



FCC CFR 47 PART 15 SUBPART F §15.519

ISED RSS-220 ISSUE 1 AMENDMENT 1

CERTIFICATION TEST REPORT

FOR

SMART PHONE

MODEL NUMBERS: A2407, 2408, 2409

REPORT NUMBER: 13259319-E21V3

ISSUE DATE: SEPTEMBER 25, 2020

FCC ID: BCG-E3547A

IC: 579C-E3547A

Prepared for

**APPLE INC.
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Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
V1	08/31/2020	Initial Issue	Thu Chan
V2	09/11/2020	Addressed TCB's questions	Thu Chan
V3	09/25/2020	Added Section 5.3 Appendix: Updated Information Section 5.1: Updated Information of Ant. UWB3 Section 5.6: Naming Changed on ANT 2	Thu Chan

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: APPLE INC.
ONE APPLE PARK WAY
CUPERTINO, CA 95014, USA

EUT DESCRIPTION: SMART PHONE

MODELS: A2407, A2408, A2409

SERIAL NUMBERS: G6TD20AR04RR
G6TCN00KQ5W0

DATE TESTED: JULY 5 – AUGUST 22, 2020

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC §15 Subpart F	Complies
ISED RSS-220 Issue 1 Amendment 1	Complies

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. 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 NVLAP, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released For
UL Verification Services Inc. By:

Tested By:



THU CHAN
STAFF ENGINEER
UL Verification Services Inc.



GIA-PIAO CHIN
TEST ENGINEER
UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with CFR Title 47 Part 15 Subpart F, KDB 393764 D01 UWB FAQ v02, ISED RSS-220 Issue 1 Amendment 1 and ANSI C63.10-2013 and RSS GEN Issue 5.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA and at 47658 Kato Road, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies the locations of the facilities that were utilized for radiated emission measurements documented in this report. The specific facilities used are identified in the test results sections.

47173 Benicia Street ISED 2324A	47266 Benicia Street ISED 22541	47658 Kato Rd ISED 2324B
☐ Chamber A	☒ Chamber D	☐ Chamber I
☐ Chamber B	☐ Chamber E	☐ Chamber J
☐ Chamber C	☒ Chamber F	☐ Chamber K
	☐ Chamber G	☐ Chamber L
	☐ Chamber H	☐ Chamber M

The above test sites and facilities are covered under FCC Test Firm Registration # 208313 and covered under ISED Canada company numbers 2324A, 2324B and 22541 as listed in the table.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0.

4. DECISION RULES AND MEASUREMENT UNCERTAINTY

4.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

4.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	U _{LAB}
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.39 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.07 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.52 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	4.88 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.24 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.37 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.17 dB

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

5. INTRODUCTION OF TEST DATA REUSE

5.1. DESCRIPTION OF EUT

The EUT is a smartphone with multimedia functions (music, application support, and video), cellular GSM, GPRS, EGPRS, UMTS, LTE, 5G, CDMA, IEEE 802.11a/b/g/n/ac/ax, Bluetooth, Ultra-Wideband, GPS, NFC and WPT. All models support at least one UICC based SIM. The second SIM is either an UICC based p-SIM (physical SIM) or e-SIM (electronic SIM). The device supports a built-in inductive charging transmitter and receiver. The rechargeable battery is not user accessible.

This test report addresses the UWB operational mode.

The EUT has a UWB transceiver with four integral antennas (ANT 0 = UWB1, ANT 1 = UWB2, ANT 2 = ANT6/shared UWB & UWB3) and operates on 6.5 GHz (Channel 5) and 8 GHz (Channel 9). The antennas are not user accessible and UWB3 is disable on device. Six signal configurations (CONFIG 0,1,2,3,4 & 5) are available for each ANT/CH setting.

ANT	CH	CONFIG
0	5	0
0	5	1
0	5	2
0	5	3
0	5	4
0	5	5
0	9	0
0	9	1
0	9	2
0	9	3
0	9	4
0	9	5
1	5	0
1	5	1
1	5	2
1	5	3
1	5	4
1	5	5
1	9	0
1	9	1
1	9	2
1	9	3
1	9	4
1	9	5
2	5	0
2	5	1
2	5	2
2	5	3
2	5	4
2	5	5
2	9	0
2	9	1
2	9	2
2	9	3
2	9	4
2	9	5

5.2. INTRODUCTION

This application for certification is leveraging the data reuse procedures from KDB 484596 D01 based on reference FCC ID BCG-E3545A & IC: 579C-E3545A to cover variant model BCG-E3547A & IC: 579C-E3547A. The major difference between the parent/reference model and the variant model is the depopulation in the variant model of the mmWave transmitter. All other circuitry and features are identical. The data reuse test plan was approved via manufacturer KDB inquiry.

5.3. REFERENCE DETAIL

Reference application that contains the reused reference data which is attached to this report in the Appendix.

Equipment Class	Reference FCC ID & IC	Reference Report	Report Title / Section
UWB	BCG-E3545A 579C-E3545A	13259315-E21	FCC IC_UWB Report / All Sections

5.4. DIFFERENCE IN MODEL NUMBERS

Models A2407, A2408 and A2409 (FCC ID: BCG-E3547A & IC ID: 579C-E3547A) are electrically identical and are allocated for marketing and logistic purposes only. A2407 was used to perform spot check testing described in this report.

5.5. MAXIMUM OUTPUT POWER

Highest Average Powers based on ANT/CH.

ANT	CH	CONFIG	Average Power (dBm EIRP)
0	5	0	-43.05
0	9	2	-42.48
1	5	0	-42.9
1	9	3	-42.42
2	5	1	-42.38
2	9	3	-43.15

5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Three integral antennas are employed and the antenna gains are listed as follow:

CH	Freq. Band (GHz)	Gain (dBi)		
		ANT 0 (UWB1)	ANT 1 (UWB2)	ANT 2 (ANT6/shared UWB)
5	6.5	-2.7	-2.3	-5.2
9	8.0	0.3	-0.4	-2.0

5.7. MODULATION

The UWB signal is BPSK pulsed modulated signal.

5.8. SOFTWARE AND FIRMWARE

The Software and Firmware version used at test is 18A23120m.

6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

SUPPORT EQUIPMENT LIST			
Description	Manufacturer	Model	Serial Number
Laptop + Adapter	Apple	Mac Book Air	C02TK02YJ10C
Kanzi – USB Adapter	Apple	--	325D59
Laptop + Adapter	Apple	Mac Book Air	C02YL5TNJHC8
Kanzi – USB Adapter	Apple	--	316FAS
Smart Phone	Apple	A2341	G6TD201104P9-CRB-P3A16DL-025438

I/O CABLES

I/O CABLES					
Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
AC	1	AC	Un-shielded	2	N/A
USB	1	USB	Un-shielded	1	N/A

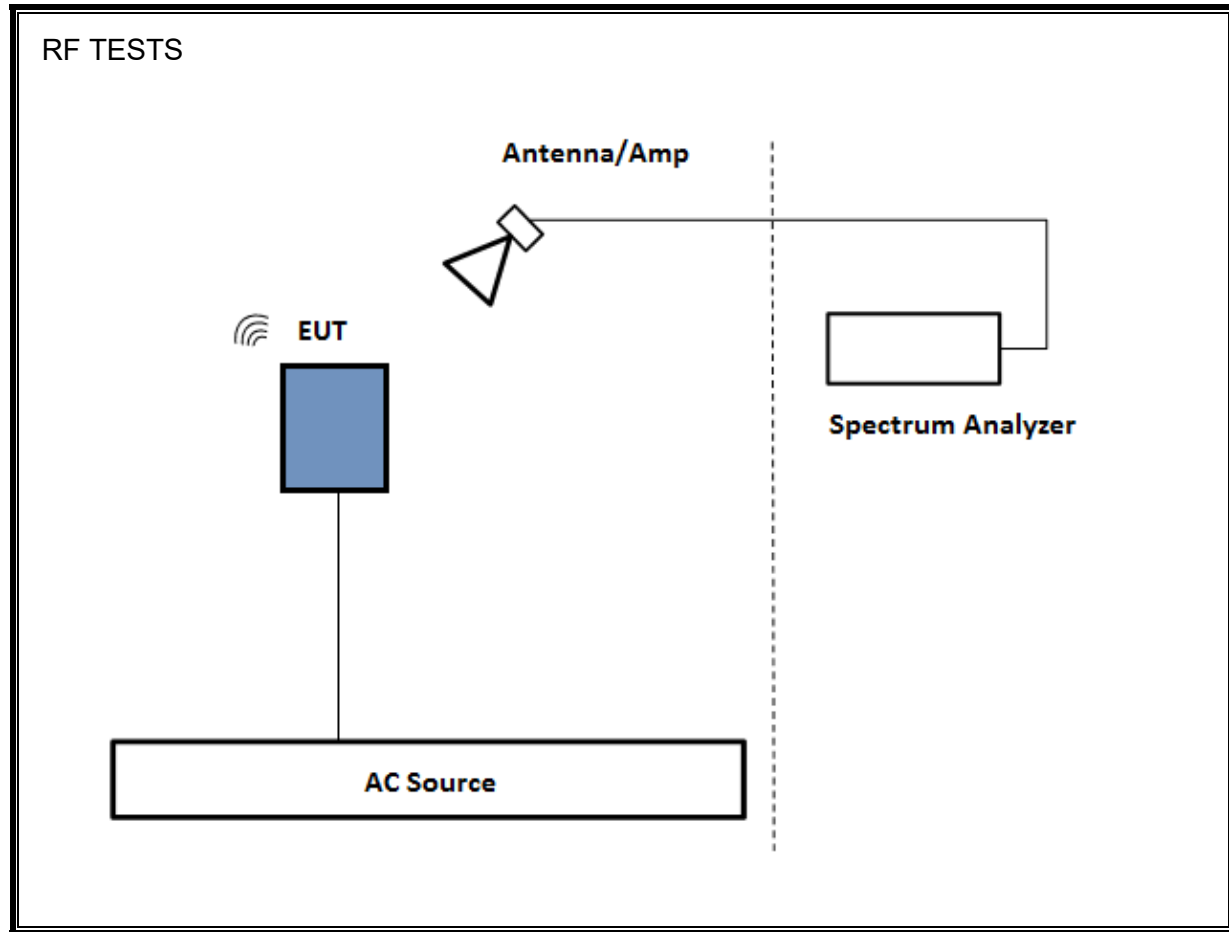
TEST SETUP

The EUT was examined at pre-scan test using a fundamental frequency in the portrait (z), landscape (y), and flatbed (x) position and the worst case orientation of individual ANT/CH/CONFIG setting was determined for final spurious emission measurement.

Measurements of spurious average emissions were made with the device operating at a higher power than production power to ensure compliance. Measurements of the in-band signals (peak and average emissions) were all made at the production power settings.

EUT was connected to AC power adapter in all test cases.

SETUP DIAGRAM FOR TESTS



7. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List					
Description	Manufacturer	Model	Local ID	Cal Date	Cal Due
EMI Test Receiver	Rohde & Schwarz	ESW44	PRE0203383	2/18/2020	2/18/2021
Horn Antenna, 1-18 GHz	ETS Lindgren	3117	T119	4/21/2020	4/21/2021
Preamp, 1-18 GHz	Miteq	AFS42-00101800-25-S-42	PRE0183207	6/11/2020	6/11/2021
PXA Signal Analyzer	Agilent	N9030A	T342	1/24/2020	1/24/2021
Hybrid Antenna, 30-2000 MHz	SunAR	JB1	T243	4/15/2020	4/15/2021
Preamp, 0.1-1300 MHz	Sonoma Inst.	310	T173	7/22/2020	7/22/2021
Horn Antenna, 1-18 GHz	ETS Lindgren	3117	T711	2/12/2020	2/12/2021
Preamp, 1-18 GHz	Miteq	AFS42-00101800-25-S-42	PRE0183530	8/31/2019	8/31/2020
EMI Test Receiver	Rohde & Schwarz	ESW44	PRE0203384	2/18/2020	2/18/2021
Antenna, Active Loop 9kHz-30MHz	ETS Lindgren	6502	T1616	10/18/2019	10/18/2020
Spectrum Analyzer, 44GHz	Keysight	N9030A	T905	1/27/2020	1/27/2021
Preamplifier, 1-26.5GHz	Agilent	8449B	T404	4/8/2020	4/8/2021
Horn Antenna, 18-26.5GHz	ARA	MWH-1826/B	PRE0079280	4/17/2020	4/17/2021
Preamplifier, 26-40 GHz	Miteq	NSTTA2640-35-HG	T1864	4/8/2020	4/8/2021
Horn Antenna, 26-40 GHz	ARA	MWH-2640/B	PRE0182203	4/17/2020	4/17/2021
DC Power Supply	Hewlett Packard	E3610A	T502	NCR	--
DC Power Supply	All-Bright Technology Co.	8185D	PRE0129629	NCR	--
Multimeter	Fluke	77	T78	1/21/2020	1/21/2021
Low Pass Filter	Microtronics	LPM20143	PR0199966	11/23/2019	11/23/2020
High Pass Filter, CH5	Wainwright Inst. GMBH	WHW2-7100-10000-18000-40DC	--	NCR	--
High Pass Filter, CH9	Wainwright Inst. GMBH	WHW2-8165-11500-21000-40CD	--	NCR	--
EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESR	T1436	2/20/2020	2/20/2021
Power Cable, Line Conducted Emissions	UL	PR1	T861	10/27/2019	10/27/2020
LISN for Conducted Emissions CISPR-16	FISCHER CUSTOM COMMUNICATIONS	FCC-LISN-50/250-25-2-01	T1310	1/23/2020	1/23/2021
Radiated Software	UL	UL EMC	Ver 9.5, Mar 6, 2020		
AC Line Conducted Software	UL	UL EMC	Ver 9.5, Feb 21, 2020		

8. SPOT CHECK VERIFICATIONS

Spot check verifications have been performed on device model A2407 for in-band Peak Power and Maximum Average Emissions on all the configurations listed on Section 5.1 operating at the same production power settings as model A2341. For the verification of unwanted emissions from 9 kHz to 40 GHz, Config 3, Payload 125 of both CH5 and CH9 on Ant 2 were selected to test, using a higher power than production power to ensure compliance.

Tabulated data provides the test results of all available test configurations. The plots of Ant 0, CONFIG 0, Payload 125 bandwidth measurement on CH5 and CH9 are presented and same measurement settings apply to the rest of test configurations.

8.1. PEAK POWER AND MAXIMUM AVERAGE EMISSIONS

LIMITS

FCC

15.519 (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, f_m . That limit is 0 dBm EIRP.

15.519 (c) 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

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Annex, Section 4 (c) Peak measurements shall be made in addition to average measurements. Transmissions shall not exceed 0 dBm e.i.r.p. in any 50 MHz bandwidth when the average limit is -41.3 dBm/MHz.

Section 5.3.1 (d) Radiated emissions above 960 MHz from a device shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz.

Frequency	E.I.R.P. in a Resolution Bandwidth of 1 MHz
4.75 – 10.6 GHz	-41.3 dBm

TEST PROCEDURE

ANSI C63.10 Clause 10.3.

RSS-220 Annex

Peak EIPR power is measured using RBW of 50 MHz.

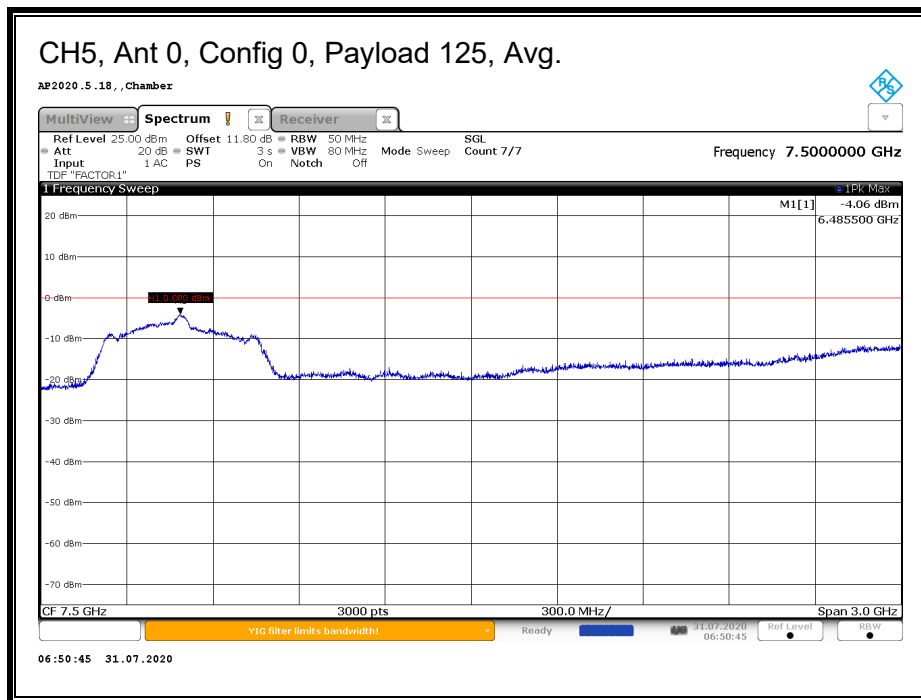
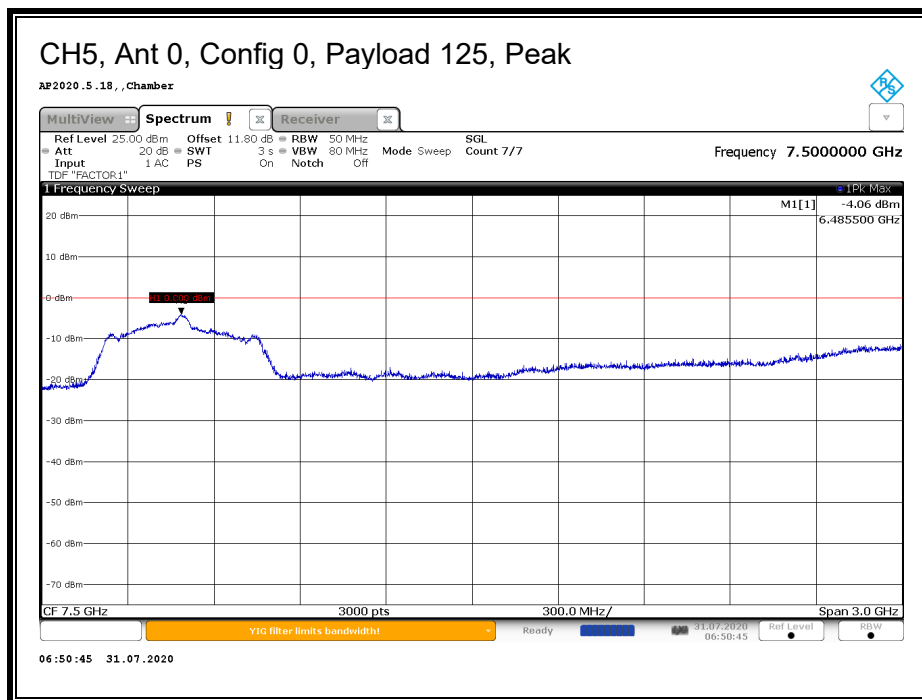
The radiated emissions of 6 - 9 GHz frequency band are performed at 3-meter test distance.

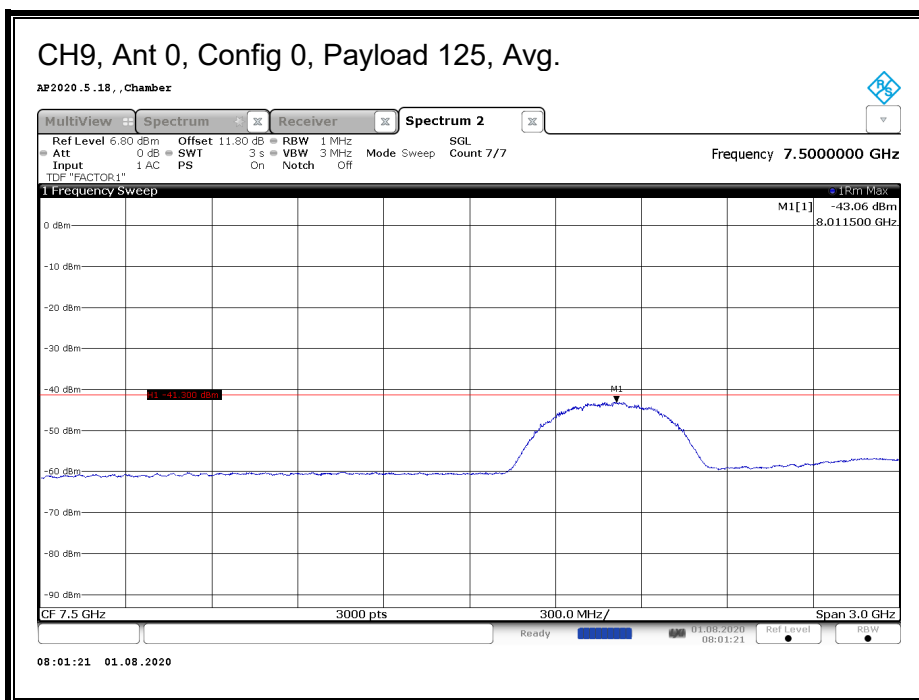
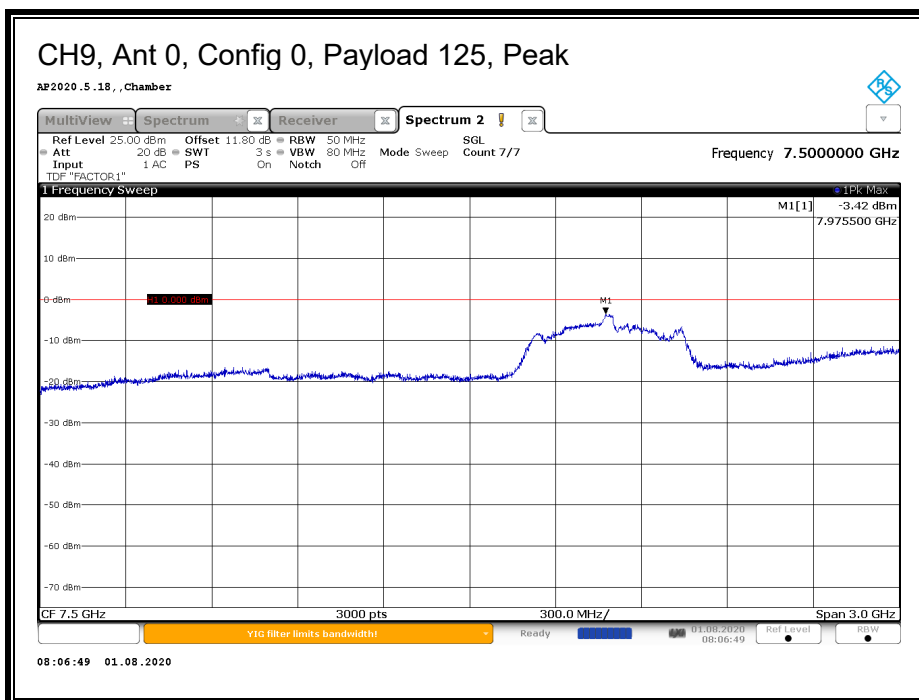
Tabulated data provides the test results of all available test configurations. The plots of Ant 0, CONFIG 0, Payload 125 power measurement on CH5 and CH9 are presented and same measurement settings apply to the rest of test configurations.

RESULTS

Tested By: 19419, 12501, 12485, 12472, 20737

ANT	CH	CONFIG	Payload	EUT Orientation	Meas. Ant. Polarity	Peak EIRP Power				Average EIRP Power			
						FM (GHz)	Peak Power (dBm/50MHz)	Peak Limit (0 dBm/50 MHz)	Margin (dB)	FM (GHz)	Avg Power (dBm/MHz)	Avg Limit (dBm/MHz)	Margin (dB)
0	5	0	125	Portrait	H	6.4855	-4.06	0	-4.06	6.4655	-43.05	-41.3	-1.75
0	5	1	125	Portrait	H	6.4805	-3.45	0	-3.45	6.4655	-43.28	-41.3	-1.98
0	5	2	125	Portrait	H	6.4915	-7.44	0	-7.44	6.4655	-43.35	-41.3	-2.05
0	5	3	125	Portrait	H	6.4825	-7.07	0	-7.07	6.4625	-43.76	-41.3	-2.46
0	5	4	0	Portrait	H	6.2415	-8.71	0	-8.71	6.4685	-43.57	-41.3	-2.27
0	5	5	0	Portrait	H	6.2445	-6.86	0	-6.86	6.4615	-43.52	-41.3	-2.22
0	9	0	125	Portrait	H	7.9755	-3.42	0	-3.42	8.0115	-43.06	-41.3	-1.76
0	9	1	125	Portrait	H	7.9755	-3.19	0	-3.19	8.0115	-43.26	-41.3	-1.96
0	9	2	125	Portrait	H	7.9845	-6.15	0	-6.15	8.0095	-42.48	-41.3	-1.18
0	9	3	125	Portrait	H	7.9765	-6.13	0	-6.13	8.0075	-42.78	-41.3	-1.48
0	9	4	0	Portrait	H	8.2375	-6.73	0	-6.73	8.0075	-42.96	-41.3	-1.66
0	9	5	0	Portrait	H	8.2385	-5.01	0	-5.01	8.0075	-42.86	-41.3	-1.56
1	5	0	125	Portrait	H	6.4835	-4.63	0	-4.63	6.4065	-42.9	-41.3	-1.60
1	5	1	125	Portrait	H	6.4895	-4.21	0	-4.21	6.4065	-43.48	-41.3	-2.18
1	5	2	125	Portrait	H	6.4865	-8.23	0	-8.23	6.4105	-43.63	-41.3	-2.33
1	5	3	125	Portrait	H	6.4835	-7.82	0	-7.82	6.4065	-43.39	-41.3	-2.09
1	5	4	0	Portrait	H	6.4305	-9.05	0	-9.05	6.4075	-43.22	-41.3	-1.92
1	5	5	0	Portrait	H	6.4245	-7.69	0	-7.69	6.4075	-43.46	-41.3	-2.16
1	9	0	125	Portrait	H	7.9805	-3.51	0	-3.51	8.0215	-42.43	-41.3	-1.13
1	9	1	125	Portrait	H	7.9925	-2.71	0	-2.71	8.0115	-42.65	-41.3	-1.35
1	9	2	125	Portrait	H	7.9935	-6.34	0	-6.34	8.0095	-42.57	-41.3	-1.27
1	9	3	125	Portrait	H	8.0005	-5.85	0	-5.85	8.0185	-42.42	-41.3	-1.12
1	9	4	0	Portrait	H	7.7415	-5.98	0	-5.98	8.0075	-42.74	-41.3	-1.44
1	9	5	0	Portrait	H	7.7465	-4.40	0	-4.40	8.0155	-42.94	-41.3	-1.64
2	5	0	125	Landscape	H	6.2455	-4.43	0	-4.43	6.3085	-42.92	-41.3	-1.62
2	5	1	125	Landscape	H	6.2395	-2.84	0	-2.84	6.3075	-42.38	-41.3	-1.08
2	5	2	125	Landscape	H	6.4945	-7.59	0	-7.59	6.3555	-42.77	-41.3	-1.47
2	5	3	125	Landscape	H	6.4865	-7.20	0	-7.20	6.3335	-42.57	-41.3	-1.27
2	5	4	0	Landscape	H	6.2465	-4.11	0	-4.11	6.3565	-42.92	-41.3	-1.62
2	5	5	0	Landscape	H	6.2435	-3.21	0	-3.21	6.3105	-43.49	-41.3	-2.19
2	9	0	125	Landscape	H	8.2485	-4.16	0	-4.16	8.1405	-44.27	-41.3	-2.97
2	9	1	125	Landscape	H	8.2425	-3.29	0	-3.29	8.1465	-44.10	-41.3	-2.80
2	9	2	125	Landscape	H	7.9895	-7.92	0	-7.92	8.1425	-43.58	-41.3	-2.28
2	9	3	125	Landscape	H	7.9965	-7.12	0	-7.12	8.1425	-43.15	-41.3	-1.85
2	9	4	0	Landscape	H	8.2485	-3.36	0	-3.36	8.0295	-43.20	-41.3	-1.90
2	9	5	0	Landscape	H	8.2415	-1.90	0	-1.90	8.0335	-44.11	-41.3	-2.81





8.2. EMISSIONS BELOW 960 MHz

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:

15.209 (a)

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3

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Section 3.4 Radiated emissions at or below 960 MHz for all subclasses of UWB device shall not exceed the following limits. Measurements of radiated emissions at and below 960 MHz are to be made using a CISPR quasi-peak detector. CISPR measurement bandwidth specifications are to be used.

Frequency (MHz)	Field Strength (Microvolts/m)	Measurement Distance (Metres)	E.i.r.p. (dBmW)
0.009-0.490	2,400/F (F in kHz)	300	$10 \log (17.28 / F^2)$ (F in kHz)
0.490-1.705	24,000/F (F in kHz)	30	$10 \log (17.28 / F^2)$ (F in kHz)
1.705-30	30	30	-45.7
30-88	100	3	-55.2
88-216	150	3	-51.7
216-960	200	3	-49.2

Note: The emission limits for the bands 9-90 kHz and 110-490 kHz are based on measurements employing an average emissions detector.

TEST PROCEDURES

ANSI C63.10 Clause 10.2 and 10.3.

RSS-220 Annex

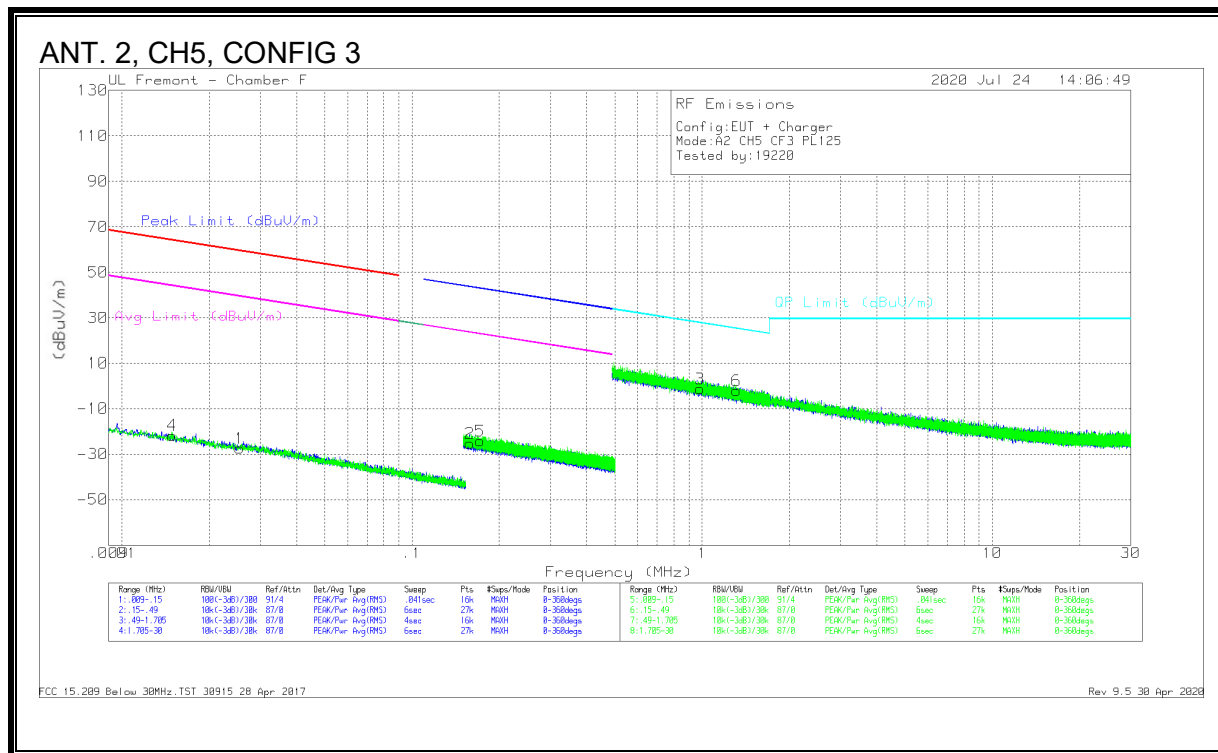
PROCEDURE FOR 9 kHz TO 960 MHz

Measurements are made with the antenna feeding a spectrum analyzer via a preamplifier and cables, at a maximum distance of 3m from the EUT.

