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TEST REPORT

of

FCC Part 15 Subpart C §15.247
IC RSS-247 Issue 2 and RSS-Gen Issue 5

FCC ID: 2AVZC-A000010007A
IC Certification: 26076-A000010007A

Equipment Under Test	:	BT/Wi-Fi Combo Module Gen6
Model Name	:	A000020012A
Variant Model Name(s)	:	-
Applicant	:	Markone technology CO., Ltd.
Manufacturer	:	SUNTEL VINA CO., LTD.
Date of Receipt	:	2021.06.08
Date of Test(s)	:	2021.06.11 ~ 2021.07.13
Date of Issue	:	2021.07.15

In the configuration tested, the EUT complied with the standards specified above. This test report does not assure KOLAS accreditation.

1) The results of this test report are effective only to the items tested.
2) The SGS Korea is not responsible for the sampling, the results of this test report apply to the sample as received.
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Tested by: **Nancy Park**

Technical Manager: **Jinhyoung Cho**

SGS Korea Co., Ltd. Gunpo Laboratory

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1. General Information

1.1. Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)
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- Designation number: KR0150

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1.2. Details of Applicant

Applicant : Markone technology CO., Ltd.
Address : 232, Yeongudanji-ro, Ochang-eup, Cheongwon-gu, Cheongju-si, Chungcheonbuk-do, South Korea, 28119
Contact Person : Lee, Jong-bok
Phone No. : +82 10 9916 2536

1.3. Details of Manufacturer

Company : SUNTEL VINA CO., LTD.
Address : Lot XN8, Dai An Industrial Zone Extension, Lai Cach Town, Cam Giang District, Hai Duong Province, Viet Nam.(SUNTEL VINA)

1.4. Description of EUT

Kind of Product	BT/Wi-Fi Combo Module Gen6
Model Name	A000020012A
Serial Number	Conducted: 001 Radiated: 002
Power Supply	DC 3.3 V
Frequency Range	2 412 ㎒ ~ 2 462 ㎒ (11b/g/n_HT20)
Modulation Technique	DSSS, OFDM
Number of Channels	11 channels (11b/g/n_HT20)
Antenna Type	PCB & Cable Assembly Antenna
Antenna Gain	1.63 ㏈i
H/W Version	V04
S/W Version	V10

1.5. Test Equipment List

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Interval	Cal. Due
Signal Generator	R&S	SMR40	100272	Jun. 16, 2021	Annual	Jun. 16, 2022
Signal Generator	R&S	SMBV100A	255834	May 31, 2021	Annual	May 31, 2022
Spectrum Analyzer	R&S	FSV30	103453	Nov. 04, 2020	Annual	Nov. 04, 2021
Spectrum Analyzer	Agilent	N9020A	MY53421758	Sep. 04, 2020	Annual	Sep. 04, 2021
Attenuator	AEROFLEX / INMET	26A-10dB	3	Mar. 24, 2021	Annual	Mar. 24, 2022
High Pass Filter	Wainwright Instrument GmbH	WHK3.0/18G-10SS	21	Jun. 04, 2021	Annual	Jun. 04, 2022
High Pass Filter	Wainwright Instrument GmbH	WHNX7.5/26.5G-6SS	11	May 17, 2021	Annual	May 17, 2022
Low Pass Filter	Mini-Circuits	NLP-1200+	V 8979400903-2	Feb. 08, 2021	Annual	Feb. 08, 2022
Power Sensor	R&S	NRP-Z81	100669	May 07, 2021	Annual	May 07, 2022
DC Power Supply	Agilent	U8002A	MY49030063	Feb. 02, 2021	Annual	Feb. 02, 2022
Preamplifier	H.P.	8447F	2944A03909	Aug. 06, 2020	Annual	Aug. 06, 2021
Signal Conditioning Unit	R&S	SCU-18	10117	Jun. 09, 2021	Annual	Jun. 09, 2022
Preamplifier	TESTEK	TK-PA1840H	130016	Jan. 07, 2021	Annual	Jan. 07, 2022
Loop Antenna	Schwarzbeck Mess-Elektronik	FMZB 1519	1519-039	Aug. 22, 2019	Biennial	Aug. 22, 2021
Bilog Antenna	Schwarzbeck Mess-Elektronik	VULB 9163	01126	Dec. 22, 2020	Biennial	Dec. 22, 2022
Horn Antenna	R&S	HF906	100326	Feb. 04, 2021	Annual	Feb. 04, 2022
Horn Antenna	Schwarzbeck Mess-Elektronik	BBHA 9170	9170-540	Nov. 26, 2020	Annual	Nov. 26, 2021
Test Receiver	R&S	ESU26	100109	Feb. 19, 2021	Annual	Feb. 19, 2022
Turn Table	Innco systems GmbH	DS 1200 S	N/A	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.
Antenna Mast	Innco systems GmbH	MA4640-XP-ET	MA4640/536/383 30516/L	N.C.R.	N/A	N.C.R.
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.
Test Receiver	R&S	ESCI 7	100911	Feb. 19, 2021	Annual	Feb. 19, 2022
Two-Line V-Network	R&S	ENV216	100190	May 04, 2021	Annual	May 04, 2022
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.
Coaxial Cable	RFONE	MWX221-NMSNMS (4 m)	J1023142	Jul. 05, 2021	Semi-annual	Jan. 05, 2022
Coaxial Cable	RFONE	PL520-NMNM-10M (10 m)	20200324001	Jul. 05, 2021	Semi-annual	Jan. 05, 2022
Coaxial Cable	RFONE	PL360P-292M292M-1.5 M-A	20200324015	Feb. 19, 2021	Semi-Annual	Aug. 19, 2021

Note;
- For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.

1.6. Summary of Test Results

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part15 Subpart C, IC RSS-247 Issue 2 and RSS-Gen Issue 5			
Section in FCC	**Section in IC**	**Test Item(s)**	**Result**
15.205(a) 15.209 15.247(d)	RSS-247 Issue 2 5.5 RSS-Gen Issue 5 8.9	Transmitter Radiated Spurious Emissions and Conducted Spurious Emission	Complied
15.247(a)(2)	RSS-247 Issue 2 5.2(a) RSS-Gen Issue 5 6.7	6 dB Bandwidth & 99 % Bandwidth	Complied
15.247(b)(3)	RSS-247 Issue 2 5.4(d)	Maximum Peak Conducted Output Power	Complied
15.247(e)	RSS-247 Issue 2 5.2(b)	Power Spectral Density	Complied
15.207	RSS-Gen Issue 5 8.8	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 15.247 Meas Guidance v05r02 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) + Duty factor (dB)

1.9. Test Report Revision

Revision	Report Number	Date of Issue	Description
0	F690501-RF-RTL002375	2021.07.15	Initial

1.10. Measurement Uncertainty

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

Parameter		Uncertainty
RF Output Power		± 0.36 dB
Conducted Spurious Emission		± 0.63 dB
Occupied Bandwidth		± 13.12 kHz
Power Spectral Density		± 0.63 dB
AC Conducted Emission		± 3.45 dB
Radiated Emission, 9 kHz to 30 MHz	H	± 3.66 dB
	V	± 3.66 dB
Radiated Emission, below 1 GHz	H	± 4.90 dB
	V	± 4.82 dB
Radiated Emission, above 1 GHz	H	± 3.62 dB
	V	± 3.64 dB

All measurement uncertainty values are shown with a coverage factor *k* = 2 to indicate a 95 % level of confidence.

