



FCC Test Report

Report No.: BUMK-ESH-P20102044B-1

FCC ID: 2AWXZTY-R8822

Product: Smart Camera

Model: SC002-WP2

Received Date: Oct.30, 2020

Test Date: Nov.02 to Nov.18, 2020

Issued Date: Nov.19, 2020

Applicant: Zhejiang Tuya Smart Electronics Co., Ltd

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Issued By: BUREAU VERITAS ADT (Shanghai) Corporation

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Release Control Record

Issue No.	Description	Date Issued
BUMK-ESH-P20102044B-1	Original release	Nov.19, 2020

1 Certificate of Conformity

Product: Smart Camera

Brand: --

Model: SC002-WP2

Applicant: Zhejiang Tuya Smart Electronics Co., Ltd

Test Date: Nov.02 to Nov.18, 2020

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10:2013

The above equipment has been tested by **BUREAU VERITAS ADT (Shanghai) Corporation**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by :



, **Date:**

Nov.19, 2020

Yuan ZHANG
Project Engineer

Approved by :



, **Date:**

Nov.19, 2020

Daniel Sun
EMC Lab Manager



2 Summary of Test Results

The EUT has been tested according to the following specifications:

47 CFR FCC Part 15, Subpart C (SECTION 15.247)			
FCC Clause	Test Item	Result	Remarks
15.203	Antenna Requirement	PASS	No antenna connector is used.
15.207	AC Power Conducted Emission	PASS	Meet the requirement of limit.
15.247(a)(2)	Minimum 6dB Bandwidth	PASS	Meet the requirement of limit.
15.247(b)	Conducted Output Power	PASS	Meet the requirement of limit.
15.247(e)	Power Spectral Density	PASS	Meet the requirement of limit.
15.247(d)	Conducted Band Edges Measurement	PASS	Meet the requirement of limit.
15.247(d)	Conducted Spurious Emissions	PASS	Meet the requirement of limit.
15.247(d)	Emissions in restricted frequency bands	PASS	Meet the requirement of limit.
15.205 / 15.209 / 15.247(d)	Radiated Emissions Measurement	PASS	Meet the requirement of limit.

2.1 Test Instruments

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
Hybrid Antenna(25MHz-1.5GHz)	Schwarzbeck	VULB9168	E1A1012	Jul.29, 20	Jul.28, 22
Horn Antenna(1GHz -18GHz)	Schwarzbeck	BBHA9120D	E1A1017	Aug.25, 20	Aug.24, 22
Double Ridge Horn Antenna(18G-40G)	COM-POWER	AH-840	E1A1040	Jul.15, 20	Jul.14, 22
Pre-Amplifier(100kHz-1.3GHz)	Agilent	8447D	E1A2001	Apr.20, 20	Apr.19, 21
Pre-Amplifier(0.5GHz-18GHz)	EMCI	EMC184045SE	E1A2009	Jul.06, 20	Jul.05, 21
Pre-Amplifier(18GHz-40GHz)	EMCI	EMC051845SE	E1A2008	Jul.06, 20	Jul.05, 21
EMI test receiver	R&S	ESR7	E1R1005	Apr.20, 20	Apr.19, 21
Spectrum Analyzer	Keysight	N9030B	E1S1003	Jul.23, 20	Jul.22, 21
Spectrum Analyzer	Keysight	N9020A	E1S1004	Mar.03, 20	Mar.02, 21
EMI test receiver	R&S	ESCS30	E1R1001	May.12, 20	May.11, 21
LISN	R&S	ENV216	E1L1011	May.12, 20	May.11, 21
Humidity&Temp Tester	Baolima	WS508	E1H1011	Apr. 03, 20	Apr. 02, 21
RF Control Unit	Toscend	JS0806-2	E1C5003	N/A	N/A
Test Software	ADT	ADT_COND_V7 .3.1	N/A	N/A	N/A
Test Software	Toscend	JS32-RE	N/A	N/A	N/A
Test Software	Toscend	JS1120	N/A	N/A	N/A
Test Software	Toscend	JS1120-3	N/A	N/A	N/A

2.2 Measurement Uncertainty

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

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Measurement	Frequency	Expanded Uncertainty ($k=2$) ($\pm$)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.83 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.36 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	3.47 dB
	6GHz ~ 18GHz	3.75 dB
	18GHz ~ 40GHz	3.30 dB

2.3 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Smart Camera
Brand	--
Test Model	SC002-WP2
Model Difference	--
Power Rating	5VDC/1A with adaptor 100-240V~,50/60Hz
Adapter Information	1) KA06E-0501000US I/P:100-240Vac, 50/60Hz, 0.25A O/P:5Vdc, 1A 2) TEKA-UCA10US I/P:100-240Vac, 50/60Hz, 0.2A O/P:5Vdc, 1A
Modulation Type	DSSS, OFDM
Modulation Technology	802.11b/g/n20
Operating Frequency	See clause 3.2
Number of Channel	See clause 3.2
Antenna Type	PCB Antenna
Antenna Connector	--
Antenna Gain	1.55dBi

Note: For more details, please refer to the User's manual of the EUT.

Modulation Mode	TX /RX Function
802.11b	1TX / 1RX
802.11g	1TX / 1RX
802.11n (HT20)	1TX / 1RX

3.2 Description of Test Modes

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20).

Channel	Frequency	Channel	Frequency
1	2412MHz	7	2442MHz
2	2417MHz	8	2447MHz
3	2422MHz	9	2452MHz
4	2427MHz	10	2457MHz
5	2432MHz	11	2462MHz
6	2437MHz	-	-

3.2.1 Test Mode Applicability:

EUT Configure Mode	Applicable to				Description
	RE ≥ 1G	RE < 1G	PLC	APCM	
-	√	√	√	√	-

Where **RE≥1G**: Radiated Emission above 1GHz **RE≤1G**: Radiated Emission below 1GHz
PLC: Power Line Conducted Emission **APCM**: Antenna Port Conducted Measurement

Radiated Emission Test (Above 1 GHz):

- ☒ ☐ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 13	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 13	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 13	1, 6, 11	OFDM	BPSK	6.5

Radiated Emission Test (Below 1 GHz):

- ☒ ☐ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Power Line Conducted Emission Test:

- ☒ ☐ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1	DSSS	DBPSK	1.0

Antenna Port Conducted Measurement

- ☒ ☐ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5

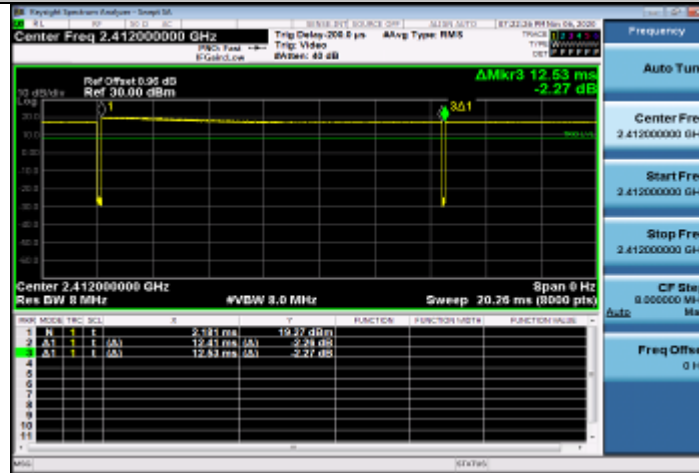
3.2.2 Test Condition:

Applicable to	Normal Environmental Conditions	Normal Input Power
RE ≥ 1G	25deg. C, 60%RH	120Vac, 60Hz
RE < 1G	25deg. C, 60%RH	120Vac, 60Hz
PLC	25deg. C, 60%RH	120Vac, 60Hz
APCM	25deg. C, 60%RH	120Vac, 60Hz

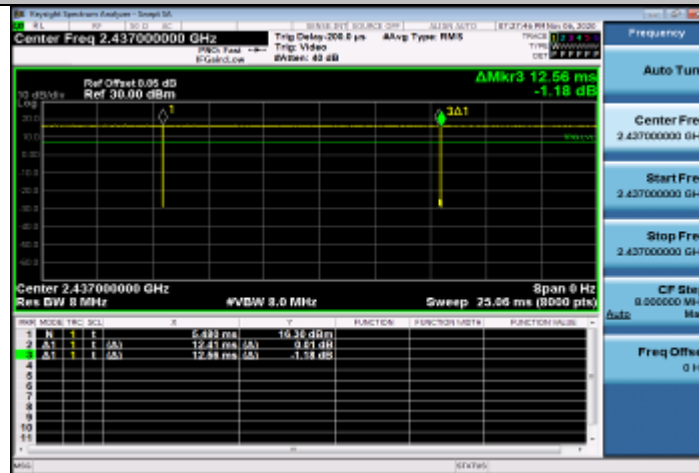
3.3 Duty Cycle of Test Signal

Test Mode	Antenna	Channel [MHz]	Duty Cycle [%]	10log(1/x) Factor[dB]
11B	Ant1	2412	99.04	0.04
		2437	98.81	0.05
		2462	98.88	0.05
11G	Ant1	2412	94.06	0.27
		2437	94.93	0.23
		2462	97.63	0.10
11N20SISO	Ant1	2412	94.12	0.26
		2437	87.27	0.59
		2462	88.89	0.51

11B_Ant1_2412



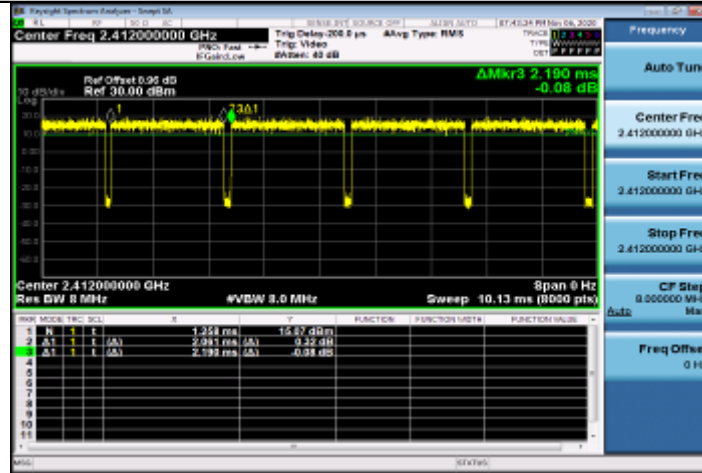
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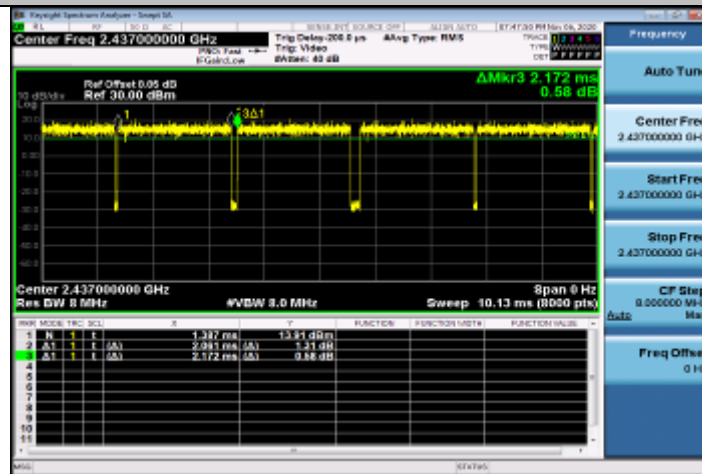
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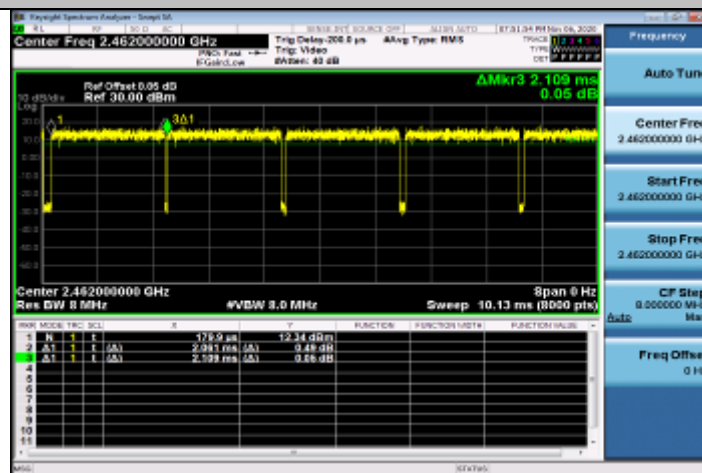
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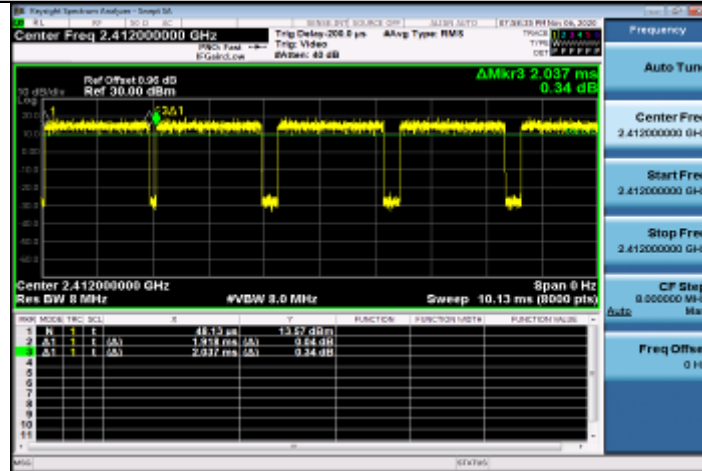
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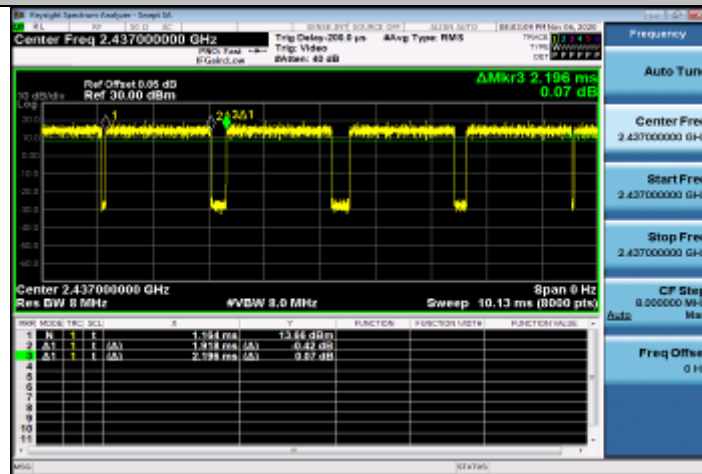
11G_Ant1_2462



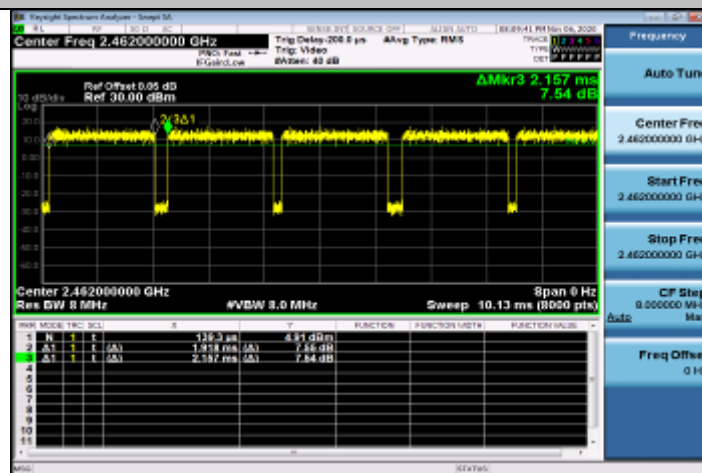
11N20SISO_Ant1_2412



11N20SISO_Ant1_2437



11N20SISO_Ant1_2462





3.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units.

3.5 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standard:

FCC Part 15, Subpart C (15.247)

KDB 558074 D01 DTS Meas Guidance v05r02

ANSI C63.10:2013

All relaxed test items have been performed and recorded as per the above standard.

4 Test Procedure and Results

4.1 AC Power Conducted Emission

4.1.1 Limits

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.1.2 Test Procedures

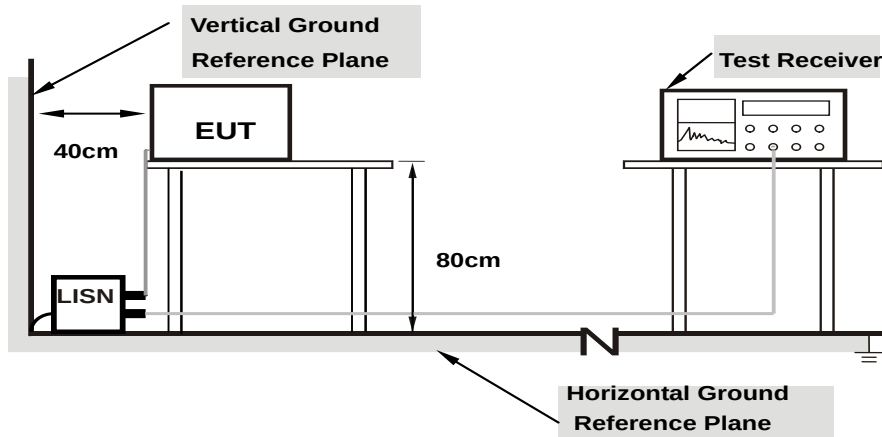
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.1.3 Deviation from Test Standard

No deviation.

4.1.4 Test Setup



Note: 1.Support units were connected to second LISN.

For the actual test configuration, please refer to the attached file (Test Setup Photo).

