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# TEST REPORT

**FCC ID: VLJ-HUGO**

**Product: Hugo**

**Model No.: H100**

**Additional Model No.: N/A**

**Trade Mark: Hubble Hugo / Binatone Hugo**

**Report No.: FCC17111011A-3**

**Issued Date: March 13, 2018**

**Issued for:**

**Binatone Electronics International LTD.**

**Floor 23A, 9 Des Voeux Road West, Sheung Wan, Hong Kong**

**Issued By:**

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# 1. GENERAL INFORMATION

<b>Product:</b>	Hugo
<b>Model No.:</b>	H100
<b>Additional Model:</b>	N/A
<b>Applicant:</b>	Binatone Electronics International LTD.
<b>Address:</b>	Floor 23A, 9 Des Voeux Road West, Sheung Wan, Hong Kong
<b>Manufacturer:</b>	Binatone Electronics International LTD.
<b>Address:</b>	Floor 23A, 9 Des Voeux Road West, Sheung Wan, Hong Kong
<b>Data of receipt:</b>	September 29, 2017
<b>Date of Test:</b>	February 09, 2018 to March 09, 2018
<b>Applicable Standards:</b>	FCC CFR Title 47 Part 15 Subpart C Section 15.247

The above equipment has been tested by World Standardization Certification & Testing Group Co., Ltd. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

**Tested By:** Pu Shixi  
( Pu Shixi)

**Date:** 2018.03.13

**Check By:** Qin Shuiquan  
( Qin Shuiquan)

**Date:** 2018.03.13

**Approved By:** Wang Fengbing  
(Wang Fengbing)

**Date:** 2018.03.13





### 1.1 GENERAL DESCRIPTION OF EUT

Model No.	H100
Product	Hugo
Brand Name	<b>Hubble Hugo / Binatone Hugo</b>
Hardware version:	N/A
Software version:	N/A
Extreme Temp. Tolerance	-10°C to +55°C
Adapter Information:	Adapter:HNC050300U Input: AC100~240V 50/60Hz 0.45A MAX Output: 5.0V=3.0A
Battery information:	Li-Polymer Battery :TMB724050 PLE1800 Voltage: 3.7V Capacity: 1800mAh Limited Charge Voltage: 4.2V
Operating Frequency	2412-2462MHz
Channels	11
Channel Spacing	5MHz
Modulation Type	CCK for IEEE 802.11b OFDM for IEEE 802.11g/n HT-20
Antenna Type:	Integral antenna
Antenna gain:	0 dBi
Deviation	None
Condition of Test Sample	Normal





## 1.2. FACILITIES AND ACCREDITATIONS

All measurement facilities used to collect the measurement data are located at **Building A-B, Baoshi Science & Technology Park, Baoshi Road, Bao'an District, Shenzhen, Guangdong, China of the World Standardization Certification & Testing Group CO., LTD, 518108**

### FCC Registration Number: 366353

The data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C 63.10-2013. The sample tested as described in this report is in compliance with the FCC Rules Part15 Subpart C.

ALL the testing were referenced KDB NO.558074V04

The offset factor to the measurement is conducted as the average.

The test results of this report relate only to the tested sample identified in this report

### 1.2.1. ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

- USA** NVLAP (The certificate registration number is NVLAP LAB CODE:600142-0)
- Japan** VCCI (The certificate registration number is C-4790, R-3684, G-837)
- Canada** INDUSTRY CANADA (The certificated registration number is 7700A-1)
- China** CNAS (The certificated registration number is L3732)

Copies of granted accreditation certificates are available for downloading from our web site, <http://www.wsct-cert.com>





## 2. TEST DESCRIPTION

### 2.1 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately **95 %**.

No.	Item	Uncertainty
1	Conducted Emission Test	$\pm 3.2\text{dB}$
2	RF power,conducted	$\pm 0.16\text{dB}$
3	Spurious emissions,conducted	$\pm 0.21\text{dB}$
4	All emissions,radiated(<1G)	$\pm 4.7\text{dB}$
5	All emissions,radiated(>1G)	$\pm 4.7\text{dB}$
6	Temperature	$\pm 0.5^\circ\text{C}$
7	Humidity	$\pm 2\%$





## 2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	802.11b
Mode 2	802.11g
Mode 3	802.11n20

For Conducted Emission	
Final Test Mode	Description
Mode 1	802.11b

For Radiated Emission	
Final Test Mode	Description
Mode 1	802.11b
Mode 2	802.11g
Mode 3	802.11n20

Note:

- (1) *The measurements are performed at the highest, middle, lowest available channels.*
- (2) *The EUT use new battery.*
- (3) *The data rate was set in 1Mbps,6 Mbps,6.5 Mbps for radiated emission due to the highest RF output power.*
- (4) *Record the worst case of each test item in this report.*
- (5) *when we test the equipment,duty cycle≥98%.*







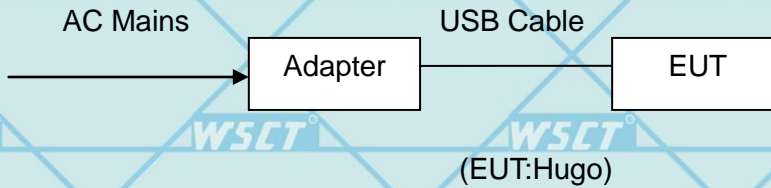
### 2.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power

Test software Version	N/A
Test program	N/A

Frequency(802.11b/g/n20)	2412 MHz	2437 MHz	2462 MHz
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### 2.4 CONFIGURATION OF SYSTEM UNDER TEST



I/O Port of EUT			
I/O Port Type	Q'TY	Cable	Tested with
USB port	1	1m USB cable, unshielded	1
Power	1	1m	1

### 2.5 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
1	Adapter	/	HNC050300U	/	/
2	Earphone	/	N/A	/	/

Note:

- (1) The support equipment was authorized by Declaration of Confirmation.
- (2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.
- (3) “YES” is means “shielded” “with core”; “NO” is means “unshielded” “without core”.
- (4) The adapter supply by the applicant.





# 3.SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission Test	PASS	Complies
15.247(a)(2) Limit	Spectrum bandwidth of a Orthogonal Frequency Division Multiplex System Limit: 6dB bandwidth>500kHz	PASS	Complies
15.247(b)	Maximum peak outputpower Limit: max. 30dBm	PASS	Complies
15.109,15.205&15.209	Transmitter Radiated Emission Limit: Table 15.209	PASS	Complies
15.247(e)	Power Spectral Density Limit: max. 8dBm	PASS	Complies
15.247(d)	Bandedge Limit: 30dB less than Reference level Restricted band limit: Table 15.209	PASS	Complies

NOTE:

(1) "N/A" denotes test is not applicable in this test report.





# 4. MEASUREMENT INSTRUMENTS

NAME OF EQUIPMENT	MANUFACTURER	MODEL	SERIAL NUMBER	Calibration Date	Calibration Due.
EMI Test Receiver	R&S	ESCI	100005	08/19/2017	08/18/2018
LISN	AFJ	LS16	16010222119	08/19/2017	08/18/2018
LISN(EUT)	Mestec	AN3016	04/10040	08/19/2017	08/18/2018
Universal Radio Communication Tester	R&S	CMU 200	1100.0008.02	08/19/2017	08/18/2018
Coaxial cable	Megalon	LMR400	N/A	08/12/2017	08/11/2018
GPIB cable	Megalon	GPIB	N/A	08/12/2017	08/11/2018
Spectrum Analyzer	R&S	FSU	100114	08/19/2017	08/18/2018
Pre Amplifier	H.P.	HP8447E	2945A02715	10/13/2017	10/12/2018
Pre-Amplifier	CDSI	PAP-1G18-38	--	10/13/2017	10/12/2018
Bi-log Antenna	SUNOL Sciences	JB3	A021907	09/13/2017	09/12/2018
9*6*6 Anechoic	--	--	--	08/21/2017	08/20/2018
Horn Antenna	COMPLIANCE ENGINEERING	CE18000	--	09/13/2017	09/12/2018
Horn Antenna	SCHWARZBECK	BBHA9120D	9120D-631	08/23/2017	08/22/2018
Cable	TIME MICROWAVE	LMR-400	N-TYPE04	04/25/2017	04/24/2018
System-Controller	CCS	N/A	N/A	N.C.R	N.C.R
Turn Table	CCS	N/A	N/A	N.C.R	N.C.R
Antenna Tower	CCS	N/A	N/A	N.C.R	N.C.R
RF cable	Murata	MXHQ87WA3000	-	08/21/2017	08/20/2018
Loop Antenna	EMCO	6502	00042960	08/22/2017	08/21/2018
Horn Antenna	SCHWARZBECK	BBHA 9170	1123	08/19/2017	08/18/2018
Power meter	Anritsu	ML2487A	6K00003613	08/23/2017	08/22/2018
Power sensor	Anritsu	MX248XD	--	08/19/2017	08/18/2018





# 5. EMC EMISSION TEST

## 5.1 CONDUCTED EMISSION MEASUREMENT

### 5.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

Frequency of emission (MHz)	Conducted limit (dB $\mu$ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " \* " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz





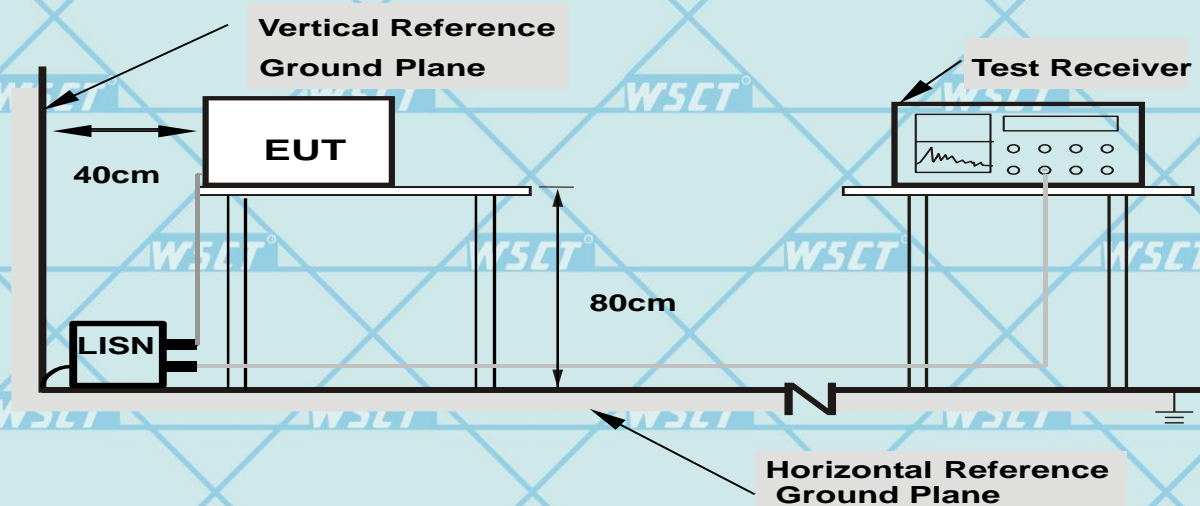
### 5.1.2 TEST PROCEDURE

- The EUT was placed 0.4 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- LISN at least 80 cm from nearest part of EUT chassis.
- For the actual test configuration, please refer to the related Item –EUT Test Photos.

### 5.1.3 DEVIATION FROM TEST STANDARD

No deviation

### 5.1.4 TEST SETUP



- Note:**
- Support units were connected to second LISN.
  - Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

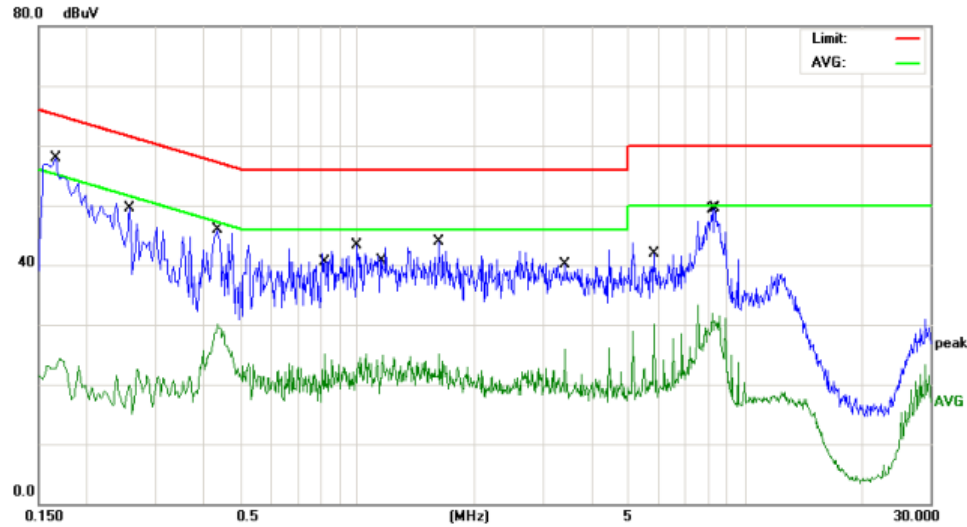
### 5.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.




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**5.1.6 TEST RESULTS**

Model Name	H100	Test Mode	Mode 1
Temperature	26 °C	RelativeHumidity	54%
Pressure	1010hPa	Phase	L



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1	*	0.1660	46.16	11.68	57.84	65.15	-7.31	QP
2		0.2580	38.40	11.12	49.52	61.49	-11.97	QP
3		0.4340	34.93	10.90	45.83	57.18	-11.35	QP
4		0.4380	18.66	10.89	29.55	47.10	-17.55	AVG
5		0.8260	14.38	10.71	25.09	46.00	-20.91	AVG
6		0.9980	32.67	10.63	43.30	56.00	-12.70	QP
7		1.1620	14.23	10.62	24.85	46.00	-21.15	AVG
8		1.6220	33.22	10.60	43.82	56.00	-12.18	QP
9		3.4220	15.44	10.56	26.00	46.00	-20.00	AVG
10		5.8180	19.48	10.54	30.02	50.00	-19.98	AVG
11		8.2100	21.29	10.57	31.86	50.00	-18.14	AVG
12		8.3620	38.85	10.57	49.42	60.00	-10.58	QP

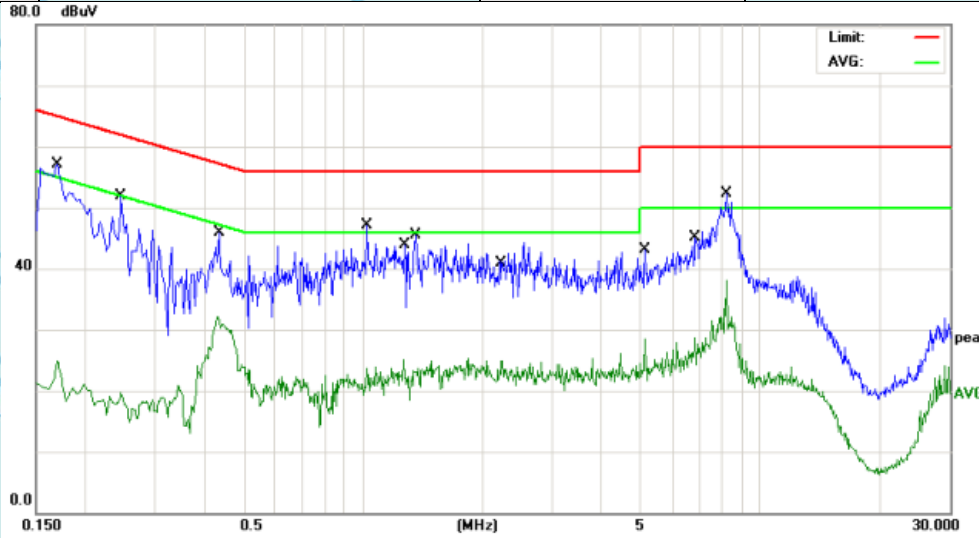
Remark: All the modes have been investigated, and only worst mode is presented in this report.





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Model Name	H100	Test Mode	Mode 1
Temperature	26 °C	Relative Humidity	54%
Pressure	1010hPa	Phase	N



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1		0.1700	45.49	11.62	57.11	64.96	-7.85	QP
2		0.2460	40.78	11.14	51.92	61.89	-9.97	QP
3		0.4340	34.91	10.90	45.81	57.18	-11.37	QP
4		0.4351	20.34	10.89	31.23	47.15	-15.92	AVG
5		1.0260	36.39	10.63	47.02	56.00	-8.98	QP
6		1.2660	14.39	10.63	25.02	46.00	-20.98	AVG
7		1.3580	34.95	10.62	45.57	56.00	-10.43	QP
8		2.2380	14.31	10.58	24.89	46.00	-21.11	AVG
9		5.1380	18.01	10.53	28.54	50.00	-21.46	AVG
10		6.8460	18.14	10.57	28.71	50.00	-21.29	AVG
11	*	8.2180	41.73	10.57	52.30	60.00	-7.70	QP
12		8.2180	27.48	10.57	38.05	50.00	-11.95	AVG

Remark: All the modes have been investigated, and only worst mode is presented in this report.





