

Report No.:	TW2302203-03E
Applicant:	Shenzhen Bilian Electronic Co.,Ltd.
Product:	802.11b/g/n 1T1R WLAN + Bluetooth 4.2 USB Module
Model No.:	BL-M8723DU4
Trademark:	N/A
Test Standards:	FCC Part 15.247
Test result:	It is herewith confirmed and found to comply with the requirements set up by ANSI C63.10, FCC Part 15.247 for the evaluation of electromagnetic compatibility

Approved By lem

Terry Tang

Manager

Dated:

March 02, 2023

Results appearing herein relate only to the sample tested The technical reports is issued errors and omissions exempt and is subject to withdrawal at

# SHENZHEN TIMEWAY TESTING LABORATORIES

Zone C, 1st Floor, Block B, Jun Xiang Da Building, Zhongshan Park Road West, Tong Le Village, Nanshan District, Shenzhen, China Tel (755) 83448688, Fax (755) 83442996, E-Mail:info@timeway-lab.com



# **Special Statement:**

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.

The testing quality system of our laboratory meet with ISO/IEC-17025 requirements, which is approved by CNAL. This approval result is accepted by MRA of APLAC.

Our test facility is recognized, certified, or accredited by the following organizations:

# CNAL-LAB Code: L2292

The EMC Laboratory has been assessed and in compliance with CNAL/AC01:2002 accreditation criteria for testing Laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of testing Laboratories.

# FCC-Registration No.: 744189

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 744189.

# Industry Canada (IC) — Registration No.: 5205A

The EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 5205A.

# A2LA (Certification Number:5013.01)

The EMC Laboratory has been accredited by the American Association for Laboratory Accreditation (A2LA). Certification Number:5013.01

# CAB identifier: CN0033

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#### 1.0 **General Details**

#### Test Lab Details 1.1 SHENZHEN TIMEWAY TESTING LABORATORIES. Name: Zone C, 1st Floor, Block B, Jun Xiang Da Building, Zhongshan Park Road West, Tong Le Address: Village, Nanshan District, Shenzhen, China Telephone: (755) 83448688 Fax: (755) 83442996 Site Listed with Federal Communications commission (FCC) Registration Number:744189 For 3m Anechoic Chamber Site Listed with Industry Canada of Ottawa, Canada Registration Number: IC: 5205A For 3m Anechoic Chamber 1.2 Applicant Details Applicant: Shenzhen Bilian Electronic Co., Ltd. Address: Room 501, Building 3, No. 32, Dafu Road, Zhangge Community, Fucheng Street, Longhua District, Shenzhen City, China Telephone: Fax: --

#### Description of EUT 1.3

Product:	802.11b/g/n 1T1R WLAN + Bluetooth 4.2 USB Module
Manufacturer:	Shenzhen Bilian Electronic Co.,Ltd.
Address:	Room 501, Building 3, No. 32, Dafu Road, Zhangge Community, Fucheng Street
	Longhua District, Shenzhen City, China
Trademark:	N/A
Model Number:	BL-M8723DU4
Additional Model Nu	mber: N/A
Hardware Version:	1.0
Software Version:	1.15
Serial No.:	LB202303130001
Type of Modulation	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK)
	IEEE 802.11g/n (HT20, HT40): OFDM (64QAM, 16QAM, QPSK, BPSK)
Frequency range	IEEE 802.11b/g/n (HT20): 2412-2462MHz;
	IEEE 802.11n HT40: 2422-2452MHz;
Channel Spacing	5MHz for IEEE 802.11b/g/n (HT20, HT40)
Air Data Rate	IEEE 802.11b: 11, 5.5, 2, 1 Mbps
	IEEE 802.11g; 54, 48.36, 24, 18, 12, 9, 6 Mbps

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	IEEE 802.11n HT20/HT40: mcs0-mcs7
Frequency Selection	By software
Channel Number	IEEE 802.11b/g/n (HT20): 11 Channels;
	IEEE 802.11n (HT40): 7 Channels;
Antenna:	PIFA Antenna provided to the EUT.
	with Gain 0.2dBi maximum (Get from the antenna specification)
Rating:	DC5.0V

- 1.4 Submitted Sample: 2 Samples
- 1.5 Test Duration 2023-02-20 to 2023-03-02
- 1.6 Test Uncertainty

Conducted Emissions Uncertainty =3.6dB Radiated Emissions below 1GHz Uncertainty =4.7dB Radiated Emissions above 1GHz Uncertainty =6.0dB Conducted Power Uncertainty =6.0dB Occupied Channel Bandwidth Uncertainty =5% Note: The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.

1.7 Test Engineer

Andy - Xing

The sample tested by

Print Name: Andy Xing

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2.0 Test Equipment					
Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	R&S	ESPI 3	100379	2022-07-15	2023-07-14
LISN	R&S	EZH3-Z5	100294	2022-07-18	2023-07-17
LISN	R&S	EZH3-Z5	100253	2022-07-18	2023-07-17
Impuls-Begrenzer	R&S	ESH3-Z2	100281	2022-07-18	2023-07-17
Loop Antenna	EMCO	6507	00078608	2022-07-18	2025-07-17
Spectrum	R&S	FSIQ26	100292	2022-07-15	2023-07-14
Horn Antenna	A-INFO	LB-180400-KF	J211060660	2022-07-18	2025-07-17
Horn Antenna	R&S	BBHA 9120D	9120D-631	2022-07-18	2024-07-17
Power meter	Anritsu	ML2487A	6K00003613	2022-07-18	2023-07-17
Power sensor	Anritsu	MA2491A	32263	2022-07-18	2023-07-17
Bilog Antenna	Schwarebeck	VULB9163	9163/340	2022-07-18	2025-07-17
9*6*6 Anechoic			N/A	2022-07-26	2025-07-25
EMI Test Receiver	RS	ESVB	826156/011	2022-07-15	2023-07-14
EMI Test Receiver	RS	ESCS 30	834115/006	2022-07-15	2023-07-14
Spectrum	HP/Agilent	E4407B	MY50441392	2022-07-15	2023-07-14
Spectrum	RS	FSP	1164.4391.38	2022-07-15	2023-07-14
RF Cable	Zhanadi	ZT26-NJ-NJ-8		2022-07-15	2023-07-14
KF Cable	Zhengdi	M/FA			
RF Cable	Zhengdi	7m		2022-07-15	2023-07-14
Pre-Amplifier	Schwarebeck	BBV9743	#218	2022-07-15	2023-07-14
Pre-Amplifier	HP/Agilent	8449B	3008A00160	2022-07-15	2023-07-14
LISN	SCHAFFNER	NNB42	00012	2022-08-18	2023-07-17

#### 2.2 Automation Test Software

#### For Conducted Emission Test

Name	Version
EZ-EMC	Ver.EMC-CON 3A1.1

#### For Radiated Emissions

Name	Version
EMI Test Software BL410-EV18.91	V18.905
EMI Test Software BL410-EV18.806 High Frequency	V18.06

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#### **3. DESCRIPTION OF TEST MODES**

#### IEEE 802.11b, 802.11g, 802.11n (HT20) mode

The EUT had been tested under operating condition. There are three channels have been tested as following:

Channel	Frequency (MHz)
Low	2412
Middle	2437
High	2462

IEEE 802.11b mode: 1Mbps data rate (worst case) was chosen for full testing. IEEE 802.11g mode: 6Mbps data rate (worst case) was chosen for full testing. IEEE 802.11n (HT20) mode: mcs0 (worst case) were chosen for full testing

#### IEEE 802.11n (HT40) mode

The EUT had been tested under operating condition. There are three channels have been tested as following:

Channel	Frequency (MHz)
Low	2422
Middle	2437
High	2452

IEEE 802.11n (HT40) mode: mcs0 data rate (worst case) were chosen for full testing

Note: During the test, the duty cycle was set up to >98%

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#### 3.0 **Technical Details**

#### 3.1 Summary of test results

Standard	Test Type	Result	Notes
FCC Part 15, Paragraph15.203	Antenna Requirement	Pass	Complies
FCC Part 15, Paragraph15.207	Conducted Emission Test	Pass	Complies
FCC Part 15 Subpart C Paragraph 15.247(a)(2) Limit	Spectrum bandwidth of a Orthogonal Frequency Division Multiplex System Limit: 6dB bandwidth>500kHz	Pass	Complies
FCC Part 15, Paragraph 15.247(b)	Maximum peak output power Limit: max. 30dBm	Pass	Complies
FCC Part 15, Paragraph 15.109,15.205 & 15.209	Transmitter Radiated Emission Limit: Table 15.209	Pass	Complies
FCC Part 15, Paragraph 15.247(e)	Power Spectral Density Limit: max. 8dBm/3kHz	Pass	Complies
FCC Part 15, Paragraph 15.247(d)	Out of Band Emission and Restricted Band Radiation Limit: 20dB less than peak value of fundamental frequency Restricted band limit: Table 15.209	Pass	Complies

#### 3.2 **Test Standards**

FCC Part 15 Subpart & Subpart C, Paragraph 15.247

#### 4.0 **EUT Modification**

No modification by SHENZHEN TIMEWAY TESTING LABORATORIES.

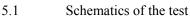
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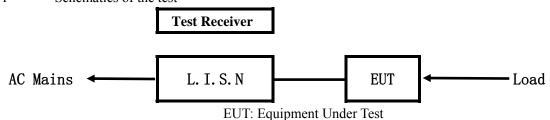
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# 5.0 Power Line Conducted Emission Test



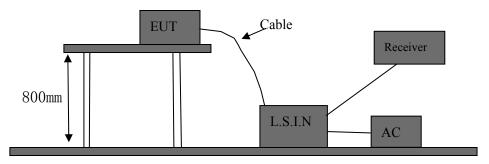


5.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.10-2013. The Frequency spectrum From 0.15MHz to 30MHz was investigated. The LISN used was 500hm/50uH as specified by section 5.1 of ANSI C63.10-2013.