1.11. Information of software for test.

- Using the software of Tera term (Version 4.72) to testing of EUT.

1.12. Duty Cycle of EUT

Regarding to KDB 558074 D01 15.247 Meas Guidance v05r02, 6, 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.

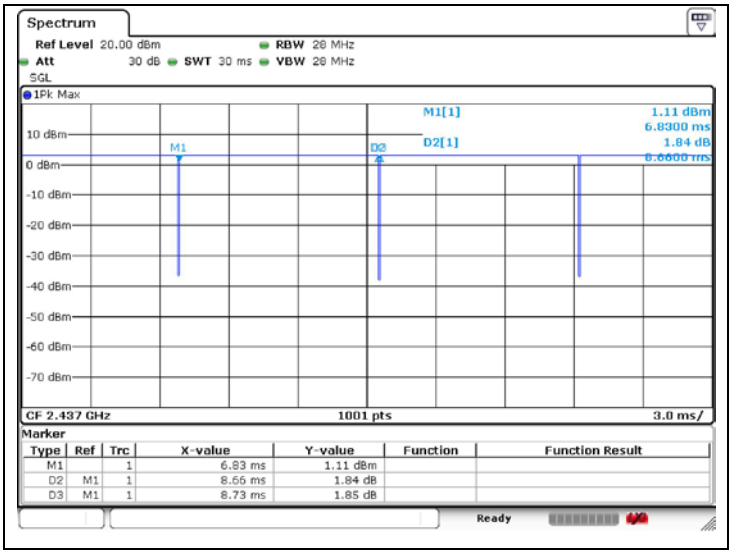
Mode	Data Rate (Mbps)	Duty Cycle (%)	Correction Factor (dB)
11b	1	99.20	0.03
11g	6	93.46	0.29
11n_HT20	MCS0	93.06	0.31

Remark;

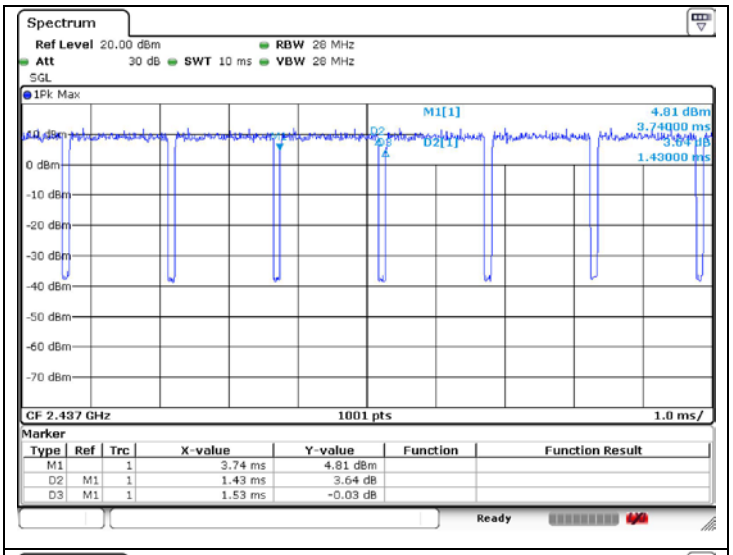
1. As measured duty cycles of EUT, all of mode and data rate keeps constant period and are converted to log scale (power averaging) to compensate correction factor to result of average test items.
2. Duty Cycle (%) = (Tx on time / Tx on + off time) x 100
3. Correction Factor (dB) = 10 log (1 / Duty Cycle)

