FCC CFR47 PART 22H
RADIATED EMISSION GSM850 ONLY
CERTIFICATION TEST REPORT

FOR

CELLULAR PHONE WITH BLUETOOH AND WLAN RADIOS

MODEL NUMBER: A1785

FCC ID: BCG-E3088A

REPORT NUMBER: 16U23308-E3V1

ISSUE DATE: JULY 27, 2016

Prepared for
APPLE, INC.
1 INFINITE LOOP
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Prepared by
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	07/27/2016	Initial Review	Chin Pang

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: APPLE
1 INFINITE LOOP
CUPERTINO, CA 95014, U.S.A.

EUT DESCRIPTION: CELLULAR PHONE WITH BLUETOOTH AND WLAN RADIOS

MODEL: A1785

SERIAL NUMBER: C39RW01HHFML (RADIATED)

DATE TESTED: JULY 20, 2016 – JULY 22, 2016

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC CFR47 PART 22H	Pass

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

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL 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 any government.

Approved & Released For
UL Verification Services Inc. By:

CHIN PANG
SENIOR ENGINEER
UL VERIFICATION SERVICES INC.

Prepared By:

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LAB ENGINEER
UL VERIFICATION SERVICES INC.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with TIA-603-D, FCC CFR 47 Part 2, FCC Part 22 and FCC KDB 971168 D01 v02r02 and ANSI C63.26:2015.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47266 Benicia Street, Fremont, California, USA. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street
☐ Chamber A	☐ Chamber D
☐ Chamber B	☒ Chamber E
☐ Chamber C	☒ Chamber F
	☒ Chamber G
	☐ Chamber H

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers A through H are covered under Industry Canada company address code 2324B with site numbers 2324B -1 through 2324B-8, respectively.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://ts.nist.gov/standards/scopes/2000650.htm.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

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

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)

36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Conducted Disturbance, 9KHz to 0.15 MHz	3.84 dB
Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Radiated Disturbance, 9KHz to 30 MHz	3.15 dB
Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Radiated Disturbance,1000 to 18000 MHz	4.32 dB
Radiated Disturbance,18000 to 26000 MHz	4.45 dB
Radiated Disturbance,26000 to 40000 MHz	5.24 dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT Model A1785 is a mobile phone with multimedia functions (music, application support, and video), cellular GSM/GPRS/EGPRS/CDMA/WCDMA/HSPA+/DC-HSDPA/LTE-radio, IEEE 802.11a/b/g/n/ac, NFC and Bluetooth radio. The rechargeable battery is not user accessible.

5.2. MAXIMUM OUTPUT POWER

Please refer to FCC ID: BCG-E3088A

5.3. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was version 0.26.02.

5.4. MAXIMUM ANTENNA GAIN

Please see table below:

Frequency(MHz)	Port A (LAT) Antenna Gain (dBi)	Port B (UAT) Antenna Gain (dBi)
824 - 849	-2.07	-3.57

5.5. WORST-CASE CONFIGURATION AND MODE

EUT was investigated in three orthogonal orientations X/Y/Z, it was determined that Portrait orientation was worst-case orientation for cell bands; Flatbed orientation was worst-case orientation without AC/DC adapter and headset.

GSM850 GPRS was selected to do the radiated spurious test due to it has the highest power compared to other mode, EGPRS, UMTS and CDMA.

5.6. DESCRIPTION OF TEST SETUP

TESTS SUPPORT EQUIPMENT

Support Equipment List			
Description	Manufacturer	Model	Serial Number
AC/DC adapter	HP	HNSTNN-DA40	WDWR7OBAR9AKS8
Laptop	HP	HP ProBook 450 G2	CND5367Z97
DC power supply	Sorensen	XT 20-3	1318A00530

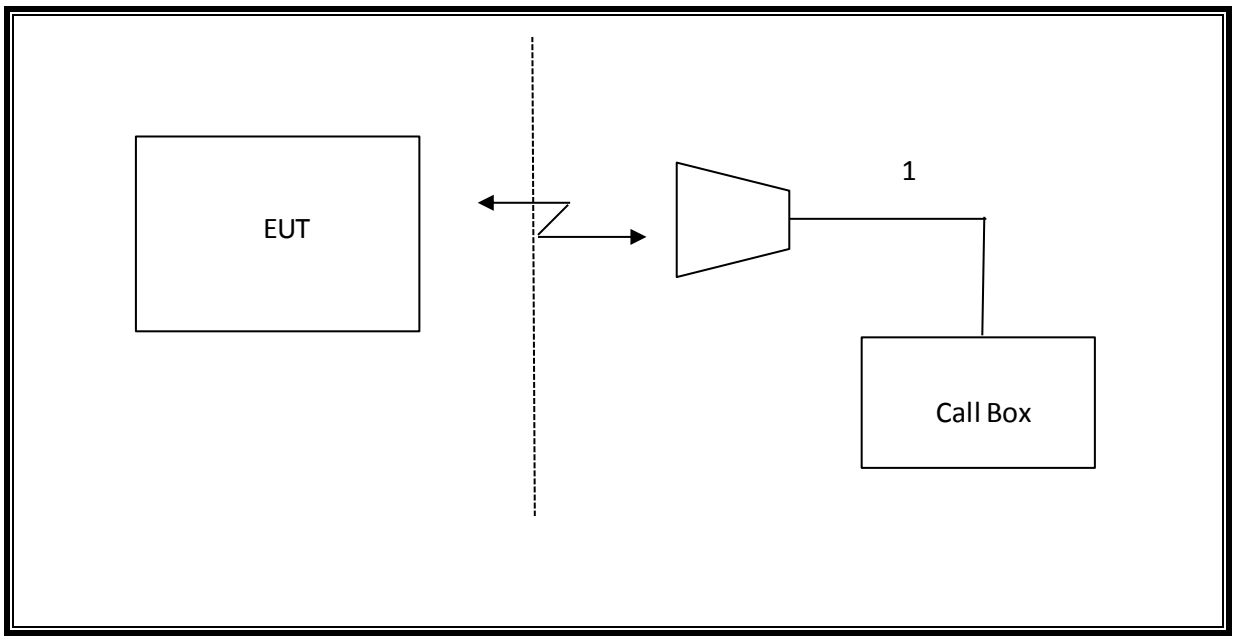
I/O CABLES (RF CONDUCTED TEST)