A final test is made at any frequencies at which emissions are found. During this final scan, the antenna is kept no further from the EUT than the maximum distance calculated for each band that yields a minimum system noise floor.

RESULTS

8.2.1. EMISSIONS, 9 kHz – 30 MHz



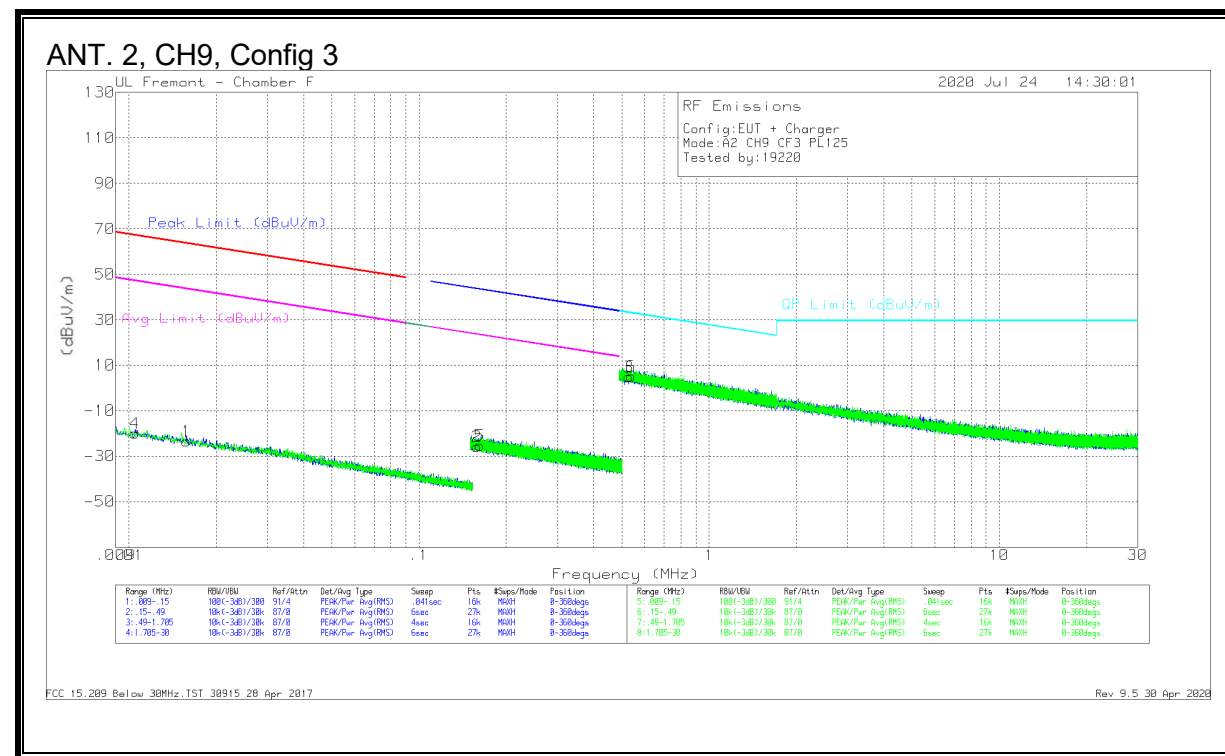
Trace Markers

Marker	Freq. (MHz)	Meter Reading (dBuV/m)	Det	Loop Antenna (dBm)	Cables (dB)	Dist Corr 300m	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.02548	38.05	Pk	14.7	0	-80	-27.25	59.46	-86.71	39.46	-66.71	-	-	-	-	0-360
2	.15833	43.6	Pk	11.1	.1	-80	-25.2	-	-	-	-	43.63	-68.83	23.63	-48.83	0-360
4	.01492	41.36	Pk	17	0	-80	-21.64	64.11	-85.75	44.11	-65.75	-	-	-	-	0-360
5	.17185	44.61	Pk	11.1	.1	-80	-24.19	-	-	-	-	42.92	-67.11	22.92	-47.11	0-360

Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV/m)	Det	Loop Antenna (dBm)	Cables (dB)	Dist Corr (dB) 40Log	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
3	.98385	27.5	Pk	11.2	.1	-40	-1.2	27.76	-28.96	0-360
6	1.31376	26.56	Pk	11.2	.1	-40	-2.14	25.26	-27.4	0-360

Pk - Peak detector



Trace Markers

Marker	Freq. (MHz)	Meter Reading (dBuV/m)	Det	Loop Antenna (dBm)	Cables (dB)	Dist Corr 300m	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.01581	39.95	Pk	16.7	0	-80	-23.35	63.6	-86.95	43.6	-66.95	-	-	43.63	-66.33	0-360
2	.15833	43.1	Pk	11.1	1	-80	-25.7	67.17	-87.16	47.17	-67.16	-	-	-	-	0-360
4	.01049	41.21	Pk	18.8	0	-80	-19.99	67.17	-87.16	47.17	-67.16	-	-	-	-	0-360
5	.16219	43.59	Pk	11.1	1	-80	-25.21	-	-	-	-	43.42	-68.63	23.42	-48.63	0-360

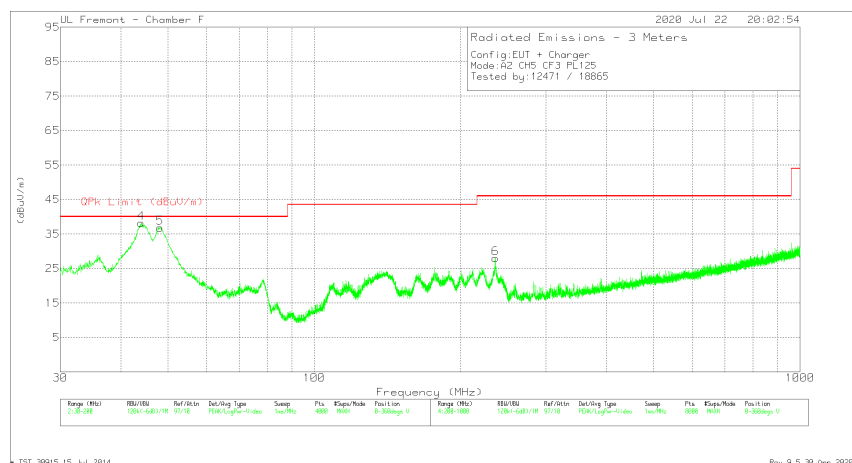
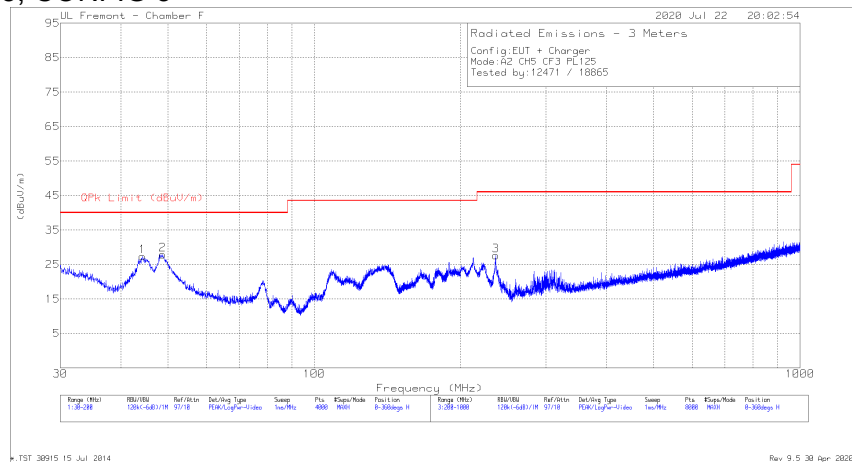
Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV/m)	Det	Loop Antenna (dBm)	Cables (dB)	Dist Corr (dB) 40Log	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
3	.5283	33.93	Pk	11	.1	-40	5.03	33.15	-28.12	0-360
6	.53856	34	Pk	11	.1	-40	5.1	32.98	-27.88	0-360

Pk - Peak detector

8.2.2. EMISSIONS, 30 - 960 MHz

ANT. 2, CH5, CONFIG 3



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	44.2837	41.82	Pk	17.2	-31.7	27.32	40	-12.68	0-360	401	H
2	48.7474	44.71	Pk	14.9	-31.7	27.91	40	-12.09	0-360	401	H
4	44.0286	52.55	Pk	17.4	-31.7	38.25	40	-1.75	0-360	100	V
5	48.1522	53.46	Pk	15.1	-31.7	36.86	40	-3.14	0-360	100	V
3	236.3047	39.93	Pk	17.9	-30.2	27.63	46.02	-18.39	0-360	99	H
6	235.8047	40.39	Pk	17.9	-30.3	27.99	46.02	-18.03	0-360	100	V

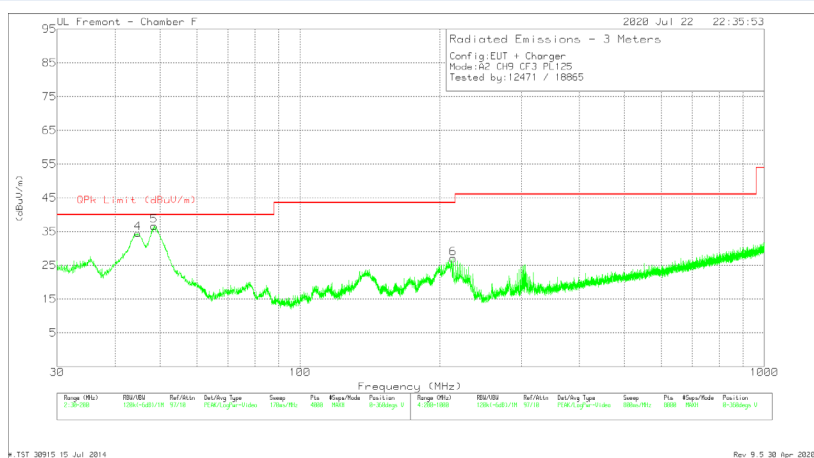
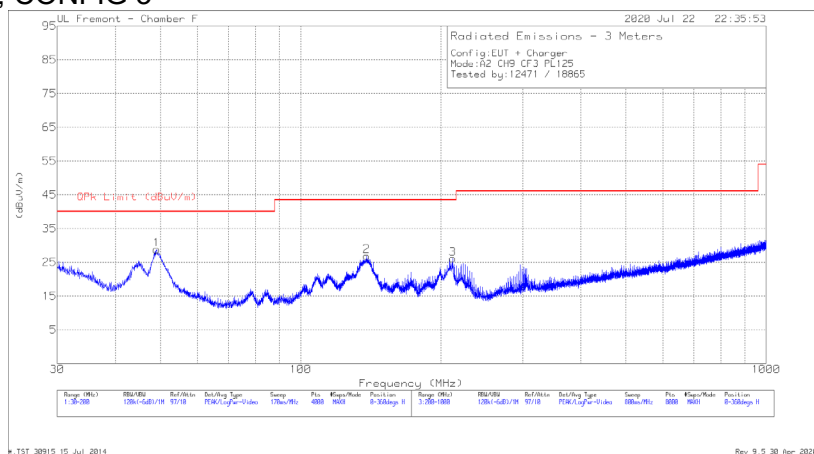
Pk - Peak detector

Radiated Emissions

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	44.1001	50.34	Qp	17.3	-31.7	35.94	40	-4.06	51	105	V
5	47.9554	50.55	Qp	15.2	-31.7	34.05	40	-5.95	22	100	V

Qp - Quasi-Peak detector

ANT. 2, CH9, CONFIG 3



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	49.0449	45.7	Pk	14.8	-31.7	28.8	40	-11.2	0-360	401	H
2	138.5306	38.37	Pk	19.4	-30.9	26.87	43.52	-16.65	0-360	200	H
4	44.7513	49.33	Pk	16.9	-31.7	34.53	40	-5.47	0-360	100	V
5	48.5348	53.36	Pk	15	-31.7	36.66	40	-3.34	0-360	100	V
3	212.1016	39.51	Pk	17	-30.4	26.11	43.52	-17.41	0-360	99	H
6	213.8018	40.35	Pk	17.1	-30.4	27.05	43.52	-16.47	0-360	99	V

Pk - Peak detector

Radiated Emissions

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	44.8924	46.37	Qp	16.9	-31.7	31.57	40	-8.43	122	105	V
5	48.5204	49.81	Qp	15	-31.7	33.11	40	-6.89	270	102	V

Qp - Quasi-Peak detector

8.3. AVERAGE EMISSIONS ABOVE 960 MHz

LIMITS

FCC

15.519 (c)

Frequency in MHz	EIRP in dBm
960-1610	-75.3
1610-1990	-63.3
1990-3100	-61.3
3100-10600	-41.3
Above 10600	-61.3

§15.519 (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 in MHz	EIRP in dBm
1164-1240	-85.3
1559-1610	-85.3

RSS-220

Section 5.3.1 (d) Radiated emissions above 960 MHz from a device shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz.

Hand-held (Outdoor) Communication, Measurement, Location Sensing, and Tracking Devices	
Frequency	E.i.r.p. in a Resolution Bandwidth of 1 MHz
960-1 610 MHz	-75.3 dBm
1.61-4.75 GHz	-70.0 dBm
4.75-10.6 GHz	-41.3 dBm
Above 10.6 GHz	-61.3 dBm

Section 5.3.1 (e) In addition to the limits specified in paragraph (d) of this section, radiated emissions shall not exceed the following average limits when measured using a resolution bandwidth greater than or equal to 1 kHz. The measurements shall demonstrate compliance with the stated limits at whatever resolution bandwidth is used.

Frequency	E.i.r.p. in a Resolution Bandwidth of no less than 1 kHz
1 164-1 240 MHz	-85.3 dBm
1 559-1 610 MHz	-85.3 dBm

TEST PROCEDURES

ANSI C63.10 Clause 10.2 and 10.3.

RSS-220 Annex

PROCEDURE FOR 0.96 TO 6 GHz

Measurements are made with the antenna feeding a spectrum analyzer via a preamplifier and cables, at a maximum distance of 0.5m from the EUT.

A low pass filter with a cut off frequency of 6 GHz is used to suppress the fundamental and perform measurement for 0.96 - 6 GHz.

RESULTS FOR 6 GHz TO 9 GHz

The 6 - 9 GHz frequency band is covered in Section 8.2.

PROCEDURE FOR 9 GHz TO 18 GHz

Measurements are made with the antenna feeding a spectrum analyzer via a preamplifier and cables, at a maximum distance of 0.5m from the EUT.

A high pass filter with pass band frequency beyond 9 GHz is used to suppress the fundamental and perform measurement for 9 - 18 GHz.

PROCEDURE FOR 1.164 TO 1.240 GHz

Measurements are made with the antenna feeding a spectrum analyzer via a preamplifier and cables, at a maximum distance of 0.5m from the EUT.

RBW = 120 kHz & VBW = 360 kHz were used at pre-scan.

A low pass filter with a cut off frequency of 6 GHz is used to suppress the fundamental and perform measurement for 1.164 – 1.240 GHz.

PROCEDURE FOR 1.559 TO 1.610 GHz

Measurements are made with the antenna feeding a spectrum analyzer via a preamplifier and cables, at a maximum distance of 0.5m from the EUT.

RBW = 120 kHz & VBW = 360 kHz were used at pre-scan.

A low pass filter with a cut off frequency of 6 GHz is used to suppress the fundamental and perform measurement for 1.559 – 1.610 GHz.

PROCEDURE FOR 18 GHz TO 40 GHz

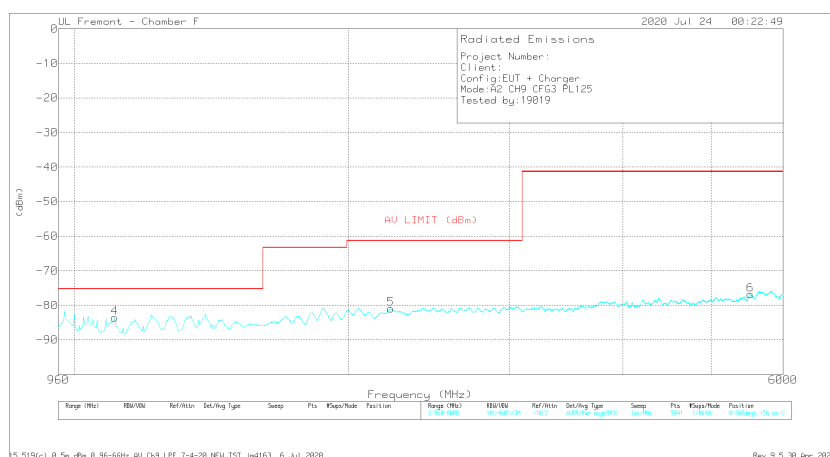
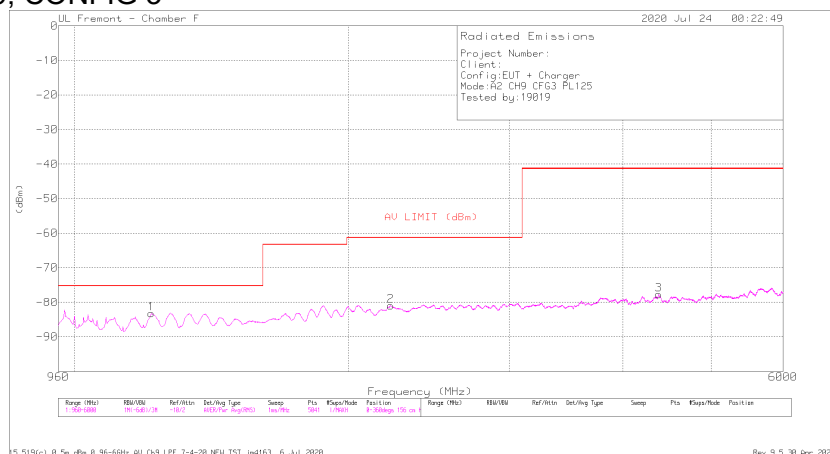
Measurements are made with the antenna feeding a spectrum analyzer via a preamplifier and cables, at a maximum distance of 0.5m from the EUT.

A final test is made at any frequencies at which emissions are found. During this final scan, the antenna is kept no further from the EUT than the maximum distance calculated for each band that yields a minimum system noise floor.

Distance Correction Factor from 3m to 0.5m = $20 \cdot \log(0.5\text{m}/3\text{m}) = -15.56 \text{ dB}$

RESULTS

ANT. 2, CH9, CONFIG 3



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T711 (dBm)	Amp/Cbl (dB)	Dist Correction (dB)	Conversion Factor (dB)	CH9_LPF (dB)	EIRP (dBm)	FCC15.519(c) ERP RMS (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1214	-62.79	RMS	28.4	-45.2	-15.6	11.8	.2	-83.19	-75.3	-7.89	228	156	H
2	2225	-63.85	RMS	31.7	-45.3	-15.6	11.8	.3	-80.95	-61.3	-19.65	338	156	H
3	4382	-64.9	RMS	33.9	-43.2	-15.6	11.8	.3	-77.7	-41.3	-36.4	228	156	H
4	1107	-62.05	RMS	27.5	-45.5	-15.6	11.8	.2	-83.65	-75.3	-8.35	220	156	V
5	2225	-63.91	RMS	31.7	-45.3	-15.6	11.8	.3	-81.01	-61.3	-19.71	264	156	V
6	5525	-67.88	RMS	34.7	-41.7	-15.6	11.8	1.8	-76.88	-41.3	-35.58	65	156	V

RMS - RMS detection

*Note: Test was performed with a low-pass filter with cutoff frequency at 6 GHz to suppress CH9 fundamental signal.

UL Fremont - Chamber F

2020 Jul 26 13:21:36

Radiated Emissions

Project Number:

Client:

Config: EUT + Charger

Mode: NO CH5 CFG3 PL125

Tested by: 18861

(dBm)

ISED R55-228 5.3.1 (d)

0 5 6

Frequency (MHz)

Range (MHz)	RBW (Hz)	Ref Ant	Swing Type	Swamp	Pts	Range/Node	Position
0.00 - 60.00	900	100	100	100	100	100	100

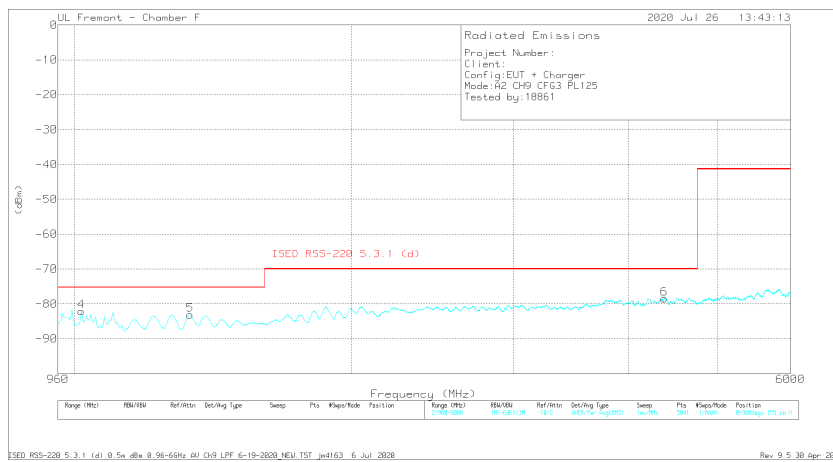
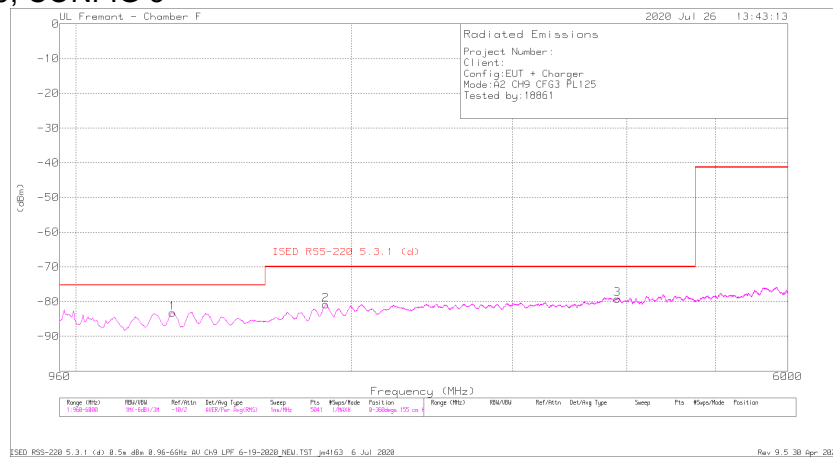
ISED R55-228 5.3.1 (d) 0.5m offset 8.95-66Hz @ 0.5 LFP 6-19-2008 NEW TST 144153 6 Jul 2020

Rev: 9.5 30 Aug 2019

Marker	Frequency (MHz)	Meter Reading (dBM)	Det	AF T711 (dBi/m)	Amp/Cbl (dB)	Dist Correction (dB)	Conversion Factor (dB)	CH5_LPF (dB)	Corrected Reading	ISED RSS-220 5.3.1 (dB)	Margin (dB)	Azimuth (deg)	Height (cm)	Polarity
1	1105	-61.38	RMS	27.5	-45.4	-15.6	11.8	2	-82.88	-75.3	-7.58	220	155	H
2	1894	-63.57	RMS	45	-45	-15.7	11.8	3	-81.27	-70	-11.27	308	155	H
3	3917	-66.51	RMS	33.7	-43.1	-15.6	11.8	6	-79.11	-70	-9.11	264	155	H
4	1221	-63.23	RMS	28.5	-45.3	-15.6	11.8	2	-83.63	-75.3	-8.33	53	155	V
5	2054	-63.51	RMS	31.3	-45.4	-15.6	11.8	4	-81.01	-70	-11.01	31	155	V
6	4381	-65.17	RMS	33.9	-43.2	-15.6	11.8	3	-77.97	-70	-7.97	272	155	V

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ANT. 2, CH9, CONFIG 3



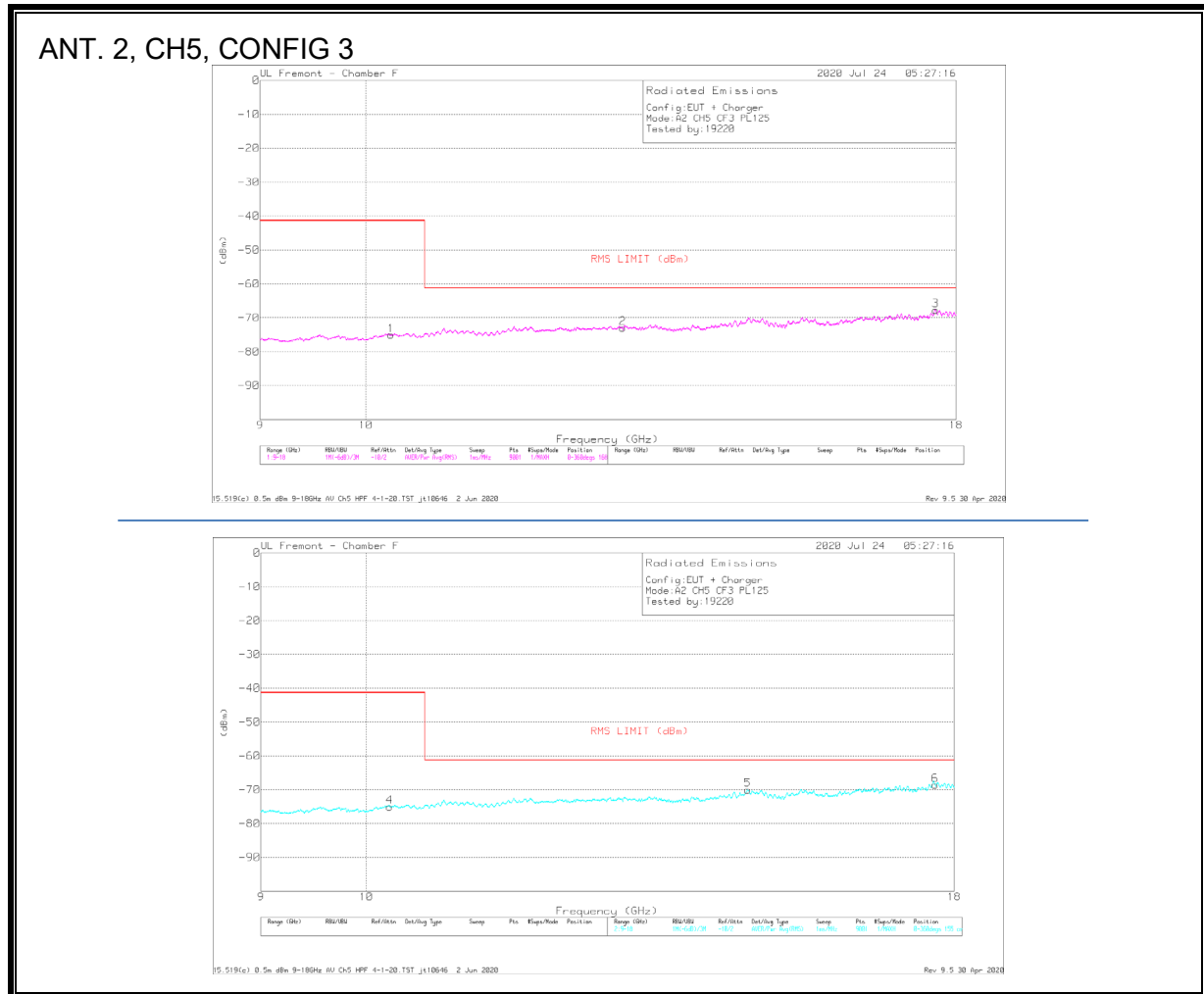
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T711 (dBm)	Amp/Cbt (dB)	Dist Correction (dB)	Conversion Factor (dB)	CH9_LFF (dB)	Corrected Reading (dBm)	ISED RSS-228 5.3.1 (d)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1275	-63.22	RMS	29	-45.3	-15.6	11.8	.1	-83.22	-75.3	-7.92	22	155	H
2	1876	-63.16	RMS	30.8	-45	-15.6	11.8	.3	-80.86	-70	-10.86	1	155	H
3	3906	-66.48	RMS	33.6	-43.1	-15.6	11.8	.6	-79.18	-70	-9.18	154	155	H
4	1018	-60.64	RMS	27.3	-45.2	-15.6	11.8	.2	-82.14	-75.3	-6.84	207	155	V
5	1336.5	-63.11	RMS	29	-45.3	-15.6	11.8	.1	-83.11	-75.3	-7.81	75	155	V
6	4375	-65.34	RMS	33.9	-43.6	-15.6	11.8	.4	-78.44	-70	-8.44	295	155	V

RMS - RMS detection

*Note: Test was performed with a low-pass filter with cutoff frequency at 6 GHz to suppress CH9 fundamental signal.

8.3.2. AVERAGE EMISSIONS, 9 – 18 GHz



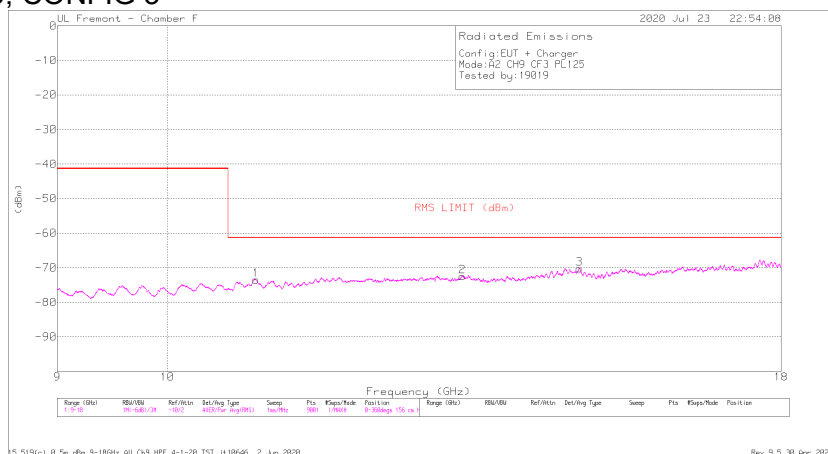
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T711 (dBm)	Amp/Cbl (dB)	Dist Correction (dB)	Conversion Factor (dB)	CH5_HPF (dB)	EIRP (dBm)	FCC15.519(c) EIRP RMS (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	10.253	-70.71	RMS	37.2	-38.4	-15.6	11.8	.6	-75.11	-41.3	-33.81	0	168	H
2	12.915	-71.4	RMS	39.2	-37.5	-15.6	11.8	.5	-73	-61.3	-11.7	329	168	H
3	17.639	-71.11	RMS	41.4	-34.8	-15.6	11.8	.6	-67.11	-61.3	-6.41	132	168	H
4	10.237	-70.63	RMS	37.2	-38.4	-15.6	11.8	.6	-75.03	-41.3	-33.73	317	155	V
5	14.642	-70.81	RMS	40.1	-36.2	-15.6	11.8	.7	-70.01	-61.3	-8.71	207	155	V
6	17.66	-70.78	RMS	41.4	-35.9	-15.6	11.8	.5	-68.58	-61.3	-7.28	185	155	V

RMS - RMS detection

*Note: Test was performed with a high-pass filter with pass-band frequency starting at 9 GHz to surpress CH5 fundamental signal.