- Test plots

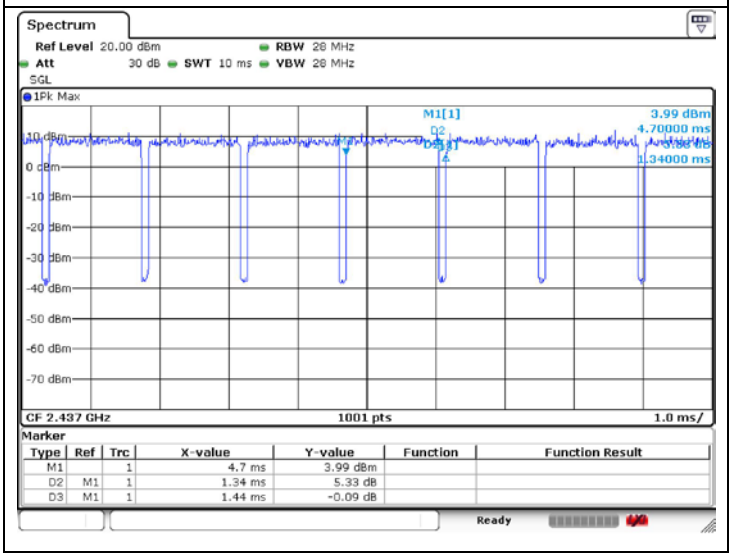
802.11b



802.11g



802.11n_HT20

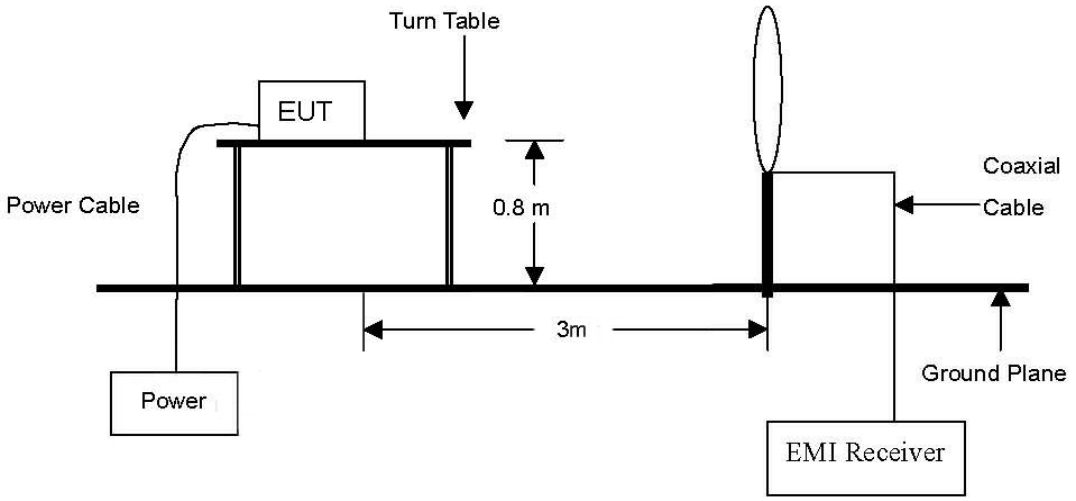


2. Transmitter Radiated Spurious Emissions and Conducted Spurious Emission

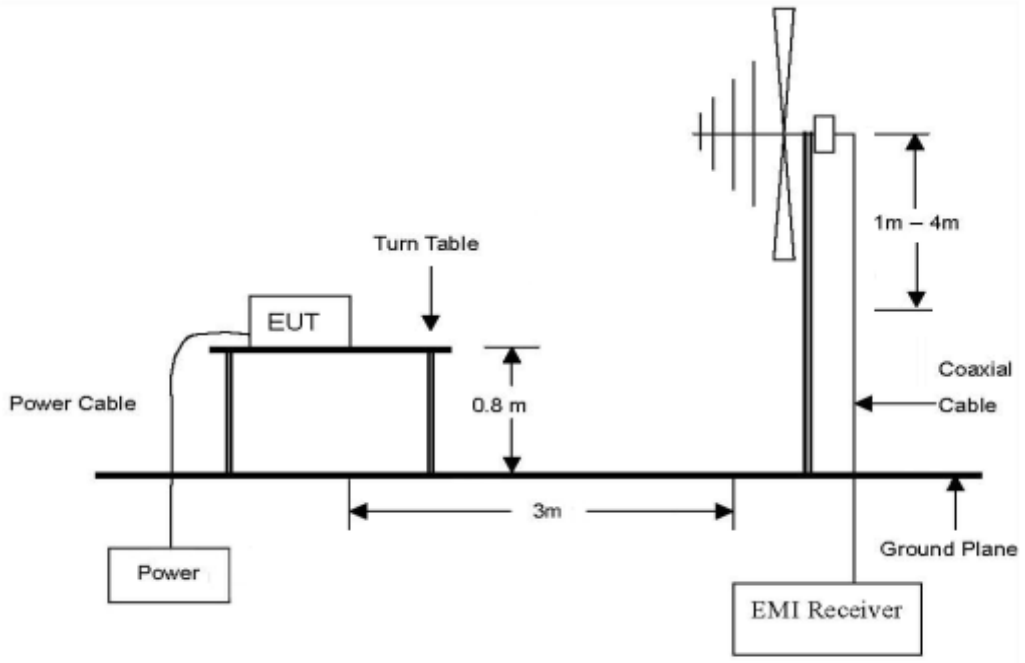
2.1. Test Setup

2.1.1. Transmitter Radiated Spurious Emissions

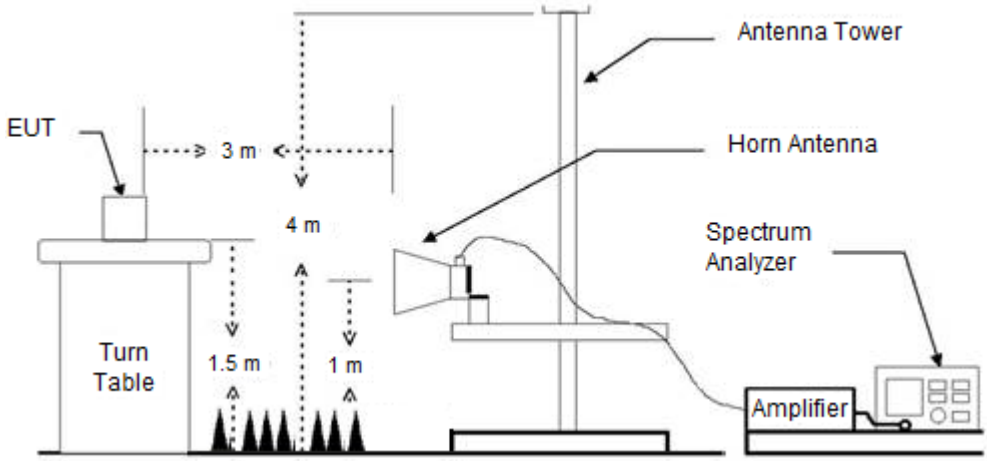
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 ㎑ to 30 ㎒ emissions.



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



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.



2.1.2. Conducted Spurious Emission

2.2. Limit

2.2.1. FCC

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 §15.209(a) is not required. In addition, radiated emission 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) (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.

2.2.2. IC

According to RSS-247 Issue 2, 5.5, in any 100 ㎑ bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced 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 that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 ㏈ instead of 20 ㏈. Attenuation below the general field strength limits specified in RSS-Gen is not required.

According to RSS-Gen Issue 5, 8.9, except where otherwise indicated in the applicable RSS, radiated emissions shall comply with the field strength limits shown in table 5 and table 6. Additionally, the level of any transmitter unwanted emission shall not exceed the level of the transmitter's fundamental emission.

Table 5 – General Field Strength Limits at frequencies above 30 ㎒

Frequency (㎒)	Field Strength (㎛/m at 3 m)
30-88	100
88-216	150
216-960	200
Above 960	500

Table 6 – General Field Strength Limits at frequencies below 30 ㎒

Frequency	Magnetic Field Strength (H-Field) (㎛/m)	Measurement Distance (meters)
9-490 ㎑ [1]	6.37/F (F in ㎑)	300
490-1 705 ㎑	63.7/F (F in ㎑)	30
1.705-30 ㎒	0.08	30

Note[1]: The emission limits for the ranges 9-90 ㎑ and 110-490 ㎑ are based on measurements employing a linear average detector.

2.3. Test Procedures

Radiated emissions from the EUT were measured according to the dictates in section 11.11 & 11.12 of 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.

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.

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 11.11.2
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 = Max hold.

- Unwanted Emissions Level Measurement refer to section 11.11.3
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 = Max hold.

2. Unwanted Emissions into Restricted Frequency Bands

- Peak Power measurement procedure refer to section 11.12.2.4
Set RBW = as specified in Table 9, VBW ≥ 3 x RBW, Detector = Peak, Sweep time = auto, Trace = Max hold.

Table 9 – RBW as a function of frequency

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

If the peak – detected amplitude can be shown to comply with the average limit, then it is not necessary to perform a separate average measurement.

