## TEST REPORT of FCC PART 15 SUBPART E AND CANADA RSS-210

New Application; Class I PC; Class II PC Limited Modular Approval

Product :	USB WiFi adapter
Brand:	Acer
Model:	UWA2
Model Difference:	N/A
FCC ID:	HLZUWA2
IC:	1754F-UWA2
FCC Rule Part:	§15.407, Cat:NII
IC Rule Part:	RSS-210 issue 8:2010, Annex 9
Applicant:	Acer Incorporated
Address:	8F, 88, Sec 1, Hsin Tai Wu Rd, Hsichih, New Taipei City 22181, Taiwan, R.O.C.

## **Test Performed by:**

#### **International Standards Laboratory**

<Lung-Tan LAB> \*Site Registration No. BSMI: SL2-IN-E-0013; MRA TW1036; TAF: 0997; IC: IC4067B-3; \*Address: No. 120, Lane 180, San Ho Tsuen, Hsin Ho Rd. Lung-Tan Hsiang, Tao Yuan County 325, Taiwan \*Tel : 886-3-407-1718; Fax: 886-3-407-1738 Report No.: **ISL-13LR039FE** 

Issue Date : 2013/04/17



Test results given in this report apply only to the specific sample(s) tested and are traceable to national or international standard through calibration of the equipment and evaluating measurement uncertainty herein.

This report MUST not be used to claim product endorsement by TAF, NVLAP or any agency of the Government.

This test report shall not be reproduced except in full, without the written approval of International Standards Laboratory.



#### **VERIFICATION OF COMPLIANCE**

Applicant:	Acer Incorporated
Product Description:	USB WiFi adapter
Brand Name:	Acer
Model No.:	UWA2
Model Difference:	N/A
FCC ID:	HLZUWA2
IC:	1754F-UWA2
FCC Rule Part:	§15.407, Cat: NII
IC Rule Part	RSS-210 issue 8:2010, Annex 9
Date of test:	$2013/03/07 \sim 2013/03/22$
Date of EUT Received:	2013/03/07

#### We hereby certify that:

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

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

Test By:	DinoChen	Date:	2013/04/17
	Dion Chang / Engineer		
Prepared By:	Gigi Jeh	Date:	2013/04/17
	Gigi Yeh / Specialist		
Approved By:	Timent In	Date:	2013/04/17
	Vincent Su / Technical Manager		



## Version

Version No.	Date	Description
00	2013/04/17	Initial creation of document



### FCC ID: HLZUWA2 IC: 1754F-UWA2

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## 1. GENERAL INFORMATION

## **1.1. Product Description**

General:

Product Name:	USB WiFi adapter
Brand Name:	acer
Model Name:	UWA2
Model Difference:	N/A
Power Supply:	5VDC form USB Port
Hardware Version:	N/A
Software Version:	N/A
Adhoc Mode	No
DFS Mode	N/A
ТРС	No
Operation Environment	Indoor, the USB dongle with laptops/notebooks is prohibited.



#### WLAN: 2X2 SM-MIMO

Wi-Fi	Frequency Range (MHz)	Channels	Peak Rated Power	Modulation Technology		
802.11b	2412 - 2462(DTS)	11	19.83dBm	DSSS		
802.11g	2412 - 2462(DTS)	11	24.31dBm	DSSS, OFDM		
802.11n	HT20 2412 – 2462(DTS)	11	25.99dBm	OFDM		
802.1111	HT40 2422 – 2452(DTS)	7	26.09dBm	OFDM		
802.11a	5180 - 5240(NII)	4	10.03dBm	OFDM		
802.11a	5745 – 5825(DTS)	5	20.09dBm	OFDIVI		
	HT20 5180 – 5240(NII)	4	13.66dBm			
000 11	HT20 5745 – 5825(DTS)	5	20.42dBm			
802.11n	HT40 5190 – 5230(NII)	2	12.29dBm	OFDM		
	HT40 5755 – 5795(DTS)	2	22.89dBm			
Modulation ty	pe	CCK, DQPSK, DBPSK for DSSS 64QAM. 16QAM, QPSK, BPSK for OFDM				
Transition Rat	e:	Upto 72Mbps				
		PCB Antenna				
		2.4GHz: -5.2dBi; 5GHz: 5.9dBi				
			According to KDB662911 D01 SM-MIMO signals could be			
Antenna Designation:		considered uncorrelated for purposes of directional gain				
		computation.				
		Directional gai	$\mathbf{n} = G_{ANT}$			

The EUT is compliance with IEEE 802.11 a/b/g/n Standard. This report applies for frequency band 5150 MHz– 5250 MHz

### **1.2. Related Submittal(s) / Grant (s)**

This submittal(s) (test report) is intended for <u>FCC ID: HLZUWA2</u> filing to comply with Section 15.407 of the FCC Part 15, Subpart E Rules. and <u>IC: 1754F-UWA2</u> filing to comply with Industry Canada RSS-210 issue 8: 2010 Annex 9. The composite system (digital device) is compliance with Subpart B is authorized under a DoC procedure.

#### **1.3. Test Methodology**

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (2003). Radiated testing was performed at an antenna to EUT distance 3 meters.

KDB Document: 789033 D01 General UNII Test Procedures v01r03

#### **1.4. Test Facility**

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of International Standards Laboratory <Lung-Tan LAB> No. 120, Lane 180, San Ho Tsuen, Hsin Ho Rd., Lung-Tan Hsiang, Tao Yuan County 325, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003. FCC Registration Number is: TW1036, Canada Registration Number: 4067B-3.

#### **1.5. Special Accessories**

Not available for this EUT intended for grant.

#### **1.6. Equipment Modifications**

Not available for this EUT intended for grant.

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## 2. SYSTEM TEST CONFIGURATION

### **2.1. EUT Configuration**

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

#### **2.2. EUT Exercise**

The EUT (Transmitter) was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements.

#### 2.3. Test Procedure

#### 2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 7 and 13 of ANSI C63.4-2003.Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and Average detector mode.

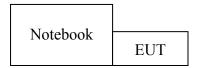
#### 2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." Is still within the 3Db illumination BW of the measurement antenna. According to the requirements in Section 8 and 13 and Subclause 8.3.1.2 of ANSI C63.4-2003.



## **2.4.** Configuration of Tested System

#### Fig. 2-1 Configuration of Tested System



#### **Table 1-1 Equipment Used in Tested System**

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
1	Notebook	IBM	X40	N/A	Shield	Non-shield



## 3. SUMMARY OF TEST RESULT

FCC Rules	Description Of Test	Result
§15.207	AC Power Line Conducted	Compliant
RSS-Gen §7.2.4	Emission	
§15.407(a)		Compliant
RSS 210 A9.2	26dB/99% Emission Bandwidth	
RSS-Gen §4.6.3		
§15.407(a)	Deals Outmut Dessen Maggument	Compliant
RSS 210 A9.2(1)(2)(3)	Peak Output Power Measurement	
§15.407(a)	Peak Power Spectral Density	Compliant
RSS 210 A9.2(1)(2)(3)	Measurement	
15.407(a)(6)	Peak Excursion Measurement	Compliant
§15.407(b)	Undesirable Emission – Con-	Compliant
RSS 210 A9.2(1)(2)(3)	ducted Measurement	
§15.407(b)	Undesirable Emission – Radiated	Compliant
RSS 210 A9.2(1)(2)(3)	Measurement	
§15.407©	Transmission in case of Absence	Compliant
RSS 210 A9.4(4)	of Information	
§15.407(g)		Compliant
RSS 210 A9.5(5)	Frequency Stability	
§15.407(a)		Compliant
RSS-GEN 7.1.2,	Antenna Requirement	
RSS-210 issue 8,§A8.4		
§15.407(d)		Compliant
RSS 210 A9.3	TPC and DFS Measurement	
MPE	Maximum Permissible Exposure	Compliant



FCC ID: HLZUWA2 IC: 1754F-UWA2

#### 4. DESCRIPTION OF TEST MODES

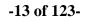
The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting mode is programmed.

a mode: 5150MHz-5250MHz: Channel lowest (5180MHz), Mid (5220MHz) and Highest (5240MHz) with 6Mbps data rate are chosen for full testing.

n HT 20 mode: 5150MHz-5250MHz: Channel lowest (5180MHz), Mid (5220MHz) and Highest (5240MHz) with 6.5Mbps data rate are chosen for full testing

n HT 40 mode: 5150MHz-5250MHz: Channel lowest (5190MHz) 、Mid (5210MHz)and Highest (5230MHz) with 13.5Mbps data rate are chosen for full testing

The worst case 802.11 n HT20 (5GHz) was reported for Radiated Emission.



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## 5. AC POWER LINE CONDUCTED EMISSION TEST

#### 5.1. Standard Applicable

According to §15.207, frequency range within 150 KHz to 30 MHz shall not exceed the Limit table as below.

Frequency range	Limits dB(uV)		
MHz	Quasi-peak	Average	
0.15 to 0.50	66 to 56	56 to 46	
0.50 to 5	56	46	
5 to 30	60	50	
Note 1.The lower limit shall apply at the tr	ansition frequencies		

2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

Conducted Emission Test Site						
EQUIPMENT MFR		MODEL	SERIAL	LAST	CAL DUE.	
ТҮРЕ		NUMBER	NUMBER	CAL.		
LISN 20	R&S	ENV216	101477	05/09/2012	05/09/2013	
LISN 06	ROHDE&SC HWARZ	ESH3/Z5	828874/009	01/19/2013	01/19/2014	
Conduction 02-1 Cable	WOKEN	CFD 300-NL	Conduction 02 -1	06/28/2012	06/28/2013	
EMI Receiver 14	ROHDE& SCHWARZ	ESCI	101034	02/21/2012	02/21/2013	
ISN T2 01	FCC	FCC-TLISN-T2-02	20253	11/10/2012	11/10/2013	
ISN T4 03	FCC	FCC-TLISN-T4-02	20254	11/10/2012	11/10/2013	
ISN T8 05	Teseq GmbH	ISN T800	30305	04/06/2012	04/06/2013	

#### 5.2. Measurement Equipment Used:





## 5.3. EUT Setup:

1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4-2003.

2. The AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.

3. The LISN was connected with 120Vac/60Hz power source.

#### **5.4. Measurement Procedure:**

- 1. The EUT was placed on a table which is 0.8m above ground plane.
- 2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 3. Repeat above procedures until all frequency measured were complete.

#### 5.5. Measurement Result:

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peaked.

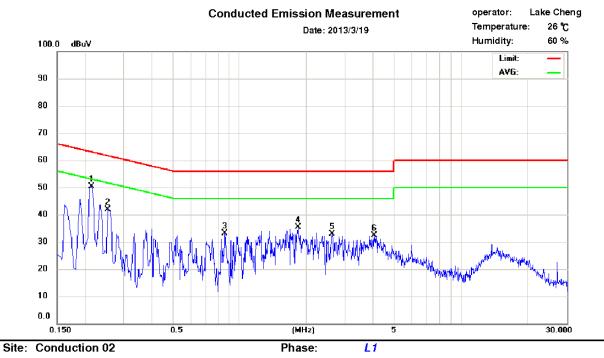
Note: Refer to next page for measurement data and plots.



FCC ID: HLZUWA2 IC: 1754F-UWA2

#### AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Operation Mode	Test Date:	2013/03/19
Test By:	Dino		

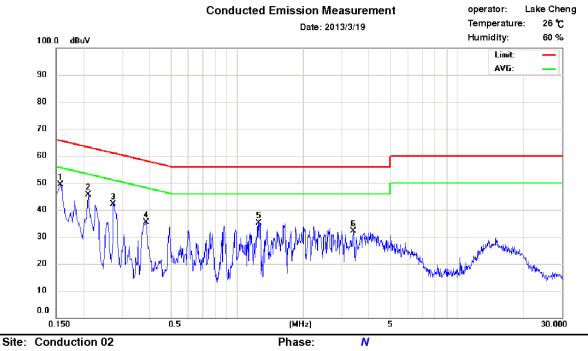


Limit: CISPR22 Class B Conduction

No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	0.2140	9.74	41.85	63.05	-21.20	27.47	53.05	-25.58	
2	0.2540	9.74	37.45	61.63	-24.18	20.29	51.63	-31.34	
3	0.8580	9.66	28.33	56.00	-27.67	18.50	46.00	-27.50	
4	1.8300	9.74	29.68	56.00	-26.32	18.65	46.00	-27.35	
5	2.6140	9.77	30.09	56.00	-25.91	24.46	46.00	-21.54	
6	4.0620	9.79	27.17	56.00	-28.83	20.22	46.00	-25.78	



### FCC ID: HLZUWA2 IC: 1754F-UWA2



Limit: CISPR22 Class B Conduction

No.	Frequency (MHz)	Correct Factor (dB)	QP Emission (dBuV)	QP Limit (dBuV)	QP Margin (dB)	AVG Emission (dBuV)	AVG Limit (dBuV)	AVG Margin (dB)	Note
1	0.1580	9.53	47.66	65.57	-17.91	32.54	55.57	-23.03	
2	0.2100	9.78	44.14	63.21	-19.07	34.32	53.21	-18.89	
3	0.2740	9.76	37.41	61.00	-23.59	23.96	51.00	-27.04	
4	0.3860	9.71	35.69	58.15	-22.46	34.21	48.15	-13.94	
5	1.2620	9.72	35.99	56.00	-20.01	32.19	46.00	-13.81	
6	3.3780	9.76	27.52	56.00	-28.48	20.15	46.00	-25.85	

### 6. PEAK OUTPUT POWER MEASUREMENT

#### 6.1 Standard Applicable

According to §15.407(a)

- 1. For the band 5.15-5.25 GHz, the maximum conducted power over the frequency of operation shall not exceed the lesser of 50 mW (17dBm) or 4 dBm + 10log B.
- 2. For the band 5.25-5.35 GHz and 5.47-5.725GMHz, the maximum conducted power over the frequency of operation shall not exceed the lesser of 250 mW (24dBm) or 11 dBm + 10log B.
- 3. For the band 5.725-5.825 GHz, the maximum conducted power over the frequency of operation shall not exceed the lesser of 1W (30dBm) or 17 dBm + 10log B.

According to RSS-210 A9.2

- 1. For the band 5150-5250 MHz, the maximum equivalent isotropically radiated power (e.i.r.p.) shall not exceed 200mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10dBm in any 1.0 MHz band.
- 2. For the bands 5250-5350 MHz and 5470-5725 MHz, the maximum conducted output power shall not exceed 250mW or 11 + 10 log10 B, dBm, whichever power is less. The power spectral density shall not exceed 11dBm in any 1.0 MHz band. The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. In addition, devices with maximum e.i.r.p. greater than 500mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W. In addition to the above requirements, devices operating in the band 5250-5350 MHz with maximum e.i.r.p. greater than 200mW shall comply with the following e.i.r.p. elevation mask where  $\theta$  is the angle above the local horizontal plane (of the earth) as shown below:

(i) -13 dB(W/MHz) for  $0o \le \theta < 8o$ (ii) -13 - 0.716 ( $\theta$ -8) dB(W/MHz) for  $8o \le \theta < 40o$ (iii) -35.9 - 1.22 ( $\theta$ -40) dB(W/MHz) for  $40o \le \theta \le 45o$ (iv) -42 dB(W/MHz) for  $\theta > 45^{\circ}$ 

For the band 5725-5825 MHz, the maximum conducted output power shall not exceed 1.0 W or 17 + 10 log10 B, dBm, whichever power is less. The power spectral density shall not exceed 17dBm in any 1.0 MHz band. The maximum e.i.r.p. shall not exceed 4.0 W or 23 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. Fixed point-to-point systems for this band are permitted to have an e.i.r.p. greater than 4 W, provided that the higher e.i.r.p. is achieved by employing higher gain antennas, but not higher transmitter output powers. Point-to-multipoint systems, omni-directional applications and multiple co-located transmitters transmitting the same information are prohibited from exceeding 4W e.i.r.p. However, remote stations of point-to-multipoint systems shall be permitted to operate at greater than 4W e.i.r.p, under the same conditions as for point-to-point systems where B is the 26dB emission bandwidth in MHz

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#### 6.2 Measurement Procedure

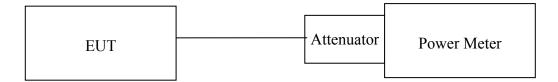
- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter
- 3. Record the max. reading.
- 4. Repeat above procedures until all frequency measured were complete.