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	RF In/Out	1	Antenna	Un-shielded	5m	NA

TEST SETUP

SETUP DIAGRAM FOR TESTS

RADIATED SETUP



6. 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**	**T No.**	**Cal Due**
Wideband Communication Test Set, Call Box	Rohde & Schwarz	CMW500	T259	10/23/16
P - Series Power Meter	Keysight	N1911A	T1245	05/03/17
*Wideband Power Sensor 50 MHz - 18 GHz	Keysight	N1921A	T749	09/24/16
Wideband Communication Test Set, Call Box	Rohde & Schwarz	CMW500	T954	05/03/17
Antenna, Horn 1-18GHz	Emco	3115	T59	11/18/16
*Tuned Dipole, 400 - 1000MHz	ETS Lindgren	3121C DB4	T273	05/16/17
Filter, HPF 1.0GHz	Micro-Tronics	HPM18129	T889	09/01/16
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	T341	10/14/16
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	T136	03/14/17
Amplifier, 1 - 18GHz	Miteq	AFS42-00101800-25-S-42	T493	07/23/16

NOTE: * testing is completed before equipment calibration expiration date.

7. RADIATED TEST RESULTS

7.1. FIELD STRENGTH OF SPURIOUS RADIATION

RULE PART(S)

FCC: §2.1053, §22.917

LIMIT

§27.53 (h) For operations in the 1710–1755 MHz and 2110–2155 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 + 10 log10(P) dB.

