

FCC CFR47 PART 15 SUBPART C INDUSTRY CANADA RSS-210 ISSUE 8

BLUETOOTH LOW ENERGY CERTIFICATION TEST REPORT

FOR

HANDHELD COMPUTING DEVICE

MODEL NUMBER: 1573

FCC ID: C3K1573 IC: 3048A-1573

REPORT NUMBER: 13U15414-16

ISSUE DATE: NOVEMBER 10, 2013

Prepared for MICROSOFT CORPORATION ONE MICROSOFT WAY REDMOND, WA 98052, U.S.A.

Prepared by UL VERIFICATION SERVICES 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
-	11/10/13	Initial Issue	T. LEE

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ATTESTATION OF TEST RESULTS

	APPLICABLE STANDARDS STANDARD TEST RESULTS					
DATE TESTED:	OCTOBER 23, 2013 –	OCTOBER 29, 2013				
SERIAL NUMBER:	001925433252					
MODEL:	1573					
EUT DESCRIPTION:		FING DEVICE WITH WWAN, 802.11 BLUETOOTH RADIOS				
COMPANY NAME:	MICROSOFT CORPO ONE MICROSOFT WA REDMOND, WA 98052	AY,				

STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	Pass
INDUSTRY CANADA RSS-210 Issue 8 Annex 8	Pass
INDUSTRY CANADA RSS-GEN Issue 3	Pass

UL VERIFICATION SERVICES 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 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 and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL VERIFICATION SERVICES 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 By:

TIM LEE WISE PROGRAM MANAGER UL VERIFICATION SERVICES Tested By:

JOE VANG EMC ENGINEER UL VERIFICATION SERVICES

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1. TEST METHODOLOGY

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

2. 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 is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at <u>http://www.ccsemc.com</u>.

3. CALIBRATION AND UNCERTAINTY

3.1. 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.

3.2. 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

3.3. 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%.

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4. EQUIPMENT UNDER TEST

4.1. DESCRIPTION OF EUT

The EUT is a handheld computing device with WWAN, 802.11 a/b/g/n WLAN and Bluetooth radios.

4.2. MAXIMUM OUTPUT POWER

The transmitter has a maximum peak conducted output power as follows:

Frequency Range	Frequency Range Mode		Output Power	
(MHz)		(dBm)	(mW)	
2402 - 2480	BLE	2.47	1.77	

4.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes a monopole antenna, with a maximum gain of 3.1 dBi.

4.4. SOFTWARE AND FIRMWARE

The EUT driver software installed during testing was Window RT 8.1 Preview Build 943

The test utility software used during testing was Laptool 189.1.0.9.0\ WIFI Tool.exe

4.5. 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 fundamental of the EUT was investigated in three orthogonal orientations X,Y,Z, it was determined that zZ orientation was worst-case orientation; therefore, all final radiated testing was performed with the EUT in Z orientation.

Conducted measurement was conducted on Model 1572 under FCC ID C3K1572. Model 1572 are identical to Model 1573 except Model 1573 includes the WWAN radio.

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4.6. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List								
Description	Manufacturer	Model	Serial Number	FCC ID				
USB Ethernet Adaptor	CISCO	USB 300M	CU90MC02233	DoC				
Laptop	Lenovo	L420	7854CT0	DoC				
AC Adaptor (laptop)	Lenovo	92P1156	111S92P1156ZDXN272091	N/A				

I/O CABLES

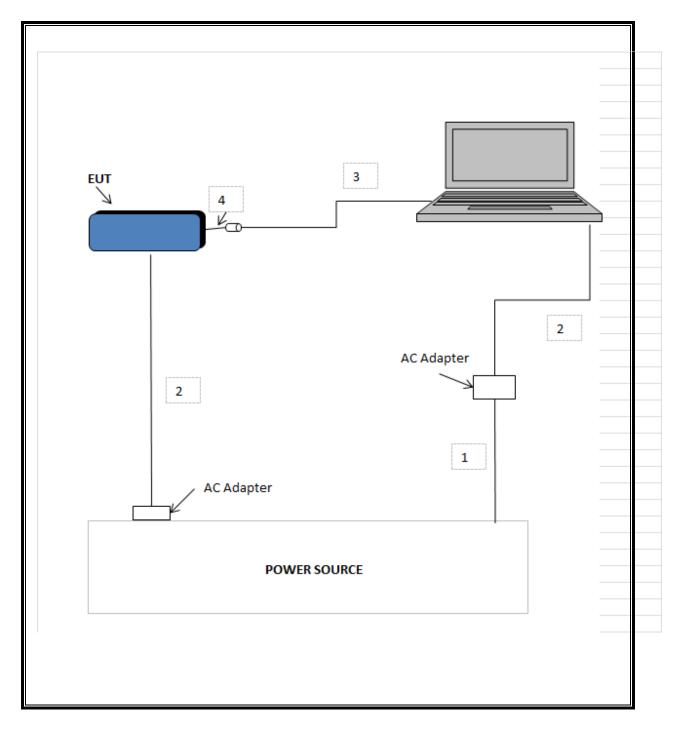
	I/O Cable List									
Cable	Port # of identical		Connector	Cable Type	Cable	Remarks				
No		ports	Туре		Length (m)					
1	AC	1	AC	Unshielded	1.8	AC adapter				
2	USB	1	USB	Unshielded	0.1	USB to Ethernet adapter				
3	DC	1	DC	Unshielded	1.8					
4	Ethernet	1	RJ 45	Unshielded	7.62	Connects to USB adapter				

TEST SETUP

The EUT is a standalone wireless handheld computing device. Test software exercised the wireless module installed within the device under test.

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SETUP DIAGRAM FOR TESTS



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4.7. 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	Asset	Cal Date	Cal Due		
Bilog 30-1000MHz	Sunol	JB1	C01011	02/07/12	03/28/14		
LISN, 30 MHz	FCC	LISN-50/250-25-	N02625	01/14/13	01/14/14		
Power meter	Agilent	N119A	T198	06/25/12	12/13/13		
Power Sensor	Agilent	E9323A	T397	06/26/12	04/02/14		
Spectrum Analyzer, 26 GHz	Agilent / HP	E4440A	C01176	10/21/12	12/13/13		
Spectrum Analyzer	Agilent	N9030A	F00128	2/22/2013	2/22/2014		
Horn Antenna, 1-18GHz	ETS Lindgren	3117	F00133	2/19/2013	2/19/2014		
Antenna, Biconolog, 30MHz-1	Sunol Sciences	JB3	F00168	3/7/2013	3/7/2014		
High Pass Filter, fc: 3.0GHz, 50	Micro-Tronics	HPM17543	F00180	8/24/2013	8/24/2014		
Low Pass Filter, fc: 5GHz, 50 O	Micro-Tronics	LPS17541	F00174	8/24/2013	8/24/2014		
RF PreAmplifier, 1-18GHz	Miteq	To Be Determine	F00353	8/24/2013	8/24/2014		
Amplifier	Sonoma	310	F00008	11/6/2012	11/6/2013		

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4.7.1. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS LIMITS

None; for reporting purposes only.

