TEST REPORT

of

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

FCC ID: TQ8-VN470ZZZAN
IC Certification: 5074A-VN470ZZZKN

Equipment Under Test	:	Car infotainment system
Model Name	:	FCC: VN470ZZZAN IC: VN470ZZZKN
Variant Model Name(s)	:	Refer to the page 3
Applicant	:	Hyundai Mobis Co., Ltd.
Manufacturer	:	Hyundai Mobis Co., Ltd.
Date of Receipt	:	2022.08.10
Date of Test(s)	:	2022.09.16 ~ 2022.10.04
Date of Issue	:	2022.10.21

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

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Tested by: **Taek Kim**

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)
- 10-2, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- Designation number: KR0150

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1.2. Details of Applicant

Applicant : Hyundai Mobis Co., Ltd.
Address : 203, Teheran-ro, Gangnam-gu, Seoul, South Korea, 135-977
Contact Person : Choe, Seung-hoon
Phone No. : +82 31 260 0098

1.3. Details of Manufacturer

Company : Same as applicant
Address : Same as applicant

1.4. Description of EUT

Kind of Product	Car infotainment system
FCC Model Name	VN470ZZZAN
IC Model Name	VN470ZZZKN
FCC Variant Model Name	VN450ZZZAN
IC Variant Model Name	VN450ZZZKN
Serial Number	Conducted Sample: C-001 Radiated Sample: R-001
Power Supply	DC 14.4 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	Pattern antenna
Antenna Gain※	Port 2: 0.19 ㏈i
H/W Version	1.0
S/W Version	1.0
FVIN	N/A

1.5. Declaration by the Manufacturer

- WLAN 2.4G transmits only on Port 2.

1.6. Test Equipment List

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Interval	Cal. Due
Signal Generator	R&S	SMR40	100272	Jun. 16, 2022	Annual	Jun. 16, 2023
Signal Generator	R&S	SMBV100A	255834	May 25, 2022	Annual	May 25, 2023
Spectrum Analyzer	R&S	FSV30	103210	Dec. 08, 2021	Annual	Dec. 08, 2022
Spectrum Analyzer	Agilent	N9020A	MY53421758	Aug. 26, 2022	Annual	Aug. 26, 2023
Attenuator	AEROFLEX / INMET	40AH2W-10	40G-1	Jun. 08, 2022	Annual	Jun. 08, 2023
High Pass Filter	Wainwright Instrument GmbH	WHKX3.0/18G-6SS	21	Jun. 09, 2022	Annual	Jun. 09, 2023
High Pass Filter	Wainwright Instrument GmbH	WHNX7.5/26.5G-6SS	15	May 31, 2022	Annual	May 31, 2023
Low Pass Filter	Mini-Circuits	NLP-1200+	V 8979400903-2	Feb. 10, 2022	Annual	Feb. 10, 2023
Power Sensor	R&S	NRP-Z81	100669	May 06, 2022	Annual	May 06, 2023
DC Power Supply	Agilent	U8002A	MY54110041	Sep. 15, 2022	Annual	Sep. 15, 2023
Preamplifier	H.P.	8447F	2944A03909	Aug. 04, 2022	Annual	Aug. 04, 2023
Signal Conditioning Unit	R&S	SCU-18	10117	Jun. 13, 2022	Annual	Jun. 13, 2023
Preamplifier	TESTEK	TK-PA1840H	130016	Jan. 10, 2022	Annual	Jan. 10, 2023
Loop Antenna	Schwarzbeck Mess-Elektronik	FMZB 1519	1519-039	Aug. 23, 2021	Biennial	Aug. 23, 2023
Bilog Antenna	Schwarzbeck Mess-Elektronik	VULB 9163	01126	Feb. 07, 2022	Annual	Feb. 07, 2023
Horn Antenna	R&S	HF906	100326	Feb. 18, 2022	Annual	Feb. 18, 2023
Horn Antenna	Schwarzbeck Mess-Elektronik	BBHA 9170	9170-540	Nov. 30, 2021	Annual	Nov. 30, 2022
EMI Test Receiver	R&S	ESU26	100109	Jan. 18, 2022	Annual	Jan. 18, 2023
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.
Coaxial Cable	RFONE	MWX221-NMSNMS (4 m)	J1023142	Apr. 04, 2022	Semi-Annual	Oct. 04, 2022
Coaxial Cable	micro-coax UTiflex	142A SERIES 502839-8 (10 m)	90000034	Apr. 04, 2022	Semi-Annual	Oct. 04, 2022
Coaxial Cable	RFONE	PL360P-292M292M-1.5M-A	20200324002	Aug. 18, 2022	Semi-Annual	Feb. 18, 2023

1.7. 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	N/A[1)]

Note;

1) The AC power line test was not performed because the EUT use battery power for operation and which do not operate from the AC power lines.

1.8. 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.

1.9. Sample Calculation

Where relevant, the following sample calculation is provided:

1.9.1. Conducted Test

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

1.9.2. Radiation Test

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

1.10. Information of software for test

- Operating software of EUT has integrated test interface. No additional software was used.

1.11. Test Report Revision

Revision	Report Number	Date of Issue	Description
0	F690501-RF-RTL003492	2022.10.21	Initial

1.12. Measurement Uncertainty

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

Parameter	Uncertainty	
RF Output Power	0.32 dB	
Occupied Bandwidth	3.90 kHz	
Conducted Spurious Emission	0.61 dB	
Power Spectral Density	0.62 dB	
Radiated Emission, 9 kHz to 30 MHz	H	3.30 dB
	V	3.30 dB
Radiated Emission, below 1 GHz	H	4.80 dB
	V	5.20 dB
Radiated Emission, above 1 GHz	H	3.90 dB
	V	4.00 dB

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

1.13. Worst-Case Configuration and Test Mode

802.11b mode:
We found out the test mode with the highest power level after we analyze all the data rates. 11 Mbps data rate among 1 Mbps, 2 Mbps, 5.5 Mbps and 11 Mbps is chosen as worst case.

802.11g mode:
We found out the test mode with the highest power level after we analyze all the data rates. 9 Mbps data rate among 6 Mbps, 9 Mbps, 12 Mbps, 18 Mbps, 24 Mbps, 36 Mbps, 48 Mbps and 54 Mbps is chosen as worst case.

802.11n_HT20 mode:
We found out the test mode with the highest power level after we analyze all the data rates. MCS0 data rate among MCS0, MCS1, MCS2, MCS3, MCS4, MCS5, MCS6 and MCS7 is chosen as worst case.

Radiated emission below 1GHz was performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

Radiated emission above 1GHz was performed with the EUT set to transmit Low/Middle/High Channels.

Conducted tests were performed with the EUT set to transmit Low/Middle/High channels with highest output power.

1.14. Description of Variant Models

Model Names			Description							
			Marketing Area	BT	WLAN	Speaker ch.	RVM Camera	Built-in Camera	SVM Camera	ICC Camera
Basic Model	FCC	VN470ZZZAN	U.S.A	O	O	10	O	O	O	O
	IC	VN470ZZZKN	Canada	O	O	10	O	O	O	O
Variant Model	FCC	VN450ZZZAN	U.S.A	O	O	6	O	X	X	X
	IC	VN450ZZZKN	Canada	O	O	6	O	X	X	X

Note;

All the test was performed with basic model.

