ACCREDITED	
Certificate # 1514	.1

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ACCREDITED Certificate # 1514.1	
Test Type:	Emissions
Product Type:	Wireless Earbud
Product Name/Number:	Model BL3L
	A94BL3L 3232A-BL3L
Prepared For:	Product Assurance Engineering Department, Bose Corporation
Name of manufacturing agency applying for equipment type approval	Bose Corporation
Postal Address of manufacturing Agency	
Test Results:	Pass
Applicable Standards:	FCC 47 CFR PART 15 SUBPART C ISED RSS-247 ISSUE 2 ISED RSS-GEN ISSUE 5
Report Number:	EMC.BL3L.2020.132.1
General Comments/Special Test Condit This report relates only to the items test Enter product and any special modificat	ed. This report covers EMC marking requirements for

	Print Name	Signature	Date
Prepared By:	Chad Bell	Chad Bell	May 11, 2020
Electrical Engineer Review* By:	Bryan Cerqua	Bryon H Cerqua	May 15, 2020

\* Since every test result is separately reviewed after its completion, the electrical engineer review indicated above represents a higher-level review to ensure this report lists and contains all applicable and appropriate requirements. If the report carries the "accredited" logo, the reviewer must verify all the tests in this report are covered under the current

ISO17025 accreditation. The A2LA-accredited logo must be removed if any of the tests in this report are covered under the current current scope of accreditation. It is the responsibility or the reviewer to ensure the A2LA advertising policy is followed.

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# **Test Report Summary**

### Product Information:

Description

Wireless Earbud. The antenna is an inverted L with a maximum gain of 1.21dBi formed by Laser Direct Sequence on the inside of the top cover of the earbud.

#### **EUT** Condition

Product was as built in the factory. And for the conducted measurements the antenna was removed, and coaxial cable was installed in its place. Where necessary USB debug wires were added to allow control of the Radio. Worst case data rate was determined to be 1Mbps.

Setup (Cables and Accessories)

Support Equipment List				
Description Manufacturer Model Serial Number FCC ID				
AC Adapter	Bose	S008VU0500160	068170Z50403725AE	N/A

I/O Cable List					
		# of		Cable	
Cable		Identical		Length	
No.	Port	Ports	Cable Type	(m)	Remarks
1	AC In	1	N/A	0	Wall-wart adapter
2	USB	1	Shielded	0.3	Output of AC adapter

#### Scope:

This report covers EMC requirements. Enter specific EMC requirements covered by this report (i.e. FCC or CE).

#### Test Objective:

Verify product meets all applicable EMC requirements.

#### Results:

Product complies with all applicable EMC requirements. All final results represent worst-case emissions and/or immunity.

#### Conclusions:

The device under test (D.U.T.):

[X] meets all test standards on page 1 of this report.

#### Affirmation of Test Results:

	Print Name	Signature	Date
Testing Engineer/Technician	Chad Bell	Chad Bell	May 1, 2020



# Test Results Summary

TEST NAME	TEST RESULT PASS or N/A	COMMENT(S)
On Time and Duty Cycle	N/A	
99% Occupied Bandwidth	N/A	
20dB Occupied Bandwidth	Pass	
Hopping Frequency Separation	Pass	
Number of Hopping Channels	Pass	
Average Time of Occupancy	Pass	
Output Power	Pass	
Conducted Spurious Emissions	Pass	
RF Conducted Emissions – AC Mains	Pass	
RF Radiated Emissions 30MHz -1GHz	Pass	
Radiated RF Emissions 1-25GHz	Pass	
Radiated Band Edge	Pass	

# **Environmental Conditions**

Ambient:

Temperature:	22±4°C
Humidity:	30-60%RH
Mains Voltage:	120VAC, 5VDC USB

# FCC Test Site Accreditation:

Firm Name	<u>Location</u>	Accreditation	MRA Designation Number	Expiration Date	<u>Contact</u>	Contact Title	Address	P.O. Box	<u>Mail</u> Stop	<u>City</u>	<u>State</u>	Zip	<u>Country</u>	E-mail Address	Phone Number
<u>Bose</u> Corporation	1 New York Avenue, Framingham, MA	American Association for Laboratory Accreditation	N/A US1088	07/31/2020	Carole Park	Quality Manager	Mail Stop 450 The Mountain	N/A	450	Framingham	n Massachusett	s0170:	United States	Carole_Park@bose.co	508- m 766- 6084

# Canadian Test Site Registration:

Organization	<u>CAB</u> identifier	Scope / Recognition Date (yyyy-mm-dd)	Expiration (yyyy-mm-dd)
BOSE CORPORATION	US0210	RSS-GEN (2019-02-11)	RECOGNIZED UNTIL:
1 New York Avenue		RSS-210 (2019-02-11)	2020-07-31
Framingham, MA		RSS-247 (2019-02-11)	
01701			A2LA
UNITED STATES			ISO/IEC
Website: https://www.bose.com/en_us/index.html			17025:2005 Expires: 2020-07-31
ISED#: 3232A			
Contact: Benjamin Cerretani <u>benjamin_cerretani@bose.com</u>			

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# **RF Conducted Measurements**

# On Time and Duty Cycle

Project code name:		Marketing name:		Mode	el number:	BL3L		
Project number (Integrity):	BL3L	Build Phase:	C2.5					
Tested by:	Chad Bell		Date:	April 10, 202	20			
Requirements Standard(s):			Referenced S	tandard(s):				
EUT powered with:	5V USB	Temp / Humidity:	n/a	Test locat	ion:			
Test equipment used TN's:	2408							
EUT Serial number(s):	Model BL3L con	ducted #1						
EUT Software installed:	0.3.8	0.3.8						
EUT Modification(s):	Product was tes installed.	Product was tested as built except the antenna was disconnected and a coaxial cable was						

## Conclusion:

This test is for information only.

### Limits:

None; for reporting purposes only.

### Procedure:

ANSI C63.10, Section 11.6: Zero-Span Spectrum Analyzer Method.

## Equipment Used:

ΤN	Description	Model	S/N	Manufacturer	Most Recent Calibration	Calibration Due Date	Most Recent Verification	Verification Due Date
2408	Signal and Spectrum Analyzer	FSV40	101414	Rohde & Schwarz	25-Mar-2020	25-Mar-2021		



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## Data Collection:

Mode	ON Time (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
Bluetooth DH5	2.89	3.75	0.771	77.1	2.26
Bluetooth 3DH5	2.9	3.75	0.773	77.3	2.23

Spectr	um												₽
Ref Le	vel				3W 1 MHz								<u> </u>
Att		20	) dB 😑 SWT 5	ms 😑 VI	BW 3 MHz								
TRG: VII	D TDF												
●1Pk Vie	ew.												
								<u>{1}</u>	- 1		<b></b>		<del>27 d</del> l
) dBm—											(	3.7500	00 m
J UBIII—							M	1[1]	1			-17.07	7 dBn
-10 dBm												1.5	i63 μ
-10 upili	M1												
-20 dBm	_								D1		D2		
20 0011									Ť		I Î		
-30 dBm													
00 00													
-40 dBm			.000 dBm										
	- 1"	(0 -41	.000 0611										
-50 dBm	-								<u> </u>		+ + +		
- Marilla	d Mil								h	والأرين أأنظارها بالأ	1.1.1.1.1		
									_	1.11			
. N . H A	الن ا								-1	n a la stati a da stati	d nitrite		
י ארייך יות	1								ob	in the second states of the			
-80 dBm										<u>P(1)         </u>		_	
CF 2.44	1 GH	7	1		3200	1 nts				1		500.0	1 115 /
larker	1 011	-			3200	r pts			_			500.0	, 63/
	<b>D</b> -6	Tur I	¥	- 1	V	- 1	<b>F</b>			E	ction Re		
Type M1	Ref	Trc 1	X-value		<u>Y-value</u> -17.07 dB		Funct	.ion		Fun		suit	
D1	M1	1		.562 µs 563 ms	-17.07 dB								
D1	M1	1		303 ms 3.75 ms	-2.27 0								
02	1411	1			-2.27 0	10							

Spect	rum												
Ref Le	evel :	10.00 dBr	n	👄 F	RBW 1 MHz								
🔵 Att		20 di	B 👄 SWT 5	ms 😑 ٧	BW 3 MHz								
TRG: VI	D TDF												
🔵 1Pk Ma	ах												
	_				allow a broad such so allow			-1-1					<sup>404</sup> -216010B
0 dBm—		d ( ( make)	nd for star and the part	ul de chaite	ter in the second second	rin <sup>41</sup>	alla trees h		duy.			( '	
-10 dBm	M1								_			-	1.563 µs
-20 dBm												<u>2</u> 4	
-30 dBm	<b>-</b>								_				
-40 dBm		RG -41.00	0 dBm						_				
John States	an and									يعرفها واستلاريه	La La Barrow		
-60 dBm	<u>+</u>												
-70 dBm	<u>+</u>												
-80 dBm	<u>ا</u> ر					-							
CF 2.44	41 GH	z			3200	1 pt	5						500.0 µs/
Marker													
Туре	Ref	Trc	X-value		Y-value		Funct	tion		Fui	nction I	Resu	lt
M1		1		562 µs	-18.33 di								
D1 D2	M1 M1	1	2.8995		-2.66								
	MI	1	3	.75 ms	-1.99	uB							]



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# 99% Occupied Bandwidth

Project code name:		Marketing name:		Mode	el number:	BL3L		
Project number (Integrity):	BL3L	Build Phase:	C2.5					
Tested by:	Chad Bell		Date:	February 13	3, 2020			
Requirements			Referenced Standard(s):					
Standard(s):								
EUT powered with:	5V USB	Temp / Humidity:	n/a	Test locat	ion: Brau	n Room		
Test equipment used TN's:	2408							
EUT Serial number(s):	Model BL3L con	ducted #1						
EUT Software installed:	0.3.8	0.3.8						
EUT Modification(s):	Product was tes	Product was tested as built except the antenna was disconnected and a coaxial cable was						
	installed.							

### Conclusion:

This test is for information only.

### Limits:

None; for reporting purposes only.

### Procedure:

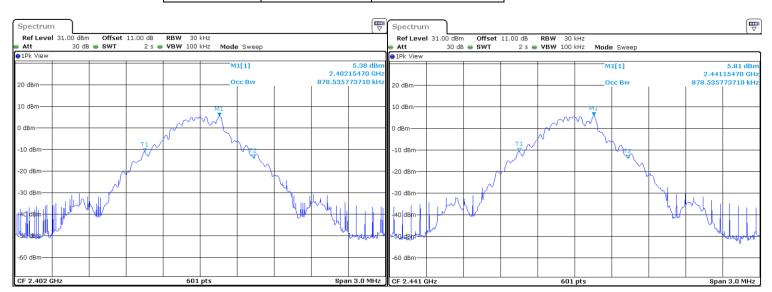
The transmitter output is connected to a spectrum analyzer. The RBW is set to  $\geq$  1-5% of the 99% Occupied Bandwidth. The VBW is set to  $\geq$  RBW. The sweep time is coupled.



