FCC 47 CFR PART 15 SUBPART E
INDUSTRY CANADA RSS-210 ISSUE 8
CLASS II PERMISSIVE CHANGE

CERTIFICATION TEST REPORT

FOR

WiFi 11A/N MODULE

MODEL NUMBER: MIC-B2

FCC ID: MCLMICB2
IC: 2878D-MICB2

REPORT NUMBER: 13J15402-1, Revision B

ISSUE DATE: August 27, 2013

Prepared for
HON HAI PRECISION IND. CO., LTD.
5F-1, HSIN-AN RD.
HSINCHU SCIENCE-BASED INDUSTRIAL PARK
TAIWAN, R.O.C

Prepared by
UL VERIFICATION SERVICES INC.
47173 BENICIA STREET
FREMONT, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--	07/16/2013	Initial Issue	G. Quizon
A	08/22/2013	Added Average Power Measurement, Section 5.2	G. Quizon
B	08/27/2013	Corrections from TCB review. Cover Page, Attestation Page, Header – Revise EUT description. 8 – Correct standard reference.	G. Quizon

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701J
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS 4

2. TEST METHODOLOGY 5

3. FACILITIES AND ACCREDITATION 5

4. CALIBRATION AND UNCERTAINTY 5

4.1. MEASURING INSTRUMENT CALIBRATION 5

4.2. SAMPLE CALCULATION 5

4.3. MEASUREMENT UNCERTAINTY 5

5. EQUIPMENT UNDER TEST 6

5.1. DESCRIPTION OF EUT 6

5.2. DESCRIPTION OF CLASS II PERMISSIVE CHANGE 6

5.3. MAXIMUM OUTPUT POWER 6

5.4. DESCRIPTION OF AVAILABLE ANTENNAS 6

5.5. SOFTWARE AND FIRMWARE 7

5.6. WORST-CASE CONFIGURATION AND MODE 7

5.7. DESCRIPTION OF TEST SETUP 7

6. TEST AND MEASUREMENT EQUIPMENT 10

7. RADIATED TEST RESULTS 11

7.1. LIMITS AND PROCEDURE 11

7.2. TX ABOVE 1 GHz 802.11n HT20 SISO MODE IN THE 5.2 GHz BAND 12

7.3. TX ABOVE 1 GHz 802.11n HT20 MIMO MODE IN THE 5.2 GHz BAND 23

7.4. RECEIVER ABOVE 1 GHz 34

7.6. WORST-CASE BELOW 1 GHz 37

8. AC POWER LINE CONDUCTED EMISSIONS 40

9. SETUP PHOTOS 41

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701J
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: HON HAI PRECISION IND. CO., LTD.
5F-1, 5 HSIN-AN ROAD
HSINCHU SCIENCE-BASED INDUSTRIAL PARK
TAIWAN, R.O.C.

EUT DESCRIPTION: WiFi 11 A/N MODULE

MODEL: MIC-B2

SERIAL NUMBER: 100-120047-0000

DATE TESTED: JUNE 19, 2013 – JULY 20, 2013

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
CFR 47 Part 15 Subpart E	(Radiated and LC) Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 9	(Radiated and LC) Pass
INDUSTRY CANADA RSS-GEN Issue 3	(Radiated and LC) 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:

George Quizon
EMC SUPERVISOR
UL Verification Services Inc.

Tested By:

Lieu Nguyen
EMC ENGINEER
UL Verification Services Inc.

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC CFR 47 Part 2, FCC CFR 47 Part 15, FCC 06-96, FCC KDB 789033, ANSI C63.10-2009, RSS-GEN Issue 3, and RSS-210 Issue 8.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

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, 0.15 to 30 MHz	3.52 dB
Radiated Disturbance, 30 to 1000 MHz	4.94 dB

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

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a WiFi 802.11 a/n module.

The radio module is manufactured by Hon Hai Precision

5.2. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

The major change filed under this application is change in the crystal manufacturer. The design, specification, and performance of this crystal are identical to the previous tested crystal. It has been noted that only modes 802.11n SISO HT20 and 802.11n MIMO HT20 are affected by this change.

5.3. MAXIMUM OUTPUT POWER

The measured average power values were verified to be within the ± 0.5 dB of the original values. Refer to the original document no.11J13872-1B for the original measurements and for all antenna port results.

802.11n SISO HT20

Channel	Frequency (MHz)	Power (dBm)	Power (11J13872-1B) (dBm)	Margin (dB)
Low	5180	13.7	13.22	0.5
Mid	5200	13.5	13.1	0.4
High	5240	12.8	12.41	0.4

802.11n MIMO HT20

Channel	Frequency (MHz)	Chain 0 Power (dBm)	Chain 1 Power (dBm)	Power (dBm)	Total Power (11J13872-1B) (dBm)	Margin (dB)
Low	5180	10.48	10.90	13.71	13.66	0.05
Mid	5200	10.23	10.12	13.19	13.39	-0.20
High	5240	10.50	10.40	13.46	13.47	-0.01

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a PIFA antenna. The antenna gain for the SISO mode is 1.23 dBi. The antenna gain for MIMO mode is 4.23 dBi.

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

5.5. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Broadcom, rev. 5.91.100.31. The test utility software used during testing was BCM Internal, rev. 5.91.RC100.31.

5.6. WORST-CASE CONFIGURATION AND MODE

Radiated emission and power line conducted emission were performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

The EUT was tested as an external module installed in a test jig board connected to a host Laptop PC. The EUT was oriented in a flat orientation, similar to the orientation it would have in real installations; see setup photos for details.

Based on the baseline scan, the worst-case data rates were:

802.11a mode: N/A. Testing of 802.11n HT20 SISO mode was considered representative.
802.11n HT20 SISO mode: MCS0
802.11n HT20 MIMO mode: MCS8

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop	Dell	PP09S	N/A	QDS-BRCM1022
Testjig 1	Broadcom	LA65NS0-00	--	--
Testjig 2	Broadcom	BCM9SDIO2 CONAD	--	--
AC Adapter	Dell	LA90PS0-00	--	--
DC Power Supply	HP	E3610A	C01219/1000617	

I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC	2	3-Prong	Unshielded	1	
2	DC	1	Barrel	Shielded	1.5	
3	I/O	1	Ribbon	Unshielded	0.5	
4	DC	1	Clips	Unshielded	1.5	
5	Antenna	Max. 2	RF	Shielded	1	

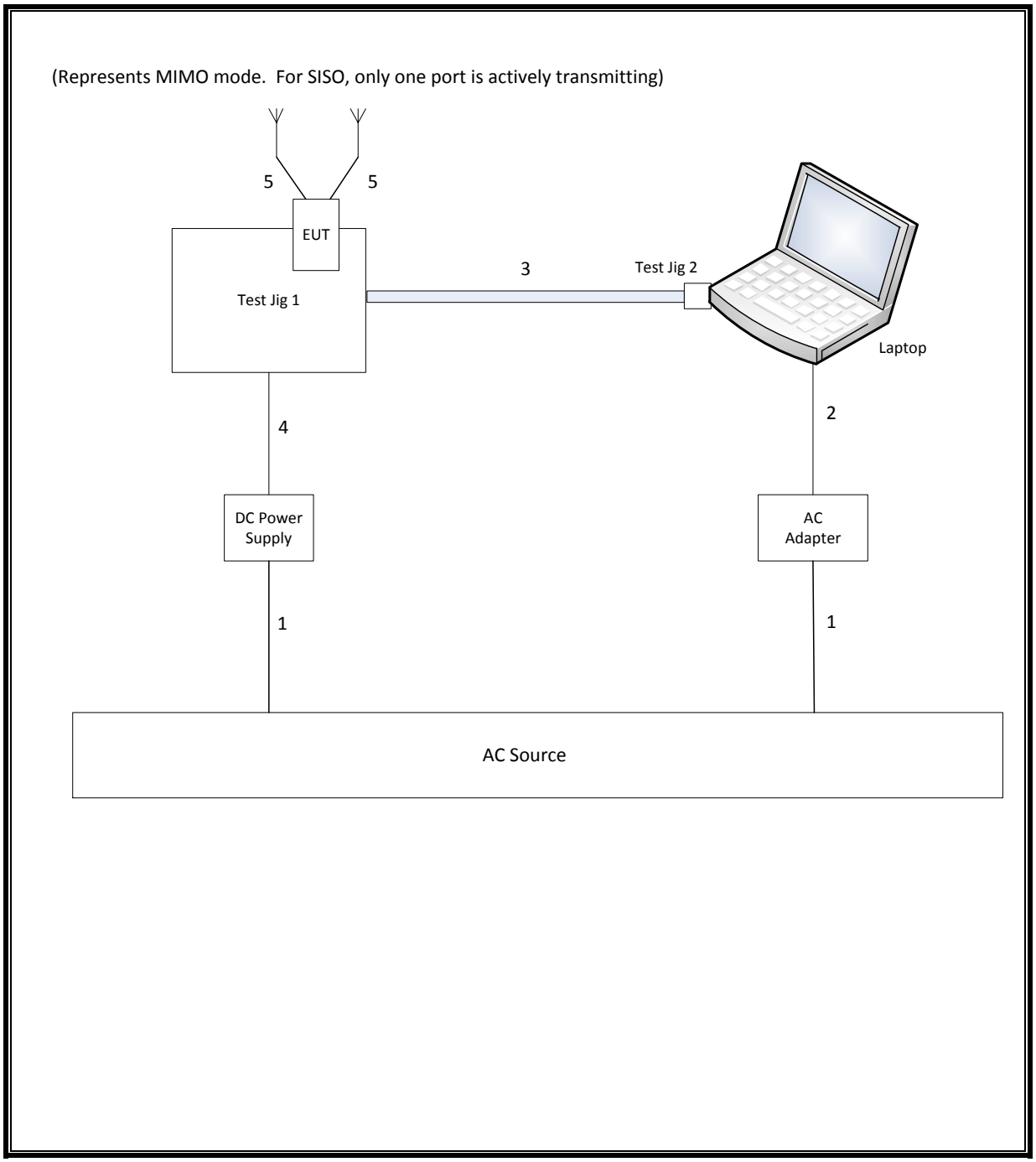
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701J
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

TEST SETUP

The EUT was attached to a support jig. The support jig interfaced with the laptop via a SDIO board/ribbon cable assembly. Test software exercised the radio card.

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

SETUP DIAGRAM FOR TESTS



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

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**	**Asset**	**Cal Date**	**Cal Due**
Power Meter	Agilent / HP	N1911A	MY45100242	07/27/12	07/27/13
Peak / Average Power Sensor	Agilent / HP	E9323A	US40411556	07/26/12	07/26/13
PXA Signal Analyzer	Agilent / HP	N9030A	T313	01/22/13	01/22/14
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C00996	05/11/12	05/11/13
Antenna, Bilog, 30MHz-1 GHz	Sunol Sciences	JB1	C01011	03/23/13	03/23/14
Antenna, Horn, 18 GHz	EMCO	3115	C00945	11/12/12	11/12/13
Antenna, Horn, 18 GHz	ETS	3117	C01005	04/23/12	02/21/14
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	01/14/13	01/14/14
Preamplifier, 26.5 GHz	Agilent / HP	8449B	C01052	10/22/12	10/22/13
Temperature / Humidity Chamber	Thermotron	SE 600-10-10	C00930	11/01/12	11/01/13

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

7. RADIATED TEST RESULTS

7.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.205 and §15.209

IC RSS-210 Clause 2.6 (Transmitter)

IC RSS-GEN Clause 6 (Receiver)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane. The antenna to EUT distance is 3 meters.

