



CERTIFICATION TEST REPORT

Report Number. : 4789497455-E9V2

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

Model : SM-N985F/DS, SM-N985F

FCC ID : A3LSMN985F

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

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

Date Of Issue:

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ACCREDITED

Testing Laboratory

TL-637

REPORT REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	07/07/20	Initial issue	Sungeun Lee
V2	07/08/20	Updated to address TCB's question	Sungeun Lee

TABLE OF CONTENTS

REPORT REVISION HISTORY	2
TABLE OF CONTENTS	3
1. ATTESTATION OF TEST RESULTS	5
1.1. INTRODUCTION OF TEST DATA REUSE	6
1.2. DIFFERENCE	6
1.3. SPOT CHECK VERIFICATION DATA.....	6
1.4. REFERENCE DETAIL.....	7
2. SUMMARY TABLE	8
3. TEST METHODOLOGY	8
4. FACILITIES AND ACCREDITATION	8
5. CALIBRATION AND UNCERTAINTY	9
5.1. MEASURING INSTRUMENT CALIBRATION.....	9
5.2. SAMPLE CALCULATION.....	9
5.3. MEASUREMENT UNCERTAINTY	9
5.4. DECISION RULE	9
6. EQUIPMENT UNDER TEST	10
6.1. EUT DESCRIPTION.....	10
6.2. DESCRIPTION OF AVAILABLE ANTENNAS	11
6.3. WORST-CASE CONFIGURATION AND MODE	11
6.4. DESCRIPTION OF TEST SETUP	12
7. MEASUREMENT METHOD.....	14
8. TEST AND MEASUREMENT EQUIPMENT	15
9. ANTENNA PORT TEST RESULTS	16
9.1. 10 dB BANDWIDTH	16
9.1.1. 10dB BANDWIDTH MEASUREMENT	17
9.1.2. 10dB BANDWIDTH PLOT	18
9.2. PEAK POWER AND MAXIMUM AVERAGE EMISSIONS.....	20
9.2.1. MAXIMUM PEAK AND AVERAGE POWER	21
9.3. CESSATION TIME.....	28
10. RADIATED TEST RESULTS	31
10.1. LIMITS AND PROCEDURE	31
10.2. TRANSMITTER ABOVE 1 GHz	34
10.2.1. SPURIOUS EMISSION 1 GHz – 6 GHz	34
10.2.2. SPURIOUS EMISSION 9 GHz – 18 GHz.....	42
10.2.3. SPURIOUS EMISSION 1164 MHz – 1240 MHz	50
10.2.4. SPURIOUS EMISSION 1559 MHz – 1610 MHz	58
10.3. WORST CASE BELOW 1 GHz.....	66

11. AC POWER LINE CONDUCTED EMISSIONS	68
11.1.1. AC Power Line.....	69

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SAMSUNG ELECTRONICS CO., LTD.

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

MODEL: SM-N985F/DS, SM-N985F

SERIAL NUMBER: R3CN40CD4CE (RADIATED, Original)
R38N406WLZB (Spot-Check);

DATE TESTED: JUN 08, 2020 – JUL 02, 2020 (Original);
JUL 07, 2020 (Spot-Check);

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart F	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
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1.1. INTRODUCTION OF TEST DATA REUSE

This report referenced from the FCC ID: A3LSMN986B UWB (FCC CFR 47 Part 15F).
And the applicant takes full responsibility that the test data as referenced in this report represent compliance for this FCC ID.

1.2. DIFFERENCE

The FCC ID: A3LSMN985F shares the same enclosure and circuit board as FCC ID: A3LSMN986B. The UWB antennas and surrounding circuitry and layout are identical between these two units.

After confirming through preliminary radiated emissions that the performance of the FCC ID: A3LSMN986B remains representative of FCC ID: A3LSMN985F. The test data of FCC ID: A3LSMN986B being submitted for this application to cover UWB features.

1.3. SPOT CHECK VERIFICATION DATA (Worst case of the radiated band-edge and radiated spurious emissions)

Band	Test Item	Mode	Worst Case	Test Limit	Original model	Spot-check model	Deviation	Remark
					SM-N986B/DS Results	SM-N985F/DS Results		
					FCC ID : A3LSMN986B	FCC ID : A3LSMN985F		
UWB	Peak EIRP	SP0	Ant2_LDS Ch9 BPRF 4	0dBm/50MHz	-1.55 dBm	-1.52 dBm	0.03 dB	
		SP1	Ant2_LDS Ch5 BPRF 4		-2.26 dBm	-4.07 dBm	-1.81 dB	
		SP3	Ant1_Patch Ch9 BPRF 127		-10.95 dBm	-10.77 dBm	0.18 dB	
	AV EIRP	SP0	Ant2_LDS Ch9 BPRF 127	-41.3dBm/MHz	-42.81 dBm	-42.81 dBm	0.00 dB	
		SP1	Ant1_Patch Ch9 HPRF 127		-43.17 dBm	-42.87 dBm	0.30 dB	
		SP3	Ant2_LDS Ch9 HPRF 127		-43.54 dBm	-43.80 dBm	-0.26 dB	
	1 - 6 GHz RSE	SP0	Ant2_LDS CH9 BPRF 4	15.159 (c)	-10.26 dBm	-10.31 dBm	-0.05 dB	Noise floor
	9 - 18 GHz RSE	SP0	Ant2_LDS CH9 BPRF 4		-5.09 dBm	-5.10 dBm	-0.01 dB	Noise floor
	1164-1240 MHz RSE	SP0	Ant1_Patch CH5 BPRF 4	-85.3dBm	-5.94 dBm	-6.45 dBm	-0.51 dB	Noise floor
	1559-1610 MHz RSE	SP0	Ant1_Patch CH9 BPRF 4		-5.52 dBm	-5.46 dBm	0.06 dB	Noise floor

Comparison of two models, upper deviation is within 3 dB range and all test results are under FCC Technical Limits.

1.4. REFERENCE DETAIL

Reference application that contains the reused reference data in the individual test reports:

Equipment Class	Reference FCC ID (Parent)	Application Type	Reference Test report number	Exhibit Type	Variant Test Report Number	Data Re-used
PCE	A3LSMN986B	Original Grant	4789468331-E2	Test Report	4789497455-E2	All
DTS	A3LSMN986B	Original Grant	4789468331-E3 (802.11b/g/n/ax)	Test Report	4789497455-E3 (802.11b/g/n/ax)	All
			4789468331-E4 Bluetooth LE	Test Report	4789497455-E4 Bluetooth LE	All
DSS	A3LSMN986B	Original Grant	4789468331-E5 (Bluetooth)	Test Report	4789497455-E5 (Bluetooth)	All
NII	A3LSMN986B	Original Grant	4789468331-E6 (802.11a/n/ac/ax)	Test Report	4789497455-E6 (802.11a/n/ac/ax)	All
DXX	A3LSMN986B	Original Grant	4789468331-E7 (NFC)	Test Report	4789497455-E7 (NFC)	All
DCD	A3LSMN986B	Original Grant	4789468331-E8 (WPT)	Test Report	4789497455-E8 (WPT)	All
UWB	A3LSMN986B	Original Grant	4789468331-E9	Test Report	4789497455-E9	All

For this application the data reuse is summarized below for each equipment class:

Equipment Class	Reference FCC ID (Parent)	Application Type	Test Item	Data Re-used
PCE	A3LSMN986B	Original Grant	WWAN	All except SAR (full test), HAC (full test)
DTS	A3LSMN986B	Original Grant	BLE	All
			WLAN	All except SAR (full test), HAC (full test)
			WLAN 802.11ax	All except HAC (full test)
DSS	A3LSMN986B	Original Grant	BT	All except SAR (full test)
NII	A3LSMN986B	Original Grant	WLAN	All except SAR (full test), HAC (full test)
			WLAN 802.11ax	All except HAC (full test)
DXX	A3LSMN986B	Original Grant	NFC	All
DCD	A3LSMN986B	Original Grant	WPT	All except RF exposure
UWB	A3LSMN986B	Original Grant	UWB	All

2. SUMMARY TABLE

FCC Part Section	Test Description	Test Limit	Test Condition	Test Result
15.503(a)	10dB Bandwidth	≥ 500 MHz	Radiated	Pass
15.517(e) 15.521(g)	Maximum Peak Power Spectral Density	< 0dBm EIRP in 50 MHz BW		Pass
15.517(c)	Radiated Emissions Above 960 MHz	See table in 15.517(c) for details		Pass
15.517(d)	Radiated Emissions un the 1164 - 1240 MHz and 1559 - 1610 MHz GPS Bands	See table in 15.517(d) for details		Pass
15.209	Radiated Emissions Below 960 MHz	Emissions in restricted bands must meet the radiated limits detailed in 15.209		Pass
15.207,15.251(j)	AC Line Conducted Emissions 150 kHz - 30 MHz	< FCC 15.207 limits	Power Line conducted	Pass
15.519(a)(1)	Shutdown Timing Requirements	< 10s	Radiated	Pass

3. TEST METHODOLOGY

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. ANSI C63.10-2013.
4. KDB 393764 D01 UWB FAQ v02
5. KDB 484596 D01 Referencing Test Data v01

4. 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	
☒	Chamber 1
☐	Chamber 2
☐	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>.

5. CALIBRATION AND UNCERTAINTY

5.1. 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.

5.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

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

$$P \text{ (dBm EIRP)} = E \text{ (dBuV/m)} - 95.2 \text{ dB}$$

5.3. 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	2.35 dB
Radiated Disturbance, 30 MHz to 1 GHz	3.49 dB
Radiated Disturbance, 1 GHz to 18 GHz	5.82 dB
Radiated Disturbance, 18 GHz to 40 GHz	5.49 dB

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

5.4. DECISION RULE

Decision rule for statement(s) of conformity is based on Procedure 1, Clause 4.4.2 in IEC Guide 115:2007.

6. EQUIPMENT UNDER TEST

6.1. EUT DESCRIPTION

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

This report covers the Samsung models SM-N986B/DS and SM-N986B. These models are identical in hardware except SM-N986B has single SIM tray. With some pre-scan, model SM-N986B/DS was set for final test.

The EUT is a UWB transceiver with 2 TX antennas (Ant1 & 2) installed in a smart phone host and operates on 6.5 GHz (Channel5) and 8 GHz (Channel9). Three signal configurations (CONFIG SP0, SP1, SP3) are available for each ANT/CH setting. CONFIG 2 is not supported.

Worst Case Preamble ID (BPRF: 9 – 24 / HPRF: 25 – 32):

Peak EIRP (BPRF: 9 / HPRF: 25), 10dB Bandwidth & Average EIRP (BPRF: 10 / HPRF: 25)

ANT	Channel	CONFIG	PRF Mode	Packet Length
Ant1	5	SP0	BPRF	4
			HPRF	127
		SP1	BPRF	4
			HPRF	127
		SP3	BPRF	4
			HPRF	127
	9	SP0	BPRF	4
			HPRF	127
		SP1	BPRF	4
			HPRF	127
		SP3	BPRF	4
			HPRF	127
Ant2	5	SP0	BPRF	4
			HPRF	127
		SP1	BPRF	4
			HPRF	127
		SP3	BPRF	4
			HPRF	127
	9	SP0	BPRF	4
			HPRF	127
		SP1	BPRF	4
			HPRF	127
		SP3	BPRF	4
			HPRF	127

6.2. 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.**

The radio utilizes an internal antennas, with Antenna 1's maximum gain of

Frequency Band [MHz]	ANT1 Gain [dBi]	ANT2 Gain [dBi]
CH5 6500	-4.21	-8.30
CH9 8000	-0.83	-8.81

"PATCH ANTENNA" and "LDS ANTENNA" as indicated in antenna specification are written as ANT 1 and ANT 2 in this report.

6.3. 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.

For ANT 1 (Patch), the fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z it was determined that Z orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Z orientation.
For ANT 2 (LDS), the fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z it was determined that Z orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Z orientation.
MIMO does not support.

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

6.4. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Charger	SAMSUNG	EP-TA800	R37N39301T8SE3	N/A
Data Cable	SAMSUNG	EP-DG980	N/A	N/A

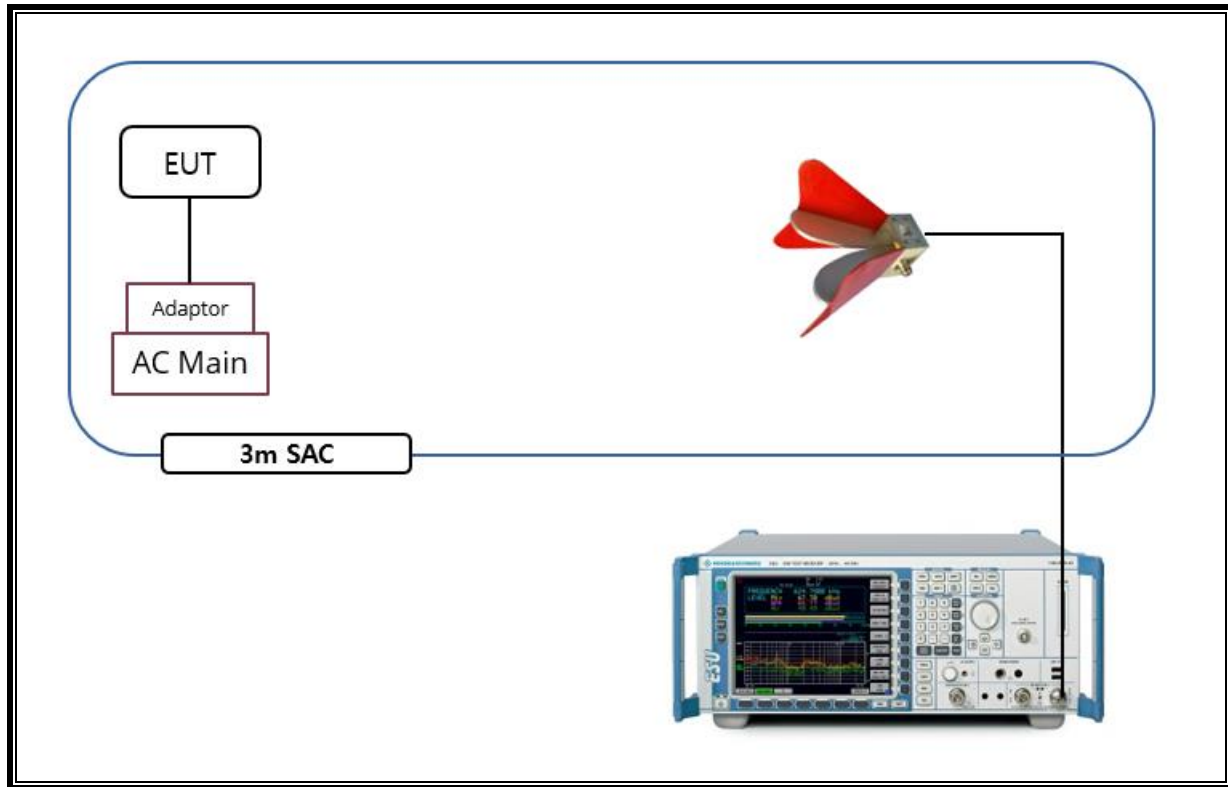
I/O CABLE

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	1.1m	N/A

TEST SETUP

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

SETUP DIAGRAM FOR TESTS (RADIATED TEST SETUP) 50cm for Spurious, 3m for EIRP.



7. MEASUREMENT METHOD

10 dB BW : ANSI C63.10-2013, Section 10.1 / FCC Part §15.503(a)

Peak power and maximum average emissions: ANSI C63.10-2013 Section 10.3, 15.519(c)(e)

Cessation time: 15.519(a)(1)

Radiated measurement procedure: ANSI C63.10-2013, Section 10.3

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

8. 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	Next Cal. Date
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	750	08-04-20
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	749	08-04-20
Antenna, Bilog, 30MHz-1GHz	SCHWARZBECK	VULB9163	845	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00168724	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00168717	08-04-20
Antenna, Horn, 18 GHz	ETS	3117	00205959	08-04-20
Antenna, Horn, 40 GHz	ETS	3116C	00166155	08-14-20
Antenna, Horn, 40 GHz	ETS	3116C	00168645	10-02-21
Preamplifier	ETS	3116C-PA	00168841	08-08-20
Preamplifier, 1000 MHz	Sonoma	310N	341282	08-05-20
Preamplifier, 1000 MHz	Sonoma	310N	351741	08-05-20
Preamplifier, 1000 MHz	Sonoma	310N	370599	08-05-20
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1876511	08-06-20
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	1896138	08-06-20
Preamplifier, 18 GHz	Miteq	AFS42-00101800-25-S-42	2029169	08-06-20
Spectrum Analyzer, 44 GHz	Agilent / HP	N9030A	MY54170614	08-06-20
Attenuator	PASTERNAK	PE7087-10	A001	08-08-20
Attenuator	PASTERNAK	PE7087-10	A008	08-08-20
Attenuator	PASTERNAK	PE7004-10	2	08-06-20
Attenuator	PASTERNAK	PE7087-10	A009	08-08-20
EMI Test Receive, 40 GHz	R&S	ESU40	100457	08-06-20
Low Pass Filter CH5	Wainwright Instruments	WLKX12-5400-5940-18000-60ST	1	05-14-21
Low Pass Filter CH9	Wainwright Instruments	WLKX10-6400-7424-18000-60ST	1	05-14-21
High Pass Filter CH5	Wainwright Instruments	WHW2-7100-10000-18000-40CD	2	05-14-21
High Pass Filter CH9	Wainwright Instruments	WHW2-8165-11500-21000-40CD	11	05-14-21
LISN	R&S	ENV-216	101837	08-09-20
Antenna, Loop, 9kHz-30MHz	R&S	HFH2-Z2	100418	10-02-21
UL Software				
Description	Manufacturer	Model	Version	
Radiated software	UL	UL EMC	Ver 9.5	
AC Line Conducted software	UL	UL EMC	Ver 9.5	

9. ANTENNA PORT TEST RESULTS

9.1. 10 dB BANDWIDTH

LIMITS

FCC §15.503

(a) UWB bandwidth. For the purpose of this subpart, the UWB bandwidth is the frequency band bounded by the points that are 10 dB below the highest radiated emission, as based on the complete transmission system including the antenna. The upper boundary is designated f_H and the lower boundary is designated f_L . The frequency at which the highest radiated emission occurs is designated f_M .

(b) Center frequency. The center frequency, f_c , equals $(f_H + f_L)/2$.

(c) Fractional bandwidth. The fractional bandwidth equals $2(f_H - f_L) / (f_H + f_L)$.

(d) Ultra-wideband (UWB) transmitter. An intentional radiator that, at any point in time, has a fractional bandwidth equal to or greater than 0.20 or has a UWB bandwidth equal to or greater than 500 MHz, regardless of the fractional bandwidth.

FCC §15.519

(b) The UWB bandwidth of a device operating under the provisions of this section must be contained between 3100 MHz and 10,600 MHz.

Test Procedure

ANSI C63.10-2013 – Section 10.1

Test settings

1. RBW = 1MHz
2. VBW = 3MHz
3. Span was set wide enough to capture the 10dB points of the signal
4. Sweep = auto couple
5. Detector = Peak
6. Trace mode = Max hold
7. The trace was allowed to stabilize

RESULTS

Plots: worst cases were reported.