Refer to section E3 of KDB Document: KDB 789033 D01 General UNII Test Procedures v01r03

Conducted Emission Test Site									
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.				
ТҮРЕ		NUMBER	NUMBER	CAL.					
Power Meter 05	Anritsu	ML2495A	1116010	04/17/2012	04/16/2013				
Power Sensor 05	Anritsu	MA2411B	34NKF50	04/16/2012	04/15/2013				
Temperature Chamber	KSON	THS-B4H100	2287	03/15/2013	03/14/2014				
DC Power supply	ABM	51850	N/A	06/17/2012	06/16/2013				
AC Power supply	EXTECH	CFC105W	NA	12/19/2012	12/18/2013				
Splitter	MCLI	PS4-199	12465	07/18/2012	07/17/2013				
Spectrum analyzer	Agilent	N9030A	MY51360021	03/11/2013	03/10/2014				

#### 6.3 Measurement Equipment Used:

#### 6.4 Measurement Equipment Used:





#### 6.5 Measurement Result

Mode	Freq(MHz)	channel	Peak power (dBm)	limit(dBm)	result
	5180	36	10.03	16.98	pass
802.11a	5200	40	9.62	16.98	pass
	5240	48	8.65	16.98	pass

#### **IC EIRP**

Mode	Freq(MHz)	channel	Peak EIRP power (dBm)	EIRP limit(dBm)	result
	5180	36	15.93	23	pass
802.11a	5200	40	15.52	23	pass
	5240	48	14.55	23	pass

#### 2\*2 MIMO

			Output Chain (dBm)		Combine Peak			
Mode	Freq(MHz)	channel	Chain A	chain B	Output Power (dBm)	Limit(dBm)	Result	
	5180	36	11.42	9.72	13.66	16.98	Pass	
N HT20	5200	40	10.71	10.09	13.42	16.98	Pass	
	5240	48	10.09	10.17	13.14	16.98	Pass	

			Output Ch	ain (dBm)	Combine		
Mode	Freq(MHz)	channel	Chain A	chain B	Peak Output Power (dBm)	Limit(dBm)	Result
N HT40	5190	38	9.67	8.86	12.29	16.98	Pass
IN П140	5210	42	8.85	9.06	11.97	16.98	Pass
	5230	46	8.56	9.12	11.86	16.98	Pass



#### IC EIRP

#### 2\*2 MIMO

			Output Chain (dBm)		Combine EIRP			
Mode	Freq(MHz)	channel	Chain A	chain B	Output Power (dBm)	EIRP Limit(dBm)	Result	
	5180	36	11.42	9.72	19.56	23	Pass	
N HT20	5200	40	10.71	10.09	19.32	23	Pass	
	5240	48	10.09	10.17	19.04	23	Pass	

			Output Ch	ain (dBm)				
Mode	Freq(MHz)	channel	Chain A	chain B	EIRP Output Power (dBm)	EIRP Limit(dBm)	Result	
N HT40	5190	38	9.67	8.86	18.19	23	Pass	
IN 11140	5210	42	8.85	9.06	17.87	23	Pass	
	5230	46	8.56	9.12	17.76	23	Pass	

Offset 10dB for insertion loss.



## 100% Duty Cycle

/ideo BW 3.0 MHz	PNO: Wide	SDVSE:3NT	Avg Type: Log-Pwr	09:03:47 PM Mar 18, 2013 TRACE 12:04 4 TYPE DET 26:001000	BW
	IFGain:Low	Atten: 30 dB		DET PANNON	Res BW
0 dB/div Ref 20.00 dBm					1.0 MH
					Video BV
10.0					3.0 MH Auto <u>Ma</u>
					VBW:3dB RBN
10.0					1. <u>Auto</u> Ma
0.0					Span:3dB RBN
30.0					Auto Ma
43.0					RBW Control
50.0					[Gaussian,-3 dB]
70.0					
Center 2.412000000 GHz Res BW 1.0 MHz	#VBW	3.0 MHz	Sweep 1	Span 0 Hz 00.0 ms (1001 pts)	
50		or o - 111 112	STATUS		

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### 7. 26dB /99% EMISSION BANDWIDTH MEASUREMENT

#### 7.1 Standard Applicable

According to §15.407(a). No Limit required.

According to RSS 210 A9.2(1), No Limit required

RSS-Gen §4.4.1, the transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual.

The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded.

#### 7.2 Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3. Set the spectrum analyzer as RBW=300KHz, VBW =1MHz, Span= 50MHz, Sweep=auto
- 4. Mark the peak frequency and –26dB (upper and lower) frequency.
- 5. Repeat above procedures until all frequency measured were complete.

Refer to section D of KDB Document: KDB 789033 D01 General UNII Test Procedures v01r03

#### 7.3 Measurement Equipment Used:

Refer to section 6.3 for details.

#### 7.4 Test Set-up:

Refer to section 6.4 for details.



#### 7.5 Measurement Result

802.11a Mode

Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	10 Log (B) with 26dB Bandwidth (dB)	10 Log (B) with 99% Bandwidth (dB)
5180	23.15	16.978	13.65	12.30
5220	23.32	16.908	13.68	12.28
5240	22.65	16.845	13.55	12.26

#### 802.11n HT20 Mode chain a

Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	10 Log (B) with 26dB Bandwidth (dB)	10 Log (B) with 99% Bandwidth (dB)
5180	23.40	18.026	13.69	12.56
5220	23.90	18.040	13.78	12.56
5240	24.15	18.088	13.83	12.57

#### 802.11n HT20 Mode chain b

Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	10 Log (B) with 26dB Bandwidth (dB)	10 Log (B) with 99% Bandwidth (dB)
5180	23.63	18.035	13.73	12.56
5220	22.93	17.998	13.60	12.55
5240	24.04	18.041	13.81	12.56

#### 802.11n HT20 Mode combine

Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	10 Log (B) with 26dB Bandwidth (dB)	10 Log (B) with 99% Bandwidth (dB)
5180	22.14	17.831	13.45	12.51
5220	22.19	17.814	13.46	12.51
5240	22.63	17.859	13.55	12.52



#### 802.11n HT40 Mode chain a

Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	10 Log (B) with 26dB Bandwidth (dB)	10 Log (B) with 99% Bandwidth (dB)
5180	42.72	36.595	16.31	15.63
5220	44.74	36.513	16.51	15.62
5240	45.57	36.524	16.59	15.63

#### 802.11n HT40 Mode chain b

Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	10 Log (B) with 26dB Bandwidth (dB)	10 Log (B) with 99% Bandwidth (dB)
5180	44.52	36.448	16.49	15.62
5220	42.13	36.378	16.25	15.61
5240	42.12	36.363	16.24	15.61

#### 802.11n HT40 Mode combine

Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)	10 Log (B) with 26dB Bandwidth (dB)	10 Log (B) with 99% Bandwidth (dB)
5180	41.79	36.407	16.21	15.61
5220	42.02	36.541	16.23	15.63
5240	41.56	36.416	16.19	15.61

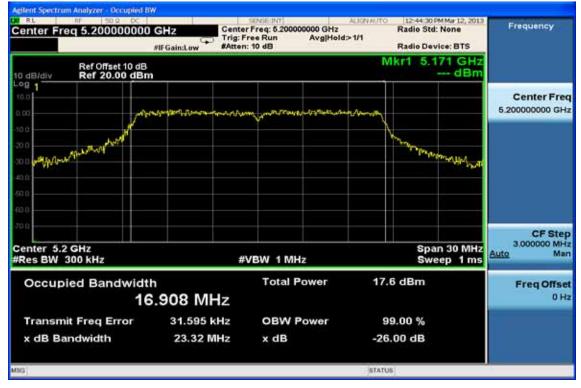


## 802.11a

## 26dB Band Width Test Data CH-Low

	20.00 dBm	#IFGain:Low	Center Freq: 5.18 Trig: Free Run #Atten: 10 dB		>1/1	Radio St	4 PM Mar 12, 2013 td: None evice: BTS	Trace/E	Detector
0 dB/div	Ref Offset 10 dB Ref 20.00 dBr				IV		171 GHz 970 dBm		
10.0 0.00		and an and a start start	-	ware ward and the	min			Cle	ear Write
	- Writting						many		Average
40.0 50.0 10.0								Ν	Max Hold
enter 5.1 Res BW			#VBW 11	MHz			an 30 MHz veep 1 ms	1	Min Hold
Occup	ied Bandwidt 1	<sup>th</sup> 6.978 MH		I Power	18.	2 dBm		Auto	Detector Peak
Transmit Freq Error x dB Bandwidth		-24.875 k 23.15 M		V Power		9.00 % .00 dB			
50					STATU	5			-

## 26dB Band Width Test Data CH-Mid





## 26dB Band Width Test Data CH-High





### 802.11n HT20 chain a 26dB Band Width Test Data CH-Low

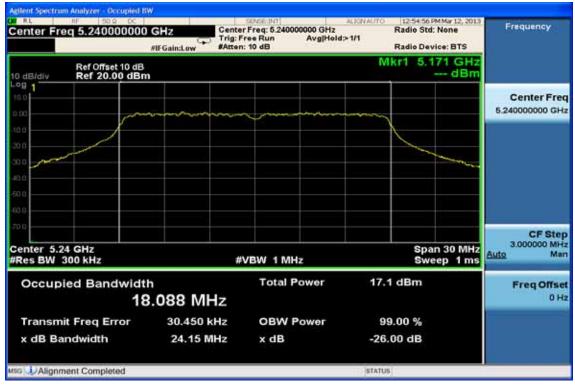


## 26dB Band Width Test Data CH-Mid

Center Freq 5.200000000	Trig	tter Freq: 5.200000000 GHz ;: Free Run Avg Holdp en: 10 dB	ALIONAUTO 12-46:01 PM Radio Std: N Radio Devic	lone Frequency
Ref Offset 10 dB Ref 20.00 dBr			Mkr1 5.17	1 GHz - dBm
- 09 1 10.0 0.00	bagether bradges werder open son	al a grade all son galaxies and a for	aronn	Center Fre 5.200000000 GH
100 200 300 webgengraat both webgengraat both			June	Jacobine P
500 500 700 Center 5.2 GHz #Res BW 300 kHz		#VBW 1 MHz		30 MHz p 1 ms
Occupied Bandwidt	h	Total Power	15.7 dBm	FreqOffs
	.040 MHz			01
Transmit Freq Error	78.951 kHz	OBW Power	99.00 %	
x dB Bandwidth	23.90 MHz	x dB	-26.00 dB	
150			STATUS	

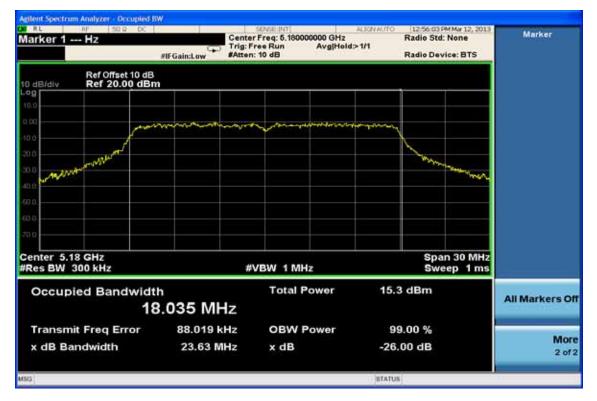


## 26dB Band Width Test Data CH-High





#### 802.11n HT20 chain b 26dB Band Width Test Data CH-Low

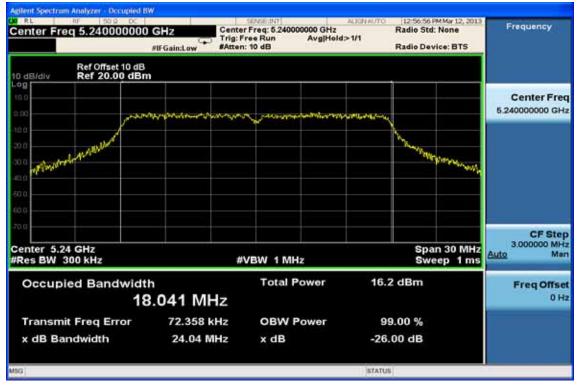


## 26dB Band Width Test Data CH-Mid

Center Freq 5	req 5.200000000 GHz			rig: Free S. 200000000 GHz rig: Free Run Avg Held>1/1 Atten: 10 dB			Radio Device: BTS		Frequency
0 dB/div	ef Offset 10 dE								
- <b>09</b> 10.0 0.00	June	-Maria - Marana	um	a and the second	ىسى، بەرمەر سىرى، بەرمەر	www			Center Free 5.200000000 GH
100 200 200	ala Maril						howward	Mar Mar	
40.0 50.0 50.0									
Center 5.2 GH Res BW 300			#V	BW 1 MH	Iz			an 30 MHz eep 1 ms	СF Stej 3.000000 МН <u>Auto</u> Ма
Occupied Bandwidth 17.998 MHz Transmit Freq Error 105.14 kHz x dB Bandwidth 22.93 MHz		łz	Total Power 1		15.8 dBm			Freq Offset 0 Hz	
				OBW Power x dB		99.00 % -26.00 dB			
56						STATUS	(		



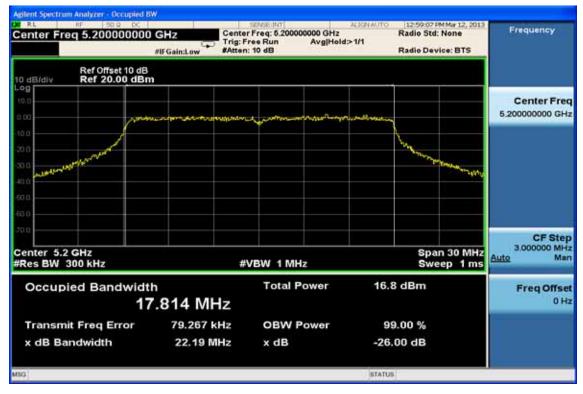
## 26dB Band Width Test Data CH-High



## 802.11n HT20 combine 26dB Band Width Test Data CH-Low

Center Fre	eq 5.18000000	Tri	nter Freq: 5.160000000 GHz g: Free Run Avg Held tten: 10 dB	Radio S	evice: BTS	Frequency
10 dB/div	Ref Offset 10 dB Ref 20.00 dB					
10.0 0.00		w.r	man and a constrained and the second se	mantha Malaya		Center Freq 5.180000000 GHz
300 300 400				have an	and the second second	
500. 630						
Center 5.1 #Res BW			#VBW 1 MHz		oan 30 MHz weep 1 ms	CF Step 3.000000 MHz <u>Auto</u> Man
Occup	ied Bandwidt 1	<sup>th</sup> 7.831 MHz	Total Power	18.7 dBm		Freq Offset 0 Hz
	Transmit Freq Error 8 x dB Bandwidth 2		OBW Power x dB	99.00 % -26.00 dB		
MSG				STATUS		

## 26dB Band Width Test Data CH-Mid



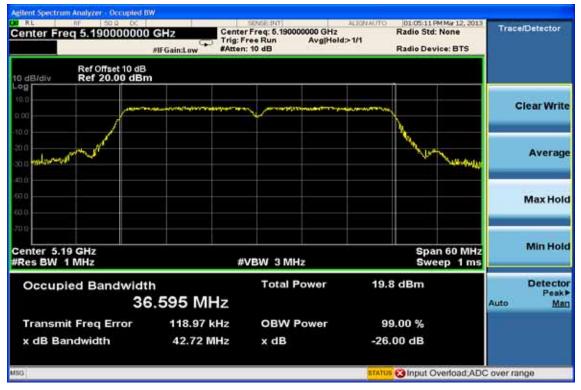


## 26dB Band Width Test Data CH-High





#### 802.11n HT40 chain a 26dB Band Width Test Data CH-Low



## 26dB Band Width Test Data CH-Mid





#### FCC ID: HLZUWA2 IC: 1754F-UWA2



## 26dB Band Width Test Data CH-High

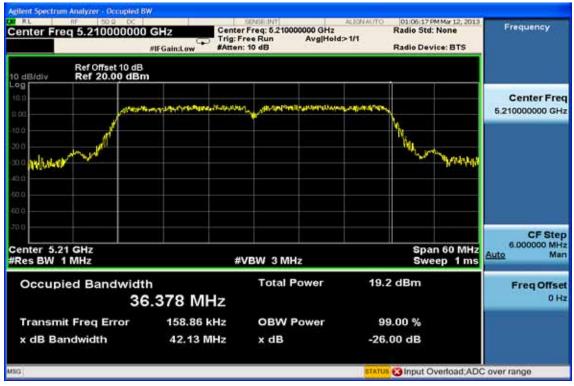




#### 802.11n HT40 chain b 26dB Band Width Test Data CH-Low

Center Freq 5.190000	000 GHz	Center Freq: 5.190000000 GHz Trig: Freq: 5.190000000 GHz Trig: Freq: 8.19000000 GHz Avg Held>1/1			PMMar 12, 2013 I: None vice: BTS	Trace/Detector	
Ref Offset 10 0 dB/div Ref 20.00							
0.0	الاسابان الاوري أباله واروضا وسيدوي الوي	winner and	ann an the state of the state o	and the second s		ClearW	Vrite
00 marting marting				A WAR	and and a second	Ave	rage
00						Max	Hold
enter 5.19 GHz Res BW 1 MHz		#VBW 3 MH;	z		an 60 MHz eep 1 ms	Mint	lolo
Occupied Bandw	Total P	ower	19.1 dBm		Dete Pr Auto	eak≯ Man	
Transmit Freq Error x dB Bandwidth	199.21 kHz 44.52 MHz			99.00 % -26.00 dB			
a.			51	ATUS CO Input C	Overload;ADC	over range	

## 26dB Band Width Test Data CH-Mid





#### FCC ID: HLZUWA2 IC: 1754F-UWA2

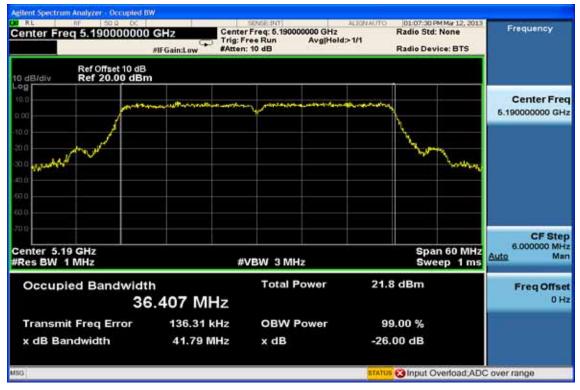


## 26dB Band Width Test Data CH-High





# 802.11n HT40 combine 26dB Band Width Test Data CH-Low



# 26dB Band Width Test Data CH-Mid





# 26dB Band Width Test Data CH-High



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# 8. PEAK POWER SPECTRAL DENSITY

# 8.1 Standard Applicable

According to §15.407(a)

- 1. For the band 5.15-5.25 GHz, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band.
- 2. For the band 5.25-5.35 GHz and 5.47-5.725GMHz, the peak power spectral density shall not exceed 11 dBm in any 1-MHz band.
- 3. For the band 5.725-5.825 GHz, the peak power spectral density shall not exceed 17 dBm in any 1-MHz band.