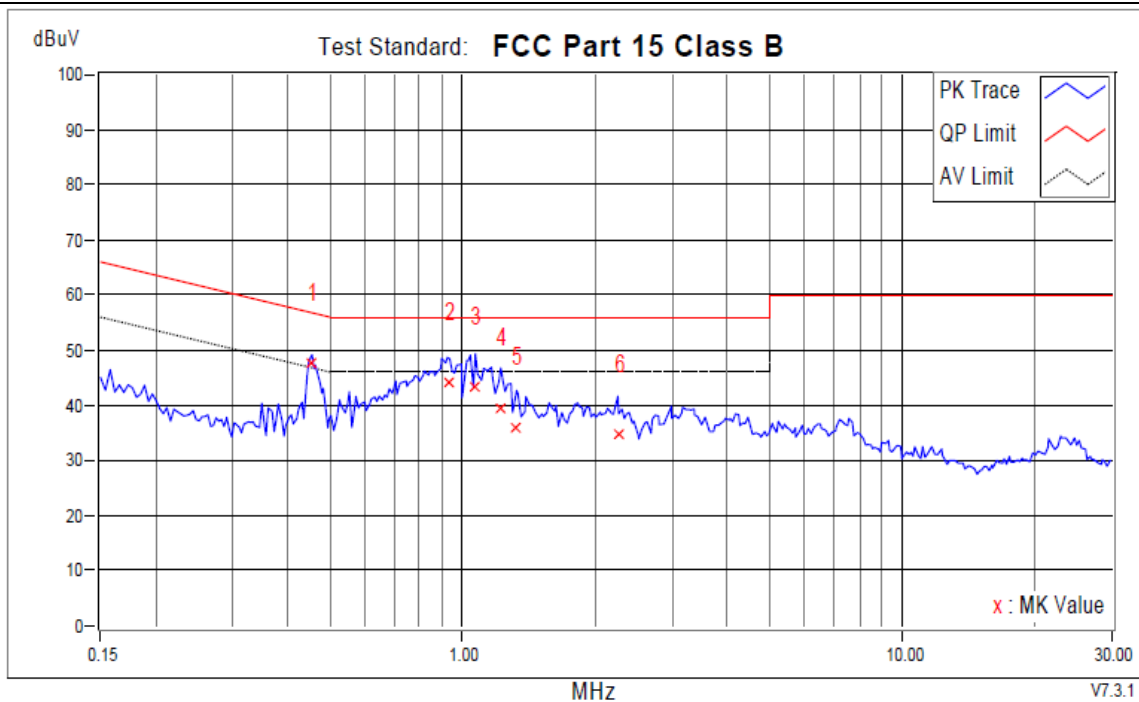
4.1.5 EUT Operating Conditions

Same as 4.1.6.

4.1.6 Test Results

Working While Charging

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Power supply	AC 120V, 60Hz with adaptor KA06E-0501000US		

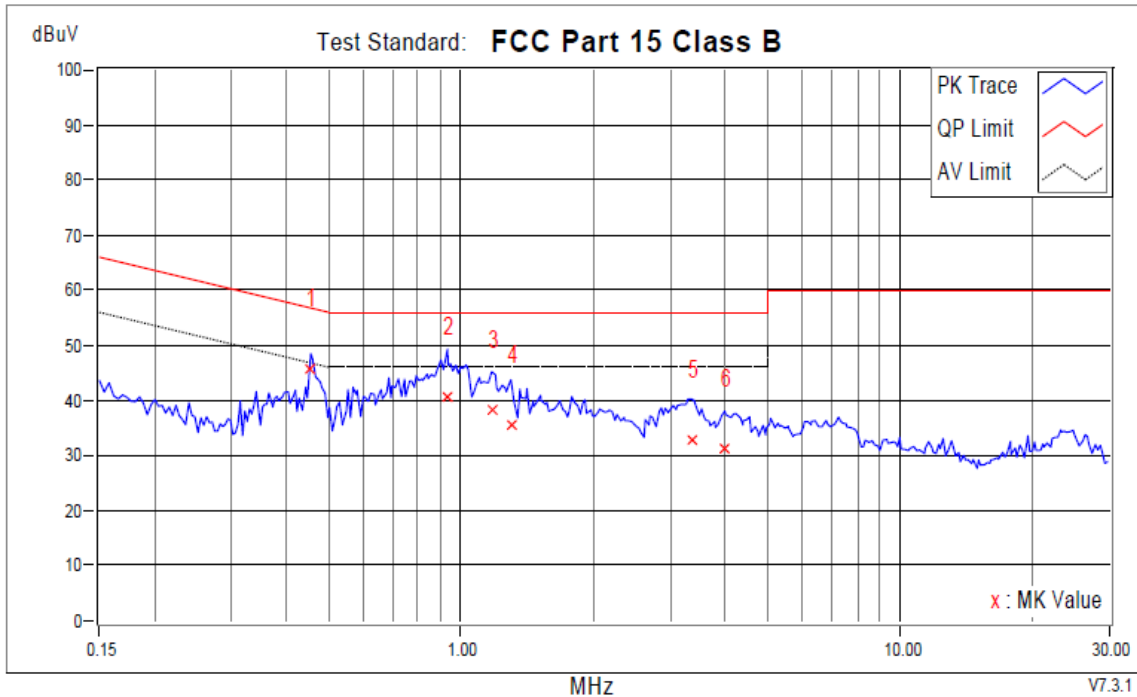


No.	Frequency MHz	Corr. Factor dB	Reading dBuV		Emission dBuV		Limit dBuV		Margins dB		Notes
			QP	AV	QP	AV	QP	AV	QP	AV	
+1	0.45498	9.87	37.60	24.74	47.47	34.61	56.78	46.78	-9.32	-12.18	
2	0.93591	9.91	34.19	19.88	44.10	29.79	56.00	46.00	-11.90	-16.21	
3	1.07038	9.91	33.38	16.13	43.29	26.04	56.00	46.00	-12.71	-19.96	
4	1.22287	9.91	29.39	14.93	39.30	24.84	56.00	46.00	-16.70	-21.16	
5	1.32844	9.92	25.93	11.16	35.85	21.08	56.00	46.00	-20.15	-24.92	
6	2.25902	9.94	24.90	10.36	34.84	20.30	56.00	46.00	-21.16	-25.70	

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Power supply	AC 120V, 60Hz with adaptor KA06E-0501000US		

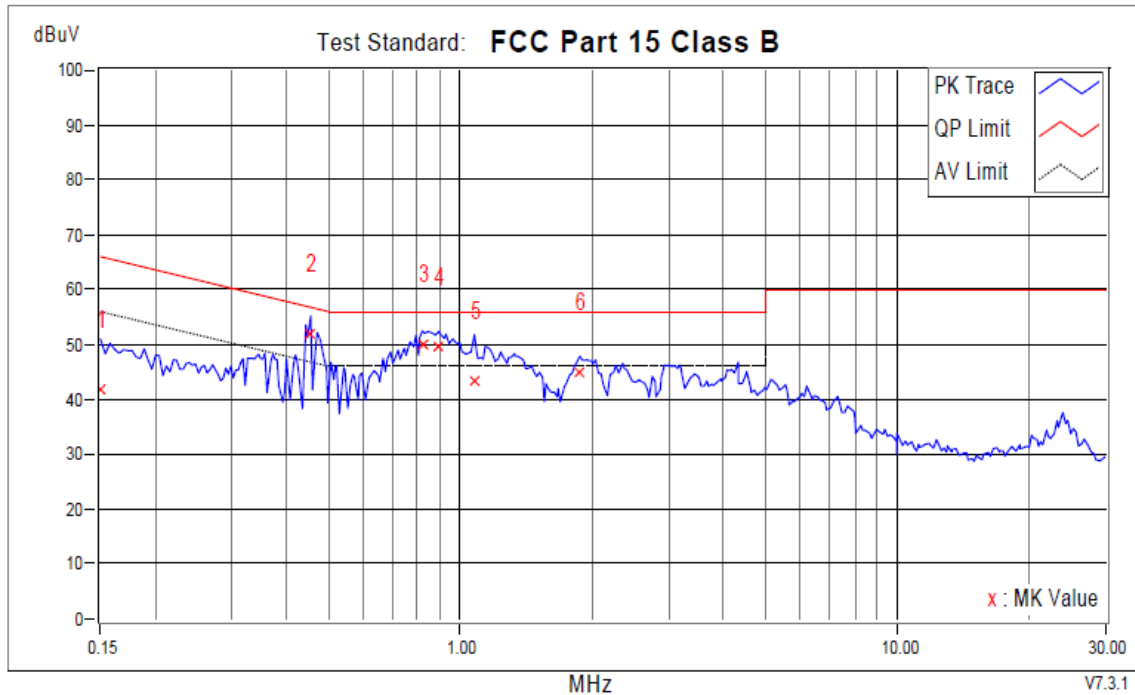


	Frequency	Corr. Factor	Reading dBuV		Emission dBuV		Limit dBuV		Margins dB		Notes
No.	MHz	dB	QP	AV	QP	AV	QP	AV	QP	AV	
+1	0.45498	9.87	35.79	27.81	45.66	37.68	56.78	46.78	-11.13	-9.11	
2	0.93200	9.91	30.84	22.30	40.75	32.21	56.00	46.00	-15.25	-13.79	
3	1.17595	9.91	28.48	19.05	38.39	28.96	56.00	46.00	-17.61	-17.04	
4	1.30107	9.92	25.60	14.24	35.52	24.16	56.00	46.00	-20.48	-21.84	
5	3.34991	9.89	22.98	12.13	32.87	22.02	56.00	46.00	-23.13	-23.98	
6	3.99506	9.74	21.63	10.55	31.37	20.29	56.00	46.00	-24.63	-25.71	

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Power supply	AC 240V, 50Hz with adaptor KA06E-0501000US		

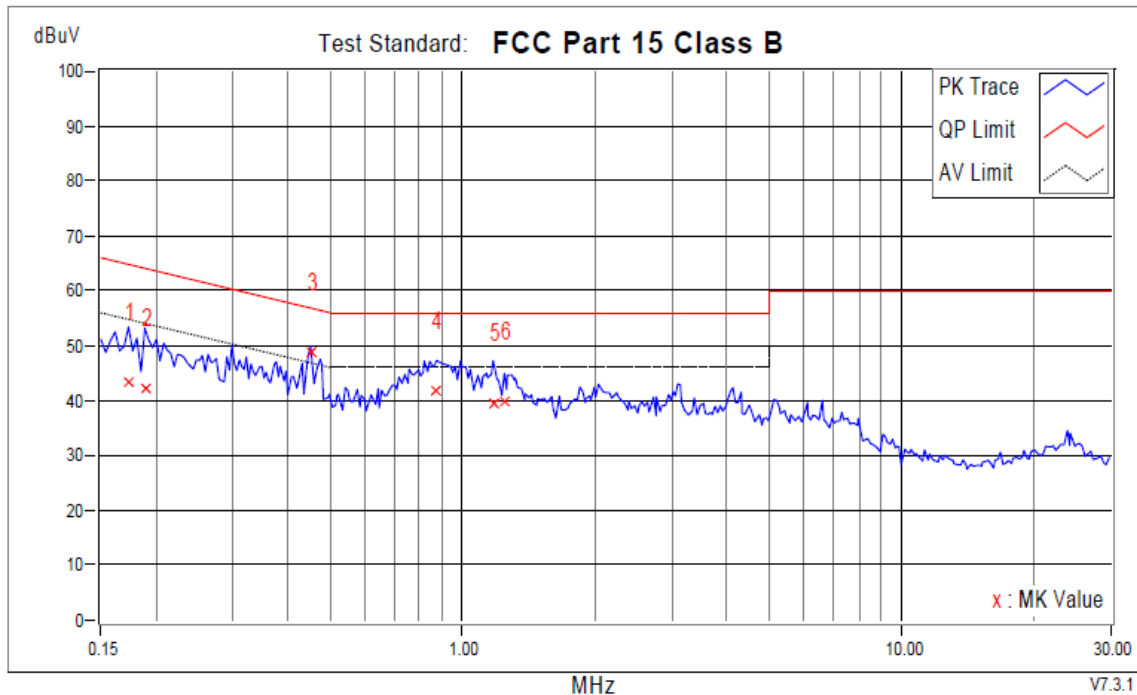


No.	Frequency MHz	Corr. Factor dB	Reading dBuV		Emission dBuV		Limit dBuV		Margins dB		Notes
			QP	AV	QP	AV	QP	AV	QP	AV	
1	0.15000	9.86	32.03	18.24	41.89	28.10	66.00	56.00	-24.11	-27.90	
+2	0.45498	9.74	42.18	29.10	51.92	38.84	56.78	46.78	-4.87	-7.95	
3	0.81861	9.60	40.41	28.55	50.01	38.15	56.00	46.00	-5.99	-7.85	
4	0.89290	9.60	40.08	29.36	49.68	38.96	56.00	46.00	-6.32	-7.04	
5	1.07820	9.62	33.76	21.93	43.38	31.55	56.00	46.00	-12.62	-14.45	
6	1.87975	9.75	35.07	26.19	44.82	35.94	56.00	46.00	-11.18	-10.06	

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Power supply	AC 240V, 50Hz with adaptor KA06E-0501000US		

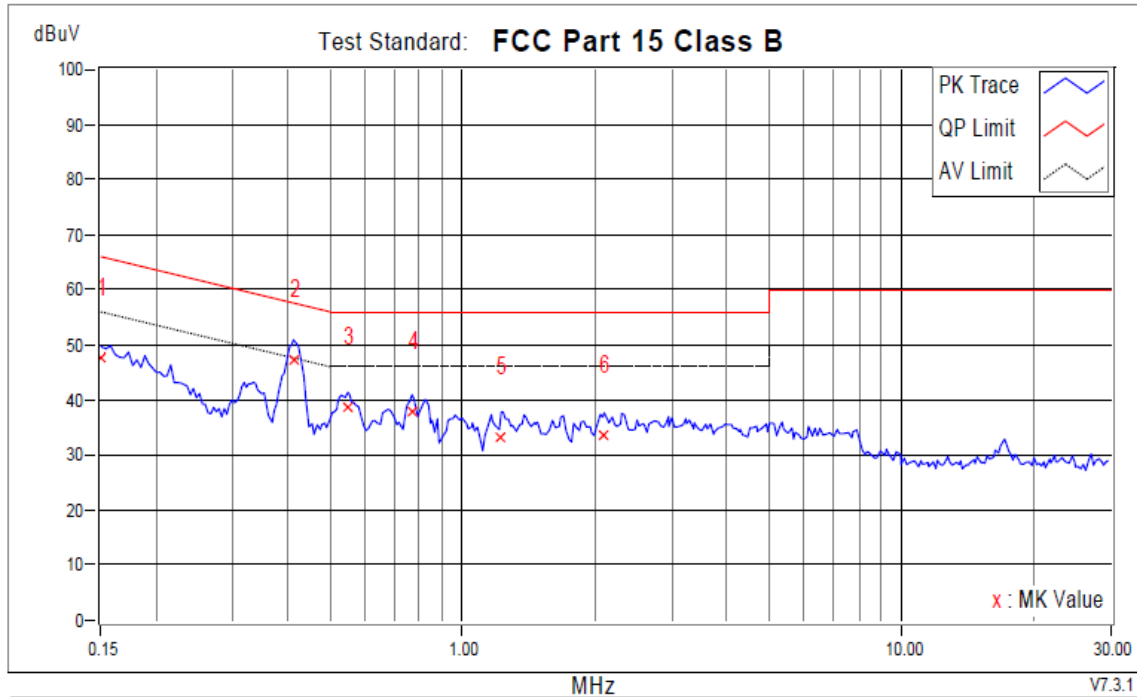


	Frequency	Corr. Factor	Reading dBuV		Emission dBuV		Limit dBuV		Margins dB		Notes
No.	MHz	dB	QP	AV	QP	AV	QP	AV	QP	AV	
1	0.17346	9.85	33.47	17.54	43.32	27.39	64.79	54.79	-21.48	-27.41	
2	0.18910	9.83	32.55	18.27	42.38	28.10	64.08	54.08	-21.70	-25.98	
+3	0.45107	9.87	38.80	28.89	48.67	38.76	56.86	46.86	-8.19	-8.10	
4	0.87335	9.90	32.07	18.08	41.97	27.98	56.00	46.00	-14.03	-18.02	
5	1.17595	9.91	29.59	15.95	39.50	25.86	56.00	46.00	-16.50	-20.14	
6	1.24633	9.91	30.01	14.98	39.92	24.89	56.00	46.00	-16.08	-21.11	

REMARKS:

1. Q.P. and AV. Are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Power supply	AC 120V, 60Hz with adaptor TEKA-UCA10US		

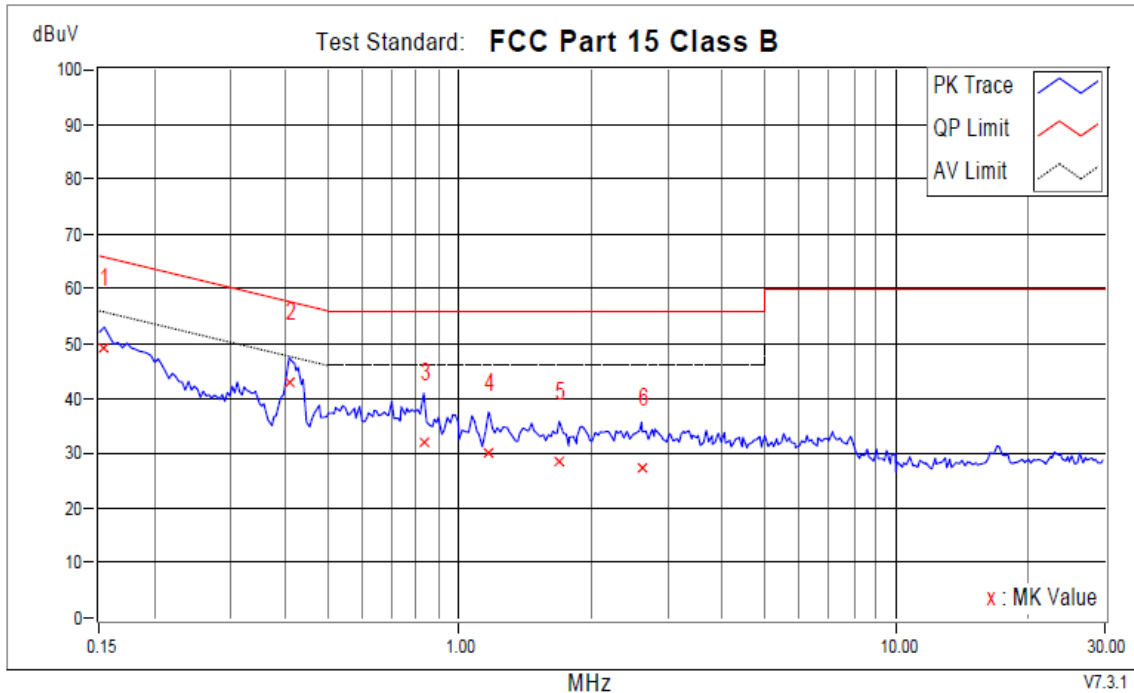


No.	Frequency MHz	Corr. Factor dB	Reading dBuV		Emission dBuV		Limit dBuV		Margins dB		Notes
			QP	AV	QP	AV	QP	AV	QP	AV	
1	0.15000	9.86	37.72	21.63	47.58	31.49	66.00	56.00	-18.42	-24.51	
+2	0.41197	9.73	37.66	30.21	47.39	39.94	57.61	47.61	-10.22	-7.67	
3	0.54882	9.71	28.99	20.60	38.70	30.31	56.00	46.00	-17.30	-15.69	
4	0.76778	9.60	28.39	20.42	37.99	30.02	56.00	46.00	-18.01	-15.98	
5	1.22678	9.65	23.44	15.81	33.09	25.46	56.00	46.00	-22.91	-20.54	
6	2.10653	9.77	23.70	15.11	33.47	24.88	56.00	46.00	-22.53	-21.12	

