



CERTIFICATION TEST REPORT

Report Number. : 4790357232-E3V2

Applicant : SAMSUNG ELECTRONICS CO., LTD.
129 SAMSUNG-RO, YEONGTONG-GU, SUWON-SI,
GYEONGGI-DO, 16677, KOREA

Model : SM-F721B

FCC ID : A3LSMF721B

EUT Description : GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax,
NFC and WPT

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C

Date Of Issue:
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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	2022-06-14	Initial issue	SunGeun Lee
V2	2022-06-24	Updated to address TCB's Question	SunGeun Lee

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.

EUT DESCRIPTION: GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, NFC and WPT

MODEL NUMBER: SM-F721B

SERIAL NUMBER: 6335d079fa3f7ece, 6335d07dfc3f7ece (CONDUCTED);
R3CT40DGDYV, R3CT40SS53H, R3CT40SS6FB, R3CT504WY2D (RADIATED);

DATE TESTED: 2022-04-04 ~ 2022-06-14;

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Complies

UL Korea, Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Korea, Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Korea, Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Korea, Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by IAS, any agency of the Federal Government, or any agency of any government.

Approved & Released For
UL Korea, Ltd. By:



Seokhwan Hong
Suwon Lab Engineer
UL Korea, Ltd.

Tested By:



Sungeun Lee
Suwon Lab Engineer
UL Korea, Ltd.

2. TEST METHODOLOGY

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. KDB 558074 D01 DTS Meas Guidance v05r02.
4. KDB 662911 D01 Multiple Transmitter Output v02r01
5. ANSI C63.10-2013.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 218 Maeyeong-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16675, Korea. Line conducted emissions are measured only at the 218 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

218 Maeyeong-ro	
<input checked="" type="checkbox"/>	Chamber 1
<input checked="" type="checkbox"/>	Chamber 2
<input checked="" type="checkbox"/>	Chamber 3

UL Korea, Ltd. is accredited by IAS, Laboratory Code TL-637. The full scope of accreditation can be viewed at <https://www.iasonline.org/wp-content/uploads/2017/05/TL-637-cert-New.pdf>.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

$$\begin{aligned} \text{Field Strength (dBuV/m)} &= \text{Measured Voltage (dBuV)} + \text{Antenna Factor (dB/m)} + \\ &\text{Cable Loss (dB)} - \text{Preamp Gain (dB)} \\ 28.9 \text{ dBuV/m} &= 36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} \end{aligned}$$

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 0.15 to 30 MHz	3.02 dB
Radiated Disturbance, 30 MHz to 1 GHz	4.05 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.78 dB
Radiated Disturbance, 18 GHz to 40 GHz	5.58 dB

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

4.4. DECISION RULE

Decision rule for statement(s) of conformity is based on Procedure 2, Clause 4.4.3 in IEC Guide 115:2007.

5. EQUIPMENT UNDER TEST

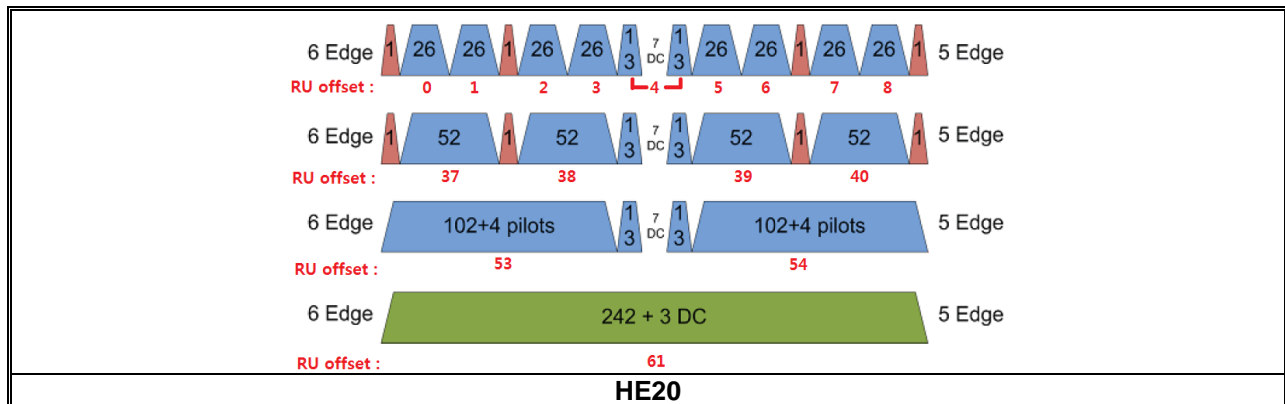
5.1. EUT DESCRIPTION

The EUT is a GSM/WCDMA/LTE/5G NR Phone + BT/BLE, DTS/UNII a/b/g/n/ac/ax, NFC and WPT. This test report addresses the DTS (WLAN) operational mode.

WiFi operating mode

Frequency range	Mode	ANT 1	ANT 2
2.4GHz (2412 MHz ~ 2472 MHz)	802.11b SISO	TX/RX	TX/RX
	802.11g MIMO	TX/RX	
	802.11n(HT20) MIMO	TX/RX	
	802.11ax(HE20) MIMO	TX/RX	

802.11ax RU allocations



Test RU offset for tones

Mode	Tones number in RU	RU offset
HE20	26T	0
		4
		8
		12
	52T	37
		38
		40
		44
	106T	53
		54
242T / SU <small>Note 1</small>	61 / -	

Note. Full RU(Resource Unit) 242T mode and SU(Single Unit) mode have no difference in physical waveform. This report has been reported the SU mode with highest output power in MIMO.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum total conducted average output power as follows:

Frequency Range [MHz]	Mode	Output Power [dBm]		Output Power [mW]	
		ANT1	ANT2	ANT1	ANT2
2412 - 2472	802.11b SISO	18.88	18.59	77.27	72.28
	802.11g MIMO	20.31		107.40	
	802.11n(HT20) MIMO	20.45		110.92	
	802.11ax(HE20) MIMO	19.49		88.92	

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

**The internal antenna was Permanently attached.
 Therefore this E.U.T Complies with the requirement of §15.203.**

Bands [MHz]	ANT 1 [dBi]	ANT 2 [dBi]	Correlated Directional Gain [dBi]
2 412 ~ 2 472	-5.10	-7.00	-2.99

Directional gain for the MIMO operations is determined using KDB 662911 D01 Multiple Transmitter Output section F (2)(d)(1) for *Unequal antenna gains, with equal transmit powers*. The gain is calculated using the formula for correlated transmissions across the two transmit antennas. Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}]$ dBi.

Sample calculation for this device with $N_{ANT} = 2$
 Directional gain = $10 \log[(10^{-5.10/20} + 10^{-7.00/20})^2 / 2] = -2.99$ dBi

5.4. TESTED CHANNELS LIST

Ch.	Frequency [MHz]	11b [SISO]	11g [MIMO]	11n(HT20) [MIMO]	11ax(HE20) [MIMO]
1	2 412	O	O	O	O
6	2 437	O	O	O	O
11	2 462	O	O	O	O
12	2 467	O	O	O	O
13	2 472	O	O	O	O

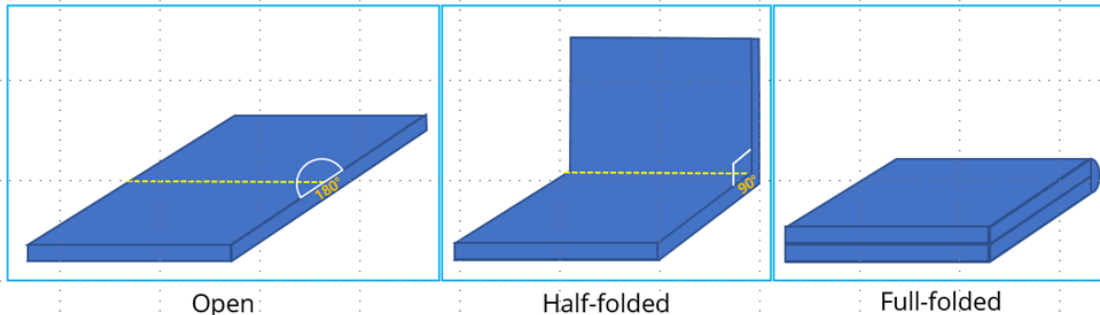
Note: Tested channels are applied to all test items.

5.5. WORST-CASE CONFIGURATION AND MODE

Radiated emission below 1GHz and power line conducted emission were 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/mid/High Channels.

Worst case of antenna axis:

ANT1	ANT2	MIMO
Y	Y	Z
Open	Open	Half-folded



Based on the baseline scan, the worst-case data rates were:

- 802.11b mode: 1 Mbps 1TX
- 802.11g mode: 6 Mbps 2TX
- 802.11n HT20 mode: MCS0 2TX
- 802.11ax HE20 mode: MCS0 2TX

Worst-case selection criteria for 802.11ax test items :

For the 6dB Bandwidth, it was tested at the RU allocation with lowest tones number for each bandwidth.

All radiated and power line conducted tests were performed attached with travel adapter for the worst case condition mode.

Test case configuration for 802.11b, g, n HT20, ax HE20(SU) modes: Conducted, Radiated

SISO Target[dBm]						MIMO Target[dBm]				
Ch.	Freq.	802.11b	802.11g	802.11n HT20	802.11ax HE20	Ch.	Freq.	802.11g	802.11n HT20	802.11ax HE20
1	2412	18	17	17	16	1	2412	20	20	19
6	2437	18	17	17	16	6	2437	20	20	19
11	2462	18	17	17	16	11	2462	20	20	19
12	2467	5	5	5	5	12	2467	8	8	8
13	2472	-3	-3	-3	-3	13	2472	0	0	0

	Radiated Band-Edge, Conducted Band-Edge
	Radiated Band-Edge, Radiated Spurious Emission, Conducted Band-Edge, Conducted Spurious Emission, PSD
	Radiated Spurious Emission, Conducted Spurious Emission, PSD

Note1. 802.11ax (SU mode)'s target power is lower than 802.11n HT20 mode (SISO: 1 dB, MIMO: 1 dB). Therefore, Radiated Band-Edge test was replaced with 11n mode.

Note2. In 802.11ax (RU mode), conducted & radiated spurious test was performed on the lower tone(26T) with high density.

Test case configuration for 802.11ax HE20(RU) modes:

MIMO Worst RU offset[dBm]					
Mode	Ch.	Freq.	Tone	RU offset	Test Case
802.11ax RU mode	1	2412	26 T	0	-
				4	-
				8	O
	6	2437		0	-
				4	-
				8	O
	11	2462		0	-
				4	-
				8	O

Note1. In 802.11ax HE20(RU) mode, the test case according to RU offset was selected from the offset with worst average power.

Note2. Radiated Band-Edge: investigated additional test with other lower RU tones. SU Mode (Worst case) is reported.

5.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA800	R37R38J49R8SE3	N/A
Data Cable	SAMSUNG	EP-DN980	N/A	N/A

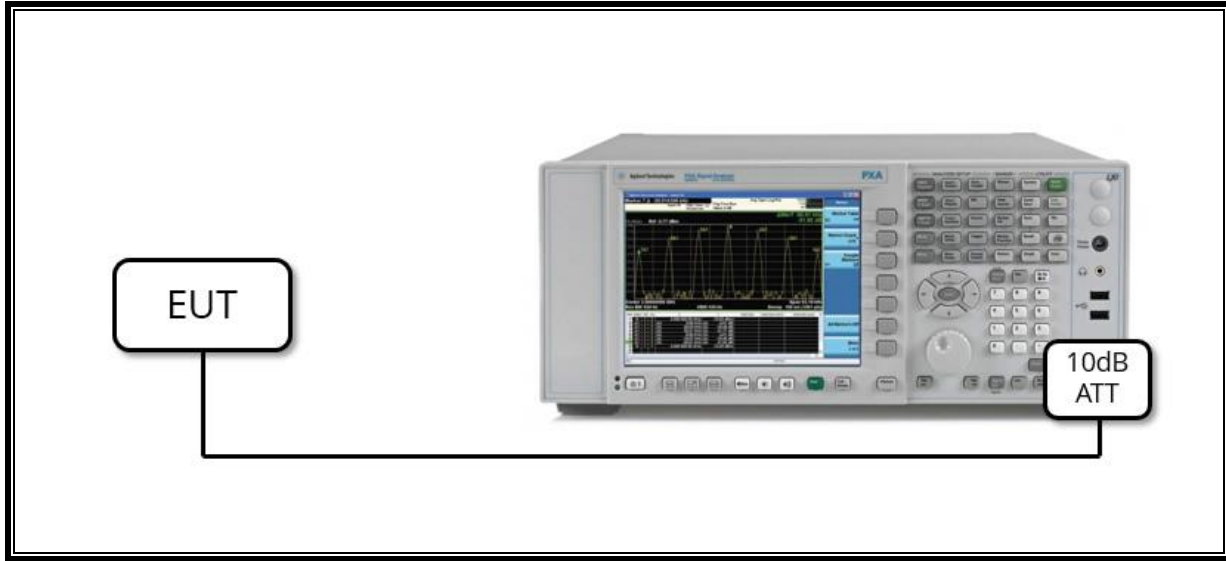
I/O CABLE

I/O Cable List						
Cable No.	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	DC Power	1	C Type	Shielded	1.0 m	N/A

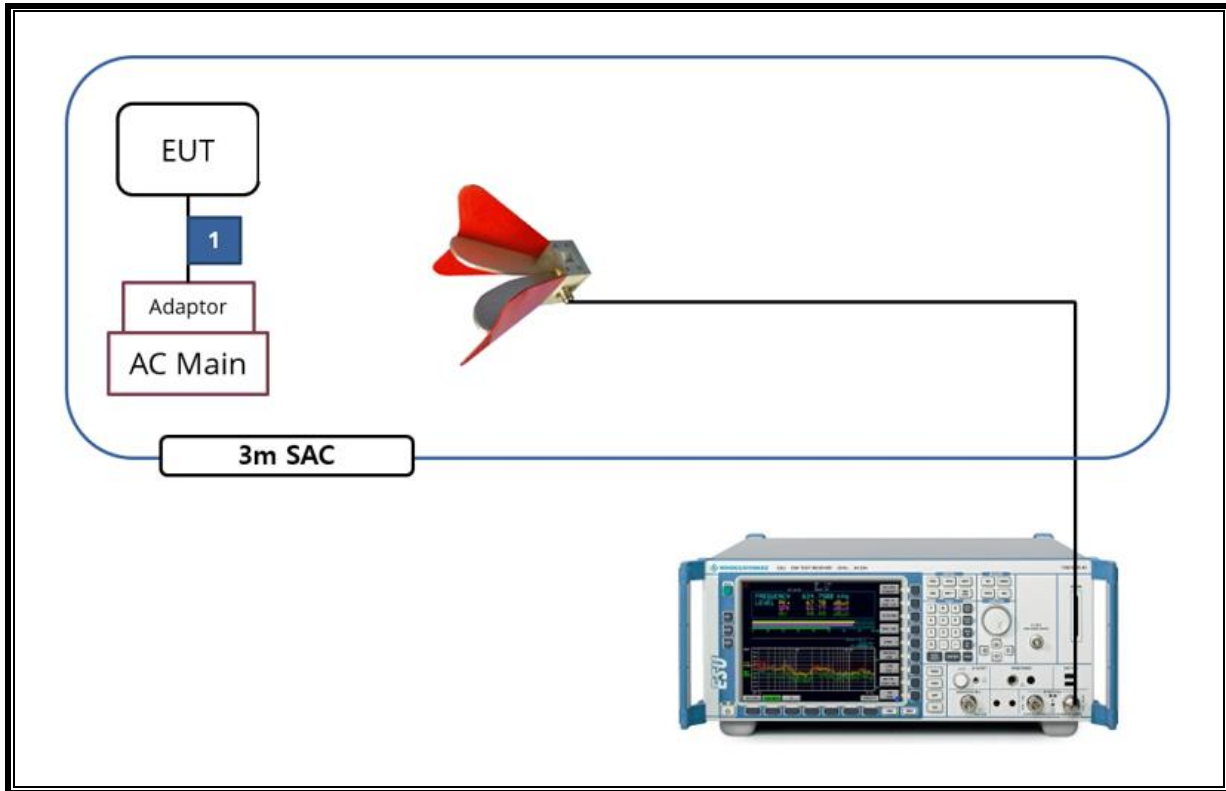
TEST SETUP

The EUT is a stand-alone unit during the tests.
Test software in hidden menu exercised the EUT to enable DTS mode.