Test Voltage: 120V~, 60Hz

Block diagram of Test setup



### 5.3 Configuration of the EUT

The EUT was configured according to ANSI C63.10-2013. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

A. EUT

Device	Manufacturer	Model	FCC ID	
802.11b/g/n 1T1R WLAN +	Shenzhen Bilian Electronic	BL-M8723DU4	2ALAV DI MOZZZDIJA	
Bluetooth 4.2 USB Module	Co.,Ltd.	BL-M8/23DU4	2AL6K-BL-M8723DU4	

### B. Internal Device

Device	Manufacturer	Model	FCC ID/DOC
N/A			

#### C. Peripherals

Device	Manufacturer	Model	FCC ID/DOC	Cable
PC	DELL	P54G		

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5.4 EUT Operating Condition Operating condition is according to ANSI C63.10-2013.

A Setup the EUT and simulators as shown on follow

B Enable AF signal and confirm EUT active to normal condition

#### 5.5 Power line conducted Emission Limit according to Paragraph 15.207

Frequency	Limits (dB µ V)				
(MHz)	Quasi-peak Level	Average Level			
$0.15 \sim 0.50$	66.0~56.0*	56.0~46.0*			
$0.50~\sim~5.00$	56.0	46.0			
$5.00 \sim 30.00$	60.0	50.0			

Notes: 1. \*Decreasing linearly with logarithm of frequency.

2. The tighter limit shall apply at the transition frequencies

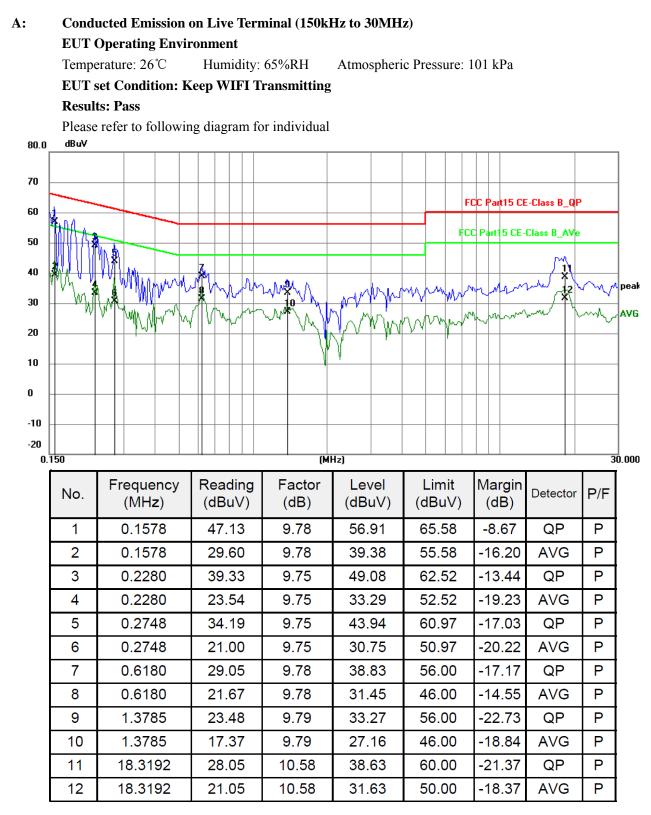
### 5.6 Test Results

The frequency spectrum from 0.15MHz to 30MHz was investigated. All reading are quasi-peak values with a resolution bandwidth of 9kHz.

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3:	Condu	icted Emission	on Neutral T	Germinal (15	0kHz to 30N	AHz)			
		<b>Operating Envi</b>				,			
	Tempe	erature: 26°C	Humidity:	65%RH	Atmospheri	c Pressure: 1	01 kPa		
	EUT s	set Condition: I	-						
	Result	ts: Pass							
	Please	refer to followi	ng diagram fo	or individual					
80.0	dBuV								
70									
-						F	CC Part15 Cl	E-Class B_QP	
60 <u>1</u>	41.4								
50						FC	C Part15 CE-	Class B_AVe	
40	$\mathbb{W}(\mathbb{W})$		7					M	
		", WWINN M	Mamp.	man		h mar	A m	WW XX	r pe
30 -		WWW PAR		Wr	Mary Marin	M Y	m m	w	m A
20 -					Mar and a start of the start of		W P		~ ~
10						V V			
0  -									
-10 -									
-20									
0.1	50			(MI					30.0
	No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
Γ	1	0.1578	46.85	9.78	56.63	65.58	-8.95	QP	Р
	2	0.1578	28.81	9.78	38.59	55.58	-16.99	AVG	Р
	3	0.2007	41.67	9.75	51.42	63.58	-12.16	QP	Р
	4	0.2007	24.51	9.75	34.26	53.58	-19.32	AVG	Р
	5	0.2280	39.68	9.75	49.43	62.52	-13.09	QP	Р
F	6	0.2280	24.29	9.75	34.04	52.52	-18.48	AVG	Р
F	7	0.6414	27.11	9.78	36.89	56.00	-19.11	QP	Р
ŀ	8	0.6414	20.06	9.78	29.84	46.00	-16.16	AVG	Р
ŀ	9	1.6515	22.57	9.80	32.37	56.00	-23.63	QP	Р
F	10	1.6515	16.89	9.80	26.69	46.00	-19.31	AVG	Р
ŀ	11	18.9120	25.35	10.61	35.96	60.00	-24.04		P
ŀ	12	18.9120	19.43	10.61	30.04	50.00	-19.96		P
L	14	10.0120				00.00	10.00		L '

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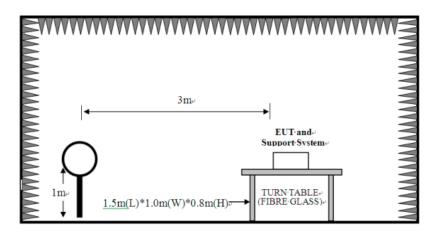


#### 6 Radiated Emission Test

- 6.1 Test Method and test Procedure:
- The EUT was tested according to ANSI C63.10-2013. The radiated test was performed at Timeway EMC Laboratory. This site is on file with the FCC laboratory division, Registration No. 744189
- (2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.10-2013.
- (3) The frequency spectrum from 30 MHz to 25 GHz was investigated. All readings from 30 MHz to 1 GHz are Quasi-peak values with a resolution bandwidth of 120 kHz. For measurement above 1GHz, peak values with RBW=1MHz VBW=3MHz and PK detector. AV value with RBW=1MHz, VBW=3MHz and RMS detector. Measurements were made at 3 meters.
- (4) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
- (5) Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a "**QP**" in the data table.
- (6) The antenna polarization: Vertical polarization and Horizontal polarization.

### Block diagram of Test setup

For radiated emissions from 9kHz to 30MHz



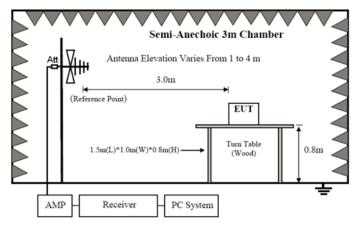
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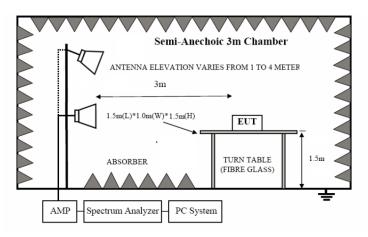
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For radiated emissions from 30MHz to1GHz



For radiated emissions above 1GHz



- 6.2 Configuration of the EUT Same as section 5.3 of this report
- 6.3 EUT Operating Condition Same as section 5.4 of this report.
- 6.4 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

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14.11

15 200

Frequencies in restricted band are complied to limit on Paragraph 15.209							
Frequency Range (MHz)	Distance (m)	Field strength (dB $\mu$ V/m)					

1 5 6 ( )		ũ ( )
0.009-0.490	3	20log(2400/F(kHz)) +40log (300/3)
0.490-1.705	3	20log(24000/F(kHz)) +40log (30/3)
1.705-30	3	69.5
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

Note: 1. RF Voltage (dBuV) = 20 log RF Voltage (uV)

2. In the Above Table, the higher limit applies at the band edges.

3. Distance refers to the distance in meters between the measuring instrument antenna and the EUT

4. Worse case were recorded in the test report. 802.11b was the worst case.

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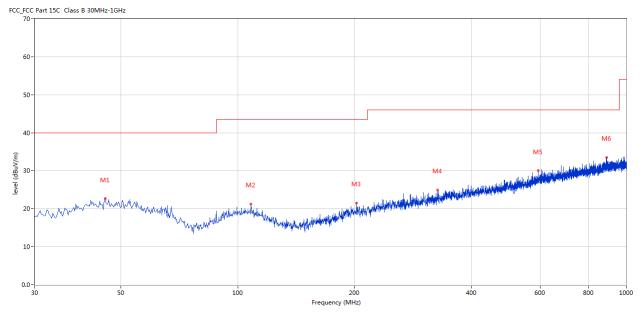
# Test result General Radiated Emission Data and Harmonics Radiated Emission Data

