

FCC Test Report

FCC ID	:	MXF-WRTD303N		
Equipment	:	Easy Connect		
Model No.	:	WRTD-303N		
Brand Name	:	Gemtek		
Applicant	:	Gemtek Technology Co., Ltd.		
Address	:	No.15-1 Zhonghua Road, Hsinchu Industrial Park, Hukou, Hsinchu, Taiwan, 30352		
Standard	:	47 CFR FCC Part 15.247		
Received Date	:	Jun. 03, 2014		
Tested Date	:	Jun. 03 ~ Aug. 12, 2014		

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:

Along Chem

Along Chen / Assistant Manager





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Release Record

Report No.	Version	Description	Issued Date
FR462101AC	Rev. 01	Initial issue	Sep. 11, 2014



FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 0.162MHz 50.38 (Margin -4.96dB) - AV	Pass
15.247(d) 15.209	Radiated Emissions	[dBuV/m at 3m]: 2487.00MHz 53.00 (Margin -1.00dB) - AV [dBuV/m at 3m]: 2483.50MHz 73.00 (Margin -1.00dB) - PK	Pass
15.247(b)(3)	Fundamental Emission Output Power	Max Power [dBm]: 28.43	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

Summary of Test Results



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 _{⊤x})	Data Rate / MCS		
2400-2483.5	b	2412-2462	1-11 [11]	2	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.

1.1.2 Antenna Details

Ant.	Model	Туре	e Connector	Operating Frequencies (MHz) / Antenna Gain (dBi)					
No.	mouor	. , , , , ,		2400~2483.5	5150~5250	5250~5350	5470~5725	5725~5850	
1	WRTD-303N	PIFA	I-PEX	2.5	3.02	3.02	2.8	3.03	

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	12Vdc from AC adapter
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1.1.4 Accessories

	Accessories				
No.	Equipment	Description			
		Brand Name: AOEM			
		Model Name: ADS0248-W 120200			
1	AC Adapter 1	Power Rating: I/P: 100-240Vac, 50-60Hz, 0.6A O/P: 12Vdc, 2A			
		Power Line: 1.2m non-shielded cable with one core			
		Brand Name: APD			
		Model Name: WA-24Q12FU			
2	2 AC Adapter 2	Power Rating: I/P: 100-240Vac, 50-60Hz, 0.6A O/P: 12Vdc, 2A			
		Power Line: 1.8m non-shielded cable with one core			
		Brand Name: MOSO			
		Model Name: MSP-C2000IC12.0-24W-US			
3	AC Adapter 3	Power Rating: I/P: 100-240Vac, 50-60Hz, 0.8A O/P: 12Vdc, 2.0A			
		Power Line: 1.4m non-shielded cable with one core			
		Brand Name: WTE Battery			
4	Battery 1	Model Name: 303N			
		Rating: 7.4Vdc, 4050mAh (29.97Wh)			
		Brand Name: MAXELL Battery			
5	Battery 2	Model Name: ML2032			
		Lithium 3Vdc Battery Button Cell			
		Brand Name: TOSHIBA			
6	HDD	Model Name: MQ01ABF050			
		Capacity: 500GB			



1.1.5 Channel List

Frequency	band (MHz)	2400~	2483.5	
802.11 b /	g / n HT20	802.11n HT40		
Channel	Channel Frequency(MHz)		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	MP TOOL, Version1.3.8.0				
	Mode	Duty cycle (%)	Duty factor (dB)		
	11b	100.00%	0.00		
Duty Cycle and Duty Factor	11g	100.00%	0.00		
	HT20	100.00%	0.00		
	HT40	100.00%	0.00		



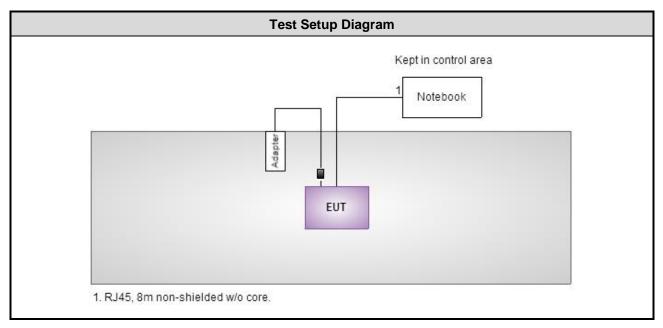
1.1.7 Power Setting

Modulation Mode	Test Frequency (MHz)	Power Set
11b	2412	51/56
11b	2437	56/61
11b	2462	50/55
11g	2412	57/60
11g	2437	61/63
11g	2462	57/60
HT20	2412	55/58
HT20	2437	61/63
HT20	2462	54/57
HT40	2422	54/57
HT40	2437	57/61
HT40	2452	53/56

1.2 Local Support Equipment List

	Support Equipment List						
No.	No. Equipment Brand Model S/N FCC ID Signal cable / Length (m)						
1	Notebook	DELL	E6430		DoC	RJ45, 8m non-shielded cable w/o core.	

1.3 Test Setup Chart





1.4 The Equipment List

Test Item	Conducted Emission									
Test Site	Conduction room 1 / (Conduction room 1 / (CO01-WS)								
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until					
EMC Receiver	R&S	ESCS 30	100169	Oct. 15, 2013	Oct. 14, 2014					
LISN	SCHWARZBECK	Schwarzbeck 8127	8127-667	Nov. 23, 2013	Nov. 22, 2014					
LISN (Support Unit)	SCHWARZBECK	Schwarzbeck 8127	8127-666	Dec. 04, 2013	Dec. 03, 2014					
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Apr. 23, 2014	Apr. 22, 2015					
50 ohm terminal (Support Unit)	NA	50	04	Apr. 18, 2014	Apr. 17, 2015					

Test Item Radiated Emission **Test Site** 966 chamber1 / (03CH01-WS) Instrument Manufacturer Model No. Serial No. **Calibration Date Calibration Until** Spectrum Analyzer FSV40 101498 R&S Jan. 25, 2014 Jan. 24, 2015 Receiver R&S ESR3 101658 Jan. 10, 2014 Jan. 09, 2015 **Bilog Antenna** SCHWARZBECK VULB9168 VULB9168-522 Jan. 02, 2014 Jan. 01, 2015 Horn Antenna SCHWARZBECK BBHA 9120 D BBHA 9120 D 1096 Feb. 13, 2014 Feb. 12, 2015 1G-18G Horn Antenna SCHWARZBECK BBHA 9170 BBHA 9170517 Dec. 27, 2013 Dec. 26, 2014 18G-40G BPA-530 SN:100219 Nov. 28, 2013 Nov. 27, 2014 Preamplifier Burgeon MY39501308 Preamplifier Agilent 83017A Dec. 16, 2013 Dec. 15, 2014 Preamplifier WM TF-130N-R1 923365 Oct. 23, 2013 Oct. 22, 2014 **RF** Cable HUBER+SUHNER SUCOFLEX104 MY16014/4 Dec. 16, 2013 Dec. 15, 2014 **RF** Cable HUBER+SUHNER SUCOFLEX104 MY16019/4 Dec. 15, 2014 Dec. 16, 2013 **RF** Cable HUBER+SUHNER SUCOFLEX104 MY16139/4 Dec. 16, 2013 Dec. 15, 2014 LF cable 3M CFD400NL-LW CFD400NL-001 Woken Dec. 16, 2013 Dec. 15, 2014 LF cable 10M Woken CFD400NL-LW CFD400NL-002 Dec. 16, 2013 Dec. 15, 2014 Note: Calibration Interval of instruments listed above is one year.

Loop Antenna	R&S	HFH2-Z2	100330	Nov. 15, 2012	Nov. 14, 2014		
Note: Calibration Interval of instruments listed above is two year.							



Test Item	Radiated Emission								
Test Site	966 chamber 3 / (03C	er 3 / (03CH03-WS)							
Instrument	Manufacturer	Model No. Serial No.		Calibration Date	Calibration Until				
Spectrum Analyzer	Agilent	N9010A	MY53400091	Oct. 07, 2013	Oct. 06, 2014				
Receiver	Agilent	N9038A	MY53290044	Jan. 08, 2014	Jan. 07, 2015				
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-562	Feb. 07, 2014	Feb. 06, 2015				
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1206	Feb. 20, 2014	Feb. 19, 2015				
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Dec. 27, 2013	Dec. 26, 2014				
Preamplifier	EMC	EMC02325	980187	Nov. 22, 2013	Nov. 21, 2014				
Preamplifier	Agilent	83017A	MY53270014	Nov. 22, 2013	Nov. 21, 2014				
Preamplifier	WM	TF-130N-R1	923365	Oct. 23, 2013	Oct. 22, 2014				
RF cable-3M	HUBER+SUHNER	SUCOFLEX104	MY22620/4	Feb. 19, 2014	Feb. 18, 2015				
RF cable-8M	HUBER+SUHNER	SUCOFLEX104	MY22601/4	Feb. 19, 2014	Feb. 18, 2015				
RF cable-1M	HUBER+SUHNER	SUCOFLEX104	MY22624/4	Feb. 19, 2014	Feb. 18, 2015				
LF cable-0.8M	EMC	EMC8D-NM-NM-800	EMC8D-NM-NM-800 -001	Feb. 17, 2014	Feb. 16, 2015				
LF cable-3M	EMC	EMC8D-NM-NM-300 0	131103	Feb. 17, 2014	Feb. 16, 2015				
LF cable-13M	EMC	EMC8D-NM-NM-130 00	131104	4 Feb. 17, 2014 Feb					

Loop Antenna	R&S	HFH2-Z2	100330	Nov. 15, 2012	Nov. 14, 2014			
Note: Calibration Inter	Note: Calibration Interval of instruments listed above is two year.							

Test Item	RF Conducted								
Test Site	(TH01-WS)								
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until				
Spectrum Analyzer	R&S	FSV40	101063	Feb. 17, 2014	Feb. 16, 2015				
Power Meter	Anritsu	ML2495A	1241002	Oct. 24, 2013	Oct. 23, 2014				
Power Sensor	Anritsu	MA2411B	1207366	Oct. 24, 2013	Oct. 23, 2014				
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 C63.10-2009 FCC KDB 558074 D01 DTS Meas Guidance v03r02 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					
Frequency error	±34.134 Hz					
Temperature	±0.6 °C					
Conducted emission	±2.670 dB					
AC conducted emission	±2.92 dB					
Radiated emission ≤ 1GHz	±3.26 dB					
Radiated emission > 1GHz	±4.94 dB					



2 Test Configuration

2.1 **Testing Condition**

Test Item	Test Site	Ambient Condition	Tested By
AC Conduction	CO01-WS	22°C / 53%	Skys Huang
Radiated Emissions	03CH01-WS 03CH03-WS	22°C / 65-66%	Anderson Hung
RF Conducted	TH01-WS	24°C / 65%	Brad Wu

FCC site registration No.: 657002 / 390588

IC site registration No.: 10807A-1 / 10807C-1

2.2 The Worst Test Modes and Channel Details

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

NOTE:

 The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The X-plane results were found as the worst case and were shown in this report.

2) 3 Adapters: AOEM, APD, and MOSO had been pretested and found that **APD adapter** was the worst for final testing.



3 Transmitter Test Results

3.1 Conducted Emissions

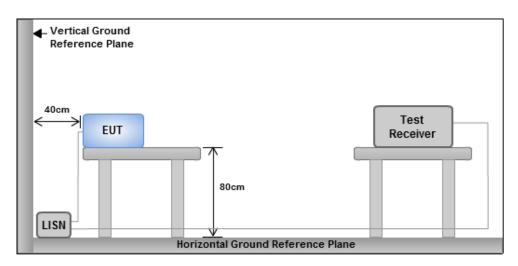
3.1.1 Limit of Conducted Emissions

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.
- 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 Ω 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.

