TEST REPORT

of

FCC Part 15 Subpart C §15.247

FCC ID: 2AQNN-SBM-H100U

Equipment Under Test	:	Monit Air Quality Monitor Hub
Model Name	:	SBM-H100U
Applicant	:	Monit Corp.
Manufacturer	:	Monit Corp.
Date of Receipt	:	2018.03.20
Date of Test(s)	:	2018.07.13 ~ 2018.07.26
Date of Issue	:	2018.07.31

In the configuration tested, the EUT complied with the standards specified above.

Tested By: **Nancy Park** **Date:** **2018.07.31**

Technical Manager: **Jungmin Yang** **Date:** **2018.07.31**

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INDEX

Table of contents

1. General Information ---------- 3

2. Transmitter Radiated Spurious Emissions and Conducted Spurious Emission --------- 10

3. 6 dB Bandwidth ---------- 82

4. Maximum Peak Conducted Output Power ---------- 90

5. Power Spectral Density ---------- 93

6. AC Conducted Power Line Emissions ---------- 101

7. Antenna Requirement ---------- 105

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1. General Information

1.1. Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)
- Wireless Div. 2FL, 10-2, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- Designation number: KR0150

All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx.

Phone No. : +82 31 688 0901
Fax No. : +82 31 688 0921

1.2. Details of Applicant

Applicant : Monit Corp.
Address : 105, Samyoung building, 5, Nambusunhwan-ro 289-gil, Seocho-gu, Seoul, South Korea, 06699
Contact Person : Lim, William
Phone No. : +82 2 6927 5425

1.3. Details of manufacturer

Company : Same as applicant
Address : Same as applicant

1.4. Description of EUT

Kind of Product	Monit Air Quality Monitor Hub
Model Name	SBM-H100U
Power Supply	DC 5 V
Frequency Range	2 402 ㎒ ~ 2 480 ㎒ (Bluetooth Low Energy), 2 412 ㎒ ~ 2 462 ㎒ (11b/g/n_HT20), 2 422 ㎒ ~ 2 452 ㎒ (11n_HT40)
Modulation Technique	GFSK, DSSS, OFDM
Number of Channels	40 channels (Bluetooth Low Energy), 11 channels (11b/g/n_HT20) 7 channels (11n_HT40)
Antenna Type	PCB Antenna
Antenna Gain	2 ㏈i

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1.5. Test Equipment List

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Interval	Cal. Due
Signal Generator	R&S	SMR40	100272	Jun. 12, 2018	Annual	Jun. 12, 2019
Signal Generator	R&S	SMBV100A	259067	Jun. 15, 2018	Annual	Jun. 15, 2019
Spectrum Analyzer	R&S	FSV30	100955	Mar. 12, 2018	Annual	Mar. 12, 2019
Spectrum Analyzer	Agilent	N9020A	MY53421758	Sep. 25, 2017	Annual	Sep. 25, 2018
Attenuator	MCLI	FAS-23-20	23834	Jun. 12, 2018	Annual	Jun. 12, 2019
High Pass Filter	Wainwright Instrument GmbH	WHK3.0/18G-10SS	344	May 27, 2018	Annual	May 27, 2019
High Pass Filter	Wainwright Instrument GmbH	WHNX7.5/26.5G-6SS	15	Jun. 11, 2018	Annual	Jun. 11, 2019
Low Pass Filter	Mini-Circuits	NLP-1200+	V 9500401023-2	Jun. 12, 2018	Annual	Jun. 12, 2019
Power Sensor	R&S	NRP-Z81	100669	Feb. 22, 2018	Annual	Feb. 22, 2019
DC Power Supply	Agilent	U8002A	MY50020026	Dec. 07, 2017	Annual	Dec. 07, 2018
Preamplifier	H.P.	8447F	2944A03909	Aug. 11, 2017	Annual	Aug. 11, 2018
Signal Conditioning Unit	R&S	SCU-18	102244	Sep. 22, 2017	Annual	Sep. 22, 2018
Preamplifier	MITEQ Inc.	JS44-18004000-35-8P	1546891	May 13, 2018	Annual	May 13, 2019
Loop Antenna	Schwarzbeck Mess-Elektronik	FMZB 1519	1519-039	Aug. 23, 2017	Biennial	Aug. 23, 2019
Bilog Antenna	Schwarzbeck Mess-Elektronik	VULB 9163	01126	Mar. 26, 2018	Biennial	Mar. 26, 2020
Horn Antenna	R&S	HF906	100326	Feb. 14, 2018	Biennial	Feb. 14, 2020
Horn Antenna	Schwarzbeck Mess-Elektronik	BBHA 9170	BBHA9170431	Aug. 25, 2016	Biennial	Aug. 25, 2018
Antenna Master	INNCO systems GmbH	MA4640-XP-ET	MA4640/536/383 30516/L	N.C.R.	N/A	N.C.R.
Controller	INNCO systems GmbH	CONTROLLER CO3000-4P	CO3000/963/383 30516/L	N.C.R.	N/A	N.C.R.
Turn Table	INNCO systems GmbH	DS 1200 S	N/A	N.C.R.	N/A	N.C.R.
Test Receiver	R&S	ESU26	100109	Feb. 07, 2018	Annual	Feb. 07, 2019
Anechoic Chamber	SY Corporation	L × W × H (9.6 m × 6.4 m × 6.6 m)	N/A	N.C.R.	N/A	N.C.R.
Coaxial Cable	SUCOFLEX	104 (3 m)	MY3258414	Jul. 04, 2018	Semi-annual	Jan. 04, 2019
Coaxial Cable	SUCOFLEX	104 (10 m)	MY3145814	Jul. 04, 2018	Semi-annual	Jan. 04, 2019
Coaxial Cable	Rosenberger	LA1-C006-1500	131014 01/20	Mar. 05, 2018	Semi-annual	Sep. 05, 2018
Two-Line V-Network	R&S	ENV216	100190	May 14, 2018	Annual	May 14, 2019
Shield Room	SY Corporation	L × W × H (6.5 m × 3.5 m × 3.5 m)	N/A	N.C.R.	N/A	N.C.R.
Test Receiver	R&S	ESIB 7	100253	Feb. 23, 2018	Annual	Feb. 23, 2019

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1.6. Summary of Test Results

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part15 Subpart C		
Section	**Test Item(s)**	**Result**
15.205(a) 15.209 15.247(d)	Transmitter Radiated Spurious Emissions and Conducted Spurious Emission	Complied
15.247(a)(2)	6 dB Bandwidth	Complied
15.247(b)(3)	Maximum Peak Conducted Output Power	Complied
15.247(e)	Power Spectral Density	Complied
15.207	AC Power Line Conducted Emission	Complied

1.7. Test Procedure(s)

The measurement procedures described in the American National Standard of Procedure for Compliance Testing of unlicensed Wireless Devices (ANSI C63.10-2013) and the guidance provided in KDB 558074 D01 DTS Meas Guidance v04 were used in the measurement of the DUT.

1.8. Sample calculation

Where relevant, the following sample calculation is provided:

1.8.1. Conducted test

Offset value (dB) = Attenuator (dB) + Cable loss (dB)

1.8.2. Radiation test

Field strength level (dBμV/m) = Measured level (dBμV) + Antenna factor (dB) + Cable loss (dB) - Amplifier gain (dB)

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1.9. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty (㎧)
Conducted Disturbance	± 3.30
Radiated Disturbance, 9 ㎑ to 30 ㎒	± 3.59
Radiated Disturbance, below 1 ㎓	± 5.88
Radiated Disturbance, above 1 ㎓	± 5.94

Uncertainty figures are valid to a confidence level of 95 %.

1.10. Test report revision

Revision	Report number	Date of Issue	Description
0	F690501/RF-RTL012929	2018.07.31	Initial

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1.11. Duty Cycle of EUT

Regarding to KDB 558074 D01 DTS Meas Guidance v04, 6.0, the maximum duty cycles of all modes were investigated and set the spectrum analyzer as below;
Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value. Set detector = peak or average. 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.

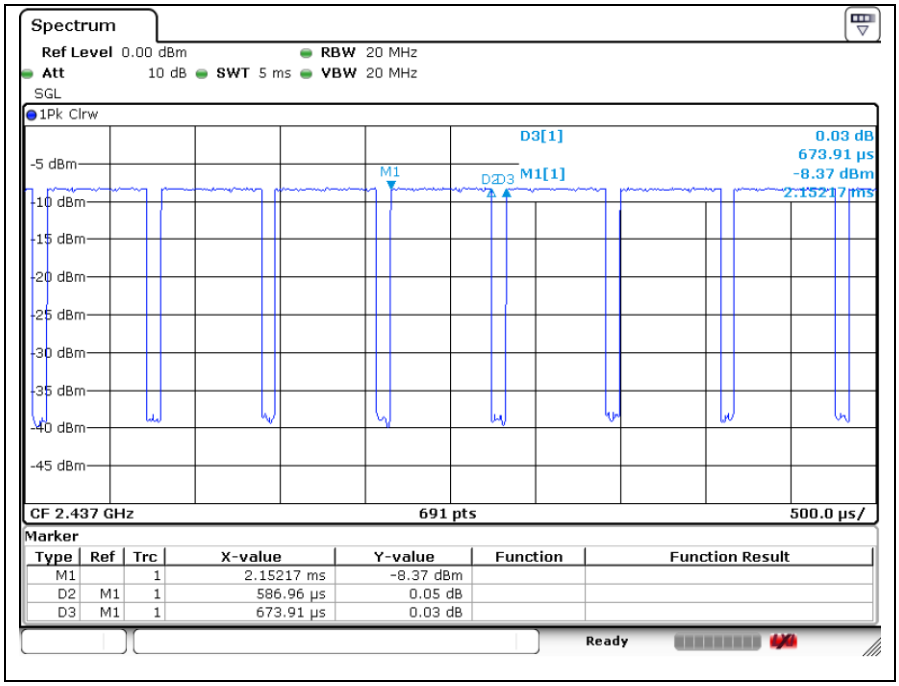
Mode	Data Rate	Duty Cycle (%)	Correction factor (dB)
11b	1 Mbps	87.10	0.60
11g	6 Mbps	88.04	0.55
11n_HT20	MCS0	85.56	0.68
11n_HT40	MCS0	87.91	0.56

Remark;

