NCC RADIO TEST REPORT

Equipment	:	**PS20 購物助手**
Brand Name	:	**ZEBRA**
Model Name	:	**PS20J**
Applicant	:	台灣斑馬科技股份有限公司 台北市信義區松高路 **9** 號 **13** 樓
Manufacturer	:	**Zebra Technologies Corporation** **1 Zebra Plaza Holtsville, NY 11742**
Standard	:	**NCC LP0002 (2018-01-10)**

The product was received on Jun. 02, 2018, and testing was started from Jun. 06, 2018 and completed on Sep. 08, 2018. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in NCC LP0002 (2018-01-10) and shown compliance with the applicable technical standards.

The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Jones Tsai

Approved by: Jones Tsai

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

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History of this test report

Report No.	Version	Description	Issue Date
TR860204C	01	Initial issue of report	Oct. 02, 2018

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	LP0002 3.10.1.6(2)(A)	6dB Bandwidth	Pass	-
3.1	-	99% Bandwidth	Pass	-
3.2	LP0002 3.10.1.2(1)(C)	Power Output Measurement	Pass	-
0	LP0002 3.10.1.6(2)(B)	Power Spectral Density	Pass	-
0	LP0002 3.10.1.5	Conducted Band Edges	Pass	-
		Conducted Spurious Emission	Pass	-
3.5	LP0002 3.10.1.5	Radiated Band Edges and Radiated Spurious Emission	Pass	Under limit 1.04 dB at 2390.000 MHz
3.6	LP0002 2.11	Receiver Radiated Emission	Pass	Under limit 11.31 dB at 51.060 MHz
3.7	LP0002 2.3	AC Conducted Emission	Pass	Under limit 4.20 dB at 0.544 MHz
3.8	LP0002 2.2 3.10.1.3 3.10.1.4	Antenna Requirement	Pass	-
3.9	LP0002 2.2 5.20.2	Maximum Power Density	Pass	-

Reviewed by: Louis Wu
Report Producer: Maggie Chiang

1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	PS20 購物助手
Sample 1	Plus SKU
Sample 2	Base SKU
Brand Name	ZEBRA
Model Name	PS20J
EUT supports Radios application	WLAN 11a/b/g/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE
HW Version	EV3
SW Version	91-09-06.00-ON-U00-STD
FW Version	91-09-06.00-ON-U00-STD
MFD	06JUL18
EUT Stage	Engineering Sample

Remark: The above EUT's information was declared by manufacturer.

Specification of Accessories				
Battery	**Brand Name**	Zebra	**Part Number**	BT-000351

Supported Unit Used in Test Configuration and System				
1-slot cradle	**Brand Name**	Symbol	**Part Number**	CRD-MC18-1SL
Adapter	**Brand Name**	Zebra	**Part Number**	PWR-BGA12V108W0WW
Programming USB cable	**Brand Name**	Zebra	**Part Number**	CBL-PS20-USBCHG-01

1.2 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Channel Frequency Range	2412 MHz ~ 2462 MHz
Maximum Output Power to antenna <CDD Mode>	**<Ant. 1>** 802.11b : 20.94 dBm (0.1242 W) 802.11g : 18.94 dBm (0.0783 W) 802.11n HT20 : 18.82 dBm (0.0762 W) 802.11n HT40 : 20.24 dBm (0.1057 W) 802.11ac VHT20 : 18.81 dBm (0.0760 W) 802.11ac VHT40 : 20.19 dBm (0.1045 W) **<Ant. 2>** 802.11b : 20.97 dBm (0.1250 W) 802.11g : 18.77 dBm (0.0753 W) 802.11n HT20 : 18.70 dBm (0.0741 W) 802.11n HT40 : 20.08 dBm (0.1019 W) 802.11ac VHT20 : 18.66 dBm (0.0735 W) 802.11ac VHT40 : 20.04 dBm (0.1009 W) **MIMO <Ant. 1 + 2>** 802.11b : 23.84 dBm (0.2421 W) 802.11g : 21.50 dBm (0.1413 W) 802.11n HT20 : 21.78 dBm (0.1507 W) 802.11n HT40 : 19.91 dBm (0.0979 W) 802.11ac VHT20 : 21.77 dBm (0.1503 W) 802.11ac VHT40 : 19.90 dBm (0.0977 W)
Maximum Output Power to antenna <TXBF Mode>	**MIMO <Ant. 1 + 2>** 802.11ac VHT20 : 21.75 dBm (0.1496 W) 802.11ac VHT40 : 18.86 dBm (0.0769 W)
99% Occupied Bandwidth <CDD Mode>	**<Ant. 1>** 802.11b : 13.29MHz 802.11g : 16.83MHz 802.11n HT20 : 17.93MHz 802.11n HT40 : 36.46MHz **<Ant. 2>** 802.11b : 14.19MHz 802.11g : 16.78MHz 802.11n HT20 : 17.93MHz 802.11n HT40 : 36.46MHz **MIMO <Ant. 1>** 802.11b : 13.29MHz 802.11g : 16.83MHz 802.11n HT20 : 18.03MHz 802.11n HT40 : 36.46MHz **MIMO <Ant. 2>** 802.11b : 14.19MHz 802.11g : 16.78MHz 802.11n HT20 : 17.93MHz 802.11n HT40 : 36.66MHz

<table>
<tr><th colspan="2">Standards-related Product Specification</th></tr>
<tr><td>99% Occupied Bandwidth
<TXBF Mode></td><td>MIMO <Ant. 1>
802.11n VHT20 : 17.78MHz
802.11n VHT40 : 37.26MHz
MIMO <Ant. 2>
802.11n VHT20 : 18.23MHz
802.11n VHT40 : 36.46MHz</td></tr>
<tr><td>Antenna Type / Gain</td><td><Ant. 1> PIFA Antenna with gain 2.02 dBi
<Ant. 2> PIFA Antenna with gain 2.23 dBi</td></tr>
<tr><td>Type of Modulation</td><td>802.11b : DSSS (DBPSK/DQPSK/CCK)
802.11g/n : OFDM (BPSK/QPSK/16QAM/64QAM)
802.11ac : OFDM (BPSK/QPSK/16QAM/64QAM/256QAM)</td></tr>
<tr><td>Antenna Function Description</td><td><table><tr><th></th><th>Ant. 1</th><th>Ant. 2</th></tr><tr><td>802.11 b/g/n/ac</td><td>V</td><td>V</td></tr><tr><td>802.11 b/g/n/ac MIMO</td><td>V</td><td>V</td></tr><tr><td>802.11 ac TXBF</td><td>V</td><td>V</td></tr></table></td></tr>
</table>

Note: MIMO Ant. 1+2 is a calculated result from sum of the power MIMO Ant. 1 and MIMO Ant. 2.

1.3 Modification of EUT

No modifications are made to the EUT during all test items.

1.4 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW1190 and TW0007 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.	
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978	
Test Site No.	**Sporton Site No.**	
	TH05-HY	CO05-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	**Sporton Site No.**
	03CH11-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

1.5 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- NCC LP0002 (2018-01-10)
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ANSI C63.10-2013

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

2 Test Configuration of Equipment Under Test

a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Z plane for Sample 1 CDD Mode Ant. 1, Ant. 1+2, TXBF Mode Ant. 1+2, and Sample 2 CDD Mode Ant. 1+2 ; Y Plane for Sample 1 CDD Mode Ant. 2) for were recorded in this report) were recorded in this report.

b. AC power line Conducted Emission was tested under maximum output power.

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	1	2412	7	2442
	2	2417	8	2447
	3	2422	9	2452
	4	2427	10	2457
	5	2432	11	2462
	6	2437		

2.2 Test Mode

Final test modes are considering the modulation and worse data rates as below table.

Single Mode

Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0
802.11ac VHT20 (Covered by HT20)	MCS0
802.11ac VHT40 (Covered by HT40)	MCS0

MIMO Mode

Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0
802.11n HT40	MCS0
802.11ac VHT20 (Covered by HT20)	MCS0
802.11ac VHT40 (Covered by HT40)	MCS0

TXBF Mode

Modulation	Data Rate
802.11ac VHT20	MCS0
802.11ac VHT40	MCS0

Test Cases	
AC Conducted Emission	Mode 1: WLAN (2.4GHz) Link + Bluetooth Link + MPEG4 + 1 Slot Locking Cradle + AC Adapter (Sanhua) for Sample 1
Receiver Radiated Emission	Mode 1: WLAN 2.4GHz Idle for Sample 1

<CDD Mode>

<Ant. 1>

802.11b RF Avg Output Power (dBm)						
Power vs. Channel			Power vs Data Rate			
Channel	Frequency (MHz)	Data Rate (bps)	Channel	Data Rate (bps)		
		1M		2M	5.5M	11M
Duty Cycle (%)		99.03		98.10	95.56	93.48
CH 01	2412	20.67	CH 06	20.89	20.93	20.93
CH 02	2417	20.72				
CH 06	2437	**20.94**				
CH 10	2457	20.65				
CH 11	2462	20.80				

802.11g RF Avg Output Power (dBm)											
Power vs. Channel			Power vs Data Rate								
Channel	Frequency (MHz)	Data Rate (bps)	Channel	Data Rate (bps)							
		6M		9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
Duty Cycle (%)		94.39		93.15	90.27	88.69	85.62	78.07	76.40	74.39
CH 01	2412	18.61	CH 02	18.71	18.75	18.92	18.89	18.72	18.55	18.54
CH 02	2417	**18.94**								
CH 06	2437	18.78								
CH 10	2457	18.91								
CH 11	2462	17.47								

802.11n HT20 RF Avg Output Power (dBm)											
Power vs. Channel			Power vs Data Rate								
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index							
		MCS 0		MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7
Duty Cycle (%)		94.00		91.90	88.68	85.37	79.82	75.49	74.39	71.96
CH 01	2412	**18.82**	CH 01	18.50	18.80	18.79	18.52	18.52	18.46	18.53
CH 02	2417	18.75								
CH 06	2437	18.66								
CH 10	2457	18.71								
CH 11	2462	17.09								

802.11n HT40 RF Avg Output Power (dBm)											
Power vs. Channel			Power vs Data Rate								
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index							
		MCS 0		MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7
Duty Cycle (%)		91.18		85.51	79.62	76.02	69.12	63.79	61.26	60.28
CH 03	2422	17.08	CH 06	19.97	20.02	20.03	19.96	19.85	19.91	19.92
CH 04	2427	18.23								
CH 06	2437	**20.24**								
CH 08	2447	17.72								
CH 09	2452	15.72								

802.11ac VHT20 RF Avg Output Power (dBm)											
Power vs. Channel			Power vs Data Rate								
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index							
		MCS 0		MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7	MCS 8
Duty Cycle (%)		94.00		91.08	88.00	83.83	79.91	76.24	74.92	73.08	69.75
CH 01	2412	**18.81**	CH 01	18.60	18.80	18.79	18.55	18.53	18.47	18.53	18.51
CH 02	2417	18.71									
CH 06	2437	18.62									
CH 10	2457	18.67									
CH 11	2462	17.05									

802.11ac VHT40 RF Avg Output Power (dBm)												
Power vs. Channel			Power vs Data Rate									
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index								
		MCS 0		MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7	MCS 8	MCS 9
Duty Cycle (%)		90.29		84.72	76.92	73.33	69.82	64.14	61.67	57.64	55.29	51.92
CH 03	2422	17.06	CH 06	20.03	20.16	20.13	19.90	19.91	19.90	20.09	20.11	20.18
CH 04	2427	18.20										
CH 06	2437	**20.19**										
CH 08	2447	17.64										
CH 09	2452	15.69										

<Ant. 2>

802.11b RF Avg Output Power (dBm)						
Power vs. Channel			Power vs Data Rate			
Channel	Frequency (MHz)	Data Rate (bps)	Channel	Data Rate (bps)		
		1M		2M	5.5M	11M
Duty Cycle (%)		99.03		98.41	95.56	92.81
CH 01	2412	20.96	CH 06	20.78	20.80	20.58
CH 02	2417	20.93				
CH 06	2437	**20.97**				
CH 10	2457	20.94				
CH 11	2462	20.90				

802.11g RF Avg Output Power (dBm)											
Power vs. Channel			Power vs Data Rate								
Channel	Frequency (MHz)	Data Rate (bps)	Channel	Data Rate (bps)							
		6M		9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
Duty Cycle (%)		95.33		93.15	91.07	88.66	84.97	80.18	75.28	73.86
CH 01	2412	18.19	CH 06	18.36	18.34	18.48	18.52	18.03	18.09	18.02
CH 02	2417	18.73								
CH 06	2437	**18.77**								
CH 10	2457	18.26								
CH 11	2462	17.01								

802.11n HT20 RF Avg Output Power (dBm)											
Power vs. Channel			Power vs Data Rate								
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index							
		MCS 0		MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7
Duty Cycle (%)		94.00		92.34	88.53	85.96	80.18	76.14	72.84	72.03
CH 01	2412	17.98	CH 06	18.61	18.31	18.32	18.01	17.94	18.07	17.99
CH 02	2417	18.64								
CH 06	2437	**18.70**								
CH 10	2457	17.58								
CH 11	2462	16.87								

802.11n HT40 RF Avg Output Power (dBm)											
Power vs. Channel			Power vs Data Rate								
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index							
		MCS 0		MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7
Duty Cycle (%)		91.18		85.26	80.00	73.24	69.37	64.07	61.82	60.66
CH 03	2422	18.22	CH 06	19.96	20.03	19.71	19.41	19.35	19.41	19.38
CH 04	2427	19.03								
CH 06	2437	**20.08**								
CH 08	2447	16.64								
CH 09	2452	15.25								

802.11ac VHT20 RF Avg Output Power (dBm)												
Power vs. Channel			Power vs Data Rate									
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index								
		MCS 0		MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7	MCS 8
Duty Cycle (%)		94.00		90.65	86.84	85.52	80.73	76.24	74.25	70.81	69.01
CH 01	2412	17.97	CH 06	18.65	18.39	18.35	17.96	18.02	18.05	18.18	18.00
CH 02	2417	18.62									
CH 06	2437	**18.66**									
CH 10	2457	17.47									
CH 11	2462	16.81									

802.11ac VHT40 RF Avg Output Power (dBm)												
Power vs. Channel			Power vs Data Rate									
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index								
		MCS 0		MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7	MCS 8	MCS 9
Duty Cycle (%)		90.29		82.99	79.81	76.30	68.82	63.07	61.95	61.11	57.43	56.25
CH 03	2422	18.21	CH 06	19.61	19.58	19.46	19.47	19.48	19.46	19.40	19.37	19.38
CH 04	2427	19.02										
CH 06	2437	**20.04**										
CH 08	2447	16.63										
CH 09	2452	15.14										

MIMO <Ant. 1+2>

802.11b RF Avg Output Power (dBm)						
Power vs. Channel			Power vs Data Rate			
Channel	Frequency (MHz)	Data Rate (bps)	Channel	Data Rate (bps)		
		1M		2M	5.5M	11M
CH 01	2412	23.72	CH 10	23.39	23.62	23.44
CH 02	2417	23.65				
CH 06	2437	23.19				
CH 10	2457	**23.84**				
CH 11	2462	23.50				

802.11g RF Avg Output Power (dBm)										
Power vs. Channel			Power vs Data Rate							
Channel	Frequency (MHz)	Data Rate (bps)	Channel	Data Rate (bps)						
		6M		9Mbps	12Mbps	18Mbps	24Mbps	36Mbps	48Mbps	54Mbps
CH 01	2412	21.05	CH 02	21.49	21.09	21.27	21.12	20.96	20.87	20.84
CH 02	2417	**21.50**								
CH 06	2437	21.44								
CH 10	2457	19.69								
CH 11	2462	18.33								

802.11n HT20 RF Avg Output Power (dBm)											
Power vs. Channel			Power vs Data Rate								
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index							
		MCS0		MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 01	2412	21.45	CH 06	21.41	21.63	21.69	21.40	21.32	21.29	21.33
CH 02	2417	21.12								
CH 06	2437	**21.78**								
CH 10	2457	20.13								
CH 11	2462	18.15								

Power vs. Channel			Power vs Data Rate							
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index						
		MCS0		MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 03	2422	17.97	CH 04	19.96	20.03	19.71	19.41	19.35	19.41	19.38
CH 04	2427	**19.91**								
CH 06	2437	18.79								
CH 08	2447	17.07								
CH 09	2452	15.55								

802.11ac VHT20 RF Avg Output Power (dBm)													
Power vs. Channel			Power vs Data Rate										
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index									
		MCS 0		MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7	MCS 8		
CH 01	2412	21.41	CH 06	21.44	21.60	21.71	21.38	21.38	21.23	21.34	21.30		
CH 02	2417	21.09											
CH 06	2437	**21.77**											
CH 10	2457	20.11											
CH 11	2462	18.14											

802.11ac VHT40 RF Avg Output Power (dBm)													
Power vs. Channel			Power vs Data Rate										
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index									
		MCS 0		MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7	MCS 8	MCS 9	
CH 03	2422	17.94	CH 04	19.58	19.66	19.69	19.66	19.49	19.64	19.65	19.57	19.48	
CH 04	2427	**19.90**											
CH 06	2437	18.71											
CH 08	2447	17.06											
CH 09	2452	15.54											

