FCC 47 CFR PART 15 SUBPART C

CERTIFICATION TEST REPORT

FOR

SWING CADDIE

MODEL NUMBER: SC200

FCC ID: 2ABTKSC200

REPORT NUMBER: 15U20138-E1A

ISSUE DATE: APRIL 6,2015

Prepared for

UCOMM TECHNOLOGY CO., LTD.
#401 GWANYANG DOOSAN VENTURE DIGM 1307-37 GWANYANG2-DONG,
DONGAN-GU, ANYANG-SI, GYEONGGI-DO, 431-810
SOUTH KOREA

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
--	3/20/2015	Initial Issue	M.Heckrotte
A	4/06/2015	Update Section 6.3	S. Aguilar

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701I
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: UCOMM TECHNOLOGY CO., LTD.
#401 GWANYANG DOOSAN VENTURE DIGM 1307-37
GWANYANG2-DONG, DONGAN-GU, ANYANG-SI, GYEONGGI-DO, 431-810, SOUTH KOREA

EUT DESCRIPTION: SWING CADDIE (BATTERY OPERATED)

MODEL: SC200

SERIAL NUMBER: TX- 2061251

DATE TESTED: FEBRUARY 27 – MARCH 10, 2015

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART C	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:

MICHAEL HECKROTTE
PRINCIPAL ENGINEER
UL Verification Services Inc.

Tested By:

STEVE AGUILAR
LAB ENGINEER
UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2009, FCC CFR 47 Part 2, and FCC CFR 47 Part 15.

3. FACILITIES AND ACCREDITATION

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

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	☐ 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.

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
Radiated Disturbance, 1 to 6 GHz	±3.86 dB
Radiated Disturbance, 6 to 18 GHz	±4.23 dB
Radiated Disturbance, 18 to 26 GHz	±5.30 dB
Radiated Disturbance, 26 to 40 GHz	±3.23 dB
Radiated Disturbance, 40 GHz above	±3.50dB

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a portable battery operated 24 GHz field disturbance sensor for analyzing a golf swings.

Manufactured by RFbeam Microwave GmbH Model K-LC1a.

5.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak EIRP output power @ 3m distance as follows:

Frequency Range (GHz)	Mode	Output Power (dBuV/m)
24.075 -24.175	Modulator	105.80

5.3. MAXIMUM FUNDAMENTAL FIELD STRENGTH

The maximum field strength of the fundamental is 195 millivolts/meter at 3 meters.

5.4. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes an integral patch antenna, with a maximum gain of 8.6 dBi.

