



**FCC 47 CFR PART 15 SUBPART C  
ISED RSS-247 Issue 2**

**CERTIFICATION TEST REPORT**

*For*

**WLAN+Bluetooth Module**

**MODEL NUMBER: LBEE5PK2BC**

**PROJECT NUMBER: 4790016144.1**

**REPORT NUMBER: 4790016144.1-BC -3**

**FCC ID: VPYLB2BC**

**IC: 772C-LB2BC**

**ISSUE DATE: Aug. 02, 2022**

*Prepared for*

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### Revision History

Rev.	Issue Date	Revisions	Revised By
V0	08/02/2022	Initial Issue	

#### 1. Introduction

LBEE5PK2BC and LBEE5PK2AE have identical PCB layout, antenna, SW implementation for Bluetooth and Wi-Fi. Based on their similarity, the FCC Part 15C (equipment class: DTS), Part 15E (equipment class: NII) test data issued data of VPYLB2AE references the text data of existing report.

The applicant takes full responsibility that the test data referenced below represents compliance for this FCC ID.

#### 2. Differences

LBEE5PK2BC and LBEE5PK2AE have identical PCB layout, antenna, SW implementation for Bluetooth and Wi-Fi. The two models are identical except for the operation temperature declared by the client.

#### 3. Spot Check Verification Data Section

The two models are identical except for the operation temperature declared by the client, according to general guidance of KDB 484596 D01 (please refer to clause 1). a) b) c)), we used all the original test data to apply the new FCC ID for VPYLB2BC (IC: 772C-LB2BC), but added the conducted output power, conducted spurious emission spot check and radiated spurious emission worst case test in this report to demonstrate that the referenced test data remains valid for the new device.

#### 4. Reference Section

The Murata Manufacturing Co., Ltd. takes full responsibility that the test data as referenced table 1 below represents compliance for FCC ID: LBEE5PK2BC.

[Table 1]

Data type	FCC Rule Parts	Operating Frequency range (MHz)	Technology	Test Report No.
Reference data	15C	2402 - 2480	Bluetooth	4790016144.1-AE-1
	15C	2402 - 2480	Bluetooth LE	4790016144.1-AE-2
	15C	2412 - 2472	WLAN 802.11b/g/n	4790016144.1-AE-3
	15E	5180-5825	WLAN 802.11a/n/ac	4790016144.1-EA-4



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## 1. ATTESTATION OF TEST RESULTS

### Applicant Information

Company Name: Murata Manufacturing Co., Ltd.  
Address: 10-1, Higashikotari 1-chome, Nagaokakyo-shi, Kyoto 617-8555, Japan

### Manufacturer Information

Company Name: Murata Manufacturing Co., Ltd.  
Address: 10-1, Higashikotari 1-chome, Nagaokakyo-shi, Kyoto 617-8555, Japan

### EUT Description

Product Name: WLAN+Bluetooth Module  
Model Name: LBEE5PK2BC  
Sample Number: 4059724  
Data of Receipt Sample: Jul. 12, 2021  
Date Tested: Jul. 23, 2021 ~ Aug. 02, 2022

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	PASS
ISED RSS-247 Issue 2	PASS
ISED RSS-GEN Issue 5	PASS



Summary of Test Results			
Clause	Test Items	FCC Rules	Test Results
1	Conducted Power Spot Check	FCC 15.247 (b) (3) RSS-247 Clause 5.4 (d) RSS-Gen Clause 6.12	Complied
2	Conducted Band edge And Spurious emission Spot Check	FCC 15.247 (d) RSS-247 Clause 5.5 RSS-GEN Clause 6.13	Complied
3	Radiated Band edges and Spurious emission	FCC 15.247 (d) FCC 15.209 FCC 15.205 RSS-247 Clause 5.5 RSS-GEN Clause 8.9 RSS-GEN Clause 6.13	Complied
4	Conducted Emission Test for AC Power Port	FCC 15.207 RSS-GEN Clause 8.8	Complied
5	Antenna Requirement	FCC 15.203 RSS-GEN Clause 6.8	Complied
<p>Note: The measurement result for the sample received is &lt;Pass&gt; according to &lt; ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15C, ISSED RSS-GEN, ISSED RSS-247&gt; when &lt;Accuracy Method&gt; decision rule is applied.</p>			

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## 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 414788 D01 Radiated Test Site v01r01, ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15, ISED RSS-GEN ISSUE5, ISED RSS-247 ISSUE2.

## 3. FACILITIES AND ACCREDITATION

Accreditation Certificate	<b>A2LA (Certificate No.: 4829.01)</b> <b>UL-CCIC COMPANY LIMITED has been assessed and proved to be in compliance with A2LA.</b> <b>FCC (FCC Designation No.: CN1247)</b> <b>UL-CCIC COMPANY LIMITED has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules.</b> <b>IC (IC Designation No.: 25056; CAB No.: CN0073)</b> <b>UL-CCIC COMPANY LIMITED has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules.</b>
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Note 1: All tests measurement facilities use to collect the measurement data are located at No. 2, Chengwan Road, Suzhou Industrial Park, Suzhou 215122, People's Republic of China

Note 2: For below 30MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. These measurements below 30MHz had been correlated to measurements performed on an OFS.

Note 3: The test anechoic chamber in UL-CCIC COMPANY LIMITED had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.