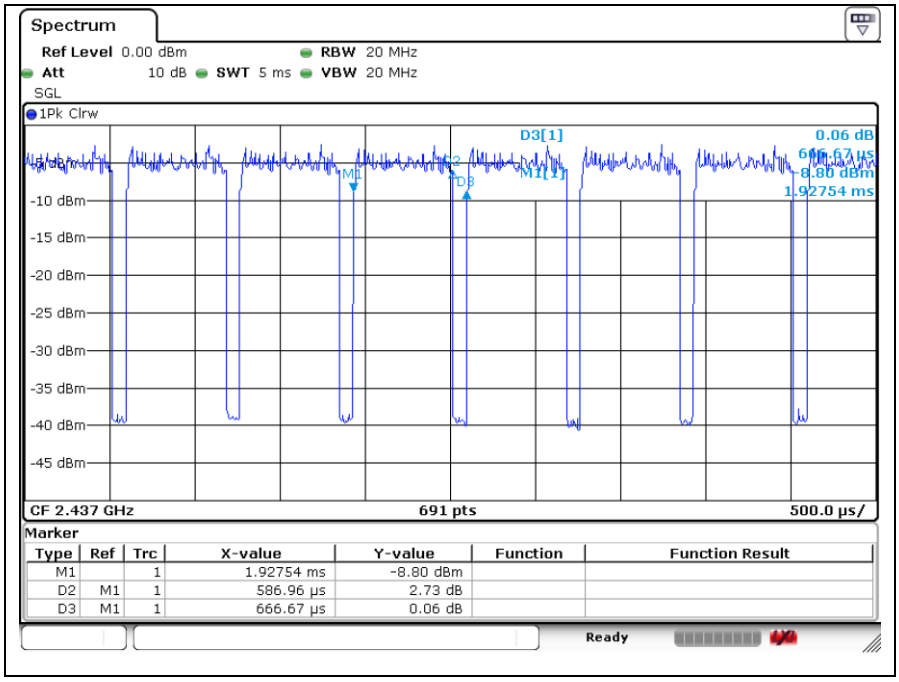
1. As measured duty cycles of EUT, all of mode and data rate keep constant period and are converted to log scale (power averaging) to compensate correction factor to result of average test items.
2. Duty Cycle (%) = (Tx on time / Tx on + off time) x 100
3. Correction factor (dB) = 10 log (1 / Duty Cycle)

<PLOT>

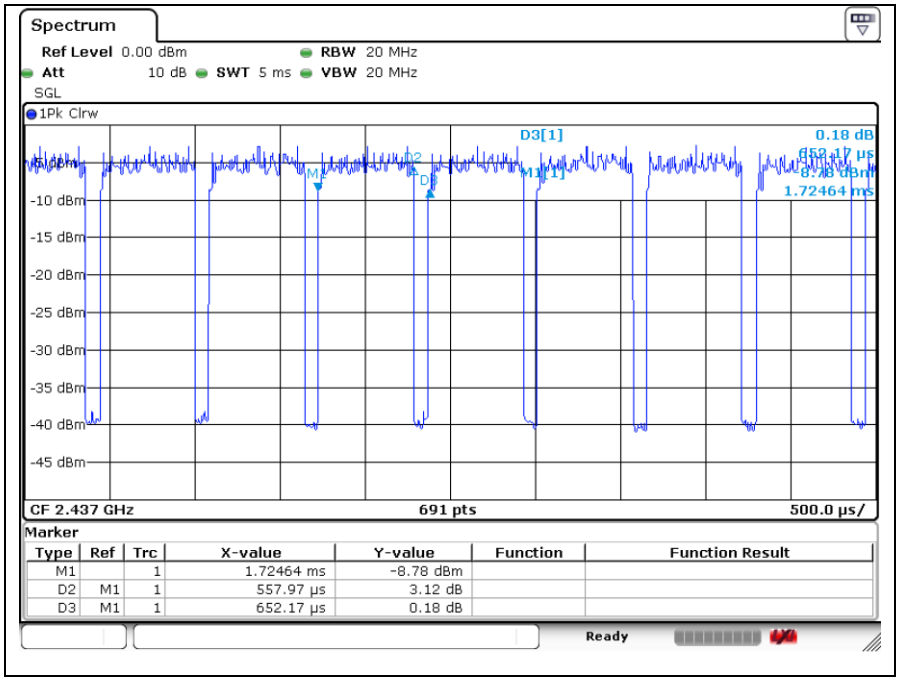
802.11b



802.11g



802.11n_HT20



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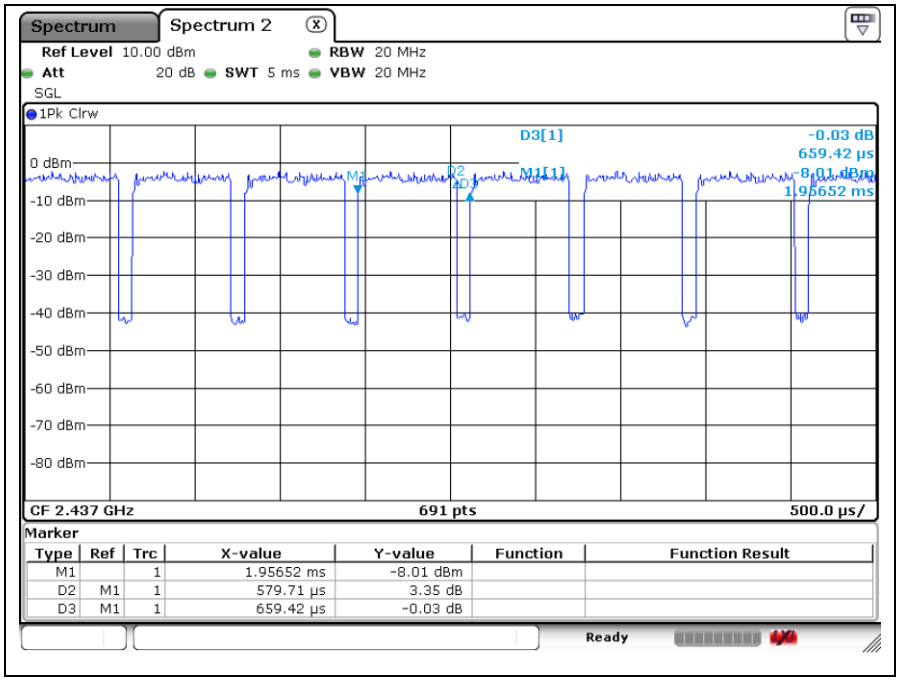
802.11n_HT40

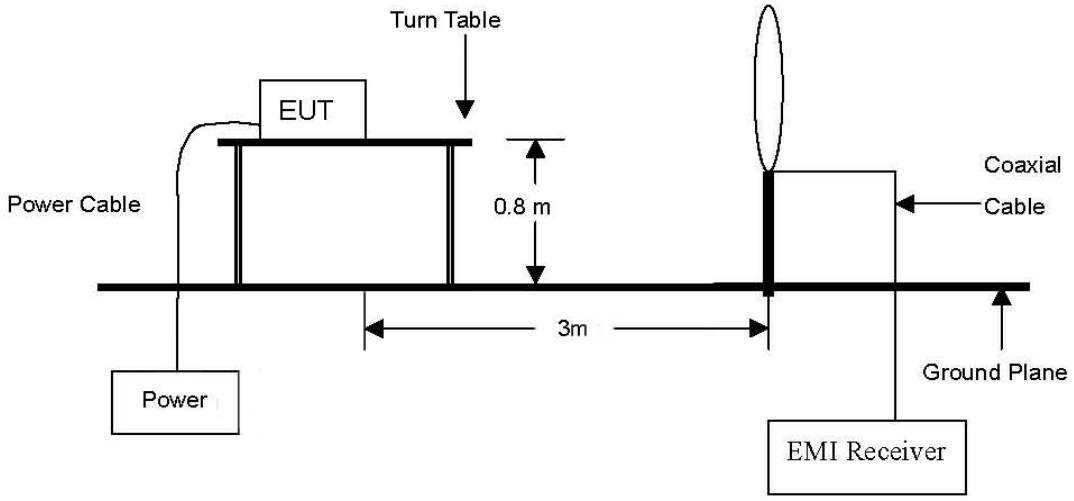

Spectrum
Spectrum 2
Ref Level 10.00 dBm
RBW 20 MHz
Att 20 dB
SWT 5 ms
VBW 20 MHz
SGL
1Pk Clrw
D3[1]
-0.03 dB
659.42 µs
M1[1]
-8.01 dBm
1.95652 ms
0 dBm
-10 dBm
-20 dBm
-30 dBm
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
CF 2.437 GHz
691 pts
500.0 µs/
Marker
Type Ref Trc X-value Y-value Function Function Result
M1 1 1.95652 ms -8.01 dBm
D2 M1 1 579.71 µs 3.35 dB
D3 M1 1 659.42 µs -0.03 dB
Ready

2. Transmitter Radiated Spurious Emissions and Conducted Spurious Emission

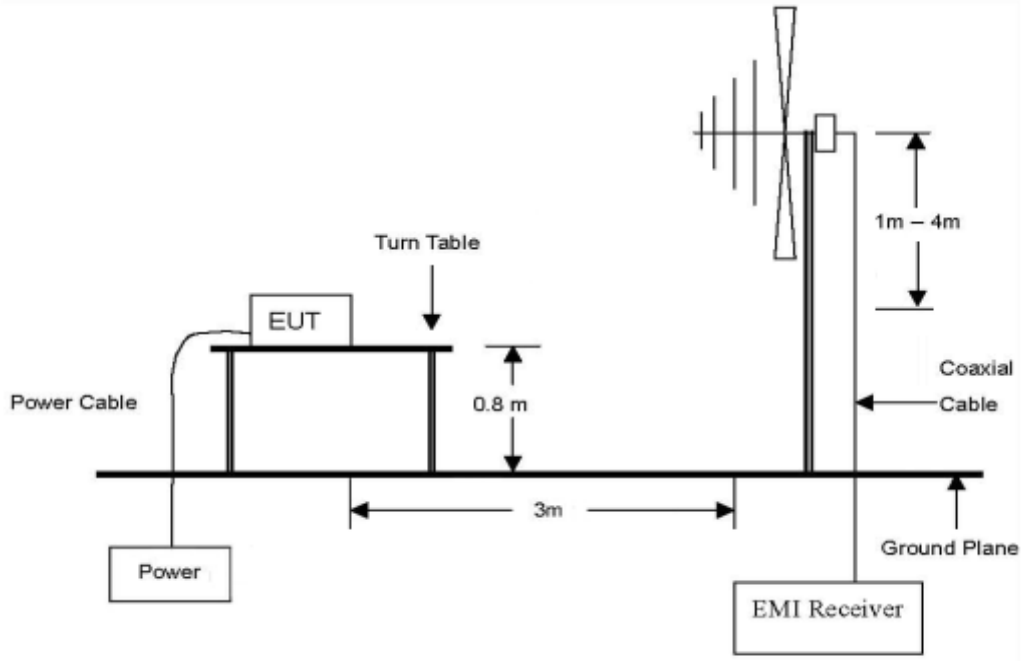
2.1. Test Setup

2.1.1. Transmitter Radiated Spurious Emissions

The diagram below shows the test setup that is utilized to make the measurements for emission from 9 ㎑ to 30 ㎒.



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓.



