



FCC RADIO TEST REPORT

FCC ID : J9CQSIP7180P
Equipment : 7c Modular Platform
Brand Name : Qualcomm
Model Name : QSIP7180P
Applicant : Qualcomm Technologies, Inc
5775 Morehouse Dr.San Diego, CA 92121-1714 (USA)
Manufacturer : Qualcomm Technologies, Inc
5775 Morehouse Dr.San Diego, CA 92121-1714 (USA)
Standard : FCC Part 15 Subpart C §15.247

The product was received on Jun. 08, 2020 and testing was started from Jun. 11, 2020 and completed on Jul. 31, 2020. We, SPORTON INTERNATIONAL INC., EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

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: Louis Wu

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

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



Table of Contents

History of this test report.....	3
Summary of Test Result.....	4
1 General Description	5
1.1 Product Feature of Equipment Under Test.....	5
1.2 Modification of EUT	5
1.3 Testing Location	6
1.4 Applicable Standards.....	6
2 Test Configuration of Equipment Under Test	7
2.1 Carrier Frequency and Channel	7
2.2 Test Mode.....	7
2.3 Connection Diagram of Test System.....	8
2.4 Support Unit used in test configuration and system	8
2.5 EUT Operation Test Setup	9
2.6 Measurement Results Explanation Example.....	9
3 Test Result	10
3.1 6dB and 99% Bandwidth Measurement	10
3.2 Output Power Measurement.....	12
3.3 Power Spectral Density Measurement	13
3.4 Conducted Band Edges and Spurious Emission Measurement	15
3.5 Radiated Band Edges and Spurious Emission Measurement	56
3.6 Antenna Requirements.....	60
4 List of Measuring Equipment.....	61
5 Uncertainty of Evaluation	62
Appendix A. Conducted Test Results	
Appendix B. Radiated Spurious Emission	
Appendix C. Radiated Spurious Emission Plots	
Appendix D. Duty Cycle Plots	
Appendix E. Setup Photographs	



History of this test report

Report No.	Version	Description	Issued Date
FR042002-06C	01	Initial issue of report	Sep. 17, 2020

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.247(a)(2)	6dB Bandwidth	Pass	-
3.1	2.1049	99% Occupied Bandwidth	Reporting only	-
3.2	15.247(b)	Power Output Measurement	Pass	-
3.3	15.247(e)	Power Spectral Density	Pass	-
3.4	15.247(d)	Conducted Band Edges	Pass	-
		Conducted Spurious Emission	Pass	-
3.5	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	Pass	Under limit 1.06 dB at 2483.520 MHz
-	15.207	AC Conducted Emission	Not Required	-
3.6	15.203 & 15.247(b)	Antenna Requirement	Pass	-

Note: Not required means after assessing, test items are not necessary to carry out.

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Wii Chang

Report Producer: Amy Chen

1 General Description

1.1 Product Feature of Equipment Under Test

Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n/ac, Wi-Fi 5GHz 802.11a/n/ac.

Antenna Information								
Antenna No.	Brand	Model	Antenna Net gain	Frequency Range (MHz)	Cable Loss (dBi)	Ant. Type	Connector Type	Cable Length (mm)
1	WNC	81.EBJ15.005	3.00	2400-2500 MHz	1.15	PIFA	IPEX	300
			2.56	5150-5350 MHz	1.7			
			4.76	5470-5725MHz	1.74			
			4.76	5725-5825 MHz	1.79			
2	WNC	81.EBJ15.005	3.62	2400-2500 MHz	1.15	PIFA	IPEX	300
			3.08	5150-5350 MHz	1.7			
			3.31	5470-5725MHz	1.74			
			2.42	5725-5825 MHz	1.79			

Remark:

1. Above antenna gains of antenna are Total (H+V).
2. For Bluetooth mode was fixed transmission on Chain (0)
3. The maximum gain was chosen for test.

1.2 Modification of EUT

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



1.3 Testing Location

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
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

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
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.
	03CH15-HY

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

FCC designation No.: TW1190 and TW0007

1.4 Applicable Standards

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

- ♦ FCC Part 15 Subpart C §15.247
- ♦ FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05r02
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01.
- ♦ FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ♦ ANSI C63.10-2013

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. The TAF code is not including all the FCC KDB listed without accreditation.
3. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

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: 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 two degrees (0 and 90). The worst cases (Degree 0) were recorded in this report.

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	1	2412	8	2447
	2	2417	9	2452
	3	2422	10	2457
	4	2427	11	2462
	5	2432	12	2467
	6	2437	13	2472
	7	2442		

2.2 Test Mode

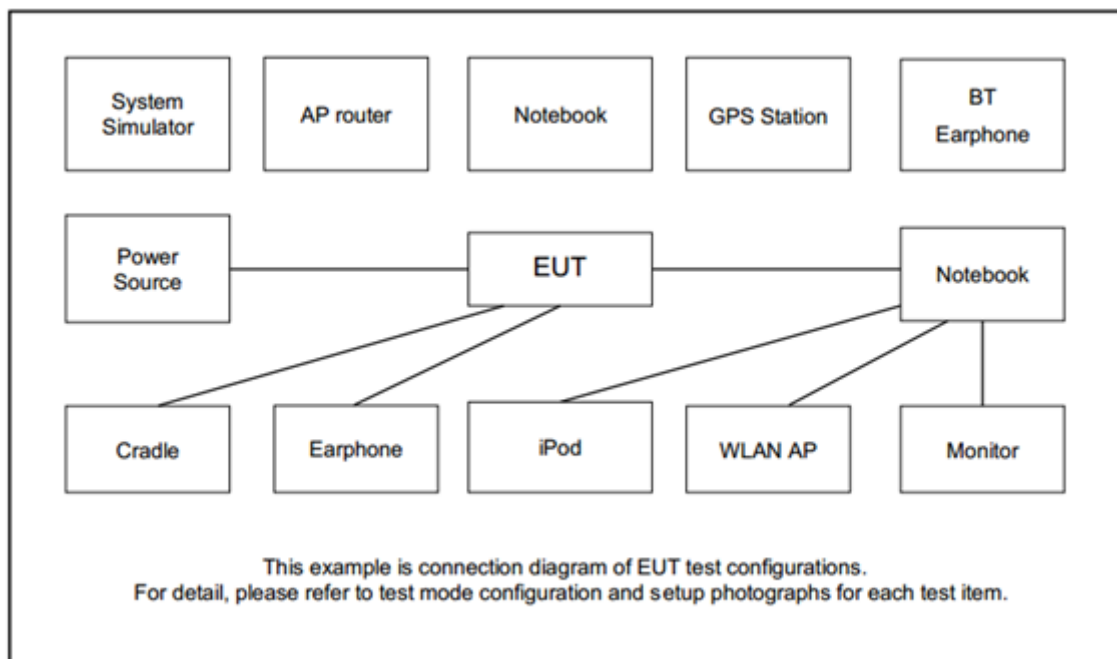
Final test modes are considering the modulation and worse data rates as below table.

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

Ch. #	2400-2483.5 MHz			
	802.11b	802.11g	802.11n HT20	802.11n HT40
Low	01	01	01	03
	02	02	02	04
Middle	06	06	06	06
	10	10	10	08
High	11	11	11	09
	12	12	12	10
	13	13	13	11

Remark: For radiation spurious emission, the final modulation and the worst data rate was reference the max RF conducted power.

2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	DELL	Latitude 3400	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
2.	Power Supply	GW Instek	GPE-2323	N/A	N/A	Unshielded, 1.8 m



2.5 EUT Operation Test Setup

The RF test items, utility “QRCT V4.0.00156.0” 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.

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.

$$\begin{aligned}\text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 4.2 + 10 = 14.2 \text{ (dB)}\end{aligned}$$

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.

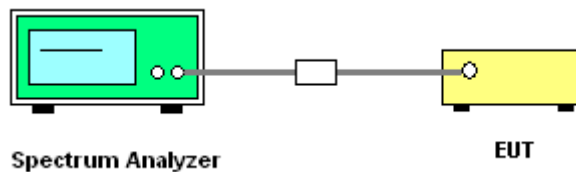
3.1.2 Measuring Instruments

See list of measuring equipment of this test report.

3.1.3 Test Procedures

1. The testing follows the ANSI C63.10 Section 6.9.3 (OBW) and 11.8.1 (6dB BW).
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) is set 1-5% of the emission bandwidth and set the Video bandwidth (VBW) $\geq 3 * RBW$.
6. Measure and record the results in the test report.

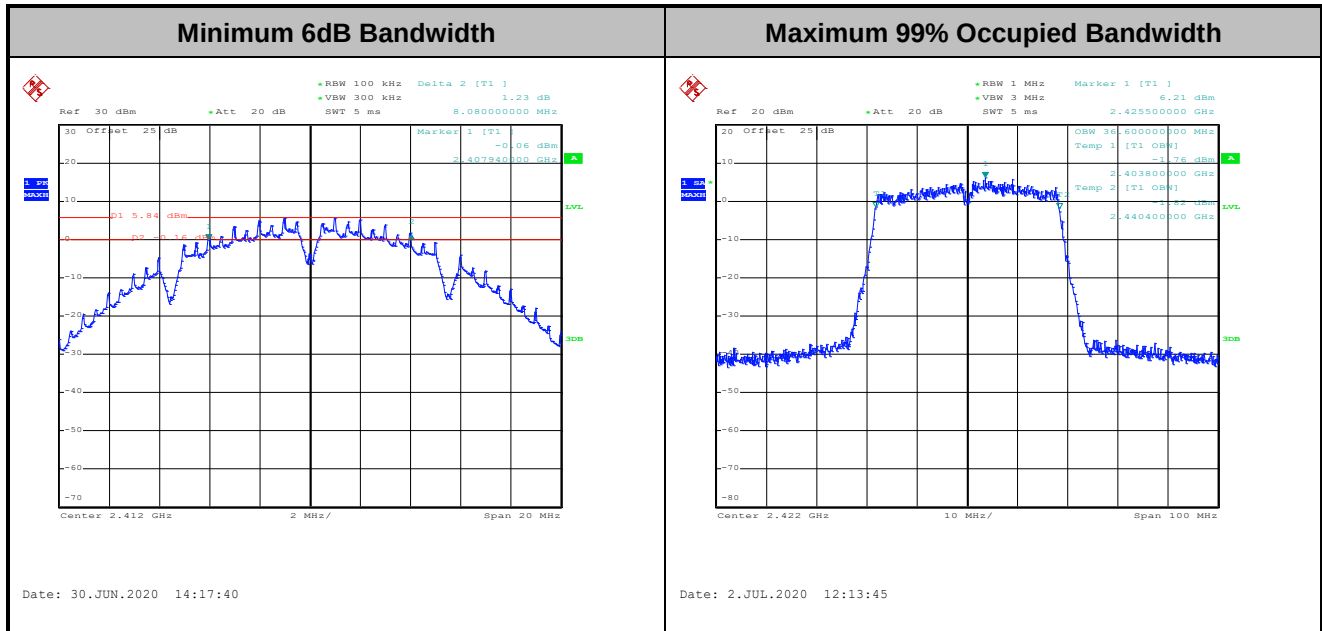
3.1.4 Test Setup





3.1.5 Test Result of 6dB and 99% Occupied Bandwidth

Please refer to Appendix A.



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 peak 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.

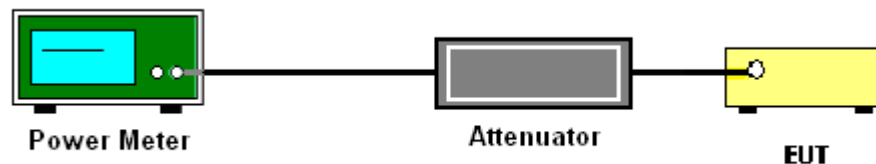
3.2.2 Measuring Instruments

See list of measuring equipment of this test report.

3.2.3 Test Procedures

1. For Average Power, the testing follows ANSI C63.10 Section 11.9.2.3.2 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 Average Output Power

Please refer to Appendix A.

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

See list of measuring equipment of this test report.

3.3.3 Test Procedures

1. The testing follows the ANSI C63.10 Section 11.10.2 Method PKPSD.
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) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.
7. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

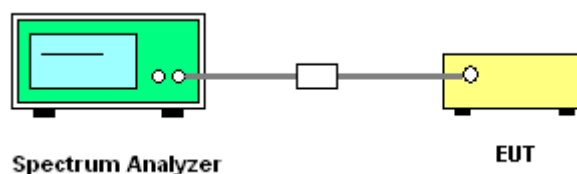
If measurements performed using method (2) plus $10 \log(N)$ exceeds the emission limit, the test should choose method (1) before declaring that the device fails the emission limit.

Method (1): Measure and sum the spectra across the outputs.

The total final Power Spectral Density is from a device with 2 transmitter outputs. The spectrum measurements of the individual outputs are all performed with the same span and number of points, the spectrum value in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 to obtain the value for the first frequency bin of the summed spectrum.

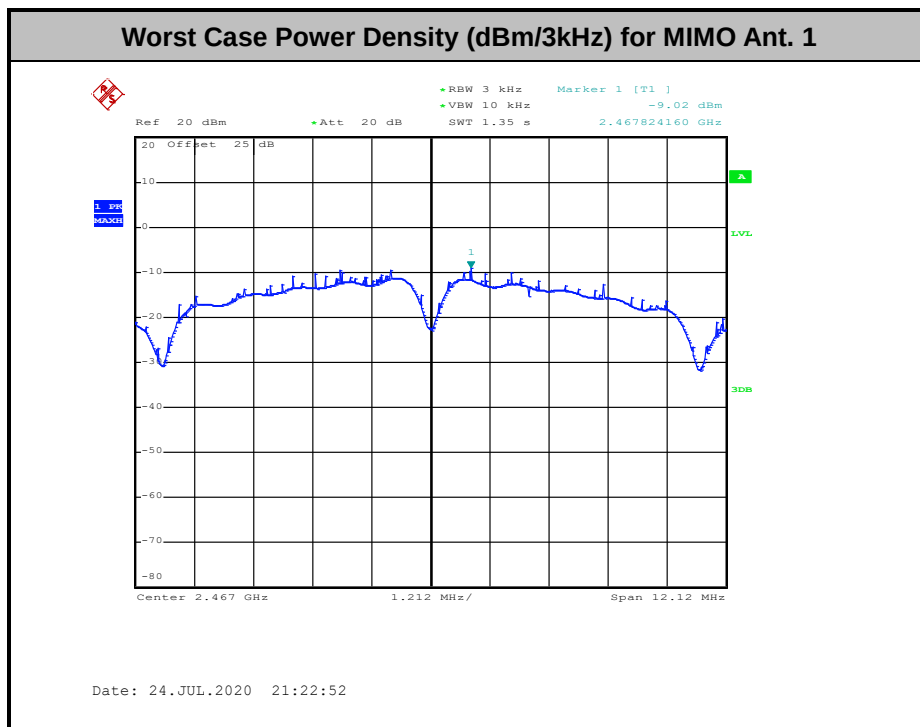
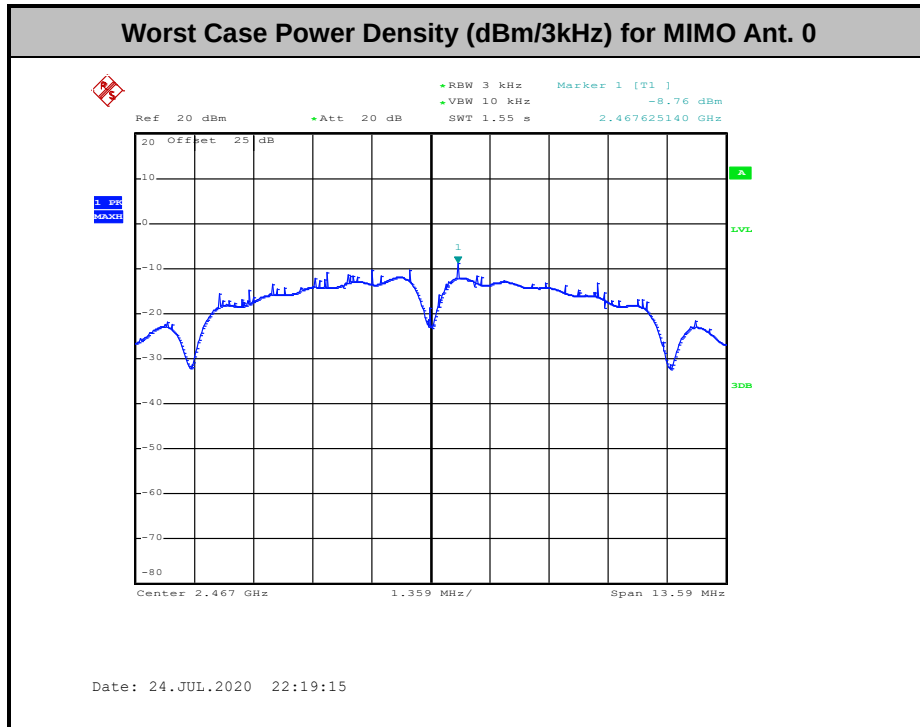
Method (2): Measure and add $10 \log(N)$ dB, where N is the number of outputs. (N=2)

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.



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.

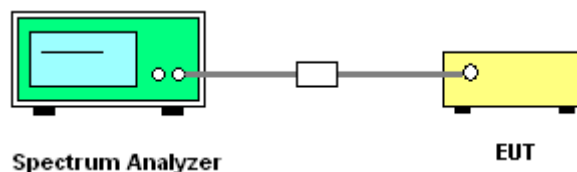
3.4.2 Measuring Instruments

See list of measuring equipment of this test report.

3.4.3 Test Procedures

1. The testing follows the ANSI C63.10 Section 11.11.3 Emission level measurement.
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 per 15.247(d).
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



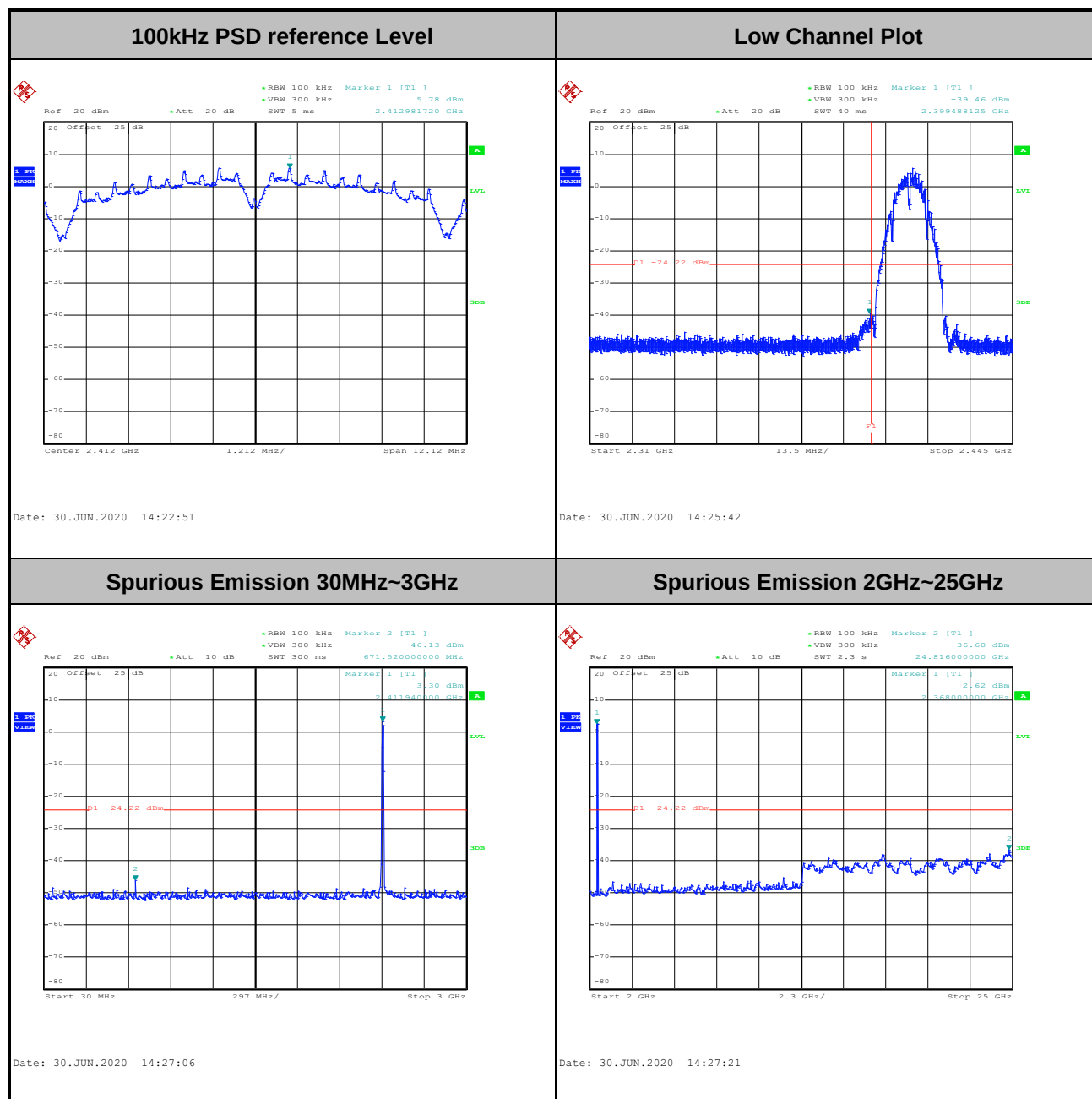


3.4.5 Test Result of Conducted Band Edges and Spurious Emission

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

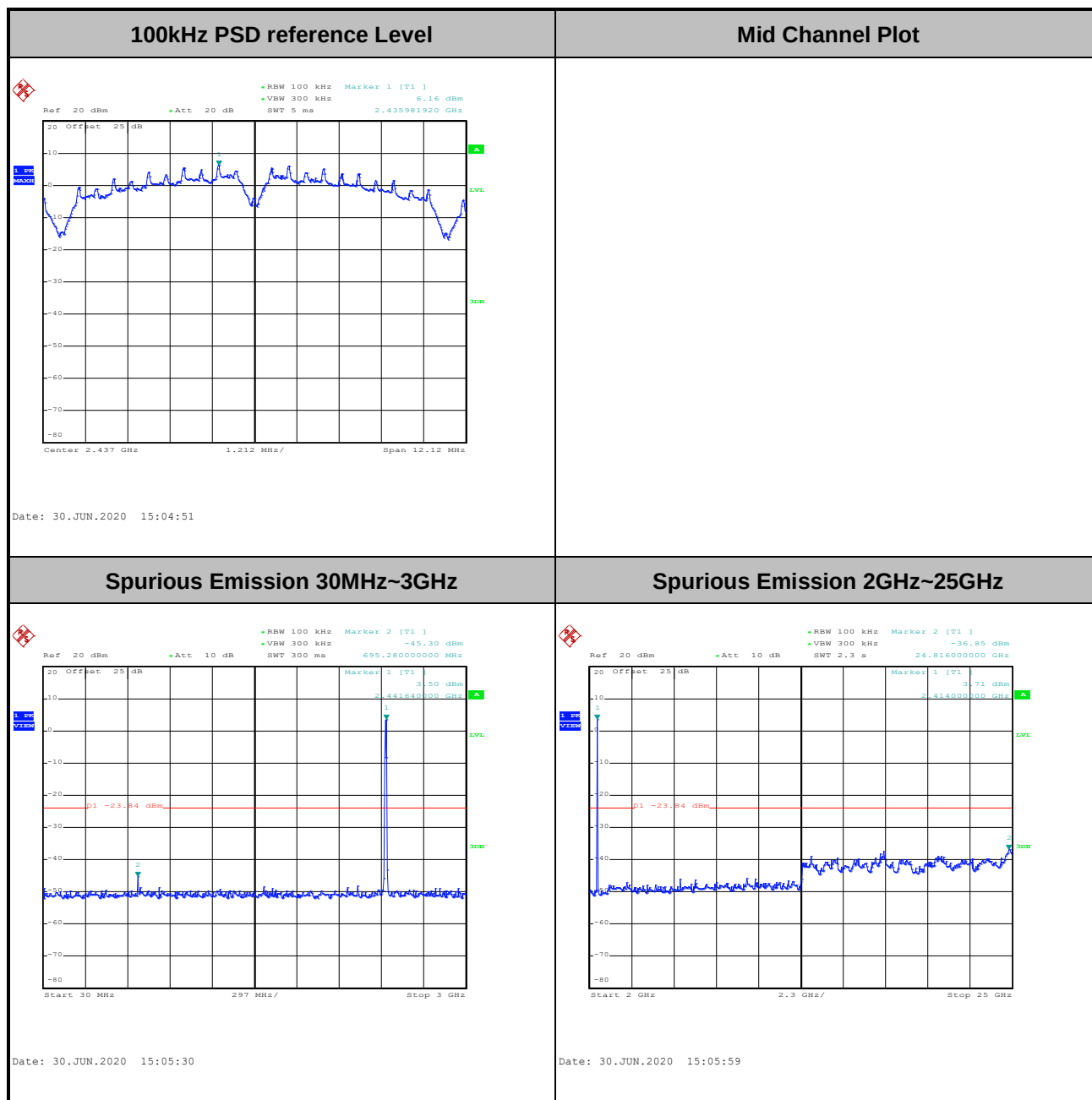
Number of TX = 2, Ant. 0 (Measured)

Test Mode :	802.11b	Test Channel :	01
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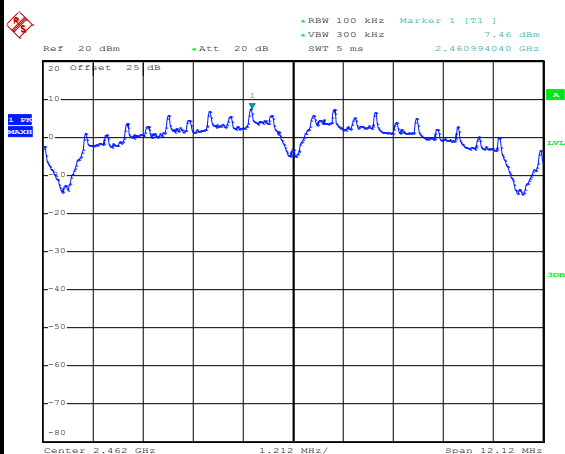
Test Mode :	802.11b	Test Channel :	06
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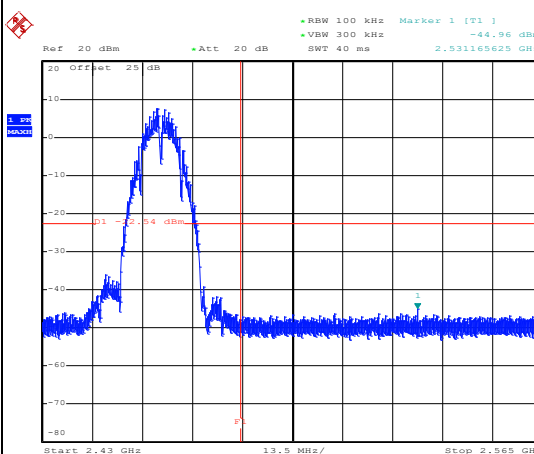
Test Mode :	802.11b	Test Channel :	11
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100kHz PSD reference Level



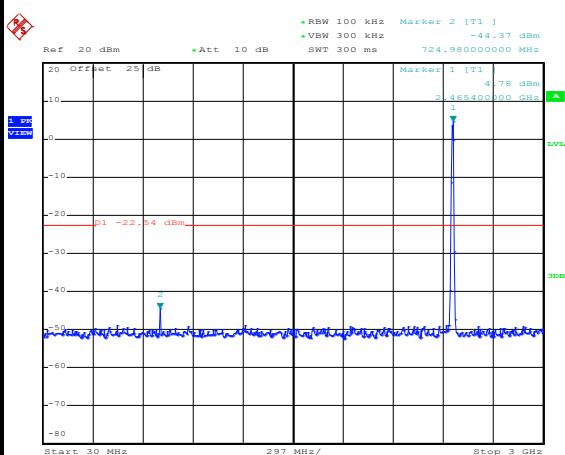
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High Channel Plot