According to RSS-210 A9.2

- For the band 5150-5250 MHz, the maximum equivalent isotropically radiated power (e.i.r.p.) shall not exceed 200 mW or 10 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.
- 2. For the bands 5250-5350 MHz and 5470-5725 MHz, the maximum conducted output power shall not exceed 250 mW or 11 + 10 log10 B, dBm, whichever power is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band. The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. In addition, devices with maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W. In addition to the above requirements, devices operating in the band 5250-5350 MHz with maximum e.i.r.p. greater than 200 mW shall comply with the following e.i.r.p. elevation mask where  $\theta$  is the angle above the local horizontal plane (of the earth) as shown below:

(i) -13 dB(W/MHz) for  $0o \le \theta < 8o$ 

(ii) -13 – 0.716 (0-8) dB(W/MHz) for 80  $\leq$  0 < 400

- (iii)  $-35.9 1.22 (\theta 40) dB(W/MHz)$  for  $400 \le \theta \le 450$
- (iv) -42dB (W/MHz) for  $\theta > 45^{\circ}$
- 3. For the band 5725-5825 MHz, the maximum conducted output power shall not exceed 1.0 W or 17 + 10 log10 B, dBm, whichever power is less. The power spectral density shall not exceed 17 dBm in any 1.0 MHz band. The maximum e.i.r.p. shall not exceed 4.0 W or 23 + 10 log10 B, dBm, whichever power is less. B is the 99% emission bandwidth in MHz. Fixed point-to-point systems for this band are permitted to have an e.i.r.p. greater than 4 W, provided that the higher e.i.r.p. is achieved by employing higher gain antennas, but not higher transmitter output powers. Point-to-multipoint systems, omni-directional applications and multiple co-located transmitters transmitting the same information are prohibited from exceeding 4 W e.i.r.p. However, remote stations of point-to-multipoint systems shall be permitted to operate at greater than 4 W e.i.r.p, under the same conditions as for point-to-point systems. B is the 99% emission bandwidth in MHz.

## 8.2 Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to Spectrum.
- 3. Set RBW=1MHz,VBW=3MHz, Span=50MHz (Base Mode), Sweep time = Auto, traces 100 sweeps of video averaging.
- 4. Record the max. reading.
- 5. Repeat above procedures until all frequency measured were complete.

Refer to section F of KDB Document: KDB 789033 D01 General UNII Test Procedures v01r03

## 8.3 Measurement Equipment Used:

Refer to section 6.3 for details.

## 8.4 Test Set-up:

Refer to section 6.4 for details.



## 8.5 Measurement Result

#### 802.11a Mode

Frequency MHz	RF Power Density Reading (dBm)	Cable loss (dB)	Maximum Limit (dBm)
5180	-1.555	0.00	4
5220	-1.709	0.00	4
5240	-1.665	0.00	4

#### 802.11n HT20

Frequency MHz	Chain A RF Power Density Reading (dBm)	Chain B RF Power Density Reading (dBm)	Cable loss (dB)	Combine RF Power Density Level (dBm)	Maximum Limit (dBm)
5180	-0.243	-1.448	0.00	2.21	4
5220	-0.571	-1.229	0.00	2.12	4
5240	-0.570	-0.824	0.00	2.32	4

#### 802.11n HT40 Mode

Frequency MHz	Chain A RF Power Density Reading Reading (dBm)	Chain B RF Power Density Reading Reading (dBm)	Cable loss (dB)	Combine RF Power Density Level (dBm)	Maximum Limit (dBm)
5190	-4.236	-5.059	0.00	-1.62	4
5210	-4.436	-4.676	0.00	-1.54	4
5230	-4.478	-4.319	0.00	-1.39	4

Offset: 10dB for insertion loss.



#### **IC EIRP**

#### 802.11a Mode

Frequency MHz	RF EIRP Power Density Reading (dBm)	Cable loss (dB)	EIRP Maximum Limit (dBm)
5180	4.35	0.00	10
5220	4.19	0.00	10
5240	4.24	0.00	10

#### 802.11n HT20

Frequency MHz	Chain A RF Power Density Reading (dBm)	Chain B RF Power Density Reading (dBm)	Cable loss (dB)	Combine RF EIRP Power Density Level (dBm)	EIRP Maximum Limit (dBm)
5180	-0.243	-1.448	0.00	8.11	10
5220	-0.571	-1.229	0.00	8.02	10
5240	-0.570	-0.824	0.00	8.22	10

#### 802.11n HT40 Mode

Frequency MHz	Chain A RF Power Density Reading Reading (dBm)	Chain B RF Power Density Reading Reading (dBm)	Cable loss (dB)	Combine RF EIRP Power Density Level (dBm)	EIRP Maximum Limit (dBm)
5190	-4.236	-5.059	0.00	4.28	10
5210	-4.436	-4.676	0.00	4.36	10
5230	-4.478	-4.319	0.00	4.51	10

Offset: 10dB for insertion loss.



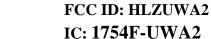
## 802.11a

# Peak Power Spectral Density Data Plot (CH Low)

gitent Spectrum Analyzer Swept SA RL 05:14:05 PM Mar 12, 2013 TRACE Marker 1 5.183800000000 GHz PNO: Wide Carl Peak Search Avg Type: RMS Avg|Hold>100/100 Trig: Free Run DET A MININ n: 20 dB Peak Criteria Mkr1 5.183 800 GHz -1.555 dBm Ref Offset 10 dB Ref 20.00 dBm 10 dB/div Peak Table > 1 Continuous Peak Search On **Pk-Pk Search Min Search** More Center 5.18000 GHz #Res BW 1.0 MHz Span 25.00 MHz Sweep 1.00 ms (1001 pts) 2 of 2 #VBW 3.0 MHz\* STATUS

# Peak Power Spectral Density Data Plot (CH Mid)







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# Peak Power Spectral Density Data Plot (CH High)



# 802.11n HT20 (chain a) Power Spectral Density Test Plot (CH-Low)

RL #F 509 00 Center Freq 5.180000000	CH2 PNO: Wide Trig: Free Run IF Gain:Low Atten: 20 dB	Avg Type: RMS Avg Hold>100/100	05:56:02 PM Mar 12, 2013 TRACE 2 2 4 5 TYPE A 00000000000000000000000000000000000	Frequency
Ref Offset 10 dB		Mkr1	5.183 950 GHz -0.243 dBm	Auto Tune
10.0		21		Center Fred 5.18000000 GH
10.0				Start Free 5.167500000 GH
in o material and			No. Alas	Stop Fred 5.192500000 GH
0.0				CF Stej 2.500000 MH <u>Auto</u> Ma
ez 0				Freq Offse 0 H
Center 5.18000 GHz Res BW 1.0 MHz	#VBW 3.0 MHz*	Sweep	Span 25.00 MHz 1.00 ms (1001 pts)	

# **Power Spectral Density Test Plot (CH-Mid)**

Center Freq 5.200000000	PNO: Wide Ca	Trig: Free Run Atten: 20 dB	Avg Type: RMS Avg Hold>100/100	05:57:21 PM Mar 12, 2013 TRACE 22:04 5 TYPE 7 DET A MONTANIS	Frequency
Ref Offset 10 dB	IFGain:Low	Atten. 20 db	Mkr1	5.195 600 GHz -0.571 dBm	Auto Tune
10.0	±1				Center Free 5.200000000 GH
0.00					Start Fre 5.187500000 GH
20.0 20.0				No. Martin	Stop Fre 5.212500000 GH
40.0 50.0					CF Ste 2.500000 MH Auto Ma
10 0					Freq Offse 0 H
Center 5.20000 GHz Res BW 1.0 MHz	#VBW	3.0 MHz*	Sweep	Span 25.00 MHz 1.00 ms (1001 pts)	



# **Power Spectral Density Test Plot (CH-High)**

Center Freq 5.2400000	00 GHz	Trig: Free Run Atten: 20 dB	Avg Type: RMS Avg[Hold>100/100	05:58:07 PM Mar 12, 2013 TRACE 2 2 4 5 TYPE A 4440 PT 14	Frequency
Ref Offset 10 dB	IFGain:Low	Atten: 20 dB	Mkr1	5.236 225 GHz -0.570 dBm	Auto Tune
00	<u>_1</u>				Center Fre 5.240000000 GH
0.00					Start Fre 5.227500000 GH
no and and a second sec				Winnoway	Stop Fre 6.252500000 GH
0.0					CF Ste 2.500000 MH Auto Ma
80					Freq Offse 0 H
center 5.24000 GHz Res BW 1.0 MHz	#VBW	3.0 MHz*	Sweep	Span 25.00 MHz 1.00 ms (1001 pts)	



# 802.11n HT20 for 5GHz (chain b) Power Spectral Density Test Plot (CH-Low)



# Power Spectral Density Test Plot (CH-Mid)





# **Power Spectral Density Test Plot (CH-High)**

	RF 50.9 DC		TM: SINGE	ALIONAUTO	06:00:23 PM Mar 12, 2013 TRACE 12, 2013	Frequency
enter F	req 5.2400000	PNO: Wide CP IFGain:Low	Trig: Free Run Atten: 20 dB	Avg Type: RMS Avg[Hold>100/100	TYPE A MANNAN	
) dB/div	Ref Offset 10 dB Ref 20.00 dBm			Mkr1	5.245 700 GHz -0.824 dBm	Auto Tune
0.0						Center Free 5.240000000 GH
				<b>↓</b>		
0.0						Start Free 5.227500000 GH
0.0						
0.0	2 Martin				Mar Marker	Stop Free 5.252500000 GH
43.0 50.0						CF Step 2.500000 MH Auto Mar
m 0						Freq Offse 0 H
70.0						
	24000 GHz 1.0 MHz	#VBW	3.0 MHz*	Sweep	Span 25.00 MHz 1.00 ms (1001 pts)	
		#VBW	3.0 MHz*	Sweep	1.00 ms (1001 pts)	



# 802.11n HT40 (chain a) Power Spectral Density Test Plot (CH-Low)

pan 50.000		PNO: Fast 😱	Trig: Free Run Atten: 20 dB	Avg Type: RMS Avg Hold>100/100	06:01:29 PM Mar 12, 2013 TRACE 12 7 4 5 TYPE 2, 44 MINING	Span
	f Offset 10 dB f 20.00 dBn			Mkr	1 5.182 05 GHz -4.236 dBm	Spa 50.0000000 MH
0.0						
0.02	~	••••••••••••••••••••••••••••••••••••••				Full Spa
0.0 0.0						Zero Spa
0.0						Last Spa
80						
enter 5.1900 Res BW 1.0		#VBW	3.0 MHz*	Sweep	Span 50.00 MHz 1.00 ms (1001 pts)	

# Power Spectral Density Test Plot (CH-Mid)





# **Power Spectral Density Test Plot (CH-High)**

Center Freq 5.230000000	GHz	SENSEINT	Avg Type: RMS	TRACE FIRE A	Frequency
	PNO: Fast 😱 IFGain:Low	Trig: Free Run Atten: 20 dB	Avg Hold>100/10	DET A MINIMUM	
Ref Offset 10 dB 0 dB/dly Ref 20.00 dBm			ľv	lkr1 5.236 35 GHz -4.478 dBm	Auto Tune
10.0					Center Free 5.230000000 GH
10.0			•••••		Start Free 5:205000000 GH
100 / · · · · · · · · · · · · · · · · · ·					Stop Free 5.255000000 GH
43.0				<u>~</u> ~~	CF Step 5.000000 MH Auto Mai
ab 0					Freq Offse 0 H
70.0 Center 5.23000 GHz				Span 50.00 MHz	
Res BW 1.0 MHz	#VBW	3.0 MHz*	Swee	ep 1.00 ms (1001 pts)	



# 802.11n HT40 for 5GHz (chain b) Power Spectral Density Test Plot (CH-Low)

Center Freq 5.1900000	PNO: Fast	Trig: Free Run Atten: 20 dB	Avg Type: RMS Avg Hold>100/100	06:03:37 PM Mar 12, 2013 TRACE	Frequency
Ref Offset 10 dB			Mkr	1 5.199 80 GHz -5.059 dBm	Auto Tune
10.0					Center Free 5.190000000 GH
10.0			· · · · · · · · · · · · · · · · · · ·	_	Start Free 5.165000000 GH
20.0					Stop Free 5.215000000 GH
43.0				$\sim$	CF Ste 5.000000 MH Auto Ma
eD 0					Freq Offse 0 H
Center 5.19000 GHz Res BW 1.0 MHz	#VBW	3.0 MHz*	Sweep	Span 50.00 MHz 1.00 ms (1001 pts)	

# Power Spectral Density Test Plot (CH-Mid)





# **Power Spectral Density Test Plot (CH-High)**

RL RF 50.9 DC		SEMSE: INT	ALIONAUTO	06:05:05 PM Mar 12, 2013	Frequency
enter Freq 5.23000000	PNO: Fast C	Trig: Free Run Atten: 20 dB	Avg Type: RMS Avg Hold>100/100	TRACE	A state weather
Ref Offset 10 dB dB/div Ref 20.00 dBm			Mkr	5.225 85 GHz -4.319 dBm	Auto Tune
i i					Center Free 5.230000000 GH
0.0				7	Start Free 5.20500000 GH
10 10					Stop Free 5.25500000 GH
1.0				$\sim$	CF Ste 5.000000 MH <u>Auto</u> Ma
					Freq Offse 0 H
enter 5.23000 GHz Res BW 1.0 MHz		3.0 MHz*		Span 50.00 MHz I.00 ms (1001 pts)	

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# 9. PEAK EXCURSION MEASUREMENT

# 9.1 Standard Applicable

15.407(a)(6) The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the peak transmit power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

## 9.2 Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to spectrum.
- 3. Trace A, Set RBW=1MHz, VBW = 3MHz, Span = 26dBc, Max. hold.
- 4. Trace B, Set RBW=1MHz, VBW = 3MHz, Span = 26dBc, traces 100 sweeps of RMS averaging. Max. hold..
- 5. Delta Mark trace A center frequency and trace B center frequency.
- 6. Repeat above procedures until all frequency measured were complete.

Refer to section G of KDB Document: KDB 789033 D01 General UNII Test Procedures v01r03

## 9.3 Measurement Equipment Used:

Refer to section 6.3 for details.

## 9.4 Test Set-up:

Refer to section 6.4 for details.