## 4. CALIBRATION AND UNCERTAINTY

### 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations and is traceable to recognized national standards.

### 4.2. MEASUREMENT UNCERTAINTY

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

Test Item	Uncertainty
Conduction emission	3.1dB
Radiation Emission test (include Fundamental emission) (9kHz-30MHz)	3.4dB
Radiation Emission test (include Fundamental emission) (30MHz-1GHz)	3.4dB
Radiation Emission test (1GHz to 26GHz) (include Fundamental emission)	3.9dB (1GHz-18GHz)
	4.2dB (18GHz-26.5GHz)
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.	



## 5. EQUIPMENT UNDER TEST

### 5.1. DESCRIPTION OF EUT

Product Name:	WLAN+Bluetooth Module
Model No.:	LBEE5PK2BC
Operating Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz This report just including 2.4G WIFI part.
Type of Modulation:	IEEE for 802.11b: DBPSK, DQPSK IEEE for 802.11g: BPSK, QPSK, 16QAM, 64QAM IEEE for 802.11 n HT20/HT40: BPSK, QPSK, 16QAM, 64QAM
Channels Step:	Channels with 5MHz step
Rated Input	DC 3.3V
Test software of EUT:	SecureCRT (manufacturer declare)
Antenna Type:	Type 1: PCB Antenna Type 2: External Dipole Antenna
Antenna Gain:	Type 1: 3.0 dBi for 2.4G band; 3.3 dBi for 5G band Type 2: 3.4 dBi for 2.4G band; 4.75 dBi for 5G band Note: 1. The product has only one transmission chain and two antenna types are provided. 2. This data is provided by customer and our lab isn't responsible for this data.





## 5.2. MAXIMUM OUTPUT POWER

Number of Transmit Chains (NTX)	IEE Std. 802.11	Channel Number	Max AVG Conducted Power (dBm)
1	IEEE 802.11B	1-11[11]	18.32
1	IEEE 802.11G	1-11[11]	17.88
1	IEEE 802.11N HT20	1-11[11]	16.91

## 5.3. CHANNEL LIST

Channel List for 802.11B/G/N(20 MHz)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	4	2427	7	2442	10	2457
2	2417	5	2432	8	2447	11	2462
3	2422	6	2437	9	2452		

## 5.4. POWER GRADE

Power Grade											
Mode	2412	2417	2422	2427	2432	2437	2442	2447	2452	2457	2462
11B	16	17	17	17	17	17	17	17	17	17	16
11G	9	9	9	16	16	16	16	16	9	9	9
11N HT20	8	8	8	16	16	16	16	16	8	8	8



## 5.5. TEST CHANNEL CONFIGURATION

Test Mode	Test Channel (MHz)
IEEE 802.11B	LCH: CH01 2412; CH02 2417
	MCH: CH06 2437
	HCH: CH10 2457; CH11 2462
IEEE 802.11G	LCH: CH01 2412; CH04 2427
	MCH: CH06 2437
	HCH: CH08 2447; CH11 2462
IEEE 802.11N HT20	LCH: CH01 2412; CH04 2427
	MCH: CH06 2437
	HCH: CH08 2447; CH11 2462

## 5.6. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band						
Test Software		SecureCRT				
Modulation Mode	Transmit Antenna Number	Test Channel				
802.11B	1	CH01: 16	CH02: 17	CH06:17	CH10:17	CH11:16
802.11G	1	CH01: 9	CH04: 16	CH06: 16	CH08: 16	CH11: 9
802.11N HT20	1	CH01: 8	CH04: 16	CH06: 16	CH08: 16	CH11: 8



### 5.7. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
1	2400-2483.5	PCB Antenna	3.0
		External Dipole Antenna	3.4

Note: This data is provided by customer and our lab isn't responsible for this data.

Test Mode	Transmit and Receive Mode	Description
IEEE 802.11B	☒1TX, 1RX	Antenna1 can be used as transmitting/receiving antenna independently.
IEEE 802.11G	☒1TX, 1RX	Antenna1 can be used as transmitting/receiving antenna independently.
IEEE 802.11N HT20	☒1TX, 1RX	Antenna1 can be used as transmitting/receiving antenna independently.

### 5.8. THE WORSE CASE CONFIGURATIONS

For WIFI module, the worst-case data rates as provided by the client were:

802.11B mode: 11 Mbps  
802.11G mode: 6 Mbps  
802.11N HT20 mode: MCS0



## 5.9. TEST ENVIRONMENT

Environment Parameter	Selected Values During Tests	
Relative Humidity	55 ~ 65%	
Atmospheric Pressure:	101kPa	
Temperature	TN	23 ~ 28°C
Voltage:	VL	N/A
	VN	DC 3.3V
	VH	N/A

Note: VL= Lower Extreme Test Voltage  
VN= Nominal Voltage  
VH= Upper Extreme Test Voltage  
TN= Normal Temperature



## 5.10. DESCRIPTION OF TEST SETUP

### SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	Description
1	Laptop	ThinkPad	E590	/
2	Brix	GIGABYTE	/	/
3	DC Power Supply	Tektronix	PWS2326	INPUT: AC 230V OUTPUT: 0-32V, 6A

### I/O PORT

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	RJ45	RJ45	LAN	100cm Length	/

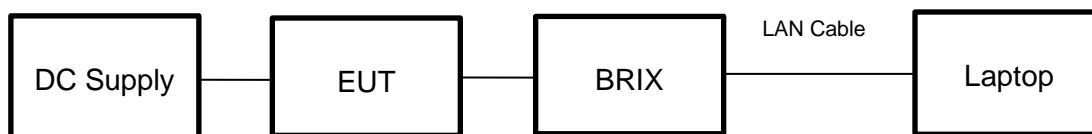
### ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	/	/	/	/

### TEST SETUP

The EUT can work in an engineer mode with a software through a table PC.