1.15. 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.

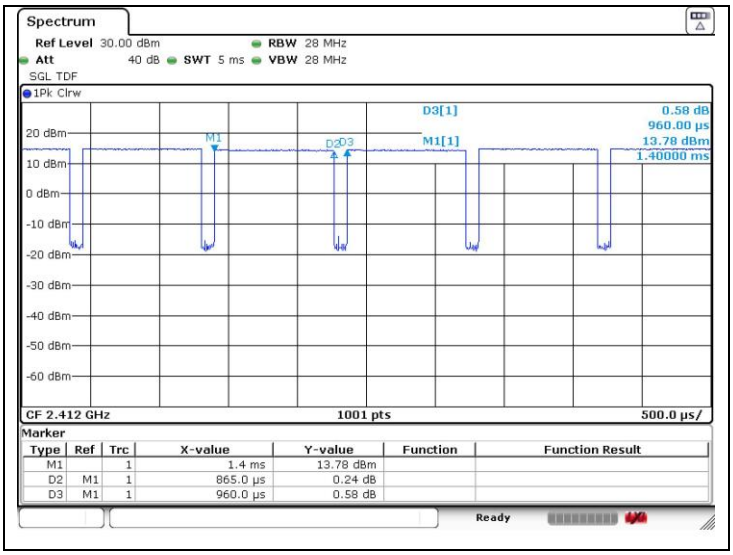
Mode	Data Rate (Mbps)	Duty Cycle (%)	Correction Factor (dB)
11b	11	90.10	0.45
11g	9	88.68	0.52
11n_HT20	MCS0	91.00	0.41

Remark;

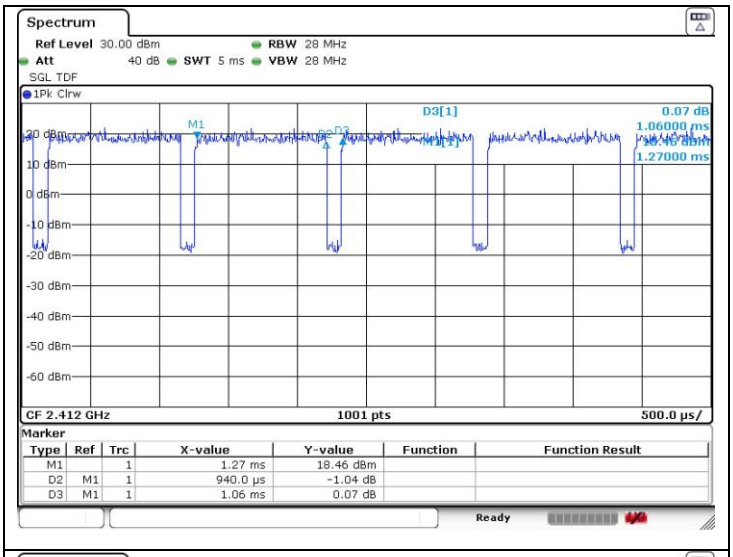
1. As measured duty cycles of EUT, all of mode and data rate keeps constant period and are converted to log scale (power averaging) to compensate correction factor to result of average test items.
2. Duty Cycle (%) = (Tx on time / Tx on + off time) x 100
3. Correction Factor (dB) = 10 log (1 / Duty Cycle)