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Power supply	AC 120V, 60Hz with adaptor TEKA-UCA10US		

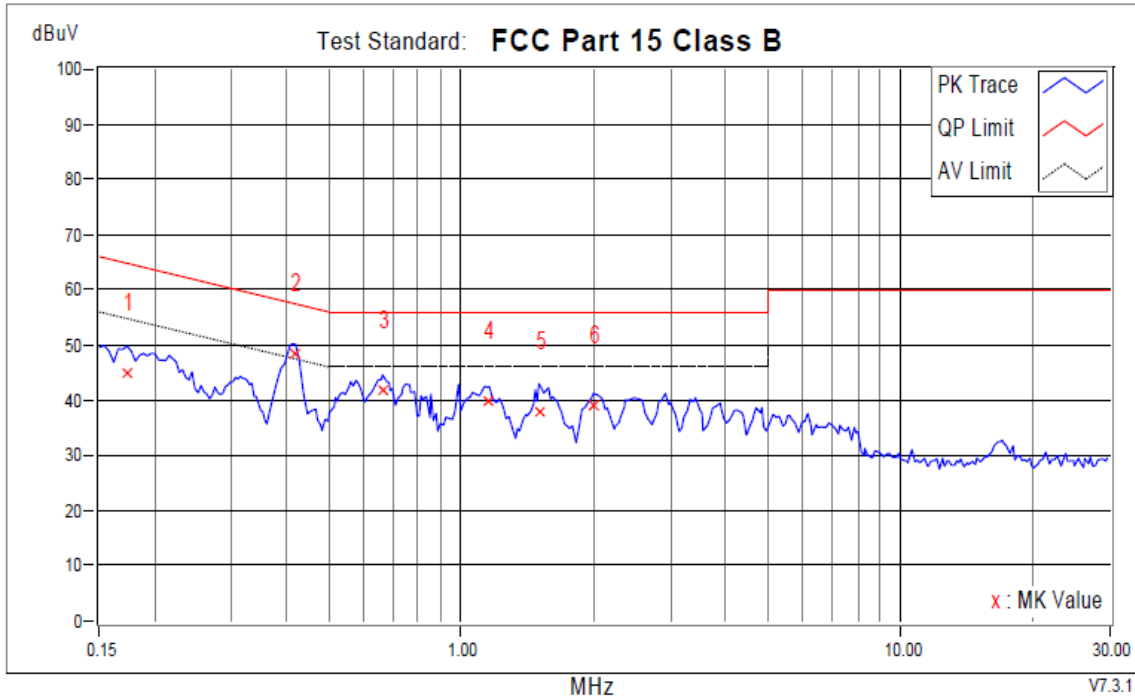


No.	Frequency MHz	Corr. Factor dB	Reading dBuV		Emission dBuV		Limit dBuV		Margins dB		Notes
			QP	AV	QP	AV	QP	AV	QP	AV	
1	0.15391	9.87	39.19	21.28	49.06	31.15	65.79	55.79	-16.73	-24.64	
+2	0.40806	9.87	33.27	25.99	43.14	35.86	57.69	47.69	-14.54	-11.82	
3	0.83034	9.90	22.22	12.99	32.12	22.89	56.00	46.00	-23.88	-23.11	
4	1.16813	9.91	20.20	13.22	30.11	23.13	56.00	46.00	-25.89	-22.87	
5	1.69598	9.92	18.72	9.56	28.64	19.48	56.00	46.00	-27.36	-26.52	
6	2.61483	9.95	17.42	8.09	27.37	18.04	56.00	46.00	-28.63	-27.96	

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Power supply	AC 240V, 50Hz with adaptor TEKA-UCA10US		

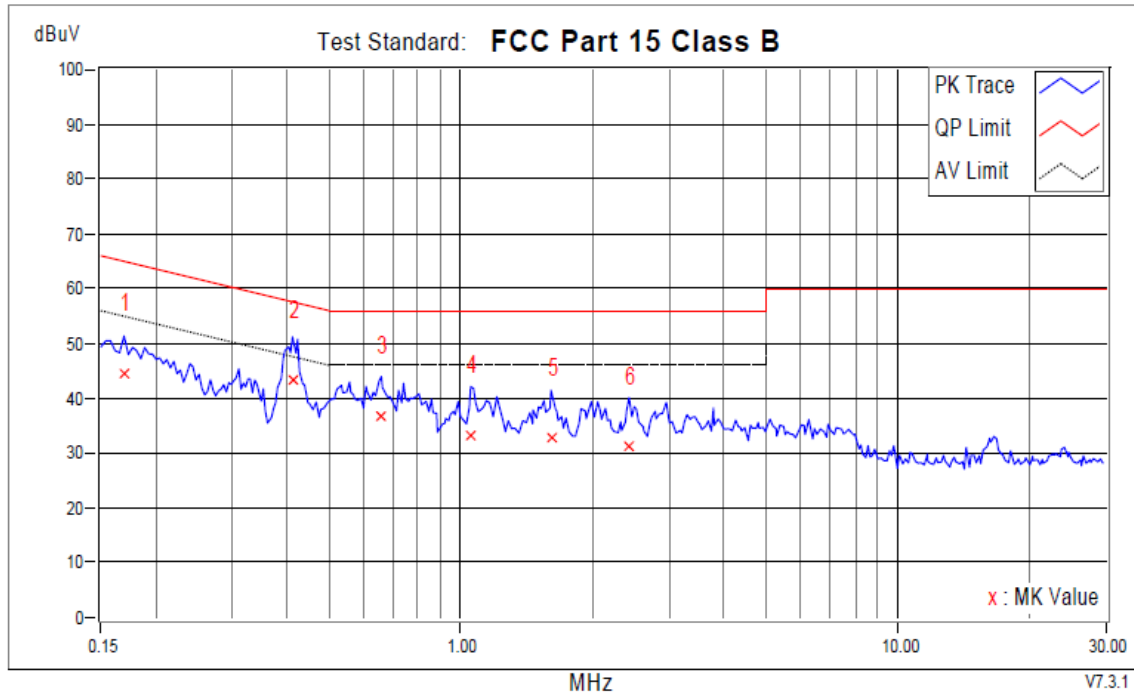


No.	Frequency MHz	Corr. Factor dB	Reading dBuV		Emission dBuV		Limit dBuV		Margins dB		Notes
			QP	AV	QP	AV	QP	AV	QP	AV	
1	0.17346	9.87	35.16	21.75	45.03	31.62	64.79	54.79	-19.76	-23.17	
+2	0.41979	9.73	38.68	30.86	48.41	40.59	57.45	47.45	-9.04	-6.86	
3	0.66221	9.63	32.33	24.82	41.96	34.45	56.00	46.00	-14.04	-11.55	
4	1.14858	9.63	30.26	22.29	39.89	31.92	56.00	46.00	-16.11	-14.08	
5	1.50439	9.69	28.02	20.37	37.71	30.06	56.00	46.00	-18.29	-15.94	
6	2.00487	9.77	29.47	20.52	39.24	30.29	56.00	46.00	-16.76	-15.71	

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Power supply	AC 240V, 50Hz with adaptor TEKA-UCA10US		



No.	Frequency MHz	Corr. Factor dB	Reading dBuV		Emission dBuV		Limit dBuV		Margins dB		Notes
			QP	AV	QP	AV	QP	AV	QP	AV	
1	0.16955	9.85	34.55	18.36	44.40	28.21	64.98	54.98	-20.58	-26.77	
+2	0.41197	9.87	33.39	24.76	43.26	34.63	57.61	47.61	-14.35	-12.98	
3	0.65830	9.83	26.77	18.64	36.60	28.47	56.00	46.00	-19.40	-17.53	
4	1.05474	9.91	23.33	15.43	33.24	25.34	56.00	46.00	-22.76	-20.66	
5	1.60996	9.92	22.72	14.00	32.64	23.92	56.00	46.00	-23.36	-22.08	
6	2.43106	9.95	21.23	14.08	31.18	24.03	56.00	46.00	-24.82	-21.97	

REMARKS:

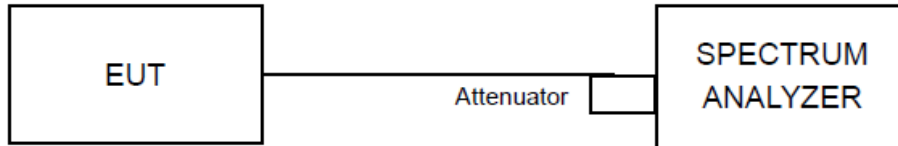
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

4.2 Minimum 6dB Bandwidth

4.2.1 Limit

For digital modulation systems, the minimum 6dB bandwidth shall be at least 500 kHz

4.2.2 Test Setup



4.2.3 Test Procedures

The EUT was tested according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance” for compliance to FCC 47CFR 15.247 requirements (clause 8.2).

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW ≥ 3 · RBW, peak detector with maximum hold) is implemented by the instrumentation function.

4.2.4 Deviation of Test Standard

No deviation.

4.2.5 Test Results

Test Mode	Antenna	Channel [MHz]	DTS BW [MHz]	FL[MHz]	FH[MHz]	Limit[MHz]	Verdict
11B	Ant1	2412	8.640	2407.960	2416.600	≥ 0.5	PASS
		2437	8.680	2432.440	2441.120	≥ 0.5	PASS
		2462	7.680	2457.960	2465.640	≥ 0.5	PASS
11G	Ant1	2412	16.440	2403.800	2420.240	≥ 0.5	PASS
		2437	16.400	2428.840	2445.240	≥ 0.5	PASS
		2462	16.600	2453.720	2470.320	≥ 0.5	PASS
11N20SISO	Ant1	2412	17.680	2403.200	2420.880	≥ 0.5	PASS
		2437	17.640	2428.200	2445.840	≥ 0.5	PASS
		2462	17.640	2453.200	2470.840	≥ 0.5	PASS

11B_Ant1_2412



11B_Ant1_2437



11B_Ant1_2462



11G_Ant1_2412



11G_Ant1_2437



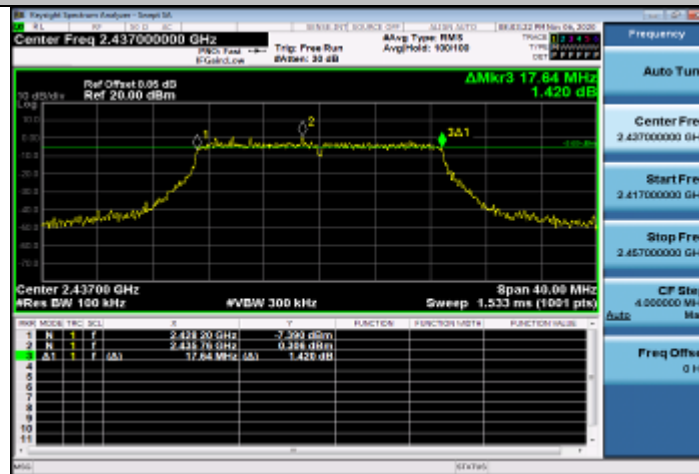
11G_Ant1_2462



11N20SISO_Ant1_2412



11N20SISO_Ant1_2437



11N20SISO_Ant1_2462

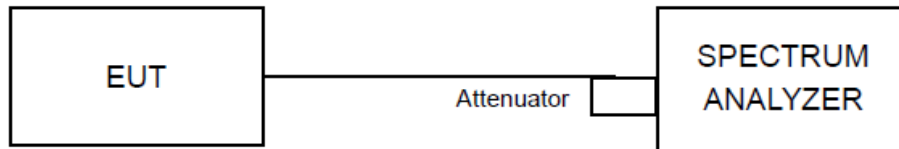


4.3 Conducted Output Power

4.3.1 Limit

For systems using digital modulation in the 2400 – 2483.5 MHz bands: 1 Watt (30 dBm)

4.3.2 Test Setup



4.3.3 Test Procedures

The EUT was tested according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance” for compliance to FCC 47CFR 15.247 requirements (clause 9.2.2.4).

- a) Measure the duty cycle, x , of the transmitter output signal as described in Section 6.0.
- b) Set span to at least 1.5 OBW.
- c) Set RBW = 1 % to 5 % of the OBW, not to exceed 1 MHz.
- d) Set VBW $\geq$ 3 RBW.
- e) Number of points in sweep $\geq$ 2 span / RBW. (This gives bin-to-bin spacing $\leq$ RBW/2, so that narrowband signals are not lost between frequency bins.)
- f) Sweep time = auto.
- g) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
- h) Do not use sweep triggering. Allow the sweep to “free run”.
- i) Trace average at least 100 traces in power averaging (i.e., RMS) mode; however, the number of traces to be averaged shall be increased above 100 as needed such that the average accurately represents the true average over the on and off periods of the transmitter.
- j) Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
- k) Add $10 \log (1/x)$, where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on- and off-times of the transmission). For example, add $10 \log (1/0.25) = 6 \text{ dB}$ if the duty cycle is 25 %.

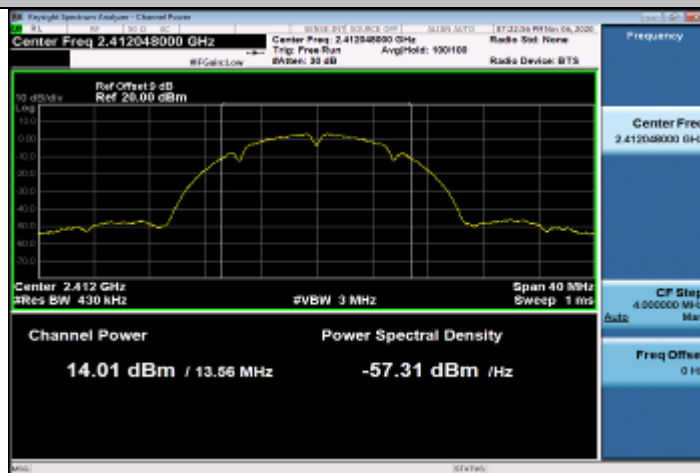
4.3.4 Deviation of Test Standard

No deviation.

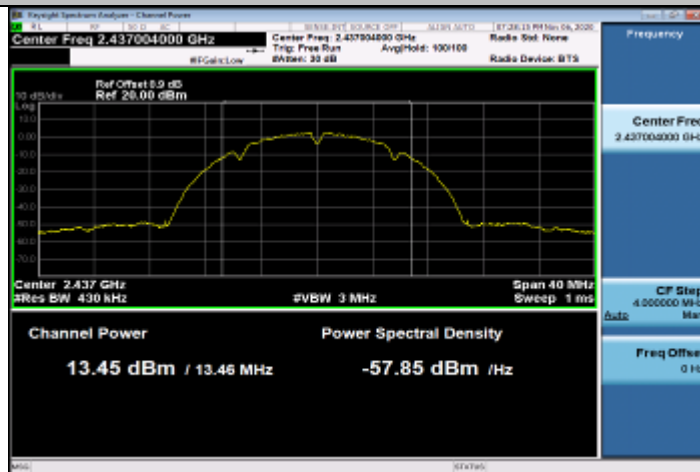
4.3.5 Test Results

Test Mode	Antenna	Channel [MHz]	Level [dBm]	10log(1/x) Factor[dB]	Power [dBm]	Limit [dBm]	Verdict
11B	Ant1	2412	14.01	0.04	14.05	<=30	PASS
		2437	13.45	0.05	13.5	<=30	PASS
		2462	11.61	0.05	11.66	<=30	PASS
11G	Ant1	2412	13.05	0.27	13.32	<=30	PASS
		2437	12.74	0.23	12.97	<=30	PASS
		2462	10.92	0.10	11.02	<=30	PASS
11N20SISO	Ant1	2412	12.49	0.26	12.75	<=30	PASS
		2437	12.52	0.59	13.11	<=30	PASS
		2462	10.82	0.51	11.33	<=30	PASS