TEST PROCEDURE

For Cellular equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

For PCS equipment - Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

MODES TESTED

- GPRS 850

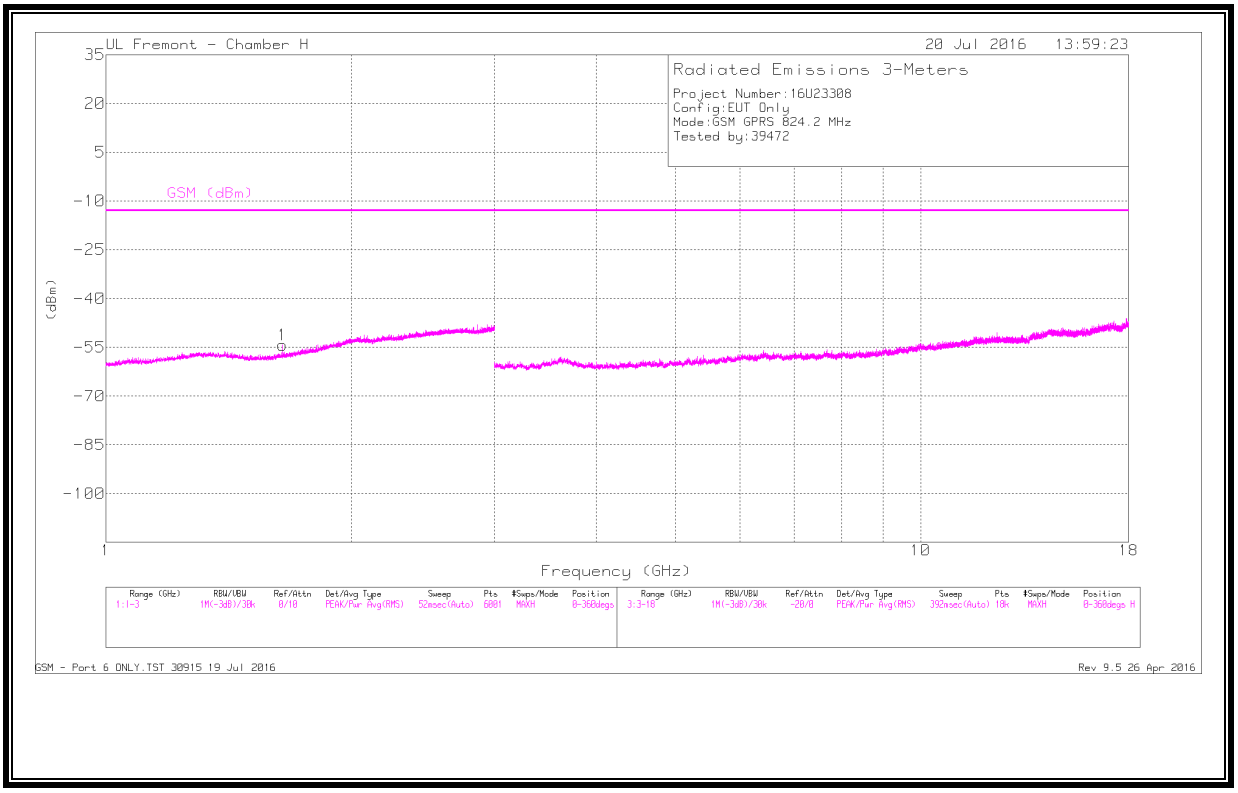
RESULTS

7.1.1. LAT

GSM

LOW CHANNEL, GPRS 850MHz BAND 5

HORIZONTAL



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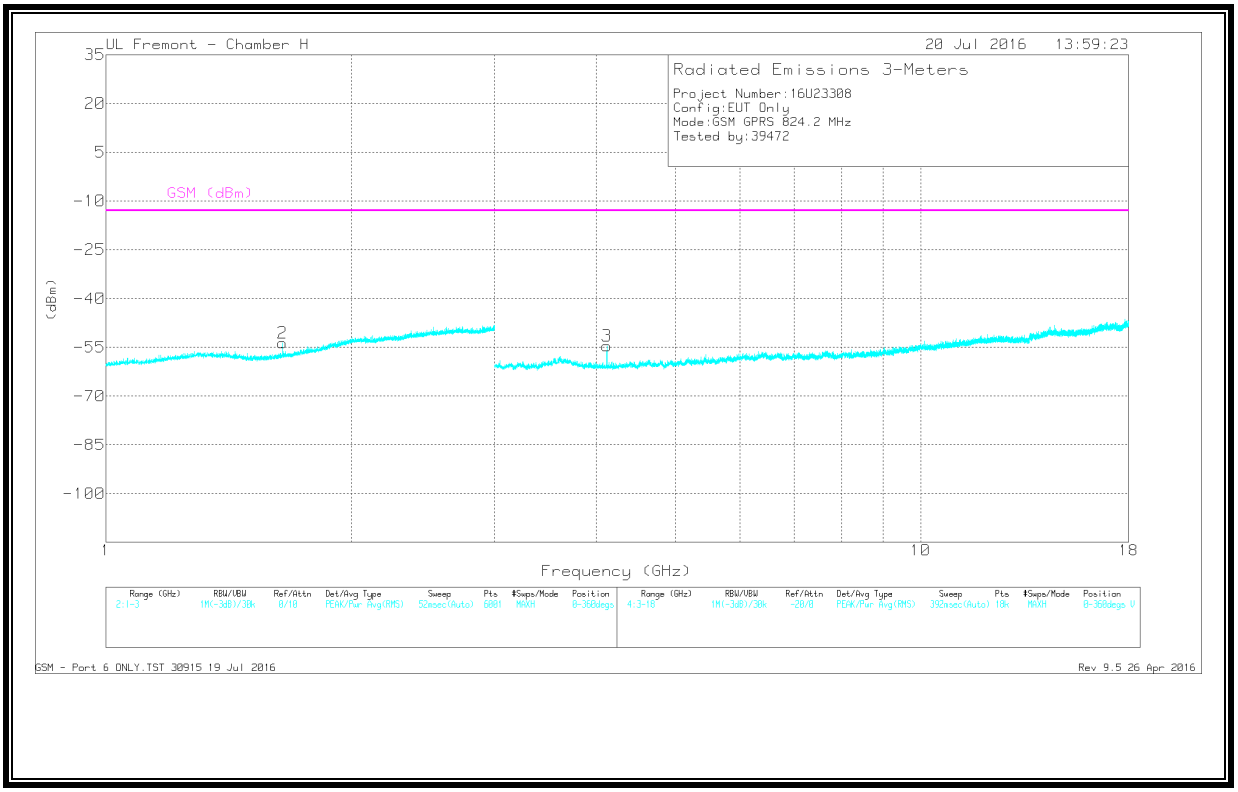


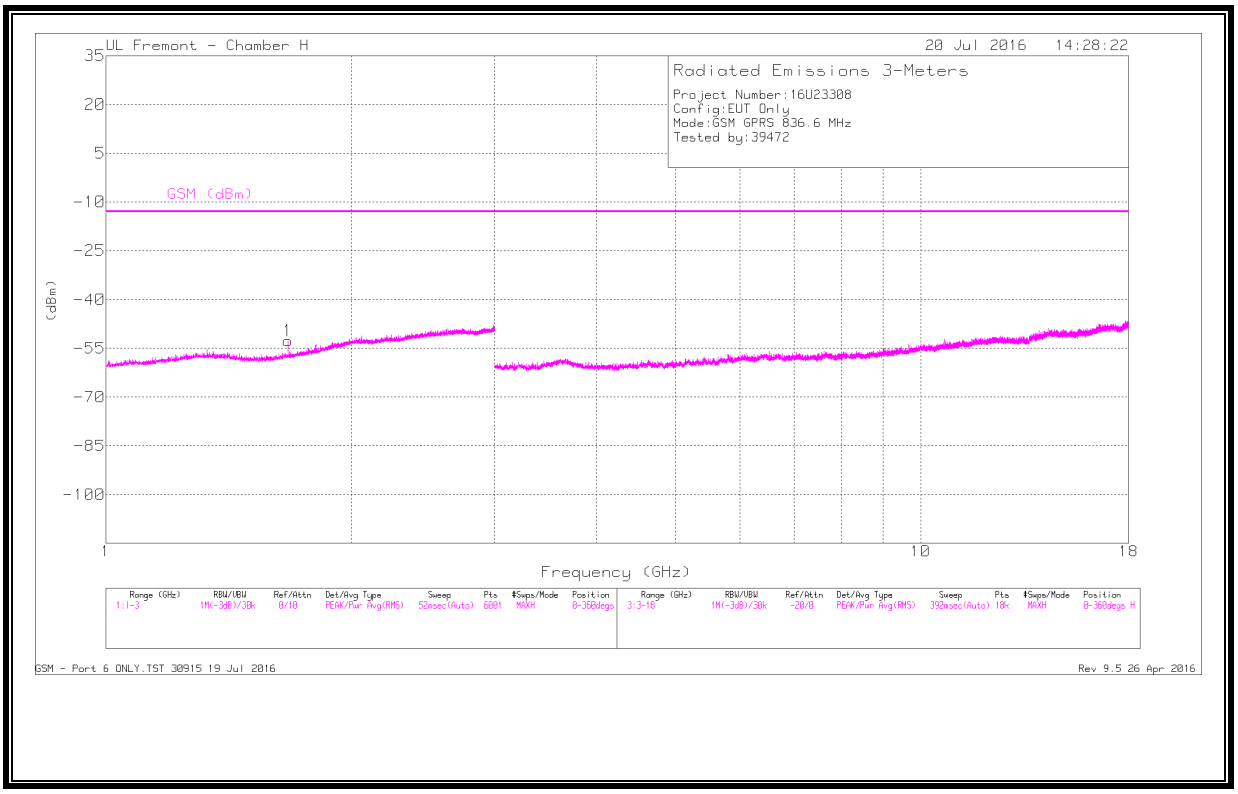
DATA
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T120 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Conversion Factor (dB)	DC Corr (dB)	Corrected Reading (dBm)	GSM (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 4.12	-60.14	PK2	33.5	-34.9	11.8	0	-49.74	-13	-36.74	310	246	V
1	1.648	-65.62	PK2	28.3	-21	11.8	0	-46.52	-13	-33.52	50	391	H
3	1.649	-64.16	PK2	28.3	-21	11.8	0	-45.06	-13	-32.06	274	391	V

