

# **FCC Test Report**

**FCC ID** : UIDSBR-AC1200P

: AC1200 Wi-Fi Router with RipCurrent<sup>™</sup> **Equipment** 

Technology

Model No. : SBR-AC1200P

**Brand Name** : ARRIS

**Applicant** : ARRIS Group, Inc.

: 3871 Lakefield Drive, Suite 300, Suwanee, **Address** 

Georgia 30024, United States

**Standard** : 47 CFR FCC Part 15.247

**Received Date** : Sep. 22, 2015

**Tested Date** : Oct. 02 ~ Oct. 23, 2015

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Approved & Reviewed by:

Gary Chang / Manager



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## **Release Record**

Report No.	Version	Description	Issued Date
FR592203AC	Rev. 01	Initial issue	Nov. 20, 2015

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# **Summary of Test Results**

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 1.021MHz 42.05 (Margin -3.95dB) - AV	Pass
15.247(d)	Radiated Emissions	[dBuV/m at 3m]: 2483.50MHz 52.99 (Margin -1.01dB) – AV	Door
15.209	Radiated Emissions	[dBuV/m at 3m]: 2500.00MHz 52.99 (Margin -1.01dB) - AV	Pass
15.247(b)(3)	Maximum Output Power	Max Power [dBm]: 29.95	Pass
15.247(a)(2)	6dB Bandwidth	Meet the requirement of limit	Pass
15.247(e)	Power Spectral Density	Meet the requirement of limit	Pass
15.203	Antenna Requirement	Meet the requirement of limit	Pass

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## 1 General Description

## 1.1 Information

## 1.1.1 Specification of the Equipment under Test (EUT)

RF General Information								
Frequency Range (MHz)	IEEE Std. 802.11	Ch. Freq. (MHz)	Channel Number	Transmit Chains (N <sub>TX</sub> )	Data Rate / MCS			
2400-2483.5	b	2412-2462	1-11 [11]	1	1-11 Mbps			
2400-2483.5	g	2412-2462	1-11 [11]	2	6-54 Mbps			
2400-2483.5	n (HT20)	2412-2462	1-11 [11]	2	MCS 0-15			
2400-2483.5	n (HT40)	2422-2452	3-9 [7]	2	MCS 0-15			

Note 1: RF output power specifies that Maximum Peak Conducted Output Power.

Note 2: 802.11b uses a combination of DSSS-DBPSK, DQPSK, CCK modulation.

Note 3: 802.11g/n uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.

Note 4: Only chain 1 can transmit 802.11b signal.

#### 1.1.2 Antenna Details

Ant No	Model	Typo	Connector	Operating Frequency (MHz) / Gain (dBi)			
Ant. No.	Ant. No.   Model	Туре	Connector	2400~2483.5	5725~5850		
1	617210JN	Dipole	I-pex	1.83			
2	617210JM	Dipole	I-pex	2.02			
3	617210JP	PIFA	I-pex		2.87	3.60	
4	617210K2	PIFA	I-pex		3.23	3.82	

### 1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	100-240Vac, 50-60Hz, 1.0A Power line: 1.5m non-shielded without core
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#### 1.1.4 Accessories

	Accessories						
No.	No. Equipment Description						
1	RJ45 cable	1m non-shielded without core					

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## 1.1.5 Channel List

Frequency	band (MHz)	2400~	2483.5	
802.11 b /	g / n HT20	802.11n HT40		
Channel	Frequency(MHz)	Channel	Frequency(MHz)	
1	2412	3	2422	
2	2417	4	2427	
3	2422	5	2432	
4	2427	6	2437	
5	2432	7	2442	
6	2437	8	2447	
7	2442	9	2452	
8	2447			
9	2452			
10	2457			
11	2462			

## 1.1.6 Test Tool and Duty Cycle

Test Tool	MTool, version: 2.0.2.7					
	Mode	Duty cycle (%)	Duty factor (dB)			
	11b	100.00%	0.00			
Duty Cycle and Duty Factor	11g	99.65%	0.02			
	HT20	99.63%	0.02			
	HT40	98.50%	0.07			

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## 1.1.7 Power Setting

Modulation Mode	Test Frequency (MHz)	Power Set
11b	2412	90
11b	2437	94
11b	2462	86
11g	2412	68
11g	2437	86
11g	2462	66
HT20	2412	64
HT20	2437	86
HT20	2462	64
HT40	2422	58
HT40	2437	72
HT40	2452	62

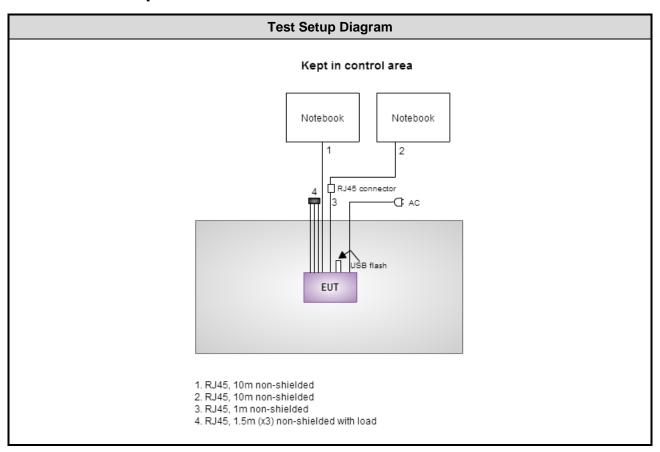
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## 1.2 Local Support Equipment List

	Support Equipment List							
No.	No. Equipment Brand Model FCC ID Signal cable / Length (m)							
1	Notebook	DELL	Latitude E6430	DoC	RJ45, 10m non-shielded.			
2	Notebook	DELL	Latitude E6430	DoC	RJ45, 10m non-shielded.			
3	USB 2.0 flash	Kingston	DTSE9					
4	Load	ICC			RJ45, 1.5m non-shielded x3.			

## 1.3 Test Setup Chart



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## 1.4 The Equipment List

Test Item	Conducted Emission	Conducted Emission						
Test Site	Conduction room 1 / (CO01-WS)							
Tested Date	Oct. 20, 2015	Oct. 20, 2015						
Instrument Manufacturer Model No. Serial No. Calibration Date Calibration U								
Receiver	R&S	ESR3	101657	Jan. 15, 2015	Jan. 14, 2016			
LISN	SCHWARZBECK	Schwarzbeck 8127	8127-667	Nov. 17, 2014	Nov. 16, 2015			
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Dec. 31, 2014	Dec. 30, 2015			
Measurement Software AUDIX e3 6.120210k NA NA NA								
	erval of instruments liste	d above is one year.						

Test Item	Radiated Emission below 1GHz test										
Test Site	966 chamber 2 / (03CH02-WS)										
Tested Date	Oct. 20, 2015	Oct. 20, 2015									
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until						
Receiver	R&S	ESR3	101657	Jan. 15, 2015	Jan. 14, 2016						
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-524	Oct. 05, 2015	Oct. 04, 2016						
Preamplifier	Burgeon	BPA-530	100218	Nov. 10, 2014	Nov. 09, 2015						
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-003	Dec. 16, 2014	Dec. 15, 2015						
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-004	Dec. 16, 2014	Dec. 15, 2015						
Measurement Software	AUDIX	e3	6.120210g	NA	NA						
Note: Calibration Inte	Note: Calibration Interval of instruments listed above is one year.										

Test Item	Radiated Emission ab	Radiated Emission above 1GHz test										
Test Site	966 chamber 2 / (03CH02-WS)											
Tested Date	Oct. 02 ~ Oct. 12, 2015											
Instrument	Manufacturer	Manufacturer Model No. Serial No. Calibration Date Calibration Until										
Spectrum Analyzer	R&S	FSV40	101499	Dec. 31, 2014	Dec. 30, 2015							
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1095	Oct. 14, 2014	Oct. 13, 2015							
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 10, 2014	Nov. 09, 2015							
Preamplifier	Agilent	83017A	MY39501309	Sep. 22, 2015	Sep. 21, 2016							
Preamplifier	EMC	EMC184045B	980192	Sep. 01, 2015	Aug. 31, 2016							
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16140/4	Dec. 16, 2014	Dec. 15, 2015							
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16018/4	Dec. 16, 2014	Dec. 15, 2015							
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16015/4	Dec. 16, 2014	Dec. 15, 2015							
Measurement Software												
Note: Calibration Inter	rval of instruments listed	d above is one year.										

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Test Item	RF Conducted										
Test Site	(TH01-WS)										
Tested Date	Oct. 19 ~ Oct. 23, 201	oct. 19 ~ Oct. 23, 2015									
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until						
Spectrum Analyzer	R&S	FSV40	101063	Feb. 03, 2015	Feb. 02, 2016						
Power Meter	Anritsu	ML2495A	1241002	Sep. 21, 2015	Sep. 20, 2016						
Power Sensor	Anritsu	MA2411B	1207366	Sep. 21, 2015	Sep. 20, 2016						
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA						
Note: Calibration Inter	Note: Calibration Interval of instruments listed above is one year.										

### 1.5 Test Standards

According to the specification of EUT, the EUT must comply with following standards and KDB documents.

47 CFR FCC Part 15.247

ANSI C63.10-2013

FCC KDB 558074 D01 DTS Meas Guidance v03r03

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

## 1.6 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

Measurement Uncertainty								
Parameters	Uncertainty							
Bandwidth	±34.134 Hz							
Conducted power	±0.808 dB							
Power density	±0.463 dB							
Conducted emission	±2.670 dB							
AC conducted emission	±2.92 dB							
Radiated emission ≤ 1GHz	±3.62 dB							
Radiated emission > 1GHz	±5.60 dB							

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## 2 Test Configuration

## 2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	21°C / 57%	Peter Lin
Radiated Emissions	03CH02-WS	22-23°C / 63-66%	Aska Huang Anderson Hung
RF Conducted	TH01-WS	22°C / 63%	Felix Sung

FCC site registration No.: 657002IC site registration No.: 10807A-2

## 2.2 The Worst Test Modes and Channel Details

Test item	Modulation Mode	Test Frequency (MHz)	Data Rate	Test Configuration
Conducted Emissions	HT20	2437	MCS 0	
Radiated Emissions ≤1GHz	HT20	2437	MCS 0	
Radiated Emissions >1GHz Maximum Output Power 6dB bandwidth Power spectral density	11b 11g HT20 HT40	2412 / 2437 / 2462 2412 / 2437 / 2462 2412 / 2437 / 2462 2422 / 2437 / 2452	1 Mbps 6 Mbps MCS 0 MCS 0	

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## 3 Transmitter Test Results

#### 3.1 Conducted Emissions

#### 3.1.1 Limit of Conducted Emissions

Conducted Emissions Limit									
Frequency Emission (MHz) Quasi-Peak Average									
0.15-0.5	66 - 56 *	56 - 46 *							
0.5-5	56	46							
5-30	60	50							
Note 1: * Decreases with the logarithm of the frequency.									

#### 3.1.2 Test Procedures

- 1. The device is placed on a test table, raised 80 cm above the reference ground plane. The vertical conducting plane is located 40 cm to the rear of the device.
- 2. The device is connected to line impedance stabilization network (LISN) and other accessories are connected to other LISN. Measured levels of AC power line conducted emission are across the 50  $\Omega$  LISN port.
- 3. AC conducted emission measurements is made over frequency range from 150 kHz to 30 MHz.
- 4. This measurement was performed with AC 120V / 60Hz.

