

EVALUATION REPORT

Applicant Name:
SAMSUNG Electronics Co., Ltd.**Date of Issue:**

July 15, 2020

Address:
129, Samsung-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Rep. of Korea**Location:**HCT CO., LTD.,
74, Seoicheon-ro 578beon-gil, Majang-myeon,
Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA**FCC ID:** A3LSMN980F
APPLICANT: SAMSUNG Electronics Co., Ltd.**Equipment Class(es) :** PCE, DSS, DTS, UNII, DCD**Rule Part(s) :** 15, 22, 24, 27, 2**Application's Statement :** The applicant takes full responsibility that the test data referenced below represents compliance for this FCC ID.**Differences Brief Description :** Hardware and software of this device are identical to the implementation in A3LSMN981B. The operational description includes detailed information about the changes between the devices. The data from that application has been verified through appropriate spot checks to demonstrate compliance for this device as shown in the summary table below.**Test Reference :** KDB 484596 D01 Reference Test Data v01

The detail test data can be found in this documents, Appendix A.

Category	Spot Check	Verdict
Licensed EMC	ERP / EIRP	Share
	RSE	Share
Unlicensed EMC	Band Edge	Share
	Spurious Emissions	Share

Reference Detail Section

Reference FCC ID	Equipment Class	Report Title	Section
A3LSMN981B	PCE	2G, 3G Report	All sections
		LTE B12(17) Report	All sections
		LTE B13 Report	All sections
		LTE B26(5) Report (Part 22)	All sections
		LTE B26 Report (Part 90)	All sections
		LTE B25(2) Report	All sections
		LTE B66(4) Report	All sections
		LTE B41 Report	All sections
	DSS	Bluetooth Report	All sections
	DTS	DTS Report , DTS ax Report	All sections
		BT LE Report	All sections
	NII	UNII Test Report , UNII ax Report	All sections
	DXX	NFC Report	All sections
	DCD	WPT Report	All sections

Report prepared by : Se Wook Park**Engineer of Telecommunication testing center****Approved by : Jung Kwon****Manager of Telecommunication testing center**



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REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	June 30, 2020	Initial Release
1	July 15, 2020	Revised the Overlapping band

Appendix A. The Spot check test data

1. Summary of the spot check for Licensed EMC

1.1 EFFECTIVE RADIATED POWER

Mode	Ch./ Freq.		Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBd)	C.L	Pol.	Limit	ERP	
	channel	Freq.(MHz)						W	W	dBm
GSM850	128	824.2	-25.60	38.01	-10.25	1.28	V	< 7.00	0.445	26.48
WCDMA850	4132	826.4	-34.32	29.29	-10.25	1.28	V		0.060	17.76
LTE B5	20450	829.0	-33.85	29.96	-10.22	1.28	H		0.070	18.46
LTE B26(22)	26840	829.0	-34.12	29.69	-10.22	1.28	H		0.066	18.19
LTE B26(90)	26790	824.0	-34.12	29.49	-10.25	1.28	H		0.063	17.96

Mode	Ch./ Freq.		Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBd)	C.L	Pol.	Limit	ERP	
	channel	Freq.(MHz)						W	W	dBm
LTE B12(17)	23095	707.5	-33.16	27.61	-9.93	1.18	V	< 3.00	0.045	16.50
LTE B13	23255	784.5	-32.09	30.21	-10.10	1.24	V		0.077	18.87

Mode	Frequency (MHz)		Mode	SM-N981B/DS (dBm)	SM-N980F/DS (dBm)	Deviation (dB)
	MHz	Ch.				
GSM850	824.2	128	VOICE	27.91	26.48	1.43
WCDMA850	826.4	4132	RMC	18.43	17.76	0.67
LTE B12(17) (B.W 1.4MHz)	707.5	23095	QPSK	16.63	16.50	0.13
LTE B13 (B.W 5MHz)	784.5	23255	QPSK	19.04	18.87	0.17
LTE B26(22) (B.W 10MHz)	829.0	26840	QPSK	18.76	18.19	0.57
LTE B26(90) (B.W 10MHz)	824.0	26790	QPSK	18.12	17.96	0.16
LTE B5 (B.W 10MHz)	829.0	20450	QPSK	18.70	18.46	0.24

1.2 EQUIVALENT ISOTROPIC RADIATED POWER

Mode	Ch./ Freq.		Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBd)	C.L	Pol.	Limit	ERP	
	channel	Freq.(MHz)						W	W	dBm
GSM1900	512	1850.2	-11.81	21.83	10.10	1.94	V	< 2.00	0.998	29.99
WCDMA1900	9262	1852.4	-20.38	13.26	10.10	1.94	V		0.139	21.42
WCDMA1700	1513	1752.6	-20.15	13.17	10.00	1.90	V	< 1.00	0.134	21.27
LTE B2	18700	1860.0	-19.58	14.23	10.13	1.95	V	< 2.00	0.174	22.41
LTE B25	26140	1860.0	-19.73	14.08	10.13	1.95	V		0.168	22.26
LTE B66(4)	132572	1770.0	-19.78	13.56	10.05	1.92	V	< 1.00	0.148	21.69
LTE B41(PC2)	39750	2506.0	-22.14	14.53	10.73	2.32	H	< 2.00	0.197	22.94
LTE B41(PC3)	39725	2503.5	-23.92	12.83	10.70	2.31	H		0.133	21.22

Mode	Frequency		Mode	SM-N981B/DS (dBm)	SM-N980F/DS (dBm)	Deviation (dB)
	MHz	Ch.				
GSM1900	1850.2	512	VOICE	29.15	29.99	-0.84
WCDMA1900	1852.4	9262	RMC	20.48	21.42	-0.94
WCDMA1700	1752.6	1513	RMC	22.43	21.27	1.16
LTE B2 (B.W 20MHz)	1860.0	18700	QPSK	21.63	22.41	-0.78
LTE B25 (B.W 20MHz)	1860.0	26140	QPSK	21.51	22.26	-0.75
LTE B66(4) (B.W 20MHz)	1770.0	132572	QPSK	22.32	21.69	0.63
LTE B41(PC2) (B.W 15MHz)	2506.0	39750	QPSK	24.11	22.94	1.17
LTE B41(PC3) (B.W 15MHz)	2503.5	39725	QPSK	22.12	21.22	0.90

1.3 RADIATED SPURIOUS EMISSIONS

Mode, Channel, (Frequency)	Freq. (MHz)	Measured Level (dBm)	Ant. Gain (dBd)	Substitute Level (dBm]	C.L	Pol.	Result (dBm)
GSM850 CH 128 (824.2)	2,472.60	-55.25	10.60	-60.29	2.28	V	-51.97
WCDMA850 CH 4132 (826.4)	3,305.60	-58.08	12.33	-60.07	2.69	H	-50.43
LTE B13 (B.W 5MHz) CH 23230 (782.0)	3,128.0	-58.46	11.15	-59.63	2.59	V	-51.07
LTE B13 Wide Band (B.W 5MHz) CH 23205 (779.5)	1602.18	-63.53	9.30	-73.25	1.82	H	-65.77
LTE B5 CH 20525 (836.5)	3,346.00	-58.64	12.48	-60.29	2.70	V	-50.52
LTE B26(22) CH 26965 (841.5)	3366.00	-58.74	12.58	-60.55	2.72	V	-50.70
LTE B26(90) CH 26740 (819.0)	3276.00	-58.47	12.10	-60.13	2.68	V	-50.71
LTE B12(17) CH 23155 (713.5)	2,140.50	-56.62	9.43	-60.61	2.11	V	-53.29