## 5.2 RADIATED EMISSION MEASUREMENT

### 5.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

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

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

Notes:

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

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

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







### 5.2.2 TEST PROCEDURE

- a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment or of the substitution antenna shall be 0.8 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

***Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported***

### 5.2.3 DEVIATION FROM TEST STANDARD

No deviation

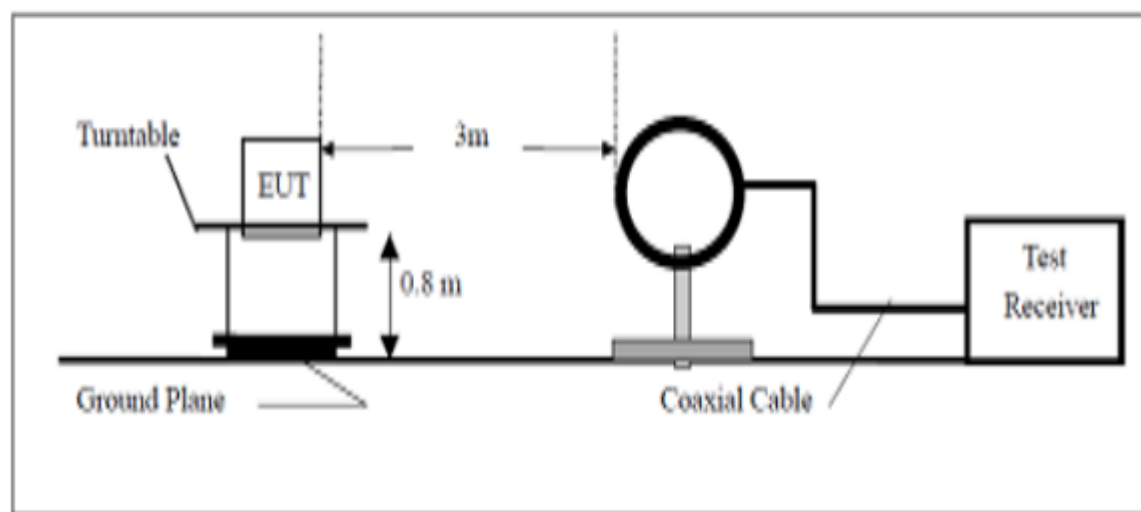




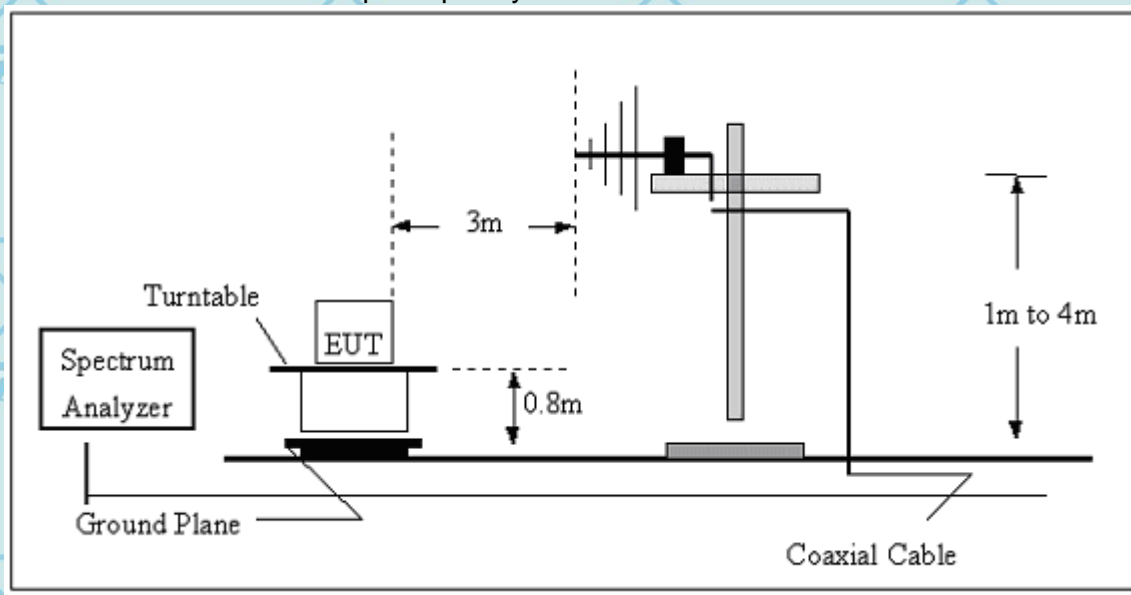
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5.2.4 TEST SETUP

(A) Radiated Emission Test-Up Frequency Below 30MHz

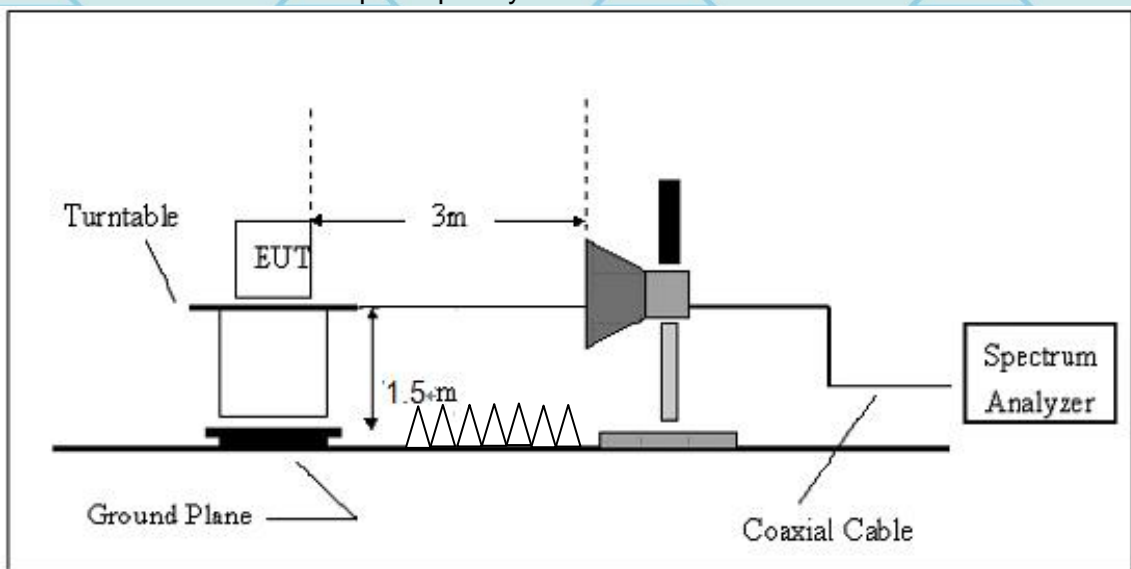


(B) Radiated Emission Test-Up Frequency 30MHz~1GHz





(C) Radiated Emission Test-Up Frequency Above 1GHz



**5.2.5 EUT OPERATING CONDITIONS**

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.




**5.2.5.1 RESULTS (BELOW 30 MHZ)**

Model Name	H100	Test Mode	Mode 1
Temperature	20 °C	Relative Humidity	48%
Pressure	1010 hPa	Polarization	---

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

**NOTE:**

No result in this part for margin above 20dB.

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

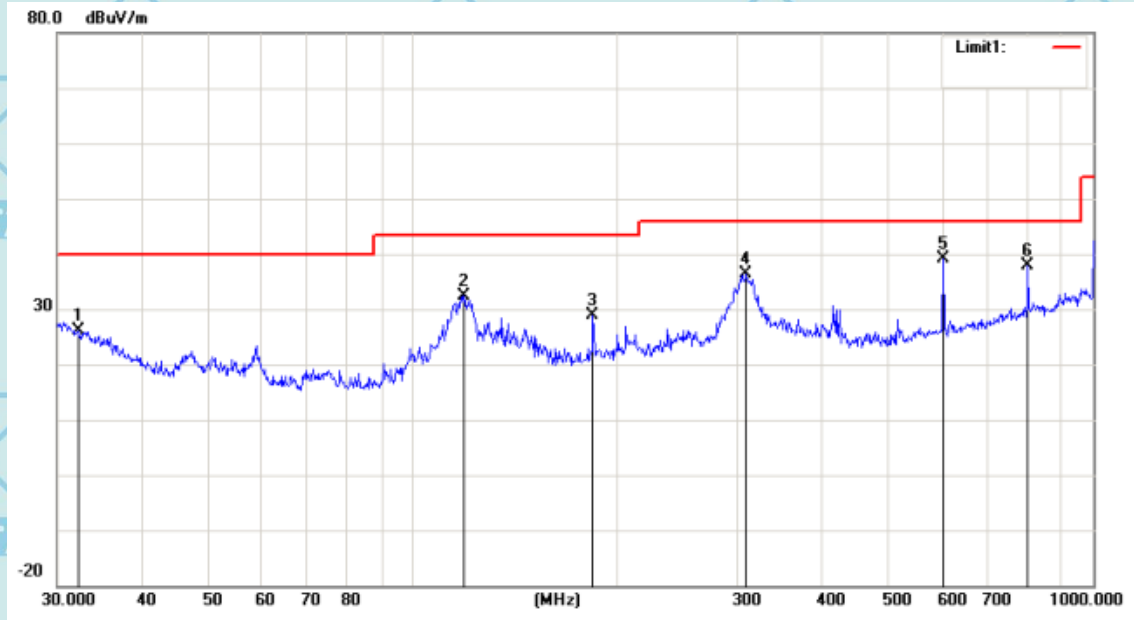
Limit line = specific limits(dBuV) + distance extrapolation factor.

All the x/y/z orientation has been investigated, and only worst case is presented in this report.




**5.2.5.2 TEST RESULTS (BETWEEN 30M – 1000 MHZ)**

Model Name	H100	Test Mode	Mode 1
Temperature	20 °C	Relative Humidity	48%
Pressure	1010 hPa	Polarization :	Horizontal



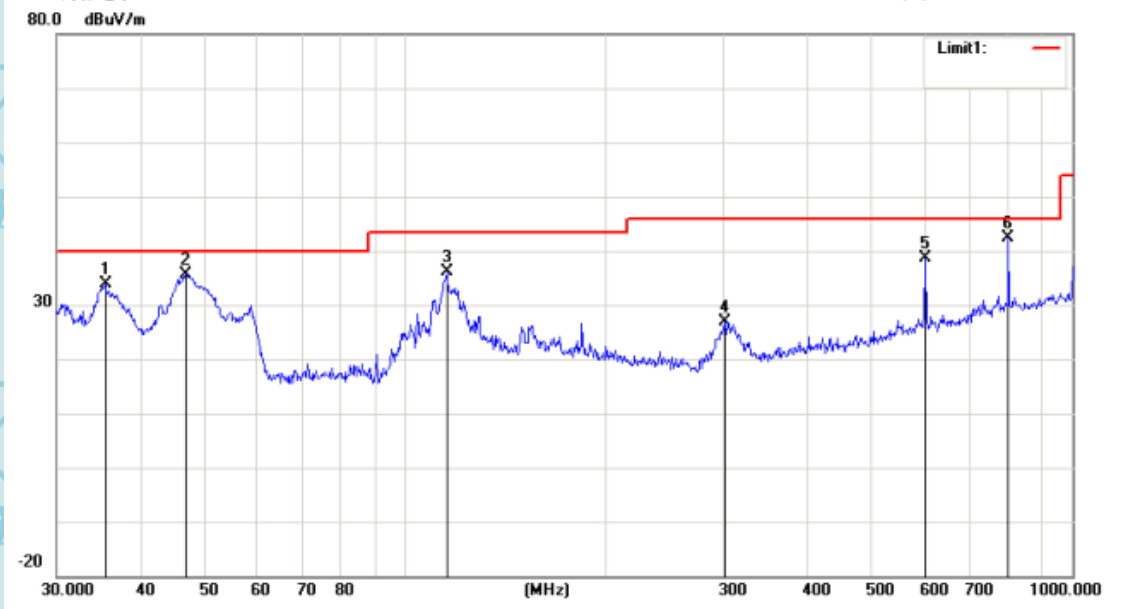
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		32.1795	24.11	2.03	26.14	40.00	-13.86	QP
2		119.0180	34.77	-2.41	32.36	43.50	-11.14	QP
3		183.8440	34.03	-5.25	28.78	43.50	-14.72	QP
4		308.9126	40.90	-4.47	36.43	46.00	-9.57	QP
5	*	601.4265	38.11	1.04	39.15	46.00	-6.85	QP
6		801.7863	33.65	4.29	37.94	46.00	-8.06	QP

Remark: All the modes have been investigated, and only worst mode is presented in this report.





Model Name	H100	Test Mode	Mode 1
Temperature	20 °C	Relative Humidity	48%
Pressure	1010 hPa	Polarization :	Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		35.4993	33.99	-0.23	33.76	40.00	-6.24	QP
2		46.8303	43.20	-7.56	35.64	40.00	-4.36	QP
3		115.3205	38.94	-2.74	36.20	43.50	-7.30	QP
4		301.4224	32.48	-5.54	26.94	46.00	-19.06	QP
5		601.4265	37.47	1.04	38.51	46.00	-7.49	QP
6	*	801.7863	38.15	4.29	42.44	46.00	-3.56	QP

Remark: All the modes have been investigated, and only worst mode is presented in this report.




**5.2.5.3 TEST RESULTS (1GHZ TO 25GHZ)**

Model Name	H100	Test Mode	Mode 1 TX
Temperature	20 °C	Relative Humidity	48%
Pressure	1010 hPa		

Freq. (MHz)	Ant.Pol.	Emission Level(dBuV)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
4824	V	60.54	41.25	74	54	-13.46	-12.75
7236	V	59.78	40.20	74	54	-14.22	-13.80
4824	H	58.20	39.58	74	54	-15.80	-14.42
7236	H	58.85	39.85	74	54	-15.15	-14.15

**Remark:**

All emissions not reported were more than 20dB below the specified limit or in the noise floor.  
 Factor = Antenna Factor + Cable Loss – Pre-amplifier.  
 All the x/y/z orientation has been investigated, and only worst case is presented in this report.

Model Name	H100	Frequency	2437MHz
Temperature	20 °C	Relative Humidity	48%
Pressure	1010 hPa	Test Mode	Mode 1TX

Freq. (MHz)	Ant.Pol.	Emission Level(dBuV)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
4874	V	58.31	41.79	74	54	-15.69	-12.21
7311	V	58.28	39.84	74	54	-15.72	-14.16
4874	H	59.70	40.06	74	54	-14.30	-13.94
7311	H	58.58	39.58	74	54	-15.42	-14.42

**Remark:**

All emissions not reported were more than 20dB below the specified limit or in the noise floor.  
 Factor = Antenna Factor + Cable Loss – Pre-amplifier.  
 All the x/y/z orientation has been investigated, and only worst case is presented in this report.





Model Name	H100	Frequency	2462MHz
Temperature	20 °C	Relative Humidity	48%
Pressure	1010 hPa	Test Mode	Mode 1TX

Freq. (MHz)	Ant.Pol.	Emission Level(dBuV)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
4924	V	60.74	40.42	74	54	-13.26	-13.58
7386	V	59.95	40.94	74	54	-14.05	-13.06
4924	H	59.18	40.33	74	54	-14.82	-13.67
7386	H	58.86	39.86	74	54	-15.14	-14.14

**Remark:**

All emissions not reported were more than 20dB below the specified limit or in the noise floor.

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

All the x/y/z orientation has been investigated, and only worst case is presented in this report.

Model Name	H100	Frequency	2412MHz
Temperature	20 °C	Relative Humidity	48%
Pressure	1010 hPa	Test Mode	Mode2TX

Freq. (MHz)	Ant.Pol.	Emission Level(dBuV)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
4824	V	59.86	41.75	74	54	-14.14	-12.25
7236	V	59.49	39.27	74	54	-14.51	-14.73
4824	H	58.17	39.32	74	54	-15.83	-14.68
7236	H	58.26	39.26	74	54	-15.74	-14.74

**Remark:**

All emissions not reported were more than 20dB below the specified limit or in the noise floor.

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

All the x/y/z orientation has been investigated, and only worst case is presented in this report.