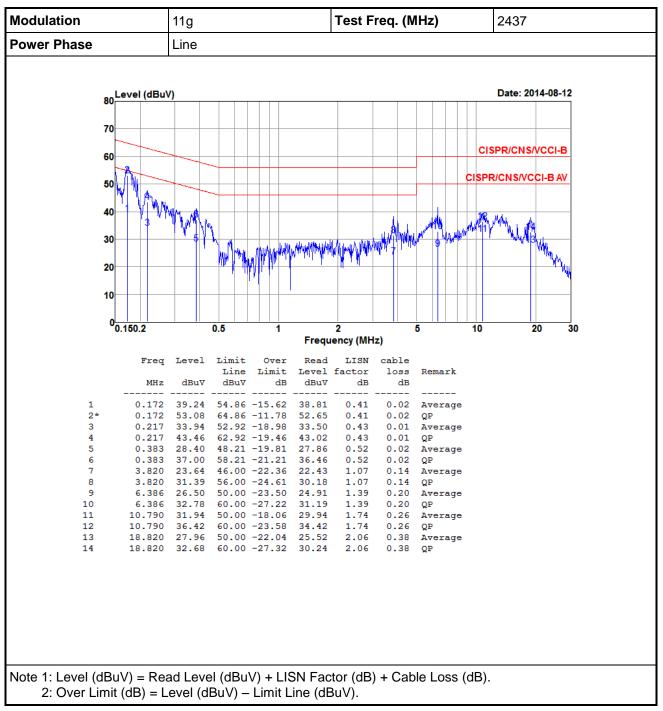
3.1.3 Test Setup



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

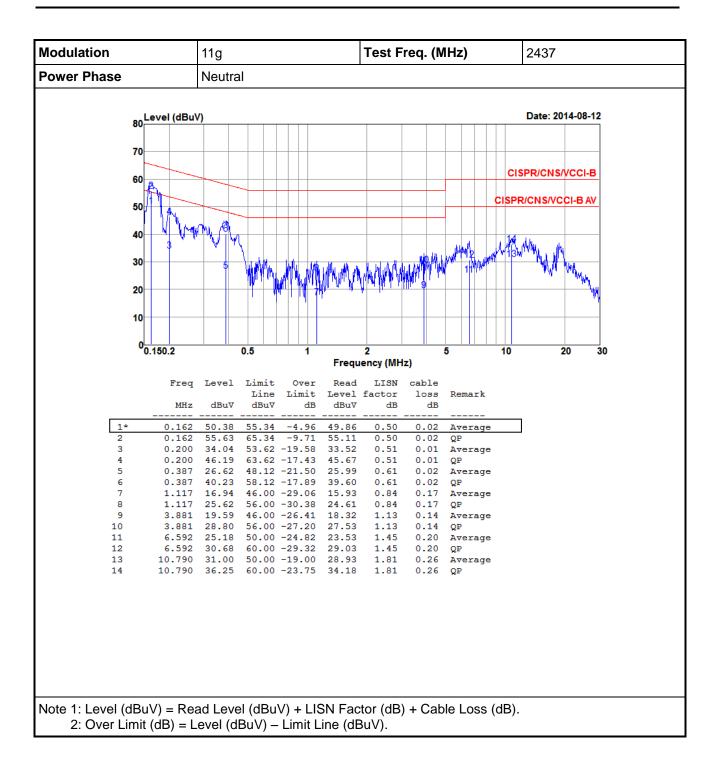
2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes





3.1.4 Test Result of Conducted Emissions







3.2 6dB and Occupied Bandwidth

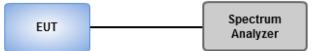
3.2.1 Limit of 6dB Bandwidth

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

3.2.2 Test Procedures

- 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.

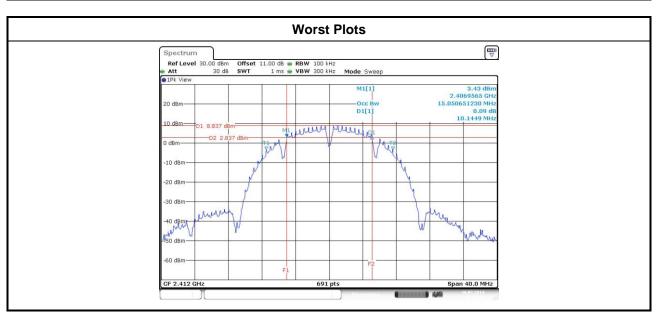
3.2.3 Test Setup





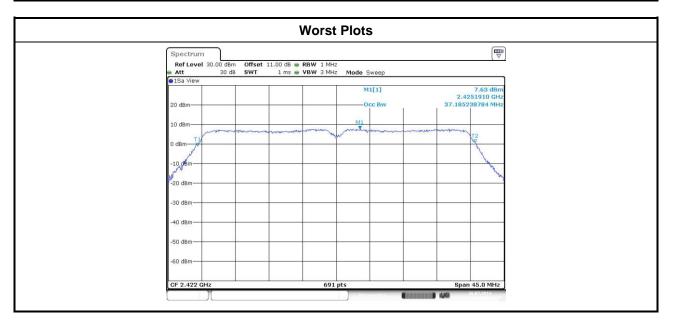
Modulation				6dB Bandv	vidth (MHz)		Limit (kH=)
Mode	N _{TX}	Freq. (MHz)	Chain 0	Chain 1	Chain 2	Chain 3	Limit (kHz)
11b	2	2412	10.14	10.14			500
11b	2	2437	10.14	10.14			500
11b	2	2462	10.14	10.14			500
11g	2	2412	16.52	16.52			500
11g	2	2437	16.52	16.52			500
11g	2	2462	16.52	16.52			500
HT20	2	2412	17.74	17.80			500
HT20	2	2437	17.74	17.80			500
HT20	2	2462	17.80	17.80			500
HT40	2	2422	36.52	36.52			500
HT40	2	2437	36.52	36.52			500
HT40	2	2452	36.52	36.52			500

3.2.4 Test Result of 6dB and Occupied Bandwidth





Modulation	N	Freq.		99% Occupied Bandwidth (MHz)				
Mode	Ν _{τχ}	(MHz)	Chain 0	Chain 1	Chain 2	Chain 3		
11b	2	2412	15.12	15.12				
11b	2	2437	15.16	15.23				
11b	2	2462	15.09	15.12				
11g	2	2412	16.82	16.82				
11g	2	2437	16.82	16.82				
11g	2	2462	16.82	16.79				
HT20	2	2412	17.87	17.91				
HT20	2	2437	17.91	17.91				
HT20	2	2462	17.87	17.87				
HT40	2	2422	37.19	37.12				
HT40	2	2437	37.12	37.12				
HT40	2	2452	37.19	37.19				





3.3 **RF Output Power**

3.3.1 Limit of RF Output Power

Conducted power shall not exceed 1Watt.

- Antenna gain <= 6dBi, no any corresponding reduction is in output power limit.
- Antenna 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

- Spectrum analyzer
 - 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.

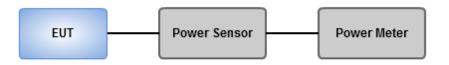
Power meter

- 1. 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)

Power meter

1. 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





Modulation Mode	N _{TX}	Freq. (MHz)	Peak	Peak conducted output power (dBm)			Total Power	Total Power	Limit
Mode		(11172)	Chain 0	Chain 1	Chain 2	Chain 3	(mW)	(dBm)	(dBm)
11b	2	2412	22.12	22.54			342.403	25.35	30.00
11b	2	2437	23.56	23.92			473.590	26.75	30.00
11b	2	2462	21.87	21.79			304.823	24.84	30.00
11g	2	2412	24.89	24.74			606.170	27.83	30.00
11g	2	2437	26.01	24.73			696.192	28.43	30.00
11g	2	2462	25.08	24.06			576.790	27.61	30.00
HT20	2	2412	24.07	23.79			494.602	26.94	30.00
HT20	2	2437	25.78	24.53			662.234	28.21	30.00
HT20	2	2462	23.71	23.05			436.800	26.40	30.00
HT40	2	2422	23.42	23.17			427.277	26.31	30.00
HT40	2	2437	24.66	24.34			564.059	27.51	30.00
HT40	2	2452	23.04	22.57			382.090	25.82	30.00

3.3.4 Test Result of Maximum Output Power

Modulation Mode	N _{TX}	Freq. (MHz)	Conduc	•	age) outpu Bm)	Total Power	Total Power	Limit (dBm)	
			Chain 0	Chain 1	Chain 2	Chain 3	(mW)	(dBm)	(ubiii)
11b	2	2412	19.74	20.29			201.094	23.03	30.00
11b	2	2437	21.34	21.91			291.383	24.64	30.00
11b	2	2462	19.13	19.29			166.765	22.22	30.00
11g	2	2412	16.61	16.88			94.567	19.76	30.00
11g	2	2437	18.59	17.88			133.653	21.26	30.00
11g	2	2462	16.57	16.38			88.845	19.49	30.00
HT20	2	2412	15.61	15.84			74.762	18.74	30.00
HT20	2	2437	18.44	17.67			128.302	21.08	30.00
HT20	2	2462	15.13	14.99			64.134	18.07	30.00
HT40	2	2422	14.72	14.87			60.339	17.81	30.00
HT40	2	2437	16.02	16.56			85.284	19.31	30.00
HT40	2	2452	14.24	14.09			52.191	17.18	30.00

Note: Conducted average output power is for reference only.



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.
 - 1. Set the RBW = 3kHz, VBW = 10kHz.
 - 2. 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

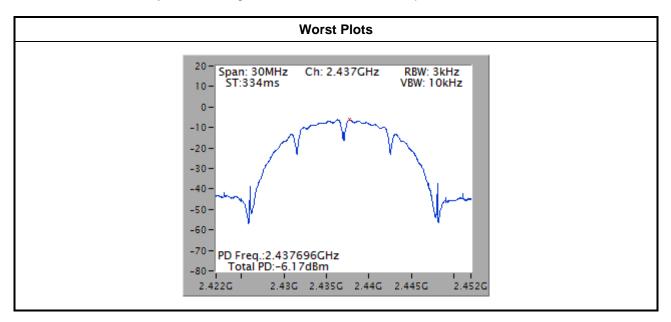




Modulation Mode	N _{TX}	Freq. (MHz)	Total Power Spectral Density (dBm/3kHz)	Limit (dBm/3kHz)		
11b	2	2412	-8.03	8.00		
11b	2	2437	-6.17	8.00		
11b	2	2462	-8.66	8.00		
11g	2	2412	-9.13	8.00		
11g	2	2437	-7.53	8.00		
11g	2	2462	-8.66	8.00		
HT20	2	2412	-9.07	8.00		
HT20	2	2437	-6.96	8.00		
HT20	2	2462	-9.69	8.00		
HT40	2	2422	-12.06	8.00		
HT40	2	2437	-9.85	8.00		
HT40	2	2452	-9.41	8.00		

3.4.4 Test Result of Power Spectral Density

Note: Test result is bin-by-bin summing measured value of each TX port.