For measurements below 1 GHz the resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 1 MHz for peak measurements and as applicable for average measurements.

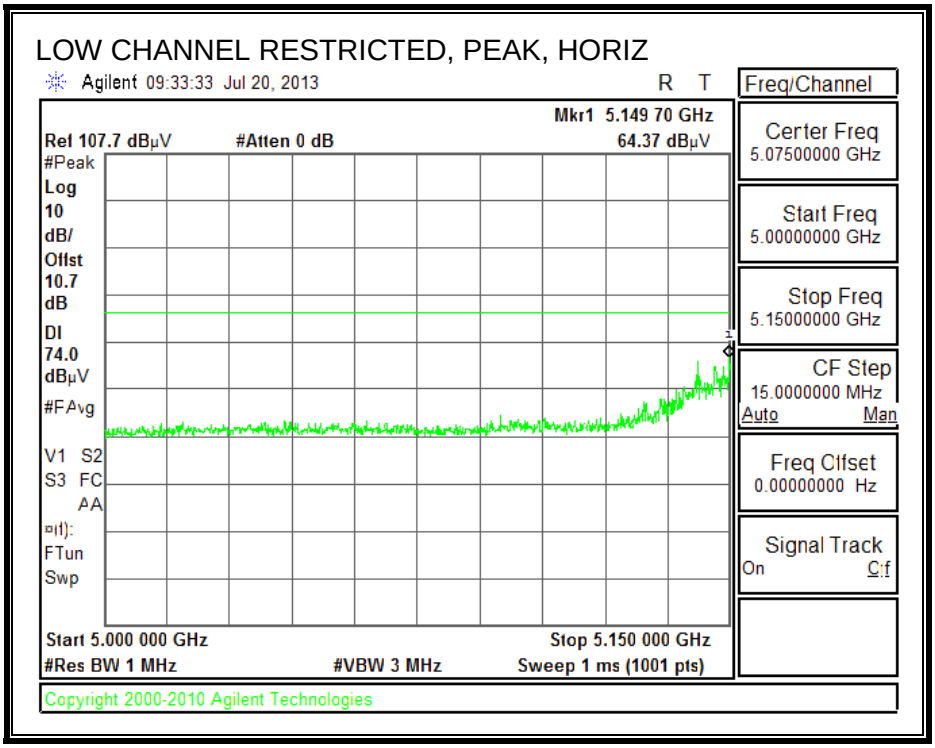
The spectrum from 30 MHz to 40 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in each applicable band.

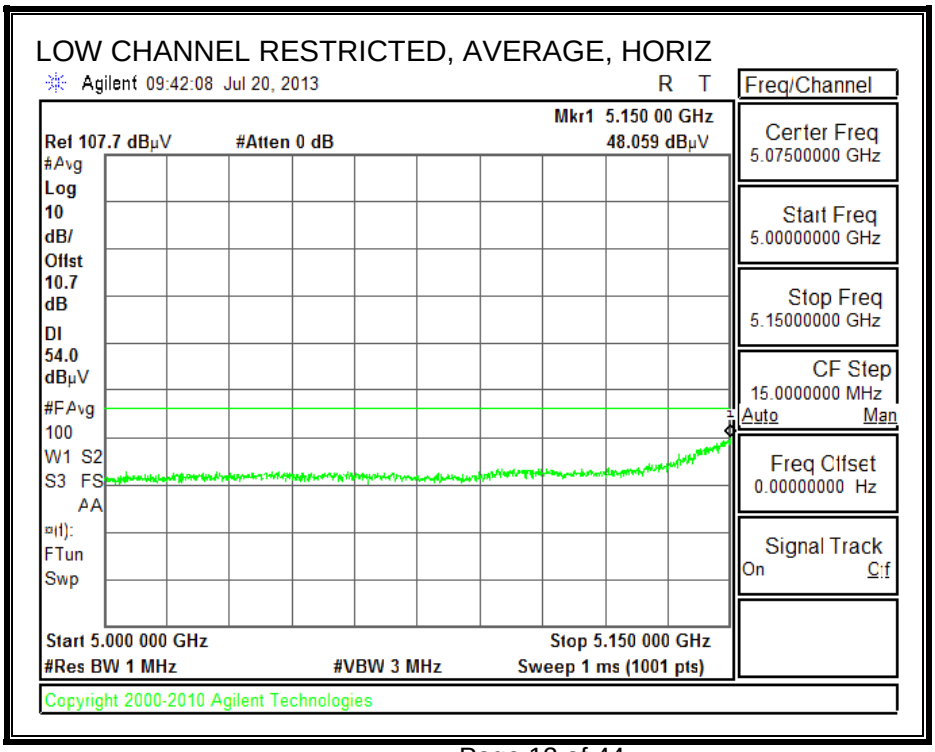
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

7.2. TX ABOVE 1 GHz 802.11n HT20 SISO MODE IN THE 5.2 GHz BAND

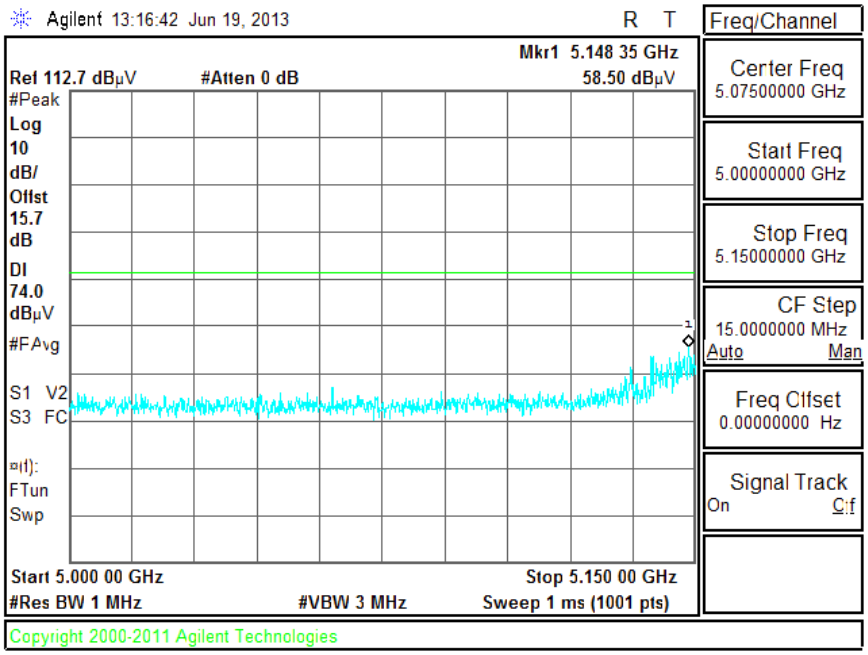
RESTRICTED BANDEDGE (LOW CHANNEL)