Model Name	H100	Frequency	2437MHz
Temperature	20 °C	Relative Humidity	48%
Pressure	1010 hPa	Test Mode	Mode 2 TX

Freq. (MHz)	Ant.Pol.	Emission Level(dBuV)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
4874	V	60.04	40.16	74	54	-13.96	-13.84
7311	V	58.60	40.00	74	54	-15.40	-14.00
4874	H	59.02	40.18	74	54	-14.98	-13.82
7311	H	58.79	39.79	74	54	-15.21	-14.21

**Remark:**

All emissions not reported were more than 20dB below the specified limit or in the noise floor.  
 Factor = Antenna Factor + Cable Loss – Pre-amplifier.  
 All the x/y/z orientation has been investigated, and only worst case is presented in this report.

Model Name	H100	Frequency	2462MHz
Temperature	20 °C	Relative Humidity	48%
Pressure	1010 hPa	Test Mode	Mode 2 TX

Freq. (MHz)	Ant.Pol.	Emission Level(dBuV)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
4924	V	58.81	39.85	74	54	-15.19	-14.15
7386	V	59.42	40.99	74	54	-14.58	-13.01
4924	H	59.02	39.29	74	54	-14.98	-14.71
7386	H	58.05	39.05	74	54	-15.95	-14.95

**Remark:**

All emissions not reported were more than 20dB below the specified limit or in the noise floor.  
 Factor = Antenna Factor + Cable Loss – Pre-amplifier.  
 All the x/y/z orientation has been investigated, and only worst case is presented in this report.





Model Name	H100	Frequency	2412MHz
Temperature	20 °C	Relative Humidity	48%
Pressure	1010 hPa	Test Mode	Mode3 TX

Freq. (MHz)	Ant.Pol.	Emission Level(dBuV)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
4824	V	59.98	41.13	74	54	-14.02	-12.87
7236	V	59.85	40.90	74	54	-14.15	-13.10
4824	H	59.50	40.95	74	54	-14.50	-13.05
7236	H	59.55	40.55	74	54	-14.45	-13.45

**Remark:**

All emissions not reported were more than 20dB below the specified limit or in the noise floor.  
 Factor = Antenna Factor + Cable Loss – Pre-amplifier.

All the x/y/z orientation has been investigated, and only worst case is presented in this report.

Model Name	H100	Frequency	2437MHz
Temperature	20 °C	Relative Humidity	48%
Pressure	1010 hPa	Test Mode	Mode 3 TX

Freq. (MHz)	Ant.Pol.	Emission Level(dBuV)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
4874	V	59.44	39.41	74	54	-14.56	-14.59
7311	V	58.28	39.09	74	54	-15.72	-14.91
4874	H	59.98	40.42	74	54	-14.02	-13.58
7311	H	58.26	39.26	74	54	-15.74	-14.74

**Remark:**

All emissions not reported were more than 20dB below the specified limit or in the noise floor.  
 Factor = Antenna Factor + Cable Loss – Pre-amplifier.

All the x/y/z orientation has been investigated, and only worst case is presented in this report.





Model Name	H100	Frequency	2462MHz
Temperature	20 °C	Relative Humidity	48%
Pressure	1010 hPa	Test Mode	Mode 3TX

Freq. (MHz)	Ant.Pol.	Emission Level(dBuV)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
4924	V	59.81	39.91	74	54	-14.19	-14.09
7386	V	58.63	39.99	74	54	-15.37	-14.01
4924	H	58.30	40.67	74	54	-15.70	-13.33
7386	H	58.91	39.91	74	54	-15.09	-14.09

**Remark:**

All emissions not reported were more than 20dB below the specified limit or in the noise floor.

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

All the x/y/z orientation has been investigated, and only worst case is presented in this report.





# 6. ANTENNA APPLICATION

## 6.1 Antenna requirement

The EUT'S antenna is met the requirement of FCC part 15C section 15.203 and 15.247

FCC part 15C section 15.247 requirements: Systems operating in the 2402-2480MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

## 6.2 Result

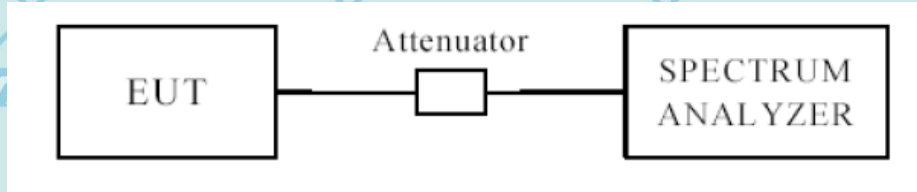
The EUT's antenna is Integral antenna, The antenna's gain is 0dBi and meets the requirement.





# 7.0.6DB BANDWIDTH MEASUREMENT

## 7.1 TEST SETUP



## 7.2 LIMITS OF 6DB BANDWIDTH MEASUREMENT

The minimum of 6dB Bandwidth Measurement is >500 kHz

## 7.3 TEST PROCEDURE

1. Set resolution bandwidth (RBW) = 100 kHz
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

## 7.4 TEST RESULT

6dB Occupied Bandwidth

EUT		Hugo		Model Name		H100	
Mode		802.11b		Humidity		56% RH	
Temperature		24 deg. C,					
Channel	Channel Frequency (MHz)	Data Transfer Rate (Mbps)	6 dB Bandwidth (kHz)	Minimum Limit (MHz)	Pass/ Fail		
1	2412	1	9551.3	0.5	Pass		
6	2437	1	9166.7	0.5	Pass		
11	2462	1	8717.9	0.5	Pass		





EUT		Hugo		Model Name		H100	
Mode		802.11g		Humidity		56% RH	
Temperature		24 deg. C,					
Channel	Channel Frequency (MHz)	Data Transfer Rate (Mbps)	6 dB Bandwidth (kHz)	Minimum Limit (MHz)	Pass/ Fail		
1	2412	6	16538.5	0.5	Pass		
6	2437	6	16346.2	0.5	Pass		
11	2462	6	16089.7	0.5	Pass		

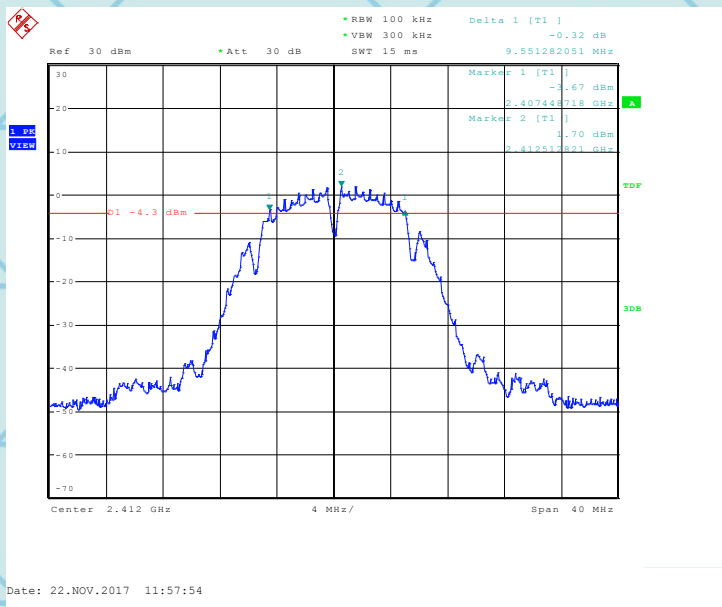
EUT		Hugo		Model Name		H100	
Mode		802.11n20		Humidity		56% RH	
Temperature		24 deg. C,					
Channel	Channel Frequency (MHz)	Data Transfer Rate (Mbps)	6 dB Bandwidth (kHz)	Minimum Limit (MHz)	Pass/ Fail		
1	2412	6.5	17692.3	0.5	Pass		
6	2437	6.5	17692.3	0.5	Pass		
11	2462	6.5	17179.5	0.5	Pass		



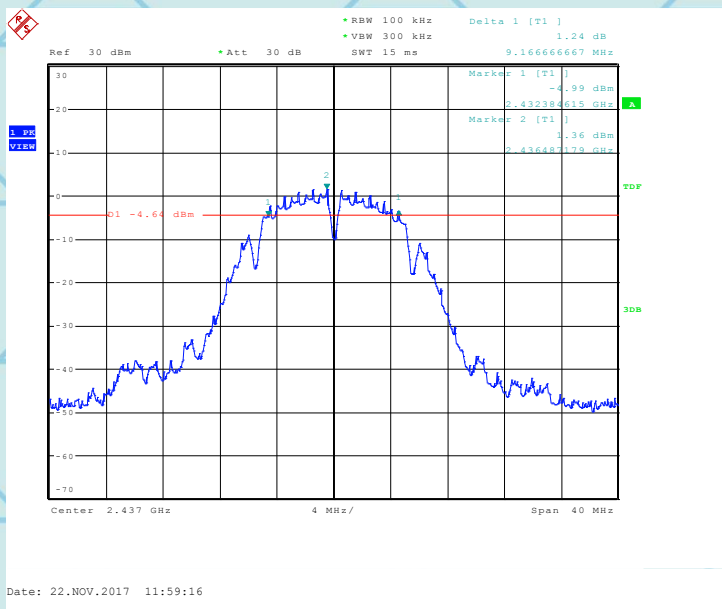


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### 802.11b at 1Mbps of CH1



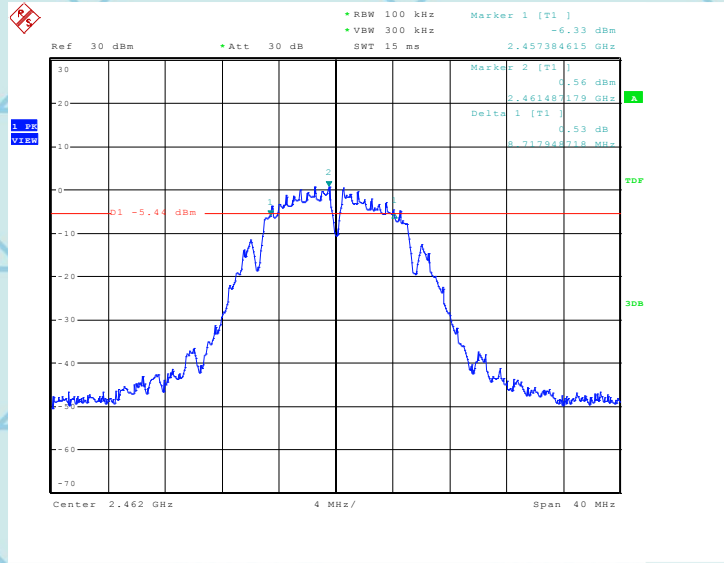
### 802.11b at 1Mbps of CH6



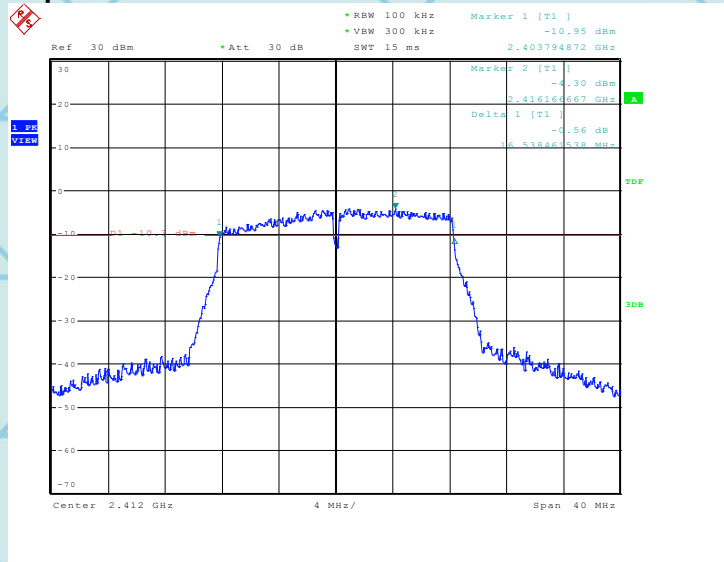


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### 802.11b at 1Mbps of CH11



