FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 8

C2PC CERTIFICATION TEST REPORT

FOR

DOLPHIN CT50 HEALTHCARE

MODEL NUMBER: CT50L0N
FCC ID: HD5-CT50L0N
IC ID: 1693B-CT50L0N

REPORT NUMBER: 15U21901-E5V3
ISSUE DATE: JANUARY 13, 2016

Prepared for
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NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	12/21/15	Initial Issue	C.S.OOI
V2	01/12/16	Added KDB 937606 OATS Correlation Justification on Page 12	C.S.OOI
V3	01/13/16	Modified Justification Statement on Page 12	C.S.OOI

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: HONEYWELL INTERNATIONAL INC
HONEYWELL SCANNING & MOBILITY

EUT DESCRIPTION: DOLPHIN CT50 HEALTHCARE

MODEL: CT50L0N

SERIAL NUMBER: 152884063F (Radiated)

DATE TESTED: NOVEMBER 30, 2015

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART C	Pass
INDUSTRY CANADA RSS-210 ISSUE 8	Pass
INDUSTRY CANADA RSS-GEN Issue 3	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.

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, FCC CFR 47 Part 2 and FCC CFR 47 Part 15, RSS-GEN Issue 4, and RSS-210 Issue 8.

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. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street
☐ Chamber A(IC: 2324B-1)	☐ Chamber D(IC: 2324B-4)
☐ Chamber B(IC: 2324B-2)	☐ Chamber E(IC: 2324B-5)
☒ Chamber C(IC: 2324B-3)	☐ Chamber F(IC: 2324B-6)
	☐ Chamber G(IC: 2324B-7)
	☐ Chamber H(IC: 2324B-8)

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, 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%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Dolphin CT50 Healthcare with BT, BLE, DTS & UNII a/b/g/n/ac and NFC.

Reason for C2PC:

Enclosure plastic material changed compound. Enclosure is the same shape and size as what was filed but will be produce with no hand strap. All other electronic components are the same as what was filed.

5.2. MAXIMUM OUTPUT POWER

The testing was performed at 3 meters. The transmitter maximum E-field at 30m distance is 22.17 dBuV/m which convert from the 1 meter data.

5.3. WORST-CASE CONFIGURATION AND MODE

The NFC function was tested at its' fundamental and only operational frequency of 13.56 MHz. The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z. It was determined that the Y-orientation was the worst-case orientation; therefore all final radiated testing was performed with the EUT in the Y-orientation while generating continuous emissions.

5.4. MODIFICATIONS

No modifications were made during testing.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
AC Adapter	PHIHONG	PSA10F-050Q	N/A	N/A
USB CUP Adapter	Honeywell	N/A	N/A	N/A