ANT. 2, CH9, CONFIG 3



Trace Markers

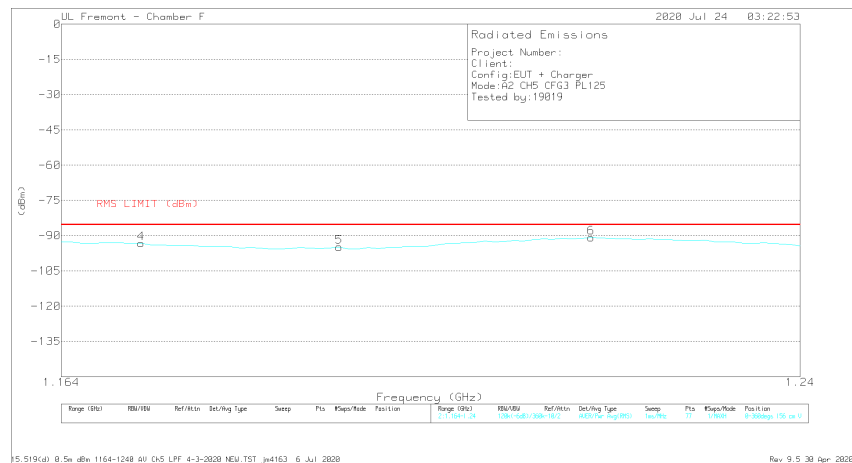
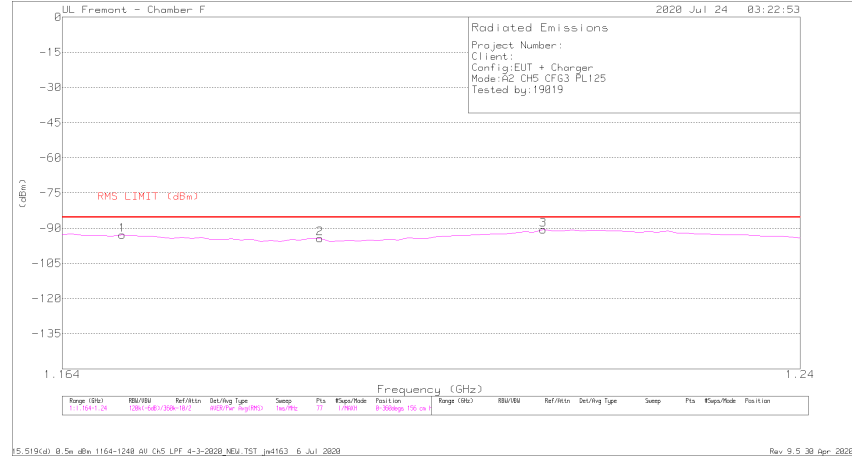
Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T711 (dBm)	Amp/Cbl (dB)	Dist Correction (dB)	Conversion Factor (dB)	CH9_HPF (dB)	EIRP (dBm)	FCC15.519(c) EIRP RMS (dBm)	Margin (dB)	Asimuth (Degs)	Height (cm)	Polarity
1	10.866	-69.65	RMS	37.8	-37.8	-15.6	11.8	0	-73.45	-61.3	-12.15	339	156	H
2	13.265	-71.24	RMS	39.1	-37	-15.6	11.8	.4	-72.54	-61.3	-11.24	251	156	H
3	14.838	-70.84	RMS	40	-36.4	-15.6	11.8	.8	-70.24	-61.3	-8.94	273	156	H
4	10.146	-69.64	RMS	37	-36.6	-15.6	11.8	0	-75.04	-41.3	-33.74	241	156	V
5	13.337	-71.54	RMS	39.1	-36.5	-15.6	11.8	.4	-72.34	-61.3	-11.04	109	156	V
6	16.393	-70.8	RMS	40.8	-36.8	-15.6	11.8	.6	-70	-61.3	-8.7	66	156	V

RMS - RMS detection

*Note: Test was performed with a high-pass filter with pass-band frequency starting at 9 GHz to surpress CH9 fundamental signal.

8.3.3. AVERAGE EMISSIONS, 1.164 – 1.240 GHz

ANT. 2, CH5, CONFIG 3



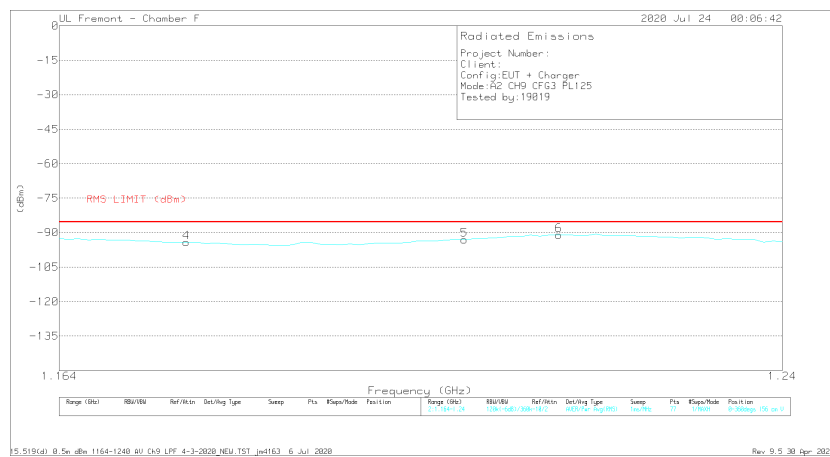
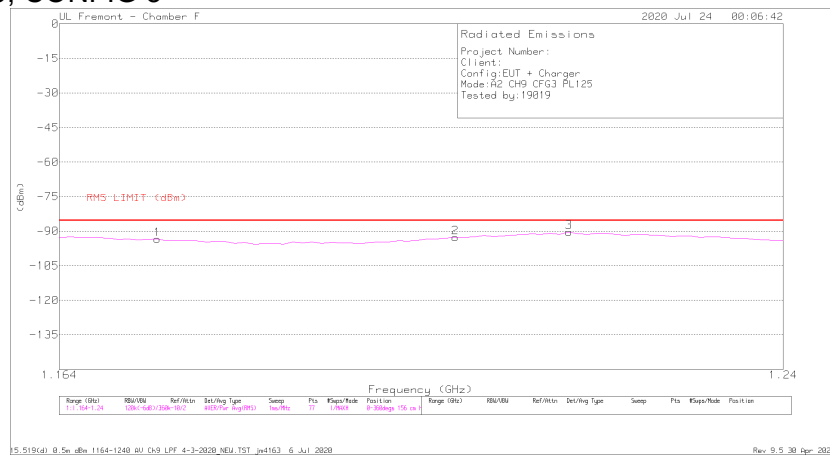
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T711 (dBm)	Amp/Cbl (dB)	Dist Correction (dB)	Conversion Factor (dB)	CH5 LP Filter	EIRP (dBm)	FCC15.519(d) EIRP RMS (dBm)	Margin (dB)	Altitude (Dgms)	Height (cm)	Polarity
1	1.17	-72.43	RMS	28.6	-45.4	-15.6	11.8	.1	-92.93	-85.3	-7.63	338	156	H
2	1.19	-74.58	RMS	29.1	-45.2	-15.6	11.8	.1	-94.38	-85.3	-9.08	97	156	H
3	1.213	-71.58	RMS	29.7	-45.2	-15.6	11.8	.2	-90.68	-85.3	-5.38	97	156	H
4	1.172	-72.79	RMS	28.6	-45.4	-15.6	11.8	.1	-93.29	-85.3	-7.99	176	156	V
5	1.192	-75.22	RMS	29.2	-45.1	-15.6	11.8	.1	-94.82	-85.3	-9.52	44	156	V
6	1.218	-71.88	RMS	29.9	-45.2	-15.6	11.8	.2	-90.78	-85.3	-5.48	176	156	V

RMS - RMS detection

*Note: Test was performed with a low-pass filter with cutoff frequency at 6 GHz to suppress CH5 fundamental signal.

ANT. 2, CH9, CONFIG 3



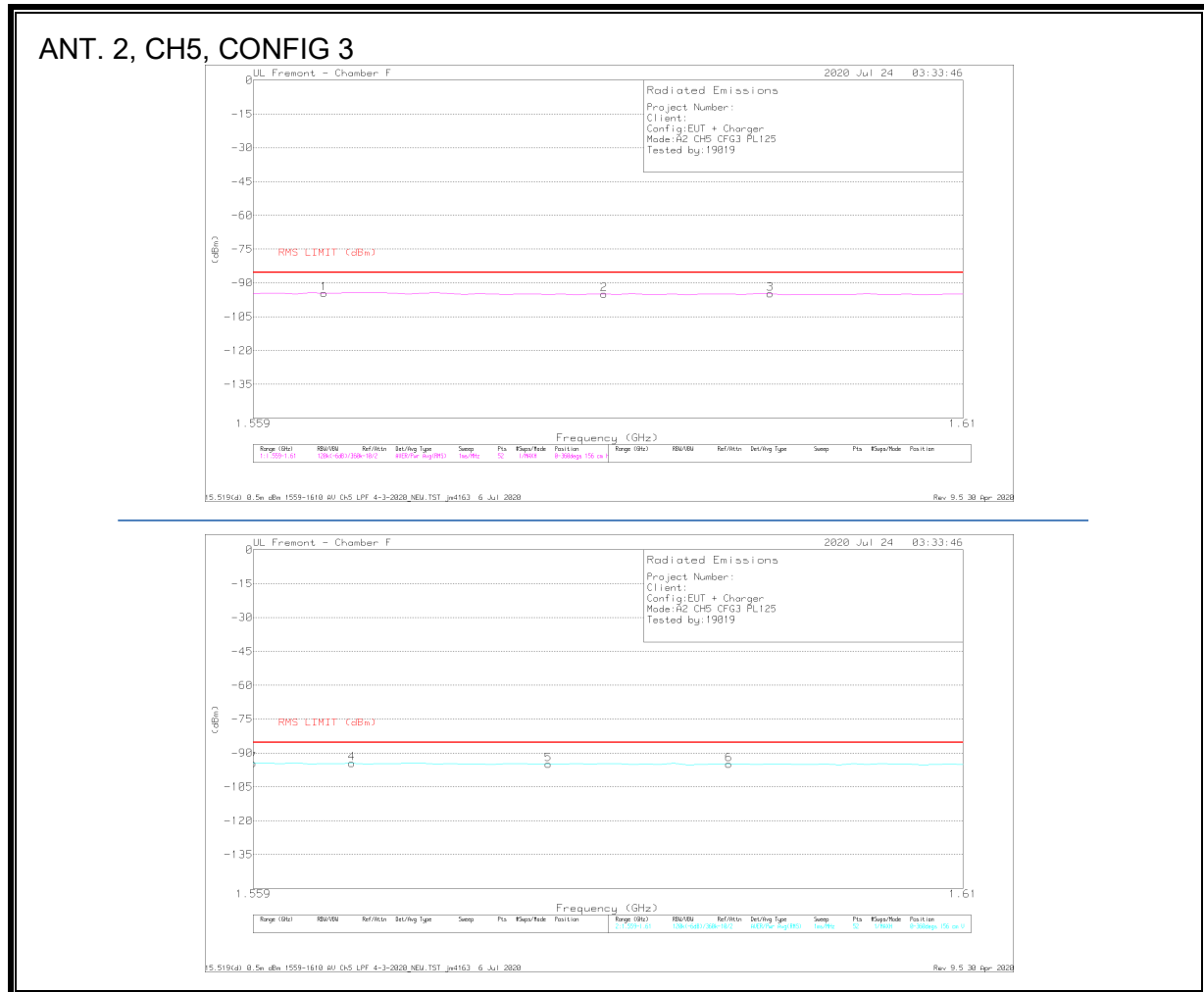
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T711 (dBm)	Amp/Cbl (dB)	Dist Correction (dB)	Conversion Factor (dB)	CH9 LP Filter	EIRP (dBm)	FCC15.519(d) EIRP RMS (dBm)	Margin (dB)	Asimuth (Degs)	Height (cm)	Polarity
1	1.174	-72.96	RMS	28.6	-45.4	-15.6	11.8	.1	-93.46	-85.3	-8.16	264	156	H
2	1.205	-73.53	RMS	29.6	-45.2	-15.6	11.8	.2	-92.73	-85.3	-7.43	175	156	H
3	1.217	-71.44	RMS	29.9	-45.2	-15.6	11.8	.2	-90.34	-85.3	-5.04	175	156	H
4	1.177	-73.73	RMS	28.7	-45.4	-15.6	11.8	.1	-94.13	-85.3	-8.83	229	156	V
5	1.206	-73.77	RMS	29.6	-45.2	-15.6	11.8	.2	-92.97	-85.3	-7.67	207	156	V
6	1.216	-72.15	RMS	29.9	-45.2	-15.6	11.8	.2	-91.05	-85.3	-5.75	317	156	V

RMS - RMS detection

*Note: Test was performed with a low-pass filter with cutoff frequency at 6 GHz to surpress CH9 fundamental signal.

8.3.4. AVERAGE EMISSIONS, 1.559 – 1.610 GHz



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T711 (dBm)	Amp/Cbl (dB)	Dist Correction (dB)	Conversion Factor (dB)	CH5 LP Filter	EIRP (dBm)	FCC15.519(d) EIRP RMS (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.564	-73.59	RMS	27.9	-45.2	-15.6	11.8	.2	-94.49	-85.3	-9.19	176	156	H
2	1.584	-74.04	RMS	27.9	-45.2	-15.6	11.8	.2	-94.94	-85.3	-9.64	22	156	H
3	1.596	-74.05	RMS	28	-45.2	-15.6	11.8	.3	-94.75	-85.3	-9.45	264	156	H
4	1.566	-73.62	RMS	27.9	-45.2	-15.6	11.8	.2	-94.52	-85.3	-9.22	52	156	V
5	1.58	-74.01	RMS	28	-45.3	-15.6	11.8	.2	-94.91	-85.3	-9.61	75	156	V
6	1.593	-74.23	RMS	28	-45.2	-15.6	11.8	.3	-94.93	-85.3	-9.63	207	156	V
7	1.559	-73.82	RMS	28	-45.2	-15.6	11.8	.2	-94.62	-85.3	-9.32	339	156	V

RMS - RMS detection

*Note: Test was performed with a low-pass filter with cutoff frequency at 6 GHz to surpress CH5 fundamental signal.

ANT. 2, CH9, CONFIG 3



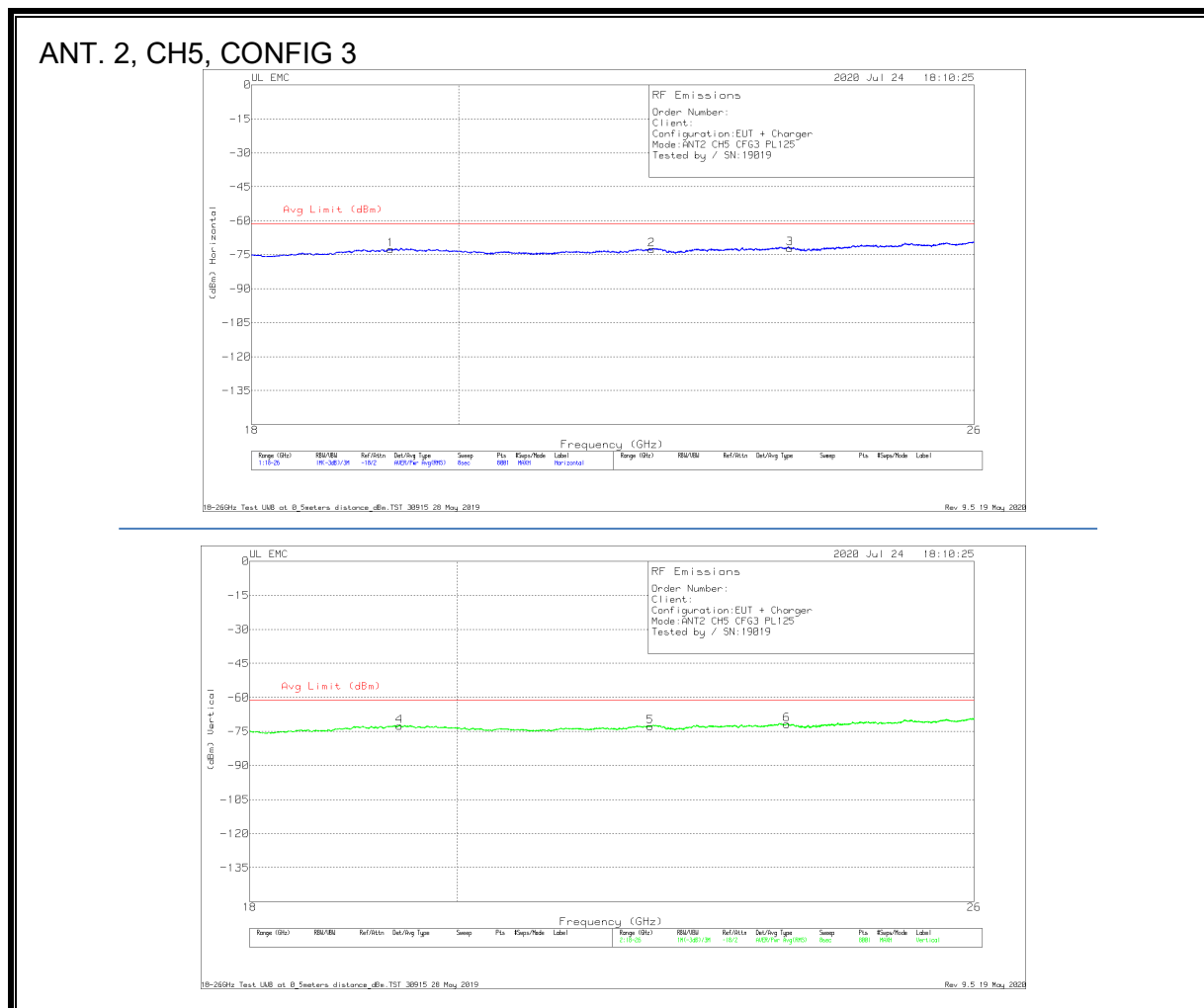
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T711 (dBm)	Amp/Cbl (dB)	Dist Correction (dB)	Conversion Factor (dB)	CH9 LP Filter	EIRP (dBm)	FCC15.519(d) ERP RMS (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.568	-73.2	RMS	27.9	-45.2	-15.6	11.8	.2	-94.1	-85.3	-8.8	228	156	H
2	1.584	-73.64	RMS	27.9	-45.2	-15.6	11.8	.2	-94.54	-85.3	-9.24	295	156	H
3	1.599	-74.27	RMS	28	-45.2	-15.6	11.8	.3	-94.97	-85.3	-9.67	185	156	H
4	1.571	-73.5	RMS	28	-45.2	-15.6	11.8	.2	-94.3	-85.3	-9	43	156	V
5	1.584	-74.33	RMS	27.9	-45.2	-15.6	11.8	.2	-95.23	-85.3	-9.93	154	156	V
6	1.597	-73.95	RMS	28	-45.2	-15.6	11.8	.3	-94.65	-85.3	-9.35	198	156	V

RMS - RMS detection

*Note: Test was performed with a low-pass filter with cutoff frequency at 6 GHz to suppress CH9 fundamental signal.

8.3.5. AVERAGE EMISSIONS, 18 – 26 GHz

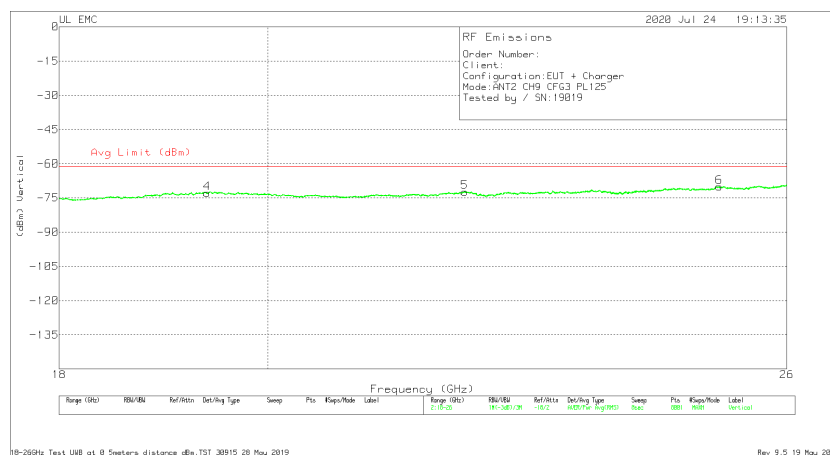
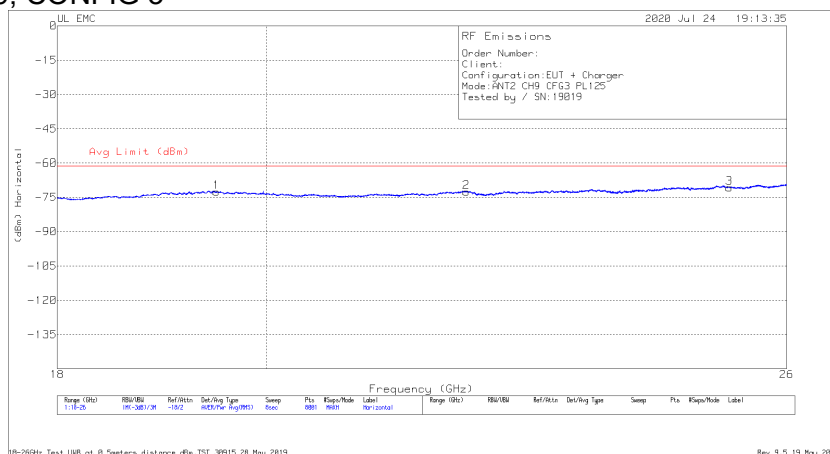


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	PRE0079280 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Conversion Factor (dB)	EIRP (dBm)	Avg Limit (dBm)	Margin (dB)
1	19.32	-82.63	RMS	32.7	-18.9	-15.6	11.8	-72.63	-61.3	-11.33
2	22.064	-81.93	RMS	33.4	-20.3	-15.6	11.8	-72.63	-61.3	-11.33
3	23.672	-82.05	RMS	33.8	-20.1	-15.6	11.8	-72.15	-61.3	-10.85
4	19.422	-82.79	RMS	32.6	-18.6	-15.6	11.8	-72.59	-61.3	-11.29
5	22.059	-81.98	RMS	33.4	-20.4	-15.6	11.8	-72.78	-61.3	-11.48
6	23.641	-82.09	RMS	33.7	-19.6	-15.6	11.8	-71.79	-61.3	-10.49

RMS - RMS detection

ANT. 2, CH9, CONFIG 3

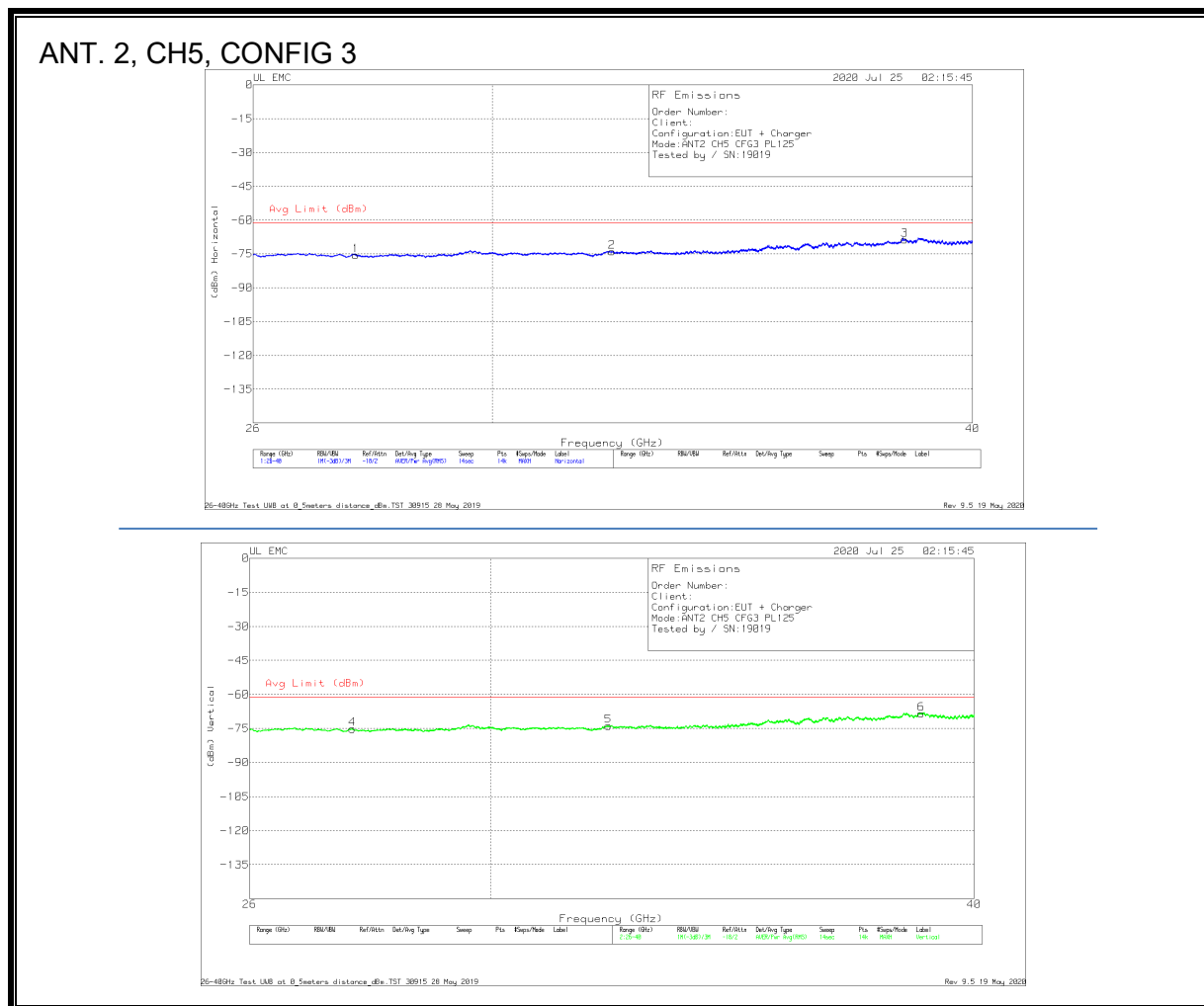


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	PRE0079280 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Conversion Factor (dB)	EIRP (dBm)	Avg Limit (dBm)	Margin (dB)
1	19.504	-82.55	RMS	32.8	-19.1	-15.6	11.8	-72.65	-61.3	-11.35
2	22.122	-82.14	RMS	33.4	-20.1	-15.6	11.8	-72.64	-61.3	-11.34
3	25.258	-81.52	RMS	34.2	-19.7	-15.6	11.8	-70.82	-61.3	-9.52
4	19.397	-82.68	RMS	32.6	-19	-15.6	11.8	-72.88	-61.3	-11.58
5	22.093	-82.07	RMS	33.4	-19.9	-15.6	11.8	-72.37	-61.3	-11.07
6	25.126	-81.27	RMS	34.3	-19.3	-15.6	11.8	-70.07	-61.3	-8.77

RMS - RMS detection

8.3.6. AVERAGE EMISSIONS, 26 – 40 GHz

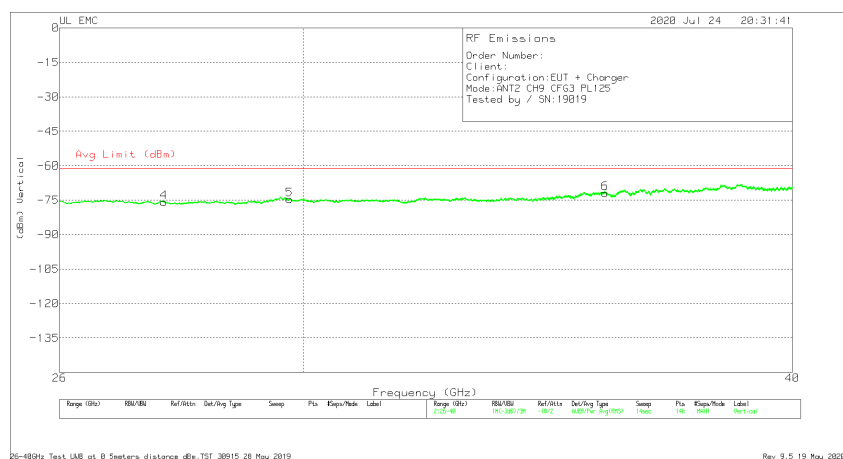
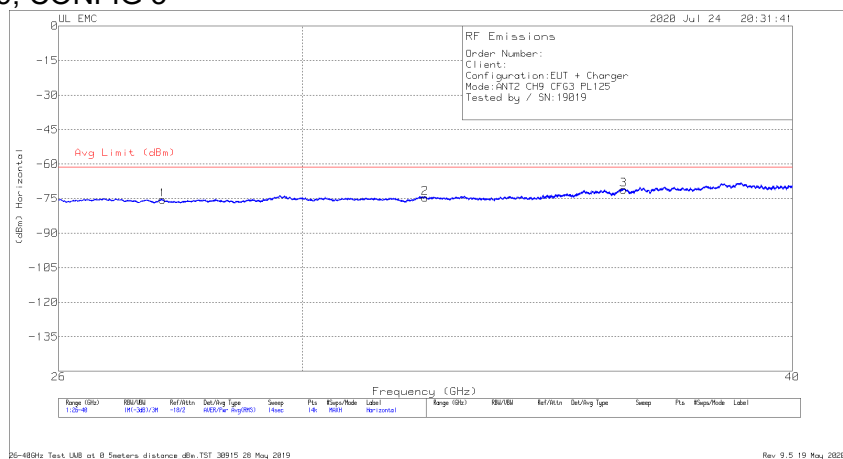


Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	PRE0182203 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Conversion Factor (dB)	EIRP (dBm)	Avg Limit (dBm)	Margin (dB)
1	27.647	-78.46	RMS	35.8	-29.1	-15.6	11.8	-75.56	-61.3	-14.26
2	32.231	-79.36	RMS	37	-27.8	-15.6	11.8	-73.96	-61.3	-12.66
3	38.405	-77.98	RMS	38.3	-25.2	-15.6	11.8	-68.68	-61.3	-7.38
4	27.638	-78.21	RMS	35.8	-29	-15.6	11.8	-75.21	-61.3	-13.91
5	32.182	-78.96	RMS	37	-28.1	-15.6	11.8	-73.86	-61.3	-12.56
6	38.761	-77.74	RMS	38.2	-25.1	-15.6	11.8	-68.44	-61.3	-7.14

RMS - RMS detection

ANT. 2, CH9, CONFIG 3



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	PRE0182203 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Conversion Factor (dB)	EIRP (dBm)	Avg Limit (dBm)	Margin (dB)
1	27.638	-78.46	RMS	35.8	-29	-15.6	11.8	-75.46	-61.3	-14.16
2	32.241	-79.97	RMS	37	-27.8	-15.6	11.8	-74.57	-61.3	-13.27
3	36.226	-78.78	RMS	37.6	-26.1	-15.6	11.8	-71.08	-61.3	-9.78
4	27.647	-78.71	RMS	35.8	-29.1	-15.6	11.8	-75.81	-61.3	-14.51
5	29.764	-80.76	RMS	37.2	-27.2	-15.6	11.8	-74.56	-61.3	-13.26
6	35.827	-79.75	RMS	37.7	-26	-15.6	11.8	-71.85	-61.3	-10.55

RMS - RMS detection

9. SETUP PHOTOS

Please refer to 13259315-EP2V1 for setup photos.

Appendix A – Reference Test Report

Attached is the test report (13259315-E21) containing the reference data from the parent model as detailed in Section 5.3.

END OF REPORT



FCC CFR 47 PART 15 SUBPART F §15.519

ISED RSS-220 ISSUE 1 AMENDMENT 1

CERTIFICATION TEST REPORT

FOR

SMART PHONE

MODEL NUMBER: A2341

REPORT NUMBER: 13259315-E21V4

ISSUE DATE: SEPTEMBER 25, 2020

FCC ID: BCG-E3545A

IC: 579C-E3545A

Prepared for

**APPLE INC.
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CUPERTINO, CA 95014, U.S.A.**

Prepared by

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NVLAP LAB CODE 200065-0 (FREMONT)

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	08/24/2020	Initial Issue	Thu Chan
V2	09/11/2020	Addressed TCB's questions	Thu Chan
V3	09/18/2020	Addressed TCB's questions	Thu Chan
V4	09/25/2020	Section 5.1: Updated Information of Ant. UWB3 Section 5.3: Naming Changed on ANT 2	Thu Chan

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: APPLE INC.
ONE APPLE PARK WAY
CUPERTINO, CA 95014, USA

EUT DESCRIPTION: SMART PHONE

MODEL: A2341

SERIAL NUMBERS: G6TD200B04PJ
G6TCP027Q5R9
G6TD201104P9

DATE TESTED: JULY 5 – AUGUST 22, 2020

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC §15 Subpart F	Complies
ISED RSS-220 Issue 1 Amendment 1	Complies

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. 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 NVLAP, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released For
UL Verification Services Inc. By:



THU CHAN
STAFF ENGINEER
UL Verification Services Inc.