<TXBF Mode>

MIMO <Ant. 1+2>

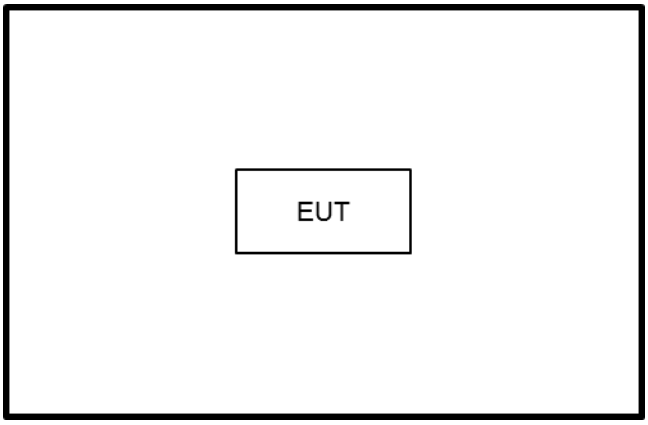
802.11ac VHT20 RF Avg Output Power (dBm)												
Power vs. Channel			Power vs Data Rate									
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index								
		MCS 0		MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7	MCS 8
CH 01	2412	20.97	CH 06	21.72	21.46	21.50	21.65	21.54	21.67	21.67	21.72
CH 02	2417	20.94									
CH 06	2437	**21.75**									
CH 10	2457	19.66									
CH 11	2462	18.28									

802.11ac VHT40 RF Avg Output Power (dBm)													
Power vs. Channel			Power vs Data Rate										
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index									
		MCS 0		MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7	MCS 8	MCS 9
CH 03	2422	18.37	CH 04	18.76	18.76	18.22	18.72	18.56	18.69	18.65	18.71	18.71
CH 04	2427	**18.86**										
CH 06	2437	18.80										
CH 08	2447	16.21										
CH 09	2452	14.62										

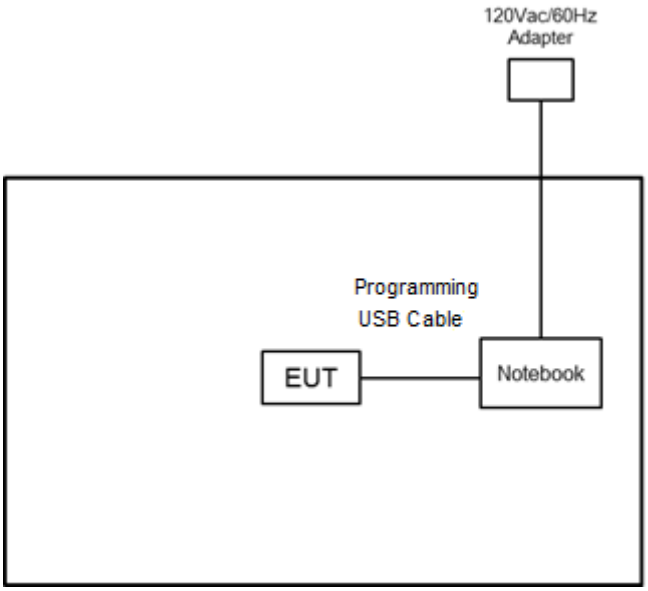
2.3 Connection Diagram of Test System

<WLAN Tx Mode>

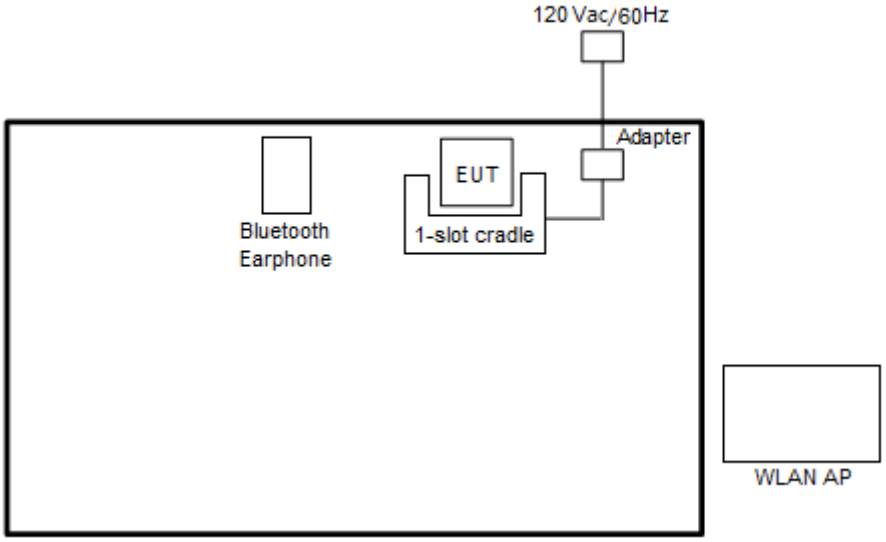
<CDD Mode>



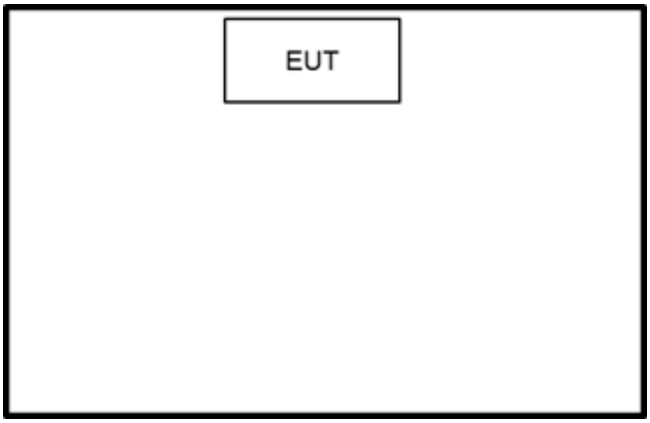
<TXBF Mode>



<AC Conducted Emission Mode>



<Receiver Radiated Emission Mode>



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Bluetooth Earphone	Sony Ericsson	MW600	PY7DDA-2029	N/A	N/A
2.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8m
3.	Notebook	DELL	Latitude E6320	FCC DoC/ Contains FCC ID: QDS-BRCM1054	N/A	AC I/P: Unshielded, 1.2m DC O/P: Shielded, 1.8m
4.	Notebook	Lenovo	G480	PPD-AR5895	N/A	AC Non-Shielded, 1.8m

2.5 EUT Operation Test Setup

The RF test items, utility “QRCT” was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.

For TXBF mode, the modulation modes and data rates manipulated by the command lines in the engineering program made the EUT link to another EUT by power under the normal operation. The “QRCT” software tool was used to enable the EUT to transmit signals continuously.

2.6 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 4.2 dB and 10dB attenuator.

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 4.2 + 10 = 14.2 (dB)

3 Test Result

3.1 6dB and 99% Bandwidth Measurement

3.1.1 Limit of 6dB and 99% Bandwidth

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

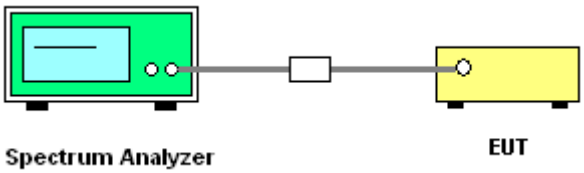
3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedures

1. The testing follows FCC KDB Publication 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. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) = 1MHz and set the Video bandwidth (VBW) = 3MHz.
6. Measure and record the results in the test report.

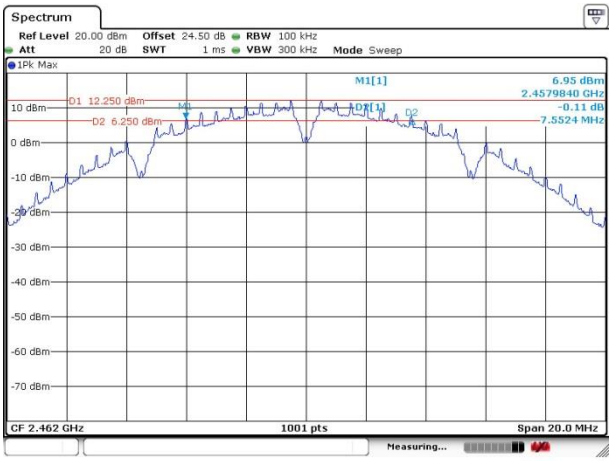
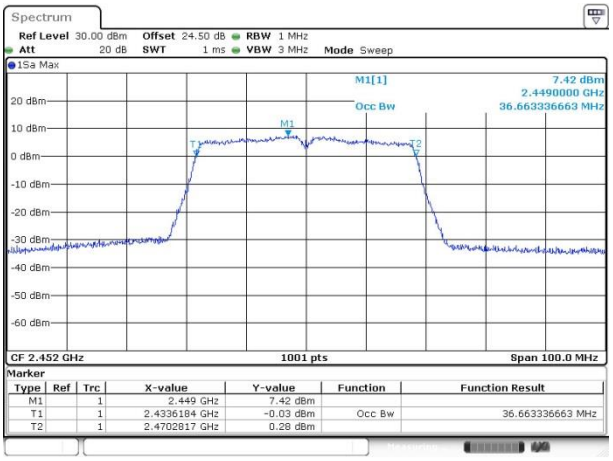
3.1.4 Test Setup



3.1.5 Test Result of 6dB and 99% Occupied Bandwidth

<CDD Modes>

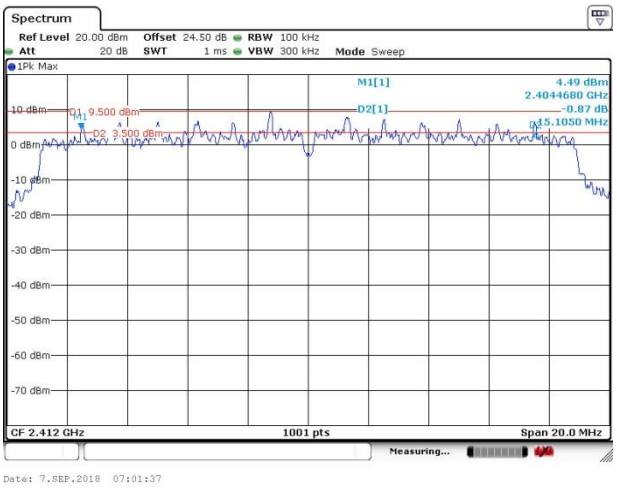
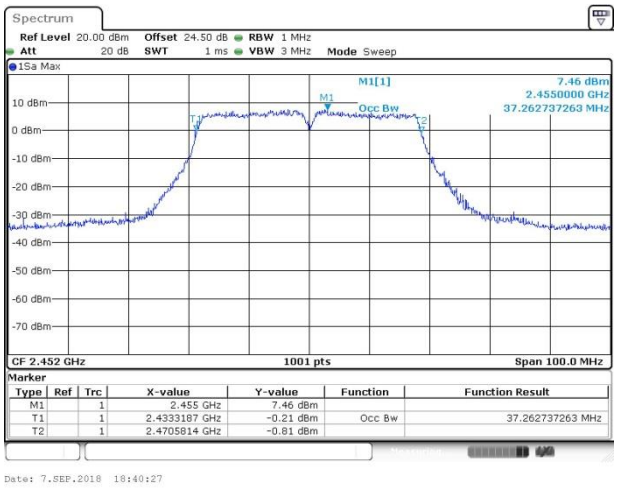
2.4GHz Band										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)		6dB BW (MHz)		6dB BW Limit (MHz)	Pass/Fail
					Ant 1	Ant 2	Ant 1	Ant 2		
11b	1Mbps	1	1	2412	13.09	13.79	8.01	8.01	0.50	Pass
11b	1Mbps	1	6	2437	13.09	13.64	8.03	8.03	0.50	Pass
11b	1Mbps	1	11	2462	13.29	14.19	7.57	8.03	0.50	Pass
11g	6Mbps	1	1	2412	16.73	16.78	15.46	15.52	0.50	Pass
11g	6Mbps	1	6	2437	16.78	16.73	15.88	15.42	0.50	Pass
11g	6Mbps	1	11	2462	16.83	16.73	15.46	15.72	0.50	Pass
HT20	MCS0	1	1	2412	17.83	17.88	16.12	15.44	0.50	Pass
HT20	MCS0	1	6	2437	17.88	17.93	16.52	15.66	0.50	Pass
HT20	MCS0	1	11	2462	17.93	17.93	16.12	16.62	0.50	Pass
HT40	MCS0	1	3	2422	36.46	36.46	35.12	35.12	0.50	Pass
HT40	MCS0	1	6	2437	36.46	36.46	35.60	35.12	0.50	Pass
HT40	MCS0	1	9	2452	36.46	36.46	35.12	35.68	0.50	Pass
11b	1Mbps	2	1	2412	13.24	14.14	8.01	8.03	0.50	Pass
11b	1Mbps	2	6	2437	13.09	13.39	8.01	8.03	0.50	Pass
11b	1Mbps	2	11	2462	13.29	14.19	**7.55**	8.05	0.50	Pass
11g	6Mbps	2	1	2412	16.73	16.68	15.44	15.68	0.50	Pass
11g	6Mbps	2	6	2437	16.78	16.73	15.34	16.26	0.50	Pass
11g	6Mbps	2	11	2462	16.83	16.78	15.88	16.28	0.50	Pass
HT20	MCS0	2	1	2412	17.93	17.93	15.94	15.70	0.50	Pass
HT20	MCS0	2	6	2437	17.93	17.88	15.90	16.02	0.50	Pass
HT20	MCS0	2	11	2462	18.03	17.93	15.94	16.76	0.50	Pass
HT40	MCS0	2	3	2422	36.36	36.46	35.68	35.12	0.50	Pass
HT40	MCS0	2	6	2437	36.46	36.36	35.12	35.08	0.50	Pass
HT40	MCS0	2	9	2452	36.46	**36.66**	35.16	35.28	0.50	Pass

Minimum 6dB Bandwidth	Maximum 99% Occupied Bandwidth
	

Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

<TXBF Modes>

2.4GHz Band										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)		6dB BW (MHz)		6dB BW Limit (MHz)	Pass/Fail
					Ant 1	Ant 2	Ant 1	Ant 2		
VHT20	MCS0	2	1	2412	17.78	17.73	**15.11**	17.17	0.50	Pass
VHT20	MCS0	2	6	2437	17.78	17.83	15.12	17.54	0.50	Pass
VHT20	MCS0	2	11	2462	17.68	18.23	15.70	16.66	0.50	Pass
VHT40	MCS0	2	3	2422	36.26	36.46	33.89	35.96	0.50	Pass
VHT40	MCS0	2	6	2437	36.56	36.36	35.72	35.05	0.50	Pass
VHT40	MCS0	2	9	2452	**37.26**	36.36	35.40	36.44	0.50	Pass

Minimum 6dB Bandwidth	Maximum 99% Occupied Bandwidth
	

Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

3.2 Output Power Measurement

3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for output power is 30dBm. If transmitting antenna with directional gain greater than 6dBi is used, the output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

3.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.2.3 Test Procedures

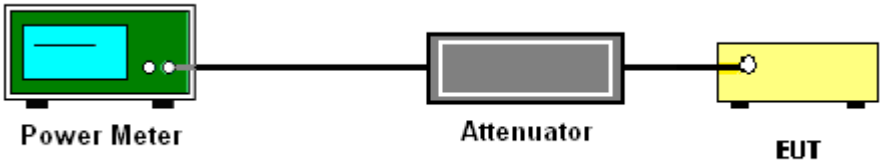
<CDD Modes>

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v04 section 9.2.3.1 Method AVGPM.
2. The RF output of EUT was connected to the power meter 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.
5. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

<TXBF Modes>

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v04 section 9.2.3.2 Method AVGPM-G.
2. The RF output of EUT was connected to the power meter 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.
5. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