SETUP DIAGRAM FOR TESTS (CONDUCTED TEST SETUP)



SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP)



6. MEASUREMENT METHOD

6 dB BW : ANSI C63.10-2013, Section 11.8.2 Option 2

OUTPUT POWER : ANSI C63.10-2013, Section 11.9.2.3.1 Method AVGPM

POWER SPECTRAL DENSITY : ANSI C63.10-2013, Section 11.10.3 & 11.10.5 Method AVGPSD-1 and Method AVGPSD-2

Out-of-band Emissions (Conducted) : ANSI C63.10-2013, Section 11.11 Emissions in nonrestricted frequency bands

Out-of-band Emissions in Non-restricted Bands: ANSI C63.10-2013, Section 11.11 Emissions in nonrestricted frequency bands

Out-of-band Emissions in Restricted Bands : ANSI C63.10-2013, Section 11.12 Emissions in restricted frequency bands

AC Power Line Conducted Emission : ANSI C63.10-2013, Section 6.2

7. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment List				
Description	Manufacturer	Model	S/N	Cal Due
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	2022-08-19
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	2022-08-13
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	2022-08-13
Antenna, Horn, 18 GHz	ETS	3115	00167211	2022-07-27
Antenna, Horn, 18 GHz	ETS	3115	00161451	2022-08-15
Antenna, Horn, 18 GHz	ETS	3117	00168724	2022-07-27
Antenna, Horn, 18 GHz	ETS	3117	00168717	2022-08-15
Antenna, Horn, 40 GHz	ETS	3116C	00166155	2022-08-04
Preamplifier	ETS	3116C-PA	00168841	2022-08-04
Preamplifier, 1000 MHz	Sonoma	310N	341282	2022-08-02
Preamplifier, 1000 MHz	Sonoma	310N	351741	2022-08-02
Preamplifier, 1000 MHz	Sonoma	310N	370599	2022-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	2022-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	2022-08-02
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029168	2022-08-02
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	2022-08-04
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54490312	2022-08-04
Spectrum Analyzer, 44 GHz	KEYSIGHT	N9030B	MY60070693	2023-01-18
Spectrum Analyzer, 44 GHz	KEYSIGHT	N9040B	MY60080268	2023-01-19
Average Power Sensor	Agilent / HP	U2000	MY54270007	2022-08-04
Average Power Sensor	Agilent / HP	U2000	MY54260010	2022-08-04
Attenuator	PASTERNAK	PE7087-10	A001	2022-08-03
Attenuator	PASTERNAK	PE7087-10	A008	2022-08-03
Attenuator	PASTERNAK	PE7004-10	2	2022-08-02
Attenuator	PASTERNAK	PE7087-10	A009	2022-08-03
EMI Test Receive, 40 GHz	R&S	ESU40	100439	2022-08-02
EMI Test Receive, 40 GHz	R&S	ESU40	100457	2022-08-02
EMI Test Receive, 3 GHz	R&S	ESR3	101832	2022-08-02
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	009	2022-08-02
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	015	2022-08-02
Low Pass Filter 5GHz	Micro-Tronics	LPS17541	019	2022-08-02
High Pass Filter 3GHz	Micro-Tronics	HPM17543	010	2022-08-02
High Pass Filter 3GHz	Micro-Tronics	HPM17543	015	2022-08-02
High Pass Filter 3GHz	Micro-Tronics	HPM17543	020	2022-08-02
High Pass Filter 6GHz	Micro-Tronics	HPS17542	009	2022-08-02
High Pass Filter 6GHz	Micro-Tronics	HPS17542	016	2022-08-02
High Pass Filter 6GHz	Micro-Tronics	HPS17542	020	2022-08-02
LISN	R&S	ENV-216	101837	2022-08-05
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	2023-10-06
UL Software				
Description	Manufacturer	Model	Version	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	UL	UL EMC	Ver 9.5	

8. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result
15.247 (a)(2)	Occupied Bandwidth(6dB)	> 500kHz	Conducted	PASS
2.1051, 15.247(d)	Band Edge / Conducted Spurious Emission	-30 dBc		PASS
15.247 (b)(3)	TX conducted output power	< 30 dBm		PASS
15.247(e)	PSD	< 8 dBm/3kHz		PASS
15.207(a)	AC Power Line conducted emissions	Section 11	Power Line conducted	PASS
15.205, 15.209	Radiated Spurious Emission	< 54dBuV/m(Av)	Radiated	PASS

9. ANTENNA PORT TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

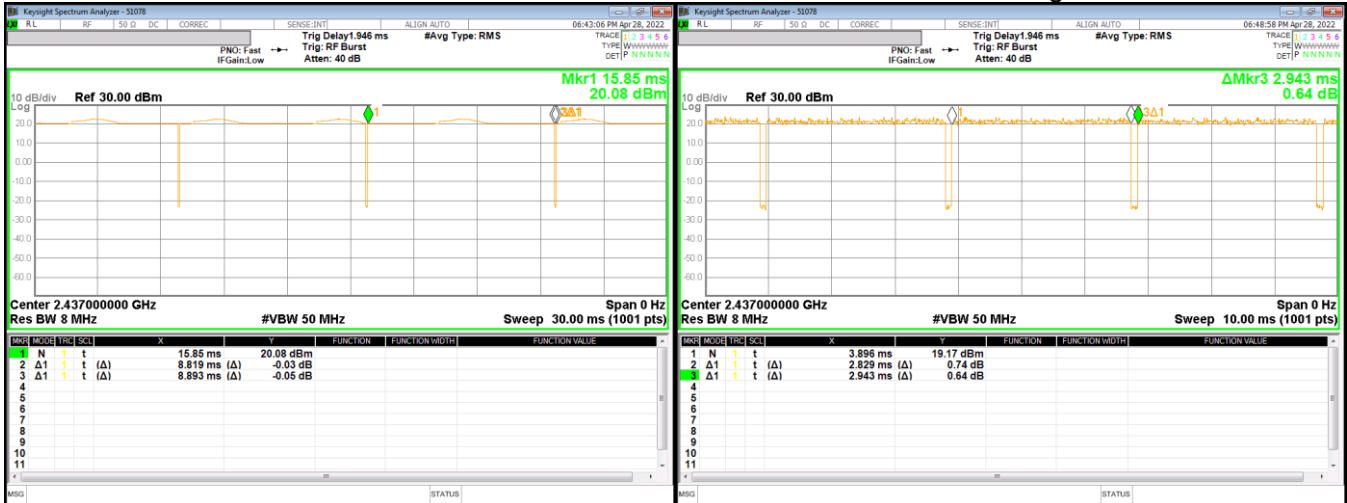
None; for reporting purposes only.

Mode	On Time [ms]	Period [ms]	Duty Cycle X [Linear]	Duty Cycle X [%]	Duty Cycle Correction Factor[dB]	1/T Minimum VBW[kHz]
802.11b SISO	8.819	8.893	0.992	99.168	-	0.11
802.11g SISO & MIMO	2.829	2.943	0.961	96.126	0.17	0.35
802.11n(HT20) SISO & MIMO	5.032	5.143	0.978	97.842	0.09	0.20
802.11ax(HE20) MIMO SU	2.596	2.618	0.992	99.160	-	0.39
802.11ax(HE20) MIMO 26T	2.591	2.613	0.992	99.158	-	0.39
802.11ax(HE20) MIMO 52T	2.436	2.458	0.991	99.105	-	0.41
802.11ax(HE20) MIMO 106T	2.388	2.410	0.991	99.087	-	0.42

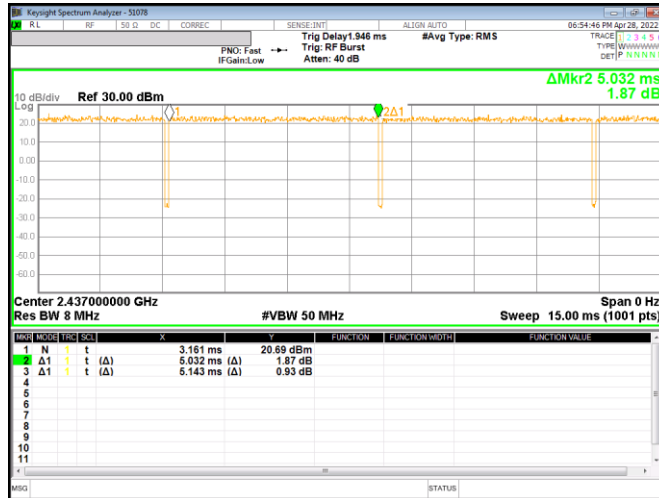
Note. According to ANSI C63.10 Section 11.6, do not apply the Duty Cycle Correction Factor judging that a duty cycle of greater than or equal to 98% is continuous signal.

802.11b

802.11g

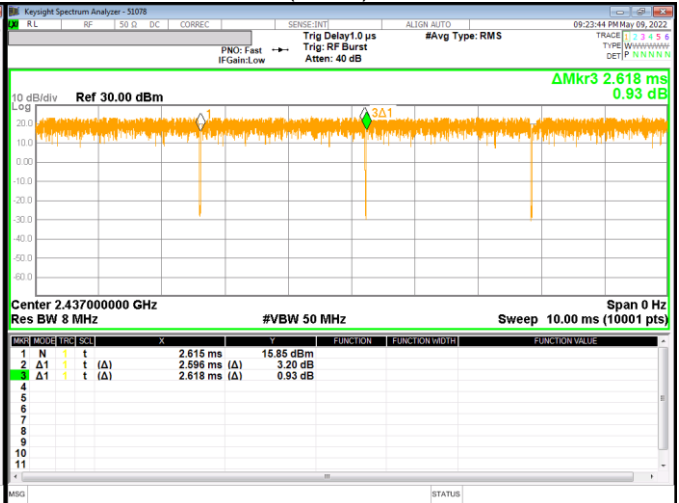
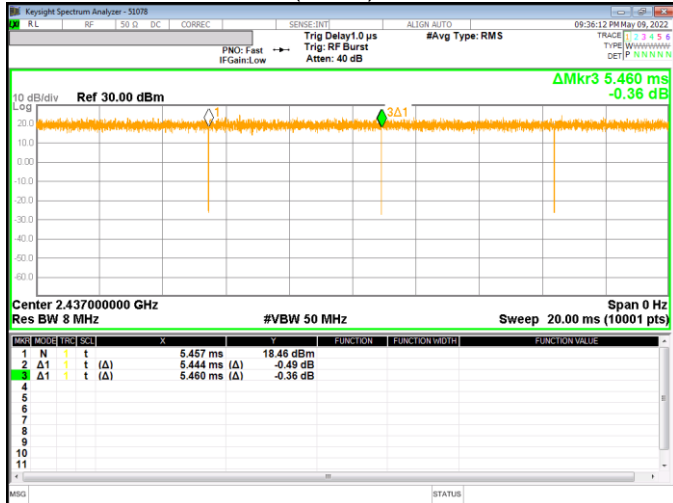


802.11n HT20



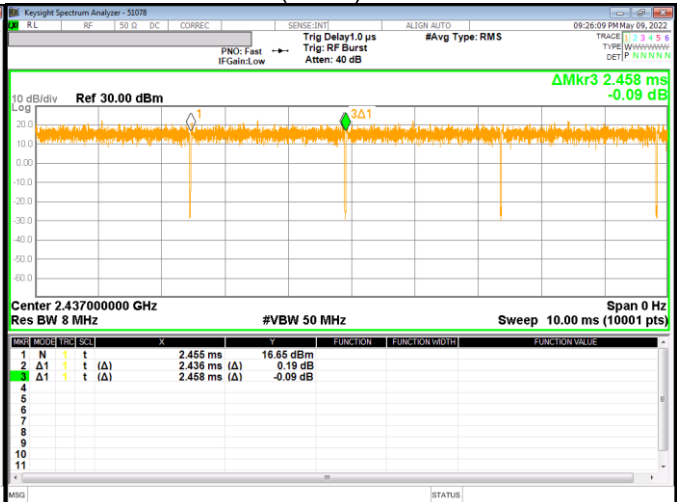
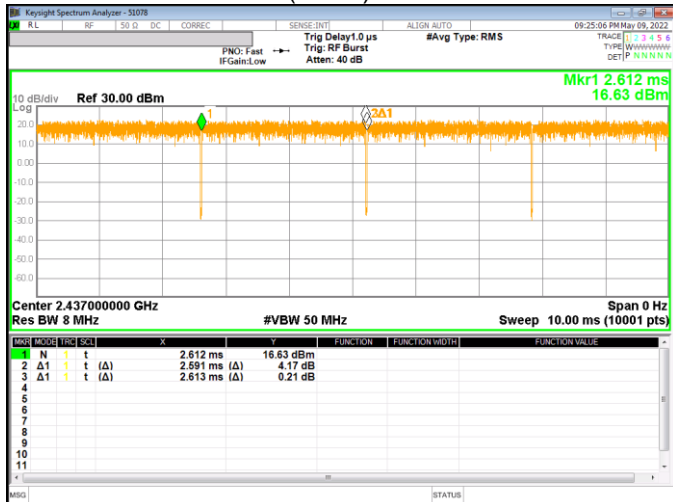
802.11ax(HE20) MIMO SU

802.11ax(HE20) MIMO 26T



802.11ax(HE20) MIMO 52T

802.11ax(HE20) MIMO 106T



9.2. 6 dB BANDWIDTH

LIMITS

FCC §15.247 (a) (2)

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

TEST PROCEDURE

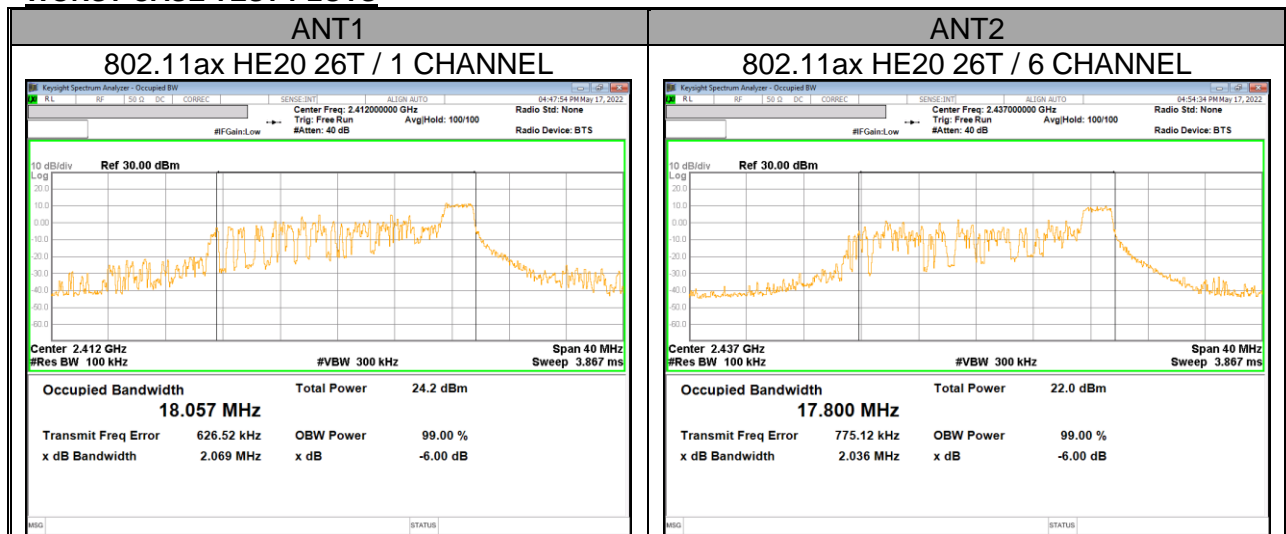
Reference to KDB 558074 D01 15.247 Meas Guidance: The transmitter output is connected to a spectrum analyzer with the RBW set to 100 kHz, the VBW $\geq 3 \times$ RBW, peak detector and max hold.

ANSI C63.10-2013, Section 11.8.1

RESULTS

- Please refer to the next page

WORST CASE TEST PLOTS



9.2.1. 802.11b SISO MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]		Minimum Limit [MHz]
		ANT 1	ANT 2	
1	2 412	7.158	9.023	0.5
6	2 437	8.532	7.136	
11	2 462	8.995	7.586	
12	2 467	7.087	7.599	
13	2 472	7.108	7.081	
Worst		7.087	7.081	

9.2.2. 802.11g MIMO MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]		Minimum Limit [MHz]
		ANT 1	ANT 2	
1	2 412	8.901	13.210	0.5
6	2 437	16.040	14.470	
11	2 462	10.690	15.760	
12	2 467	16.310	15.090	
13	2 472	11.970	12.600	
Worst		8.901	12.600	

9.2.3. 802.11n HT20 MIMO MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]		Minimum Limit [MHz]
		ANT 1	ANT 2	
1	2 412	13.460	13.880	0.5
6	2 437	17.600	15.060	
11	2 462	13.840	16.970	
12	2 467	17.180	17.150	
13	2 472	11.320	16.920	
Worst		11.320	13.880	

9.2.4. 802.11ax HE20(26T) MIMO MODE IN THE 2.4 GHz BAND

Channel	Frequency [MHz]	6 dB Bandwidth [MHz]		Minimum Limit [MHz]
		ANT 1	ANT 2	
1	2 412	2.069	2.068	0.5
6	2 437	2.074	2.036	
11	2 462	2.079	2.094	
12	2 467	13.790	2.663	
13	2 472	14.510	17.050	
Worst		2.069	2.036	

9.3. OUTPUT POWER

LIMITS

FCC §15.247 (b) (3)

For systems using digital modulation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands: 1 Watt, based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

TEST PROCEDURE

Measurements perform using a wideband RF frame average power sensor. The cable assembly insertion loss and duty cycle correction factor was entered as an offset in the power sensor to allow for direct reading of power. Output power measurement was performed utilizing the 8.3.2.3 under KDB558074 D01 15.247 Meas Guidance.