- Average Power measurements procedure refer to section 11.12.2.5.2
The EUT shall be configured to operate at the maximum achievable duty cycle.
Measure the duty cycle D of the transmitter output signal as described in section 11.6.
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 / D)], where D is the duty cycle.
2) If a specific emission is demonstrated to be continuous (D ≥ 98 %) rather than turning ON and OFF with the transmit cycle, then no duty cycle correction is required for that emission.

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.

2.3.3. Test Procedures for Conducted Spurious Emissions

All data rates and modes were investigated for conducted spurious emissions.

Per the guidance of ANSI C63.10-2013, section 11.11.1 & 11.11.2 & 11.11.3, 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 11.11.3
   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, The trace was allowed to stabilize.

2. Conducted Spurious Emissions
 - The Measurement refer to section 11.11.3
   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.

2.4. Test Results

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

2.4.1. Radiated Spurious Emission below 1 000 ㎒

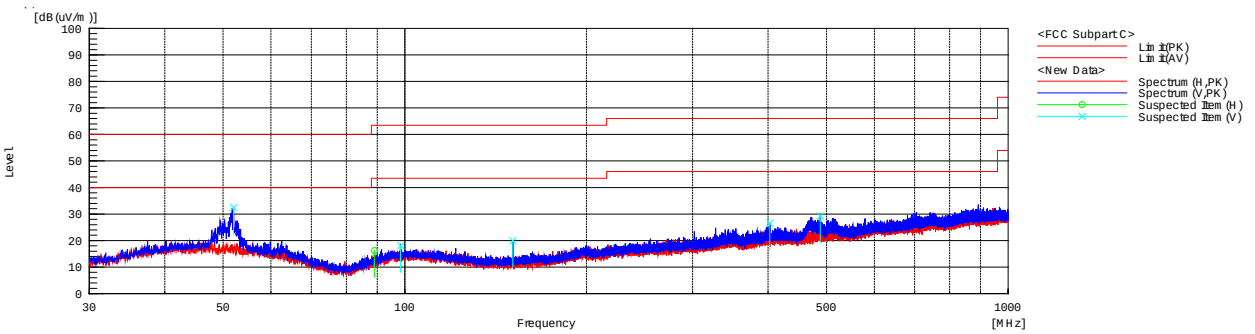
The frequency spectrum from 9 ㎑ to 1 000 ㎒ was investigated. All reading values are peak values.

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)
52.03	39.70	Peak	V	19.70	-27.22	32.18	40.00	7.82
402.56	30.40	Peak	V	21.55	-25.52	26.43	46.00	19.57
488.08	32.20	Peak	V	22.66	-25.82	29.04	46.00	16.96
Above 500.00	Not detected	-	-	-	-	-	-	-

Remark;

1. Spurious emissions for all channels were investigated and almost the same below 1 ㎓.
2. Reported spurious emissions are in **11g / 6 Mbps / 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



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)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*2 310.00	19.19	Peak	V	28.00	6.06	-	53.25	74.00	20.75
*2 310.00	10.00	Average	V	28.00	6.06	-	44.06	54.00	9.94
*2 355.20	21.50	Peak	V	28.02	6.18	-	55.70	74.00	18.30
*2 362.68	11.05	Average	V	28.05	6.19	-	**45.29**	54.00	8.71
*2 390.00	19.81	Peak	V	28.16	6.14	-	54.11	74.00	19.89
*2 390.00	10.26	Average	V	28.16	6.14	-	44.56	54.00	9.44

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*4 999.70	51.97	Peak	H	33.30	-32.85	-	52.42	74.00	21.58
*7 499.56	46.61	Peak	V	36.10	-31.41	-	51.30	74.00	22.70
Above 7 500.00	Not detected	-	-	-	-	-	-	-	-

Middle Channel (2 437 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*4 999.64	51.53	Peak	H	33.30	-32.85	-	51.98	74.00	22.02
*7 309.82	45.41	Peak	H	36.12	-31.40	-	50.13	74.00	23.87
*7 499.60	46.33	Peak	V	36.10	-31.41	-	51.02	74.00	22.98
Above 7 500.00	Not detected	-	-	-	-	-	-	-	-

High Channel (2 462 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*2 483.50	17.69	Peak	V	28.33	6.21	-	52.23	74.00	21.77
*2 483.50	8.97	Average	V	28.33	6.21	-	43.51	54.00	10.49
*2 485.21	20.17	Peak	V	28.33	6.22	-	54.72	74.00	19.28
*2 498.26	9.49	Average	V	28.30	6.26	-	44.05	54.00	9.95
*2 500.00	17.47	Peak	V	28.30	6.27	-	52.04	74.00	21.96
*2 500.00	8.78	Average	V	28.30	6.27	-	43.35	54.00	10.65

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*4 999.64	51.30	Peak	H	33.30	-32.85	-	51.75	74.00	22.25
*7 387.02	44.65	Peak	H	36.20	-31.34	-	49.51	74.00	24.49
*7 499.64	46.88	Peak	V	36.10	-31.41	-	51.57	74.00	22.43
Above 7 500.00	Not detected	-	-	-	-	-	-	-	-

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)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*2 310.00	18.98	Peak	V	28.00	6.06	-	53.04	74.00	20.96
*2 310.00	9.99	Average	V	28.00	6.06	0.29	44.34	54.00	9.66
*2 386.83	24.68	Peak	V	28.15	6.15	-	58.98	74.00	15.02
*2 389.36	13.52	Average	V	28.16	6.14	0.29	48.11	54.00	5.89
*2 390.00	24.67	Peak	V	28.16	6.14	-	58.97	74.00	15.03
*2 390.00	13.59	Average	V	28.16	6.14	0.29	**48.18**	54.00	5.82

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*4 999.50	51.36	Peak	H	33.30	-32.85	-	51.81	74.00	22.19
7 237.50	53.59	Peak	H	35.98	-31.17	-	58.40	74.00	15.60
*7 499.74	46.92	Peak	V	36.10	-31.41	-	51.61	74.00	22.39
Above 7 500.00	Not detected	-	-	-	-	-	-	-	-

Middle Channel (2 437 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*4 999.64	51.77	Peak	H	33.30	-32.85	-	52.22	74.00	21.78
*7 312.80	51.12	Peak	H	36.13	-31.39	-	55.86	74.00	18.14
*7 313.20	38.99	Average	H	36.13	-31.39	0.29	44.02	54.00	9.98
*7 499.56	46.40	Peak	V	36.10	-31.41	-	51.09	74.00	22.91
Above 7 500.00	Not detected	-	-	-	-	-	-	-	-