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## Basic Rate (DH5) Data Collection:

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	0.8785
Middle	2441	0.8785
High	2480	0.8686



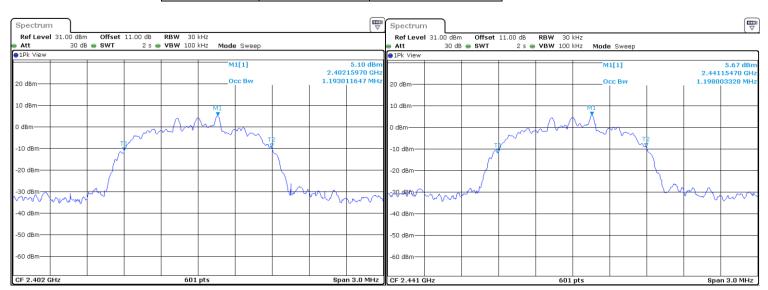
Spectrum						□
Ref Level 31.00 de		RBW 30 kH ■ VBW 100 kH				
1Pk View	ub <b>- 5</b> 41 2.5	<b>• • • • •</b> • • • • • • • • • • • • • •	ne moue sweep			
			M1[1]			3 dBm
20 dBm			Occ Bw		2.4801547 868.55241264	
20 dBm						
10 dBm						
		ann	X X			
0 dBm						
	T1 o	N	2			
-10 dBm	T X	++	- Vr2			
00 ID	M		1 m			
-20 dBm	1 A			7		
-30 dBm	N					
Line Illu	ul V			l Aluh	ANI IL	
140 dB						
					- WIII	
usolaalterra		+ +			mun	water and
-60 dBm						
05.0.40.011-		(01 -			0	
CF 2.48 GHz		601 p	ls .		Span 3.0	MHZ

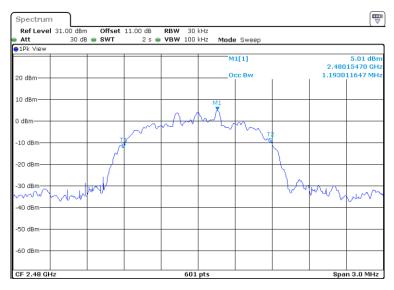


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# Enhanced Data Rate (3DH5) Data Collection:

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.193
Middle	2441	1.198
High	2480	1.193





# Equipment Used:

TN	Description	Model	S/N	Manufacturer	Most Recent Calibration	Calibration Due Date	Most Recent Verification	Verification Due Date
2408	Signal and Spectrum Analyzer	FSV40	101414	Rohde & Schwarz	27-Mar-2019	26-Mar-2020		

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# 20dB Occupied Bandwidth

Project code name:		Marketing name:		Mode	el number:	BL3L
Project number (Integrity):	BL3L	Build Phase:	C2.5			
Tested by:	Chad Bell		Date:	February 13	3, 2020	
	•					
Requirements	FCC §15.247 (2	)	Poforoncod S	tandard(c);	ANG 62 1	0.2012 602
Standard(s):	RSS-247 5.2 (a)		Referenced Standard(s):		ANSI 63.10:2013 - 6.9.2	
EUT powered with:	5V USB	Temp / Humidity:	n/a	Test locat	ion:	
Test equipment used TN's:	2408					
EUT Serial number(s):	Model BL3L con	ducted #1				
EUT Software installed:	0.3.8					
EUT Modification(s):	Product was tes	ted as built except the	e antenna was di	isconnected a	and a coaxia	l cable was
	installed.					

## Conclusion:

This test is for information only.

### Limits:

None; for reporting purposes only.

### Procedure:

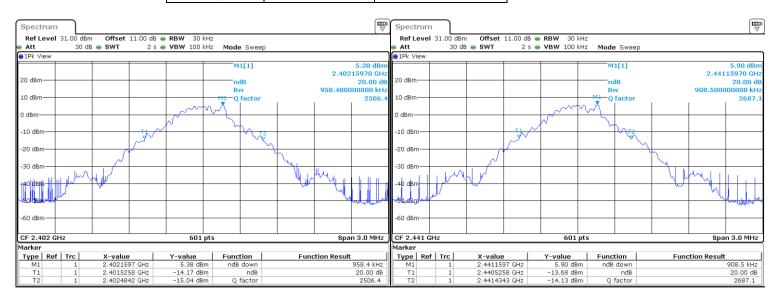
The transmitter output is connected to a spectrum analyzer. The RBW is set to  $\geq$  1-5% of the 20dB bandwidth. The VBW is set to  $\geq$  RBW. The sweep time is coupled.



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### Basic Rate (DH5) Data Collection:

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	0.958
Middle	2441	0.909
High	2480	0.953



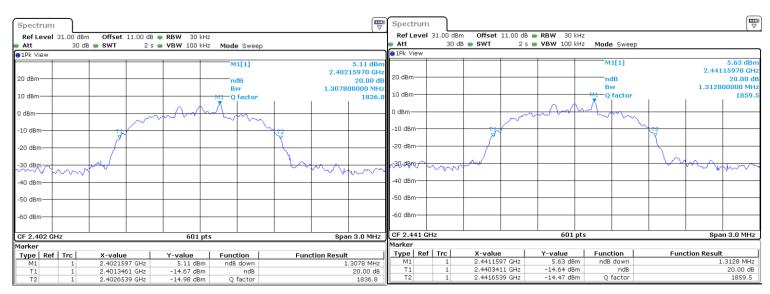
Spectr	vel 31.		061	11.00 dB		30 kHz						T T
Att	ver 31.		Offset SWT					swee				
1Pk Vie		30 UB	- 0m1	23		100 KH2	MOUL	3 2W66	P			
JIFK VIC					_	_	M	1[1]				5.35 dB
								1[1]			2 480	115970 GH
20 dBm-	_				_	_	n	1B			2.100	20.00 d
							B				953,4000	000000 kH
10 dBm-					_			factor				2601
						acha	X		1		1	1
0 dBm—					- <del>.</del>	** *	~\		$\rightarrow$			
					$\mathcal{N}$							
-10 dBm	_			- 11/	<u> </u>	_		<del>Ν τ</del>	2			
				~7~					てー			
-20 dBm	_			<u> </u>	_	_			$\sim$			
									ተ	λ.		
-30 dBm	_		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			$\rightarrow$				<u> </u>		
	11 1	N.	111							- Y.J.	HN.I.I.	
-#Q dBm		<u>v</u> v	ΥV .			_				<u> </u>	1 W III	
	1111V		-									
-50,480,	44				-	_						Hell Law
-60 dBm												
CF 2.48	GHz					601 pts	;				Spa	n 3.0 MHz
1arker												
	Ref   T	rc	X-value		Y-valu		Func			Fund	tion Result	
M1		1	2.480159			5 dBm	ndB	down				953.4 kHz
Τ1		1	2.47952			8 dBm		ndB				20.00 dB
T2		1	2.480479	92 GHz	-14.5	0 dBm	Q	factor				2601.4

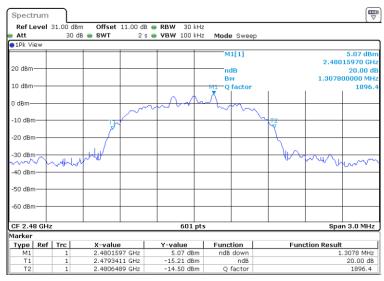




## Enhanced Data Rate (3DH5) Data Collection:

Channel	Frequency (MHz)	99% Bandwidth (MHz)
Low	2402	1.193
Middle	2441	1.198
High	2480	1.188





### Equipment Used:

TN	Description	Model	S/N	Manufacturer	Most Recent Calibration	Calibration Due Date	Most Recent Verification	Verification Due Date
2408	Signal and Spectrum Analyzer	FSV40	101414	Rohde & Schwarz	27-Mar-2019	26-Mar-2020		



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# **Hopping Frequency Separation**

Project code name:		Marketing name:		Model numbe	r: BL3L
Project number (Integrity):	BL3L	Build Phase:	C2.5		
Tested by:	Chad Bell		Date:	May 11, 2020	
	•				
Requirements	FCC 15.247 (a)	(1),	Poforoncod S	tandard(c).	
Standard(s):	IC RSS-247 5.1	(2)	Referenced Standard(s):		
EUT powered with:	5V USB	Temp / Humidity:	n/a	Test location:	
Test equipment used TN's:	2408				
EUT Serial number(s):	Model BL3L con	ducted #1			
EUT Software installed:	0.3.8				
EUT Modification(s):	Product was tes	ted as built except the	e antenna was di	sconnected and a coa	xial cable was
	installed.				

### Conclusion:

Hopping frequencies are separated by 1MHz which is more than the required minimum of 25kHz and more than 2/3 of the 20dB bandwidth of the hopping channel which would be 795kHz.

### Limits: FCC §15.247 (a) (1)

RSS-247 (5.1) (b)

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20dB bandwidth of the hoping channel, whichever is greater.

Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

## Equipment Used:

TN	Description	Model	S/N	Manufacturer	Most Recent Calibration	Calibration Due Date	Most Recent Verification	Verification Due Date
2408	Signal and Spectrum Analyzer	FSV40	101414	Rohde & Schwarz	27-Mar-2019	26-Mar-2020		



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### Data Collection:

Ref Level Att	l 10.00 dBm 20 dB		● RB .1 ms ● VB	W 200 kHz W 1 kHz	Mode Sv	veep			
TDF						· F			
●1Pk Max			1	_	- 00	111			
			M1		2 02	2[1]		1,⁄0	о.08 d- Овооо мн
0 dBm	$\rightarrow$				M:	1[1]	$\mathbf{X}$		5.83 dBi
								2/4400	100000 GH
10 dBm	$\rightarrow$	/		/		/		/	
	```	ľ	· · · ·	Í	ן ז	(	'	Í	
-20 dBm—									
-30 dBm									
40 d0									
-40 dBm									
-50 dBm—									
SO GDIII									
-60 dBm									
-70 dBm									
-80 dBm									
CF 2.441 G	Hz		<u> </u>	3200	1 pts			l Spa	 in 5.0 MHz
					•			•	

Spectrum					$\bigtriangledown$
Ref Level 1.00 de		👄 RBW 300 kHz			
● Att 20	dB <b>SWT</b> 32.1 ms	🔵 VBW 1 kHz	Mode Sweep		
TDF Pk Max					
			D2[1]		-0.10 dB
		prove to	2	N 🥂	200000 MHz
0 dBm			M1[1]	Martin Martin	- W.SadBm
		$\Lambda$	<b>\_</b>	2.44	0000000'QHz
-1 dBm				<u> </u>	1
		- N/			h
-2 dBm			₩		
		t t		1 Y	
-3 dBm					
-4 dBm					
E 40					
-5 dBm					
-6 dBm					
-o ubiii					
-7 dBm					
-8 dBm					
			1 ntc		
CF 2.441 GHz		3200:	r prs	5	pan 5.0 MHz

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# Number of Hopping Channels

Project code name:		Marketing name:		Mod	el number:	BL3L				
Project number (Integrity):	BL3L	Build Phase:	C2.5							
Tested by:	Chad Bell		Date: February 13, 2020							
Requirements	FCC 15.247 (a)	(1) (iii)	Referenced S	tandard(e).						
Standard(s):	IC RSS-247 5.1	(4)	Referenced 3	tanuaru(s).						
EUT powered with:	5V USB	Temp / Humidity:	n/a	Test locat	tion:					
Test equipment used TN's:	2408									
EUT Serial number(s):	Model BL3L con	ducted #1								
EUT Software installed:	0.3.8	0.3.8								
EUT Modification(s):	Product was tes	Product was tested as built except the antenna was disconnected and a coaxial cable was								
	installed.	•								

### Conclusion:

Bose Model BL3L uses 79 hopping channels in normal operation and always uses at least 20, both of which are more than the required 15.

## Limits:

FCC 15.247 (a) (1) (iii), IC RSS-247 5.1 (4) Frequency hopping systems in the 2400 – 2483.5 MHz band shall use at least 15 non-overlapping channels.



## Data Collection:

Spectrum									[	$\overline{\nabla}$
	31.00 dBm			<b>RBW</b> 500 k		_				
● Att ●1Pk View	30 dB	SWT	1 ms 🖷	<b>VBW</b> 500 k	HZ Mode	Sweep				
					М	1[1]	1	2.4	8.76 dE 23950 G	
20 dBm										
1C dBm			ทักงาหา	MMMM	manan	ทุกภาษา		mana	ากกากก	<u> </u>
0 dBm						· · ·				
-10 dBm										
-2D dBm										
-3D dBm										$\left  \right $
-4D dBm										
-50 dBm										
-60 dBm									S	2-
Start 2.4 G	Hz			601	pts			Stop 2	2.482 GH	lz

## **Equipment Used:**

ΤN	Description	Model	S/N	Manufacturer	Most Recent Calibration	Calibration Due Date	Most Recent Verification	Verification Due Date
2408	Signal and Spectrum Analyzer	FSV40	101414	Rohde & Schwarz	27-Mar-2019	26-Mar-2020		



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# Average Time of Occupancy

Project code name:		Marketing name:		Mod	el number:	BL3L			
Project number (Integrity):	BL3L	Build Phase:	C2.5						
Tested by:	Chad Bell		Date:	Date: February 13, 2020					
Requirements	FCC 15.247 (a)	(1) (iii)	Referenced S	tandard(c).					
Standard(s):	IC RSS-247 5.1	(4)	Referenced 3	tanuaru(s).					
EUT powered with:	5V USB	Temp / Humidity:	n/a	Test locat	tion:				
Test equipment used TN's:	2408								
EUT Serial number(s):	Model BL3L con	ducted #1							
EUT Software installed:	0.3.8	0.3.8							
EUT Modification(s):	Product was tes	Product was tested as built except the antenna was disconnected and a coaxial cable was							
	installed.								

### Conclusion:

The highest time of occupancy in any mode is 318.5mS which passes the 400mS limit by 81.53mS.

## Limit:

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

### **Equipment Used:**

ΤN	Description	Model	S/N	Manufacturer	Most Recent Calibration	Calibration Due Date	Most Recent Verification	Verification Due Date
2408	Spectrum Analyzer	FSV40	101414	Rohde & Schwarz	27-Mar-2019	26-Mar-2020		



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## Data Collection:

Ref Level 21.00 dBm         Offset 11.00 dB         RBW         2 MHz           Att         20 dB         SWT         4 ms         YBW         50.1 TR::         20 dB         SWT         3.2 s         YBW         WIZ           © IPk         View         0.0000000000         0.0000000000         0.0000000000         0.00000000000         0.00000000000         0.000000000000000         0.00000000000000000000000000000000000	Channel	Frequency (MHz)	Mode	Pulse Width (mS)	Number of pulses in 3.16 S	Numbe pulses 31.6 (X 10	s in S		(Pulse umbei	occup Width of pu mS)	η X	Limit (mS)	Margin (mS)	Re	sult
Middle         2441         3-DH5         2.895         11         110         318.5         400         81.53         Pass           Spectrum         Refevel 21.00 dBm         Offset 11.00 dB = RBW 2 MHz         Image: Constraint of the second	Middle	2441	DH5	2.889	11	110	)		3	17.7		400	82.26	P	ass
Spectrum         Spectrum         Spectrum           Ref Level 21.00 dBm         Offset 11.00 dB = RBW 2 MHz         MI           Att         20 dB = SWT         4 ms = VBW 50 HHz           Sull TRG-VID         MI [1]         -1.75 dBm           0 dBm         01(1)         01         10.24 HB           0 dBm         01(1)         01         10.24 HB           0 dBm         0 dBm         0         0           -10 dBm         -10 gBm         -10 gBm         -10 gBm           -30 dBm         -10 gBm         -10 gBm         -10 gBm	Middle	2441	2-DH5	2.895	11	110	)		3	18.5		400	81.53	P	ass
Ref Level 21.00 dBm         Offset 11.00 dB         RBW         2 MHz           Att         20 dB         SWT         4 ms         YBW         50.1 TR::         20 dB         SWT         3.2 s         YBW         WIZ           © IPk         View         0.0000000000         0.0000000000         0.0000000000         0.00000000000         0.00000000000         0.000000000000000         0.00000000000000000000000000000000000	Middle	2441	3-DH5	2.895	11	110	)		3	18.5		400	81.53	Р	ass
M1[1]       -1.75 dBm         10 dBm       01[1]       0.0000000 s         0 dBm       01[1]       0.289850 m         0 dBm       0       0         -10 dBm       0       0         -20 dBm       0       0         -30 dBm       0       0         -50 dBm       0       0         -50 dBm       0       0	RefLevel 21.00 Att 2						Ref Lev	el 21.00 dBm							
-70 dBm	10 dBm 0 dBm -10 dBm -20 dBm -30 dBm TRG -29 -40 dBm -50 dBm	0.000 dBm				0.0000000 s 10.24 dB 2.88850 ms 	0 dBm					Level L			

#### DH5

Ref Level 10.00 dbm     RbW 2 MHz       Att     20 db     SWT 4 ms     VBW 50 kHz       T05: V10 T0F     01(1)     -0.63 dB       0 dbm     01(1)     -0.63 dB       -10 dbm     01(1)     -0.63 dB       -20 dbm     M1       -20 dbm     M1       -30 dbm     -0.00 dB       -30 dBm	Spectrum	Spectrum
TRG:VID TDF         0 dBm       D1[1]       -0.83 dB         -10 dBm       -0.113 dBm       -0.113 dBm         -20 dBm       -0.114 dBm       -0.114 dBm         -30 dBm       -0.114 dBm       -0.114 dBm         -0.0 dBm       -0.114 dBm       -0.114 dBm       -0.114 dBm         -0.0 dBm       -0.114 dBm		
1 Pk Clrw       0 d8m       0 1(1)       -0.63 d6         -10 d8m       -11 10 d8m       -2.15 d8m       10 d8m         -20 d8m       -10 d8m       -10 d8m       -10 d8m         -30 d8m       -10 d8m       -10 d8m       -10 d8m         -20 d8m       -10 d8m       -10 d8m       -10 d8m         -30 d8m       -10 d8m       -10 d8m       -10 d8m         -50 d8m       -10 d8m       -10 d8m       -10 d8m         -70 d8m		
0 d8m		1Pk Cirw
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	0.83 dB 2.898062 ms	10 dBm
-20 dBm -30 dBm -40 dBm -50 dBm -50 dBm -70		0 dBm
40 dBm	-20 dBm M1 Ct	-10 dBm
40 dBm		-20 dBm
		-30 dBm
		-40 dBm
		ע איזע איזע איזע איזע איזע איזע איזע איז
-70 dBm70 dBm		-80'dem Haw har you wall have been here have been here here here here here here here h
	-80 dBm-	-70 dBm
CF 2.441 GHz 32001 pts 400.0 µs/ CF 2.441 GHz 601 pts 320.0 ms	CF 2.441 GHz 32001 pts 400.0 μs/	CF 2.441 GHz 601 pts 320.0 ms,



# **Output Power**

Project code name:		Marketing name:		Model n	umber:	BL3L	
Project number (Integrity):	BL3L	Build Phase:	C2.5				
Tested by:	Chad Bell		Date:	February 13	3, 2020		
					<b>T</b>		
Requirements	FCC 15.247	(b) (3)	Defensed	ton dond(o).			
Standard(s):	RSS-247 5.4	(d)	Referenced S	tandard(S):	andard(s):		
EUT powered with:	5V USB	Temp / Humidity:	n/a	Test locat	Test location: Braun Room		
Test equipment used TN's:	2408						
EUT Serial number(s):	Model BL3L	Nodel BL3L conducted #1					
EUT Software installed:	0.3.8						
EUT Modification(s):	Product was installed.	tested as built excep	ot the antenna was d	sconnected a	and a co	baxial cable was	