### SETUP DIAGRAM FOR TESTS





### 5.11. MEASURING INSTRUMENT AND SOFTWARE USED

Radiated Emissions (Instrument)							
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
<input checked="" type="checkbox"/>	Spectrum Analyzer	Keysight	N9010B	155727	2021-05-09	2022-04-09	2023-04-08
<input checked="" type="checkbox"/>	EMI test receiver	R&S	ESR26	126703	2020-12-05	2021-12-04	2022-12-03
<input checked="" type="checkbox"/>	Receiver Antenna (9kHz-30MHz)	Schwarzbeck	FMZB 1513	155456	2018-06-15	2021-06-03	2024-06-02
<input checked="" type="checkbox"/>	Receiver Antenna (30MHz-1GHz)	SunAR RF Motion	JB1	177821	2019-01-19	2022-01-18	2025-01-17
<input checked="" type="checkbox"/>	Receiver Antenna (1GHz-18GHz)	R&S	HF907	126705	2019-01-27	2022-02-28	2025-02-27
<input checked="" type="checkbox"/>	Receiver Antenna (18GHz-26.5GHz)	Schwarzbeck	BBHA9170	126706	2019-02-29	2022-02-28	2025-02-27
<input checked="" type="checkbox"/>	Pre-amplification (To 18GHz)	Compliance Direction System Inc.	PAP-1G18-50	178825	2021-03-26	2022-03-01	2023-02-28
<input checked="" type="checkbox"/>	Pre-amplification (To 26.5GHz)	R&S	SCU-26D	135391	2020-12-05	2021-12-04	2022-12-03
<input checked="" type="checkbox"/>	Band Reject Filter	Wainwright	WRCJV8-2350-2400-2483.5-2533.5-40SS	1	2021-05-09	2022-05-08	2023-05-07
<input checked="" type="checkbox"/>	Highpass Filter	Wainwright	WHKX10-2700-3000-18000-40SS	2	2021-05-09	2022-05-08	2023-05-07
Software							
Used	Description		Manufacturer	Name		Version	
<input checked="" type="checkbox"/>	Test Software for Radiated disturbance		Tonscend	TS+		Ver. 2.5	
Other instruments							
Used	Equipment	Manufacturer	Model No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
<input checked="" type="checkbox"/>	Spectrum Analyzer	Keysight	N9010B	155368	2021-05-09	2022-05-08	2023-05-07
<input checked="" type="checkbox"/>	Power Meter	Keysight	U2021XA	155370	2021-05-09	2022-05-08	2023-05-07
	Wideband Radio Communication Tester	R&S	CMW270	155367	2021-05-09	2022-05-08	2023-05-07
	Vector Signal Generator	Keysight	N5182B	155369	2021-05-09	2022-05-08	2023-05-07
	Analog Signer Generator	Keysight	N5173B	155522	2021-05-09	2022-05-08	2023-05-07



## 6. MEASUREMENT METHODS

No.	Test Item	KDB Name	Section
1	6dB Bandwidth	KDB 558074 D01 15.247 Meas Guidance v05r02	8.2
2	Output Power	KDB 558074 D01 15.247 Meas Guidance v05r02	8.3.1.3/8.3.2.3
3	Power Spectral Density	KDB 558074 D01 15.247 Meas Guidance v05r02	8.4
4	Out-of-band emissions in non-restricted bands	KDB 558074 D01 15.247 Meas Guidance v05r02	8.5
5	Out-of-band emissions in restricted bands	KDB 558074 D01 15.247 Meas Guidance v05r02	8.6
6	Band-edge	KDB 558074 D01 15.247 Meas Guidance v05r02	8.7
7	Conducted Emission Test for AC Power Port	ANSI C63.10-2013	6.2



## 7. ANTENNA PORT TEST RESULTS

### 7.1. CONDUCTED OUTPUT POWER

#### LIMITS

FCC Part15 (15.247), Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
FCC 15.247(b)(3) ISED RSS-247 5.4 (d) RSS-Gen Clause 6.12	Output Power	1 watt or 30dBm	2400-2483.5

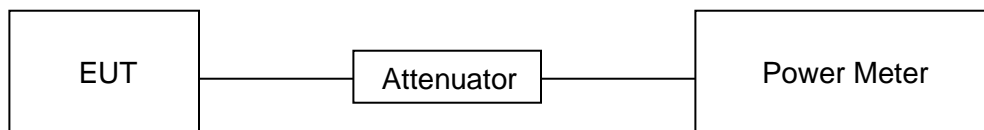
#### TEST PROCEDURE

Place the EUT on the table and set it in the transmitting mode.  
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Power sensor.  
Measure the power of each channel.  
AVG Detector used for AVG result.