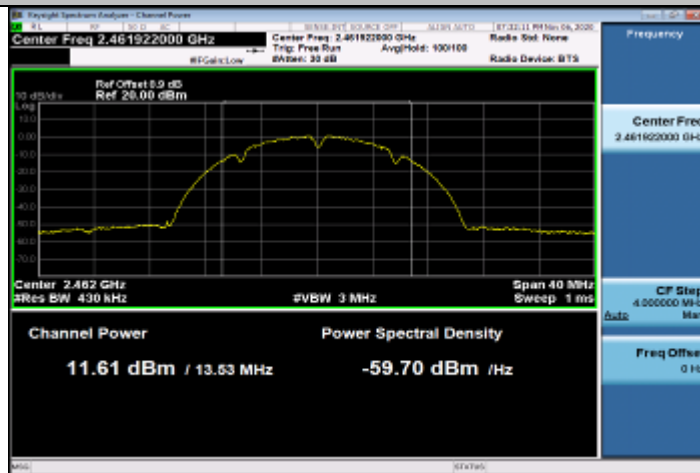
11B_Ant1_2412



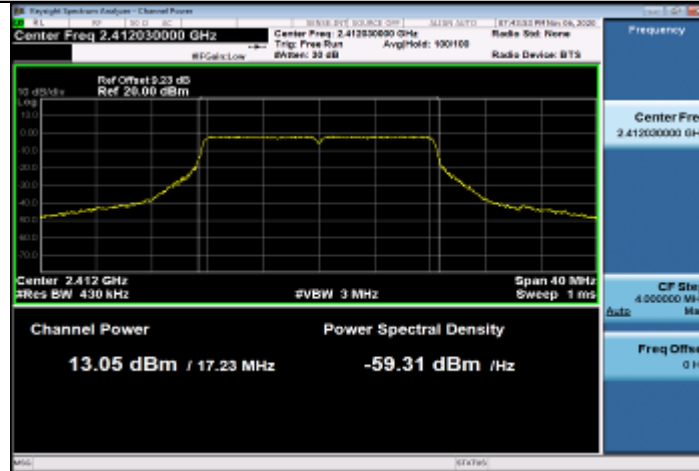
11B_Ant1_2437



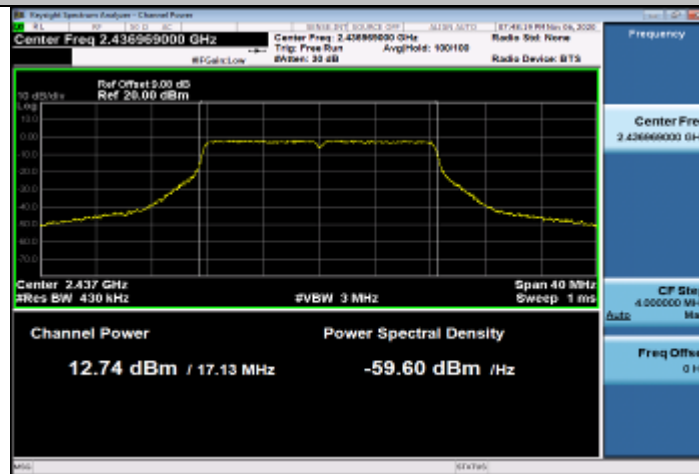
11B_Ant1_2462



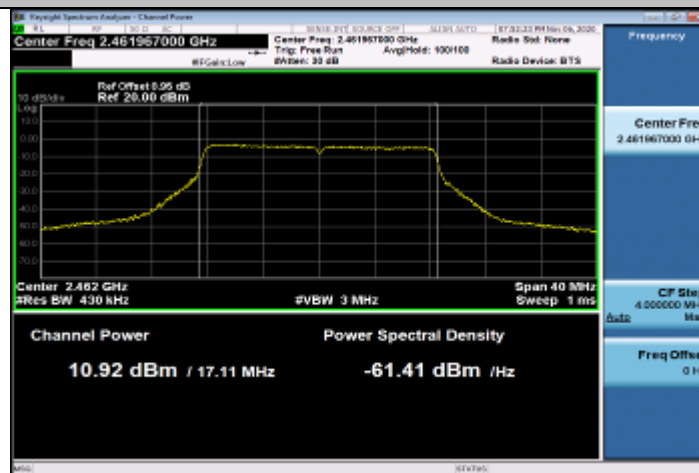
11G_Ant1_2412



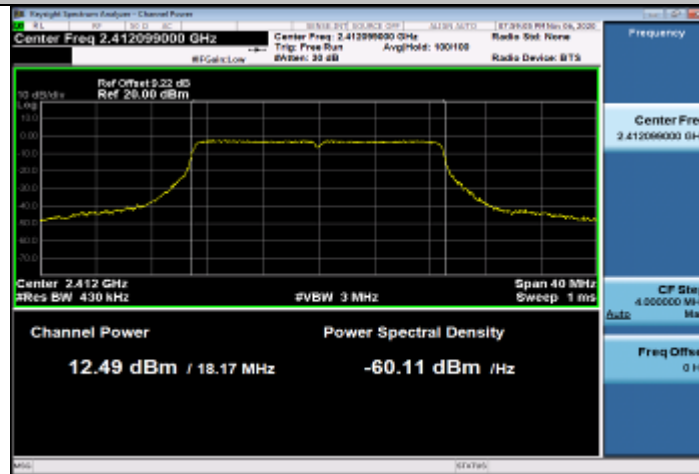
11G_Ant1_2437



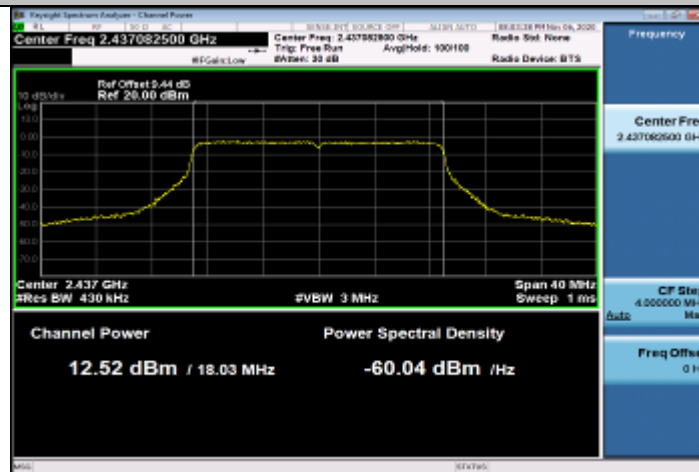
11G_Ant1_2462



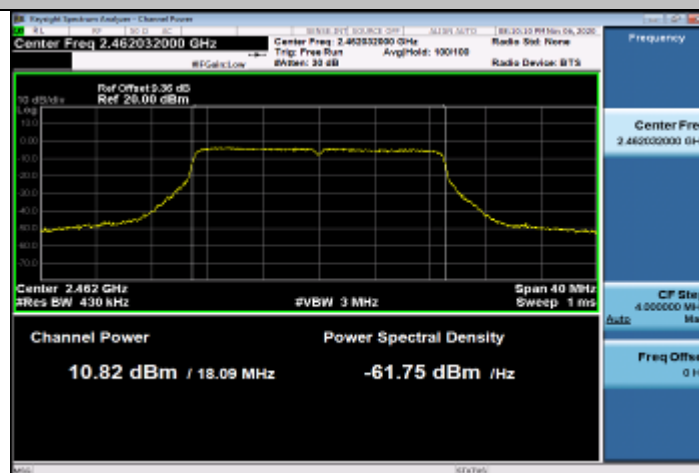
11N20SISO_Ant1_2412



11N20SISO_Ant1_2437



11N20SISO_Ant1_2462

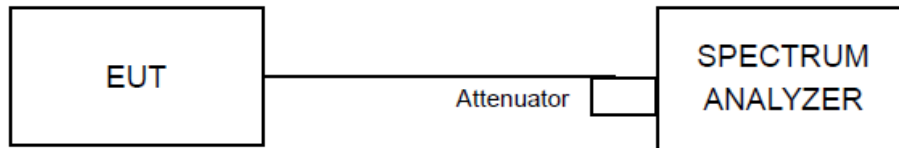


4.4 Power Spectral Density

4.4.1 Limit

The Maximum of Power Spectral Density Measurement is 8 dBm in any 3 kHz band.

4.4.2 Test Setup



4.4.3 Test Procedures

The power output per FCC § 15.247(e) was tested according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance” (clause 10.5) for compliance to FCC 47CFR 15.247 requirements.

- Measure the duty cycle (x) of the transmitter output signal.
- Set instrument center frequency to DTS channel center frequency.
- Set span to at least 1.5 OBW.
- Set RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- Set VBW $\geq 3 \text{ RBW}$.
- Detector = power averaging (RMS) or sample detector (when RMS not available).
- Ensure that the number of measurement points in the sweep $\geq 2 \text{ span/RBW}$.
- Sweep time = auto couple.
- Do not use sweep triggering. Allow sweep to “free run”.
- Employ trace averaging (RMS) mode over a minimum of 100 traces.
- Use the peak marker function to determine the maximum amplitude level.
- Add $10 \log (1/x)$, where x is the duty cycle measured in step (a), to the measured PSD to compute the average PSD during the actual transmission time.
- If resultant value exceeds the limit, then reduce RBW (no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span in order to meet the minimum measurement point requirement as the RBW is reduced).

4.4.4 Deviation of Test Standard

No deviation.

4.4.5 Test Results

Test Mode	Antenna	Channel [MHz]	Level [dBm]	10log(1/x) Factor[dB]	PSD [dBm/3kHz]	Limit [dBm/3kHz]	Verdict
11B	Ant1	2412	-18.41	0.04	-18.37	<=8	PASS
		2437	-18.91	0.05	-18.86	<=8	PASS
		2462	-20.6	0.05	-20.55	<=8	PASS
11G	Ant1	2412	-21.73	0.27	-21.46	<=8	PASS
		2437	-21.95	0.23	-21.72	<=8	PASS
		2462	-23.67	0.10	-23.57	<=8	PASS
11N20SI SO	Ant1	2412	-22.27	0.26	-22.01	<=8	PASS
		2437	-22.31	0.59	-21.72	<=8	PASS
		2462	-23.63	0.51	-23.12	<=8	PASS

11B_Ant1_2412



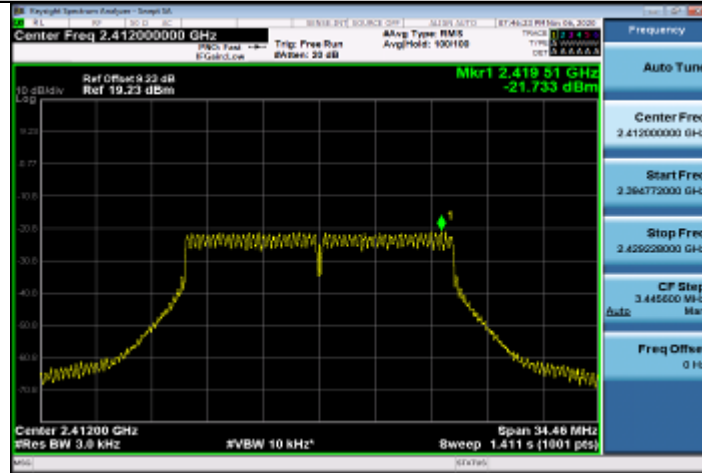
11B_Ant1_2437



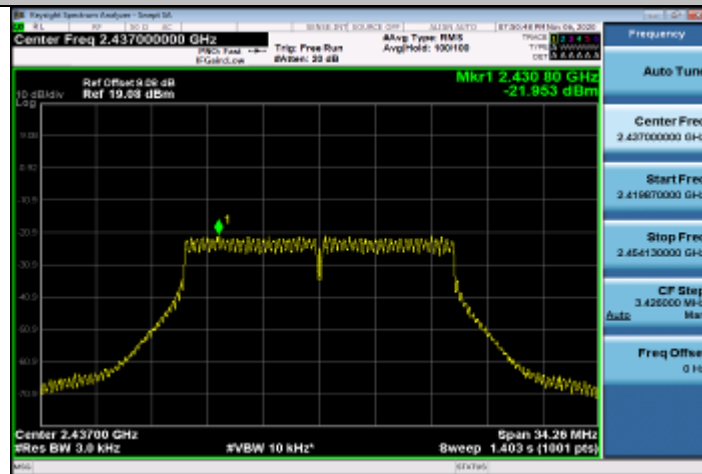
11B_Ant1_2462



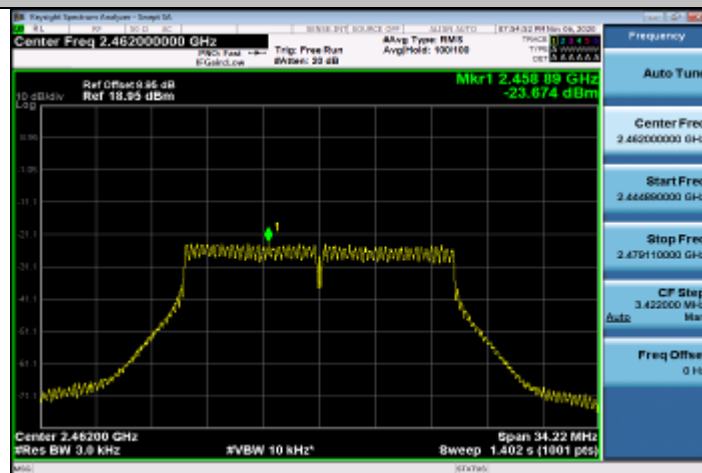
11G_Ant1_2412



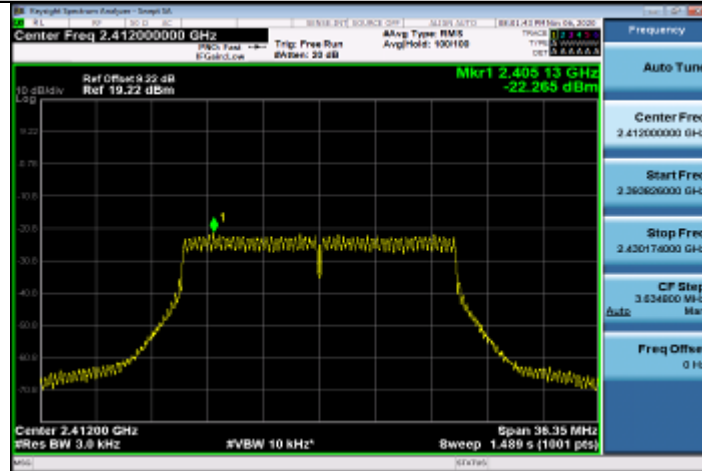
11G_Ant1_2437



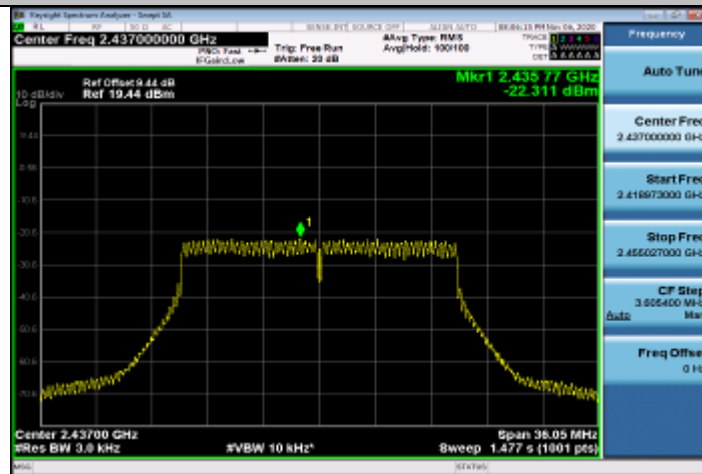
11G_Ant1_2462



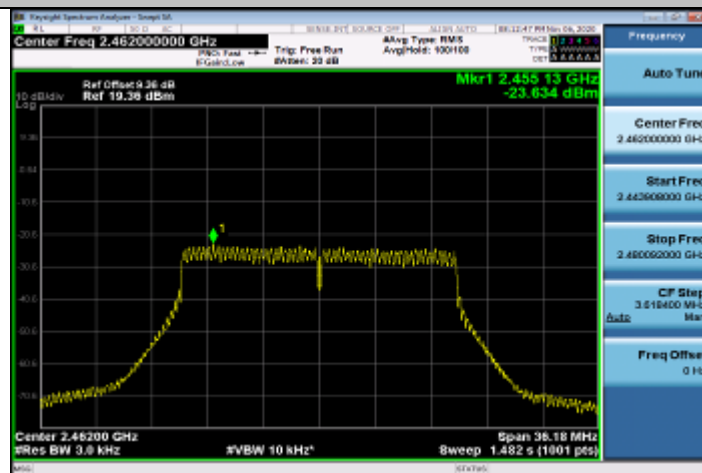
11N20SISO_Ant1_2412



11N20SISO_Ant1_2437



11N20SISO_Ant1_2462

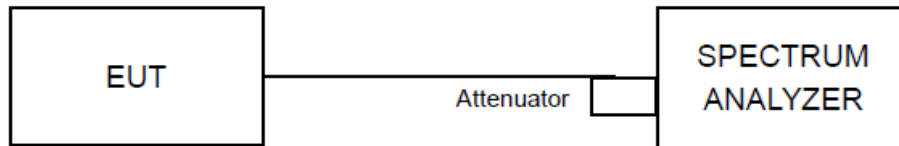


4.5 Conducted Band Edges Measurement

4.5.1 Limit

Below 30 dB of the highest emission level of operating band (in 100 kHz Resolution Bandwidth).

4.5.2 Test Setup



4.5.3 Test Procedures

The EUT was tested according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance” (clause 11.0) for compliance to FCC 47CFR 15.247 requirements.

MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW $\geq$ 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOB

1. Set RBW = 100 kHz.
2. Set VBW $\geq$ 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

4.5.4 Deviation of Test Standard

No deviation.

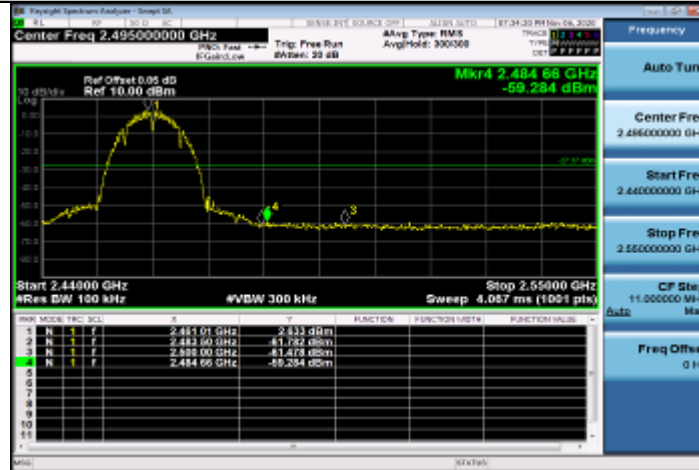
4.5.5 Test Results

Test Mode	Antenna	ChName	Channel [MHz]	RefLevel [dBm]	Max. Spurious Level [dBm]	Limit [dBm]	Verdict
11B	Ant1	Low	2412	5.06	-45.67	<=-24.94	PASS
		High	2462	2.63	-59.28	<=-27.37	PASS
11G	Ant1	Low	2412	1.56	-34.15	<=-28.44	PASS
		High	2462	-0.44	-54.8	<=-30.44	PASS
11N20SISO	Ant1	Low	2412	0.80	-34.69	<=-29.2	PASS
		High	2462	-0.32	-51.8	<=-30.32	PASS

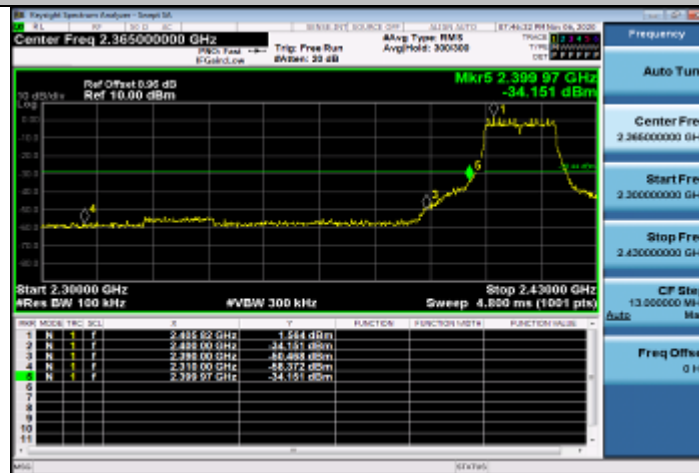
11B_Ant1_Low_2412



11B_Ant1_High_2462



11G_Ant1_Low_2412



11G_Ant1_High_2462



11N20SISO_Ant1_Low_2412



11N20SISO_Ant1_High_2462

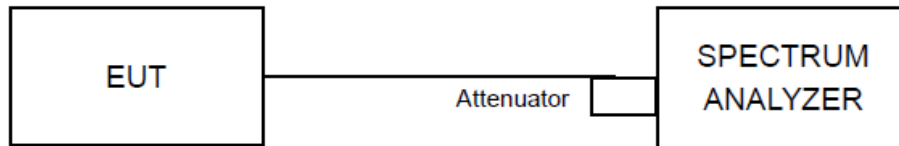


4.6 Conducted Spurious Emissions

4.6.1 Limit

Below 30 dB of the highest emission level of operating band (in 100 kHz Resolution Bandwidth).