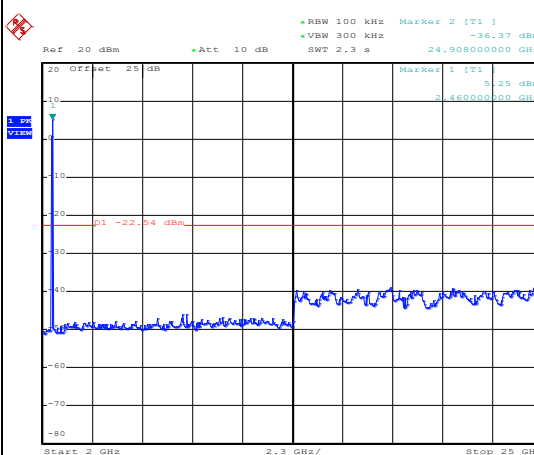
Date: 24.JUL.2020 21:07:10

Spurious Emission 30MHz~3GHz



Date: 24.JUL.2020 21:07:28

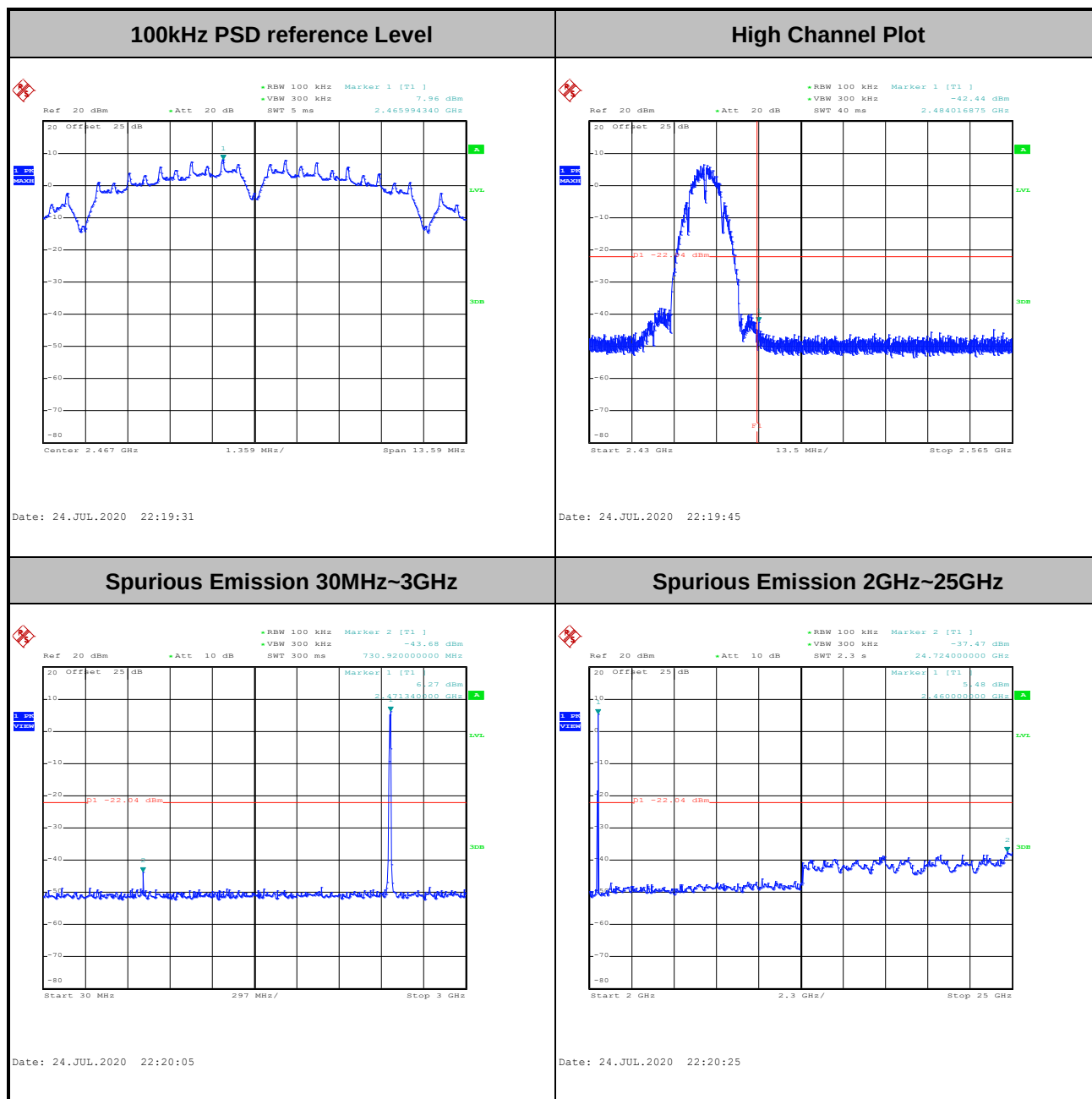
Spurious Emission 2GHz~25GHz



Date: 24.JUL.2020 21:07:49



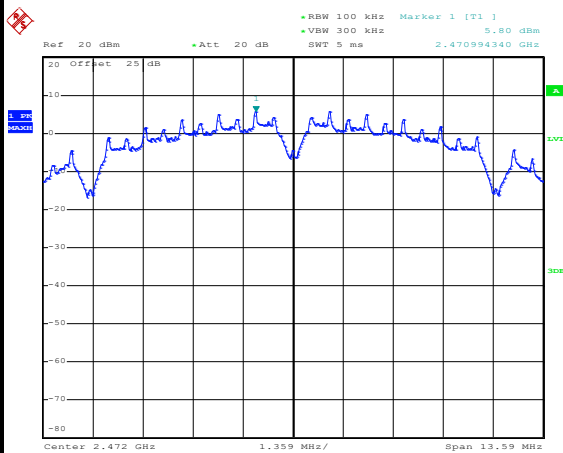
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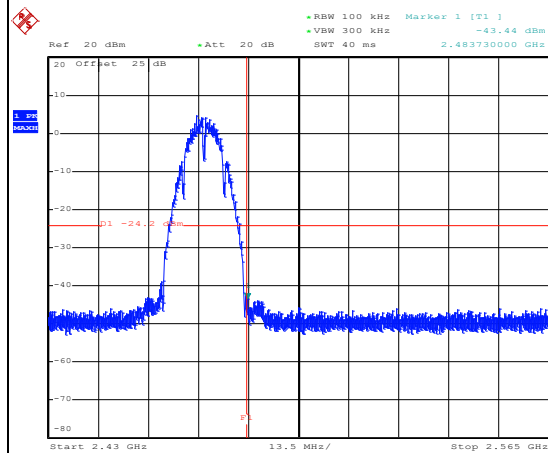


Test Mode :	802.11b	Test Channel :	13
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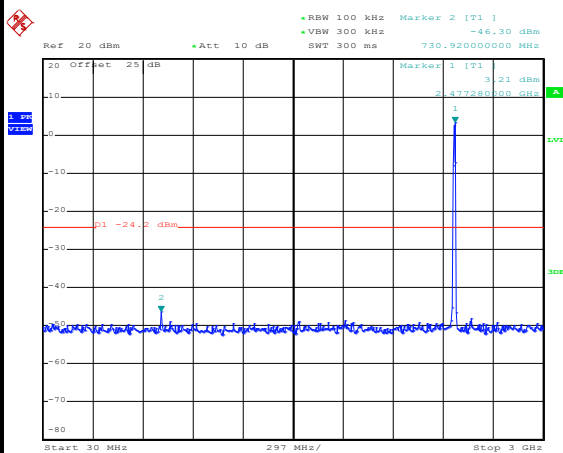
100kHz PSD reference Level



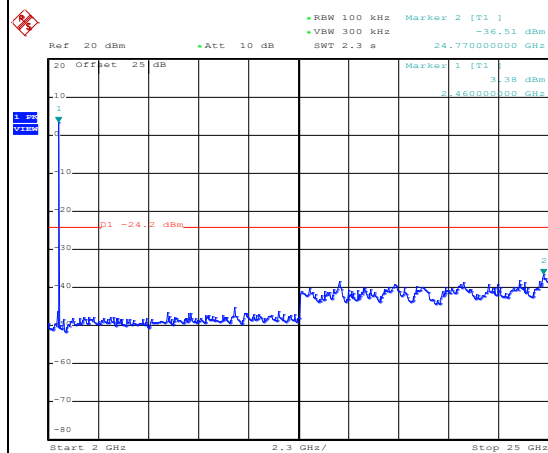
High Channel Plot



Spurious Emission 30MHz~3GHz



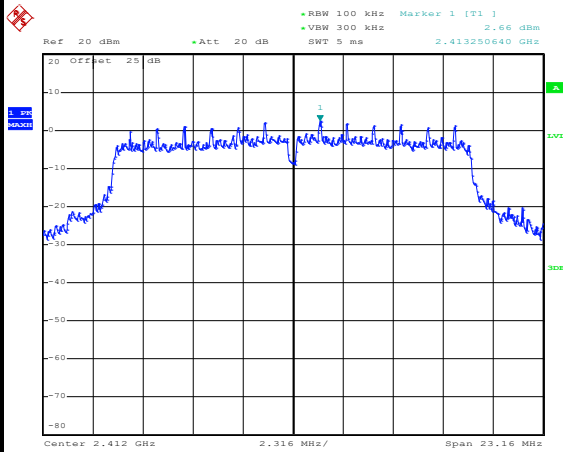
Spurious Emission 2GHz~25GHz





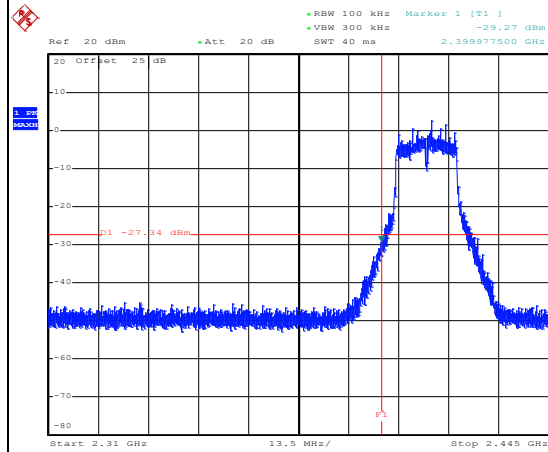
Test Mode :	802.11g	Test Channel :	01
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100kHz PSD reference Level



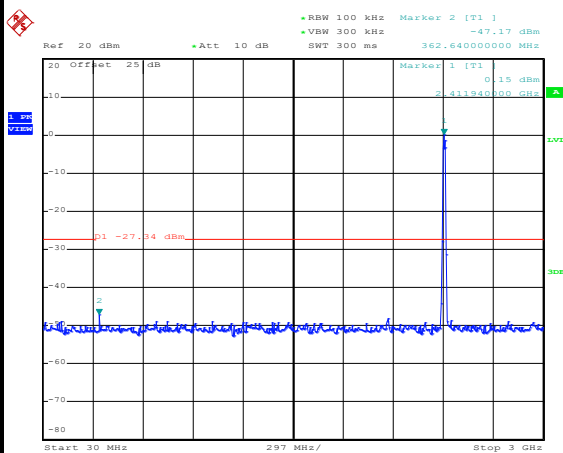
Date: 1.JUL.2020 11:53:16

Low Channel Plot



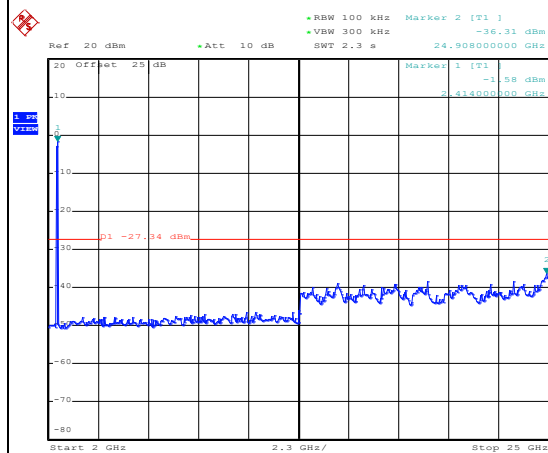
Date: 1.JUL.2020 11:53:30

Spurious Emission 30MHz~3GHz



Date: 1.JUL.2020 11:56:12

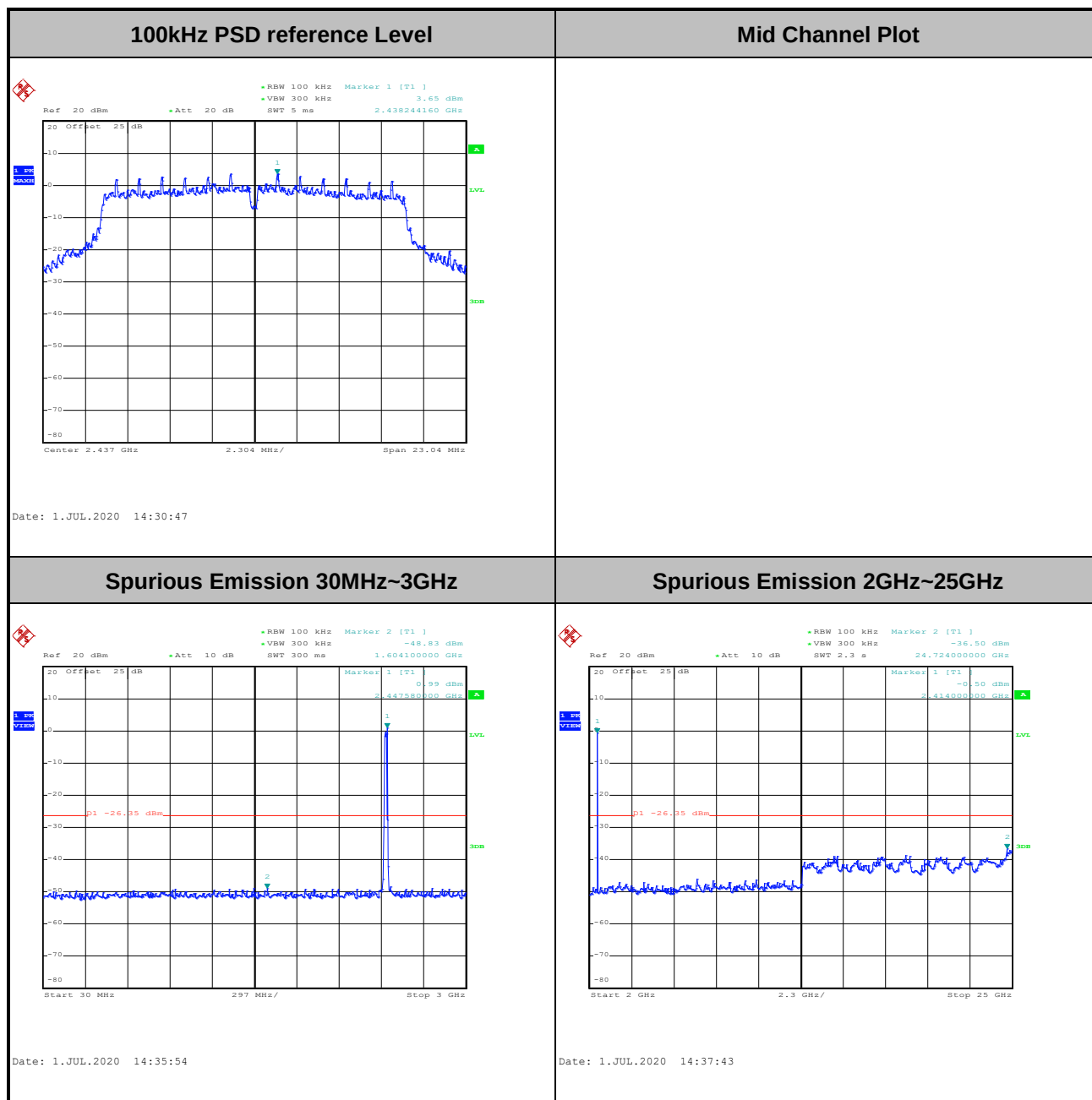
Spurious Emission 2GHz~25GHz



Date: 1.JUL.2020 11:56:42



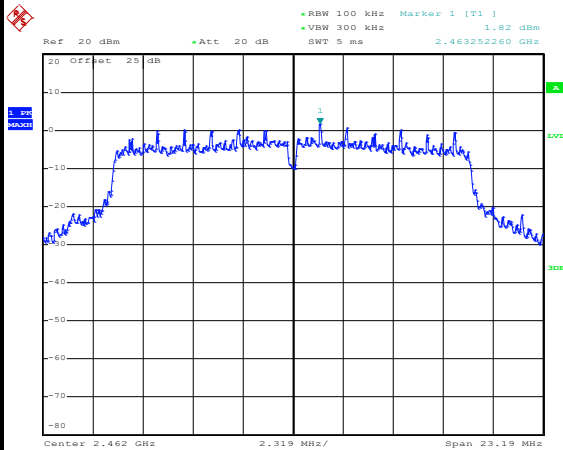
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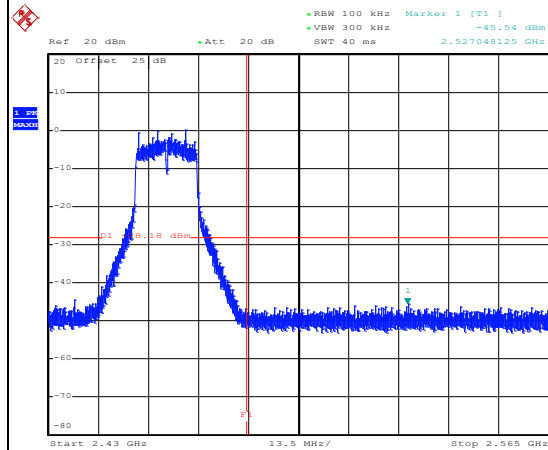
Test Mode :	802.11g	Test Channel :	11
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100kHz PSD reference Level



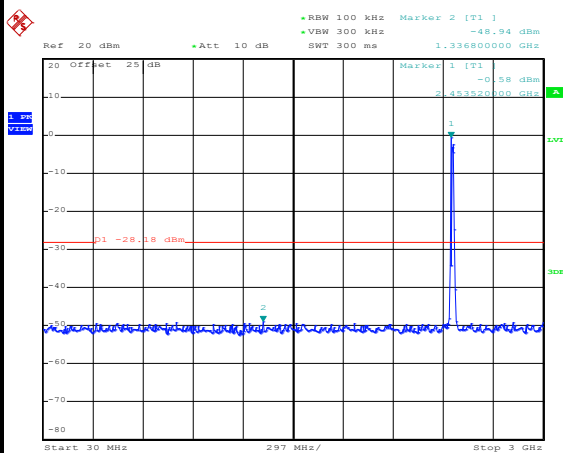
Date: 1.JUL.2020 15:01:16

High Channel Plot



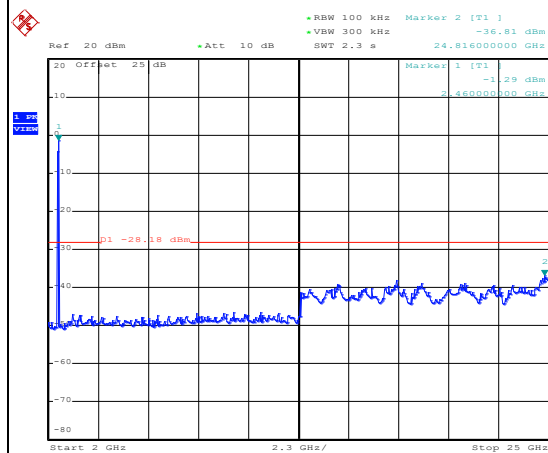
Date: 1.JUL.2020 15:02:11

Spurious Emission 30MHz~3GHz



Date: 1.JUL.2020 15:05:12

Spurious Emission 2GHz~25GHz

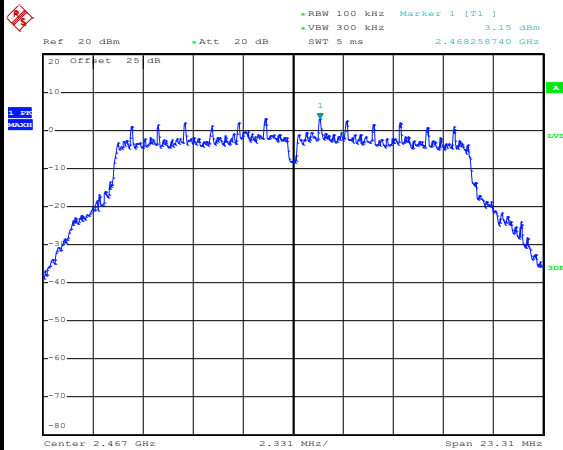


Date: 1.JUL.2020 15:05:47



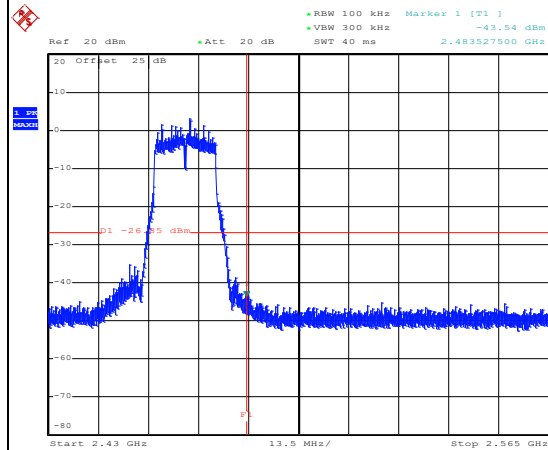
Test Mode :	802.11g	Test Channel :	12
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100kHz PSD reference Level



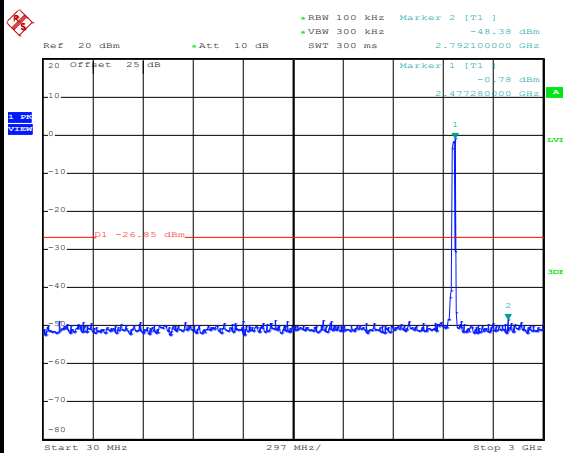
Date: 24.JUL.2020 22:22:52

High Channel Plot



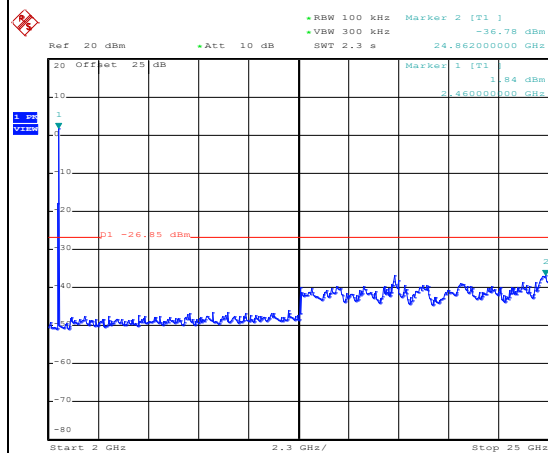
Date: 24.JUL.2020 22:23:22

Spurious Emission 30MHz~3GHz



Date: 24.JUL.2020 22:23:39

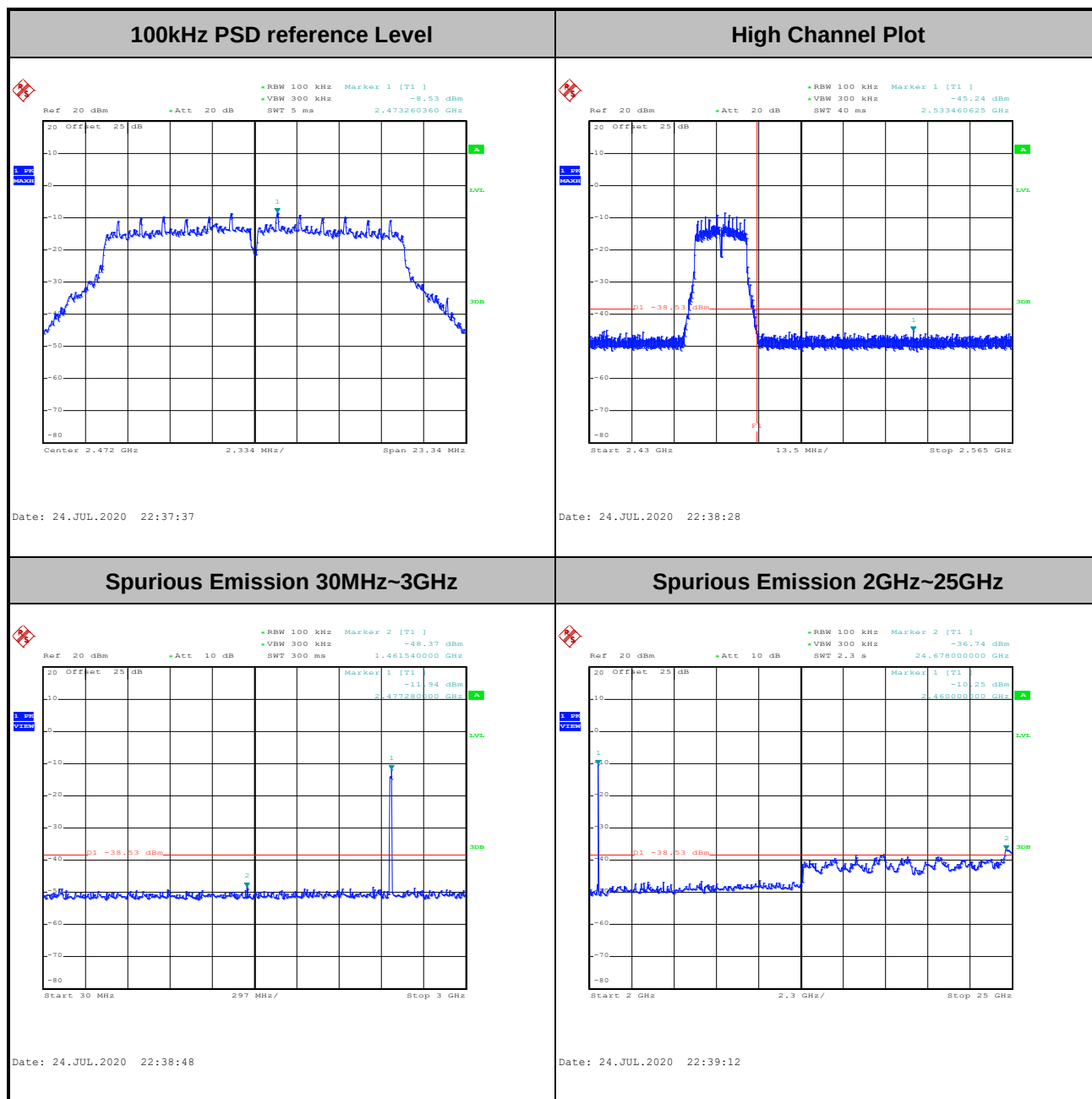
Spurious Emission 2GHz~25GHz



Date: 24.JUL.2020 22:24:13



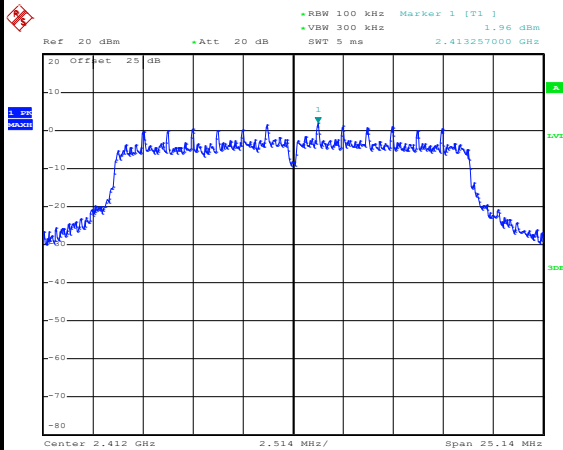
Test Mode :	802.11g	Test Channel :	13
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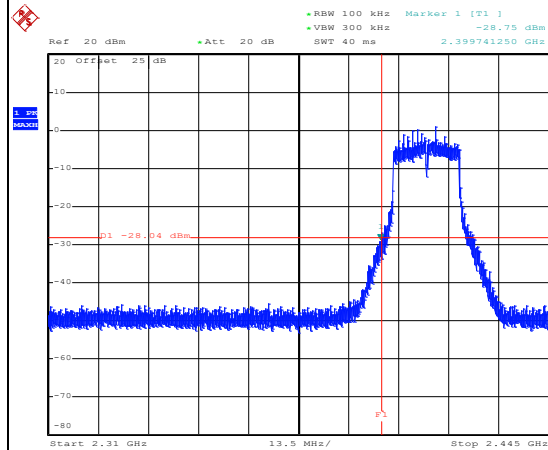
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100kHz PSD reference Level