#### TEST ENVIRONMENT

Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	DC 3.3V

#### TEST SETUP







**TEST RESULTS TABLE**

Test Mode	Test Channel	Maximum Conducted Output Power (AV)		Delata
		Original Model	Spot Check Model	
		dBm		dBm
11B	2412	17.30	17.15	-0.15
	2417	18.35	18.17	-0.18
	2437	18.53	18.32	-0.21
	2457	18.15	18.02	-0.13
	2462	17.15	17.03	-0.12
11G	2412	10.28	10.11	-0.17
	2427	16.95	16.82	-0.13
	2437	17.05	17.88	0.83
	2447	16.96	16.80	-0.16
	2462	10.55	10.37	-0.18
11N HT20	2412	9.12	8.96	-0.16
	2427	17.00	16.85	-0.15
	2437	17.04	16.91	-0.13
	2447	16.86	16.69	-0.17
	2462	9.18	9.06	-0.12



## 7.2. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

### LIMITS

FCC Part15 (15.247), Subpart C		
Section	Test Item	Limit
FCC §15.247 (d) RSS-247 Clause 5.5 RSS-GEN Clause 6.13	Conducted Bandedge and Spurious Emissions	30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power

### TEST PROCEDURE

Refer to FCC KDB 558074, connect the UUT to the spectrum analyser and use the following settings:

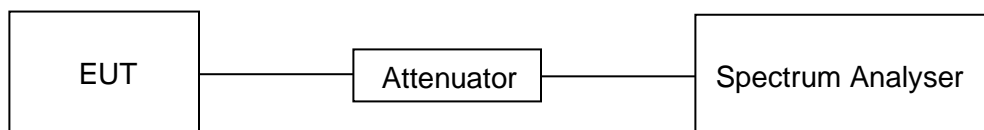
Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	100 kHz
VBW	$\geq 3 \times \text{RBW}$
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

Use the peak marker function to determine the maximum PSD level.

Span	Set the center frequency and span to encompass frequency range to be measured
Detector	Peak
RBW	100 kHz
VBW	$\geq 3 \times \text{RBW}$
measurement points	$\geq \text{span}/\text{RBW}$
Trace	Max hold
Sweep time	Auto couple.

Use the peak marker function to determine the maximum amplitude level.

### TEST SETUP





### **TEST ENVIRONMENT**

Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	DC 3.3V

### **TEST RESULT**

#### **SPOT CHECK VERIFICATION SUMMERY**

Test Item	Test Mode	Test Channel	Worst Case Test Result		Delta
			Original Model	Spot Check Model	
		MHz	dBm	dBm	dBm
Conducted Bandedge	11N HT20	2412	-36.36	-36.62	-0.26
Spurious Emission	11N HT20	2412	-51.90	-53.09	-1.19

#### **Conclusion:**

The spot check test result show that the new devices still comply with the standard and the new test result was close to the original test result, so it can demonstrate that the referenced test data remains valid for the new device.