### 802.11g at 6Mbps of CH1

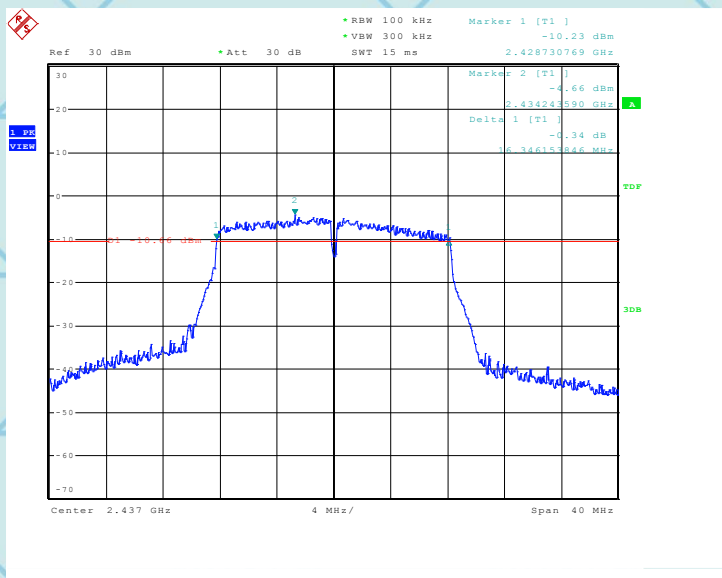




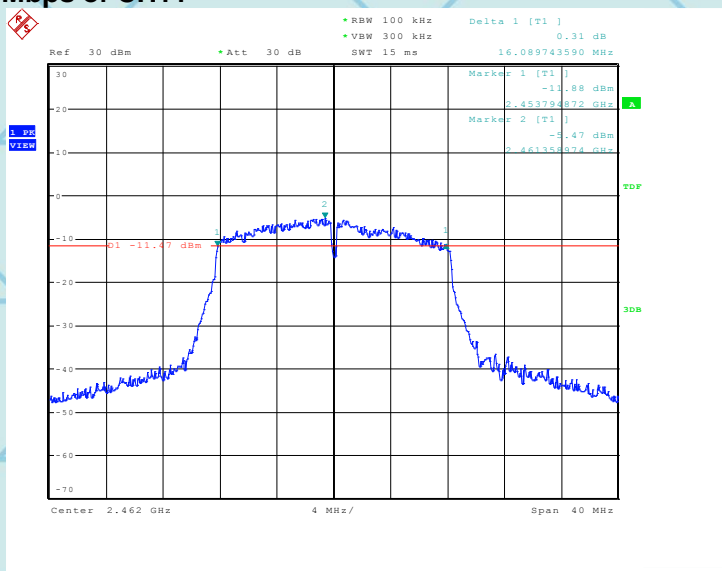


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802.11g at 6Mbps of CH6



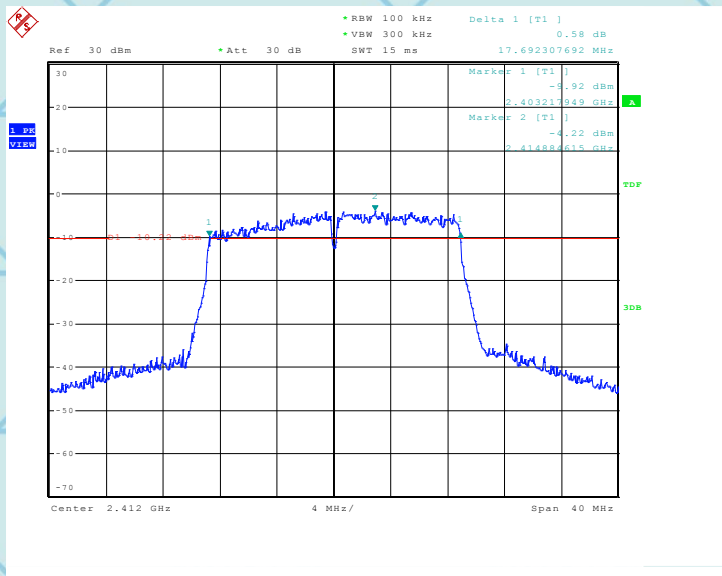
802.11g at 6Mbps of CH11



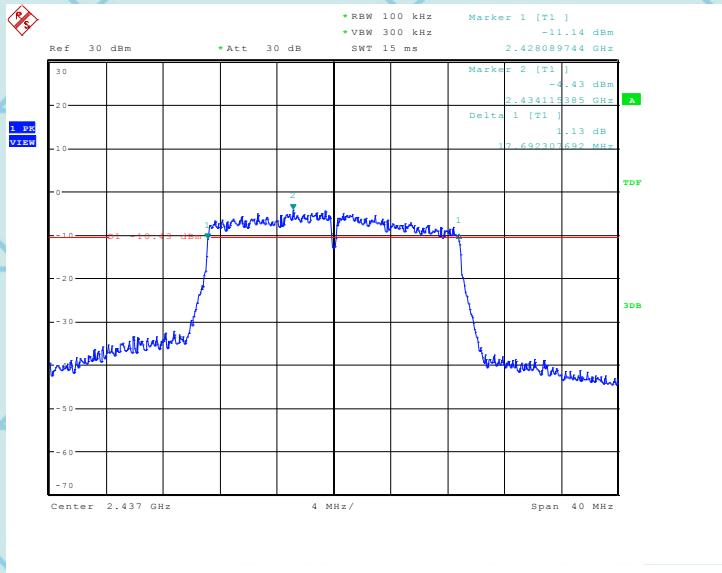


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802.11n at HT20 of CH1



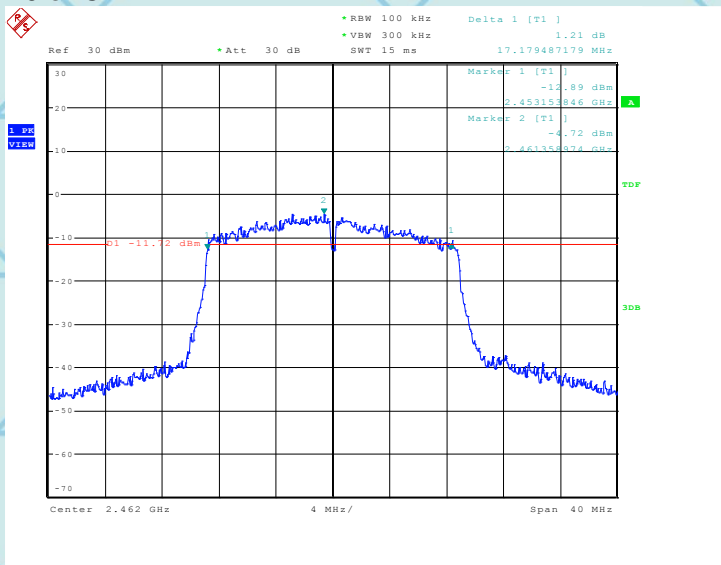
802.11n at HT20 of CH6





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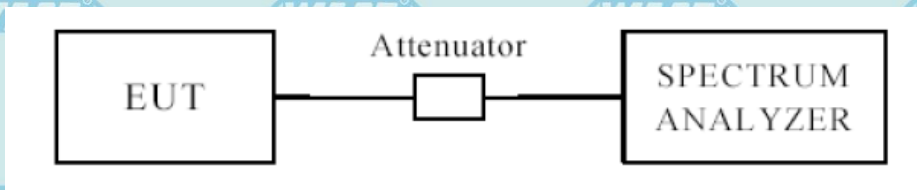
802.11n at HT20 of CH11





# 8.0. MAXIMUM CONDUCTED (AVERAGE) OUTPUT POWER

## 8.1 TEST SETUP



## 8.2 LIMITS OF MAXIMUM CONDUCTED (AVERAGE) OUTPUT POWER

The Maximum conducted (average) Output Power Measurement is 30dBm.

## 8.3 TEST PROCEDURE

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v04.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

## 8.4 TEST RESULTS

EUT	Hugo	Model Name	H100	
Mode	802.11b	Humidity	56% RH	
Temperature	24 deg. C,			
Channel	Channel Frequency (MHz)	(AVERAGE) OUTPUT POWER (dBm)	Power Limit (dBm)	Pass/ Fail
1	2412	15.00	30	Pass
6	2437	14.72	30	Pass
11	2462	13.68	30	Pass

- Note: 1. At final test to get the worst-case emission at 1Mbps for CH1, CH6 and CH11  
 2. The result basic equation calculation as follow:  
 Power Output = Power Reading + Cable loss + Attenuator  
 3. The worse case was recorded





EUT	Hugo		Model Name	H100
Mode	802.11g		Humidity	56% RH
Temperature	24 deg. C,			
Channel	Channel Frequency (MHz)	(AVERAGE) OUTPUT POWER (dBm)	Power Limit (dBm)	Pass/ Fail
1	2412	17.71	30	Pass
6	2437	16.53	30	Pass
11	2462	15.75	30	Pass

- Note: 1. At final test to get the worst-case emission at 6 Mbps for CH1, CH6 and CH11  
 2. The result basic equation calculation as follow:  
 Power Output = Power Reading + Cable loss + Attenuator  
 3. The worse case was recorded

EUT	Hugo		Model Name	H100
Mode	802.11n(HT20)		Humidity	56% RH
Temperature	24 deg. C,			
Channel	Channel Frequency (MHz)	(AVERAGE) OUTPUT POWER (dBm)	Power Limit (dBm)	Pass/ Fail
1	2412	17.53	30	Pass
6	2437	16.81	30	Pass
11	2462	16.04	30	Pass

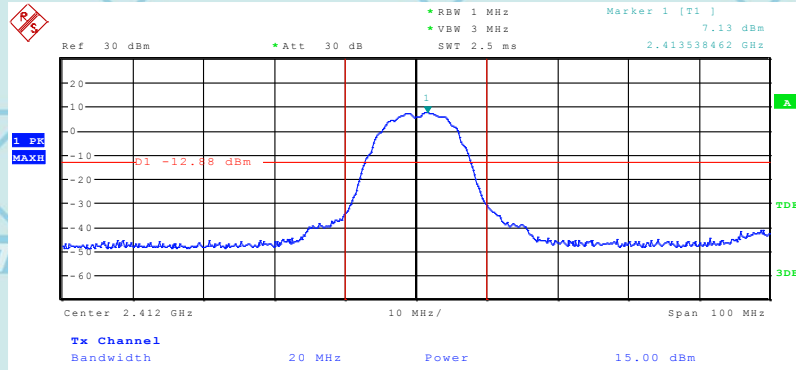
- Note: 1. At final test to get the worst-case emission at 6.5Mbps for CH1, CH6 and CH11  
 2. The result basic equation calculation as follow:  
 Power Output = Power Reading + Cable loss + Attenuator



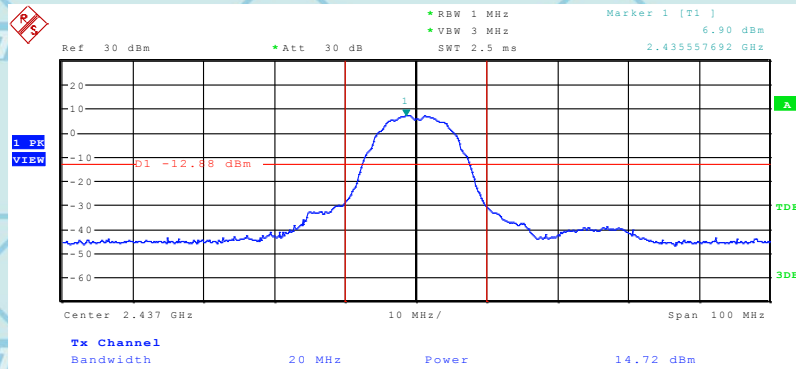


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### 802.11b at 1Mbps of CH1



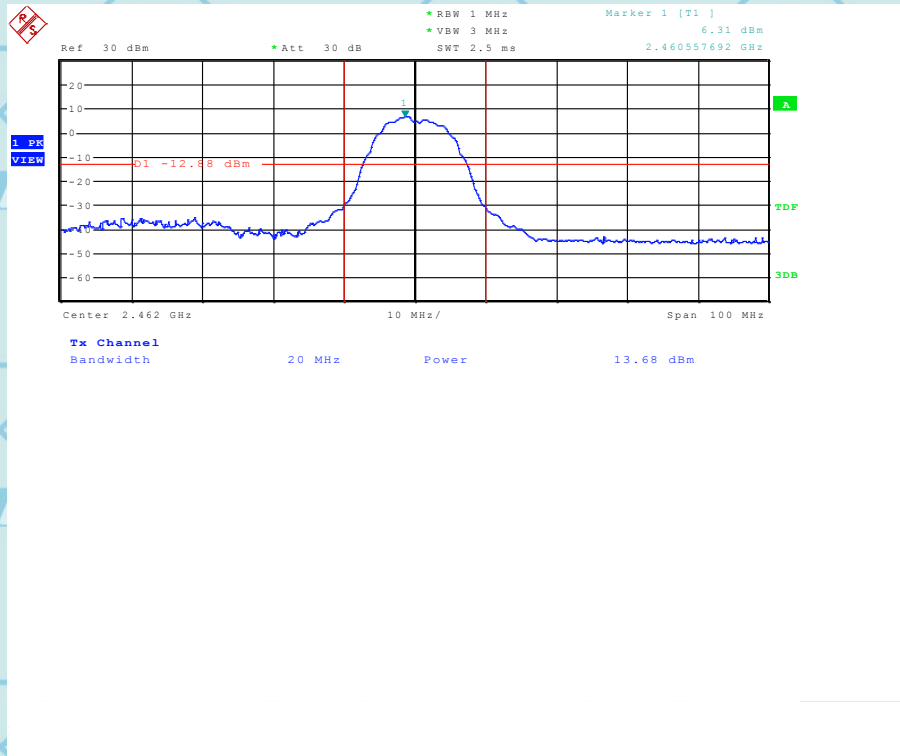
### 802.11b at 1Mbps of CH6



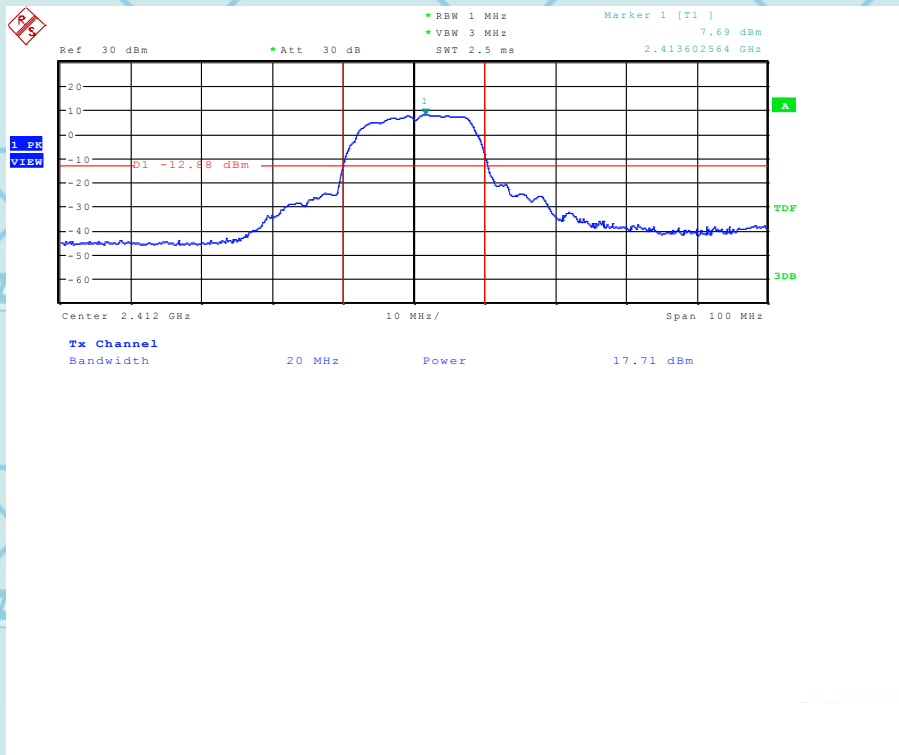


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### 802.11b at 1Mbps of CH11



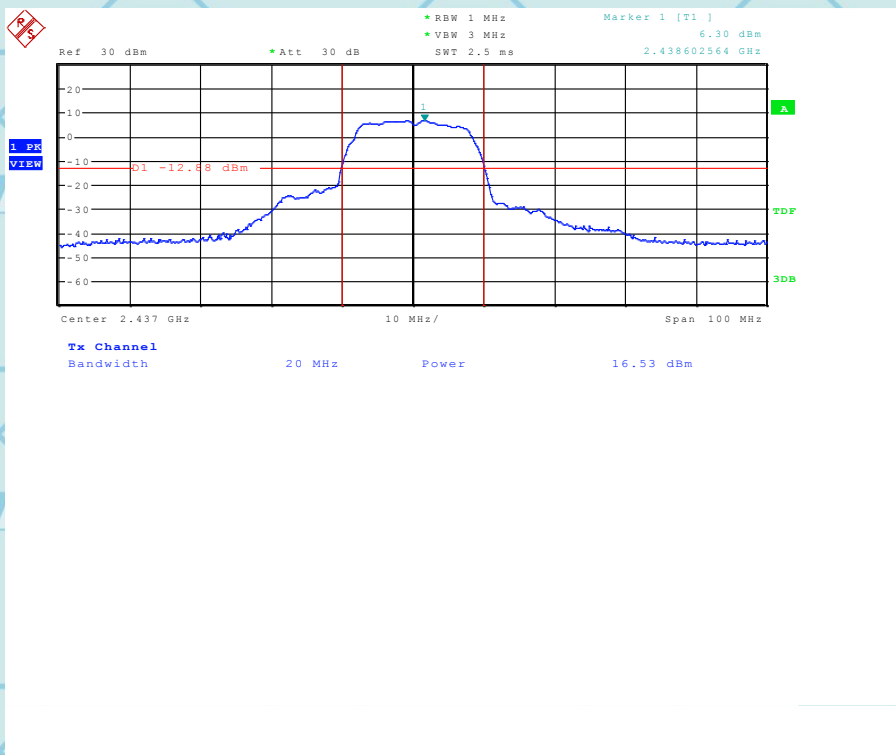
### 802.11g at 6Mbps of CH1





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802.11g at 6Mbps of CH6

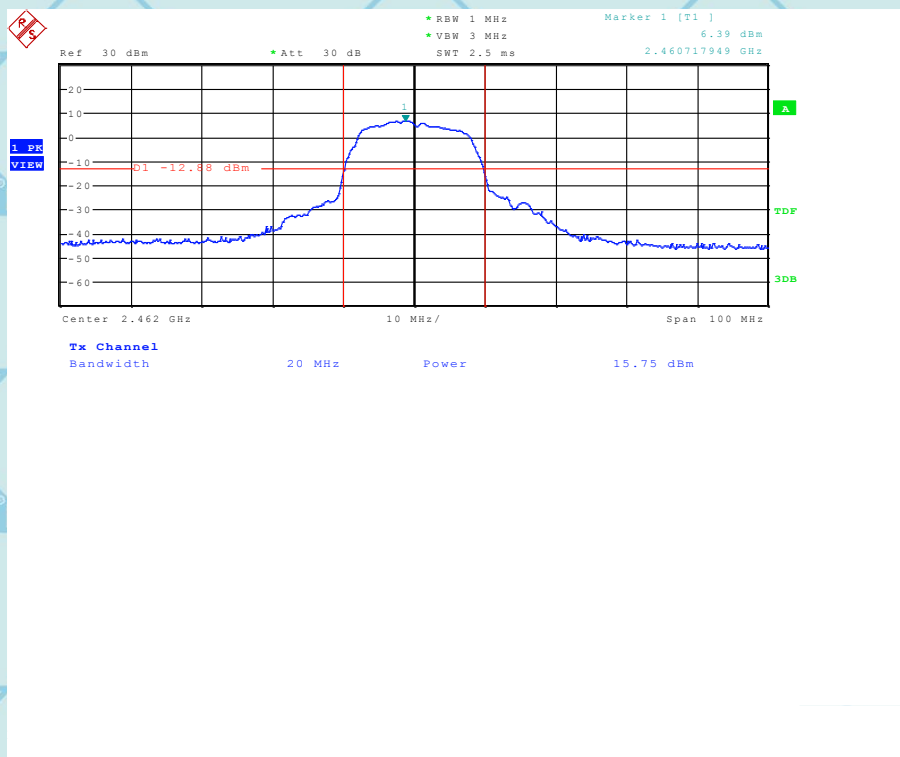






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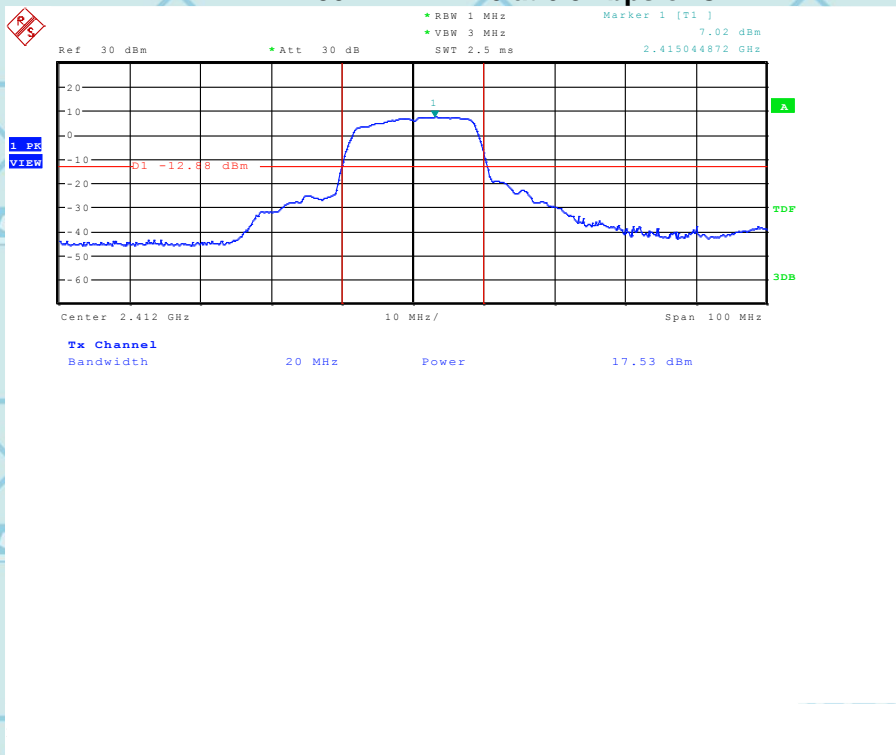
802.11g at 6Mbps of CH11



