

FCC Test Report

Equipment : **Android Box**
Model No : **SC7210**
Applicant : **KAONMEDIA Co., Ltd.**
KAONMEDIA Building, 884-3, Seongnam-daero,
Bundang-gu Seongnam-si, Gyeonggi-do Korea
Date of test : **December 5, 2017 to March 10, 2018**
FCC Rule Part(s) : **FCC Part 15 Subpart C §15.247**
Report Type : **Original Report**

The product was received on December 5, 2018 and testing was completed on March 10, 2018. We, BWS TECH Inc. 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 BWS TECH Inc. the test report shall not be reproduced except in full.

.....
(Date) 03/10/2018



.....
Tested by **Hyeong-Bae, Lee**

.....
(Date) 03/10/2018



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Reviewed by **Bang-Hyun, Nam**

BWS TECH INC.

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Report Revision

TEST REPORT NO.	DATE	DESCRIPTION
BWS-18-RF-0002	February 22, 2018	- First Approval Report
BWS-18-RF-0002-R1	March 6, 2018	- Update the Test results
BWS-18-RF-0002-R2	March 10, 2018	- Revised updating parts of Test results

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1. General Information

Scope – Measurement and determination of electromagnetic emission(EME) of radio frequency devices including intentional radiators and/or unintentional radiators for compliance with the technical rules and regulations of the U.S Federal Communications Commission(FCC)

1.1 Applicant

● Company Name	: KAONMEDIA Co., Ltd.
● Company Address	: KAONMEDIA Building, 884-3, Seongnam-daero, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea
● Phone/Fax	: Tel No. : +82-31-724-8728 Fax No. : +82-31-724-8999

1.2 Manufacturer

● Company Name	: KAONMEDIA Co., Ltd.
● Company Address	: KAONMEDIA Building, 884-3, Seongnam-daero, Bundang-gu, Seongnam-si, Gyeonggi-do, Korea
● Phone/Fax	: Tel No. : +82-31-724-8728 Fax No. : +82-31-724-8999

1.3 EUT Description

● Equipment	: Android Box
● Model(s)	: SC7210, SC7210-AR
● Operation Frequency	: 802.11 b/g/n(HT20): 2412MHz-2462MHz 802.11 n(HT40): 2422MHz-2462MHz LE: 2402MHz ~ 2480MHz
● Number of Channels	: 802.11 b/g/n(HT20): 11 802.11n(HT40): 9 LE: Channel: 40
● Modulation Method	: 802.11 b : DSSS 802.11 g/n(HT20)/n(HT40) : OFDM LE: 1Mbps GFSK
● Power Tolerance	: +/- 2dB (Have the same value each modes and ports)
● Input Voltage	: AC 220 V
● Antenna Peak Gain	: 802.11b/g/n(HT20)/n(HT40) :1.9 dBi(SISO), 4.9dBi(MIMO) : LE : 2.0 dBi

1.4 Other Information

● FCC Rule Part(s)	: Part 15 Subpart C §15.247
● FCC ID	: WQT-SC7210
● Test Procedure	: ANSI C63.10-2013 KDB 558074 D01 DTS Meas Guidance v04 KDB 662911 D01 Multiple Transmitter Output v02r01
● Date of Test	: December 5, 2017 to March 10, 2018
● Place of Test	: BWS TECH Inc. (FCC Registration Number : 287786) #23, Gokhyeon-ro 480 Beon-gil, Mohyeon-eup, Cheoin-gu, Yongin-si, Gyeonggi-do 17031, South Korea TEL: +82 31 333 5997 FAX: +82 31 333 0017

2. Description of Test Facility

Site Description

- Test Lab.** :
-  Accredited by Industry Canada, February 10, 2015
The Certificate Registration Number is 4963A-2.
 -  Accredited by FCC, September 03, 2013
The Certificate Registration Number is 287786.
 -  Accredited by VCCI, September 11, 2015
The Certificate Registration Number is C-4326
 -  Accredited by RRA(EMC,RF, SAR), December 16, 2016
The Certificate Registration Number is KR0017
 -  Accredited by KOLAS(KS Q ISO/IEC 17025), April 08, 2016
The Certificate Registration Number is KT174
- Name of Firm** : BWS TECH Inc.
- Site Location** : #23, Gokhyeon-ro 480 Beon-gil, Mohyeon-eup, Cheoin-gu, Yongin-si, Gyeonggi-do 17031, South Korea

3. Test Methodology

The tests documented in this report were performed in accordance with ANSI C63.10: 2013 and the requirements of FCC Rules Part 15.207, 15.209 and 15.247.

Radio testing was performed according to KDB 558074 D01 DTS Meas Guidance v04 and KDB 662911 D01 Multiple Transmitter Output v02r01.

3.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and is operated in a manner that intends to maximize its emission characteristics in a continuous normal application.

3.2 EUT Exercise

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

3.3 FCC Part 15.205 Restricted Bands of Operations

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510MHz.

² Above 38.6

(b) Except as provided in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

3.4 Description of Test Modes

The EUT has been tested under operating condition.

After verification, all tests were carried out with the worst case test modes as shown below, and these were chosen for full testing.

1) The worst-case of data rates and antenna configurations are shown as follows.

● Data rates

Band	Data Rate
802.11b	11 Mbps
802.11g	54 Mbps
802.11n HT20 (SISO, MIMO)	MCS15
802.11n HT40 (SISO, MIMO)	MCS15
The device supports non-beamforming in 802.11n.	

● Antenna Configuration

TEST Description	Antenna 1	Antenna 2	MIMO (2x2)
Peak Output Power	802.11b/g/n HT20/40	802.11b/g/n HT20/40	802.11n HT20/40
Power Spectral Density	-	802.11b/g/n HT20/40	802.11n HT20/40
6dB Bandwidth	-	802.11b/g/n HT20/40	802.11n HT20/40 (Test by antenna B)
Radiated Spurious Emission	-	802.11b/g/n HT20/40	802.11n HT20/40
Conducted Spurious Emission	-	802.11b/g/n HT20/40	802.11n HT20/40
Band Edge Measurement	-	802.11b/g/n HT20/40	802.11n HT20/40

2) For BLE, Channel Low (Ch00:2402MHz), Middle (Ch19:2440MHz) and High (Ch39:2480MHz) were chosen for full testing.

4. Summary of Test Result

Clause	TEST Description	Standard Section	Requirements	Result
5.1	AC Power Line Conducted Emission	§15.207	§15.207(a)	Pass
5.2	Peak Output Power Measurement	§15.247(b)(3)	≤30dBm	Pass
5.3	Power Spectral Density	§15.247(e)	≤8dBm/3kHz	Pass
5.4	6dB Bandwidth	§15.247(a)(2)	≥500kHz	Pass
5.5	Conducted Spurious Emission	§15.247(d)	≥20dBc/100kHz	Pass
5.6	Band Edges Measurement	§15.247(d)	§15.205(a)	Pass
5.7	Radiated Spurious Emission	§15.247(d), §15.209(a), §15.35(b)	§15.209(a), §15.247(d)	Pass
5.8	Antenna Application	§15.247(b), §15.203	§15.247(b), §15.203	Pass

5. Test Equipment

Equipment	Model	Manufacturer	Serial number	Calibration Due date (year/month/date)
Bi-Log Antenna	VULB9163	SCHWARZBECK	01063	2019/04/20
ACTIVE HORN ANTENNA	AHA-118	COM-POWER CORP.	701064	2019/04/20
Horn Antenna	WG20	Steatite Q-par Antennas	8179	2019/08/02
Loop Antenna	FMZB1519	SCHWARZBECK	00025	2020/01/04
EMI Test Receiver	ESR	ROHDE & SCHWARZ	101450	2019/01/02
RF Amplifier (10MHz~26.5GHz)	8449B	Agilent	3947A04710	2018/06/21
RF Amplifier (100kHz~40GHz)	33711-392-77150-11	AEROFLEX	97	2019/01/25
Antenna Master (4m)	JAC-3	DAEIL EMC	N/A	N/A
Positioner Controller	JAC-2	DAEIL EMC	N/A	N/A
PROGRAMMABLE DC POWER SUPPLY	UDP-6015R	UNICORN	1301006	2018/09/07
SPECTRUM ANALYZER	FSP	ROHDE & SCHWARZ	100631	2018/11/15
MXA SIGNAL ANALYZER	N9020A	Agilent	US46220101	2018/09/07
SYNTHESIZED SWEEPER	8340A	HEWLETT PACKARD	2520A00968	2018/11/30
USB RF POWER SENSOR	RPR3006W	D.A.R.E!! Instruments	14I000048SNO09	2018/04/18
PROGRAMMABLE TEMP. & HUMID. CHAMBER	SJ1013-TH	SeoJin Corp.	9204245	2018/06/08
RF Cable	RPM 513 1524/71	HUBER SUHNER SUCOFLEX	3612/4FB	N/A
TUNABLE BANDREJECT FILTER	5BT-1200/2600-5-N/N	K&L Microwave	90705	2018/09/07

6. Test Data

6.1 AC Power Line Conducted Emission

6.1.1 Test Limit

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.

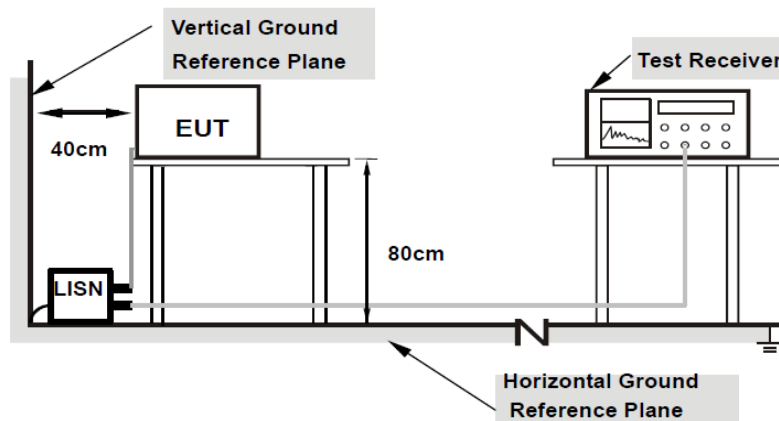
Frequency of emission(MHz)	Conducted limit(dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

6.1.2 Test Procedures

1. The EUT was placed 0.4 meter from the conducting wall of the shielding room and 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 uH 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. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

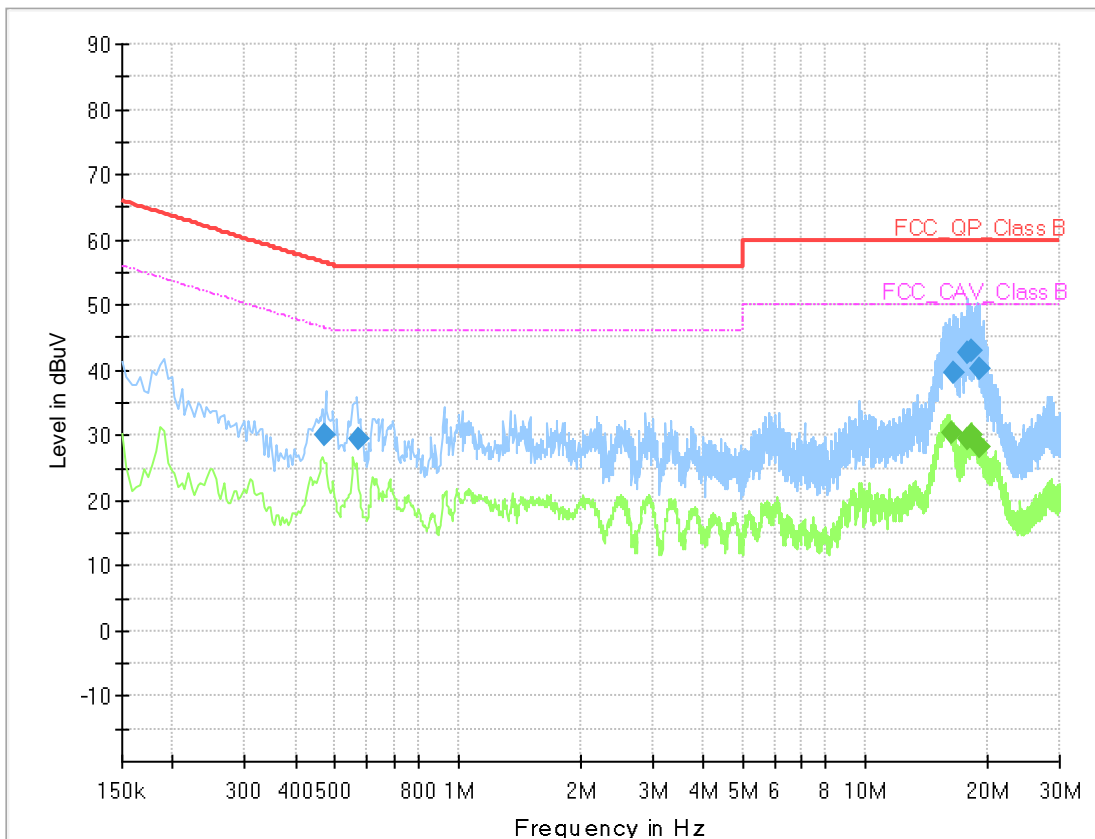
6.1.3 Test SET-UP (Block Diagram of Configuration)



6.1.4 Test Results

Common Information

Test Description: Conducted Emission
 Test Site: Shield Room
 Test Line: L1
 Model Name: SC7210

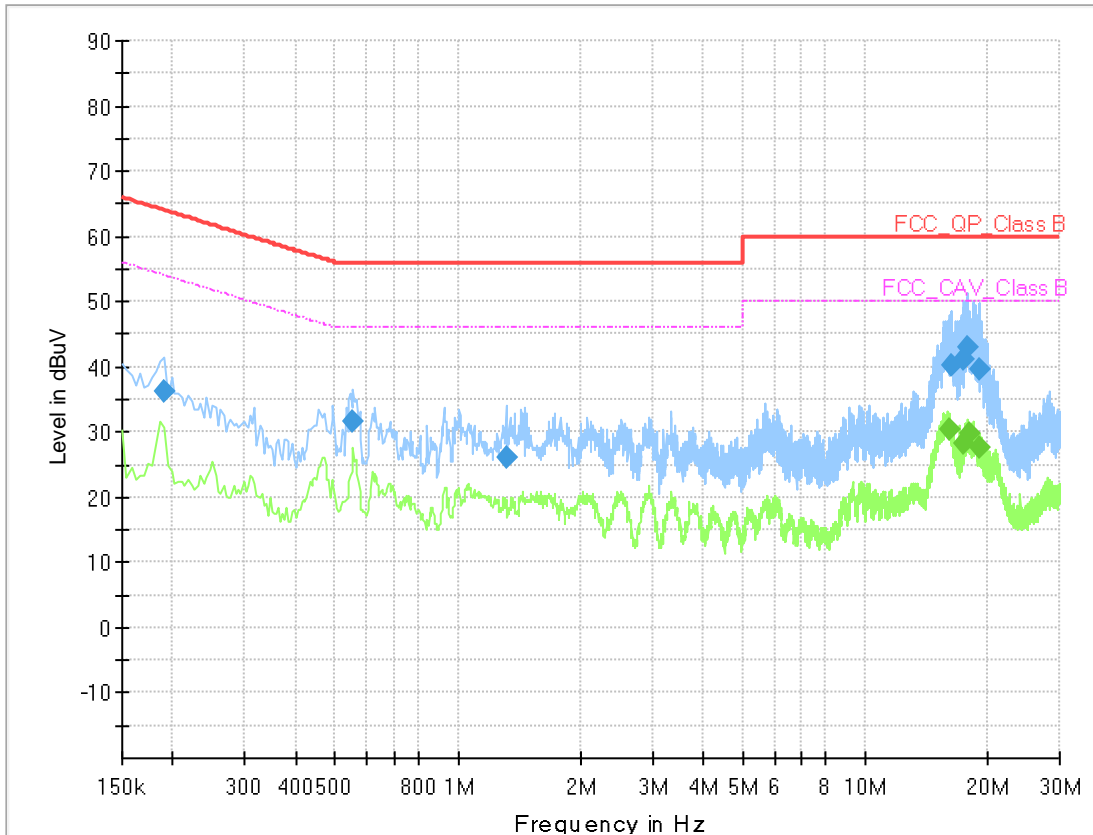


Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.469500	30.15	---	56.52	26.37	3000.0	9.000	L1	GND	7.8
0.569500	29.43	---	56.00	26.57	3000.0	9.000	L1	GND	7.8
16.236490	---	30.46	50.00	19.54	3000.0	9.000	L1	GND	8.5
16.419970	39.53	---	60.00	20.47	3000.0	9.000	L1	GND	8.5
17.729630	---	29.45	50.00	20.55	3000.0	9.000	L1	GND	8.5
17.777090	42.60	---	60.00	17.40	3000.0	9.000	L1	GND	8.5
18.278590	43.07	---	60.00	16.93	3000.0	9.000	L1	GND	8.5
18.294590	---	30.05	50.00	19.95	3000.0	9.000	L1	GND	8.5
18.975070	---	28.27	50.00	21.73	3000.0	9.000	L1	GND	8.5
19.146630	40.11	---	60.00	19.89	3000.0	9.000	L1	GND	8.5

Common Information

Test Description: Conducted Emission
 Test Site: Shield Room
 Test Line: Neutral
 Model name: SC7210



Final Result

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.190501	36.10	---	64.02	27.92	3000.0	9.000	N	GND	7.7
0.549500	31.66	---	56.00	24.35	3000.0	9.000	N	GND	7.7
1.320570	26.24	---	56.00	29.76	3000.0	9.000	N	GND	7.8
16.153130	---	30.39	50.00	19.61	3000.0	9.000	N	GND	8.4
16.236710	40.27	---	60.00	19.73	3000.0	9.000	N	GND	8.4
17.395250	41.17	---	60.00	18.83	3000.0	9.000	N	GND	8.5
17.490610	---	28.37	50.00	21.63	3000.0	9.000	N	GND	8.5
17.860630	42.90	---	60.00	17.10	3000.0	9.000	N	GND	8.5
17.968070	---	29.85	50.00	20.15	3000.0	9.000	N	GND	8.5
19.014610	---	27.72	50.00	22.28	3000.0	9.000	N	GND	8.5
19.150690	39.59	---	60.00	20.41	3000.0	9.000	N	GND	8.5

6.2 Duty Cycle

6.2.1 Test Definition

Preferably, all measurements of maximum conducted (average) output power will be performed with the EUT transmitting continuously (i.e., with a duty cycle of greater than or equal to 98%). When continuous operation cannot be realized, then the use of sweep triggering/signal gating techniques can be used to ensure that measurements are made only during transmissions at the maximum power control level. Such sweep triggering/signal gating techniques will require knowledge of the minimum transmission Duration (T) over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation. Sweep triggering/signal gating techniques can then be used if the measurement/sweep time of the analyzer can be set such that it does not exceed T at any time that data are being acquired (i.e., no transmitter OFF-time is to be considered).

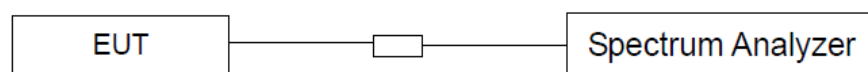
When continuous transmission cannot be achieved and sweep triggering/signal gating cannot be implemented, alternative procedures are provided that can be used to measure the average power; however, they will require an additional measurement of the transmitter duty cycle (D). Within this subclause, the duty cycle refers to the fraction of time over which the transmitter is ON and is transmitting at its maximum power control level. The duty cycle is considered to be constant if variations are less than $\pm 2\%$; otherwise, the duty cycle is considered to be nonconstant.

The term “maximum power control level” is intended to distinguish between operating power levels of the EUT and differences in power levels of individual symbols that occur with some modulation types such as quadrature amplitude modulation (QAM). During testing, the EUT is not required to transmit continuously its highest possible symbol power level. Rather, it should transmit all the symbols and should do so at the highest power control level (i.e., highest operating power level) of the EUT.

6.2.2 Measurement Procedure

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04 and KDB 662911 D01 Multiple Transmitter Output v02r01.
2. The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the ON and OFF times of the transmitted signal:
3. Set to the maximum output power setting and enable the EUT transmit continuously.
3. Set the center frequency of the instrument to the center frequency of the transmission.
4. Set $RBW \geq OBW$ if possible; otherwise, set RBW to the largest available value.
5. Set $VBW \geq RBW$. Set detector = peak or average.
6. The zero-span measurement method shall not be used unless both RBW and VBW are $> 50/T$ and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring the duty cycle shall not be used if $T \leq 16.7 \mu s$.)

6.2.3 Test SET-UP (Block Diagram of Configuration)



6.2.4 Test Results

[802.11b]

Channel	Frequency (MHz)	Transmit Time (ms)				Duty Cycle		Duty Cycle Factor (dB)	
		Antenna 1		Antenna 2		Antenna 1	Antenna 2	Antenna 1	Antenna 2
		Ton	Toff	Ton	Toff				
1	2412	8.450	8.614	8.431	8.603	0.9810	0.9800	-	-
6	2437	8.460	8.620	8.472	8.621	0.9814	0.9827	-	-
11	2462	8.463	8.621	8.469	8.618	0.9817	0.9827	-	-

[802.11g]

Channel	Frequency (MHz)	Transmit Time (ms)				Duty Cycle		Duty Cycle Factor (dB)	
		Antenna 1		Antenna 2		Antenna 1	Antenna 2	Antenna 1	Antenna 2
		Ton	Toff	Ton	Toff				
1	2412	1.423	1.621	1.438	1.632	0.8779	0.8811	0.57	0.55
6	2437	1.415	1.601	1.429	1.616	0.8838	0.8843	0.54	0.53
11	2462	1.425	1.608	1.434	1.614	0.8862	0.8885	0.52	0.51

[802.11n HT20 SISO]

Channel	Frequency (MHz)	Transmit Time (ms)				Duty Cycle		Duty Cycle Factor (dB)	
		Antenna 1		Antenna 2		Antenna 1	Antenna 2	Antenna 1	Antenna 2
		Ton	Toff	Ton	Toff				
1	2412	1.190	1.378	1.198	1.384	0.8636	0.8656	0.64	0.63
6	2437	1.195	1.388	1.193	1.374	0.8610	0.8683	0.65	0.61
11	2462	1.199	1.389	1.218	1.396	0.8632	0.8725	0.64	0.59

[802.11n HT20 MIMO]

Channel	Frequency (MHz)	Transmit Time (ms)				Duty Cycle		Duty Cycle Factor (dB)	
		Antenna 1		Antenna 2		Antenna 1	Antenna 2	Antenna 1	Antenna 2
		Ton	Toff	Ton	Toff				
1	2412	1.187	1.378	1.211	1.386	0.8614	0.8737	0.65	0.59
6	2437	1.196	1.375	1.194	1.383	0.8698	0.8633	0.61	0.64
11	2462	1.193	1.391	1.195	1.388	0.8577	0.8610	0.67	0.65

[802.11n HT40 SISO]

Channel	Frequency (MHz)	Transmit Time (ms)				Duty Cycle		Duty Cycle Factor (dB)	
		Antenna 1		Antenna 2		Antenna 1	Antenna 2	Antenna 1	Antenna 2
		T _{on}	T _{off}	T _{on}	T _{off}				
3	2422	0.597	0.791	0.587	0.788	0.7547	0.7449	1.22	1.28
6	2437	0.592	0.789	0.596	0.792	0.7503	0.7525	1.25	1.23
9	2452	0.595	0.795	0.598	0.793	0.7484	0.7541	1.26	1.23

[802.11n HT40 MIMO]

Channel	Frequency (MHz)	Transmit Time (ms)				Duty Cycle		Duty Cycle Factor (dB)	
		Antenna 1		Antenna 2		Antenna 1	Antenna 2	Antenna 1	Antenna 2
		T _{on}	T _{off}	T _{on}	T _{off}				
3	2422	0.593	0.792	0.586	0.779	0.7487	0.7522	1.26	1.24
6	2437	0.598	0.784	0.588	0.781	0.7628	0.7529	1.18	1.23
9	2452	0.591	0.787	0.599	0.794	0.7510	0.7544	1.24	1.22

[LE]

Channel	Frequency (MHz)	Transmit Time (ms)		Duty Cycle	Duty Cycle Factor (dB)
		T _{on}	T _{off}		
0	2402	0.383	0.615	0.6228	2.06
19	2440	0.391	0.623	0.6276	2.02
39	2480	0.388	0.621	0.6248	2.04

Notes : 1. Duty Cycle = T_{on} / T_{total}
2. Duty Cycle Factor = $10 * \log(1/Duty\ Cycle)$.

6.3 Peak Output Power Measurement

6.3.1 Test Limit

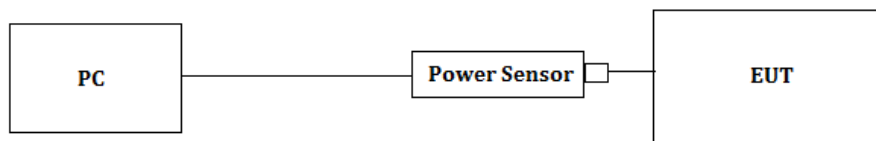
The maximum peak power shall be less than 1 Watt (30dBm).

Note: If transmitting antenna of 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 direction gain of the antenna exceeds 6dBi, 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.

6.3.2 Measurement Procedure

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04 and KDB 662911 D01 Multiple Transmitter Output v02r01.
2. The RF output of EUT was connected to the power meter. The path loss was compensated to the results for each measurement.
3. Set to the maximum output power setting and enable the EUT transmit continuously.
4. Measure the conducted output power with cable loss and record the results in the test report.

6.3.3 Test SET-UP (Block Diagram of Configuration)



6.3.4 Test Results

[802.11b]

Channel	Frequency (MHz)	Peak Output Power (EIRP) (dBm)		Duty Cycle Factor + Peak Output Power (EIRP) (dBm)		Limit (dBm)	Result
		Antenna 1	Antenna 2	Antenna 1	Antenna 2		
1	2412	23.31	23.52	23.31	23.52	≤ 30.00	Pass
6	2437	23.22	23.42	23.22	23.42	≤ 30.00	Pass
11	2462	23.07	23.29	23.07	23.29	≤ 30.00	Pass

[802.11g]

Channel	Frequency (MHz)	Peak Output Power (EIRP) (dBm)		Duty Cycle Factor + Peak Output Power (EIRP) (dBm)		Limit (dBm)	Result
		Antenna 1	Antenna 2	Antenna 1	Antenna 2		
1	2412	22.10	22.31	22.67	22.86	≤ 30.00	Pass
6	2437	22.15	22.22	22.69	22.75	≤ 30.00	Pass
11	2462	22.04	22.17	22.56	22.68	≤ 30.00	Pass

[802.11n HT20 SISO]

Channel	Frequency (MHz)	Peak Output Power (EIRP) (dBm)		Duty Cycle Factor + Peak Output Power (EIRP) (dBm)		Limit (dBm)	Result
		Antenna 1	Antenna 2	Antenna 1	Antenna 2		
1	2412	22.31	22.40	22.95	23.03	≤ 30.00	Pass
6	2437	22.29	22.34	22.94	22.95	≤ 30.00	Pass
11	2462	22.18	22.22	22.82	22.81	≤ 30.00	Pass

[802.11n HT20 MIMO]

Channel	Frequency (MHz)	Peak Output Power (EIRP) (dBm)		Duty Cycle Factor + Peak Output Power (EIRP) (dBm)			Limit (dBm)	Result
		Antenna 1	Antenna 2	Antenna 1	Antenna 2	SUM		
1	2412	19.22	19.31	19.87	19.90	22.90	≤ 30.00	Pass
6	2437	19.14	19.11	19.75	19.75	22.76	≤ 30.00	Pass
11	2462	19.05	19.07	19.72	19.72	22.73	≤ 30.00	Pass

[802.11n HT40 SISO]

Channel	Frequency (MHz)	Peak Output Power (EIRP) (dBm)		Duty Cycle Factor + Peak Output Power (EIRP) (dBm)		Limit (dBm)	Result
		Antenna 1	Antenna 2	Antenna 1	Antenna 2		
3	2422	22.27	22.39	23.49	23.67	≤ 30.00	Pass
6	2437	22.22	22.31	23.47	23.54	≤ 30.00	Pass
9	2452	22.13	22.07	23.39	23.30	≤ 30.00	Pass

[802.11n HT40 MIMO]

Channel	Frequency (MHz)	Peak Output Power (EIRP) (dBm)		Duty Cycle Factor + Peak Output Power (EIRP) (dBm)			Limit (dBm)	Result
		Antenna 1	Antenna 2	Antenna 1	Antenna 2	SUM		
3	2422	19.25	19.31	20.51	20.55	23.54	≤ 30.00	Pass
6	2437	19.14	19.09	20.32	20.32	23.33	≤ 30.00	Pass
9	2452	19.06	19.02	20.30	20.24	23.28	≤ 30.00	Pass

[LE]

Channel	Frequency (MHz)	Peak Output Power (EIRP) (dBm)	Duty Cycle Factor + Peak Output Power (EIRP) (dBm)	Max. Limit (dBm)	Result
0	2402	7.59	9.65	≤30	Pass
19	2440	7.16	9.18	≤30	Pass
39	2480	6.99	9.03	≤30	Pass

6.4 Power Spectral Density

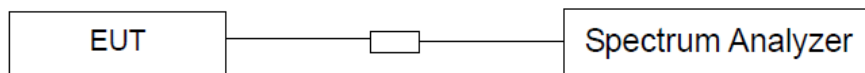
6.4.1 Test Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiated to the Antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

6.4.2 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04 and KDB 662911 D01 Multiple Transmitter Output v02r01.
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 = 3 kHz, VBW = 10 kHz, Detector = Peak, Span = 1.5 times DTS Channel Bandwidth, Trace mode = Max Hold, Sweep = Auto).
5. Measure and record the results in the test report.