4.7.2. ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time	Period	Duty Cycle	Duty	Duty Cycle
	В		x	Cycle	Correction Factor
	(msec)	(msec)	(linear)	(%)	(dB)
BLE	0.381	0.624	0.611	61.1%	2.14

🔆 Ag	ilent 23:	38:01 /	Aug 21, 20	013					F	₹Т	Marke	r
Ref 10	dBm	1	#Atten 10	dB				∆ Mk		!4 μs DO dB	Select Ma	
#Peak	•				0			>			1 2 3	<u>i 4</u>
Log	25				1			<u></u>				
10											📕 Marker Tr	ace
dB/					_						<u>Auto 1</u>	<u>2</u> <u>3</u>
Offst	⊢ –											
10.8											Rea	dout .
dB												Time
							1 1					
	worder				44	provinted	anne salar					
											Marker T	
#PA∨g											<u>On</u>	<u>Off</u>
Center	2.440 00	0 GHz							Sna	n 0 Hz		
	/ 1 MHz	0 0112		VB	W 3 M	H ₇	Swa	ep 1.04 i			Marker A	II ∩ff
Marker		ace	Туре	10		Axis	3110	cp 1.04	Amplitu			
1R		1)	Time			00.1 µs			2.27 dE			
1Δ		1)	Time			31.3 µs			-0.79 d	-		
2R		1)	Time			02.3 μs			2.28 dE			
2∆	(1)	Time			624 µs			0.00 d	в		
												More
											II :	2 of 2

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5. ANTENNA PORT TEST RESULTS

5.1. 6 dB BANDWIDTH

<u>LIMITS</u>

FCC §15.247 (a) (2)

IC RSS-210 A8.2 (a)

The minimum 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

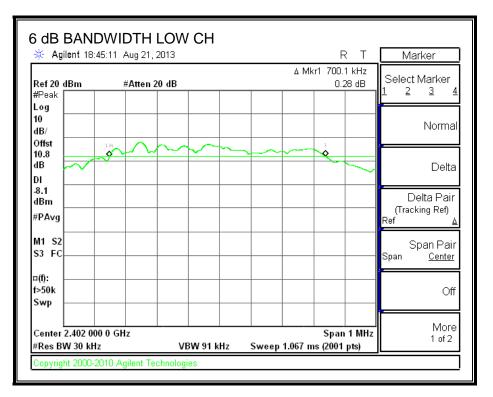
KDB 558074 D01 v02 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247".

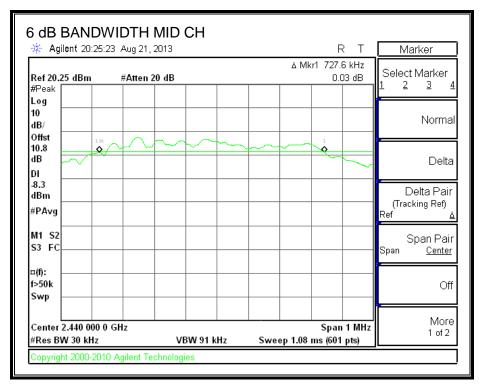
RESULTS

Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (MHz)
Low	2402	700.1000	0.5
Middle	2440	727.6000	0.5
High	2480	728.9000	0.5

....

6 dB BANDWIDTH





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6 dB l ⊯ Agi			DTH Aug 21, :		I CH				F	×Τ	Marker
Ref 20.2 #Peak	5 dBm	1	#Atten 2	0 dB				∆ Mk	r1 728. -0.0	9 kHz 3 dB	Select Marker 1 <u>2 3</u> 4
Log 10 dB/ Offst											Normal
10.8 dB DI	~	1R •		~~		~~~	<u> </u>		1		Delta
-8.6 dBm #PAvg											Delta Pair (Tracking Ref) Ref ∆
V1 S2 S3 FC											Span Pair Span <u>Center</u>
¤(f): f>50k Swp											Off
Center 3 #Res BV			lz	VE	3W 91 k	Hz	Swe	ep 1.08		1 MHz pts)	More 1 of 2
Copyrigh	nt 2000-	2010 A(gilent Te	chnologi	es]

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5.2. 99% **BANDWIDTH**

<u>LIMITS</u>

None; for reporting purposes only.

TEST PROCEDURE

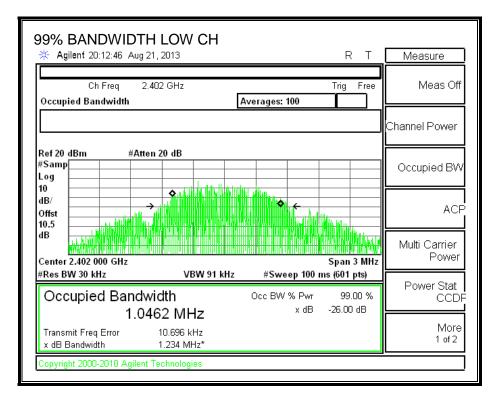
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth and to 1% of the span. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

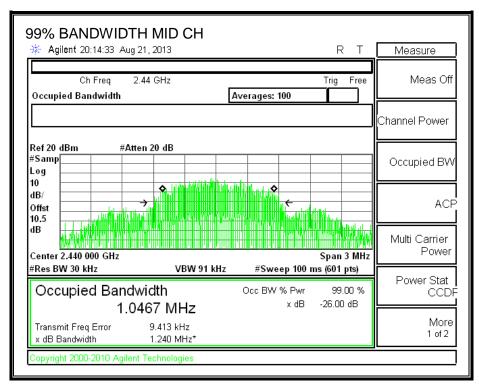
RESULTS

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.0462
Middle	2440	1.0467
High	2480	1.0425

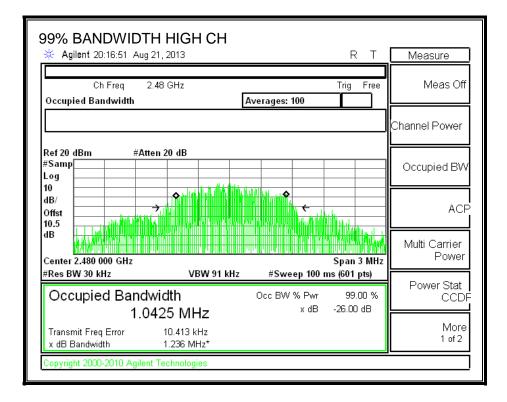
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99% BANDWIDTH





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5.3. OUTPUT POWER

LIMITS

FCC §15.247 (b)

IC RSS-210 A8.4

The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.

