

## TEST REPORT

## **Report Number.:** 14093504-E11V1

- Applicant : SONOS INC. 614 CHAPALA ST. SANTA BARBARA, CA, 93101, U.S.A. Model : S39
  - Brand : SONOS
  - FCC ID : SBVRM039
    - IC : 5373A-RM039
- **EUT Description** : 802.11 a/b/g/n/ac/ax 2x2 Client Device with BT and BLE
- Test Standard(s) : FCC 47 CFR PART 15 SUBPART C FCC 47 CFR PART 15 SUBPART E ISED RSS-247 ISSUE 2 ISED RSS-GEN ISSUE 5 + A1 + A2

Date of Issue: 2022-09-26

Prepared by: UL VERIFICATION SERVICES 47173 Benicia Street Fremont, CA 94538 U.S.A. TEL: (510) 319-4000 FAX: (510) 661-0888



## **REPORT REVISION HISTORY**

Rev.	Issue Date I	Revisions	Revised By
V1	2022-09-26	Initial Issue	

Page 2 of 25

UL VERIFICATION SERVICES 47173 Benicia Street, Fremont, CA 94538; USA

TEL:(510) 319-4000

FAX:(510) 661-0888

RE	POR	T REVISION HISTORY 2
1.	ATT	restation of test results 4
2.	TES	ST RESULTS SUMMARY
3.	TES	ST METHODOLOGY 6
4.	FAC	CILITIES AND ACCREDITATION
5.	DEC	CISION RULES AND MEASUREMENT UNCERTAINTY
5	.1.	METROLOGICAL TRACEABILITY
5	.2.	DECISION RULES
5	.3.	MEASUREMENT UNCERTAINTY7
5	.4.	SAMPLE CALCULATION
6.	EQI	UIPMENT UNDER TEST
6	.1.	EUT DESCRIPTION 8
6	.2.	MAXIMUM OUTPUT POWER & DESCRIPTION OF AVAILABLE ANTENNAS
6	.3.	SOFTWARE AND FIRMWARE
6	.4.	SIMULTANEOUS TRANSMISSION CONFIGURATIONS
6	5.5.	DESCRIPTION OF TEST SETUP10
7.	ME	ASUREMENT METHOD12
8.	TES	ST AND MEASUREMENT EQUIPMENT13
9.	SIM	IULTANEOUS TRANSMISSION TEST RESULTS14
9	.1.	ON TIME AND DUTY CYCLE14
9	.2.	LIMITS AND PROCEDURE
	9.2. 9.2.	
	9.2. 9.2.	
	9.2.	
10	SET	

TEL:(510) 319-4000

## **1. ATTESTATION OF TEST RESULTS**

COMPANY NAME:	Sonos Inc. 614 Chapala St. Santa Barbara, CA, 93101, U.S.A.
EUT DESCRIPTION:	802.11 1/b/g/n/ac/ax 2x2 Client Device with BT and BLE
MODEL:	S39
BRAND:	SONOS
SERIAL NUMBER:	Radiated Sample: A100 2207CP F0-F6-C1-A0-0D-80:1 and A100 2207CP F0-F6-C1-A0-0D-CC:9 Conducted Sample: 7885B
DATE TESTED:	2022-07-27 to 2022-08-30

APPLICABLE STANDARDS							
STANDARD	TEST RESULTS						
CFR 47 Part 15 Subpart C	Complies						
CFR 47 Part 15 Subpart E	Complies						
ISED RSS-247 Issue 2	Complies						
ISED RSS-248 ISSUE 1	Complies						
ISED RSS-GEN Issue 5 + A1 + A2	Complies						

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

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 A2LA, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Page 4 of 25

UL VERIFICATION SERVICES 47173 Benicia Street, Fremont, CA 94538; USA

TEL:(510) 319-4000

Approved & Released For UL Verification Services Inc. By:

ino de luck

Francisco de Anda Staff Engineer Consumer Technology Division UL Verification Services Inc.

1<sup>st</sup> Reviewed By:

Vien Tran Senior Laboratory Engineer Consumer Technology Division UL Verification Services Inc.