6.4.3 Test SET-UP (Block Diagram of Configuration)



6.4.4 Test Results

[802.11b]

Channel	Frequency (MHz)	Power Spectral Density (dBm)	Limit (dBm)	Result
		Antenna 2		
1	2412	-5.40	≤ 8.00	Pass
6	2437	-5.60	≤ 8.00	Pass
11	2462	-6.69	≤ 8.00	Pass

[802.11g]

Channel	Frequency (MHz)	Power Spectral Density (dBm)	Limit (dBm)	Result
		Antenna 2		
1	2412	-5.68	≤ 8.00	Pass
6	2437	-7.65	≤ 8.00	Pass
11	2462	-7.49	≤ 8.00	Pass

[802.11n HT20 SISO]

Channel	Frequency (MHz)	Power Spectral Density (dBm)	Limit (dBm)	Result
		Antenna 2		
1	2412	-7.23	≤ 8.00	Pass
6	2437	-7.68	≤ 8.00	Pass
11	2462	-7.52	≤ 8.00	Pass

[802.11n HT20 MIMO]

Channel	Frequency (MHz)	Power Spectral Density (dBm)		SUM (dBm)	Limit (dBm)	Result
		Antenna 1	Antenna 2			
1	2412	-14.52	-10.63	-9.14	≤ 8.00	Pass
6	2437	-14.07	-12.66	-10.30	≤ 8.00	Pass
11	2462	-16.17	-12.50	-10.95	≤ 8.00	Pass

[802.11n HT40 SISO]

Channel	Frequency (MHz)	Power Spectral Density (dBm)	Limit (dBm)	Result
		Antenna 2		
3	2422	-8.18	≤ 8.00	Pass
6	2437	-10.32	≤ 8.00	Pass
9	2452	-10.77	≤ 8.00	Pass

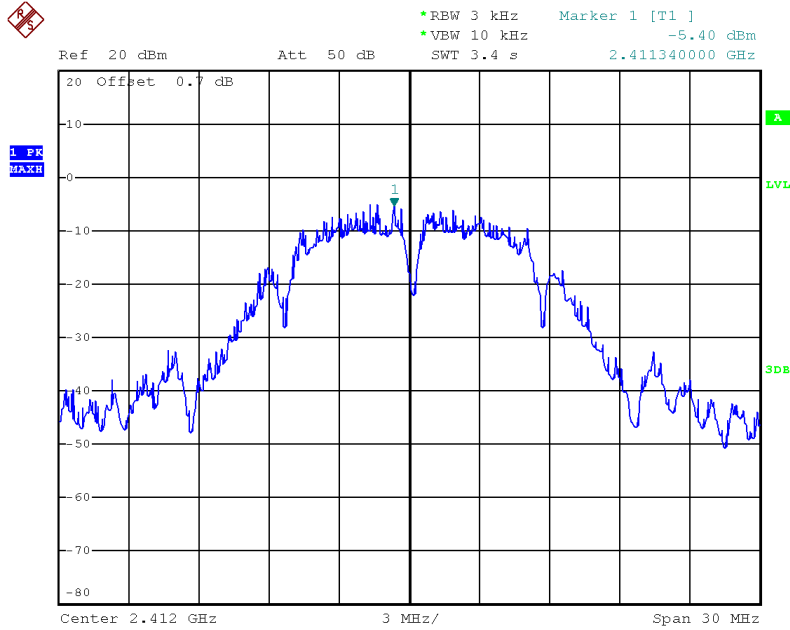
[802.11n HT40 MIMO]

Channel	Frequency (MHz)	Power Spectral Density (dBm)		SUM (dBm)	Limit (dBm)	Result
		Antenna 1	Antenna 2			
3	2422	-14.32	-12.50	-10.31	≤ 8.00	Pass
6	2437	-14.89	-14.63	-11.75	≤ 8.00	Pass
9	2452	-14.66	-14.72	-11.68	≤ 8.00	Pass

[LE]

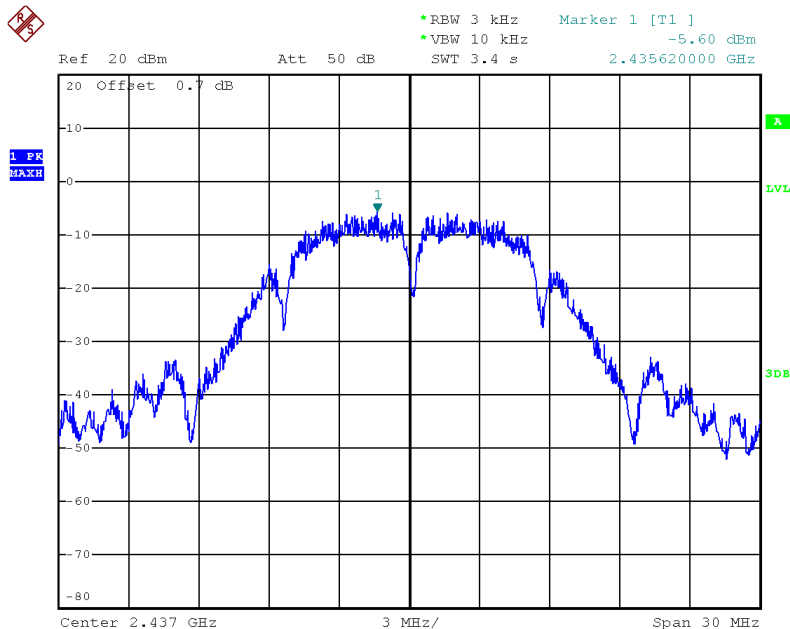
Channel	Frequency (MHz)	Power Density (dBm/3kHz)	Max. Limit (dBm/3kHz)	Result
0	2402	-14.57	≤ 8.00	Pass
19	2440	-14.61	≤ 8.00	Pass
39	2480	-22.40	≤ 8.00	Pass