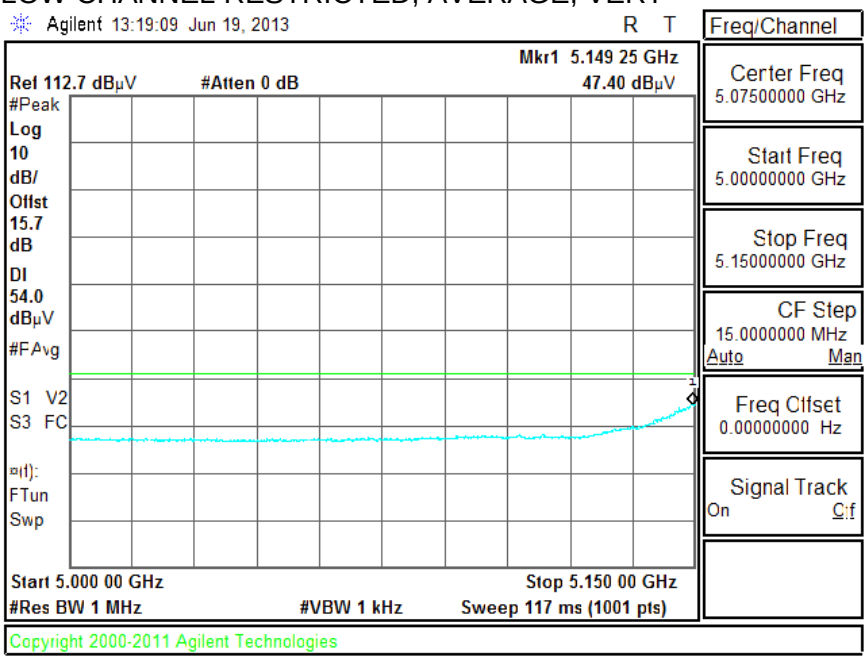


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

LOW CHANNEL RESTRICTED, PEAK, VERT



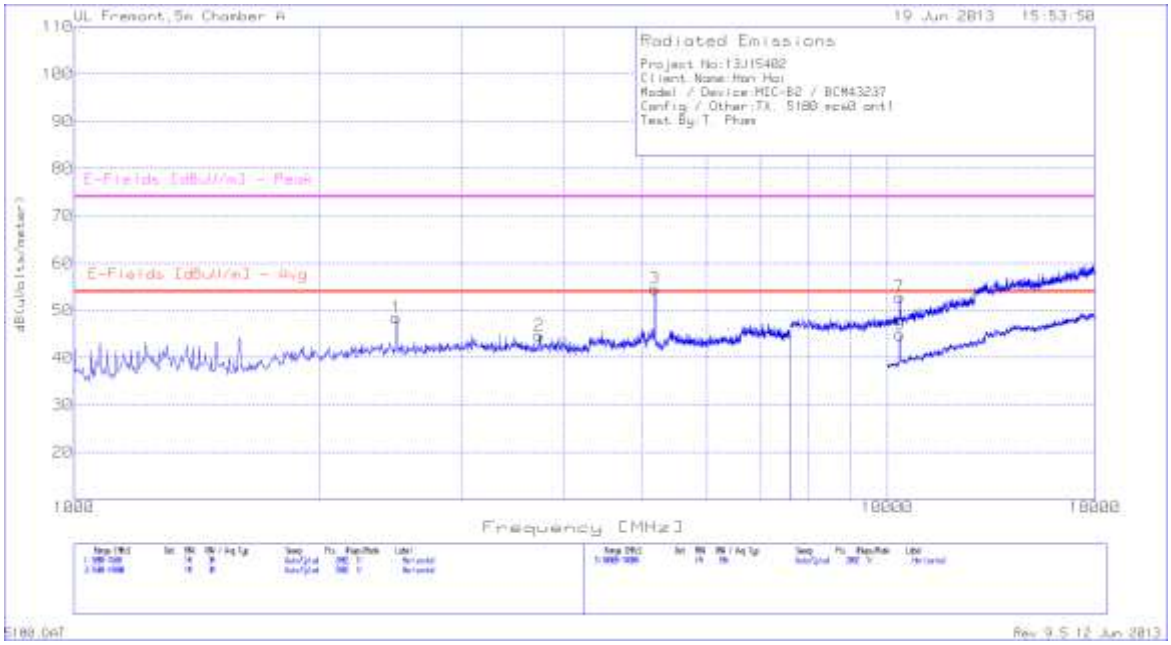
LOW CHANNEL RESTRICTED, AVERAGE, VERT



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

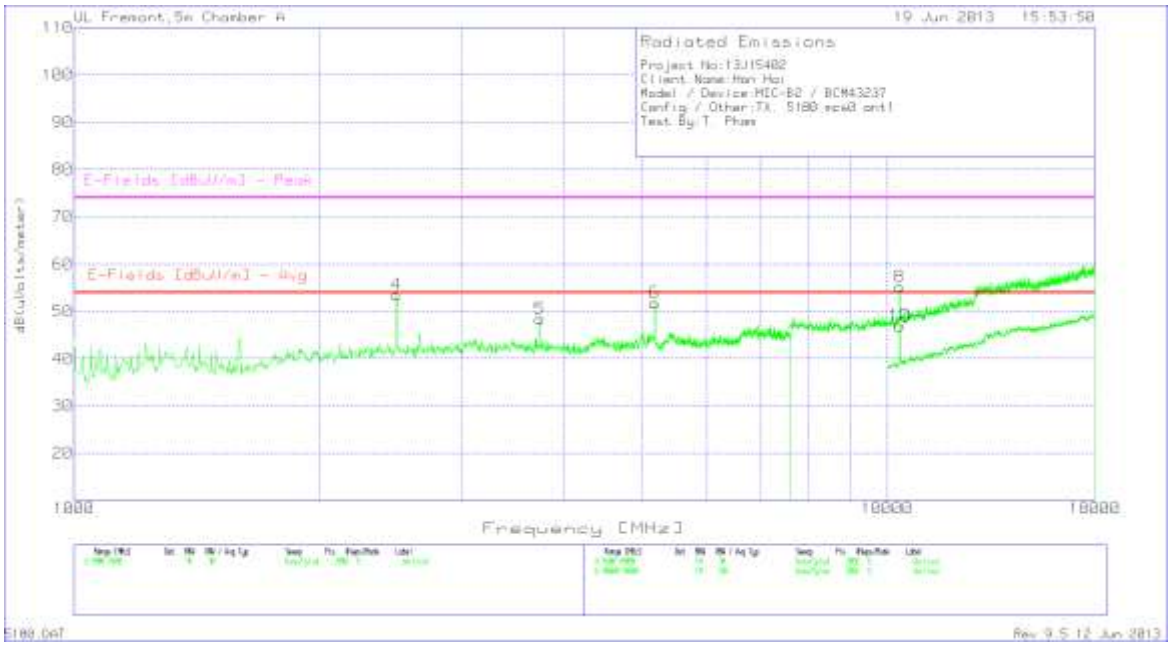
HARMONICS AND SPURIOUS EMISSIONS

Low Channel – Horizontal



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

Low Channel – Vertical



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701J
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

Trace Markers

Marker	Freq (GHz)	Meter Reading (dBuV)	Det	T119 Ant Factor [dB/m]	T34 Preamp /Cable Loss [dB]	T159 BRF [dB]	Corrected Reading dB(uVolts /meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height (cm)	Polarity
1	2.497	33.33	AV	32.3	-29.6	.1	36.13	53.97	-17.84	74	-37.87	100	Horz
2	3.734	38.08	PK	33.2	-26.6	0	44.68	53.97	-9.29	74	-29.32	201	Horz
3*	5.179	44.19	PK	34.2	-24.7	.9	54.59	53.97	.62	74	-19.41	201	Horz
4	2.491	50.64	PK	32.3	-29.6	.1	53.44	53.97	-.53	74	-20.56	201	Vert
5	2.49	39.61	AV	32.3	-29.6	.1	42.41	53.97	-11.56	74	-31.59	181	Vert
6*	5.176	41.37	PK	34.2	-24.7	.9	51.77	53.97	-2.2	74	-22.23	100	Vert

* Fundamental

PK – Peak detector

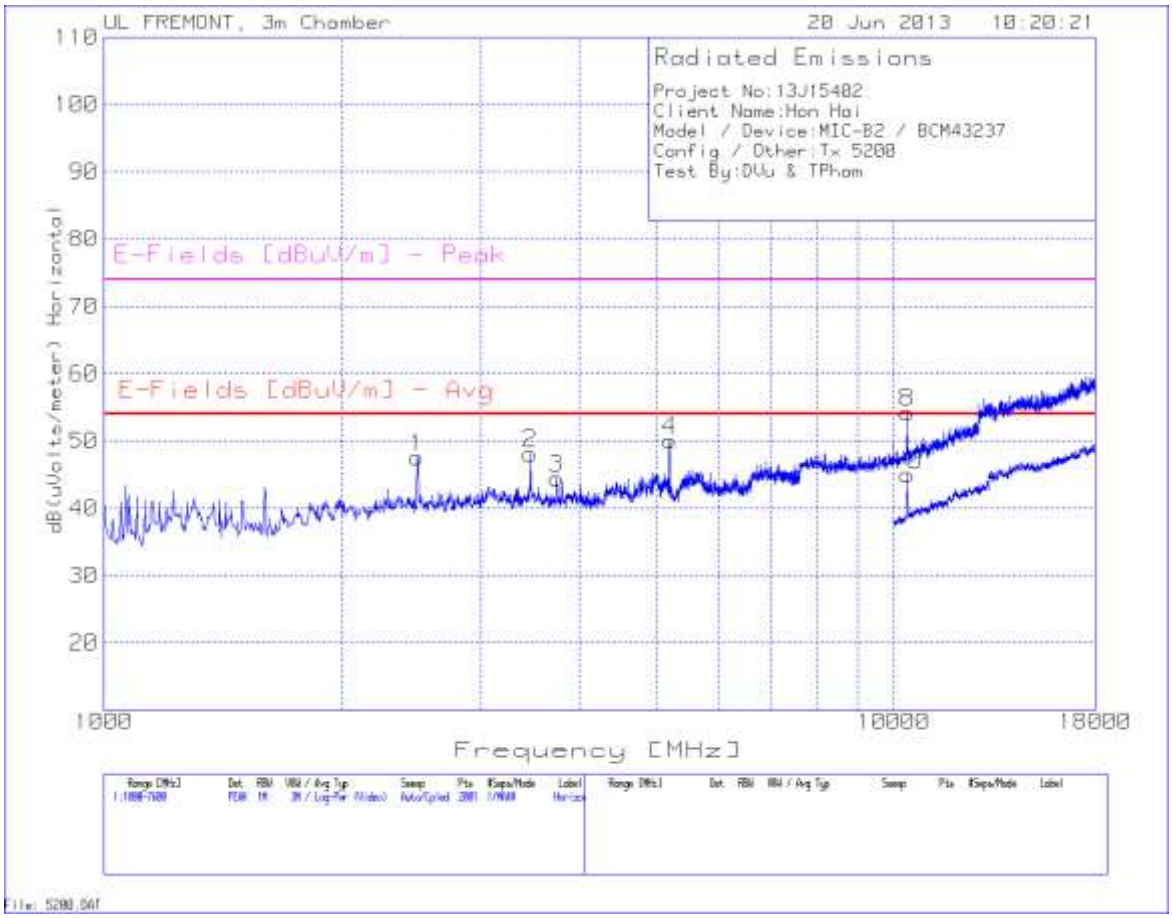
AV – Average detector

Marker	Freq (GHz)	Meter Reading (dBuV)	Det	T119 Ant Factor [dB/m]	T34 Preamp /Cable Loss [dB]	T193 HPF [dB]	Corrected Reading dB(uVolts /meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height (cm)	Polarity
7	10.355	36.43	PK	37.2	-20.9	.1	52.83	53.97	-1.14	74	-21.17	201	Horz
8	10.355	38.82	PK	37.2	-20.9	.1	55.22	**53.97**	**1.25**	74	-18.78	100	Vert
9**	10.36	28.38	VB1	37.3	-20.9	.1	44.88	53.97	-9.09	74	-29.12	100	Horz
10**	10.356	30.55	VB1	37.2	-20.9	.1	46.95	53.97	-7.02	74	-27.05	99	Vert

** VB1 - KDB 789033 v01r02 Method: VB Alternative Reduced Video

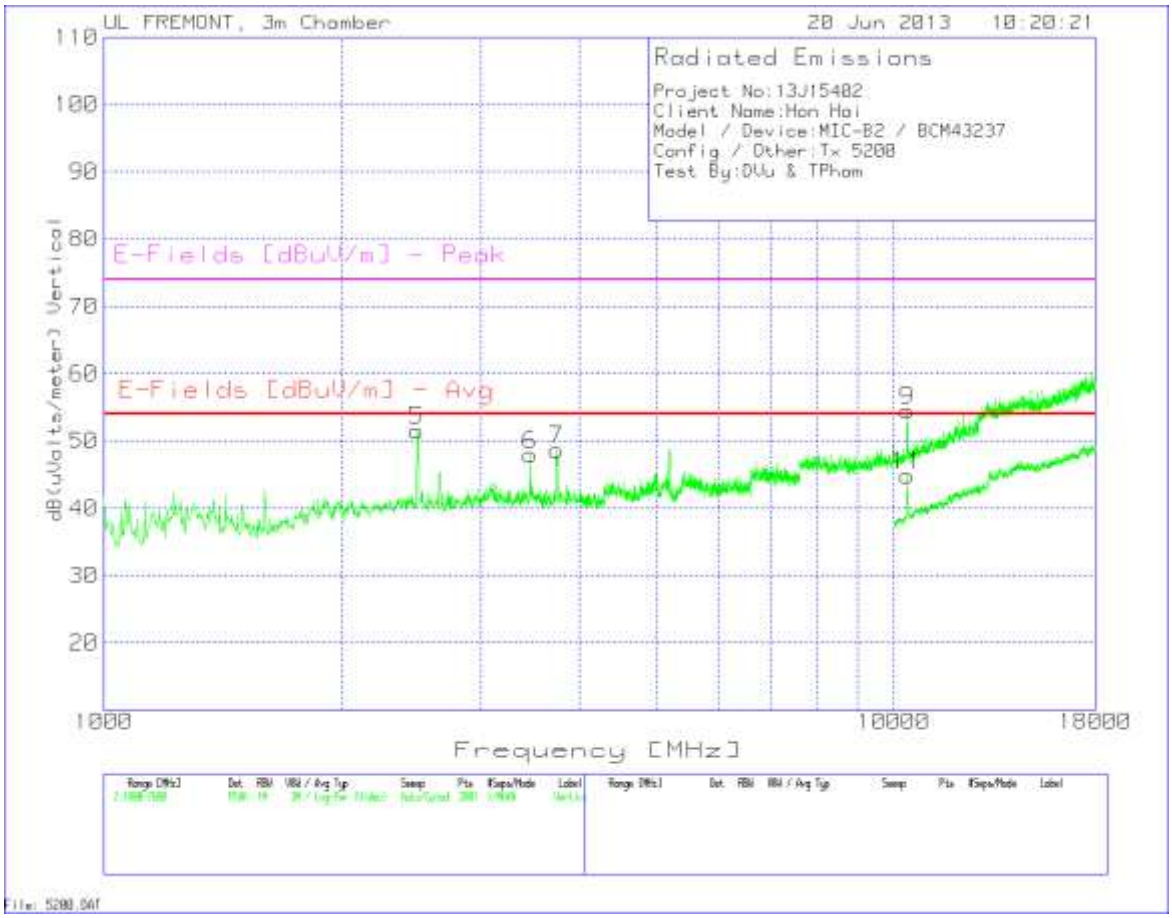
UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701J
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

Mid Channel – Horizontal



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

Mid Channel – Vertical



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

Trace Markers

Marker	Freq (GHz)	Meter Reading (dBuV)	Det	T119 Ant Factor [dB/m]	T34 Preamp/ Cable Loss [dB]	T159 BRF [dB]	DC Corr [dB]	Corrected Reading dB(uVolts /meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height (cm)	Polarity
1	2.488	44.73	PK	32.3	-29.6	.1	0	47.53	53.97	-6.44	74	-26.47	200	Horz
2	3.464	42.41	PK	33	-27.3	0	0	48.11	53.97	-5.86	74	-25.89	200	Horz
3	3.744	37.81	PK	33.2	-26.6	0	0	44.41	53.97	-9.56	74	-29.59	200	Horz
4*	5.199	39.59	PK	34.3	-24.7	.9	0	50.09	53.97	-3.88	74	-23.91	200	Horz
5	2.49	37.86	AV	32.3	-29.6	.1	.2	40.86	53.97	-13.11	74	-33.14	112	Vert
6	3.464	42.23	PK	33	-27.3	0	0	47.93	53.97	-6.04	74	-26.07	201	Vert
7	3.745	29.07	AV	33.2	-26.6	0	.2	35.87	53.97	-18.1	74	-38.13	171	Vert