Tested By:



GIA-PIAO CHIN
TEST ENGINEER
UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with CFR Title 47 Part 15 Subpart F, KDB 393764 D01 UWB FAQ v02, ISED RSS-220 Issue 1 Amendment 1 and ANSI C63.10-2013 and RSS GEN Issue 5.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA and at 47658 Kato Road, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies the locations of the facilities that were utilized for radiated emission measurements documented in this report. The specific facilities used are identified in the test results sections.

47173 Benicia Street ISED 2324A	47266 Benicia Street ISED 22541	47658 Kato Rd ISED 2324B
☐ Chamber A	☒ Chamber D	☐ Chamber I
☐ Chamber B	☐ Chamber E	☐ Chamber J
☐ Chamber C	☒ Chamber F	☐ Chamber K
	☐ Chamber G	☐ Chamber L
	☐ Chamber H	☐ Chamber M

The above test sites and facilities are covered under FCC Test Firm Registration # 208313 and covered under ISED Canada company numbers 2324A, 2324B and 22541 as listed in the table.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0.

4. DECISION RULES AND MEASUREMENT UNCERTAINTY

4.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

4.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	U _{LAB}
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.39 dB
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.07 dB
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.52 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	4.88 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.24 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.37 dB
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.17 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a smartphone with multimedia functions (music, application support, and video), cellular GSM, GPRS, EGPRS, UMTS, LTE, 5G, CDMA, IEEE 802.11a/b/g/n/ac/ax, Bluetooth, Ultra-Wideband, GPS, NFC and WPT. All models support at least one UICC based SIM. The second SIM is either an UICC based p-SIM (physical SIM) or e-SIM (electronic SIM). The device supports a built-in inductive charging transmitter and receiver. The rechargeable battery is not user accessible.

This test report addresses the UWB operational mode.

The EUT has a UWB transceiver with four integral antennas (ANT 0 = UWB1, ANT 1 = UWB2, ANT 2 = ANT6/shared UWB & UWB3) and operates on 6.5 GHz (Channel 5) and 8 GHz (Channel 9). The antennas are not user accessible and UWB3 is disable on device. Six signal configurations (CONFIG 0,1,2,3,4 & 5) are available for each ANT/CH setting.

ANT	CH	CONFIG
0	5	0
0	5	1
0	5	2
0	5	3
0	5	4
0	5	5
0	9	0
0	9	1
0	9	2
0	9	3
0	9	4
0	9	5
1	5	0
1	5	1
1	5	2
1	5	3
1	5	4
1	5	5
1	9	0
1	9	1
1	9	2
1	9	3
1	9	4
1	9	5
2	5	0
2	5	1
2	5	2
2	5	3
2	5	4
2	5	5
2	9	0
2	9	1
2	9	2
2	9	3
2	9	4
2	9	5

5.2. MAXIMUM OUTPUT POWER

Highest Average Powers based on ANT/CH.

ANT	CH	CONFIG	Average Power (dBm EIRP)
0	5	2	-42.02
0	9	4	-42.13
1	5	0	-42.15
1	9	1	-42.01
2	5	1	-42.01
2	9	3	-42.04

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

Three integral antennas are employed and the antenna gains are listed as follow:

CH	Freq. Band (GHz)	Gain (dBi)		
		ANT 0 (UWB1)	ANT 1 (UWB2)	ANT 2 (ANT6/shared UWB)
5	6.5	-2.7	-2.3	-5.2
9	8.0	0.3	-0.4	-2.0

5.4. MODULATION

The UWB signal is BPSK pulsed modulated signal.

5.5. SOFTWARE AND FIRMWARE

The Software and Firmware version used at test is 18A23120m.

6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

SUPPORT EQUIPMENT LIST			
Description	Manufacturer	Model	Serial Number
Laptop + Adapter	Apple	Mac Book Air	C02TK02YJ10C
Kanzi – USB Adapter	Apple	--	325D59
Laptop + Adapter	Apple	Mac Book Air	C02YL5TNJHC8
Kanzi – USB Adapter	Apple	--	316FAS
Smart Phone	Apple	A2172	G6TD204K04FR-CRB-G9Y63DXU-011584

I/O CABLES

I/O CABLES					
Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
AC	1	AC	Un-shielded	2	N/A
USB	1	USB	Un-shielded	1	N/A

TEST SETUP

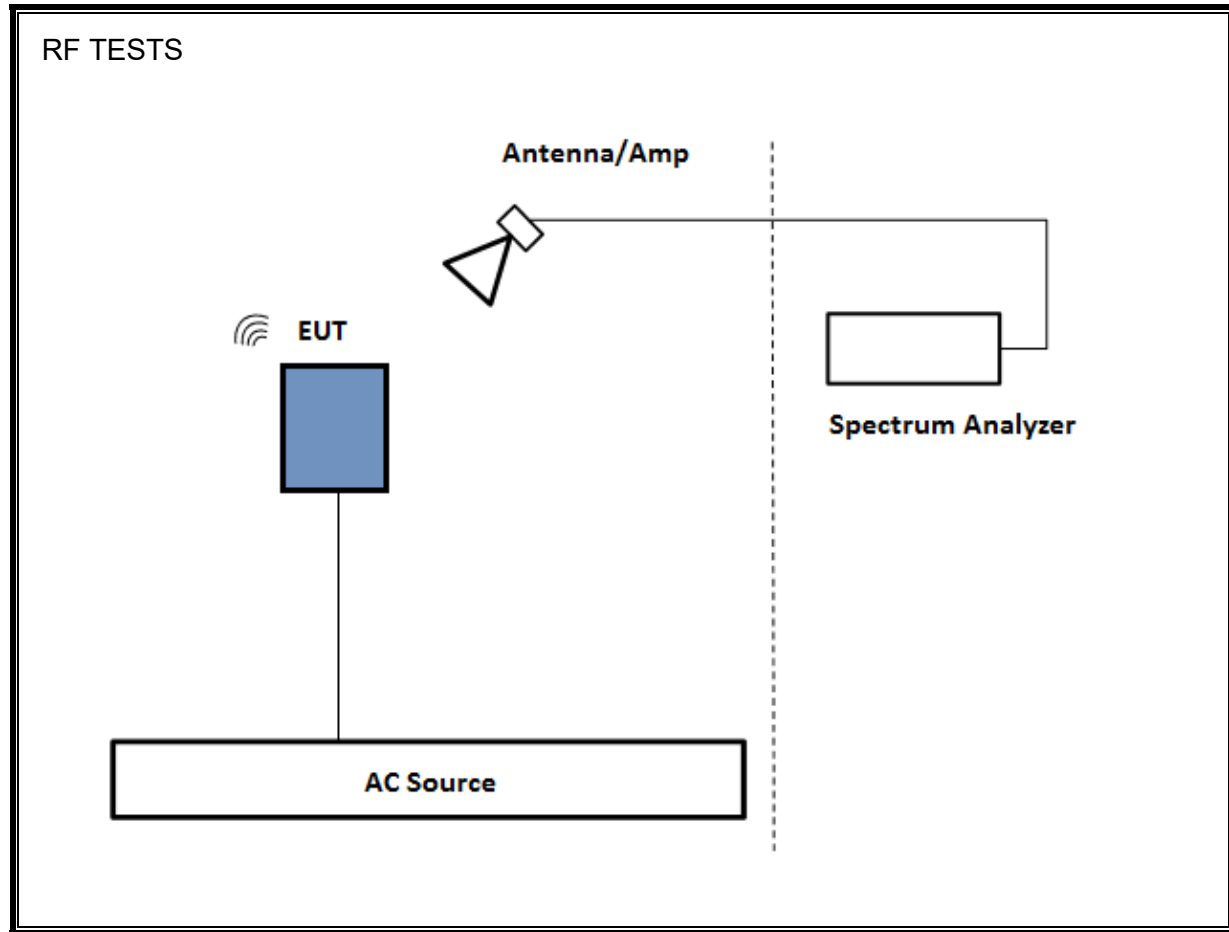
The EUT was examined at pre-scan test using a fundamental frequency in the portrait (z), landscape (y), and flatbed (x) position and the worst case orientation of individual ANT/CH/CONFIG setting was determined for final spurious emission measurement. Config 3, Payload 125 of both CH5 and CH9 on all 3 antennas were selected to test for unwanted emissions as the worst case after pre-scan.

Measurements of spurious average emissions were made with the device operating at a higher power than production power to ensure compliance. Measurements of the in-band signal (peak and average emissions, 10 dBc bandwidth, 99% bandwidth) were all made at the production power settings.

EUT was connected to AC power adapter in all test cases.

For simultaneous transmission of multiple channels in the UWB, LTE, Sub-6 GHz 5G FR1 band, 2.4 GHz WiFi & 5 GHz WiFi bands, 28 GHz & 39 GHz 5G FR2 bands, no noticeable new emission was found.

SETUP DIAGRAM FOR TESTS



7. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List					
Description	Manufacturer	Model	Local ID	Cal Date	Cal Due
EMI Test Receiver	Rohde & Schwarz	ESW44	PRE0203383	2/18/2020	2/18/2021
Horn Antenna, 1-18 GHz	ETS Lindgren	3117	T119	4/21/2020	4/21/2021
Horn Antenna, 1-18GHz	ETS Lindgren	3117	T345	5/19/2020	5/19/2021
Preamp, 1-18 GHz	Miteq	AFS42-00101800-25-S-42	PRE0183207	6/11/2020	6/11/2021
PXA Signal Analyzer	Agilent	N9030A	T342	1/24/2020	1/24/2021
Hybrid Antenna, 30-2000 MHz	SunAR	JB1	T243	4/15/2020	4/15/2021
Preamp, 0.1-1300 MHz	Sonoma Inst.	310	T173	7/22/2020	7/22/2021
Horn Antenna, 1-18 GHz	ETS Lindgren	3117	T711	2/12/2020	2/12/2021
Preamp, 1-18 GHz	Miteq	AFS42-00101800-25-S-42	PRE0183530	8/31/2019	8/31/2020
EMI Test Receiver	Rohde & Schwarz	ESW44	PRE0203384	2/18/2020	2/18/2021
Antenna, Active Loop 9kHz-30MHz	ETS Lindgren	6502	T1616	10/18/2019	10/18/2020
Spectrum Analyzer, 44GHz	Keysight	N9030A	T905	1/27/2020	1/27/2021
Preamplifier, 1-26.5GHz	Agilent	8449B	T404	4/8/2020	4/8/2021
Horn Antenna, 18-26.5GHz	ARA	MWH-1826/B	PRE0079280	4/17/2020	4/17/2021
Preamplifier, 26-40 GHz	Miteq	NSTTA2640-35-HG	T1864	4/8/2020	4/8/2021
Horn Antenna, 26-40 GHz	ARA	MWH-2640/B	PRE0182203	4/17/2020	4/17/2021
DC Power Supply	Hewlett Packard	E3610A	T502	NCR	--
DC Power Supply	All-Bright Technology Co.	8185D	PRE0129629	NCR	--
Multimeter	Fluke	77	T78	1/21/2020	1/21/2021
Low Pass Filter	Microtronics	LPM20143	PR0199966	11/23/2019	11/23/2020
High Pass Filter, CH5	Wainwright Inst. GMBH	WHW2-7100-10000-18000-40DC	--	NCR	--
High Pass Filter, CH9	Wainwright Inst. GMBH	WHW2-8165-11500-21000-40CD	--	NCR	--
EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESR	T1436	2/20/2020	2/20/2021
Power Cable, Line Conducted Emissions	UL	PR1	T861	10/27/2019	10/27/2020
LISN for Conducted Emissions CISPR-16	FISCHER CUSTOM COMMUNICATIONS	FCC-LISN-50/250-25-2-01	T1310	1/23/2020	1/23/2021
Radiated Software	UL	UL EMC	Ver 9.5, Mar 6, 2020		
AC Line Conducted Software	UL	UL EMC	Ver 9.5, Feb 21, 2020		

8. APPLICABLE LIMITS AND TEST RESULTS

8.1. 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer. The RBW is in the range of 1% to 5% of the OBW bandwidth. The VBW is set to $\geq 3 \times \text{RBW}$. The sweep time is coupled.

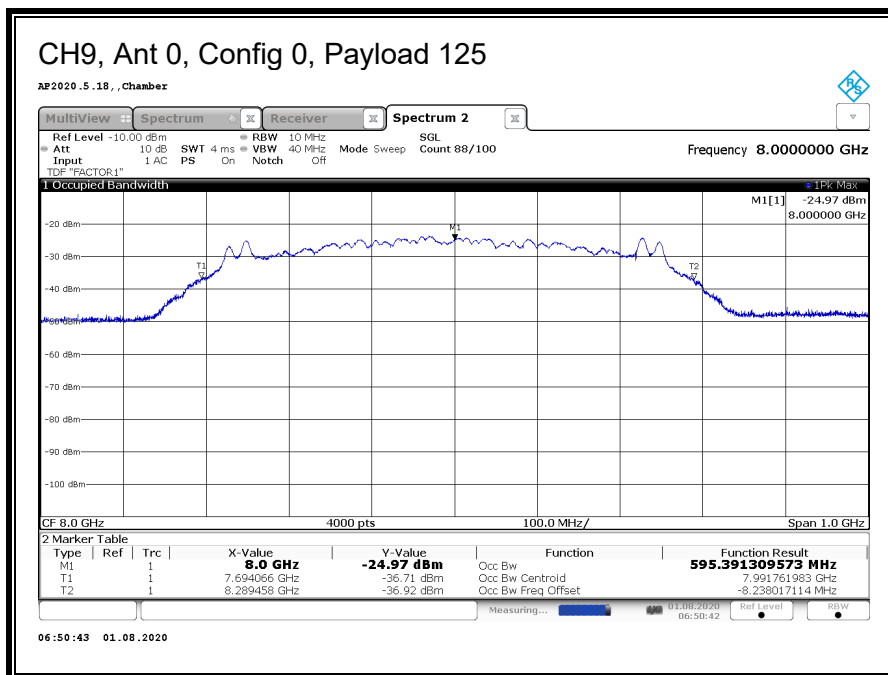
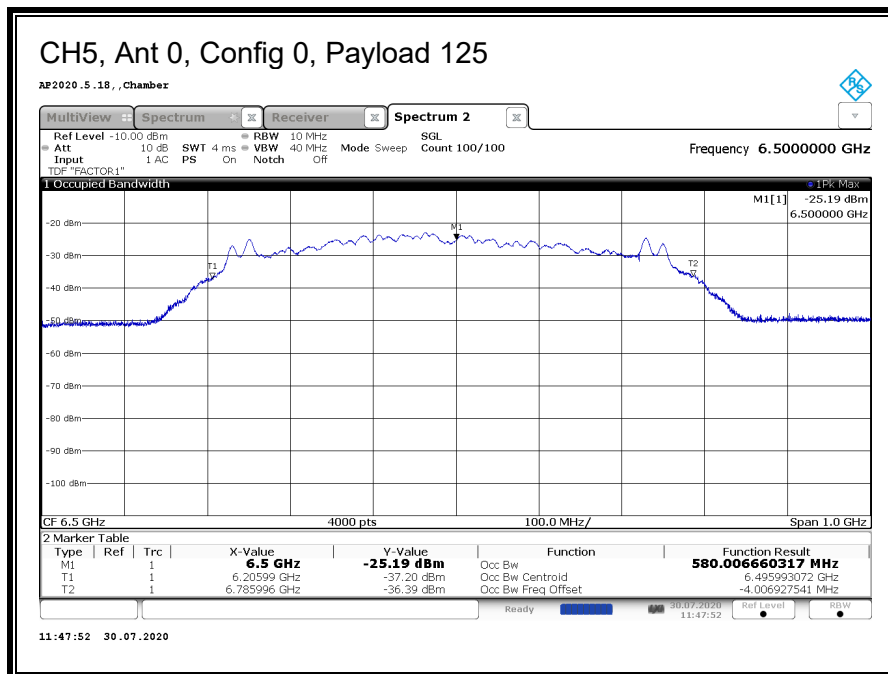
Tabulated data provides the test results of all available test configurations. The plots of Ant 0, CONFIG 0, Payload 125 bandwidth measurement on CH5 and CH9 are presented and same measurement settings apply to the rest of test configurations.

RESULTS

Tested By: 19419, 12501, 12485, 12472, 20737

ANT	CH	CONFIG	Payload	EUT Orientation	Meas. Ant Polarity	99% BW (MHz)
0	5	0	125	Portrait	H	580.01
0	5	1	125	Portrait	H	576.18
0	5	2	125	Portrait	H	599.93
0	5	3	125	Portrait	H	604.72
0	5	4	0	Portrait	H	618.70
0	5	5	0	Portrait	H	588.82
0	9	0	125	Portrait	H	595.39
0	9	1	125	Portrait	H	593.43
0	9	2	125	Portrait	H	634.26
0	9	3	125	Portrait	H	640.36
0	9	4	0	Portrait	H	670.01
0	9	5	0	Portrait	H	616.89
1	5	0	125	Portrait	H	575.10
1	5	1	125	Portrait	H	573.64
1	5	2	125	Portrait	H	630.28
1	5	3	125	Portrait	H	624.11
1	5	4	0	Portrait	H	701.50
1	5	5	0	Portrait	H	611.62
1	9	0	125	Portrait	H	584.30
1	9	1	125	Portrait	H	581.42
1	9	2	125	Portrait	H	575.10
1	9	3	125	Portrait	H	618.81
1	9	4	0	Portrait	H	632.03
1	9	5	0	Portrait	H	600.45
2	5	0	125	Landscape	H	608.21
2	5	1	125	Landscape	H	604.68
2	5	2	125	Landscape	H	625.85
2	5	3	125	Landscape	H	628.65
2	5	4	0	Landscape	H	615.35
2	5	5	0	Landscape	H	604.05
2	9	0	125	Landscape	H	598.16
2	9	1	125	Landscape	H	594.98
2	9	2	125	Landscape	H	626.51
2	9	3	125	Landscape	H	611.77
2	9	4	0	Landscape	H	628.11
2	9	5	0	Landscape	H	612.59

99% BW



8.2. OPERATING 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 .

§15.503 (b) *Center frequency*. The center frequency, f_C , equals $(f_H + f_L)/2$.

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

§15.503 (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.

§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.

RSS-220

Section 2 A *UWB device* is an intentional radiator that has either a *-10 dB bandwidth* of at least 500 MHz or a *-10 dB fractional bandwidth* greater than 0.2.

Section 5.1 (a) The *-10 dB bandwidth* of the device shall be totally contained in the band 3.1-10.6 GHz.

“-10 dB bandwidth B_{-10} ” and “-10 dB fractional bandwidth μ_{-10} ” are defined as follows:

$$B_{-10} = f_H - f_L$$
$$\mu_{-10} = B_{-10}/f_C$$

where:

f_M is the frequency of maximum UWB transmission;

f_H is the highest frequency at which the power spectral density of the UWB transmission is -10 dB relative to f_M ;

f_L is the lowest frequency at which the power spectral density of the UWB transmission is -10 dB relative to f_M ; and

$f_C = (f_H + f_L)/2$ is the centre frequency of the -10 dB bandwidth.

TEST PROCEDURE

ANSI C63.10 Clause 10.1.

RSS-220 Section 2 of the Annex

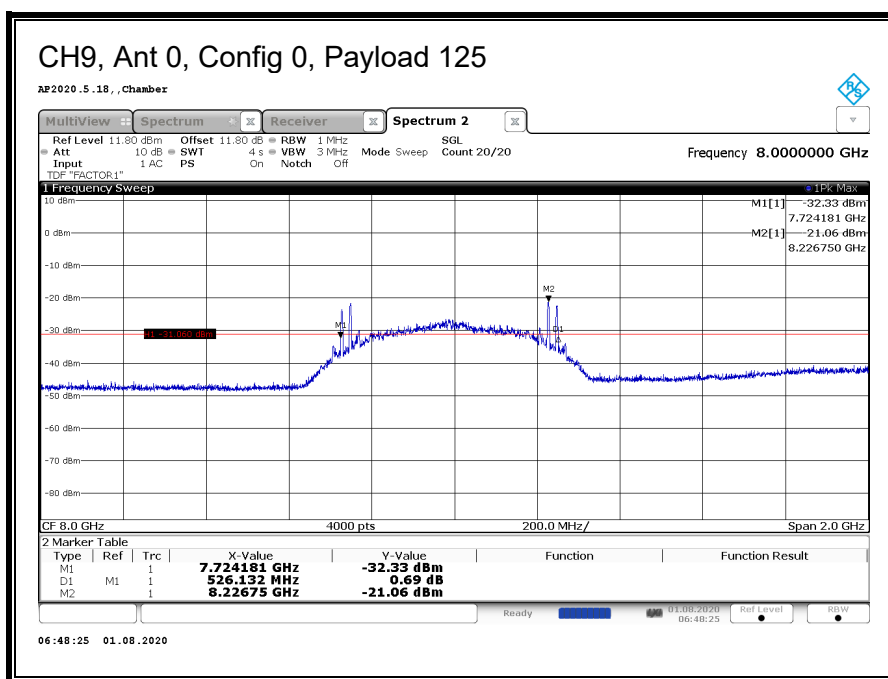
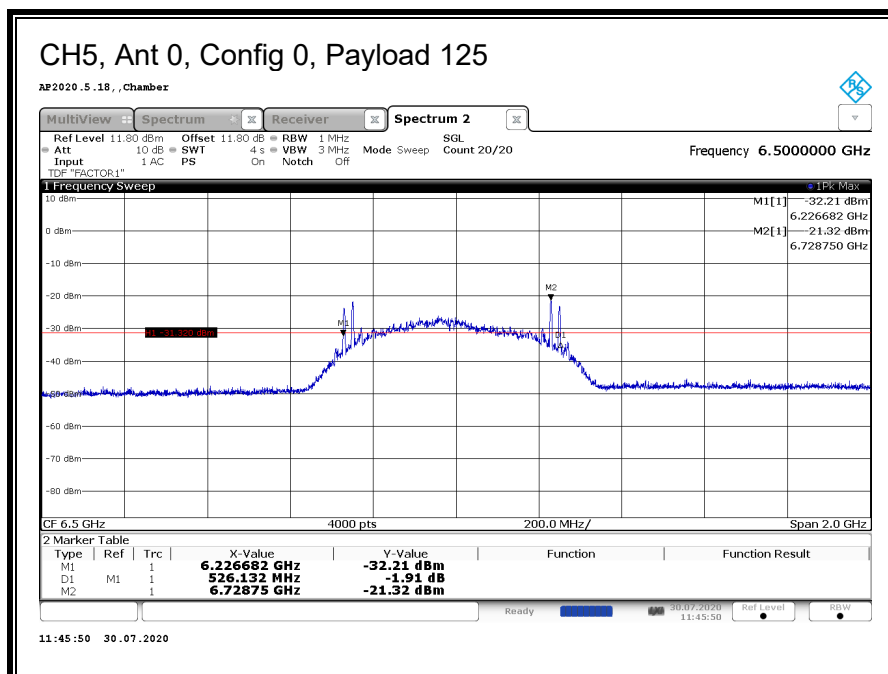
Tabulated data provides the test results of all available test configurations. The plots of Ant 0, CONFIG 0, Payload 125 bandwidth measurement on CH5 and CH9 are presented and same measurement settings apply to the rest of test configurations.

RESULTS

Tested By: 19419, 12501, 12485, 12472, 20737

ANT	CH	CONFIG	Payload	EUT Orientation	Meas. Ant Polarity	FM (GHz)	FL (GHz)	FH (GHz)	FC (GHz)	OBW (MHz)	Min. OBW (MHz)	OBW Margin (MHz)	OBW Pass/Fail
0	5	0	125	Portrait	H	6.729	6.227	6.753	6.490	526.132	500	26.132	P
0	5	1	125	Portrait	H	6.729	6.227	6.753	6.490	526.132	500	26.132	P
0	5	2	125	Portrait	H	6.729	6.228	6.751	6.489	523.631	500	23.631	P
0	5	3	125	Portrait	H	6.250	6.228	6.751	6.489	522.631	500	22.631	P
0	5	4	0	Portrait	H	6.729	6.227	6.753	6.490	526.132	500	26.132	P
0	5	5	0	Portrait	H	6.728	6.226	6.754	6.490	528.132	500	28.132	P
0	9	0	125	Portrait	H	8.227	7.724	8.250	7.987	526.132	500	26.132	P
0	9	1	125	Portrait	H	8.226	7.724	8.250	7.987	526.132	500	26.132	P
0	9	2	125	Portrait	H	8.226	7.726	8.249	7.987	523.631	500	23.631	P
0	9	3	125	Portrait	H	8.226	7.726	8.248	7.987	522.131	500	22.131	P
0	9	4	0	Portrait	H	8.226	7.724	8.250	7.987	526.132	500	26.132	P
0	9	5	0	Portrait	H	8.226	7.723	8.251	7.987	528.132	500	28.132	P
1	5	0	125	Portrait	H	6.729	6.227	6.753	6.490	526.132	500	26.132	P
1	5	1	125	Portrait	H	6.729	6.227	6.753	6.490	526.132	500	26.132	P
1	5	2	125	Portrait	H	6.729	6.228	6.752	6.490	523.631	500	23.631	P
1	5	3	125	Portrait	H	6.729	6.229	6.751	6.490	522.131	500	22.131	P
1	5	4	0	Portrait	H	6.729	6.227	6.753	6.490	526.132	500	26.132	P
1	5	5	0	Portrait	H	6.423	6.226	6.754	6.490	527.632	500	27.632	P
1	9	0	125	Portrait	H	7.748	7.724	8.250	7.987	525.631	500	25.631	P
1	9	1	125	Portrait	H	7.748	7.724	8.250	7.987	525.631	500	25.631	P
1	9	2	125	Portrait	H	7.748	7.725	8.249	7.987	523.631	500	23.631	P
1	9	3	125	Portrait	H	7.748	7.726	8.248	7.987	522.631	500	22.631	P
1	9	4	0	Portrait	H	7.748	7.724	8.250	7.987	526.132	500	26.132	P
1	9	5	0	Portrait	H	7.748	7.723	8.251	7.987	527.632	500	27.632	P
2	5	0	125	Landscape	H	6.250	6.227	6.752	6.489	525.631	500	25.631	P
2	5	1	125	Landscape	H	6.251	6.227	6.752	6.489	525.631	500	25.631	P
2	5	2	125	Landscape	H	6.250	6.228	6.751	6.489	523.631	500	23.631	P
2	5	3	125	Landscape	H	6.251	6.229	6.751	6.490	522.131	500	22.131	P
2	5	4	0	Landscape	H	6.251	6.227	6.752	6.489	525.631	500	25.631	P
2	5	5	0	Landscape	H	6.251	6.226	6.753	6.489	527.132	500	27.132	P
2	9	0	125	Landscape	H	8.226	7.725	8.250	7.988	525.131	500	25.131	P
2	9	1	125	Landscape	H	8.227	7.725	8.250	7.988	525.131	500	25.131	P
2	9	2	125	Landscape	H	8.226	7.726	8.249	7.988	523.131	500	23.131	P
2	9	3	125	Landscape	H	8.226	7.726	8.249	7.987	522.631	500	22.631	P
2	9	4	0	Landscape	H	8.226	7.725	8.250	7.988	525.131	500	25.131	P
2	9	5	0	Landscape	H	8.226	7.724	8.252	7.988	527.632	500	27.632	P

RESULTS



8.3. PEAK POWER AND MAXIMUM AVERAGE EMISSIONS

LIMITS

FCC

15.519 (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, f_M . That limit is 0 dBm EIRP.

15.519 (c) 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

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Annex, Section 4 (c) Peak measurements shall be made in addition to average measurements. Transmissions shall not exceed 0 dBm e.i.r.p. in any 50 MHz bandwidth when the average limit is -41.3 dBm/MHz.

Section 5.3.1 (d) Radiated emissions above 960 MHz from a device shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz.

Frequency	E.I.R.P. in a Resolution Bandwidth of 1 MHz
4.75 – 10.6 GHz	-41.3 dBm

TEST PROCEDURE

ANSI C63.10 Clause 10.3.

RSS-220 Annex

Peak EIPR power is measured using RBW of 50 MHz.

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

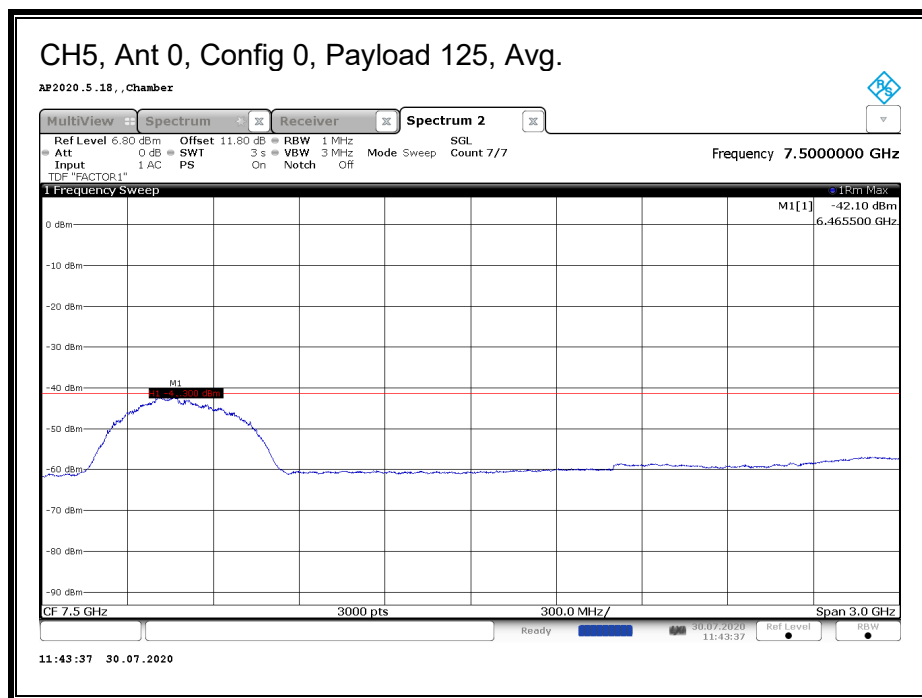
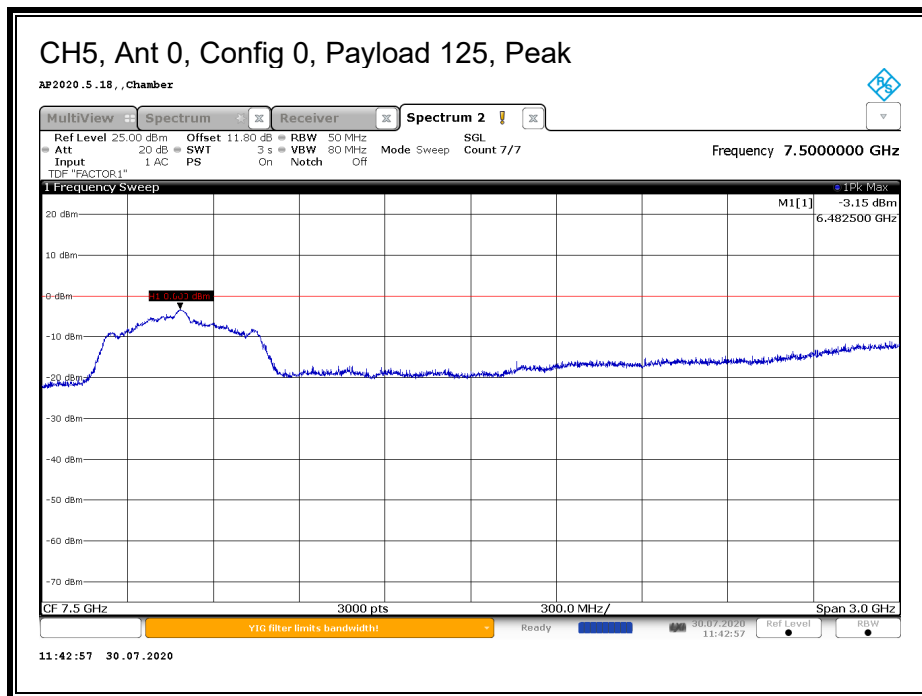
Tabulated data provides the test results of all available test configurations. The plots of Ant 0, CONFIG 0, Payload 125 power measurement on CH5 and CH9 are presented and same measurement settings apply to the rest of test configurations.