#### 3.1.3 Test Setup



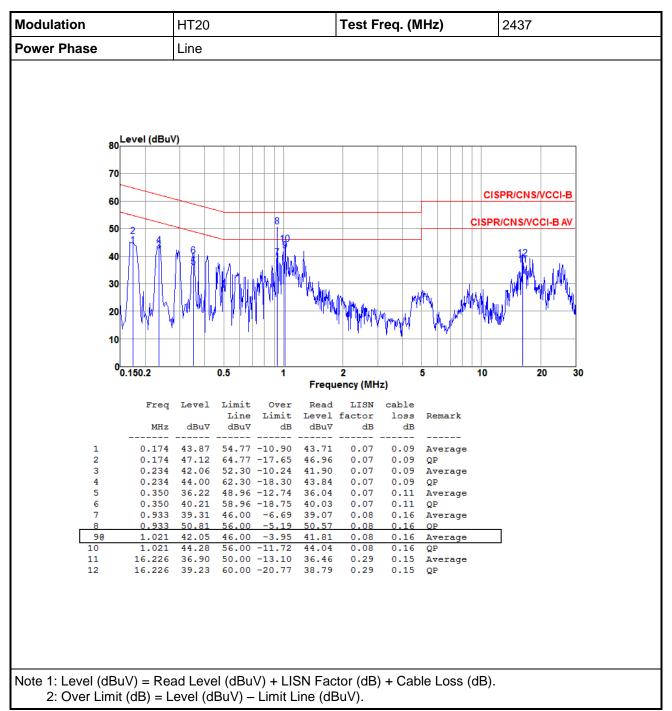
Note: 1. Support units were connected to second LISN.

Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

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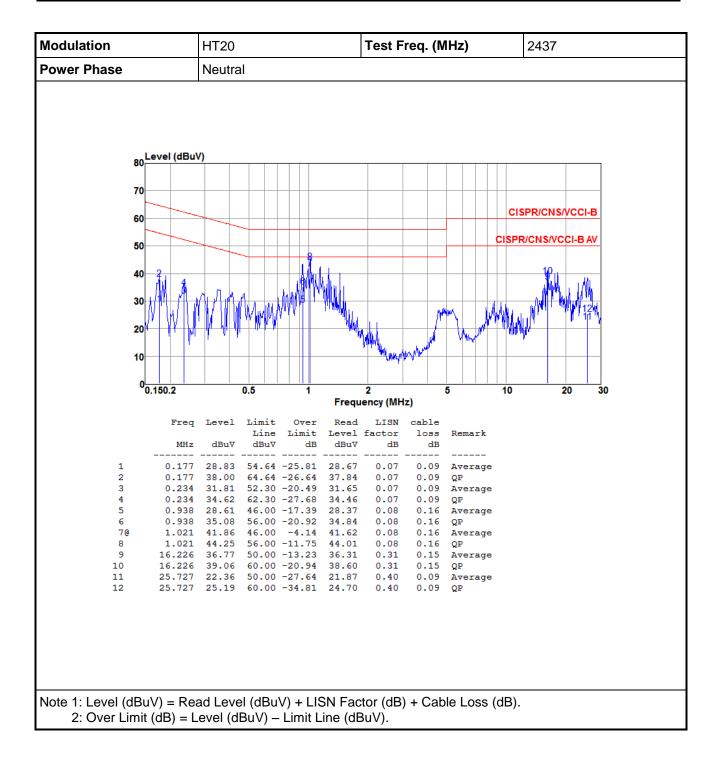


#### 3.1.4 Test Result of Conducted Emissions



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## 3.2 6dB and Occupied Bandwidth

#### 3.2.1 Limit of 6dB Bandwidth

The minimum 6dB bandwidth shall be at least 500 kHz.

#### 3.2.2 Test Procedures

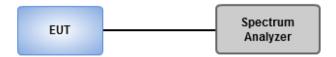
#### 6dB Bandwidth

- 1. Set resolution bandwidth (RBW) = 100 kHz, Video bandwidth = 300 kHz.
- 2. Detector = Peak, Trace mode = max hold.
- 3. Sweep = auto couple, Allow the trace to stabilize.
- 4. 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 6dB relative to the maximum level measured in the fundamental emission.

#### **Occupied Bandwidth**

- Set resolution bandwidth (RBW) = 1 MHz, Video bandwidth = 3 MHz.
- 2. Detector = Sample, Trace mode = max hold.
- 3 Sweep = auto couple, Allow the trace to stabilize.
- 4. Use the OBW measurement function of spectrum analyzer to measure the occupied bandwidth.

#### 3.2.3 Test Setup

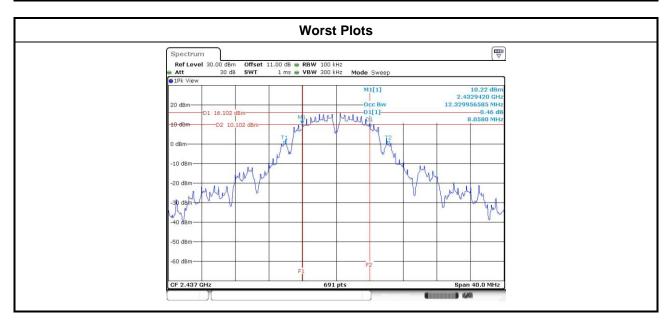


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## 3.2.4 Test Result of 6dB and Occupied Bandwidth

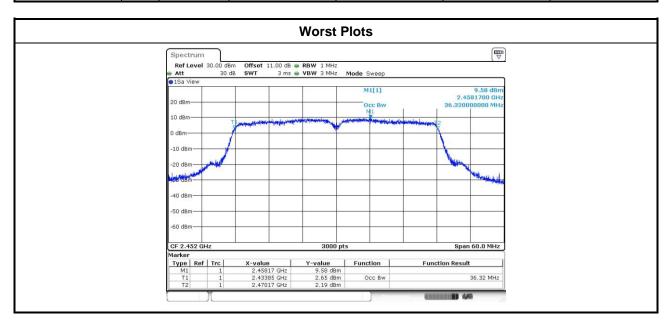
Modulation	NI NI	Eron (MU=)			Limit (kHz)		
Mode	N <sub>TX</sub>	Freq. (MHz)	Chain 0 Chain 1 C		Chain 2	Chain 2 Chain 3	
11b	1	2412	8.12				500
11b	1	2437	8.06				500
11b	1	2462	8.06				500
11g	2	2412	16.35	16.35			500
11g	2	2437	16.35	16.41			500
11g	2	2462	16.35	16.35			500
HT20	2	2412	17.62	17.62			500
HT20	2	2437	17.62	17.62			500
HT20	2	2462	17.62	17.62			500
HT40	2	2422	35.36	35.48			500
HT40	2	2437	35.71	35.48			500
HT40	2	2452	35.83	35.71			500



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Modulation	N	Freq.		99% Occupied E	Bandwidth (MHz)	
Mode	N <sub>TX</sub>	(MHz)	Chain 0	Chain 1	Chain 2	Chain 3
11b	1	2412	10.13			
11b	1	2437	12.40			
11b	1	2462	10.15			
11g	2	2412	16.86	16.80		
11g	2	2437	17.00	16.92		
11g	2	2462	16.90	16.80		
HT20	2	2412	17.84	17.78		
HT20	2	2437	18.05	17.94		
HT20	2	2462	17.87	17.79		
HT40	2	2422	36.28	36.30		
HT40	2	2437	36.28	36.32		
HT40	2	2452	36.26	36.32		



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## 3.3 RF Output Power

### 3.3.1 Limit of RF Output Power

Cor	duct	ed power shall not exceed 1Watt.
$\boxtimes$	Ante	enna gain <= 6dBi, no any corresponding reduction is in output power limit.
	Ante	enna gain > 6dBi
		Non Fixed, point to point operations.  The conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dB
		Fixed, point to point operations Systems operating in the 2400–2483.5 MHz band that are used exclusively for fixed, point-to-point Operations, maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.
		Systems operating in the 5725–5850 MHz band that are used exclusively for fixed, point-to-point operations .no any corresponding reduction is in transmitter peak output power

#### 3.3.2 Test Procedures

Maximum Peak Conducted Output Power

#### 

- 1. Set RBW = 1MHz, VBW = 3MHz, Detector = Peak.
- 2. Sweep time = auto, Trace mode = max hold, Allow trace to fully stabilize.
- 3. Use the spectrum analyzer channel power measurement function with the band limits set equal to the DTS bandwidth edges.

#### Nower meter

- A broadband Peak RF power meter is used for output power measurement. The video bandwidth of power meter is greater than DTS bandwidth of EUT. If duty cycle of test signal is not 100 %, trigger and gating function of power meter will be enabled to capture transmission burst for measuring output power.
- Maximum Conducted Output Power (For reference only)

#### Nower meter

 A broadband Average RF power meter is used for output power measurement. The video bandwidth of power meter is greater than DTS bandwidth of EUT. If duty cycle of test signal is not 100 %, trigger and gating function of power meter will be enabled to capture transmission burst for measuring output power.

#### 3.3.3 Test Setup



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## 3.3.4 Test Result of Maximum Output Power

		N <sub>TX</sub> Freq. (MHz)		Peak	conducte	ed Outpu	t Power (	dBm)		Amt		FIDD
Modulation Mode	N <sub>TX</sub>		Chain 0	Chain 1	Chain 2	Chain 3	Total Power (mW)	Total Power (dBm)	Limit (dBm)	Ant. Gain (dBi)	EIRP (dBm)	EIRP Limit (dBm)
11b	1	2412	26.04				401.791	26.04	30.00	1.83	27.87	36.00
11b	1	2437	27.07				509.331	27.07	30.00	1.83	28.90	36.00
11b	1	2462	25.19				330.370	25.19	30.00	1.83	27.02	36.00
11g	2	2412	26.11	25.83			791.144	28.98	30.00	2.02	31.00	36.00
11g	2	2437	26.89	26.90			978.431	29.91	30.00	2.02	31.93	36.00
11g	2	2462	25.90	25.13			714.882	28.54	30.00	2.02	30.56	36.00
HT20	2	2412	24.22	25.60			627.319	27.97	30.00	2.02	29.99	36.00
HT20	2	2437	26.93	26.95			988.624	29.95	30.00	2.02	31.97	36.00
HT20	2	2462	24.65	24.67			584.832	27.67	30.00	2.02	29.69	36.00
HT40	2	2422	22.42	24.00			425.771	26.29	30.00	2.02	28.31	36.00
HT40	2	2437	25.34	25.91			731.921	28.64	30.00	2.02	30.66	36.00
HT40	2	2452	24.76	23.73			535.274	27.29	30.00	2.02	29.31	36.00

Modulation	odulation		Condi	ucted (Average)	Output Power	(dBm)	Total	Total	Limit
Mode	N <sub>TX</sub>	Freq. (MHz)	Chain 0	Chain 1	Chain 2	Chain 3	Power (mW)	Power (dBm)	(dBm)
11b	1	2412	22.23				167.109	22.23	
11b	1	2437	24.67				293.089	24.67	
11b	1	2462	21.41				138.357	21.41	
11g	2	2412	16.93	16.75			96.633	19.85	
11g	2	2437	21.12	21.23			262.159	24.19	
11g	2	2462	16.73	16.39			90.649	19.57	
HT20	2	2412	15.64	15.65			73.372	18.66	
HT20	2	2437	20.96	21.22			257.173	24.10	
HT20	2	2462	15.64	15.67			73.542	18.67	
HT40	2	2422	13.39	14.40			49.370	16.93	
HT40	2	2437	17.31	17.55			110.712	20.44	
HT40	2	2452	15.12	14.54			60.953	17.85	

Note: Conducted average output power is for reference only.