* Fundamental

PK – Peak detector

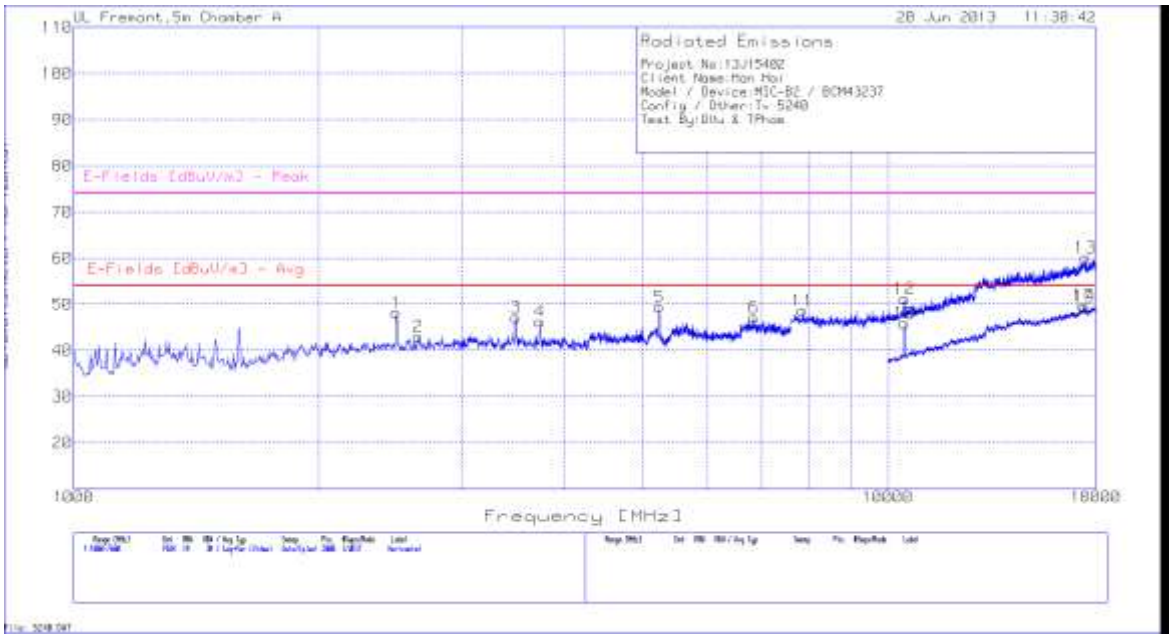
AV – Average detector

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T119 Ant Factor [dB/m]	T34 Preamp/Cable Loss [dB]	T193 HPF [dB]	DC Corr [dB]	Corrected Reading dB(uVolts/ meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height (cm)	Polarity
8	10.401	37.44	PK	37.3	-20.7	.2	0	54.24	**53.97**	**.27**	74	-19.76	201	Horz
9	10.407	37.64	PK	37.4	-20.7	.2	0	54.54	**53.97**	**.57**	74	-19.46	100	Vert
10**	10.4	28.14	VB1	37.3	-20.7	.2	0	44.94	53.97	-9.03	74	-29.06	99	Horz
11**	10.4	28.08	VB1	37.3	-20.7	.2	0	44.88	53.97	-9.09	74	-29.12	100	Vert

** VB1 - KDB 789033 v01r02 Method: VB Alternative Reduced Video

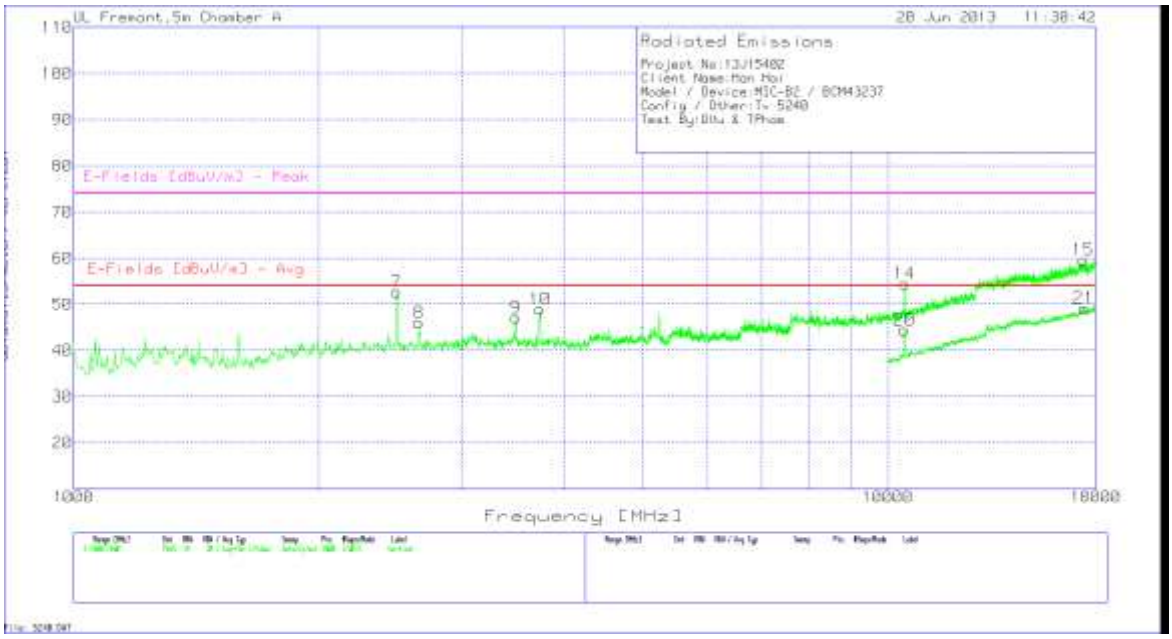
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

High Channel – Horizontal



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

High Channel – Vertical



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

Trace Markers

Marker	Freq (GHz)	Meter Reading (dBuV)	Det	T119 Ant Factor [dB/m]	T34 Preamp/ Cable Loss [dB]	T159 BRF [dB]	DC Corr [dB]	Corrected Reading dB(uVolts /meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height (cm)	Polarity
1	2.491	45.17	PK	32.3	-29.6	.1	0	47.97	53.97	-6	74	-26.03	201	Horz
2	2.649	39.19	PK	32.6	-29.1	.1	0	42.79	53.97	-11.18	74	-31.21	201	Horz
3	3.494	41.16	PK	33	-27.2	0	0	46.96	53.97	-7.01	74	-27.04	100	Horz
4	3.741	39.46	PK	33.2	-26.6	0	0	46.06	53.97	-7.91	74	-27.94	201	Horz
5*	5.242	38.72	PK	34.3	-24.7	.9	0	49.22	53.97	-4.75	74	-24.78	201	Horz
6	6.845	34.48	PK	35.6	-23.2	.1	0	46.98	53.97	-6.99	74	-27.02	201	Horz
7	2.494	37.86	AV	32.3	-29.6	.1	0.2	40.86	53.97	-13.11	74	-33.14	207	Vert
8	2.656	42.35	PK	32.6	-29.1	0	0	45.85	53.97	-8.12	74	-28.15	201	Vert
9	3.494	41.08	PK	33	-27.2	0	0	46.88	53.97	-7.09	74	-27.12	100	Vert
10	3.745	29.07	AV	33.2	-26.6	0	0.2	35.87	53.97	-18.1	74	-38.13	171	Vert

* Fundamental

PK – Peak detector

AV – Average detector

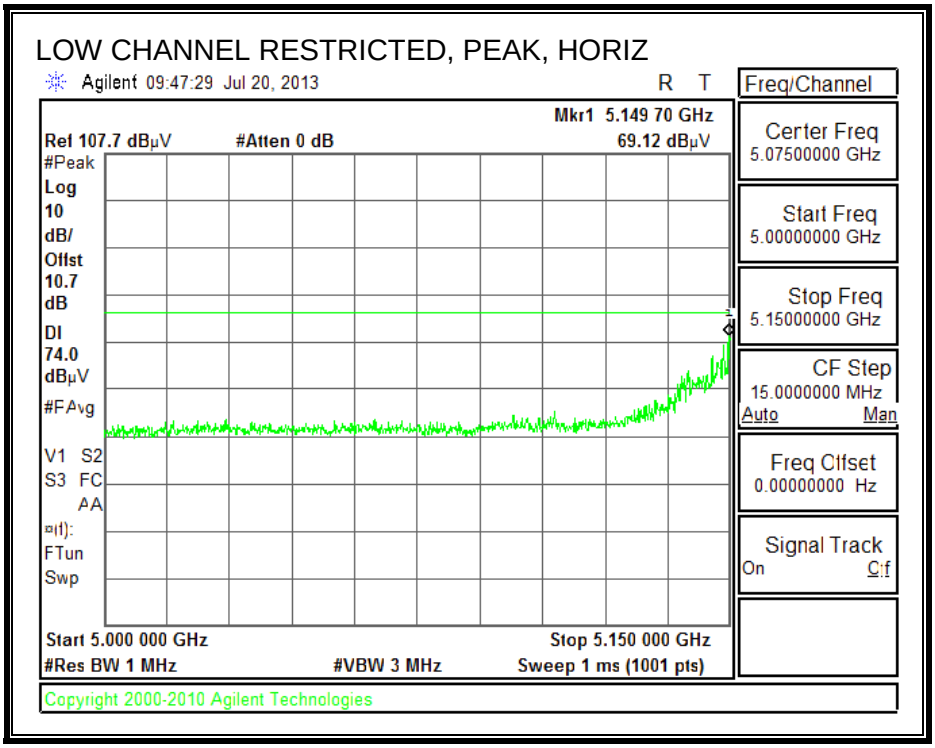
Marker	Freq (GHz)	Meter Reading (dBuV)	Det	T119 Ant Factor [dB/m]	T34 Preamp/Cable Loss [dB]	T193 HPF [dB]	DC Corr [dB]	Corrected Reading dB(uVolts/ meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height (cm)	Polarity
11	7.855	34.95	PK	35.8	-22.6	.3	0	48.45	53.97	-5.52	74	-25.55	201	Horz
12	10.485	33.96	PK	37.5	-20.6	.2	0	51.06	53.97	-2.91	74	-22.94	99	Horz
13	17.48	32.84	PK	41.3	-14.2	0	0	59.94	53.97	5.97	74	-14.06	201	Horz
14	10.485	37.23	PK	37.5	-20.6	.2	0	54.33	53.97	.36	74	-19.67	100	Vert
15	17.376	31.94	PK	41.3	-14.3	.5	0	59.44	53.97	5.47	74	-14.56	100	Vert
16**	10.48	28.61	VB1	37.5	-20.6	.2	0	45.71	53.97	-8.26	74	-28.29	99	Horz
17**	17.37	22.16	VB1	41.3	-14.3	.4	0	49.56	53.97	-4.41	74	-24.44	99	Horz
18**	10.48	28.61	VB1	37.5	-20.6	.2	0	45.71	53.97	-8.26	74	-28.29	99	Horz
19**	17.42	21.75	VB1	41.3	-14.3	.4	0	49.15	53.97	-4.82	74	-24.85	99	Horz
20**	10.48	27.17	VB1	37.5	-20.6	.2	0	44.27	53.97	-9.70	74	-29.73	100	Vert
21**	17.41	21.48	VB1	41.3	-14.3	.5	0	48.98	54	-4.99	74	-25.02	100	Vert