Pk - Peak detector

MID CHANNEL

HORIZONTAL



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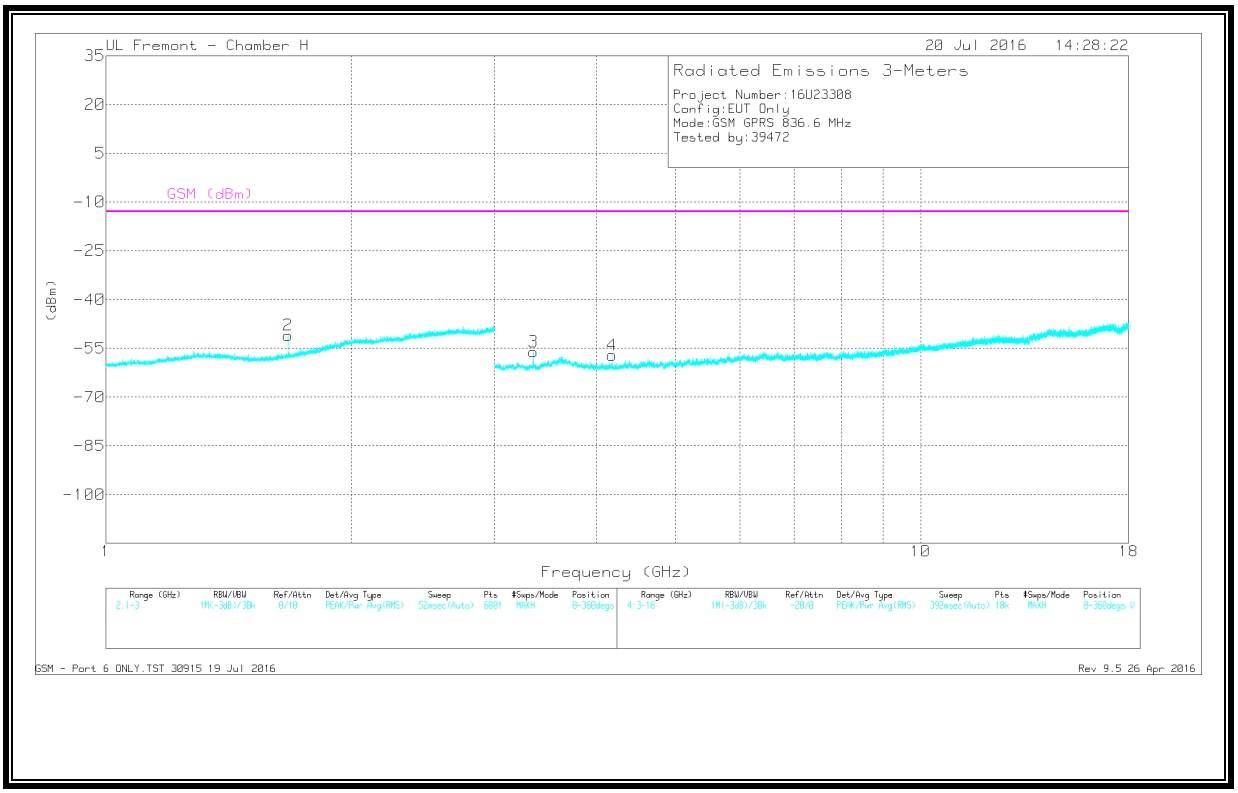

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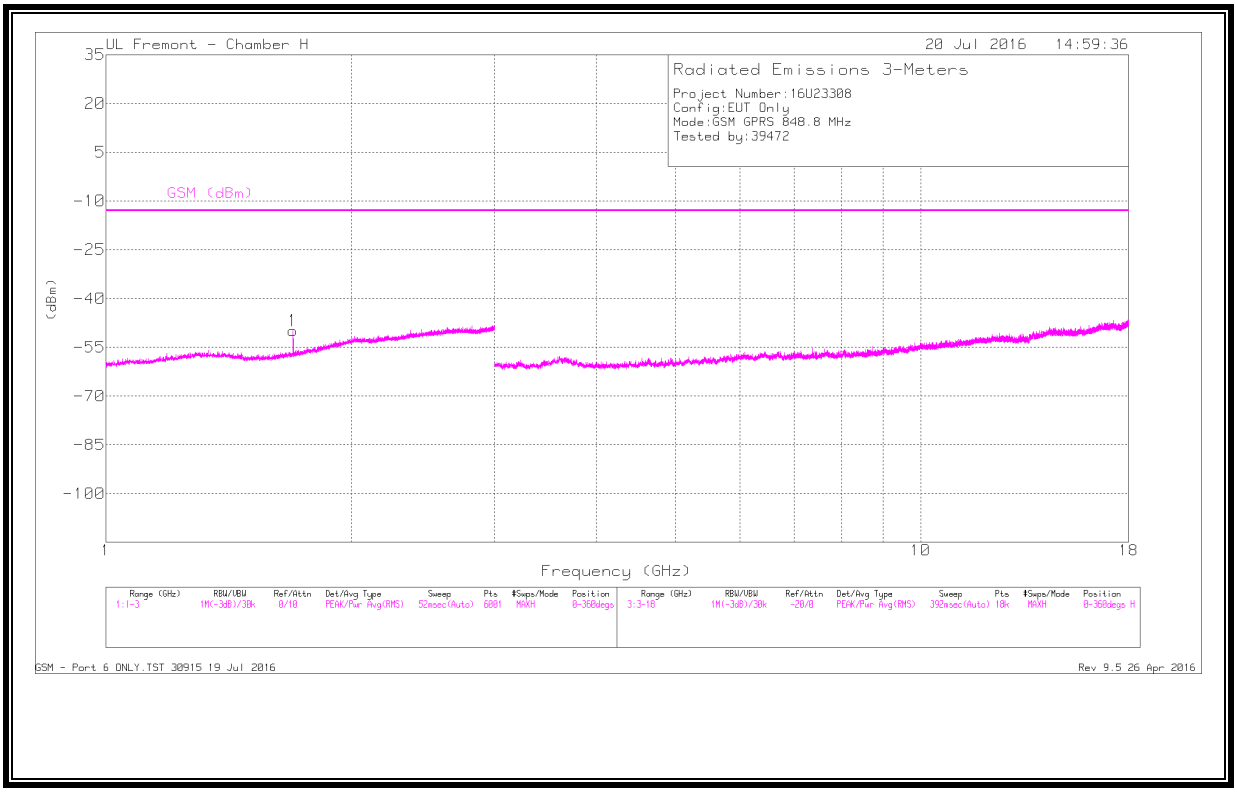
Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T120 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Conversion Factor (dB)	DC Corr (dB)	Corrected Reading (dBm)	GSM (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.673	-64.99	PK	28.5	-21	11.8	0	-45.69	-13	-32.69	207	387	H
2	* 1.673	-62.32	PK	28.5	-21	11.8	0	-43.02	-13	-30.02	244	385	V
4	* 4.183	-59.11	PK	33.5	-35.2	11.8	0	-49.01	-13	-36.01	209	123	V
3	3.346	-59.33	PK	33.4	-36.4	11.8	0	-50.53	-13	-37.53	248	178	V