ANSI C63.10-2013, Section 11.9.2.3.1 Method AVGPM

DIRECTIONAL ANTENNA GAIN

The TX chains are correlated and the antenna gain is unequal among the chains. The directional gain is:

Bands [MHz]	ANT 1 [dBi]	ANT 2 [dBi]	Correlated Directional Gain [dBi]
2 412 ~ 2 472	-5.10	-7.00	-2.99

Note. Since the correlated directional gain does not exceed 6dBi, it is not mentioned further below.

9.3.1. TEST RESULTS

- 802.11b,g,n,ax(SU) mode

Mode	Channel	Frequency [MHz]	SISO Average Power [dBm]		MIMO Average Power [dBm]			Power Limit [dBm]
			ANT1	ANT2	ANT1	ANT2	Total Corr'd Power [dBm]	
802.11b	1	2 412	18.65	18.53	Not Supported			30.00
	6	2 437	18.21	18.59				
	11	2 462	18.88	18.44				
	12	2 467	4.63	5.76				
	13	2 472	-2.81	-2.95				
Worst Case			18.88	18.59				
802.11g	1	2 412	17.54	17.27	17.63	16.65	20.18	30.00
	6	2 437	17.60	17.42	17.64	16.92	20.31	
	11	2 462	17.54	17.03	17.57	16.62	20.13	
	12	2 467	5.60	5.51	5.72	3.02	7.59	
	13	2 472	-2.31	-2.58	-2.06	-3.66	0.22	
Worst Case			17.60	17.42			20.31	
802.11n HT20	1	2 412	17.57	17.62	17.73	16.84	20.32	30.00
	6	2 437	17.73	17.66	17.75	17.11	20.45	
	11	2 462	17.58	17.36	17.66	16.82	20.27	
	12	2 467	5.82	5.59	5.93	3.20	7.79	
	13	2 472	-2.42	-2.67	-2.08	-3.68	0.20	
Worst Case			17.73	17.66			20.45	
802.11ax HE20(SU)	1	2 412	-	-	16.14	14.87	18.56	30.00
	6	2 437	-	-	16.24	15.09	18.71	
	11	2 462	-	-	16.58	15.89	19.26	
	12	2 467	-	-	5.53	3.74	7.74	
	13	2 472	-	-	-2.32	-3.85	-0.01	
Worst Case			-	-			19.26	

- Calculation of Output Power result

Average Power = Meas. Power + Duty Cycle CF / Total Corr'd Power = ANT1's Average Power + ANT2's Average Power

- 802.11ax (RU) mode

Channel	Frequency [MHz]	Tones	RU Offset	MIMO Average Power [dBm]			Power Limit [dBm]			
				ANT1	ANT2	Total Corr'd Power [dBm]				
1	2 412	26T	0	15.81	14.96	18.42	30.00			
			4	16.58	14.84	18.81				
			8	16.73	16.22	19.49				
		52T	37	16.05	14.92	18.53				
			38	16.82	15.01	19.02				
			40	16.66	16.04	19.37				
		106T	53	16.51	15.08	18.86				
			54	16.88	15.83	19.40				
			6	2 437	26T	0		16.24	14.21	18.35
						4		15.52	15.35	18.45
8	16.55	14.15				18.52				
52T	37	16.18			14.13	18.29				
	38	15.73			14.53	18.18				
	40	16.56			14.29	18.58				
106T	53	16.28			14.66	18.56				
	54	16.48			14.69	18.69				
	11	2 462			26T	0		16.08	13.53	18.00
						4		15.62	14.25	18.00
8			15.60	14.57		18.13				
52T			37	16.88	14.10	18.72				
			38	16.28	14.14	18.35				
			40	15.92	15.50	18.73				
106T			53	16.76	14.17	18.67				
			54	16.05	15.59	18.84				
			12	2 467	26T	0		5.48	2.39	7.21
						4		5.76	3.96	7.96
8	5.52	2.15				7.16				
52T	37	5.52			2.75	7.36				
	38	5.62			4.16	7.96				
	40	5.72			4.11	8.00				
106T	53	5.64			3.47	7.70				
	54	5.53			3.82	7.77				
	13	2 472			26T	0	-2.25	-4.13	-0.08	
						4	-2.58	-4.23	-0.32	
8			-1.99	-4.49		-0.05				
52T			37	-2.36	-4.31	-0.22				
			38	-2.25	-4.22	-0.11				
			40	-2.39	-4.45	-0.29				
106T			53	-2.23	-3.96	0.00				
			54	-2.21	-4.06	-0.03				
			Worst Case					19.49		

9.4. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

RSS-247 (5.2) (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

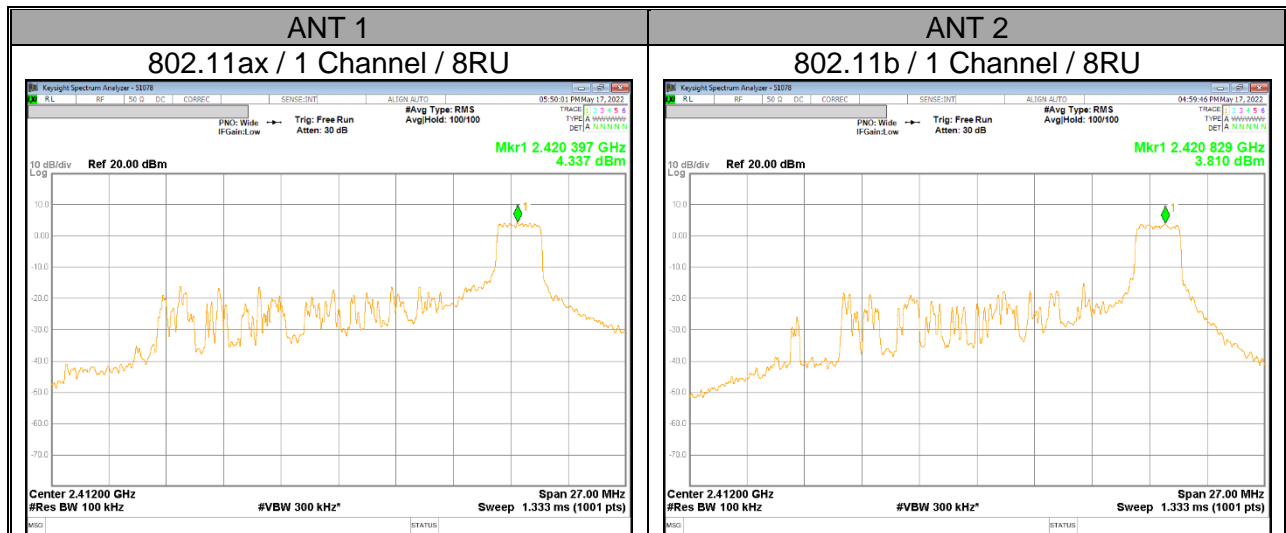
Power Spectral Density was performed utilizing the section 8.4 under KDB558074 D01 15.247 Meas Guidance.

ANSI C63.10-2013, Section 11.10.3 & 11.10.5

RESULTS

- Please refer to the next page

WORST CASE TEST PLOTS



9.4.1. 802.11b/g/n HT20 MODE TEST RESULTS

- SISO Mode

Mode	Channel	Frequency [MHz]	Meas PSD [dBm/100kHz]		DCCF	Total Corr'd PSD [dBm/100kHz]		PSD Limit [dBm/3kHz]
			ANT1	ANT2		ANT1	ANT2	
802.11b	1	2 412	2.348	1.276	-	2.348	1.276	8.00 ^{Note}
	6	2 437	1.653	1.417	-	1.653	1.417	
	11	2 462	2.544	1.354	-	2.544	1.354	

- SISO Mode (Ant1 + Ant2)

Mode	Channel	Frequency [MHz]	Meas PSD [dBm/100kHz]		DCCF	Total Corr'd PSD [dBm/100kHz]	PSD Limit [dBm/3kHz]
			ANT1	ANT2			
802.11g	1	2 412	-1.089	-1.417	0.17	1.930	8.00 ^{Note}
	6	2 437	-1.522	-1.321	0.17	1.760	
	11	2 462	-0.881	-2.033	0.17	1.761	
802.11n HT20	1	2 412	-1.237	-2.021	0.09	1.489	
	6	2 437	-1.700	-1.751	0.09	1.375	
	11	2 462	-0.454	-2.037	0.09	1.927	

- MIMO Mode (802.11ax HE20) (Ant1 + Ant2)

Channel	Frequency [MHz]	Tones	RU Offset	Meas PPSD [dBm/100kHz]		DCCF	Total Corr'd PSD [dBm/100kHz]	PSD Limit [dBm/3kHz]
				ANT1	ANT2			
1	2 412	26T	0	2.922	2.636	-	5.792	8.00 ^{Note}
			4	3.421	2.520	-	6.004	
			8	4.337	3.810	-	7.092	
6	2 437	26T	0	3.837	2.297	-	6.145	
			4	3.198	3.246	-	6.232	
			8	4.013	2.069	-	6.159	
11	2 462	26T	0	3.595	1.462	-	5.668	
			4	2.182	1.980	-	5.092	
			8	2.846	2.408	-	5.643	

Calculation of Output PSD result

- 1TX : Corr'd PSD = Meas PSD + Duty Cycle CF

- 2TX : Total PSD = ANT1 Meas PSD + ANT2 Meas PSD + Duty Cycle CF

Note1. RBW 100kHz measurement data is lower than 3kHz limit.

Note2. 12,13ch's PSD test was omitted (Channel 12&13's target is much lower than other channels)

Note3. In 11g/n20/ax20 (PSD, CBE and Spurious) were tested in SISO mode, and even the sum of SISO mode meets the limit, so MIMO mode test is excluded.

9.5. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

RSS-247 5.5

Output power was measured based on the use of average measurement, therefore the required attenuation is 30 dB.

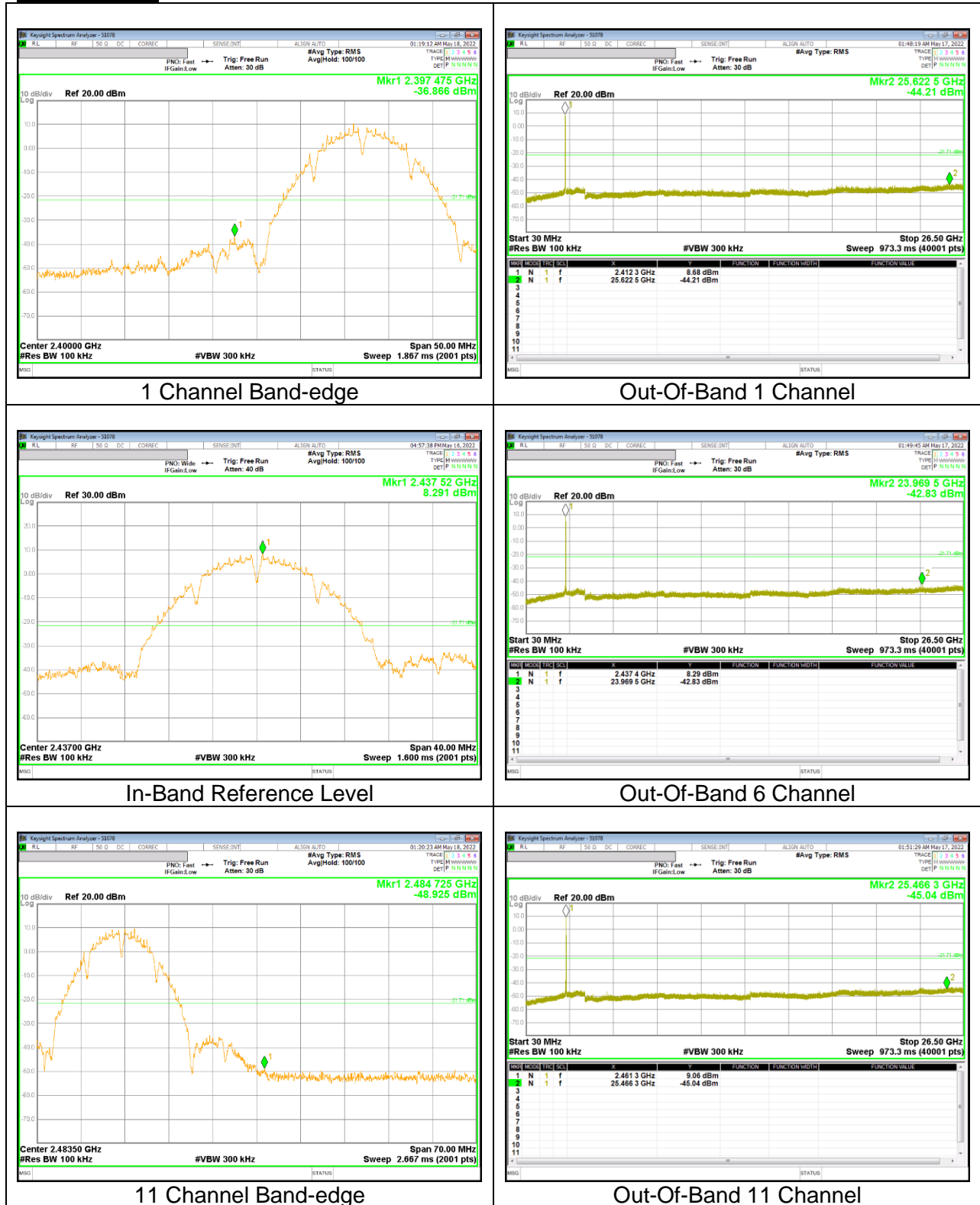
TEST PROCEDURE

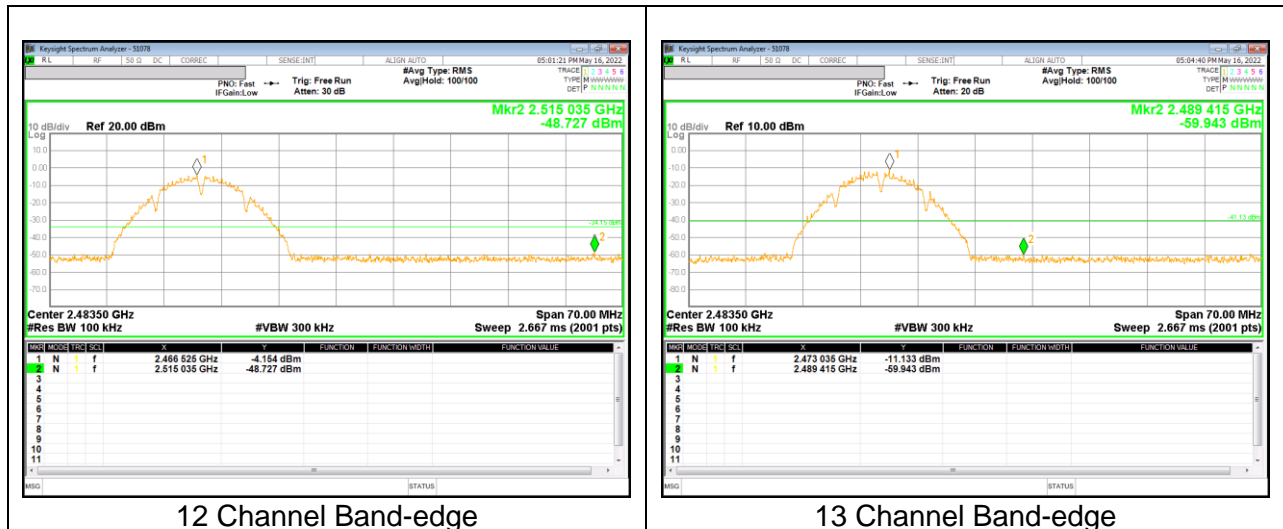
KDB 558074 D01 v05r02, Section 8.5
ANSI C63.10-2013, Section 11.11.3