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Modulation	Frequency		Mode	SM-N981B/DS (dBm)	SM-N980F/DS (dBm)	Deviation (dB)
	MHz	Ch.				
GSM850	2,472.60	128	VOICE	-44.61	-51.97	7.36
WCDMA850	3305.60	4132	RMC	-36.92	-50.43	13.51
LTE B12(17) (B.W 5MHz)	2140.50	23155	QPSK	-48.93	-53.29	4.36
LTE B13 (B.W 5MHz)	3128.00	23230	QPSK	-50.06	-51.07	1.01
LTE B13 Wide Band (B.W 5MHz)	1602.18	23205	QPSK	-66.25	-63.53	-2.72
LTE B26(22) (B.W 15MHz)	3366.00	26965	QPSK	-47.38	-50.70	3.32
LTE B26(90) (B.W 10MHz)	3276.00	26790	QPSK	-48.23	-50.71	2.48
LTE B5 (B.W 1.4MHz)	3346.00	20525	QPSK	-49.46	-50.52	1.06

Mode, Channel (Frequency)	Freq. (MHz)	Measured Level (dBm)	Ant. Gain (dBd)	Substitute Level (dBm]	C.L	Pol.	Result (dBm)
GSM1900 CH 661 (1880.0)	7,520.00	-58.25	11.30	-48.08	4.30	V	-41.08
WCDMA1900 CH 9538 (1907.6)	7,630.40	-58.41	11.60	-48.36	4.34	V	-41.10
WCDMA1700 CH 1513 (1752.6)	7,010.40	-56.83	11.65	-48.57	4.10	H	-41.02
LTE B25 CH 26365 (1882.5)	7,530.00	-57.23	11.30	-46.99	4.29	V	-39.98
LTE B2 CH 18900 (1880.0)	7,520.00	-56.90	11.30	-46.73	4.30	V	-39.73
LTE B66(4) CH 132665 (1779.3)	7,117.20	-57.86	11.25	-49.56	4.15	V	-42.46
LTE B41(PC2) CH 41515 (2682.5)	10,730.00	-45.27	10.90	-42.09	5.25	H	-36.44
LTE B41(PC3) CH 39675 (2498.5)	14,991.00	-53.25	12.83	-45.72	6.21	V	-39.10



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Modulation	Frequency		Mode	SM-N981B/DS (dBm)	SM-N980F/DS (dBm)	Deviation (dB)
	MHz	Ch.				
GSM1900	7520.00	661	VOICE	-39.56	-41.08	1.52
WCDMA1900	7630.40	9538	RMC	-39.69	-41.10	1.41
WCDMA1700	7010.40	1513	RMC	-40.72	-41.02	0.30
LTE B2 (B.W 10MHz)	7520.00	18900	QPSK	-38.75	-39.73	0.98
LTE B25 (B.W 5MHz)	7530.00	26365	QPSK	-39.08	-39.98	0.90
LTE B66(4) (B.W 1.4MHz)	7117.20	132665	QPSK	-40.41	-42.46	2.05
LTE B41(PC2) (B.W 15MHz)	10730.00	41515	QPSK	-35.30	-36.44	1.14
LTE B41(PC3) (B.W 5MHz)	14991.00	39675	QPSK	-35.14	-39.10	3.96

2. Summary of the spot check for Unlicensed EMC

Mod	Test Item	Mod/ Channel	Measured Frequency [MHz]	SM-N981B/DS Result [dBuV/m]		SM-N980F/DS Result [dBuV/m]		Deviation (dB)	
				Peak	Average	Peak	Average	Peak	Average
BT	Band Edge	DH5_ch 78	2483.5 MHz~2500 MHz	60.16	50.74	59.62	51.60	0.54	-0.86
	RSE	DH5_ch 0	7206 MHz	50.69	36.98	51.38	37.67	-0.69	-0.69
BT LE	Band Edge	2M_37 byte_ch 0	2310 MHz~2390 MHz	53.49	47.04	53.62	47.25	-0.13	-0.21
	RSE	2M_37 byte_ch 39	7440 MHz	49.55	42.94	50.48	44.15	-0.93	-
DTS	Band Edge	Ant all HE20 242T / ch1 / PLS 14	2310 MHz~2390 MHz	67.77	-	67.34	-	0.43	-
			2310 MHz~2389 MHz	-	51.27	-	48.21	-	3.06
			# 2389 MHz~2390 MHz	-	51.95	-	48.80	-	3.15
	RSE	ANT 2 b / ch 6 / PLS 19	7311 MHz	53.61	43.89	51.68	41.08	1.93	2.81
UNII	Band Edge	Ant all HE20 242T / ch100 / PLS 16	5350 ~ 5460 MHz	59.91	47.37	60.52	47.65	-0.61	-0.28
			5460 ~ 5470 MHz	65.81	-	65.28	-	0.53	-
	RSE	Ant all HE40_26T_RU9 / ch 159 / PLS 12	17385 MHz	64.47	-	66.81	-	-2.34	-
NFC	Fundmental		13.56 MHz	15.32		12.47		2.85	
	RSE		30MHz ~ 1GHz	24.34		24.98		-0.64	
WPT	Fundmental		590 ~ 625 KHz (Spen Charging)	13.46		13.35		0.11	

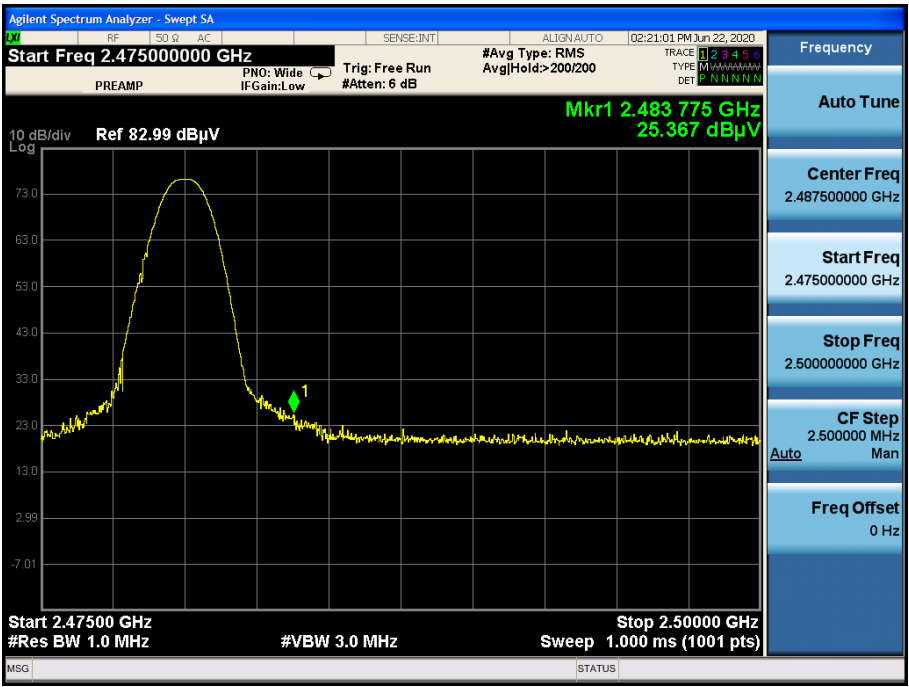
3. Test Plot

BT Band Edge (DH5/ch.78)