9.1.1. 10dB BANDWIDTH MEASUREMENT

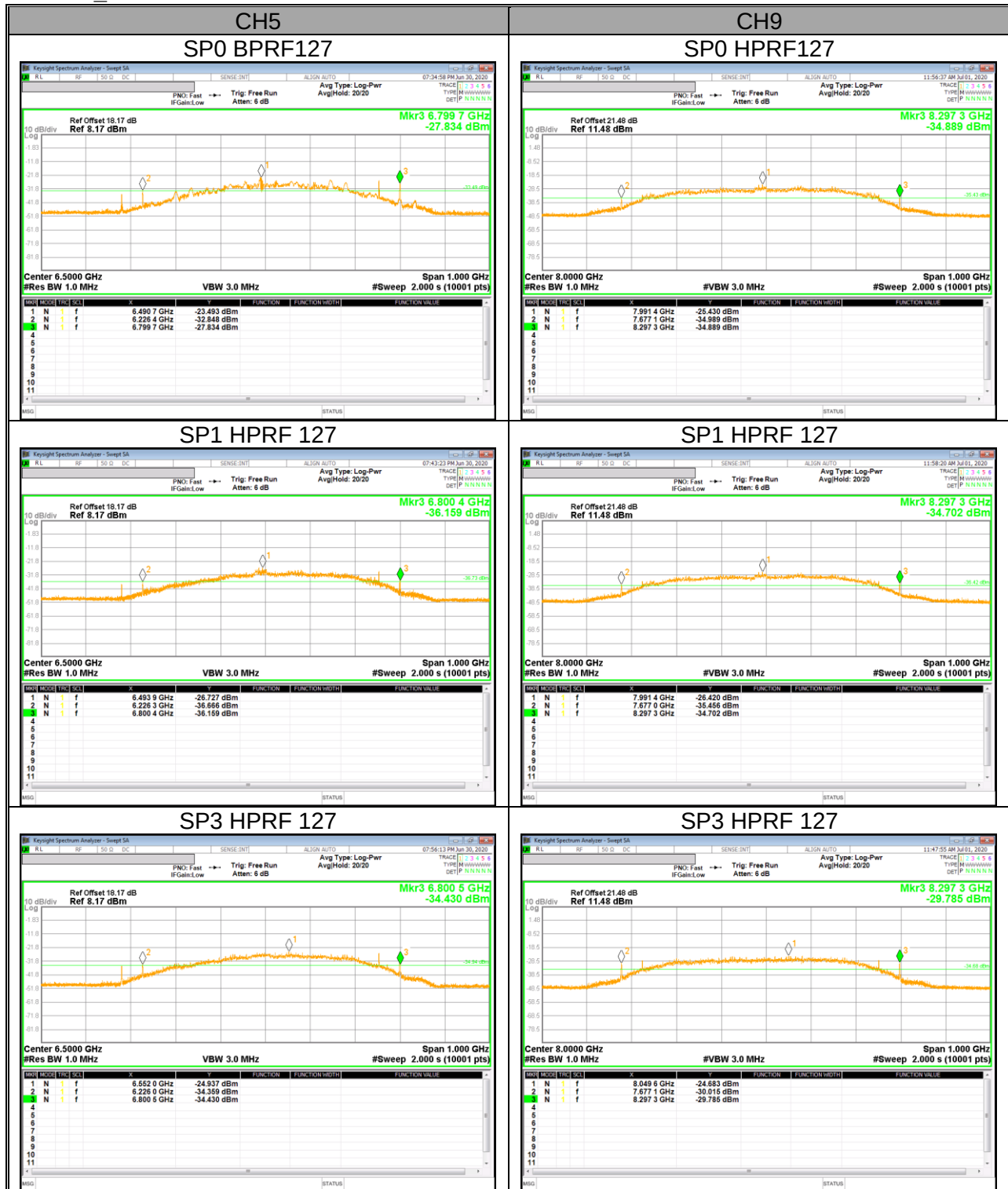
ANT	Channel	CONFIG	PRF Mode	f _L (MHz)	f _H (MHz)	f _C (MHz)	BW (MHz)
Ant1 Patch	CH5	SP0	BPRF4	6179.5	6799.7	6489.6	620.2
			BPRF127	6226.4	6799.7	6513.05	573.3
			HPRF127	6226	6800.4	6513.2	574.4
		SP1	BPRF4	6179.5	6800.5	6490	621
			BPRF127	6226	6800.3	6513.15	574.3
			HPRF127	6226.3	6800.4	6513.35	574.1
		SP3	BPRF4	6179.5	6800.6	6490.05	621.1
			BPRF127	6179.4	6800.6	6490	621.2
			HPRF127	6226	6800.5	6513.25	574.5
	CH9	SP0	BPRF4	7676.6	8297.8	7987.2	621.2
			BPRF127	7676.6	8297.8	7987.2	621.2
			HPRF127	7677.1	8297.3	7987.2	620.2
		SP1	BPRF4	7676.9	8297.6	7987.25	620.7
			BPRF127	7677.1	8297.5	7987.3	620.4
			HPRF127	7677	8297.3	7987.15	620.3
		SP3	BPRF4	7676.8	8297.6	7987.2	620.8
			BPRF127	7676.9	8297.5	7987.2	620.6
			HPRF127	7677.1	8297.3	7987.2	620.2
Ant2 LDS	CH5	SP0	BPRF4	5989.55	6748.7	6369.125	759.15
			BPRF127	5988.35	6747.95	6368.15	759.6
			HPRF127	6149.9	6784.7	6467.3	634.8
		SP1	BPRF4	5987.9	6748.1	6368	760.2
			BPRF127	5989.25	6748.7	6368.975	759.45
			HPRF127	6202.25	6786.95	6494.6	584.7
		SP3	BPRF4	6176	6789.5	6482.75	613.5
			BPRF127	6175.85	6791.75	6483.8	615.9
			HPRF127	6177.5	6788	6482.75	610.5
	CH9	SP0	BPRF4	7727.6	8248	7987.8	520.4
			BPRF127	7728.1	8249.3	7988.7	521.2
			HPRF127	7711	8279.9	7995.45	568.9
		SP1	BPRF4	7726	8248.1	7987.05	522.1
			BPRF127	7727.1	8249.5	7988.3	522.4
			HPRF127	7703.6	8284.8	7994.2	581.2
		SP3	BPRF4	7695.2	8287.7	7991.45	592.5
			BPRF127	7693	8291.9	7992.45	598.9
			HPRF127	7691.2	8285.4	7988.3	594.2

9.1.2. 10dB BANDWIDTH PLOT

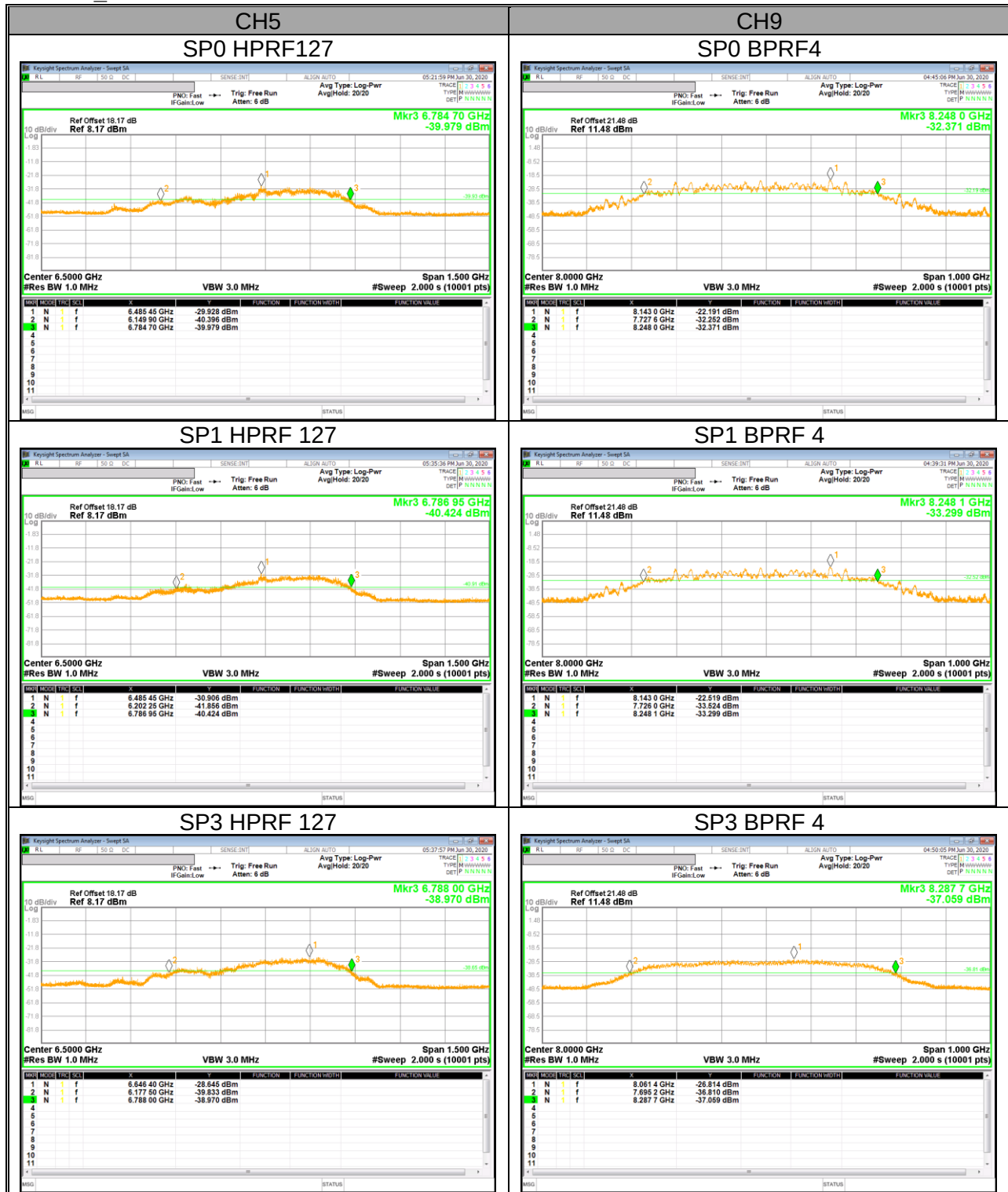
RESULTS

worst cases were reported.

- ANT1_Patch



- ANT2 LDS



9.2. PEAK POWER AND MAXIMUM AVERAGE EMISSIONS

LIMITS

FCC §15.519

(c) The radiated emissions at or below 960 MHz from a device operating under the provisions of this section shall not exceed the emission levels in §15.209. The radiated emissions above 960 MHz from a device operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz:

Frequency in MHz	EIRP in dBm
3100-10600	-41.3

(e) There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs, fm. That limit is 0 dBm EIRP.

TEST PROCEDURE

ANSI C63.10 Clause 10.3.

Peak EIRP power is measured using RBW of 50 MHz.

The radiated emissions of 6 – 9 GHz frequency band are performed at 3 meter test distance.

Test Notes

The EIRP in dBm was calculated from the measurement Field Strength in dBuV/m by applying a -95.2dB correction factor to the Field Strength level.

RESULTS

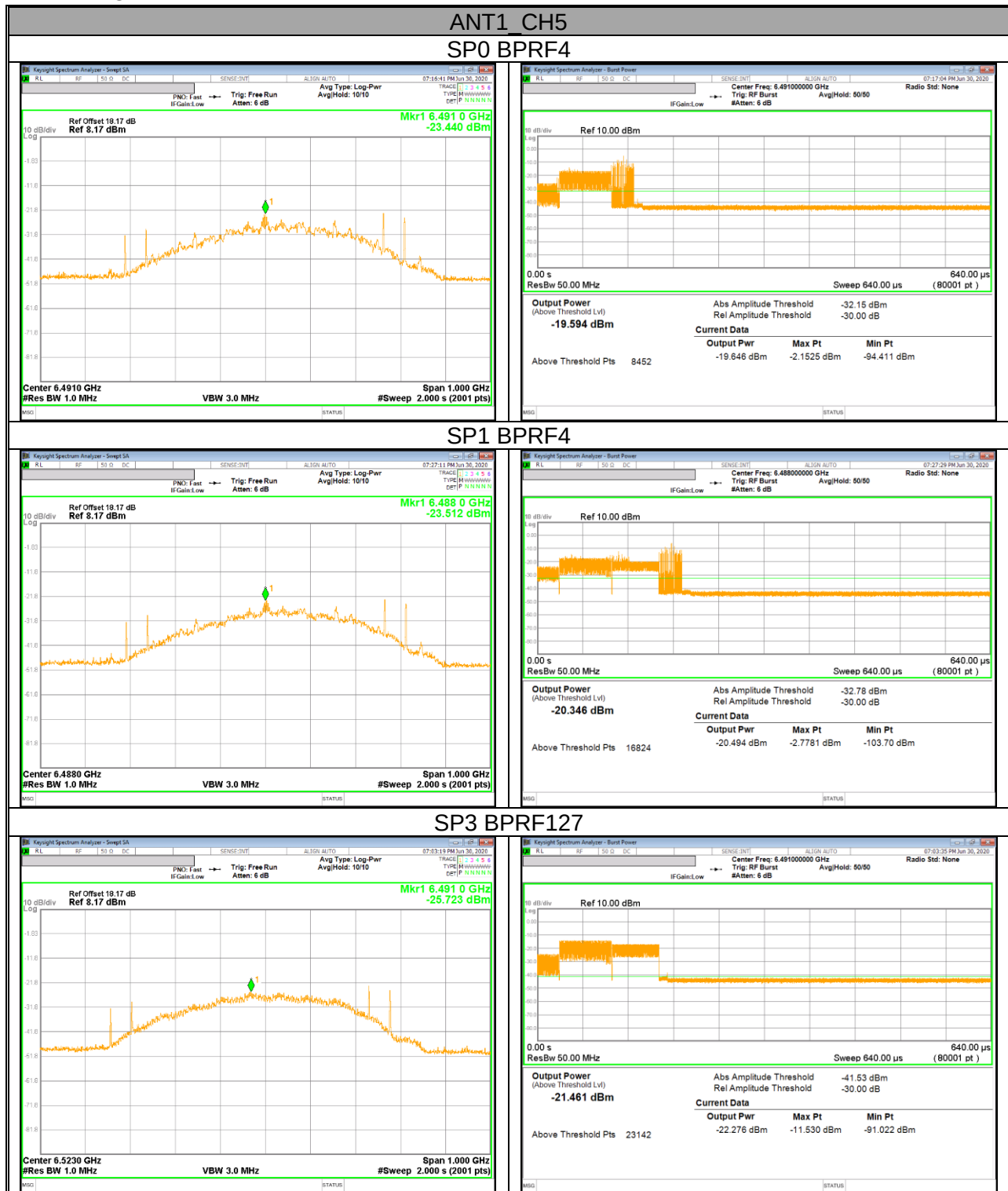
Plots: worst cases were reported.

9.2.1. MAXIMUM PEAK AND AVERAGE POWER

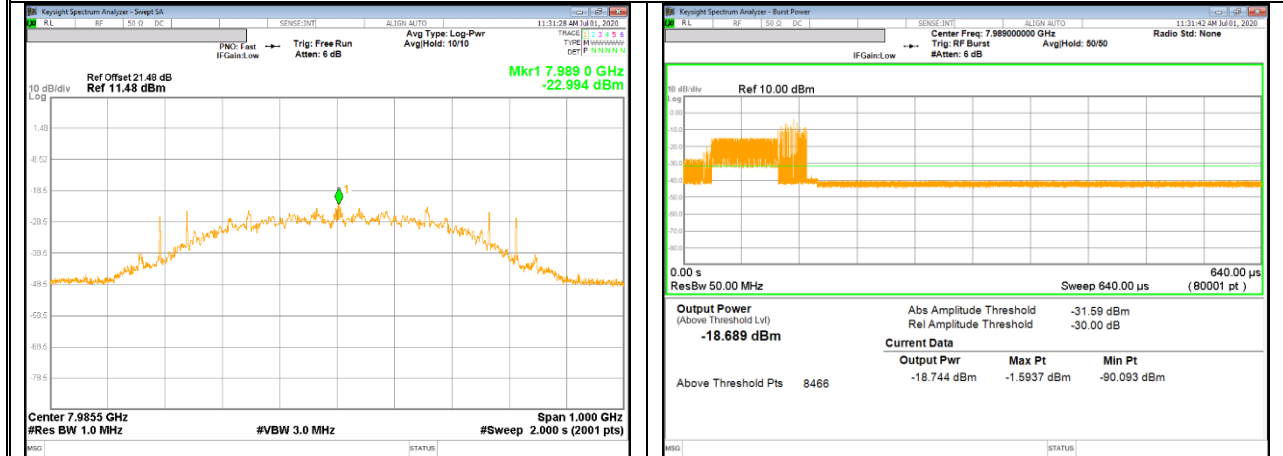
ANT	Channel	CONFIG	PRF Mode	Peak Power (dBm/50MHz)	Peak Limit (dBm/50MHz)	Margin	AV Power (dBm/MHz)	AV Limit (dBm/MHz)	Margin
Ant1 Patch	CH5	SP0	BPRF4	-2.15	0	2.15	-44.6	-41.3	3.3
			BPRF127	-3.67	0	3.67	-42.86	-41.3	1.56
			HPRF127	-10.83	0	10.83	-44	-41.3	2.7
		SP1	BPRF4	-2.78	0	2.78	-44.5	-41.3	3.2
			BPRF127	-4.62	0	4.62	-43.33	-41.3	2.03
			HPRF127	-11.73	0	11.73	-43.86	-41.3	2.56
		SP3	BPRF4	-11.56	0	11.56	-44.05	-41.3	2.75
			BPRF127	-11.53	0	11.53	-44.03	-41.3	2.73
			HPRF127	-13.32	0	13.32	-43.96	-41.3	2.66
	CH9	SP0	BPRF4	-1.59	0	1.59	-44.63	-41.3	3.33
			BPRF127	-3.9	0	3.9	-42.89	-41.3	1.59
			HPRF127	-10.79	0	10.79	-43.1	-41.3	1.8
		SP1	BPRF4	-2.48	0	2.48	-43.76	-41.3	2.46
			BPRF127	-4.76	0	4.76	-43.34	-41.3	2.04
			HPRF127	-11.74	0	11.74	-43.17	-41.3	1.87
		SP3	BPRF4	-11	0	11	-43.96	-41.3	2.66
			BPRF127	-10.95	0	10.95	-43.93	-41.3	2.63
			HPRF127	-13.07	0	13.07	-43.59	-41.3	2.29
Ant2 LDS	CH5	SP0	BPRF4	-2.14	0	2.14	-45.6	-41.3	4.3
			BPRF127	-3.93	0	3.93	-42.85	-41.3	1.55
			HPRF127	-11.4	0	11.4	-43.84	-41.3	2.54
		SP1	BPRF4	-2.26	0	2.26	-44.32	-41.3	3.02
			BPRF127	-5	0	5	-43.44	-41.3	2.14
			HPRF127	-12.76	0	12.76	-43.77	-41.3	2.47
		SP3	BPRF4	-12.38	0	12.38	-43.99	-41.3	2.69
			BPRF127	-12.21	0	12.21	-43.99	-41.3	2.69
			HPRF127	-13.36	0	13.36	-44.01	-41.3	2.71
	CH9	SP0	BPRF4	-1.55	0	1.55	-44.79	-41.3	3.49
			BPRF127	-4.2	0	4.2	-42.81	-41.3	1.51
			HPRF127	-11.53	0	11.53	-43.29	-41.3	1.99
		SP1	BPRF4	-2.58	0	2.58	-43.75	-41.3	2.45
			BPRF127	-5.41	0	5.41	-43.24	-41.3	1.94
			HPRF127	-12.64	0	12.64	-43.28	-41.3	1.98
		SP3	BPRF4	-11.5	0	11.5	-43.7	-41.3	2.4
			BPRF127	-11.68	0	11.68	-43.78	-41.3	2.48
			HPRF127	-15.05	0	15.05	-43.54	-41.3	2.24

