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# FCC Test Report

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Report No.: AGC02866150301FE04

**FCC ID** : 2AEJ9FREEDOM  
**APPLICATION PURPOSE** : Original Equipment  
**PRODUCT DESIGNATION** : GSM/WCDMA Mobile Phone  
**BRAND NAME** : N/A  
**MODEL NAME** : Freedom  
**CLIENT** : Digit Secure India Private Limited  
**DATE OF ISSUE** : Apr.24, 2015  
**STANDARD(S)** : FCC Part 15.247  
**TEST PROCEDURE(S)** : KDB 558074 v03r02  
**REPORT VERSION** : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd



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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Apr.24, 2015	Valid	Original Report

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## 1. VERIFICATION OF CONFORMITY

<b>Applicant</b>	Digit Secure India Private Limited
<b>Address</b>	Plot No-1303&1304, 4th Floor, Khanamet, HiTech City, Ayappa Society, Madhapur, Hyderabad, Telangana, India
<b>Manufacturer</b>	SHENZHEN HSEM TECHNOLOGY CO., LTD.
<b>Address</b>	4TH FLOOR, 5 PLANTS, TONGFUYU INDUSTRIAL, TAOYUAN STREET, NANSHAN DISTRICT, SHENZHEN P.R. CHINA
<b>Product Designation</b>	GSM/WCDMA Mobile Phone
<b>Brand Name</b>	N/A
<b>Test Model</b>	Freedom
<b>Date of test</b>	Apr.17, 2015 to Apr.23, 2015
<b>Deviation</b>	None
<b>Condition of Test Sample</b>	Normal
<b>Report Template</b>	AGCRT-US-BGN/RF

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2003) and the energy emitted by the sample EUT tested as described in this report is in compliance with requirement of FCC Part 15 Rules requirement.

Prepared By

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Apr.24, 2015

Checked By

*Kidd Yang*

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Apr.24, 2015

Authorized By

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Apr.24, 2015

## 2. GENERAL INFORMATION

### 2.1. PRODUCT DESCRIPTION

The EUT is designed as “GSM/WCDMA Mobile Phone”. It is designed by way of utilizing the DSSS and OFDM technology to achieve the system operation.

A major technical description of EUT is described as following

<b>Operation Frequency</b>	2.412 GHz~2.462GHz
<b>Output Power</b>	IEEE 802.11b:10.48dBm; IEEE 802.11g:8.53dBm; IEEE 802.11n(20):8.25dBm; IEEE 802.11n(40):6.73dBm
<b>Modulation</b>	DSSS(DBPSK/DQPSK/CCK);OFDM(BPSK/QPSK/16-QAM/64-QAM)
<b>Number of channels</b>	11
<b>Hardware Version</b>	DX01_MB_P2_V01
<b>Software Version</b>	ALPS.KK1.MP1.V2.11
<b>Antenna Designation</b>	Integrated Antenna
<b>Antenna Gain</b>	0.7dBi
<b>Power Supply</b>	DC3.7V by Built-in Li-ion Battery

### 2.2. TABLE OF CARRIER FREQUENCIES

Frequency Band	Channel Number	Frequency
2400~2483.5MHZ	1	2412 MHZ
	2	2417 MHZ
	3	2422 MHZ
	4	2427 MHZ
	5	2432 MHZ
	6	2437 MHZ
	7	2442 MHZ
	8	2447 MHZ
	9	2452 MHZ
	10	2457 MHZ
	11	2462 MHZ

Note: For 20MHZ bandwidth system use Channel 1 to Channel 11  
For 40MHZ bandwidth system use Channel 3 to Channel 9

### 2.3. IEEE 802.11N MODULATION SCHEME

MCS Index	Nss	Modulation	R	NBPSC	NCBPS		NDBPS		Data rate(Mbps)	
									800nsGI	
					20MHz	40MHz	20MHz	40MHz	20MHz	40MHz
0	1	BPSK	1/2	1	52	108	26	54	6.5	13.5
1	1	QPSK	1/2	2	104	216	52	108	13.0	27.0
2	1	QPSK	3/4	2	104	216	78	162	19.5	40.5
3	1	16-QAM	1/2	4	208	432	104	216	26.0	54.0
4	1	16-QAM	3/4	4	208	432	156	324	39.0	81.0
5	1	64-QAM	2/3	6	312	648	208	432	52.0	108.0
6	1	64-QAM	3/4	6	312	648	234	489	58.5	121.5
7	1	64-QAM	5/6	6	312	648	260	540	65.0	135.0

Symbol	Explanation
NSS	Number of spatial streams
R	Code rate
NBPSC	Number of coded bits per single carrier
NCBPS	Number of coded bits per symbol
NDBPS	Number of data bits per symbol
GI	Guard interval

### 2.4. RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2AEJ9FREEDOM** filing to comply with the FCC Part 15 requirements.

### 2.5. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4 (2003).

Radiated testing was performed at an antenna to EUT distance 3 meters.

Others testing (listed at item 5.3) was performed according to the procedures in FCC Part 15.247 rules KDB 558074 D01 DTS Meas Guidance v03r02.

### 2.6. SPECIAL ACCESSORIES

Refer to section 5.2.

## **2.7. EQUIPMENT MODIFICATIONS**

Not available for this EUT intended for grant.



### 3. MEASUREMENT UNCERTAINTY

Conducted measurement: +/- 2.75dB

Radiated measurement: +/- 3.2dB

### 4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Low channel TX
2	Middle channel TX
3	High channel TX
4	Normal operating

Note:

Transmit by 802.11b with Data rate (1/2/5.5/11)

Transmit by 802.11g with Data rate (6/9/12/18/24/36/48/54)

Transmit by 802.11n (20MHz) with Data rate (6.5/13/19.5/26/39/52/58.5/65)

Transmit by 802.11n (40MHz) with Data rate

(13.5/27/40.5/54/81/108/121.5/135)

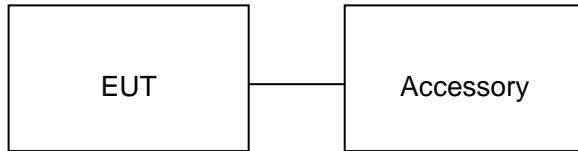
**Note:**

1. The EUT has been set to operate continuously on the lowest, middle and highest operation frequency Individually, and the eut is operating at its maximum duty cycle>or equal 98%
2. All modes under which configure applicable have been tested and the worst mode test data recording in the test report, if no other mode data.
3. For Radiated Emission, 3axis were chosen for testing for each applicable mode.

## 5. SYSTEM TEST CONFIGURATION

### 5.1. CONFIGURATION OF EUT SYSTEM

Configure:



### 5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	GSM/WCDMA Mobile Phone	Freedom	FCC ID: 2AE18E5FREEDOM	EUT
2	Adapter	Freedom	5V 2000mA	Accessory
3	USB Cable	Freedom	N/A	Accessory
4	Laptop	Dell	INSPIRON	A.E

Note: All the accessories have been used during the test in conduction emission test.

### 5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.247	Output Power	Compliant
§15.247	6 dB Bandwidth	Compliant
§15.247	Conducted Spurious Emission	Compliant
§15.247	Maximum Conducted Output Power SPECTRAL Density	Compliant
§15.209	Radiated Emission	Compliant
§15.247	Band Edges	Compliant
§15.207	Line Conduction Emission	Compliant

**Note:** The EUT received power from DC3.7V lithium battery.

## 6. TEST FACILITY

<b>Site</b>	Compliance Certification Services (Shenzhen) Inc.
<b>Location</b>	No.10-1 Mingkeda Logistics park, No.18, Huanguan South Rd.,Guan Lan Town, Baoan District, Shenzhen, China
<b>Description</b>	Test Firm Registration Number: 441872

## TEST EQUIPMENT LIST

Description	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Power Sensor	R&S	NRP-Z23	100323	07/25/2014	07/24/2015
PC	HP	4-1220TX	MY45100361	--	--
RF attenuator	N/A	RFA20db	68	N/A	N/A
Spectrum Analyzer	Agilent	E4440A	US41421290	02/17/2015	02/16/2016
Amplifier	EM	EM30180	0607030	02/17/2015	02/16/2016
Horn Antenna	EM	EM-AH-10180	67	02/17/2015	02/16/2016
Horn Antenna	A.H. Systems Inc.	SAS-574	--	07/25/2014	07/24/2015
EMI Test Receiver	Rohde & Schwarz	ESCI	100694	07/25/2014	07/24/2015
WIDEBAND FREQUENCY ANTENNA	SCHWARZBECK	VULB9168	26	08/16/2014	08/15/2015
Loop Antenna	A.H.	SAS-526B	264	05/10/2014	05/09/2015
LISN	R&S	ESH3-Z5	8389791009	07/25/2014	07/24/2015
Radiation Cable 1	Sat	RE1	R003	06/04/2014	06/03/2015
Radiation Cable 2	Sat	RE2	R002	06/04/2014	06/03/2015
Conduction Cable	Sat	CE1	C001	06/04/2014	06/03/2015

Radiated Emission Test Site 966(2)					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
PSA Series Spectrum Analyzer	Agilent	E4446A	US44300399	03/01/2015	03/01/2016
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	03/09/2015	03/08/2016
Amplifier	MITEQ	AM-1604-3000	1123808	03/18/2015	03/17/2016
High Noise Amplifier	Agilent	8449B	3008A01838	03/18/2015	03/17/2016
Board-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170-497	07/10/2014	07/09/2015
Bilog Antenna	SCHAFFNER	CBL6143	5082	03/01/2015	03/01/2016
Horn Antenna	SCHWARZBECK	BBHA9120	D286	03/01/2015	03/01/2016
Loop Antenna	COM-POWER	AL-130	121044	09/27/2014	09/26/2015
Turn Table	N/A	N/A	N/A	N.C.R	N.C.R
Controller	Sunol Sciences	SC104V	022310-1	N.C.R	N.C.R
Controller	CT	N/A	N/A	N.C.R	N.C.R
Temp. / Humidity Meter	Anymetre	JR913	N/A	02/28/2015	02/27/2016
Antenna Tower	SUNOL	TLT2	N/A	N.C.R	N.C.R
Test S/W	FARAD	LZ-RF / CCS-SZ-3A2			

Conducted Emission Test Site					
Name of Equipment	Manufacturer	Model Number	Serial Number	Last Calibration	Due Calibration
EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI	100783	03/09/2015	03/08/2016
LISN(EUT)	ROHDE&SCHWARZ	ENV216	101543-WX	03/09/2015	03/08/2016
LISN	EMCO	3825/2	8901-1459	03/09/2015	03/08/2016
Temp. / Humidity Meter	VICTOR	HTC-1	N/A	03/04/2015	03/03/2016
Test S/W	FARAD	EZ-EMC/ CCS-3A1-CE			

## **7. OUTPUT POWER**

### **7.1. MEASUREMENT PROCEDURE**

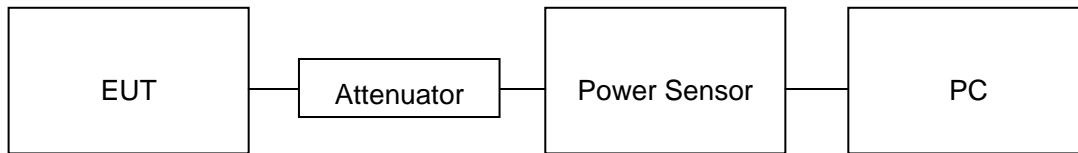
For max average conducted output power test:

1. Connect EUT RF output port to power probe through an RF attenuator.
2. Connect the power probe to the PC.
3. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
4. Record the maximum power from the software.

**Note :** The EUT was tested according to KDB 558074v03r02 for compliance to FCC 47CFR 15.247 requirements.

## 7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

### AVERAGE POWER SETUP



### 7.3. LIMITS AND MEASUREMENT RESULT

<b>TEST ITEM</b>	OUTPUT POWER
<b>TEST MODE</b>	802.11b with data rate 1

Frequency (GHz)	Average Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	10.48	30	Pass
2.437	10.43	30	Pass
2.462	10.39	30	Pass

<b>TEST ITEM</b>	OUTPUT POWER
<b>TEST MODE</b>	802.11g with data rate 6

Frequency (GHz)	Average Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	8.53	30	Pass
2.437	8.44	30	Pass
2.462	8.39	30	Pass

<b>TEST ITEM</b>	OUTPUT POWER
<b>TEST MODE</b>	802.11n 20 with data rate 6.5

Frequency (GHz)	Average Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	8.25	30	Pass
2.437	8.18	30	Pass
2.462	8.14	30	Pass

<b>TEST ITEM</b>	OUTPUT POWER
<b>TEST MODE</b>	802.11n 40 with data rate 13.5

<b>Frequency (GHz)</b>	<b>Average Power (dBm)</b>	<b>Applicable Limits (dBm)</b>	<b>Pass or Fail</b>
2.422	6.73	30	Pass
2.437	6.66	30	Pass
2.452	6.63	30	Pass



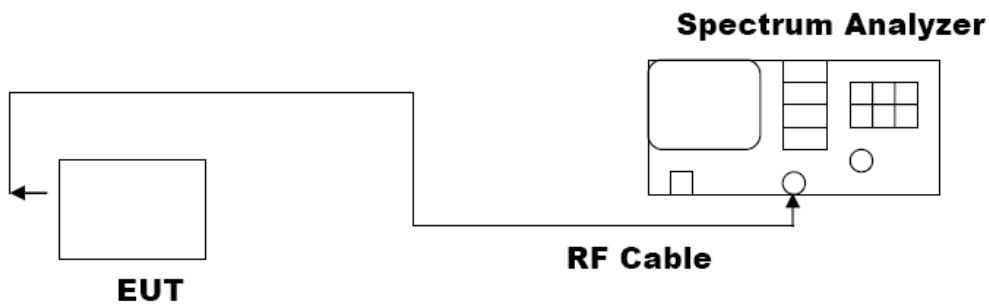
## 8. 6DB BANDWIDTH

### 8.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set SPA Centre Frequency = Operation Frequency, RBW= 100 KHz, VBW $\geq 3 \times$  RBW.
4. Set SPA Trace 1 Max hold, then View.

**Note:** The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

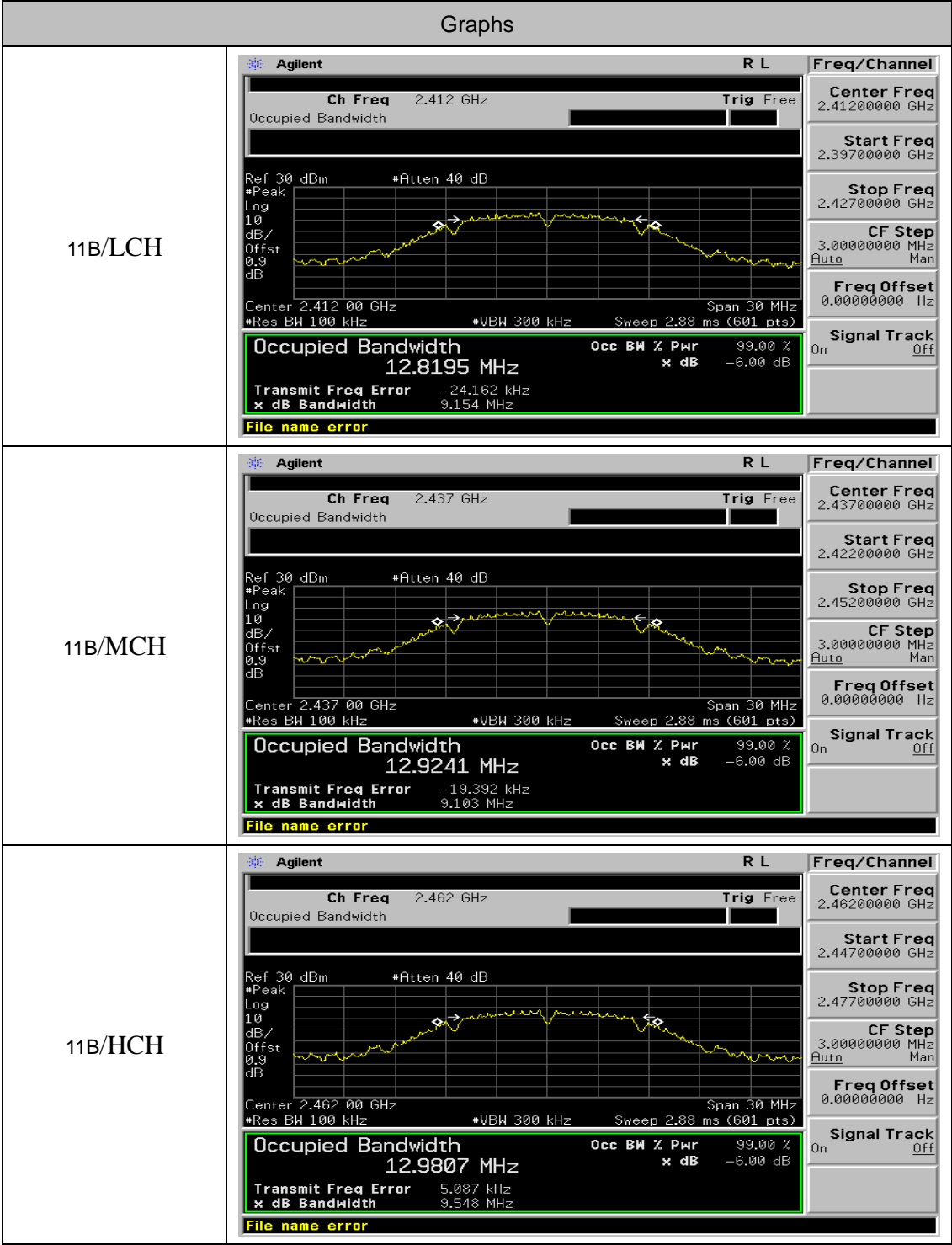
### 8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



### 8.3. LIMITS AND MEASUREMENT RESULTS

Mode	Channel	6dB Bandwidth [MHz]	OBW [MHz]	Verdict
11B	LCH	9.15	12.82	PASS
11B	MCH	9.10	12.92	PASS
11B	HCH	9.55	12.98	PASS
11G	LCH	13.81	16.37	PASS
11G	MCH	15.09	16.39	PASS
11G	HCH	14.84	16.36	PASS
11N20SISO	LCH	16.01	17.54	PASS
11N20SISO	MCH	13.34	17.54	PASS
11N20SISO	HCH	15.71	17.53	PASS
11N40SISO	LCH	34.30	35.76	PASS
11N40SISO	MCH	33.99	35.82	PASS
11N40SISO	HCH	35.17	35.81	PASS

Test Graph



11G/LCH	<div><div><div>Agilent</div><div>R L</div><div>Freq/Channel</div><div>Ch Freq 2.412 GHz</div><div>Trig Free</div><div>Occupied Bandwidth</div><div>Ref 30 dBm</div><div>*Atten 40 dB</div><div>*Peak</div><div>Log</div><div>10</div><div>dB/</div><div>Offst</div><div>0.9</div><div>dB</div><div>Center 2.412 00 GHz</div><div>*Res BW 100 kHz</div><div>*VBW 300 kHz</div><div>Sweep 2.88 ms (601 pts)</div><div>Span 30 MHz</div><div>Occupied Bandwidth</div><div>16.3694 MHz</div><div>Occ BW % Pwr</div><div>99.00 %</div><div>x dB</div><div>-6.00 dB</div><div>Transmit Freq Error</div><div>1.462 kHz</div><div>x dB Bandwidth</div><div>13.810 MHz</div><div>File name error</div></div></div>
11G/MCH	<div><div><div>Agilent</div><div>R T</div><div>Freq/Channel</div><div>Ch Freq 2.437 GHz</div><div>Trig Free</div><div>Occupied Bandwidth</div><div>Ref 30 dBm</div><div>*Atten 40 dB</div><div>*Peak</div><div>Log</div><div>10</div><div>dB/</div><div>Offst</div><div>0.9</div><div>dB</div><div>Center 2.437 00 GHz</div><div>*Res BW 100 kHz</div><div>*VBW 300 kHz</div><div>Sweep 2.88 ms (601 pts)</div><div>Span 30 MHz</div><div>Occupied Bandwidth</div><div>16.3931 MHz</div><div>Occ BW % Pwr</div><div>99.00 %</div><div>x dB</div><div>-6.00 dB</div><div>Transmit Freq Error</div><div>-9.948 kHz</div><div>x dB Bandwidth</div><div>15.087 MHz</div><div>File name error</div></div></div>
11G/HCH	<div><div><div>Agilent</div><div>R L</div><div>Freq/Channel</div><div>Ch Freq 2.462 GHz</div><div>Trig Free</div><div>Occupied Bandwidth</div><div>Ref 30 dBm</div><div>*Atten 40 dB</div><div>*Peak</div><div>Log</div><div>10</div><div>dB/</div><div>Offst</div><div>0.9</div><div>dB</div><div>Center 2.462 00 GHz</div><div>*Res BW 100 kHz</div><div>*VBW 300 kHz</div><div>Sweep 2.88 ms (601 pts)</div><div>Span 30 MHz</div><div>Occupied Bandwidth</div><div>16.3585 MHz</div><div>Occ BW % Pwr</div><div>99.00 %</div><div>x dB</div><div>-6.00 dB</div><div>Transmit Freq Error</div><div>-2.344 kHz</div><div>x dB Bandwidth</div><div>14.840 MHz</div><div>File name error</div></div></div>

11N20SISO/LCH	<div><div><div>Agilent</div><div>R L</div><div>Freq/Channel</div><div>Ch Freq 2.412 GHz</div><div>Trig Free</div><div>Occupied Bandwidth</div><div>Ref 30 dBm</div><div>*Atten 40 dB</div><div>*Peak</div><div>Log</div><div>10</div><div>dB/</div><div>Offst</div><div>0.9</div><div>dB</div><div>Center 2.412 00 GHz</div><div>*Res BW 100 kHz</div><div>*VBW 300 kHz</div><div>Sweep 2.88 ms (601 pts)</div><div>Span 30 MHz</div><div>Occupied Bandwidth</div><div>17.5436 MHz</div><div>Occ BW % Pwr</div><div>99.00 %</div><div>x dB</div><div>-6.00 dB</div><div>Transmit Freq Error</div><div>-7.456 kHz</div><div>x dB Bandwidth</div><div>16.009 MHz</div><div>File name error</div></div><div><div>Center Freq</div><div>2.41200000 GHz</div><div>Start Freq</div><div>2.39700000 GHz</div><div>Stop Freq</div><div>2.42700000 GHz</div><div>CF Step</div><div>3.00000000 MHz</div><div>Auto</div><div>Man</div><div>Freq Offset</div><div>0.00000000 Hz</div><div>Signal Track</div><div>On</div><div>Off</div></div></div>
11N20SISO/MCH	<div><div><div>Agilent</div><div>R T</div><div>Freq/Channel</div><div>Ch Freq 2.437 GHz</div><div>Trig Free</div><div>Occupied Bandwidth</div><div>Ref 30 dBm</div><div>*Atten 40 dB</div><div>*Peak</div><div>Log</div><div>10</div><div>dB/</div><div>Offst</div><div>0.9</div><div>dB</div><div>Center 2.437 00 GHz</div><div>*Res BW 100 kHz</div><div>*VBW 300 kHz</div><div>Sweep 2.88 ms (601 pts)</div><div>Span 30 MHz</div><div>Occupied Bandwidth</div><div>17.5414 MHz</div><div>Occ BW % Pwr</div><div>99.00 %</div><div>x dB</div><div>-6.00 dB</div><div>Transmit Freq Error</div><div>2.959 kHz</div><div>x dB Bandwidth</div><div>13.336 MHz</div><div>File name error</div></div><div><div>Center Freq</div><div>2.43700000 GHz</div><div>Start Freq</div><div>2.42200000 GHz</div><div>Stop Freq</div><div>2.45200000 GHz</div><div>CF Step</div><div>3.00000000 MHz</div><div>Auto</div><div>Man</div><div>Freq Offset</div><div>0.00000000 Hz</div><div>Signal Track</div><div>On</div><div>Off</div></div></div>
11N20SISO/HCH	<div><div><div>Agilent</div><div>R L</div><div>Freq/Channel</div><div>Ch Freq 2.462 GHz</div><div>Trig Free</div><div>Occupied Bandwidth</div><div>Ref 30 dBm</div><div>*Atten 40 dB</div><div>*Peak</div><div>Log</div><div>10</div><div>dB/</div><div>Offst</div><div>0.9</div><div>dB</div><div>Center 2.462 00 GHz</div><div>*Res BW 100 kHz</div><div>*VBW 300 kHz</div><div>Sweep 2.88 ms (601 pts)</div><div>Span 30 MHz</div><div>Occupied Bandwidth</div><div>17.5322 MHz</div><div>Occ BW % Pwr</div><div>99.00 %</div><div>x dB</div><div>-6.00 dB</div><div>Transmit Freq Error</div><div>3.660 kHz</div><div>x dB Bandwidth</div><div>15.715 MHz</div><div>File name error</div></div><div><div>Center Freq</div><div>2.46200000 GHz</div><div>Start Freq</div><div>2.44700000 GHz</div><div>Stop Freq</div><div>2.47700000 GHz</div><div>CF Step</div><div>3.00000000 MHz</div><div>Auto</div><div>Man</div><div>Freq Offset</div><div>0.00000000 Hz</div><div>Signal Track</div><div>On</div><div>Off</div></div></div>