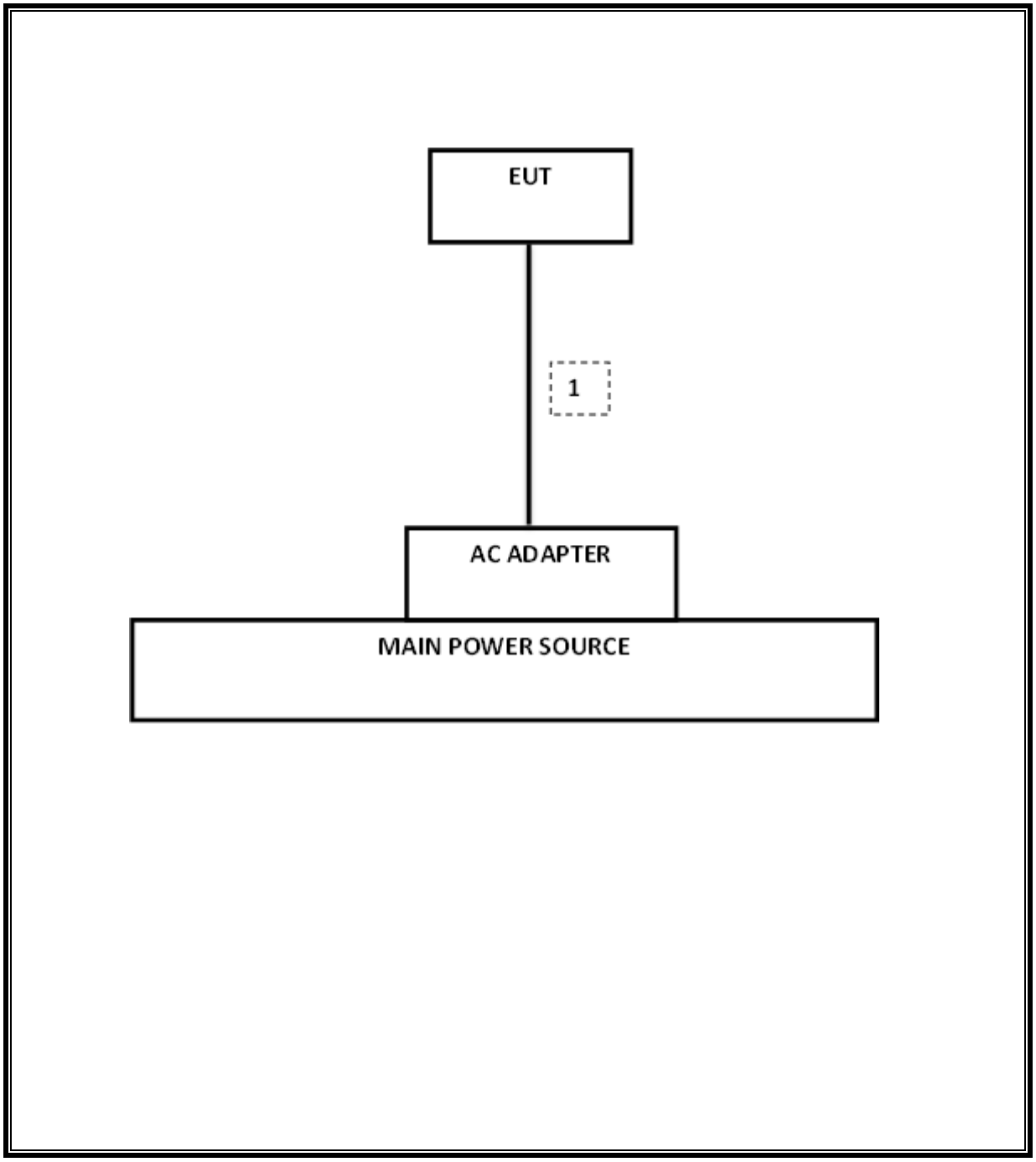
I/O CABLES

N/A

TEST SETUP

The EUT is a stand-alone unit during the tests. Test software exercised the radio card.

SETUP DIAGRAM FOR TESTS



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 Due**
Spectrum Analyzer, 44 GHz	Agilent / HP	E4446A	C01069	12/20/15
Antenna, Loop, 30 MHz	EMCO	6502	C00593	02/20/16
Antenna, Biconolog, 30MHz-1 GHz	Sunol Sciences	JB1	T243	12/08/15
Preamplifier, 1300 MHz	Agilent / HP	8447D	C00580	01/21/16
EMI Test Receiver, 30 MHz	R & S	ESHS 20	N02396	08/08/16
LISN, 30 MHz	FCC	50/250-25-2	C00626	01/14/16
DMM	Fluke	77-11	N02303	10/31/16
Temperature Chamber	CSZ	2PHS-8-3	T267	03/04/16

7. RADIATED EMISSION TEST RESULTS

7.1. LIMITS AND PROCEDURE

LIMIT

§15.225
IC RSS-210, Annex 2, Section A2.6 (Transmitter)
IC RSS-GEN, Section 6 (Receiver)

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/ meter at 30 meters.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110– 14.010 MHz and shall not exceed the general radiated emission limits in § 15.209 as follows:
§15.209 (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (µV/m)	Measurement Distance (m)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
30 – 88	100**	3
88 - 216	150**	3
216 – 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.
§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

Formula for converting the filed strength from uV/m to dBuV/m is:
Limit (dBuV/m) = 20 log limit (uV/m)

In addition:

§15.209 (d) The emission limits shown the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector.