RESULTS

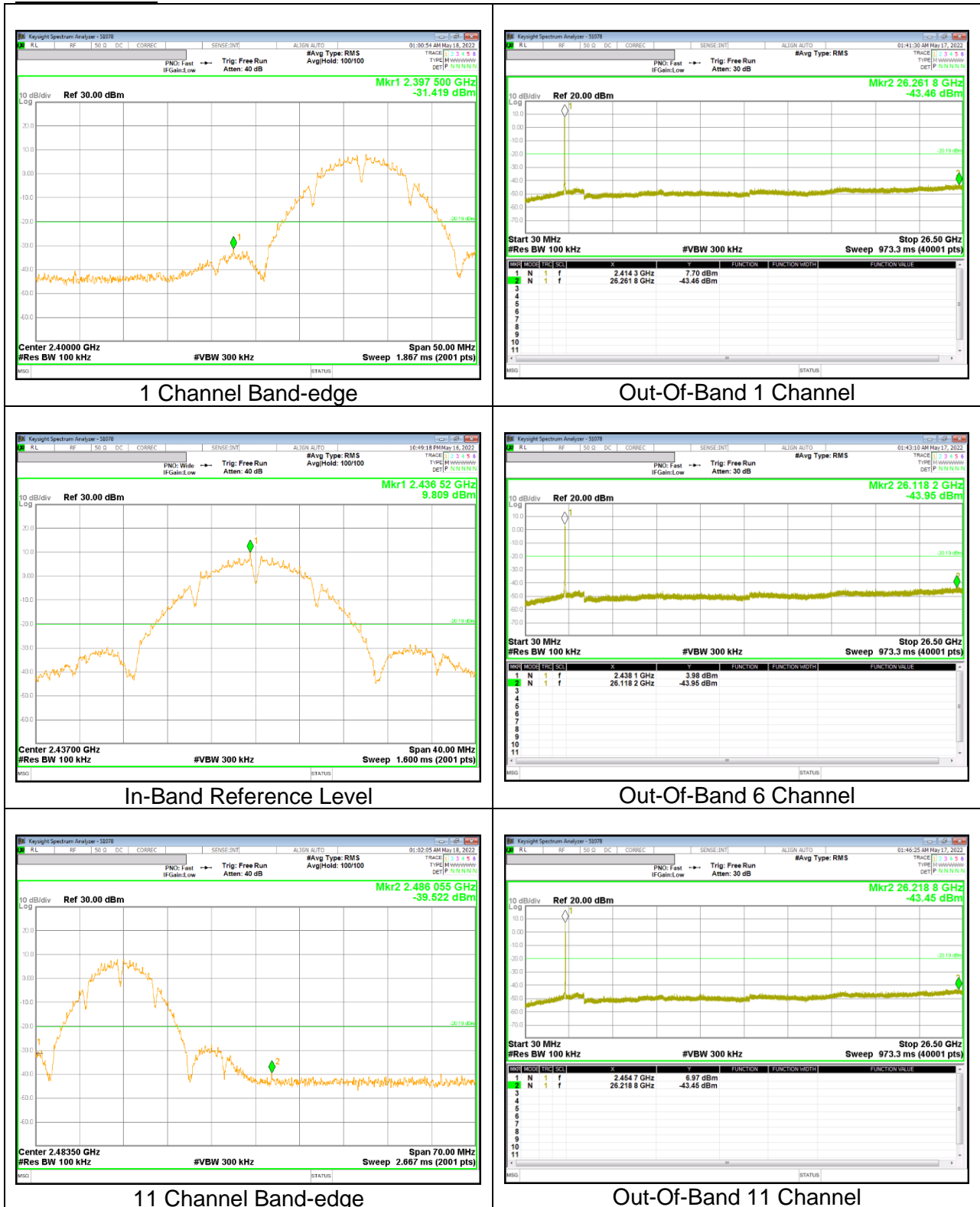
9.5.1. 802.11b MODE

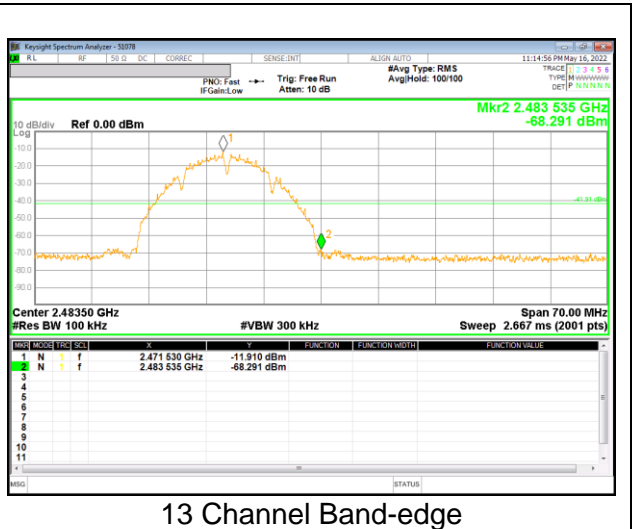
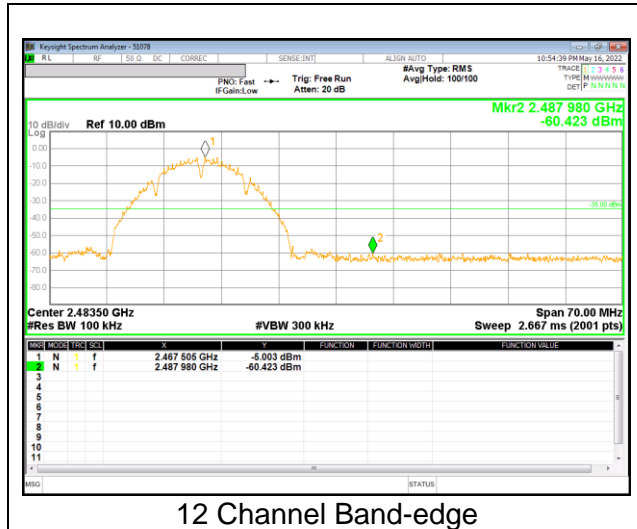
1TX Antenna 1





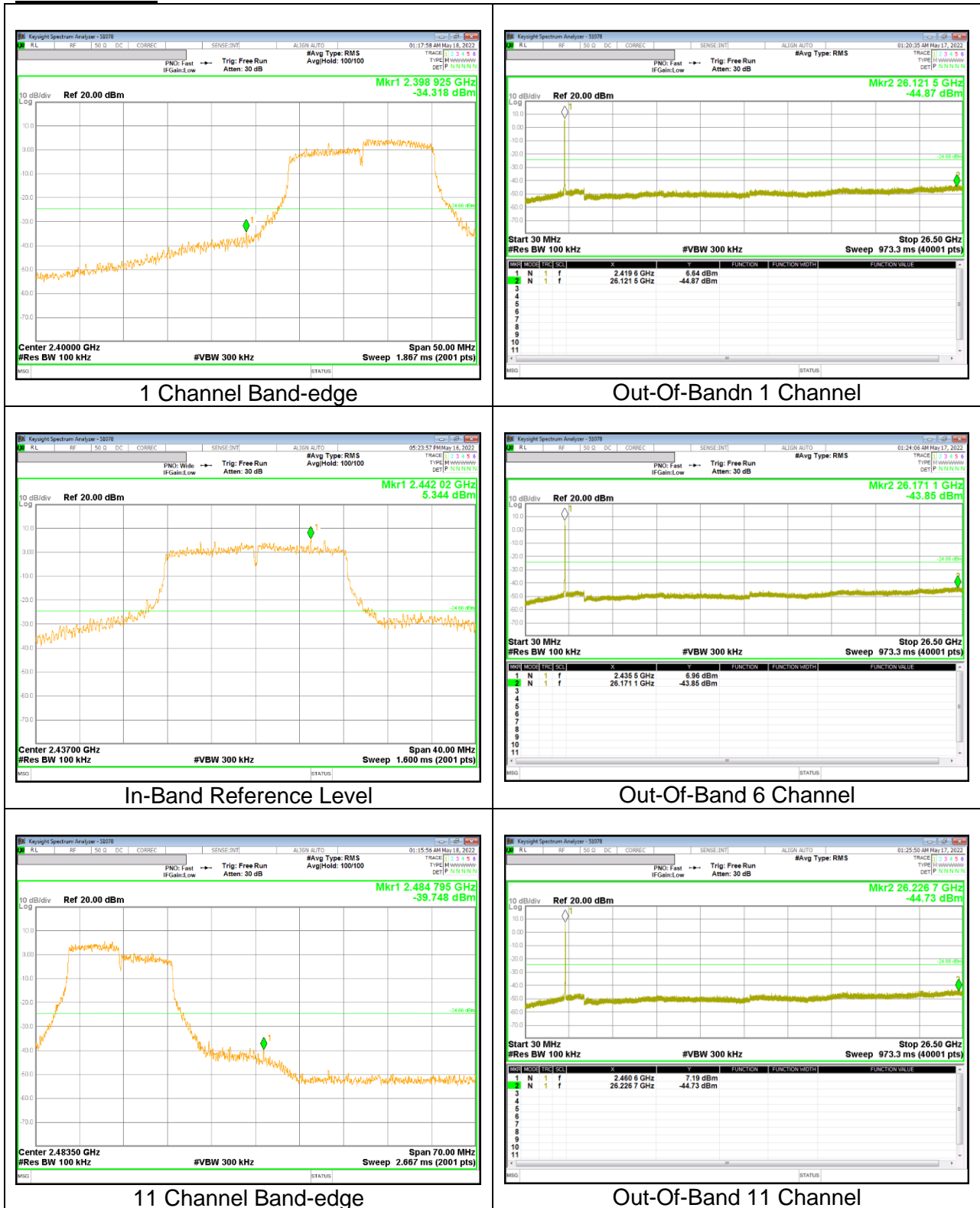
1TX Antenna 2

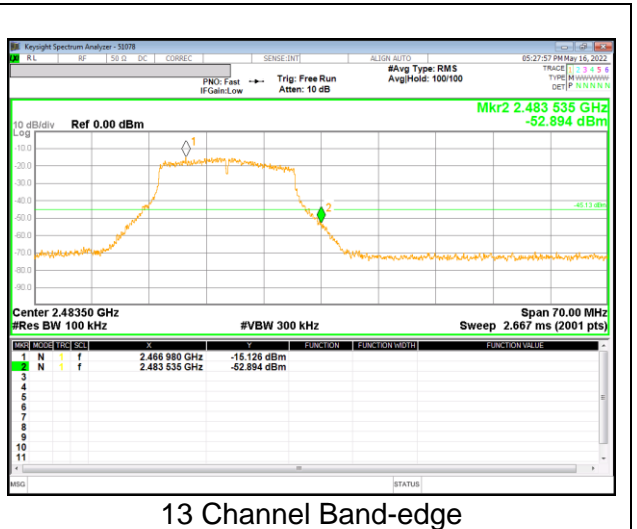
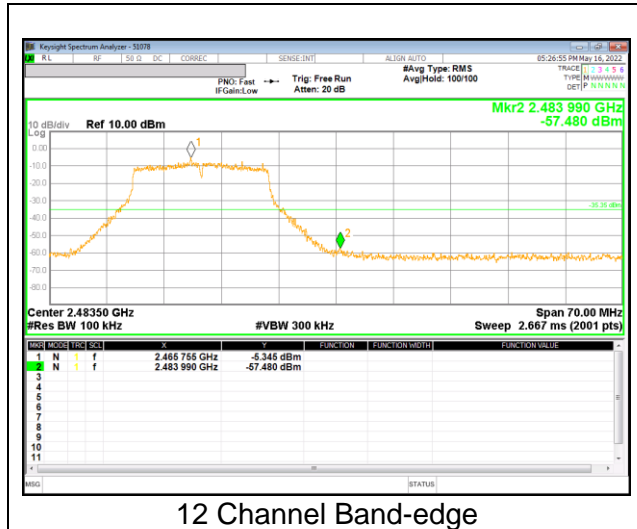




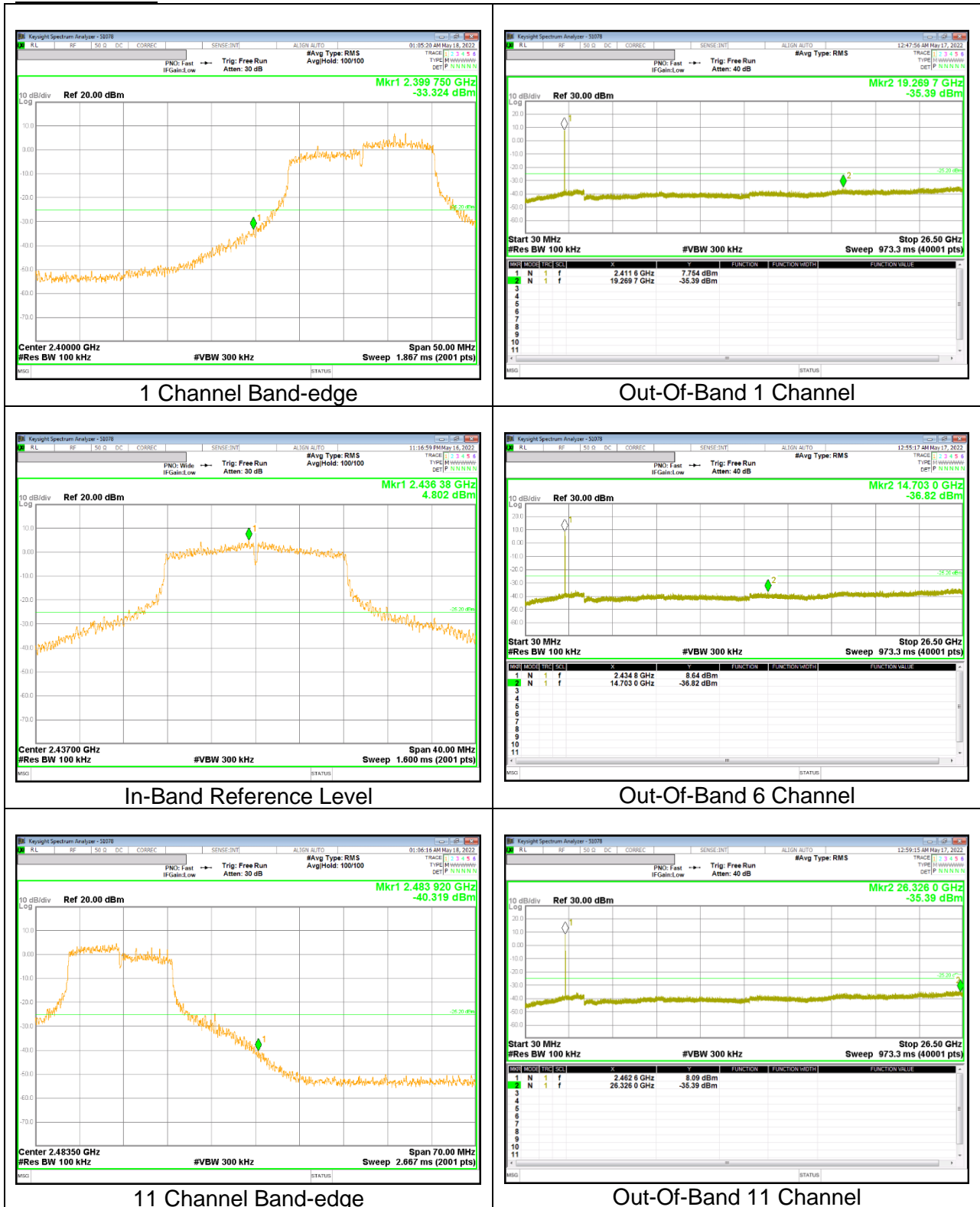
9.5.2. 802.11g MODE

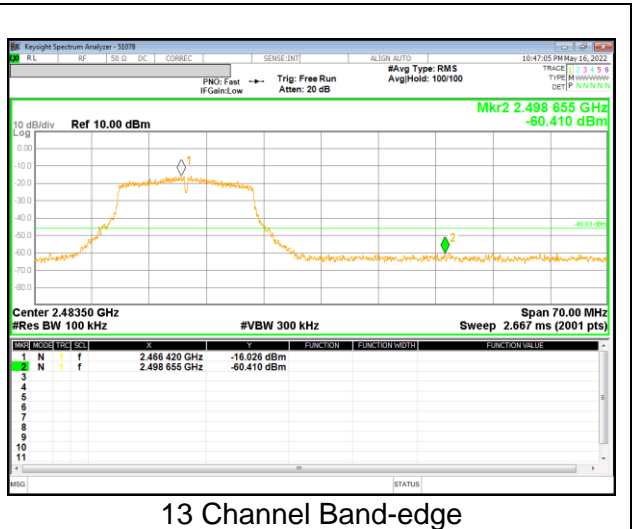
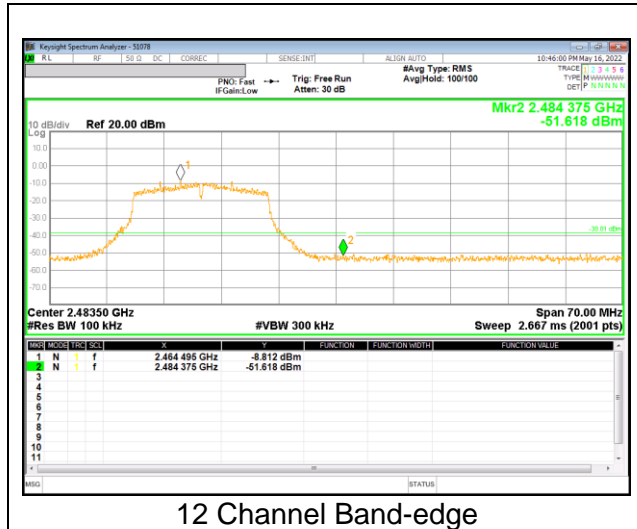
1TX Antenna 1