Test Mode : 802.11b 2412MHz_ANT 2



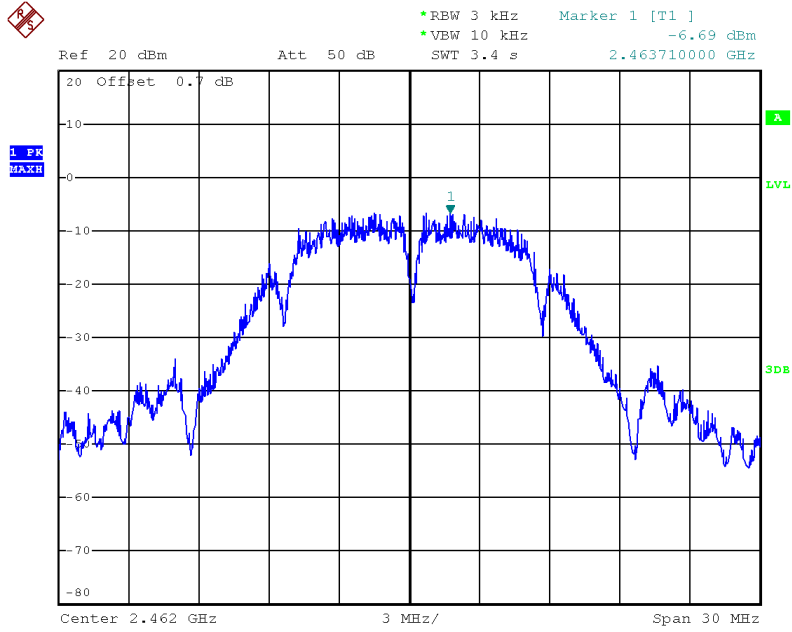
Date: 13.FEB.2018 11:53:34

Test Mode : 802.11b 2437MHz_ANT 2



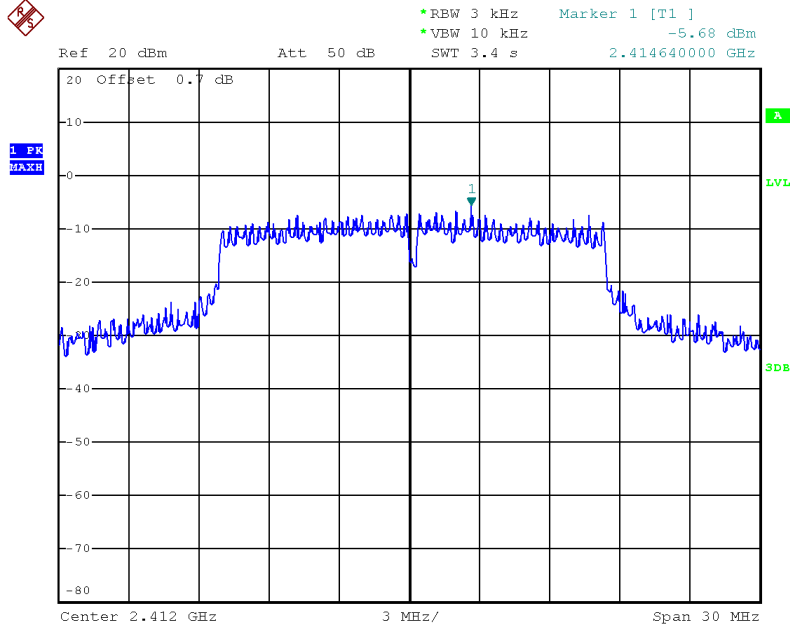
Date: 28.FEB.2018 14:35:22

Test Mode : 802.11b 2462MHz_ANT 2



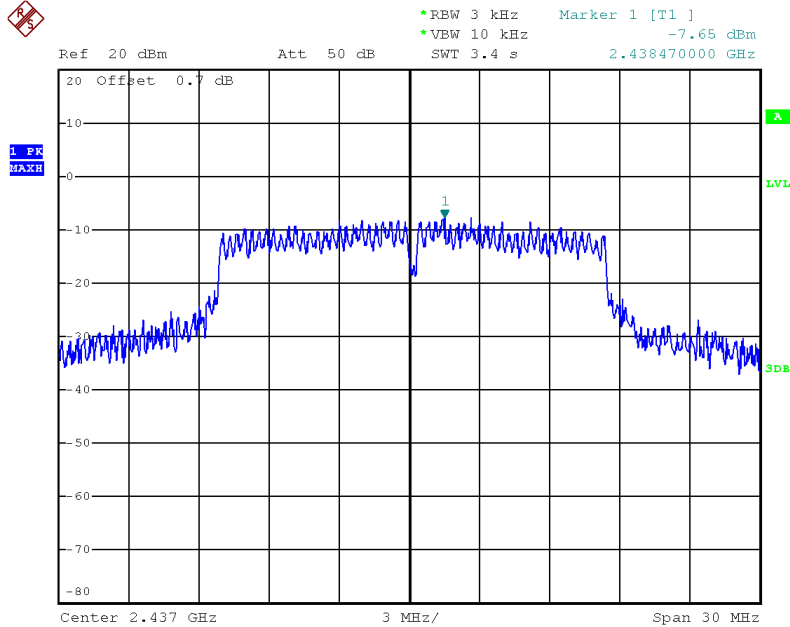
Date: 28.FEB.2018 14:40:11

Test Mode : 802.11g 2412MHz_ANT 2



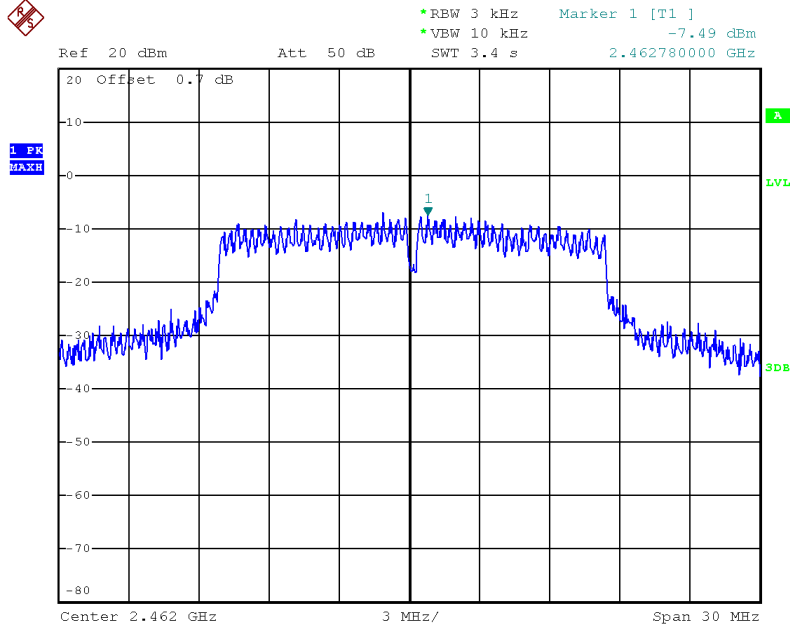
Date: 13.FEB.2018 11:50:19

Test Mode : 802.11g 2437MHz_ANT 2



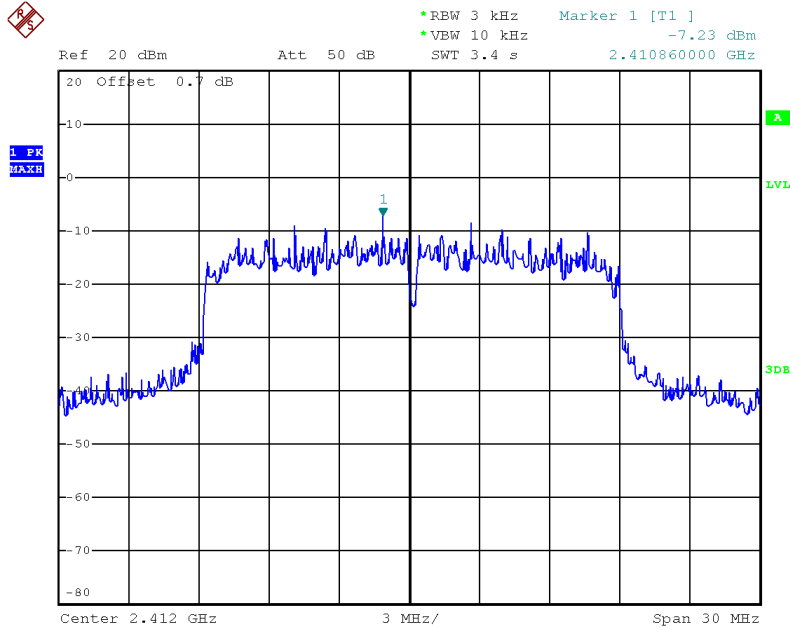
Date: 28.FEB.2018 14:45:16

Test Mode : 802.11g 2462MHz_ANT 2



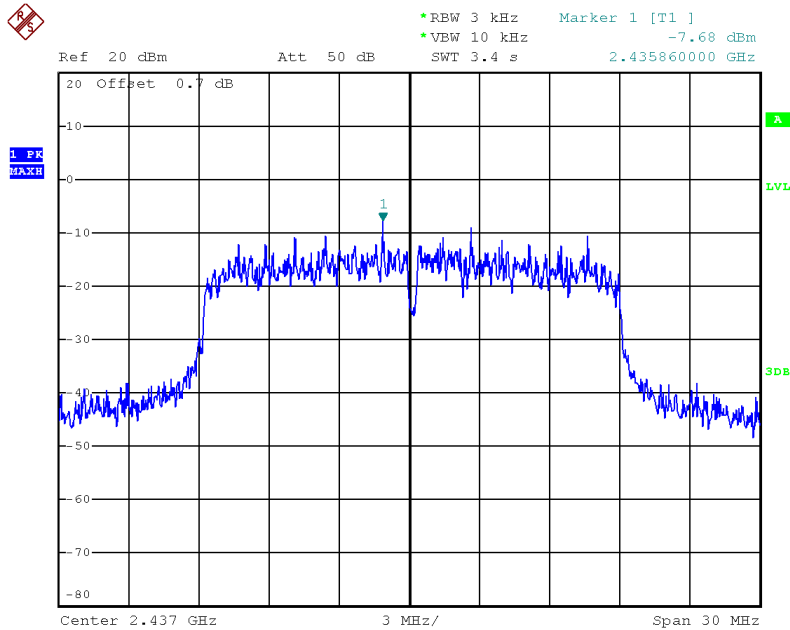
Date: 28.FEB.2018 14:42:57

Test Mode : 802.11n HT20 2412MHz_SISO ANT 2



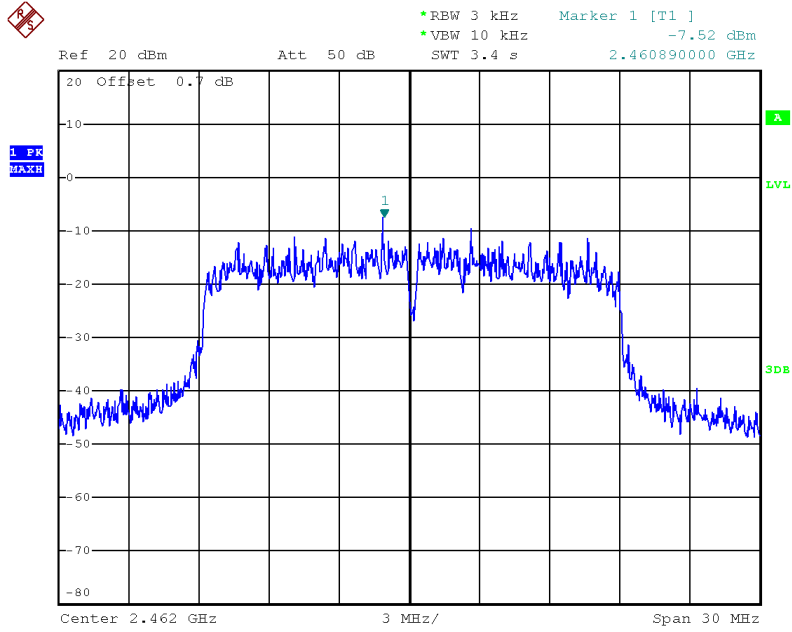
Date: 13.FEB.2018 11:47:19

Test Mode : 802.11n HT20 2437MHz_SISO ANT 2



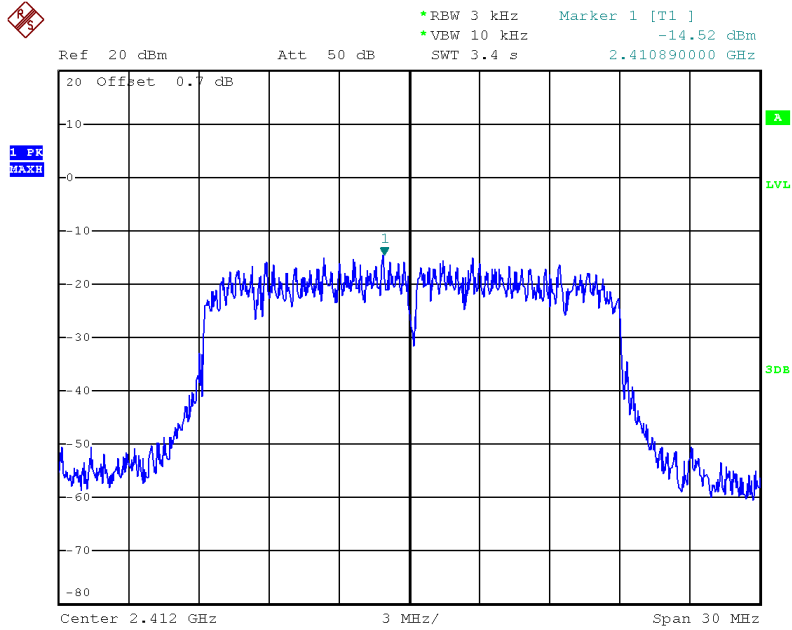
Date: 28.FEB.2018 15:12:49

Test Mode : 802.11n HT20 2462MHz_SISO ANT 2



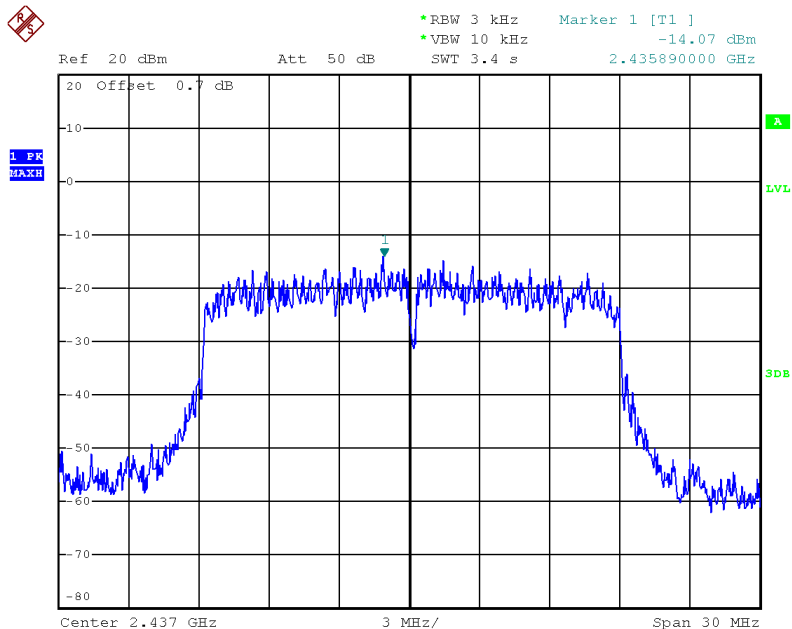
Date: 28.FEB.2018 15:12:06

Test Mode : 802.11n HT20 2412MHz_MIMO_ANT 1



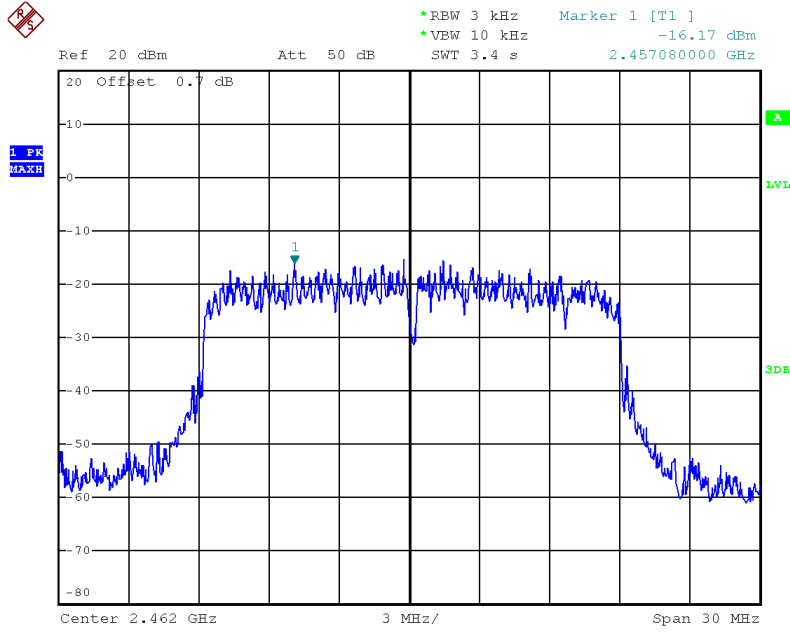
Date: 28.FEB.2018 15:16:17

Test Mode : 802.11n HT20 2437MHz_MIMO_ANT 1



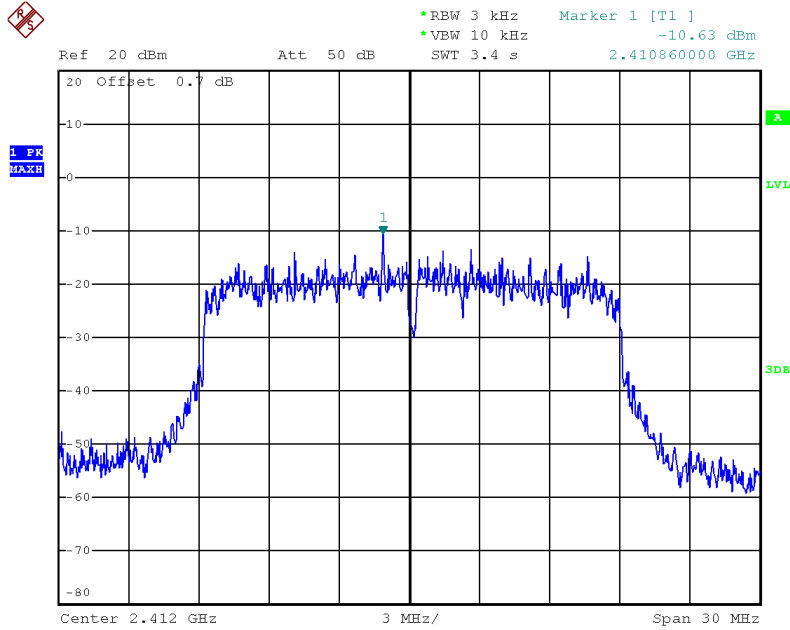
Date: 28.FEB.2018 15:16:53

Test Mode : 802.11n HT20 2462MHz_MIMO_ANT 1



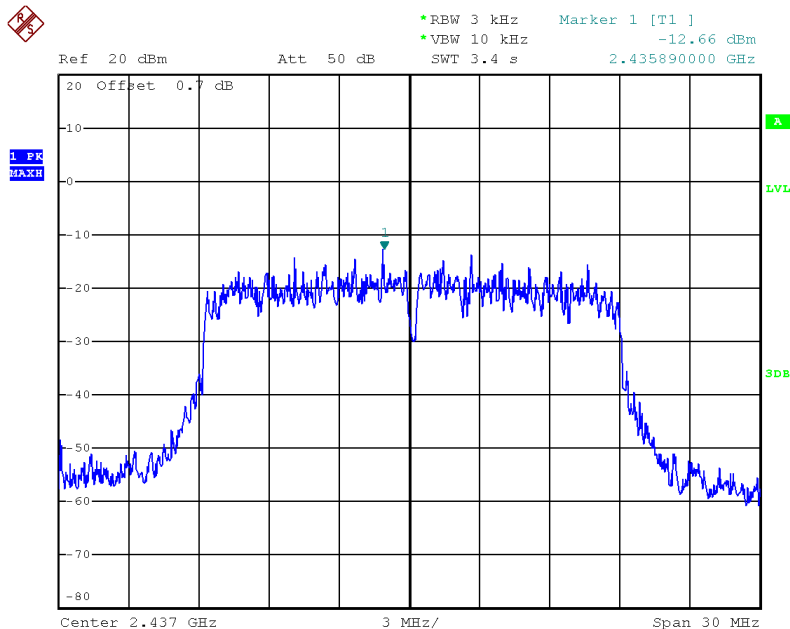
Date: 28.FEB.2018 15:19:13

Test Mode : 802.11n HT20 2412MHz_MIMO_ANT 2



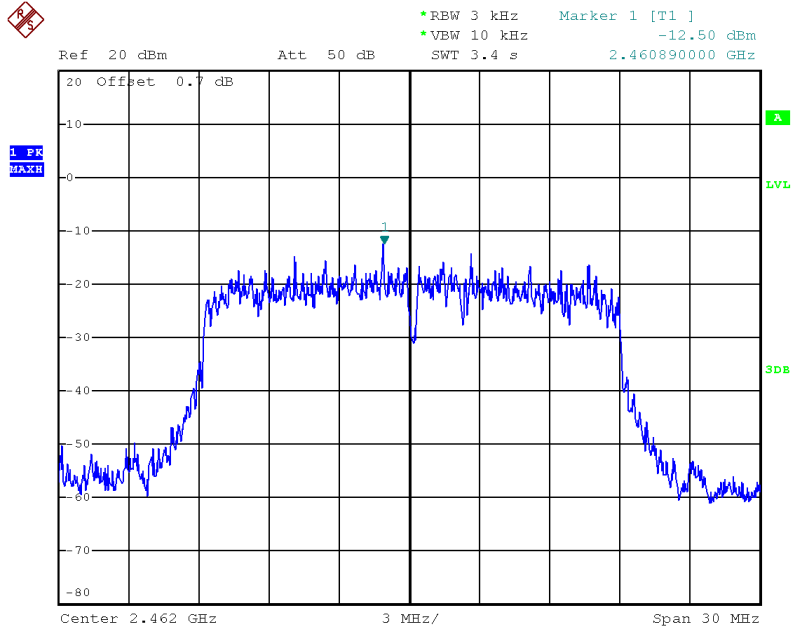
Date: 28.FEB.2018 15:15:28

Test Mode : 802.11n HT20 2437MHz_MIMO_ANT 2



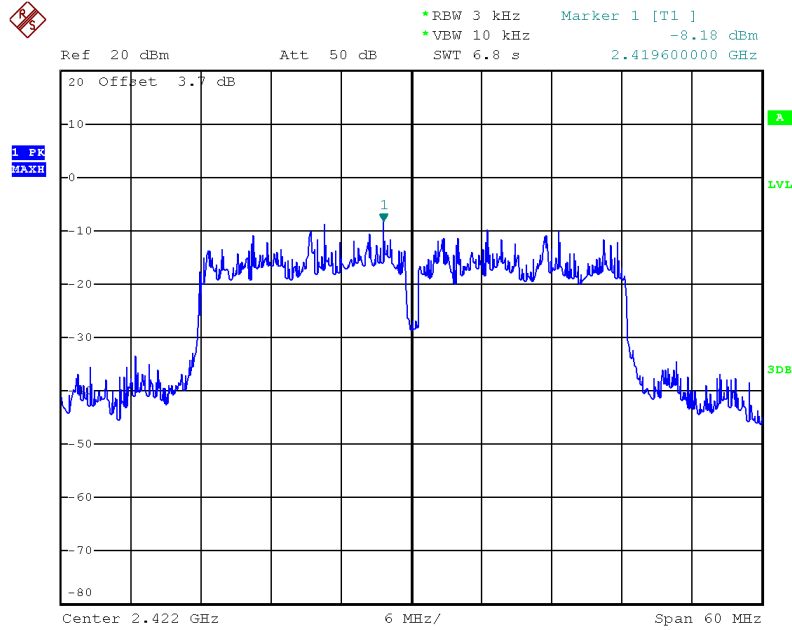
Date: 28.FEB.2018 15:17:36

Test Mode : 802.11n HT20 2462MHz_MIMO_ANT 2



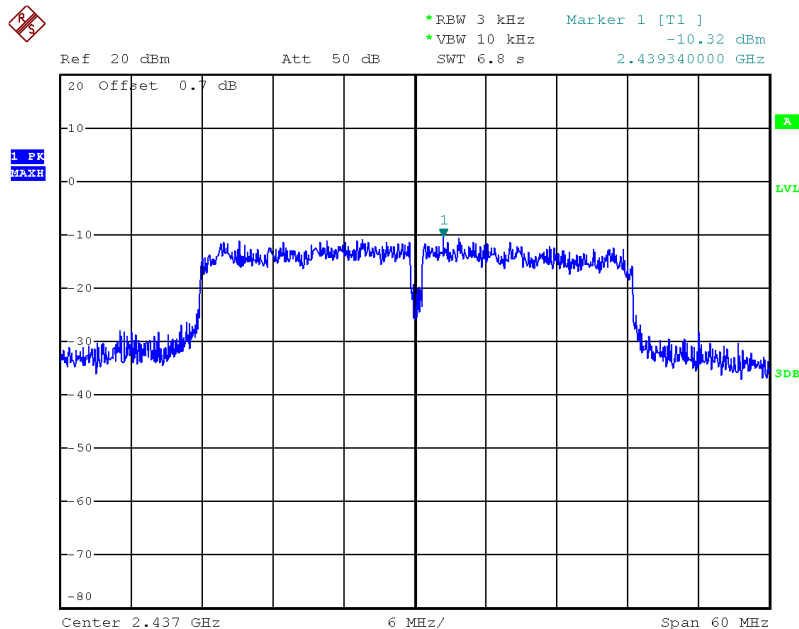
Date: 28.FEB.2018 15:18:23

Test Mode : 802.11n HT40 2422MHz_SISO ANT 2



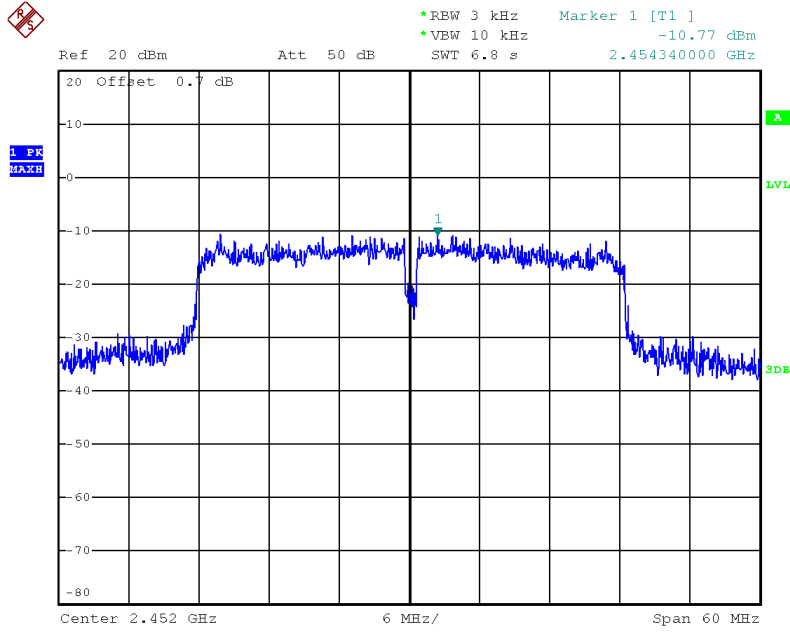
Date: 13.FEB.2018 12:58:53

Test Mode : 802.11n HT40 2437MHz_SISO ANT 2



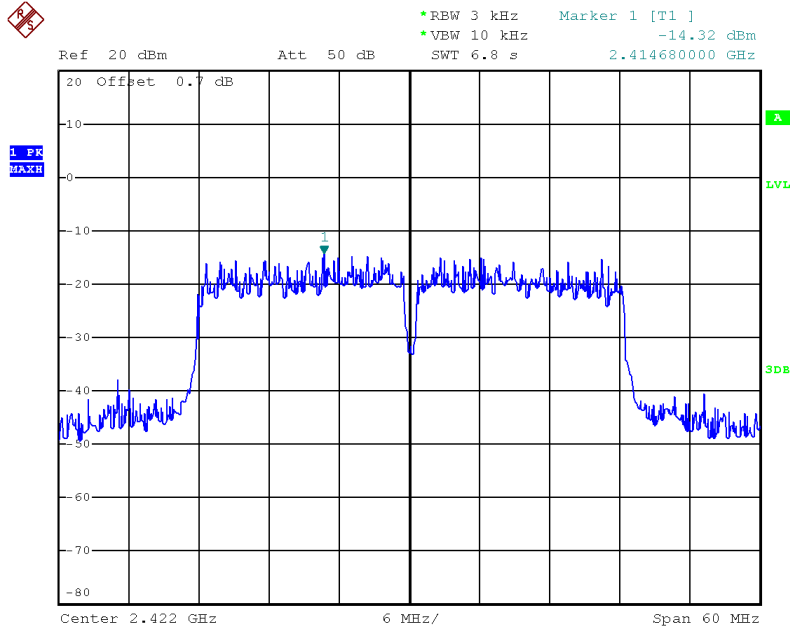
Date: 9.MAR.2018 15:58:57

Test Mode : 802.11n HT40 2452MHz_SISO ANT 2



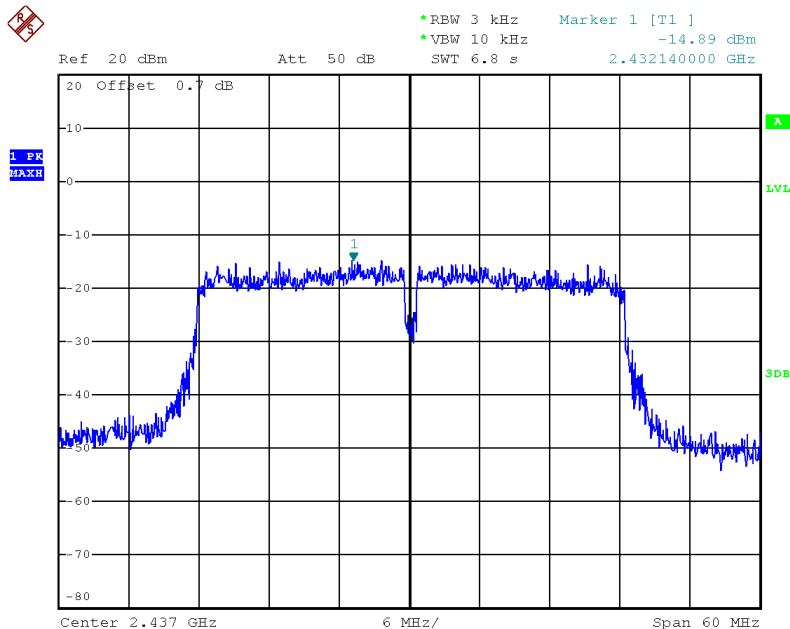
Date: 9.MAR.2018 16:03:03

Test Mode : 802.11n HT40 2422MHz_MIMO_ANT 1



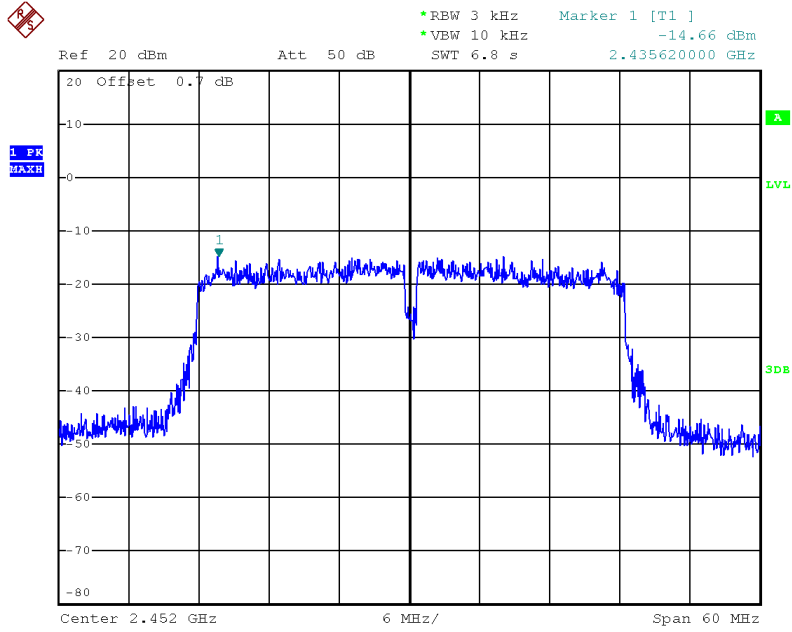
Date: 13.FEB.2018 12:52:24

Test Mode : 802.11n HT40 2437MHz_MIMO_ANT 1



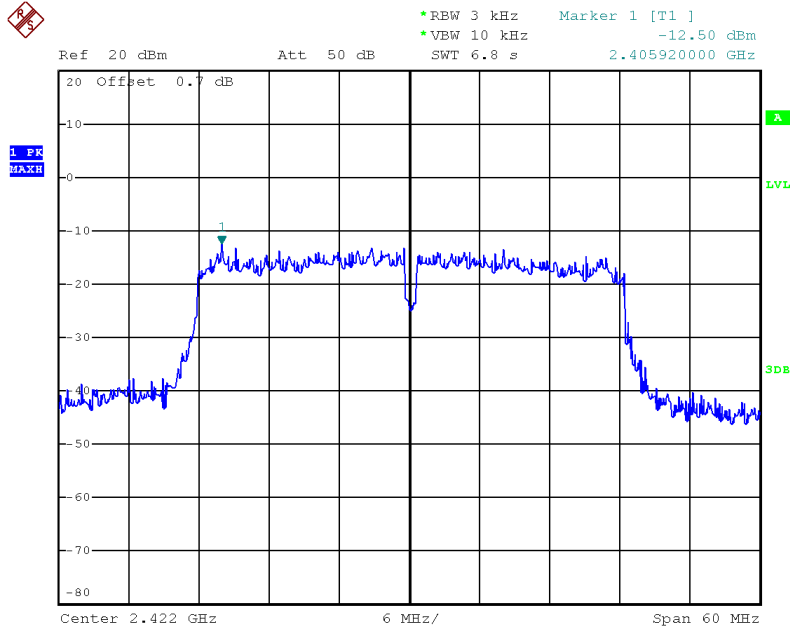
Date: 9.MAR.2018 16:06:36

Test Mode : 802.11n HT40 2452MHz_MIMO_ANT 1



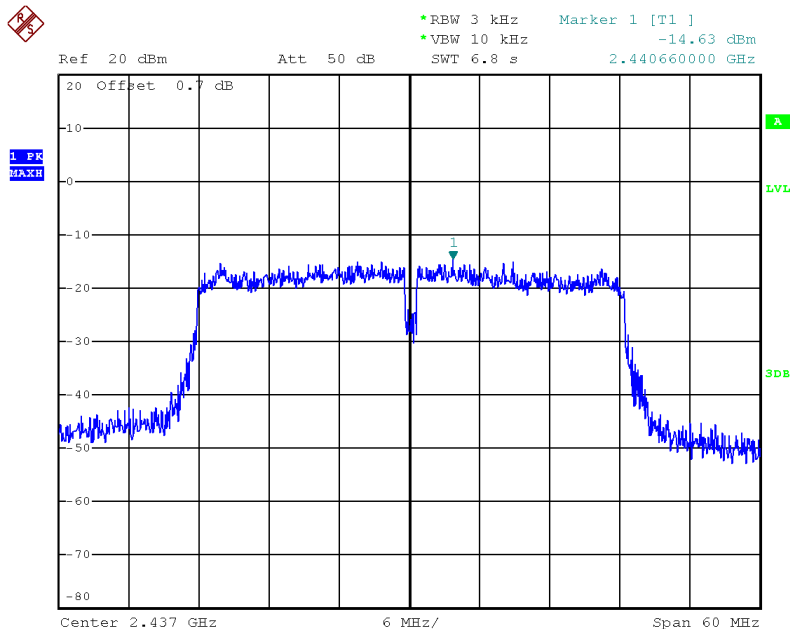
Date: 9.MAR.2018 16:05:37

Test Mode : 802.11n HT40 2422MHz_MIMO_ANT 2



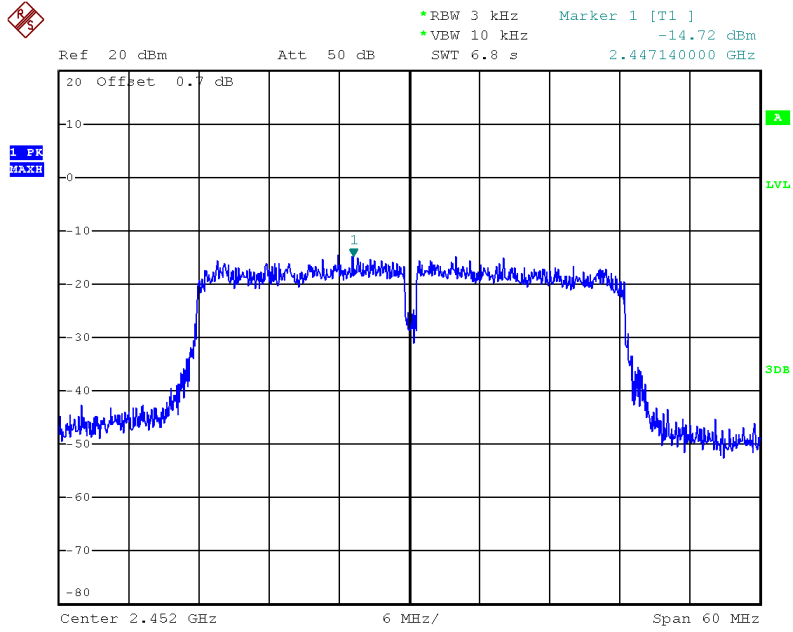
Date: 21.FEB.2018 10:12:42

Test Mode : 802.11n HT40 2437MHz_MIMO_ANT 2



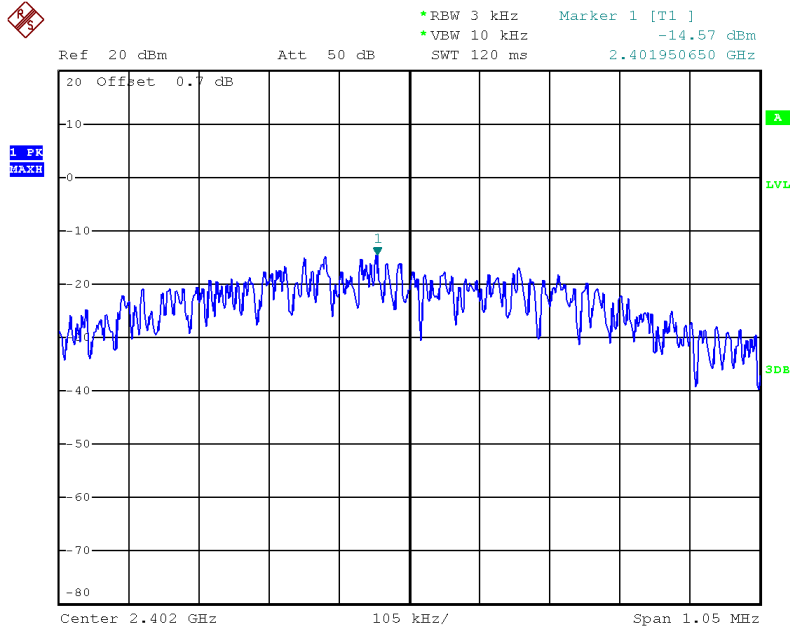
Date: 9.MAR.2018 16:07:27

Test Mode : 802.11n HT40 2452MHz_MIMO_ANT 2



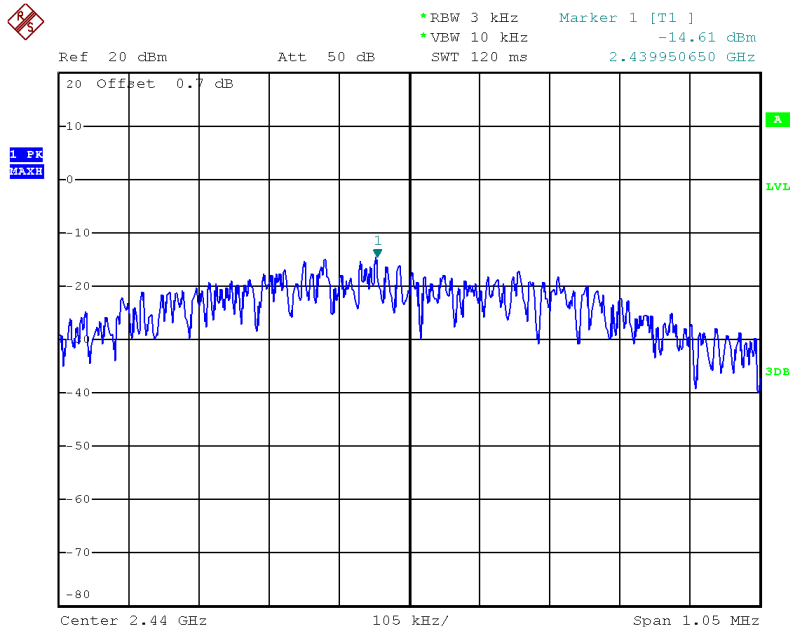
Date: 9.MAR.2018 16:04:45

Test Mode : LE 2402MHz



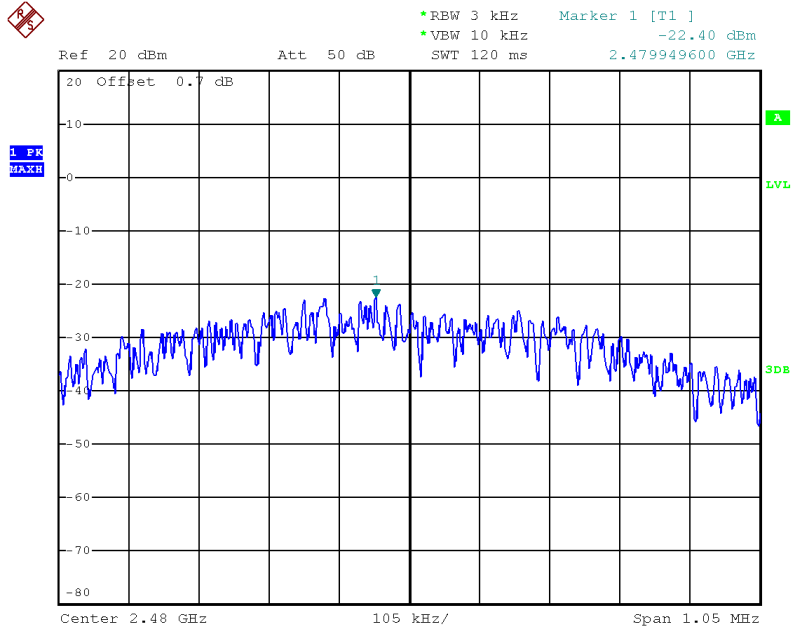
Date: 14.FEB.2018 14:11:53

Test Mode : LE 2440MHz



Date: 14.FEB.2018 14:12:51

Test Mode : LE 2480MHz



Date: 14.FEB.2018 14:13:30

6.5 6dB Bandwidth

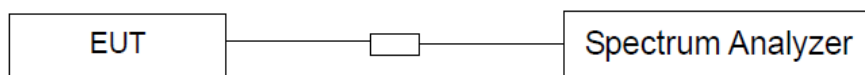
6.5.1 Test Limit

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

6.5.2 Measurement Procedure

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, Detector = Peak, Trace mode = Max Hold, Sweep = Auto).
5. Measure and record the results in the test report.

6.5.3 Test SET-UP (Block Diagram of Configuration)



6.5.4 Test Results

[802.11b]

Channel	Frequency (MHz)	6dB Spectrum Bandwidth (MHz)	Limit (MHz)	Result
		Antenna 2		
1	2412	10.72	≥ 0.5	Pass
6	2437	10.74	≥ 0.5	Pass
11	2462	10.74	≥ 0.5	Pass

[802.11g]

Channel	Frequency (MHz)	6dB Spectrum Bandwidth (MHz)	Limit (MHz)	Result
		Antenna 2		
1	2412	16.80	≥ 0.5	Pass
6	2437	16.80	≥ 0.5	Pass
11	2462	16.89	≥ 0.5	Pass

[802.11n HT20 SISO]

Channel	Frequency (MHz)	6dB Spectrum Bandwidth (MHz)	Limit (MHz)	Result
		Antenna 2		
1	2412	17.92	≥ 0.5	Pass
6	2437	17.91	≥ 0.5	Pass
11	2462	17.91	≥ 0.5	Pass

[802.11n HT20 MIMO]

Channel	Frequency (MHz)	6dB Spectrum Bandwidth (MHz)	Limit (MHz)	Result
		Antenna 2		
1	2412	17.91	≥ 0.5	Pass
6	2437	17.91	≥ 0.5	Pass
11	2462	17.91	≥ 0.5	Pass

[802.11n HT40 SISO]

Channel	Frequency (MHz)	6dB Spectrum Bandwidth (MHz)	Limit (MHz)	Result
		Antenna 2		
3	2422	37.44	≥ 0.5	Pass
6	2437	37.56	≥ 0.5	Pass
9	2452	37.38	≥ 0.5	Pass

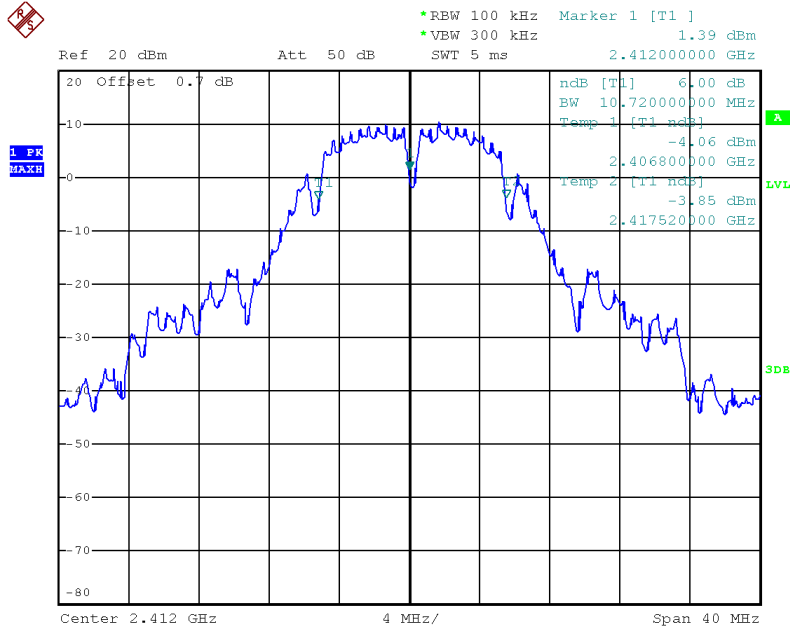
[802.11n HT40 MIMO]

Channel	Frequency (MHz)	6dB Spectrum Bandwidth (MHz)	Limit (MHz)	Result
		Antenna 2		
3	2422	37.20	≥ 0.5	Pass
6	2437	37.26	≥ 0.5	Pass
9	2452	37.26	≥ 0.5	Pass

[LE]

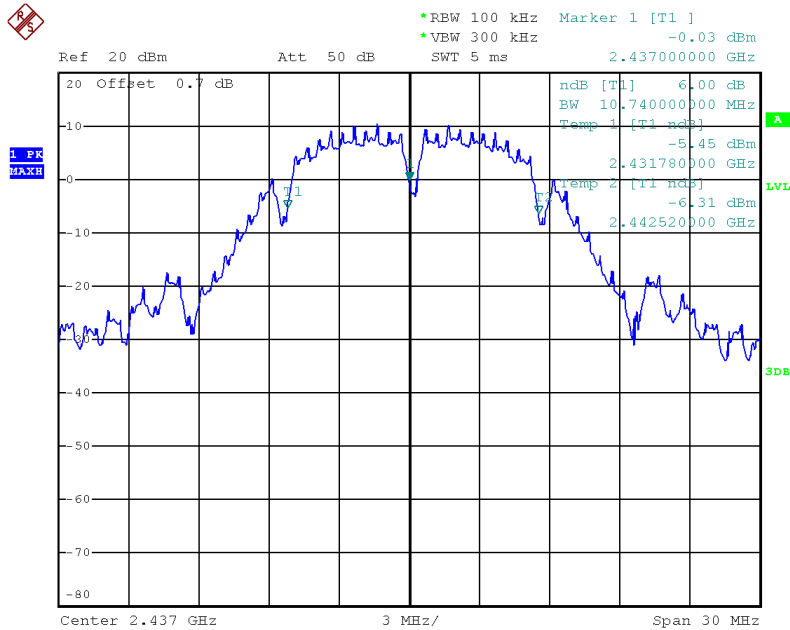
Channel	Frequency (MHz)	6dB Bandwidth (kHz)	Min. Limit (kHz)	Result
0	2402	948	500	Pass
19	2440	930	500	Pass
39	2480	957	500	Pass