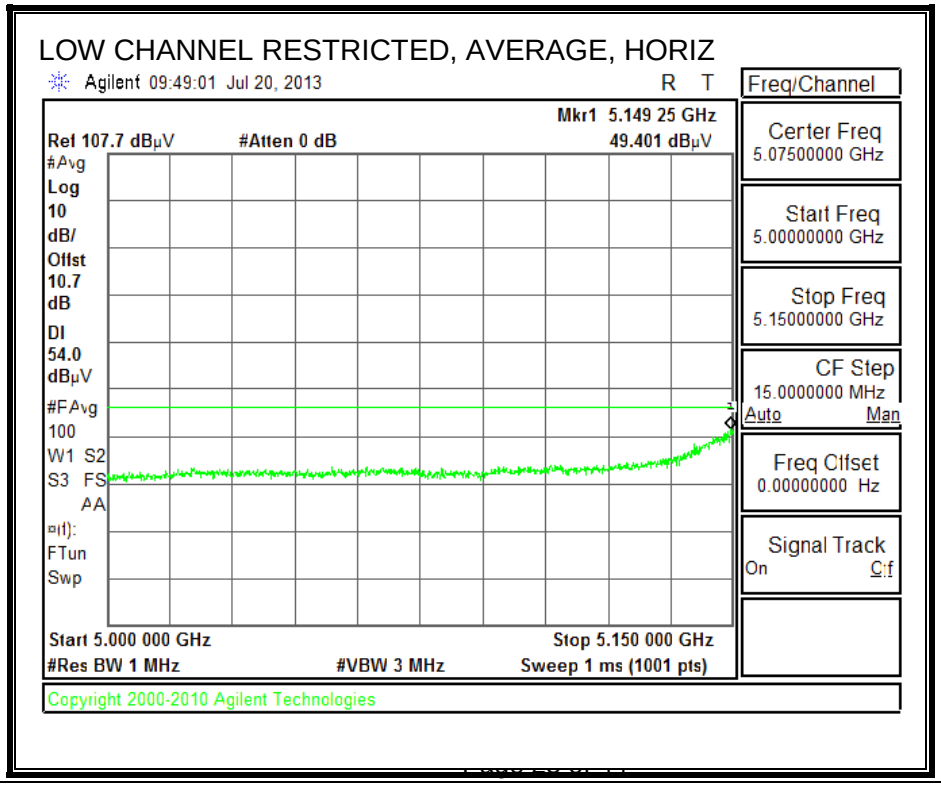
** VB1 - KDB 789033 v01r02 Method: VB Alternative Reduced Video

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

7.3. TX ABOVE 1 GHz 802.11n HT20 MIMO MODE IN THE 5.2 GHz BAND

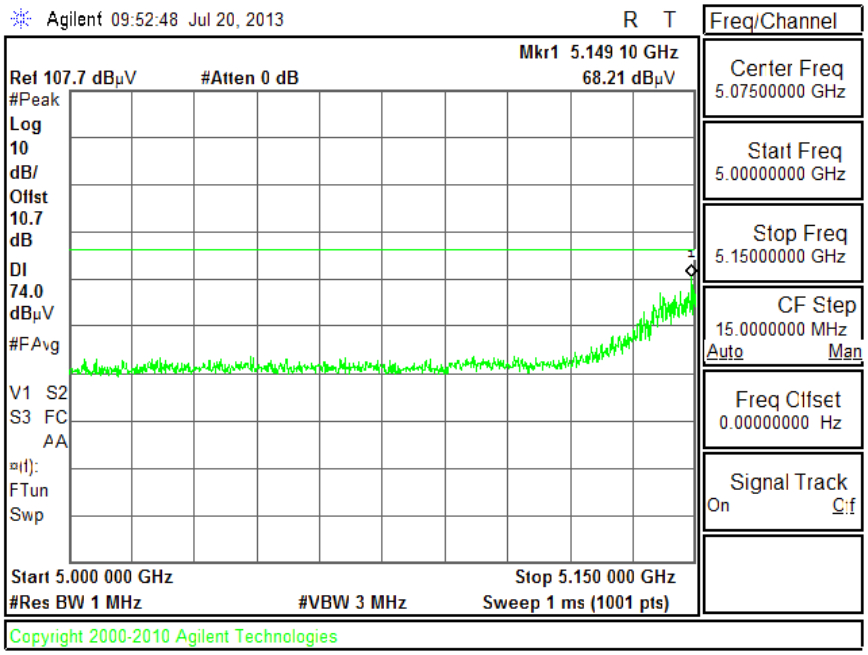
RESTRICTED BANDEDGE (LOW CHANNEL)



