



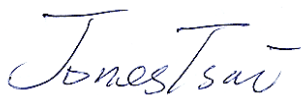
NCC RADIO TEST REPORT

Equipment : Mobile Computer
Brand Name : Zebra
Model Name : MC3300R
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 Jul. 19, 2018, and testing was started from Jul. 26, 2018 and completed on Aug. 30, 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.



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
TR812630-07C	01	Initial issue of report	Sep. 10, 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	-
3.3	LP0002 3.10.1.6(2)(B)	Power Spectral Density	Pass	-
3.4	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 1.12 dB at 2389.920 MHz
3.6	LP0002 2.11	Receiver Radiated Emission	Pass	Under limit 3.37 dB at 39.990 MHz
3.7	LP0002 2.3	AC Conducted Emission	Pass	Under limit 19.25 dB at 0.179 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: Joseph Lin
Report Producer: Natasha Hsieh

1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	Mobile Computer
Brand Name	Zebra
Model Name	MC3300R
EUT supports Radios application	UHF RFID WLAN 11b/g/n HT20 WLAN 11a/n HT20/HT40 WLAN 11ac VHT20/VHT40/VHT80 Bluetooth BR/EDR/LE
HW Version	DV
SW Version	RFID Manager Application Version: 2.0.9.1 RFID Demo. Application Version: 2.2.5.24 Terminal Version: 91-01-49-NN-00-A
FW Version	Module Version: PAAEES00-001-N12 Radio Version: 2.0.29.0 Terminal Version: FUSION_BA_2_10.0.0.019_N
MFD	10JUL18
EUT Stage	Identical Prototype

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

Specification of Accessories				
Sentry 2X battery	Brand Name	Zebra	Part Number	BT-000337
MC32 2X battery	Brand Name	Symbol	Part Number	82-000012-02
Adapter	Brand Name	Zebra	Part Number	PWR-WUA5V12W0US
USB Cable	Brand Name	Zebra	Part Number	CBL-MC33-USBCHG-01
GUN HOLSTER	Brand Name	Zebra	Part Number	SG-MC3021212-01R

**<Sample Information>**

	SKU1	SKU2	SKU3
Part Number	MC339R-GE2HA4-US	MC339R-GF2HA4-US	MC333R-GI2HA4-US
RFID Antenna	Long range	Long range	Middle range
Scanner	SE4850	SE4750	SE4750
Keypad	29	29	29
Region	US	US	US

	SKU4	SKU5	SKU6
Part Number	MC339R-GE3HA4US	MC339R-GF3HA4US	MC333R-GI3HA4US
RFID Antenna	Long range	Long range	Middle range
Scanner	SE4850	SE4750	SE4750
Keypad	38	38	38
Region	US	US	US

	SKU7	SKU8	SKU9
Part Number	MC339R-GE4HA4US	MC339R-GF4HA4US	MC333R-GI4HA4US
RFID Antenna	Long range	Long range	Middle range
Scanner	SE4850	SE4750	SE4750
Keypad	47	47	47
Region	US	US	US

1.2 Product Specification of Equipment Under Test

Standards-related Product Specification			
Tx/Rx Channel Frequency Range	2412 MHz ~ 2462 MHz		
Maximum Average Output Power to antenna <CDD Mode>	<Ant. 1> 802.11b : 18.99 dBm (0.0793 W) 802.11g : 18.98 dBm (0.0791 W) 802.11n HT20 : 18.94 dBm (0.0783 W) <Ant. 2> 802.11b : 18.83 dBm (0.0764 W) 802.11g : 18.88 dBm (0.0773 W) 802.11n HT20 : 18.76 dBm (0.0752 W) <MIMO Ant. 1 + 2> 802.11b : 21.37 dBm (0.1371 W) 802.11g : 20.49 dBm (0.1119 W) 802.11n HT20 : 20.86 dBm (0.1219 W)		
Maximum Average Output Power to antenna <TXBF Mode>	<MIMO Ant. 1 + 2> 802.11n HT20 : 21.81 dBm (0.1517 W)		
99% Occupied Bandwidth <CDD Mode>	<Ant. 1> 802.11b : 11.90MHz 802.11g : 18.45MHz 802.11n HT20 : 19.20MHz <MIMO Ant. 1> 802.11b : 11.85MHz 802.11g : 18.70MHz 802.11n HT20 : 19.15MHz <MIMO Ant. 2> 802.11b : 12.00MHz 802.11g : 18.50MHz 802.11n HT20 : 19.05MHz		
99% Occupied Bandwidth <TXBF Mode>	<MIMO Ant. 1> 802.11n HT20 : 18.23MHz <MIMO Ant. 2> 802.11n HT20 : 18.28MHz		
Type of Modulation	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11a/g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)		
Antenna Type / Gain	<Ant. 1> : Patch Antenna with gain 3.39 dBi <Ant. 2> : Patch Antenna with gain 3.18 dBi		
Antenna Function Description		Ant. 1	Ant. 2
	802.11 b/g/n	V	V
	802.11 b/g/n MIMO	V	V
	802.11 n TXBF	V	V

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) 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

MIMO Mode

Modulation	Data Rate
802.11b	1 Mbps
802.11g	6 Mbps
802.11n HT20	MCS0

TXBF Mode

Modulation	Data Rate
802.11n HT20	MCS0

Test Cases	
AC Conducted Emission	Mode 1: WLAN (2.4GHz) Link + Bluetooth Link + 29 Keypad + Scanner + Battery (Sentry 2X) + USB Cable + Adapter (PWR-WUA5V12W0US) for SKU 3 Mode 2: WLAN (5GHz) Link + Bluetooth Link + 29 Keypad + MPEG 4 + Battery (Sentry 2X) + USB Cable + Adapter (PWR-WUA5V12W0US) for SKU 3 Mode 3: WLAN Idle + Bluetooth Idle + 29 Keypad + Scanner + Battery (Sentry 2X) + USB Cable + Adapter (PWR-WUA5V12W0US) for SKU 3
Receiver Radiated Emission	Mode 1 :WLAN Idle + Bluetooth Idle + Battery (Sentry 2X) + USB Cable + Adapter (PWR-WUA5V12W0US) for SKU 3
Remark: For Radiated Test Cases, the tests were performed with Sentry 2X battery.	

<CDD Modes>
<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 (%)		100.00		98.92	97.30	95.24
CH 01	2412	18.80		CH 11	18.97	18.69
CH 02	2417	18.75				
CH 06	2437	18.98				
CH 10	2457	18.75				
CH 11	2462	18.99				

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 (%)		96.05		94.25	92.16	89.51	86.52	81.87	78.32	76.15
CH 01	2412	13.91	CH 06	18.85	18.79	18.76	18.94	18.82	18.94	18.92
CH 02	2417	18.67								
CH 06	2437	18.98								
CH 10	2457	17.19								
CH 11	2462	14.22								

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 (%)		95.86		91.67	89.51	86.52	83.15	79.47	78.32	77.04
CH 01	2412	13.76	CH 06	18.70	18.69	18.93	18.93	18.93	18.92	18.92
CH 02	2417	18.60								
CH 06	2437	18.94								
CH 10	2457	16.94								
CH 11	2462	14.26								

<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 (%)		100.00		98.93	97.30	95.24
CH 01	2412	18.78		CH 11	18.81	18.82
CH 02	2417	18.10				
CH 06	2437	18.73				
CH 10	2457	18.72				
CH 11	2462	18.83				

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 (%)		96.05			94.25	92.61	88.89	86.58	81.87	78.32
CH 01	2412	13.59	CH 06	18.68	18.73	18.67	18.85	18.66	18.79	18.72
CH 02	2417	18.26								
CH 06	2437	18.88								
CH 10	2457	17.09								
CH 11	2462	14.20								

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 (%)		95.83		92.37	89.51	86.96	82.68	79.33	77.62	77.04
CH 01	2412	13.46	CH 06	18.69	18.56	18.75	18.74	18.75	18.72	18.73
CH 02	2417	18.32								
CH 06	2437	18.76								
CH 10	2457	16.88								
CH 11	2462	14.19								

<MIMO 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	21.12	CH 06	21.30	21.33	21.30
CH 02	2417	20.85				
CH 06	2437	21.37				
CH 10	2457	21.12				
CH 11	2462	21.03				

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
CH 01	2412	16.62	CH 06	20.16	20.21	20.12	20.25	20.28	20.43
CH 02	2417	19.49							
CH 06	2437	20.49							
CH 10	2457	19.25							
CH 11	2462	15.72							

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
CH 01	2412	14.59	CH 06	20.59	20.64	20.85	20.80	20.79	20.76
CH 02	2417	19.03							
CH 06	2437	20.86							
CH 10	2457	18.58							
CH 11	2462	15.22							

<TXBF Modes>

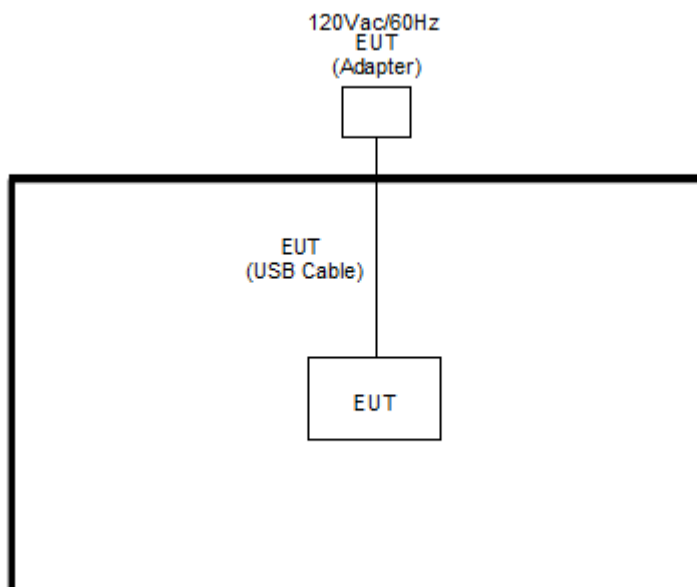
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802.11n HT20 RF Avg Output Power (dBm)										
Power vs. Channel			Power vs Data Rate							
Channel	Frequency (MHz)	MCS Index	Channel	MCS Index						
		MCS0		MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
CH 01	2412	14.66	CH 06	21.76	21.71	21.76	21.76	21.76	21.76	21.71
CH 02	2417	21.56								
CH 06	2437	21.81								
CH 10	2457	19.41								
CH 11	2462	15.06								

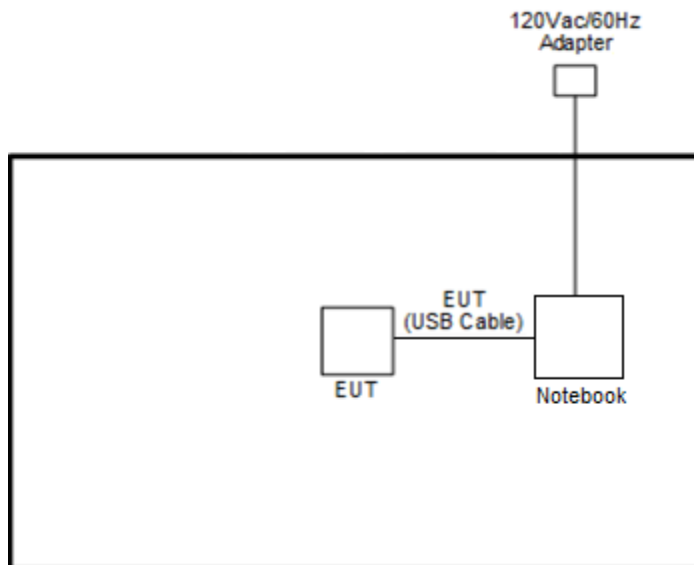
2.3 Connection Diagram of Test System

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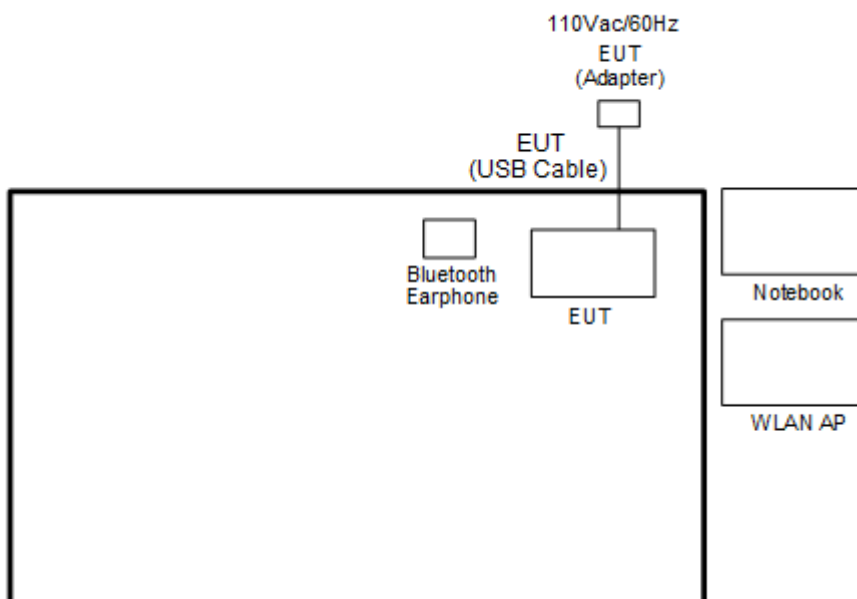
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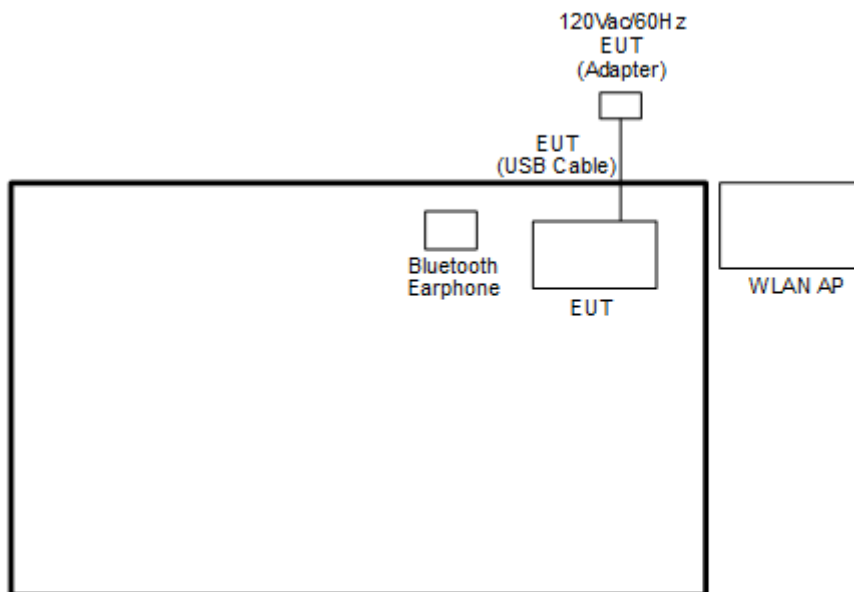


<TXBF Mode>



<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, 1.8 m
3.	Notebook	DELL	Latitude E6320	FCC DoC/ Contains FCC ID: QDS-BRCM1054	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	SD Card	SanDisk	MicroSD HC	FCC DoC	N/A	N/A

2.5 EUT Operation Test Setup

The RF test items, utility “CMD” 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 “CMD” 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.

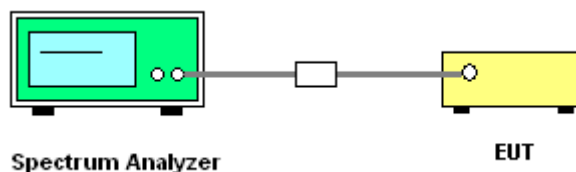
3.1.2 Measuring Instruments

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 Mode>

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	11.85	-	8.56	-	0.50	Pass
11b	1Mbps	1	6	2437	11.90	-	9.04	-	0.50	Pass
11b	1Mbps	1	11	2462	11.90	-	9.04	-	0.50	Pass
11g	6Mbps	1	1	2412	18.10	-	16.04	-	0.50	Pass
11g	6Mbps	1	6	2437	18.45	-	16.32	-	0.50	Pass
11g	6Mbps	1	11	2462	18.40	-	16.28	-	0.50	Pass
HT20	MCS0	1	1	2412	18.95	-	16.92	-	0.50	Pass
HT20	MCS0	1	6	2437	19.20	-	17.56	-	0.50	Pass
HT20	MCS0	1	11	2462	19.15	-	17.56	-	0.50	Pass
11b	1Mbps	2	1	2412	11.65	11.80	8.50	8.54	0.50	Pass
11b	1Mbps	2	6	2437	11.85	11.90	8.06	8.54	0.50	Pass
11b	1Mbps	2	11	2462	11.80	12.00	9.00	9.04	0.50	Pass
11g	6Mbps	2	1	2412	18.00	17.00	15.72	15.40	0.50	Pass
11g	6Mbps	2	6	2437	18.40	18.30	16.32	15.72	0.50	Pass
11g	6Mbps	2	11	2462	18.70	18.50	16.32	16.36	0.50	Pass
HT20	MCS0	2	1	2412	19.05	18.75	16.92	16.30	0.50	Pass
HT20	MCS0	2	6	2437	19.15	19.00	17.54	16.92	0.50	Pass
HT20	MCS0	2	11	2462	19.10	19.05	17.56	17.58	0.50	Pass



Minimum 6dB Bandwidth



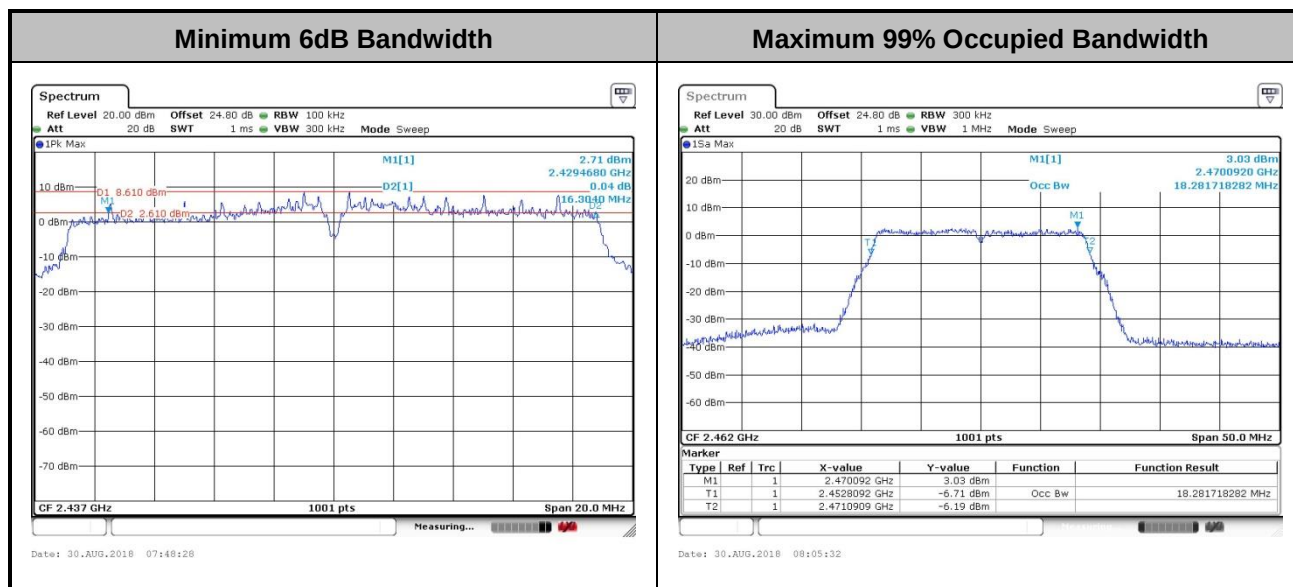
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FAX : 886-3-328-4978
Report Template No.: BU5-TRLP0002WL2G4 AC Version 2.2

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<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		
HT20	MCS0	2	1	2412	18.13	18.13	17.18	17.56	0.50	Pass
HT20	MCS0	2	6	2437	18.23	18.18	17.62	16.30	0.50	Pass
HT20	MCS0	2	11	2462	18.08	18.28	17.62	17.60	0.50	Pass



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

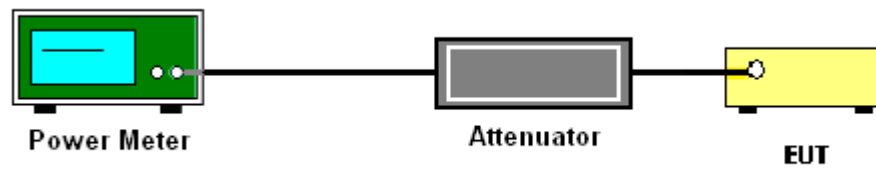
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1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v04 section 9.2.3.1 Method AVGPM.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the 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	21.80	21.71	-	3.39	3.18	25.19	24.89
11b	1Mbps	1	2	2417	21.85	21.30		3.39	3.18	25.24	24.48
11b	1Mbps	1	6	2437	22.03	21.83		3.39	3.18	25.42	25.01
11b	1Mbps	1	10	2457	21.81	21.88		3.39	3.18	25.20	25.06
11b	1Mbps	1	11	2462	22.28	21.90		3.39	3.18	25.67	25.08
11g	6Mbps	1	1	2412	20.65	20.32		3.39	3.18	24.04	23.50
11g	6Mbps	1	2	2417	24.14	23.53		3.39	3.18	27.53	26.71
11g	6Mbps	1	6	2437	24.30	24.00		3.39	3.18	27.69	27.18
11g	6Mbps	1	10	2457	23.27	23.04		3.39	3.18	26.66	26.22
11g	6Mbps	1	11	2462	20.83	20.82		3.39	3.18	24.22	24.00
HT20	MCS0	1	1	2412	20.76	20.51		3.39	3.18	24.15	23.69
HT20	MCS0	1	2	2417	24.16	23.36		3.39	3.18	27.55	26.54
HT20	MCS0	1	6	2437	24.46	24.11		3.39	3.18	27.85	27.29
HT20	MCS0	1	10	2457	23.31	23.28		3.39	3.18	26.70	26.46
HT20	MCS0	1	11	2462	21.06	20.86		3.39	3.18	24.45	24.04
11b	1Mbps	2	1	2412	21.40	20.80	24.12	3.39		27.51	
11b	1Mbps	2	2	2417	21.22	20.77	24.01	3.39		27.40	
11b	1Mbps	2	6	2437	21.46	21.47	24.48	3.39		27.87	
11b	1Mbps	2	10	2457	21.26	21.24	24.26	3.39		27.65	
11b	1Mbps	2	11	2462	21.44	21.36	24.41	3.39		27.80	
11g	6Mbps	2	1	2412	20.37	20.38	23.39	3.39		26.78	
11g	6Mbps	2	2	2417	23.00	22.62	25.82	3.39		29.21	
11g	6Mbps	2	6	2437	23.49	23.41	26.46	3.39		29.85	
11g	6Mbps	2	10	2457	22.41	22.66	25.55	3.39		28.94	
11g	6Mbps	2	11	2462	19.52	19.74	22.64	3.39		26.03	



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
HT20	MCS0	2	1	2412	18.65	18.20	21.44	3.39		24.83	
HT20	MCS0	2	2	2417	22.30	22.24	25.28	3.39		28.67	
HT20	MCS0	2	6	2437	23.72	23.60	26.67	3.39		30.06	
HT20	MCS0	2	10	2457	21.96	21.85	24.92	3.39		28.31	
HT20	MCS0	2	11	2462	19.20	19.12	22.17	3.39		25.56	