Test Mode : 802.11b 2412MHz_ANT 2



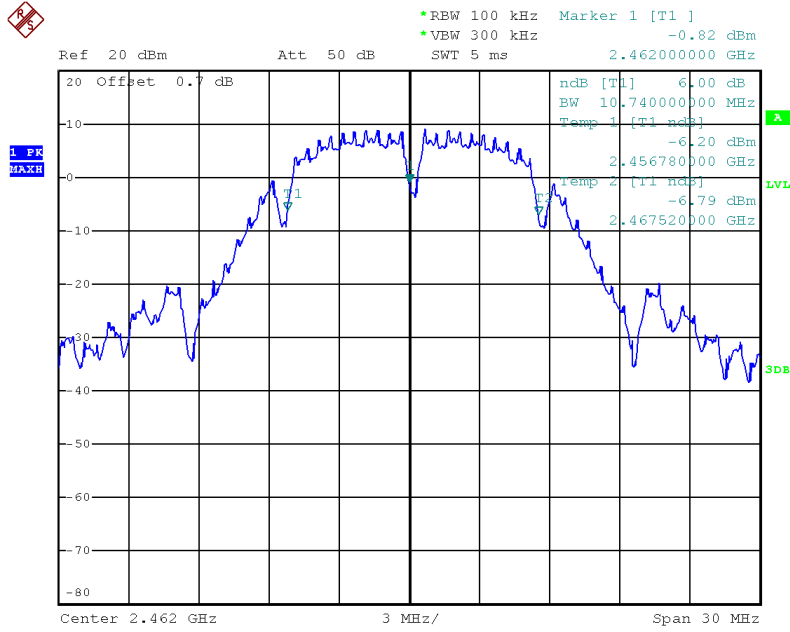
Date: 13.FEB.2018 12:46:03

Test Mode : 802.11b 2437MHz_ANT 2



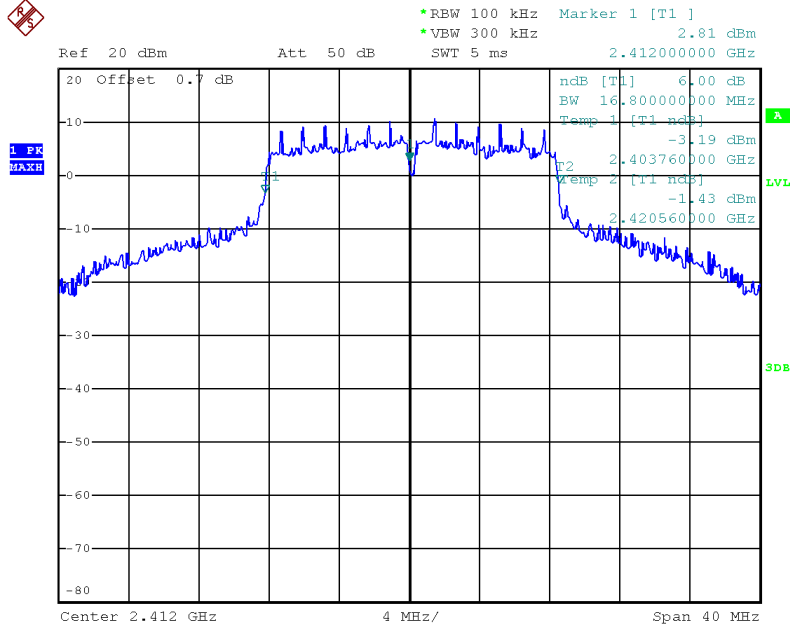
Date: 28.FEB.2018 15:28:09

Test Mode : 802.11b 2462MHz_ANT 2



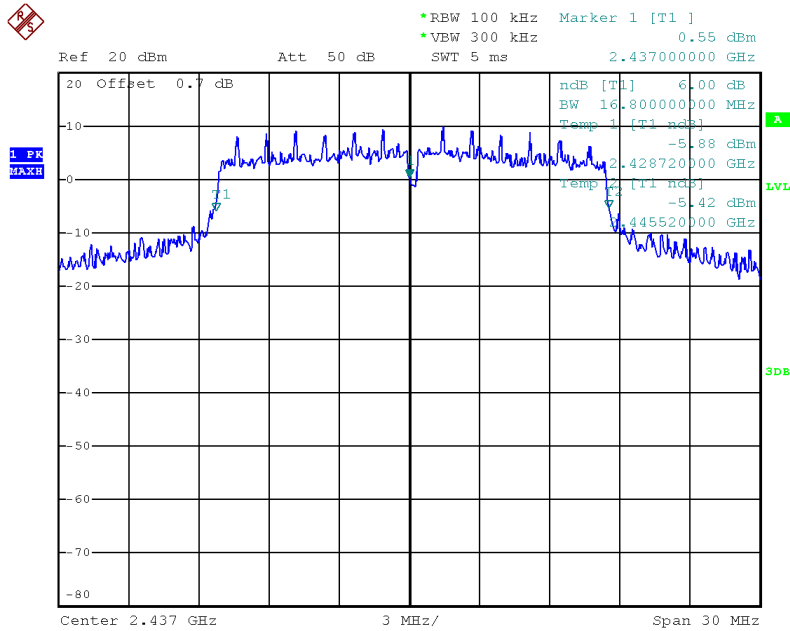
Date: 28.FEB.2018 15:28:37

Test Mode : 802.11g 2412MHz_ANT 2



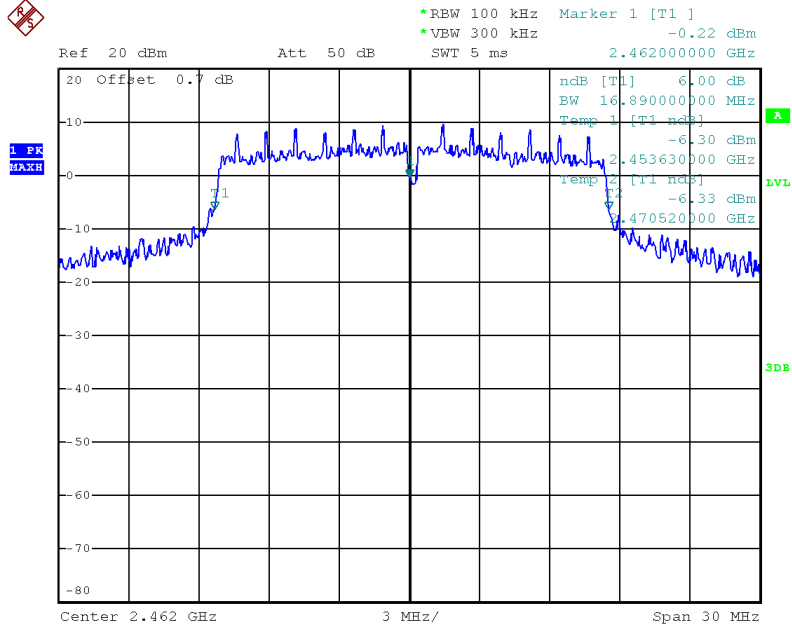
Date: 13.FEB.2018 12:42:03

Test Mode : 802.11g 2437MHz_ANT 2



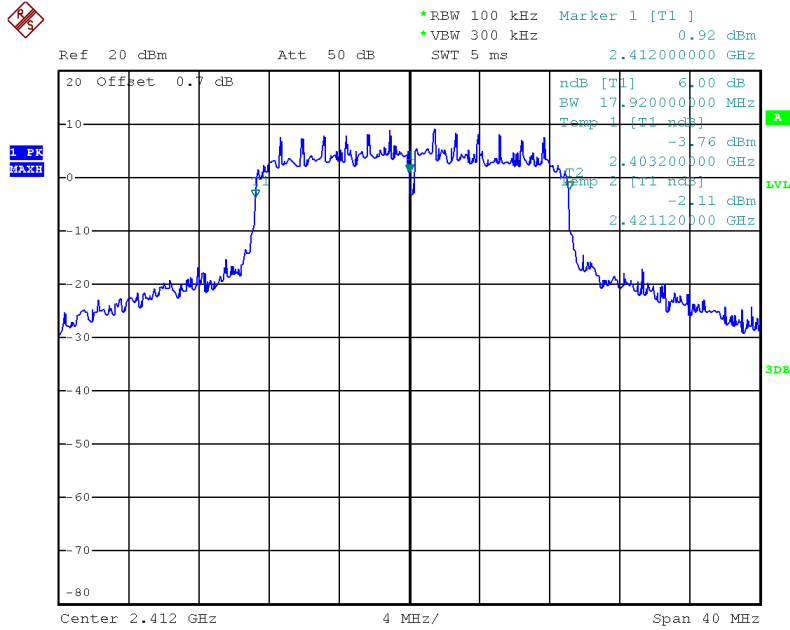
Date: 28.FEB.2018 15:26:52

Test Mode : 802.11g 2462MHz_ANT 2



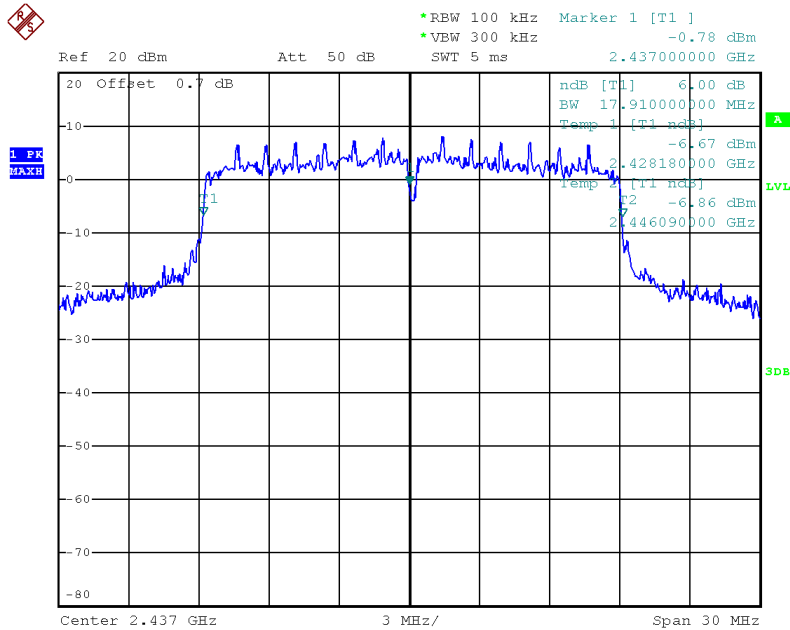
Date: 28.FEB.2018 15:26:19

Test Mode : 802.11n HT20 2412MHz_SISO ANT 2



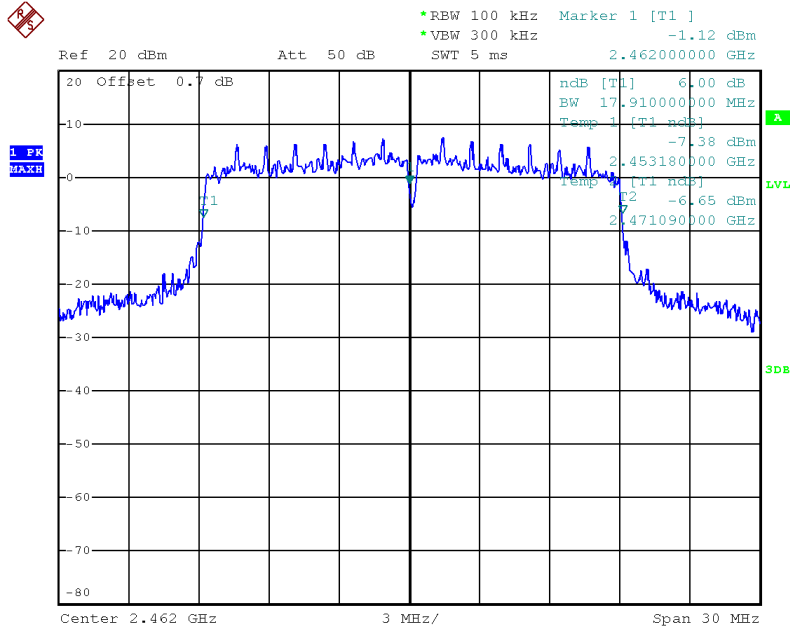
Date: 13.FEB.2018 12:35:37

Test Mode : 802.11n HT20 2437MHz_SISO ANT 2



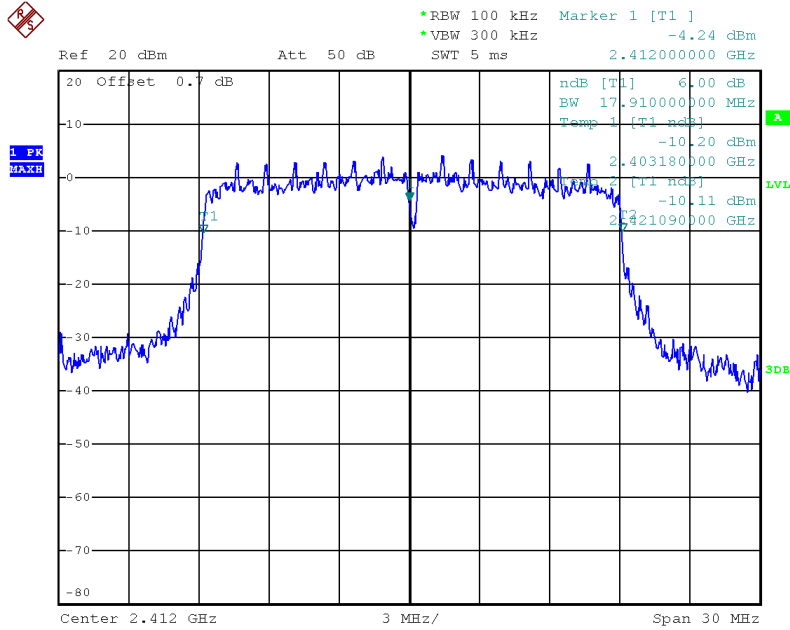
Date: 28.FEB.2018 15:24:47

Test Mode : 802.11n HT20 2462MHz_SISO ANT 2



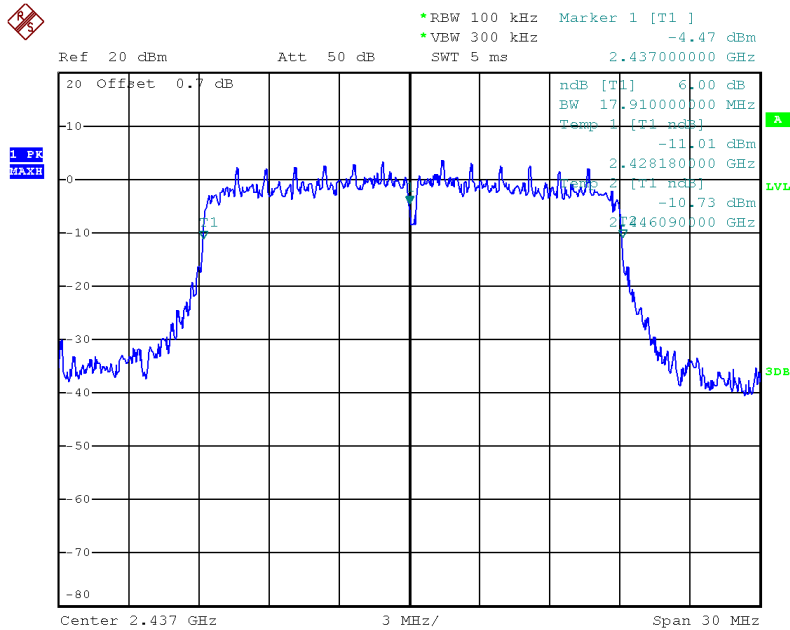
Date: 28.FEB.2018 15:25:34

Test Mode : 802.11n HT20 2412MHz_MIMO_ANT 2



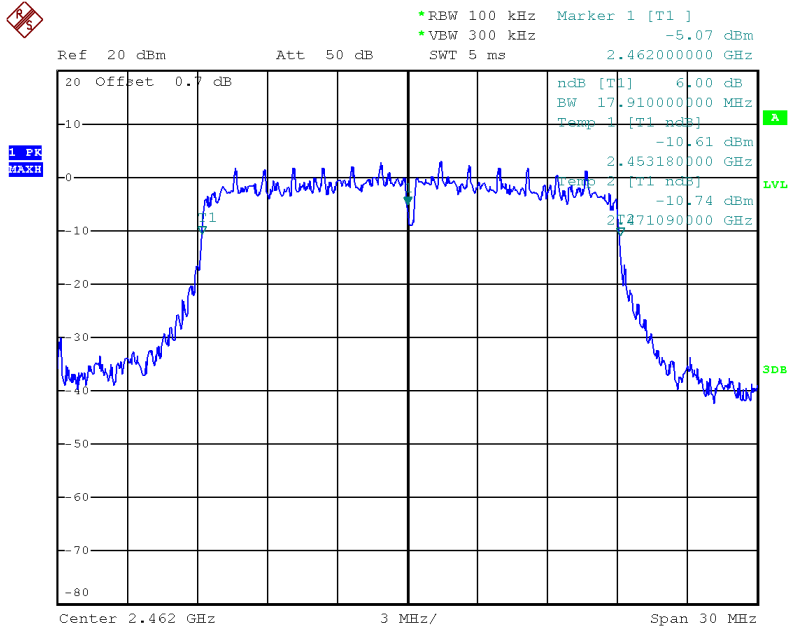
Date: 28.FEB.2018 15:23:03

Test Mode : 802.11n HT20 2437MHz_MIMO_ANT 2



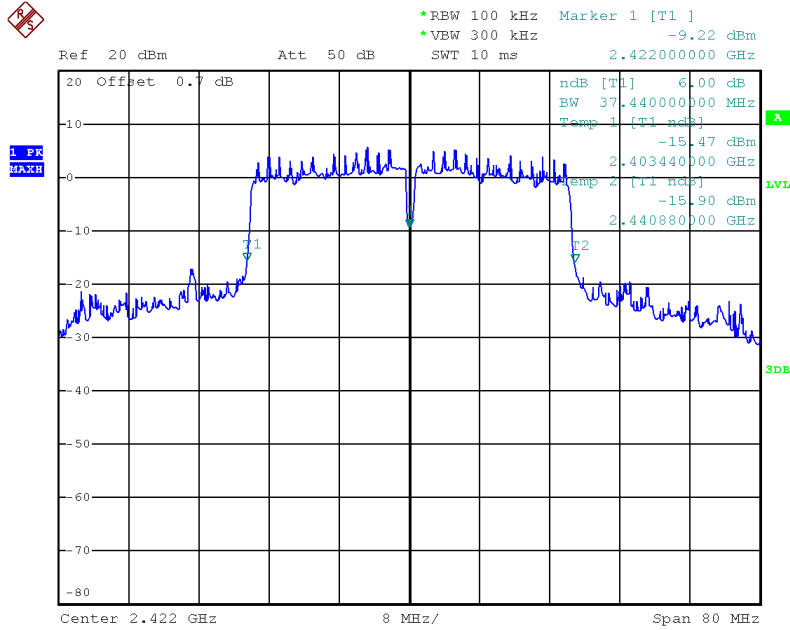
Date: 28.FEB.2018 15:22:28

Test Mode : 802.11n HT20 2462MHz_MIMO_ANT 2



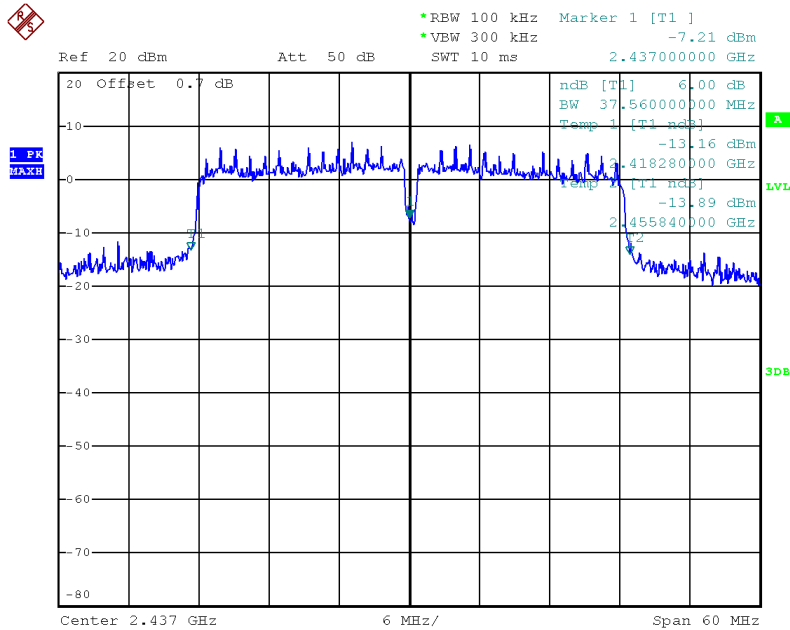
Date: 28.FEB.2018 15:21:53

Test Mode : 802.11n HT40 2422MHz_SISO ANT 2



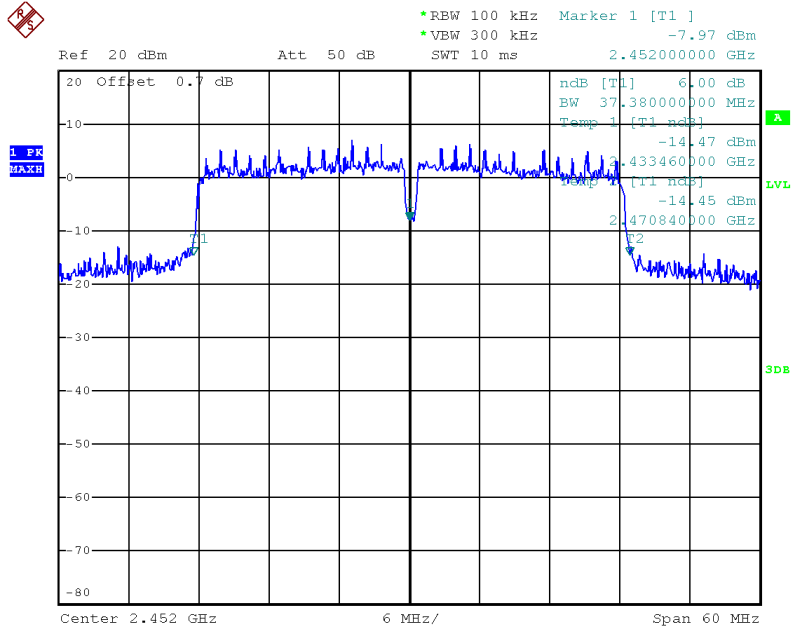
Date: 13.FEB.2018 12:48:35

Test Mode : 802.11n HT40 2437MHz_SISO ANT 2



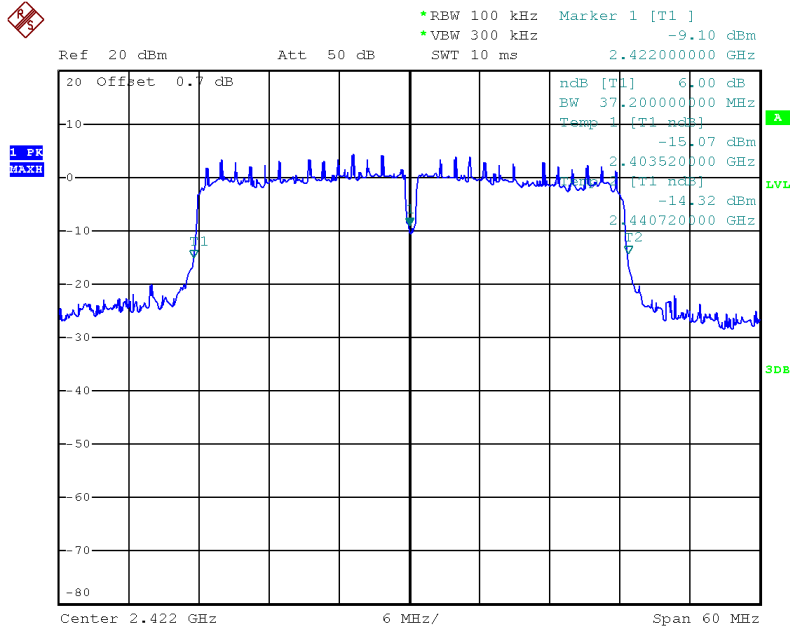
Date: 9.MAR.2018 16:10:16

Test Mode : 802.11n HT40 2452MHz_SISO ANT 2



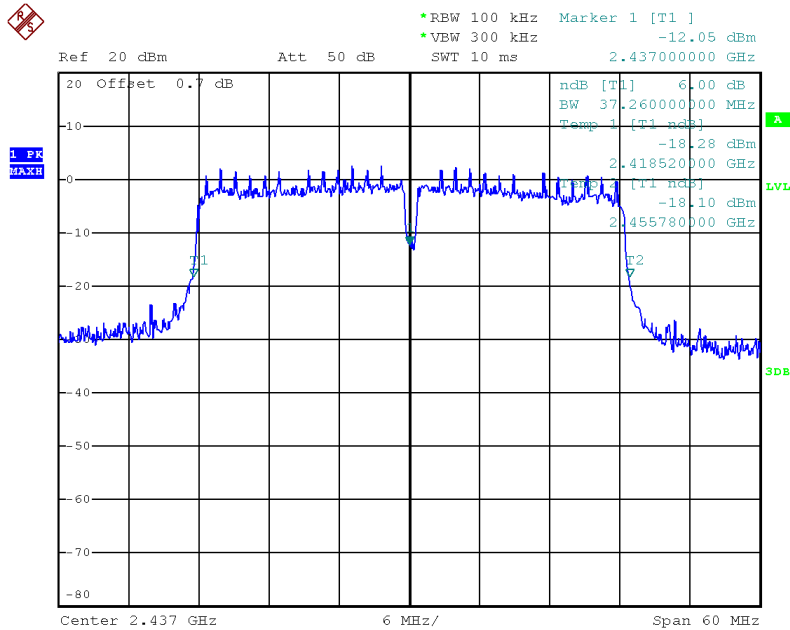
Date: 9.MAR.2018 16:11:55

Test Mode : 802.11n HT40 2422MHz_MIMO_ANT 2



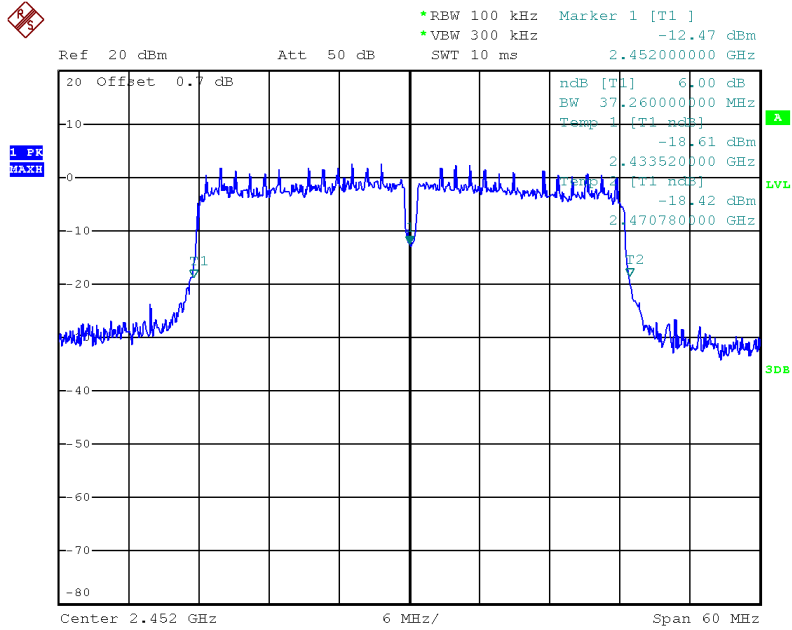
Date: 21.FEB.2018 10:17:42

Test Mode : 802.11n HT40 2437MHz_MIMO_ANT 2



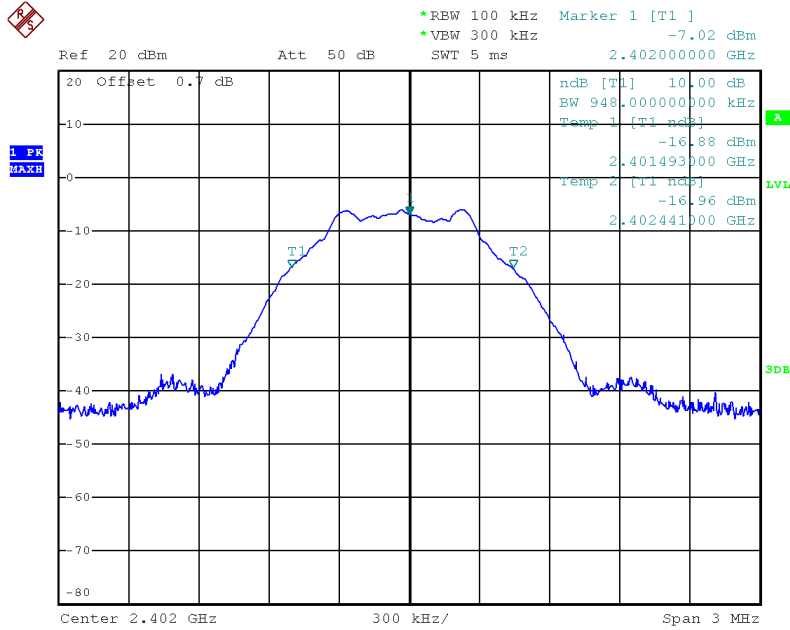
Date: 9.MAR.2018 16:09:35

Test Mode : 802.11n HT40 2452MHz_MIMO_ANT 2



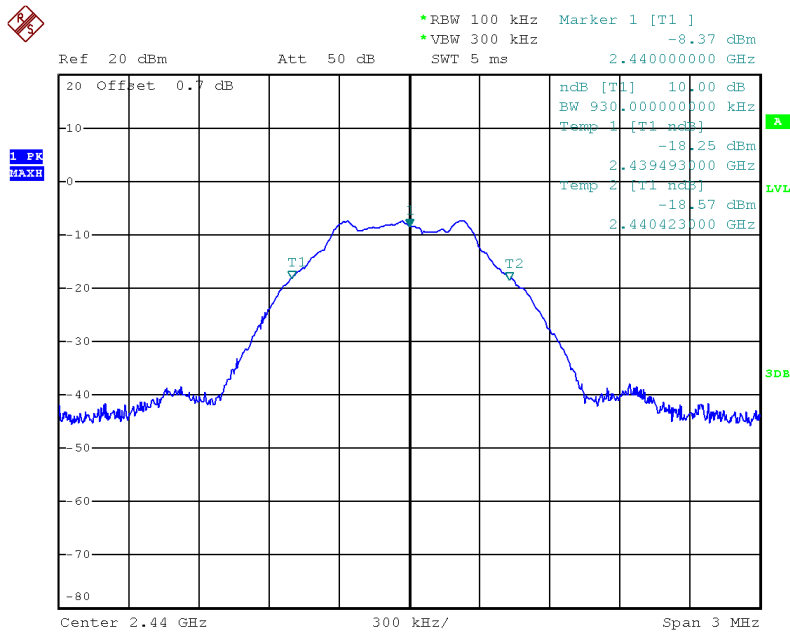
Date: 9.MAR.2018 16:11:19

Test Mode : LE 2402MHz



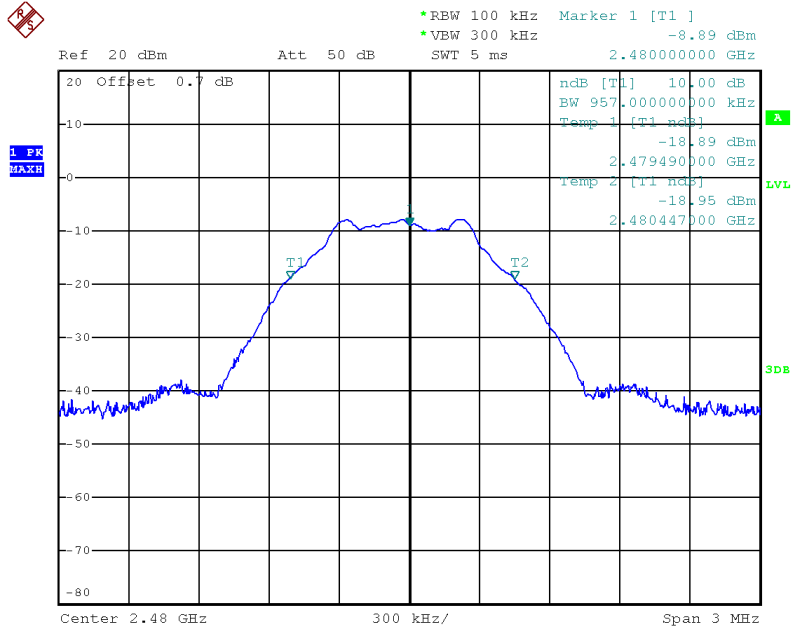
Date: 14.FEB.2018 14:15:11

Test Mode : LE 2440MHz



Date: 14.FEB.2018 14:14:41

Test Mode : LE 2480MHz



Date: 14.FEB.2018 14:14:16

6.6 Conducted Spurious Emission

6.6.1 Test Limit

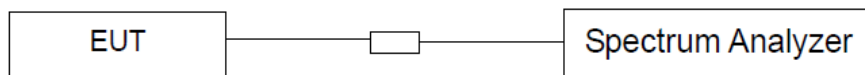
According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

6.6.2 Test Procedure

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04 and KDB 662911 D01 Multiple Transmitter Output v02r01.
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 to transmit continuously.
4. Set (RBW = 100 kHz, VBW = 300 kHz, Detector = Peak, Trace mode = Max Hold, Sweep = Auto).
5. Measure and record the results in the test report.

6.6.3 Test SET-UP (Block Diagram of Configuration)

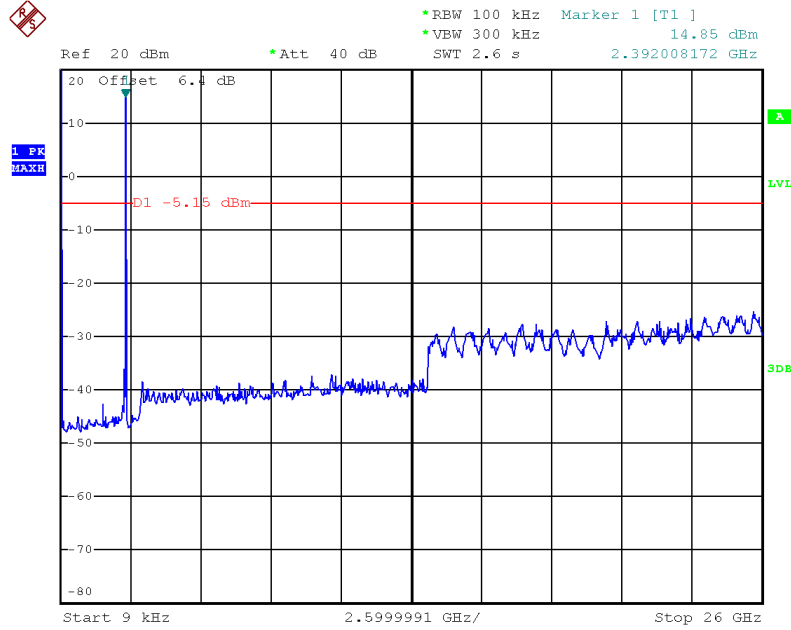
Conducted Emission Test Set-Up, Frequency above 1000MHz



6.6.4 Test Result

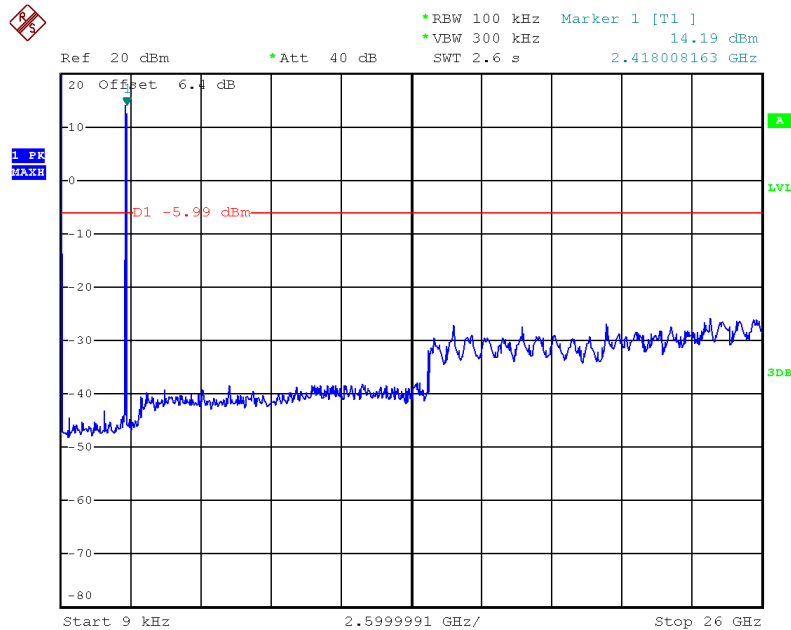
[Conducted Spurious Emission Test]