11N40SISO/LCH	<div><div><div>Agilent</div><div>R L</div><div>Freq/Channel</div><div>Ch Freq 2.422 GHz</div><div>Trig Free</div><div>Occupied Bandwidth</div><div>Ref 30 dBm</div><div>*Atten 40 dB</div><div>*Peak</div><div>Log</div><div>10</div><div>dB/</div><div>Offst</div><div>0.9</div><div>dB</div><div>Center 2.422 00 GHz</div><div>*Res BW 100 kHz</div><div>*VBW 300 kHz</div><div>Sweep 5.76 ms (601 pts)</div><div>Span 60 MHz</div><div>Occupied Bandwidth 35.7598 MHz</div><div>Occ BW % Pwr 99.00 %</div><div>x dB -6.00 dB</div><div>Transmit Freq Error -47.718 kHz</div><div>x dB Bandwidth 34.299 MHz</div><div>File name error</div></div><div><div>Center Freq 2.42200000 GHz</div><div>Start Freq 2.39200000 GHz</div><div>Stop Freq 2.45200000 GHz</div><div>CF Step 6.00000000 MHz</div><div>Auto Man</div><div>Freq Offset 0.00000000 Hz</div><div>Signal Track On Off</div></div></div>
11N40SISO/MCH	<div><div><div>Agilent</div><div>R T</div><div>Freq/Channel</div><div>Ch Freq 2.437 GHz</div><div>Trig Free</div><div>Occupied Bandwidth</div><div>Ref 30 dBm</div><div>*Atten 40 dB</div><div>*Peak</div><div>Log</div><div>10</div><div>dB/</div><div>Offst</div><div>0.9</div><div>dB</div><div>Center 2.437 00 GHz</div><div>*Res BW 100 kHz</div><div>*VBW 300 kHz</div><div>Sweep 5.76 ms (601 pts)</div><div>Span 60 MHz</div><div>Occupied Bandwidth 35.8217 MHz</div><div>Occ BW % Pwr 99.00 %</div><div>x dB -6.00 dB</div><div>Transmit Freq Error -57.010 kHz</div><div>x dB Bandwidth 33.990 MHz</div><div>File name error</div></div><div><div>Center Freq 2.43700000 GHz</div><div>Start Freq 2.40700000 GHz</div><div>Stop Freq 2.46700000 GHz</div><div>CF Step 6.00000000 MHz</div><div>Auto Man</div><div>Freq Offset 0.00000000 Hz</div><div>Signal Track On Off</div></div></div>
11N40SISO/HCH	<div><div><div>Agilent</div><div>R L</div><div>Freq/Channel</div><div>Ch Freq 2.452 GHz</div><div>Trig Free</div><div>Occupied Bandwidth</div><div>Ref 30 dBm</div><div>*Atten 40 dB</div><div>*Peak</div><div>Log</div><div>10</div><div>dB/</div><div>Offst</div><div>0.9</div><div>dB</div><div>Center 2.452 00 GHz</div><div>*Res BW 100 kHz</div><div>*VBW 300 kHz</div><div>Sweep 5.76 ms (601 pts)</div><div>Span 60 MHz</div><div>Occupied Bandwidth 35.8077 MHz</div><div>Occ BW % Pwr 99.00 %</div><div>x dB -6.00 dB</div><div>Transmit Freq Error -24.108 kHz</div><div>x dB Bandwidth 35.167 MHz</div><div>File name error</div></div><div><div>Center Freq 2.45200000 GHz</div><div>Start Freq 2.42200000 GHz</div><div>Stop Freq 2.48200000 GHz</div><div>CF Step 6.00000000 MHz</div><div>Auto Man</div><div>Freq Offset 0.00000000 Hz</div><div>Signal Track On Off</div></div></div>

## 9. CONDUCTED SPURIOUS EMISSION

### 9.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set SPA Trace 1 Max hold, then View.

**Note:** The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

Owing to satisfy the requirements of the number of measurement points, we set the RBW=1MHz, VBW>RBW, scan up through 10th harmonic, and consider the tested results as the worst case, if the tested results conform to the requirement, we can deem that the real tested results(set the RBW=100KHz, VBW>RBW) are conform to the requirement.

### 9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 8.2.

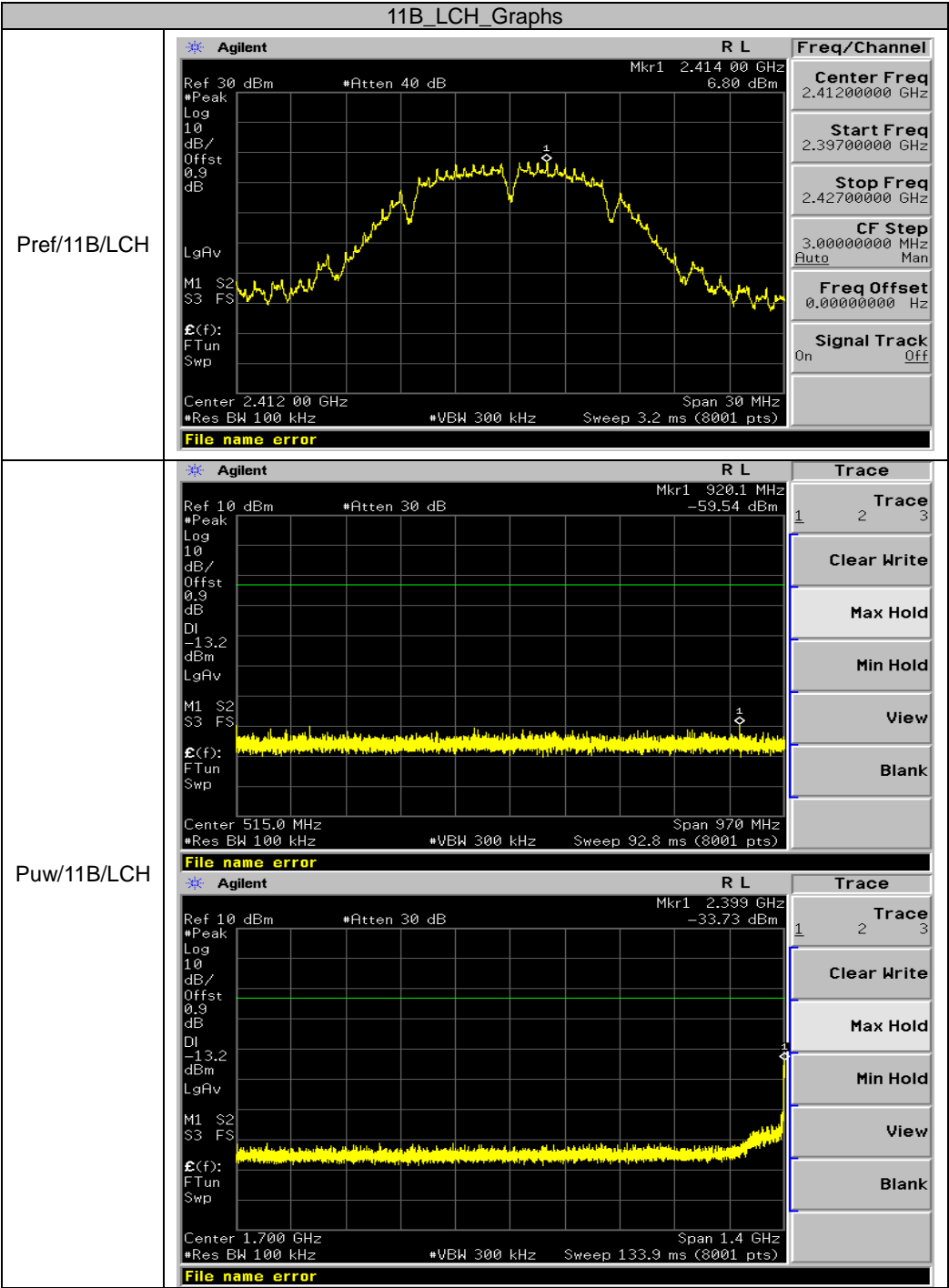
### 9.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6.

### 9.4. LIMITS AND MEASUREMENT RESULT

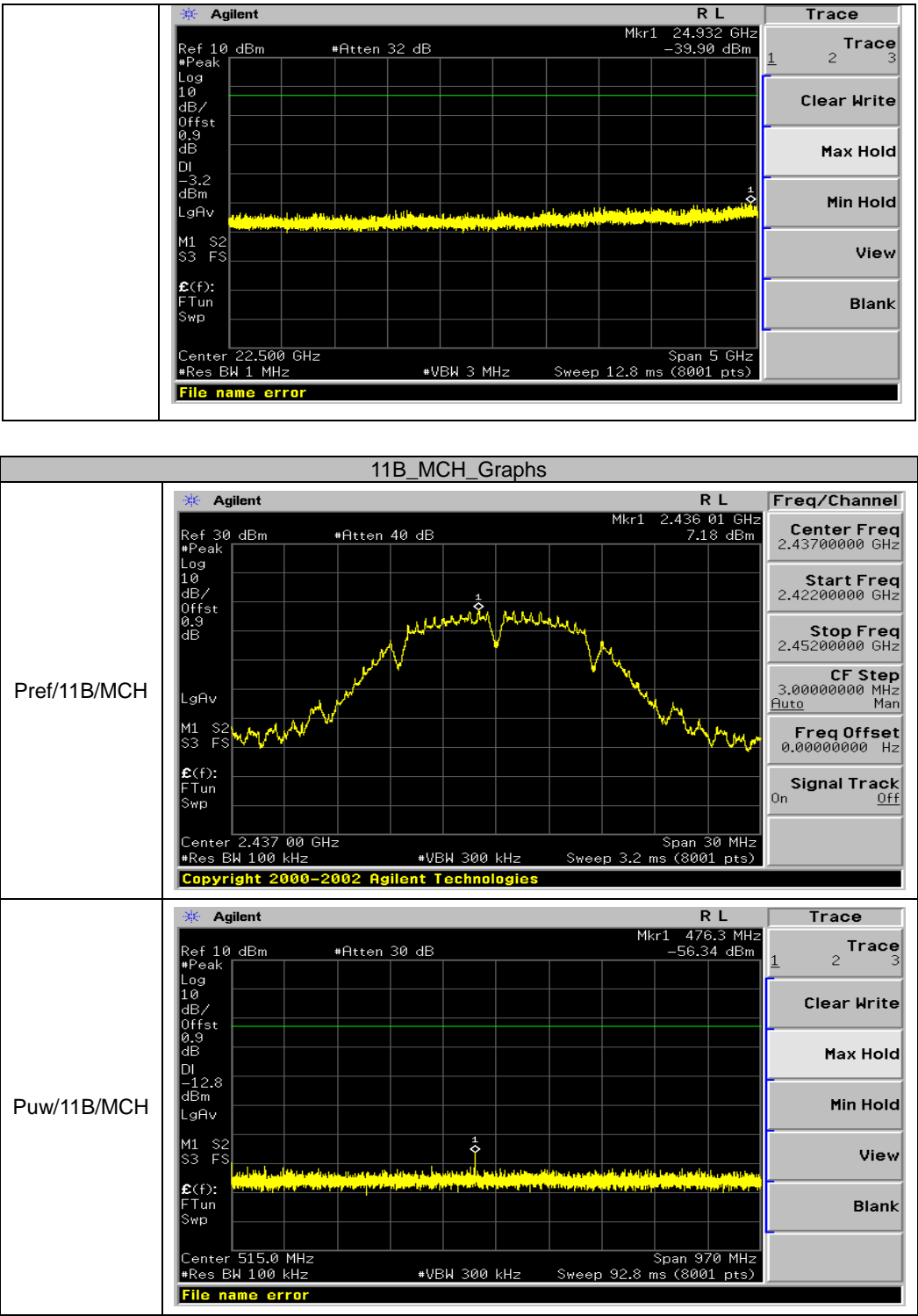
LIMITS AND MEASUREMENT RESULT		
Applicable Limits	Measurement Result	
	Test Data	Criteria
In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power. In addition, radiation emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in§15.209(a))	At least -20dBc than the limit Specified on the BOTTOM Channel	PASS
	At least -20dBc than the limit Specified on the TOP Channel	PASS

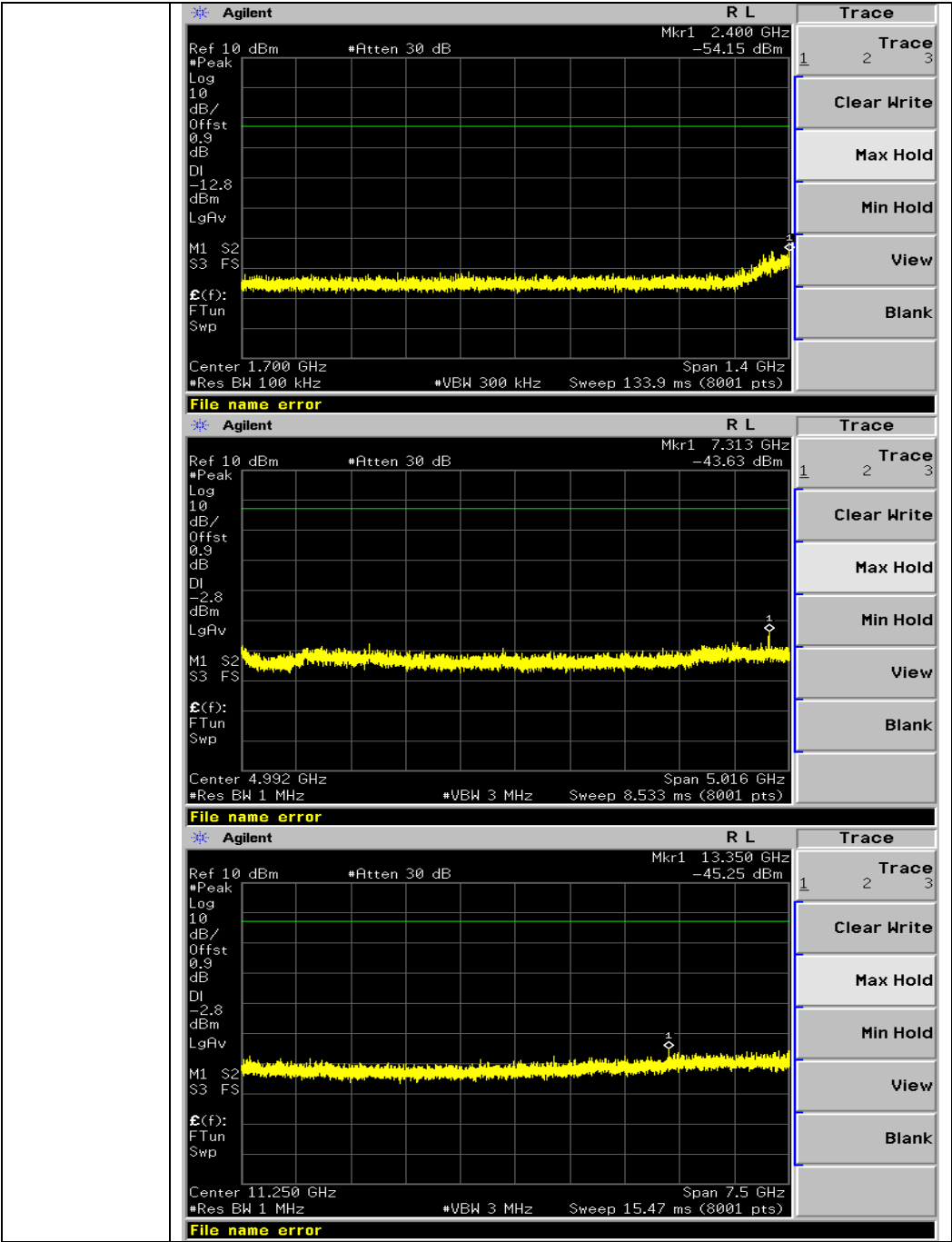
Test Graph

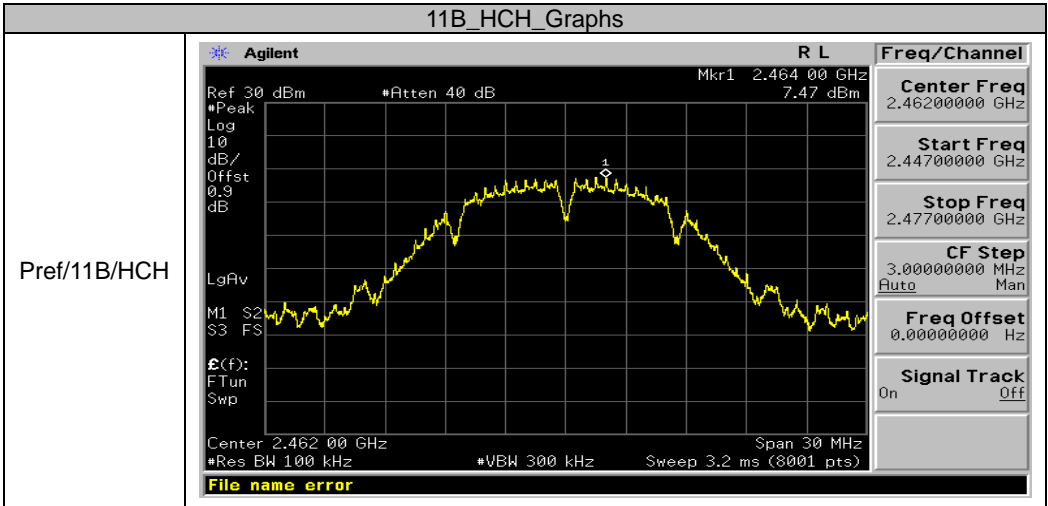
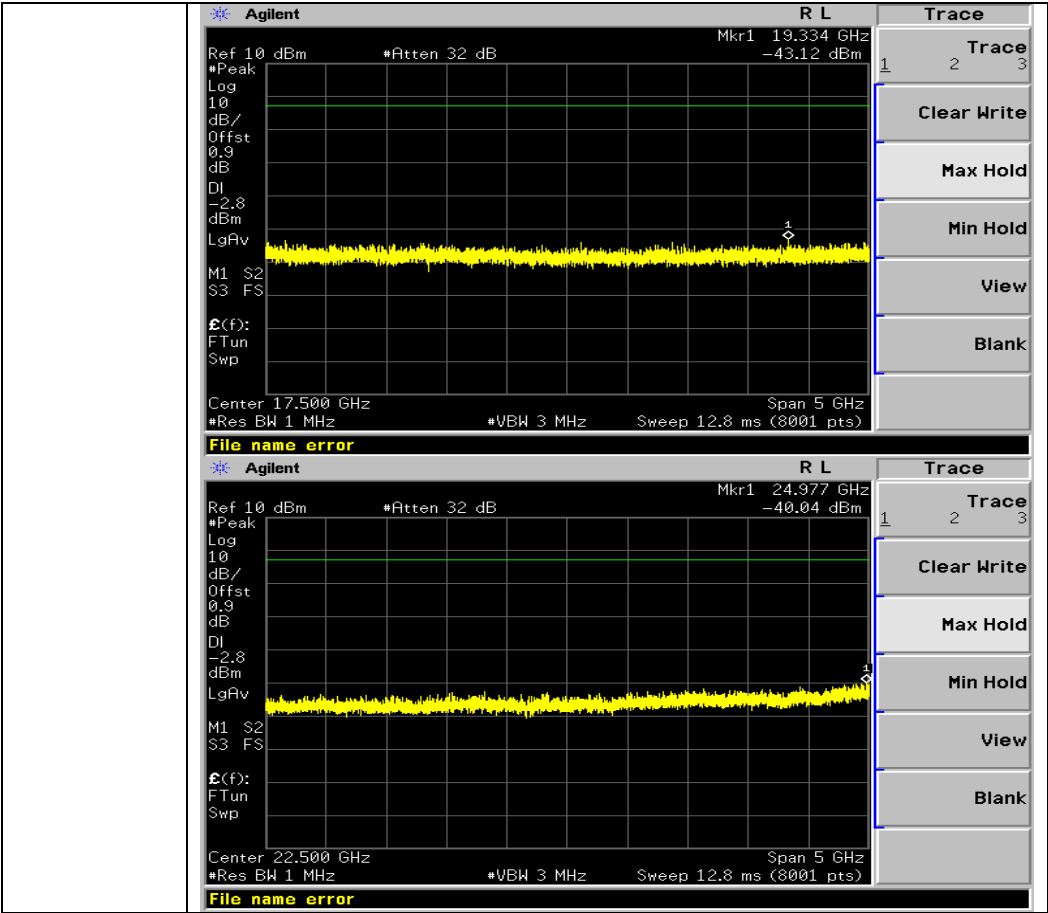