5.5. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was Ver. 0.90

5.6. WORST-CASE CONFIGURATION

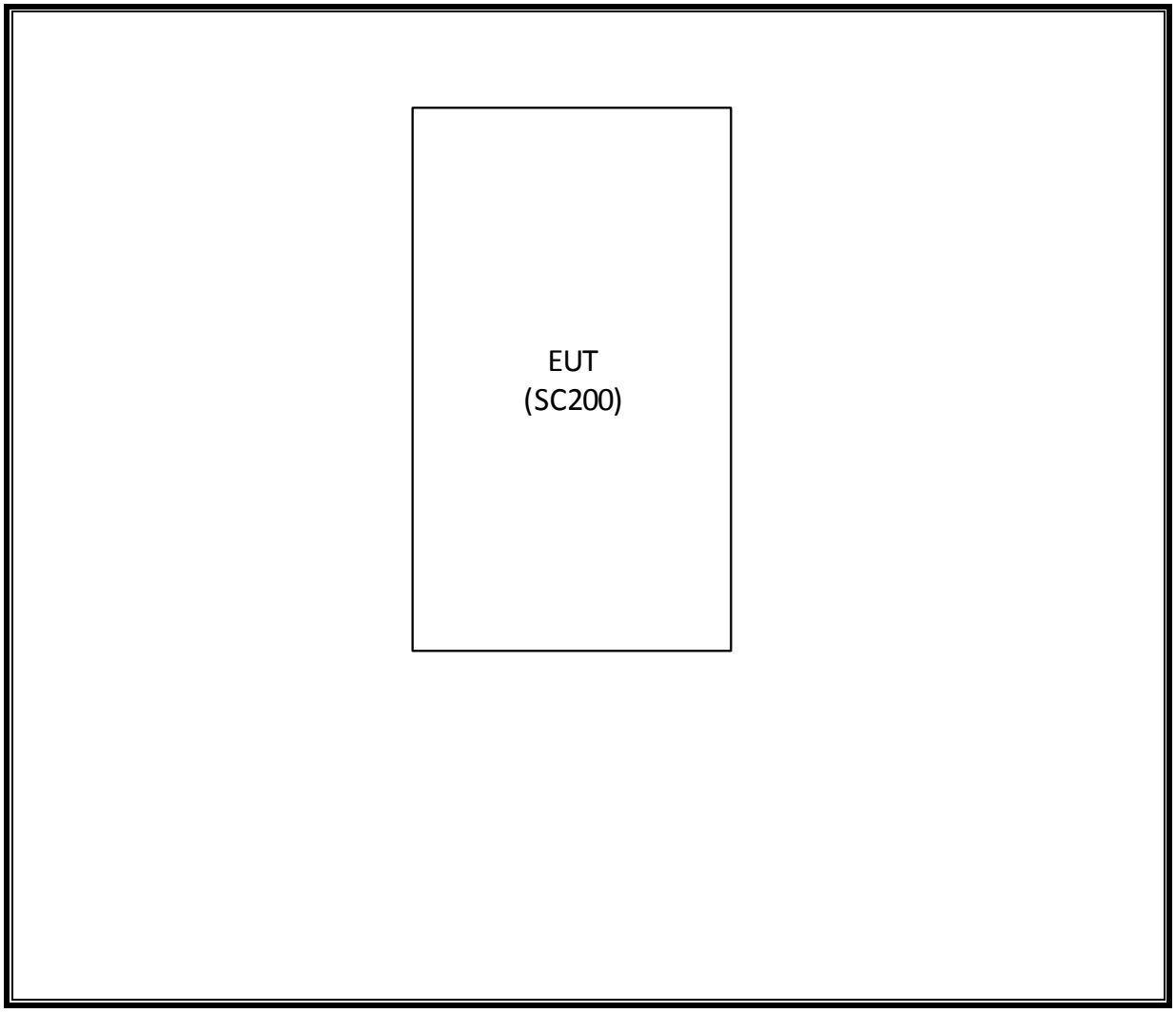
The worst case boresight orientation configuration was with the EUT mounted vertically (upright) on the turntable top.

5.7. DESCRIPTION OF TEST SETUP

TEST SETUP

The EUT transmits and receives once turned on.