3.2.4 Test Setup



3.2.5 Test Result of Peak Output Power (Reporting Only)

<CDD Modes>

2.4GHz Band											
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak Conducted Power (dBm)			DG (dBi)		EIRP Power (dBm)	
					Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2
11b	1Mbps	1	1	2412	23.20	23.42	-	2.02	2.23	25.22	25.65
11b	1Mbps	1	2	2417	23.25	23.40		2.02	2.23	25.27	25.63
11b	1Mbps	1	6	2437	23.59	23.44		2.02	2.23	25.61	25.67
11b	1Mbps	1	10	2457	23.11	23.42		2.02	2.23	25.13	25.65
11b	1Mbps	1	11	2462	23.20	23.10		2.02	2.23	25.22	25.33
11g	6Mbps	1	1	2412	23.59	22.89		2.02	2.23	25.61	25.12
11g	6Mbps	1	2	2417	23.75	23.35		2.02	2.23	25.77	25.58
11g	6Mbps	1	6	2437	23.62	23.41		2.02	2.23	25.64	25.64
11g	6Mbps	1	10	2457	23.67	22.95		2.02	2.23	25.69	25.18
11g	6Mbps	1	11	2462	21.90	21.91		2.02	2.23	23.92	24.14
HT20	MCS0	1	1	2412	23.70	22.25		2.02	2.23	25.72	24.48
HT20	MCS0	1	2	2417	23.77	23.45		2.02	2.23	25.79	25.68
HT20	MCS0	1	6	2437	23.40	23.54		2.02	2.23	25.42	25.77
HT20	MCS0	1	10	2457	23.73	22.33		2.02	2.23	25.75	24.56
HT20	MCS0	1	11	2462	21.53	21.70		2.02	2.23	23.55	23.93
HT40	MCS0	1	3	2422	22.98	23.78		2.02	2.23	25.00	26.01
HT40	MCS0	1	4	2427	23.70	24.70		2.02	2.23	25.72	26.93
HT40	MCS0	1	6	2437	25.70	25.06		2.02	2.23	27.72	27.29
HT40	MCS0	1	8	2447	23.35	22.92		2.02	2.23	25.37	25.15
HT40	MCS0	1	9	2452	21.75	21.30		2.02	2.23	23.77	23.53
VHT20	MCS0	1	1	2412	23.66	22.23		2.02	2.23	25.68	24.46
VHT20	MCS0	1	2	2417	23.70	23.41		2.02	2.23	25.72	25.64
VHT20	MCS0	1	6	2437	23.35	23.50		2.02	2.23	25.37	25.73
VHT20	MCS0	1	10	2457	23.63	22.30		2.02	2.23	25.65	24.53
VHT20	MCS0	1	11	2462	20.36	21.69		2.02	2.23	22.38	23.92
VHT40	MCS0	1	3	2422	22.91	23.72		2.02	2.23	24.93	25.95
VHT40	MCS0	1	4	2427	23.65	24.62		2.02	2.23	25.67	26.85
VHT40	MCS0	1	6	2437	25.64	25.00		2.02	2.23	27.66	27.23
VHT40	MCS0	1	8	2447	23.30	22.81		2.02	2.23	25.32	25.04
VHT40	MCS0	1	9	2452	21.62	21.44		2.02	2.23	23.64	23.67

2.4GHz Band											
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak Conducted Power (dBm)			DG (dBi)		EIRP Power (dBm)	
					Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2
11b	1Mbps	2	1	2412	23.24	21.03	25.28	2.23		27.51	
11b	1Mbps	2	2	2417	23.13	23.10	26.13	2.23		28.36	
11b	1Mbps	2	6	2437	22.77	22.77	25.78	2.23		28.01	
11b	1Mbps	2	10	2457	23.13	23.12	26.14	2.23		28.37	
11b	1Mbps	2	11	2462	22.92	22.69	25.82	2.23		28.05	
11g	6Mbps	2	1	2412	22.80	22.82	25.82	2.23		28.05	
11g	6Mbps	2	2	2417	22.93	23.40	26.18	2.23		28.41	
11g	6Mbps	2	6	2437	22.72	23.52	26.15	2.23		28.38	
11g	6Mbps	2	10	2457	21.24	21.54	24.40	2.23		26.63	
11g	6Mbps	2	11	2462	19.98	20.32	23.16	2.23		25.39	
HT20	MCS0	2	1	2412	23.15	23.25	26.21	2.23		28.44	
HT20	MCS0	2	2	2417	22.70	23.00	25.86	2.23		28.09	
HT20	MCS0	2	6	2437	23.46	23.85	**26.67**	2.23		28.90	
HT20	MCS0	2	10	2457	21.80	21.70	24.76	2.23		26.99	
HT20	MCS0	2	11	2462	19.90	20.28	23.10	2.23		25.33	
HT40	MCS0	2	3	2422	20.98	21.66	24.34	2.23		26.57	
HT40	MCS0	2	4	2427	22.63	23.11	25.89	2.23		28.12	
HT40	MCS0	2	6	2437	21.71	22.41	25.08	2.23		27.31	
HT40	MCS0	2	8	2447	20.22	20.60	23.42	2.23		25.65	
HT40	MCS0	2	9	2452	18.64	19.04	21.85	2.23		24.08	
VHT20	MCS0	2	1	2412	23.23	23.12	26.19	2.23		28.42	
VHT20	MCS0	2	2	2417	23.22	22.21	25.75	2.23		27.98	
VHT20	MCS0	2	6	2437	23.40	23.82	26.63	2.23		28.86	
VHT20	MCS0	2	10	2457	21.74	21.74	24.75	2.23		26.98	
VHT20	MCS0	2	11	2462	19.76	20.30	23.05	2.23		25.28	
VHT40	MCS0	2	3	2422	20.99	21.32	24.17	2.23		26.40	
VHT40	MCS0	2	4	2427	22.62	23.10	25.88	2.23		28.11	
VHT40	MCS0	2	6	2437	21.54	22.00	24.79	2.23		27.02	
VHT40	MCS0	2	8	2447	20.07	20.64	23.37	2.23		25.60	
VHT40	MCS0	2	9	2452	18.52	18.99	21.77	2.23		24.00	

3.2.6 Test Result of Average output Power

<CDD Modes>

2.4GHz Band																		
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant 1	Ant 2	Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	1	1	2412	0.04	0.04	20.67	20.96	-	30.00	30.00	2.02	2.23	22.69	23.19	36.00	36.00	Pass
11b	1Mbps	1	2	2417	0.04	0.04	20.72	20.93		30.00	30.00	2.02	2.23	22.74	23.16	36.00	36.00	Pass
11b	1Mbps	1	6	2437	0.04	0.04	20.94	**20.97**		30.00	30.00	2.02	2.23	22.96	23.20	36.00	36.00	Pass
11b	1Mbps	1	10	2457	0.04	0.04	20.65	20.94		30.00	30.00	2.02	2.23	22.67	23.17	36.00	36.00	Pass
11b	1Mbps	1	11	2462	0.04	0.04	20.80	20.90		30.00	30.00	2.02	2.23	22.82	23.13	36.00	36.00	Pass
11g	6Mbps	1	1	2412	0.25	0.21	18.61	18.19		30.00	30.00	2.02	2.23	20.63	20.42	36.00	36.00	Pass
11g	6Mbps	1	2	2417	0.25	0.21	18.94	18.73		30.00	30.00	2.02	2.23	20.96	20.96	36.00	36.00	Pass
11g	6Mbps	1	6	2437	0.25	0.21	18.78	18.77		30.00	30.00	2.02	2.23	20.80	21.00	36.00	36.00	Pass
11g	6Mbps	1	10	2457	0.25	0.21	18.91	18.26		30.00	30.00	2.02	2.23	20.93	20.49	36.00	36.00	Pass
11g	6Mbps	1	11	2462	0.25	0.21	17.47	17.01		30.00	30.00	2.02	2.23	19.49	19.24	36.00	36.00	Pass
HT20	MCS0	1	1	2412	0.27	0.27	18.82	17.98		30.00	30.00	2.02	2.23	20.84	20.21	36.00	36.00	Pass
HT20	MCS0	1	2	2417	0.27	0.27	18.75	18.64		30.00	30.00	2.02	2.23	20.77	20.87	36.00	36.00	Pass
HT20	MCS0	1	6	2437	0.27	0.27	18.66	18.70		30.00	30.00	2.02	2.23	20.68	20.93	36.00	36.00	Pass
HT20	MCS0	1	10	2457	0.27	0.27	18.71	17.58		30.00	30.00	2.02	2.23	20.73	19.81	36.00	36.00	Pass
HT20	MCS0	1	11	2462	0.27	0.27	17.09	16.87		30.00	30.00	2.02	2.23	19.11	19.10	36.00	36.00	Pass
HT40	MCS0	1	3	2422	0.40	0.40	17.08	18.22		30.00	30.00	2.02	2.23	19.10	20.45	36.00	36.00	Pass
HT40	MCS0	1	4	2427	0.40	0.40	18.23	19.03		30.00	30.00	2.02	2.23	20.25	21.26	36.00	36.00	Pass
HT40	MCS0	1	6	2437	0.40	0.40	20.24	20.08		30.00	30.00	2.02	2.23	22.26	22.31	36.00	36.00	Pass
HT40	MCS0	1	8	2447	0.40	0.40	17.72	16.64		30.00	30.00	2.02	2.23	19.74	18.87	36.00	36.00	Pass
HT40	MCS0	1	9	2452	0.40	0.40	15.72	15.25		30.00	30.00	2.02	2.23	17.74	17.48	36.00	36.00	Pass
VHT20	MCS0	1	1	2412	0.27	0.27	18.81	17.97		30.00	30.00	2.02	2.23	20.83	20.20	36.00	36.00	Pass
VHT20	MCS0	1	2	2417	0.27	0.27	18.71	18.62		30.00	30.00	2.02	2.23	20.73	20.85	36.00	36.00	Pass
VHT20	MCS0	1	6	2437	0.27	0.27	18.62	18.66		30.00	30.00	2.02	2.23	20.64	20.89	36.00	36.00	Pass
VHT20	MCS0	1	10	2457	0.27	0.27	18.67	17.47		30.00	30.00	2.02	2.23	20.69	19.70	36.00	36.00	Pass
VHT20	MCS0	1	11	2462	0.27	0.27	17.05	16.81		30.00	30.00	2.02	2.23	19.07	19.04	36.00	36.00	Pass
VHT40	MCS0	1	3	2422	0.44	0.44	17.06	18.21		30.00	30.00	2.02	2.23	19.08	20.44	36.00	36.00	Pass
VHT40	MCS0	1	4	2427	0.44	0.44	18.20	19.02		30.00	30.00	2.02	2.23	20.22	21.25	36.00	36.00	Pass
VHT40	MCS0	1	6	2437	0.44	0.44	20.19	20.04		30.00	30.00	2.02	2.23	22.21	22.27	36.00	36.00	Pass
VHT40	MCS0	1	8	2447	0.44	0.44	17.64	16.63		30.00	30.00	2.02	2.23	19.66	18.86	36.00	36.00	Pass
VHT40	MCS0	1	9	2452	0.44	0.44	15.69	15.14		30.00	30.00	2.02	2.23	17.71	17.37	36.00	36.00	Pass

2.4GHz Band																			
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant 1	Ant 2	Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	2	1	2412	0.04	0.04	20.40	20.99	23.72	30.00		2.23		25.95		36.00		Pass
11b	1Mbps	2	2	2417	0.04	0.04	20.57	20.70	23.65	30.00		2.23		25.88		36.00		Pass
11b	1Mbps	2	6	2437	0.04	0.04	20.00	20.35	23.19	30.00		2.23		25.42		36.00		Pass
11b	1Mbps	2	10	2457	0.04	0.04	20.69	20.97	**23.84**	30.00		2.23		26.07		36.00		Pass
11b	1Mbps	2	11	2462	0.04	0.04	20.44	20.53	23.50	30.00		2.23		25.73		36.00		Pass
11g	6Mbps	2	1	2412	0.25	0.25	18.06	18.01	21.05	30.00		2.23		23.28		36.00		Pass
11g	6Mbps	2	2	2417	0.25	0.25	18.23	18.73	21.50	30.00		2.23		23.73		36.00		Pass
11g	6Mbps	2	6	2437	0.25	0.25	18.15	18.70	21.44	30.00		2.23		23.67		36.00		Pass
11g	6Mbps	2	10	2457	0.25	0.25	16.61	16.75	19.69	30.00		2.23		21.92		36.00		Pass
11g	6Mbps	2	11	2462	0.25	0.25	15.26	15.37	18.33	30.00		2.23		20.56		36.00		Pass
HT20	MCS0	2	1	2412	0.27	0.22	18.41	18.47	21.45	30.00		2.23		23.68		36.00		Pass
HT20	MCS0	2	2	2417	0.27	0.22	18.19	18.03	21.12	30.00		2.23		23.35		36.00		Pass
HT20	MCS0	2	6	2437	0.27	0.22	18.56	18.97	21.78	30.00		2.23		24.01		36.00		Pass
HT20	MCS0	2	10	2457	0.27	0.22	17.17	17.07	20.13	30.00		2.23		22.36		36.00		Pass
HT20	MCS0	2	11	2462	0.27	0.22	15.17	15.11	18.15	30.00		2.23		20.38		36.00		Pass
HT40	MCS0	2	3	2422	0.40	0.40	14.71	15.20	17.97	30.00		2.23		20.20		36.00		Pass
HT40	MCS0	2	4	2427	0.40	0.40	16.68	17.10	19.91	30.00		2.23		22.14		36.00		Pass
HT40	MCS0	2	6	2437	0.40	0.40	15.50	16.05	18.79	30.00		2.23		21.02		36.00		Pass
HT40	MCS0	2	8	2447	0.40	0.40	13.96	14.16	17.07	30.00		2.23		19.30		36.00		Pass
HT40	MCS0	2	9	2452	0.40	0.40	12.43	12.64	15.55	30.00		2.23		17.78		36.00		Pass
VHT20	MCS0	2	1	2412	0.22	0.27	18.29	18.51	21.41	30.00		2.23		23.64		36.00		Pass
VHT20	MCS0	2	2	2417	0.22	0.27	17.99	18.17	21.09	30.00		2.23		23.32		36.00		Pass
VHT20	MCS0	2	6	2437	0.22	0.27	18.47	19.03	21.77	30.00		2.23		24.00		36.00		Pass
VHT20	MCS0	2	10	2457	0.22	0.27	17.02	17.17	20.11	30.00		2.23		22.34		36.00		Pass
VHT20	MCS0	2	11	2462	0.22	0.27	15.04	15.21	18.14	30.00		2.23		20.37		36.00		Pass
VHT40	MCS0	2	3	2422	0.40	0.40	14.70	15.14	17.94	30.00		2.23		20.17		36.00		Pass
VHT40	MCS0	2	4	2427	0.40	0.40	16.66	17.10	19.90	30.00		2.23		22.13		36.00		Pass
VHT40	MCS0	2	6	2437	0.40	0.40	15.50	15.90	18.71	30.00		2.23		20.94		36.00		Pass
VHT40	MCS0	2	8	2447	0.40	0.40	13.90	14.20	17.06	30.00		2.23		19.29		36.00		Pass
VHT40	MCS0	2	9	2452	0.40	0.40	12.50	12.55	15.54	30.00		2.23		17.77		36.00		Pass

<TXBF Modes>

2.4GHz Band																		
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)		Average Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant 1	Ant 2	Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	
VHT20	MCS0	2	1	2412	0.00	0.00	17.70	18.20	20.97	30.00		5.14		26.10		36.00		Pass
VHT20	MCS0	2	2	2417	0.00	0.00	17.00	18.70	20.94	30.00		5.14		26.08		36.00		Pass
VHT20	MCS0	2	6	2437	0.00	0.00	17.50	19.70	**21.75**	30.00		5.14		26.88		36.00		Pass
VHT20	MCS0	2	10	2457	0.00	0.00	16.60	16.70	19.66	30.00		5.14		24.80		36.00		Pass
VHT20	MCS0	2	11	2462	0.00	0.00	14.40	16.00	18.28	30.00		5.14		23.42		36.00		Pass
VHT40	MCS0	2	3	2422	0.00	0.00	14.60	16.00	18.37	30.00		5.14		23.50		36.00		Pass
VHT40	MCS0	2	4	2427	0.00	0.00	15.90	15.80	18.86	30.00		5.14		24.00		36.00		Pass
VHT40	MCS0	2	6	2437	0.00	0.00	15.20	16.30	18.80	30.00		5.14		23.93		36.00		Pass
VHT40	MCS0	2	8	2447	0.00	0.00	13.40	13.00	16.21	30.00		5.14		21.35		36.00		Pass
VHT40	MCS0	2	9	2452	0.00	0.00	11.90	11.30	14.62	30.00		5.14		19.76		36.00		Pass

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.

3.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.3.3 Test Procedures

<CDD Modes>

Method AVGPSD-2

1. The testing follows Measurement Procedure 10.5 Method AVGPSD-2 of FCC KDB Publication No. 558074 D01 DTS 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. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 10 kHz. Video bandwidth VBW = 30 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW).
5. Number of points in sweep ≥ 2 Span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins).
6. Detector = RMS, Sweep time = auto couple.
7. Trace average at least 100 traces in power averaging mode.
8. Add 10 log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add 10 log(1/0.25) = 6 dB if the duty cycle is 25 percent.
9. Measure and record the results in the test report.For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
   Method (c): Measure and add 10 log(N_{ANT}) dB.
   With this technique, spectrum measurements are performed at each output of the device, but rather than summing the spectra or the spectral peaks across the outputs, the quantity 10 log(N_{ANT}) dB is added to each spectrum value before comparing to the emission limit. The addition of 10 log(N_{ANT}) dB serves to apportion the emission limit among the N_{ANT} outputs so that each output is permitted to contribute no more than $1/N_{ANT}$ th of the PSD limit.

<TXBF Modes>

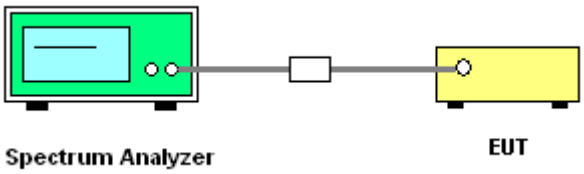
Method AVGPSD-3

1. The testing follows Measurement Procedure 10.7 Method AVGPSD-3 of FCC KDB Publication No. 558074 D01 DTS 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. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 10 kHz. Video bandwidth VBW = 30 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW).
5. Number of points in sweep ≥ 2 Span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins).
6. Detector = RMS, Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow max hold to run for at least 60 seconds, or longer as needed to allow the trace to stabilize.
9. Measure and record the results in the test report.For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

   Method (c): Measure and add 10 log(N_{ANT}) dB.