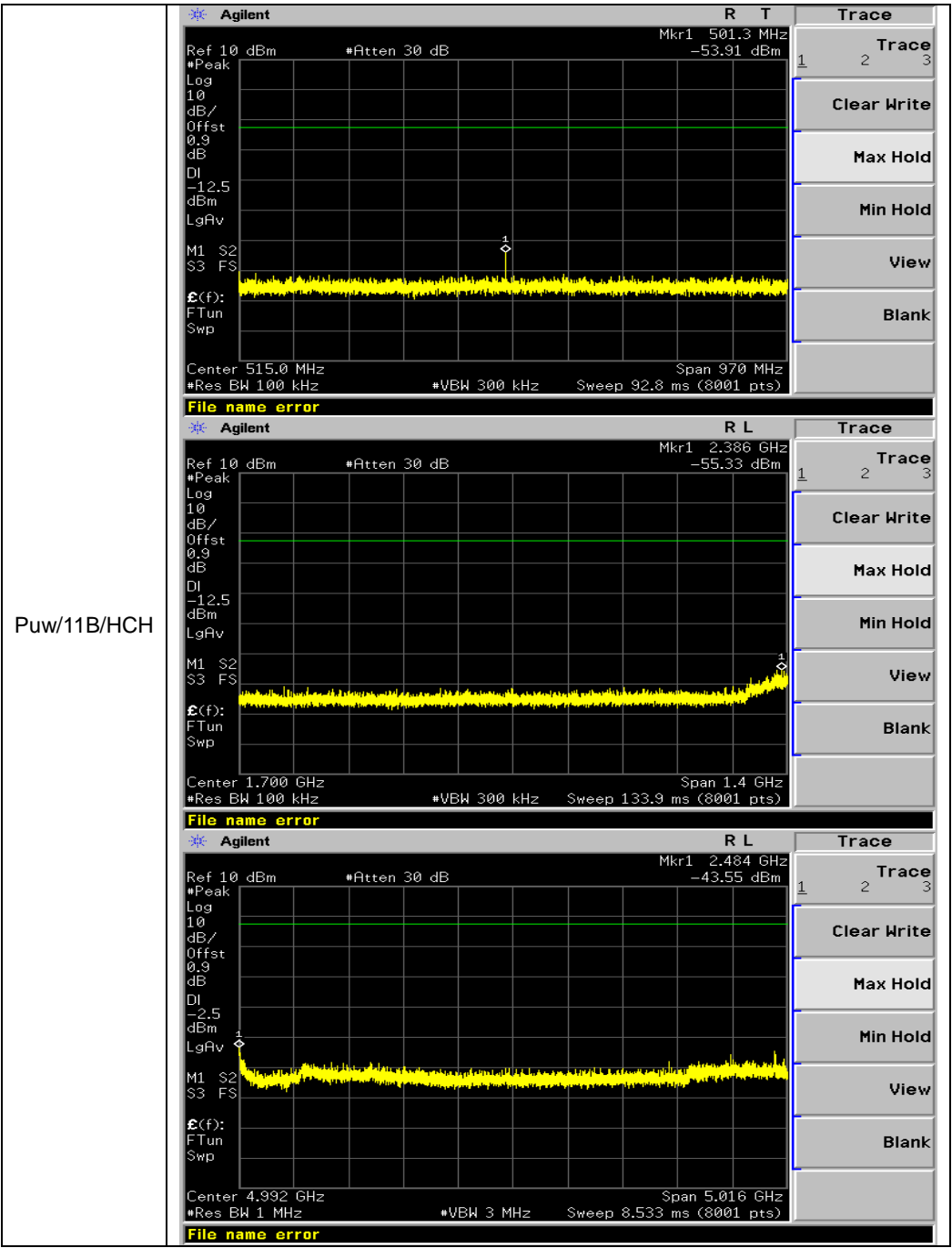




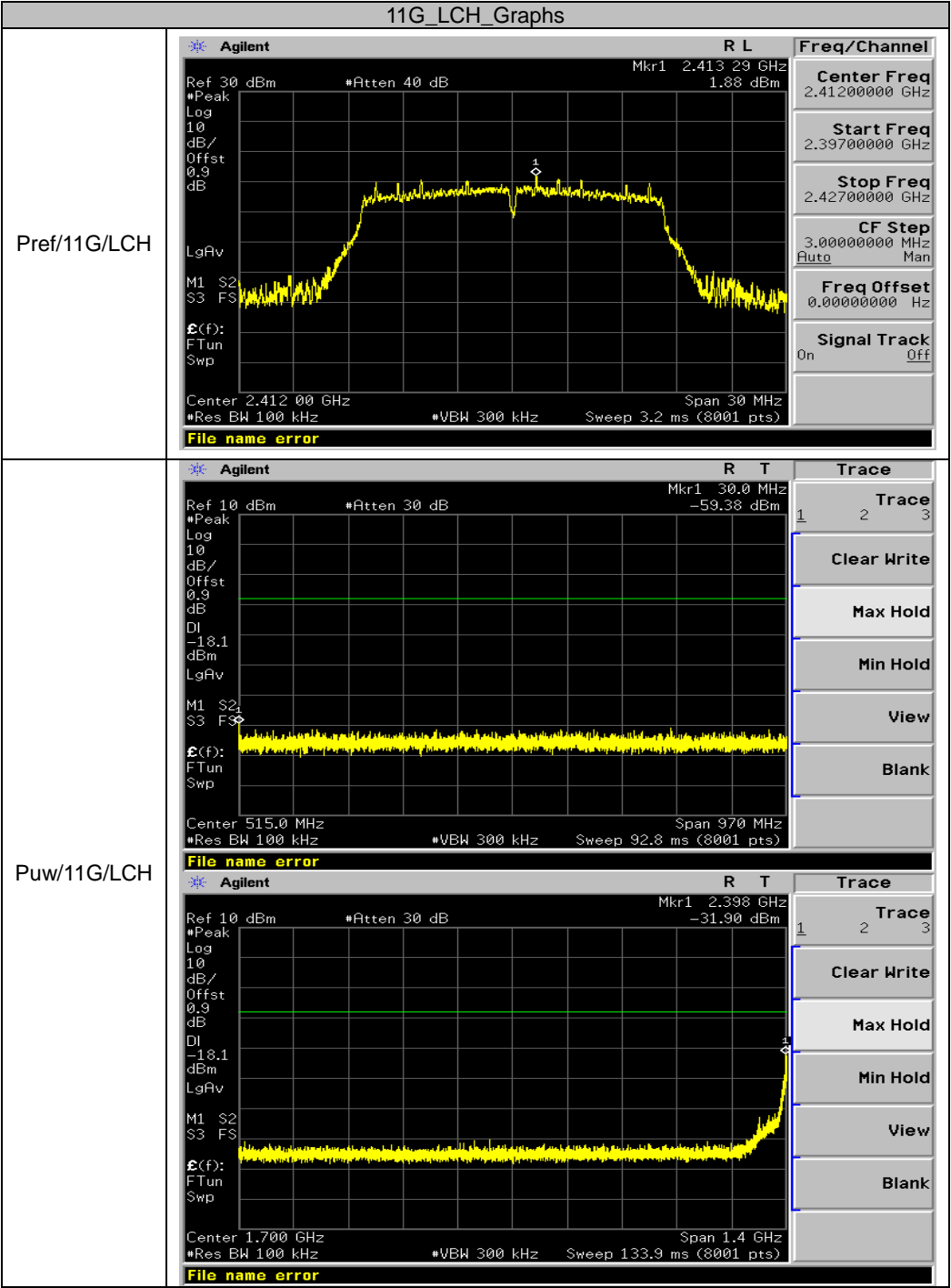




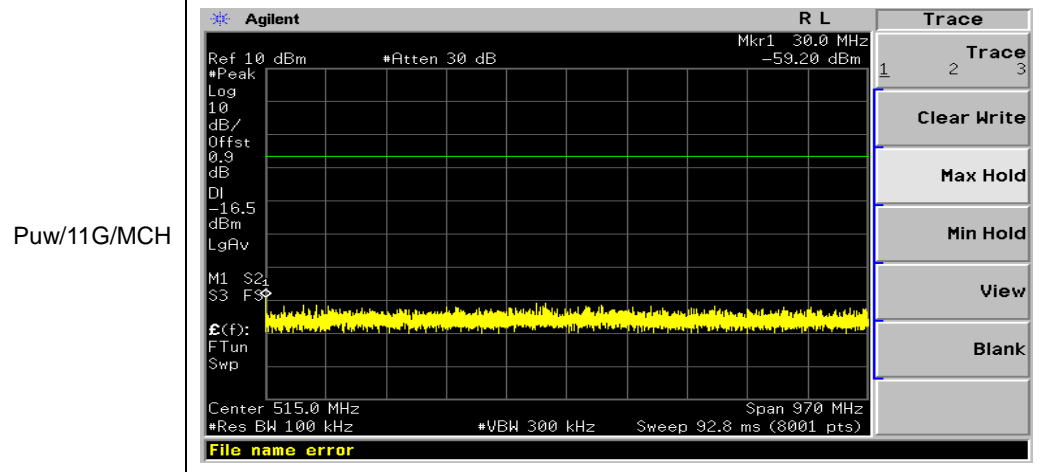
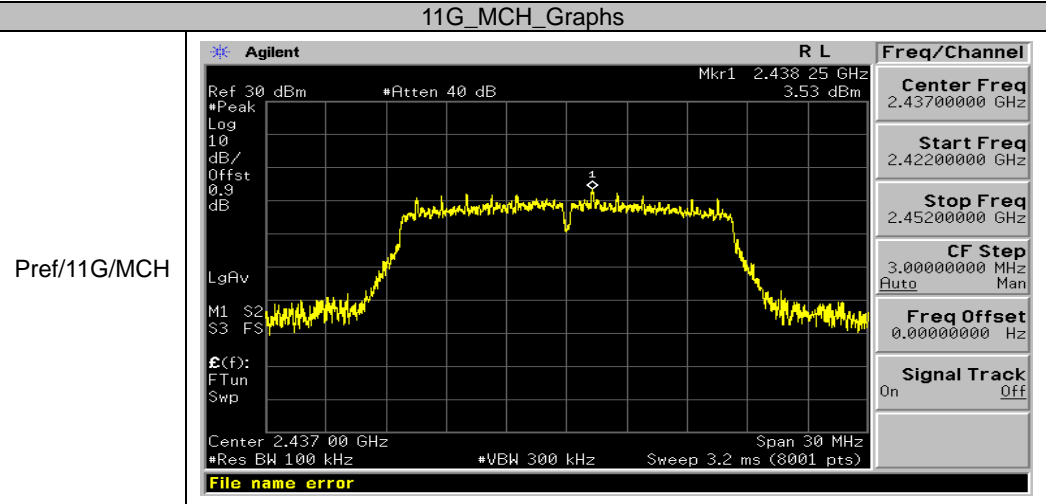
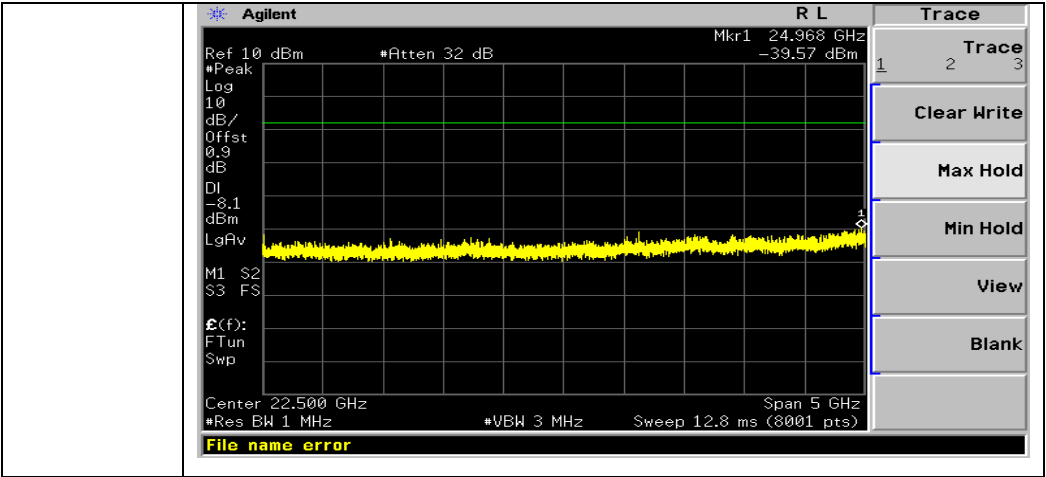
Pref/11B/HCH



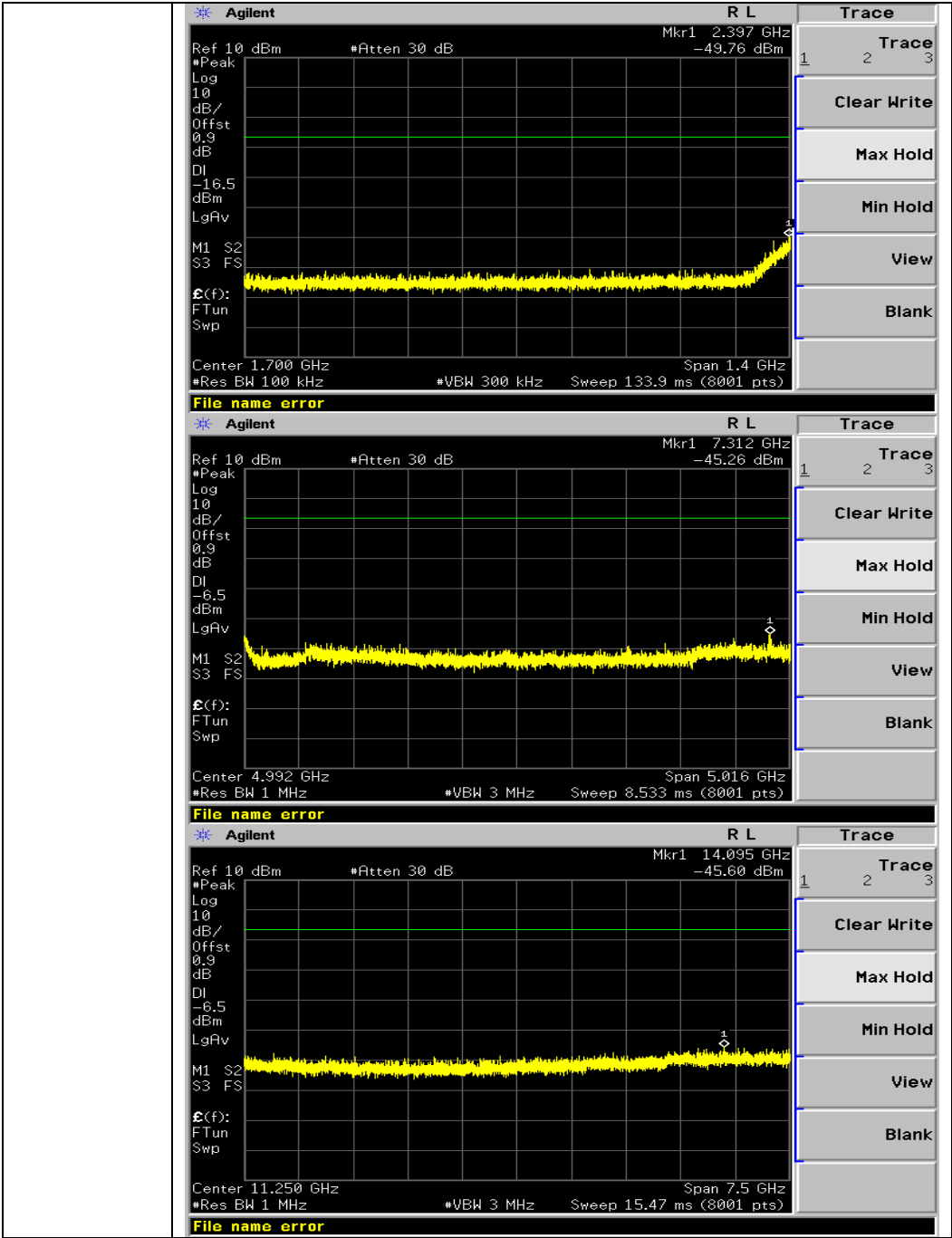


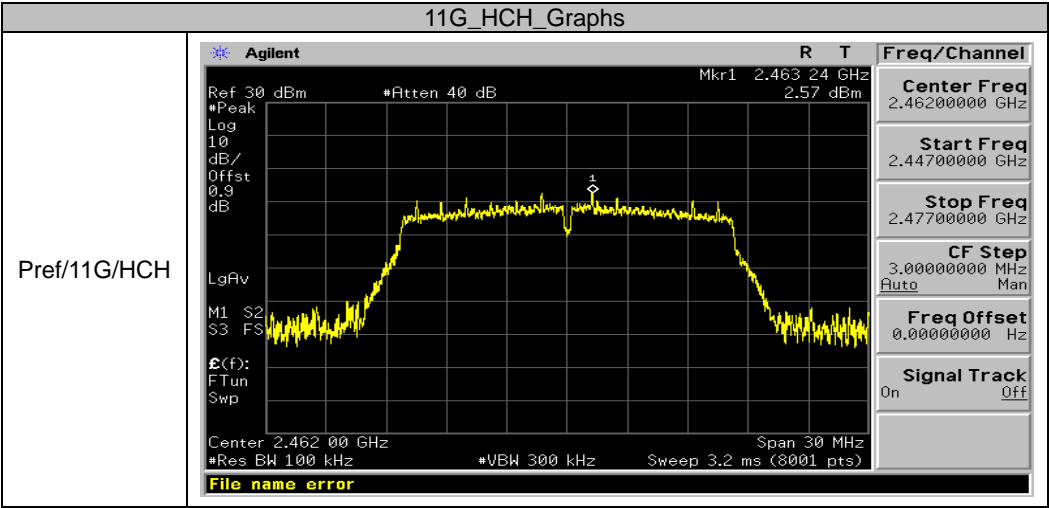
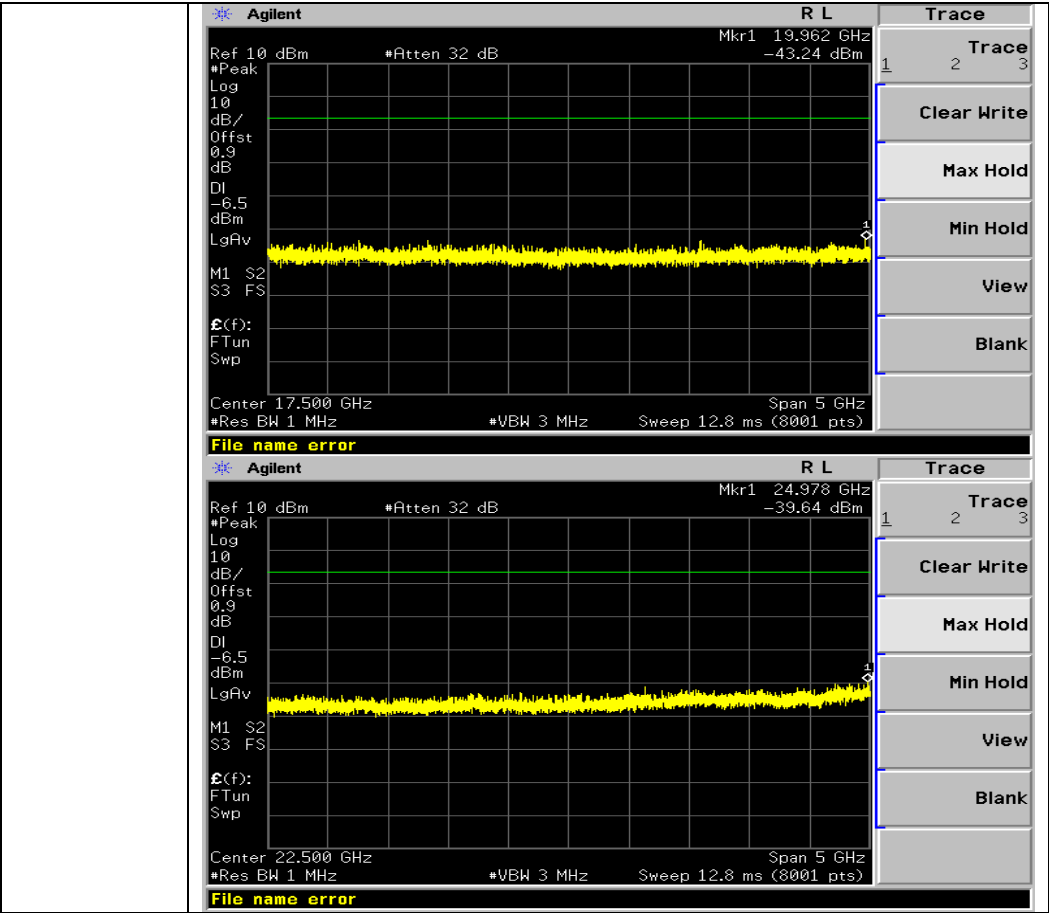