Prepared By:

Glenn Escano Senor Test Engineer Consumer Technology Division UL Verification Services Inc.

2<sup>nd</sup> Reviewed By:

Kiya Kedida Senior Project Engineer Consumer Technology Division UL Verification Services Inc.

Page 5 of 25

TEL:(510) 319-4000

FAX:(510) 661-0888

## 2. TEST RESULTS SUMMARY

This report contains data provided by the customer which can impact the validity of results. UL Verification Services Inc. is only responsible for the validity of results after the integration of the data provided by the customer.

FCC Clause	ISED Clause	Requirement	Result	Comment		
See Comment		Duty Cycle	Reporting purposes only	Per ANSI C63.10, Section 12.2.		
15.209, 15.205, 15.407 (b) (1-4)	RSS-GEN 8.9, 8.10, RSS-247 6.2	Radiated Emissions	Complies	For colocation testing		

## 3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with:

- FCC CFR 47 Part 2
- FCC CFR 47 Part 15
- KDB 662911 D01 v02r01
- KDB 905462 D02 v02/D03 v01r02/D06 v02
- KDB 558074 D01 15.247 Meas Guidance v05r02
- KDB 789033 D02 v02r01
- KDB 414788 D01 Radiated Test Site v01r01
- ANSI C63.10-2013
- RSS-GEN Issue 5 + A1 + A2
- RSS-247 Issue 2
- ISED RSS-248 ISSUE 1

The scope of this report covers the co-location modes in the 2.4GHz and 5Ghz band.

## 4. FACILITIES AND ACCREDITATION

UL Verification Services Inc. is accredited by A2LA, Certificate Number #0751.05, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
	Building 1: 47173 Benicia Street Fremont, CA 94538, U.S.A	US0104	2324A	550739
	Building 2: 47266 Benicia Street Fremont, CA 94538, U.S.A	US0104	22541	550739
$\boxtimes$	Building 4: 47658 Kato Rd Fremont, CA 94538, U.S.A	US0104	2324B	550739

Page 6 of 25

UL VERIFICATION SERVICES 47173 Benicia Street, Fremont, CA 94538; USA

TEL:(510) 319-4000

FAX:(510) 661-0888

## 5. DECISION RULES AND MEASUREMENT UNCERTAINTY

## 5.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

## 5.2. **DECISION RULES**

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

## 5.3. **MEASUREMENT UNCERTAINTY**

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

PARAMETER	U <sub>Lab</sub>
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.84 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	6.01 dB
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.73 dB
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.51 dB

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

## 5.4. SAMPLE CALCULATION

#### RADIATED EMISSIONS

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

#### MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided: Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss. 36.5 dBuV + 0 dB +10.1 dB+ 0 dB = 46.6 dBuV

Page 7 of 25

UL VERIFICATION SERVICES 47173 Benicia Street, Fremont, CA 94538; USA

TEL:(510) 319-4000

FAX:(510) 661-0888

## 6. EQUIPMENT UNDER TEST

#### 6.1. EUT DESCRIPTION

The EUT is an 802.11 a/b/g/n/ac/ax 2x2 Client Device with BT and BLE.

# 6.2. MAXIMUM OUTPUT POWER & DESCRIPTION OF AVAILABLE ANTENNAS

Refer to reports 14093504-E1, -E2, -E3, -E4, -E5, -E6, -E7 and -E8 for output power and antenna gain and type information.

## 6.3. SOFTWARE AND FIRMWARE

The EUT software used during testing was 70.1-29190-diag.

The test utility software used during testing was GUI\_V8.

UL VERIFICATION SERVICES 47173 Benicia Street, Fremont, CA 94538; USA

Page 8 of 25

TEL:(510) 319-4000 F.

## 6.4. SIMULTANEOUS TRANSMISSION CONFIGURATIONS

Simultaneous transmission of the following was investigated:

- 2.4GHz WLAN and Bluetooth
- 2.4GHz WLAN and BLE
- 5GHz/6GHz WLAN and Bluetooth
- 5GHz/6GHz WLAN and BLE

Per the manufacturer, no other radios transmit simultaneously. See section 9.2 for modes tested. All test case was identified based on the the highest power in the band.

