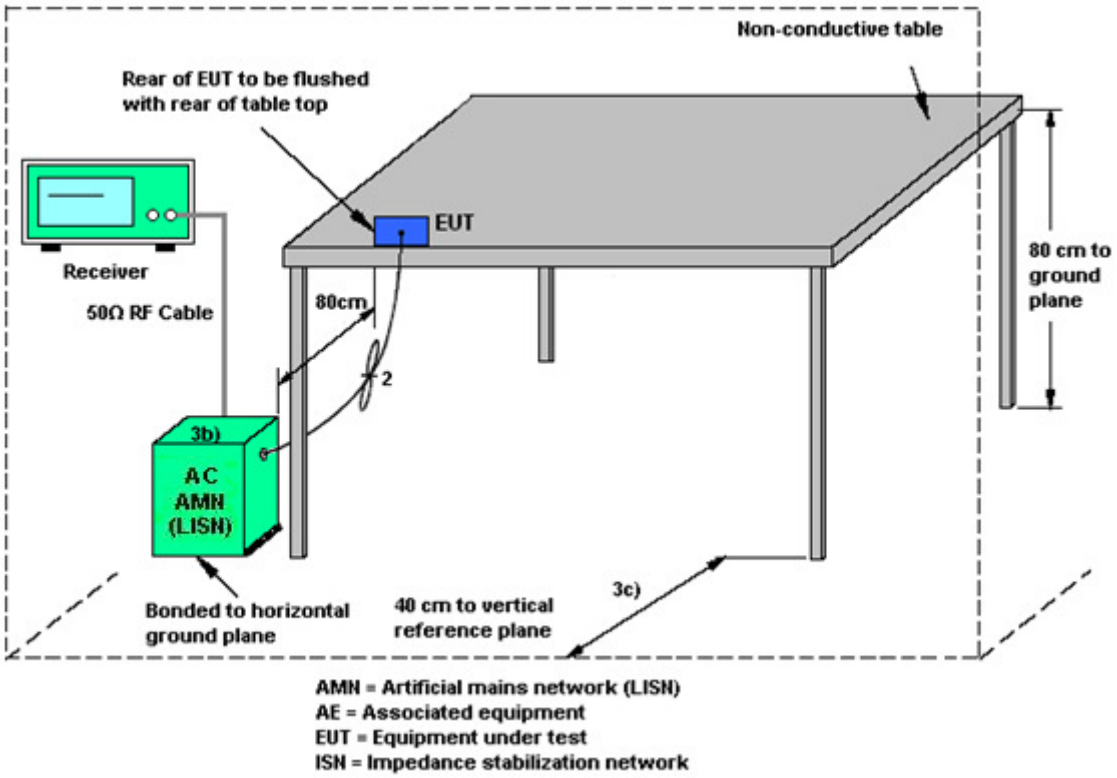
3.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.3.3 Test Procedures

1. 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.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

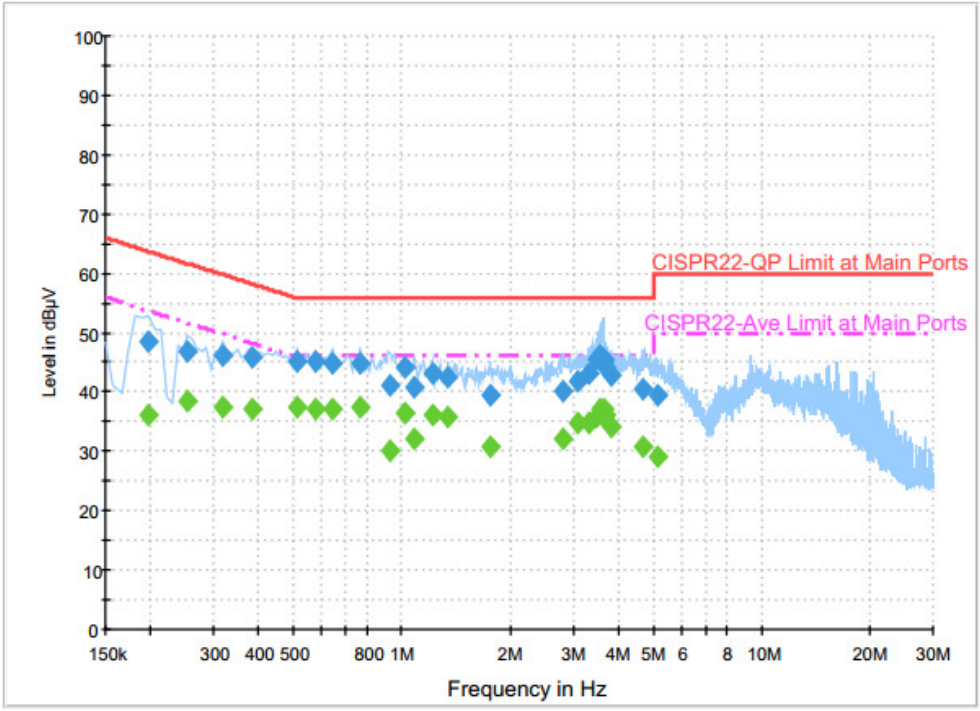
3.3.4 Test Setup



AMN = Artificial mains network (LISN)
AE = Associated equipment
EUT = Equipment under test
ISN = Impedance stabilization network

3.3.5 Test Result of AC Conducted Emission

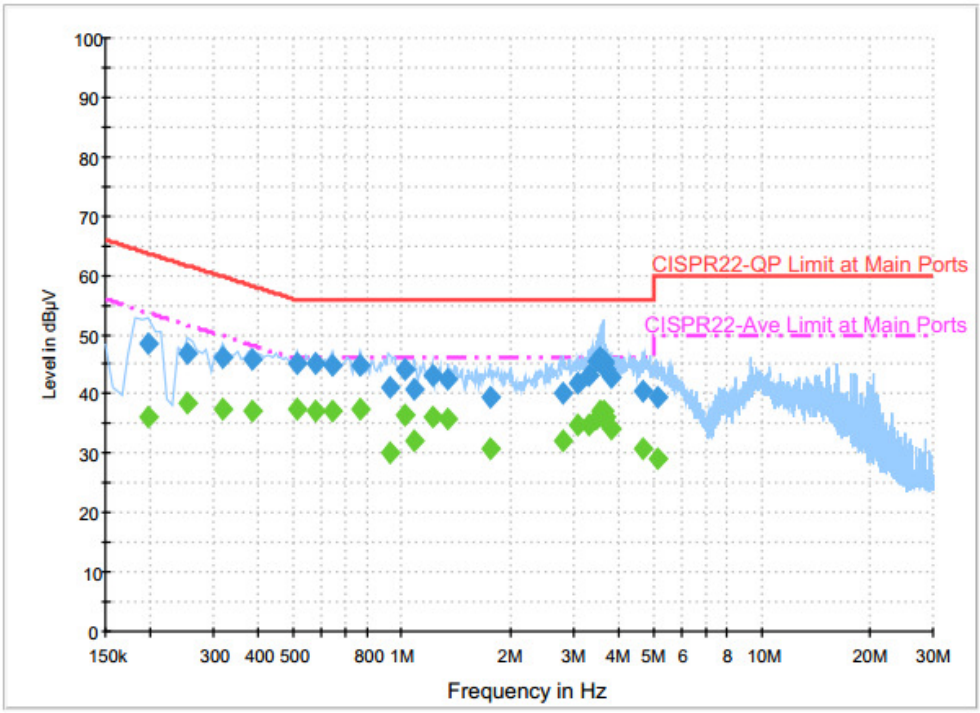
Test Mode :	Mode 1	**Temperature :**	21~23℃
Test Engineer :	Arthur Hsieh	**Relative Humidity :**	50~52%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	Bluetooth Link + WLAN (2.4GHz) Link + MPEG4 + Scanner + Snap-on 1 + RJ-45 Cable Link with Notebook + Adapter + SD Card for Sample 2		



Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.198000	48.6	Off	L1	19.6	15.1	63.7
0.254000	47.0	Off	L1	19.6	14.6	61.6
0.318000	46.1	Off	L1	19.6	13.7	59.8
0.382000	45.9	Off	L1	19.6	12.3	58.2
0.510000	45.1	Off	L1	19.6	10.9	56.0
0.574000	45.0	Off	L1	19.6	11.0	56.0
0.638000	44.8	Off	L1	19.6	11.2	56.0
0.766000	44.7	Off	L1	19.6	11.3	56.0
0.926000	41.1	Off	L1	19.6	14.9	56.0
1.022000	44.0	Off	L1	19.6	12.0	56.0
1.078000	40.8	Off	L1	19.6	15.2	56.0
1.214000	43.2	Off	L1	19.6	12.8	56.0
1.342000	42.6	Off	L1	19.6	13.4	56.0
1.766000	39.4	Off	L1	19.6	16.6	56.0

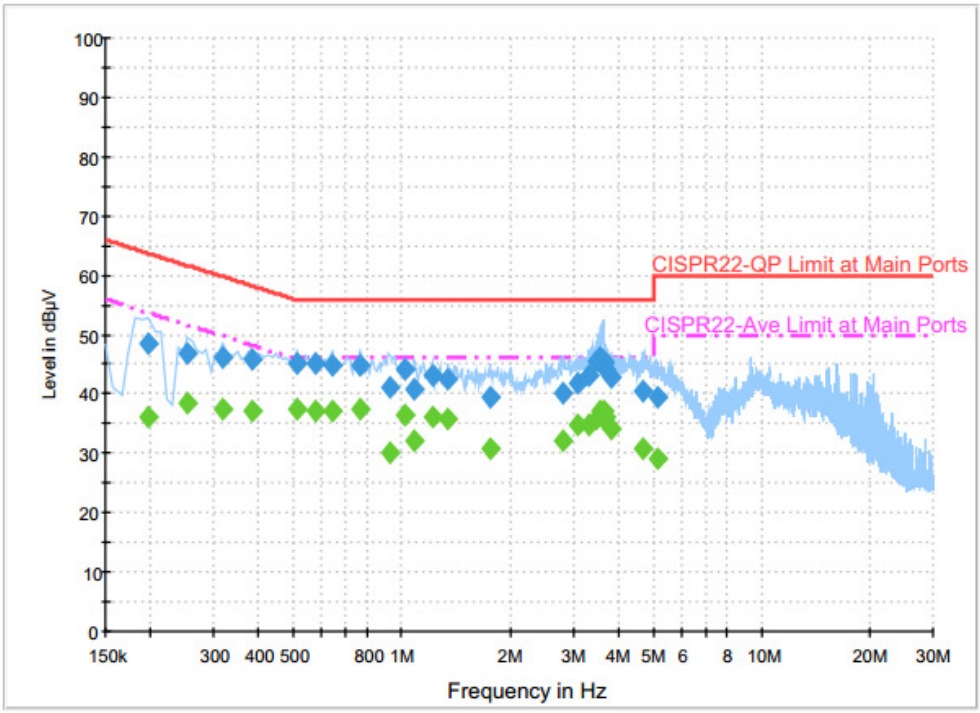
Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Arthur Hsieh	Relative Humidity :	50~52%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	Bluetooth Link + WLAN (2.4GHz) Link + MPEG4 + Scanner + Snap-on 1 + RJ-45 Cable Link with Notebook + Adapter + SD Card for Sample 2		



Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
2.814000	40.3	Off	L1	19.4	15.7	56.0
3.102000	41.8	Off	L1	19.5	14.2	56.0
3.318000	43.3	Off	L1	19.5	12.7	56.0
3.462000	45.6	Off	L1	19.5	10.4	56.0
3.574000	46.0	Off	L1	19.5	10.0	56.0
3.630000	45.3	Off	L1	19.6	10.7	56.0
3.646000	45.4	Off	L1	19.6	10.6	56.0
3.710000	44.3	Off	L1	19.6	11.7	56.0
3.806000	42.9	Off	L1	19.6	13.1	56.0
4.694000	40.6	Off	L1	19.6	15.4	56.0
5.126000	39.6	Off	L1	19.6	20.4	60.0

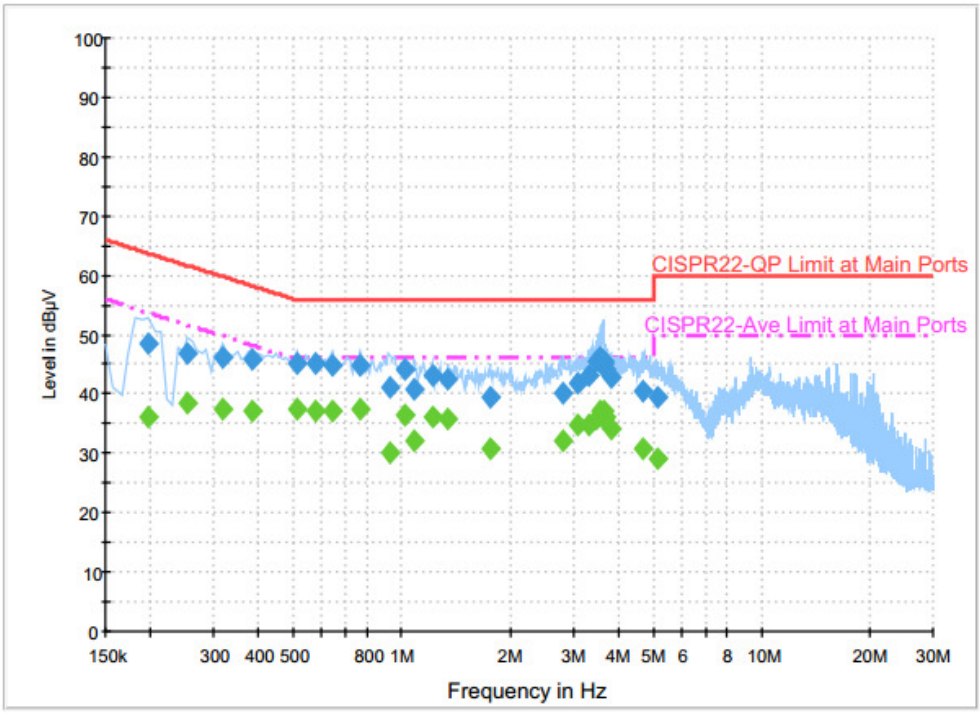
Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Arthur Hsieh	Relative Humidity :	50~52%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	Bluetooth Link + WLAN (2.4GHz) Link + MPEG4 + Scanner + Snap-on 1 + RJ-45 Cable Link with Notebook + Adapter + SD Card for Sample 2		



Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.198000	36.2	Off	L1	19.6	17.5	53.7
0.254000	38.3	Off	L1	19.6	13.3	51.6
0.318000	37.4	Off	L1	19.6	12.4	49.8
0.382000	37.3	Off	L1	19.6	10.9	48.2
0.510000	37.5	Off	L1	19.6	8.5	46.0
0.574000	37.0	Off	L1	19.6	9.0	46.0
0.638000	37.1	Off	L1	19.6	8.9	46.0
0.766000	37.5	Off	L1	19.6	8.5	46.0
0.926000	30.2	Off	L1	19.6	15.8	46.0
1.022000	36.6	Off	L1	19.6	9.4	46.0
1.078000	32.2	Off	L1	19.6	13.8	46.0
1.214000	36.1	Off	L1	19.6	9.9	46.0
1.342000	35.9	Off	L1	19.6	10.1	46.0
1.766000	30.8	Off	L1	19.6	15.2	46.0

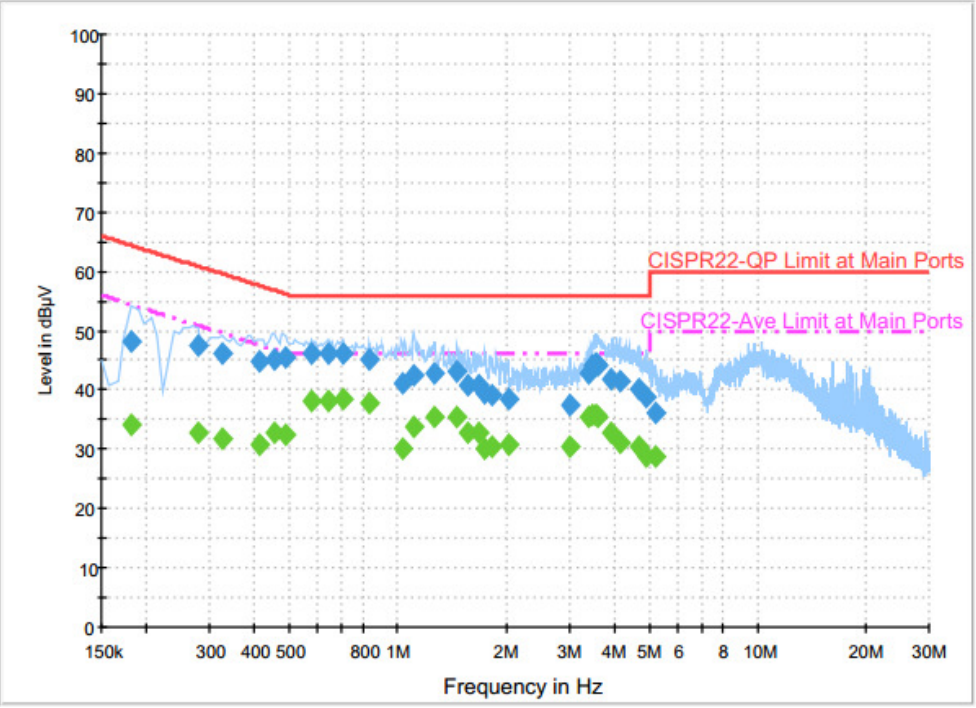
Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Arthur Hsieh	Relative Humidity :	50~52%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	Bluetooth Link + WLAN (2.4GHz) Link + MPEG4 + Scanner + Snap-on 1 + RJ-45 Cable Link with Notebook + Adapter + SD Card for Sample 2		



Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
2.814000	32.1	Off	L1	19.4	13.9	46.0
3.102000	34.7	Off	L1	19.5	11.3	46.0
3.318000	34.7	Off	L1	19.5	11.3	46.0
3.462000	35.8	Off	L1	19.5	10.2	46.0
3.574000	37.1	Off	L1	19.5	8.9	46.0
3.630000	35.6	Off	L1	19.6	10.4	46.0
3.646000	37.1	Off	L1	19.6	8.9	46.0
3.710000	36.1	Off	L1	19.6	9.9	46.0
3.806000	34.1	Off	L1	19.6	11.9	46.0
4.694000	30.8	Off	L1	19.6	15.2	46.0
5.126000	29.1	Off	L1	19.6	20.9	50.0

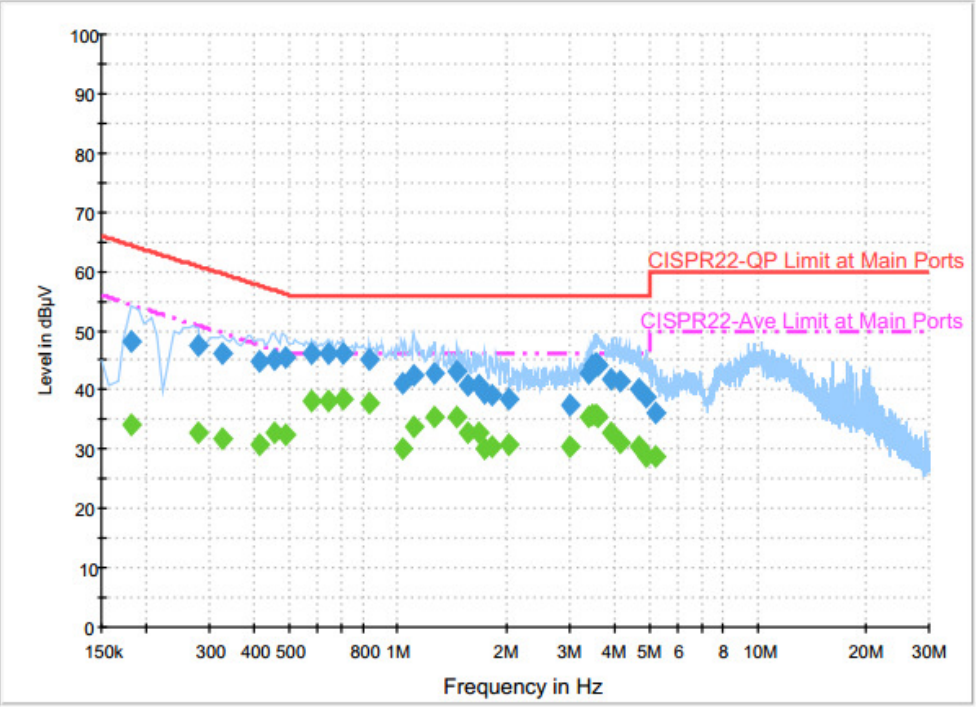
Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Arthur Hsieh	Relative Humidity :	50~52%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	Bluetooth Link + WLAN (2.4GHz) Link + MPEG4 + Scanner + Snap-on 1 + RJ-45 Cable Link with Notebook + Adapter + SD Card for Sample 2		



Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.182000	48.3	Off	N	19.5	16.1	64.4
0.278000	47.5	Off	N	19.5	13.4	60.9
0.326000	46.1	Off	N	19.5	13.5	59.6
0.414000	44.7	Off	N	19.5	12.9	57.6
0.454000	45.1	Off	N	19.5	11.7	56.8
0.486000	45.6	Off	N	19.6	10.6	56.2
0.574000	46.3	Off	N	19.5	9.7	56.0
0.638000	46.1	Off	N	19.5	9.9	56.0
0.702000	46.1	Off	N	19.5	9.9	56.0
0.830000	45.3	Off	N	19.5	10.7	56.0
1.030000	41.2	Off	N	19.5	14.8	56.0
1.110000	42.4	Off	N	19.6	13.6	56.0
1.270000	42.9	Off	N	19.6	13.1	56.0
1.462000	43.2	Off	N	19.6	12.8	56.0
1.566000	40.8	Off	N	19.6	15.2	56.0
1.686000	40.9	Off	N	19.6	15.1	56.0
1.742000	39.6	Off	N	19.6	16.4	56.0
1.838000	39.1	Off	N	19.6	16.9	56.0

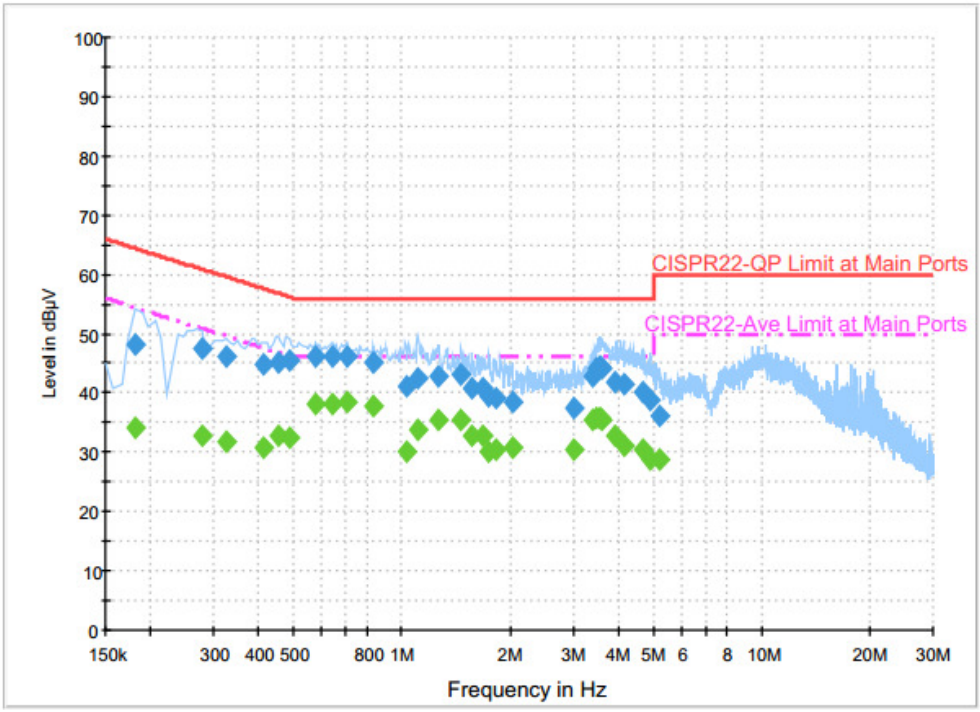
Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Arthur Hsieh	Relative Humidity :	50~52%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	Bluetooth Link + WLAN (2.4GHz) Link + MPEG4 + Scanner + Snap-on 1 + RJ-45 Cable Link with Notebook + Adapter + SD Card for Sample 2		



Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
2.038000	38.3	Off	N	19.1	17.7	56.0
3.022000	37.6	Off	N	19.4	18.4	56.0
3.414000	42.7	Off	N	19.5	13.3	56.0
3.486000	44.1	Off	N	19.5	11.9	56.0
3.542000	44.3	Off	N	19.5	11.7	56.0
3.614000	44.2	Off	N	19.5	11.8	56.0
3.910000	41.7	Off	N	19.6	14.3	56.0
4.134000	41.4	Off	N	19.6	14.6	56.0
4.662000	40.3	Off	N	19.6	15.7	56.0
4.886000	38.9	Off	N	19.6	17.1	56.0
5.198000	36.2	Off	N	19.6	23.8	60.0

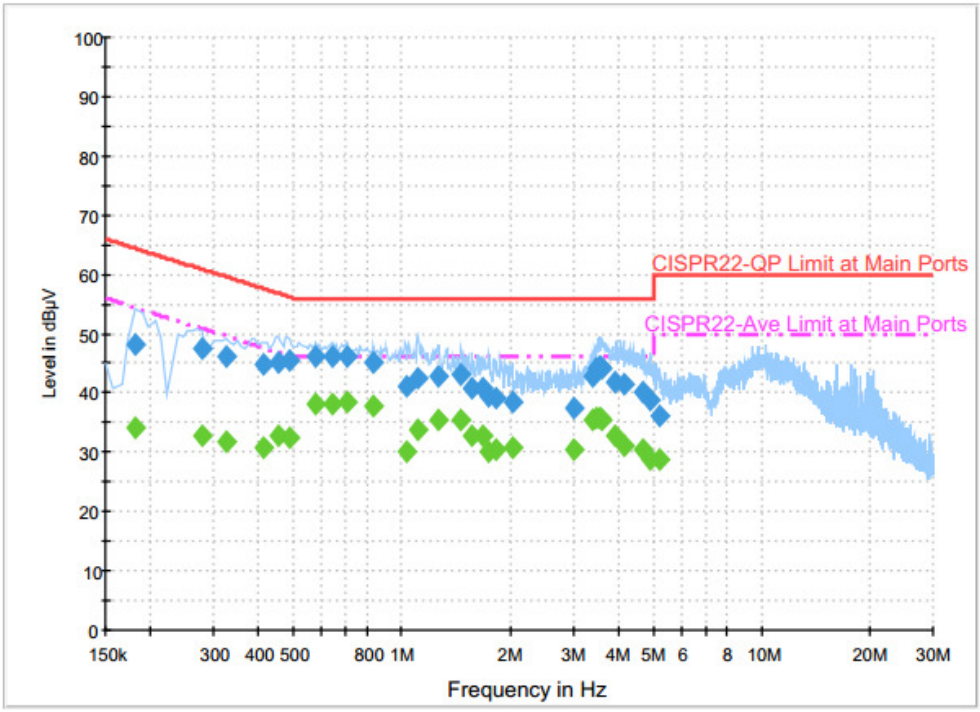
Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Arthur Hsieh	Relative Humidity :	50~52%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	Bluetooth Link + WLAN (2.4GHz) Link + MPEG4 + Scanner + Snap-on 1 + RJ-45 Cable Link with Notebook + Adapter + SD Card for Sample 2		



Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.182000	34.0	Off	N	19.5	20.4	54.4
0.278000	32.6	Off	N	19.5	18.3	50.9
0.326000	31.7	Off	N	19.5	17.9	49.6
0.414000	30.7	Off	N	19.5	16.9	47.6
0.454000	32.9	Off	N	19.5	13.9	46.8
0.486000	32.5	Off	N	19.6	13.7	46.2
0.574000	38.1	Off	N	19.5	7.9	46.0
0.638000	38.1	Off	N	19.5	7.9	46.0
0.702000	38.5	Off	N	19.5	7.5	46.0
0.830000	37.9	Off	N	19.5	8.1	46.0
1.030000	29.9	Off	N	19.5	16.1	46.0
1.110000	33.6	Off	N	19.6	12.4	46.0
1.270000	35.3	Off	N	19.6	10.7	46.0
1.462000	35.5	Off	N	19.6	10.5	46.0
1.566000	32.7	Off	N	19.6	13.3	46.0
1.686000	32.8	Off	N	19.6	13.2	46.0
1.742000	30.2	Off	N	19.6	15.8	46.0
1.838000	30.5	Off	N	19.6	15.5	46.0

Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Arthur Hsieh	Relative Humidity :	50~52%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	Bluetooth Link + WLAN (2.4GHz) Link + MPEG4 + Scanner + Snap-on 1 + RJ-45 Cable Link with Notebook + Adapter + SD Card for Sample 2		



Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
2.038000	30.8	Off	N	19.1	15.2	46.0
3.022000	30.6	Off	N	19.4	15.4	46.0
3.414000	35.3	Off	N	19.5	10.7	46.0
3.486000	35.9	Off	N	19.5	10.1	46.0
3.542000	35.8	Off	N	19.5	10.2	46.0
3.614000	35.5	Off	N	19.5	10.5	46.0
3.910000	32.6	Off	N	19.6	13.4	46.0
4.134000	31.0	Off	N	19.6	15.0	46.0
4.662000	30.3	Off	N	19.6	15.7	46.0
4.886000	28.7	Off	N	19.6	17.3	46.0
5.198000	28.9	Off	N	19.6	21.1	50.0

3.4 Antenna Requirements

3.4.1 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.