High Channel (2 462 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*2 483.50	21.95	Peak	V	28.33	6.21	-	56.49	74.00	17.51
*2 483.50	11.88	Average	V	28.33	6.21	0.29	46.71	54.00	7.29
*2 485.36	23.94	Peak	V	28.33	6.22	-	58.49	74.00	15.51
*2 484.90	12.20	Average	V	28.33	6.22	0.29	47.04	54.00	6.96
*2 500.00	20.93	Peak	V	28.30	6.27	-	55.50	74.00	18.50
*2 500.00	11.84	Average	V	28.30	6.27	0.29	46.70	54.00	7.30

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*4 999.84	51.92	Peak	H	33.30	-32.85	-	52.37	74.00	21.63
*7 387.60	50.49	Peak	H	36.20	-31.34	-	55.35	74.00	18.65
*7 385.60	37.57	Average	H	36.20	-31.34	0.29	42.72	54.00	11.28
*7 499.86	46.14	Peak	V	36.10	-31.41	-	50.83	74.00	23.17
Above 7 500.00	Not detected	-	-	-	-	-	-	-	-

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)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*2 310.00	19.50	Peak	V	28.00	6.06	-	53.56	74.00	20.44
*2 310.00	10.30	Average	V	28.00	6.06	0.31	44.67	54.00	9.33
*2 389.36	26.04	Peak	V	28.16	6.14	-	60.34	74.00	13.66
*2 389.13	12.87	Average	V	28.16	6.14	0.31	**47.48**	54.00	6.52
*2 390.00	23.93	Peak	V	28.16	6.14	-	58.23	74.00	15.77
*2 390.00	12.62	Average	V	28.16	6.14	0.31	47.23	54.00	6.77

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*4 999.82	51.50	Peak	H	33.30	-32.85	-	51.95	74.00	22.05
7 240.30	52.29	Peak	H	35.98	-31.16	-	57.11	74.00	16.89
*7 499.68	45.89	Peak	V	36.10	-31.41	-	50.58	74.00	23.42
Above 7 500.00	Not detected	-	-	-	-	-	-	-	-

Middle Channel (2 437 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*4 999.68	51.61	Peak	H	33.30	-32.85	-	52.06	74.00	21.94
*7 311.40	49.80	Peak	H	36.12	-31.39	-	54.53	74.00	19.47
*7 308.10	36.24	Average	H	36.12	-31.40	0.31	41.27	54.00	12.73
*7 499.68	46.10	Peak	V	36.10	-31.41	-	50.79	74.00	23.21
Above 7 500.00	Not detected	-	-	-	-	-	-	-	-

High Channel (2 462 ㎒)

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*2 483.50	23.58	Peak	V	28.33	6.21	-	58.12	74.00	15.88
*2 483.50	12.61	Average	V	28.33	6.21	0.31	47.46	54.00	6.54
*2 484.53	26.46	Peak	V	28.33	6.21	-	61.00	74.00	13.00
*2 483.70	13.07	Average	V	28.33	6.21	0.31	47.92	54.00	6.08
*2 500.00	21.41	Peak	V	28.30	6.27	-	55.98	74.00	18.02
*2 500.00	11.65	Average	V	28.30	6.27	0.31	46.53	54.00	7.47

Radiated Emissions			Ant.	Correction Factors			Total	Limit	
Frequency (㎒)	Reading (dBμV)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	DF (dB)	Actual (dBμV/m)	Limit (dBμV/m)	Margin (dB)
*4 999.86	51.30	Peak	H	33.30	-32.85	-	51.75	74.00	22.25
*7 393.00	48.71	Peak	H	36.20	-31.35	-	53.56	74.00	20.44
*7 499.44	47.03	Peak	V	36.10	-31.41	-	51.72	74.00	22.28
Above 7 500.00	Not detected	-	-	-	-	-	-	-	-

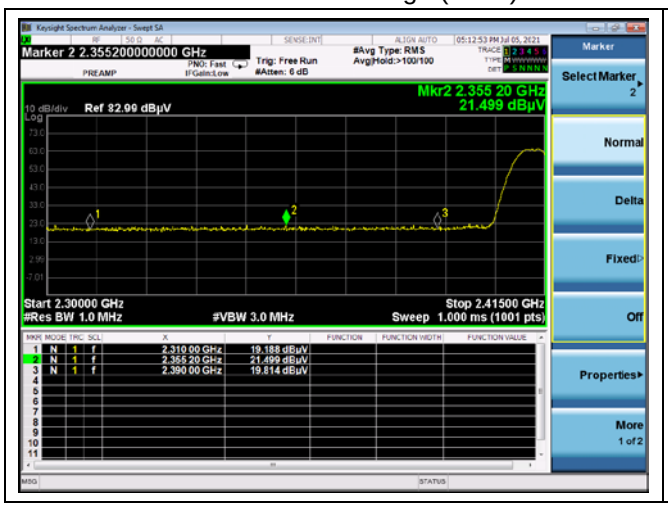
Remarks;

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 + (DF) or Reading + AF + AMP + CL + (DF).
5. According to § 15.31(o), emission levels are not reported much lower than the limits by over 20 ㏈.
6. The maximized peak measured value complies with the average limit, to perform an average measurement is unnecessary.

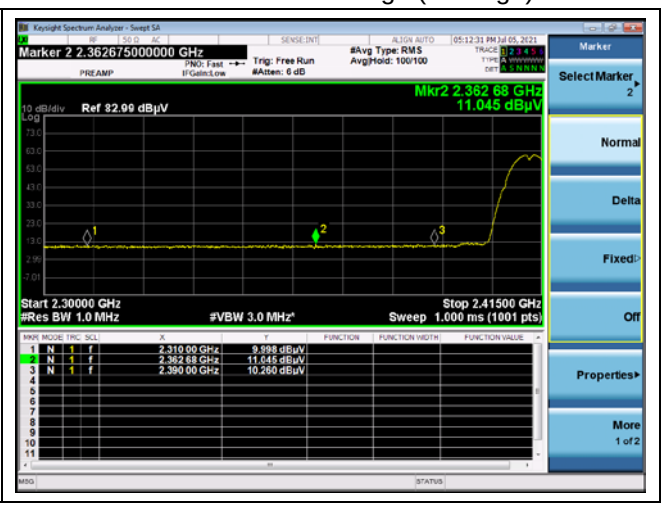
- Test plots

DSSS: 802.11b (1 Mbps)

Low channel band edge (Peak)