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

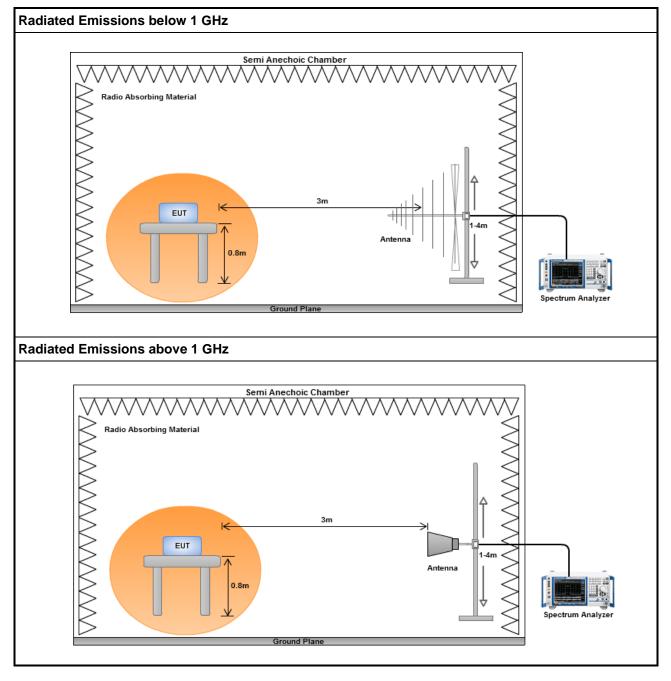
- 1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at a height of 0.8 m test table above the ground plane.
- 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:

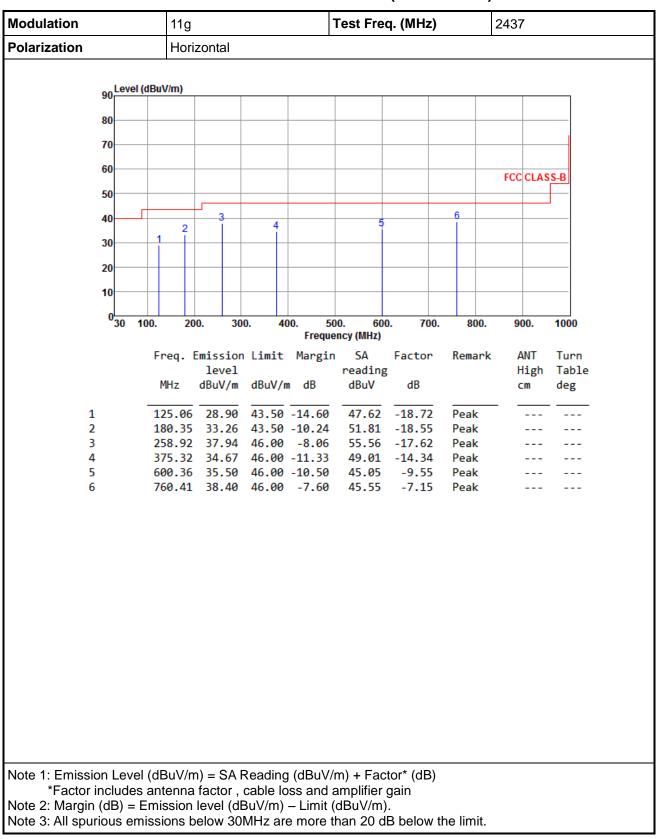
- 1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
- 2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
- 3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission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



3.5.3 Test Setup





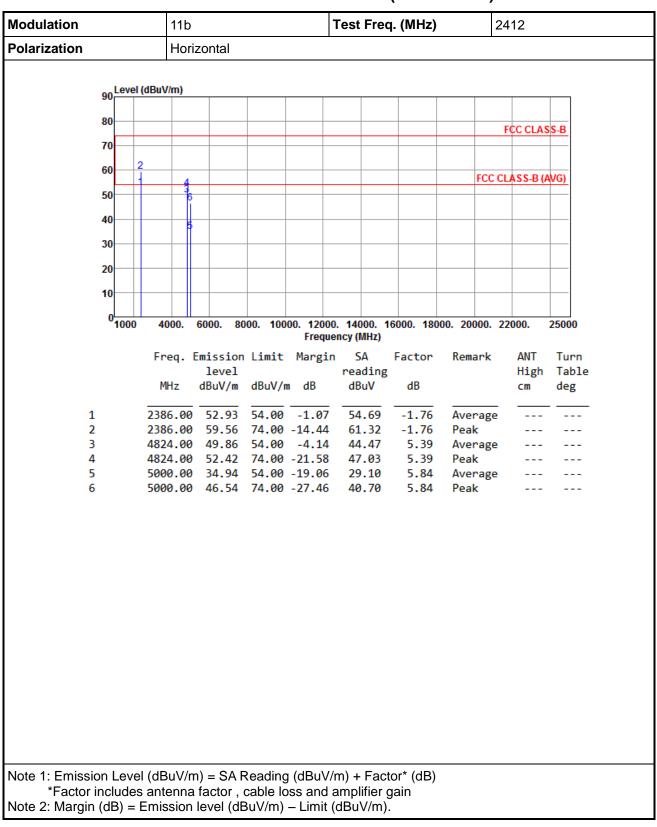


3.5.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)



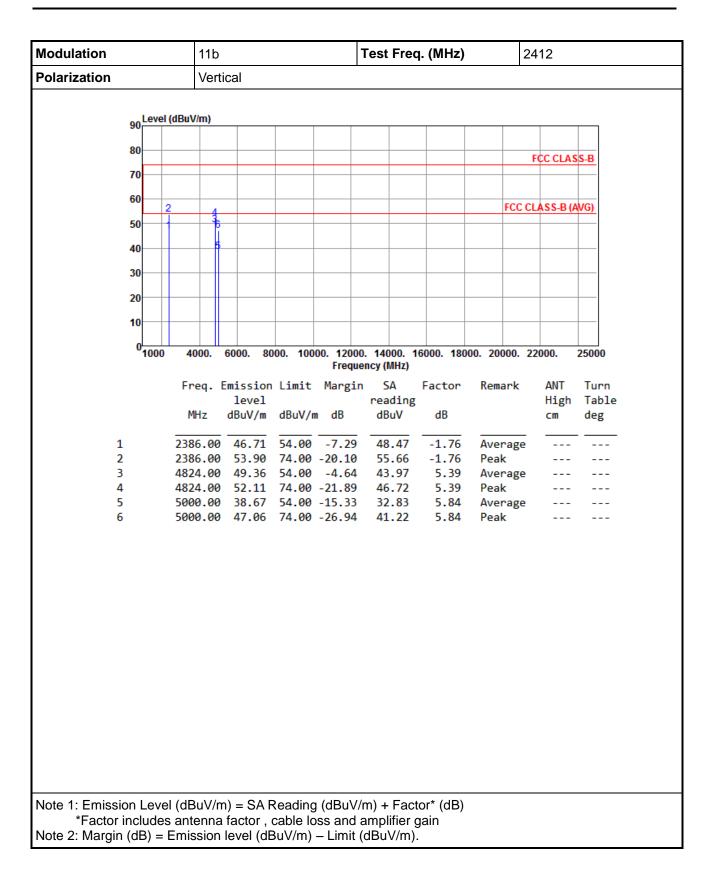
Modulation	11g Test Freq. (MHz) 2437								
Polarization	Vert	ical							
90 Level (dE	<u>uV/m)</u>								
80									
70									
60								FCC CLAS	S-B
50									<u>}</u>
40 12		4							
30	3	ĭ	5		6				
20									
10									
030100). 20	0. 30	0. 4	00. <u>5</u> 0	0. 60	0. 700.	800.	900.	1000
					ncy (MHz)				
	Freq. I		Limit	Margin		Factor	Remark	ANT	Turn
	MHz	level dBuV/m	dBuV/r	n dB	reading dBuV	g dB		High cm	Table deg
_									
1		36.15				-16.55	QP		
2 3		36.67 32.37			53.84 49.39	-17.17 -17.02	Peak Peak		
4				-10.99		-17.59	Peak		
				-15.83		-14.34	Peak		
6	600.36	28.94	46.00	-17.06	38.49	-9.55	Peak		
Note 1: Emission Level (
*Factor includes a									
Note 2: Margin (dB) = En	HISSION	ievel (db	suv/m)	– Limit ((ubuv/m)).			