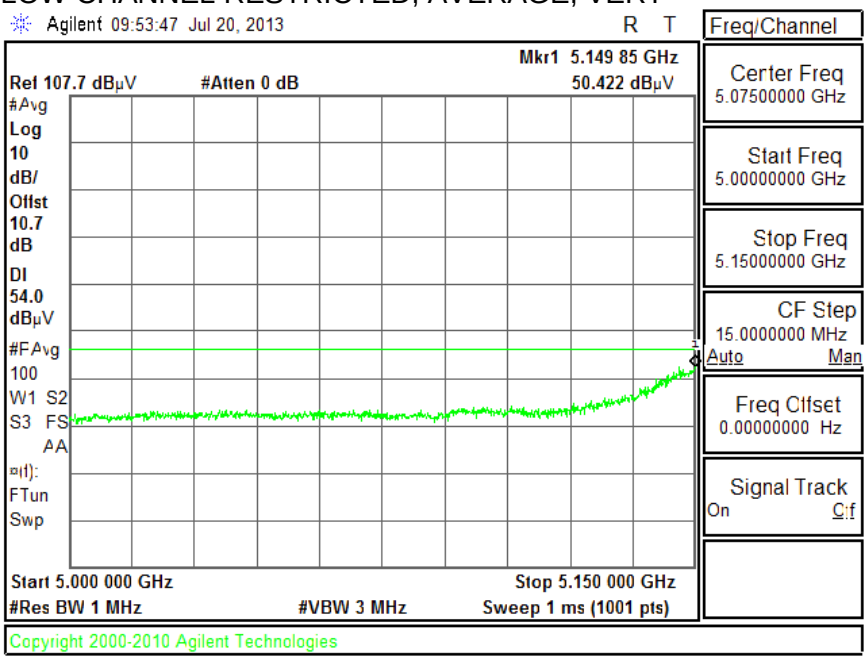


This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

LOW CHANNEL RESTRICTED, PEAK, VERT



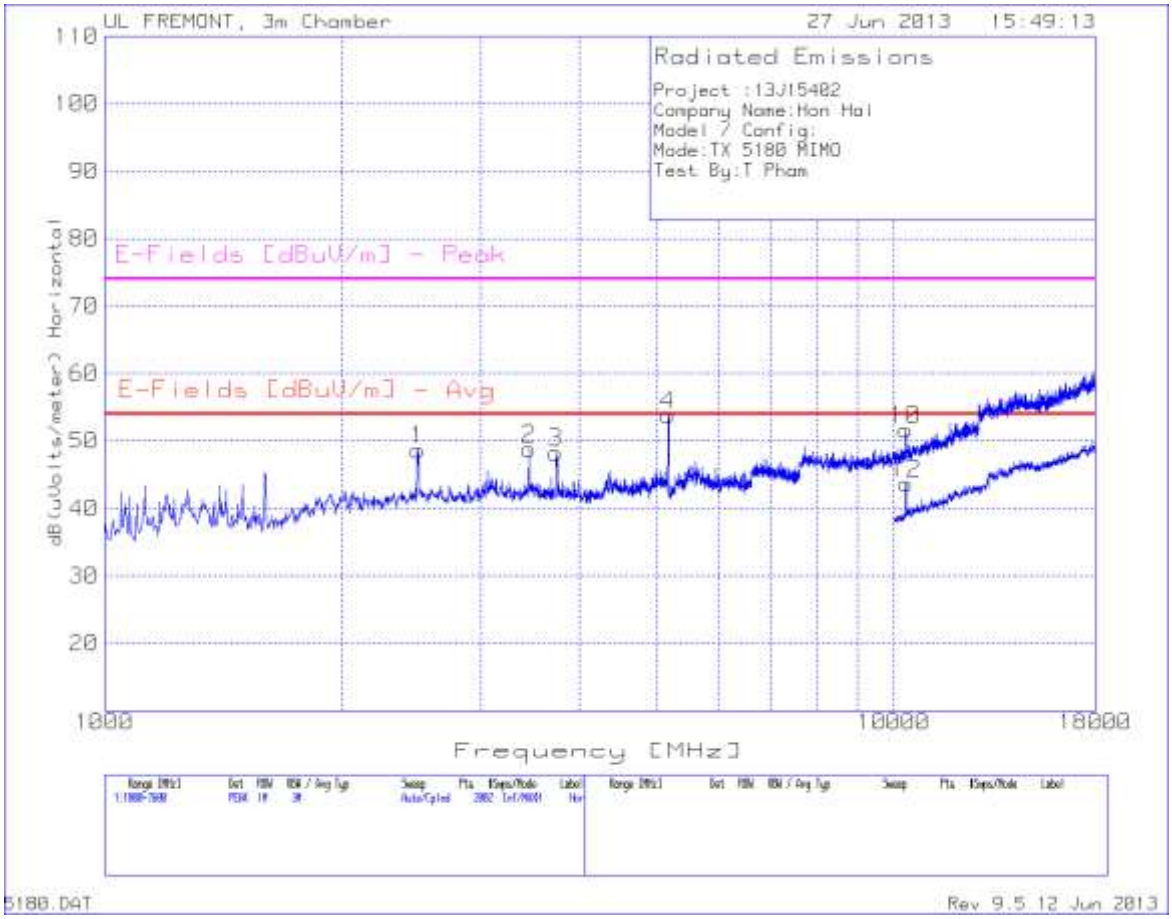
LOW CHANNEL RESTRICTED, AVERAGE, VERT



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

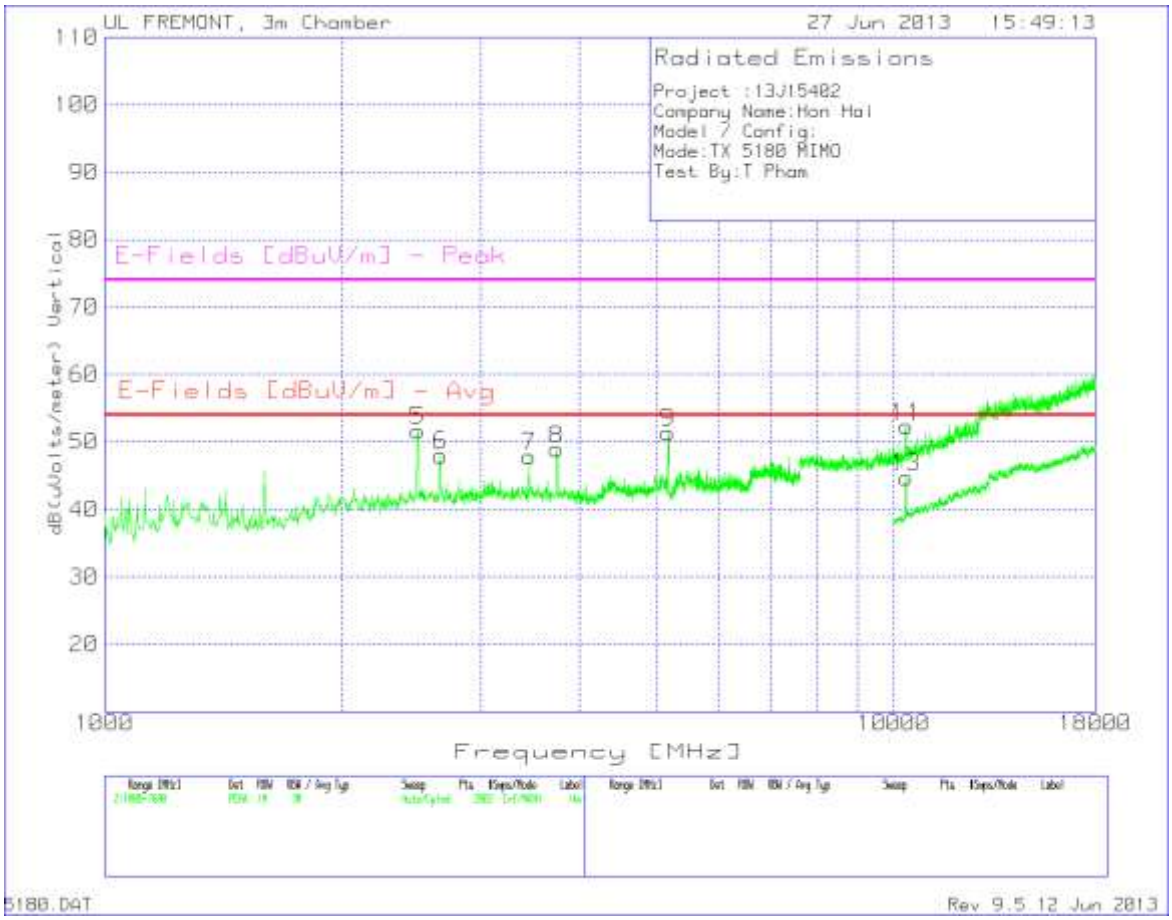
HARMONICS AND SPURIOUS EMISSIONS

Low Channel – Horizontal



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

Low Channel – Vertical



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

Trace Markers

Marker	Freq (GHz)	Meter Reading (dBuV)	Det	T119 Ant Factor [dB/m]	T34 Preamp/Cable Loss [dB]	T159 BRF [dB]	Corrected Reading dB(uVolts/meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height (cm)	Polarity
1	2.494	35.51	AV	32.3	-29.6	.1	38.31	53.97	-15.66	74	-35.69	234	Horz
2	3.453	38.69	AV	32.9	-27.3	0	44.29	53.97	-9.68	74	-29.71	192	Horz
3	3.733	26.62	AV	33.2	-26.6	0	33.22	53.97	-20.75	74	-40.78	222	Horz
4*	5.182	43.45	PK	34.2	-24.7	.9	53.85	53.97	-.12	74	-20.15	99	Horz
5	2.491	40.58	AV	32.3	-29.6	.1	43.38	53.97	-10.59	74	-30.62	183	Vert
6	2.664	29.29	AV	32.6	-29.1	.1	32.89	53.97	-21.08	74	-41.11	278	Vert
7	3.451	42.28	PK	32.9	-27.3	0	47.88	53.97	-6.09	74	-26.12	100	Vert
8	3.734	26.95	VB1	33.2	-26.6	0	33.55	53.97	-20.42	74	-40.45	153	Vert
9*	5.182	40.99	PK	34.2	-24.7	.9	51.39	53.97	-2.58	74	-22.61	201	Vert

* Fundamental

PK – Peak detector

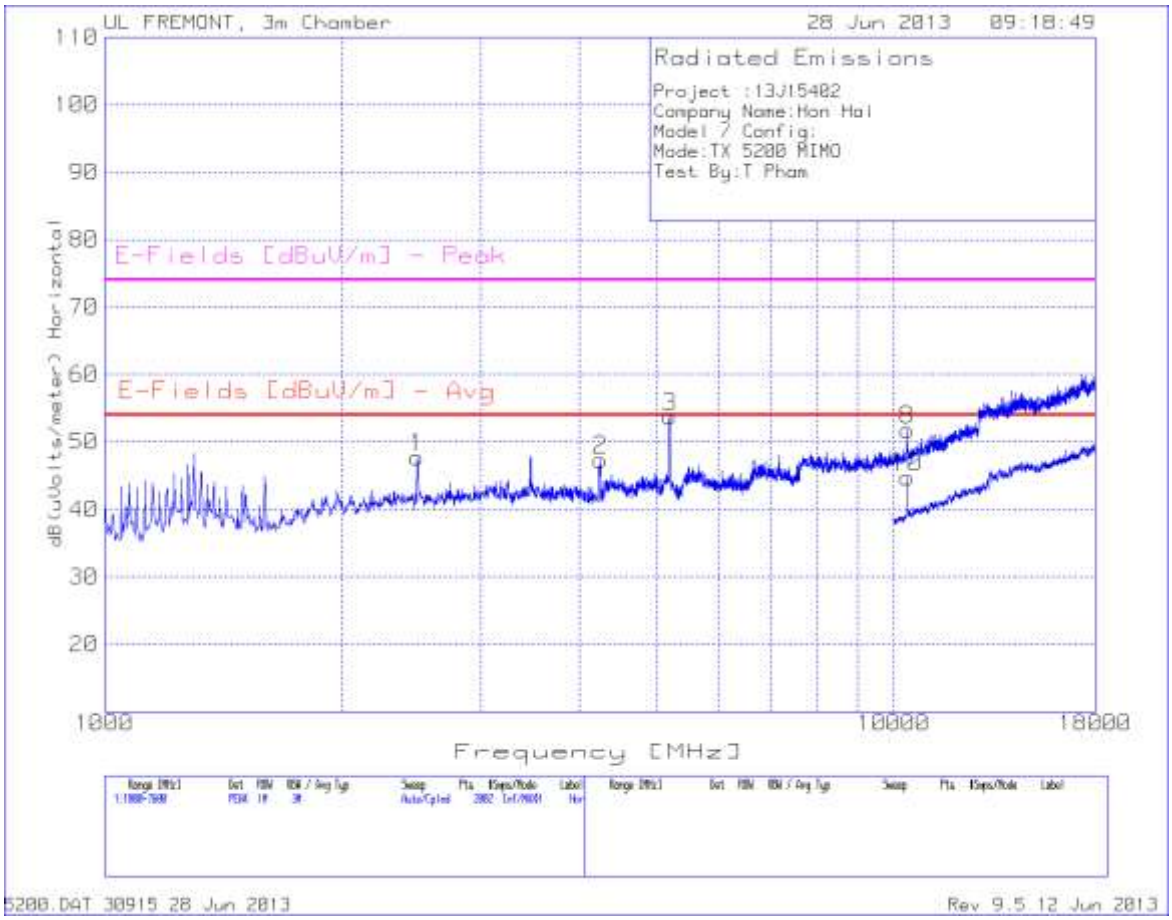
AV – Average detector

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T119 Ant Factor [dB/m]	T34 Preamp /Cable Loss [dB]	T193 HPF [dB]	Corrected Reading dB(uVolts/meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height (cm)	Polarity
10	10.355	35.3	PK	37.2	-20.9	.1	51.7	53.97	-2.27	74	-22.3	99	Horz
11	10.36	35.76	PK	37.3	-20.9	.1	52.26	53.97	-1.71	74	-21.74	201	Vert
12**	10.368	27.01	VB1	37.3	-20.8	.2	43.71	53.97	-10.26	74	-30.29	99	Horz
13**	10.36	28.28	VB1	37.3	-20.9	.1	44.78	53.97	-9.19	74	-29.22	201	Vert

** VB1 - KDB 789033 v01r02 Method: VB Alternative Reduced Video

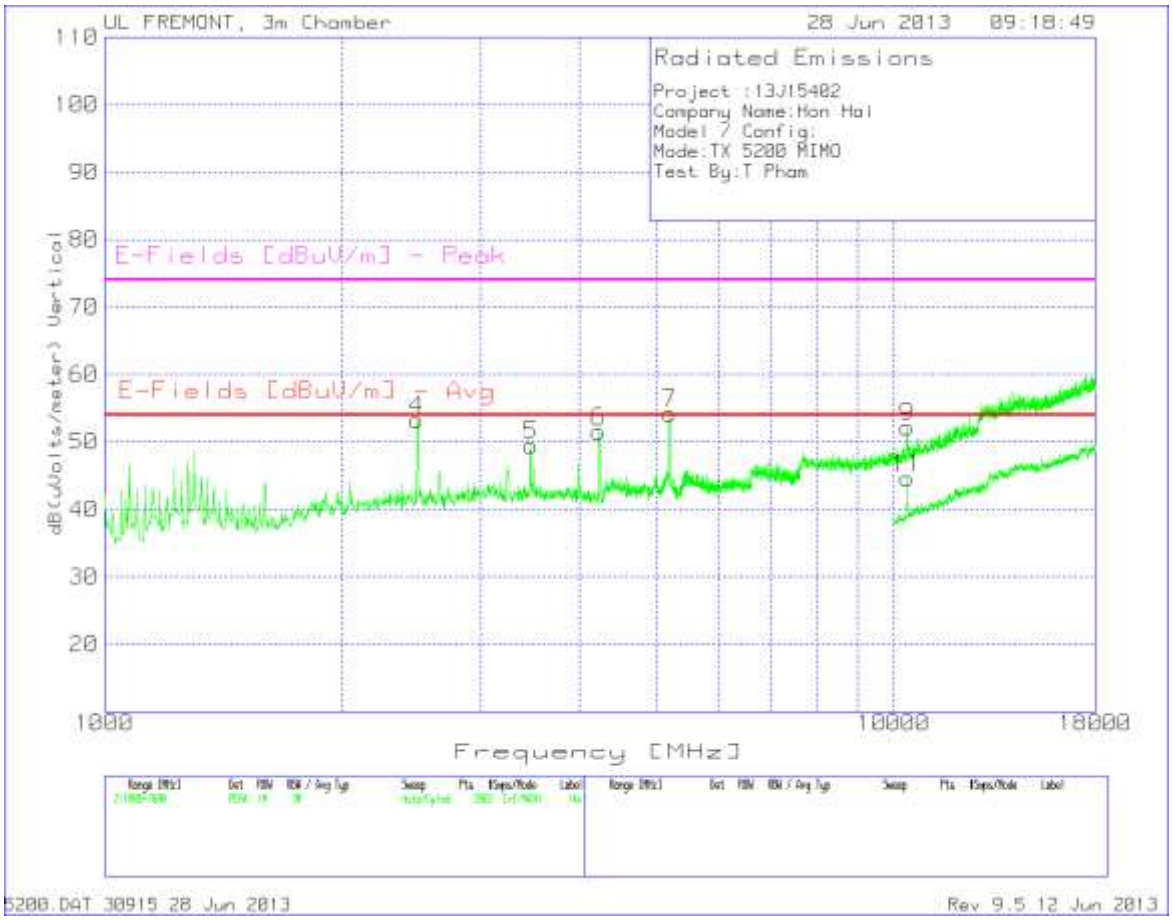
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

Mid Channel – Horizontal



UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701J
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