4.6.2 Test Setup



4.6.3 Test Procedures

The EUT was tested according to DTS test procedure of “KDB558074 D01 DTS Meas Guidance” (clause 11.0) for compliance to FCC 47CFR 15.247 requirements.

MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW $\geq$ 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOB

1. Set RBW = 100 kHz.
2. Set VBW $\geq$ 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

4.6.4 Deviation of Test Standard

No deviation.

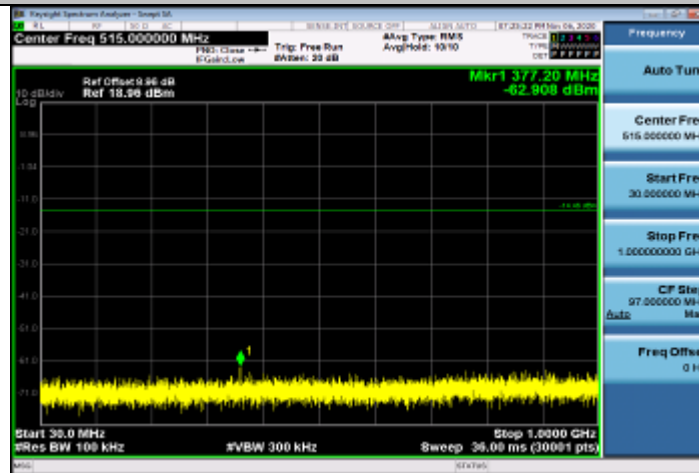
4.6.5 Test Results

Test Mode	Antenna	Channel [MHz]	FreqRange [MHz]	RefLevel [dBm]	Max. Level [dBm]	Limit [dBm]	Verdict
11B	Ant1	2412	Reference	5.54	5.54	---	PASS
			30~1000	30~1000	-62.908	<=-14.457	PASS
			1000~26500	1000~26500	-46.844	<=-14.457	PASS
		2437	Reference	4.90	4.90	---	PASS
			30~1000	30~1000	-63.89	<=-15.102	PASS
			1000~26500	1000~26500	-46.92	<=-15.102	PASS
		2462	Reference	2.22	2.22	---	PASS
			30~1000	30~1000	-63.862	<=-17.778	PASS
			1000~26500	1000~26500	-46.472	<=-17.778	PASS
11G	Ant1	2412	Reference	1.65	1.65	---	PASS
			30~1000	30~1000	-62.734	<=-18.35	PASS
			1000~26500	1000~26500	-45.958	<=-18.35	PASS
		2437	Reference	1.05	1.05	---	PASS
			30~1000	30~1000	-63.504	<=-18.948	PASS
			1000~26500	1000~26500	-46.559	<=-18.948	PASS
		2462	Reference	-1.13	-1.13	---	PASS
			30~1000	30~1000	-64.292	<=-21.125	PASS
			1000~26500	1000~26500	-46.612	<=-21.125	PASS
11N20SISO	Ant1	2412	Reference	0.87	0.87	---	PASS
			30~1000	30~1000	-63.658	<=-19.133	PASS
			1000~26500	1000~26500	-45.999	<=-19.133	PASS
		2437	Reference	0.64	0.64	---	PASS
			30~1000	30~1000	-63.41	<=-19.362	PASS
			1000~26500	1000~26500	-46.285	<=-19.362	PASS
		2462	Reference	-0.58	-0.58	---	PASS
			30~1000	30~1000	-63.9	<=-20.578	PASS
			1000~26500	1000~26500	-46.885	<=-20.578	PASS

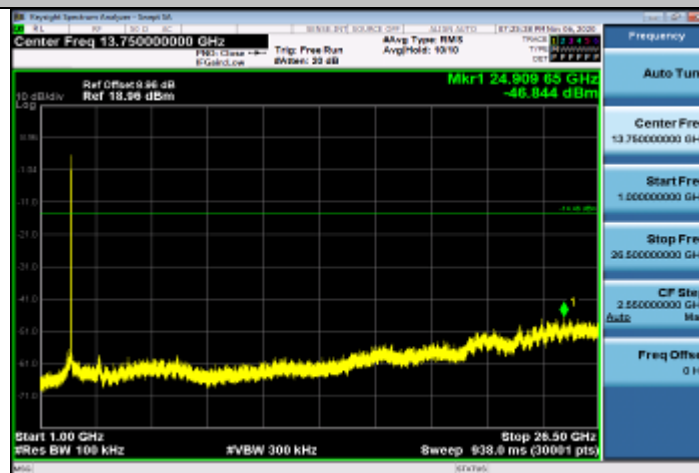
11B_Ant1_2412_0~Reference



11B_Ant1_2412_30~1000



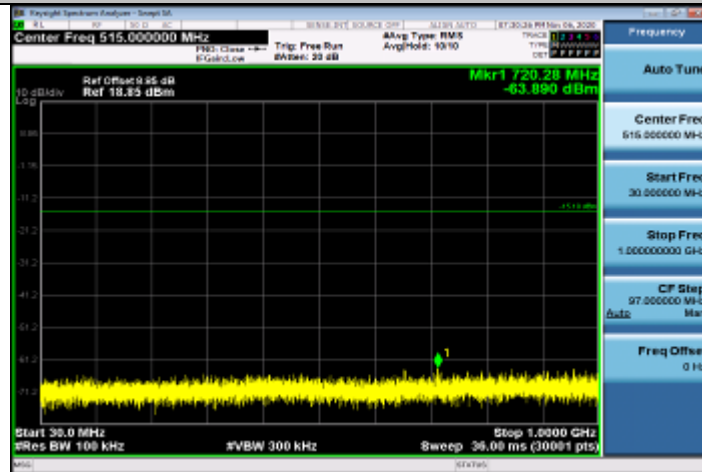
11B_Ant1_2412_1000~26500



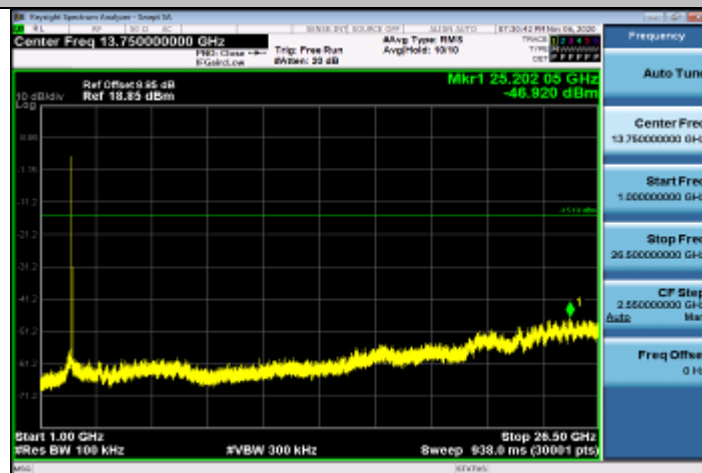
11B_Ant1_2437_0~Reference



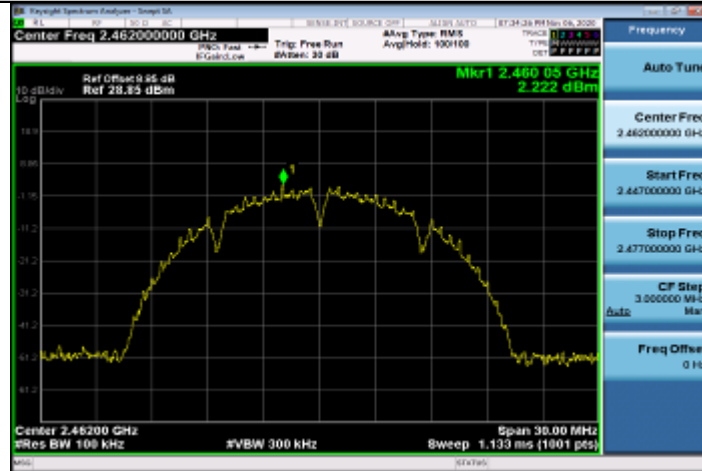
11B_Ant1_2437_30~1000



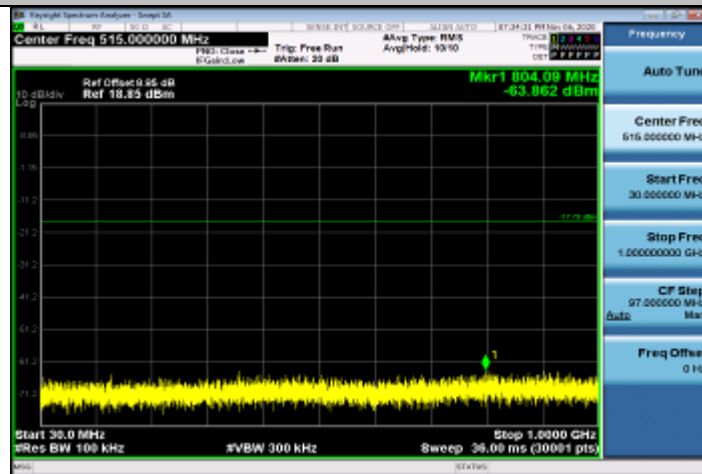
11B_Ant1_2437_1000~26500



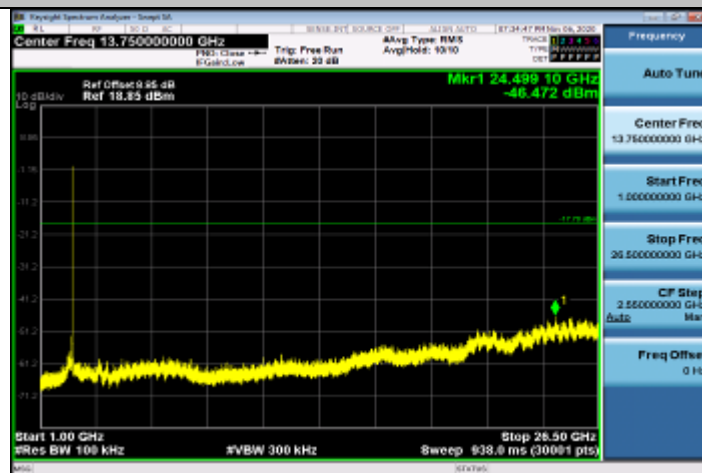
11B_Ant1_2462_0~Reference



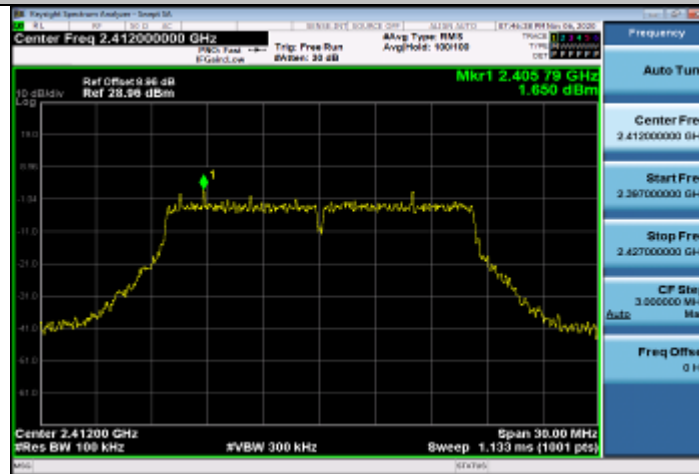
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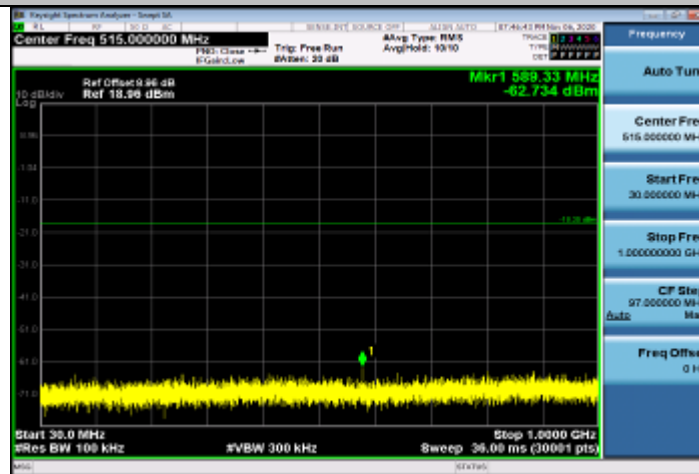
11B_Ant1_2462_1000~26500



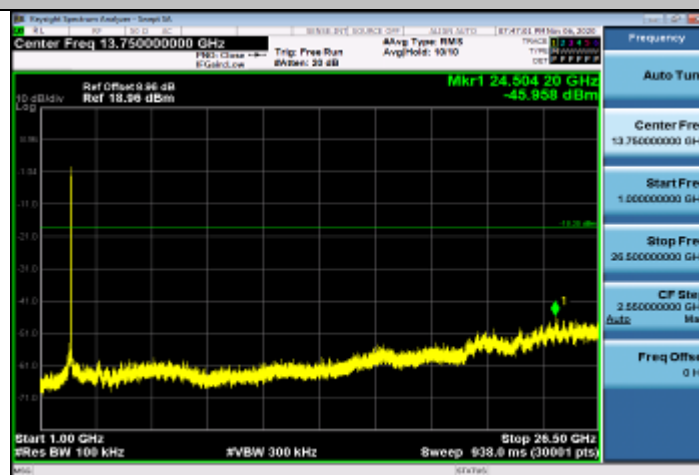
11G_Ant1_2412_0~Reference



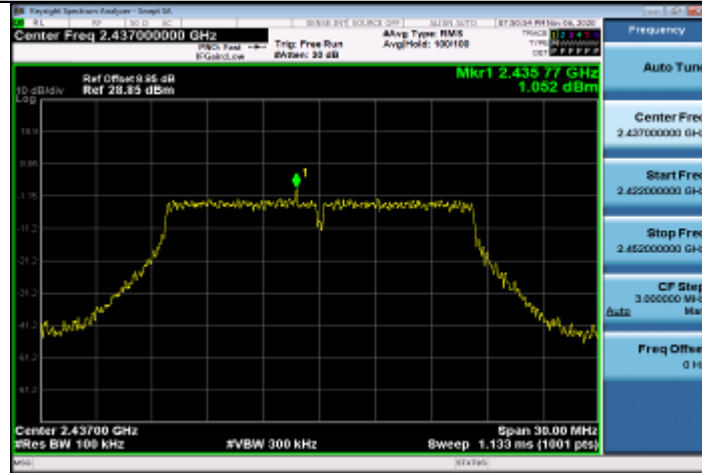
11G_Ant1_2412_30~1000



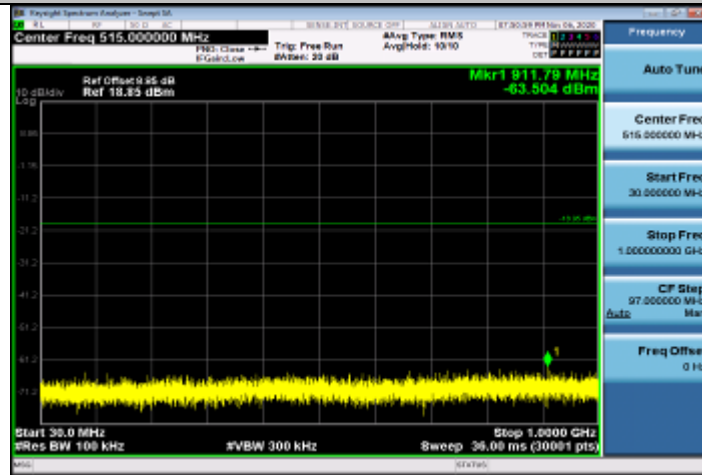
11G_Ant1_2412_1000~26500



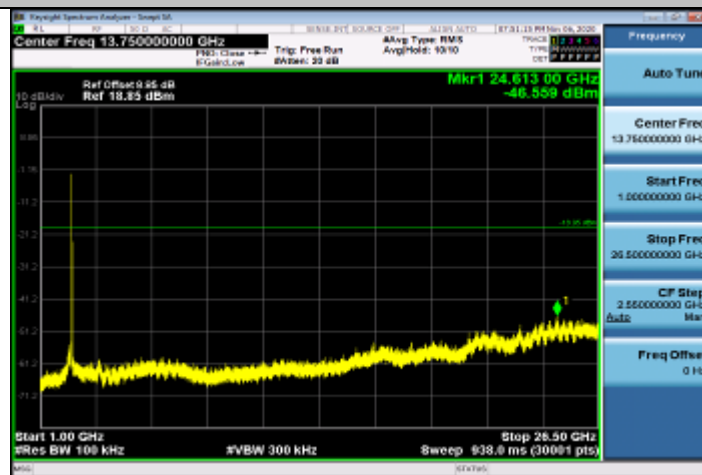
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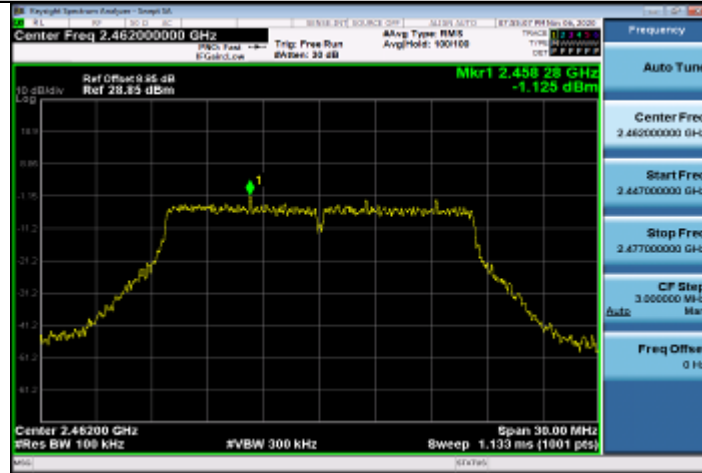
11G_Ant1_2437_30~1000