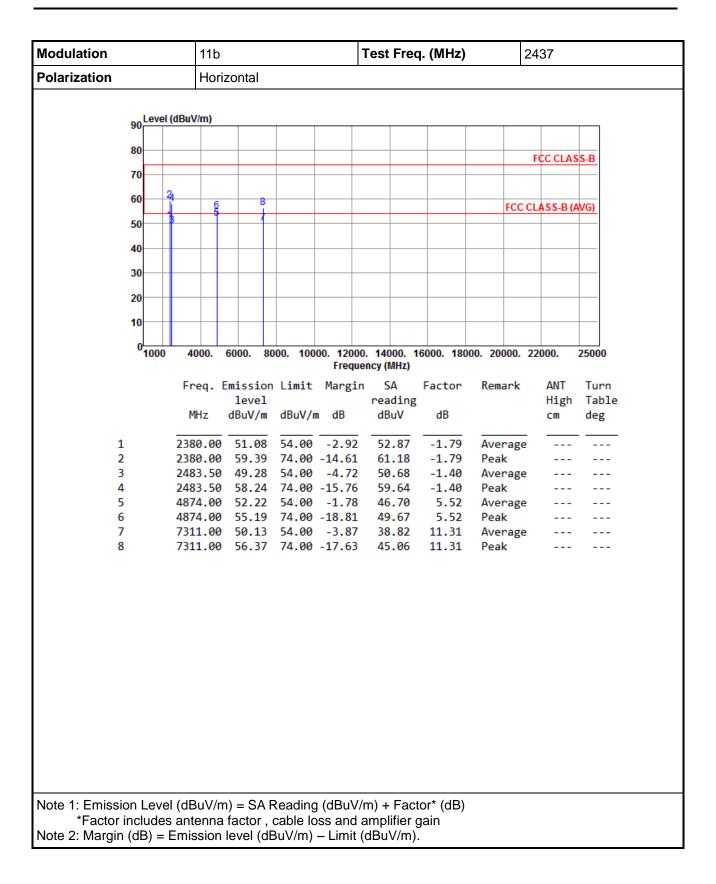


3.5.5 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 11b

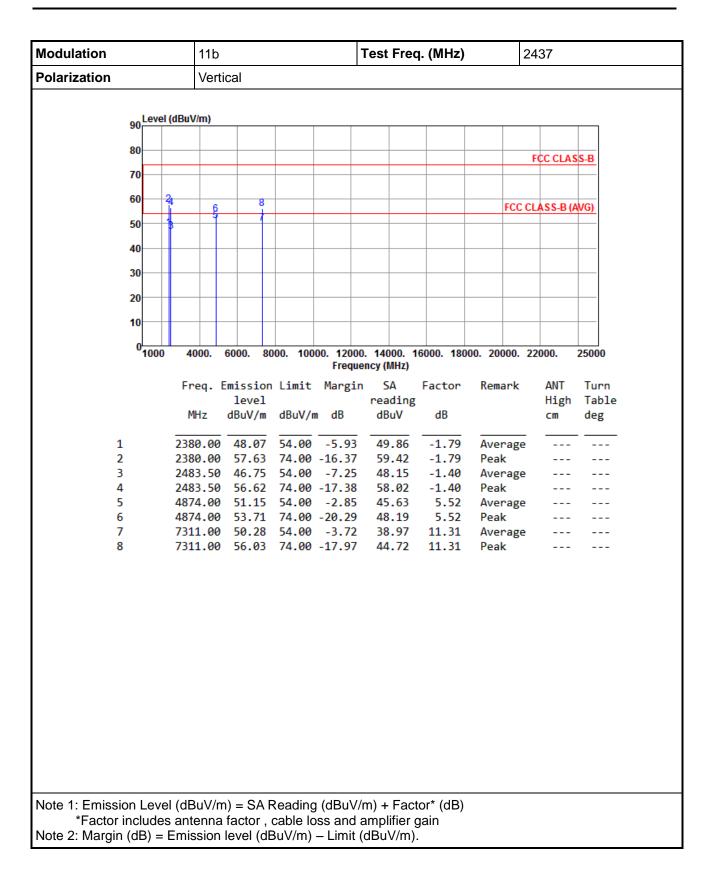




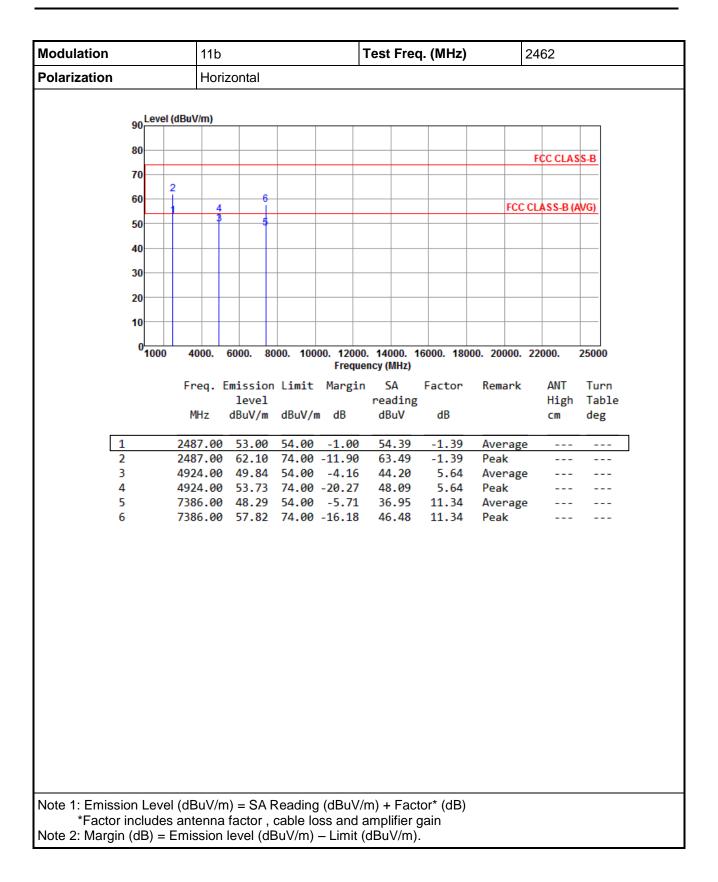




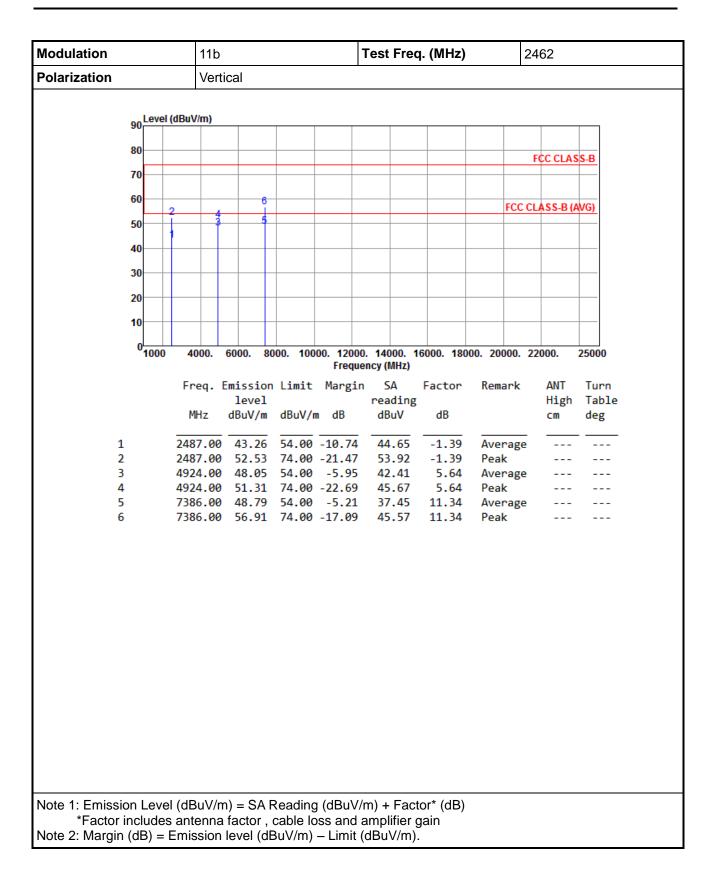




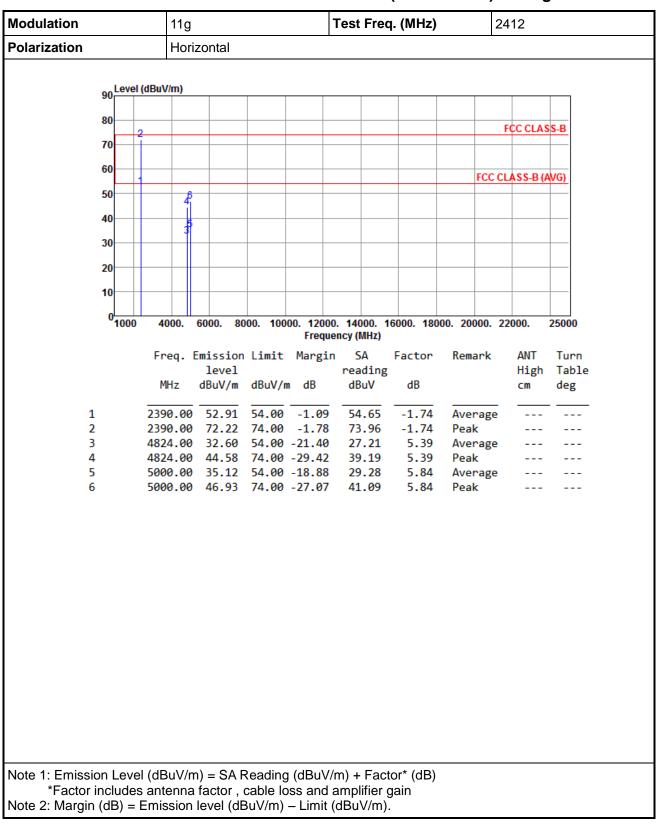










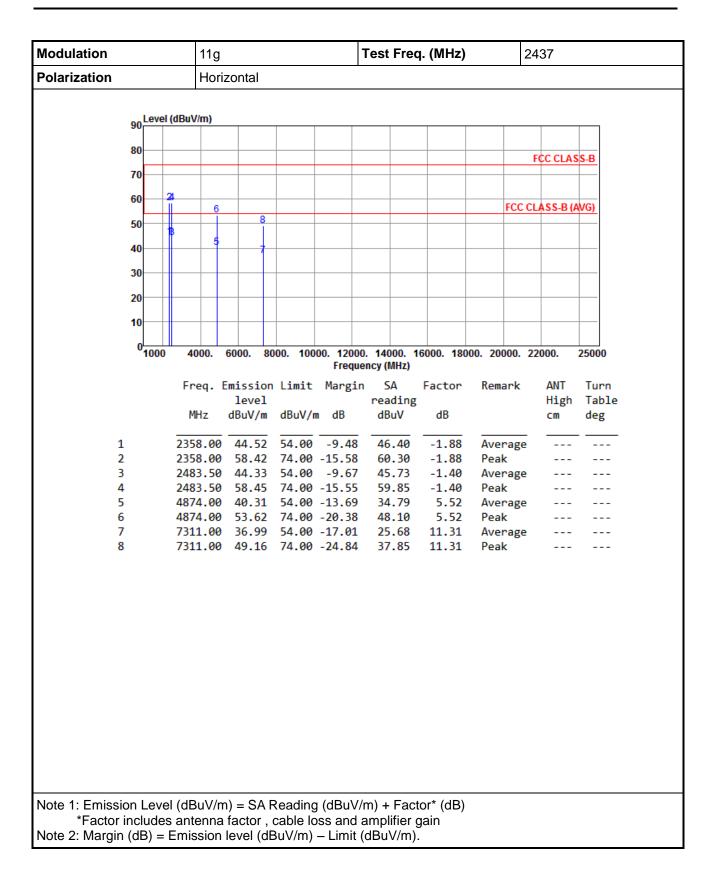


3.5.6 Transmitter Radiated Unwanted Emissions (Above 1GHz) for 11g

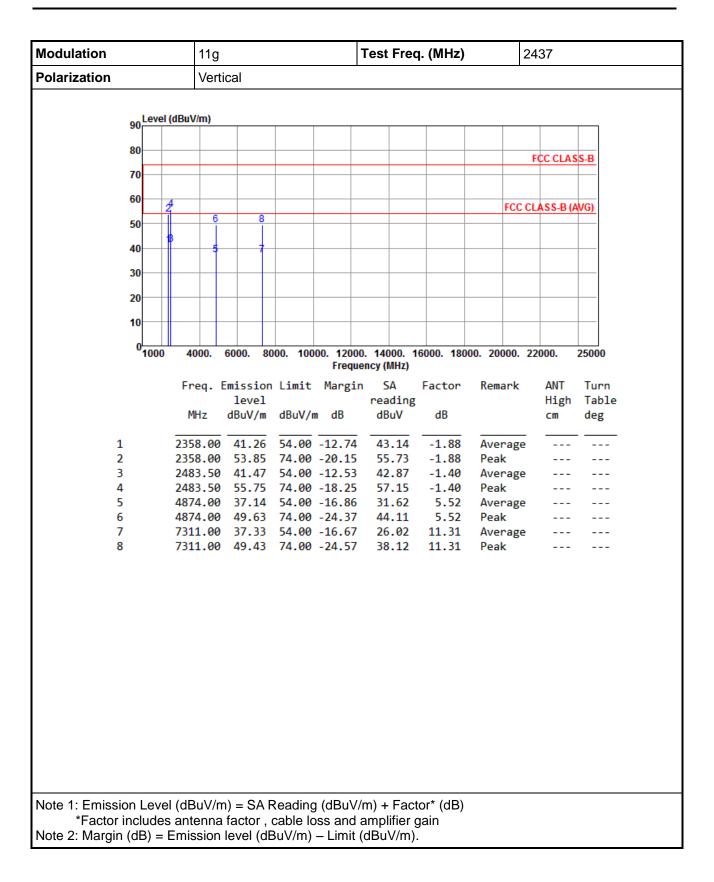


Modulation			11g Test Freq. (MHz) 2412								
Polarization		Vertical									
	Le	vel (dBu	ıV/m)								
	90										
	80									FCC CLAS	SS-B
	70	_	_								
	60	2									
									FCC	CLASS-B (/	AVG)
	50	1	4								
	40		 					_			
	30—		3								
	20										
	10										
	0										
	0 <mark>100</mark>	00	4000.	6000. 80	00. 100		. 14000. 1 ncy (MHz)	6000. 180	00. 20000.	22000.	25000
		F	req.	Emission	Limit	Margin	SA	Factor	Remark	ANT	Turn
				level			reading			High	
			MHz	dBuV/m	dBuV/r	n dB	dBuV	dB		cm	deg
1	L	23	90.00	45.95	54.00	-8.05	47.69	-1.74	Averag	e	
	2			62.86			64.60	-1.74	Peak		
	3			32.33			26.94	5.39	Averag	e	
	4 5			44.26 39.06			38.87 33.22	5.39 5.84	Peak Averag	A	
	5			47.84				5.84	Peak		
Note 1: Emiss	ion Le	vel (d	BuV/n	n) = SA F	Reading	ı (dBuV/i	n) + Fact	or* (dB)			
*Factor	incluc	les an	itenna	factor,	cable lo	oss and a	mplifier g	gain			
Note 2: Margir											