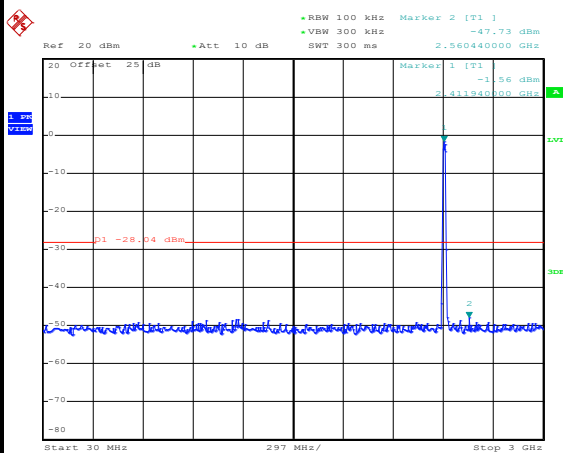
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Low Channel Plot



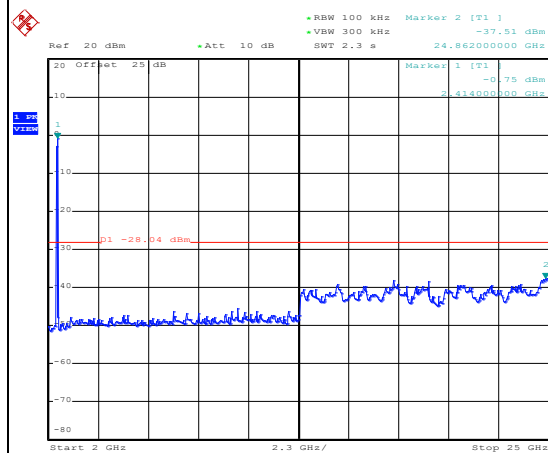
Date: 1.JUL.2020 17:51:25

Spurious Emission 30MHz~3GHz



Date: 1.JUL.2020 17:55:48

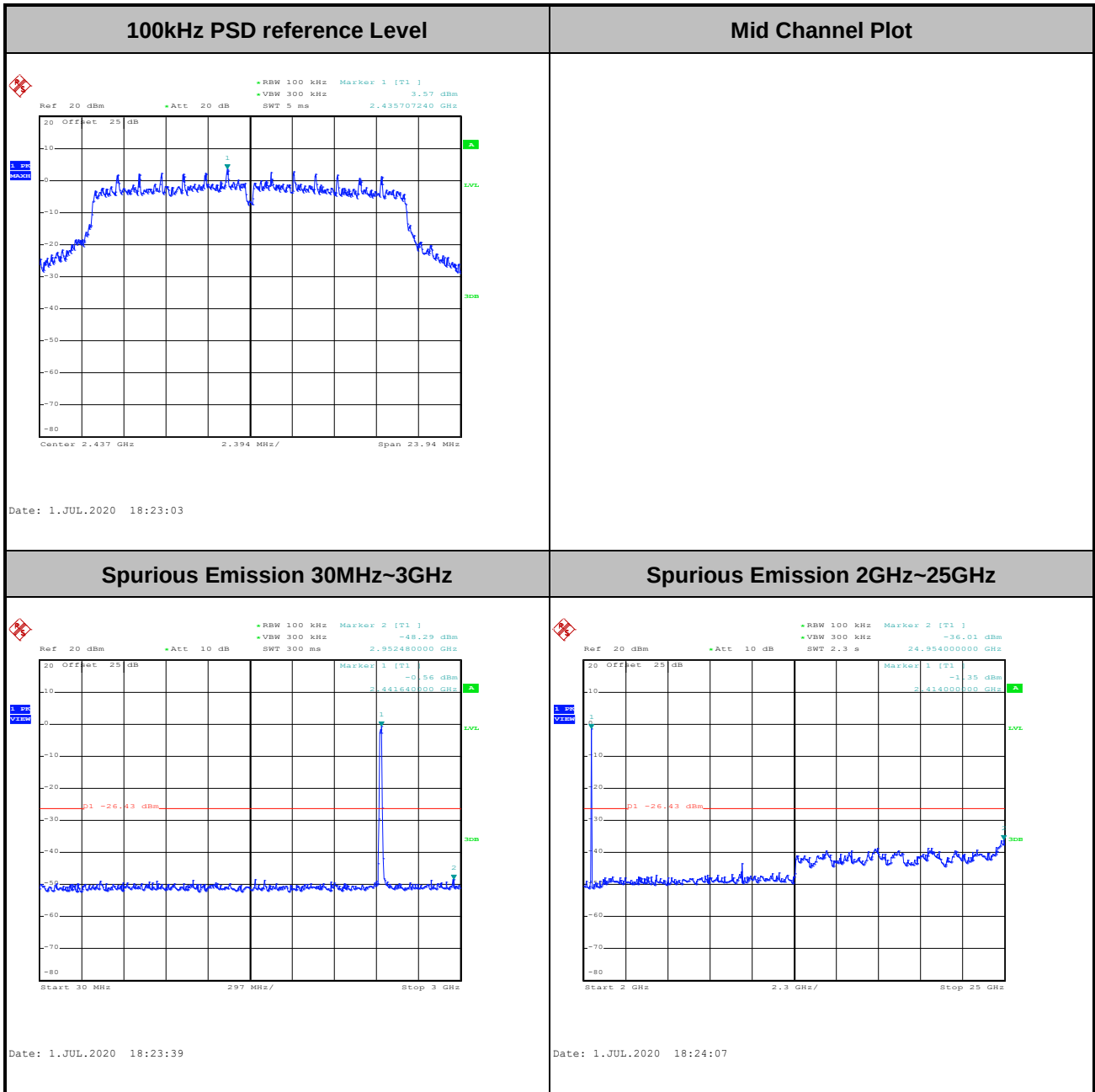
Spurious Emission 2GHz~25GHz



Date: 1.JUL.2020 17:56:10



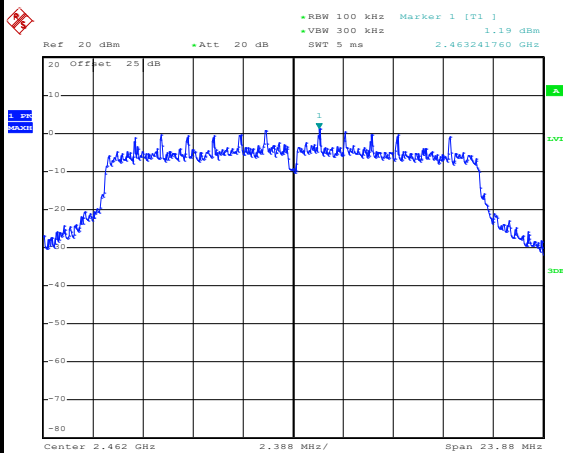
Test Mode :	802.11n HT20	Test Channel :	06
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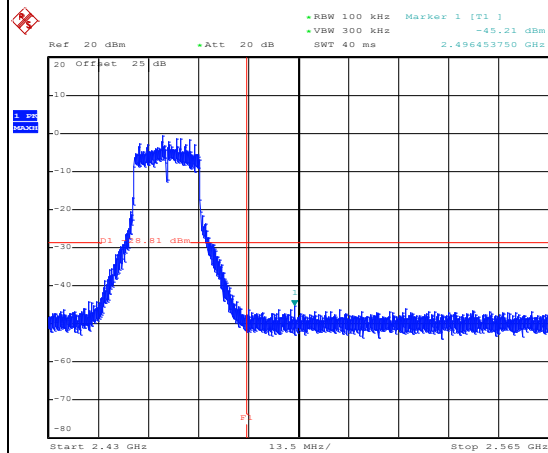
Test Mode :	802.11n HT20	Test Channel :	11
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100kHz PSD reference Level



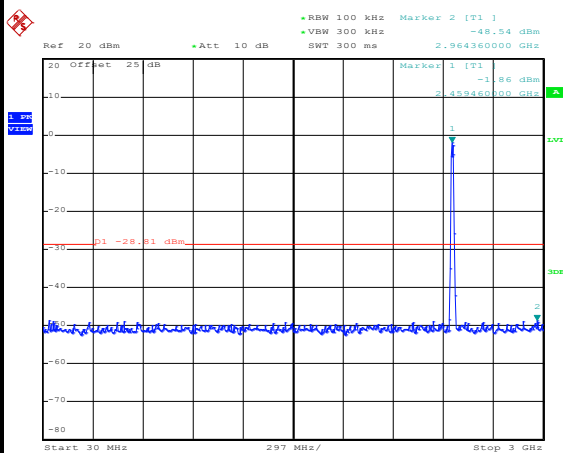
Date: 2.JUL.2020 09:52:50

High Channel Plot



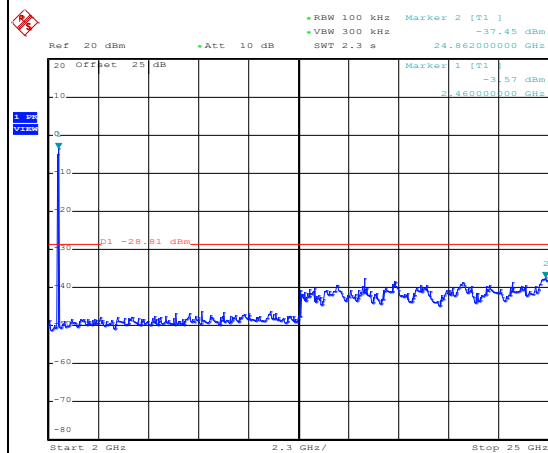
Date: 2.JUL.2020 09:53:29

Spurious Emission 30MHz~3GHz



Date: 2.JUL.2020 09:54:33

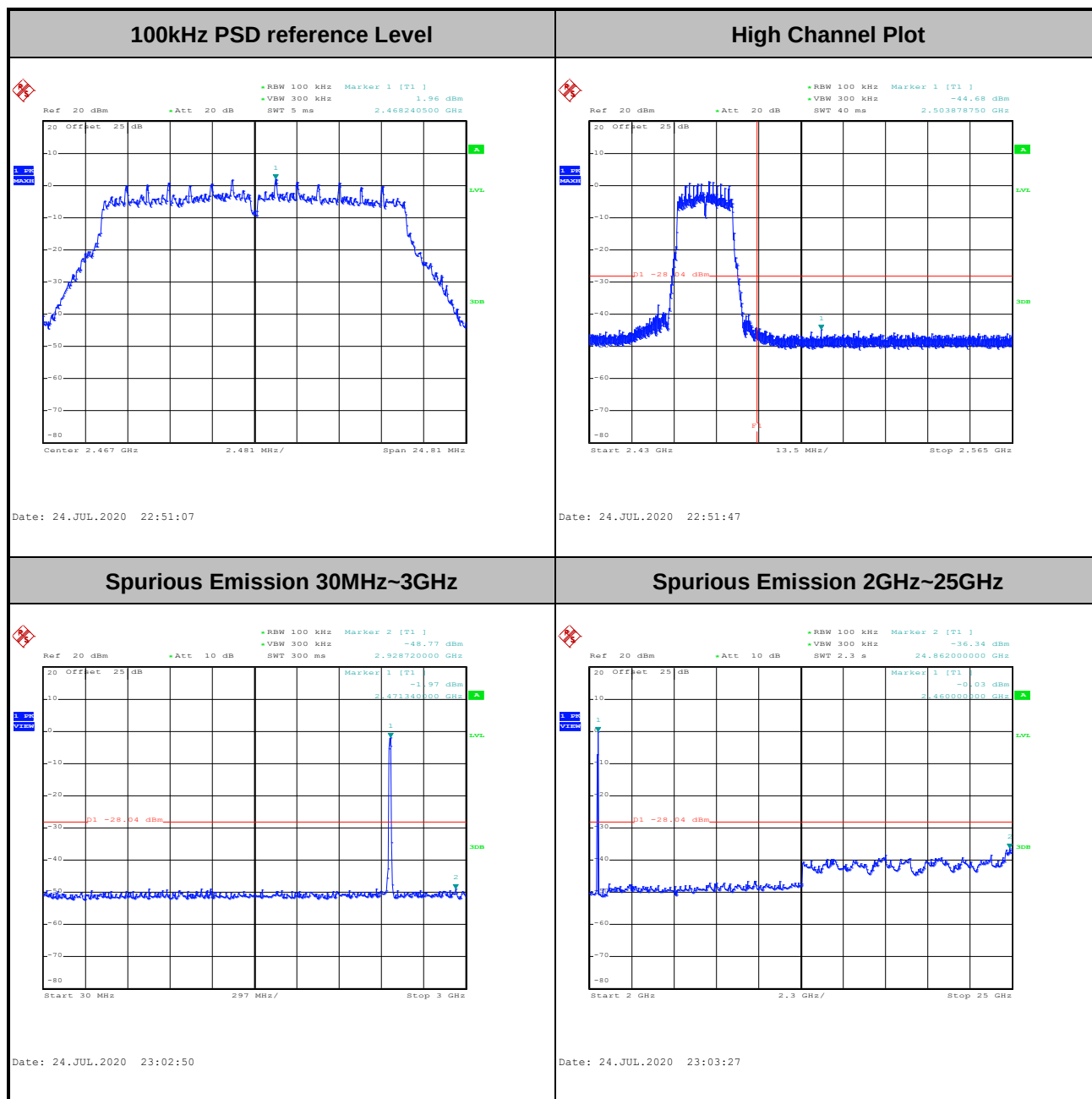
Spurious Emission 2GHz~25GHz



Date: 2.JUL.2020 09:55:59

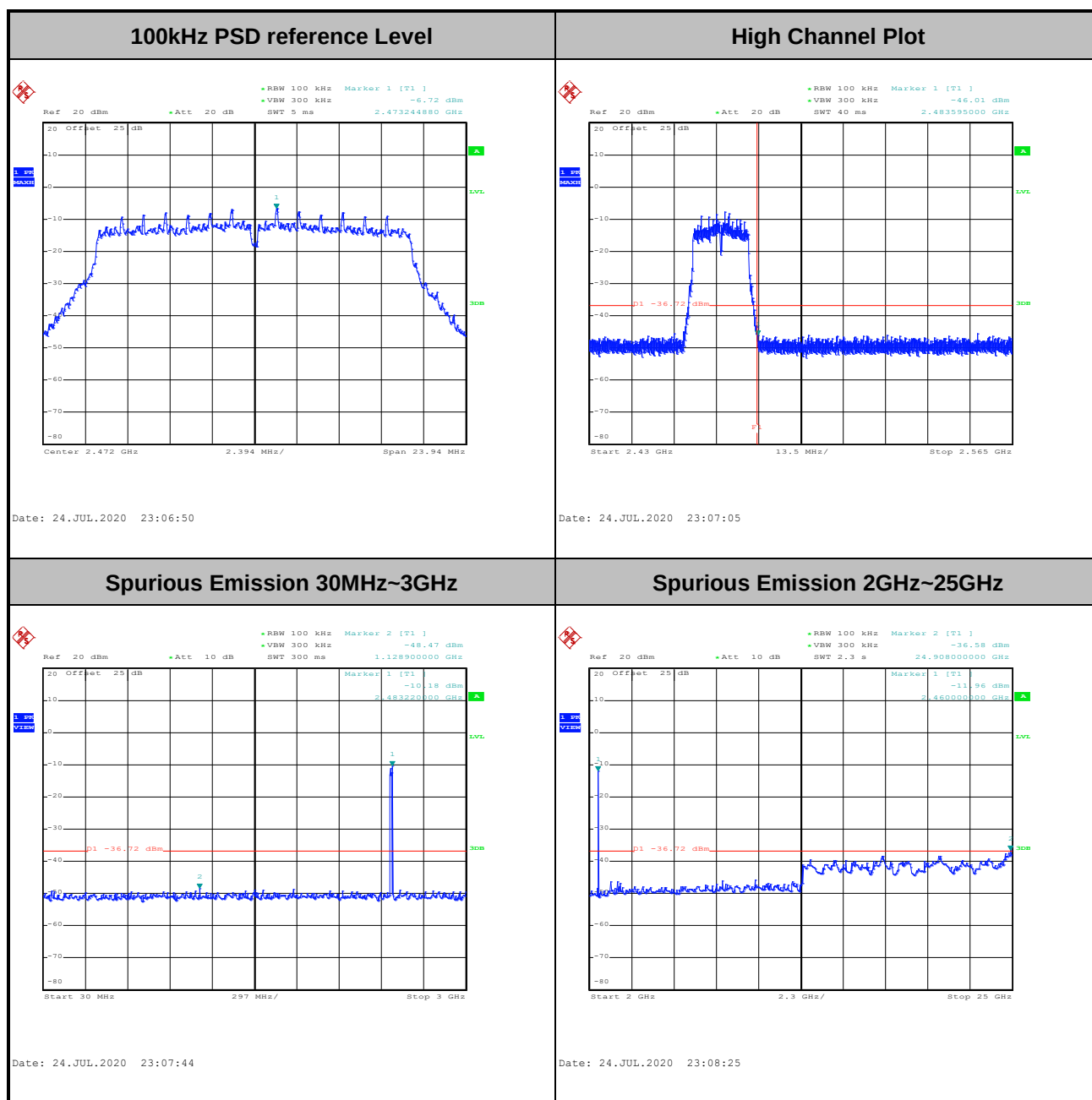


Test Mode :	802.11n HT20	Test Channel :	12
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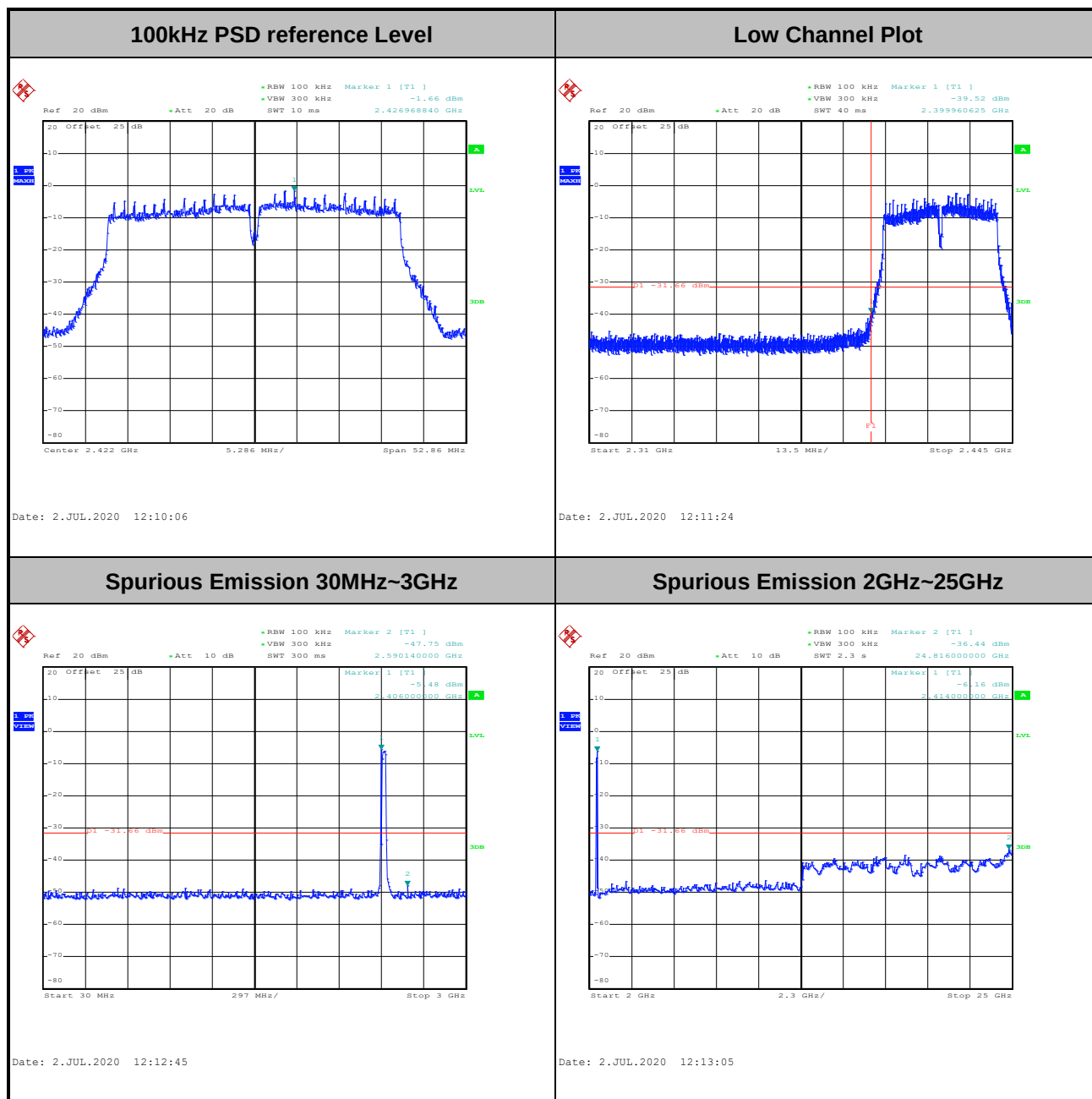


Test Mode :	802.11n HT20	Test Channel :	13
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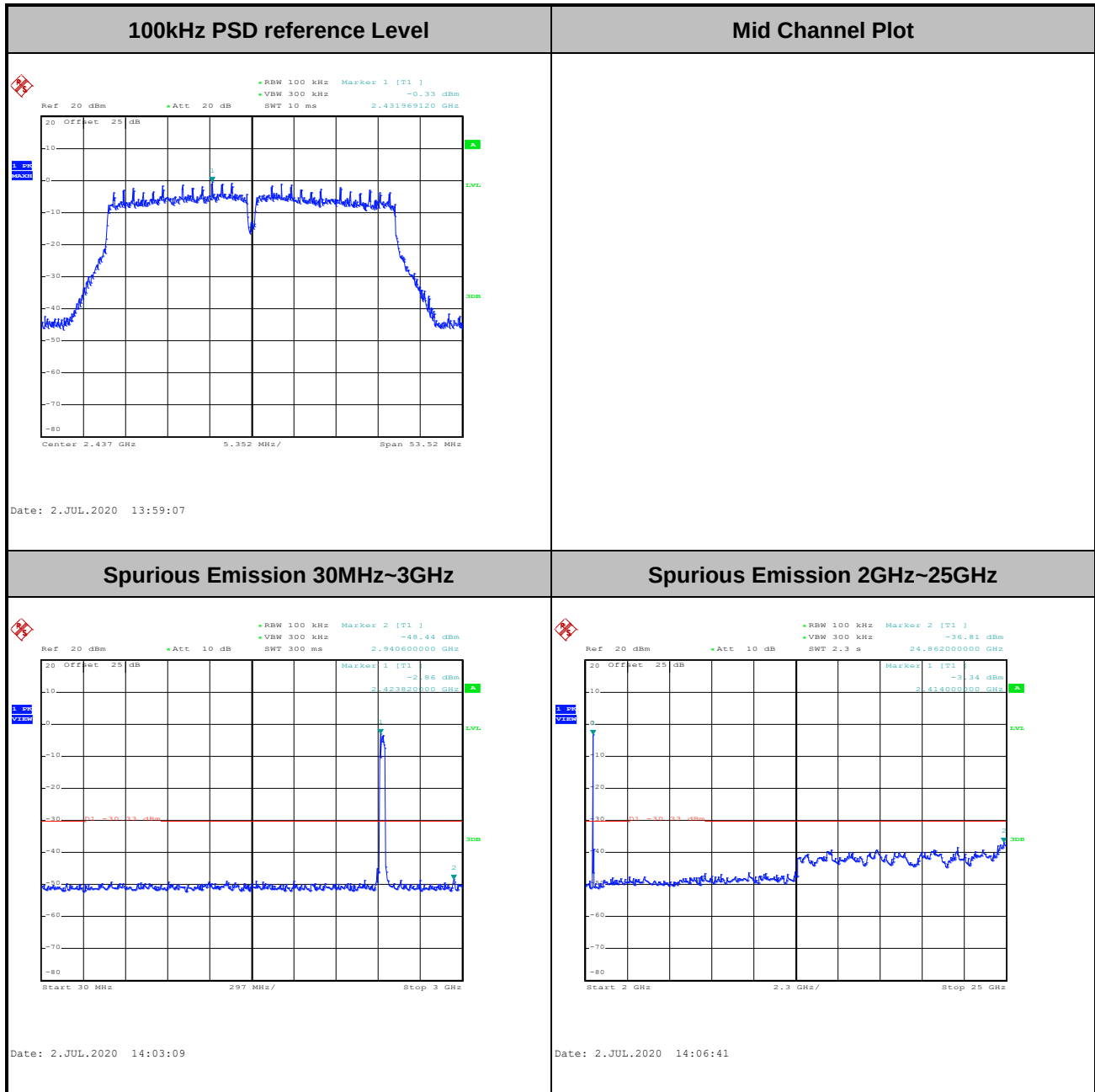


Test Mode :	802.11n HT40	Test Channel :	03
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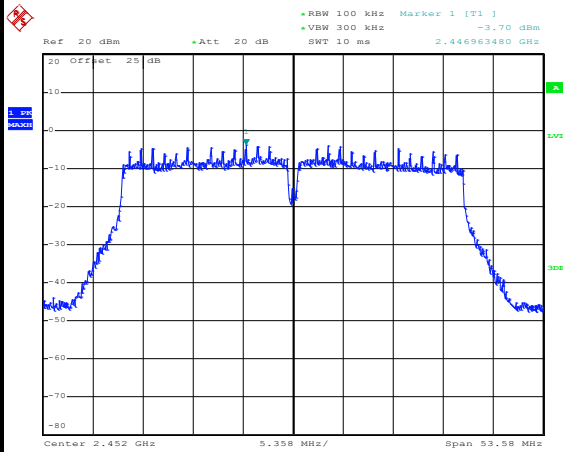
Test Mode :	802.11n HT40	Test Channel :	06
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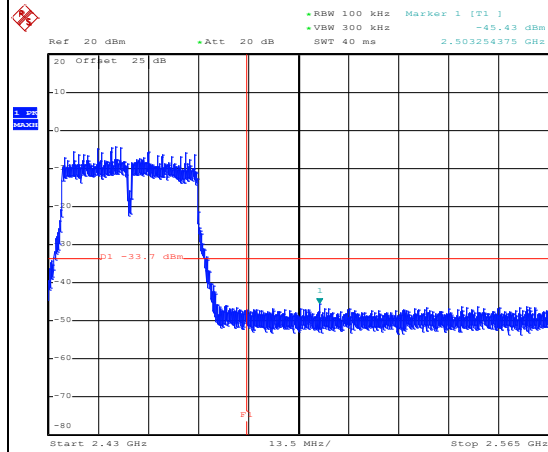
Test Mode :	802.11n HT40	Test Channel :	09
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100kHz PSD reference Level