TEST PROCEDURE

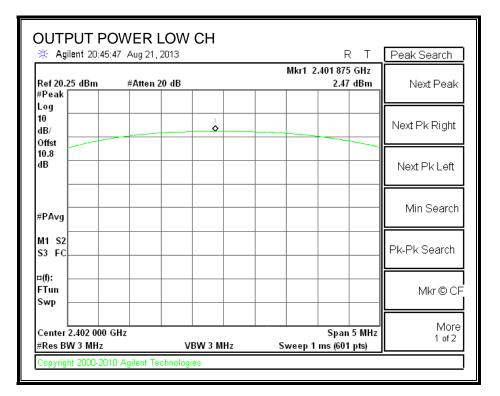
KDB 558074 D01 v02 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247".

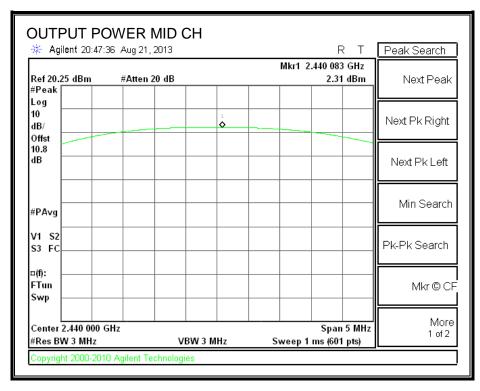
RESULTS

Channel	Frequency (MHz)	Peak Power Reading (dBm)	Limit (dBm)	Margin (dB)
Low	2402	2.47	30	-27.530
Middle	2440	2.31	30	-27.690
High	2480	2.08	30	-27.920

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OUTPUT POWER





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	DWER HIGH CH	RT	Peak Search
Ref 20.25 dBm #Peak	#Atten 20 dB	Mkr1 2.479 792 GHz 2.08 dBn	.
Log 10 dB/ Offst			Next Pk Right
10.8 dB			Next Pk Left
#PAvg			Min Search
V1 S2 S3 FC			Pk-Pk Search
¤(f): FTun Swp			Mkr©CF
Center 2.480 000 (#Res BW 3 MHz	GHz VBW 3 MH	Span 5 Mi Iz Sweep 1 ms (601 pts)	Hz More 1 of 2

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5.4. AVERAGE POWER

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is connected to a power meter.

RESULTS

The cable assembly insertion loss of 10.75 dB (including 10 dB pad and 0.75 dB cable) was entered as an offset in the power meter to allow for direct reading of power.

Channel	Frequency	AV power
	(MHz)	(dBm)
Low	2402	2.29
Middle	2440	2.14
High	2480	1.96

5.5. POWER SPECTRAL DENSITY

LIMITS

FCC §15.247 (e)

IC RSS-210 A8.2 (b)

The power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

KDB 558074 D01 v02 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247".

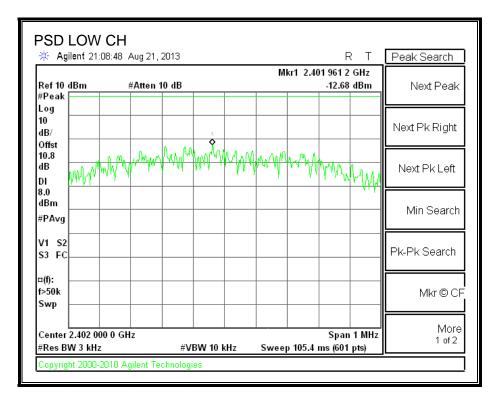
RESULTS

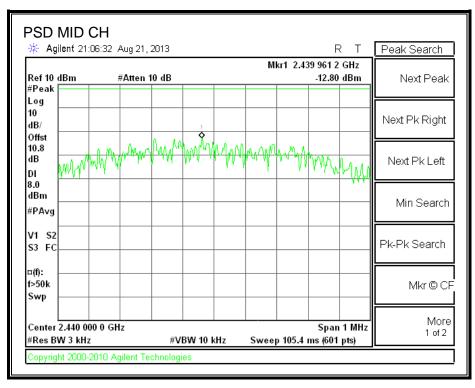
Channel	Frequency (MHz)	PSD (dBm)	Limit (dBm)	Margin (dB)
Low	2402	-10.85	8	-18.85
Middle	2440	-11.52	8	-19.52
High	2480	-12.27	8	-20.27

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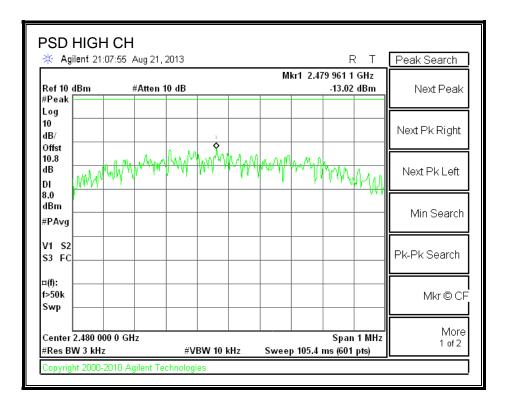
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POWER SPECTRAL DENSITY





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5.6. CONDUCTED SPURIOUS EMISSIONS

LIMITS

FCC §15.247 (d)

IC RSS-210 A8.5

Output power was measured based on the use of a peak measurement, therefore the required attenuation is 20 dB.

TEST PROCEDURE

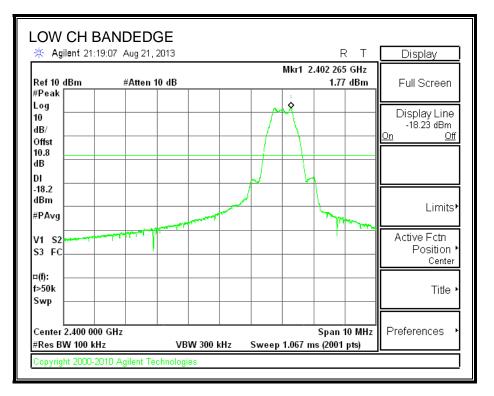
KDB 558074 D01 v02 "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under 15.247".