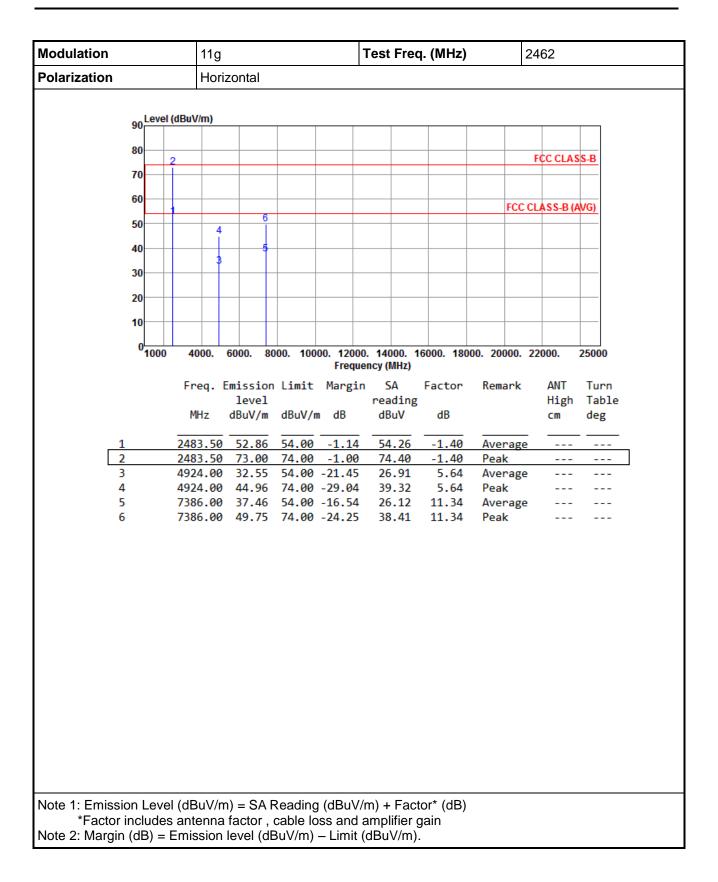








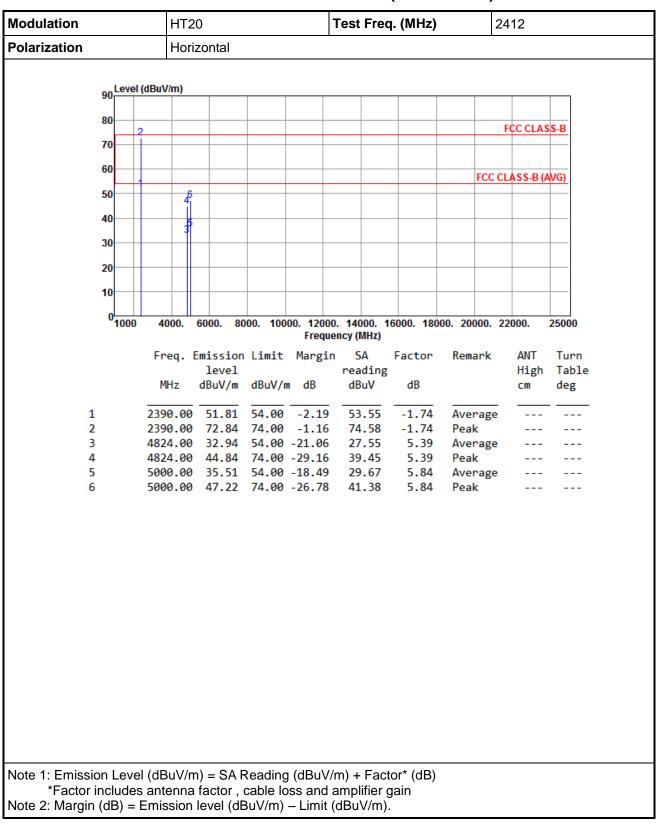






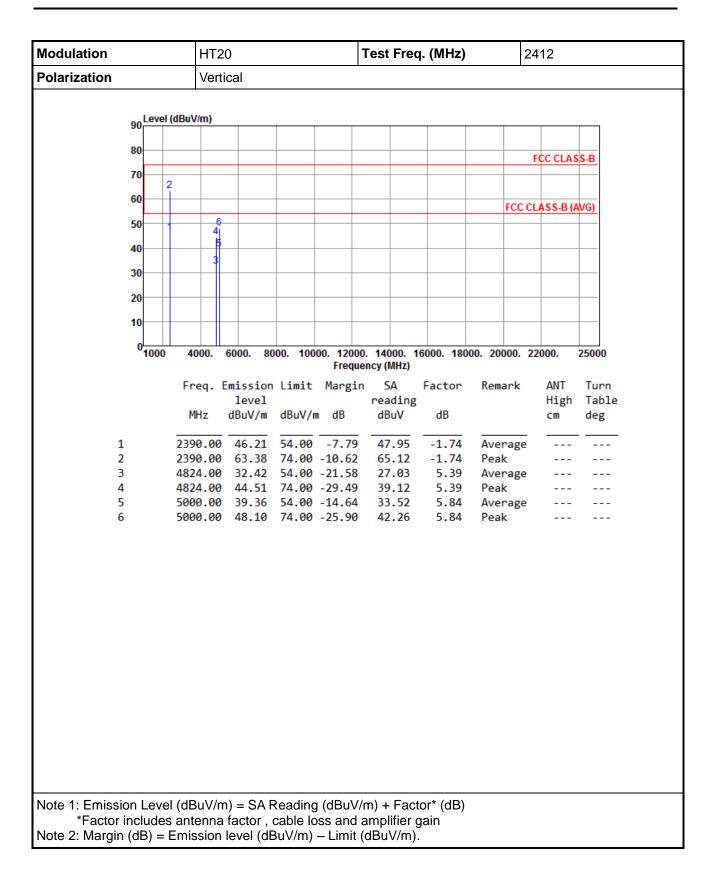
Modulation			11g Test Freq. (MHz) 2462										
Polarization			Vertical										
	Lev	el (dBu	IV/m)										
	90	· ·											
	80									FCC CLAS	SS-B		
	70												
	60	2											
				6				_	FCC	CLASS-B (AVG)		
	50	1	4	Ť									
	40		\rightarrow										
	30—		3										
	20												
	10										+		
	0 <mark>100</mark>		4000.	6000. 8	000 100	00 12000	14000 1	6000 190	00. 20000.	22000	25000		
	100		+000.	0000. 0	000. 100		ncy (MHz)	0000. 180	00. 20000.	22000.	25000		
		F	req.	Emissio	n Limit	Margin	SA	Factor	Remark	ANT	Turn		
				level			reading			High			
			MHz	dBuV/m	dBuV/ı	n dB	dBuV	dB		CM	deg		
1		24	83.50	44.91	54.00	-9.09	46.31	-1.40	Average	e			
2						-11.96	63.44	-1.40	Peak				
3						-21.95 -29.74	26.41 38.62	5.64 5.64	Averag Peak	e			
5						-16.81				e			
6		73	86.00	49.22	74.00	-24.78	37.88	11.34	Peak				
Note 1: Emissio		رما الم	Ru\//∽	0) - 64	Dooding		m) + Eact	tor* (dP)					
Factor i													
1 40.01 1													