SETUP DIAGRAM FOR TESTS



5.8. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment List				
Description	**Manufacturer**	**Model**	**S/N or T#**	**Cal Due**
N9030A PXA Signal Analyzer	Agilent	N9030A	MY52350427	9/13/2015
Analog Signal Generator, 40 GHz	Agilent	E8257D	MY48050681	9/26/2015
Down Converter, 67 GHz	Agilent	MT-463	12020	CNR
mmWave Source 50 - 75 GHz	OML	S15MS-AG	80708-4	CNR
Mixer Diplexer for HP	OML	DPL.313B	N02429	CNR
Harmonic Mixer, 50 GHz	Agilent	M1970U-002	MY5139	11/1/2015
Harmonic Mixer , 50 to 80 GHz	Agilent	M1970V	MY51390830	6/18/2015
Harmonic Mixer , 75 to 110 GHz	Agilent	M1970W	MY51430784	6/12/2015
Harmonic Mixer, 90 to 140 GHz	OML	M08HWA	F90519-2	6/17/2015
Harmonic Mixer, 140 to 220 GHz	OML	M05HWA	G90519-1	6/17/2015
Harmonic Mixer, 220 to 325 GHz	OML	M03HW/A	H70814-1	3/1/2016
Single Average Power Meter	Agilent	N1913A	MY53100006	5/1/2015
Waveguide Power Sensor	Agilent	V8486A	MY52300008	5/6/2015
Spectrum Analyzer	Agilent	8564E	3943A01643	8/6/2015
Horn Antenna, 18 to 26.5GHz	ARA	MWH-1826/B	1049	12/17/2015
PreAmplifier, 1-26.5GHz	Agilent	8449B	3008A04710	3/23/2015
Preamplifier, 40 GHz	Miteq	NSP4000-SP2	924343	9/3/2015
Antenna, Horn, 40 GHz	ARA	MWH-2640/B	1029	7/15/2015
Oscilloscope 1GHz 4 Ch DSO	Agilent	DSO9104A	MY51420139	6/11/2015
Low Pass Filter, 10MHz	Solar Electronics	6623-10	136101	3/26/2015
Low Noise Amplifier	VIVAtech	VTLN-018-FB	51	CNR
Waveguide switch	mi-Wave	530V/387	1332	CNR
MM-Wave Isolator	Millitech	FBI-15-RSES0	1734	CNR
50-75GHZ RF Detector	Millitech	DET-15-RPFWI	41	CNR
Spectrum Analyzer, PXA, 3Hz to 44GHz	Agilent	N9030A	T906	5/7/2015
Antenna, Horn, 18 GHz	ETS Lindgren	3117	T863	4/14/2015
Antenna, Biconolog, 30MHz-1 GHz	Sunol Sciences	JB3	T900	3/28/2015
RF PreAmplifier, 1-18GHz	Miteq	AFS42-00101800-25-S-42	T495	6/5/2015
Preamp, 1000MHz	Sonoma	310N	T835	6/5/2015
EMI Test Receiver, 9 kHz-7 GHz	R & S	ESCI 7	100935	9/16/2015
LISN, 30 MHz	FCC	50/250-25-2	114	1/15/2016
Radiated Software	UL	UL EMC	Ver 9.5, July 22, 2014	
Conducted Software	UL	UL EMC	Ver 9.5, May 17, 2012	

5.9. 99% BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

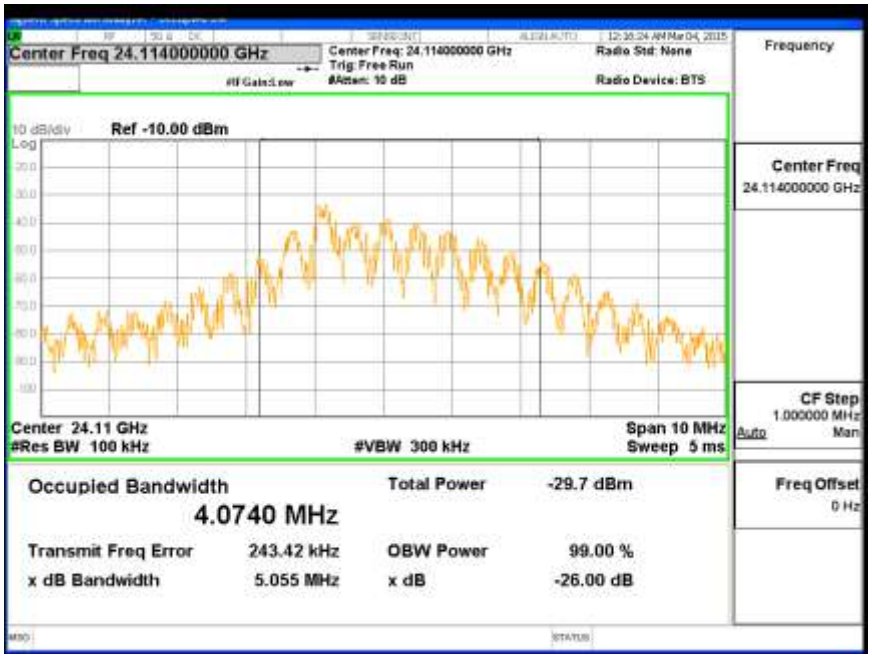
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

Frequency (GHz)	99% Bandwidth (kHz)
24.11	4074

99% BANDWIDTH

99% BANDWIDTH



6. RADIATED EMISSION TEST RESULTS

6.1. LIMITS AND PROCEDURES

LIMITS

§15.245

The field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Limits for radiated disturbance of an intentional radiator		
Fundamental Frequency (MHz)	Field Strength of fundamental (millivolts / meter)	Field Strength of harmonic (millivolts / meter)
902-928	500	1.6
2435-2465	500	1.6
5785-5815	500	1.6
10500-10550	2500	25
24075-24175	2500	25

§15.245 (3) Emissions radiated outside of the specified frequency bands, except for harmonics, shall…general limits in §15.209.