Test Mode : 802.11b 2412MHz_ANT 2



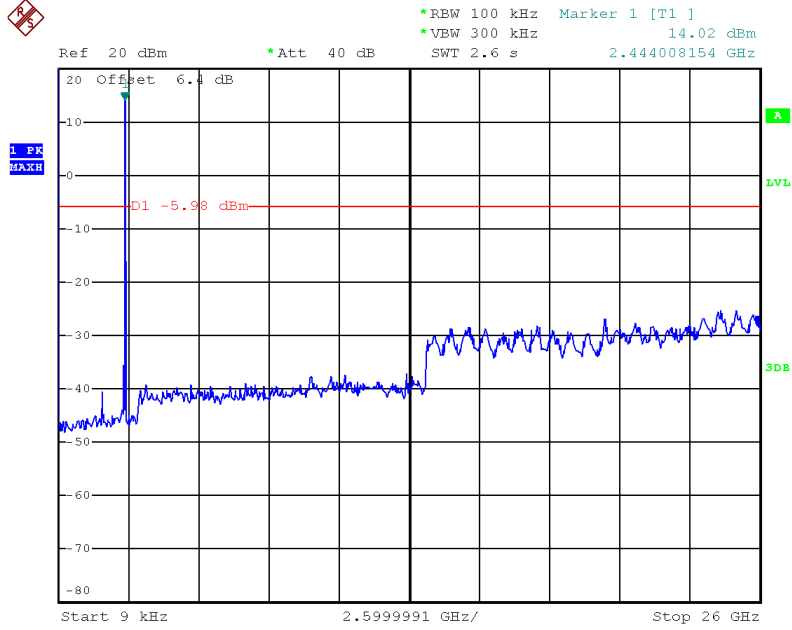
Date: 13.FEB.2018 17:44:15

Test Mode : 802.11b 2437MHz_ANT 2



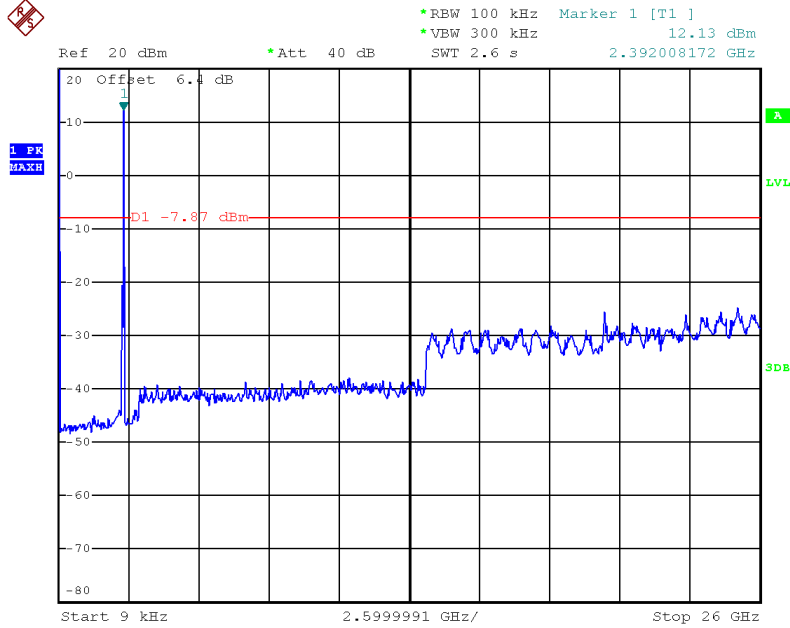
Date: 28.FEB.2018 15:36:51

Test Mode : 802.11b 2462MHz_ANT 2



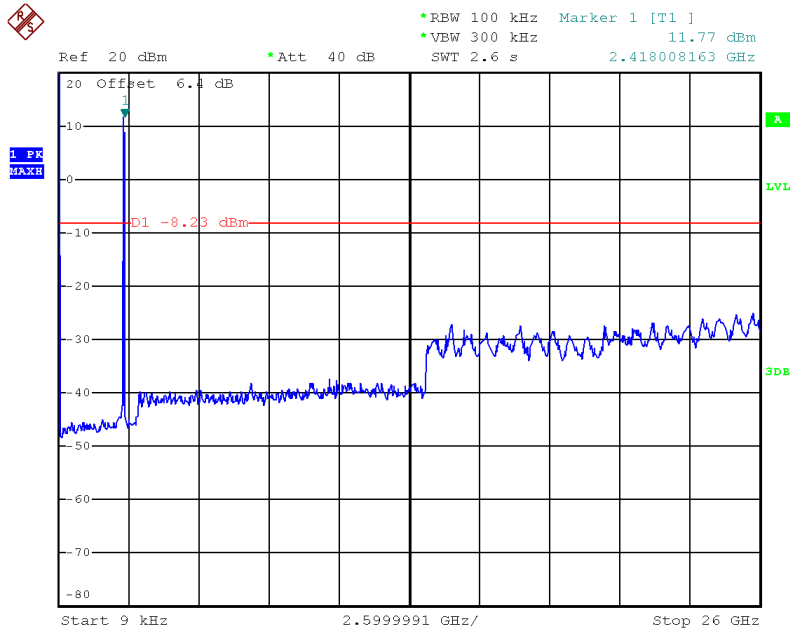
Date: 28.FEB.2018 15:35:53

Test Mode : 802.11g 2412MHz_ANT 2



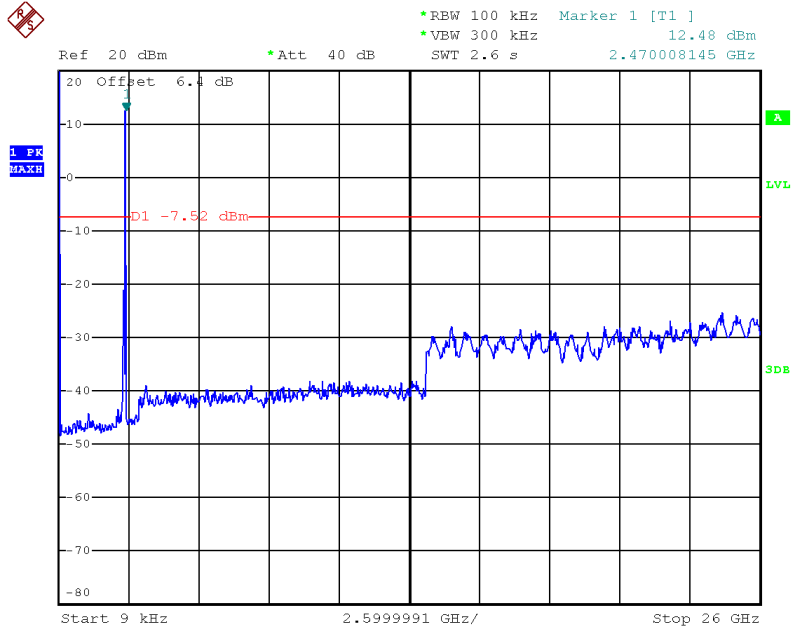
Date: 13.FEB.2018 17:38:22

Test Mode : 802.11g 2437MHz_ANT 2



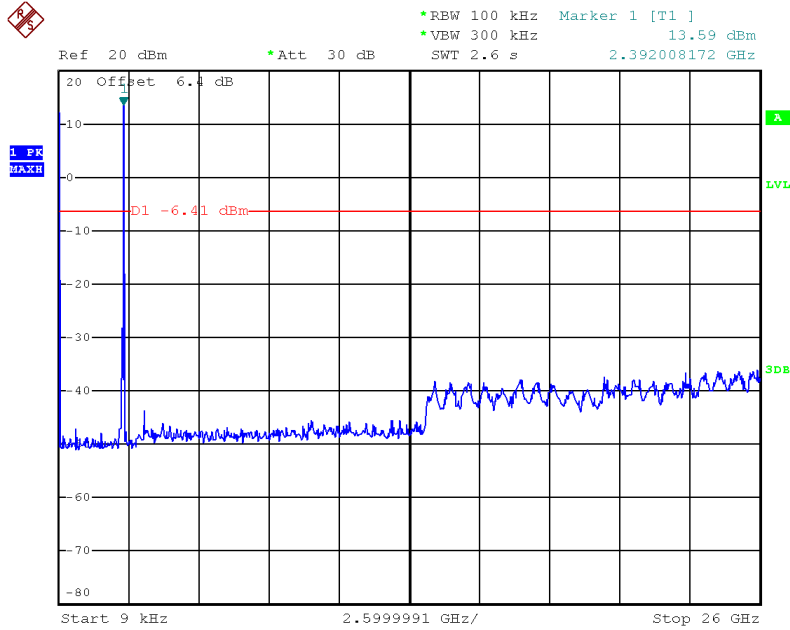
Date: 28.FEB.2018 15:39:02

Test Mode : 802.11g 2462MHz_ANT 2



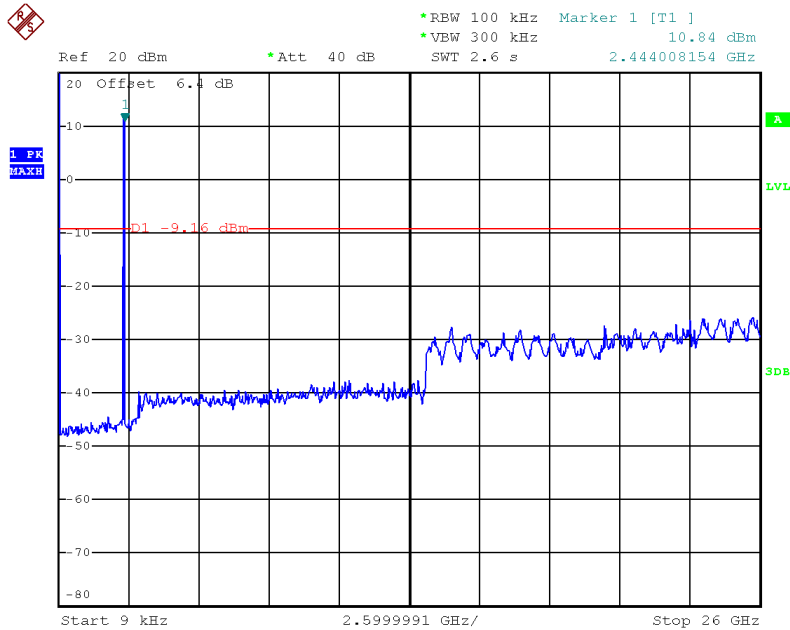
Date: 28.FEB.2018 15:39:45

Test Mode : 802.11n HT20 2412MHz_SISO ANT 2



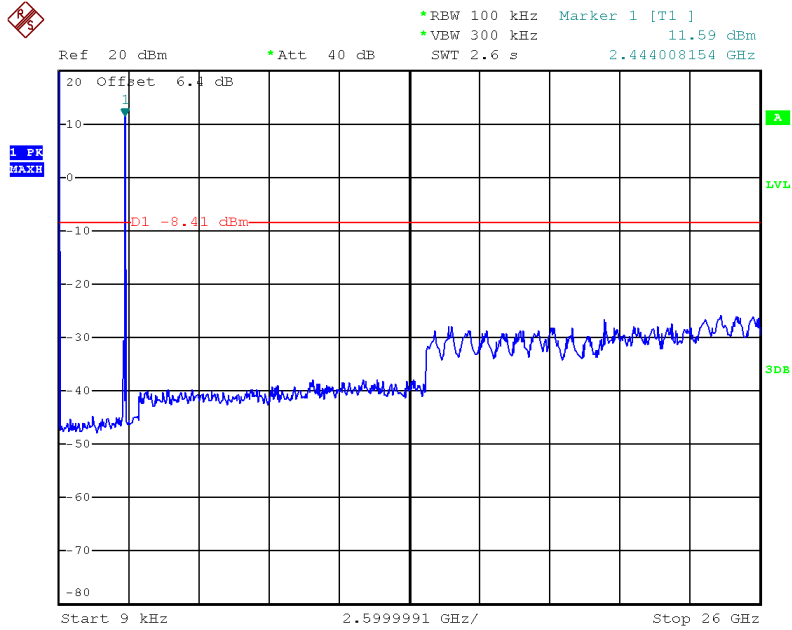
Date: 13.FEB.2018 17:26:59

Test Mode : 802.11n HT20 2437MHz_SISO ANT 2



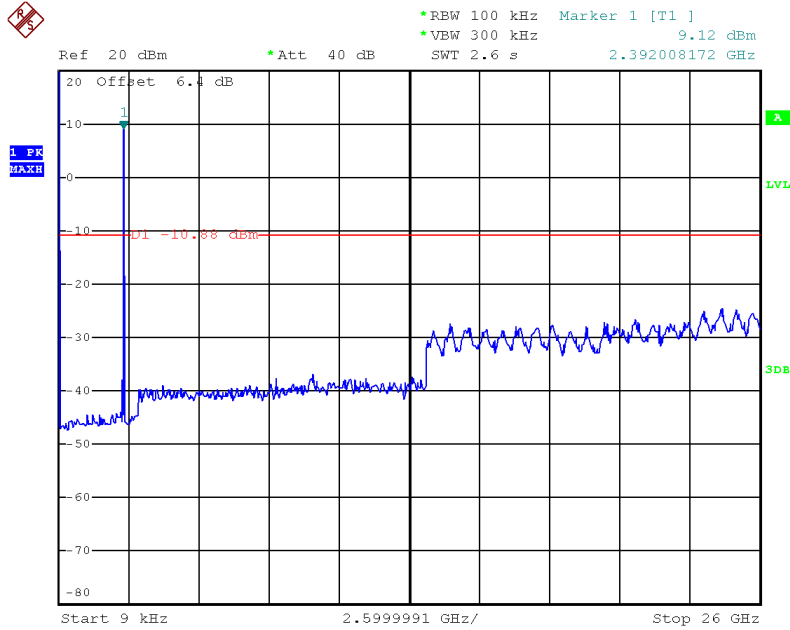
Date: 28.FEB.2018 15:40:51

Test Mode : 802.11n HT20 2462MHz_SISO ANT 2



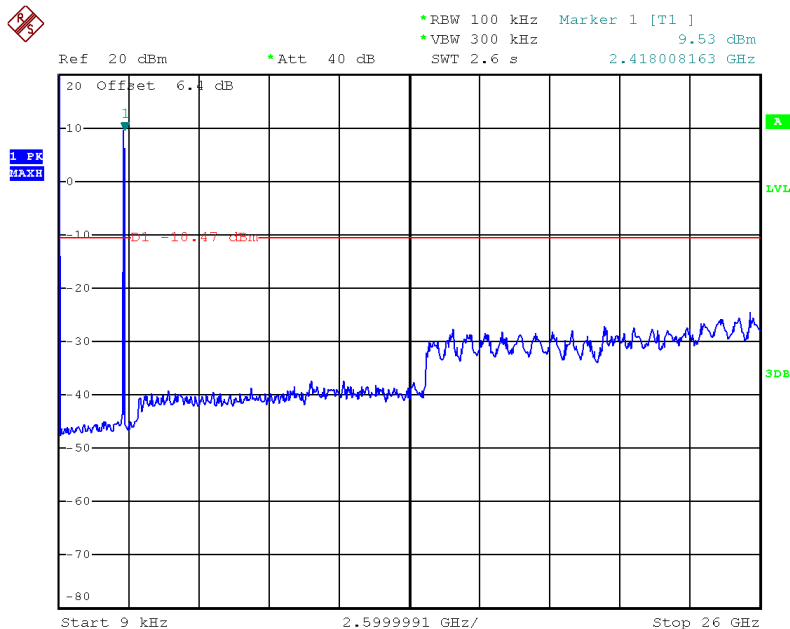
Date: 28.FEB.2018 15:42:02

Test Mode : 802.11n HT20 2412MHz_MIMO_ANT 1



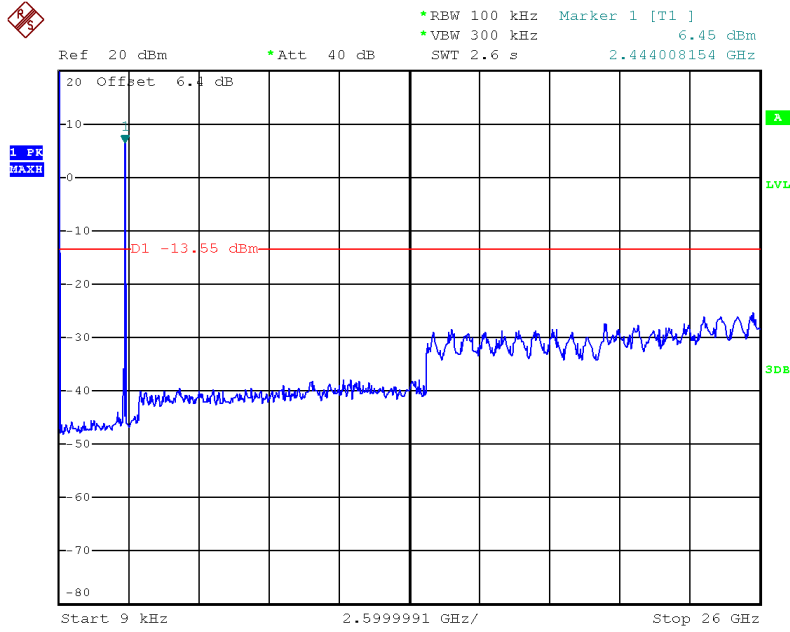
Date: 28.FEB.2018 15:46:38

Test Mode : 802.11n HT20 2437MHz_MIMO_ANT 1



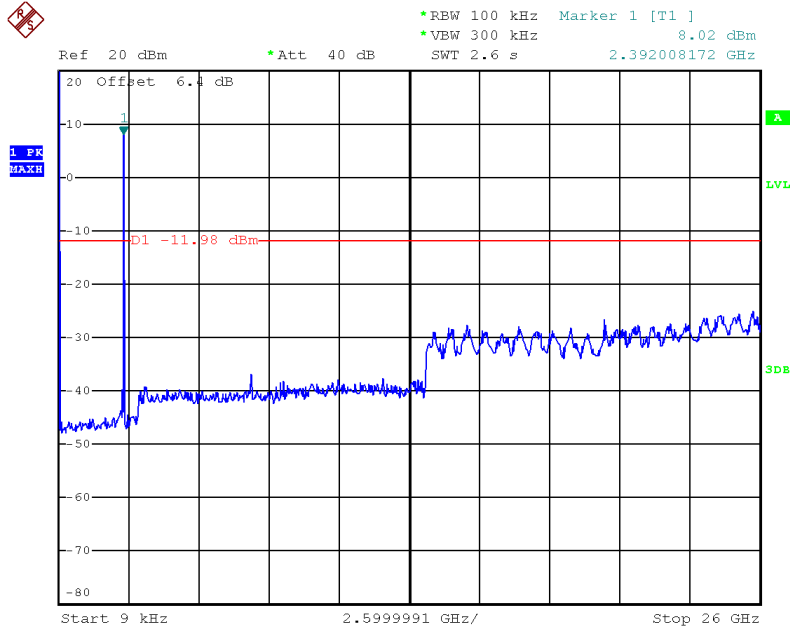
Date: 28.FEB.2018 15:56:29

Test Mode : 802.11n HT20 2462MHz_MIMO_ANT 1



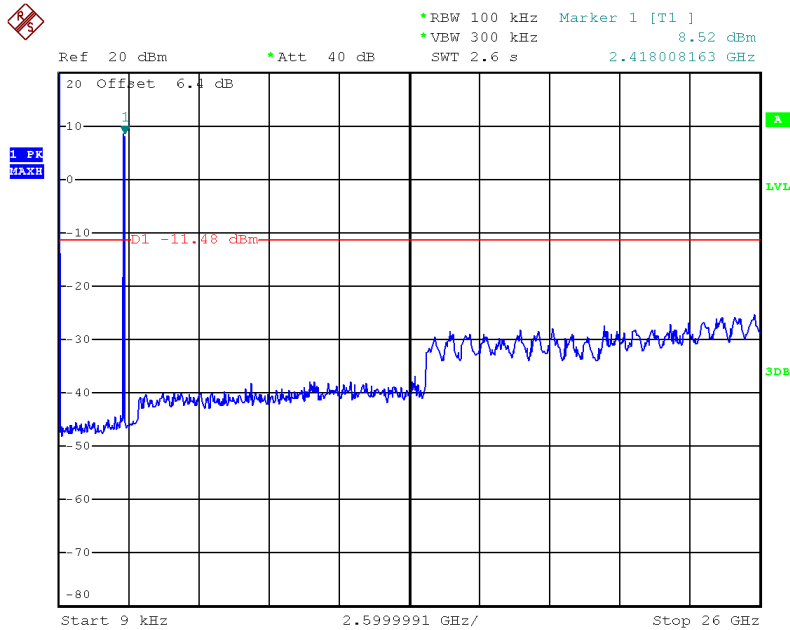
Date: 28.FEB.2018 15:59:09

Test Mode : 802.11n HT20 2412MHz_MIMO_ANT 2



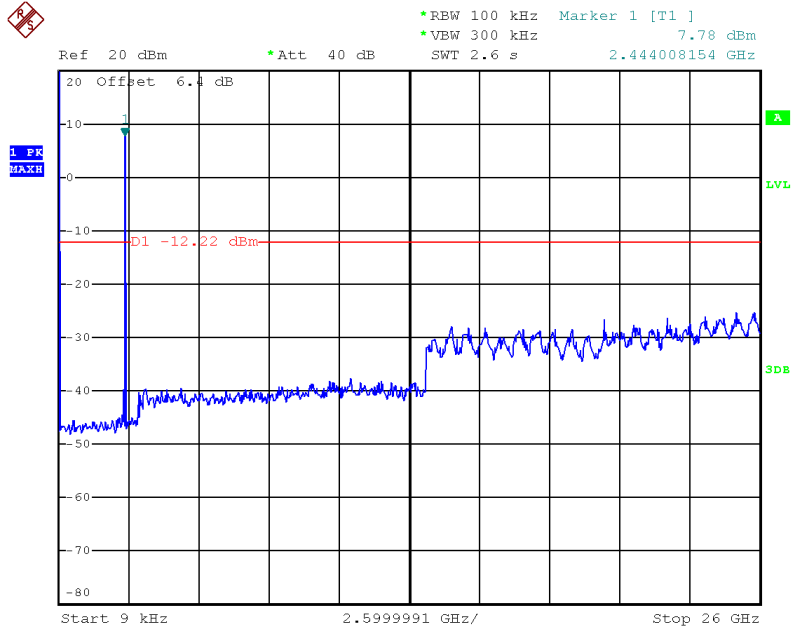
Date: 28.FEB.2018 15:43:17

Test Mode : 802.11n HT20 2437MHz_MIMO_ANT 2



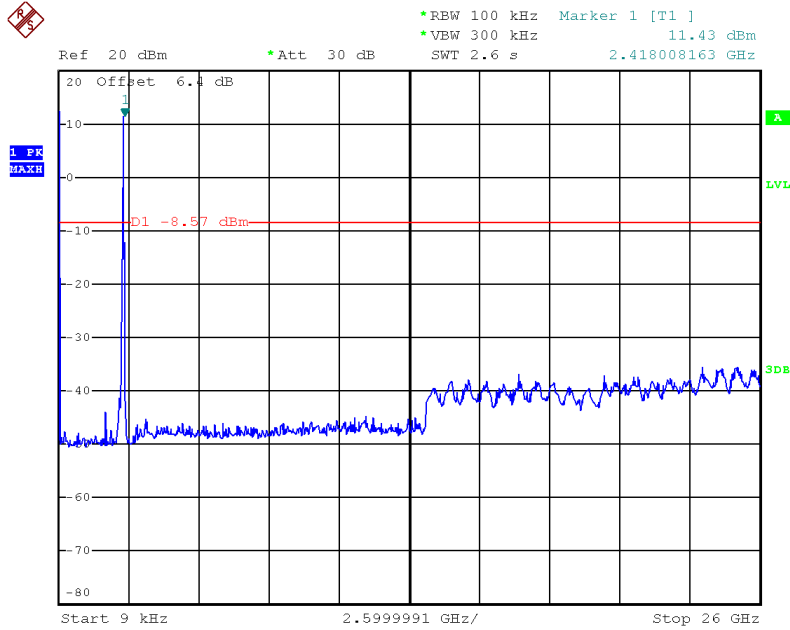
Date: 28.FEB.2018 15:57:30

Test Mode : 802.11n HT20 2462MHz_MIMO_ANT 2



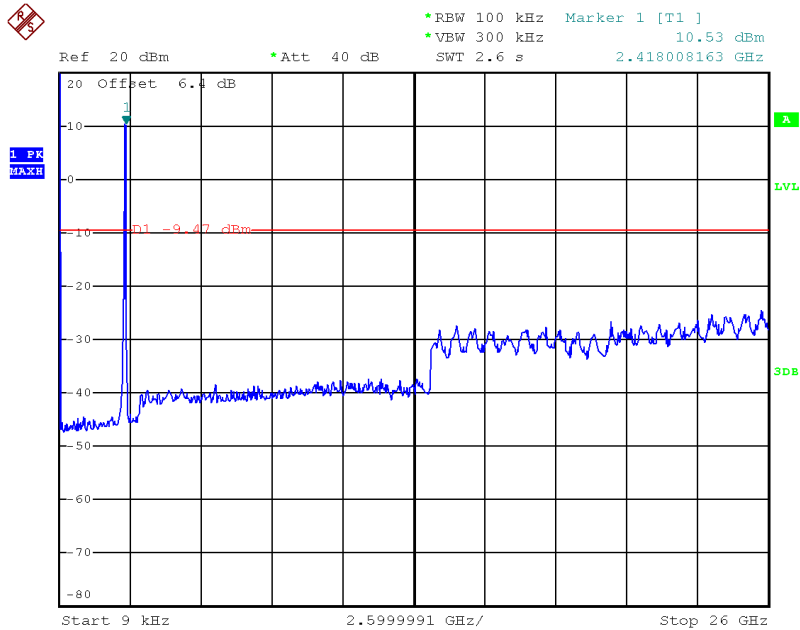
Date: 28.FEB.2018 15:58:16

Test Mode : 802.11n HT40 2422MHz_SISO ANT 2



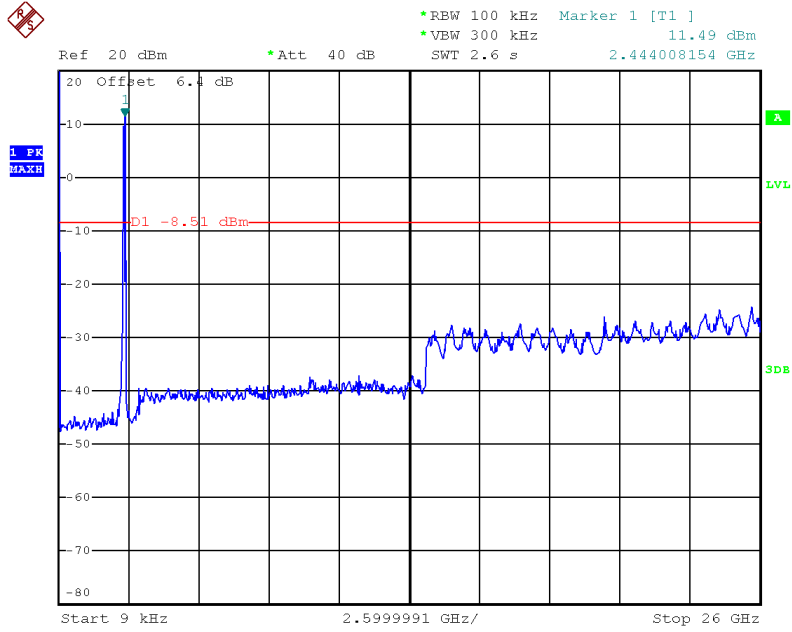
Date: 13.FEB.2018 17:31:49

Test Mode : 802.11n HT40 2437MHz_SISO ANT 2



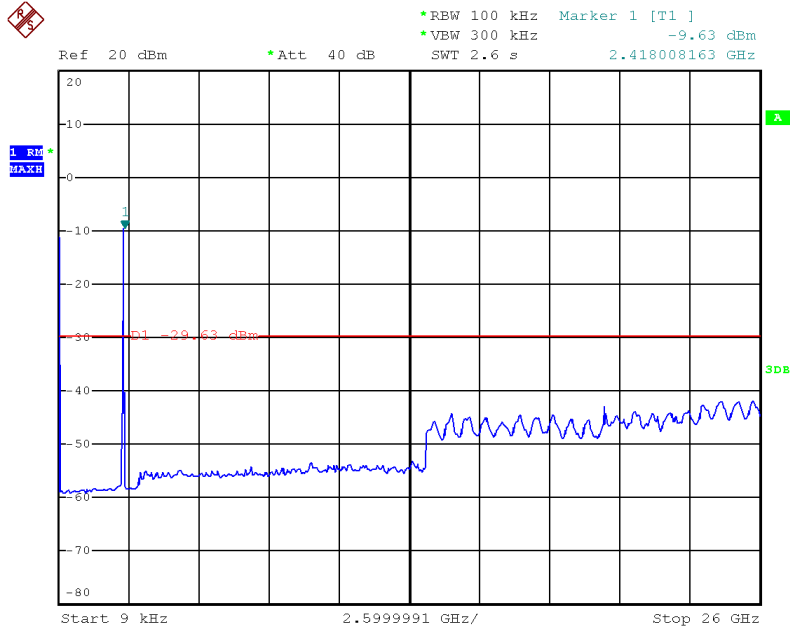
Date: 9.MAR.2018 16:30:12

Test Mode : 802.11n HT40 2452MHz_SISO ANT 2



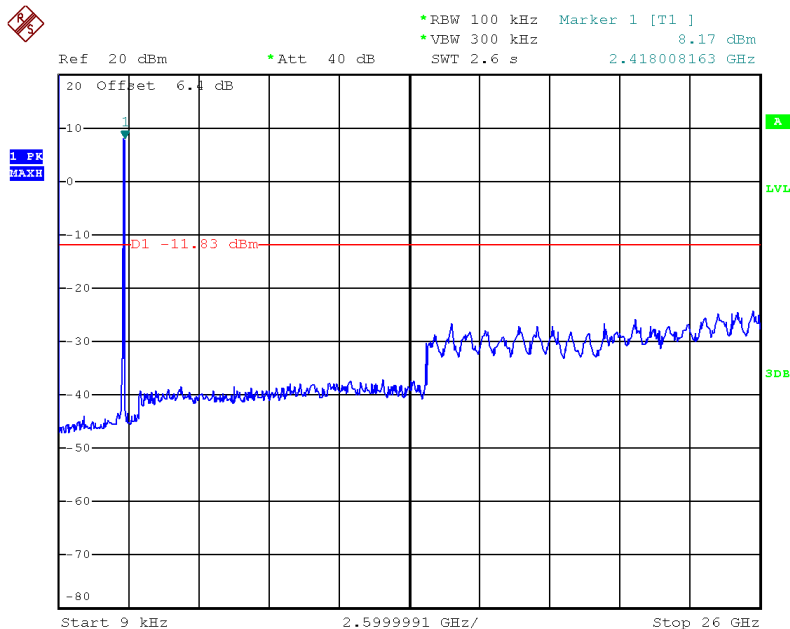
Date: 9.MAR.2018 16:28:14

Test Mode : 802.11n HT40 2422MHz_MIMO_ANT 1



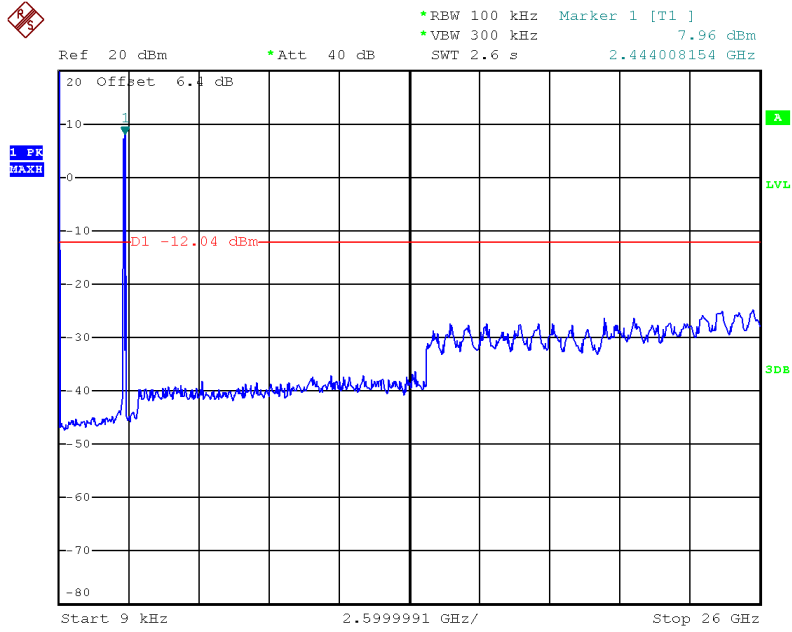
Date: 22.FEB.2018 04:23:04

Test Mode : 802.11n HT40 2437MHz_MIMO_ANT 1



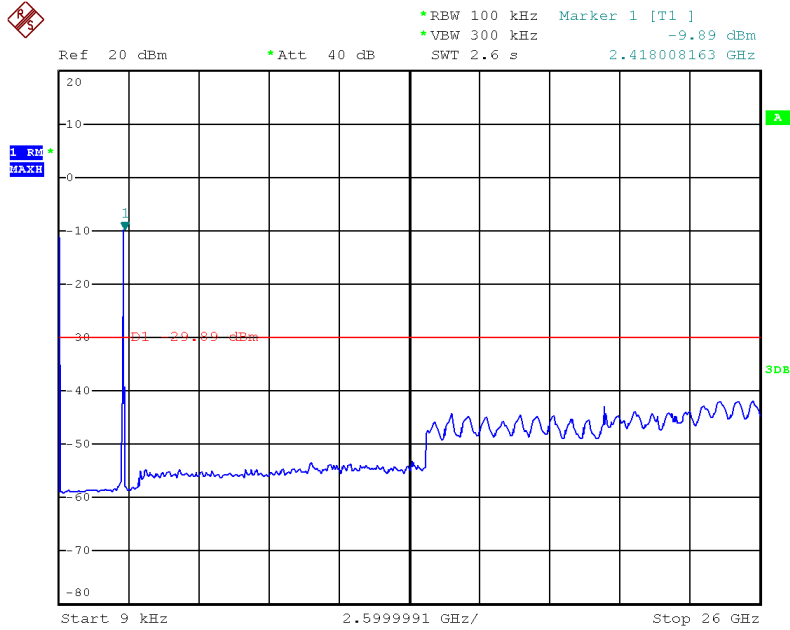
Date: 9.MAR.2018 16:35:36

Test Mode : 802.11n HT40 2452MHz_MIMO_ANT 1



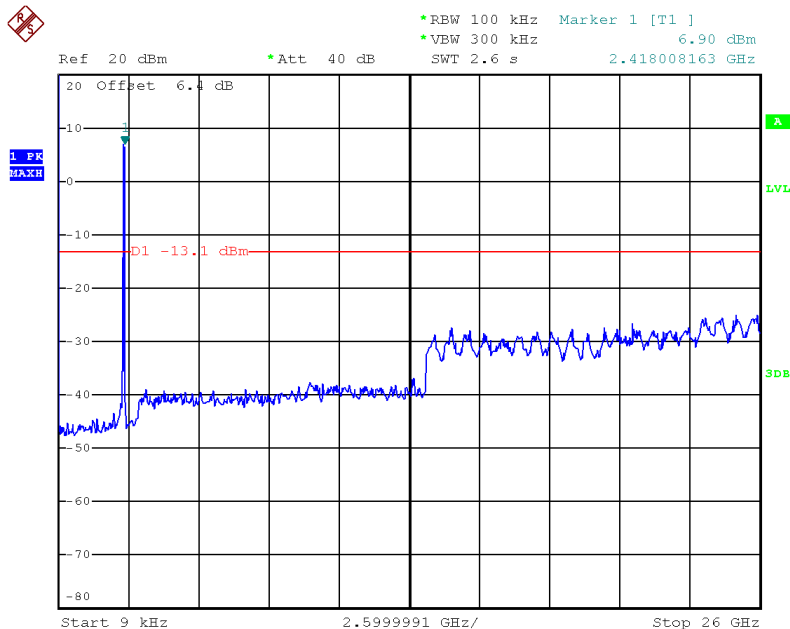
Date: 9.MAR.2018 16:24:53

Test Mode : 802.11n HT40 2422MHz_MIMO_ANT 2



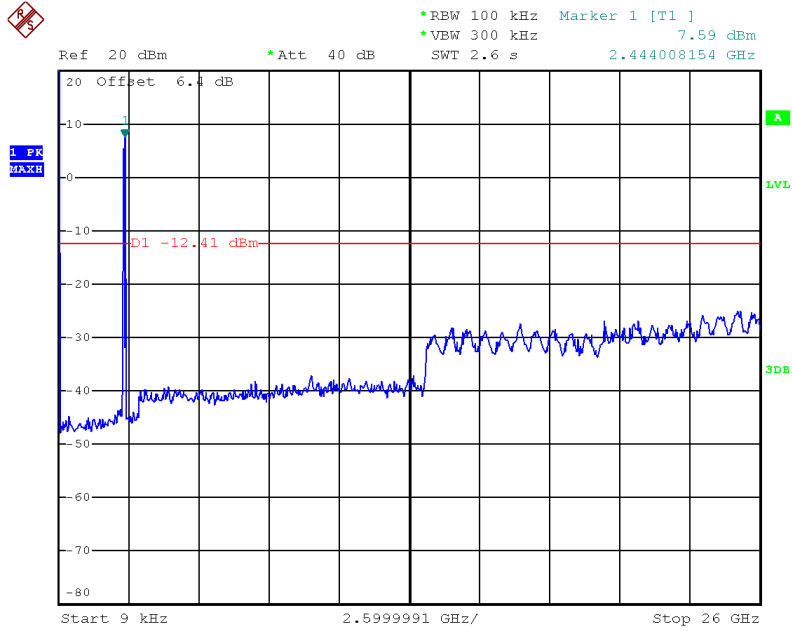
Date: 22.FEB.2018 04:24:12

Test Mode : 802.11n HT40 2437MHz_MIMO_ANT 2



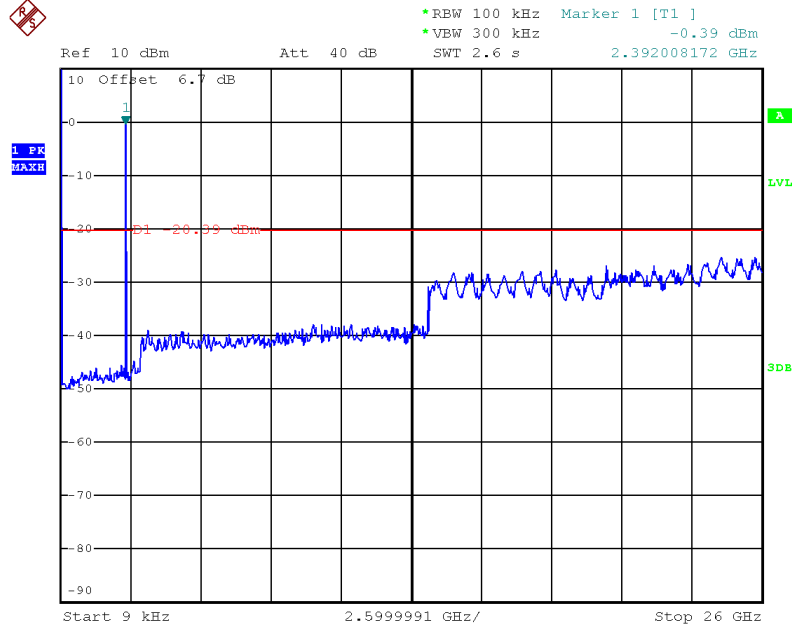
Date: 9.MAR.2018 16:31:44

Test Mode : 802.11n HT40 2452MHz_MIMO_ANT 2



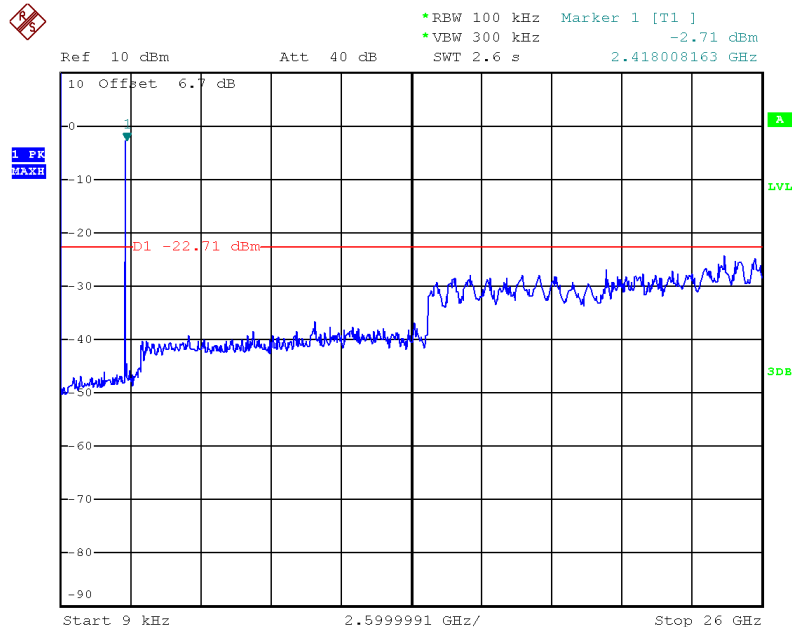
Date: 9.MAR.2018 16:26:29

Test Mode : LE 2402MHz



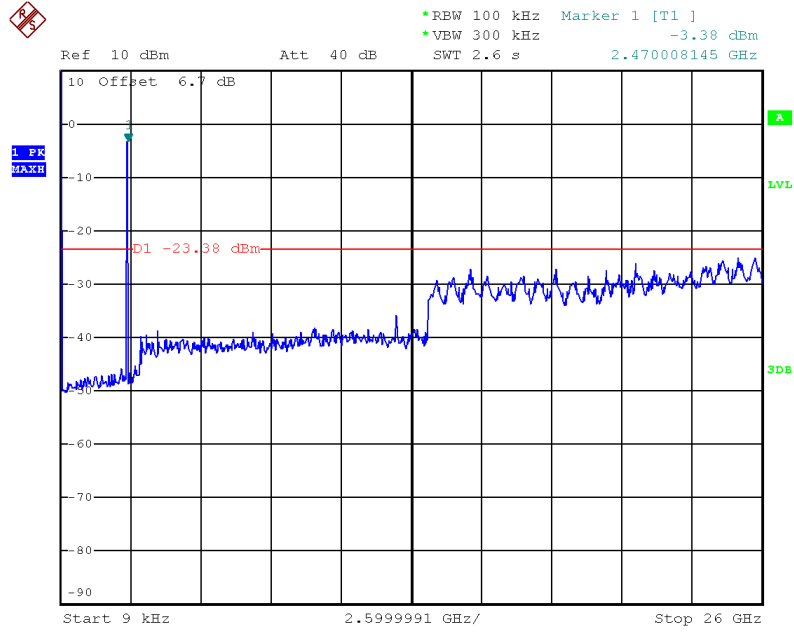
Date: 14.FEB.2018 14:16:57

Test Mode : LE 2440MHz



Date: 14.FEB.2018 14:18:42

Test Mode : LE 2480MHz



Date: 14.FEB.2018 14:17:57

6.7 Band Edges Measurement

6.7.1 Test Limit

According to §15.247(d), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

6.7.2 Test Procedure

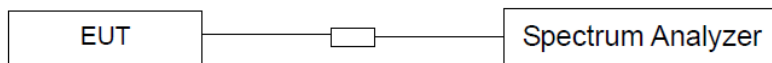
The EUT is placed on a turntable with 1.5 meter above ground. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:

PEAK: RBW=VBW=100kHz / Sweep=AUTO
AVERAGE: RBW=100kHz / VBW=10Hz / Sweep=AUTO

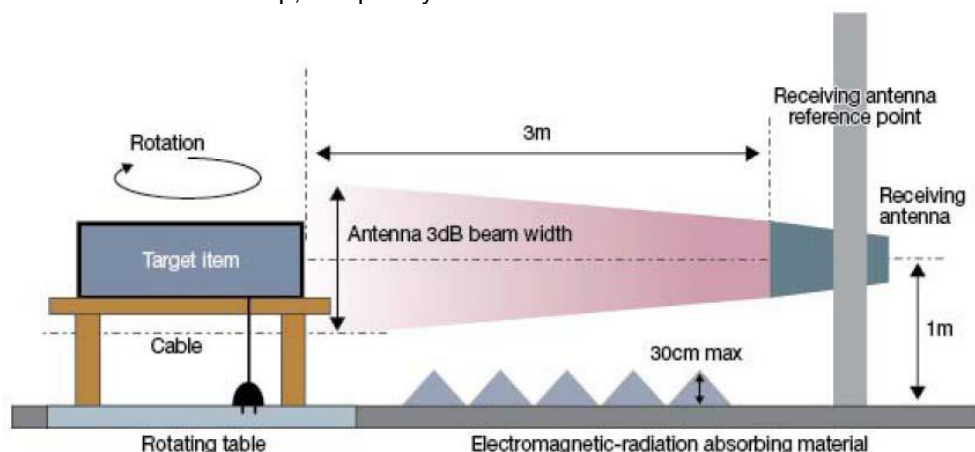
Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

6.7.3 Test SET-UP (Block Diagram of Configuration)

(a) Conducted Emission Test Set-Up, Frequency above 1000MHz



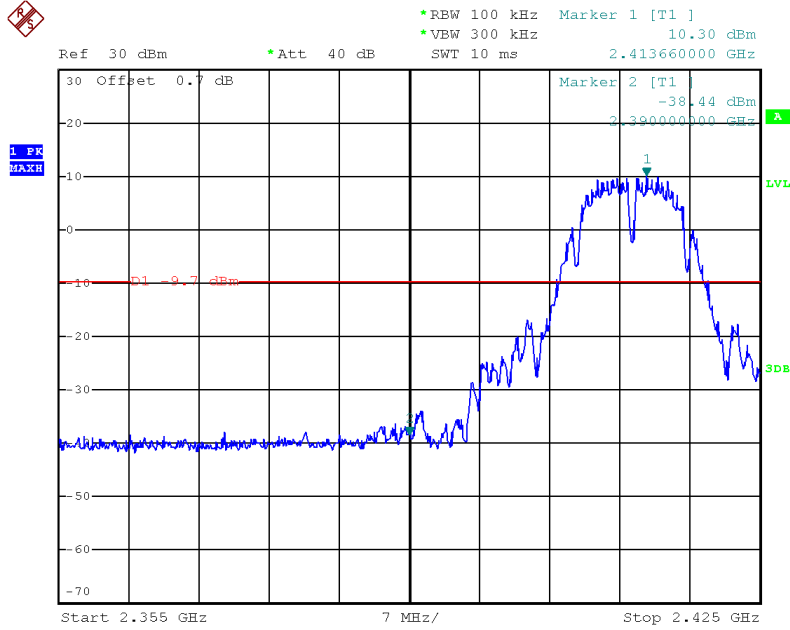
(b) Radiated Emission Test Set-Up, Frequency above 1000MHz



6.7.4 Test Result

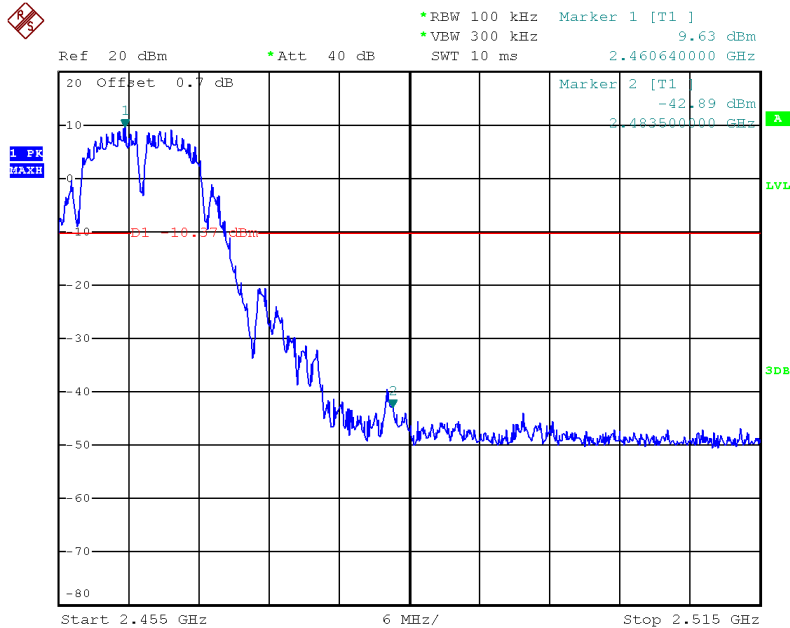
[Conducted Band Edges]