3.4.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.4.3 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
Power Meter	Agilent	E4416A	GB41292344	300MHz~40GHz	Dec. 26, 2016	Jan. 05, 2017 ~Jan. 12, 2017	Dec. 25, 2017	Conducted (TH05-HY)
Power Sensor	Agilent	E9327A	US40441548	300MHz~40GHz	Dec. 26, 2016	Jan. 05, 2017 ~Jan. 12, 2017	Dec. 25, 2017	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz-40GHz	Jul. 17, 2016	Jan. 05, 2017 ~Jan. 12, 2017	Jul. 16, 2017	Conducted (TH05-HY)
BT Base Station(Measure)	Rohde & Schwarz	CBT	101136	BT 3.0	Sep. 21, 2016	Jan. 05, 2017 ~Jan. 12, 2017	Sep. 20, 2017	Conducted (TH05-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Jan. 17, 2017	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz~7GHz	Aug. 30, 2016	Jan. 17, 2017	Aug. 29, 2017	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 29, 2016	Jan. 17, 2017	Nov. 28, 2017	Conduction (CO05-HY)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Nov. 10, 2016	Jan. 21, 2017 ~ Feb. 08, 2017	Nov. 09, 2017	Radiation (03CH11-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Sep. 02, 2015	Jan. 21, 2017 ~ Feb. 08, 2017	Sep. 01, 2017	Radiation (03CH11-HY)
Bilog Antenna	TESEQ	CBL 6111D	35414	30MHz~1GHz	Oct. 15, 2016	Jan. 21, 2017 ~ Feb. 08, 2017	Oct. 14, 2017	Radiation (03CH11-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1522	1GHz ~ 18GHz	Mar. 30, 2016	Jan. 21, 2017 ~ Feb. 08, 2017	Mar. 31, 2017	Radiation (03CH11-HY)
Preamplifier	Keysight	83017A	MY53270080	1GHz~26.5GHz	Nov. 10, 2016	Jan. 21, 2017 ~ Feb. 08, 2017	Nov. 09, 2017	Radiation (03CH11-HY)
Spectrum Analyzer	Keysight	N9010A	MY52350276	10Hz ~ 44GHZ	Mar. 21, 2016	Jan. 21, 2017 ~ Feb. 08, 2017	Mar. 20, 2017	Radiation (03CH11-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Jan. 21, 2017 ~ Feb. 08, 2017	N/A	Radiation (03CH11-HY)
Turn Table	EMEC	TT 2000	N/A	0~360 Degree	N/A	Jan. 21, 2017 ~ Feb. 08, 2017	N/A	Radiation (03CH11-HY)
Preamplifier	MITEQ	TTA0204	1872107	2GHz~40GHz	Feb. 15, 2016	Jan. 21, 2017 ~ Feb. 08, 2017	Feb. 14, 2017	Radiation (03CH11-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Nov. 08, 2016	Jan. 21, 2017 ~ Feb. 08, 2017	Nov. 07, 2017	Radiation (03CH11-HY)

5 Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**2.7**

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.2**

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.5**

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	**5.2**

Appendix A. Radiated Spurious Emission

Test Engineer :	Jacky Hung and Ken Wu	Temperature :	20~24°C
		Relative Humidity :	50~54%

2.4GHz 2400~2483.5MHz

BT (Band Edge @ 3m)

BT	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BT CH00 2402MHz		2388.75	52.93	-21.07	74	50.45	27.19	8.89	33.6	279	283	P	H
		2388.75	28.2	-25.8	54	-	-	-	-	-	-	A	H
	*	2402	99.44	-	-	96.95	27.19	8.89	33.59	279	283	P	H
	*	2402	74.71	-	-	-	-	-	-	-	-	A	H
													H
													H
		2388.54	47.38	-26.62	74	44.9	27.19	8.89	33.6	302	57	P	V
		2388.54	22.65	-31.35	54	-	-	-	-	-	-	A	V
	*	2402	93.8	-	-	91.31	27.19	8.89	33.59	302	57	P	V
	*	2402	69.07	-	-	-	-	-	-	-	-	A	V
													V
													V
BT CH 39 2441MHz		2388.54	53.14	-20.86	74	50.66	27.19	8.89	33.6	212	267	P	H
		2388.54	28.41	-25.59	54	-	-	-	-	-	-	A	H
	*	2441	99.09	-	-	96.39	27.34	8.94	33.58	212	267	P	H
	*	2441	74.36	-	-	-	-	-	-	-	-	A	H
		2490.06	43.93	-30.07	74	41.03	27.5	8.98	33.58	212	267	P	H
		2490.06	19.2	-34.8	54	-	-	-	-	-	-	A	H
		2388.68	46	-28	74	43.52	27.19	8.89	33.6	302	54	P	V
		2388.68	21.27	-32.73	54	-	-	-	-	-	-	A	V
	*	2441	93.87	-	-	91.17	27.34	8.94	33.58	302	54	P	V
	*	2441	69.14	-	-	-	-	-	-	-	-	A	V
		2486.42	44.69	-29.31	74	41.84	27.45	8.98	33.58	302	54	P	V
		2486.42	19.96	-34.04	54	-	-	-	-	-	-	A	V

BT CH 78 2480MHz	*	2480	98.31	-	-	95.46	27.45	8.98	33.58	261	300	P	H
	*	2480	73.58	-	-	-	-	-	-	-	-	A	H
		2484.16	50.94	-23.06	74	48.09	27.45	8.98	33.58	261	300	P	H
		2484.16	26.21	-27.79	54	-	-	-	-	-	-	A	H
													H
													H
	*	2480	93.23	-	-	90.38	27.45	8.98	33.58	399	336	P	V
	*	2480	68.5	-	-	-	-	-	-	-	-	A	V
		2483.76	47.16	-26.84	74	44.31	27.45	8.98	33.58	399	336	P	V
		2483.76	22.43	-31.57	54	-	-	-	-	-	-	A	V
													V
													V

Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.

2.4GHz 2400~2483.5MHz

BT (Harmonic @ 3m)

BT	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BT CH 00 2402MHz		4804	31.77	-42.23	74	40.55	31.66	10.65	51.09	100	0	P	H
		4804	7.04	-46.96	54	-	-	-	-	-	-	A	H
													H
													H
		4804	32.35	-41.65	74	41.13	31.66	10.65	51.09	100	0	P	V
		4804	7.62	-46.38	54	-	-	-	-	-	-	A	V
													V
													V
BT CH 39 2441MHz		4882	33.14	-40.86	74	41.54	31.78	10.88	51.06	100	0	P	H
		4882	8.41	-45.59	54	-	-	-	-	-	-	A	H
		7323	36.61	-37.39	74	37.04	37.29	12.79	50.51	100	0	P	H
		7323	11.88	-42.12	54	-	-	-	-	-	-	A	H
		4882	33.2	-40.8	74	41.6	31.78	10.88	51.06	100	0	P	V
		4882	8.47	-45.53	54	-	-	-	-	-	-	A	V
		7323	36.99	-37.01	74	37.42	37.29	12.79	50.51	100	0	P	V
		7323	12.26	-41.74	54	-	-	-	-	-	-	A	V
BT CH 78 2480MHz		4960	35.64	-38.36	74	43.61	31.94	11.12	51.03	100	0	P	H
		4960	10.91	-43.09	54	-	-	-	-	-	-	A	H
		7440	37.61	-36.39	74	37.8	37.44	12.88	50.51	100	0	P	H
		7440	12.88	-41.12	54	-	-	-	-	-	-	A	H
		4960	37.33	-36.67	74	45.3	31.94	11.12	51.03	100	0	P	V
		4960	12.6	-41.4	54	-	-	-	-	-	-	A	V
		7440	36.93	-37.07	74	37.12	37.44	12.88	50.51	100	0	P	V
		7440	12.2	-41.8	54	-	-	-	-	-	-	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

2.4GHz BT (LF)

BT	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz BT LF		30.81	23.37	-16.63	40	29.39	25.18	1.29	32.49	-	-	P	H
		38.1	20.24	-19.76	40	30.02	21.42	1.29	32.49	-	-	P	H
		255.18	19.44	-26.56	46	30.5	19.2	2.34	32.6	-	-	P	H
		784.4	30.39	-15.61	46	30.24	28.12	4.26	32.23	-	-	P	H
		820.8	31.22	-14.78	46	30.35	28.55	4.39	32.07	-	-	P	H
		923.7	33.29	-12.71	46	30.24	29.86	4.63	31.44	199	152	P	H
													H
													H
													H
													H
													H
													H
		36.48	28.86	-11.14	40	38.08	21.98	1.29	32.49	164	288	P	V
		46.47	26.46	-13.54	40	41.03	16.63	1.29	32.49	-	-	P	V
		136.38	18.67	-24.83	43.5	31.59	17.93	1.78	32.63	-	-	P	V
		653.5	27.56	-18.44	46	29.99	26.24	3.8	32.47	-	-	P	V
		840.4	31.94	-14.06	46	30.74	28.78	4.39	31.97	-	-	P	V
		949.6	34.67	-11.33	46	30.58	30.6	4.69	31.2	-	-	P	V
													V
													V
													V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Note symbol

*	**Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is **over limit** line.
P/A	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBµV/m) =

Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBµV) - Preamp Factor(dB)

2. Over Limit(dB) = Level(dBµV/m) – Limit Line(dBµV/m)

For Peak Limit @ 2390MHz:

1. Level(dBµV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBµV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBµV) – 35.86 (dB)

= 55.45 (dBµV/m)

2. Over Limit(dB)

= Level(dBµV/m) – Limit Line(dBµV/m)

= 55.45(dBµV/m) – 74(dBµV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBµV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBµV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBµV) – 35.86 (dB)

= 43.54 (dBµV/m)

2. Over Limit(dB)

= Level(dBµV/m) – Limit Line(dBµV/m)

= 43.54(dBµV/m) – 54(dBµV/m)

= -10.46(dB)

Both peak and average measured complies with the limit line, so test result is "PASS".

Appendix B. Radiated Spurious Emission Plots

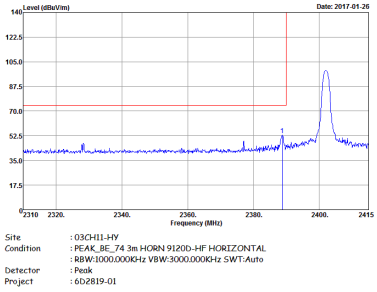
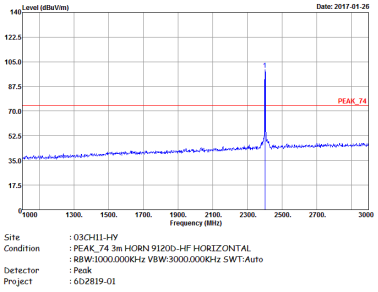
Test Engineer :	Jacky Hung and Ken Wu	**Temperature :**	20~24°C
		Relative Humidity :	50~54%

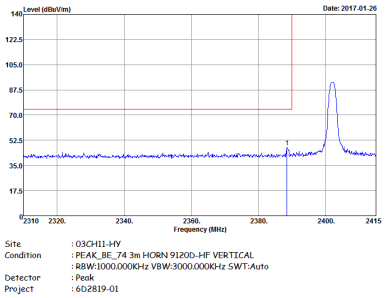
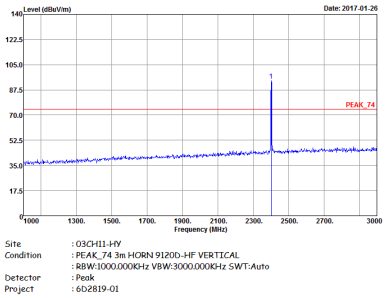
Note symbol

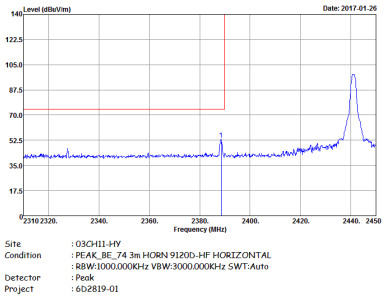
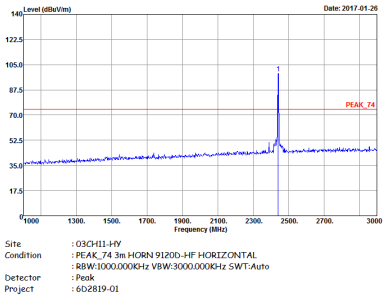
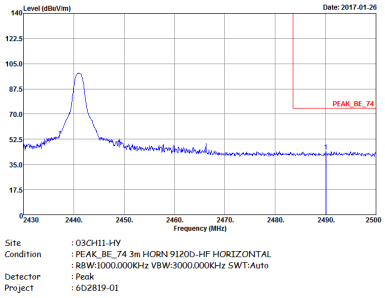
-L	**Low channel location**
-R	**High channel location**

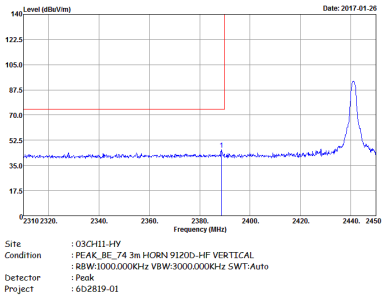
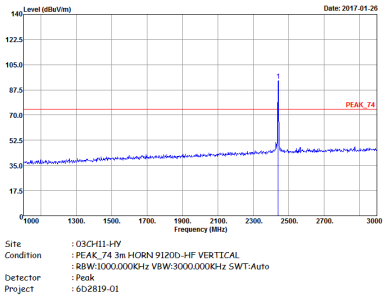
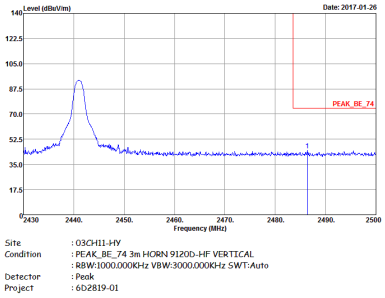
2.4GHz 2400~2483.5MHz

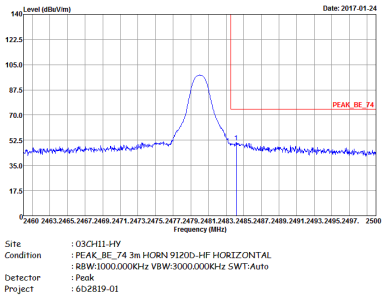
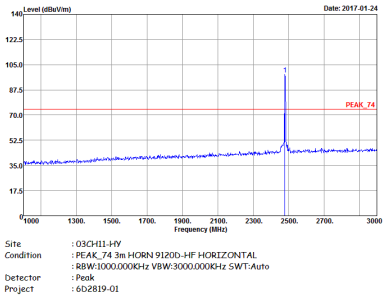
BT (Band Edge @ 3m)

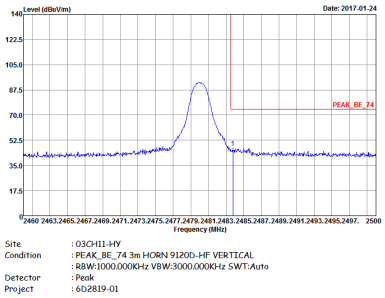
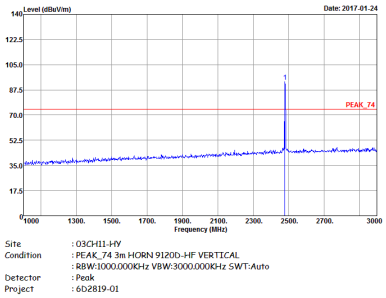
BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH00 2402MHz	
1	Horizontal	Fundamental
Peak		

BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH00 2402MHz	
1	Vertical	Fundamental
Peak		

BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH39 2441MHz	
1	Horizontal	Fundamental
Peak		
Peak		Left blank

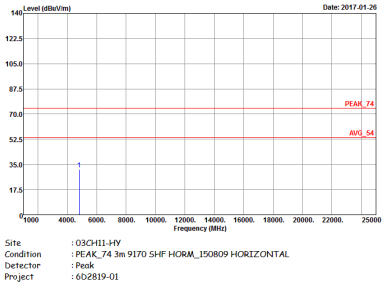
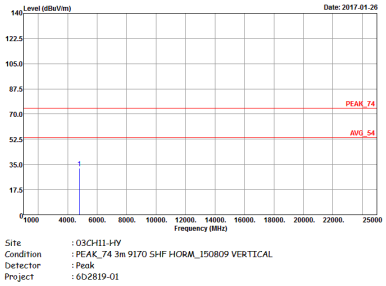
BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH39 2441MHz	
1	Vertical	Fundamental
Peak		
Peak		Left blank

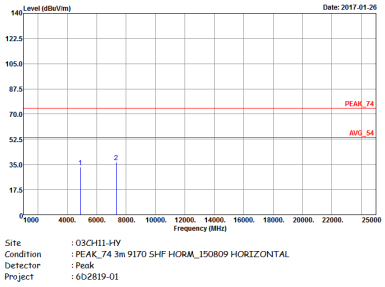
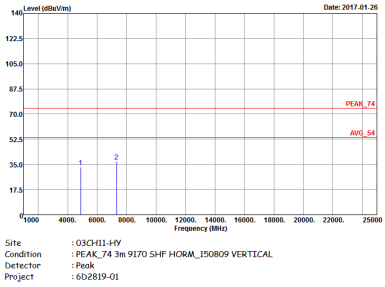
BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH78 2480MHz	
1	Horizontal	Fundamental
Peak		

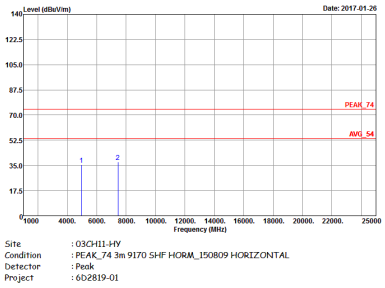
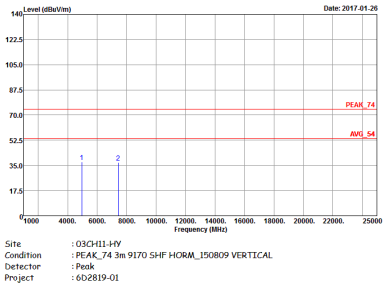
BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH78 2480MHz	
1	Vertical	Fundamental
Peak		

2.4GHz 2400~2483.5MHz

BT (Harmonic @ 3m)

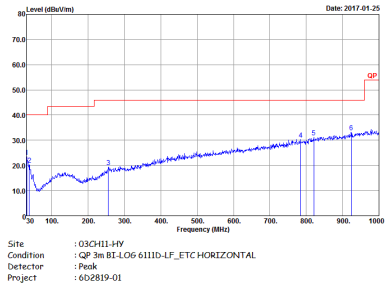
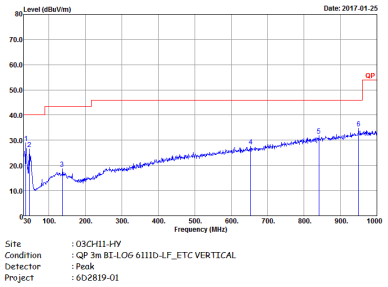
BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH00 2402MHz	
1	Horizontal	Vertical
Peak Avg.		

BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH39 2441MHz	
1	Horizontal	Vertical
Peak Avg.		

BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH78 2480MHz	
1	Horizontal	Vertical
Peak Avg.		

Emission below 1GHz

2.4GHz BT (LF)

BT	2.4GHz 2400~2483.5MHz	
ANT	BT LF	
1	Horizontal	Vertical
QP / Peak		

Appendix D. Original Report

Please refer to Sporton report number FR6D2819A as below.

FCC RF Test Report

APPLICANT	:	Honeywell International Inc.
EQUIPMENT	:	CN75WAN mobile computer
BRAND NAME	:	Honeywell
MODEL NAME	:	CN75WAN
MARKETING NAME	:	CN75
FCC ID	:	HD5-CN75WAN
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DSS) Spread Spectrum Transmitter

The product was received on Dec. 28, 2016 and testing was completed on Feb. 02, 2017. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in 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: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager

Testing Laboratory 1190

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

TABLE OF CONTENTS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR6D2819A	Rev. 01	Initial issue of report	Mar. 08, 2017

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(1)	Number of Channels	≥ 15Chs	Pass	-
3.2	15.247(a)(1)	Hopping Channel Separation	≥ 2/3 of 20dB BW	Pass	-
3.3	15.247(a)(1)	Dwell Time of Each Channel	≤ 0.4sec in 31.6sec period	Pass	-
3.4	15.247(a)(1)	20dB Bandwidth	NA	Pass	-
3.4	-	99% Bandwidth	-	Pass	-
3.5	15.247(b)(1)	Peak Output Power	≤ 125 mW	Pass	-
3.6	15.247(d)	Conducted Band Edges	≤ 20dBc	Pass	-
3.7	15.247(d)	Conducted Spurious Emission	≤ 20dBc	Pass	-
3.8	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	15.209(a) & 15.247(d)	Pass	Under limit 4.77 dB at 32.700 MHz
3.9	15.207	AC Conducted Emission	15.207(a)	Pass	Under limit 7.40 dB at 3.526 MHz
3.10	15.203 & 15.247(b)	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Honeywell International Inc.
9680 Old Bailes Road, Fort Mill, SC 29707 USA

1.2 Manufacturer

Honeywell International Inc.
9680 Old Bailes Road, Fort Mill, SC 29707 USA

1.3 Product Feature of Equipment Under Test

Product Feature	
Equipment	CN75WAN mobile computer
Brand Name	Honeywell
Model Name	CN75WAN
Marketing Name	CN75
FCC ID	HD5-CN75WAN
Sample 1	CN75 WWAN-Q5 WWAN_Q5 keypad
Sample 2	CN75 WWAN-N5 WWAN_N5 keypad
Sample 3	CN75E WWAN-N7 WWAN_N7 keypad
Sample 4	CN75E WWAN-Q6 WWAN_Q6 keypad
EUT supports Radios application	CDMA/EV-DO/GSM/EGPRS/WCDMA/HSPA WLAN 11a/b/g/n HT20 Bluetooth BR/EDR/LE
HW Version	v1.1
SW Version	W03.320
EUT Stage	Identical Prototype

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

1.4 Product Specification of Equipment Under Test

Standards-related Product Specification	
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 BR(1Mbps) : 7.17 dBm (0.0052 W) Bluetooth EDR (2Mbps) : 8.32 dBm (0.0068 W) Bluetooth EDR (3Mbps) : 8.84 dBm (0.0077 W)
99% Occupied Bandwidth	Bluetooth BR(1Mbps) : 0.832MHz Bluetooth EDR (2Mbps) : 1.192MHz Bluetooth EDR (3Mbps) : 1.172MHz
Antenna Type / Gain	PIFA Antenna type with gain 2.29 dBi
Type of Modulation	Bluetooth BR (1Mbps) : GFSK Bluetooth EDR (2Mbps) : π/4-DQPSK Bluetooth EDR (3Mbps) : 8-DPSK

1.5 Modification of EUT

No modifications are made to the EUT during all test items.