3.2.6 Test Result of Average output Power

<CDD Mode>

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	0.00	0.00	18.80	18.78	-	30.00	30.00	3.39	3.18	22.19	21.96	36.00	36.00	Pass
11b	1Mbps	1	2	2417	0.00	0.00	18.75	18.10		30.00	30.00	3.39	3.18	22.14	21.28	36.00	36.00	Pass
11b	1Mbps	1	6	2437	0.00	0.00	18.98	18.73		30.00	30.00	3.39	3.18	22.37	21.91	36.00	36.00	Pass
11b	1Mbps	1	10	2457	0.00	0.00	18.75	18.72		30.00	30.00	3.39	3.18	22.14	21.90	36.00	36.00	Pass
11b	1Mbps	1	11	2462	0.00	0.00	18.99	18.83		30.00	30.00	3.39	3.18	22.38	22.01	36.00	36.00	Pass
11g	6Mbps	1	1	2412	0.18	0.18	13.91	13.59		30.00	30.00	3.39	3.18	17.30	16.77	36.00	36.00	Pass
11g	6Mbps	1	2	2417	0.18	0.18	18.67	18.26		30.00	30.00	3.39	3.18	22.06	21.44	36.00	36.00	Pass
11g	6Mbps	1	6	2437	0.18	0.18	18.98	18.88		30.00	30.00	3.39	3.18	22.37	22.06	36.00	36.00	Pass
11g	6Mbps	1	10	2457	0.18	0.18	17.19	17.09		30.00	30.00	3.39	3.18	20.58	20.27	36.00	36.00	Pass
11g	6Mbps	1	11	2462	0.18	0.18	14.22	14.20		30.00	30.00	3.39	3.18	17.61	17.38	36.00	36.00	Pass
HT20	MCS0	1	1	2412	0.18	0.18	13.76	13.46		30.00	30.00	3.39	3.18	17.15	16.64	36.00	36.00	Pass
HT20	MCS0	1	2	2417	0.18	0.18	18.60	18.32		30.00	30.00	3.39	3.18	21.99	21.50	36.00	36.00	Pass
HT20	MCS0	1	6	2437	0.18	0.18	18.94	18.76		30.00	30.00	3.39	3.18	22.33	21.94	36.00	36.00	Pass
HT20	MCS0	1	10	2457	0.18	0.18	16.94	16.88		30.00	30.00	3.39	3.18	20.33	20.06	36.00	36.00	Pass
HT20	MCS0	1	11	2462	0.18	0.18	14.26	14.19		30.00	30.00	3.39	3.18	17.65	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	0.00	0.00	18.40	17.80	21.12	30.00		3.39		24.51		36.00		Pass
11b	1Mbps	2	2	2417	0.00	0.00	18.10	17.57	20.85	30.00		3.39		24.24		36.00		Pass
11b	1Mbps	2	6	2437	0.00	0.00	18.41	18.30	21.37	30.00		3.39		24.76		36.00		Pass
11b	1Mbps	2	10	2457	0.00	0.00	18.16	18.05	21.12	30.00		3.39		24.51		36.00		Pass
11b	1Mbps	2	11	2462	0.00	0.00	18.03	18.01	21.03	30.00		3.39		24.42		36.00		Pass
11g	6Mbps	2	1	2412	0.18	0.18	13.65	13.56	16.62	30.00		3.39		20.01		36.00		Pass
11g	6Mbps	2	2	2417	0.18	0.18	16.56	16.39	19.49	30.00		3.39		22.88		36.00		Pass
11g	6Mbps	2	6	2437	0.18	0.18	17.50	17.45	20.49	30.00		3.39		23.88		36.00		Pass
11g	6Mbps	2	10	2457	0.18	0.18	16.13	16.34	19.25	30.00		3.39		22.64		36.00		Pass
11g	6Mbps	2	11	2462	0.18	0.18	12.68	12.74	15.72	30.00		3.39		19.11		36.00		Pass
HT20	MCS0	2	1	2412	0.18	0.18	11.71	11.44	14.59	30.00		3.39		17.98		36.00		Pass
HT20	MCS0	2	2	2417	0.18	0.18	16.10	15.93	19.03	30.00		3.39		22.42		36.00		Pass
HT20	MCS0	2	6	2437	0.18	0.18	17.88	17.81	20.86	30.00		3.39		24.25		36.00		Pass
HT20	MCS0	2	10	2457	0.18	0.18	15.65	15.48	18.58	30.00		3.39		21.97		36.00		Pass
HT20	MCS0	2	11	2462	0.18	0.18	12.23	12.19	15.22	30.00		3.39		18.61		36.00		Pass

<TXBF Mode>

2.4GHz Band																
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Average Conducted Power (dBm)			Conducted Power Limit (dBm)		DG (dBi)		EIRP Power (dBm)		EIRP Power Limit (dBm)		Pass /Fail
					Ant 1	Ant 2	SUM	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	Ant 1	Ant 2	
HT20	MCS0	2	1	2412	11.80	11.50	14.66	29.70		6.30		20.96		36.00		Pass
HT20	MCS0	2	2	2417	18.60	18.50	21.56	29.70		6.30		27.86		36.00		Pass
HT20	MCS0	2	6	2437	18.80	18.80	21.81	29.70		6.30		28.11		36.00		Pass
HT20	MCS0	2	10	2457	16.30	16.50	19.41	29.70		6.30		25.71		36.00		Pass
HT20	MCS0	2	11	2462	12.00	12.10	15.06	29.70		6.30		21.36		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 $\leq$ 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 $10 \log(N_{\text{ANT}})$ 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 $10 \log(N_{\text{ANT}})$ dB is added to each spectrum value before comparing to the emission limit. The addition of $10 \log(N_{\text{ANT}})$ dB serves to apportion the emission limit among the N_{ANT} outputs so that each output is permitted to contribute no more than $1/N_{\text{ANT}}^{\text{th}}$ of the PSD limit.

<TXBF Modes>

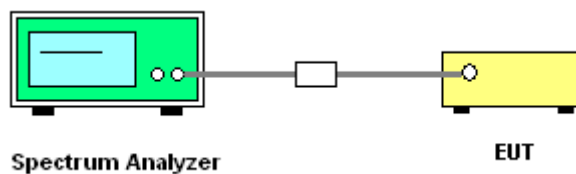
Method AVGPSD-3

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 $\geq 2 \text{ Span} / \text{RBW}$. (This ensures that bin-to-bin spacing is $\leq \text{RBW}/2$, 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 $10 \log(N_{\text{ANT}})$ 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 $10 \log(N_{\text{ANT}})$ dB is added to each spectrum value before comparing to the emission limit. The addition of $10 \log(N_{\text{ANT}})$ dB serves to apportion the emission limit among the N_{ANT} outputs so that each output is permitted to contribute no more than $1/N_{\text{ANT}}^{\text{th}}$ of the PSD limit.

3.3.4 Test Setup

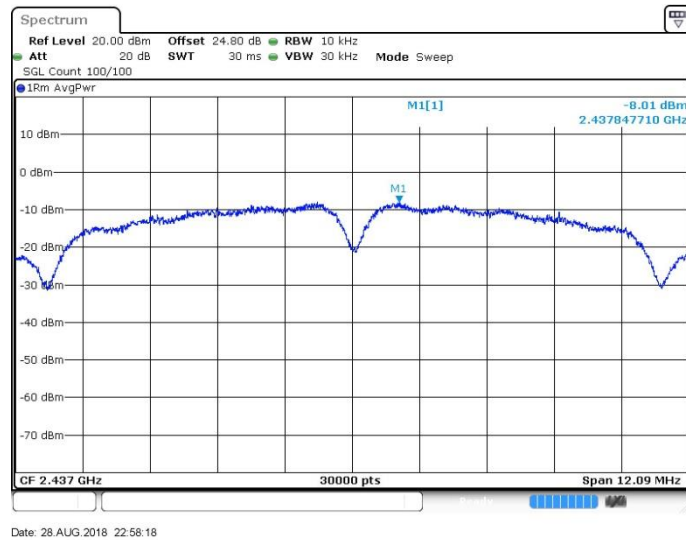


3.3.5 Test Result of Power Spectral Density

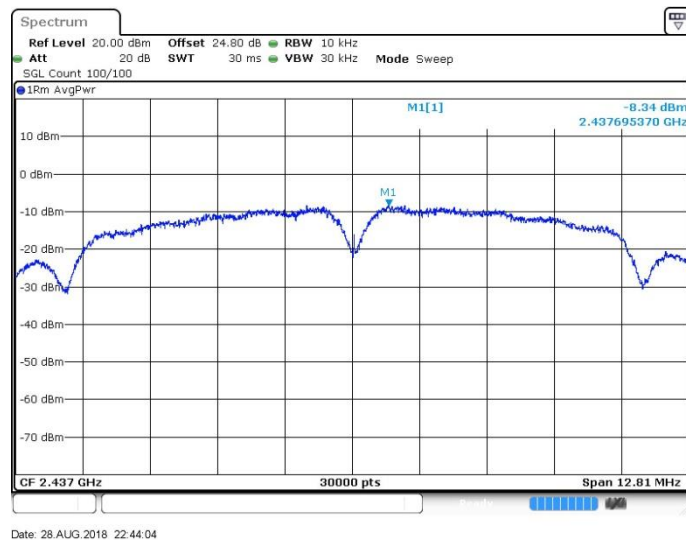
<CDD Mode>

2.4GHz Band														
Mod.	Data Rate	N _{TX}	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	0.00	0.00	-7.56	-	-	3.39	3.18	8.00	8.00	Pass
11b	1Mbps	1	6	2437	0.00	0.00	-7.00	-		3.39	3.18	8.00	8.00	Pass
11b	1Mbps	1	11	2462	0.00	0.00	-7.43	-		3.39	3.18	8.00	8.00	Pass
11g	6Mbps	1	1	2412	0.18	0.18	-12.75	-		3.39	3.18	8.00	8.00	Pass
11g	6Mbps	1	6	2437	0.18	0.18	-7.66	-		3.39	3.18	8.00	8.00	Pass
11g	6Mbps	1	11	2462	0.18	0.18	-11.88	-		3.39	3.18	8.00	8.00	Pass
HT20	MCS0	1	1	2412	0.18	0.18	-14.02	-		3.39	3.18	8.00	8.00	Pass
HT20	MCS0	1	6	2437	0.18	0.18	-9.19	-		3.39	3.18	8.00	8.00	Pass
HT20	MCS0	1	11	2462	0.18	0.18	-14.34	-		3.39	3.18	8.00	8.00	Pass
11b	1Mbps	2	1	2412	0.00	0.00	-8.22	-8.55	-5.21	6.30		7.70		Pass
11b	1Mbps	2	6	2437	0.00	0.00	-8.01	-8.34	-5.00	6.30		7.70		Pass
11b	1Mbps	2	11	2462	0.00	0.00	-8.80	-9.71	-5.79	6.30		7.70		Pass
11g	6Mbps	2	1	2412	0.18	0.18	-12.17	-11.36	-8.35	6.30		7.70		Pass
11g	6Mbps	2	6	2437	0.18	0.18	-8.73	-8.54	-5.53	6.30		7.70		Pass
11g	6Mbps	2	11	2462	0.18	0.18	-13.48	-13.79	-10.47	6.30		7.70		Pass
HT20	MCS0	2	1	2412	0.18	0.18	-16.29	-16.73	-13.28	6.30		7.70		Pass
HT20	MCS0	2	6	2437	0.18	0.18	-10.24	-10.75	-7.23	6.30		7.70		Pass
HT20	MCS0	2	11	2462	0.18	0.18	-16.70	-16.41	-13.40	6.30		7.70		Pass

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



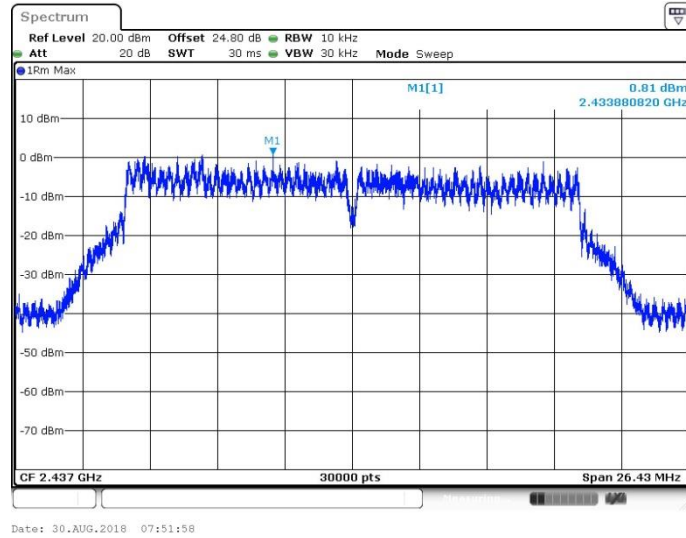
Worst Case Power Density (dBm/3kHz) for MIMO Ant. 2



<TXBF Modes>

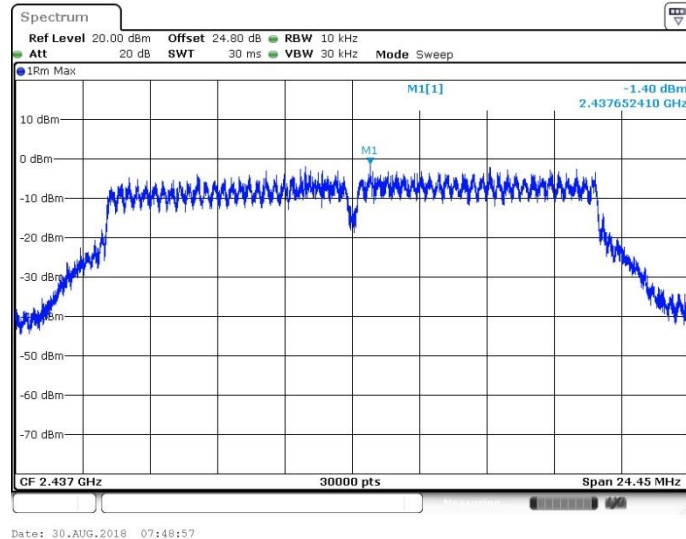
2.4GHz Band														
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Duty Factor (dB)		Average PSD (dBm/3kHz)			DG (dBi)		Average PSD Limit (dBm/3kHz)		Pass/Fail
					Ant 1	Ant 2	Ant 1	Ant 2	Worse + 3.01	Ant 1	Ant 2	Ant 1	Ant 2	
HT20	MCS0	2	1	2412	0.00	0.00	-7.37	-7.18	-4.17	6.30		7.70		Pass
HT20	MCS0	2	6	2437	0.00	0.00	0.81	-1.40	3.82	6.30		7.70		Pass
HT20	MCS0	2	11	2462	0.00	0.00	-7.27	-7.69	-4.26	6.30		7.70		Pass

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



Date: 30.AUG.2018 07:51:58

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



Date: 30.AUG.2018 07:48:57

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.

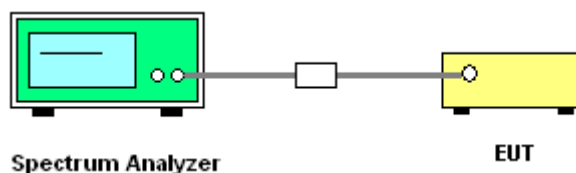
3.4.2 Measuring Instruments

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





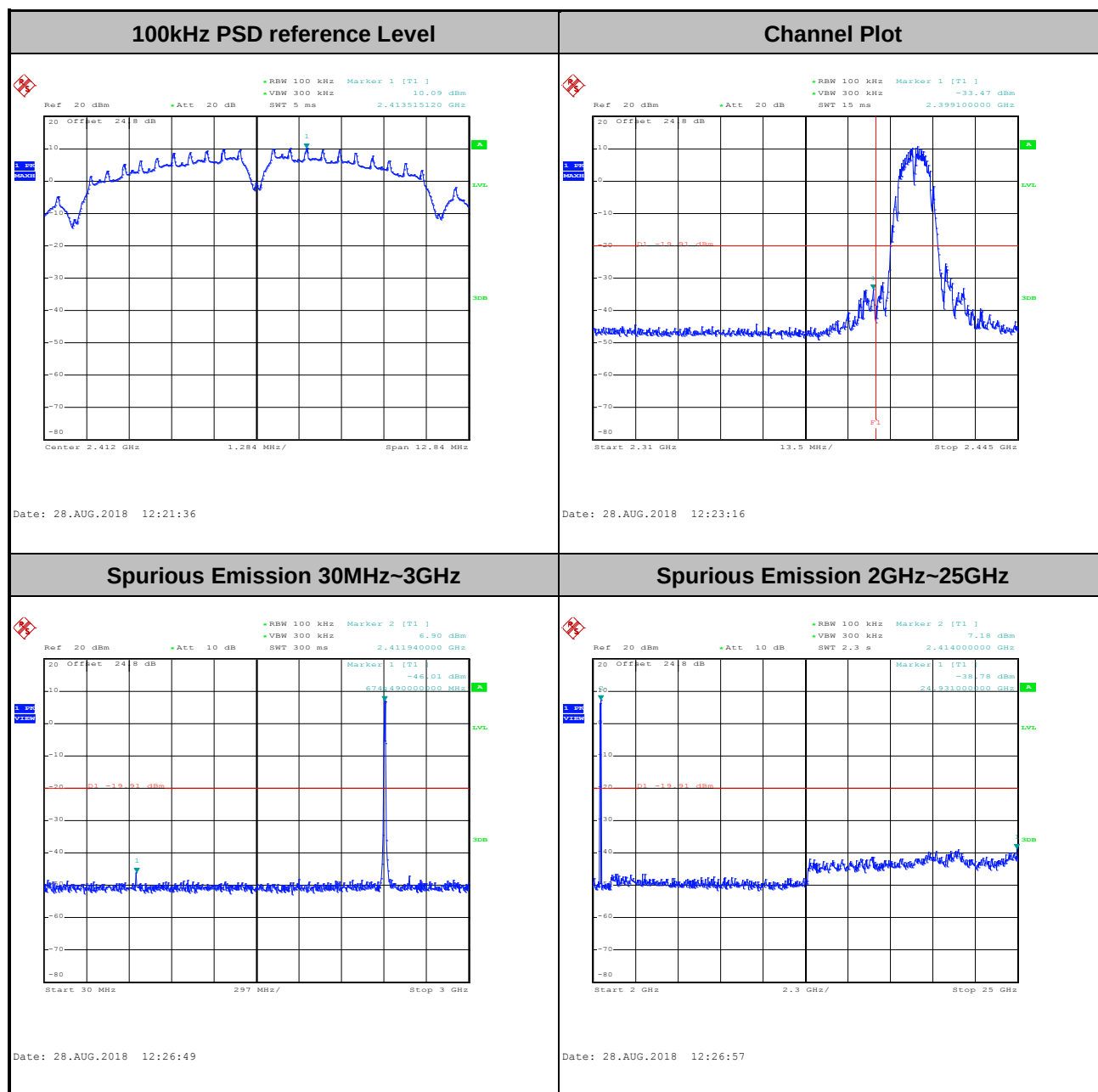
3.4.5 Test Result of Conducted Band Edges and Spurious Emission

Test Engineer :	Kai Liao	Temperature :	21~25°C
		Relative Humidity :	51~54%

<CDD Mode>

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

Test Mode :	802.11b	Test Channel :	01
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20 Offset 24.8 dB

Ref 20 dBm

Att 20 dB

RBW 100 kHz

VBW 300 kHz

SWT 5 ms

Marker 1 [T1]

10.50 dBm

2.438017000 GHz

Center 2.437 GHz

1.356 MHz/

Span 13.56 MHz

Ref 20 dBm • Att 10 dB • RBW 100 kHz • VBW 300 kHz • SWT 300 ms • 2.438670000 GHz • 9.23 dBm