Pk - Peak detector

HIGH CHANNEL

HORIZONTAL



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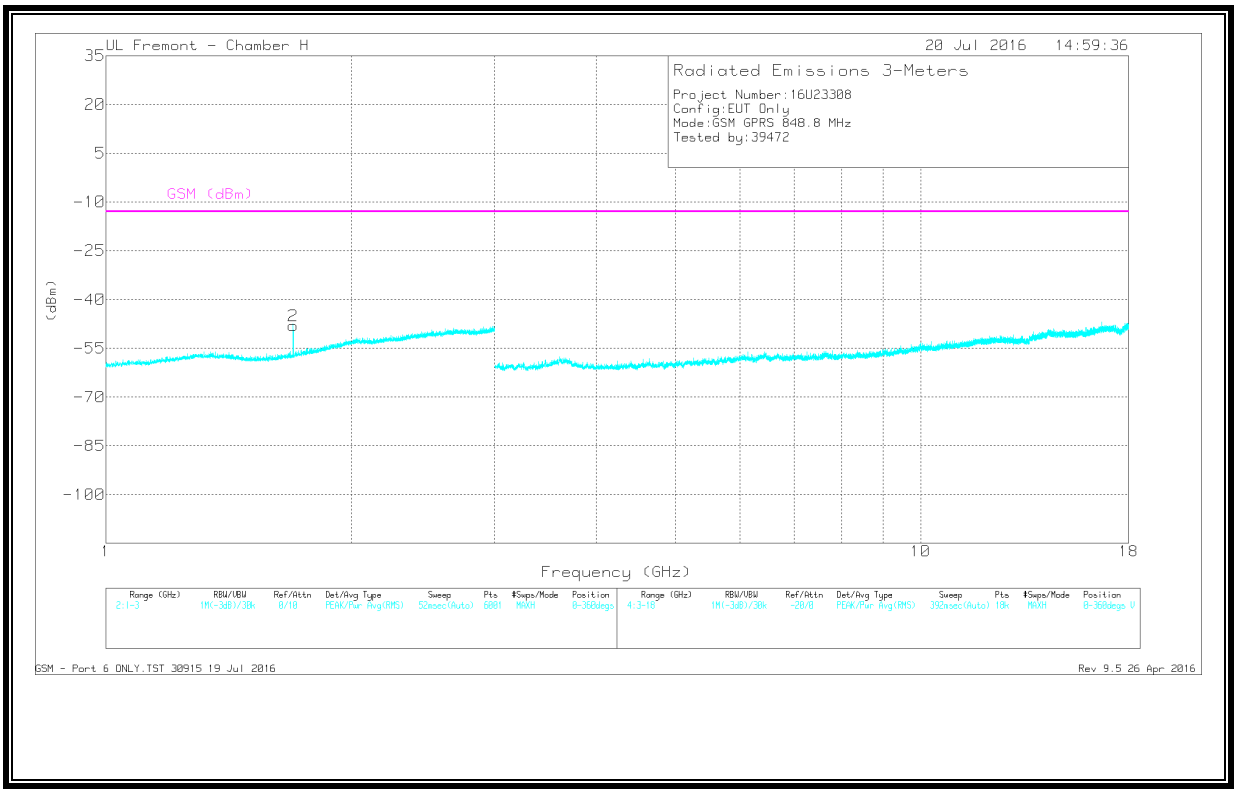


DATA

Trace-Markers

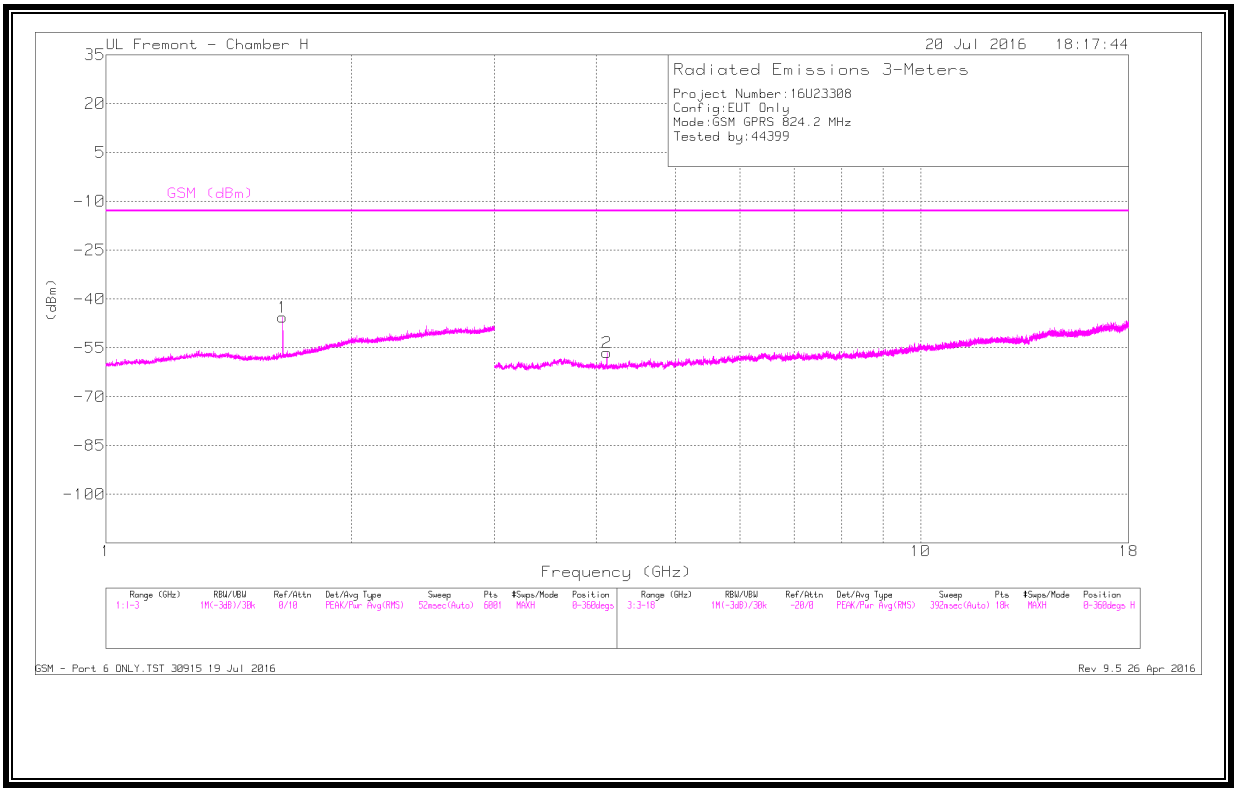
Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T120 (dB/m)	Amp/Cbl /Fltr/Pad (dB)	Conversion Factor (dB)	DC Corr (dB)	Corrected Reading (dBm)	GSM (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 1.698	-63.74	PK2	28.7	-21	11.8	0	-44.24	-13	-31.24	42	363	H
2	* 1.698	-61.74	PK2	28.7	-21	11.8	0	-42.24	-13	-29.24	319	374	V