   With this technique, spectrum measurements are performed at each output of the device, but rather than summing the spectra or the spectral peaks across the outputs, the quantity 10 log(N_{ANT}) dB is added to each spectrum value before comparing to the emission limit. The addition of 10 log(N_{ANT}) dB serves to apportion the emission limit among the N_{ANT} outputs so that each output is permitted to contribute no more than $1/N_{ANT}$ th of the PSD limit.

3.3.4 Test Setup

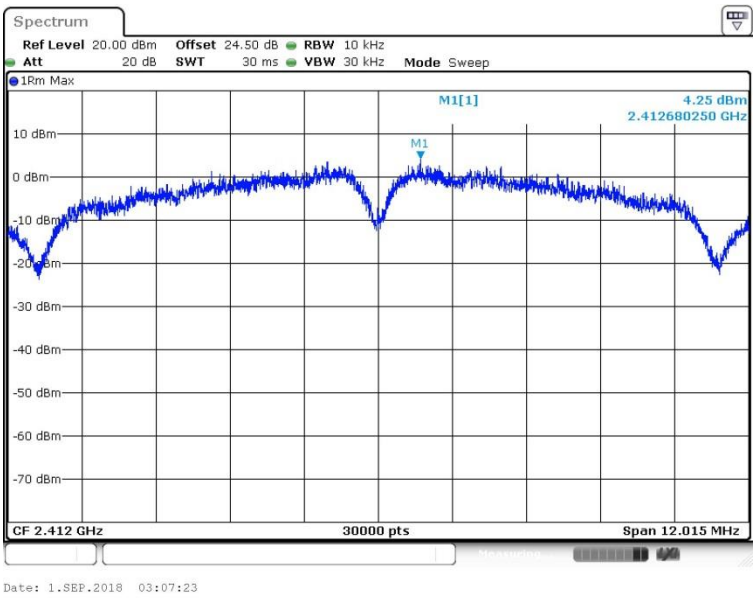


3.3.5 Test Result of Power Spectral Density

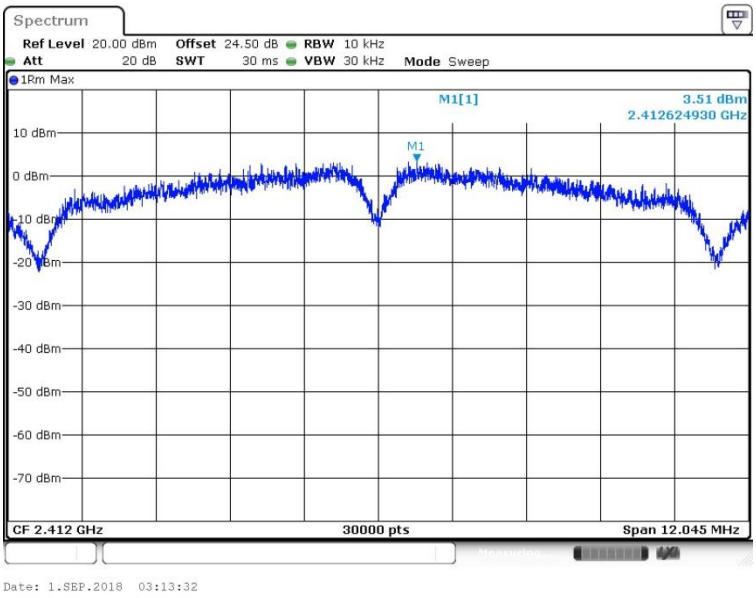
<CDD Modes>

2.4GHz Band														
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)		Average PSD (dBm/3kHz)			DG (dBi)		Average PSD Limit (dBm/3kHz)		Pass/Fail
					Ant 1	Ant 2	Ant 1	Ant 2	Worse + 3.01	Ant 1	Ant 2	Ant 1	Ant 2	
11b	1Mbps	1	1	2412	0.04	0.04	4.15	**4.72**	-	2.02	2.23	8.00	8.00	Pass
11b	1Mbps	1	6	2437	0.04	0.04	4.10	3.53		2.02	2.23	8.00	8.00	Pass
11b	1Mbps	1	11	2462	0.04	0.04	3.85	3.29		2.02	2.23	8.00	8.00	Pass
11g	6Mbps	1	1	2412	0.25	0.21	-0.22	-0.72		2.02	2.23	8.00	8.00	Pass
11g	6Mbps	1	6	2437	0.25	0.21	-0.08	-0.22		2.02	2.23	8.00	8.00	Pass
11g	6Mbps	1	11	2462	0.25	0.21	-1.58	-2.65		2.02	2.23	8.00	8.00	Pass
HT20	MCS0	1	1	2412	0.27	0.27	0.54	-1.89		2.02	2.23	8.00	8.00	Pass
HT20	MCS0	1	6	2437	0.27	0.27	-0.27	0.87		2.02	2.23	8.00	8.00	Pass
HT20	MCS0	1	11	2462	0.27	0.27	-1.72	-2.38		2.02	2.23	8.00	8.00	Pass
HT40	MCS0	1	3	2422	0.40	0.40	-5.28	-3.34		2.02	2.23	8.00	8.00	Pass
HT40	MCS0	1	6	2437	0.40	0.40	-1.93	-2.06		2.02	2.23	8.00	8.00	Pass
HT40	MCS0	1	9	2452	0.40	0.40	-6.58	-6.08		2.02	2.23	8.00	8.00	Pass
11b	1Mbps	2	1	2412	0.04	0.04	4.29	3.55	**7.30**	5.14		8.00		Pass
11b	1Mbps	2	6	2437	0.04	0.04	2.12	3.18	6.19	5.14		8.00		Pass
11b	1Mbps	2	11	2462	0.04	0.04	3.55	3.65	6.66	5.14		8.00		Pass
11g	6Mbps	2	1	2412	0.25	0.25	-1.43	-1.94	1.58	5.14		8.00		Pass
11g	6Mbps	2	6	2437	0.25	0.25	-1.08	0.15	3.16	5.14		8.00		Pass
11g	6Mbps	2	11	2462	0.25	0.25	-4.47	-3.97	-0.96	5.14		8.00		Pass
HT20	MCS0	2	1	2412	0.27	0.22	-1.20	-1.36	1.81	5.14		8.00		Pass
HT20	MCS0	2	6	2437	0.27	0.22	-0.54	-0.50	2.51	5.14		8.00		Pass
HT20	MCS0	2	11	2462	0.27	0.22	-4.47	-4.61	-1.46	5.14		8.00		Pass
HT40	MCS0	2	3	2422	0.40	0.40	-7.63	-7.70	-4.62	5.14		8.00		Pass
HT40	MCS0	2	6	2437	0.40	0.40	-6.69	-6.46	-3.45	5.14		8.00		Pass
HT40	MCS0	2	9	2452	0.40	0.40	-9.76	-10.36	-6.75	5.14		8.00		Pass

Worst Case Power Density (dBm/3kHz) for MIMO Ant. 1



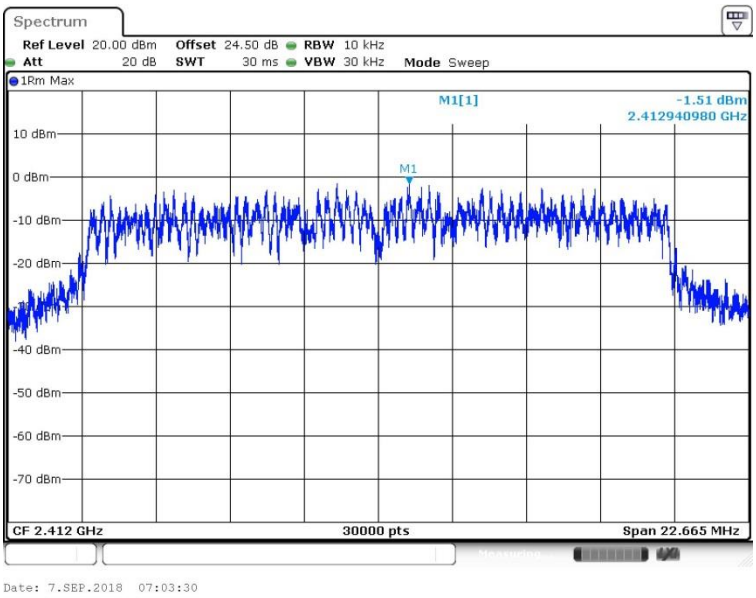
Worst Case Power Density (dBm/3kHz) for MIMO Ant. 2



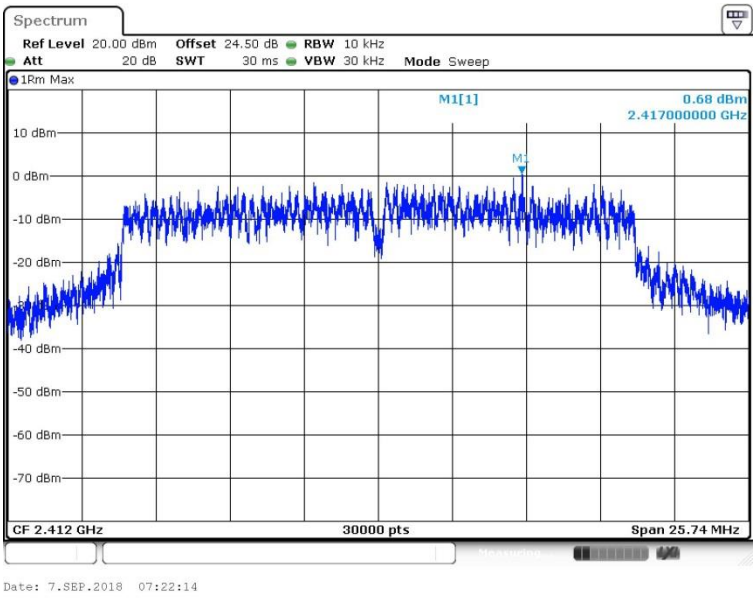
<TXBF Modes>

2.4GHz Band															
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)		Average PSD (dBm/10kHz)			DG (dBi)		Average PSD Limit (dBm/3kHz)		Pass/Fail
					Ant 1	Ant 2	Ant 1	Ant 2	Worse + 3.01	Ant 1	Ant 2	Ant 1	Ant 2	
VHT20	MCS0	2	1	2412	0.00	0.00	-1.51	0.68	**3.69**	5.14		8.00		Pass
VHT20	MCS0	2	6	2437	0.00	0.00	-3.85	-1.26	1.75	5.14		8.00		Pass
VHT20	MCS0	2	11	2462	0.00	0.00	-5.23	-7.55	-2.22	5.14		8.00		Pass
VHT40	MCS0	2	3	2422	0.00	0.00	-4.92	-2.86	0.15	5.14		8.00		Pass
VHT40	MCS0	2	6	2437	0.00	0.00	-4.49	-8.11	-1.48	5.14		8.00		Pass
VHT40	MCS0	2	9	2452	0.00	0.00	-9.94	-10.62	-6.93	5.14		8.00		Pass

Worst Case Power Density (dBm/3kHz) for MIMO Ant. 1



Worst Case Power Density (dBm/3kHz) for MIMO Ant. 2



3.4 Conducted Band Edges and Spurious Emission Measurement

3.4.1 Limit of Conducted Band Edges and Spurious Emission Measurement

In any 100 kHz bandwidth outside of the authorized frequency band, the emissions which fall in the non-restricted bands shall be attenuated at least 20 dB / 30dB relative to the maximum PSD level in 100 kHz by RF conducted measurement and radiated emissions which fall in the restricted bands, as defined in NCC LP0002 Section 2.7, must also comply with the radiated emission limits specified in NCC LP0002 Section 2.8.

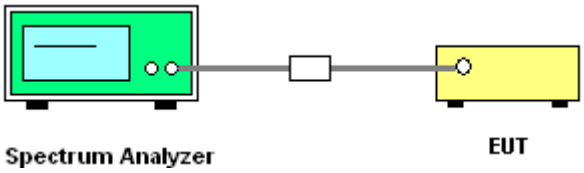
3.4.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.4.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 D01 DTS 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. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured 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 when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB
5. Measure and record the results in the test report.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

3.4.4 Test Setup



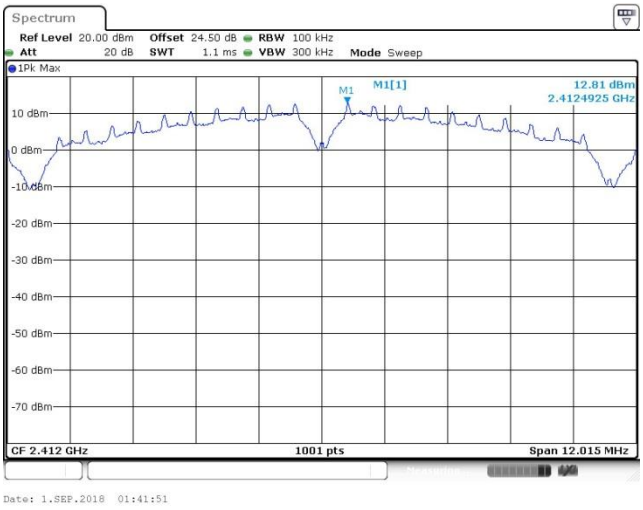
3.4.5 Test Result of Conducted Band Edges and Spurious Emission

Test Engineer :	Derek Hsu and Shiming Liu	**Temperature :**	21~25℃
		Relative Humidity :	51~54%

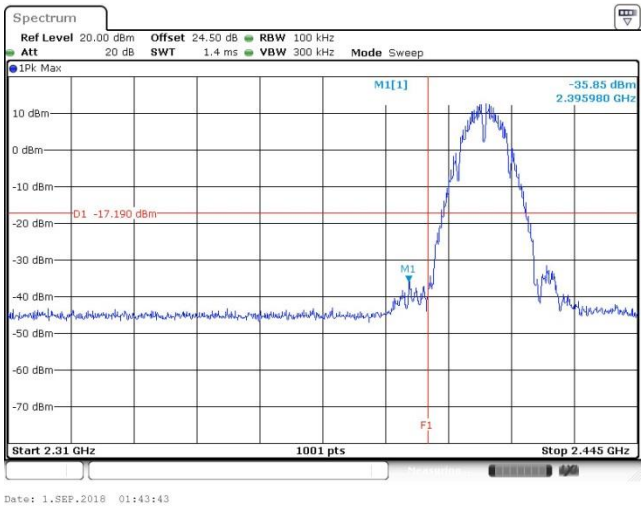
Number of TX = 1, Ant. 1 (Measured)

