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## FCC TEST REPORT

Report No: STS1502002F03

Issued for

DOPPIO MOBILE INTERNATIONAL LIMITED

1011A, 10/F., Harbour Centre Tower 1, No.1 Hok  
Cheung St., Hung Hom, Kowloon, Hong Kong.

Product Name:	THUNDER PLUS
Brand Name:	doppio
Model No.:	DP5108
Series Model:	N/A
FCC ID:	N2GDP5108
Test Standard:	FCC Part 15.247

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**Report Revise Record**

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Jan.30, 2015	Valid	Original Report





## TABLE OF CONTENTS

<b>1. VERIFICATION OF CONFORMITY .....</b>	<b>5</b>
<b>2. GENERAL INFORMATION .....</b>	<b>6</b>
2.1. PRODUCT DESCRIPTION .....	6
2.2. TABLE OF CARRIER FREQUENCIES .....	6
2.3. IEEE 802.11N MODULATION SCHEME .....	7
2.4. RELATED SUBMITTAL(S) / GRANT (S) .....	7
2.5. TEST METHODOLOGY .....	7
2.6. SPECIAL ACCESSORIES .....	7
2.7. EQUIPMENT MODIFICATIONS .....	7
<b>3. MEASUREMENT UNCERTAINTY .....</b>	<b>8</b>
<b>4. DESCRIPTION OF TEST MODES .....</b>	<b>8</b>
<b>5. SYSTEM TEST CONFIGURATION .....</b>	<b>9</b>
5.1. CONFIGURATION OF EUT SYSTEM .....	9
5.2. EQUIPMENT USED IN EUT SYSTEM .....	9
5.3. SUMMARY OF TEST RESULTS .....	9
<b>6. TEST FACILITY .....</b>	<b>10</b>
<b>7. OUTPUT POWER .....</b>	<b>11</b>
7.1. MEASUREMENT PROCEDURE .....	11
7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) .....	12
7.3. LIMITS AND MEASUREMENT RESULT .....	13
<b>8. 6DB BANDWIDTH .....</b>	<b>15</b>
8.1. MEASUREMENT PROCEDURE .....	15
8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) .....	15
8.3. LIMITS AND MEASUREMENT RESULTS .....	15
<b>9. CONDUCTED SPURIOUS EMISSION .....</b>	<b>20</b>
9.1. MEASUREMENT PROCEDURE .....	20
9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) .....	20
9.3. MEASUREMENT EQUIPMENT USED .....	20
9.4. LIMITS AND MEASUREMENT RESULT .....	20
<b>10. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY .....</b>	<b>49</b>
10.1 MEASUREMENT PROCEDURE .....	49
10.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION) .....	49
10.3 MEASUREMENT EQUIPMENT USED .....	49
10.4 LIMITS AND MEASUREMENT RESULT .....	49



<b>11. RADIATED EMISSION .....</b>	<b>54</b>
11.1. MEASUREMENT PROCEDURE .....	54
11.2. TEST SETUP .....	55
11.3. LIMITS AND MEASUREMENT RESULT .....	56
11.4. TEST RESULT .....	57
<b>12. BAND EDGE EMISSION .....</b>	<b>70</b>
12.1. MEASUREMENT PROCEDURE .....	70
12.2. TEST SET-UP .....	70
12.3. Radiated Test Result .....	71
12.4. Conducted Test Result .....	75
<b>13. FCC LINE CONDUCTED EMISSION TEST .....</b>	<b>79</b>
13.1. LIMITS OF LINE CONDUCTED EMISSION TEST .....	79
13.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST .....	79
13.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST .....	80
13.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST .....	80
13.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST .....	81
<b>14. ANTENNA REQUIREMENT .....</b>	<b>83</b>
14.1 STANDARD REQUIREMENT .....	83
14.2 EUT ANTENNA .....	83
<b>APPENDIX A: PHOTOGRAPHS OF TEST SETUP .....</b>	<b>84</b>
<b>APPENDIX A: PHOTOGRAPHS OF TEST SETUP .....</b>	<b>84</b>
<b>APPENDIX B: PHOTOGRAPHS OF EUT .....</b>	<b>86</b>



## 1. VERIFICATION OF CONFORMITY

<b>Applicant</b>	DOPPIO MOBILE INTERNATIONAL LIMITED
<b>Address</b>	1011A, 10/F., Harbour Centre Tower 1, No.1 Hok Cheung St., Hung Hom, Kowloon, Hong Kong.
<b>Manufacturer</b>	DOPPIO MOBILE (SHENZHEN) LIMITED
<b>Address</b>	Room313, 3th Floor, Building 10 Jiale Building, NO.11 YanNan Road,Futian District, Shenzhen
<b>Product Designation</b>	THUNDER PLUS
<b>Brand Name</b>	doppio
<b>Test Model</b>	DP5108
<b>Date of test</b>	Jan.05, 2015 to Jan.30, 2015
<b>Deviation</b>	None
<b>Condition of Test Sample</b>	Normal
<b>Report Template</b>	STSRT-US-BGN/RF

We hereby certify that:

The above equipment was tested by Shenzhen STS Test Services 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.

Testing Engineer :

(Jin Ming)

Report writing :

(Sunny zheng)

Authorized Signatory :

(Bovey Yang)





## 2. GENERAL INFORMATION

### 2.1. PRODUCT DESCRIPTION

The EUT is designed as "THUNDER PLUS". 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(Average)</b>	IEEE 802.11b:9.7dBm; IEEE 802.11g:7.54dBm; IEEE 802.11n(20):7.48dBm; IEEE 802.11n(40):4.75dBm
<b>Modulation</b>	DSSS(DBPSK/DQPSK/CCK);OFDM(BPSK/QPSK/16-QAM/64-QAM)
<b>Number of channels</b>	11
<b>Hardware Version</b>	P6120-02
<b>Software Version</b>	DP5108_DOPPIO_ONE
<b>Antenna Designation</b>	Integrated Antenna
<b>Antenna Gain</b>	0.8dBi
<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: N2GDP5108** 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:**

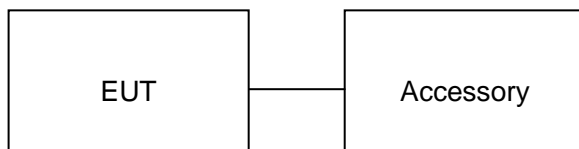
1. The EUT has been set to operate continuously on the lowest, middle and highest operation frequency Individually, and the eut is operating at its maximum duty cycle>or equal 98%
2. All modes under which configure applicable have been tested and the worst mode test data recording in the test report, 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	Mobile Phone	DP5108	FCCID:N2GDP5108	EUT
2	Adapter	DP5108	DC 5V/1A	Accessory
3	Battery	DP5108	DC 3.7V 4000mAh	Accessory
4	Earphone	DP5108	N/A	Accessory
5	USB Cable	DP5108	N/A	Accessory

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
§15.203	Antenna Requirement	Compliant

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



## 6. TEST FACILITY

<b>Site</b>	Shenzhen STS Test Services Co., Ltd.
<b>Location</b>	1/F, Building 2, Zhuoke Science Park, Chongqing Road, Fuyong, Baoan District, Shenzhen, China
<b>Description</b>	The test site is constructed and calibrated to meet the FCC requirements in documents ANSI C63.4:2003.FCC Registration No.: 842334

### ALL TEST EQUIPMENT LIST

#### Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Spectrum Analyzer	Agilent	E4407B	MY50140340	2014.10.25	2015.10.24
Test Receiver	R&S	ESCI	101427	2014.10.25	2015.10.24
Bilog Antenna	TESEQ	CBL6111D	34678	2014.10.27	2015.10.26
Horn Antenna	R&S	9120D	152265	2014.10.27	2015.10.26
Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2014.07.06	2015.07.05
Amplifier	Agilent	8449B	60538	2014.10.25	2015.10.24
Loop Antenna	ARA	PLA-1030/B	1029	2014.06.08	2015.06.07
Power Meter	Anritsu	ML2495A	1204003	2014.10.25	2015.10.24
Power Sensor	Anritsu	MA2411B	100309	2014.10.25	2015.10.24
Low frequency cable	N/A	R01	N/A	2014.10.25	2015.10.24
High frequency cable	N/A	R02	N/A	2014.10.25	2015.10.24

#### Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Test Receiver	R&S	ESCI	102086	2014.10.25	2015.10.24
LISN	R&S	ENV216	101242	2014.10.25	2015.10.24
LISN	EMCO	3810/2NM	000-23625	2014.10.25	2015.10.24
Conduction Cable	HUBER+SUHNER	C01	N/A	2014.10.25	2015.10.24



## 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.

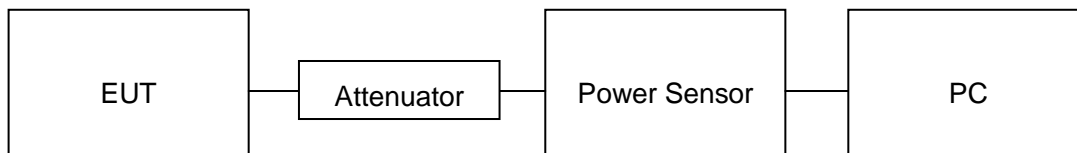
**Note :** The EUT was tested according to KDB 558074v03r02 for compliance to FCC 47CFR 15.247 requirements.





## 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	9.35	30	Pass
2.437	9.34	30	Pass
2.462	9.39	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	7.54	30	Pass
2.437	7.45	30	Pass
2.462	7.41	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	7.48	30	Pass
2.437	7.44	30	Pass
2.462	7.36	30	Pass



TEST ITEM	OUTPUT POWER
TEST MODE	802.11n 40 with data rate 13.5

Frequency (GHz)	Average Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.422	4.75	30	Pass
2.437	4.69	30	Pass
2.452	4.61	30	Pass



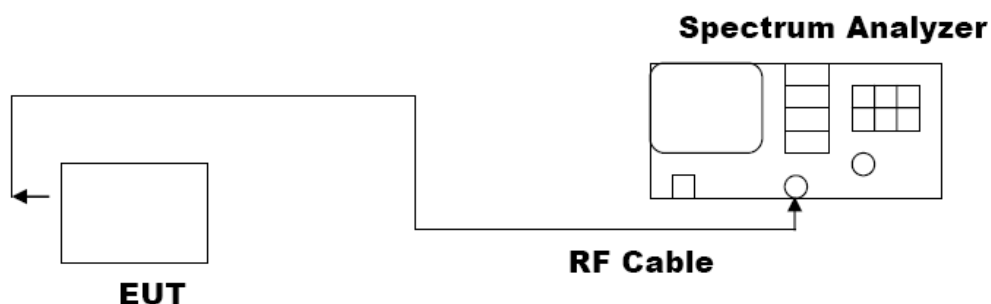
## 8. 6DB BANDWIDTH

### 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 $\square$ 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)

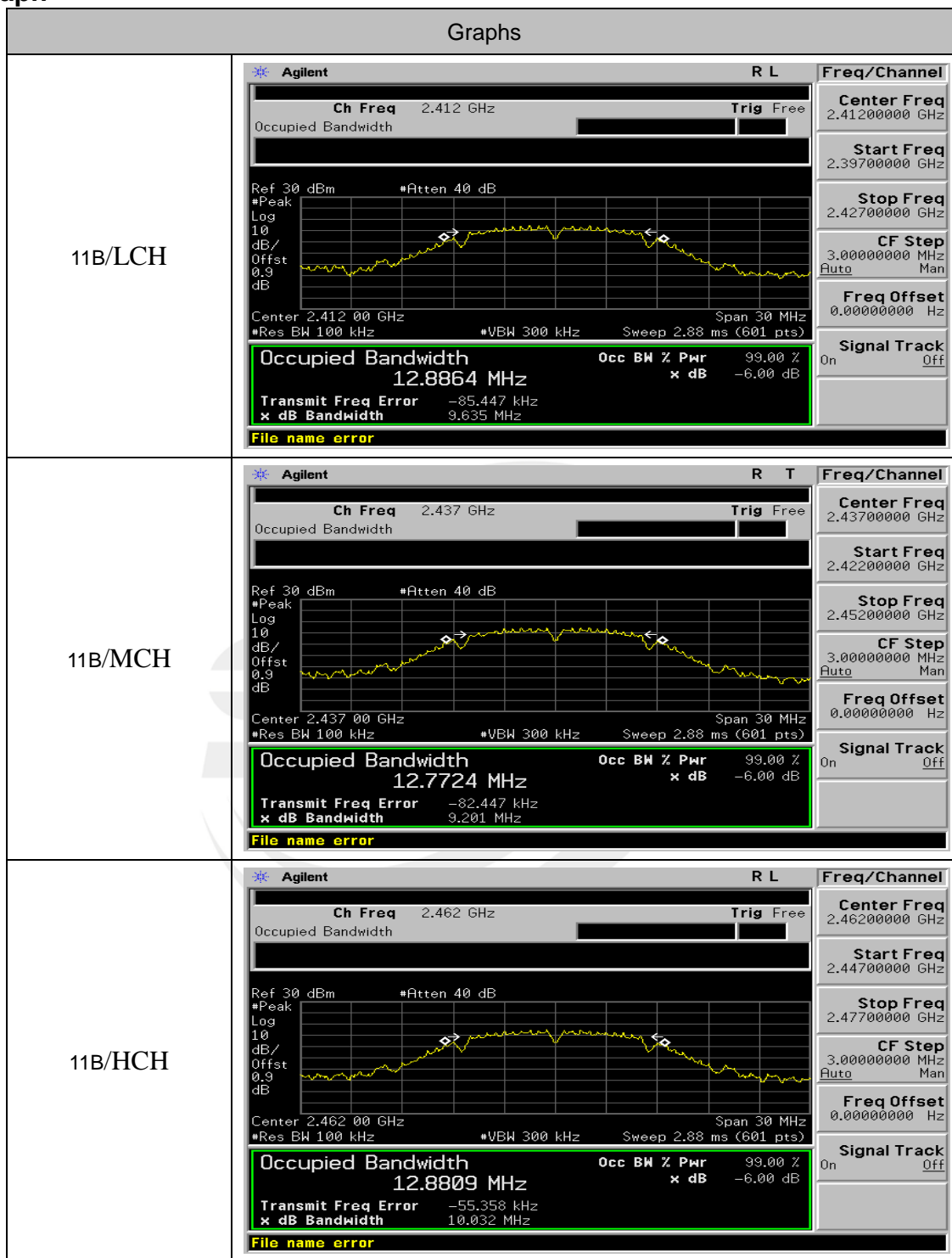


### 8.3. LIMITS AND MEASUREMENT RESULTS

Mode	Channel	6dB Bandwidth [MHz]	Channel Separation (KHz)	Verdict
11B	LCH	9.64	$\geq 500\text{KHz}$	PASS
11B	MCH	9.20	$\geq 500\text{KHz}$	PASS
11B	HCH	10.03	$\geq 500\text{KHz}$	PASS
11G	LCH	16.16	$\geq 500\text{KHz}$	PASS
11G	MCH	13.93	$\geq 500\text{KHz}$	PASS
11G	HCH	13.50	$\geq 500\text{KHz}$	PASS
11N20SISO	LCH	17.18	$\geq 500\text{KHz}$	PASS
11N20SISO	MCH	14.09	$\geq 500\text{KHz}$	PASS
11N20SISO	HCH	15.15	$\geq 500\text{KHz}$	PASS
11N40SISO	LCH	35.24	$\geq 500\text{KHz}$	PASS
11N40SISO	MCH	35.31	$\geq 500\text{KHz}$	PASS
11N40SISO	HCH	35.57	$\geq 500\text{KHz}$	PASS



## Test Graph





11G/LCH	<p>Agilent R T Freq/Channel</p> <p>Ch Freq 2.412 GHz Trig Free</p> <p>Center Freq 2.41200000 GHz</p> <p>Start Freq 2.39700000 GHz</p> <p>Stop Freq 2.42700000 GHz</p> <p>CF Step 3.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Ref 30 dBm #Atten 40 dB</p> <p>Peak Log 10 dB/Offst 0.9 dB</p> <p>Center 2.412 00 GHz Span 30 MHz</p> <p>Res BW 100 kHz VBW 300 kHz Sweep 2.88 ms (601 pts)</p> <p>Occupied Bandwidth 16.3700 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB</p> <p>Transmit Freq Error 3.081 kHz</p> <p>x dB Bandwidth 16.160 MHz</p> <p>File name error</p>
11G/MCH	<p>Agilent R L Freq/Channel</p> <p>Ch Freq 2.437 GHz Trig Free</p> <p>Center Freq 2.43700000 GHz</p> <p>Start Freq 2.42200000 GHz</p> <p>Stop Freq 2.45200000 GHz</p> <p>CF Step 3.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Ref 30 dBm #Atten 40 dB</p> <p>Peak Log 10 dB/Offst 0.9 dB</p> <p>Center 2.437 00 GHz Span 30 MHz</p> <p>Res BW 100 kHz VBW 300 kHz Sweep 2.88 ms (601 pts)</p> <p>Occupied Bandwidth 16.3752 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB</p> <p>Transmit Freq Error -24.825 kHz</p> <p>x dB Bandwidth 13.927 MHz</p> <p>File name error</p>
11G/HCH	<p>Agilent R L Freq/Channel</p> <p>Ch Freq 2.462 GHz Trig Free</p> <p>Center Freq 2.46200000 GHz</p> <p>Start Freq 2.44700000 GHz</p> <p>Stop Freq 2.47700000 GHz</p> <p>CF Step 3.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Ref 30 dBm #Atten 40 dB</p> <p>Peak Log 10 dB/Offst 0.9 dB</p> <p>Center 2.462 00 GHz Span 30 MHz</p> <p>Res BW 100 kHz VBW 300 kHz Sweep 2.88 ms (601 pts)</p> <p>Occupied Bandwidth 16.3651 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB</p> <p>Transmit Freq Error -24.442 kHz</p> <p>x dB Bandwidth 13.501 MHz</p> <p>File name error</p>



11N20SISO/LCH	<p>Agilent R L Freq/Channel</p> <p>Ch Freq 2.412 GHz Trig Free</p> <p>Center Freq 2.41200000 GHz</p> <p>Start Freq 2.39700000 GHz</p> <p>Stop Freq 2.42700000 GHz</p> <p>CF Step 3.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Ref 30 dBm #Atten 40 dB</p> <p>Peak Log 10 dB/Offst 0.9 dB</p> <p>Center 2.412 00 GHz Span 30 MHz</p> <p>Res BW 100 kHz VBW 300 kHz Sweep 2.88 ms (601 pts)</p> <p>Occupied Bandwidth 17.5349 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB</p> <p>Transmit Freq Error -4.543 kHz</p> <p>x dB Bandwidth 17.183 MHz</p> <p>File name error</p>
11N20SISO/MCH	<p>Agilent R L Freq/Channel</p> <p>Ch Freq 2.437 GHz Trig Free</p> <p>Center Freq 2.43700000 GHz</p> <p>Start Freq 2.42200000 GHz</p> <p>Stop Freq 2.45200000 GHz</p> <p>CF Step 3.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Ref 30 dBm #Atten 40 dB</p> <p>Peak Log 10 dB/Offst 0.9 dB</p> <p>Center 2.437 00 GHz Span 30 MHz</p> <p>Res BW 100 kHz VBW 300 kHz Sweep 2.88 ms (601 pts)</p> <p>Occupied Bandwidth 17.5594 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB</p> <p>Transmit Freq Error -26.493 kHz</p> <p>x dB Bandwidth 14.094 MHz</p> <p>File name error</p>
11N20SISO/HCH	<p>Agilent R T Freq/Channel</p> <p>Ch Freq 2.462 GHz Trig Free</p> <p>Center Freq 2.46200000 GHz</p> <p>Start Freq 2.44700000 GHz</p> <p>Stop Freq 2.47700000 GHz</p> <p>CF Step 3.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p> <p>Ref 30 dBm #Atten 40 dB</p> <p>Peak Log 10 dB/Offst 0.9 dB</p> <p>Center 2.462 00 GHz Span 30 MHz</p> <p>Res BW 100 kHz VBW 300 kHz Sweep 2.88 ms (601 pts)</p> <p>Occupied Bandwidth 17.5421 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB</p> <p>Transmit Freq Error -11.638 kHz</p> <p>x dB Bandwidth 15.153 MHz</p> <p>File name error</p>



11N40SISO/LCH	<p>Agilent R T</p> <p>Ch Freq 2.422 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 30 dBm #Atten 40 dB</p> <p>#Peak Log 10 dB/Offst 0.9 dB</p> <p>Center 2.422 00 GHz Span 60 MHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 5.76 ms (601 pts)</p> <p>Occupied Bandwidth 35.7503 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB</p> <p>Transmit Freq Error -14.810 kHz x dB Bandwidth 35.243 MHz</p> <p>File name error</p> <p>Freq/Channel</p> <p>Center Freq 2.42200000 GHz</p> <p>Start Freq 2.39200000 GHz</p> <p>Stop Freq 2.45200000 GHz</p> <p>CF Step 6.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p>
11N40SISO/MCH	<p>Agilent R L</p> <p>Ch Freq 2.437 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 30 dBm #Atten 40 dB</p> <p>#Peak Log 10 dB/Offst 0.9 dB</p> <p>Center 2.437 00 GHz Span 60 MHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 5.76 ms (601 pts)</p> <p>Occupied Bandwidth 35.7617 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB</p> <p>Transmit Freq Error -71.369 kHz x dB Bandwidth 35.310 MHz</p> <p>File name error</p> <p>Freq/Channel</p> <p>Center Freq 2.43700000 GHz</p> <p>Start Freq 2.40700000 GHz</p> <p>Stop Freq 2.46700000 GHz</p> <p>CF Step 6.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p>
11N40SISO/HCH	<p>Agilent R L</p> <p>Ch Freq 2.452 GHz Trig Free</p> <p>Occupied Bandwidth</p> <p>Ref 30 dBm #Atten 40 dB</p> <p>#Peak Log 10 dB/Offst 0.9 dB</p> <p>Center 2.452 00 GHz Span 60 MHz</p> <p>#Res BW 100 kHz #VBW 300 kHz Sweep 5.76 ms (601 pts)</p> <p>Occupied Bandwidth 35.7309 MHz Occ BW % Pwr 99.00 % x dB -6.00 dB</p> <p>Transmit Freq Error -75.234 kHz x dB Bandwidth 35.574 MHz</p> <p>File name error</p> <p>Freq/Channel</p> <p>Center Freq 2.45200000 GHz</p> <p>Start Freq 2.42200000 GHz</p> <p>Stop Freq 2.48200000 GHz</p> <p>CF Step 6.00000000 MHz Auto Man</p> <p>Freq Offset 0.00000000 Hz</p> <p>Signal Track On Off</p>



## 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

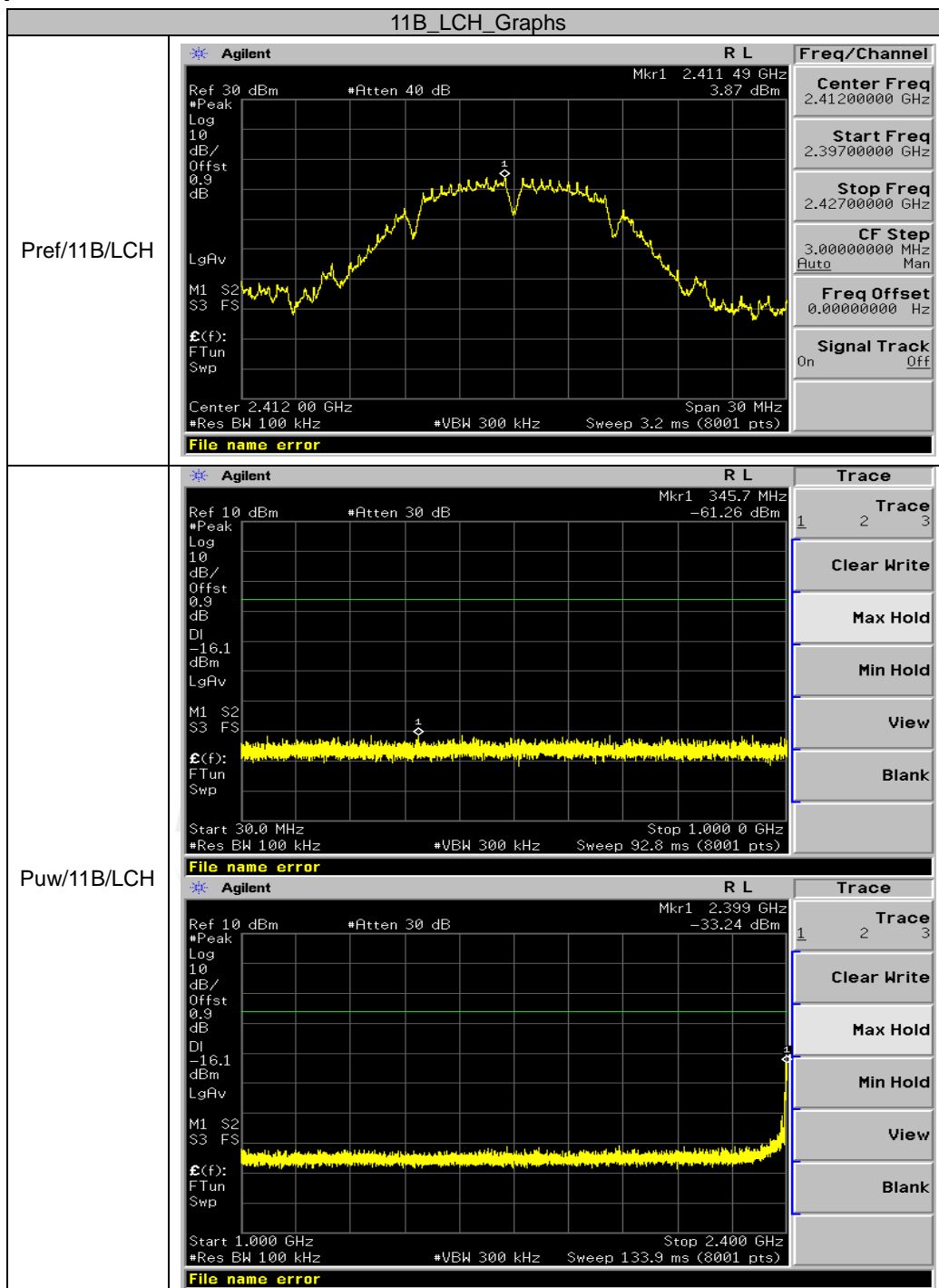
The same as described in section 6.