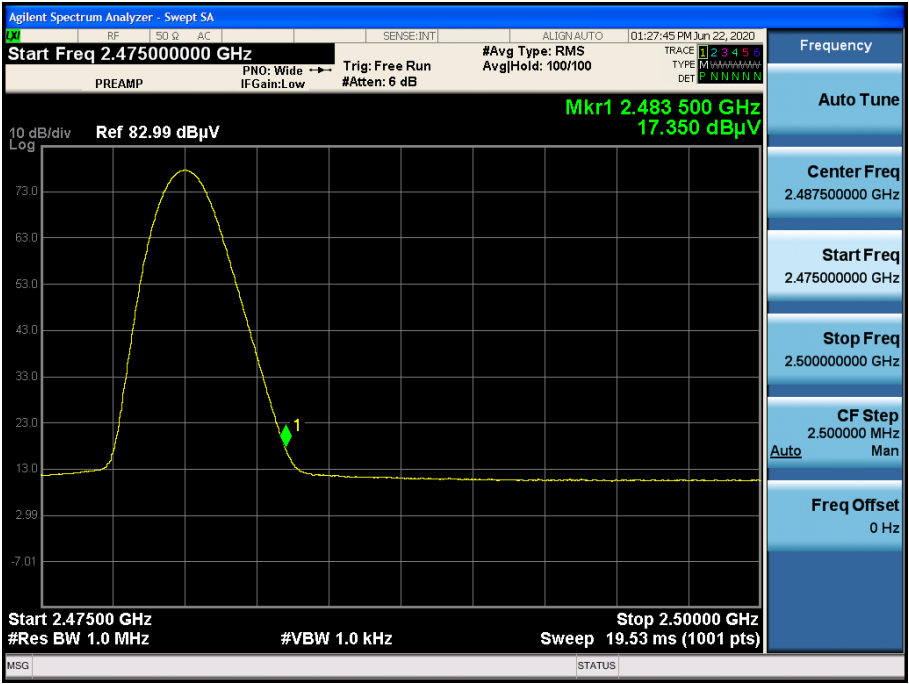
Bandedge

Frequency	Reading	A.F.+CL	Pol.	Total	Limit	Margin	Measurement
[MHz]	[dBuV]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Type
2483.5	23.987	34.25	H	58.24	73.98	15.74	PK
2483.5	17.350	34.25	H	51.60	53.98	2.38	AV
2483.5	25.367	34.25	V	59.62	73.98	14.36	PK
2483.5	16.334	34.25	V	50.58	53.98	3.40	AV

[Radiated Restricted Band Edges plot- Peak Reading]



[Radiated Restricted Band Edges plot- Average Reading]

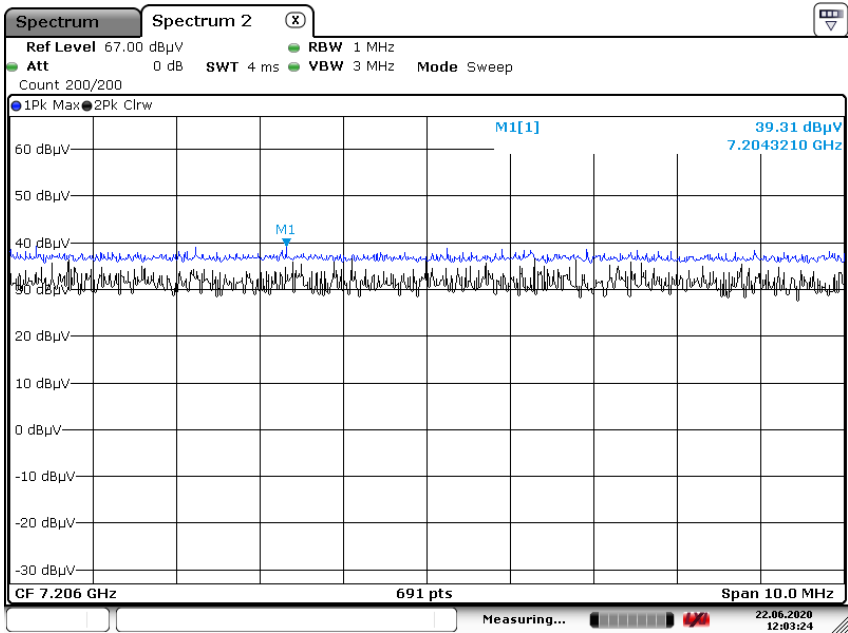


BT R.S.E 3rd Harmonic(DH5/ch.0)

RSE

Frequency	Reading	AN.+CL-AMP G	Pol.	Total	Limit	Margin	Measurement
[MHz]	[dBuV]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Type
7206	39.31	12.07	H	51.38	73.98	22.60	PK
7206	25.60	12.07	H	37.67	53.98	16.31	AV

[Radiated Spurious Emissions plot – Peak Reading]



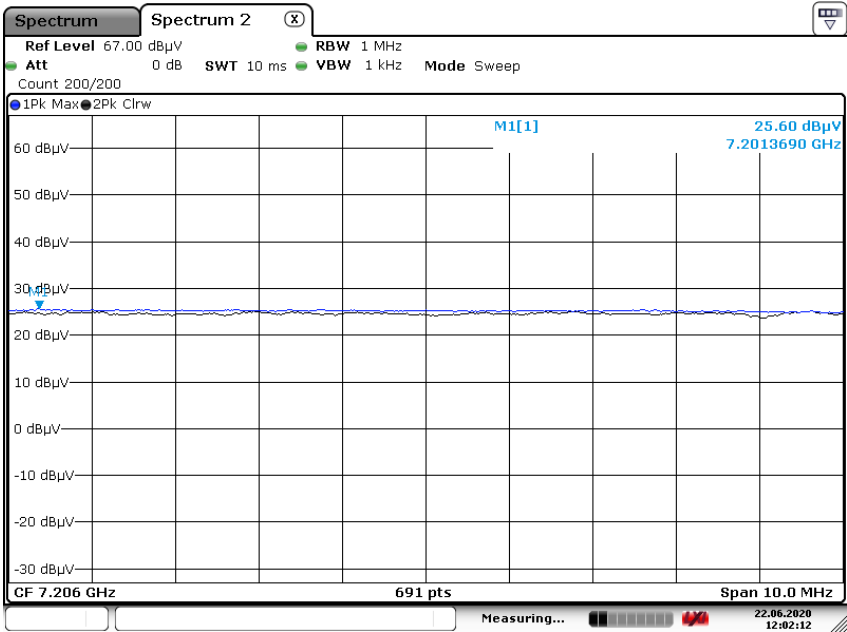
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[Radiated Spurious Emissions plot – Average Reading]



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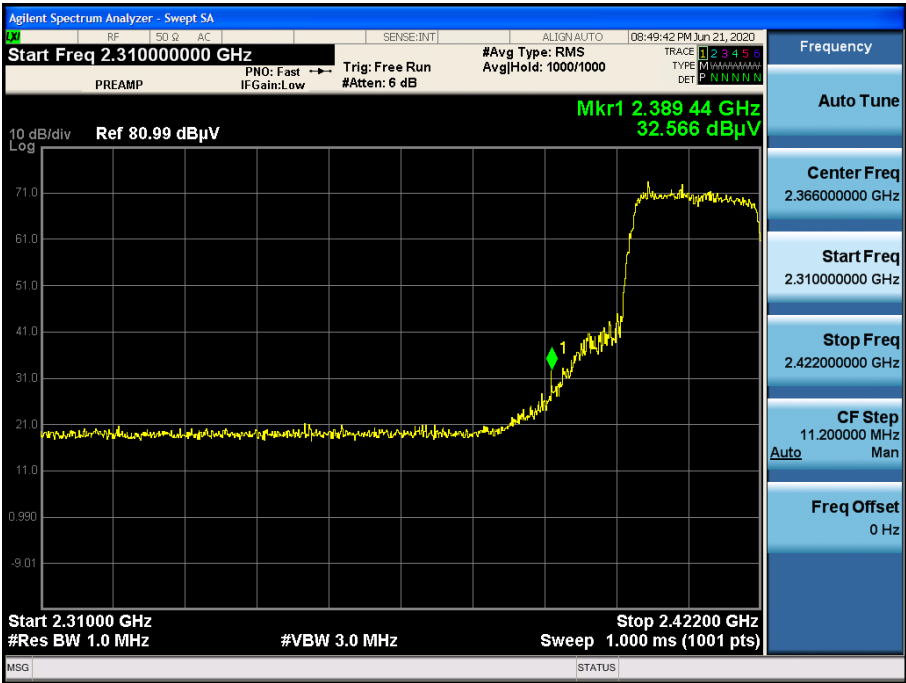
DTS Band Edge (802.11ax_ HE20 242T_MCS 0_ch1)

