

# EVALUATION REPORT

**Applicant Name:**  
SAMSUNG Electronics Co., Ltd.

**Date of Issue:**  
July 16, 2021

**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:** A3LSMG715U1  
**APPLICANT:** SAMSUNG Electronics Co., Ltd.

Equipment Class(es) : PCE, DSS, DTS, NII, DXX

Rule Part(s) : 15, 22, 24, 27, 2, 90

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 A3LSMG715U 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	Field Strength	Share
	Band Edge	Share
	Spurious Emissions	Share

Reference Detail Section

Reference FCC ID	Equipment Class	Report Title	Section
A3LSMG715U	PCE	2G, 3G Report	All sections
		LTE B2 Report	All sections
		LTE B4 Report	All sections
		LTE B5 Report	All sections
		LTE B7 Report	All sections
		LTE B12 Report	All sections
		LTE B13 Report	All sections
		LTE B14 Report	All sections
		LTE B38 Report	All sections
		LTE B40 Report	All sections
		LTE B41 Report	All sections
		LTE B66 Report	All sections
	DSS	Bluetooth Report	All sections
	DTS	DTS Report	All sections
		BT LE Report	All sections
	NII	UNII Test Report	All sections
DXX	ANT+ Report	All sections	
	NFC Report	All sections	



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**Report prepared by : Jae Mun Do**  
**Engineer of Telecommunication testing center**



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**Approved by : Jong Seok Lee**  
**Manager of Telecommunication testing center**



## REVISION HISTORY

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

Revision No.	Date of Issue	Description
0	July 16, 2021	Initial Release

## 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	-22.90	40.67	-10.42	1.39	V	< 7.00	0.769	28.86
WCDMA850	4132	826.4	-31.57	32.18	-10.42	1.40	V		0.109	20.36
LTE B5	20450	829.0	-31.75	32.15	-10.41	1.40	V		0.108	20.34

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	23173	715.3	-29.27	31.49	-10.07	1.30	V	< 3.00	0.103	20.12
LTE B13	23230	782.0	-29.41	33.07	-10.37	1.36	V		0.136	21.34
LTE B14	23330	793.0	-31.58	31.44	-10.42	1.36	V		0.092	19.66

Mode	Frequency (MHz)		Mode	A3LSMG715U (dBm)	A3LSMG715U1 (dBm)	Deviation (dB)
	MHz	Ch.				
GSM850	824.2	128	VOICE	28.80	28.86	-0.06
WCDMA850	826.4	4132	RMC	19.70	20.36	-0.66
LTE B5 (B.W 10MHz)	829.0	20450	QPSK	19.96	20.34	-0.38
LTE B12 (B.W 1.4MHz)	715.3	23173	QPSK	19.80	20.12	-0.32
LTE B13 (B.W 10MHz)	782.0	23230	QPSK	21.14	21.34	-0.20
LTE B14 (B.W 10MHz)	793.0	23330	QPSK	20.11	19.66	0.45

**1.2 EQUIVALENT ISOTROPIC RADIATED POWER**

Mode	Ch./ Freq.		Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBi)	C.L	Pol.	Limit	EIRP	
	channel	Freq.(MHz)						W	W	dBm
GSM1900	810	1909.8	-12.07	22.47	10.23	2.15	H	< 2.00	1.136	30.55
WCDMA1900	9538	1907.6	-17.07	17.47	10.23	2.15	H		0.359	25.55
LTE B2	19193	1909.3	-17.76	16.78	10.23	2.15	H		0.306	24.86
LTE B7	21425	2567.5	-24.42	12.78	10.95	2.52	H		0.132	21.21
LTE B41	40620	2593.0	-24.81	12.52	10.98	2.53	H		0.125	20.97
LTE B40 (Low)	38775	2312.5	-33.34	5.04	9.68	2.38	H	< 0.25	0.017	12.34
LTE B40 (Upper)	39175	2352.5	-34.57	3.45	9.90	2.41	H		0.012	10.94

Mode	Ch./ Freq.		Measured Level (dBm)	Substitute Level (dBm)	Ant. Gain (dBi)	C.L	Pol.	Limit	EIRP	
	channel	Freq.(MHz)						W	W	dBm
WCDMA1700	1412	1732.4	-17.72	16.01	9.90	2.05	H	< 1.00	0.243	23.86
LTE B4	20175	1732.5	-19.75	13.98	9.90	2.05	H		0.152	21.83
LTE B66	132647	1777.5	-19.38	14.27	10.05	2.07	H		0.168	22.25

Mode	Frequency (MHz)		Mode	A3LSMG715U (dBm)	A3LSMG715U1 (dBm)	Deviation (dB)
	MHz	Ch.				
GSM1900	1909.8	810	VOICE	30.92	30.55	0.37
WCDMA1900	1907.6	9538	RMC	24.90	25.55	-0.65
WCDMA1700	1732.4	1412	RMC	23.03	23.86	-0.83
LTE B2 (B.W 1.4MHz)	1909.3	19193	QPSK	25.13	24.86	0.27
LTE B4 (B.W 1.4MHz)	1732.5	20175	QPSK	23.11	21.83	1.28
LTE B66 (B.W 5MHz)	1777.5	132647	QPSK	23.63	22.25	1.38
LTE B7 (B.W 5MHz)	2567.5	21425	QPSK	21.74	21.21	0.53
LTE B41 (B.W 15MHz)	2593.0	40620	QPSK	22.44	20.97	1.47
LTE B40 (Low) (B.W 5MHz)	2312.5	38775	QPSK	11.14	12.34	-1.20
LTE B40 (Upper) (B.W 5MHz)	2352.5	39175	QPSK	10.25	10.94	-0.69

### 1.3 RADIATED SPURIOUS EMISSIONS

Mode, Channel, (Frequency)	Freq. (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm]	C.L	Pol.	Result (dBm)
GSM850 CH 128 (824.2)	3 296.80	-55.68	12.25	-56.77	2.89	H	-47.40
GSM1900 CH 661 (1880)	5 640.00	-45.64	13.30	-43.47	3.85	H	-34.02
WDM850 CH 4132 (826.4)	3 305.60	-58.06	12.33	-59.14	2.90	V	-49.71
WDM1700 CH 1412 (1732.4)	6 929.60	-58.27	12.05	-50.97	4.28	H	-43.20
WDM1900 CH 9262 (1852.4)	7 409.60	-56.98	11.13	-46.80	4.45	H	-40.12
LTE B2 CH 19100 (1900.0)	5 700.00	-51.31	13.40	-49.05	3.87	H	-39.52
LTE B4 CH 20175 (1732.5)	5 197.50	-58.46	12.90	-57.04	3.70	H	-47.84
LTE B66 CH 132597 (1772.5)	5 317.50	-55.51	13.35	-54.31	3.73	H	-44.69
LTE B7 CH 20850 (2510.0)	12 550.00	-51.79	13.90	-47.57	5.98	H	-39.65
LTE B5 CH 20407 (824.7)	2 474.10	-54.79	10.60	-59.00	2.47	H	-50.87
LTE B12 CH 23035 (701.5)	1 403.00	-45.75	7.60	-54.01	1.85	H	-48.26
LTE B13 CH 23205 (779.5)	2 338.5	-52.60	9.83	-54.82	2.41	V	-47.40
LTE B14 CH 23330 (793.0)	3 172.0	-54.31	11.35	-54.53	2.83	V	-46.01
LTE B41 CH 41565 (2687.5)	13 437.50	-49.15	12.63	-40.49	6.26	V	-34.12
LTE B40 (Low) CH 38775 (2312.5)	9 250.00	-58.38	10.70	-55.14	5.06	V	-49.50
LTE B40 (Upper) CH 39225 (2357.5)	9 430.00	-58.13	10.80	-54.84	5.12	H	-49.16