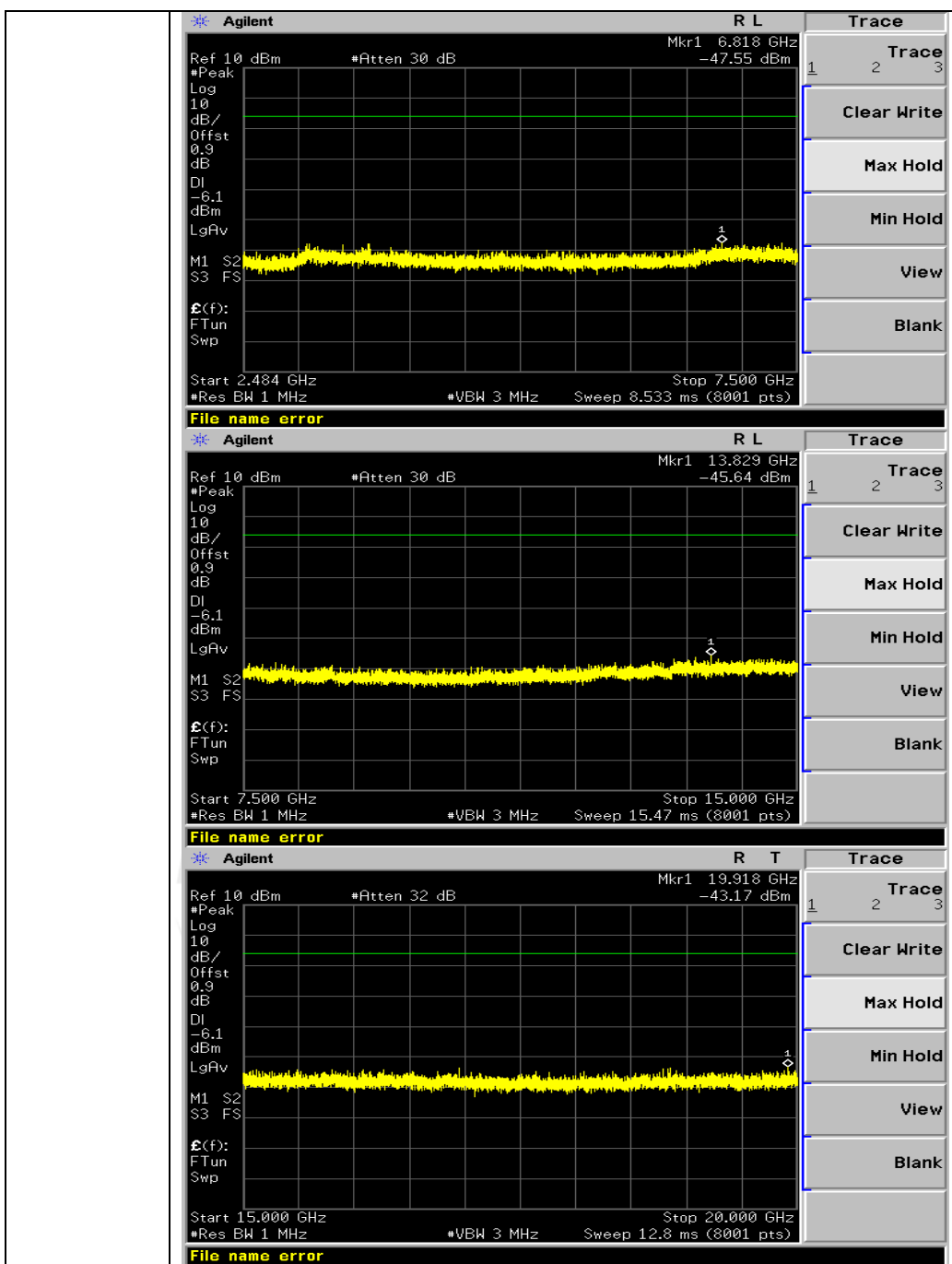
### 9.4. LIMITS AND MEASUREMENT RESULT

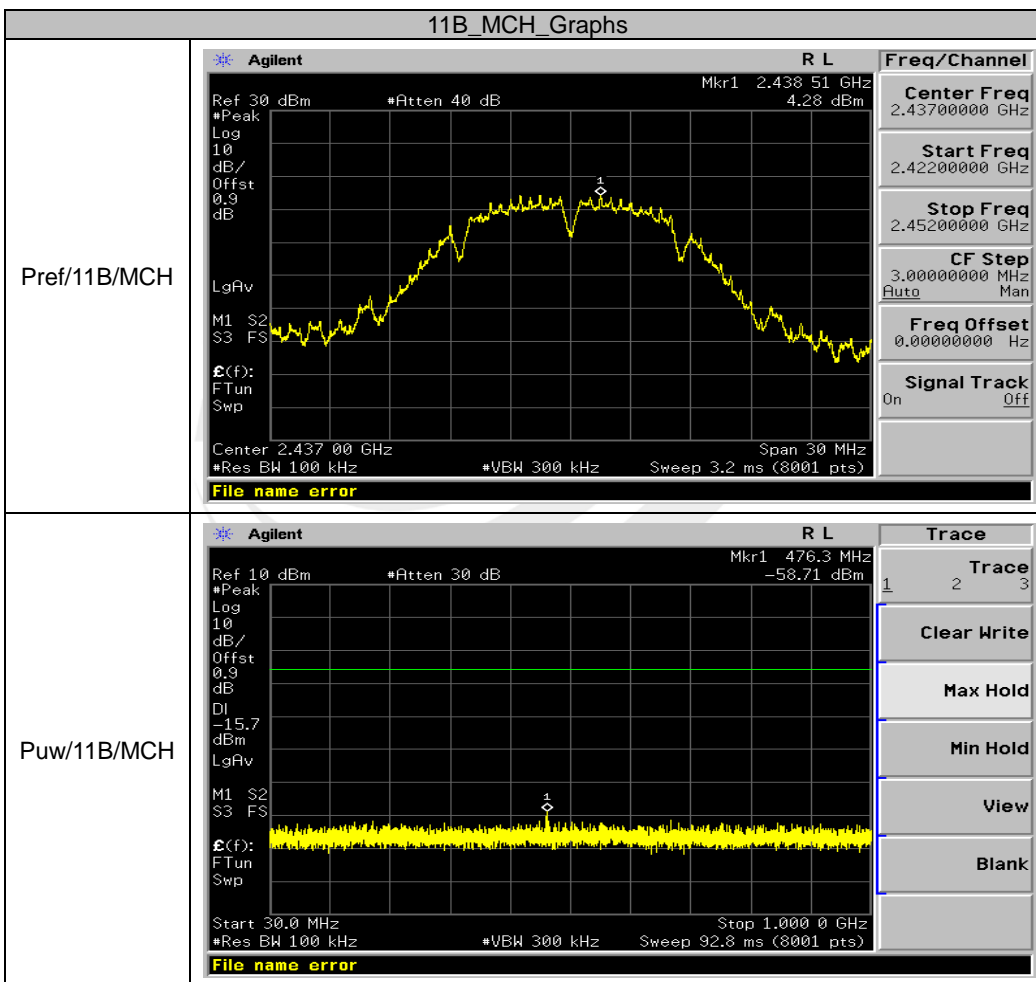
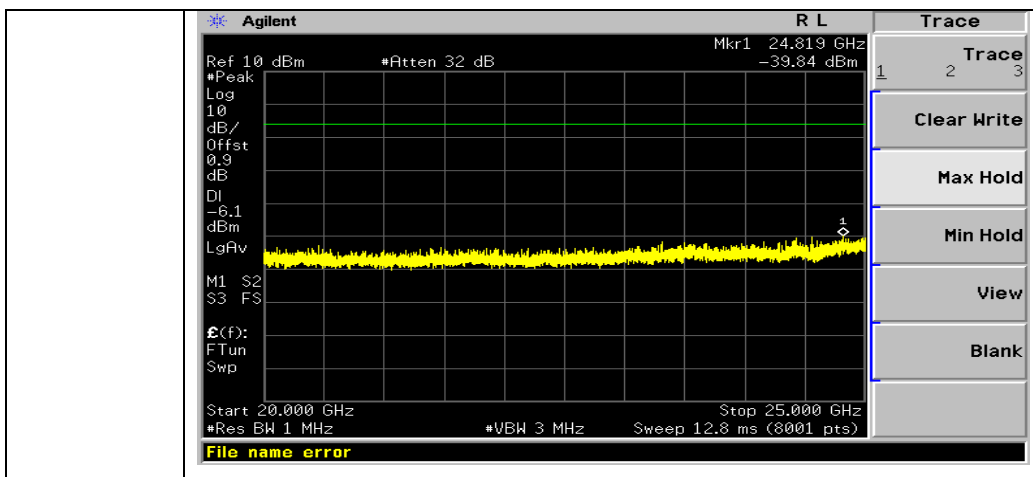
LIMITS AND MEASUREMENT RESULT		
Applicable Limits	Measurement Result	
	Test Data	Criteria
In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 20 dB below 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



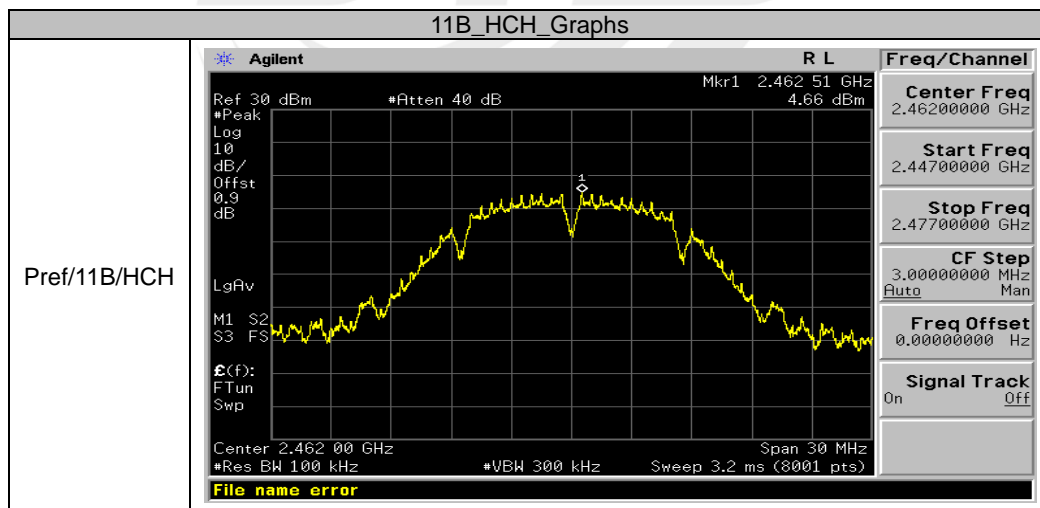
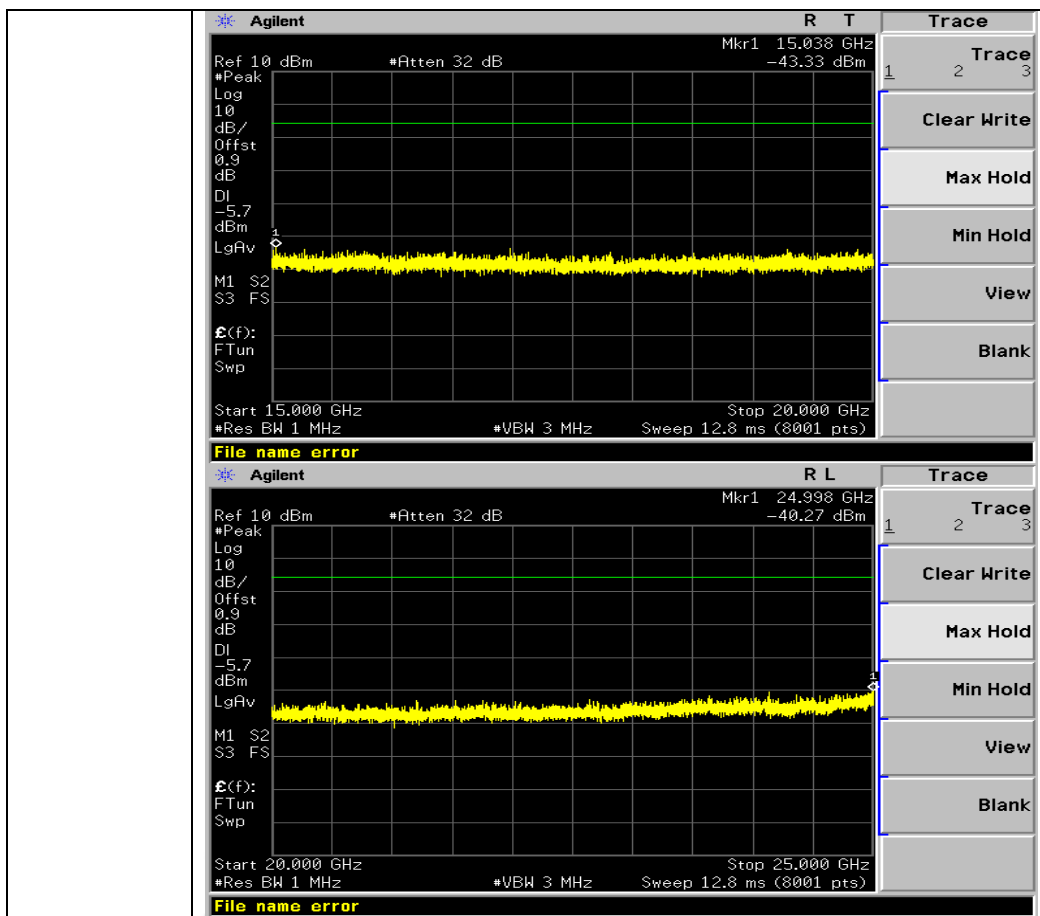
## Test Graph



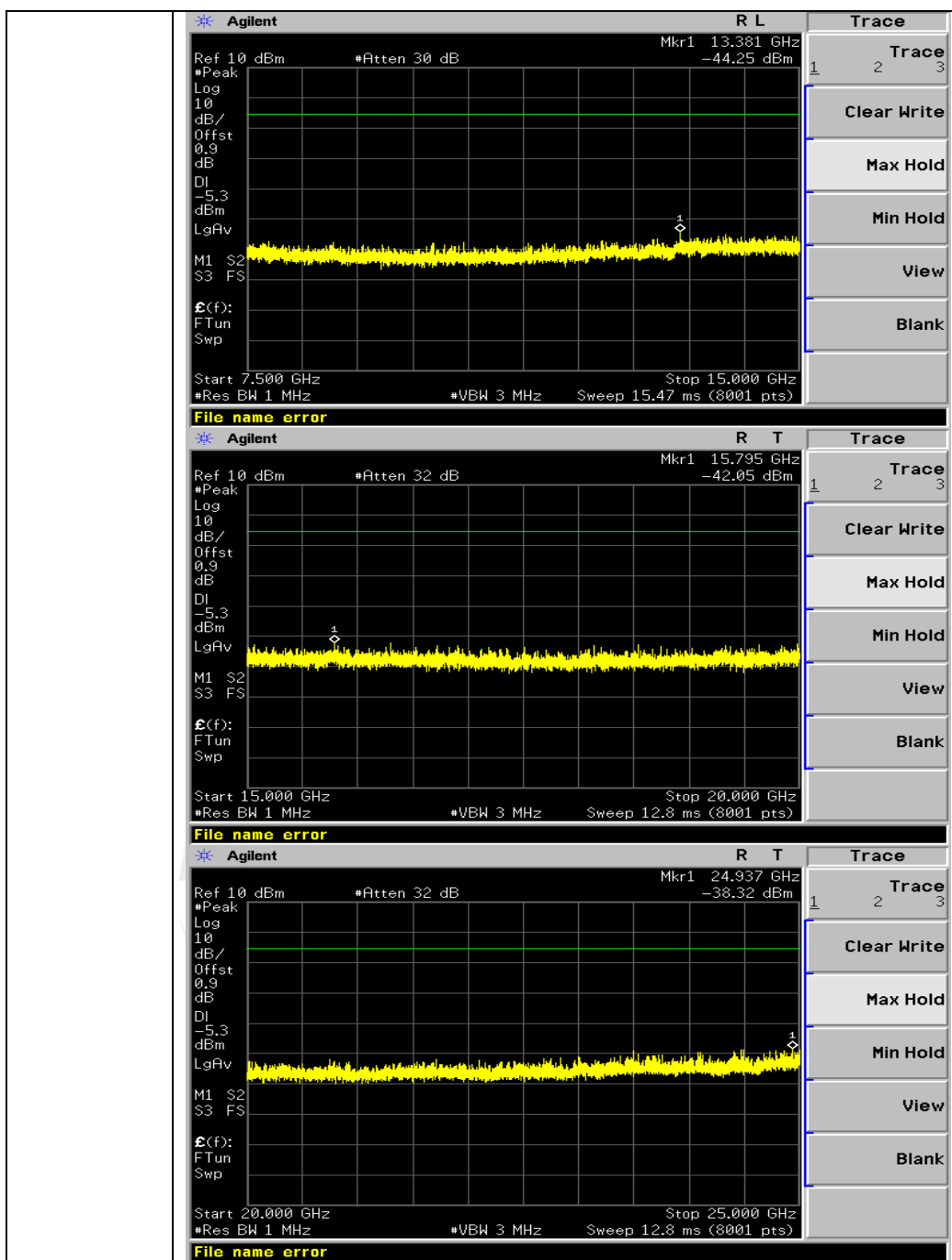


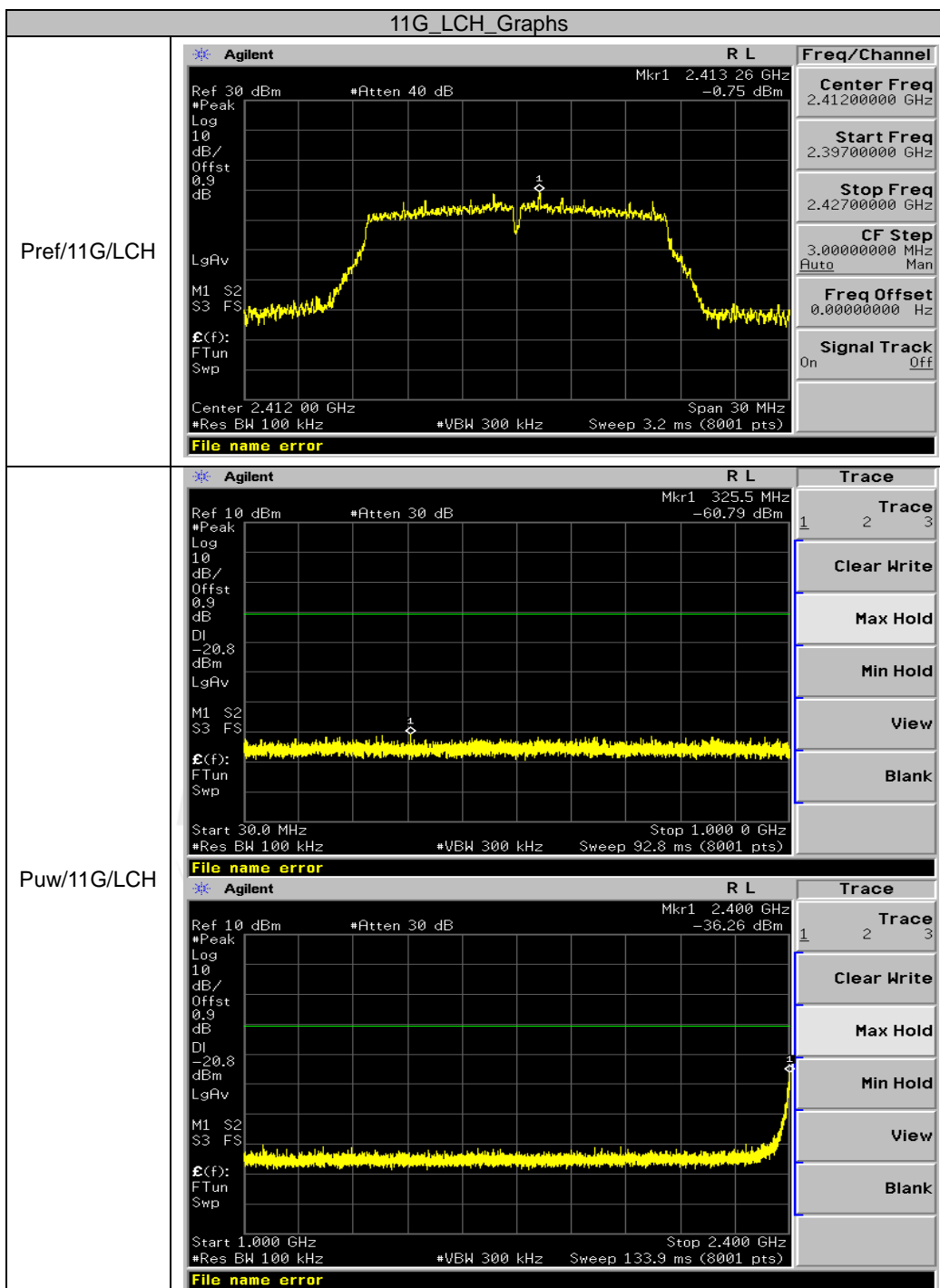


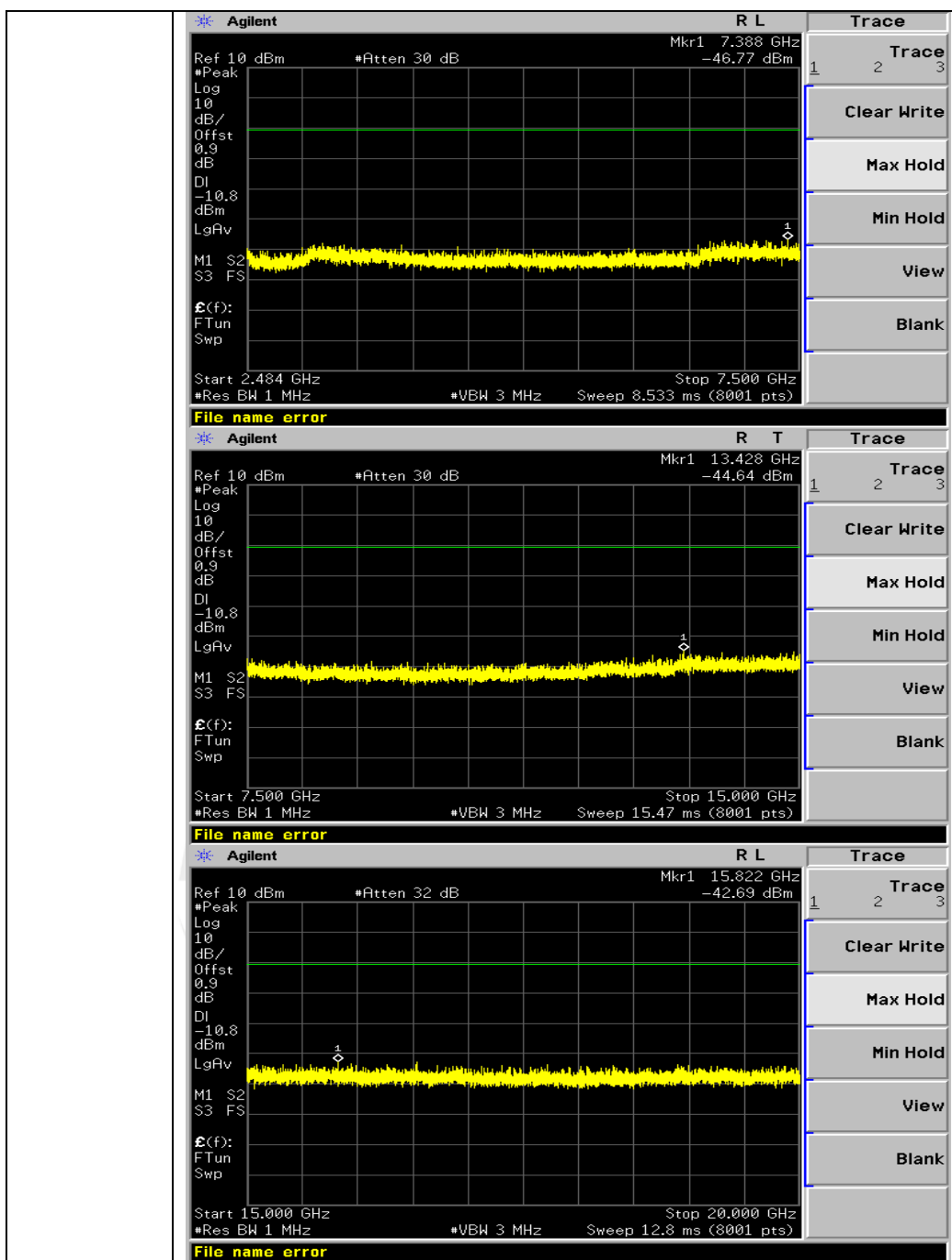


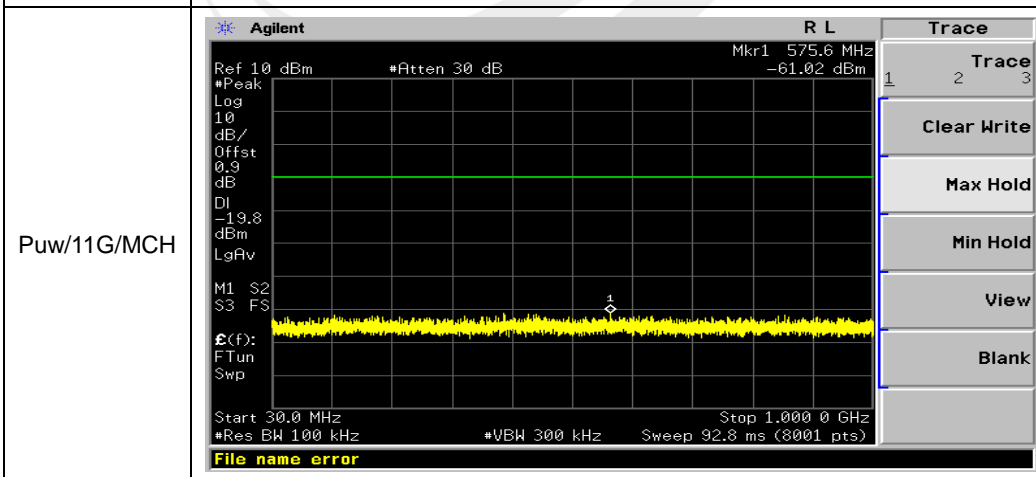
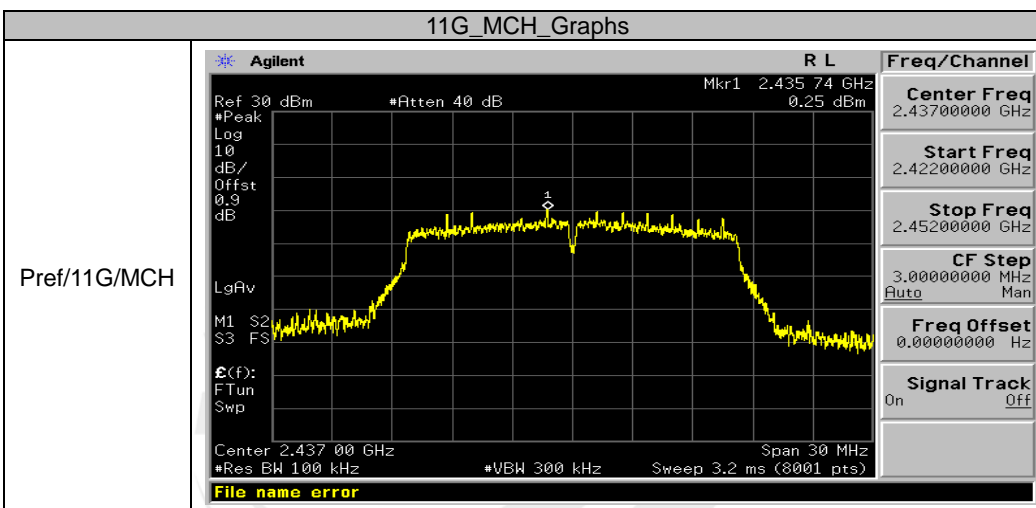
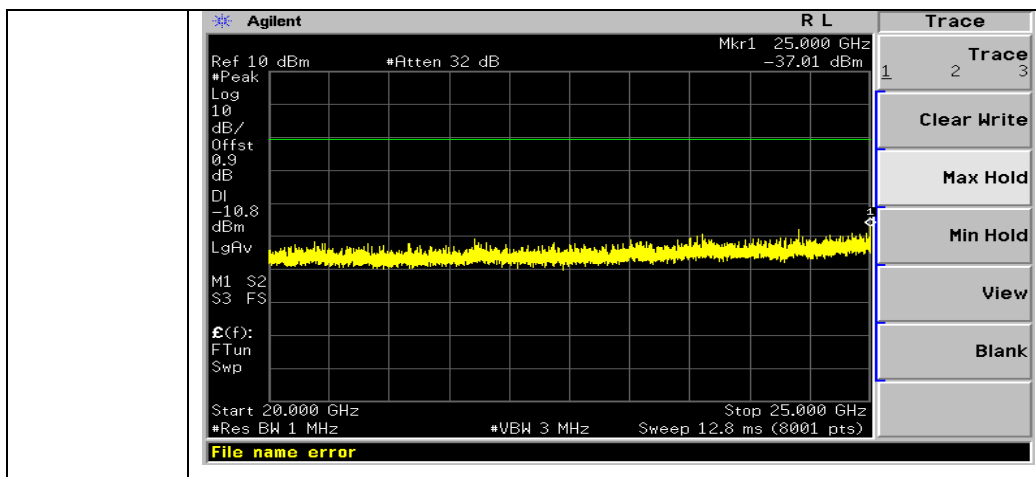


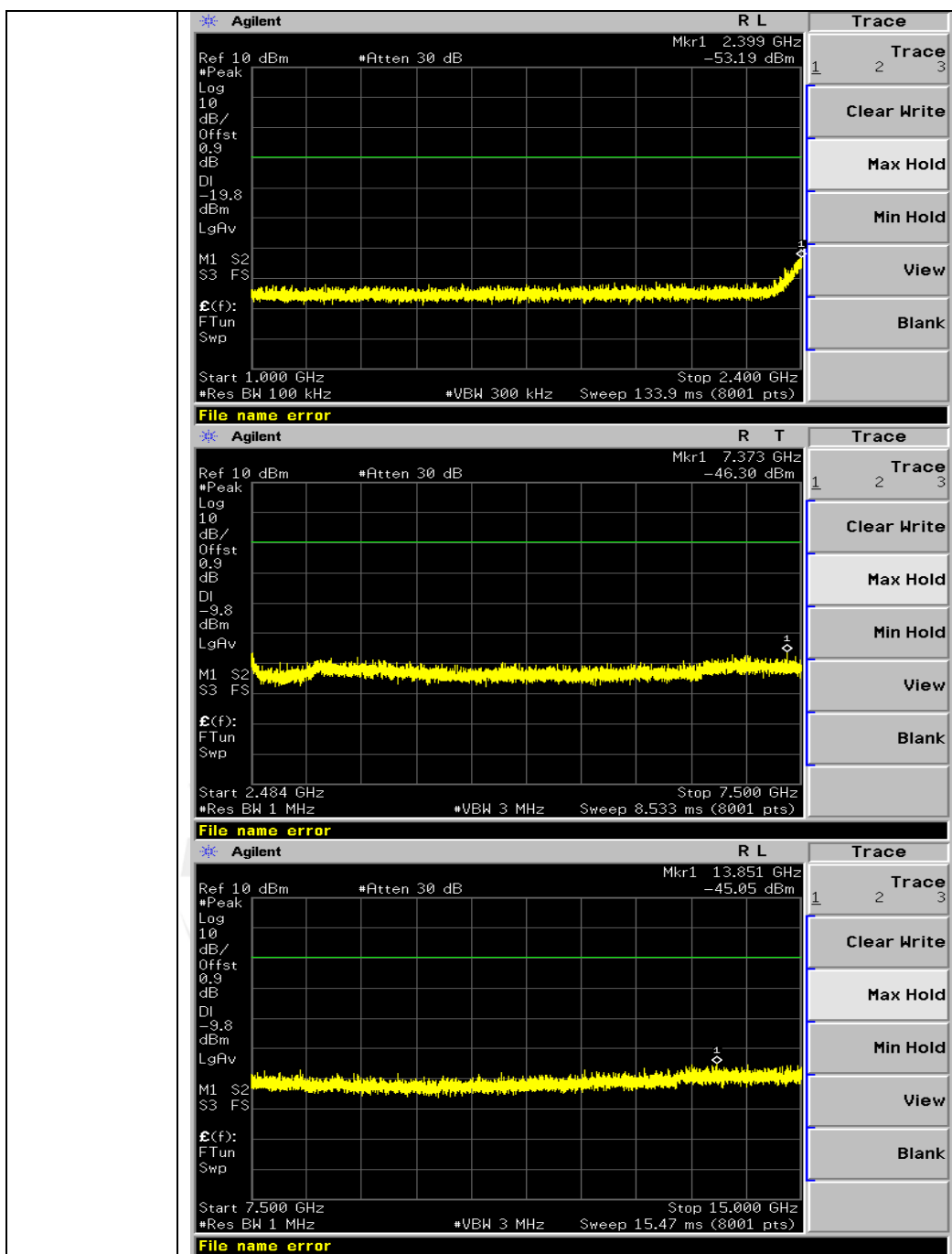


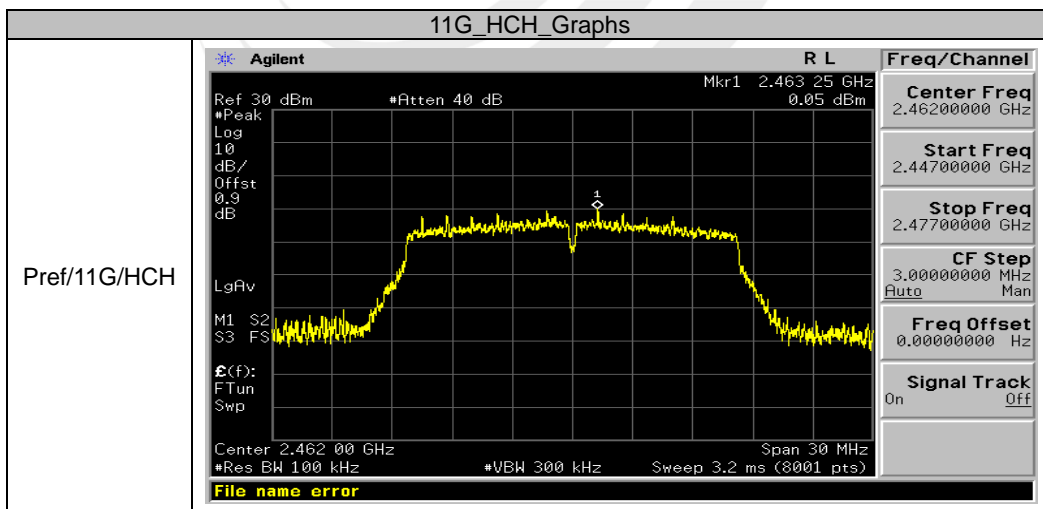
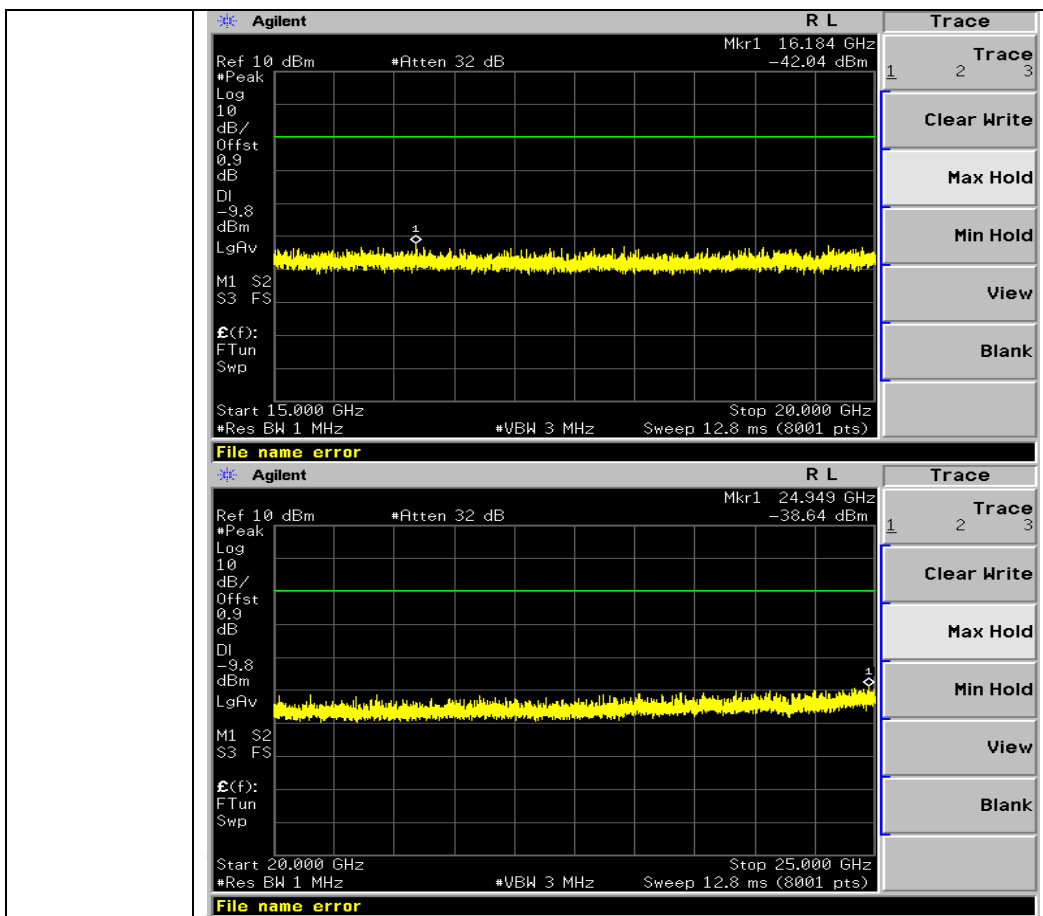