MAXIMUM PEAK AND AVERAGE POWER PLOTS

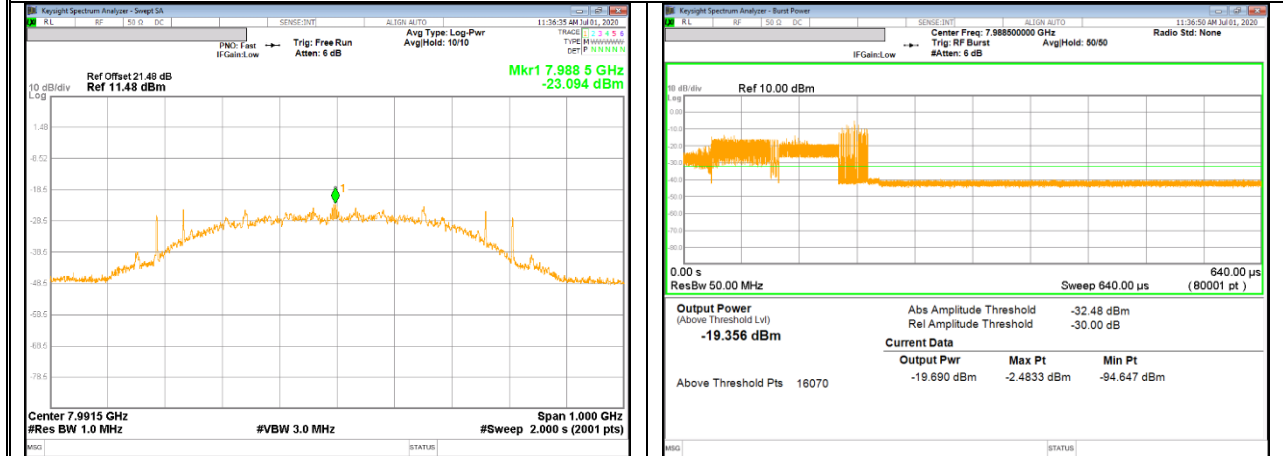
- PEAK POWER



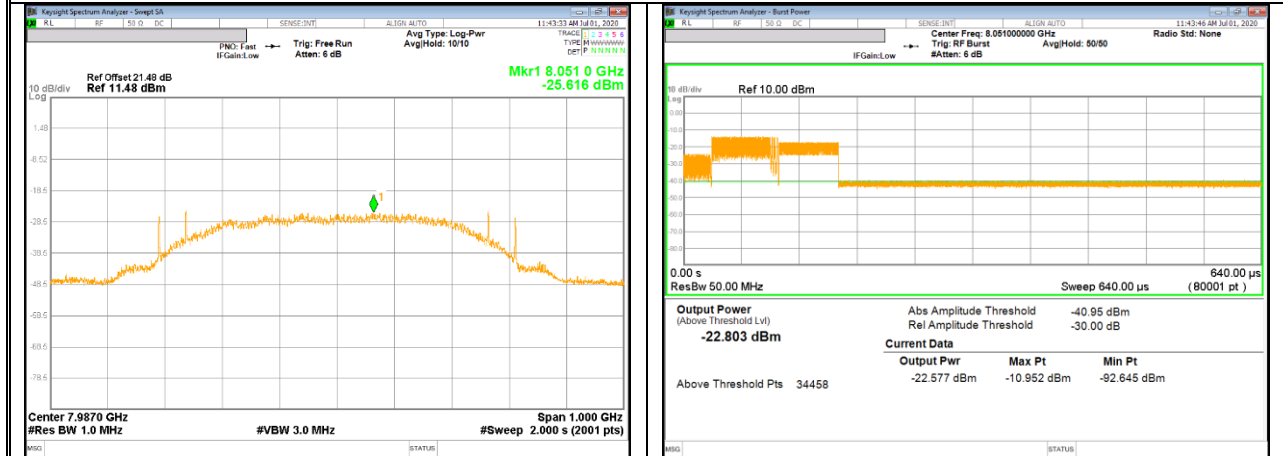
ANT1 CH9 SP0 BPRF4



SP1 BPRF4



SP3 BPRF127



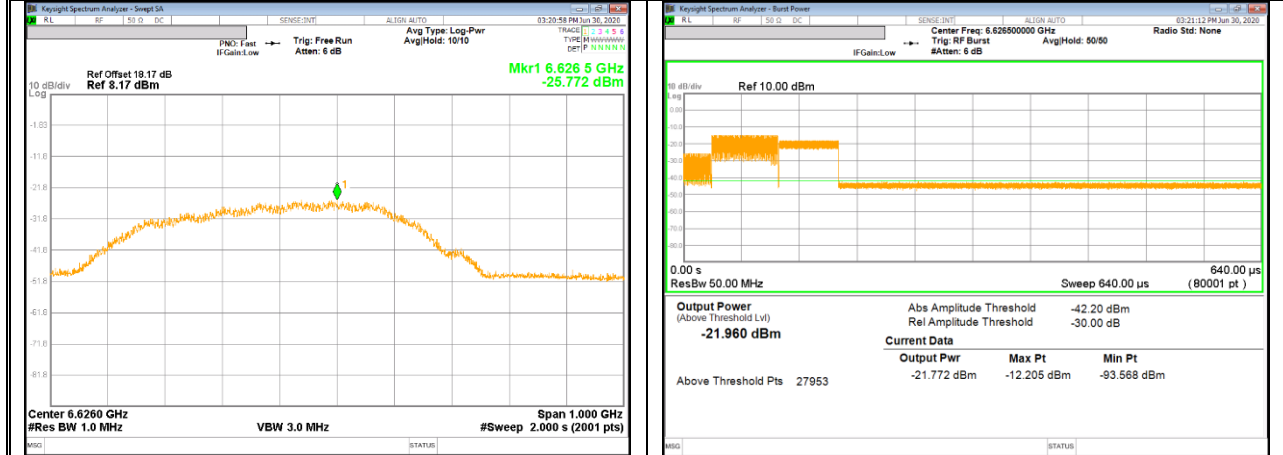
ANT2 CH5 SP0 BPRF4



SP1 BPRF4



SP3 BPRF127



The figure consists of two side-by-side screenshots of the Keysight Spectrum Analyzer software interface.

Left Screenshot:

- Header:** Keysight Spectrum Analyzer - Single SW. Date: 6/25/2020, Time: 6:40 PM.
- Controls:** PNO: Fast, Trig: Free Run, Atten: 6 dB, Avg Type: Log-Pwr, AvgHold: 10/10.
- Display:** A spectrum plot with a noisy orange trace. A green marker 'Mkr1' is placed at 7.986 GHz with a value of -22.548 dBm. The y-axis is labeled '10 dBdBr' and ranges from -45.0 to 10.0.
- Parameters:** Center Freq: 7.9870 GHz, Res BW: 1.0 MHz, Span: 1.000 GHz, Sweep: 2.000 s (2001 pts).

Right Screenshot:

- Header:** Keysight Spectrum Analyzer - Burst Power. Date: 6/25/2020, Time: 6:57:21 PM.
- Controls:** SENSE: INT, ALIAS: AUTO, Center Freq: 7.986000000 GHz, Trig: RF Burst, Avg/Hold: 50/80, Radio Sts: None, IF Gain: Low, Atten: 6 dB.
- Display:** A spectrum plot with a cleaner orange trace. A green reference line is at 20.00 dBm. The y-axis is labeled '10 dBdBr' and ranges from -75.0 to 10.0.
- Parameters:** Center Freq: 7.986000000 GHz, Res BW: 50.00 MHz, Sweep: 640.00 μs (80001 pt).
- Measurements:**
 - Output Power (Above Threshold Lvl):** -18.587 dBm
 - Abs Amplitude Threshold:** -31.55 dBm
 - Rel Amplitude Threshold:** -30.00 dB
 - Current Data:**
 - Output Pwr:** -17.594 dBm
 - Max Pt:** -1.5508 dBm
 - Min Pt:** -94.043 dBm
 - Above Threshold Pts:** 3661

The figure consists of two side-by-side screenshots of the Keysight Spectrum Analyzer software interface.

Left Screenshot:

- Top Panel:** Shows various controls including "SENSE: INVT", "ALIGN: AUTO", "Avg Type: Log-Pwr", "Avg/Hold: 10/10", "PNO: Last", "Trig: Free Run", "Atten: 6 dB", and "IF Gain: Low".
- Plot Area:** Displays a spectrum plot with a peak at 7.9915 GHz. The peak is labeled "Mkr1 7.9915 0 GHz -23.904 dBm". The y-axis is labeled "10 dBdiv" and "L-0g". The x-axis is labeled "Center 7.9915 GHz" and "Span 1.000 GHz".
- Bottom Panel:** Shows "Res BW 1.0 MHz" and "VBW 3.0 MHz".

Right Screenshot:

- Top Panel:** Shows various controls including "SENSE: INVT", "ALIGN: AUTO", "Center Freq: 7.989000000 GHz", "Trig: RF Burst", "Avg/Hold: 50/50", and "Radio Std: None".
- Plot Area:** Displays a zoomed-in view of the peak. The y-axis is labeled "10 dBdiv" and "L-0g". The x-axis is labeled "Ref 10.00 dBm". The plot shows a peak at 7.9915 GHz with a measured power of -20.417 dBm.
- Bottom Panel:** Shows "Output Power" and "Current Data". The "Output Power" section displays "Abs Amplitude Threshold -32.58 dBm" and "Rel Amplitude Threshold -30.00 dB". The "Current Data" section displays "Output Pwr -20.469 dBm", "Max Pt -2.5776 dBm", and "Min Pt -90.462 dBm".

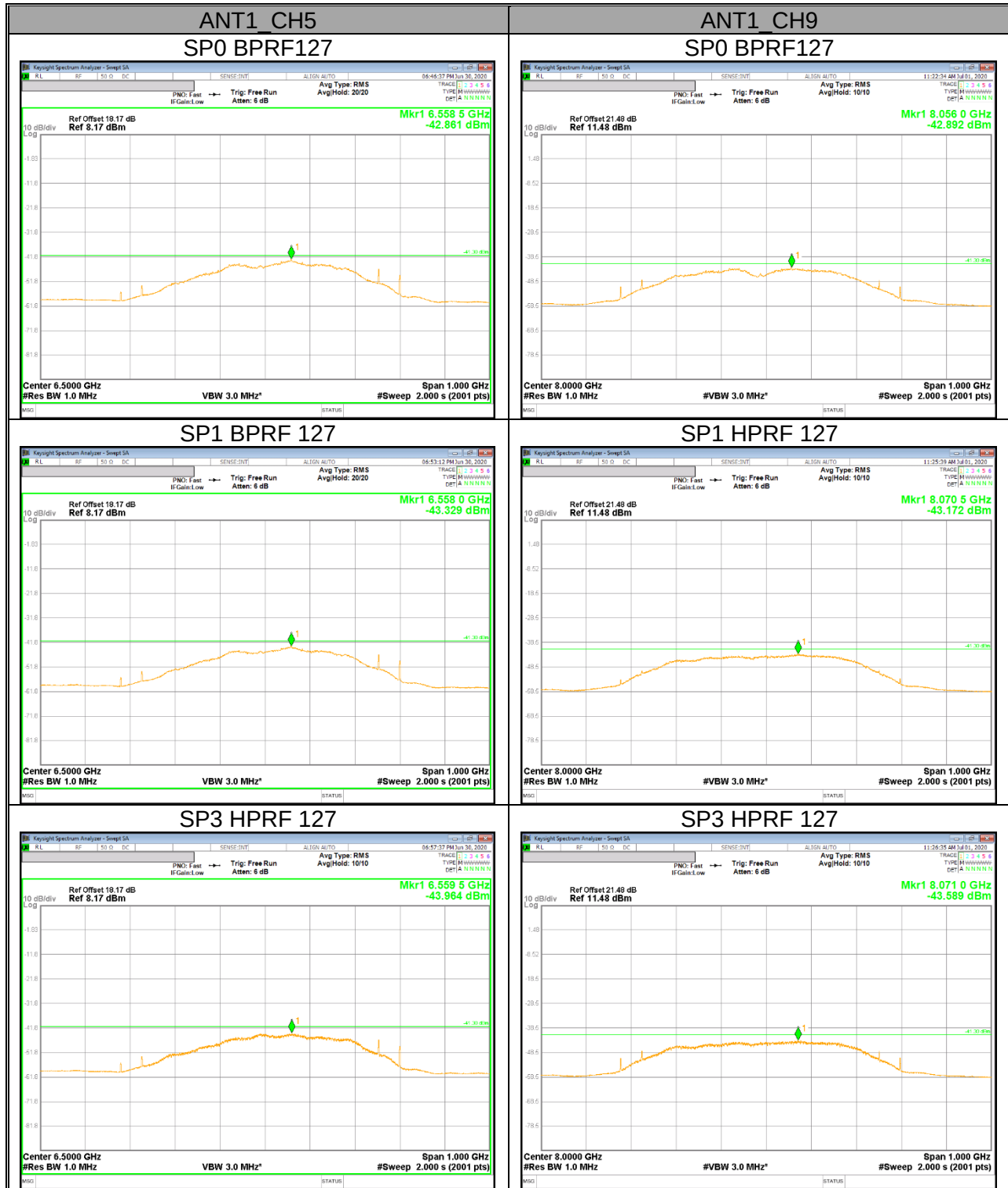
Left Screenshot: Wideband Spectrum Plot

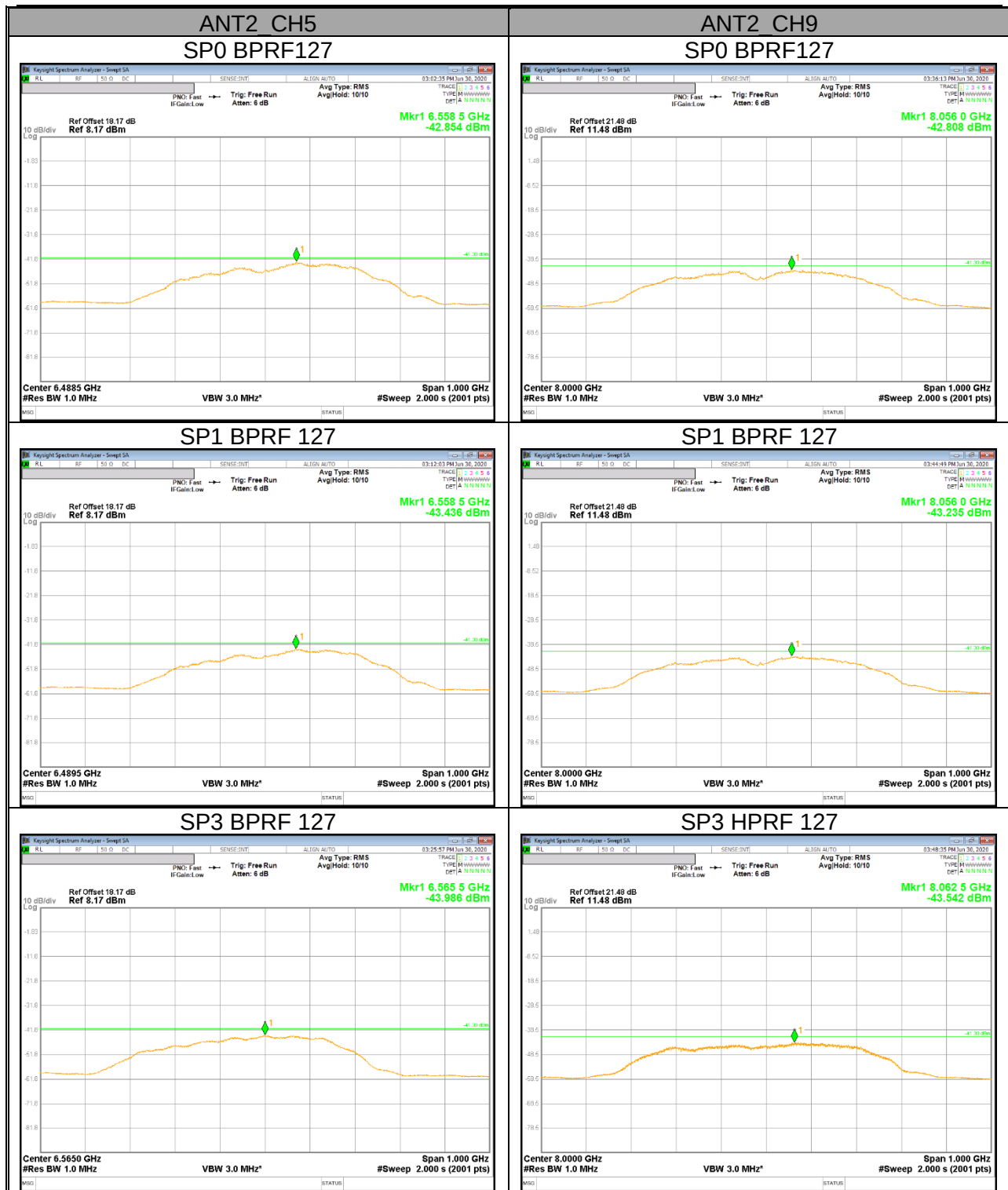
- Center Freq: 8.0615 GHz
- Span: 1.000 GHz
- Res BW: 1.0 MHz
- VBW: 3.0 MHz
- #Sweep: 2,000 s (2001 pts)
- Ref Offset: 21.49 dB
- Ref: 11.48 dBm
- Peak 1: 8.0615 GHz, -25.484 dBm
- Output Power: -23.021 dBm

Right Screenshot: Zoomed-in Peak View

- Center Freq: 8.06150000 GHz
- Span: 640.00 MHz
- Res BW: 50.00 MHz
- VBW: 3.0 MHz
- Ref: 10.00 dBm
- Output Power: -23.021 dBm
- Abs Amplitude Threshold: -11.50 dBm
- Rel Amplitude Threshold: -30.00 dB
- Above Threshold Pts: 37930

- AVERAGE POWER





9.3. CESSATION TIME

LIMITS

FCC §15.519(a)(1)

A UWB device operating under the provisions of this section shall transmit only when it is sending information to an associated receiver. The UWB intentional radiator shall cease transmission within 10 seconds unless it receives an acknowledgement from the associated receiver that its transmission is being received. An acknowledgment of reception must continue to be received by the UWB intentional radiator at least every 10 seconds or the UWB device must cease transmitting.

TEST PROCEDURES

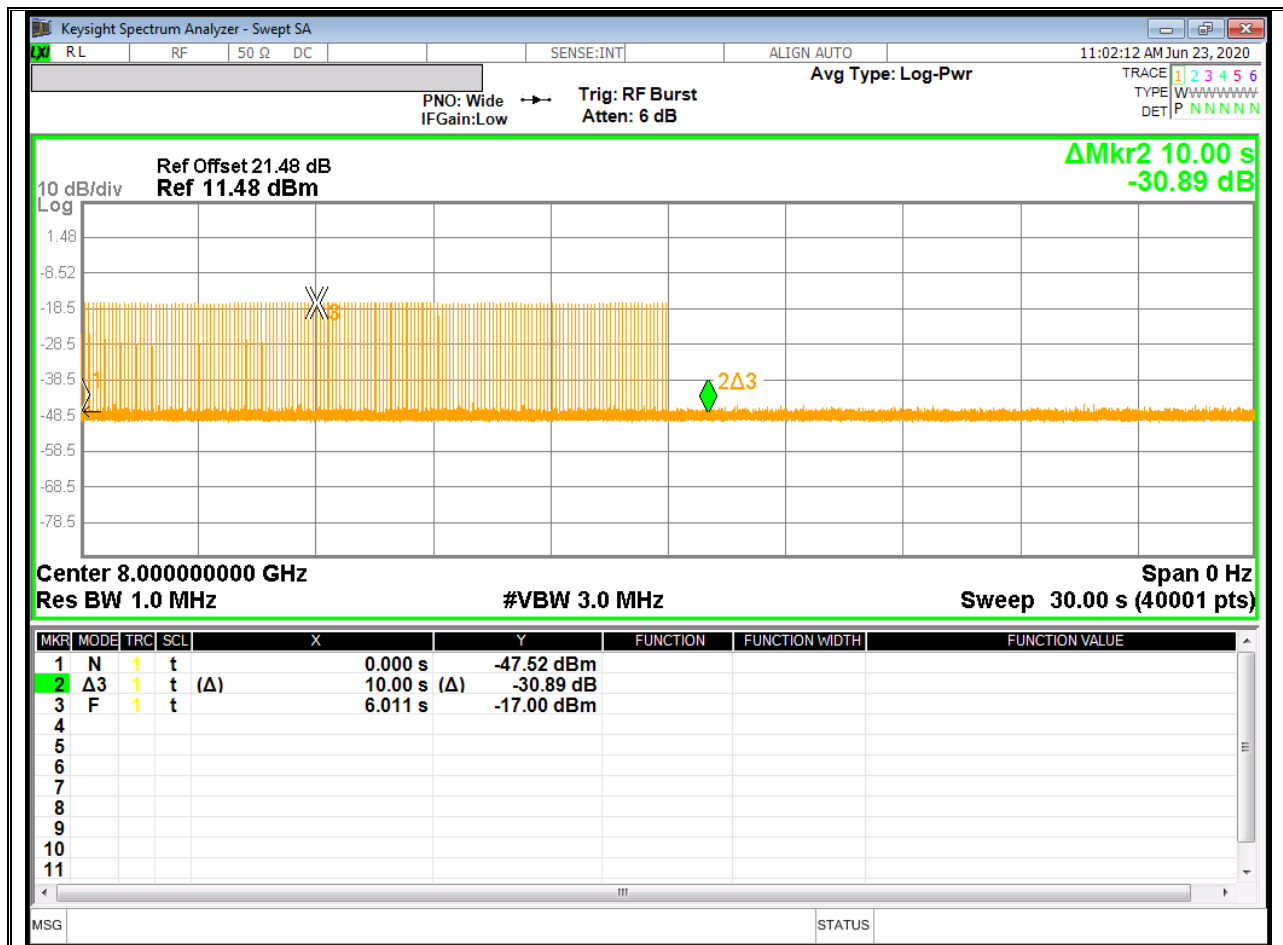
Transmissions are monitored for two cases:

1. The smart phone ends the UWB link.
2. The EUT ends the UWB link.

RESULTS

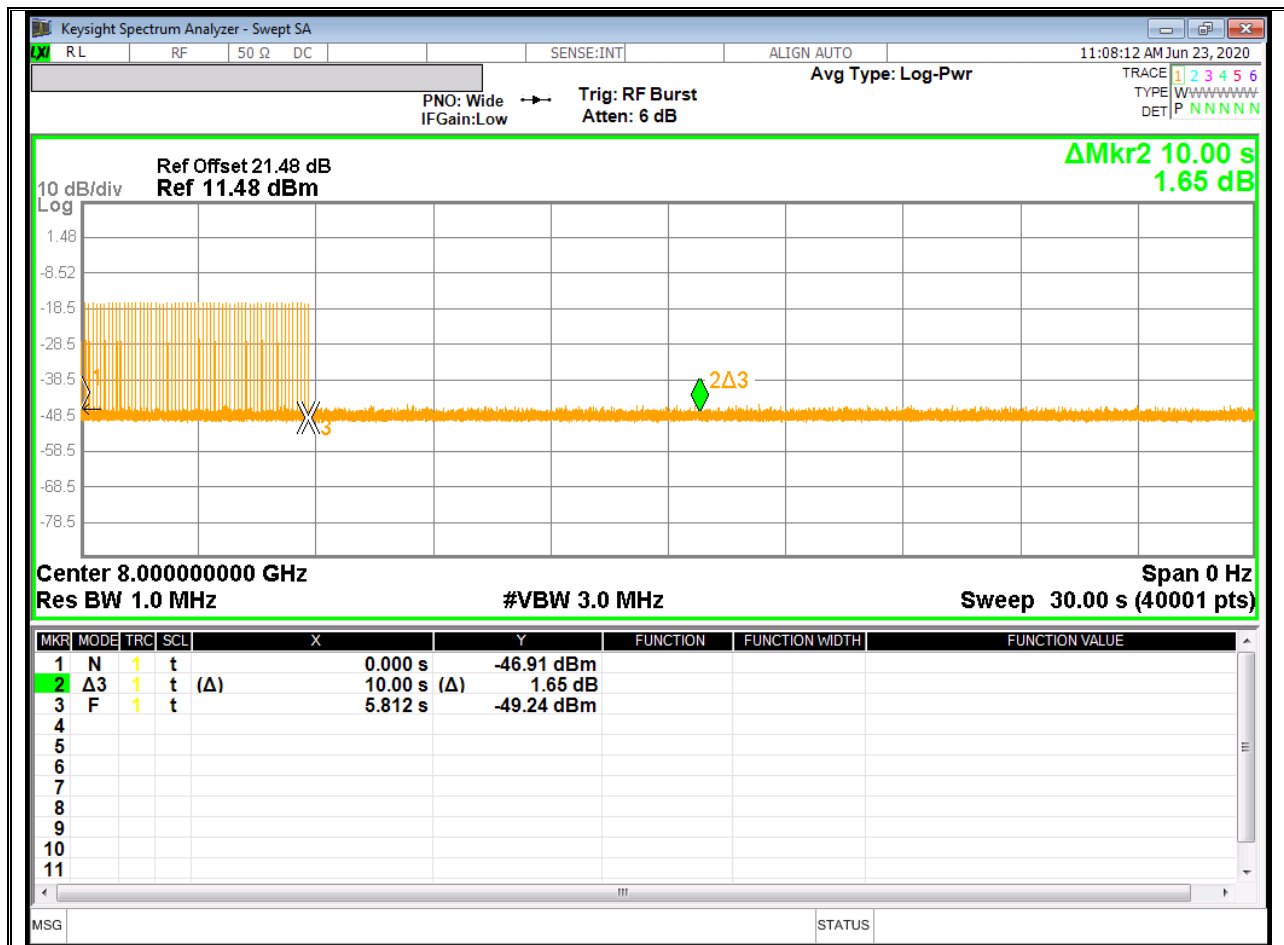
Please see the next page

Case 1: Smart Phone ends the UWB link



Marker 1: EUT and smart phone are linked.
Marker 3: Smart phone ends UWB link.
Marker 2Δ3: "10s" after EUT ends UWB link.

EUT detects "Smart Phone ends UWB link" and ceases transmitting within 10 seconds.

Case 2: EUT ends the UWB link

Marker 1: EUT and smart phone are linked.

Marker 3: EUT ends UWB link.

Marker 2Δ3: "10s" after EUT ends UWB link.

EUT ceases transmitting within 10 seconds.

10. RADIATED TEST RESULTS

10.1. LIMITS AND PROCEDURE

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.

▪ FCC Part 15.517 (c): The radiated emissions at or below 960 MHz from a device operating under the provisions of this section shall not exceed the emission levels in §15.209. The radiated emissions above 960 MHz from a device operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz:

Frequency range (MHz)	EIRP in dBm
960-1610	-75.3
1610-1990	-53.3
1990-3100	-51.3
3100-10600	-41.3
Above 10600	-51.3

▪ FCC Part 15.517 (d): In addition to the radiated emission limits specified in the table in paragraph (c) of this section, UWB transmitters operating under the provisions of this section shall not exceed the following average limits when measured using a resolution bandwidth of no less than 1 kHz:

Frequency range (MHz)	EIRP in dBm
1164-1240	-85.3
1559-1610	-85.3

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz and 150 cm for above 1GHz. The antenna to EUT distance is 0.5 or 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 (120kHz for emissions in the GPS), then the video bandwidth is set to 3 MHz (500kHz for emissions in the GPS)

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 9kHz to 30MHz; 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.

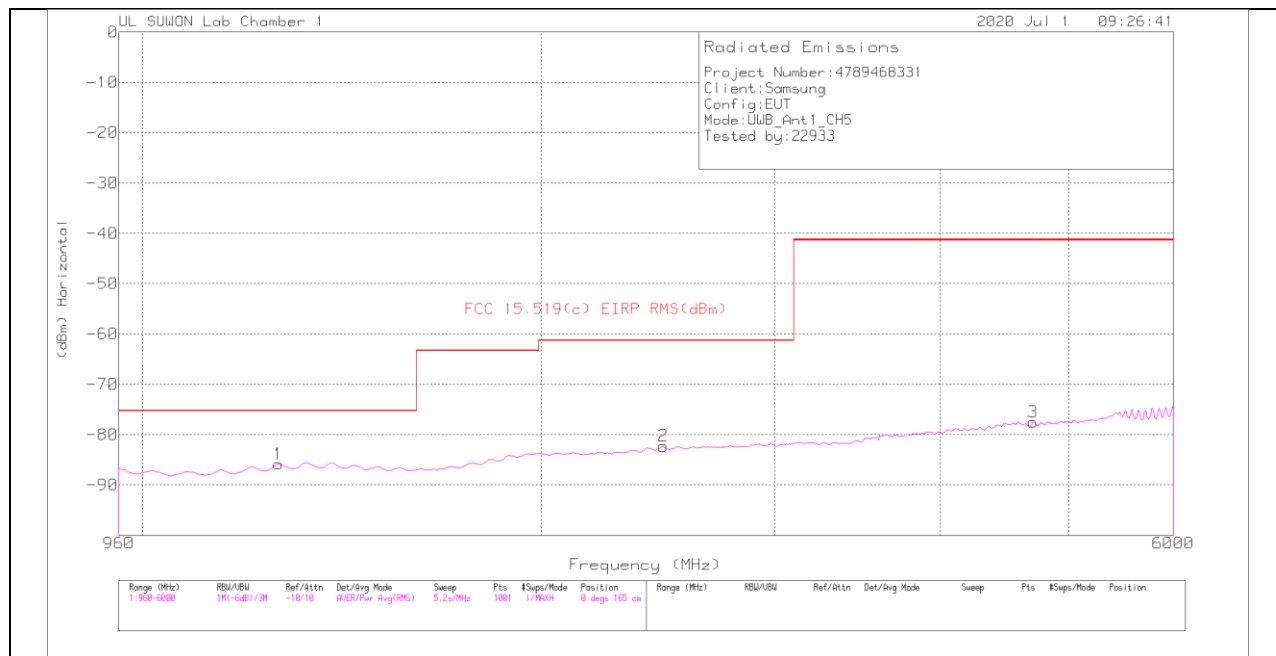
Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open are test site.
Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the one of tests made in an open field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

10.2. TRANSMITTER ABOVE 1 GHz

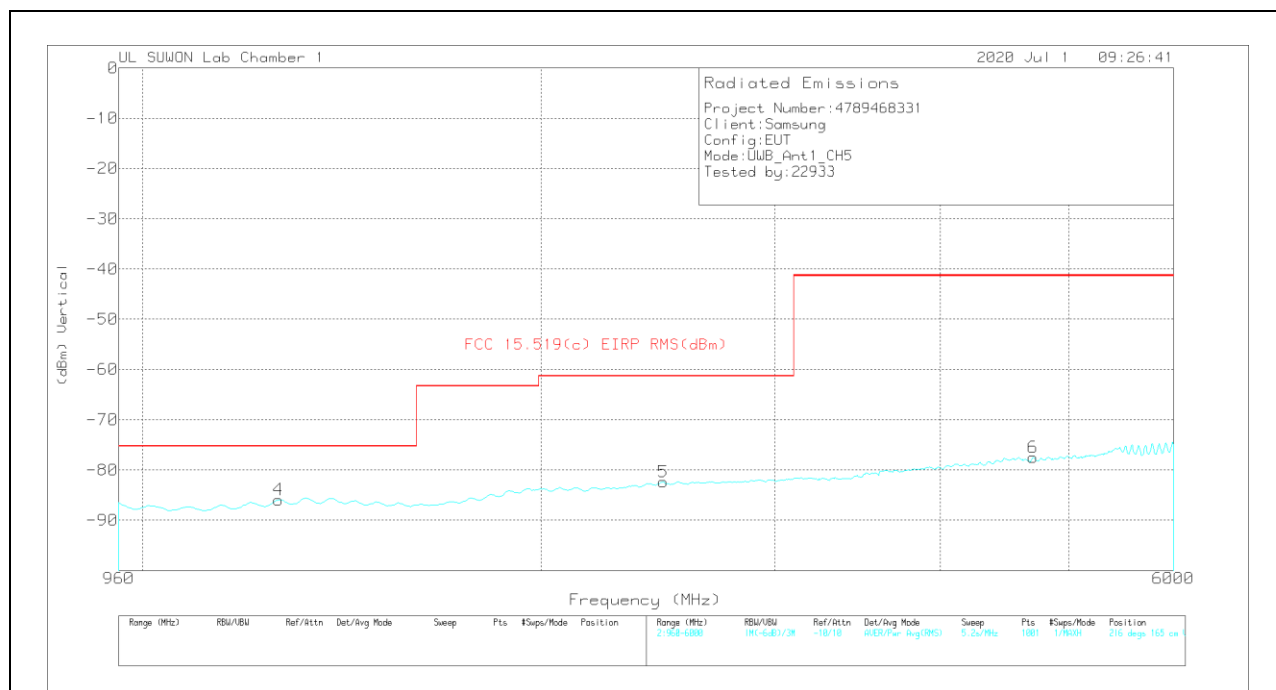
10.2.1. SPURIOUS EMISSION 1 GHz – 6 GHz TX Antenna 1 Patch

CHANNEL, CH 5

HORIZONTAL RESULT



VERTICAL RESULT



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

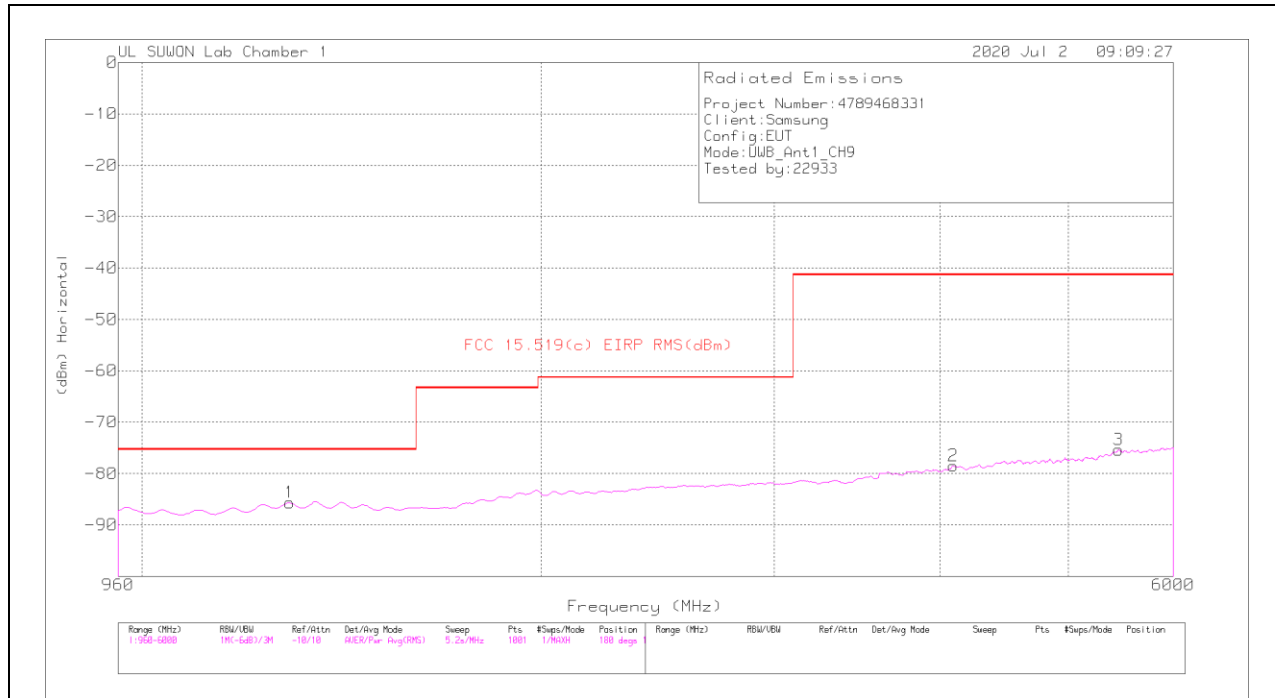
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	3117_00168717	0.96-18GHz[dB]	Dist. Corr. (dB)	Conv. Fact. (dB)	UWB_CH5_LPF[dB]	Corrected Reading (dBm)	FCC 15.519(c) EIRP RMS(dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1267.44	-74.92	RMS	29.3	-36.6	-15.6	11.8	.2	-85.82	-75.3	-10.52	180	165	H
2	2472	-76.58	RMS	31.9	-34.1	-15.6	11.8	.3	-82.28	-61.3	-20.98	36	165	H
3	4699.68	-77.18	RMS	34.2	-31.4	-15.6	11.8	.7	-77.48	-41.3	-36.18	324	165	H
4	1267.44	-75	RMS	29.3	-36.6	-15.6	11.8	.2	-85.9	-75.3	-10.6	360	165	V
5	2472	-76.68	RMS	31.9	-34.1	-15.6	11.8	.3	-82.38	-61.3	-21.08	72	165	V
6	4699.68	-77.2	RMS	34.2	-31.4	-15.6	11.8	.7	-77.5	-41.3	-36.2	252	165	V

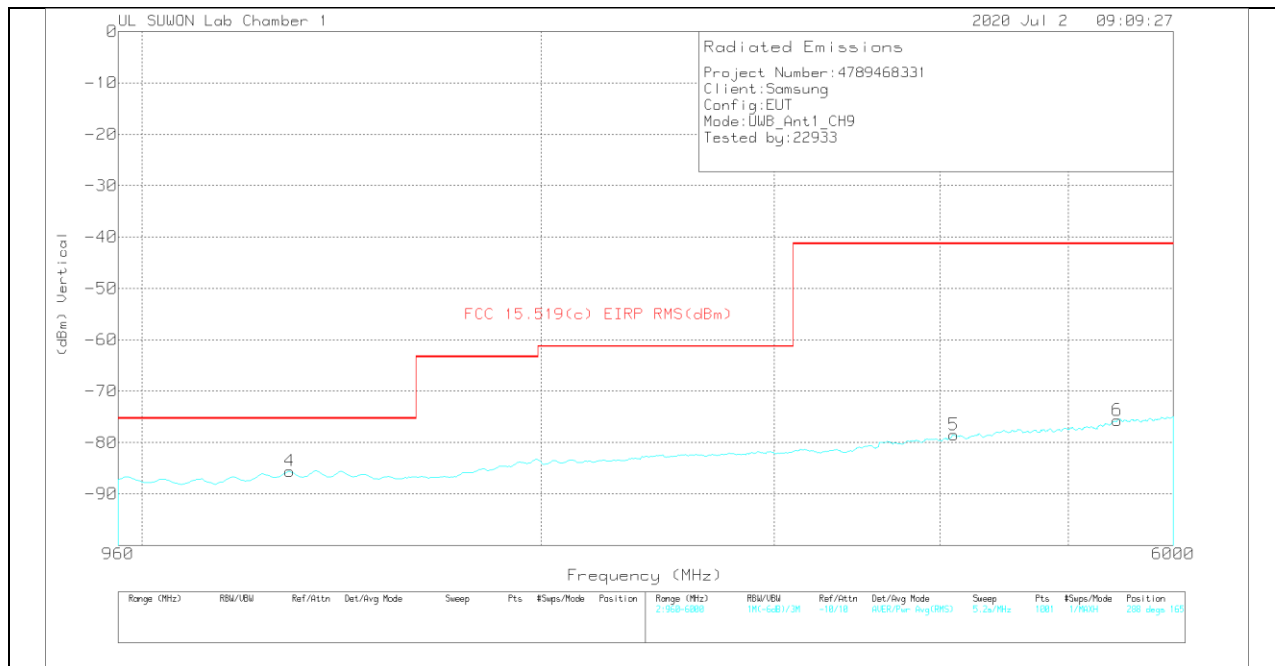
RMS - RMS detection

CHANNEL, CH 9

HORIZONTAL RESULT



VERTICAL RESULT



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Trace Markers

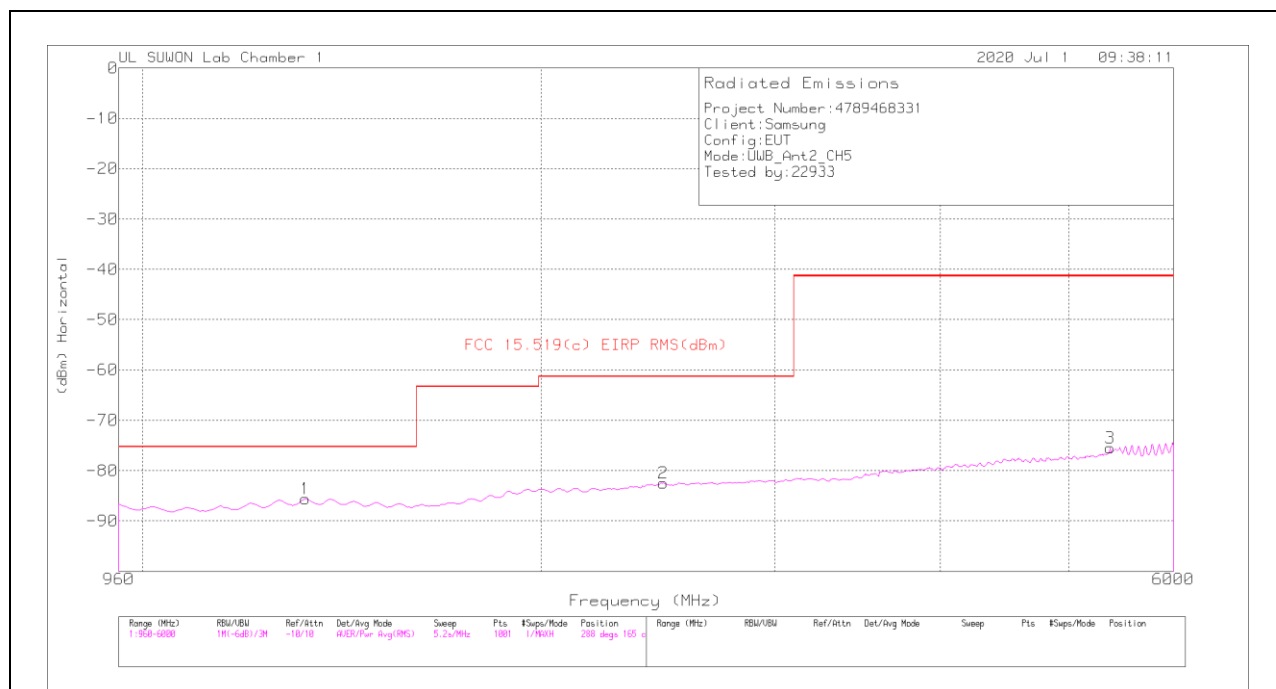
Marker	Frequency (MHz)	Meter Reading (dBm)	Det	3117_00168717	0.96-18GHz[dB]	Dist. Corr. (dB)	Conv. Fact. (dB)	UWB_CH5_LPF[dB]	Corrected Reading (dBm)	FCC 15.519(c) EIRP RMS(dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1292.64	-74.95	RMS	29.5	-36.6	-15.6	11.8	.2	-85.65	-75.3	-10.35	252	165	H
2	4094.88	-76.89	RMS	33.6	-31.9	-15.6	11.8	.5	-78.49	-41.3	-37.19	144	165	H
3	5455.68	-77.76	RMS	34.7	-30.6	-15.6	11.8	2.1	-75.36	-41.3	-34.06	360	165	H
4	1292.64	-74.84	RMS	29.5	-36.6	-15.6	11.8	.2	-85.64	-75.3	-10.24	108	165	V
5	4099.92	-76.9	RMS	33.6	-31.9	-15.6	11.8	.5	-78.5	-41.3	-37.2	108	165	V
6	5445.6	-77.96	RMS	34.7	-30.7	-15.6	11.8	2.1	-75.66	-41.3	-34.36	144	165	V