## 9.5 Test Results:

#### 802.11a Mode

Frequency	peak excursion	Limit	Margin
(MHz)	( <b>dB</b> )	( <b>dB</b> )	( <b>dB</b> )
5180	8.270	13.00	-4.73
5220	8.230	13.00	-4.77
5240	7.950	13.00	-5.05

#### 802.11n HT20 Mode chain a

Frequency	peak excursion	Limit	Margin
(MHz)	( <b>dB</b> )	( <b>dB</b> )	( <b>dB</b> )
5180	8.210	13.00	-4.79
5220	8.770	13.00	-4.23
5240	8.010	13.00	-4.99

#### 802.11n HT20 Mode chain b

Frequency	peak excursion	Limit	Margin
(MHz)	( <b>dB</b> )	( <b>dB</b> )	( <b>dB</b> )
5180	7.710	13.00	-5.29
5220	8.160	13.00	-4.84
5240	8.530	13.00	-4.47

#### 802.11n HT20 Mode combine

Frequency	peak excursion	Limit	Margin
(MHz)	( <b>dB</b> )	( <b>dB</b> )	( <b>dB</b> )
5180	10.950	13.00	-2.05
5220	9.120	13.00	-3.88
5240	10.100	13.00	-2.90



#### 802.11n HT40 Mode chain a

Frequency (MHz)	peak excursion (dB)	Limit (dB)	Margin (dB)
5180	7.550	13.00	-5.45
5220	7.260	13.00	-5.74
5240	8.180	13.00	-4.82

#### 802.11n HT20 Mode chain b

Frequency	peak excursion	Limit	Margin
(MHz)	( <b>dB</b> )	( <b>dB</b> )	( <b>dB</b> )
5180	8.360	13.00	-4.64
5220	7.730	13.00	-5.27
5240	8.230	13.00	-4.77

## 802.11n HT20 Mode combine

Frequency	peak excursion	Limit	Margin
(MHz)	( <b>dB</b> )	( <b>dB</b> )	( <b>dB</b> )
5180	8.200	13.00	-4.80
5220	9.620	13.00	-3.38
5240	10.380	13.00	-2.62



# 802.11a mode

# **Peak Excursion Data Plot (CH Low)**



# Peak Excursion Data Plot (CH Mid)





# Peak Excursion Data Plot (CH High)





# 802.11n HT20 Mode chain a Peak Excursion Data Plot (CH Low)



# Peak Excursion Data Plot (CH Mid)





# Peak Excursion Data Plot (CH High)





# 802.11n HT20 Mode chain b Peak Excursion Data Plot (CH Low)



# Peak Excursion Data Plot (CH Mid)





# Peak Excursion Data Plot (CH High)





# 802.11n HT20 Mode combine Peak Excursion Data Plot (CH Low)

arker 1 0.000 Hz	PNO: Wide 💭	Trig: Free Run	Avg Type: Log-P		Properties
Ref Offset 10 dB	IFGain:Low	Atten: 20 dB		ΔMkr1 0 Hz -10.95 dB	Select Marker
		v		*	Relative To
0.0 0.0	***************************************	A destantion of the second sec	krielissierennennensensensensensensen 1∆2	and have a second second	X Axis Sca Frequency Auto Ma
0.0 Denter and the second seco				a starting	Marker Trace [Trace2, Man Init]
10					Lin On g
enter 5.18000 GHz Res BW 1.0 MHz	#VBW 3	3.0 MHz	Swee	Span 25.00 MHz p 1.00 ms (1001 pts)	

## Peak Excursion Data Plot (CH Mid)





# Peak Excursion Data Plot (CH High)

arker 1 0.000 Hz	PNO: Wide 😱	Trig: Free Run	Avg Type: Log-Pwr	07:10:23 PM Mar 12, 2013 TRACE 12 3 4 5 TYPE MA WWWW DET PLASING	Properties
Ref Offset 10 dB	IFGain:Low	Atten: 20 dB		AMkr1 0 Hz -10.10 dB	Select Marker
10.0	X			*	Relative To
0.00 000000000000000000000000000000000		Yenday Yaya ya Katala	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	Marine Carlo	X Axis Scal Frequency Auto Ma
no atte				and the second second	Marker Trace (Trace2, Man Init)
43.0 50.0					Line On <u>O</u>
80					
enter 5.24000 GHz Res BW 1.0 MHz	#VBW	3.0 MHz	Sweep	Span 25.00 MHz 1.00 ms (1001 pts)	



# 802.11n HT40 Mode chain a Peak Excursion Data Plot (CH Low)

Marker 1 0.000 Hz	PNO: Fast 😱 Trig	Free Run	Avg Type:	Log-Pwr	TRACE	Mar 12, 2013	Properties
Ref Offset 10 dB	IFGain:Low Att	en: 20 dB			ΔMk	r1 0 Hz 55 dB	Select Marker 1
10.0						*	Relative To
			1.62	4/3sved		and the second	X Axis Scal Frequency <u>Auto</u> Ma Marker Trace [Trace2, Man Init]
50 0 ED 0							Line on <u>o</u>
Center 5.19000 GHz Res BW 1.0 MHz	#VBW 3.0	MHz		Sweep 1	Span 50 .00 ms (1	0.00 MHz 001 pts)	

## Peak Excursion Data Plot (CH Mid)





# Peak Excursion Data Plot (CH High)





# 802.11n HT40 Mode chain b Peak Excursion Data Plot (CH Low)

arker 1 Δ 0.000 Hz	PNO: Fast C Trig: Free Run	Avg Type: Log-Pwr	07:25:40 PM Mar 12, 2013 TRACE 1 2013	Trace/Det	
Ref Offset 10 dB	IFGain:Low Atten: 20 dB		ΔMkr1 0 Hz	Select Trace	
dB/div Ref 20.00 dBm			-8.365 dB		
00			*	Clear Write	
		χ. 1Δ2	-	_	
				Trace Average	
and 1			WHAT	Max Hold	
			m	_	
0.0				Min Hole	
				View/Blank	
0.0				View	
				More 1 of 3	
enter 5.19000 GHz Res BW 1.0 MHz	#VBW 3.0 MHz	Sweep	Span 50.00 MHz 1.00 ms (1001 pts)		

## Peak Excursion Data Plot (CH Mid)





# Peak Excursion Data Plot (CH High)





# 802.11n HT40 Mode combine Peak Excursion Data Plot (CH Low)

PNO: Fast 🖵 IFGain:Low	Atten: 20 dB			PANNN	the second se
			Select Marker		
				*	Relative To
lannan within	and wan	manunda 102 queridan	men		
	V		1		X Axis Sca Frequency Auto Ma
				My marine	Marker Trace [Trace2, Man Init
				m	
					On <u>C</u>
#VBW 3	3.0 MHz	Sweep	Span 50 1.00 ms (1	0.00 MHz 1001 pts)	
	#VBW 3	#VBW 3.0 MHz	#VBW 3.0 MHz Sweep	Span 50	#VBW 3.0 MHz Sweep 1.00 ms (1001 pts)

# Peak Excursion Data Plot (CH Mid)





# Peak Excursion Data Plot (CH High)





# **10. UNDESIRABLE EMISSION - CONDUCTED MEASUREMENT**

## **10.1 Standard Applicable**

According to §15.407(b),

(b) Undesirable Emission Limits: Except as shown in Paragraph (b)(6) of this section, the peak emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.
- (2) For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.
- (3) For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz.
- (4) For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz.
- (5) The above emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
- (6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in Section 15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in Section 15.207.
- (7) The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.
- (8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency block edges as the design of the equipment permits.



#### According to RSS-210 A9.2

- For transmitters operating in the band 5150-5250 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27dBm/MHz e.i.r.p.
- (2) For transmitters operating in the band 5250-5350 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27dBm/MHz e.i.r.p. Devices operating in the band 5250-5350 MHz that generate emissions in the band 5150-5250 MHz shall not exceed an out-of-band emission limit of -27dBm/MHz e.i.r.p. in the band 5150-5250 MHz in order to operate indoor/outdoor, or alternatively shall comply with the spectral power density for operation within the band 5150-5250 MHz and shall be labeled "for indoor use only".
- (3) For transmitters operating in the band 5470-5725 MHz, all emissions outside that band shall not exceed -27dBm/MHz e.i.r.p.
- (4) For transmitters operating in the band 5725-5825 MHz, all emissions within the frequency range from the band edges to 10 MHz above or below the band edges shall not exceed -17dBm/MHz e.i.r.p. For frequencies more than 10 MHz above or below the band edges, emissions shall not exceed -27dBm/MHz.

#### **10.2 Measurement Procedure**

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to spectrum.
- 3. Set Spectrum RBW=1MHz, VBW = 1MHz for peak measurement and 10Hz for average measurement.
- 4. Set Spectrum at lower/upper band edge and the restricted band adjacent to the lower/upper edge of the authorized band, with the transmitter set to the lowest/highest channel.
- 5. Set Spectrum over the 30MHz to 40GHz range with the transmitter set to the lowest, middle, and highest channels.

#### Refer to section H of KDB Document: KDB 789033 D01 General UNII Test Procedures v01r03

Conducted RF measurements of the transmitter output were made at the band edges and the adjacent restricted bands.

Also, conducted RF measurements of the transmitter output over the 30 MHz to 40 GHz band were made in order to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

## **10.3 Measurement Equipment Used:**

Refer to section 6.3 for details.



# 802.11a mode Ch Low 30MHz – 6GHz

larker 1 3.8′	127200000		Trig: Free Run #Atten: 20 dB	Avg Type: Log-Pv Avg Hold>1/1		Marker		
Ref Offset 10 dB Mkr1 3.812 72 GHz dB/dly Ref 20.00 dBm -44.564 dBm						Select Marker		
00 100						Norma		
900 900 900				• <sup>1</sup>	-77.00.05m	Delt		
0.0	ە جەمەلىما يەرەكلىرا م	ananan ananan bar	يوندمون والموري يوند مي موديد. الم	and a share and a share and a	a Bhaineach an an Anna a Bhaine an Anna An	Fixed		
tart 30 MHz Res BW 1.0 M	/Hz         #VBW 3.0 MHz         Sweep 10.0 ms (1001 pt           ×         Y         FUNCTION FUNCTION WADTH         FUNCTION WADTH				Stop 6.000 GHz Sweep 10.0 ms (1001 pts) FUNCTION FUNCTION WIDTH FUNCTION VALUE			
1 N 1 7 2 3 4 5	3	1812 72 GHz	-44.564 dBm			Properties		
6								
6 7 8 9 10						Moi 1 of		

# Ch Low 6GHz – 18GHz

Marker Select Marker 1	04:11:05 PM Mar 13, 2013 TRACE 2:2:4:5 TYPE MONOMOUND DET PM/NN/2:2	Type: Log-Pwr fold>1/1	Ave	Trig: Free Run #Atten: 20 dB	O GHZ PNO: Fast	60000000000	arker 1 1
	kr1 10.36 GHz -41.945 dBm	M				Offset 10 dB 20.00 dBm	0 dB/div
Norm							2.00
Del	-27.00 (Bm)					2	0.0
Fixed							0.0
o	Stop 26.00 GHz Sweep 33.3 ms (1001 pts) FUNCTION VIDTH FUNCTION VALUE			3.0 MHz	/IHz ×	tart 6.00 C Res BW 1	
Properties				-41.945 dBm	10.36 GHz		1 N 1 2 3 4 5 6 9
Mo 1 of							7
		STATUS					0



## Ch Low 18GHz – 40GHz

rker 1			GHz PNO: Fast C FGain:Low	Trig: Free Ru	n Avg	Type: Log-Pwr Hold>1/1	04:12:15 PM Mar 13, 2013 TRACE 12:34 S TYPE MWWWWW DET P 4 NIN MAR	Marker
dB/div	Ref Offset Ref 20.0	10 dB	- ounicou			M	(r1 30.200 GHz -40.527 dBm	Select Marker
0 0								Norma
о —	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~		1	and the second	une from	e.concentro aneth	-77.00 10m	Delt
0 0 0								Fixed
es BW	SCL	× 30.2	#VB	W 3.0 MHz Y -40.527 dBm	FUNCTION	Sweep FUNCTION WIDTH	Stop 40.000 GHz 23.3 ms (1001 pts) FUNCTION VALUE	o
								Properties
								Mor 1 of

## Ch Mid 30MHz – 6GHz

Marker	M Mar 13, 2013	TRAC	/pe: Log-Pwr Id>1/1	Avg	Trig: Free Run #Atten: 20 dB	PNO: Fast	847790000000	
Select Marke	79 GHz 84 dBm	4.847	Mkr1		MARCEN: 20 GB	IFGain:Low	ef Offset 10 dB ef 20.00 dBm	Bidiv Re
Norm		1						
Del	-27.00 (Em	1						
Fixed			~~~		ميند مرير ورو مريد ورو ورو ورو ورو ورو ورو ورو ورو ورو ور			mennen
c	.000 GHz 1001 pts)	0.0 ms (	Sweep 1 FUNCTION WIDTH	PUNCTION	V 3.0 MHz	#VB	MHz a. ×	nt 30 MHz s BW 1.0 I MODE TRC SCL
						ST THE SET IN		
Properties								
Properties Mo 1 of								



## Ch Mid 6GHz – 18GHz

arker 1	10.400000000		Trig: Free Run #Atten: 20 dB	Avg	Type: Log-Pwr Hold>1/1	04:13:40 PM Mar 13, 2013 TRACE 2 2 4 5 TYPE MUMORANIC DET P SUNNIN	Marker Select Marker
0 dB/div	Ref Offset 10 dB Ref 20.00 dBn	n			N	kr1 10.40 GHz -43.653 dBm	Select Marker
10.Q							Norma
10.0 20.0 20.0 40.17		1		and similar back	front	-27.00 iEm	Delt
50.0 60.0 70.0	the Charles of Annual Sector of Sect						Fixed
tart 6.00 Res BW	1.0 MHz	Louis and	W 3.0 MHz			Stop 26.00 GHz 33.3 ms (1001 pts)	01
ACR MODE TR 1 N 1 2 3 4 5		× 10.40 GHz	γ -43,653 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Properties
6 7 8 9 10							Mor 1 of
ia l		A			STATUS		

## Ch Mid 18GHz – 40GHz

Marker Select Marker	04:14:15 PM Mar 13, 2013 TRACE 12:14:5 TYPE MUMMONDO DET P-21 N N D 2	Type: Log-Pwr Hold>1/1	Avg	Trig: Free Run #Atten: 20 dB	DO GHZ PNO: Fast	0500000000	
Selectimarker	r1 27.050 GHz -40.852 dBm	Mk				Offset 10 dB f 20.00 dBm	
Norma							
Delt	-27.00 dBm	a. o. briston - a. Joren			manan in su		¢1
					and the second		
Fixed							
	Stop 40.000 GHz 23.3 ms (1001 pts) FUNCTION VALUE	Sweep 2	PUNCTION	( 3.0 MHz	#VB	MHz	26.000 GH BW 1.0 MH
Fixed O Properties	23.3 ms (1001 pts)		FUNCTION		#VB	MHz ×	8 BW 1.0 MH
o	23.3 ms (1001 pts)		FUNCTION	Ŷ		MHz ×	BW 1.0 MI



# Ch High 30MHz – 6GHz

arker 1		09 00 0000000 GH	IO: Fast C	Trig: Free Ri #Atten: 20 dl	Avg Avgl	Type: Log-Pwr Hold>1/1	04:14:57 PM Mar 13, 20 TRACE	Marker
0 dB/div	Ref Offset Ref 20.0	10 dB	ain:Low	BAtten: 20 di	3	Mkr	1 4.011 99 GH -45.466 dBr	Select Marker
•g ifi U 2.00								Norma
10.0 20.0 20.0 20.0						<b>≬</b> 1.	-27.00 re	Delt
50.0 10.0 10.0	and a general second	مىسىدىغۇلىمىيەتل يىرىر <del>ا</del> يۇرىس	رويندي مي <sub>ار ال</sub> مر	******	and reported to	and and a second se	purse insta	Fixed
Res BW	1.0 MHz	× 4.011 99		W 3.0 MHz Y -45.466 dBm	FUNCTION	SWEED	Stop 6.000 GH 10.0 ms (1001 pt FUNCTION VALUE	
2 3 4 5 6								Properties
7 8 9 0 1 2								Mor 1 of