Bandedge

Frequency	Reading	Duty Cycle	A.F.+CL	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBuV]	Factor [dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Type
2390.0	32.566	0.00	34.77	H	67.34	73.98	6.64	PK
# 2389 ~ 2390	13.670	0.36	34.77	H	48.80	53.98	5.18	AV
2389.0	13.083	0.36	34.77	H	48.21	53.98	5.77	AV

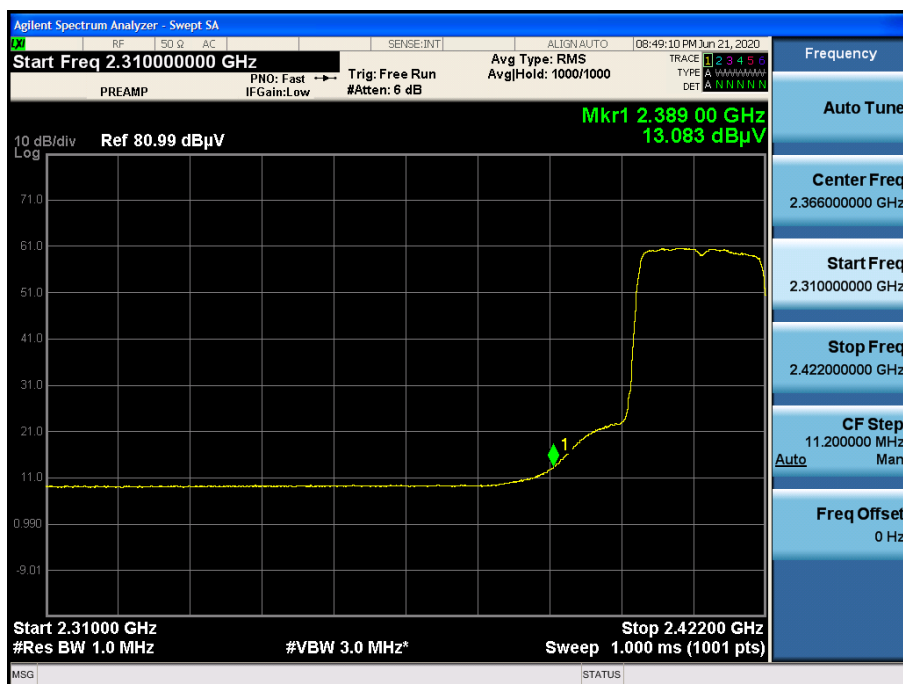
Note : “#” integration method Used (ANSI C63.10 Section11.13.3)

[Radiated Restricted Band Edges plot – Peak Reading]



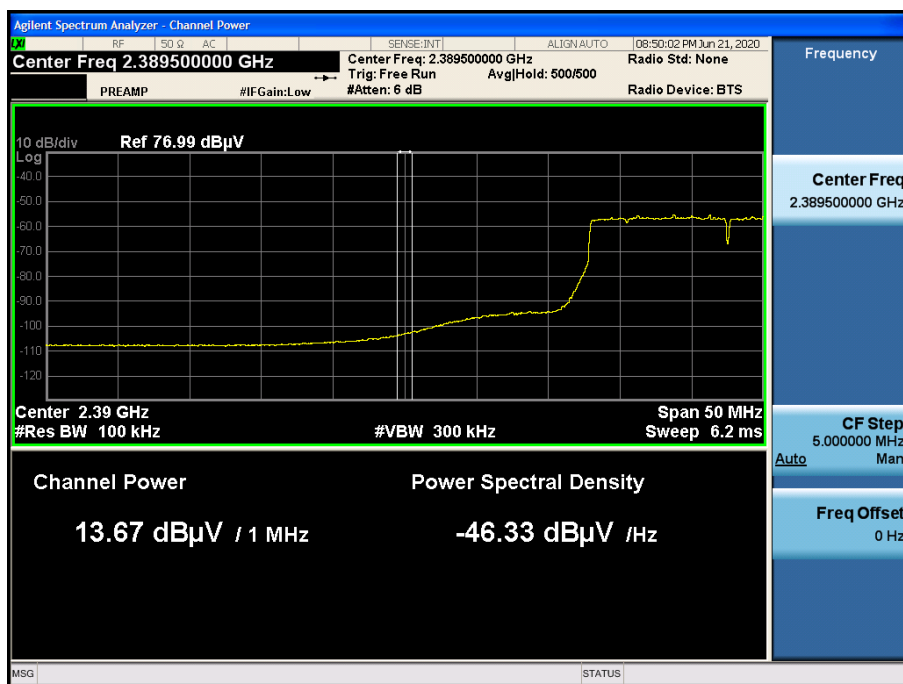
[Radiated Restricted Band Edges plot – Average Reading]

2 310 ~ 2 389 MHz



[Radiated Restricted Band Edges plot – Average Reading]

2 389 2 390 MHz_ Integration Method

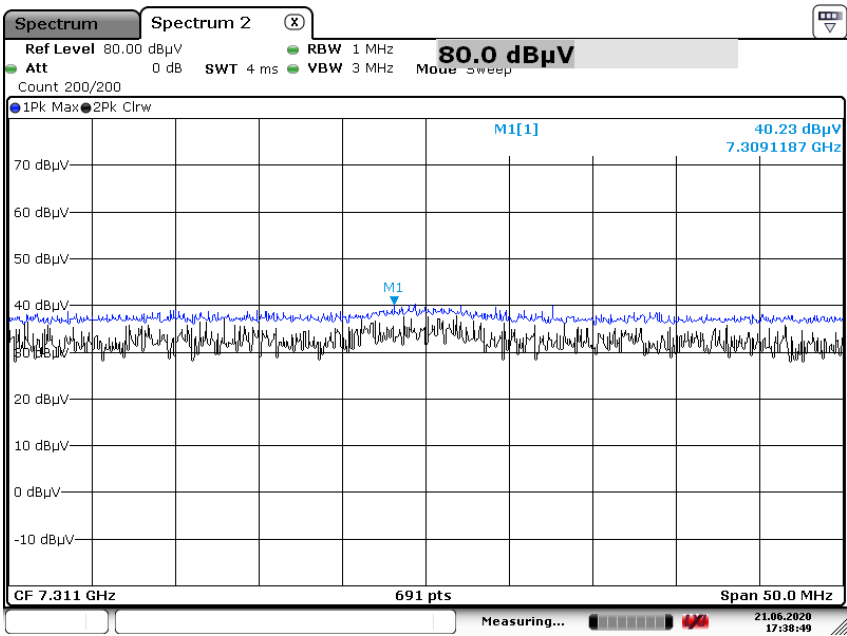


DTS R.S.E 3rd Harmonic (802.11b 1Mbps/ch.6)

RSE

Frequency [MHz]	Reading [dBuV]	AN.+CL-AMP G [dB]	Pol. [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
7311	40.23	11.45	H	51.68	73.98	22.30	PK
7311	29.63	11.45	H	41.08	53.98	12.90	AV

[Radiated Spurious Emissions plot – Peak Reading]