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## 3.4 Power Spectral Density

### 3.4.1 Limit of Power Spectral Density

Power spectral density shall not be greater than 8 dBm in any 3 kHz band.

#### 3.4.2 Test Procedures

- Maximum peak conducted output power was used to demonstrate compliance to the fundamental output power limit.
  - Set the RBW = 3kHz, VBW = 10kHz.
  - Detector = Peak, Sweep time = auto couple.
  - 3. Trace mode = max hold, allow trace to fully stabilize.
  - 4. Use the peak marker function to determine the maximum amplitude level.
- Maximum (average) conducted output power was used to demonstrate compliance to the fundamental output power limit.
  - 1. Set the RBW = 100kHz, VBW = 300 kHz.
  - 2. Detector = RMS, Sweep time = auto couple.
  - 3. Set the sweep time to: ≥ 10 x (number of measurement points in sweep) x (maximum data rate per stream).
  - 4. Perform the measurement over a single sweep.
  - 5. Use the peak marker function to determine the maximum amplitude level.

### 3.4.3 Test Setup



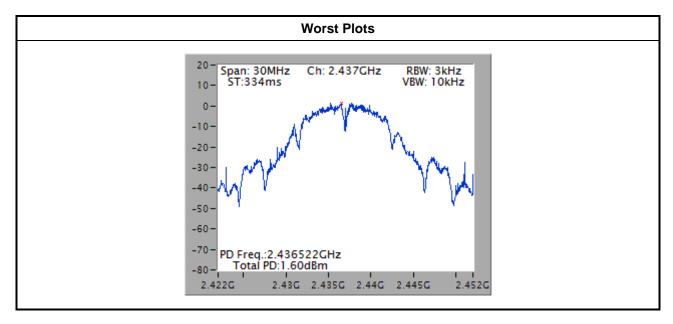
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## 3.4.4 Test Result of Power Spectral Density

Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	Total Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)
11b	1	2412	1.03	8.00
11b	1	2437	1.60	8.00
11b	1	2462	-0.41	8.00
11g	2	2412	-6.41	8.00
11g	2	2437	-2.58	8.00
11g	2	2462	-6.99	8.00
HT20	2	2412	-6.74	8.00
HT20	2	2437	-2.15	8.00
HT20	2	2462	-7.79	8.00
HT40	2	2422	-11.89	8.00
HT40	2	2437	-7.88	8.00
HT40	2	2452	-11.44	8.00

Note: Test result for g / HT20 / HT40 is bin-by-bin summing measured value of each TX port.



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### 3.5 Unwanted Emissions into Restricted Frequency Bands

#### 3.5.1 Limit of Unwanted Emissions into Restricted Frequency Bands

Restricted Band Emissions Limit												
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)									
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300									
0.490~1.705	24000/F(kHz)	33.8 - 23	30									
1.705~30.0	30	29	30									
30~88	100	40	3									
88~216	150	43.5	3									
216~960	200	46	3									
Above 960	500	54	3									

#### Note 1:

Qusai-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit **Note 2:** 

Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

#### 3.5.2 Test Procedures

- 1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m
- 2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
- 3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

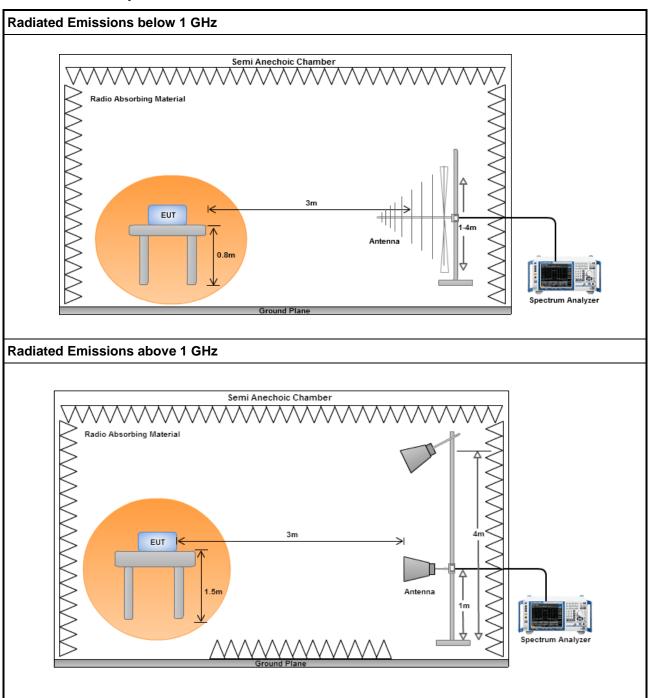
#### Note:

- 1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
- 2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
- RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above 1GHz.

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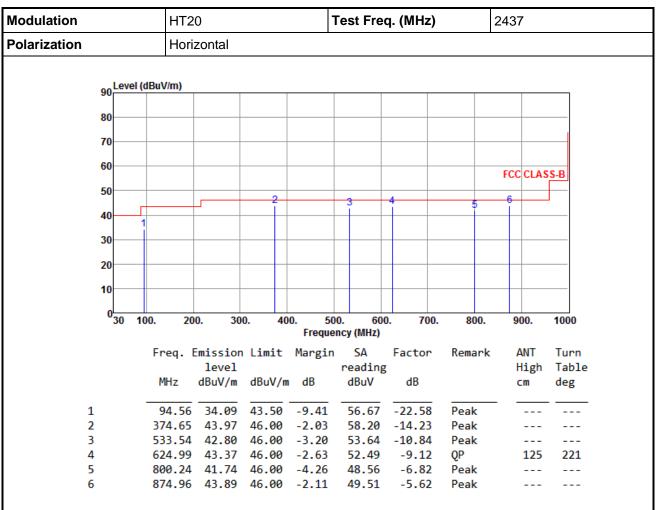
## 3.5.3 Test Setup



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### 3.5.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)



Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

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Modulation				HT2	0			Test Fre	q. (MHz	243	2437		
Polarization		Vertical											
				•									
	90	Leve	el (dBu	V/m)									
	-												
	80		_										
	70												
	60										FCC	CLAS	S_B
	50											OLAG	
	-	١.				4				5	6-		۱ ۱
	40	1	1		3	ī							
	30												
	-												
	20	$\vdash$											
	10												
	0	30	100.	20	0. 30	00.		00. 60 ency (MHz)		0. 800	. 9	00.	1000
			Е.	noa F	miccio	a Limi	t Margi		Factor	Remar	. L	ΔNT	Turn
				eq. L	level	, CIMI	c mangin	reading		ivenial		High	Table
			N	ИHz	dBuV/m	dBuV	/m dB	dBuV	dB			cm	deg
	1			44.31	38.90			55.52		•		100	125
	2			90.23	39.01			62.25					
	3			95.41	36.99								
	4			74.52									
	5 6			46.25								100	202
•	D		ŏ	75.00	44.04	40.0	0 -1.96	49.66	-5.62	QP		100	202

\*Factor includes antenna factor, cable loss and amplifier gain

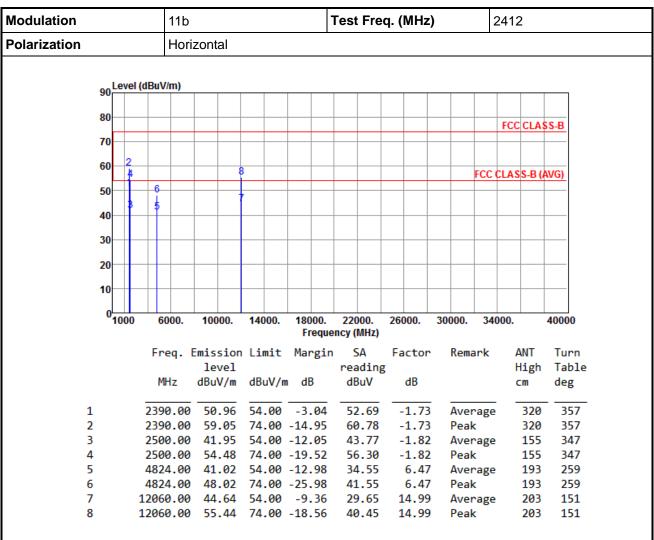
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.

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### 3.5.5 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 11b



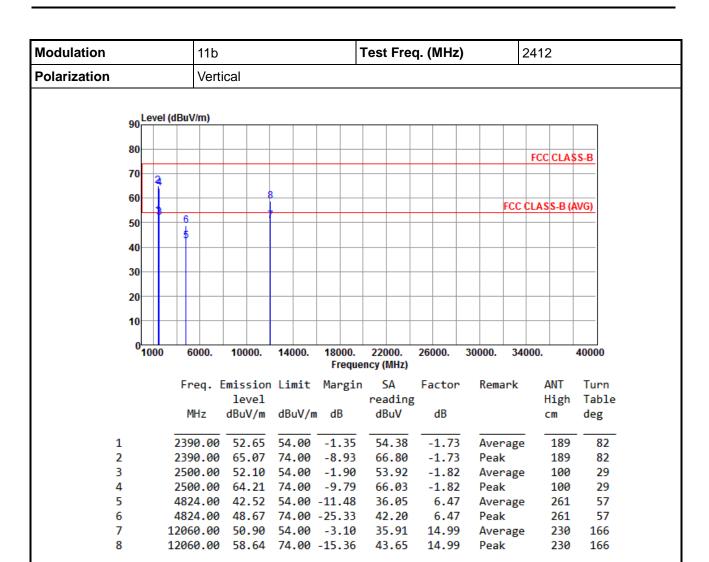
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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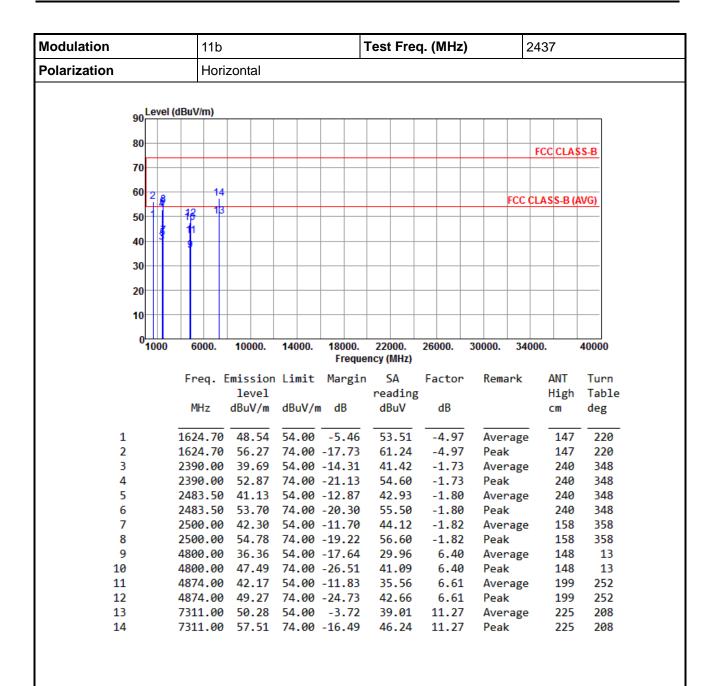