## Ch High 6GHz – 18GHz

Marker Select Marke	04:15:32 PM Mar 13, 2013 TRACE 2:2:4:5 TYPE MONOCOMP DET PM/N/M/M	Type: Log-Pwr fold>1/1	Avg	Trig: Free Run #Atten: 20 dB	GHz PNO: Fast C IFGain:Low	00000000		<sup>RL</sup> arker 1
Selectiviarie	r1 10.48 GHz -43.759 dBm	М				10 dB	Ref Offset Ref 20.0	dB/div
Norm								1.U 00
Del	-27.00 iOm					1/2		
Fixed		ray Lat. p. a. p. a. p. a.	an a	ekr 30.0000			uni	
c	Stop 26.00 GHz 3 ms (1001 pts) FUNCTION VALUE	Sweep 3 FUNCTION WIDTH	FUNCTION	√ 3.0 MHz -43.759 dBm	#VB	×	1.0 MHz	art 6.00 Res BW
Properties				40.702 0011	.40 0112			
Mo 1 o								
		STATUS						

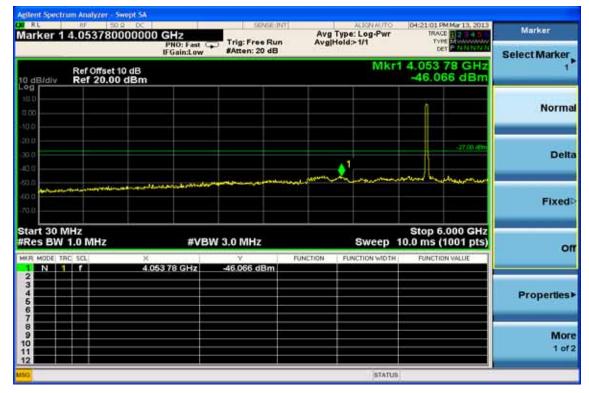


# Ch High 18GHz – 40GHz

Peak Search	MMar 13, 2013 21 1 2 3 4 5 PE MUNINA ET P. ANNINA	TRAC	Type: Log-Pwr Hold:> 1/1	Avg	Trig: Free Run Atten: 20 dB	GHZ PNO: Fast G			er 1 2
NextPea	26 GHz 25 dBm	r1 26.8 -40.9	Mk				10 dB 0 dBm	Ref Offse Ref 20.0	/div
Next Pk Rig									
Next Pk Le	-27.00 rem	مرور الموجان الم	unter fur the track	manstream	مرود و معرف المرود و المرود و المرود المرود و ا		and an draw at		- Angel
Marker Del									
Mkr⊸C	.000 GHz 1001 pts)	3.3 ms (			.0 MHz	#VBV		0 GHz .0 MHz	BW 1
_	DN VALUE	FUNCTIO	FUNCTION WIDTH	FUNCTION	γ 10.925 dBm	26 GHz	× 26.8		
Mkr→RefL									
Mo 1 of									



#### 802.11n HT20 Mode (chain a) Ch Low 30MHz – 6GHz

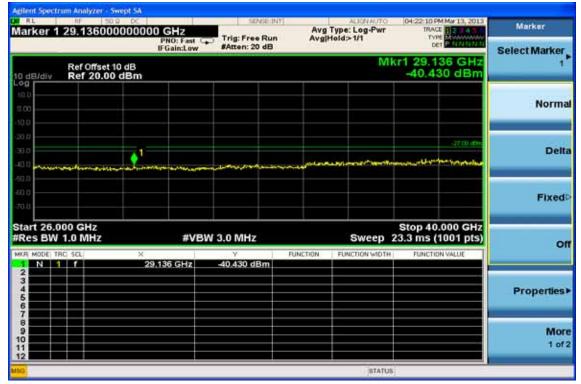


## Ch Low 6GHz – 18GHz

Marker	04:21:40 PM Mar 13, 2013 TRACE 12:14 4 TYPE MULTINE DET PELAINIST	Type: Log-Pwr Iold>1/1	Avg	Trig: Free Run #Atten: 20 dB	PNO: Fast		10.36000	ker 1
Select Marke	kr1 10.36 GHz -41.261 dBm	М		20 40	IF Gain: Low	10 dB 0 dBm	Ref Offset Ref 20.0	3/div
Norm								
Del	-37.00 mBrm					¢1		
Fixed				*8000*6040000040,000	******	~~~~~	In strategy	hanna dha an
c	Stop 26.00 GHz 3.3 ms (1001 pts) FUNCTION VALUE	Sweep 3	FUNCTION	3.0 MHz		×	1.0 MHz	NODE TR
Properties				-41.261 dBm	0.36 GHz			N 1
<b>Mo</b> 1 o								
		STATUS					-944-001	



## Ch Low 18GHz – 40GHz



## Ch Mid 30MHz – 6GHz

Peak Search	M Mar 13, 2013 1 <b>1 2 3 4 5</b> 4 5 7 Pd/M M M M	TRAC	pe: Log-Pwr Id>1/1		Free Run n: 20 dB	Trig: F	GH2 PNO: Fast	00000000		
Next Pea	62 GHz 60 dBm		Mkr1						Ref Offsel Ref 20.0	
Next Pk Righ		1								
Next Pk Lei	- 477.00 mErro			<u> </u>						
Marker Delt		محمد الري	**************************************	nation						
Mkr⊸C	.000 GHz 1001 pts) IN VALUE	0.0 ms (	Sweep 1	FUNCTION		3W 3.0 MH -45.860	#VB	× 7 995	O MHZ	30 MH BW 1.0
WIKI					o apin	40.000	0 0 % OF 16	0,000		
Mkr→RefLy										
_										



## Ch Mid 6GHz – 18GHz

Marker Select Marker	04:10:10 PM Mar 13, 2013 TRACE 12:14 5 TYPE MONOTONIC DET PM/NIMIS	Type: Log-Pwr Iold>1/1	Avg	Trig: Free Run #Atten: 20 dB	GHZ PNO: Fast G	00000000		1 10.	ker
Select Marker	kr1 10.40 GHz -41.053 dBm	M				10 dB	ef Offset ef 20.0	Re	Bídiv
Norm									
Delt	-27.00 dBm	فليستحدث والمراجع				• •			
Fixed								~~~~	~
0	Stop 26.00 GHz 3.3 ms (1001 pts)			3.0 MHz	#VBI		MHz	0 GH	s BW
Properties	FUNCTION VALUE	FUNCTION WIDTH	FUNCTION	γ -41.053 dBm	0.40 GHz	× 10		TRC SCL	
Mor 1 of									
		STATUS							

## Ch Mid 18GHz – 40GHz

Marker	04:10:46 PM Mar 13, 2013 TRACE 2:24 5 TYPE MUMMUM DET P-41N11723	Type: Log-Pwr fold>1/1	Avg	Trig: Free Run #Atten: 20 dB		26.7560000
Select Marker 1	r1 26.756 GHz -40.514 dBm	Mk			3	Ref Offset 10 d Ref 20.00 dE
Norm						
Del	-27.00 mm			c	ويسرو والمراجعة المحاور ويعار	1 • - North Martin and State State (1997)
Fixed						
Fixed	Stop 40.000 GHz 3.3 ms (1001 pts) FUNCTION VALUE	Sweep 2	FUNCTION	N 3.0 MHz	×	00 GHz 1.0 MHz
	3.3 ms (1001 pts)	Sweep 2	PUNCTION		and the second se	1.0 MHz
o	3.3 ms (1001 pts)	Sweep 2	FUNCTION	Y	×	SCL



# Ch High 30MHz – 6GHz

	.8627400	DOOOO GH2 PNO: Fas IFGain:Lo	Trig: Free Run #Atten: 20 dB	Avg T	ype: Log-Pwr old>1/1	04:22:55 PM Mar 13, 2013 TRACE 2 2 4 4 TYPE MWWWWWW DET PM/MN/M	Peak Search
0 dB/div	Ref Offset 10 Ref 20.00 c	dB JBm			Mkr	3.862 74 GHz -45.223 dBm	Next Peak
10.0 2.00							Next Pk Righ
20.0 30.0 40.0				1		-27.00 n <del>011</del>	Next Pk Lef
50.0 60.0 70.0		ملاهلا المسراد والمعينة المديدان سر	and the strength of the state	and a start and a start and a start a s	*******		Marker Delb
Res BW 1.	O MHZ	#\ × 3.862 74 GHz	/BW 3.0 MHz -45.223 dBm	FUNCTION	Sweep 1	Stop 6.000 GHz 0.0 ms (1001 pts) FUNCTION VALUE	Mkr→C
2 3 4 5 6							Mkr→RefLv
7 8 9 9 9 10 11 12							Mor 1 of

## Ch High 6GHz – 18GHz

Marker Select Marker	04:23:36 PM Mar 13, 2013 TRACE 2:24 5 TYPE MONOCOMP DET P MAN MAR	Type: Log-Pwr fold>1/1	Avg	Trig: Free Run #Atten: 20 dB	GHz PNO: Fast C FGain:Low	0000000		
Select Marker	kr1 10.48 GHz -42.405 dBm	М					Ref Offset Ref 20.0	dB/div
Norm								00
Deil	-77.00 mm	مر بار کار ا				ě1		10 10 10
Fixed					************		adial anima	
o	Stop 26.00 GHz 3.3 ms (1001 pts) FUNCTION VALUE	Sweep 3	FUNCTION	7 7 42,405 dBm	#VB	× 10	1.0 MHZ	art 6.00 Res BW
Properties					ی بالاندامان از از ایست از ایست از ایست از ایست			
Moi 1 of								
		STATUS						

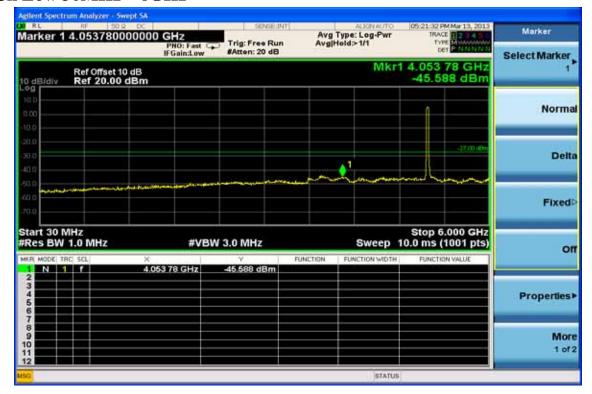


# Ch High 18GHz – 40GHz

Marker Select Marker	05:16:53 PM Mar 13, 2013 TRACE 1 2 7 4 5 TYPE MUMMONDO DET P MININIS	ype: Log-Pwr old>1/1	Ave	Trig: Free Run #Atten: 20 dB	GHZ PNO: Fast C	0000000			arker
Jelect Marker	1 29.570 GHz -39.319 dBm	Mk				0 dB	tef Offset tef 20.0		dB/di
Norm									00
Del	-27.00 iEm			- all and a second		1-	-	دەريانىرى <del>تە</del>	
Fixed									
o	top 40.000 GHz .3 ms (1001 pts)	Sweep 2	PUNCTION	N 3.0 MHz	#VB	×	GHz MHz	W 1.	
Properties	Tone non-medic		TORCHUR.	-39.319 dBm	70 GHz			1	
Mo 1 of									
		STATUS							



#### 802.11n HT20 Mode (chain b) Ch Low 30MHz – 6GHz

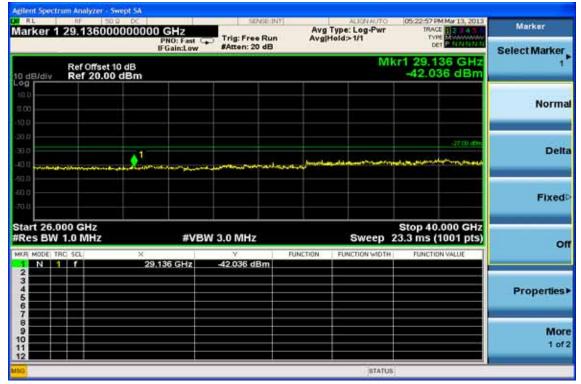


## Ch Low 6GHz – 18GHz

Marker Select Marke	21 PM Mar 13, 2013 IRACE 12, 7,4 5 TYPE MULTINING	TR	Type: Log-Pwr Iold>1/1	Avg	ig: Free Run tten: 20 dB		PNO: Fast	second second	10.36000	er 1 1
Norm	0.36 GHz 810 dBm	kr1 10 -41	M				I CHINEUW	10 dB	Ref Offset Ref 20.0	div
Norm										
Del	-77.00 1877							<b>≬</b> <sup>1</sup>		
Fixed					ne manal darkiy.		********	ni longe	angangang	-ulu
c	26.00 GHz s (1001 pts)	3.3 ms	Sweep 3	FUNCTION	MHz	3W 3.0	#VE	×	.0 MHz	6.00 ( BW 1
Properties					810 dBm	4	0.36 GHz	1		4 1
Mo 1 o										
			STATUS							



## Ch Low 18GHz – 40GHz



## Ch Mid 30MHz – 6GHz

Marker Select Marke	MAR 13, 2013	TRAC	ype: Log-Pwr old>1/1	Avg	Trig: Free Run #Atten: 20 dB	Fast C	00000 GHz	866200		
	62 GHz 59 dBm		Mkr1				dB	of Offset 10 of 20.00 (	Ref	dB/div
Norm		1								
Del	- 477.00 (69%									
Fixed		unsus han	***	and a second	and and a second se	8200, - <b>9</b> 24	الايام وحد الانتقال المروسية	ar 1 8 4 16 10, 17	*****	0
c	and the second statements	Stop 6. 0.0 ms (1 FUNCTID	Sweep 1 FUNCTION WIDTH	PUNCTION	.0 MHz Y 46.959 dBm		× 3.886 62 G	MHz	MHZ N 1.0 M	MODE
Properties										
Mo 1 o										
	_		STATUS							



## Ch Mid 6GHz – 18GHz

Marker Select Marker	05-25-00 PM Mar 13, 2013 TRACE 2 2 3 4 5 TYPE MONOMOUND DET P NINNING	Type: Log-Pwr Iold>1/1	Av	Trig: Free Run #Atten: 20 dB	PNO: Fast	00000000		ker 1 1
Selectimarker	kr1 10.40 GHz -42.923 dBm	M				10 dB	Ref Offset Ref 20.0	Bídiv
Norma								
Delt	-77 00 (69)			مىدىدەمەر بىرىمەر بىرى		• <sup>1</sup>		
Fixed								
0	Stop 26.00 GHz 3.3 ms (1001 pts)	Sweep 3	PUNCTION	/ 3.0 MHz	#VBI	×	.0 MHz	t 6.00 s BW 1
Properties				-42.923 dBm	0.40 GHz	10		N 1
Mor 1 of								
		STATUS						

## Ch Mid 18GHz – 40GHz

Marker Select Marke	PM Mar 13, 2013	T	e: Log-Pwr i>1/1				GHz PNO: Fast	0000000		
Select Marke	756 GHz 503 dBm		MI					10 dB	Ref Offset Ref 20.0	
Norm										
De	-27.00 attre									.1
	**********	an a	4	and a stand of the	eria ja ana	مربعان ويدينا شيل م	- tot-gai		*****	rice, here
Fixed	0.000 GHz	Ston							GH7	26.000
c	(1001 pts)	23.3 m	Sweep 2	UNCTION	]	V 3.0 MHz Y		×	O MHZ	BW 1.
Propertie					Bm.	-41.503 df	756 GHz	26.	۲ 	N 1
Mo 1 o										



# Ch High 30MHz – 6GHz

	3.8267400	00000 GHz PNO: Fast IFGain:Low	Trig: Free Run #Atten: 20 dB	Avg	Type: Log-Pwr fold>1/1	05:26:30 PM Mar 13, 2013 TRACE 2:24.5 TYPE DET P 24 NIN TAN	Marker Select Marker
dB/div	Ref Offset 10 Ref 20.00	dB			Mkr	3.826 74 GHz -45.518 dBm	Select Marker
.00							Norma
				<b>≬</b> 1		-27.00 (67)	Delt
	anna <b>a</b> n tanan sanan	مېرولوم دواوم د وور مەرسىلىدلۇل مۇرىم.			- otransia	annight, " nggataggaratagar	Fixed
Res BW	1.0 MHz	#VI × 3.826 74 GHz	3.0 MHz	FUNCTION	Sweep FUNCTION WIDTH	Stop 6.000 GHz 10.0 ms (1001 pts) FUNCTION VALUE	o
		3,626 /4 GHZ	40.010 UBM				Properties
							Mor 1 of
		A			STATUS		

# Ch High 6GHz – 18GHz

Marker	5:27:32 PM Mar 13, 2013 TRACE 2 2 4 4 TYPE MWWWWWW DET P ALAINIAN	Type: Log-Pwr told>1/1	Avg	Trig: Free Run #Atten: 20 dB	PNO: Fast C	00000000	10.4800	
Select Marker 1	1 10.48 GHz 44.185 dBm	MI			a cameta	t 10 dB	Ref Offse Ref 20.0	B/div
Norm								
Delt	-27,00 mBm					<b>↓</b> 1		
Fixed					ann an Alban M	ana ng kanana sa	rykelen kannek	mil
o	Stop 25.00 GHz 3 ms (1001 pts) FUNCTION VALUE	Sweep 3	PUNCTION	/ 3.0 MHz	#VB	×	1.0 MHz	rt 6.00 s BW
Properties				-44.185 dBm	0.48 GHz	10	1	N 1
Mor 1 of								
		STATUS						_