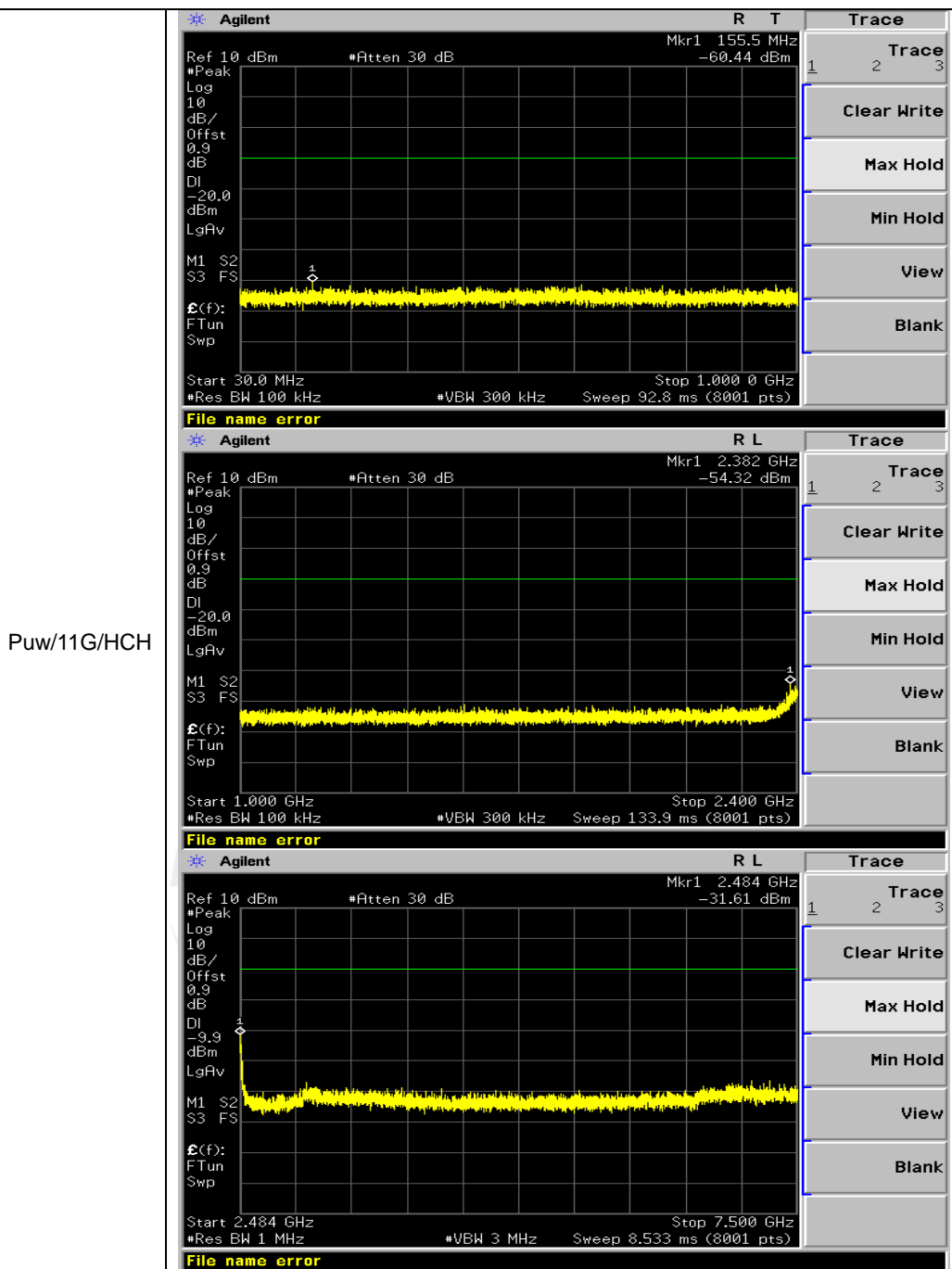


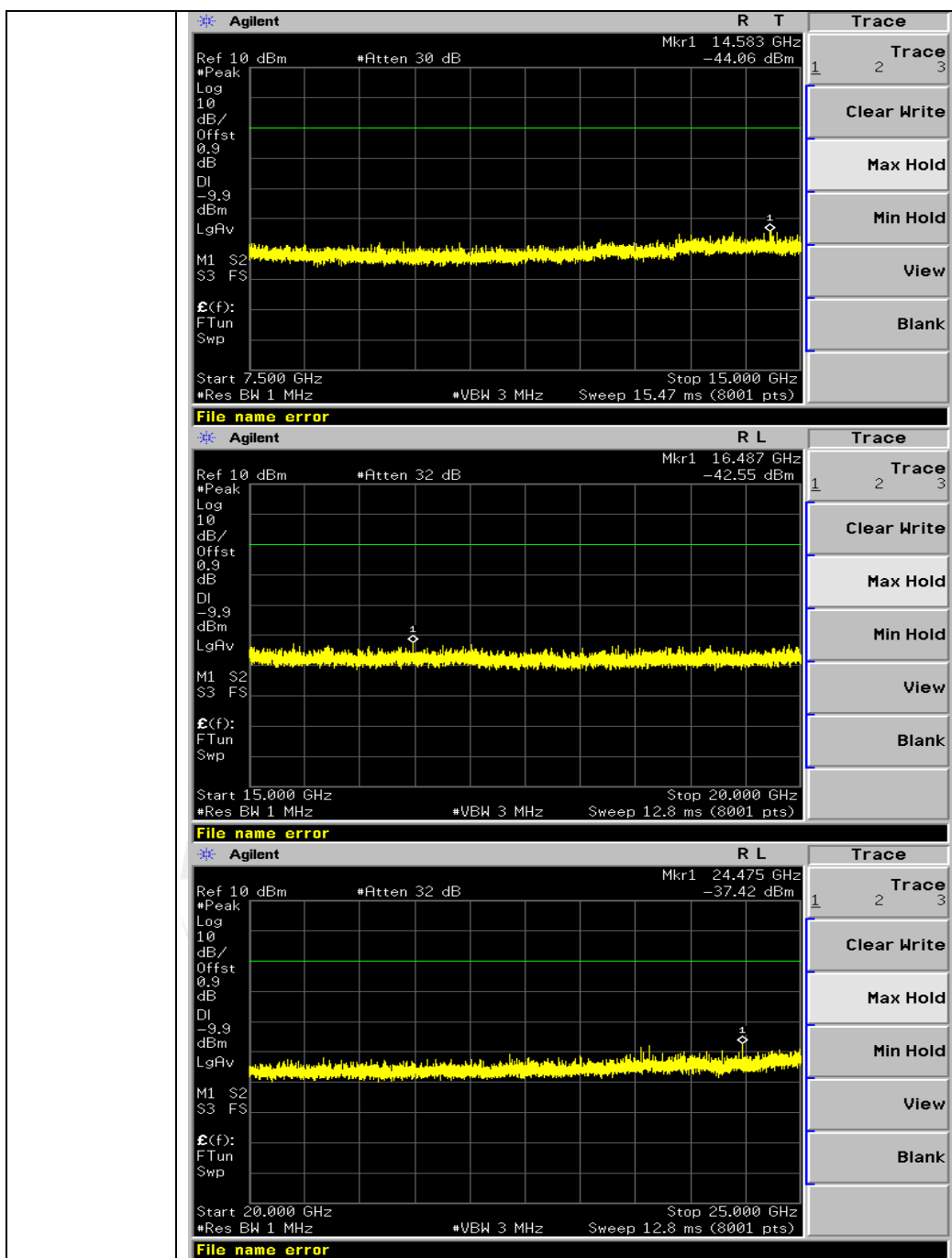


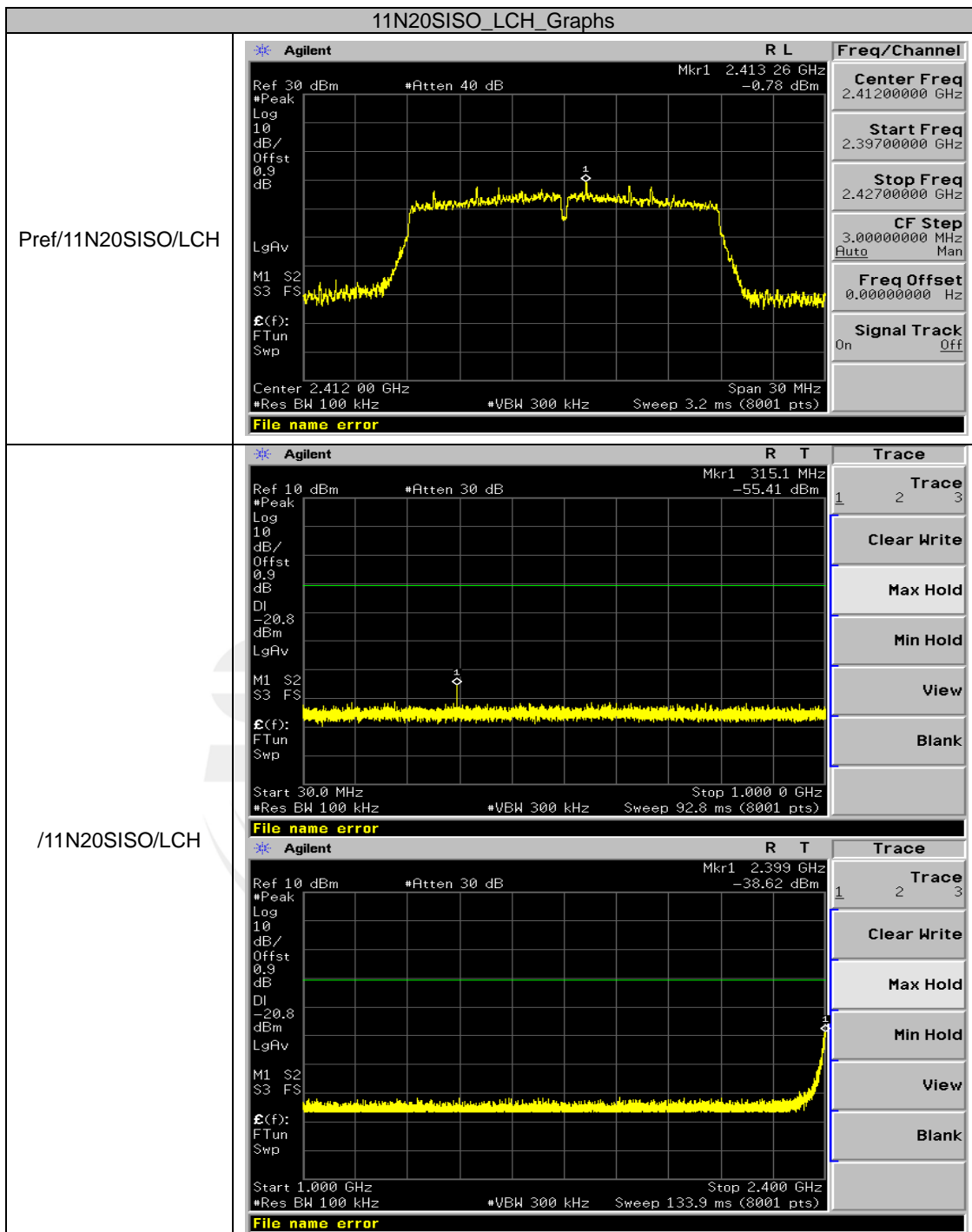




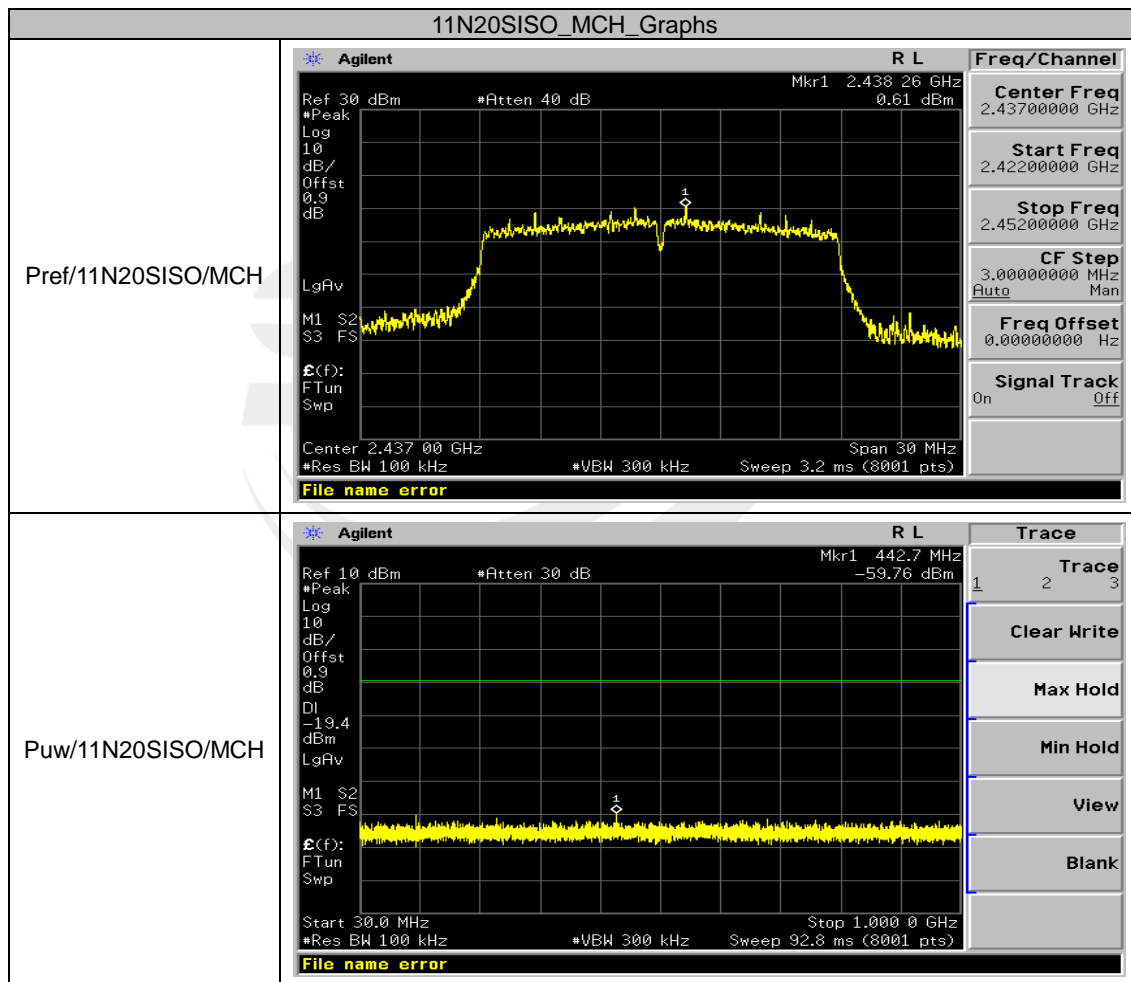
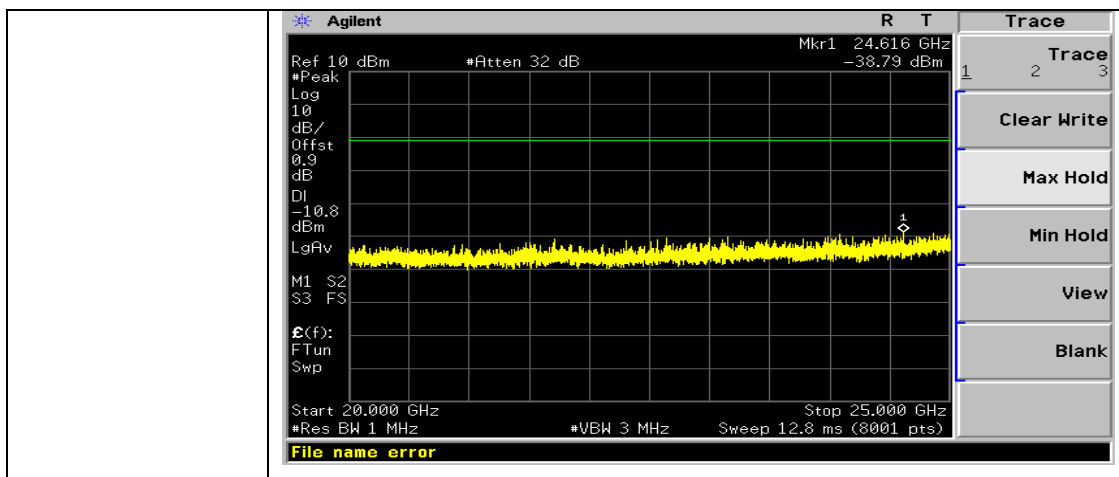


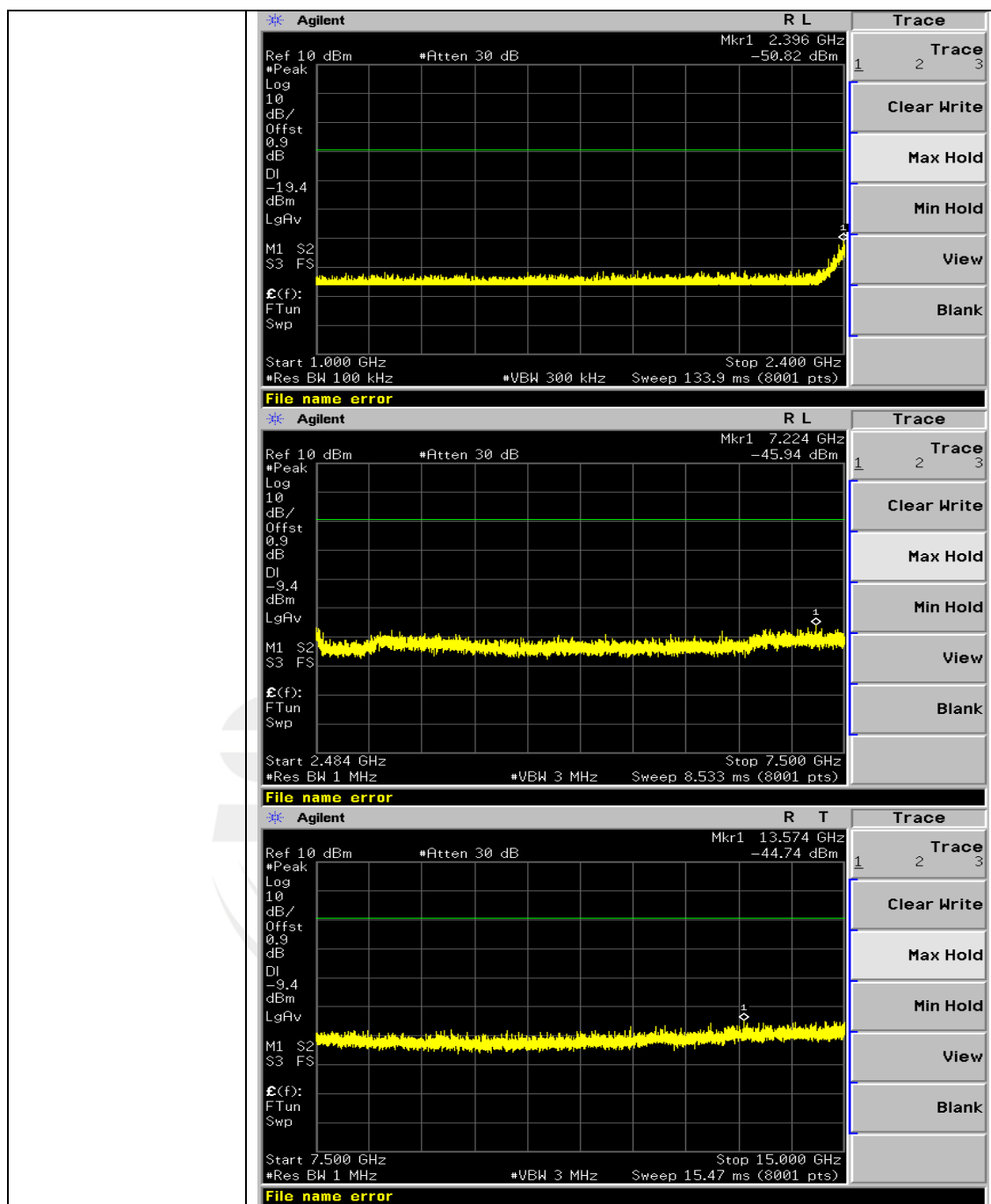


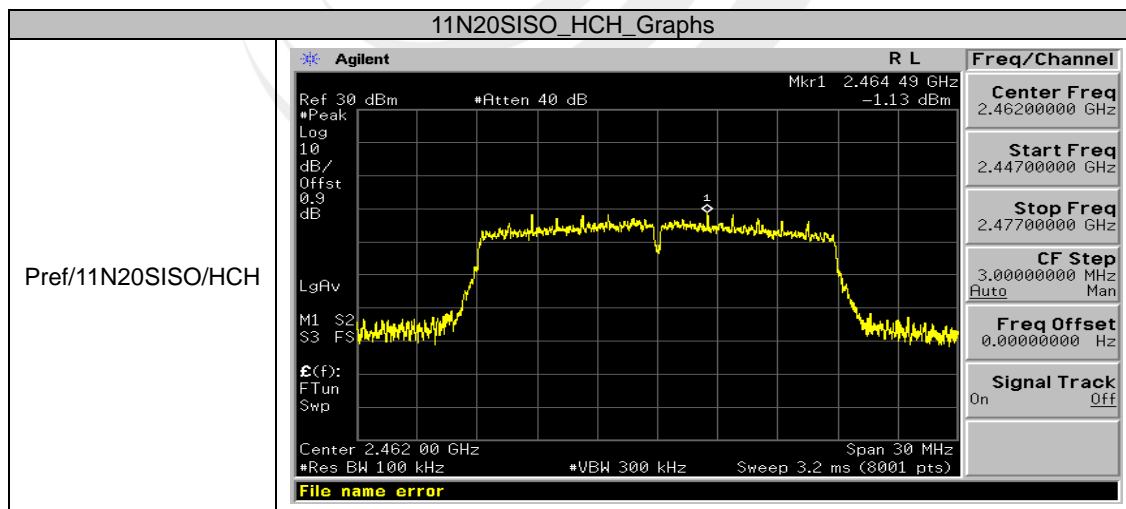
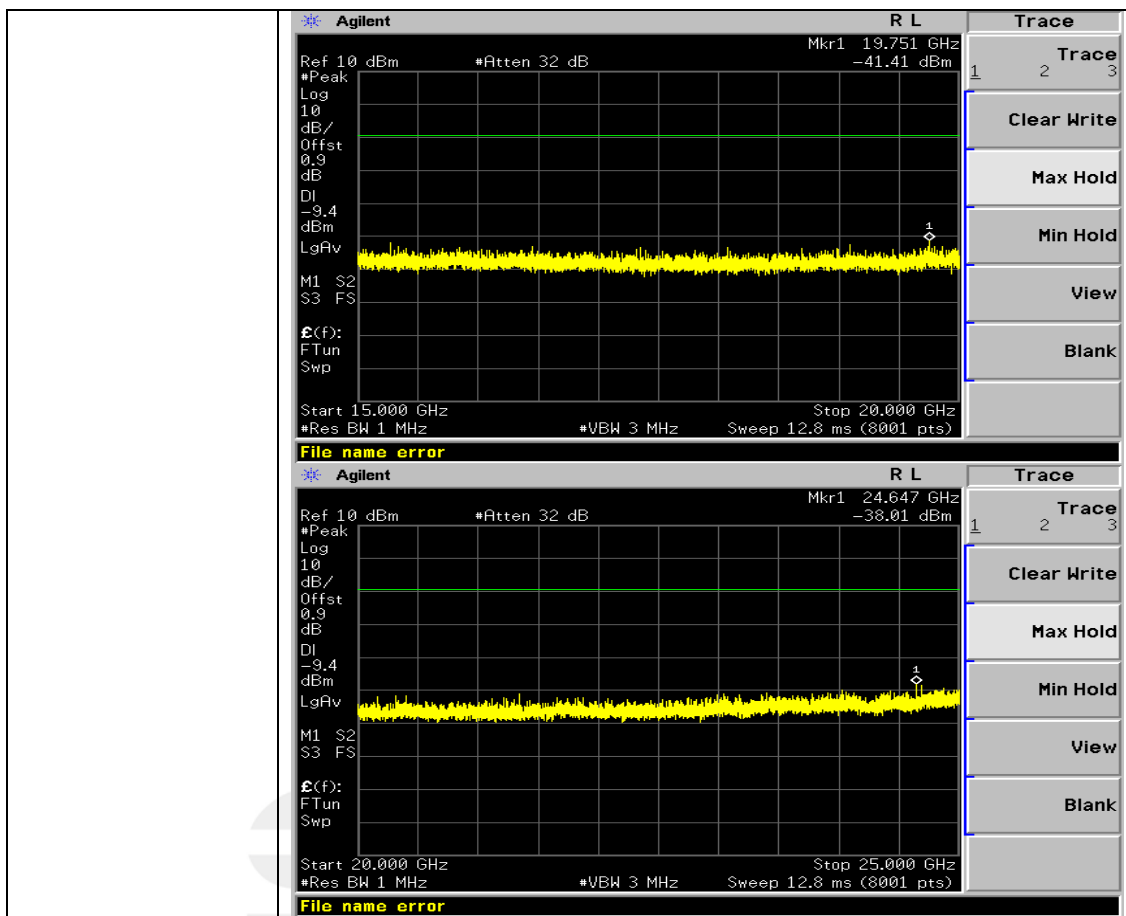