1.6 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1022 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.	
Test Site Location	No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C. TEL: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	**Sporton Site No.**	
	TH05-HY	CO05-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd. Guishan Dist, Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	**Sporton Site No.**
	03CH11-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

1.7 Applicable 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
- ANSI C63.10-2013

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.

2 Test Configuration of Equipment Under Test

2.1 Descriptions of Test Mode

Preliminary tests were performed in different data rates 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	7.16 dBm	8.28 dBm	8.76 dBm
Ch39	2441MHz	7.17 dBm	8.32 dBm	8.84 dBm
Ch78	2480MHz	7.06 dBm	8.26 dBm	**8.80 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 3Mbps for all the test items due to the highest RF output power.

a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction (150 kHz to 30 MHz), radiation (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). Pre-scanned tests, X, Y, Z in three orthogonal panels, and different data rates were conducted to determine the final configuration (Y plane as worst plane) from all possible combinations, and the worst mode of radiated spurious emissions is Bluetooth 3Mbps mode, and recorded in this report.

b. AC power line Conducted Emission was tested under maximum output power.

2.2 Test Mode

The following summary table is showing all test modes to demonstrate in compliance with the standard.

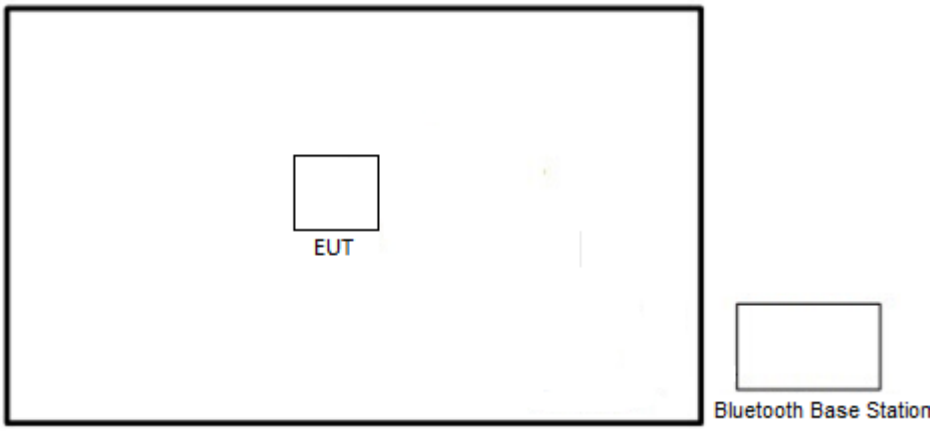
Summary table of Test Cases			
Test Item	**Data Rate / Modulation**		
	Bluetooth BR 1Mbps GFSK	**Bluetooth EDR 2Mbps π/4-DQPSK**	**Bluetooth EDR 3Mbps 8-DPSK**
Conducted Test Cases	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz	Mode 4: CH00_2402 MHz Mode 5: CH39_2441 MHz Mode 6: CH78_2480 MHz	Mode 7: CH00_2402 MHz Mode 8: CH39_2441 MHz Mode 9: CH78_2480 MHz
Radiated Test Cases	**Bluetooth EDR 3Mbps 8-DPSK**		
	Mode 1: CH00_2402 MHz Mode 2: CH39_2441 MHz Mode 3: CH78_2480 MHz		
AC Conducted Emission	Mode 1: WCDMA Band V Idle + Bluetooth Link + WLAN (2.4GHz) Link + MPEG4 + Scanner + Snap-on 1 + RJ-45 Cable Link with Notebook + Adapter + SD Card for Sample 3		

Remark:

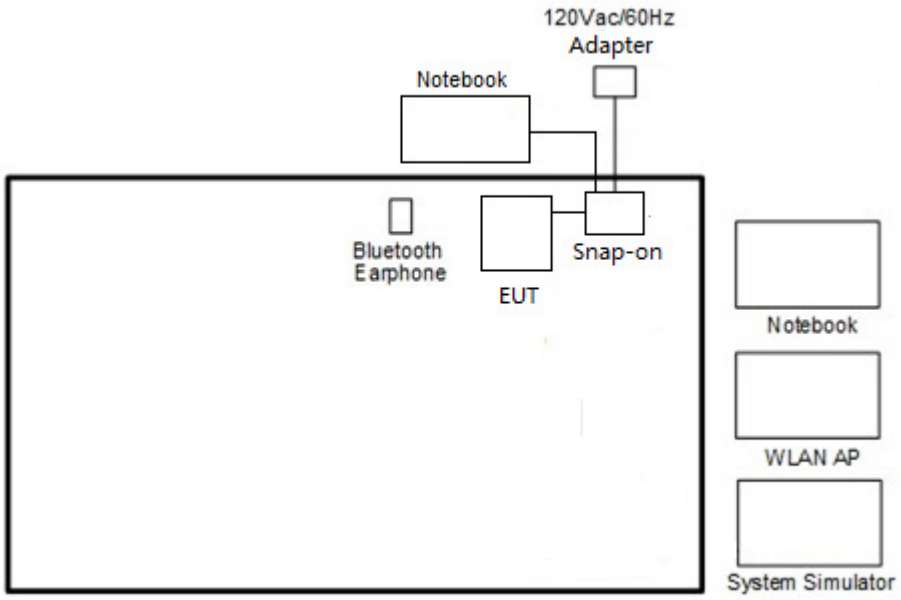
1. For radiated test cases, the worst mode data rate 3Mbps was reported only, because this data rate has the highest RF output power at preliminary tests, and the conducted spurious emissions and conducted band edge measurement for each data rate are no worse than 3Mbps, and no other significantly frequencies found in conducted spurious emission.
2. Snap-on 1: Ethernet Snap-On 1000AA01
3. Adapter: Level V (for Snap-on)
4. All the radiated test cases were performed with sample 1.

2.3 Connection Diagram of Test System

<Bluetooth Tx Mode>



<AC Conducted Emission Mode>



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Bluetooth Base Station	R&S	CBT32	N/A	N/A	Unshielded, 1.8 m
2.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
3.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
4.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded,1.8m
5.	Notebook	DELL	Latitude E6320	FCC DoC/ Contains FCC ID: QDS-BRCM1054	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
6.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A
7.	CN75A/CN75E Vehicle dock	intermec technologies corp	1000AV01	FCC DoC	NA	NA
8.	CK75 Vehicle dock	intermec technologies corp	1001AV01	FCC DoC	NA	NA
9.	car charger	intermec technologies corp	852-057-005	Verification	NA	Unshielded, 1.2m
10.	Snap-on(LAN)	intermec technologies corp	1000AA01	FCC DoC	NA	NA
11.	Snap-on(RS232)	intermec technologies corp	1000AA03	FCC DoC	NA	NA
12.	Snap-On (VoCollect)	intermec technologies corp	1000AA05	FCC DoC	NA	NA
13.	Snap-on (USB)	intermec technologies corp	1000AA07	FCC DoC	NA	NA
14.	Snap-on adapter	intermec technologies corp	9001AE01	FCC DoC	NA	AC IP: Unshielded, 1.8m DC OP: Shielded, 1.8m
15.	Earphone	Honeywell	Vocollect SR-20	FCC DoC	1.1 meter, shielded cable	NA
16.	USB Cable	intermec technologies corp	VE011-2018	FCC DoC	NA	1.4 meter, shielded cable, w/t ferrite core
17.	Battery	intermec technologies corp	1000AB02	NA	NA	NA

2.5 EUT Operation Test Setup

For Bluetooth function, the RF utility, “rtt-adv-usr v21” was installed in EUT which was programmed in order to make the EUT get into the engineering modes to contact with Bluetooth base station for continuous transmitting and receiving signals.

2.6 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 4.2 + 10 = 14.2 (dB)

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.

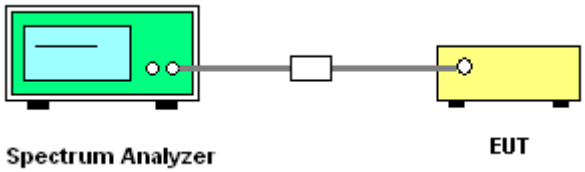
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedure

1. The testing follows ANSI C63.10-2013 clause 7.8.3.
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 = 300kHz; 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

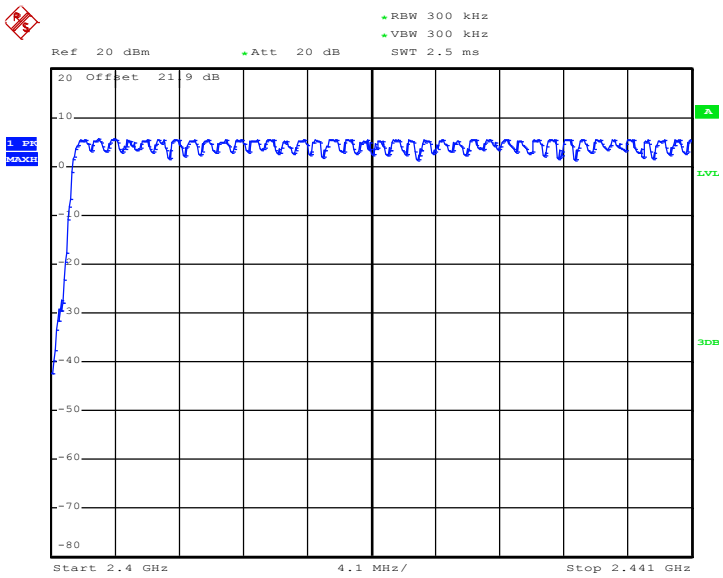


3.1.5 Test Result of Number of Hopping Frequency

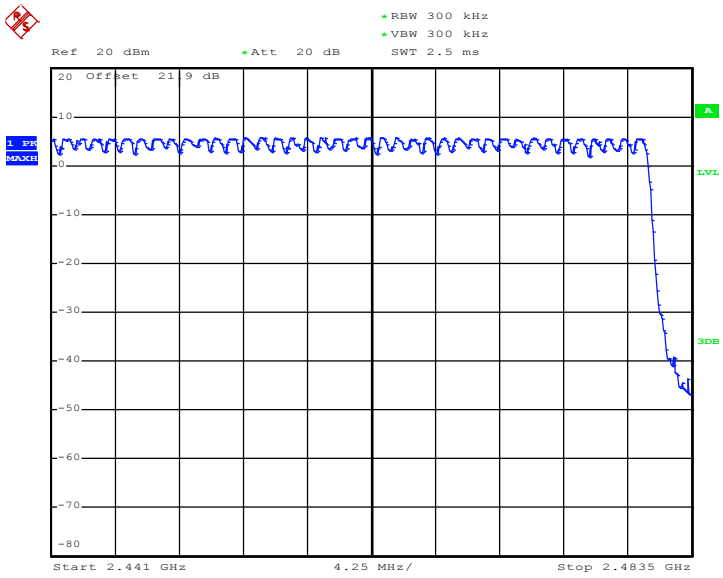
Test Mode :	3Mbps	Temperature :	24~26℃
Test Engineer :	Aking Chang	Relative Humidity :	48~51%

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



Date: 12.JAN.2017 05:31:05



Date: 12.JAN.2017 05:32:27

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.

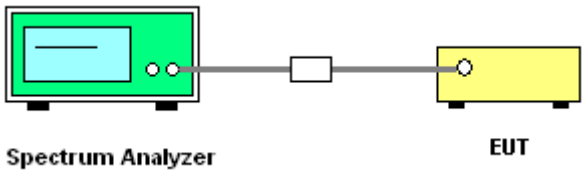
3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.2.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 7.8.2.
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 = 300kHz; 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

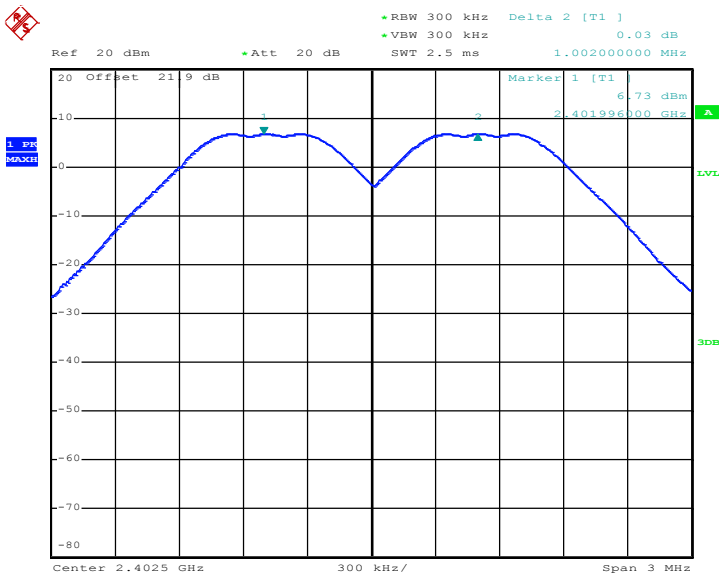


3.2.5 Test Result of Hopping Channel Separation

Test Mode :	1Mbps	Temperature :	24~26℃
Test Engineer :	Aking Chang	Relative Humidity :	48~51%

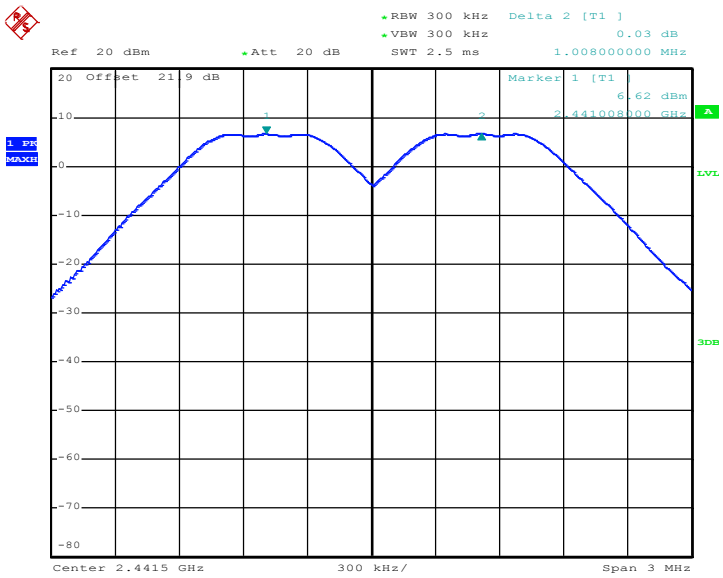
Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.002	0.6187	Pass
39	2441	1.008	0.6000	Pass
78	2480	1.002	0.6160	Pass

Channel Separation Plot on Channel 00 - 01



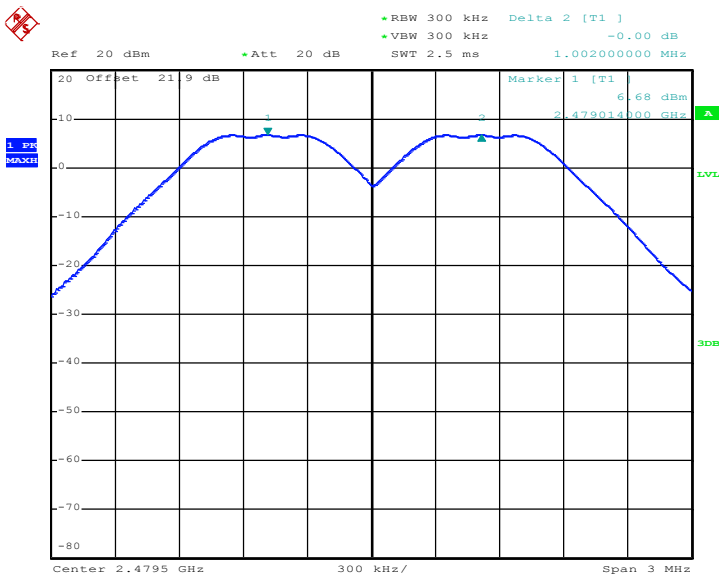
Date: 12.JAN.2017 05:39:50

Channel Separation Plot on Channel 39 - 40



Date: 12.JAN.2017 05:43:30

Channel Separation Plot on Channel 77 - 78

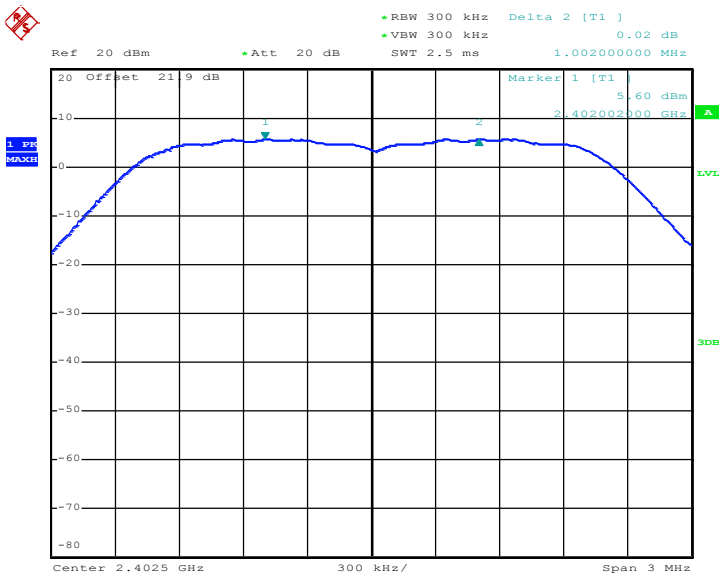


Date: 12.JAN.2017 05:48:50

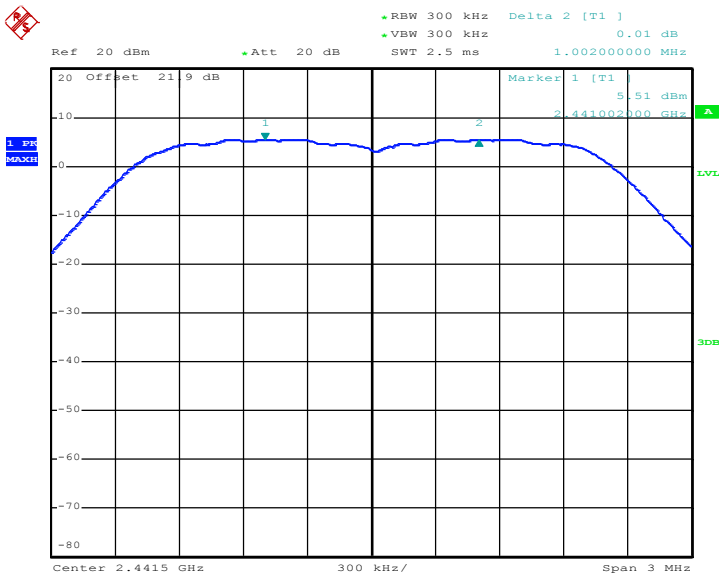
Test Mode :	2Mbps	Temperature :	24~26℃
Test Engineer :	Aking Chang	Relative Humidity :	48~51%

Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.002	0.8800	Pass
39	2441	1.002	0.8760	Pass
78	2480	1.002	0.8800	Pass

Channel Separation Plot on Channel 00 - 01

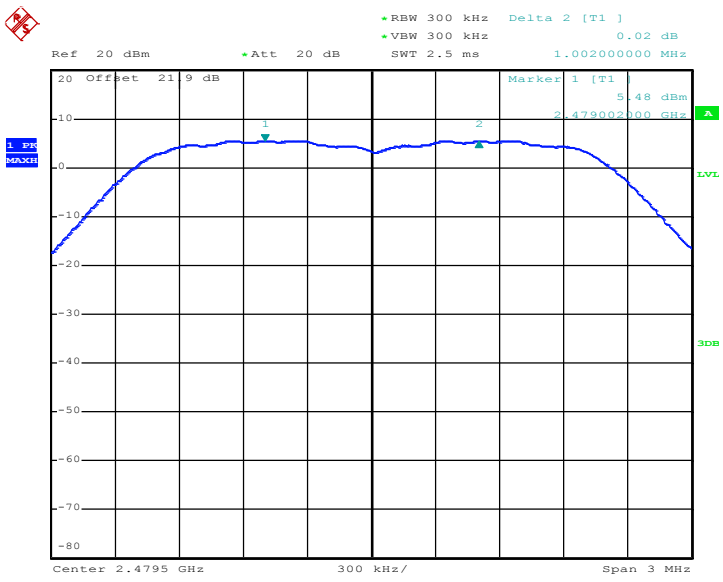


Channel Separation Plot on Channel 39 - 40



Date: 12.JAN.2017 05:58:19

Channel Separation Plot on Channel 77 - 78

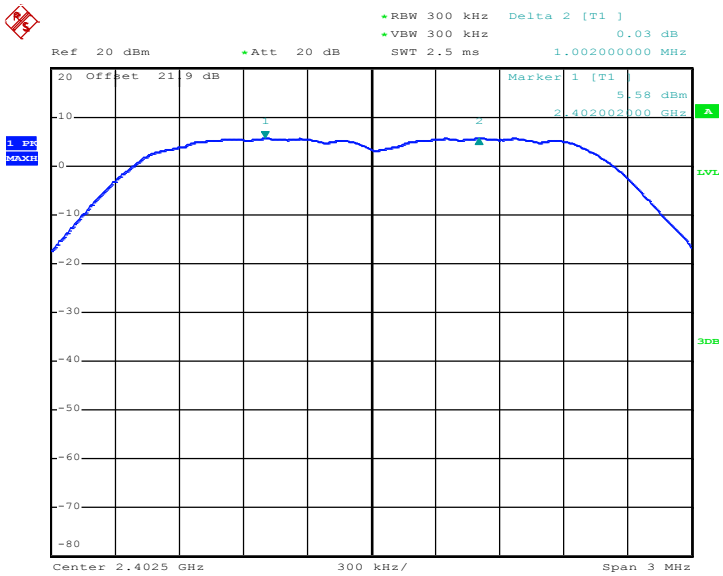


Date: 12.JAN.2017 06:06:30

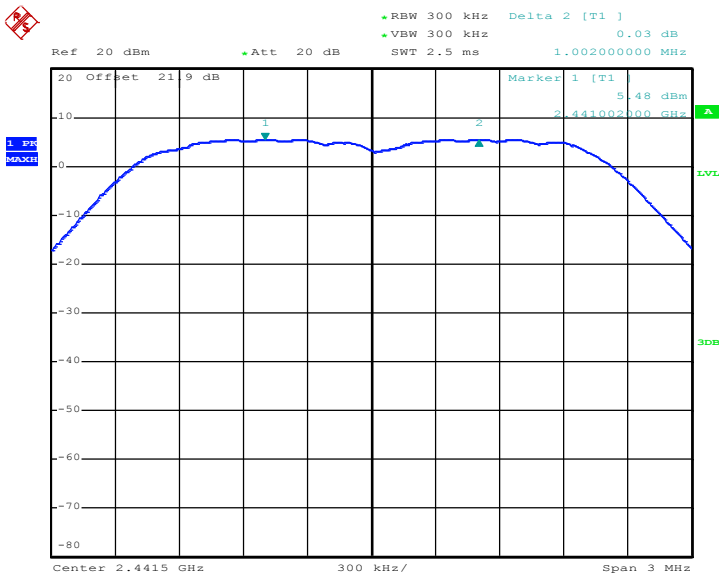
Test Mode :	3Mbps	Temperature :	24~26℃
Test Engineer :	Aking Chang	Relative Humidity :	48~51%

Channel	Frequency (MHz)	Frequency Separation (MHz)	(2/3 of 20dB BW) Limits (MHz)	Pass/Fail
00	2402	1.002	0.8480	Pass
39	2441	1.002	0.8520	Pass
78	2480	1.002	0.8560	Pass

Channel Separation Plot on Channel 00 - 01

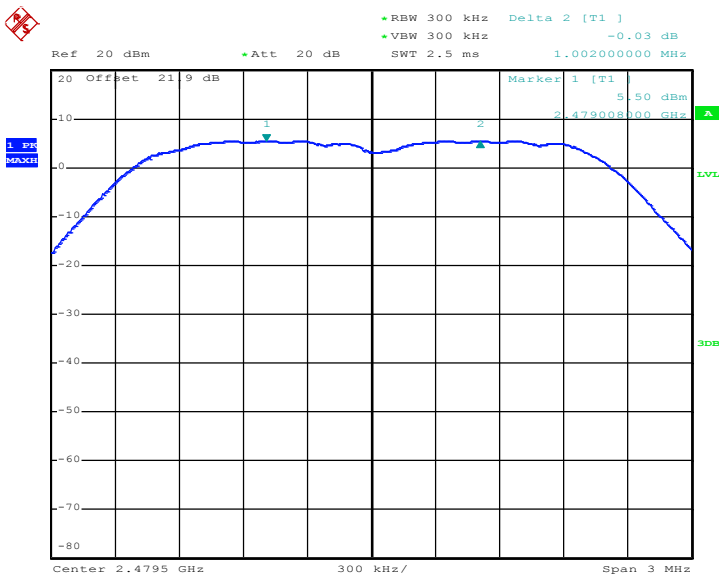


Channel Separation Plot on Channel 39 - 40



Date: 12.JAN.2017 06:23:09

Channel Separation Plot on Channel 77 - 78



Date: 12.JAN.2017 06:30:19

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.