- Test plots

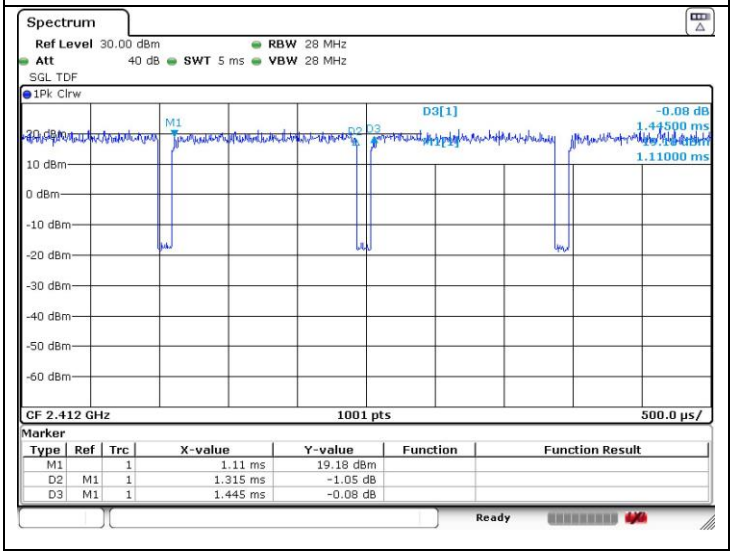
802.11b



802.11g



802.11n_HT20

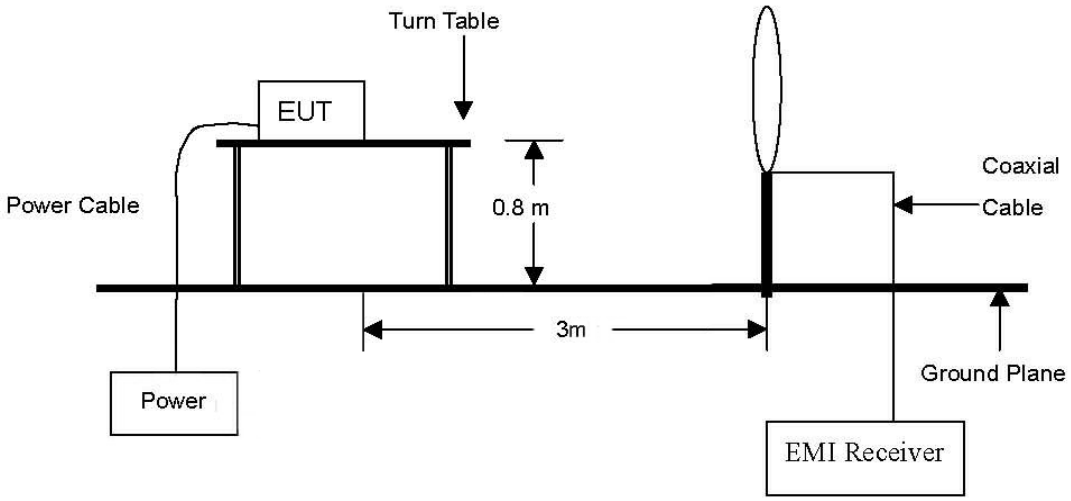


2. Transmitter Radiated Spurious Emissions and Conducted Spurious Emission

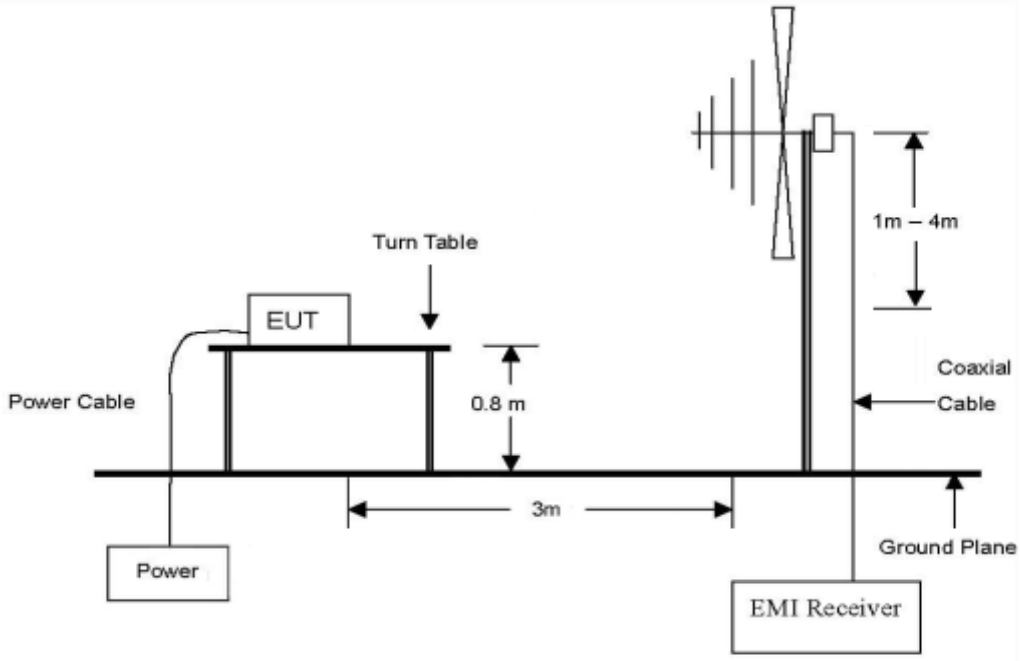
2.1. Test Setup

2.1.1. Transmitter Radiated Spurious Emissions

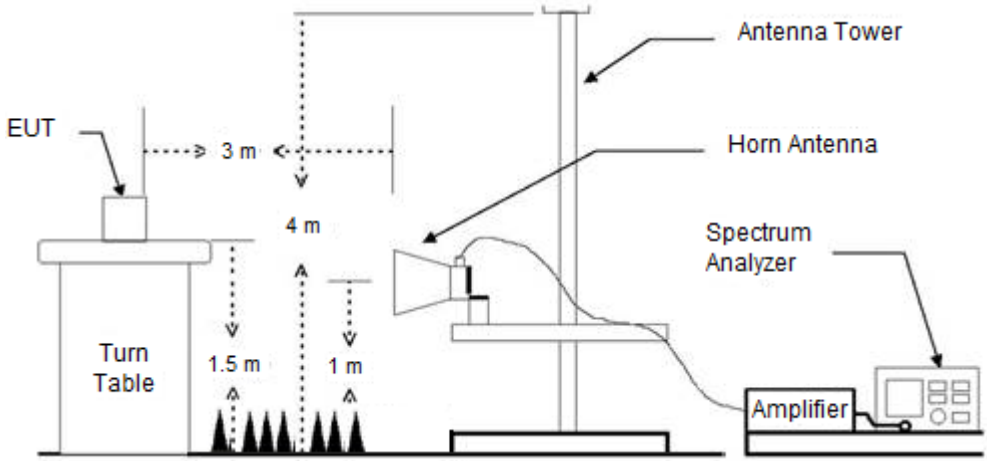
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 ㎑ to 30 ㎒ emissions.



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 (㎛V/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. For measurements below 1 ㎓ resolution bandwidth is set to 100 ㎑ for peak detection measurements or 120 ㎑ for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.
6. For measurements Above 1 ㎓ resolution bandwidth is set to 1 ㎒, the video bandwidth is set to 3 ㎒ for peak measurements and as applicable for average measurements.

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.

3. Definition of DUT Axis.

The test orthogonal plan of EUT was investigated with three axis described in the test setup photo.
The Z-axis was worst-case, all radiated testing of EUT was performed with **Z-axis**.

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 ㎒

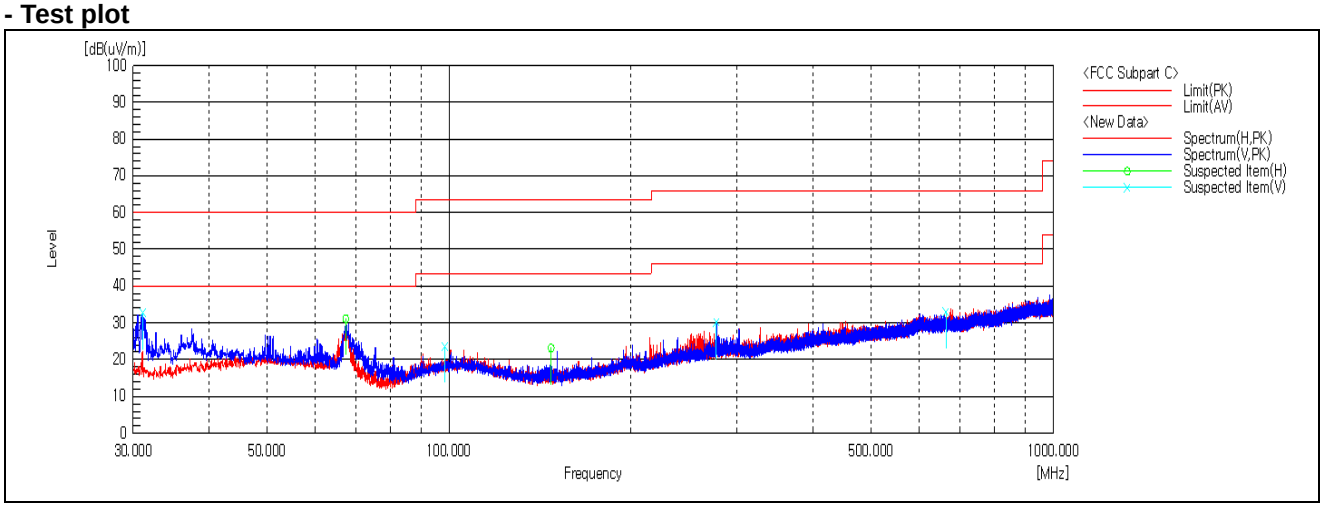
The frequency spectrum from 9 ㎑ to 1 000 ㎒ was investigated. All reading values are peak values.