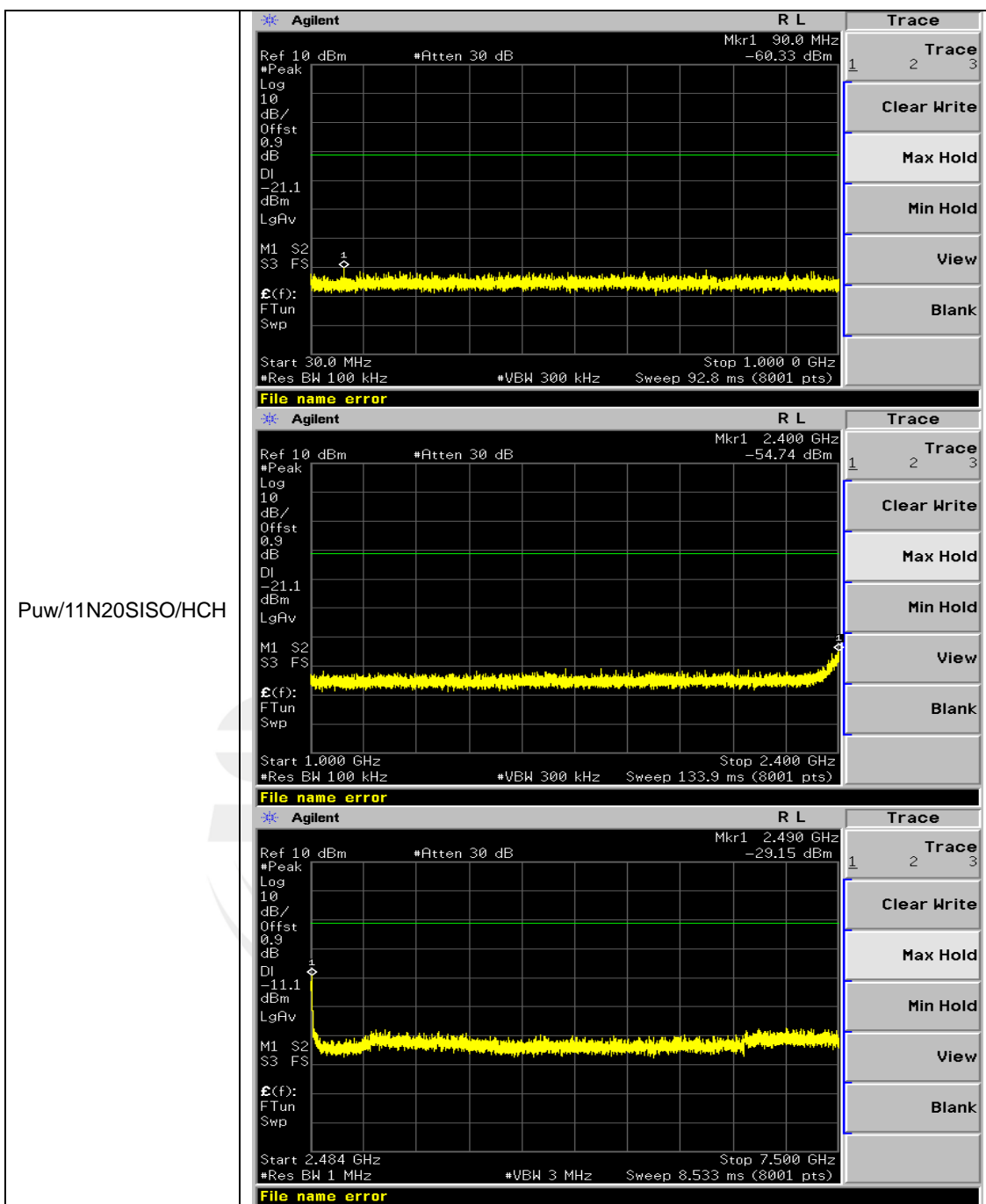


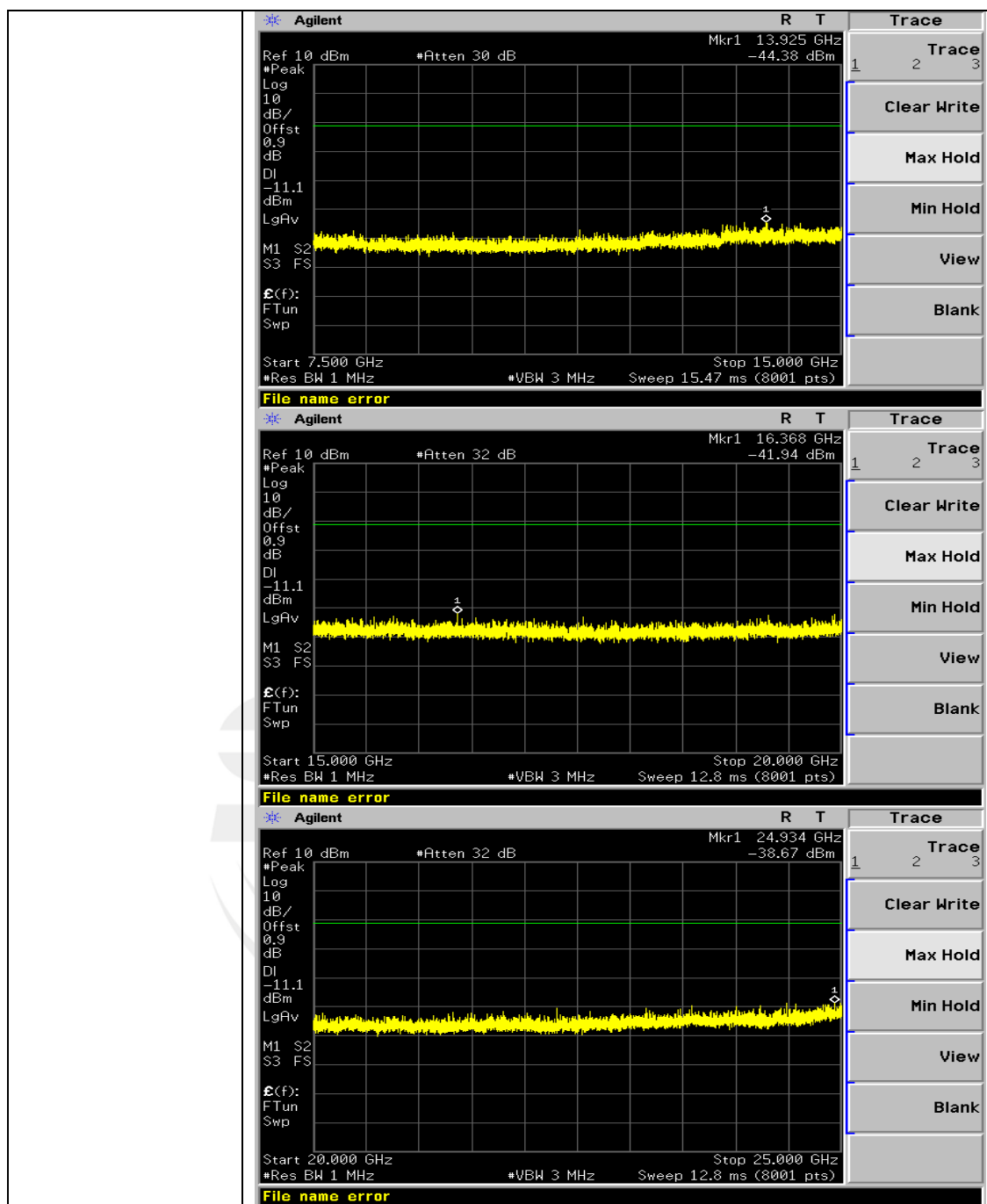


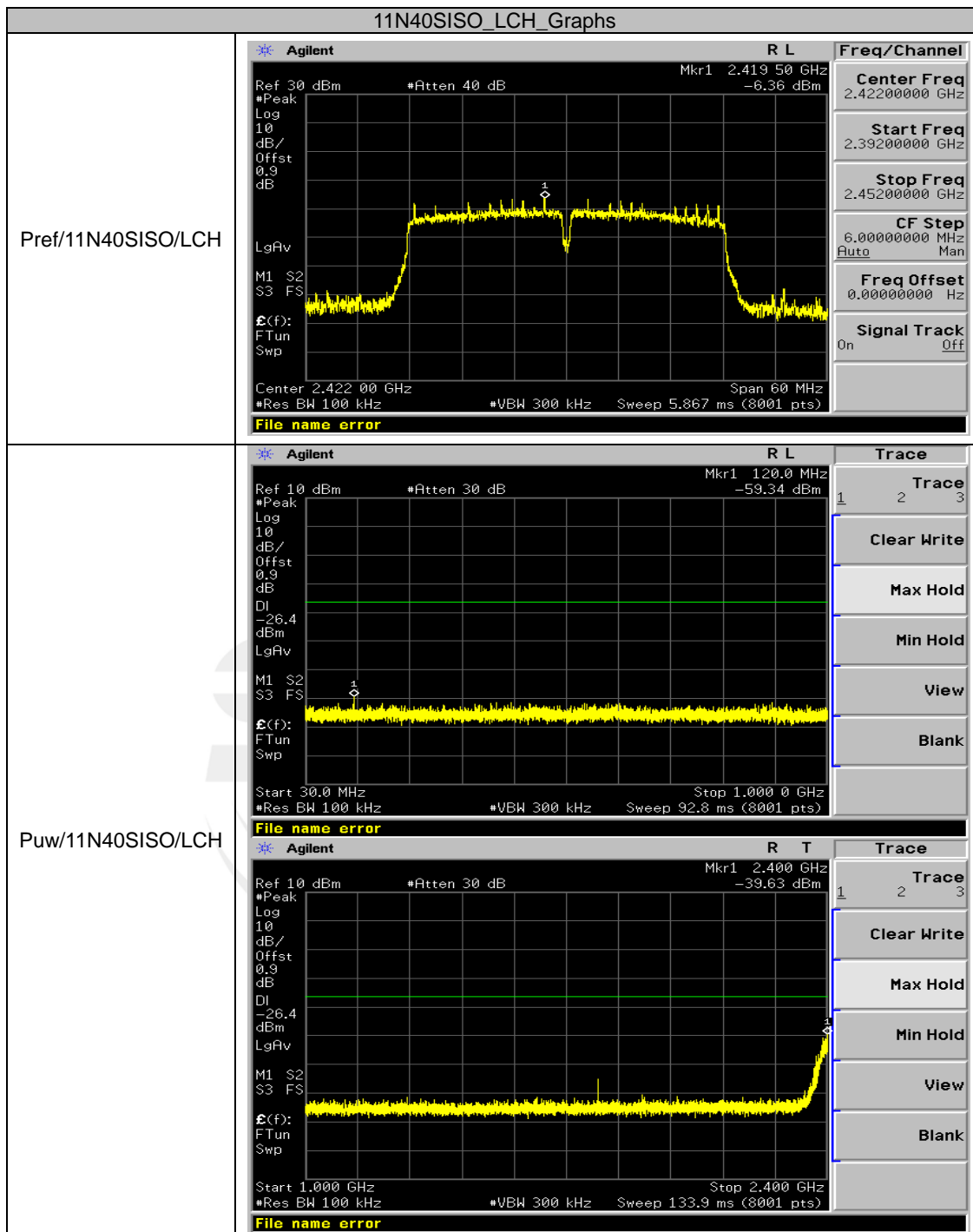


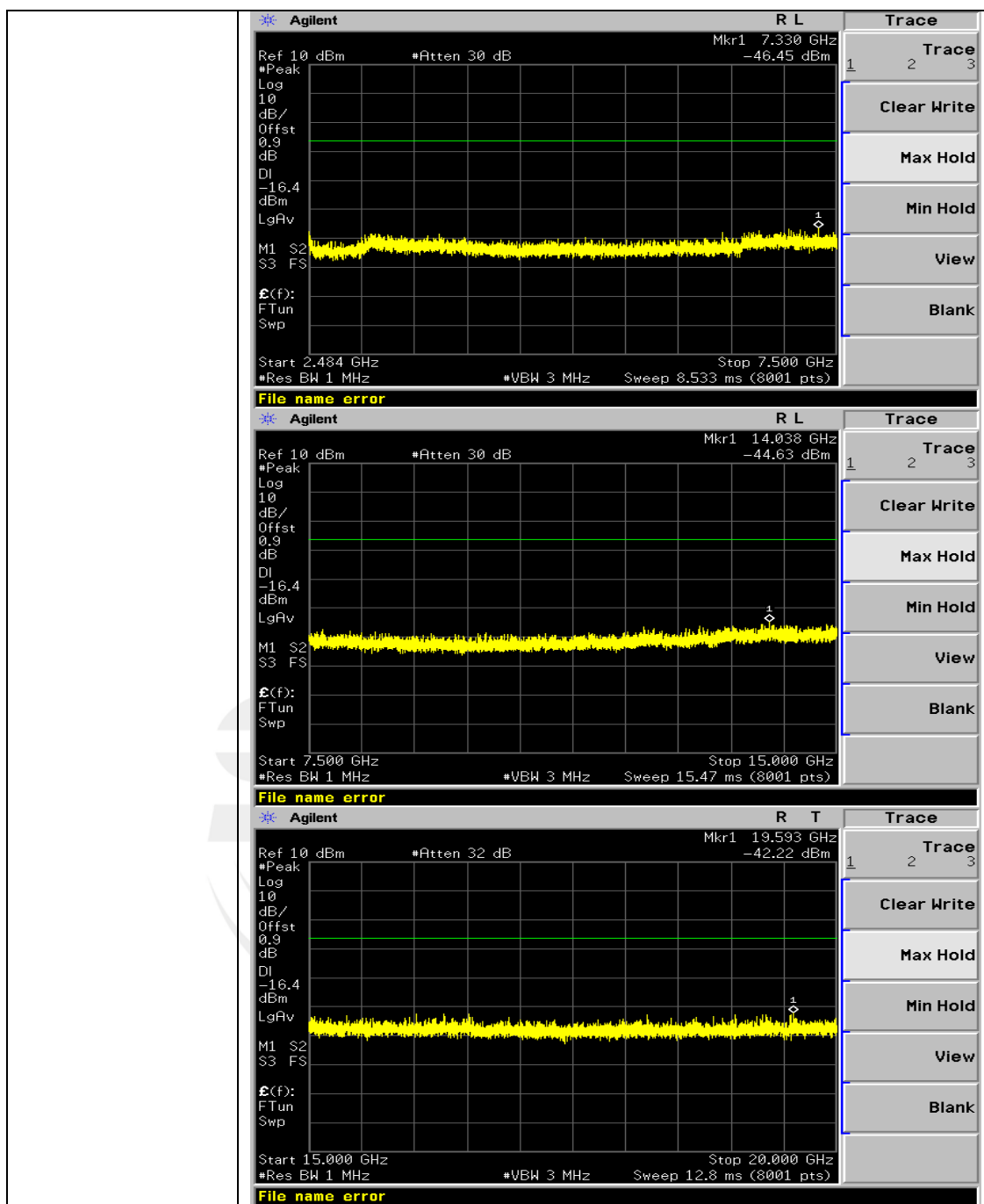


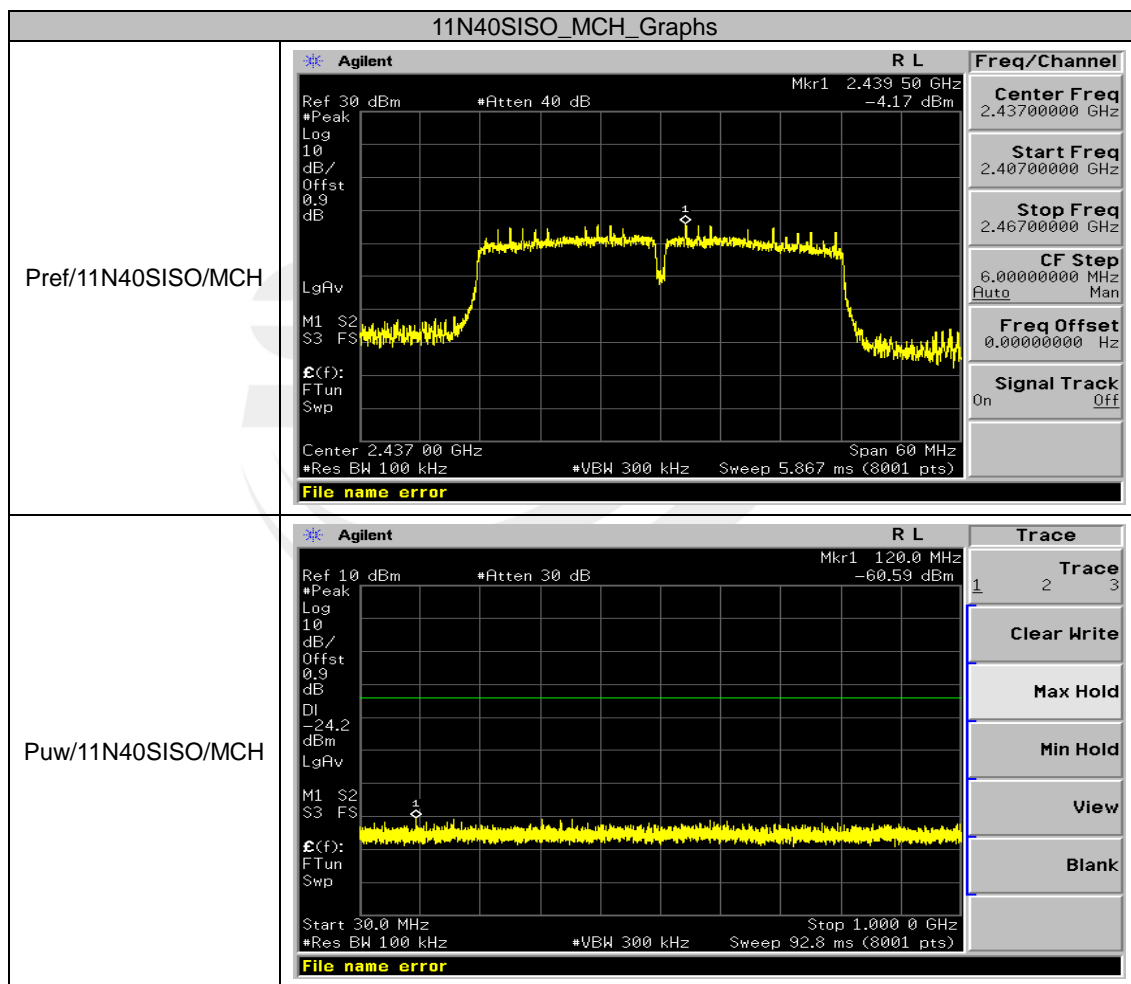
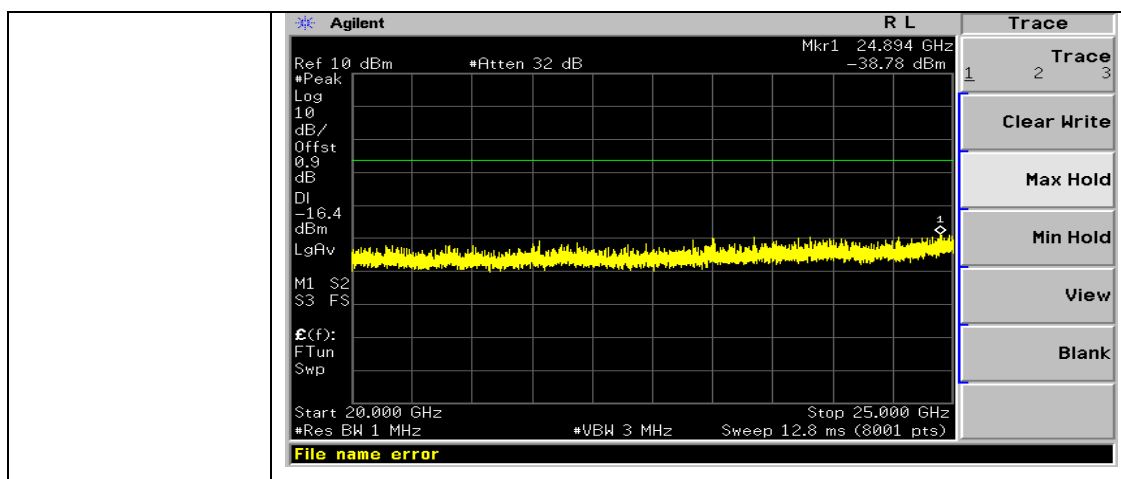


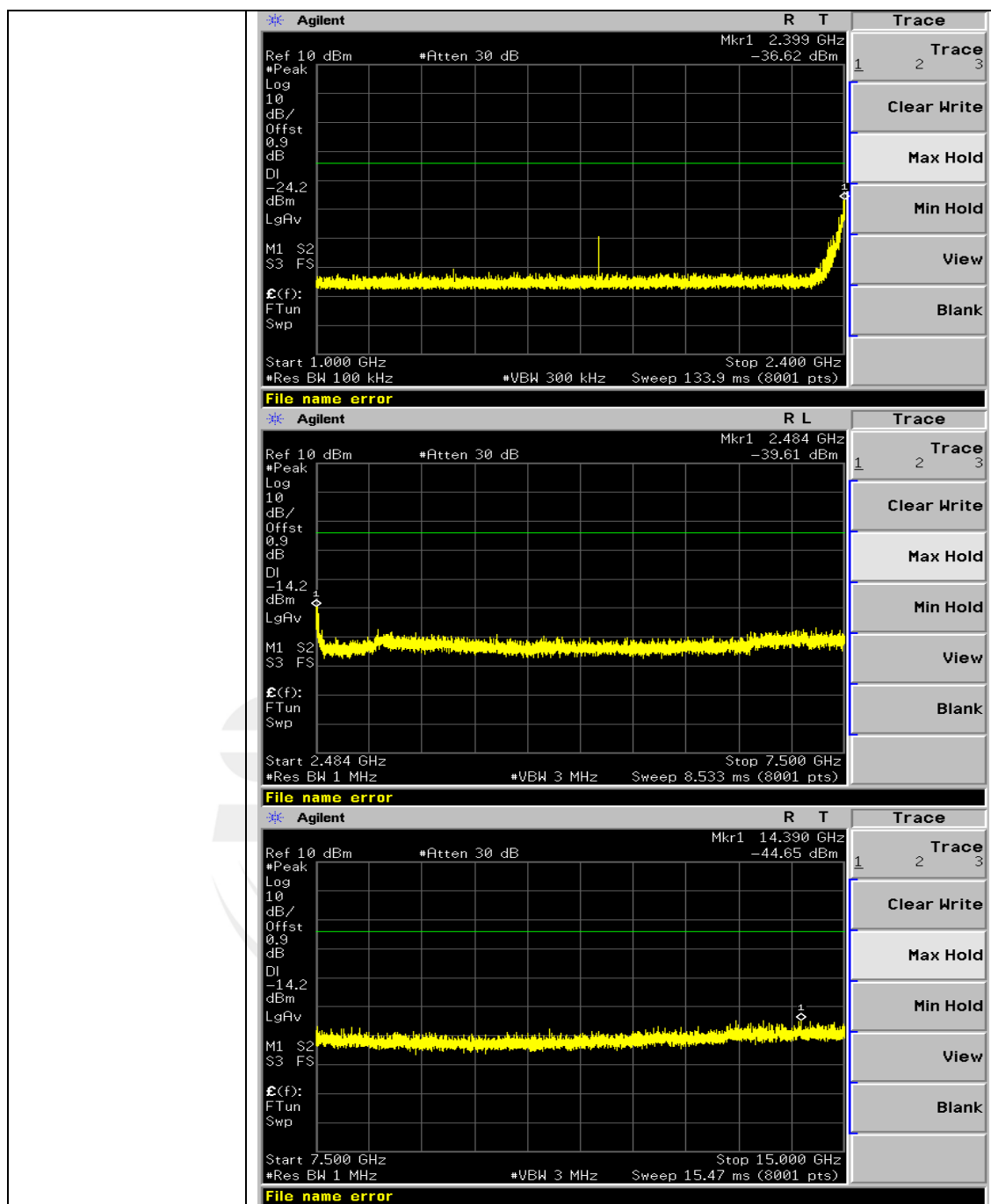


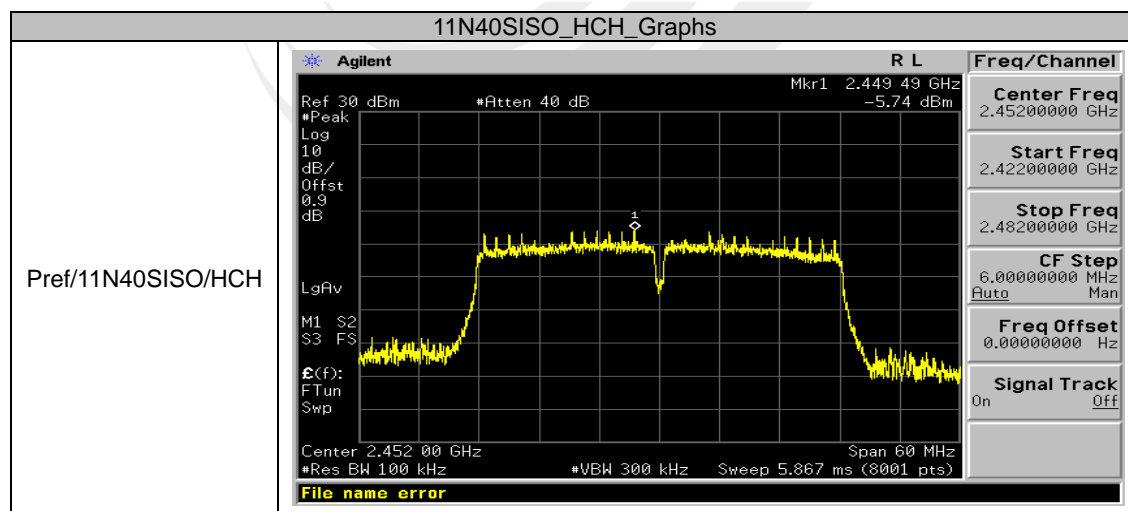
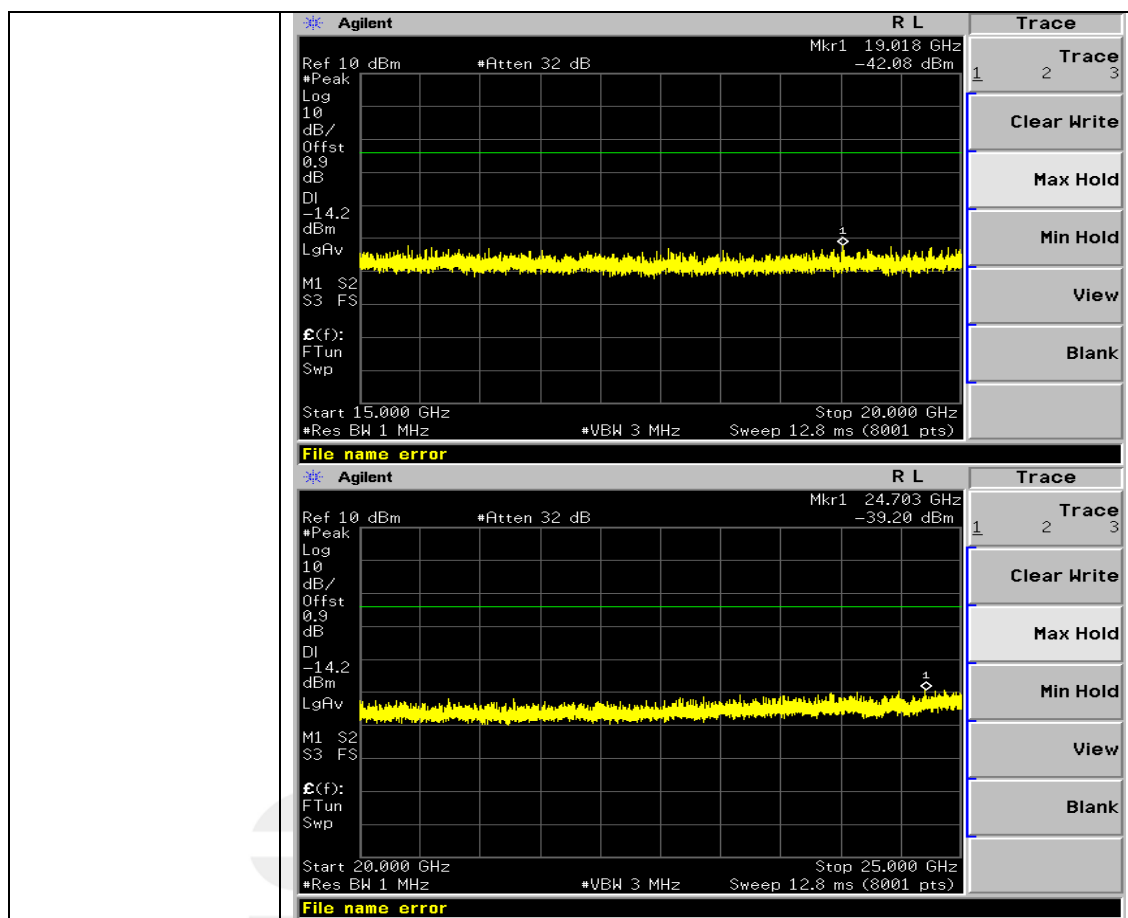