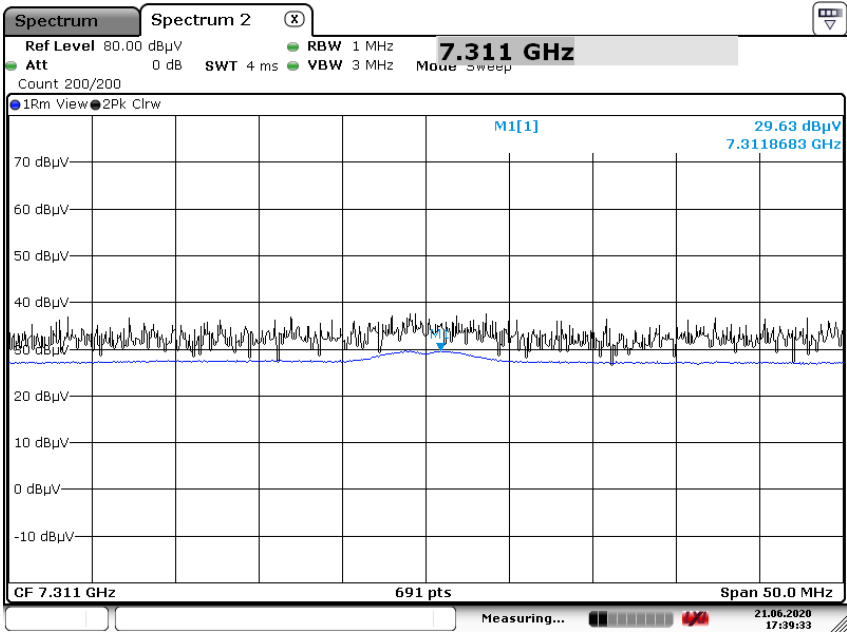
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[Radiated Spurious Emissions plot – Average Reading]



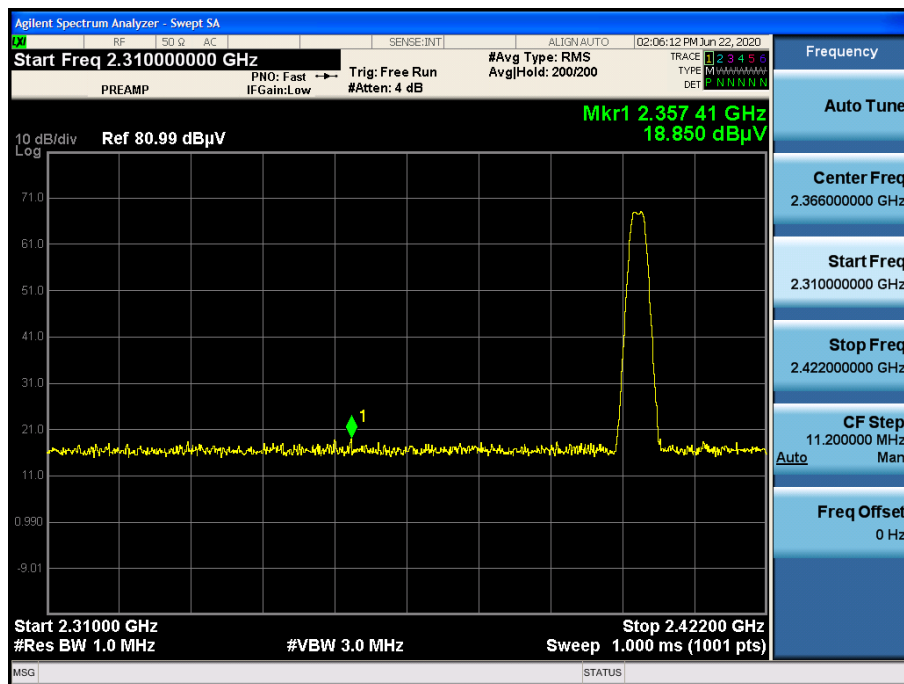
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BT(LE) Band Edge (LE(5.0) 2M 37byte/ch.0)

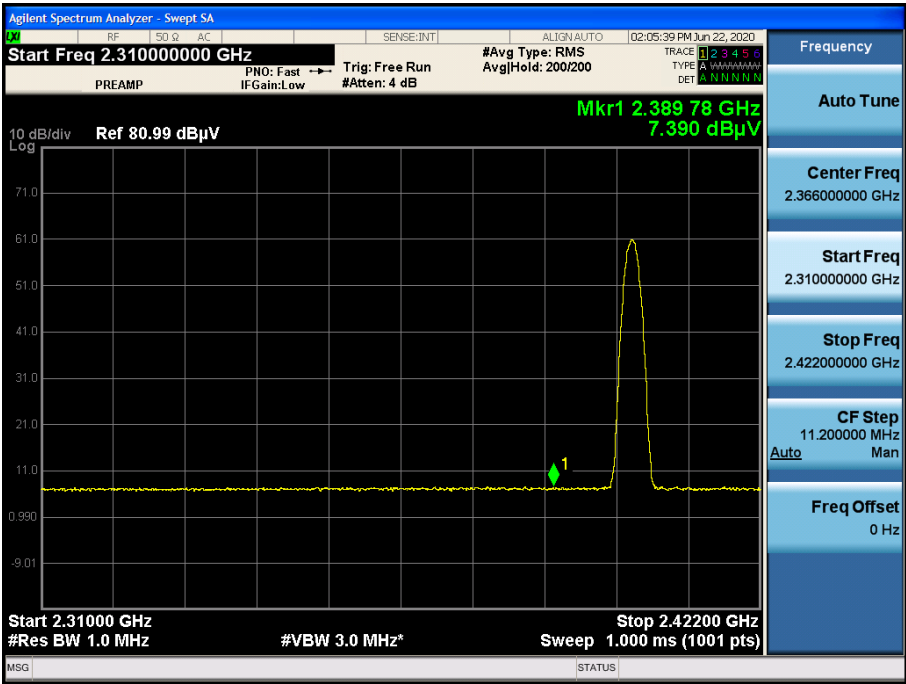
Bandedge

Frequency	Reading	Duty cycle						Measurement
[MHz]	[dBuV]	[dB]	A.F.+CL	Pol.	Total	Limit	Margin	Type
2390.0	18.850	0.00	34.77	H	53.62	73.98	20.36	PK
2390.0	7.390	5.09	34.77	H	47.25	53.98	6.73	AV

[Radiated Restricted Band Edges plot – Peak Reading]



[Radiated Restricted Band Edges plot – Average Reading]

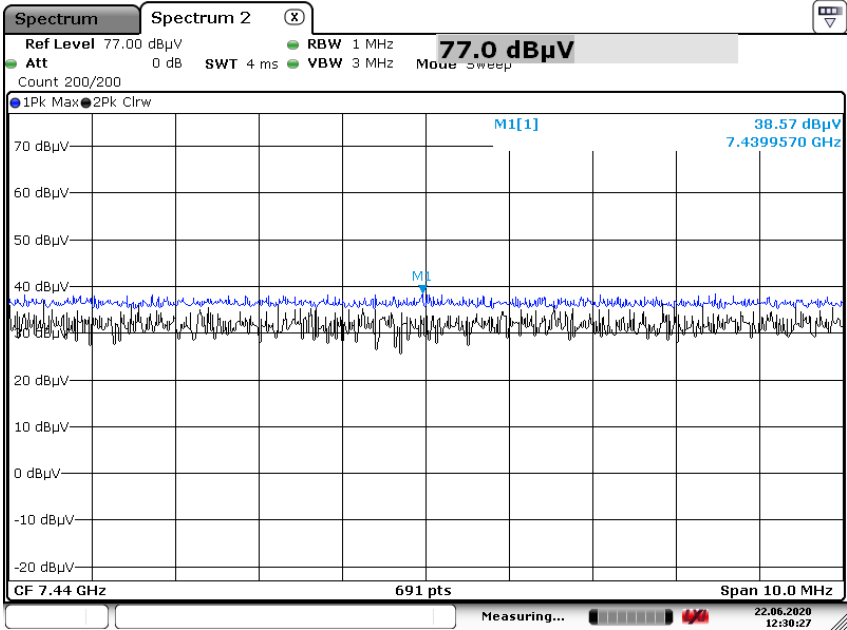


BT(LE) R.S.E 3rd Harmonic (LE(5.0) 2M 37byte/ch.39)