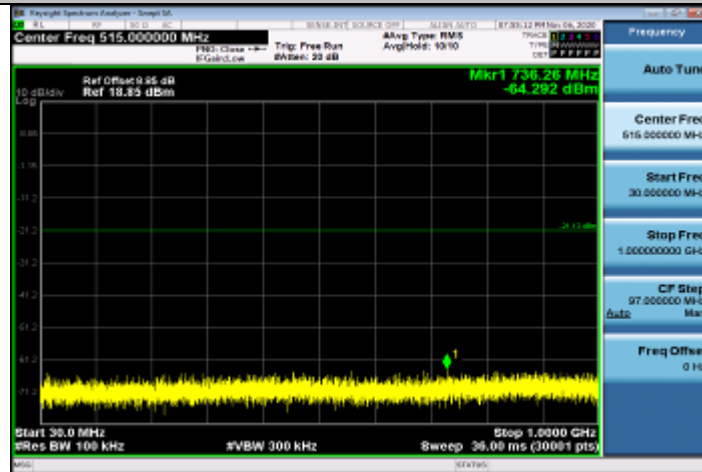
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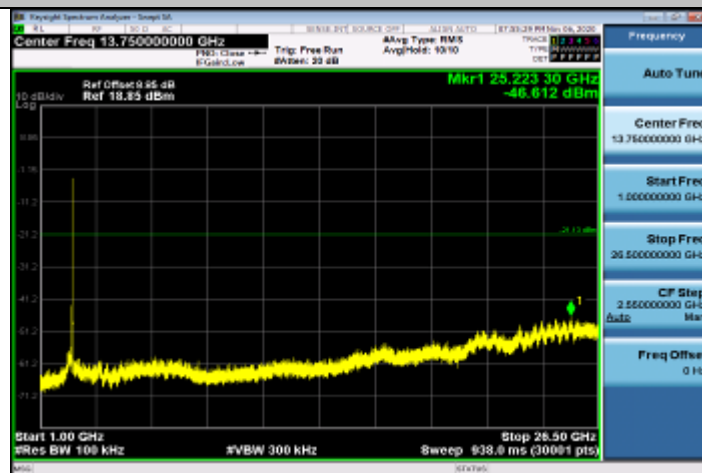
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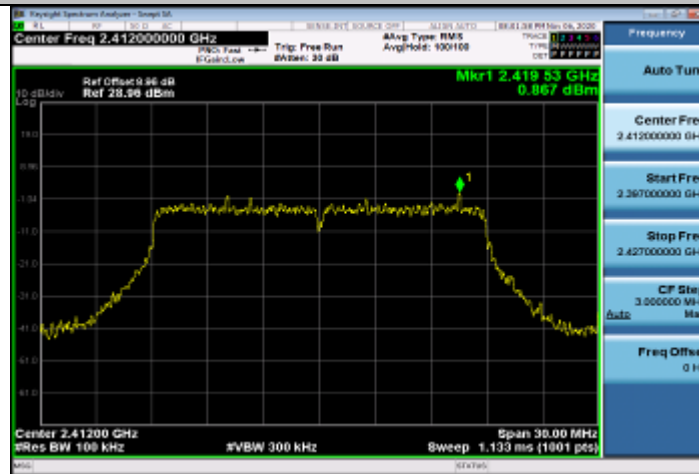
11G_Ant1_2462_30~1000



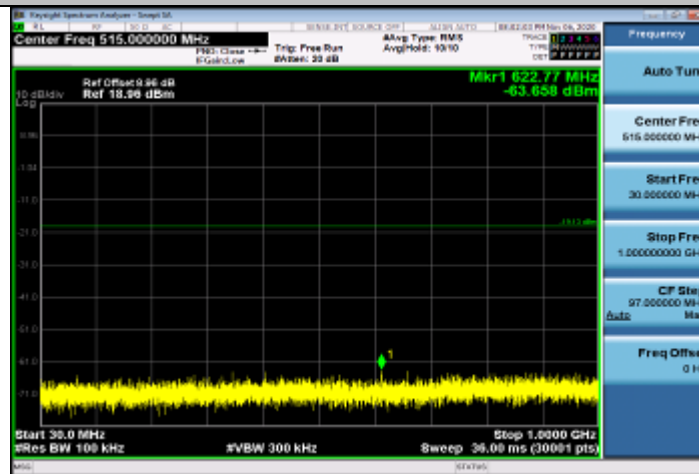
11G_Ant1_2462_1000~26500



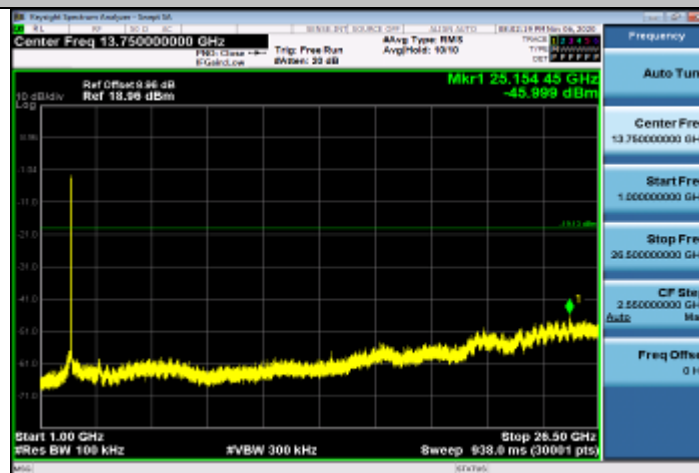
11N20SISO_Ant1_2412_0~Reference



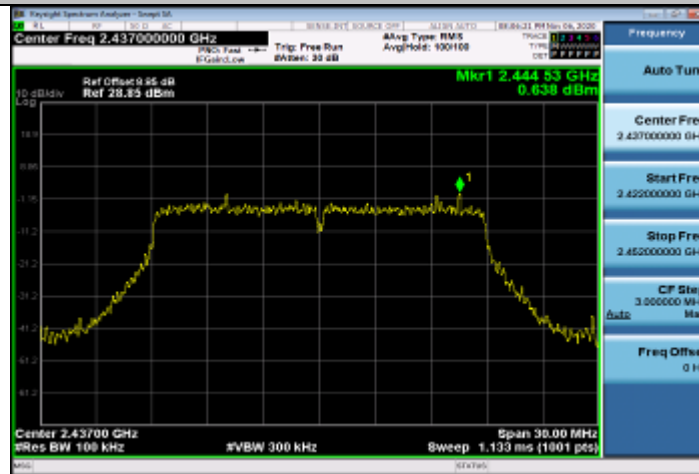
11N20SISO_Ant1_2412_30~1000



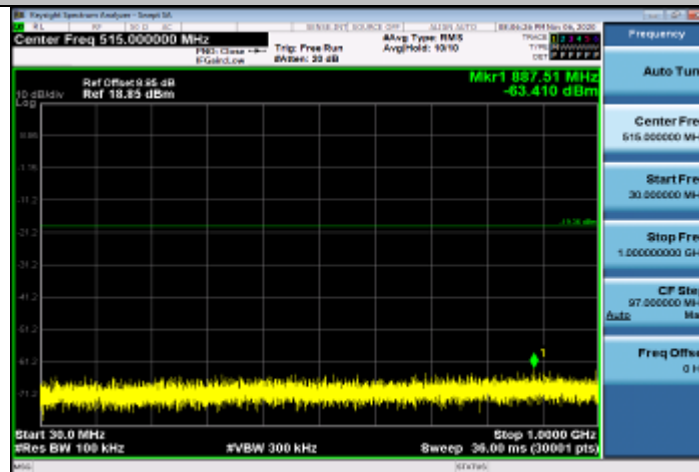
11N20SISO_Ant1_2412_1000~26500



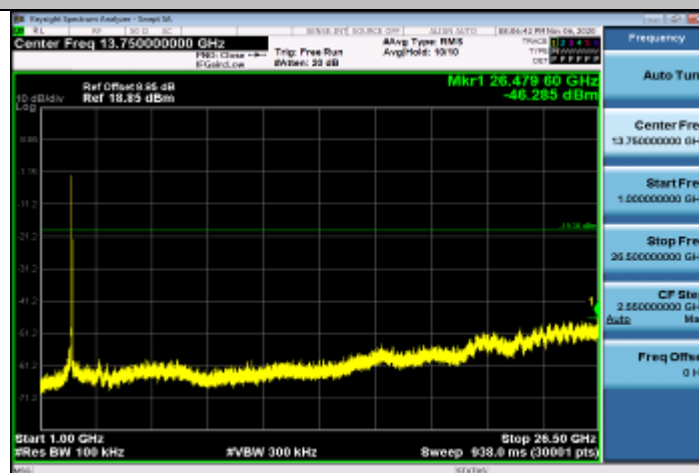
11N20SISO_Ant1_2437_0~Reference



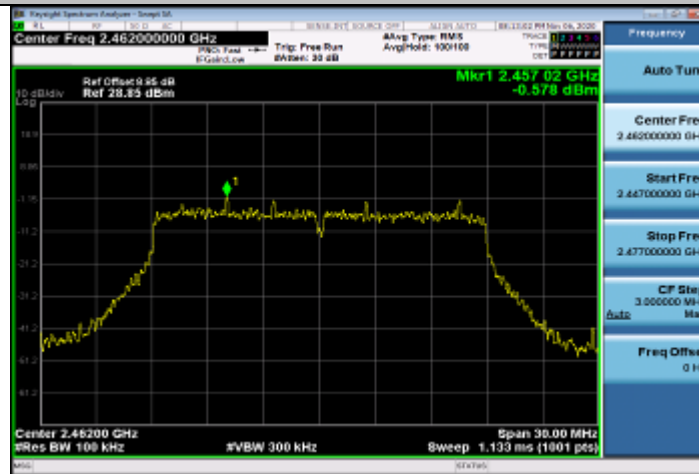
11N20SISO_Ant1_2437_30~1000



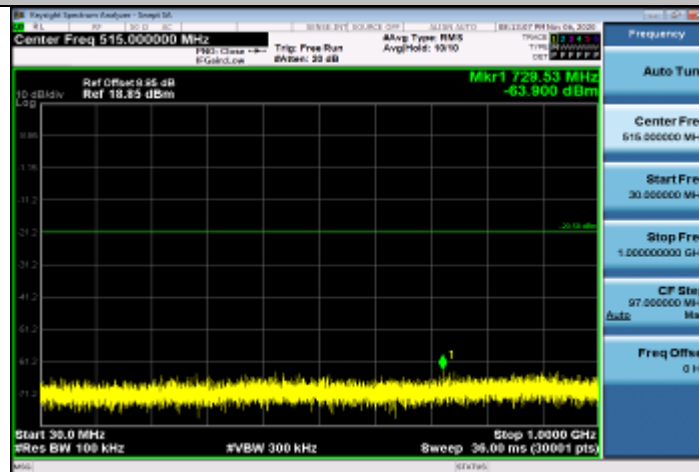
11N20SISO_Ant1_2437_1000~26500



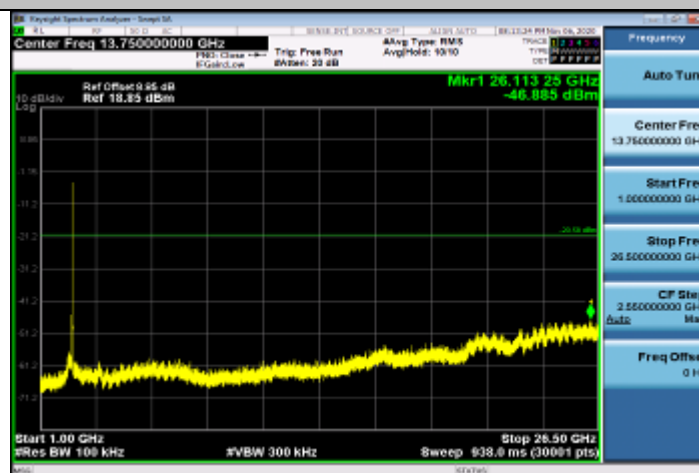
11N20SISO_Ant1_2462_0~Reference



11N20SISO_Ant1_2462_30~1000



11N20SISO_Ant1_2462_1000~26500



4.7 Emissions in restricted frequency bands

4.7.1 Test Limit

For 15.205 requirement:

Radiated emissions which fall in the restricted bands, as defined in Section 15.205(a) of FCC part15, must also comply with the radiated emission limits specified in Section 15.209(a).

Frequency (MHz)	Frequency (MHz)	Frequency (MHz)	Frequency (GHz)
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
1 0.495 - 0.505	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.5
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.4
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	(2)
13.36 - 13.41	--	--	--



All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47CFR must not exceed the limits shown in Table per Section 15.209.

FCC Part 15 Subpart C Paragraph 15.209		
Frequency [MHz]	Field Strength [uV/m]	Measured Distance [Meters]
0.009 - 0.490	2400/F (kHz)	300
0.490 - 1.705	24000/F (kHz)	30
1.705 - 30	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

4.7.2 Test Procedure Reference

ANSI C63.10 Section 6.3 (General Requirements)

ANSI C63.10 Section 6.6 (Standard test method above 1GHz)

4.7.3 Test Procedures

Peak Field Strength Measurements

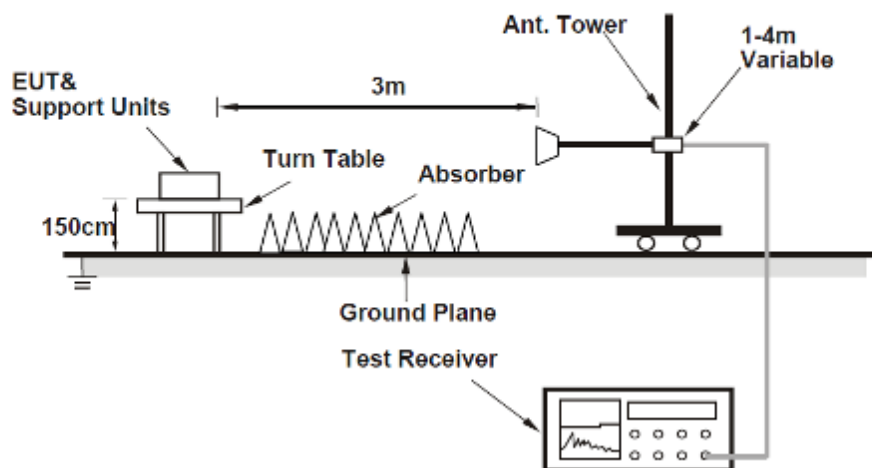
1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = 1MHz
3. VBW = 3MHz
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

Average Measurements above 1GHz (Method VB)

8. 1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
9. 2. RBW = 1MHz
10. 3. VBW; If the EUT is configured to transmit with duty cycle $\geq 98\%$, set VBW = 10 Hz.
11. If the EUT duty cycle is $< 98\%$, set VBW $\geq 1/T$. T is the minimum transmission duration.
12. 4. Detector = Peak
13. 5. Sweep time = auto
14. 6. Trace mode = max hold
15. 7. Trace was allowed to stabilize

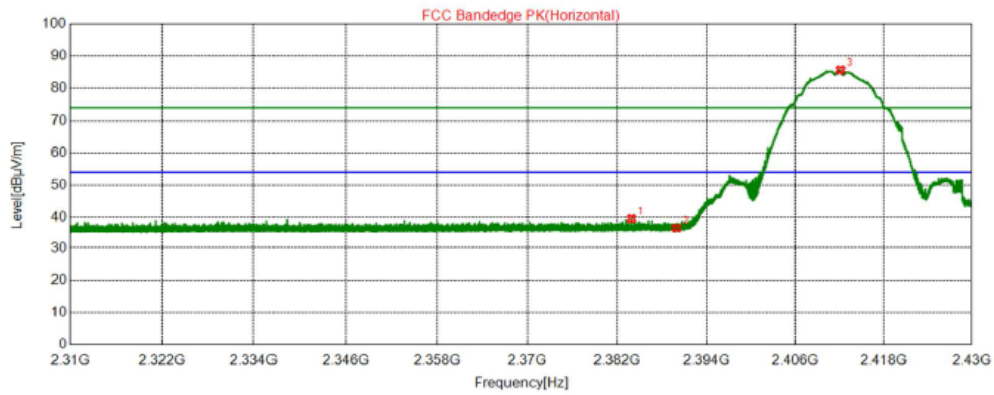
4.7.4 Test Setup

For Radiated emission above 1GHz



4.7.5 Test Results

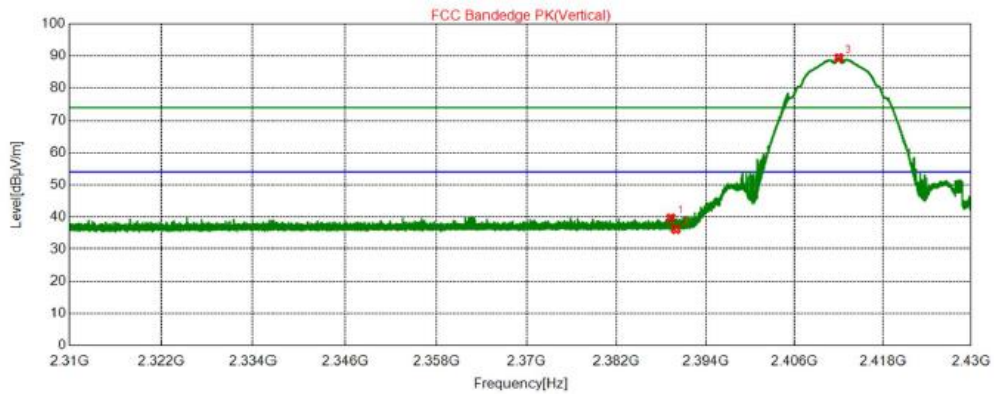
802.11b-2412MHz/ Horizontal



○ QP Detector ★ AV Detector

NO.	Freq. [MHz]	Reading [dB µ V/m]	Factor [dB]	Level [dB µ V/m]	Limit [dB µ V/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2383.	49.57	-9.90	39.67	74.00	34.33	175	184	Horizontal
2	2390.	46.55	-9.88	36.67	74.00	37.33	165	319	Horizontal
3	2412.	95.50	-9.80	85.70	74.00	-11.70	155	328	Horizontal

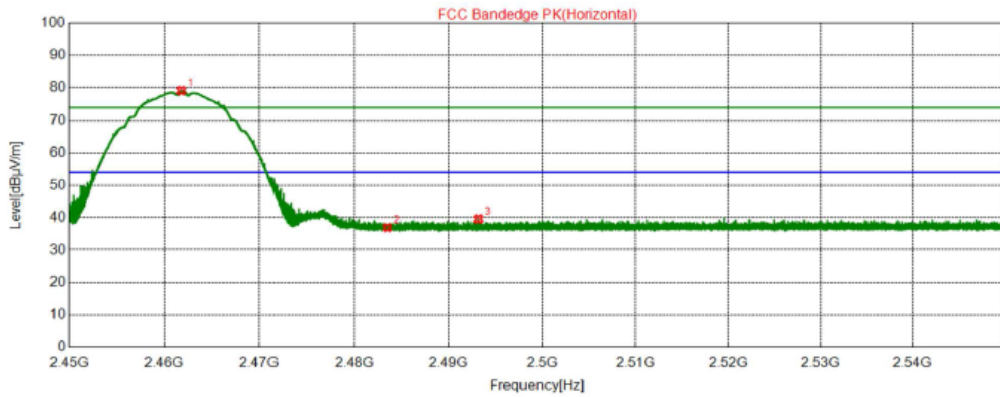
802.11b-2412MHz/ Vertical



○ QP Detector ★ AV Detector

NO.	Freq. [MHz]	Reading [dB µ V/m]	Factor [dB]	Level [dB µ V/m]	Limit [dB µ V/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2389.	49.60	-9.88	39.72	74.00	34.28	175	216	Vertical
2	2390.	46.14	-9.88	36.26	74.00	37.74	175	216	Vertical
3	2412.	99.24	-9.80	89.44	74.00	-15.44	175	216	Vertical