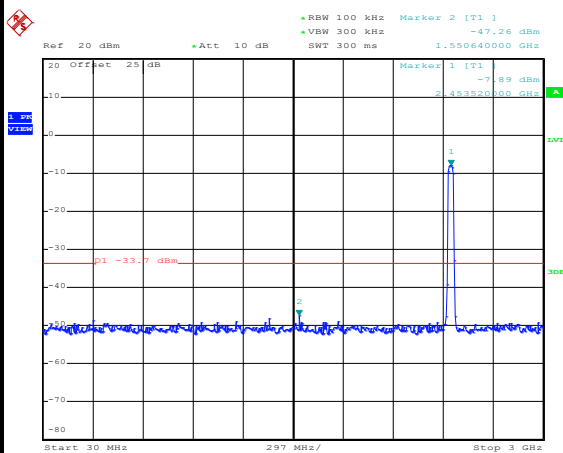
Date: 2.JUL.2020 14:32:33

High Channel Plot



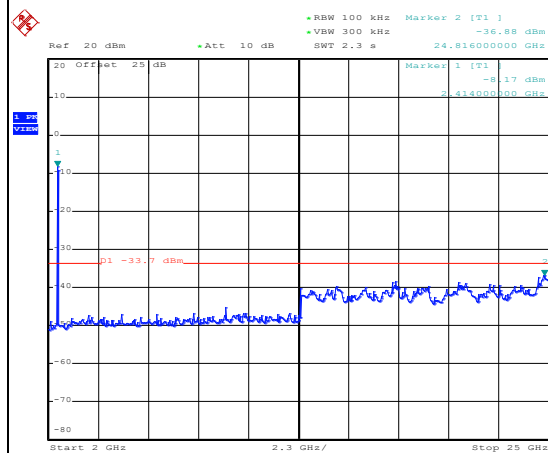
Date: 2.JUL.2020 14:33:17

Spurious Emission 30MHz~3GHz



Date: 2.JUL.2020 14:35:14

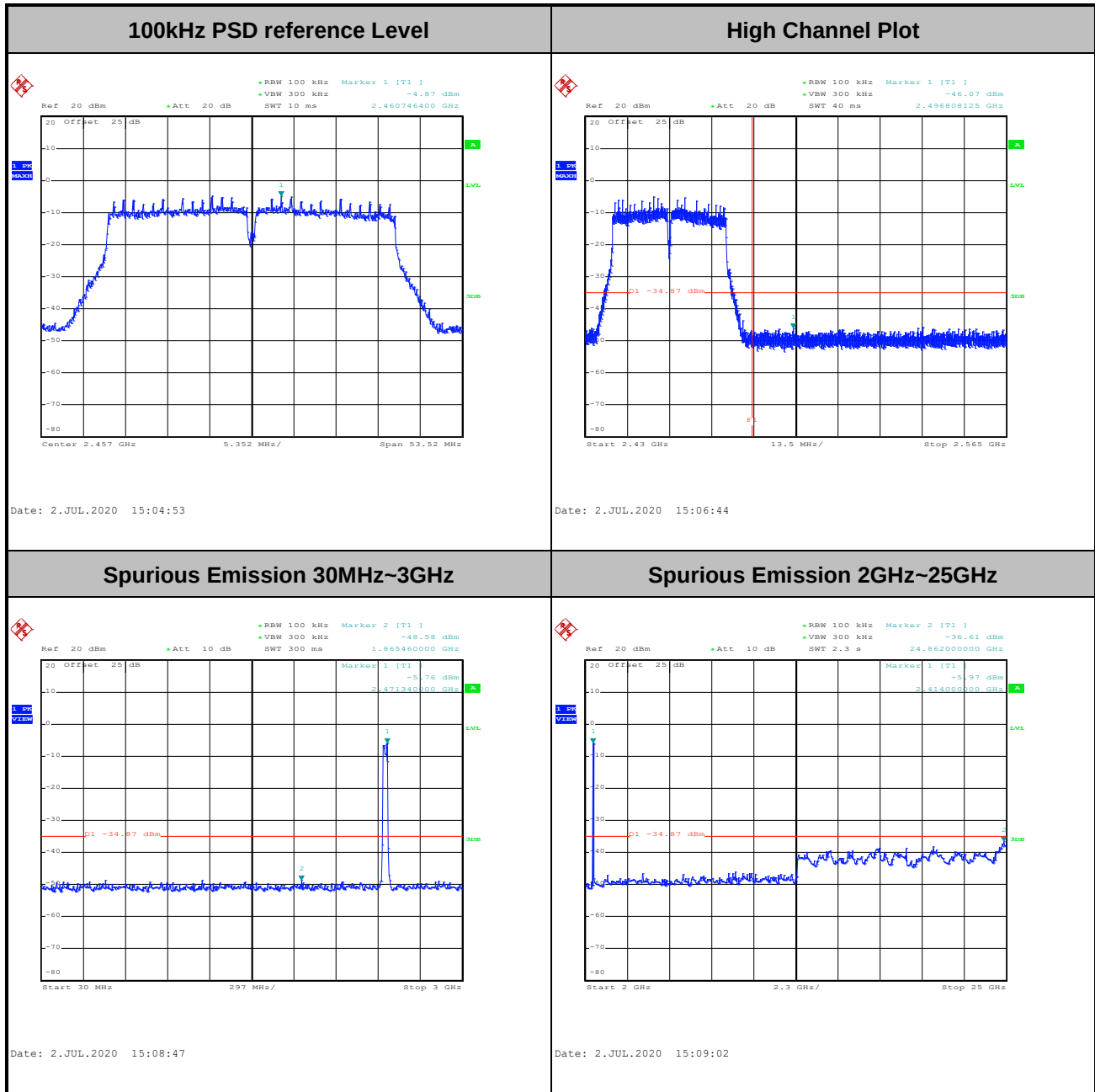
Spurious Emission 2GHz~25GHz



Date: 2.JUL.2020 14:35:32



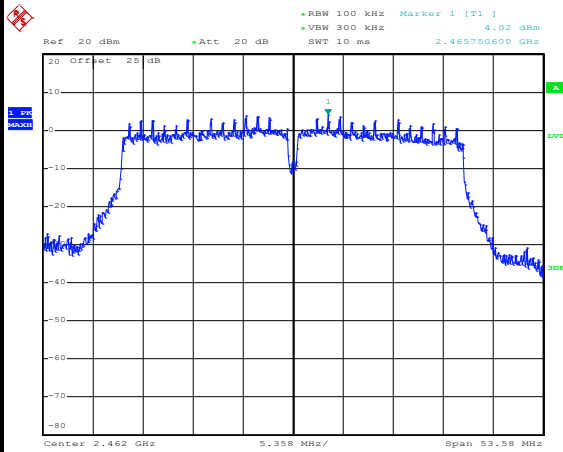
Test Mode :	802.11n HT40	Test Channel :	10
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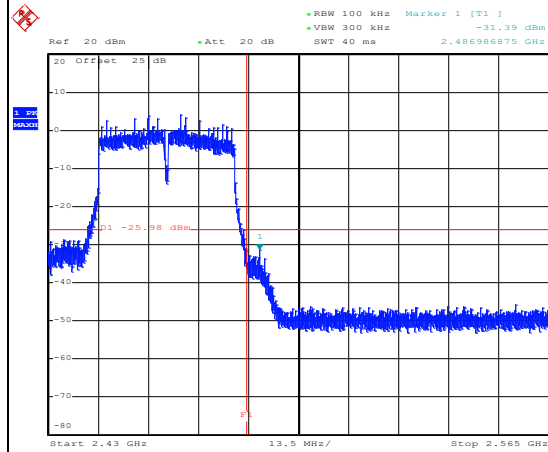
Test Mode :	802.11n HT40	Test Channel :	11
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100kHz PSD reference Level



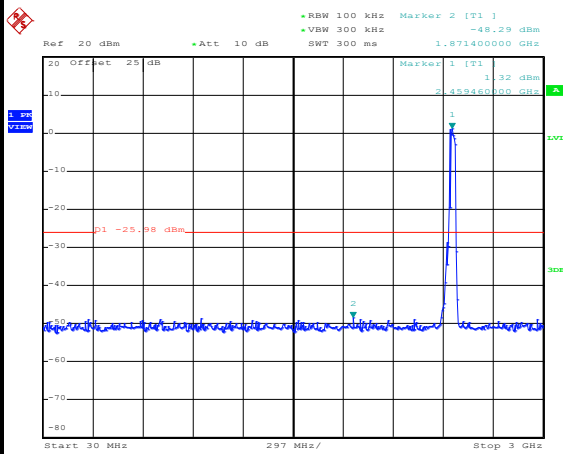
Date: 2.JUL.2020 15:50:17

High Channel Plot



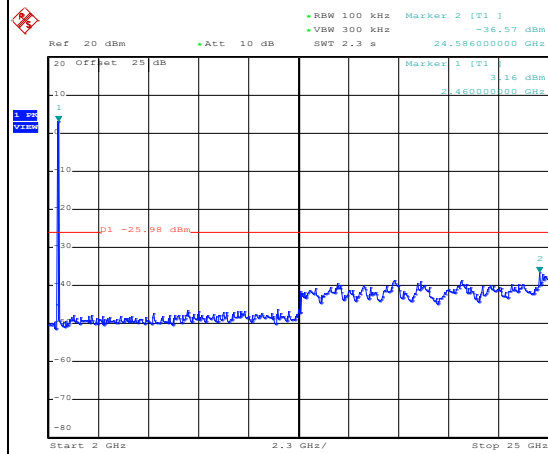
Date: 2.JUL.2020 15:52:06

Spurious Emission 30MHz~3GHz



Date: 2.JUL.2020 15:55:01

Spurious Emission 2GHz~25GHz



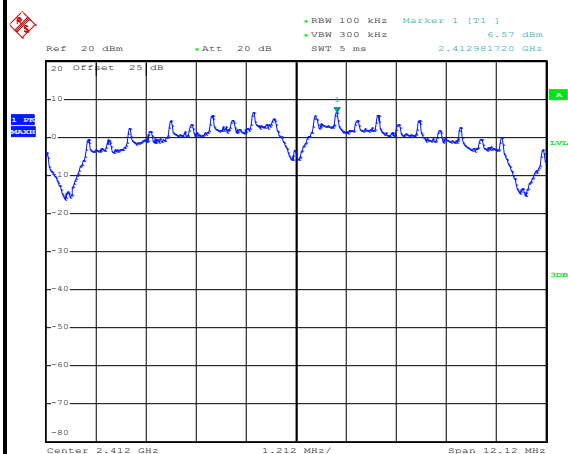
Date: 2.JUL.2020 15:55:17



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

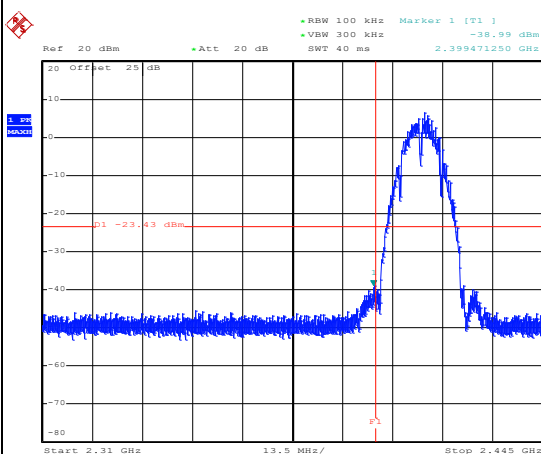
Test Mode :	802.11b	Test Channel :	01
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100kHz PSD reference Level



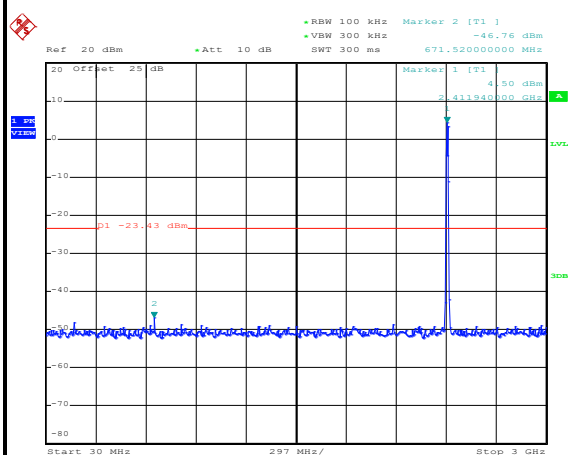
Date: 30.JUN.2020 14:44:25

Low Channel Plot



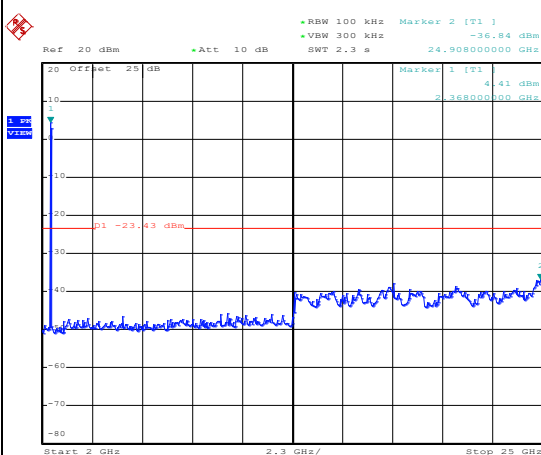
Date: 30.JUN.2020 14:45:26

Spurious Emission 30MHz~3GHz



Date: 30.JUN.2020 14:48:44

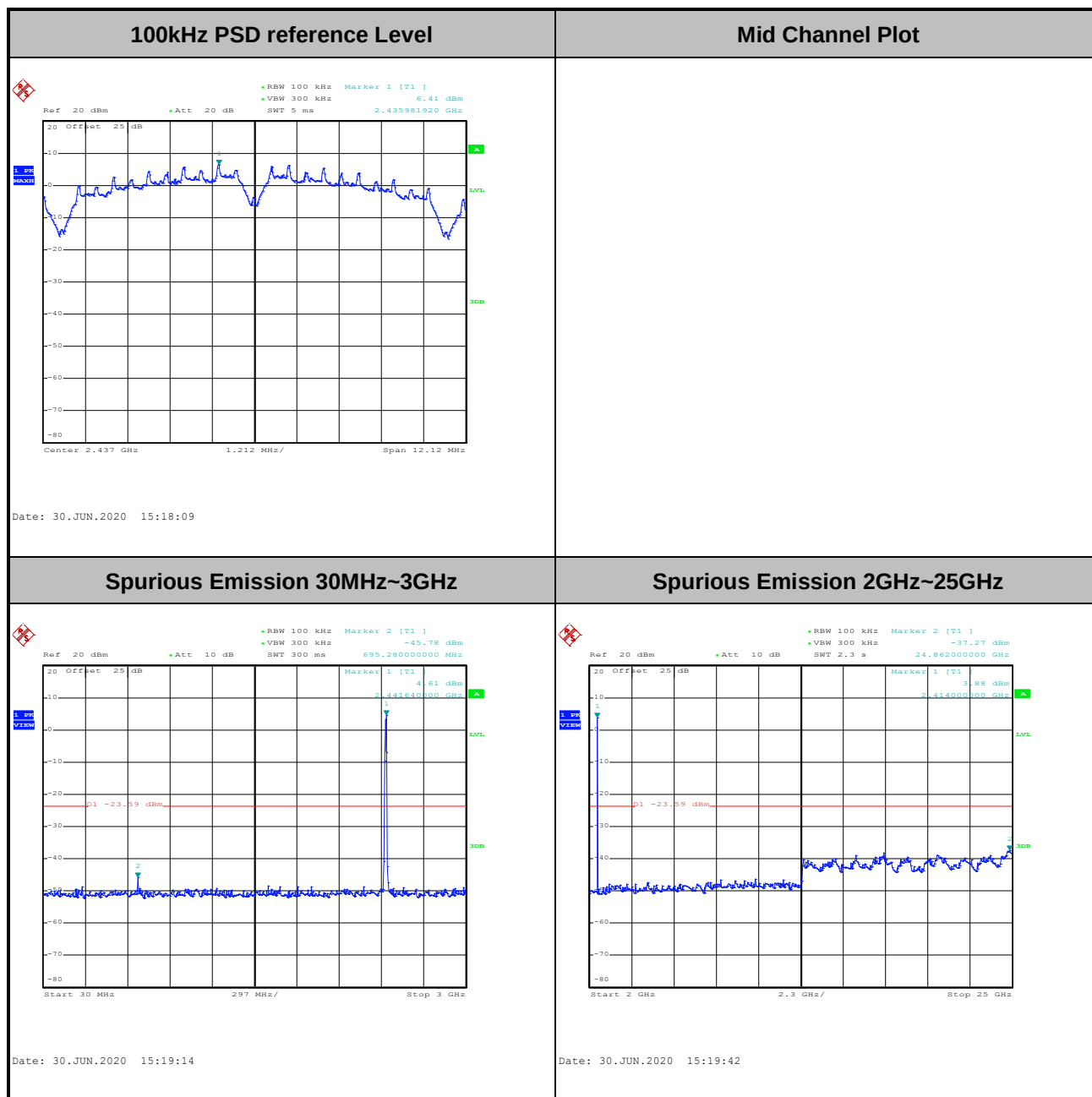
Spurious Emission 2GHz~25GHz



Date: 30.JUN.2020 14:49:07



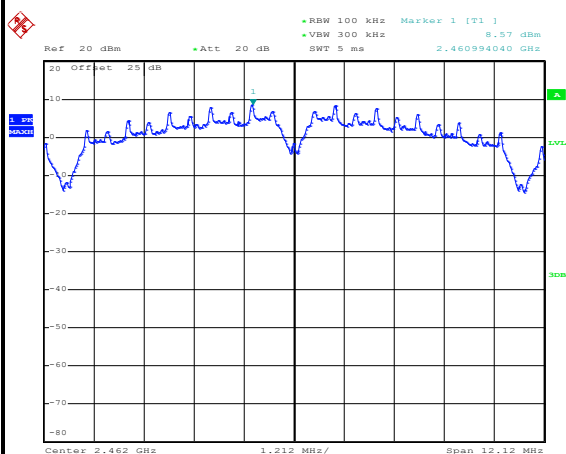
Test Mode :	802.11b	Test Channel :	06
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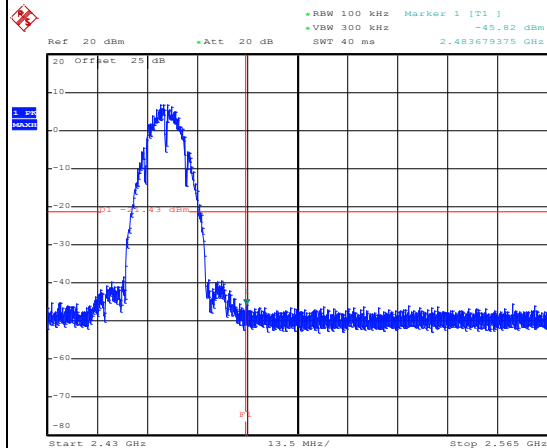
Test Mode :	802.11b	Test Channel :	11
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100kHz PSD reference Level



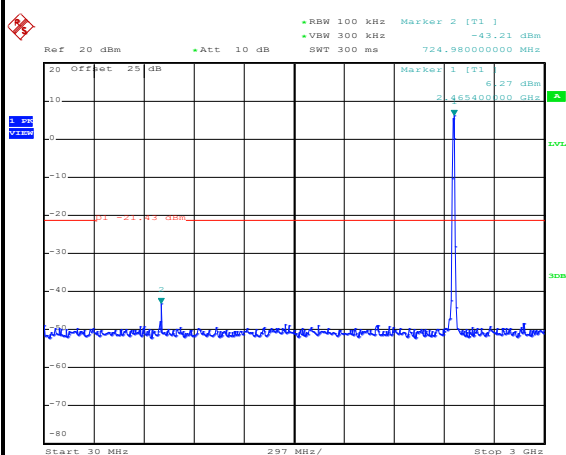
Date: 24.JUL.2020 21:09:21

High Channel Plot



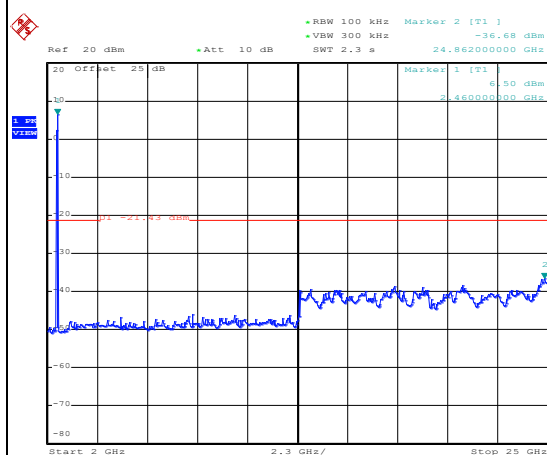
Date: 24.JUL.2020 21:09:33

Spurious Emission 30MHz~3GHz



Date: 24.JUL.2020 21:13:38

Spurious Emission 2GHz~25GHz

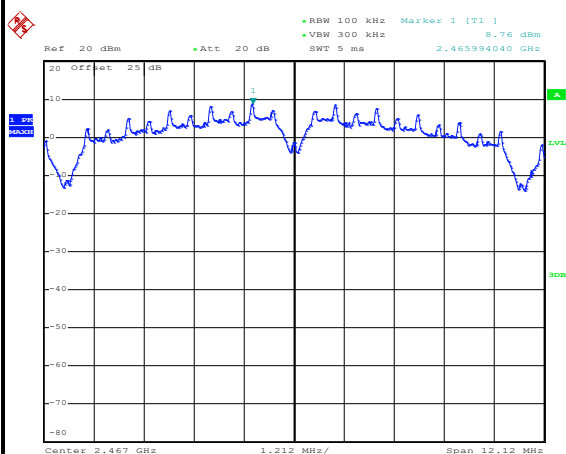


Date: 24.JUL.2020 21:13:52



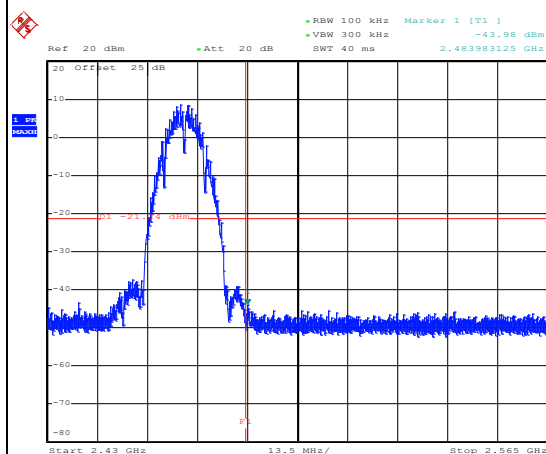
Test Mode :	802.11b	Test Channel :	12
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100kHz PSD reference Level



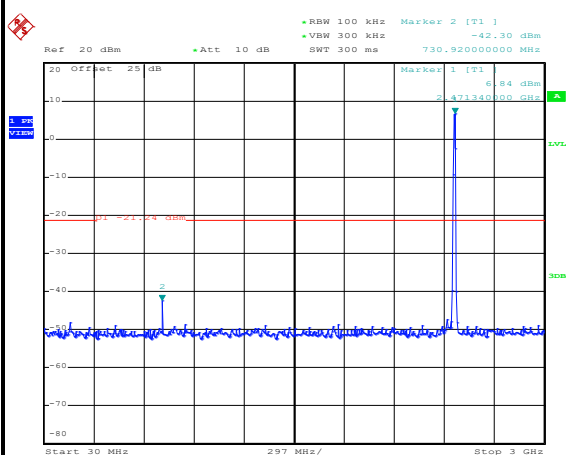
Date: 24.JUL.2020 21:23:04

High Channel Plot



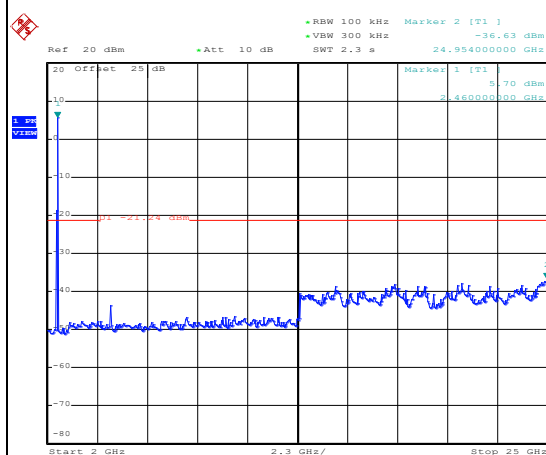
Date: 24.JUL.2020 21:23:20

Spurious Emission 30MHz~3GHz



Date: 24.JUL.2020 21:23:34

Spurious Emission 2GHz~25GHz

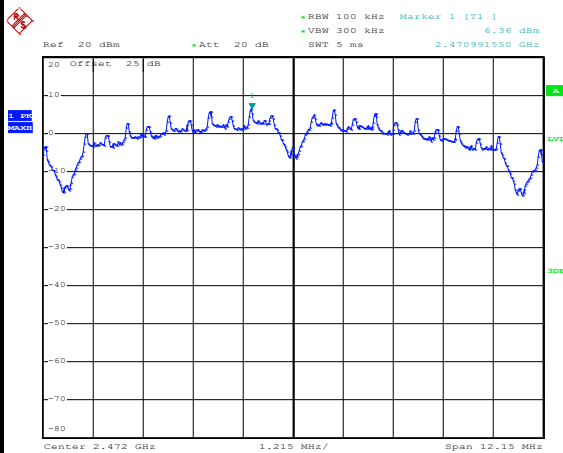


Date: 24.JUL.2020 21:23:49



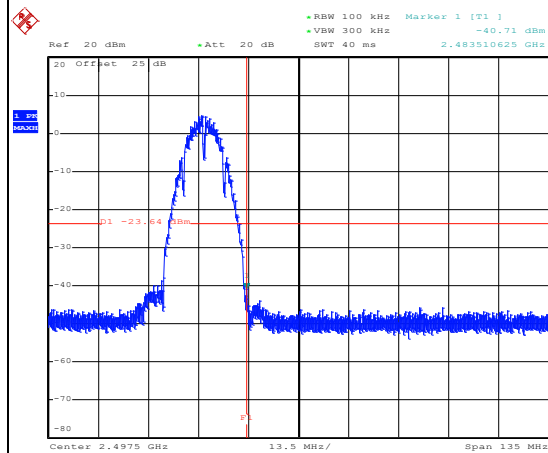
Test Mode :	802.11b	Test Channel :	13
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100kHz PSD reference Level



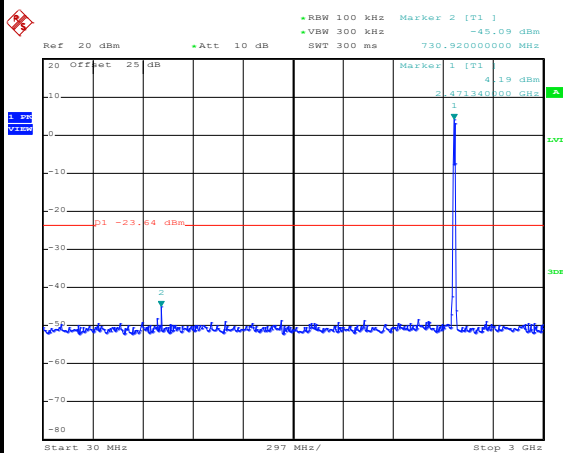
Date: 24.JUL.2020 21:34:41

High Channel Plot



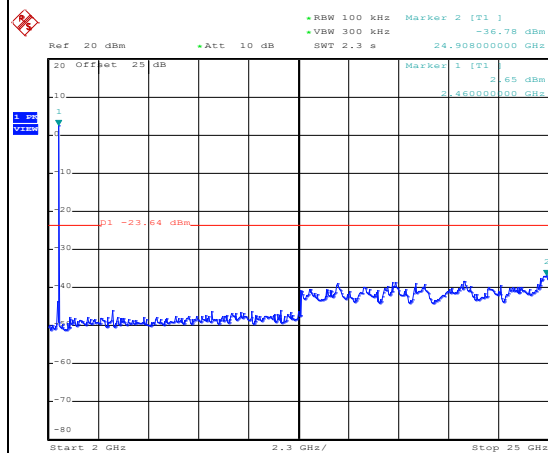
Date: 24.JUL.2020 21:35:15

Spurious Emission 30MHz~3GHz



Date: 24.JUL.2020 21:35:32

Spurious Emission 2GHz~25GHz

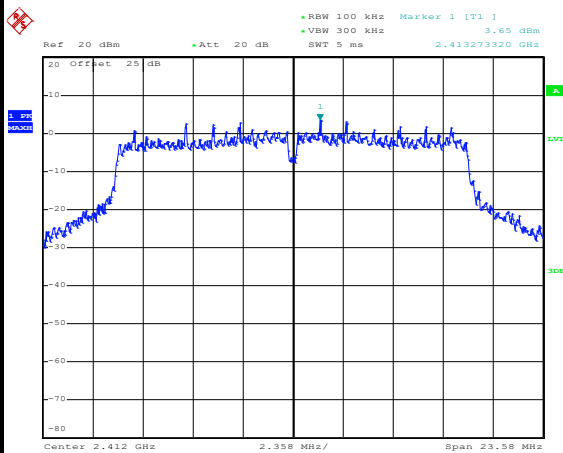


Date: 24.JUL.2020 21:35:47



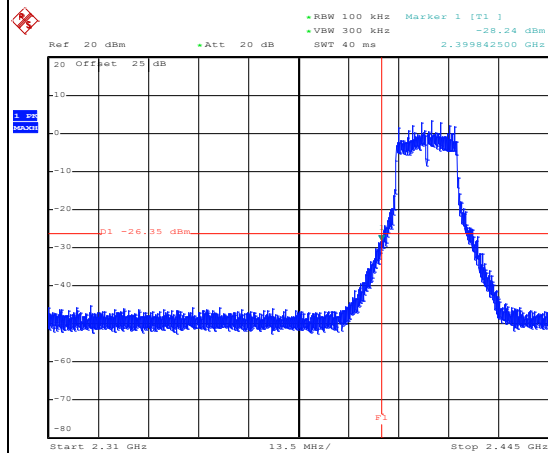
Test Mode :	802.11g	Test Channel :	01
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100kHz PSD reference Level