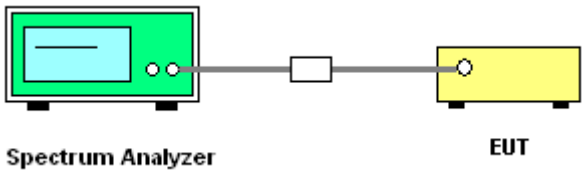
3.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.3.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 7.8.4.
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 :	Aking Chang	Relative Humidity :	48~51%

Mode	Hopping Channel Number	Hops Over Occupancy Time(hops)	Package Transfer Time (msec)	Dwell Time (sec)	Limits (sec)	Pass/Fail
Normal	79	106.67	2.90	0.31	0.4	Pass
AFH	20	53.33	2.90	0.15	0.4	Pass

Remark:

1. In normal mode, hopping rate is 1600 hops/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.

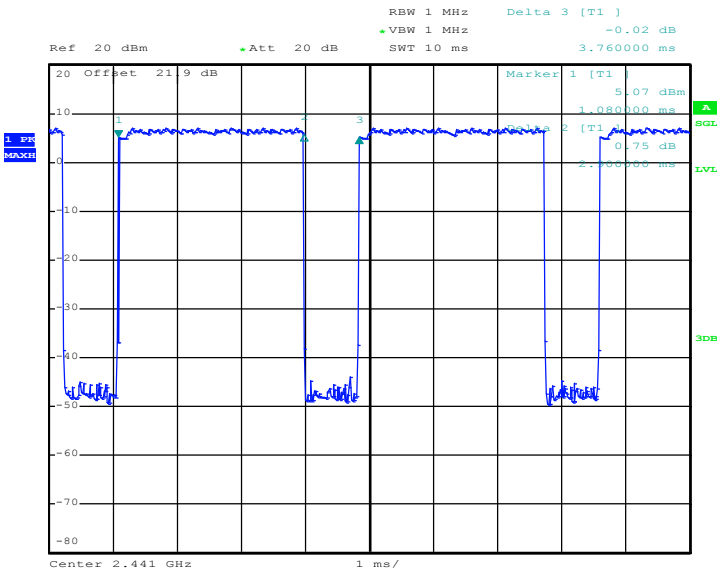
2. In AFH mode, hopping rate is 800 hops/s with 6 slots in 20 hopping channels.

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) = 53.33 hops.

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

Package Transfer Time Plot



Date: 10.JAN.2017 17:48:54

3.4 20dB and 99% Bandwidth Measurement

3.4.1 Limit of 20dB and 99% Bandwidth

Reporting only

3.4.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.4.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 6.9.2 and 6.9.3.
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 5 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. Use the following spectrum analyzer settings for 99 % Bandwidth measurement.
   Span = approximately 1.5 to 5 times the 99% bandwidth, centered on a hopping channel;
   RBW ≥ 1% of the 99% bandwidth; VBW ≥ RBW; Sweep = auto; Detector function = peak;
   Trace = max hold.
6. Measure and record the results in the test report.

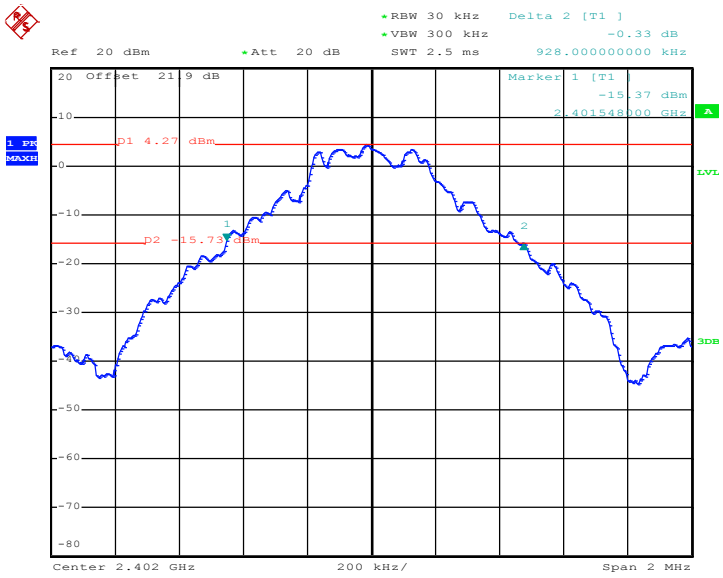
3.4.4 Test Setup

3.4.5 Test Result of 20dB Bandwidth

Test Mode :	1Mbps	Temperature :	24~26℃
Test Engineer :	Aking Chang	Relative Humidity :	48~51%

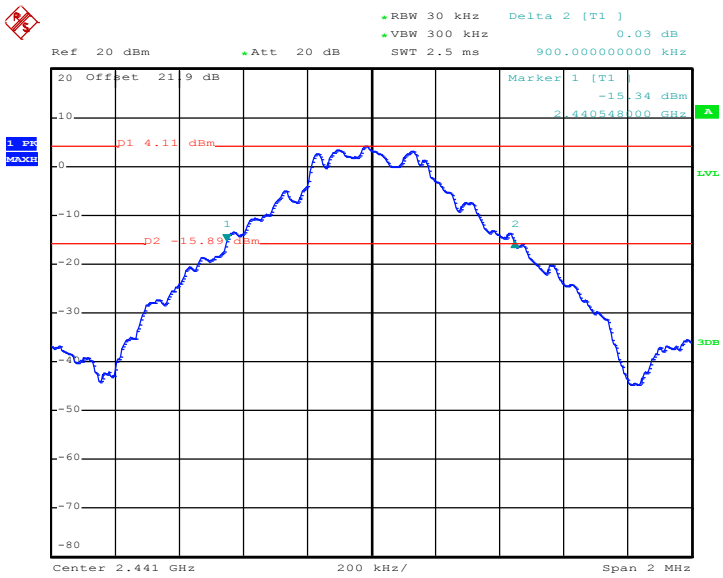
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	0.928
39	2441	0.900
78	2480	0.924

20 dB Bandwidth Plot on Channel 00



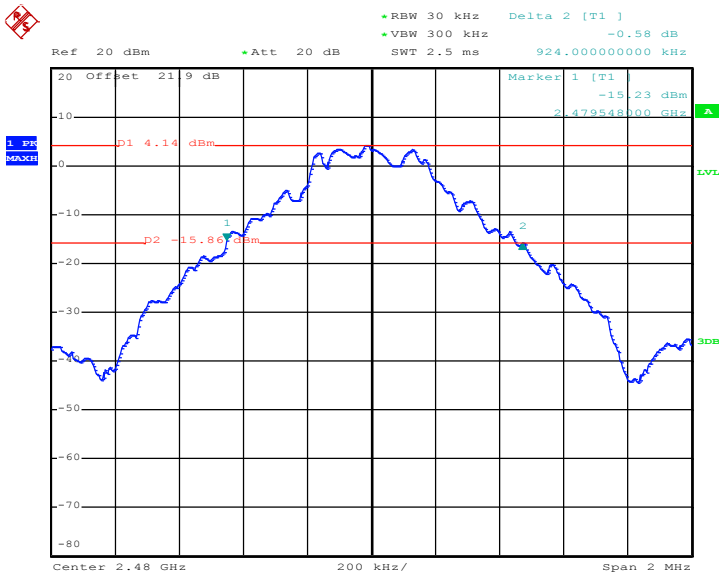
Date: 12.JAN.2017 05:38:37

20 dB Bandwidth Plot on Channel 39



Date: 12.JAN.2017 05:42:33

20 dB Bandwidth Plot on Channel 78

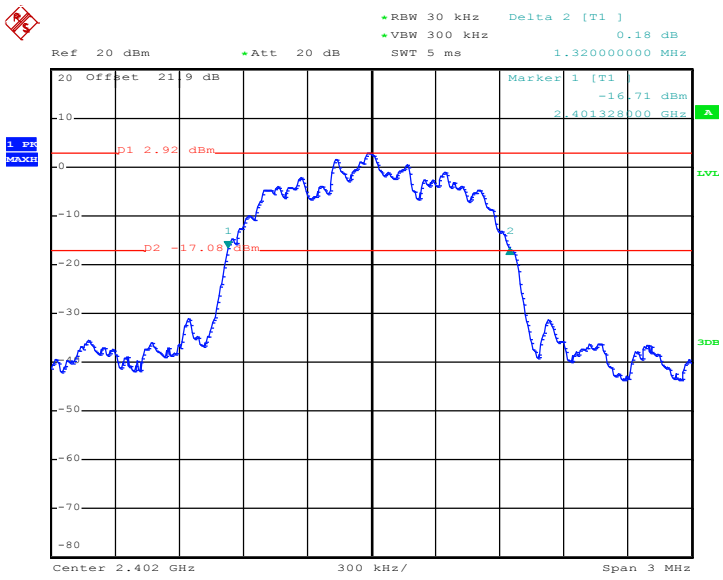


Date: 12.JAN.2017 05:47:50

Test Mode :	2Mbps	Temperature :	24~26℃
Test Engineer :	Aking Chang	Relative Humidity :	48~51%

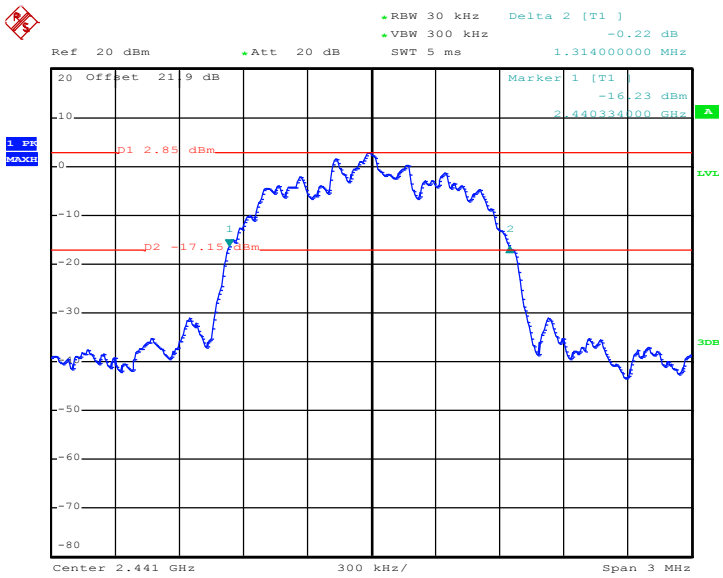
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.320
39	2441	1.314
78	2480	1.320

20 dB Bandwidth Plot on Channel 00



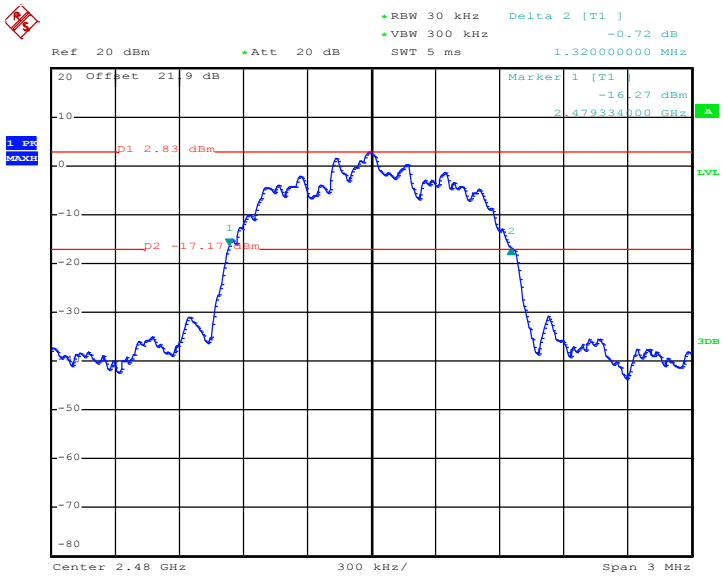
Date: 12.JAN.2017 05:51:55

20 dB Bandwidth Plot on Channel 39



Date: 12.JAN.2017 05:56:12

20 dB Bandwidth Plot on Channel 78

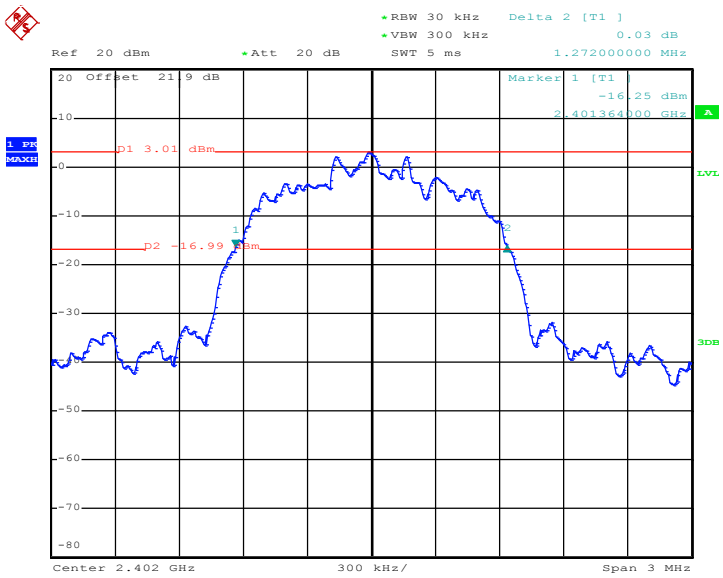


Date: 12.JAN.2017 06:05:13

Test Mode :	3Mbps	Temperature :	24~26℃
Test Engineer :	Aking Chang	Relative Humidity :	48~51%

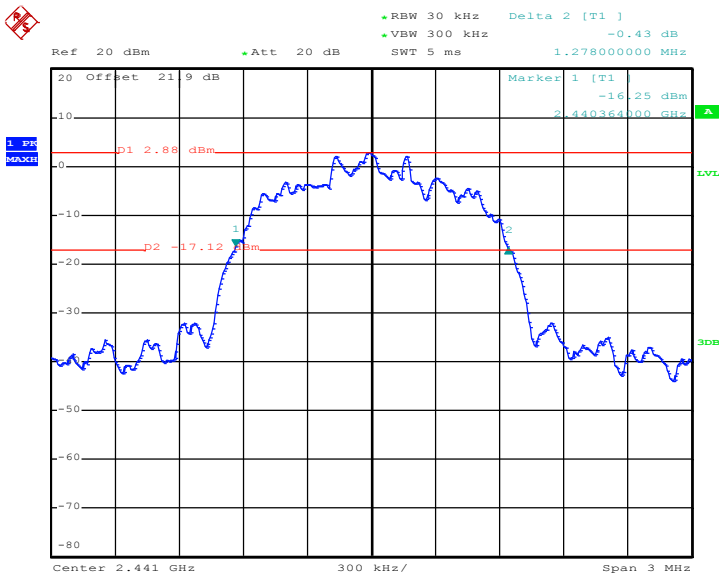
Channel	Frequency (MHz)	20dB Bandwidth (MHz)
00	2402	1.272
39	2441	1.278
78	2480	1.284

20 dB Bandwidth Plot on Channel 00



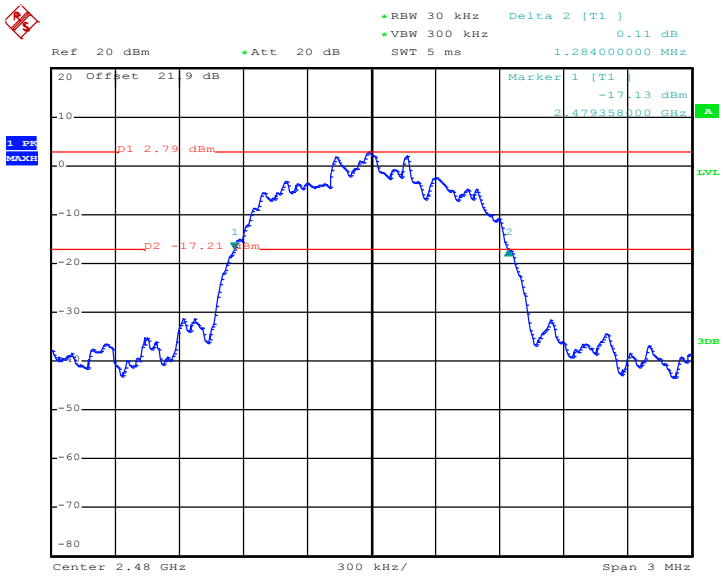
Date: 12.JAN.2017 06:14:04

20 dB Bandwidth Plot on Channel 39



Date: 12.JAN.2017 06:21:39

20 dB Bandwidth Plot on Channel 78



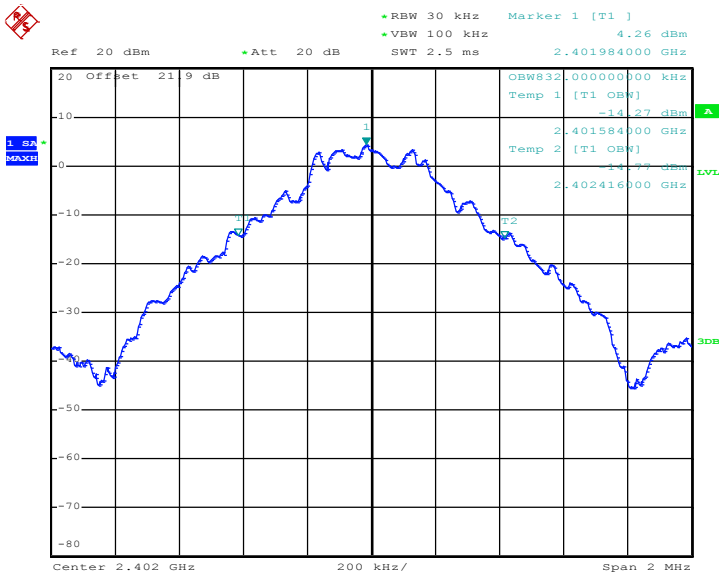
Date: 12.JAN.2017 06:28:56

3.4.6 Test Result of 99% Occupied Bandwidth

Test Mode :	1Mbps	Temperature :	24~26℃
Test Engineer :	Aking Chang	Relative Humidity :	48~51%

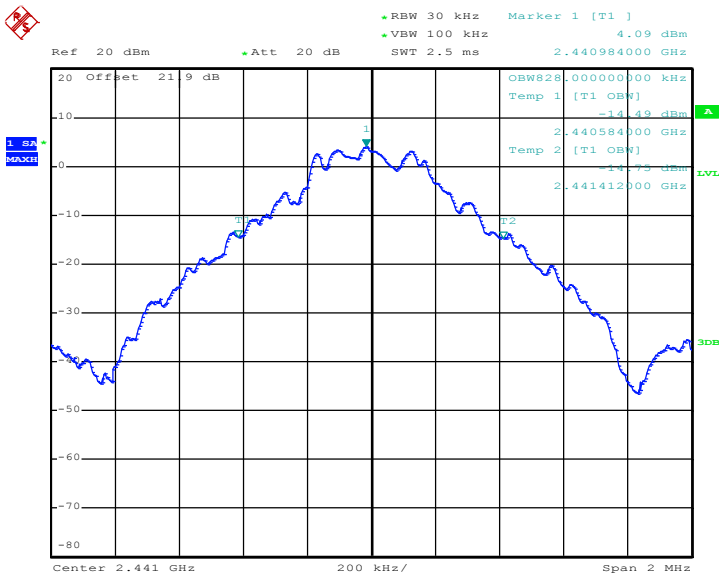
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	0.832
39	2441	0.828
78	2480	0.832

99% Occupied Bandwidth Plot on Channel 00



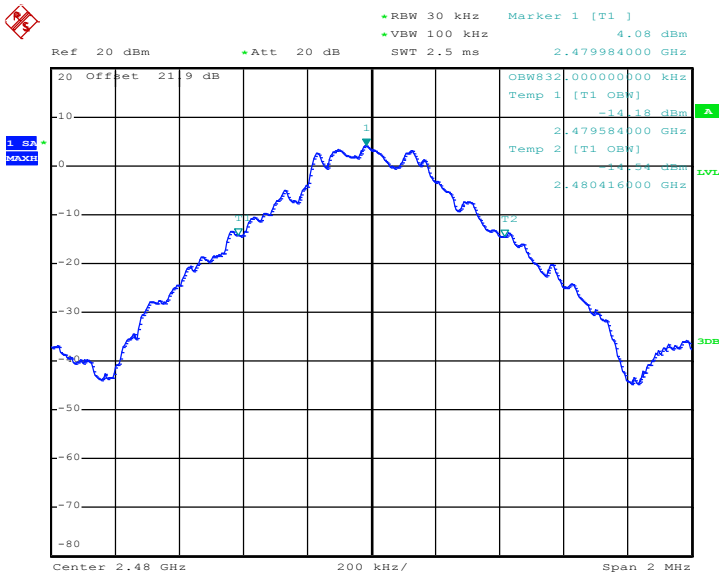
Date: 12.JAN.2017 05:35:43

99% Occupied Bandwidth Plot on Channel 39



Date: 12.JAN.2017 05:41:23

99% Occupied Bandwidth Plot on Channel 78

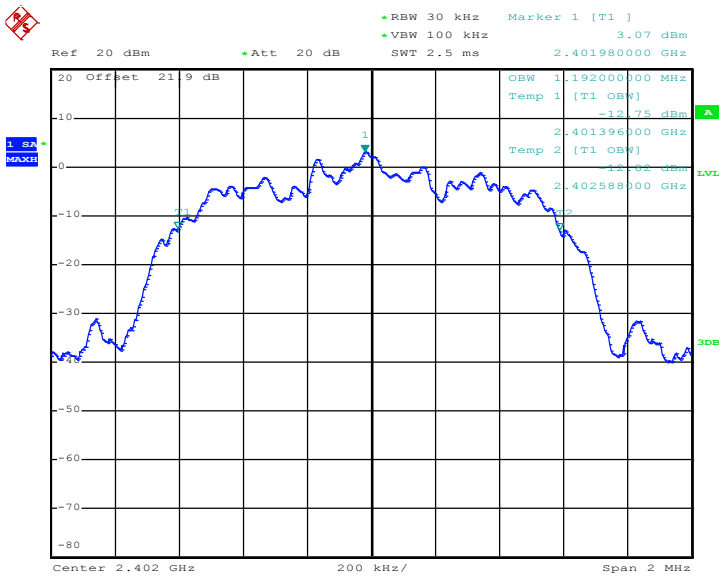


Date: 12.JAN.2017 05:45:44

Test Mode :	2Mbps	Temperature :	24~26℃
Test Engineer :	Aking Chang	Relative Humidity :	48~51%

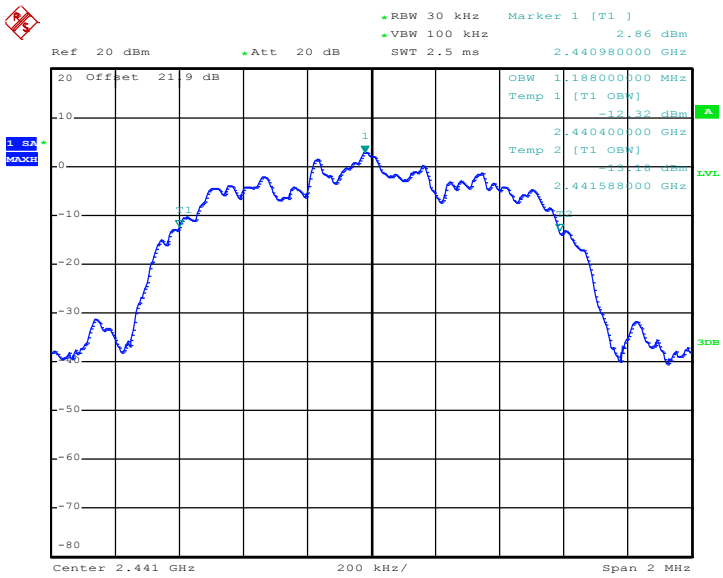
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	1.192
39	2441	1.188
78	2480	1.192

99% Occupied Bandwidth Plot on Channel 00



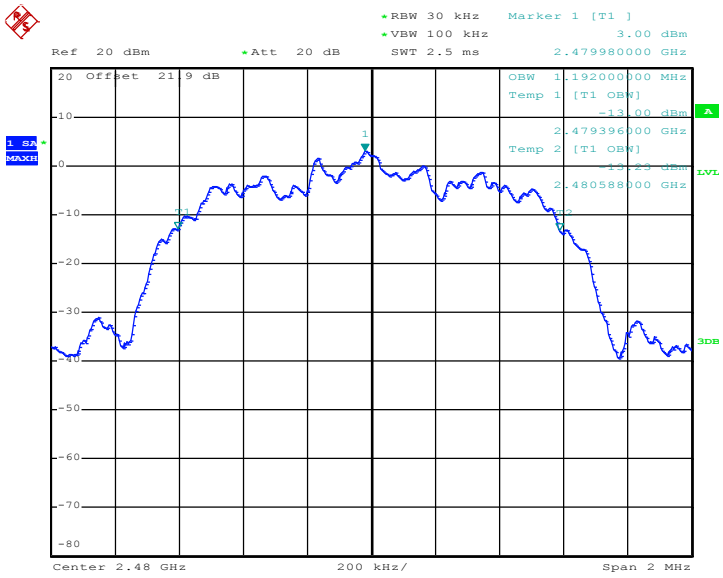
Date: 12.JAN.2017 05:50:54

99% Occupied Bandwidth Plot on Channel 39



Date: 12.JAN.2017 05:54:29

99% Occupied Bandwidth Plot on Channel 78

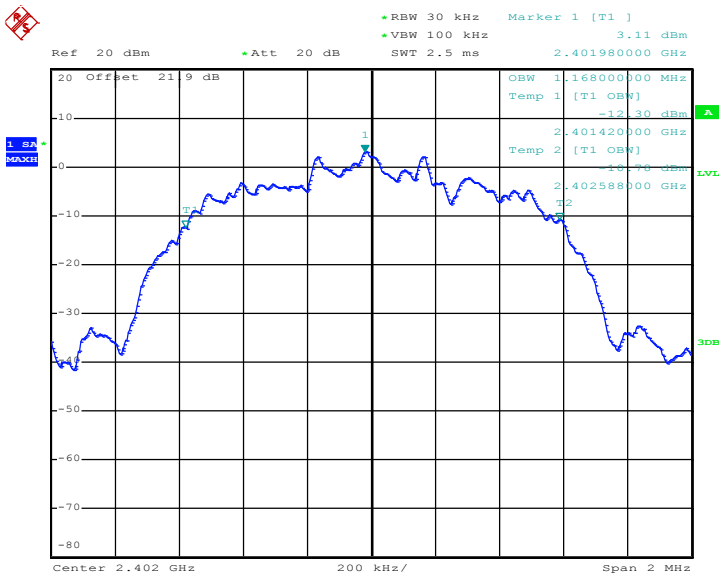


Date: 12.JAN.2017 06:00:06

Test Mode :	3Mbps	Temperature :	24~26℃
Test Engineer :	Aking Chang	Relative Humidity :	48~51%

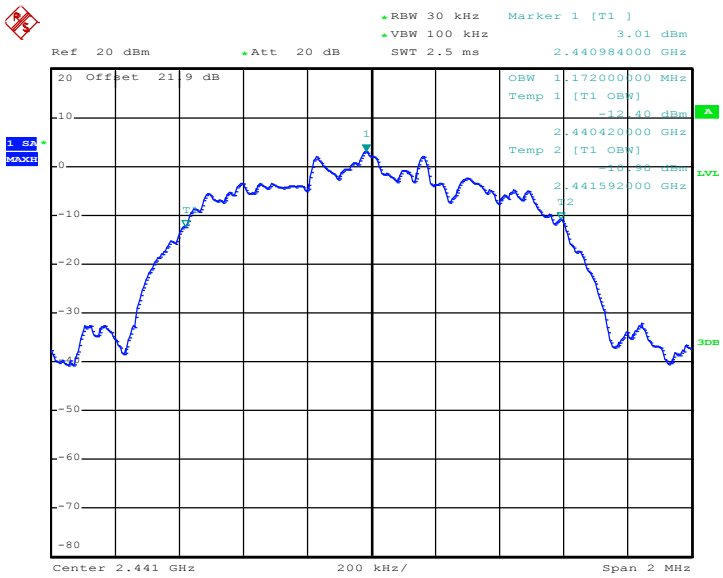
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)
00	2402	1.168
39	2441	1.172
78	2480	1.172

99% Occupied Bandwidth Plot on Channel 00



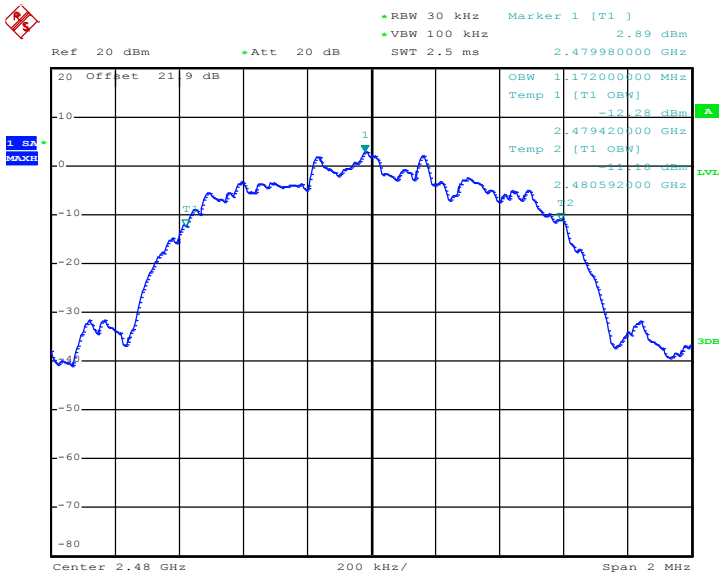
Date: 12.JAN.2017 06:11:11

99% Occupied Bandwidth Plot on Channel 39



Date: 12.JAN.2017 06:19:14

99% Occupied Bandwidth Plot on Channel 78



Date: 12.JAN.2017 06:24:40

Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

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, 2Mbps, 3Mbps and AFH modes are 0.125 watts.