#### Radiated Emission In Horizontal (30MHz----1000MHz)

Pass

EUT set Condition: Keep Transmitting

**Results:** 



No.	Frequency	Results	Factor	Limit	Over	Detector	Table	Height	ANT	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	Limit (dB)		(o)	(cm)		
1	45.516	22.62	-11.39	40.0	-17.38	Peak	243.00	100	Horizontal	Pass
2	108.065	21.22	-13.42	43.5	-22.28	Peak	0.00	100	Horizontal	Pass
3	202.132	21.48	-13.40	43.5	-22.02	Peak	214.00	100	Horizontal	Pass
4	327.231	24.87	-10.32	46.0	-21.13	Peak	276.00	100	Horizontal	Pass
5	592.944	30.01	-5.19	46.0	-15.99	Peak	238.00	100	Horizontal	Pass
6	891.630	33.52	-1.93	46.0	-12.48	Peak	306.00	100	Horizontal	Pass

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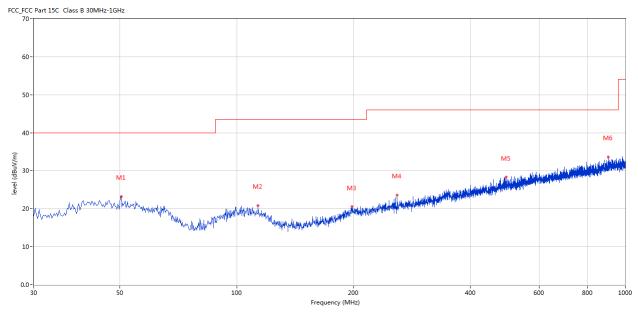
# **Test result** General Radiated Emission Data and Harmonics Radiated Emission Data

#### Radiated Emission In Vertical (30MHz----1000MHz)

Pass

EUT set Condition: **Keep Transmitting** 

**Results:** 



No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	ANT	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(o)	(cm)		
1	50.365	23.22	-11.39	40.0	-16.78	Peak	75.00	100	Vertical	Pass
2	113.399	20.87	-14.12	43.5	-22.63	Peak	334.00	100	Vertical	Pass
3	197.768	20.51	-13.50	43.5	-22.99	Peak	334.00	100	Vertical	Pass
4	258.863	23.61	-11.85	46.0	-22.39	Peak	109.00	100	Vertical	Pass
5	494.271	28.28	-7.12	46.0	-17.72	Peak	12.00	100	Vertical	Pass
6	903.024	33.59	-1.87	46.0	-12.41	Peak	2.00	100	Vertical	Pass

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#### Operation Mode: Transmitting under CH01 for 802.11b mode

Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB µ V/m)
4824.00	59.6 (PK) / 43.1 (AV)	Н	74(Peak)/ 54(AV)
4824.00	57.2 (PK) / 41.3 (AV)	V	74(Peak)/ 54(AV)
7236.00		H/V	74(Peak)/ 54(AV)
9648.00		H/V	74(Peak)/ 54(AV)
12060		H/V	74(Peak)/ 54(AV)
14472		H/V	74( eak)/ 54(AV)
16884		H/V	74(Peak)/ 54(AV)
19296		H/V	74(Peak)/ 54(AV)
21708		H/V	74(Peak)/ 54(AV)
24120		H/V	74(Peak)/ 54(AV)

#### Operation Mode: Transmitting under CH06 for 802.11b mode

Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB µ V/m)
4874.00	59.9 (PK)/ 44.0 (AV)	Н	74(Peak)/ 54(AV)
4874.00	57.7 (PK)/ 41.1 (AV)	V	74(Peak)/ 54(AV)
7311.00		H/V	74(Peak)/ 54(AV)
9748.00		H/V	74(Peak)/ 54(AV)
12185		H/V	74(Peak)/ 54(AV)
14622		H/V	74(Peak)/ 54(AV)
17059		H/V	74(Peak)/ 54(AV)
19496		H/V	74(Peak)/ 54(AV)
21933		H/V	74(Peak)/ 54(AV)
24370		H/V	74(Peak)/ 54(AV)

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Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB µ V/m)
4924	60.6 (PK)/ 43.9 (AV)	Н	74(Peak)/ 54(AV)
4924	57.9 (PK)/ 41.8 (AV)	V	74(Peak)/ 54(AV)
7368		H/V	74(Peak)/ 54(AV)
9848		H/V	74(Peak)/ 54(AV)
12310		H/V	74(Peak)/ 54(AV)
14772		H/V	74(Peak)/ 54(AV)
17234		H/V	74(Peak)/ 54(AV)
19696		H/V	74(Peak)/ 54(AV)
22158		H/V	74(Peak)/ 54(AV)
24620		H/V	74(Peak)/ 54(AV)

#### Operation Mode: Transmitting under CH11 for 802.11b mode

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

2. Remark "---" means that the emissions level is too low to be measured

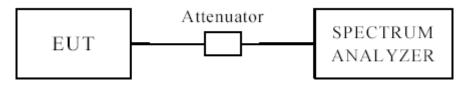
- 3. For 802.11b mode at 1Mbps
- 4. For radiated Emissions from 18-25GHz and below 30MHz, it is only the floor noise and less than the limit for more than 20dB. No necessary to take down.
- 5. Note: the final peak measurement results less than the AV limit. No necessary to take down the final AV measurement result

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7.0 6dB Bandwidth Measurement7.1 Test Setup



# 7.2 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is >500 kHz

# 7.3 Test Procedure

- 1. Set resolution bandwidth (RBW) = 100 kHz
- 2. Set the video bandwidth (VBW)  $\ge$  3 x RBW.
- 3. Detector = Peak.
- 4. Trace mode = max hold.
- 5. Sweep = auto couple.
- 6. Allow the trace to stabilize.

7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

# 7.4 Test Result

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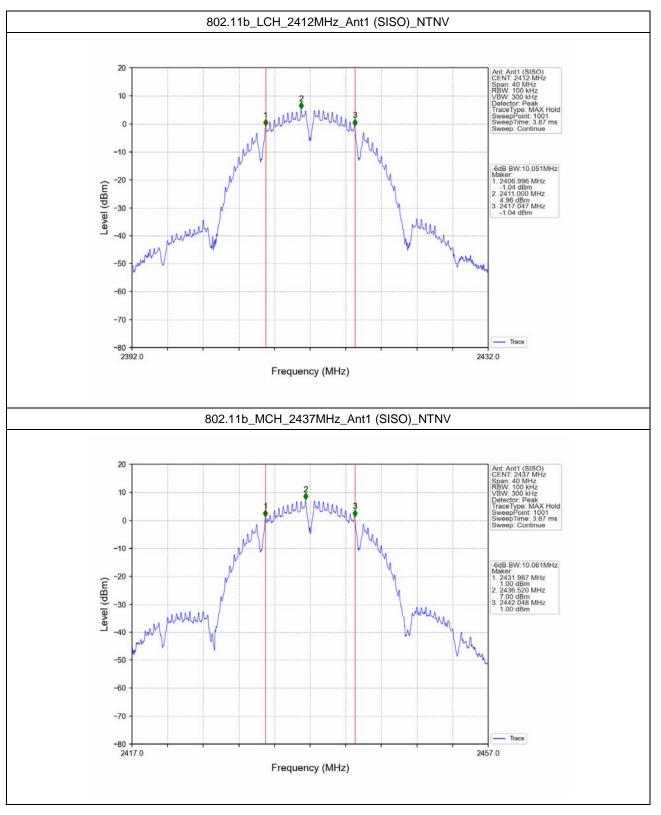


#### 6dB Occupied Bandwidth

Mode	ТХ	Frequency	ΔΝΤ	6dB Bandwidth (MHz)		Verdict
Mode	Туре	(MHz)	ANT	Result	Limit	verdici
		2412	1	10.051	>=0.5	Pass
802.11b	SISO	2437	1	10.061	>=0.5	Pass
		2462	1	10.092	>=0.5	Pass
802.11g	SISO	2412	1	16.324	>=0.5	Pass
		2437	1	16.368	>=0.5	Pass
		2462	1	16.355	>=0.5	Pass
000 44 -		2412	1	17.343	>=0.5	Pass
802.11n (HT20)	SISO	2437	1	17.338	>=0.5	Pass
(1120)		2462	1	17.542	>=0.5	Pass
900 11n		2422	1	35.381	>=0.5	Pass
802.11n (HT40)	SISO	2437	1	35.414	>=0.5	Pass
		2452	1	35.402	>=0.5	Pass

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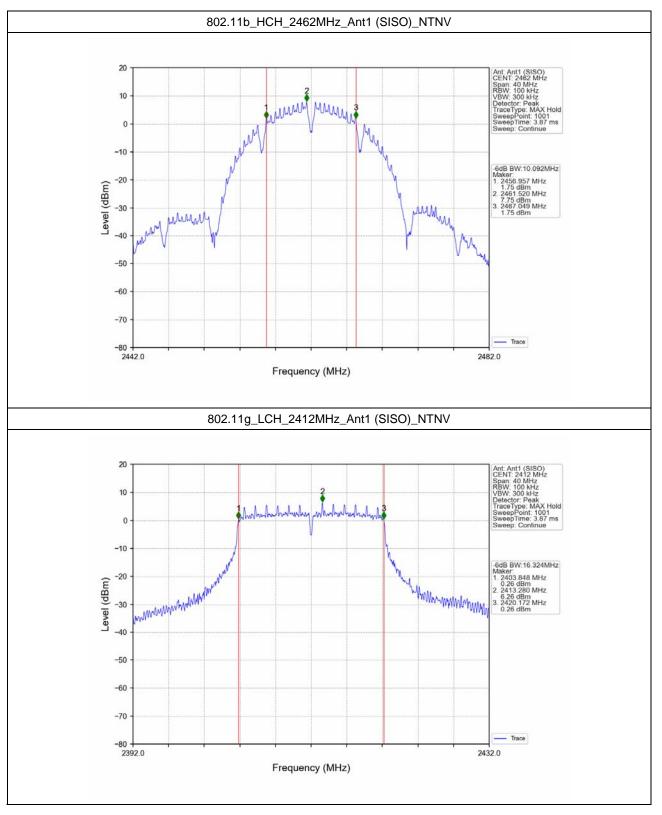