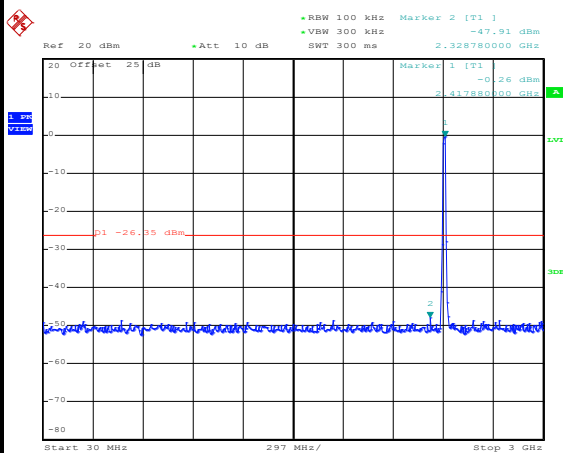
Date: 1.JUL.2020 12:09:32

Low Channel Plot



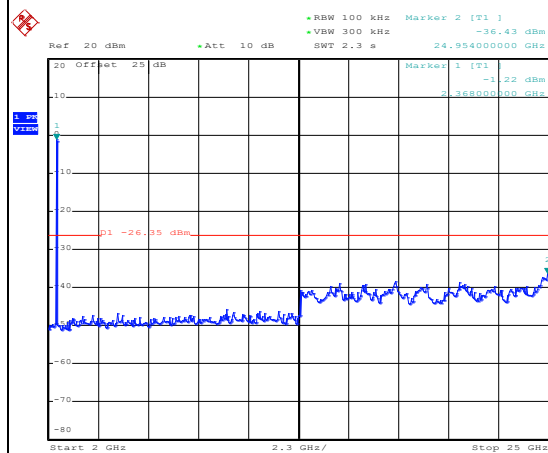
Date: 1.JUL.2020 12:10:19

Spurious Emission 30MHz~3GHz



Date: 1.JUL.2020 12:12:24

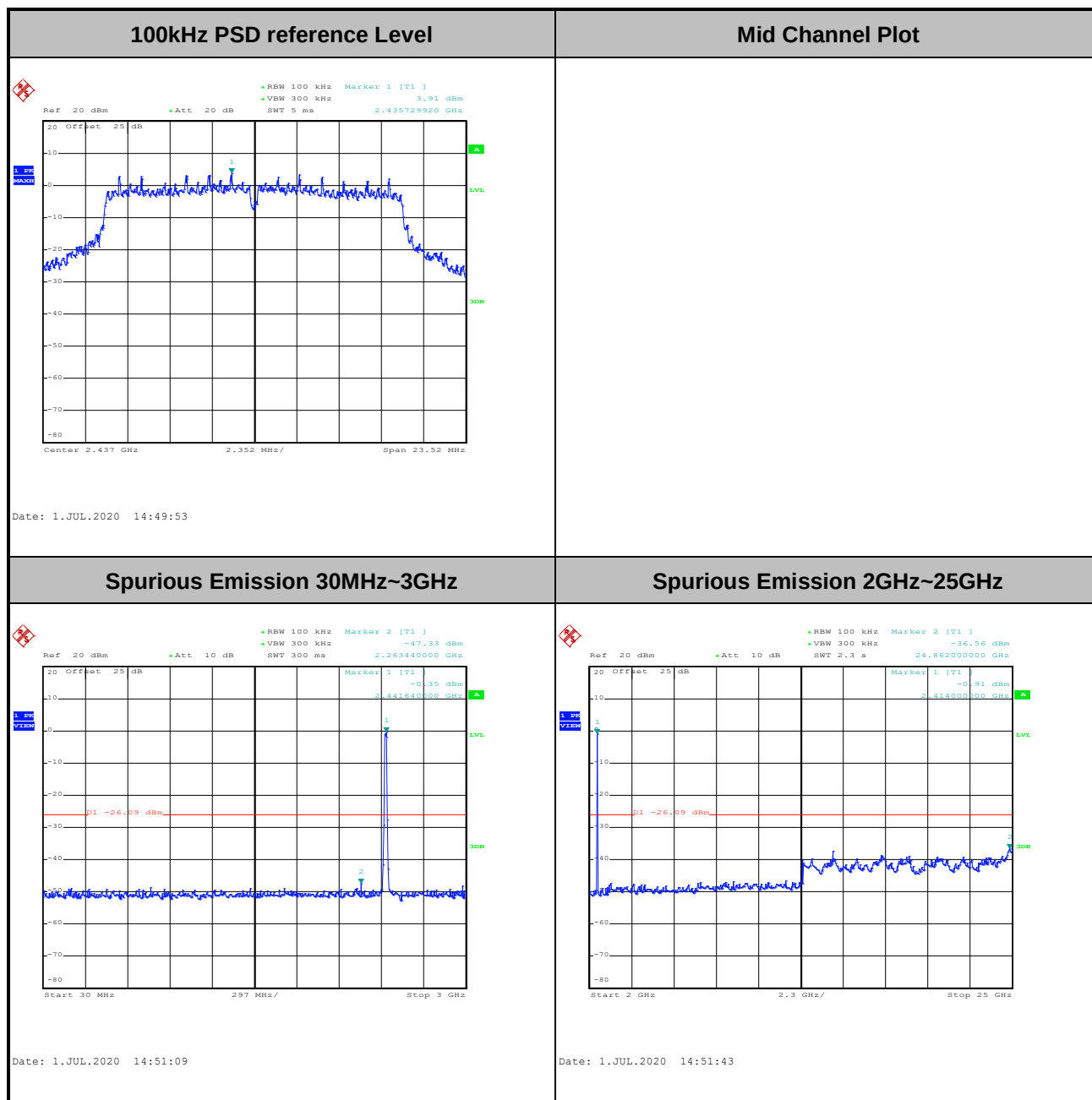
Spurious Emission 2GHz~25GHz



Date: 1.JUL.2020 12:12:42



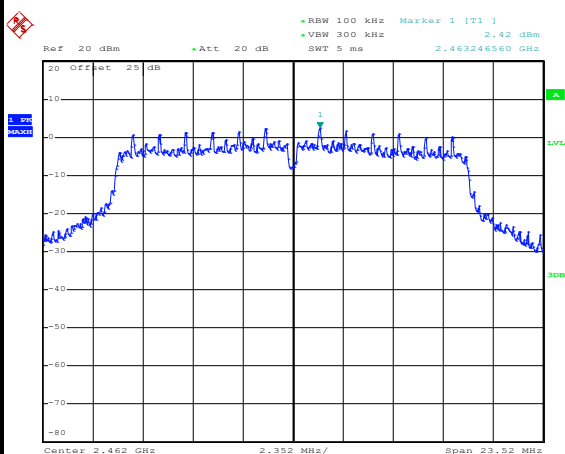
Test Mode :	802.11g	Test Channel :	06
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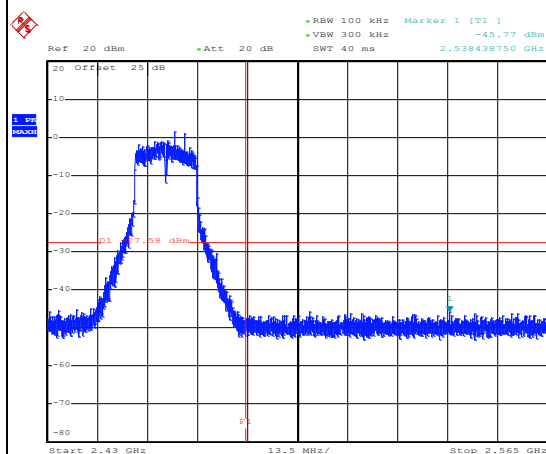
Test Mode :	802.11g	Test Channel :	11
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100kHz PSD reference Level



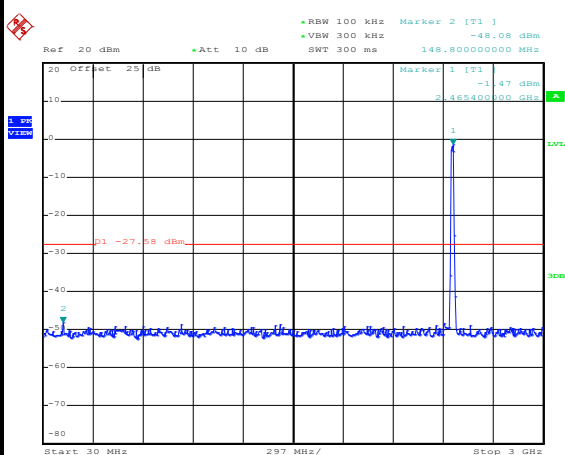
Date: 1.JUL.2020 15:14:15

High Channel Plot



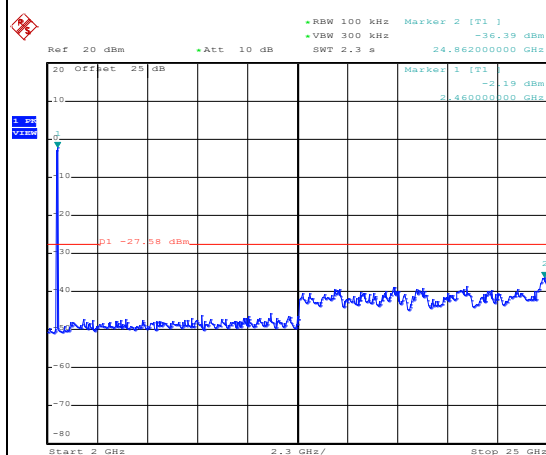
Date: 1.JUL.2020 15:17:25

Spurious Emission 30MHz~3GHz



Date: 1.JUL.2020 15:23:58

Spurious Emission 2GHz~25GHz

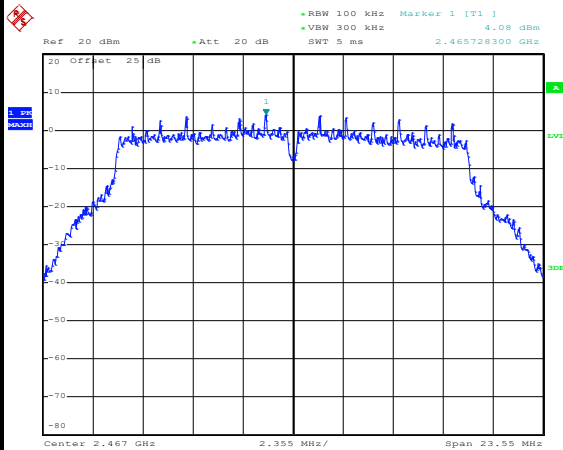


Date: 1.JUL.2020 15:24:16



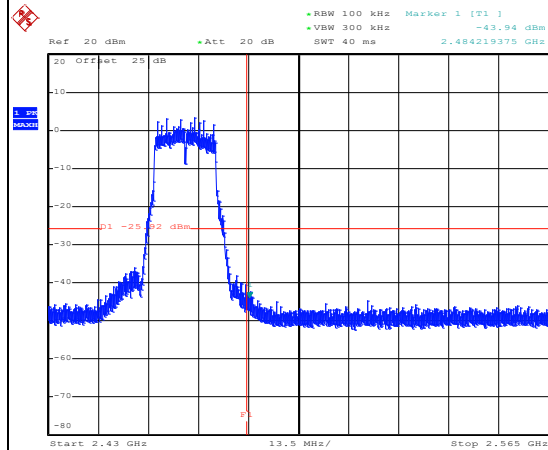
Test Mode :	802.11g	Test Channel :	12
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100kHz PSD reference Level



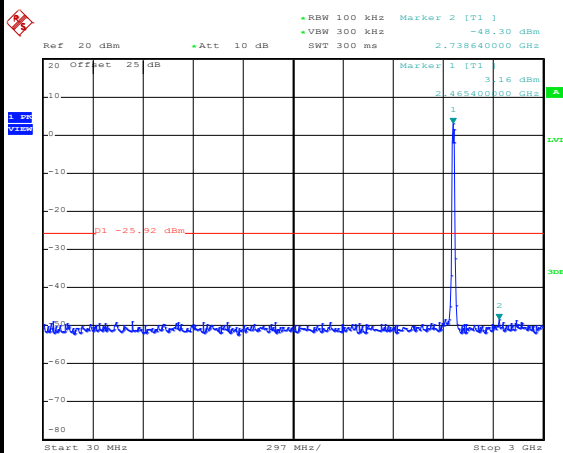
Date: 24.JUL.2020 22:26:21

High Channel Plot



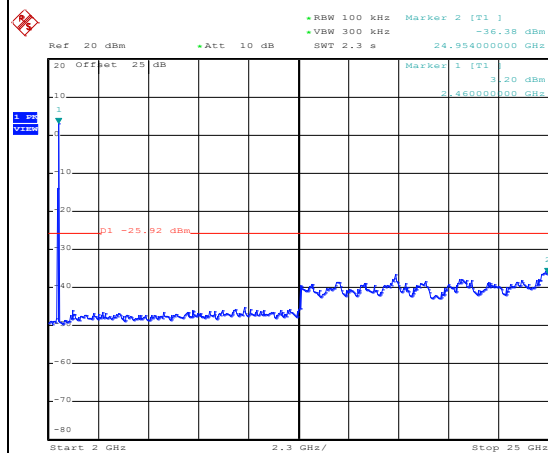
Date: 24.JUL.2020 22:26:51

Spurious Emission 30MHz~3GHz



Date: 24.JUL.2020 22:41:43

Spurious Emission 2GHz~25GHz

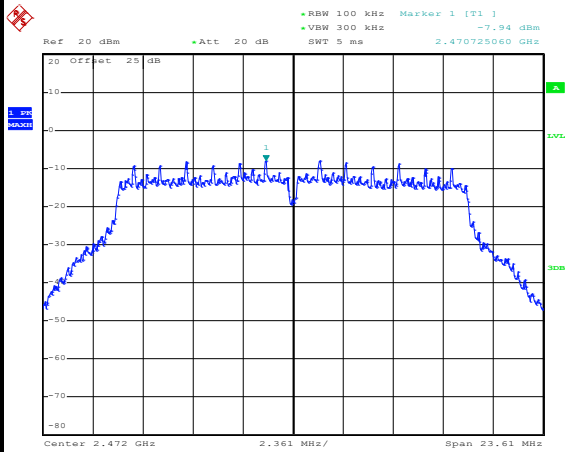


Date: 24.JUL.2020 22:43:53



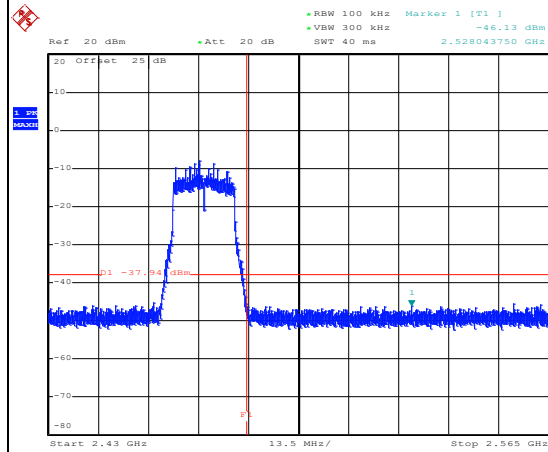
Test Mode :	802.11g	Test Channel :	13
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100kHz PSD reference Level



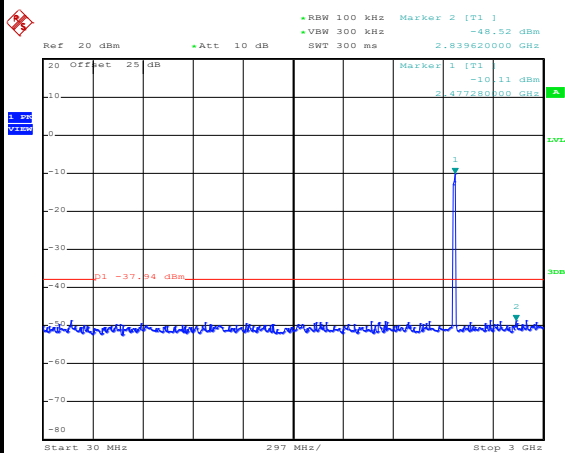
Date: 24.JUL.2020 22:32:27

High Channel Plot



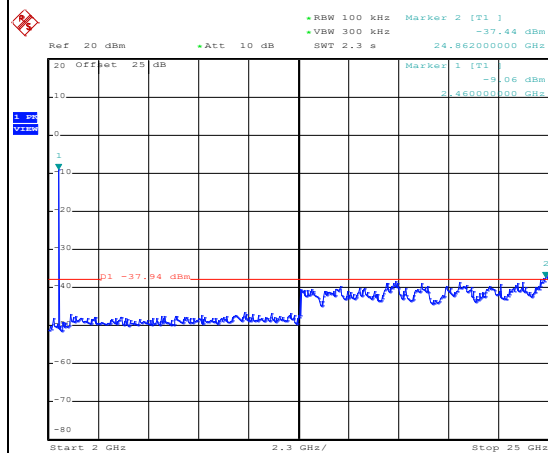
Date: 24.JUL.2020 22:32:46

Spurious Emission 30MHz~3GHz



Date: 24.JUL.2020 22:33:05

Spurious Emission 2GHz~25GHz

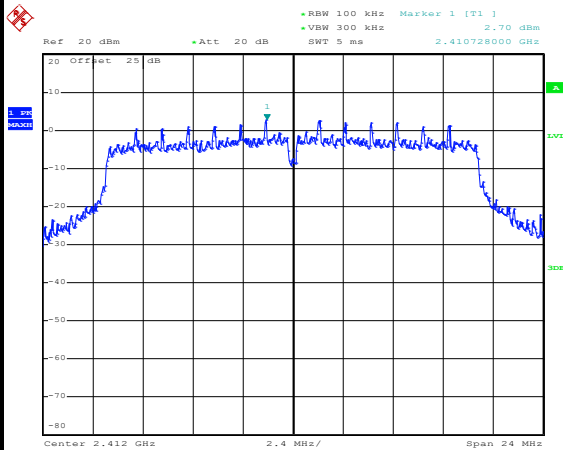


Date: 24.JUL.2020 22:34:18



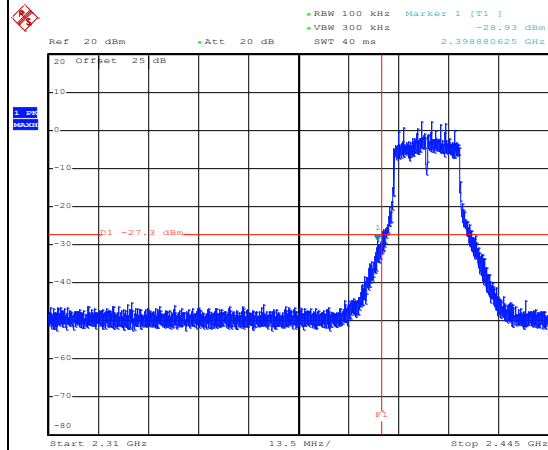
Test Mode :	802.11n HT20	Test Channel :	01
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100kHz PSD reference Level



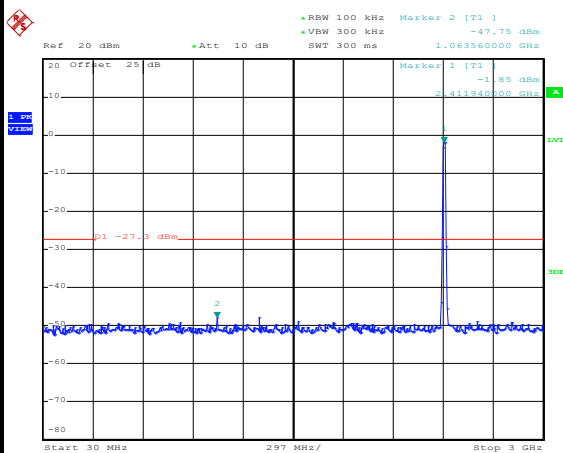
Date: 1.JUL.2020 18:06:39

Low Channel Plot



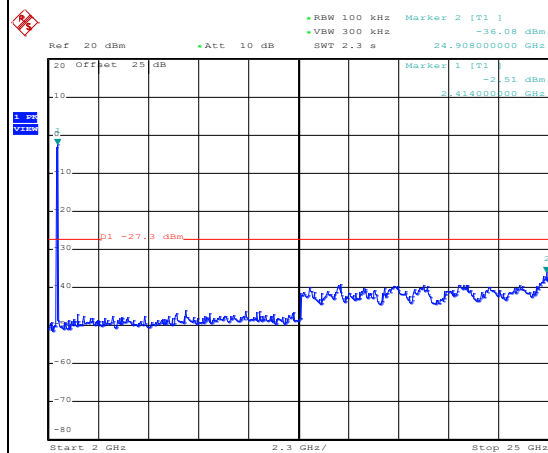
Date: 1.JUL.2020 18:08:54

Spurious Emission 30MHz~3GHz



Date: 1.JUL.2020 18:10:19

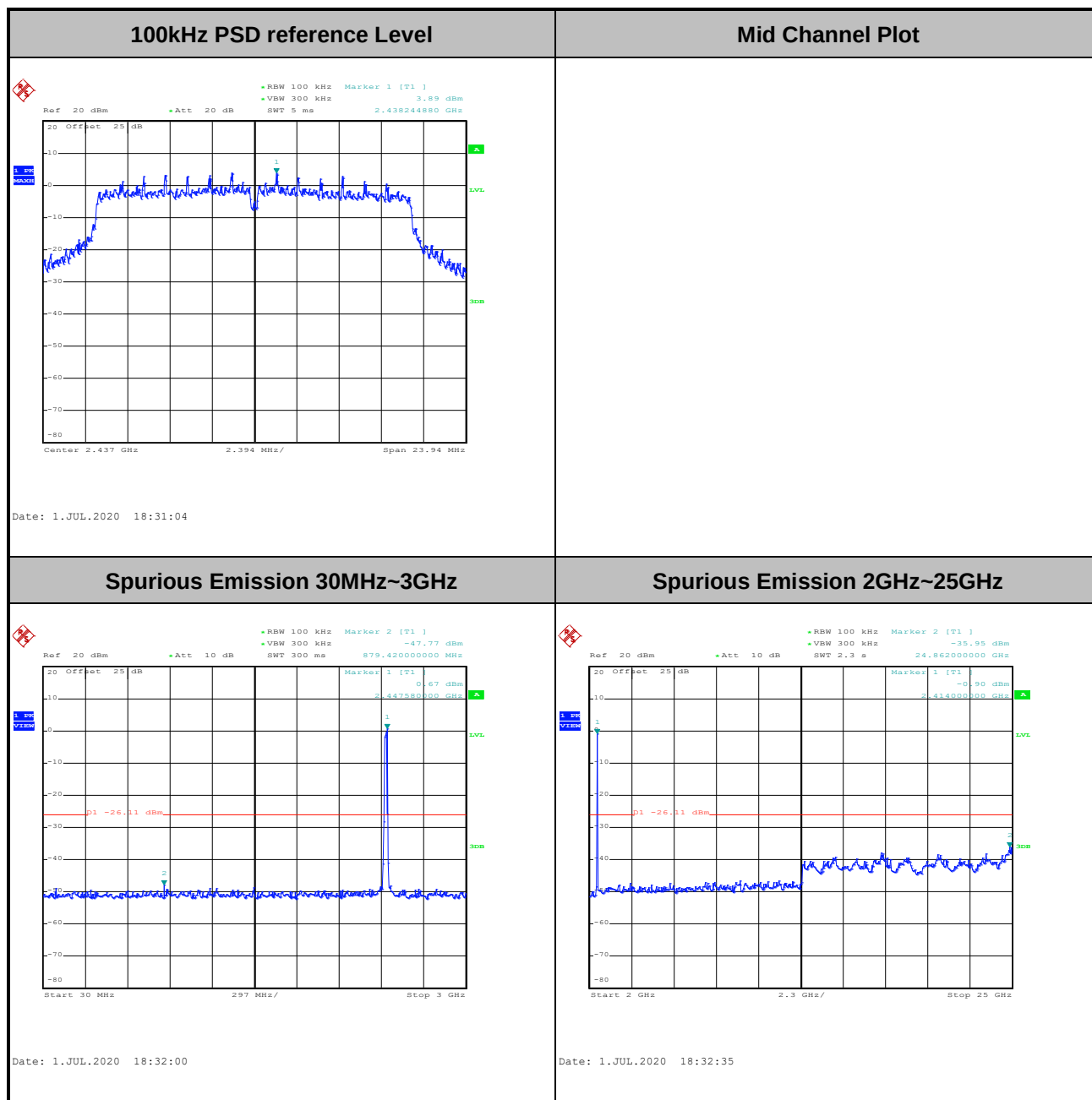
Spurious Emission 2GHz~25GHz



Date: 1.JUL.2020 18:10:40



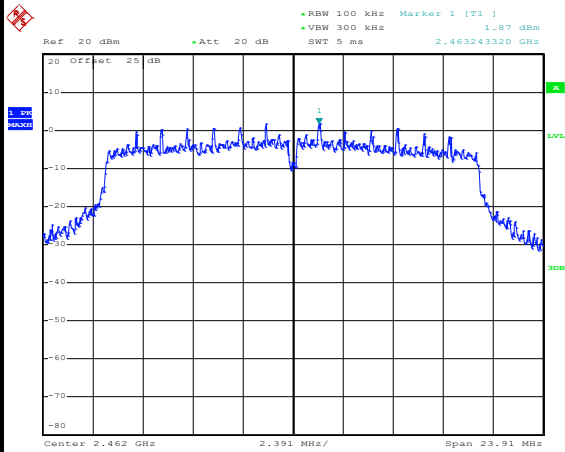
Test Mode :	802.11n HT20	Test Channel :	06
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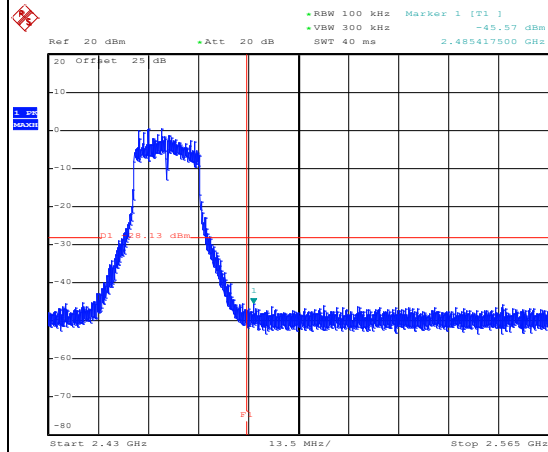
Test Mode :	802.11n HT20	Test Channel :	11
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100kHz PSD reference Level



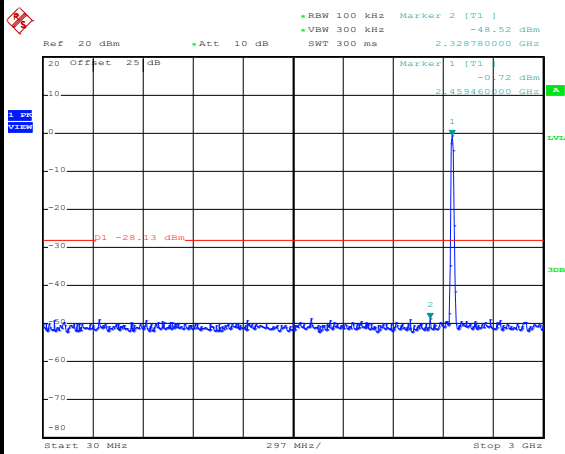
Date: 2.JUL.2020 10:05:50

High Channel Plot



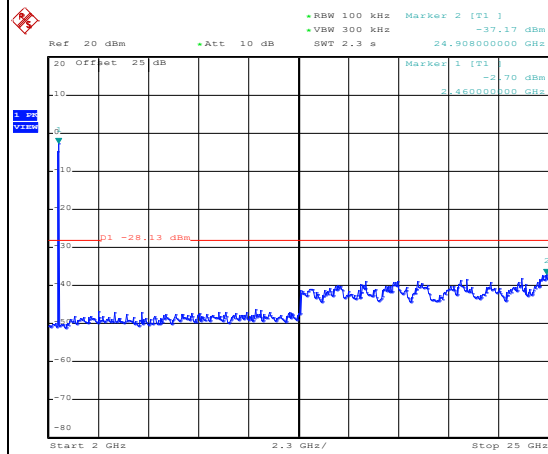
Date: 2.JUL.2020 10:06:44

Spurious Emission 30MHz~3GHz



Date: 2.JUL.2020 10:10:43

Spurious Emission 2GHz~25GHz

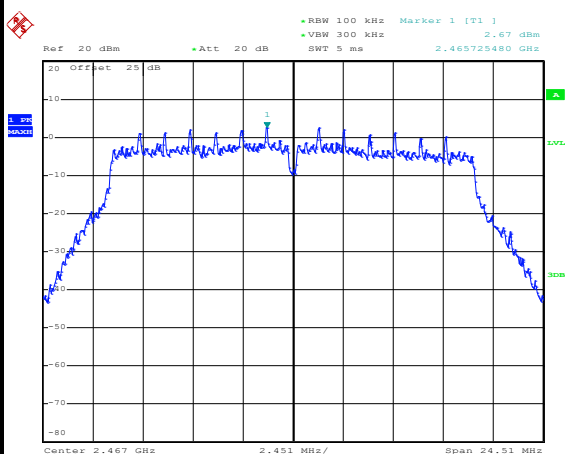


Date: 2.JUL.2020 10:11:01



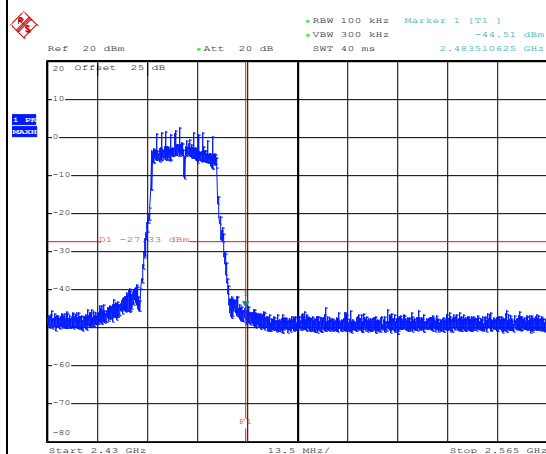
Test Mode :	802.11n HT20	Test Channel :	12
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100kHz PSD reference Level