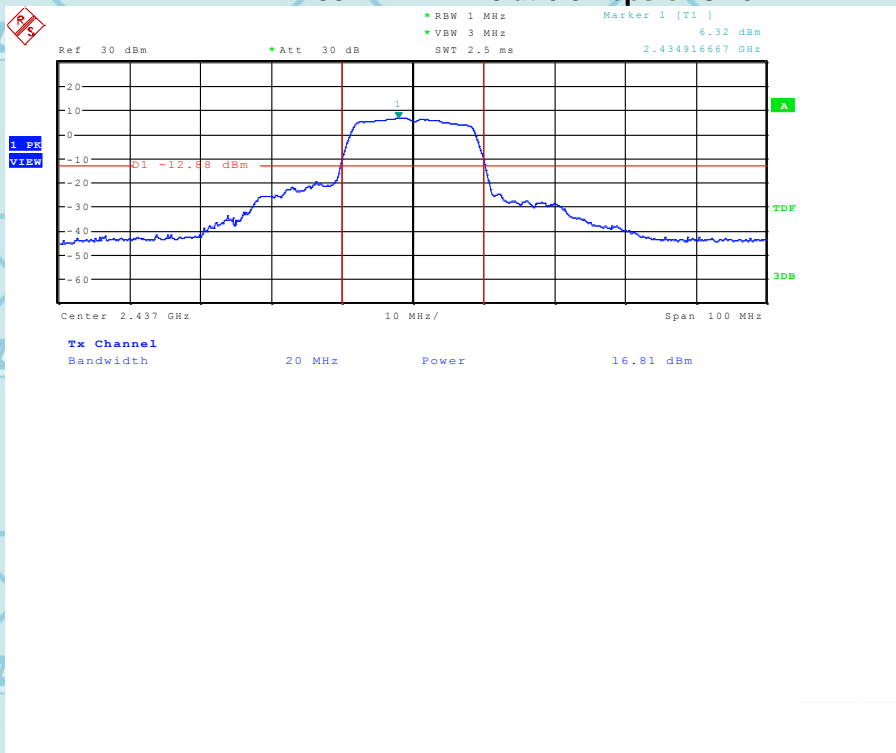


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### 802.11n HT-20 at 6.5Mbps of CH1



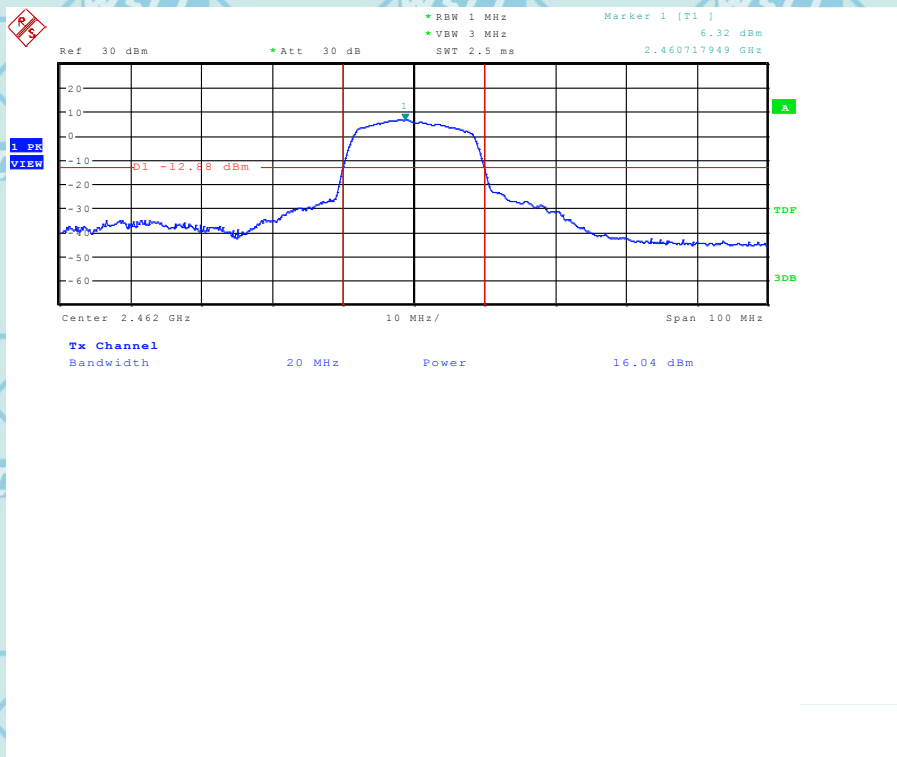
### 802.11n HT-20 at 6.5Mbps of CH6





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802.11n HT-20 at 6.5Mbps of CH11





# 9. POWER SPECTRAL DENSITY MEASUREMENT

## 9.1 TEST SETUP



## 9.2 LIMITS OF POWER SPECTRAL DENSITY MEASUREMENT

The Maximum Power Spectral Density Measurement is 8dBm.

## 9.3 TEST PROCEDURE

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW = 3 kHz.
3. Set the VBW = 10 kHz.
4. Set the span to 1.5 times the DTS channel bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
11. The resulting peak PSD level must be  $\leq 8$  dBm.




**9.4 TEST RESULT**

EUT	Hugo		Model Name	H100	
Mode	802.11b		Humidity	56% RH	
Temperature	24 deg. C,				
Channel	Channel Frequency (MHz)	Final RF Power Level in (dBm)	Maximum Limit (dBm)	Pass/ Fail	
1Mbps					
1	2412	-14.81	8	Pass	
6	2437	-14.07	8	Pass	
11	2462	-14.15	8	Pass	

EUT	Hugo		Model Name	H100	
Mode	802.11g		Humidity	56% RH	
Temperature	24 deg. C,				
Channel	Channel Frequency (MHz)	Final RF Power Level in (dBm)	Maximum Limit (dBm)	Pass/ Fail	
6Mbps					
1	2412	-16.09	8	Pass	
6	2437	-14.57	8	Pass	
11	2462	-14.72	8	Pass	

EUT	Hugo		Model Name	H100	
Mode	802.11n HT20		Humidity	56% RH	
Temperature	24 deg. C,				
Channel	Channel Frequency (MHz)	Final RF Power Level in (dBm)	Maximum Limit (dBm)	Pass/ Fail	
6.5Mbps					
1	2412	-15.86	8	Pass	
6	2437	-15.30	8	Pass	
11	2462	-14.99	8	Pass	

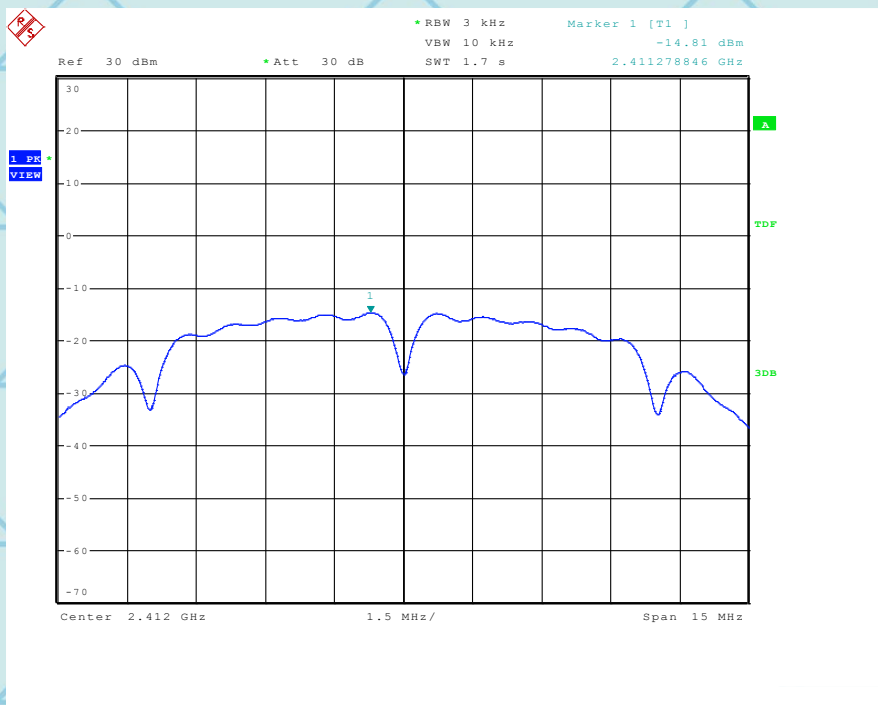
Remark: All of the modes have been investigated, and only worst mode is presented in this report.