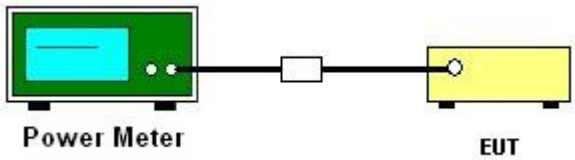
3.5.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.5.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 7.8.5.
2. The RF output of EUT was connected to the power meter 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 :	Aking Chang	Relative Humidity :	48~51%

Channel	Frequency (MHz)	RF Power (dBm)		
		GFSK	Max. Limits (dBm)	Pass/Fail
		1 Mbps		
00	2402	7.16	20.97	Pass
39	2441	7.17	20.97	Pass
78	2480	7.06	20.97	Pass

Note: For AFH mode using 20 hopping channels, the maximum output power limit is 20.97dBm.

Test Mode :	2Mbps	Temperature :	24~26℃
Test Engineer :	Aking Chang	Relative Humidity :	48~51%

Channel	Frequency (MHz)	RF Power (dBm)		
		π /4-DQPSK	Max. Limits (dBm)	Pass/Fail
		2 Mbps		
00	2402	8.28	20.97	Pass
39	2441	8.32	20.97	Pass
78	2480	8.26	20.97	Pass

Test Mode :	3Mbps	Temperature :	24~26℃
Test Engineer :	Aking Chang	Relative Humidity :	48~51%

Channel	Frequency (MHz)	RF Power (dBm)		
		8-DPSK	Max. Limits (dBm)	Pass/Fail
		3 Mbps		
00	2402	8.76	20.97	Pass
39	2441	8.84	20.97	Pass
78	2480	8.80	20.97	Pass

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.

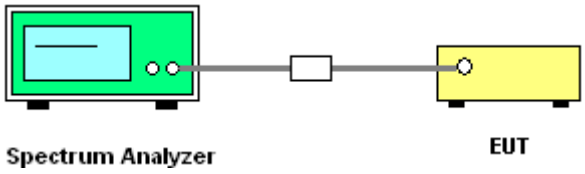
3.6.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.6.3 Test Procedures

1. The testing follows ANSI C63.10-2013 clause 7.8.6.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Set RBW = 100kHz, VBW = 300kHz. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100kHz 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.

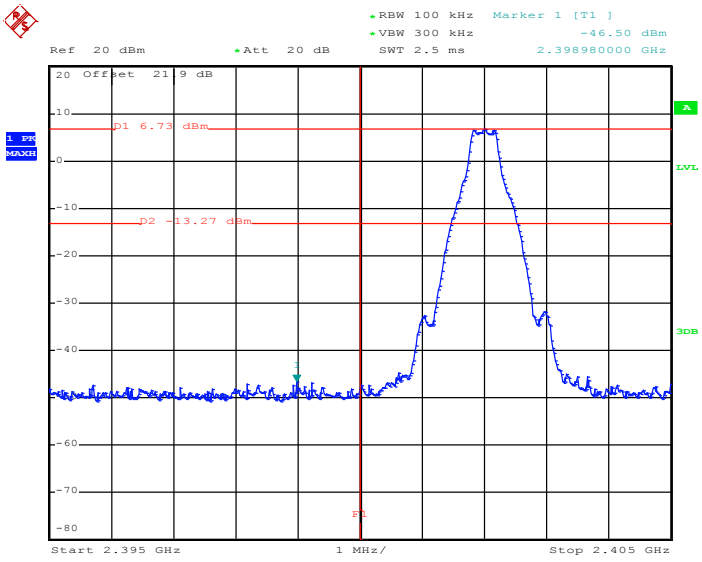
3.6.4 Test Setup



3.6.5 Test Result of Conducted Band Edges

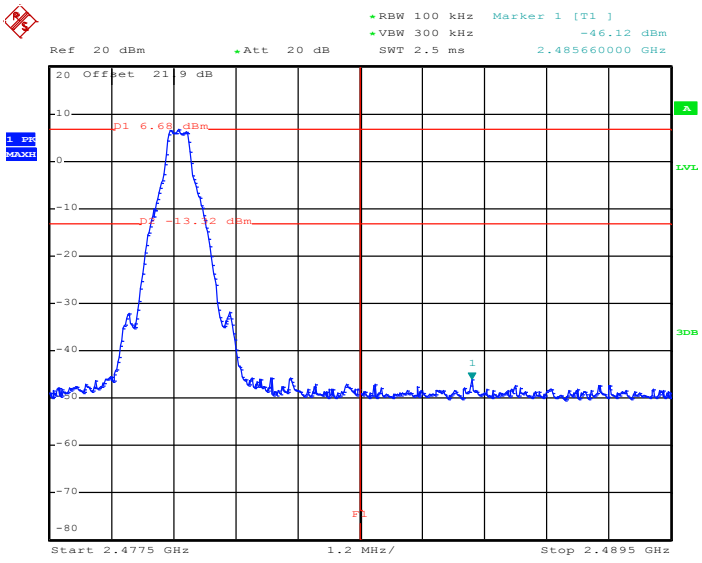
Test Mode :	1Mbps	**Temperature :**	24~26℃
Test Channel :	00 and 78	**Relative Humidity :**	48~51%
		Test Engineer :	Aking Chang

Low Band Edge Plot on Channel 00



Date: 12.JAN.2017 05:36:02

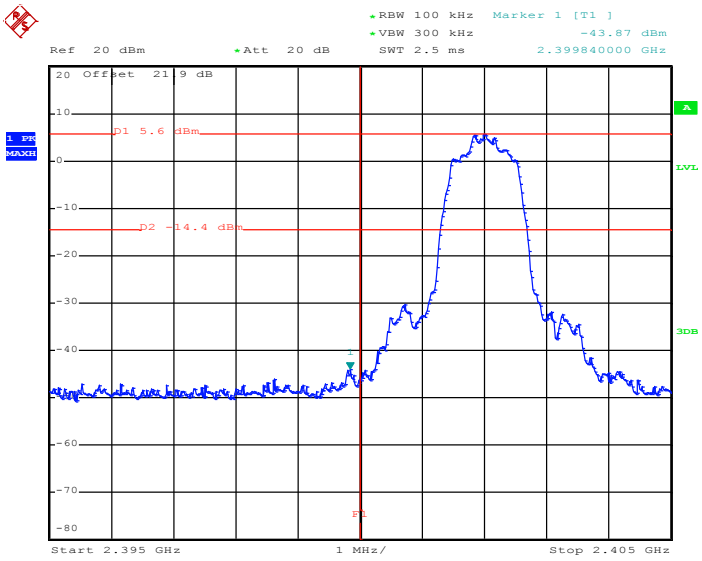
High Band Edge Plot on Channel 78



Date: 12.JAN.2017 05:46:20

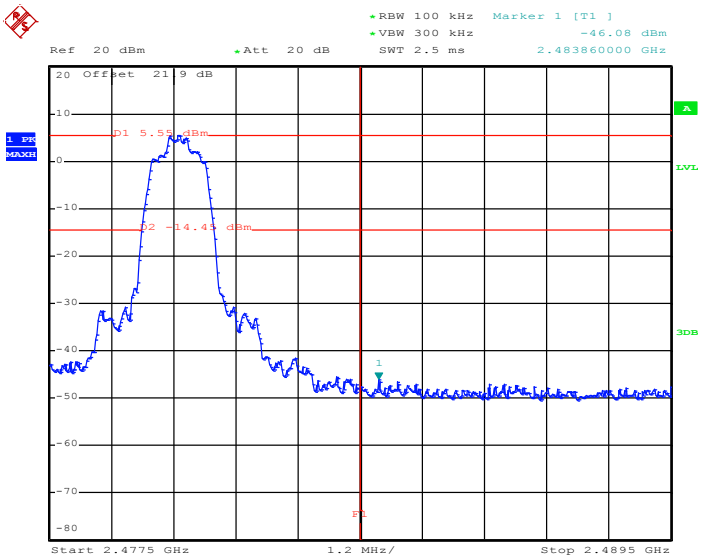
Test Mode :	2Mbps	**Temperature :**	24~26℃
Test Channel :	00 and 78	**Relative Humidity :**	48~51%
		Test Engineer :	Aking Chang

Low Band Edge Plot on Channel 00



Date: 12.JAN.2017 05:50:20

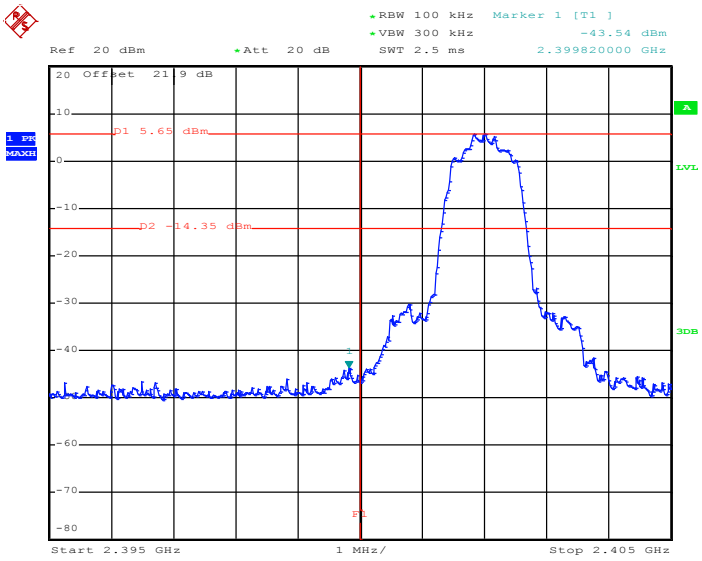
High Band Edge Plot on Channel 78



Date: 12.JAN.2017 06:01:35

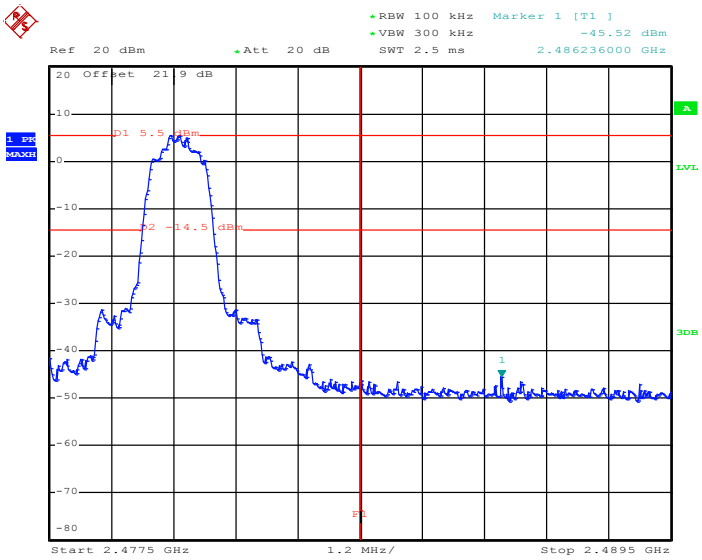
Test Mode :	3Mbps	**Temperature :**	24~26℃
Test Channel :	00 and 78	**Relative Humidity :**	48~51%
		Test Engineer :	Aking Chang

Low Band Edge Plot on Channel 00



Date: 12.JAN.2017 06:11:51

High Band Edge Plot on Channel 78

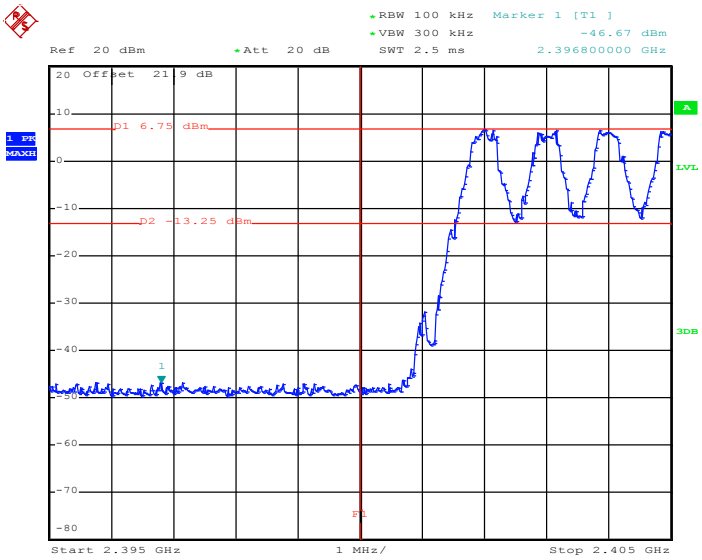


Date: 12.JAN.2017 06:25:05

3.6.6 Test Result of Conducted Hopping Mode Band Edges

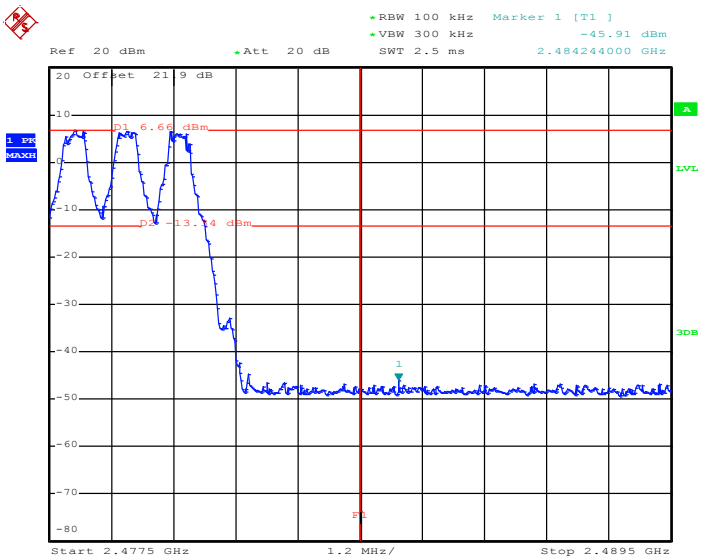
Test Mode :	1Mbps	Temperature :	24~26℃
Test Engineer :	Aking Chang	Relative Humidity :	48~51%

1Mbps Hopping Mode Low Band Edge Plot



Date: 12.JAN.2017 05:21:05

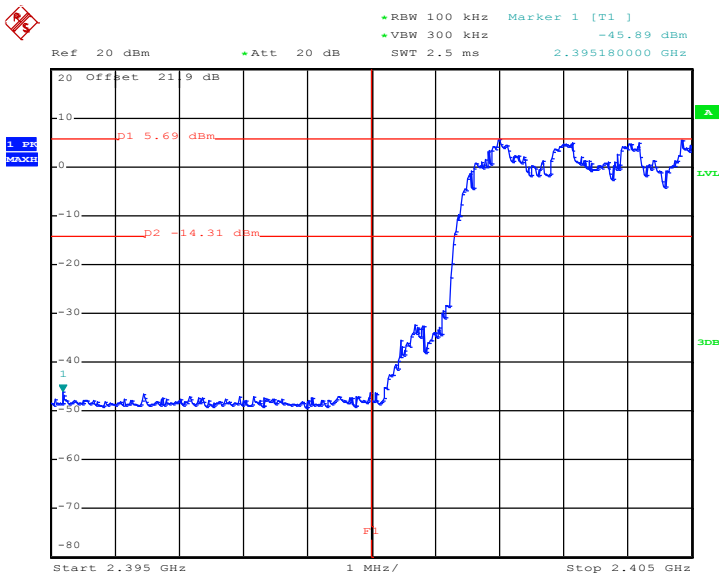
1Mbps Hopping Mode High Band Edge Plot



Date: 12.JAN.2017 05:23:08

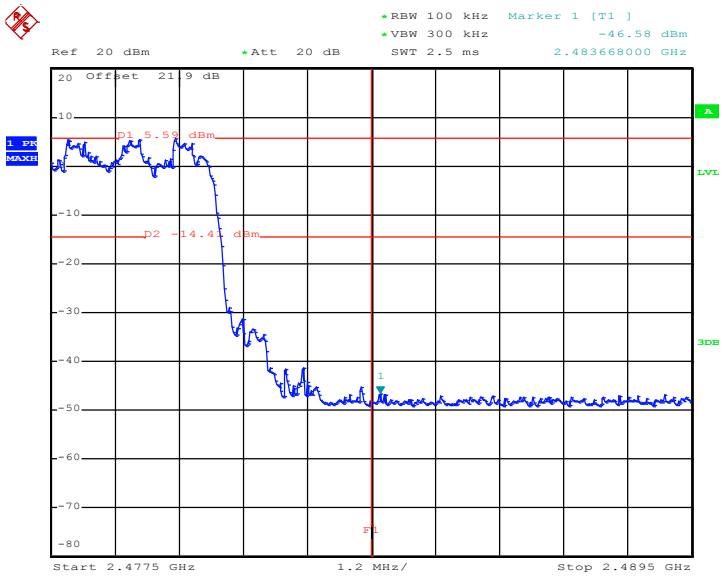
Test Mode :	2Mbps	Temperature :	24~26℃
Test Engineer :	Aking Chang	Relative Humidity :	48~51%

2Mbps Hopping Mode Low Band Edge Plot



Date: 12.JAN.2017 05:27:35

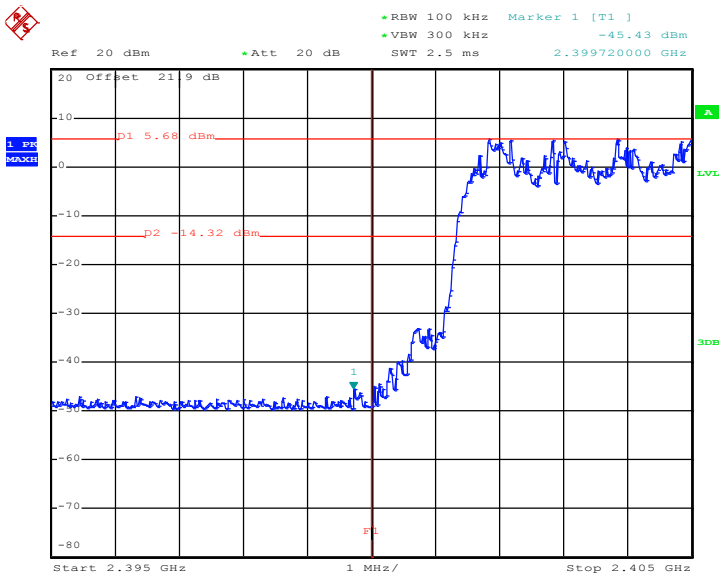
2Mbps Hopping Mode High Band Edge Plot



Date: 12.JAN.2017 05:25:21

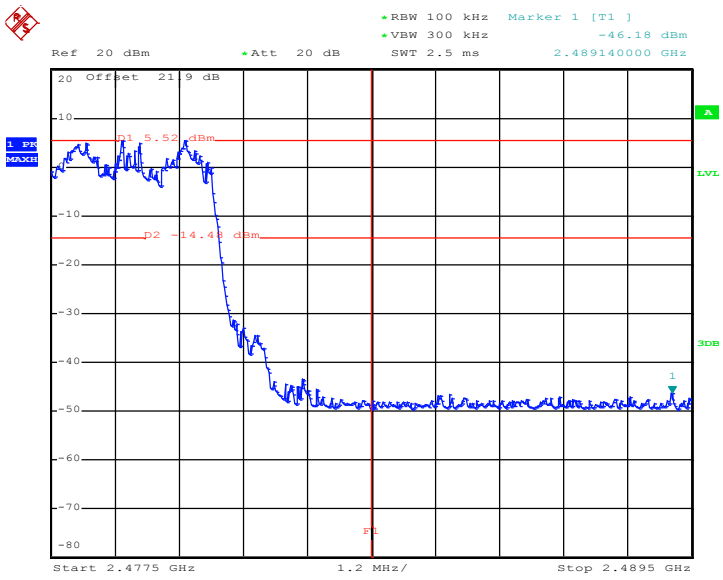
Test Mode :	3Mbps	Temperature :	24~26℃
Test Engineer :	Aking Chang	Relative Humidity :	48~51%

3Mbps Hopping Mode Low Band Edge Plot



Date: 12.JAN.2017 05:28:45

3Mbps Hopping Mode High Band Edge Plot



Date: 12.JAN.2017 05:29:46

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

The measuring equipment is listed in the section 4 of this test report.