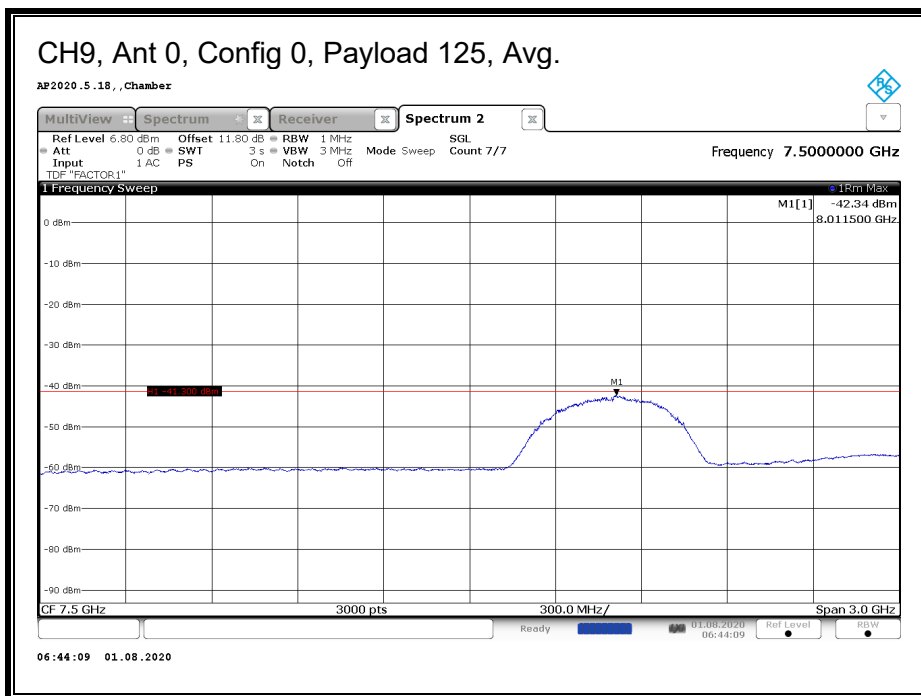
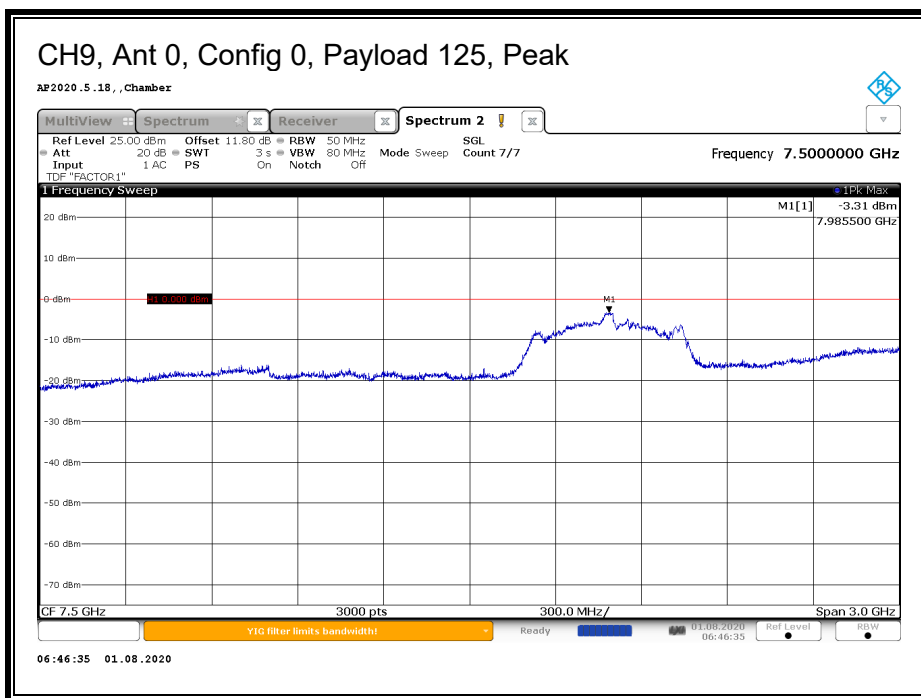
RESULTS

Tested By: 19419, 12501, 12485, 12472, 20737

ANT	CH	CONFIG	Payload	EUT Orientation	Meas. Ant. Polarity	Peak EIRP Power				Average EIRP Power			
						FM (GHz)	Peak Power (dBm/50MHz)	Peak Limit (0 dBm/50 MHz)	Margin (dB)	FM (GHz)	Avg Power (dBm/MHz)	Avg Limit (dBm/MHz)	Margin (dB)
0	5	0	125	Portrait	H	6.4825	-3.15	0	-3.15	6.4655	-42.10	-41.3	-0.80
0	5	1	125	Portrait	H	6.4945	-2.62	0	-2.62	6.4655	-42.40	-41.3	-1.10
0	5	2	125	Portrait	H	6.4845	-6.11	0	-6.11	6.4655	-42.02	-41.3	-0.72
0	5	3	125	Portrait	H	6.4895	-6.07	0	-6.07	6.4625	-42.30	-41.3	-1.00
0	5	4	0	Portrait	H	6.7355	-8.12	0	-8.12	6.4075	-42.47	-41.3	-1.17
0	5	5	0	Portrait	H	6.4875	-6.39	0	-6.39	6.4615	-42.22	-41.3	-0.92
0	9	0	125	Portrait	H	7.9855	-3.31	0	-3.31	8.0115	-42.34	-41.3	-1.04
0	9	1	125	Portrait	H	7.9995	-2.78	0	-2.78	8.0115	-42.83	-41.3	-1.53
0	9	2	125	Portrait	H	7.9875	-5.80	0	-5.80	7.9715	-42.4	-41.3	-1.10
0	9	3	125	Portrait	H	7.9775	-5.87	0	-5.87	8.0075	-42.3	-41.3	-1.00
0	9	4	0	Portrait	H	8.2405	-5.94	0	-5.94	8.0075	-42.13	-41.3	-0.83
0	9	5	0	Portrait	H	8.2435	-4.40	0	-4.40	8.0155	-42.26	-41.3	-0.96
1	5	0	125	Portrait	H	6.4865	-3.6	0	-3.60	6.4555	-42.15	-41.3	-0.85
1	5	1	125	Portrait	H	6.4805	-2.95	0	-2.95	6.4505	-42.5	-41.3	-1.20
1	5	2	125	Portrait	H	6.4845	-7.06	0	-7.06	6.4515	-42.68	-41.3	-1.38
1	5	3	125	Portrait	H	6.4925	-6.83	0	-6.83	6.4515	-42.47	-41.3	-1.17
1	5	4	0	Portrait	H	6.4285	-8.35	0	-8.35	6.4475	-42.64	-41.3	-1.34
1	5	5	0	Portrait	H	6.4325	-6.89	0	-6.89	6.4485	-42.46	-41.3	-1.16
1	9	0	125	Portrait	H	7.9775	-2.27	0	-2.27	8.0265	-42.81	-41.3	-1.51
1	9	1	125	Portrait	H	7.9765	-1.73	0	-1.73	8.0255	-42.01	-41.3	-0.71
1	9	2	125	Portrait	H	7.9835	-6.04	0	-6.04	8.0285	-42.02	-41.3	-0.72
1	9	3	125	Portrait	H	8.0025	-5.04	0	-5.04	8.0255	-42.12	-41.3	-0.82
1	9	4	0	Portrait	H	7.7345	-5.26	0	-5.26	8.0295	-42.08	-41.3	-0.78
1	9	5	0	Portrait	H	7.7395	-3.65	0	-3.65	8.0285	-42.38	-41.3	-1.08
2	5	0	125	Landscape	H	6.4875	-4.25	0	-4.25	6.3235	-42.46	-41.3	-1.16
2	5	1	125	Landscape	H	6.4875	-2.65	0	-2.65	6.3235	-42.01	-41.3	-0.71
2	5	2	125	Landscape	H	6.4915	-7.16	0	-7.16	6.3655	-42.50	-41.3	-1.20
2	5	3	125	Landscape	H	6.4845	-6.71	0	-6.71	6.2495	-42.05	-41.3	-0.75
2	5	4	0	Landscape	H	6.2415	-3.99	0	-3.99	6.3105	-42.48	-41.3	-1.18
2	5	5	0	Landscape	H	6.2445	-2.84	0	-2.84	6.3095	-42.40	-41.3	-1.10
2	9	0	125	Landscape	H	8.2405	-3.68	0	-3.68	8.0875	-42.41	-41.3	-1.11
2	9	1	125	Landscape	H	8.2435	-2.46	0	-2.46	8.0875	-42.14	-41.3	-0.84
2	9	2	125	Landscape	H	7.9815	-6.66	0	-6.66	8.0345	-42.08	-41.3	-0.78
2	9	3	125	Landscape	H	7.9905	-6.40	0	-6.40	8.0905	-42.04	-41.3	-0.74
2	9	4	0	Landscape	H	8.2375	-2.67	0	-2.67	8.0295	-42.12	-41.3	-0.82
2	9	5	0	Landscape	H	8.2415	-1.14	0	-1.14	8.0285	-42.29	-41.3	-0.99

RESULTS





8.4. 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.

RSS-220

Section 5.3.1 (b) The device is to transmit only when it is sending information to an associated receiver. The device shall cease transmission of information 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 device at least every 10 seconds or the UWB device shall cease transmitting any information other than periodic signals used for the establishment or re-establishment of a communication link with an associated receiver.

TEST PROCEDURES

Transmissions are monitored for two cases:

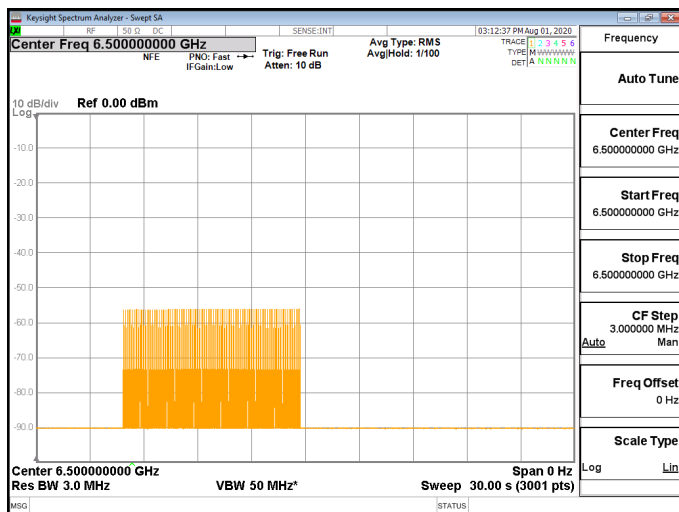
1. The smart phone ends the UWB link.
2. The EUT ends the UWB link.

RESULTS

Signal Levels on all Plots

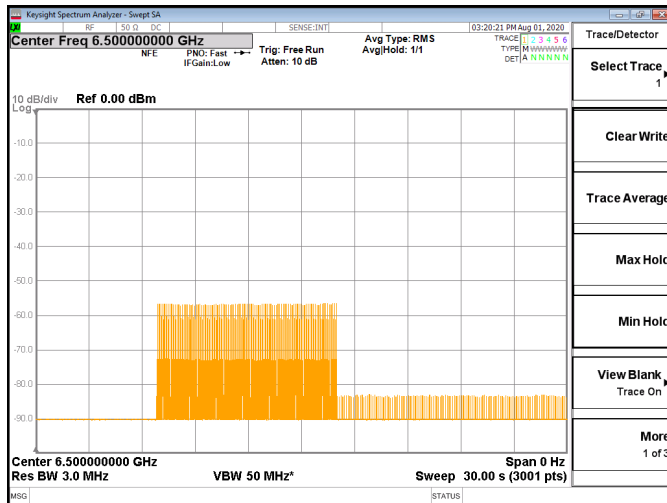
- EUT is High Amplitude
- Smart Phone is Low Amplitude

Case 1: Smart Phone ends the UWB link

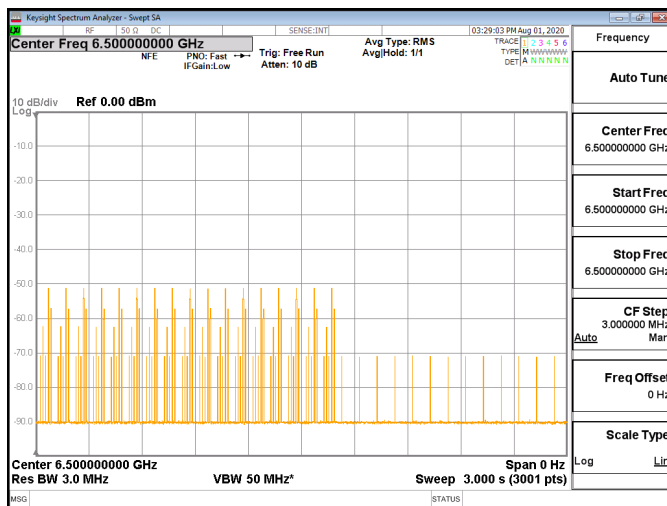


RESULT

- All devices, including the EUT, cease transmissions

Case 2: EUT ends the UWB linkRESULT

- EUT ends the link, Smart Phone stops Acknowledgements but continues Polling
 - EUT ceases transmissions, does not respond to Polling Signals

Zoom-in Plot during On-Off TransitionRESULT

- Shows Link Traffic, Acknowledgements and Polling Signals while Link is established
- Shows Polling Signals after Link has ended

8.5. EMISSIONS BELOW 960 MHz

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:

15.209 (a)

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3

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Section 3.4 Radiated emissions at or below 960 MHz for all subclasses of UWB device shall not exceed the following limits. Measurements of radiated emissions at and below 960 MHz are to be made using a CISPR quasi-peak detector. CISPR measurement bandwidth specifications are to be used.

Frequency (MHz)	Field Strength (Microvolts/m)	Measurement Distance (Metres)	E.i.r.p. (dBmW)
0.009-0.490	2,400/F (F in kHz)	300	$10 \log (17.28 / F^2)$ (F in kHz)
0.490-1.705	24,000/F (F in kHz)	30	$10 \log (17.28 / F^2)$ (F in kHz)
1.705-30	30	30	-45.7
30-88	100	3	-55.2
88-216	150	3	-51.7
216-960	200	3	-49.2

Note: The emission limits for the bands 9-90 kHz and 110-490 kHz are based on measurements employing an average emissions detector.

TEST PROCEDURE

ANSI C63.10 Clause 10.2 and 10.3.

RSS-220 Annex

PROCEDURE FOR 9 kHz TO 960 MHz

Measurements are made with the antenna feeding a spectrum analyzer via a preamplifier and cables, at a maximum distance of 3m from the EUT.

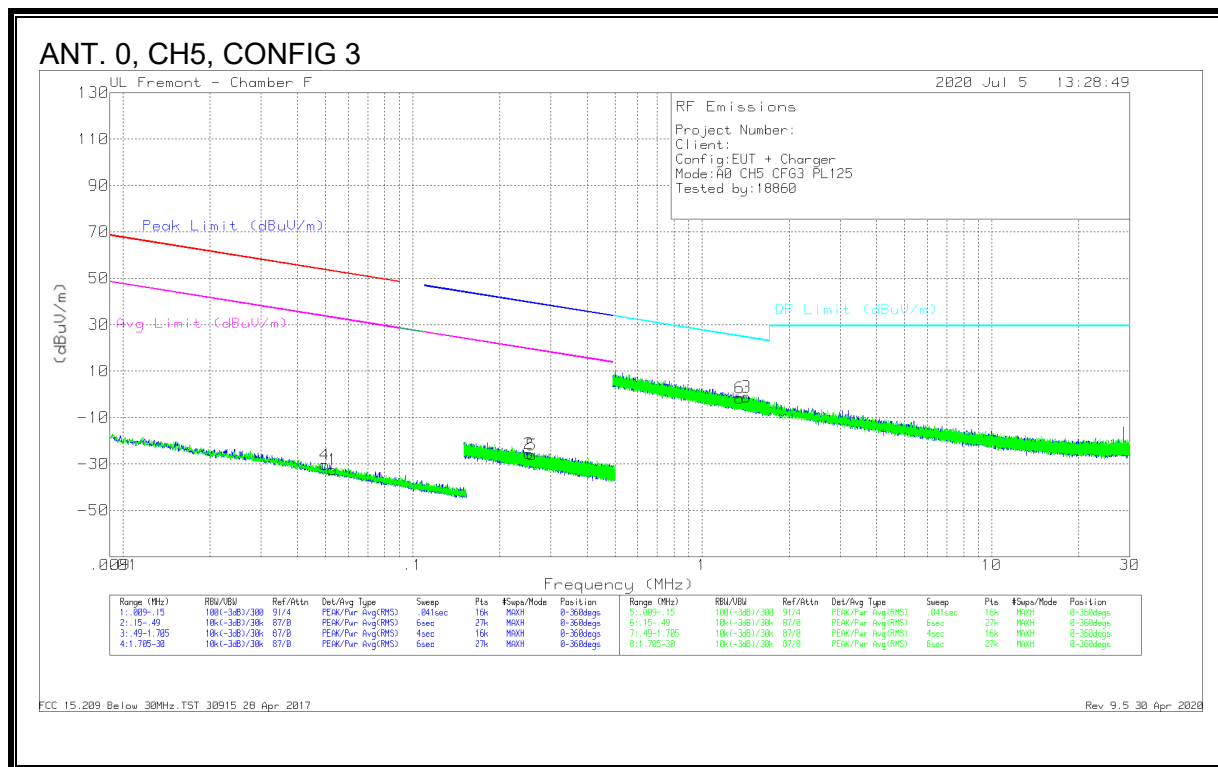
A final test is made at any frequencies at which emissions are found. During this final scan, the antenna is kept no further from the EUT than the maximum distance calculated for each band that yields a minimum system noise floor.

RESULTS

Emissions Summary

Ant	CH	Config	Payload	Power Setting	Frequency Range	
					9 kHz - 30 MHz	30 - 960 MHz
0	5	3	125	Max	PASS	PASS
0	9	3	125	Max	PASS	PASS
1	5	3	125	Max	PASS	PASS
1	9	3	125	Max	PASS	PASS
2	5	3	125	Max	PASS	PASS
2	9	3	125	Max	PASS	PASS

8.5.1. EMISSIONS, 9 kHz – 30 MHz



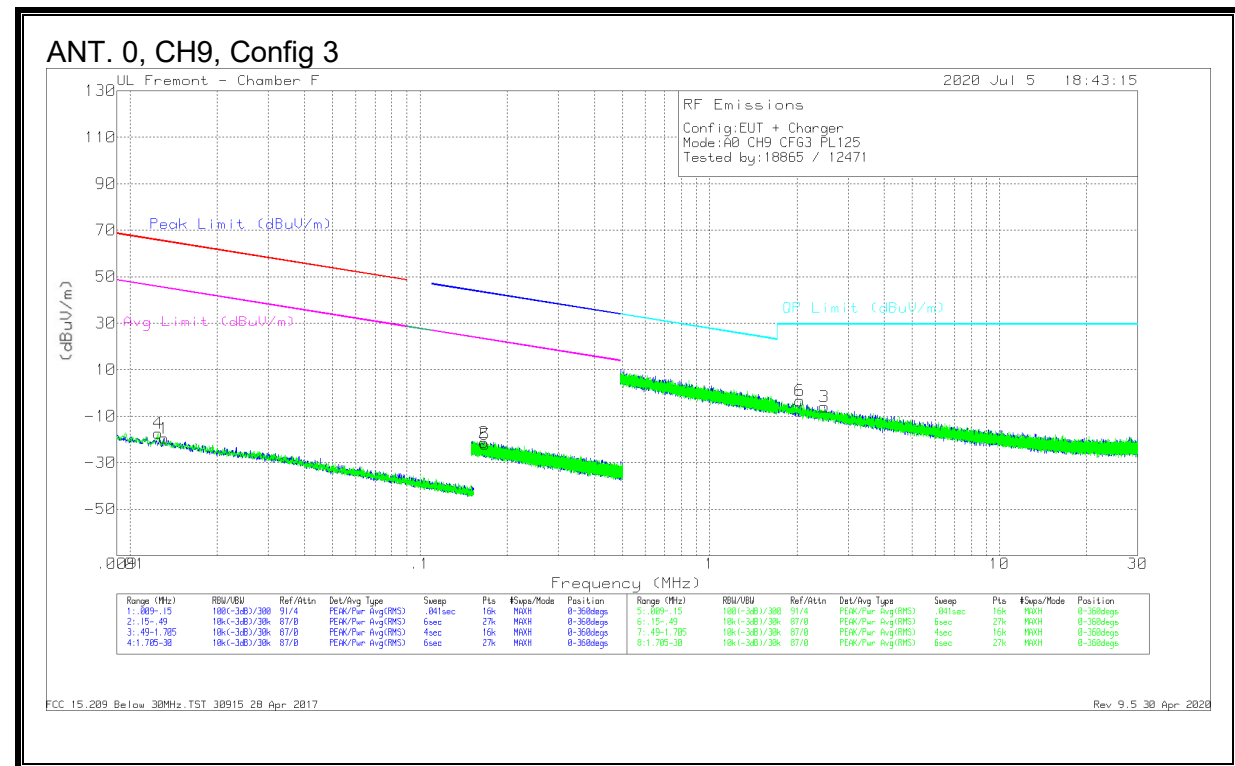
Trace Markers

Marker	Freq. (MHz)	Meter Reading (dBuV/m)	Det	Loop Antenna (dBm)	Cables (dB)	Dist Corr 300m	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.05297	35.06	Pk	12.4	0	-80	-32.54	53.11	-85.65	33.11	-65.65	-	-	-	-	0-360
2	.25219	43.42	Pk	10.9	.1	-80	-25.58	-	-	-	-	39.58	-65.16	19.58	-45.16	0-360
4	.04977	37.31	Pk	12.4	0	-80	-30.29	53.65	-83.94	33.65	-63.94	-	-	-	-	0-360
5	.25816	42.94	Pk	10.9	.1	-80	-26.06	-	-	-	-	39.38	-65.44	19.38	-45.44	0-360

Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV/m)	Det	Loop Antenna (dBm)	Cables (dB)	Dist Corr 40Log	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
3	1.42222	27.55	Pk	11.2	.1	-40	-1.15	24.57	-25.72	0-360
6	1.34926	27.16	Pk	11.2	.1	-40	-1.54	25.03	-26.57	0-360

Pk - Peak detector



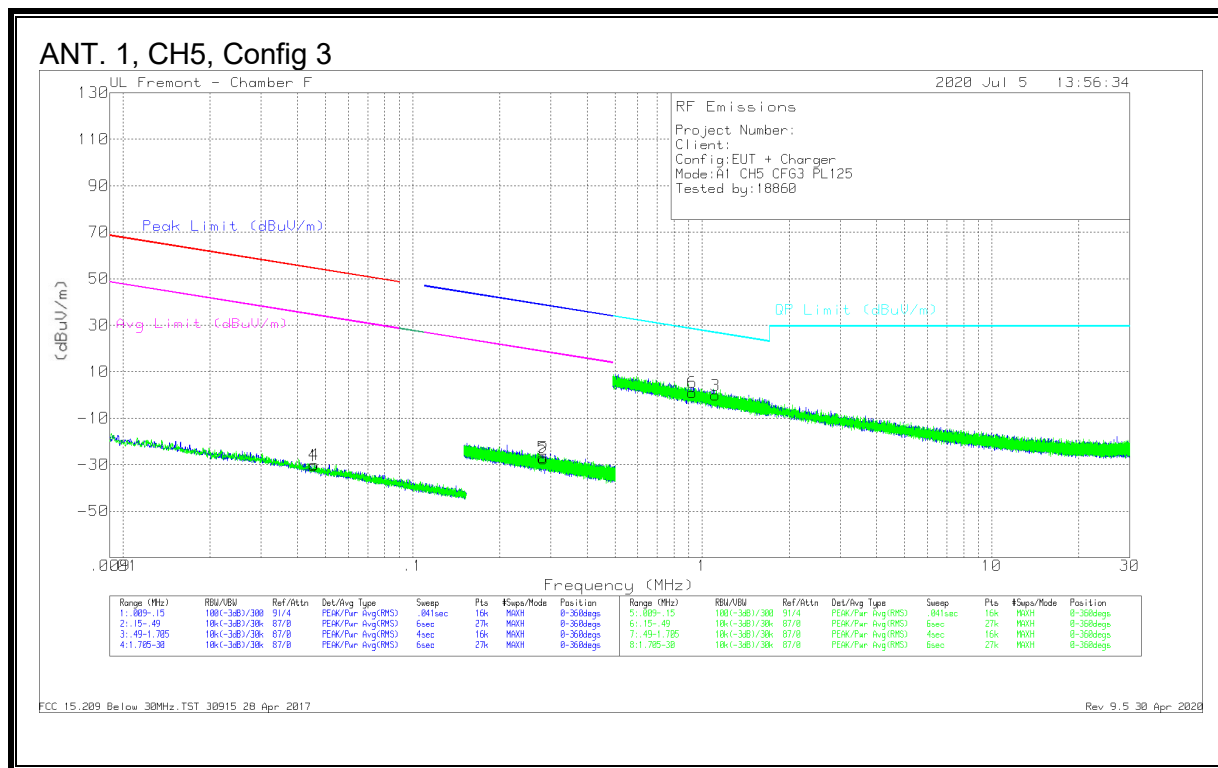
Trace Markers

Marker	Freq. (MHz)	Meter Reading (dBuV/m)	Det	Loop Antenna (dBm)	Cables (dB)	Dist Corr 300m	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.0131	42.68	Pk	17.3	0	-80	-19.52	65.24	-84.76	45.24	-84.76	-	-	-	-	0-360
2	.16648	47.47	Pk	11.1	-1	-80	-21.33	-	-	-	-	43.19	-64.52	23.19	-44.52	0-360
4	.01249	44.7	Pk	18	0	-80	-17.3	65.65	-82.95	45.65	-82.95	-	-	-	-	0-360
5	.16781	46.69	Pk	11.1	-1	-80	-22.11	-	-	-	-	43.12	-65.23	23.12	-45.23	0-360

Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV/m)	Det	Loop Antenna (dBm)	Cables (dB)	Dist Corr 40Log	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
3	2.48471	22.54	Pk	11.3	.2	-40	-5.96	29.5	-35.46	0-360
6	2.0477	25.12	Pk	11.3	.2	-40	-3.38	29.5	-32.88	0-360

Pk - Peak detector



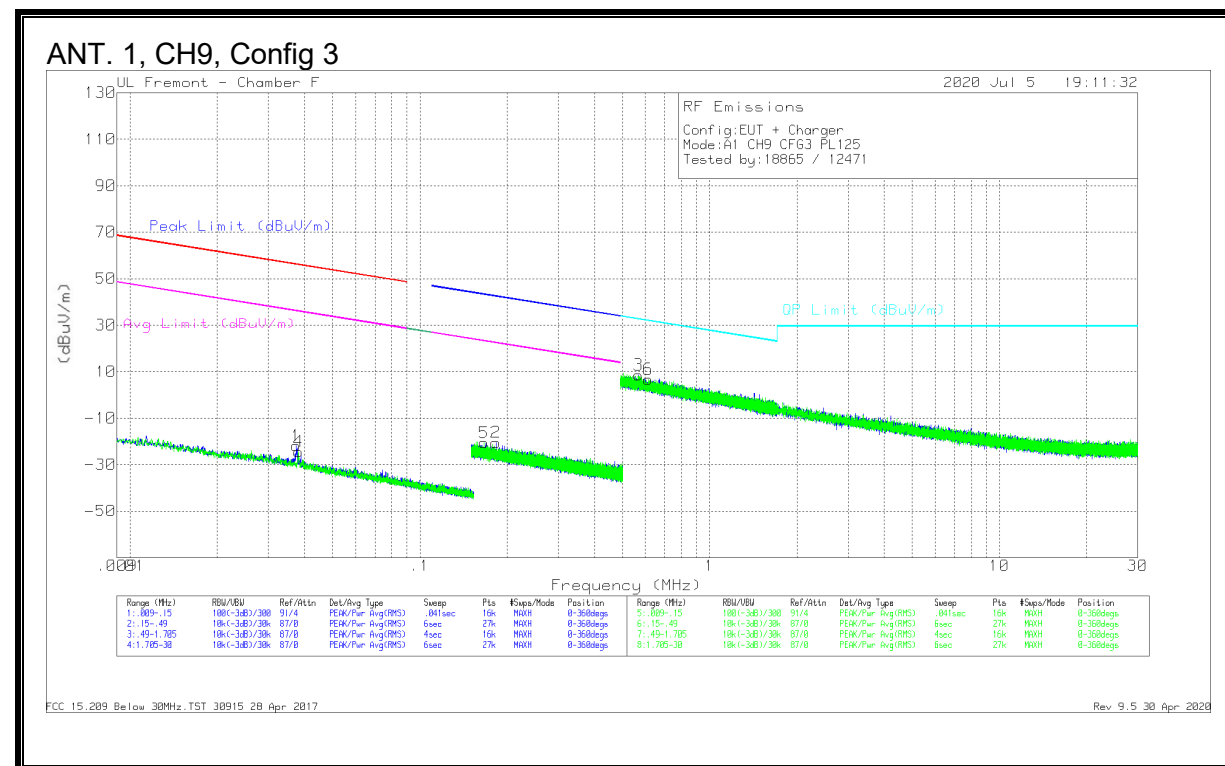
Trace Markers

Marker	Freq. (MHz)	Meter Reading (dBuV/m)	Det	Loop Antenna (dBm)	Cables (dB)	Dist Corr 300m	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.04555	36.75	Pk	12.8	0	-80	-30.45	54.42	-84.87	34.42	-84.87	-	-	-	-	0-360
2	.28345	41.48	Pk	10.9	.1	-80	-27.52	-	-	-	-	38.56	-66.08	18.56	-46.08	0-360
4	.04573	37.2	Pk	12.8	0	-80	-30	54.38	-84.38	34.38	-84.38	-	-	-	-	0-360
5	.28185	42.07	Pk	10.9	.1	-80	-26.93	-	-	-	-	38.61	-65.54	18.61	-45.54	0-360

Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV/m)	Det	Loop Antenna (dBm)	Cables (dB)	Dist Corr (dB) 40Log	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
3	1.111	28.58	Pk	11.2	.1	-40	-12	26.71	-26.83	0-360
6	.9251	29.84	Pk	11.1	.1	-40	1.04	28.3	-27.26	0-360

Pk - Peak detector



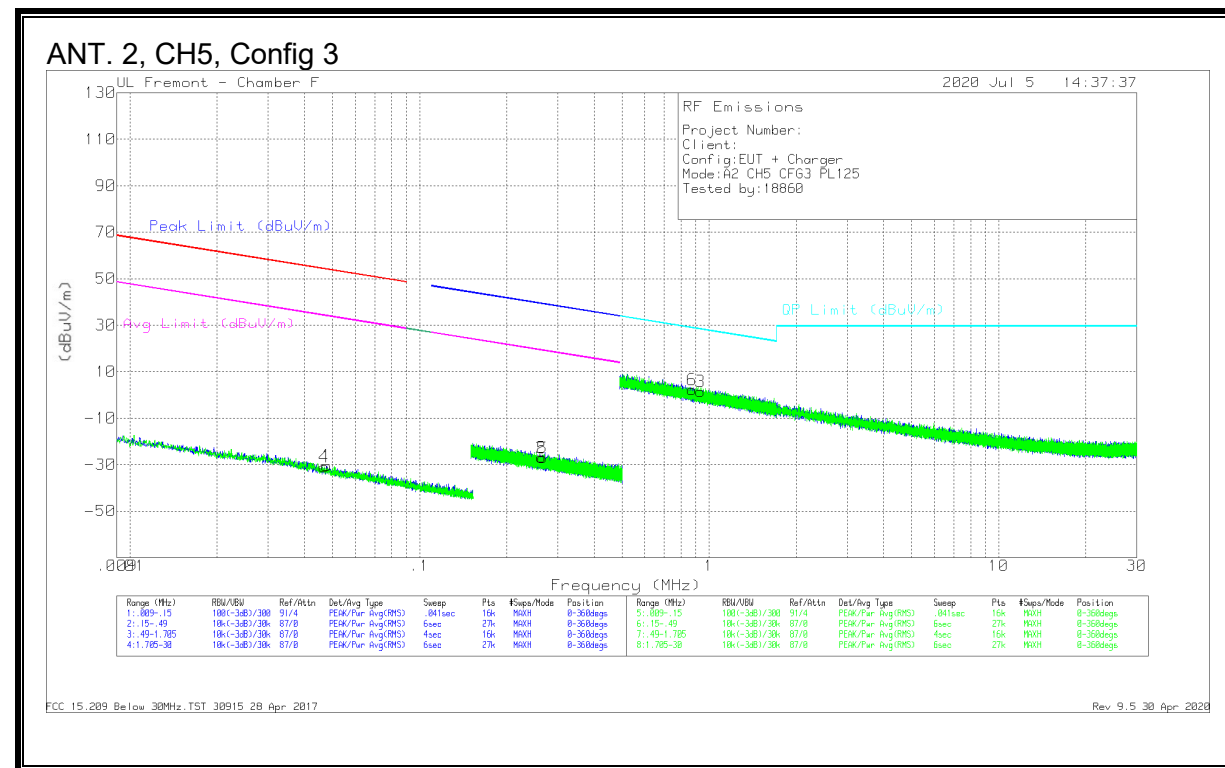
Trace Markers

Marker	Freq. (MHz)	Meter Reading (dBuV/m)	Det	Loop Antenna (dBm)	Cables (dB)	Dist Corr 300m	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.03743	44.46	Pk	13.7	0	-80	-21.84	56.12	-77.96	36.12	-57.96	-	-	-	-	0-360
2	.18294	48.39	Pk	11.1	.1	-80	-20.41	-	-	-	-	42.37	-62.78	22.37	-42.78	0-360
4	.03809	42.02	Pk	13.6	0	-80	-24.38	55.97	-80.35	35.97	-60.35	-	-	-	-	0-360
5	.1666	48.2	Pk	11.1	.1	-80	-20.6	-	-	-	-	43.19	-63.79	23.19	-43.79	0-360

Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV/m)	Det	Loop Antenna (dBm)	Cables (dB)	Dist Corr 40Log	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
3	.56836	37.48	Pk	11	.1	-40	8.58	32.52	-23.94	0-360
6	.61342	35.65	Pk	11	.1	-40	6.75	31.85	-25.1	0-360

Pk - Peak detector



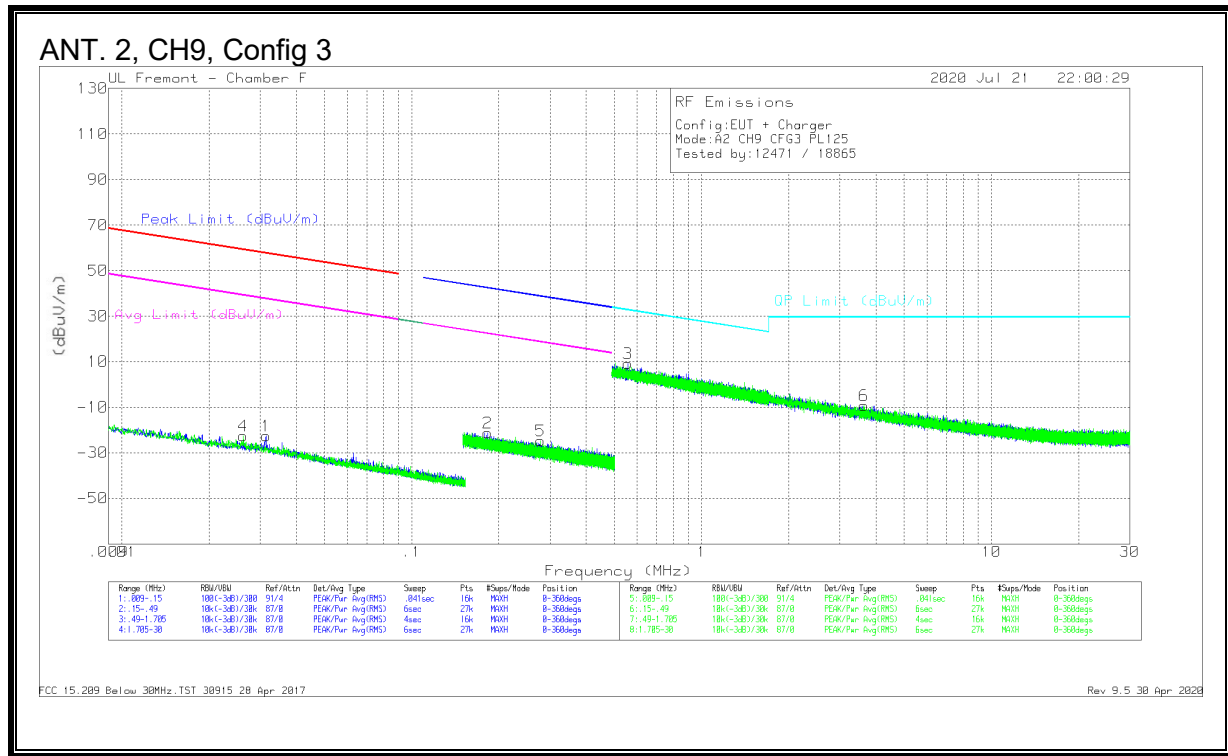
Trace Markers

Marker	Freq. (MHz)	Meter Reading (dBuV/m)	Det	Loop Antenna (dBm)	Cables (dB)	Dist Corr 300m	Corrected Reading (dBuV/m)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Avg Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
1	.04775	36.38	Pk	12.6	0	-80	-30.44	54.01	-84.45	34.01	-84.45	-	-	-	-	0-360
2	.2634	42.13	Pk	10.9	.1	-80	-26.87	-	-	-	-	39.2	-66.07	19.2	-46.07	0-360
4	.04685	36.34	Pk	12.7	0	-80	-30.96	54.17	-85.13	34.17	-85.13	-	-	-	-	0-360
5	.26614	41.91	Pk	10.9	.1	-80	-27.09	-	-	-	-	39.11	-66.2	19.11	-46.2	0-360

Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV/m)	Det	Loop Antenna (dBm)	Cables (dB)	Dist Corr (dB) 40Log	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
3	.93376	30.28	Pk	11.1	.1	-40	1.48	28.22	-26.74	0-360
6	.87167	31.18	Pk	11	.1	-40	2.28	28.81	-26.53	0-360

Pk - Peak detector



Trace Markers

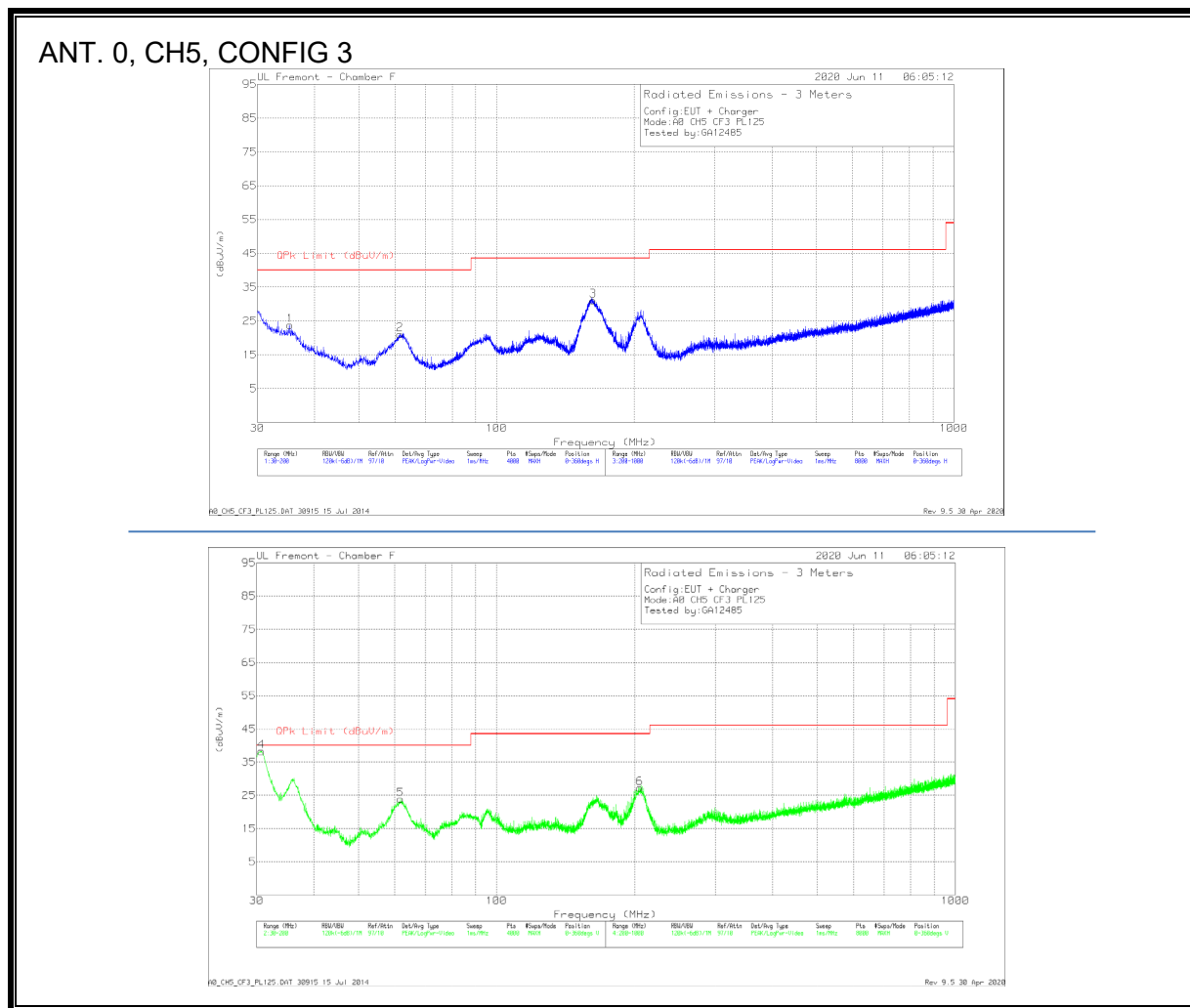
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1	.031445	43.24	Pk	14.3	0	-80	-22.46	57.63	-80.09	37.63	-80.09	-	-	22.36	-43.63	0-360
2	.18216	47.53	Pk	11.1	-1	-80	-21.27	58.2	-81.86	38.2	-81.86	-	-	22.36	-43.63	0-360
4	.02824	42.84	Pk	14.7	0	-80	-22.66	58.2	-81.86	38.2	-81.86	-	-	22.36	-43.63	0-360
5	.27821	44.21	Pk	10.9	-1	-80	-24.79	-	-	-	-	38.73	-63.52	18.73	-43.52	0-360

Pk - Peak detector

Marker	Frequency (MHz)	Meter Reading (dBuV/m)	Det	Loop Antenna (dBm)	Cables (dB)	Dist Corr (dB) 40Log	Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)
3	.5581	38.01	Pk	11	.1	-40	9.11	32.67	-23.56	0-360
6	3.63646	19.28	Pk	11.4	.2	-40	-9.12	29.5	-38.62	0-360

Pk - Peak detector

8.5.2. EMISSIONS, 30 - 960 MHz



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	35.3564	31.68	Pk	24	-31.9	23.78	40	-16.22	0-360	201	H
2	61.5007	38.95	Pk	13.7	-31.6	21.05	40	-18.95	0-360	400	H
3	162.5493	43.69	Pk	18.2	-30.8	31.09	43.52	-12.43	0-360	201	H
4	30.7227	42.56	Pk	27.6	-31.9	38.26	40	-1.74	0-360	100	V
5	61.7557	41.79	Pk	13.7	-31.6	23.89	40	-16.11	0-360	100	V
6	205.4007	40.18	Pk	17.5	-30.4	27.28	43.52	-16.24	0-360	100	V

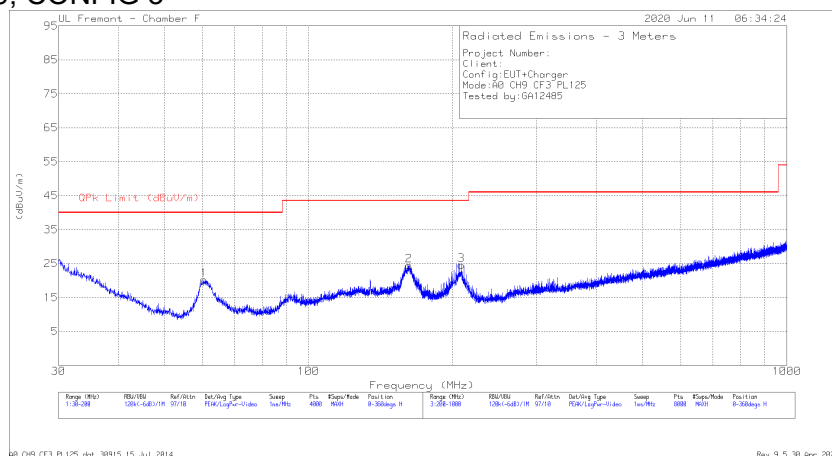
Pk - Peak detector

Radiated Emissions

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	30.6094	40.56	Qp	27.7	-31.9	36.36	40	-3.64	138	102	V

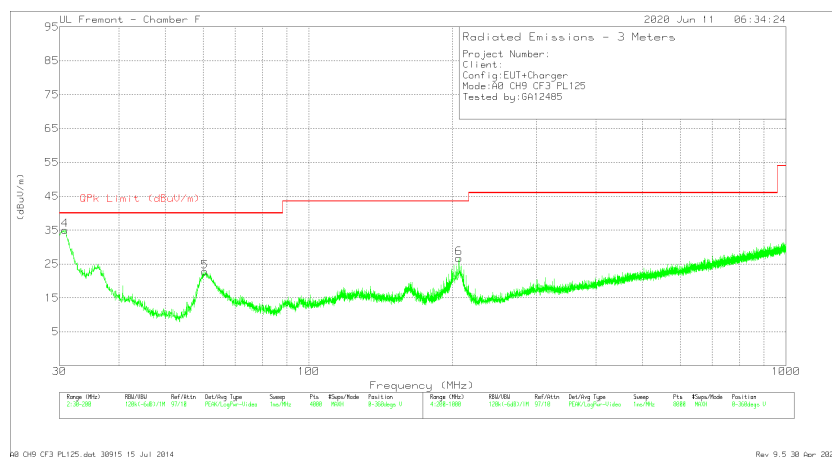
Qp - Quasi-Peak detector

ANT. 0, CH9, CONFIG 3



69_O19_CF3_PL125_dut_38915_15_Jul_2014

Rev. 9.5_30 Apr. 2020



69_O19_CF3_PL125_dut_38915_15_Jul_2014

Rev. 9.5_30 Apr. 2020

Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	60.4379	38.37	Pk	13.5	-31.6	20.27	40	-19.73	0-360	400	H
2	162.1667	36.83	Pk	18.3	-30.7	24.43	43.52	-19.09	0-360	200	H
4	30.8077	39.35	Pk	27.6	-31.9	35.05	40	-4.95	0-360	100	V
5	60.5654	40.79	Pk	13.6	-31.6	22.79	40	-17.21	0-360	100	V
3	208.7011	38.02	Pk	17	-30.4	24.62	43.52	-18.9	0-360	100	H
6	206.3008	39.93	Pk	17.2	-30.4	26.73	43.52	-16.79	0-360	100	V

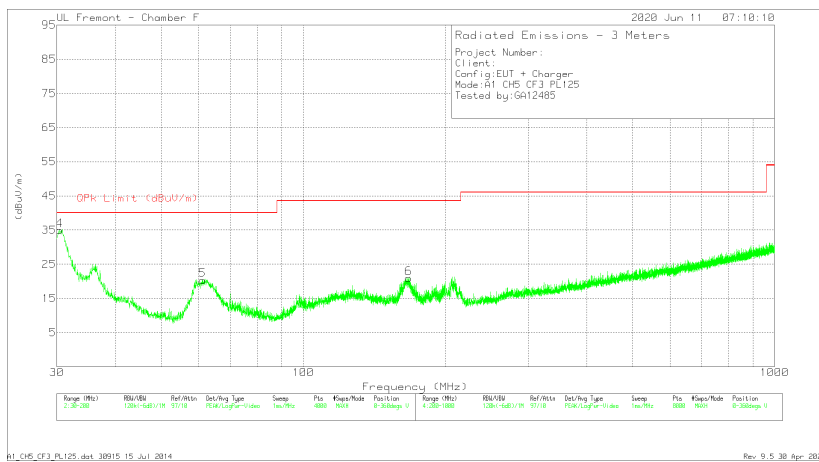
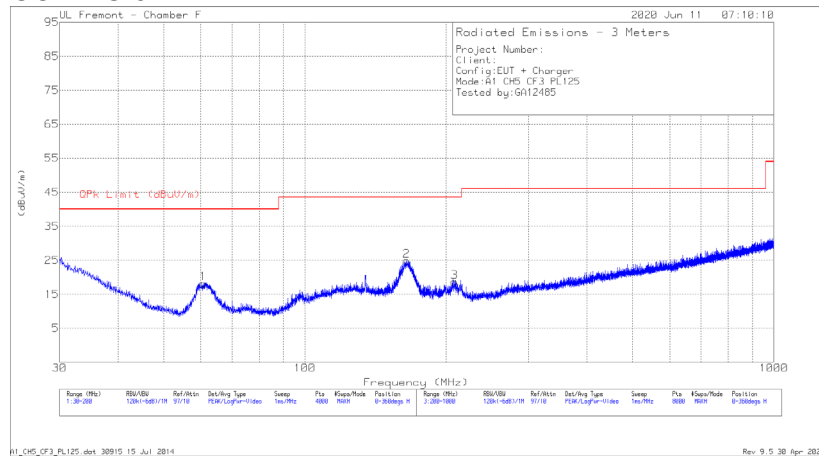
Pk - Peak detector

Radiated Emissions

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	30.5821	36.45	Qp	27.7	-31.9	32.25	40	-7.75	348	105	V

Qp - Quasi-Peak detector

ANT.1, CH5, CONFIG 3



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	60.778	36.21	Pk	13.6	-31.6	18.21	40	-21.79	0-360	200	H
2	164.9299	37.49	Pk	18.1	-30.7	24.89	43.52	-18.63	0-360	100	H
4	30.4251	38.93	Pk	27.9	-31.9	34.93	40	-5.07	0-360	100	V
5	61.1606	38.34	Pk	13.6	-31.6	20.34	40	-19.66	0-360	100	V
6	167.268	33.54	Pk	18	-30.6	20.94	43.52	-22.58	0-360	100	V
3	208.5011	32.16	Pk	17	-30.5	18.66	43.52	-24.86	0-360	100	H

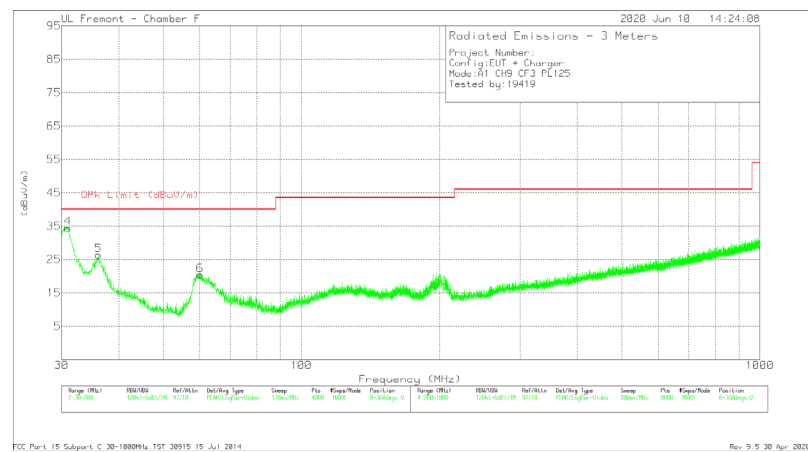
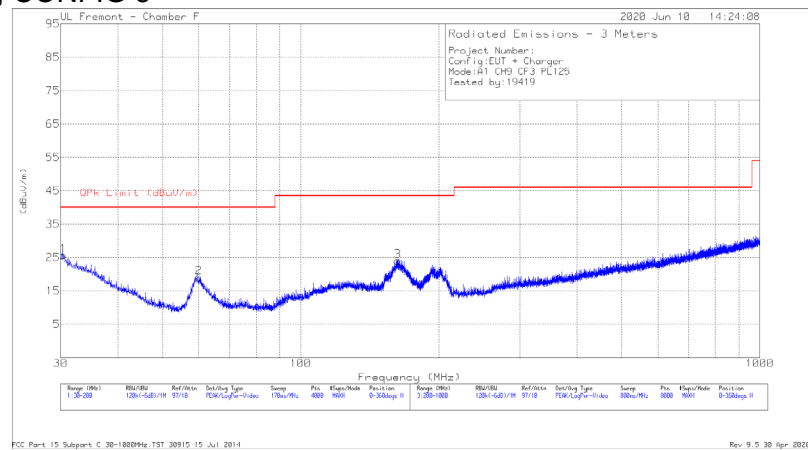
Pk - Peak detector

Radiated Emissions

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	30.2816	28.44	Qp	28	-31.9	24.54	40	-15.46	116	332	V

Qp - Quasi-Peak detector

ANT. 1, CH9, CONFIG 3



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	30.4251	29.65	Pk	27.9	-31.9	25.65	40	-14.35	0-360	201	H
2	59.9703	37.17	Pk	13.5	-31.6	19.07	40	-20.93	0-360	399	H
3	162.6343	36.6	Pk	18.2	-30.8	24	43.52	-19.52	0-360	201	H
4	30.9778	38.92	Pk	27.4	-31.9	34.42	40	-5.58	0-360	100	V
5	36.1216	34.75	Pk	23.4	-31.8	26.35	40	-13.65	0-360	100	V
6	60.1828	38.45	Pk	13.5	-31.6	20.35	40	-19.65	0-360	100	V

Pk - Peak detector

Radiated Emissions

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	30.9514	35	Qp	27.4	-31.9	30.5	40	-9.5	334	107	V

Qp - Quasi-Peak detector

U. Fremont - Chamber F

2020 Jun 11 08:35:59

Radiated Emissions - 3 Meters

Project Number:
Client:
Config: A2 CH5 CF3 PL125
Mode: EUT-Charger
Tested by: ghl2485

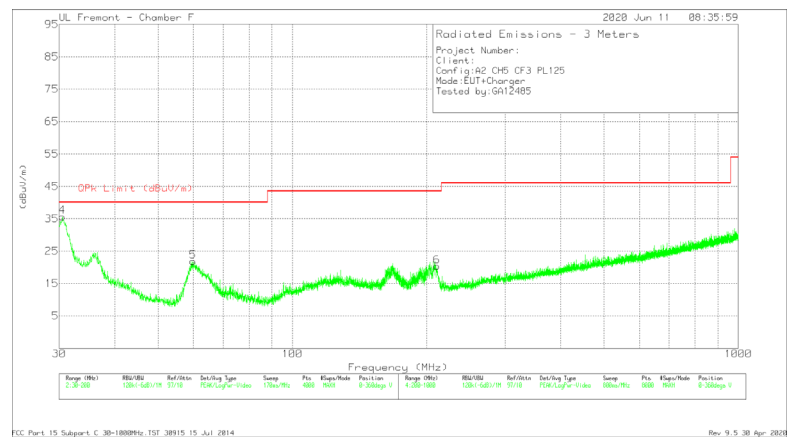
0Pk L (w/it) < dB(u/w)

Frequency (MHz)

Power (mW)	dBm/dBμV	Ref Ant	Scaling Type	Temp	Pre	Range Mode	Full Scale (mV)	Min (dBm)	Max (dBm)	Ref Ant	Scaling Type	Temp	Pre	Range Mode	Full Scale (mV)
1.0E-008	130nV-dBμV/10V	10/10	PL125, w/it < 0 dB(u/w)	150mV/10V	400	0-30000 Hz	3.20E+003	130nV-dBμV/10V	10/10	PL125, w/it < 0 dB(u/w)	150mV/10V	400	0-30000 Hz	3.20E+003	

FCC Part 15 Subpart C, 30-1000MHz, 1ST, 201515_15_Jul_2014

Rev: 9.5_30 Apr 2014

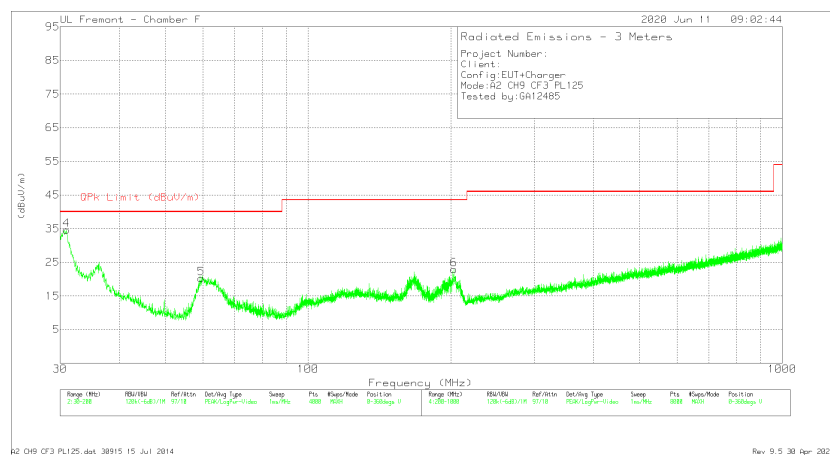
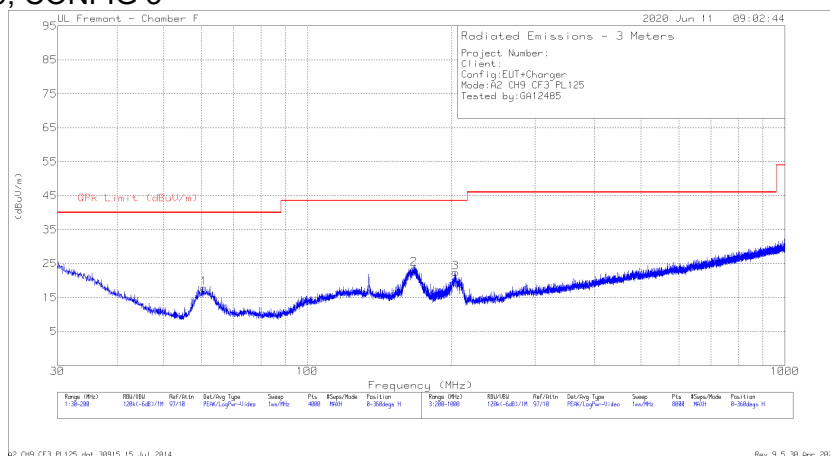


Marker	Frequency (MHz)	Meter Reading (dBUV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBUV/m)	QPk Limit (dBUV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	59.4601	37.05	Pk	13.5	-31.6	18.95	40	-21.05	0-360	400	H
2	164.0372	37.62	Pk	18.2	-30.8	25.02	43.52	-18.5	0-360	200	H
4	30.5101	39.75	Pk	27.8	-31.9	35.65	40	-4.35	0-360	100	V
5	59.8427	39.96	Pk	13.5	-31.6	21.86	40	-18.14	0-360	100	V
3	209.2012	34.11	Pk	17	-30.4	20.71	43.52	-22.81	0-360	100	H
6	211.0014	33.73	Pk	17	-30.4	20.33	43.52	-23.19	0-360	100	V

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	30.5317	35.14	Qb	27.8	-31.9	31.04	40	-8.96	163	102	V

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ANT. 2, CH9, CONFIG 3



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	60.7355	35.86	Pk	13.6	-31.6	17.86	40	-22.14	0-360	300	H
2	167.268	36.08	Pk	18	-30.6	23.48	43.52	-20.04	0-360	201	H
4	30.9352	39.06	Pk	27.5	-31.9	34.66	40	-5.34	0-360	100	V
5	59.5877	38.37	Pk	13.5	-31.6	20.27	40	-19.73	0-360	100	V
3	204.5006	34.95	Pk	17.8	-30.4	22.35	43.52	-21.17	0-360	100	H
6	203.2004	34.79	Pk	18.5	-30.4	22.89	43.52	-20.63	0-360	100	V

Pk - Peak detector

Radiated Emissions

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	30.7274	34.58	Qp	27.6	-31.9	30.28	40	-9.72	168	100	V

Qp - Quasi-Peak detector

8.6. AVERAGE EMISSIONS ABOVE 960 MHz

LIMITS

FCC

15.519 (c)

Frequency in MHz	EIRP in dBm
960-1610	-75.3
1610-1990	-63.3
1990-3100	-61.3
3100-10600	-41.3
Above 10600	-61.3

§15.519 (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 in MHz	EIRP in dBm
1164-1240	-85.3
1559-1610	-85.3

RSS-220

Section 5.3.1 (d) Radiated emissions above 960 MHz from a device shall not exceed the following average limits when measured using a resolution bandwidth of 1 MHz.

Hand-held (Outdoor) Communication, Measurement, Location Sensing, and Tracking Devices	
Frequency	E.i.r.p. in a Resolution Bandwidth of 1 MHz
960-1 610 MHz	-75.3 dBm
1.61-4.75 GHz	-70.0 dBm
4.75-10.6 GHz	-41.3 dBm
Above 10.6 GHz	-61.3 dBm

Section 5.3.1 (e) In addition to the limits specified in paragraph (d) of this section, radiated emissions shall not exceed the following average limits when measured using a resolution bandwidth greater than or equal to 1 kHz. The measurements shall demonstrate compliance with the stated limits at whatever resolution bandwidth is used.

Frequency	E.i.r.p. in a Resolution Bandwidth of no less than 1 kHz
1 164-1 240 MHz	-85.3 dBm
1 559-1 610 MHz	-85.3 dBm

TEST PROCEDURE

ANSI C63.10 Clause 10.2 and 10.3.

RSS-220 Annex

PROCEDURE FOR 0.96 TO 6 GHz

Measurements are made with the antenna feeding a spectrum analyzer via a preamplifier and cables, at a maximum distance of 0.5m from the EUT.

A low pass filter with a cut off frequency of 6 GHz is used to suppress the fundamental and perform measurement for 0.96 - 6 GHz.

RESULTS FOR 6 GHz TO 9 GHz

The 6 - 9 GHz frequency band is covered in Section 8.2.

PROCEDURE FOR 9 GHz TO 18 GHz

Measurements are made with the antenna feeding a spectrum analyzer via a preamplifier and cables, at a maximum distance of 0.5m from the EUT.

A high pass filter with pass band frequency beyond 9 GHz is used to suppress the fundamental and perform measurement for 9 - 18 GHz.

PROCEDURE FOR 1.164 TO 1.240 GHz

Measurements are made with the antenna feeding a spectrum analyzer via a preamplifier and cables, at a maximum distance of 0.5m from the EUT.

RBW = 120 kHz & VBW = 360 kHz were used at pre-scan.

A low pass filter with a cut off frequency of 6 GHz is used to suppress the fundamental and perform measurement for 1.164 – 1.240 GHz.

PROCEDURE FOR 1.559 TO 1.610 GHz

Measurements are made with the antenna feeding a spectrum analyzer via a preamplifier and cables, at a maximum distance of 0.5m from the EUT.

RBW = 120 kHz & VBW = 360 kHz were used at pre-scan.

A low pass filter with a cut off frequency of 6 GHz is used to suppress the fundamental and perform measurement for 1.559 – 1.610 GHz.

PROCEDURE FOR 18 GHz TO 40 GHz

Measurements are made with the antenna feeding a spectrum analyzer via a preamplifier and cables, at a maximum distance of 0.5m from the EUT.

A final test is made at any frequencies at which emissions are found. During this final scan, the antenna is kept no further from the EUT than the maximum distance calculated for each band that yields a minimum system noise floor.