Marker 1: 1 [T1] -46.84 dBm

Marker 2: 2 -46.84 dBm

Marker 3: 3 -46.84 dBm

Marker 4: 4 -46.84 dBm

Marker 5: 5 -46.84 dBm

Marker 6: 6 -46.84 dBm

Marker 7: 7 -46.84 dBm

Marker 8: 8 -46.84 dBm

Marker 9: 9 -46.84 dBm

Marker 10: 10 -46.84 dBm

Marker 11: 11 -46.84 dBm

Marker 12: 12 -46.84 dBm

Marker 13: 13 -46.84 dBm

Marker 14: 14 -46.84 dBm

Marker 15: 15 -46.84 dBm

Marker 16: 16 -46.84 dBm

Marker 17: 17 -46.84 dBm

Marker 18: 18 -46.84 dBm

Marker 19: 19 -46.84 dBm

Marker 20: 20 -46.84 dBm

Marker 21: 21 -46.84 dBm

Marker 22: 22 -46.84 dBm

Marker 23: 23 -46.84 dBm

Marker 24: 24 -46.84 dBm

Marker 25: 25 -46.84 dBm

Marker 26: 26 -46.84 dBm

Marker 27: 27 -46.84 dBm

Marker 28: 28 -46.84 dBm

Marker 29: 29 -46.84 dBm

Marker 30: 30 -46.84 dBm

Marker 31: 31 -46.84 dBm

Marker 32: 32 -46.84 dBm

Marker 33: 33 -46.84 dBm

Marker 34: 34 -46.84 dBm

Marker 35: 35 -46.84 dBm

Marker 36: 36 -46.84 dBm

Marker 37: 37 -46.84 dBm

Marker 38: 38 -46.84 dBm

Marker 39: 39 -46.84 dBm

Marker 40: 40 -46.84 dBm

Marker 41: 41 -46.84 dBm

Marker 42: 42 -46.84 dBm

Marker 43: 43 -46.84 dBm

Marker 44: 44 -46.84 dBm

Marker 45: 45 -46.84 dBm

Marker 46: 46 -46.84 dBm

Marker 47: 47 -46.84 dBm

Marker 48: 48 -46.84 dBm

Marker 49: 49 -46.84 dBm

Marker 50: 50 -46.84 dBm

Marker 51: 51 -46.84 dBm

Marker 52: 52 -46.84 dBm

Marker 53: 53 -46.84 dBm

Marker 54: 54 -46.84 dBm

Marker 55: 55 -46.84 dBm

Marker 56: 56 -46.84 dBm

Marker 57: 57 -46.84 dBm

Marker 58: 58 -46.84 dBm

Marker 59: 59 -46.84 dBm

Marker 60: 60 -46.84 dBm

Marker 61: 61 -46.84 dBm

Marker 62: 62 -46.84 dBm

Marker 63: 63 -46.84 dBm

Marker 64: 64 -46.84 dBm

Marker 65: 65 -46.84 dBm

Marker 66: 66 -46.84 dBm

Marker 67: 67 -46.84 dBm

Marker 68: 68 -46.84 dBm

Marker 69: 69 -46.84 dBm

Marker 70: 70 -46.84 dBm

Marker 71: 71 -46.84 dBm

Marker 72: 72 -46.84 dBm

Marker 73: 73 -46.84 dBm

Marker 74: 74 -46.84 dBm

Marker 75: 75 -46.84 dBm

Marker 76: 76 -46.84 dBm

Marker 77: 77 -46.84 dBm

Marker 78: 78 -46.84 dBm

Marker 79: 79 -46.84 dBm

Marker 80: 80 -46.84 dBm

Marker 81: 81 -46.84 dBm

Marker 82: 82 -46.84 dBm

Marker 83: 83 -46.84 dBm

Marker 84: 84 -46.84 dBm

Marker 85: 85 -46.84 dBm

Marker 86: 86 -46.84 dBm

Marker 87: 87 -46.84 dBm

Marker 88: 88 -46.84 dBm

Marker 89: 89 -46.84 dBm

Marker 90: 90 -46.84 dBm

Marker 91: 91 -46.84 dBm

Marker 92: 92 -46.84 dBm

Marker 93: 93 -46.84 dBm

Marker 94: 94 -46.84 dBm

Marker 95: 95 -46.84 dBm

Marker 96: 96 -46.84 dBm

Marker 97: 97 -46.84 dBm

Marker 98: 98 -46.84 dBm

Marker 99: 99 -46.84 dBm

Marker 100: 100 -46.84 dBm

Marker 101: 101 -46.84 dBm

Marker 102: 102 -46.84 dBm

Marker 103: 103 -46.84 dBm

Marker 104: 104 -46.84 dBm

Marker 105: 105 -46.84 dBm

Marker 106: 106 -46.84 dBm

Marker 107: 107 -46.84 dBm

Marker 108: 108 -46.84 dBm

Marker 109: 109 -46.84 dBm

Marker 110: 110 -46.84 dBm

Marker 111: 111 -46.84 dBm

Marker 112: 112 -46.84 dBm

Marker 113: 113 -46.84 dBm

Marker 114: 114 -46.84 dBm

Marker 115: 115 -46.84 dBm

Marker 116: 116 -46.84 dBm

Marker 117: 117 -46.84 dBm

Marker 118: 118 -46.84 dBm

Marker 119: 119 -46.84 dBm

Marker 120: 120 -46.84 dBm

Marker 121: 121 -46.84 dBm

Marker 122: 122 -46.84 dBm

Marker 123: 123 -46.84 dBm

Marker 124: 124 -46.84 dBm

Marker 125: 125 -46.84 dBm

Marker 126: 126 -46.84 dBm

Marker 127: 127 -46.84 dBm

Marker 128: 128 -46.84 dBm

Marker 129: 129 -46.84 dBm

Marker 130: 130 -46.84 dBm

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Marker 132: 132 -46.84 dBm

Marker 133: 133 -46.84 dBm

Marker 134: 134 -46.84 dBm

Marker 135: 135 -46.84 dBm

Marker 136: 136 -46.84 dBm

Marker 137: 137 -46.84 dBm

Marker 138: 138 -46.84 dBm

Marker 139: 139 -46.84 dBm

Marker 140: 140 -46.84 dBm

Marker 141: 141 -46.84 dBm

Marker 142: 142 -46.84 dBm

Marker 143: 143 -46.84 dBm

Marker 144: 144 -46.84 dBm

Marker 145: 145 -46.84 dBm

Marker 146: 146 -46.84 dBm

Marker 147: 147 -46.84 dBm

Marker 148: 148 -46.84 dBm

Marker 149: 149 -46.84 dBm

Marker 150: 150 -46.84 dBm

Marker 151: 151 -46.84 dBm

Marker 152: 152 -46.84 dBm

Marker 153: 153 -46.84 dBm

Marker 154: 154 -46.84 dBm

Marker 155: 155 -46.84 dBm

Marker 156: 156 -46.84 dBm

Marker 157: 157 -46.84 dBm

Marker 158: 158 -46.84 dBm

Marker 159: 159 -46.84 dBm

Marker 160: 160 -46.84 dBm

Marker 161: 161 -46.84 dBm

Marker 162: 162 -46.84 dBm

Marker 163: 163 -46.84 dBm

Marker 164: 164 -46.84 dBm

Marker 165: 165 -46.84 dBm

Marker 166: 166 -46.84 dBm

Marker 167: 167 -46.84 dBm

Marker 168: 168 -46.84 dBm

Marker 169: 169 -46.84 dBm

Marker 170: 170 -46.84 dBm

Marker 171: 171 -46.84 dBm

Marker 172: 172 -46.84 dBm

Marker 173: 173 -46.84 dBm

Marker 174: 17



Ref 20 dBm • Att 10 dB SWT 2.3 s 2.43700000 GHz

20 Offset 24.5 dB

Marker 1 [T1] -38.00 dBm 21.84500000 GHz

21 -19.7 dBm

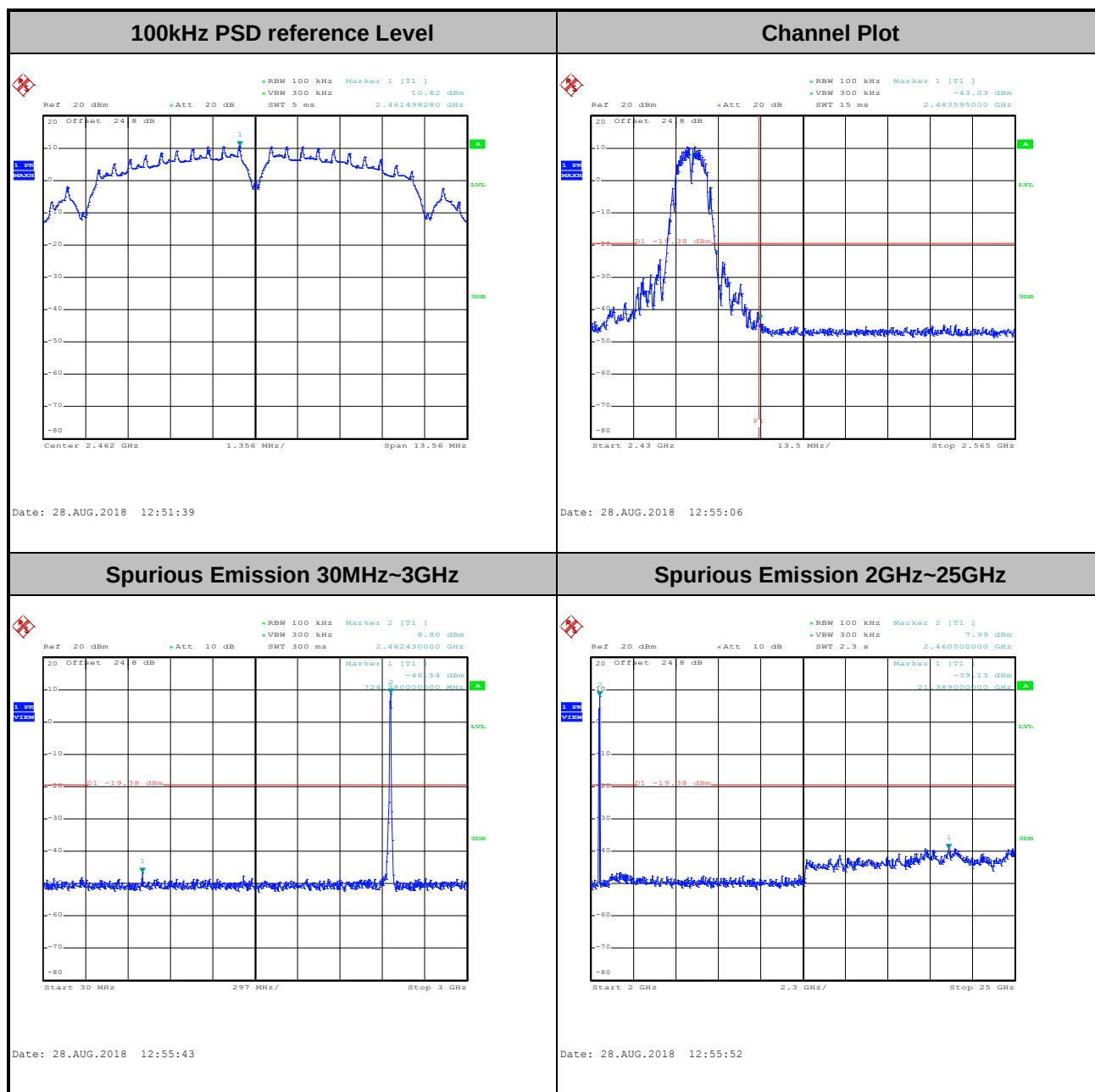
1

Start 2 GHz 2.3 GHz/ Stop 2.5 GHz

Report Version : 01

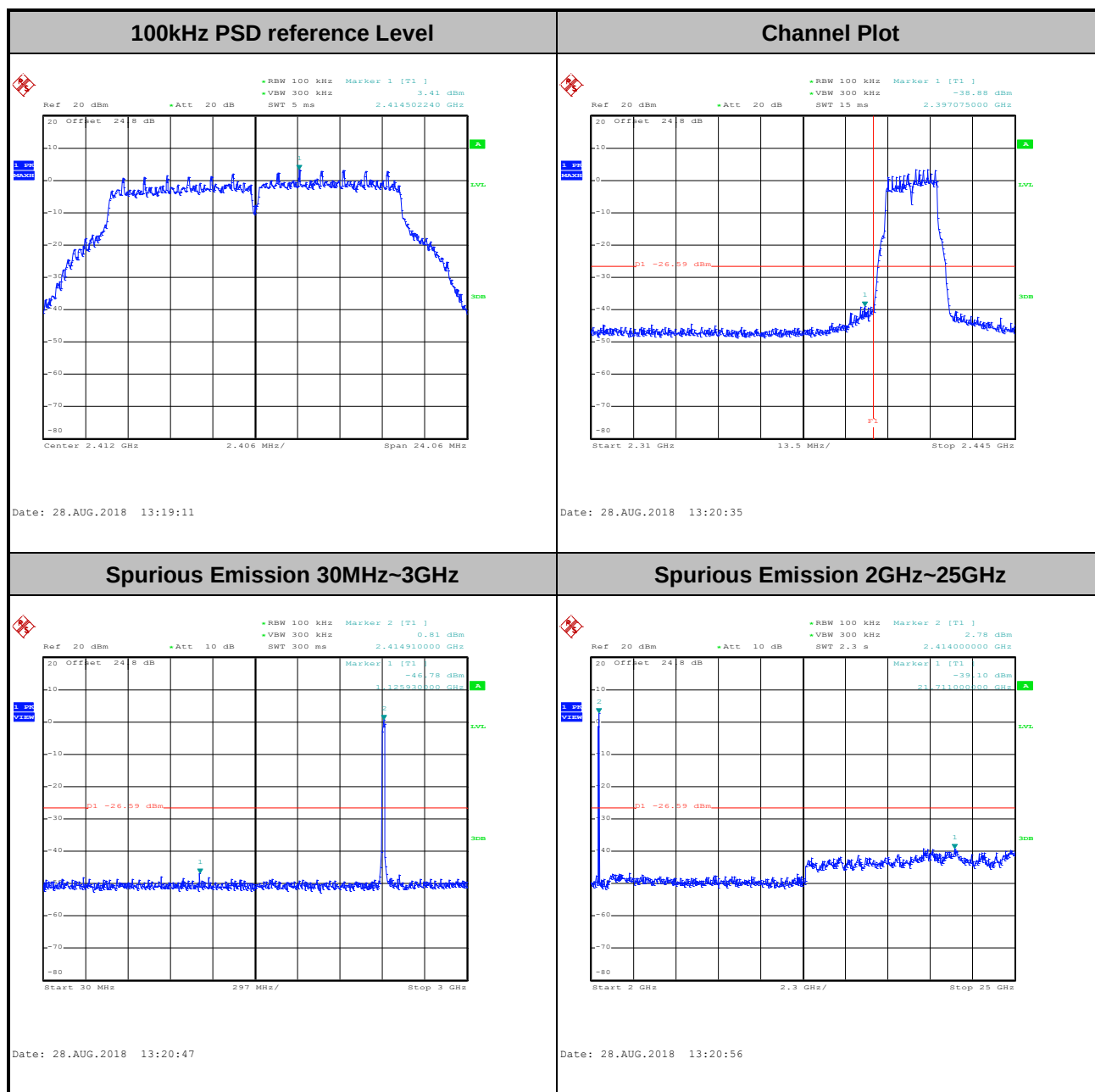


Test Mode :	802.11b	Test Channel :	11
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Test Mode :	802.11g	Test Channel :	01
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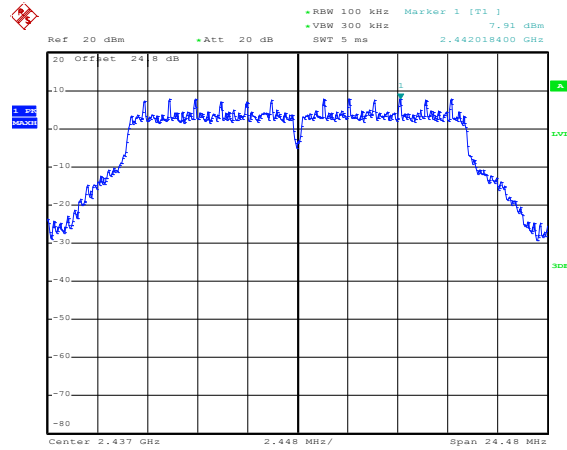




Test Mode : 802.11g

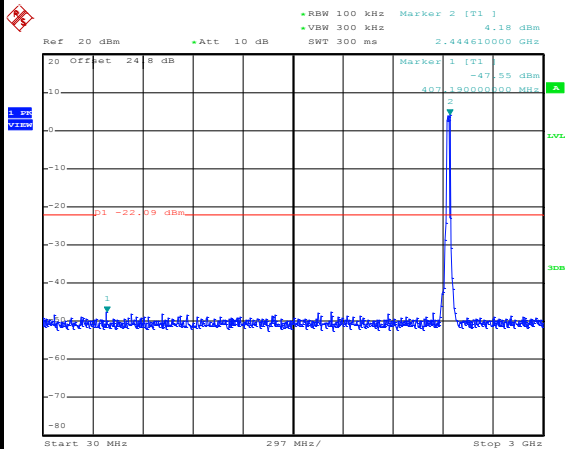
Test Channel : 06

100kHz PSD reference Level



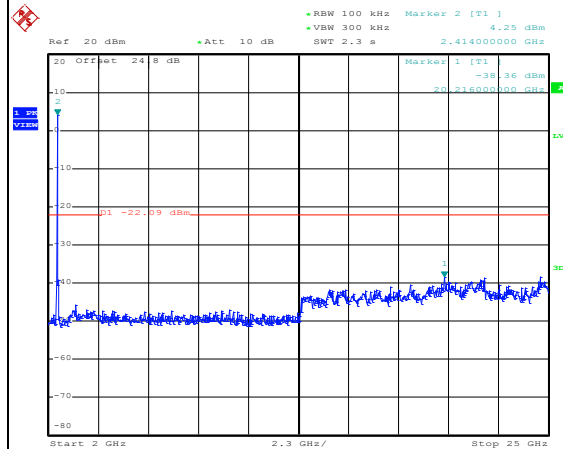
Date: 28.AUG.2018 15:16:37

Spurious Emission 30MHz~3GHz



Date: 28.AUG.2018 15:18:59

Spurious Emission 2GHz~25GHz

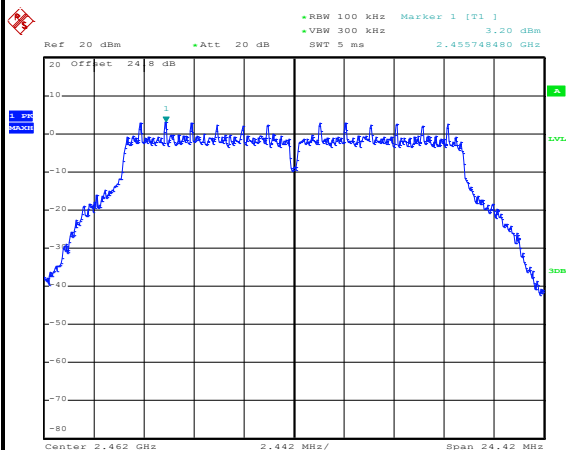


Date: 28.AUG.2018 15:19:07



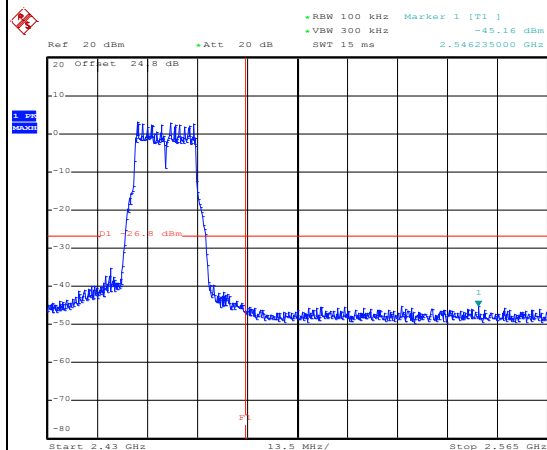
Test Mode :	802.11g	Test Channel :	11
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100kHz PSD reference Level



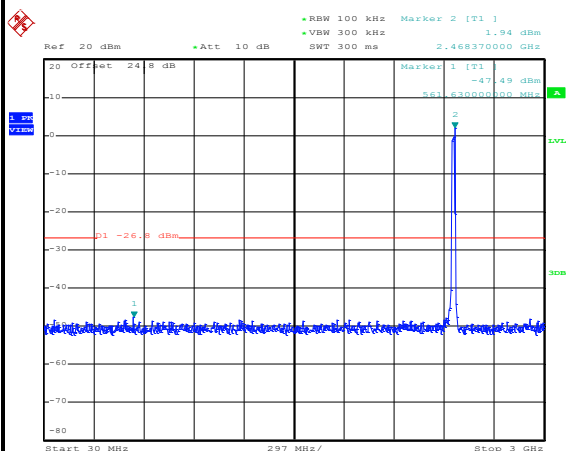
Date: 28.AUG.2018 15:23:44

Channel Plot



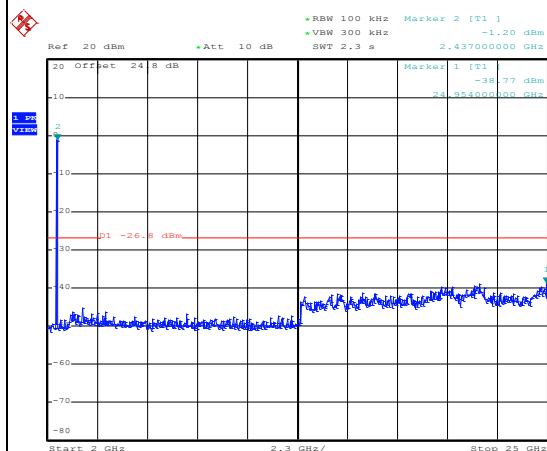
Date: 28.AUG.2018 15:24:18

Spurious Emission 30MHz~3GHz



Date: 28.AUG.2018 15:26:21

Spurious Emission 2GHz~25GHz

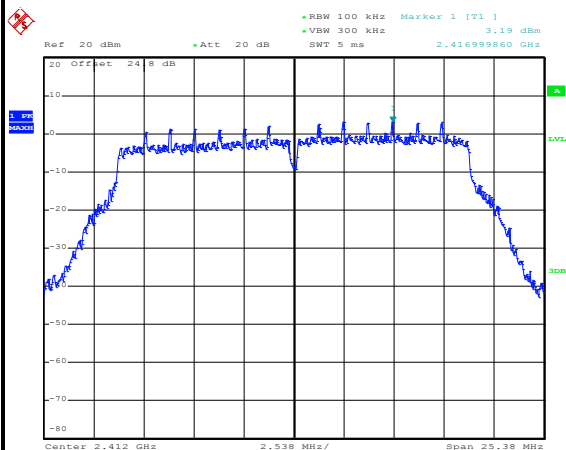


Date: 28.AUG.2018 15:26:30



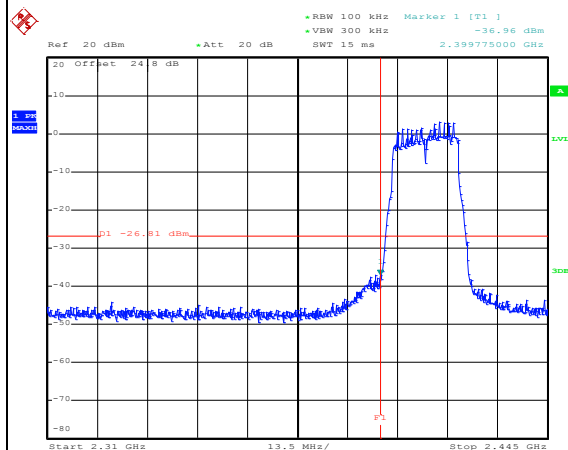
Test Mode :	802.11n HT20	Test Channel :	01
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100kHz PSD reference Level