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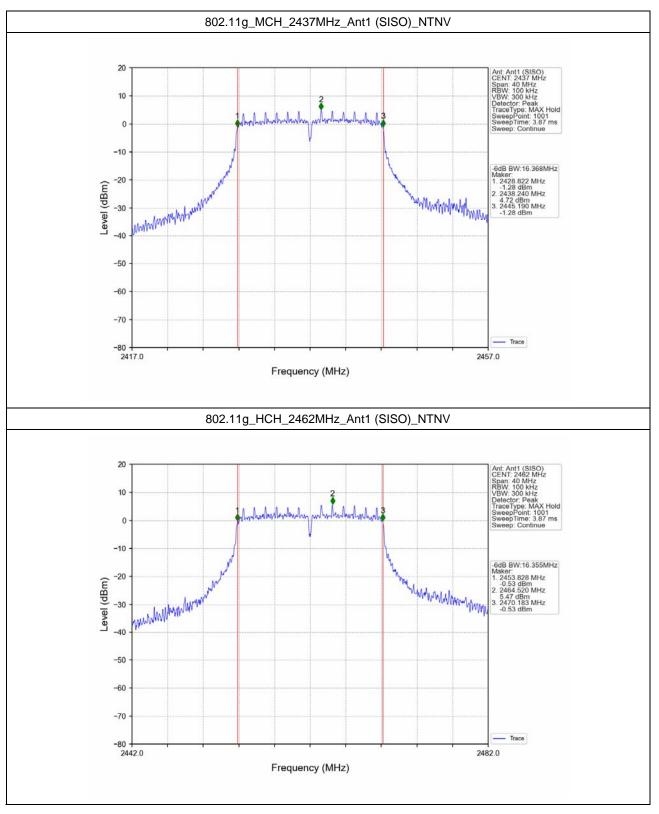




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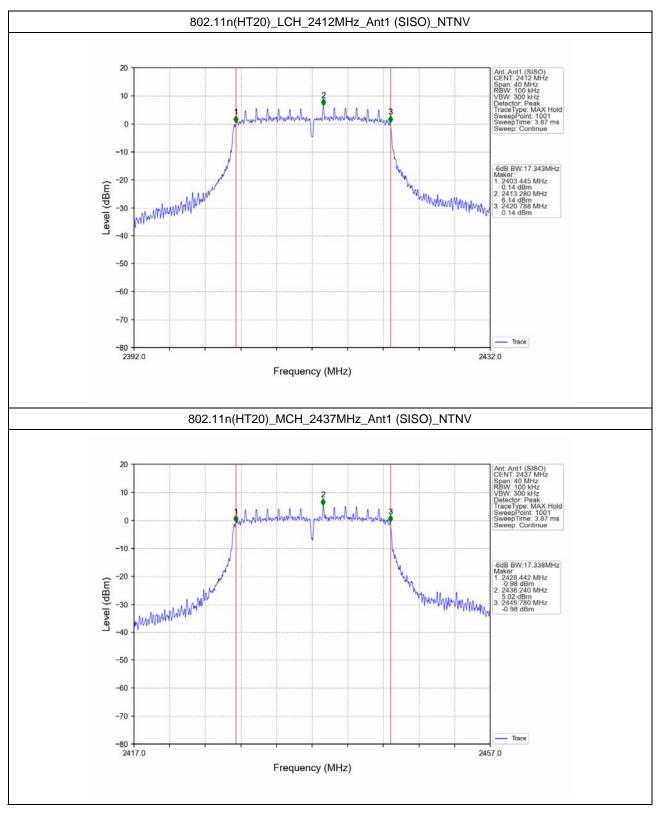




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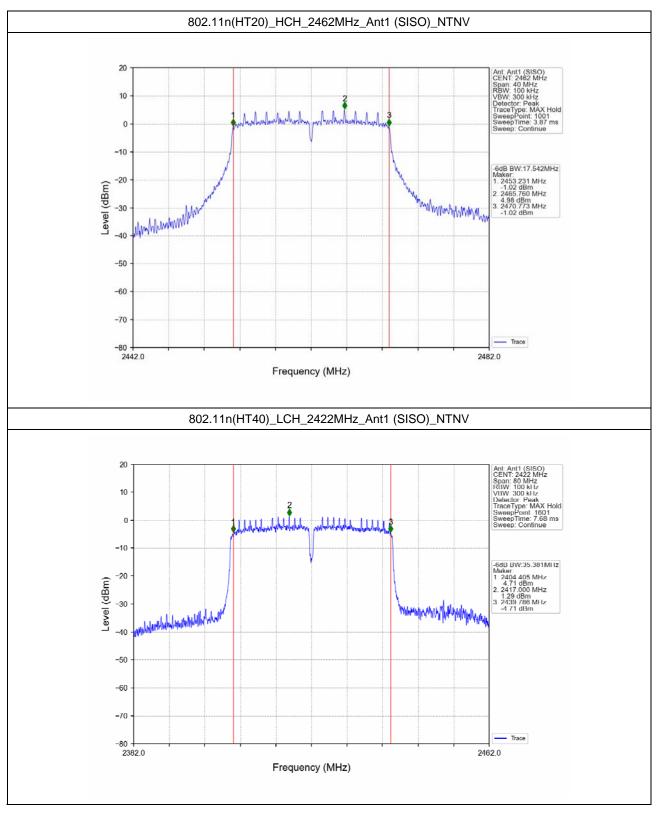




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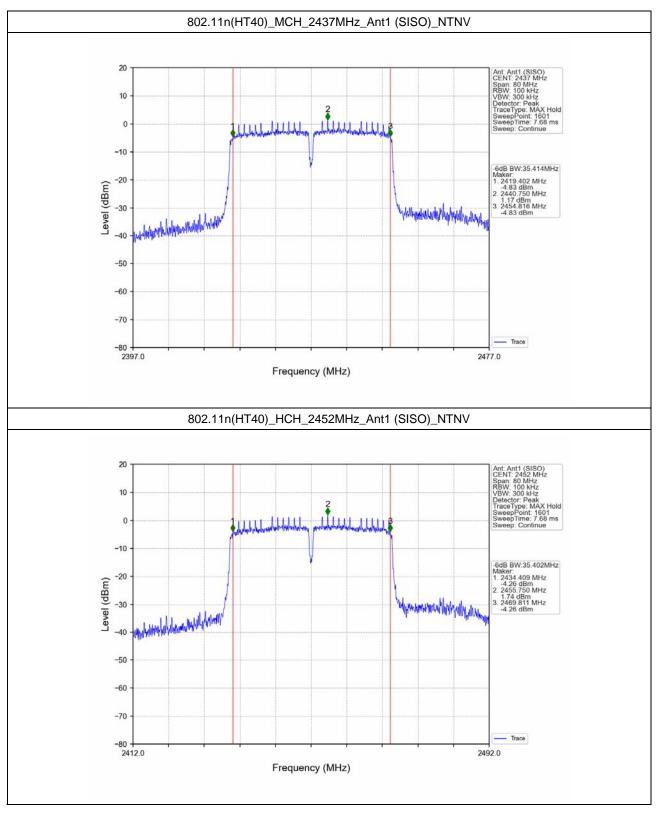




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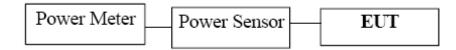


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8. Maximum Output Power 8.1 Test Setup



### 8.2 Limits of Maximum Output Power

The Maximum Output Power Measurement is 30dBm.

#### **8.3 Test Procedure**

The RF power output was measured with a Power meter connected to the RF Antenna connector (conducted measurement) while EUT was operating in transmit mode at the appropriate centre frequency.

Note: The AV Power was measured

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#### **8.4Test Results**

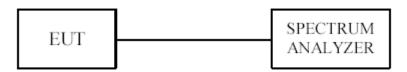
Mode	ТΧ	Frequency	Maximum Average Condu	cted Output Power (dBm)	Verdict				
Туре		(MHz)	ANT1	Limit	Verdict				
		2412	16.32	<=30	Pass				
802.11b	SISO	2437	16.41	<=30	Pass				
		2462	16.58	<=30	Pass				
	SISO	2412	15.65	<=30	Pass				
802.11g		2437	15.80	<=30	Pass				
		2462	15.92	<=30	Pass				
000 11-		2412	15.46	<=30	Pass				
802.11n	SISO	2437	15.77	<=30	Pass				
(HT20)		2462	15.87	<=30	Pass				
000 44=		2422	15.21	<=30	Pass				
802.11n	SISO	2437	15.06	<=30	Pass				
(HT40)		2452	15.34	<=30	Pass				
	Note1: Antenna Gain: Ant1: 0.50dBi;								

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# 9. Power Spectral Density Measurement

9.1 Test Setup



# 9.2 Limits of Power Spectral Density Measurement

The Maximum Power Spectral Density Measurement is 8dBm/3kHz.

### 9.3 Test Procedure

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.