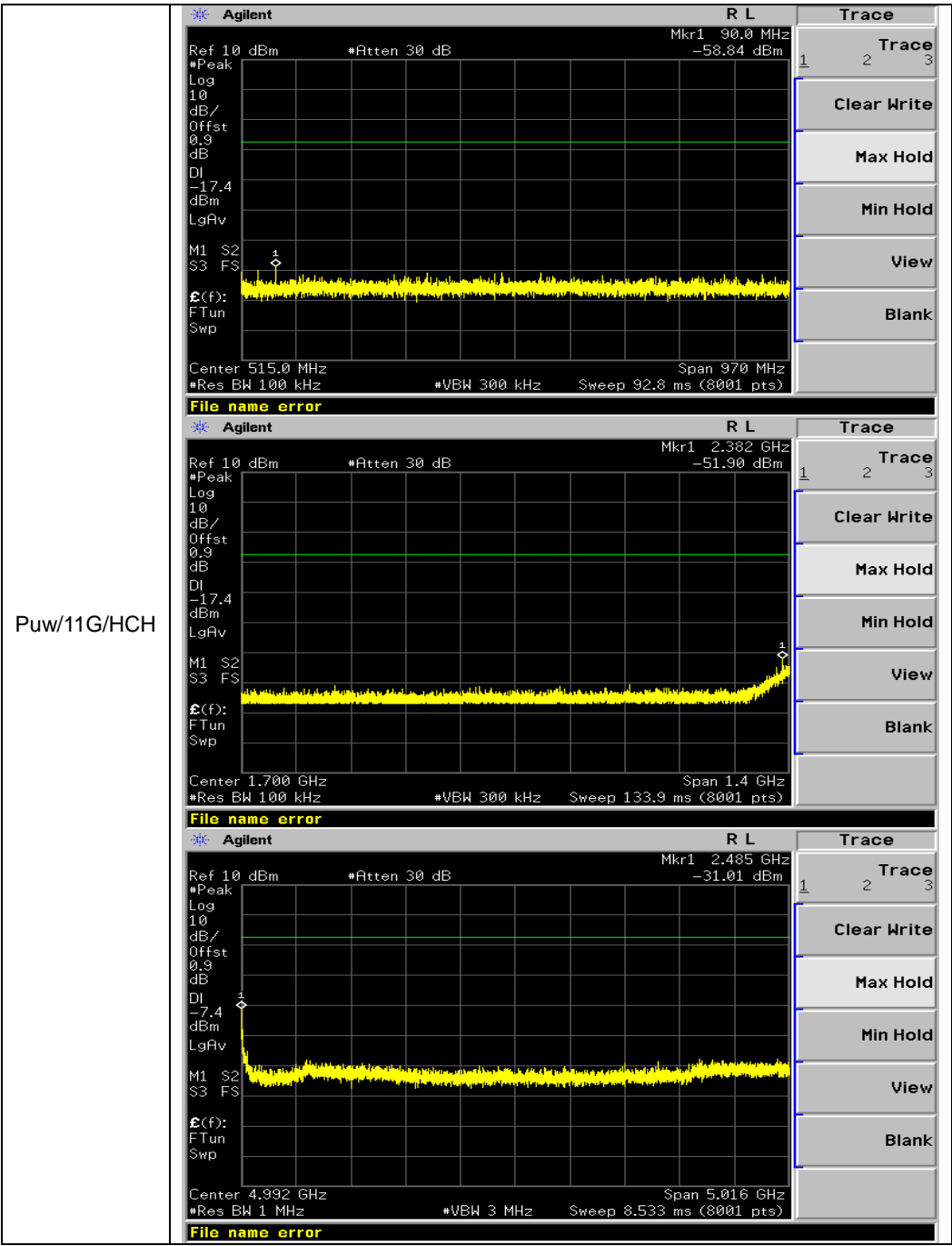




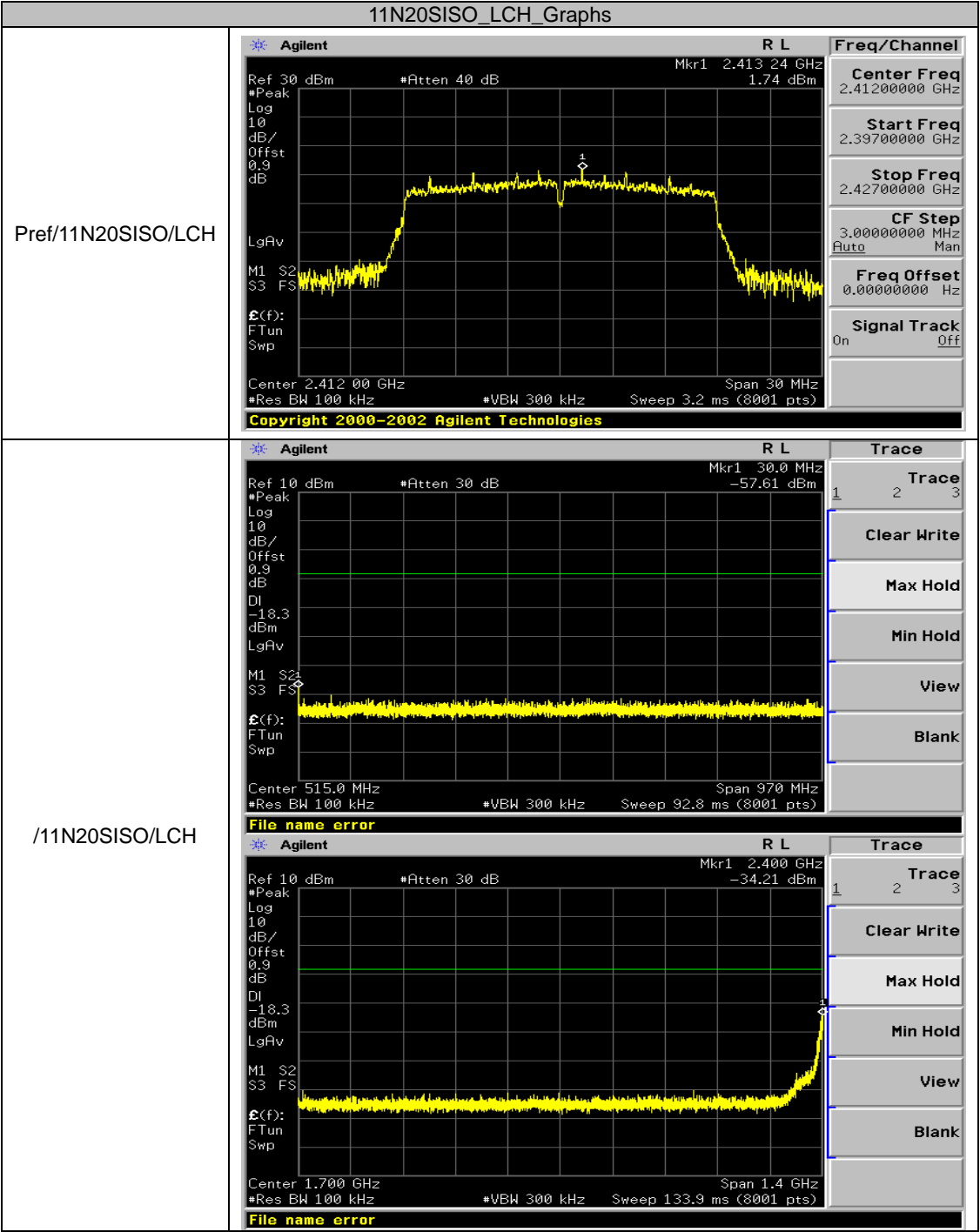




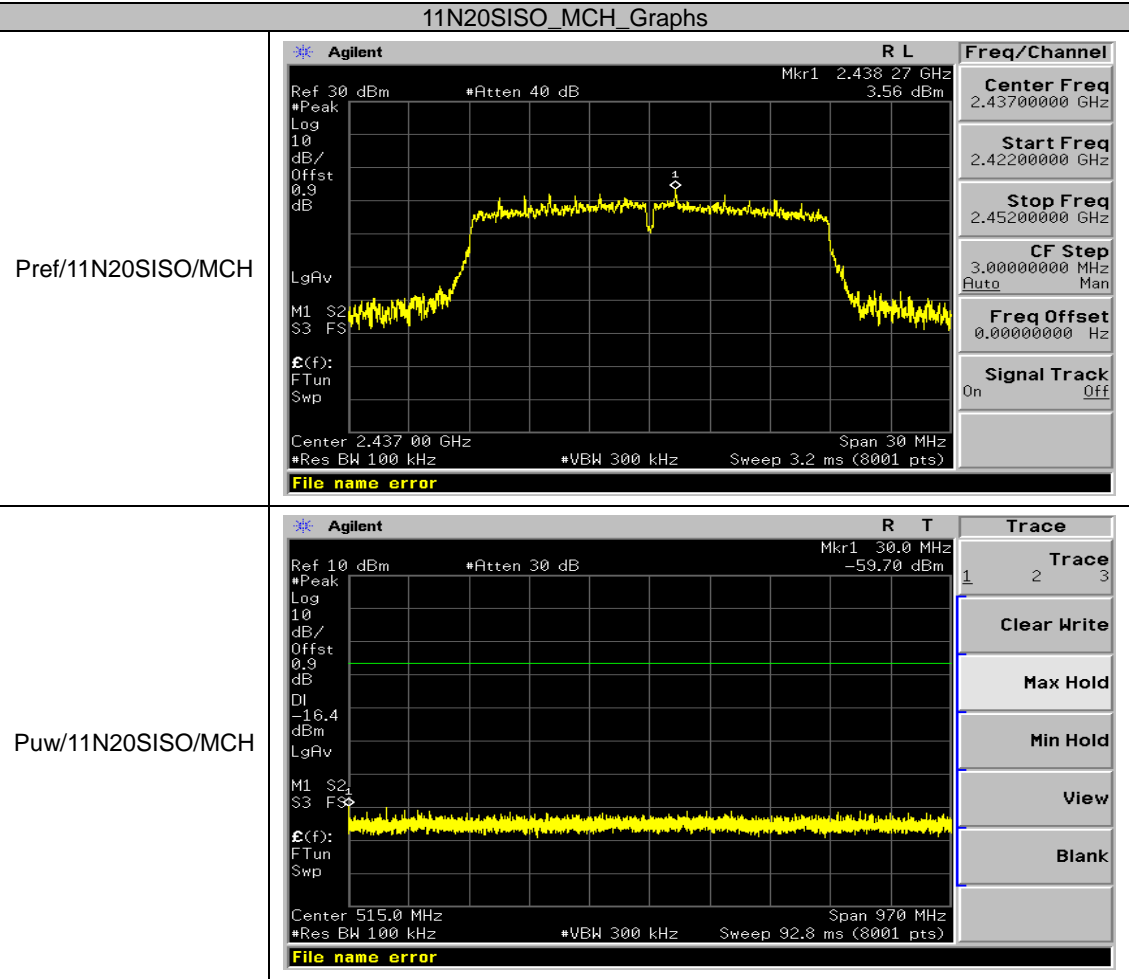
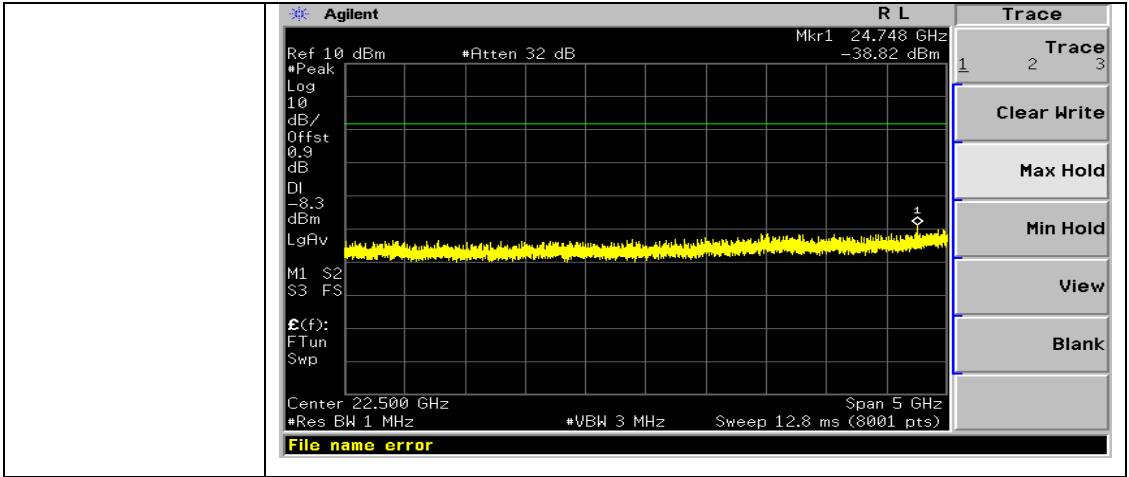


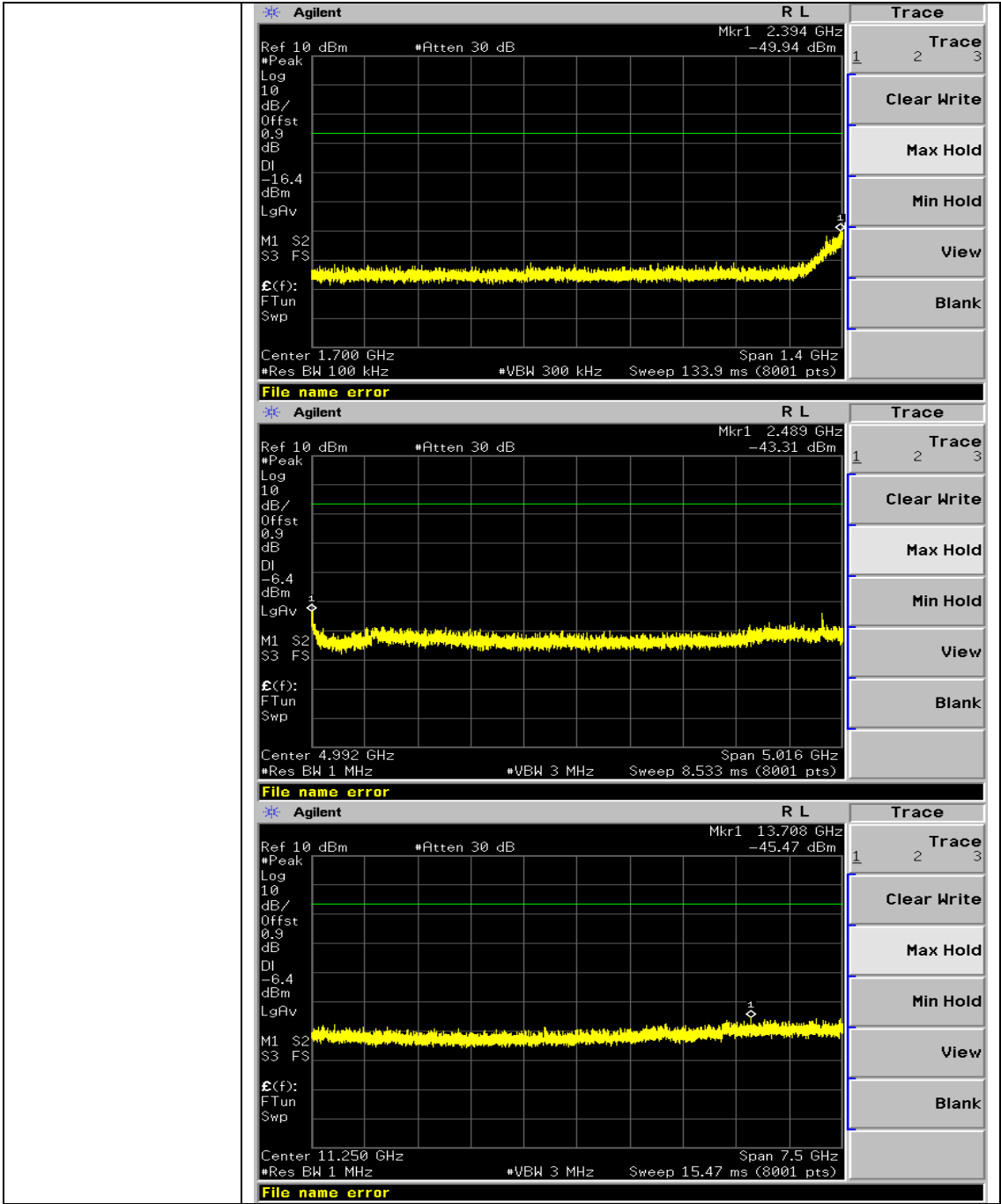




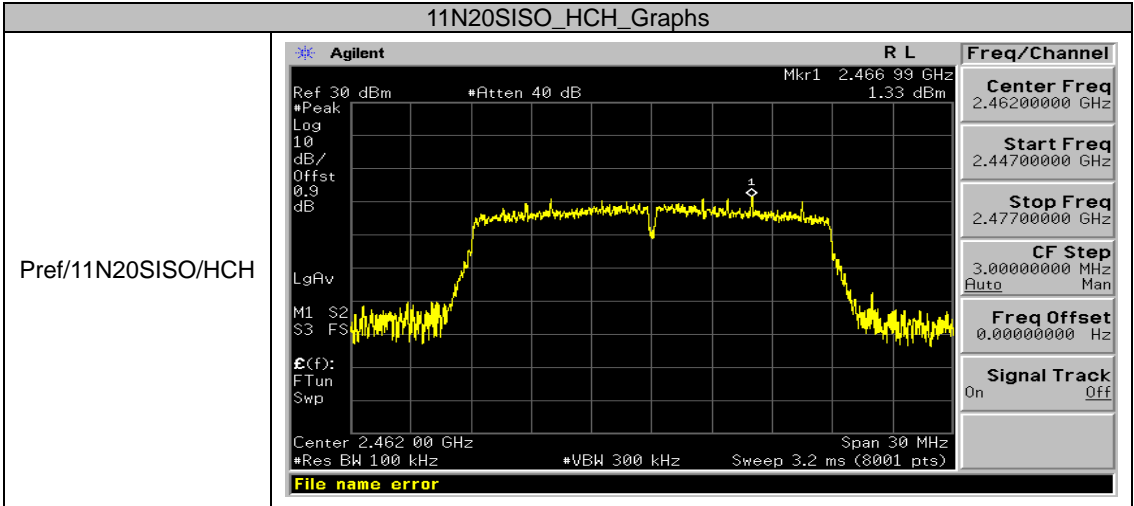
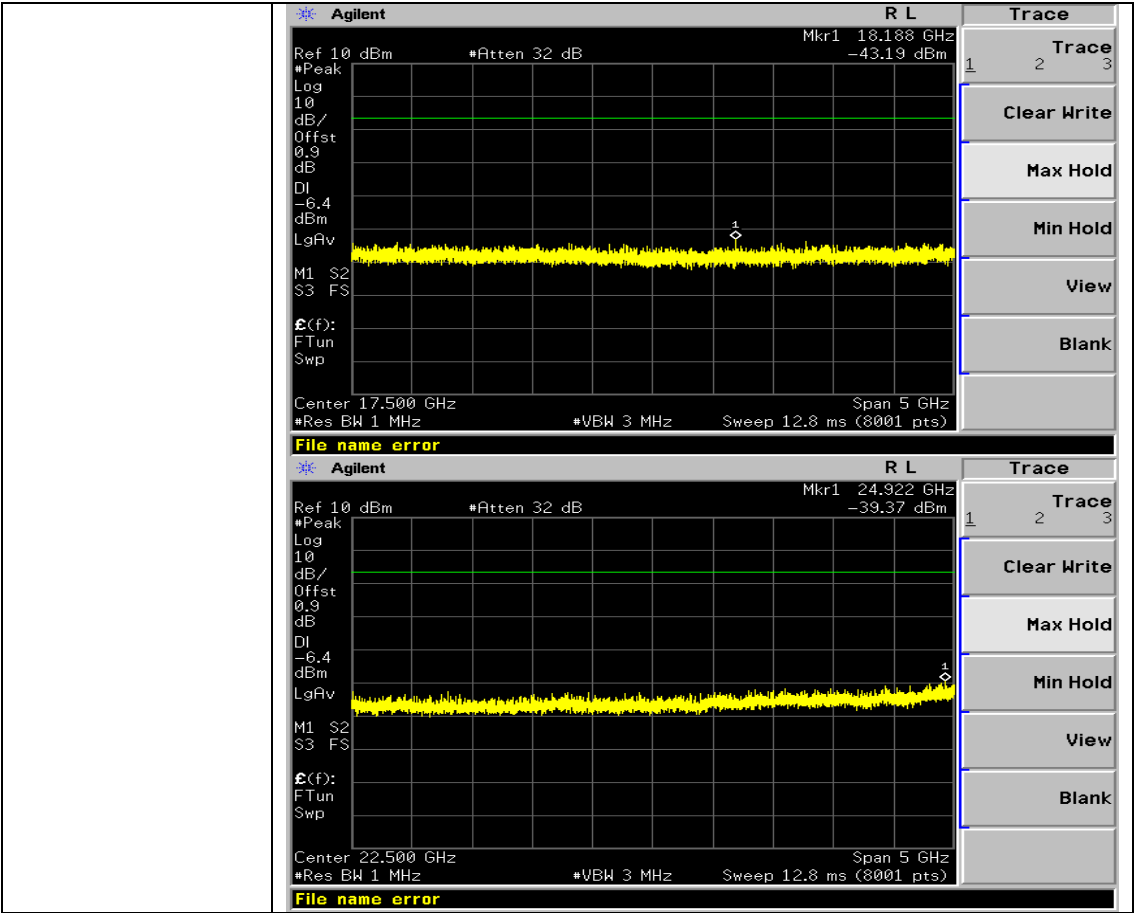