Page 9 of 25

UL VERIFICATION SERVICES 47173 Benicia Street, Fremont, CA 94538; USA

TEL:(510) 319-4000

## 6.5. DESCRIPTION OF TEST SETUP

SUPPORT TEST EQUIPMENT											
Des	cription	Manufacturer	Model	Serial N	umber	FCC ID/ DoC					
	.aptop	Lenovo	T460s	PC0JM	IBF8	Doc					
A	op AC/DC dapter	Lenovo	ADLX90NLC2A	11S45N0247Z12	ZSHH448JEY	Doc					
USB-A to Ethernet Adapter		Plugable	USB2-E100	8CAE4CE	46AFA	Doc					
	C to USB-A le Adapter	Amazon Basics	L6LUC160-CS-R <b>/O CABLES (CON</b> I	N/A	۸	Doc					
Cable No.											
1	AC	3	3 AC Un-s		1.25	AC Mains to EUT/Spectrum Analyzer/AC/DC Adapter					
2	DC	1	DC	Un-shielded	1	AC/DC Adapter to Laptop					
3	Ethernet	ernet 1 RJ45 Un-shielded		1.5	Laptop to USB Ethernet Adapter						
4	USB-A	1	USB-A	Shielded	0.05	USB Ethernet Adapter to USB					
5	USB-C	1	USB-C	Shielded	0.05	EUT to USB- C/USB-A Female Adapter					
6	SMA Cable	1	SMA	Un-Shielded 0.1		EUT to Spectrum Analyzer					
		• •	I/O CABLES (RAD	DIATED TEST)							
Cable No.	Port	# Of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks					
1	AC	3	AC	Un-shielded	1.25	AC Mains to EUT/Spectrum Analyzer/AC/DC Adapter					
2	DC	1	DC	Un-shielded	1	AC/DC Adapter to Laptop					
3	Ethernet	1	RJ45	Un-shielded	10	Laptop to USB Ethernet Adapter					
4	USB-A	1	USB-A	Shielded	0.05	USB Ethernet Adapter to USB					
5	USB-C	1	USB-C	Shielded	Shielded 0.05						
6	SMA Cable	1	SMA	Un-Shielded	10	EUT to Horn Antenna					

#### TEST SETUP

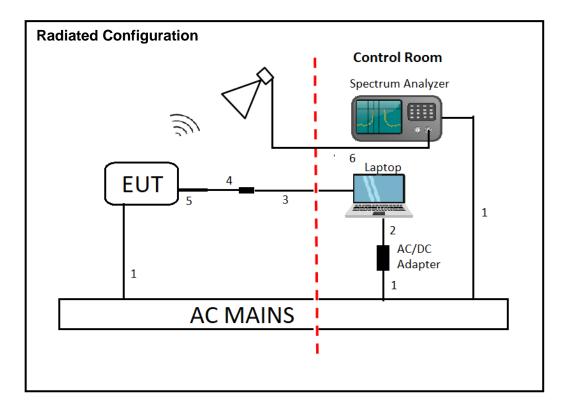
The EUT is a stand-alone unit, and the radio is exercised remotely by Sonos Compliance GUI test utility software via ethernet.