Modulation	Frequency		Mode	A3LSMG715U (dBm)	A3LSMG715U1 (dBm)	Deviation (dB)
	MHz	Ch.				
GSM850	3 296.80	128	VOICE	-31.60	-47.40	15.80
GSM1900	5 640.00	661	RMC	-27.16	-34.02	6.86
WDM850	3 305.60	4132	RMC	-49.33	-49.71	0.38
WDM1700	6 929.60	1412	RMC	-40.72	-43.20	2.48
WDM1900	7 409.60	9262	RMC	-39.88	-40.12	0.24
LTE B2 (B.W 20MHz)	5 700.00	19100	QPSK	-28.96	-39.52	10.56
LTE B4 (B.W 5MHz)	5 197.50	20175	QPSK	-35.23	-47.84	12.61
LTE B66 (B.W 15MHz)	5 317.50	132597	QPSK	-32.06	-44.69	12.63
LTE B7 (B.W 20MHz)	12 550.00	20850	QPSK	-36.40	-39.65	3.25
LTE B5 (B.W 1.4MHz)	2 474.10	20407	QPSK	-38.22	-50.87	12.65
LTE B12 (B.W 5MHz)	1 403.00	23035	QPSK	-45.50	-48.26	2.76
LTE B13 (B.W 5MHz)	2 338.5	23205	QPSK	-40.82	-47.40	6.58
LTE B14 (B.W 5MHz)	3 172.0	23330	QPSK	-41.57	-46.01	4.44
LTE B41 (B.W 5MHz)	13 437.50	41565	QPSK	-35.06	-34.12	-0.94
LTE B40 (Low) (B.W 5MHz)	9 250.00	38775	QPSK	-49.71	-49.50	-0.21
LTE B40 (Upper) (B.W 5MHz)	9 430.00	39225	QPSK	-51.19	-49.16	-2.03

## 2. Summary of the spot check for Unlicensed EMC

Mod	Test Item	Mod/ Channel	Measured Frequency [MHz]	A3LSMG715U Result [dBuV/m]		A3LSMG715U1 Result [dBuV/m]		Deviation (dB)	
				Peak	Average	Peak	Average	Peak	Average
BT	Band Edge	2-DH5/ch.78	2483.5 MHz~2500 MHz	65.45	40.72	65.60	40.87	0.15	0.15
	RSE	2-DH5/ch.39	7323 MHz	60.38	46.69	50.43	36.74	-9.95	-9.95
BT(LE)	Band Edge	LE(5.0) 2M 37byte/ch.39	2483.5 MHz~2500 MHz	57.55	48.64	53.73	45.01	-3.82	-3.63
	RSE	LE(5.0) 2M 37byte/ch.19	7320 MHz	60.23	47.76	51.08	43.39	-9.15	-4.37
DTS (2.4G WLAN)	Band Edge	802.11g_ 6Mbps/ch.13	2483.5 MHz~2500 MHz (2484MHz)	62.97	51.95	60.41	48.93	-2.56	-3.02
	RSE	802.11n(20M) MCS0/ch.6	7311 MHz	60.49	48.30	50.70	38.86	-9.79	-9.44
U-NII (5G WLAN)	Band Edge	802.11ac(80M)_ MCS0/ch.42	4500 MHz~5150 MHz	61.48	47.31	60.31	48.28	-1.17	0.97
	RSE	802.11ac(20M)_ MCS0/ch.165	17475 MHz	63.77	-	61.48	-	-2.29	-
NFC	Field Strength	With Tag mode	13.56 MHz	14.45	-	13.18	-	-1.27	-
	RSE	With Tag mode	38.389 MHz	28.15	-	25.16	-	-2.99	-
ANT+	Band Edge	Period 128(0dBm)/ch.0	2310.0 MHz~2400.0 MHz	59.93	28.05	60.43	28.55	0.50	0.50
	RSE	Period 128(0dBm)/ch.39	7323 MHz	60.47	49.02	51.58	39.37	-8.89	-9.65
	Field Strength	Period 128(0dBm)/ch.78	2480 MHz	82.53	50.65	81.64	49.76	-0.89	-0.89

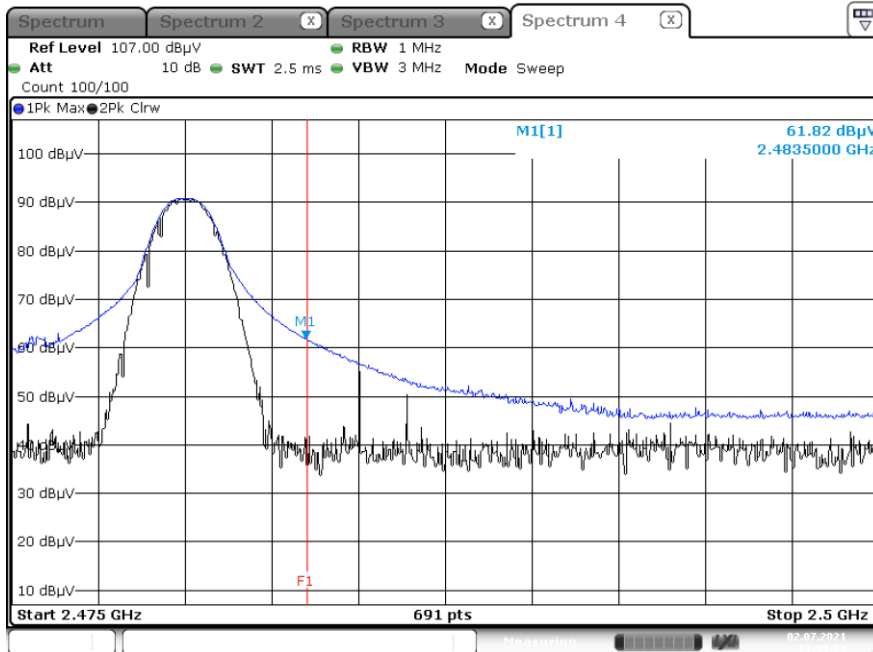
### 3. Test Plot

#### BT Band Edge (2-DH5/ch.78)

##### Bandedge

Frequency [MHz]	Reading dBuV	※ A.F+C.L-AMP+ATT+D.F [dB]	ANT. POL [H/V]	Duty Cycle Correction [dB]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2483.5	61.82	3.78	H	0	65.60	73.98	8.38	PK
2483.5	61.82	3.78	H	-24.73	40.87	53.98	13.11	AV

[Radiated Restricted Band Edges plot- Peak&Average Reading]