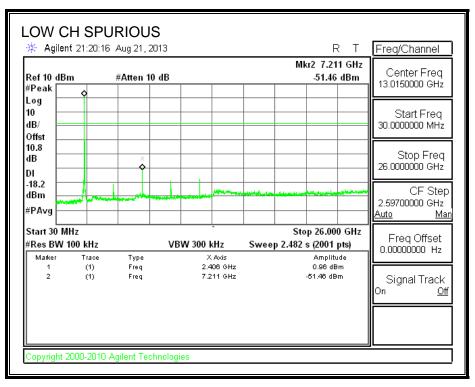
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RESULTS

SPURIOUS EMISSIONS, LOW CHANNEL

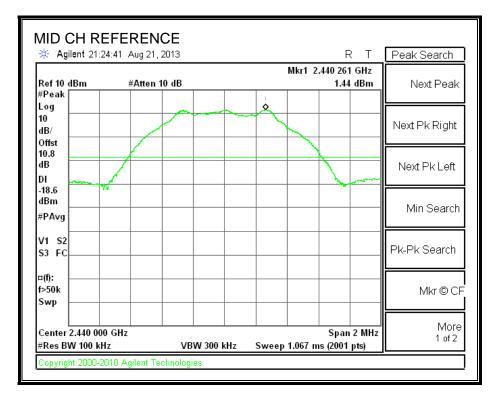


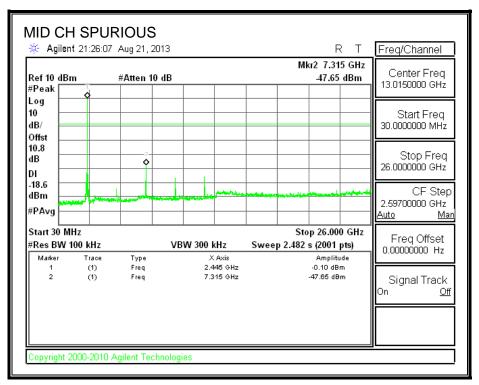


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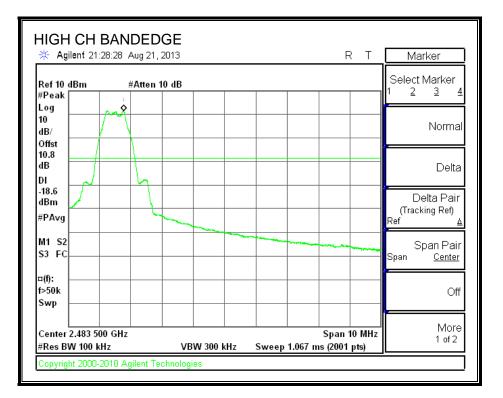
SPURIOUS EMISSIONS, MID CHANNEL

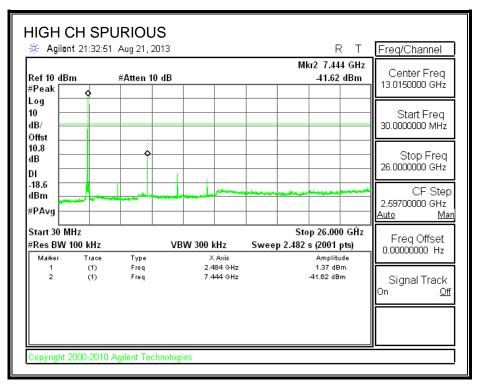




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SPURIOUS EMISSIONS, HIGH CHANNEL





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6. RADIATED TEST RESULTS

6.1. LIMITS AND PROCEDURE

<u>LIMITS</u>

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. The EUT is configured in accordance with ANSI C63.4. The EUT is set to transmit in a continuous mode.

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, video bandwidth is set to 3 MHz, then Peak detection mode is set for peak measurements and Avg detection mode is used for average measurements.

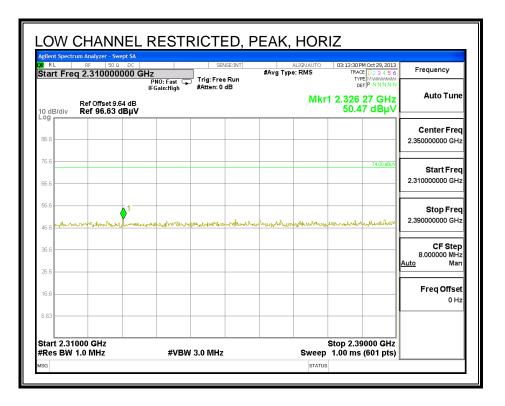
The spectrum from 30 MHz to 26 GHz is investigated with the transmitter set to the lowest, middle, and highest channels in the 2.4 GHz band.

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.

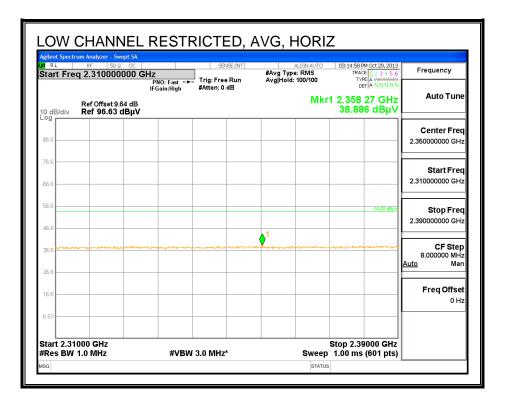
The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized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

6.2. TX ABOVE 1 GHz FOR BLUETOOTH LOW ENERGY MODE

RESTRICTED BANDEDGE (LOW CHANNEL, HORIZONTAL)



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AVERAGE FIELD STRENGTH CALCULATION:

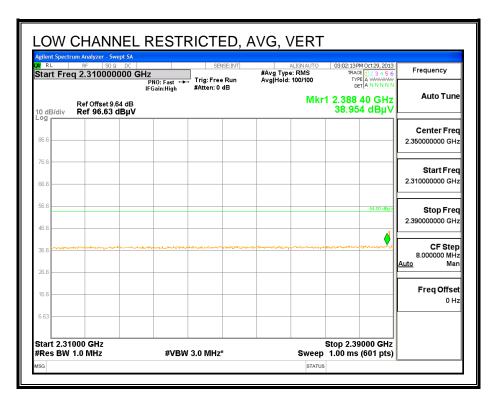
- AVG Field Strength = Avg Reading + Duty Cycle Correction Factor = 38.886 dBuV/m +2.14 dBm = 41.026 dBuVm
- AVG Margin = AVE Reading AVE Power Limit = 41.026 dBuV/m – 54 dBuV/m = -12.974 dBm