Page 10 of 25

UL VERIFICATION SERVICES 47173 Benicia Street, Fremont, CA 94538; USA

TEL:(510) 319-4000

#### SETUP DIAGRAMS



Page 11 of 25

UL VERIFICATION SERVICES 47173 Benicia Street, Fremont, CA 94538; USA

TEL:(510) 319-4000

## 7. MEASUREMENT METHOD

Radiated emissions non-restricted frequency bands: ANSI C63.10 Subclause -11.11

Radiated emissions restricted frequency bands: ANSI C63.10 Subclause -11.12.1

Page 12 of 25

UL VERIFICATION SERVICES 47173 Benicia Street, Fremont, CA 94538; USA

TEL:(510) 319-4000

## 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	ID Num	Cal Due	Last Cal					
Antenna, Broadband Hybrid, 30MHz to 2GHz	Sunol Sciences Corp.	JB1	82258	2022-10-01	2021-10-01					
Amplifier, 10KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310	175953	2023-02-08	2022-02-08					
Amplifier, 10KHz to 1GHz, 32dB	SONOMA INSTRUMENT	310N	29654	2023-04-24	2022-04-24					
Antenna, Horn 1-18GHz	ETS-Lindgren (Cedar Park, Texas)	3117	80707	2023-04-28	2022-04-28					
Antenna, Horn 1-18GHz	ETS-Lindgren (Cedar Park, Texas)	3117	206086	2022-09-22	2021-09-22					
Antenna, Horn 1-18GHz	ETS-Lindgren (Cedar Park, Texas)	3117	80402	2023-07-05	2022-07-05					
RF Filter Box, 1-18GHz	FREMONT	SAC-L1	171013	2023-06-24	2022-06-24					
RF Filter Box, 1-18GHz	UL-FR1 (CTECH)	SAC 8 port rf box 1	171875	2023-08-12	2022-08-12					
RF Filter Box, 1-18GHz	UL-FR1 (CTECH)	SAC 8 port rf box 1	197920	2023-04-19	2022-04-19					
EMI TEST RECEIVER, with B8 option	Rohde & Schwarz	ESW44	169937	2023-02-20	2022-02-20					
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	169927	2023-02-16	2022-02-16					
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	201501	2023-02-19	2022-02-19					
		AC Line Cond	ucted							
LISN	Fischer Custom Communications, Inc	FCC-LISN- 50/250-25-2- 01-480V	175765	2023-01-26	2022-01-26					
EMI TEST RECEIVER	Rohde & Schwarz	ESR	93091	2023-02-21	2022-02-21					
Transient Limiter	Com-Power	LIT-930	127455	2023-02-02	2022-02-02					
	ι	JL TEST SOFTW	ARE LIST							
Radiated Software	UL	UL EMC	Ver 2014-07-15, 2016-08-23, 2020-06-04, 2022-05-05, 2022-05-18, and 2022-07-06							
Antenna Port Software	UL	UL RF	Ver 2022-05-31							
AC Line Conducted Software	UL	UL EMC	Rev 9.5, 2022-02-17							

Page 13 of 25

UL VERIFICATION SERVICES 47173 Benicia Street, Fremont, CA 94538; USA

TEL:(510) 319-4000

## 9. SIMULTANEOUS TRANSMISSION TEST RESULTS

#### 9.1. ON TIME AND DUTY CYCLE

Refer to reports 14093500-E1, -E2, -E3, -E4, -E5, -E6, -E7 and -E8 for duty cycle data

Page 14 of 25

UL VERIFICATION SERVICES 47173 Benicia Street, Fremont, CA 94538; USA

TEL:(510) 319-4000

## 9.2. LIMITS AND PROCEDURE

FCC §15.205 and §15.209

FCC §15.407(b)(1-4) -

RSS-GEN, Section 8.9 and 8.10

RSS 247 Issue 2 Sections 6.2.1.2 (for 5150-5250 MHz band) 6.2.2.2 (for 5250-5350 MHz band) 6.2.3.2 (for 5470-5600 MHz and 5650-5725 MHz bands) 6.2.4.2 (for 5725-5850 MHz band)

Frequency Range (MHz)	Field Strength Limit (uV/m) at 3 m	Field Strength Limit (dBuV/m) at 3 m			
0.009-0.490	2400/F(kHz) @ 300 m	-			
0.490-1.705	24000/F(kHz) @ 30 m	-			
1.705 - 30	30 @ 30m	-			
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 1.5 m above the ground plane for measurement above 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For pre-scans above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 30 KHz for peak measurements.

For final measurements above 1 GHz the resolution bandwidth is set to 1 MHz; the video bandwidth is set to 3 MHz for peak measurements and as applicable for average measurements.