The applicable rules yield the following equivalent limits for field strength at 3 meters, expressed in logarithmic form:

FUNDAMENTAL:	128 dBuV/m average 148 dBuV/m peak
HARMONICS:	88 dBuV/m average 108 dBuV/m peak
NON-HARMONIC SPURIOUS:	54 dBuV/m average 74 dBuV/m peak

TEST PROCEDURES

ANSI C63.10

PROCEDURE FOR 30 MHz TO 40 GHz

Radiated measurements are made with the measurement antenna feeding a spectrum analyzer via a preamplifier and cables.

PROCEDURE FOR 40 TO 100 GHz

External harmonic mixers and Standard Gain horn antennas are utilized.

The measurement antenna is scanned around the entire perimeter surface of the EUT, and rotated 360 degrees to include all polarizations. The frequency of any emissions observed is recorded.

A final test is made at 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 mixer band that yields a minimum system noise floor at least 6 dB below the spurious emissions limit.

6.2. FUNDAMENTAL RESULTS

Company:	Ucomm Technologies Co. Ltd.
Project #:	14U17188
Date:	3/2/2015
Test Engineer:	Steve Aguilar
Configuration:	EUT Alone. Upright
Mode:	TX and RX Mode

Freq. GHz	Distance (m)	Read Pk dBuV	Ant factor		CL/Amp dB	Peak dBuV/m	Pk Lim dBuV/m	Avg Lim dBuV/m	Pk Mar dB	Avg Mar dB	Pol (V/H)
24.11	3.0	88.5	34.2	0.0	-22.7	100.0	148.0	128.0	-48.0	-28.0	H
24.11	3.0	94.3	34.2	0.0	-22.7	105.8	148.0	128.0	-42.2	-22.2	V

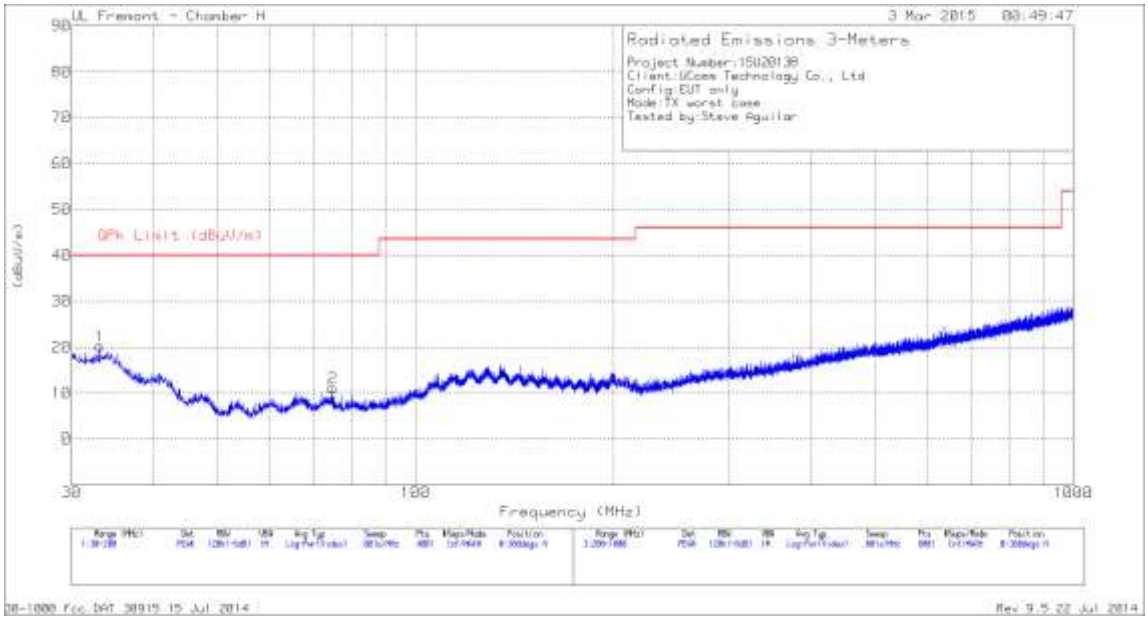
The maximum field strength of 105.8 dBuV/m is equivalent to 195 millivolts/meter.