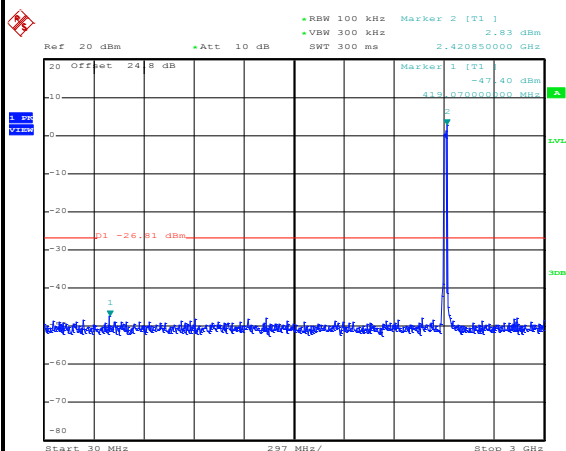
Date: 28.AUG.2018 18:03:44

Channel Plot



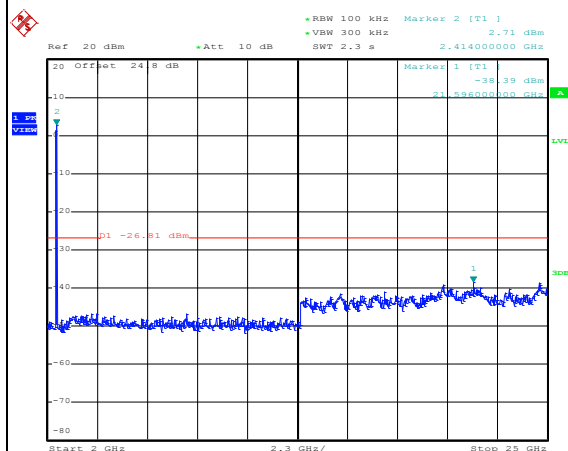
Date: 28.AUG.2018 18:04:34

Spurious Emission 30MHz~3GHz



Date: 28.AUG.2018 18:06:19

Spurious Emission 2GHz~25GHz



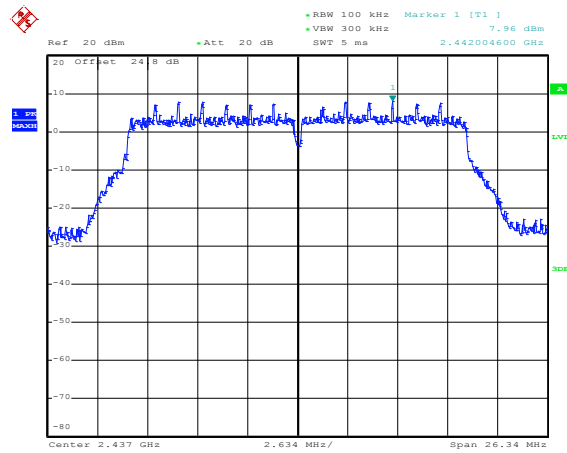
Date: 28.AUG.2018 18:06:27



Test Mode : 802.11n HT20

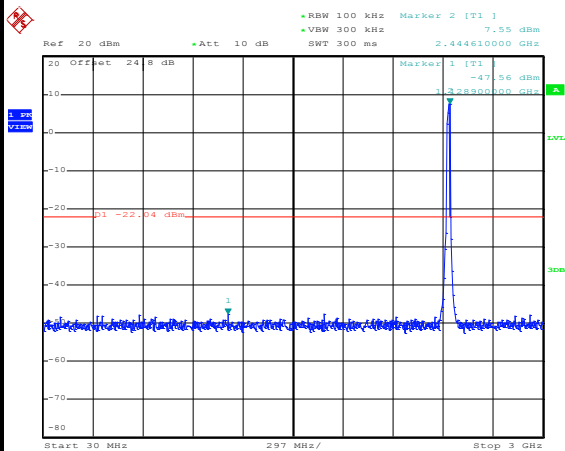
Test Channel : 06

100kHz PSD reference Level



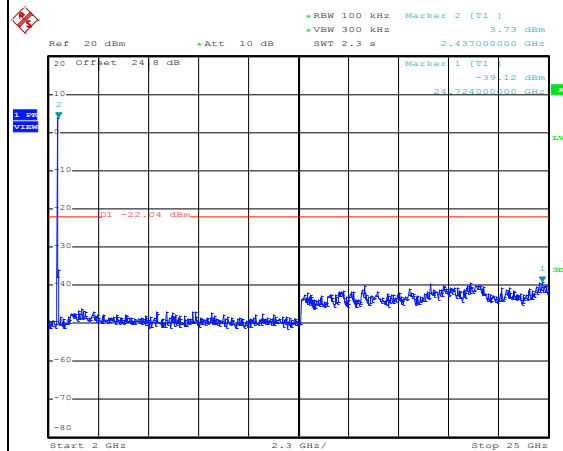
Date: 28.AUG.2018 18:10:54

Spurious Emission 30MHz~3GHz



Date: 28.AUG.2018 18:15:56

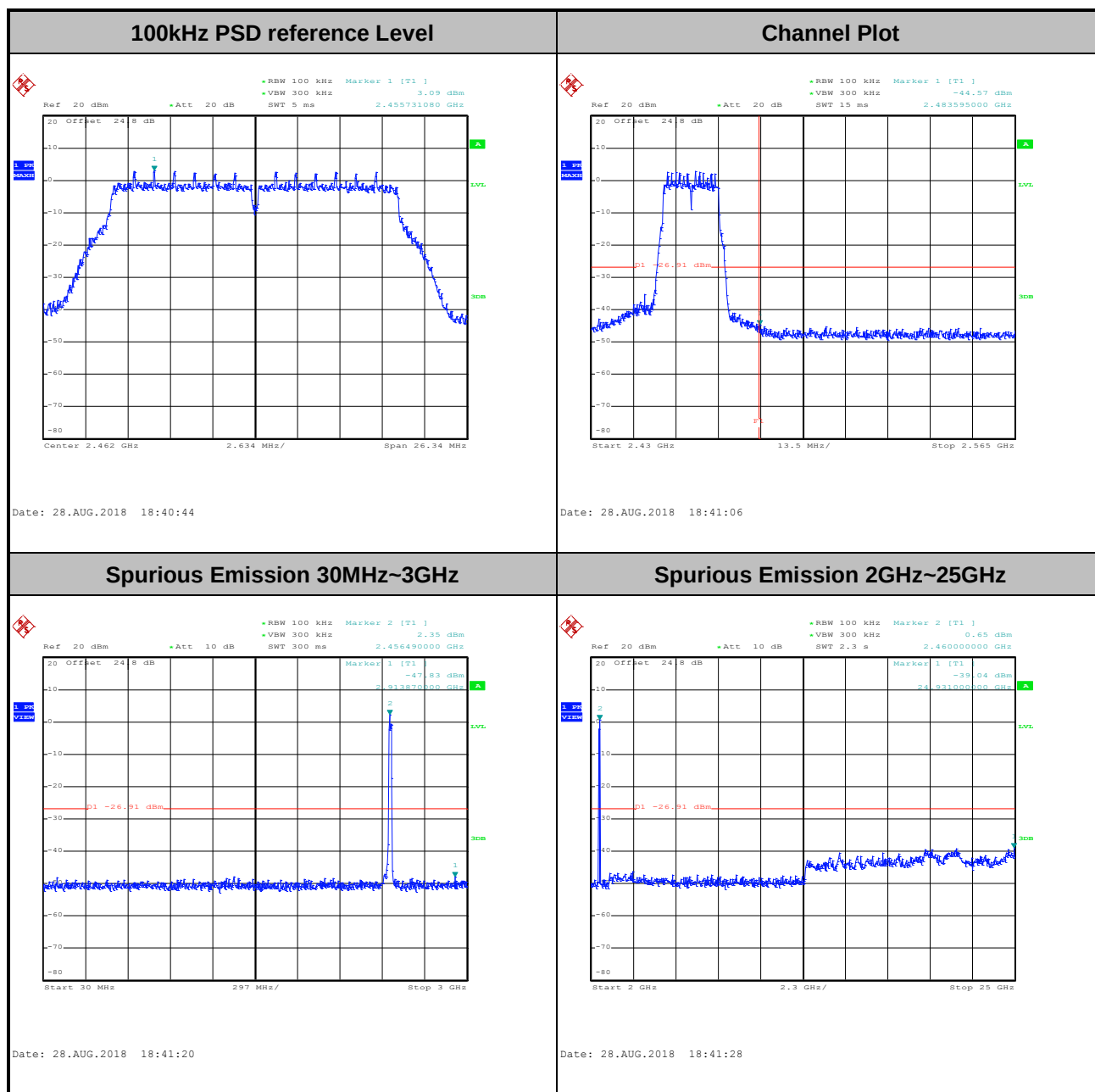
Spurious Emission 2GHz~25GHz



Date: 28.AUG.2018 18:16:04

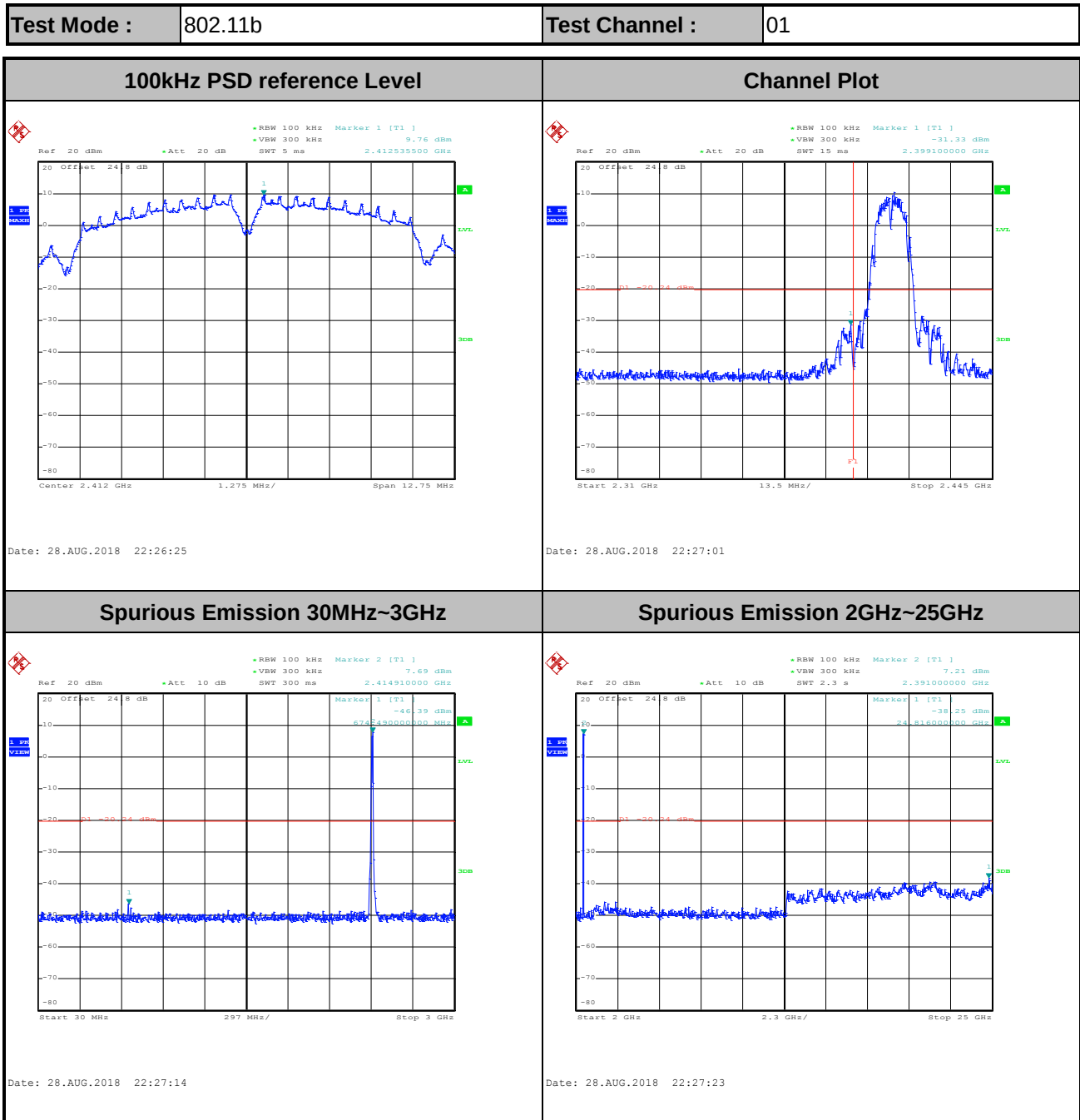


Test Mode :	802.11n HT20	Test Channel :	11
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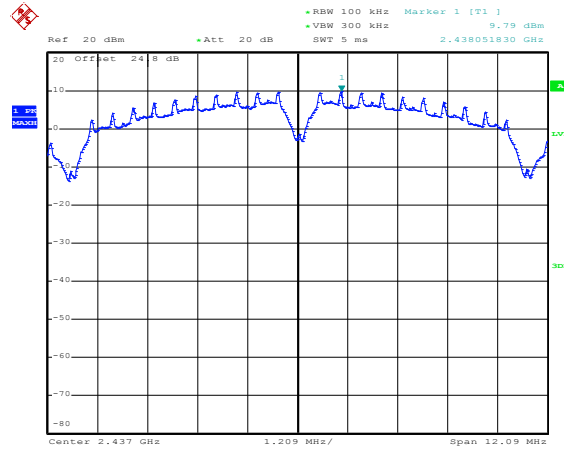




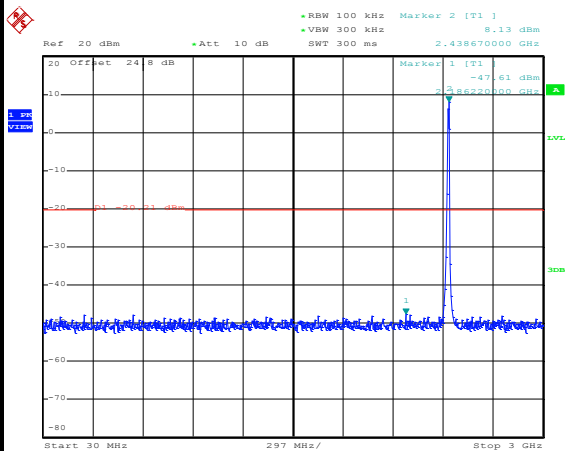
Number of TX = 2, Ant. 1 (Measured)



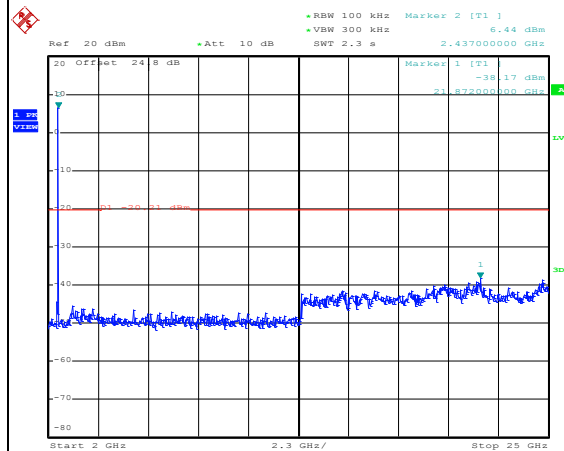
Test Mode :	802.11b	Test Channel :	06
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100kHz PSD reference Level


Date: 28.AUG.2018 22:55:16

Spurious Emission 30MHz~3GHz


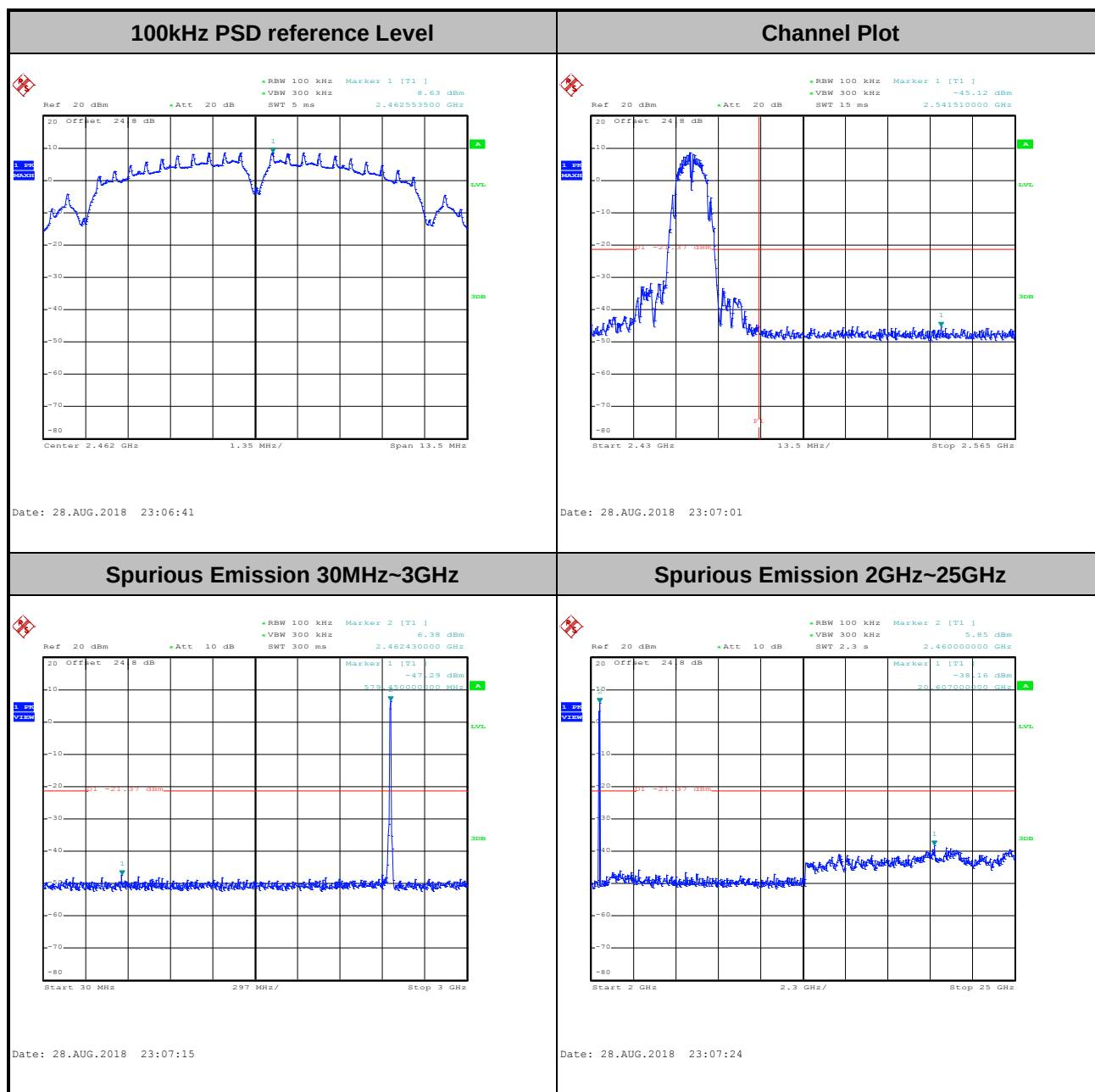
Date: 28.AUG.2018 22:59:58

Spurious Emission 2GHz~25GHz


Date: 28.AUG.2018 23:00:07



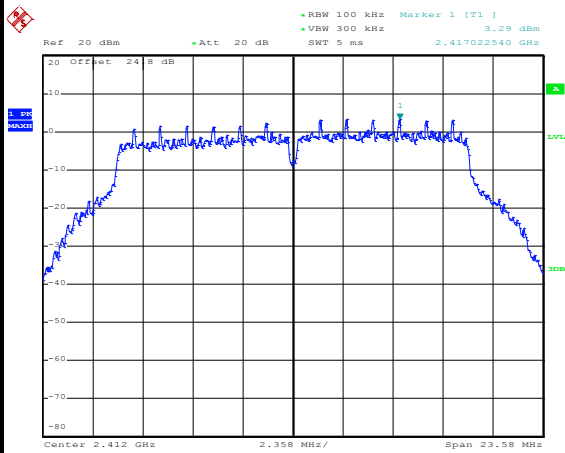
Test Mode :	802.11b	Test Channel :	11
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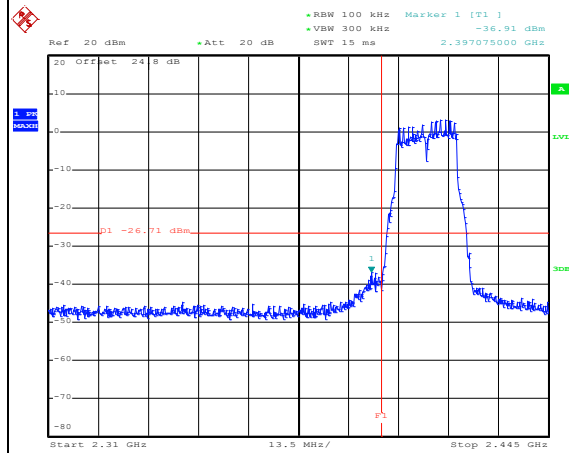
Test Mode :	802.11g	Test Channel :	01
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100kHz PSD reference Level



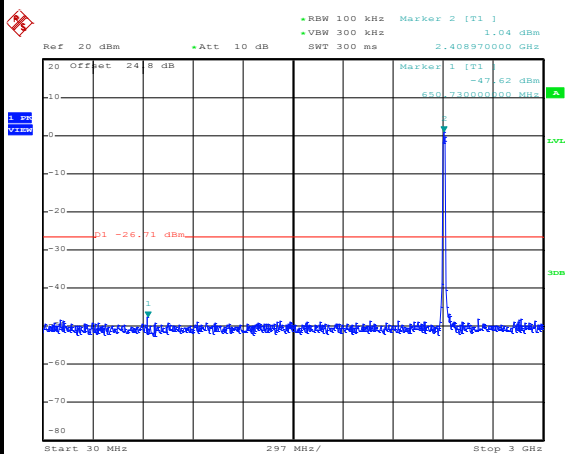
Date: 28.AUG.2018 15:32:11

Channel Plot



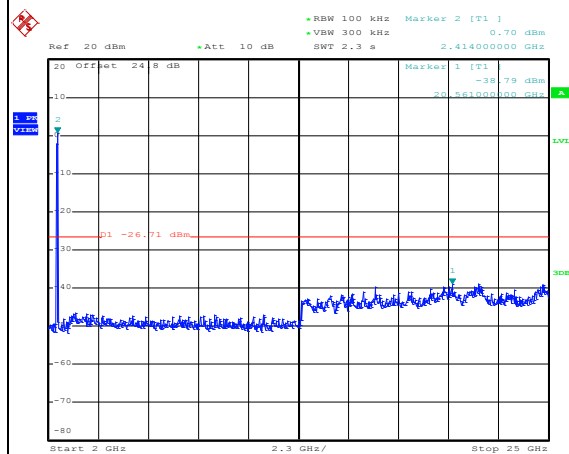
Date: 28.AUG.2018 15:32:36

Spurious Emission 30MHz~3GHz



Date: 28.AUG.2018 15:33:00

Spurious Emission 2GHz~25GHz

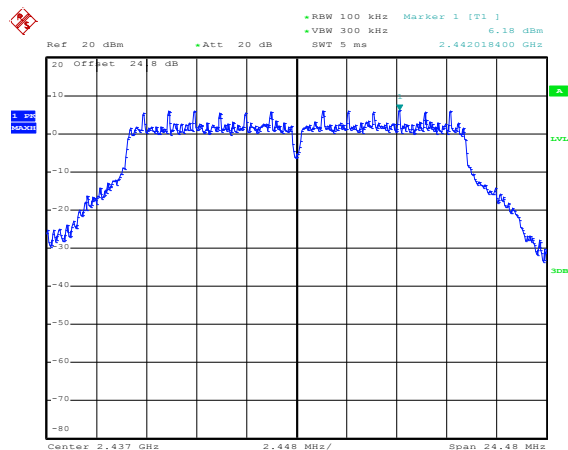


Date: 28.AUG.2018 15:33:08



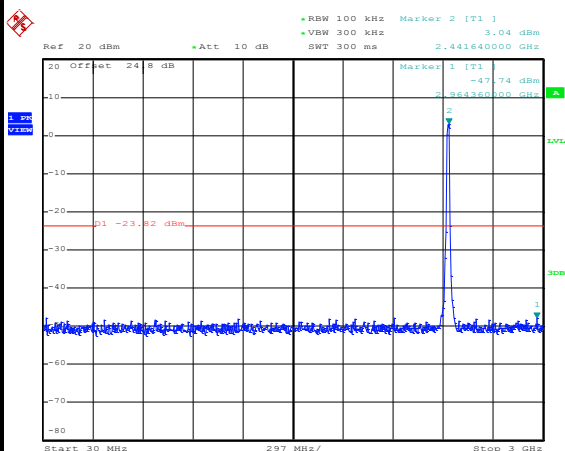
Test Mode :	802.11g	Test Channel :	06
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100kHz PSD reference Level



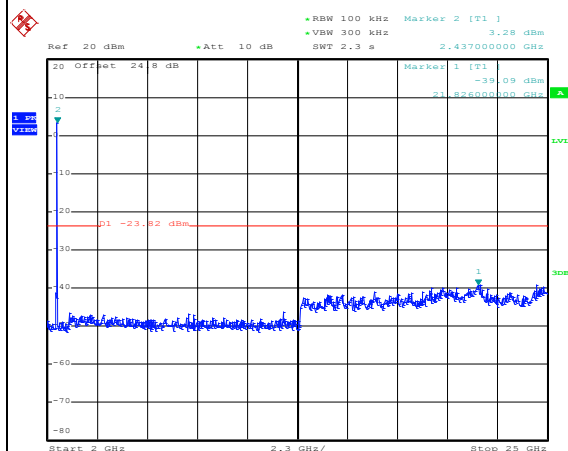
Date: 28.AUG.2018 17:08:28

Spurious Emission 30MHz~3GHz



Date: 28.AUG.2018 17:10:02

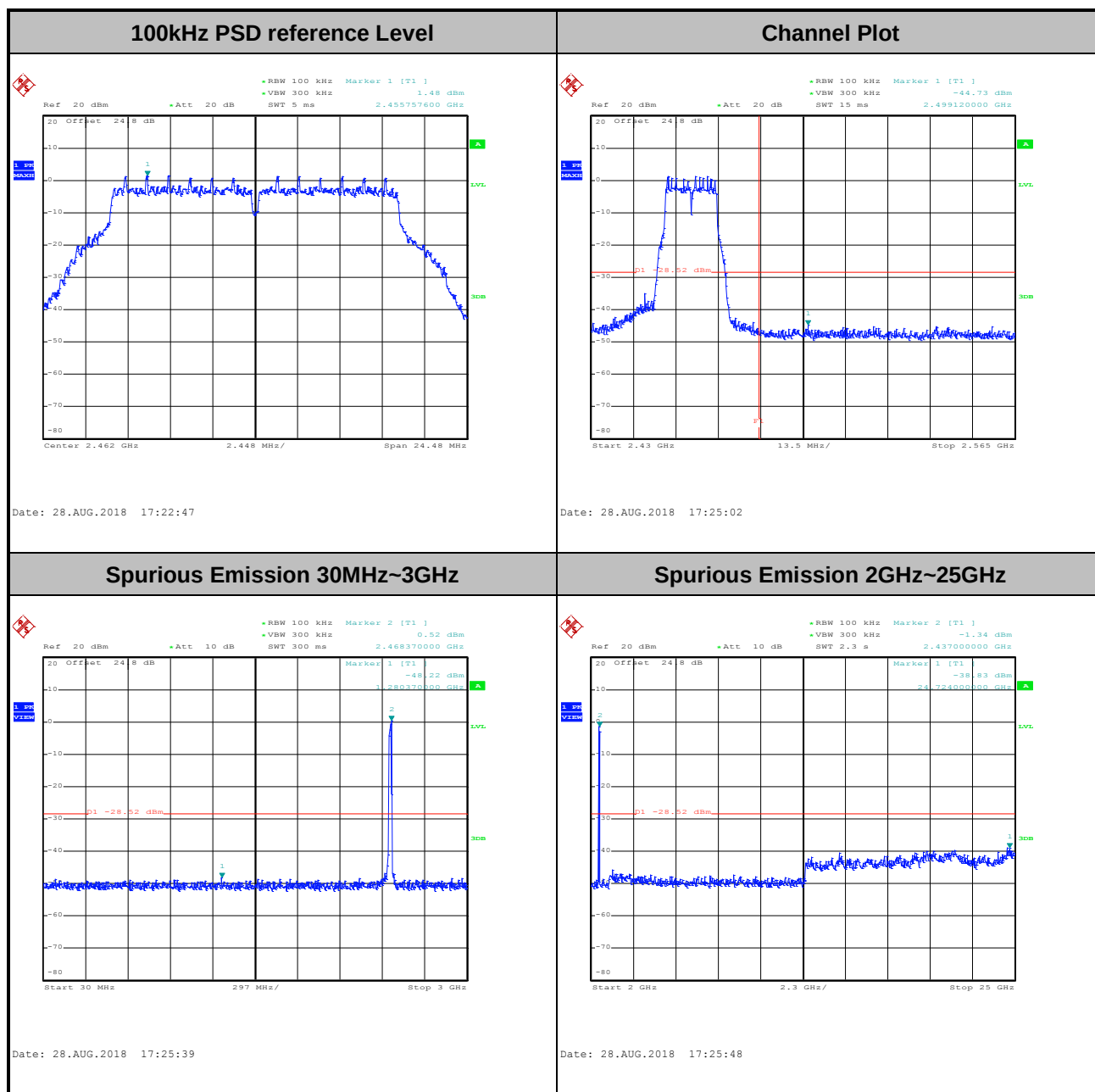
Spurious Emission 2GHz~25GHz



Date: 28.AUG.2018 17:10:11



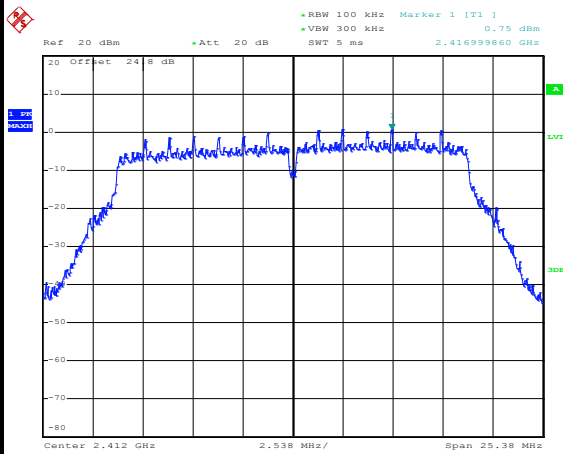
Test Mode :	802.11g	Test Channel :	11
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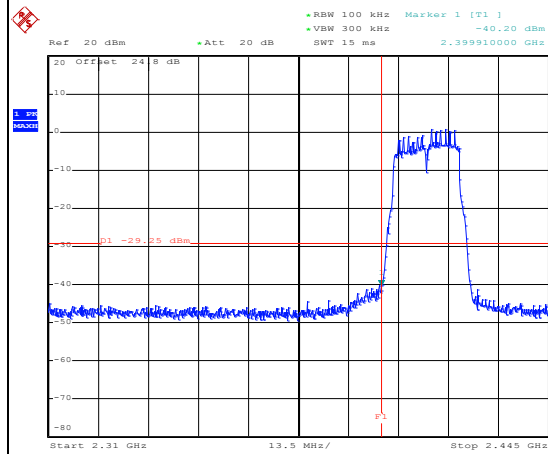
Test Mode :	802.11n HT20	Test Channel :	01
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100kHz PSD reference Level