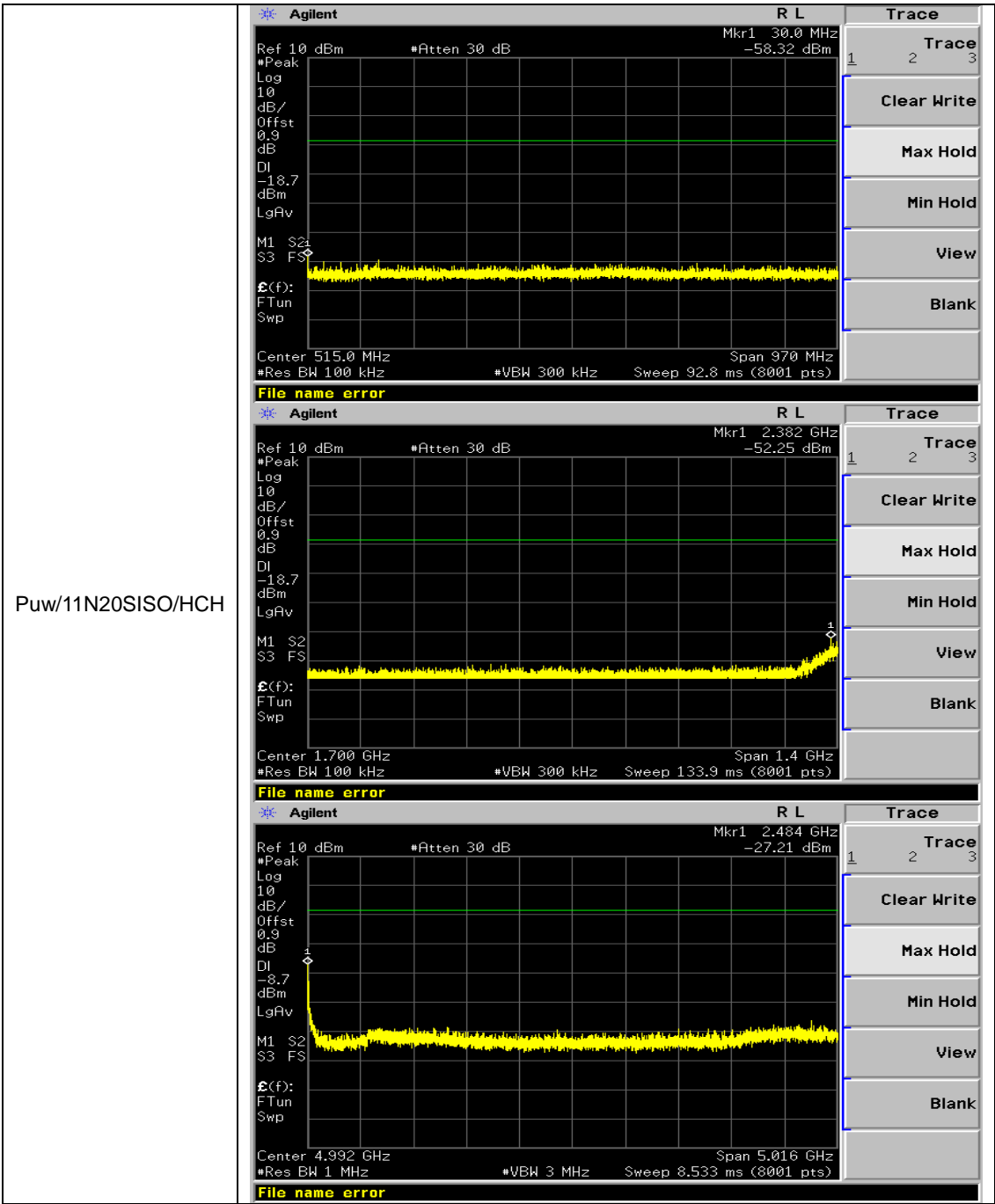


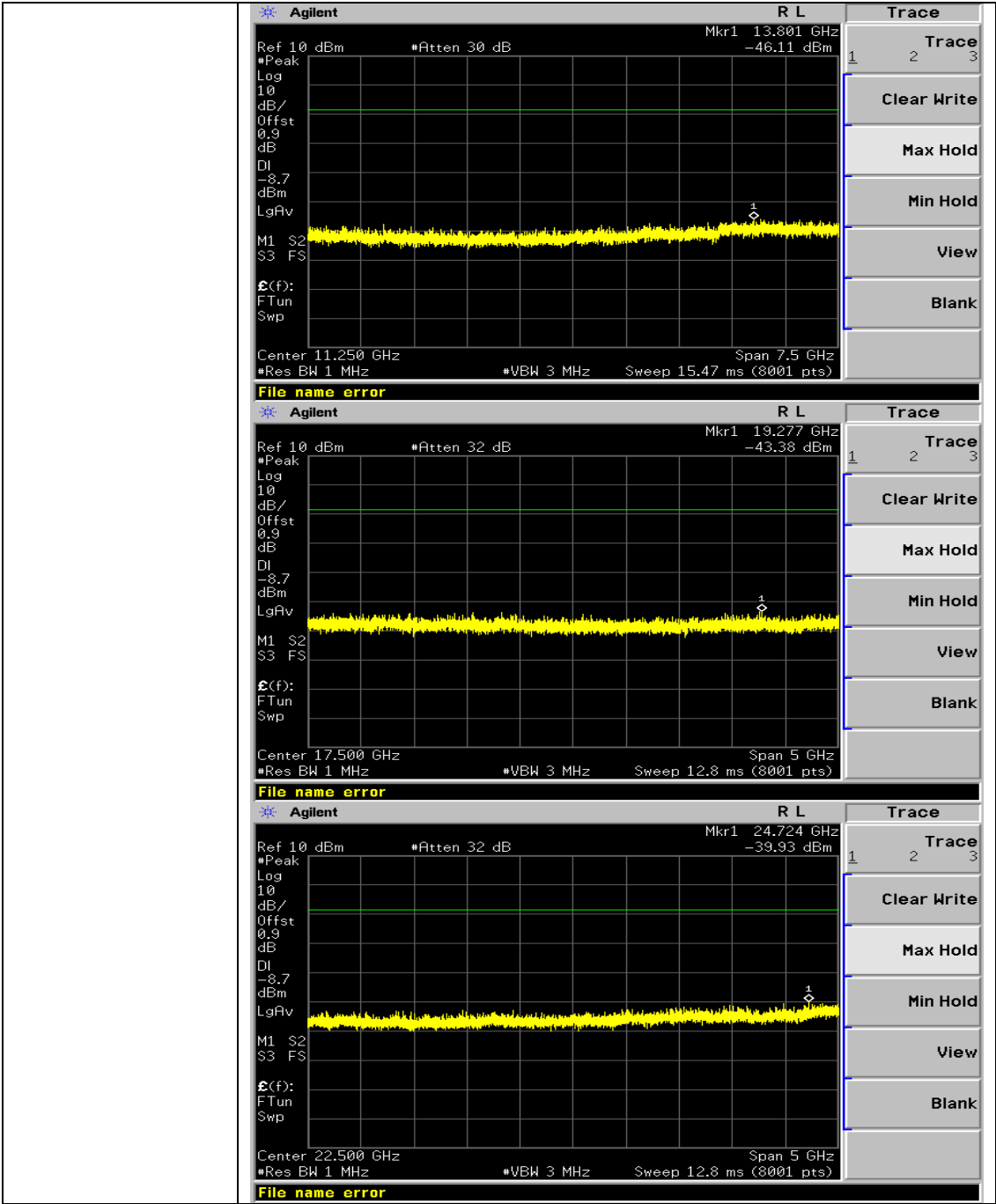


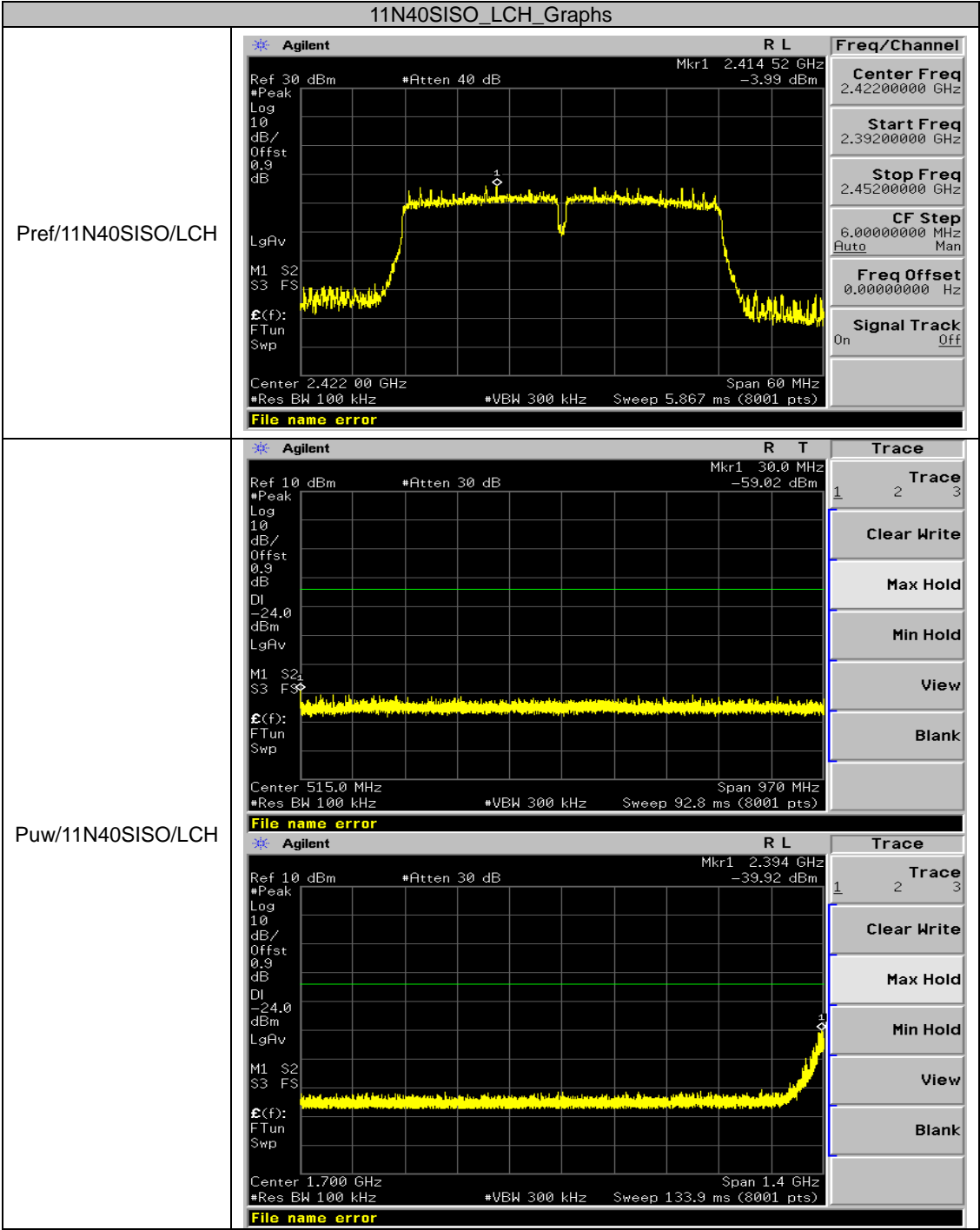


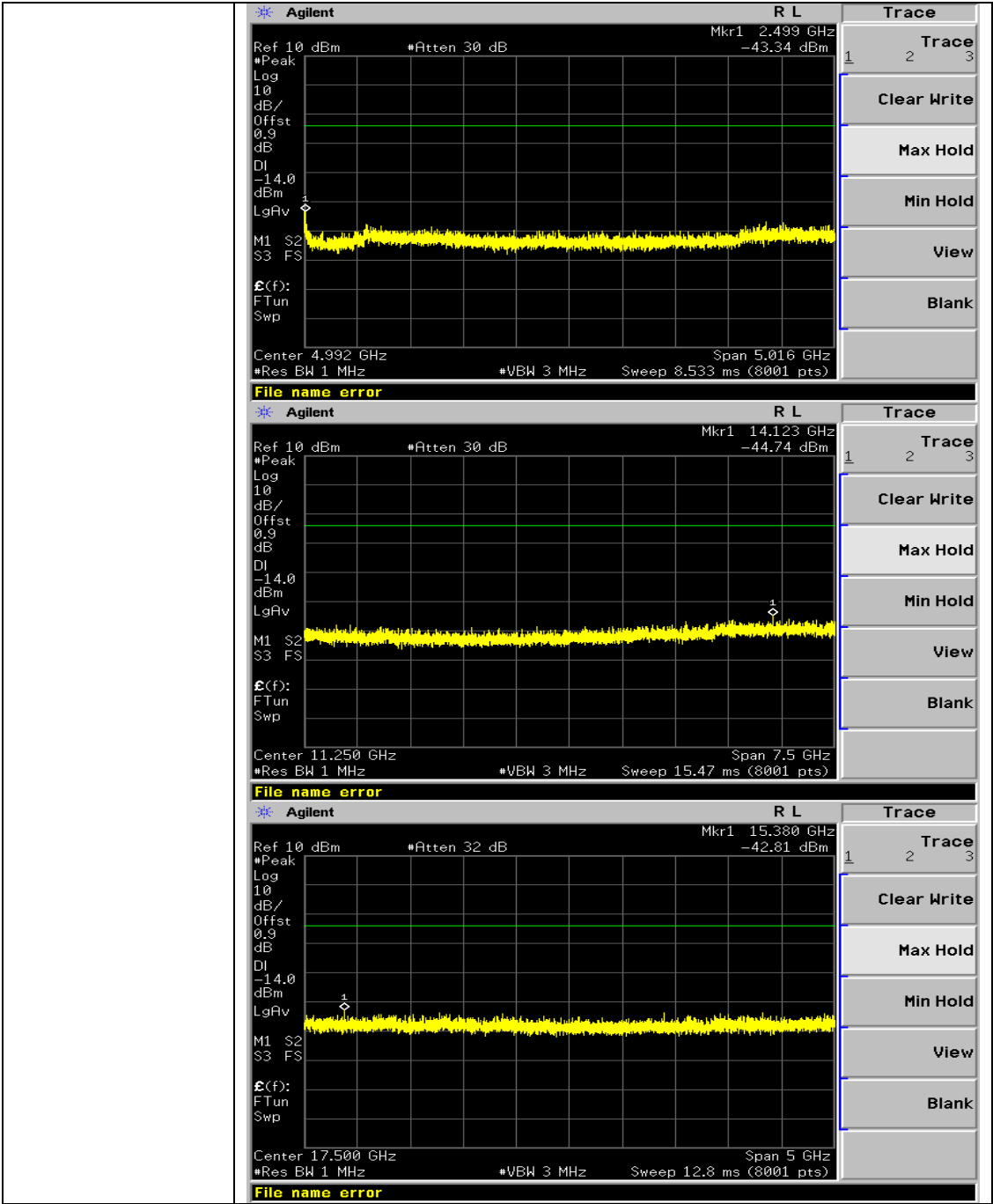


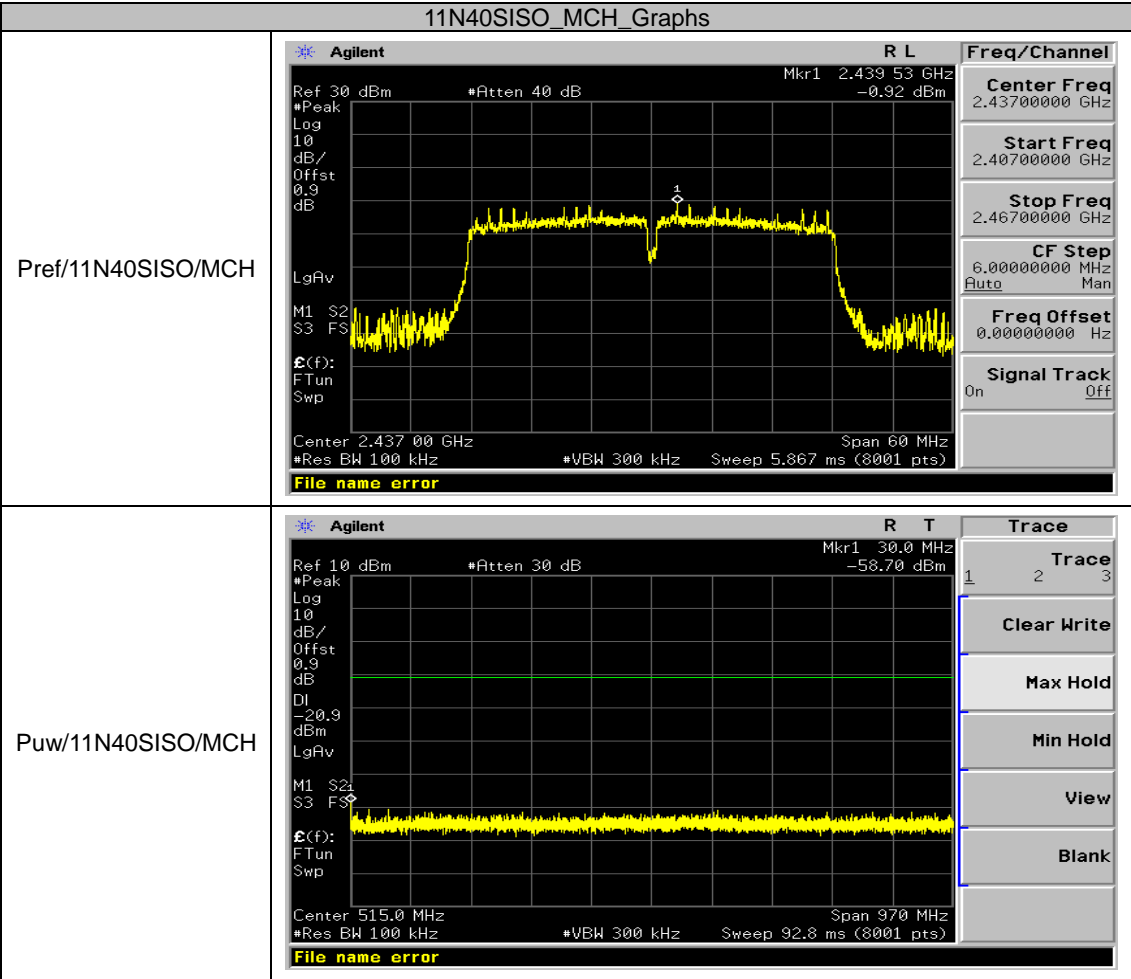
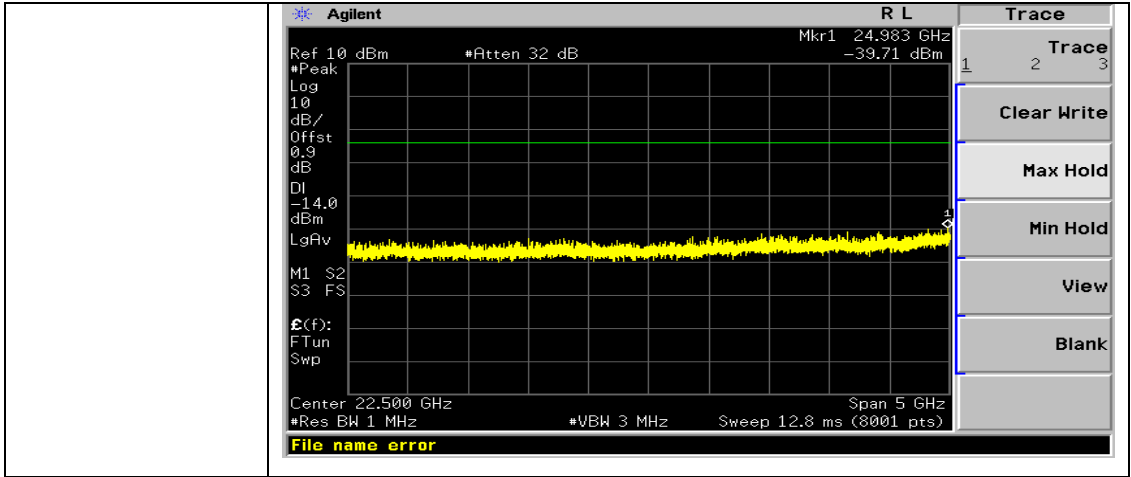


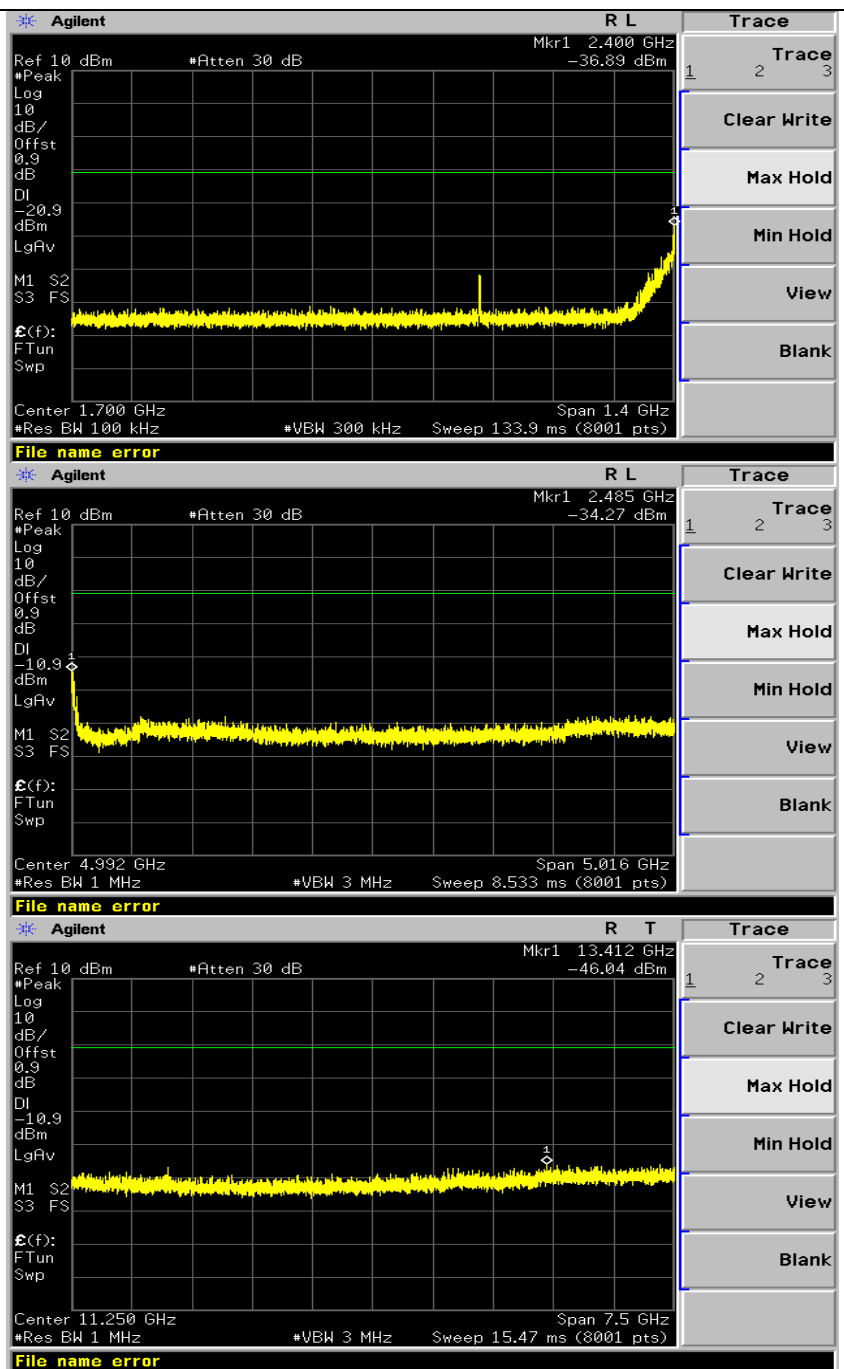


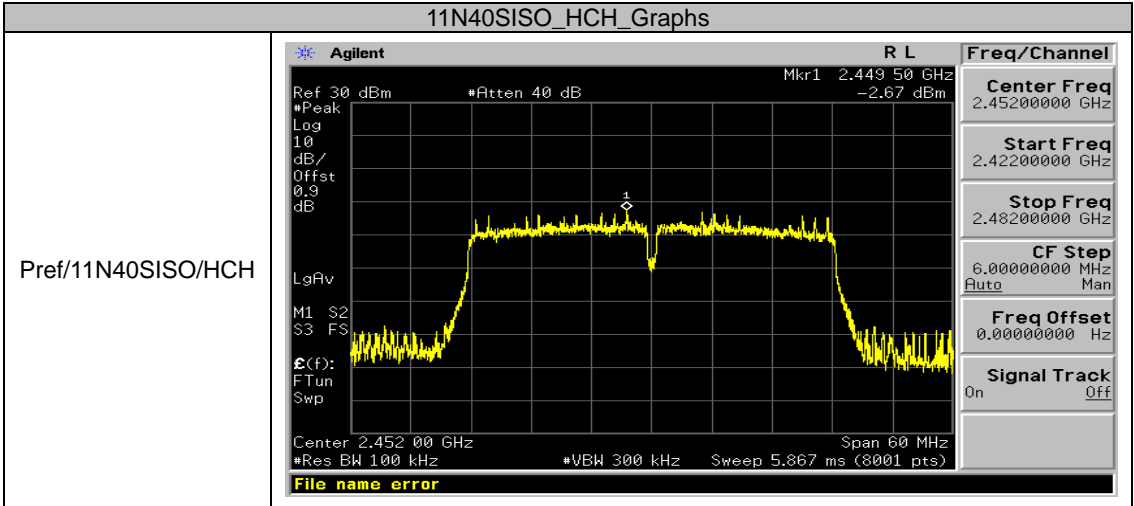
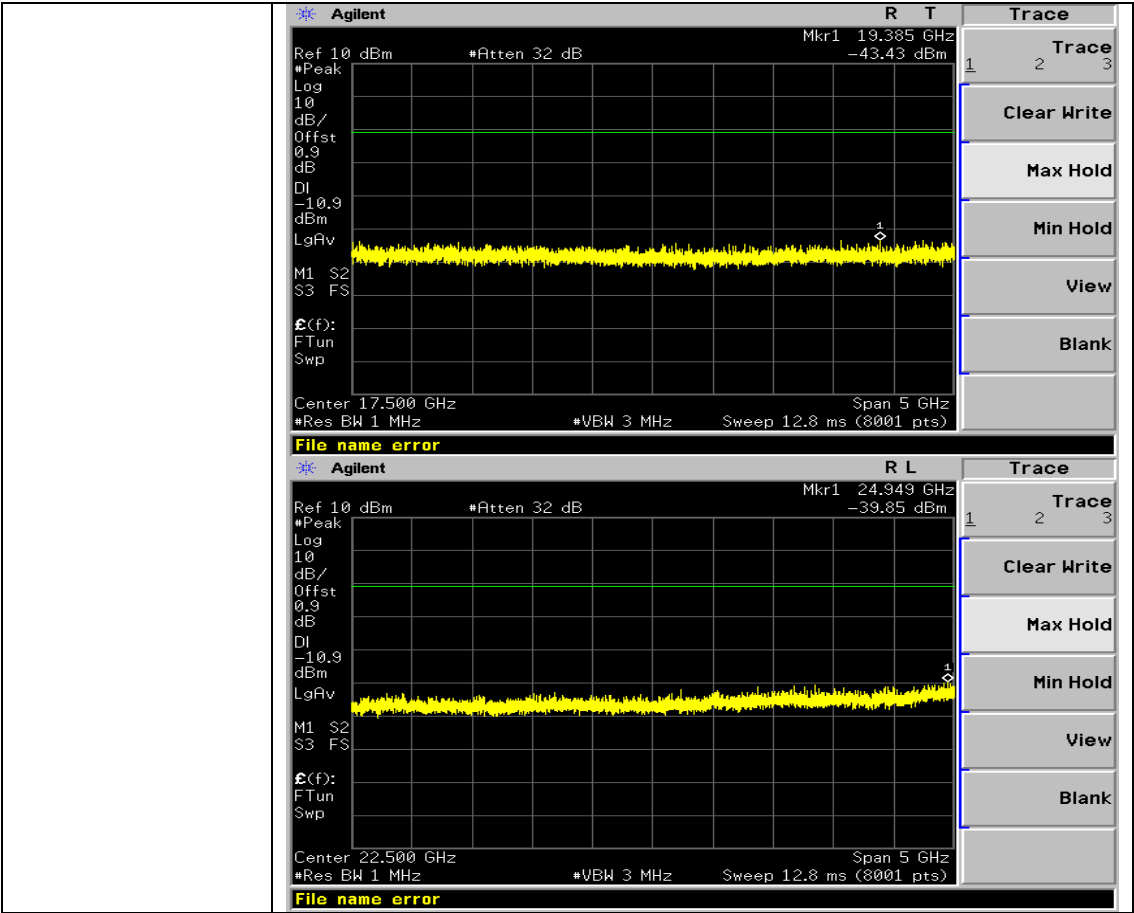




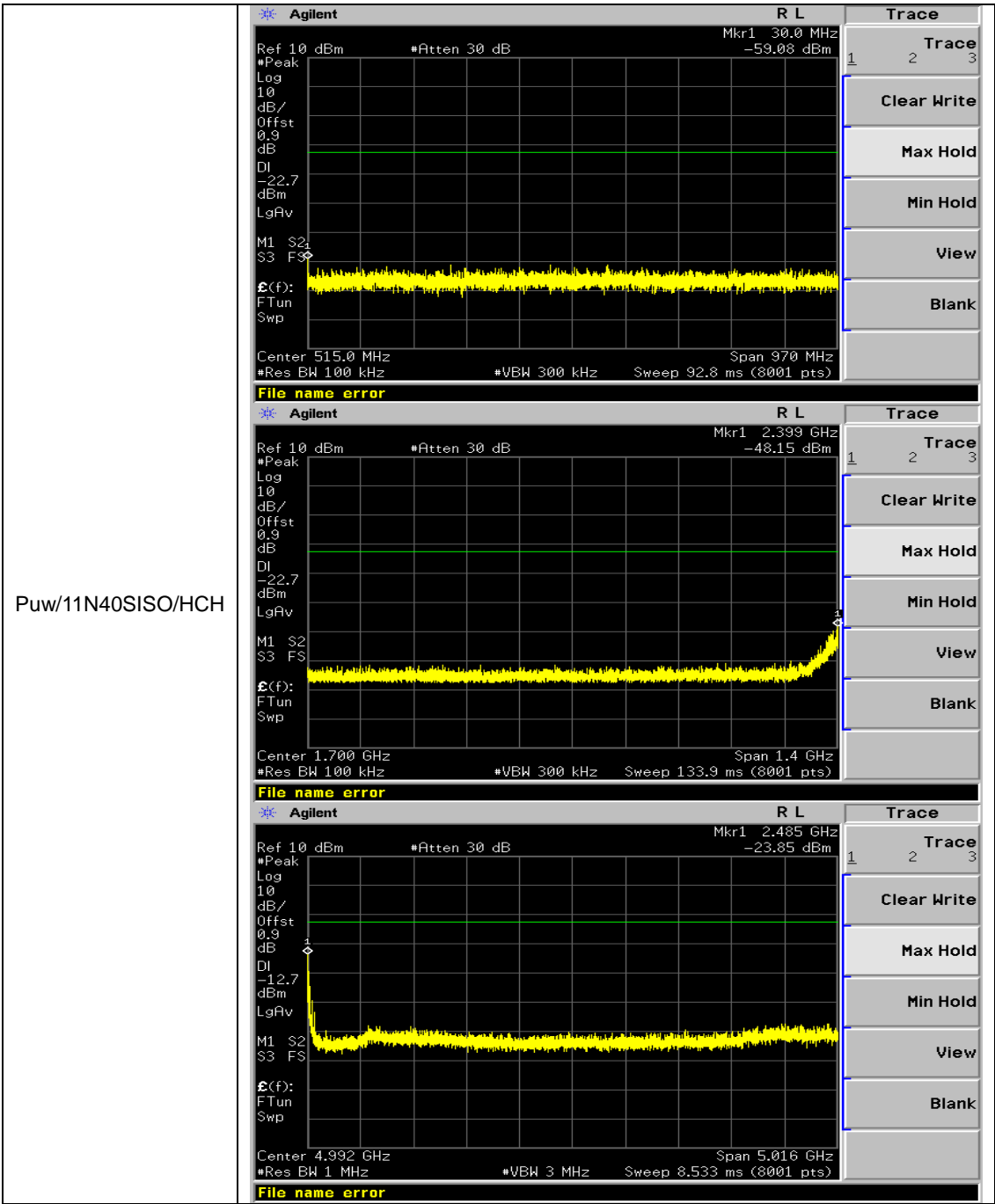














## 10. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY

### 10.1 MEASUREMENT PROCEDURE

- (1). Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- (2). Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- (3). Set SPA Trace 1 Max hold, then View.

Note: The method of AVGPSD in the KDB 558074 item 10.3 was used in this testing.

### 10.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

Refer To Section 8.2.

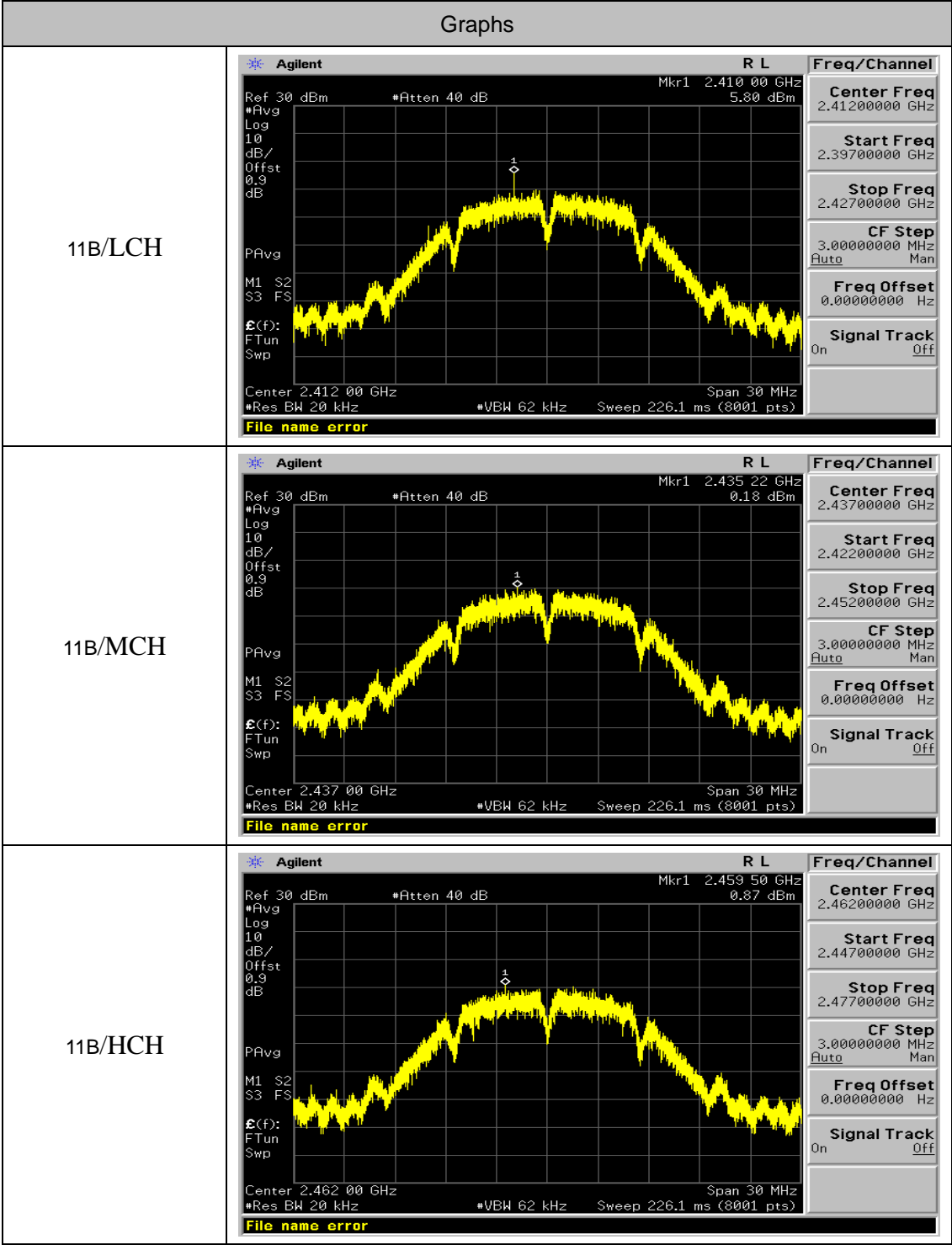
### 10.3 MEASUREMENT EQUIPMENT USED

Refer To Section 6.