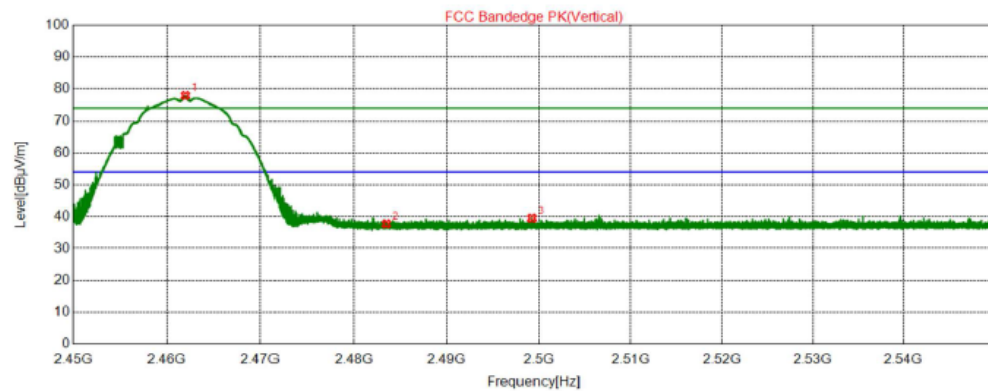
802.11b-2462MHz/ Horizontal



○ QP Detector ★ AV Detector

NO.	Freq. [MHz]	Reading [dB μ V/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2461.	88.80	-9.64	79.16	74.00	-5.16	155	185	Horizontal
2	2483.	46.57	-9.56	37.01	74.00	36.99	165	52	Horizontal
3	2493.	49.18	-9.53	39.65	74.00	34.35	175	328	Horizontal

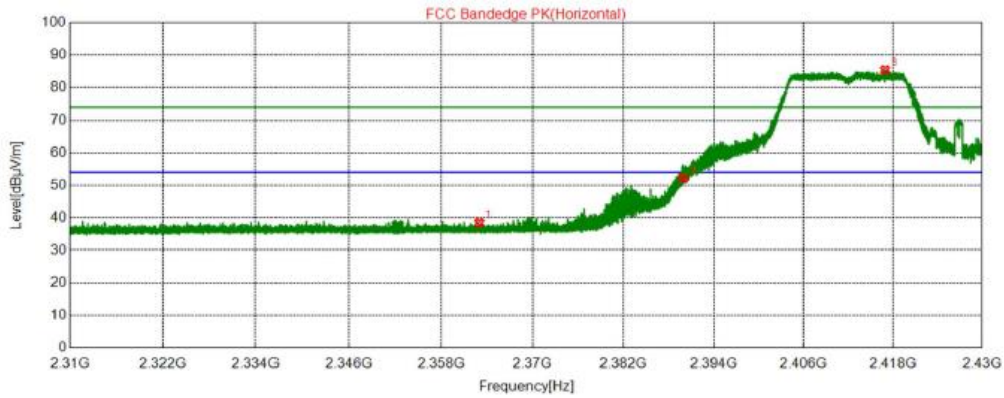
802.11b-2462MHz/ Vertical



○ QP Detector ★ AV Detector

NO.	Freq. [MHz]	Reading [dB μ V/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2462.	87.66	-9.64	78.02	74.00	-4.02	175	155	Vertical
2	2483.	47.37	-9.56	37.81	74.00	36.19	175	93	Vertical
3	2499.	49.07	-9.51	39.56	74.00	34.44	165	144	Vertical

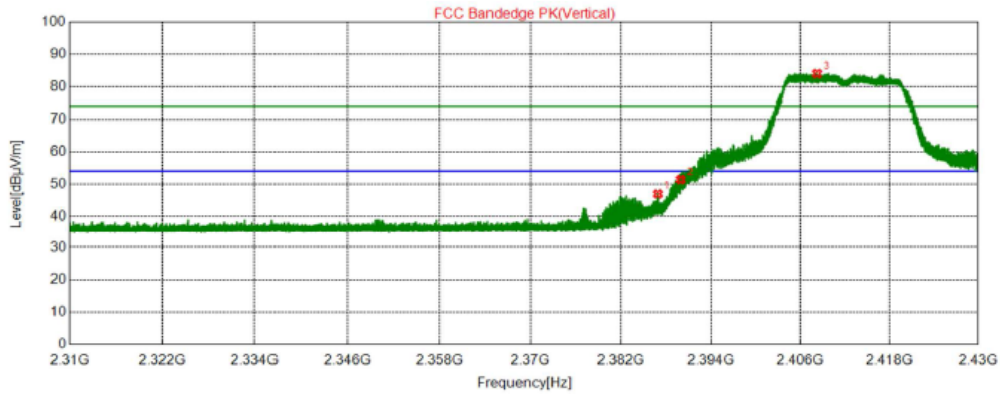
802.11g-2412MHz/ Horizontal



○ QP Detector ★ AV Detector

NO.	Freq. [MHz]	Reading [dB μ V/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2363.	48.54	-9.97	38.57	74.00	35.43	165	10	Horizontal
2	2390.	62.04	-9.88	52.16	74.00	21.84	165	154	Horizontal
3	2416.	95.22	-9.78	85.44	74.00	-11.44	165	31	Horizontal

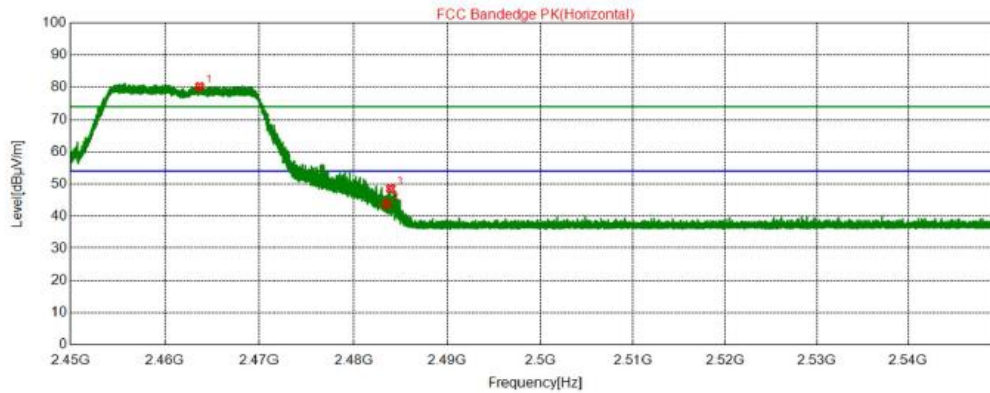
802.11g-2412MHz/ Vertical



○ QP Detector ★ AV Detector

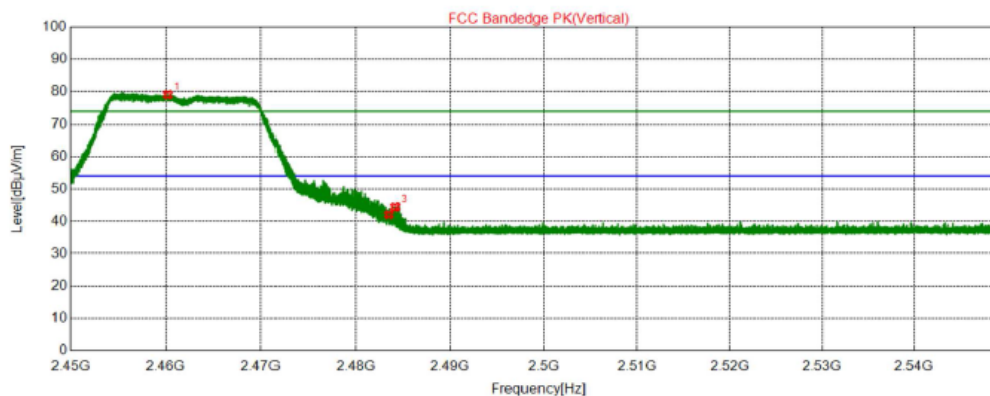
NO.	Freq. [MHz]	Reading [dB μ V/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2386.	56.95	-9.89	47.06	74.00	26.94	165	278	Vertical
2	2390.	61.32	-9.88	51.44	74.00	22.56	175	329	Vertical
3	2408.	93.91	-9.81	84.10	74.00	-10.10	175	329	Vertical

802.11g-2462MHz/ Horizontal



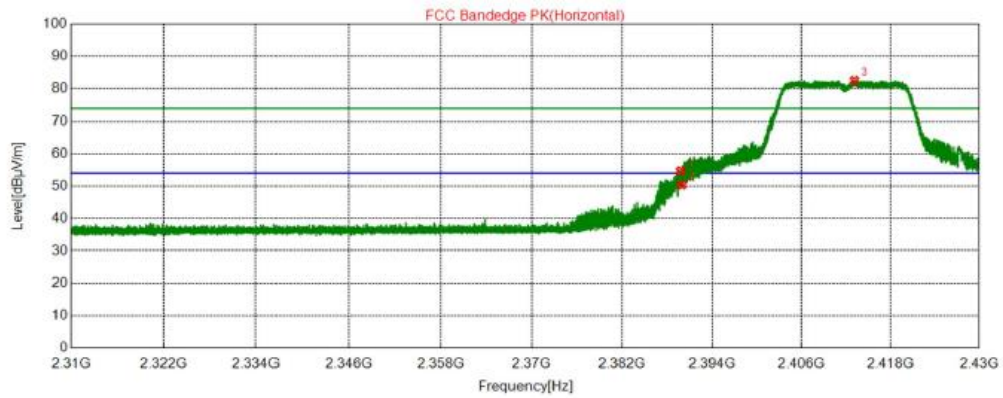
NO.	Freq. [MHz]	Reading [dB μ V/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2463.	89.82	-9.63	80.19	74.00	-6.19	155	156	Horizontal
2	2483.	53.43	-9.56	43.87	74.00	30.13	155	176	Horizontal
3	2483.	58.13	-9.56	48.57	74.00	25.43	155	156	Horizontal

802.11g-2462MHz/ Vertical



NO.	Freq. [MHz]	Reading [dB μ V/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2460.	88.74	-9.64	79.10	74.00	-5.10	175	328	Vertical
2	2483.	51.70	-9.56	42.14	74.00	31.86	175	307	Vertical
3	2484.	54.02	-9.56	44.46	74.00	29.54	175	143	Vertical

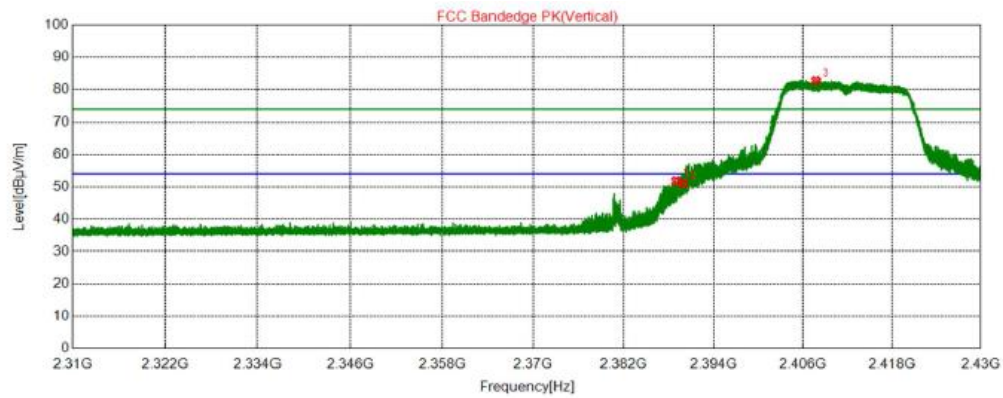
802.11n (HT20)-2412MHz/ Horizontal



○ QP Detector * AV Detector

NO.	Freq. [MHz]	Reading [dB μ V/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2389.	64.59	-9.88	54.71	74.00	19.29	155	20	Horizontal
2	2390.	60.31	-9.88	50.43	74.00	23.57	165	257	Horizontal
3	2413.	92.42	-9.80	82.62	74.00	-8.62	165	31	Horizontal

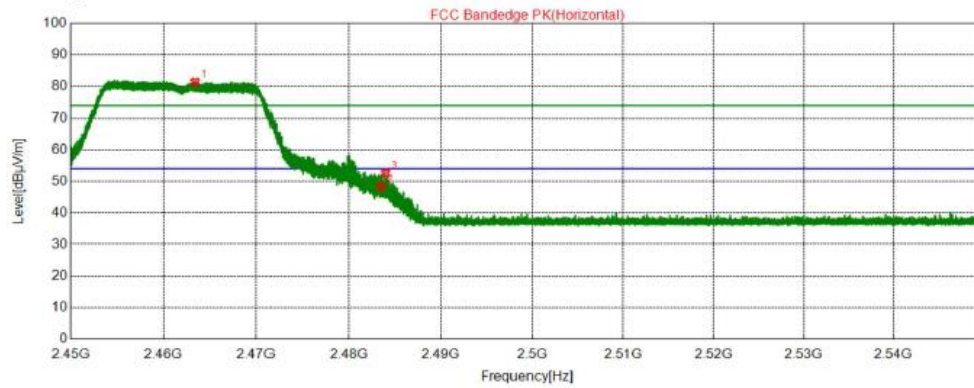
802.11n (HT20)-2412MHz/ Vertical



○ QP Detector * AV Detector

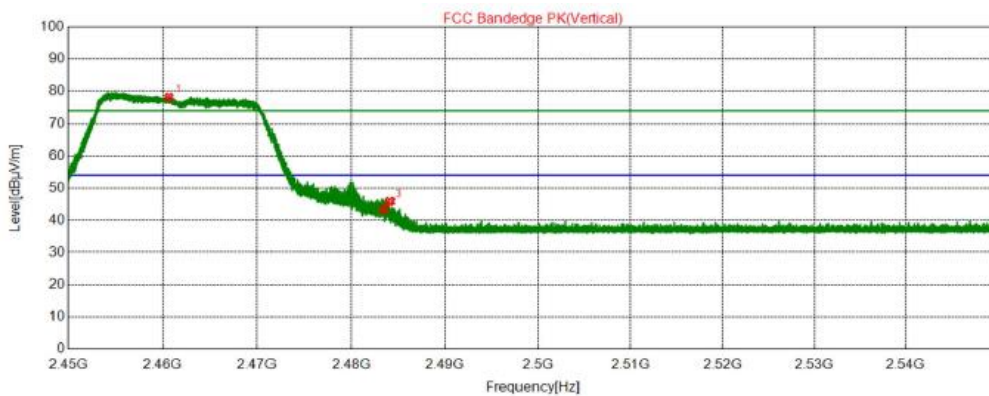
NO.	Freq. [MHz]	Reading [dB μ V/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2389.	61.72	-9.88	51.84	74.00	22.16	175	328	Vertical
2	2390.	61.07	-9.88	51.19	74.00	22.81	175	349	Vertical
3	2407.	92.59	-9.81	82.78	74.00	-8.78	175	328	Vertical

802.11n (ht20)-2462MHz/ Horizontal



NO.	Freq. [MHz]	Reading [dB μ V/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2463.	91.06	-9.63	81.43	74.00	-7.43	165	155	Horizontal
2	2483.	57.98	-9.56	48.42	74.00	25.58	175	164	Horizontal
3	2483.	62.14	-9.56	52.58	74.00	21.42	165	155	Horizontal

802.11n (HT20)-2462MHz/ Vertical



NO.	Freq. [MHz]	Reading [dB μ V/m]	Factor [dB]	Level [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	2460.	87.82	-9.64	78.18	74.00	-4.18	165	164	Vertical
2	2483.	53.01	-9.56	43.45	74.00	30.55	165	144	Vertical
3	2484.	55.49	-9.56	45.93	74.00	28.07	165	164	Vertical

4.8 Radiated Emission Measurement

4.8.1 Limits

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table.

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

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.

4.8.2 Test Procedures

For Radiated emission below 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degree to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Both X and Y axes of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotate table was turned from 0 degree to 360 degree to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1 GHz) / 1.5 meters (for above 1 GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna 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.
- d. 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 rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detected function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

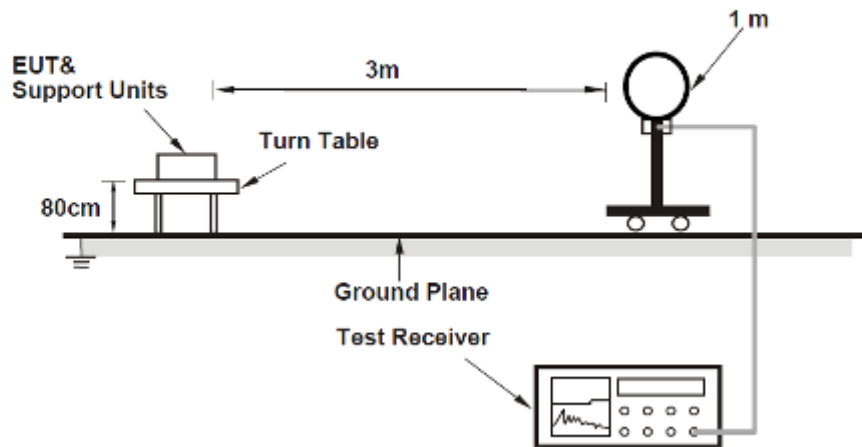
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz & 360 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 1/T for RMS Average (Duty cycle < 98 %) for Peak detection at frequency above 1 GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz (Duty cycle $\geq$ 98 %) for Average detection (AV) at frequency above 1 GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.8.3 Deviation from Test Standard

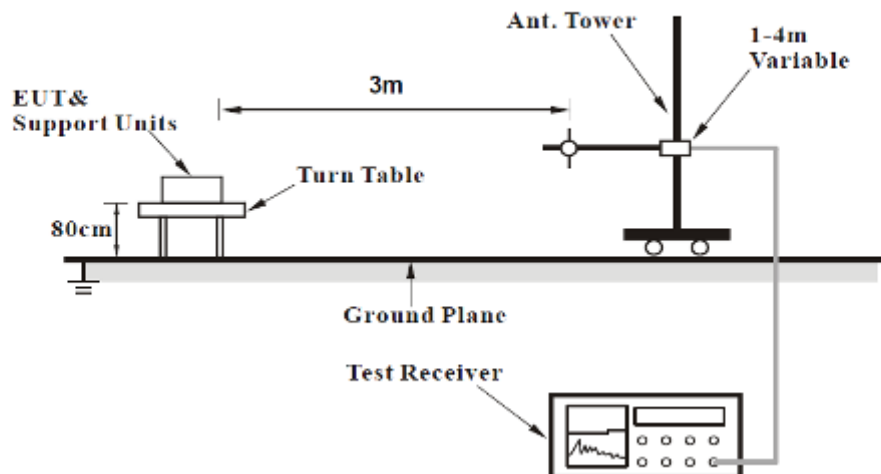
No deviation.