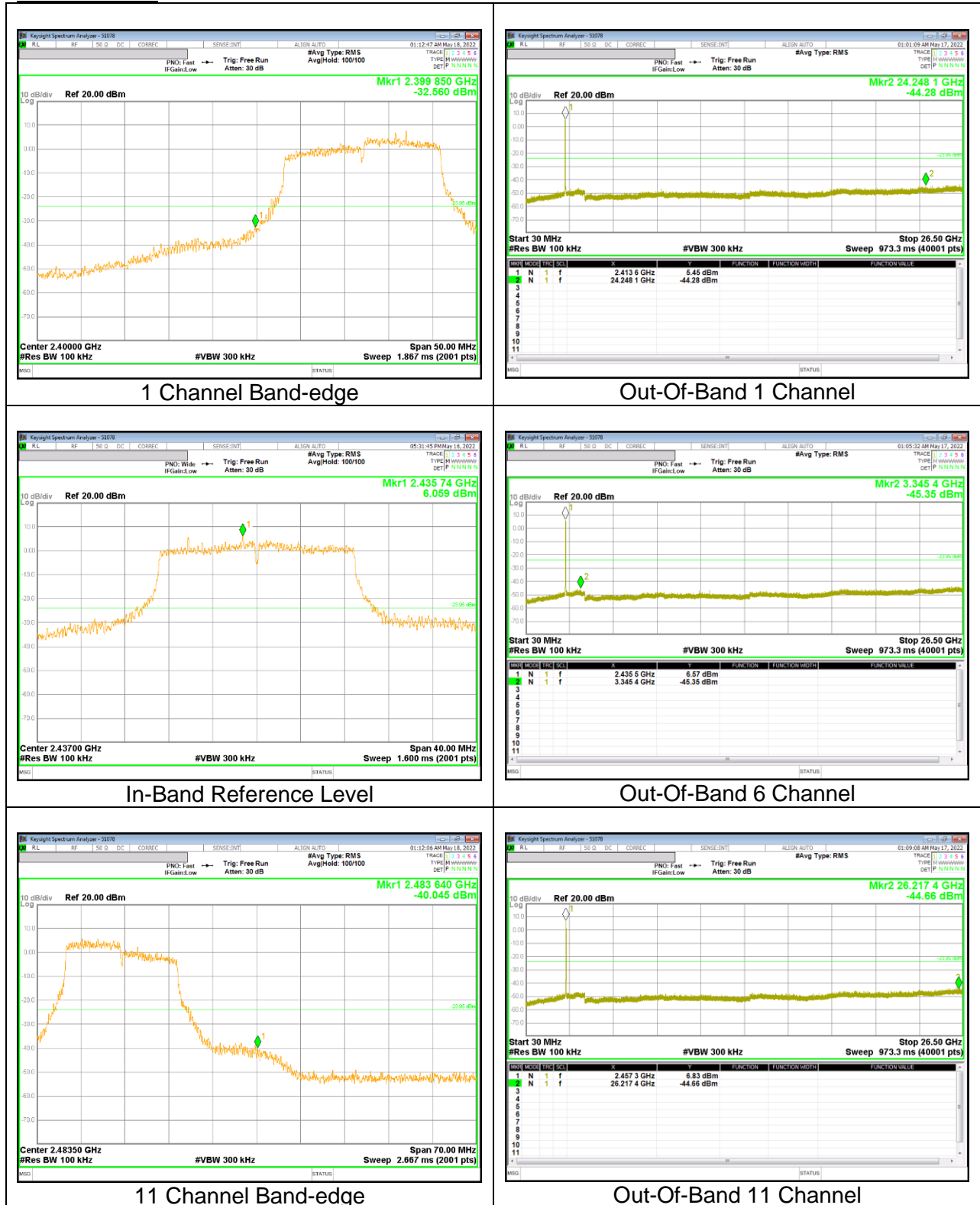
1TX Antenna 2

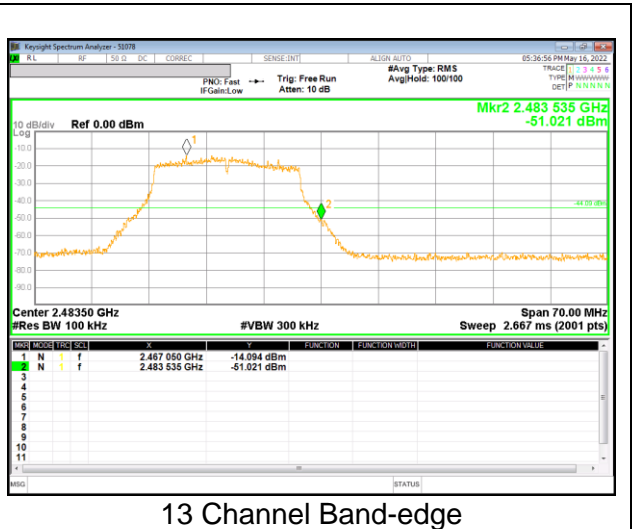
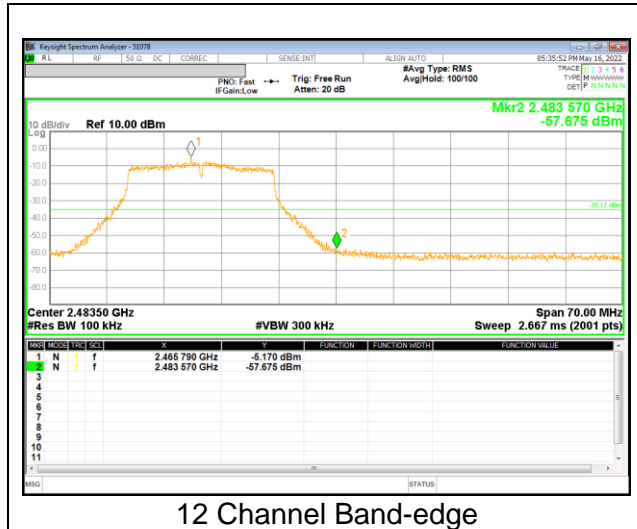




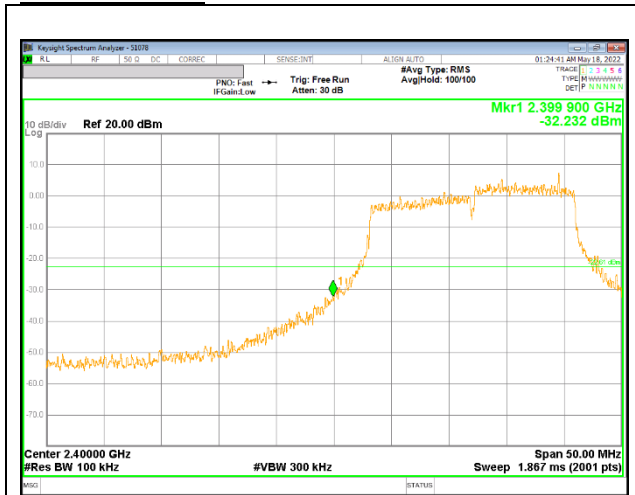
9.5.3. 802.11n HT20 MODE

1TX Antenna 1

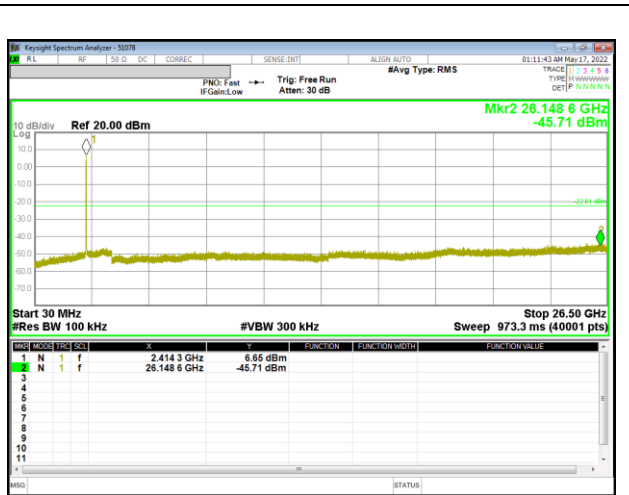




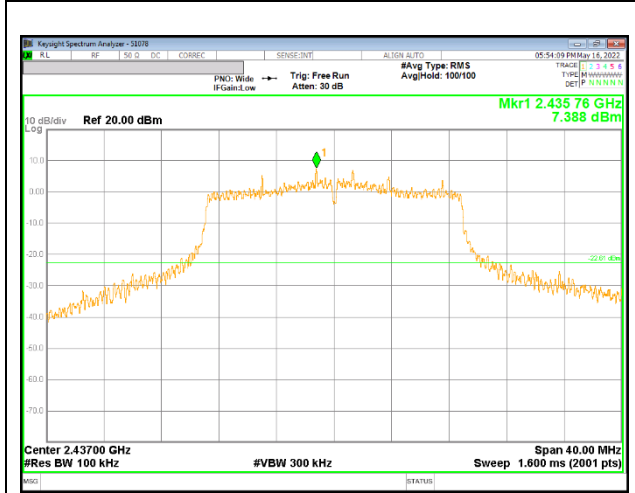
1TX Antenna 2



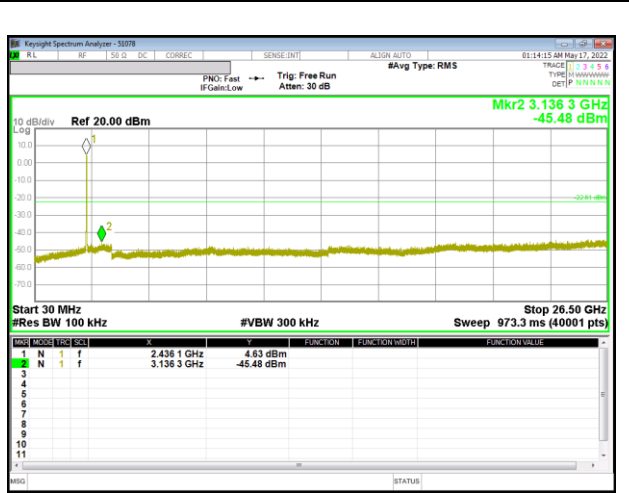
1 Channel Band-edge



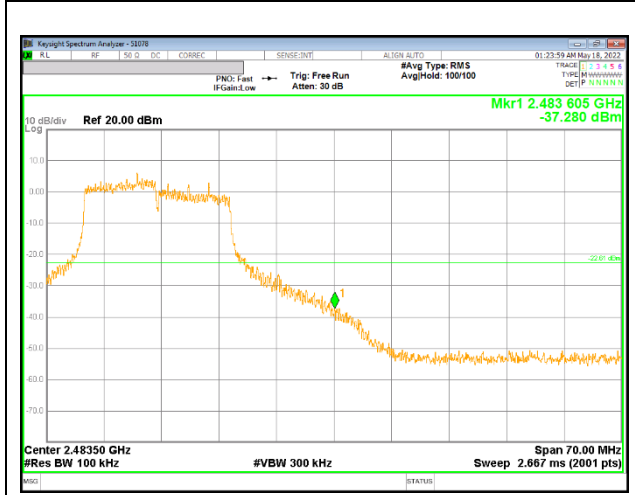
Out-Of-Band 1 Channel



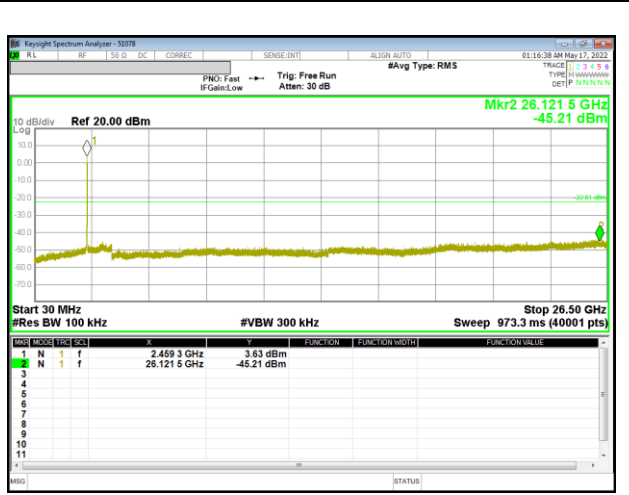
In-Band Reference Level



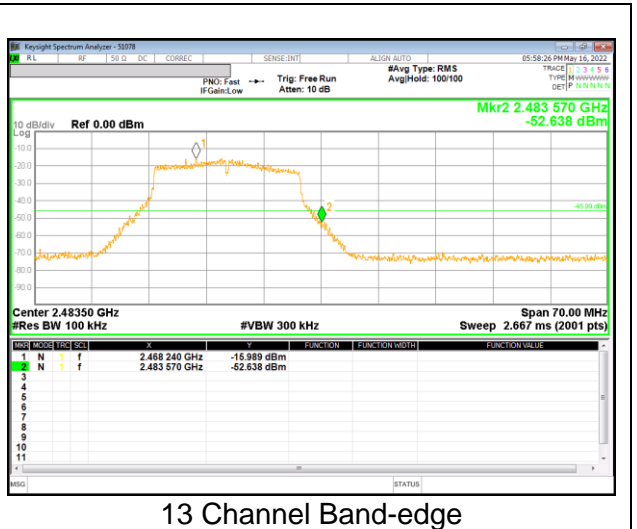
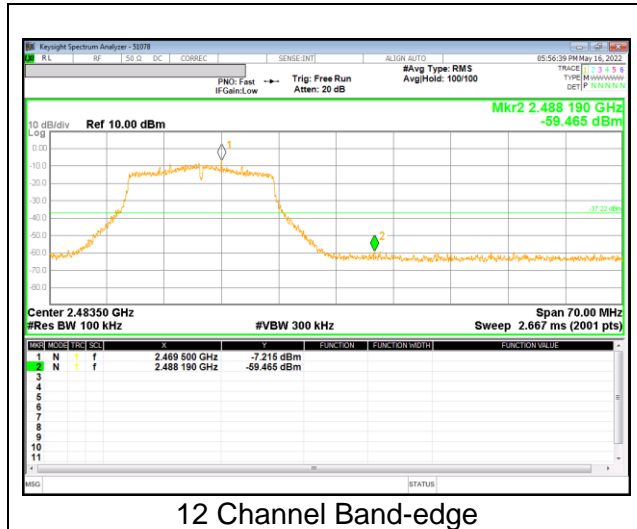
Out-Of-Band 6 Channel