§15.209 (d) The provisions in §§ 15.225, measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

TEST PROCEDURE

ANSI C63.10-2013

The EUT is an intentional radiator that incorporates a digital device. The highest fundamental frequency generated or used in the device is 13.56 MHz. The frequency range was investigated from 0.15 MHz to the 10^{th} harmonic of the highest fundamental frequency, or 1000 MHz, whichever is greater (1000MHz)

RESULTS

No non-compliance noted:

KDB 937606 OATS and Chamber Correlation Justification

- Device is a small handheld scanner.
- Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.
- OATs and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

FUNDAMENTAL AND SPURIOUS EMISSIONS (0.15 – 30 MHz)

FCC Part 15, Subpart B & C **1 Meter Distance Measurement At Emissions Chamber**

Company: Honeywell
Project #: 15U21901
Tester: A. Escamilla
Date: 11/30/15

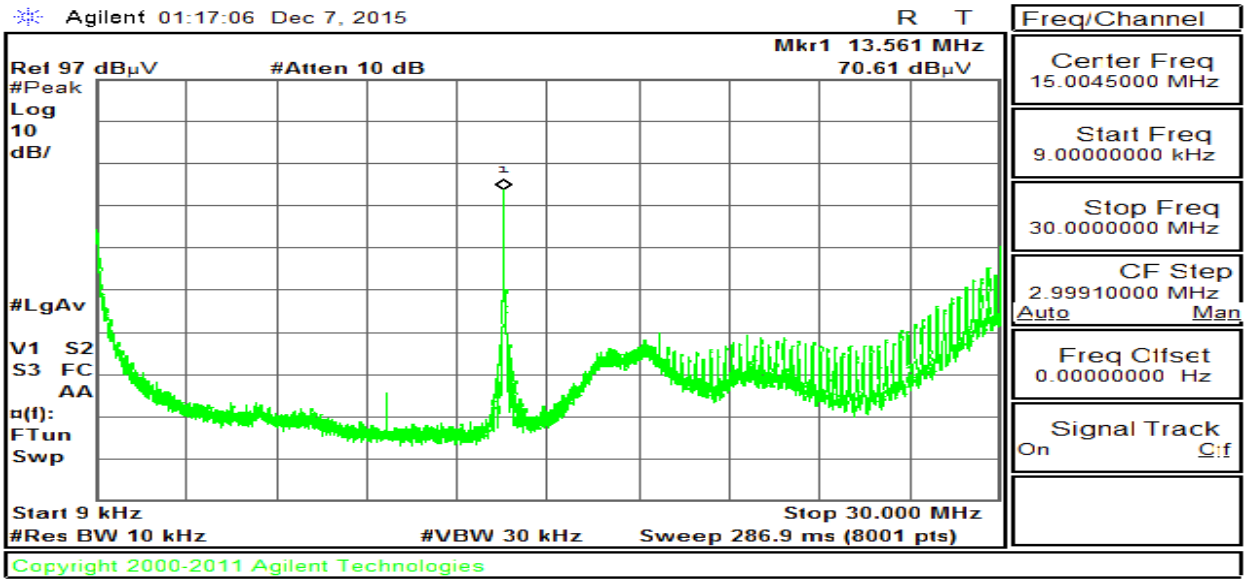
Frequency (MHz)	PK (dBu/V)	QP (dBu/V)	AV (dBuV)	AF dB/m	Distance (m)	Distance Correction (dB)	PK Corrected Reading (dBuV/m)	AV Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	PK Margin (dB)	AV Margin (dB)	Notes
Loop Antenna Face On:													
Fundamental Field Strength & Within Bands:													
13.56	70.61		--	10.64	1	-59.08	22.17	--	84.00	--	-61.8	--	Fundamental @ 30m Dist
13.553	62.37		--	10.64	1	-59.08	13.93	--	50.48	--	-36.6	--	13.41-13.553MHz Spurious @ 30m
13.567	61.96		--	10.64	1	-59.08	13.52	--	50.48	--	-37.0	--	13.567-13.710MHz Spurious @ 30m
13.4	35.67		--	10.66	1	-59.08	-12.75	--	40.51	--	-53.3	--	13.110-13.410MHz Spurious @ 30m
13.71	41.67		--	10.63	1	-59.08	-6.79	--	40.51	--	-47.3	--	13.710-14.010MHz Spurious @ 30m
Loop Antenna Face Off:													
Fundamental Field Strength & Within Bands:													
13.56	63.97		--	10.64	1	-59.08	15.53	--	84.00	--	-68.5	--	Fundamental @ 30m Dist
13.553	52.23		--	10.64	1	-59.08	3.79	--	50.48	--	-46.7	--	13.41-13.553MHz Spurious @ 30m
13.567	48.26		--	10.64	1	-59.08	-0.18	--	50.48	--	-50.7	--	13.567-13.710MHz Spurious @ 30m
13.4	36.64		--	10.66	1	-59.08	-11.78	--	40.51	--	-52.3	--	13.110-13.410MHz Spurious @ 30m
13.71	32.73		--	10.63	1	-59.08	-15.73	--	40.51	--	-56.2	--	13.710-14.010MHz Spurious @ 30m
Loop Antenna Face On:													
Spurious Emissions 9kHz - 490kHz:													
0.01	32.57	--		18.9	1	-99.08	-47.61	-47.61	67.60	47.60	-115.2	-95.2	9kHz-10kHz Spurious @ 30m
0.1	36.76	--		11.8	1	-99.08	-50.52	-50.52	47.60	27.60	-98.1	-78.1	10kHz-100kHz Spurious @ 30m
0.109	38.64	--		11.8	1	-99.08	-48.65	-48.65	46.86	26.86	-95.5	-75.5	100kHz-489kHz Spurious @ 30m
Spurious Emissions 490kHz - 30MHz:													
0.49	32.34		--	11.7	1	-59.08	-15.04	--	33.80		-48.8	--	489kHz-490kHz Spurious @ 30m
0.811	42.04		--	11.76	1	-59.08	-5.28	--	29.42		-34.7	--	490kHz-1MHz Spurious @ 30m
1.048	32.18		--	11.8	1	-59.08	-15.10	--	27.20		-42.3	--	1MHz-1.705MHz Spurious @ 30 m
1.832	25.79		--	11.8	1	-59.08	-21.49	--	29.54		-51.0	--	1.705MHz-5MHz Spurious @ 30m
9.015	22.02		--	11.1	1	-59.08	-25.97	--	29.54		-55.5	--	5-10MHz Spurious @ 30m
30	36.87		--	8.4	1	-59.08	-13.81	--	29.54		-43.4	--	20-30MHz Spurious @ 30m