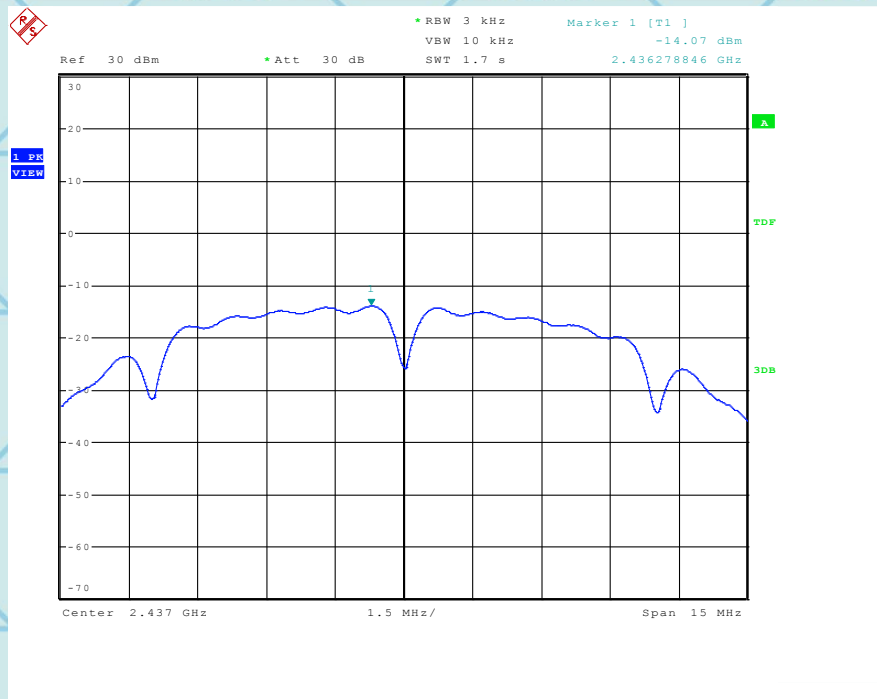


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802.11b at 1Mbps of CH1



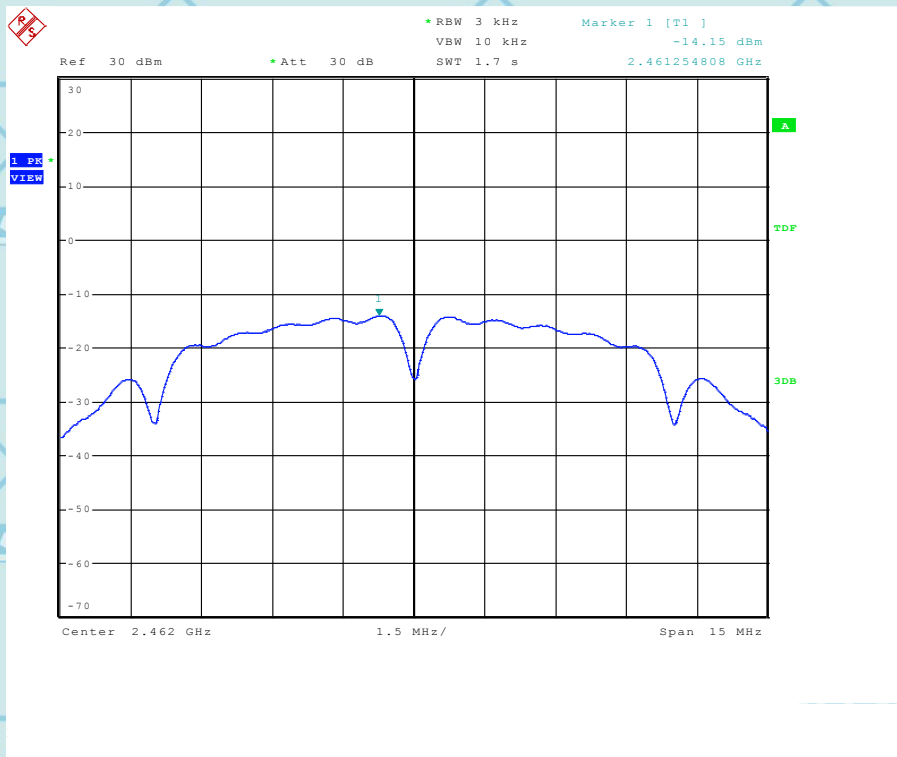
802.11b at 1Mbps at CH6



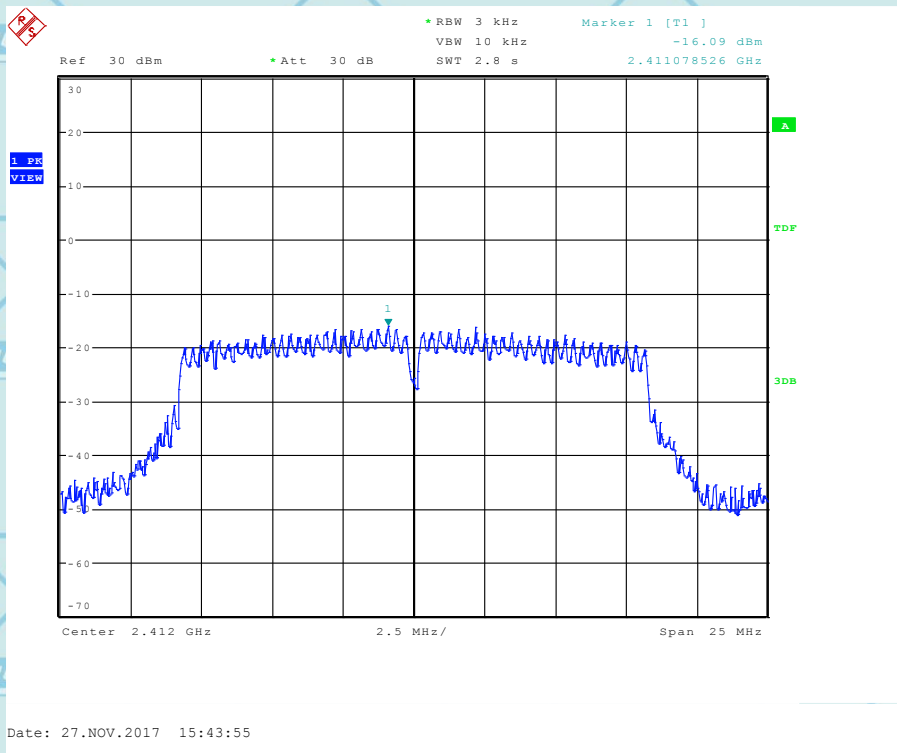


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802.11b at 1Mbps of CH11



802.11g at 6Mbps of CH1



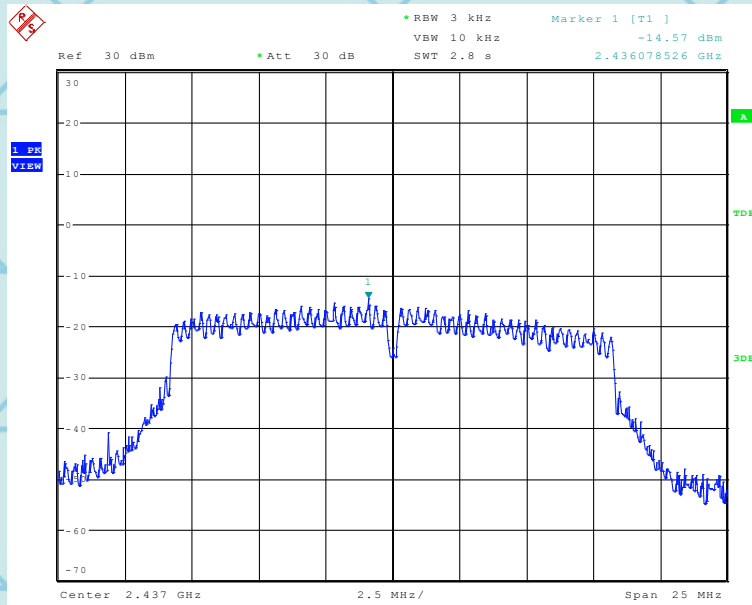
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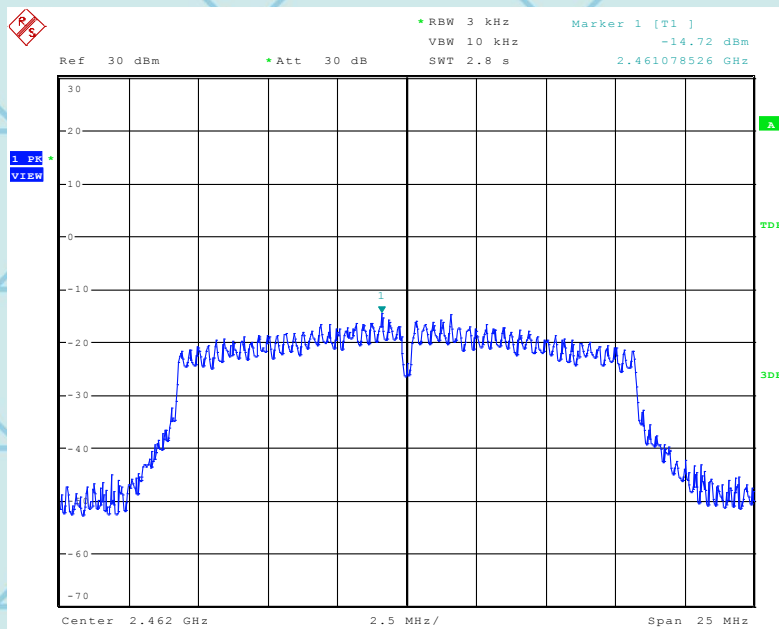


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802.11g at 6Mbps of CH6



802.11g at 6Mbps of CH11

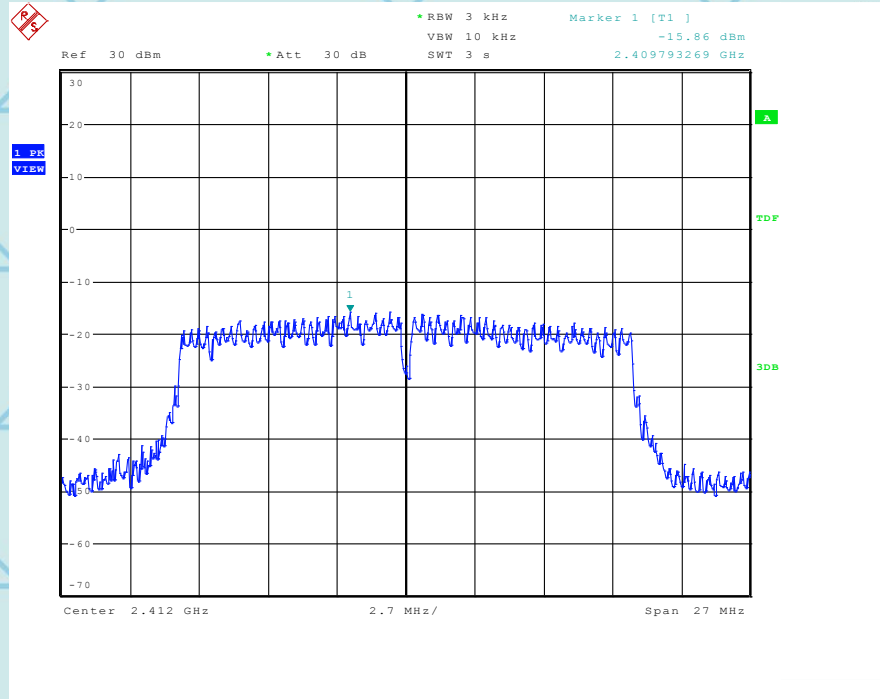




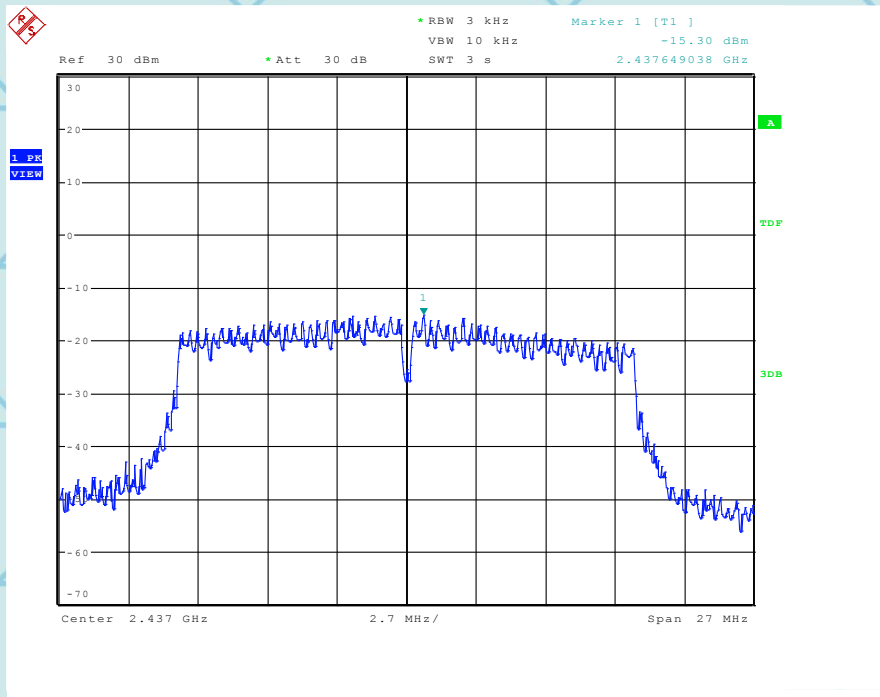


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802.11n HT20 at 6.5Mbps of CH1



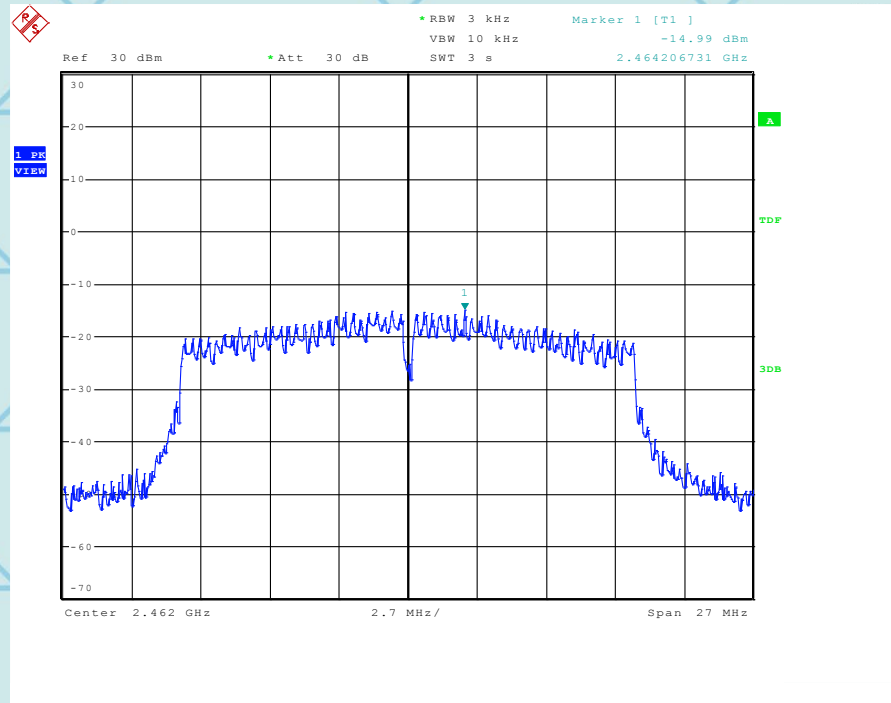
802.11n HT20 at 6.5Mbps of CH6





802.11n HT20 at 6.5Mbps of CH11

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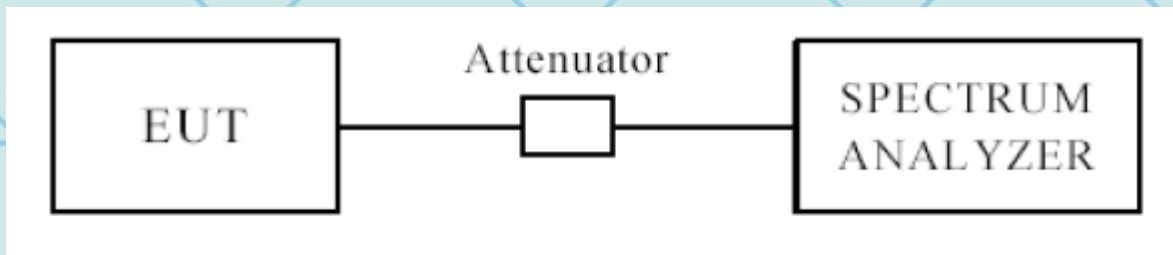
世标检测认证股份

ADD: Building A-B Baoshi Science & technology Park, Baoshi Road, Bao'an District, Shenzhen, Guangdong, China  
 TEL: 86-755-26996143/26996144/26996145/26996192 FAX: 86-755-86376605 E-mail: Fengbing.Wang@wsct-cert.com Http: www.wsct-cert.com



# 10. OUT OF BAND MEASUREMENT

## 10.1 TEST SETUP FOR BAND EDGE



The restricted band requirement based on radiated emission test; please see the clause 6 for the test setup

## 10.2 LIMITS OF OUT OF BAND EMISSIONS MEASUREMENT

1. Below -20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).
2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

## 10.3 TEST PROCEDURE

For signals in the restricted bands above and below the 2.4-2.483GHz allocated band a measurement was made of radiated emission test. (Peak values with RBW=VBW=1MHz and PK detector. AV value with RBW=1MHz, VBW=10Hz and PK detector)

For bandage test, the spectrum set as follows: RBW=100 kHz, VBW=100 kHz. A conducted measurement used

## 10.4 TEST RESULT

Please see next pages

Note: This is a handheld device. The radiated emissions should be tested under 3-axes position (Lying, Stand), After pre-test. It was found that the worse radiated emission was get at the lying position.




**Radiated measurement:**
**802.11b**

Indicated		result (PK/AV)	Antenna Polar (H/V)	Correction Factor			FCC Part 15.247		
Frequency (MHz)	Receiver Reading (dB $\mu$ V/m)			Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
Low Channel (2412MHz)									
2390	30.63	AV	V	30.3	4.1	33.1	31.93	54	22.07
2390	29.34	AV	H	30.3	4.1	33.1	30.64	54	23.36
2390	39.88	PK	V	30.3	4.1	33.1	41.18	74	32.82
2390	39.48	PK	H	30.3	4.1	33.1	40.78	74	33.22
HighChannel (2462MHz)									
2483.5	29.30	AV	V	31	4.4	32.7	32.00	54	22.00
2483.5	30.60	AV	H	31	4.4	32.7	33.30	54	20.70
2483.5	41.00	PK	V	31	4.4	32.7	43.70	74	30.30
2483.5	39.55	PK	H	31	4.4	32.7	42.25	74	31.75

**802.11g**

Indicated		result (PK/AV)	Antenna Polar (H/V)	Correction Factor			FCC Part 15.247		
Frequency (MHz)	Receiver Reading (dB $\mu$ V/m)			Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
Low Channel (2412MHz)									
2390	33.44	AV	V	30.3	4.1	33.1	34.74	54	19.26
2390	33.50	AV	H	30.3	4.1	33.1	34.80	54	19.20
2390	49.43	PK	V	30.3	4.1	33.1	50.73	74	23.27
2390	51.75	PK	H	30.3	4.1	33.1	53.05	74	20.95
HighChannel (2462MHz)									
2483.5	30.12	AV	V	31	4.4	32.7	32.82	54	21.18
2483.5	30.82	AV	H	31	4.4	32.7	33.52	54	20.48
2483.5	39.90	PK	V	31	4.4	32.7	42.60	74	31.40
2483.5	41.95	PK	H	31	4.4	32.7	44.65	74	29.35

Note: The BAND EDGE RESTRICTED BANDS emission is too low at least 20dB to the Fundamental.




**802.11n HT20**

Indicated		result (PK/AV)	Antenna Polar (H/V)	Correction Factor			FCC Part 15.247		
Frequency (MHz)	Receiver Reading (dB $\mu$ V/m)			Ant. Factor (dB/m)	Cable Loss (dB)	Pre-Amp. Gain (dB)	Cord. Amp. (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)
Low Channel (2412MHz)									
2390	33.67	AV	V	30.3	4.1	33.1	34.97	54	19.03
2390	33.78	AV	H	30.3	4.1	33.1	35.08	54	18.92
2390	51.55	PK	V	30.3	4.1	33.1	52.85	74	21.15
2390	49.76	PK	H	30.3	4.1	33.1	51.06	74	22.94
HighChannel (2462MHz)									
2483.5	31.99	AV	V	31	4.4	32.7	34.69	54	19.31
2483.5	29.97	AV	H	31	4.4	32.7	32.67	54	21.33
2483.5	41.12	PK	V	31	4.4	32.7	43.82	74	30.18
2483.5	40.06	PK	H	31	4.4	32.7	42.76	74	31.24



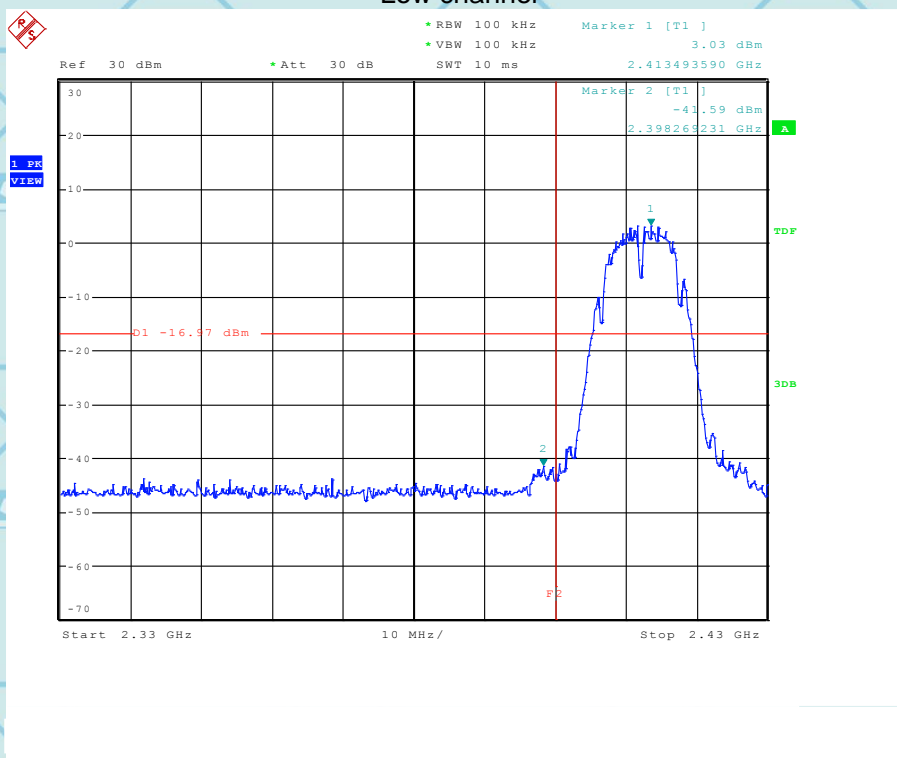


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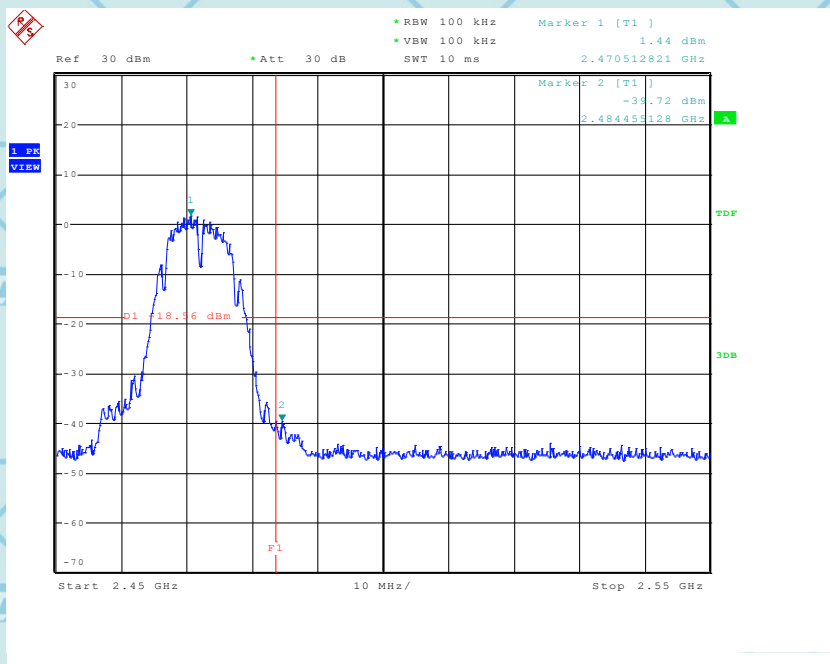
### Band Edges Measurement:

802.11b:

#### Low channel



#### High channel

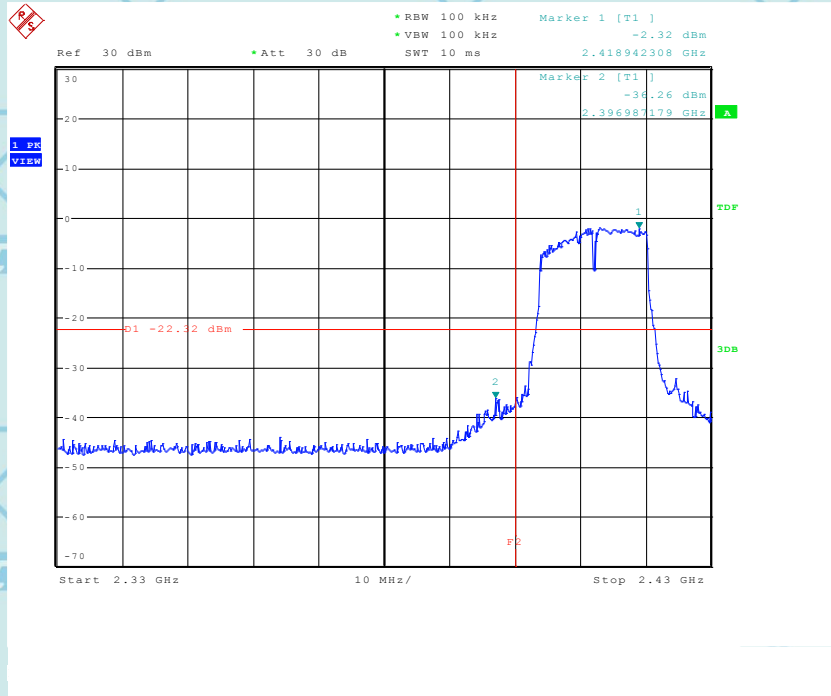




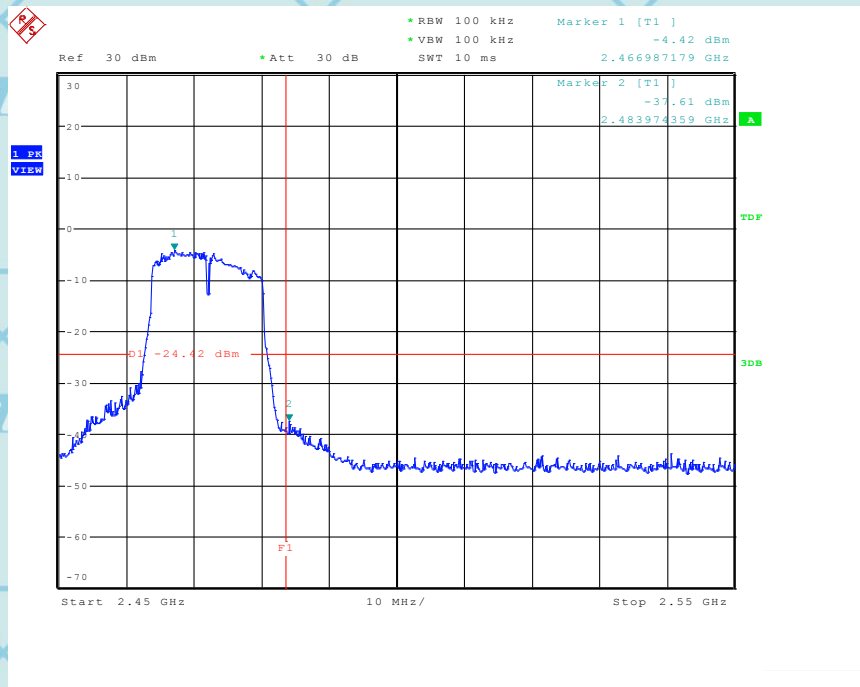
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802.11g:

Low channel



High channel

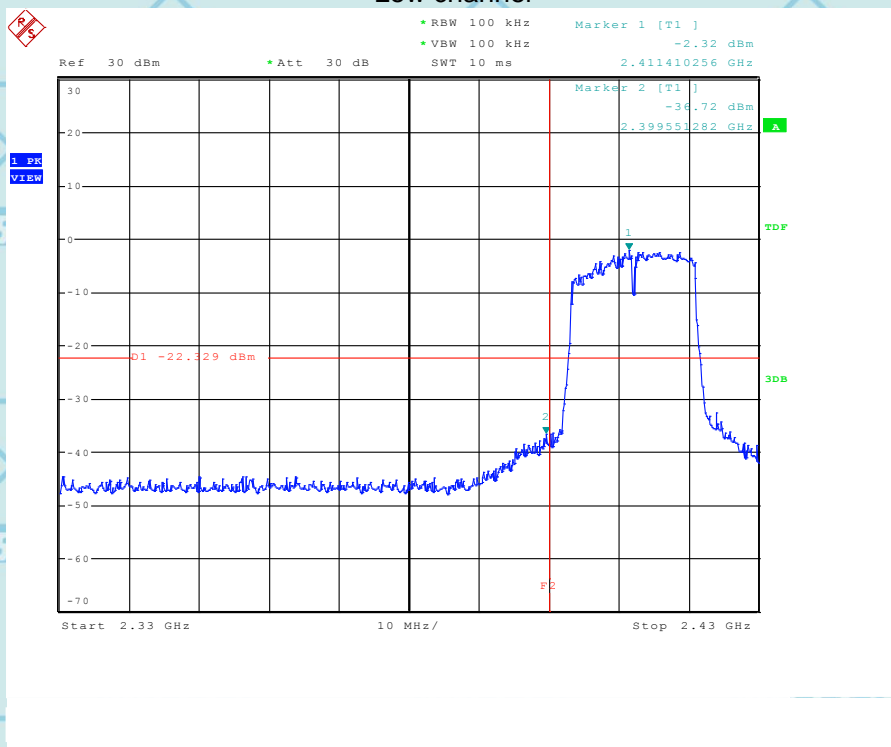




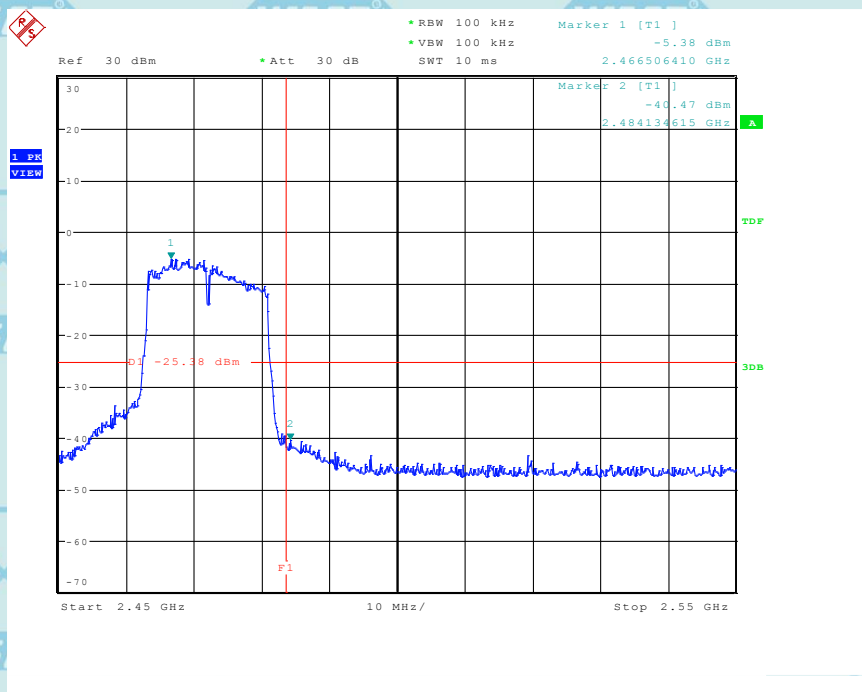
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802.11n HT20:

Low channel



High channel



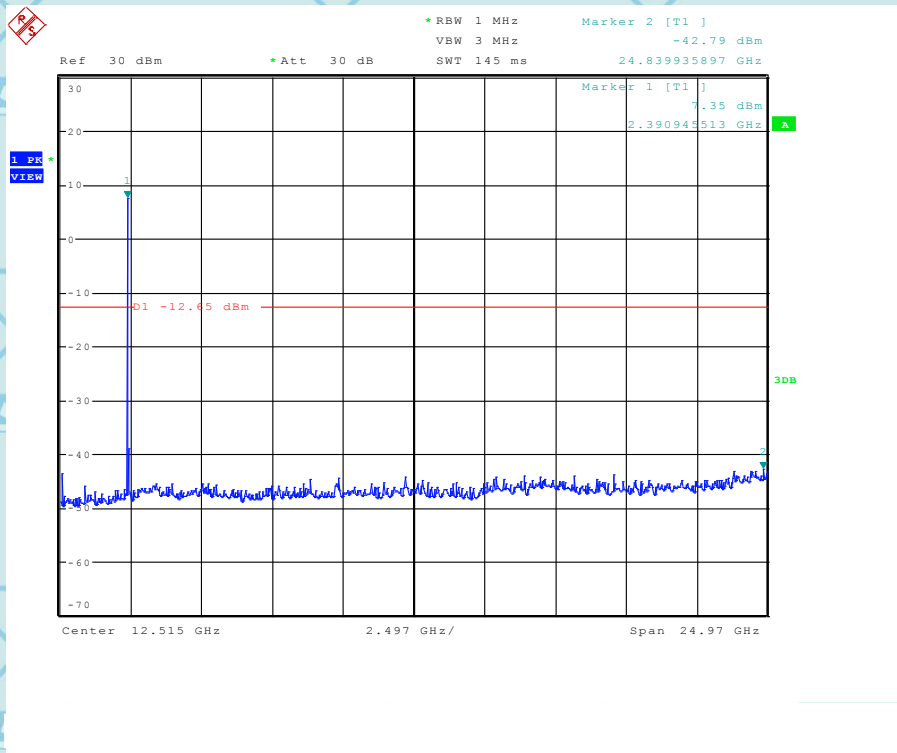




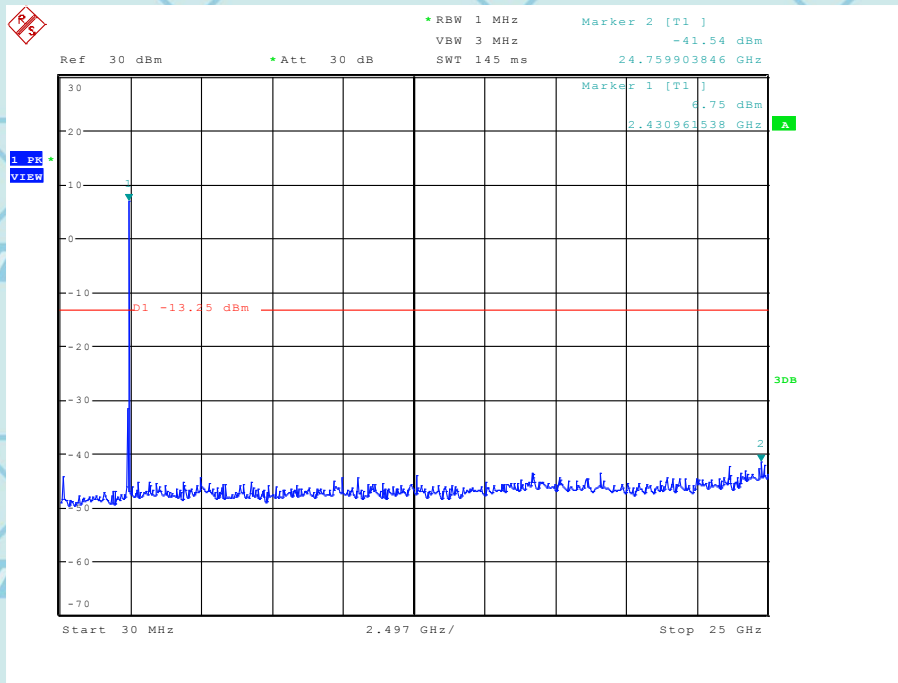
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Conducted measurement:  
802.11b:

### Low channel



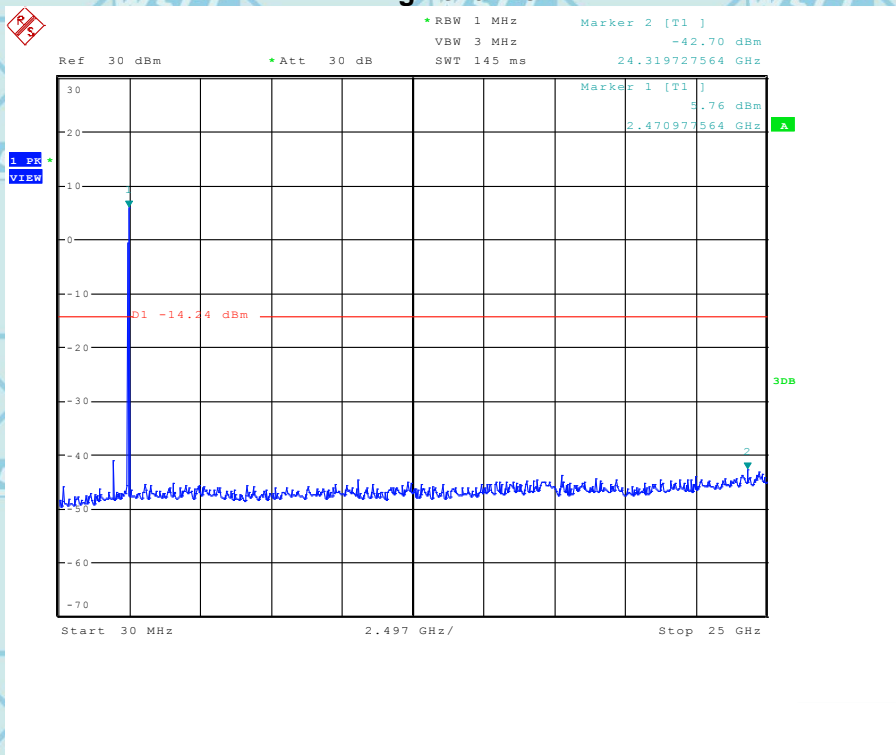
### Middle channel





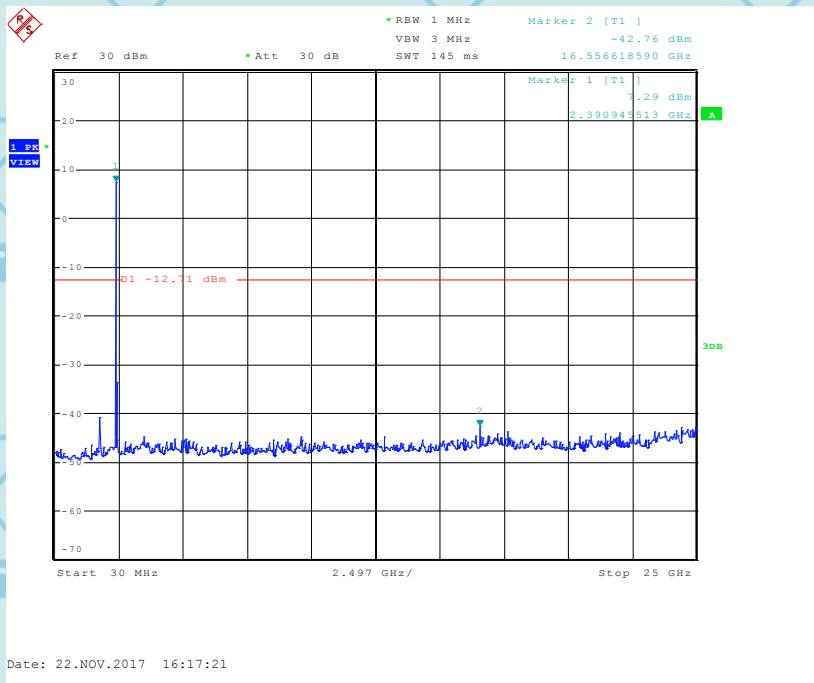
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High channel