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RESTRICTED BANDEDGE (LOW CHANNEL, VERTICAL)

tart Fro	RF 50 Ω eq 2.3100000	DOD GHZ): Fast 😱	Trig: Free		#Avg Type	ALIGN AUTO E: RMS	TRA	M Oct 29, 2013 E 1 2 3 4 5 6 PE M M M M M M ET P N N N N N	Frequency
0 dB/div	Ref Offset 9.6 Ref 96.63 d	4 dB	in:High	#Atten: 0	dB		Mkr	1 2.320	80 GHz 8 dBµV	Auto Tune
og 36.6										Center Freq 2.35000000 GHz
76.6 56.6									74.00 dBµV	Start Freq 2.310000000 GHz
16.6	manjulantinurafiel	Monnow	Amerikanser	เขาเหาให้เการา	marthaur	h markey or her	[ไป]ระโกษส์คมูลค่างไ	wy-fribuer/vray	April por and for the	Stop Freq 2.390000000 GHz
6.6										CF Step 8.000000 MHz <u>Auto</u> Man
6.6										Freq Offset 0 Hz
	1000 GHz (1.0 MHz			3.0 MHz					9000 GHz (601 pts)	

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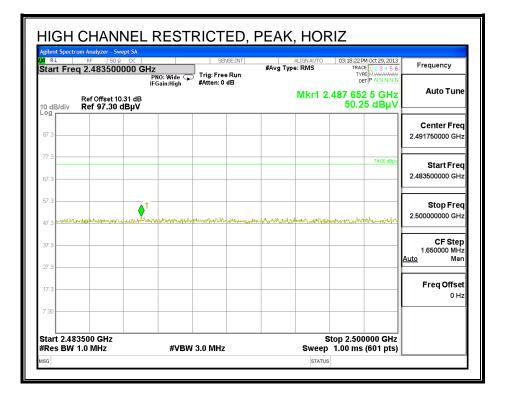
AVERAGE FIELD STRENGTH CALCULATION:

AVG Field Strength	= Avg Reading + Duty Cycle Correction Factor
-	= 38.954 dBuV/m +2.14 dBm
	= 41.094 dBuV/m

AVG Margin = AVE Reading – AVE Power Limit = 41.094 dBuV/m – 54 dBuV/m = -12.906 dBm

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RESTRICTED BANDEDGE (HIGH CHANNEL, HORIZONTAL)

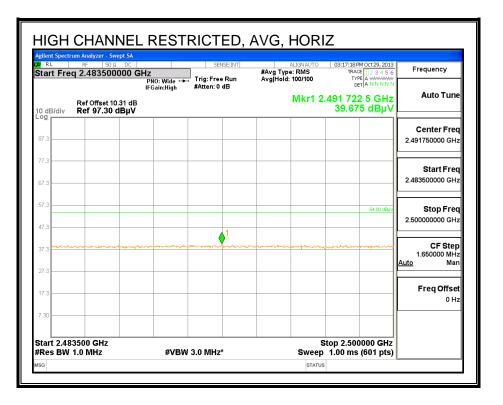


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 UL VERIFICATION SERVICES INC.
 FORM NO: CCSUP47011

 47173 BENICIA STREET, FREMONT, CA 94538, USA
 TEL: (510) 771-1000
 FAX: (510) 661-0888

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AVERAGE FIELD STRENGTH CALCULATION:

AVG Field Strength	= Avg Reading + Duty Cycle Correction Factor
	= 39.675 dBuV/m +2.14 dBm
	= 41.815 dBuV/m

AVG Margin = AVE Reading – AVE Power Limit = 41.815 dBuV/m – 54 dBuV/m = -12.185 dBm

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RESTRICTED BANDEDGE (HIGH CHANNEL, VERTICAL)

start Freq 2	.483500000 GI		SENSE:INT	ALIGN AUT #Avg Type: RMS	0 03:22:28 PM Oct 29, 2013 TRACE 1 2 3 4 5 6 TYPE M MMMMMM	Frequency
	ef Offset 10.31 dB ef 97.30 dBµV	PNO: Wide Ģ IFGain:High	#Atten: 0 dB	Mkr1	2.484 930 0 GHz 50.52 dBµV	Auto Tune
87.3						Center Freq 2.491750000 GHz
67.3					74.00 dBµV	Start Freq 2.483500000 GHz
57.3	1 Warturserandyornand	Sort U.R. Marcheller	างแกกงางคายใจหาการเป	up you and the good and	หระ Janlan แกา เป็นไปเป็น	Stop Freq 2.500000000 GHz
27.3						CF Step 1.650000 MHz <u>Auto</u> Man
17.3						Freq Offset 0 Hz
7.30						

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 UL VERIFICATION SERVICES INC.

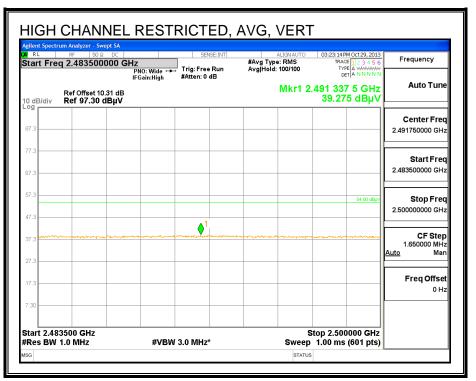
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AVERAGE FIELD STRENGTH CALCULATION:

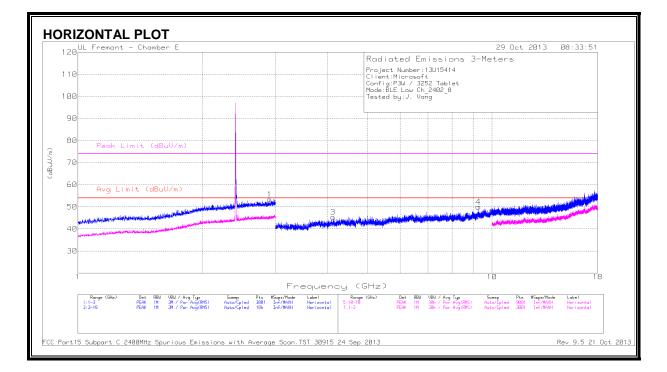
AVG Field Strength	= Avg Reading + Duty Cycle Correction Factor
	= 39.275 dBuV/m +2.14 dBm
	= 41.415 dBuV/m