\*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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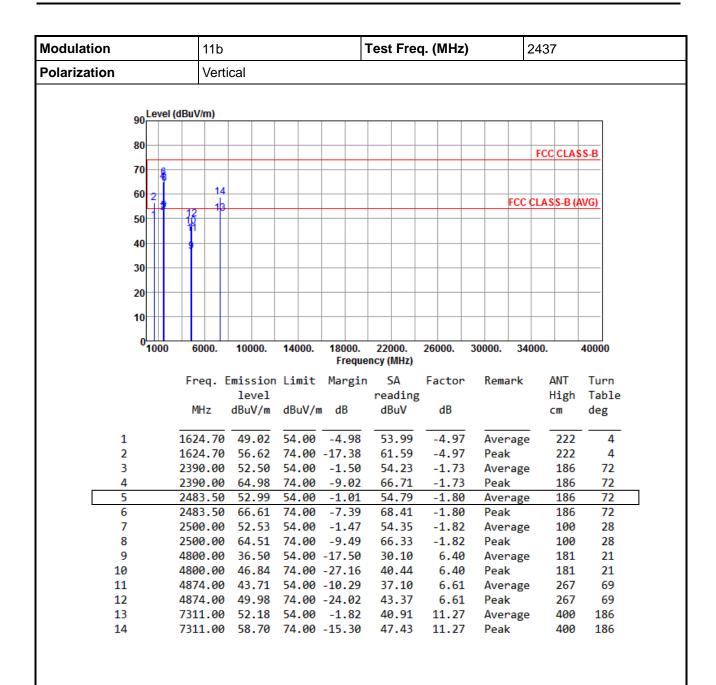


\*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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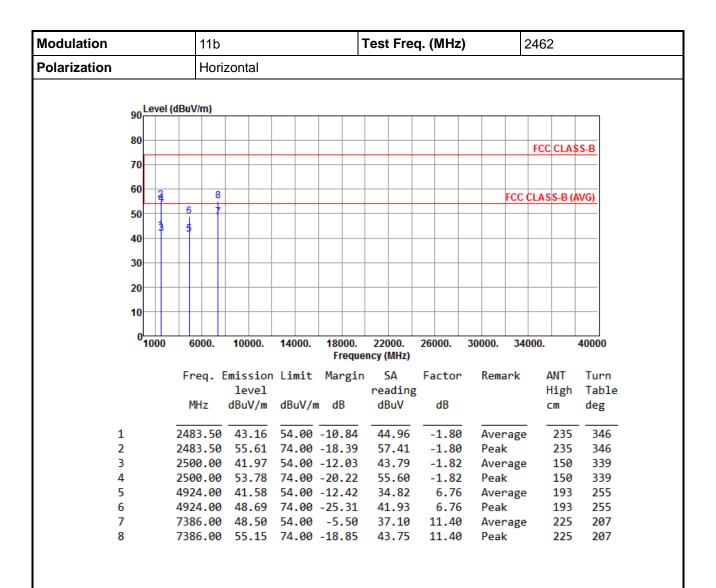


\*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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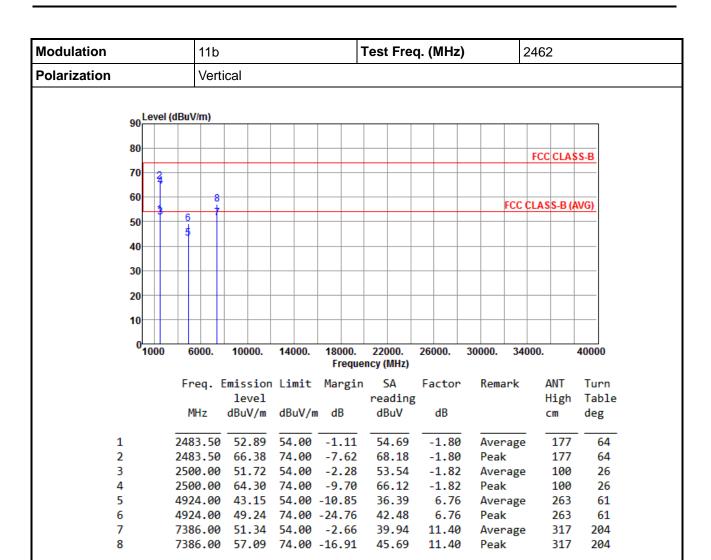


\*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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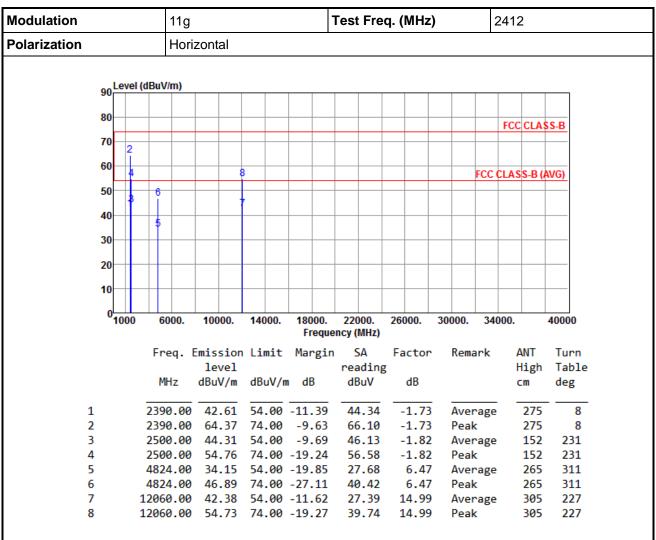
\*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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### 3.5.6 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 11g



Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) - Limit (dBuV/m).

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Modulation			11g					Test Freq. (MHz)					2412		
Polarization		Vertical													
	90 Le	vel (dE	BuV/m)												
	80	2											FCC CLA	SS-B	
	70	4						+	$\dashv$			+		-	
	60					3									
	••_	4										FCC (	CLASS-B (	AVG)	
	50		6			_									
	40														
			5												
	30														
	20								_						
	10														
	010	00	6000.	100	00.	14000.	18000.	2200	0.	26000.	30000.	340	000.	40000	
							Frequ	ency (M	Hz)						
			Freq.	Emiss	sion	Limit	Margi	n SA	١	Factor	Rem	ark	ANT	Turn	
				lev				read	ling				High	Tabl	
			MHz	dBu\	//m	dBuV/ı	n dB	dBu	ıV	dB			cm	deg	
:	1	2	390.00	52.	41	54.00	-1.59	54.	14	-1.73	Ave	rage	157	329	
	2		390.00			74.00				-1.73			157	329	
	3		500.00			54.00				-1.82		rage			
	4					74.00				-1.82			100		
	5		824.00				-19.60			6.47		rage			
	5 7		824.00				-27.11			6.47			241		
	_	12	000.00	45.	. / ŏ	34.00	-8.22	30.	/9	14.99	Ave	rage	223	177	

14.99

Peak

223

177

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

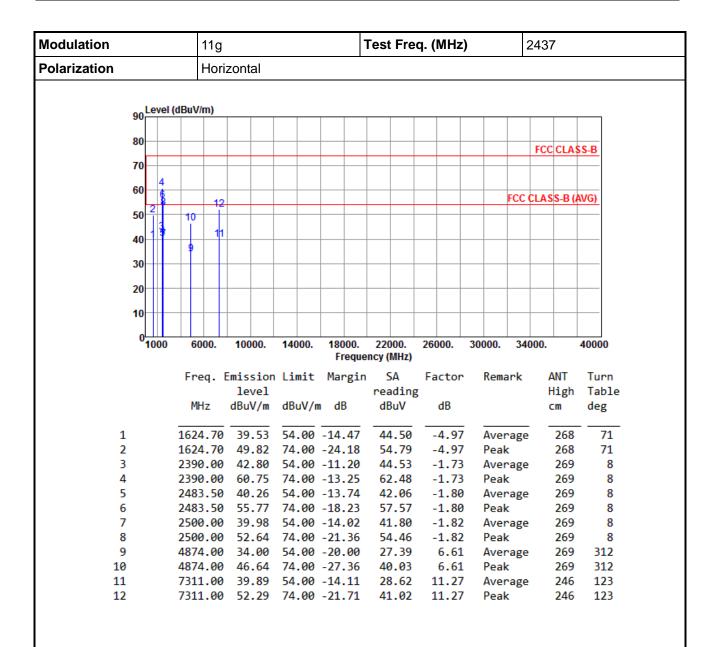
12060.00 59.43 74.00 -14.57 44.44

\*Factor includes antenna factor , cable loss and amplifier gain Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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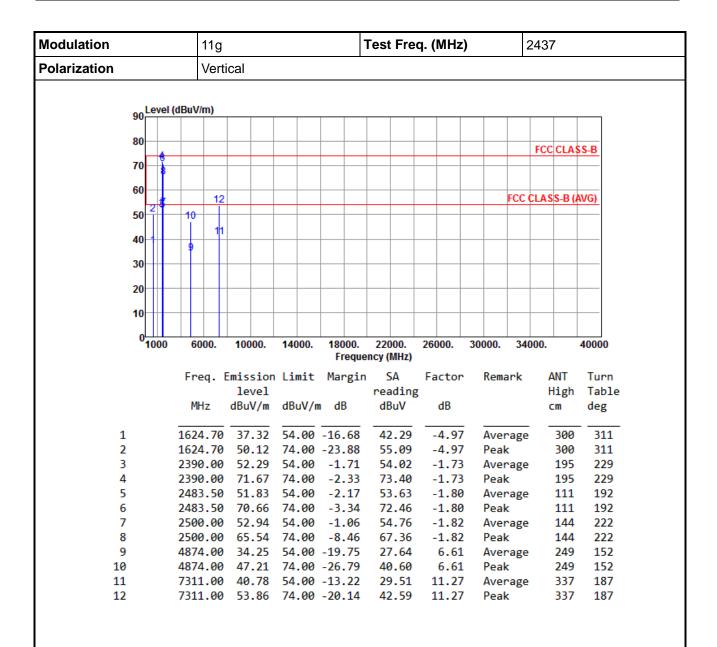


\*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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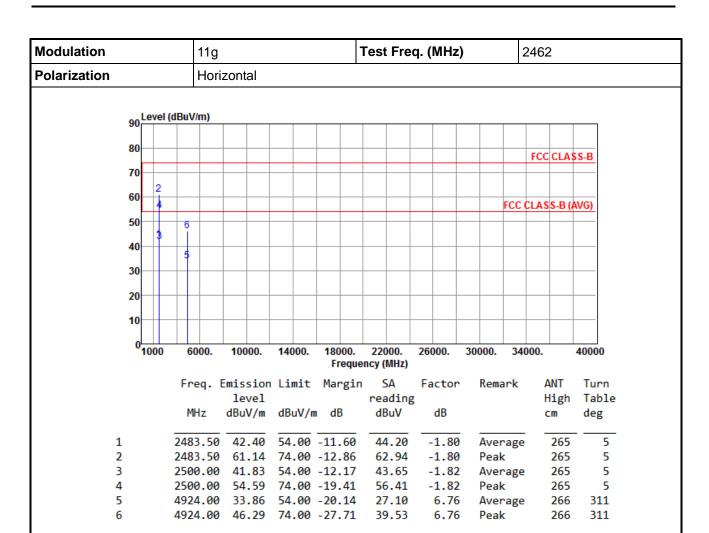