RMS - RMS detection

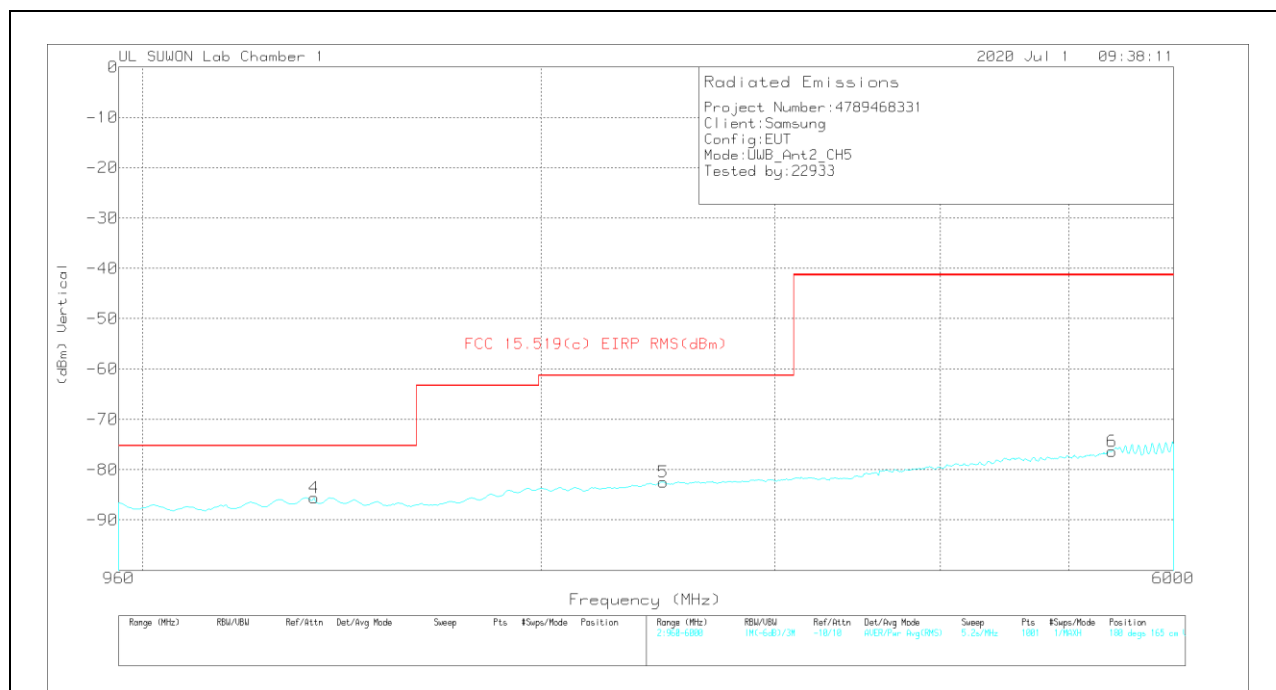
TX Antenna 2_LDS

CHANNEL, CH 5

HORIZONTAL RESULT



VERTICAL RESULT



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

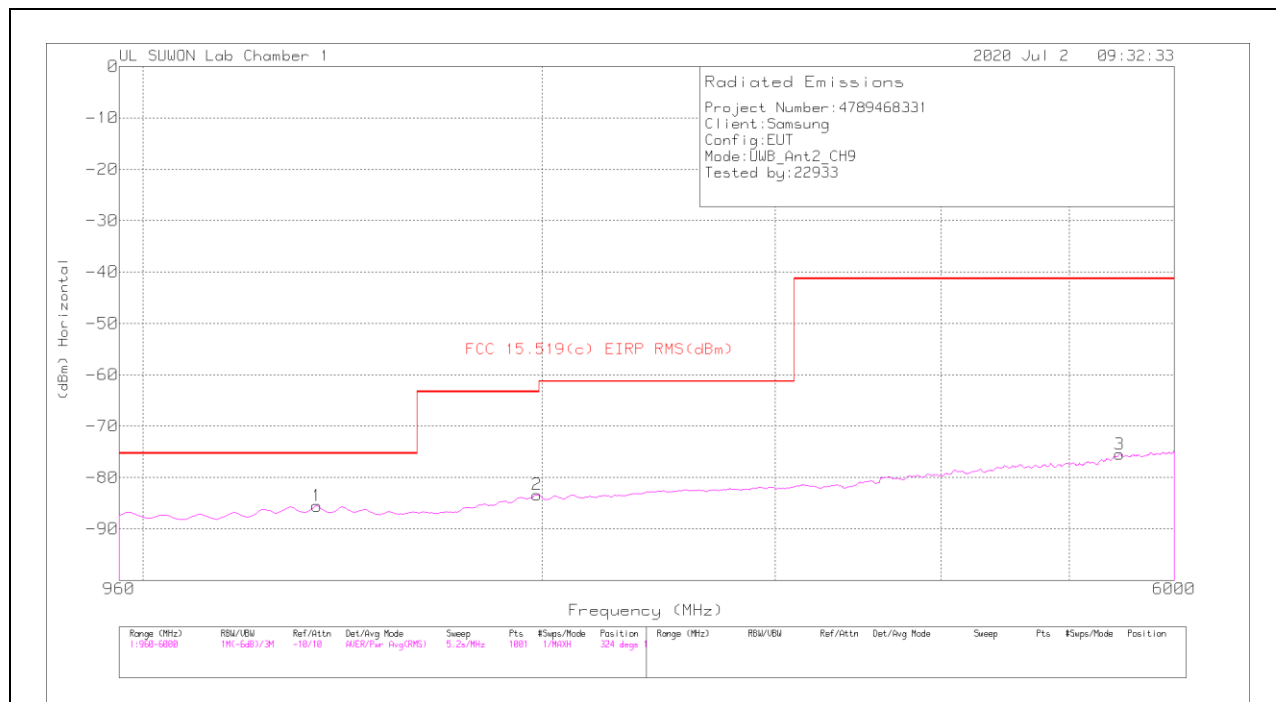
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	3117_00168717	0.96-18GHz[dB]	Dist. Corr. (dB)	Conv. Fact. (dB)	UWB_CH5_LPF[dB]	Corrected Reading (dBm)	FCC 15.19(c) EIRP RMS(dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1327.92	-75.14	RMS	29.6	-36.5	-15.6	11.8	.2	-85.64	-75.3	-10.34	216	165	H
2	2472	-76.76	RMS	31.9	-34.1	-15.6	11.8	.3	-82.46	-61.3	-21.16	216	165	H
3	5375.04	-77.44	RMS	34.7	-30.7	-15.6	11.8	1.8	-75.44	-41.3	-34.14	288	165	H
4	1348.08	-75.16	RMS	29.6	-36.4	-15.6	11.8	.2	-85.56	-75.3	-10.26	252	165	V
5	2472	-76.77	RMS	31.9	-34.1	-15.6	11.8	.3	-82.47	-61.3	-21.17	108	165	V
6	5390.16	-78.36	RMS	34.7	-30.7	-15.6	11.8	1.8	-76.36	-41.3	-35.06	108	165	V

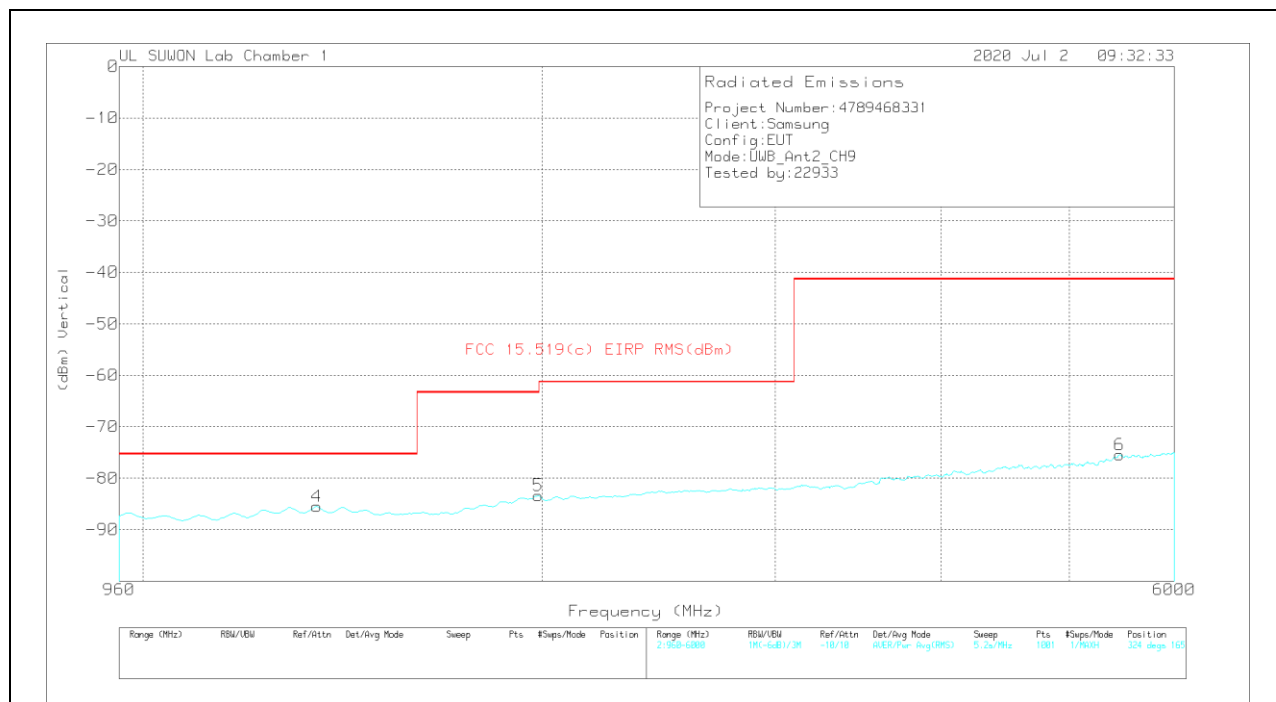
RMS - RMS detection

CHANNEL, CH 9

HORIZONTAL RESULT



VERTICAL RESULT



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	3117_00168717	0.96-18GHz[dB]	Dist. Corr. (dB)	Conv. Fact. (dB)	UWB_CH5_LPF[dB]	Corrected Reading (dBm)	FCC 15.19(c) EIRP RMS(dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1353.12	-75.11	RMS	29.6	-36.4	-15.6	11.8	.2	-85.51	-75.3	-10.21	288	165	H
2	1983.12	-75.94	RMS	31.2	-35.1	-15.6	11.8	.3	-83.34	-63.3	-20.04	288	165	H
3	5455.68	-77.88	RMS	34.7	-30.6	-15.6	11.8	2.1	-75.48	-41.3	-34.18	221	165	H
4	1353.12	-75.09	RMS	29.6	-36.4	-15.6	11.8	.2	-85.49	-75.3	-10.19	72	165	V
5	1988.16	-75.99	RMS	31.2	-35.1	-15.6	11.8	.3	-83.39	-63.3	-20.09	36	165	V
6	5455.68	-77.87	RMS	34.7	-30.6	-15.6	11.8	2.1	-75.47	-41.3	-34.17	324	165	V

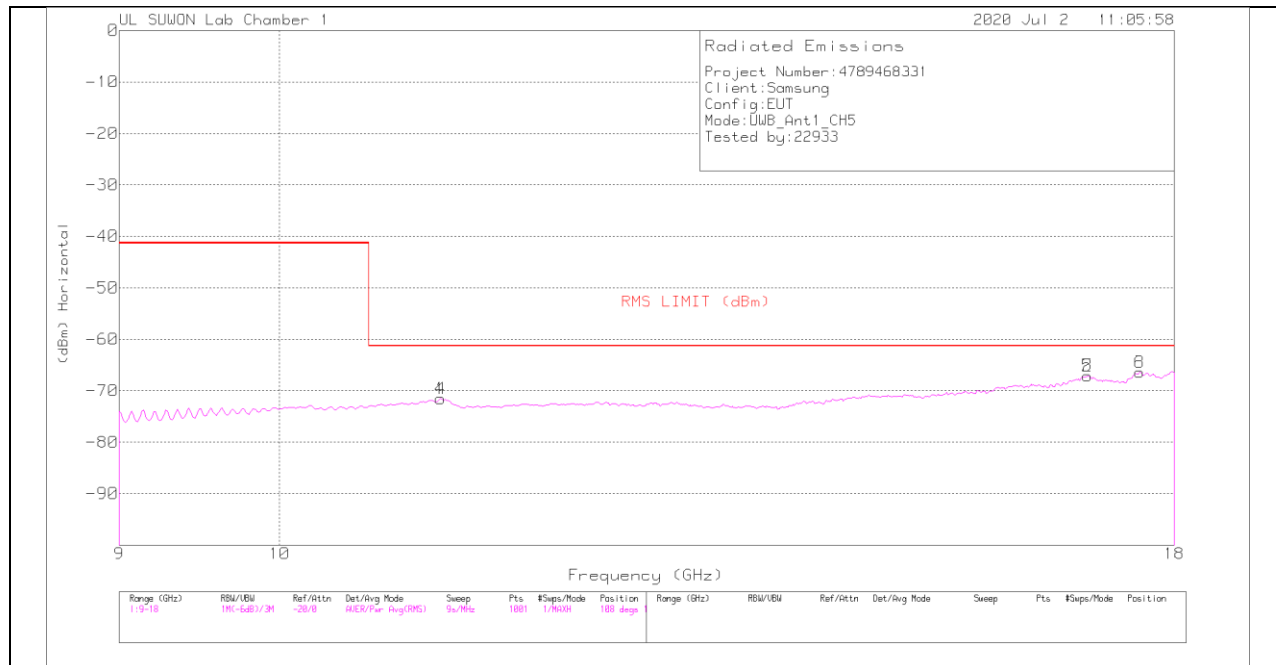
RMS - RMS detection

10.2.2. SPURIOUS EMISSION 9 GHz – 18 GHz

TX Antenna 1_Patch

CHANNEL, CH 5

HORIZONTAL RESULT



VERTICAL RESULT



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

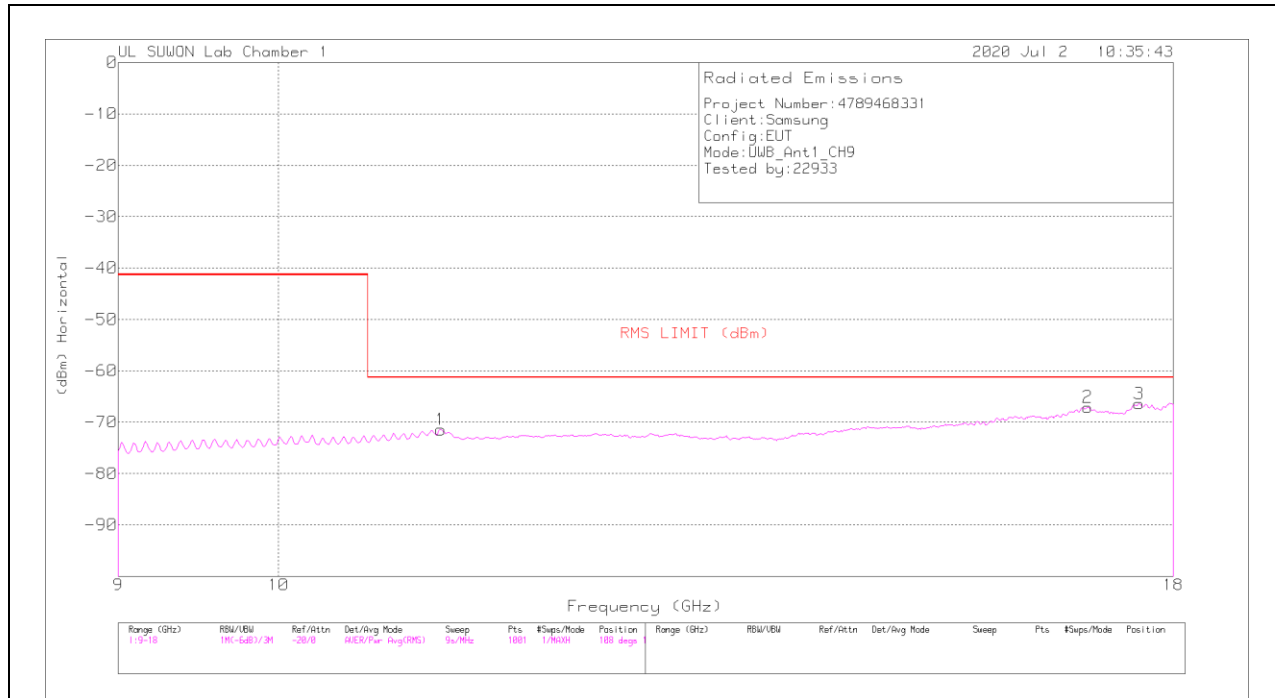
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	3117_00158717	0.96-18GHz[dB]	Dist. Corr. (dB)	Conv. Fact. (dB)	UWB_CH5_HPF[dB]	Corrected Reading (dBm)	RMS LIMIT (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	11.115	-85.75	RMS	38.3	-21.9	-15.6	11.8	1.6	-71.55	-61.3	-10.25	180	165	H
2	17.001	-87.3	RMS	41.7	-18	-15.6	11.8	-3	-67.1	-61.3	-5.8	360	165	H
3	17.595	-87.4	RMS	41.2	-16.9	-15.6	11.8	-5	-66.4	-61.3	-5.1	360	165	H
4	11.115	-85.75	RMS	38.3	-21.9	-15.6	11.8	1.6	-71.55	-61.3	-10.25	180	165	H
5	17.001	-87.3	RMS	41.7	-18	-15.6	11.8	-3	-67.1	-61.3	-5.8	360	165	H
6	17.595	-87.4	RMS	41.2	-16.9	-15.6	11.8	-5	-66.4	-61.3	-5.1	360	165	H