The spectrum from 1 GHz to 18 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.

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.

UL VERIFICATION SERVICES 47173 Benicia Street, Fremont, CA 94538; USA

TEL:(510) 319-4000

FAX:(510) 661-0888

#### KDB 558074 D01 15.247 Meas Guidance v05r02

Use of a duty cycle correction factor (DCCF) is permitted for calculating average radiated field strength emission levels for an FHSS device in 15.247. This DCCF can be applied when the field strength limit (e.g., within a Government Restricted band) and the conditions specified in Section 15.35(c) can be satisfied. The average radiated field strength is calculated by subtracting the DCCF from the maximum radiated field strength level as determined through measurement. The maximum radiated field strength level represents the worst-case (maximum amplitude) RMS measurement of the emission(s) during continuous transmission (i.e., not including any time intervals during which the transmitter is off or is transmitting at a reduced power level). It is also acceptable to apply the DCCF to a measurement performed with a peak detector instead of the specified RMS power averaging detector. Note that Section 15.35(c) specifies that the DCCF shall represent the worst-case (greatest duty cycle) over any 100 msec transmission period.

Note - For this test program, Peak detection was used. The DCCF was then subtracted from the peak value. The DCCF was calculated based on the worst case on-time when the device transmits DH5 packets and operates on 20 channels (5/1600 s per hop = 3.125 ms per channel). In this mode, the device will have a maximum of 2 hops on a channel in 100ms or 2x 3.125 ms = 6.25 ms on any channel. Therefore, DCCF= 20log (6.25 / 100) = - 24dB.

Page 16 of 25

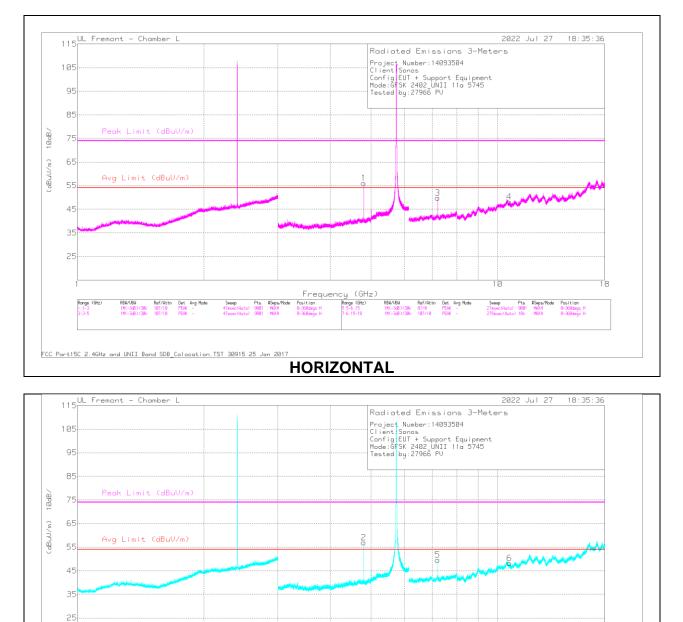
UL VERIFICATION SERVICES 47173 Benicia Street, Fremont, CA 94538; USA

TEL:(510) 319-4000

FAX:(510) 661-0888

#### 9.2.1. TEST CASE 1

#### BT GFSK 2441MHz + WLAN 5GHz 11a 5745MHz



Page 17 of 25

VERTICAL

 Frequency
 (GHz)

 ssitian
 Range (GHz)