Distance Correction Factor from 3m to 0.5m = $20 \cdot \log(0.5\text{m}/3\text{m}) = -15.56 \text{ dB}$

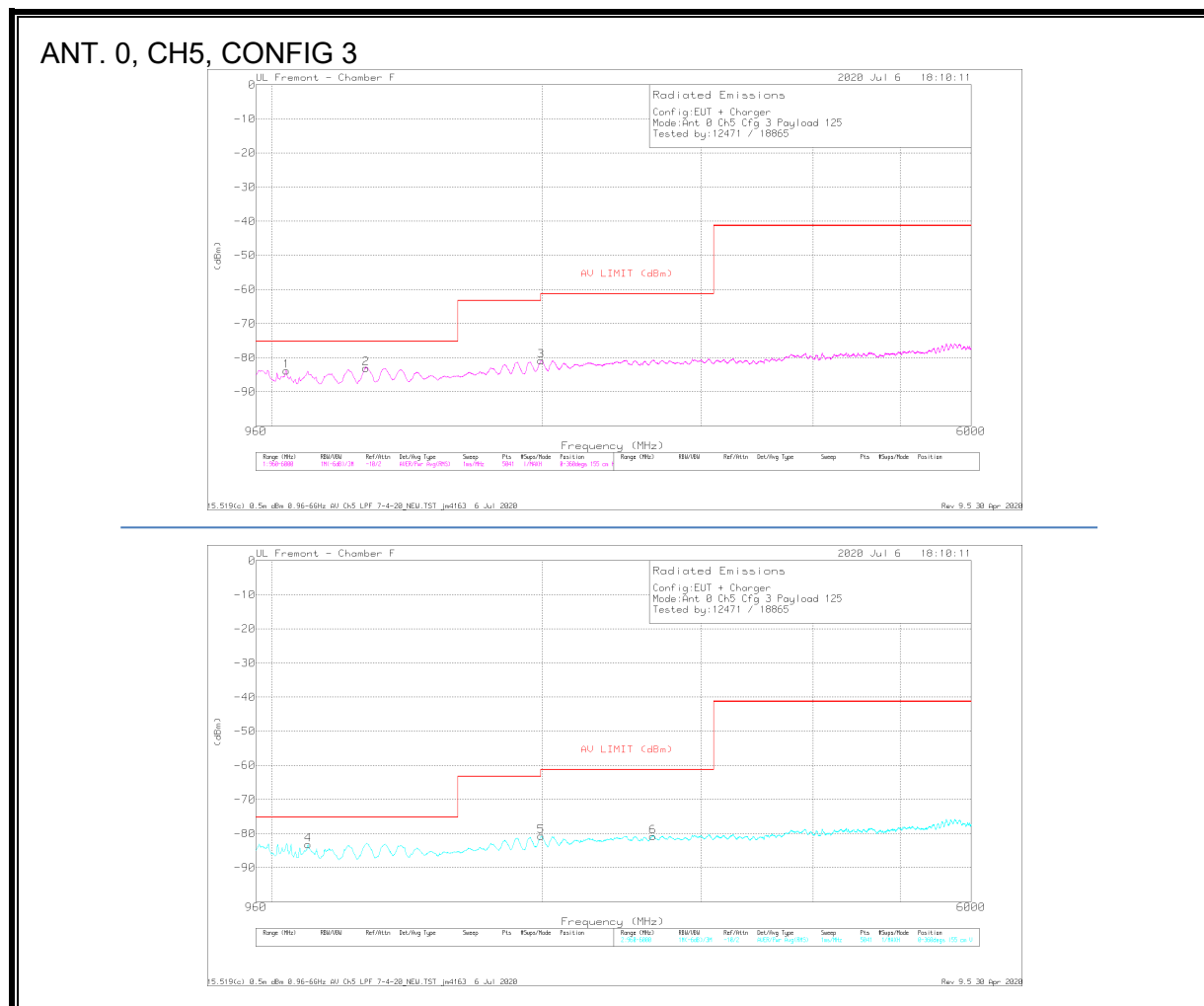
RESULTS

Average Emissions Summary

Ant	CH	Config	Payload	Power Setting	Frequency Range				
					1164 - 1240 MHz	1559 - 1610 MHz	0.96 - 18 GHz	18 - 26 GHz	26 - 40 GHz
0	5	3	125	Max	PASS	PASS	PASS	PASS	PASS
0	9	3	125	Max	PASS	PASS	PASS	PASS	PASS
1	5	3	125	Max	PASS	PASS	PASS	PASS	PASS
1	9	3	125	Max	PASS	PASS	PASS	PASS	PASS
2	5	3	125	Max	PASS	PASS	PASS	PASS	PASS
2	9	3	125	Max	PASS	PASS	PASS	PASS	PASS

8.6.1. AVERAGE EMISSIONS, 0.96 – 6 GHz

8.6.1.1. FCC15.519 (C)



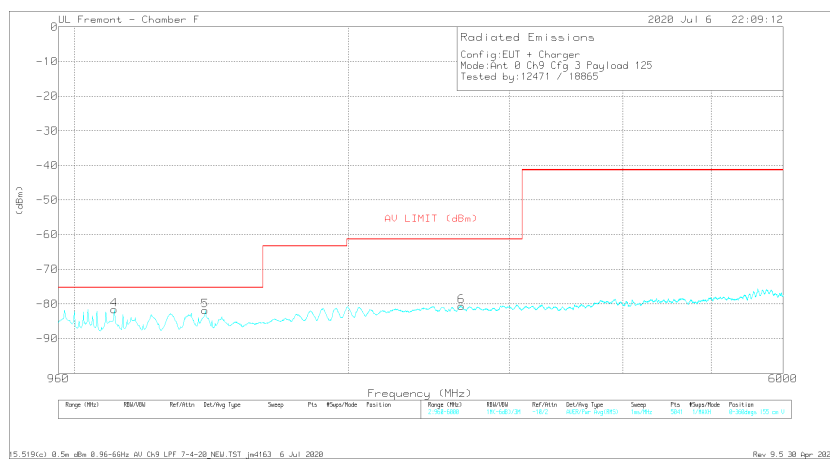
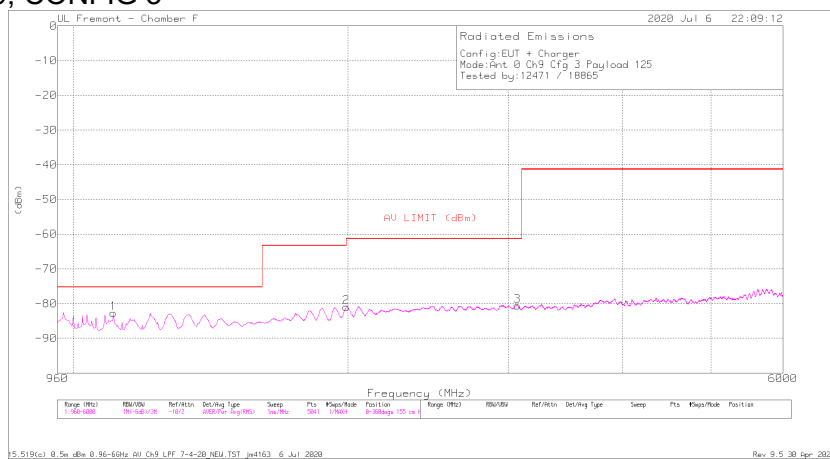
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T711 (dBm)	Amp/Cbl (dB)	Dist Correction (dB)	Conversion Factor (dB)	CH5_LPF (dB)	EIRP (dBm)	FCC15.519(c) EIRP RMS (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1038	-61.96	RMS	26.9	-45.2	-15.6	11.8	.2	-83.86	-75.3	-8.56	242	155	H
2	1272	-62.86	RMS	28.9	-45.4	-15.6	11.8	.1	-83.06	-75.3	-7.76	86	155	H
3	1993	-63.3	RMS	31.3	-45.4	-15.6	11.8	.3	-80.9	-61.3	-19.6	110	155	H
4	1098	-61.6	RMS	27.5	-45.5	-15.6	11.8	.2	-83.2	-75.3	-7.9	206	155	V
5	1994	-63.11	RMS	31.3	-45.4	-15.6	11.8	.3	-80.71	-61.3	-19.41	140	155	V
6	2655	-64.54	RMS	32.4	-45	-15.6	11.8	.1	-80.84	-61.3	-19.54	75	155	V

RMS - RMS detection

*Note: Test was performed with a low-pass filter with cutoff frequency at 6 GHz to suppress CH5 fundamental signal.

ANT. 0, CH9, CONFIG 3



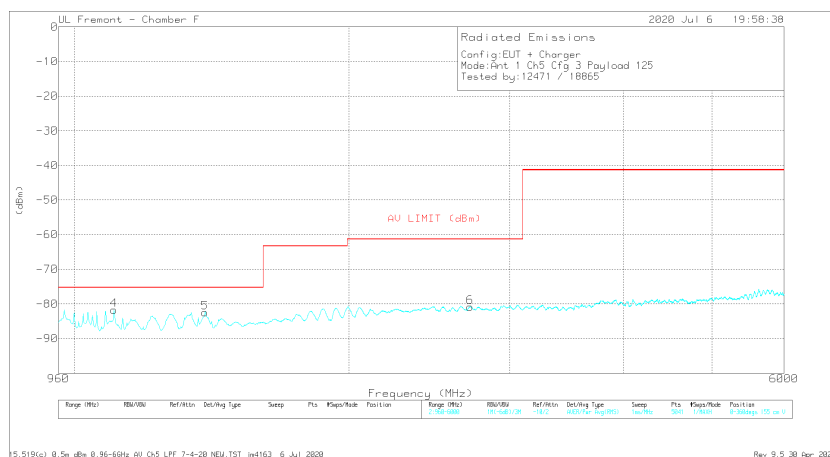
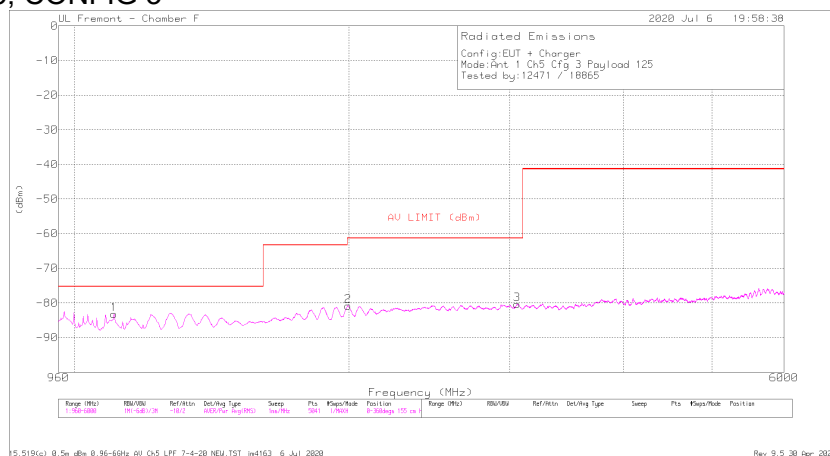
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T711 (dBm)	Amp/Cbl (dB)	Dist Correction (dB)	Conversion Factor (dB)	CH9_LPF (dB)	EIRP (dBm)	FCC15.519(c) ERP RMS (dBm)	Margin (dB)	Altitude (Degs)	Height (cm)	Polarity
1	1106	-61.22	RMS	27.5	-45.4	-15.6	11.8	.2	-82.72	-75.3	-7.42	242	155	H
2	1991	-63.34	RMS	31.3	-45.4	-15.6	11.8	.3	-80.94	-61.3	-19.64	220	155	H
3	3068	-66.11	RMS	33	-44.1	-15.6	11.8	.4	-80.61	-61.3	-19.31	197	155	H
4	1106	-60.14	RMS	27.5	-45.4	-15.6	11.8	.2	-81.64	-75.3	-6.34	229	155	V
5	1392	-61.61	RMS	28.7	-45.2	-15.6	11.8	.1	-81.81	-75.3	-6.51	206	155	V
6	2660	-64.3	RMS	32.5	-45.1	-15.6	11.8	.1	-80.6	-61.3	-19.3	52	155	V

RMS - RMS detection

*Note: Test was performed with a low-pass filter with cutoff frequency at 6 GHz to suppress CH9 fundamental signal.

ANT. 1, CH5, CONFIG 3



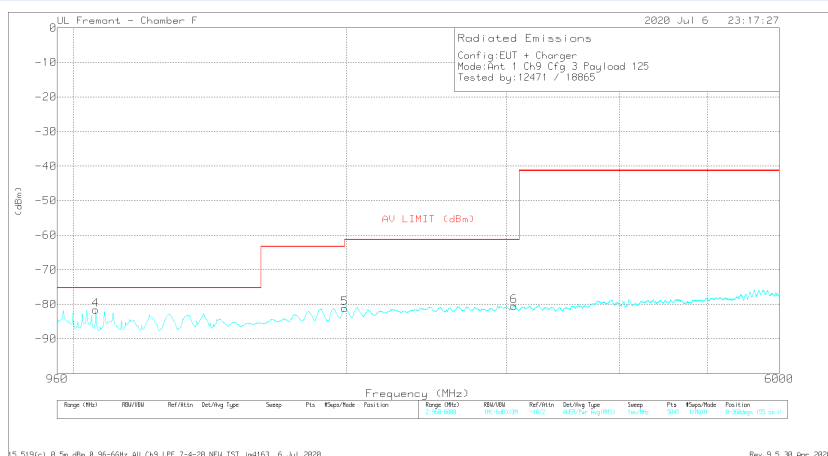
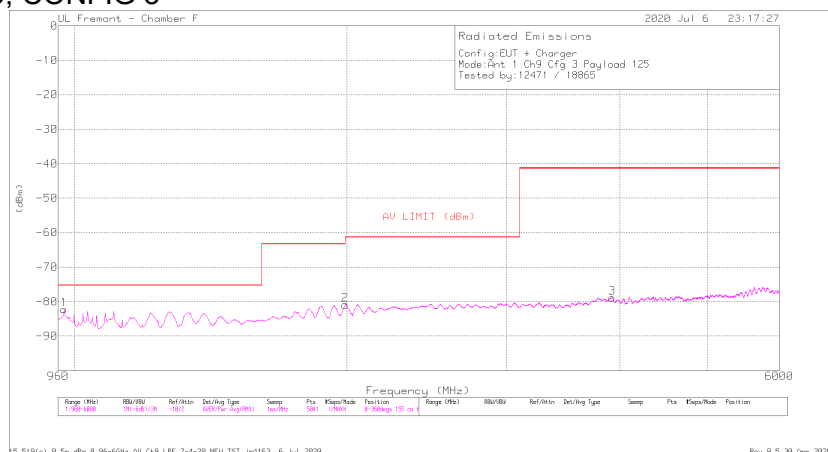
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T711 (dBm)	Amp/Cbl (dB)	Dist Correction (dB)	Conversion Factor (dB)	CH5_LPF (dB)	EIRP (dBm)	FCC15.519(c) ERP RMS (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1105	-61.77	RMS	27.5	-45.4	-15.6	11.8	.2	-83.27	-75.3	-7.97	242	155	H
2	1996	-63.29	RMS	31.3	-45.4	-15.6	11.8	.3	-80.89	-61.3	-19.59	0	155	H
3	3058	-65.93	RMS	33	-44.1	-15.6	11.8	.5	-80.33	-61.3	-19.03	242	155	H
4	1105	-60.2	RMS	27.5	-45.4	-15.6	11.8	.2	-81.7	-75.3	-6.4	228	155	V
5	1390	-62.45	RMS	28.8	-45.2	-15.6	11.8	.2	-82.45	-75.3	-7.15	207	155	V
6	2716	-64.68	RMS	32.3	-44.9	-15.6	11.8	.2	-80.88	-61.3	-19.58	338	155	V

RMS - RMS detection

*Note: Test was performed with a low-pass filter with cutoff frequency at 6 GHz to suppress CH5 fundamental signal.

ANT. 1, CH9, CONFIG 3



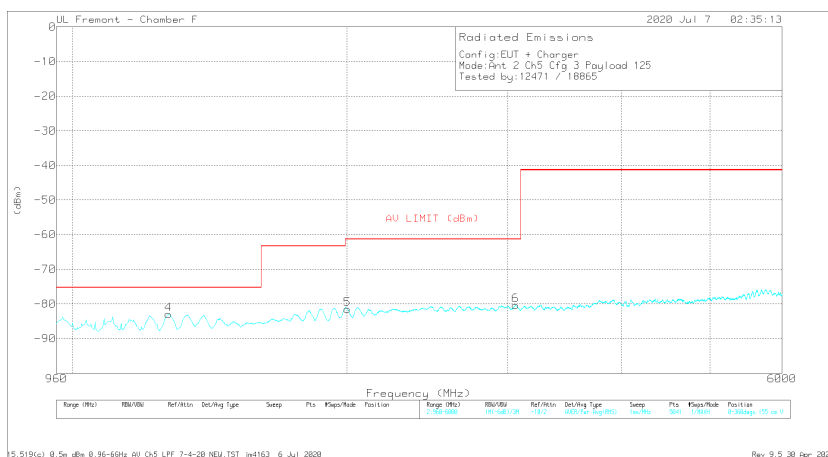
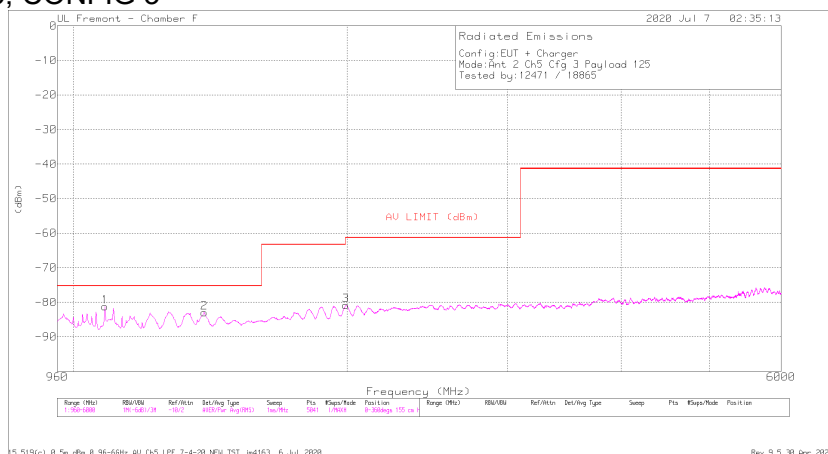
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T711 (dBm)	Amp/Cbl (dB)	Dist Correction (dB)	Conversion Factor (dB)	CH9_LPF (dB)	EIRP (dBm)	FCC15.519(c) EIRP RMS (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	975	-61.27	RMS	27.8	-45.1	-15.6	11.8	.2	-82.17	-75.3	-6.87	251	155	H
2	1992	-63.31	RMS	31.3	-45.4	-15.6	11.8	.3	-80.91	-61.3	-19.61	53	155	H
3	3924	-66.77	RMS	33.7	-42.6	-15.6	11.8	.6	-78.87	-41.3	-37.57	229	155	H
4	1059	-59.28	RMS	26.8	-45.4	-15.6	11.8	.1	-81.58	-75.3	-6.28	220	155	V
5	1991	-63.45	RMS	31.3	-45.4	-15.6	11.8	.3	-81.05	-61.3	-19.75	242	155	V
6	3061	-66.1	RMS	33	-44.1	-15.6	11.8	.5	-80.5	-61.3	-19.2	286	155	V

RMS - RMS detection

*Note: Test was performed with a low-pass filter with cutoff frequency at 6 GHz to suppress CH9 fundamental signal.

ANT. 2, CH5, CONFIG 3



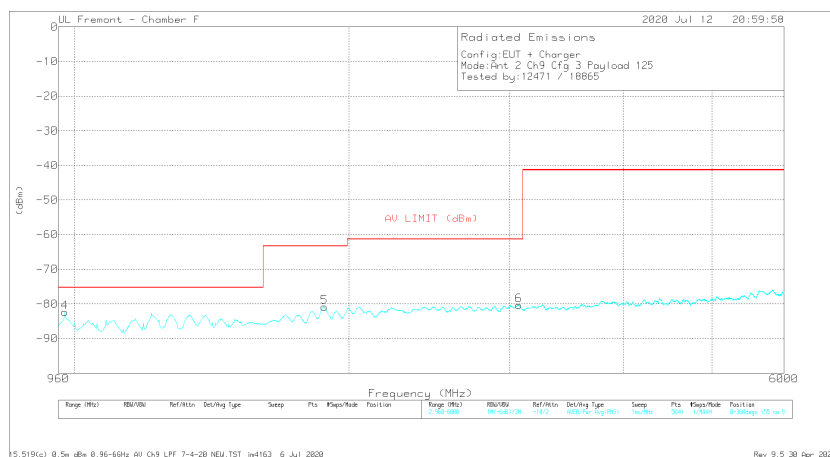
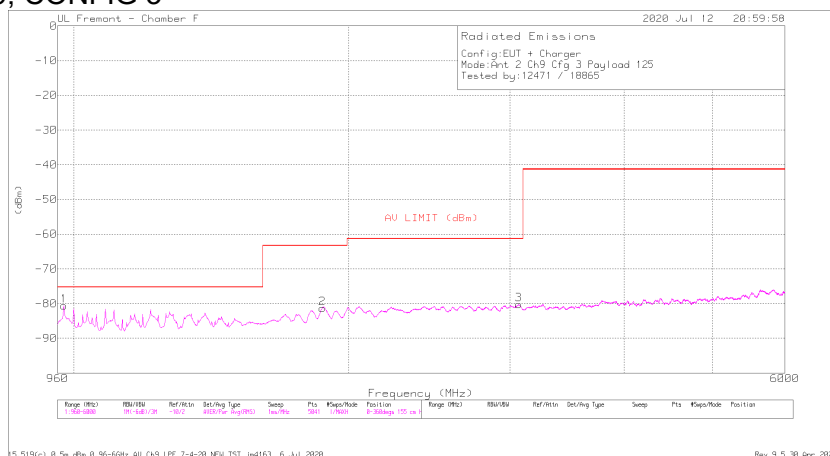
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T711 (dBm)	Amp/Cbl (dB)	Dist Correction (dB)	Conversion Factor (dB)	CH5_LPF (dB)	EIRP (dBm)	FCC15.519(c) ERP RMS (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1083	-59.66	RMS	27.4	-45.4	-15.6	11.8	.2	-81.26	-75.3	-5.96	197	155	H
2	1393	-62.73	RMS	28.7	-45.2	-15.6	11.8	.1	-82.93	-75.3	-7.63	176	155	H
3	1994	-63.24	RMS	31.3	-45.4	-15.6	11.8	.3	-80.84	-61.3	-19.54	308	155	H
4	1274	-62.99	RMS	29	-45.3	-15.6	11.8	.1	-82.99	-75.3	-7.69	141	155	V
5	2002	-63.83	RMS	31.3	-45.4	-15.6	11.8	.3	-81.43	-61.3	-20.13	295	155	V
6	3062	-65.93	RMS	33	-44.1	-15.6	11.8	.5	-80.33	-61.3	-19.03	339	155	V

RMS - RMS detection

*Note: Test was performed with a low-pass filter with cutoff frequency at 6 GHz to suppress CH5 fundamental signal.

ANT. 2, CH9, CONFIG 3



Trace Markers

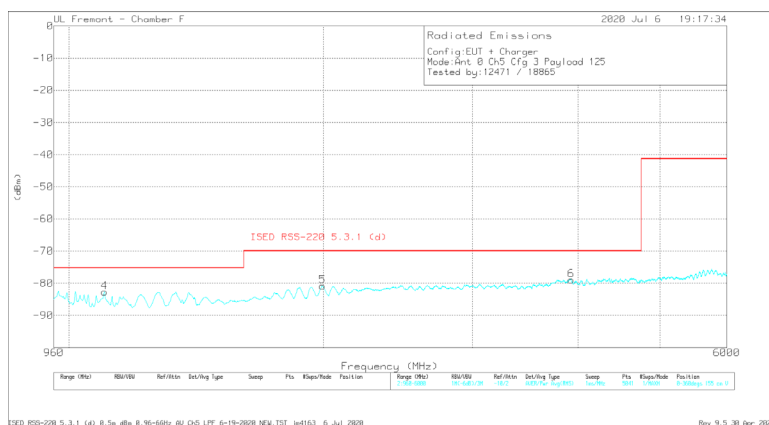
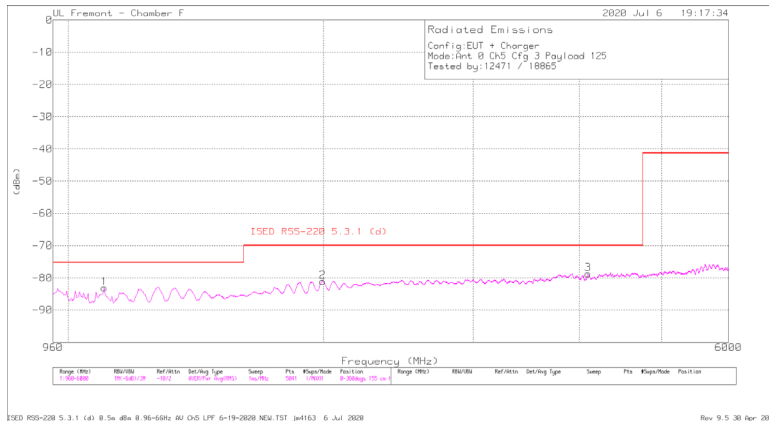
Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T711 (dBm)	Amp/Cbl (dB)	Dist Correction (dB)	Conversion Factor (dB)	CH9_LPF (dB)	EIRP (dBm)	FCC15.519(c) ERP RMS (dBm)	Margin (dB)	Altitude (Meters)	Height (cm)	Polarity
1	976	-59.65	RMS	27.8	-45.1	-15.6	11.8	.2	-80.55	-75.3	-5.25	110	155	H
2	1871	-63.56	RMS	30.8	-45.1	-15.6	11.8	.3	-81.36	-63.3	-18.06	44	155	H
3	3068	-65.78	RMS	33	-44.1	-15.6	11.8	.4	-80.28	-61.3	-18.98	242	155	H
4	976	-61.43	RMS	27.8	-45.1	-15.6	11.8	.2	-82.33	-75.3	-7.03	119	155	V
5	1879	-63.07	RMS	30.7	-45	-15.6	11.8	.3	-80.87	-63.3	-17.57	229	155	V
6	3071	-65.89	RMS	33	-44.1	-15.6	11.8	.4	-80.39	-61.3	-19.09	317	155	V

RMS - RMS detection

*Note: Test was performed with a low-pass filter with cutoff frequency at 6 GHz to suppress CH9 fundamental signal.

8.6.1.2. RSS-220 5.3.1 (d)

ANT. 0, CH5, CONFIG 3



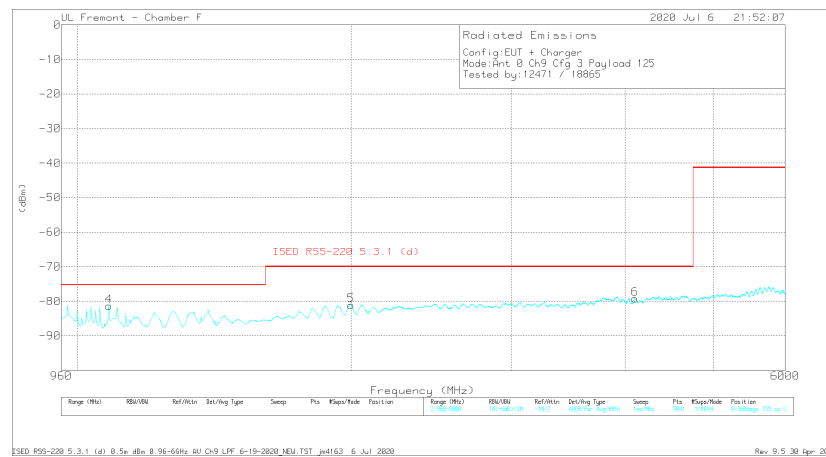
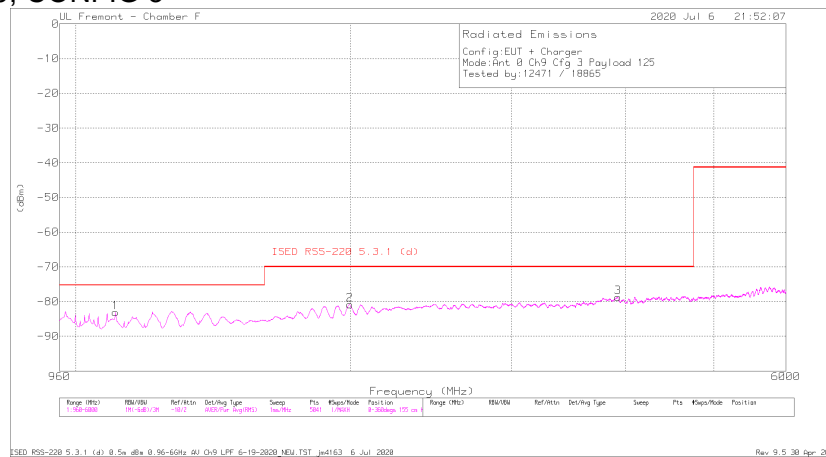
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T711 (dBm)	Amp/Cbl (dB)	Dist Correction (dB)	Conversion Factor (dB)	CH5_LPF (dB)	Corrected Reading (dBm)	ISSED RSS-220 5.3.1 (d)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1103	-61.54	RMS	27.5	-45.4	-15.6	11.8	.2	-83.04	-75.3	-7.74	241	155	H
2	1996	-63.45	RMS	31.3	-45.4	-15.6	11.8	.3	-81.05	-70	-11.05	1	155	H
3	4097	-66.28	RMS	33.8	-42.9	-15.6	11.8	.5	-78.68	-70	-8.68	198	155	H
4	1102	-61.11	RMS	27.5	-45.5	-15.6	11.8	.2	-82.71	-75.3	-7.41	229	155	V
5	1995	-63.2	RMS	31.3	-45.4	-15.6	11.8	.3	-80.8	-70	-10.8	97	155	V
6	3929	-67.13	RMS	33.7	-42.2	-15.6	11.8	.5	-78.93	-70	-8.93	31	155	V

RMS - RMS detection

*Note: Test was performed with a low-pass filter with cutoff frequency at 6 GHz to suppress CH5 fundamental signal.

ANT. 0, CH9, CONFIG 3



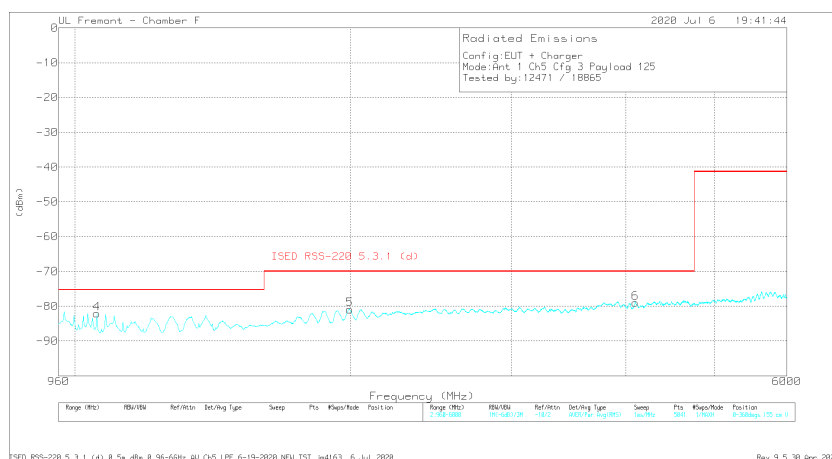
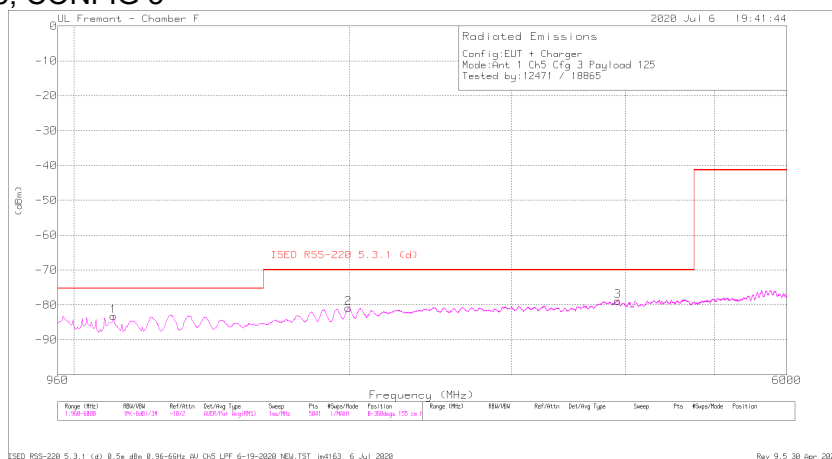
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T711 (dBm)	Amp/Cbl (dB)	Dist Correction (dB)	Conversion Factor (dB)	CH9_LPF (dB)	Corrected Reading (dBm)	ISED RSS-228 5.3.1 (d)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1106	-61.59	RMS	27.5	-45.4	-15.6	11.8	.2	-83.09	-75.3	-7.79	251	155	H
2	1998	-63.29	RMS	31.3	-45.4	-15.6	11.8	.3	-80.89	-70	-10.89	206	155	H
3	3928	-66.98	RMS	33.7	-42.3	-15.6	11.8	.6	-78.78	-70	-8.78	97	155	H
4	1083	-59.79	RMS	27.4	-45.4	-15.6	11.8	.2	-81.39	-75.3	-6.09	220	155	V
5	2000	-63.55	RMS	31.3	-45.4	-15.6	11.8	.3	-81.15	-70	-11.15	87	155	V
6	4103	-66.84	RMS	33.8	-43	-15.6	11.8	.6	-79.24	-70	-9.24	154	155	V

RMS - RMS detection

*Note: Test was performed with a low-pass filter with cutoff frequency at 6 GHz to suppress CH9 fundamental signal.