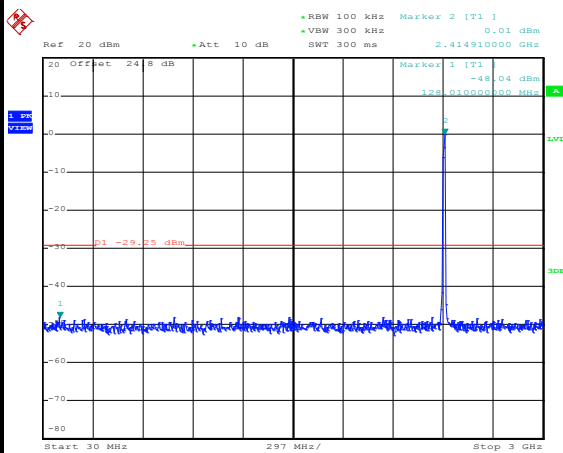
Date: 28.AUG.2018 23:20:34

Channel Plot



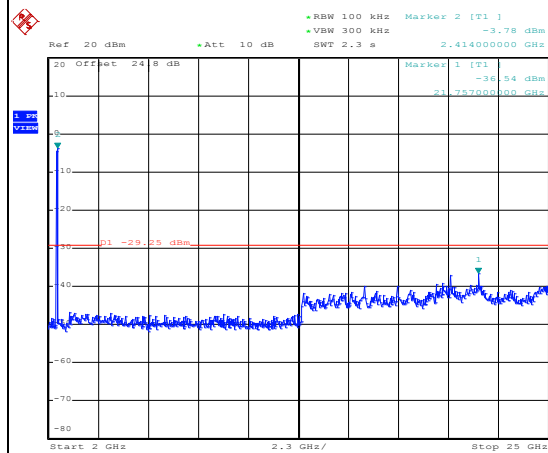
Date: 28.AUG.2018 23:20:52

Spurious Emission 30MHz~3GHz



Date: 28.AUG.2018 23:21:05

Spurious Emission 2GHz~25GHz



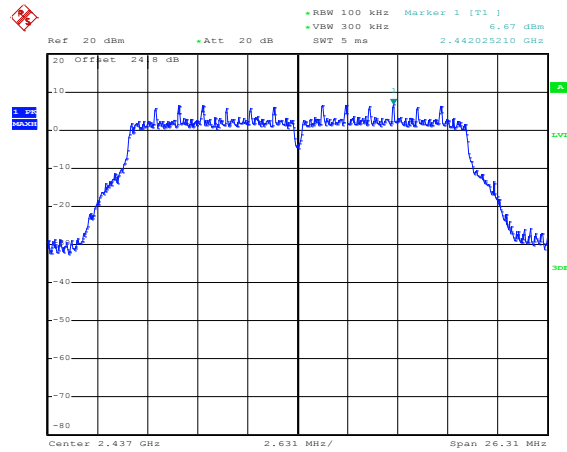
Date: 28.AUG.2018 23:21:13



Test Mode : 802.11n HT20

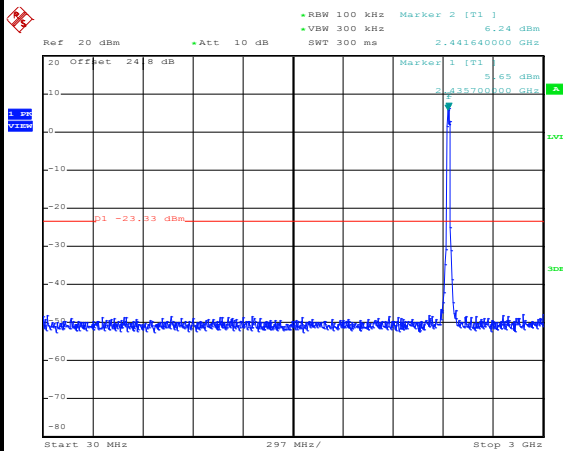
Test Channel : 06

100kHz PSD reference Level



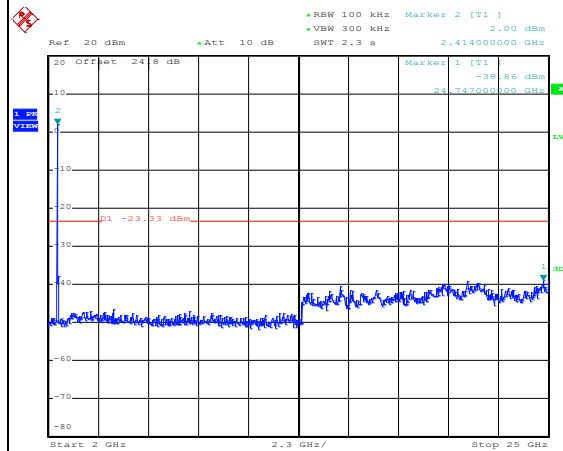
Date: 28.AUG.2018 23:39:28

Spurious Emission 30MHz~3GHz

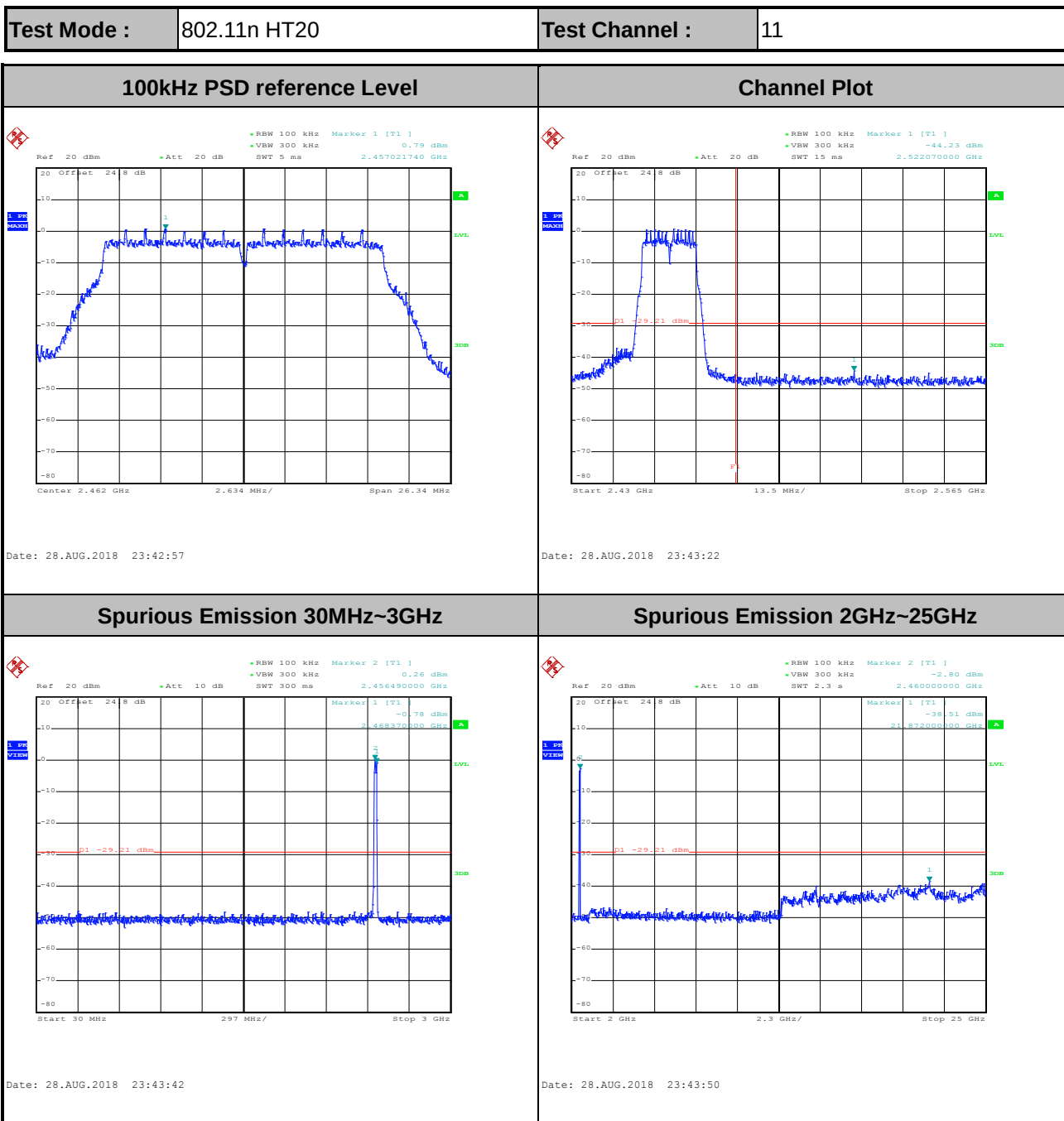


Date: 28.AUG.2018 23:39:46

Spurious Emission 2GHz~25GHz



Date: 28.AUG.2018 23:39:55

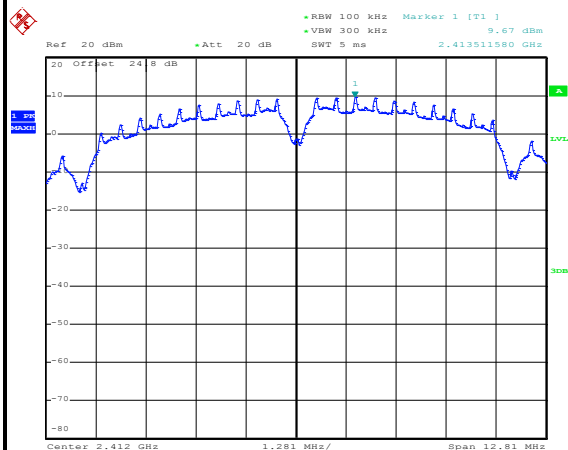




Number of TX = 2, Ant. 2 (Measured)

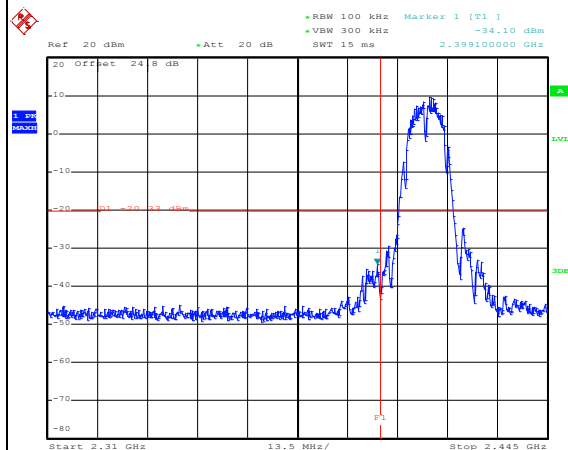
Test Mode :	802.11b	Test Channel :	01
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100kHz PSD reference Level



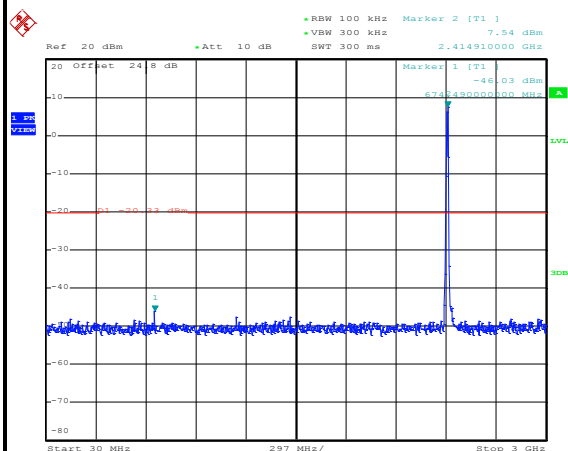
Date: 28.AUG.2018 22:30:43

Channel Plot



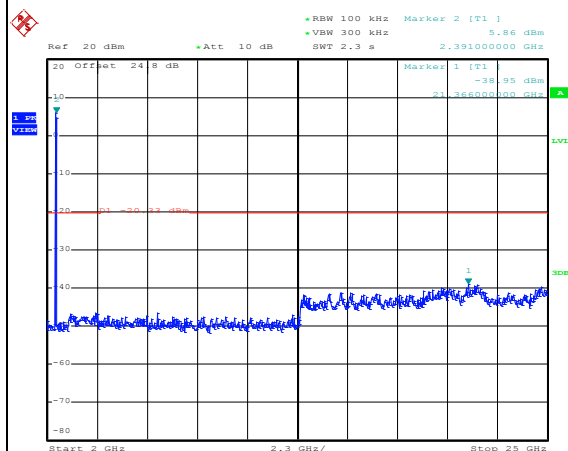
Date: 28.AUG.2018 22:36:42

Spurious Emission 30MHz~3GHz



Date: 28.AUG.2018 22:36:56

Spurious Emission 2GHz~25GHz



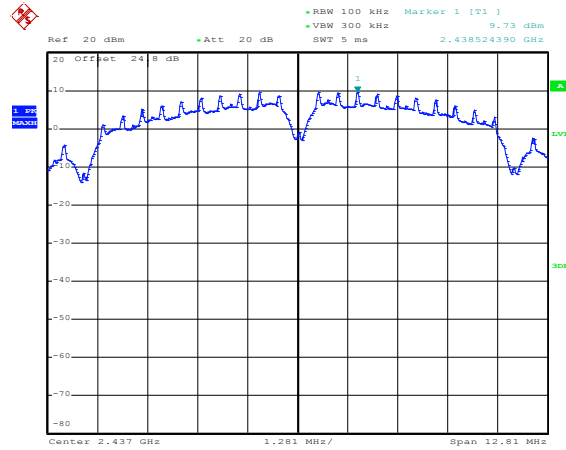
Date: 28.AUG.2018 22:37:04



Test Mode : 802.11b

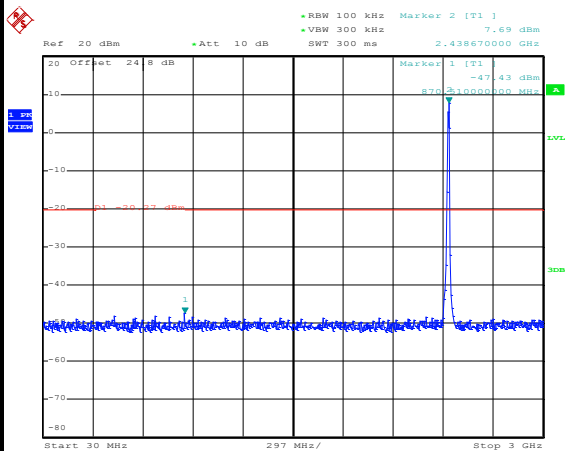
Test Channel : 06

100kHz PSD reference Level



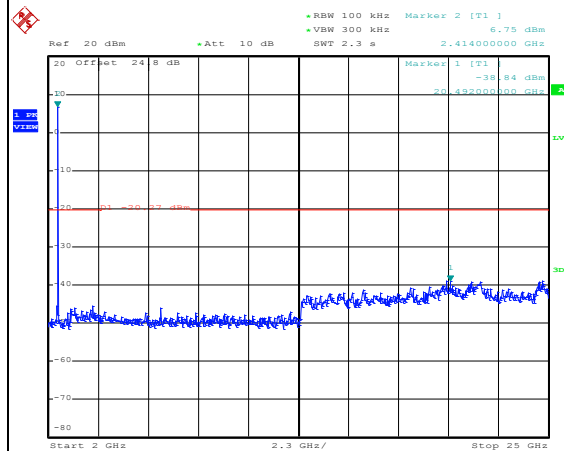
Date: 28.AUG.2018 22:42:09

Spurious Emission 30MHz~3GHz

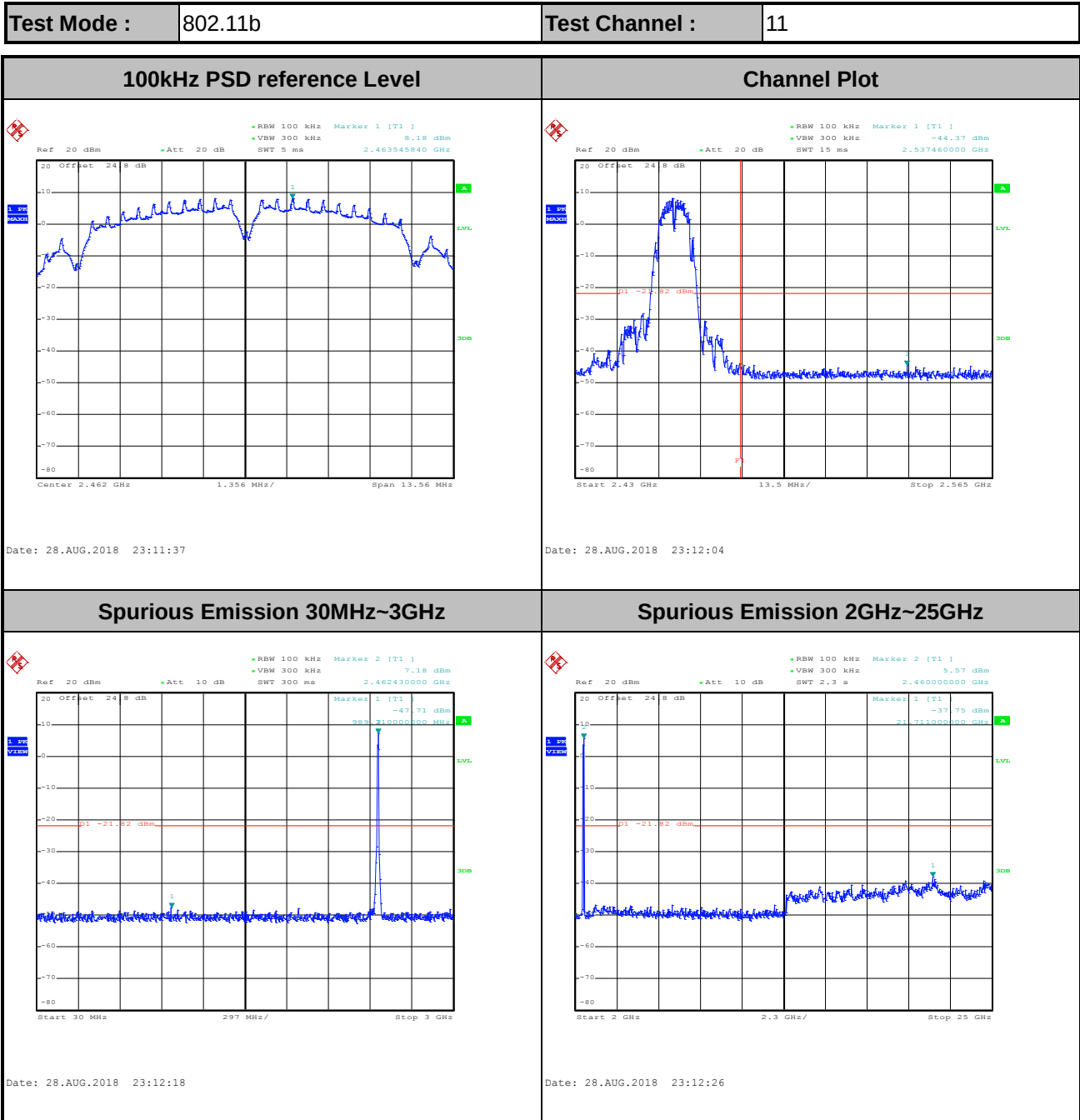


Date: 28.AUG.2018 22:42:24

Spurious Emission 2GHz~25GHz



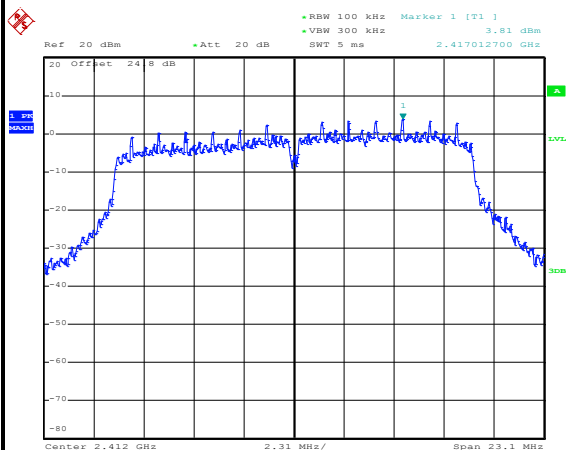
Date: 28.AUG.2018 22:42:33





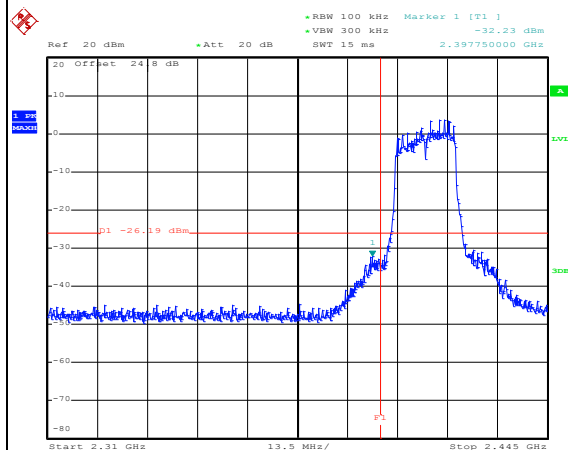
Test Mode :	802.11g	Test Channel :	01
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100kHz PSD reference Level



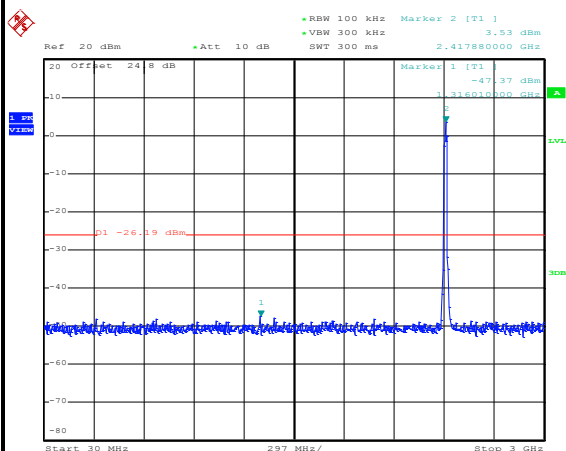
Date: 28.AUG.2018 15:36:36

Channel Plot



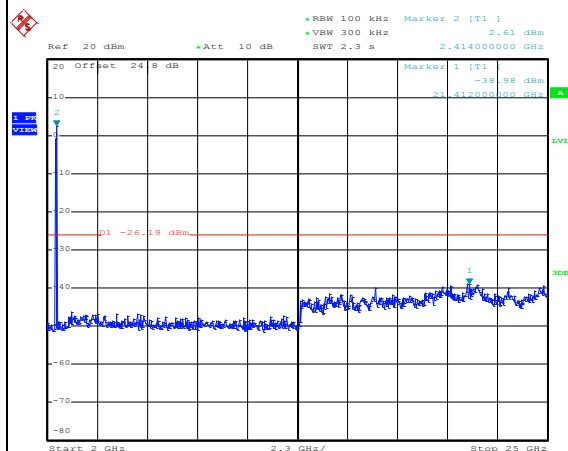
Date: 28.AUG.2018 15:37:10

Spurious Emission 30MHz~3GHz



Date: 28.AUG.2018 15:37:23

Spurious Emission 2GHz~25GHz

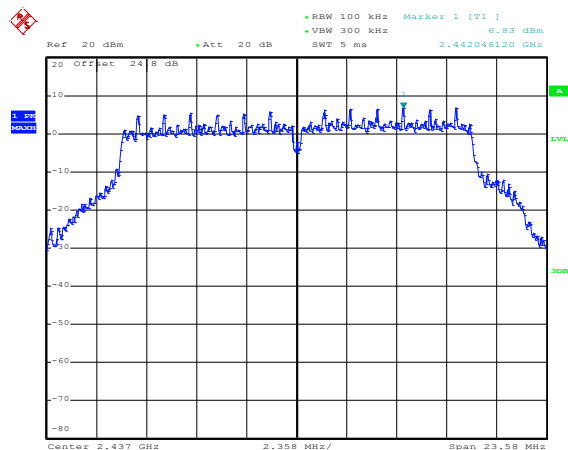


Date: 28.AUG.2018 15:37:32



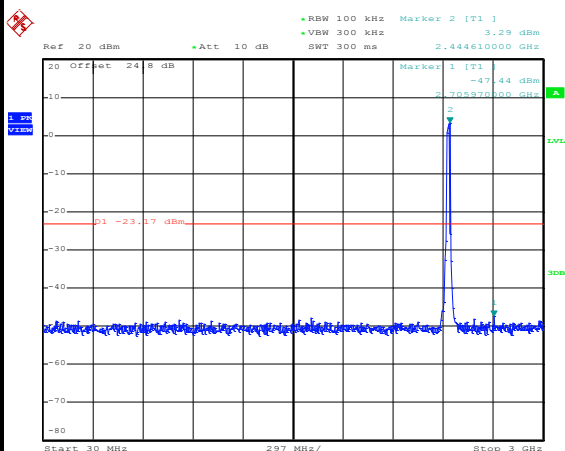
Test Mode :	802.11g	Test Channel :	06
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100kHz PSD reference Level