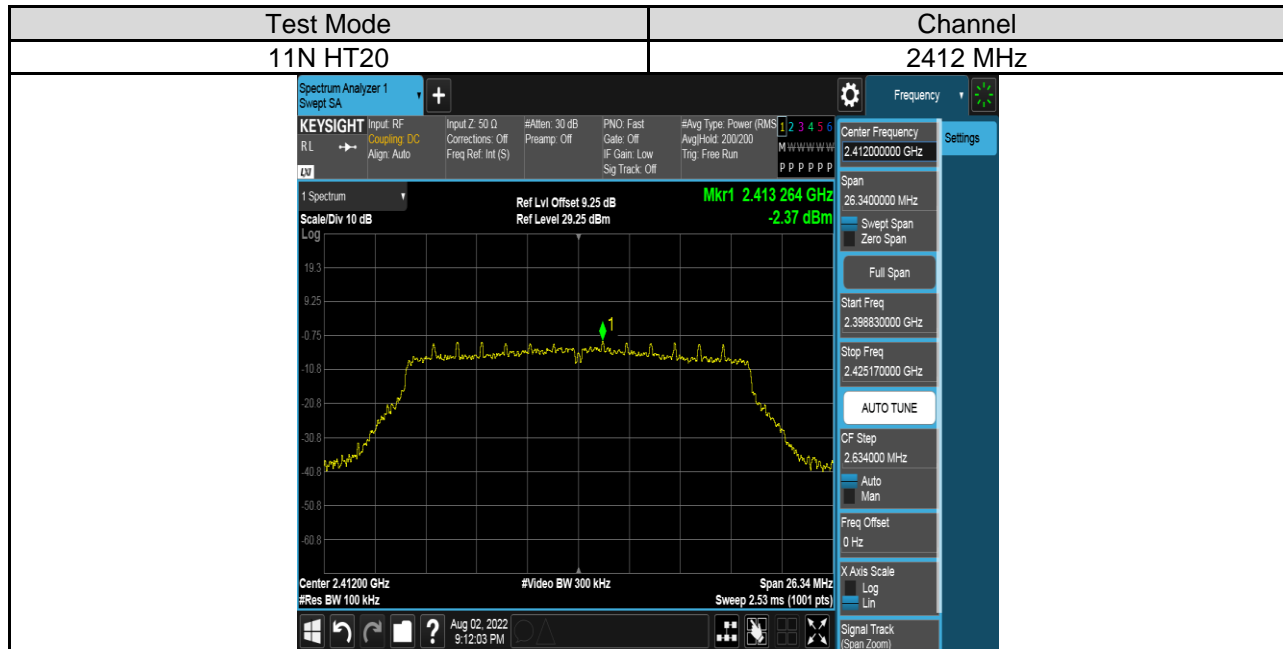


## PART 1: REFERENCE LEVEL MEASUREMENT

### TEST RESULTS TABLE

Test Mode	Test Channel	Result[dBm]
11N HT20	2412	-2.37

### TEST GRAPHS



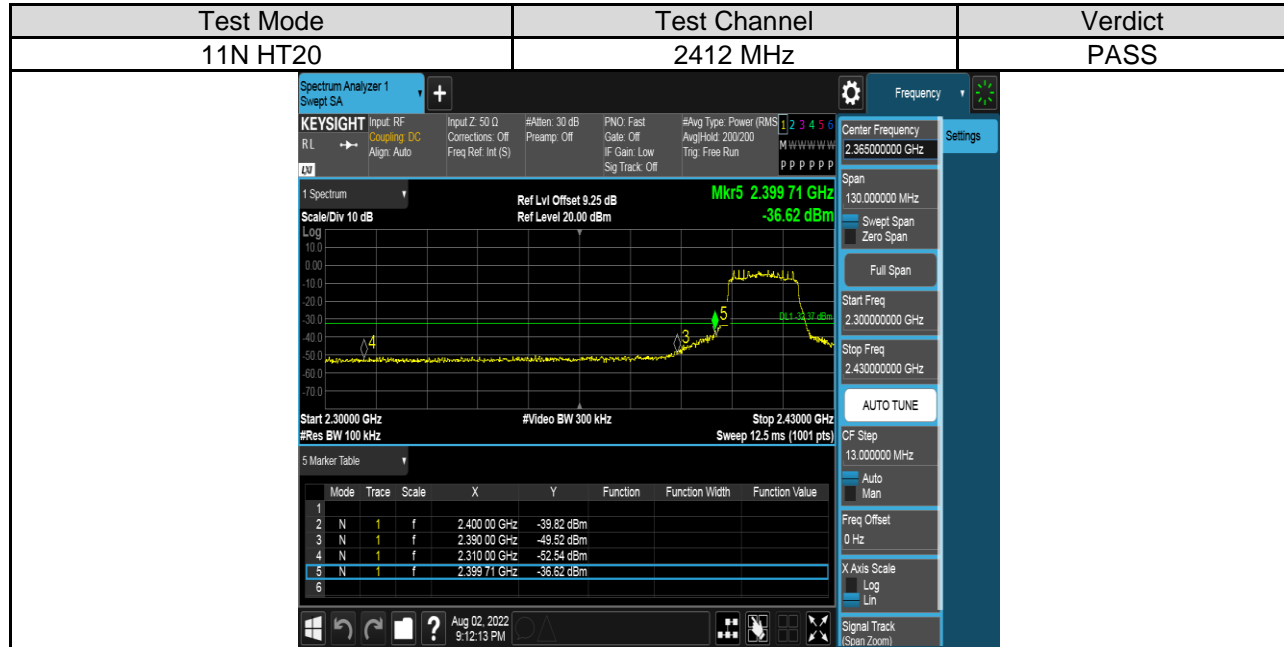


## PART 2: CONDUCTED BANDEDGE

### TEST RESULTS TABLE

Test Mode	Test Channel	Result	Verdict
11N HT20	2412	Refer to the Test Graph	PASS

### TEST GRAPHS



## PART 3: CONDUCTED SPURIOUS EMISSION

### TEST RESULTS TABLE

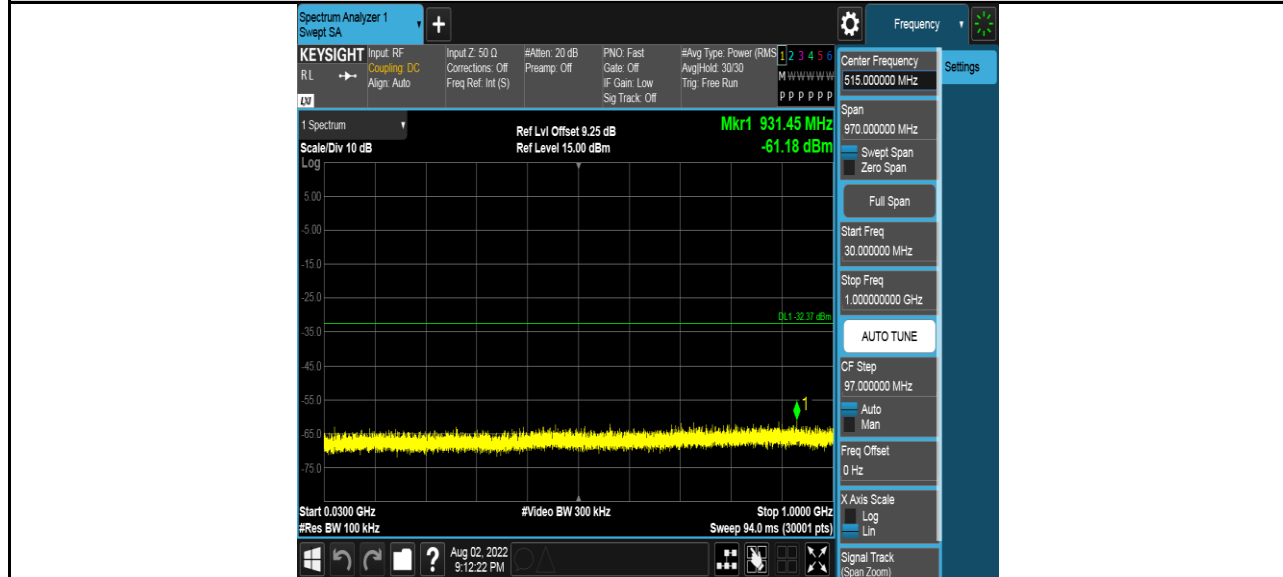
Test Mode	Test Channel	Result	Verdict
11N HT20	2412	Refer to the Test Graph	PASS