7.1.2. UAT

GSM

LOW CHANNEL, GPRS, 850MHz BAND 5

HORIZONTAL



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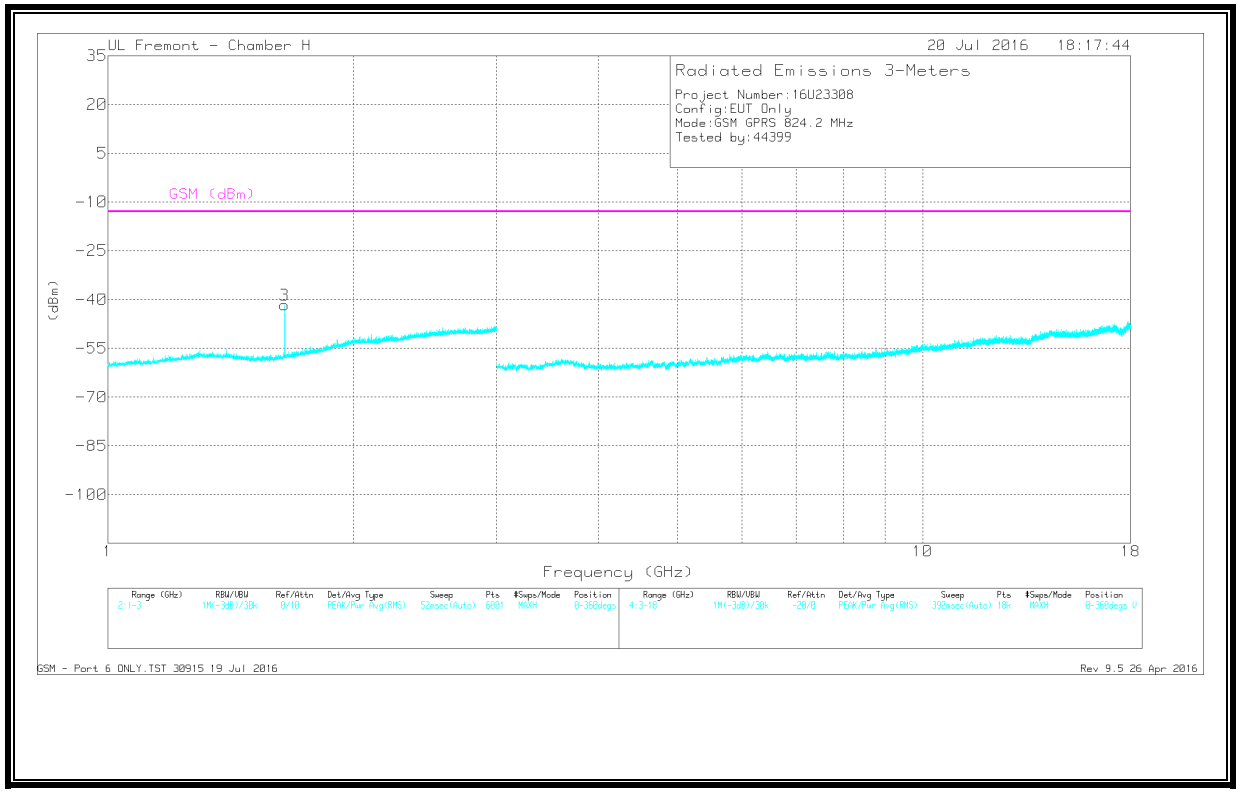