ANT. 1, CH5, CONFIG 3



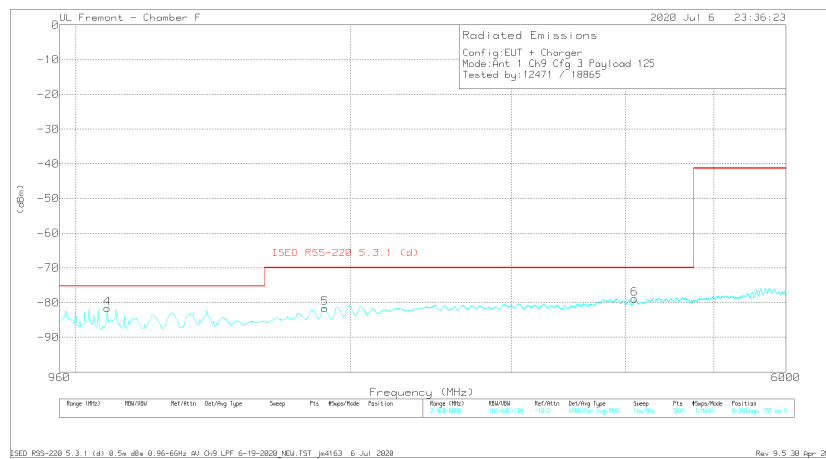
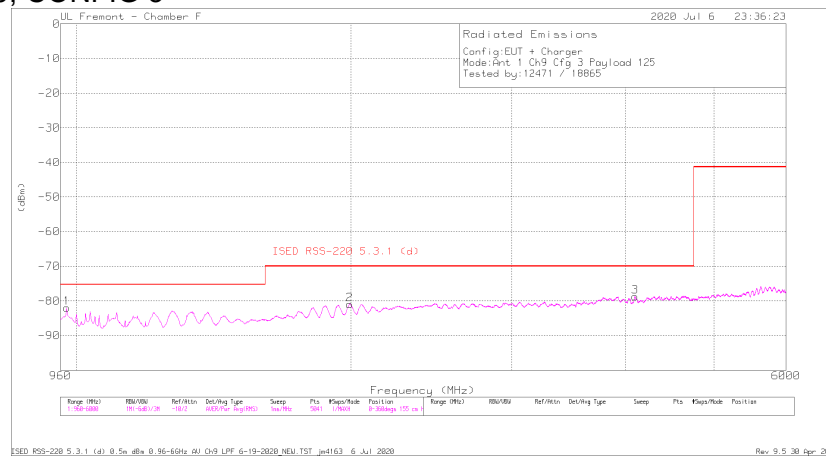
Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T711 (dBm)	Amp/Cbl (dB)	Dist Correction (dB)	Conversion Factor (dB)	CH5_LPF (dB)	Corrected Reading (dBm)	ISSED RSS-220 5.3.1 (d)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1105	-61.75	RMS	27.5	-45.4	-15.6	11.8	.2	-83.25	-75.3	-7.95	251	155	H
2	1993	-63.29	RMS	31.3	-45.4	-15.6	11.8	.3	-80.89	-70	-10.89	339	155	H
3	3924	-66.7	RMS	33.7	-42.6	-15.6	11.8	.6	-78.8	-70	-8.8	229	155	H
4	1057	-59.73	RMS	26.7	-45.4	-15.6	11.8	.1	-82.13	-75.3	-6.83	220	155	V
5	1997	-63.31	RMS	31.3	-45.4	-15.6	11.8	.3	-80.91	-70	-10.91	132	155	V
6	4098	-66.53	RMS	33.8	-42.9	-15.6	11.8	.5	-78.93	-70	-8.93	241	155	V

RMS - RMS detection

*Note: Test was performed with a low-pass filter with cutoff frequency at 6 GHz to suppress CH5 fundamental signal.

ANT. 1, CH9, CONFIG 3



Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T711 (dBm)	Amp/Cbl (dB)	Dist Correction (dB)	Conversion Factor (dB)	CH9_LPF (dB)	Corrected Reading (dBm)	ISSED RSS-228 5.3.1 (d)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	976	-61.11	RMS	27.8	-45.1	-15.6	11.8	.2	-82.01	-75.3	-6.71	242	155	H
2	1993	-63.4	RMS	31.3	-45.4	-15.6	11.8	.3	-81	-70	-11	176	155	H
3	4098	-66.3	RMS	33.8	-42.9	-15.6	11.8	.5	-78.7	-70	-8.7	131	155	H
4	1083	-60.03	RMS	27.4	-45.4	-15.6	11.8	.2	-81.63	-75.3	-6.33	229	155	V
5	1875	-63.75	RMS	30.8	-45.1	-15.6	11.8	.3	-81.55	-70	-11.55	118	155	V
6	4094	-66.29	RMS	33.8	-43.1	-15.6	11.8	.5	-78.89	-70	-8.89	163	155	V

RMS - RMS detection

*Note: Test was performed with a low-pass filter with cutoff frequency at 6 GHz to suppress CH9 fundamental signal.

OL Fremant - Chamber F

2020 Jul 7 02:51:37

Radiated Emissions
Config: EUT + Charger
Mode: Int 2 Ch5 Cfg 3 Payload 125
Tested by: 12471 / 18865

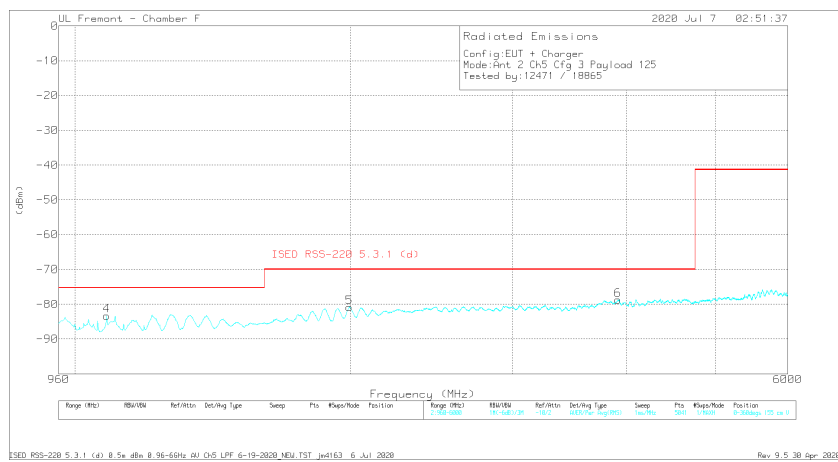
ISED RSS-220 5.3.1 (d)

Frequency (MHz)

Range (MHz)	Ref/Att	Ref/Att	Det/Ref Type	Sweep	Freq	Power/Rate	Position	Range (MHz)	Ref/Att	Ref/Att	Det/Ref Type	Sweep	Freq	Power/Rate	Position
1-6000	100-140/1.28	-10/2	100/1.28	100/1.28	100/1.28	100/1.28	100/1.28	1-6000	100-140/1.28	-10/2	100/1.28	100/1.28	100/1.28	100/1.28	100/1.28

ISED RSS-220 5.3.1 (d) 8.5w dbr 8.96-65Hz au CH5 LPF 6-19-2020 NCU TST jmd163 6 Jul 2020

Rev: 9.5.30 Apr 2020



Marker	Frequency (MHz)	Meter Reading (dBm)	Det	A/ 17111 (dBm)	Amp/CBI (dB)	Dist Correction (dB)	Conversion Factor (dB)	CH5_LPF (dB)	Corrected Reading (dBm)	ISED RSS-228 5.3.1 (dB)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1083	-58.06	RMS	27.4	-45.4	-15.6	11.8	2	-79.66	-75.3	-4.36	162	155	H
2	1995	-63.09	RMS	31.3	-45.4	-15.6	11.8	3	-80.69	-70	-10.69	207	155	H
3	3922	-66.41	RMS	33.7	-42.8	-15.6	11.8	2	-78.71	-70	-8.71	368	155	H
4	1083	-61.68	RMS	27.4	-45.4	-15.6	11.8	2	-83.28	-75.3	-7.98	154	155	V
5	1993	-63.26	RMS	31.3	-45.4	-15.6	11.8	3	-80.86	-70	-10.86	65	155	V
6	3916	-66.13	RMS	33.7	-43.1	-15.6	11.8	6	-78.73	-70	-8.73	65	155	V

*Note: Test was performed with a low-pass filter with cutoff frequency at 6 GHz to suppress CH5 fundamental signal.

UL Fremont - Chamber F

2020 Jul 12 20:41:20

Radiated Emissions
Config: EUT + Charger
Mode: Int. 2 Ch9 Cfg. 3 Payload 125
Tested by: 12471 / 18865

dBm

0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-90

0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 6000

Frequency (MHz)

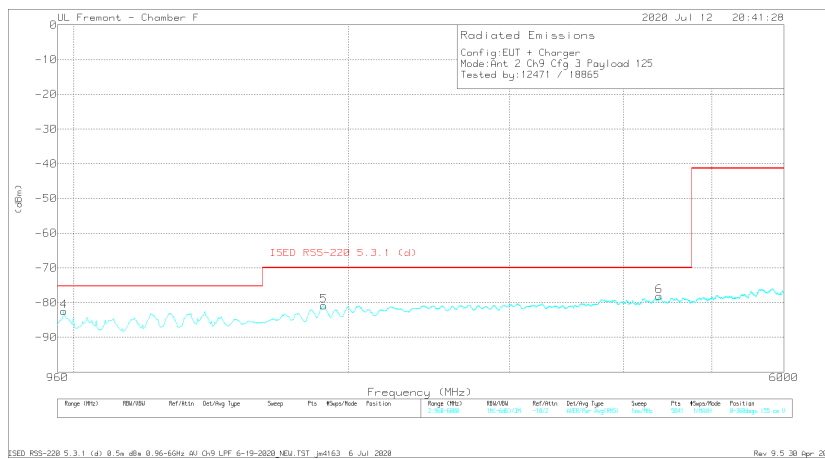
1 2 3

Range (MHz) BW (MHz) Ref (dBm) Start/Stop Type Samps/sec (Hz) Pk Exp/Rate Position
1.50e+000 10.00e+000 -100.0 410.0/4.0 avg (dB) 1000 1.00sec 0.00000 120 cm

Range (MHz) BW (MHz) Ref (dBm) Start/Stop Type Samps/sec (Hz) Pk Exp/Rate Position
5.31e+000 10.00e+000 -100.0 410.0/4.0 avg (dB) 1000 1.00sec 0.00000 120 cm

IS5D R55-220 5.3.1 (d) @ 5.5m, 0.96-658Hz BW Ch9 LFF 6-10-2020 NEU TST jcd163 6 Jul 2020

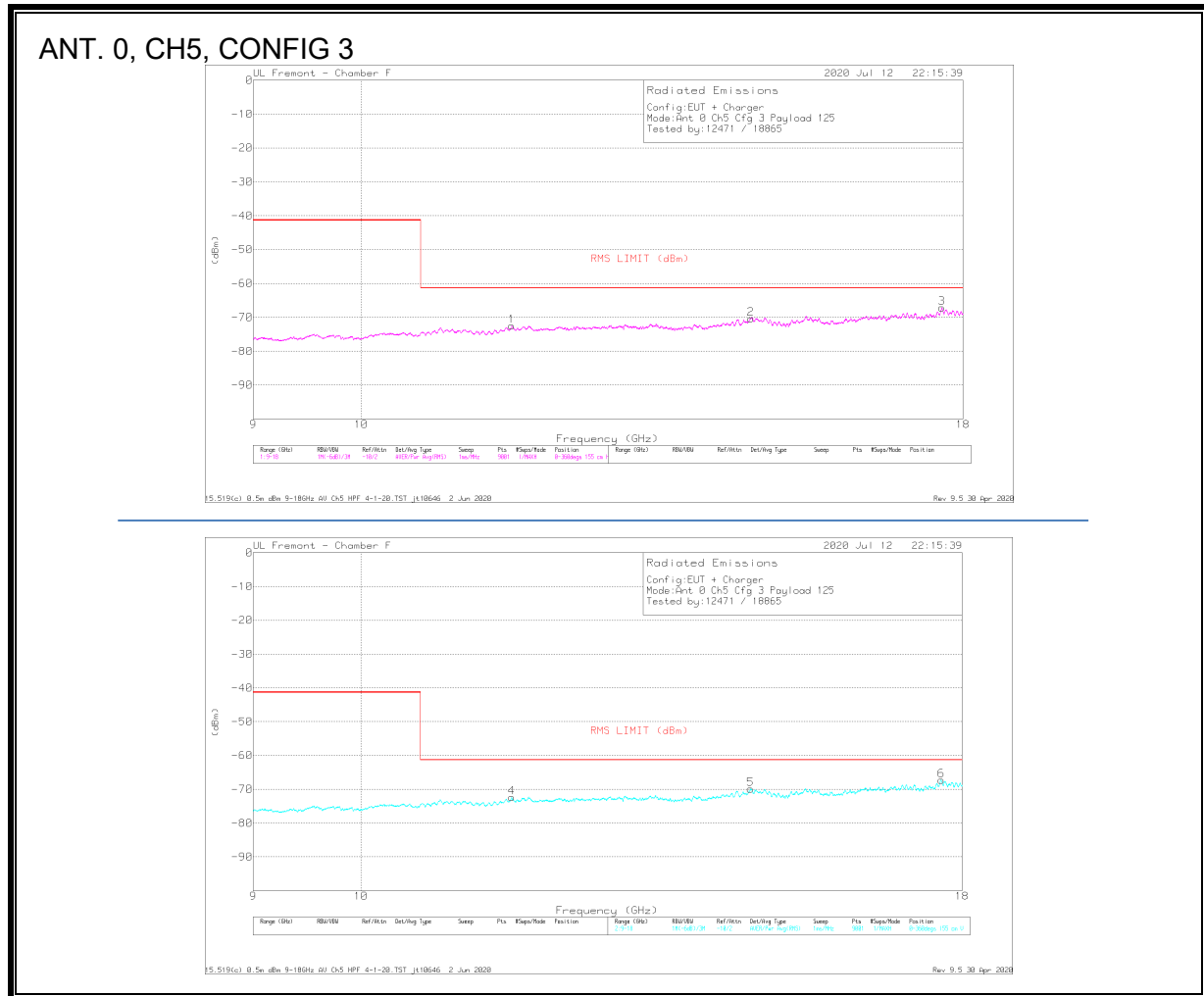
Rev: 9.5.30 Apr. 20



Marker	Frequency (MHz)	Meter Reading (dBm)	Det	AF T711 (dBm)	Amp/Cb1 (dB)	Dist Correction (dB)	Conversion Factor (dB)	Ch9_LPF (dB)	Corrected Reading (dBm)	ISED RSS-229 5.3.1 (dB)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1083	-59.17	RMS	27.4	-45.4	-15.6	11.8	2	-80.77	-75.3	-5.47	141	155	H
2	2049	-63.41	RMS	31.3	-45.4	-15.6	11.8	4	-80.91	-70	-10.91	53	155	H
3	4383	-65.58	RMS	33.9	-43.2	-15.6	11.8	3	-78.38	-70	-8.38	316	155	H
4	976	-61.54	RMS	27.8	-45.1	-15.6	11.8	2	-82.44	-75.3	-7.14	132	155	V
5	1879	-63.09	RMS	30.7	-45	-15.6	11.8	3	-80.89	-70	-10.89	330	155	V
6	4381	-65.34	RMS	33.9	-43.2	-15.6	11.8	3	-78.14	-70	-8.14	110	155	V

*Note: Test was performed with a low-pass filter with cutoff frequency at 6 GHz to suppress CH9 fundamental signal.

8.6.2. AVERAGE EMISSIONS, 9 – 18 GHz



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T711 (dBm)	Amp/Cbl (dB)	Dist Correction (dB)	Conversion Factor (dB)	CH5_HP (dB)	EIRP (dBm)	FCC15.519(c) EIRP RMS (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	11.585	-70.72	RMS	38.6	-37.2	-15.6	11.8	.6	-72.52	-61.3	-11.22	329	155	H
2	14.63	-71.1	RMS	40.1	-36.3	-15.6	11.8	.7	-70.4	-61.3	-9.1	219	155	H
3	17.634	-70.86	RMS	41.5	-34.6	-15.6	11.8	.6	-67.16	-61.3	-5.86	1	155	H
4	11.589	-70.77	RMS	38.6	-37	-15.6	11.8	.6	-72.37	-61.3	-11.07	251	155	V
5	14.639	-70.67	RMS	40.1	-36.2	-15.6	11.8	.7	-69.87	-61.3	-8.57	251	155	V
6	17.637	-70.85	RMS	41.5	-34.7	-15.6	11.8	.6	-67.25	-61.3	-5.95	163	155	V

RMS - RMS detection

*Note: Test was performed with a high-pass filter with pass-band frequency starting at 9 GHz to suppress CH5 fundamental signal.

ANT. 0, CH9, CONFIG 3



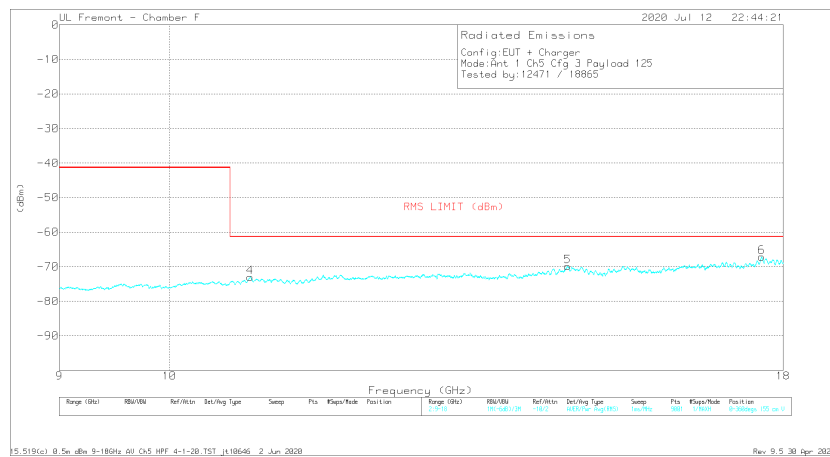
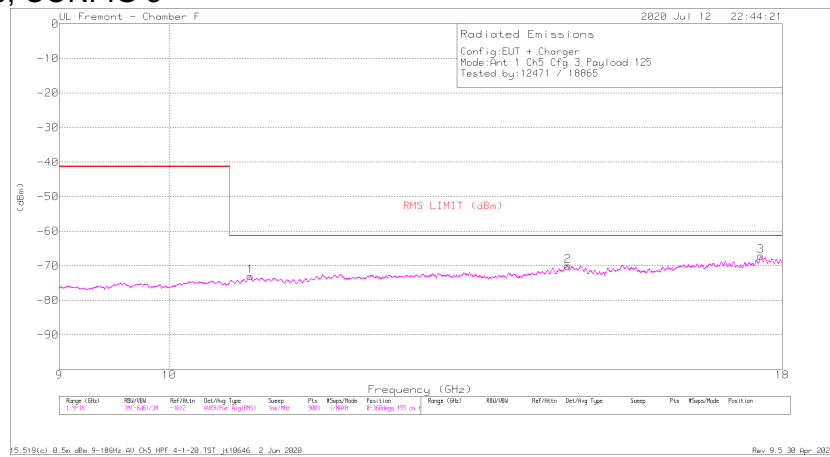
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T711 (dBm)	Amp/Cbl (dB)	Dist Correction (dB)	Conversion Factor (dB)	CH9_HPF (dB)	EIRP (dBm)	FCC15.519(c) EIRP RMS (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	10.873	-70.06	RMS	37.8	-37.7	-15.6	11.8	0	-73.76	-61.3	-12.46	330	155	H
2	14.841	-71.12	RMS	40.1	-36.4	-15.6	11.8	.8	-70.42	-61.3	-9.12	286	155	H
3	17.627	-71.62	RMS	41.4	-36.6	-15.6	11.8	-4	-68.22	-61.3	-6.92	220	155	H
4	10.872	-69.6	RMS	37.8	-37.7	-15.6	11.8	0	-73.3	-61.3	-12	75	155	V
5	14.841	-70.92	RMS	40.1	-36.4	-15.6	11.8	.8	-70.22	-61.3	-8.92	53	155	V
6	17.637	-71.32	RMS	41.6	-34.7	-15.6	11.8	-5	-67.82	-61.3	-6.52	207	155	V

RMS - RMS detection

*Note: Test was performed with a high-pass filter with pass-band frequency starting at 9 GHz to suppress CH9 fundamental signal.

ANT. 1, CH5, CONFIG 3



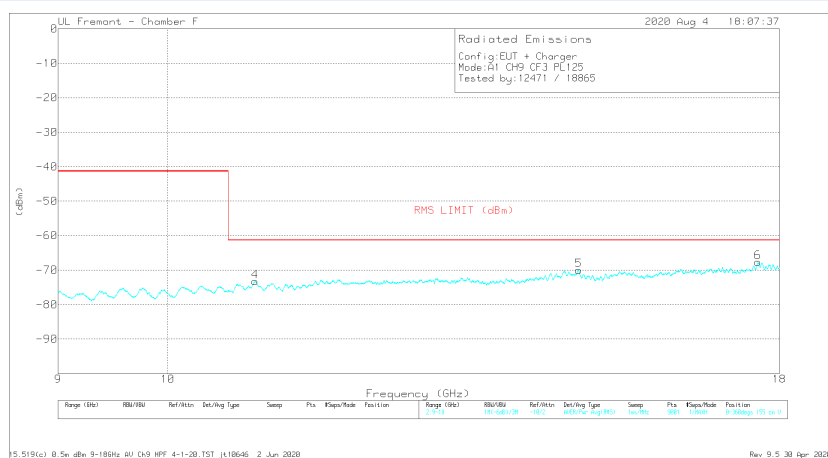
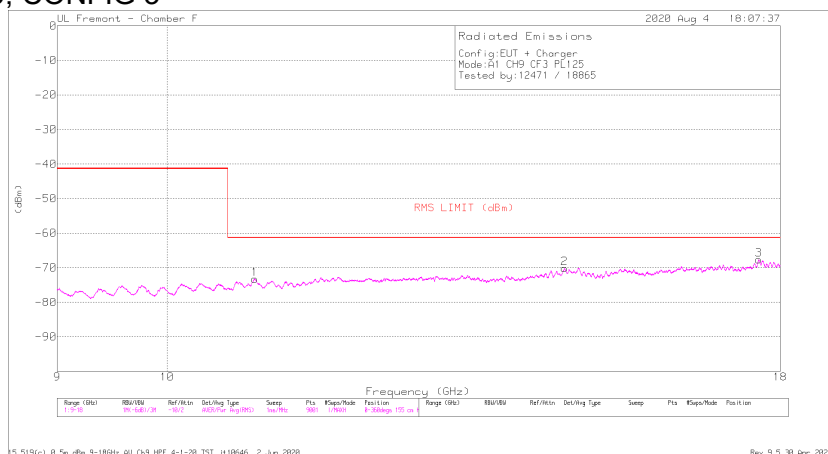
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T711 (dBm)	Amp/Cbl (dB)	Dist Correction (dB)	Conversion Factor (dB)	CH5_HPF (dB)	EIRP (dBm)	FCC15.519(c) EIRP RMS (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	10.808	-70.68	RMS	37.9	-37	-15.6	11.8	.6	-72.98	-61.3	-11.68	251	155	H
2	14.655	-70.67	RMS	40.2	-36.4	-15.6	11.8	.7	-69.97	-61.3	-8.67	30	155	H
3	17.634	-70.9	RMS	41.5	-34.6	-15.6	11.8	.6	-67.2	-61.3	-5.9	141	155	H
4	10.805	-70.52	RMS	37.8	-37.1	-15.6	11.8	.6	-73.02	-61.3	-11.72	154	155	V
5	14.641	-70.72	RMS	40.1	-36.2	-15.6	11.8	.7	-69.92	-61.3	-8.62	88	155	V
6	17.634	-70.79	RMS	41.5	-34.6	-15.6	11.8	.6	-67.09	-61.3	-5.79	43	155	V

RMS - RMS detection

*Note: Test was performed with a high-pass filter with pass-band frequency starting at 9 GHz to suppress CH5 fundamental signal.

ANT. 1, CH9, CONFIG 3



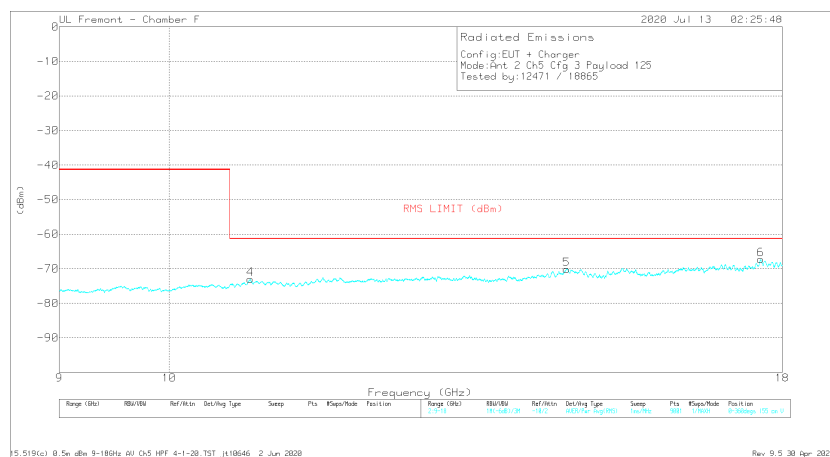
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T711 (dBm)	Amp/Cbl (dB)	Dist Correction (dB)	Conversion Factor (dB)	CH9_HPF (dB)	EIRP (dBm)	FCC15.519(c) EIRP RMS (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	10.876	-69.51	RMS	37.8	-37.7	-15.6	11.8	0	-73.21	-61.3	-11.91	308	155	H
2	14.638	-70.68	RMS	40.1	-36.2	-15.6	11.8	-4	-70.18	-61.3	-8.88	44	155	H
3	17.635	-71.27	RMS	41.5	-34.6	-15.6	11.8	-5	-67.67	-61.3	-6.37	1	155	H
4	10.877	-69.55	RMS	37.8	-37.7	-15.6	11.8	0	-73.25	-61.3	-11.95	184	155	V
5	14.843	-70.69	RMS	40.1	-36.4	-15.6	11.8	-8	-69.99	-61.3	-8.69	118	155	V
6	17.635	-71.27	RMS	41.5	-34.6	-15.6	11.8	-5	-67.67	-61.3	-6.37	272	155	V

RMS - RMS detection

*Note: Test was performed with a high-pass filter with pass-band frequency starting at 9 GHz to suppress CH9 fundamental signal.

ANT. 2, CH5, CONFIG 3



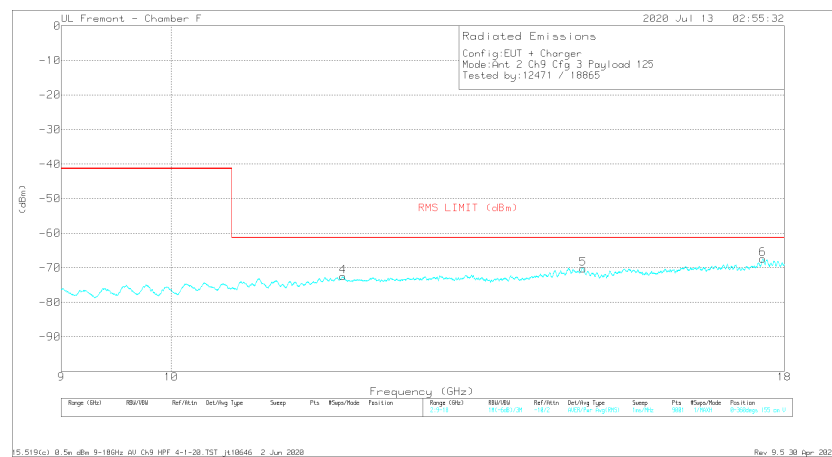
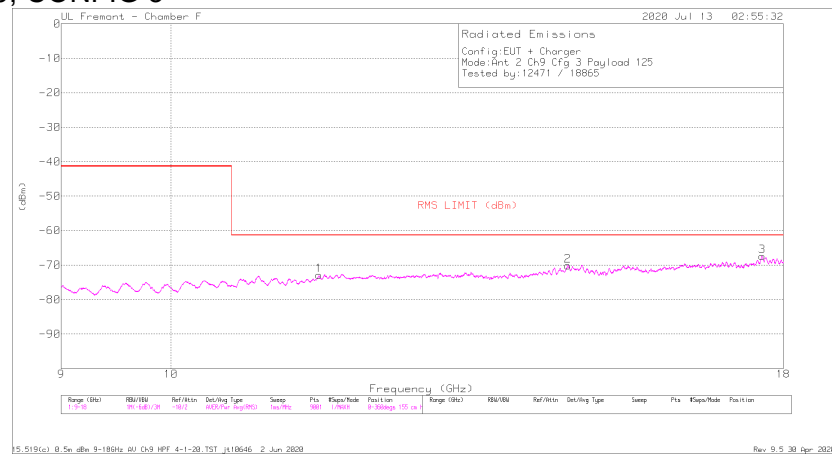
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T711 (dBm)	Amp/Cbl (dB)	Dist Correction (dB)	Conversion Factor (dB)	CH5_HPF (dB)	EIRP (dBm)	FCC15.519(c) ERP RMS (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	10.806	-70.69	RMS	37.9	-37.1	-15.6	11.8	.6	-73.09	-61.3	-11.79	264	155	H
2	14.644	-70.79	RMS	40.1	-36.2	-15.6	11.8	.7	-69.99	-61.3	-8.69	22	155	H
3	17.625	-70.85	RMS	41.4	-34.7	-15.6	11.8	.6	-67.35	-61.3	-6.05	1	155	H
4	10.808	-70.64	RMS	37.9	-37	-15.6	11.8	.6	-72.94	-61.3	-11.64	339	155	V
5	14.64	-70.9	RMS	40.1	-36.2	-15.6	11.8	.7	-70.1	-61.3	-8.8	163	155	V
6	17.632	-70.91	RMS	41.5	-34.6	-15.6	11.8	.6	-67.21	-61.3	-5.91	339	155	V

RMS - RMS detection

*Note: Test was performed with a high-pass filter with pass-band frequency starting at 9 GHz to suppress CH5 fundamental signal.

ANT. 2, CH9, CONFIG 3



Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T711 (dBm)	Amp/Cbl (dB)	Dist Correction (dB)	Conversion Factor (dB)	CH9_HP (dB)	Corrected Reading (dBm)	FCC15.519(c) ERP RMS (dBm)	Margin (dB)	Altitude (Dogs)	Height (cm)	Polarity
1	11.528	-70.61	RMS	38.4	-37.4	-15.6	11.8	.5	-72.91	-61.3	-11.61	330	155	H
2	14.636	-70.63	RMS	40.1	-36.2	-15.6	11.8	.4	-70.13	-61.3	-8.83	330	155	H
3	17.637	-70.92	RMS	41.5	-34.7	-15.6	11.8	.5	-67.42	-61.3	-6.12	263	155	H
4	11.792	-70.66	RMS	38.9	-37.4	-15.6	11.8	.5	-72.46	-61.3	-11.16	339	155	V
5	14.847	-70.82	RMS	40.1	-36.5	-15.6	11.8	.8	-70.22	-61.3	-8.92	317	155	V
6	17.635	-70.98	RMS	41.5	-34.6	-15.6	11.8	.5	-67.38	-61.3	-6.08	317	155	V

RMS - RMS detection

*Note: Test was performed with a high-pass filter with pass-band frequency starting at 9 GHz to suppress CH9 fundamental signal.