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)
31.09	42.90	Peak	V	16.49	-26.71	**32.68**	40.00	7.32
67.43	41.20	Peak	H	16.17	-26.22	31.15	40.00	8.85
98.30	32.20	Peak	V	17.53	-26.01	23.72	43.50	19.78
277.03	35.90	Peak	V	18.58	-24.29	30.19	46.00	15.81
664.38	31.50	Peak	V	25.30	-23.77	33.03	46.00	12.97
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 **11g / 9 Mbps / High 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

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	13.45	Peak	H	27.80	9.67	-	50.92	74.00	23.08
*2 310.00	3.22	Average	H	27.80	9.67	0.45	41.14	54.00	12.86
*2 353.43	15.60	Peak	H	27.82	9.70	-	53.12	74.00	20.88
*2 386.06	4.45	Average	H	28.02	9.78	0.45	42.70	54.00	11.30
*2 390.00	14.29	Peak	H	28.04	9.80	-	52.13	74.00	21.87
*2 390.00	3.61	Average	H	28.04	9.80	0.45	41.90	54.00	12.10

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)
*11 673.16	33.19	Peak	H	38.75	-19.50	-	52.44	74.00	21.56
Above 11 700.00	Not detected	-	-	-	-	-	-	-	-

Mid 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)
*7 310.80	42.16	Peak	H	36.02	-25.61	-	52.57	74.00	21.43
*11 673.18	33.39	Peak	H	38.75	-19.50	-	52.64	74.00	21.36
Above 11 700.00	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	14.00	Peak	H	28.13	10.04	-	52.17	74.00	21.83
*2 483.50	4.04	Average	H	28.13	10.04	0.45	42.66	54.00	11.34
*2 497.60	15.44	Peak	H	28.10	10.16	-	53.70	74.00	20.30
*2 493.89	4.71	Average	H	28.11	10.13	0.45	43.40	54.00	10.60
*2 500.00	13.54	Peak	H	28.10	10.18	-	51.82	74.00	22.18
*2 500.00	3.99	Average	H	28.10	10.18	0.45	42.72	54.00	11.28

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)
*7 386.00	42.69	Peak	H	36.03	-24.60	-	54.12	74.00	19.88
*7 385.35	32.56	Average	H	36.03	-24.57	0.45	**44.47**	54.00	9.53
*11 673.51	33.51	Peak	H	38.75	-19.50	-	52.76	74.00	21.24
Above 11 700.00	Not detected	-	-	-	-	-	-	-	-

OFDM: 802.11g

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	14.30	Peak	H	27.80	9.67	-	51.77	74.00	22.23
*2 310.00	3.86	Average	H	27.80	9.67	0.52	41.85	54.00	12.15
*2 389.83	16.67	Peak	H	28.04	9.80	-	54.51	74.00	19.49
*2 356.42	4.21	Average	H	27.84	9.70	0.52	42.27	54.00	11.73
*2 390.00	14.47	Peak	H	28.04	9.80	-	52.31	74.00	21.69
*2 390.00	4.56	Average	H	28.04	9.80	0.52	42.92	54.00	11.08

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)
7 237.50	45.26	Peak	H	35.85	-25.57	-	55.54	74.00	18.46
*11 673.48	33.47	Peak	H	38.75	-19.50	-	52.72	74.00	21.28
Above 11 700.00	Not detected	-	-	-	-	-	-	-	-

Mid 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)
*7 312.70	44.19	Peak	H	36.03	-25.60	-	54.62	74.00	19.38
*7 310.90	31.64	Average	H	36.02	-25.61	0.52	42.57	54.00	11.43
*11 673.54	33.32	Peak	H	38.75	-19.50	-	52.57	74.00	21.43
Above 11 700.00	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	15.91	Peak	H	28.13	10.04	-	54.08	74.00	19.92
*2 483.50	4.72	Average	H	28.13	10.04	0.52	43.41	54.00	10.59
*2 486.12	17.39	Peak	H	28.13	10.06	-	55.58	74.00	18.42
*2 487.59	5.18	Average	H	28.12	10.07	0.52	43.89	54.00	10.11
*2 500.00	15.19	Peak	H	28.10	10.18	-	53.47	74.00	20.53
*2 500.00	4.31	Average	H	28.10	10.18	0.52	43.11	54.00	10.89

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)
*7 388.15	43.15	Peak	H	36.02	-24.70	-	54.47	74.00	19.53
*7 389.65	31.31	Average	H	36.02	-24.77	0.52	43.08	54.00	10.92
*11 673.46	33.84	Peak	H	38.75	-19.50	-	53.09	74.00	20.91
Above 11 700.00	Not detected	-	-	-	-	-	-	-	-

OFDM: 802.11n_HT20

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	13.67	Peak	H	27.80	9.67	-	51.14	74.00	22.86
*2 310.00	4.08	Average	H	27.80	9.67	0.41	41.96	54.00	12.04
*2 383.59	16.15	Peak	H	28.00	9.76	-	53.91	74.00	20.09
*2 384.89	4.61	Average	H	28.01	9.77	0.41	42.80	54.00	11.20
*2 390.00	15.36	Peak	H	28.04	9.80	-	53.20	74.00	20.80
*2 390.00	4.16	Average	H	28.04	9.80	0.41	42.41	54.00	11.59

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)
7 234.95	45.05	Peak	H	35.84	-25.63	-	55.26	74.00	18.74
*11 673.62	34.87	Peak	H	38.75	-19.50	-	54.12	74.00	19.88
*11 673.40	26.68	Average	H	38.75	-19.50	0.41	**46.34**	54.00	7.66
Above 11 700.00	Not detected	-	-	-	-	-	-	-	-

Mid 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)
*7 310.20	44.84	Peak	H	36.02	-25.61	-	55.25	74.00	18.75
*7 312.20	31.48	Average	H	36.02	-25.60	0.41	42.31	54.00	11.69
*11 673.65	32.96	Peak	H	38.75	-19.49	-	52.22	74.00	21.78
Above 11 700.00	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	14.48	Peak	H	28.13	10.04	-	52.65	74.00	21.35
*2 483.50	4.99	Average	H	28.13	10.04	0.41	43.57	54.00	10.43
*2 486.40	17.78	Peak	H	28.13	10.06	-	55.97	74.00	18.03
*2 493.12	4.92	Average	H	28.11	10.12	0.41	43.56	54.00	10.44
*2 500.00	14.42	Peak	H	28.10	10.18	-	52.70	74.00	21.30
*2 500.00	4.19	Average	H	28.10	10.18	0.41	42.88	54.00	11.12

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)
*7 387.80	43.45	Peak	H	36.02	-24.68	-	54.79	74.00	19.21
*7 385.95	30.61	Average	H	36.03	-24.59	0.41	42.46	54.00	11.54
*11 673.25	33.60	Peak	H	38.75	-19.50	-	52.85	74.00	21.15
Above 11 700.00	Not detected	-	-	-	-	-	-	-	-

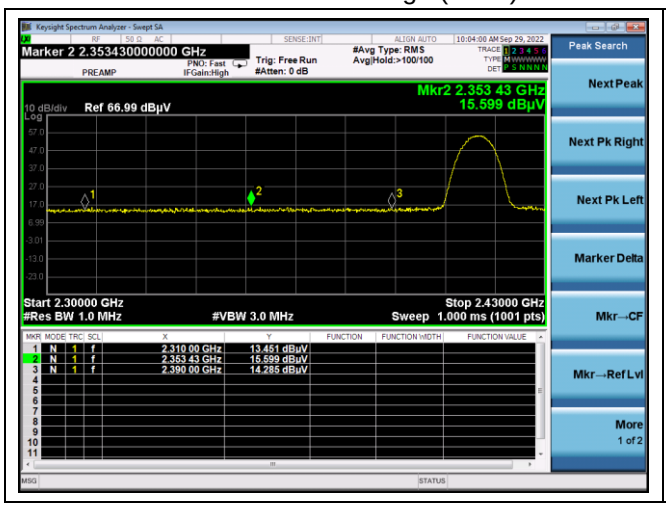
Remarks;

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.