RSE

Frequency	Reading	Duty cycle						Measurement
		Factor	AN.+CL-AMP G	Pol.	Total	Limit	Margin	Type
[MHz]	[dBuV]	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
7440	38.57	0.00	11.91	H	50.48	73.98	23.50	PK
7440	27.15	5.09	11.91	H	44.15	53.98	9.83	AV

[Radiated Spurious Emissions plot – Peak Reading]



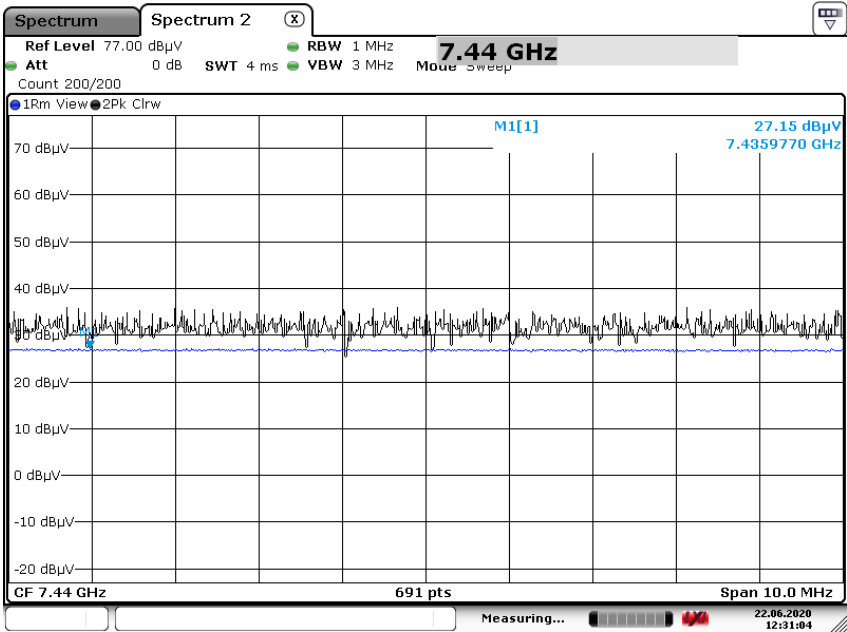
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[Radiated Spurious Emissions plot – Average Reading]



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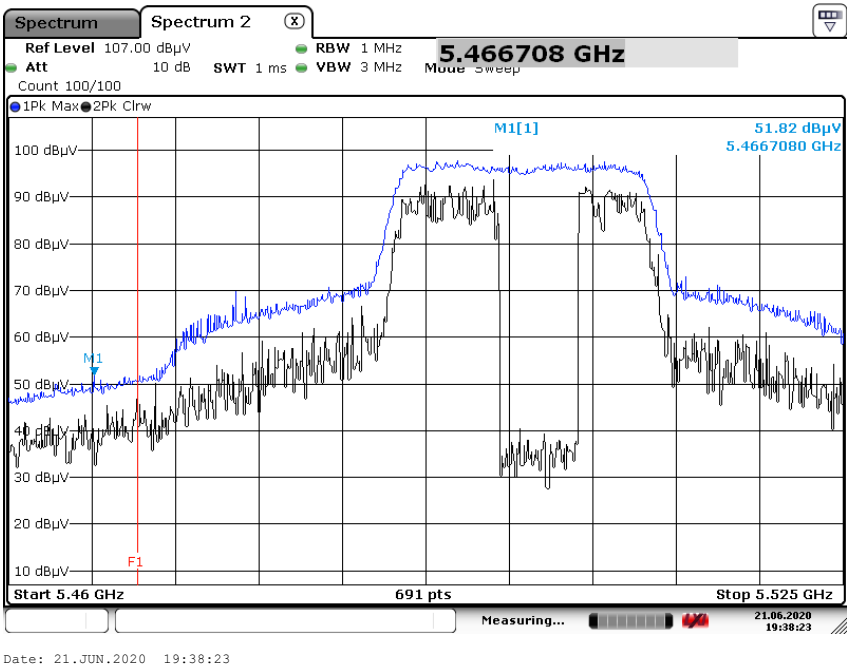
U-NII Band Edge (802.11ax_ HE20 242T_MCS 0 _ch100)

Bandedge

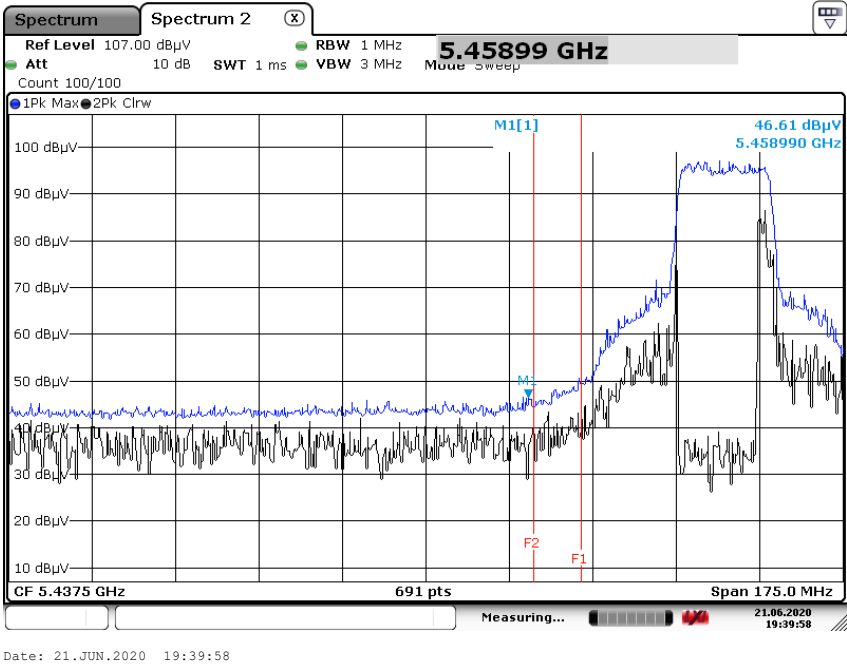
Frequency	Reading	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBuV]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Type
5460	46.61	13.91	H	60.52	73.98	13.46	PK
5460	33.74	13.91	H	47.65	53.98	6.33	AV
5470	51.82	13.46	H	65.28	68.20	2.92	PK