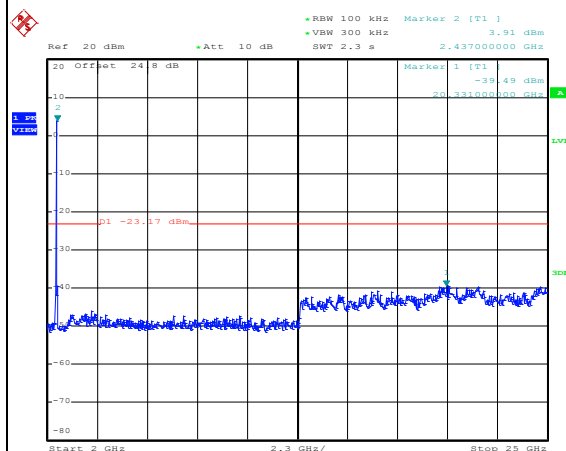
Date: 28.AUG.2018 17:16:17

Spurious Emission 30MHz~3GHz



Date: 28.AUG.2018 17:17:34

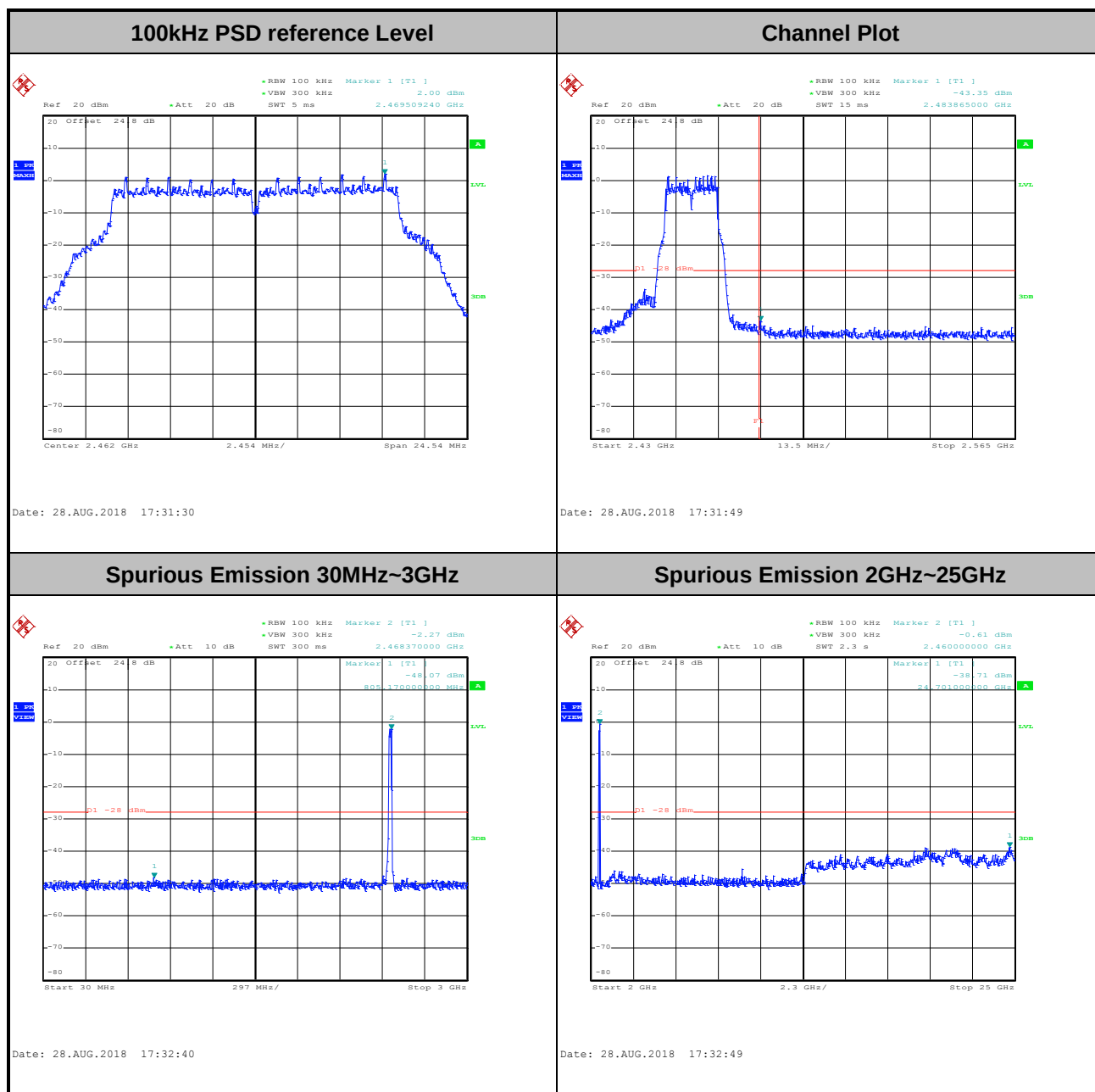
Spurious Emission 2GHz~25GHz

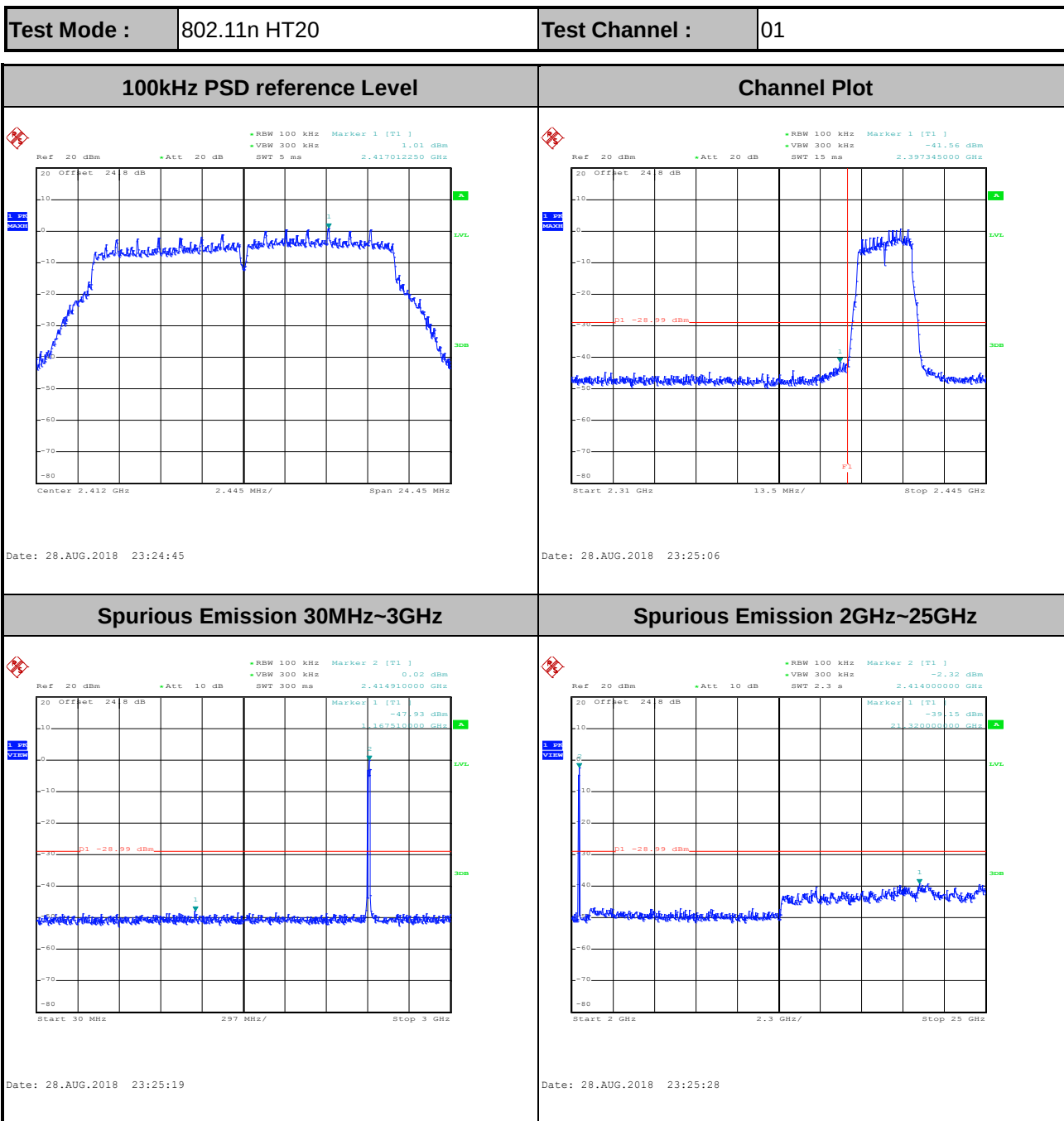


Date: 28.AUG.2018 17:17:42



Test Mode :	802.11g	Test Channel :	11
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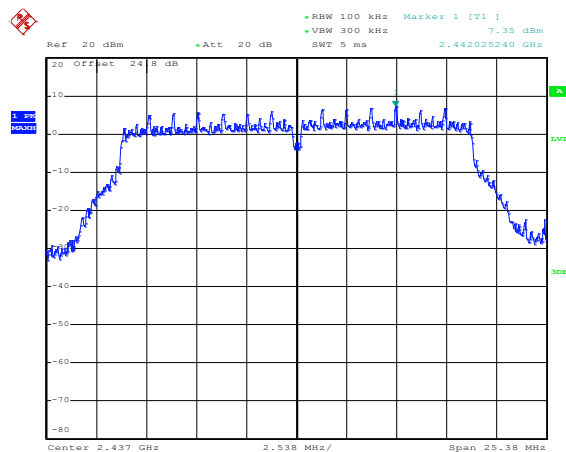




Test Mode : 802.11n HT20

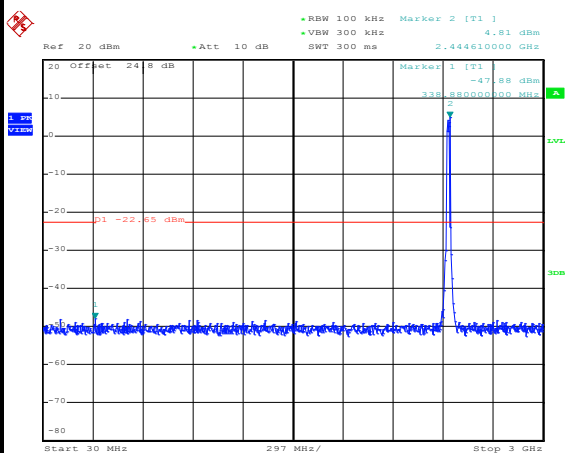
Test Channel : 06

100kHz PSD reference Level



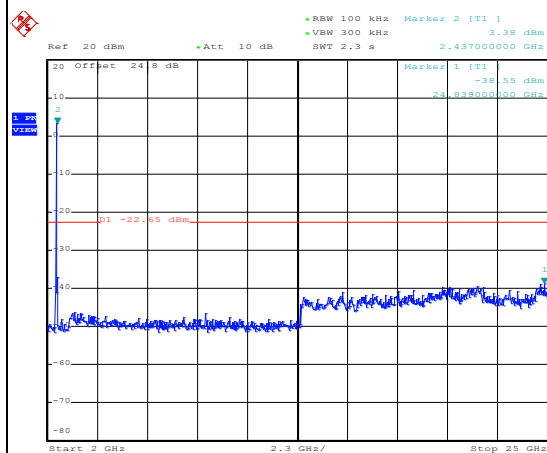
Date: 28.AUG.2018 23:30:56

Spurious Emission 30MHz~3GHz

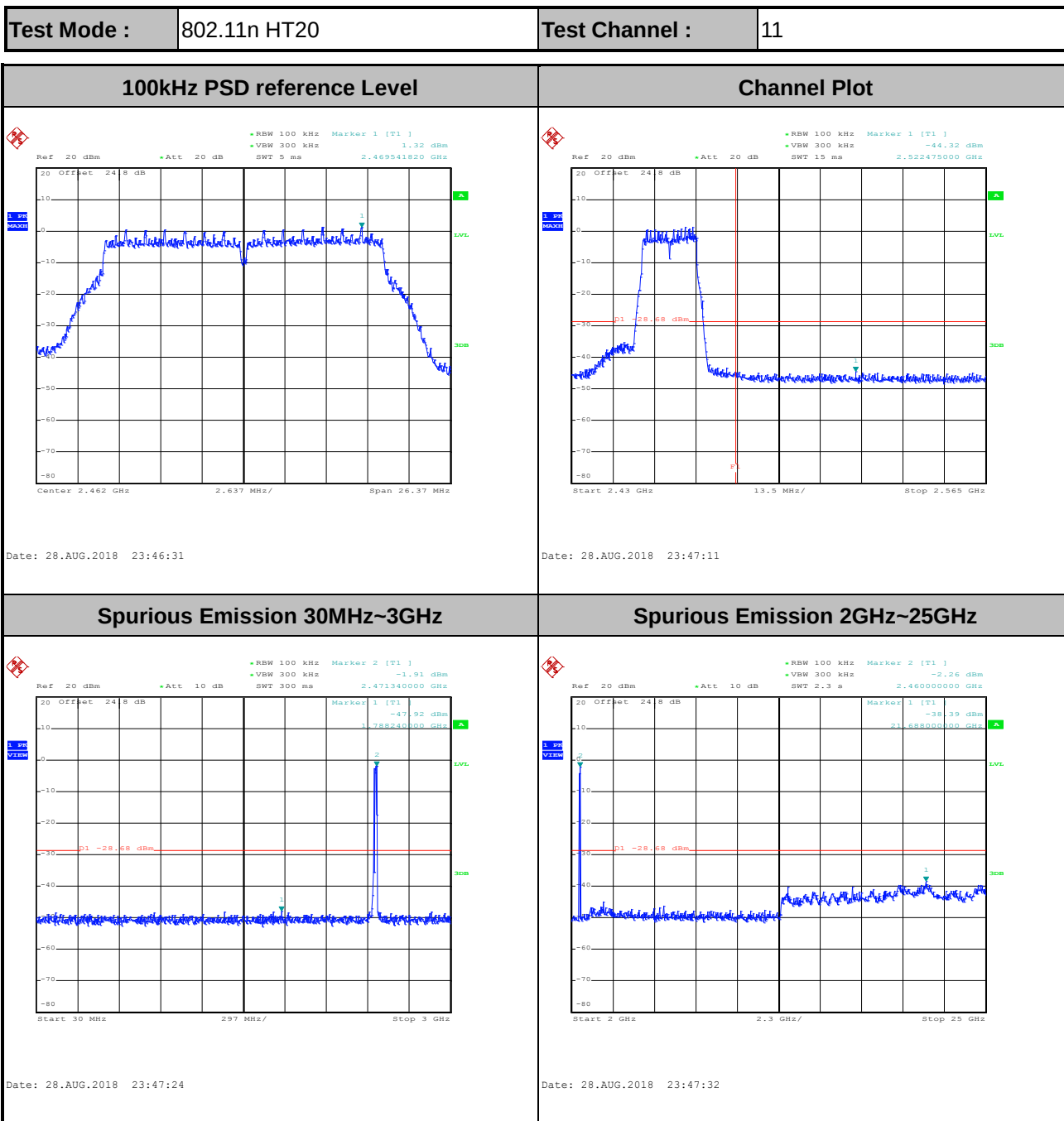


Date: 28.AUG.2018 23:31:13

Spurious Emission 2GHz~25GHz



Date: 28.AUG.2018 23:31:22

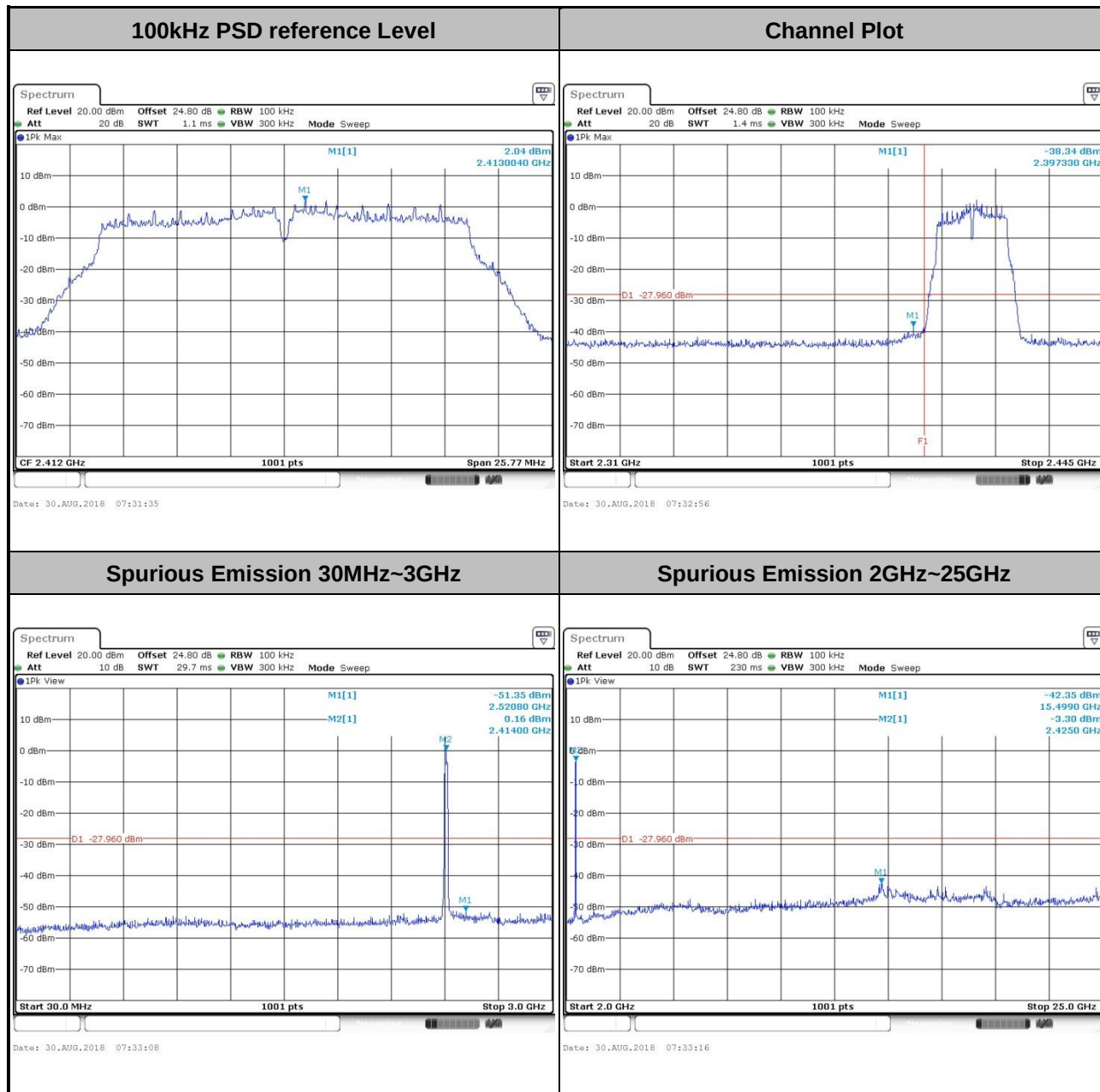




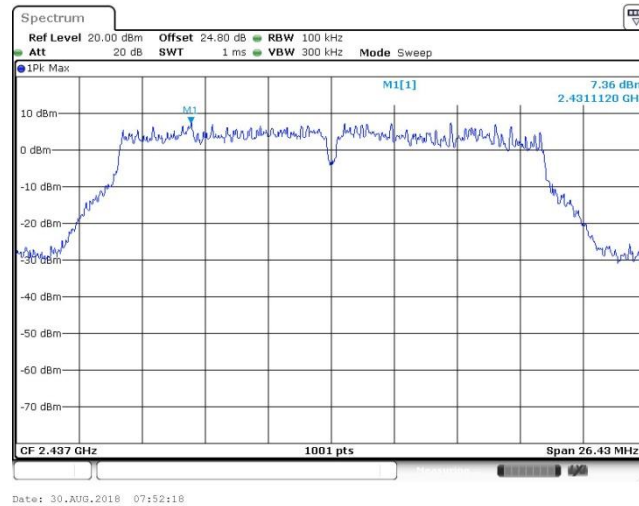
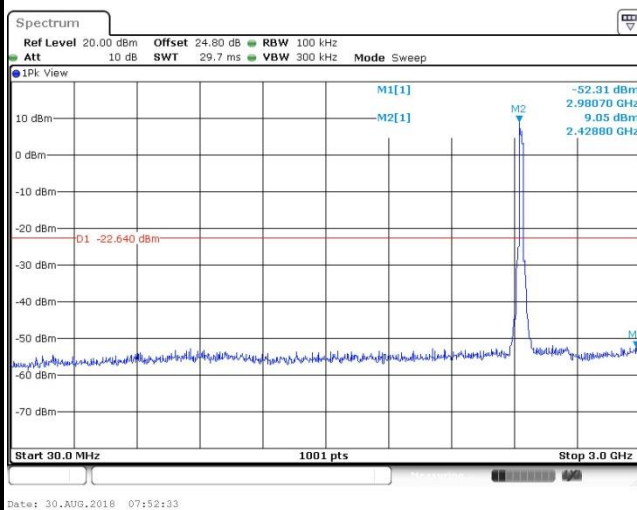
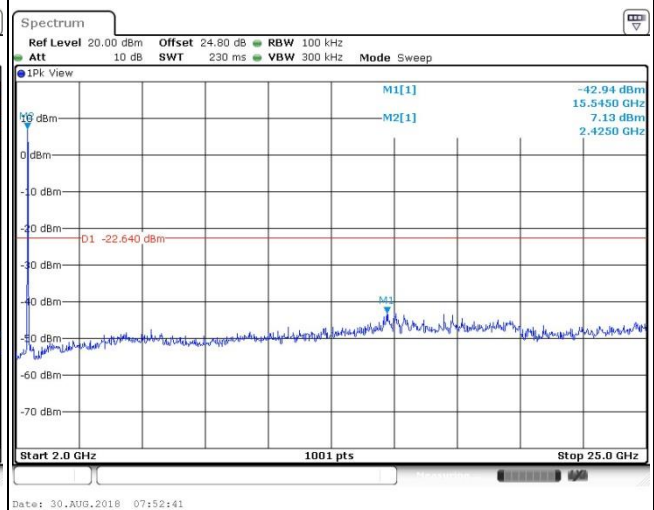
<TXBF Modes>

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

Test Mode :	802.11n HT20	Test Channel :	01
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Test Mode :	802.11n HT20	Test Channel :	06
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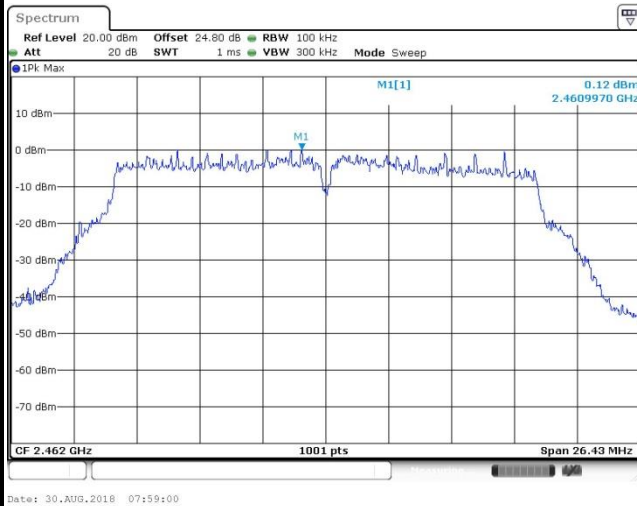
100kHz PSD reference Level