 -388degs U
 6:5-6:15

 -388degs U
 8:5-6:15

Pts #Sups/Mode Position

UL VERIFICATION SERVICES 47173 Benicia Street, Fremont, CA 94538; USA

RBM/UBM

mge

Ref/Attn Det Avg Mode

FCC Part15C 2.4GHz and UNII Band SDB\_Colocation.TST 30915 25 Jan 2017

Sжеер

TEL:(510) 319-4000

RBN/UBN

Ref/Attn Det Avg Mode

Ѕиеер

Pts #Sups/Mode Position

FAX:(510) 661-0888

#### **Radiated Emissions**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	80707 ACF (dB)	Amp/Cbl/Fltr (dB)	Filter (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4.80395	48.39	PK-U	34.1	-26.5	2	0	57.99	•	-	74	-16.01	125	101	Н
	* 4.804006	40.35	ADR	34.1	-26.5	2	1.05	51	54	-3	-	-	125	101	Н
2	* 4.803965	49.06	PK-U	34.1	-26.5	2	0	58.66	•	-	74	-15.34	63	105	V
	* 4.803877	41.67	ADR	34.1	-26.5	2	1.05	52.32	54	-1.68	-	-	63	105	V
3	* 10.660448	37	PK-U	37.9	-18.6	.5	0	56.8		-	74	-17.2	65	177	н
	* 10.660752	25.44	ADR	37.9	-18.6	.5	1.05	46.29	54	-7.71		-	65	177	Н
4	7.205577	40.39	PK-U	35.9	-22.4	.5	0	54.39	•	-			312	102	Н
	7.205753	29.87	ADR	35.9	-22.4	.5	1.05	44.92		-			312	102	Н
5	* 10.678089	36.89	PK-U	37.8	-18.2	.5	0	56.99	•	-	74	-17.01	100	147	V
	* 10.677058	25.39	ADR	37.8	-18.3	.5	1.05	46.44	54	-7.56			100	147	V
6	7.206237	40.34	PK-U	35.9	-22.4	.5	0	54.34	-	-	-		340	102	V
	7.205646	30.01	ADR	35.9	-22.4	.5	1.05	45.06		-			340	102	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

Page 18 of 25

UL VERIFICATION SERVICES 47173 Benicia Street, Fremont, CA 94538; USA

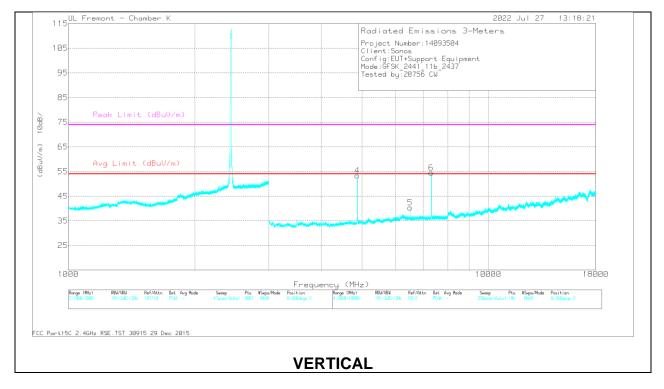
TEL:(510) 319-4000

#### 9.2.2. TEST CASE 2

#### BT GFSK 2441MHz + WLAN 2.4GHz 11b 2437MHz



## HORIZONTAL



Page 19 of 25

UL VERIFICATION SERVICES 47173 Benicia Street, Fremont, CA 94538; USA

TEL:(510) 319-4000

FAX:(510) 661-0888

#### **Radiated Emissions**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AF 80404 (dB/m)	Amp/Cbl/Fltr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4873.778	58.46	PKFH	34.1	-40.3	52.26	-	-	74	-21.74	94	284	Н
	* 4874.027	55.19	VA1T	34.1	-40.3	48.99	54	-5.01	-	-	94	284	Н
2	6509.439	49.63	PKFH	35.9	-38.8	46.73	-	-	-	-	93	181	Н
	6509.379	41.84	VA1T	35.9	-38.8	38.94	-	-	-	-	93	181	Н
3	* 7312.318	57.71	PKFH	35.8	-38	55.51	-	-	74	-18.49	66	103	Н
	* 7312.707	51.51	VA1T	35.8	-38	49.31	54	-4.69	-	-	66	103	Н
4	* 4873.794	60.51	PKFH	34.1	-40.3	54.31	-	-	74	-19.69	322	170	V
	* 4874.425	55.14	VA1T	34.1	-40.3	48.94	54	-5.06	-	-	322	170	V
5	6509.525	49.33	PKFH	35.9	-38.8	46.43	-	-	-	-	95	108	V
	6509.301	42.2	VA1T	35.9	-38.8	39.3	-	-	-	-	95	108	V
6	* 7312.547	59.85	PKFH	35.8	-38	57.65	-	-	74	-16.35	288	223	V
	* 7311.708	54.2	VA1T	35.8	-38	52	54	-2	-	-	288	223	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band PKFH FHSS/BT RB=100k for Frequencies<1GHz / RB=1MHz for Frequencies>1GHz, VB=3 x RB, Peak