3.7.3 Test Procedure

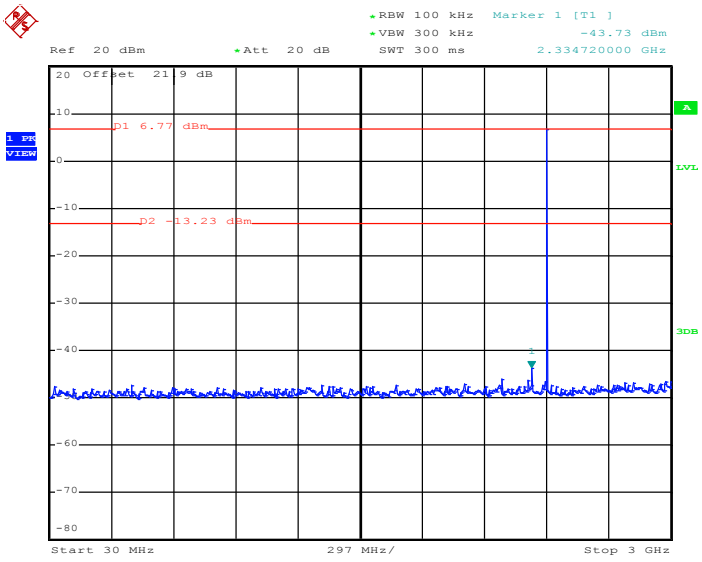
1. The testing follows ANSI C63.10-2013 clause 7.8.8.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 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.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.7.4 Test Setup

3.7.5 Test Result of Conducted Spurious Emission

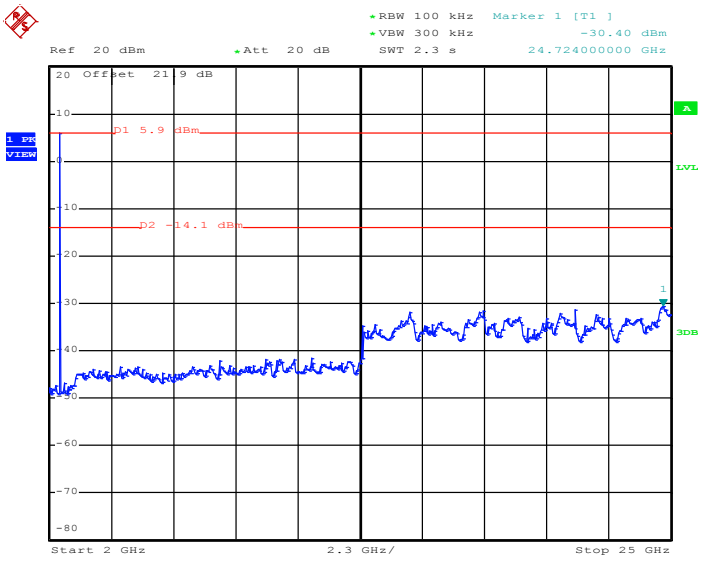
Test Mode :	1Mbps	Temperature :	24~26℃
Test Channel :	00	Relative Humidity :	48~51%
		Test Engineer :	Aking Chang

1Mbps CSE Plot on Ch 00 between 30MHz ~ 3 GHz



Date: 12.JAN.2017 05:34:41

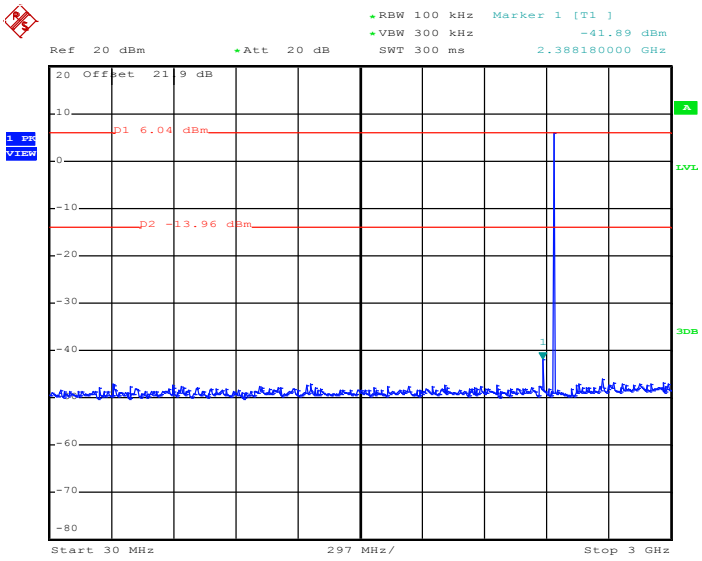
1Mbps CSE Plot on Ch 00 between 2 GHz ~ 25 GHz



Date: 12.JAN.2017 05:35:02

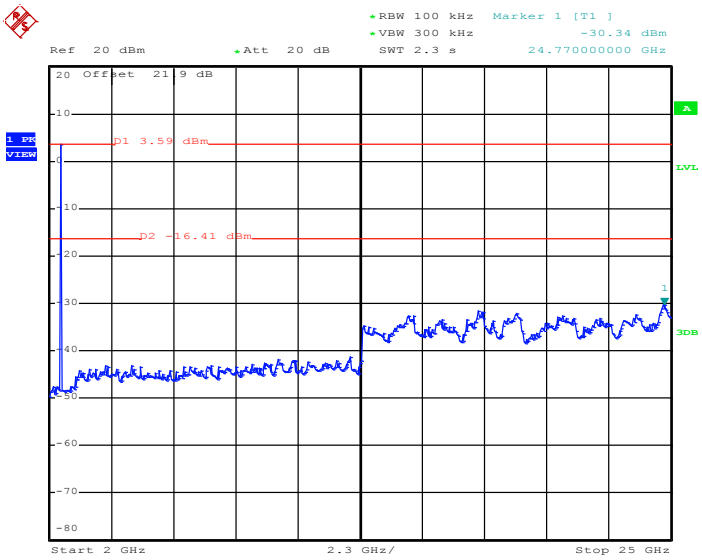
Test Mode :	1Mbps	Temperature :	24~26℃
Test Channel :	39	Relative Humidity :	48~51%
		Test Engineer :	Aking Chang

1Mbps CSE Plot on Ch 39 between 30MHz ~ 3 GHz



Date: 12.JAN.2017 05:40:25

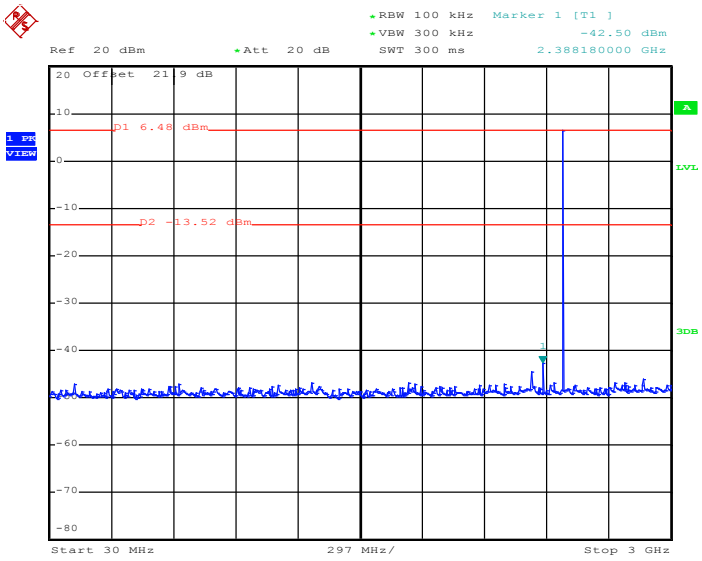
1Mbps CSE Plot on Ch 39 between 2 GHz ~ 25 GHz



Date: 12.JAN.2017 05:40:47

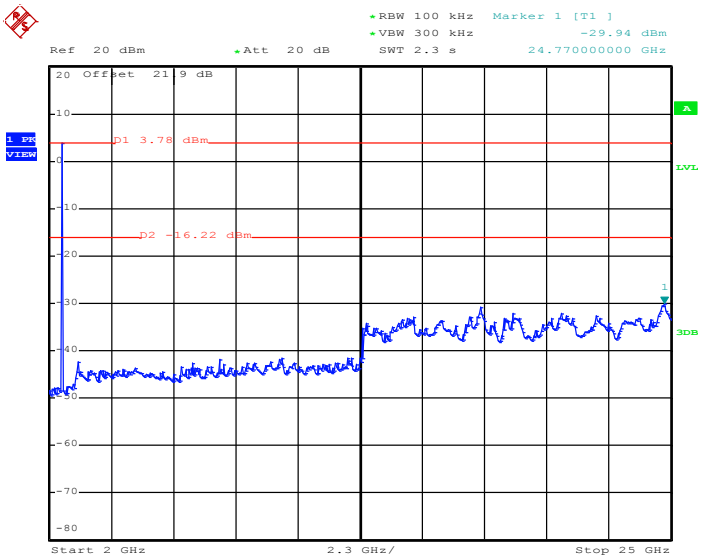
Test Mode :	1Mbps	**Temperature :**	24~26℃
Test Channel :	78	**Relative Humidity :**	48~51%
		Test Engineer :	Aking Chang

1Mbps CSE Plot on Ch 78 between 30MHz ~ 3 GHz



Date: 12.JAN.2017 05:44:16

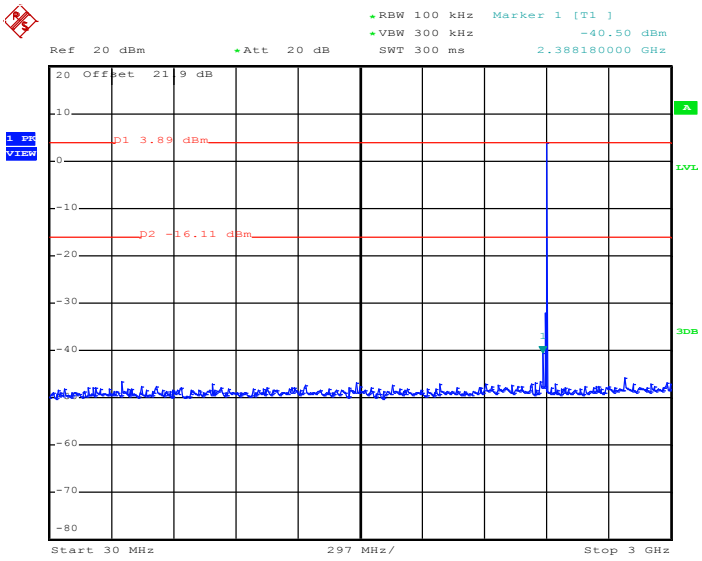
1Mbps CSE Plot on Ch 78 between 2 GHz ~ 25 GHz



Date: 12.JAN.2017 05:44:38

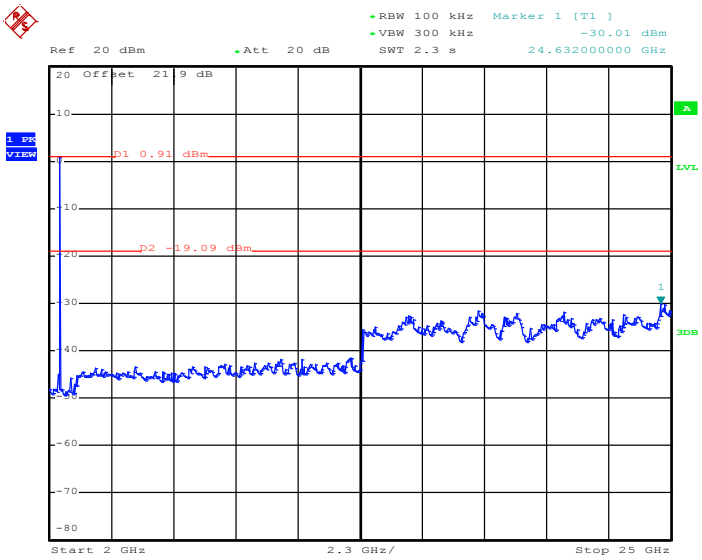
Test Mode :	2Mbps	**Temperature :**	24~26℃
Test Channel :	00	**Relative Humidity :**	48~51%
		Test Engineer :	Aking Chang

2Mbps CSE Plot on Ch 00 between 30MHz ~ 3 GHz



Date: 12.JAN.2017 05:49:36

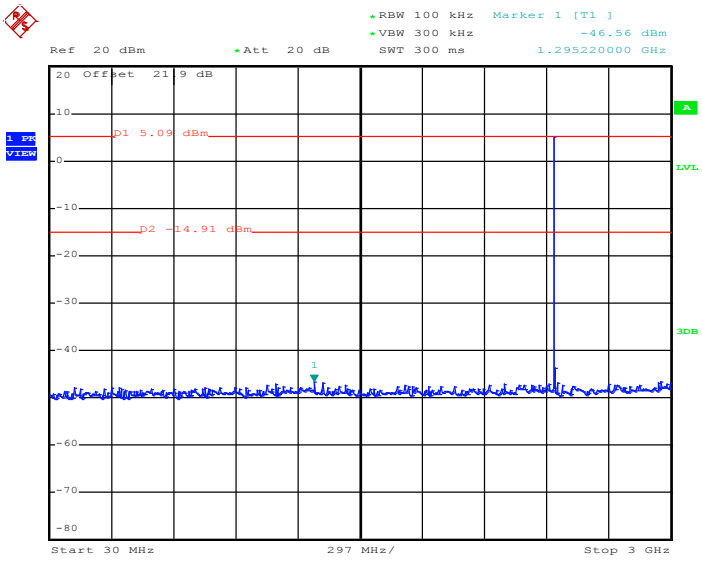
2Mbps CSE Plot on Ch 00 between 2 GHz ~ 25 GHz



Date: 12.JAN.2017 05:49:57

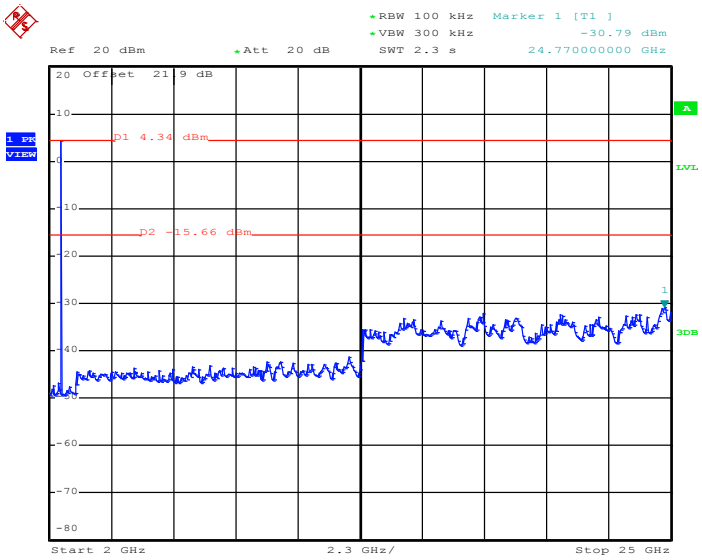
Test Mode :	2Mbps	**Temperature :**	24~26℃
Test Channel :	39	**Relative Humidity :**	48~51%
		Test Engineer :	Aking Chang

2Mbps CSE Plot on Ch 39 between 30MHz ~ 3 GHz



Date: 12.JAN.2017 06:07:08

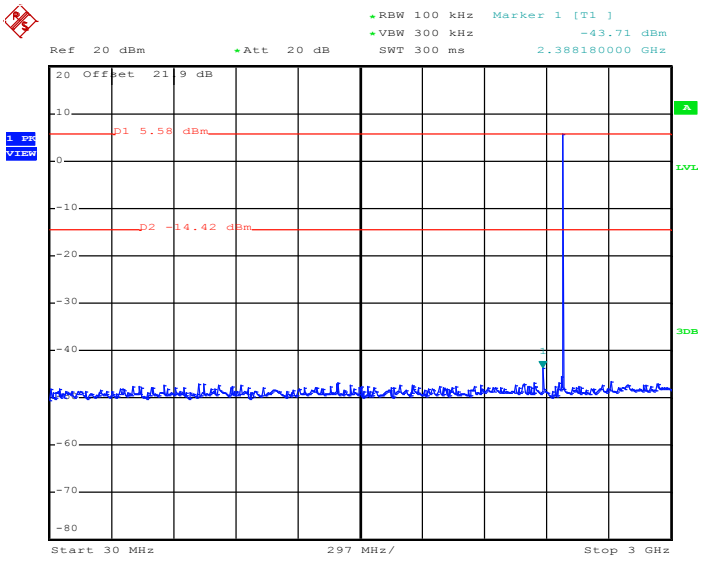
2Mbps CSE Plot on Ch 39 between 2 GHz ~ 25 GHz



Date: 12.JAN.2017 06:08:06

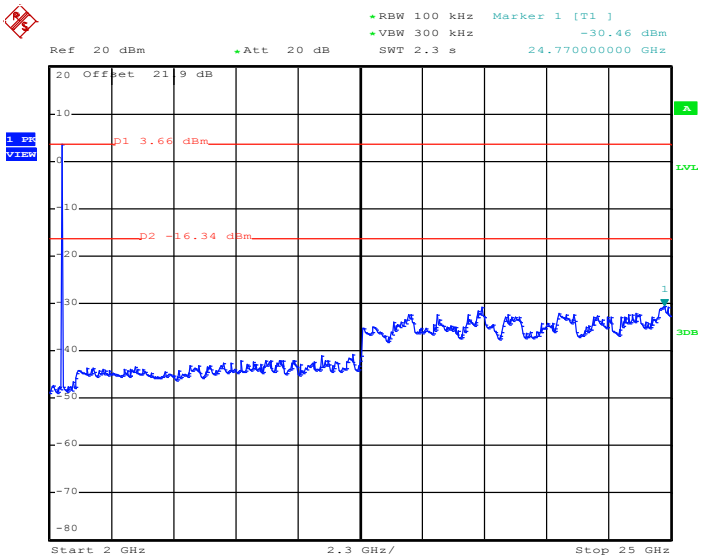
Test Mode :	2Mbps	Temperature :	24~26℃
Test Channel :	78	Relative Humidity :	48~51%
		Test Engineer :	Aking Chang

2Mbps CSE Plot on Ch 78 between 30MHz ~ 3 GHz



Date: 12.JAN.2017 06:02:03

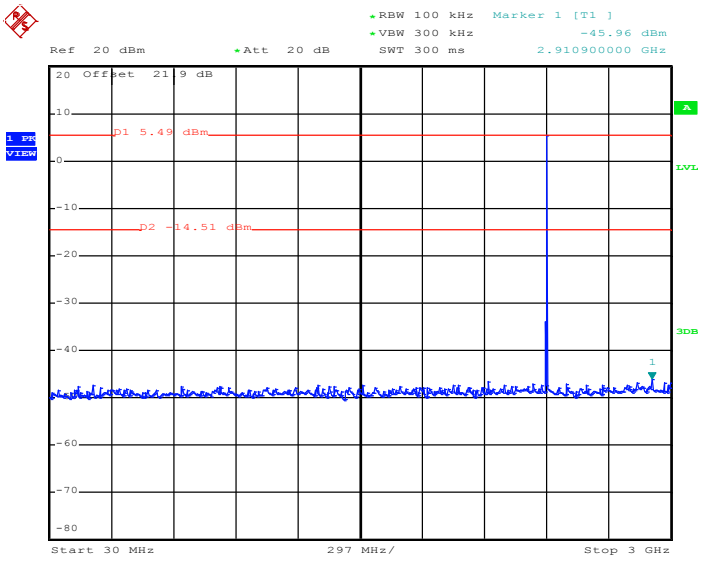
2Mbps CSE Plot on Ch 78 between 2 GHz ~ 25 GHz



Date: 12.JAN.2017 06:03:54

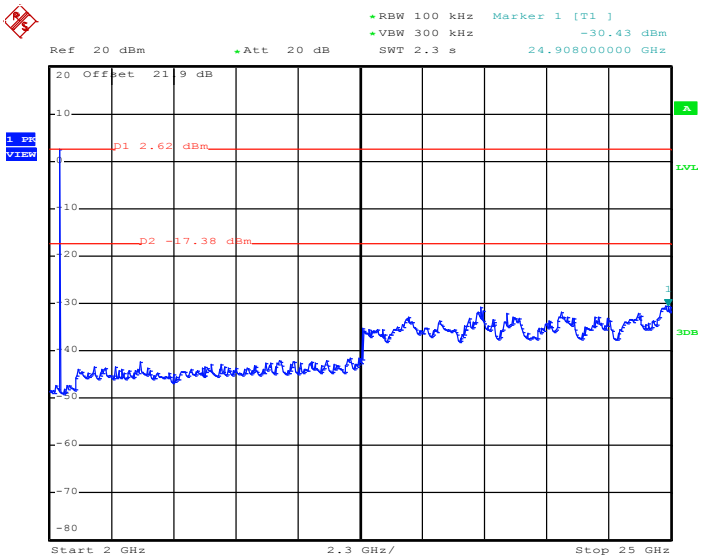
Test Mode :	3Mbps	Temperature :	24~26℃
Test Channel :	00	Relative Humidity :	48~51%
		Test Engineer :	Aking Chang

3Mbps CSE Plot on Ch 00 between 30MHz ~ 3 GHz



Date: 12.JAN.2017 06:17:12

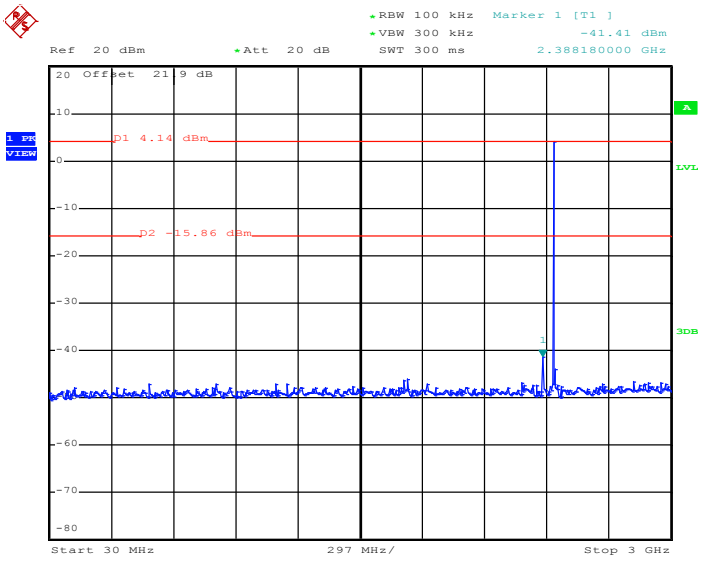
3Mbps CSE Plot on Ch 00 between 2 GHz ~ 25 GHz



Date: 12.JAN.2017 06:09:29

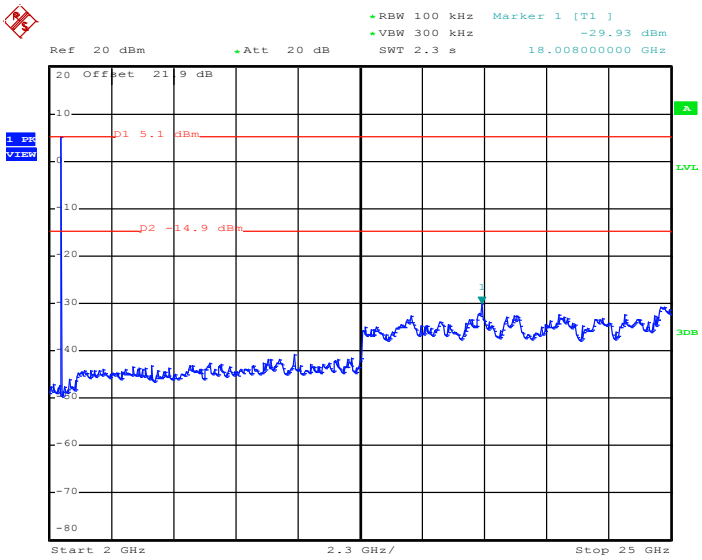
Test Mode :	3Mbps	**Temperature :**	24~26℃
Test Channel :	39	**Relative Humidity :**	48~51%
		Test Engineer :	Aking Chang

3Mbps CSE Plot on Ch 39 between 30MHz ~ 3 GHz



Date: 12.JAN.2017 06:19:48

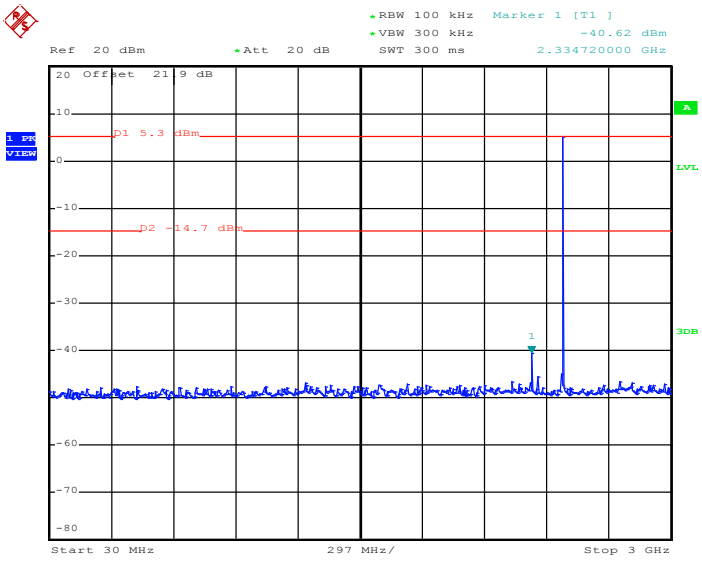
3Mbps CSE Plot on Ch 39 between 2 GHz ~ 25 GHz



Date: 12.JAN.2017 06:20:10

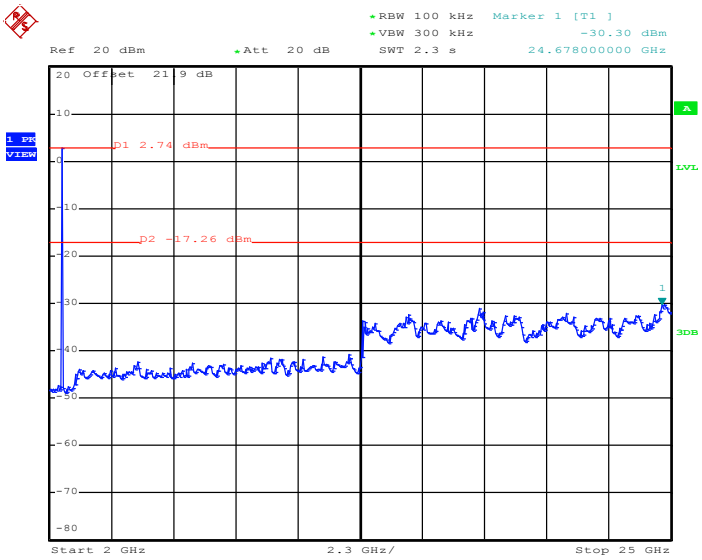
Test Mode :	3Mbps	**Temperature :**	24~26℃
Test Channel :	78	**Relative Humidity :**	48~51%
		Test Engineer :	Aking Chang

3Mbps CSE Plot on Ch 78 between 30MHz ~ 3 GHz



Date: 12.JAN.2017 06:25:30

3Mbps CSE Plot on Ch 78 between 2 GHz ~ 25 GHz



Date: 12.JAN.2017 06:27:32

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

The measuring equipment is listed in the section 4 of this test report.