Test Mode : 802.11b 2412MHz Band Edge_ANT 2



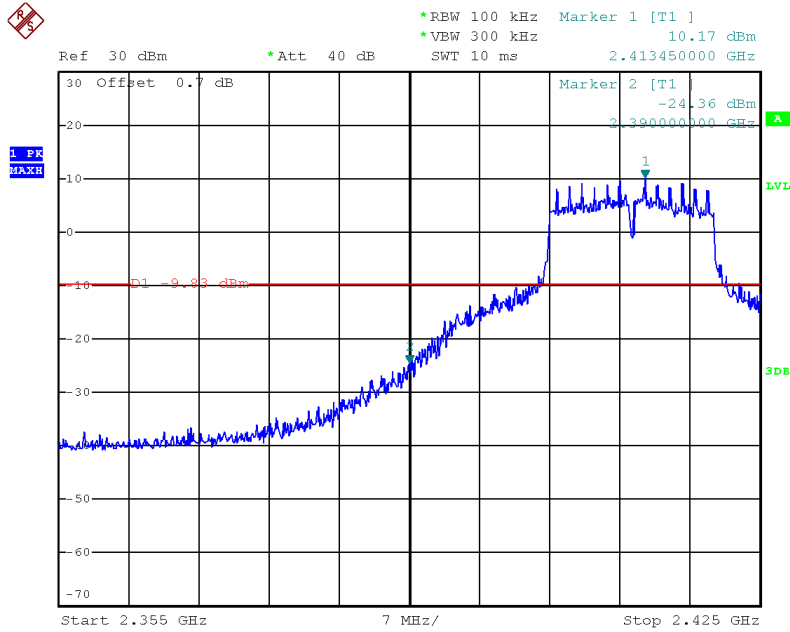
Date: 14.FEB.2018 11:06:25

Test Mode : 802.11b 2462MHz Band Edge_ANT 2



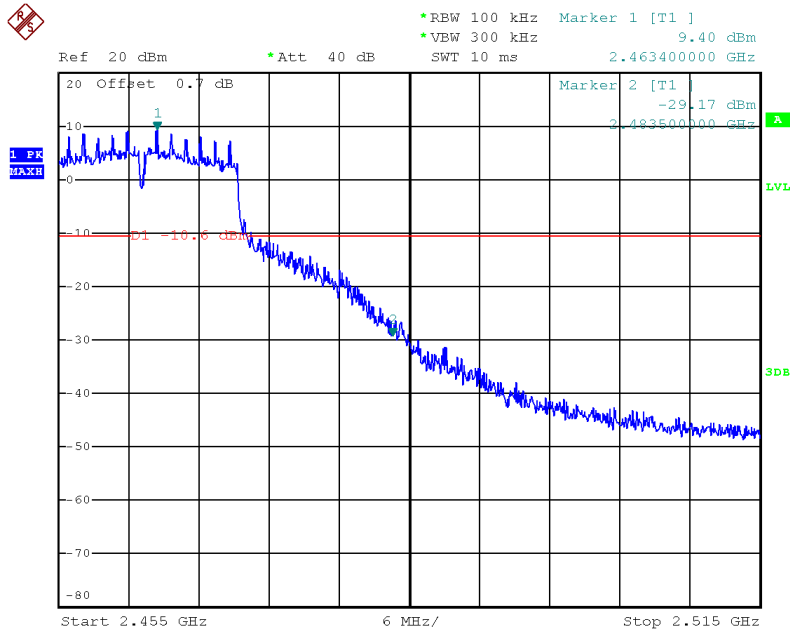
Date: 28.FEB.2018 16:07:15

Test Mode : 802.11g 2412MHz Band Edge_ANT 2



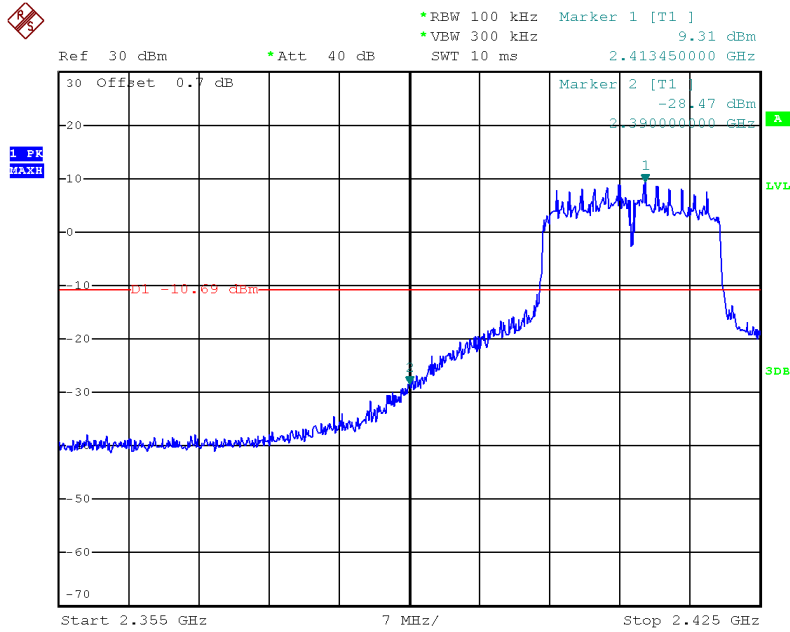
Date: 14.FEB.2018 11:07:35

Test Mode : 802.11g 2462MHz Band Edge_ANT 2



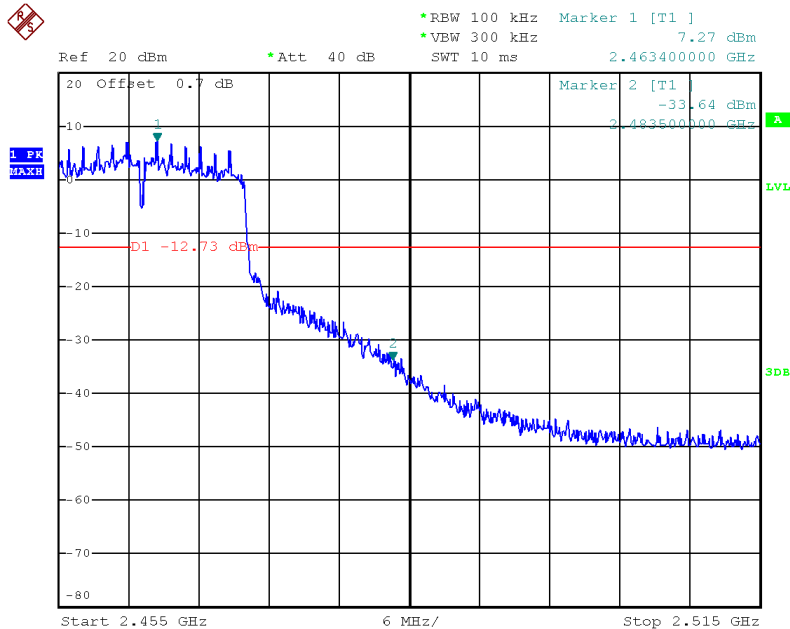
Date: 28.FEB.2018 16:06:34

Test Mode : 802.11n HT20 2412MHz Band Edge_SISO ANT 2



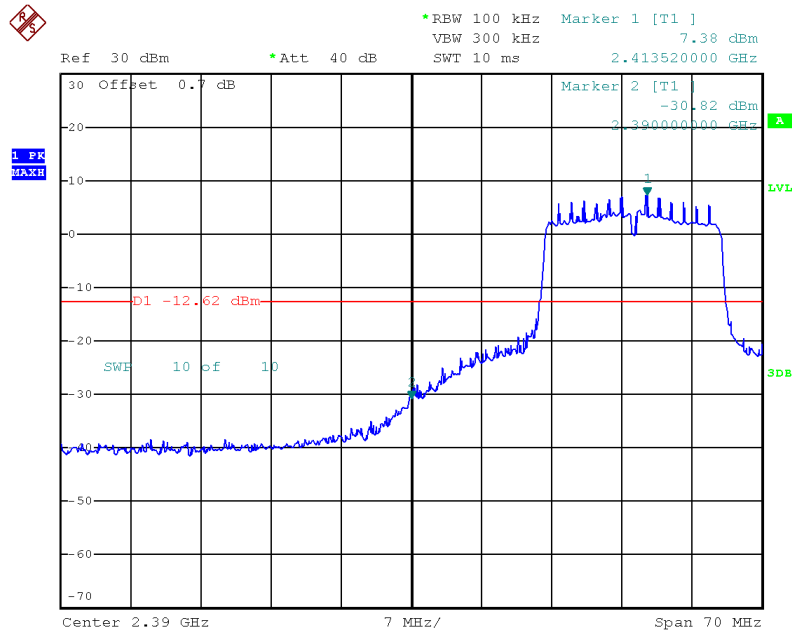
Date: 14.FEB.2018 10:15:10

Test Mode : 802.11n HT20 2462MHz Band Edge_SISO ANT 2



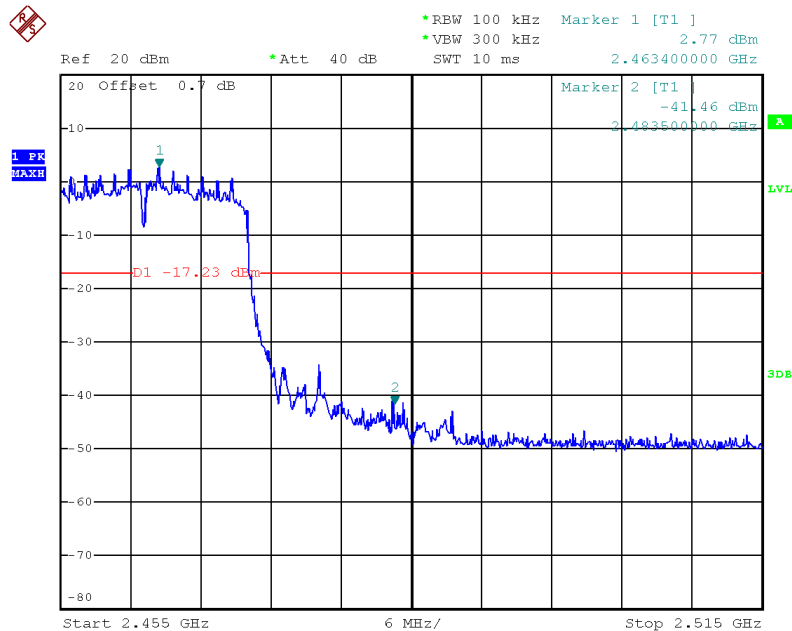
Date: 28.FEB.2018 16:05:12

Test Mode : 802.11n HT20 2412MHz Band Edge_MIMO_ANT 1



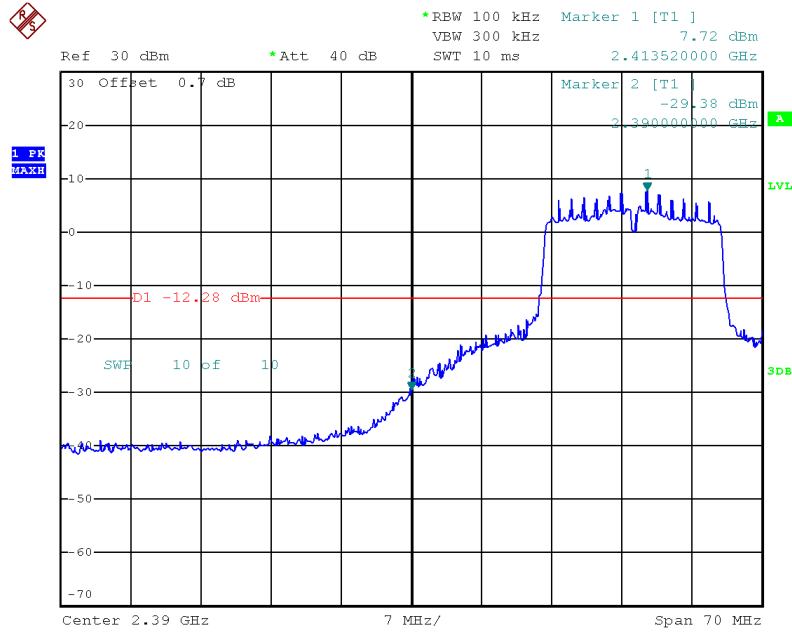
Date: 15.FEB.2018 11:30:57

Test Mode : 802.11n HT20 2462MHz Band Edge_MIMO ANT 1



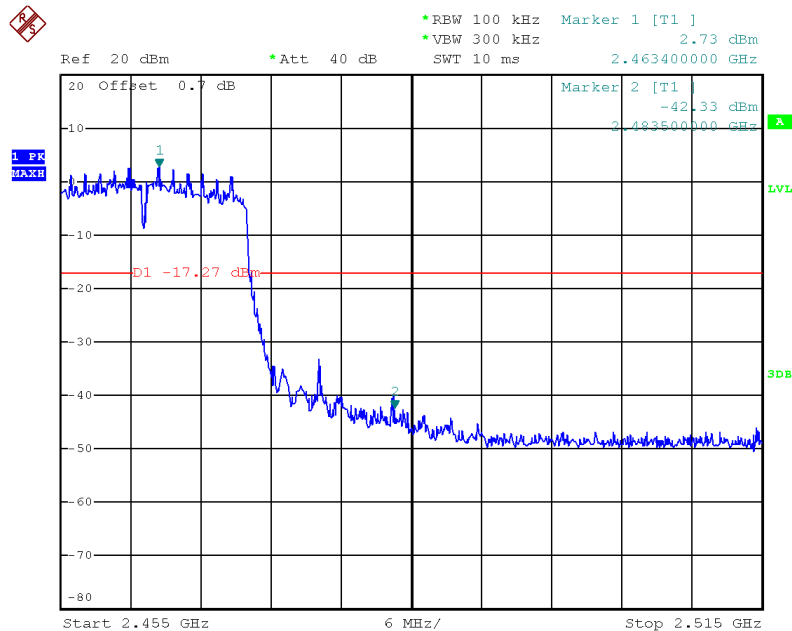
Date: 28.FEB.2018 16:04:09

Test Mode : 802.11n HT20 2412MHz Band Edge_MIMO_ANT 2



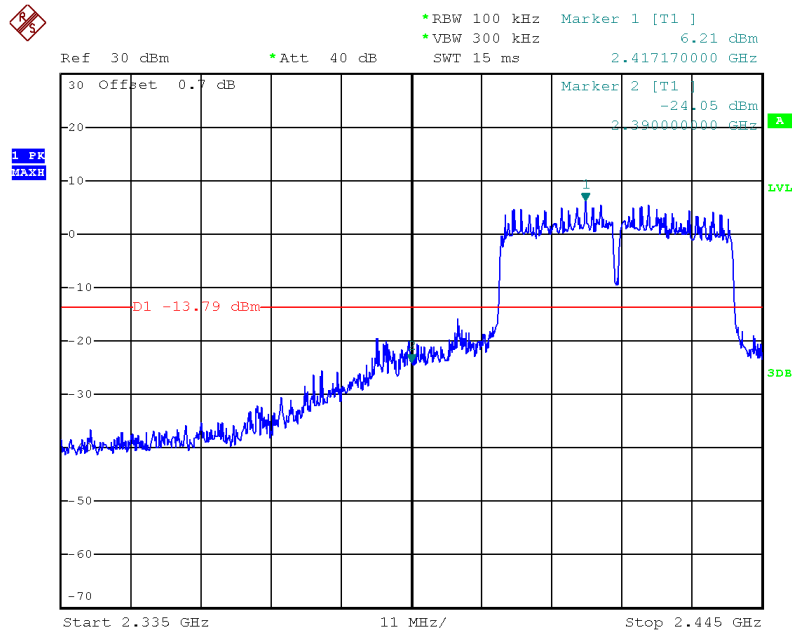
Date: 15.FEB.2018 11:33:38

Test Mode : 802.11n HT20 2462MHz Band Edge_MIMO ANT 2



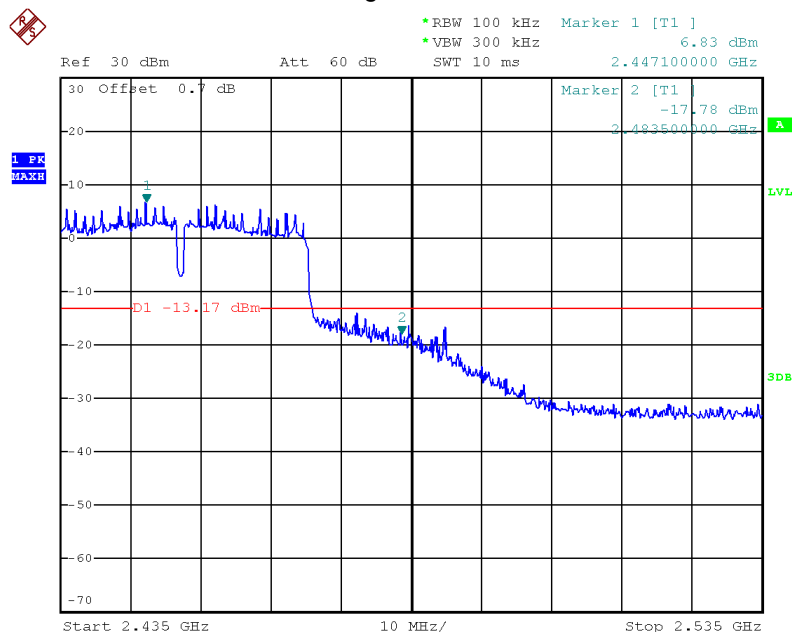
Date: 28.FEB.2018 16:03:03

Test Mode : 802.11n HT40 2422MHz Band Edge_SISO ANT 2



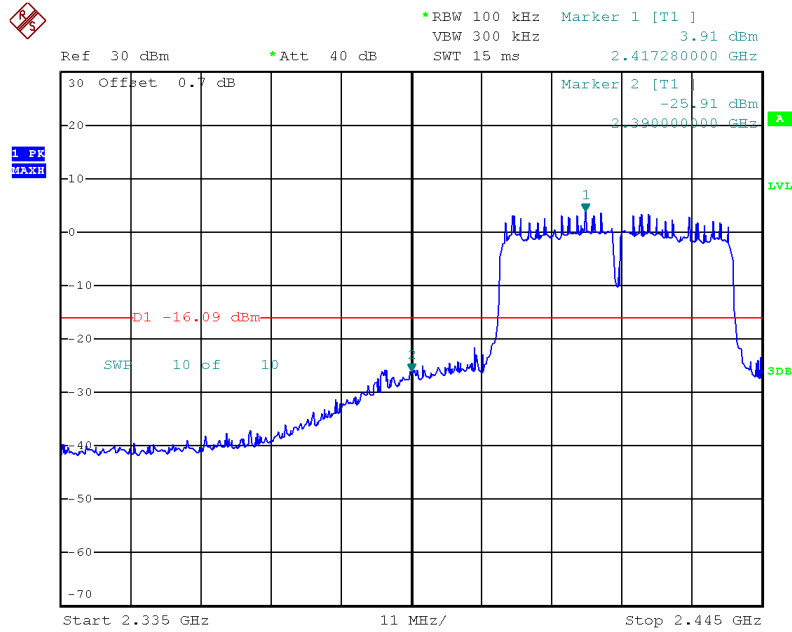
Date: 14.FEB.2018 10:18:56

Test Mode : 802.11n HT40 2452MHz Band Edge_SISO ANT 2



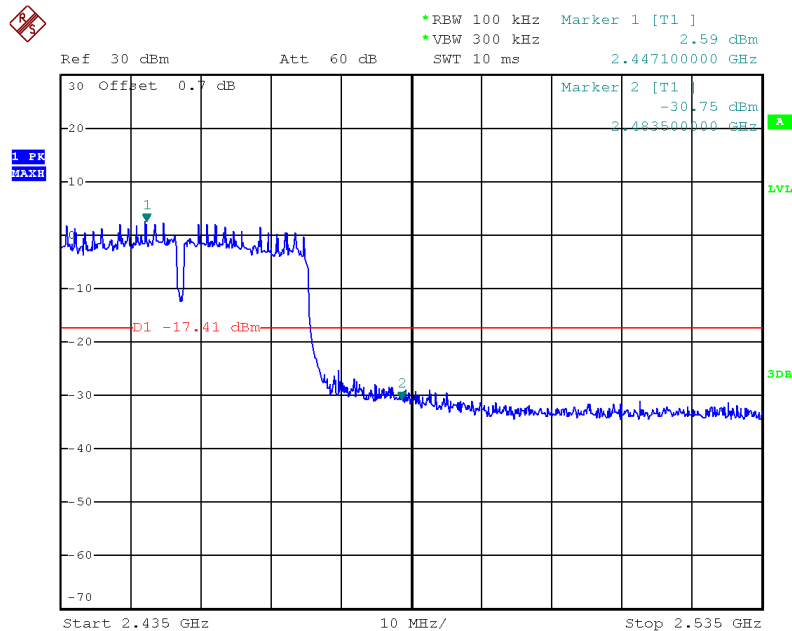
Date: 9.MAR.2018 16:15:37

Test Mode : 802.11n HT40 2422MHz Band Edge_MIMO ANT 1



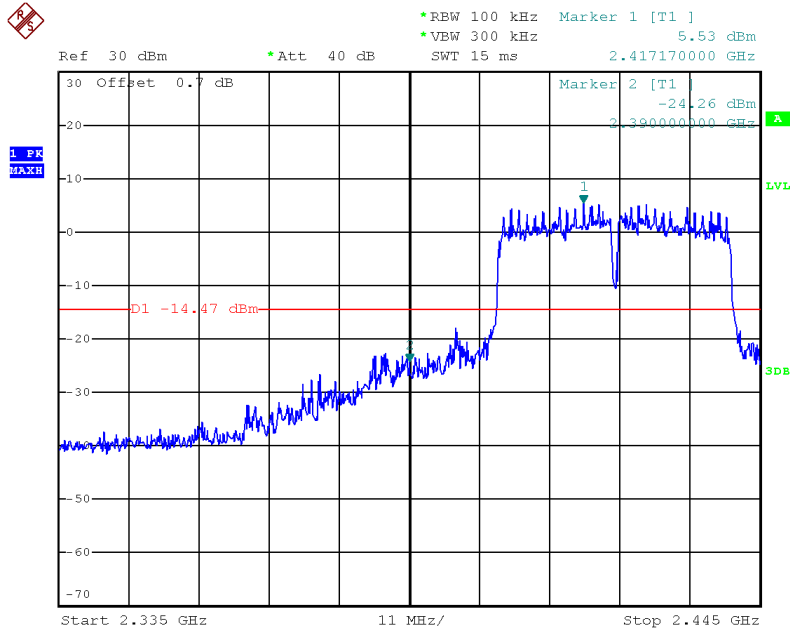
Date: 15.FEB.2018 11:41:03

Test Mode : 802.11n HT40 2462MHz Band Edge_MIMO ANT 1



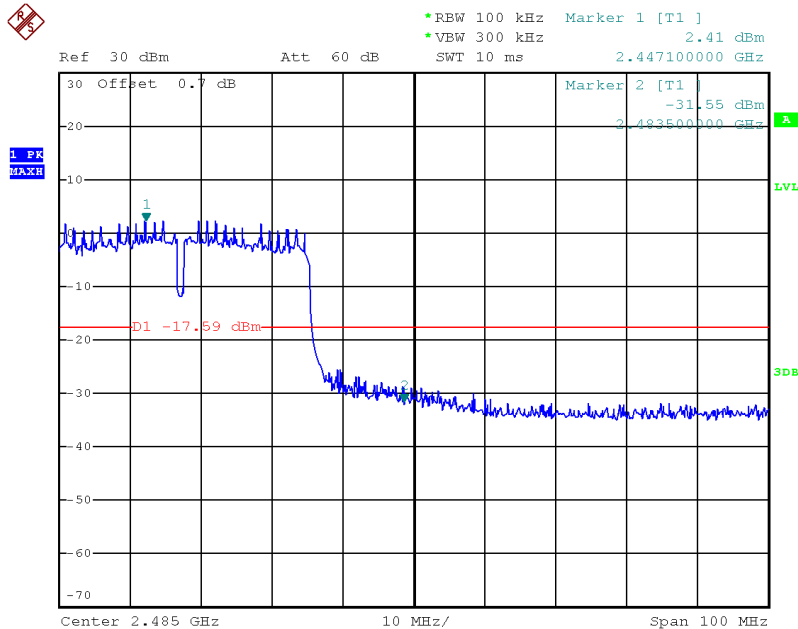
Date: 9.MAR.2018 16:17:15

Test Mode : 802.11n HT40 2422MHz Band Edge_MIMO ANT 2



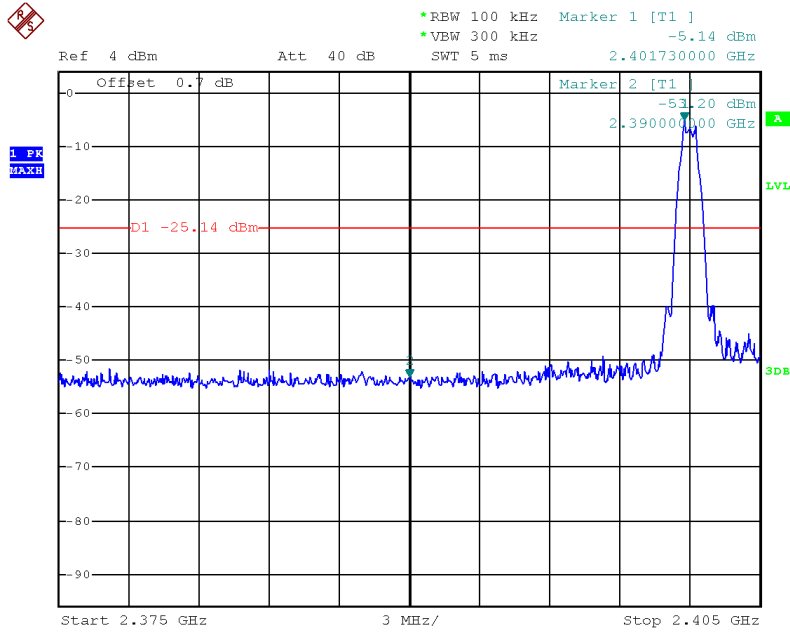
Date: 14.FEB.2018 10:17:55

Test Mode : 802.11n HT40 2462MHz Band Edge_MIMO ANT 2



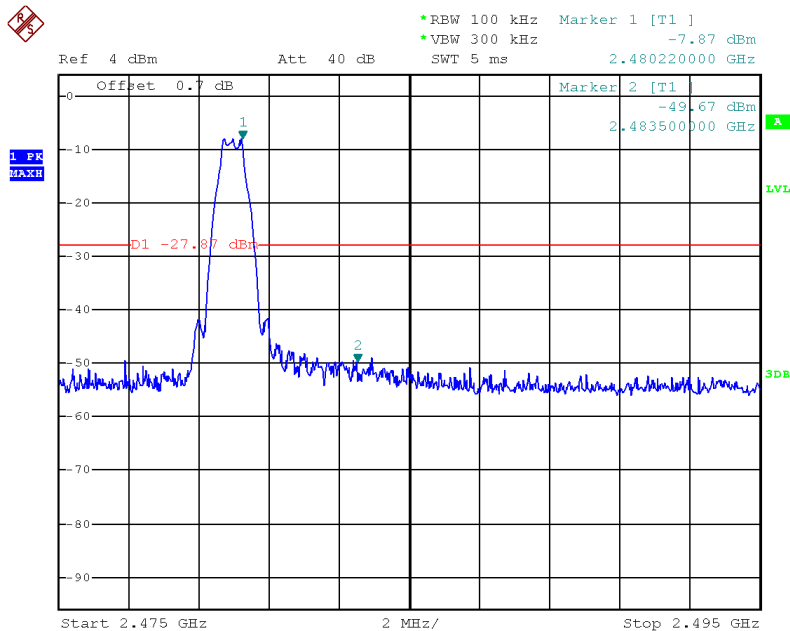
Date: 9.MAR.2018 16:18:14

Test Mode : BLE 2402MHz Band Edge



Date: 14.FEB.2018 14:20:14

Test Mode : BLE 2480MHz Band Edge



Date: 14.FEB.2018 14:20:57

[Radiated Band Edges Test]

802.11b ANT 2

Frequency [MHz]	Reading [dB μ V]	Detector Mode	Factor [dB]	Level [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Pol/Phase
2400	34.97	Peak	8.38	43.35	73.98	30.63	Hor
2400	35.52	Peak	8.38	43.90	73.98	30.08	Ver
2483.5	35.12	Peak	8.54	43.66	73.98	30.32	Hor
2483.5	34.88	Peak	8.54	43.42	73.98	30.56	Ver

802.11g ANT 2

Frequency [MHz]	Reading [dB μ V]	Detector Mode	Factor [dB]	Level [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Pol/Phase
2400	35.28	Peak	8.38	43.66	73.98	30.32	Hor
2400	35.69	Peak	8.38	44.07	73.98	29.91	Ver
2483.5	35.32	Peak	8.54	43.86	73.98	30.12	Hor
2483.5	35.25	Peak	8.54	43.79	73.98	30.19	Ver

802.11n20 SISO ANT 2

Frequency [MHz]	Reading [dB μ V]	Detector Mode	Factor [dB]	Level [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Pol/Phase
2400	35.66	Peak	8.38	44.04	73.98	29.94	Hor
2400	35.11	Peak	8.38	43.49	73.98	30.49	Ver
2483.5	35.46	Peak	8.54	44.00	73.98	29.98	Hor
2483.5	35.38	Peak	8.54	43.92	73.98	30.06	Ver

802.11n20 MIMO ANT 1

Frequency [MHz]	Reading [dB μ V]	Detector Mode	Factor [dB]	Level [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Pol/Phase
2400	35.01	Peak	8.38	43.39	73.98	30.59	Hor
2400	35.13	Peak	8.38	43.51	73.98	30.47	Ver
2483.5	35.54	Peak	8.54	44.08	73.98	29.90	Hor
2483.5	35.34	Peak	8.54	43.88	73.98	30.10	Ver

802.11n20 MIMO ANT 2

Frequency [MHz]	Reading [dB μ V]	Detector Mode	Factor [dB]	Level [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Pol/Phase
2400	35.12	Peak	8.38	43.50	73.98	30.48	Hor
2400	34.91	Peak	8.38	43.29	73.98	30.69	Ver
2483.5	35.21	Peak	8.54	43.75	73.98	30.23	Hor
2483.5	35.19	Peak	8.54	43.73	73.98	30.25	Ver

802.11n40 SISO ANT 2

Frequency [MHz]	Reading [dB μ V]	Detector Mode	Factor [dB]	Level [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Pol/Phase
2400	34.84	Peak	8.38	43.22	73.98	30.76	Hor
2400	35.33	Peak	8.38	43.71	73.98	30.27	Ver
2483.5	34.58	Peak	8.54	43.12	73.98	30.86	Hor
2483.5	34.99	Peak	8.54	43.53	73.98	30.45	Ver

802.11n40 MIMO ANT 1

Frequency [MHz]	Reading [dB μ V]	Detector Mode	Factor [dB]	Level [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Pol/Phase
2400	35.32	Peak	8.38	43.70	73.98	30.28	Hor
2400	35.20	Peak	8.38	43.58	73.98	30.40	Ver
2483.5	35.17	Peak	8.54	43.71	73.98	30.27	Hor
2483.5	34.82	Peak	8.54	43.36	73.98	30.62	Ver

802.11n40 MIMO ANT 2

Frequency [MHz]	Reading [dB μ V]	Detector Mode	Factor [dB]	Level [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Pol/Phase
2400	35.22	Peak	8.38	43.60	73.98	30.38	Hor
2400	35.16	Peak	8.38	43.54	73.98	30.44	Ver
2483.5	35.21	Peak	8.54	43.75	73.98	30.23	Hor
2483.5	35.40	Peak	8.54	43.94	73.98	30.04	Ver

Note : Factor = Antenna Gain + Cable loss – Amplifier Gain.

6.8 Radiated Spurious Emission

6.8.1 Test Limit

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 FCC section 15.209 limits as below.

Note: Wireless charger configuration was evaluated.

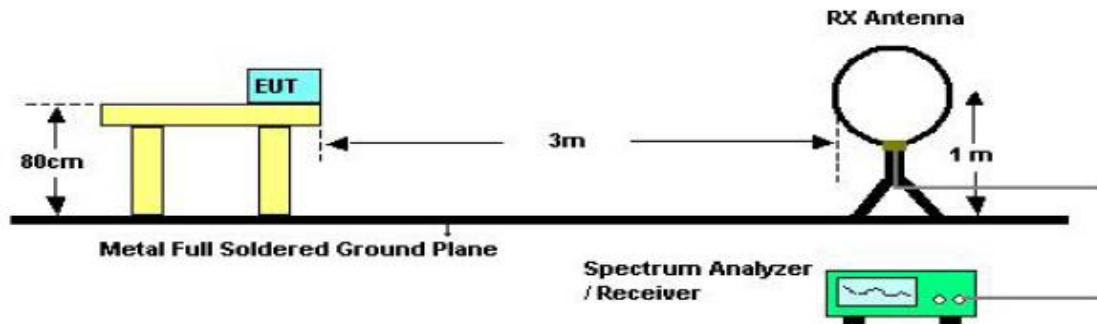
Frequency (MHz)	Field Strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

6.8.2 Test Procedure

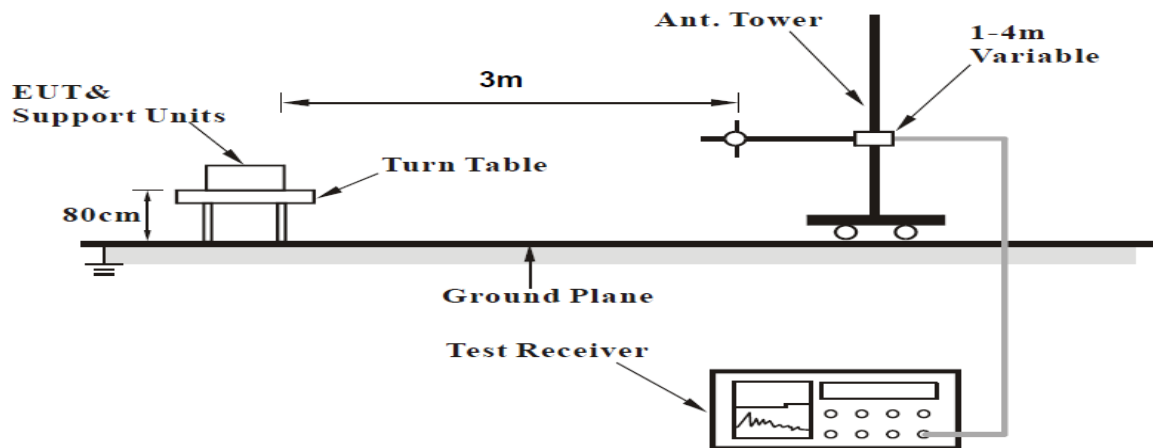
- The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04.