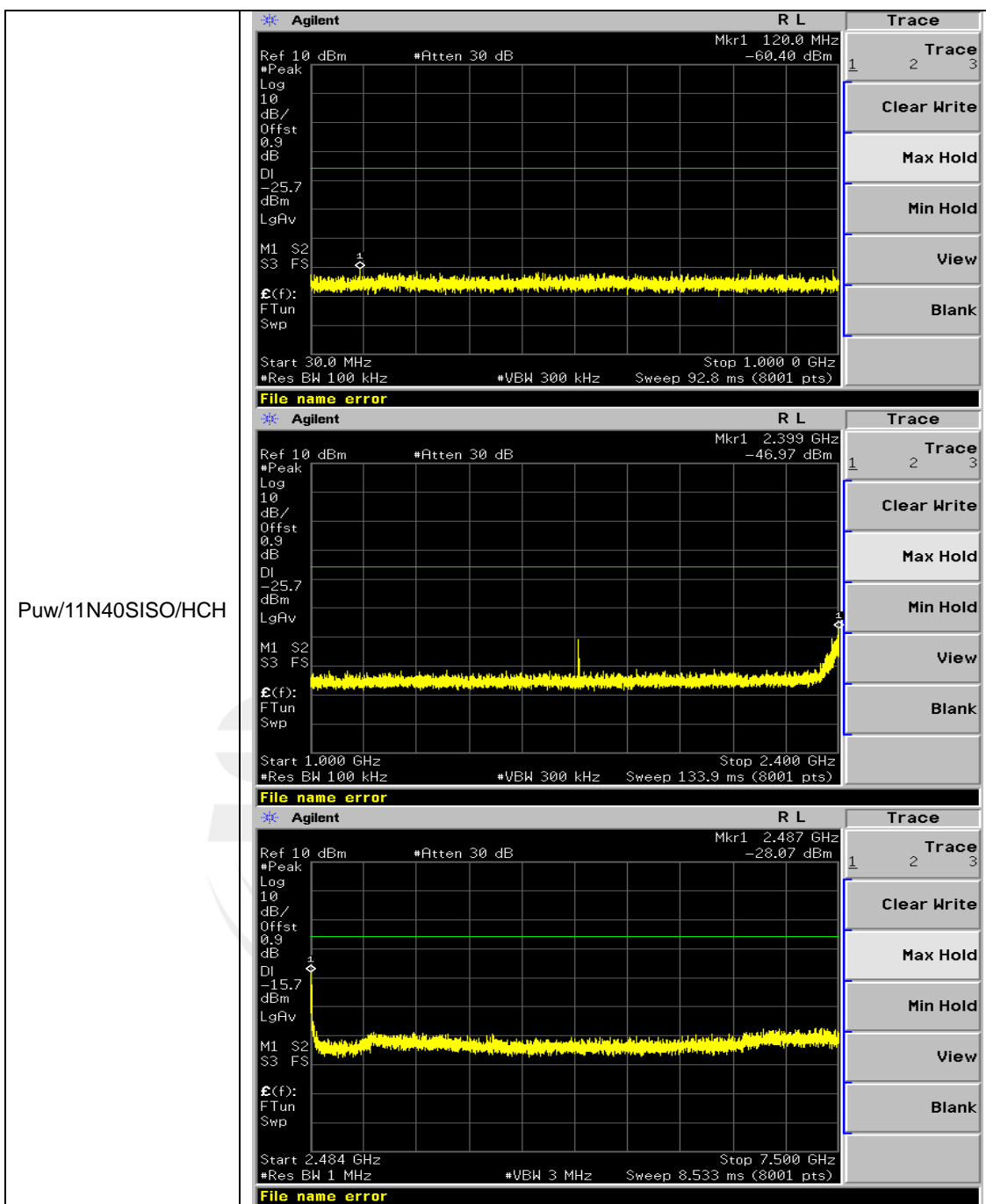


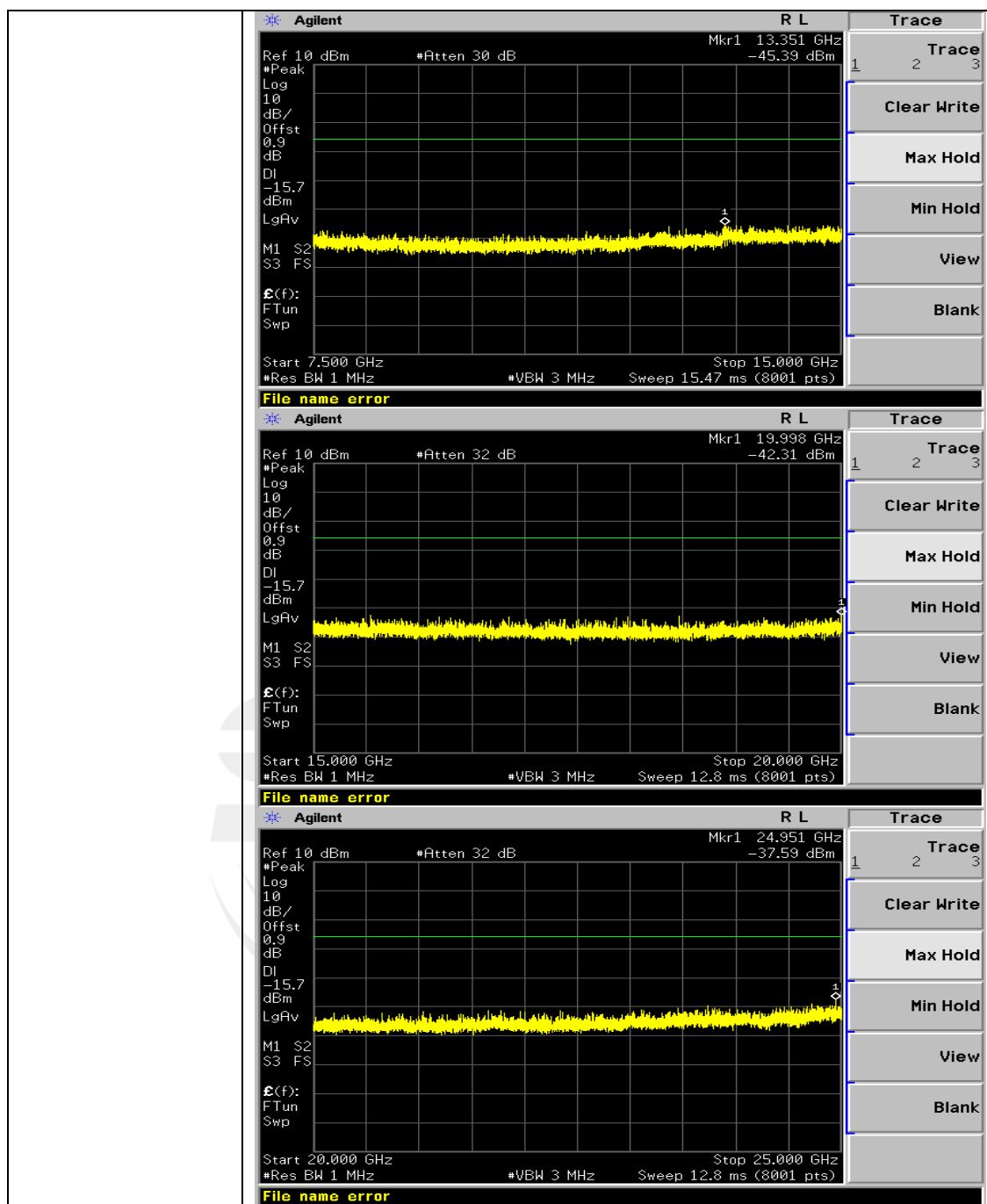














## 10. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY

### 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

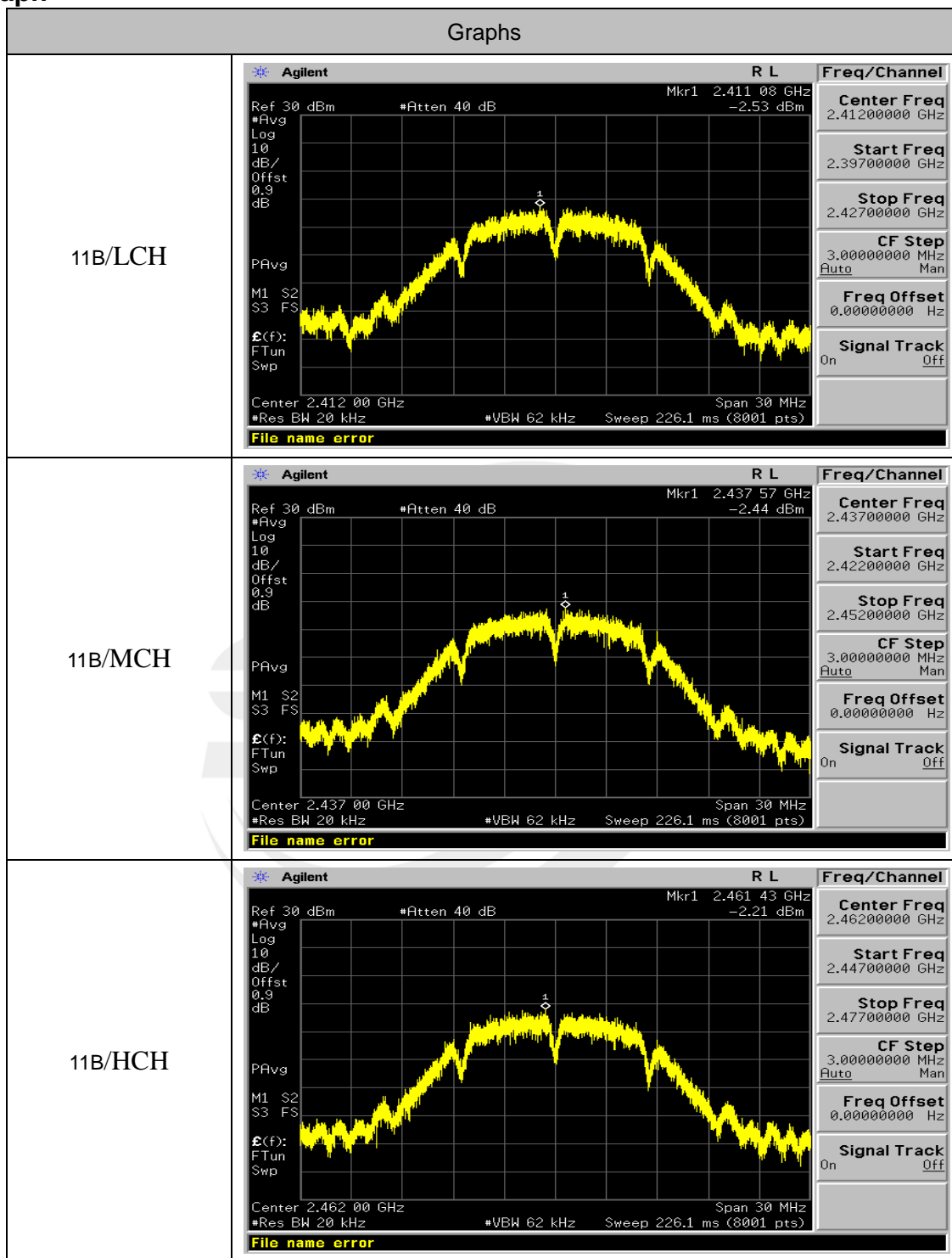
Refer To Section 6.

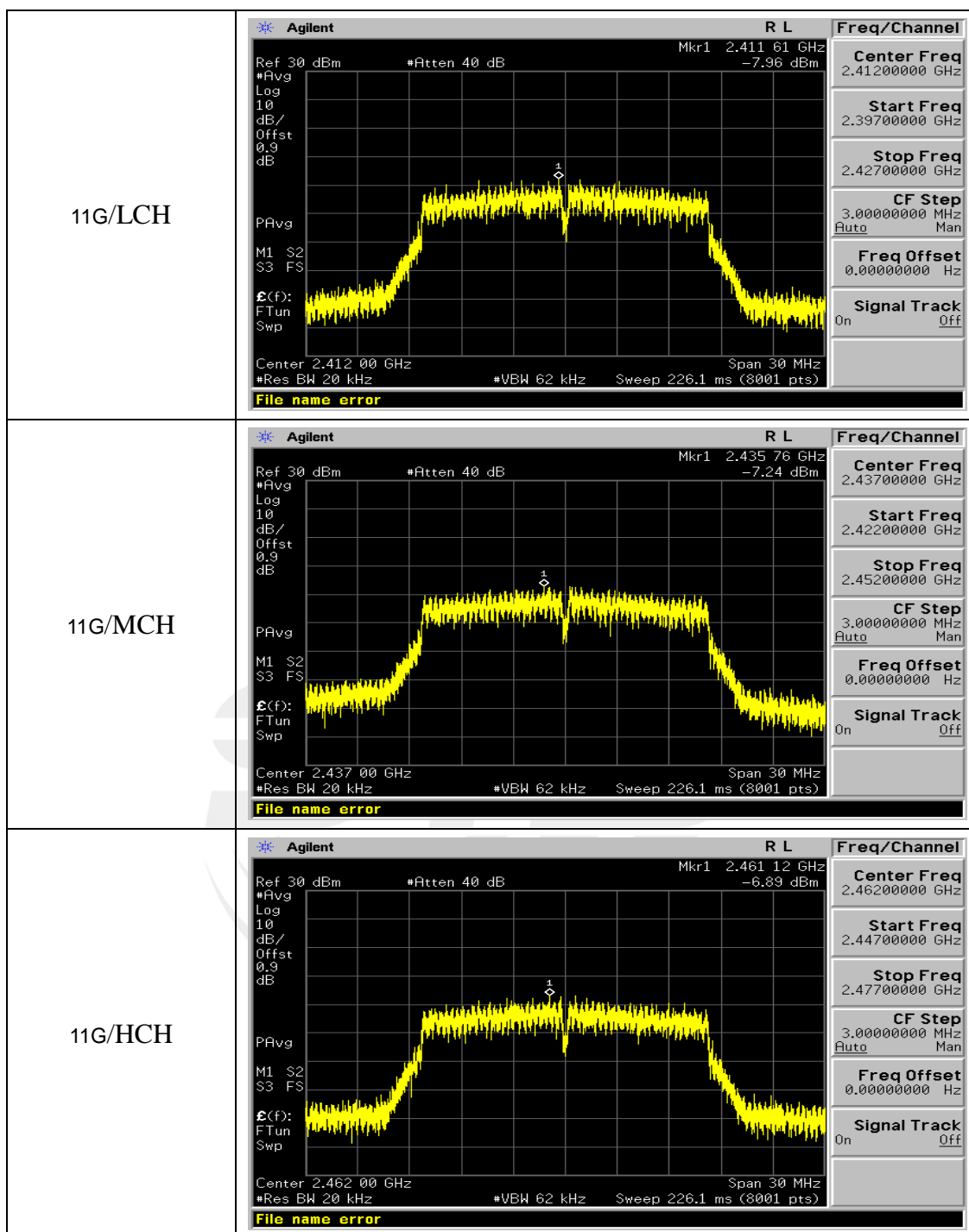
### 10.4 LIMITS AND MEASUREMENT RESULT

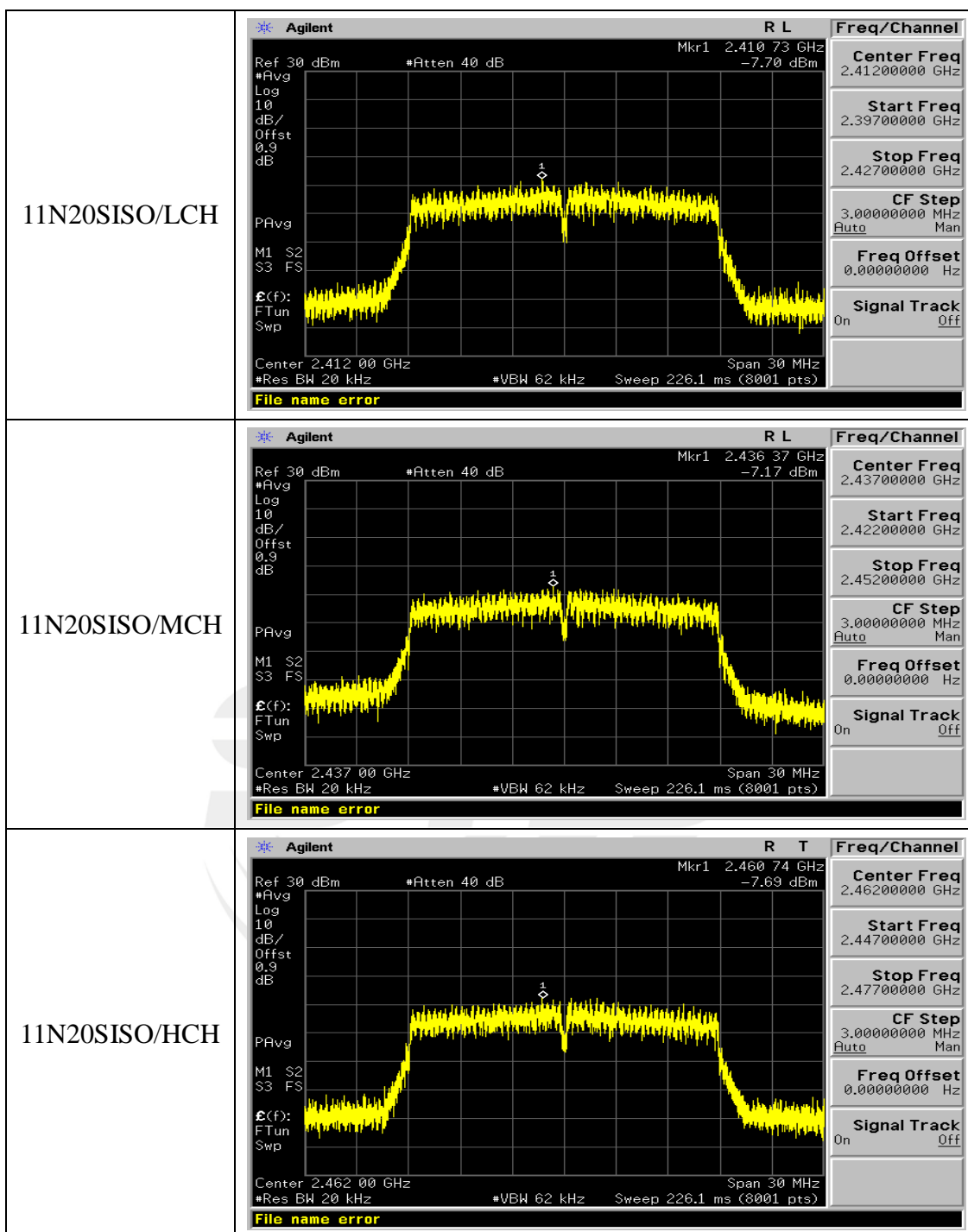
Mode	Channel	Av.PSD [dBm/20kHz]	Limit[dBm/3kHz]	Verdict
11B	LCH	-2.53	8	PASS
11B	MCH	-2.44	8	PASS
11B	HCH	-2.21	8	PASS
11G	LCH	-7.96	8	PASS
11G	MCH	-7.24	8	PASS
11G	HCH	-6.89	8	PASS
11N20SISO	LCH	-7.7	8	PASS
11N20SISO	MCH	-7.17	8	PASS
11N20SISO	HCH	-7.69	8	PASS
11N40SISO	LCH	-15.74	8	PASS
11N40SISO	MCH	-13.44	8	PASS
11N40SISO	HCH	-14.25	8	PASS

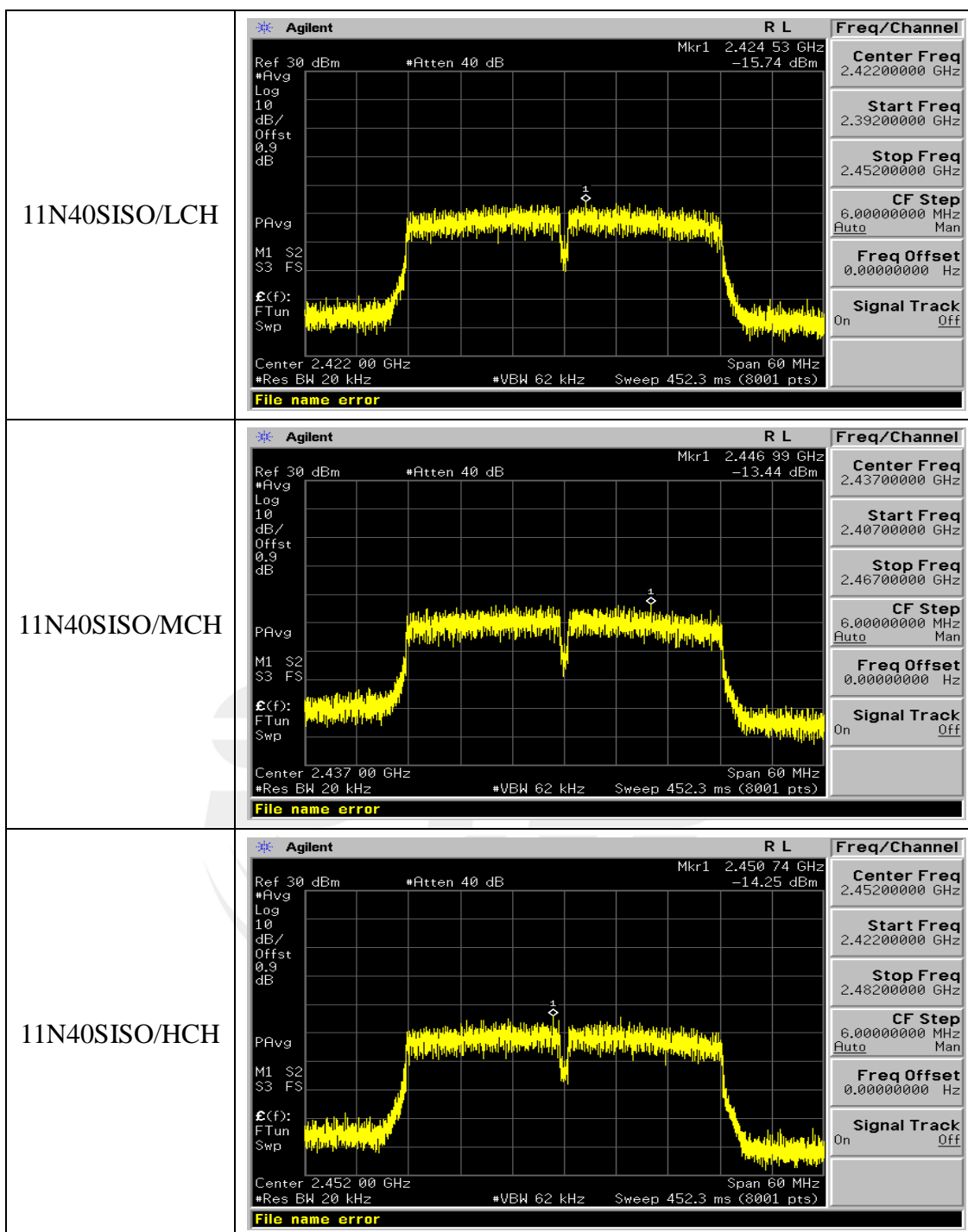


## Test Graph











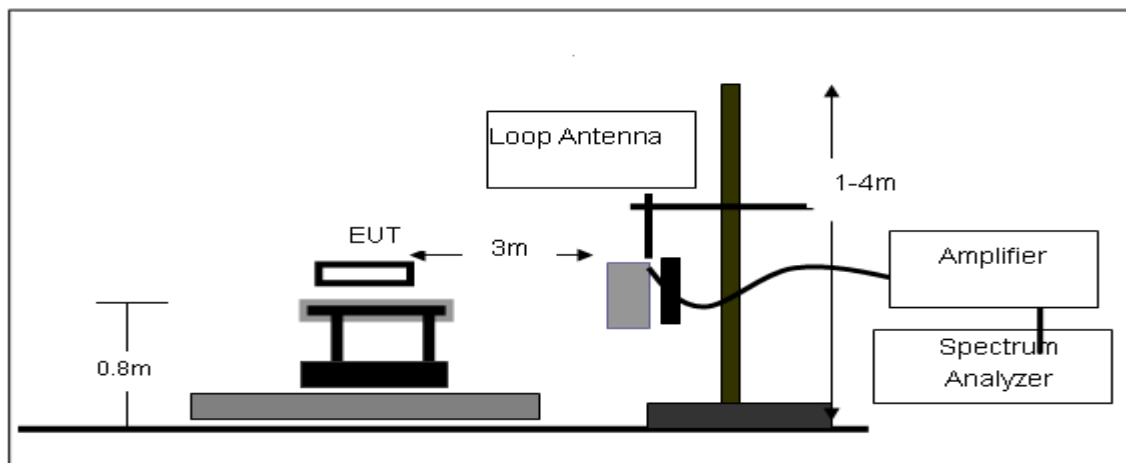
## 11. RADIATED EMISSION

### 11.1. MEASUREMENT PROCEDURE

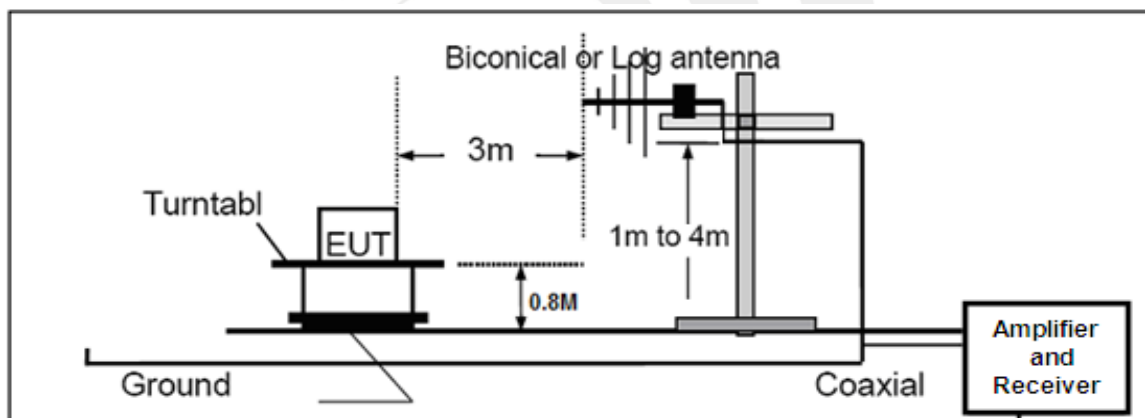
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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

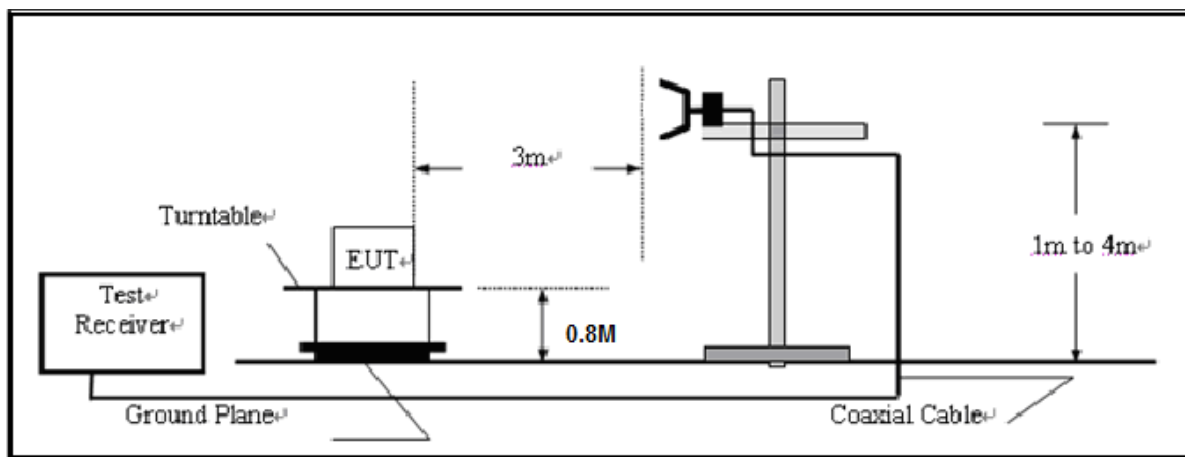
RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP 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

### LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak
Start Frequency	1000 MHz(Peak/AV)
Stop Frequency	10th carrier harmonic(Peak/AV)
RB / VB (emission in restricted band)	1 MHz / 1 MHz, AV=1 MHz / 10Hz

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP



#### 11.4. TEST RESULT

##### RADIATED EMISSION BELOW 30MHZ

Between 9KHz – 30 MHz)

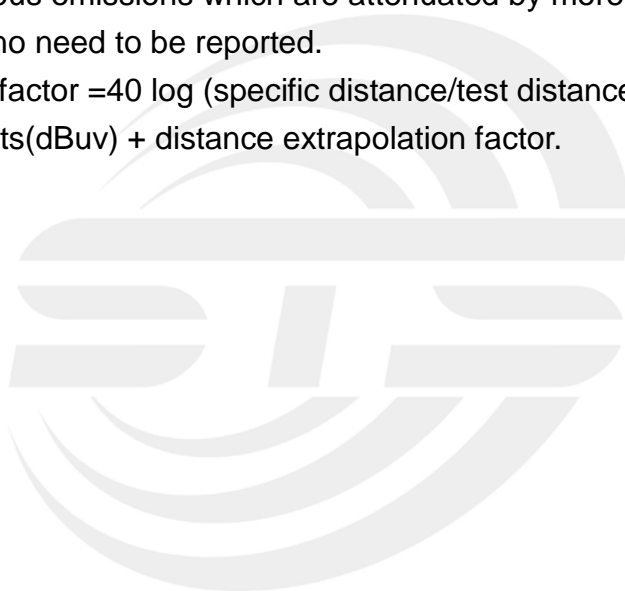
Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

Note:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor =  $40 \log (\text{specific distance/test distance})$ (dB);

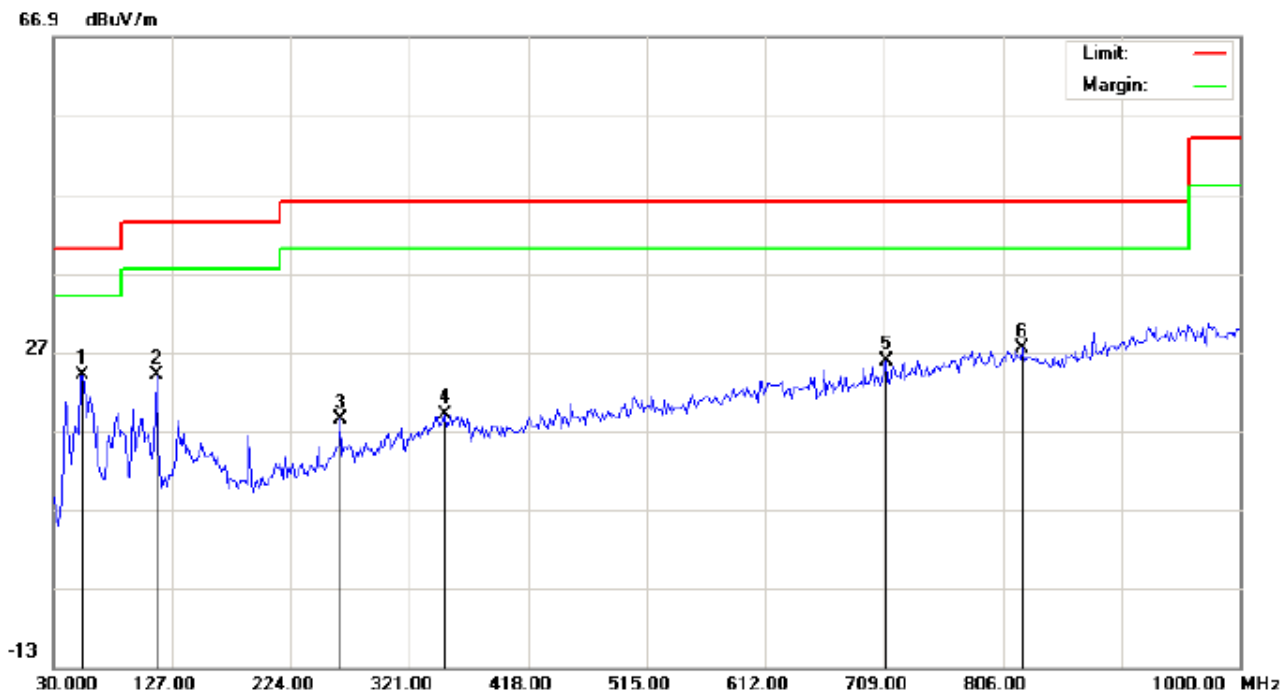
Limit line = specific limits(dBuV) + distance extrapolation factor.