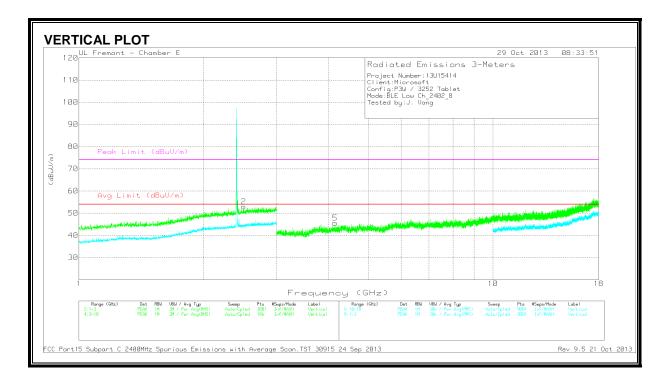
- AVG Margin = AVE Reading AVE Power Limit = 41.415 dBuV/m – 54 dBuV/m
 - = -12.585 dBm

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HARMONICS AND SPURIOUS EMISSIONS

LOW CHANNEL, 2402 MHz





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HORIZONTAL AND VERTICAL DATA

Radiated Emissions

Mark er	Freque ncy (GHz)	Meter Readin g (dBuV)	Det	AF T346 (dB/m)	Amp/C bl/10d B Pad	Correc ted Readin g (dBuV/ m)	Avg Limit (dBuV/ m)	Margi n (dB)	Peak Limit (dBuV/ m)	Margi n (dB)	Azimut h (Degs)	Heigh t (cm)	Polarit y
1	2.903	44.35	РК	33.2	-24.2	53.35	53.97	62	74	-20.65	0-360	101	н
2	2.499	44.68	РК	32.7	-24.4	52.98	53.97	99	74	-21.02	0-360	101	V
6	2.904	36.67	Avg	33.2	-24.2	45.67	53.97	-8.3	-	-	0-360	199	н
7	2.498	36.6	Avg	32.7	-24.4	44.9	53.97	-9.07	-	-	0-360	100	V

Mark er	Freque ncy (GHz)	Meter Readin g (dBuV)	Det	AF T346 (dB/m)	Amp/C bl/3GH z HPF	Correc ted Readin g (dBuV/ m)	Avg Limit (dBuV/ m)	Margi n (dB)	Peak Limit (dBuV/ m)	Margi n (dB)	Azimut h (Degs)	Heigh t (cm)	Polarit Y
3	4.131	42.79	РК	33.9	-31.3	45.39	53.97	-8.58	74	-28.61	0-360	101	Н
4	9.273	37.68	РК	37.1	-24.8	49.98	53.97	-3.99	74	-24.02	0-360	101	Н
5	4.154	43.37	РК	33.9	-31.7	45.57	53.97	-8.4	74	-28.43	0-360	100	V

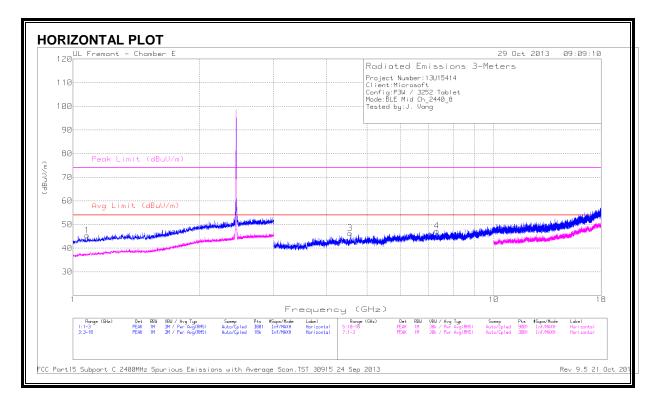
Frequen	Meter	Det	AF T346	Amp/Cbl	Correct	Avg	Margi	Peak	Margi	Azimut	Heigh	Polarit
су	Readin		(dB/m)	/3GHz HPF	ed	Limit (dBuV/	n	Limit (dBuV/	n	h	t	У
(GHz)	g				Reading	m)	(dB)	m)	(dB)	(Degs)	(cm)	
	(dBuV)				(dBuV/ m)							
9.273	22.25	Av	37.1	-24.8	34.55	53.97	-19.42	-	-	262	390	Н

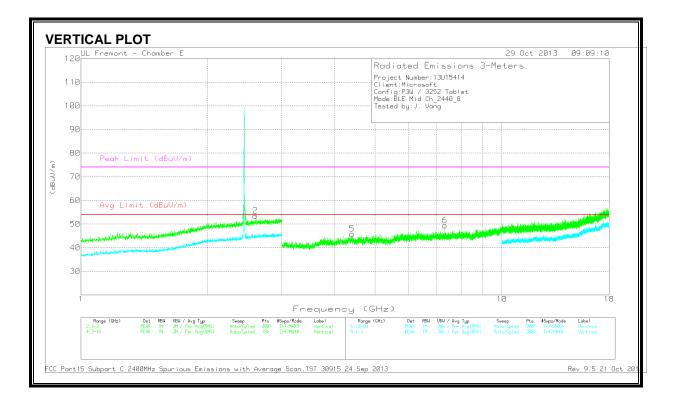
PK - Peak detector

Av - average detection

Avg - Video bandwidth < Resolution bandwidth

MID CHANNEL, 2440 MHz





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HORIZONTAL AND VERTICAL DATA

Radiated Emissions

Mark er	Freque ncy (GHz)	Meter Readin g (dBuV)	Det	AF T346 (dB/m)	Amp/C bl/10d B Pad	Correc ted Readin g (dBuV/ m)	Avg Limit (dBuV/ m)	Margi n (dB)	Peak Limit (dBuV/ m)	Margi n (dB)	Azimut h (Degs)	Heigh t (cm)	Polarit Y
1	1.081	44.89	РК	28.5	-28	45.39	53.97	-8.58	74	-28.61	0-360	101	Н
2	2.597	44.71	РК	32.9	-24.2	53.41	53.97	56	74	-20.59	0-360	100	V
7	1.079	37.43	Avg	28.4	-28	37.83	53.97	-16.14	-	-	0-360	101	Н
8	2.599	36.83	Avg	32.9	-24.2	45.53	53.97	-8.44	-	-	0-360	199	V

Mark er	Freque ncy (GHz)	Meter Readin g (dBuV)	Det	AF T346 (dB/m)	Amp/C bl/3GH z HPF	Correc ted Readin g (dBuV/ m)	Avg Limit (dBuV/ m)	Margi n (dB)	Peak Limit (dBuV/ m)	Margi n (dB)	Azimut h (Degs)	Heigh t (cm)	Polarit y
3	4.557	43.49	РК	34.3	-31.5	46.29	53.97	-7.68	74	-27.71	0-360	100	Н
4	7.32	39.54	РК	36	-28.2	47.34	53.97	-6.63	74	-26.66	0-360	199	Н
5	4.406	42.22	РК	34.2	-30.6	45.82	53.97	-8.15	74	-28.18	0-360	100	V
6	7.32	41.61	РК	36	-28.2	49.41	53.97	-4.56	74	-24.59	0-360	100	V