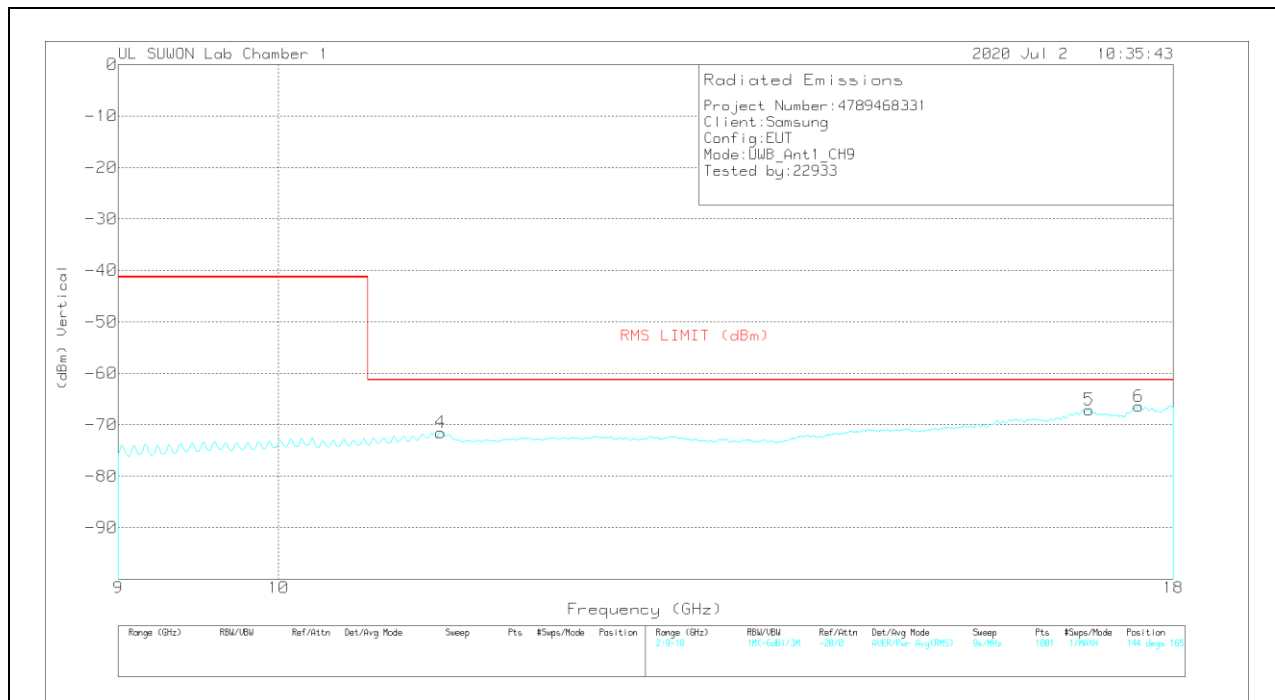
RMS - RMS detection

CHANNEL, CH 9

HORIZONTAL RESULT



VERTICAL RESULT



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Trace Markers

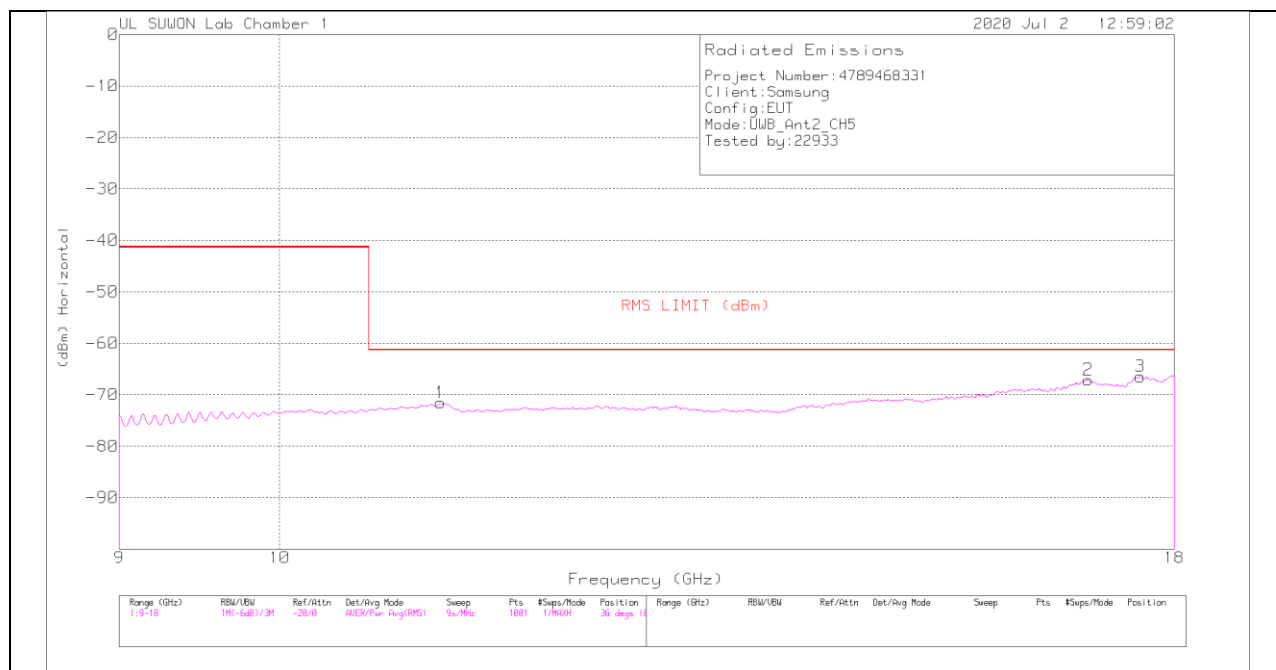
Marker	Frequency (GHz)	Meter Reading (dBm)	Det	3117_00168717	0.96-18GHz[dB]	Dist. Corr. (dB)	Conv. Fact. (dB)	UWB_CH5_HPF[dB]	Corrected Reading (dBm)	RMS LIMIT (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	11.124	-85.56	RMS	38.3	-22	-15.6	11.8	1.6	-71.46	-61.3	-10.16	252	165	H
2	17.019	-87.39	RMS	41.7	-17.9	-15.6	11.8	.3	-67.09	-61.3	-5.79	144	165	H
3	17.5995	-87.42	RMS	41.2	-16.8	-15.6	11.8	4	-66.42	-61.3	-5.12	36	165	H
4	11.124	-85.59	RMS	38.3	-22	-15.6	11.8	1.6	-71.49	-61.3	-10.19	0	165	V
5	17.028	-87.49	RMS	41.7	-17.8	-15.6	11.8	.3	-67.09	-61.3	-5.79	144	165	V
6	17.595	-87.4	RMS	41.2	-16.9	-15.6	11.8	.5	-66.4	-61.3	-5.1	36	165	V

RMS - RMS detection

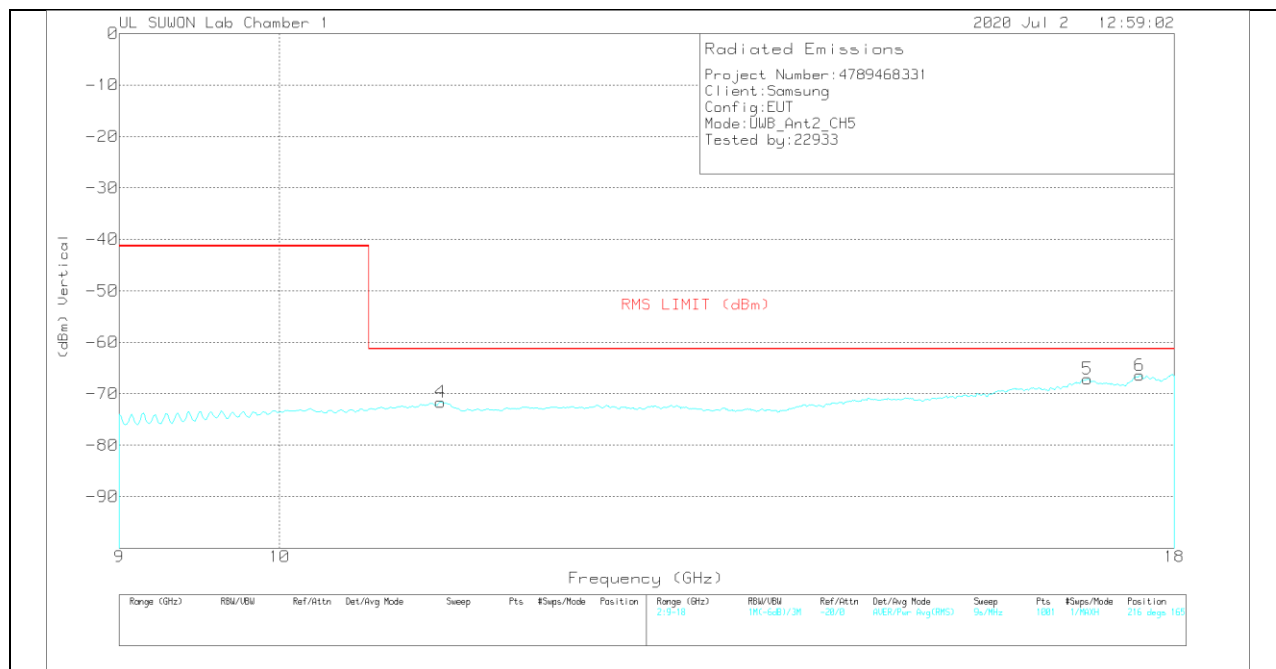
TX Antenna 2_LDS

CHANNEL, CH 5

HORIZONTAL RESULT



VERTICAL RESULT



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

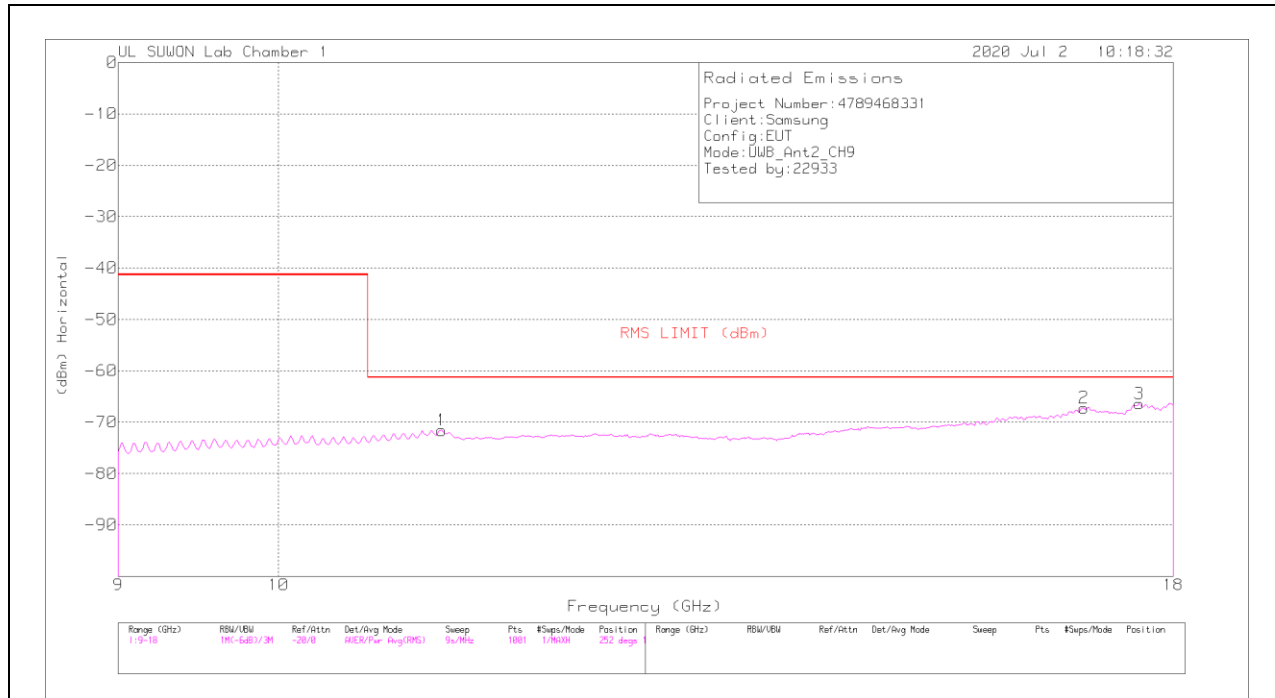
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	3117_00168717	0.96-18GHz[dB]	Dist. Corr. (dB)	Conv. Fact. (dB)	UWB_CH5_HPF[dB]	Corrected Reading (dBm)	RMS LIMIT (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	11.115	-85.73	RMS	38.3	-21.9	-15.6	11.8	1.6	-71.53	-61.3	-10.23	324	165	H
2	17.01	-87.42	RMS	41.7	-17.9	-15.6	11.8	.3	-67.12	-61.3	-5.82	252	165	H
3	17.604	-87.35	RMS	41.2	-16.9	-15.6	11.8	.4	-66.45	-61.3	-5.15	144	165	H
4	11.115	-85.92	RMS	38.3	-21.9	-15.6	11.8	1.6	-71.62	-61.3	-10.32	144	165	V
5	17.001	-87.33	RMS	41.7	-18	-15.6	11.8	.3	-67.13	-61.3	-5.83	324	165	V
6	17.595	-87.41	RMS	41.2	-16.9	-15.6	11.8	.5	-66.41	-61.3	-5.11	144	165	V

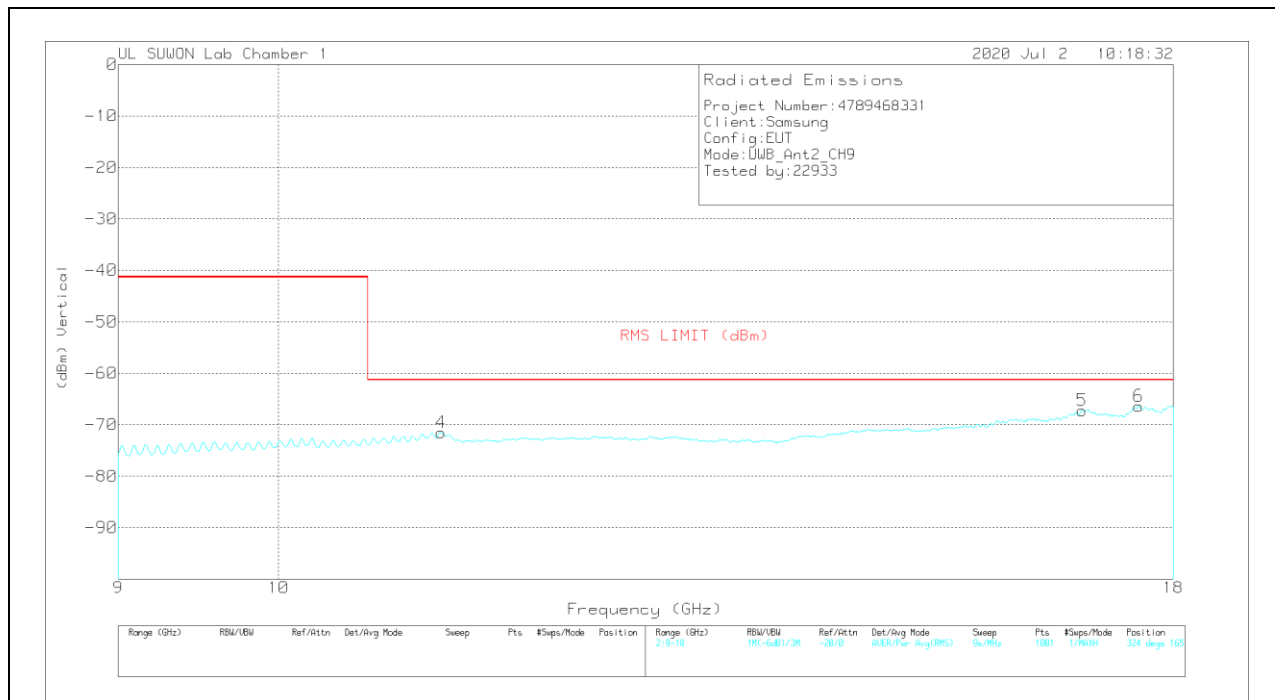
RMS - RMS detection

CHANNEL, CH 9

HORIZONTAL RESULT



VERTICAL RESULT



Note: Emission was scanned up to 40GHz; No emissions were detected above the noise floor which was at least 20dB below the specification limit.

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	3117_00168717	0.96-18GHz[dB]	Dist. Corr. (dB)	Conv. Fact. (dB)	UWB_CH5_HPF[dB]	Corrected Reading (dBm)	RMS LIMIT (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	11.133	-85.58	RMS	38.3	-22.1	-15.6	11.8	1.6	-71.58	-61.3	-10.28	216	165	H
2	16.974	-87.42	RMS	41.7	-17.9	-15.6	11.8	.2	-67.22	-61.3	-5.92	252	165	H
3	17.604	-87.33	RMS	41.2	-16.9	-15.6	11.8	4	-66.43	-61.3	-5.13	108	165	H
4	11.1295	-85.53	RMS	38.3	-22.1	-15.6	11.8	1.6	-71.53	-61.3	-10.23	324	165	V
5	16.956	-87.33	RMS	41.7	-18	-15.6	11.8	.2	-67.23	-61.3	-5.93	252	165	V
6	17.595	-87.39	RMS	41.2	-16.9	-15.6	11.8	.5	-66.39	-61.3	-5.09	288	165	V

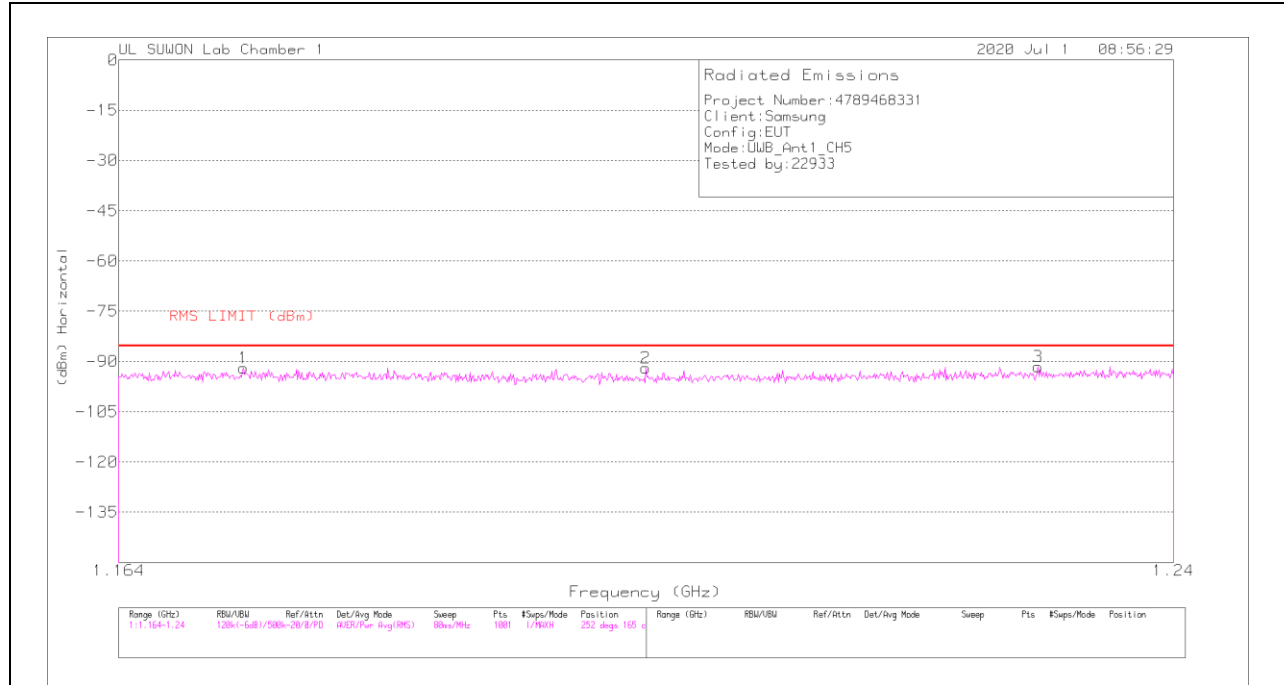
RMS - RMS detection

10.2.3. SPURIOUS EMISSION 1164 MHz – 1240 MHz

TX Antenna 1 Patch

CHANNEL, CH 5

HORIZONTAL RESULT



VERTICAL RESULT



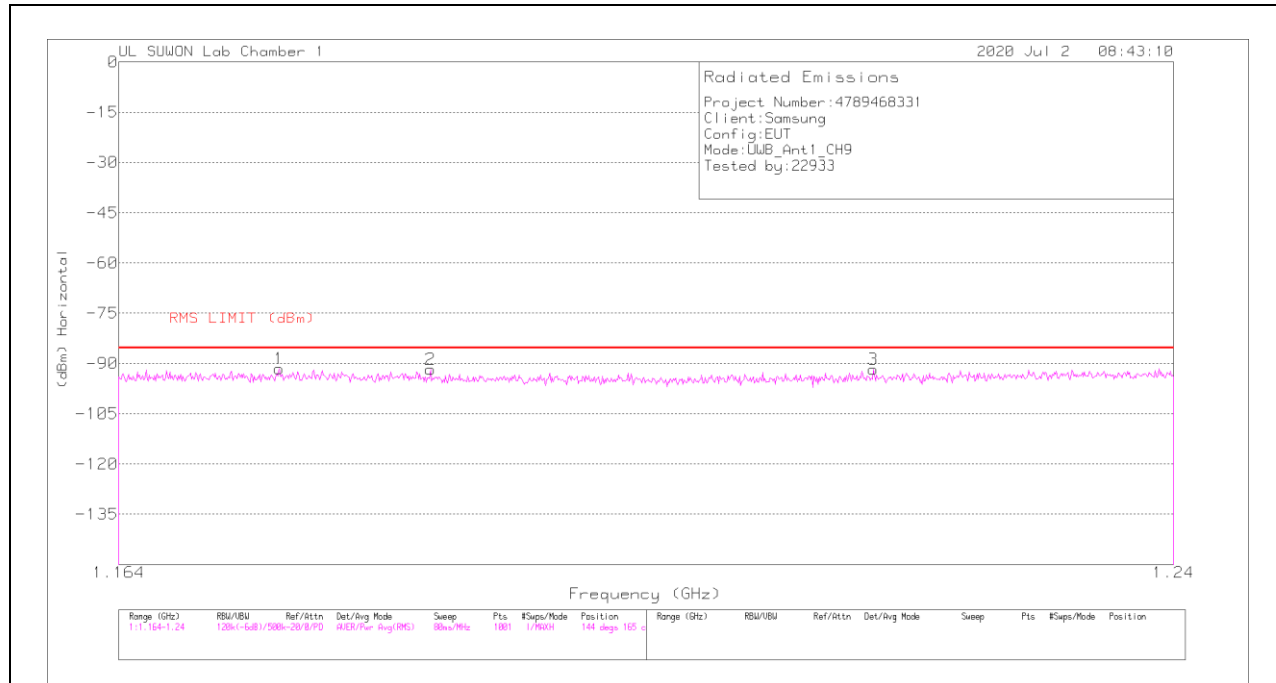
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	3117_00168717	0.96-18GHz(dB)	Dist. Corr. (dB)	Conv. Fact. (dB)	UWB_CH5_LPF(dB)	Corrected Reading (dBm)	RMS LIMIT (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.17274	-79.93	RMS	28.4	-36.8	-15.6	11.8	2	-91.93	-85.3	-6.63	180	165	H
2	1.20139	-80.27	RMS	28.6	-36.7	-15.6	11.8	2	-91.97	-85.3	-6.67	144	165	H
3	1.22997	-80.27	RMS	29	-36.7	-15.6	11.8	2	-91.57	-85.3	-6.27	144	165	H
4	1.17844	-80.43	RMS	28.4	-36.7	-15.6	11.8	2	-92.33	-85.3	-7.03	288	165	V
5	1.19402	-79.44	RMS	28.6	-36.8	-15.6	11.8	2	-91.24	-85.3	-5.94	108	165	V
6	1.23377	-80.38	RMS	29	-36.7	-15.6	11.8	2	-91.68	-85.3	-6.38	144	165	V