Radiated Restricted Band Edges plot – Peak Reading

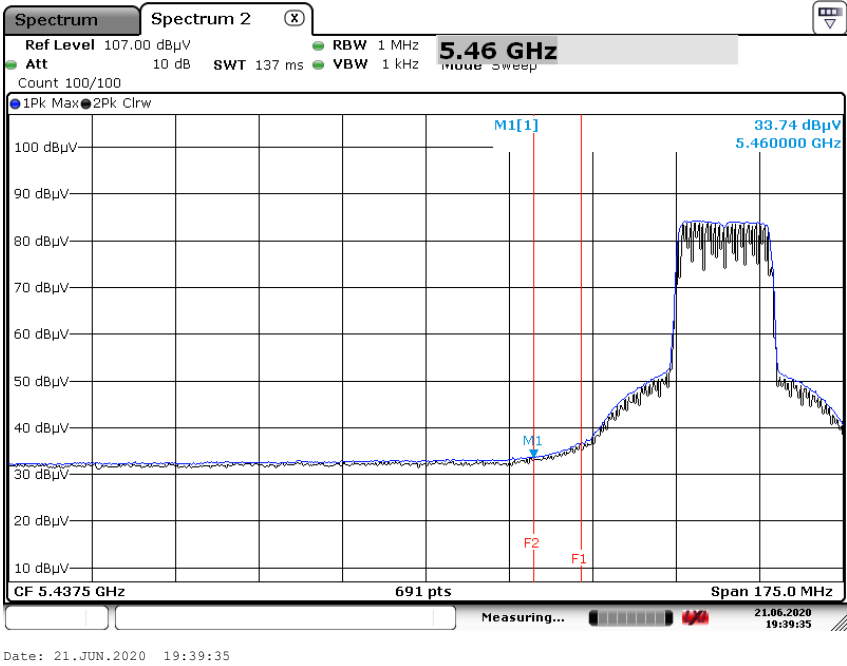
5460 ~ 5470 MHz



Radiated Restricted Band Edges plot – Peak Reading
5350 ~ 5460 MHz



Radiated Restricted Band Edges plot – Average Reading
5350 ~ 5460 MHz

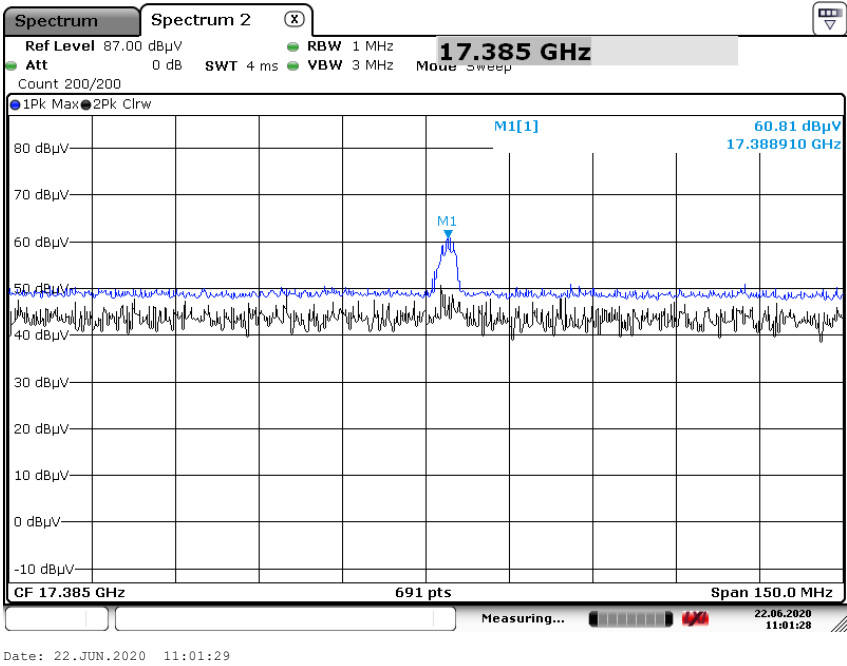


U-NII R.S.E 3rd Harmonic (802.11ax_ HE40_26T_RU9_ MCS 0 _ ch 159)

RSE

Frequency	Reading	AN.+CL-AMP G	Pol.	Total	Limit	Margin	Measurement
[MHz]	[dBuV]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Type
17385	60.81	6.00	H	66.81	68.20	1.39	PK

[Radiated Spurious Emissions plot – Peak Reading]

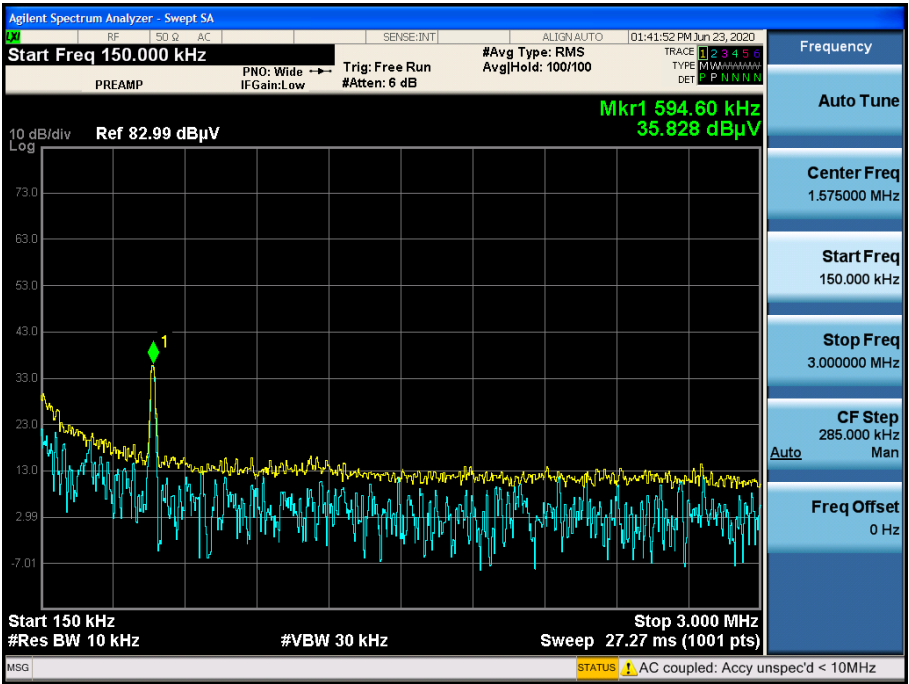


WPT S-pen Charging

Fundamental

Frequency (kHz)	Reading Level (dBuV/m)@3m	Ant.Factor (dB/m)	Cable Loss (dB)	Distance Correction (dB)	Result Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
# 594.6	35.828	17.1	0.42	-40	13.35	32.16	18.81

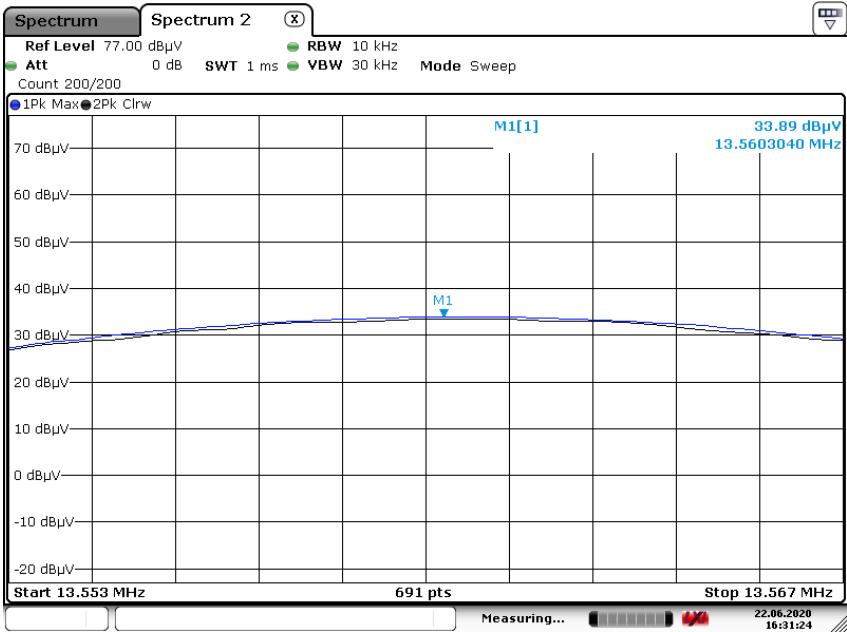
[plot]



NFC fund

Frequency	Read Level	Ant.Factor+Cable Loss	Distance Correction	Ant. POL	Result Level	Limit	Margin
(MHz)	(dBuV)@3m	(dB/m)	(dB)		(dBuV/m)@30m	(dBuV/m)@30m	(dB)
13.5603	33.89	18.58	-40.00	H	12.47	84.00	71.53

[plot]