Mid Channel – Vertical



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

Trace Markers

Marker	Freq (GHz)	Meter Reading (dBuV)	Det	T119 Ant Factor [dB/m]	T34 Preamp/ Cable Loss [dB]	T159 BRF [dB]	Corrected Reading dB(uVolts /meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height (cm)	Polarity
1	2.491	44.95	PK	32.3	-29.6	.1	47.75	53.97	-6.22	74	-26.25	99	Horz
2	4.246	39.61	PK	33.5	-25.9	.1	47.31	53.97	-6.66	74	-26.69	201	Horz
3*	5.202	43.25	PK	34.3	-24.7	.9	53.75	53.97	-.22	74	-20.25	99	Horz
4	2.492	40.54	AV	32.3	-29.6	.1	43.34	53.97	-10.63	74	-30.66	194	Vert
5	3.467	38.64	AV	33	-27.3	0	44.34	53.97	-9.63	74	-29.66	161	Vert
6	4.232	30.56	AV	33.5	-25.9	.2	38.36	53.97	-15.61	74	-35.64	215	Vert
7*	5.199	43.77	PK	34.3	-24.7	.9	54.27	**53.97**	**.3**	74	-19.73	99	Vert

* Fundamental

PK – Peak detector

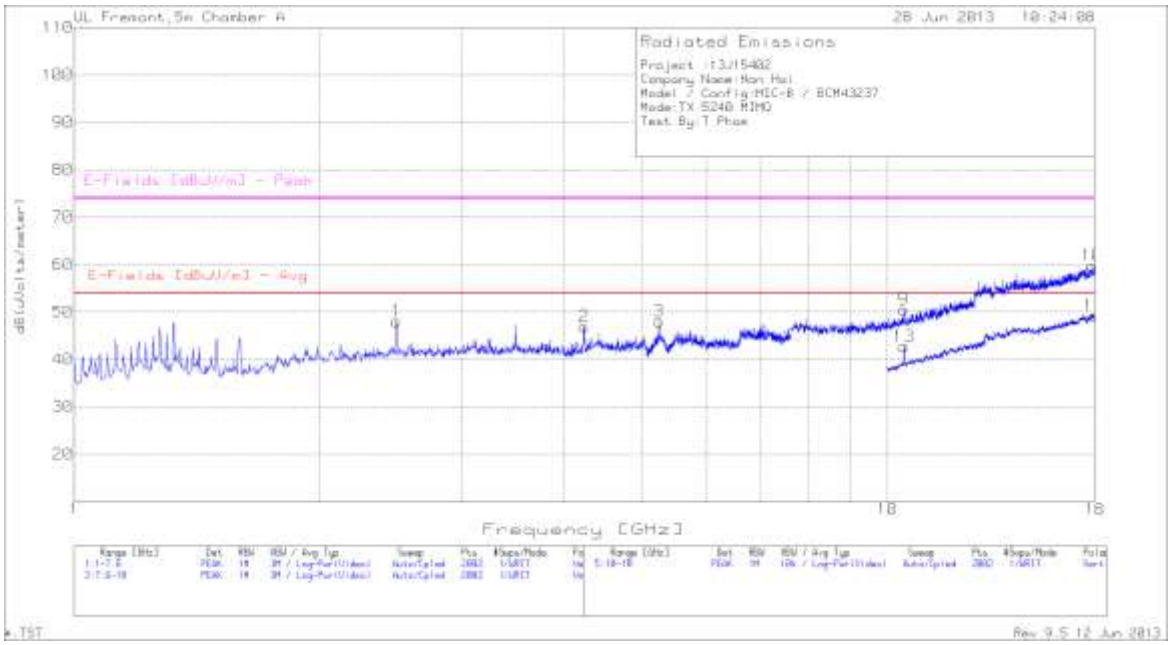
AV – Average detector

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T119 Ant Factor [dB/m]	T34 Preamp/ Cable Loss [dB]	T193 HPF [dB]	Corrected Reading dB(uVolts /meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height (cm)	Polarity
8	10.396	34.96	PK	37.3	-20.8	.3	51.76	53.97	-2.21	74	-22.24	99	Horz
9	10.396	35.36	PK	37.3	-20.8	.3	52.16	53.97	-1.81	74	-21.84	201	Vert
10**	10.4	27.95	VB1	37.3	-20.7	.2	44.75	53.97	-9.22	74	-29.25	99	Horz
11**	10.396	27.78	VB1	37.3	-20.8	.3	44.58	53.97	-9.39	74	-29.42	99	Vert

** VB1 - KDB 789033 v01r02 Method: VB Alternative Reduced Video

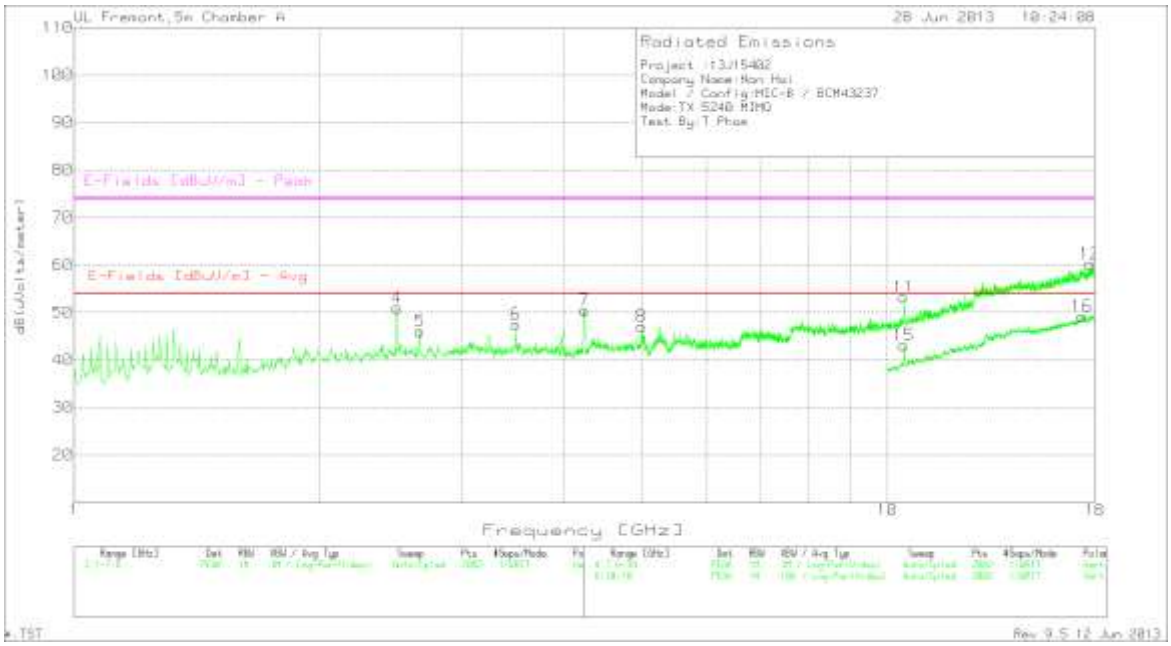
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

High Channel – Horizontal



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

High Channel – Vertical



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

Trace Markers

Marker (GHz)	Freq (GHz)	Meter Reading (dBuV)	Det	T119 Ant Factor [dB/m]	T34 Preamp /Cable Loss [dB]	T159 BRF [dB]	Corrected Reading dB(uVolts /meter)	E-Fields [dBuV /m] - Avg	Margin (dB)	E-Fields [dBuV/ m] - Peak	Margin (dB)	Height (cm)	Polarity
1	2.496	34.24	AV	32.3	-29.6	.1	37.04	53.97	-16.93	74	-36.96	127	H
2	4.239	39.08	PK	33.5	-25.9	.2	46.88	53.97	-7.09	74	-27.12	201	H
3*	5.242	37.55	PK	34.3	-24.7	.9	48.05	53.97	-5.92	74	-25.95	189	H
4	2.493	39.96	AV	32.3	-29.6	.1	42.76	53.97	-11.21	74	-31.24	239	V
5	2.662	42.54	PK	32.6	-29.1	0	46.04	53.97	-7.93	74	-27.96	99	V
6	3.494	41.68	PK	33	-27.2	0	47.48	53.97	-6.49	74	-26.52	201	V
7	4.235	31.55	VB1	33.5	-25.9	.2	39.35	53.97	-14.62	74	-34.65	238	V
8	4.988	37.52	PK	34	-25	.5	47.02	53.97	-6.95	74	-26.98	99	V

* Fundamental

PK – Peak detector

AV – Average detector

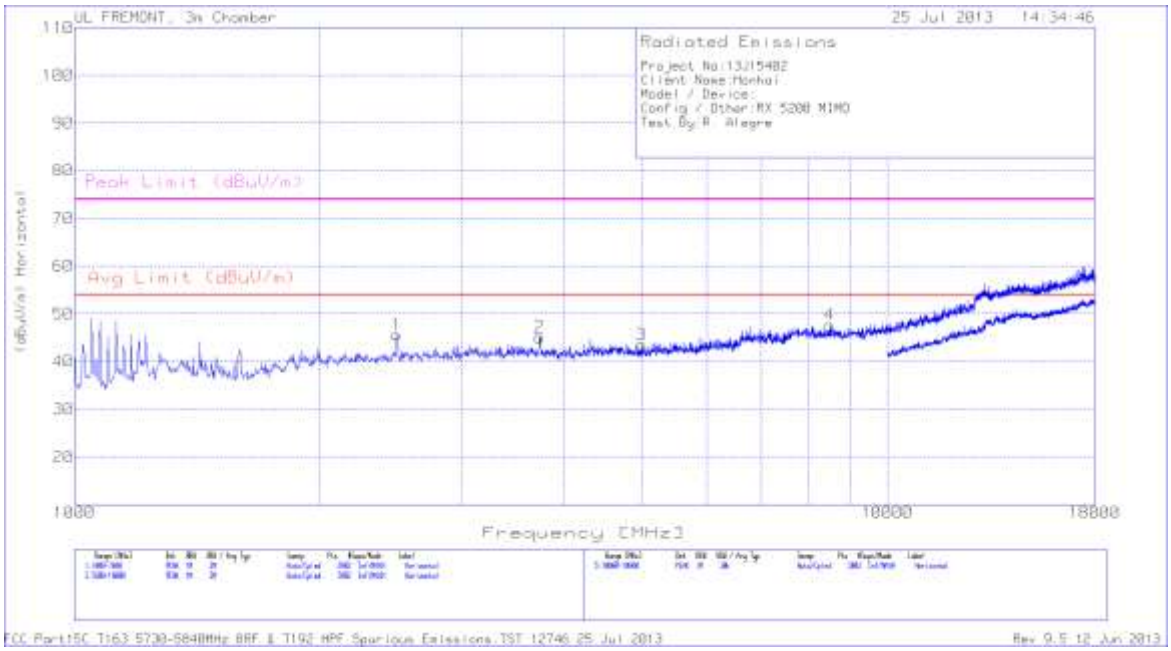
Marker (GHz)	Freq (GHz)	Meter Reading (dBuV)	Det	T119 Ant Factor [dB/m]	T34 Preamp/C able Loss [dB]	T193 HPF [dB]	Corrected Reading dB(uVolts /meter)	E-Fields [dBuV/m] - Avg	Margin (dB)	E-Fields [dBuV/m] - Peak	Margin (dB)	Height (cm)	Polarity
9	10.479	33.4	PK	37.5	-20.6	.2	50.5	53.97	-3.47	74	-23.5	100	H
10	17.854	31.79	PK	41.5	-14	.5	59.79	**53.97**	**5.82**	74	-14.21	201	H
11	10.479	36.17	PK	37.5	-20.6	.2	53.27	53.97	-.7	74	-20.73	99	V
12	17.766	32.74	PK	41.5	-14.1	.1	60.24	**53.97**	**6.27**	74	-13.76	201	V
13**	10.484	25.58	VB1	37.5	-20.6	.2	42.68	53.97	-11.29	74	-31.32	99	H
14**	17.992	21.18	VB1	41.6	-13.9	.4	49.28	53.97	-4.69	74	-24.72	99	H
15**	10.476	25.95	VB1	37.5	-20.6	.2	43.05	53.97	-10.92	74	-30.95	100	V
16**	17.352	21.89	VB1	41.3	-14.3	.3	49.19	53.97	-4.78	74	-24.81	201	V