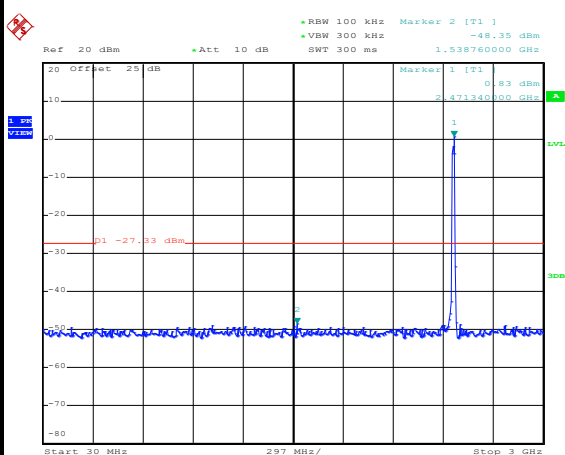
Date: 24.JUL.2020 22:56:56

High Channel Plot



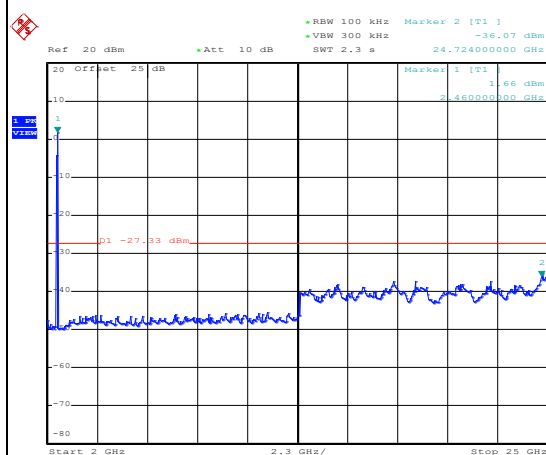
Date: 24.JUL.2020 22:57:29

Spurious Emission 30MHz~3GHz



Date: 24.JUL.2020 22:58:25

Spurious Emission 2GHz~25GHz

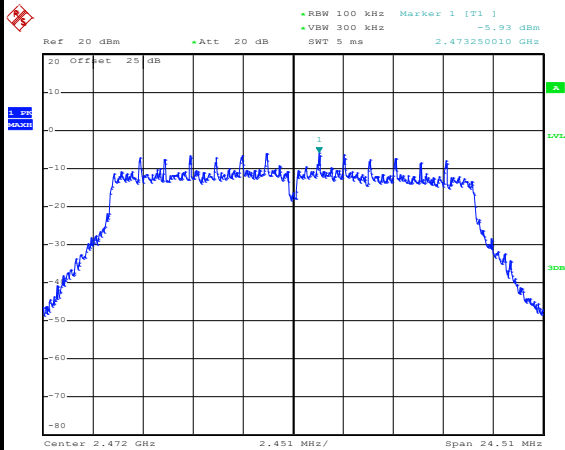


Date: 24.JUL.2020 23:00:51



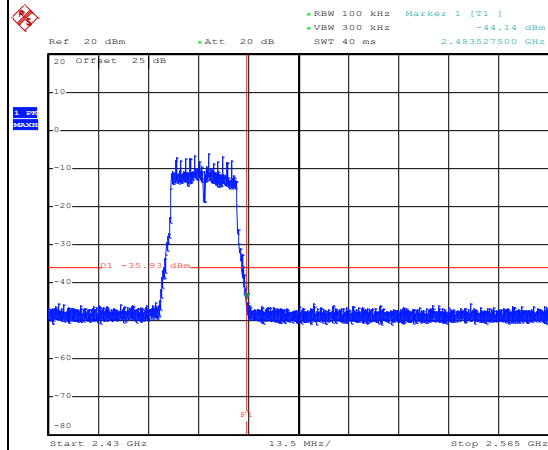
Test Mode :	802.11n HT20	Test Channel :	13
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100kHz PSD reference Level



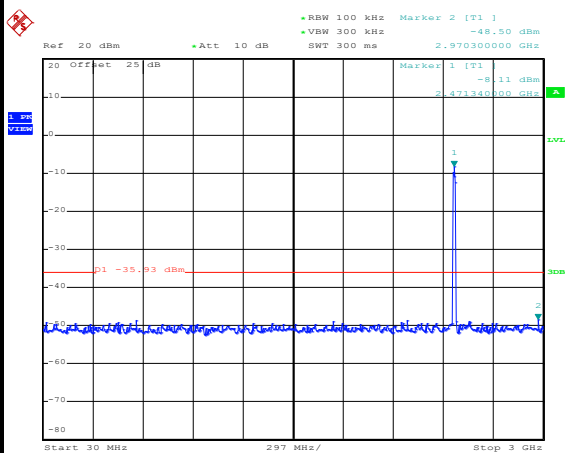
Date: 24.JUL.2020 23:12:54

High Channel Plot



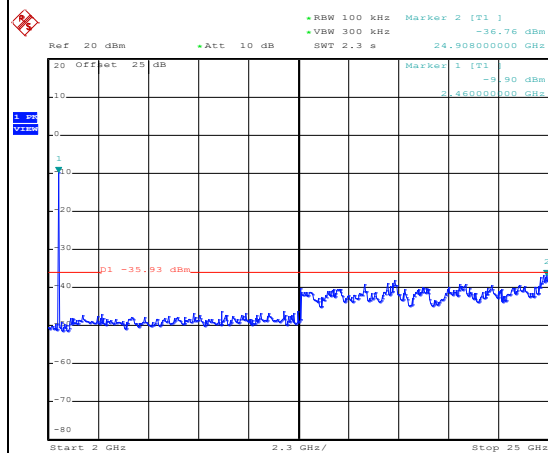
Date: 24.JUL.2020 23:14:31

Spurious Emission 30MHz~3GHz



Date: 24.JUL.2020 23:14:51

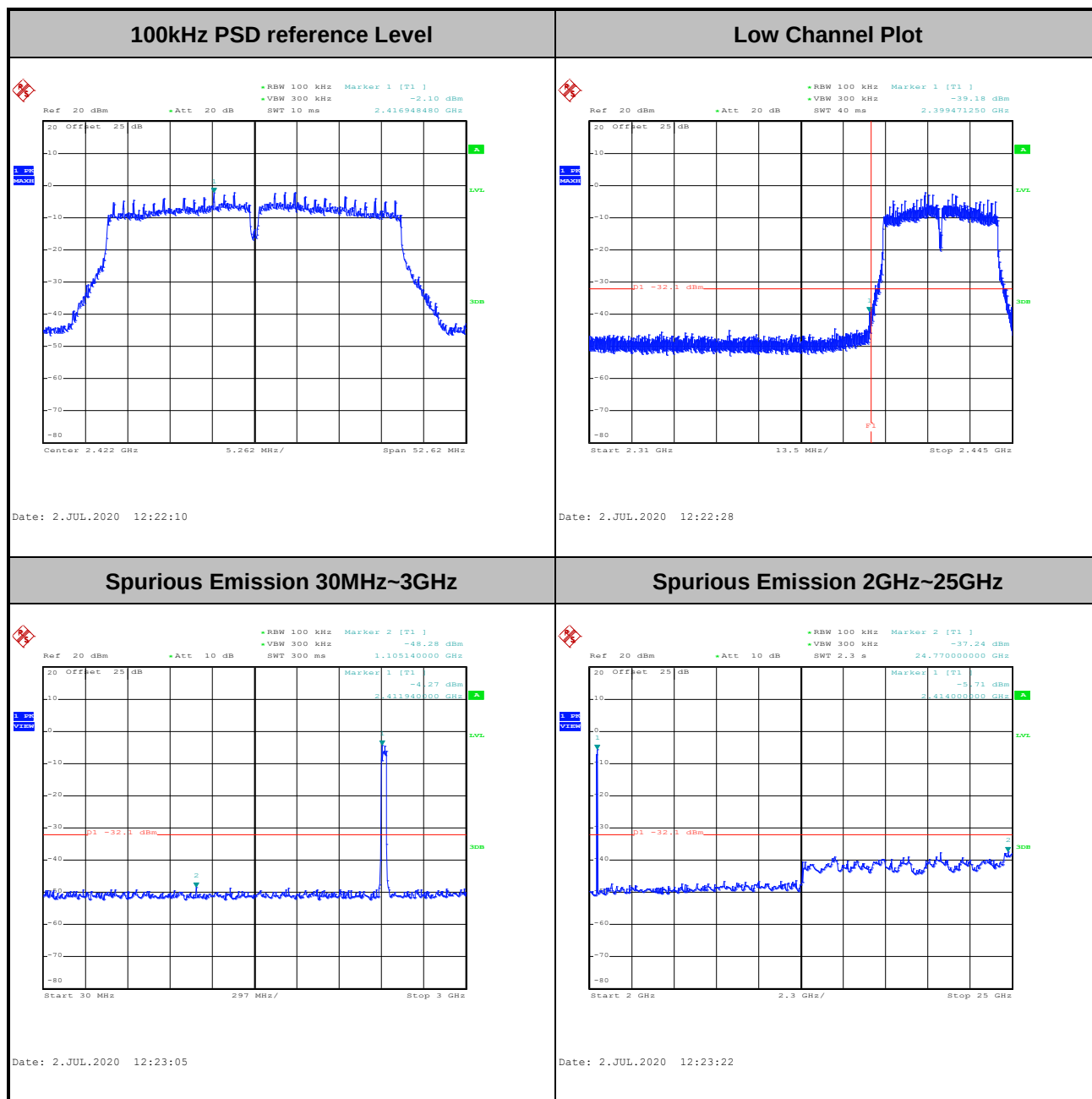
Spurious Emission 2GHz~25GHz



Date: 24.JUL.2020 23:16:57

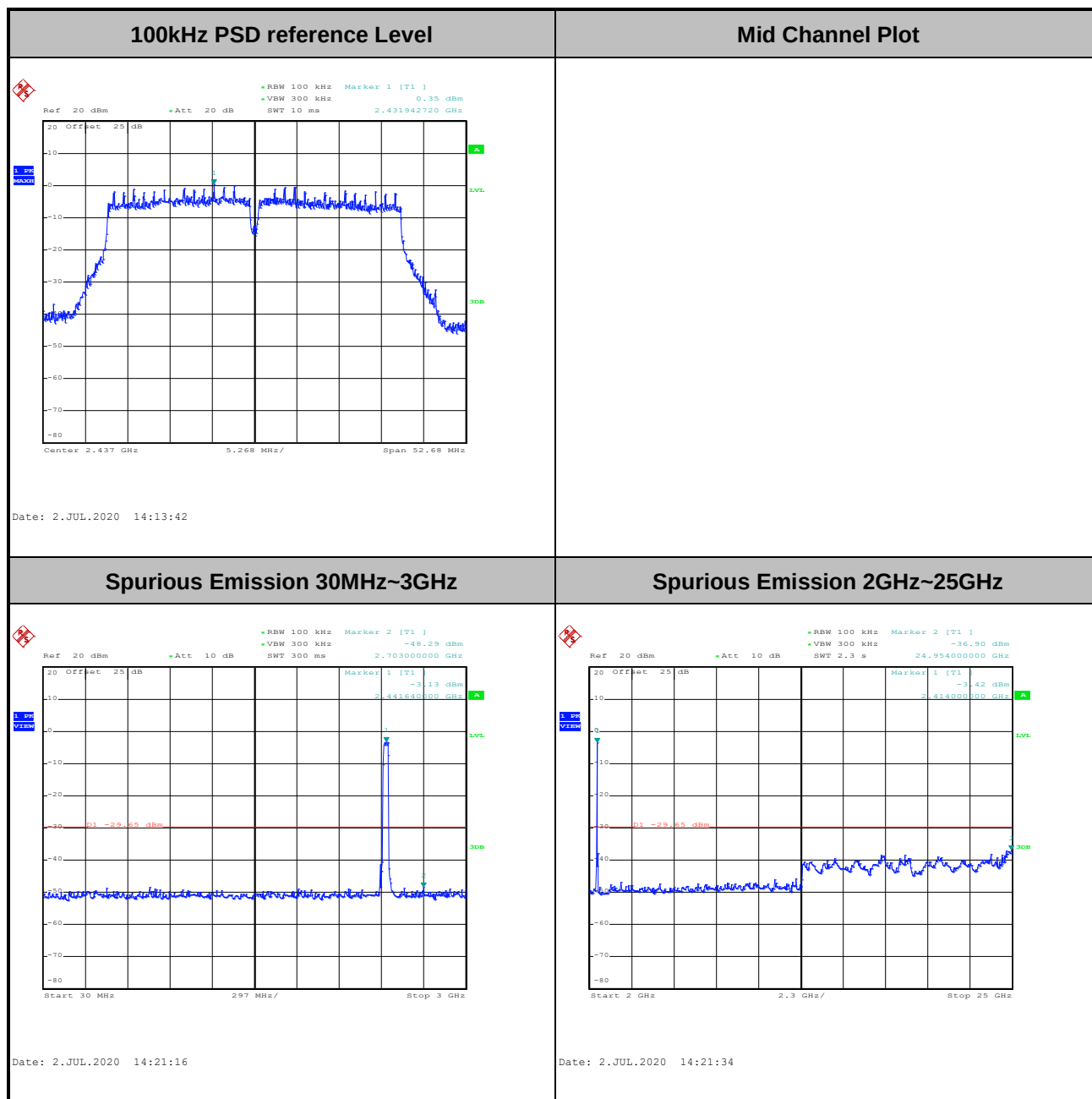


Test Mode :	802.11n HT40	Test Channel :	03
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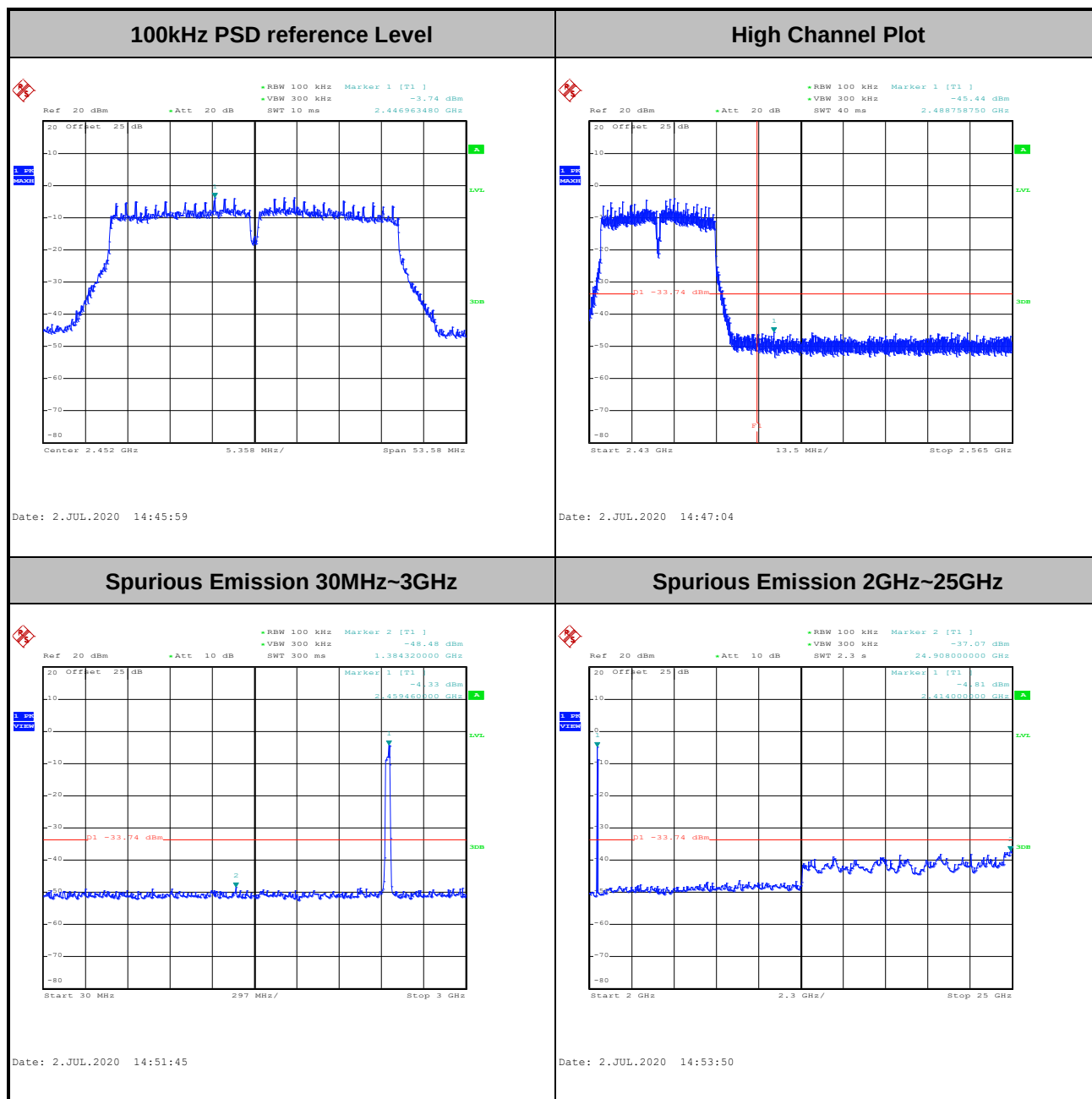


Test Mode :	802.11n HT40	Test Channel :	06
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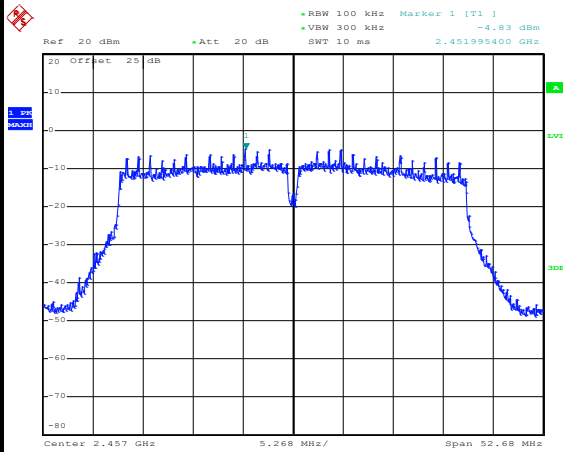
Test Mode :	802.11n HT40	Test Channel :	09
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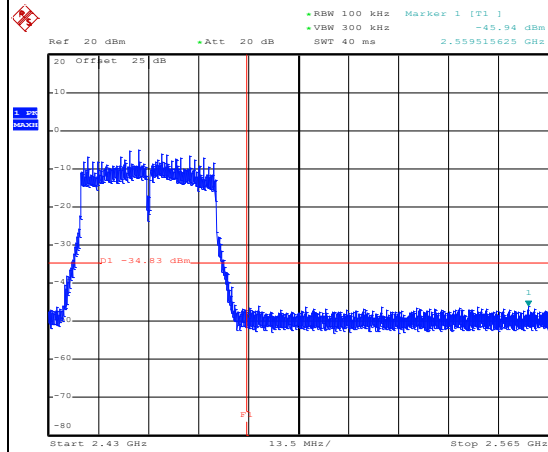
Test Mode :	802.11n HT40	Test Channel :	10
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100kHz PSD reference Level



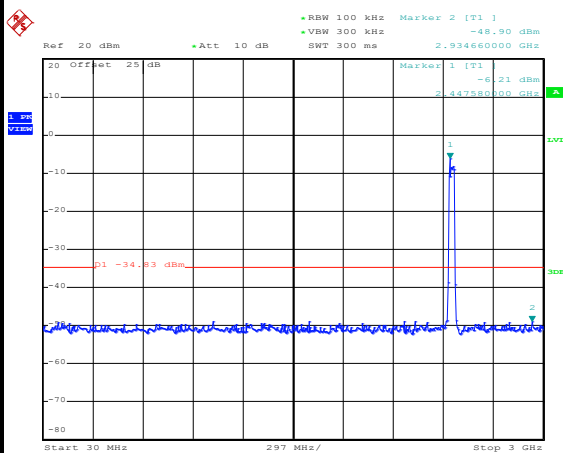
Date: 2.JUL.2020 15:17:57

High Channel Plot



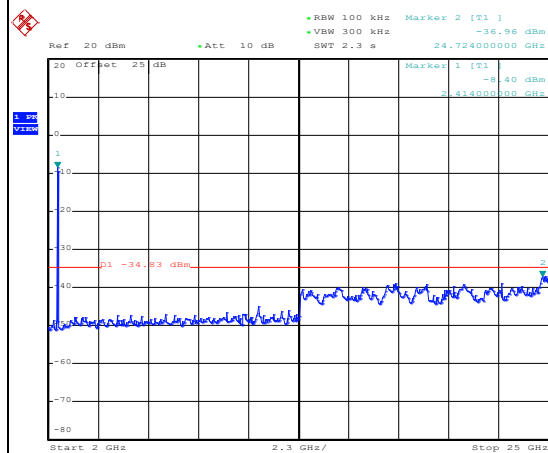
Date: 2.JUL.2020 15:21:38

Spurious Emission 30MHz~3GHz



Date: 2.JUL.2020 15:28:10

Spurious Emission 2GHz~25GHz

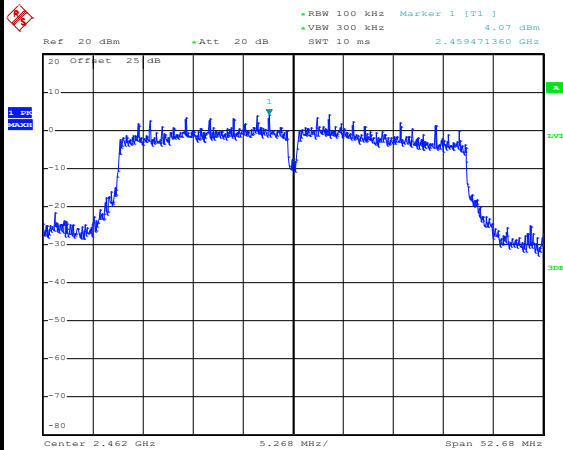


Date: 2.JUL.2020 15:28:25



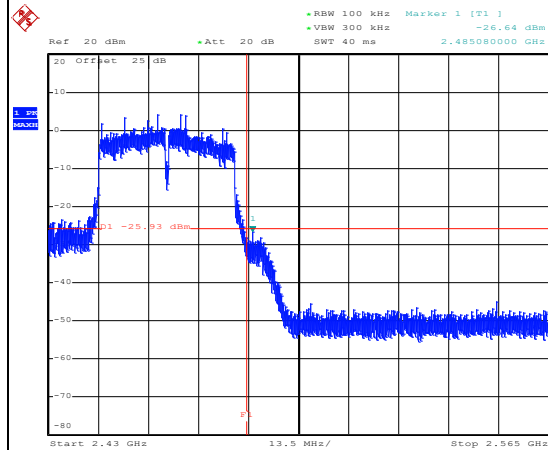
Test Mode :	802.11n HT40	Test Channel :	11
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100kHz PSD reference Level



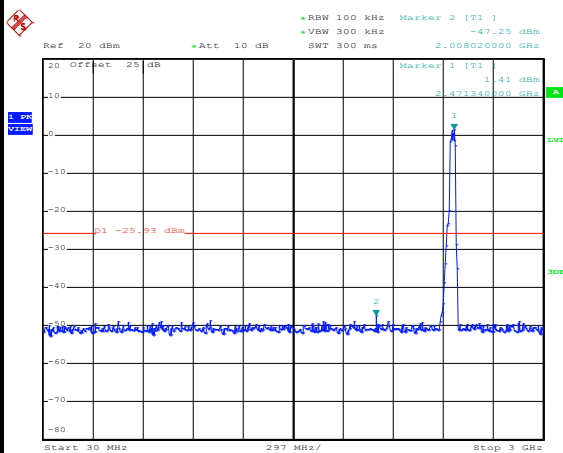
Date: 2.JUL.2020 16:05:47

High Channel Plot



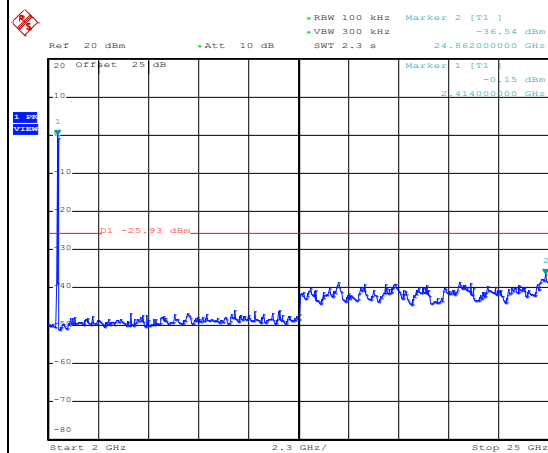
Date: 2.JUL.2020 16:09:09

Spurious Emission 30MHz~3GHz



Date: 2.JUL.2020 16:10:31

Spurious Emission 2GHz~25GHz



Date: 2.JUL.2020 16:10:45

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 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

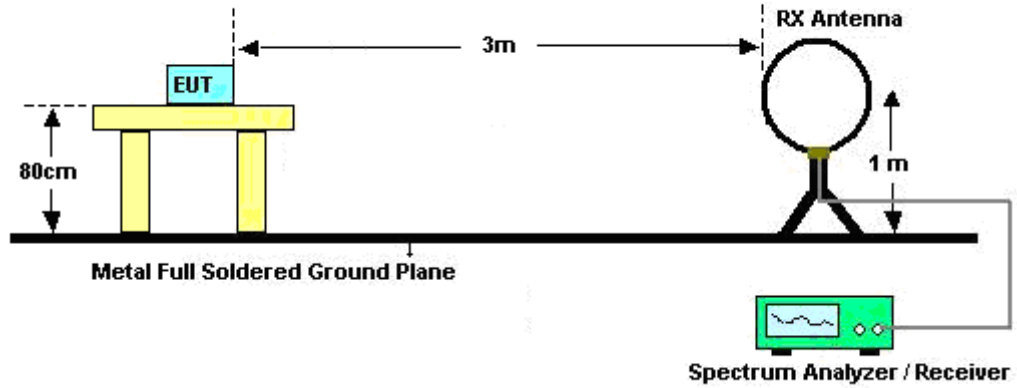
See list of measuring equipment of this test report.