- 2. Set the RBW = 3 kHz.
- 3. Set the VBW  $\geq$  10 kHz.
- 4. Set the span to 1.5 times the DTS channel bandwidth.
- 5. Detector = peak.
- 6. Sweep time = auto couple.
- 7. Trace mode = max hold.
- 8. Allow trace to fully stabilize.
- 9. Use the peak marker function to determine the maximum amplitude level.
- 10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
- 11. The resulting peak PSD level must be  $\leq 8 \text{ dBm/3kHz}$ .

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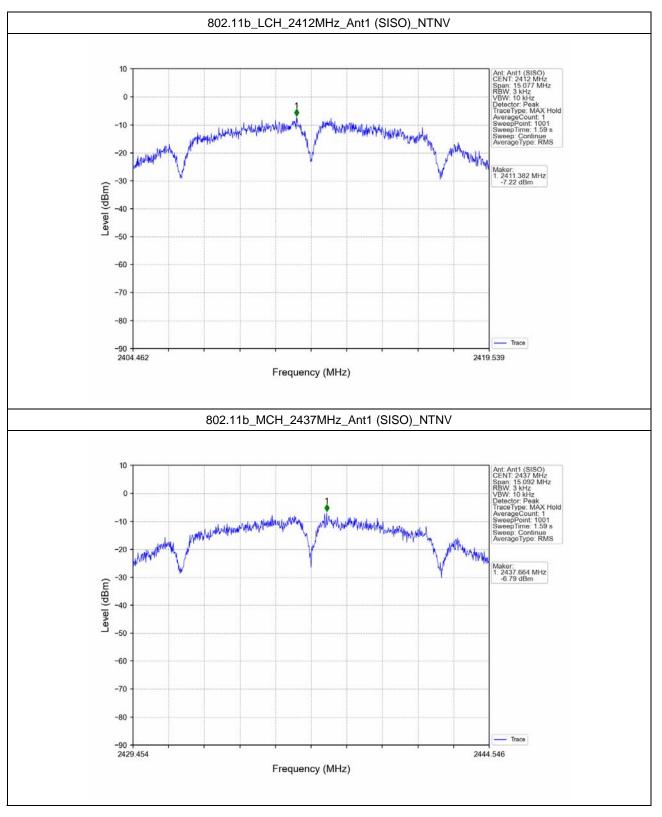
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Test Result					
Mode	тх	Frequency	Maximum PSD (dBm/3kHz)		Verdict
	Туре	(MHz)	ANT1	Limit	verdici
802.11b	SISO	2412	-7.22	<=8	Pass
		2437	-6.79	<=8	Pass
		2462	-5.70	<=8	Pass
802.11g		2412	-9.52	<=8	Pass
	SISO	2437	-9.38	<=8	Pass
		2462	-8.88	<=8	Pass
802.11n (HT20)	SISO	2412	-10.90	<=8	Pass
		2437	-9.24	<=8	Pass
		2462	-8.87	<=8	Pass
802.11n (HT40)	SISO	2422	-13.39	<=8	Pass
		2437	-13.77	<=8	Pass
		2452	-11.61	<=8	Pass
		Note1: Antenr	na Gain: Ant1: 0.50dBi;		

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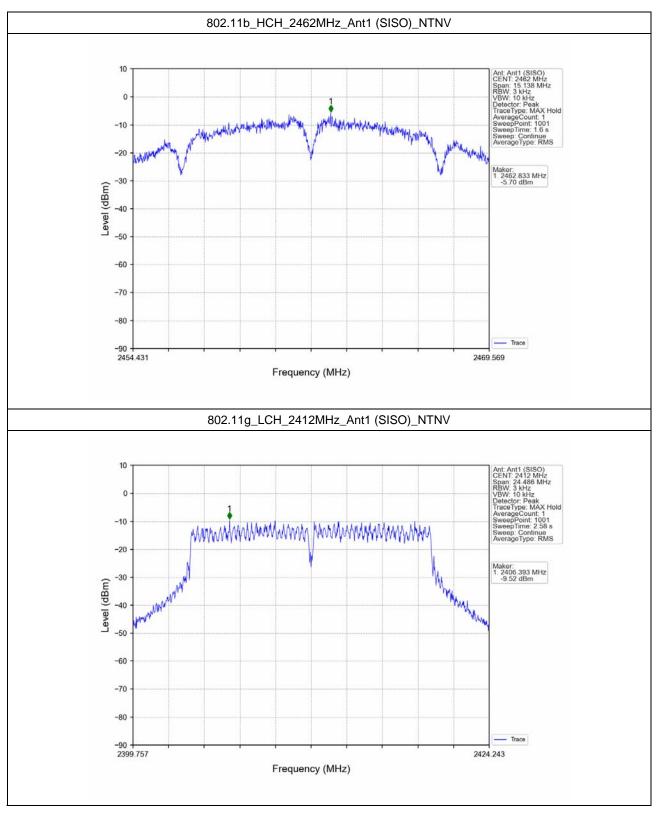




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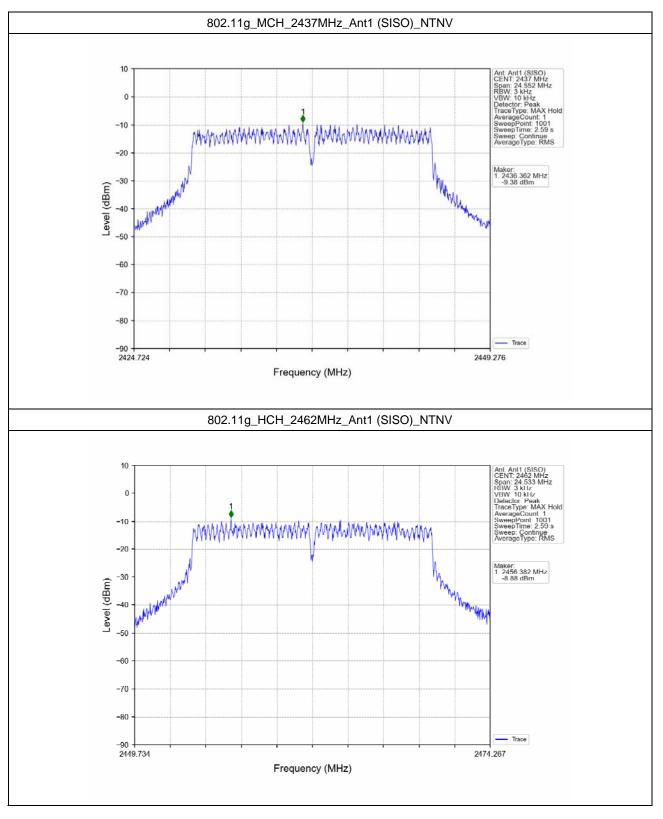




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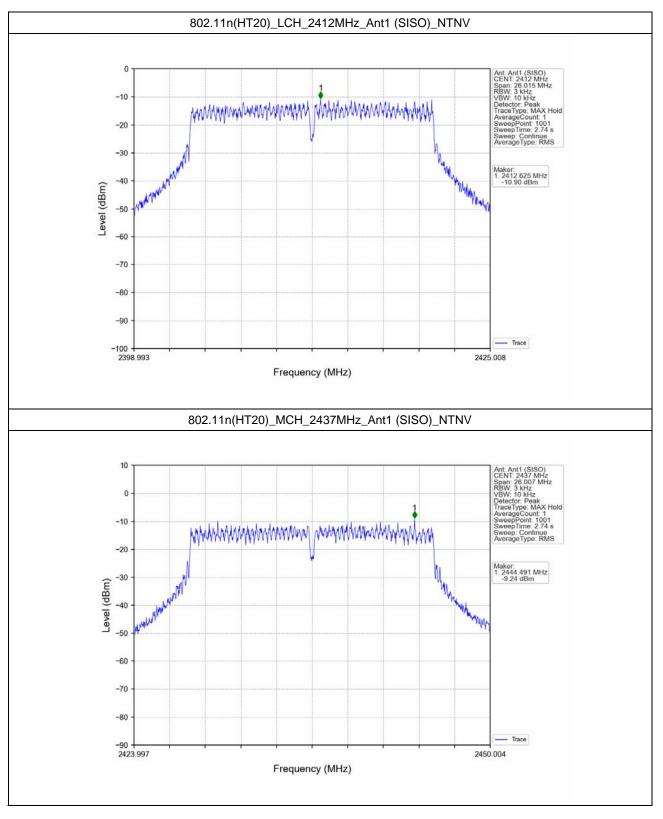




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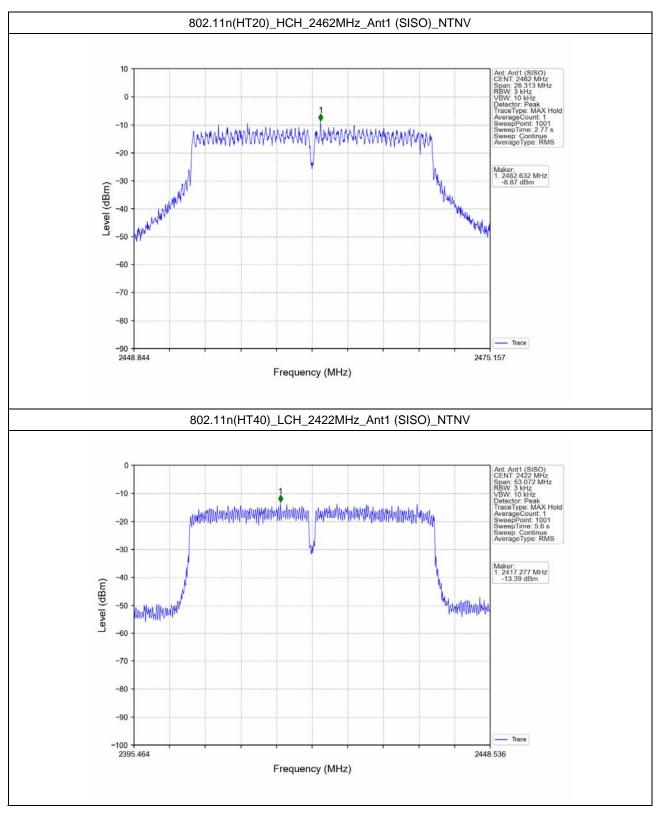