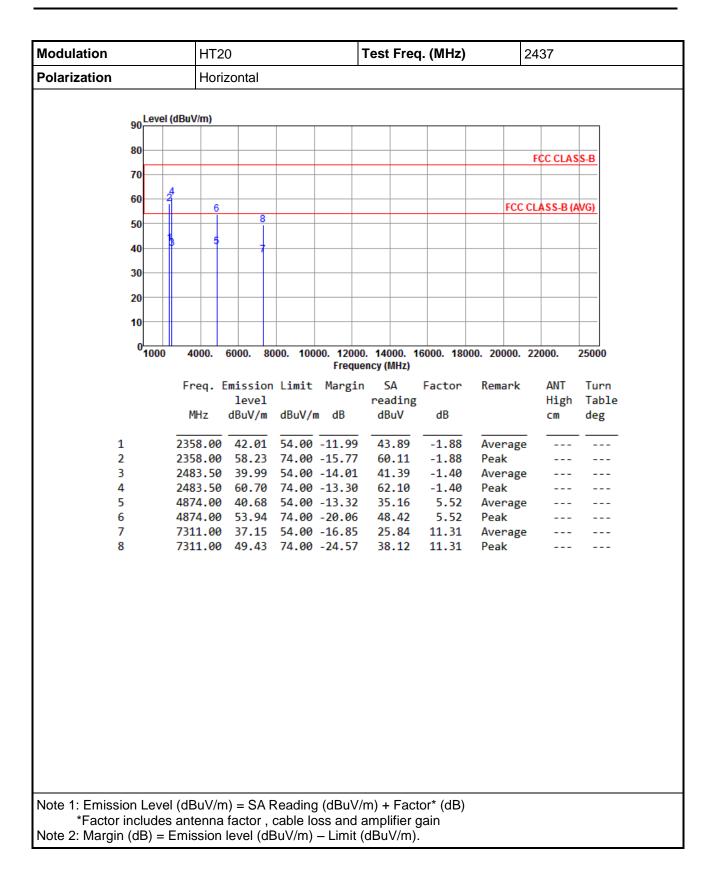


3.5.7 Transmitter Radiated Unwanted Emissions (Above 1GHz) for HT20

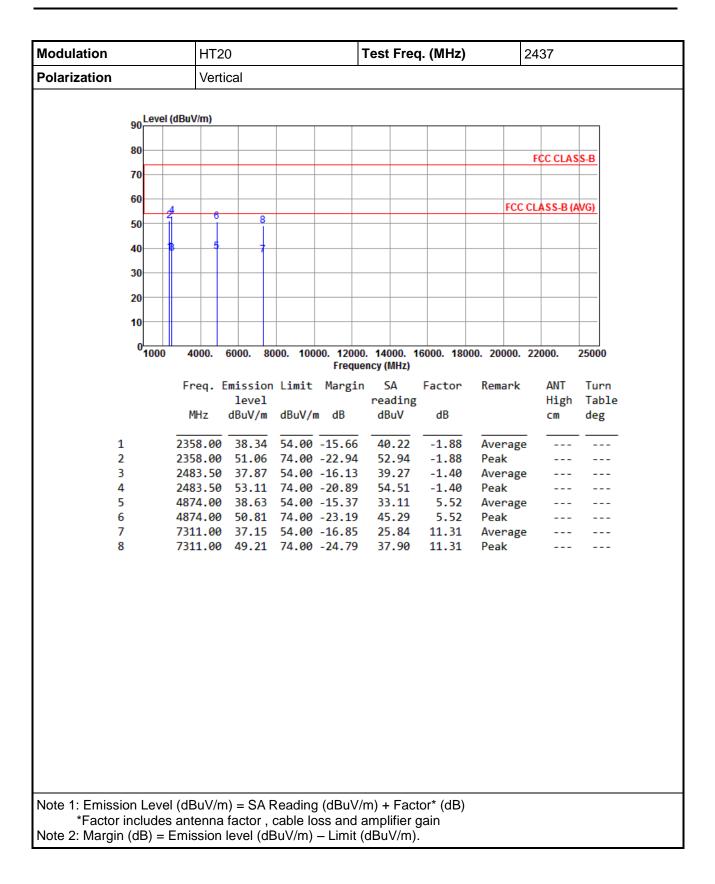




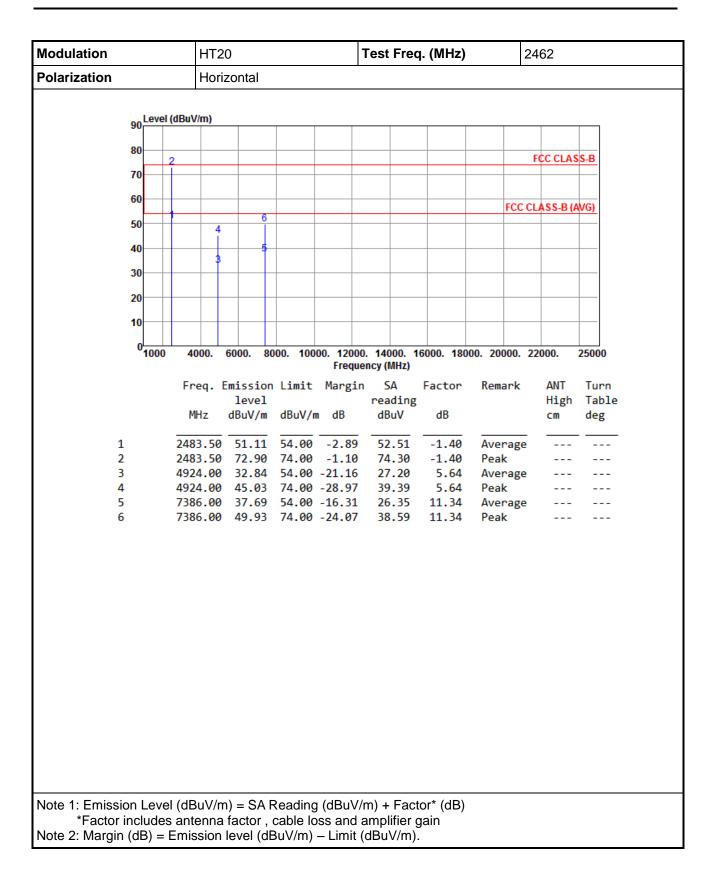




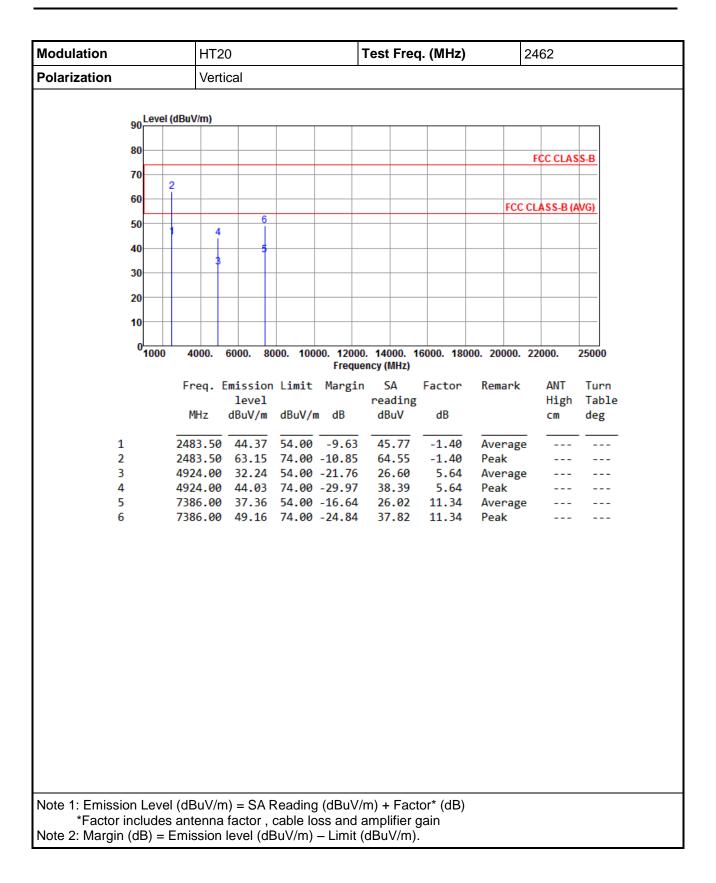




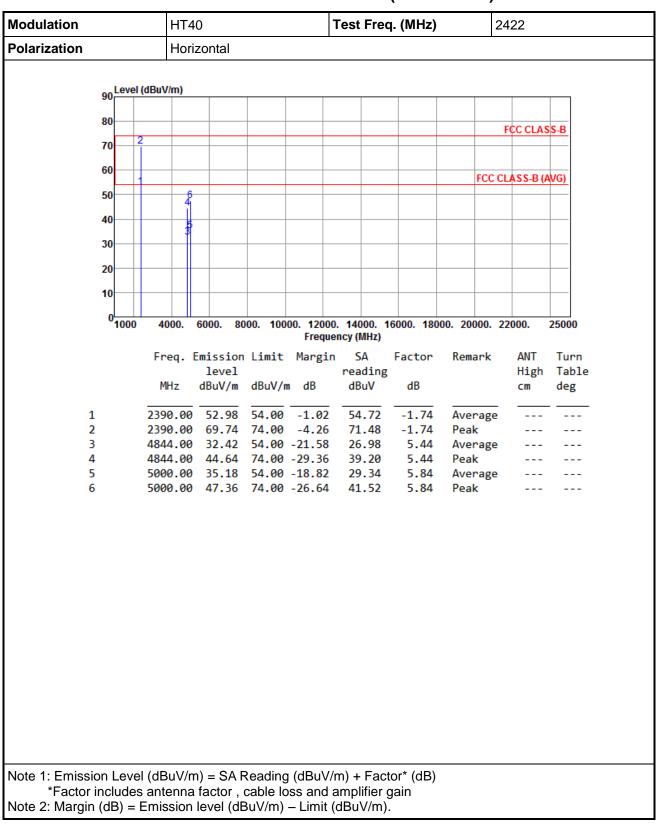






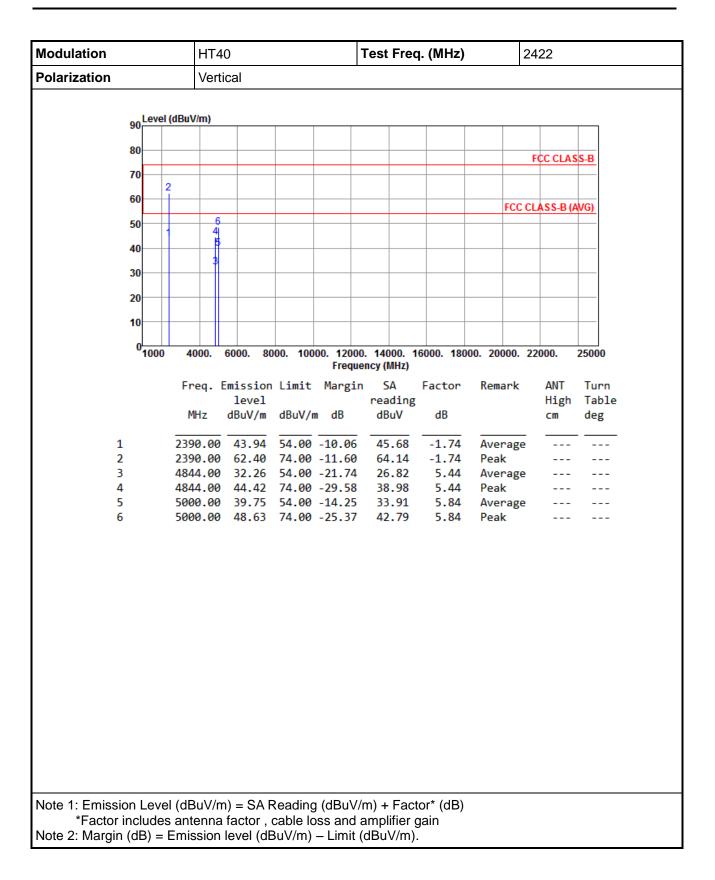




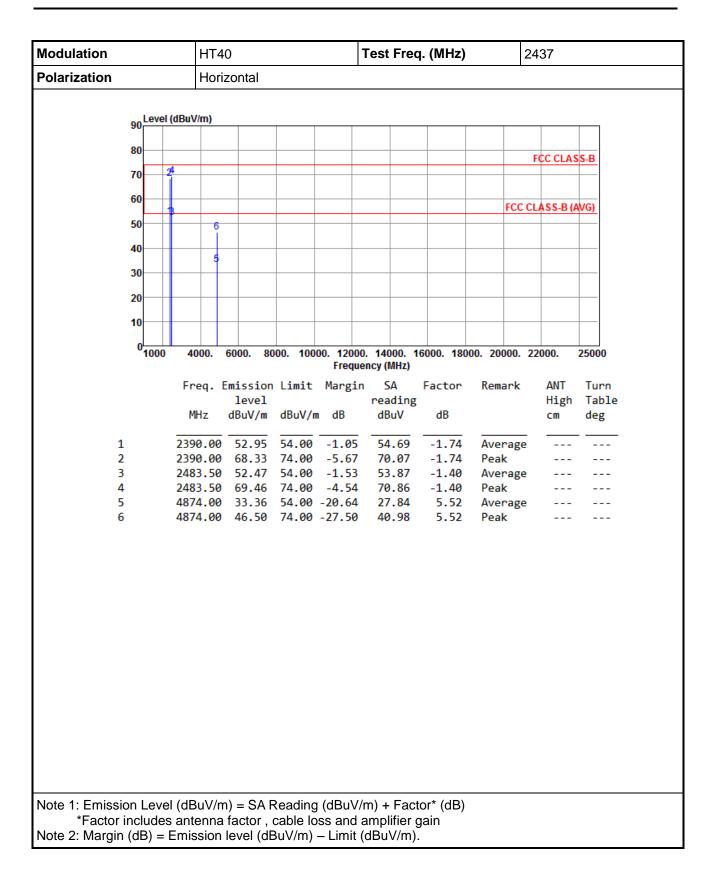


3.5.8 Transmitter Radiated Unwanted Emissions (Above 1GHz) for HT40

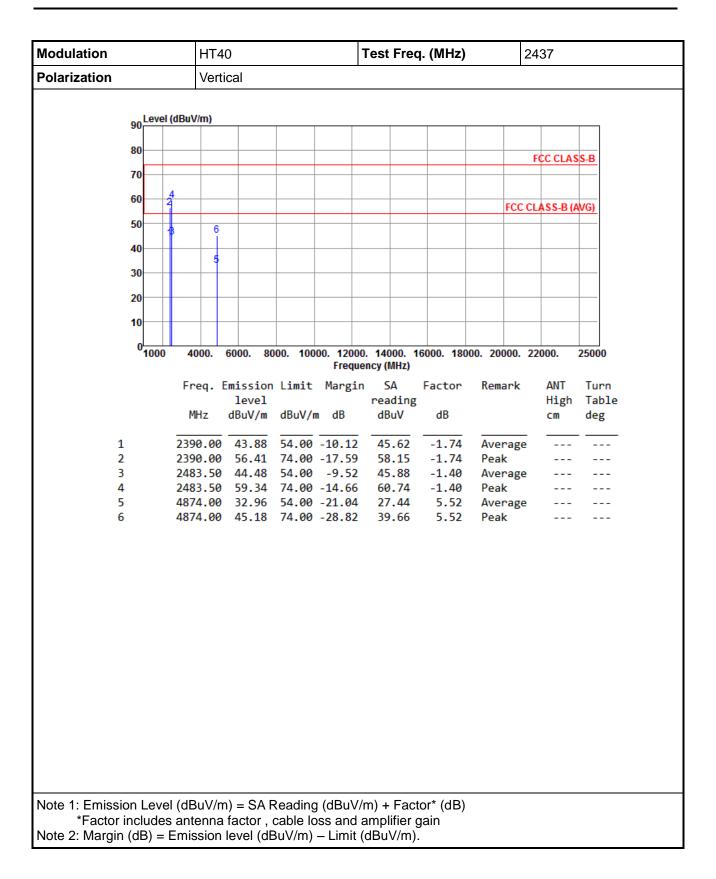




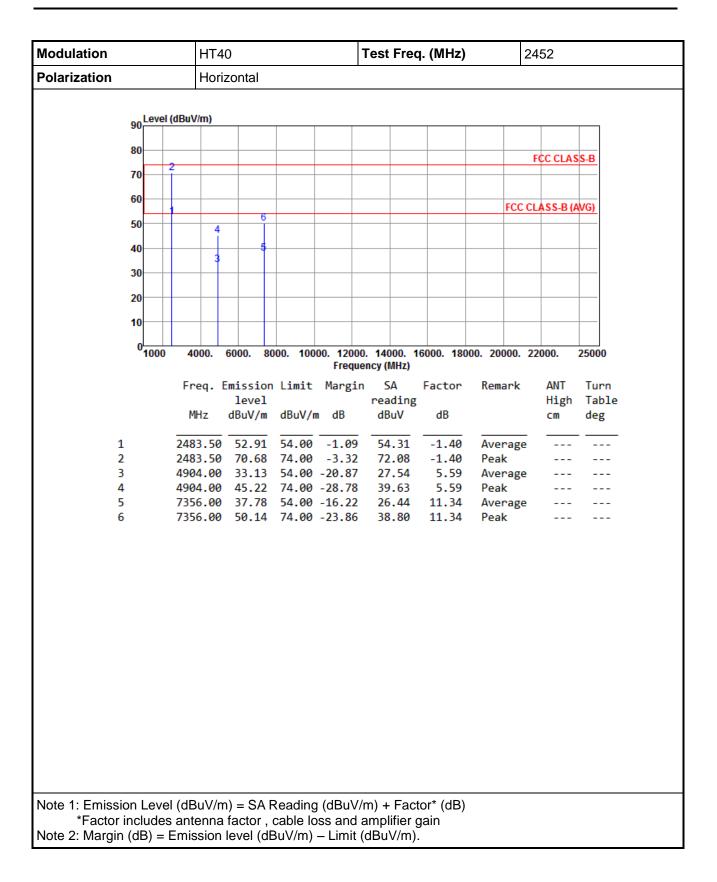














Nodulation	HT40 Test Freq. (MHz) 2452										
Polarization	Vertical										
90	uV/m)										
90											
80						FCC CLAS	S-B				
70											
60											
	6				FCC	CLASS-B (A	WG)				
50	4 Ĭ										
40											
30	3										
20											
10											
0 <mark></mark> 1000	4000. 6000. 80		44000	000 400	00 20000	22000	25000				
1000	4000. 6000. 80	000. 10000. 12000 Freque	. 14000. 1 ncy (MHz)	6000. 180	00. 20000.	22000.	25000				
I	Freq. Emission	Limit Margin		Factor	Remark	ANT	Turn				
	level		reading	-ID		High					
	MHz dBuV/m	dBuV/m dB	dBuV	dB		CM	deg				
1 24	483.50 45.86	54.00 -8.14	47.26	-1.40	Average						
		74.00 -10.47	64.93	-1.40	Peak						
		54.00 -21.42 74.00 -29.59	26.99 38.82	5.59 5.59	Average Peak						
		54.00 -16.34		11.34							
		74.00 -24.37			Peak						
Note 1: Emission Level (o *Factor includes a Note 2: Margin (dB) = Em	ntenna factor,	cable loss and a	amplifier g	jain							