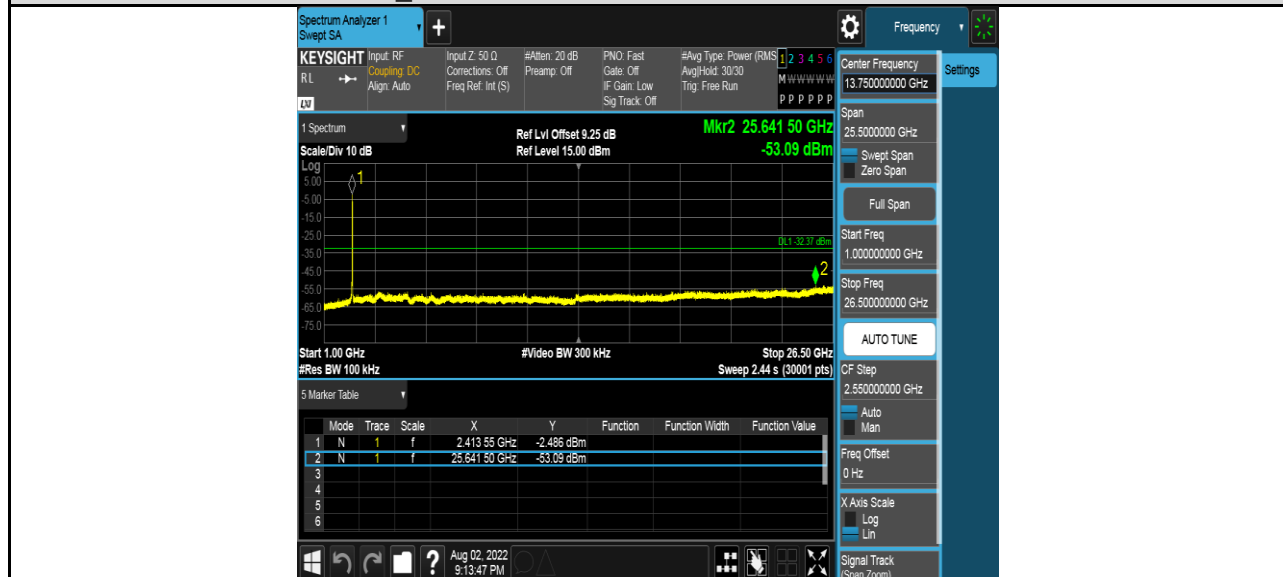
## TEST GRAPHS

Test Mode	Channel	Verdict
11N HT20	2412 MHz	PASS

### LCH SPURIOUS EMISSION\_30MHz~1GHz



### LCH SPURIOUS EMISSION\_1GHz~26.5GHz



## 7.3. RADIATED TEST RESULTS

### 7.3.1. LIMITS AND PROCEDURE

#### LIMITS

Please refer to FCC §15.205 and §15.209, ISED RSS-247 Clause 5.5, ISED RSS-GEN Clause 8.9&6.13 (Transmitter)

Radiation Disturbance Test Limit for ISED (9kHz-1GHz)

Except where otherwise indicated in the applicable RSS, radiated emissions shall comply with the field strength limits shown in table 5 and table 6. Additionally, the level of any transmitter unwanted emission shall not exceed the level of the transmitter's fundamental emission.

**Table 5 – General field strength limits at frequencies above 30 MHz**

Frequency (MHz)	Field strength ( $\mu\text{V/m}$ at 3 m)
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

**Table 6 – General field strength limits at frequencies below 30 MHz**

Frequency	Magnetic field strength (H-Field) ( $\mu\text{A/m}$ )	Measurement distance (m)
9 - 490 kHz <sup>Note 1</sup>	$6.37/F$ (F in kHz)	300
490 - 1705 kHz	$63.7/F$ (F in kHz)	30
1.705 - 30 MHz	0.08	30

**Note 1:** The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.



Please refer to FCC KDB 558074

Radiation Disturbance Test Limit for FCC (Class B) (9KHz-1GHz)

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

Note: 1) At frequencies at or above 30 MHz, measurements may be performed at a distance other than what is specified provided: measurements are not made in the near field except where it can be shown that near field measurements are appropriate due to the characteristics of the device; and it can be demonstrated that the signal levels needed to be measured at the distance employed can be detected by the measurement equipment. Measurements shall not be performed at a distance greater than 30 meters unless it can be further demonstrated that measurements at a distance of 30 meters or less are impractical. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements; inverse-linear-distance-squared for power density measurements).

(2) At frequencies below 30 MHz, measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field. Pending the development of an appropriate measurement procedure for measurements performed below 30 MHz, when performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). This paragraph (f) shall not apply to Access BPL devices operating below 30 MHz.





Radiation Disturbance Test Limit for FCC (Above 1G)

Frequency (MHz)	dB(uV/m) (at 3 meters)	
	Peak	Average
Above 1000	74	54

Restricted bands of operation

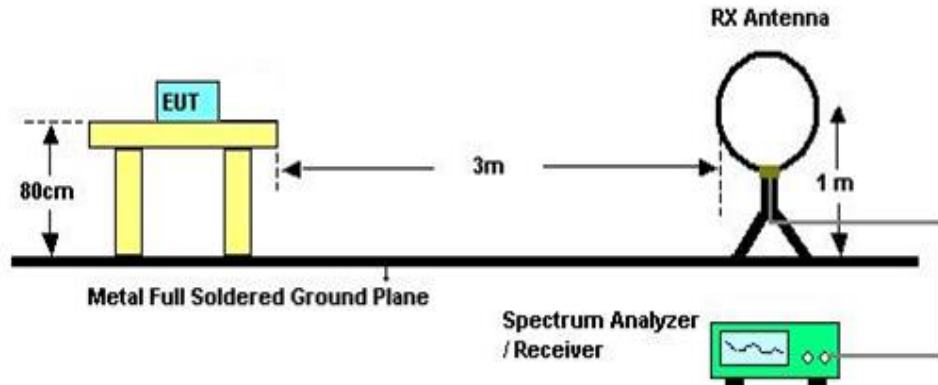
MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
<sup>1</sup> 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	( <sup>2</sup> )
13.36-13.41			

Note: <sup>1</sup>Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.