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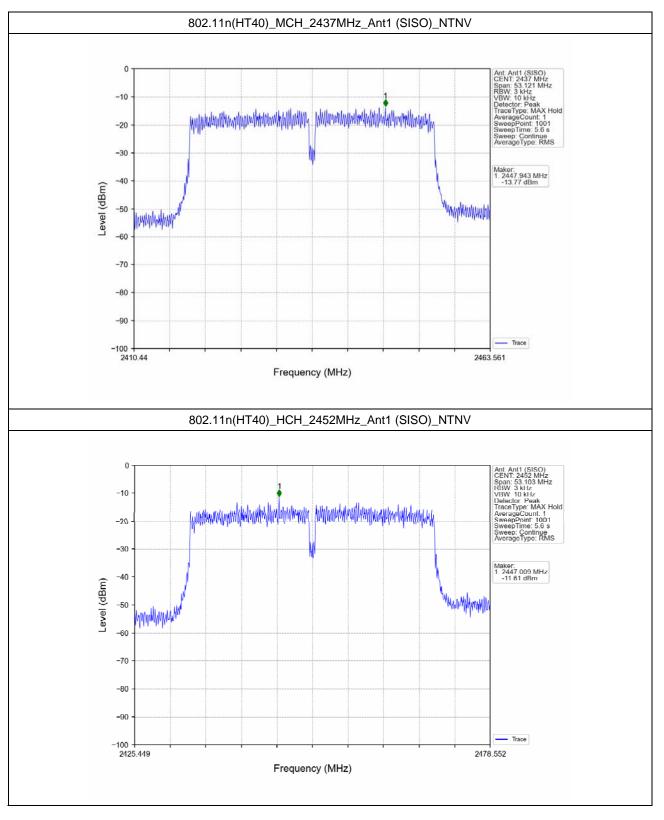




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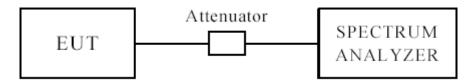


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**10 Out of Band Measurement 10.1 Test Setup for band edge** 



### The restricted band requirement based on radiated emission test; please see the clause 6 for the test setup

# 10.2 Limits of Out of Band Emissions Measurement

- 1. Below –20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).
- 2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

# **10.3 Test Procedure**

For signals in the restricted bands above and below the 2.4-2.483GHz allocated band a measurement was made of radiated emission test. (Peak values with RBW=VBW=1MHz and PK detector. AV value with RBW=1MHz, VBW=10Hz and PK detector)

For bandage test, the spectrum set as follows: RBW=100, VBW=300 kHz. A conducted measurement used

### **10.4 Test Result**

Please see next pages

Note: For band-edge measurement, the frequency from 30MHz-25GHz was tested. And It met the FCC rule.

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### **Test Result**

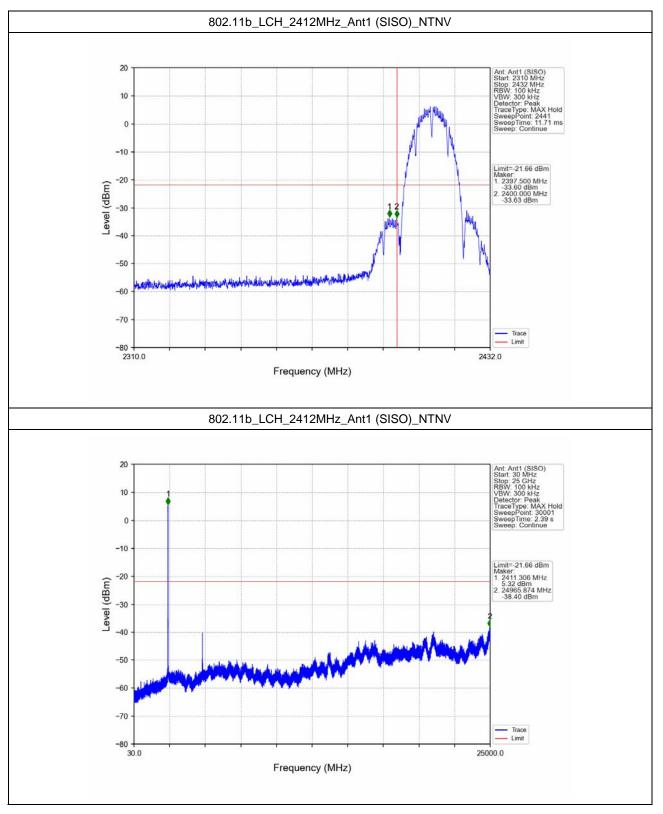
	ТХ	Frequency		Level of Reference	Limit	
Mode	Туре	(MHz)	ANT	(dBm)	(dBm)	Verdict
		2412	1	8.34	-21.66	Pass
802.11b	SISO	2437	1	8.34	-21.66	Pass
		2462	1	8.34	-21.66	Pass
		2412	1	5.46	-24.54	Pass
802.11g	02.11g SISO	2437	1	5.46	-24.54	Pass
		2462	1	5.46	-24.54	Pass
000.44+		2412	1	4.64	-25.36	Pass
802.11n	SISO	2437	1	4.64	-25.36	Pass
(HT20)		2462	1	4.64	-25.36	Pass
802.11n	8180	2422	1	1.57	-28.43	Pass
(HT40)	SISO	2437	1	1.57	-28.43	Pass

to establish the reference level.

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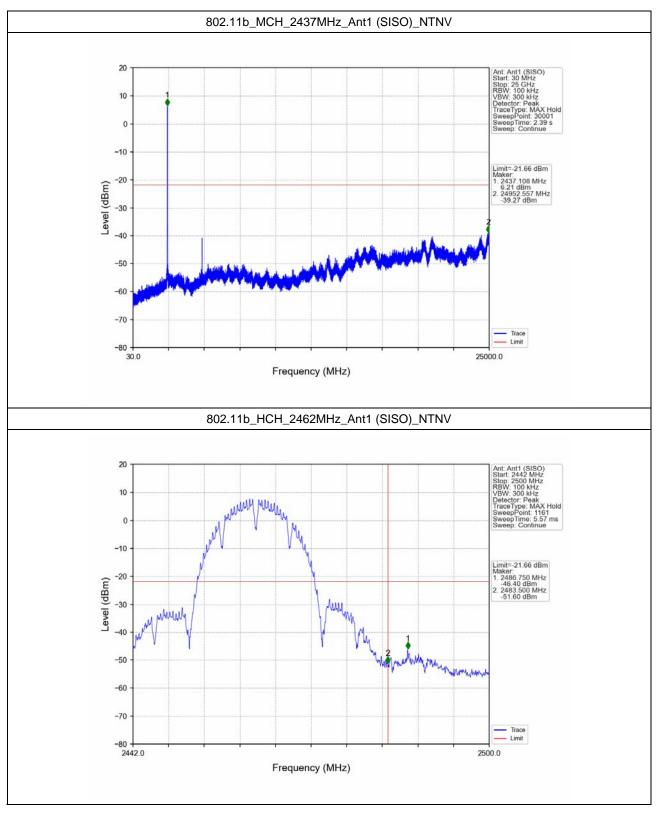




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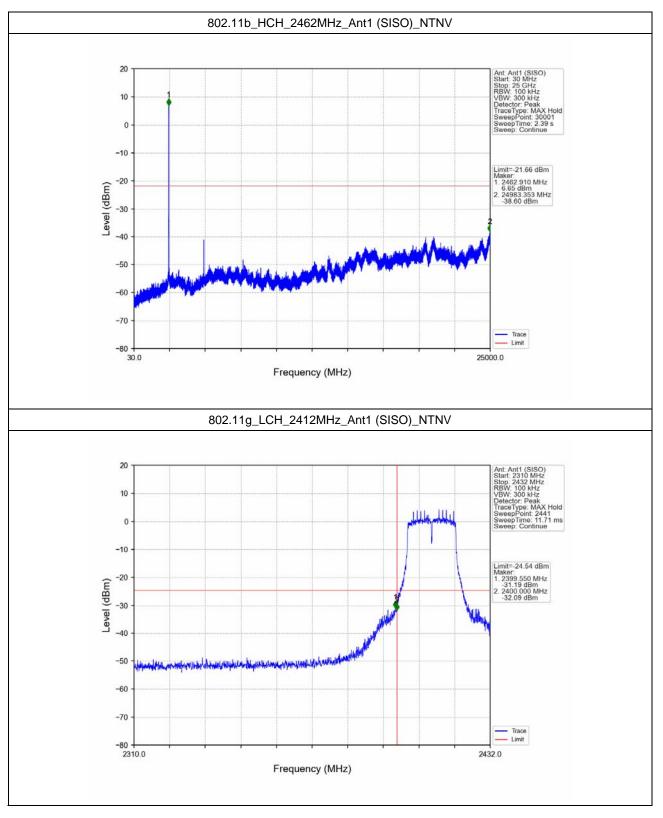