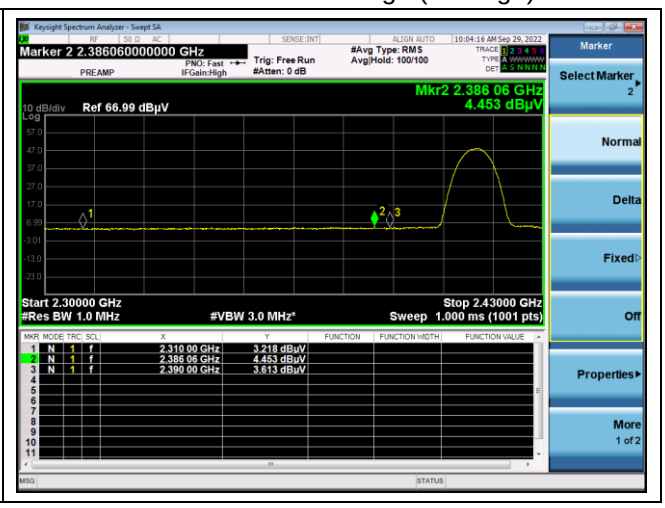
- Test plots

DSSS: 802.11b

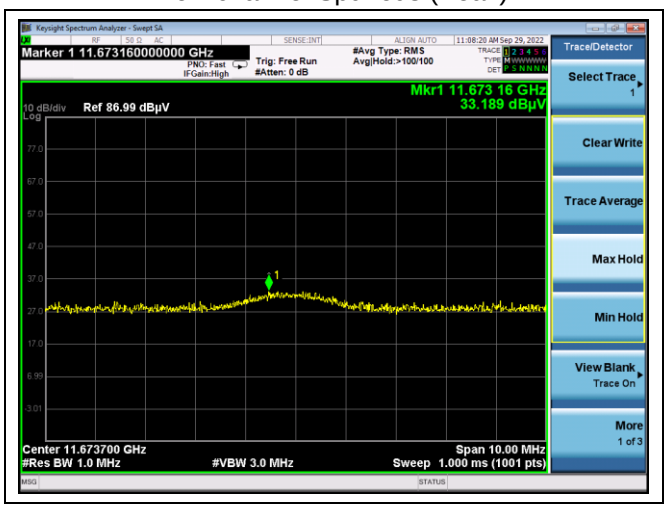
Low channel band edge (Peak)



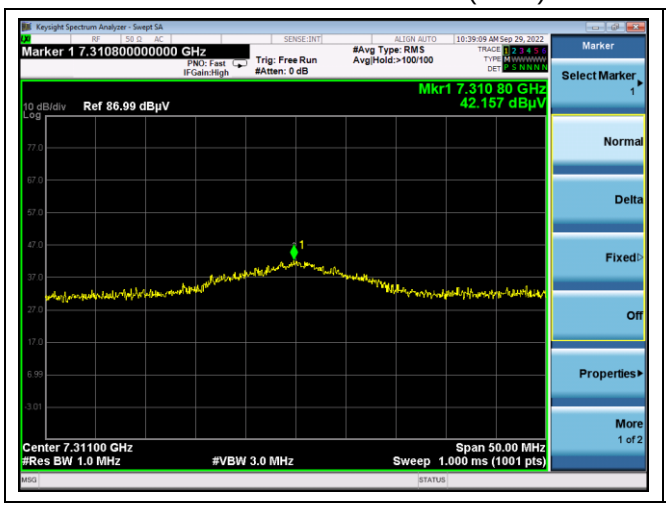
Low channel band edge (Average)



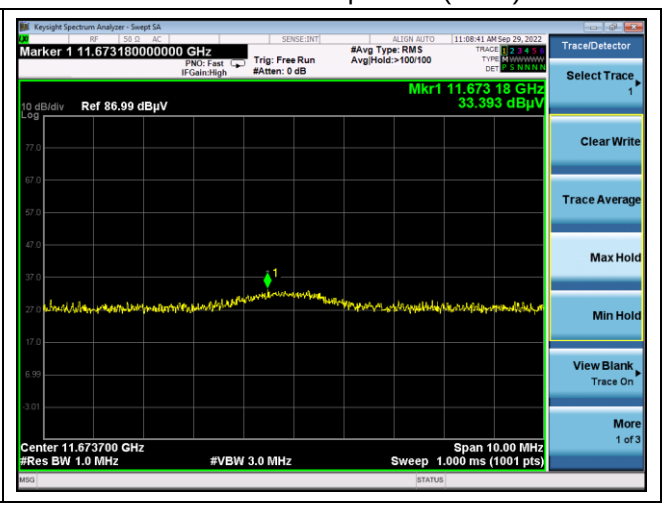
Low channel Spurious (Peak)



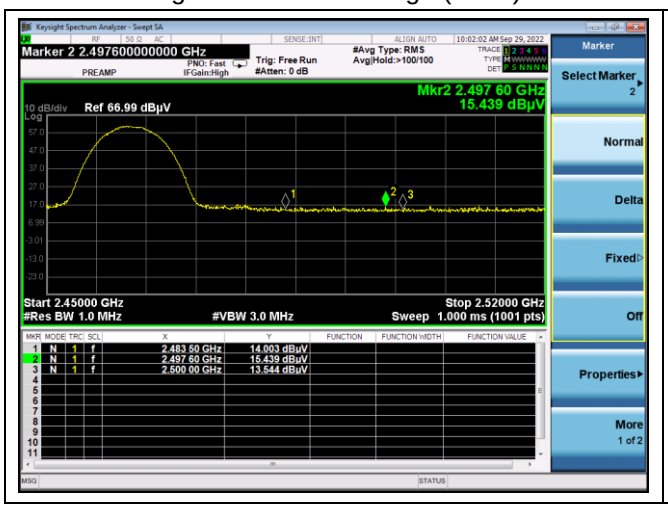
Middle channel 3rd Harmonic (Peak)



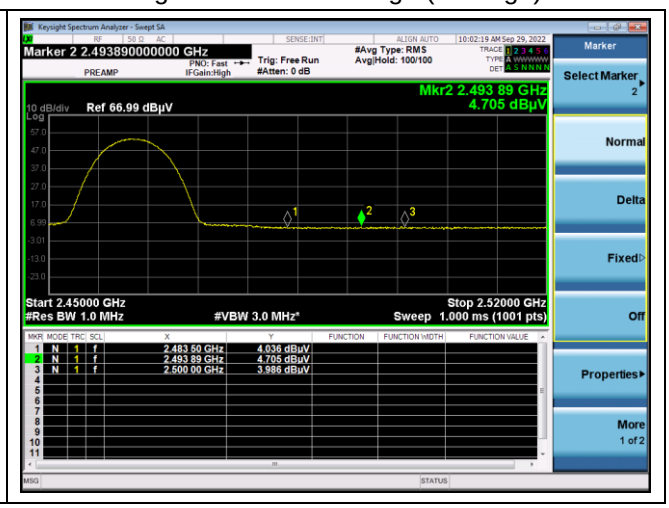
Middle channel Spurious (Peak)