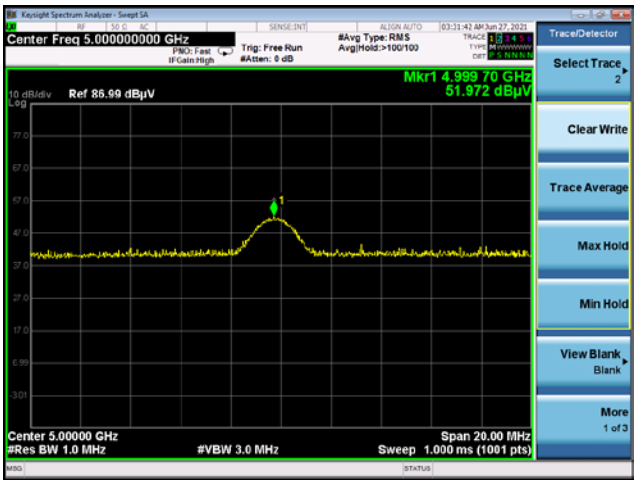
Low channel band edge (Average)



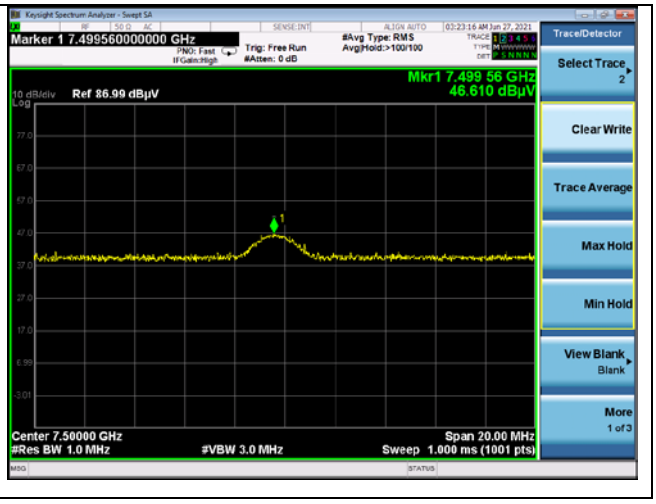
High channel band edge (Peak)

High channel band edge (Average)

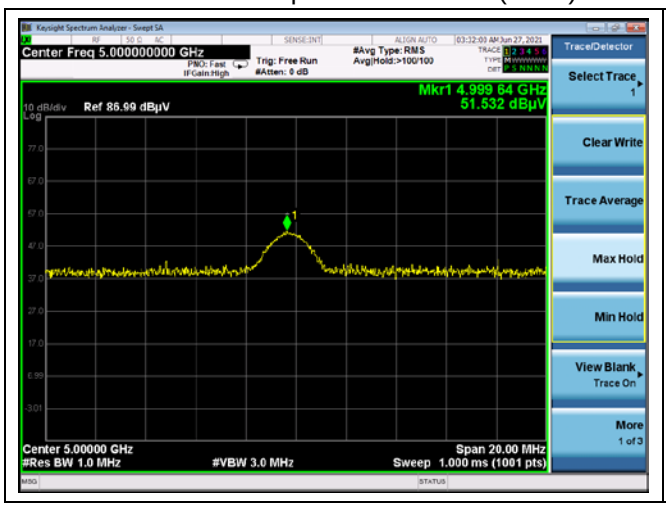
Low channel spurious emission (Peak)



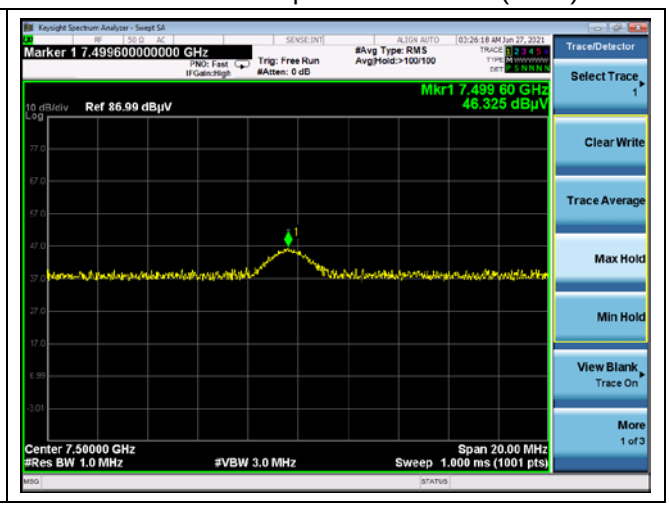
Low channel spurious emission (Peak)



Middle channel spurious emission (Peak)

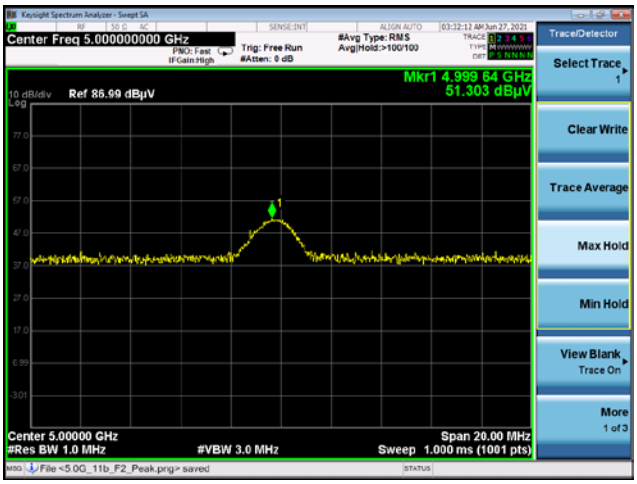


Middle channel spurious emission (Peak)

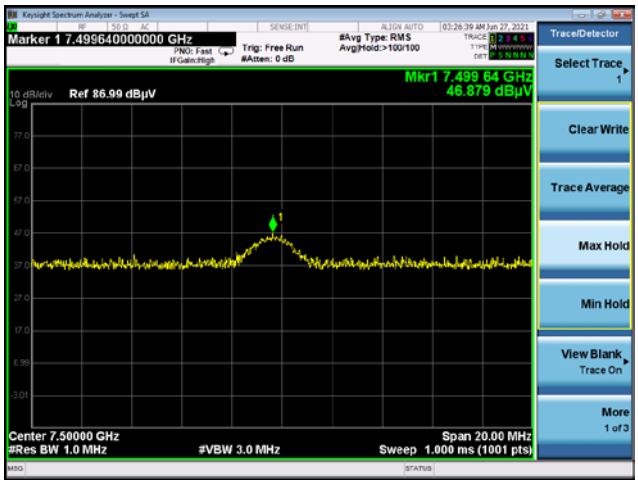


Middle channel 3rd harmonic (Peak)

High channel spurious emission (Peak)