### 10.4 LIMITS AND MEASUREMENT RESULT

Mode	Channel	Av.PSD [dBm/20kHz]	Limit[dBm/3kHz]	Verdict
11B	LCH	5.8	8	PASS
11B	MCH	0.18	8	PASS
11B	HCH	0.87	8	PASS
11G	LCH	-5.86	8	PASS
11G	MCH	-4.37	8	PASS
11G	HCH	-5.53	8	PASS
11N20SISO	LCH	-5.41	8	PASS
11N20SISO	MCH	-4.9	8	PASS
11N20SISO	HCH	-4.87	8	PASS
11N40SISO	LCH	-10.42	8	PASS
11N40SISO	MCH	-8.56	8	PASS
11N40SISO	HCH	-11.18	8	PASS

Test Graph



11G/LCH	<div><div><div>Agilent</div><div><div>Ref 30 dBm</div><div>*Atten 40 dB</div><div>Mkr1 2.412 63 GHz</div><div>-5.86 dBm</div></div><div><div>Log</div><div>10</div><div>dB/</div><div>Offst</div><div>0.9</div><div>dB</div></div><div><div>PAvg</div><div>M1 S2</div><div>S3 FS</div><div><math>\mathcal{E}(f)</math>:</div><div>FTun</div><div>Swp</div></div><div><div>Center 2.412 00 GHz</div><div>*Res BW 20 kHz</div><div>*VBW 62 kHz</div><div>Sweep 226.1 ms (8001 pts)</div></div><div><div>Span 30 MHz</div></div><div><div>File name error</div></div></div><div><div>Freq/Channel</div><div>Center Freq</div><div>2.41200000 GHz</div><div>Start Freq</div><div>2.39700000 GHz</div><div>Stop Freq</div><div>2.42700000 GHz</div><div>CF Step</div><div>3.00000000 MHz</div><div>Auto</div><div>Man</div><div>Freq Offset</div><div>0.00000000 Hz</div><div>Signal Track</div><div>On</div><div>Off</div></div></div>
11G/MCH	<div><div><div>Agilent</div><div><div>Ref 30 dBm</div><div>*Atten 40 dB</div><div>Mkr1 2.435 75 GHz</div><div>-4.37 dBm</div></div><div><div>Log</div><div>10</div><div>dB/</div><div>Offst</div><div>0.9</div><div>dB</div></div><div><div>PAvg</div><div>M1 S2</div><div>S3 FS</div><div><math>\mathcal{E}(f)</math>:</div><div>FTun</div><div>Swp</div></div><div><div>Center 2.437 00 GHz</div><div>*Res BW 20 kHz</div><div>*VBW 62 kHz</div><div>Sweep 226.1 ms (8001 pts)</div></div><div><div>Span 30 MHz</div></div><div><div>File name error</div></div></div><div><div>Freq/Channel</div><div>Center Freq</div><div>2.43700000 GHz</div><div>Start Freq</div><div>2.42200000 GHz</div><div>Stop Freq</div><div>2.45200000 GHz</div><div>CF Step</div><div>3.00000000 MHz</div><div>Auto</div><div>Man</div><div>Freq Offset</div><div>0.00000000 Hz</div><div>Signal Track</div><div>On</div><div>Off</div></div></div>
11G/HCH	<div><div><div>Agilent</div><div><div>Ref 30 dBm</div><div>*Atten 40 dB</div><div>Mkr1 2.461 36 GHz</div><div>-5.53 dBm</div></div><div><div>Log</div><div>10</div><div>dB/</div><div>Offst</div><div>0.9</div><div>dB</div></div><div><div>PAvg</div><div>M1 S2</div><div>S3 FS</div><div><math>\mathcal{E}(f)</math>:</div><div>FTun</div><div>Swp</div></div><div><div>Center 2.462 00 GHz</div><div>*Res BW 20 kHz</div><div>*VBW 62 kHz</div><div>Sweep 226.1 ms (8001 pts)</div></div><div><div>Span 30 MHz</div></div><div><div>File name error</div></div></div><div><div>Freq/Channel</div><div>Center Freq</div><div>2.46200000 GHz</div><div>Start Freq</div><div>2.44700000 GHz</div><div>Stop Freq</div><div>2.47700000 GHz</div><div>CF Step</div><div>3.00000000 MHz</div><div>Auto</div><div>Man</div><div>Freq Offset</div><div>0.00000000 Hz</div><div>Signal Track</div><div>On</div><div>Off</div></div></div>

11N20SISO/LCH	<div><div><div>Agilent</div><div>R L</div><div>Freq/Channel</div><div>Ref 30 dBm</div><div>*Atten 40 dB</div><div>Mkr1 2.409 12 GHz</div><div>-5.41 dBm</div><div>Center Freq</div><div>2.41200000 GHz</div><div>Start Freq</div><div>2.39700000 GHz</div><div>Stop Freq</div><div>2.42700000 GHz</div><div>CF Step</div><div>3.00000000 MHz</div><div>Auto Man</div><div>Freq Offset</div><div>0.00000000 Hz</div><div>Signal Track</div><div>On Off</div><div>Center 2.412 00 GHz</div><div>Span 30 MHz</div><div>*Res BW 20 kHz</div><div>*VBW 62 kHz</div><div>Sweep 226.1 ms (8001 pts)</div><div>File name error</div></div><div><div>PAvg</div><div>M1 S2</div><div>S3 FS</div><div>E(f):</div><div>FTun</div><div>Swp</div></div></div>
11N20SISO/MCH	<div><div><div>Agilent</div><div>R L</div><div>Freq/Channel</div><div>Ref 30 dBm</div><div>*Atten 40 dB</div><div>Mkr1 2.436 62 GHz</div><div>-4.90 dBm</div><div>Center Freq</div><div>2.43700000 GHz</div><div>Start Freq</div><div>2.42200000 GHz</div><div>Stop Freq</div><div>2.45200000 GHz</div><div>CF Step</div><div>3.00000000 MHz</div><div>Auto Man</div><div>Freq Offset</div><div>0.00000000 Hz</div><div>Signal Track</div><div>On Off</div><div>Center 2.437 00 GHz</div><div>Span 30 MHz</div><div>*Res BW 20 kHz</div><div>*VBW 62 kHz</div><div>Sweep 226.1 ms (8001 pts)</div><div>File name error</div></div><div><div>PAvg</div><div>M1 S2</div><div>S3 FS</div><div>E(f):</div><div>FTun</div><div>Swp</div></div></div>
11N20SISO/HCH	<div><div><div>Agilent</div><div>R L</div><div>Freq/Channel</div><div>Ref 30 dBm</div><div>*Atten 40 dB</div><div>Mkr1 2.462 87 GHz</div><div>-4.87 dBm</div><div>Center Freq</div><div>2.46200000 GHz</div><div>Start Freq</div><div>2.44700000 GHz</div><div>Stop Freq</div><div>2.47700000 GHz</div><div>CF Step</div><div>3.00000000 MHz</div><div>Auto Man</div><div>Freq Offset</div><div>0.00000000 Hz</div><div>Signal Track</div><div>On Off</div><div>Center 2.462 00 GHz</div><div>Span 30 MHz</div><div>*Res BW 20 kHz</div><div>*VBW 62 kHz</div><div>Sweep 226.1 ms (8001 pts)</div><div>File name error</div></div><div><div>PAvg</div><div>M1 S2</div><div>S3 FS</div><div>E(f):</div><div>FTun</div><div>Swp</div></div></div>

11N40SISO/LCH	<div><div><div>Agilent</div><div>Ref 30 dBm</div><div>*Atten 40 dB</div><div>Mkr1 2.420 12 GHz</div><div>-10.42 dBm</div><div>R L</div><div>Center 2.422 00 GHz</div><div>*Res BW 20 kHz</div><div>*VBW 62 kHz</div><div>Sweep 452.3 ms (8001 pts)</div><div>File name error</div></div><div><div>Agilent</div><div>Ref 30 dBm</div><div>*Atten 40 dB</div><div>Mkr1 2.444 49 GHz</div><div>-8.56 dBm</div><div>R L</div><div>Center 2.437 00 GHz</div><div>*Res BW 20 kHz</div><div>*VBW 62 kHz</div><div>Sweep 452.3 ms (8001 pts)</div><div>File name error</div></div><div><div>Agilent</div><div>Ref 30 dBm</div><div>*Atten 40 dB</div><div>Mkr1 2.458 24 GHz</div><div>-11.18 dBm</div><div>R L</div><div>Center 2.452 00 GHz</div><div>*Res BW 20 kHz</div><div>*VBW 62 kHz</div><div>Sweep 452.3 ms (8001 pts)</div><div>File name error</div></div></div>
11N40SISO/MCH	<div><div><div>Agilent</div><div>Ref 30 dBm</div><div>*Atten 40 dB</div><div>Mkr1 2.420 12 GHz</div><div>-10.42 dBm</div><div>R L</div><div>Center 2.422 00 GHz</div><div>*Res BW 20 kHz</div><div>*VBW 62 kHz</div><div>Sweep 452.3 ms (8001 pts)</div><div>File name error</div></div><div><div>Agilent</div><div>Ref 30 dBm</div><div>*Atten 40 dB</div><div>Mkr1 2.444 49 GHz</div><div>-8.56 dBm</div><div>R L</div><div>Center 2.437 00 GHz</div><div>*Res BW 20 kHz</div><div>*VBW 62 kHz</div><div>Sweep 452.3 ms (8001 pts)</div><div>File name error</div></div><div><div>Agilent</div><div>Ref 30 dBm</div><div>*Atten 40 dB</div><div>Mkr1 2.458 24 GHz</div><div>-11.18 dBm</div><div>R L</div><div>Center 2.452 00 GHz</div><div>*Res BW 20 kHz</div><div>*VBW 62 kHz</div><div>Sweep 452.3 ms (8001 pts)</div><div>File name error</div></div></div>
11N40SISO/HCH	<div><div><div>Agilent</div><div>Ref 30 dBm</div><div>*Atten 40 dB</div><div>Mkr1 2.420 12 GHz</div><div>-10.42 dBm</div><div>R L</div><div>Center 2.422 00 GHz</div><div>*Res BW 20 kHz</div><div>*VBW 62 kHz</div><div>Sweep 452.3 ms (8001 pts)</div><div>File name error</div></div><div><div>Agilent</div><div>Ref 30 dBm</div><div>*Atten 40 dB</div><div>Mkr1 2.444 49 GHz</div><div>-8.56 dBm</div><div>R L</div><div>Center 2.437 00 GHz</div><div>*Res BW 20 kHz</div><div>*VBW 62 kHz</div><div>Sweep 452.3 ms (8001 pts)</div><div>File name error</div></div><div><div>Agilent</div><div>Ref 30 dBm</div><div>*Atten 40 dB</div><div>Mkr1 2.458 24 GHz</div><div>-11.18 dBm</div><div>R L</div><div>Center 2.452 00 GHz</div><div>*Res BW 20 kHz</div><div>*VBW 62 kHz</div><div>Sweep 452.3 ms (8001 pts)</div><div>File name error</div></div></div>

## **11. RADIATED EMISSION**

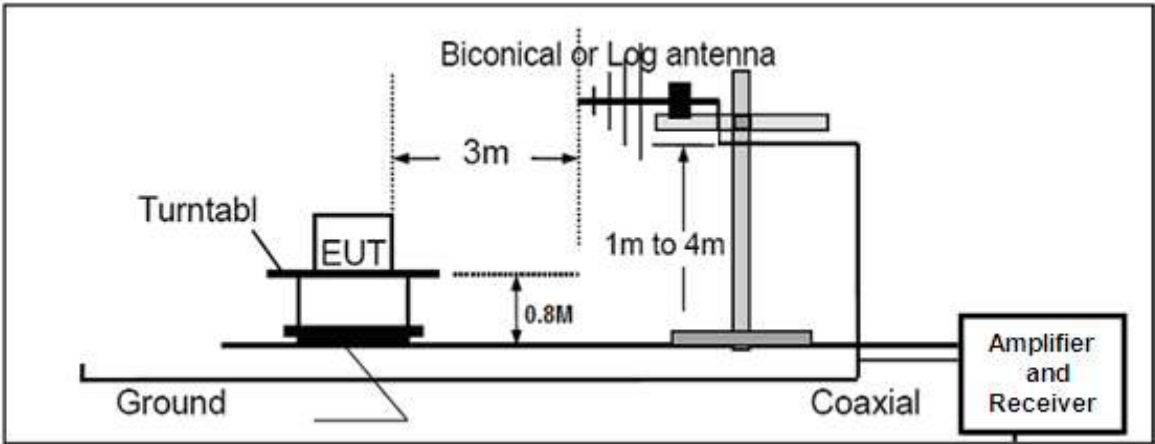
### **11.1. MEASUREMENT PROCEDURE**

1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

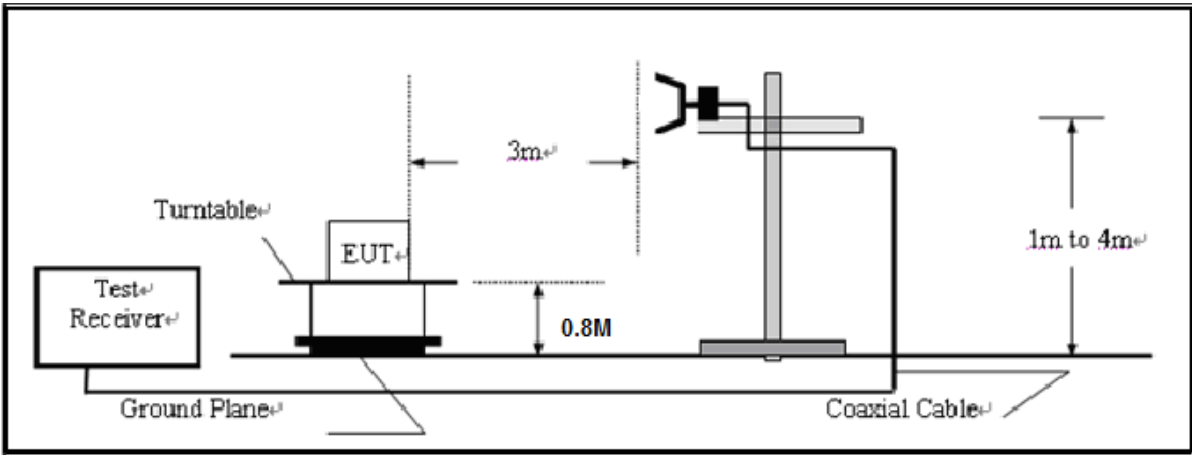


11.2. TEST SETUP

RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



### 11.3. LIMITS AND MEASUREMENT RESULT

15.209(a) Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (micorvolts/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

Note: All modes were tested For restricted band radiated emission,  
the test records reported below are the worst result compared to other modes.

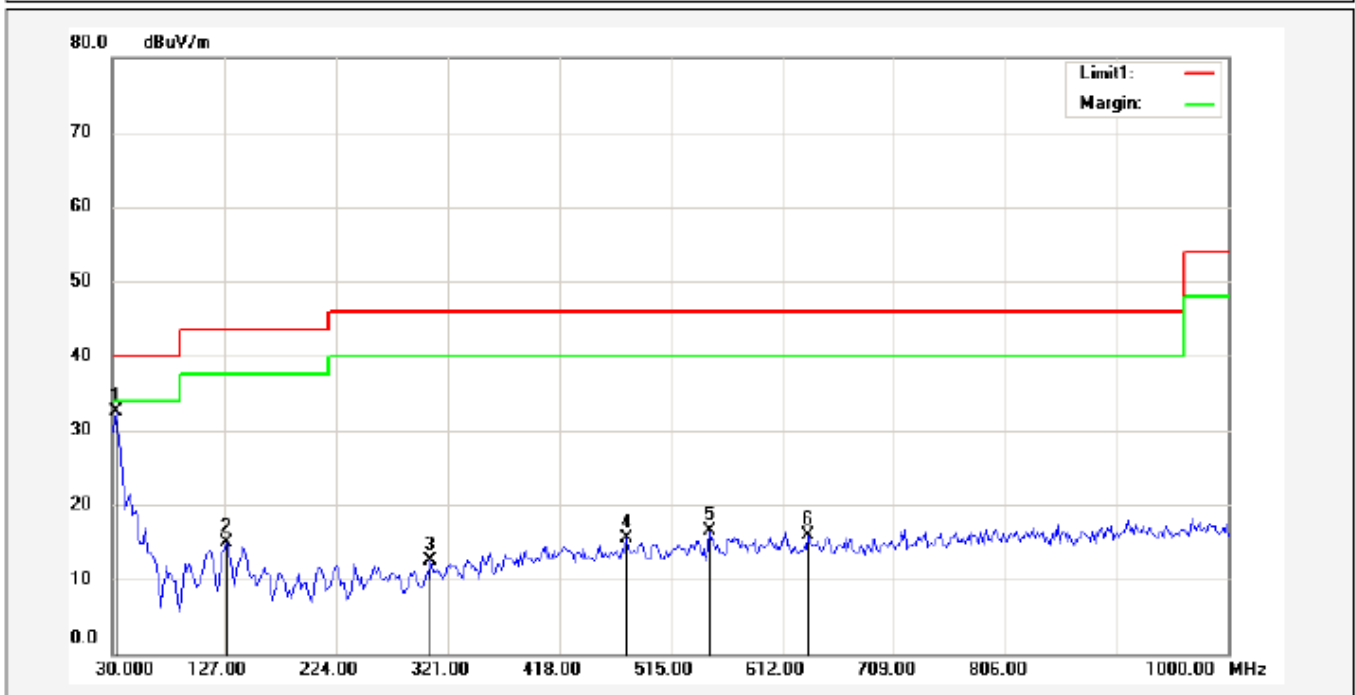
### 11.4. TEST RESULT

#### RADIATED EMISSION BELOW 30MHZ

No emission found between lowest internal used/generated frequencies to 30MHz.

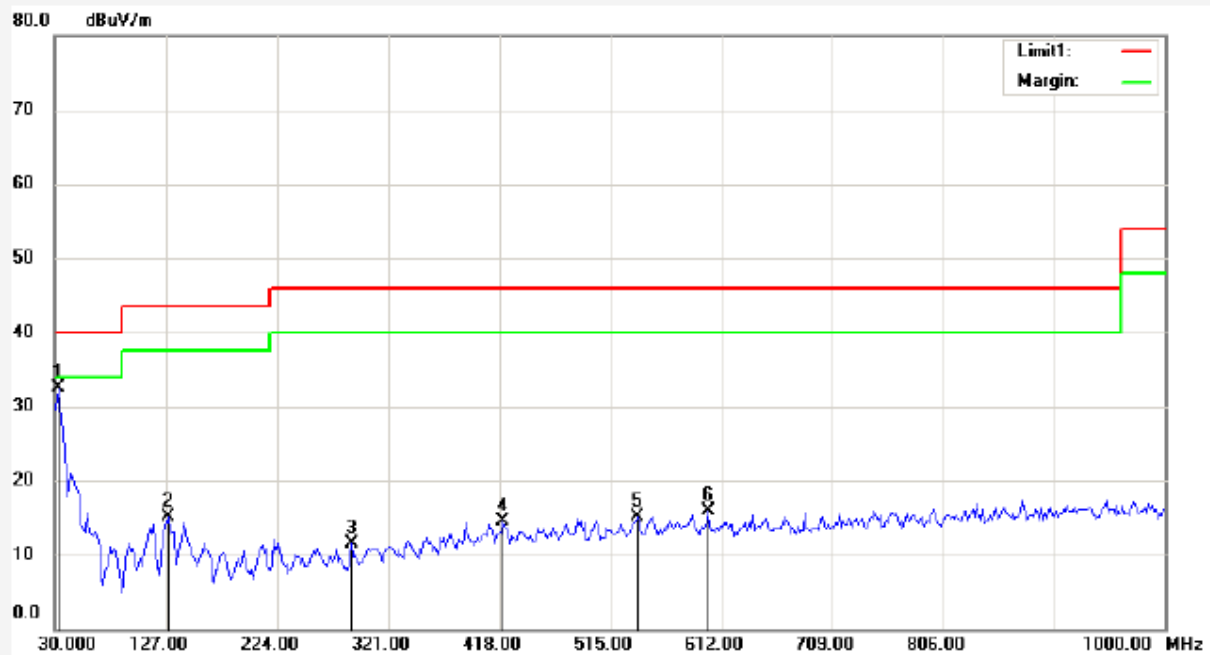
**RADIATED EMISSION BELOW 1GHZ**

Job No.: 20150422	Probe : Horizontal
Standard: FCC Part15 Class B (30-1000MHz)	Tested Distance: 3m
Test item: Radiation Test	Power Source: DC 3V
Temp.(C)/Hum.(%RH): 24 (C) / 52 %RH	Date: 2015-4-22 Time: 17:39:34
Company:	EUT:
Model: Freedom	Test By : JIMMY
Test Mode: WIFI 11B 2412	



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1*	33.2333	46.13	-13.64	32.49	40.00	-7.51	---	---	peak
2	128.6167	35.73	-20.80	14.93	43.50	-28.57	---	---	peak
3	306.4500	31.89	-19.32	12.57	46.00	-33.43	---	---	peak
4	476.2000	30.02	-14.50	15.52	46.00	-30.48	---	---	peak
5	548.9500	29.57	-13.12	16.45	46.00	-29.55	---	---	peak
6	634.6333	28.41	-12.49	15.92	46.00	-30.08	---	---	peak

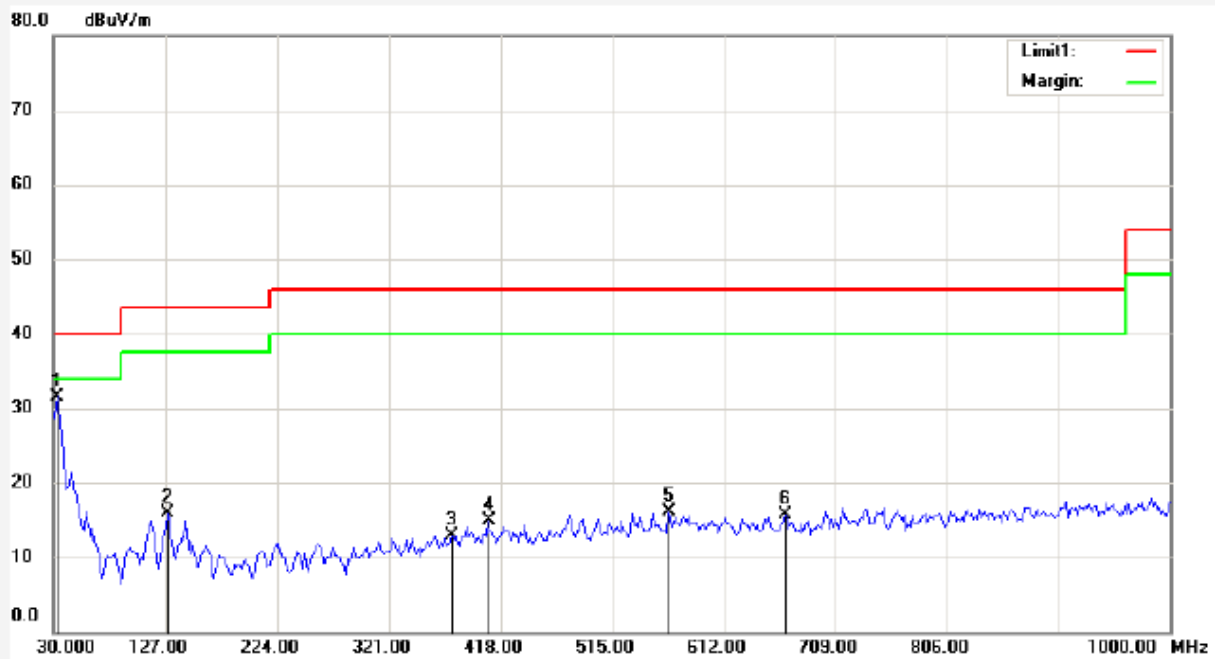
Job No.: 20150422	Probe : Vertical
Standard: FCC Part15 Class B (30-1000MHz)	Tested Distance: 3m
Test item: Radiation Test	Power Source: DC 3V
Temp.(C)/Hum.(%RH): 24 (C) / 52 %RH	Date: 2015-4-22 Time: 17:40:25
Company:	EUT:
Model: Freedom	Test By : JIMMY
Test Mode: WIFI 11B 2412	



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1*	33.2333	46.05	-13.64	32.41	40.00	-7.59	---	---	peak
2	128.6167	35.96	-20.80	15.16	43.50	-28.34	---	---	peak
3	288.6667	31.99	-20.46	11.53	46.00	-34.47	---	---	peak
4	421.2333	29.98	-15.44	14.54	46.00	-31.46	---	---	peak
5	539.2500	28.38	-13.33	15.05	46.00	-30.95	---	---	peak
6	600.6833	28.84	-12.85	15.99	46.00	-30.01	---	---	peak