Test Mode :	802.11b	**Test Channel :**	01

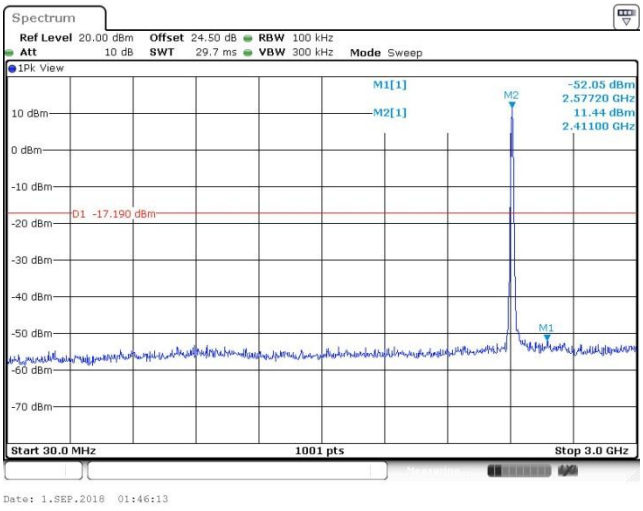
100kHz PSD reference Level



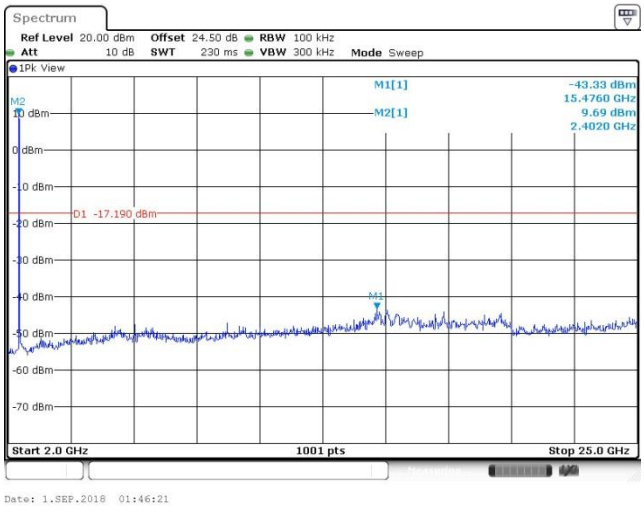
Channel Plot



Spurious Emission 30MHz~3GHz

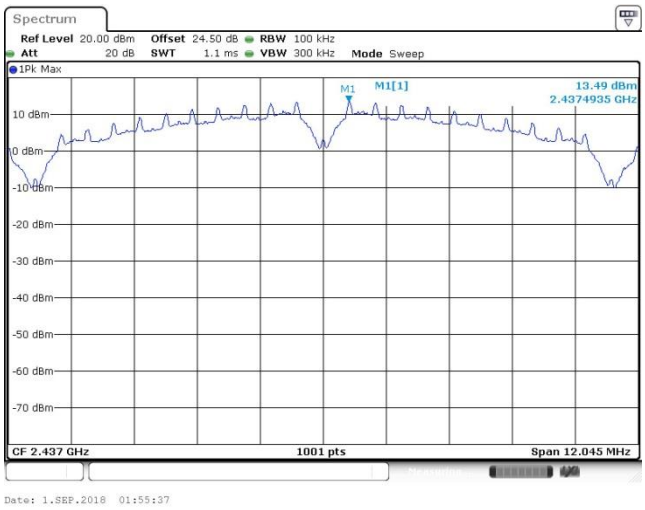


Spurious Emission 2GHz~25GHz

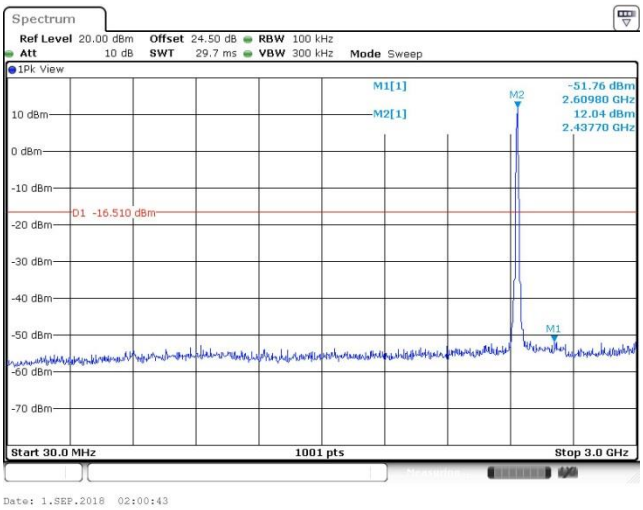


Test Mode :	802.11b	Test Channel :	06

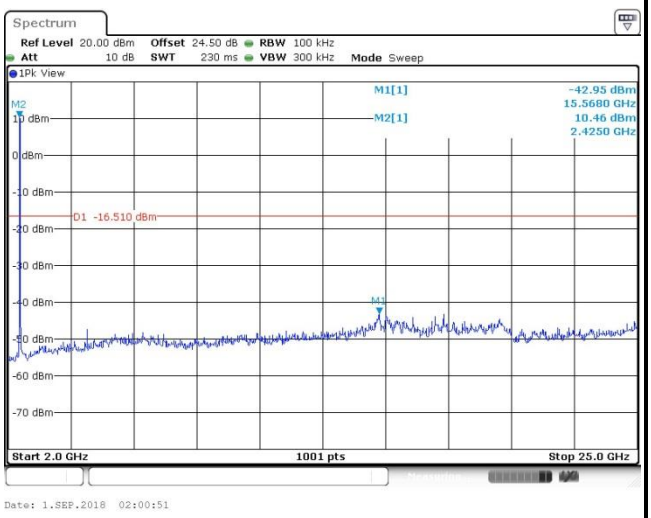
100kHz PSD reference Level



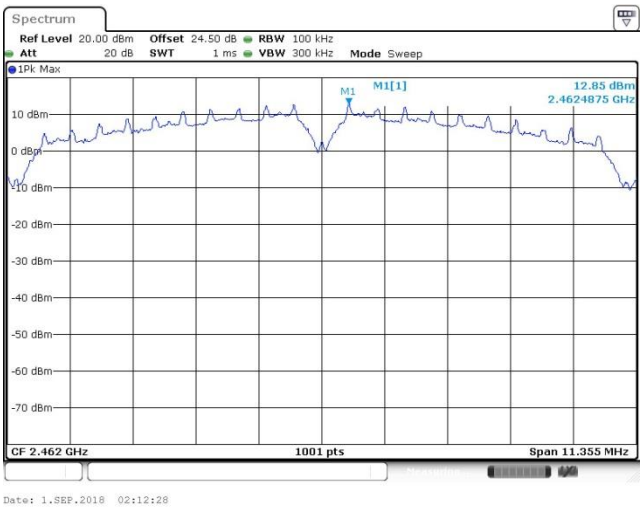
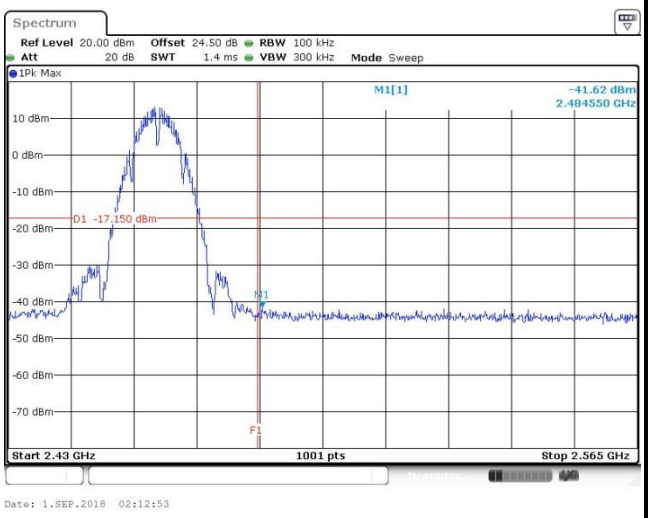
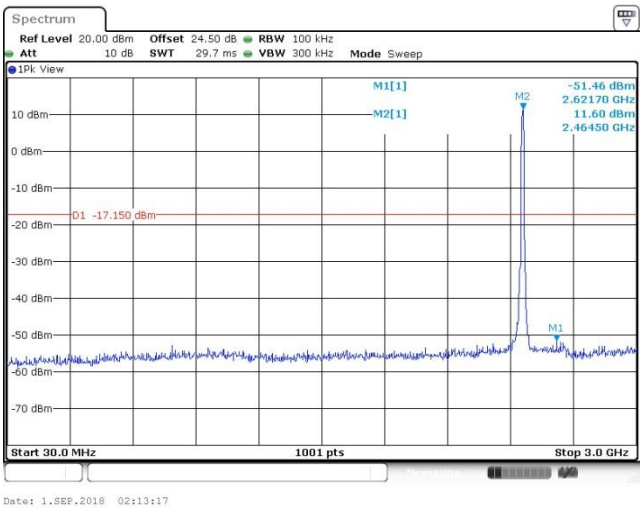
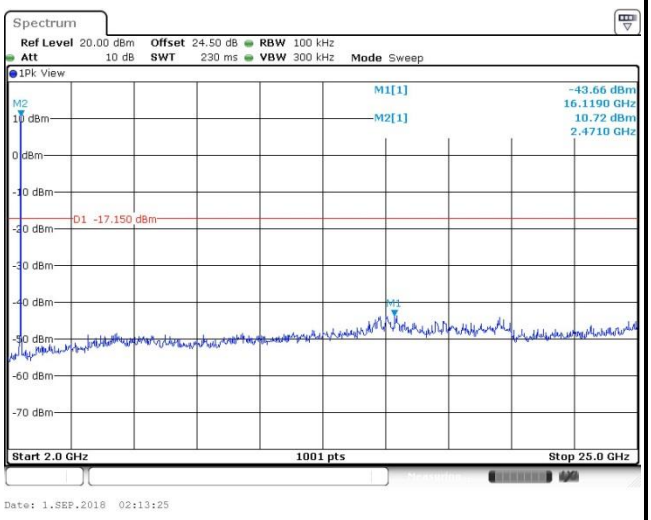
Spurious Emission 30MHz~3GHz



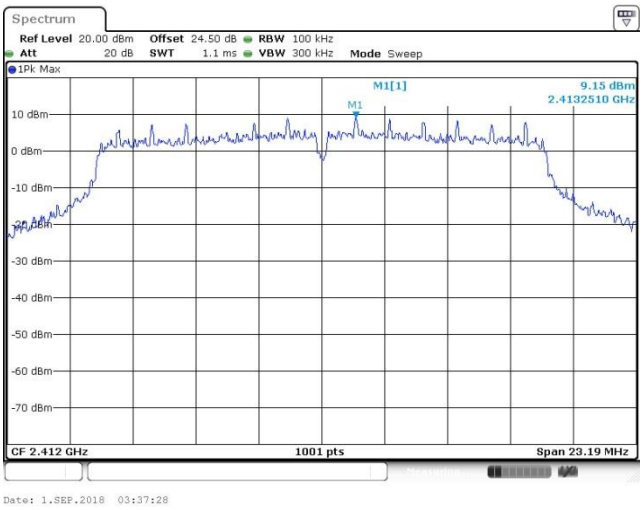
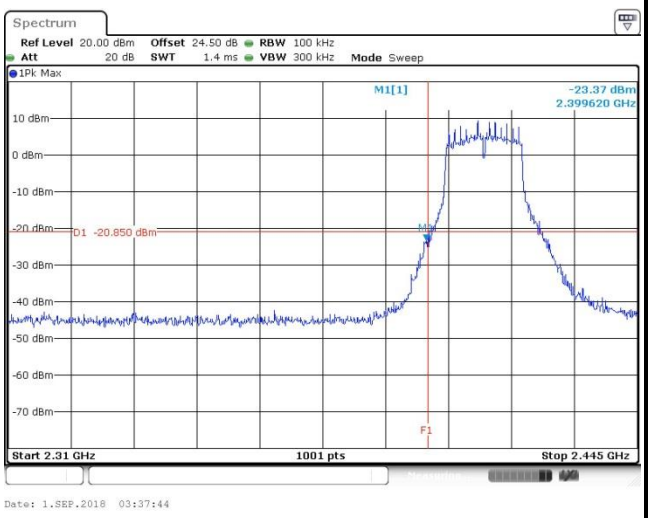
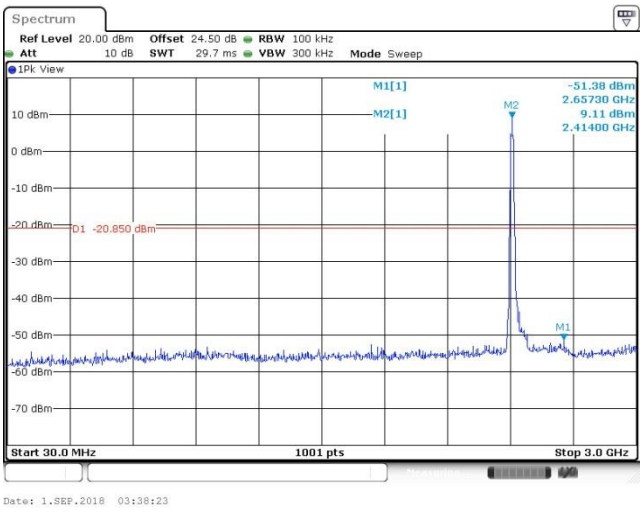
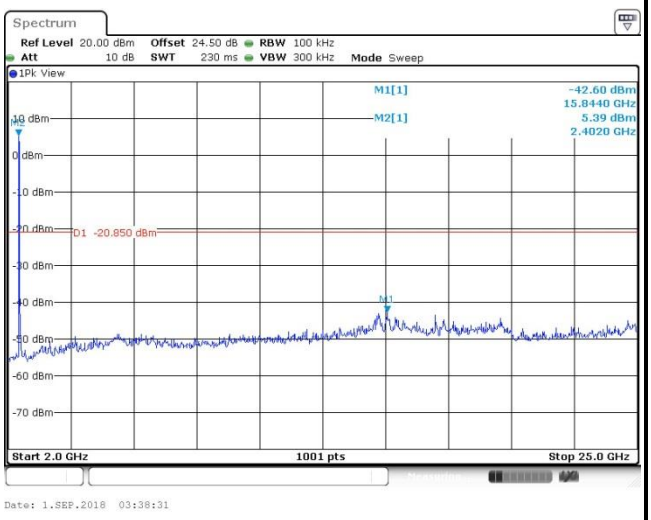
Spurious Emission 2GHz~25GHz



Test Mode :	802.11b	Test Channel :	11

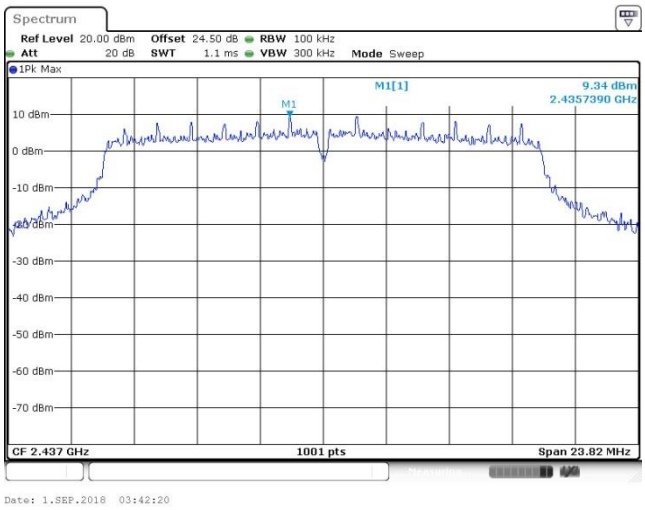
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11g	Test Channel :	01

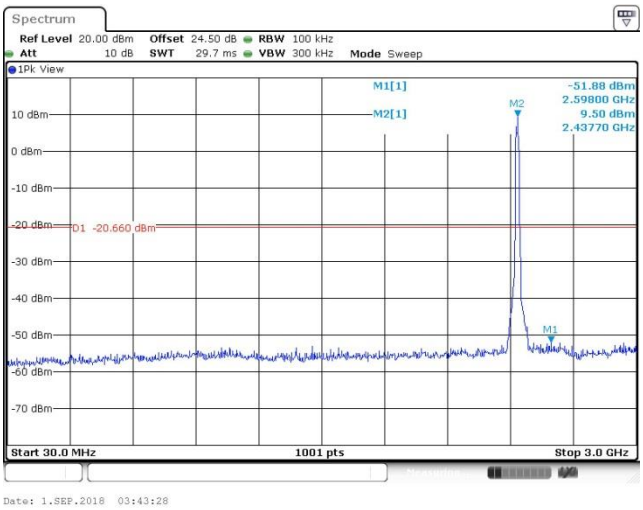
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11g	Test Channel :	06

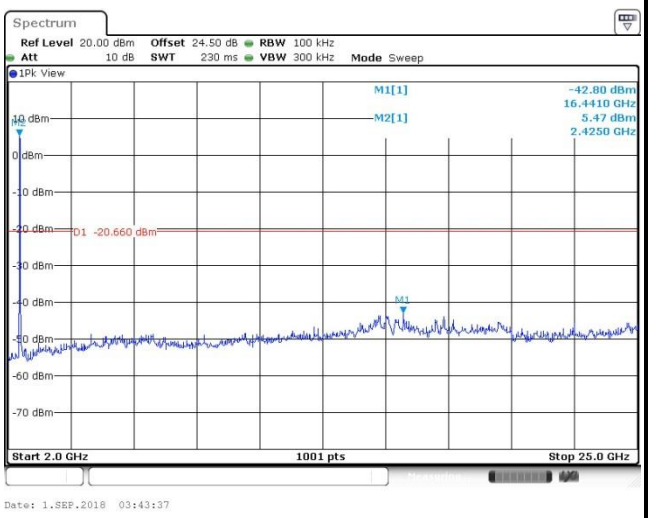
100kHz PSD reference Level



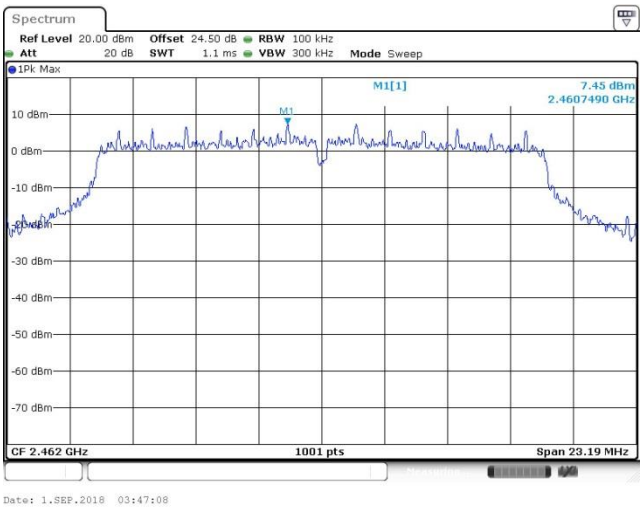
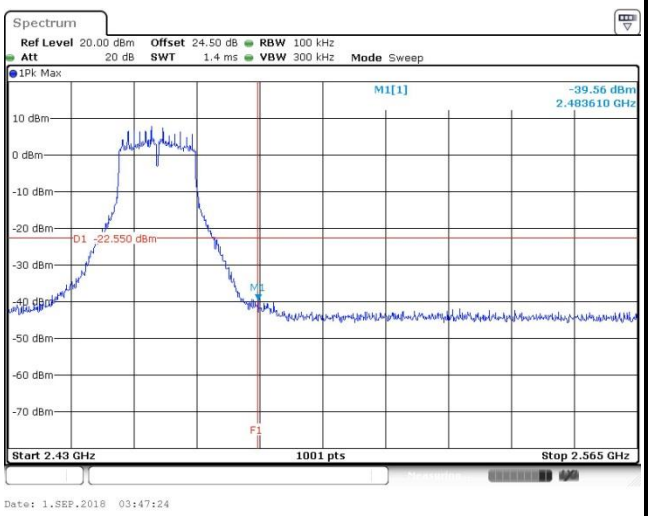
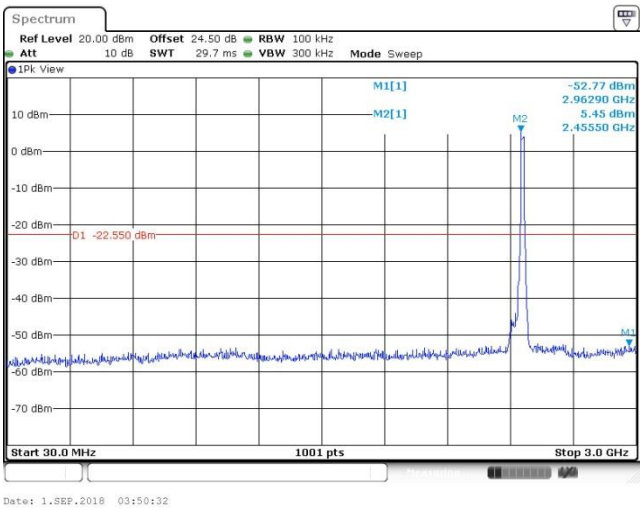
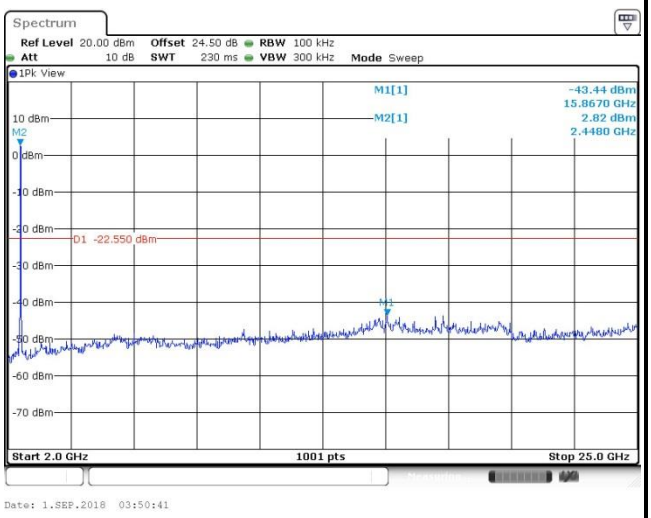
Spurious Emission 30MHz~3GHz