RMS - RMS detection

CHANNEL, CH 9

HORIZONTAL RESULT



VERTICAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	3117_00168717	0.96-18GHz[dB]	Dist. Corr. (dB)	Conv. Fact. (dB)	UWB_CH5_LPF(dB)	Corrected Reading (dBm)	RMS LIMIT (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.17525	-79.62	RMS	28.4	-36.8	-15.6	11.8	-2	-91.62	-85.3	-6.32	288	165	H
2	1.18596	-79.61	RMS	28.5	-36.8	-15.6	11.8	-2	-91.71	-85.3	-6.41	324	165	H
3	1.21788	-80.23	RMS	28.8	-36.7	-15.6	11.8	-2	-91.73	-85.3	-6.43	36	165	H
4	1.16765	-80.21	RMS	28.3	-36.8	-15.6	11.8	-2	-92.31	-85.3	-7.01	144	165	V
5	1.18885	-80.89	RMS	28.5	-36.8	-15.6	11.8	-2	-92.79	-85.3	-7.49	216	165	V
6	1.22275	-80.07	RMS	28.9	-36.8	-15.6	11.8	-2	-91.57	-85.3	-6.27	144	165	V

RMS - RMS detection

TX Antenna 2_LDS

CHANNEL, CH 5

HORIZONTAL RESULT



VERTICAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	3117_00168717	0.96-18GHz(dB)	Dist. Corr. (dB)	Conv. Fact. (dB)	UWB_CH5_LPF(dB)	Corrected Reading (dBm)	RMS LIMIT (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.17532	-81.4	RMS	28.4	-36.8	-15.6	11.8	-2	-93.4	-85.3	-8.1	145	165	H
2	1.20998	-79.92	RMS	28.7	-36.7	-15.6	11.8	-2	-91.52	-85.3	-6.22	108	165	H
3	1.22328	-81.03	RMS	28.9	-36.8	-15.6	11.8	-2	-92.53	-85.3	-7.23	288	165	H
4	1.19402	-79.75	RMS	28.6	-36.8	-15.6	11.8	-2	-91.55	-85.3	-6.25	216	165	V
5	1.20185	-80.31	RMS	28.6	-36.7	-15.6	11.8	-2	-92.01	-85.3	-6.71	252	165	V
6	1.21401	-80.3	RMS	28.8	-36.7	-15.6	11.8	-2	-91.8	-85.3	-6.5	360	165	V

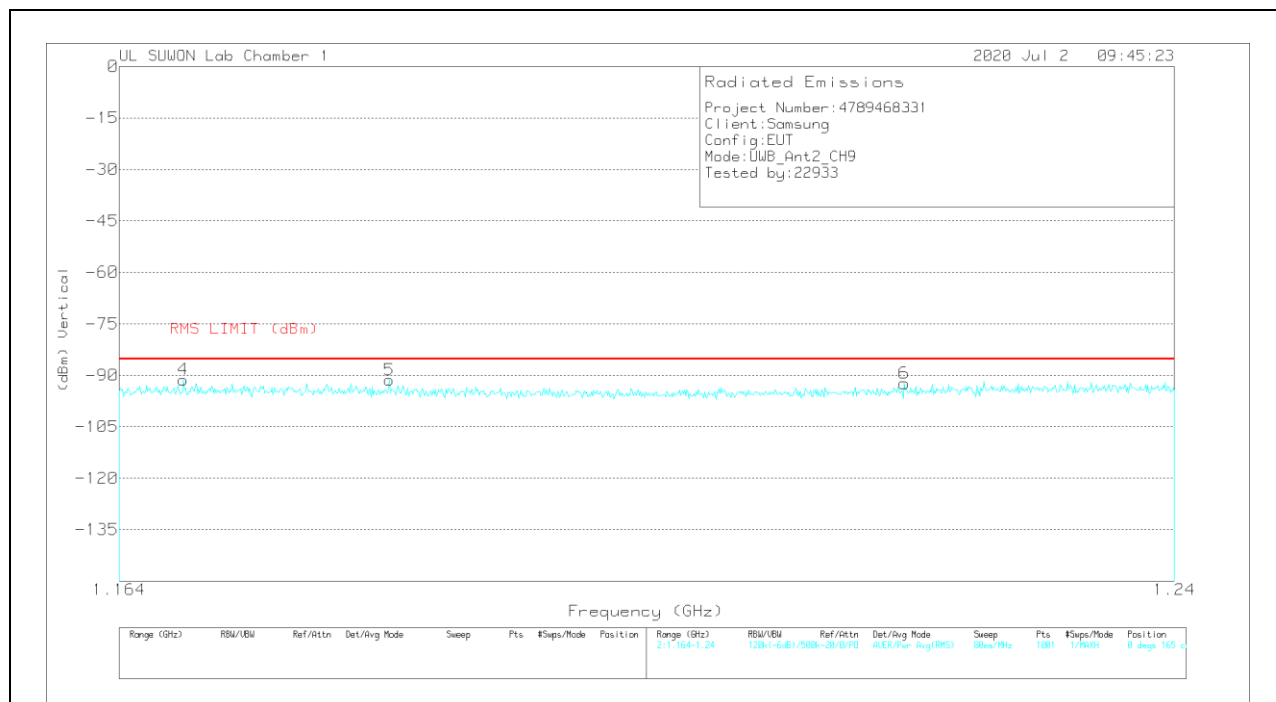
RMS - RMS detection

CHANNEL, CH 9

HORIZONTAL RESULT



VERTICAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	3117_00168717	0.96-18GHz[dB]	Dist. Corr. (dB)	Conv. Fact. (dB)	UWB_CH5_LPF(dB)	Corrected Reading (dBm)	RMS LIMIT (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.17601	-80.94	RMS	28.4	-36.8	-15.6	11.8	2	-92.94	-85.3	-7.64	252	165	H
2	1.18726	-80.47	RMS	28.5	-36.7	-15.6	11.8	2	-92.27	-85.3	-6.97	360	165	H
3	1.21545	-80.55	RMS	28.8	-36.8	-15.6	11.8	2	-92.15	-85.3	-6.85	288	165	H
4	1.16848	-79.16	RMS	28.3	-36.8	-15.6	11.8	2	-91.26	-85.3	-5.96	36	165	V
5	1.183	-79.49	RMS	28.5	-36.8	-15.6	11.8	2	-91.39	-85.3	-6.09	36	165	V
6	1.22009	-80.74	RMS	28.8	-36.8	-15.6	11.8	2	-92.34	-85.3	-7.04	72	165	V

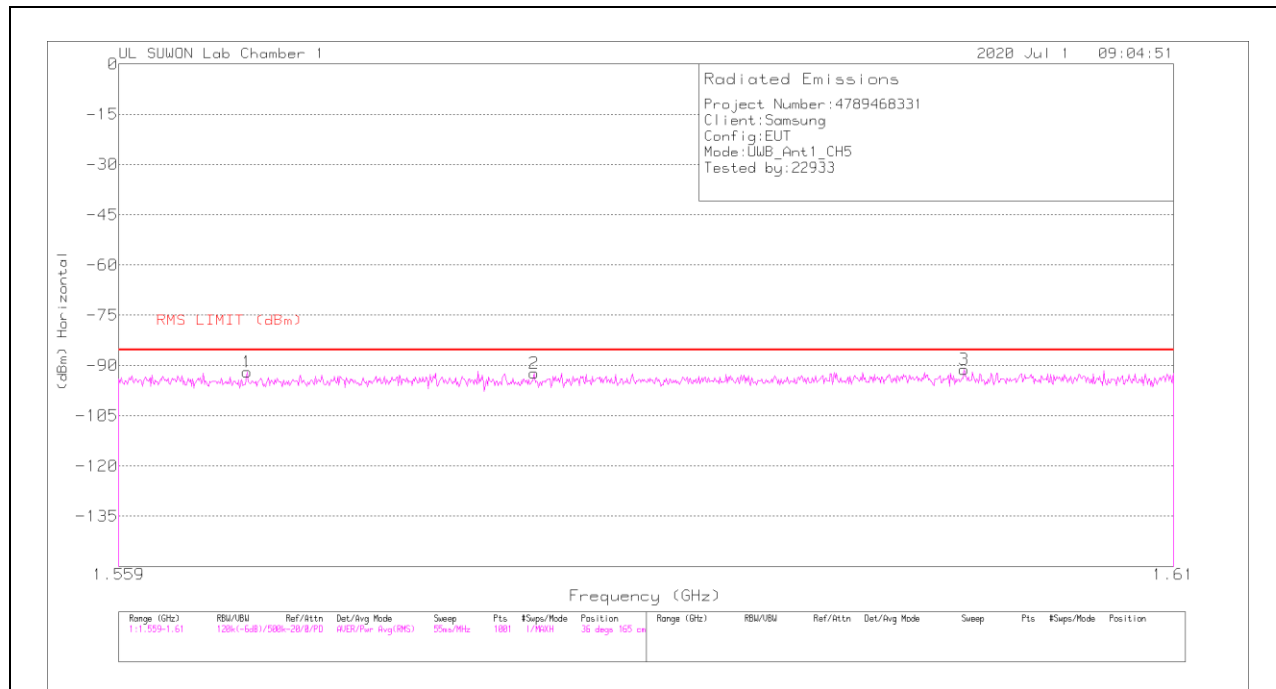
RMS - RMS detection

10.2.4. SPURIOUS EMISSION 1559 MHz – 1610 MHz

TX Antenna 1_Patch

CHANNEL, CH 5

HORIZONTAL RESULT



VERTICAL RESULT



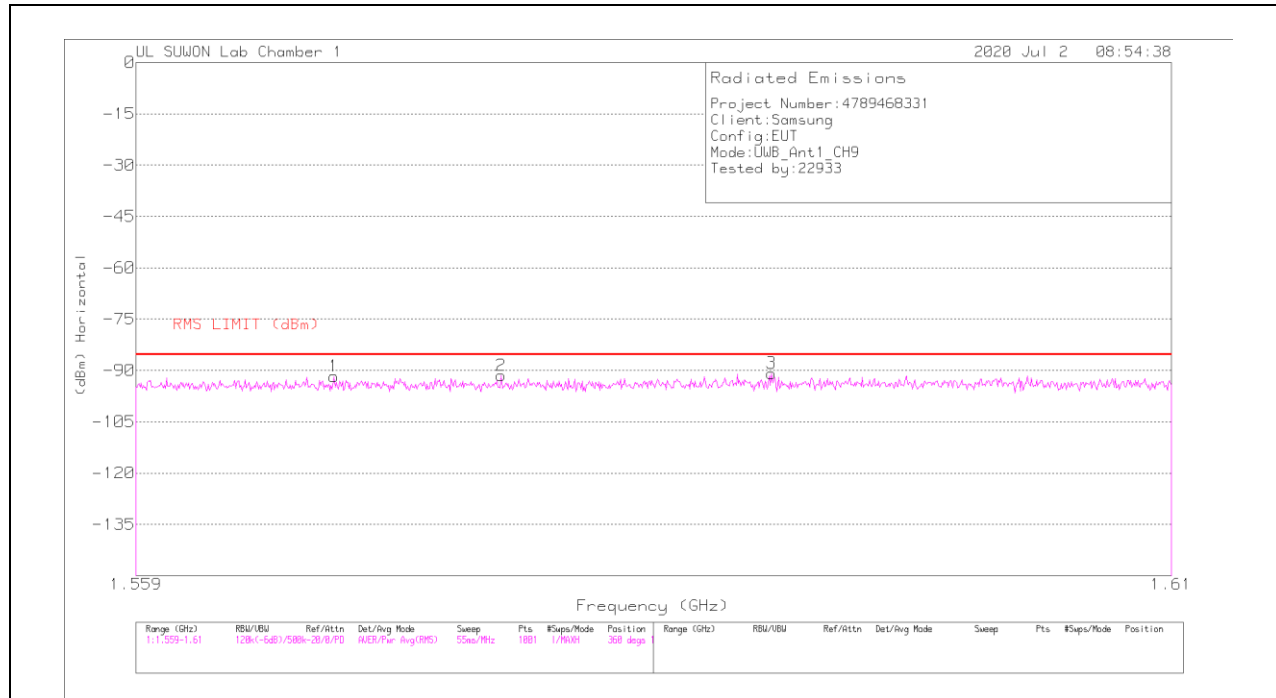
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	3117_00168717	0.96-18GHz[dB]	Dist. Corr. (dB)	Conv. Fact. (dB)	UWB_CH5_LPF(dB)	Corrected Reading (dBm)	RMS LIMIT (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.56512	-80.83	RMS	28.3	-35.9	-15.6	11.8	.3	-91.93	-85.3	-6.63	72	165	H
2	1.57889	-81.23	RMS	28.3	-35.9	-15.6	11.8	.3	-92.33	-85.3	-7.03	144	165	H
3	1.59975	-80.01	RMS	28.3	-35.9	-15.6	11.8	.3	-91.11	-85.3	-5.81	324	165	H
4	1.56079	-80.81	RMS	28.3	-35.8	-15.6	11.8	.3	-91.81	-85.3	-6.51	324	165	V
5	1.57904	-80.43	RMS	28.3	-35.9	-15.6	11.8	.3	-91.53	-85.3	-6.23	144	165	V
6	1.60357	-81.1	RMS	28.3	-35.8	-15.6	11.8	.3	-92.1	-85.3	-6.8	252	165	V

RMS - RMS detection

CHANNEL, CH 9

HORIZONTAL RESULT



VERTICAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	3117_00168717	0.96-18GHz[dB]	Dist. Corr. (dB)	Conv. Fact. (dB)	UWB_CH5_LPF(dB)	Corrected Reading (dBm)	RMS LIMIT (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.56864	-80.61	RMS	28.3	-35.9	-15.6	11.8	.3	-91.71	-85.3	-6.41	144	165	H
2	1.5768	-80.34	RMS	28.3	-35.9	-15.6	11.8	.3	-91.44	-85.3	-6.14	144	165	H
3	1.59011	-79.72	RMS	28.3	-35.9	-15.6	11.8	.3	-90.82	-85.3	-5.52	252	165	H
4	1.56767	-81.5	RMS	28.3	-35.9	-15.6	11.8	.3	-92.6	-85.3	-7.3	144	165	V
5	1.57869	-80.82	RMS	28.3	-35.9	-15.6	11.8	.3	-91.92	-85.3	-6.62	288	165	V
6	1.60352	-79.43	RMS	28.3	-35.8	-15.6	11.8	.3	-90.43	-85.3	-5.13	36	165	V

RMS - RMS detection

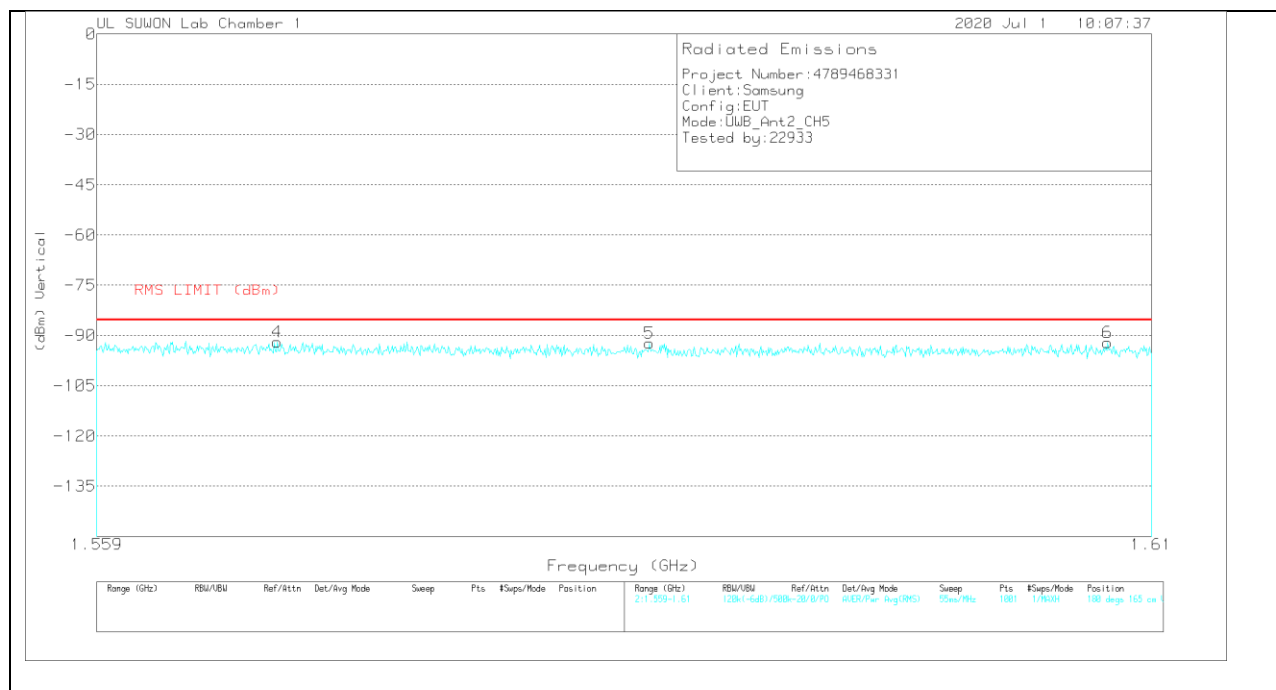
TX Antenna 2_LDS

CHANNEL, CH 5

HORIZONTAL RESULT



VERTICAL RESULT



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	3117_00168717	0.96-18GHz(dB)	Dist. Corr. (dB)	Conv. Fact. (dB)	UWB_CH5_LPF(dB)	Corrected Reading (dBm)	RMS LIMIT (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.56665	-80.34	RMS	28.3	-35.9	-15.6	11.8	.3	-91.44	-85.3	-6.14	72	165	H
2	1.58154	-80.7	RMS	28.3	-35.9	-15.6	11.8	.3	-91.8	-85.3	-6.5	180	165	H
3	1.60123	-81.19	RMS	28.3	-35.9	-15.6	11.8	.3	-92.28	-85.3	-6.98	72	165	H
4	1.56762	-80.78	RMS	28.3	-35.9	-15.6	11.8	.3	-91.88	-85.3	-6.58	288	165	V
5	1.58552	-80.93	RMS	28.3	-36.1	-15.6	11.8	.3	-92.23	-85.3	-6.93	180	165	V
6	1.60786	-81.02	RMS	28.3	-35.9	-15.6	11.8	.3	-92.12	-85.3	-6.82	108	165	V