## RADIATED EMISSION BELOW 1GHZ

EUT	THUNDER PLUS	Model Name	DP5108
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2412MHZ	Antenna	Horizontal



Site: site #1

Polarization: **Horizontal**

Temperature: 26

Limit: FCC Class B 3M Radiation

Power: AC 120V/60Hz

Humidity: 60 %

EUT: THUNDER PLUS

Distance: 3m

M/N: DP5108

Mode: Low Channel TX

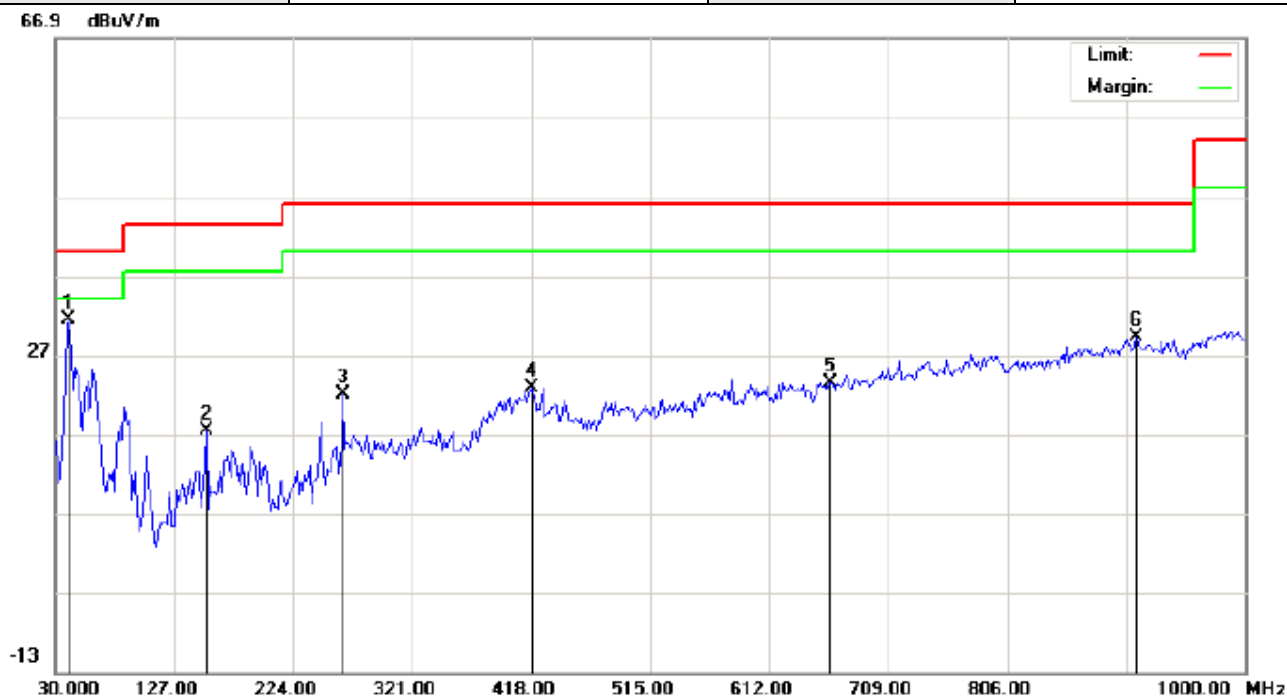
Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	54.2500	12.86	11.20	24.06	40.00	-15.94	peak			
2		114.0667	12.65	11.45	24.10	43.50	-19.40	peak			
3		264.4167	4.05	14.34	18.39	46.00	-27.61	peak			
4		350.1000	0.25	18.74	18.99	46.00	-27.01	peak			
5		710.6167	0.26	25.50	25.76	46.00	-20.24	peak			
6		822.1667	-0.01	27.32	27.31	46.00	-18.69	peak			

RESULT: PASS



EUT	THUNDER PLUS	Model Name	DP5108
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2412MHZ	Antenna	Vertical



Site: site #1

Limit: FCC Class B 3M Radiation

EUT: THUNDER PLUS

M/N: DP5108

Mode: Low Channel TX

Note:

Polarization: **Vertical**

Power: AC 120V/60Hz

Distance: 3m

Temperature: 26

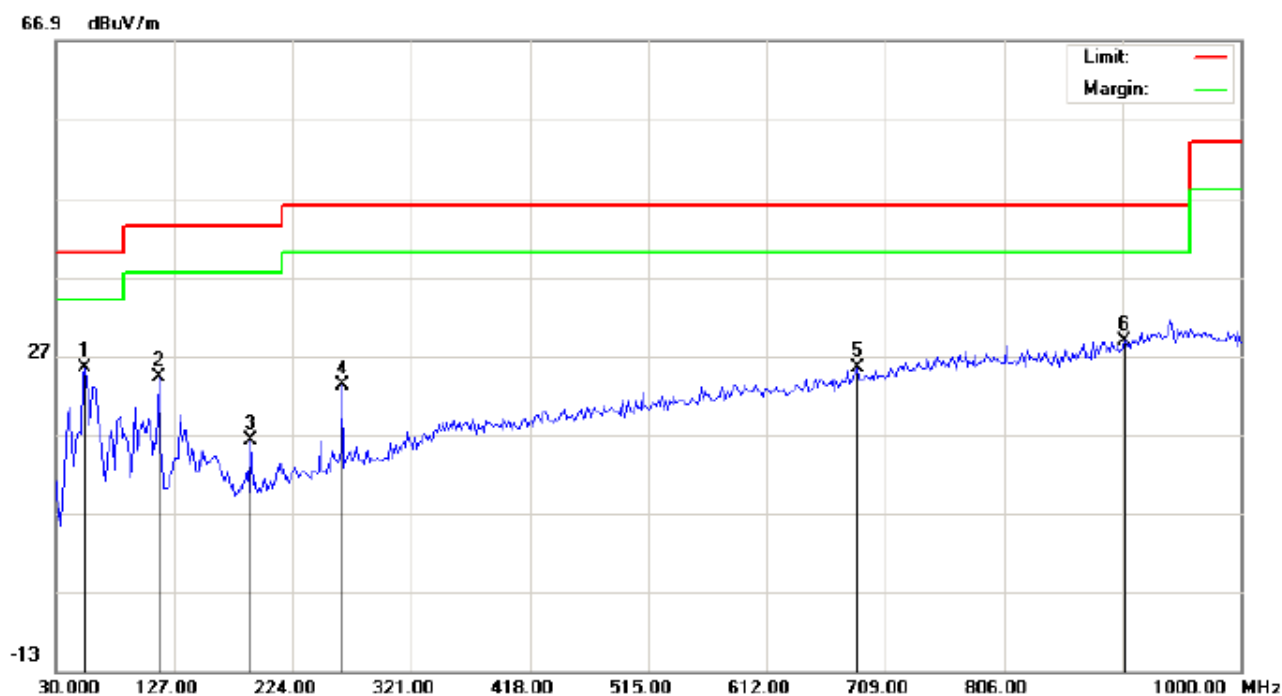
Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	41.3167	22.68	8.81	31.49	40.00	-8.51	peak			
2		152.8667	2.13	15.28	17.41	43.50	-26.09	peak			
3		264.4167	7.57	14.34	21.91	46.00	-24.09	peak			
4		418.0000	3.26	19.62	22.88	46.00	-23.12	peak			
5		662.1167	-0.76	24.17	23.41	46.00	-22.59	peak			
6		911.0833	0.35	28.92	29.27	46.00	-16.73	peak			

**RESULT: PASS**



EUT	THUNDER PLUS	Model Name	DP5108
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2437MHZ	Antenna	Horizontal



Site: site #1

Polarization: **Horizontal**

Temperature: 26

Limit: FCC Class B 3M Radiation

Power: AC 120V/60Hz

Humidity: 60 %

EUT: THUNDER PLUS

Distance: 3m

M/N: DP5108

Mode: Middle Channel TX

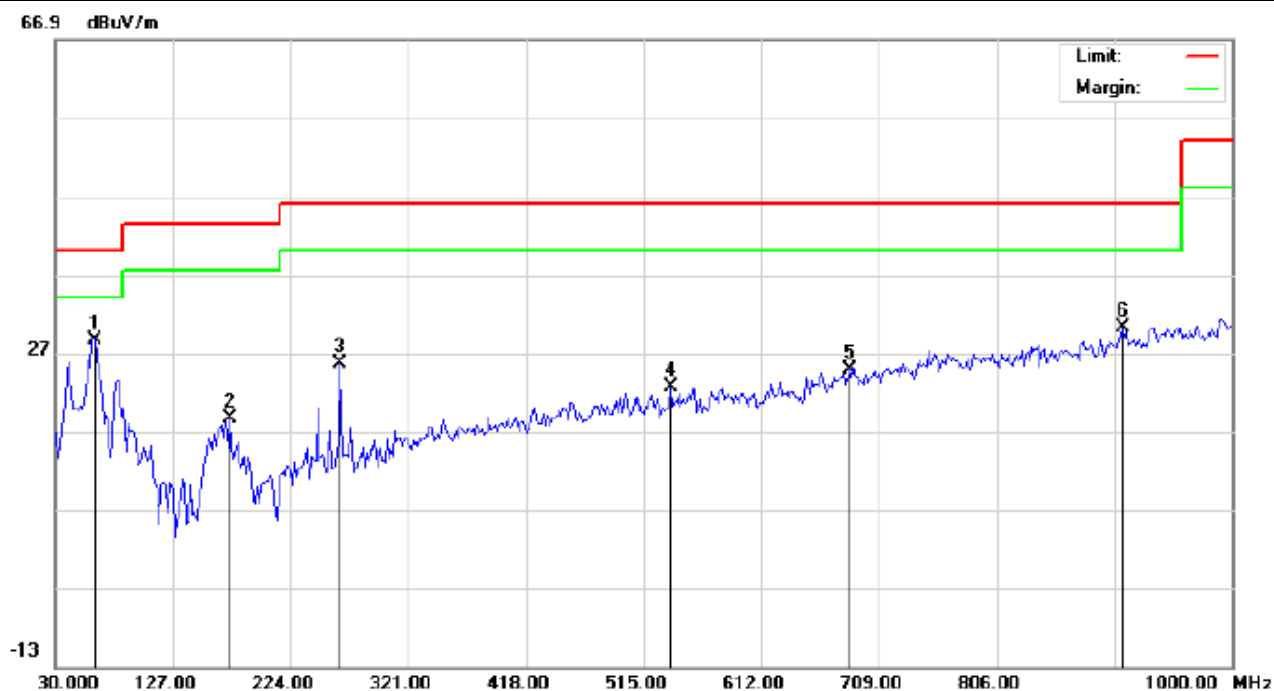
Note:

No.	Mk	Freq. MHz	Reading dBuV	Factor dB/m	Measurement dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree degree	Comment
1	*	54.2500	14.22	11.20	25.42	40.00	-14.58	peak			
2		114.0667	12.77	11.45	24.22	43.50	-19.28	peak			
3		190.0500	4.57	11.54	16.11	43.50	-27.39	peak			
4		264.4167	8.93	14.34	23.27	46.00	-22.73	peak			
5		686.3667	0.63	24.82	25.45	46.00	-20.55	peak			
6		904.6167	0.08	28.74	28.82	46.00	-17.18	peak			

**RESULT: PASS**



EUT	THUNDER PLUS	Model Name	DP5108
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2437MHZ	Antenna	Vertical



Site: site #1

Limit: FCC Class B 3M Radiation

EUT: THUNDER PLUS

M/N: DP5108

Mode: Middle Channel TX

Note:

Polarization: **Vertical**

Power: AC 120V/60Hz

Distance: 3m

Temperature: 26

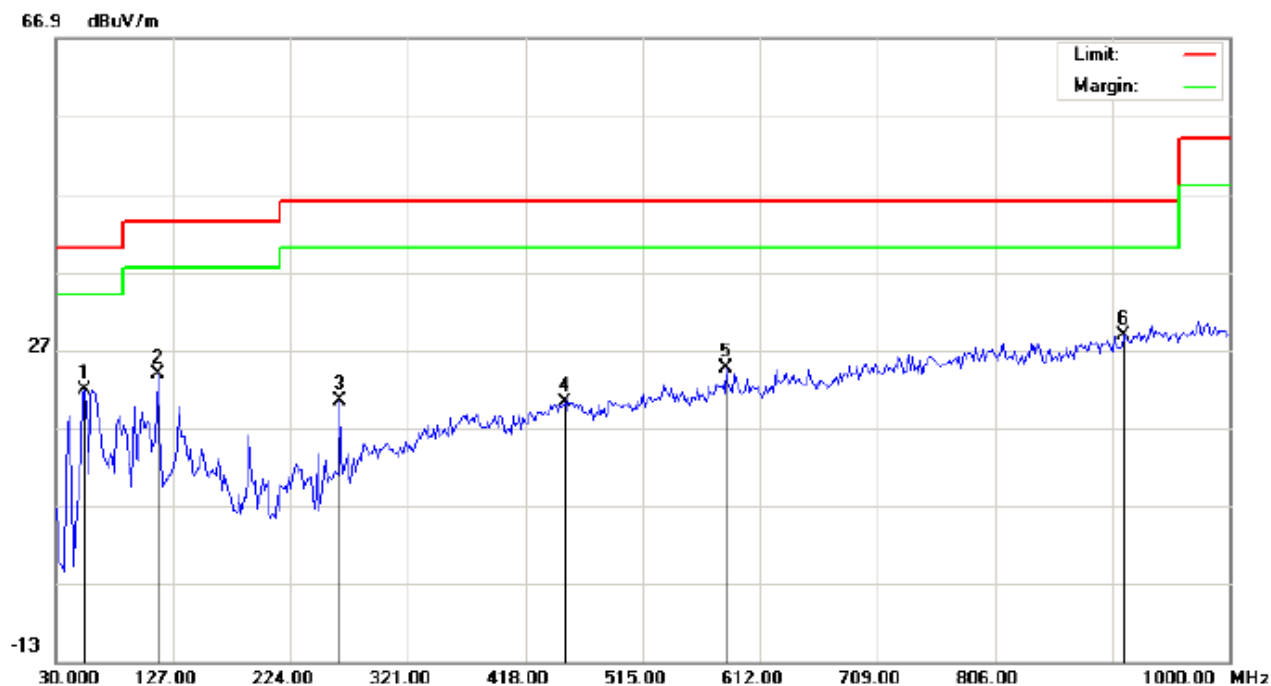
Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	62.3333	21.46	7.24	28.70	40.00	-11.30	peak			
2		173.8833	4.07	14.46	18.53	43.50	-24.97	peak			
3		264.4167	11.33	14.34	25.67	46.00	-20.33	peak			
4		537.6333	0.48	22.15	22.63	46.00	-23.37	peak			
5		684.7500	0.00	24.78	24.78	46.00	-21.22	peak			
6		909.4667	1.34	28.87	30.21	46.00	-15.79	peak			

**RESULT: PASS**



EUT	THUNDER PLUS	Model Name	DP5108
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2462MHZ	Antenna	Horizontal



Site: site #1

Limit: FCC Class B 3M Radiation

EUT: THUNDER PLUS

M/N: DP5108

Mode: High Channel TX

Note:

Polarization: **Horizontal**

Power: AC 120V/60Hz

Distance: 3m

Temperature: 26

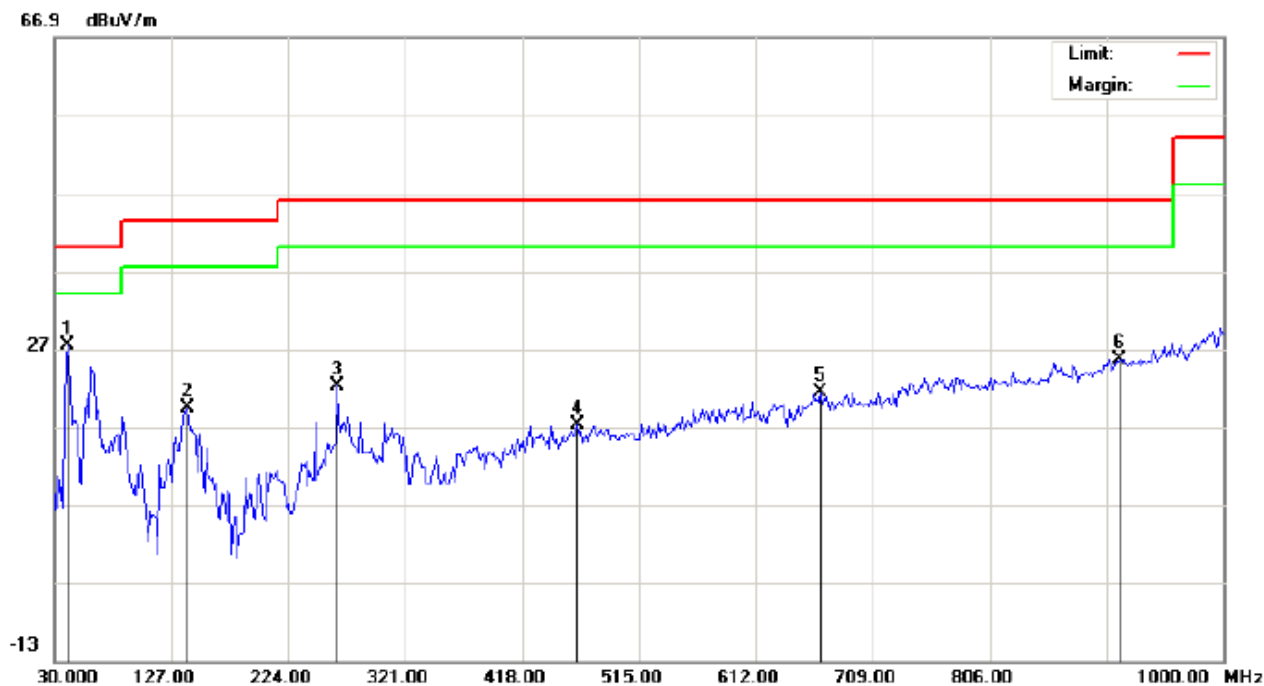
Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		54.2500	10.65	11.20	21.85	40.00	-18.15	peak			
2		114.0667	12.36	11.45	23.81	43.50	-19.69	peak			
3		264.4167	6.05	14.34	20.39	46.00	-25.61	peak			
4		450.3333	-0.47	20.59	20.12	46.00	-25.88	peak			
5		584.5167	1.25	23.34	24.59	46.00	-21.41	peak			
6	*	912.7000	-0.08	28.96	28.88	46.00	-17.12	peak			

**RESULT: PASS**



EUT	THUNDER PLUS	Model Name	DP5108
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with date rate 1 2462MHZ	Antenna	Vertical



Site: site #1

Polarization: **Vertical**

Temperature: 26

Limit: FCC Class B 3M Radiation

Power: AC 120V/60Hz

Humidity: 60 %

EUT: THUNDER PLUS

Distance: 3m

M/N: DP5108

Mode: High Channel TX

Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	41.3167	18.65	8.81	27.46	40.00	-12.54	peak			
2		139.9333	4.20	15.17	19.37	43.50	-24.13	peak			
3		264.4167	7.84	14.34	22.18	46.00	-23.82	peak			
4		463.2667	-3.62	20.73	17.11	46.00	-28.89	peak			
5		665.3500	-2.83	24.26	21.43	46.00	-24.57	peak			
6		914.3167	-3.33	29.01	25.68	46.00	-20.32	peak			

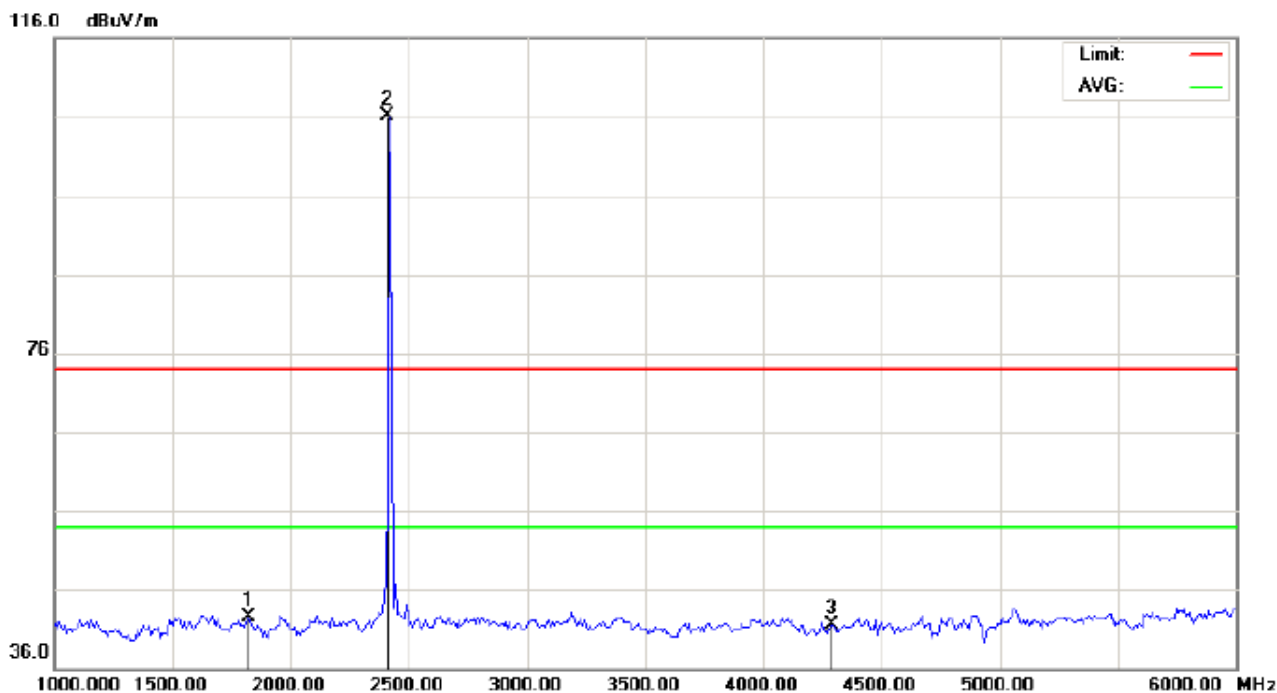
**RESULT: PASS****Note:** 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

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



## RADIATED EMISSION ABOVE 1GHZ

EUT	THUNDER PLUS	Model Name	DP5108
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2412MHZ	Antenna	Horizontal



Site: site #1

Limit: FCC Class B 3M Radiation above 1GHZ(PK)

EUT: THUNDER PLUS

M/N: DP5108

Mode: 802.11b Low Channel TX

Note:

Polarization: *Horizontal*

Power:

Distance: 3m

Temperature: 26

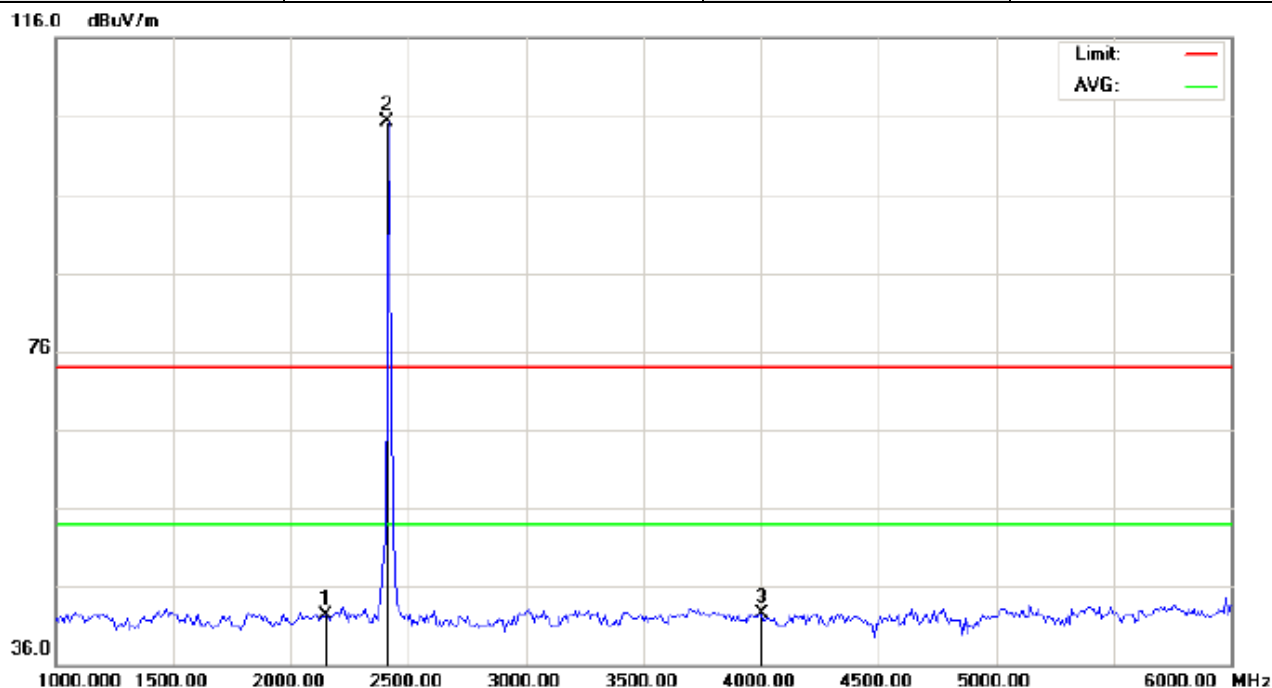
Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		1825.000	54.56	-11.96	42.60	74.00	-31.40	peak			
2	*	2412.000	115.78	-9.67	106.11	74.00	32.11	peak			
3		4291.667	45.41	-3.82	41.59	74.00	-32.41	peak			

RESULT: PASS



EUT	THUNDER PLUS	Model Name	DP5108
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2412MHZ	Antenna	Vertical



Site: site #1

Polarization: **Vertical**

Temperature: 26

Limit: FCC Class B 3M Radiation above 1GHZ(PK)

Power:

Humidity: 60 %

EUT: THUNDER PLUS

Distance: 3m

M/N: DP5108

Mode: 802.11b Low Channel TX

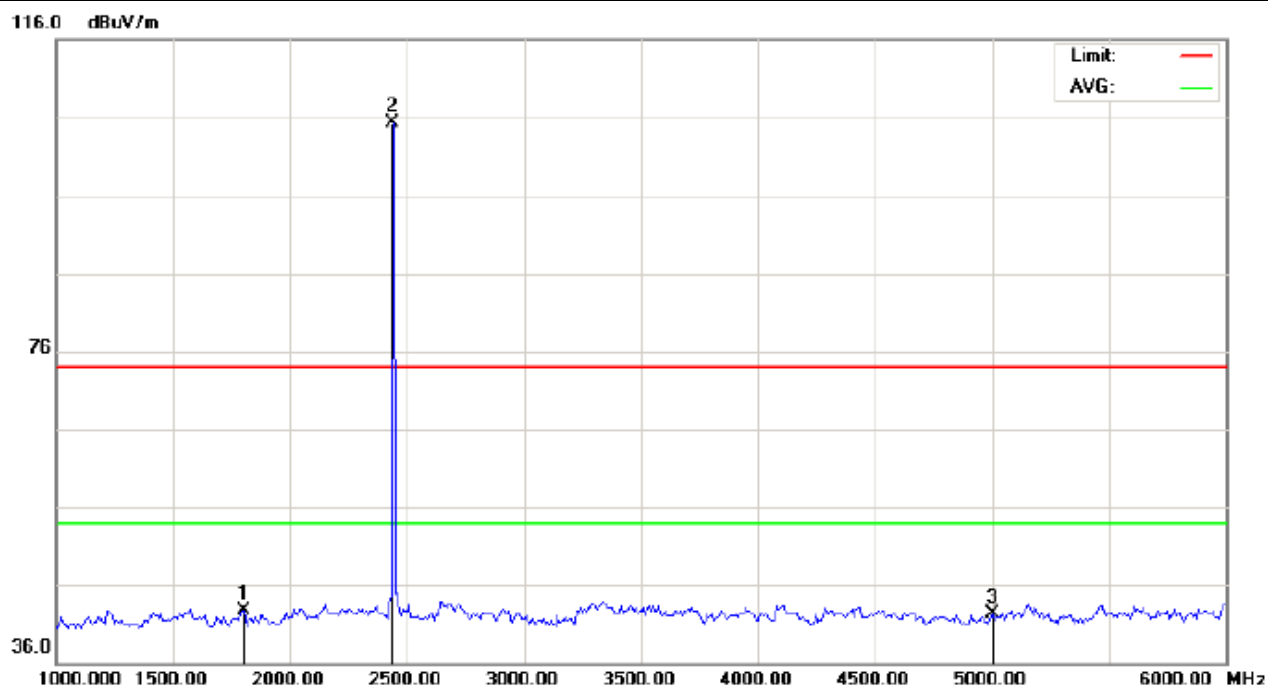
Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2150.000	52.31	-9.95	42.36	74.00	-31.64	peak			
2	*	2412.000	115.07	-9.67	105.40	74.00	31.40	peak			
3		4000.000	47.28	-4.81	42.47	74.00	-31.53	peak			

**RESULT: PASS**



EUT	Mobile Phone	Model Name	AM526
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2437MHZ	Antenna	Horizontal



Site: site #1

Limit: FCC Class B 3M Radiation above 1GHZ(PK)

EUT: THUNDER PLUS

M/N: DP5108

Mode: 802.11b Middle Channel TX

Note:

Polarization: **Horizontal**

Power:

Distance: 3m

Temperature: 26

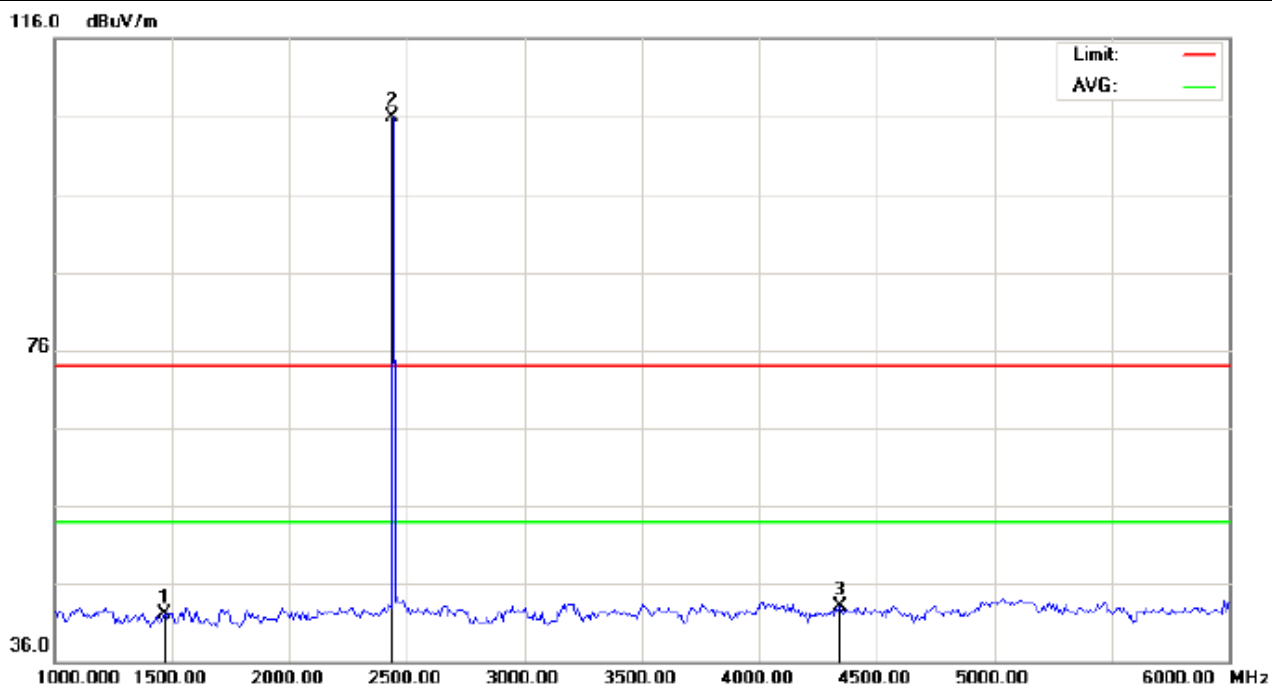
Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		1800.000	55.01	-12.22	42.79	74.00	-31.21	peak			
2	*	2437.000	114.85	-9.64	105.21	74.00	31.21	peak			
3		5000.000	44.02	-1.80	42.22	74.00	-31.78	peak			