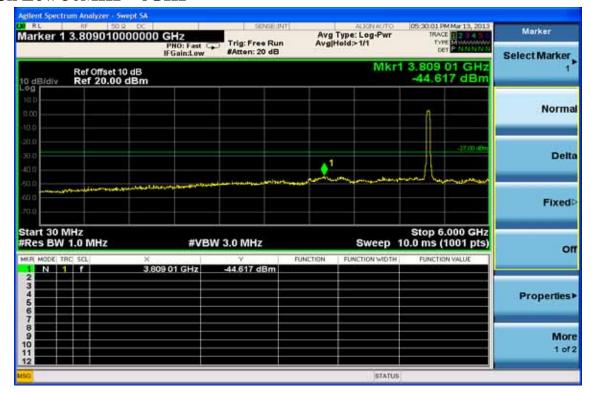


# Ch High 18GHz – 40GHz

Marker	5:28:15 PM Mar 13, 2013 TRACE	pe: Log-Pwr Id>1/1	Avg	Trig: Free Run #Atten: 20 dB		.570000000	r 1 29.	
Select Marker 1	29.570 GHz -41.058 dBm	Mk				ef Offset 10 dB ef 20.00 dBm	Rel	dB/di
Norm								
Dell	-27.00 (69)	ulane-u-a	in man production				an an tai	
Fixed								0
o	top 40.000 GHz 3 ms (1001 pts)	Sweep 2	202.00.000	N 3.0 MHz	and the second se	MHz	26.000 C BW 1.0	les B
Properties	FUNCTION VALUE	UNCTION WIDTH	FUNCTION	γ -41.058 dBm	29.570 GHz		DE TRC SCI	
Moi 1 of								



#### 802.11n HT40 Mode (chain a) Ch Low 30MHz – 6GHz

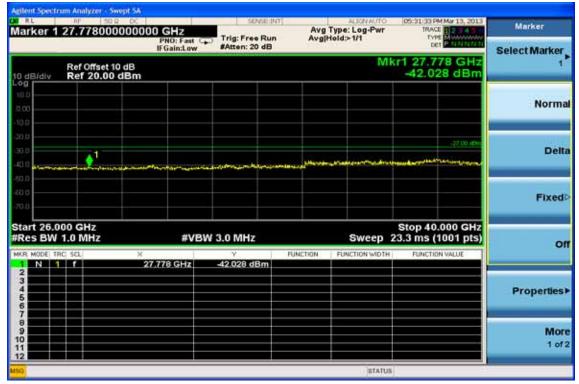


## Ch Low 6GHz – 18GHz

Marker	05:00:54 PM Mar 13, 2013 TRACE	Type: Log-Pwr	Avg	SENSE IN		000000000		RL arker 1
Select Marker	TYPE MUMANANA DET P 44 M N N N	fold>1/1	Avgi	Trig: Free Run #Atten: 20 dB	PNO: Fast G			
	kr1 10.38 GHz -43.023 dBm	м				et 10 dB 00 dBm	Ref Offse Ref 20.0	) dB/div
Norm								0.00
Delt	-27.00 (0%)	Annual and the stand				• <sup>1</sup>		0.0 0.0 0.0
Fixed								0.0 0.0
0	Stop 26.00 GHz 3.3 ms (1001 pts)	Sweep 3		3.0 MHz	#VBV		GHz 1.0 MHz	tart 6.00 Res BW
	FUNCTION VALUE	FUNCTION WIDTH	FUNCTION	√ -43.023 dBm	0.38 GHz	×		KR MODE TR
Properties								2 3 4 5 6 7
Mor 1 of								8
		STATUS			A			0



## Ch Low 18GHz – 40GHz



## Ch Mid 30MHz – 6GHz

Marker Select Marker	M Mar 13, 2013	TRAC	Vype: Log-Pwr old>1/1	Avg	Trig: Free Run #Atten: 20 dB	GHZ PNO: Fast	50000000 C		arker
Selectivarker	95 GHz 21 dBm		Mkr1					Ref Offs Ref 20	dB/div
Norma		1							0.00
Delt	- 477.00 (Chris			• <sup>1</sup>					0.0 0.0 0.0 0.0
Fixed		\			anapola Junya Partaya	Anna ann an Anna Anna Anna Anna Anna An	an a	an a	
0	and the second statements of the second s	Stop 6 0.0 ms ( FUNCTIO	Sweep 1 FUNCTION WIDTH	PUNCTION	3.0 MHz y -44.921 dBm	#VB	× 3.820	MHz W 1.0 MHz	R MODE
									2
Properties									3
Properties Mor 1 of									4



## Ch Mid 6GHz – 18GHz

Marker	05:33:30 PM Mar 13, 2013 TRACE 12, 2, 4, 5 TYPE MONOMOUND DET P MANNAN	Type: Log-Pwr Iold>1/1	Avg	Trig: Free Run #Atten: 20 dB	PNO: Fast	00000000		1 10	rker
Select Marker 1	kr1 10.40 GHz -45.092 dBm	М			I Gameere	10 dB	ef Offset 1 ef 20.00	R	dB/di
Norma									
Delt	-77.00 mm	مسلحين وريدو				↓ <sup>1</sup>			0 0 0
Fixed				**************************************	Maria and Carl	- Carlour - Ch		al la l	
0	Stop 25.00 GHz 3.3 ms (1001 pts)	Sweep 3	FUNCTION	3.0 MHz	#VBV	×	MHz	00 GH W 1.0	es B
Properties	FUNCTION VALUE	PORCHORWOOTH	FUNCTION	-45.092 dBm	0.40 GHz			1 1	
Mor 1 of									
		STATUS							

## Ch Mid 18GHz – 40GHz

Marker	M Mar 13, 2013	TRAC	d>1/1	Avg		-	GHz PNO: Fast	0000000		
Select Marker 1	68 GHz 47 dBm		MK					10 dB	Ref Offset Ref 20.0	
Norm										
Del	-27.00 mm	and an area				<b>↓</b> 1				
Fixed							Person and and	,,	-April and a seal	na.n.,444,
0	.000 GHz 1001 pts)	3.3 ms (	Sweep 2	RUNCTION	łz	3W 3.0 MH	#VB	×	0 MHz	26.000 BW 1.0
Properties					dBm	-40.147 c	768 GHz	31.7	ť	N 1
Moi 1 of										



## Ch High 30MHz – 6GHz

rker 1 4.035870000000	GH2 PNO: Fast G	Trig: Free Run #Atten: 20 dB	Avg	Type: Log-Pwr Hold:> 1/1	05-43:43 PM Mar 13, 2013 TRACE 1 2 3 4 3 TVYE DUMONTO DET PENNINAL	Marker Select Marker
Bildiv Ref 20.00 dBm				Mkr1	4.035 87 GHz -44.294 dBm	1
p					1	Norma
				▲1	-27.00 (Em:	Delt
	****			~~~~		Fixed
rt 30 MHz es BW 1.0 MHz Model TRC SCL X N 1 f 4.03	#VBW	/ 3.0 MHz	FUNCTION	Sweep 1	Stop 6.000 GHz 0.0 ms (1001 pts) FUNCTION VALUE	or
						Properties
						More 1 of 2

# Ch High 6GHz – 18GHz



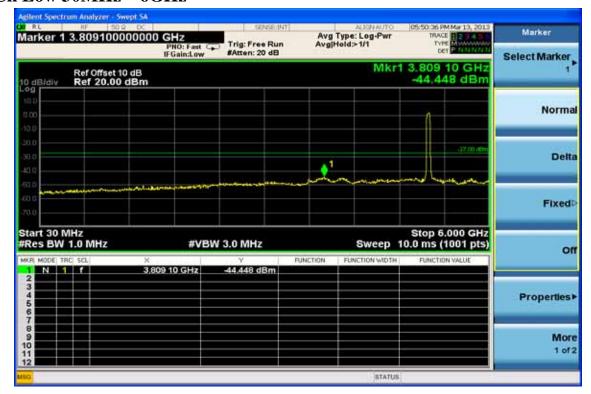


# Ch High 18GHz – 40GHz

RL larker 1			NO: Fast C	Trig: Free Rur	Avg	Type: Log-Pwr Hold>1/1	05:46:14 PM Mar 13, 2013 TRACE 2 2 4 4 TVPE 244 10 DET P 544011011	Marker		
	Ref Offset 10 dB Mkr1 29.108 GHz									
	Ref 20.0	U dBm						Norm		
30.0	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1	1	- Martine 18	ور المحمد	محدار		-27.00 mm	Dell		
50.0 50.0 70.0								Fixed		
Res BW	1.0 MHz	×		W 3.0 MHz Y	FUNCTION	Sweep 2	Stop 40.000 GHz 3.3 ms (1001 pts) FUNCTION VALUE	o		
2 N 1 2 3 4 5 6		29.10	08 GHz	-40.439 dBm				Properties		
7 8 9 0								<b>Mo</b> 1 of		
1								.1		



#### 802.11n HT40 Mode (chain b) Ch Low 30MHz – 6GHz

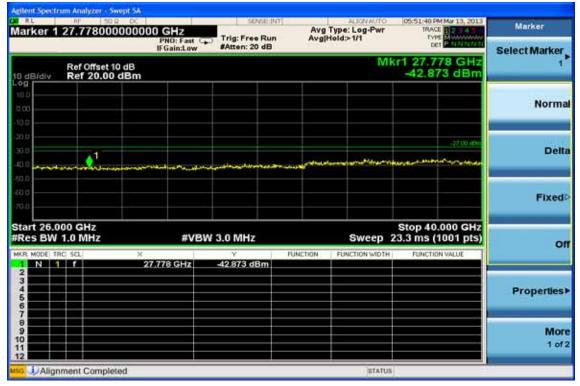


## Ch Low 6GHz – 18GHz

RL arker 1	1 10.3800000	000000		SENSE	Avg	Type: Log-Pwr	05:51:10 PM Mar 13, 2013 TRACE	Marker
		P IF	Gain:Low	Trig: Free Ri #Atten: 20 dl		Hold>1/1	DET PANNNI	Select Marker
dB/div	Ref Offset 10 Ref 20.00 d	dB IBm				M	45.351 dBm	1
99 0.00								Norma
0.0 0.0 0.0		↓ <sup>1</sup>					-27.00 (897	Delt
	والمنادوق المواقع وقاريتهم والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع والمراجع وال	money	la anni i anni i	en den ar an and de	اللجل فسليكم ومالا مريعهم	and a stand and a stand		_
0.0								Fixed
art 6,00	0 GHz / 1.0 MHz		#VBI	W 3.0 MHz		Sweep 3	Stop 25.00 GHz 33.3 ms (1001 pts)	
art 6.00 Res BW	1.0 MHz	× 10.	#VB\ 38 GHz	W 3.0 MHz -45.351 dBm	FUNCTION	Sweep 3	Stop 25.00 GHz 33.3 ms (1001 pts) FUNCTION VALUE	Fixed
art 6.00 Res BW	1.0 MHZ			Y		and the second	33.3 ms (1001 pts)	
art 6.00 Res BW	1.0 MHZ			Y		and the second	33.3 ms (1001 pts)	0



## Ch Low 18GHz – 40GHz



## Ch Mid 30MHz – 6GHz

Marker	MM# 13, 2013	TRAC	pe: Log-Pwr Id>1/1		: Free Run ten: 20 dB		GH2 PNO: Fast	000000	209500		
Select Marke	Ref Offset 10 dB         Mkr1 3.820 95 GHz           0 dB/div         Ref 20.00 dBm         -45.144 dBm										
Norm		1									0
Del	77.00 (677			↓ <sup>1</sup>							
Fixed		~~~ `L.			vern Window	and in the second	nd, and films to	and land and date			
C	and the second statements of the second s	Stop 6. 0.0 ms (* FUNCTID	Sweep 1	FUNCTION	MHz / 144 dBm	3W 3.0 -45.	#VB	× 3.620	L	MHz V 1.0 M TRC SCL	es B
Properties											
Mo 1 o											
			STATUS								



## Ch Mid 6GHz – 18GHz

gilent Spect	rum Analyzer - S	Swept SA	SENSE:IN	T.	ALKINAUTO	05:53:12 PM Mar 13, 2013	
larker 1	10.40000	0000000 GHz PNO: Fast	Trig: Free Run	Avg	Type: Log-Pwr Hold:>1/1	TRACE	Trace/Det
0 dB/div	Ref Offset Ref 20.0	IFGain:Low	#Atten: 20 dB	10.000	M	kr1 10.40 GHz -45.550 dBm	Select Trace
10.0 10.0							Clear Write
20.0 30.0		▲ <sup>1</sup>				-27.00 mBm	Trace Averag
50.0 <b></b>	Ner-desidentes	anontonen	alar of the orthographic states and the	and a start of the			Max Hol
English and	1.0 MHz		BW 3.0 MHz	Distance of the		Stop 26.00 GHz 3.3 ms (1001 pts)	Min Hol
CR MODE T		× 10.40 GHz	-45.550 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	
3 4 5 6 7							View/Blank Trace On
9 9 0 1							Mor 1 of
40		^			STATUS		<u> </u>

## Ch Mid 18GHz – 40GHz

Marker	Mar 13, 2013	TRAC	/pe: Log-Pwr Id>1/1			GHZ PNO: Fast 0 FGain:Low	0000000		
Select Marker 1	68 GHz 98 dBm		Mk			r Game Gw	10 dB	Ref Offset Ref 20.00	
Norm									
Del	-77.00 000	ملحمو	markathan tana tana	مىمىتە»رىمىزىدن	 1	and the street	- الجواريد المرور	1 Aur Atractor	*****
Fixed									
o	or other states in the state of	Stop 40. 3.3 ms (1 FUNCTID	Sweep 2 FUNCTION WIDTH	FUNCTION	 V 3.0 MHz -42.208 d	#VB	X	.0 MHz	26.000 BW 1.
Properties									
Mo									
1 of									



## Ch High 30MHz – 6GHz

rker 1 4.035870000000 GHz IFGain: IFGain:	554-30 FM Mar 13, 2013 TRACE 12 2 4 4 Tryte Permitting Det Permitting Select Mark	TRACE
Ref Offset 10 dB	.035 87 GHz 45.313 dBm	
	Nor	<u> </u>
	Fix	
rt 30 MHz IS BW 1.0 MHz MODE TRC SCL X N 1 1	Stop 6.000 GHz ms (1001 pts) FUNCTION VALUE	10.0 ms (1001
	Properti	
	M	

## Ch High 6GHz – 18GHz





# Ch High 18GHz – 40GHz

Marker	05:55:50 PM Mar 13, 2013 TRACE 12:3:4:5 TYPE MUMMUM DET P:41 N N 23	ype: Log-Pwr old>1/1	Ave	Trig: Free Run #Atten: 20 dB	GHZ	0000000			
Select Marker	Ref Offset 10 dB Mkr1 29.108 GHz 0 dB/div Ref 20.00 dBm -42.322 dBm								
Norm									
Del	-27.00 albert	مىلىماردۇمىرىي بىلى يېرلىمىلىد	- James and a start	an a	angla <sup>d</sup> angarba	¢ <sup>1</sup>		-	
Fixed									
C	top 40.000 GHz .3 ms (1001 pts) FUNCTION VALUE	Sweep 2 FUNCTION WIDTH	FUNCTION	3.0 MHz Y -42.322 dBm	#VBV	× 29.10	.0 MHz	t 26.00 s BW 1 MODE TRO	
Properties									
Mo 1 of									
		STATUS				ted	ent Comple	Aliann	



#### 11. UNDESIRABLE EMISSION - RADICTED MEASUREMENT

#### **11.1 Standard Applicable**

#### According to §15.407(b),

(b) Undesirable Emission Limits: Except as shown in Paragraph (b)(6) of this section, the peak emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

- For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.
- (2) For transmitters operating in the 5.25-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz. Devices operating in the 5.25-5.35 GHz band that generate emissions in the 5.15-5.25 GHz band must meet all applicable technical requirements for operation in the 5.15-5.25 GHz band (including indoor use) or alternatively meet an out-of-band emission EIRP limit of -27 dBm/MHz in the 5.15-5.25 GHz band.
- (3) For transmitters operating in the 5.47-5.725 GHz band: all emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz.
- (4) For transmitters operating in the 5.725-5.825 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an EIRP of -17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an EIRP of -27 dBm/MHz.
- (5) The above emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
- (6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in Section 15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in Section 15.207.
- (7) The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.
- (8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency block edges as the design of the equipment permits.