* No more emissions were found up to 30MHz

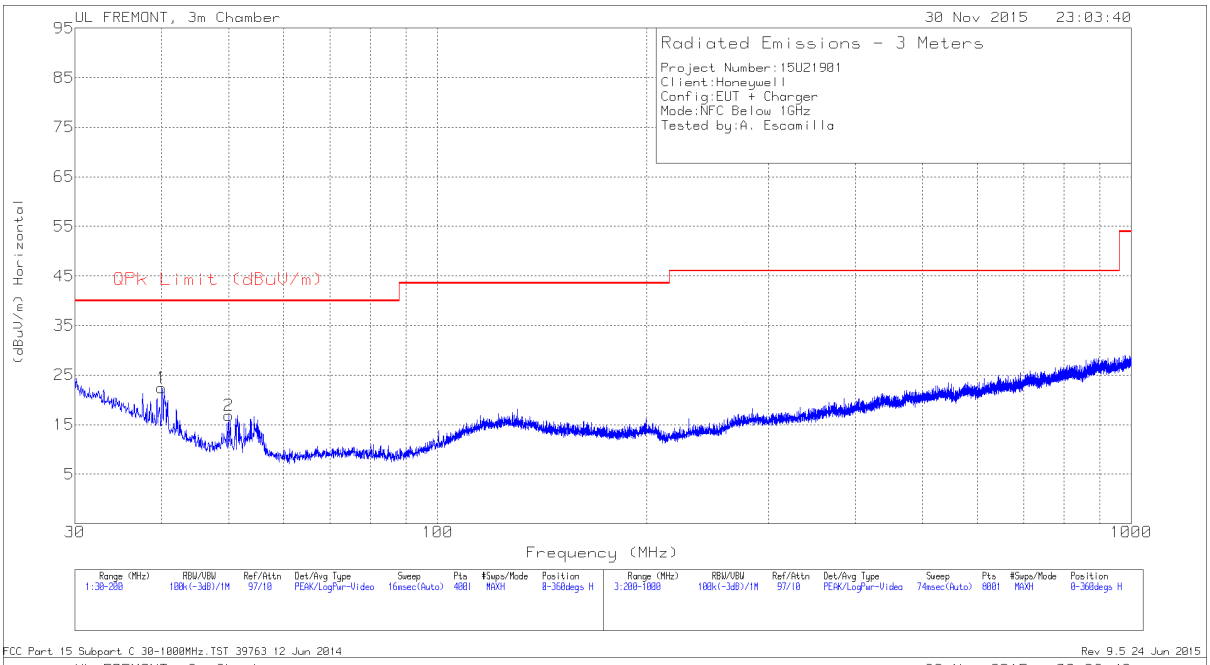
Note: The emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 10000Mhz. Radiated emission limits in these three bands are based on measurements employing an average detector.