**RESULT: PASS**



EUT	Mobile Phone	Model Name	AM526
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2437MHZ	Antenna	Vertical



Site: site #1

Limit: FCC Class B 3M Radiation above 1GHZ(PK)

EUT: THUNDER PLUS

M/N: DP5108

Mode: 802.11b Middle Channel TX

Note:

Polarization: **Vertical**

Power:

Distance: 3m

Temperature: 26

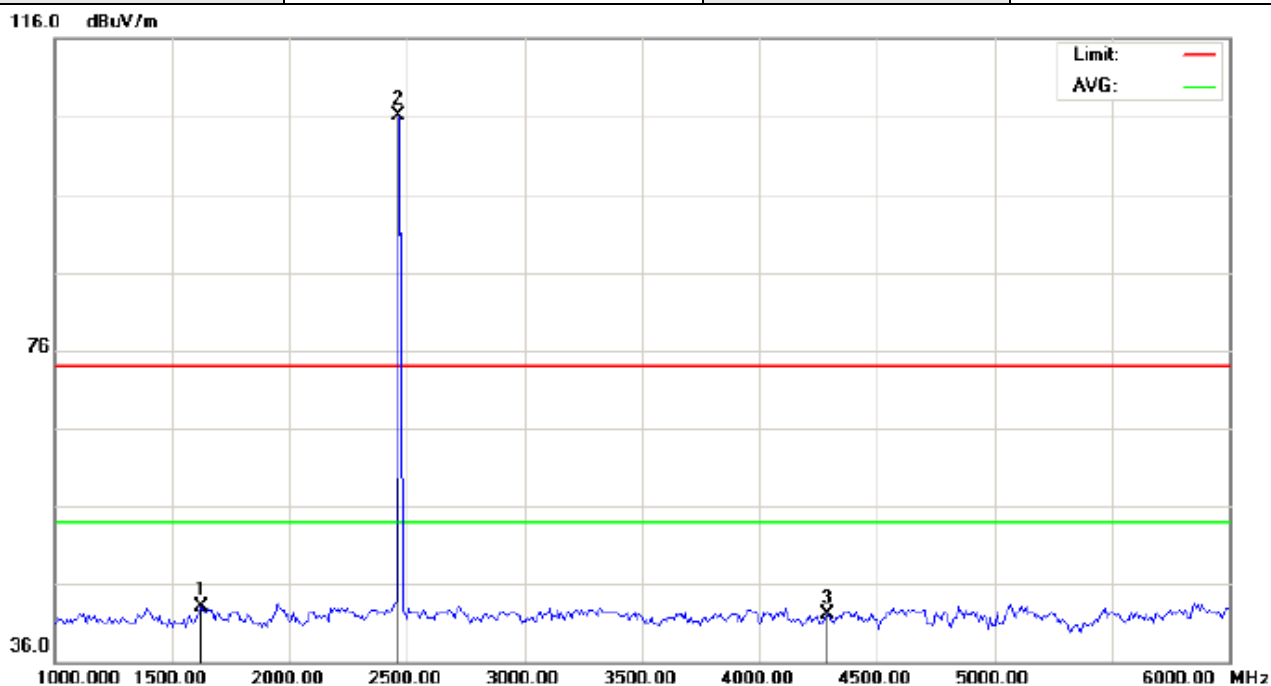
Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		1466.667	57.42	-15.39	42.03	74.00	-31.97	peak			
2	*	2437.000	115.64	-9.64	106.00	74.00	32.00	peak			
3		4341.667	46.66	-3.65	43.01	74.00	-30.99	peak			

**RESULT: PASS**



EUT	Mobile Phone	Model Name	AM526
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2462MHZ	Antenna	Horizontal



Site: site #1

Limit: FCC Class B 3M Radiation above 1GHZ(PK)

EUT: THUNDER PLUS

M/N: DP5108

Mode: 802.11b High Channel TX

Note:

Polarization: *Horizontal*

Power:

Distance: 3m

Temperature: 26

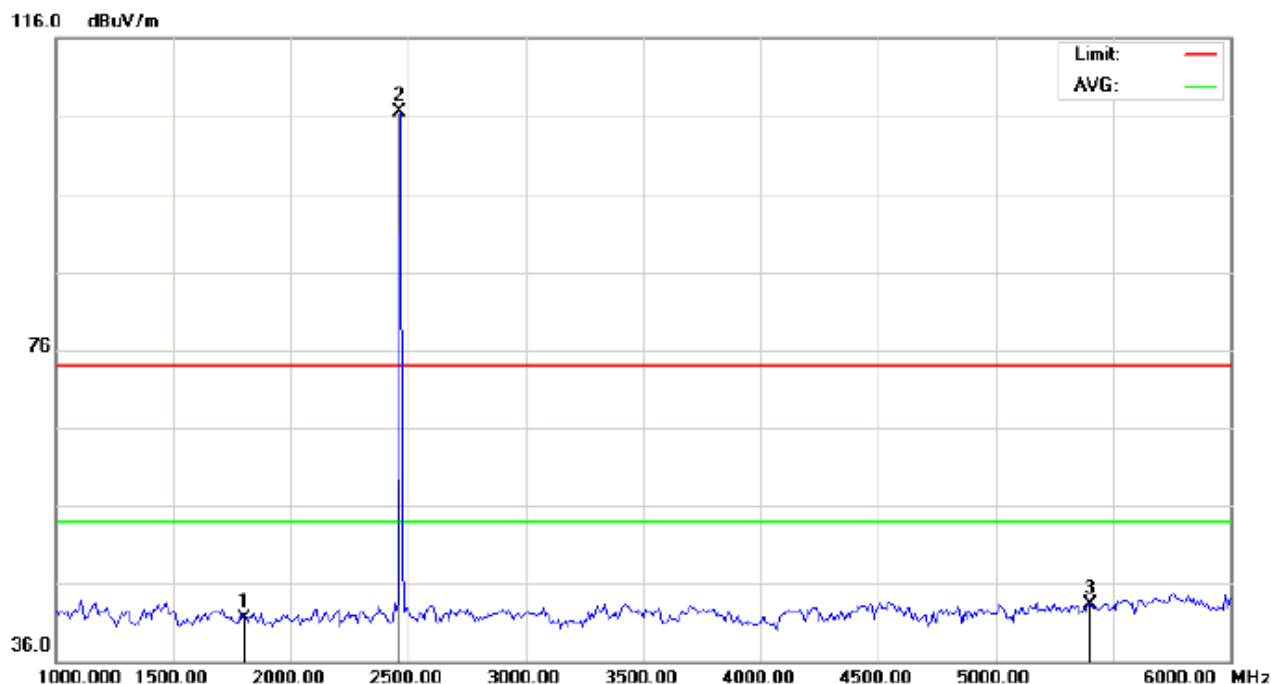
Humidity: 60 %

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		1625.000	57.24	-14.06	43.18	74.00	-30.82	peak			
2	*	2462.000	115.74	-9.61	106.13	74.00	32.13	peak			
3		4291.667	45.91	-3.82	42.09	74.00	-31.91	peak			

**RESULT: PASS**



EUT	Mobile Phone	Model Name	AM526
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2462MHZ	Antenna	Vertical



Site: site #1 Polarization: **Vertical** Temperature: 26  
Limit: FCC Class B 3M Radiation above 1GHZ(PK) Power: Humidity: 60 %  
EUT: THUNDER PLUS Distance: 3m  
M/N: DP5108  
Mode: 802.11b High Channel TX  
Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		1800.000	53.81	-12.22	41.59	74.00	-32.41	peak			
2	*	2462.000	116.18	-9.61	106.57	74.00	32.57	peak			
3		5400.000	45.10	-1.81	43.29	74.00	-30.71	peak			

**RESULT: PASS**

**Note:** The other modes radiation emissions have more than 20dB margin.

All modes radiation emission from 6GHz to 25GHz at least have 20dB margin.

Factor = Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

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

## 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

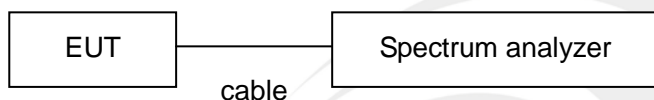
b) Set RBW=100kHz, VBW=300kHz

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

### 12.2. TEST SET-UP

Radiated same as 11.2

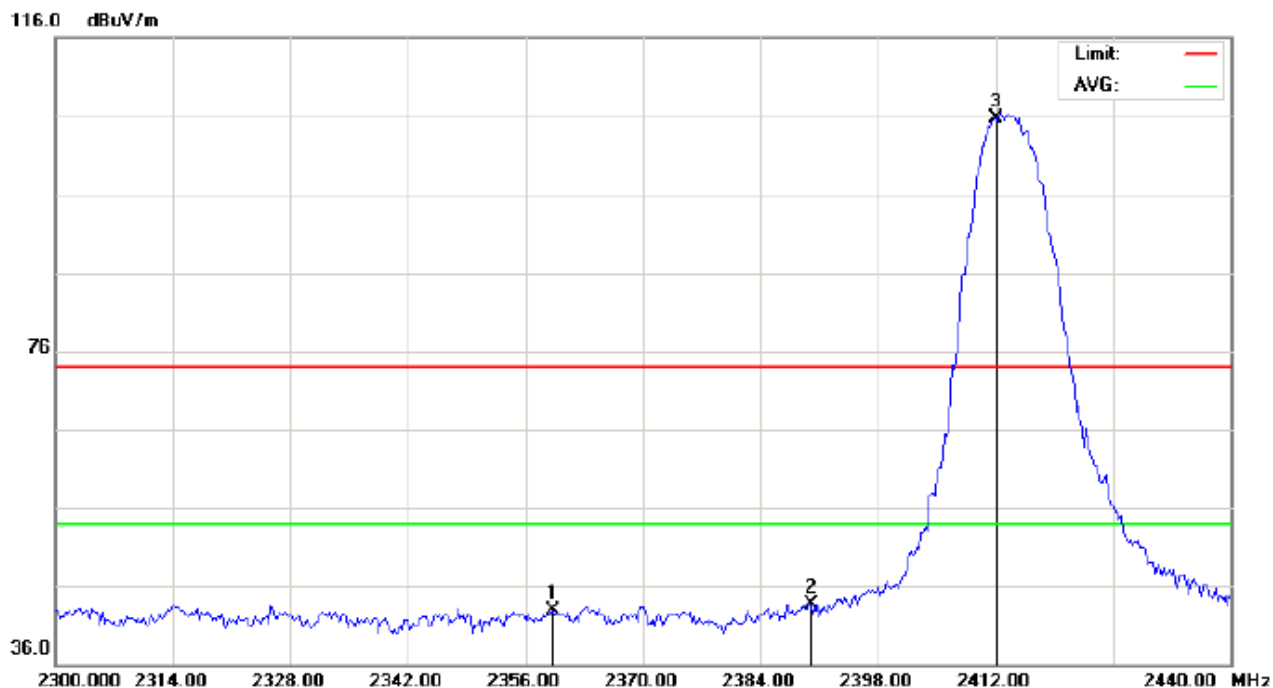
Conducted set up





### 12.3. Radiated Test Result

EUT	THUNDER PLUS	Model Name	DP5108
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2412MHZ	Antenna	Horizontal



Site: site #1

Polarization: **Horizontal**

Temperature: 26

Limit: FCC Class B 3M Radiation above 1GHZ(PK)

Power:

Humidity: 60 %

EUT: THUNDER PLUS

Distance: 3m

M/N: DP5108

Mode: 802.11b Low Channel TX

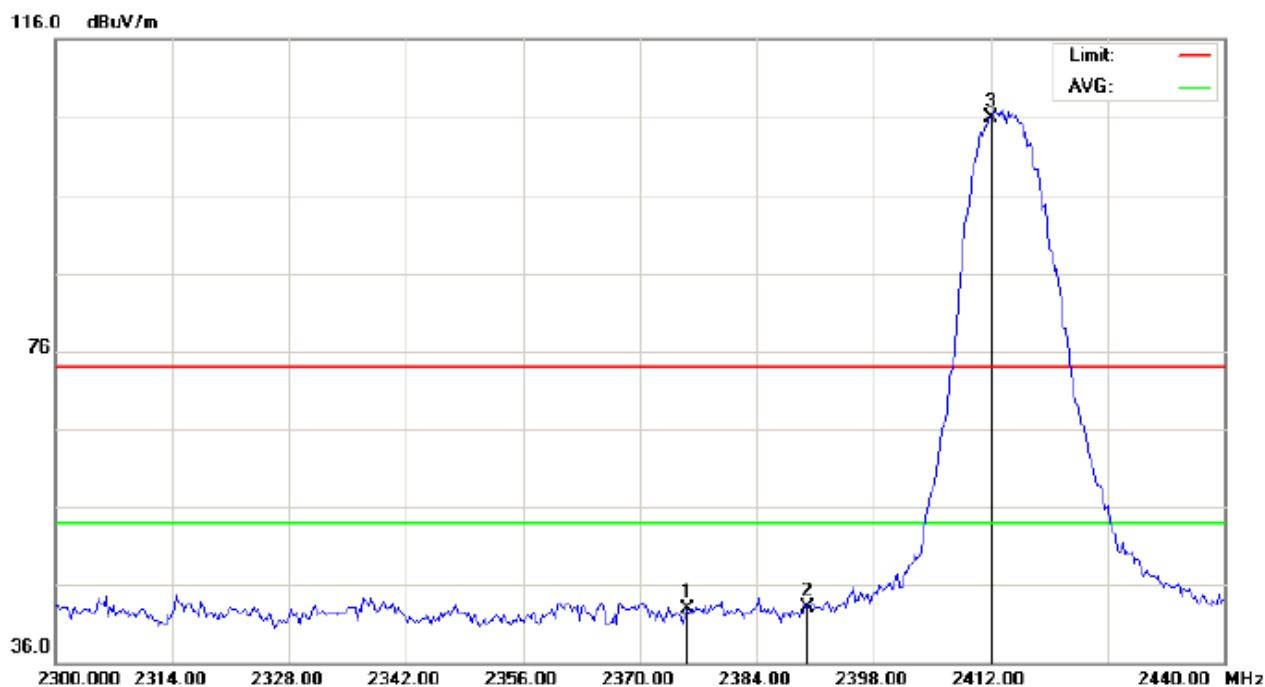
Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2359.267	52.61	-9.72	42.89	74.00	-31.11	peak			
2		2390.000	53.40	-9.69	43.71	74.00	-30.29	peak			
3	*	2412.000	115.36	-9.67	105.69	74.00	31.69	peak			

**RESULT: PASS**



EUT	THUNDER PLUS	Model Name	DP5108
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2412MHZ	Antenna	Vertical



Site: site #1

Polarization: **Vertical**

Temperature: 26

Limit: FCC Class B 3M Radiation above 1GHZ(PK)

Power:

Humidity: 60 %

EUT: THUNDER PLUS

Distance: 3m

M/N: DP5108

Mode: 802.11b Low Channel TX

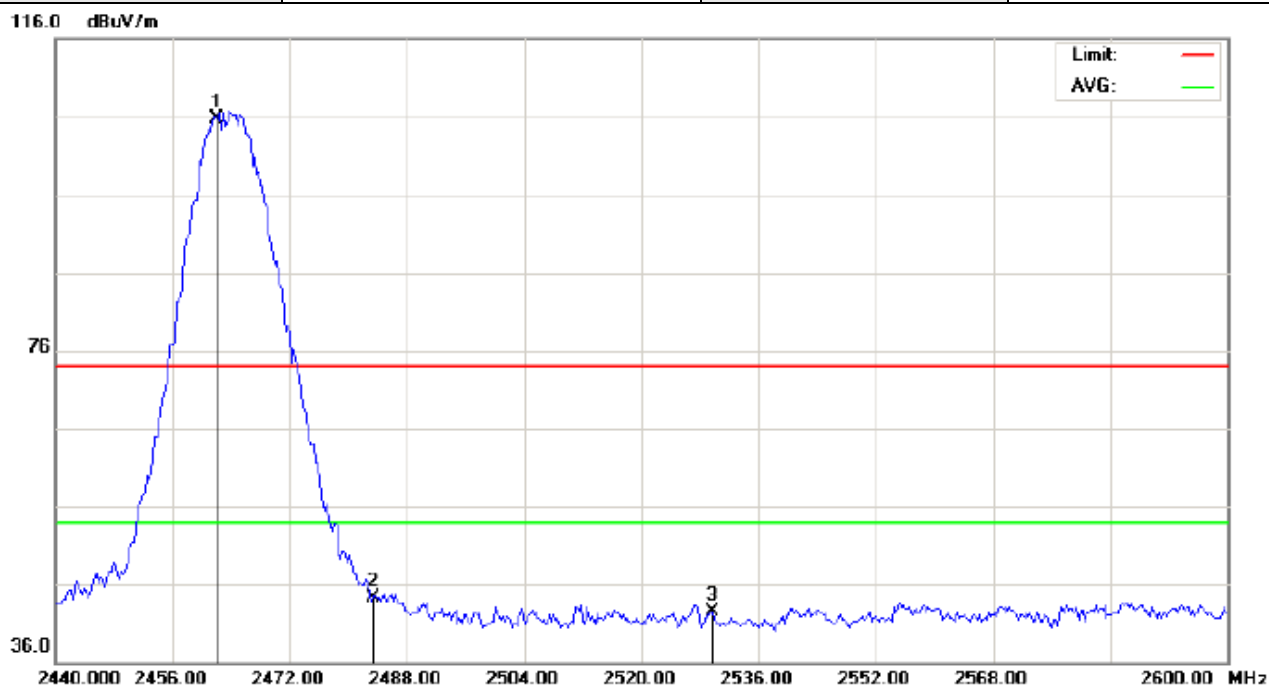
Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		2375.600	52.66	-9.71	42.95	74.00	-31.05	peak			
2		2390.000	52.77	-9.69	43.08	74.00	-30.92	peak			
3	*	2412.000	115.58	-9.67	105.91	74.00	31.91	peak			

**RESULT: PASS**



EUT	THUNDER PLUS	Model Name	DP5108
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2462MHZ	Antenna	Horizontal



Site: site #1

Polarization: *Horizontal*

Temperature: 26

Limit: FCC Class B 3M Radiation above 1GHZ(PK)

Power:

Humidity: 60 %

EUT: THUNDER PLUS

Distance: 3m

M/N: DP5108

Mode: 802.11b High Channel TX

Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2462.000	115.39	-9.61	105.78	74.00	31.78	peak			
2		2483.500	53.81	-9.59	44.22	74.00	-29.78	peak			
3		2529.600	52.04	-9.50	42.54	74.00	-31.46	peak			

**RESULT: PASS**



EUT	THUNDER PLUS	Model Name	DP5108
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	802.11b with data rate 1 2462MHZ	Antenna	Vertical



Site: site #1

Polarization: **Vertical**

Temperature: 26

Limit: FCC Class B 3M Radiation above 1GHZ(PK)

Power:

Humidity: 60 %

EUT: THUNDER PLUS

Distance: 3m

M/N: DP5108

Mode: 802.11b High Channel TX

Note:

No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	2462.000	114.92	-9.61	105.31	74.00	31.31	peak			
2		2483.500	55.72	-9.59	46.13	74.00	-27.87	peak			
3		2542.133	51.62	-9.47	42.15	74.00	-31.85	peak			

**RESULT: PASS****Note:** The other modes radiation emission have enough 20dB margin.

Factor = Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

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



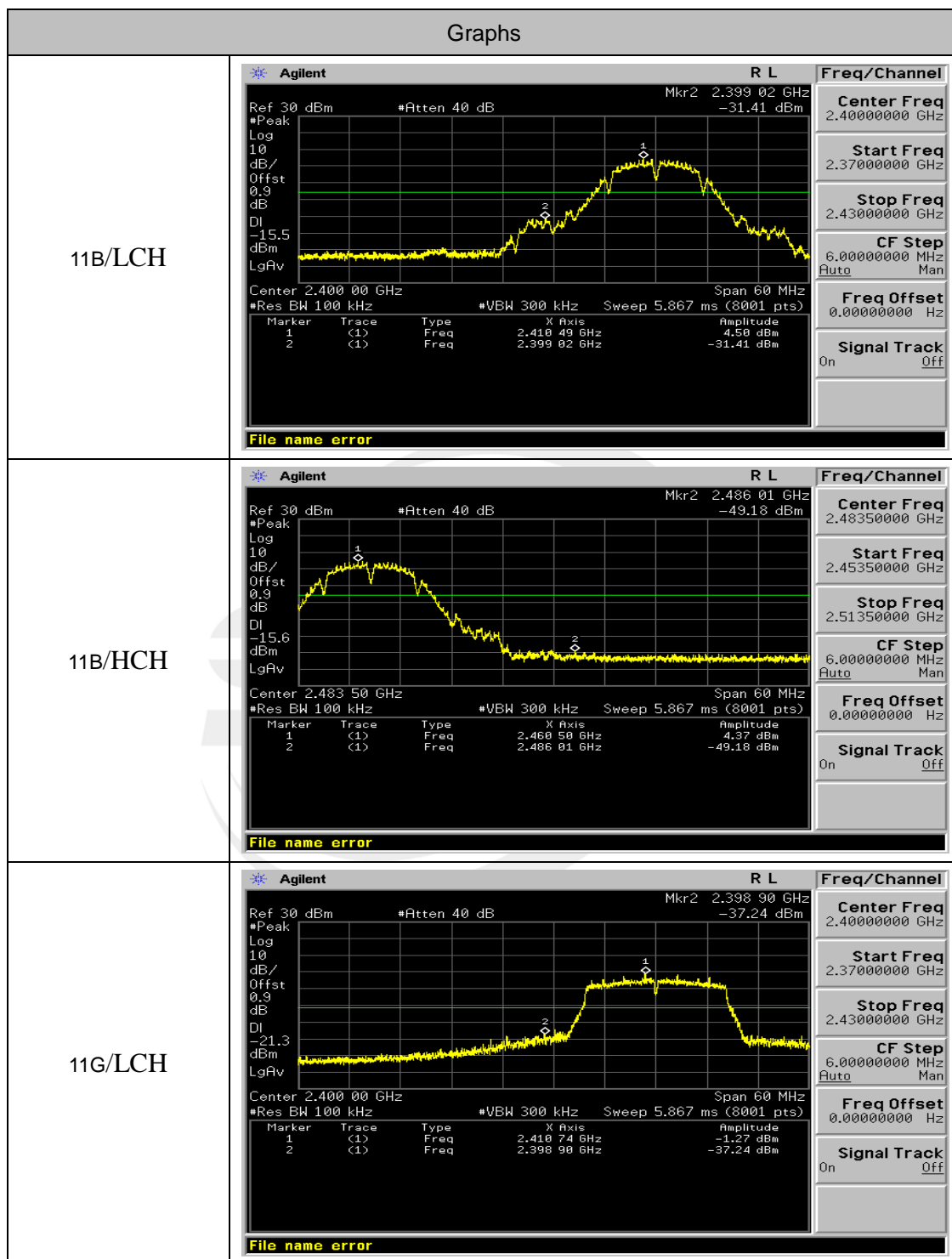
#### 12.4. Conducted Test Result

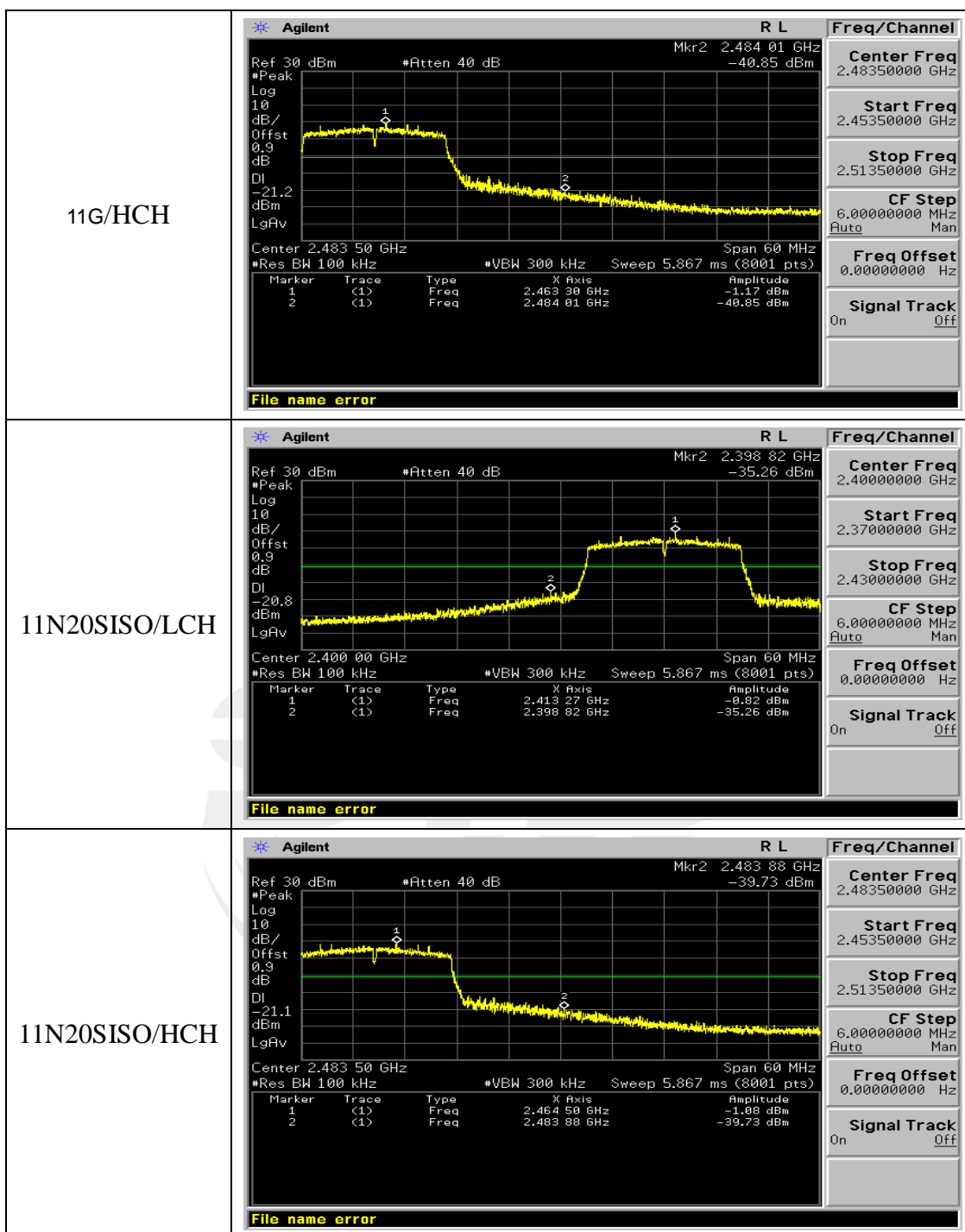
Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
11B	LCH	4.5	-31.41	-15.5	PASS
11B	HCH	4.37	-49.18	-15.63	PASS
11G	LCH	-1.27	-37.24	-21.27	PASS
11G	HCH	-1.17	-40.85	-21.17	PASS
11N20SISO	LCH	-0.82	-35.26	-20.82	PASS
11N20SISO	HCH	-1.08	-39.73	-21.08	PASS
11N40SISO	LCH	-6.66	-38.85	-26.66	PASS
11N40SISO	HCH	-6.5	-41.67	-26.5	PASS

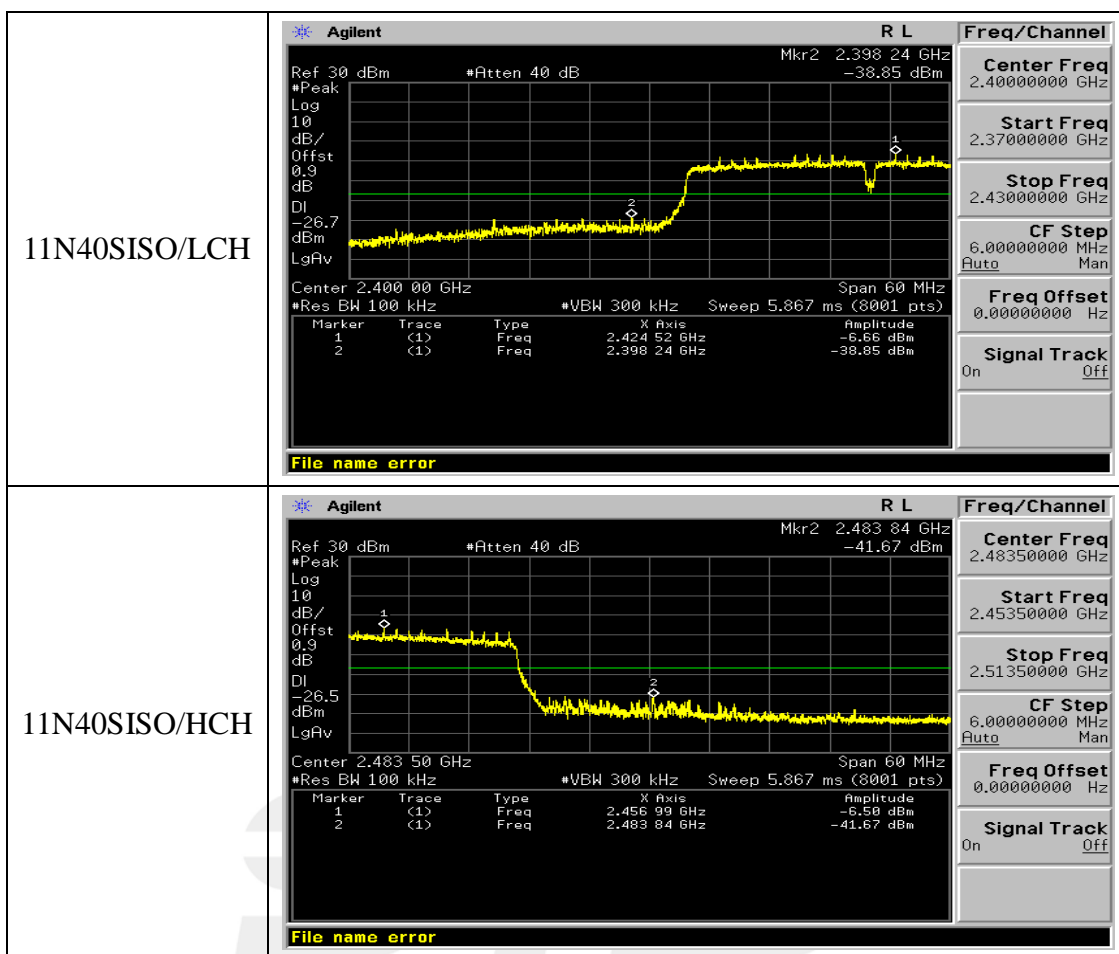




## Test Graph







### 13. FCC LINE CONDUCTED EMISSION TEST

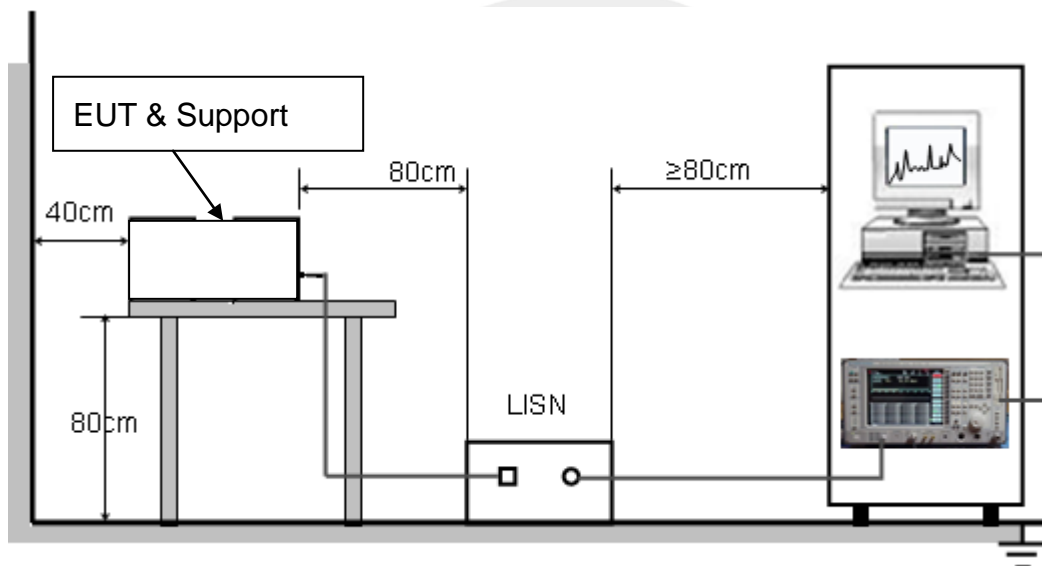
#### 13.1. LIMITS OF LINE CONDUCTED EMISSION TEST

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.