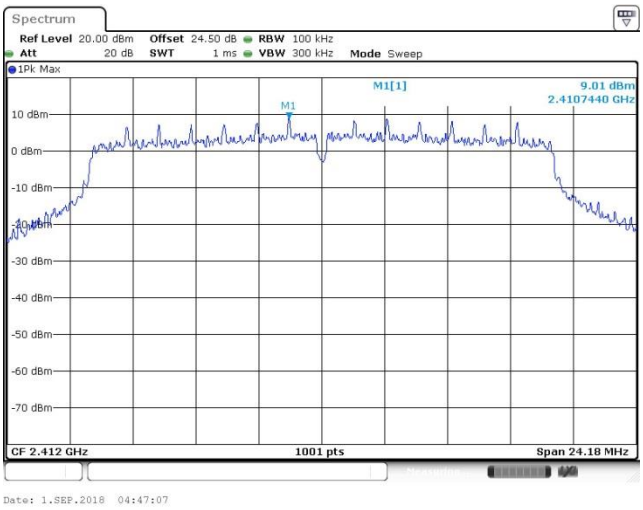
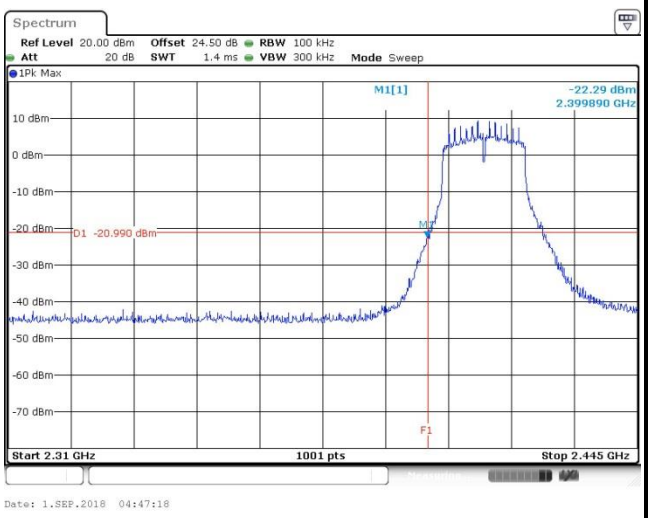
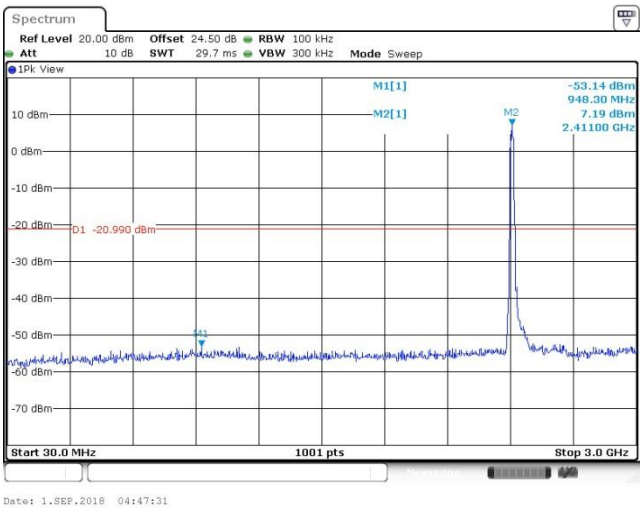
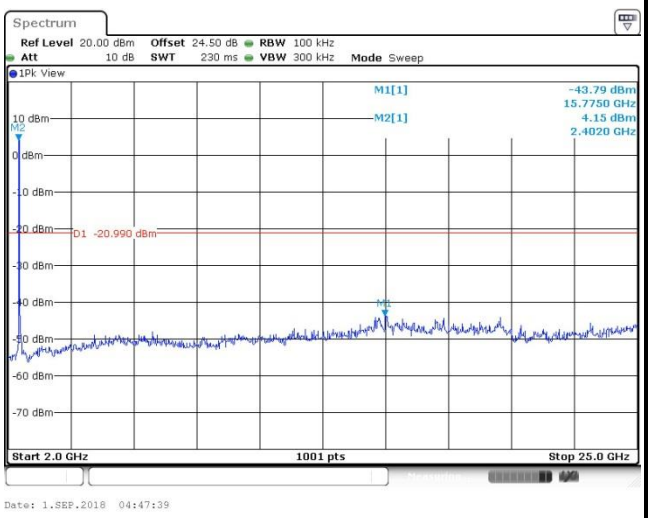
Spurious Emission 2GHz~25GHz



Test Mode :	802.11g	Test Channel :	11

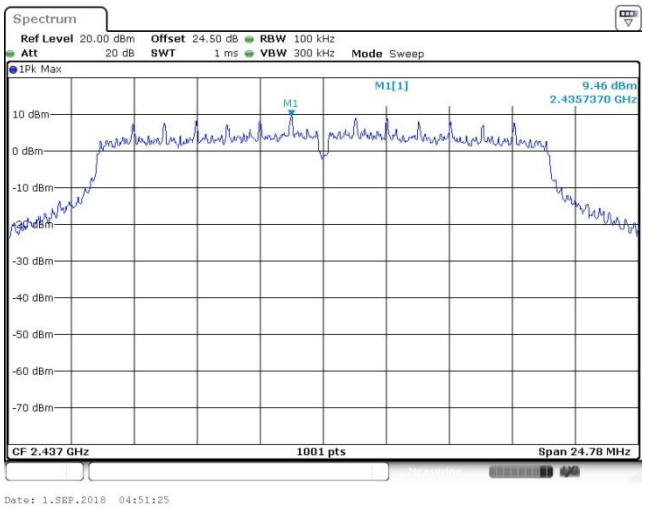
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11n HT20	Test Channel :	01

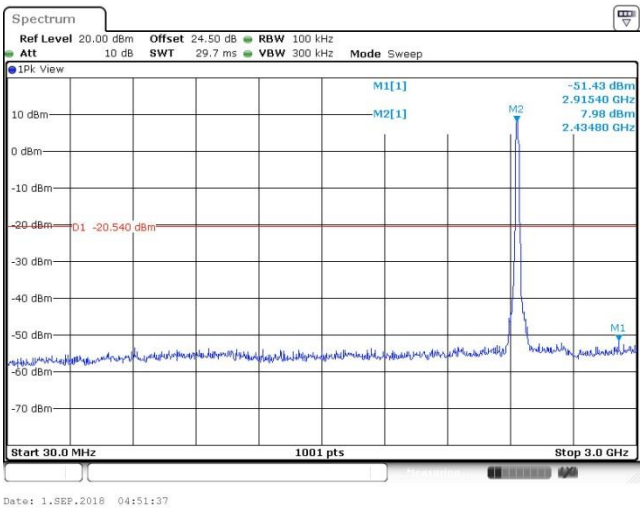
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11n HT20	Test Channel :	06

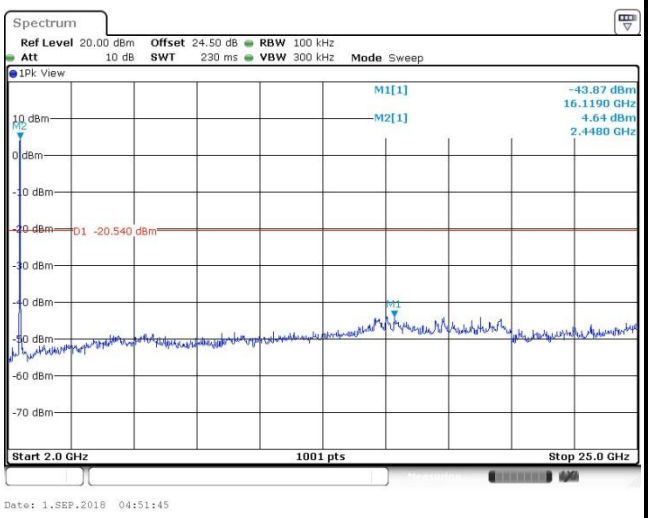
100kHz PSD reference Level



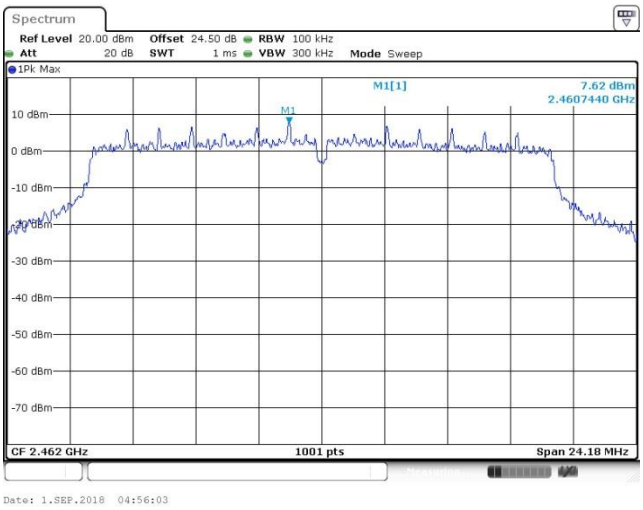
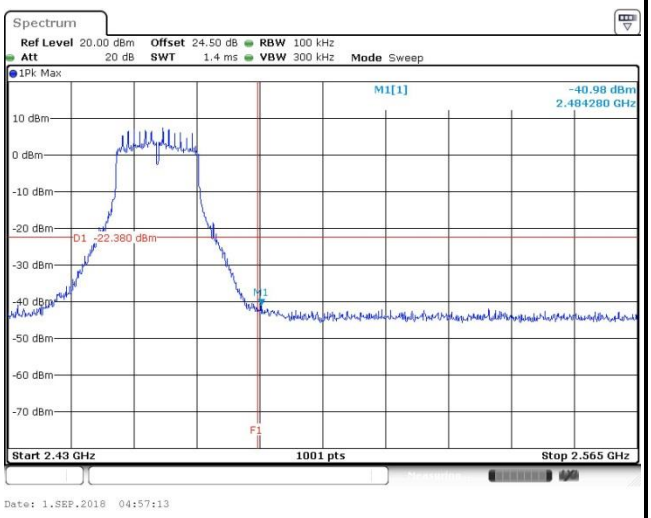
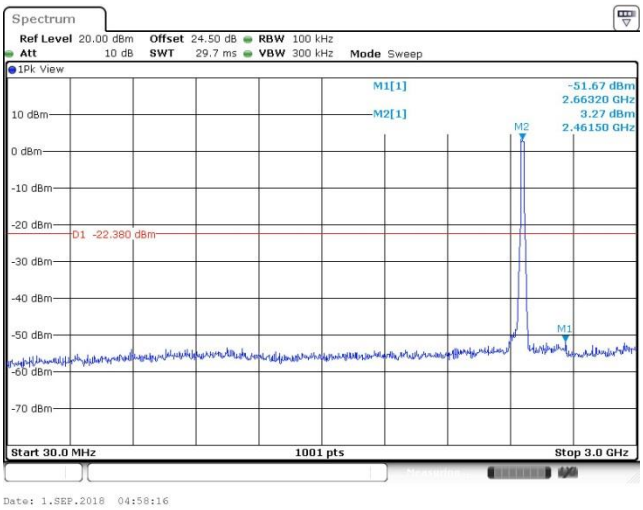
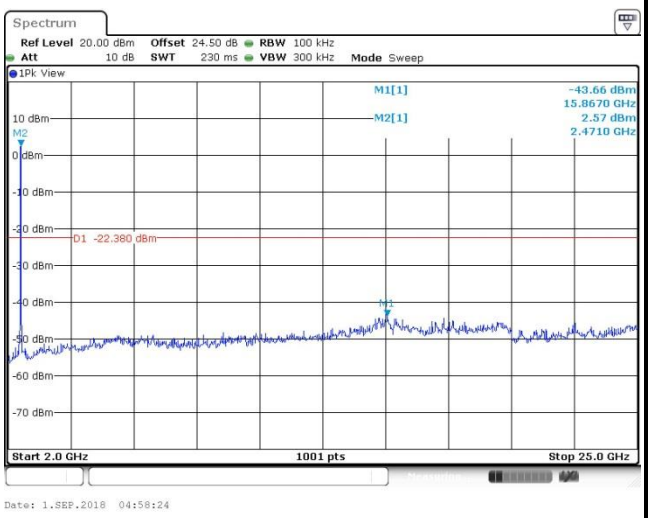
Spurious Emission 30MHz~3GHz



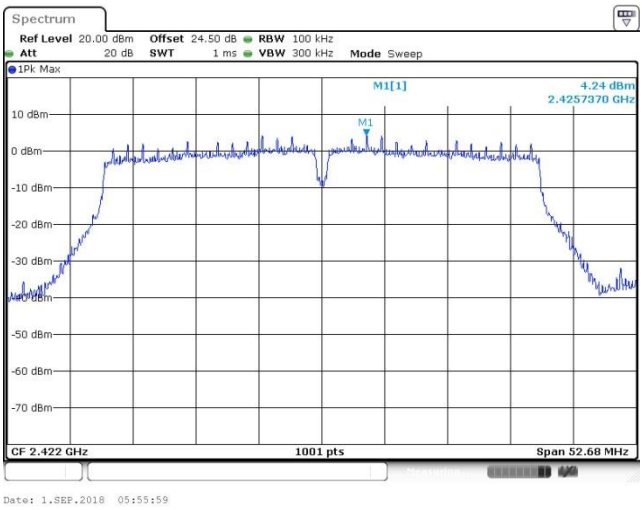
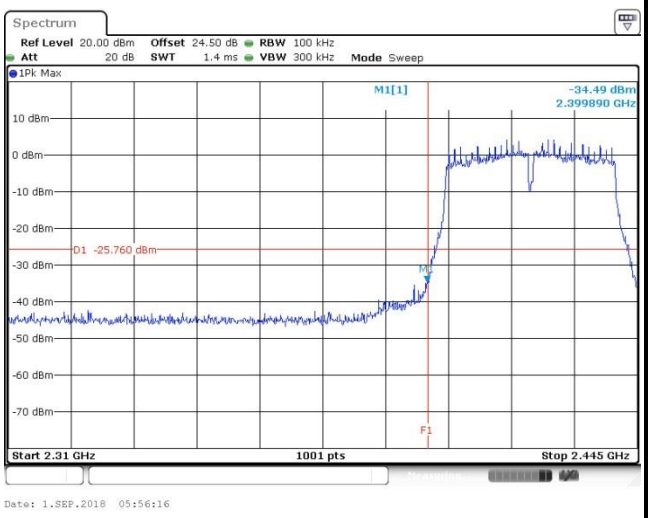
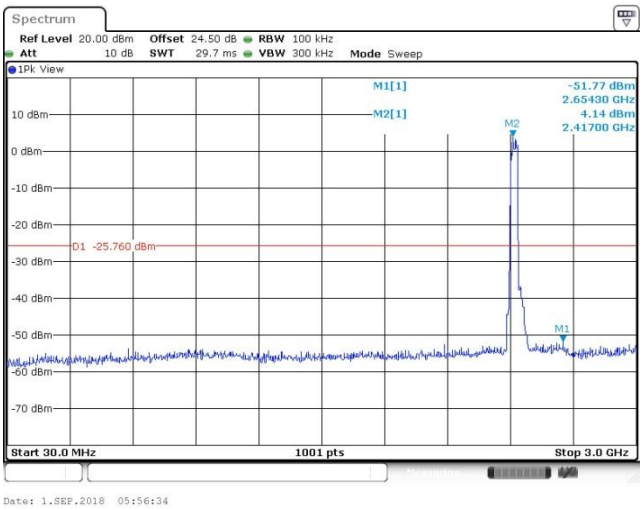
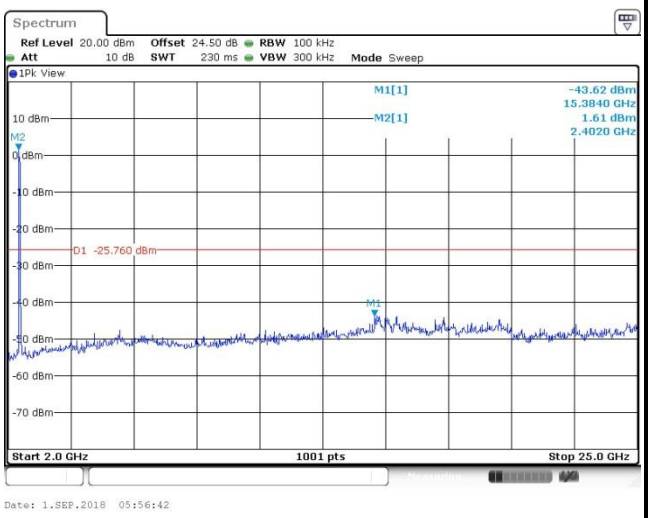
Spurious Emission 2GHz~25GHz