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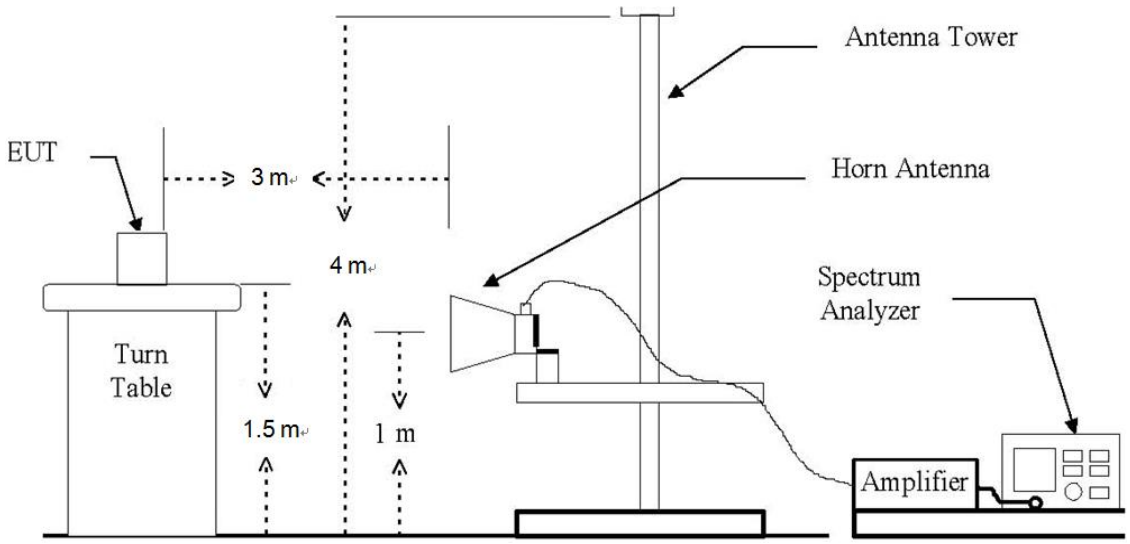
The diagram below shows the test setup that is utilized to make the measurements for emission .The spurious emissions were investigated form 1 ㎓ to the 10th harmonic of the highest fundamental frequency or 40 ㎓, whichever is lower.



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2.1.2. Conducted Spurious Emission

2.2. Limit

According to §15.247(d), in any 100 ㎑ bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 ㏈ below that in the 100 ㎑ bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 ㏈ instead of 20 ㏈. Attenuation below the general limits specified in section §15.209(a) is not required. In addition, radiated emission which fall in the restricted bands, as defined in section §15.205(a), must also comply with the radiated emission limits specified in section §15.209(a) (see §15.205(c)).

According to §15.209(a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (㎒)	Field Strength (㎶/m)	Measurement Distance (Meters)
0.009-0.490	2 400/F(㎑)	300
0.490-1.705	24 000/F(㎑)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 ㎒, 76-88 ㎒, 174-216 ㎒ or 470-806 ㎒. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§15.231 and 15.241.

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2.3. Test Procedures

Radiated emissions from the EUT were measured according to the dictates in section 11.0 & 12.0 of KDB 558074 D01 DTS Meas Guidance v04 and ANSI C63.10 2013.

2.3.1. Test Procedures for emission below 30 ㎒

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
2. Then antenna is a loop antenna is fixed at one meter above the ground to determine the maximum value of the field strength. Both parallel and perpendicular of the antenna are set to make the measurement.
3. For each suspected emission, the EUT was arranged to its worst case and then the table was turned from 0 degrees to 360 degrees to find the maximum reading.
4. The test-receiver system was set to average or quasi peak detect function and Specified Bandwidth with Maximum Hold Mode.

Note;

Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 meter open field test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788 D01 Radiated Test Site v01.

2.3.2. Test Procedures for emission from above 30 ㎒

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site below 1 ㎓ and 1.5 meters above the ground at a 3 meter anechoic chamber test site above 1 ㎓. The table was rotated 360 degrees to determine the position of the highest radiation.
2. During performing radiated emission below 1 ㎓, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable-height antenna tower. During performing radiated emission above 1 ㎓, the EUT was set 3 meter away from the interference-receiving antenna.
3. The antenna is a bi-log antenna, a horn antenna and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was 10 ㏈ lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 ㏈ margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

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Note;

All data rates and modes were investigated for radiated spurious emissions. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

1. Unwanted Emissions into Non-Restricted Frequency Bands

- The Reference Level Measurement refer to section 11.2
  Set analyzer center frequency to DTS channel center frequency, SPAN ≥ 1.5 times the DTS bandwidth, the RBW = 100 ㎑ and VBW ≥ 3 x RBW, Detector = Peak, Sweep time = Auto couple, Trace mode = Max hold.

- Unwanted Emissions Level Measurement refer to section 11.3
  Set the center frequency and span to encompass frequency range to be measured, the RBW = 100 ㎑ and VBW ≥ 3 x RBW, Detector = Peak, Sweep time = Auto couple, Trace mode = Max hold.

2. Unwanted Emissions into Restricted Frequency Bands

- Peak Power measurement procedure refer to section 12.2.4
  Set RBW = as specified in Table 1, VBW ≥ 3 x RBW, Detector = Peak, Sweep time = auto, Trace mode = Max hold.

Table 1 - RBW as a function of frequency

Frequency	RBW
9-150 ㎑	200-300 ㎐
0.15-30 ㎒	9-10 ㎑
30-1 000 ㎒	100-120 ㎑
> 1 000 ㎒	1 ㎒

-Average Power measurements procedure refer to section 12.2.5.2
The EUT shall be configured to operate at the maximum achievable duty cycle.
Measure the duty cycle, x, of the transmitter output signal as described in section 6.0.
Set RBW = 1 ㎒, VBW ≥ 3 x RBW, Detector = RMS, if span / (# of points in sweep) ≤ (RBW/2).
Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied then the detector mode shall be set to peak.

Averaging type = power (i.e., RMS).
As an alternative the detector and averaging type may be set for linear voltage averaging.
Some instruments require linear display mode in order to use linear voltage averaging. Log or ㏈ averaging shall not be used. Sweep time = auto, Perform a trace average of at least 100 traces.

A correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle. The correction factor is computed as follows:
1) If power averaging (RMS) mode was used in step f), then the applicable correction factor is 10 log(1/x), where x is the duty cycle.

3. Definition of DUT Axis.

Definition of the test orthogonal plan for EUT was described in the test setup photo.
The test orthogonal plan of EUT is **X – axis** during radiation test.

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2.3.3. Test Procedures for Conducted Spurious Emissions

All data rates and modes were investigated for radiated spurious emissions. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

Per the guidance of KDB 558074 D01 DTS Meas Guidance v04, section 11.1 & 11.2 & 11.3, the reference level for out of band emissions is established from the plots of this section since the band edge emissions are measured with a RBW of 100 ㎑. This reference level is then used as the limit in subsequent plots for out of band spurious emissions shown in section 2.4.3. The limit for out of band spurious emission at the band edge is 20 ㏈ below the fundamental emission level measured in a 100 ㎑ bandwidth.

1. Conducted Emissions at Band Edge
 - The Measurement refer to section 11.2
   Set the center frequency and span to encompass frequency range to be measured, the RBW = 100 ㎑ and VBW ≥ 3 x RBW, Detector = Peak, Sweep time = Auto couple, Trace mode = Max hold, The trace was allowed to stabilize.

2. Conducted Spurious Emissions
 - The Measurement refer to section 11.3
   Start frequency was set to 9 ㎑ and stop frequency was set to 25 ㎓ (separated into two plots per channel), RBW = 1 ㎒, VBW ≥ 3 x RBW, Detector = Peak, Sweep time = Auto couple, Trace = Max hold, The trace was allowed to stabilize.

3. TDF function
 - For plots showing conducted spurious emissions from 9 ㎑ to 25 ㎓, all path loss of wide frequency range was investigated and compensated to spectrum analyzer as TDF function.
   So, the reading values shown in plots were final result.

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2.4. Test Results

Ambient temperature : (23 ± 1) ℃
Relative humidity : 47 % R.H.

2.4.1. Radiated Spurious Emission below 1 000 ㎒

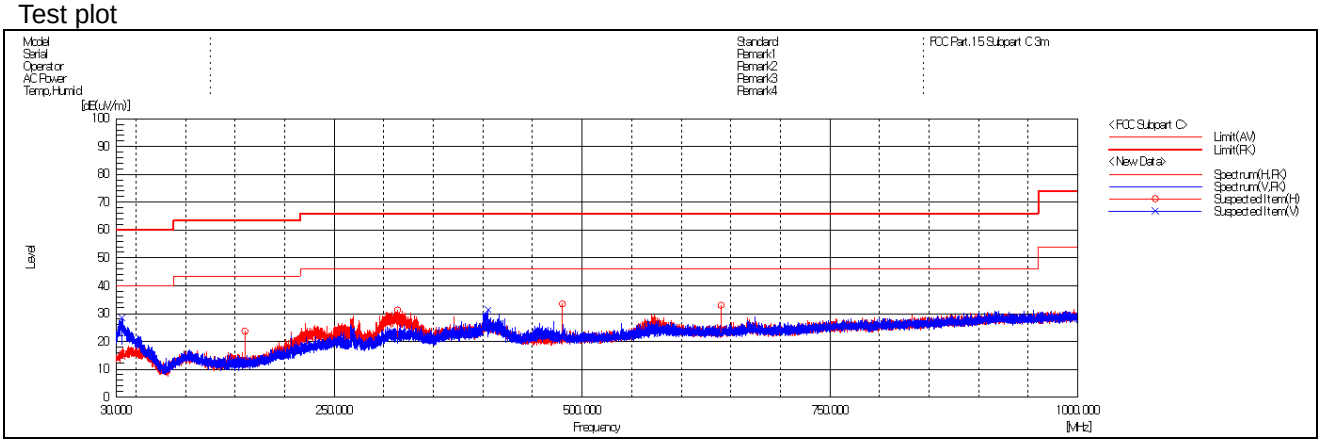
The frequency spectrum from 9 ㎑ to 1 000 ㎒ was investigated. All reading values are peak values.

Radiated Emissions			Ant	Correction Factors		Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP + CL (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
35.86	42.40	Peak	V	12.44	-26.86	27.98	40.00	12.02
160.02	40.80	Peak	H	8.70	-25.52	23.98	43.50	19.52
313.73	42.30	Peak	H	13.67	-24.34	31.63	46.00	14.37
404.82	40.40	Peak	V	16.00	-24.65	31.75	46.00	14.25
480.00	41.70	Peak	H	17.00	-24.81	33.89	46.00	12.11
640.01	38.60	Peak	H	19.40	-24.46	33.54	46.00	12.46
Above 700.00	Not detected	-	-	-	-	-	-	-

Remark;

1. Spurious emissions for all channels were investigated and almost the same below 1 ㎓.
2. Reported spurious emissions are in **11n_HT40 / MCS0 / Low channel** as worst case among other modes.
3. Radiated spurious emission measurement as below.
   (Actual = Reading + AF + AMP + CL)
4. According to §15.31(o), emission levels are not report much lower than the limits by over 20 ㏈.

Test plot



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2.4.2. Radiated Spurious Emission above 1 000 ㎒

The frequency spectrum above 1 000 ㎒ was investigated. All reading values are peak and average values.