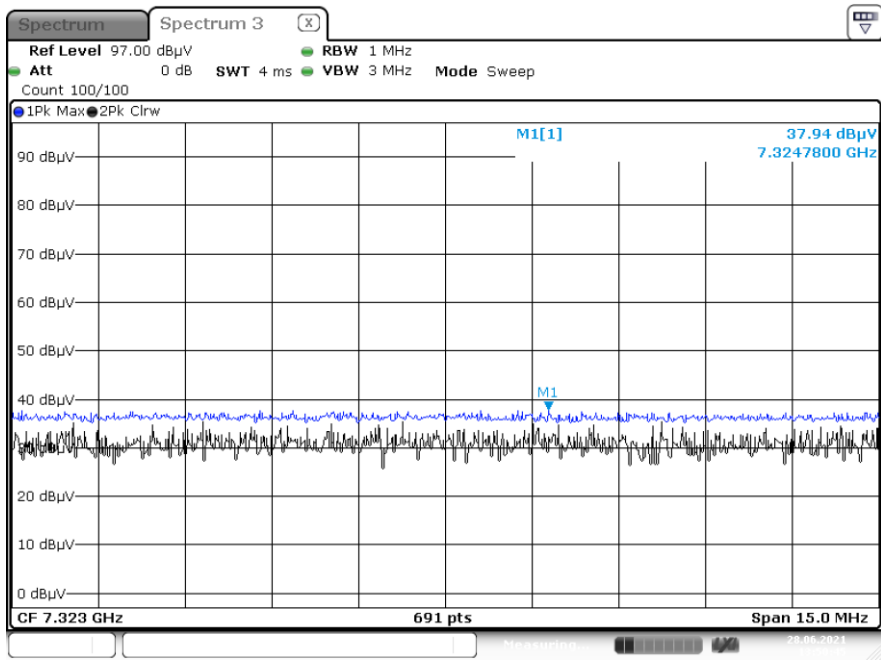


### BT R.S.E 3<sup>rd</sup> Harmonic(2-DH5/ch.39)

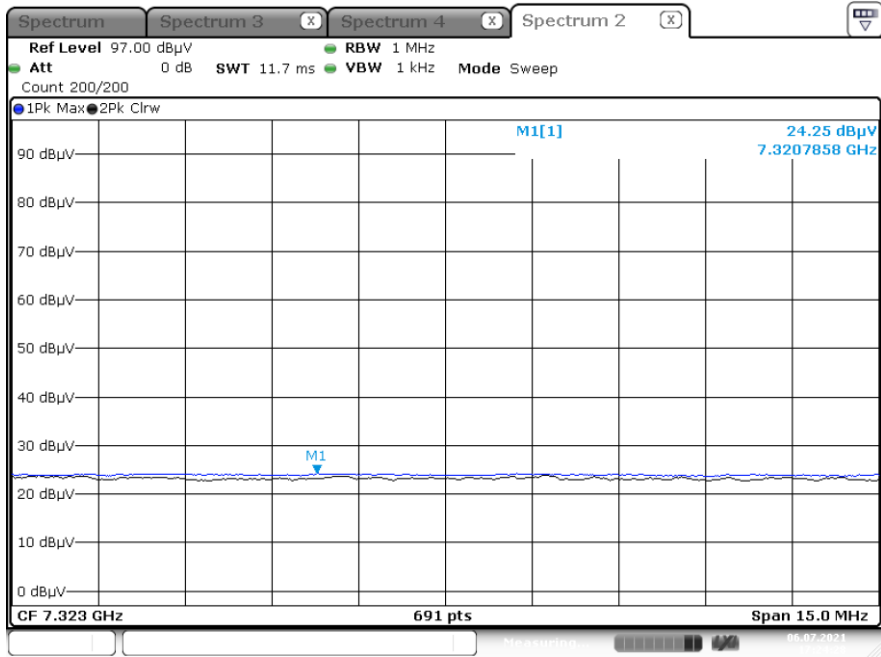
**RSE**

Frequency [MHz]	Reading dBuV	A.F+C.L-A.G+D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
7323	37.94	12.49	H	50.43	73.98	23.55	PK
7323	24.25	12.49	H	36.74	53.98	17.24	AV

[Radiated Spurious Emissions plot – Peak Reading]



[Radiated Spurious Emissions plot – Average Reading]

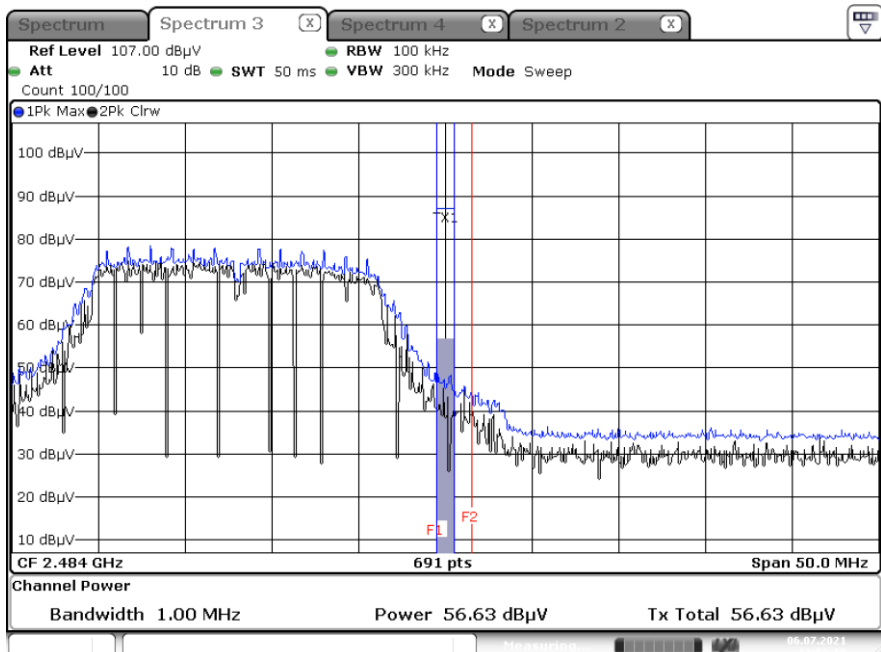


### DTS Band Edge (802.11g\_6 Mbps\_ch13)

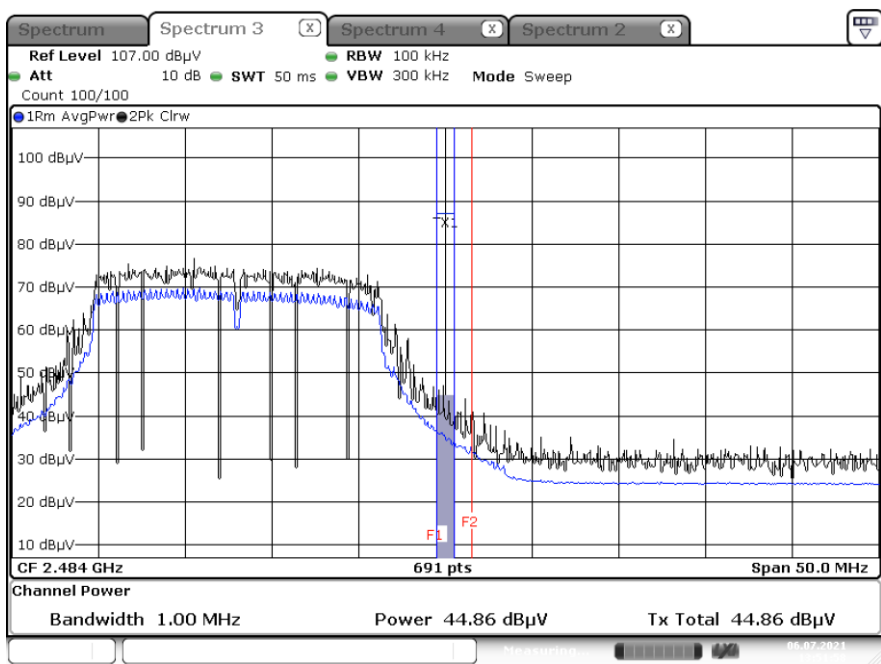
**Bandedge**

Frequency [MHz]	Reading dBuV	Duty Cycle Factor	※ A.F+C.L-AMP+ATT+D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2483.5*(2484)	56.63	0.00	3.78	H	60.41	73.98	13.57	PK
2483.5*(2484)	44.86	0.29	3.78	H	48.93	53.98	5.05	AV

[Radiated Restricted Band Edges plot – Peak Reading]