## Conclusion:

The Bose Model BL3L passes output power by 18.63dB.

## Limits:

FCC §15.247 (b) (3)

RSS-247 5.4 (d)

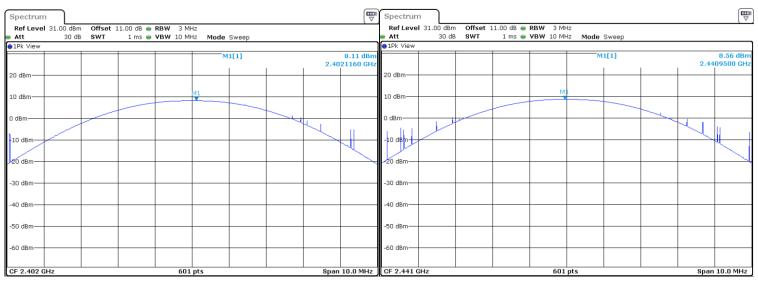
The maximum antenna gain is less than or equal to 6 dBi, therefore the limit is 30 dBm.



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## Basic Rate (DH5) Data Collection:

	Output Power Summary Table (Basic Rate: 1 Mbps)												
Channel	nnel Frequency (MHz) Mode Output Power Directional Gain (dBi) Margin (dB) R												
Low	2402	DH5	8.11	1.21	30	20.68	Pass						
Middle	2441	DH5	8.56	1.21	30	20.23	Pass						
High	2480	DH5	8.12	1.21	30	20.67	Pass						



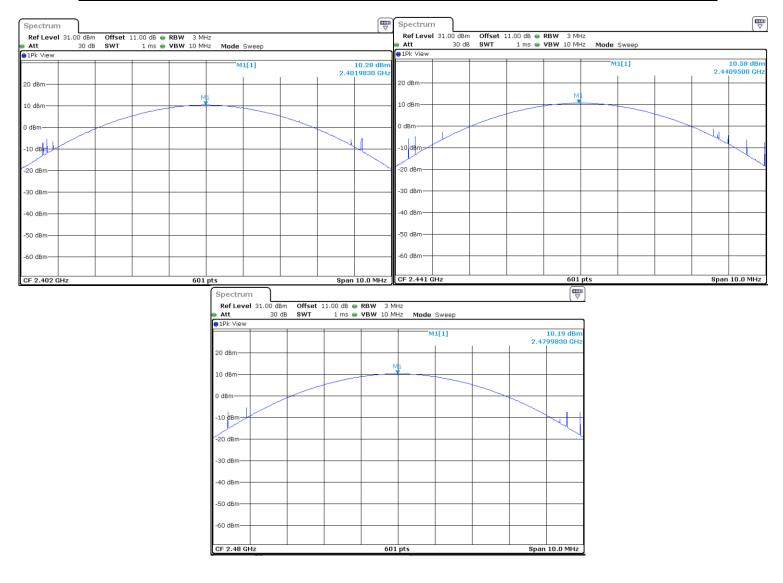
Ref Level 31.00 dBm		B 👄 RBW 3 MHz			
Att 30 dB	<b>SWT</b> 1 m	s 🔵 <b>VBW</b> 10 MHz	Mode Sweep		
1Pk View					
			M1[1]	2.	8.12 dBn 4799670 GH
0 dBm					
.0 dBm		ML			_
I dBm					ſ
10 dBm					X
30 dBm					
40 dBm					
50 dBm					
60 dBm		_			



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## Enhanced Data Rate (3DH5) Data Collection:

	Output Power Summary Table (Enhanced Rate: 3 Mbps)											
Channel Frequency		Mode	Output Power	Directional Gain	Limit	Margin	Result					
channer	(MHz)		(dBm)	(dBi)	(dB)	(dB)	Result					
Low	2402	3-DH5	10.28	1.21	30	18.51	Pass					
Middle	2441	3-DH5	10.58	1.21	30	18.21	Pass					
High	2480	3-DH5	10.19	1.21	30	18.60	Pass					



## Equipment Used:

TN	Description	Model	S/N	Manufacturer	Most Recent Calibration	Calibration Due Date	Most Recent Verification	Verification Due Date
2408	Signal and Spectrum Analyzer	FSV40	101414	Rohde & Schwarz	27-Mar-2019	26-Mar-2020		

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# **Conducted Spurious Emissions**

Project code name:		Marketing name:		Model n	umber:	BL3L	
Project number (Integrity):	BL3L	Build Phase:	C2.5				
Tested by:	Chad Bell		Date:	March 19, 2	020		
	1						
Requirements	FCC §15.247	′ (d)	Poforoncod S	enced Standard(s): ANSI 63.10 (11.10.2)			
Standard(s):	RSS-247 5.5		Referenceu 3	tandard(s): ANSI 63.10 (11.10.2)			
EUT powered with:	5V USB	Temp / Humidity:	n/a	Test location:			
	T						
Test equipment used TN's:	2408						
EUT Serial number(s):	Model BL3L	lodel BL3L conducted #1					
EUT Software installed:	0.3.8	0.3.8					
EUT Modification(s):	Product was	tested as built excep	ot the antenna was di	sconnected a	and a co	axial cable was	
	installed.	•					

### Conclusion:

The Bose Model BL3L passes Conducted Spurious Emissions by more than 20dB.

## Limits

FCC §15.247 (d)

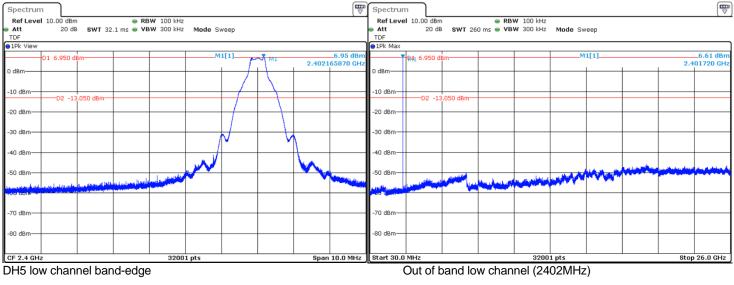
RSS-247 5.5

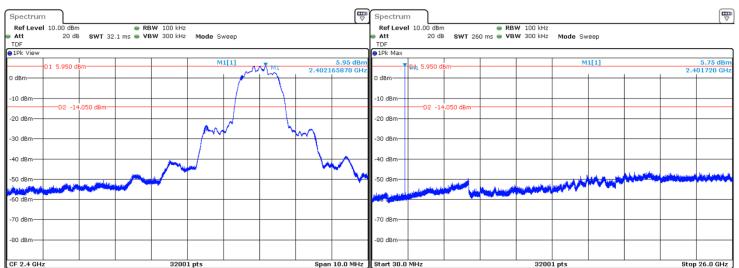
Output power was measured based on the use of a peak measurement; therefore, the required attenuation is 20 dB.

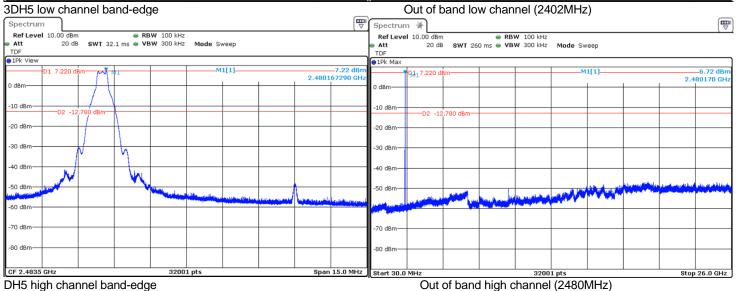


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### Data Collection:



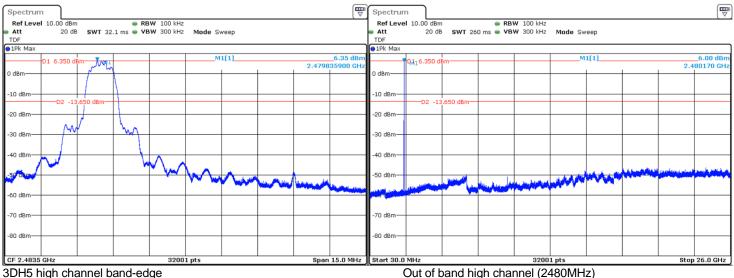


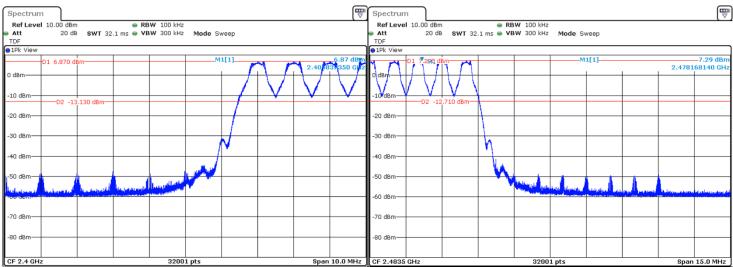


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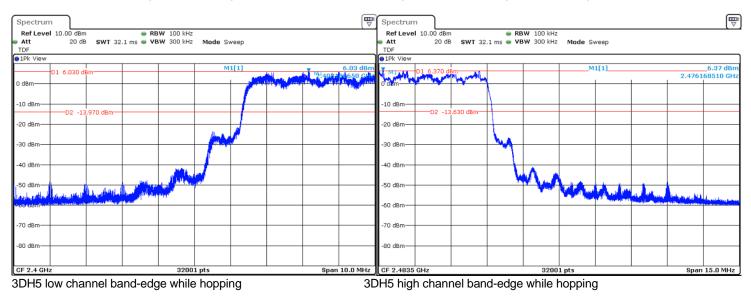






DH5 low channel band-edge while hopping





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### Equipment Used:

TN	Description	Model	S/N	Manufacturer	Most Recent Calibration	Calibration Due Date	Most Recent Verification	Verification Due Date
2408	Signal and Spectrum Analyzer	FSV40	101414	Rohde & Schwarz	27-Mar-2019	26-Mar-2020		



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# **RF** Conducted Emissions – AC Mains

Project code name:		Marketing name:		Model nu		el num	ber:	BL3L
Project number (Integrity):	BL3L	Build Phase:	C2.5					
Tested by:	Chad Bell		Date:	March	h 20, 2	020		
Requirements Standard(s):	FCC Part15B, EN55032, EN301489 Referenced Standard(s):							
EUT powered with:	Bose Power P/T 722809-0010	Temp / Humidity:	N/A <b>Test location:</b> Henry Room			Room		
Test equipment used TN's:	2247,1380,2236							
EUT Serial number(s):	C2.5 sample #2	C2.5 sample #2						
EUT Software installed:	0.3.8							
EUT Modification(s):	Product was teste	d as built						

## Conclusion:

The Bose Model BL3L passes RF Conducted Emissions on the AC Mains by 18.1dB.

## Limits:

### AC MAINS PORTS

		Freq	Limits (dBµV)		Comments
Standard	Class	Range (MHz)	QP	AVG	
	٨	0.15 - 0.5	79	66	-Ensure bandwidth set to 9 kHz. -EUT must pass both QP and AVG Limits.
FCC 15B/	A	0.5 - 30	73	60	<sup>1</sup> These Limits decrease linearly with the log of the frequency.
CISPR32 based Class B		0.15 - 0.5	66-56 <sup>1</sup>	56-46 <sup>1</sup>	CISPR32 based standards: EN55032, AS/NZS CISPR32
only	В	0.5 - 5	56	46	
		5 - 30	60	50	



BASE	

# Test Checklist:

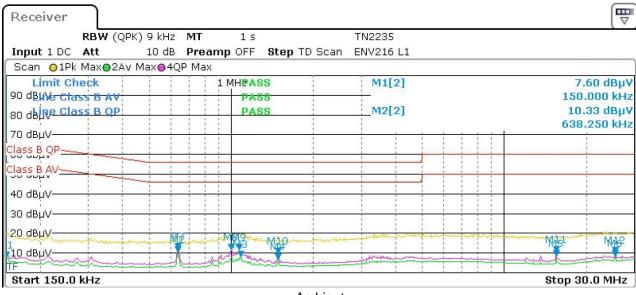
No.	ITEM (√ or n/a) →	OK
	This checklist is intended to be a reminder of some highlights from the standards listed above, and not a step by	
1	step procedure. You must be familiar with the listed standards prior to using this checklist.	N
2	Check EUT performance prior to any testing.	
	Place the EUT on the table, with the rear of the unit aligned with the rear of the table. The EUT is to be 40 cm	
3	away from the screen room walls and ≥80 cm from all other metal objects (including other walls). Other system	
	components should have a ~10 cm spacing and should be ≥80 cm from any metal objects.	
	Connect cables, accessories, and loads that would be utilized in a nominal configuration. Use judgment to	
	determine minimum number of accessories required to achieve maximum level of emissions. If possible, avoid	
	using peripheral components that would force multiple earth grounds.	
4	• For audio amplifier products that incorporate external speaker outputs, and are designed to connect to a variety	
	of loudspeakers, it is recommended to terminate the speaker outputs with resistive loads equal to rated load	
	impedance.	
-	At least one of each type of EUT I/O port should have a customer intent cable connected to it. Document cable	
5	configuration used for the test (describe cables used and take picture).	N
	Bundle EUT mains cord into 30-40 cm bundle. Do not bundle peripheral components' mains cords. I/O cables are	
6	draped over rear edge of tabletop, bundled if necessary, to keep them >40 cm above reference ground plane	N
Ū	(floor).	
7	RF filter/bead all non-system component cables (external source) where necessary.	
8	Verify the proper mains voltage and frequency for the EUT.	Ń
	MAINS PORT TESTING	
	The EUT line cord under test is connected to the EUT LISN. For multiple component systems with multiple line	
	cords, each line cord shall be tested separately. All other system component line cords are connected to a second	
9	("other system components") LISN. A power strip can be used for multiple components connected to the second	
	LISN (but not for the EUT LISN). Unused LISN ports are terminated with 50 $\Omega$ terminators.	
	If the EUT has I/O terminals which can be connected to an earth ground through peripheral equipment, the	
	measurements shall be performed both with and without the EUT I/O ground/shell terminal connected to	v
	earth ground, with 150 ohms in series.	
	• Perform this test for each line cord which comprises the EUT (i.e. for a console/bass box type system, even	
4.0	when measuring the bass box line cord, the console is still considered part of the EUT, so measurements are	
10	performed with the <u>console</u> grounded, with 150 ohms in series, and ungrounded).	
	• If the EUT has an unbalanced (coax) antenna input terminal as well as other I/O or mains terminals which	
	connect to earth ground, measurements shall be performed with the antenna shell both ungrounded and	
	grounded, with 150 ohms in series. When measuring with the antenna shell grounded with 150 ohms in series, no	
	other earth grounds shall be connected per CISPR 32 (i.e. float safety grounds if necessary).	
11	A transient limiter MUST be used to protect receiver input.	N
12	Ensure correct frequency, amplitude, bandwidth, and transducer factors are set on receiver.	N
13	For average measurements, it is generally recommended to use receiver mode. If using spectrum analyzer	
	mode for average measurements, be careful to provide sufficient sweep time to ensure accurate results.	
14	Perform measurements on both sides of mains (line and neutral).	
	EUT measured in all typical operational modes. Give special attention to modes where there is a potentially	N
	<ul> <li>significant difference in spectral emissions.</li> <li>Amplifiers are exercised up to maximum power (though not a requirement for CISPR 32).</li> </ul>	
	• We deem it acceptable to use pink noise instead of 1 kHz sine wave as the input signal (allowed by	
	CISPR 32).	
15	• Connecting cable positions are varied to obtain worst case emissions, within the range of likely configurations.	