DSSS: 802.11b (1 Mbps)

Low Channel (2 412 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Duty (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*2 310.00	19.43	Peak	H	27.82	7.54	-	54.79	74.00	19.21
*2 310.00	7.63	Average	H	27.82	7.54	0.60	43.59	54.00	10.41
*2 384.03	20.56	Peak	H	27.97	7.68	-	56.21	74.00	17.79
*2 389.73	9.59	Average	H	27.98	7.69	0.60	45.86	54.00	8.14
*2 390.00	18.83	Peak	H	27.98	7.69	-	54.50	74.00	19.50
*2 390.00	8.88	Average	H	27.98	7.69	0.60	45.15	54.00	8.85

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Duty (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*4 824.10	58.47	Peak	V	32.54	-33.72	-	57.29	74.00	16.71
*4 823.55	50.60	Average	V	32.54	-33.72	0.60	50.02	54.00	3.98
Above 4 900.00	Not detected	-	-	-	-	-	-	-	-

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Middle Channel (2 437 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Duty (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*4 874.05	59.91	Peak	V	32.75	-33.91	-	58.75	74.00	15.25
*4 873.15	51.88	Average	V	32.75	-33.90	0.60	51.33	54.00	2.67
*7 303.05	45.82	Peak	H	35.81	-30.87	-	50.76	74.00	23.24
*7 309.95	35.04	Average	H	35.84	-30.83	0.60	40.65	54.00	13.35
Above 7 400.00	Not detected	-	-	-	-	-	-	-	-

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High Channel (2 462 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Duty (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*2 483.50	19.05	Peak	H	28.00	7.84	-	54.89	74.00	19.11
*2 483.50	8.95	Average	H	28.00	7.84	0.60	45.39	54.00	8.61
*2 486.77	21.40	Peak	H	28.00	7.84	-	57.24	74.00	16.76
*2 486.40	9.45	Average	H	28.00	7.84	0.60	45.89	54.00	8.11
*2 500.00	18.84	Peak	H	28.00	7.87	-	54.71	74.00	19.29
*2 500.00	8.48	Average	H	28.00	7.87	0.60	44.95	54.00	9.05

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Duty (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*4 924.05	60.47	Peak	V	32.80	-34.02	-	59.25	74.00	14.75
*4 924.90	52.80	Average	V	32.80	-34.03	0.60	52.17	54.00	1.83
*7 385.55	44.75	Peak	H	36.07	-30.31	-	50.51	74.00	23.49
*7 384.80	34.72	Average	H	36.07	-30.31	0.60	41.08	54.00	12.92
Above 7 400.00	Not detected	-	-	-	-	-	-	-	-

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OFDM: 802.11g (6 Mbps)

Low Channel (2 412 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Duty (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*2 310.00	17.86	Peak	H	27.82	7.54	-	53.22	74.00	20.78
*2 310.00	8.21	Average	H	27.82	7.54	0.55	44.12	54.00	9.88
*2 389.73	20.76	Peak	H	27.98	7.69	-	56.43	74.00	17.57
*2 389.27	10.16	Average	H	27.98	7.69	0.55	46.38	54.00	7.62
*2 390.00	20.21	Peak	H	27.98	7.69	-	55.88	74.00	18.12
*2 390.00	9.63	Average	H	27.98	7.69	0.55	45.85	54.00	8.15

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Duty (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*4 830.85	58.86	Peak	V	32.59	-33.74	-	57.71	74.00	16.29
*4 824.80	47.40	Average	V	32.55	-33.71	0.55	46.79	54.00	7.21
Above 4 900.00	Not detected	-	-	-	-	-	-	-	-

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Middle Channel (2 437 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Duty (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*4 881.00	59.21	Peak	V	32.76	-33.88	-	58.09	74.00	15.91
*4 875.00	48.61	Average	V	32.75	-33.91	0.55	48.00	54.00	6.00
*7 311.45	46.17	Peak	H	35.85	-30.83	-	51.19	74.00	22.81
*7 311.95	34.19	Average	H	35.85	-30.83	0.55	39.76	54.00	14.24
Above 7 400.00	Not detected	-	-	-	-	-	-	-	-

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High Channel (2 462 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Duty (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*2 483.50	22.94	Peak	H	28.00	7.84	-	58.78	74.00	15.22
*2 483.50	10.41	Average	H	28.00	7.84	0.55	46.80	54.00	7.20
*2 483.64	24.45	Peak	H	28.00	7.84	-	60.29	74.00	13.71
*2 483.78	10.49	Average	H	28.00	7.84	0.55	46.88	54.00	7.12
*2 500.00	18.36	Peak	H	28.00	7.87	-	54.23	74.00	19.77
*2 500.00	8.42	Average	H	28.00	7.87	0.55	44.84	54.00	9.16

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Duty (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*4 930.95	59.81	Peak	V	32.80	-34.00	-	58.61	74.00	15.39
*4 925.15	49.28	Average	V	32.80	-34.03	0.55	48.60	54.00	5.40
*7 393.00	47.87	Peak	H	36.09	-30.24	-	53.72	74.00	20.28
*7 388.50	34.31	Average	H	36.08	-30.28	0.55	40.66	54.00	13.34
Above 7 400.00	Not detected	-	-	-	-	-	-	-	-

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OFDM: 802.11n_HT20 (MCS0)

Low Channel (2 412 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Duty (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*2 310.00	19.65	Peak	H	27.82	7.54	-	55.01	74.00	18.99
*2 310.00	7.38	Average	H	27.82	7.54	0.68	43.42	54.00	10.58
*2 385.97	21.50	Peak	H	27.97	7.68	-	57.15	74.00	16.85
*2 388.59	9.98	Average	H	27.98	7.69	0.68	46.33	54.00	7.67
*2 390.00	20.51	Peak	H	27.98	7.69	-	56.18	74.00	17.82
*2 390.00	9.92	Average	H	27.98	7.69	0.68	46.27	54.00	7.73

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Duty (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*4 829.85	57.88	Peak	V	32.58	-33.74	-	56.72	74.00	17.28
*4 824.95	46.60	Average	V	32.55	-33.71	0.68	46.12	54.00	7.88
Above 4 900.00	Not detected	-	-	-	-	-	-	-	-

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Middle Channel (2 437 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Duty (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*4 875.10	58.72	Peak	V	32.75	-33.91	-	57.56	74.00	16.44
*4 873.20	47.90	Average	V	32.75	-33.90	0.68	47.43	54.00	6.57
*7 313.10	48.57	Peak	H	35.85	-30.82	-	53.60	74.00	20.40
*7 312.55	33.97	Average	H	35.85	-30.82	0.68	39.68	54.00	14.32
Above 7 400.00	Not detected	-	-	-	-	-	-	-	-

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High Channel (2 462 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Duty (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*2 483.50	22.88	Peak	H	28.00	7.84	-	58.72	74.00	15.28
*2 483.50	10.31	Average	H	28.00	7.84	0.68	46.83	54.00	7.17
*2 483.96	24.73	Peak	H	28.00	7.84	-	60.57	74.00	13.43
*2 483.60	10.64	Average	H	28.00	7.84	0.68	47.16	54.00	6.84
*2 500.00	18.58	Peak	H	28.00	7.87	-	54.45	74.00	19.55
*2 500.00	8.75	Average	H	28.00	7.87	0.68	45.30	54.00	8.70

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Duty (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*4 925.20	59.67	Peak	V	32.80	-34.03	-	58.44	74.00	15.56
*4 923.10	48.82	Average	V	32.80	-34.01	0.68	48.29	54.00	5.71
*7 387.70	49.41	Peak	H	36.08	-30.29	-	55.20	74.00	18.80
*7 387.65	33.59	Average	H	36.08	-30.29	0.68	40.06	54.00	13.94
Above 7 400.00	Not detected	-	-	-	-	-	-	-	-

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OFDM: 802.11n_HT40 (MCS0)

Low Channel (2 422 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Duty (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*2 310.00	17.39	Peak	H	27.82	7.54	-	52.75	74.00	21.25
*2 310.00	7.54	Average	H	27.82	7.54	0.56	43.46	54.00	10.54
*2 389.88	26.98	Peak	H	27.98	7.69	-	62.65	74.00	11.35
*2 389.88	14.53	Average	H	27.98	7.69	0.56	50.76	54.00	3.24
*2 390.00	26.78	Peak	H	27.98	7.69	-	62.45	74.00	11.55
*2 390.00	14.35	Average	H	27.98	7.69	0.56	50.58	54.00	3.42

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Duty (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*4 844.24	54.90	Peak	V	32.67	-33.82	-	53.75	74.00	20.25
*4 844.24	43.14	Average	V	32.67	-33.82	0.56	42.55	54.00	11.45
*7 252.92	43.10	Peak	H	35.71	-30.76	-	48.05	74.00	25.95
*7 253.04	31.13	Average	H	35.71	-30.76	0.56	36.64	54.00	17.36
Above 7 300.00	Not detected	-	-	-	-	-	-	-	-

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Middle Channel (2 437 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Duty (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*4 874.36	55.28	Peak	V	32.75	-33.91	-	54.12	74.00	19.88
*4 874.24	43.84	Average	V	32.75	-33.91	0.56	43.24	54.00	10.76
*7 298.52	44.10	Peak	H	35.80	-30.87	-	49.03	74.00	24.97
*7 299.72	32.09	Average	H	35.80	-30.88	0.56	37.57	54.00	16.43
Above 7 300.00	Not detected	-	-	-	-	-	-	-	-

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High Channel (2 452 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Duty (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*2 483.50	28.21	Peak	H	28.00	7.84	-	64.05	74.00	9.95
*2 483.50	13.70	Average	H	28.00	7.84	0.56	50.10	54.00	3.90
*2 485.80	28.64	Peak	H	28.00	7.84	-	64.48	74.00	9.52
*2 483.70	14.39	Average	H	28.00	7.84	0.56	50.79	54.00	3.21
*2 500.00	20.73	Peak	H	28.00	7.87	-	56.60	74.00	17.40
*2 500.00	9.53	Average	H	28.00	7.87	0.56	45.96	54.00	8.04

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Duty (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*4 904.60	56.59	Peak	V	32.80	-33.84	-	55.55	74.00	18.45
*4 902.44	44.39	Average	V	32.80	-33.81	0.56	43.94	54.00	10.06
*7 343.16	43.93	Peak	H	35.97	-30.68	-	49.22	74.00	24.78
*7 347.12	31.04	Average	H	35.99	-30.67	0.56	36.92	54.00	17.08
Above 7 400.00	Not detected	-	-	-	-	-	-	-	-

Remark;

1. "*" means the restricted band.
2. Measuring frequencies from 1 ㎓ to the 10th harmonic of highest fundamental frequency.
3. Radiated emissions measured in frequency above 1 000 ㎒ were made with an instrument using peak/average detector mode.
4. Actual = Reading + AF + CL + (Duty) or Reading + AF + AMP + CL + (Duty).
5. According to § 15.31(o), emission levels are not reported much lower than the limits by over 20 ㏈.