\*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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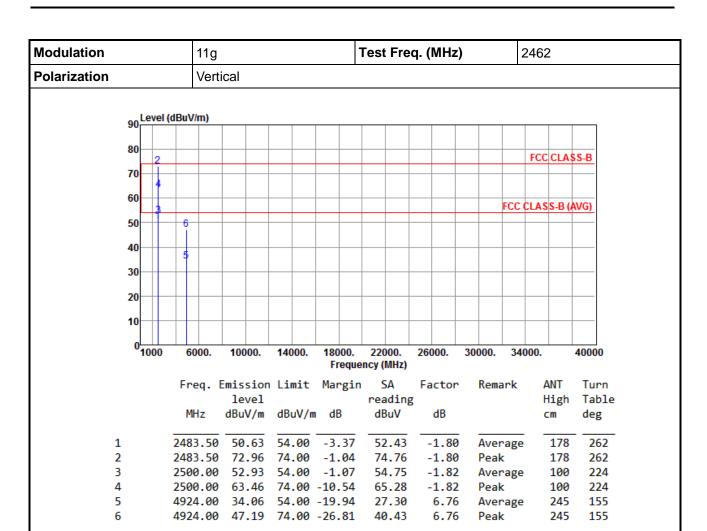


\*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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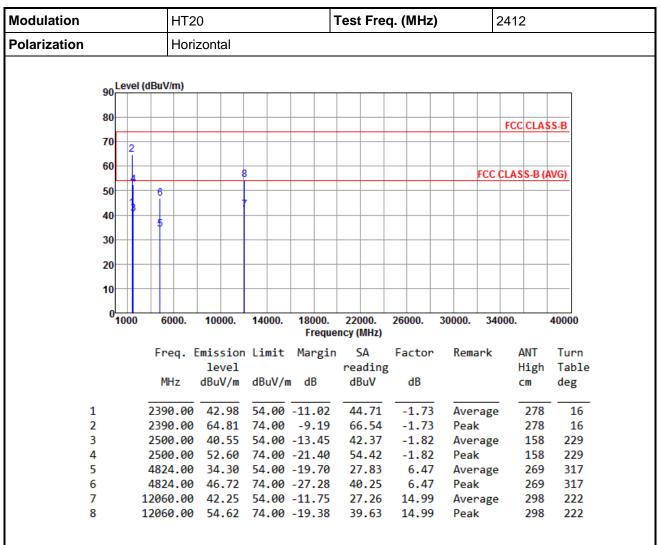
\*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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## 3.5.7 Transmitter Radiated Unwanted Emissions (Above 1GHz) for HT20



Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) - Limit (dBuV/m).

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30 20 10

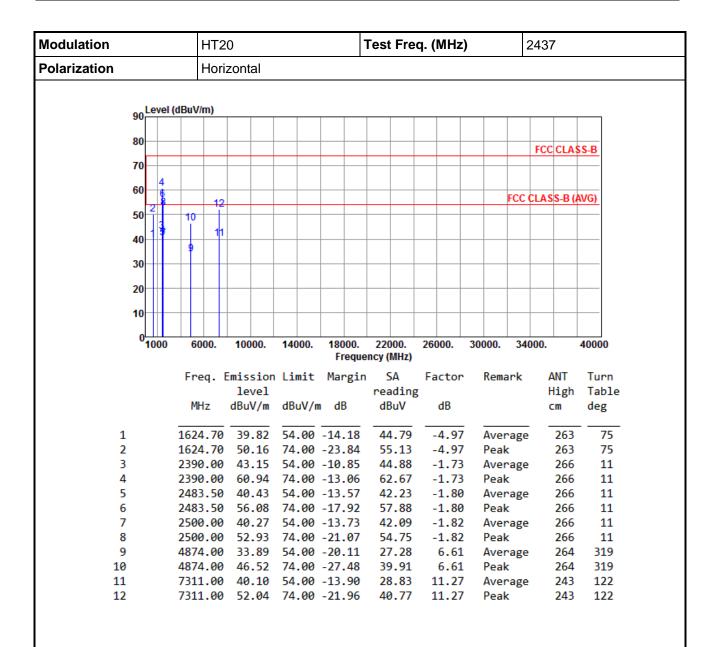
Modulation				HT:	20				-	Гest	Fre	q. (	MH	<u>z)</u>	2	2412	2	
Polarization				Ver	tical													
	90.	Leve	el (dBu	V/m)														
	80															FCC	CLA	ce D
	70	2	1													FCC	CLA	SS-B
	60		3				8								FCC	CLAS	S-B (	AVG)
	50		6				_											
	40	$\dashv$				-	_											

	<sup>0</sup> 1000	6000.	6000. 10000.		18000. Freque	22000. ncy (MHz)	26000.	30000.	34000.		40000	
		Freq.	Emission level	Limit	Margin	SA reading	Factor	Remar		ANT High	Turn Table	
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB		(	-m	deg	
1		2390.00	52.97	54.00	-1.03	54.70	-1.73	Avera	nge -	135	349	
2		2390.00	72.83	74.00	-1.17	74.56	-1.73	Peak		135	349	
3		2500.00	52.91	54.00	-1.09	54.73	-1.82	Avera	ige	100	342	
4		2500.00	68.12	74.00	-5.88	69.94	-1.82	Peak		100	342	
5		4824.00	34.52	54.00	-19.48	28.05	6.47	Avera	ige	239	144	
6		4824.00	46.68	74.00	-27.32	40.21	6.47	Peak		239	144	
7		12060.00	45.26	54.00	-8.74	30.27	14.99	Avera	ige	237	190	
8		12060.00	59.29	74.00	-14.71	44.30	14.99	Peak		237	190	

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)
\*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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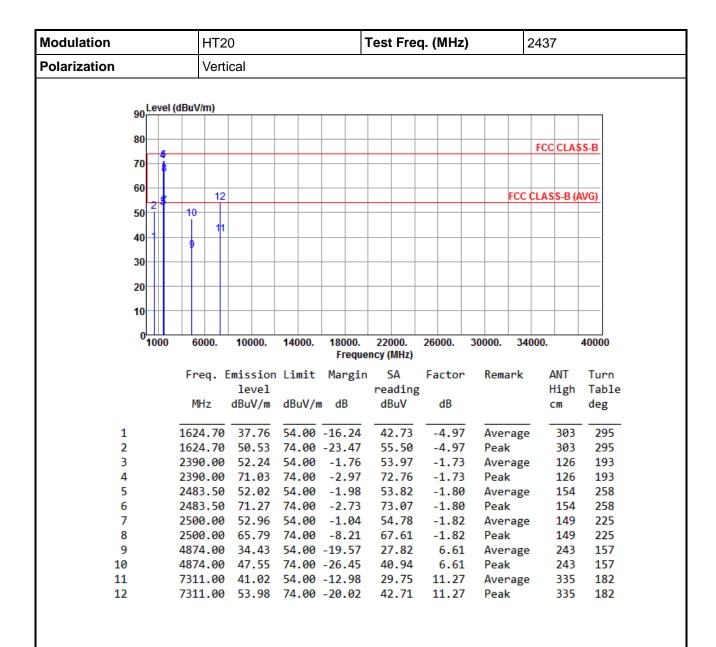


\*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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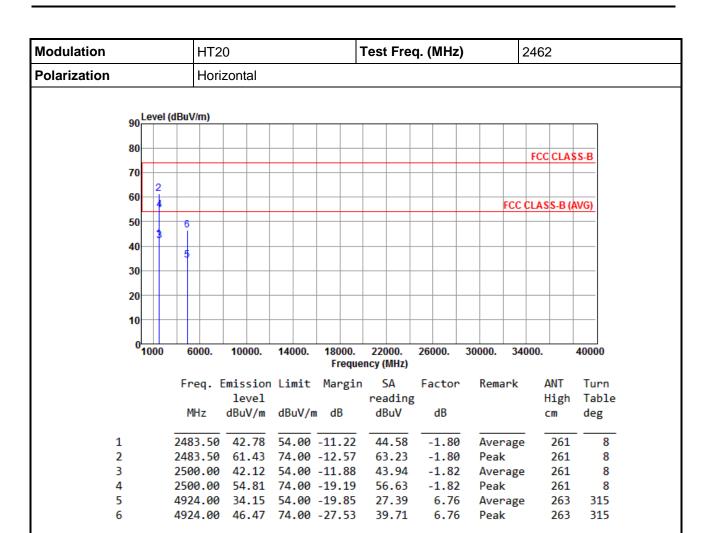


\*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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\*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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Modulation				HT2	0				-	Test	Fre	q. (	MHz	)		2	2462	2	
Polarization		Vertical																	
	90	Level	(dBuV	/m)				_											
	80																		
	80	2															FCC	CLA	SS-B
	70	+						+											
	60	$\bot\!\!\!\!\bot$						_											
								+	_							FCC (	CLAS	S-B (	AVG)
	50		6																
	40		-					+											
	30																		
	50																		
	20							+											
	10							+											
	0																		
		1000	60	000.	100	00.	14000	. 1	18000. Freque	220 ncy (I		260	000.	3000	00.	340	000.		40000
			Fre	eq. E	Emis	sion	Limit	. 1	Margin	S	Α	Fa	ctor	R	lema	rk	Д	NT	Tur
				•	le	vel			_		ding	3					Н	ligh	Tab
			M	Ιz	dBu'	V/m	dBuV/	m	dB	dB	uV		dB				C	m	deg
	1		248	3.50	50	. 47	54.00	_	3.53	52	.27	_	1.80	Α Α	ver	age	-	125	24
	2			3.50			74.00		1.35		.45		1.80		eak	_		125	
	3			00.6			54.00		1.07		.75		1.82			age		122	
	4		2500	0.00	63	.91	74.00	-1	10.09	65	.73	-	1.82	P	eak			122	34

6.76

6.76

Average

Peak

243

243

154

154

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

4924.00 34.29 54.00 -19.71 27.53

4924.00 47.28 74.00 -26.72 40.52

\*Factor includes antenna factor , cable loss and amplifier gain Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

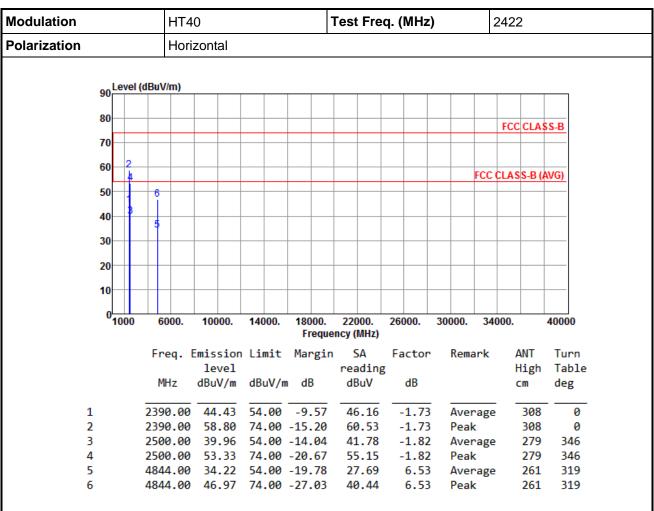
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# 3.5.8 Transmitter Radiated Unwanted Emissions (Above 1GHz) for HT40