Frequen	Meter	Det	AF T346	Amp/Cbl	Correct	Avg	Margi	Peak	Margi	Azimut	Heigh	Polarit
су			(dB/m)	/3GHz	ed	Limit	n	Limit	n	h	t	У
	Readin			HPF		(dBuV/		(dBuV/				
(GHz)	g				Reading	m)	(dB)	m)	(dB)	(Degs)	(cm)	
	(dBuV)				(dBuV/ m)							
7.319	31.69	Av	36	-28.2	39.49	53.97	-14.48	-	-	351	368	V

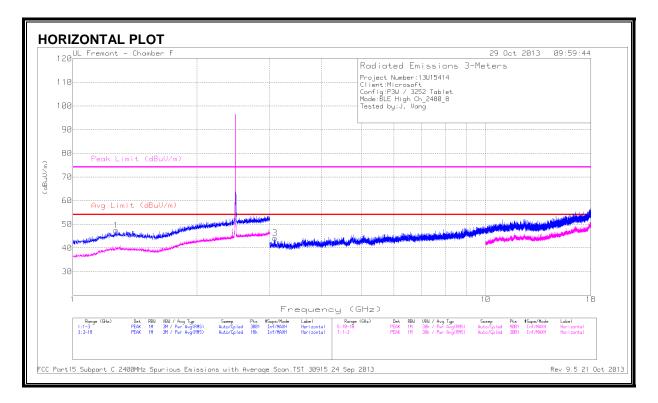
PK - Peak detector

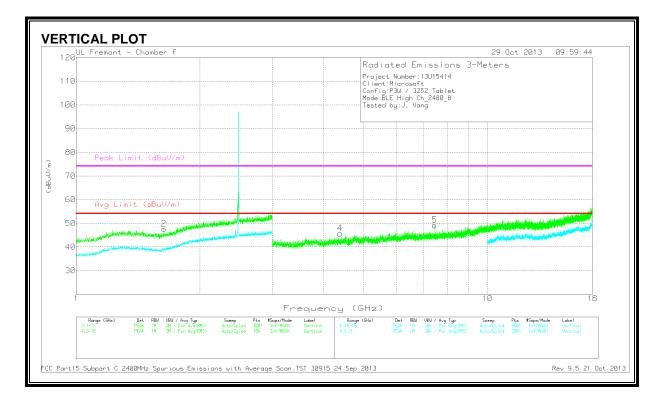
Avg - Video bandwidth < Resolution bandwidth

Av - average detection

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HIGH CHANNEL, 2480 MHz





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HORIZONTAL AND VERTICAL DATA

Radiated Emissions

Mark er	Freque ncy (GHz)	Meter Readin g (dBuV)	Det	AF T120 (dB/m)	Amp/C bl/10d B Pad	Correc ted Readin g (dBuV/ m)	Avg Limit (dBuV/ m)	Margi n (dB)	Peak Limit (dBuV/ m)	Margi n (dB)	Azimut h (Degs)	Heigh t (cm)	Polarit y
1	1.273	42.42	РК	29.8	-24.8	47.42	53.97	-6.55	74	-26.58	0-360	199	Н
2	1.635	42.93	РК	28.3	-23.6	47.63	53.97	-6.34	74	-26.37	0-360	200	V
6	1.271	35.54	Avg	29.8	-24.8	40.54	53.97	-13.43	-	-	0-360	100	н
7	1.636	34.55	Avg	28.4	-23.6	39.35	53.97	-14.62	-	-	0-360	200	V

Mark er	Freque ncy (GHz)	Meter Readin g (dBuV)	Det	AF T120 (dB/m)	Amp/C bl/3GH z HPF	Correc ted Readin g (dBuV/ m)	Avg Limit (dBuV/ m)	Margi n (dB)	Peak Limit (dBuV/ m)	Margi n (dB)	Azimut h (Degs)	Heigh t (cm)	Polarit Y
3	3.091	40.45	РК	33.3	-29.6	44.15	53.97	-9.82	74	-29.85	0-360	100	Н
4	4.382	41.41	РК	33.6	-29.3	45.71	53.97	-8.26	74	-28.29	0-360	200	V
5	7.44	39.58	РК	35.8	-26.2	49.18	53.97	-4.79	74	-24.82	0-360	200	V

Frequen	Meter	Det	AF T120	Amp/Cbl	Correct	Avg	Margi	Peak	Margi	Azimut	Heigh	Polarit
су	D I'.		(dB/m)	/3GHz	ed	Limit	n	Limit	n	h	t	У
(0))	Readin			HPF		(dBuV/	(15)	(dBuV/	(15)	(5)		
(GHz)	g				Reading	m)	(dB)	m)	(dB)	(Degs)	(cm)	
	(dBuV)				(dBuV/ m)							
7.439	28.68	Av	35.8	-26.2	38.28	53.97	-15.69	-	-	40	304	V