11 Channel Band-edge

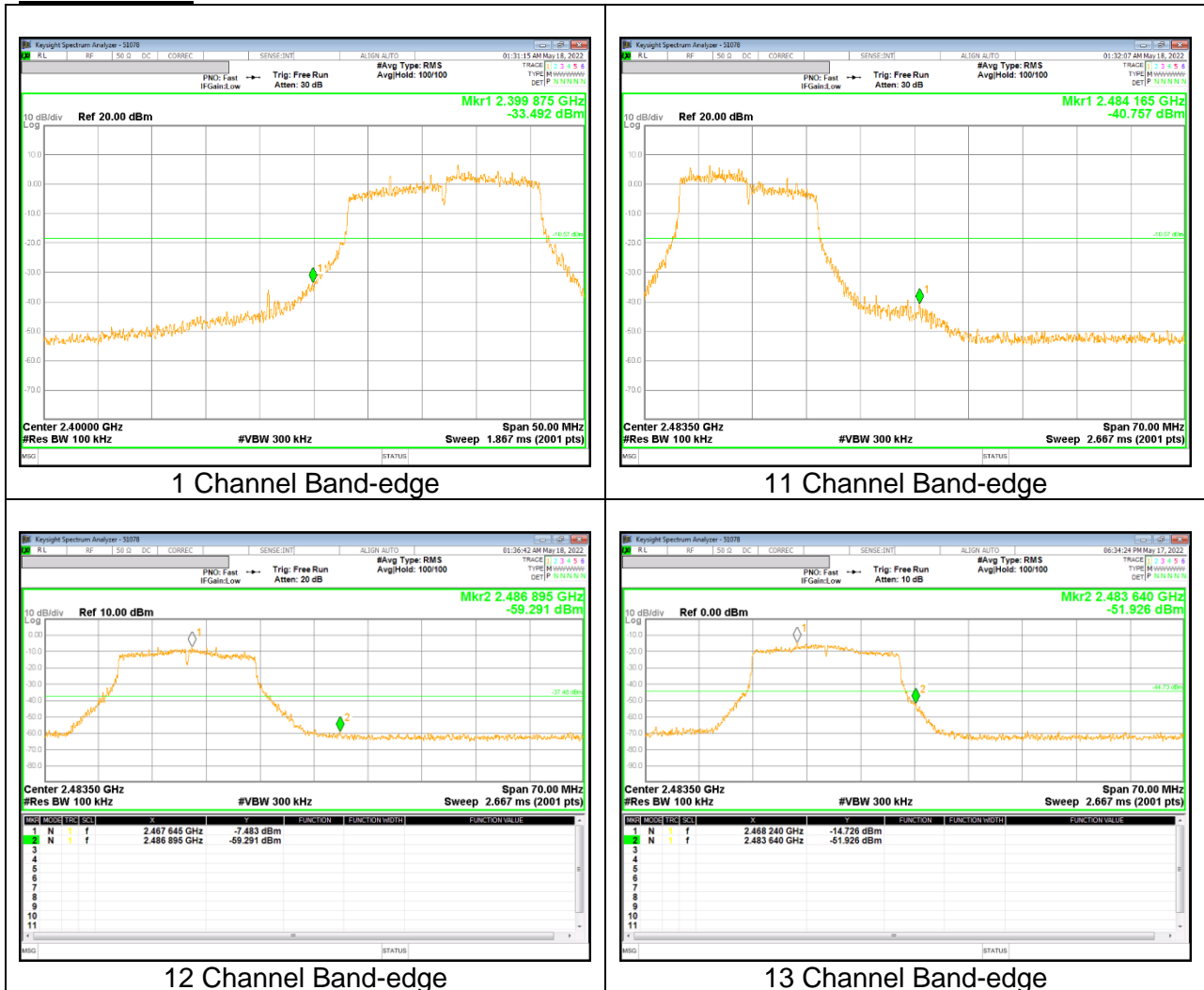


Out-Of-Band 11 Channel

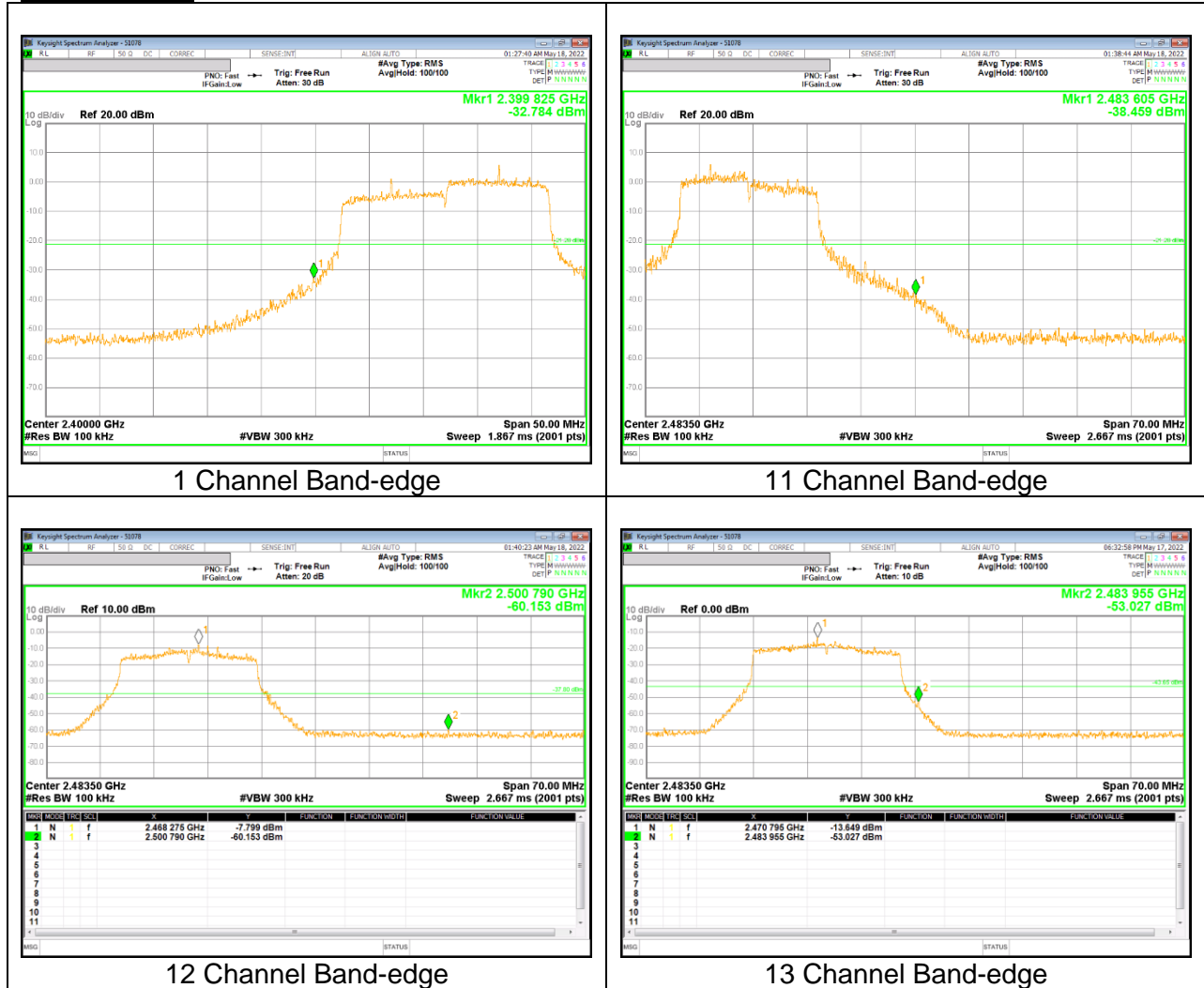


9.5.4. 802.11ax HE20(SU) MODE

1TX Antenna 1

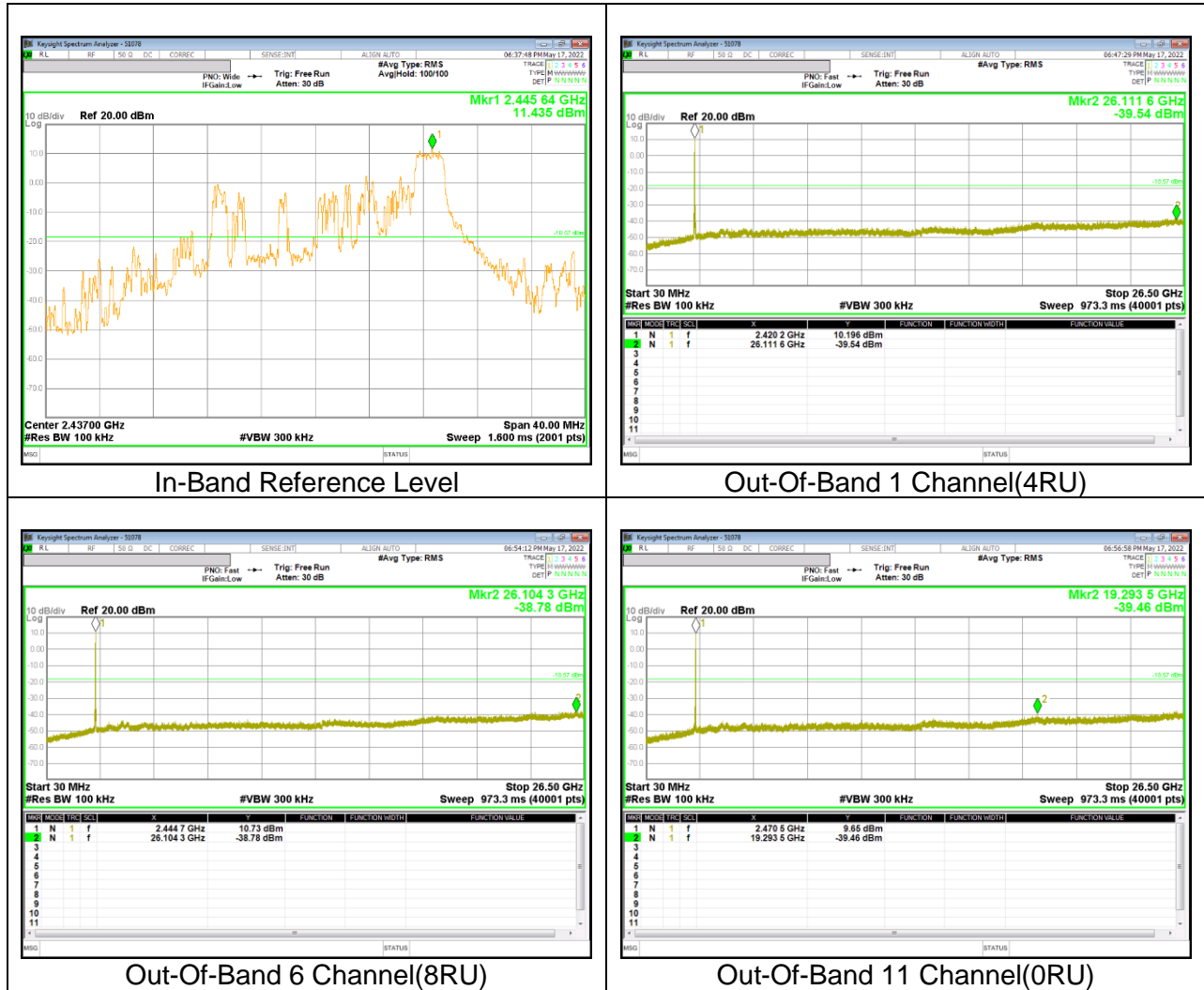


1TX Antenna 2

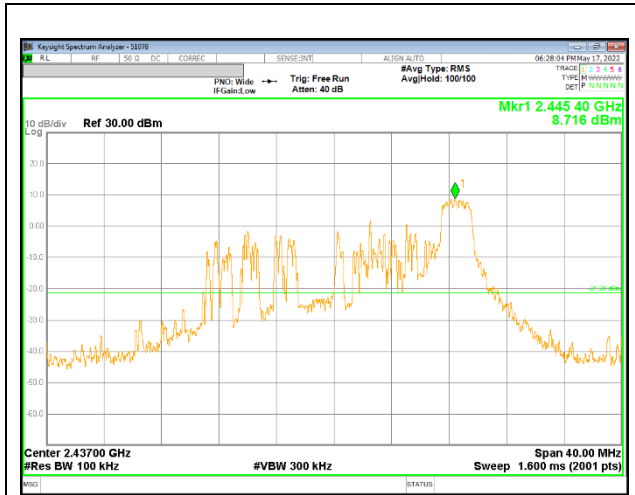


9.5.5. 802.11ax HE20(RU) MODE

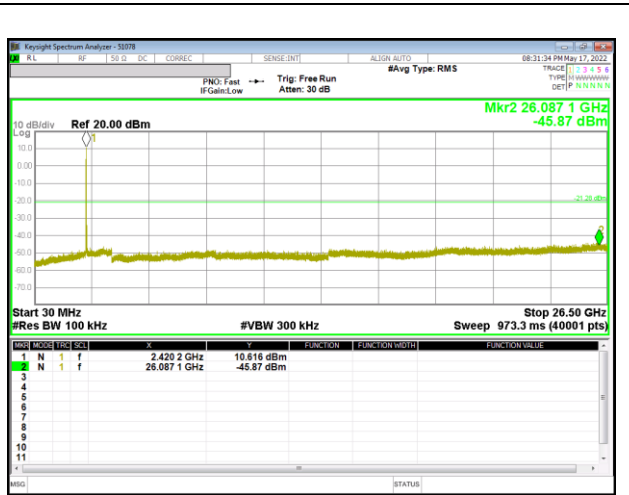
1TX Antenna 1 MODE



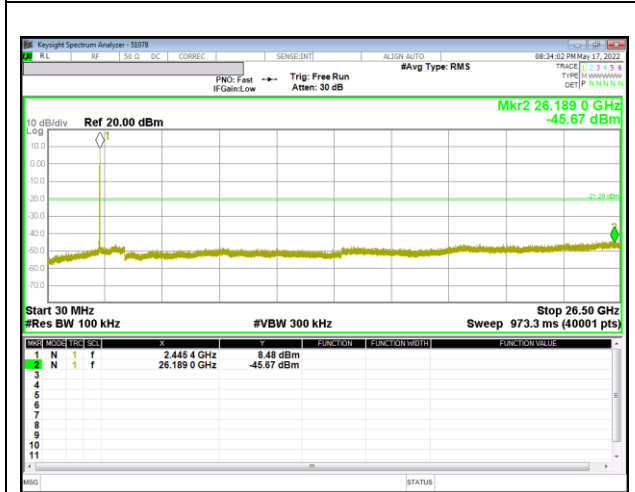
1TX Antenna 2 MODE



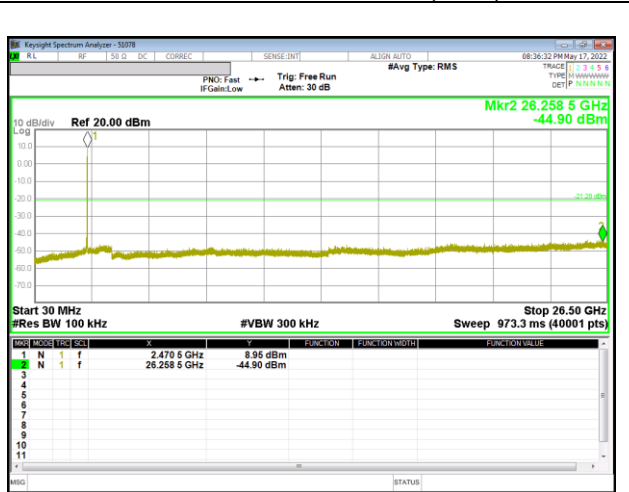
In-Band Reference Level



Out-Of-Band 1 Channel(4RU)



Out-Of-Band 6 Channel(0RU)



Out-Of-Band 11 Channel(8RU)

10. RADIATED TEST RESULTS

LIMITS

FCC §15.205 and §15.209

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (µV/m)	Measurement Distance (m)
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

** 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 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.

FCC Part 15.205 (a) : Only spurious emissions are permitted in any of the frequency bands listed below :

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	5.35 ~ 5.46	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~ 12.52025	149.9 ~ 150.05	1645.5 ~ 1646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.57675 ~ 12.57725	156.52475 ~	1660 ~ 1710	8.025 ~ 8.5	22.01 ~ 23.12
4.17725 ~ 4.17775	13.36 ~ 13.41	156.52525	1718.8 ~ 1722.2	9.0 ~ 9.2	23.6 ~ 24.0
4.20725 ~ 4.20775	16.42 ~ 16.423	156.7 ~ 156.9	2200 ~ 2300	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	16.69475 ~ 16.69525	162.0125 ~	2310 ~ 2390	10.6 ~ 12.7	36.43 ~ 36.5
6.26775 ~ 6.26825	16.80425 ~ 16.80475	167.17	2483.5 ~ 2500	13.25 ~ 13.4	Above 38.6
6.31175 ~ 6.31225	25.5 ~ 25.67	167.72 ~ 173.2	2655 ~ 2900		
8.291 ~ 8.294	37.5 ~ 38.25	240 ~ 285	3260 ~ 3267		
8.362 ~ 8.366	73 ~ 74.6	322 ~ 335.4	3332 ~ 3339		
8.37625 ~ 8.38675	74.8 ~ 75.2	399.90 ~ 410	3345.8 ~ 3358		
		608 ~ 614	3600 ~ 4400		
		960 ~ 1240			

▪ FCC Part 15.205(b) : The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in §15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in §15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in §15.35 apply to these measurements.

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1 GHz and 150 cm for above 1 GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and add duty cycle factor for average measurements. (Restricted bandedge, Final detection of spurious harmonic emissions)

Duty cycle factor = $10\log(1/x)$ For this sample:

802.11b SISO mode = 0 dB (duty cycle > 98%);
802.11g MIMO mode = 0.17 dB (96.12%);
802.11n(HT20) MIMO mode = 0.09 dB (97.84%);
802.11ax(HE20) MIMO SU mode = 0 dB (duty cycle > 98%);
802.11ax(HE20) MIMO 26 Tone mode = 0 dB (duty cycle > 98%);

Pre-scans to detect harmonic and spurious emissions, the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 kHz for peak measurements.

The spectrum from 1 GHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.
(From 30MHz to 1GHz, test was performed with the EUT set to transmit at the channel with highest output power)

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

Note : Emission was pre-scanned from 9 kHz to 30 MHz; No emissions were detected which was at least 20dB below the specification limit (consider distance correction factor).
Per FCC part 15.31(o), test results were not reported.

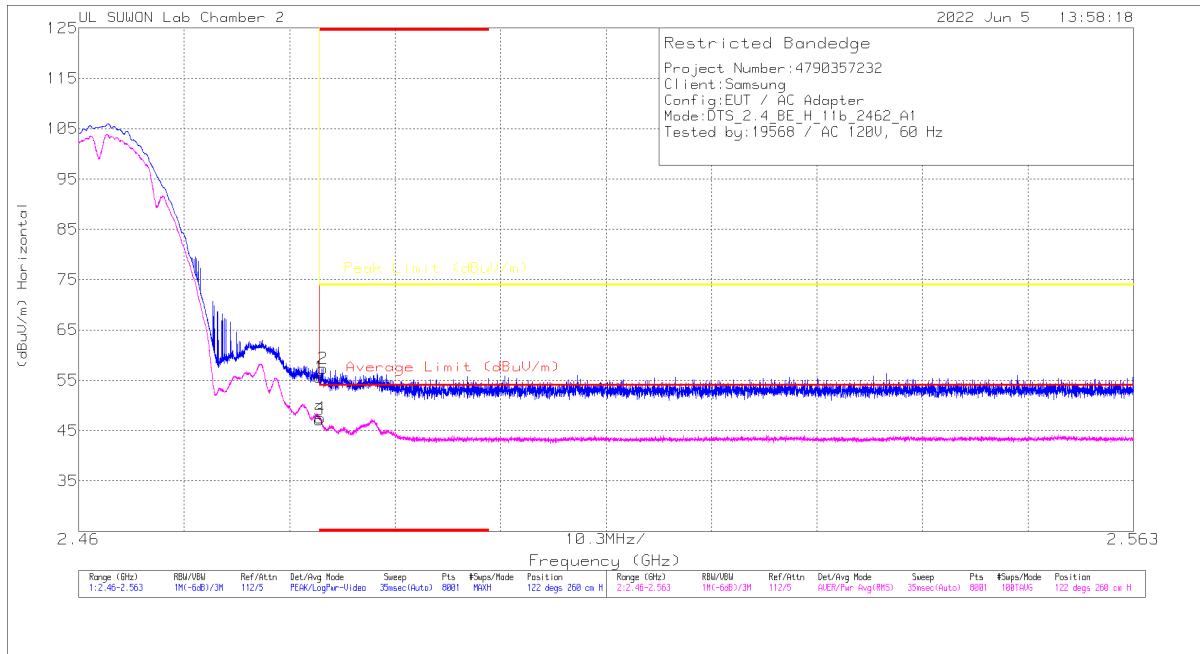
Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site.
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the one of tests made in an open field based on KDB 414788.