Test Mode :	802.11n HT20	Test Channel :	11

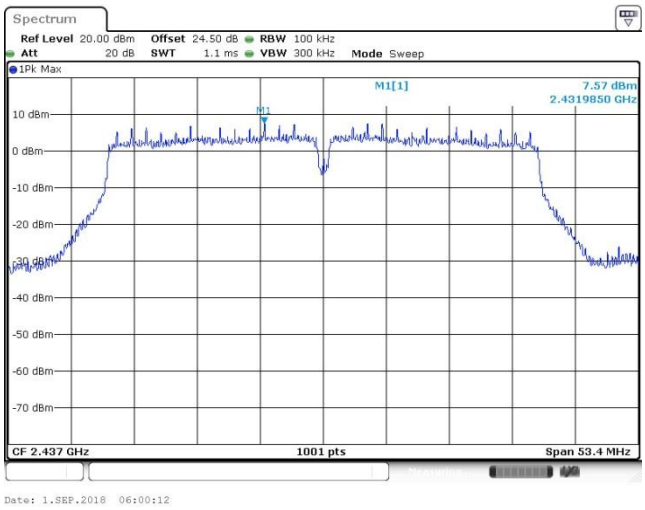
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11n HT40	Test Channel :	03

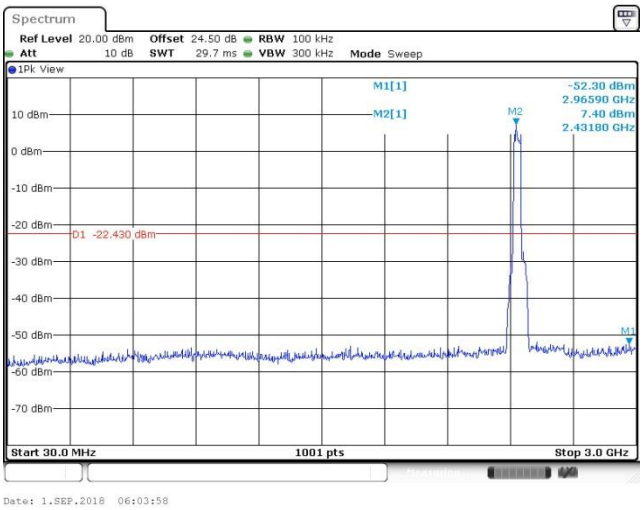
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11n HT40	Test Channel :	06

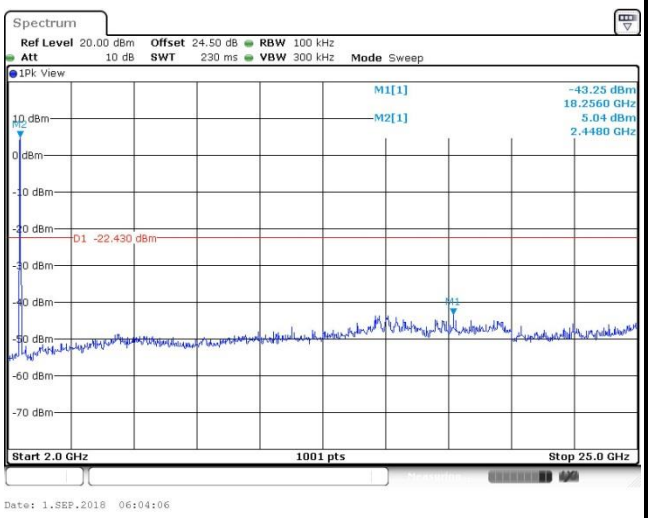
100kHz PSD reference Level



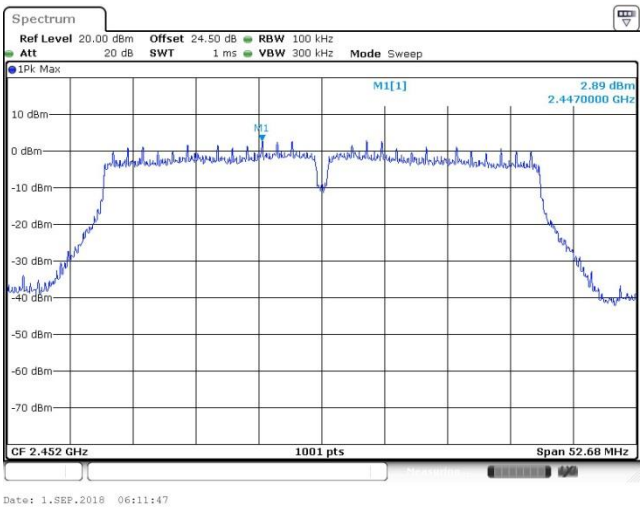
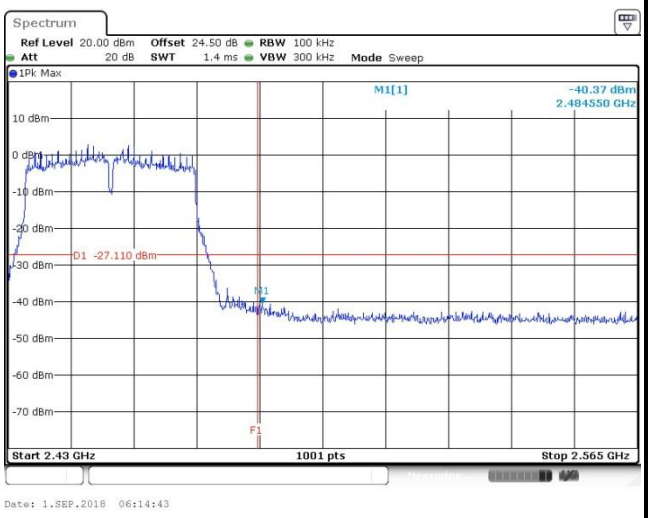
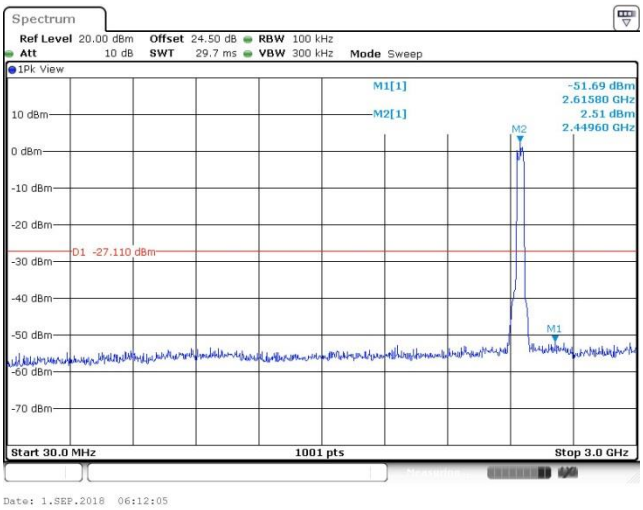
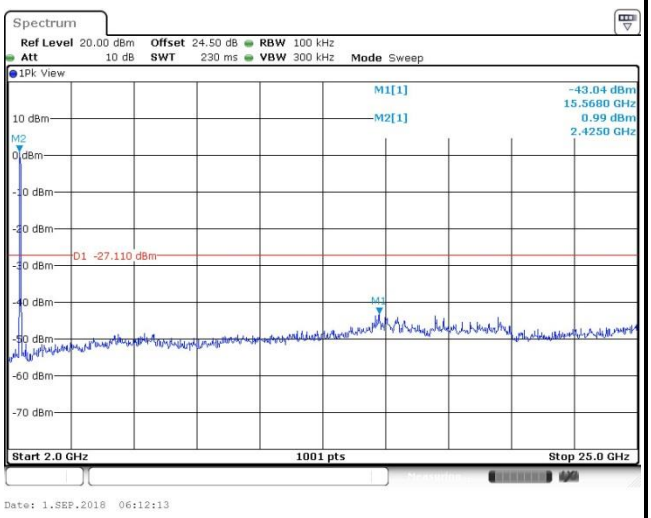
Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz

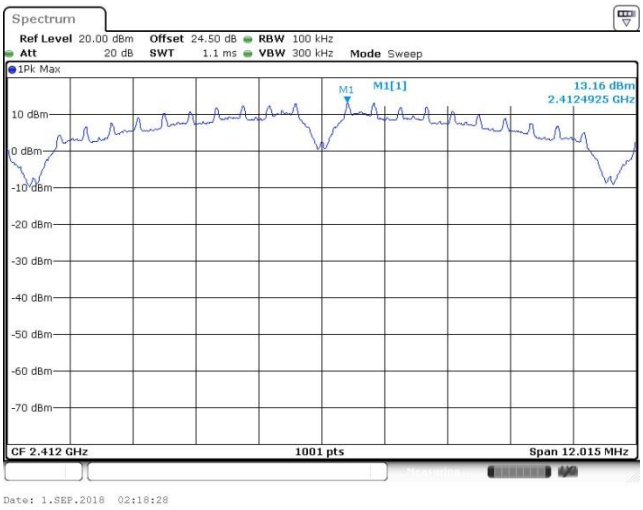
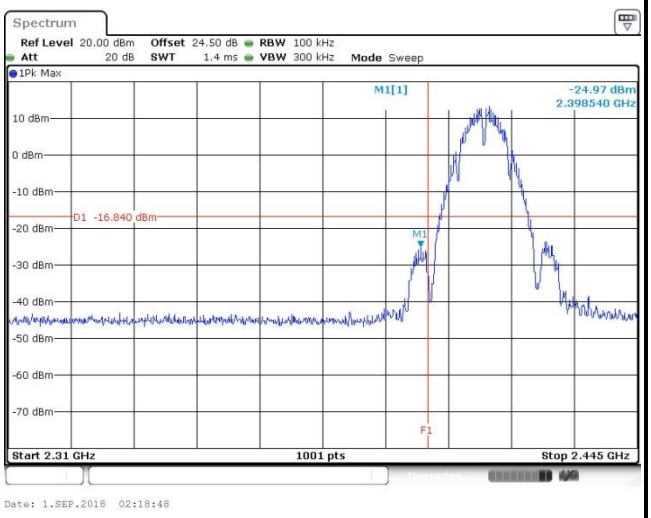
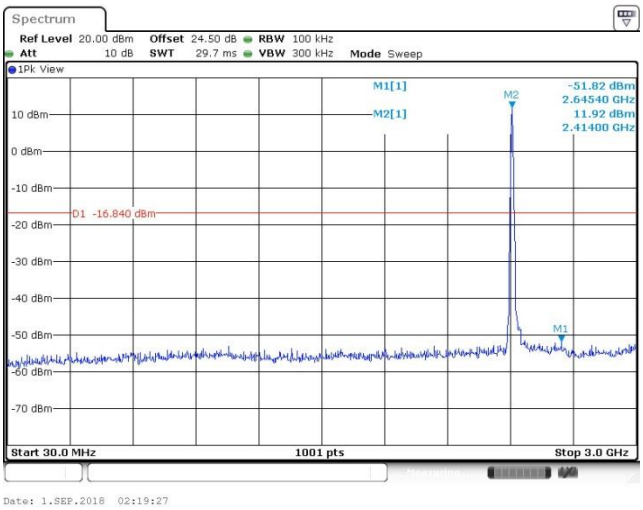
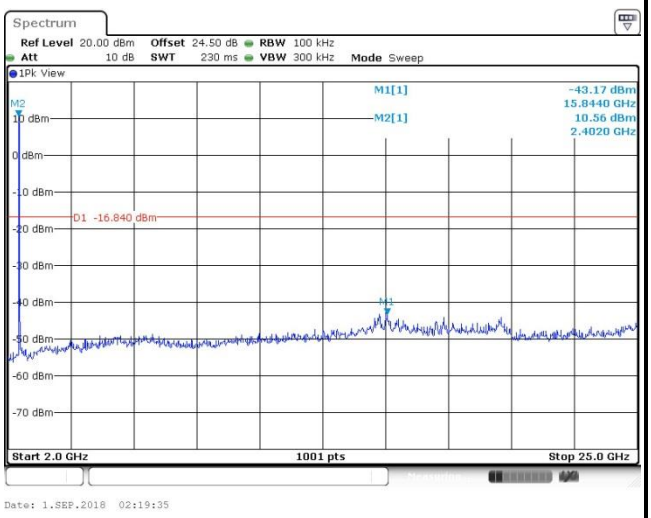


Test Mode :	802.11n HT40	Test Channel :	09

100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

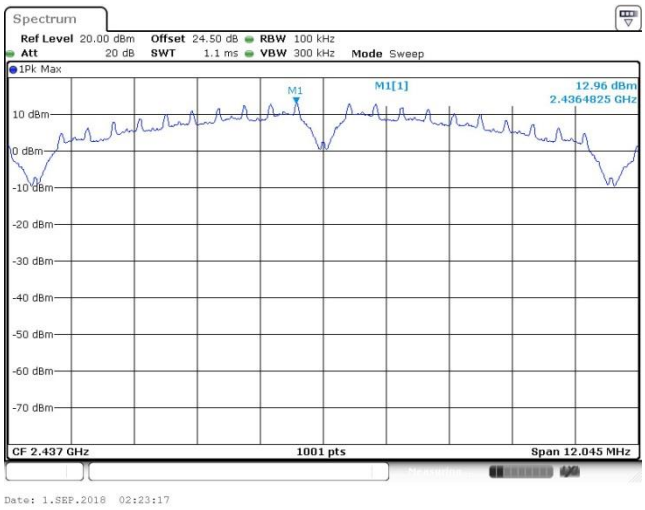
Number of TX = 1, Ant. 2 (Measured)

Test Mode :	802.11b	Test Channel :	01

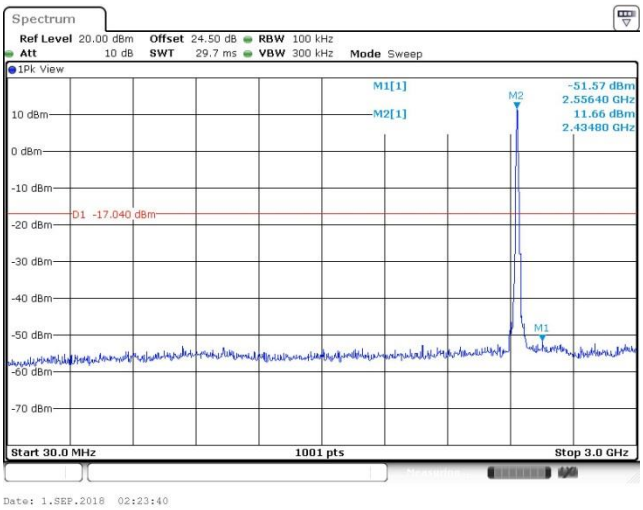
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11b	Test Channel :	06