<sup>2</sup>Above 38.6c

## TEST SETUP AND PROCEDURE

Below 30MHz

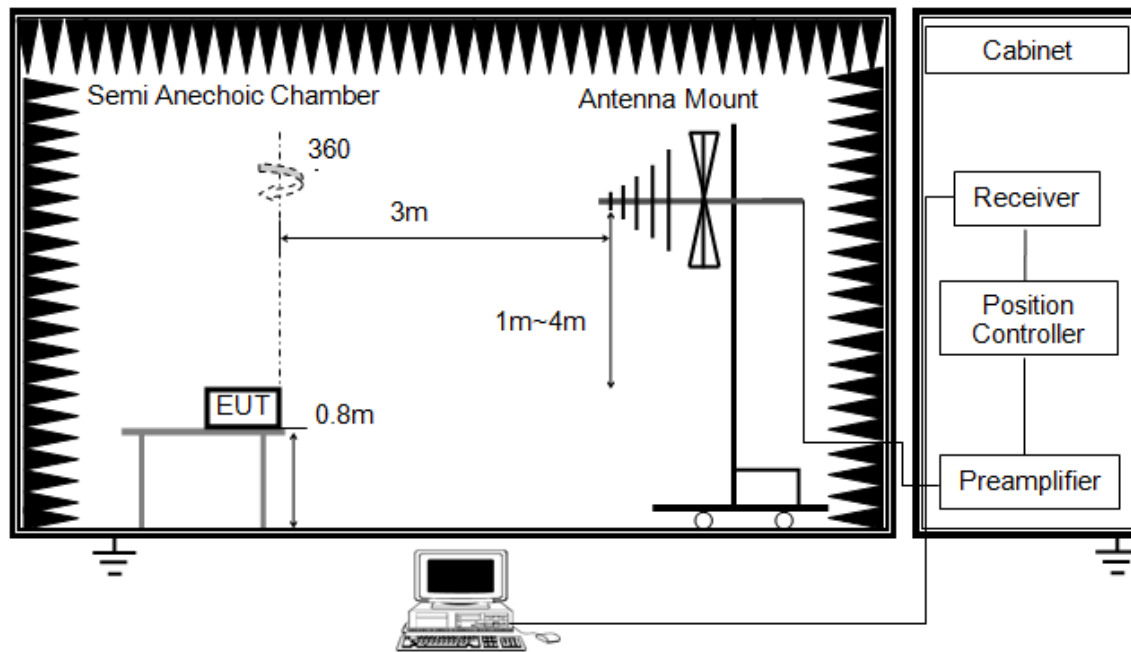


The setting of the spectrum analyser

RBW	200 Hz (From 9kHz to 0.15MHz) / 9kHz (From 0.15MHz to 30MHz)
VBW	200 Hz (From 9kHz to 0.15MHz) / 9kHz (From 0.15MHz to 30MHz)
Sweep	Auto
Detector	Peak/QP/Average
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013
2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both Horizontal, Face-on and Face-off polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a 1m height antenna tower.
5. The radiated emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector
6. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)
8. The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377  $\Omega$ . For example, the measurement frequency X kHz resulted in a level of Y dBuV/m, which is equivalent to  $Y-51.5 = Z$  dBuA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to be 15.209(a) limit.

Below 1G

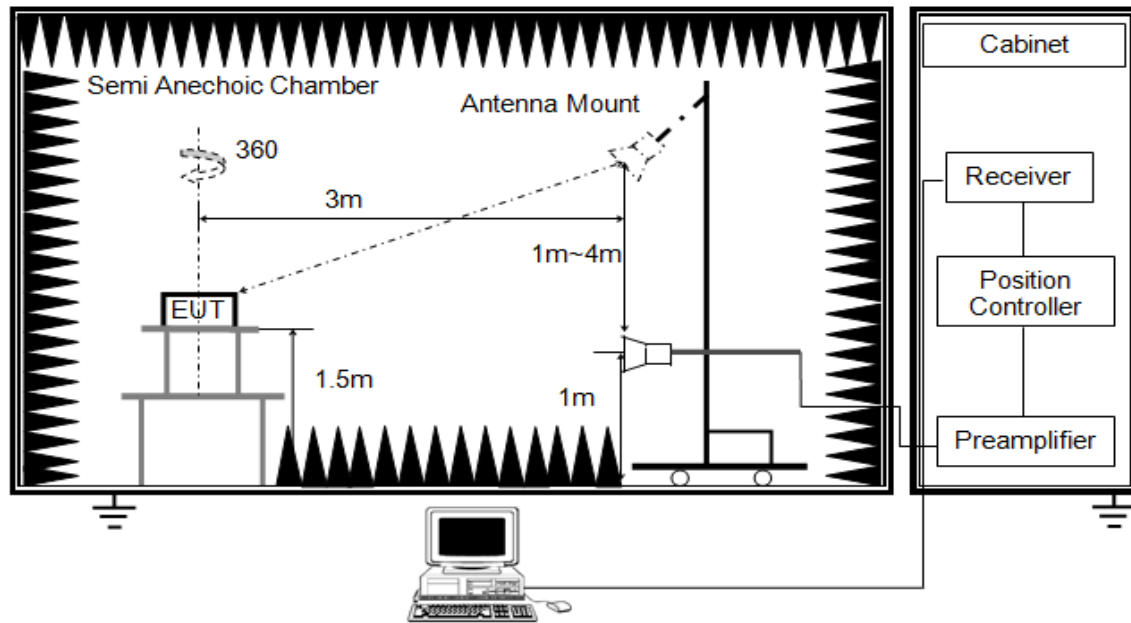


The setting of the spectrum analyser

RBW	120 kHz
VBW	300 kHz
Sweep	Auto
Detector	Peak/QP
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
6. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)