4.8.4 Test Setup

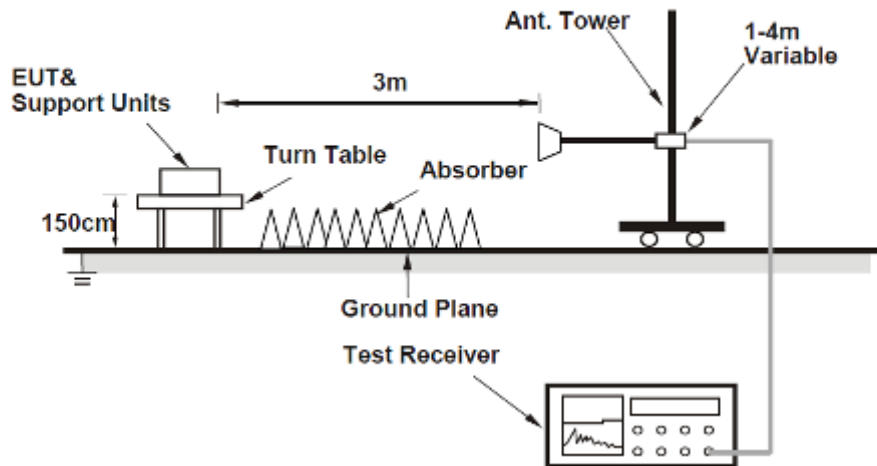
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.8.5 EUT Operating Conditions

- Placed the EUT on a testing table.
- Use the software to control the EUT under transmission condition continuously at specific channel frequency.

4.8.6 Test Results

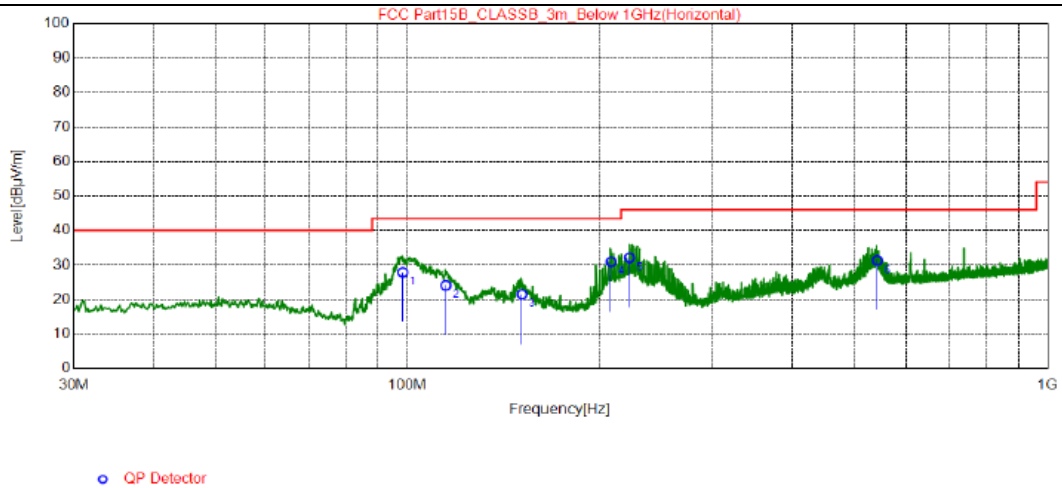
Radiated Emissions Range 9kHz~30MHz

The amplitude of spurious emissions which are attenuated by more than 20 dB below the permissible value has no need to be reported.

Radiated Emissions Range 30MHz~1GHz

With adaptor KA06E-0501000US

Mode	802.11b-2412MHz	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz	Antenna Polarity	Horizontal

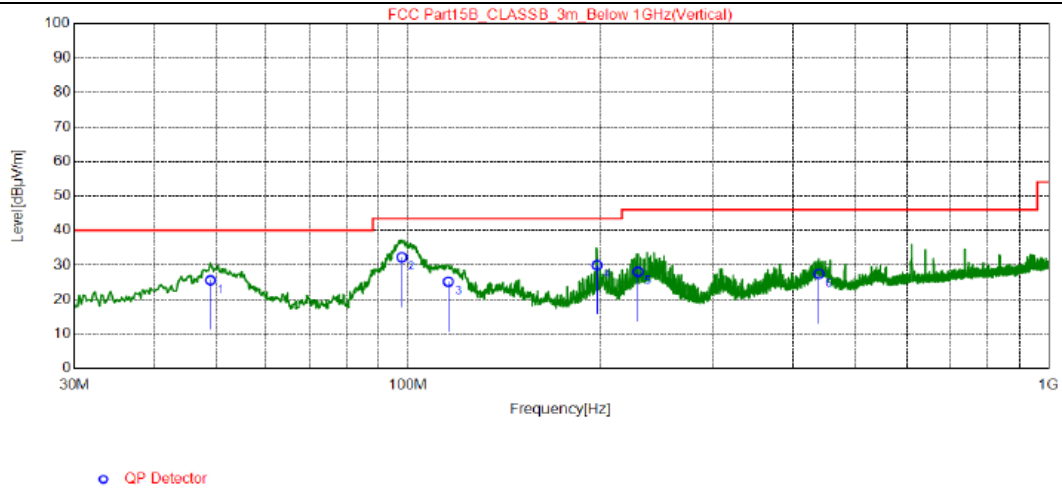


NO.	Freq. [MHz]	QP Reading [dBμV/m]	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	98.28	43	-15.13	27.87	43.50	15.63	200	251	Horizontal
2	114.7	37.23	-13.14	24.09	43.50	19.41	200	267	Horizontal
3	151.0	31.53	-10.01	21.52	43.50	21.98	200	98	Horizontal
4	208.2	42.88	-11.97	30.91	43.50	12.59	200	80	Horizontal
5	222.6	43.78	-11.66	32.12	46.00	13.88	200	255	Horizontal
6	543.7	35.15	-3.80	31.35	46.00	14.65	200	259	Horizontal

REMARKS:

1. Emission Level(dBuV/m) = Spectrum reading (dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value =Limit value – Emission Level

Mode	802.11b-2412MHz	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz	Antenna Polarity	Vertical



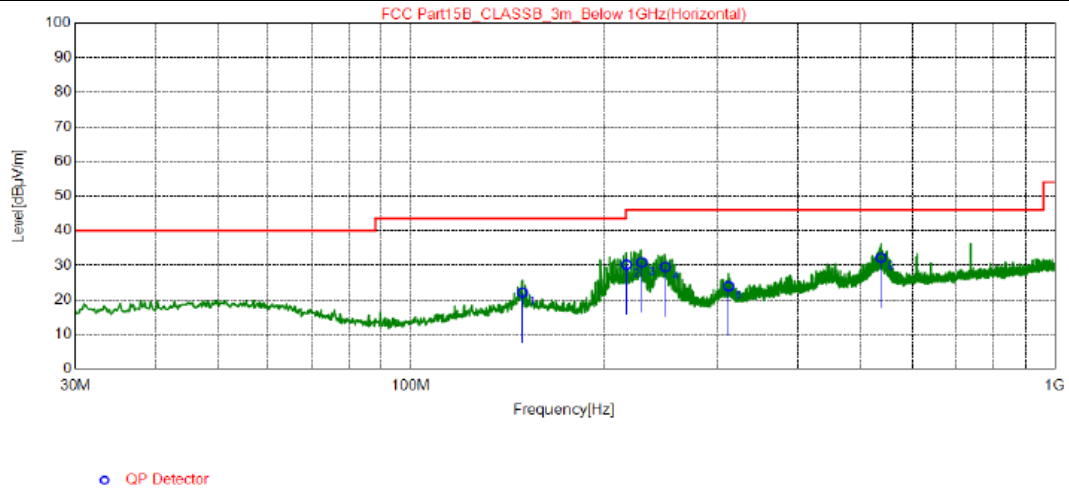
NO.	Freq. [MHz]	QP Reading [dBμV/m]	Factor [dB]	QP Value [dBμV/m]	QP Limit [dBμV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	49.01	35.31	-9.77	25.54	40.00	14.46	100	310	Vertical
2	97.70	47.4	-15.18	32.22	43.50	11.28	100	89	Vertical
3	115.5	38.18	-13.05	25.13	43.50	18.37	100	245	Vertical
4	197.4	41.93	-11.97	29.96	43.50	13.54	100	291	Vertical
5	228.8	39.49	-11.44	28.05	46.00	17.95	100	257	Vertical
6	439.3	32.81	-5.38	27.43	46.00	18.57	100	169	Vertical

REMARKS:

1. Emission Level(dBuV/m) = Original Spectrum reading (dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value =Limit value – Emission Level

With adaptor TEKA-UCA10US

Mode	802.11b-2412MHz	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz	Antenna Polarity	Horizontal

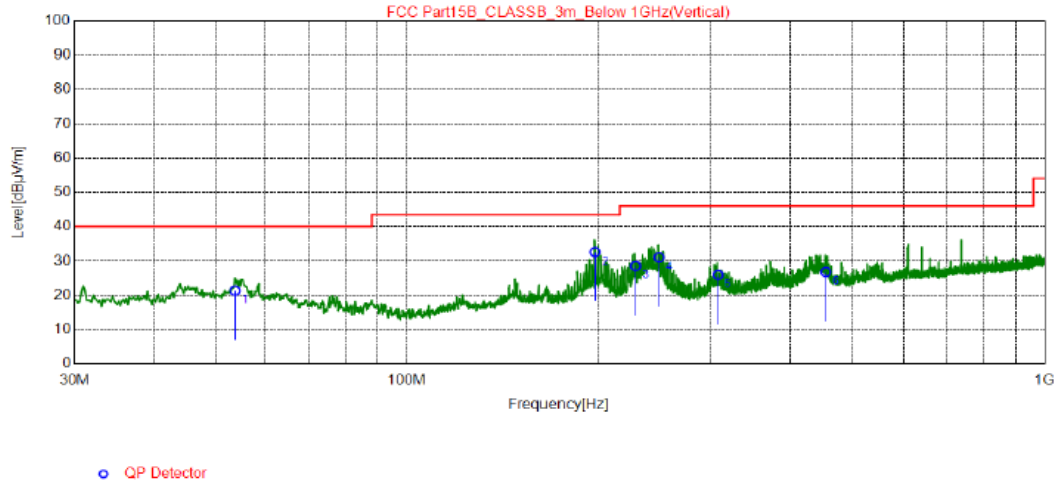


NO.	Freq. [MHz]	QP Reading [dBuV/m]	Factor [dB]	QP Value [dBuV/m]	QP Limit [dBuV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	149.1	32.14	-10.07	22.07	43.50	21.43	200	94	Horizontal
2	216.4	41.96	-11.81	30.15	46.00	15.85	200	66	Horizontal
3	228.6	42.26	-11.45	30.81	46.00	15.19	200	244	Horizontal
4	249.0	40.12	-10.62	29.50	46.00	16.50	200	124	Horizontal
5	312.2	32.26	-8.31	23.95	46.00	22.05	200	298	Horizontal
6	539.0	36.09	-3.88	32.21	46.00	13.79	200	105	Horizontal

REMARKS:

1. Emission Level(dBuV/m) = Spectrum reading (dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value =Limit value – Emission Level

Mode	802.11b-2412MHz	Detector Function	Quasi-Peak (QP)
Frequency Range	30MHz ~ 1GHz	Antenna Polarity	Vertical



NO.	Freq. [MHz]	QP Reading [dBuV/m]	Factor [dB]	QP Value [dBuV/m]	QP Limit [dBuV/m]	QP Margin [dB]	Height [cm]	Angle [°]	Polarity
1	53.66	31.25	-9.91	21.34	40.00	18.66	100	345	Vertical
2	197.4	44.54	-11.97	32.57	43.50	10.93	100	20	Vertical
3	228.6	40	-11.45	28.55	46.00	17.45	100	208	Vertical
4	249.0	41.67	-10.62	31.05	46.00	14.95	100	273	Vertical
5	308.1	34.34	-8.41	25.93	46.00	20.07	100	254	Vertical
6	455.2	31.83	-5.07	26.76	46.00	19.24	100	181	Vertical

REMARKS:

1. Emission Level(dBuV/m) = Original Spectrum reading (dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value =Limit value – Emission Level



Radiated Emission Range 1GHz~10th Harmonic

802.11b

Channel	TX Channel 1	Detector Function	Peak (PK)
Frequency Range	1GHz ~ 25GHz		Average (AV)

Spurious Emission Level							
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Correction Factor (dB/m)	Antenna Polarity	Detector
1	7236.45	40.51	74.00	33.49	-0.66	H	PK
2	7237.30	35.45	54.00	18.55	-0.66	H	AV
3	7236.45	43.10	74.00	30.90	-0.66	V	PK
4	7238.15	38.35	54.00	15.65	-0.66	V	AV

REMARKS:

1. Emission Level(dBuV/m) = Original Spectrum reading (dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Limit value – Emission Level

Channel	TX Channel 6	Detector Function	Peak (PK)
Frequency Range	1GHz ~ 25GHz		Average (AV)

Spurious Emission Level							
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Correction Factor (dB/m)	Antenna Polarity	Detector
1	7311.25	37.07	74.00	36.93	-0.85	H	PK
2	7312.10	30.90	54.00	23.10	-0.85	H	AV
3	7310.40	40.27	74.00	33.73	-0.85	V	PK
4	7311.25	36.38	54.00	17.62	-0.85	V	AV

REMARKS:

1. Emission Level(dBuV/m) = Original Spectrum reading (dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Limit value – Emission Level

Channel	TX Channel 11	Detector Function	Peak (PK)
Frequency Range	1GHz ~ 25GHz		Average (AV)

Spurious Emission Level							
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Correction Factor (dB/m)	Antenna Polarity	Detector
1	7386.05	35.92	74.00	38.08	-1.05	H	PK
2	7386.05	30.07	54.00	23.93	-1.05	H	AV
3	7387.75	37.69	74.00	36.31	-1.05	V	PK
4	7387.75	32.83	54.00	21.17	-1.05	V	AV

REMARKS:

1. Emission Level(dBuV/m) = Original Spectrum reading (dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value =Limit value – Emission Level

802.11g

Channel	TX Channel 1	Detector Function	Peak (PK)
Frequency Range	1GHz ~ 25GHz		Average (AV)

Spurious Emission Level							
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Correction Factor (dB/m)	Antenna Polarity	Detector
1	7235.60	38.30	74.00	35.70	-0.66	H	PK
2	7237.30	30.63	54.00	23.37	-0.66	H	AV
3	7237.30	41.89	74.00	32.11	-0.66	V	PK
4	7237.30	35.56	54.00	18.44	-0.66	V	AV

REMARKS:

1. Emission Level(dBuV/m) = Original Spectrum reading (dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Limit value – Emission Level



Channel	TX Channel 6	Detector Function	Peak (PK)
Frequency Range	1GHz ~ 25GHz		Average (AV)

Spurious Emission Level							
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Correction Factor (dB/m)	Antenna Polarity	Detector
1	4872.6000	25.41	74.00	48.59	-10.76	H	PK
2	4873.4500	18.44	54.00	35.56	-10.76	H	AV
3	7305.3000	39.79	74.00	34.21	-0.84	V	PK
4	7307.8500	32.00	54.00	22.00	-0.84	V	AV

REMARKS:

1. Emission Level(dBuV/m) = Original Spectrum reading (dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value =Limit value – Emission Level

Channel	TX Channel 11	Detector Function	Peak (PK)
Frequency Range	1GHz ~ 25GHz		Average (AV)

Spurious Emission Level							
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Correction Factor (dB/m)	Antenna Polarity	Detector
1	7380.1000	36.65	74.00	37.35	-1.03	H	PK
2	7388.6000	28.00	54.00	26.00	-1.05	H	AV
3	7305.3000	39.79	74.00	34.21	-0.84	V	PK
4	7307.8500	32.00	54.00	22.00	-0.84	V	AV

REMARKS:

1. Emission Level(dBuV/m) = Original Spectrum reading (dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Limit value – Emission Level

802.11n (HT20)

Channel	TX Channel 1	Detector Function	Peak (PK)
Frequency Range	1GHz ~ 25GHz		Average (AV)

Spurious Emission Level							
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Correction Factor (dB/m)	Antenna Polarity	Detector
1	7227.10	38.11	74.00	35.89	-0.63	H	PK
2	7239.85	30.42	54.00	23.58	-0.67	H	AV
3	7239.85	41.60	74.00	32.40	-0.65	V	PK
4	7233.90	34.37	54.00	19.63	-0.67	V	AV

REMARKS:

1. Emission Level(dBuV/m) = Original Spectrum reading (dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Limit value – Emission Level

Channel	TX Channel 6	Detector Function	Peak (PK)
Frequency Range	1GHz ~ 25GHz		Average (AV)

Spurious Emission Level							
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Correction Factor (dB/m)	Antenna Polarity	Detector
1	7301.05	36.32	74.00	37.68	-0.83	H	PK
2	7307.00	28.55	54.00	25.45	-0.84	H	AV
3	7302.75	39.93	74.00	34.07	-0.83	V	PK
4	7303.60	31.61	54.00	22.39	-0.83	V	AV

REMARKS:

1. Emission Level(dBuV/m) = Original Spectrum reading (dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value =Limit value – Emission Level



Channel	TX Channel 11	Detector Function	Peak (PK)
Frequency Range	1GHz ~ 25GHz		Average (AV)

Spurious Emission Level							
No.	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Correction Factor (dB/m)	Antenna Polarity	Detector
1	7375.85	35.38	74.00	38.62	-1.02	H	PK
2	7381.80	27.26	54.00	26.74	-1.04	H	AV
3	7397.95	55.01	74.00	36.42	-1.08	V	PK
4	7382.65	30.57	54.00	23.43	-1.04	V	AV

REMARKS:

1. Emission Level(dBuV/m) = Original Spectrum reading (dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Limit value – Emission Level

5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

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