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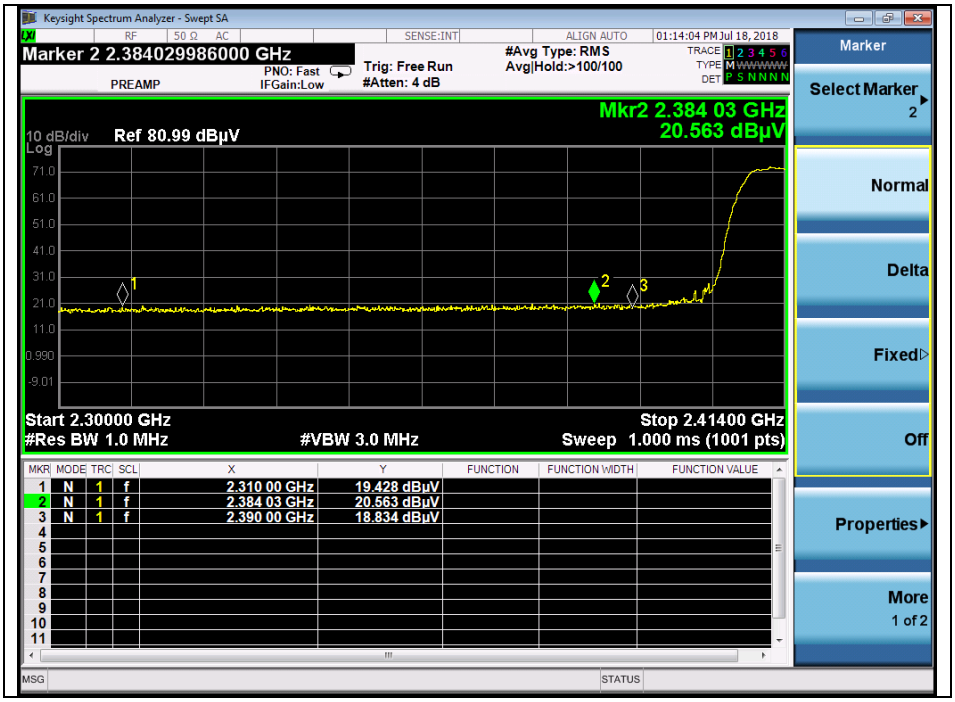
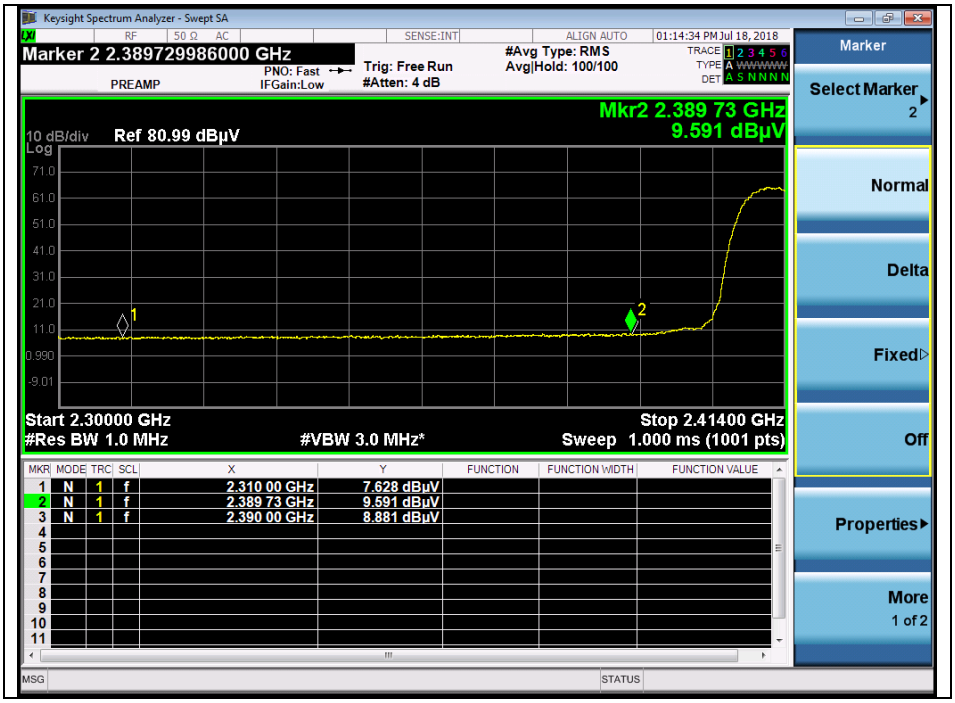
2.4.3. Plot of Transmitter Radiated Spurious Emissions

DSSS: 802.11b (1 Mbps)

Low channel Band edge (Peak)



Low channel Band edge (Average)



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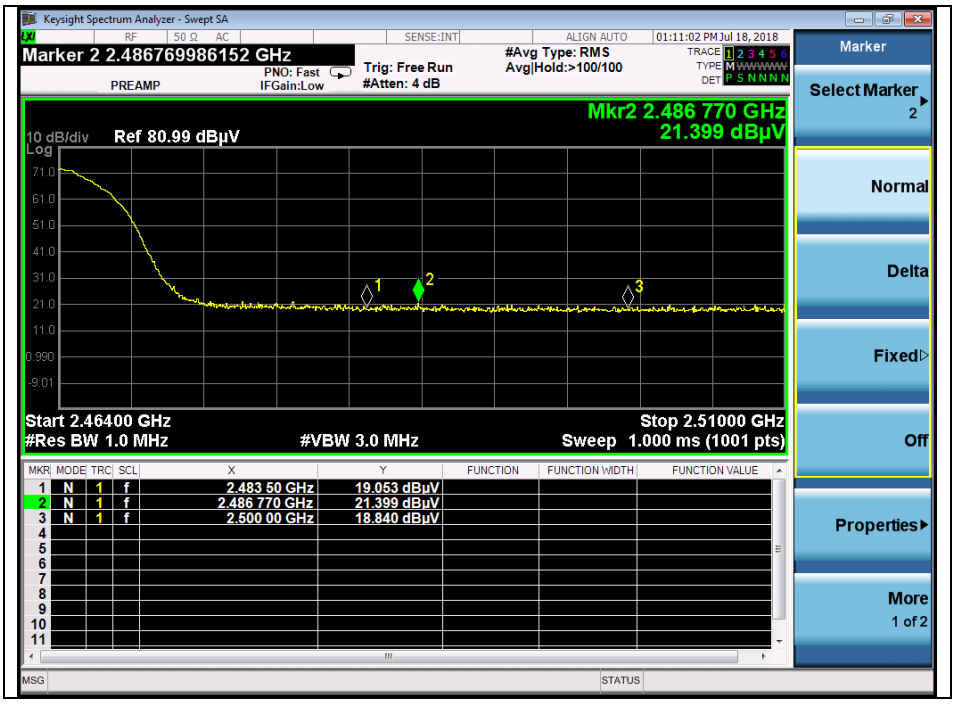
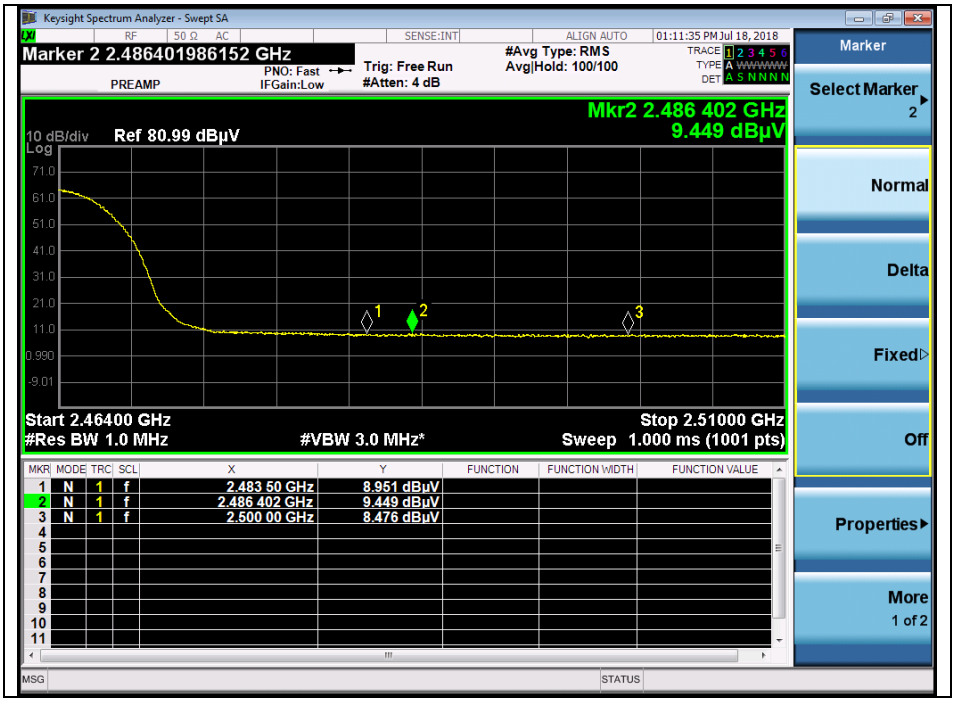
High channel Band edge (Peak)

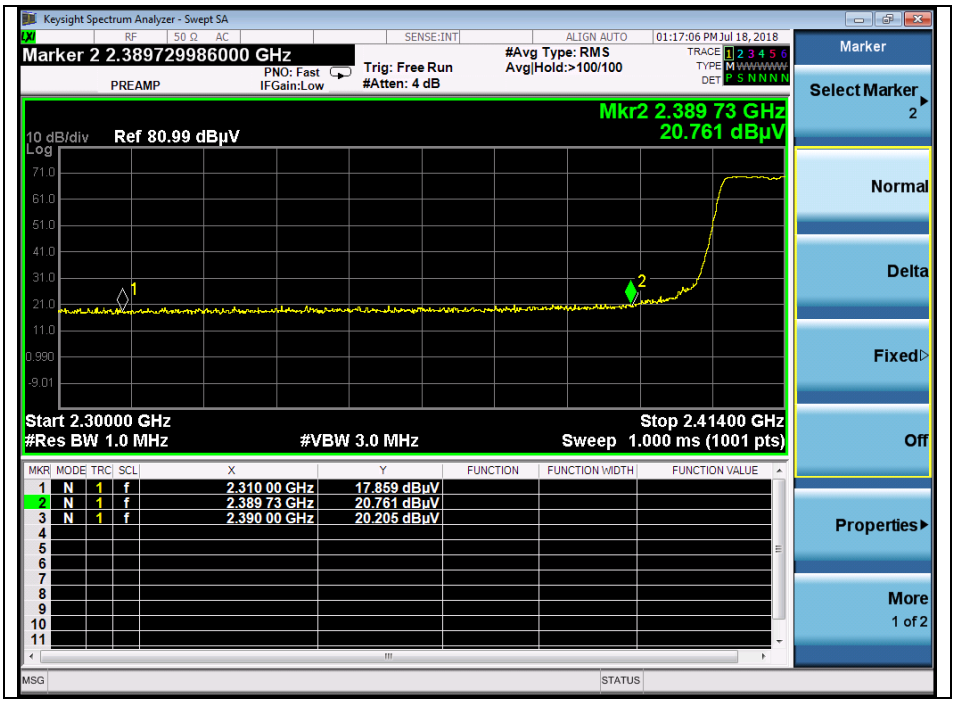


High channel Band edge (Average)