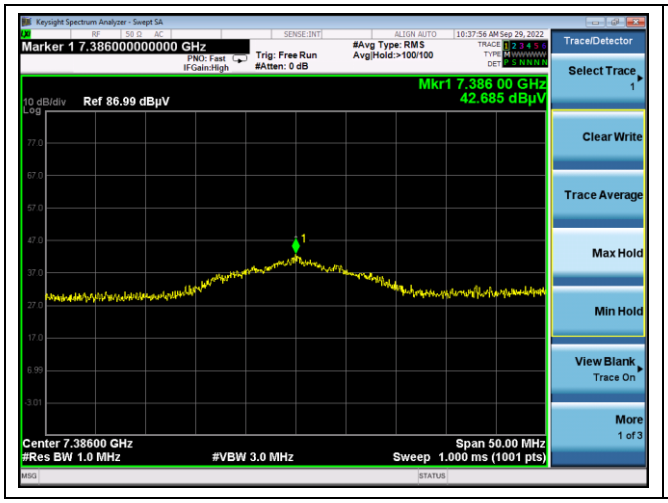
High channel band edge (Peak)



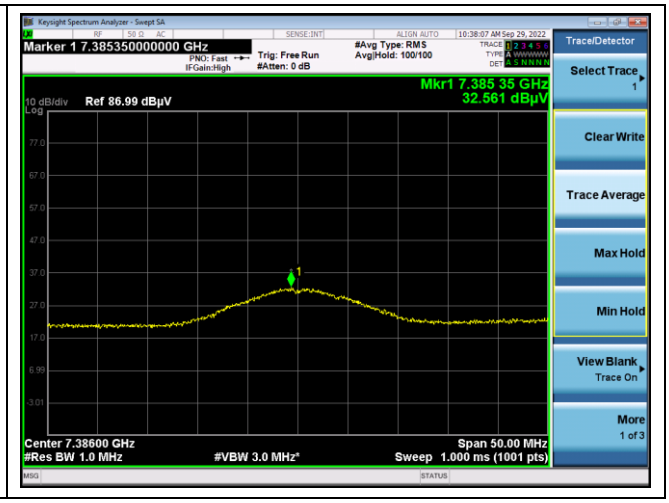
High channel band edge (Average)



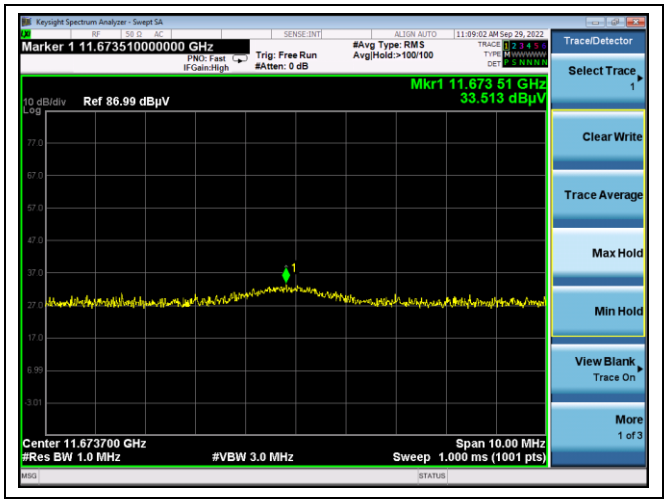
High channel 3rd Harmonic (Peak)



High channel 3rd Harmonic (Average)

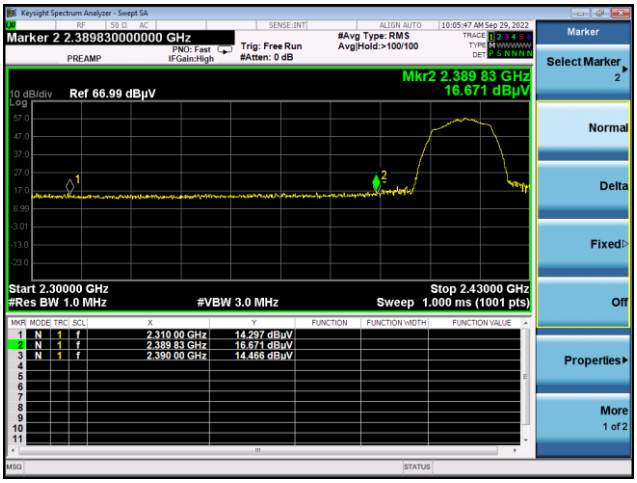


High channel Spurious (Peak)

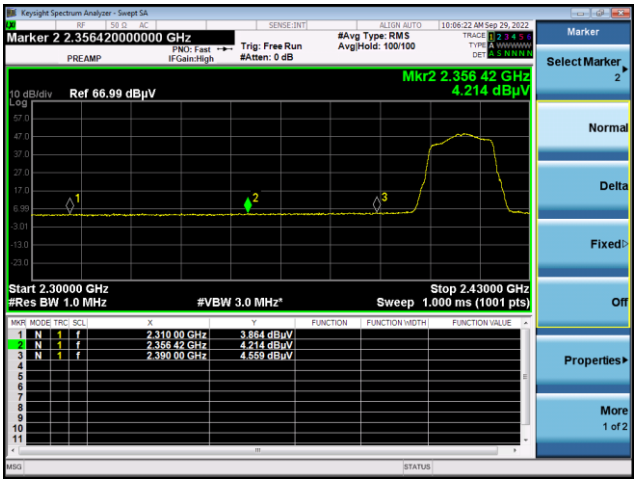


OFDM: 802.11g

Low channel band edge (Peak)

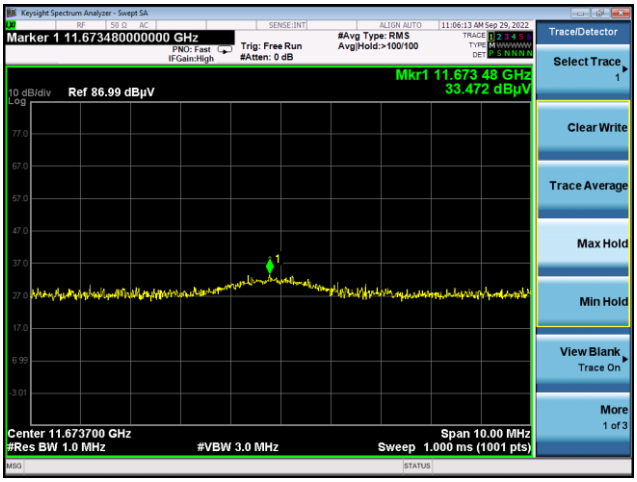


Low channel band edge (Average)