VA1T - FHSS: Linear Voltage Average VB=1/Ton where: Ton is transmit duration

Page 20 of 25

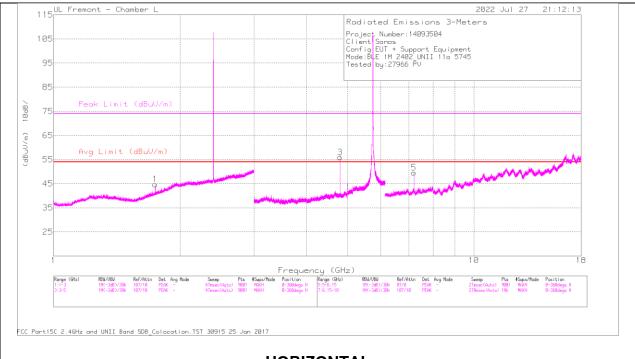
**UL VERIFICATION SERVICES** 47173 Benicia Street, Fremont, CA 94538; USA

TEL:(510) 319-4000

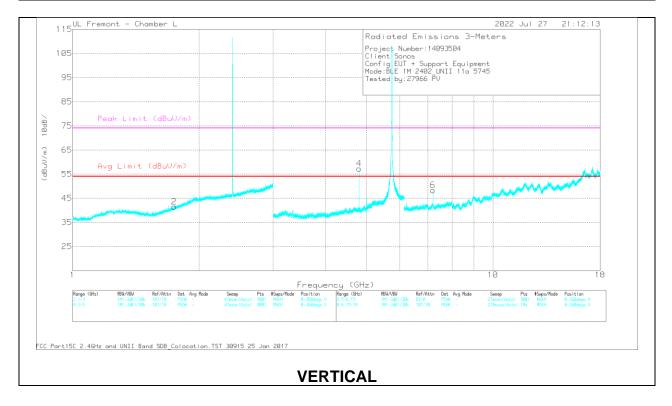
FAX:(510) 661-0888

#### 9.2.3. TEST CASE 3

#### BLE 2402MHz + WLAN 5GHz 11a 5745MHz



#### HORIZONTAL



Page 21 of 25

UL VERIFICATION SERVICES 47173 Benicia Street, Fremont, CA 94538; USA

TEL:(510) 319-4000

FAX:(510) 661-0888

#### **Radiated Emissions**

Marker	Frequency (GHz)	Meter Reading (dBuV)	Det	80707 ACF (dB)	Amp/Cbl/Pad (dB)	Filter (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	1.744584	35.94	PK-U	29.6	-14.8	.5	0	51.24					289	205	Н
	1.744616	24.22	ADR	29.6	-14.8	.5	1.05	40.57	-	-	-	-	289	205	н
2	1.746239	36	PK-U	29.6	-14.8	.5	0	51.3		-			171	394	V
	1.745911	24.32	ADR	29.6	-14.8	.5	1.05	40.67				-	171	394	V
3	* 4.803879	47.91	PK-U	34.1	-26.5	2	0	57.51		-	74	-16.49	127	103	н
	* 4.803827	38.97	ADR	34.1	-26.5	2	1.05	49.62	54	-4.38		-	127	103	Н
4	* 4.804165	49.05	PK-U	34.1	-26.5	2	0	58.65		-	74	-15.35	62	106	V
	* 4.803681	41.39	ADR	34.1	-26.5	2	1.05	52.04	54	-1.96		•	62	106	V
5	7.205213	40.12	PK-U	35.9	-22.4	.5	0	54.12		-	-	-	316	102	н
	7.205317	29.28	ADR	35.9	-22.4	.5	1.05	44.33		-		-	316	102	Н
6	7.206336	40.43	PK-U	35.9	-22.4	.5	0	54.43		-		-	342	101	V
	7.205269	29.9	ADR	35.9	-22.4	.5	1.05	44.95		-		-	342	101	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band PK-U - U-NII: Maximum Peak ADR - U-NII AD primary method, RMS average