- The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
- The EUT was placed on a turntable. For emissions testing at or below 1 GHz, the table height was 80cm above the reference ground plane. For emission measurements above 1 GHz, the table height was 1.5m.
- The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower. The radiation measurements are tested under 3-axes(X,Y,Z) position(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand), After pre-test, It was found that the worse radiation emission was get at the X position. So the data shown was the X position only.
- Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
- For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
- Use the following spectrum analyzer settings and peak emission levels are measured :
 - Span shall wide enough to fully capture the emission being measured;
 - Set RBW (9-150kHz: 200Hz, 0.15-30MHz: 9kHz, 30-1000MHz: 120kHz, above 1GHz: 1MHz).
 - VBW $\geq 3 \times$ RBW ; Sweep = auto; Detector function = peak; Trace = max hold
 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.
- Measure and record the results in the test report.

6.8.3 Test SET-UP (Block Diagram of Configuration)

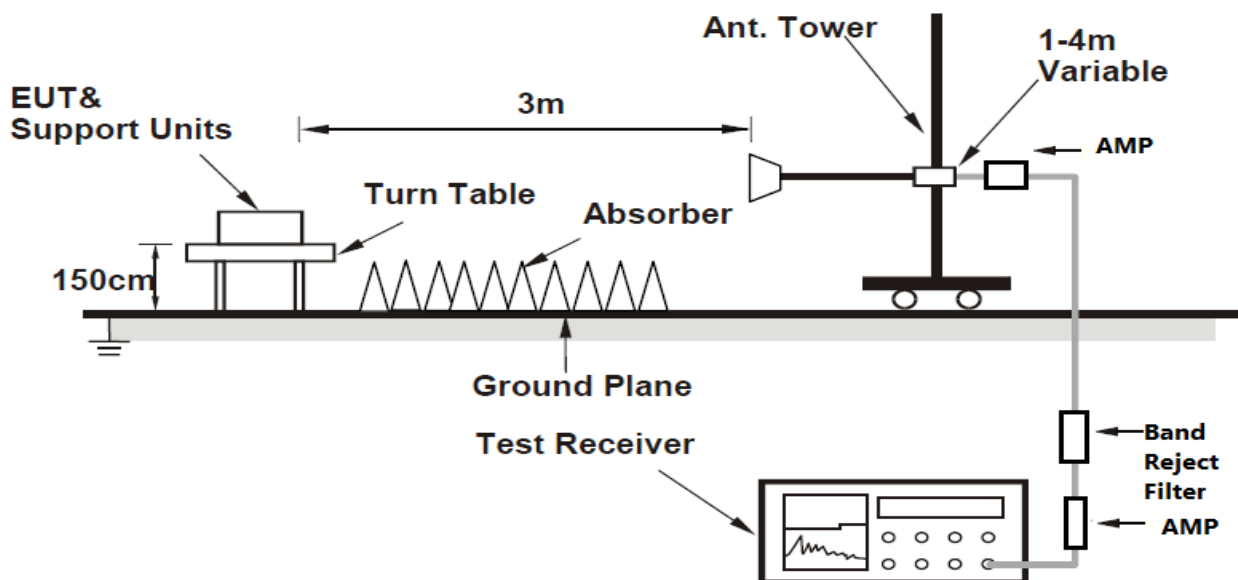
1. Radiated Emission Test Set-Up, Frequency Below 30MHz



2. Radiated Emission Test Set-Up, Frequency Below 1000MHz



3. Radiated Emission Test Set-Up, Frequency Above 1000MHz.



6.8.4 Test Results

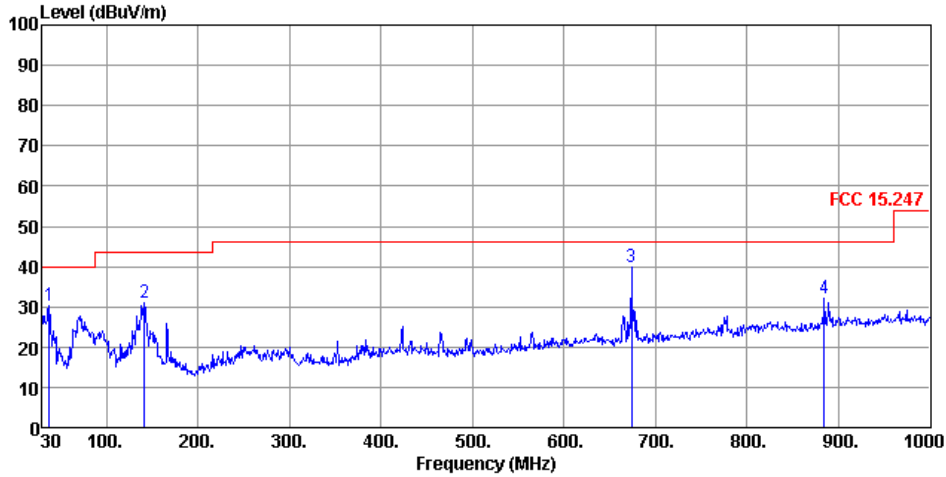
[Below 30MHz]

Frequency [MHz]	Reading [dB μ V]	Antenna Factor [dB]	Cable Loss [dB]	Preamp Factor [dB]	Level [dBuV/m]	Pol/Phase
No other emissions were detected at a level greater than 20dB below limit.						

Remark: §15.31(o)_The amplitude of spurious emissions from intentional radiators and emissions from unintentional radiators which are attenuated more than 20 dB below the permissible value need not be reported unless specifically required elsewhere in this part.

[Below 1GHz – 30MHz~1GHz]

Test Mode : 802.11b ANT 2 (Worst case : X-H)

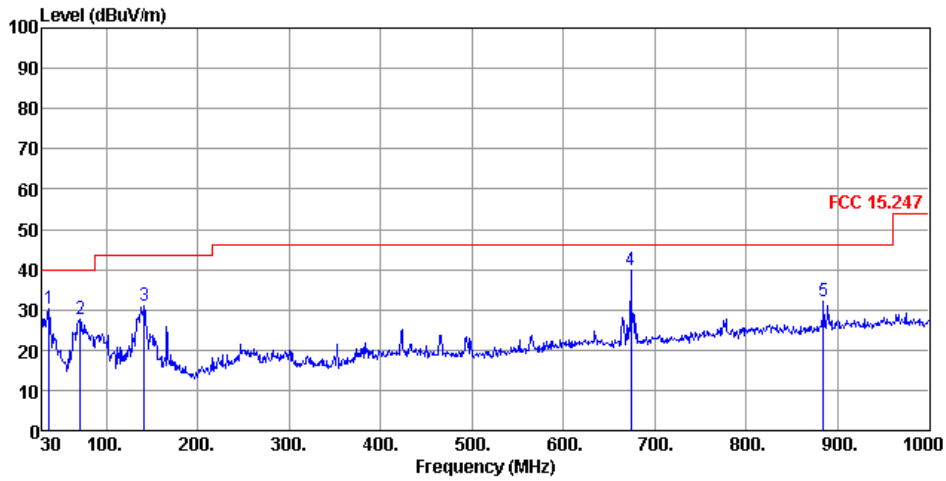


Condition: FCC 15.247 3m ANT3052 20151006 HORIZONTAL
 eut : KAON
 mode : 802.11b-ANTB
 memo : SPU-BELOW1G-1-F1-H

	Freq	Level	ReadAntenna	Cable	Limit	Over				
	MHz	dBuV/m	Level	Factor	Loss	Factor	Line	Limit	Remark	Pol/Phase
			dBuV	dB/m	dB	dB/m	dBuV/m	dB		
1	37.76	30.08	50.64	11.75	0.03	-20.56	40.00	-9.92	Peak	HORIZONTAL
2	141.55	30.91	50.19	12.54	0.28	-19.28	43.50	-12.59	Peak	HORIZONTAL
3 pp	674.08	39.80	49.07	20.49	1.04	-9.27	46.00	-6.20	Peak	HORIZONTAL
4	884.57	31.97	37.91	23.02	1.32	-5.94	46.00	-14.03	Peak	HORIZONTAL

Note : Only the worst case plots for Radiated Spurious Emissions.

Test Mode : 802.11g ANT 2 (Worst case : X-H)

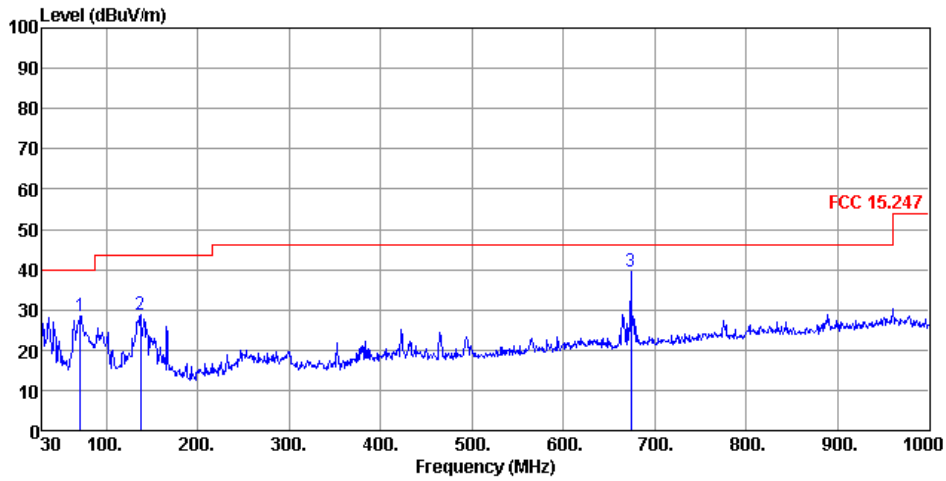


Condition: FCC 15.247 3m ANT3052 20151006 HORIZONTAL
 eut : KAON
 mode : 802.11g-ANTB
 memo : SPU-BELOW1G-1-F1-H

	Freq	Level	ReadAntenna	Cable	Limit	Over				
	MHz	dBUV/m	Level	Factor	Loss	Factor	Line	Limit	Remark	Pol/Phase
			dBuV	dB/m	dB	dB/m	dBUV/m	dB		
1	37.76	30.08	50.64	11.75	0.03	-20.56	40.00	-9.92	Peak	HORIZONTAL
2	71.71	27.70	50.34	9.51	0.11	-22.64	40.00	-12.30	Peak	HORIZONTAL
3	141.55	30.91	50.19	12.54	0.28	-19.28	43.50	-12.59	Peak	HORIZONTAL
4 pp	674.08	39.80	49.07	20.49	1.04	-9.27	46.00	-6.20	Peak	HORIZONTAL
5	884.57	31.97	37.91	23.02	1.32	-5.94	46.00	-14.03	Peak	HORIZONTAL

Note : Only the worst case plots for Radiated Spurious Emissions.

Test Mode : 802.11n(HT20) SISO ANT 2 (Worst case : X-H)

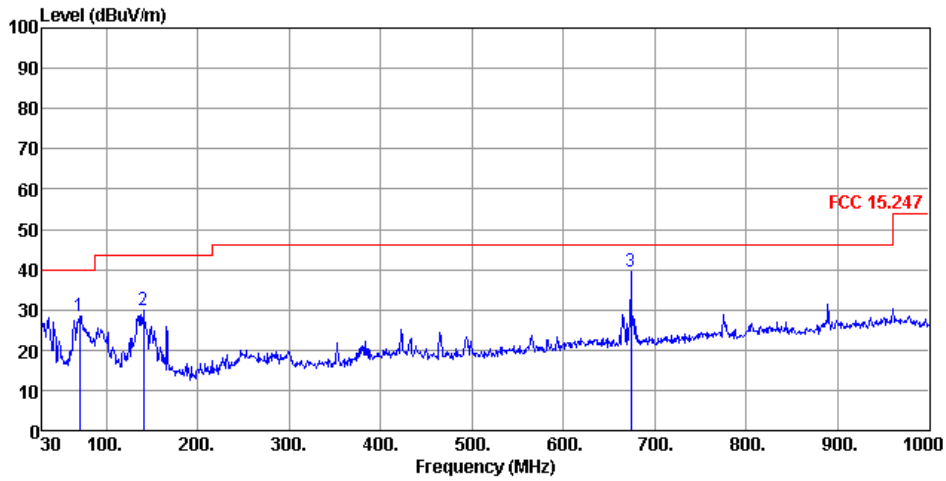


Condition: FCC 15.247 3m ANT3052 20151006 HORIZONTAL
 eut : KAON
 mode : 802.11n20-ANTB
 memo : SPU-BELOW1G-1-F1-H

	Freq	Level	ReadAntenna	Cable	Limit	Over				
	MHz	dBUV/m	Level	Factor	Loss	Factor	Line	Limit	Remark	Pol/Phase
			dBuV	dB/m	dB	dB/m	dBUV/m	dB		
1	71.71	28.27	50.91	9.51	0.11	-22.64	40.00	-11.73	Peak	HORIZONTAL
2	137.67	28.67	48.03	12.48	0.27	-19.36	43.50	-14.83	Peak	HORIZONTAL
3 pp	674.08	39.57	48.84	20.49	1.04	-9.27	46.00	-6.43	Peak	HORIZONTAL

Note : Only the worst case plots for Radiated Spurious Emissions.

Test Mode : 802.11n(HT20) MIMO (Worst case : X-H)

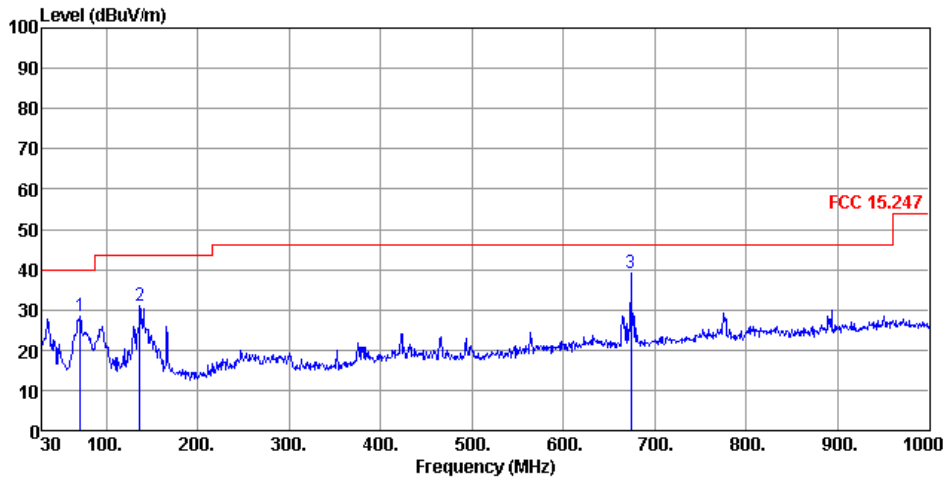


Condition: FCC 15.247 3m ANT3052 20151006 HORIZONTAL
 eut : KAON
 mode : 802.11n20-MIMO
 memo : SPU-BELOW1G-1-F1-H

	Freq	Level	ReadAntenna	Cable	Limit	Over				
	MHz	dBUV/m	Level	Factor	Loss	Factor	Line	Limit	Remark	Pol/Phase
			dBuV	dB/m	dB	dB/m	dBUV/m	dB		
1	70.74	28.59	51.04	9.71	0.11	-22.45	40.00	-11.41	Peak	HORIZONTAL
2	140.58	29.72	49.02	12.52	0.28	-19.30	43.50	-13.78	Peak	HORIZONTAL
3 pp	674.08	39.57	48.84	20.49	1.04	-9.27	46.00	-6.43	Peak	HORIZONTAL

Note : Only the worst case plots for Radiated Spurious Emissions.

Test Mode : 802.11n(HT40) SISO ANT 2 (Worst case : X-H)

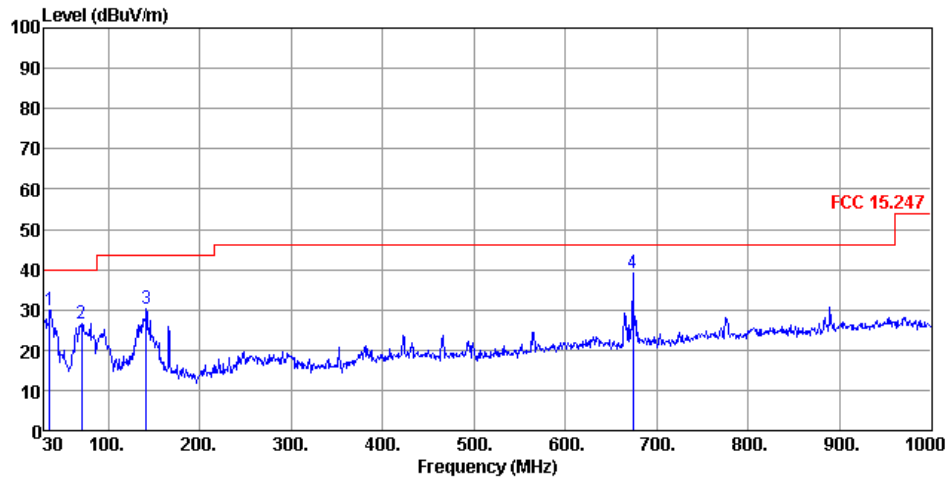


Condition: FCC 15.247 3m ANT3052 20151006 HORIZONTAL
 eut : KAON
 mode : 802.11n40-ANTB
 memo : SPU-BELOW1G-1-F1-H

	Freq	Level	ReadAntenna	Cable	Limit	Over				
	MHz	dBUV/m	Level	Factor	Loss	Factor	Line	Limit	Remark	Pol/Phase
			dBuV	dB/m	dB	dB/m	dBUV/m	dB		
1	71.71	28.56	51.20	9.51	0.11	-22.64	40.00	-11.44	Peak	HORIZONTAL
2	136.70	30.85	50.23	12.46	0.27	-19.38	43.50	-12.65	Peak	HORIZONTAL
3 pp	674.08	39.28	48.55	20.49	1.04	-9.27	46.00	-6.72	Peak	HORIZONTAL

Note : Only the worst case plots for Radiated Spurious Emissions.