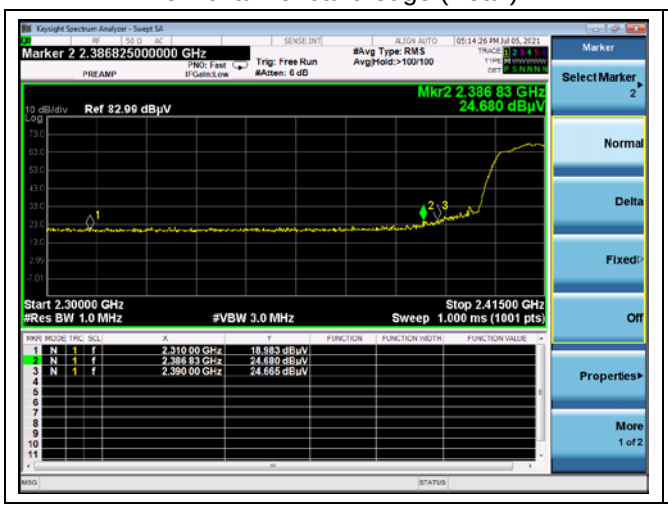
High channel spurious emission (Peak)



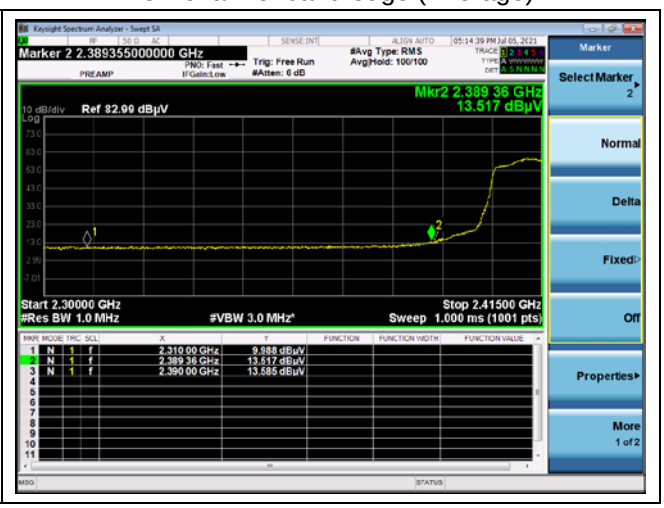
High channel 3rd harmonic (Peak)

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)

Low channel spurious emission (Peak)

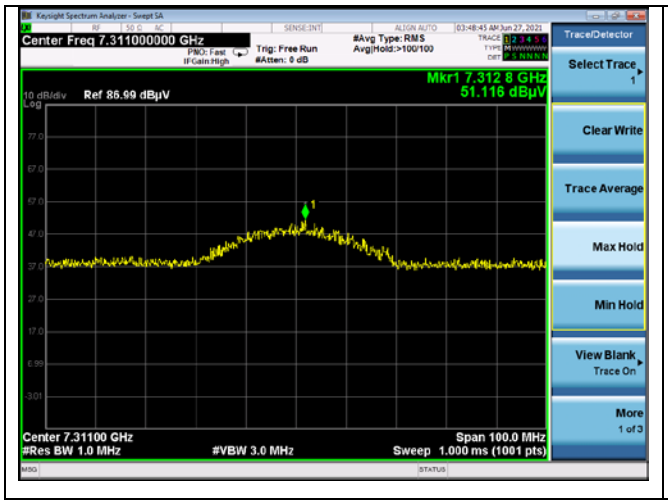
Low channel spurious emission (Peak)

Low channel 3rd harmonic (Peak)

Middle channel spurious emission (Peak)

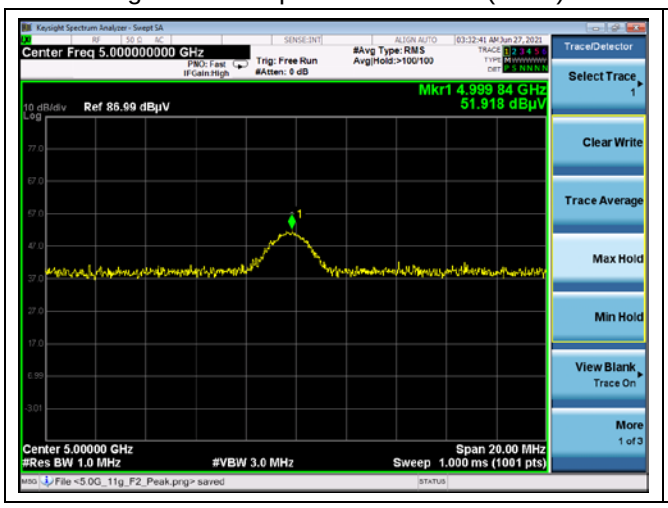
Middle channel spurious emission (Peak)

Middle channel 3rd harmonic (Peak)



Middle channel 3rd harmonic (Average)

High channel spurious emission (Peak)



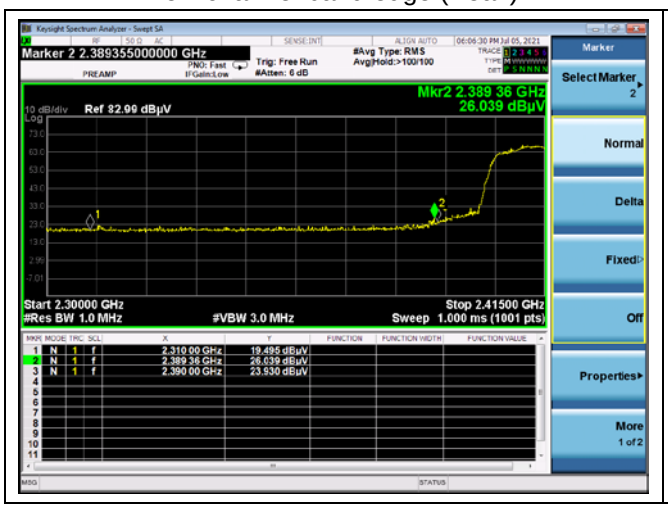
High channel spurious emission (Peak)

High channel 3rd harmonic (Peak)

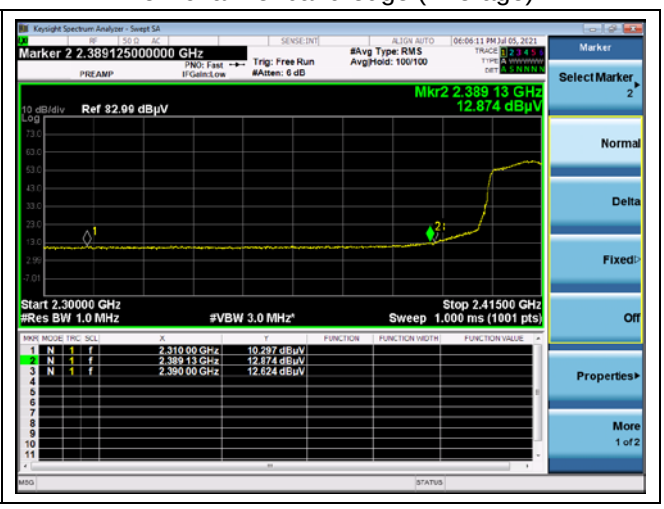
High channel 3rd harmonic (Average)