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

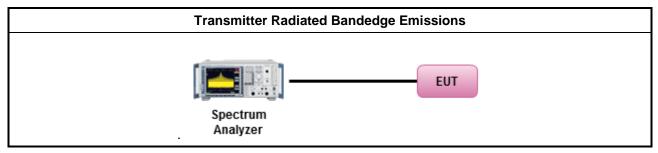
Reference level measurement

- 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



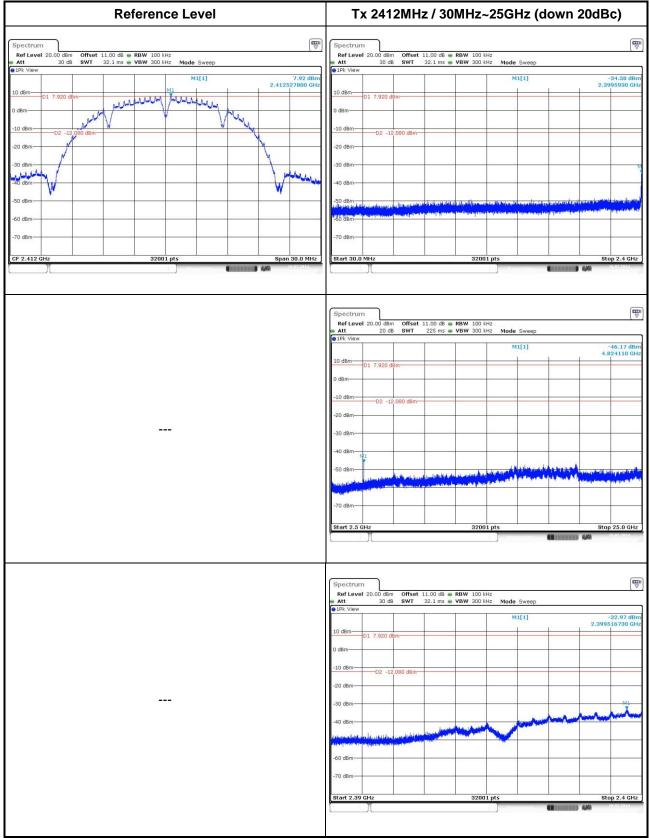
3.6.5 Test Result of Emissions in non-restricted frequency bands

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.