### [Radiated Restricted Band Edges plot – Average Reading]

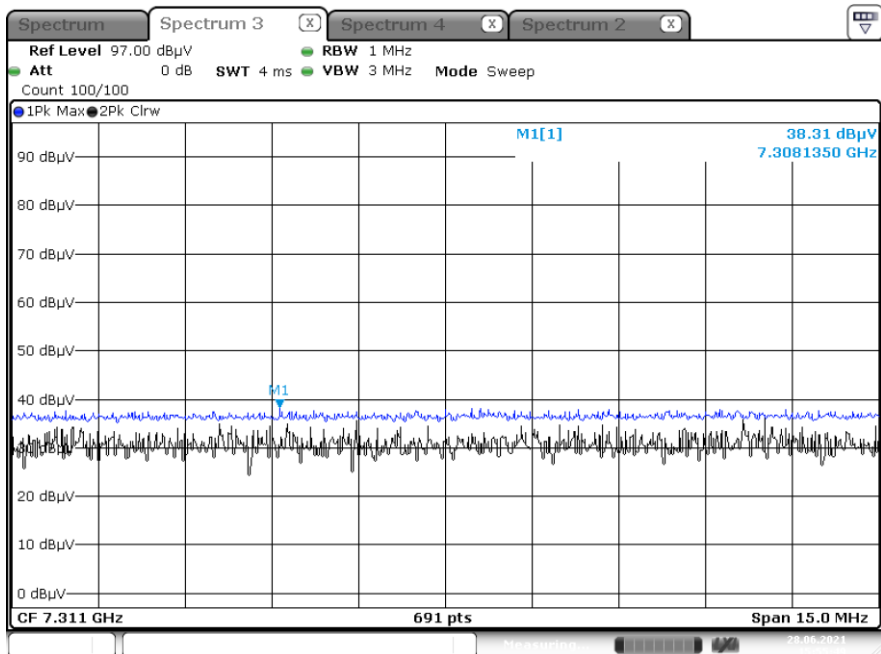


### DTS R.S.E 3<sup>rd</sup> Harmonic (802.11n\_20 MHz BW 6.5 Mbps/ch.6)

RSE

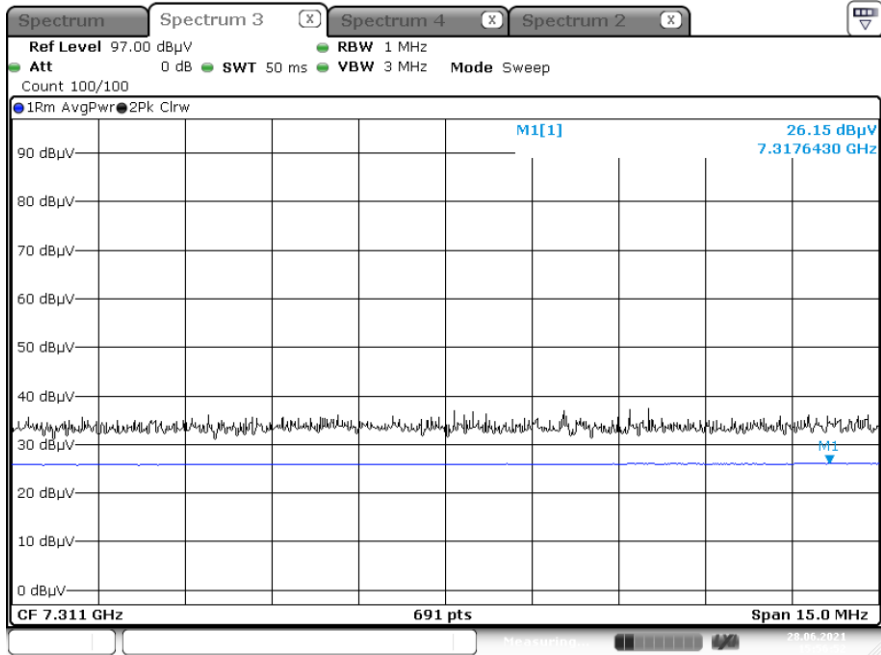
Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor	A.F+C.L-AMP+D.F [dB]	Pol. [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
7311	38.31	0.00	12.39	H	50.70	73.98	23.28	PK
7311	26.15	0.32	12.39	H	38.86	53.98	15.12	AV

[Radiated Spurious Emissions plot – Peak Reading]





[Radiated Spurious Emissions plot – Average Reading]

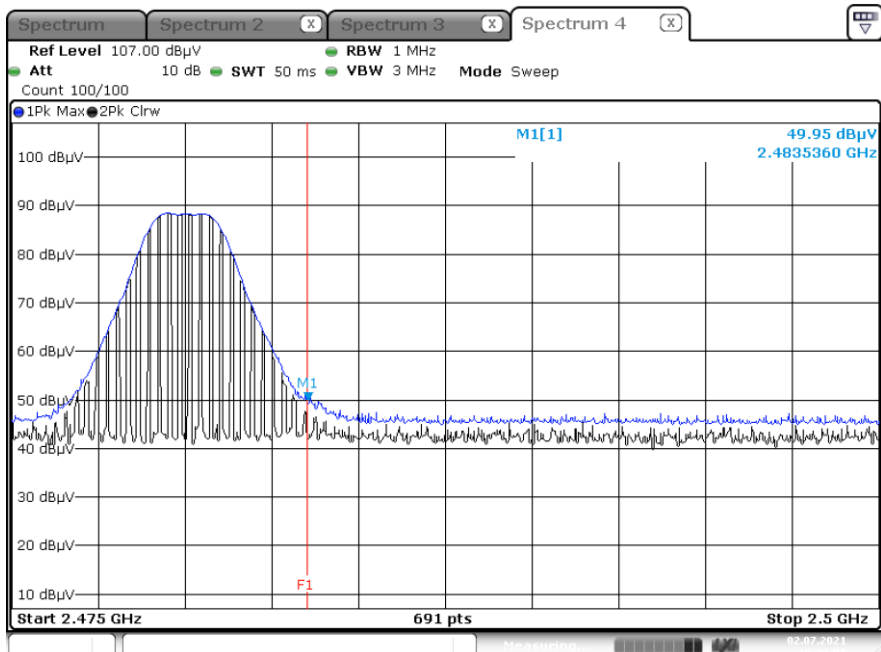


### BT(LE) Band Edge (LE(5.0) 2M 37byte/ch.39)

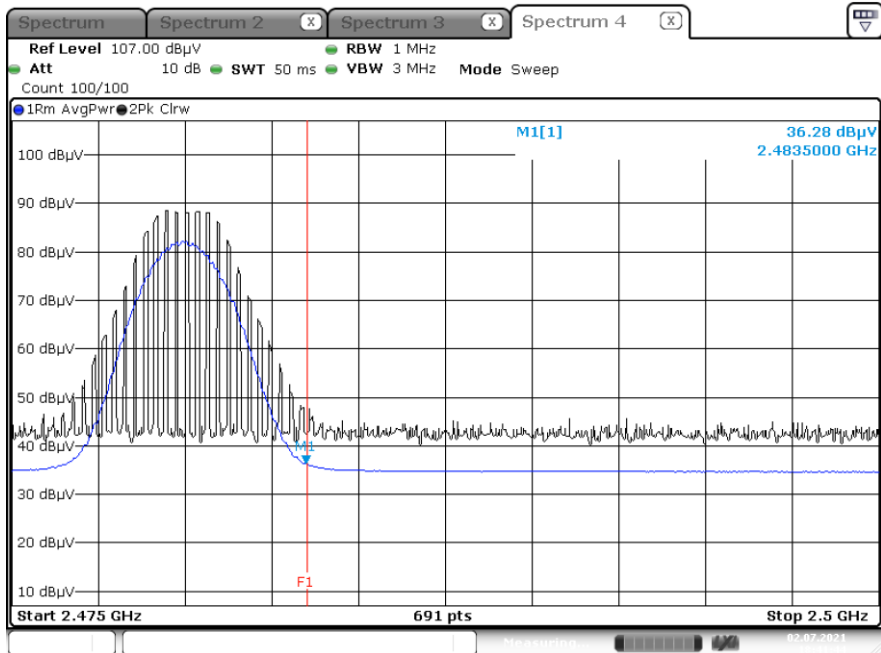
**Bandedge**

Frequency [MHz]	Reading dBuV	Duty cycle Factor	※ A.F+C.L+ ATT-A.G+D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2483.5	49.95	0.00	3.78	H	53.73	73.98	20.25	PK
2483.5	36.28	4.95	3.78	H	45.01	53.98	8.97	AV