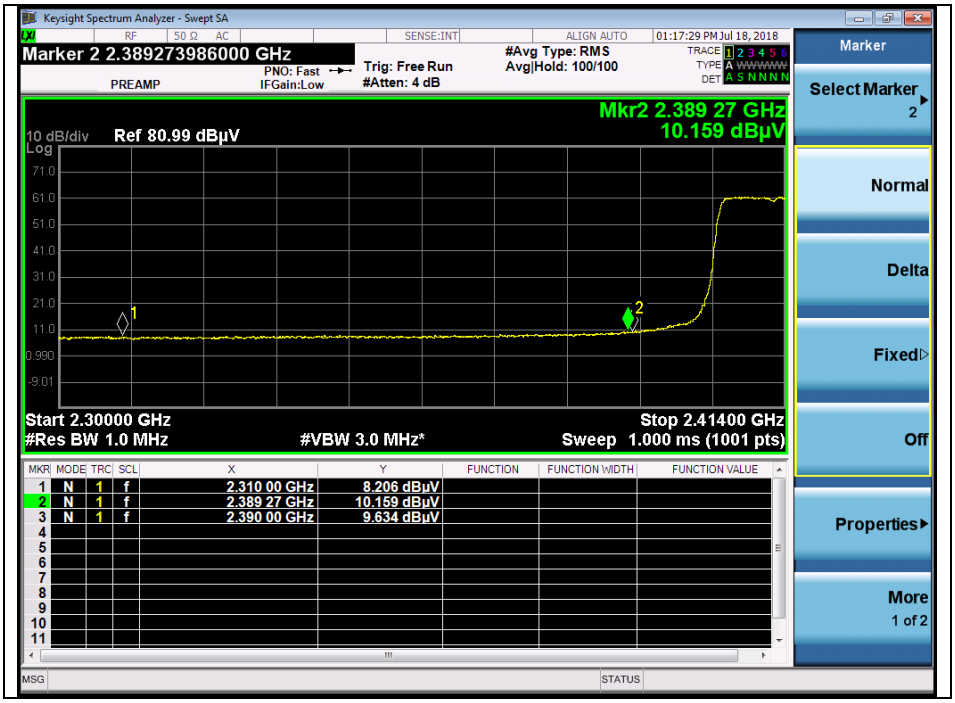


OFDM: 802.11g (6 Mbps)

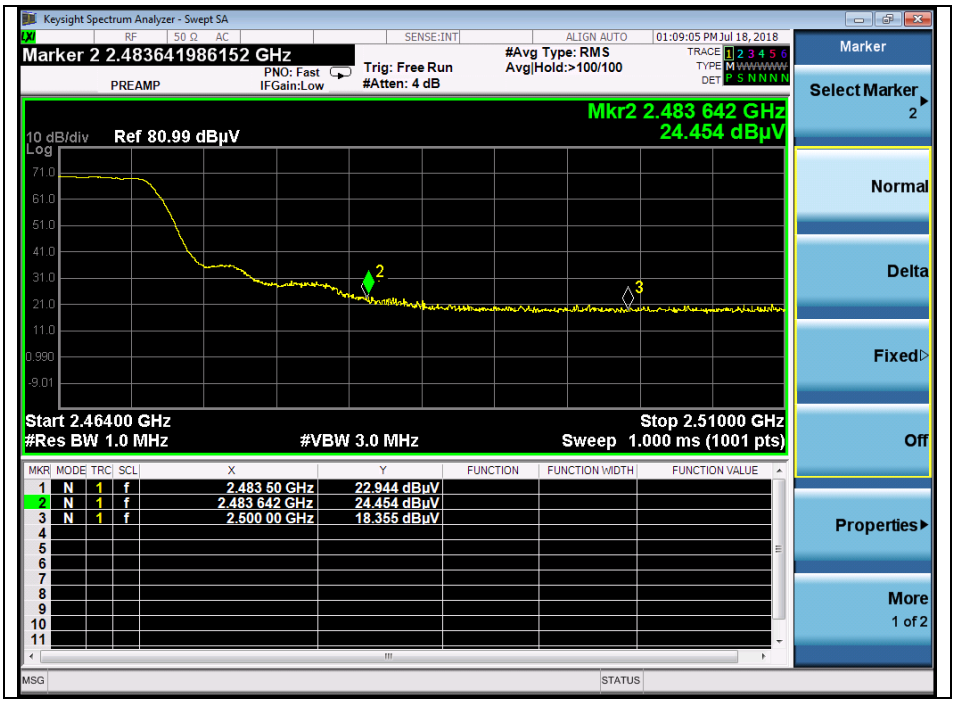
Low channel Band edge (Peak)



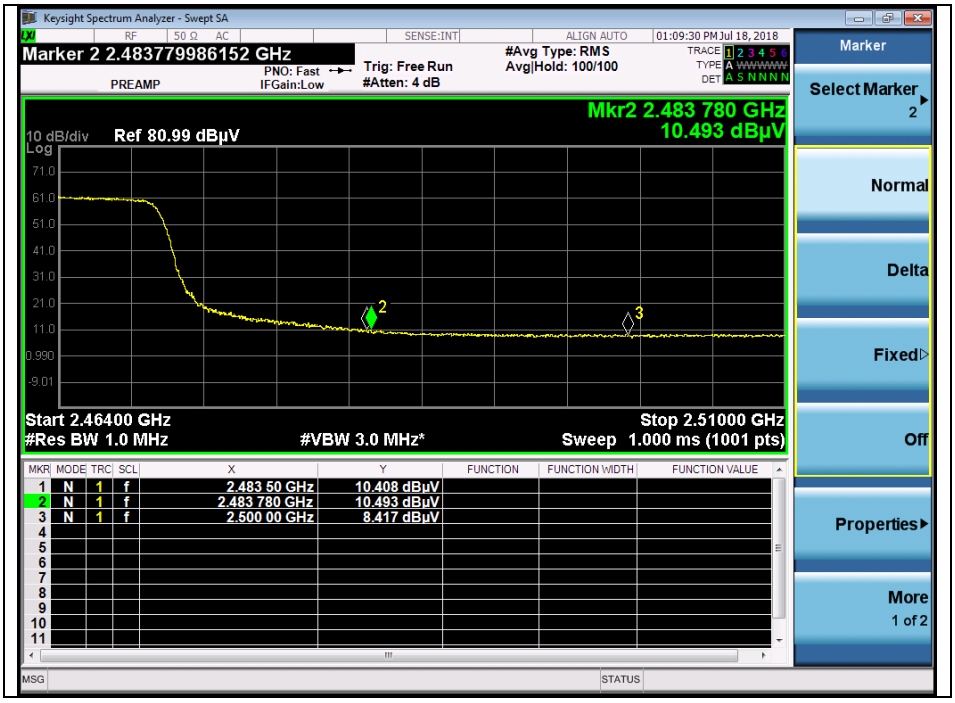
Low channel Band edge (Average)



High channel Band edge (Peak)



High channel Band edge (Average)



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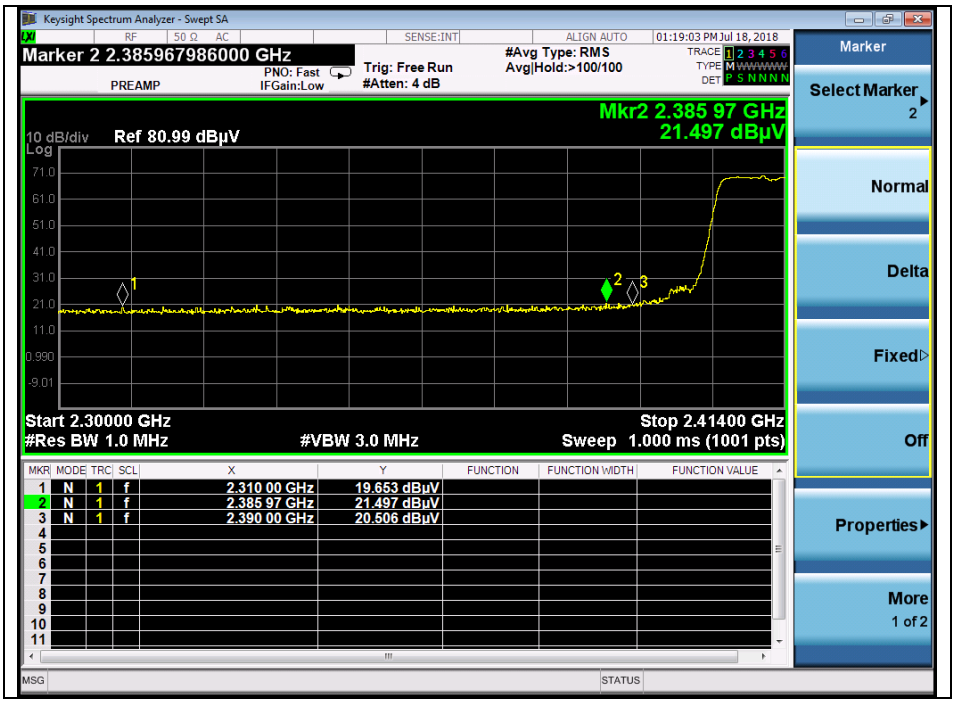
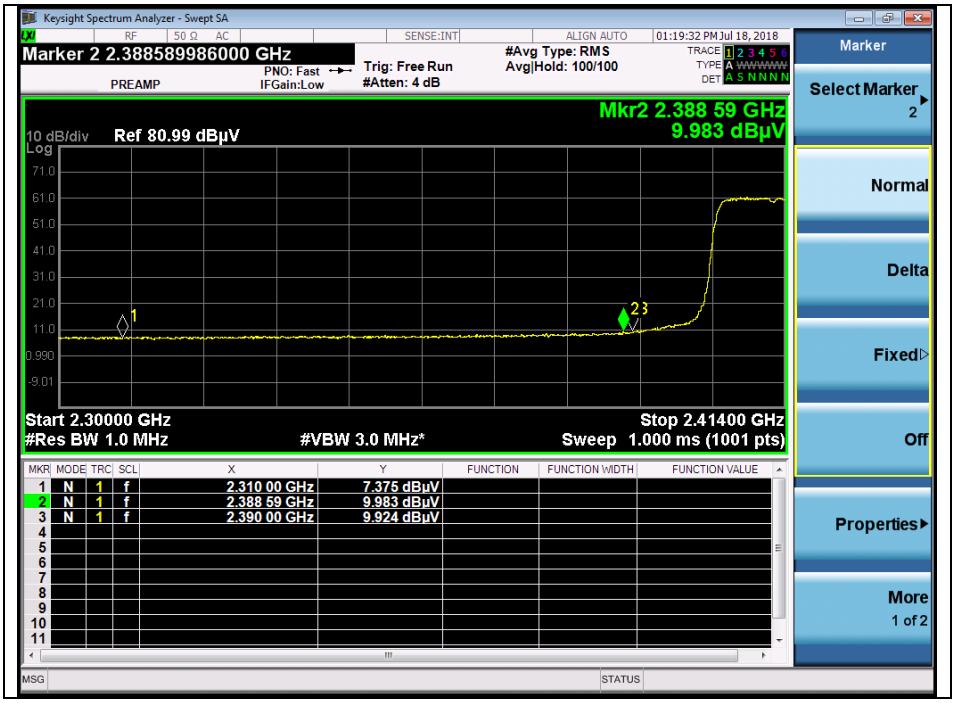
OFDM: 802.11n_HT20 (MCS0)

Low channel Band edge (Peak)



Low channel Band edge (Average)