10	Cables are not positioned on top of, or under, the system components unless required by design.	
	• CISPR 32 specifies audio amps to be set to 1/8 power output during measurement, however if worst case	
	emissions are found to be at another output level and are passing, it is sufficient to capture just the worst	
	case emissions (i.e. passing worst case results can be used for CISPR 32 as for FCC with a statement that	
	emissions at other volume/output levels were less).	
16	At each frequency where there is a significant emission, maximize each emission by changing the EUT cable	
10	orientation. Record the worst-case frequency, amplitude, mains conductor.	N
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17 Document test results and test equipment using test template.18 Take picture(s) of worst-case test set up.

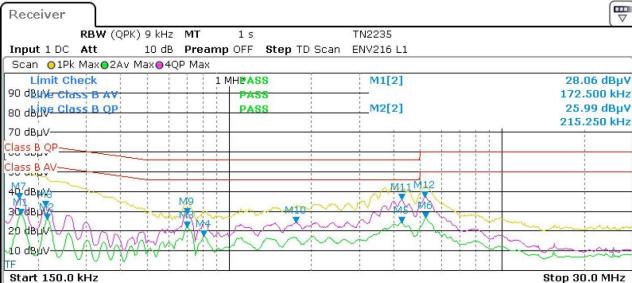
## Data Collection:



Ambient



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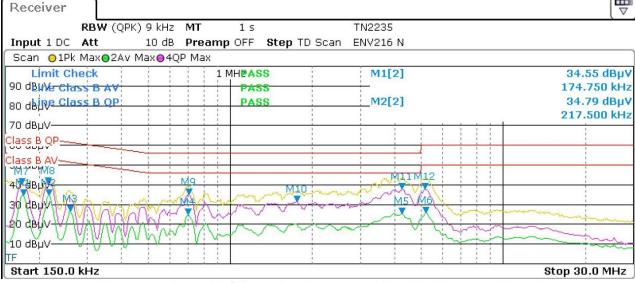
Max current draw with fully depleted battery in charging case and both earbuds, 120V 60Hz, Measuring Line

	FCC 15B and CISPR 32 Class B Product									
Mk	Frequency	MEA	SURED	LI	LIMIT		RGIN			
#	MHz	dBµV QP	dBµV AVG	dBµV QP	dBµV AVG	dB QP	dB AVG	Notes		
1	4.2945	35.70	24.30	56.0	46.0	20.3	21.7			
2	4.3013	35.70	24.30	56.0	46.0	20.3	21.7			
3	5.2283	37.10	26.30	60.0	50.0	22.9	23.7			
4	5.2598	37.00	26.50	60.0	50.0	23.0	23.5			
5	0.7035	28.60	22.00	56.0	46.0	27.4	24.0			
6	0.7013	28.60	22.00	56.0	46.0	27.4	24.0			
7	0.1725	36.20	28.10	64.8	54.8	28.6	26.7			
8	0.2153	32.30	26.00	63.0	53.0	30.7	27.0			
9	0.1703	36.30	27.50	64.9	54.9	28.6	27.4			
10	0.2130	32.30	25.20	63.1	53.1	30.8	27.9			
11	0.8093	24.20	17.40	56.0	46.0	31.8	28.6			
12	1.7588	24.40	16.70	56.0	46.0	31.6	29.3			



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Max current draw with fully depleted battery, 120V 60Hz, Measuring Neutral

	FCC 15B and CISPR 32 Class B Product										
Mk	Frequency	MEAS	SURED	LI	MIT	MIT MA					
#	MHz	dBµV QP	dBµV AVG	dBµV QP	dBµV AVG	dB QP	dB AVG	Notes			
1	0.2175	40.60	34.80	62.9	52.9	22.3	18.1				
2	4.2540	37.70	25.50	56.0	46.0	18.3	20.5				
3	4.2585	37.70	25.50	56.0	46.0	18.3	20.5				
4	0.2153	40.60	34.50	63.0	53.0	22.4	18.5				
5	0.1748	40.00	34.50	64.7	54.7	24.7	20.2				
6	0.1725	40.20	34.50	64.8	54.8	24.6	20.3				
7	0.7058	35.10	24.70	56.0	46.0	20.9	21.3				
8	0.7035	35.00	24.80	56.0	46.0	21.0	21.2				
9	5.1810	37.80	25.60	60.0	50.0	22.2	24.4				
10	5.2193	37.70	25.90	60.0	50.0	22.3	24.1				
11	0.2603	33.20	26.80	61.4	51.4	28.2	24.6				
12	1.7565	31.40	19.80	56.0	46.0	24.6	26.2				

## **Equipment Used:**

TN	Description	Model	S/N	Manufacturer	Most Recent Calibration	Calibration Due Date	Most Recent Verification	Verification Due Date
2247	EMI Test Receiver, 7GHZ	ESR7	101263	Rohde & Schwarz	27-Mar-2019	26-Mar-2020		
1380	Conducted Comb Generator	CGC- 510	311559	Com-Power Corporation			15-Mar-2019	14-Mar-2020
2236	2-LINE V- NETWORK	ENV216	101193	Rohde & Schwarz	21-Jan-2020	20-Jan-2022		



Uncertainty Budget (AC mains measurements)								
Title:	Conducted	<b>RF Emissions</b>	s (Mains)					
Source of Uncertainty	Value	Distribution	Divisor	Uncertainty				
	units:± dB			(± dB)				
Receiver - absolute level	0.3	Rect.	1.73	0.17				
Receiver - frequency response	1.0	Rect	1.73	0.58				
Receiver - attenuator switching	0.2	Rect.	1.73	0.12				
Receiver - bandwidth switching	0.2	Rect.	1.73	0.12				
Receiver - display	0.5	Rect.	1.73	0.29				
LISN impedance	2.6	Triang.	2.45	1.06				
LISN insertion loss	0.6	Norm.	2.00	0.30				
Cable correction factor	0.1	Norm.	2.00	0.05				
	nty (RSS):	1.30						
	Cov	verage factor (	(2 sigma):	2.00				
Ext	ended uncert	ainty (95% coi	nfidence):	2.60				



 5E

# **Radiated Measurements**

# RF Radiated Emissions 30MHz -1GHz

Project code name:		Marketing name:		Model nu	mber: BL3L		
Project number (Integrity):	BL3L	Build Phase:	C2.5				
Tested by:	Chad Bell		Date:	March 10, 2020			
Requirements Standard(s):	FCC Part15B	FCC Part15B Referenced Standard(s):					
EUT powered with:	Bose Power P/T 722809- 0010	Temp / Humidity:	N/A	Test location:	Maxwell House		
	· · · · · · · · · · · · · · · · · ·						
Test equipment used TN's:	1375,2319,1541	,3062,2077					
EUT Serial number(s):	C2.5 sample #2						
EUT Software installed:	Special software	pecial software to enable 900mA charging in the charging case.					
EUT Modification(s):	None						

## Conclusion:

Tested while playing audio and while charging, charging mode was found to be worst case and therefore what is represented in the report. The Bose Model BL3L passes Radiated Emissions from 30MHz-1GHz by 12.3dB.





# Test Checklist:

No.	ITEM $(\sqrt{\text{ or n/a}}) \rightarrow$	OK
1	This checklist is intended to be a reminder of some highlights from the standards listed above, and not a step by step procedure. You must be familiar with the listed standards prior to using this checklist.	$\checkmark$
2	Check EUT performance, confirm proper mains voltage prior to testing.	
3	If dimensions of EUT are greater than 1 meter in any direction, measurements performed at 3 meters may not be accurate, especially at lower frequencies.	$\checkmark$
4	Remove all non-essential items from the Maxwell House chamber.	
5	Place comb generator field site source in reference location on turntable. Sweep source, verify results against established reference plot. Verification plot should be recorded in test setup verification section of this document.	$\checkmark$
6	Place EUT on turntable with the rear of the unit aligned with the table edge closest to the antenna (maintain ~10 cm spacing between components). Connect the cables, accessories, and loads that would be utilized in a nominal configuration (judgment can be used to determine the minimum number of accessories required to achieve the maximum level of emissions). Telescoping antennas should be fully extended and vertical. If this is an initial test of a system, decide what nominal configuration setup should be, bundle cables, and take a picture to ensure future tests are performed using same configuration. For formal reports record type and length of cables used.	V
7	At least one of each type of EUT I/O port shall have a customer intent cable connected to it. If more than one cable of any cable type measurably increases emissions, those cables shall be maintained in the test setup. Investigate all surfaces (top, bottom, sides, and front) for I/O ports not in the main cluster. Examples of ports that may not be in the main cluster of jacks are: • Headphone, HDMI, USB, jacks or other convenience jacks on the front of the EUT.	V
	Document cable configuration used for the test (describe cables used and take picture).	
8	Whenever practical, all cables will be terminated in a representative load both with respect to impedance matching and paths to earth via power connections.	$\checkmark$
9	Dress mains cord according to standard (see below). Drape all other cables over the edge of the table at the rear of the EUT, and bundle the excess in the center to ensure ~40 cm above the ground plane (floor). Bundles should be ~30-40 cm in length.	V
10	Verify appropriate test antenna is being used. The central point of the EUT arrangement shall be positioned at the center of the turntable. The measurement distance is the shortest horizontal distance between an imaginary circular periphery just encompassing this arrangement and the calibration point of the antenna.	
11	Ensure proper correction factors and limit lines are selected on receiver.	
12	Ensure highest clock frequency used in EUT is known and taken into account to determine required frequency range. (Less than 108 MHz: 1 GHz, 108-500 MHz: 2 GHz, 500-1000 MHz: 5 GHz, greater than 1 GHz: 5 x fundamental up to 40 GHz for FCC and 6 GHz for CISPR22.) Above 1 GHz, average and peak Limits exist.	V
13	For average measurements, it is recommended to use receiver mode. If using spectrum analyzer mode for average measurements, be careful to provide sufficient sweep time to ensure accurate results.	$\checkmark$
14	For all measurements, it may be necessary to investigate individual emissions for periodic nature and insure adequate dwell time to obtain an accurate reading.	$\checkmark$
15	Since broadband emissions sources can at times look like the noise floor, when making measurements of these types of emission sources, be extra careful in making sure the signals to be measured have sufficient S/N ratio to provide valid measurements.	V