[Radiated Restricted Band Edges plot – Peak Reading]



[Radiated Restricted Band Edges plot – Average Reading]

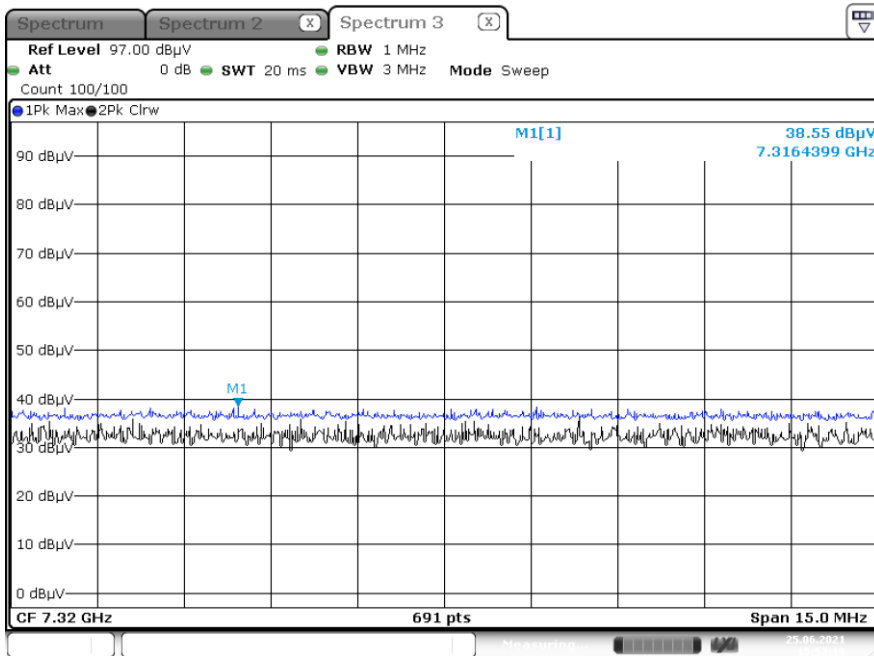


**BT(LE) R.S.E 3<sup>rd</sup> Harmonic (LE(5.0) 2M 37byte/ch.19)**

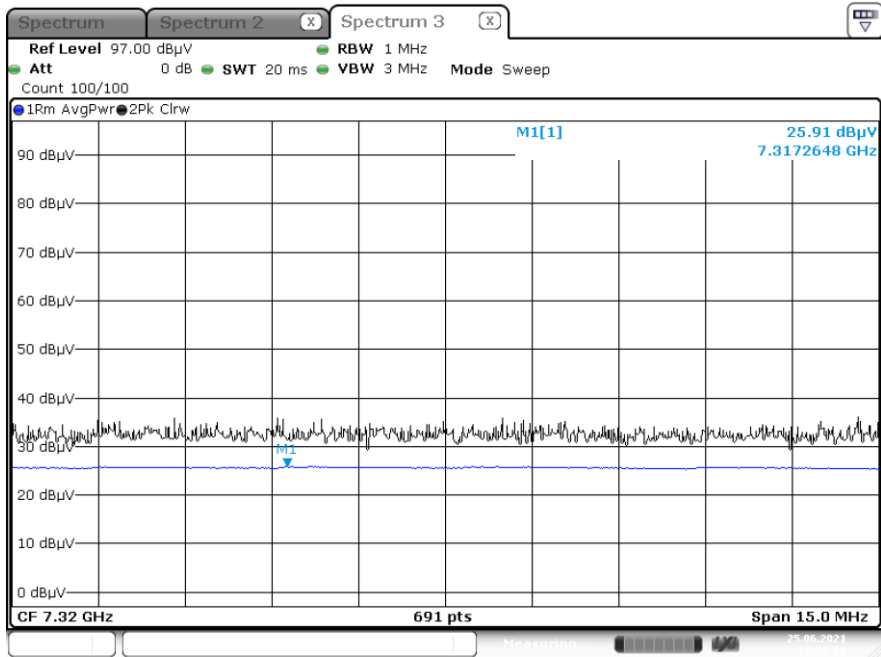
**RSE**

Frequency [MHz]	Reading dBuV	Duty cycle Factor	A.F+C.L-A.G+D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
7320	38.55	0.00	12.53	H	51.08	73.98	22.90	PK
7320	25.91	4.95	12.53	H	43.39	53.98	10.59	AV

[Radiated Spurious Emissions plot – Peak Reading]



[Radiated Spurious Emissions plot – Average Reading]