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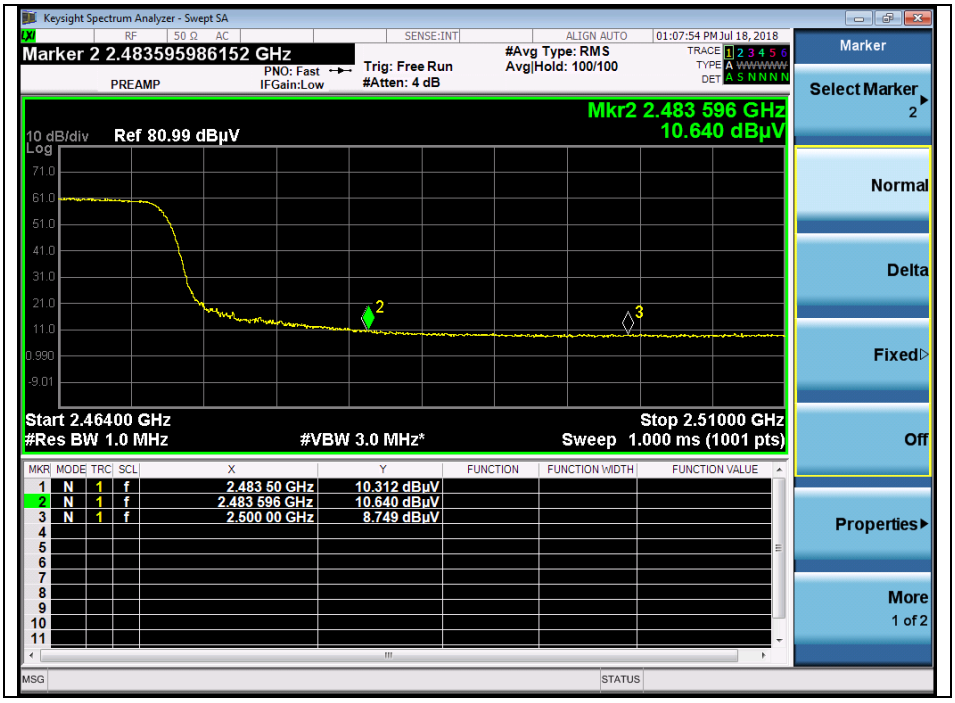
High channel Band edge (Peak)

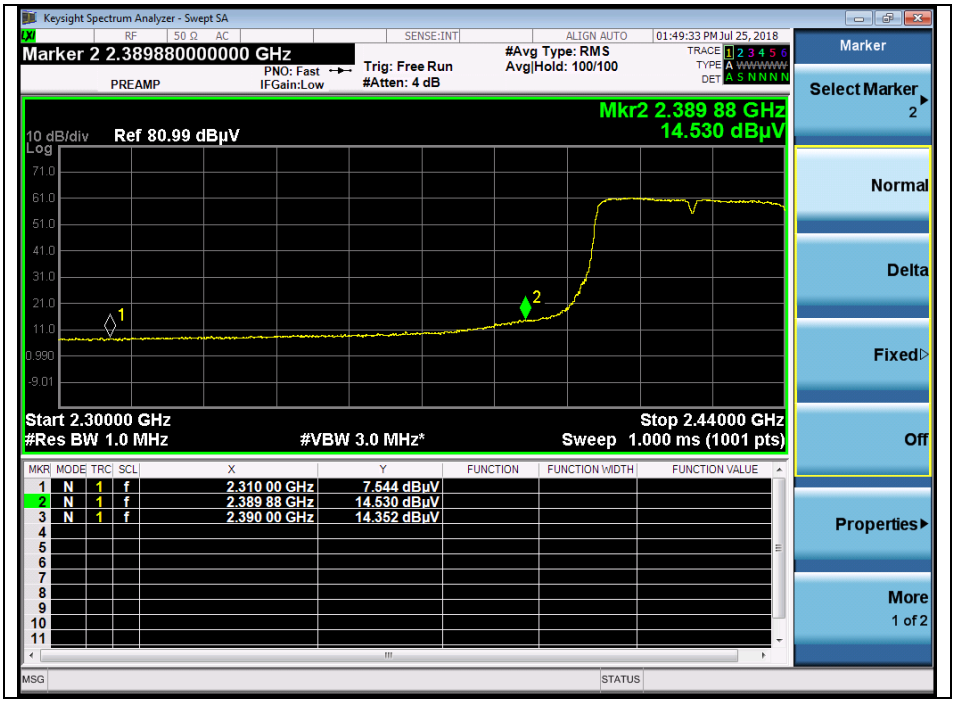
High channel Band edge (Average)



OFDM: 802.11n_HT40 (MCS0)

Low channel Band edge (Peak)

Low channel Band edge (Average)



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High channel Band edge (Peak)

High channel Band edge (Average)

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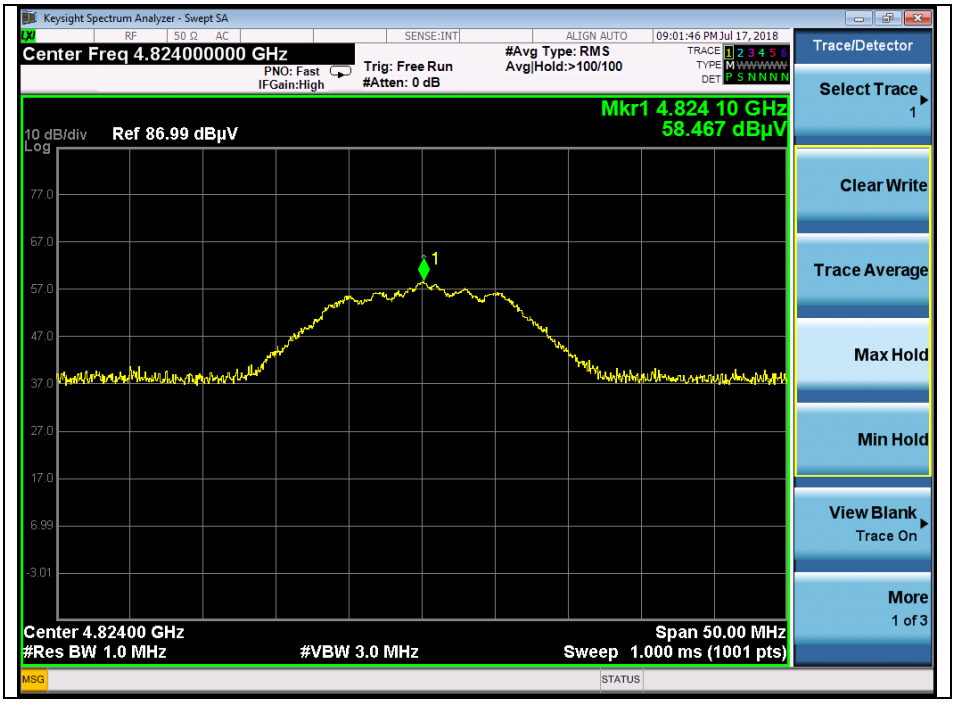
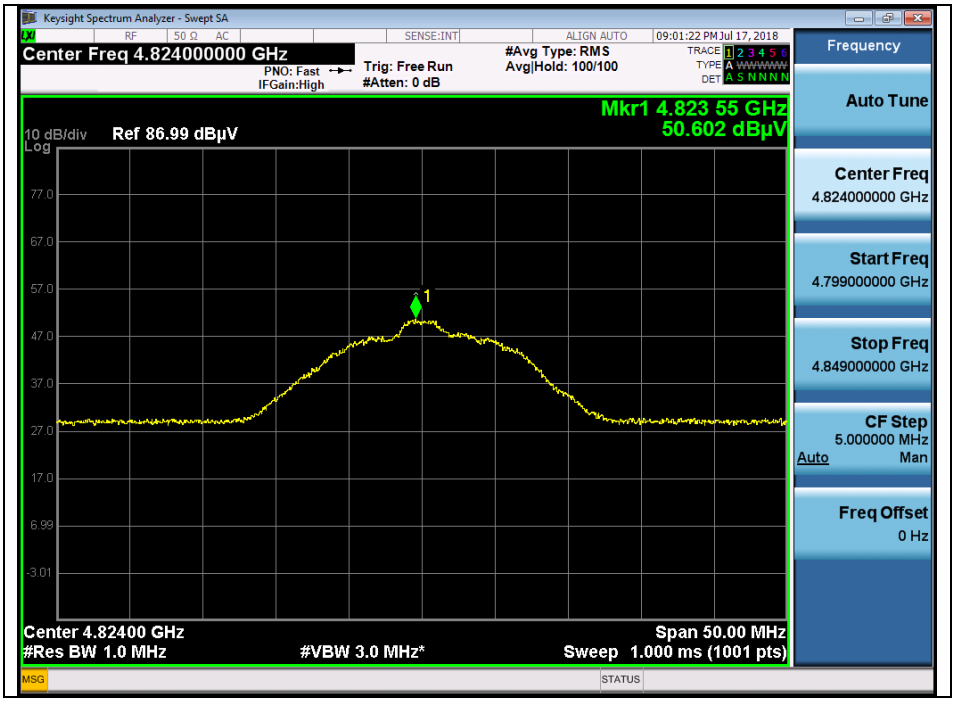
DSSS: 802.11b (1 Mbps)

Low channel 2nd harmonic (Peak)



Low channel 2nd harmonic (Average)



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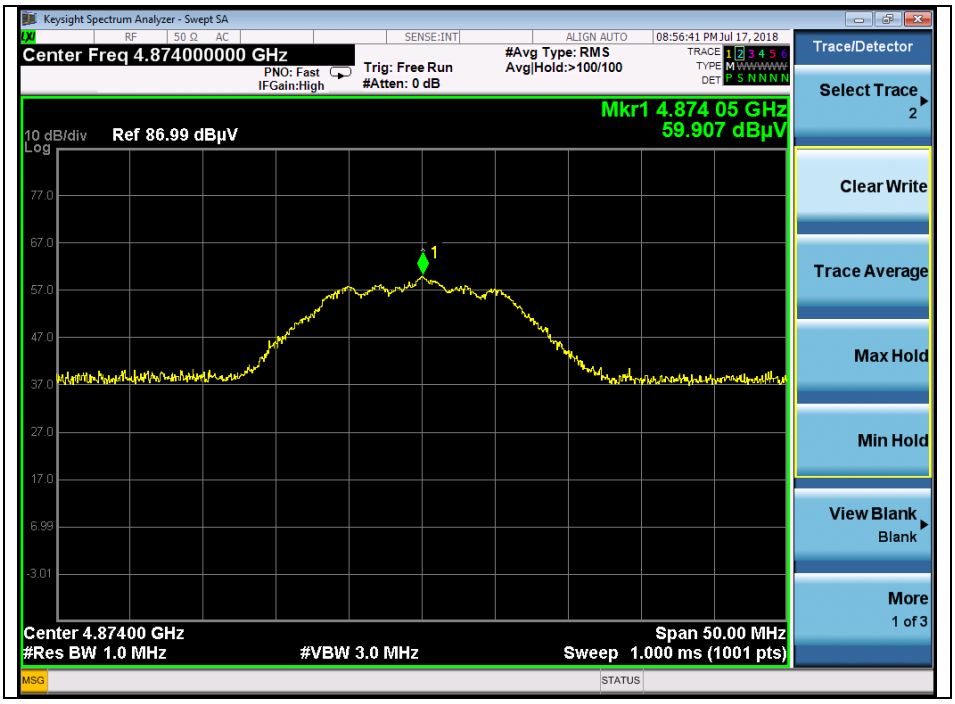
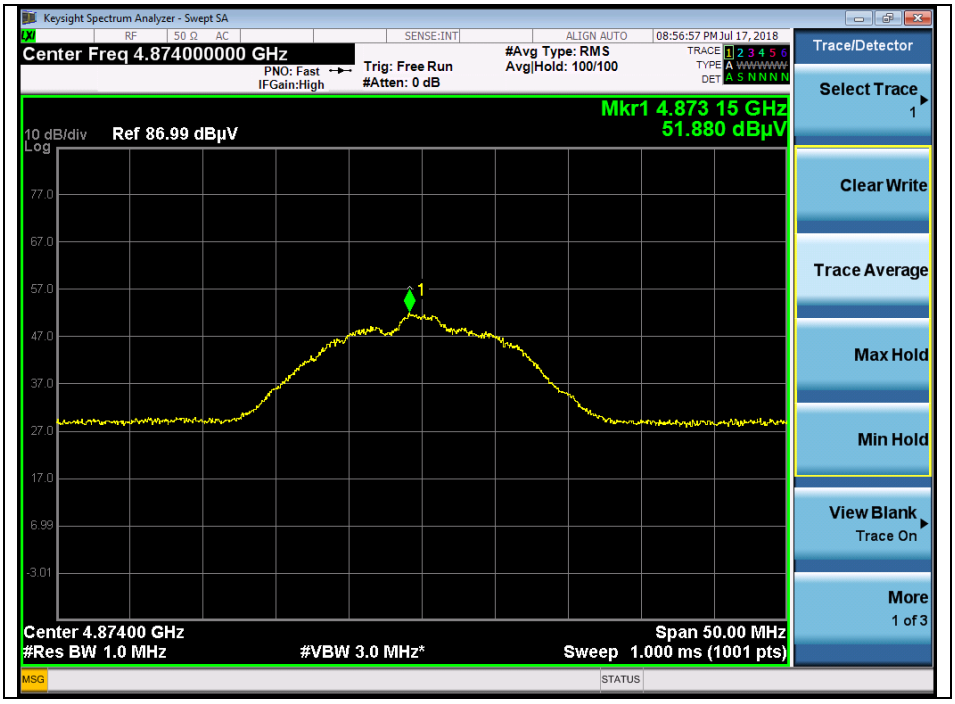
Middle channel 2nd harmonic (Peak)