802.11g:

Low channel

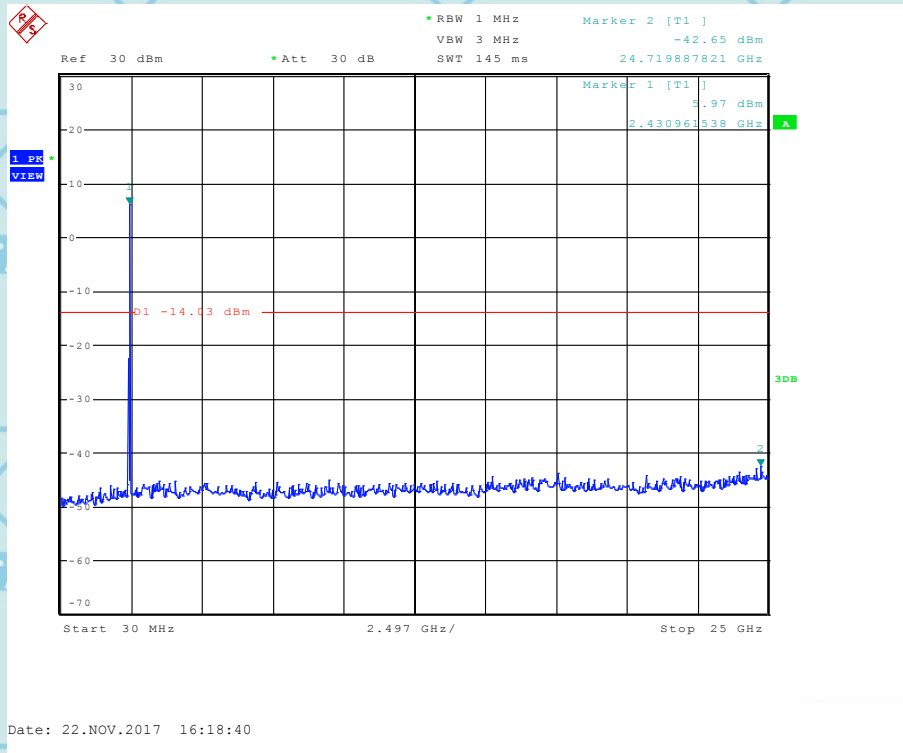




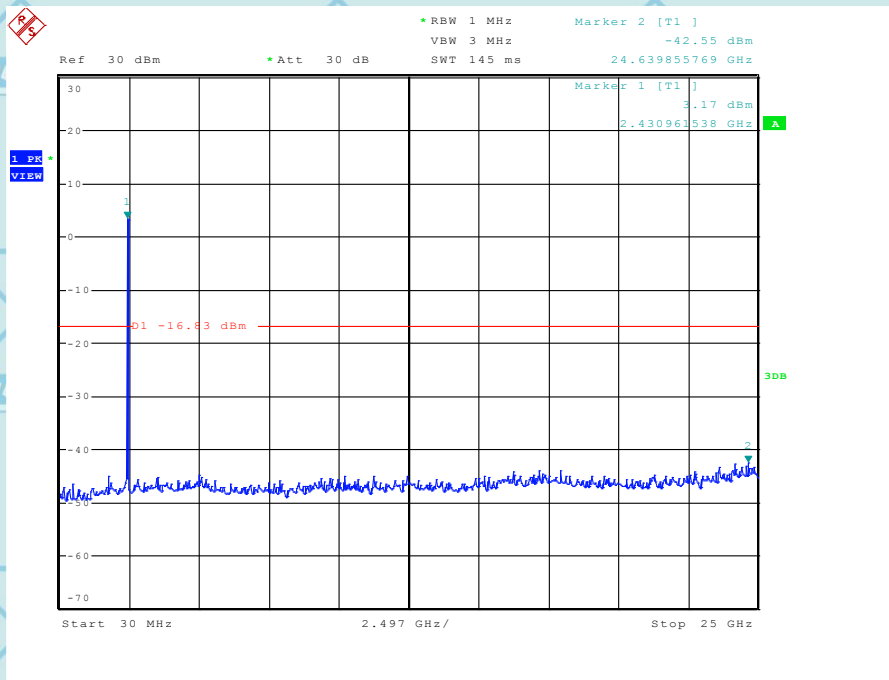
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### Middle channel

TESTING  
NVLAP LAB CODE 600142-0



### High channel

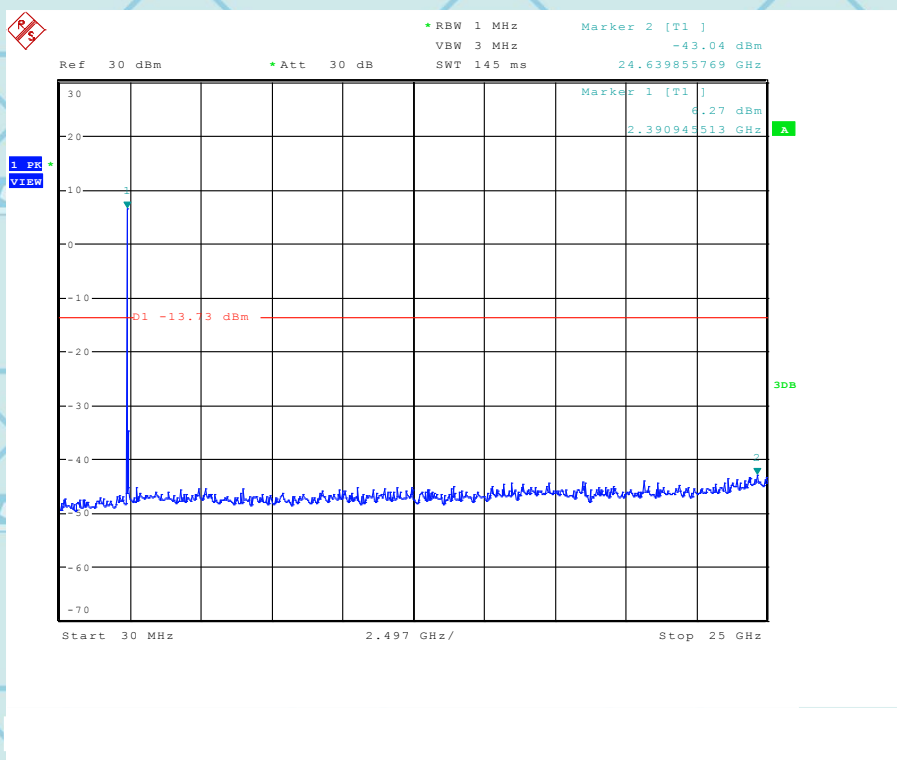




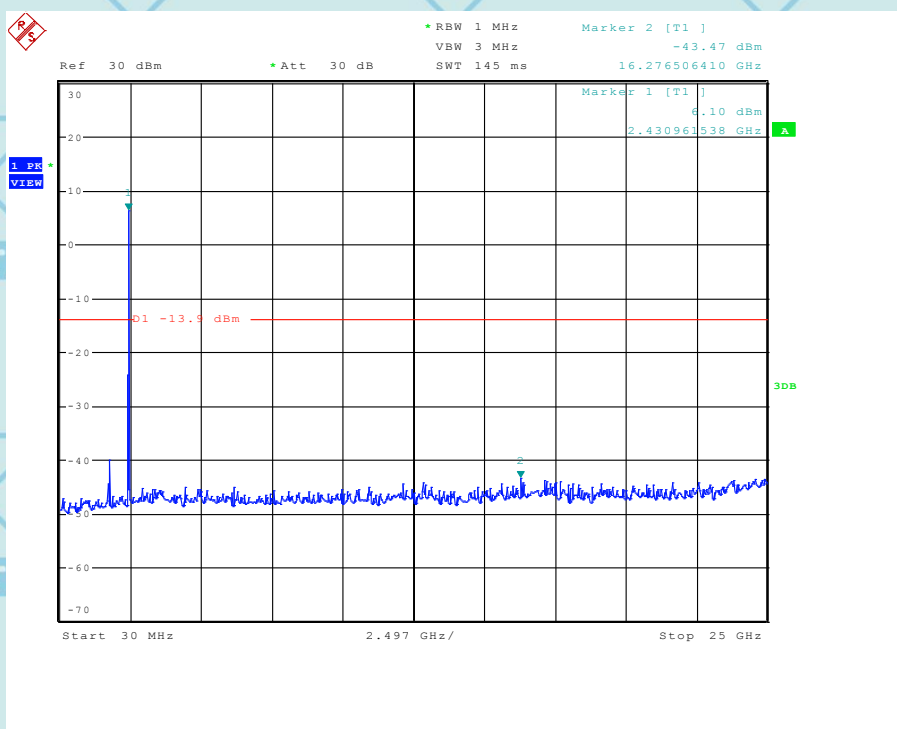
For Question, Please Contact with WSCT www.wsct-cert.com

802.11n HT20:

Low channel



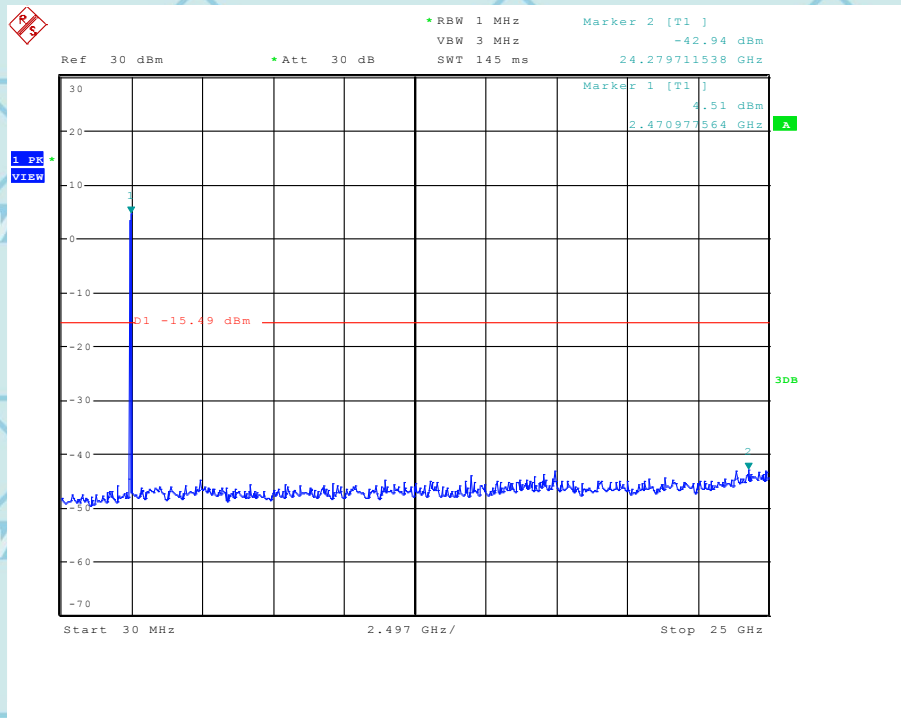
Middle channel





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High channel



# 11. EUT TEST PHOTO





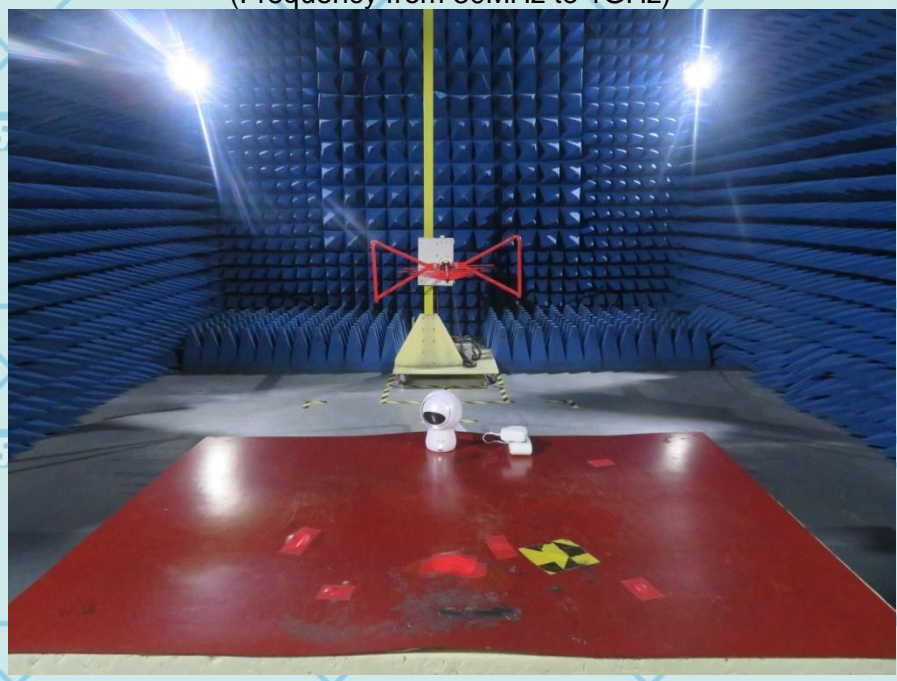
CONDUCTED EMISSION TEST

NVLAQ LAB CODE 600142-0

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RADIATED EMISSION TEST (Frequency from 30MHz to 1GHz)



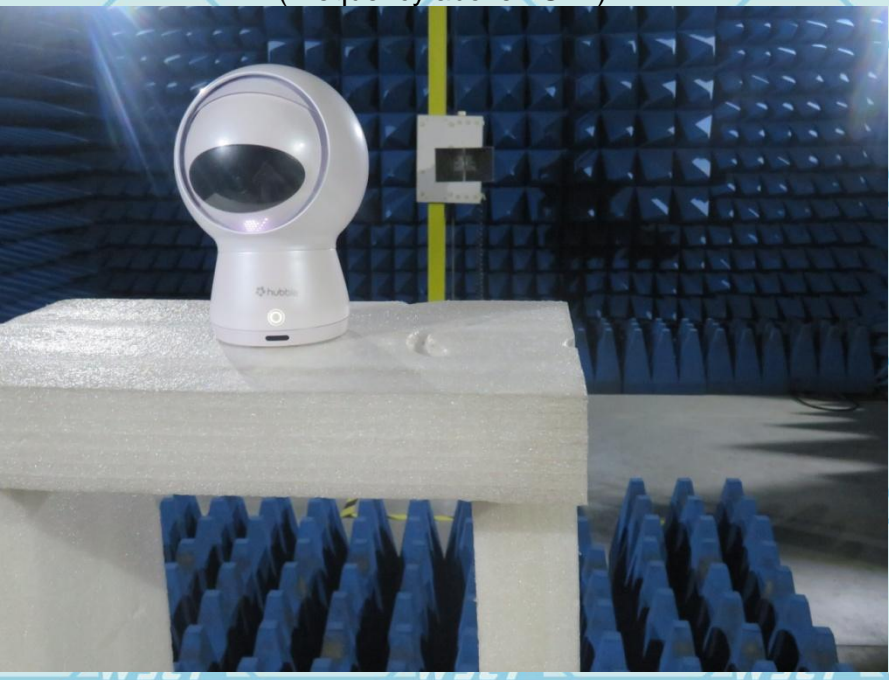
世标检测认证股份 World Standardization Certification & Testing Group Co.,Ltd.

ADD:Building A-B Baoshi Science & technology Park, Baoshi Road, Bao'an District, Shenzhen, Guangdong, China TEL:86-755-26996143/26996144/26996145/26996192 FAX:86-755-86376605 E-mail:Fengbing.Wang@wsct-cert.com Http:www.wsct-cert.com



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**RADIATED EMISSION TEST  
(Frequency above 1GHz)**



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# 12.PHOTOGRAPHS OF EUT

Refer to test report”H100 FCC111011A BT”.

---END OF REPORT---