Spurious Emission 30MHz~3GHz

Spurious Emission 2GHz~25GHz




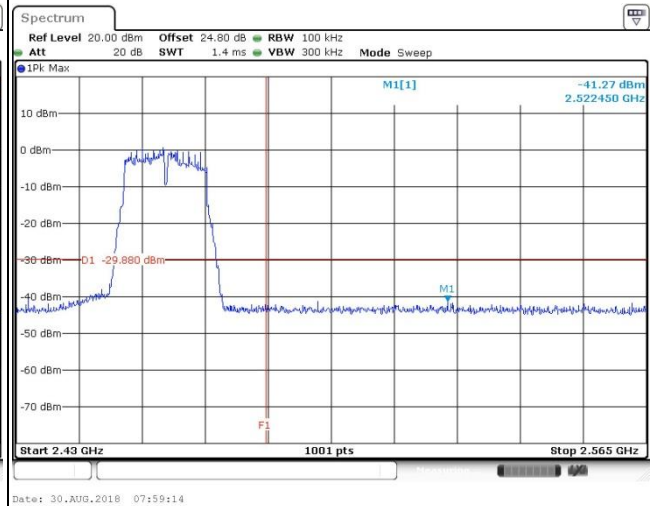
Test Mode : 802.11n HT20

Test Channel : 11

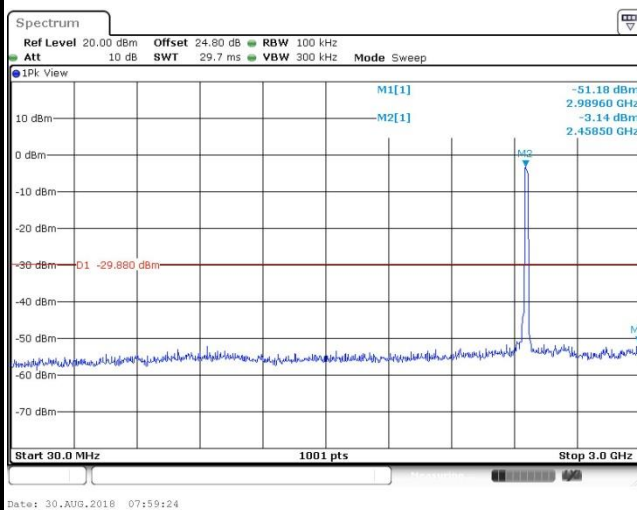
100kHz PSD reference Level



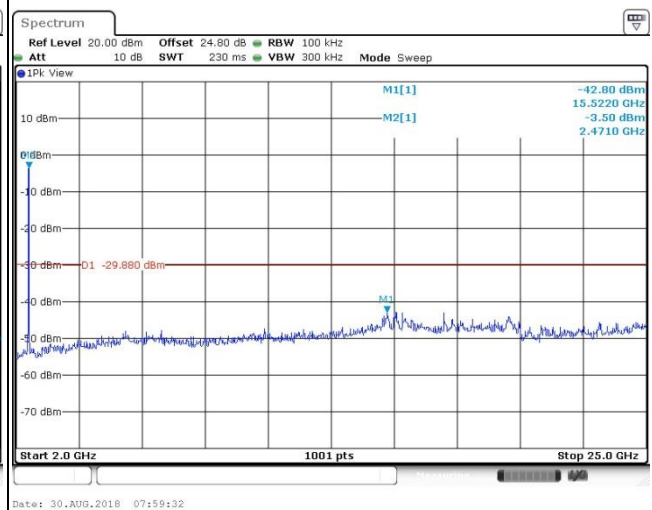
Channel Plot



Spurious Emission 30MHz~3GHz

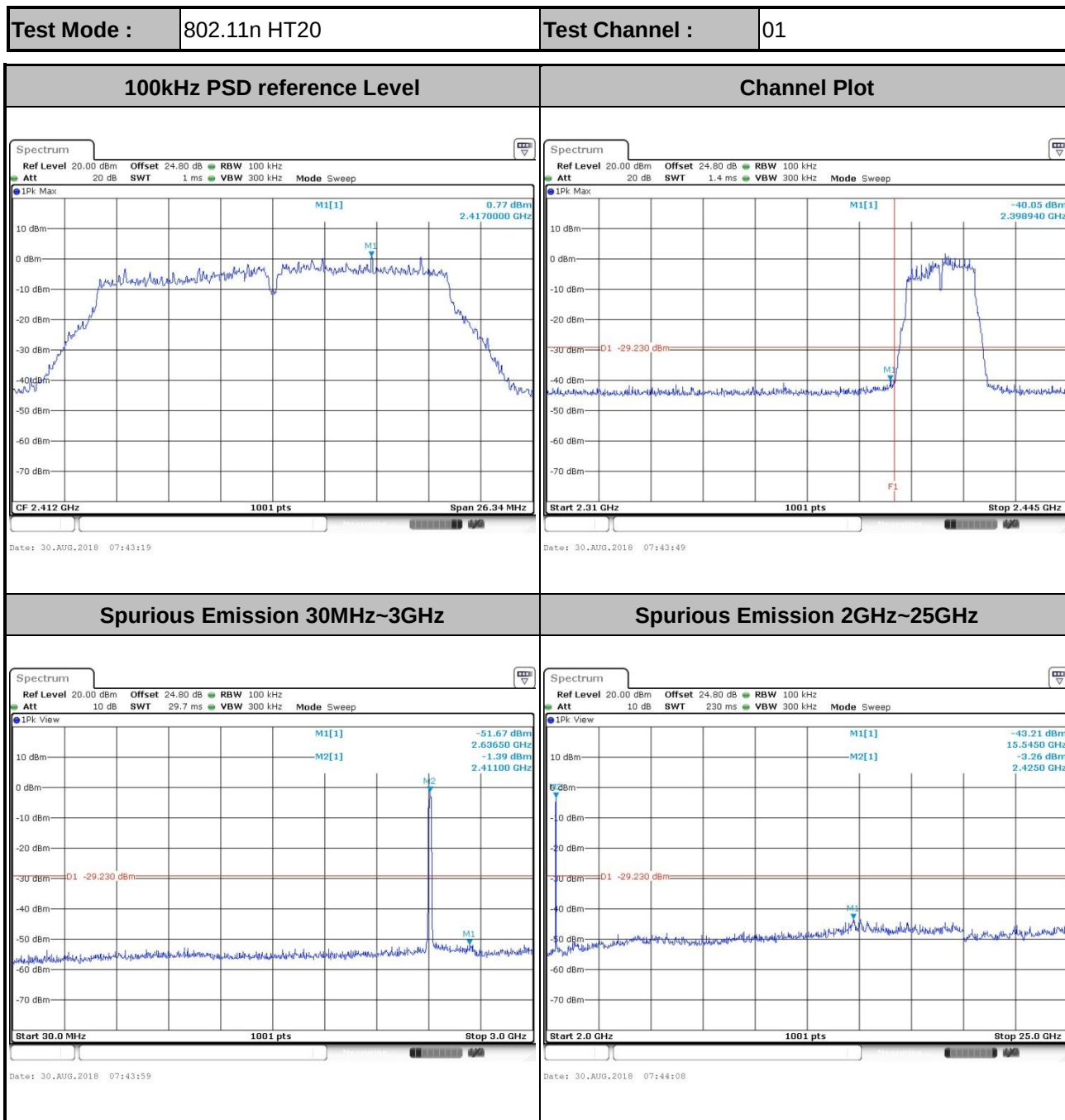


Spurious Emission 2GHz~25GHz

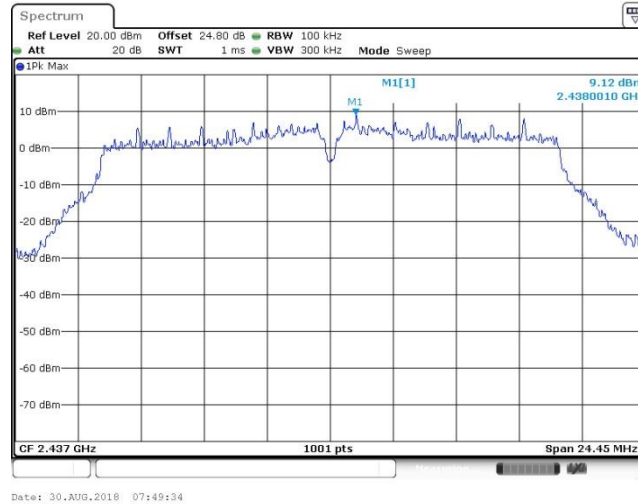
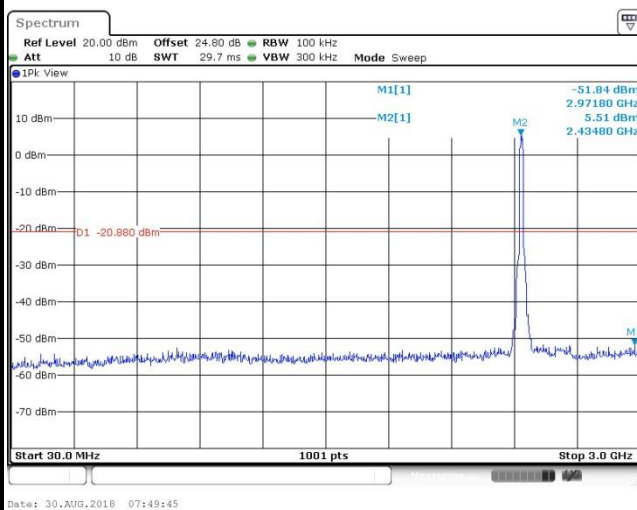
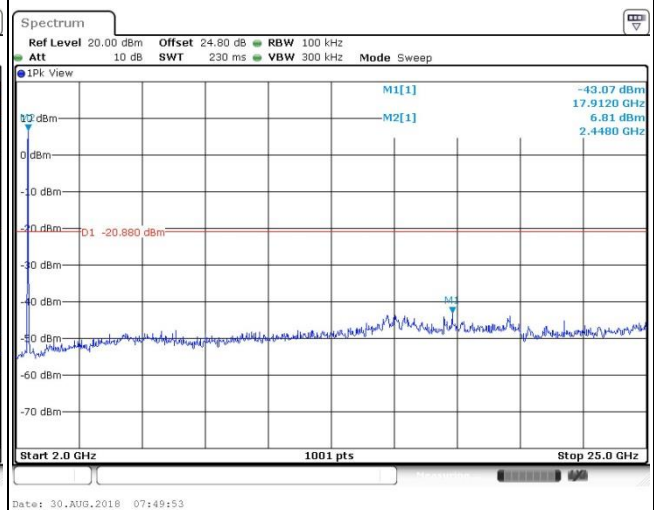




Number of TX = 2, Ant. 2 (Measured)



Test Mode :	802.11n HT20	Test Channel :	06
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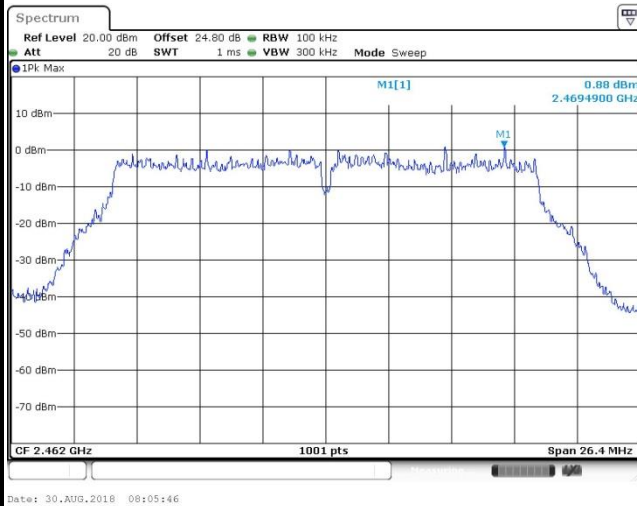
100kHz PSD reference Level

Spurious Emission 30MHz~3GHz

Spurious Emission 2GHz~25GHz




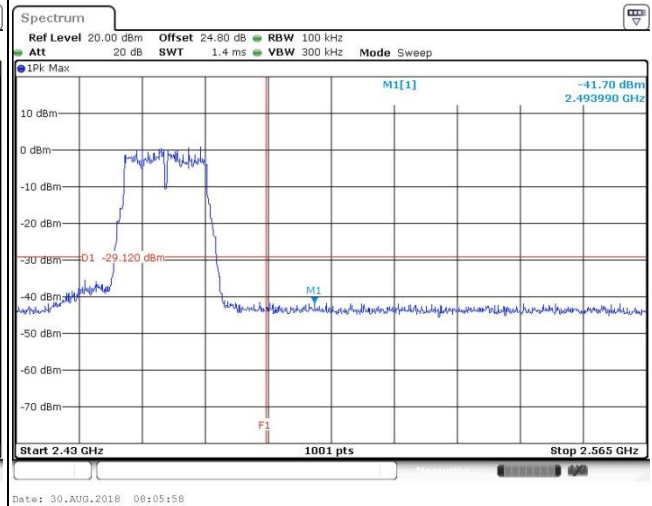
Test Mode : 802.11n HT20

Test Channel : 11

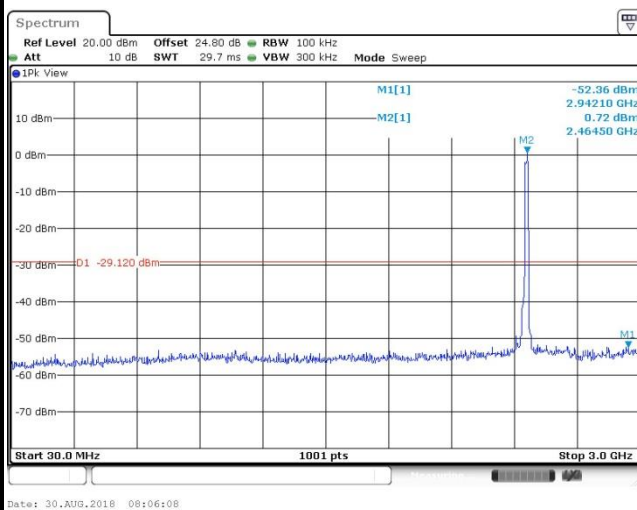
100kHz PSD reference Level



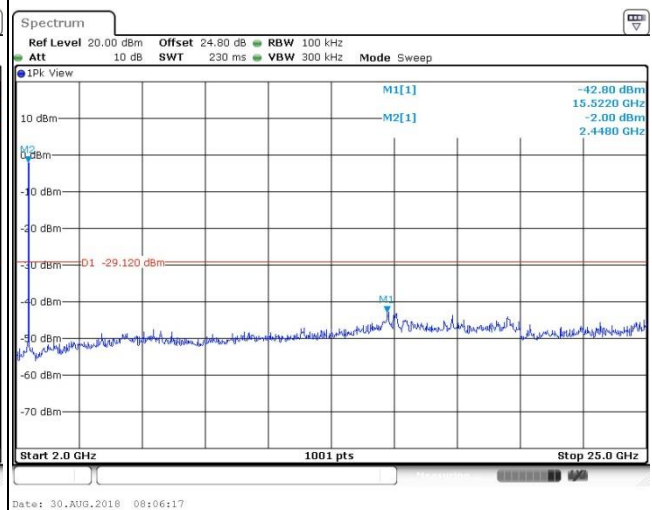
Channel Plot



Spurious Emission 30MHz~3GHz



Spurious Emission 2GHz~25GHz



3.5 Radiated Band Edges and Spurious Emission Measurement

3.5.1 Limit of Radiated band edge and Spurious Emission Measurement

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the NCC LP0002 section 2.8 limits as below.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

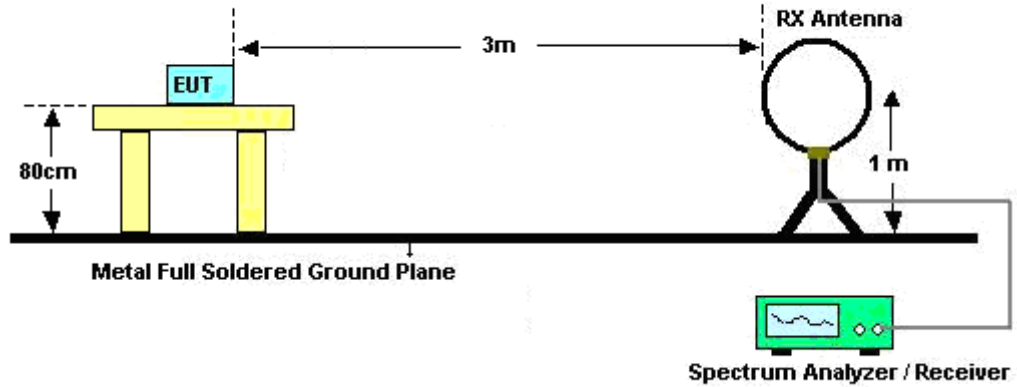
1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
8. Use the following spectrum analyzer settings:
 - (1) Span shall wide enough to fully capture the emission being measured;
 - (2) Set RBW=100 kHz for $f < 1$ GHz; VBW $\geq$ RBW; Sweep = auto; Detector function = peak; Trace = max hold;
 - (3) Set RBW = 1 MHz, VBW= 3MHz for $f \geq 1$ GHz for peak measurement.

For average measurement:

 - VBW = 10 Hz, when duty cycle is no less than 98 percent.
 - VBW $\geq 1/T$, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

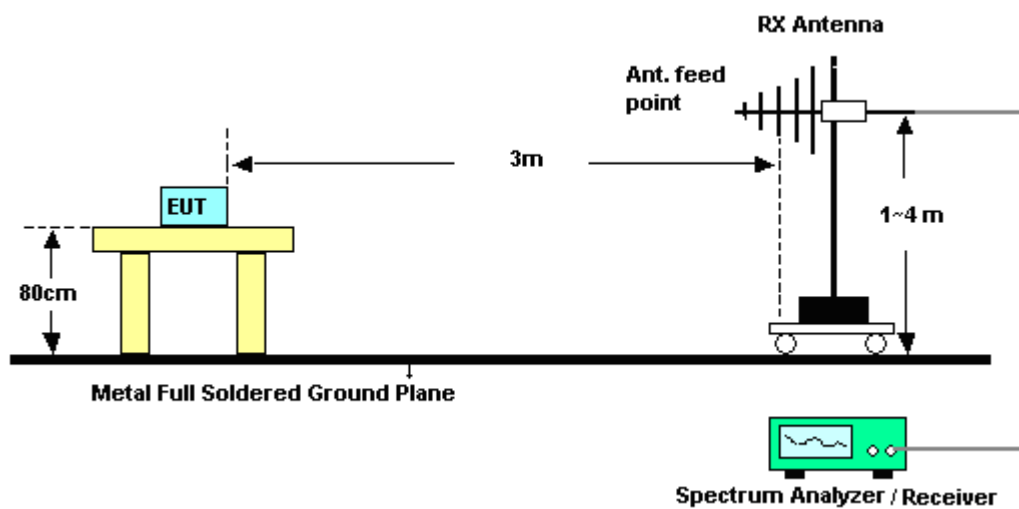
3.5.4 Test Setup

For radiated emissions below 30MHz

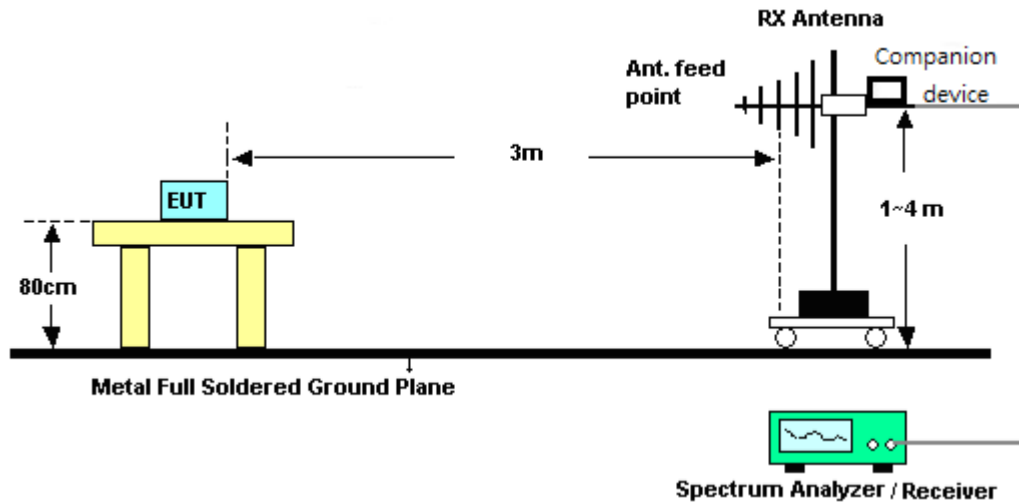


For radiated emissions from 30MHz to 1GHz

<CDD Mode>

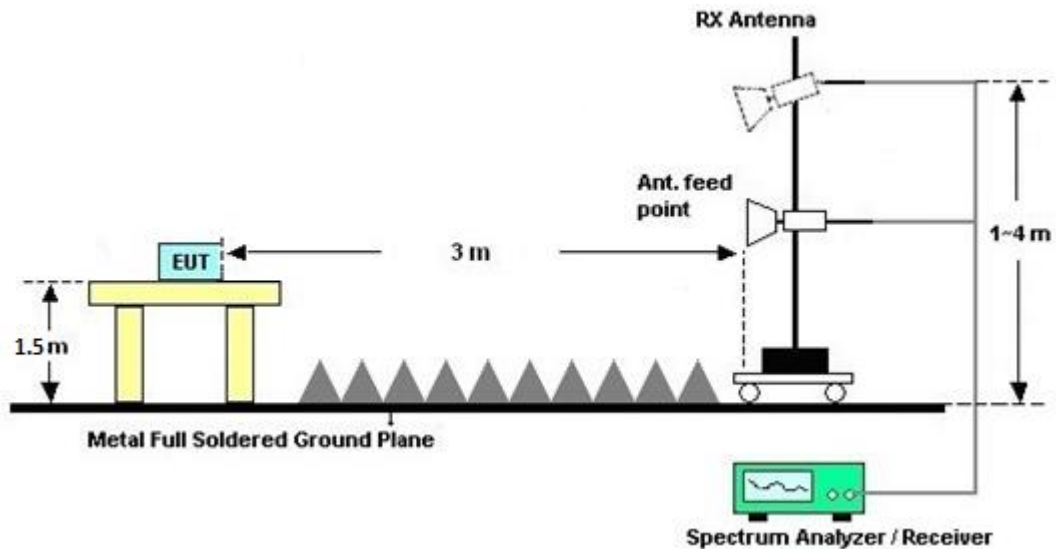


<TXBF Modes>

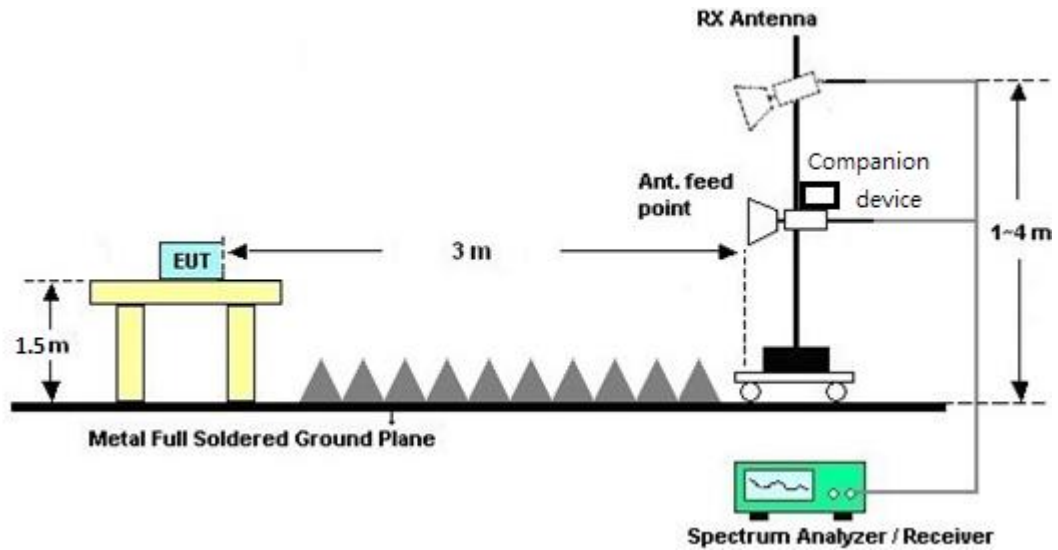


For radiated emissions above 1GHz

<CDD Mode>



<TXBF Modes>



3.5.5 Test Results of Radiated Spurious Emissions (9kHz ~ 30MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per NCC LP0002 section 5.13 was not reported.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

3.5.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix B and C.

3.5.7 Duty Cycle

Please refer to Appendix D.

3.5.8 Test Result of Radiated Spurious Emission (30MHz ~ 10th Harmonic)

Please refer to Appendix B and C.

3.6 Test of Receiver Radiated Emission Measurement

3.6.1 Limit of Receiver Radiated Emission

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.6.2 Measuring Instruments

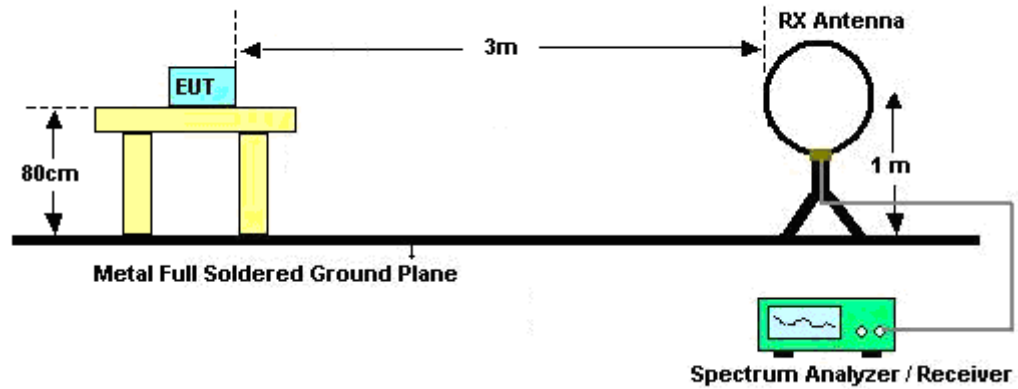
The measuring equipment is listed in the section 4 of this test report.