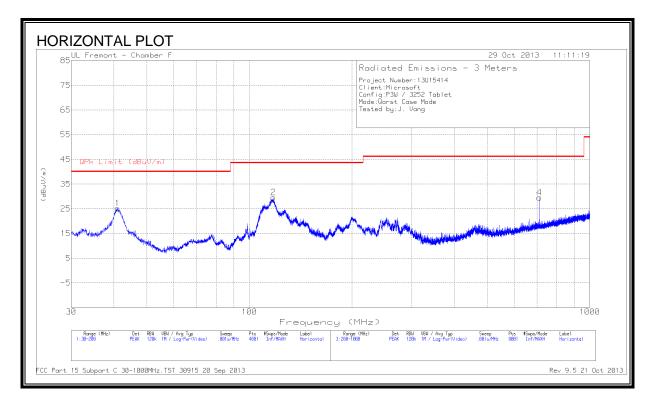
PK - Peak detector

Av - average detection

Avg - Video bandwidth < Resolution bandwidth

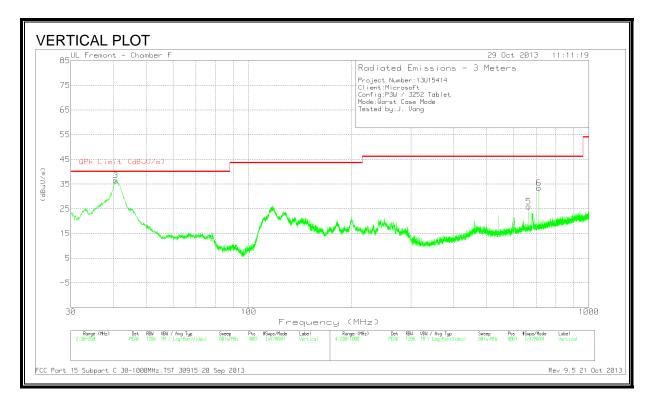
WORST-CASE BELOW 1 GHz

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



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



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HORIZONTAL & VERTICAL DATA

Radiated Emissions

Mark	Frequen	Meter	Det	AF T122	Amp/Cbl	Correct	QPk Limit	Margi	Azimut	Heigh	Polarit
er	су	Readin		(dB/m)	(dB)	ed	(dBuV/m)	n	h	t	У
	(MHz)	g				Reading		(dB)	(Degs)	(cm)	
	(ъ				neuung		(0.5)	(5683)	(011)	
		(dBuV)				(dBuV/					
						m)					
1	41.0075	44.09	РК	13.1	-32	25.19	40	-14.81	0-360	300	Н
1	41.0075	44.09	PK	13.1	-32	25.19	40	-14.81	0-360	300	п
2	117.635	47.01	РК	13.9	-31.4	29.51	43.52	-14.01	0-360	300	Н
3	40.6675	55.15	РК	13.3	-32	36.45	40	-3.55	0-360	100	V
4	711.2	39.02	РК	20.4	-29.9	29.52	46.02	-16.5	0-360	100	н
5	665.1	36.07	РК	19.8	-30	25.87	46.02	-20.15	0-360	100	V
5				0	50				2 500	_30	-
6	713.1	42.88	РК	20.4	-29.8	33.48	46.02	-12.54	0-360	100	V

Frequen	Meter	Det	AF T122	Amp/Cbl	Correct	QPk Limit	Margi	Azimut	Heigh	Polarit
су			(dB/m)	(dB)	ed	(dBuV/m)	n	h	t	У
	Readin									
(MHz)	g				Reading		(dB)	(Degs)	(cm)	
	(dBuV)				(dBuV/					
					m)					
40.9181	51.03	QP	13.2	-32	32.23	40	-7.77	140	136	V

PK - Peak detector

QP - Quasi-Peak detector

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7. AC POWER LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

RSS-Gen 7.2.2

Frequency of Emission (MHz)	Conducted I	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

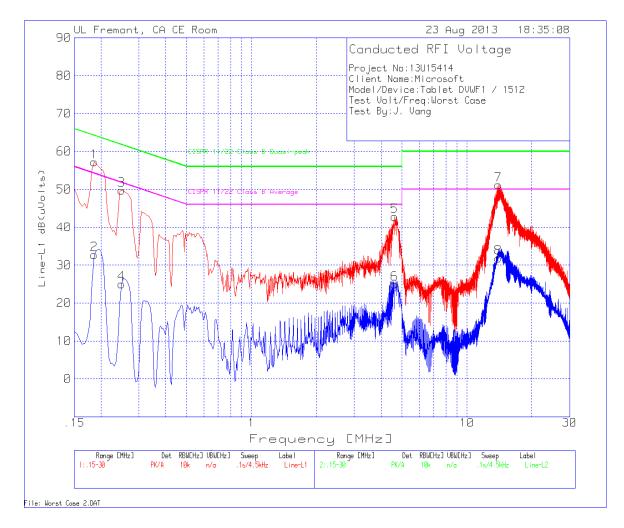
ANSI C63.4

RESULTS

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LINE 1 RESULTS



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DATA SUMMARY

Line-L1 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L1 (dB)	LC Cables 1&3 (dB)	Corrected Reading dB(uVolts)	CISPR 11/22 Class B Quasi-peak	Margin to Limit (dB)	CISPR 11/22 Class B Average	Margin to Limit (dB)
1	.186	57.09	PK	.1	0	57.19	64.2	-7.01	-	-
2	.186	32.63	Av	.1	0	32.73	-	-	54.2	-21.47
3	.249	49.72	PK	.1	0	49.82	61.8	-11.98	-	-
4	.249	24.89	Av	.1	0	24.99	-	-	51.8	-26.81
5	4.623	42.61	PK	.1	.1	42.81	56	-13.19	-	-
6	4.623	24.77	Av	.1	.1	24.97	-	-	46	-21.03
7	14.0145	50.73	PK	.2	.2	51.13	60	-8.87	-	-
8	14.0145	31.43	Av	.2	.2	31.83	-	-	50	-18.17

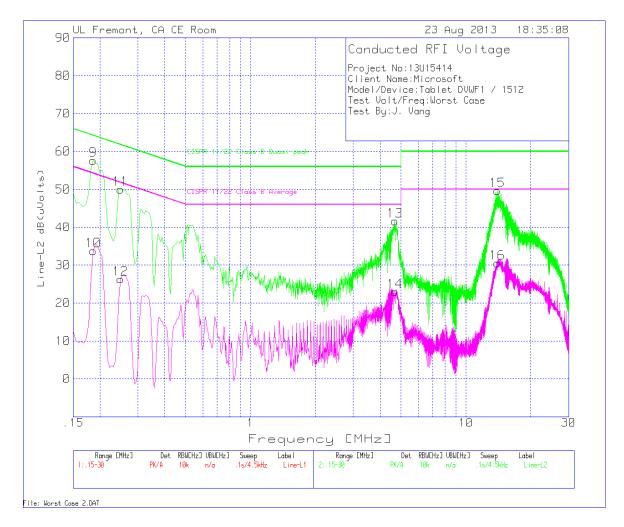
PK - Peak detector

Av - average detection

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LINE 2 RESULTS



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DATA SUMMARY

Line-L2 .15 - 30MHz

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	T24 IL L2 (dB)	LC Cables 2&3 (dB)	Corrected Reading dB(uVolts)	CISPR 11/22 Class B Quasi-peak	Margin to Limit (dB)	CISPR 11/22 Class B Average	Margin to Limit (dB)
9	.186	57.51	PK	.1	0	57.61	64.2	-6.59	-	-
10	.186	33.68	Av	.1	0	33.78	-	-	54.2	-20.42
11	.249	49.88	PK	.1	0	49.98	61.8	-11.82	-	-
12	.249	26.27	Av	.1	0	26.37	-	-	51.8	-25.43
13	4.6905	41.47	PK	.1	.1	41.67	56	-14.33	-	-
14	4.6905	22.75	Av	.1	.1	22.95	-	-	46	-23.05
15	14.0055	49.21	PK	.2	.2	49.61	60	-10.39	-	-
16	14.0055	30.18	Av	.2	.2	30.58	-	-	50	-19.42

PK - Peak detector

Av - average detection

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