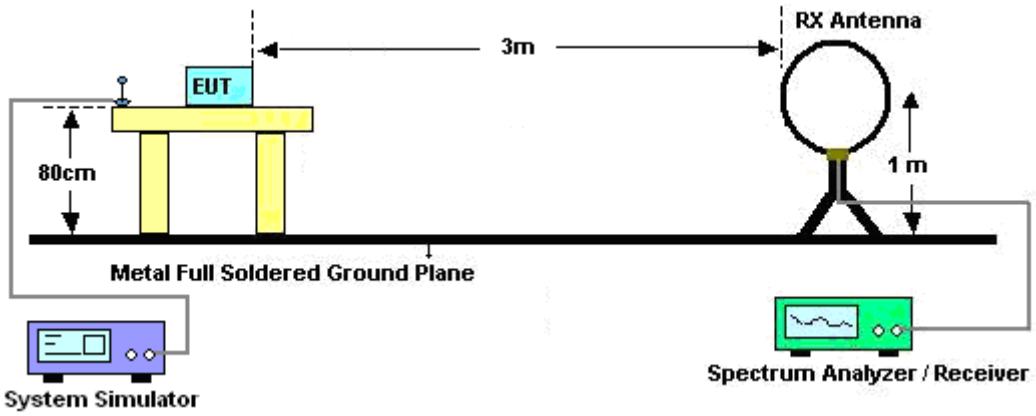
3.8.3 Test Procedures

1. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. 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.
4. Set to the maximum power setting and enable the EUT transmit continuously.
5. 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 Emission Level = Peak Emission Level + 20*log(Duty cycle)
6. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

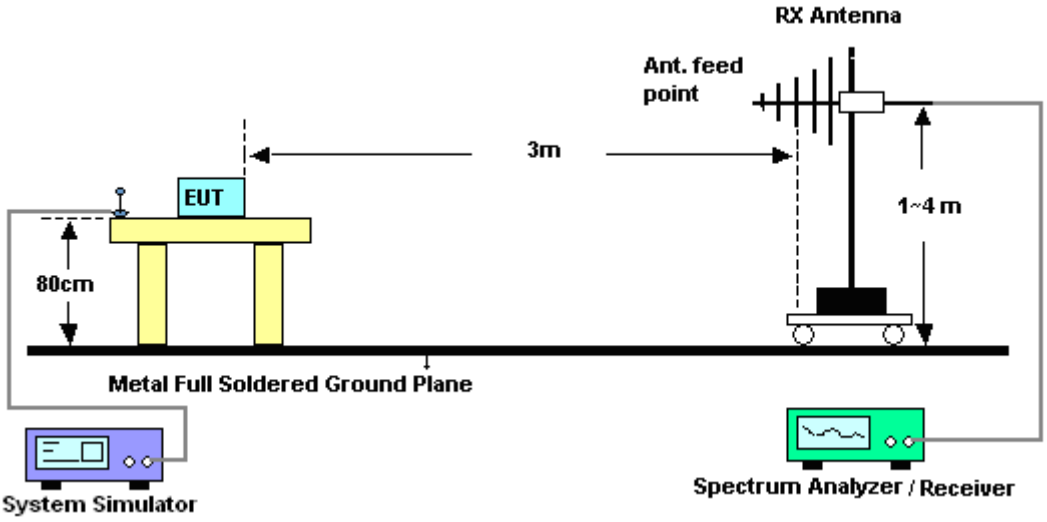
Note: The average levels were calculated from the peak level corrected with duty cycle correction factor (-24.76dB) derived from 20log (dwell time/100ms). This correction is only for signals that hop with the fundamental signal, such as band-edge and harmonic. Other spurious signals that are independent of the hopping signal would not use this correction.

3.8.4 Test Setup

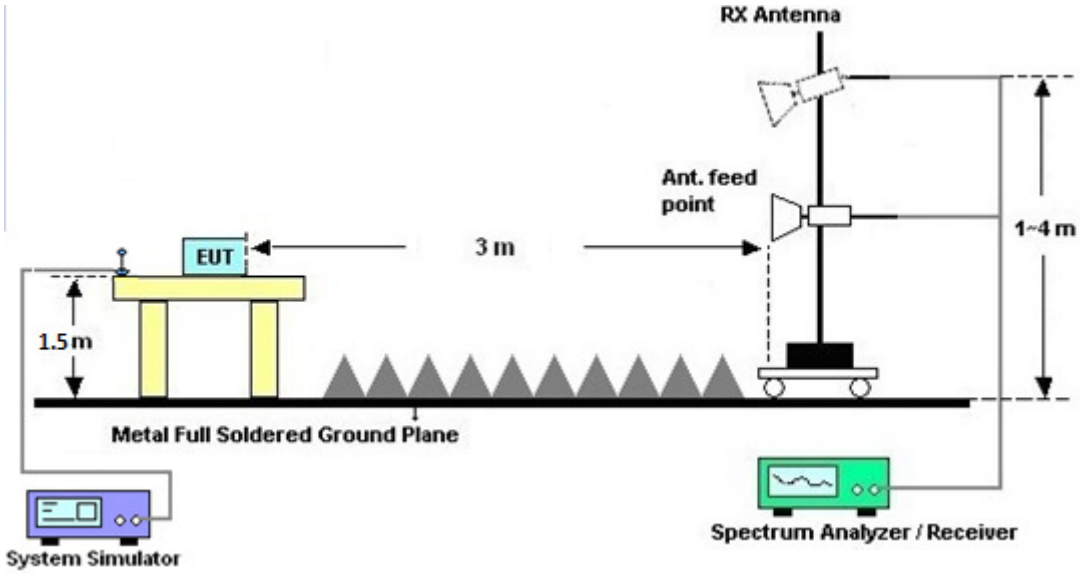
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



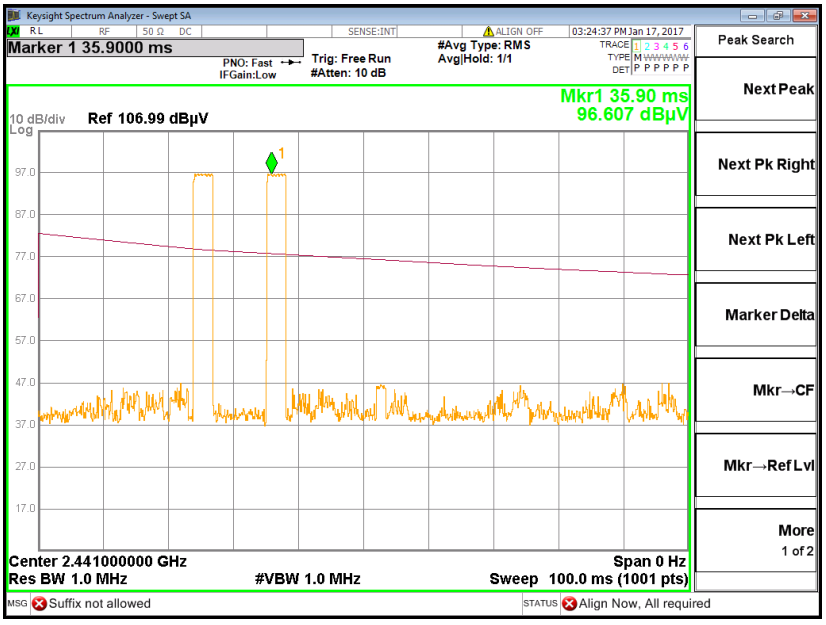
3.8.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

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

3DH5 on time (One Pulse) Plot on Channel 39

3DH5 on time (Count Pulses) Plot on Channel 39



Note:

1. Worst case Duty cycle = on time/100 milliseconds = 2 * 2.89 / 100 = 5.78 %
2. Worst case Duty cycle correction factor = 20*log(Duty cycle) = -24.76 dB
3. 3DH5 has the highest duty cycle worst case and is reported.

Duty Cycle Correction Factor Consideration for AFH mode:

Bluetooth normal hopping rate is 1600Hz and reduced to 800Hz in AFH mode; due to the reduced number of hopping frequencies, with the same packet configuration the dwell time in each channel frequency within 100msec period is longer in AFH mode than normal mode.

In AFH mode, the minimum hopping frequencies are 20, to get the longest dwell time DH5 packet is observed; the period to have DH5 packet completing one hopping sequence is

2.89 ms x 20 channels = 57.8 ms

There cannot be 2 complete hopping sequences within 100ms period, considering the random hopping behavior, maximum 2 hops can be possibly observed within the period. [100ms / 57.6ms] = 2 hops

Thus, the maximum possible ON time:

2.89 ms x 2 = 5.78 ms

Worst case Duty Cycle Correction factor, which is derived from the maximum possible ON time,

20 x log(5.78 ms/100ms) = -24.76 dB

3.8.7 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix A and B.

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

Please refer to Appendix A and B.

3.9 AC Conducted Emission Measurement

3.9.1 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 (dBμV)	
	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.

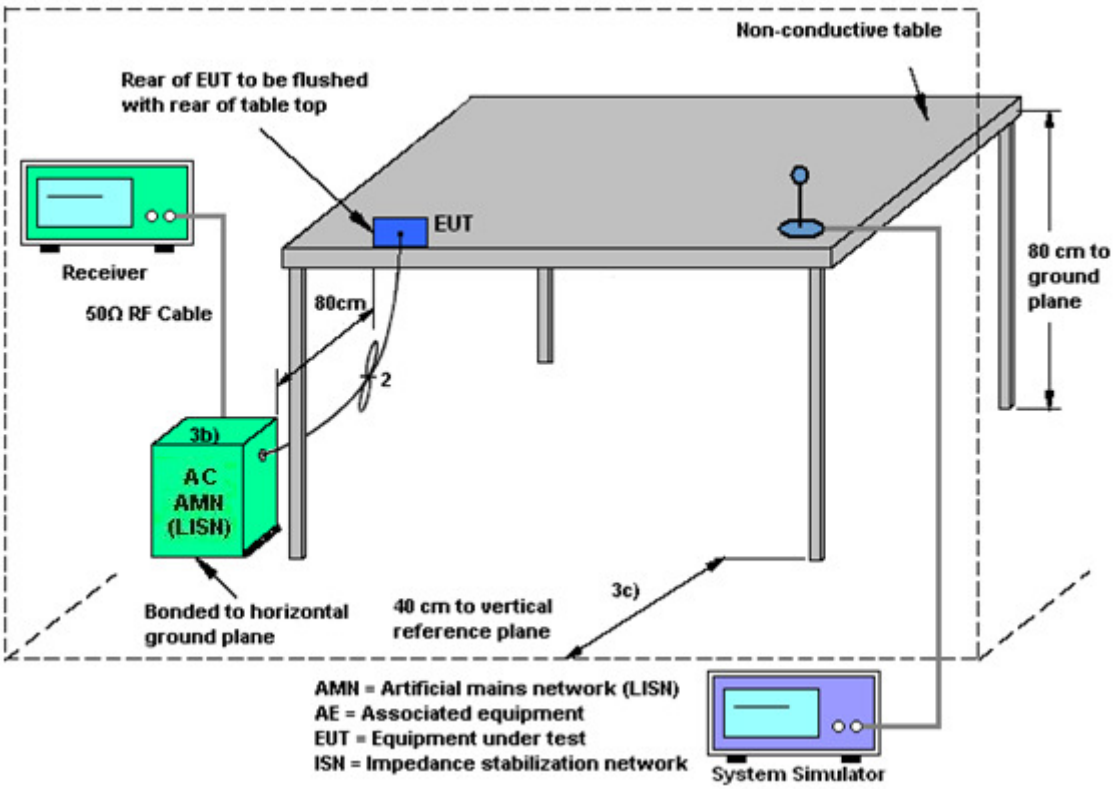
3.9.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.9.3 Test Procedures

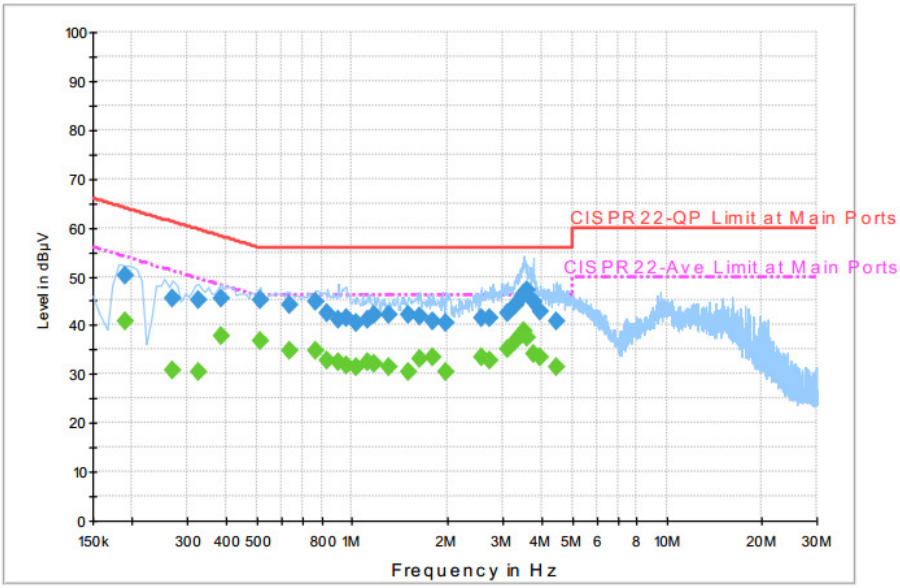
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.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

3.9.4 Test Setup



3.9.5 Test Result of AC Conducted Emission

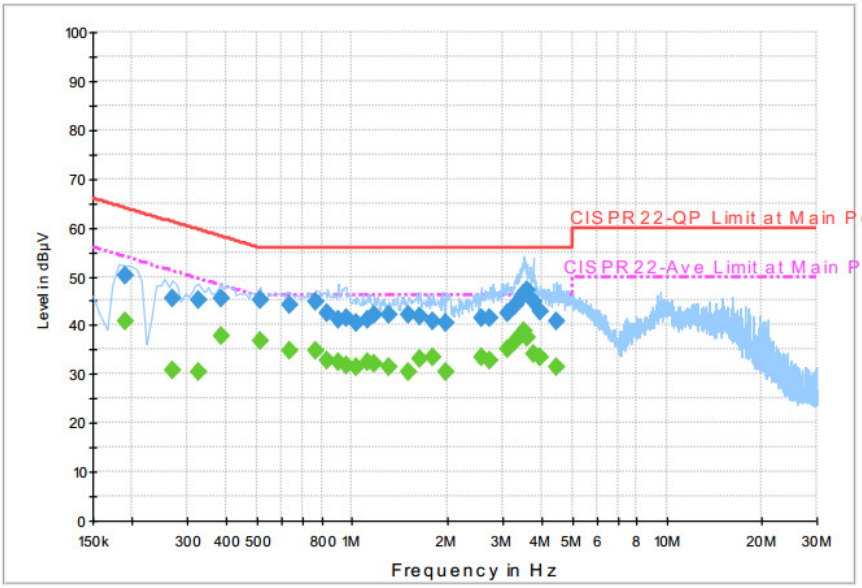
Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Arthur Hsieh	Relative Humidity :	51~53%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WCDMA Band V Idle + Bluetooth Link + WLAN (2.4GHz) Link + MPEG4 + Scanner + Snap-on 1 + RJ-45 Cable Link with Notebook + Adapter + SD Card for Sample 3		



Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.190000	50.0	Off	L1	19.6	14.0	64.0
0.270000	45.5	Off	L1	19.6	15.6	61.1
0.326000	45.0	Off	L1	19.6	14.6	59.6
0.382000	45.5	Off	L1	19.6	12.7	58.2
0.510000	45.0	Off	L1	19.6	11.0	56.0
0.630000	44.1	Off	L1	19.5	11.9	56.0
0.766000	44.8	Off	L1	19.6	11.2	56.0
0.838000	42.6	Off	L1	19.6	13.4	56.0
0.902000	41.2	Off	L1	19.6	14.8	56.0
0.958000	41.5	Off	L1	19.6	14.5	56.0
1.038000	40.4	Off	L1	19.6	15.6	56.0
1.118000	41.0	Off	L1	19.6	15.0	56.0
1.182000	42.1	Off	L1	19.6	13.9	56.0
1.310000	42.1	Off	L1	19.6	13.9	56.0
1.502000	42.2	Off	L1	19.6	13.8	56.0
1.646000	41.7	Off	L1	19.6	14.3	56.0

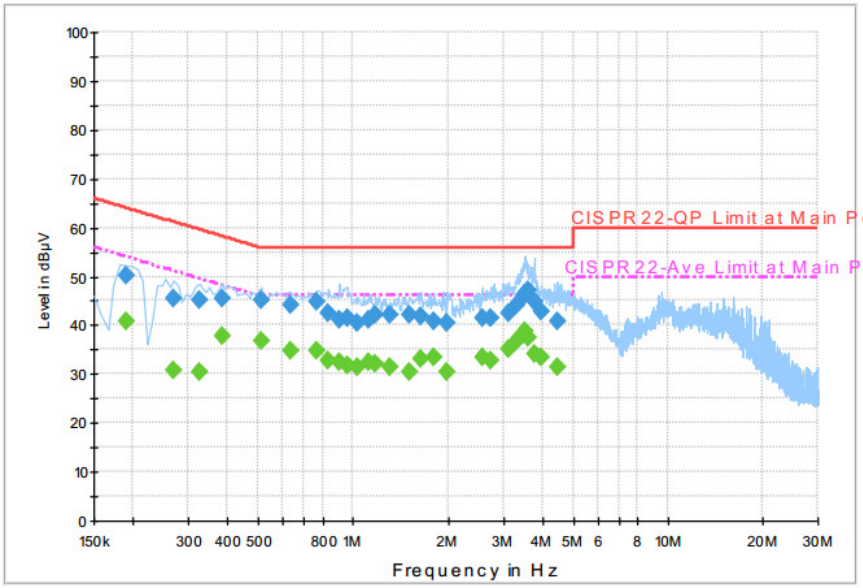
Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Arthur Hsieh	Relative Humidity :	51~53%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WCDMA Band V Idle + Bluetooth Link + WLAN (2.4GHz) Link + MPEG4 + Scanner + Snap-on 1 + RJ-45 Cable Link with Notebook + Adapter + SD Card for Sample 3		



Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
1.814000	40.6	Off	L1	19.6	15.4	56.0
1.990000	40.5	Off	L1	19.6	15.5	56.0
2.574000	41.4	Off	L1	19.2	14.6	56.0
2.734000	41.4	Off	L1	19.3	14.6	56.0
3.134000	42.6	Off	L1	19.5	13.4	56.0
3.318000	44.2	Off	L1	19.5	11.8	56.0
3.478000	45.9	Off	L1	19.5	10.1	56.0
3.526000	46.5	Off	L1	19.5	9.5	56.0
3.614000	47.2	Off	L1	19.5	8.8	56.0
3.758000	44.7	Off	L1	19.6	11.3	56.0
3.974000	42.8	Off	L1	19.6	13.2	56.0
4.462000	40.9	Off	L1	19.6	15.1	56.0

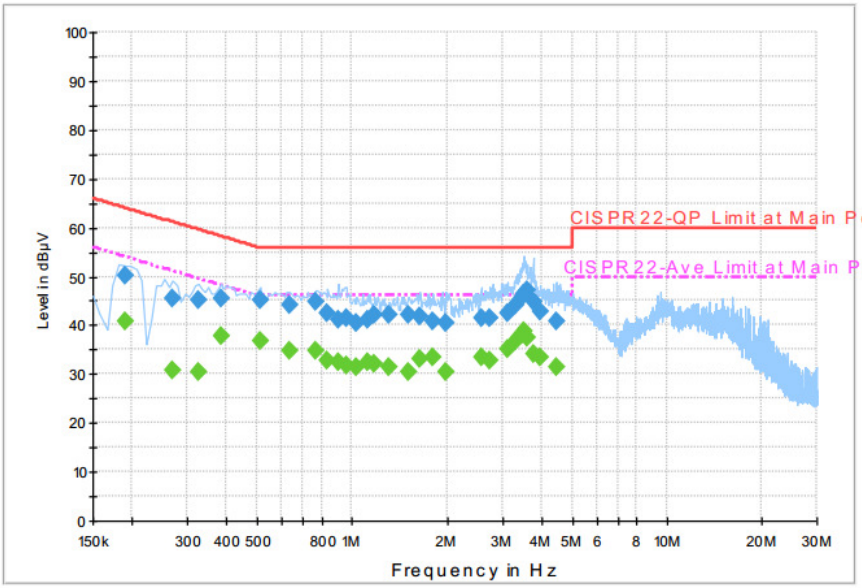
Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Arthur Hsieh	Relative Humidity :	51~53%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WCDMA Band V Idle + Bluetooth Link + WLAN (2.4GHz) Link + MPEG4 + Scanner + Snap-on 1 + RJ-45 Cable Link with Notebook + Adapter + SD Card for Sample 3		



Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.190000	40.7	Off	L1	19.6	13.3	54.0
0.270000	30.8	Off	L1	19.6	20.3	51.1
0.326000	30.5	Off	L1	19.6	19.1	49.6
0.382000	37.7	Off	L1	19.6	10.5	48.2
0.510000	36.7	Off	L1	19.6	9.3	46.0
0.630000	34.7	Off	L1	19.5	11.3	46.0
0.766000	34.9	Off	L1	19.6	11.1	46.0
0.838000	32.7	Off	L1	19.6	13.3	46.0
0.902000	32.4	Off	L1	19.6	13.6	46.0
0.958000	31.9	Off	L1	19.6	14.1	46.0
1.038000	31.3	Off	L1	19.6	14.7	46.0
1.118000	32.4	Off	L1	19.6	13.6	46.0
1.182000	32.0	Off	L1	19.6	14.0	46.0
1.310000	31.5	Off	L1	19.6	14.5	46.0
1.502000	30.4	Off	L1	19.6	15.6	46.0
1.646000	33.2	Off	L1	19.6	12.8	46.0

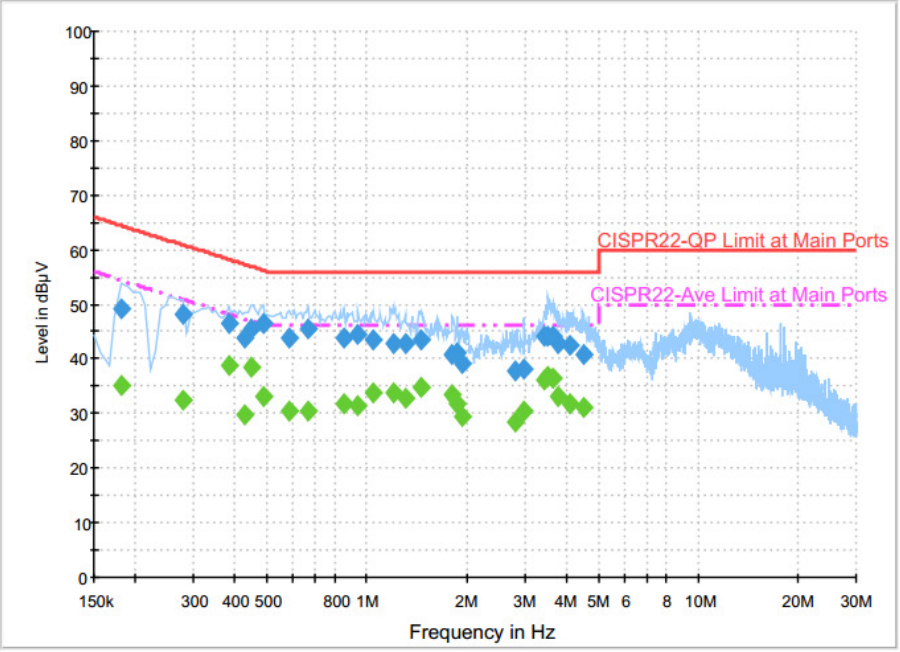
Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Arthur Hsieh	Relative Humidity :	51~53%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WCDMA Band V Idle + Bluetooth Link + WLAN (2.4GHz) Link + MPEG4 + Scanner + Snap-on 1 + RJ-45 Cable Link with Notebook + Adapter + SD Card for Sample 3		



Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
1.814000	33.6	Off	L1	19.6	12.4	46.0
1.990000	30.6	Off	L1	19.6	15.4	46.0
2.574000	33.4	Off	L1	19.2	12.6	46.0
2.734000	32.8	Off	L1	19.3	13.2	46.0
3.134000	35.0	Off	L1	19.5	11.0	46.0
3.318000	36.7	Off	L1	19.5	9.3	46.0
3.478000	38.1	Off	L1	19.5	7.9	46.0
3.526000	38.6	Off	L1	19.5	7.4	46.0
3.614000	37.5	Off	L1	19.5	8.5	46.0
3.758000	34.1	Off	L1	19.6	11.9	46.0
3.974000	33.4	Off	L1	19.6	12.6	46.0
4.462000	31.5	Off	L1	19.6	14.5	46.0

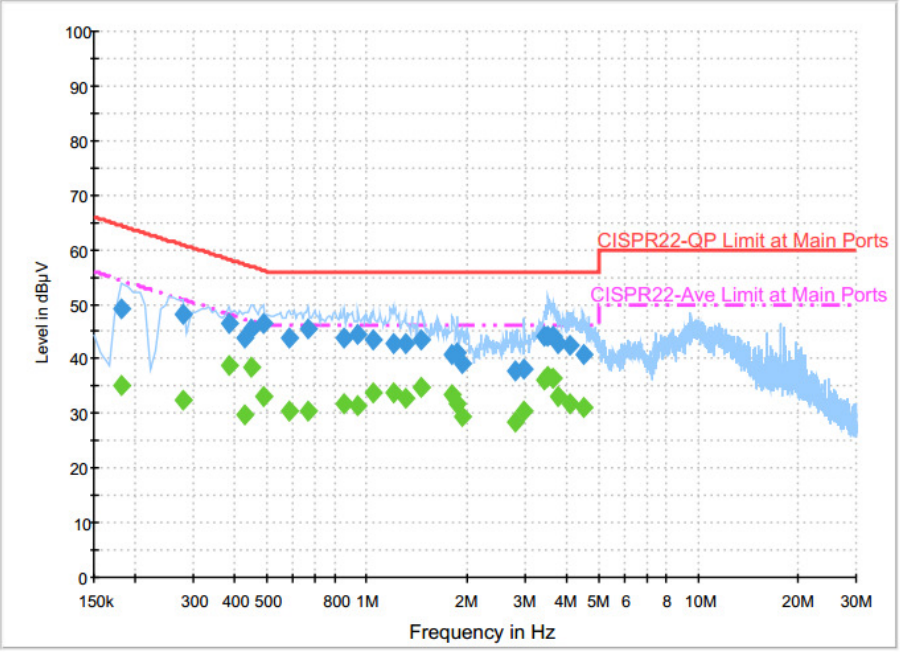
Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Arthur Hsieh	Relative Humidity :	51~53%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WCDMA Band V Idle + Bluetooth Link + WLAN (2.4GHz) Link + MPEG4 + Scanner + Snap-on 1 + RJ-45 Cable Link with Notebook + Adapter + SD Card for Sample 3		



Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.182000	49.0	Off	N	19.5	15.4	64.4
0.278000	48.2	Off	N	19.5	12.7	60.9
0.382000	46.4	Off	N	19.5	11.8	58.2
0.430000	43.8	Off	N	19.5	13.5	57.3
0.446000	45.6	Off	N	19.5	11.3	56.9
0.486000	46.4	Off	N	19.6	9.8	56.2
0.582000	43.8	Off	N	19.5	12.2	56.0
0.662000	45.4	Off	N	19.5	10.6	56.0
0.854000	43.9	Off	N	19.5	12.1	56.0
0.942000	44.4	Off	N	19.5	11.6	56.0