3.5.3 Test Procedures

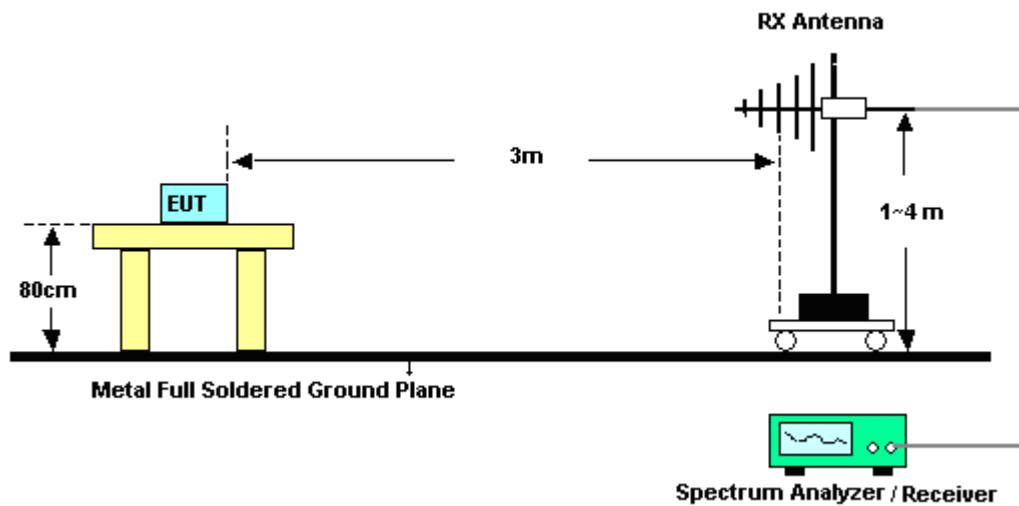
1. The testing follows the ANSI C63.10 Section 11.12.1 Radiated emission measurements.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the 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

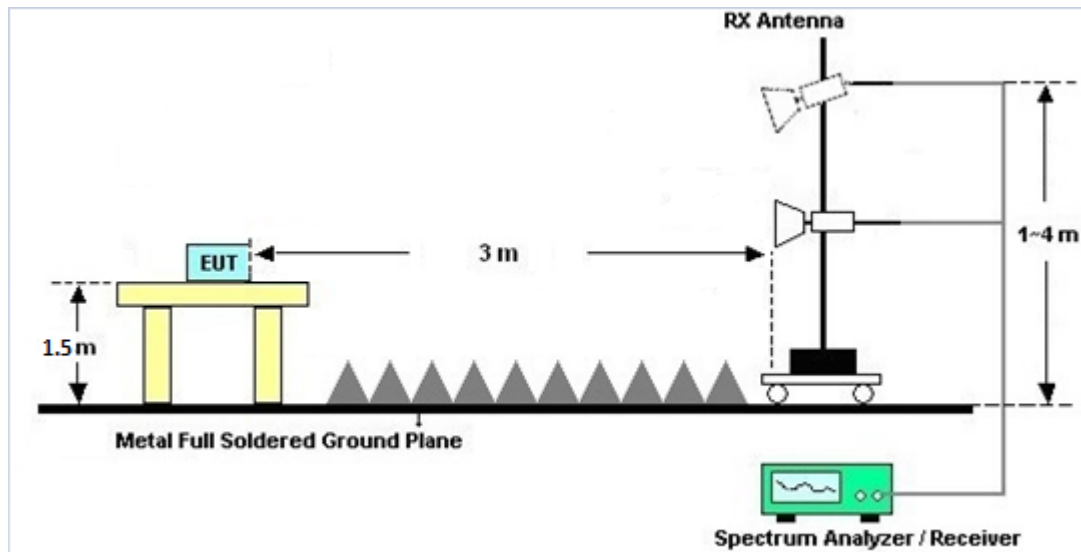
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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 was not reported.

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, 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 Antenna Requirements

3.6.1 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 rule.

3.6.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.6.3 Antenna Gain

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. 0	Ant. 1	Power	PSD	Reduction	Reduction
	(dBi)	(dBi)	(dBi)	(dBi)	(dB)	(dB)
2.4 GHz	3.62	3.62	3.62	6.63	0.00	0.63

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

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



4 List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Hygrometer	Testo	608-H1	34893241	N/A	Mar. 02, 2020	Jun. 11, 2020~ Jul. 24, 2020	Mar. 01, 2021	Conducted (TH05-HY)
Power Sensor	DARE	RPR3006W	16I00054SN O10	10MHz~6GHz	Dec. 23, 2019	Jun. 11, 2020~ Jul. 24, 2020	Dec. 22, 2020	Conducted (TH05-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP40	100055	9kHz~40GHz	Dec. 30, 2019	Jun. 11, 2020~ Jul. 24, 2020	Dec. 29, 2020	Conducted (TH05-HY)
Power Supply	GW Instek	SPS-606	GES842931	NA	Aug. 19, 2019	Jun. 11, 2020~ Jul. 24, 2020	Aug. 18, 2020	Conducted (TH05-HY)
Switch Control Manframe	Burgeon	ETF-058	EC1300484	N/A	Aug. 22, 2019	Jun. 11, 2020~ Jul. 24, 2020	Aug. 21, 2020	Conducted (TH05-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Jan. 09, 2020	Jul. 01, 2020~ Jul. 31, 2020	Jan. 08, 2021	Radiation (03CH15-HY)
Bilog Antenna	TESEQ	CBL6111D&00 800N1D01N-0 6	41912&05	30MHz to 1GHz	Feb. 09, 2020	Jul. 01, 2020~ Jul. 31, 2020	Feb. 08, 2021	Radiation (03CH15-HY)
Amplifier	SONOMA	310N	363440	9kHz~1GHz	Dec. 27, 2019	Jul. 01, 2020~ Jul. 31, 2020	Dec. 26, 2020	Radiation (03CH15-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1620	1-18GHz	Oct. 28, 2019	Jul. 01, 2020~ Jul. 31, 2020	Oct. 27, 2020	Radiation (03CH15-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA917058 4	18GHz- 40GHz	Dec. 10, 2019	Jul. 01, 2020~ Jul. 31, 2020	Dec. 09, 2020	Radiation (03CH15-HY)
Preamplifier	Jet-Power	JPA0118-55-3 03	1710001800 055006	1GHz~18GHz	May 07, 2020	Jul. 01, 2020~ Jul. 31, 2020	May 06, 2021	Radiation (03CH15-HY)
Preamplifier	Keysight	83017A	MY53270195	1GHz~26.5GHz	Aug. 23, 2019	Jul. 01, 2020~ Jul. 31, 2020	Aug. 22, 2020	Radiation (03CH15-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz ~ 40GHz	Dec. 13, 2019	Jul. 01, 2020~ Jul. 31, 2020	Dec. 12, 2020	Radiation (03CH15-HY)
EMI Test Receiver	Keysight	N9038A(MXE)	MY54130085	20MHz~8.4GHz	Nov. 01, 2019	Jul. 01, 2020~ Jul. 31, 2020	Oct. 31, 2020	Radiation (03CH15-HY)
Spectrum Analyzer	Agilent	E4446A	MY50180136	3Hz~44GHz	May 04, 2020	Jul. 01, 2020~ Jul. 31, 2020	May 03, 2021	Radiation (03CH15-HY)
Antenna Mast	ChainTek	MBS-520-1	N/A	1m~4m	N/A	Jul. 01, 2020~ Jul. 31, 2020	N/A	Radiation (03CH15-HY)
Turn Table	ChainTek	T-200-S-1	N/A	0~360 Degree	N/A	Jul. 01, 2020~ Jul. 31, 2020	N/A	Radiation (03CH15-HY)
Software	Audix	E3 6.2009-8-24 (k5)	RK-000451	N/A	N/A	Jul. 01, 2020~ Jul. 31, 2020	N/A	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY36980/4	30M-18G	Apr. 14, 2020	Jul. 01, 2020~ Jul. 31, 2020	Apr. 13, 2021	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY9838/4PE	30M-18G	Apr. 14, 2020	Jul. 01, 2020~ Jul. 31, 2020	Apr. 13, 2021	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY37710/4	30M-18G	Apr. 17, 2020	Jul. 01, 2020~ Jul. 31, 2020	Apr. 16, 2021	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	505134/2	30MHz-40GHz	Feb. 25, 2020	Jul. 01, 2020~ Jul. 31, 2020	Feb. 24, 2021	Radiation (03CH15-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	800740/2	30MHz-40GHz	Feb. 25, 2020	Jul. 01, 2020~ Jul. 31, 2020	Feb. 24, 2021	Radiation (03CH15-HY)
Filter	Wainwright	WLK4-1000-15 30-8000-40SS	SN4	1.53G Low Pass	Jul. 04, 2019	Jul. 01, 2020~ Jul. 31, 2020	Jul. 03, 2020	Radiation (03CH15-HY)
Filter	Wainwright	WLK4-1000-15 30-8000-40SS	SN4	1.53G Low Pass	Jul. 03, 2020	Jul. 01, 2020~ Jul. 31, 2020	Jul. 02, 2021	Radiation (03CH15-HY)
Filter	Wainwright	WHKX12-2700 -3000-18000-6 0ST	SN4	3GHz High Pass Filter	Sep. 17, 2019	Jul. 01, 2020~ Jul. 31, 2020	Sep. 16, 2020	Radiation (03CH15-HY)



5 Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.0
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.4
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.0
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Appendix A. Test Result of Conducted Test Items

Test Engineer:	Kathy Chen / Kai Liao	Temperature:	21~25	°C
Test Date:	2020/6/11 ~ 2020/7/24	Relative Humidity:	51~54	%

TEST RESULTS DATA
6dB and 99% Occupied Bandwidth

2.4GHz Band MIMO										
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	99% Occupied BW (MHz)		6dB BW (MHz)		6dB BW Limit (MHz)	Pass/Fail
					Ant0	Ant1	Ant0	Ant1		
11b	1Mbps	2	1	2412	13.90	13.70	8.08	8.08	0.50	Pass
11b	1Mbps	2	6	2437	13.85	13.95	8.08	8.08	0.50	Pass
11b	1Mbps	2	11	2462	13.85	13.75	8.08	8.08	0.50	Pass
11b	1Mbps	2	12	2467	13.85	13.95	9.06	8.08	0.50	Pass
11b	1Mbps	2	13	2472	13.90	13.95	9.06	8.10	0.50	Pass
11g	6Mbps	2	1	2412	16.80	16.65	15.44	15.72	0.50	Pass
11g	6Mbps	2	6	2437	16.70	16.65	15.36	15.68	0.50	Pass
11g	6Mbps	2	11	2462	16.75	16.60	15.46	15.68	0.50	Pass
11g	6Mbps	2	12	2467	16.65	16.60	15.54	15.70	0.50	Pass
11g	6Mbps	2	13	2472	16.65	16.60	15.56	15.74	0.50	Pass
HT20	MCS0	2	1	2412	18.00	17.85	16.76	16.00	0.50	Pass
HT20	MCS0	2	6	2437	17.85	17.90	15.96	15.96	0.50	Pass
HT20	MCS0	2	11	2462	17.85	17.75	15.92	15.94	0.50	Pass
HT20	MCS0	2	12	2467	17.80	17.80	16.54	16.34	0.50	Pass
HT20	MCS0	2	13	2472	17.75	17.80	15.96	16.34	0.50	Pass
HT40	MCS0	2	3	2422	36.60	36.40	35.24	35.08	0.50	Pass
HT40	MCS0	2	6	2437	36.50	36.60	35.68	35.12	0.50	Pass
HT40	MCS0	2	9	2452	36.60	36.50	35.72	35.72	0.50	Pass
HT40	MCS0	2	10	2457	36.50	36.40	35.68	35.12	0.50	Pass
HT40	MCS0	2	11	2462	36.50	36.60	35.72	35.12	0.50	Pass

TEST RESULTS DATA
Average Output Power

2.4GHz Band MIMO																
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
					Ant0	Ant1	SUM	Ant0	Ant1	Ant0	Ant1	Ant0	Ant1	Ant0	Ant1	
11b	1Mbps	2	1	2412	18.40	18.50	21.46	29.37		6.63		28.09		36.00		Pass
11b	1Mbps	2	2	2417	18.20	18.50	21.36	29.37		6.63		27.99		36.00		Pass
11b	1Mbps	2	6	2437	18.50	18.20	21.36	29.37		6.63		27.99		36.00		Pass
11b	1Mbps	2	10	2457	18.20	18.50	21.36	29.37		6.63		27.99		36.00		Pass
11b	1Mbps	2	11	2462	16.60	17.00	19.81	29.37		6.63		26.45		36.00		Pass
11b	1Mbps	2	12	2467	16.50	17.00	19.77	29.37		6.63		26.40		36.00		Pass
11b	1Mbps	2	13	2472	14.90	15.50	18.22	29.37		6.63		24.85		36.00		Pass
11g	6Mbps	2	1	2412	16.10	17.00	19.58	29.37		6.63		26.21		36.00		Pass
11g	6Mbps	2	2	2417	17.70	18.50	21.13	29.37		6.63		27.76		36.00		Pass
11g	6Mbps	2	6	2437	18.40	18.20	21.31	29.37		6.63		27.94		36.00		Pass
11g	6Mbps	2	10	2457	17.20	17.90	20.57	29.37		6.63		27.20		36.00		Pass
11g	6Mbps	2	11	2462	15.00	15.90	18.48	29.37		6.63		25.11		36.00		Pass
11g	6Mbps	2	12	2467	13.80	14.80	17.34	29.37		6.63		23.97		36.00		Pass
11g	6Mbps	2	13	2472	2.60	3.50	6.08	29.37		6.63		12.71		36.00		Pass
HT20	MCS0	2	1	2412	14.80	15.70	18.28	29.37		6.63		24.91		36.00		Pass
HT20	MCS0	2	2	2417	17.60	18.50	21.08	29.37		6.63		27.71		36.00		Pass
HT20	MCS0	2	6	2437	18.20	18.10	21.16	29.37		6.63		27.79		36.00		Pass
HT20	MCS0	2	10	2457	17.00	17.80	20.43	29.37		6.63		27.06		36.00		Pass
HT20	MCS0	2	11	2462	14.90	15.80	18.38	29.37		6.63		25.01		36.00		Pass
HT20	MCS0	2	12	2467	12.30	13.00	15.67	29.37		6.63		22.30		36.00		Pass
HT20	MCS0	2	13	2472	3.70	4.70	7.24	29.37		6.63		13.87		36.00		Pass
HT40	MCS0	2	3	2422	14.30	14.30	17.31	29.37		6.63		23.94		36.00		Pass
HT40	MCS0	2	4	2427	16.60	16.90	19.76	29.37		6.63		26.39		36.00		Pass
HT40	MCS0	2	6	2437	16.60	17.00	19.81	29.37		6.63		26.45		36.00		Pass
HT40	MCS0	2	8	2447	14.20	14.70	17.47	29.37		6.63		24.10		36.00		Pass
HT40	MCS0	2	9	2452	13.50	13.80	16.66	29.37		6.63		23.29		36.00		Pass
HT40	MCS0	2	10	2457	8.10	8.10	11.11	29.37		6.63		17.74		36.00		Pass
HT40	MCS0	2	11	2462	0.40	0.20	3.31	29.37		6.63		9.94		36.00		Pass
VHT20	MCS0	2	1	2412	14.70	15.60	18.18	29.37		6.63		24.81		36.00		Pass
VHT20	MCS0	2	2	2417	17.50	18.40	20.98	29.37		6.63		27.61		36.00		Pass
VHT20	MCS0	2	6	2437	17.60	17.70	20.66	29.37		6.63		27.29		36.00		Pass
VHT20	MCS0	2	10	2457	16.90	17.70	20.33	29.37		6.63		26.96		36.00		Pass
VHT20	MCS0	2	11	2462	14.80	15.70	18.28	29.37		6.63		24.91		36.00		Pass
VHT20	MCS0	2	12	2467	12.20	12.90	15.57	29.37		6.63		22.20		36.00		Pass
VHT20	MCS0	2	13	2472	3.60	4.60	7.14	29.37		6.63		13.77		36.00		Pass
VHT40	MCS0	2	3	2422	14.20	14.20	17.21	29.37		6.63		23.84		36.00		Pass
VHT40	MCS0	2	4	2427	16.50	16.80	19.66	29.37		6.63		26.29		36.00		Pass
VHT40	MCS0	2	6	2437	16.50	16.90	19.71	29.37		6.63		26.35		36.00		Pass
VHT40	MCS0	2	8	2447	14.10	14.60	17.37	29.37		6.63		24.00		36.00		Pass
VHT40	MCS0	2	9	2452	13.40	13.70	16.56	29.37		6.63		23.19		36.00		Pass
VHT40	MCS0	2	10	2457	8.00	8.00	11.01	29.37		6.63		17.64		36.00		Pass
VHT40	MCS0	2	11	2462	-0.70	-0.50	2.41	29.37		6.63		9.04		36.00		Pass

Note: Measured power (dBm) has offset with cable loss.

TEST RESULTS DATA
Peak Power Spectral Density

2.4GHz Band MIMO												
Mod.	Data Rate	NTX	CH.	Freq. (MHz)	Peak PSD (dBm/3kHz)			DG (dBi)		Peak PSD Limit (dBm/3kHz)		Pass/Fail
					Ant0	Ant1	Worse + 3.01	Ant0	Ant1	Ant0	Ant1	
11b	1Mbps	2	1	2412	-10.92	-10.42	-7.41	6.63		7.37		Pass
11b	1Mbps	2	6	2437	-10.41	-10.32	-7.31	6.63		7.37		Pass
11b	1Mbps	2	11	2462	-10.58	-9.56	-6.55	6.63		7.37		Pass
11b	1Mbps	2	12	2467	-8.76	-9.02	-5.75	6.63		7.37		Pass
11b	1Mbps	2	13	2472	-11.69	-11.91	-8.68	6.63		7.37		Pass
11g	6Mbps	2	1	2412	-15.36	-14.04	-11.03	6.63		7.37		Pass
11g	6Mbps	2	6	2437	-14.18	-13.76	-10.75	6.63		7.37		Pass
11g	6Mbps	2	11	2462	-16.24	-15.56	-12.55	6.63		7.37		Pass
11g	6Mbps	2	12	2467	-13.52	-13.65	-10.51	6.63		7.37		Pass
11g	6Mbps	2	13	2472	-24.17	-24.52	-21.16	6.63		7.37		Pass
HT20	MCS0	2	1	2412	-16.36	-15.43	-12.42	6.63		7.37		Pass
HT20	MCS0	2	6	2437	-14.53	-14.27	-11.26	6.63		7.37		Pass
HT20	MCS0	2	11	2462	-17.17	-16.44	-13.43	6.63		7.37		Pass
HT20	MCS0	2	12	2467	-15.04	-13.19	-10.18	6.63		7.37		Pass
HT20	MCS0	2	13	2472	-23.48	-21.71	-18.70	6.63		7.37		Pass
HT40	MCS0	2	3	2422	-18.59	-18.86	-15.58	6.63		7.37		Pass
HT40	MCS0	2	6	2437	-17.24	-16.65	-13.64	6.63		7.37		Pass
HT40	MCS0	2	9	2452	-20.27	-20.25	-17.24	6.63		7.37		Pass
HT40	MCS0	2	10	2457	-21.36	-21.44	-18.35	6.63		7.37		Pass
HT40	MCS0	2	11	2462	-12.87	-12.56	-9.55	6.63		7.37		Pass

Measured power density (dBm) has offset with cable loss.



Appendix B. Radiated Spurious Emission

Test Engineer :	Leo Lee, Mancy Chou, and Bigshow Wang	Temperature :	21.4~22.9°C
		Relative Humidity :	52~61%

2.4GHz 2400~2483.5MHz

WIFI 802.11b (Band Edge @ 3m)

WIFI Ant.	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Path Loss	Preampl Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
0+1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2372.685	56.86	-17.14	74	42.84	27.86	17.31	31.15	400	96	P	H
		2345.7	44.86	-9.14	54	30.76	28.01	17.26	31.17	400	96	A	H
	*	2412	98.24	-	-	84.32	27.68	17.38	31.14	400	96	P	H
	*	2412	95.1	-	-	81.18	27.68	17.38	31.14	400	96	A	H
													H
													H
		2386.335	56.42	-17.58	74	42.45	27.78	17.34	31.15	352	231	P	V
		2387.28	44.87	-9.13	54	30.9	27.78	17.34	31.15	352	231	A	V
	*	2412	101.66	-	-	87.73	27.67	17.39	31.13	352	231	P	V
	*	2412	98.9	-	-	84.97	27.67	17.39	31.13	352	231	A	V
													V
													V
802.11b CH 02 2417MHz		2387.7	56.28	-17.72	74	42.32	27.77	7.42	31.15	100	181	P	H
		2390	46.98	-7.02	54	33.02	27.76	7.43	31.15	100	160	A	H
	*	2417	105.31	-	-	91.37	27.67	7.48	31.13	100	181	P	H
	*	2417	97.82	-	-	83.88	27.67	7.48	31.13	100	181	A	H
													H
													H
		2389.8	57.82	-16.18	74	43.86	27.76	7.43	31.15	394	196	P	V
		2390	48.2	-5.8	54	34.24	27.76	7.43	31.15	394	196	A	V
	*	2417	110.24	-	-	96.3	27.67	7.48	31.13	394	196	P	V
	*	2417	101.15	-	-	87.21	27.67	7.48	31.13	394	196	A	V
													V
													V



802.11b CH 06 2437MHz		2345.36	55.95	-18.05	74	41.85	28.01	17.26	31.17	400	270	P	H
		2331.44	44.83	-9.17	54	30.73	28.04	17.23	31.17	400	270	A	H
	*	2437	101.93	-	-	87.99	27.63	17.43	31.12	400	270	P	H
	*	2437	98.87	-	-	84.93	27.63	17.43	31.12	400	270	A	H
		2483.71	56.36	-17.64	74	42.41	27.53	17.52	31.1	400	270	P	H
		2486.14	44.7	-9.3	54	30.75	27.53	17.52	31.1	400	270	A	H
		2318.64	55.9	-18.1	74	41.81	28.06	17.21	31.18	350	228	P	V
		2335.6	44.87	-9.13	54	30.77	28.03	17.24	31.17	350	228	A	V
	*	2437	106.79	-	-	92.85	27.63	17.43	31.12	350	228	P	V
	*	2437	103.72	-	-	89.78	27.63	17.43	31.12	350	228	A	V
		2488.66	55.56	-18.44	74	41.61	27.52	17.53	31.1	350	228	P	V
		2483.8	44.81	-9.19	54	30.86	27.53	17.52	31.1	350	228	A	V
802.11b CH 10 2457MHz	*	2457	106.79	-	-	92.84	27.59	17.47	31.11	118	159	P	H
	*	2457	103.61	-	-	89.66	27.59	17.47	31.11	118	159	A	H
		2484.04	56.48	-17.52	74	42.53	27.53	17.52	31.1	118	159	P	H
		2483.52	48.34	-5.66	54	34.39	27.53	17.52	31.1	118	159	A	H
													H
													H
	*	2457	108.68	-	-	94.73	27.59	17.47	31.11	340	275	P	V
	*	2457	105.66	-	-	91.71	27.59	17.47	31.11	340	275	A	V
		2483.68	56.66	-17.34	74	42.71	27.53	17.52	31.1	340	275	P	V
		2483.56	48.51	-5.49	54	34.56	27.53	17.52	31.1	340	275	A	V
													V
													V



802.11b CH 11 2462MHz	*	2462	108.94	-	-	94.99	27.58	17.48	31.11	348	280	P	H
	*	2462	105.89	-	-	91.94	27.58	17.48	31.11	348	280	A	H
		2487.12	56.22	-17.78	74	42.27	27.53	17.52	31.1	348	280	P	H
		2486.08	45.96	-8.04	54	32.01	27.53	17.52	31.1	348	280	A	H
													H
													H
	*	2462	105.83	-	-	91.88	27.58	17.48	31.11	358	262	P	V
	*	2462	102.72	-	-	88.77	27.58	17.48	31.11	358	262	A	V
		2490.68	56.15	-17.85	74	42.19	27.52	17.53	31.09	358	262	P	V
		2485.92	45.35	-8.65	54	31.4	27.53	17.52	31.1	358	262	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



WIFI Ant. 0+1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 12 2467MHz	*	2467	106.67	-	-	92.72	27.57	7.57	31.11	352	233	P	H
	*	2467	103.56	-	-	89.61	27.57	7.57	31.11	352	233	A	H
		2483.76	58.67	-15.33	74	44.72	27.53	7.6	31.1	352	233	P	H
		2484.08	51.31	-2.69	54	37.36	27.53	7.6	31.1	352	233	A	H
													H
													H
	*	2467	109.35	-	-	95.4	27.57	7.57	31.11	251	154	P	V
	*	2467	106.25	-	-	92.3	27.57	7.57	31.11	251	154	A	V
		2484.2	59.93	-14.07	74	45.98	27.53	7.6	31.1	251	154	P	V
		2484.08	52.71	-1.29	54	38.76	27.53	7.6	31.1	251	154	A	V
													V
													V
802.11b CH 13 2472MHz	*	2472	104.74	-	-	90.78	27.56	7.58	31.1	357	234	P	H
	*	2472	101.6	-	-	87.64	27.56	7.58	31.1	357	234	A	H
		2483.56	59.61	-14.39	74	45.66	27.53	7.6	31.1	357	234	P	H
		2483.52	52.47	-1.53	54	38.52	27.53	7.6	31.1	357	234	A	H
													H
													H
	*	2472	107.97	-	-	94.01	27.56	7.58	31.1	367	144	P	V
	*	2472	104.88	-	-	90.92	27.56	7.58	31.1	367	144	A	V
		2483.52	59.94	-14.06	74	45.99	27.53	7.6	31.1	367	144	P	V
		2483.52	52.78	-1.22	54	38.83	27.53	7.6	31.1	367	144	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11b (Harmonic @ 3m)

WIFI Ant. 0+1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 01 2412MHz		4824	42.41	-31.59	74	59.58	31.25	10.67	59.09	100	0	P	H
													H
													H
													H
		4824	46.91	-27.09	74	64.08	31.25	10.67	59.09	100	0	P	V
													V
													V
													V
802.11b CH 06 2437MHz		4874	47.04	-26.96	74	64.19	31.25	10.72	59.12	100	0	P	H
		7311	45.56	-28.44	74	55.04	36.52	12.56	58.56	100	0	P	H
													H
													H
		4874	46.17	-27.83	74	63.32	31.25	10.72	59.12	100	0	P	V
		7311	46.88	-27.12	74	56.36	36.52	12.56	58.56	100	0	P	V
													V
													V
802.11b CH 11 2462MHz		4924	51.61	-22.39	74	68.65	31.34	10.77	59.15	332	25	P	H
		4924	49.06	-4.94	54	66.1	31.34	10.77	59.15	332	25	A	H
		7386	45.51	-28.49	74	54.84	36.46	12.67	58.46	100	0	P	H
													H
		4924	53.02	-20.98	74	70.06	31.34	10.77	59.15	399	343	P	V
		4924	50.71	-3.29	54	67.75	31.34	10.77	59.15	399	343	A	V
		7386	47.51	-26.49	74	56.84	36.46	12.67	58.46	100	0	P	V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



WIFI Ant. 0+1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11b CH 12 2467MHz		4934	51.87	-22.13	74	68.86	31.4	10.77	59.16	100	128	P	H
		4934	49.03	-4.97	54	66.02	31.4	10.77	59.16	100	128	A	H
		7401	45.89	-28.11	74	55.24	36.4	12.69	58.44	100	0	P	H
													H
		4934	53.55	-20.45	74	70.54	31.4	10.77	59.16	399	344	P	V
		4934	50.79	-3.21	54	67.78	31.4	10.77	59.16	399	344	A	V
		7401	47.79	-26.21	74	57.14	36.4	12.69	58.44	100	0	P	V
													V
802.11b CH 13 2472MHz		4944	47.14	-26.86	74	64.06	31.46	10.79	59.17	100	0	P	H
		7416	45.09	-28.91	74	54.35	36.46	12.7	58.42	100	0	P	H
													H
													H
		4944	47.56	-26.44	74	64.48	31.46	10.79	59.17	100	0	P	V
		7416	46.1	-27.9	74	55.36	36.46	12.7	58.42	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz
WIFI 802.11g (Band Edge @ 3m)

WIFI Ant. 0+1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		2389.17	60.9	-13.1	74	46.94	27.76	17.35	31.15	268	225	P	H
		2390	50.83	-3.17	54	36.87	27.76	17.35	31.15	268	225	A	H
	*	2412	105.36	-	-	91.42	27.68	17.39	31.13	268	225	P	H
	*	2412	97.24	-	-	83.3	27.68	17.39	31.13	268	225	A	H
													H
													H
		2388.855	60.37	-13.63	74	46.41	27.77	17.34	31.15	350	225	P	V
		2389.59	50.33	-3.67	54	36.37	27.76	17.35	31.15	350	225	A	V
	*	2412	106.06	-	-	92.12	27.68	17.39	31.13	350	225	P	V
	*	2412	98.86	-	-	84.92	27.68	17.39	31.13	350	225	A	V
													V
													V
802.11g CH 02 2417MHz		2370.375	56.46	-17.54	74	42.42	27.88	17.31	31.15	100	181	P	H
		2390	46.91	-7.09	54	32.95	27.76	17.35	31.15	100	181	A	H
	*	2417	106.21	-	-	92.27	27.67	17.4	31.13	100	181	P	H
	*	2417	98.36	-	-	84.42	27.67	17.4	31.13	100	181	A	H
													H
													H
		2389.695	59.05	-14.95	74	45.09	27.76	17.35	31.15	394	196	P	V
		2390	48.16	-5.84	54	34.2	27.76	17.35	31.15	394	196	A	V
	*	2417	109.64	-	-	95.7	27.67	17.4	31.13	394	196	P	V
	*	2417	101.98	-	-	88.04	27.67	17.4	31.13	394	196	A	V
													V
													V