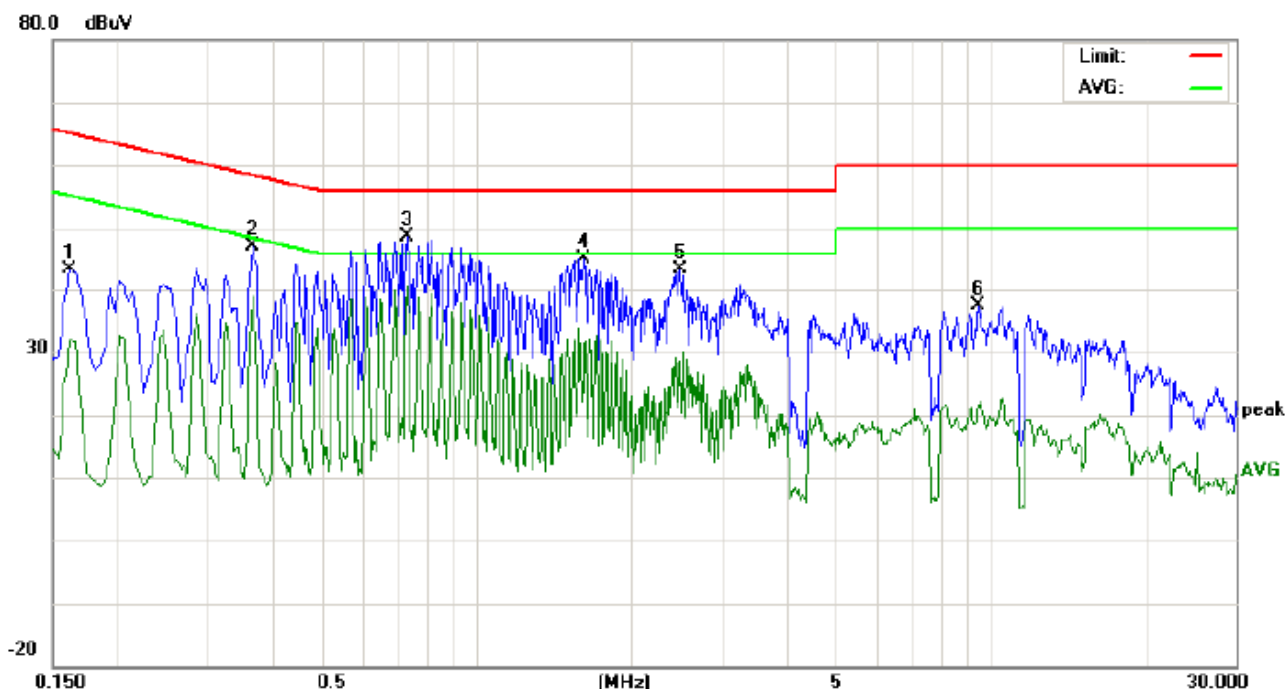
### 13.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

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



Site: Conduction

Phase: L1

Temperature: 26

Limit: FCC Class B Conduction(QP)

Power: AC 120V/60Hz

Humidity: 60 %

EUT: THUNDER PLUS

M/N: DP5108

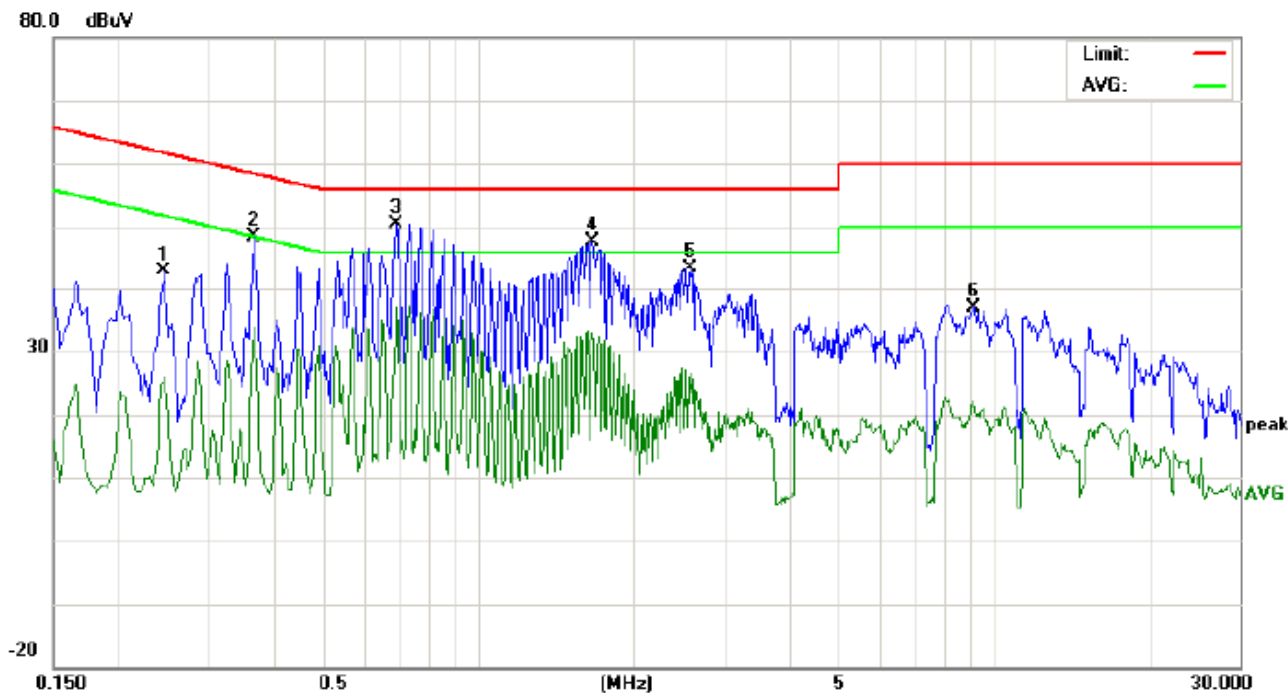
Mode: Normal Operating(WIFI)

Note:

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	0.1620	33.26		21.65	10.17	43.43		31.82	65.36	55.36	-21.93	-23.54	P	
2	0.3660	36.70		28.58	10.32	47.02		38.90	58.59	48.59	-11.57	-9.69	P	
3	0.7340	38.29		29.99	10.33	48.62		40.32	56.00	46.00	-7.38	-5.68	P	
4	1.6180	34.82		14.35	10.34	45.16		24.69	56.00	46.00	-10.84	-21.31	P	
5	2.4900	32.84		18.18	10.43	43.27		28.61	56.00	46.00	-12.73	-17.39	P	
6	9.4740	27.02		11.28	10.37	37.39		21.65	60.00	50.00	-22.61	-28.35	P	



## Line Conducted Emission Test Line 2-N



Site: Conduction

Phase: **N**

Temperature: 26

Limit: FCC Class B Conduction(QP)

Power: AC 120V/60Hz

Humidity: 60 %

EUT: THUNDER PLUS

M/N: DP5108

Mode: Normal Operating(WIFI)

Note:

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	0.2460	32.64		15.64	10.27	42.91		25.91	61.89	51.89	-18.98	-25.98	P	
2	0.3660	38.04		23.55	10.32	48.36		33.87	58.59	48.59	-10.23	-14.72	P	
3	0.6940	40.14		26.54	10.35	50.49		36.89	56.00	46.00	-5.51	-9.11	P	
4	1.6700	37.37		22.54	10.33	47.70		32.87	56.00	46.00	-8.30	-13.13	P	
5	2.5940	32.91		13.26	10.45	43.36		23.71	56.00	46.00	-12.64	-22.29	P	
6	9.1140	26.66		10.87	10.25	36.91		21.12	60.00	50.00	-23.09	-28.88	P	



## 14. ANTENNA REQUIREMENT

### 14.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

### 14.2 EUT ANTENNA

The EUT antenna is unique Antenna. It comply with the standard requirement.

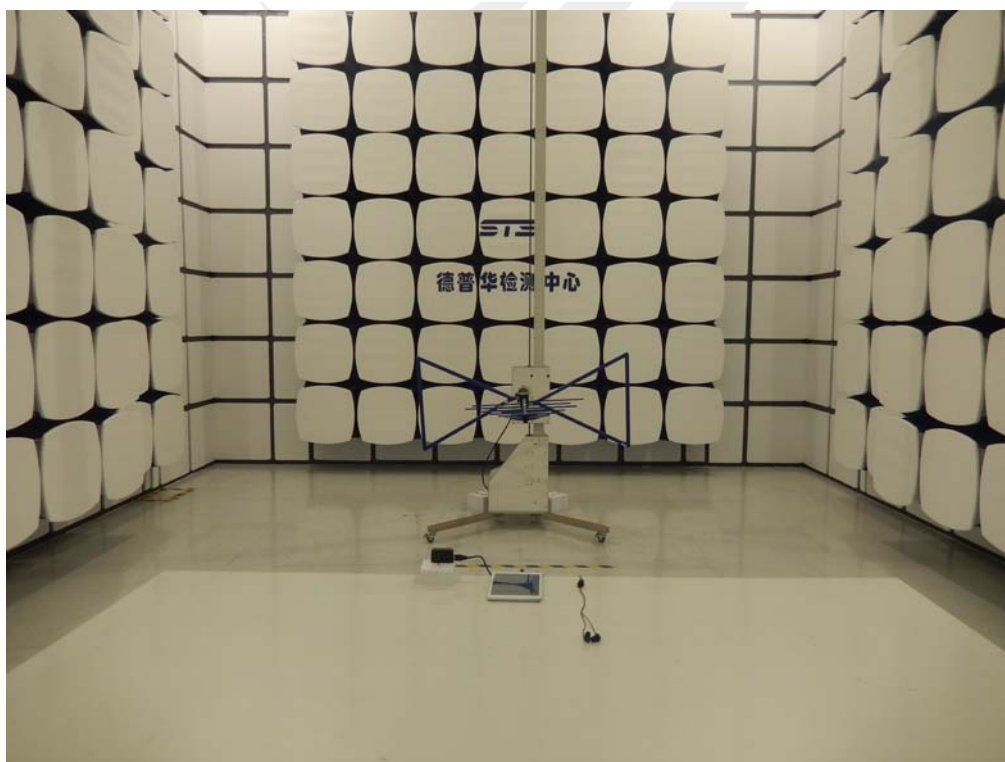


## APPENDIX A: PHOTOGRAPHS OF TEST SETUP

### FCC LINE CONDUCTED EMISSION TEST SETUP

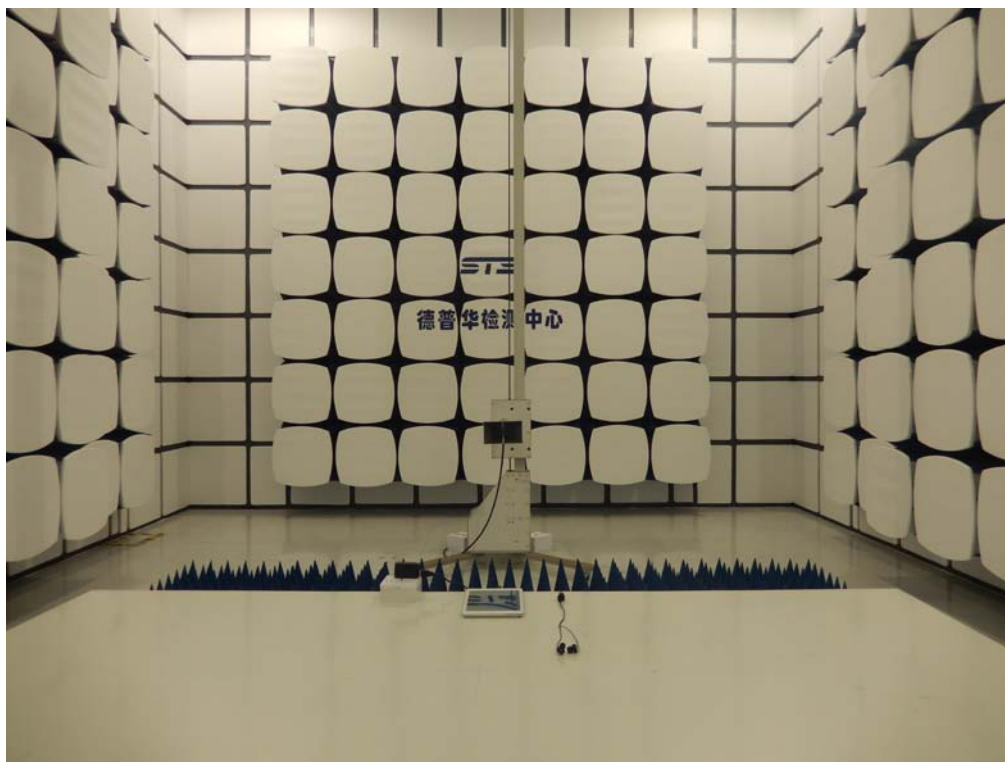


FCC RADIATED EMISSION TEST SETUP  
radiation L





Adiation H



## APPENDIX B: PHOTOGRAPHS OF EUT

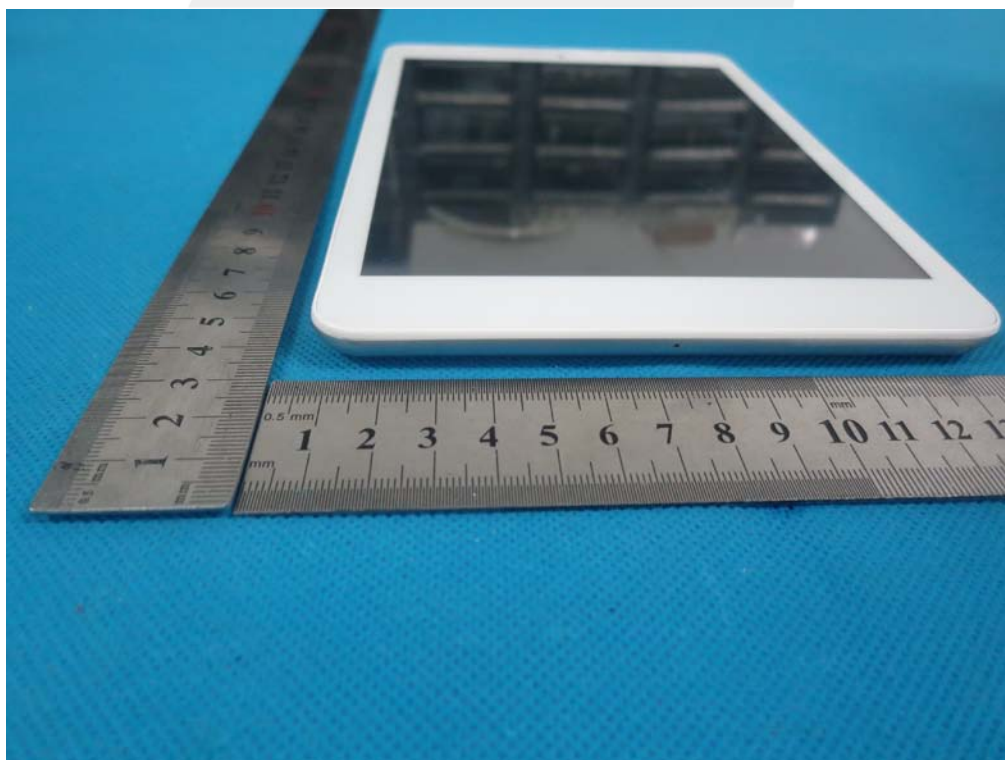
### TOTAL VIEW OF EUT



### TOP VIEW OF EUT



BOTTOM VIEW OF EUT



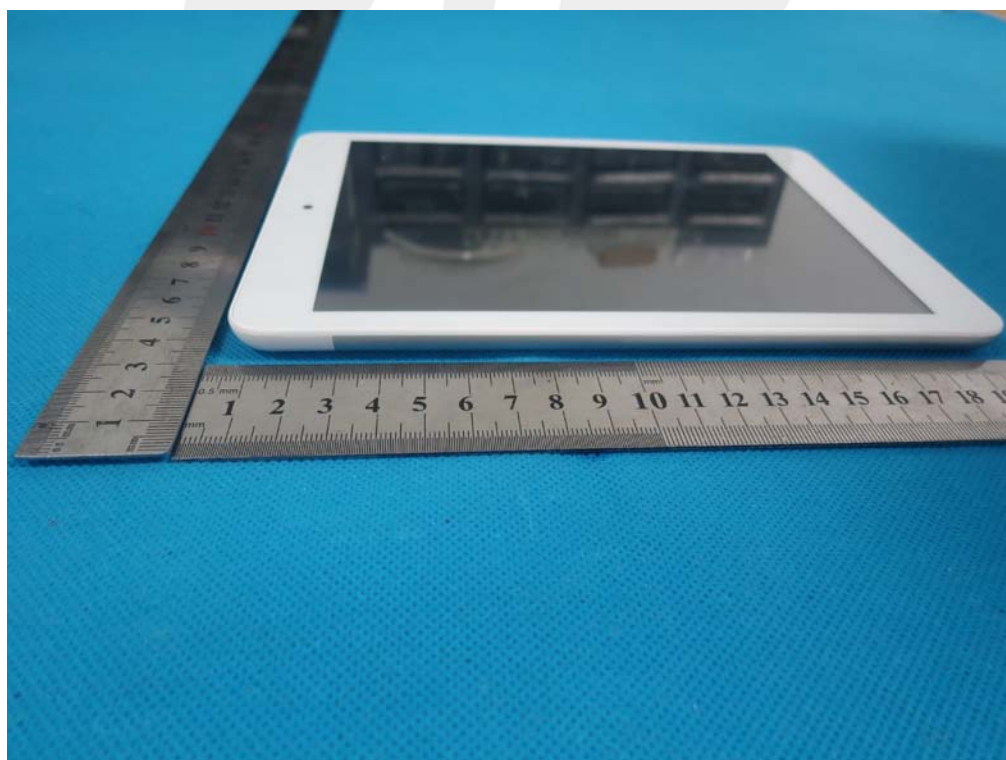
FRONT VIEW OF EUT



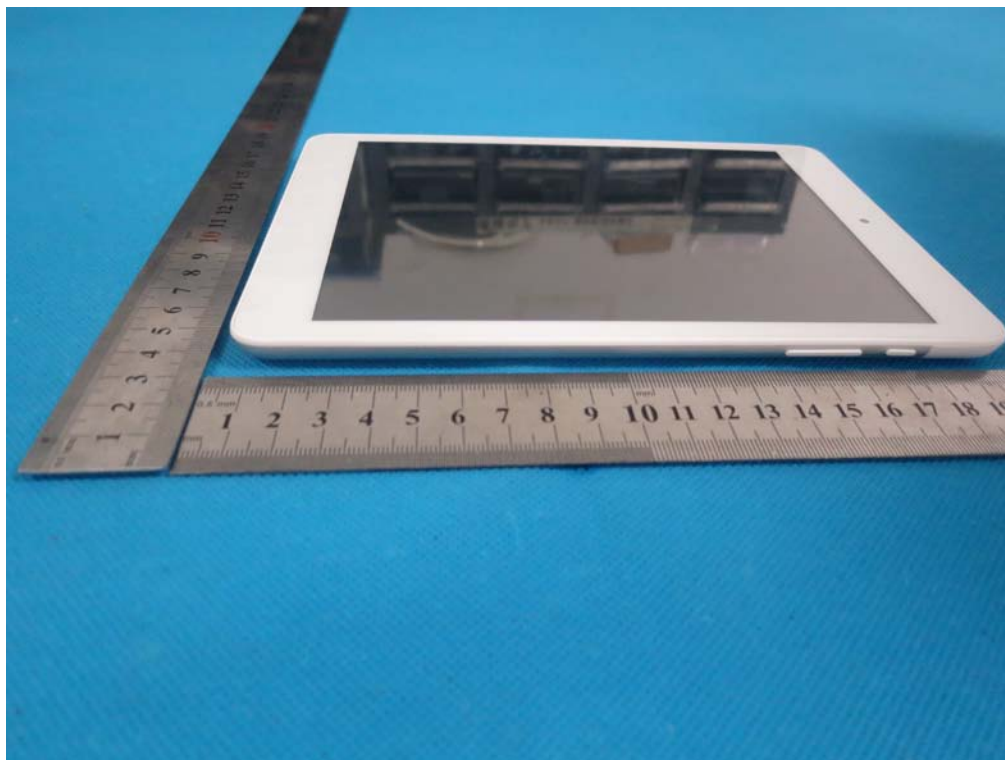
BACK VIEW OF EUT



LEFT VIEW OF EUT

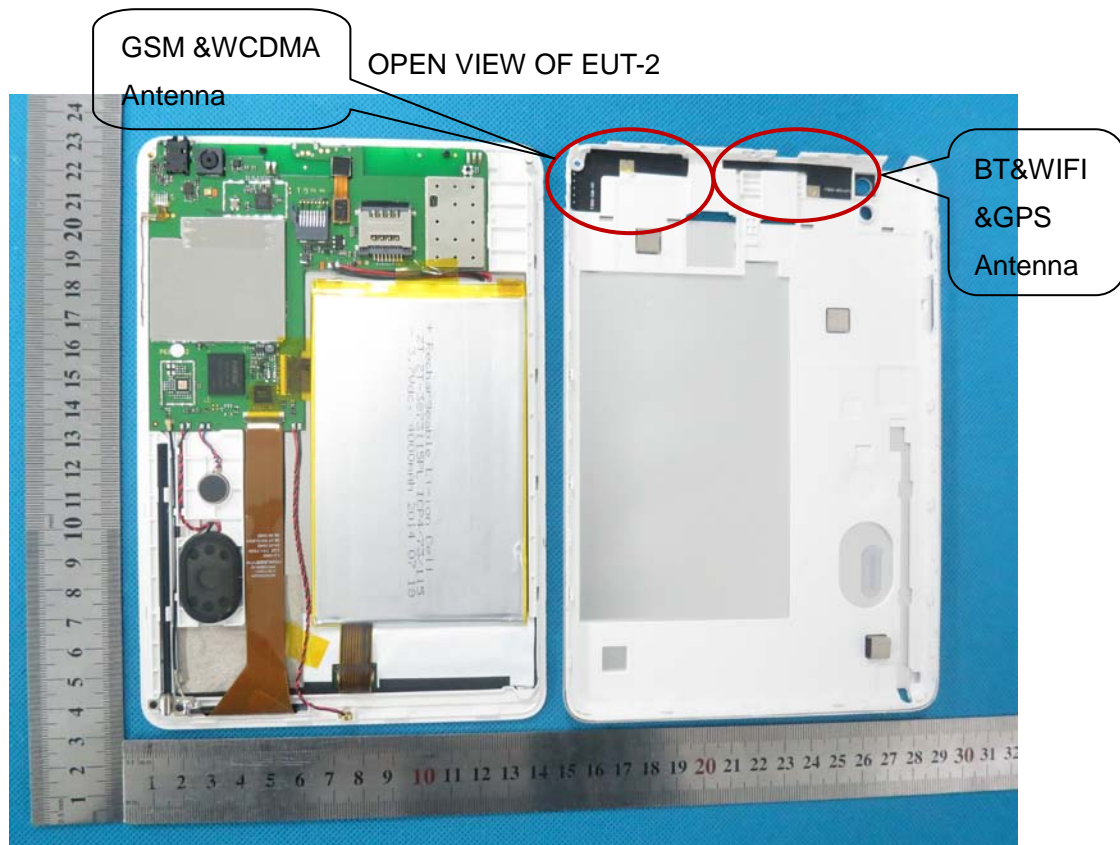


RIGHT VIEW OF EUT

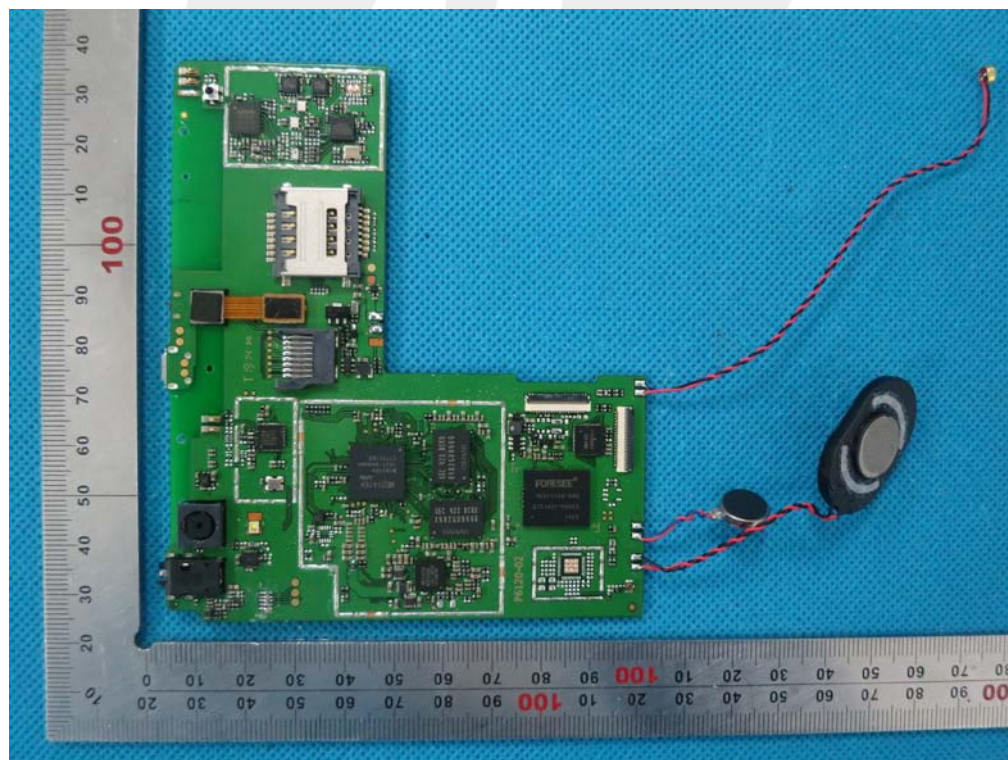


OPEN VIEW OF EUT-1

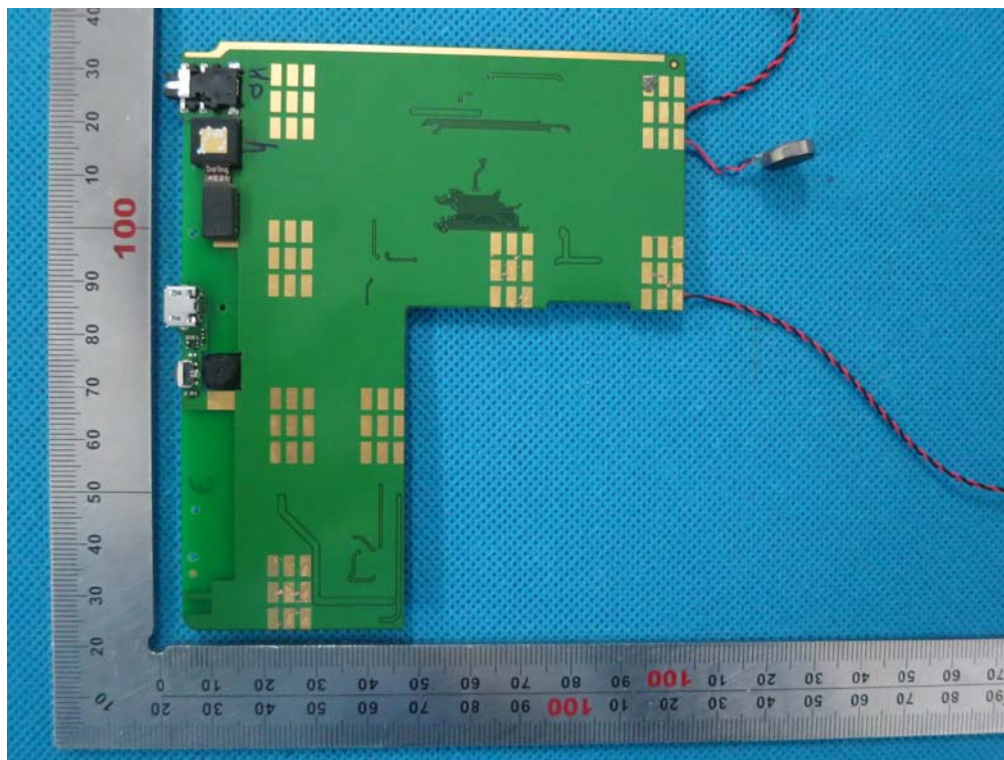




INTERNAL VIEW OF EUT-1



## INTERNAL VIEW OF EUT-2



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