10.1. TRANSMITTER ABOVE 1 GHz

10.1.1. TX ABOVE 1 GHz 802.11b MODE IN THE 2.4 GHz BAND

BAND EDGE (ANT1 WORST CASE: 11 CHANNEL)

HORIZONTAL RESULT



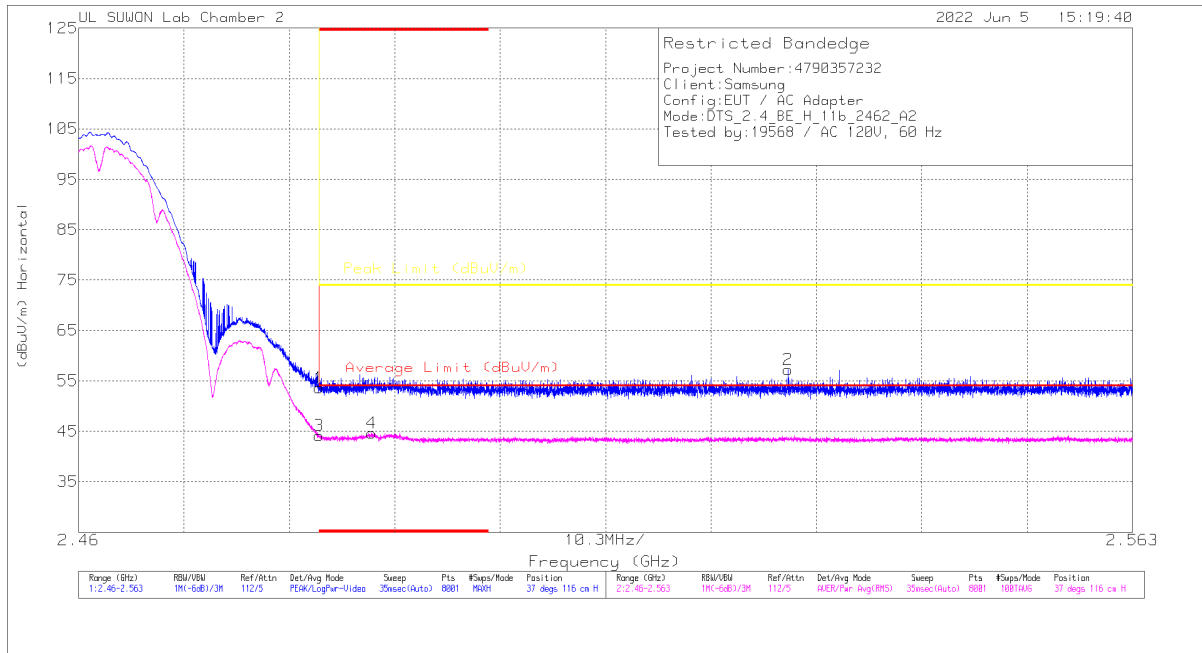
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	43.25	PK	32	-19.6	0	55.65	-	-	74	-18.35	122	260	H
2	* 2.48384	44.93	PK	32	-19.6	0	57.33	-	-	74	-16.67	122	260	H
3	* 2.48351	34.78	RMS	32	-19.6	0	47.18	54	-6.82	-	-	122	260	H
4	* 2.48359	35.11	RMS	32	-19.6	0	47.51	54	-6.49	-	-	122	260	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK - Peak detector
 RMS - RMS detection

BAND EDGE (ANT2 WORST CASE: 11 CHANNEL)

HORIZONTAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168724	10dB_ATT[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	41.27	Pk	32	-19.6	0	53.67	-	-	74	-20.33	37	116	H
2	* 2.52936	44.58	Pk	32.1	-19.4	0	57.28	-	-	74	-16.72	37	116	H
3	* 2.48351	31.78	RMS	32	-19.6	0	44.18	54	-9.82	-	-	37	116	H
4	* 2.48865	32.15	RMS	32.1	-19.6	0	44.65	54	-9.35	-	-	37	116	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK - Peak detector
 RMS - RMS detection

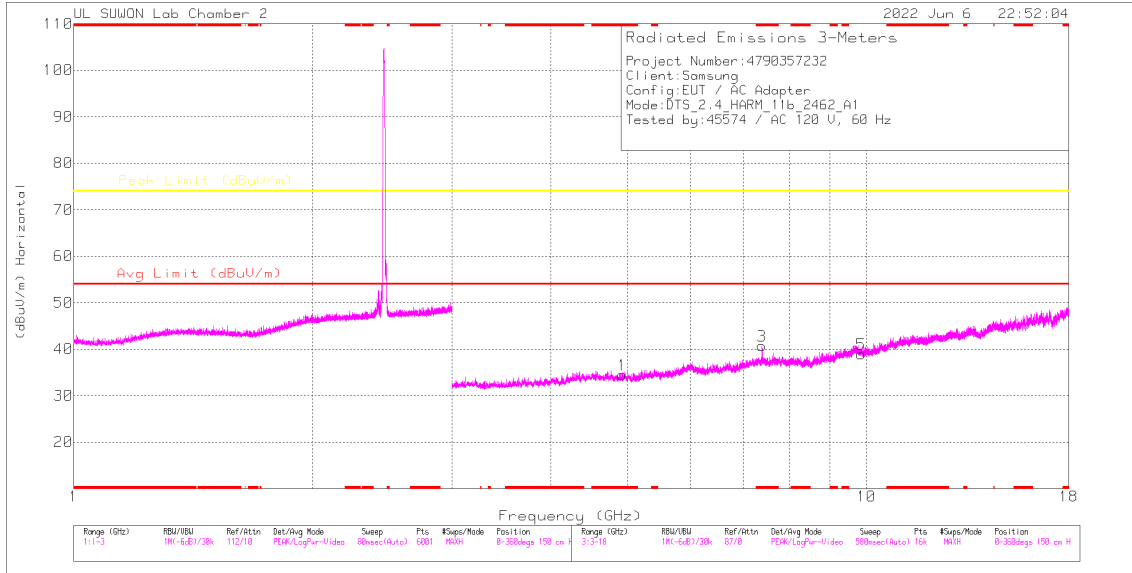
BANEDGE TEST DATA

Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity	
2412	ANT1	* 2.39	41.98	Pk	31.90	-19.70	0.00	54.18	-	-	74.00	-19.82	120	276	H	
		* 2.38741	44.78	Pk	31.90	-19.60	0.00	57.08	-	-	74.00	-16.92	120	276	H	
		* 2.39	31.41	RMS	31.90	-19.70	0.00	43.61	54.00	-10.39	-	-	-	120	276	H
		* 2.38924	34.34	RMS	31.90	-19.70	0.00	46.54	54.00	-7.46	-	-	-	120	276	H
		* 2.39	40.41	Pk	31.90	-19.70	0.00	52.61	-	-	74.00	-21.39	-	198	313	V
		* 2.38916	43.77	Pk	31.90	-19.60	0.00	56.07	-	-	74.00	-17.93	-	198	313	V
		* 2.39	31.74	RMS	31.90	-19.70	0.00	43.94	54.00	-10.06	-	-	-	198	313	V
		* 2.38903	33.16	RMS	31.90	-19.60	0.00	45.46	54.00	-8.54	-	-	-	198	313	V
		* 2.48351	43.25	Pk	32.00	-19.60	0.00	55.65	-	-	74.00	-18.35	-	122	260	H
		* 2.48364	44.93	Pk	32.00	-19.60	0.00	57.33	-	-	74.00	-16.67	-	122	260	H
2462	ANT1	* 2.48351	34.78	RMS	32.00	-19.60	0.00	47.18	54.00	-6.82	-	-	122	260	H	
		* 2.48359	35.11	RMS	32.00	-19.60	0.00	47.51	54.00	-6.49	-	-	122	260	H	
		* 2.48351	43.87	Pk	32.00	-19.60	0.00	56.27	-	-	74.00	-17.73	-	199	334	V
		* 2.48796	44.42	Pk	32.10	-19.60	0.00	56.92	-	-	74.00	-17.08	-	199	334	V
		* 2.48351	34.63	RMS	32.00	-19.60	0.00	47.03	54.00	-6.97	-	-	-	199	334	V
		* 2.48357	34.51	RMS	32.00	-19.60	0.00	46.91	54.00	-7.09	-	-	-	199	334	V
		* 2.48351	41.21	Pk	32.00	-19.60	0.00	53.61	-	-	74.00	-20.39	-	154	141	H
		2.517	43.65	Pk	32.10	-19.50	0.00	56.25	-	-	74.00	-17.75	-	154	141	H
		* 2.48351	31.01	RMS	32.00	-19.60	0.00	43.41	54.00	-10.59	-	-	-	154	141	H
		* 2.540	31.55	RMS	32.10	-19.40	0.00	44.25	54.00	-9.75	-	-	-	154	141	H
2467	ANT1	* 2.48351	40.46	Pk	32.00	-19.60	0.00	52.86	-	-	74.00	-21.14	204	375	V	
		* 2.539	43.50	Pk	32.10	-19.50	0.00	56.10	-	-	74.00	-17.90	204	375	V	
		* 2.48351	30.65	RMS	32.00	-19.60	0.00	43.05	54.00	-10.95	-	-	204	375	V	
		2.556	31.29	RMS	32.20	-19.30	0.00	44.19	54.00	-9.81	-	-	204	375	V	
		* 2.48351	42.03	Pk	32.00	-19.60	0.00	54.43	-	-	74.00	-19.57	-	156	139	H
		* 2.49533	43.72	Pk	32.10	-19.60	0.00	56.22	-	-	74.00	-17.78	-	156	139	H
		* 2.48351	30.92	RMS	32.00	-19.60	0.00	43.32	54.00	-10.68	-	-	-	156	139	H
		* 2.49671	31.49	RMS	32.10	-19.50	0.00	44.09	54.00	-9.91	-	-	-	156	139	H
		* 2.48351	41.13	Pk	32.00	-19.60	0.00	53.53	-	-	74.00	-20.47	-	194	375	V
		* 2.540	44.63	Pk	32.10	-19.40	0.00	57.33	-	-	74.00	-16.67	-	194	375	V
2472	ANT1	* 2.48351	31.03	RMS	32.00	-19.60	0.00	43.43	54.00	-10.57	-	-	194	375	V	
		2.556	31.26	RMS	32.20	-19.30	0.00	44.16	54.00	-9.84	-	-	194	375	V	

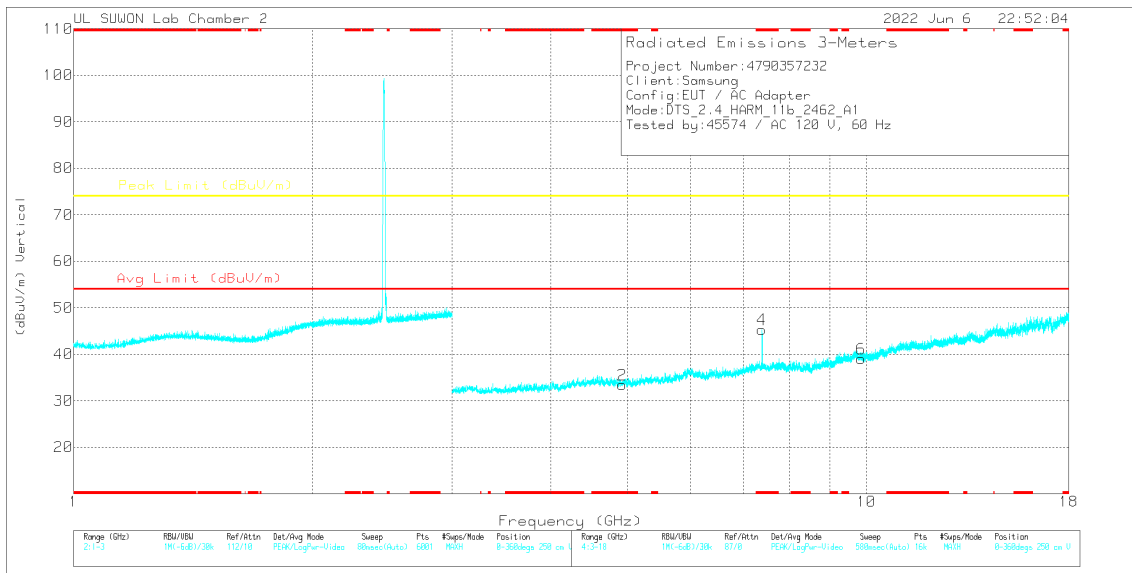
Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity	
2412	ANT2	* 2.39	39.59	Pk	31.90	-19.70	0.00	51.79	-	-	74.00	-22.21	39	138	H	
		* 2.38657	43.63	Pk	31.90	-19.60	0.00	55.93	-	-	74.00	-18.07	39	138	H	
		* 2.39	31.01	RMS	31.90	-19.70	0.00	43.21	54.00	-10.79	-	-	-	39	138	H
		* 2.38955	31.73	RMS	31.90	-19.70	0.00	43.93	54.00	-10.07	-	-	-	39	138	H
		* 2.39	40.49	Pk	31.90	-19.70	0.00	52.69	-	-	74.00	-21.31	-	96	400	V
		* 2.36262	43.71	Pk	31.80	-19.50	0.00	56.01	-	-	74.00	-17.99	-	96	400	V
		* 2.39	30.85	RMS	31.90	-19.70	0.00	43.05	54.00	-10.95	-	-	-	96	400	V
		* 2.38876	31.56	RMS	31.90	-19.60	0.00	43.86	54.00	-10.14	-	-	-	96	400	V
		* 2.48351	41.27	Pk	32.00	-19.60	0.00	53.67	-	-	74.00	-20.33	-	37	116	H
		2.529	44.58	Pk	32.10	-19.40	0.00	57.28	-	-	74.00	-16.72	-	37	116	H
2462	ANT2	* 2.48351	31.78	RMS	32.00	-19.60	0.00	44.18	54.00	-9.82	-	-	37	116	H	
		* 2.48865	32.15	RMS	32.10	-19.60	0.00	44.65	54.00	-9.35	-	-	37	116	H	
		* 2.48351	41.93	Pk	32.00	-19.60	0.00	54.33	-	-	74.00	-19.67	-	79	367	V
		2.521	43.79	Pk	32.10	-19.50	0.00	56.39	-	-	74.00	-17.61	-	79	367	V
		* 2.48351	30.97	RMS	32.00	-19.60	0.00	43.37	54.00	-10.63	-	-	-	79	367	V
		2.526	31.40	RMS	32.10	-19.40	0.00	44.10	54.00	-9.90	-	-	-	79	367	V
		* 2.48351	40.94	Pk	32.00	-19.60	0.00	53.34	-	-	74.00	-20.66	-	42	116	H
		2.553	43.65	Pk	32.20	-19.50	0.00	56.35	-	-	74.00	-17.65	-	42	116	H
		* 2.48351	30.94	RMS	32.00	-19.60	0.00	43.34	54.00	-10.66	-	-	-	42	116	H
		* 2.530	31.50	RMS	32.10	-19.40	0.00	44.20	54.00	-9.80	-	-	-	42	116	H
2467	ANT2	* 2.48351	39.28	Pk	32.00	-19.60	0.00	51.68	-	-	74.00	-22.32	84	368	V	
		2.528	43.32	Pk	32.10	-19.50	0.00	55.92	-	-	74.00	-18.08	-	84	368	V
		* 2.48351	31.06	RMS	32.00	-19.60	0.00	43.46	54.00	-10.54	-	-	-	84	368	V
		2.556	31.23	RMS	32.20	-19.30	0.00	44.13	54.00	-9.87	-	-	-	84	368	V
		* 2.48351	40.84	Pk	32.00	-19.60	0.00	53.24	-	-	74.00	-20.76	-	39	104	H
		2.527	43.79	Pk	32.10	-19.50	0.00	56.39	-	-	74.00	-17.61	-	39	104	H
		* 2.48351	30.76	RMS	32.00	-19.60	0.00	43.16	54.00	-10.84	-	-	-	39	104	H
		* 2.540	31.60	RMS	32.10	-19.40	0.00	44.30	54.00	-9.70	-	-	-	39	104	H
		* 2.48351	40.78	Pk	32.00	-19.60	0.00	53.18	-	-	74.00	-20.82	-	85	368	V
		* 2.515	43.74	Pk	32.10	-19.60	0.00	56.24	-	-	74.00	-17.76	-	85	368	V
2472	ANT2	* 2.48351	30.75	RMS	32.00	-19.60	0.00	43.15	54.00	-10.85	-	-	85	368	V	
		2.556	31.25	RMS	32.20	-19.30	0.00	44.15	54.00	-9.85	-	-	85	368	V	

Note1. Pk - Peak detector, RMS - RMS detector
 Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