** VB1 - KDB 789033 v01r02 Method: VB Alternative Reduced Video

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

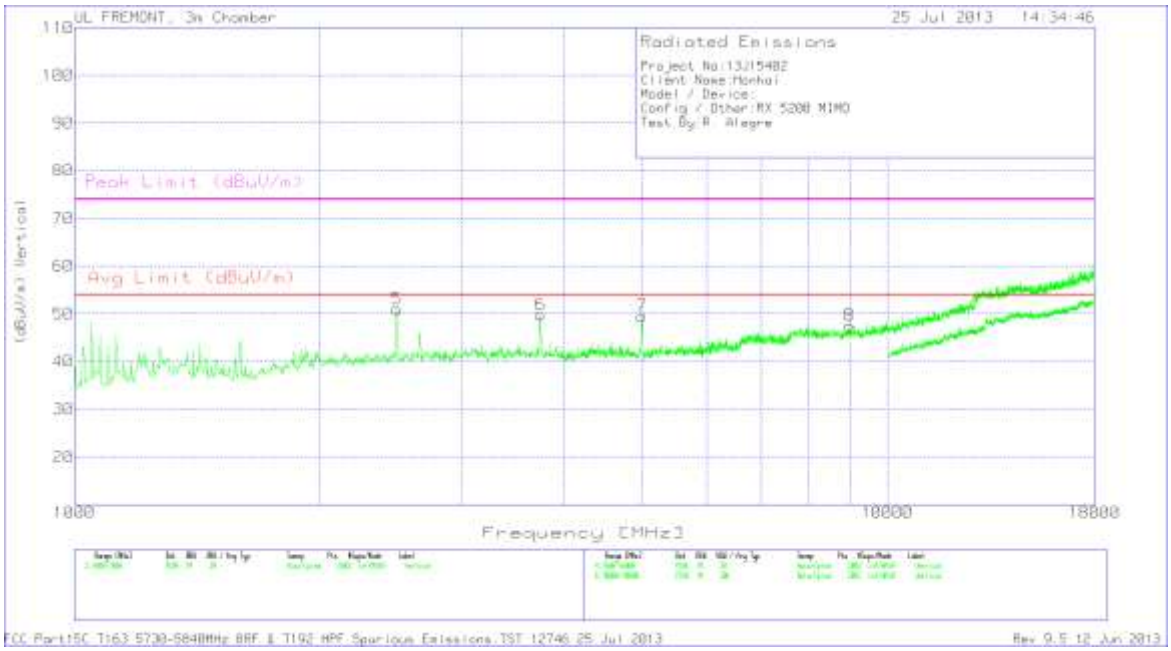
7.4. RECEIVER ABOVE 1 GHz

Mid Channel – Horizontal



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

Mid Channel – Vertical



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

Trace Markers

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T119 AF (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	Margin (dB)	Height (cm)	Polarity
1	2.491	42.89	PK	32.3	-29.6	45.59	54	-8.41	74	-28.41	100	Horz
2	3.734	38.43	PK	33.2	-26.6	45.03	54	-8.97	74	-28.97	201	Horz
3	4.981	34.51	PK	34	-25	43.51	54	-10.49	74	-30.49	201	Horz
5*	2.49	40.2	AD1	32.3	-29.6	42.9	54	-11.1	74	-31.1	103	Vert
6*	3.745	33.55	AD1	33.2	-26.6	40.15	54	-13.85	74	-33.85	115	Vert
7*	4.981	25.99	AD1	34	-25	34.99	54	-19.01	74	-39.01	114	Vert
4	8.499	33.91	PK	35.8	-22.1	47.61	54	-6.39	74	-26.39	201	Horz
8	8.977	33.45	PK	36.1	-22	47.55	54	-6.45	74	-26.45	201	Vert

PK - Peak detector

AD1 - KDB 789033 v01r02 Method: AD Primary Power Average.

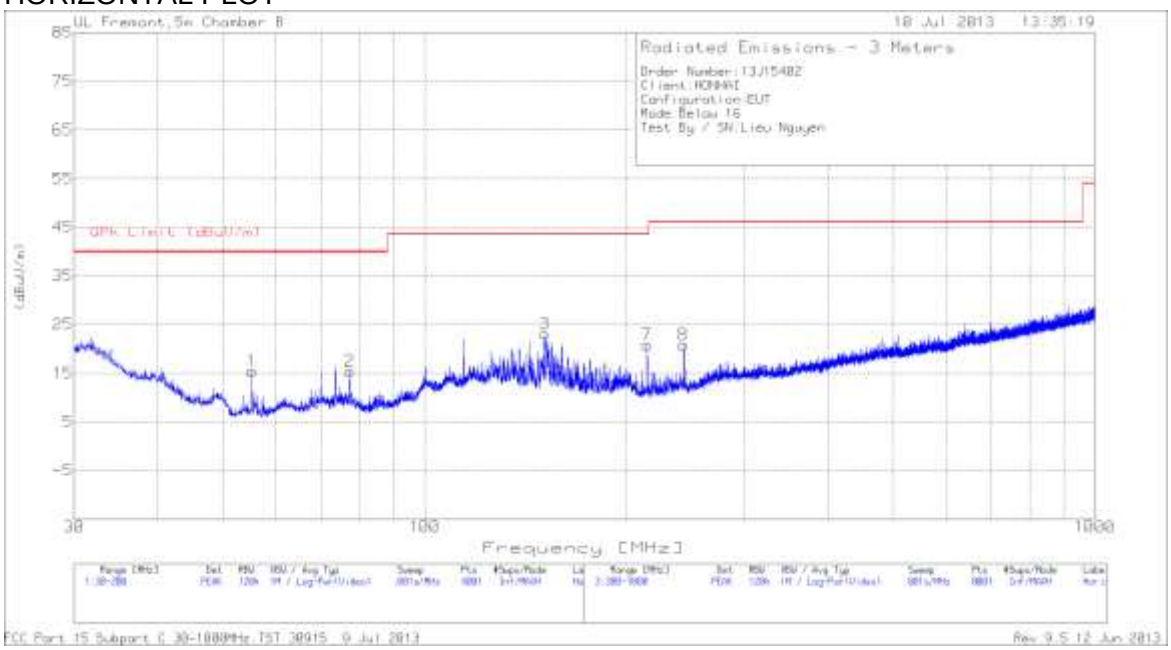
FCC Part15C T163 5730-5840MHz BRF & T192 HPF Spurious Emissions.TST 12746 25 Jul 2013Rev 9.5 12 Jun 2013

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701J
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

7.6. WORST-CASE BELOW 1 GHz

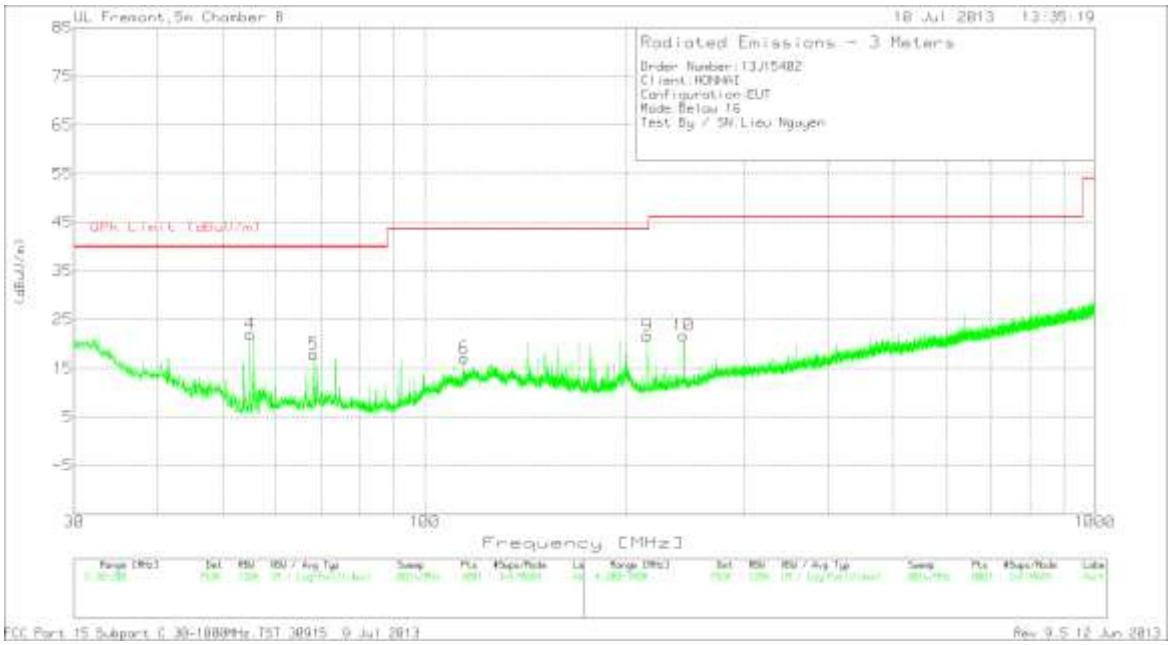
SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION, HORIZONTAL)

HORIZONTAL PLOT



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

VERTICAL PLOT



This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

Trace Markers

Frequency (MHz)	Meter Reading (dBuV)	Det	AF T243 (dB/m)	Amp/Cbl/Fltr/Pad (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
55.2875	37.25	PK	6.8	-28.6	15.45	40	-24.55	0-360	400	H
77.43	35.97	PK	7.7	-28.3	15.37	40	-24.63	0-360	100	H
151.21	38.32	PK	12.3	-27.5	23.12	43.52	-20.4	0-360	200	H
54.9475	43.79	PK	6.8	-28.6	21.99	40	-18.01	0-360	100	V
68.335	38.44	PK	7.8	-28.4	17.84	40	-22.16	0-360	100	V
114.575	31.68	PK	13.3	-27.9	17.08	43.52	-26.44	0-360	100	V
214.7	37.11	PK	10.5	-26.8	20.81	43.52	-22.71	0-360	300	H
243.4	35.72	PK	11.6	-26.5	20.82	46.02	-25.2	0-360	100	H
214.8	37.88	PK	10.5	-26.8	21.58	43.52	-21.94	0-360	200	V
243.4	36.66	PK	11.6	-26.5	21.76	46.02	-24.26	0-360	300	V

PK - Peak detector

FCC Part 15 Subpart C 30-1000MHz.TST 30915 9 Jul 2013 Rev 9.5 12 Jun 2013

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701J
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888
This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .

8. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

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

* Decreases with the logarithm of the frequency.

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

The receiver is set to a resolution bandwidth of 9 kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

Line conducted data is recorded for both NEUTRAL and HOT lines.

RESULTS

Test not conducted. This module employs 5.2 Ghz (UNII) and 5.8 Ghz (DTS). The maximum conducted output power is higher for the 5.8 GHz (DTS), therefore the AC Line Conducted Emissions test at 5.8 GHz band was considered worse case and representative of the 5.2 GHz band. See UL Report no. 13J15402-2B for additional reference.

This report shall not be reproduced except in full, without the written approval of UL Verification Services Inc. .