6.3. SPURIOUS RESULTS

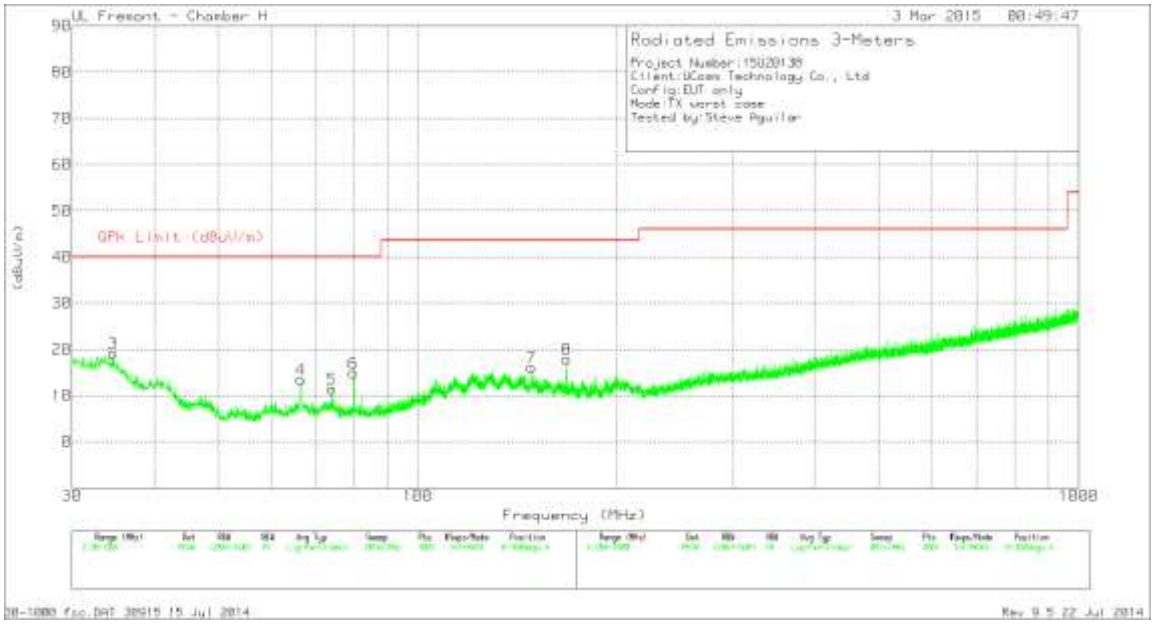
6.3.1. SPURIOUS RADIATED EMISSIONS BELOW 1 GHz