HARMONICS AND SPURIOUS EMISSIONS (ANT1 WORST CASE: 11 CHANNEL) RESULTS



HORIZONTAL



VERTICAL

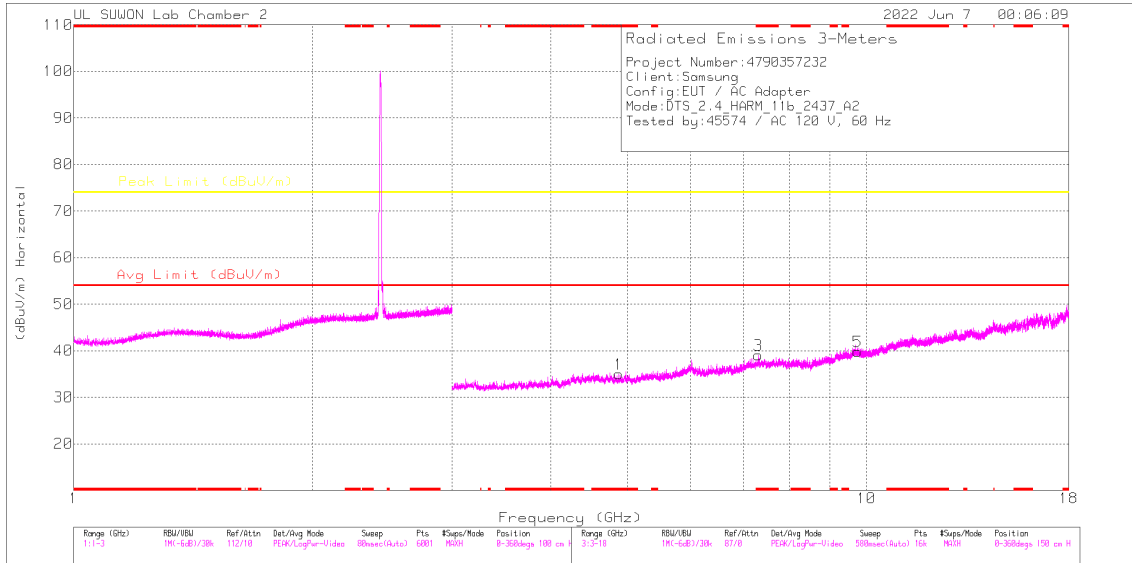
Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Radiated Emissions

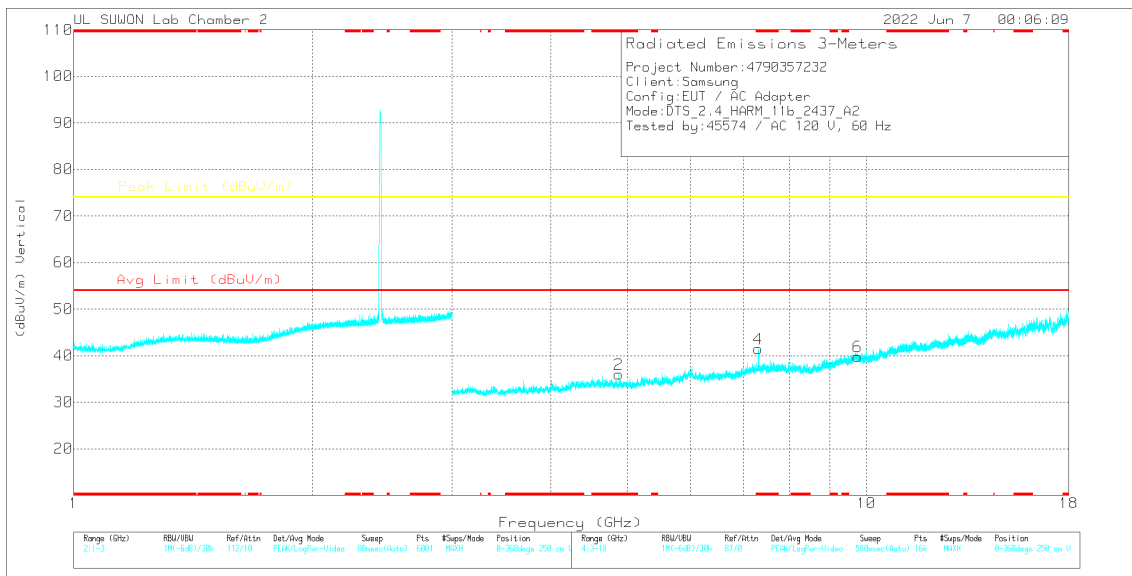
Frequency (GHz)	Meter Reading (dBuV)	Det	3117_0016872_4	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.91982	36.88	PK2	34.1	-27.3	0	43.68	-	-	74	-30.32	0	100	H
* 4.91695	36.22	PK2	34.1	-27.3	0	43.02	-	-	74	-30.98	0	100	V
* 7.38692	37.92	PK2	36.1	-23.9	0	50.12	-	-	74	-23.88	161	104	H
* 7.38686	29.48	MAV1	36.1	-23.9	0	41.68	54	-12.32	-	-	161	104	H
* 7.38682	40.44	PK2	36.1	-23.9	0	52.64	-	-	74	-21.36	239	100	V
* 7.38678	34.13	MAV1	36.1	-23.9	0	46.33	54	-7.67	-	-	239	100	V
9.83919	32.24	PK2	37.3	-21.5	0	48.04	-	-	74	-25.96	0	100	H
9.85451	32.37	PK2	37.3	-21.5	0	48.17	-	-	74	-25.83	0	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK2 - KDB558074 Method: Maximum Peak
 MAV1 - KDB558074 Option 1 Maximum RMS Average

HARMONICS AND SPURIOUS EMISSIONS (ANT2 WORST CASE: 6 CHANNEL) RESULTS



HORIZONTAL



VERTICAL

Note: Emission was scanned up to 26GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Radiated Emissions

Frequency (GHz)	Meter Reading (dBuV)	Det	3117_0016872_4	3GHz_HP[dB]	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
* 4.8739	38.04	PK2	34.1	-27.7	0	44.44	-	-	74	-29.56	348	104	H
* 4.87402	27.63	MAV1	34.1	-27.7	0	34.03	54	-19.97	-	-	348	104	H
* 4.87408	37.71	PK2	34.1	-27.7	0	44.11	-	-	74	-29.89	275	108	V
* 4.87394	28.97	MAV1	34.1	-27.7	0	35.37	54	-18.63	-	-	275	108	V
* 7.31208	36.68	PK2	36.2	-24.6	0	48.28	-	-	74	-25.72	126	100	H
* 7.3118	26.5	MAV1	36.2	-24.6	0	38.1	54	-15.9	-	-	126	100	H
* 7.31238	38.36	PK2	36.2	-24.6	0	49.96	-	-	74	-24.04	96	107	V
* 7.3117	29.92	MAV1	36.2	-24.6	0	41.52	54	-12.48	-	-	96	107	V
9.75669	32.39	PK2	37.2	-20.9	0	48.69	-	-	74	-25.31	0	100	H
9.74808	33.66	PK2	37.2	-20.9	0	49.96	-	-	74	-24.04	121	100	V

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK2 - KDB558074 Method: Maximum Peak
 MAV1 - KDB558074 Option 1 Maximum RMS Average

HARMONICS AND SPURIOUS EMISSIONS TEST DATA

Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
2412	ANT1	* 4.81345	37.44	PK2	34.10	-27.80	0.00	43.74	-	-	74.00	-30.26	0	100	H
		* 4.82328	37.26	PK2	34.10	-27.80	0.00	43.56	-	-	74.00	-30.44	0	100	V
		7.235	37.75	PK2	36.20	-25.20	0.00	48.75	-	-	74.00	-25.25	156	113	H
		7.235	40.22	PK2	36.20	-25.20	0.00	51.22	-	-	74.00	-22.78	239	100	V
		9.651	33.21	PK2	37.00	-20.90	0.00	49.31	-	-	74.00	-24.69	0	100	H
		9.644	32.95	PK2	37.00	-21.00	0.00	48.95	-	-	74.00	-25.05	0	100	V
2437	ANT1	* 4.87408	38.22	PK2	34.10	-27.70	0.00	44.62	-	-	74.00	-29.38	154	100	H
		* 4.87392	29.94	MAV1	34.10	-27.70	0.00	36.34	54.00	-17.66	-	-	154	100	H
		* 4.87384	38.15	PK2	34.10	-27.70	0.00	44.55	-	-	74.00	-29.45	261	394	V
		* 4.87396	29.44	MAV1	34.10	-27.70	0.00	35.84	54.00	-18.16	-	-	261	394	V
		* 7.31032	38.47	PK2	36.20	-24.60	0.00	50.07	-	-	74.00	-23.93	159	103	H
		* 7.31011	29.72	MAV1	36.20	-24.60	0.00	41.32	54.00	-12.68	-	-	159	103	H
		* 7.30971	40.99	PK2	36.20	-24.60	0.00	52.59	-	-	74.00	-21.41	241	104	V
		* 7.31009	34.05	MAV1	36.20	-24.60	0.00	45.65	54.00	-8.35	-	-	241	104	V
		9.758	32.72	PK2	37.20	-20.90	0.00	49.02	-	-	74.00	-24.98	0	100	H
		9.757	32.57	PK2	37.20	-20.90	0.00	48.87	-	-	74.00	-25.13	0	100	V
		2462	ANT1	* 4.91982	36.88	PK2	34.10	-27.30	0.00	43.68	-	-	74.00	-30.32	0
* 4.91695	36.22			PK2	34.10	-27.30	0.00	43.02	-	-	74.00	-30.98	0	100	V
* 7.38692	37.92			PK2	36.10	-23.90	0.00	50.12	-	-	74.00	-23.88	161	104	H
* 7.38686	29.48			MAV1	36.10	-23.90	0.00	41.68	54.00	-12.32	-	-	161	104	H
* 7.38682	40.44			PK2	36.10	-23.90	0.00	52.64	-	-	74.00	-21.36	239	100	V
* 7.38678	34.13			MAV1	36.10	-23.90	0.00	46.33	54.00	-7.67	-	-	239	100	V
9.859	32.24			PK2	37.30	-21.50	0.00	48.04	-	-	74.00	-25.96	0	100	H
9.855	32.37			PK2	37.30	-21.50	0.00	48.17	-	-	74.00	-25.83	0	100	V

Freq. [MHz]	Antenna	Frequency [GHz]	Reading [dBuV]	Detector Mode	ANT Factor	Loss [dB]	DC Corr [dB]	Result [dBuV/m]	AV Limit [dBuV/m]	AV Margin [dB]	PK Limit [dBuV/m]	PK Margin [dB]	Azimuth [Degs]	Height [cm]	Polarity
2412	ANT2	* 4.82934	37.04	PK2	34.10	-27.80	0.00	43.34	-	-	74.00	-30.66	0	100	H
		* 4.82906	37.03	PK2	34.10	-27.80	0.00	43.33	-	-	74.00	-30.67	0	100	V
		7.234	37.36	PK2	36.20	-25.20	0.00	48.36	-	-	74.00	-25.64	63	104	H
		7.235	39.38	PK2	36.20	-25.20	0.00	50.38	-	-	74.00	-23.62	24	109	V
		9.640	32.73	PK2	37.00	-21.00	0.00	48.73	-	-	74.00	-25.27	0	100	H
		9.648	32.57	PK2	37.00	-21.00	0.00	48.57	-	-	74.00	-25.43	0	100	V
2437	ANT2	* 4.8739	38.04	PK2	34.10	-27.70	0.00	44.44	-	-	74.00	-29.56	348	104	H
		* 4.87402	27.63	MAV1	34.10	-27.70	0.00	34.03	54.00	-19.97	-	-	348	104	H
		* 4.87408	37.71	PK2	34.10	-27.70	0.00	44.11	-	-	74.00	-29.89	275	108	V
		* 4.87394	28.97	MAV1	34.10	-27.70	0.00	35.37	54.00	-18.63	-	-	275	108	V
		* 7.31208	36.68	PK2	36.20	-24.60	0.00	48.28	-	-	74.00	-25.72	126	100	H
		* 7.3118	26.50	MAV1	36.20	-24.60	0.00	38.10	54.00	-15.90	-	-	126	100	H
		* 7.31238	38.36	PK2	36.20	-24.60	0.00	49.96	-	-	74.00	-24.04	96	107	V
		* 7.3117	29.92	MAV1	36.20	-24.60	0.00	41.52	54.00	-12.48	-	-	96	107	V
		9.757	32.39	PK2	37.20	-20.90	0.00	48.69	-	-	74.00	-25.31	0	100	H
		9.748	33.66	PK2	37.20	-20.90	0.00	49.96	-	-	74.00	-24.04	121	100	V
2462	ANT2	* 4.92401	37.03	PK2	34.10	-27.20	0.00	43.93	-	-	74.00	-30.07	242	103	H
		* 4.92389	25.71	MAV1	34.10	-27.20	0.00	32.61	54.00	-21.39	-	-	242	103	H
		* 4.92347	37.03	PK2	34.10	-27.20	0.00	43.93	-	-	74.00	-30.07	106	100	V
		* 4.92395	27.32	MAV1	34.10	-27.20	0.00	34.22	54.00	-19.78	-	-	106	100	V
		* 7.38373	35.34	PK2	36.10	-23.80	0.00	47.64	-	-	74.00	-26.36	126	400	H
		* 7.38479	24.38	MAV1	36.10	-23.80	0.00	36.68	54.00	-17.32	-	-	126	400	H
		* 7.38673	37.13	PK2	36.10	-23.90	0.00	49.33	-	-	74.00	-24.67	104	102	V
		* 7.38491	27.88	MAV1	36.10	-23.80	0.00	40.18	54.00	-13.82	-	-	104	102	V
		9.855	32.69	PK2	37.30	-21.50	0.00	48.49	-	-	74.00	-25.51	126	400	H
		9.843	33.16	PK2	37.30	-21.50	0.00	48.96	-	-	74.00	-25.04	123	100	V

Note1. PK2 - KDB558074 Method: Maximum Peak / MAV1 - KDB558074 Option 1 Maximum RMS Average

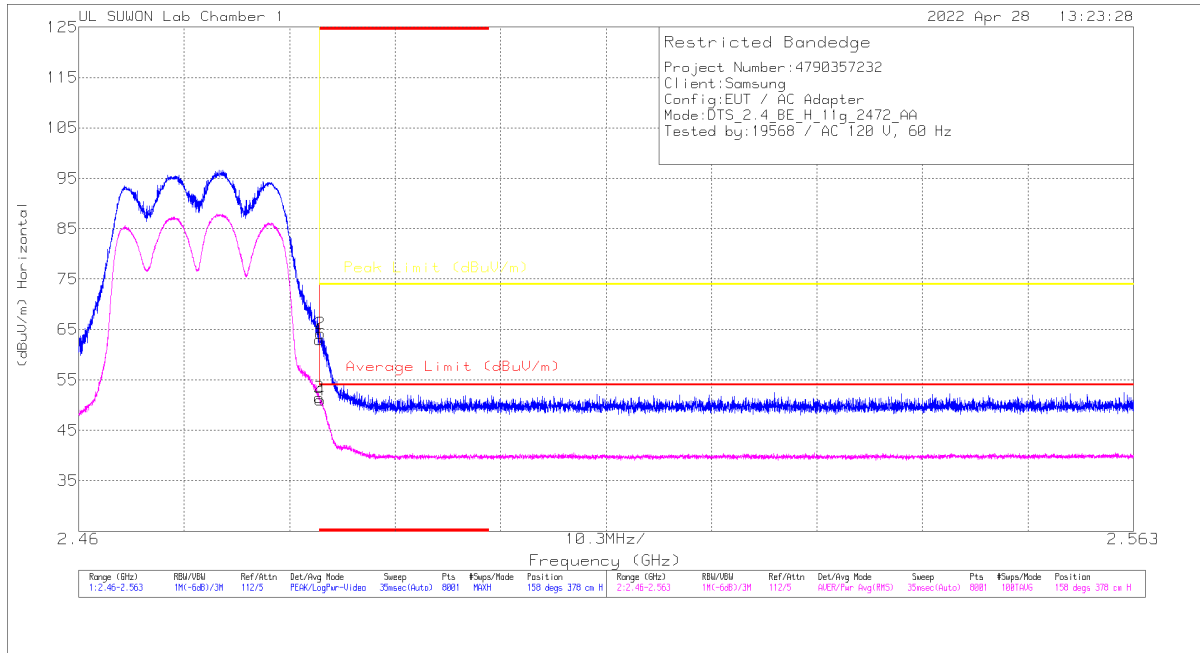
Note2. * - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

10.1.2. TX ABOVE 1 GHz 802.11g MODE IN THE 2.4 GHz BAND

2TX Antenna ALL

BAND EDGE (WORST CASE: 13 CHANNEL)

HORIZONTAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	3117_00168717	10dB_ATT(dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Average Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 2.48351	56.02	PK	32	-25	0	63.02	-	-	74	-10.98	158	378	H
2	* 2.48363	57.16	PK	32	-25	0	64.16	-	-	74	-9.84	158	378	H
3	* 2.48351	44.34	RMS	32	-25	.17	51.51	54	-2.49	-	-	158	378	H
4	* 2.48359	43.86	RMS	32	-25	.17	51.03	54	-2.97	-	-	158	378	H

* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band
 PK - Peak detector
 RMS - RMS detection