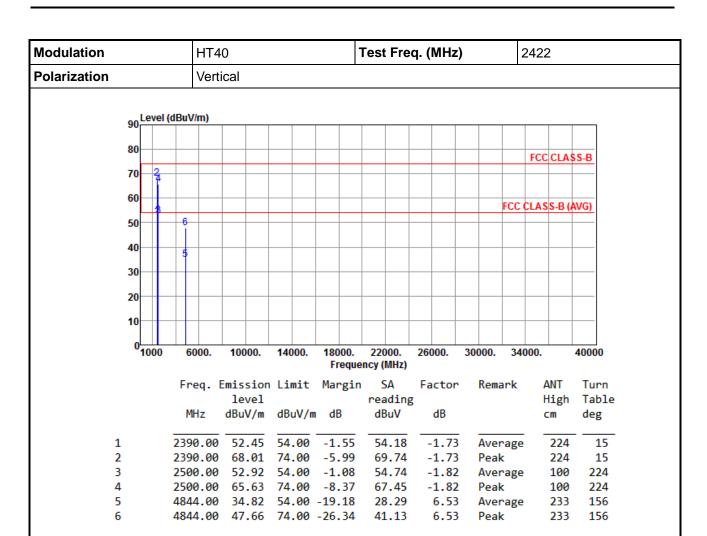
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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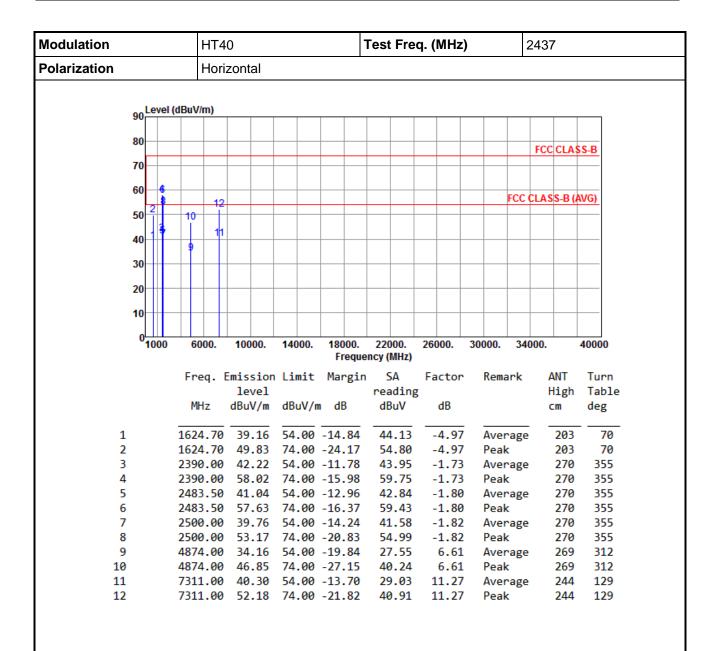


\*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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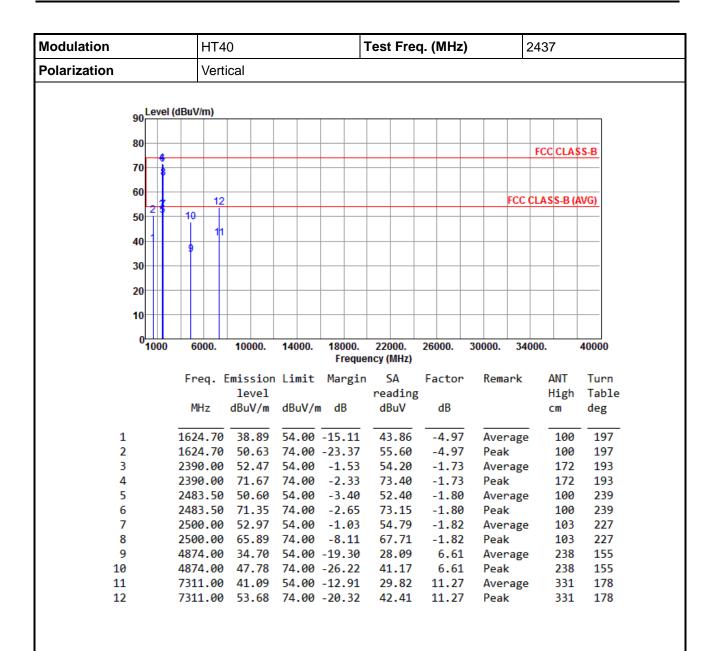


\*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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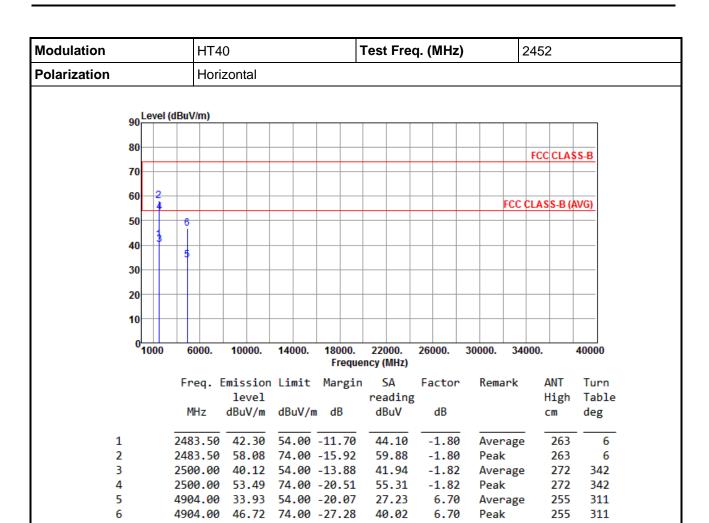


\*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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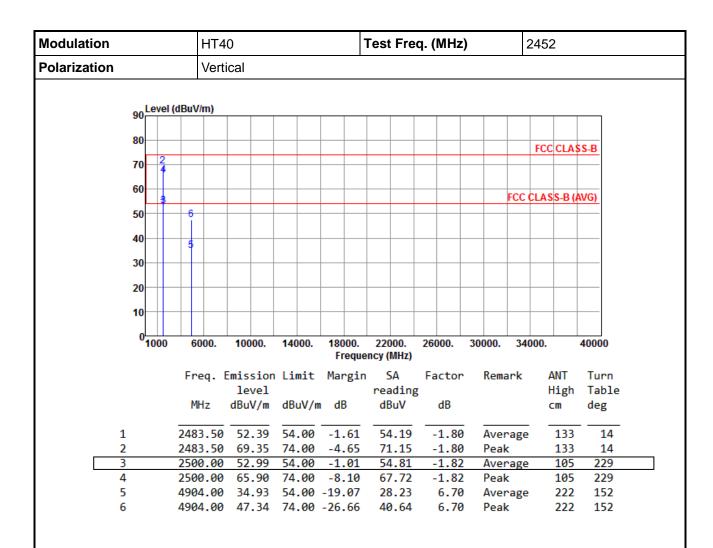


\*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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\*Factor includes antenna factor, cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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# 3.6 Emissions in Non-Restricted Frequency Bands

### 3.6.1 Emissions in Non-Restricted Frequency Bands Limit

Peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz

### 3.6.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

#### 3.6.3 Test Procedures

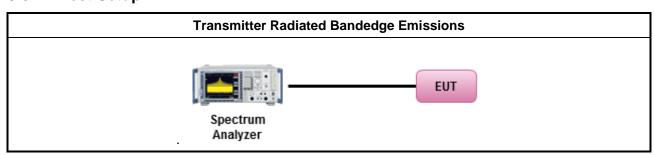
#### Reference level measurement

- 1. Set RBW=100kHz, VBW = 300kHz, Detector = Peak, Sweep time = Auto
- 2. Trace = max hold, Allow Trace to fully stabilize
- 3. Use the peak marker function to determine the maximum PSD level

#### **Emission level measurement**

- 1. Set RBW=100kHz, VBW = 300kHz, Detector = Peak, Sweep time = Auto
- 2. Trace = max hold, Allow Trace to fully stabilize
- 3. Scan Frequency range is up to 25GHz
- 4. Use the peak marker function to determine the maximum amplitude level

#### 3.6.4 Test Setup



## 3.6.5 Test Result of Emissions in non-restricted frequency bands

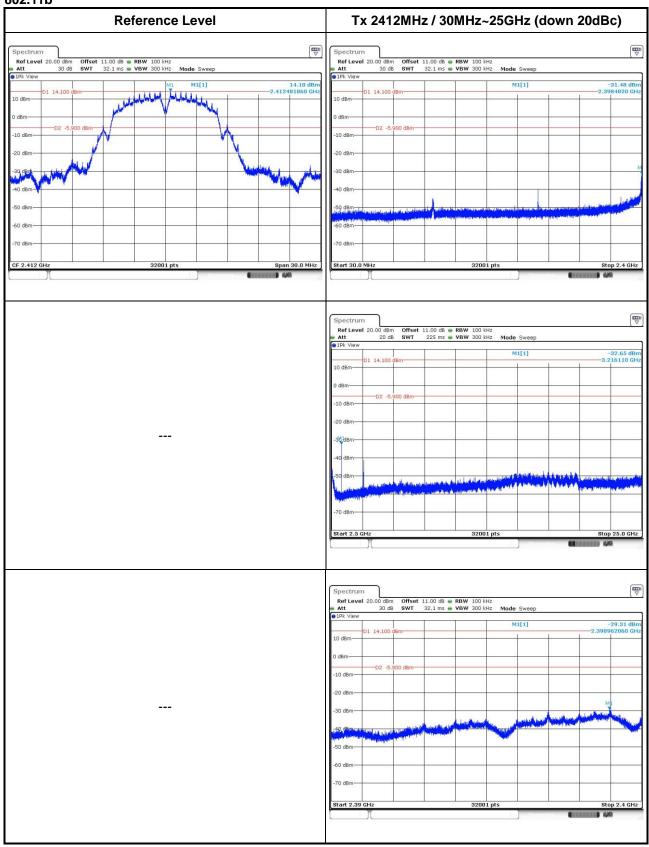
This test item is performed on each TX output individually without summing or adding 10  $log(N_{ANT})$  since measurements are made relative to the in-band emissions on the individual outputs. Only worst test result of each operating mode is presented.