16	<ul> <li>EUT is measured in all typical operational modes. Give special attention to modes where there is a potentially significant difference in spectral emissions.</li> <li>Amplifiers are exercised up to maximum power.</li> <li>Consider ports that may require active loads or signal sources to properly exercise the port and produce electrical traffic and emissions.</li> <li>Ports may need to be activated (source selected) to "wake up" electrical signals and produce emissions.</li> </ul>	V
17	Vary antenna height, antenna polarization, turn-table position, user controls, and connecting cable positions to obtain the worst case emissions, within the range of anticipated end user configurations. Cables are not positioned on top of, or under, the system components unless required by design.	V
18	Document the six worst case test result peaks using instrument software and or test template. Exclusions include peaks 20 dB or more below the limit and or system noise floor measurements.	
19	Document all equipment used during the test. If tripod mounted antennas are used in the multi-GHz range, document the antenna positioning method and height scan range in the report.	V
20	Take picture(s) of worst case test set up.	



### Data Collection:

Ref Level 6 Att PS PA TDF 1Pk View 2	57.00 dBµV/m 0 dB		🔵 RBW (CISPR) :	190 kuz			, i i i i i i i i i i i i i i i i i i i
PS PA TDF	0 dB	<b>SWT</b> 133 m		120 KH2			
		. <b>OWI</b> 100 H	ns VBW	1 MHz Mod	e Sweep	Input 1 D	с
)1Pk View⊝2							
	Pk View						
Limit Ch		100 M	1H2PASS	M1[1]			15.97 dBµV/m
60 d <mark>βμγ@n-c-c</mark>	:15B		PASS				54.9315 MHz
50 dBµV/m				M2[2]			20.39 dBµV/n
JU цвµ∨/ш— ¦					1		150.9687 MH
					1		
CC15B					1		
30 dBµV/m						MH	
			M2	M3			
🗢 dBµV/m—	<u>M1</u>				Ande Lange of the other	n-Astronomic and a starting	
	and a state of			AL AN HULLING MADE	Part of the second second		
10 dBµV/m <sup>3</sup> ****			<u>,</u>		1		
; 0 dBµV/m							
					1		
-10 dBµV/m—				   	1		
					1		
-20 dBµV/m—					1		
					1		
-30 dBµV/m—					1		
Start 30.0 M	Hz		16168 pt	ts			Stop 1.0 GHz
/larker							
Type   Ref	Trc	X-value	Y-value	Function		Function	Result
M1	1	54.9315 MHz					
M2	2	150.9687 MHz					
M3	1	209.1533 MHz					
M4	1	496.6233 MHz	24.78 dBµV/m				
				Measuring		1444	10.03.2020

Date: 10.MAR.2020 10:12:01

CISPR 32&11 @ 3 Meters and FCC B Class B @ 3 Meters											
MK	Emission	Measured	Measured	CISPR 32&11		FCC B		Table	Receiving Antenna		Notes / Mode
#	Frequency	Amplitude	Amplitude	Limit	Margin	Limit	Margin	Azimuth	Pol	Height	
	(MHz)	(dBµV/m)	(dBµV/m)	(dBµV/m)	(dB)	(dBµV/m)	(dB)	(0°closest	(H/V)	(Meters)	
		QP	Peak	QP	QP	QP	QP	to ant)			
1	54.932	9.60	26.50	40.0	30.4	40.0	30.4	251	V	1.00	Fully depleted batteries in earbud and charging case.
2	150.969	10.80	17.80	40.0	29.2	43.5	32.7	0	Н	1.49	Fully depleted batteries in earbud and charging case.
3	209.153	15.60	22.30	40.0	24.4	43.5	27.9	67	V	1.00	Fully depleted batteries in earbud and charging case.
4	496.623	15.60	22.40	47.0	31.4	46.0	30.4	359	V	1.00	Fully depleted batteries in earbud and charging case.



Receiver	Spectru	m 🛛							
Ref Level (	57.00 dBµV/m		RBW (CISPR)	120 kHz					
🖷 Att	0 dB	<b>SWT</b> 133 ms	v BW	1 MHz Mo	<b>de</b> Sweep	Input	1 DC		
PS PA TDF						•			
<mark>⊝</mark> 1Pk View <b>⊝</b> 2	Pk View								
Limit Ch		100 MF	12PASS	M1[1]					dBµV/m
60 d <mark>Bկի@ne-c-c</mark>	15B		PASS						581 MHz
				M2[1]					dBµV/m
50 dBµV/m								63.62	220 MHz
						-		1	
FCC15B						1		1	
30 dBµV/m	M1						MЗ	1	
	💫 🐺					i.	Jake In	L	and the second second
<ul> <li>dBµV/m→</li> </ul>					i Alite a dilatantani	Wild all all a little	Part -	and the second second	
and the second sec	and Maria			العلولة فللعصاء والمدين فأنواه	and the strength of the strength	and a state of the			
10 dBµV/m		instantin in the bills	And the second se	And a second second					
								1	
0 dBµV/m									
-10 dBµV/m—									
						-			
-20 dBµV/m—						1		1	
-30 dBµV/m—						-		1	
Start 30.0 M	<u> </u>		16168 p	 tc				Stop 1	L.O GHz
Marker	116		10100 h					0.001	
Type   Ref	Trc X	(-value	Y-value	Function	1	Funct	ion Pe	scult	
M1		47.6581 MHz	27.90 dBµV/m	i anction	-	i unct		ssuit	
M2			25.20 dBµV/m						
	1	63.622 MHz	uopy/iii						
M3		554.2308 MHz	29.34 dBµV/m						

#### Date: 10.MAR.2020 12:10:44

	CISPR 32&11 @ 3 Meters and FCC B Class B @ 3 Meters											
MK	Emission	Measured	Measured	CISPR 32&11		FCC B		Table	Receiving Antenna		Notes / Mode	
#	Frequency	Amplitude	Amplitude	Limit	Margin	Limit	Margin	Azimuth	Pol	Height		
	(MHz)	(dBµV/m)	(dBµV/m)	(dBµV/m)	(dB)	(dBµV/m)	(dB)	(0°closest	(H/V)	(Meters)		
		QP	Peak	QP	QP	QP	QP	to ant)				
1	47.920	24.50	27.90	40.0	15.5	40.0	15.5	360	V	1.00	Long amazon cable resistive loads installed in earbuds to ensure max charging rate	
2	63.587	27.70	29.80	40.0	12.3	40.0	12.3	0	V	1.00	Long amazon cable resistive loads installed in earbuds to ensure max charging rate	
3	554.231	19.60	26.50	47.0	27.4	46.0	26.4	256	н	1.00	Long amazon cable resistive loads installed in earbuds to ensure max charging rate	



_805E

### Limits:

	Freq Range	Lim	nits (dBuV QF	<b>D</b> <sup>1</sup> )	Comments
Standard	(MHz)	Clas	ss A	Class B	Measurements above 1 GHz are made using
		10 m	3 m 2	3 m	average and peak detectors.
	30-88	39	49	40	Mains cables draped to floor, not bundled.
FCC 15B	88-216	43.5	53.5	43.5	*For measurements above 1 GHz, peak
FCC 15B	216-960	46.5	56.5	46	Limits must also be met that are 20 dB
	>960	49.5*	59.5*	54*	higher than average Limits.
			Class A	Class B	Mains cables bundled not draped to floor.
			3 m	3 m	*For measurements above 1 GHz, peak
	30-230		50	40	Limits must also be met that are 20 dB
CISPR 32	230-1000		57	47	higher than average Limits.
CISER 32	Freq Range				*Not included in CISPR 11
	(GHz)				
	1-3		56*	50*	
	3-6		60*	54*	
E	andwidth and De				
Freq. Range (MHz)	Freq. Range (MHz) RBW (kHz)		Detector		
30 – 1000	30 – 1000 120 >300 QP		P		
> 1000	1000	>1000	Pk and	AVG	

## **Equipment Used:**

TN	Description	Model	S/N	Manufacturer	Most Recent Calibration	Calibration Due Date	Most Recent Verification	Verification Due Date
1375	System Controller	SC99V	050905- 1	Sunol Sciences Corp				
2319	EMI Test Receiver	ESR26	101276	Rohde & Schwarz	26-Mar- 2019	25-Mar- 2020		
1541	Antenna 30MHz - 6GHz	JB6	A050807	Sunol Sciences Corp	10-Dec- 2019	09-Dec- 2020		
3062	RF Cable DC- 18GHz, low loss LL142 coax, 26 feet, "N" connectors	SCE18110505- 312	N/A	Fairview Microwave[2]	26-Jul-2018		13-Aug-2019	12-Aug- 2020
2077	PreAmplifier	N/A	N/A	Bose Corporation			13-Aug-2019	12-Aug- 2020

### Uncertainty:

Bose Corporation, 1 New York Ave, Framingham, MA 01701, USA Tel: (508) 766-6000 Fax: (508) 766-1145 Without written permission of laboratory, this report shall not be reproduced except in full. Report Number: EMC.BL3L.2020.99.1



Uncertainty Budget							
Title:	Radiat	ed RF Emissio	ons (30MH	z-1GHz)			
Source of Uncertainty	Value units:± dB	Distribution	Divisor	Uncertainty (± dB)			
Receiver - absolute level	0.3	Rect.	1.73	0.17			
Receiver - frequency response	0.8	Rect.	1.73	0.46			
Receiver - attenuator switching	0.2	Rect.	1.73	0.12			
Receiver - bandwidth switching	0.2	Rect.	1.73	0.12			
Receiver - display	0.5	Rect.	1.73	0.29			
Antenna factor	0.8	Norm.	2.00	0.38			
Antenna directivity	1.0	Norm.	2.00	0.50			
Preamp correction factor	0.5	Norm.	2.00	0.25			
Cable correction factor	0.5	Norm.	2.00	0.25			
Site imperfection - NSA	4.0	Triang.	2.45	1.63			
Test table impact	1.1	Rect.	1.73	0.64			
				1			
	Comb	ined uncertair	ity (RSS):	1.98			
	Cov	verage factor (	2 sigma):	2.00			
Exte	ended uncert	ainty (95% coi	nfidence):	3.97			





# **Radiated Spurious Emissions 1-25GHz**

Project code name:		Marketing name:			Model#:	BL3L	
Project number (Integrity):	BL3L	Build Phase:	C2.5				
Tested by:	N. Sanford		Date:	12Mar2020			
Requirements Standard(s):	CISPR32, FCC	part 15B	Referenced S				
EUT powered with:	Battery	Temp / Humidity:	N/A	Test locatio	on: Marco	oni Manor	
Test equipment used TN's:	1663,2373,2479	,2357,2602,2349,241	4,2385,1757,159	96,2368			
EUT Serial number(s):	Left Earbud: L15	Left Earbud: L1520					
EUT Software installed:	0.3.8	0.3.8					
EUT Modification(s):	USB Debug wire	es were attached to th	he earbud to allow	v control of the	e radio.		

### Conclusion:

The Bose model BL3L passes radiated emissions from 1-25GHz by 5.5dB.

### Transmit Settings

CFG TX POWER = 10 Basic Rate = CFG PKT 15/339 EDR = CFG PKT 31/1020 TX DATA1 set frequency





# Test Checklist:

No.	ITEM (√ or n/a) →	OK
1	This checklist is intended to be a reminder of some highlights from the standards listed above, and not a step by	
	step procedure. You must be familiar with the listed standards prior to using this checklist.	
2	Check EUT performance, confirm proper mains voltage prior to testing.	