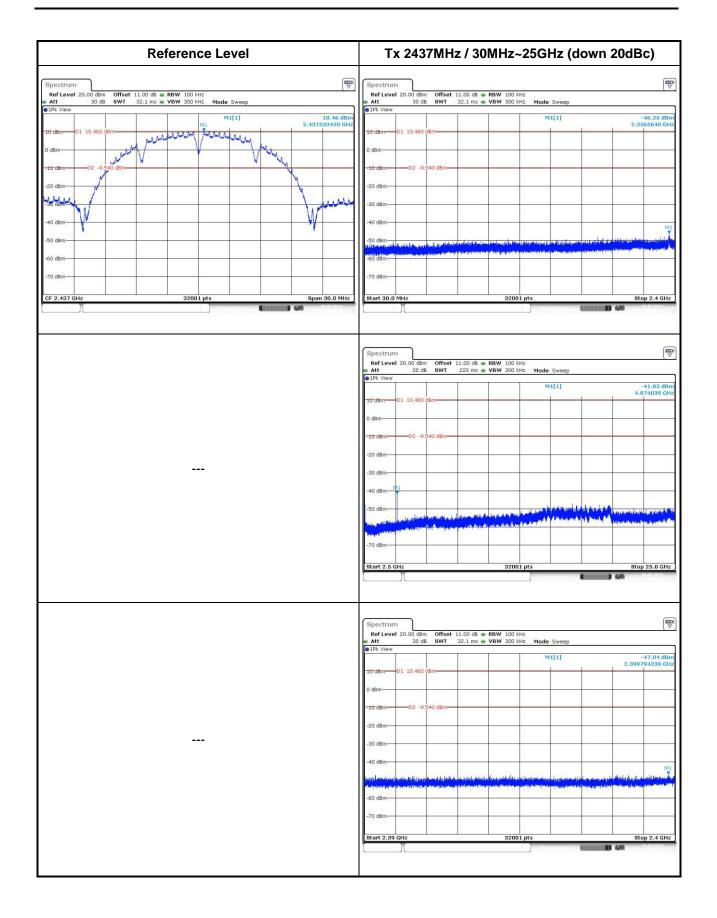


3.6.6 Unwanted Emissions into Non-Restricted Frequency Bands

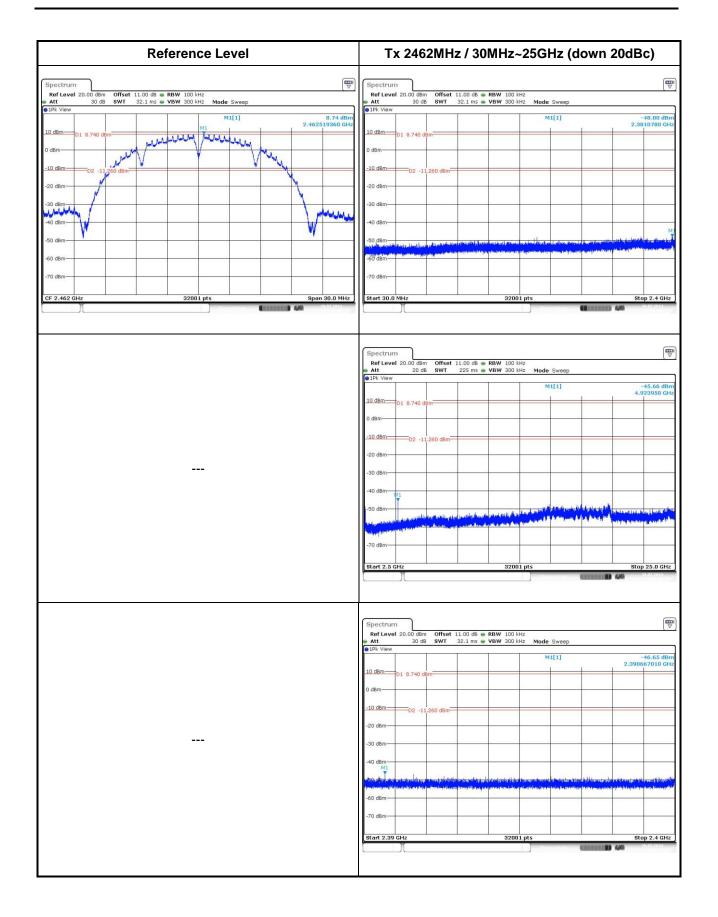
802.11b





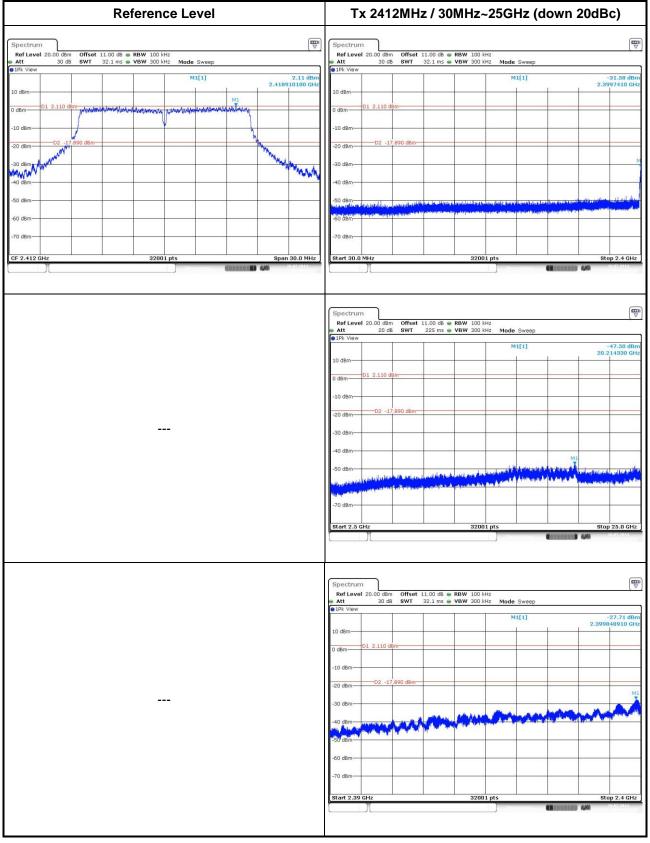




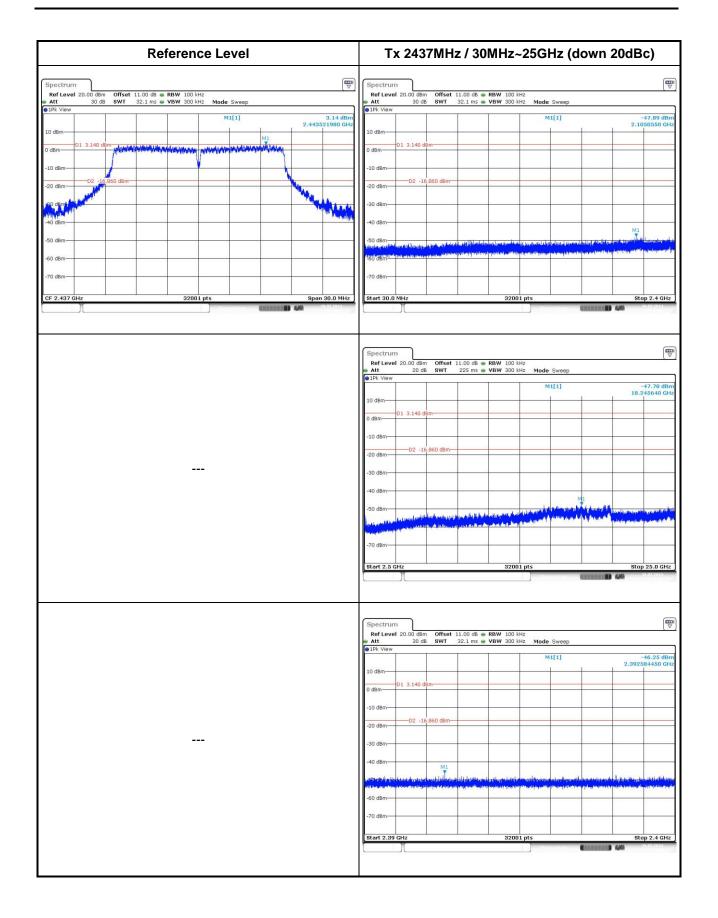




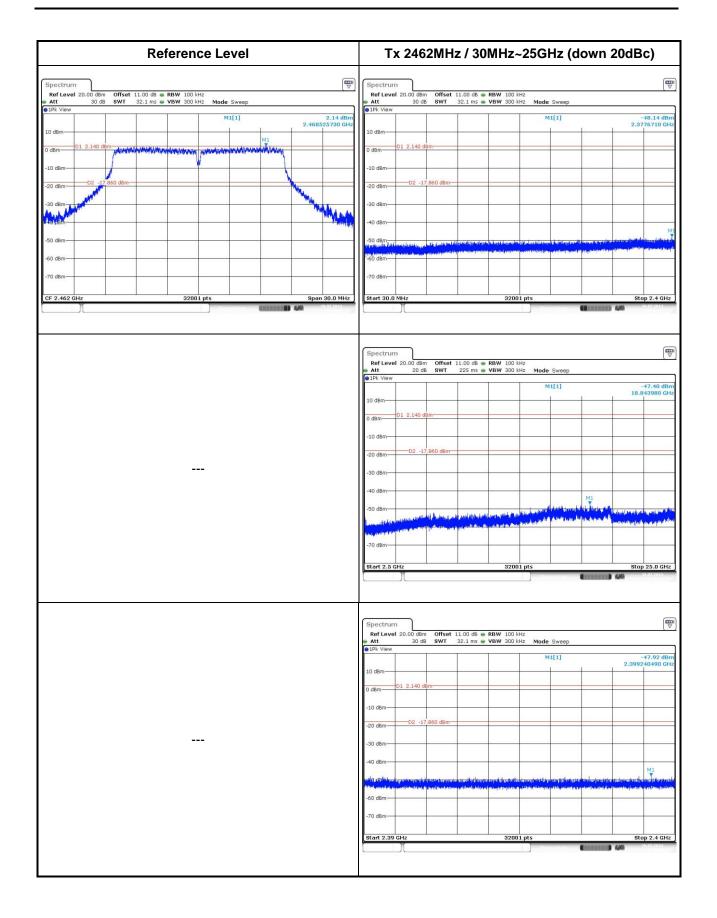
802.11g





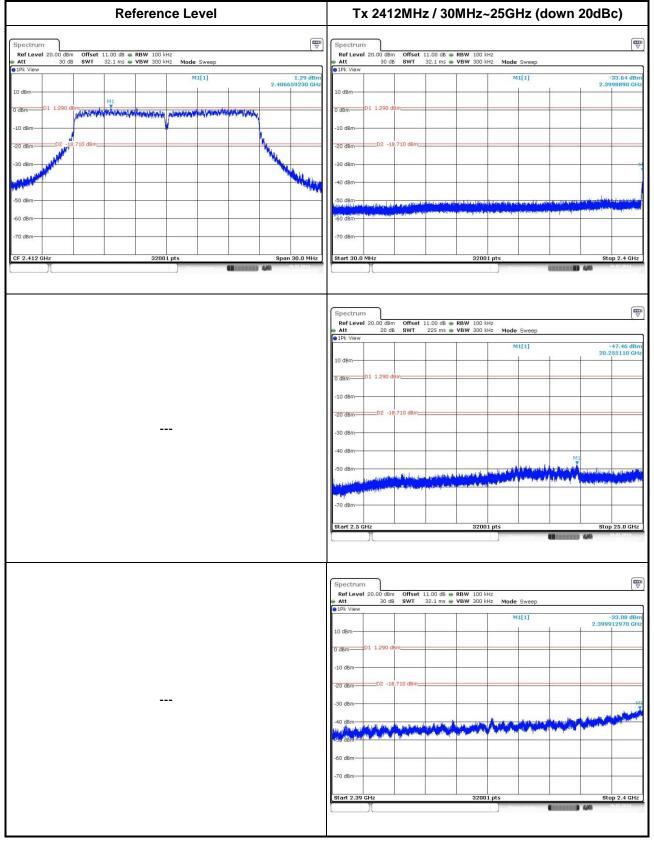




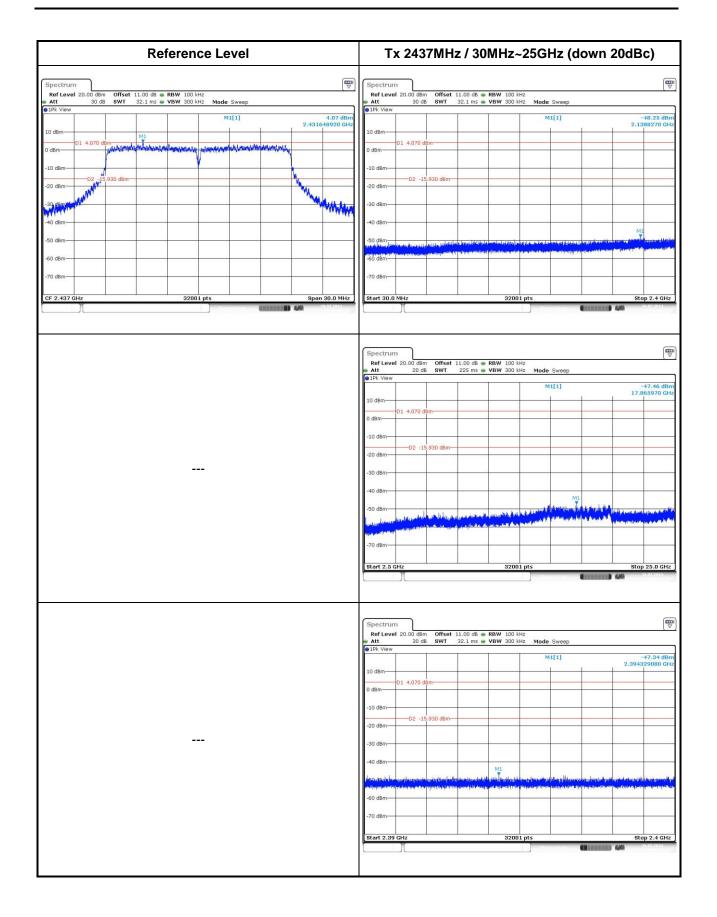




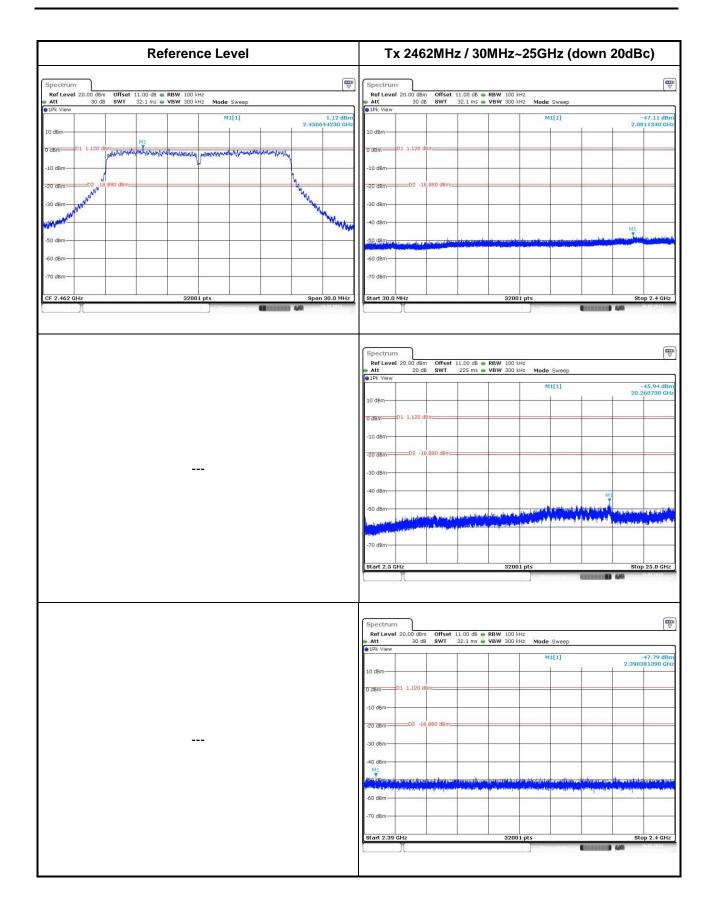
802.11n HT20





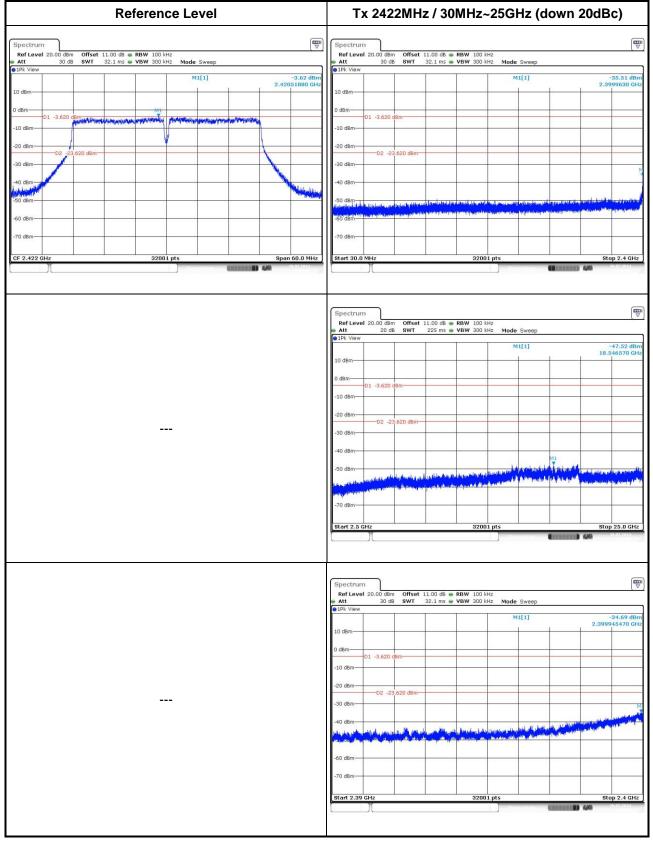




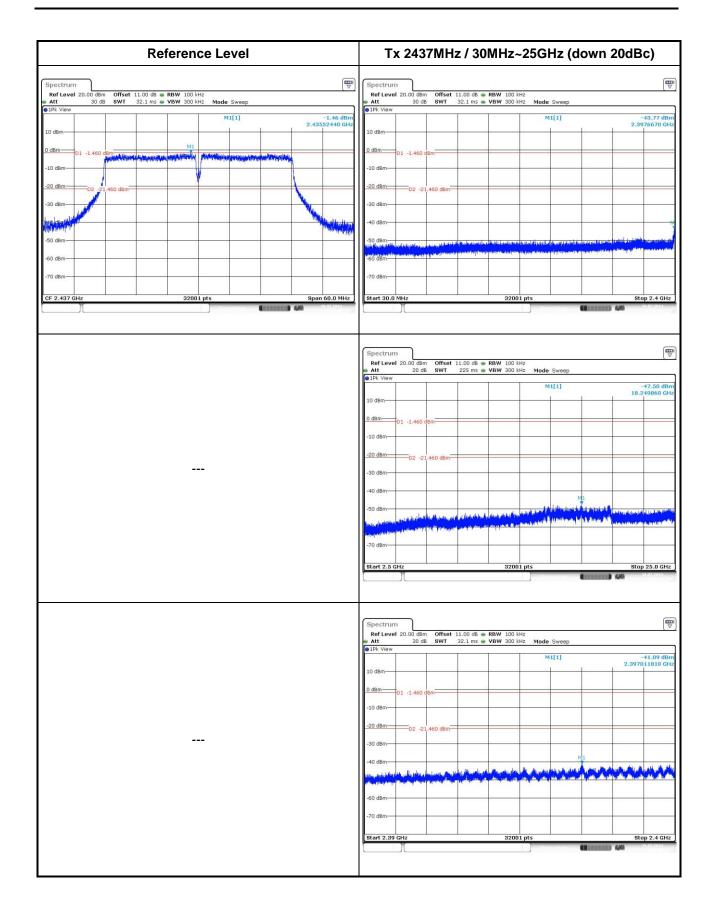




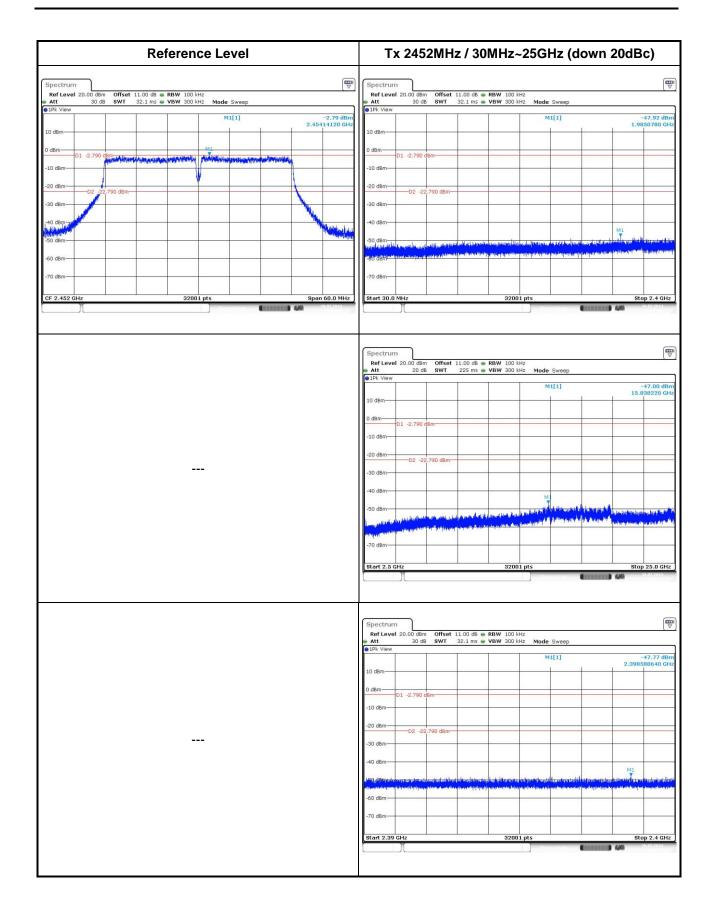
802.11n HT40













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 <u>http://www.icertifi.com.tw</u>.

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—