Test Mode : 802.11n(HT40) MIMO (Worst case : X-H)

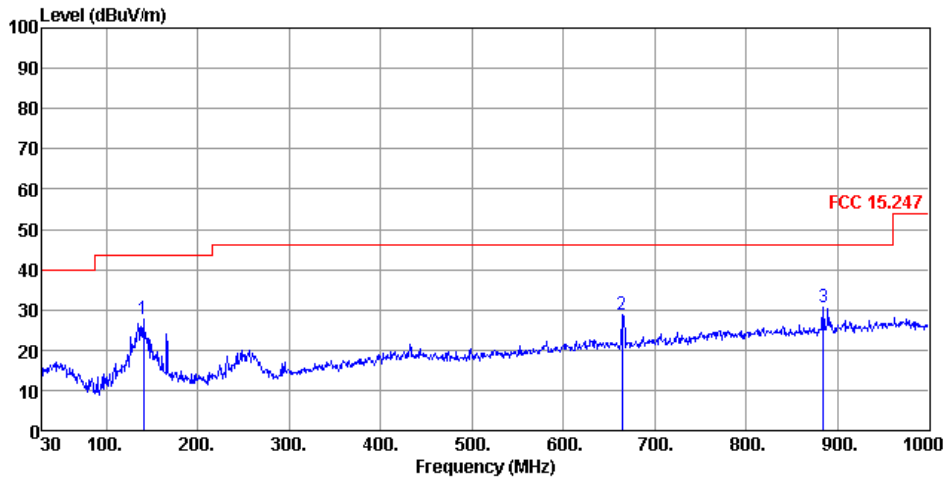


Condition: FCC 15.247 3m ANT3052 20151006 HORIZONTAL
 eut : KAON
 mode : 802.11n40-MIMO
 memo : SPU-BELOW1G-1-F1-H

	Freq	Level	ReadAntenna	Cable	Limit	Over				
	MHz	dBUV/m	Level	Factor	Loss	Factor	Line	Limit	Remark	Pol/Phase
			dBuV	dB/m	dB	dB/m	dBUV/m	dB		
1	35.82	30.02	50.77	11.57	0.02	-20.75	40.00	-9.98	Peak	HORIZONTAL
2	70.74	26.54	48.99	9.71	0.11	-22.45	40.00	-13.46	Peak	HORIZONTAL
3	141.55	30.21	49.49	12.54	0.28	-19.28	43.50	-13.29	Peak	HORIZONTAL
4 pp	674.08	39.24	48.51	20.49	1.04	-9.27	46.00	-6.76	Peak	HORIZONTAL

Note : Only the worst case plots for Radiated Spurious Emissions.

Test Mode : LE (Worst case : X-H)



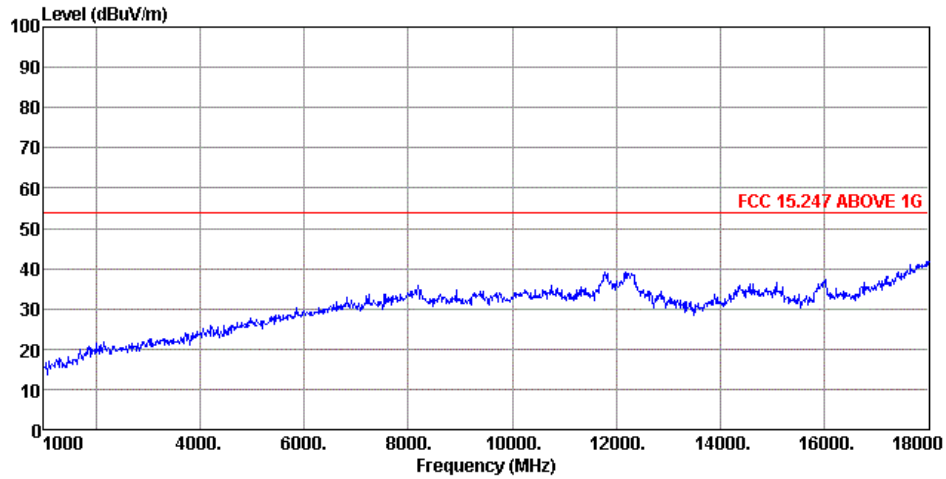
Condition: FCC 15.247 3m ANT3052 20151006 HORIZONTAL
 eut : KAON
 mode : LE
 memo : SPU-BELOW1G-1-F1-H

	Freq	Level	ReadAntenna	Cable	Limit	Over				
	MHz	dBuV/m	Level	Factor	Loss	Factor	Line	Limit	Remark	Pol/Phase
			dBuV	dB/m	dB	dB/m	dBuV/m	dB		
1	140.58	27.56	46.86	12.52	0.28	-19.30	43.50	-15.94	Peak	HORIZONTAL
2	664.38	28.85	38.26	20.39	1.02	-9.41	46.00	-17.15	Peak	HORIZONTAL
3 pp	884.57	30.61	36.55	23.02	1.32	-5.94	46.00	-15.39	Peak	HORIZONTAL

Note : Only the worst case plots for Radiated Spurious Emissions.

[Above 1GHz - 1GHz~18GHz]

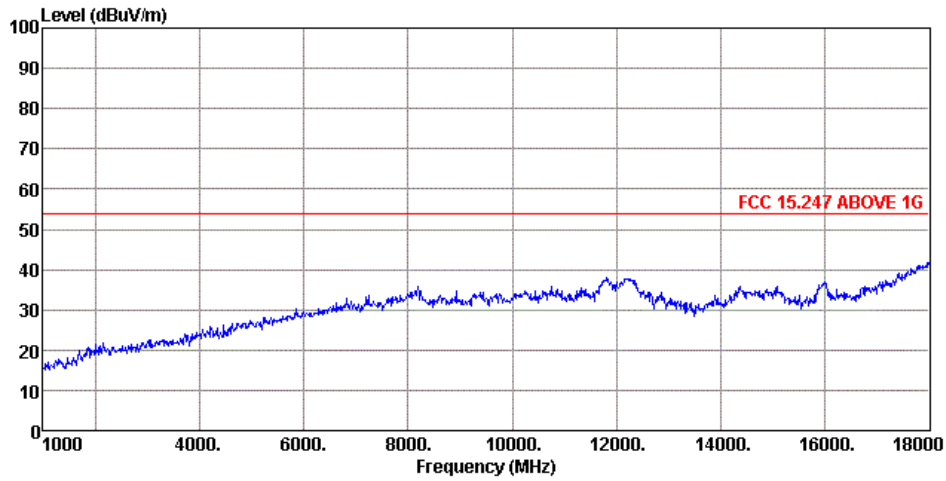
Test Mode : 802.11b ANT 2 (Worst case : X-H)



Condition: FCC 15.247 ABOVE 1G 3m AHA-118
eut : kaon
mode : 802.11b-ant2
memo : SPU-ABOVE1G-1-F1-H

Note : 1) Only the worst case plots for Radiated Spurious Emissions.
2) A filter was used for this test.

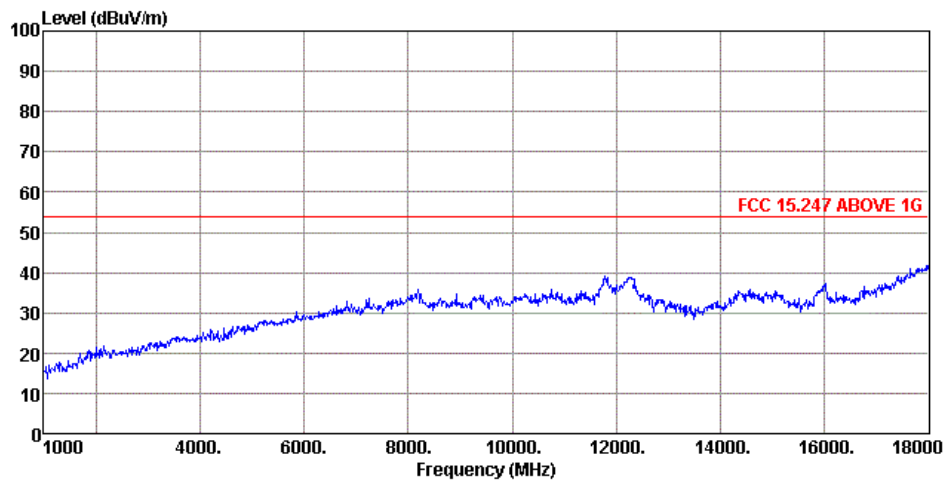
Test Mode : 802.11g ANT 2 (Worst case : X-H)



Condition: FCC 15.247 ABOVE 1G 3m AHA-118
cut : KAON
mode : 802.11G-ANT2
memo : SPU-ABOVE1G-1-F1-H

Note : 1) Only the worst case plots for Radiated Spurious Emissions.
2) A filter was used for this test.

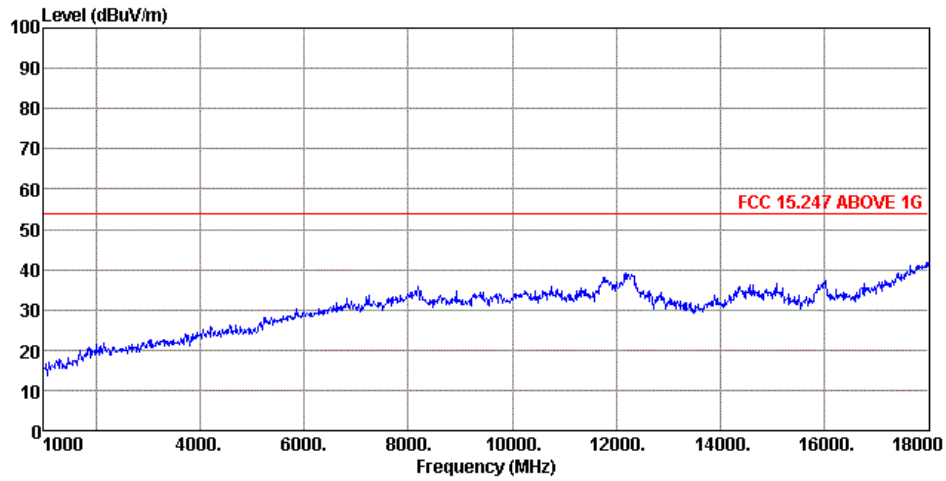
Test Mode : 802.11n(HT20) SISO ANT 2 (Worst case : X-H)



Condition: FCC 15.247 ABOVE 1G 3m AHA-118
cut : KAON
mode : 802.11N20-SISO-ANT2
memo : SPU-ABOVE1G-1-F1-H

Note : 1) Only the worst case plots for Radiated Spurious Emissions.
2) A filter was used for this test.

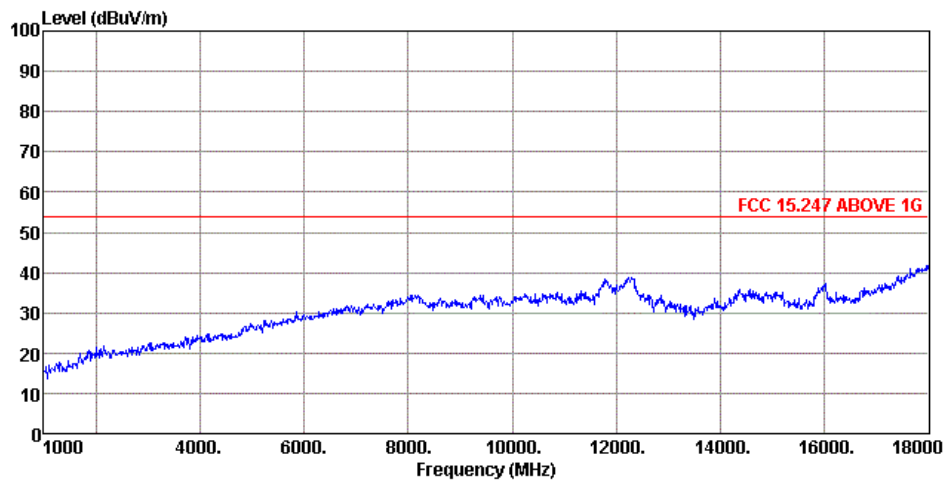
Test Mode : 802.11n(HT20) MIMO (Worst case : X-H)



Condition: FCC 15.247 ABOVE 1G 3m AHA-118
cut : KAON
mode : 802.11N20-MIMO
memo : SPU-ABOVE1G-1-F1-H

Note : 1) Only the worst case plots for Radiated Spurious Emissions.
2) A filter was used for this test.

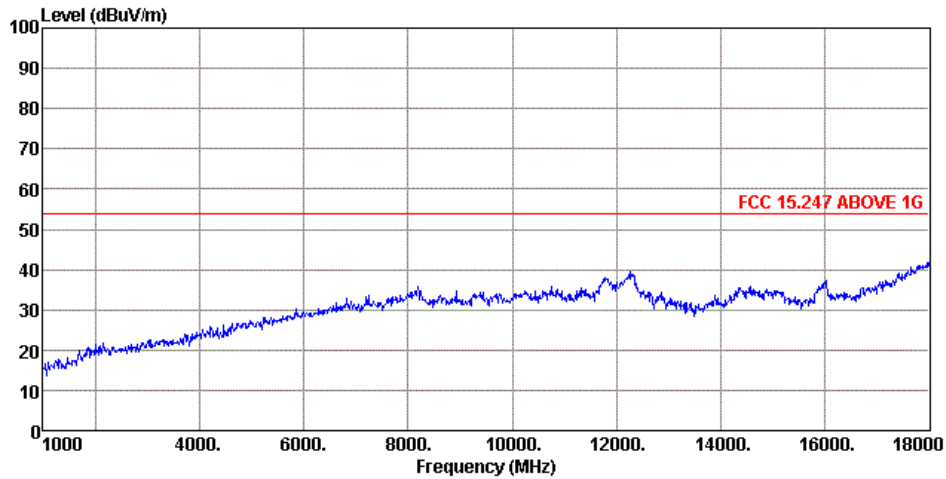
Test Mode : 802.11n(HT40) SISO ANT 2 (Worst case : X-H)



Condition: FCC 15.247 ABOVE 1G 3m AHA-118
cut : KAON
mode : 802.11N40-SISO-ANT2
memo : SPU-ABOVE1G-1-F1-H

Note : 1) Only the worst case plots for Radiated Spurious Emissions.
2) A filter was used for this test.

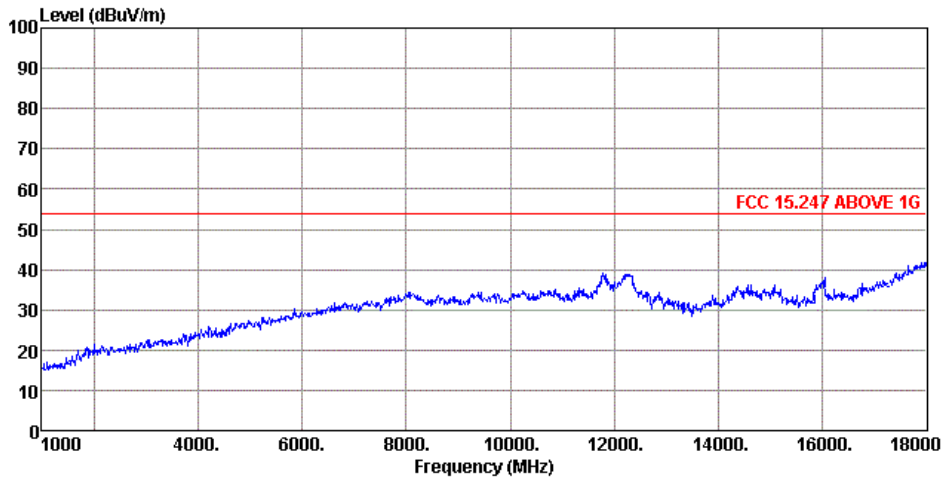
Test Mode : 802.11n(HT40) MIMO (Worst case : X-H)



Condition: FCC 15.247 ABOVE 1G 3m AHA-118
cut : KAON
mode : 802.11N40-MIMO
memo : SPU-ABOVE1G-1-F1-H

Note : 1) Only the worst case plots for Radiated Spurious Emissions.
2) A filter was used for this test.

Test Mode : LE (Worst case : X-H)



Condition: FCC 15.247 ABOVE 1G 3m AHA-118
cut : KAON
mode : LE
memo : SPU-ABOVE1G-1-F1-H

Note : 1) Only the worst case plots for Radiated Spurious Emissions.
2) A filter was used for this test.

[Above 1GHz - 18GHz~26GHz]

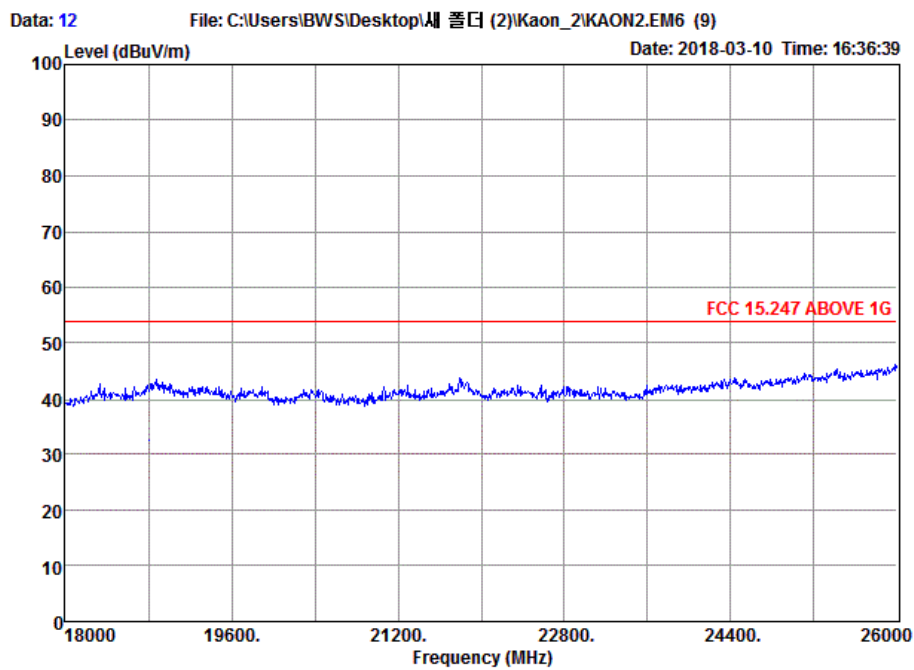
Test Mode : 802.11b ANT 2 (Worst case : X-H)



BWS TECH INC

Radiated Emission TEST .test

EUT: Kaon
Manufacturer: FCC15.247 SPU
Operating Condition: SPU-ABOVE1G-2



Review: _____

Note : Only the worst case plots for Radiated Spurious Emissions.

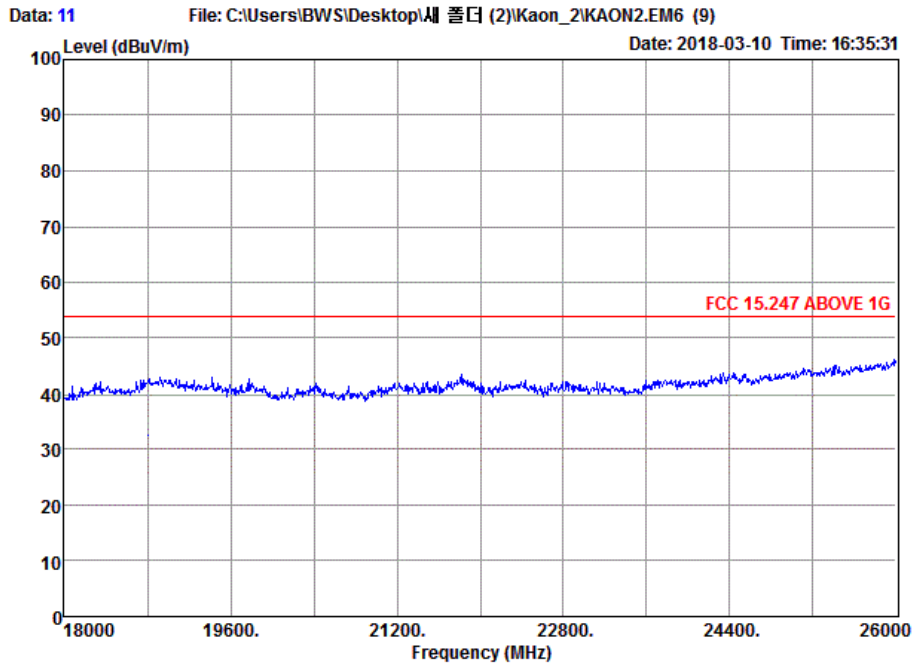
Test Mode : 802.11g ANT 2 (Worst case : X-H)



BWS TECH INC

Radiated Emission TEST ..test

EUT: Kaon
Manufacturer: FCC15.247 SPU
Operating Condition: SPU-ABOVE1G-2



Review: _____

Note : Only the worst case plots for Radiated Spurious Emissions.

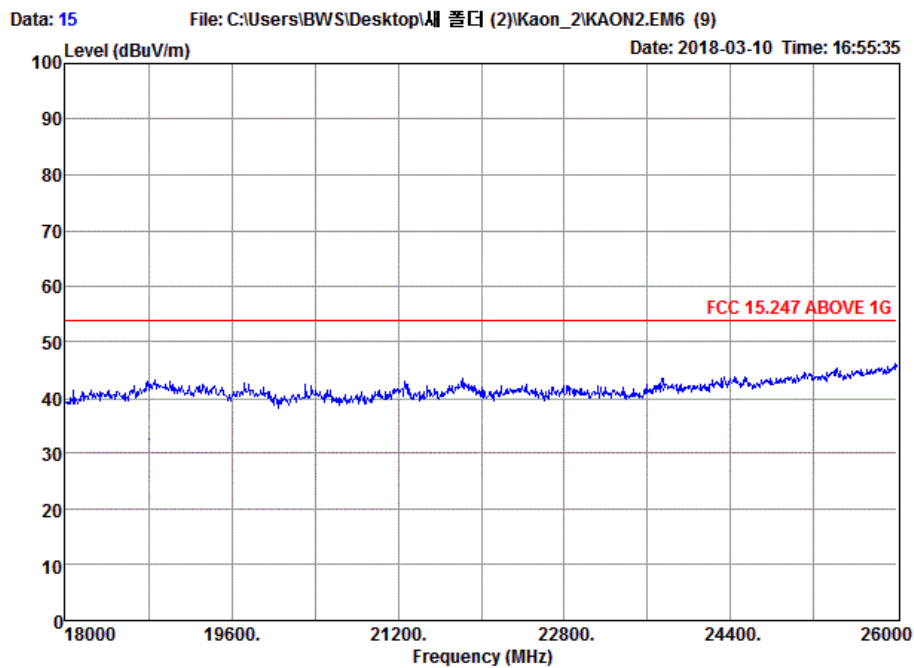
Test Mode : 802.11n(HT20) SISO ANT 2 (Worst case : X-H)



BWS TECH INC

Radiated Emission TEST ..test

EUT: Kaon
Manufacturer: FCC15.247 SPU
Operating Condition: SPU-ABOVE1G-2



Review: _____

Note : Only the worst case plots for Radiated Spurious Emissions.

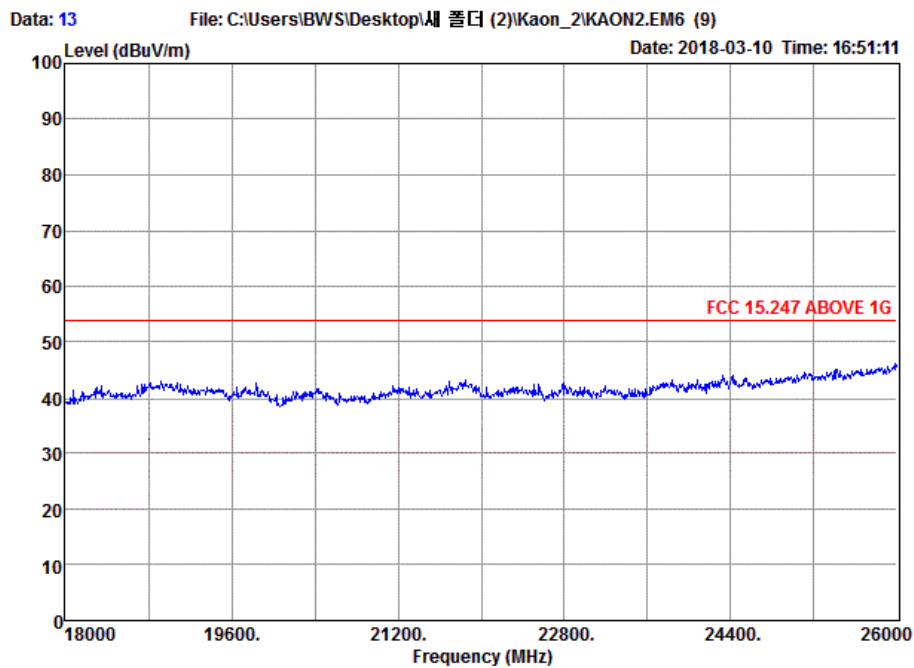
Test Mode : 802.11n(HT20) MIMO (Worst case : X-H)



BWS TECH INC

Radiated Emission TEST ..test

EUT: Kaon
Manufacturer: FCC15.247 SPU
Operating Condition: SPU-ABOVE1G-2



Review: _____

Note : Only the worst case plots for Radiated Spurious Emissions.

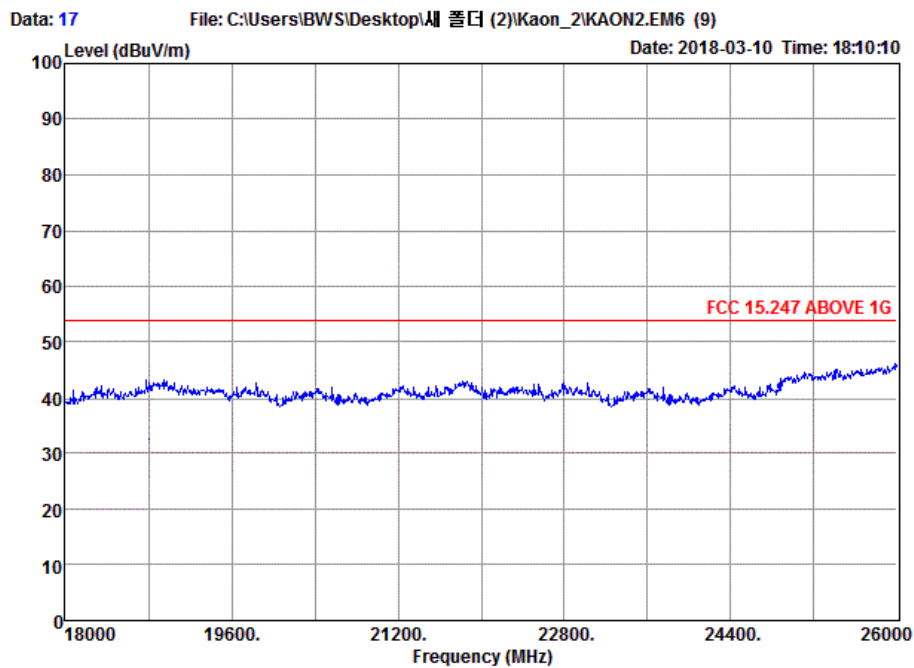
Test Mode : 802.11n(HT40) SISO ANT 2 (Worst case : X-H)



BWS TECH INC

Radiated Emission TEST ..test

EUT: Kaon
Manufacturer: FCC15.247 SPU
Operating Condition: SPU-ABOVE1G-2



Review: _____

Note : Only the worst case plots for Radiated Spurious Emissions.

Test Mode : 802.11n(HT40) MIMO (Worst case : X-H)

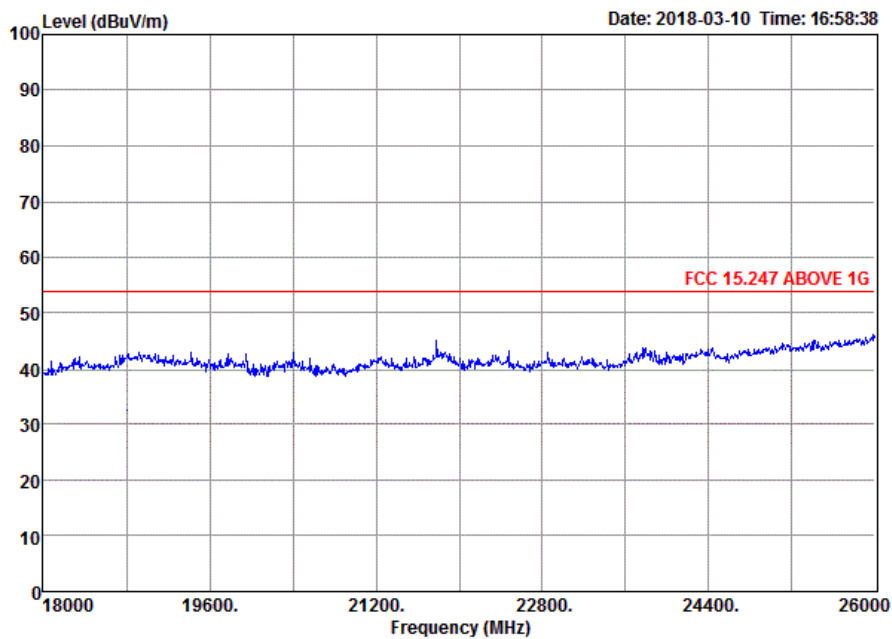


BWS TECH INC

Radiated Emission TEST ..test

EUT: Kaon
Manufacturer: FCC15.247 SPU
Operating Condition: SPU-ABOVE1G-2

Data: 16 File: C:\Users\BWS\Desktop\새 폴더 (2)\Kaon_2\KAON2.EM6 (9)



Review: _____

Note : Only the worst case plots for Radiated Spurious Emissions.

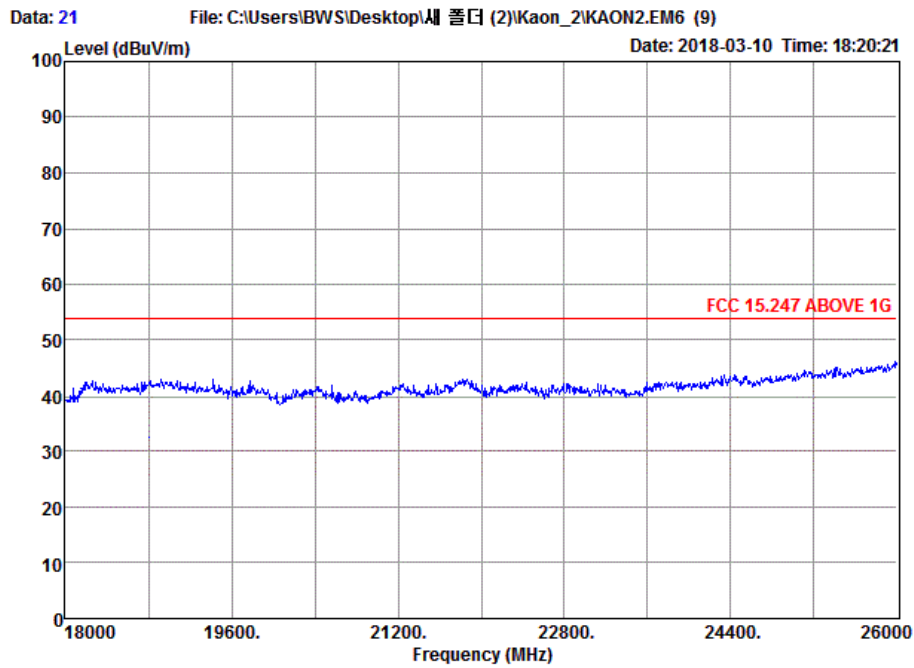
Test Mode : LE (Worst case : X-H)



BWS TECH INC

Radiated Emission TEST ..test

EUT: Kaon
Manufacturer: FCC15.247 SPU
Operating Condition: SPU-ABOVE1G-2



Review: _____

Note : Only the worst case plots for Radiated Spurious Emissions.

6.9 Antenna Application

6.9.1 Antenna Requirement

According to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to §15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

6.9.2 Directional Gain Calculations

If any transmit signals are correlated with each other (CDD)

Directional gain = $10 \cdot \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N]$ dBi

6.9.3 Test Results

Antenna Type	Frequency	Antenna Gain	Limit	Result
Chip Antenna (802.11b/g/n(HT20)/n(HT40))	2.4GHz	1.9 dBi (SISO)	≤6dBi	Pass
		4.9 dBi (MIMO)		
Chip Antenna (LE)	2.4GHz	2.0 dBi	≤6dBi	Pass