3	Using the Test Setup Verification section on this document perform verification check. Note: Six ferite panels placed under the six middle cones, check 3-meter distance horn to front edge of turntable. Remove all non-essential items from the 3m chamber. Check bore-site (tilt) option set to on in the mast controller.	$\checkmark$
4	If EUT has an intentional radiator at 2.4GHz or 5GHz notch filters should be placed before the pre-amp to prevent its overload. Modify correction factor set in the receiver to include notch filter used.	$\checkmark$
5	Place EUT on turntable with the rear of the unit aligned with the table edge closest to the antenna (maintain ~10 cm spacing between components). Connect the cables, accessories, and loads that would be utilized in a nominal configuration (judgment can be used to determine the minimum number of accessories required to achieve the maximum level of emissions). Telescoping antennas should be fully extended and vertical. If this is an initial test of a system, decide what nominal configuration setup should be, bundle cables, and take a picture to ensure future tests are performed using same configuration. For formal reports record type and length of cables used.	V
6	At least one of each type of EUT I/O port shall have a customer intent cable connected to it. Investigate all surfaces (top, bottom, sides, and front) for I/O ports not in the main cluster. Examples of ports that may not be in the main cluster of jacks are headphone jacks or convenience jacks on the front of the EUT. <b>Document cable configuration used for the test (describe cables used and take picture(s)).</b>	V
7	Dress mains cord according to standard (see below). Drape all other cables over the edge of the table at the rear of the EUT, and bundle the excess in the center to ensure ~40 cm above the ground plane (floor). Bundles should be ~30-40 cm in length.	$\checkmark$
8	Ensure highest clock frequency used in EUT is known and taken into account to determine required frequency range. (Less than 108 MHz: 1 GHz, 108-500 MHz: 2 GHz, 500-1000 MHz: 5 GHz, greater than 1 GHz: 5 x fundamental up to 40 GHz for FCC and 6 GHz for CISPR22 and CISPR32.) For measurements above 1 GHz, both average and peak limits exist.	V
9	For average measurements, it is generally recommended to use receiver mode. If using spectrum analyzer mode for average measurements, be careful to provide sufficient sweep time to ensure accurate results.	$\checkmark$
10	EUT is measured in all typical operational modes. Give special attention to modes where there is a potentially significant difference in spectral emissions. Amplifiers are exercised up to maximum power. Vary, antenna polarization, turn-table position, user controls, and cable positions, to obtain the worst case emissions, within the range of likely configurations. Cables are not positioned on top of, or under, the system components unless required by design.	V
11	Document the six worst case test result peaks using instrument software and or test template. Exclusions include peaks 20 dB or more below the limit and or system noise floor measurements.	
12	Document all equipment used during the test.	
13	Take picture(s) of worst case test set up.	



BASE	

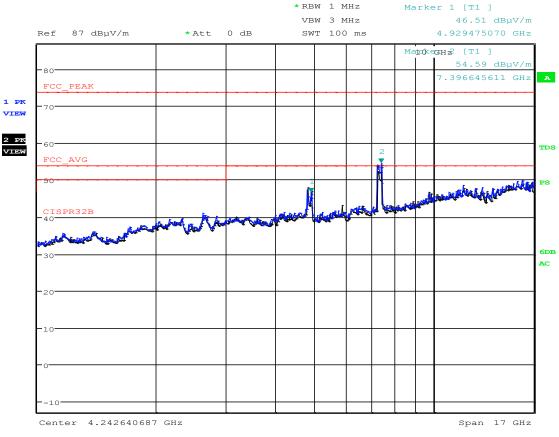
## Data Collection:

	FCC 15B Class B Product (Residential) @ 3 Meters									
Emission	Measured	Measured		FCC 15E	3		Table	Rece	eiving Ant	
Frequency	Amplitude	Amplitude	Limit	Limit	Margin	Margin	Azimuth	Pol	Height	
(MHz)	(dBµV/m)	(dBµV/m)	(dBµV/m)	(dBµV/m)	(dB)	(dB)	(0° closest	(H/V)	(Meters)	
	AVG	Peak	AVG	Peak	AVG	Peak	to ant)			Notes/Mode
4804.000	45.60	52.00	54.0	74.0	8.4	22.0	219	V	1.1	BL3L, Basic Rate
7206.000	47.50	54.70	54.0	74.0	6.5	19.3	235	V	1.4	BL3L, Basic Rate
4882.000	40.90	48.50	54.0	74.0	13.1	25.5	226	V	1.3	BL3L, Basic Rate
7323.000	48.50	55.70	54.0	74.0	5.5	18.3	234	V	1.5	BL3L, Basic Rate
4960.000	43.80	50.50	54.0	74.0	10.2	23.5	213	V	1.2	BL3L, Basic Rate
7440.000	47.80	55.10	54.0	74.0	6.2	18.9	229	V	1.4	BL3L, Basic Rate
4804.000	45.20	51.20	54.0	74.0	8.8	22.8	219	V	1.1	BL3L, EDR
7206.000	44.80	54.70	54.0	74.0	9.2	19.3	235	V	1.4	BL3L, EDR
4882.000	38.60	48.80	54.0	74.0	15.4	25.2	226	V	1.3	BL3L, EDR
7323.000	46.60	56.30	54.0	74.0	7.4	17.7	234	V	1.5	BL3L, EDR
4960.000	41.20	50.40	54.0	74.0	12.8	23.6	213	V	1.2	BL3L, EDR
7440.000	45.90	55.70	54.0	74.0	8.1	18.3	229	V	1.4	BL3L, EDR
19216.000	34.80	47.00	54.0	74.0	19.2	27.0				Noise Floor
21618.000	37.00	49.60	54.0	74.0	17.0	24.4				Noise Floor
24020.000	39.40	52.50	54.0	74.0	14.6	21.5				Noise Floor
19536.000	33.10	46.10	54.0	74.0	20.9	27.9				Noise Floor
21978.000	36.20	49.20	54.0	74.0	17.8	24.8				Noise Floor
24420.000	39.30	52.30	54.0	74.0	14.7	21.7				Noise Floor
19840.000	34.30	46.50	54.0	74.0	19.7	27.5				Noise Floor
22320.000	36.50	49.20	54.0	74.0	17.5	24.8				Noise Floor
24800.000	39.00	52.80	54.0	74.0	15.0	21.2				Noise Floor

Readings taken in test mode which enable much higher duty cycle than is possible in real world usage. Average readings were taken in this mode.



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Left Earbud, hopping on all channels, Basic Rate



A	

## Limits:

	Freq Range	Limits (dBuV QP <sup>1</sup> )			Comments
Standard	(MHz)	Clas	ss A	Class B	Measurements above 1 GHz are made using
		10 m	3 m	3 m	average and peak detectors.
	30-88	39	49	40	Mains cables draped to floor, not bundled.
FCC 15B	88-216	43.5	53.5	43.5	*For measurements above 1 GHz, peak
FCC ISB	216-960	46.5	56.5	46	limits must also be met that are 20 dB
	>960	49.5*	59.5*	54*	higher than average limits.
E	Bandwidth and D	etector Setting	S:		
Freq. Range (MHz)	RBW (kHz)	VBW (kHz)	Detector		
30 – 1000	120	>300	QP		]
> 1000	1000	>1000	Pk and	d AVG	

### Procedure:

Per 558074 D01 15.247 Meas Guidance v05r02:

Taking a RMS average measurement while the EUT is transmitting in operational duty cycle – The RMS average detector of a spectrum analyzer can be used for making average measurements with the EUT operating on its operational duty cycle. If the EUT supports more than one operational duty cycle the worst-case value should be used, i.e., the highest operational duty cycle. The measured RMS value using this method is compared against the limits and no other corrections are permitted.

The spectrum analyzer settings shall meet the requirements of ANSI C63.10 for making Average measurements. This measurement refers to spectrum analyzer settings in either 11.12.2.5.2 or 11.12.2.5.3 in ANSI C63.10; except when using 11.12.2.5.2, set Trace mode = Max Hold and the measurement correction factor in 11.12.2.5.2 i) is not added.





## Equipment Used:

•	•				Maat		Maat	
TN	Description	Model	S/N	Manufacturer	Most Recent Calibration	Calibration Due Date	Most Recent Verification	Verification Due Date
1663	EMI Test Receiver	ESU40	100098	Rohde & Schwarz	24-Mar- 2020	24-Mar- 2021		
2373	RF Cable 30MHz- 18GHz - 25 feet "N"	TRU-300	N/A	TRU Corporation			12-Nov- 2014	
2479	RF cable 30MHz- 18GHz	257-257- 3052640	N/A	SRC Haverhill			12-Mar- 2020	12-Mar- 2021
2357	RF Cable 30MHz- 18GHz	TRU-300	TRU- 12707-03	TRU Corporation			12-Mar- 2020	12-Mar- 2021
2602	Miteq pre- amp 1- 18GHz 35dB	AFS42- 01001800-28- 10P-42	N/A	Miteq			19-Jun-2019	18-Jun-2020
2349	Double Ridge Waveguide Horn Antenna 1- 18GHz	3117	00152406	ETS Lindgren	30-Jan- 2020	29-Jan- 2021		
2414	Band Reject Filter (2.4GHz)	BRM50702-07	003	Micro-Tronics	13-Jan- 2015		05-Mar- 2019	04-Mar- 2020
2385	Marconi Manor	3 Meter Semi Anechoic Chamber	N/A	AP Americas			29-Oct-2019	28-Oct-2020
2929	Mini-circuits band-edge pre-amp 300 MHz - 8 GHz 20 dB	ZX60HV-83LN+	N/A	Mini-Circuits			17-Dec- 2018	17-Dec- 2019
1757	18GHz- 40GHz Preamp	JS4018004000- 30-8P-A1	1406279	Miteq			18-Jun-2019	17-Jun-2020
1596	Horn Antenna 18GHz - 26.5GHz	AT4640	309234	Amplifier Research				
2368	RF Cable 30MHz- 26.5GHz	TRU-210	TRU- 12767-35	TRU Corporation			12-Mar- 2020	12-Mar- 2021



### Uncertainty:

Uncerta	inty Budget			
Title:	Radiated	d Emissions (>	•1GHz)	
Source of Uncertainty	Value	Distribution	Divisor	Uncertainty
	units:± dB			(± dB)
Receiver - absolute level	0.3	Rect.	1.73	0.17
Receiver - frequency response	2.0	Rect.	1.73	1.16
Receiver - attenuator switching	0.2	Rect.	1.73	0.12
Receiver - bandwidth switching	0.2	Rect.	1.73	0.12
Receiver - display	0.5	Rect.	1.73	0.29
Antenna factor	0.4	Norm.	2.00	0.20
Antenna directivity	1.0	Norm.	2.00	0.50
Preamp correction factor	0.5	Norm.	2.00	0.25
Cable correction factor	0.5	Norm.	2.00	0.25
Site imperfection - NSA	3.0	Triang.	2.45	1.22
Test table impact	1.7	Rect.	1.73	0.98
	Comb	ined uncertair	nty (RSS):	2.09
	Co	verage factor (	(2 sigma):	2.00
Ext	ended uncert	ainty (95% coi	nfidence):	4.17



E	THE	

# **Radiated Band Edge**

Project code name:		Marketing name:			Model#:	BL3L	
Project number (Integrity):	BL3L	Build Phase:	C2.5				