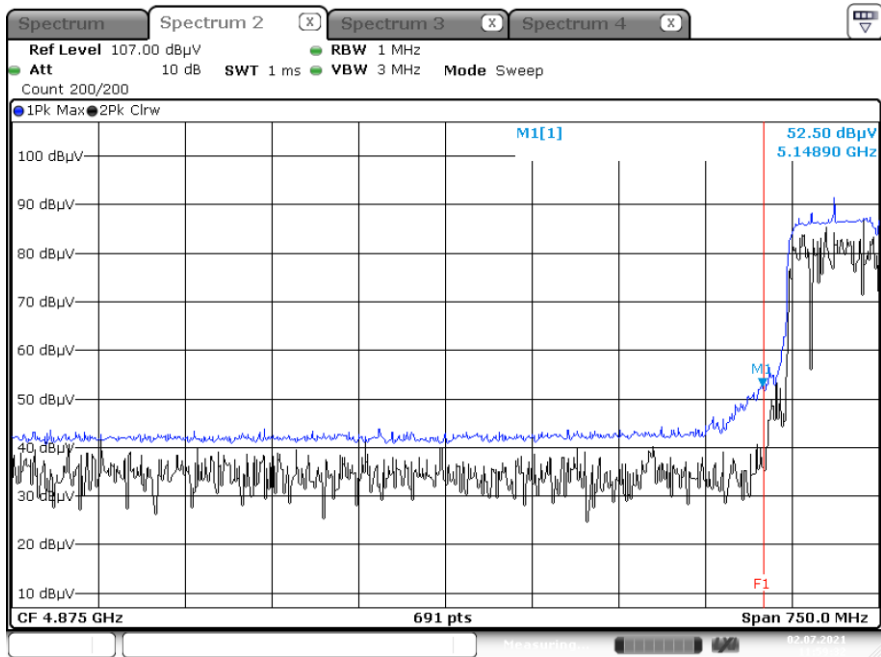


**U-NII Band Edge (802.11ac\_80 MHz BW 29.3 Mbps\_ch42)**

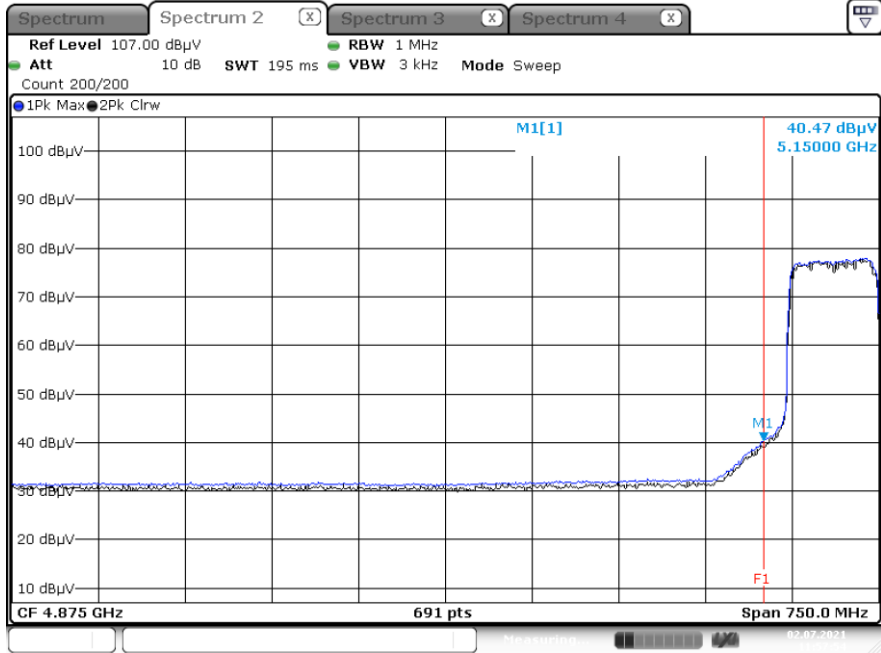
**Bandedge**

Frequency [MHz]	Reading dBuV	A.F+C.L-A.G +ATT+D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5150	52.50	7.81	H	60.31	73.98	13.67	PK
5150	40.47	7.81	H	48.28	53.98	5.70	AV

Radiated Restricted Band Edges plot – Peak Reading



Radiated Restricted Band Edges plot – Average Reading

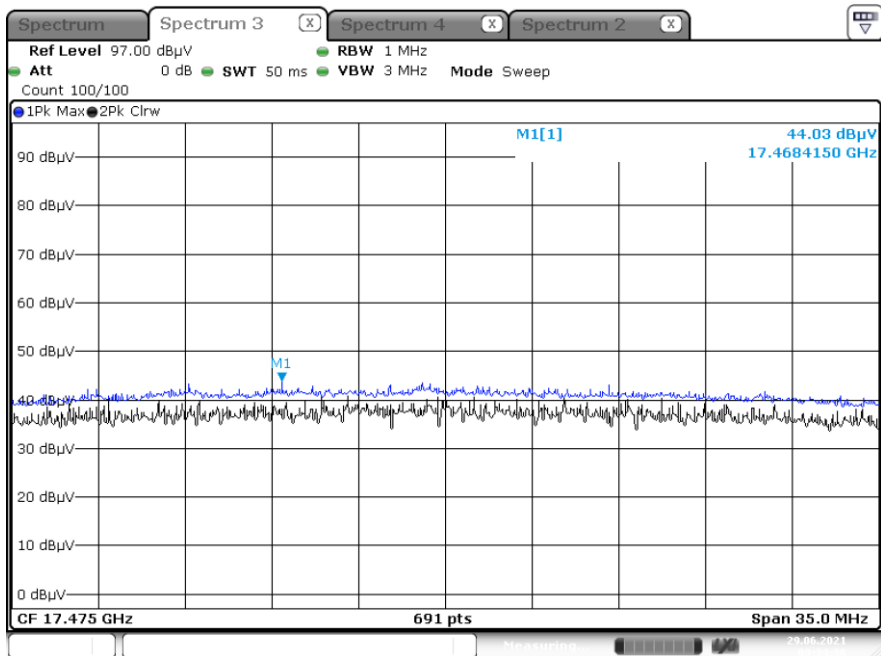


**U-NII R.S.E 3<sup>rd</sup> Harmonic (802.11ac(20) 6.5 Mbps \_ ch 165)**

**RSE**

Frequency [MHz]	Reading dBuV	A.F+C.L-A.G+D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
17475	44.03	17.45	H	61.48	68.20	6.72	PK

[Radiated Spurious Emissions plot – Peak Reading]



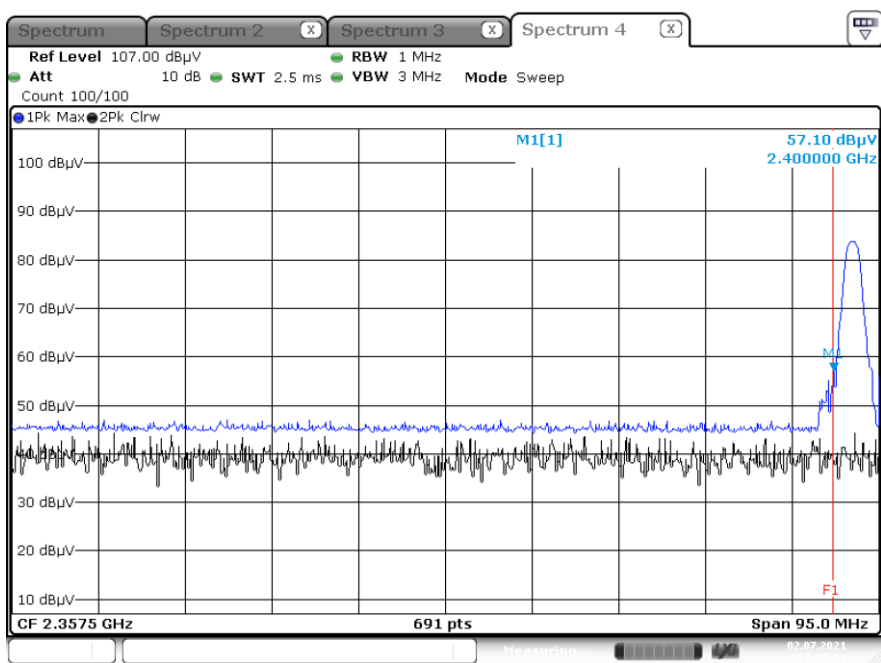


### ANT+ Band Edge (Period 128(0dBm)/ch.0

#### Bandedge

Frequency [MHz]	Reading [dBuV]	※ A.F + C.L - A.G + D.F+ ATT [dB]	Pol. [H/V]	D.C.C.F [dB]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2400.0	57.10	3.33	H	0	60.43	73.98	13.55	PK
2400.0	57.10	3.33	H	-31.88	28.55	53.98	25.43	AV