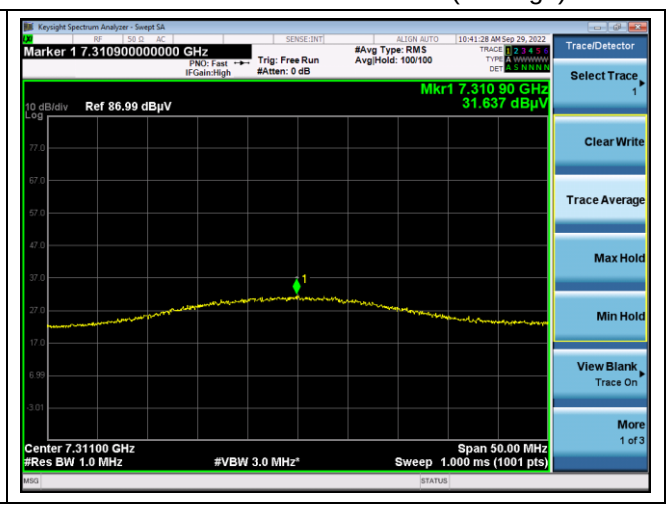
Low channel 3rd Harmonic (Peak)

Low channel Spurious (Peak)

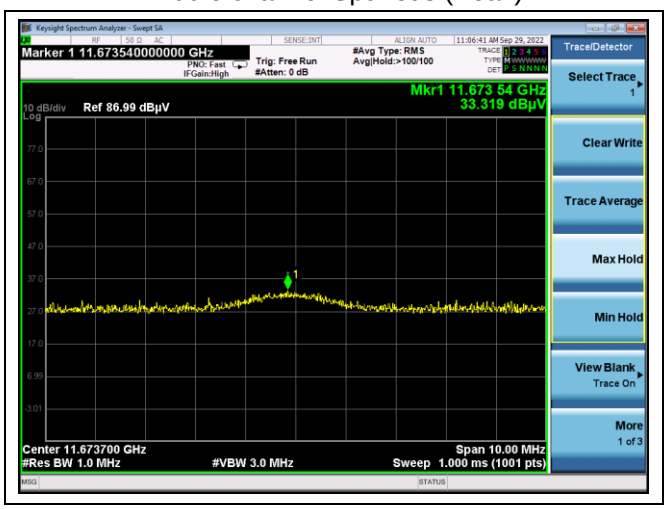


Middle channel 3rd Harmonic (Peak)

Middle channel 3rd Harmonic (Average)

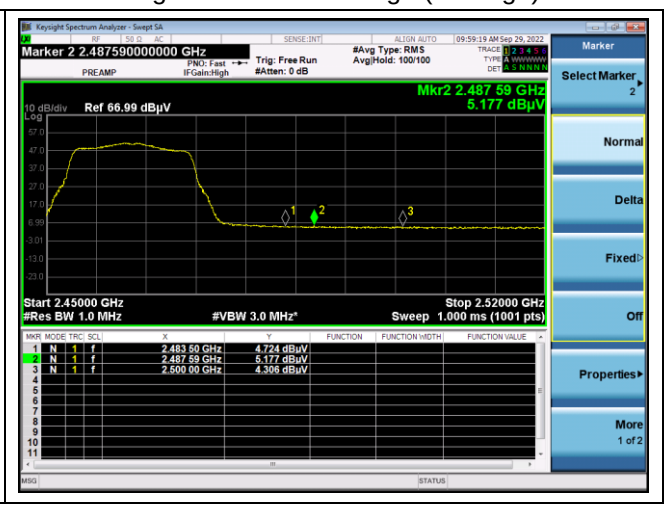


Middle channel Spurious (Peak)



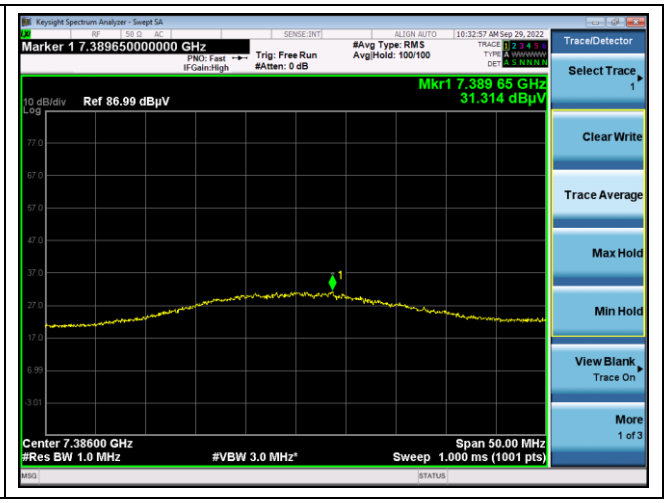
High channel band edge (Peak)

High channel band edge (Average)

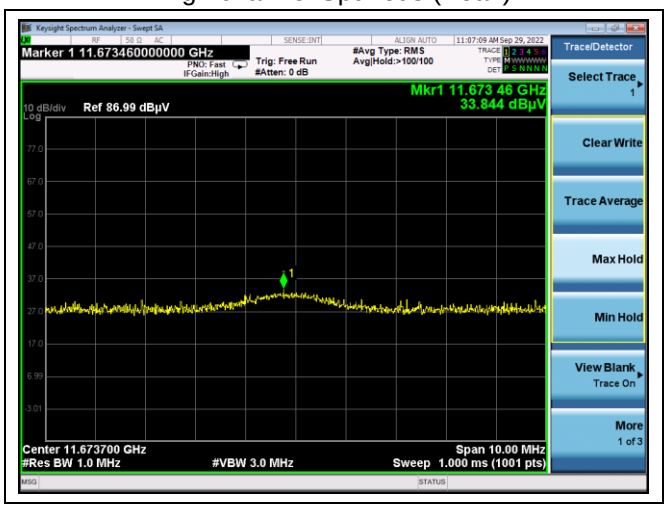


High channel 3rd Harmonic (Peak)

High channel 3rd Harmonic (Average)

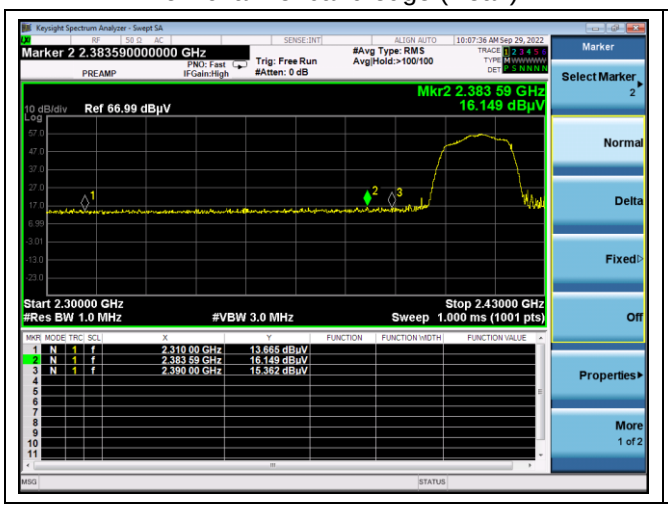


High channel Spurious (Peak)