EMISSIONS FROM 30 MHz TO 1 GHz

HORIZONTAL



VERTICAL



HORIZONTAL AND VERTICAL DATA

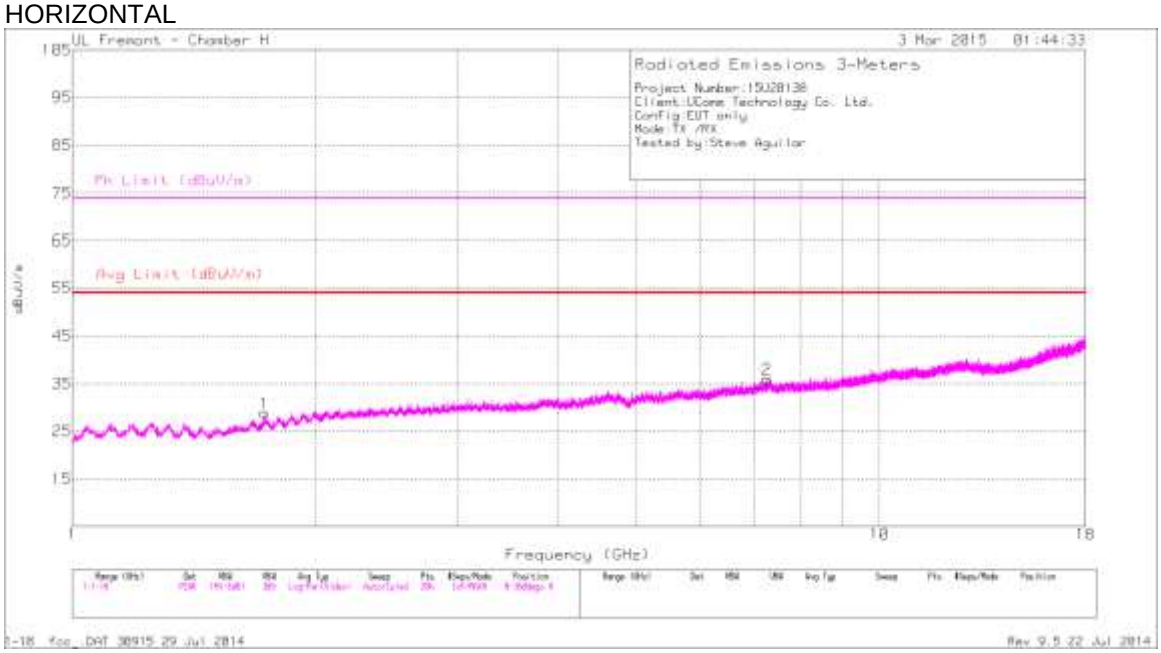
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	SS JB3 SN A051314-1	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	33.1025	29.63	PK	21.9	-31.3	20.23	40	-19.77	0-360	301	H
3	34.59	29.41	PK	21	-31.2	19.21	40	-20.79	0-360	100	V
4	66.5925	32.99	PK	11.3	-30.8	13.49	40	-26.51	0-360	100	V
5	74.2	31.2	PK	11	-30.7	11.5	40	-28.5	0-360	100	V
2	74.795	30.83	PK	11	-30.7	11.13	40	-28.87	0-360	201	H
6	79.98	35.24	PK	10.4	-30.7	14.94	40	-25.06	0-360	100	V
7	148.5325	30.27	PK	15.8	-30	16.07	43.52	-27.45	0-360	100	V
8	167.9975	32.89	PK	14.9	-29.9	17.89	43.52	-25.63	0-360	100	V

PK - Peak detector

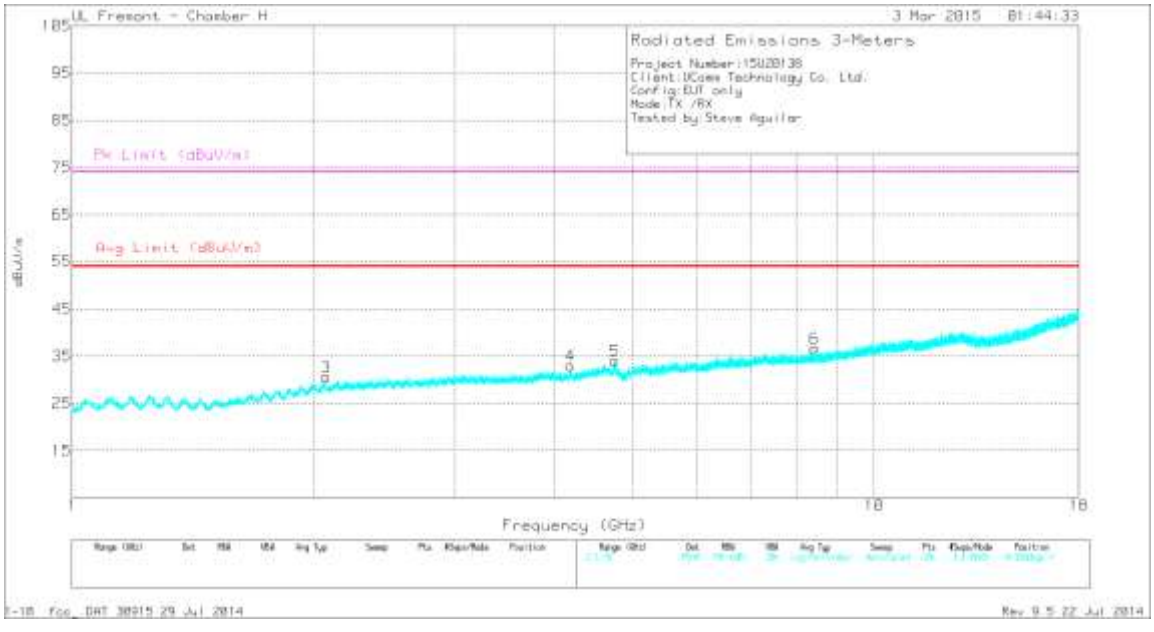
6.3.2. SPURIOUS RADIATED EMISSIONS 1 TO 40 GHz