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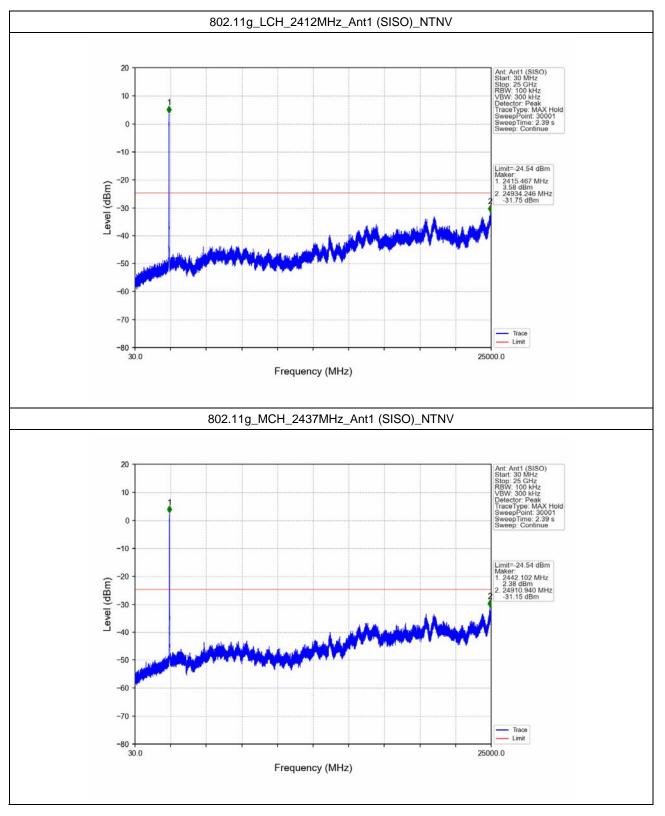




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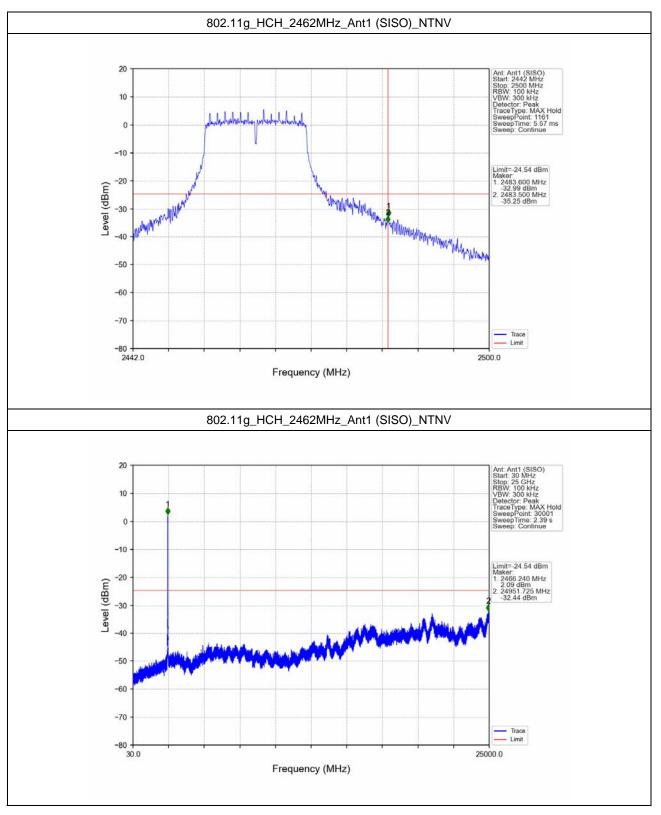




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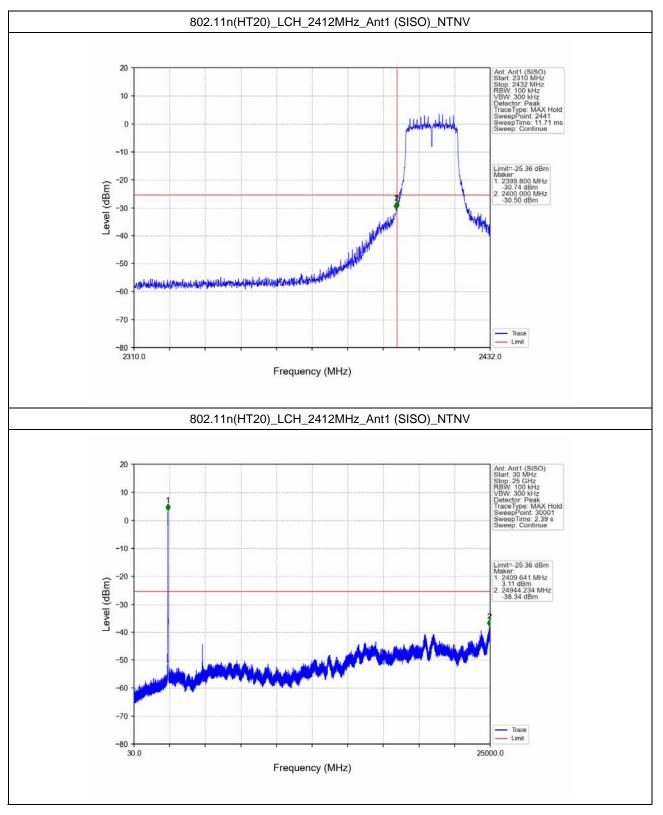




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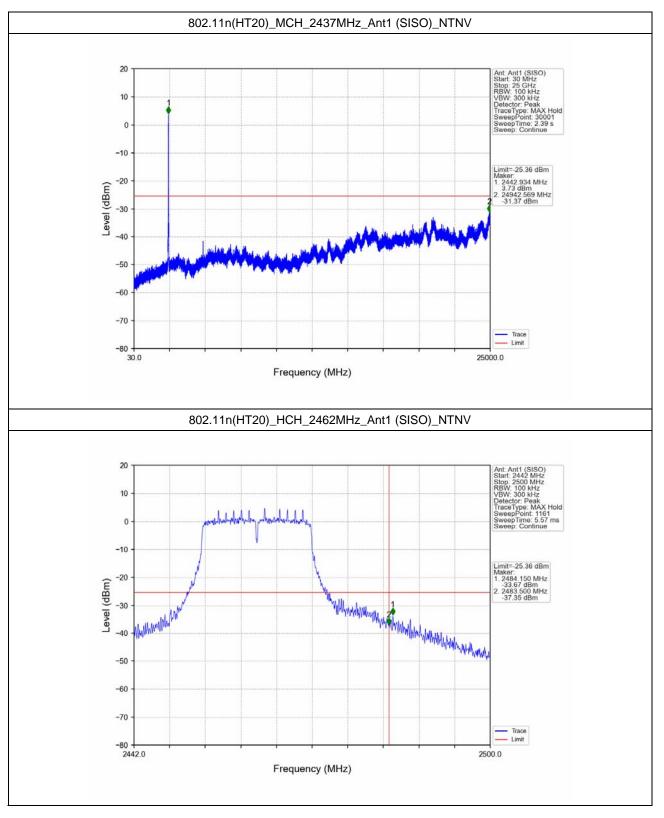




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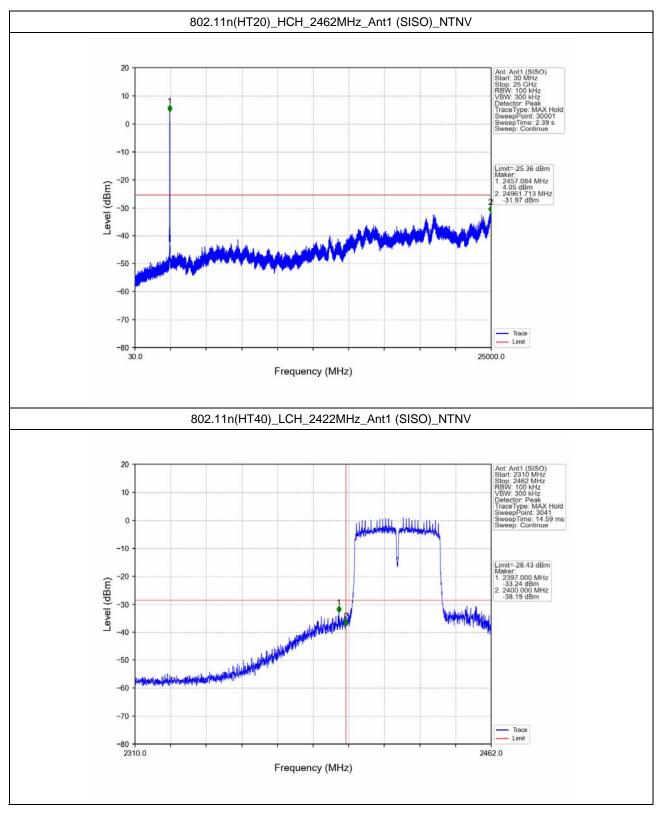