Tested by:	N. Sanford		Date:	20Mar2020			
Requirements Standard(s):	CISPR32, FCC part 15B		Referenced Standard(s):				
EUT powered with:	Battery	Temp / Humidity:	N/A Test location		on: Marco	on: Marconi Manor	
Test equipment used TN's:	1663,2373,2479	,2357,2349,2385, 29	29				
EUT Serial number(s):	Right Earbud: R	3393					
EUT Software installed:	0.3.8	0.3.8					
EUT Modification(s):	USB Debug wire	es were attached to th	e earbud to allow	w control of the	e radio.		

### Conclusion:

The Bose model BL3L passes Radiated Band Edge by 16.1dB.

### Transmit Settings

CFG TX POWER = 10 Basic Rate = CFG PKT 15/339 EDR = CFG PKT 31/1020 TX DATA1 set frequency





# Test Checklist:

No. 1 2	ITEM $(\sqrt{\text{ or n/a}}) \rightarrow$ This checklist is intended to be a reminder of some highlights from the standards listed above, and not a step by step procedure. You must be familiar with the listed standards prior to using this checklist.Check EUT performance, confirm proper mains voltage prior to testing.	OK √
2	step procedure. You must be familiar with the listed standards prior to using this checklist.	
	Check EUT periorinance, commini proper mains vollage phorito testing.	
	Using the Test Setup Verification section on this document perform verification check. Note: Six ferite panels	
3	placed under the six middle cones, check 3-meter distance horn to front edge of turntable. Remove all non-	
	essential items from the 3m chamber. Check bore-site (tilt) option set to on in the mast controller.	
4	If EUT has an intentional radiator at 2.4GHz or 5GHz notch filters should be placed before the pre-amp to prevent	
4	its overload. Modify correction factor set in the receiver to include notch filter used.	
	Place EUT on turntable with the rear of the unit aligned with the table edge closest to the antenna (maintain ~10	
	cm spacing between components). Connect the cables, accessories, and loads that would be utilized in a nominal	
	configuration (judgment can be used to determine the minimum number of accessories required to achieve the	
5	maximum level of emissions). Telescoping antennas should be fully extended and vertical. If this is an initial test	
	of a system, decide what nominal configuration setup should be, bundle cables, and take a picture to	
	ensure future tests are performed using same configuration. For formal reports record type and length of	
	cables used.	
	At least one of each type of EUT I/O port shall have a customer intent cable connected to it. Investigate all	$\checkmark$
6	surfaces (top, bottom, sides, and front) for I/O ports not in the main cluster. Examples of ports that may not be in	
	the main cluster of jacks are headphone jacks or convenience jacks on the front of the EUT.	
	Document cable configuration used for the test (describe cables used and take picture(s)).	
7	Dress mains cord according to standard (see below). Drape all other cables over the edge of the table at the rear of the EUT, and bundle the excess in the center to ensure ~40 cm above the ground plane (floor). Bundles should	$\checkmark$
1	be $\sim$ 30-40 cm in length.	
	Ensure highest clock frequency used in EUT is known and taken into account to determine required	
	frequency range. (Less than 108 MHz: 1 GHz, 108-500 MHz: 2 GHz, 500-1000 MHz: 5 GHz, greater than 1 GHz:	v
8	5 x fundamental up to 40 GHz for FCC and 6 GHz for CISPR22 and CISPR32.) For measurements above 1 GHz,	
	both average and peak limits exist.	
	For average measurements, it is generally recommended to use receiver mode. If using spectrum analyzer	
9	mode for average measurements, be careful to provide sufficient sweep time to ensure accurate results.	•
	EUT is measured in all typical operational modes. Give special attention to modes where there is a potentially	
	significant difference in spectral emissions. Amplifiers are exercised up to maximum power. Vary, antenna	
10	polarization, turn-table position, user controls, and cable positions, to obtain the worst case emissions, within the	
	range of likely configurations. Cables are not positioned on top of, or under, the system components unless	
	required by design.	
11	Document the six worst case test result peaks using instrument software and or test template. Exclusions include	
11	peaks 20 dB or more below the limit and or system noise floor measurements.	
12	Document all equipment used during the test.	
13	Take picture(s) of worst case test set up.	



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## Data Collection:

FCC 15B Class B Product (Residential) @ 3 Meters										
Emission	Measured	Measured	FCC 15B Table Receiving Ant							
Frequency	Amplitude	Amplitude	Limit	Limit	Margin	Margin	Azimuth	Pol	Height	
(MHz)	(dBµV/m)	(dBµV/m)	(dBµV/m)	(dBµV/m)	(dB)	(dB)	(0° closest	(H/V)	(Meters)	
	AVG	Peak	AVG	Peak	AVG	Peak	to ant)			Notes/Mode
2390.000	28.80	42.10	54.0	74.0	25.2	31.9	0	Н	1.5	BL3L, Basic Rate, transmitting only on lowest channel
2483.500	33.80	54.70	54.0	74.0	20.2	19.3	0	Н	1.5	BL3L, Basic Rate, transmitting only on lowest channel
2390.000	29.00	42.20	54.0	74.0	25.0	31.8	0	Н	1.5	BL3L, Basic Rate, while hopping on all channels
2483.500	34.00	54.70	54.0	74.0	20.0	19.3	0	Н	1.5	BL3L, Basic Rate, while hopping on all channels
2390.000	28.80	42.30	54.0	74.0	25.2	31.7	0	Н	1.5	BL3L, EDR, transmitting only on lowest channel
2483.500	35.10	56.70	54.0	74.0	18.9	17.3	0	Н	1.5	BL3L, EDR, transmitting only on lowest channel
2390.000	29.90	42.40	54.0	74.0	24.1	31.6	0	Н	1.5	BL3L, Basic Rate, while hopping on all channels
2483.500	35.20	57.90	54.0	74.0	18.8	16.1	0	Н	1.5	BL3L, Basic Rate, while hopping on all channels



Marker 1 [T1 ]

101.20 dBuV/m

\*RBW 1 MHz

VBW 3 MHz

Ref 90 dBµV/m \*Att 0 dB SWT 2.5 ms 2.402269**2**31 GHz 90 80 15247в 1 PK VIEW TDS 60 15247в PS 50 ALLAN all<u>o</u>Arr. 6DB AC 30 -20 10 -10 Start 2.384 GHz 2 MHz/ Stop 2.404 GHz Lower Band edge, Basic Rate \*RBW 1 MHz Marker 1 [T1 ] VBW 3 MHz 100.09 dBµV/m 2.480070513 GHz Ref 90 dBuV/m \*Att 0 dB SWT 2.51ms 90 A 80 15247в 1 PK VIEW TDS 60 15247BEA PS Winner half nint and a link the files 6DB AC -30 20 10 -10 Center 2.4735 GHz Span 50 MHz 5 MHz/

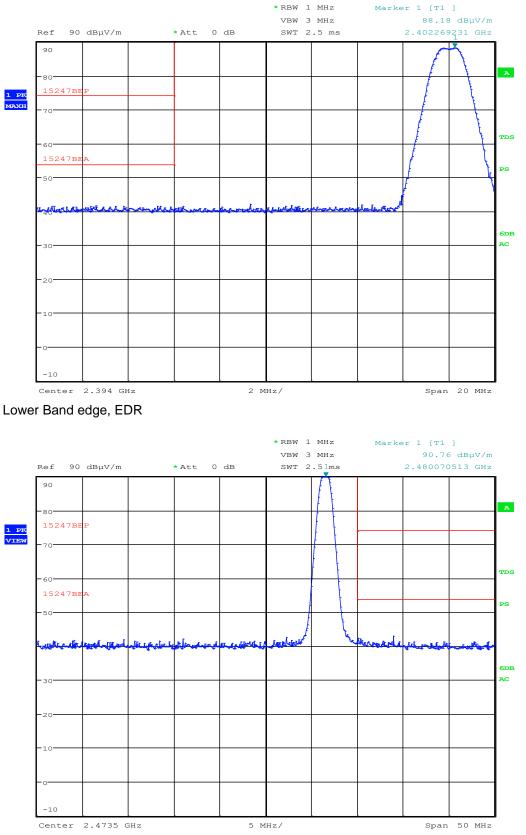
Upper Band edge, Basic Rate

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Upper Band edge, EDR

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### Limits:

	Freq Range	Limits (dBuV QP <sup>1</sup> )			Comments
Standard	(MHz)	Class A		Class B	Measurements above 1 GHz are made using
		10 m	3 m	3 m	average and peak detectors.
	30-88	39	49	40	Mains cables draped to floor, not bundled.
FCC 15B	88-216	43.5	53.5	43.5	*For measurements above 1 GHz, peak
FCC 15B	216-960	46.5	56.5	46	limits must also be met that are 20 dB
	>960	49.5*	59.5*	54*	higher than average limits.
			Class A	Class B	Mains cables bundled not draped to floor.
			3 m	3 m	*For measurements above 1 GHz, peak
	30-230		50	40	limits must also be met that are 20 dB
CISPR 32	230-1000		57	47	higher than average limits.
CISER 32	Freq Range				
	(GHz)				
	1-3		56*	50*	
	3-6		60*	54*	
Bandwidth and Detector Settings:					
Freq. Range (MHz)	RBW (kHz)	VBW (kHz)	Detector		
30 – 1000	120	>300	QP		
> 1000	1000	>1000	Pk and	d AVG	

## Equipment Used:

TN	Description	Model	S/N	Manufacturer	Most Recent Calibration	Calibration Due Date	Most Recent Verification	Verification Due Date
1663	EMI Test Receiver	ESU40	100098	Rohde & Schwarz	24-Mar-2020	24-Mar- 2021		
2479	RF cable 30MHz-18GHz	257-257- 3052640	N/A	SRC Haverhill			12-Mar-2020	12-Mar-2021
2357	RF Cable 30MHz-18GHz	TRU-300	TRU- 12707-03	TRU Corporation			12-Mar-2020	12-Mar-2021
2349	Double Ridge Waveguide Horn Antenna 1-18GHz	3117	00152406	ETS Lindgren	30-Jan-2020	29-Jan-2021		
2385	Marconi Manor	3 Meter Semi Anechoic Chamber	N/A	AP Americas			29-Oct-2019	28-Oct-2020
2929	Mini-circuits band-edge pre- amp 300 MHz - 8 GHz 20 dB	ZX60HV- 83LN+	N/A	Mini-Circuits			17-Dec-2019	17-Dec-2020



### Uncertainty:

Uncertainty Budget							
Title:	Radiated						
Source of Uncertainty	Value	Distribution	Divisor	Uncertainty			
	units:± dB			(± dB)			
Receiver - absolute level	0.3	Rect.	1.73	0.17			
Receiver - frequency response	2.0	Rect.	1.73	1.16			
Receiver - attenuator switching	0.2	Rect.	1.73	0.12			
Receiver - bandwidth switching	0.2	Rect.	1.73	0.12			
Receiver - display	0.5	Rect.	1.73	0.29			
Antenna factor	0.4	Norm.	2.00	0.20			
Antenna directivity	1.0	Norm.	2.00	0.50			
Preamp correction factor	0.5	Norm.	2.00	0.25			
Cable correction factor	0.5	Norm.	2.00	0.25			
Site imperfection - NSA	3.0	Triang.	2.45	1.22			
Test table impact	1.7	Rect.	1.73	0.98			
Combined uncertainty (RSS):							
Coverage factor (2 sigma):							
Extended uncertainty (95% confidence):							