#### **§15.205- RESTRICTED BANDS OF OPERATIONS**

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
<sup>1</sup> 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 -	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.52525	2655 - 2900	22.01 - 23.12
8.41425 - 8.41475	156.7 - 156.9	3260 - 3267	23.6 - 24.0
12.29 - 12.293	162.0125 - 167.17	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	167.72 - 173.2	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	240 - 285	3600 - 4400	( <sup>2</sup> )
13.36 - 13.41	322 - 335.4		

<sup>1</sup> Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup> Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.



-99 of 123-

FCC ID: HLZUWA2 IC: 1754F-UWA2

#### **§15.209- RADIATED EMISSION LIMITS: GENERAL REQUIREMENTS**

MEASUR	ING DISTANCE OF 3 MET	ER
FREQUENCY RANGE	FIELD STRENGTH	FIELD STRENGTH
(MHz)	(Microvolts/m)	(dBuV/m)
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

#### FCC PART 15.209

#### According to RSS-210 A9.2

- 1. For transmitters operating in the band 5150-5250 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27dBm/MHz e.i.r.p.
- 2. For transmitters operating in the band 5250-5350 MHz, all emissions outside the band 5150-5350 MHz shall not exceed -27dBm/MHz e.i.r.p. Devices operating in the band 5250-5350 MHz that generate emissions in the band 5150-5250 MHz shall not exceed an out-of-band emission limit of -27dBm/MHz e.i.r.p. in the band 5150-5250 MHz in order to operate indoor/outdoor, or alternatively shall comply with the spectral power density for operation within the band 5150-5250 MHz and shall be labeled "for indoor use only".
- 3. For transmitters operating in the band 5470-5725 MHz, all emissions outside that band shall not exceed -27dBm/MHz e.i.r.p.
- 4. For transmitters operating in the band 5725-5825 MHz, all emissions within the frequency range from the band edges to 10 MHz above or below the band edges shall not exceed -17dBm/MHz e.i.r.p. For frequencies more than 10 MHz above or below the band edges, emissions shall not exceed -27dBm/MHz.



#### 11.2 EUT Setup

- 1. The radiated emission tests were performed in the 3 meter open-test site, using the setup in accordance with the ANSI C63.4-1992.
- The EUT was put in the front of the test table. The host PC system was placed on the center of the back edge on the test table. The peripherals like modem, monitor printer, K/B, and mouse were placed on the side of the host PC system. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
- 3. The keyboard was placed directly in the front of the monitor, flushed with the front tabletop. The mouse was placed next to the Keyboard, flushed with the back of keyboard.
- 4. The spacing between the peripherals was 10 centimeters.
- 5. External I/O cables were draped along the edge of the test table and bundle when necessary.
- 6. The host PC system was connected with 120Vac/60Hz power source.

#### **11.3 Measurement Procedure**

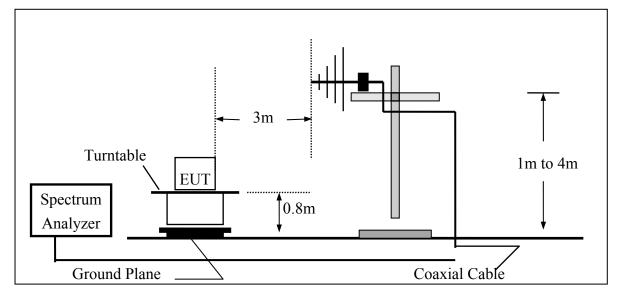
- 1. The EUT was placed on a turn table which is 0.8m above ground plane.
- 2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
- 3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
- 4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 6. Repeat above procedures until all frequency measured were complete.

Refer to section F of KDB Document: KDB 789033 D01 General UNII Test Procedures v01r03

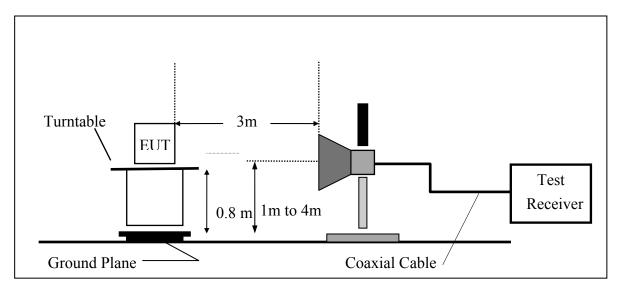


#### 11.4 Test SET-UP (Block Diagram of Configuration)

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(B) Radiated Emission Test Set-UP Frequency Over 1 GHz





# **11.5 Measurement Equipment Used:**

	Ch	amber 14(966)	)		
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.
ТҮРЕ		NUMBER	NUMBER	CAL.	
Spectrum Analyzer 21(26.5GHz)	Agilent	N9010A	MY49060537	07/17/2012	07/16/2013
Spectrum Analyzer 20(6.5GHz)	Agilent	E4443A	MY48250315	05/24/2012	05/23/2013
Spectrum Analyzer 22(43GHz)	R&S	FSU43	100143	04/25/2012	04/24/2013
Loop Antenna9K-30M	A.H.SYSTEM	SAS-564	294	02/28/2012	02/27/2014
Bilog Antenna30-1G	Schaffner	CBL 6111B	2756	01/13/2013	01/12/2014
Horn antenna1-18G	COM-POWER	AH118	2011071401	03/01/2013	02/29/2014
Horn antenna1-18G(06)	EMCO	3117	0006665	10/15/2012	10/14/2013
Horn antenna26-40G(05)	Com-power	AH-640	100A	01/09/2013	01/08/2015
Horn antenna18-26G(04)	Com-power	AH-826	081001	05/04/2011	05/03/2013
Preamplifier9-1000M	HP	8447D	NA	02/19/2013	02/18/2014
Preamplifier1-18G	MITEQ	AFS44-001018 00-25-10P-44	1329256	07/23/2012	07/22/2013
Preamplifier1-26G	EM	EM01M26G	NA	02/26/2013	02/25/2014
Preamplifier26-40G	MITEQ	JS-26004000-2 7-5A	818471	05/21/2011	05/20/2013
Cable1-18G	HUBER SUHNER	Sucoflex 106	NA	09/07/2012	09/06/2013
Cable UP to 1G	HUBER SUHNER	RG 214/U	NA	10/08/2012	10/07/2013
SUCOFLEX 1GHz~40GHz cable	HUBER SUHNER	Sucoflex 102	27963/2&3742 1/2	09/21/2011	09/20/2013
2.4G Filter	Micro-Tronics	Brm50702	76	12/27/2012	12/26/2013
5G Filter	Micro-Tronics	Brm50716	005	12/27/2012	12/26/2013



#### 11.6 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

FS = RA + AF + CL - AG

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

#### 11.7 Measurement Result

Refer to attach tabular data sheets.

#### NOTE:

The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 100kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.



#### Radiated Spurious Emission Measurement Result (below 1GHz) (worst case)

<b>L</b>		/ ( /	
Operation Mode	802.11n HT20 TX CH Low	Test Date	2013/03/16
Fundamental Frequency	5180MHz	Test By	Dino
Temperature	25	Pol	Ver./Hor
Humidity	65 %		

No	Freq	Reading	Factor	Level	Limit	Over Limit	Remark	Pol
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB		V/H
1	108.57	44.83	-16.62	28.21	43.50	-15.29	Peak	VERTICAL
2	217.21	39.33	-15.80	23.53	46.00	-22.47	Peak	VERTICAL
3	270.56	40.86	-13.37	27.49	46.00	-18.51	Peak	VERTICAL
4	380.17	43.07	-10.83	32.24	46.00	-13.76	Peak	VERTICAL
5	498.51	38.28	-9.06	29.22	46.00	-16.78	Peak	VERTICAL
6	756.53	41.62	-3.79	37.83	46.00	-8.17	Peak	VERTICAL
1	108.57	42.05	-16.62	25.43	43.50	-18.07	Peak	HORIZONTAL
2	269.59	36.15	-13.41	22.74	46.00	-23.26	Peak	HORIZONTAL
3	379.20	36.80	-10.83	25.97	46.00	-20.03	Peak	HORIZONTAL
4	499.48	38.08	-9.06	29.02	46.00	-16.98	Peak	HORIZONTAL
5	666.32	32.04	-5.74	26.30	46.00	-19.70	Peak	HORIZONTAL
6	839.95	35.01	-3.06	31.95	46.00	-14.05	Peak	HORIZONTAL

- 1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
- 2 Measuring frequencies from the lowest internal frequency to the 1GHz.
- 3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90KHz/110-490KHz using PK/AV and other Frequency Band using PK/QP
- 4 Measurement result within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100KHz, VBW=300KHz.



-105 of 123-

#### FCC ID: HLZUWA2 IC: 1754F-UWA2

#### **Radiated Spurious Emission Measurement Result (below 1GHz)**

Operation Mode	802.11n HT20 TX CH Mid	Test Date	2013/03/16
Fundamental Frequency	5200MHz	Test By	Dino
Temperature	25	Pol	Ver./Hor
Humidity	65 %		

No	Freq	Reading	Factor	Level	Limit	Over Limit	Remark	Pol
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB		V/H
1	108.57	45.32	-16.62	28.70	43.50	-14.80	Peak	VERTICAL
2	174.53	38.80	-14.52	24.28	43.50	-19.22	Peak	VERTICAL
3	275.41	43.66	-13.13	30.53	46.00	-15.47	Peak	VERTICAL
4	379.20	42.58	-10.83	31.75	46.00	-14.25	Peak	VERTICAL
5	499.48	39.84	-9.06	30.78	46.00	-15.22	Peak	VERTICAL
6	759.44	41.62	-3.77	37.85	46.00	-8.15	Peak	VERTICAL
1	108.57	41.93	-16.62	25.31	43.50	-18.19	Peak	HORIZONTAL
2	271.53	36.29	-13.32	22.97	46.00	-23.03	Peak	HORIZONTAL
3	379.20	36.98	-10.83	26.15	46.00	-19.85	Peak	HORIZONTAL
4	498.51	38.79	-9.06	29.73	46.00	-16.27	Peak	HORIZONTAL
5	665.35	31.05	-5.76	25.29	46.00	-20.71	Peak	HORIZONTAL
6	839.95	34.91	-3.06	31.85	46.00	-14.15	Peak	HORIZONTAL

- 1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
- 2 Measuring frequencies from the lowest internal frequency to the 1GHz.
- 3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90KHz/110-490KHz using PK/AV and other Frequency Band using PK/QP
- 4 Measurement result within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100KHz, VBW=300KHz.



#### **Radiated Spurious Emission Measurement Result (below 1GHz)**

Operation Mode	802.11n HT20 TX CH High	Test Date	2013/03/16
Fundamental Frequency	5240MHz	Test By	Dino
Temperature	25	Pol	Ver./Hor
Humidity	65 %		

No	Freq	Reading	Factor	Level	Limit	Over Limit	Remark	Pol
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB		V/H
1	108.57	45.68	-16.62	29.06	43.50	-14.44	Peak	VERTICAL
2	270.56	42.51	-13.37	29.14	46.00	-16.86	Peak	VERTICAL
3	378.23	43.79	-10.85	32.94	46.00	-13.06	Peak	VERTICAL
4	499.48	41.13	-9.06	32.07	46.00	-13.93	Peak	VERTICAL
5	573.20	37.02	-7.43	29.59	46.00	-16.41	Peak	VERTICAL
6	759.44	42.69	-3.77	38.92	46.00	-7.08	Peak	VERTICAL
1	108.57	41.28	-16.62	24.66	43.50	-18.84	Peak	HORIZONTAL
2	271.53	36.74	-13.32	23.42	46.00	-22.58	Peak	HORIZONTAL
3	299.66	37.72	-12.49	25.23	46.00	-20.77	Peak	HORIZONTAL
4	378.23	36.60	-10.85	25.75	46.00	-20.25	Peak	HORIZONTAL
5	499.48	41.88	-9.06	32.82	46.00	-13.18	Peak	HORIZONTAL
6	839.95	34.83	-3.06	31.77	46.00	-14.23	Peak	HORIZONTAL

- 1 No further spurious emissions detected from the lowest internal frequency and 30MHz.
- 2 Measuring frequencies from the lowest internal frequency to the 1GHz.
- 3 Radiated emissions measured in frequency range from 9MHz to 1000MHz were made with an instrument detector setting 9-90KHz/110-490KHz using PK/AV and other Frequency Band using PK/QP
- 4 Measurement result within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 5 The IF bandwidth of SPA between 9kHz to 30MHz was 10kHz, VBW= 30kHz; between 30MHz to 1GHz was 100KHz, VBW=300KHz.



#### Radiated Spurious Emission Measurement Result (above 1GHz) (worst case)

Operation Mode	802.11n HT20 TX CH Low	Test Date	2013/03/16
Fundamental Frequency	5180MHz	Test By	Dino
Temperature	25	Humidity	60 %

No	Freq	Reading	Factor	Level	Limit	Over Limit	Remark	Pol
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB		V/H
1	1168.00	59.97	-16.42	43.55	74.00	-30.45	Peak	VERTICAL
2	1826.00	55.66	-13.39	42.27	74.00	-31.73	Peak	VERTICAL
1	10360.00	35.24	6.98	42.22	74.00	-31.78	Peak	HORIZONTAL

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 Measurement of data within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.



#### Radiated Spurious Emission Measurement Result (above 1GHz) (worst case)

Operation Mode	802.11n HT20 TX CH Mid	Test Date	2013/03/16
Fundamental Frequency	5200MHz	Test By	Dino
Temperature	25	Humidity	60 %

No	Freq	Reading	Factor	Level	Limit	Over Limit	Remark	Pol
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB		V/H
1	1168.00	59.45	-16.42	43.03	74.00	-30.97	Peak	VERTICAL
2	6908.00	46.99	3.89	50.88	74.00	-23.12	Peak	VERTICAL
1	10360.00	35.17	6.98	42.15	74.00	-31.85	Peak	HORIZONTAL

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 Measurement of data within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.



#### Radiated Spurious Emission Measurement Result (above 1GHz) (worst case)

Operation Mode	802.11n HT20 TX CH High	Test Date	2013/03/16
Fundamental Frequency	5240MHz	Test By	Dino
Temperature	25	Humidity	60 %

No	Freq	Reading	Factor	Level	Limit	Over Limit	Remark	Pol
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB		V/H
1	1161.00	64.49	-16.44	48.05	74.00	-25.95	Peak	VERTICAL
2	6768.00	45.78	3.57	49.35	74.00	-24.65	Peak	VERTICAL
1	10400.00	35.10	7.04	42.14	74.00	-31.86	Peak	HORIZONTAL

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 Measurement of data within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.



# Band Edges test 802.11a mode CH-Low

Marker	11:15:07 AM Mar 13, 2013 TRACE 2 2 3 4 5 TVPE MUMMAN	Type: Log-Pwr Hold>1/1	1	Trig: Free Run	SHZ	000000 G		ker 1 5
Select Marker	5.150 00 GHz	Mkr1	10	#Atten: 30 dB	FGain:Low	II 0 dB	Ref Offset 1	
Norma						dBm	Ref 20.00	Bídiv
Delt	1	1. 196-19-1-1-1-10-10-10-10-10-10-10-10-10-10-10-		44		H	للمحمد	with
Fixed								
0	Stop 5.19000 GHz 1.00 ms (1001 pts) FUNCTION VALUE	Sweep	FUNCTIO	1.0 MHz 7 -38.073 dBm	#VBV	× 5.150	O MHZ	t 5.000 s BW 1 MODE TRC
Properties								
Mor 1 of								
		STATUS		101				

Marker	12:00:14 PM Mar 13, 2013 TRACE 12:00:40 TYPE MUMANING DET PROVINCIO	Type: Log-Pwr Hold>1/1	A	Trig: Free Run #Atten: 30 dB	PNO: Fast Ca	000000		
Select Marker	5.350 00 GHz -46.139 dBm	Mkr1		BAtten: 30 dB	IFGain:Low	10 dB	Ref Offsel Ref 20.0	l/div
Norm							m	مسل
Del	-77.00 (Drs			1000-000-000-000-000-000-000-000-000-00			1	
Fixed	2780-28029954997492-9244264		ali in constant a la su	1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 - 1977 -				
o	Stop 5.40000 GHz 1.80 ms (1001 pts) FUNCTION VALUE	Sweep 1	FUNCTION	1.0 MHz y -46.139 dBm	#VBV	× 5,350		
Properties								
Moi 1 of								
		STATUS						



#### Radiated Emission: 802.11a mode

Funda	Operation ModeTX CH LowTest DateFundamental Frequency5180 MHzTest ByTemperature25Humidity													
No	Freq	Reading	Factor	Level	Limit	Over Limit	Remark	Pol						
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB		V/H						
1	5068.02	47.09	-1.49	45.60	74.00	-28.40	Peak	VERTICAL						
2	5150.00	44.73	-1.27	43.46	74.00	-30.54	Peak	VERTICAL						
1	5145.92	48.95	-1.28	47.67	74.00	-26.33	Peak	HORIZONTAL						
2	5150.00	47.43	-1.27	46.16	74.00	-27.84	Peak	HORIZONTAL						

Operation Mode TX CH High Fundamental Frequency 5240MHz Temperature 25

Test Date Test By Dino Humidity

2013/03/16 65 %

No	Freq	Reading	Factor	Level	Limit	Over Limit	Remark	Pol
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB		V/H
1	5350.00	45.67	-0.75	44.92	74.00	-29.08	Peak	VERTICAL
2	5374.84	47.54	-0.68	46.86	74.00	-27.14	Peak	VERTICAL
1	5350.00	45.80	-0.75	45.05	74.00	-28.95	Peak	HORIZONTAL
2	5352.06	47.94	-0.74	47.20	74.00	-26.80	Peak	HORIZONTAL

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- 2 Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 Measurement of data within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.