3.6.3 Test Procedures

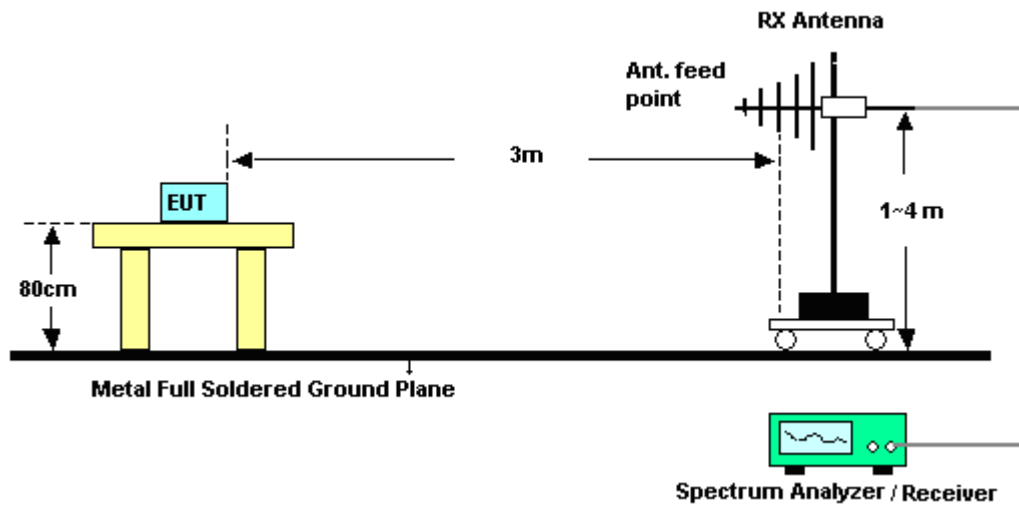
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna is a Bi-Log antenna and its height is adjusted between one to four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode (RBW=120kHz/VBW=300kHz for frequency below 1GHz; RBW=1MHz VBW=3MHz (Peak), RBW=1MHz/VBW=10Hz (Average) for frequency above 1GHz).
7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, peak values of EUT will be reported. Otherwise, the emission will be repeated by using the quasi-peak method and reported.
8. Emission level (dBμV/m) = 20 log Emission level (μV/m)
9. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

3.6.4 Test Setup

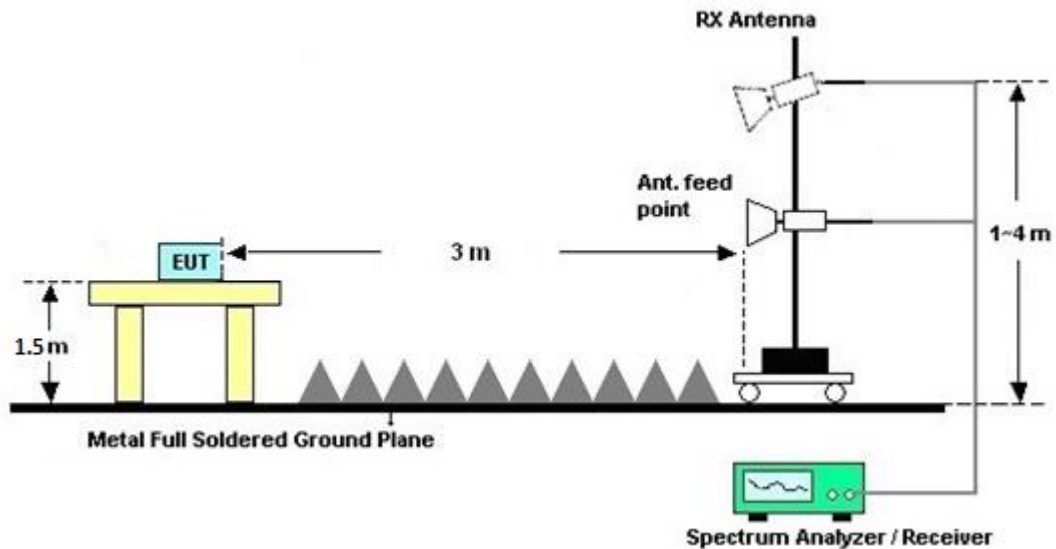
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.6.5 Test Result of Receiver Radiated Spurious Emissions (9kHz ~ 30MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per NCC LP0002 section 5.13 was not reported.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

3.6.6 Test Result of Receiver Radiated Spurious Emission (30MHz ~ 5th Harmonic)

Please refer to Appendix C.

3.7 AC Conducted Emission Measurement

3.7.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

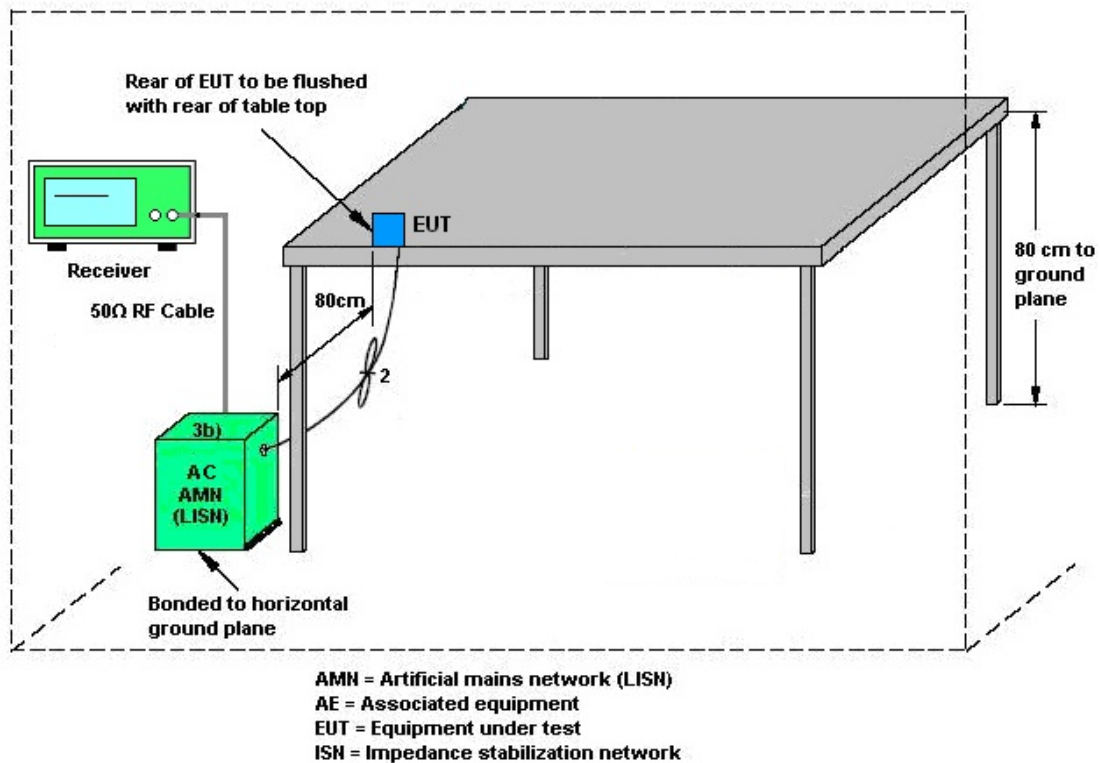
3.7.2 Measuring Instruments

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

3.7.3 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF bandwidth = 9kHz) with Maximum Hold Mode.

3.7.4 Test Setup



3.7.5 Test Result of AC Conducted Emission

Please refer to Appendix A.

3.8 Antenna Requirements

3.8.1 Standard Applicable

If directional gain of transmitting Antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. The use of a permanently attached Antenna or of an Antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the LP0002 Section 2.2, Section 3.10.1.3, and Section 3.10.1.4.

3.8.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.8.3 Antenna Gain

<CDD Modes >

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For CDD transmissions, directional gain is calculated as

Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

For power spectral density (PSD) measurements on all devices,

Array Gain = $10 \log(N_{ANT}/N_{SS}=1)$ dB.

For power measurements on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$.

Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain;

The EUT supports CDD mode.

For power, the directional gain G_{ANT} is set equal to the antenna having the highest gain, i.e., F)2)f)i).

For PSD, the directional gain calculation is following F)2)f)ii) of KDB 662911 D01 v02r01.

The power and PSD limit should be modified if the directional gain of EUT is over 6 dBi,

The directional gain "DG" is calculated as following table.

<CDD Modes>						
			DG for Power (dBi)	DG for PSD (dBi)	Power Limit Reduction (dB)	PSD Limit Reduction (dB)
	Ant. 1 (dBi)	Ant. 2 (dBi)				
2.4 GHz	3.39	3.18	3.39	6.30	0.00	0.30

Power Limit Reduction = $DG(\text{Power}) - 6\text{dBi}$, (min = 0)

PSD Limit Reduction = $DG(\text{PSD}) - 6\text{dBi}$, (min = 0)

TXBF modes

FCC KDB 662911 D01 Multiple Transmitter Output v02r01

For CDD transmissions, directional gain is calculated as

$$DirectionalGain = 10 \cdot \log \left[\frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$$

where

Each antenna is driven by no more than one spatial stream;

N_{SS} = the number of independent spatial streams of data;

N_{ANT} = the total number of antennas

$g_{j,k} = 10^{G_k / 20}$ if the k th antenna is being fed by spatial stream j , or zero if it is not;
 G_k is the gain in dBi of the k th antenna.

The EUT supports beamforming for 802.11ac modes.

The directional gain calculation is following F)2)e)ii) of KDB 662911 D01 v02r01.

The power and PSD limit should be modified if the directional gain of EUT is over 6 dBi,

The directional gain “DG” is calculated as following table.

			DG	DG	Power	PSD
			for	for	Limit	Limit
	Ant. 1	Ant. 2	Power	PSD	Reduction	Reduction
	(dBi)	(dBi)	(dBi)	(dBi)	(dB)	(dB)
2.4 GHz	3.39	3.28	6.35	6.35	0.35	0.35

Power Limit Reduction = DG(Power) – 6dBi, (min = 0)

PSD Limit Reduction = DG(PSD) – 6dBi, (min = 0)

3.9 Maximum Power Density

3.9.1 RF Exposure Limit Introduction

According to NCC LP0002, the criteria listed in Table shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §5.20.2.1 and §5.20.2.2.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f ²)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = Power Density

P = Output Power at Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna

3.9.2 Standalone Power Density Calculation

<CDD Modes>

Maximum Power Density				
Max. Power	Gain	EIRP	20 cm PSD	Limit
21.37	3.39	24.76	0.0596	1
dBm	dBi	dBm	mW/cm ²	mW/cm ²

<TXBF Modes>

Maximum Power Density				
Max. Power	Gain	EIRP	20 cm PSD	Limit
21.81	6.3	28.11	0.1288	1
dBm	dBi	dBm	mW/cm ²	mW/cm ²

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Power Meter	Anritsu	ML2495A	1240001	N/A	Sep. 07, 2017	Jul. 26, 2018 ~ Aug. 30, 2018	Sep. 06, 2018	Conducted (TH05-HY)
Power Sensor	Anritsu	MA2411B	1207349	300MHz~40GHz	Sep. 07, 2017	Jul. 26, 2018 ~ Aug. 30, 2018	Sep. 06, 2018	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100057	9kHz-40GHz	Nov. 21, 2017	Jul. 26, 2018 ~ Aug. 30, 2018	Nov. 20, 2018	Conducted (TH05-HY)
Power Sensor	DARE	RPR3006W	13I00030S NO31	10MHz~6GHz	Sep. 25, 2017	Jul. 26, 2018 ~ Aug. 30, 2018	Sep. 24, 2018	Conducted (TH05-HY)
Signal Analyzer	Rohde & Schwarz	FSV40	101397	10Hz~40GHz	Nov. 07, 2017	Jul. 26, 2018 ~ Aug. 30, 2018	Nov. 06, 2018	Conducted (TH05-HY)
Switch Box & RF Cable	Burgeon	ETF-058	EC130048 4	N/A	Mar. 01, 2018	Jul. 26, 2018 ~ Aug. 30, 2018	Feb. 28, 2019	Conducted (TH05-HY)
EMI Test Receiver	Rohde & Schwarz	ESR3	102388	9KHz~3.6GHz	Dec. 08, 2017	Aug. 06, 2018	Dec. 07, 2018	Conduction (CO05-HY)
LISN	Rohde & Schwarz	ENV216	100080	9kHz~30MHz	Nov. 30, 2017	Aug. 06, 2018	Nov. 29, 2018	Conduction (CO05-HY)
Software	Rohde & Schwarz	EMC32 V10.30	N/A	N/A	N/A	Aug. 06, 2018	N/A	Conduction (CO05-HY)
LF Cable	HUBER + SUHNER	RG-214/U	LF01	N/A	Jan. 03, 2018	Aug. 06, 2018	Jan. 02, 2019	Conduction (CO05-HY)
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	100851	N/A	Jan. 03, 2018	Aug. 06, 2018	Jan. 02, 2019	Conduction (CO05-HY)



Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz, VSWR : 2.5:1 max	Jul. 16, 2018	Aug. 07, 2018~ Aug. 27, 2018	Jul. 15, 2019	Radiation (03CH11-HY)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Jan. 16, 2018	Aug. 07, 2018~ Aug. 27, 2018	Jan. 15, 2019	Radiation (03CH11-HY)
Bilog Antenna	TESEQ	CBL 6111D&N-6- 06	35414&AT-N 0602	30MHz~1GHz	Oct. 14, 2017	Aug. 07, 2018~ Aug. 27, 2018	Oct. 13, 2018	Radiation (03CH11-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-1326	1GHz ~ 18GHz	Oct. 16, 2017	Aug. 07, 2018~ Aug. 27, 2018	Oct. 15, 2018	Radiation (03CH11-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Nov. 23, 2017	Aug. 07, 2018~ Aug. 27, 2018	Nov. 22, 2018	Radiation (03CH11-HY)
Preamplifier	Keysight	83017A	MY5327008 0	1GHz~26.5GHz	Jan. 16, 2018	Aug. 07, 2018~ Aug. 27, 2018	Jan. 15, 2020	Radiation (03CH11-HY)
Spectrum Analyzer	Keysight	N9010A	MY5420048 6	10Hz ~ 44GHz	Oct. 19, 2017	Aug. 07, 2018~ Aug. 27, 2018	Oct. 18, 2018	Radiation (03CH11-HY)
Antenna Mast	EMEC	AM-BS-4500 -B	N/A	1~4m	N/A	Aug. 07, 2018~ Aug. 27, 2018	N/A	Radiation (03CH11-HY)
Turn Table	EMEC	TT 2000	N/A	0~360 Degree	N/A	Aug. 07, 2018~ Aug. 27, 2018	N/A	Radiation (03CH11-HY)
Preamplifier	Jet-Power	JPA0118-55- 303K	1710001800 054001	1GHz~18GHz	Apr. 16, 2018	Aug. 07, 2018~ Aug. 27, 2018	Apr. 15, 2019	Radiation (03CH11-HY)
SHF-EHF Horn Antenna	SCHWARZBE CK	BBHA 9170	BBHA91705 84	18GHz- 40GHz	Nov. 27, 2017	Aug. 07, 2018~ Aug. 27, 2018	Nov. 26, 2018	Radiation (03CH11-HY)
Software	Audix	E3 6.2009-8-24	RK-001042	N/A	N/A	Aug. 07, 2018~ Aug. 27, 2018	N/A	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4P E	9kHz-30MHz	Mar. 14, 2018	Aug. 07, 2018~ Aug. 27, 2018	Mar. 13, 2019	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY2859/2	30MHz-40GHz	Mar. 14, 2018	Aug. 07, 2018~ Aug. 27, 2018	Mar. 13, 2019	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9837/4P E	30M-18G	Mar. 14, 2018	Aug. 07, 2018~ Aug. 27, 2018	Mar. 13, 2019	Radiation (03CH11-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY4274/2	30MHz-40GHz	Mar. 14, 2018	Aug. 07, 2018~ Aug. 27, 2018	Mar. 13, 2019	Radiation (03CH11-HY)
Filter	Wainwright	WLK4-1000- 1530-8000-4 0SS	SN11	1G Low Pass	Sep. 18, 2017	Aug. 07, 2018~ Aug. 27, 2018	Sep. 17, 2018	Radiation (03CH11-HY)
Filter	Wainwright	WHKX12-27 00-3000-180 00-60SS	SN3	2.7G High Pass	Sep. 18, 2017	Aug. 07, 2018~ Aug. 27, 2018	Sep. 17, 2018	Radiation (03CH11-HY)

5 Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	2.70
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Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.20
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

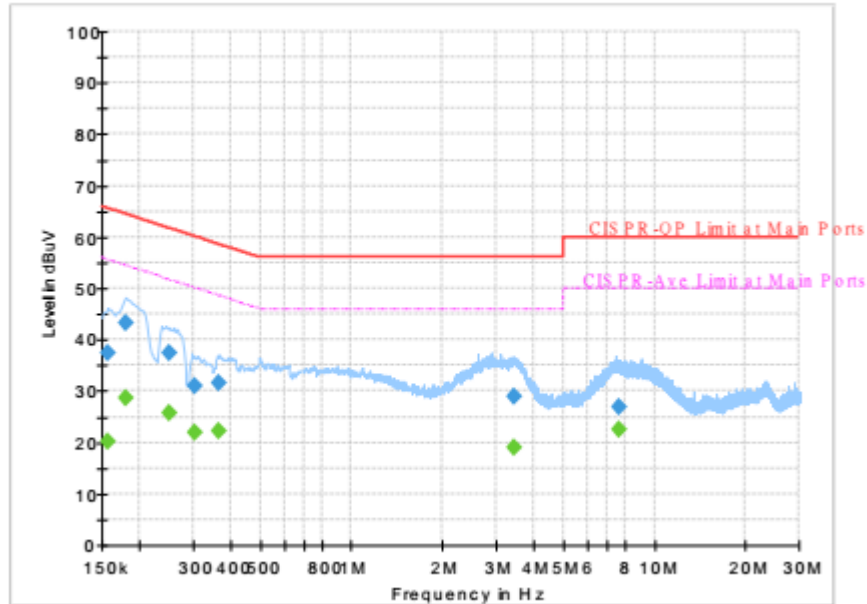
Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.50
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.20
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Appendix A. AC Conducted Emission Test Results

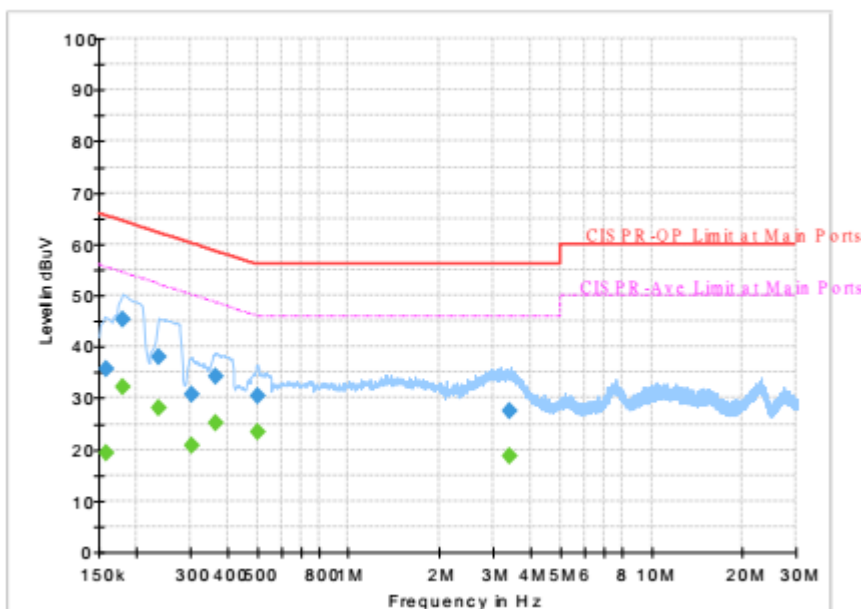
Test Mode :	Mode 1	Temperature :	21~25°C
Test Engineer :	Arthur Hsieh	Relative Humidity :	51~55%
Test Voltage :	120Vac / 60Hz	Phase :	Line



Final Result

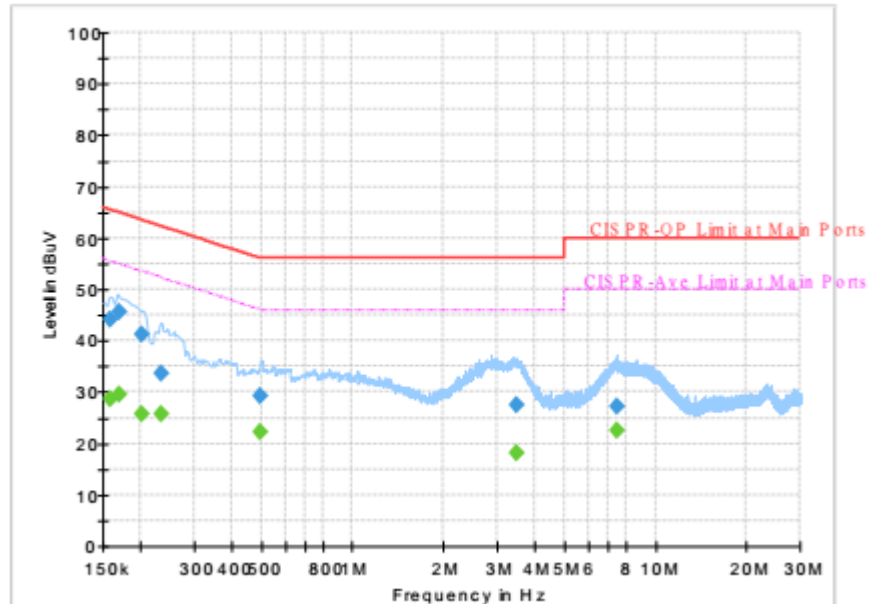
Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.156750	---	20.04	55.63	35.59	L1	OFF	19.5
0.156750	37.57	---	65.63	28.06	L1	OFF	19.5
0.179250	---	28.69	54.52	25.83	L1	OFF	19.5
0.179250	43.31	---	64.52	21.21	L1	OFF	19.5
0.251250	---	25.69	51.72	26.03	L1	OFF	19.5
0.251250	37.53	---	61.72	24.19	L1	OFF	19.5
0.305250	---	21.90	50.10	28.20	L1	OFF	19.5
0.305250	31.03	---	60.10	29.07	L1	OFF	19.5
0.366000	---	22.34	48.59	26.25	L1	OFF	19.5
0.366000	31.65	---	58.59	26.94	L1	OFF	19.5
3.453000	---	18.87	46.00	27.13	L1	OFF	19.6
3.453000	28.96	---	56.00	27.04	L1	OFF	19.6
7.647000	---	22.51	50.00	27.49	L1	OFF	19.7
7.647000	26.97	---	60.00	33.03	L1	OFF	19.7

Test Mode :	Mode 1	Temperature :	21~25℃
Test Engineer :	Arthur Hsieh	Relative Humidity :	51~55%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral


Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.159000	---	19.30	55.52	36.22	N	OFF	19.5
0.159000	35.53	---	65.52	29.99	N	OFF	19.5
0.179250	---	32.04	54.52	22.48	N	OFF	19.5
0.179250	45.27	---	64.52	19.25	N	OFF	19.5
0.235500	---	28.12	52.25	24.13	N	OFF	19.5
0.235500	38.01	---	62.25	24.24	N	OFF	19.5
0.305250	---	20.89	50.10	29.21	N	OFF	19.5
0.305250	30.85	---	60.10	29.25	N	OFF	19.5
0.366000	---	25.12	48.59	23.47	N	OFF	19.5
0.366000	34.27	---	58.59	24.32	N	OFF	19.5
0.501000	---	23.37	46.00	22.63	N	OFF	19.5
0.501000	30.52	---	56.00	25.48	N	OFF	19.5
3.392250	---	18.73	46.00	27.27	N	OFF	19.6
3.392250	27.52	---	56.00	28.48	N	OFF	19.6

Test Mode :	Mode 2	Temperature :	21~25℃
Test Engineer :	Arthur Hsieh	Relative Humidity :	51~55%
Test Voltage :	120Vac / 60Hz	Phase :	Line


Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Line	Filter	Corr. (dB)
0.159000	---	28.74	55.52	26.78	L1	OFF	19.5
0.159000	44.02	---	65.52	21.50	L1	OFF	19.5
0.170250	---	29.51	54.95	25.44	L1	OFF	19.5
0.170250	45.61	---	64.95	19.34	L1	OFF	19.5
0.201750	---	25.73	53.54	27.81	L1	OFF	19.5
0.201750	41.16	---	63.54	22.38	L1	OFF	19.5
0.233250	---	25.88	52.33	26.45	L1	OFF	19.5
0.233250	33.72	---	62.33	28.61	L1	OFF	19.5
0.498750	---	22.22	46.02	23.80	L1	OFF	19.5
0.498750	29.16	---	56.02	26.86	L1	OFF	19.5
3.482250	---	18.03	46.00	27.97	L1	OFF	19.6
3.482250	27.41	---	56.00	28.59	L1	OFF	19.6
7.505250	---	22.58	50.00	27.42	L1	OFF	19.7
7.505250	27.33	---	60.00	32.67	L1	OFF	19.7