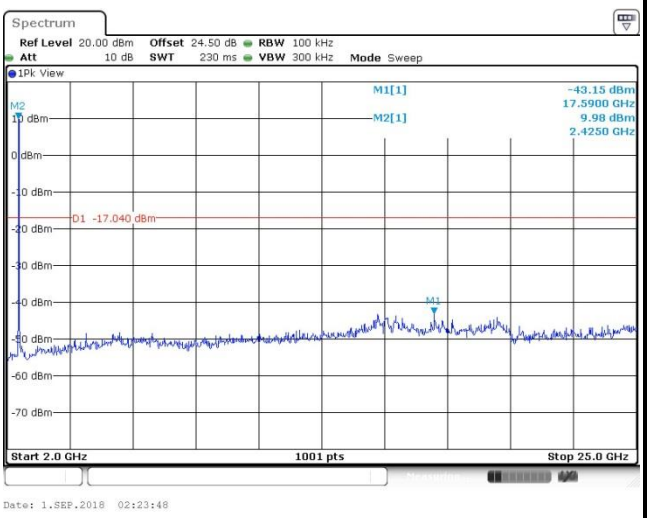
100kHz PSD reference Level



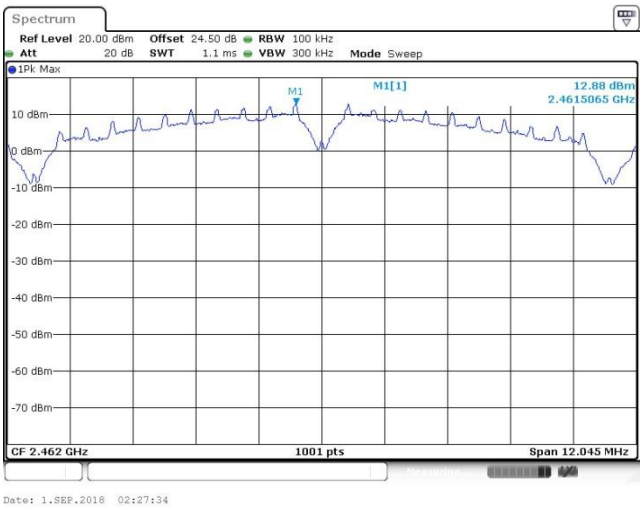
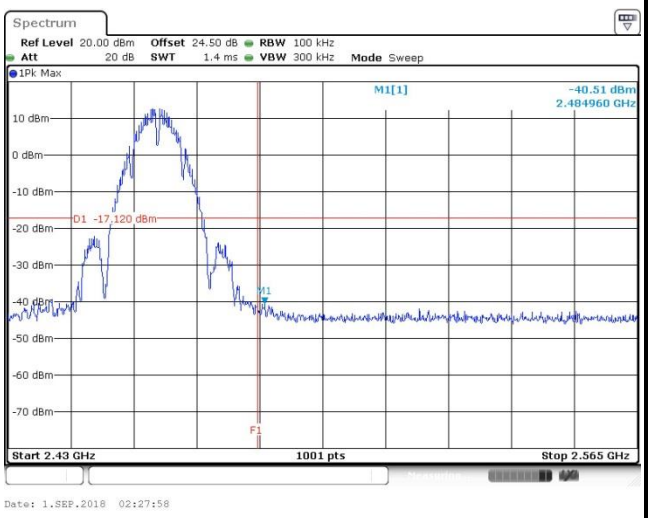
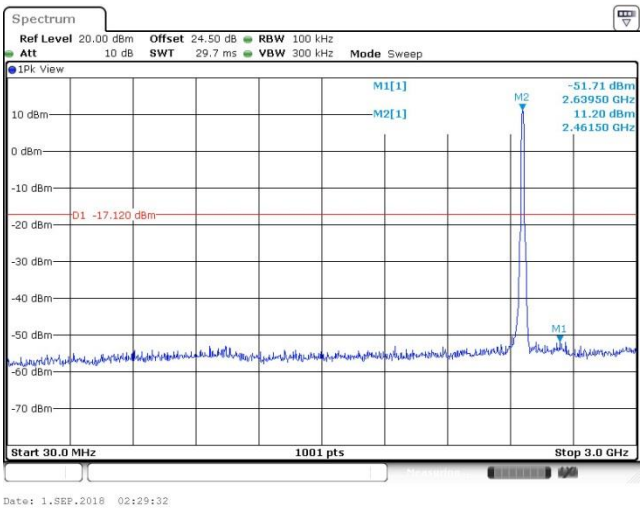
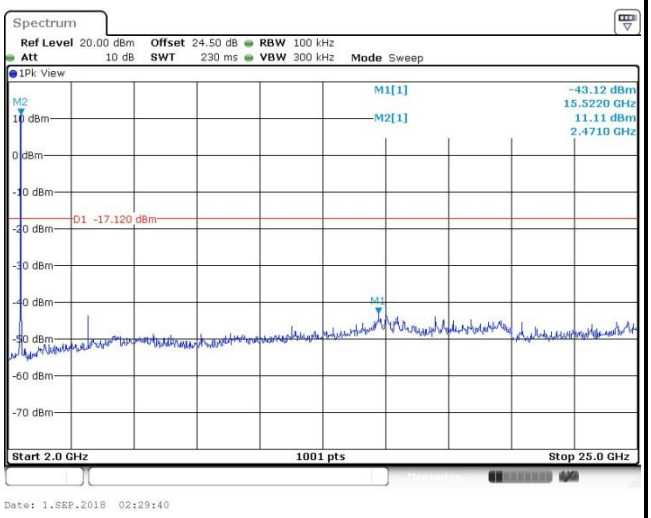
Spurious Emission 30MHz~3GHz



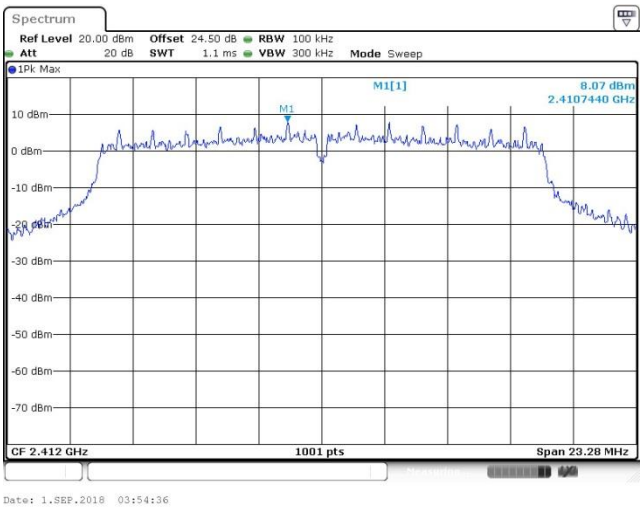
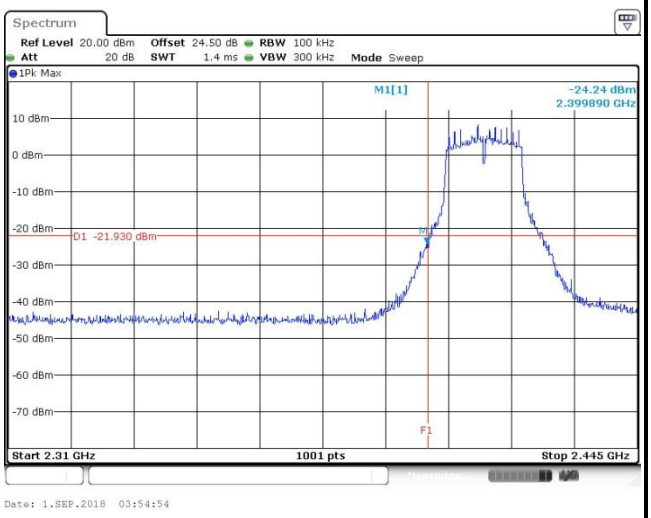
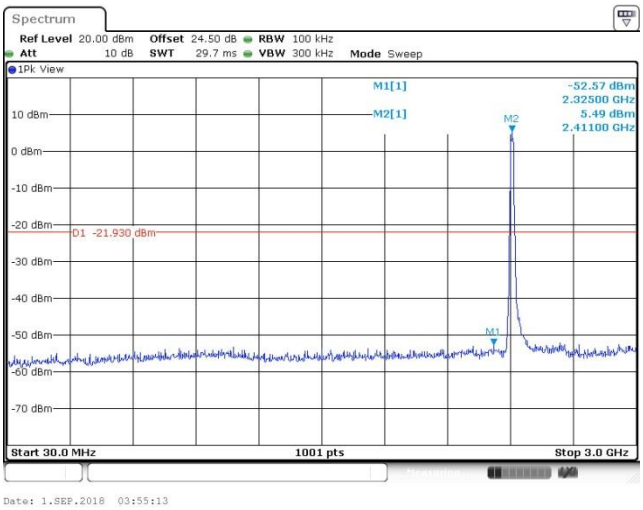
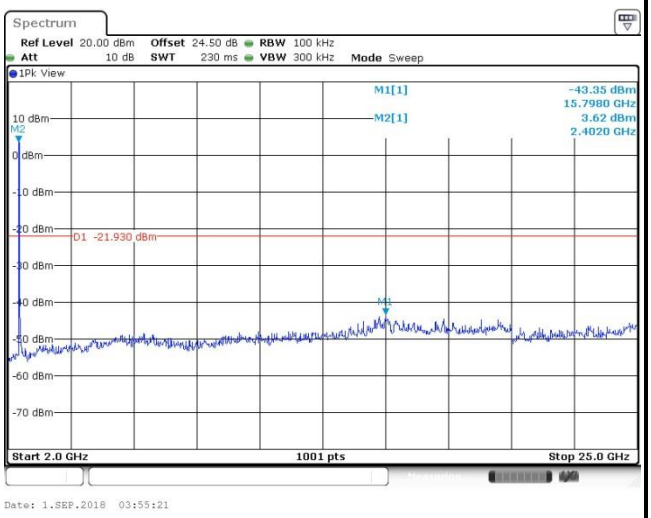
Spurious Emission 2GHz~25GHz



Test Mode :	802.11b	Test Channel :	11

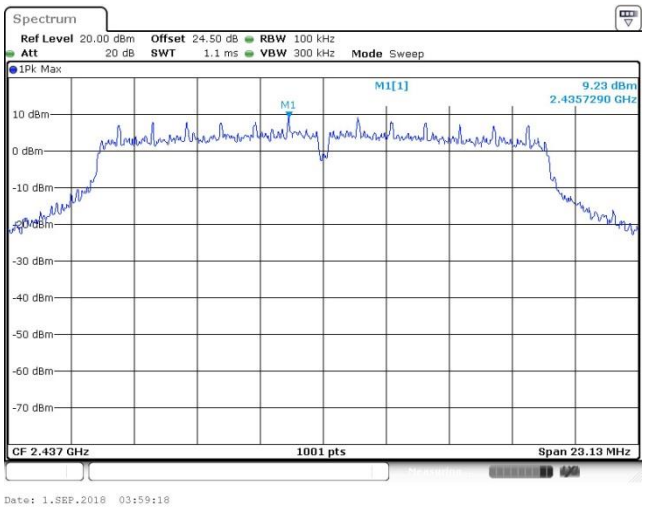
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11g	Test Channel :	01

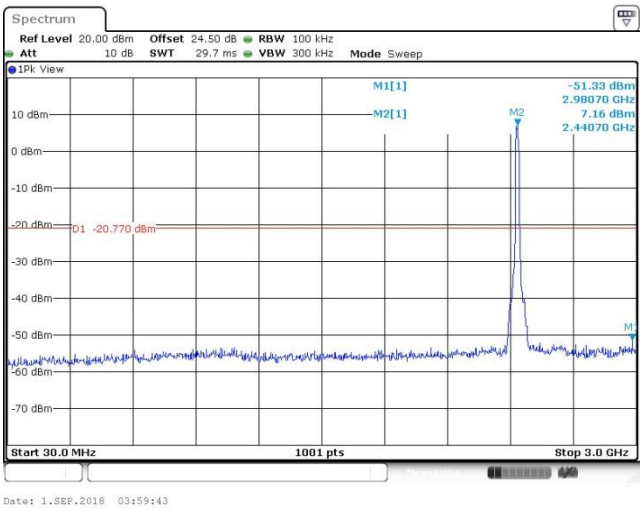
100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**
	

Test Mode :	802.11g	Test Channel :	06

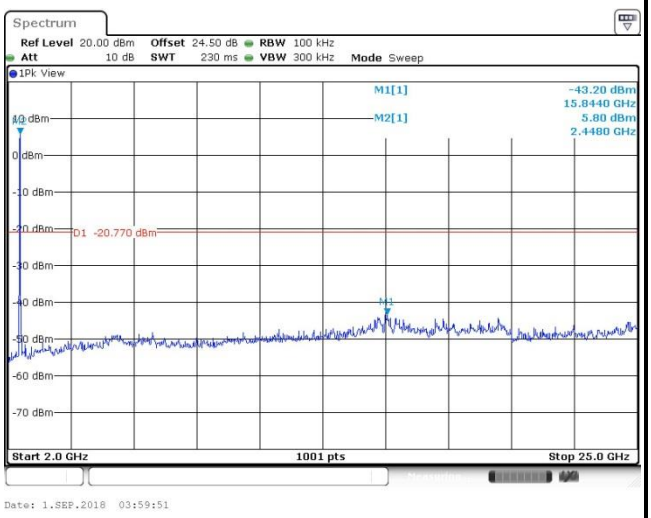
100kHz PSD reference Level



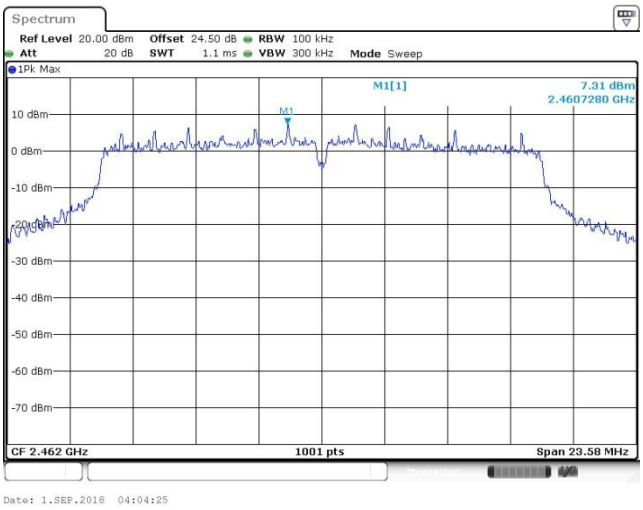
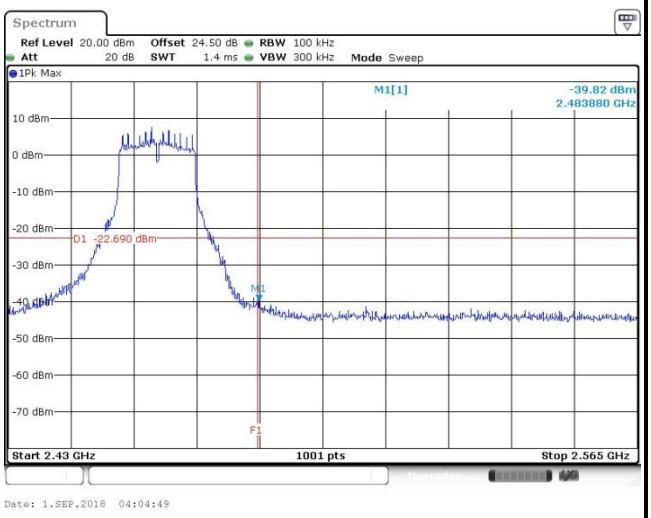
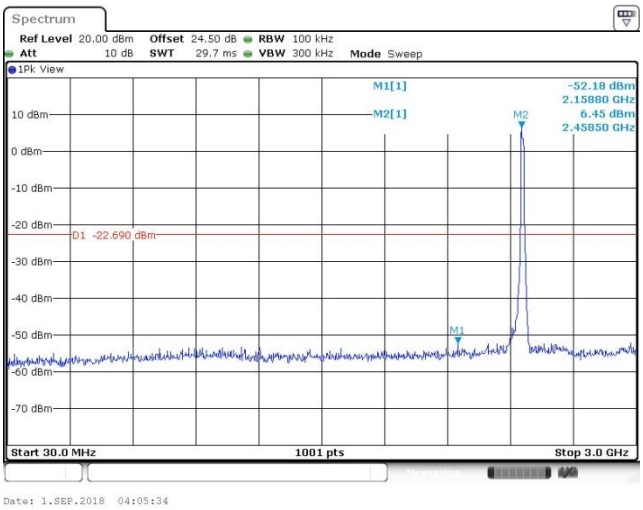
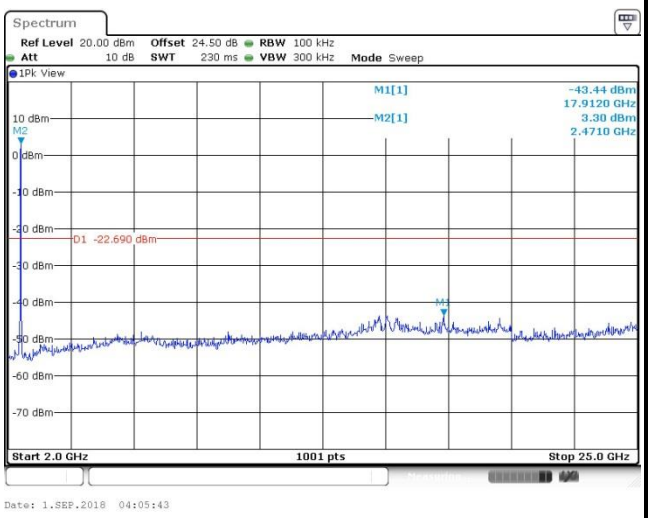
Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz



Test Mode :	802.11g	Test Channel :	11

100kHz PSD reference Level	Channel Plot
	
Spurious Emission 30MHz~3GHz	**Spurious Emission 2GHz~25GHz**