OFDM: 802.11n_HT20 (MCS0)

Low channel band edge (Peak)



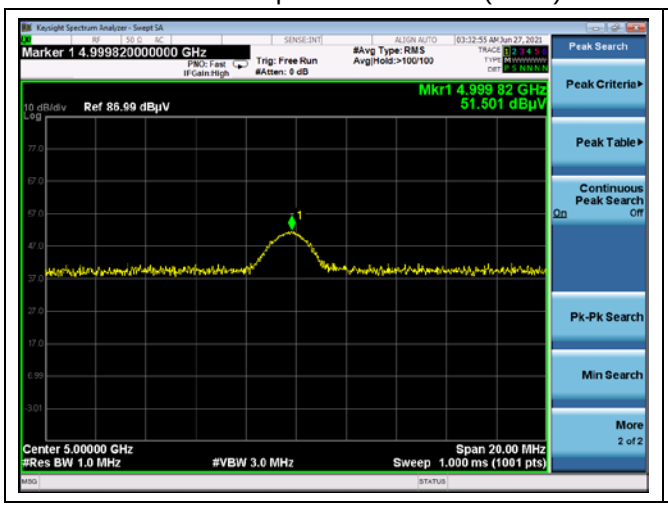
Low channel band edge (Average)



High channel band edge (Peak)

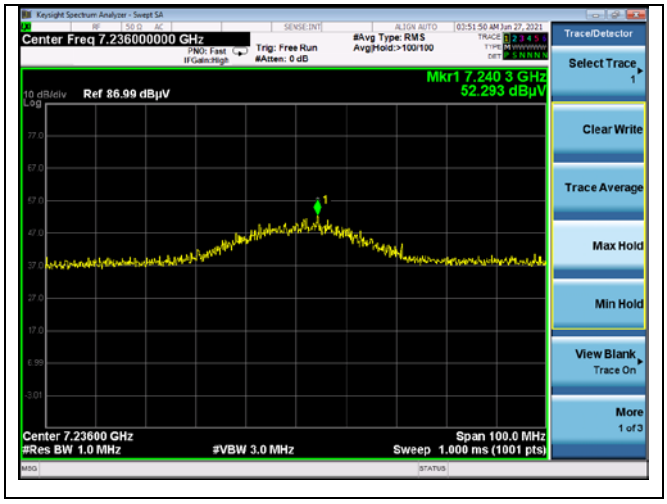
High channel band edge (Average)

Low channel spurious emission (Peak)

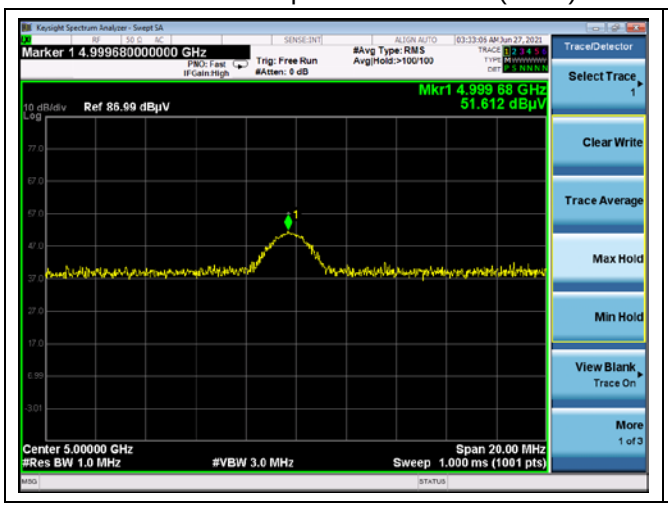


Low channel spurious emission (Peak)

Low channel 3rd harmonic (Peak)



Middle channel spurious emission (Peak)

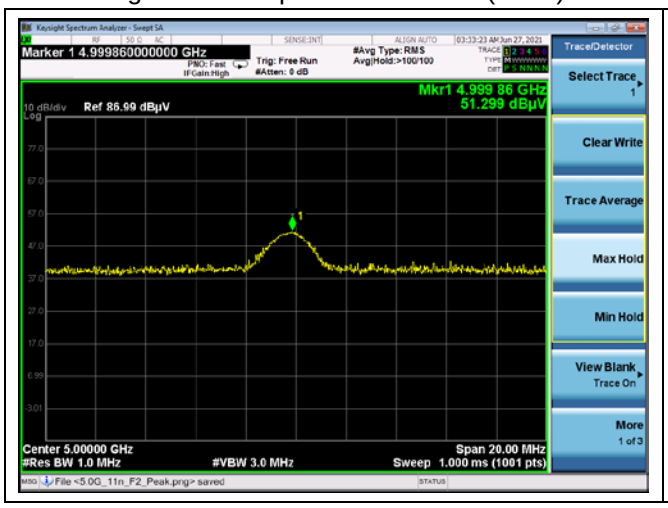


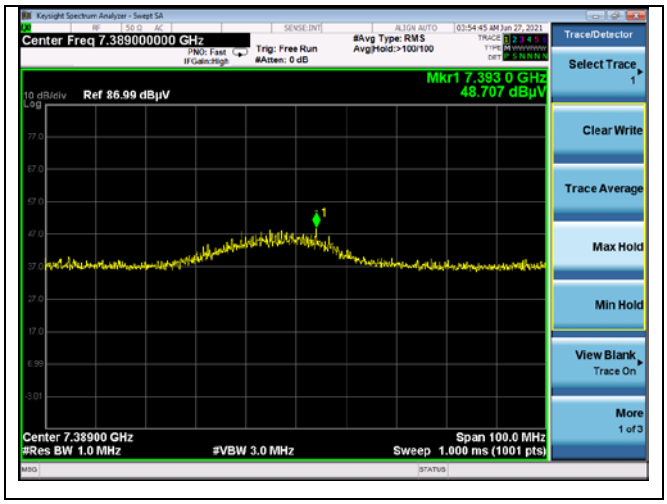
Middle channel spurious emission (Peak)

Middle channel 3rd harmonic (Peak)

Middle channel 3rd harmonic (Average)

High channel spurious emission (Peak)



High channel spurious emission (Peak)

High channel 3rd harmonic (Peak)