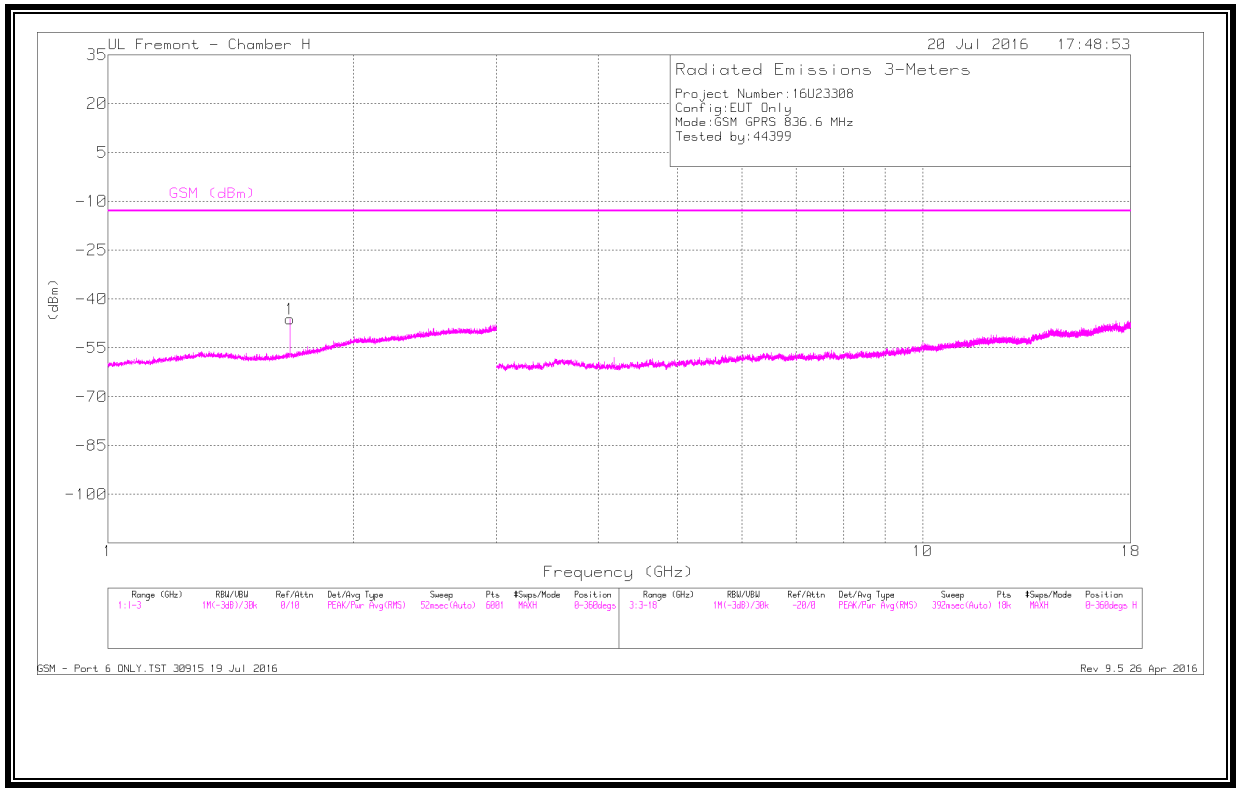
DATA

Trace-Markers

Marker	Frequency (GHz)	Meter Reading (dBm)	Det	AF T120 (dB/m)	Amp/Cbl/Fltr /Pad (dB)	Conversion Factor (dB)	Corrected Reading (dBm)	GSM (dBm)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
2	* 4.121	-60.21	Pk	33.5	-34.9	11.8	-49.81	-13	-36.81	106	125	H
1	1.648	-53.14	Pk	28.3	-21	11.8	-34.04	-13	-21.04	314	350	V
3	1.649	-63.48	Pk	28.3	-21	11.8	-44.38	-13	-31.38	110	160	H

MID CHANNEL

HORIZONTAL



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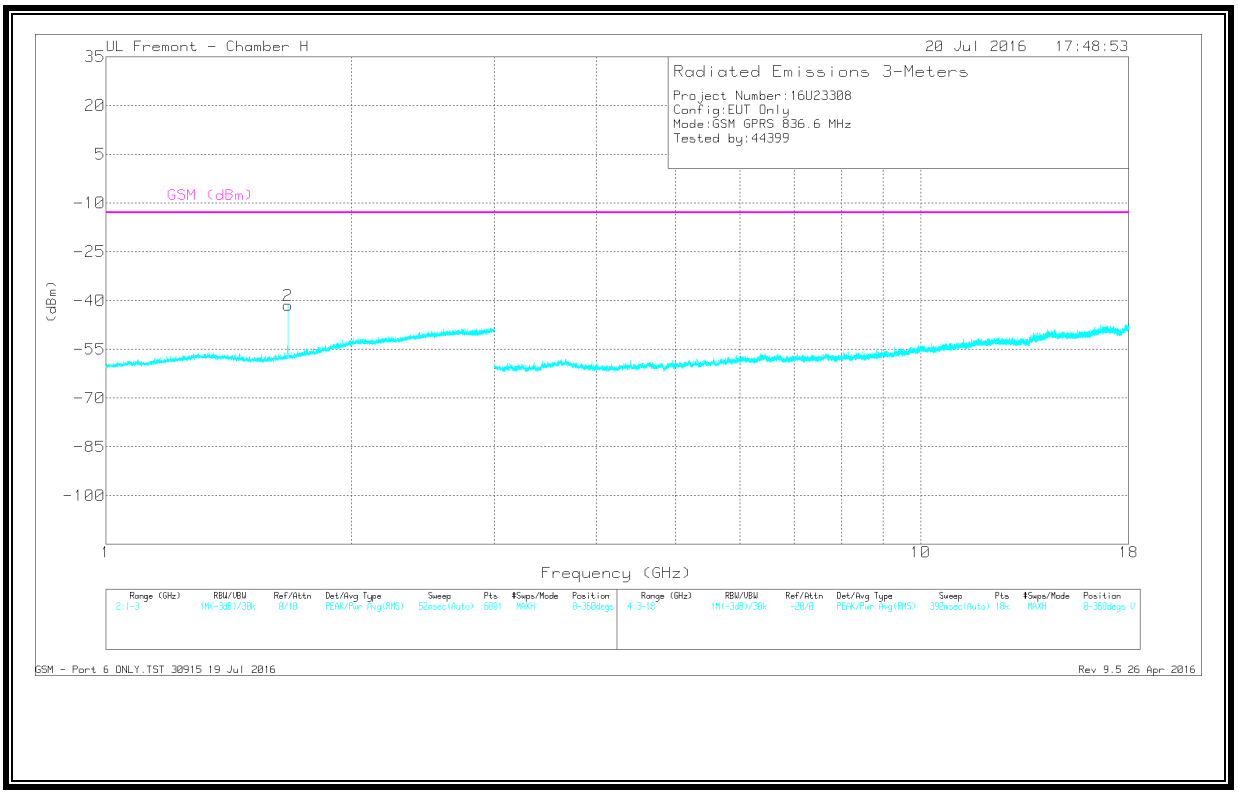