# 802.11n HT20 mode (chain a) Band Edges Test Data CH-Low

Marker	01:50:59 PM Mar 13, 2013 TRACE 12:20 0 TYPE MUNICIPAL	g Type: Log-Pwr g Hold>1/1	un	Trig: Free R	HZ NO: Fast Ca		5.150000	
Select Marker 1	5.150 00 GHz -45.279 dBm	Mkr	8	#Atten: 30 d	Gain:Low	IF 0 dB	Ref Offset 1 Ref 20.00	dB/div
Norma	لسعمسها							a U O O
Delt	-77 00 mm							0 0
Fixed		al description of the second description of the	~~\$^~~&&A		nen andere and the second s	her V Hered		
o	Stop 5.19000 GHz 2.07 ms (1001 pts) FUNCTION VALUE	Sweep 2	FUN	1.0 MHz γ -45.279 dBn	#VBV	×		
Properties				40,219 000		6,1001		
Mor 1 of								
		STATUS						

Marker	01:52:03 PM Mar 13, 2013 TRACE 2014 5 TYPE MUNICIPAL	Type: Log-Pwr fold>1/1	Av	Trig: Free Run	GHz PNO: Fast	0000000		rker 1
Select Marke	5.350 00 GHz -46.592 dBm	Mkr1		#Atten: 30 dB	IFGain:Low	t 10 dB	Ref Offse	
Norm	40,032 0811					00 dBm	Ref 20.	
De	-77.00 iEm					The set law out	1	
Fixe	and an and a start of the second start of the							
	Stop 5.40000 GHz 1.80 ms (1001 pts) FUNCTION VALUE	Sweep 1	FUNCTION	1.0 MHz y -46.592 dBm	#VB\	× 5.35(		
Propertie								
Mc 1 o								
		STATUS			AC-	hotod	ment Com	a brance



# 802.11n HT20 mode (chain b) Band Edges Test Data CH-Low

Marker	01:52:57 PM Mar 13, 2013 TRACE 22:14 9 TVPE MUNICIPAL	Type: Log-Pwr Hold>1/1		Trig: Free Rur	NO: Fast	A Supervised and the	5.150000	rker 1
Select Marker 1	5.150 00 GHz -45.157 dBm	Mkr1		#Atten: 30 dB	Gain:Low	IF 0 dB	Ref Offset 1 Ref 20.00	dB/div
Norma	-							
Delt	-17 00 10m	and a state of the					Andread	0 0
Fixed								0 0
or	Stop 5.19000 GHz 2.07 ms (1001 pts) FUNCTION VALUE		FUNC	1.0 MHz Y 45.157 dBm	#VBW	×		
Properties				40.107 dbm		5.150		
Mon 1 of								
		STATUS			A		A	

Marker	01:53:42 PM Mar 13, 2013 TRACE 2014 10 TVPE 001 1010	Type: Log-Pwr Hold>1/1	Avg	Trig: Free Run	PNO: Fast	0000000		
Select Marke	5.350 00 GHz -46.532 dBm	Mkr1	1.11	#Atten: 30 dB	FGain:Low	10 dB	Ref Offset Ref 20.0	dB/div
Norm								0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Del	-77.00 (On	1				Sun allow . N.B	ten	0 0 0
Fixed	angewonane on the stars and	14-12-12-12-14-14-14-14-14-14-14-14-14-14-14-14-14-	-17	**************************************				0 0
c	Stop 5.40000 GHz 1.80 ms (1001 pts) FUNCTION VALUE	Sweep 1	FUNCTION	1.0 MHz γ -46.532 dBm	#VBW	× 5 350		
Properties								
Mo 1 o								
		STATUS						



#### Radiated Emission: 802.11n HT20 mode, Antenna A+B

Operation Mode	TX CH Low	Test Date	2013/03/16
Fundamental Frequency	5180 MHz	Test By	Dino
Temperature	25	Humidity	65 %

No	Freq	Reading	Factor	Level	Limit	Over Limit	Remark	Pol
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB		V/H
1	5143.83	47.23	-1.29	45.94	74.00	-28.06	Peak	VERTICAL
2	5150.00	45.71	-1.27	44.44	74.00	-29.56	Peak	VERTICAL
1	5149.15	48.00	-1.27	46.73	74.00	-27.27	Peak	HORIZONTAL
2	5150.00	47.74	-1.27	46.47	74.00	-27.53	Peak	HORIZONTAL

Operation Mode TX CH High Fundamental Frequency 5240MHz Temperature 25

Test Date Test By Dino Humidity

2013/03/16 65 %

No	Freq	Reading	Factor	Level	Limit	Over Limit	Remark	Pol
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB		V/H
1	5350.00	45.98	-0.75	45.23	74.00	-28.77	Peak	VERTICAL
2	5390.31	47.41	-0.63	46.78	74.00	-27.22	Peak	VERTICAL
1	5350.00	46.24	-0.75	45.49	74.00	-28.51	Peak	HORIZONTAL
2	5357.84	47.53	-0.72	46.81	74.00	-27.19	Peak	HORIZONTAL

- 1 Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequency
- <sup>2</sup> Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 Measurement of data within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- 5 Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.



# 802.11n HT40 mode (Antenna A Port) Band Edges Test Data CH-Low

Marker	01:56:13 PM Mar 13, 2013 TRACE	npe: Log-Pwr Id>1/1		Trig: Free Rur	HZ NO: Fast C	000000 G		rker 1
Select Mark	5.150 00 GHz			#Atten: 30 dB	Gain:Low	IF		
	-43.816 dBm						Ref Offset Ref 20.0	dB/div
Norr								0
	andraman							<i>0</i>
De	-27.00.000							0
		represent N	the stand and	ant Time by all and which	manent	and	والرور معمو لعازمه	
					e pithéodori.ne.i			0
Fixe								.0
	Stop 5.2100 GHz 27 ms (1001 pts)			1.0 MHz	#VB		00 GHz 300 kHz	art 5.00
	FUNCTION VALUE	FUNCTION WIDTH	FUNCTI	Ŷ		×	C SCL	R MODE TR
				-43.816 dBm	0 GHz	5.150 (	1	N 1
Propertie								
M								
		STATUS						

Marker	01:57:29 PM Mar 13, 2013 TRACE 22:00 TVPE MUNICIPAL DET 20:00000000000000000000000000000000000	Type: Log-Pwr Hold>1/1	A	Trig: Free Run	PNO: Fast C.		5.3500000	arker 1
Select Marker 1	5.350 00 GHz -44.597 dBm	Mkr1		#Atten: 30 dB	FGain:Low	0 dB	Ref Offset 1	
Norm							Ref 20.00	
Dell	-77.00 (01)	1		an of the second states of	withorney	hu		
Fixed								0.0 0.0
o	Stop 5.40000 GHz 2.07 ms (1001 pts)	Sweep 2	FUNCTIO	I.O MHz	#VBW	×	300 kHz	tart 5.21 Res BW
Properties				44.597 dBm	00 GHz	5.350		N 1 234 56
Moi 1 of								7 9 9 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
		STATUS						a



# 802.11n HT40 mode (Antenna B Port) Band Edges Test Data CH-Low

arker 1 5.15000000000	PNO: Fast		Avg Type: Log-Pwr Avg Hold>1/1	11-58-30 PM Mar 13, 2013 TRACE	Marker
Ref Offset 10 dB	IFGain:Low	#Atten: 30 dB		0.150 00 GHz -45,279 dBm	Select Marker
00				And and such and such and	Norma
00 00 00 10 10 10	Adult Parc & and A	a and a state of back	and a start of the start	-77.00 (69)	Delt
00 00 00					Fixed
art 5.0000 GHz tes BW 300 kHz	#VBW 1	.0 MHz	Sweep 2.2	top 5.2100 GHz 7 ms (1001 pts)	0
	150 00 GHz -4	45.279 dBm	IDN PONCTION WOTH	Tenerium meor	
	150 00 GHz -	45.279 dBm		TORE TORY THESE	Properties

arker 1	5.35000000		GHZ PNO: Fast C	Trig: Free Run	Avg	Type: Log-Pwr Hold>1/1	01:59:18 PM Mar 13, 2013 TRACE TYPE Det PS/0410101	Marker
	Ref Offset 10 o	_	IFGain:Low	#Atten: 30 dB	X.93	Mkr	1 5.350 00 GHz	Select Marker
odB/div	Ref 20.00 di	Bm					-48.230 dBm	
a.p								Norma
00 000	weed housesperied							Here it as
0.0		1					-27.00 nBm	
10 G		Mana				1		Delt
a.a.			and an and a state of the	n an	and a start and	white it is a search of	in the second second	
70.0								Fixed
	000 GHz						Stop 5.40000 GHz	
Contraction of the local distance of the loc	300 kHz		#VB	W 1.0 MHz			2.07 ms (1001 pts)	0
KR MODE TP		× 5.350	000 GHz	√ -48.230 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	
3								Properties
5 6 7								
8								Mo
								1 of
1								



#### Radiated Emission: 802.11n HT40 mode, Antenna A+B

Operation Mode Fundamental Frequency Temperature	TX CH Low 5190 MHz 25	V		Test Date Test By Humidity	2013/03/16 Dino 65 %	
			0			-

No	Freq	Reading	Factor	Level	Limit	Over Limit	Remark	Pol
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB		V/H
1	5147.84	49.21	-1.28	47.93	74.00	-26.07	Peak	VERTICAL
2	5150.00	46.82	-1.27	45.55	74.00	-28.45	Peak	VERTICAL
1	5148.05	44.19	-1.28	42.91	54.00	-11.09	Average	HORIZONTAL
2	5148.05	61.83	-1.28	60.55	74.00	-13.45	Peak	HORIZONTAL
3	5150.00	45.35	-1.27	44.08	54.00	-9.92	Average	HORIZONTAL
4	5150.00	60.17	-1.27	58.90	74.00	-15.10	Peak	HORIZONTAL

Operation Mode TX CH High Fundamental Frequency 5230MHz Temperature 25

Test Date Test By Dino 65 % Humidity

2013/03/16

No	Freq	Reading	Factor	Level	Limit	Over Limit	Remark	Pol
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB		V/H
1	5350.00	44.98	-0.75	44.23	74.00	-29.77	Peak	VERTICAL
2	5387.65	47.65	-0.64	47.01	74.00	-26.99	Peak	VERTICAL
1	5350.00	44.93	-0.75	44.18	74.00	-29.82	Peak	HORIZONTAL
2	5355.35	47.87	-0.72	47.15	74.00	-26.85	Peak	HORIZONTAL

- Measuring frequencies from the lowest internal frequency to the 10th of fundamental frequen-1 cy
- <sup>2</sup> Field strength limits for frequency above 1000MHz are based on average limits. However, Peak mode field strength shall not exceed the average limits specified plus 20dB.
- 3 Measurement of data within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- 4 Spectrum Peak mode IF bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, Sweep time= 200 ms., the VBW setting was 3 MHz.
- Spectrum AV mode if bandwidth Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, 5 Sweep time= 200 ms.





## 12. TRANSMISSION IN THE ABSENCE OF DATA

#### 12.1 Standard Applicable

According to §15.407(c)

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signalling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization a description of how this requirement is met.

According to RSS-210 A9.4(4)

The device shall automatically discontinue transmission in case of absence of information to transmit, or operational failure. A description on how this is done shall accompany the application for equipment certification. Note that this is not intended to prohibit transmission of control or signalling information or the use of repetitive codes where required by the technology

#### 12.2 Result:

No non-compliance noted: Refer to the theory of operation.





# 13. FREQUENCY STABILITY

### **13.1 Standard Applicable**

According to §15.407 (g) Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

According to A9.5

(5) The applicant shall ensure frequency stability by showing that an emission is maintained within the band of operation under all normal operating conditions as specified in the user's manual.

#### 13.2 Result:

No non-compliance noted: ±20ppm ppm was defined in product specification. -120 of 123-



### 14. ANTENNA REQUIREMENT

#### 14.1 Standard Applicable

According to §15.203, Antenna requirement.

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

According to RSS-GEN 7.1.2, a transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns. Testing shall be performed using the highest-gain antenna of each combination of transmitter and antenna type for which certification is being sought, with the transmitter output power set at the maximum level. Any antenna of the same type and having equal or lesser gain as an antenna that had been successfully tested for certification with the transmitter, will also be considered certified with the transmitter, and may be used and marketed with the transmitter. The manufacturer shall include with the application for certification a list of acceptable antenna types to be used with the transmitter.

When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer. Any antenna gain in excess of 6 dBi (6 dB above isotropic gain) shall be added to the measured RF output power before using the power limits specified in RSS-210 or RSS-310 for devices of RF output powers of 10 milliwatts or less. For devices of output powers greater than 10 milliwatts, except devices subject to RSS-210 Annex 8 (Frequency Hopping and Digital Modulation Systems Operating in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz Bands) or RSS-210 Annex 9 (Local Area Network Devices), the total antenna gain shall be ad ded to the measured RF output power before using the specified power limits. For devices subject to RSS-210 Annex 8 or Annex 9, the antenna gain shall not be added.



### 14.2 Antenna Connected Construction

The directional gins of antenna used for transmitting is -5.2dBi for 2.4G / 5.9dBi for 5G, and the antenna connector is designed with unique type RF connector and no consideration of replacement. Please see EUT photo and antenna spec. for details.

According to KDB662911 D01 SM-MIMO signals could be considered uncorrelated for purposes of directional gain computation.

Directional gain =  $G_{ANT}$ 





## **15.** Maximum Permissible Exposure (MPE)

### **15.1 Standard Applicable**

According to \$1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

This is a Mobile device, the MPE is required.

According to §1.1310 and §2.1091 RF exposure is calculated.

Limits for Maximum Permissive Exposure (MPE)

Frequency Range	Electric Field	Magnetic Field	Power Density	Averaging Time					
(MHz)	Strength (V/m)	Strength (A/m)	$(mW/cm^2)$	(minute)					
Limits for General Population/Uncontrolled Exposure									
0.3-1.34	614	1.63	*(100)	30					
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	30					
30-300	27.5	0.073	0.2	30					
300-1500	/	/	F/1500	30					
1500-15000	/	/	1.0	30					

F =frequency in MHz

\* = Plane-wave equipment power density



### 15.2 Maximum Permissible Exposure (MPE) Evaluation

The worst case of Peak power N HT20 mode: refer to section 6.5 for detail measurement date.

Power measurement:

			Output Ch	ain (dBm)	Combine		
Mode	Freq(MHz)	channel	Chain A	chain B	Peak Output Power (dBm)	Limit(dBm)	Result
	5180	36	11.42	9.72	13.66	16.98	Pass
N HT20	5200	40	10.71	10.09	13.42	16.98	Pass
	5240	48	10.09	10.17	13.14	16.98	Pass

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

S=PG/4  $R^2$ 

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

Maximum peak output power at antenna input terminal:	13.66	(dBm)
Maximum peak output power at antenna input terminal:	23.22736796	(mW)
Duty cycle:	100	(%)
Maximum Pav :	23.22736796	(mW)
Antenna gain (typical):	5.9	(dBi)
Maximum antenna gain:	3.89045145	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5180	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm2)
Power density at predication frequency at 20 (cm)	0.0179867	(mW/cm^2)

#### Measurement Result

The predicted power density level at 20 cm is  $0.0179 \text{ mW/cm}^2$ . This is below the uncontrolled exposure limit of 1 mW/cm<sup>2</sup> at 5180MHz.