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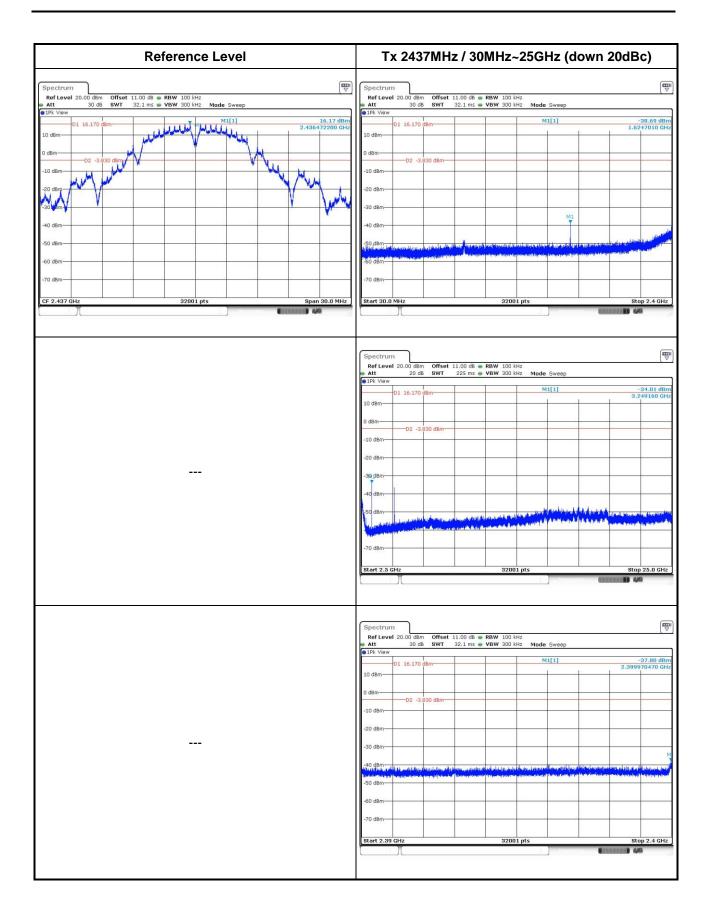
### 3.6.6 Unwanted Emissions into Non-Restricted Frequency Bands

### 802.11b



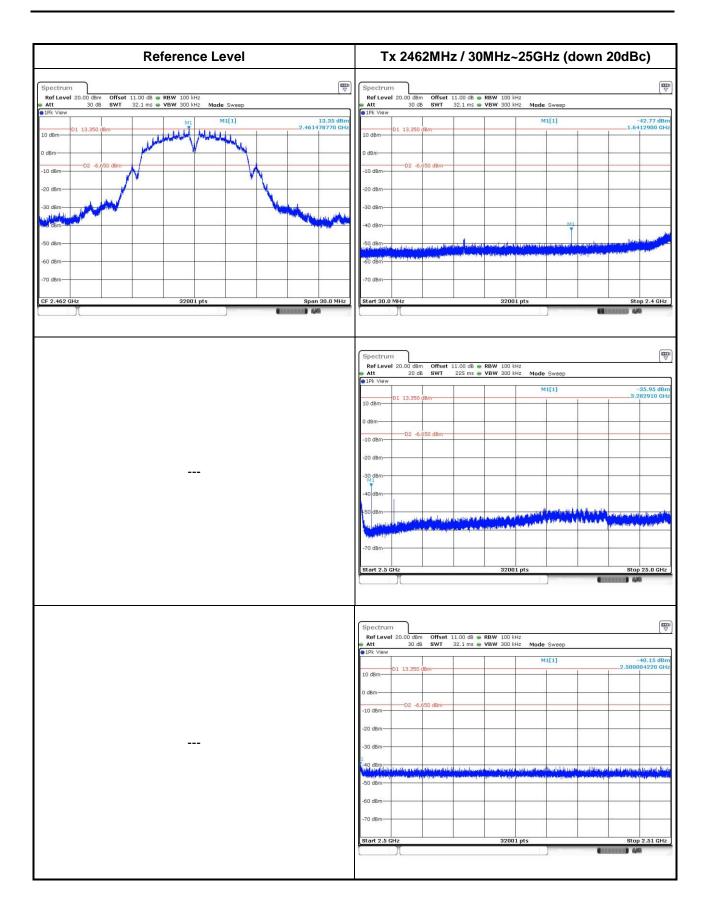
Report No.: FR592203AC Report Version: Rev. 01





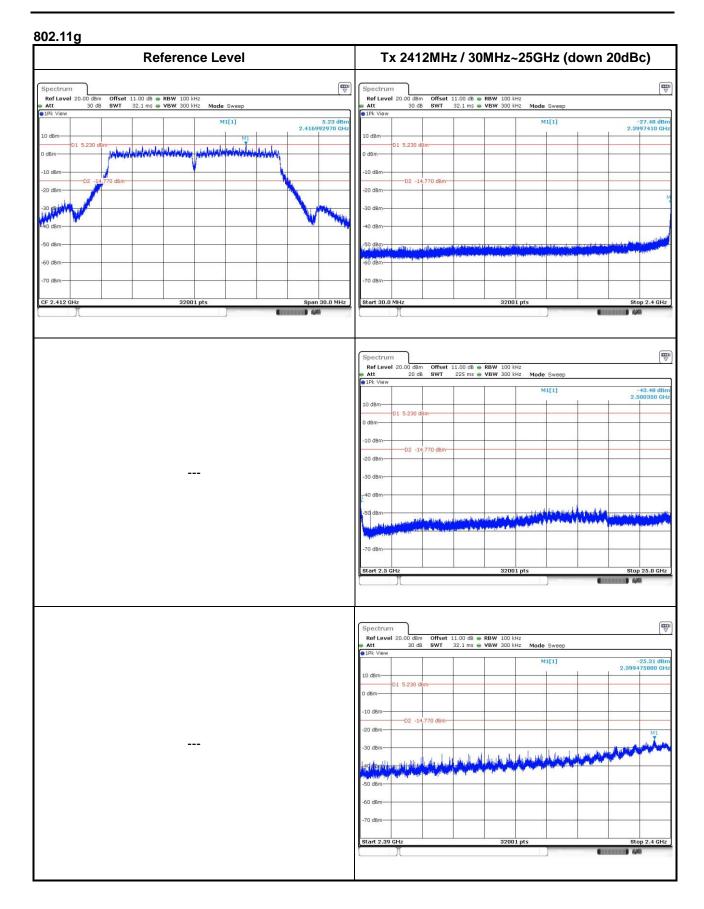
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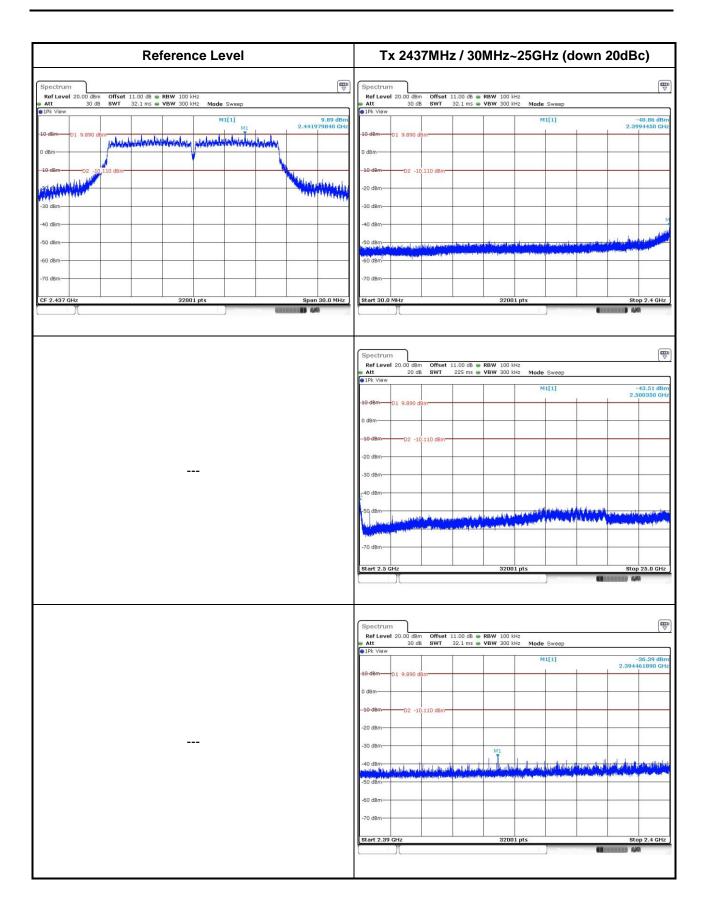
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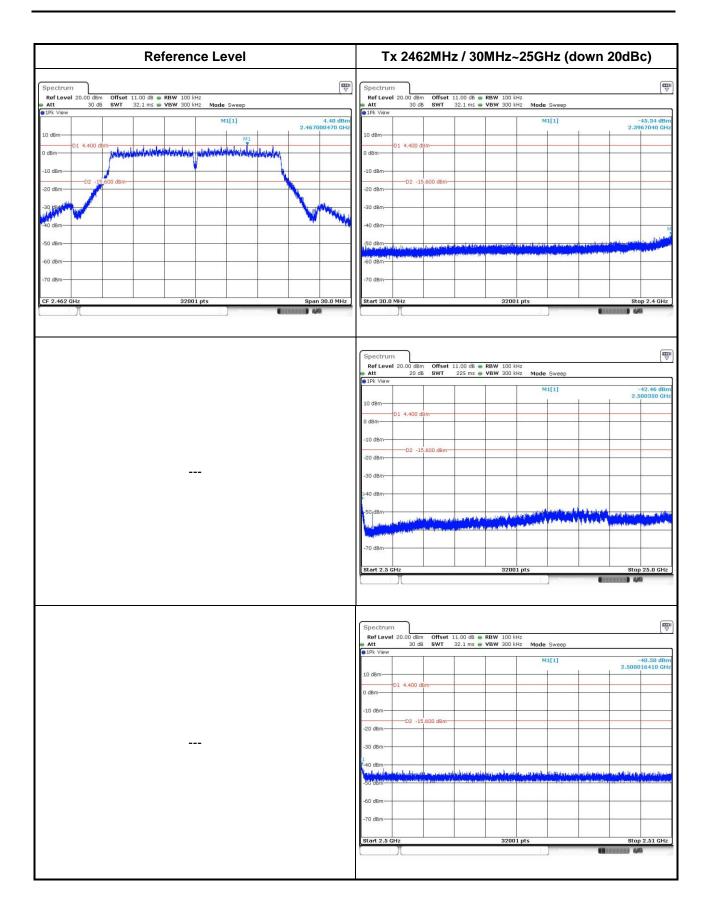
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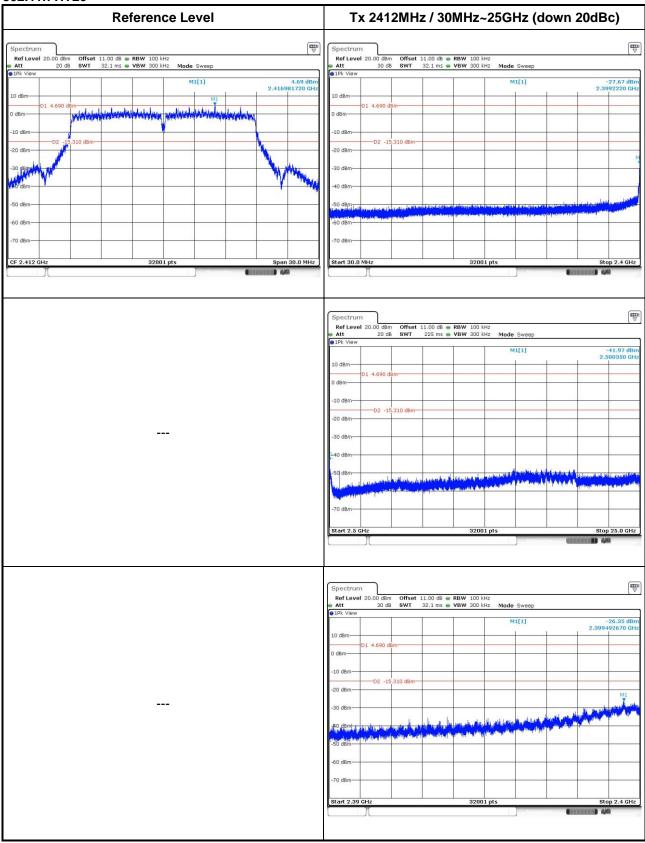