EMISSIONS FROM 1-18 GHz

HORIZONTAL



VERTICAL



HORIZONTAL AND VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	AF T863 (dB/m)	Amp/Cbl (dB)	Corrected Reading dBuV/m	Avg Limit (dBuV/m)	Av (Margin) (dB)	Pk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.728	34.13	PK	29.5	-34.8	28.83	54	-25.17	74	-45.17	0-360	100	H
3	2.075	33.84	PK	31.4	-34.7	30.54	54	-23.46	74	-43.46	0-360	201	V
4	4.18	32.3	PK	33.5	-32.8	33	54	-21.00	74	-41.00	0-360	100	V
5	4.751	32.53	PK	34.3	-32.8	34.03	54	-19.97	74	-39.97	0-360	201	V
2	7.257	30.26	PK	36.2	-30.5	35.96	54	-18.04	74	-38.04	0-360	100	H
6	8.425	29.53	PK	36.1	-28.9	36.73	54	-17.27	74	-37.27	0-360	100	V

EMISSIONS FROM 18-26 GHz

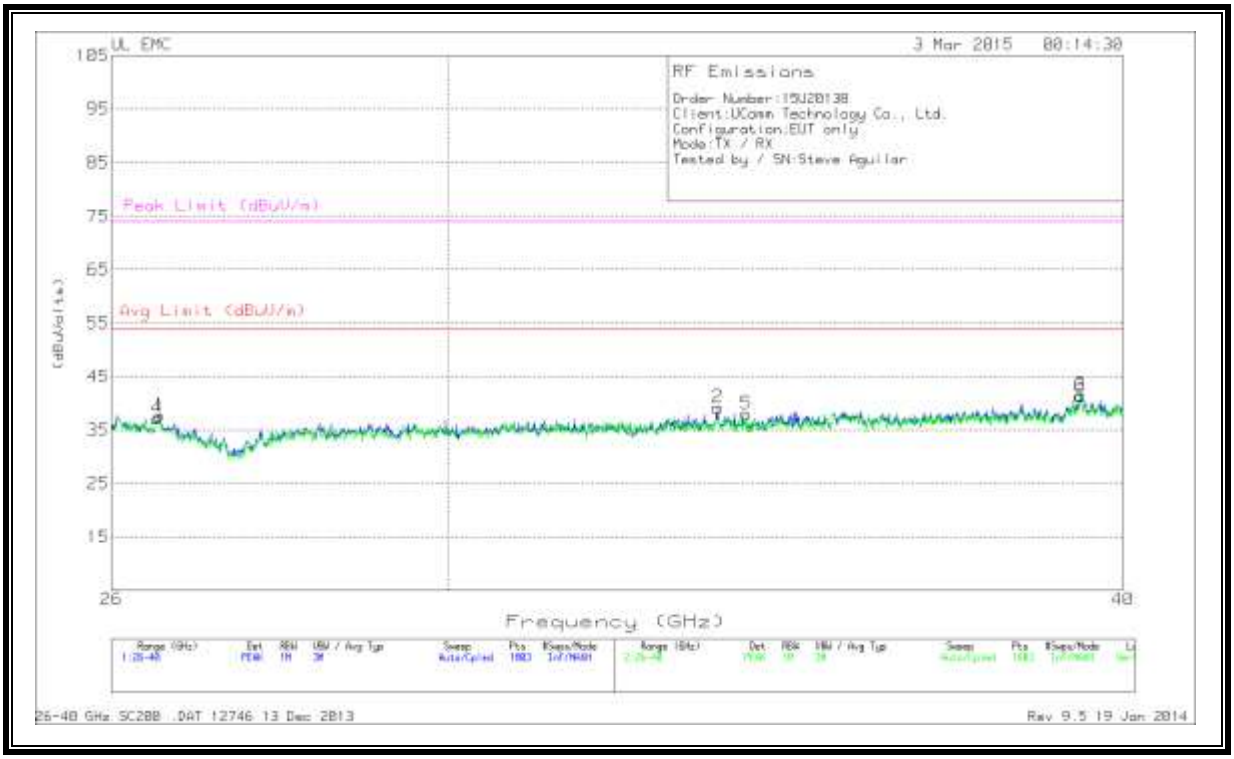
HORIZONTAL AND VERTICAL PLOT

HORIZONTAL AND VERTICAL DATA

(Unmarked peak is the fundamental emission)

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T89 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	18.793	41.57	PK	32.8	-24.2	-9.5	40.66	54	-13.33	74	-33.33
2	21.164	42.27	PK	33.3	-23.9	-9.5	42.16	54	-11.83	74	-31.83
3	25.454	43.4	PK	34.6	-22.5	-9.5	46	54	-8	74	-28
4	18.893	41.7	PK	32.8	-24.5	-9.5	40.5	54	-13.5	74	-33.5
5	21.391	42.23	PK	33.3	-23.7	-9.5	42.33	54	-11.66	74	-31.66
6	25.454	44.9	PK	34.6	-22.5	-9.5	47.5	54	-6.5	74	-26.5