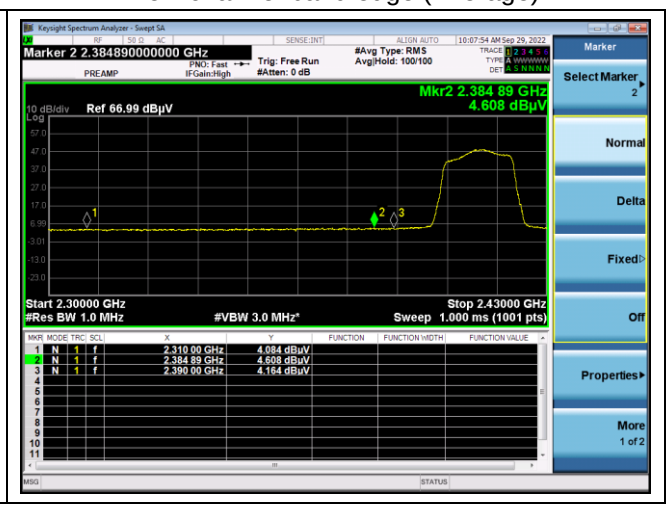


OFDM: 802.11n_HT20

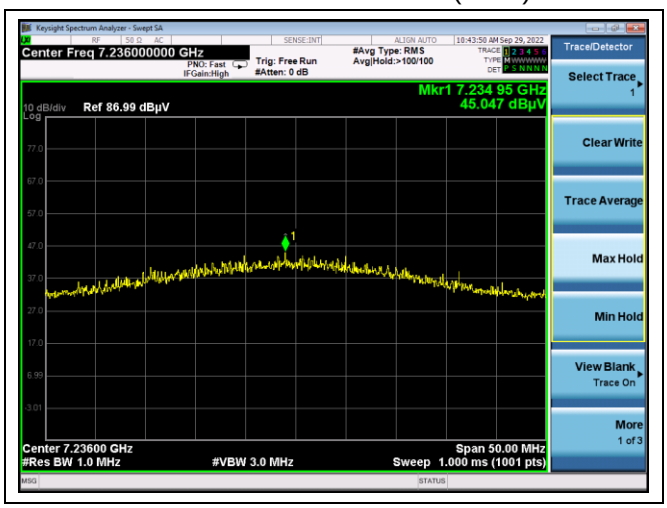
Low channel band edge (Peak)



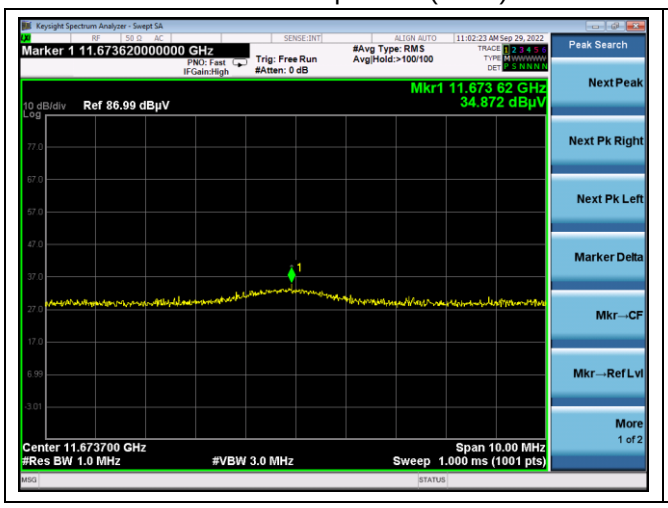
Low channel band edge (Average)



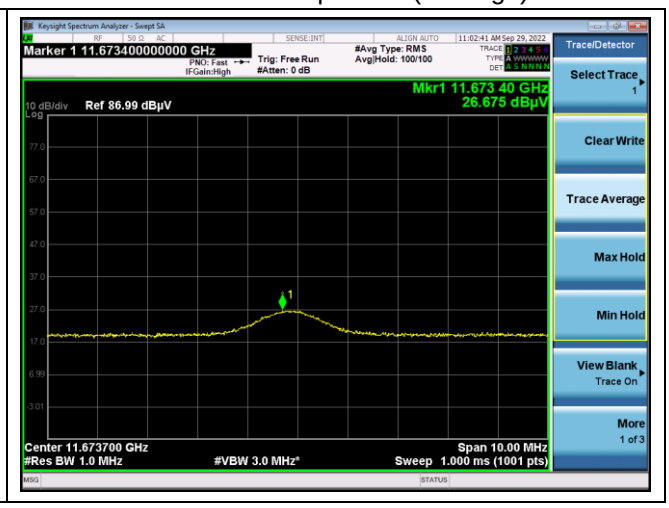
Low channel 3rd Harmonic (Peak)



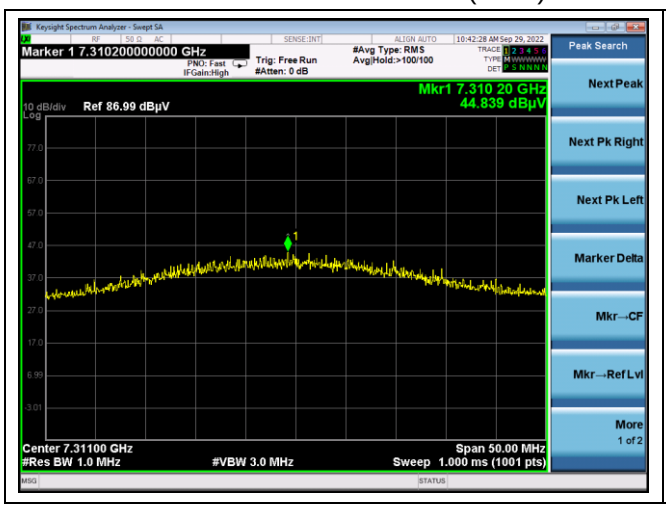
Low channel Spurious (Peak)

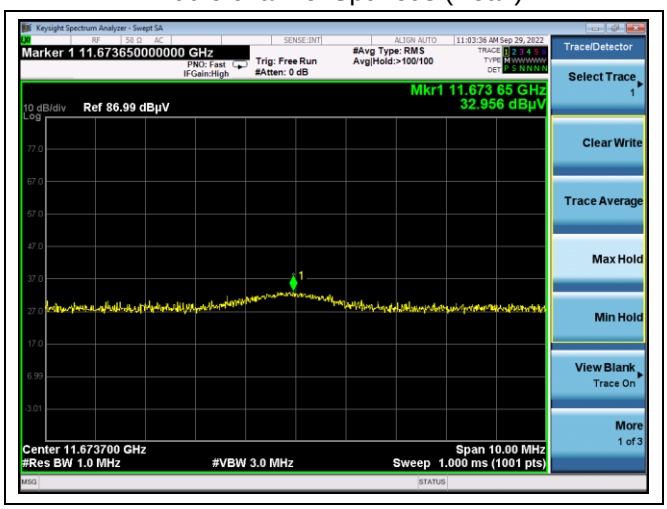


Low channel Spurious (Average)



Middle channel 3rd Harmonic (Peak)



Middle channel 3rd Harmonic (Average)

Middle channel Spurious (Peak)