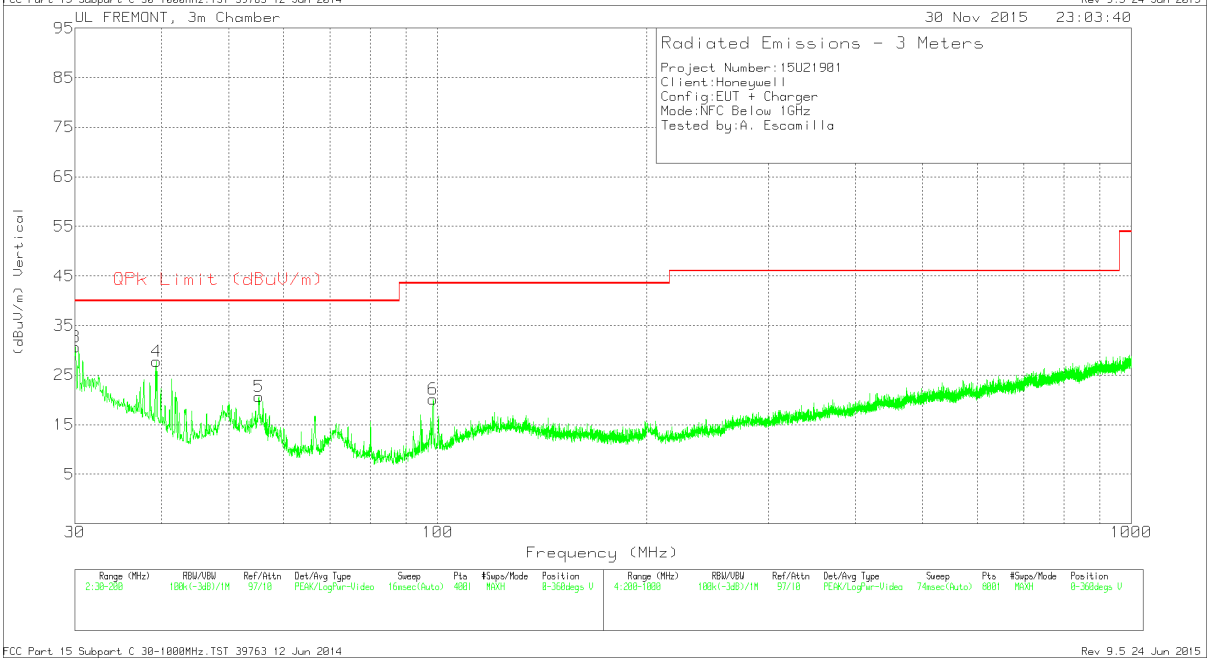
P.K. = Peak
Q.P. = Quasi Peak Readings
A.F. = Antenna factor

Rev. 05.27.15



7.1.1. TX SPURIOUS EMISSION 30 TO 1000 MHz





Trace Markers

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF T185 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
3	30.085	36.28	Pk	21.7	-27.3	30.68	40	-9.32	0-360	100	V
4	39.35	40.04	Pk	14.8	-27.1	27.74	40	-12.26	0-360	100	V
1	40.03	35.13	Pk	14.3	-27	22.43	40	-17.57	0-360	100	H
2	49.975	35.53	Pk	8.2	-26.9	16.83	40	-23.17	0-360	100	H
5	55.245	40.38	Pk	7.2	-26.9	20.68	40	-19.32	0-360	100	V
6	98.51	37.07	Pk	9.4	-26.3	20.17	43.52	-23.35	0-360	100	V

Pk - Peak detector