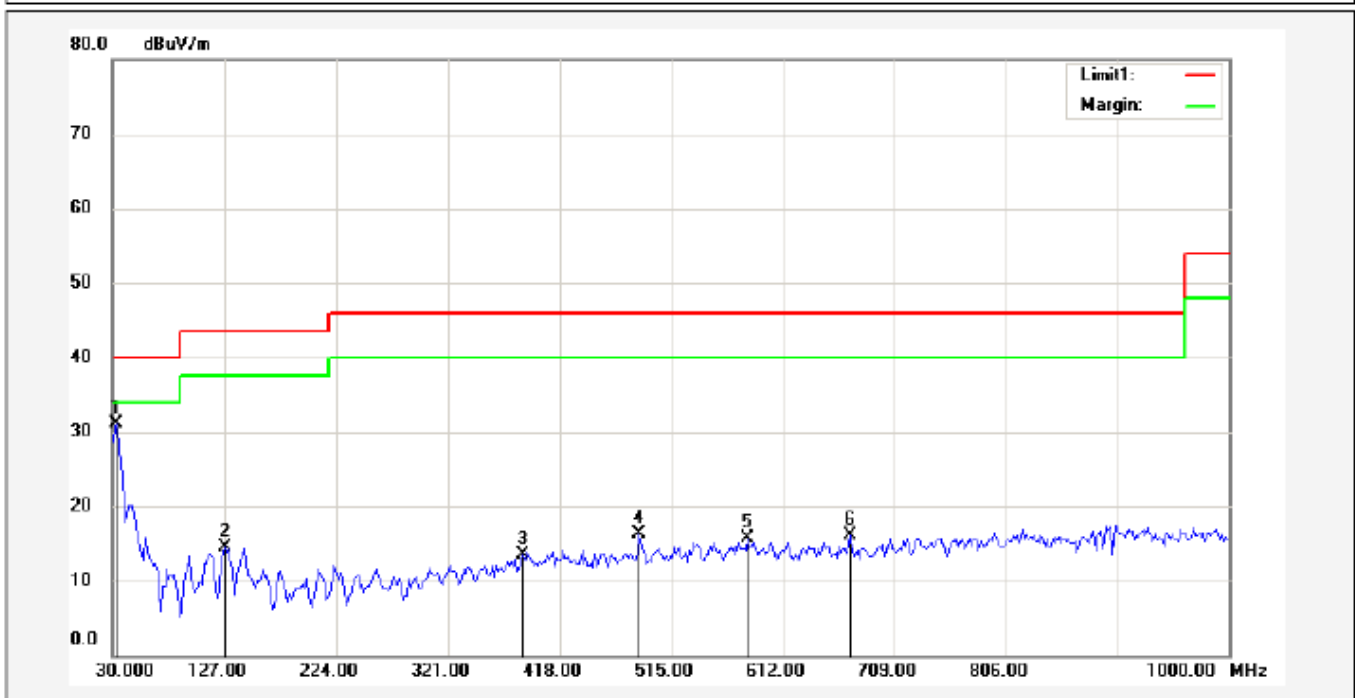
Job No.: 20150422	Probe : Horizontal
Standard: FCC Part15 Class B (30-1000MHz)	Tested Distance: 3m
Test item: Radiation Test	Power Source: DC 3V
Temp.(C)/Hum.(%RH): 24 (C) / 52 %RH	Date: 2015-4-22 Time: 17:42:31
Company:	EUT:
Model: Freedom	Test By : JIMMY

Test Mode: WIFI 11B 2437



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1*	33.2333	45.24	-13.64	31.60	40.00	-8.40	---	---	peak
2	128.6167	36.79	-20.80	15.99	43.50	-27.51	---	---	peak
3	375.9667	29.62	-16.77	12.85	46.00	-33.15	---	---	peak
4	406.6833	30.59	-15.77	14.82	46.00	-31.18	---	---	peak
5	565.1167	29.23	-13.14	16.09	46.00	-29.91	---	---	peak
6	665.3500	27.89	-12.24	15.65	46.00	-30.35	---	---	peak

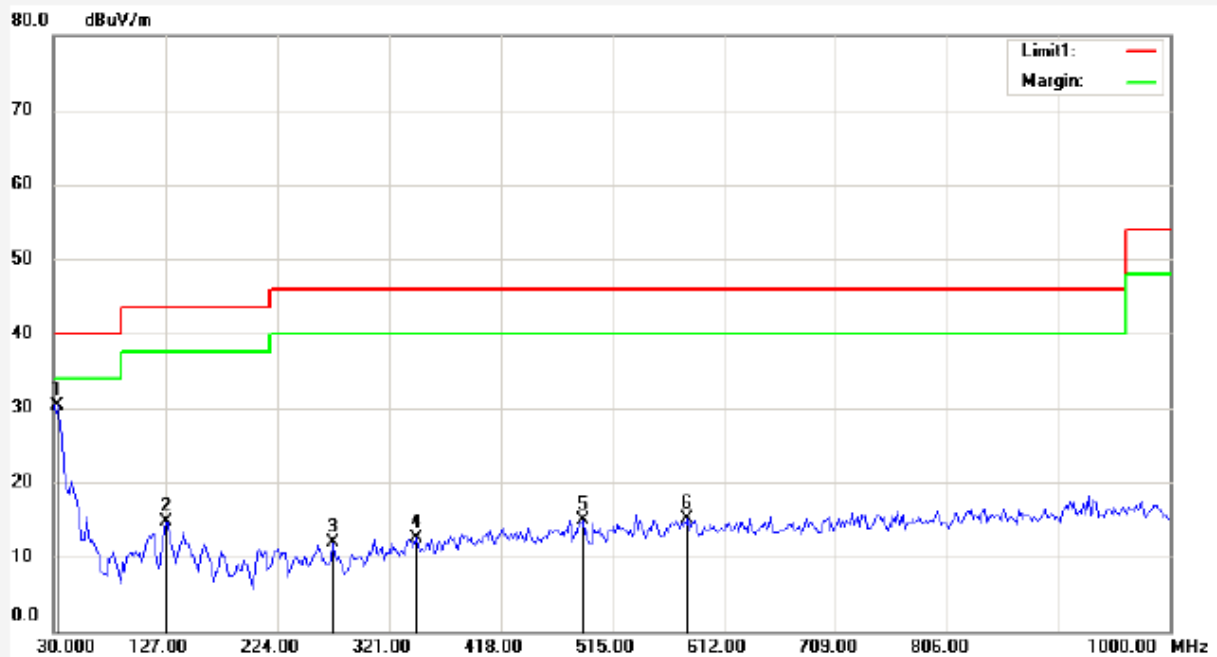
Job No.: 20150422	Probe : Vertical
Standard: FCC Part15 Class B (30-1000MHz)	Tested Distance: 3m
Test item: Radiation Test	Power Source: DC 3V
Temp.(C)/Hum.(%RH): 24 (C) / 52 %RH	Date: 2015-4-22 Time: 17:41:20
Company:	EUT:
Model: Freedom	Test By : JIMMY
Test Mode: WIFI 11B 2437	



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1*	33.2333	44.84	-13.64	31.20	40.00	-8.80	---	---	peak
2	127.0000	35.36	-20.87	14.49	43.50	-29.01	---	---	peak
3	385.6667	29.94	-16.44	13.50	46.00	-32.50	---	---	peak
4	487.5167	30.66	-14.36	16.30	46.00	-29.70	---	---	peak
5	581.2833	28.82	-13.10	15.72	46.00	-30.28	---	---	peak
6	670.2000	28.23	-12.13	16.10	46.00	-29.90	---	---	peak

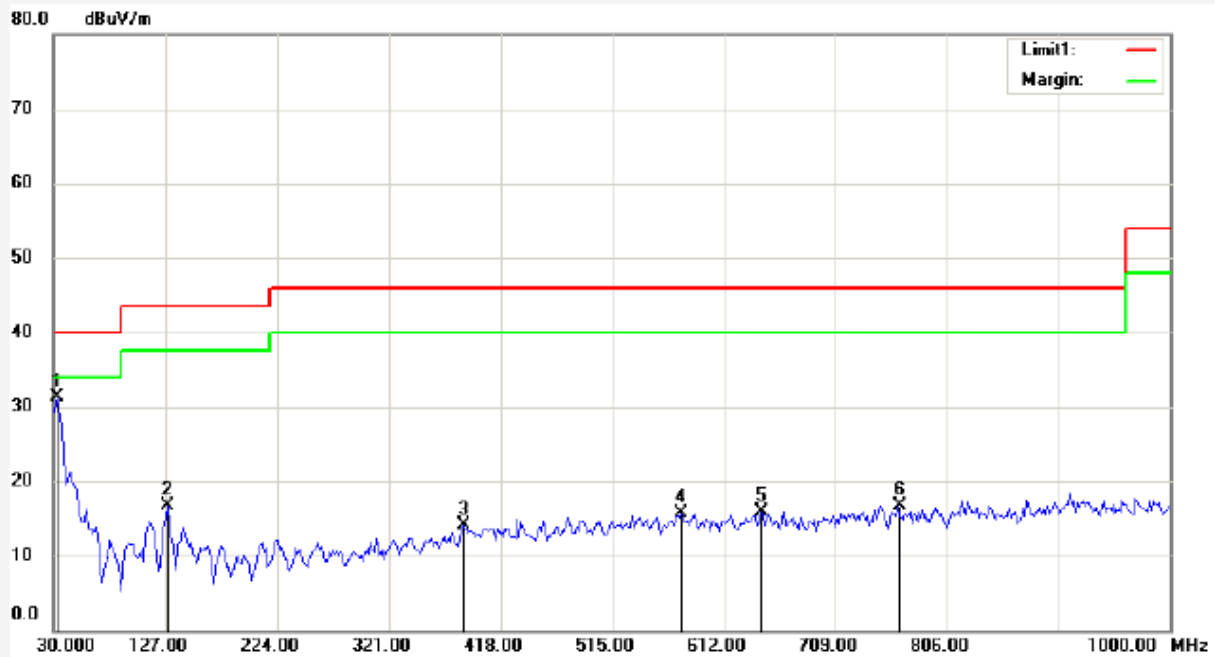
Job No.: 20150422	Probe : Horizontal
Standard: FCC Part15 Class B (30-1000MHz)	Tested Distance: 3m
Test item: Radiation Test	Power Source: DC 3V
Temp.(C)/Hum.(%RH): 24 (C) / 52 %RH	Date: 2015-4-22 Time: 17:43:16
Company:	EUT:
Model: Freedom	Test By : JIMMY

Test Mode: WIFI 11B 2462



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1*	33.2333	44.03	-13.64	30.39	40.00	-9.61	---	---	peak
2	127.0000	35.65	-20.87	14.78	43.50	-28.72	---	---	peak
3	272.5000	32.47	-20.47	12.00	46.00	-34.00	---	---	peak
4	345.2500	30.39	-17.89	12.50	46.00	-33.50	---	---	peak
5	489.1333	29.18	-14.36	14.82	46.00	-31.18	---	---	peak
6	579.6667	28.19	-13.11	15.08	46.00	-30.92	---	---	peak

Job No.: 20150422	Probe : Vertical
Standard: FCC Part15 Class B (30-1000MHz)	Tested Distance: 3m
Test item: Radiation Test	Power Source: DC 3V
Temp.(C)/Hum.(%RH): 24 (C) / 52 %RH	Date: 2015-4-22 Time: 17:44:01
Company:	EUT:
Model: Freedom	Test By : JIMMY
Test Mode: WIFI 11B 2462	



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1*	33.2333	44.89	-13.64	31.25	40.00	-8.75	---	---	peak
2	128.6167	37.50	-20.80	16.70	43.50	-26.80	---	---	peak
3	385.6667	30.46	-16.44	14.02	46.00	-31.98	---	---	peak
4	574.8167	28.79	-13.06	15.73	46.00	-30.27	---	---	peak
5	644.3333	28.40	-12.49	15.91	46.00	-30.09	---	---	peak
6	763.9667	27.75	-11.07	16.68	46.00	-29.32	---	---	peak

## RESULT: PASS

**Note:** 1. Factor=Antenna Factor + Cable loss, Margin= Result -Limit.

2. The "Factor" value can be calculated automatically by software of measurement system.

3. 30MHz~1GHz:(Scan with 11b,11g,11n, the worst casw is 11b Mode)



**RADIATED EMISSION ABOVE 1GHZ**

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector	Comment
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type	
TX 11b 2412MHz							
4824.092	46.42	10.44	56.86	74	-17.14	Pk	Horizontal
4824.092	31.86	10.44	42.3	54	-11.7	AV	Horizontal
7236.127	43.51	12.39	55.9	74	-18.1	pk	Horizontal
7236.127	33.64	12.39	46.03	54	-7.97	AV	Horizontal
4824.098	49.66	10.39	60.05	74	-13.95	Pk	Vertical
4824.082	33.37	10.39	43.76	54	-10.24	AV	Vertical
7236.110	48.48	12.68	61.16	74	-12.84	Pk	Vertical
7236.054	30.61	12.68	43.29	54	-10.71	AV	Vertical
TX 11b 2437MHz							
4874.072	49.61	10.39	60	74	-14	Pk	Horizontal
4874.108	33.35	10.39	43.74	54	-10.26	AV	Horizontal
7311.092	48.42	12.68	61.1	74	-12.9	Pk	Horizontal
7311.131	30.73	12.68	43.41	54	-10.59	AV	Horizontal
4874.098	49.82	10.39	60.21	74	-13.79	Pk	Vertical
4874.044	33.47	10.39	43.86	54	-10.14	AV	Vertical
7311.145	48.52	12.68	61.2	74	-12.8	Pk	Vertical
7311.104	30.19	12.68	42.87	54	-11.13	AV	Vertical
TX 11b 2462MHz							
4924.128	49.69	10.39	60.08	74	-13.92	pk	Horizontal
4924.083	33.18	10.39	43.57	54	-10.43	AV	Horizontal
7386.071	48.19	12.68	60.87	74	-13.13	pk	Horizontal
7386.134	30.37	12.68	43.05	54	-10.95	AV	Horizontal
4924.042	49.86	10.39	60.25	74	-13.75	pk	Vertical
4924.060	33.43	10.39	43.82	54	-10.18	AV	Vertical
7386.051	48.38	12.68	61.06	74	-12.94	pk	Vertical
7386.054	30.49	12.68	43.17	54	-10.83	AV	Vertical

**RESULT: PASS**

**Note:** 1~25GHz scan with 11b. No recording in the test report at least have 20dB margin.

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Emission Level = Meter Reading + Factor

Margin = Emission Level - Limit

## 12. BAND EDGE EMISSION

### 12.1. MEASUREMENT PROCEDURE

1) Radiated restricted band edge measurements

The radiated restricted band edge measurements are measured with an EMI test receiver connected to the receive antenna while the EUT is transmitting

2) Conducted Emissions at the bang edge

a) The transmitter output was connected to the spectrum analyzer

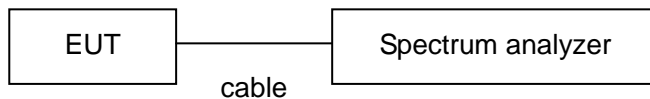
b) Set RBW=100kHz, VBW=300kHz

c) Suitable frequency span including 100kHz bandwidth from band edge

### 12.2. TEST SET-UP

Radiated same as 11.2

Conducted set up



### 12.3. Radiated Test Result

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector	Comment
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	Type	
TX 11b 2412MHz							
2399.9	78.39	-13	65.39	74	-8.61	peak	Horizontal
2399.9	59.62	-13	46.62	54	-7.38	AVG	Horizontal
2400	79.32	-12.99	66.33	74	-7.67	peak	Horizontal
2400	58.79	-12.99	45.8	54	-8.2	AVG	Horizontal
2399.9	79.63	-12.97	66.66	74	-7.34	peak	Vertical
2399.9	59.89	-12.97	46.92	54	-7.08	AVG	Vertical
2400	79.12	-12.94	66.18	74	-7.82	peak	Vertical
2400	59.47	-12.94	46.53	54	-7.47	AVG	Vertical
TX 11b 2462MHz							
2483.5	78.87	-12.78	66.09	74	-7.91	peak	Horizontal
2483.5	58.15	-12.78	45.37	54	-8.63	AVG	Horizontal
2483.6	78.76	-12.77	65.99	74	-8.01	peak	Horizontal
2483.6	58.38	-12.77	45.61	54	-8.39	AVG	Horizontal
2483.5	79.92	-12.76	67.16	74	-6.84	peak	Vertical
2483.5	57.79	-12.76	45.03	54	-8.97	AVG	Vertical
2483.6	78.82	-12.72	66.1	74	-7.9	peak	Vertical
2483.6	58.43	-12.72	45.71	54	-8.29	AVG	Vertical

### RESULT: PASS

**Note:** Scan with 11b,11g,11n, the worst casw is 11b Mode

Factor=Antenna Factor + Cable loss - Amplifier gain,

Emission Level = Meter Reading + Factor

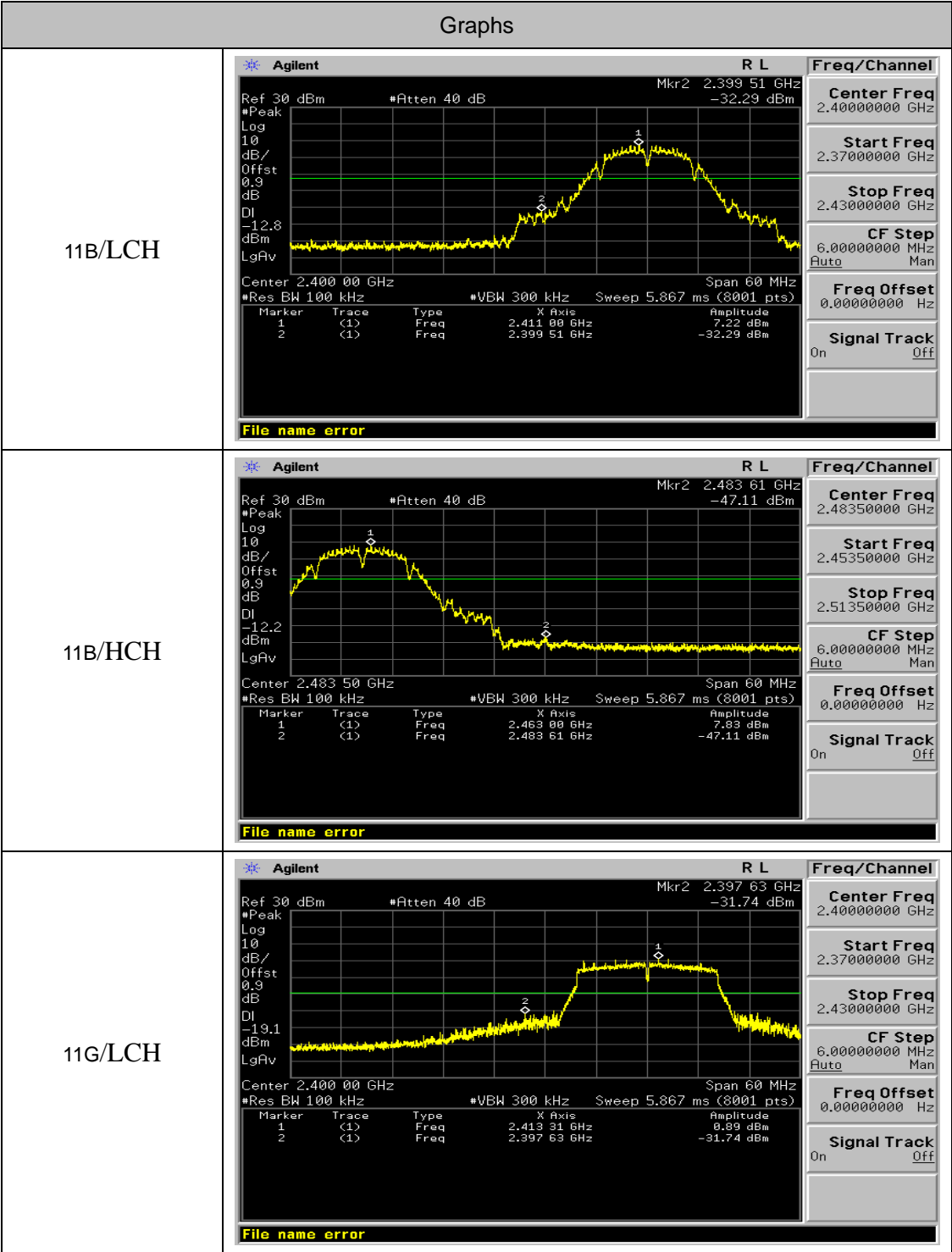
Margin= Emission Level -Limit.

The "Factor" value can be calculated automatically by software of measurement system.

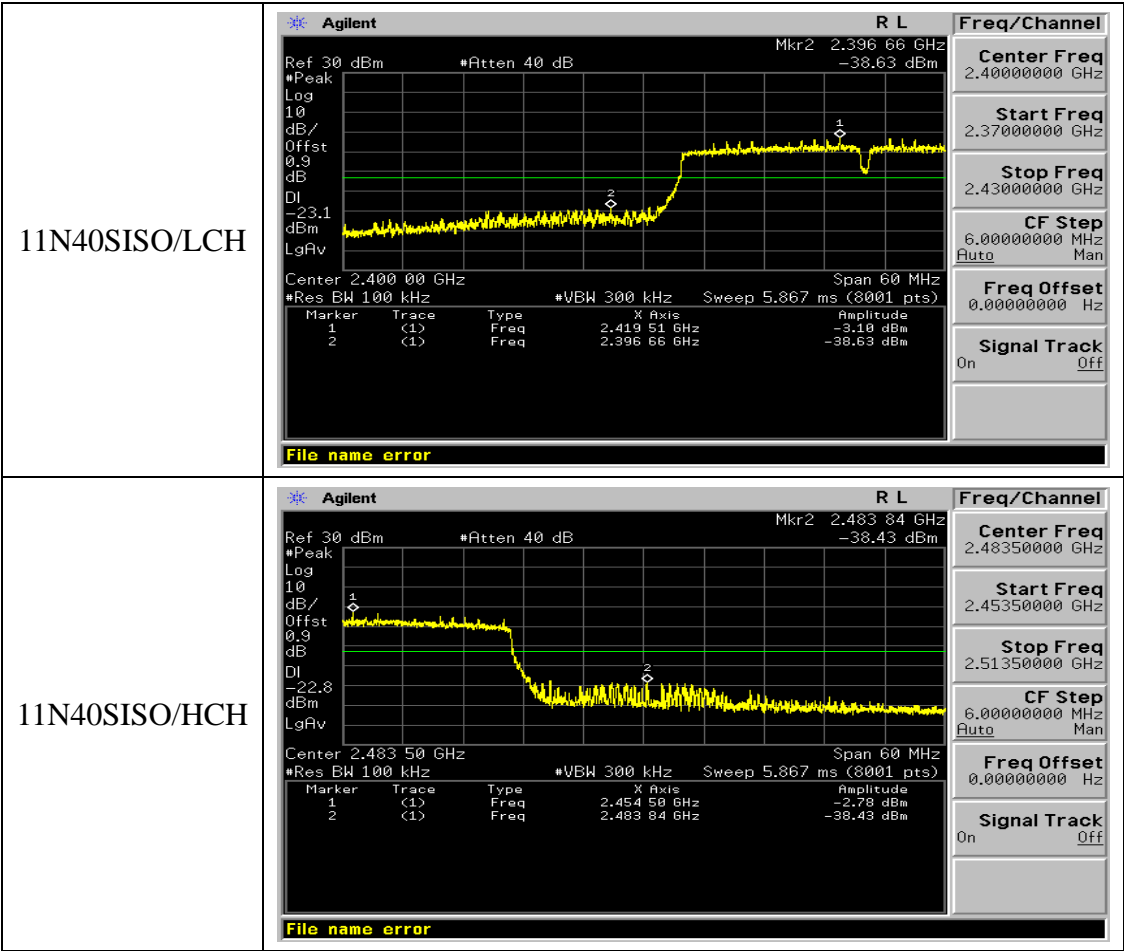
#### 12.4. Conducted Test Result

Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
11B	LCH	7.22	-32.29	-12.78	PASS
11B	HCH	7.83	-47.11	-12.17	PASS
11G	LCH	0.89	-31.74	-19.11	PASS
11G	HCH	2.46	-41.14	-17.54	PASS
11N20SISO	LCH	1.59	-32.18	-18.41	PASS
11N20SISO	HCH	1.71	-38.57	-18.29	PASS
11N40SISO	LCH	-3.1	-38.63	-23.1	PASS
11N40SISO	HCH	-2.78	-38.43	-22.78	PASS

Test Graph







### 13. FCC LINE CONDUCTED EMISSION TEST

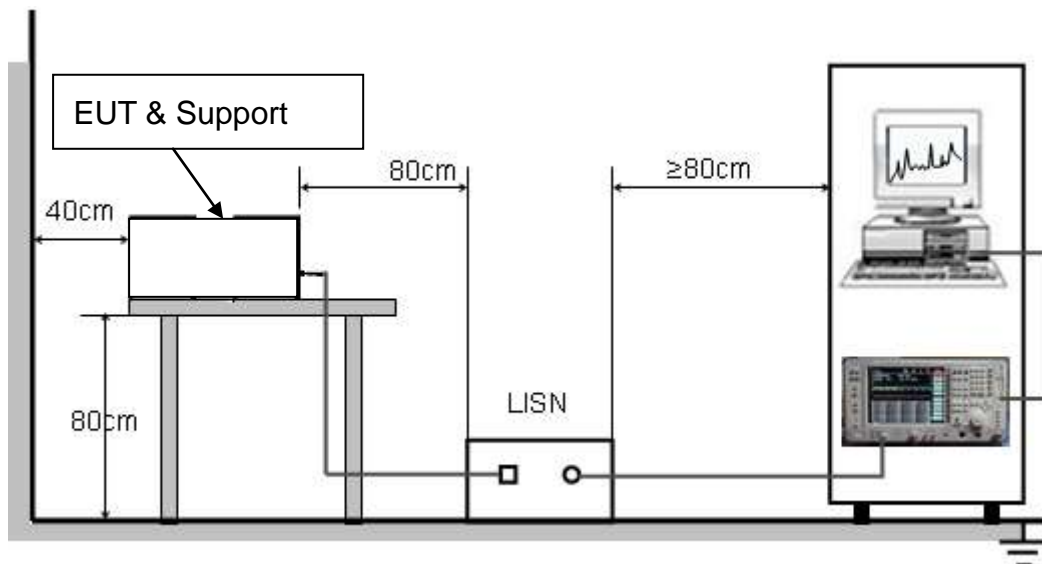
#### 13.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P.( dBuV)	Average( dBuV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Note:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