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Trace-Markers

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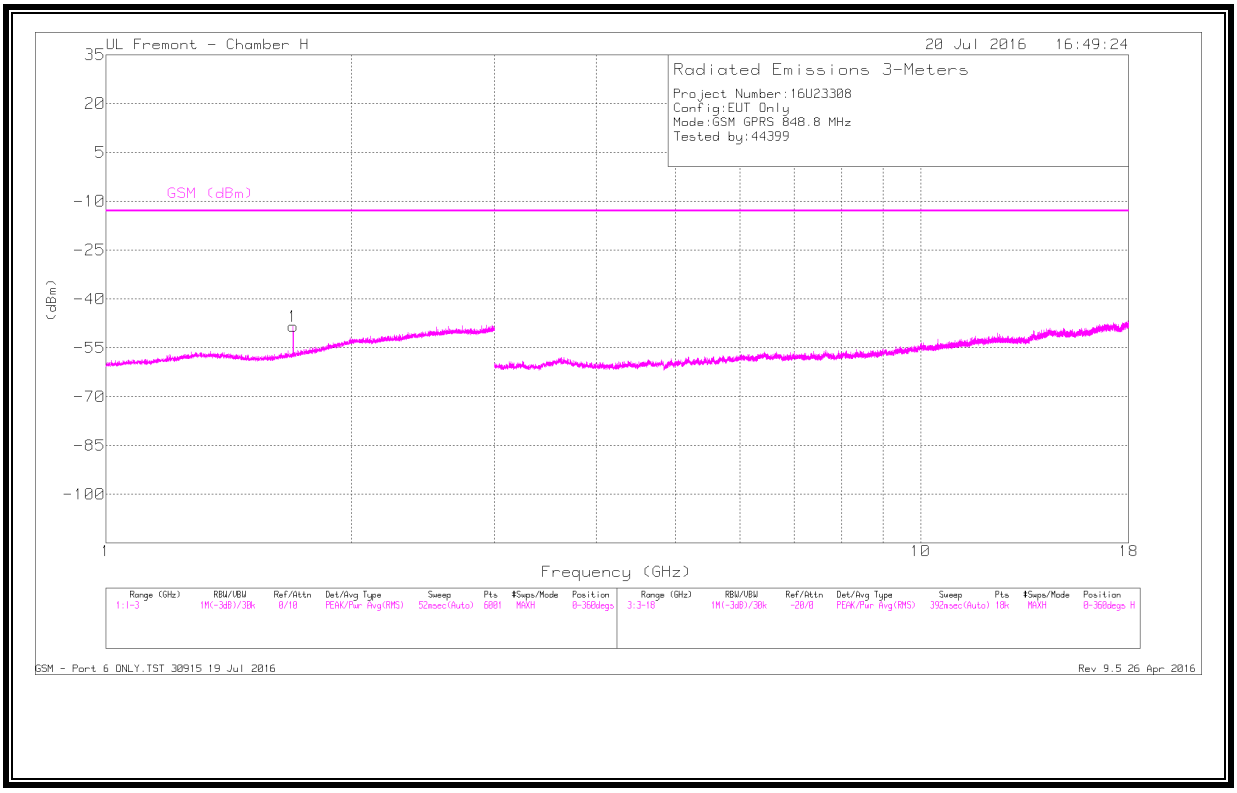
1	* 1.673	-59.98	Pk	28.5	-21	11.8	-40.68	-13	-27.68	322	306	H
2	* 1.673	-53.71	Pk	28.5	-21	11.8	-34.41	-13	-21.41	311	317	V

Pk-Peak Detector

HIGH CHANNEL

HORIZONTAL



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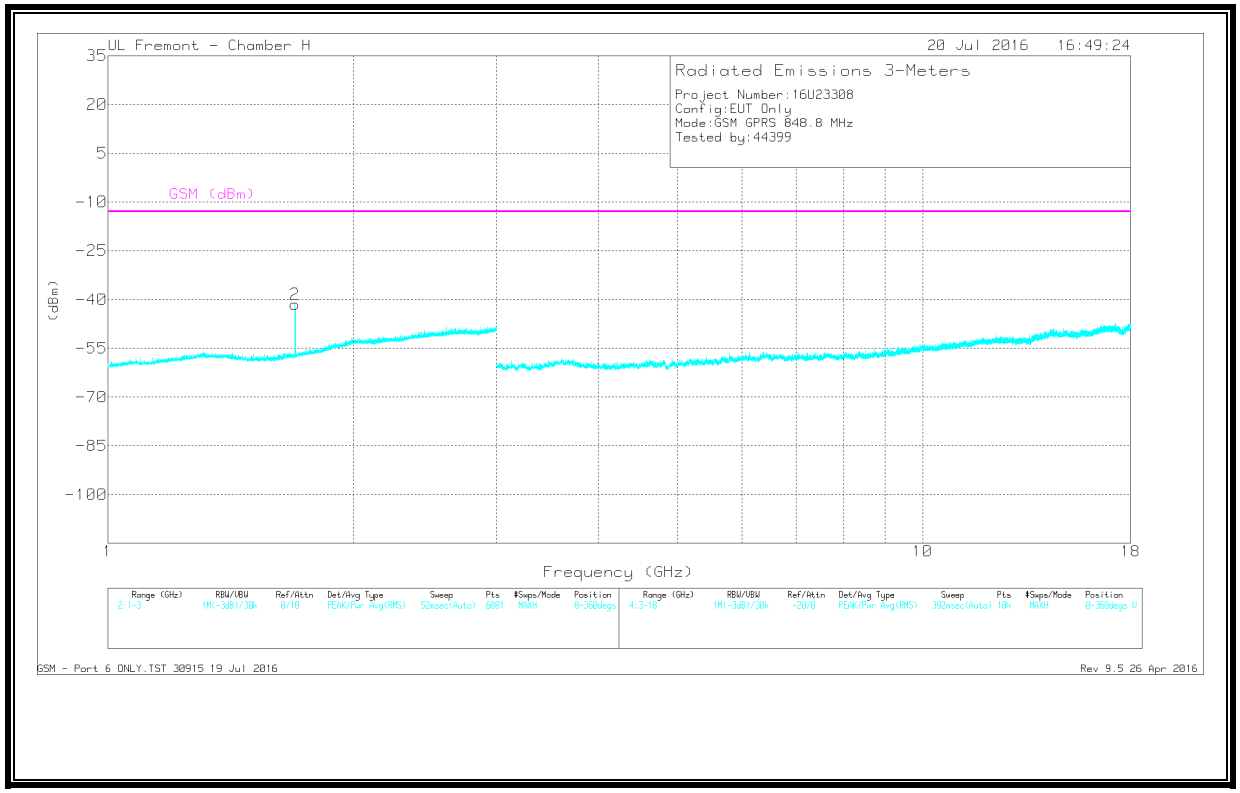

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Trace-Markers

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1	* 1.698	-64.32	Pk	28.7	-21	11.8	-44.82	-13	-31.82	326	314	H
2	* 1.697	-56.22	Pk	28.7	-21	11.8	-36.72	-13	-23.72	326	314	V

Pk-Peak Detector