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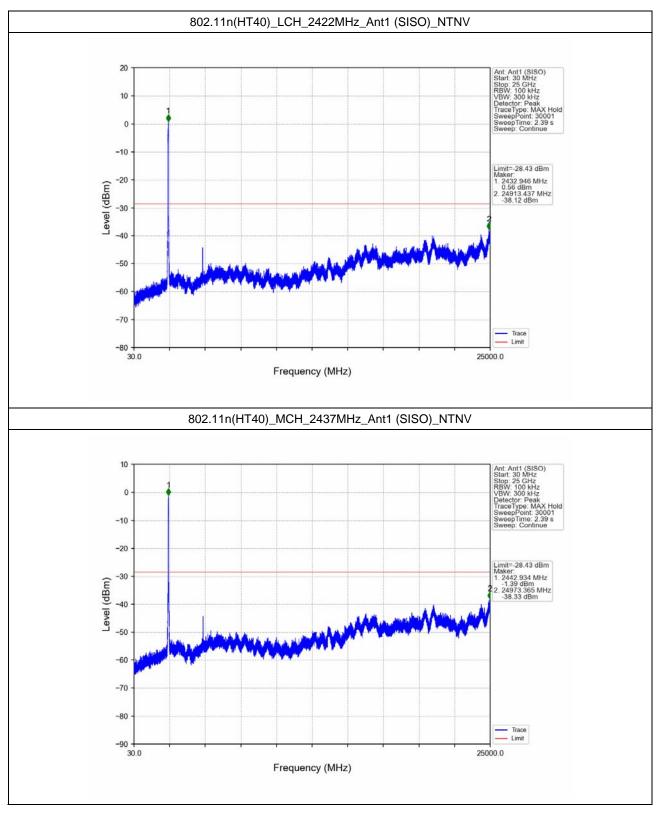




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#### 10.5 Restricted band Measurement

EUT	802.11b/g/n 1T1R WLAN +		Model	BL-M8723DU4		
	Bluetooth 4.2 USB Module					
Mode	Keeping	g Transmitting	Test Voltage	DC5.0V		
Temperature	24 deg. C,		Humidity	56% RH		
Test Result:		Pass	Detector	РК		
	802.11b mode, Low Channel, Horizontal					
2390	PK (dBµV/m)	46.5	– Limit	74(dBµV/m)		
	AV ( $dB\mu V/m$ )			54(dBµV/m)		
802.11b mode, Vertical						
2390	PK (dBµV/m)	48.4	T insit	74(dBµV/m)		
	AV ( $dB\mu V/m$ )		Limit	54(dBµV/m)		

#### 10.5 Restricted band Measurement

EUT	802.11b/g/n 1T1R WLAN +		Model	BL-M8723DU4		
	Bluetooth 4.2 USB Module					
Mode	Keeping Transmitting		Test Voltage	DC5.0V		
Temperature	24 deg. C,		Humidity	56% RH		
Test Result:	Pass		Detector	РК		
802.11b mode, High Channel, Horizontal						
2483.5	PK (dBµV/m)	47.8	Limit	74(dBµV/m)		
	AV ( $dB\mu V/m$ )			54(dBµV/m)		
802.11b mode, High Channel, Vertical						
2483.5	PK (dBµV/m)	49.6	T :	74(dBµV/m)		
	AV ( $dB\mu V/m$ )		Limit	54(dBµV/m)		

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#### 10.5 Restricted band Measurement

EUT	802.11b/g/n 1T1R WLAN +		Model	BL-M8723DU4		
	Bluetooth 4.2 USB Module					
Mode	Keeping	g Transmitting	Test Voltage	DC5.0V		
Temperature	24	l deg. C,	Humidity	56% RH		
Test Result:		Pass	Detector	РК		
	802.11g mode, Low Channel, Horizontal					
2390	PK (dBµV/m)	50.7	Limit	74(dBµV/m)		
	AV ( $dB\mu V/m$ )			54(dBµV/m)		
802.11g mode, Vertical						
2390	PK (dBµV/m)	52.5	<b>T</b> • • •	74(dBµV/m)		
	AV (dBµV/m)	38.6	Limit	54(dBµV/m)		

#### 10.5 Restricted band Measurement

EUT	802.11b/g/n 1T1R WLAN +		Model	BL-M8723DU4		
	Bluetooth 4.2 USB Module					
Mode	Keeping Transmitting		Test Voltage	DC5.0V		
Temperature	24 deg. C,		Humidity	56% RH		
Test Result:	Pass		Detector	РК		
	802.11g mode, High Channel, Horizontal					
2483.5	PK (dBµV/m)	55.8	Limit	74(dBµV/m)		
	AV ( $dB\mu V/m$ )	42.4		54(dBµV/m)		
802.11g mode, High Channel, Vertical						
2483.5	PK (dBµV/m)	58.9	T :	74(dBµV/m)		
	AV ( $dB\mu V/m$ )	44.3	Limit	54(dBµV/m)		

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#### 10.5 Restricted band Measurement

EUT	802.11b/g/n 1T1R WLAN +		Model	BL-M8723DU4		
	Bluetooth	4.2 USB Module				
Mode	Keeping	g Transmitting	Test Voltage	DC5.0V		
Temperature	24 deg. C,		Humidity	56% RH		
Test Result:	Pass		Detector	РК		
	802.11n HT20 mode, Low Channel, Horizontal					
2390	PK (dBµV/m)	50.5	Limit	74(dBµV/m)		
	AV ( $dB\mu V/m$ )		Limit	54(dBµV/m)		
802.11n HT20 mode, Low Channel, Vertical						
2390	PK (dBµV/m)	54.4	T insit	74(dBµV/m)		
	AV ( $dB\mu V/m$ )	39.0	Limit	54(dBµV/m)		

#### 10.5 Restricted band Measurement

EUT	802.11b/g/n 1T1R WLAN + Model BL-M8723DU4					
EUT	802.11b/g/n 1T1R WLAN +		Model	BL-M8/23DU4		
	Bluetooth	4.2 USB Module				
Mode	Keeping	g Transmitting	Test Voltage	DC5.0V		
Temperature	24 deg. C,		Humidity	56% RH		
Test Result:	Pass		Detector	РК		
	802.11n HT20 mode, High Channel, Horizontal					
2483.5	PK (dBµV/m)	55.8	Limit	74(dBµV/m)		
	AV ( $dB\mu V/m$ )	43.6		54(dBµV/m)		
802.11n HT20 mode, High Channel, Vertical						
2483.5	PK (dBµV/m)	60.7	T in it	74(dBµV/m)		
	AV ( $dB\mu V/m$ )	46.8	Limit	54(dBµV/m)		

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#### 10.5 Restricted band Measurement

EUT	802.11b/g/n 1T1R WLAN +		Model	BL-M8723DU4		
	Bluetooth 4	4.2 USB Module				
Mode	Keeping	Transmitting	Test Voltage	DC5.0V		
Temperature	24 deg. C,		Humidity	56% RH		
Test Result:	Pass		Detector	РК		
802.11n HT40 mode, Low Channel, Horizontal						
2390	PK (dBµV/m)	52.7	Limit	74(dBµV/m)		
	AV (dBµV/m)	37.6		54(dBµV/m)		
802.11n HT40 mode, Low Channel, Vertical						
2390	PK (dBµV/m)	55.4	<b>T</b> • •/	74(dBµV/m)		
	AV (dBµV/m)	40.8	Limit	54(dBµV/m)		

#### 10.5 Restricted band Measurement

EUT	802.11b/g/n 1T1R WLAN +		Model	BL-M8723DU4		
	Bluetooth 4	4.2 USB Module				
Mode	Keeping	Transmitting	Test Voltage	DC5.0V		
Temperature	24 deg. C,		Humidity	56% RH		
Test Result:	Pass		Detector	РК		
	80	02.11n HT40 mode, Hi	gh Channel, Horiz	ontal		
2483.5	PK (dBµV/m)	59.9	Limit	74(dBµV/m)		
	AV ( $dB\mu V/m$ )	45.4		54(dBµV/m)		
802.11n HT40 mode, High Channel, Vertical						
2483.5	PK (dBµV/m)	63.8	Limit	74(dBµV/m)		
	AV ( $dB\mu V/m$ )	49.3		54(dBµV/m)		

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# 11.0 Antenna Requirement

# 11.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And according to FCC 47 CFR Section 15.247 (b), if transmitter antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the mount in dB that the directional gain of the antenna exceeds 6 dBi.

# 11.2 Antenna Connected construction

PIFA antenna provided to the EUT. The gain of the antenna is 0.2dBi. (Get from the antenna specification provided the applicant)

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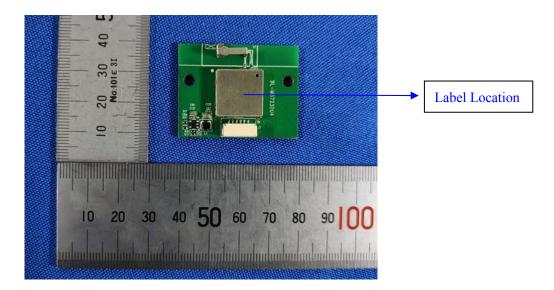


# 12.0 FCC ID Label

# FCC ID: 2AL6K-BL-M8723DU4

The label must not be a stick-on paper label. The label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

# Mark Location:



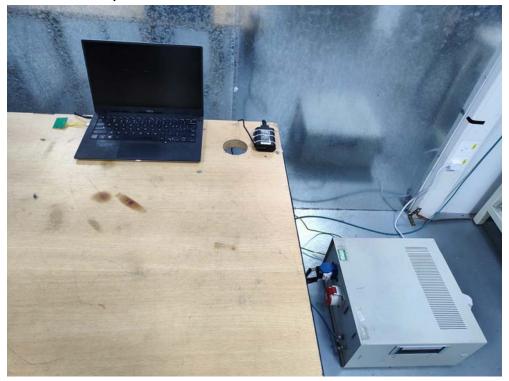
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#### 13.0 Photo of testing

Conducted Emission Test Setup:



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Page 56 of 56

Radiated Emission Test Setup:



# **Photographs – EUT**

Please refer test report TW2302203-01E

# --End of the report--

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