Page 22 of 25

UL VERIFICATION SERVICES 47173 Benicia Street, Fremont, CA 94538; USA

TEL:(510) 319-4000

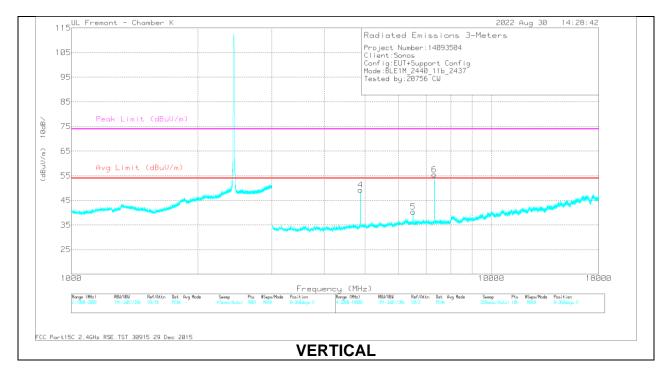
FAX:(510) 661-0888

#### 9.2.1. TEST CASE 4

#### BLE 2440MHz + WLAN 2.4GHz 11b 2437MHz



#### HORIZONTAL



Page 23 of 25

UL VERIFICATION SERVICES 47173 Benicia Street, Fremont, CA 94538; USA

TEL:(510) 319-4000

FAX:(510) 661-0888

#### **Radiated Emissions**

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	80402 ACF(dB) - 3mH	Amp/Cbl/Fltr (dB)	DC Corr (dB)	Corrected Reading (dBuV/m)	Avg Limit (dBuV/m)	Margin (dB)	Peak Limit (dBuV/m)	PK Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	* 4874.166	56.14	PK2	34.2	-40.3	0	50.04	-	-	74	-23.96	96	299	н
	* 4874.034	49.64	MAv1	34.2	-40.3	.2	43.74	54	-10.26	-	-	96	299	Н
2	6506.461	51.26	PK2	35.7	-38.8	0	48.16	-	-	-	-	91	186	Н
	6506.697	42	MAv1	35.7	-38.8	.2	39.1	-	-	-	-	91	186	Н
3	* 7309.987	56.62	PK2	35.7	-38	0	54.32	-	-	74	-19.68	279	100	Н
	* 7309.848	50.04	MAv1	35.7	-38	.2	47.94	54	-6.06	-	-	279	100	Н
4	* 4879.69	59.06	PK2	34.2	-40.4	0	52.86	-	-	74	-21.14	29	120	V
	* 4879.714	51.94	MAv1	34.2	-40.4	.2	45.94	54	-8.06	-	-	29	120	V
5	6506.398	52.28	PK2	35.7	-38.8	0	49.18	-	-	-	-	8	284	V
	6506.615	42.95	MAv1	35.7	-38.8	.2	40.05	-	-	-	-	8	284	V
6	* 7309.774	59.11	PK2	35.7	-38	0	56.81	-	-	74	-17.19	103	152	V
	* 7309.64	53.85	MAv1	35.7	-38	.2	51.75	54	-2.25	-	-	103	152	V

\* - indicates frequency in CFR47 Pt 15 / IC RSS-Restricted Band

PK2 - KDB558074 Method: Maximum Peak MAv1 - KDB558074 Option 1 Maximum RMS Average

Page 24 of 25

UL VERIFICATION SERVICES 47173 Benicia Street, Fremont, CA 94538; USA

TEL:(510) 319-4000

FAX:(510) 661-0888