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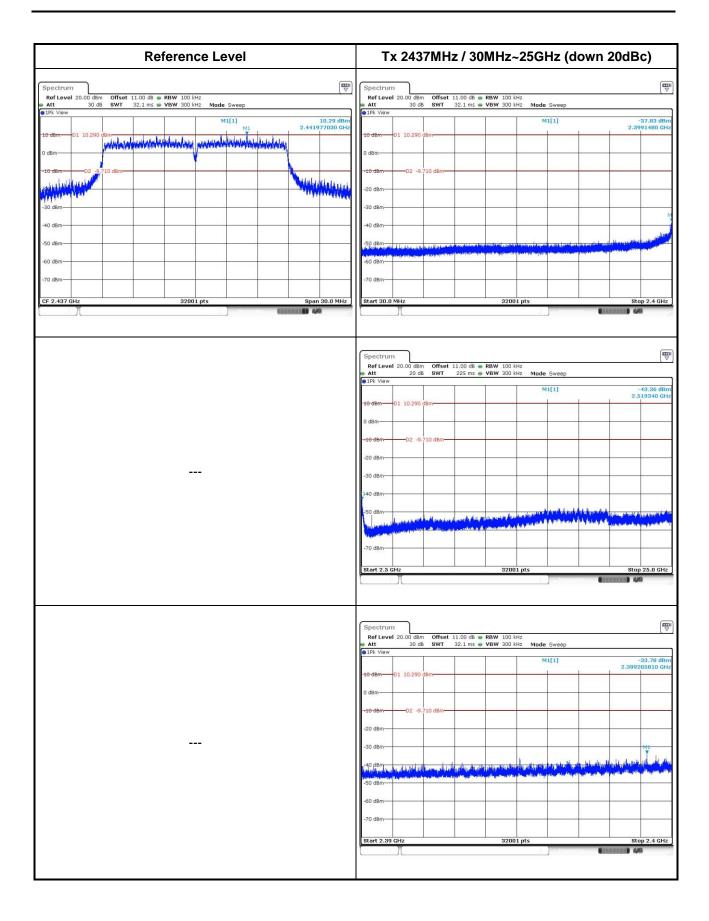


#### 802.11n HT20



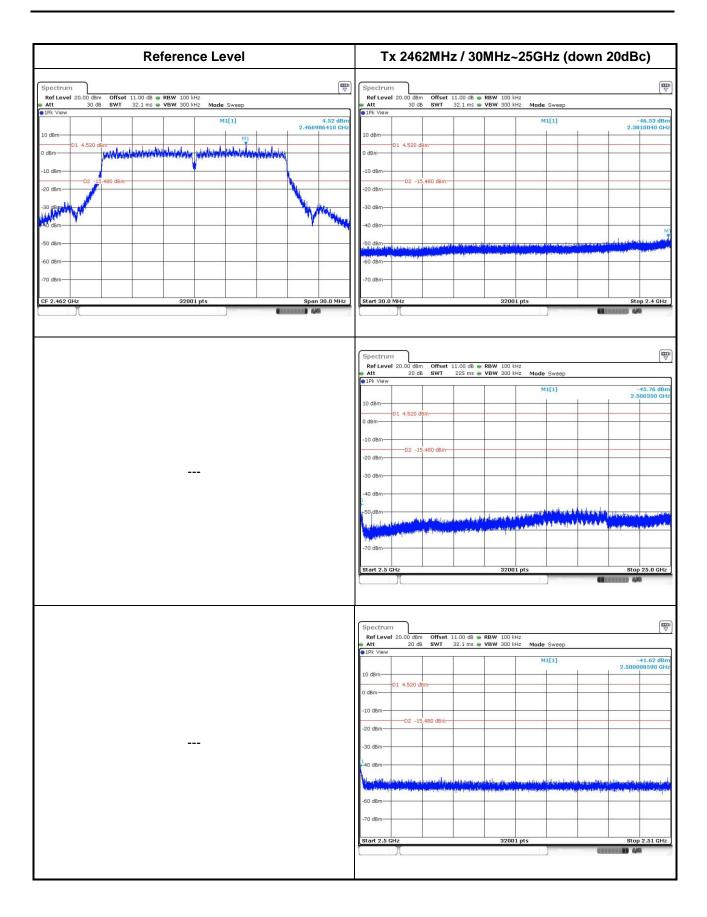
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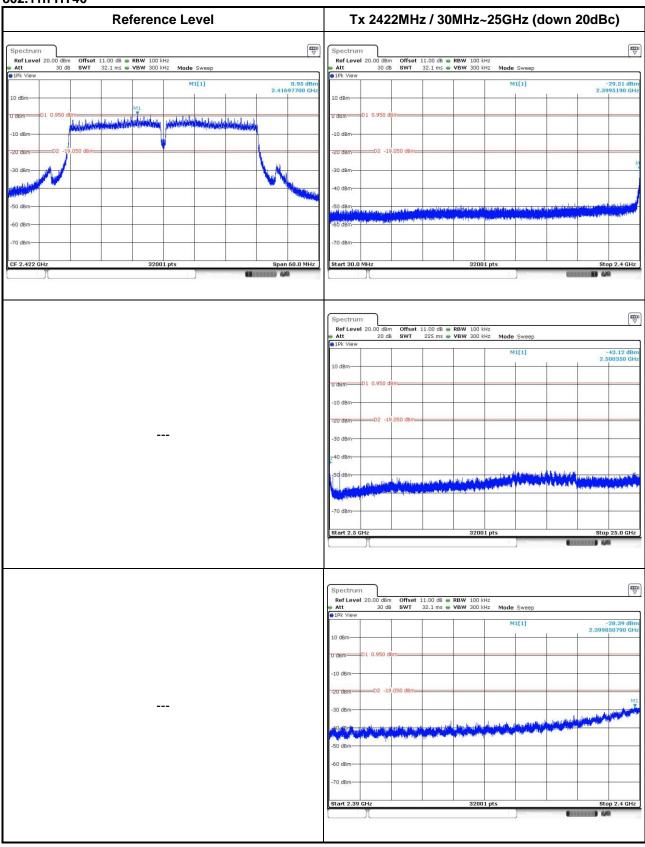




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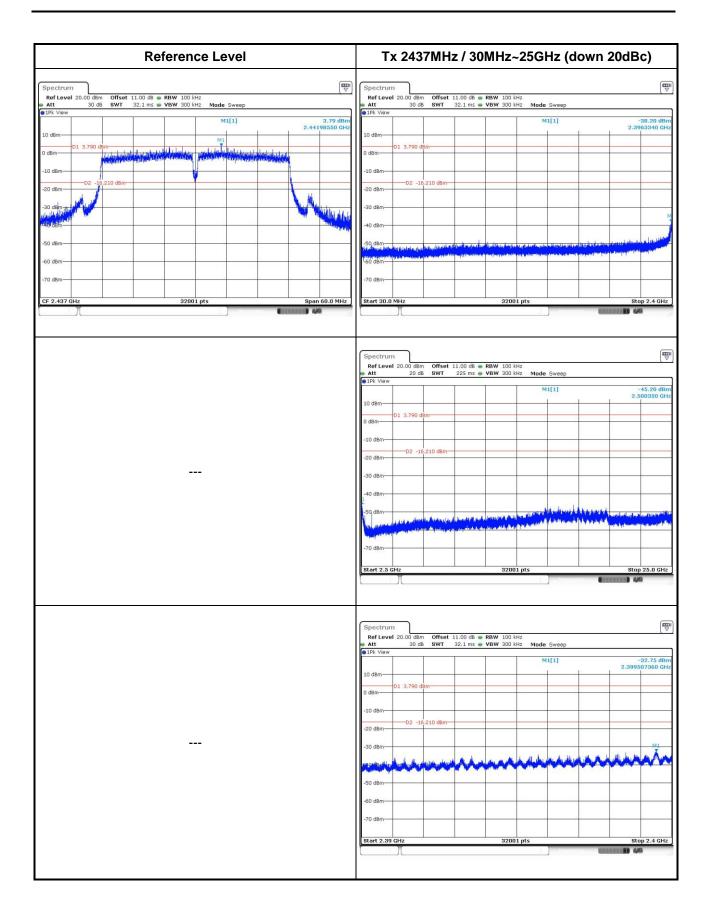


### 802.11n HT40



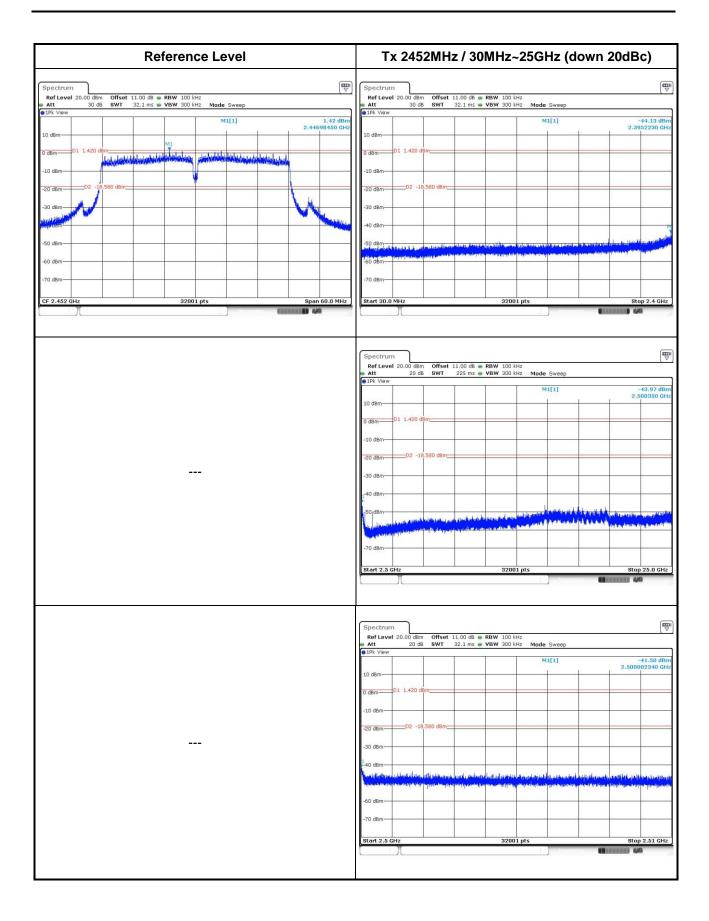
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# 4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp, it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan Hsiang. Location map can be found on our website <a href="http://www.icertifi.com.tw">http://www.icertifi.com.tw</a>.

Linkou

Tel: 886-2-2601-1640

No. 30-2, Ding Fwu Tsuen, Lin Kou District, New Taipei City, Taiwan,

R.O.C.

Kwei Shan

Tel: 886-3-271-8666 No. 3-1, Lane 6, Wen San 3rd St., Kwei Shan Hsiang, Tao Yuan Hsien 333, Taiwan, R.O.C. Kwei Shan Site II

Tel: 886-3-271-8640

No. 14-1, Lane 19, Wen San 3rd St., Kwei Shan Hsiang, Tao Yuan Hsien 333, Taiwan, R.O.C.

If you have any suggestion, please feel free to contact us as below information

Tel: 886-3-271-8666 Fax: 886-3-318-0155

Email: ICC\_Service@icertifi.com.tw

==END==

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