802.11g CH 06 2437MHz		2366.32	56.85	-17.15	74	42.81	27.9	17.3	31.16	400	269	P	H
		2330.32	44.85	-9.15	54	30.75	28.04	17.23	31.17	400	269	A	H
	*	2437	106.16	-	-	92.22	27.63	17.43	31.12	400	269	P	H
	*	2437	98.55	-	-	84.61	27.63	17.43	31.12	400	269	A	H
		2484.43	56.31	-17.69	74	42.36	27.53	17.52	31.1	400	269	P	H
		2483.53	44.87	-9.13	54	30.92	27.53	17.52	31.1	400	269	A	H
		2385.04	56.15	-17.85	74	42.17	27.79	17.34	31.15	350	225	P	V
		2390	45.04	-8.96	54	31.08	27.76	17.35	31.15	350	225	A	V
	*	2437	109.25	-	-	95.31	27.63	17.43	31.12	350	225	P	V
	*	2437	101.43	-	-	87.49	27.63	17.43	31.12	350	225	A	V
		2496.67	56.06	-17.94	74	42.1	27.51	17.54	31.09	350	225	P	V
		2483.98	45.06	-8.94	54	31.11	27.53	17.52	31.1	350	225	A	V
802.11g CH 10 2457MHz	*	2457	107.22	-	-	93.27	27.59	17.47	31.11	100	85	P	H
	*	2457	100.54	-	-	86.59	27.59	17.47	31.11	100	85	A	H
		2484.76	59.04	-14.96	74	45.09	27.53	17.52	31.1	100	85	P	H
		2483.52	48.44	-5.56	54	34.49	27.53	17.52	31.1	100	85	A	H
													H
													H
	*	2457	111.68	-	-	97.73	27.59	17.47	31.11	384	192	P	V
	*	2457	104.35	-	-	90.4	27.59	17.47	31.11	384	192	A	V
		2484.36	61.55	-12.45	74	47.6	27.53	17.52	31.1	384	192	P	V
		2483.52	50.97	-3.03	54	37.02	27.53	17.52	31.1	384	192	A	V
													V
													V



802.11g CH 11 2462MHz	*	2462	105.04	-	-	91.09	27.58	17.48	31.11	216	174	P	H
	*	2462	97.9	-	-	83.95	27.58	17.48	31.11	216	174	A	H
		2484.04	60.38	-13.62	74	46.43	27.53	17.52	31.1	216	174	P	H
		2483.52	50.75	-3.25	54	36.8	27.53	17.52	31.1	216	174	A	H
													H
													H
	*	2462	106.42	-	-	92.47	27.58	17.48	31.11	360	119	P	V
	*	2462	99.47	-	-	85.52	27.58	17.48	31.11	360	119	A	V
		2483.56	62.63	-11.37	74	48.68	27.53	17.52	31.1	360	119	P	V
		2483.52	50.79	-3.21	54	36.84	27.53	17.52	31.1	360	119	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



WIFI Ant. 0+1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 12 2467MHz	*	2467	107.29	-	-	93.35	27.56	7.57	31.11	285	196	P	H
	*	2467	99.73	-	-	85.79	27.56	7.57	31.11	285	196	A	H
		2484.36	63.74	-10.26	74	49.79	27.53	7.6	31.1	285	196	P	H
		2483.72	52.34	-1.66	54	38.39	27.53	7.6	31.1	285	196	A	H
													H
													H
	*	2467	109.95	-	-	96	27.57	7.57	31.11	365	160	P	V
	*	2467	102.62	-	-	88.67	27.57	7.57	31.11	365	160	A	V
		2484.52	63.76	-10.24	74	49.81	27.53	7.6	31.1	365	160	P	V
		2484.76	52.74	-1.26	54	38.79	27.53	7.6	31.1	365	160	A	V
													V
													V
802.11g CH 13 2472MHz	*	2472	95.88	-	-	81.92	27.56	7.58	31.1	300	196	P	H
	*	2472	88.27	-	-	74.31	27.56	7.58	31.1	300	196	A	H
		2483.52	56.93	-17.07	74	42.98	27.53	7.6	31.1	300	196	P	H
		2483.52	47.61	-6.39	54	33.66	27.53	7.6	31.1	300	196	A	H
													H
													H
	*	2472	98.63	-	-	84.67	27.56	7.58	31.1	367	160	P	V
	*	2472	90.82	-	-	76.86	27.56	7.58	31.1	367	160	A	V
		2483.52	62.25	-11.75	74	48.3	27.53	7.6	31.1	367	160	P	V
		2483.52	52.26	-1.74	54	38.31	27.53	7.6	31.1	367	160	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11g (Harmonic @ 3m)

WIFI Ant. 0+1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 01 2412MHz		4824	45.9	-28.1	74	63.07	31.25	10.67	59.09	100	0	P	H
													H
													H
													H
		4824	46.39	-27.61	74	63.56	31.25	10.67	59.09	100	0	P	V
													V
													V
													V
802.11g CH 06 2437MHz		4874	49.89	-24.11	74	67.04	31.25	10.72	59.12	100	0	P	H
		7311	45.75	-28.25	74	55.23	36.52	12.56	58.56	100	0	P	H
													H
													H
		4874	46.4	-27.6	74	63.55	31.25	10.72	59.12	100	0	P	V
		7311	46.64	-27.36	74	56.12	36.52	12.56	58.56	100	0	P	V
													V
													V
802.11g CH 11 2462MHz		4924	56.25	-17.75	74	73.29	31.34	10.77	59.15	100	127	P	H
		4924	44.29	-9.71	54	61.33	31.34	10.77	59.15	100	127	A	H
		7386	44.87	-29.13	74	54.2	36.46	12.67	58.46	100	0	P	H
													H
		4924	49.27	-24.73	74	66.31	31.34	10.77	59.15	100	0	P	V
		7386	46.93	-27.07	74	56.26	36.46	12.67	58.46	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



WIFI Ant. 0+1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11g CH 12 2467MHz		4934	43.3	-30.7	74	60.29	31.4	10.77	59.16	100	0	P	H
		7401	46.5	-27.5	74	55.85	36.4	12.69	58.44	100	0	P	H
													H
													H
		4934	41.79	-32.21	74	58.78	31.4	10.77	59.16	100	0	P	V
		7401	45.75	-28.25	74	55.1	36.4	12.69	58.44	100	0	P	V
													V
													V
802.11g CH 13 2472MHz		4944	40.98	-33.02	74	57.9	31.46	10.79	59.17	100	0	P	H
		7416	46.4	-27.6	74	55.66	36.46	12.7	58.42	100	0	P	H
													H
													H
		4944	41.28	-32.72	74	58.2	31.46	10.79	59.17	100	0	P	V
		7416	45.67	-28.33	74	54.93	36.46	12.7	58.42	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11n HT20 (Band Edge @ 3m)

WIFI Ant. 0+1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		2389.7	59.84	-14.16	74	45.88	27.76	17.35	31.15	368	233	P	H
		2390	48.93	-5.07	54	34.97	27.76	17.35	31.15	368	233	A	H
	*	2412	99.07	-	-	85.13	27.68	17.39	31.13	368	233	P	H
	*	2412	90.97	-	-	77.03	27.68	17.39	31.13	368	233	A	H
													H
													H
		2390	61.46	-12.54	74	47.5	27.76	17.35	31.15	350	226	P	V
		2390	50.55	-3.45	54	36.59	27.76	17.35	31.15	350	226	A	V
	*	2412	104.3	-	-	90.36	27.68	17.39	31.13	350	226	P	V
	*	2412	96.09	-	-	82.15	27.68	17.39	31.13	350	226	A	V
													V
													V
802.11n HT20 CH 02 2417MHz		2387.7	56.28	-17.72	74	42.32	27.77	17.34	31.15	100	181	P	H
		2390	46.98	-7.02	54	33.02	27.76	17.35	31.15	100	181	A	H
	*	2417	105.31	-	-	91.37	27.67	17.4	31.13	100	181	P	H
	*	2417	97.82	-	-	83.88	27.67	17.4	31.13	100	181	A	H
													H
													H
		2389.8	57.82	-16.18	74	43.86	27.76	17.35	31.15	394	196	P	V
		2390	48.2	-5.8	54	34.24	27.76	17.35	31.15	394	196	A	V
	*	2417	110.24	-	-	96.3	27.67	17.4	31.13	394	196	P	V
	*	2417	101.15	-	-	87.21	27.67	17.4	31.13	394	196	A	V
													V
													V



802.11n HT20 CH 06 2437MHz		2381.23	56.1	-17.9	74	42.11	27.81	17.33	31.15	400	269	P	H
		2340.77	44.82	-9.18	54	30.72	28.02	17.25	31.17	400	269	A	H
	*	2437	105.28	-	-	91.34	27.63	17.43	31.12	400	269	P	H
	*	2437	96.05	-	-	82.11	27.63	17.43	31.12	400	269	A	H
		2488.03	56.43	-17.57	74	42.48	27.52	17.53	31.1	400	269	P	H
		2484.16	44.82	-9.18	54	30.87	27.53	17.52	31.1	400	269	A	H
		2383.78	56.08	-17.92	74	42.1	27.8	17.33	31.15	347	225	P	V
		2390	45.02	-8.98	54	31.06	27.76	17.35	31.15	347	225	A	V
	*	2437	106.83	-	-	92.89	27.63	17.43	31.12	347	225	P	V
	*	2437	98.66	-	-	84.72	27.63	17.43	31.12	347	225	A	V
		2496.31	56.24	-17.76	74	42.28	27.51	17.54	31.09	347	225	P	V
		2483.62	45.08	-8.92	54	31.13	27.53	17.52	31.1	347	225	A	V
802.11n HT20 CH 10 2457MHz	*	2457	108.08	-	-	94.13	27.59	17.47	31.11	100	85	P	H
	*	2457	100.53	-	-	86.58	27.59	17.47	31.11	100	85	A	H
		2483.96	58.03	-15.97	74	44.08	27.53	17.52	31.1	100	85	P	H
		2483.52	48.15	-5.85	54	34.2	27.53	17.52	31.1	100	85	A	H
													H
													H
	*	2457	110.87	-	-	96.92	27.59	17.47	31.11	383	196	P	V
	*	2457	103.29	-	-	89.34	27.59	17.47	31.11	383	196	A	V
		2483.8	61.74	-12.26	74	47.79	27.53	17.52	31.1	383	196	P	V
		2483.52	50.92	-3.08	54	36.97	27.53	17.52	31.1	383	196	A	V
													V
													V



802.11n HT20 CH 11 2462MHz	*	2462	107.14	-	-	93.19	27.58	17.48	31.11	135	164	P	H
	*	2462	99.69	-	-	85.74	27.58	17.48	31.11	135	164	A	H
		2483.84	59.83	-14.17	74	45.88	27.53	17.52	31.1	135	164	P	H
		2483.52	50.29	-3.71	54	36.34	27.53	17.52	31.1	135	164	A	H
													H
													H
	*	2462	103.16	-	-	89.21	27.58	17.48	31.11	400	287	P	V
	*	2462	96.16	-	-	82.21	27.58	17.48	31.11	400	287	A	V
		2483.72	59.18	-14.82	74	45.23	27.53	17.52	31.1	400	287	P	V
		2483.52	48.76	-5.24	54	34.81	27.53	17.52	31.1	400	287	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



WIFI Ant. 0+1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 12 2467MHz	*	2467	104.35	-	-	90.4	27.57	7.57	31.11	274	188	P	H
	*	2467	96.41	-	-	82.46	27.57	7.57	31.11	274	188	A	H
		2483.64	57.92	-16.08	74	43.97	27.53	7.6	31.1	274	188	P	H
		2483.52	47.68	-6.32	54	33.73	27.53	7.6	31.1	274	188	A	H
													H
													H
	*	2467	107.87	-	-	93.92	27.57	7.57	31.11	365	159	P	V
	*	2467	99.96	-	-	86.01	27.57	7.57	31.11	365	159	A	V
		2483.52	61.98	-12.02	74	48.03	27.53	7.6	31.1	365	159	P	V
		2483.52	51.31	-2.69	54	37.36	27.53	7.6	31.1	365	159	A	V
													V
													V
802.11n HT20 CH 13 2472MHz	*	2472	99.49	-	-	85.53	27.56	7.58	31.1	363	157	P	H
	*	2472	91.6	-	-	77.64	27.56	7.58	31.1	363	157	A	H
		2483.52	63	-11	74	49.05	27.53	7.6	31.1	363	157	P	H
		2483.52	52.94	-1.06	54	38.99	27.53	7.6	31.1	363	157	A	H
													H
													H
	*	2472	95.99	-	-	82.03	27.56	7.58	31.1	274	187	P	V
	*	2472	88.13	-	-	74.17	27.56	7.58	31.1	274	187	A	V
		2483.6	63.1	-10.9	74	49.15	27.53	7.6	31.1	274	187	P	V
		2483.52	52.45	-1.55	54	38.5	27.53	7.6	31.1	274	187	A	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz
WIFI 802.11n HT20 (Harmonic @ 3m)

WIFI Ant. 0+1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 01 2412MHz		4824	43.31	-30.69	74	60.48	31.25	10.67	59.09	100	0	P	H
													H
													H
													H
		4824	44.34	-29.66	74	61.51	31.25	10.67	59.09	100	0	P	V
													V
													V
													V
802.11n HT20 CH 06 2437MHz		4874	54.31	-19.69	74	71.46	31.25	10.72	59.12	104	38	P	H
		4874	40.33	-13.67	54	57.48	31.25	10.72	59.12	104	38	A	H
		7311	46.08	-27.92	74	55.56	36.52	12.56	58.56	100	0	P	H
													H
		4874	43.96	-30.04	74	61.11	31.25	10.72	59.12	100	0	P	V
		7311	49.72	-24.28	74	59.2	36.52	12.56	58.56	100	0	P	V
													V
													V
802.11n HT20 CH 11 2462MHz		4924	48.65	-25.35	74	65.69	31.34	10.77	59.15	100	0	P	H
		7386	46.4	-27.6	74	55.73	36.46	12.67	58.46	100	0	P	H
													H
													H
		4924	47.21	-26.79	74	64.25	31.34	10.77	59.15	100	0	P	V
		7386	46.36	-27.64	74	55.69	36.46	12.67	58.46	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



WIFI Ant. 0+1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT20 CH 12 2467MHz		4934	44.59	-29.41	74	61.58	31.4	10.77	59.16	100	0	P	H
		7401	44.82	-29.18	74	54.17	36.4	12.69	58.44	100	0	P	H
													H
													H
		4934	42.84	-31.16	74	59.83	31.4	10.77	59.16	100	0	P	V
		7401	46.27	-27.73	74	55.62	36.4	12.69	58.44	100	0	P	V
													V
													V
802.11n HT20 CH 13 2472MHz		4944	41.2	-32.8	74	58.12	31.46	10.79	59.17	100	0	P	H
		7416	46.25	-27.75	74	55.51	36.46	12.7	58.42	100	0	P	H
													H
													H
		4944	40.15	-33.85	74	57.07	31.46	10.79	59.17	100	0	P	V
		7416	45.96	-28.04	74	55.22	36.46	12.7	58.42	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz

WIFI 802.11n HT40 (Band Edge @ 3m)

WIFI Ant. 0+1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 03 2422MHz		2390	58.99	-15.01	74	45.03	27.76	17.35	31.15	180	190	P	H
		2390	50.71	-3.29	54	36.75	27.76	17.35	31.15	180	190	A	H
	*	2422	104.37	-	-	90.43	27.66	17.41	31.13	180	190	P	H
	*	2422	96.19	-	-	82.25	27.66	17.41	31.13	180	190	A	H
		2488.84	57.99	-16.01	74	44.04	27.52	17.53	31.1	180	190	P	H
		2485.96	48.78	-5.22	54	34.83	27.53	17.52	31.1	180	190	A	H
		2374.96	58.31	-15.69	74	44.29	27.85	17.32	31.15	400	269	P	V
		2389.84	49.06	-4.94	54	35.1	27.76	17.35	31.15	400	269	A	V
	*	2422	103.87	-	-	89.93	27.66	17.41	31.13	400	269	P	V
	*	2422	95.82	-	-	81.88	27.66	17.41	31.13	400	269	A	V
		2484.16	58.8	-15.2	74	44.85	27.53	17.52	31.1	400	269	P	V
		2484.07	48.85	-5.15	54	34.9	27.53	17.52	31.1	400	269	A	V
802.11n HT40 CH 04 2427MHz		2388.56	56.5	-17.5	74	42.54	27.77	17.34	31.15	100	83	P	H
		2390	48.74	-5.26	54	34.78	27.76	17.35	31.15	100	83	A	H
	*	2427	102.86	-	-	88.92	27.65	17.42	31.13	100	83	P	H
	*	2427	95.5	-	-	81.56	27.65	17.42	31.13	100	83	A	H
		2484.52	55.43	-18.57	74	41.48	27.53	17.52	31.1	100	83	P	H
		2484.43	47.13	-6.87	54	33.18	27.53	17.52	31.1	100	83	A	H
		2389.68	56.87	-17.13	74	42.91	27.76	17.35	31.15	394	194	P	V
		2390	49.58	-4.42	54	35.62	27.76	17.35	31.15	394	194	A	V
	*	2427	108.33	-	-	94.39	27.65	17.42	31.13	394	194	P	V
	*	2427	100.3	-	-	86.36	27.65	17.42	31.13	394	194	A	V
		2500	56.65	-17.35	74	42.69	27.5	17.55	31.09	394	194	P	V
		2484.52	48.91	-5.09	54	34.96	27.53	17.52	31.1	394	194	A	V



802.11n HT40 CH 06 2437MHz		2389.68	57.98	-16.02	74	44.02	27.76	17.35	31.15	137	162	P	H
		2390	50.14	-3.86	54	36.18	27.76	17.35	31.15	137	162	A	H
	*	2437	104.88	-	-	90.94	27.63	17.43	31.12	137	162	P	H
	*	2437	97.01	-	-	83.07	27.63	17.43	31.12	137	162	A	H
		2483.53	58.79	-15.21	74	44.84	27.53	17.52	31.1	137	162	P	H
		2484.34	50.5	-3.5	54	36.55	27.53	17.52	31.1	137	162	A	H
		2389.68	57.42	-16.58	74	43.46	27.76	17.35	31.15	396	271	P	V
		2390	49.53	-4.47	54	35.57	27.76	17.35	31.15	396	271	A	V
	*	2437	103.54	-	-	89.6	27.63	17.43	31.12	396	271	P	V
	*	2437	96.23	-	-	82.29	27.63	17.43	31.12	396	271	A	V
		2484.43	59.24	-14.76	74	45.29	27.53	17.52	31.1	396	271	P	V
		2483.89	50.9	-3.1	54	36.95	27.53	17.52	31.1	396	271	P	V
802.11n HT40 CH 08 2447MHz		2318	55.63	-18.37	74	41.55	28.06	17.2	31.18	100	159	P	H
		2314.64	46.79	-7.21	54	32.7	28.07	17.2	31.18	100	159	A	H
	*	2447	99.58	-	-	85.64	27.61	17.45	31.12	100	159	P	H
	*	2447	92.47	-	-	78.53	27.61	17.45	31.12	100	159	A	H
		2483.53	56.57	-17.43	74	42.62	27.53	17.52	31.1	100	159	P	H
		2484.43	47.88	-6.12	54	33.93	27.53	17.52	31.1	100	159	A	H
		2325.52	55.87	-18.13	74	41.78	28.05	17.22	31.18	377	194	P	V
		2388.72	46.64	-7.36	54	32.68	27.77	17.34	31.15	377	194	A	V
	*	2447	104.48	-	-	90.54	27.61	17.45	31.12	377	194	P	V
	*	2447	97.31	-	-	83.37	27.61	17.45	31.12	377	194	A	V
		2483.53	58.48	-15.52	74	44.53	27.53	17.52	31.1	377	194	P	V
		2484.52	50.3	-3.7	54	36.35	27.53	17.52	31.1	377	194	A	V



802.11n HT40 CH 09 2452MHz		2363.76	58.64	-15.36	74	44.59	27.92	17.29	31.16	100	161	P	H
		2388.24	49.14	-4.86	54	35.18	27.77	17.34	31.15	100	161	A	H
	*	2452	104.41	-	-	90.46	27.6	17.46	31.11	100	161	P	H
	*	2452	96.26	-	-	82.31	27.6	17.46	31.11	100	161	A	H
		2485.33	60.2	-13.8	74	46.25	27.53	17.52	31.1	100	161	P	H
		2484.07	50.55	-3.45	54	36.6	27.53	17.52	31.1	100	161	A	H
		2358	58.48	-15.52	74	44.41	27.95	17.28	31.16	391	320	P	V
		2352.88	48.62	-5.38	54	34.53	27.98	17.27	31.16	391	320	A	V
	*	2452	104.45	-	-	90.5	27.6	17.46	31.11	391	320	P	V
	*	2452	96.07	-	-	82.12	27.6	17.46	31.11	391	320	A	V
		2483.53	59.67	-14.33	74	45.72	27.53	17.52	31.1	391	320	P	V
		2483.71	50.66	-3.34	54	36.71	27.53	17.52	31.1	391	320	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



WIFI Ant. 0+1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 10 2457MHz		2355.76	55.15	-18.85	74	41.06	27.97	17.28	31.16	134	185	P	H
		2321.68	46.61	-7.39	54	32.52	28.06	17.21	31.18	134	185	A	H
	*	2457	103.78	-	-	89.83	27.59	17.47	31.11	134	185	P	H
	*	2457	95.91	-	-	81.96	27.59	17.47	31.11	134	185	A	H
		2484.07	59.12	-14.88	74	45.17	27.53	17.52	31.1	134	185	P	H
		2483.53	51.63	-2.37	54	37.68	27.53	17.52	31.1	134	185	A	H
		2321.2	55.53	-18.47	74	41.44	28.06	17.21	31.18	400	283	P	V
		2314.32	46.58	-7.42	54	32.49	28.07	17.2	31.18	400	283	A	V
	*	2457	101.31	-	-	87.36	27.59	17.47	31.11	400	283	P	V
	*	2457	92.98	-	-	79.03	27.59	17.47	31.11	400	283	A	V
		2483.89	60.14	-13.86	74	46.19	27.53	17.52	31.1	400	283	P	V
		2483.53	51.96	-2.04	54	38.01	27.53	17.52	31.1	400	283	A	V
802.11n HT40 CH 11 2462MHz		2323.76	55.86	-18.14	74	41.77	28.05	7.3	31.18	396	190	P	H
		2354	46.4	-7.6	54	32.3	27.98	7.36	31.16	396	190	A	H
	*	2462	90.93	-	-	76.98	27.58	7.56	31.11	396	190	P	H
	*	2462	83.31	-	-	69.36	27.58	7.56	31.11	396	190	A	H
		2483.53	58.47	-15.53	74	44.52	27.53	7.6	31.1	396	190	P	H
		2483.53	50.9	-3.1	54	36.95	27.53	7.6	31.1	396	190	A	H
		2358.96	55.67	-18.33	74	41.59	27.95	7.37	31.16	166	168	P	V
		2373.04	46.56	-7.44	54	32.54	27.86	7.39	31.15	166	168	A	V
	*	2462	89.87	-	-	75.92	27.58	7.56	31.11	166	168	P	V
	*	2462	82.12	-	-	68.17	27.58	7.56	31.11	166	168	A	V
		2483.53	58.27	-15.73	74	44.32	27.53	7.6	31.1	166	168	P	V
		2483.53	49.99	-4.01	54	36.04	27.53	7.6	31.1	166	168	A	V



2.4GHz 2400~2483.5MHz
WIFI 802.11n HT40 (Harmonic @ 3m)

WIFI Ant. 0+1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 03 2422MHz		4844	42.37	-31.63	74	59.5	31.29	10.69	59.11	100	0	P	H
		7266	45.37	-28.63	74	55.02	36.5	12.48	58.63	100	0	P	H
													H
													H
		4844	41.58	-32.42	74	58.71	31.29	10.69	59.11	100	0	P	V
		7266	46.05	-27.95	74	55.7	36.5	12.48	58.63	100	0	P	V
													V
													V
802.11n HT40 CH 06 2437MHz		4874	42.07	-31.93	74	59.22	31.25	10.72	59.12	100	0	P	H
		7311	45.16	-28.84	74	54.64	36.52	12.56	58.56	100	0	P	H
													H
													H
		4874	41.47	-32.53	74	58.62	31.25	10.72	59.12	100	0	P	V
		7311	45.53	-28.47	74	55.01	36.52	12.56	58.56	100	0	P	V
													V
													V
802.11n HT40 CH 09 2452MHz		4904	43.6	-30.4	74	60.77	31.22	10.75	59.14	100	0	P	H
		7356	45.82	-28.18	74	55.12	36.58	12.62	58.5	100	0	P	H
													H
													H
		4904	41.43	-32.57	74	58.6	31.22	10.75	59.14	100	0	P	V
		7356	46.31	-27.69	74	55.61	36.58	12.62	58.5	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



WIFI Ant. 0+1	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH 10 2457MHz		4914	42.42	-31.58	74	59.53	31.28	10.76	59.15	100	0	P	H
		7371	44.85	-29.15	74	54.16	36.52	12.65	58.48	100	0	P	H
													H
													H
		4914	42.26	-31.74	74	59.37	31.28	10.76	59.15	100	0	P	V
		7371	45.41	-28.59	74	54.72	36.52	12.65	58.48	100	0	P	V
													V
													V
802.11n HT40 CH 11 2462MHz		4924	41.19	-32.81	74	58.23	31.34	10.77	59.15	100	0	P	H
		7386	45.33	-28.67	74	54.66	36.46	12.67	58.46	100	0	P	H
													H
													H
		4924	41.59	-32.41	74	58.63	31.34	10.77	59.15	100	0	P	V
		7386	45.35	-28.65	74	54.68	36.46	12.67	58.46	100	0	P	V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Emission below 1GHz

2.4GHz WIFI 802.11n HT20 (LF)

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
0+1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
2.4GHz 802.11n HT20 LF		71.71	29.61	-10.39	40	48.44	12.65	1.11	32.59	-	-	P	H
		101.78	32.74	-10.76	43.5	47.28	16.37	1.37	32.28	-	-	P	H
		293.84	32.78	-13.22	46	43.94	18.98	2.37	32.51	-	-	P	H
		359.8	36.17	-9.83	46	45.48	20.48	2.59	32.38	100	0	P	H
		729.37	35.7	-10.3	46	37.11	27.26	3.77	32.44	-	-	P	H
		832.19	33.16	-12.84	46	32.84	28.11	4.07	31.86	-	-	P	H
													H
													H
													H
													H
													H
													H
		60.07	32.79	-7.21	40	52.19	12.11	1.02	32.53	100	0	P	V
		101.78	30.55	-12.95	43.5	45.09	16.37	1.37	32.28	-	-	P	V
		252.13	34.33	-11.67	46	46	18.47	2.27	32.41	-	-	P	V
		359.8	36.79	-9.21	46	46.1	20.48	2.59	32.38	-	-	P	V
		408.3	33.97	-12.03	46	41.29	22.13	2.76	32.21	-	-	P	V
		832.19	33.28	-12.72	46	32.96	28.11	4.07	31.86	-	-	P	V
													V
													V
													V
													V
													V
													V
													V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



Note symbol

*	Fundamental Frequency which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is over limit line.
P/A	P eak or A verage
H/V	H orizontal or V ertical

A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
0+1		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
CH 01													
2412MHz		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) =
Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)
= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)
= 55.45 (dBμV/m)
2. Over Limit(dB)
= Level(dBμV/m) – Limit Line(dBμV/m)
= 55.45(dBμV/m) – 74(dBμV/m)
= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)
= Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)
= 43.54 (dBμV/m)
2. Over Limit(dB)
= Level(dBμV/m) – Limit Line(dBμV/m)
= 43.54(dBμV/m) – 54(dBμV/m)
= -10.46(dB)

Both peak and average measured complies with the limit line, so test result is “PASS”.