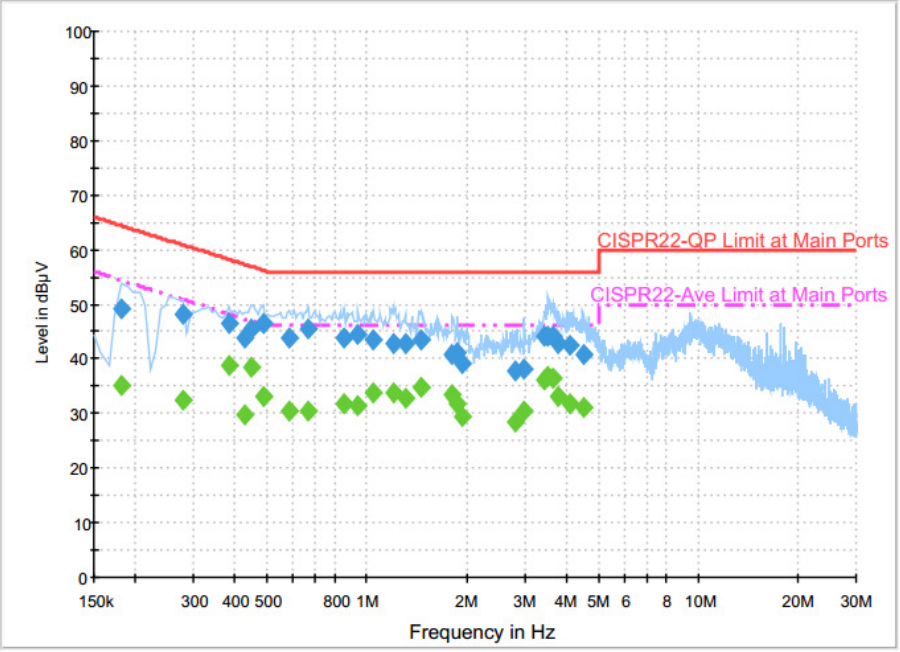
Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Arthur Hsieh	Relative Humidity :	51~53%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WCDMA Band V Idle + Bluetooth Link + WLAN (2.4GHz) Link + MPEG4 + Scanner + Snap-on 1 + RJ-45 Cable Link with Notebook + Adapter + SD Card for Sample 3		



Final Result : Quasi-Peak

Frequency (MHz)	Quasi-Peak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
1.046000	43.3	Off	N	19.6	12.7	56.0
1.198000	42.9	Off	N	19.6	13.1	56.0
1.302000	42.8	Off	N	19.6	13.2	56.0
1.454000	43.4	Off	N	19.6	12.6	56.0
1.814000	40.9	Off	N	19.6	15.1	56.0
1.870000	41.1	Off	N	19.6	14.9	56.0
1.950000	39.2	Off	N	19.6	16.8	56.0
2.814000	37.9	Off	N	19.4	18.1	56.0
2.990000	38.2	Off	N	19.4	17.8	56.0
3.454000	44.1	Off	N	19.5	11.9	56.0
3.534000	44.0	Off	N	19.5	12.0	56.0
3.630000	44.2	Off	N	19.5	11.8	56.0
3.782000	42.7	Off	N	19.6	13.3	56.0
4.102000	42.6	Off	N	19.6	13.4	56.0
4.518000	40.9	Off	N	19.6	15.1	56.0

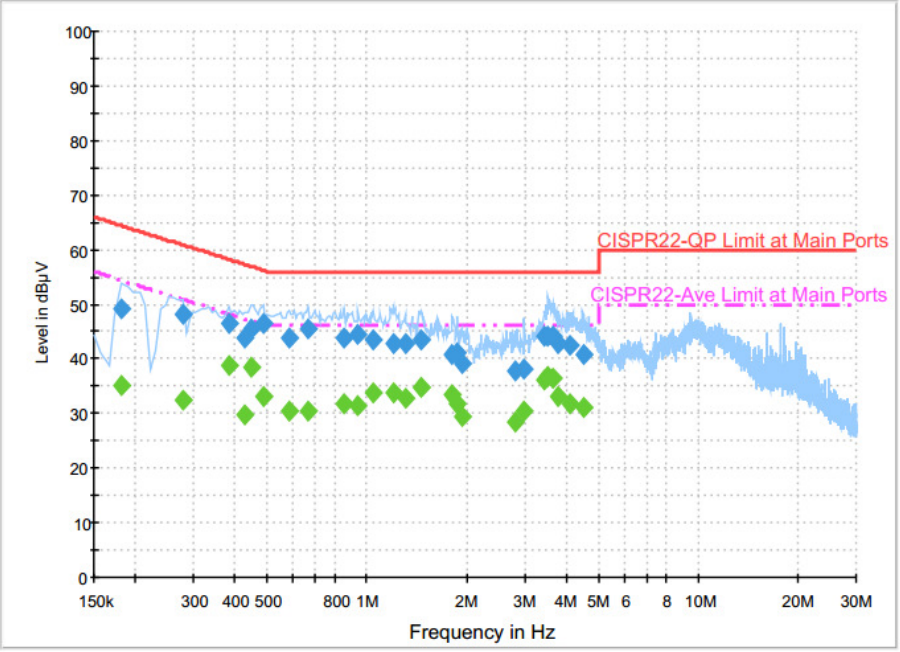
Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Arthur Hsieh	Relative Humidity :	51~53%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WCDMA Band V Idle + Bluetooth Link + WLAN (2.4GHz) Link + MPEG4 + Scanner + Snap-on 1 + RJ-45 Cable Link with Notebook + Adapter + SD Card for Sample 3		



Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.182000	35.0	Off	N	19.5	19.4	54.4
0.278000	32.6	Off	N	19.5	18.3	50.9
0.382000	38.9	Off	N	19.5	9.3	48.2
0.430000	29.7	Off	N	19.5	17.6	47.3
0.446000	38.4	Off	N	19.5	8.5	46.9
0.486000	33.2	Off	N	19.6	13.0	46.2
0.582000	30.5	Off	N	19.5	15.5	46.0
0.662000	30.6	Off	N	19.5	15.4	46.0
0.854000	31.8	Off	N	19.5	14.2	46.0
0.942000	31.3	Off	N	19.5	14.7	46.0

Test Mode :	Mode 1	Temperature :	21~23℃
Test Engineer :	Arthur Hsieh	Relative Humidity :	51~53%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WCDMA Band V Idle + Bluetooth Link + WLAN (2.4GHz) Link + MPEG4 + Scanner + Snap-on 1 + RJ-45 Cable Link with Notebook + Adapter + SD Card for Sample 3		



Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
1.046000	33.9	Off	N	19.6	12.1	46.0
1.198000	33.6	Off	N	19.6	12.4	46.0
1.302000	32.7	Off	N	19.6	13.3	46.0
1.454000	34.9	Off	N	19.6	11.1	46.0
1.814000	33.3	Off	N	19.6	12.7	46.0
1.870000	31.9	Off	N	19.6	14.1	46.0
1.950000	29.3	Off	N	19.6	16.7	46.0
2.814000	28.4	Off	N	19.4	17.6	46.0
2.990000	30.4	Off	N	19.4	15.6	46.0
3.454000	36.0	Off	N	19.5	10.0	46.0
3.534000	36.9	Off	N	19.5	9.1	46.0
3.630000	36.5	Off	N	19.5	9.5	46.0
3.782000	33.2	Off	N	19.6	12.8	46.0
4.102000	31.9	Off	N	19.6	14.1	46.0
4.518000	31.0	Off	N	19.6	15.0	46.0

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 Anti-Replacement Construction

An embedded-in antenna design is used.

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

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Power Meter	Agilent	E4416A	GB41292344	300MHz~40GHz	Dec. 26, 2016	Jan. 10, 2017 ~ Jan. 12, 2017	Dec. 25, 2017	Conducted (TH05-HY)
Power Sensor	Agilent	E9327A	US40441548	300MHz~40GHz	Dec. 26, 2016	Jan. 10, 2017 ~ Jan. 12, 2017	Dec. 25, 2017	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz-40GHz	Jul. 17, 2016	Jan. 10, 2017 ~ Jan. 12, 2017	Jul. 16, 2017	Conducted (TH05-HY)
BT Base Station (Measure)	Rohde & Schwarz	CBT	101136	BT 3.0	Sep. 21, 2016	Jan. 10, 2017 ~ Jan. 12, 2017	Sep. 20, 2017	Conducted (TH05-HY)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Nov. 10, 2016	Jan. 17, 2017 ~ Feb. 02, 2017	Nov. 09, 2017	Radiation (03CH11-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Sep. 02, 2015	Jan. 17, 2017 ~ Feb. 02, 2017	Sep. 01, 2017	Radiation (03CH11-HY)
Bilog Antenna	TESEQ	CBL 6111D	35414	30MHz~1GHz	Oct. 15, 2016	Jan. 17, 2017 ~ Feb. 02, 2017	Oct. 14, 2017	Radiation (03CH11-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1522	1GHz ~ 18GHz	Mar. 30, 2016	Jan. 17, 2017 ~ Feb. 02, 2017	Mar. 31, 2017	Radiation (03CH11-HY)
Preamplifier	Keysight	83017A	MY53270080	1GHz~26.5GHz	Nov. 10, 2016	Jan. 17, 2017 ~ Feb. 02, 2017	Nov. 09, 2017	Radiation (03CH11-HY)
Spectrum Analyzer	Keysight	N9010A	MY52350276	10Hz ~ 44GHZ	Mar. 21, 2016	Jan. 17, 2017 ~ Feb. 02, 2017	Mar. 20, 2017	Radiation (03CH11-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Jan. 17, 2017 ~ Feb. 02, 2017	N/A	Radiation (03CH11-HY)
Turn Table	EMEC	TT 2000	N/A	0~360 Degree	N/A	Jan. 17, 2017 ~ Feb. 02, 2017	N/A	Radiation (03CH11-HY)
Preamplifier	MITEQ	TTA0204	1872107	2GHz~40GHz	Feb. 15, 2016	Jan. 17, 2017 ~ Feb. 02, 2017	Feb. 14, 2017	Radiation (03CH11-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Nov. 08, 2016	Jan. 17, 2017 ~ Feb. 02, 2017	Nov. 07, 2017	Radiation (03CH11-HY)
AC Power Source	ChainTek	APC-1000W	N/A	N/A	N/A	Jan. 17, 2017	N/A	Conduction (CO05-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz~7GHz	Aug. 30, 2016	Jan. 17, 2017	Aug. 29, 2017	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 29, 2016	Jan. 17, 2017	Nov. 28, 2017	Conduction (CO05-HY)

5 Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	2.7

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

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.2

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.5

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.2

Appendix A. Radiated Spurious Emission

Test Engineer :	Jacky Hung and Ken Wu	Temperature :	20~24°C
		Relative Humidity :	50~54%

2.4GHz 2400~2483.5MHz

BT (Band Edge @ 3m)

BT	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
BT CH00 2402MHz		2340.345	49.25	-24.75	74	47	27.03	8.82	33.6	389	313	P	H
		2340.345	-24.76	-78.76	54	-	-	-	-	-	-	A	H
	*	2402	100.05	-	-	97.56	27.19	8.89	33.59	389	313	P	H
	*	2402	75.29	-	-	-	-	-	-	-	-	A	H
													H
													H
		2390	55.59	-18.41	74	53.1	27.19	8.89	33.59	282	356	P	V
		2390	30.83	-23.17	54	-	-	-	-	-	-	A	V
	*	2402	103.61	-	-	101.12	27.19	8.89	33.59	282	356	P	V
	*	2402	78.85	-	-	-	-	-	-	-	-	A	V
													V
													V
BT CH 39 2441MHz		2375.52	43.91	-30.09	74	41.55	27.14	8.82	33.6	383	311	P	H
		2375.52	19.15	-34.85	54	-	-	-	-	-	-	A	H
	*	2441	99.31	-	-	96.61	27.34	8.94	33.58	383	311	P	H
	*	2441	74.55	-	-	-	-	-	-	-	-	A	H
		2492.51	44.04	-29.96	74	41.13	27.5	8.98	33.57	383	311	P	H
		2492.51	19.28	-34.72	54	-	-	-	-	-	-	A	H
		2365.16	43.6	-30.4	74	41.29	27.09	8.82	33.6	262	339	P	V
		2365.16	18.84	-35.16	54	-	-	-	-	-	-	A	V
	*	2441	104.75	-	-	102.05	27.34	8.94	33.58	262	339	P	V
	*	2441	79.99	-	-	-	-	-	-	-	-	A	V
		2484.32	44	-30	74	41.15	27.45	8.98	33.58	262	339	P	V
		2484.32	19.24	-34.76	54	-	-	-	-	-	-	A	V

BT CH 78 2480MHz	*	2480	98.3	-	-	95.45	27.45	8.98	33.58	390	299	P	H
	*	2480	73.54	-	-	-	-	-	-	-	-	A	H
		2483.6	53.64	-20.36	74	50.79	27.45	8.98	33.58	390	299	P	H
		2483.6	28.88	-25.12	54	-	-	-	-	-	-	A	H
													H
													H
	*	2480	103.61	-	-	100.76	27.45	8.98	33.58	201	354	P	V
	*	2480	78.85	-	-	-	-	-	-	-	-	A	V
		2485.4	57.9	-16.1	74	55.05	27.45	8.98	33.58	201	354	P	V
		2485.4	33.14	-20.86	54	-	-	-	-	-	-	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

2.4GHz 2400~2483.5MHz

BT (Harmonic @ 3m)

BT	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BT CH 00 2402MHz		4804	31.64	-42.36	74	40.42	31.66	10.65	51.09	100	0	P	H
		4804	6.88	-47.12	54	-	-	-	-	-	-	A	H
													H
													H
		4804	34.17	-39.83	74	42.95	31.66	10.65	51.09	100	0	P	V
		4804	9.41	-44.59	54	-	-	-	-	-	-	A	V
													V
													V
BT CH 39 2441MHz		4882	33.74	-40.26	74	42.14	31.78	10.88	51.06	100	0	P	H
		4882	8.98	-45.02	54	-	-	-	-	-	-	A	H
		7323	37.12	-36.88	74	37.55	37.29	12.79	50.51	100	0	P	H
		7323	12.36	-41.64	54	-	-	-	-	-	-	A	H
		4882	34.34	-39.66	74	42.74	31.78	10.88	51.06	100	0	P	V
		4882	9.58	-44.42	54	-	-	-	-	-	-	A	V
		7323	36.44	-37.56	74	36.87	37.29	12.79	50.51	100	0	P	V
		7323	11.68	-42.32	54	-	-	-	-	-	-	A	V
BT CH 78 2480MHz		4960	34.55	-39.45	74	42.52	31.94	11.12	51.03	100	0	P	H
		4960	9.79	-44.21	54	-	-	-	-	-	-	A	H
		7440	37.62	-36.38	74	37.81	37.44	12.88	50.51	100	0	P	H
		7440	12.86	-41.14	54	-	-	-	-	-	-	A	H
		4960	35.07	-38.93	74	43.04	31.94	11.12	51.03	100	0	P	V
		4960	10.31	-43.69	54	-	-	-	-	-	-	A	V
		7440	37.4	-36.6	74	37.59	37.44	12.88	50.51	100	0	P	V
		7440	12.64	-41.36	54	-	-	-	-	-	-	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

2.4GHz BT (LF)

BT	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz BT LF		31.62	22.67	-17.33	40	29.21	24.66	1.29	32.49	-	-	P	H
		49.44	18.06	-21.94	40	33.93	15.33	1.29	32.49	-	-	P	H
		167.16	16.78	-26.72	43.5	31.33	16.2	2	32.75	-	-	P	H
		722.8	28.86	-17.14	46	30.09	27.15	4.02	32.4	-	-	P	H
		811	30.26	-15.74	46	29.69	28.43	4.26	32.12	-	-	P	H
		950.3	33.17	-12.83	46	29.08	30.6	4.69	31.2	169	315	P	H
													H
													H
													H
													H
													H
													H
		32.7	35.23	-4.77	40	42.29	24.14	1.29	32.49	233	167	P	V
		38.1	30.12	-9.88	40	39.9	21.42	1.29	32.49	-	-	P	V
		50.52	28.85	-11.15	40	45.15	14.9	1.29	32.49	-	-	P	V
		727	29.11	-16.89	46	30.23	27.25	4.02	32.39	-	-	P	V
		829.9	30.88	-15.12	46	29.85	28.66	4.39	32.02	-	-	P	V
		934.9	32.41	-13.59	46	28.93	30.19	4.63	31.34	-	-	P	V
													V
													V
													V
													V
													V
													V

Remark

1. No other spurious found.
2. All results are PASS against limit line.

Note symbol

*	**Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is **over limit** line.
P/A	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBµV/m)	(dB)	(dBµV/m)	(dBµV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBµV/m) =

Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBµV) - Preamp Factor(dB)

2. Over Limit(dB) = Level(dBµV/m) – Limit Line(dBµV/m)

For Peak Limit @ 2390MHz:

1. Level(dBµV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBµV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBµV) – 35.86 (dB)

= 55.45 (dBµV/m)

2. Over Limit(dB)

= Level(dBµV/m) – Limit Line(dBµV/m)

= 55.45(dBµV/m) – 74(dBµV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBµV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBµV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBµV) – 35.86 (dB)

= 43.54 (dBµV/m)

2. Over Limit(dB)

= Level(dBµV/m) – Limit Line(dBµV/m)

= 43.54(dBµV/m) – 54(dBµV/m)

= -10.46(dB)

Both peak and average measured complies with the limit line, so test result is "PASS".

Appendix B. Radiated Spurious Emission Plots

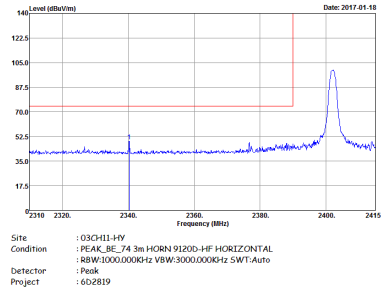
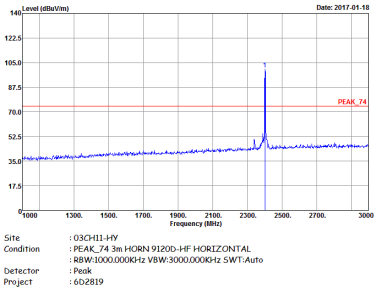
Test Engineer :	Jacky Hung and Ken Wu	Temperature :	20~24°C
		Relative Humidity :	50~54%

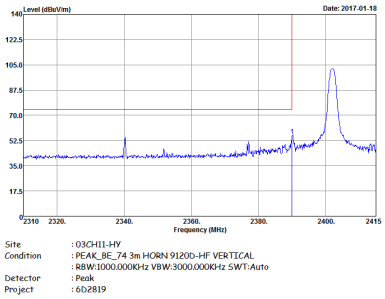
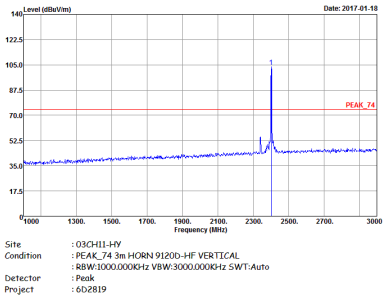
Note symbol

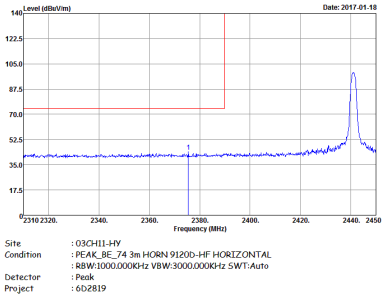
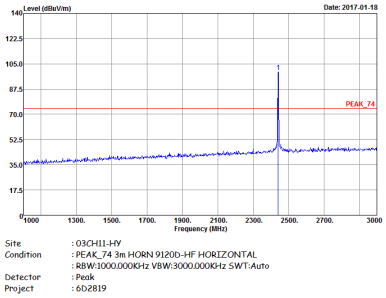
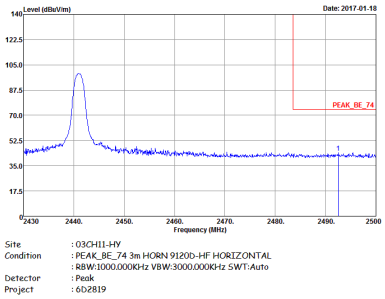
-L	**Low channel location**
-R	**High channel location**

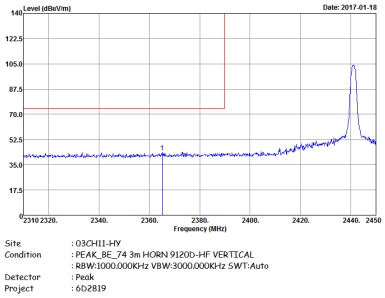
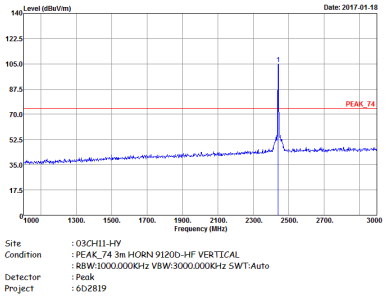
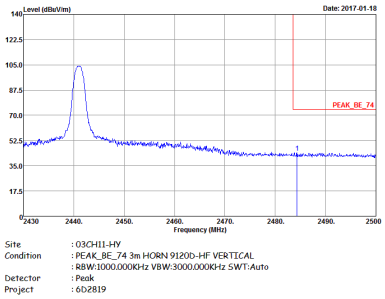
2.4GHz 2400~2483.5MHz

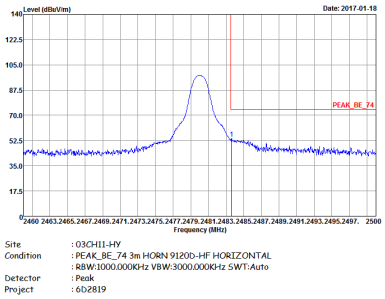
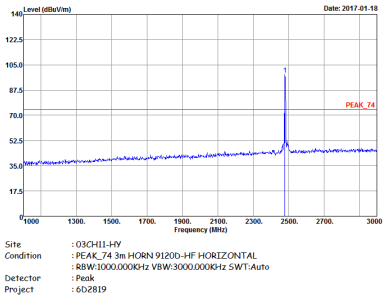
BT (Band Edge @ 3m)

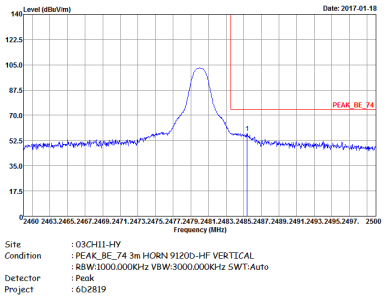
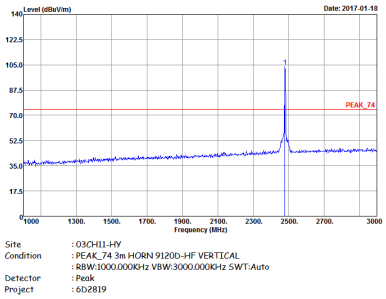
BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH00 2402MHz	
1	Horizontal	Fundamental
Peak		

BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH00 2402MHz	
1	Vertical	Fundamental
Peak		

BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH39 2441MHz	
1	Horizontal	Fundamental
Peak		
Peak		Left blank

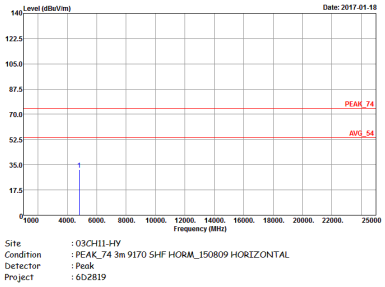
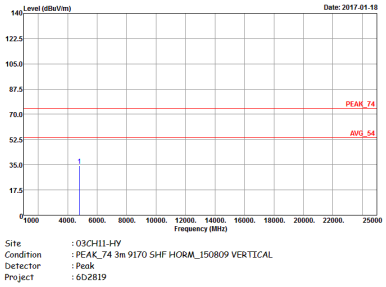
BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH39 2441MHz	
1	Vertical	Fundamental
Peak		
Peak		Left blank

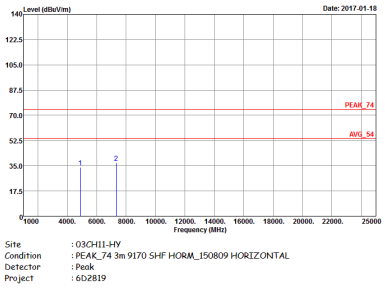
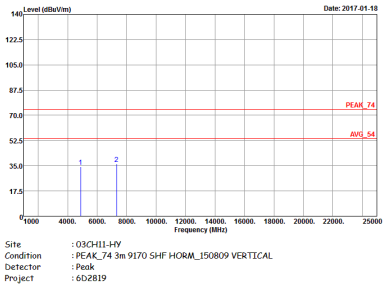
BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH78 2480MHz	
1	Horizontal	Fundamental
Peak		

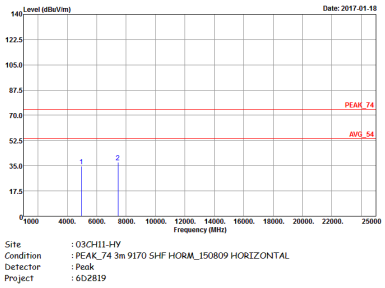
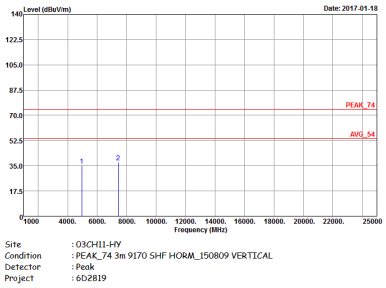
BT	2.4GHz 2400~2483.5MHz Band Edge @ 3m	
ANT	BT CH78 2480MHz	
1	Vertical	Fundamental
Peak		

2.4GHz 2400~2483.5MHz

BT (Harmonic @ 3m)

BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH00 2402MHz	
1	Horizontal	Vertical
Peak Avg.		

BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH39 2441MHz	
1	Horizontal	Vertical
Peak Avg.		

BT	2.4GHz 2400~2483.5MHz Harmonic @ 3m	
ANT	BT CH78 2480MHz	
1	Horizontal	Vertical
Peak Avg.		

Emission below 1GHz

2.4GHz BT (LF)

BT	2.4GHz 2400~2483.5MHz	
ANT	BT LF	
1	Horizontal	Vertical
QP / Peak