Radiated Restricted Band Edges plot – Peak Reading

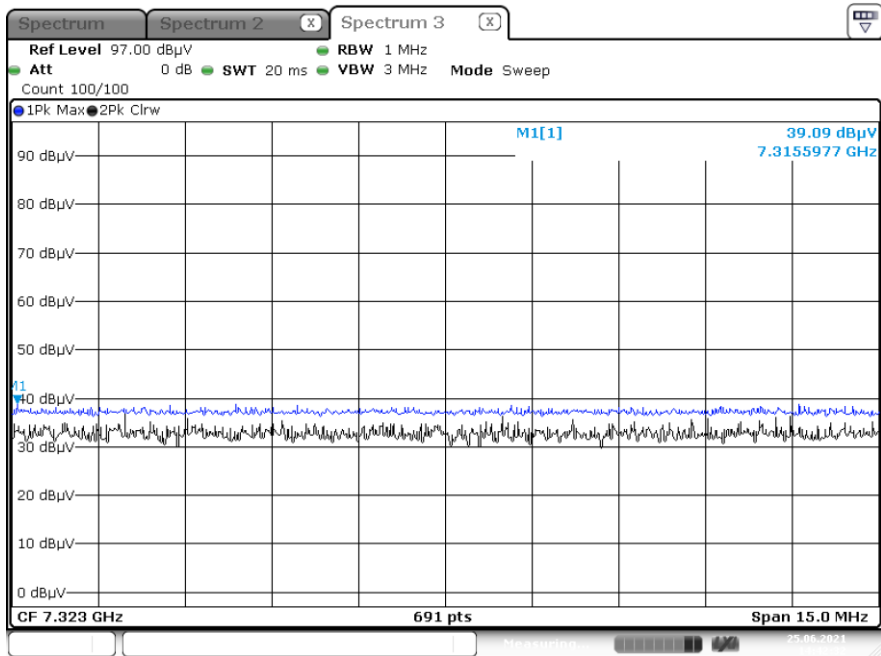


**ANT+ R.S.E 3<sup>rd</sup> Harmonic(Period 128(0dBm)/ch.39)**

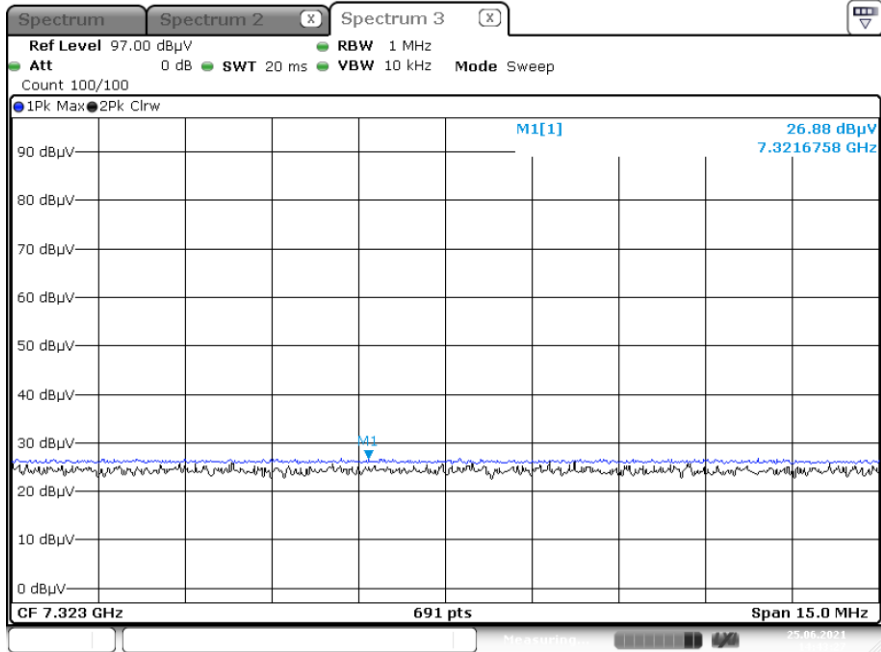
**RSE**

Frequency [MHz]	Reading [dBuV]	A.F + C.L - A.G + D.F [dB]	Pol. [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
7323	39.09	12.49	H	51.58	73.98	22.40	PK
7323	26.88	12.49	H	39.37	53.98	14.61	AV

Radiated Spurious Emissions plot – Peak Reading



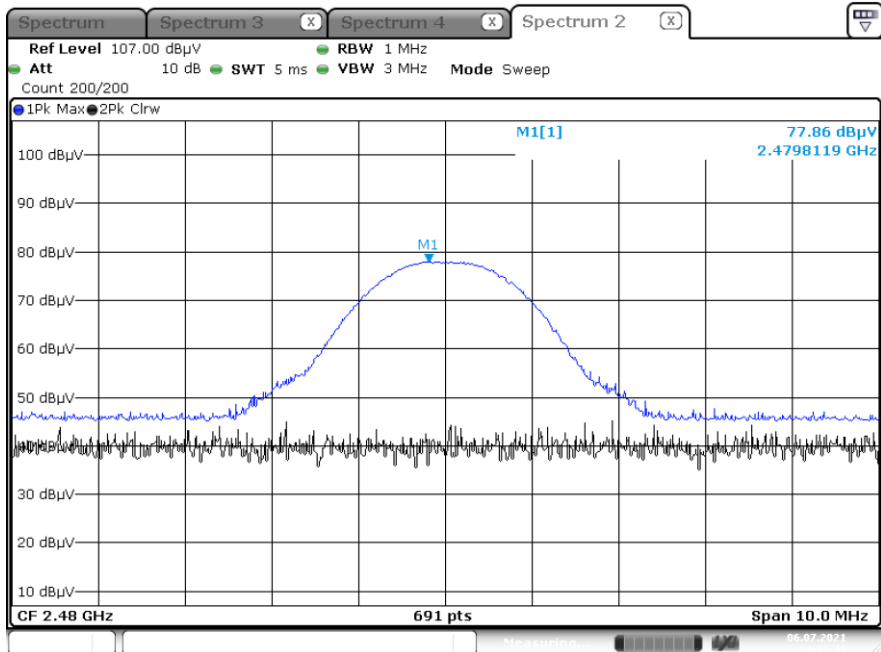
### Radiated Spurious Emissions plot – Average Reading



### ANT+ Field Strength (Period 128(0dBm)/ch.78)

#### Fundamental

Frequency [MHz]	Reading [dBuV/m]	A.F+C.L -A.G+D.F +ATT [dB]	Ant. Pol. [H/V]	D.C.C.F [dB]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2480	77.86	3.78	H	0.00	81.64	113.98	32.34	PK
2480	77.86	3.78	H	-31.88	49.76	93.98	44.22	AV

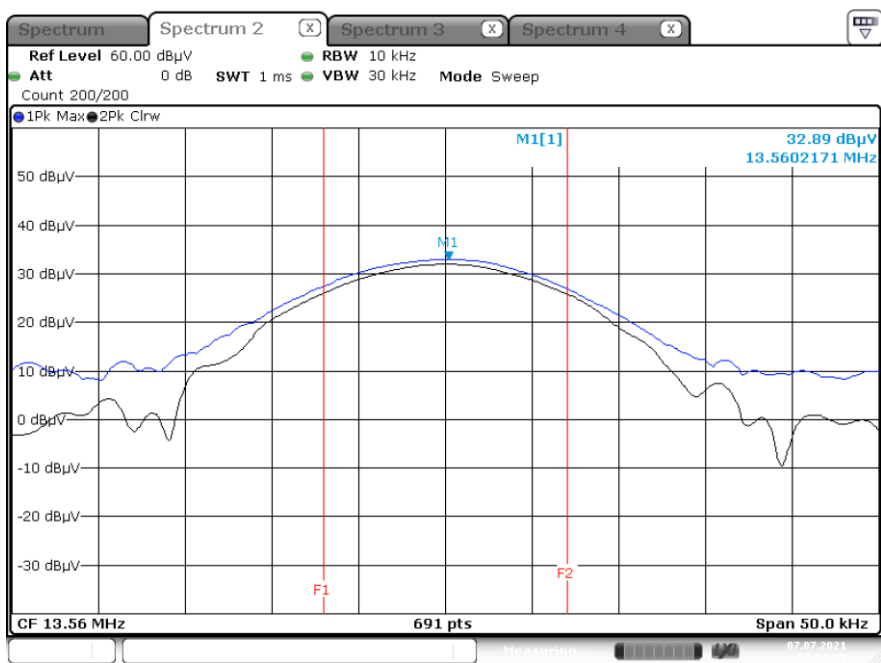


### NFC Field Strength (With Tag mode)

#### Fundamental

Frequency (MHz)	Read Level (dBuV/m)@3m	Ant.Factor +Cable Loss (dB/m)	Distance Correction (dB)	Total (dBuV/m)@30m	Limit (dBuV/m)@30m	Margin (dB)
13.5602	32.89	20.29	-40.00	13.18	84.00	70.82