#### 13.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST





### **13.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST**

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.4.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
4. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received charging voltage by adapter which received 120V/60Hz power by a LISN..
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

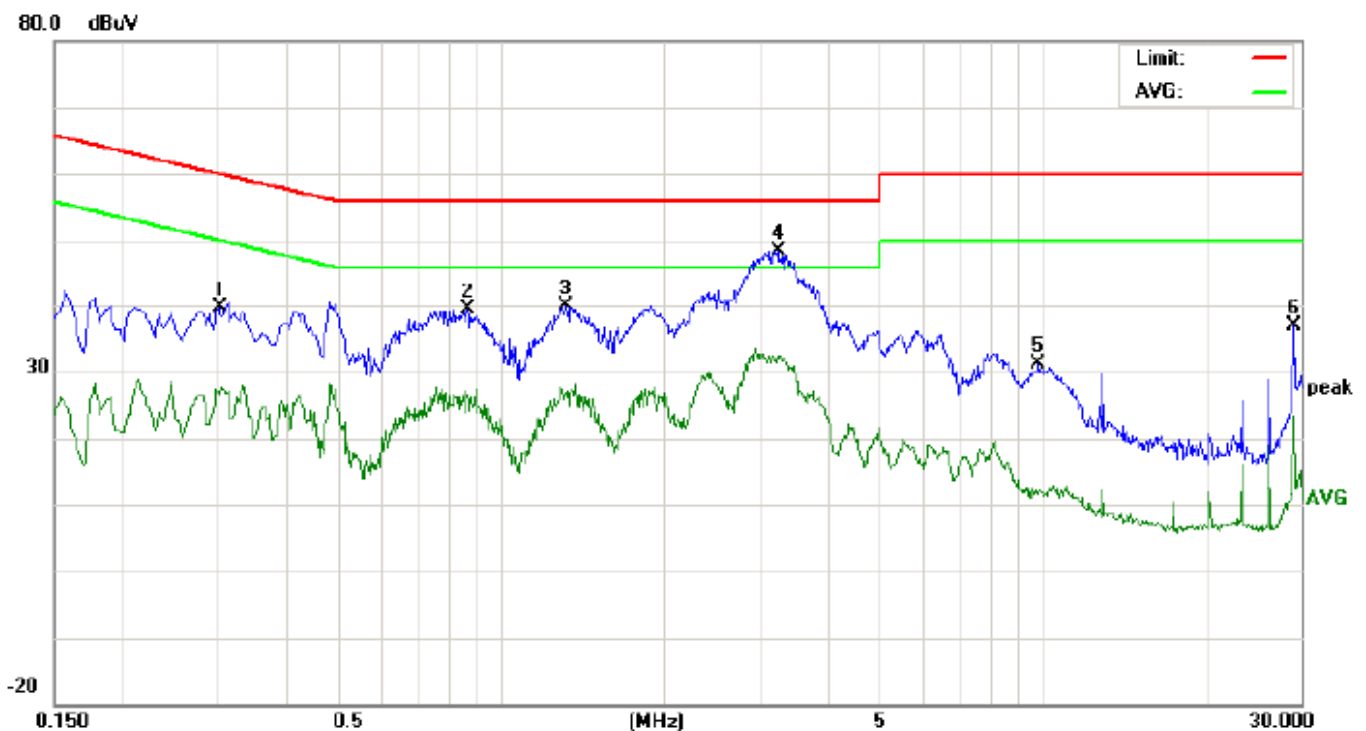
Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

### **13.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST**

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less -2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

**13.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST****LINE CONDUCTED EMISSION TEST LINE 1-L**

Job No.:	20150422	Date:	2015-4-22
Company:		Time:	18:20:50
Standard:	FCC Class B Conduction(QP)	Temp.(C)/Hum.(%):	26(C) / 60 %
Test item:	Conduction Test	EUT:	
Line :	L1	Test Voltage	AC 120V/60Hz
Model:	Freedom	Test By :	
Description: Normal Operating(WIFI)			

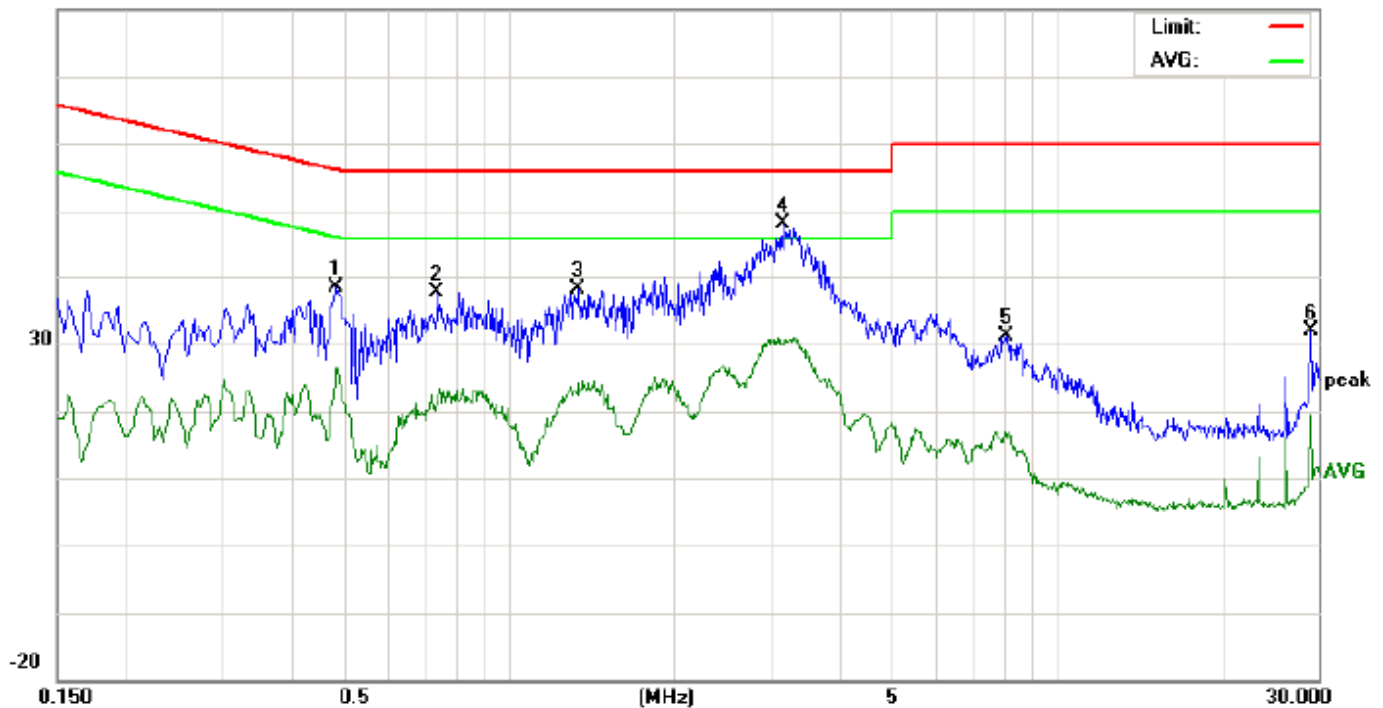


No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor dB	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.3020	29.43		16.39	10.29	39.72		26.68	60.19	50.19	-20.47	-23.51	P	
2	0.8700	29.03		16.22	10.37	39.40		26.59	56.00	46.00	-16.60	-19.41	P	
3	1.3180	29.49		16.52	10.38	39.87		26.90	56.00	46.00	-16.13	-19.10	P	
4	3.2540	37.90		21.85	10.53	48.43		32.38	56.00	46.00	-7.57	-13.62	P	
5	9.8260	20.89		1.75	10.19	31.08		11.94	60.00	50.00	-28.92	-38.06	P	
6	29.1100	26.78		13.17	10.12	36.90		23.29	60.00	50.00	-23.10	-26.71	P	

Line Conducted Emission Test Line 2-N

Job No.:	20150422	Date:	2015-4-22
Company:		Time:	18:18:38
Standard:	FCC Class B Conduction(QP)	Temp.(C)/Hum.(%):	26(C) / 60 %
Test item:	Conduction Test	EUT:	
Line :	N	Test Voltage	AC 120V/60Hz
Model:	Freedom	Test By :	
Description: Normal Operating(WIFI)			

80.0 dBuV



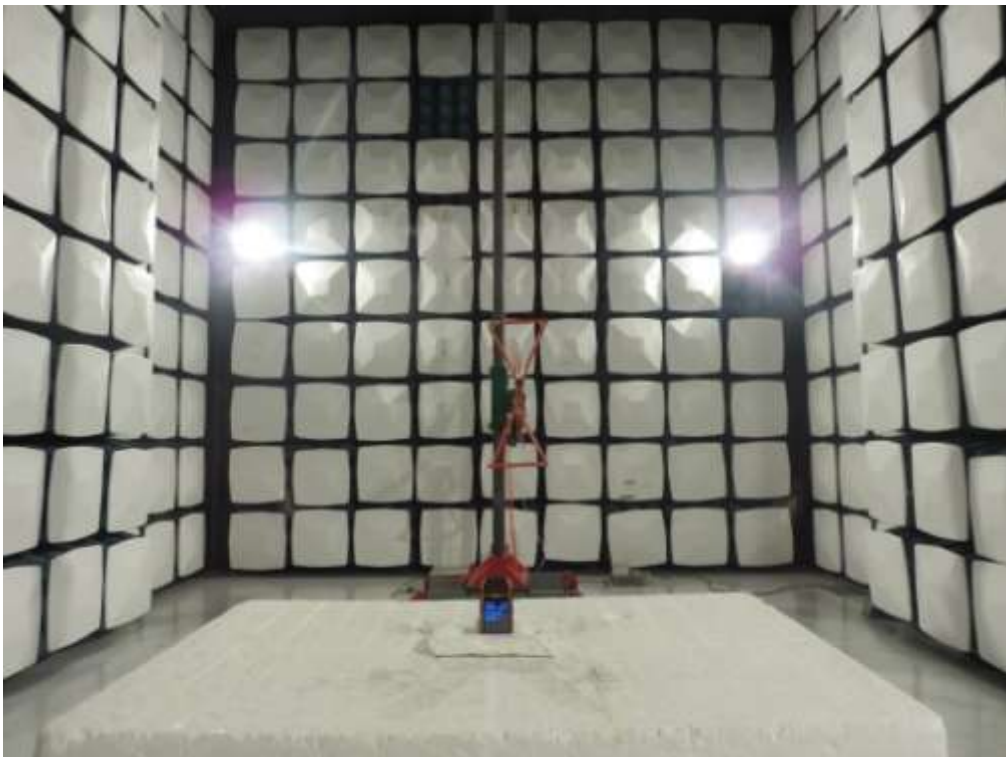
No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG		Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.4860	27.92		16.06	10.39	38.31		26.45	56.24	46.24	-17.93	-19.79	P	
2	0.7420	27.43		10.93	10.32	37.75		21.25	56.00	46.00	-18.25	-24.75	P	
3	1.3420	27.69		13.66	10.38	38.07		24.04	56.00	46.00	-17.93	-21.96	P	
4	3.1619	37.49		19.35	10.54	48.03		29.89	56.00	46.00	-7.97	-16.11	P	
5	8.0860	20.83		5.85	10.35	31.18		16.20	60.00	50.00	-28.82	-33.80	P	
6	29.1020	21.64		9.37	10.12	31.76		19.49	60.00	50.00	-28.24	-30.51	P	

## APPENDIX A: PHOTOGRAPHS OF TEST SETUP

### FCC LINE CONDUCTED EMISSION TEST SETUP



FCC RADIATED EMISSION TEST SETUP



## APPENDIX B: PHOTOGRAPHS OF EUT

### ALL VIEW OF EUT

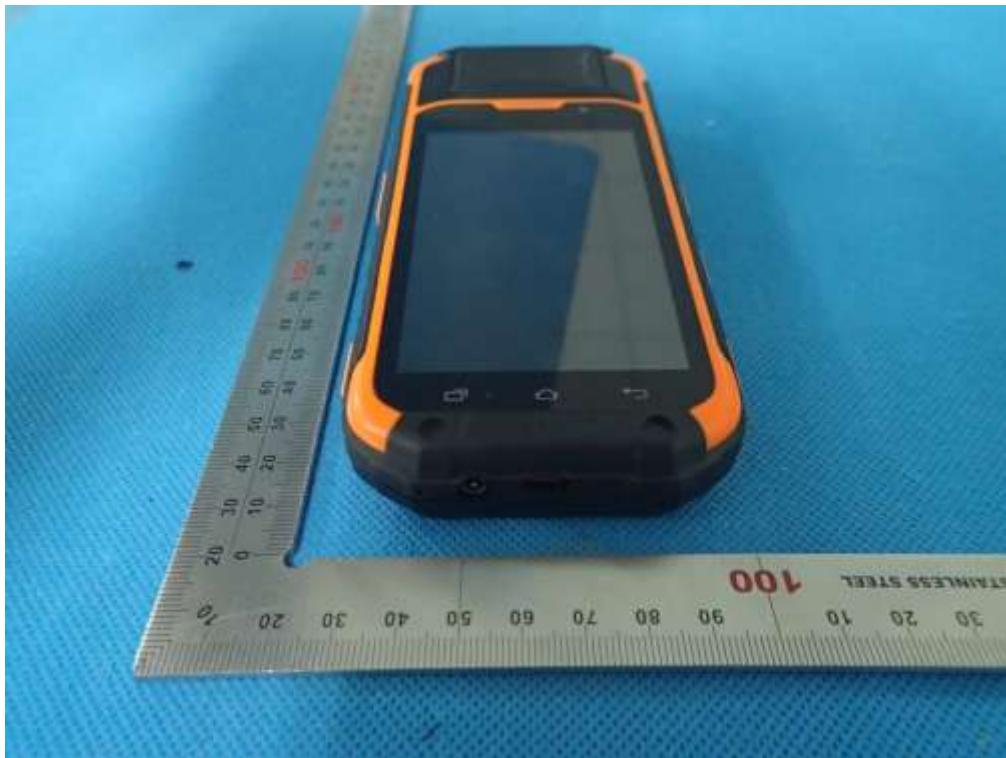


TOP VIEW OF EUT





BOTTOM VIEW OF EUT



FRONT VIEW OF EUT



BACK VIEW OF EUT



LEFT VIEW OF EUT



RIGHT VIEW OF EUT

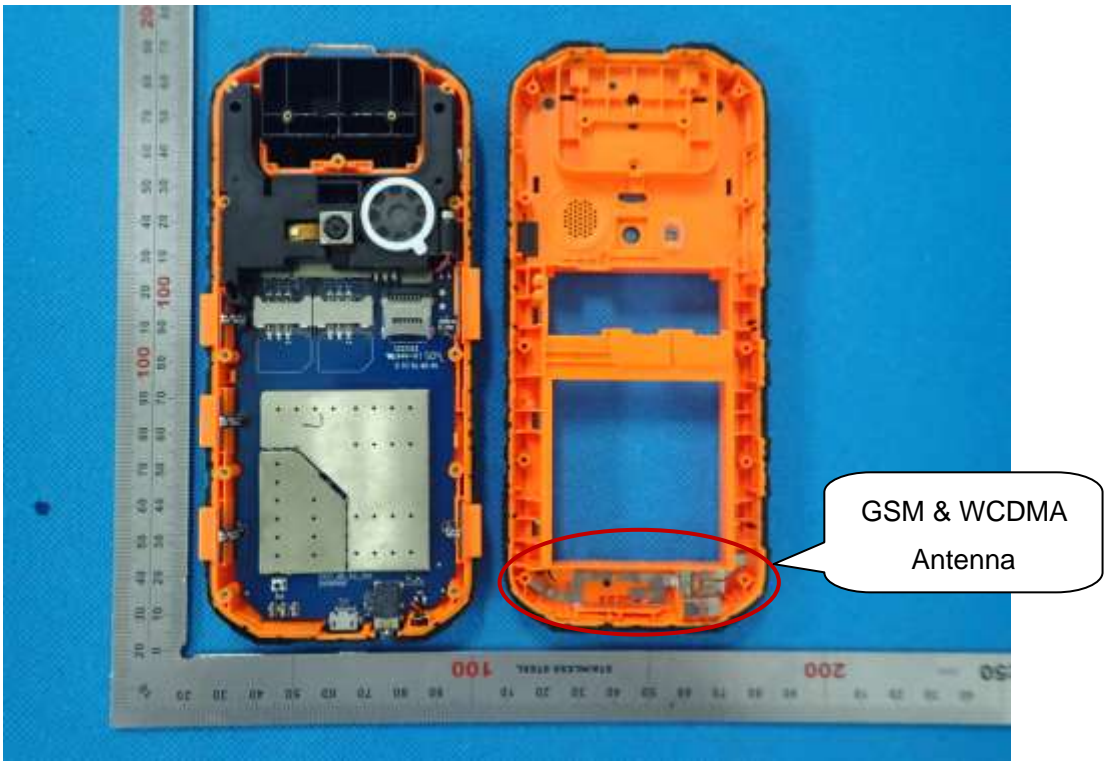


OPEN VIEW OF EUT-1

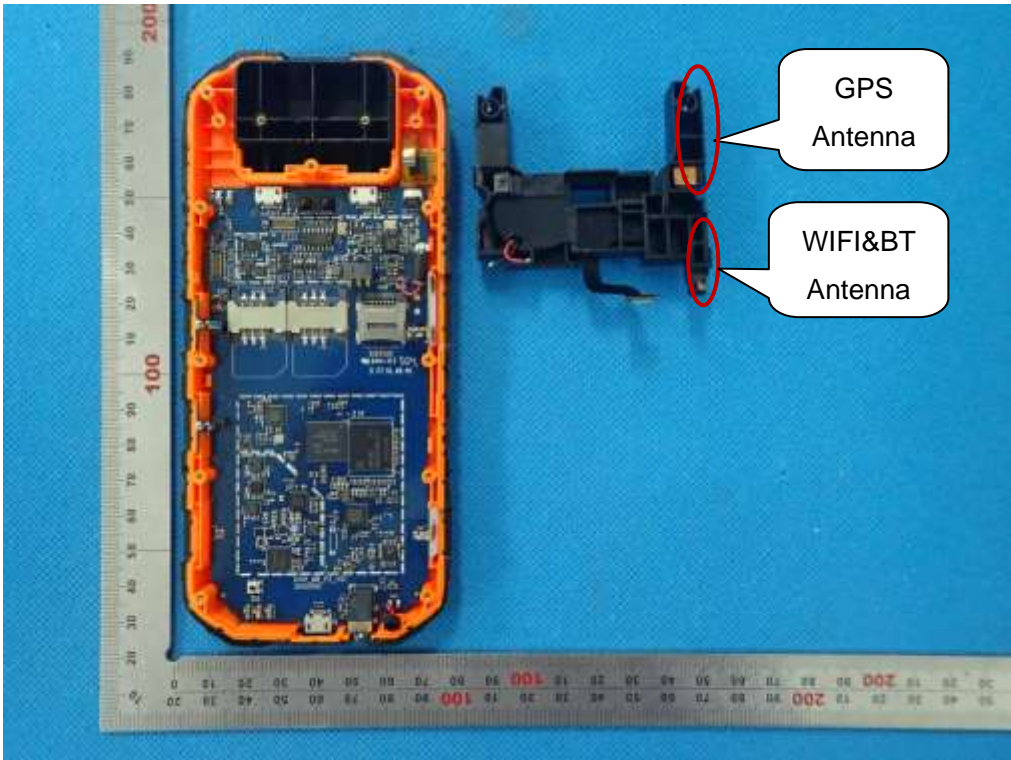




OPEN VIEW OF EUT-2



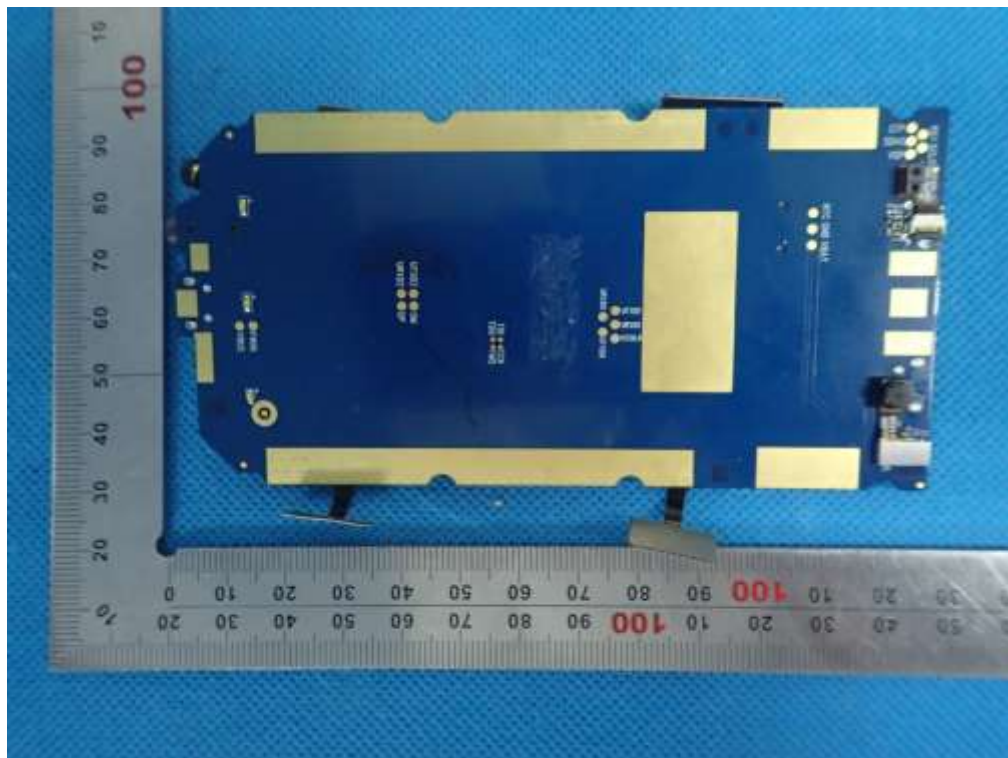
OPEN VIEW OF EUT-3



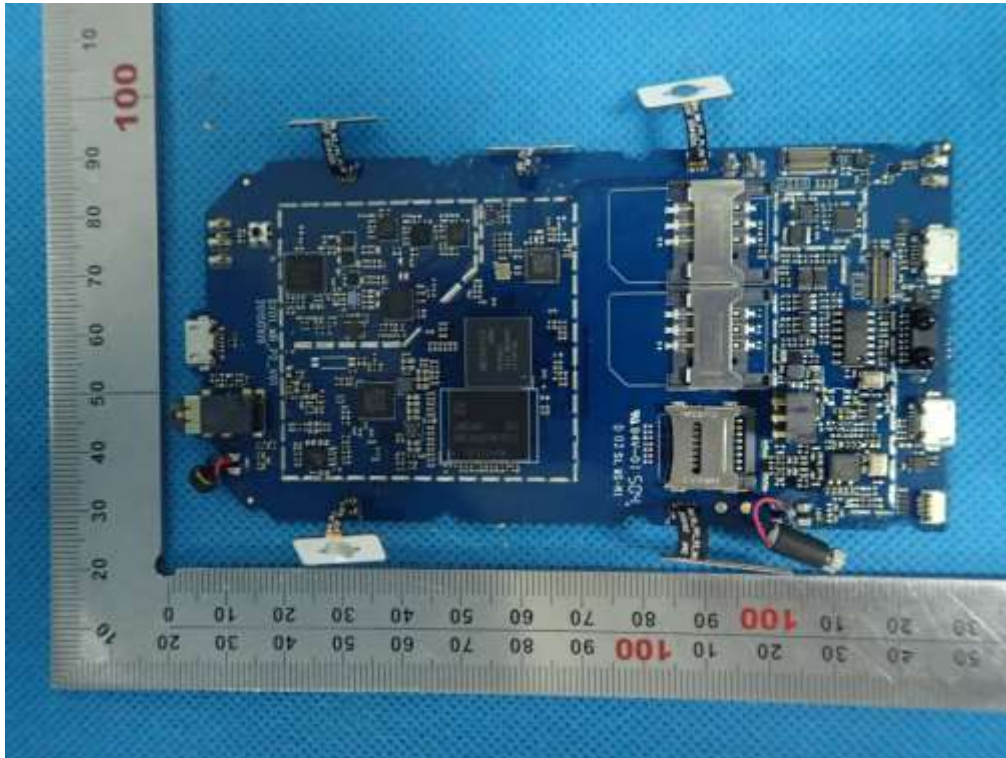
OPEN VIEW OF EUT-4



### INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2



-----END OF REPORT-----