EMISSIONS FROM 26-40 GHz



HORIZONTAL AND VERTICAL DATA

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	T90 AF (dB/m)	Amp/Cbl (dB)	Dist Corr (dB)	Corrected Reading (dBuVolts)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)
1	26.536	45.37	PK	35.5	-33.7	-9.5	37.66	54	-16.33	74	-36.33
2	33.66	48.87	PK	36.9	-37.1	-9.5	39.16	54	-14.83	74	-34.83
3	39.285	48.7	PK	38.4	-36.1	-9.5	41.5	54	-12.5	74	-32.5
4	26.513	44.57	PK	35.5	-33.4	-9.5	37.16	54	-16.83	74	-36.83
5	34.072	48.1	PK	36.9	-37.5	-9.5	38	54	-16	74	-36
6	39.277	49.13	PK	38.5	-36.8	-9.5	41.33	54	-12.66	74	-32.66

6.3.3. HARMONIC EMISSIONS 40 TO 100 GHz

Frequency (GHz)	Measurement Distance (m)	Peak Measured Power (dBm)	Rx Antenna Gain (dBi)
48.218	1.50	-35.0	43.1
EIRP (dBm)	**Peak Field Strength (dBuV/m @ 3 m)**	**Peak Field Strength Limit (dBuV/m @ 3 m)**	**Margin to Peak Limit (dB)**
-8.4	86.8	108.00	-21.2

Frequency (GHz)	Measurement Distance (m)	Average Measured Power (dBm)	Rx Antenna Gain (dBi)
48.218	1.50	-37.3	43.1
EIRP (dBm)	**Average Field Strength (dBuV/m @ 3 m)**	**Average Field Strength Limit (dBuV/m @ 3 m)**	**Margin to Average Limit (dB)**
-10.7	84.5	87.80	-3.3

6.3.4. NON-HARMONIC SPURIOUS EMISSIONS 40 TO 100 GHz

No emissions up to 100 GHz detected.