Field Strength plot

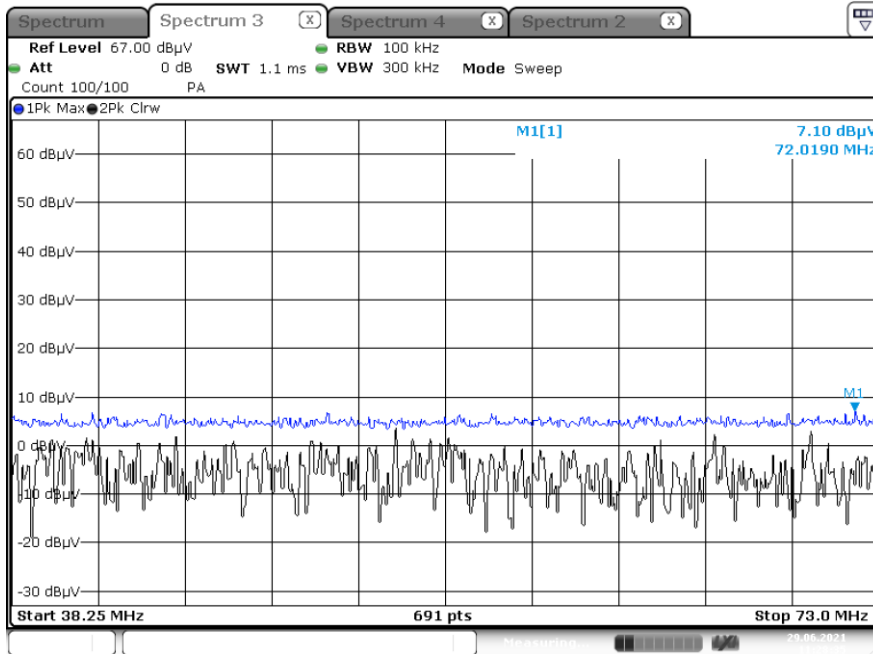


### NFC R.S.E (With Tag mode)

#### RSE

Frequency (MHz)	Read Level (dBUV/m)@3m	Ant.Factor (dB/m)	Cable Loss (dB)	Ant. Pol (H/V)	Total (dBUV/m)	Limit (dBUV/m)	Margin (dB)
72.0190	7.10	17.10	0.96	H	25.16	40.00	14.84

Radiated Spurious Emissions plot



#### 4. List of test equipment

[Licensed]

Manufacture	Model/ Equipment	Serial Number	Calibration Date	Calibration Interval	Calibration Due
T&M SYSTEM	FBSR-02B(WHK1.2/15G-10EF)/H.P.F	-	03/02/2021	Annual	03/02/2022
T&M SYSTEM	FBSR-02B(WHK3.3/18G-10EF)/H.P.F	-	03/02/2021	Annual	03/02/2022
Hewlett Packard	11667B / Power Splitter(DC~26.5 GHz)	11275	04/07/2021	Annual	04/07/2022
Hewlett Packard	E3632A/DC Power Supply	MY40004427	09/16/2020	Annual	09/16/2021
Schwarzbeck	UHAP/ Dipole Antenna	557	04/05/2021	Biennial	04/05/2023
Schwarzbeck	UHAP/ Dipole Antenna	558	04/05/2021	Biennial	04/05/2023
ESPEC	SU-642 / Chamber	93008124	03/15/2021	Annual	03/15/2022
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	10/13/2020	Biennial	10/13/2022
Schwarzbeck	BBHA 9170/ Horn Antenna(15~40GHz)	BBHA9170124	02/11/2020	Biennial	02/11/2022
Agilent	N9020A/Signal Analyzer(10Hz~26.5GHz)	MY50200093	11/17/2020	Annual	11/17/2021
Hewlett Packard	8493C/ATTENUATOR(20dB)	17280	06/01/2021	Annual	06/01/2022
REOHDE & SCHWARZ	FSV40/Spectrum Analyzer(10Hz~40GHz)	100931	10/14/2020	Annual	10/14/2021
Agilent	8960 (E5515C)/ Base Station	MY48360800	08/26/2020	Annual	08/26/2021
Schwarzbeck	FMZB1513/ Loop Antenna(9kHz~30MHz)	1513-333	03/19/2020	Biennial	03/19/2022
Schwarzbeck	VULB9160/ Bilog Antenna	3150	03/03/2021	Biennial	03/03/2023
Schwarzbeck	VULB9168/ Hybrid Antenna	760	02/22/2021	Biennial	02/22/2023
Anritsu Corp.	MT8821C/Wideband Radio Communication Tester	6262116770	07/22/2020	Annual	07/22/2021
Anritsu Corp.	MT8820C/Wideband Radio Communication Tester	6201026545	01/07/2021	Annual	01/07/2022
REOHDE & SCHWARZ	SMB100A/ SIGNAL GENERATOR (100kHz~40GHz)	177633	07/05/2021	Annual	07/05/2022
KEYSIGHT	N9030B / Signal Analyzer(5Hz~40.0GHz)	MY55480167	06/02/2021	Annual	06/02/2022
HCT CO., LTD.,	FCC LTE Mobile Conducted RF Automation Test Software	-	-	-	-

[Unlicensed]

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
TNM system	FBSM-01B / Amp & Filter Bank Switch Controller	N/A	N/A	N/A
Schwarzbeck	Loop Antenna	03/19/2020	Biennial	1513-333
Schwarzbeck	VULB 9168 / Hybrid Antenna	08/02/2019	Biennial	01039
Schwarzbeck	BBHA 9120D / Horn Antenna	08/01/2019	Biennial	912D-1151
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	04/12/2021	Biennial	BBHA9170124
Rohde & Schwarz	FSV(10 Hz ~ 40 GHz) / Spectrum Analyzer	05/14/2021	Annual	101055
Wainwright Instruments	WRCJV2400/2483.5-2370/2520-60/12SS / Band Reject Filter	01/06/2021	Annual	2
Wainwright Instruments	WRCJV12-4900-5100-5900-6100-50SS	06/24/2021	Annual	5
Wainwright Instruments	WRCJV12-4900-5100-5900-6100-50SS	06/24/2021	Annual	6
CERNEX	CBL18265035 / Power Amplifier	12/04/2020	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	03/23/2021	Annual	25956
TESCOM	TC-3000C / Bluetooth Tester	04/19/2021	Annual	3000C000175
TNM system	FBSM-05B / HPF(3~18GHz) + LNA1(1~18GHz)	01/20/2021	Annual	F6
TNM system	FBSM-05B / ATT(10dB) + LNA1(1~18GHz)	01/20/2021	Annual	None
TNM system	FBSM-05B / ATT(3dB) + LNA1(1~18GHz)	01/20/2021	Annual	None
TNM system	FBSM-05B / LNA1(1~18GHz)	01/20/2021	Annual	25540
TNM system	FBSM-05B / HPF(7~18GHz) + LNA2(6~18GHz)	01/20/2021	Annual	28550
TNM system	FBSM-05B / Thru(30MHz ~ 18GHz)	01/20/2021	Annual	None