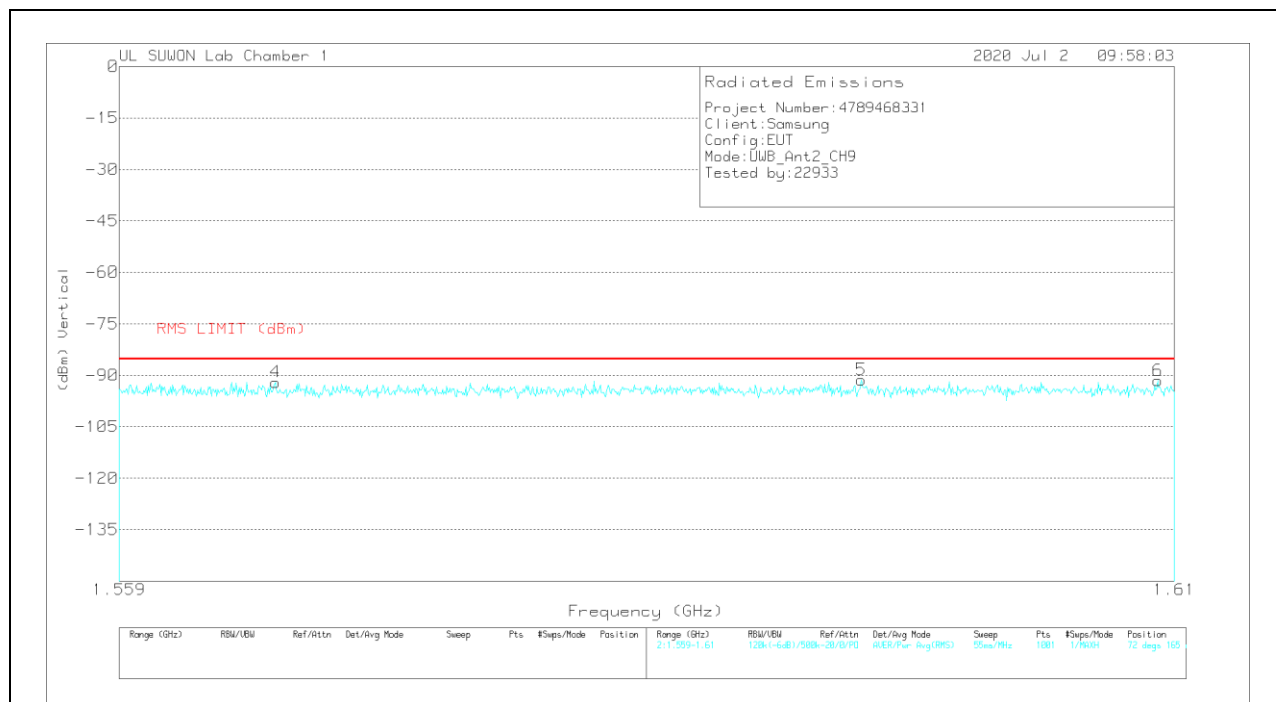
RMS - RMS detection

CHANNEL, CH 9

HORIZONTAL RESULT



VERTICAL RESULT



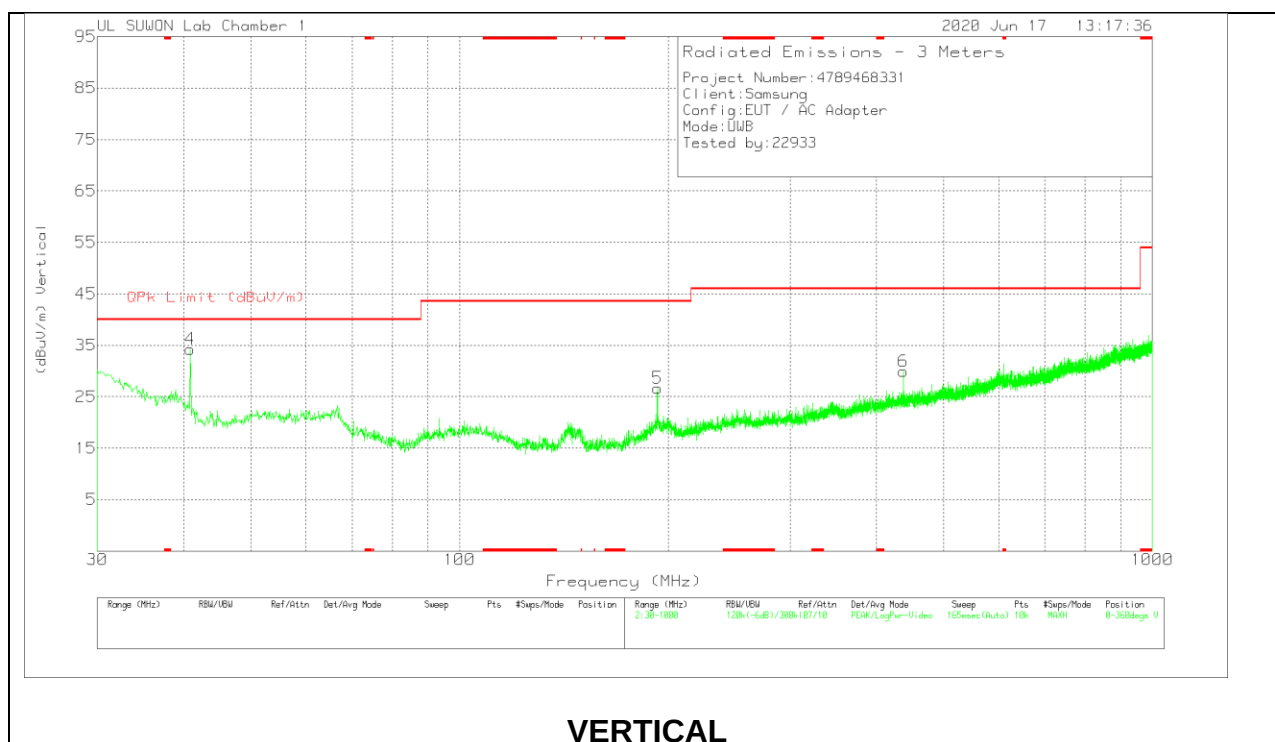
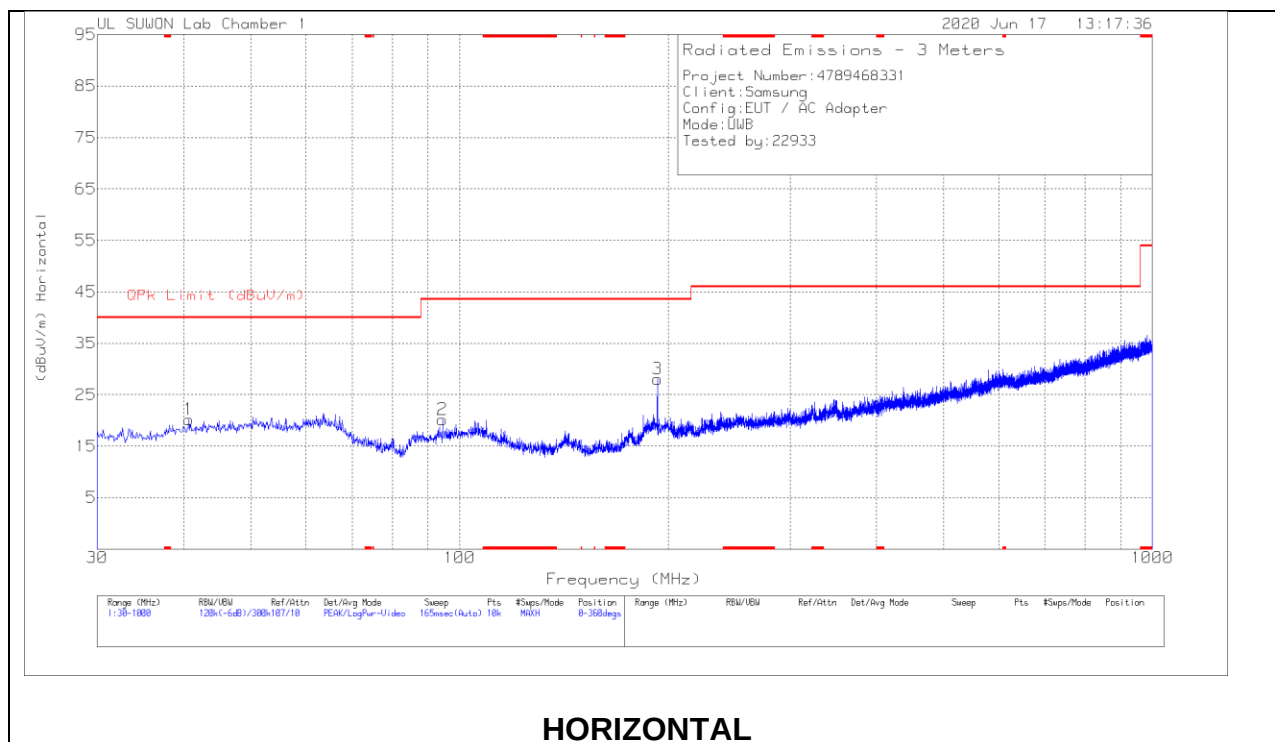
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	3117_00168717	0.96-18GHz(dB)	Dist. Corr. (dB)	Conv. Fact. (dB)	UWB_CH5_LPF(dB)	Corrected Reading (dBm)	RMS LIMIT (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.56471	-81.49	RMS	28.3	-35.9	-15.6	11.8	.3	-92.59	-85.3	-7.29	180	165	H
2	1.59271	-79.95	RMS	28.3	-35.9	-15.6	11.8	.3	-91.05	-85.3	-5.75	144	165	H
3	1.60577	-80.61	RMS	28.3	-35.9	-15.6	11.8	.3	-91.71	-85.3	-6.41	252	165	H
4	1.56645	-80.9	RMS	28.3	-35.9	-15.6	11.8	.3	-92	-85.3	-6.7	324	165	V
5	1.5947	-80.14	RMS	28.3	-36	-15.6	11.8	.3	-91.34	-85.3	-6.04	180	165	V
6	1.60918	-80.46	RMS	28.3	-35.9	-15.6	11.8	.3	-91.56	-85.3	-6.26	324	165	V

RMS - RMS detection

10.3. WORST CASE BELOW 1 GHz

SPURIOUS EMISSIONS 30 TO 1000 MHz



Below 1GHz Data

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	VULB9163_750	Below_1G[dB]	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	40.67	31.9	Pk	18.9	-30.6	20.2	40	-19.8	0-360	300	H
2	94.505	32.71	Pk	17.2	-29.7	20.21	43.52	-23.31	0-360	300	H
3	193.154	38.86	Pk	17.7	-28.5	28.06	43.52	-15.46	0-360	200	H
4	40.864	45.14	Pk	18.9	-29.8	34.24	40	-5.76	0-360	100	V
5	193.154	36.56	Pk	17.7	-27.6	26.66	43.52	-16.86	0-360	100	V
6	437.497	33.82	Pk	22	-25.9	29.92	46.02	-16.1	0-360	100	V

Pk - Peak detector

11. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 8.8

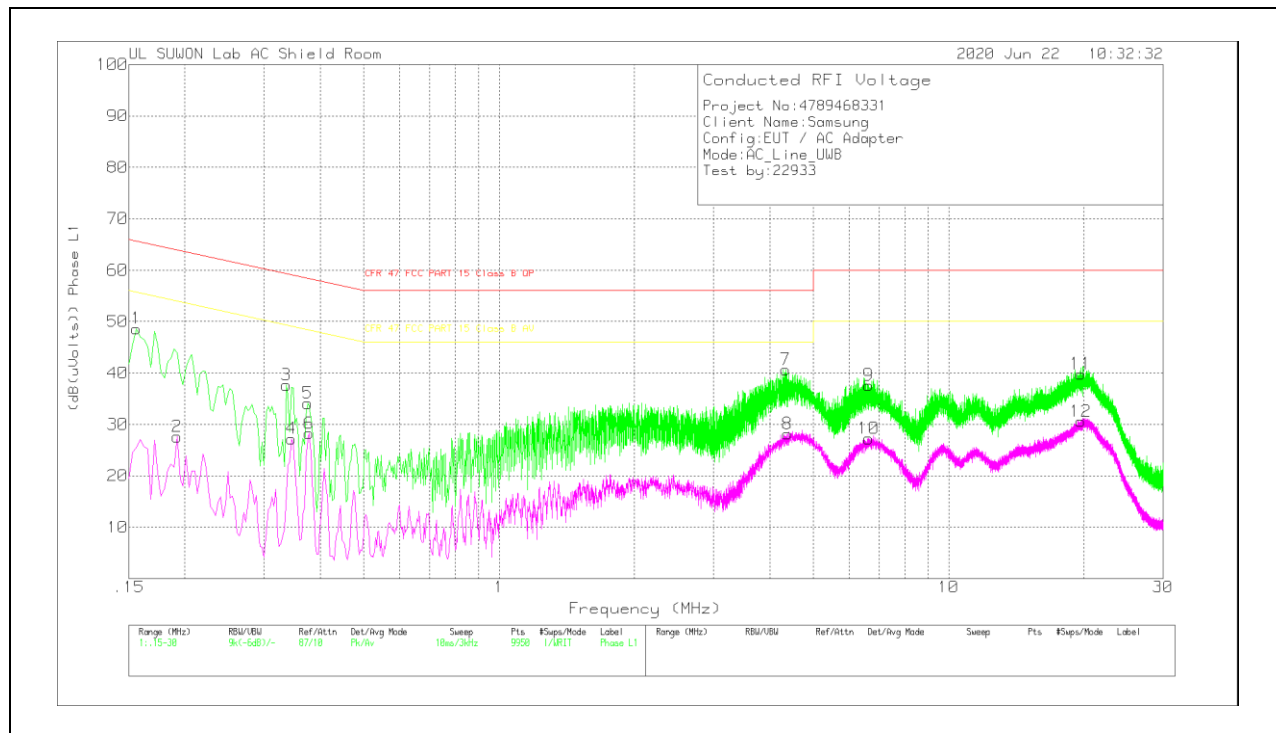
Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

RESULTS

11.1.1. AC Power Line

LINE 1 RESULTS



Trace Markers

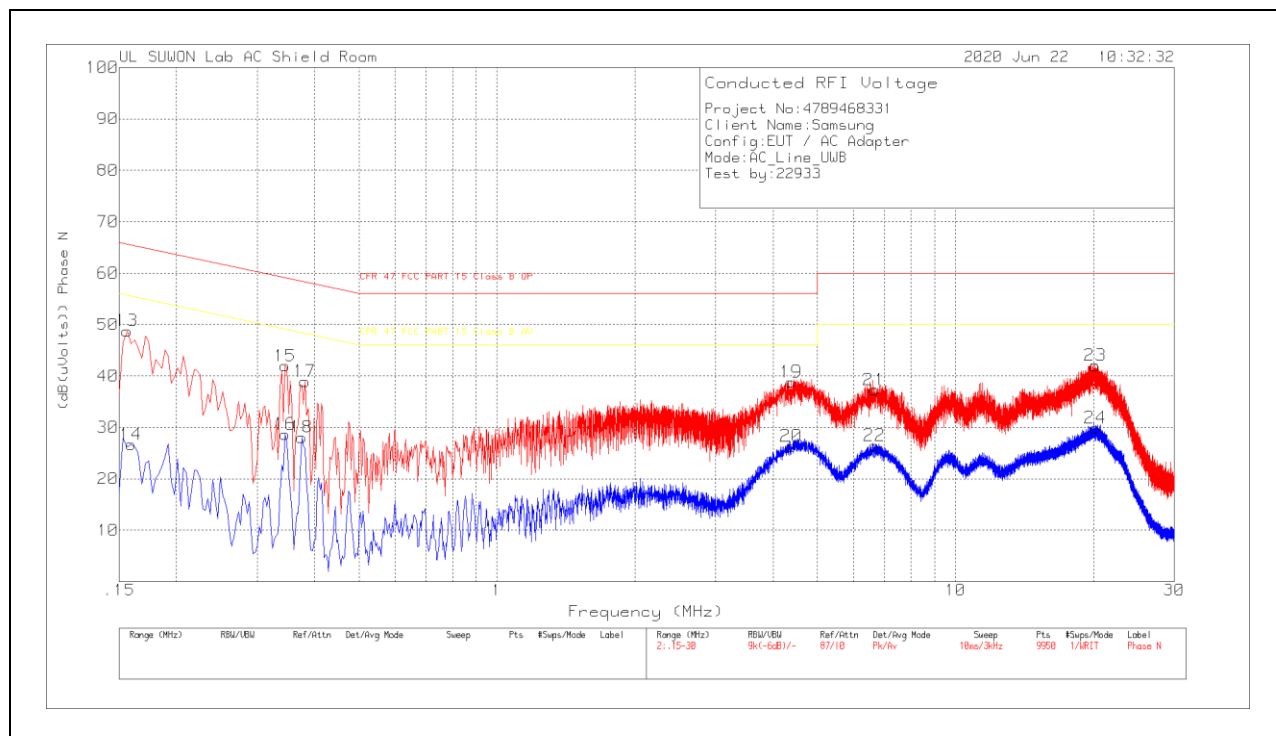
Range 1: Phase L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h Ex_L1[dB]	CABLELOS S(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B OP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
1	.156	38.64	Pk	9.9	.1	48.64	65.67	-17.03	-	-
2	.192	17.41	Av	10	.2	27.61	-	-	53.95	-26.34
3	.336	27.65	Pk	9.8	.2	37.65	59.3	-21.65	-	-
4	.345	17.13	Av	9.9	.2	27.23	-	-	49.08	-21.85
5	.375	23.99	Pk	9.9	.2	34.09	58.39	-24.3	-	-
6	.378	18.17	Av	9.9	.2	28.27	-	-	48.32	-20.05
7	4.338	30.57	Pk	9.8	.3	40.67	56	-15.33	-	-
8	4.38	18.05	Av	9.8	.3	28.15	-	-	46	-17.85
9	6.63	27.38	Pk	9.9	.3	37.58	60	-22.42	-	-
10	6.645	17.04	Av	9.9	.3	27.24	-	-	50	-22.76
11	19.653	29.12	Pk	10.3	.4	39.82	60	-20.18	-	-
12	19.671	19.88	Av	10.3	.4	30.58	-	-	50	-19.42

Pk - Peak detector

Av - Average detection

LINE 2 RESULTS



Trace Markers

Range 2: Phase N .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	101836_Wit h EX_N[dB]	CABLELOS S(dB)	Corrected Reading (dB(uVolts))	CFR 47 FCC PART 15 Class B QP	Margin (dB)	CFR 47 FCC PART 15 Class B AV	Margin (dB)
13	.156	38.76	Pk	9.9	.1	48.76	65.67	-16.91	-	-
14	.159	16.66	Av	9.9	.1	26.66	-	-	55.52	-28.86
15	.345	31.87	Pk	9.9	.2	41.97	59.08	-17.11	-	-
16	.345	18.57	Av	9.9	.2	28.67	-	-	49.08	-20.41
17	.381	28.86	Pk	9.9	.2	38.96	58.26	-19.3	-	-
18	.375	17.98	Av	9.9	.2	28.08	-	-	48.39	-20.31
19	4.38	28.7	Pk	9.8	.3	38.8	56	-17.2	-	-
20	4.383	16.25	Av	9.8	.3	26.35	-	-	46	-19.65
21	6.645	27.11	Pk	9.9	.3	37.31	60	-22.69	-	-
22	6.654	16.26	Av	9.9	.3	26.46	-	-	50	-23.54
23	20.175	31.34	Pk	10.3	.4	42.04	60	-17.96	-	-
24	20.181	19.19	Av	10.3	.4	29.89	-	-	50	-20.11

Pk - Peak detector

Av - Average detection

END OF TEST REPORT