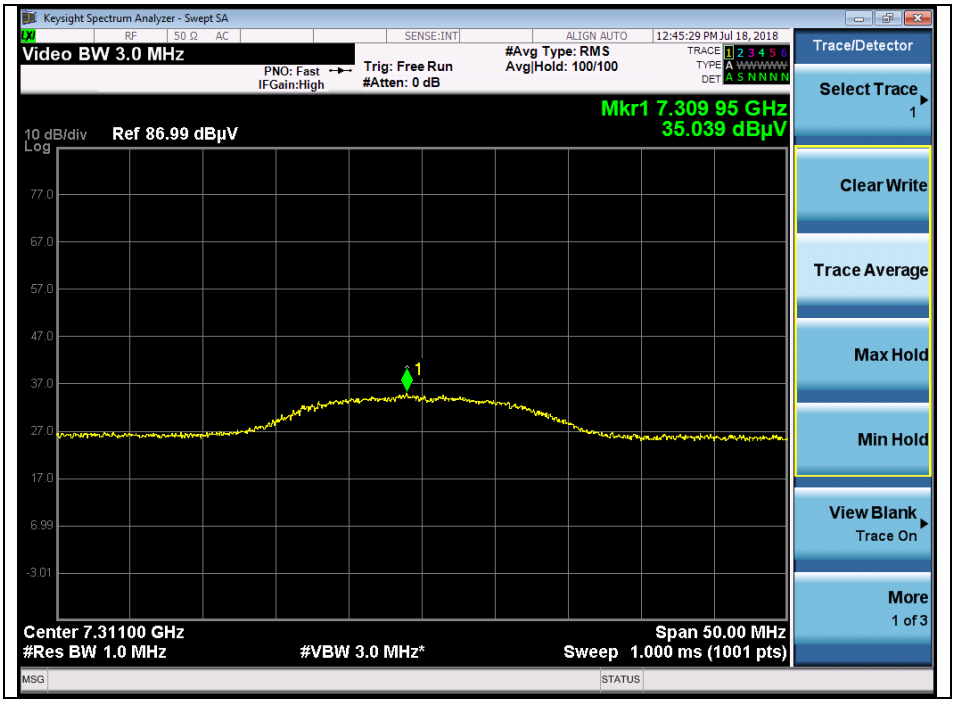


Middle channel 2nd harmonic (Average)

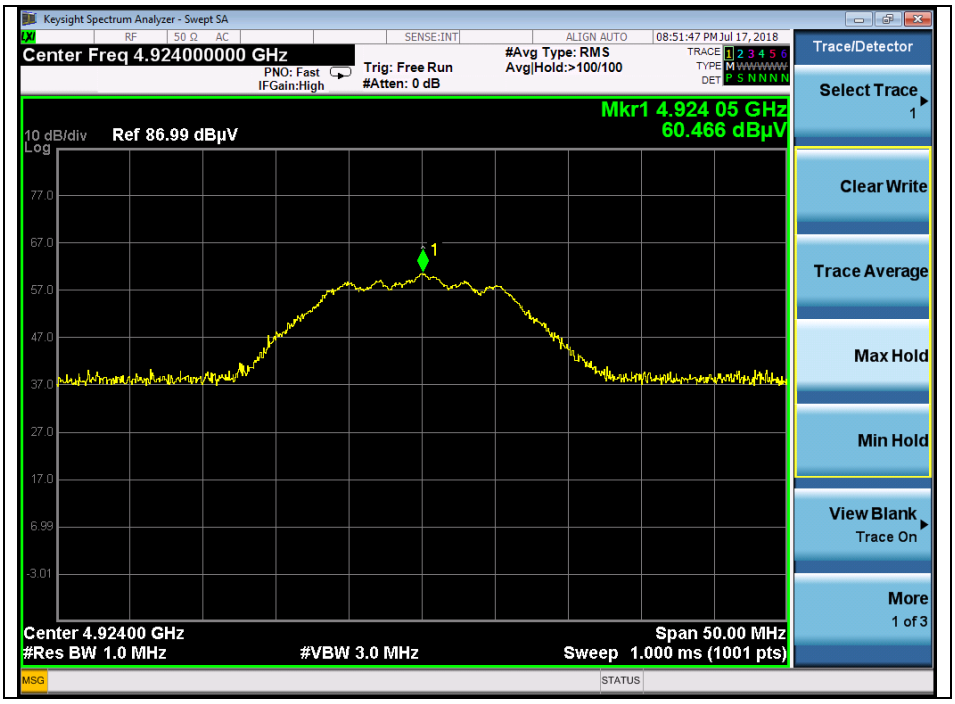


Middle channel 3rd harmonic (Peak)

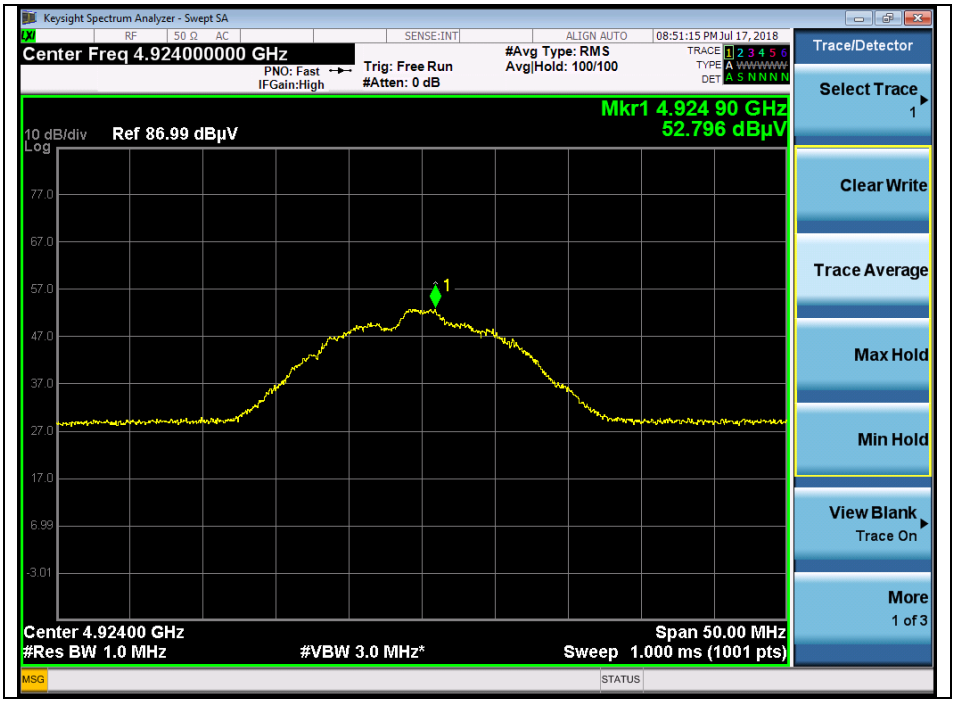
Middle channel 3rd harmonic (Average)



High channel 2nd harmonic (Peak)



High channel 2nd harmonic (Average)



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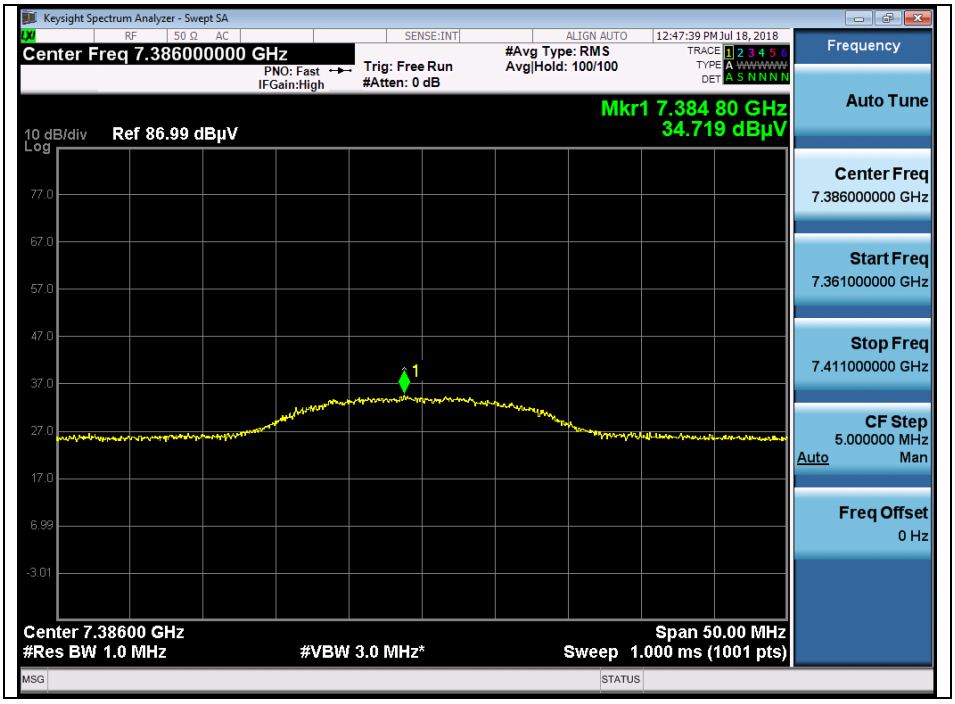
High channel 3rd harmonic (Peak)

High channel 3rd harmonic (Average)



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