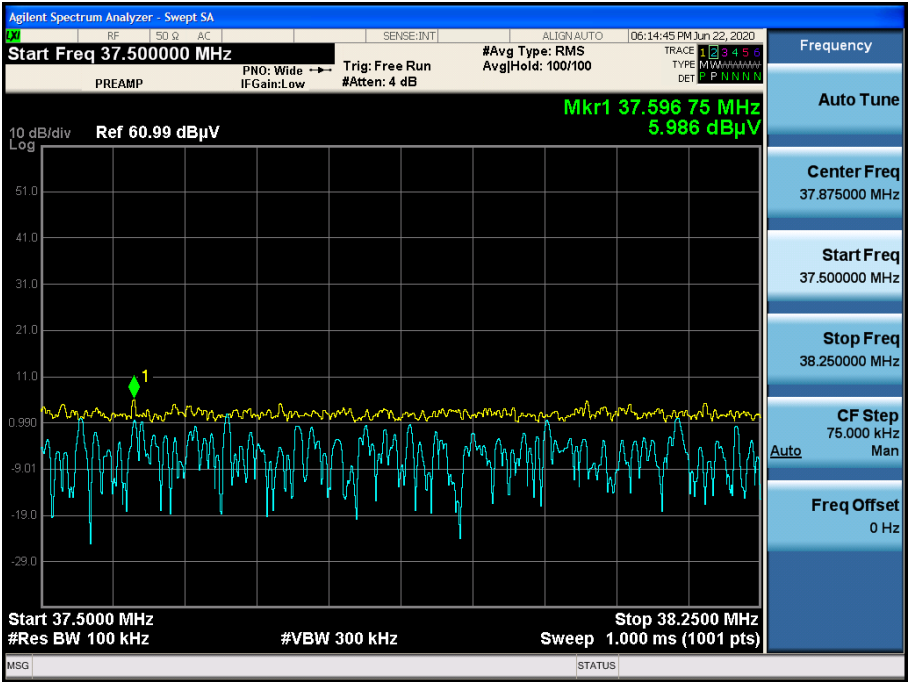
Date: 22.JUN.2020 16:31:24

NFC R.S.E Harmonic

RSE

Frequency	Reading dB μ V	Ant. factor dB /m	Cable loss dB	Ant. POL (H/V)	Total dB μ V/m	Limit dB μ V/m	Margin dB
37.611	5.986	18.50	0.49	H	24.98	40.00	15.02

[Radiated Spurious Emissions plot]



4. List of test equipment

Manufacture	Model/ Equipment	Serial Number	Calibration Date	Calibration Interval	Calibration Due
T&M SYSTEM	FBSR-02B(WHK1.2/15G-10EF)/H.P.F	-	03/09/2020	Annual	03/09/2021
T&M SYSTEM	FBSR-02B(WHK3.3/18G-10EF)/H.P.F	-	03/09/2020	Annual	03/09/2021
WAINWRIGHT INSTRUMENT	WHNX6.0/26.5G-6SS/H.P.F	1	03/19/2020	Annual	03/19/2021
Hewlett Packard	11667B / Power Splitter(DC~26.5 GHz)	11275	04/27/2020	Annual	04/27/2021
Agilent	E3632A/DC Power Supply	MY40004326	07/01/2019	Annual	07/01/2020
Schwarzbeck	UHAP/ Dipole Antenna	557	03/29/2019	Biennial	03/29/2021
Schwarzbeck	UHAP/ Dipole Antenna	558	03/29/2019	Biennial	03/29/2021
ESPEC	SU-642 / Chamber	93000717	08/14/2019	Annual	08/14/2020
Schwarzbeck	BBHA 9120D/ Horn Antenna(1~18GHz)	147	08/29/2019	Biennial	08/29/2021
Schwarzbeck	BBHA 9120D/ Horn Antenna(1~18GHz)	9120D-1298	09/25/2019	Biennial	09/25/2021
Schwarzbeck	BBHA 9170/ Horn Antenna(15~40GHz)	BBHA9170342	04/29/2019	Biennial	04/29/2021
Schwarzbeck	BBHA 9170/ Horn Antenna(15~40GHz)	BBHA9170124	02/11/2020	Biennial	02/11/2022
Agilent	N9020A/Signal Analyzer(10Hz~26.5GHz)	MY51110063	04/27/2020	Annual	04/27/2021
Hewlett Packard	8493C/ATTENUATOR(20dB)	17280	06/04/2020	Annual	06/04/2021
REOHDE & SCHWARZ	FSV40/Spectrum Analyzer(10Hz~40GHz)	100931	10/14/2019	Annual	10/14/2020
Agilent	8960 (E5515C)/ Base Station	MY48360800	08/27/2019	Annual	08/27/2020
Schwarzbeck	FMZB1513/ Loop Antenna(9kHz~30MHz)	1513-175	04/26/2019	Biennial	04/26/2021
Schwarzbeck	VULB9160/ Bilog Antenna	9160-3368	08/09/2018	Biennial	08/09/2020
Schwarzbeck	VULB9160/ Hybrid Antenna	760	03/22/2019	Biennial	03/22/2021
Anritsu Corp.	MT8821C/Wideband Radio Communication Tester	6201502997	08/09/2019	Annual	08/09/2020
Anritsu Corp.	MT8820C/Wideband Radio Communication Tester	6201026545	01/22/2020	Annual	01/22/2021
REOHDE & SCHWARZ	SMB100A/ SIGNAL GENERATOR (100kHz~40GHz)	177633	07/15/2019	Annual	07/15/2020
KEYSIGHT	E7515B / 5G Wireless Tester	MY58300756	01/07/2020	Annual	01/07/2021
KEYSIGHT	N9030B / Signal Analyzer(5Hz~40.0GHz)	MY55480167	06/04/2020	Annual	06/04/2021
Mini-Circuits	ZC4PD-K1844+ / 4-Way Divider	942907	09/05/2019	Annual	09/05/2020
HCT CO., LTD.,	FCC LTE Mobile Conducted RF Automation Test Software	-	-	-	-

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Innco system	CO3000 / Controller(Antenna mast)	N/A	N/A	CO3000-4p
Innco system	MA4640/800-XP-EP / Antenna Position Tower	N/A	N/A	N/A
Audix	EM1000 / Controller	N/A	N/A	060520
Audix	Turn Table	N/A	N/A	N/A
Rohde & Schwarz	Loop Antenna	04/26/2019	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	03/22/2019	Biennial	760
Schwarzbeck	VULB 9160 / TRILOG Antenna	08/09/2018	Biennial	9160-3368
Schwarzbeck	BBHA 9120D / Horn Antenna	04/29/2019	Biennial	9120D-937
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	11/29/2019	Biennial	BBHA9170541
Rohde & Schwarz	FSP(9 kHz ~ 30 GHz) / Spectrum Analyzer	04/27/2020	Annual	100854
Rohde & Schwarz	FSV40-N / Spectrum Analyzer	09/26/2019	Annual	101068-SZ
Agilent	N9020A / Signal Analyzer	05/11/2020	Annual	MY51110085
Wainwright Instruments	WRCJV2400/2483.5-2370/2520-60/12SS / Band Reject Filter	01/21/2020	Annual	2
Wainwright Instruments	WRCJV5100/5850-40/50-8EEK / Band Reject Filter	02/10/2020	Annual	1
Wainwright Instruments	WHK3.0/18G-10EF / High Pass Filter	03/02/2020	Annual	8
Wainwright Instruments	WHKX8-6090-7000-18000-40SS/ High Pass Filter	03/02/2020	Annual	25
Api tech.	18B-03 / Attenuator (3 dB)	03/02/2020	Annual	1
Agilent	8493C-10 / Attenuator(10 dB)	03/02/2020	Annual	08285
CERNEX	CBLU1183540 / Power Amplifier	03/02/2020	Annual	22964
CERNEX	CBL06185030 / Power Amplifier	03/02/2020	Annual	22965
CERNEX	CBL18265035 / Power Amplifier	12/26/2019	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	03/23/2020	Annual	25956