Above 1G

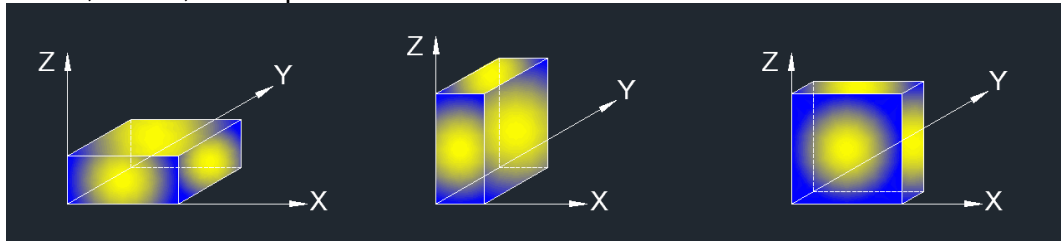


The setting of the spectrum analyser

RBW	1 MHz
VBW	PEAK:3 MHz AVG: See note6
Sweep	Auto
Detector	Peak
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
3. The EUT was placed on a turntable with 1.5m above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. For measurement above 1GHz, the emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the limit specified in Section 15.209.
6. For measurements above 1 GHz, the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements; and 1 MHz resolution bandwidth with video bandwidth  $\geq 1/T$  but not less than the setting list in section 7.1 when use peak detector, max hold to be run for at least  $[50 \cdot (1/\text{Duty Cycle})]$  traces for average measurements. For the Duty Cycle need to refer the results in section 7.1.
7. For the actual test configuration, please refer to the related item in this test report (Photographs of the Test Configuration)

X axis, Y axis, Z axis positions:



Note: For all radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worse case (X axis) data recorded in the report.



### 7.3.2.TEST ENVIRONMENT

Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	DC 3.3V

## RESULTS

### 7.3.3.WORST CASE VERIFICATION SUMMERY

Antenna Type	Test Item	Test Mode	Test Channel	Frequency	Worst Case Test Result		Delta
					Original Model	Spot CheckModel	
			MHz	MHz	dBuV/m	dBuV/m	dB
External Dipole Antenna	Restricted Bandedge	11N HT20	2462	2483.5	67.88	66.44	-1.44
	Spurious Emission	11G	2427	17034.2543	56.05	55.20	-0.85

#### Conclusion:

The worst case test result show that the new devices still comply with the standard and the new test result was close to the original test result, so it can demonstrate that the referenced test data remains valid for the new device.

### 7.3.4.RESTRICTED BANDEDGE

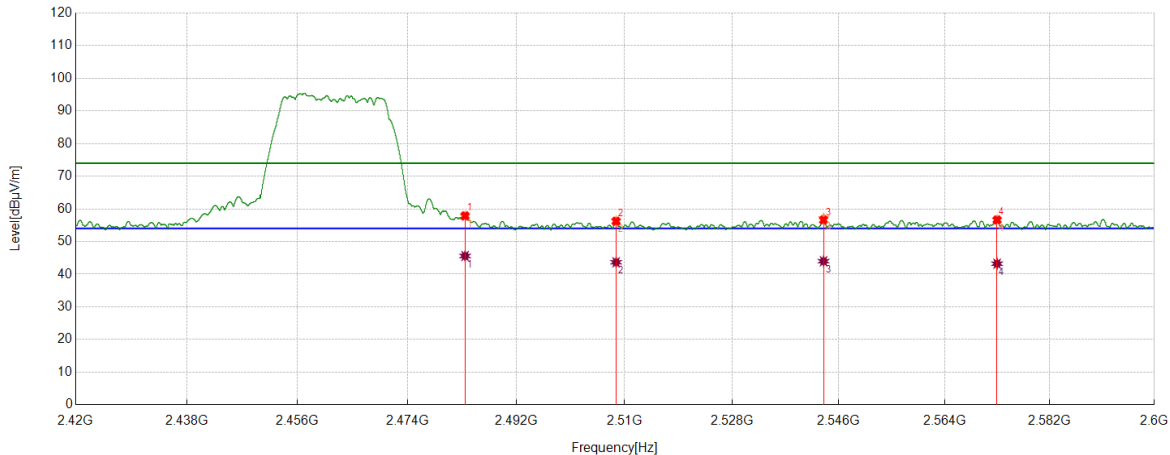
#### TEST RESULT TABLE

Test Mode		Channel	Puw(dBm)	Verdict
External Dipole Antenna	11N HT20	2462	<Limit	PASS



## TEST GRAPHS

Test Mode	Channel	Polarization	Verdict
11N HT20	2462 MHz	Horizontal	PASS



### PK Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	2483.5	44.85	12.97	57.82	74.00	-16.18	Horizontal
2	2508.5711	43.09	13.19	56.28	74.00	-17.72	Horizontal
3	2543.4279	43.73	13.40	57.13	74.00	-16.87	Horizontal
4	2572.9516	43.20	13.45	56.65	74.00	-17.35	Horizontal

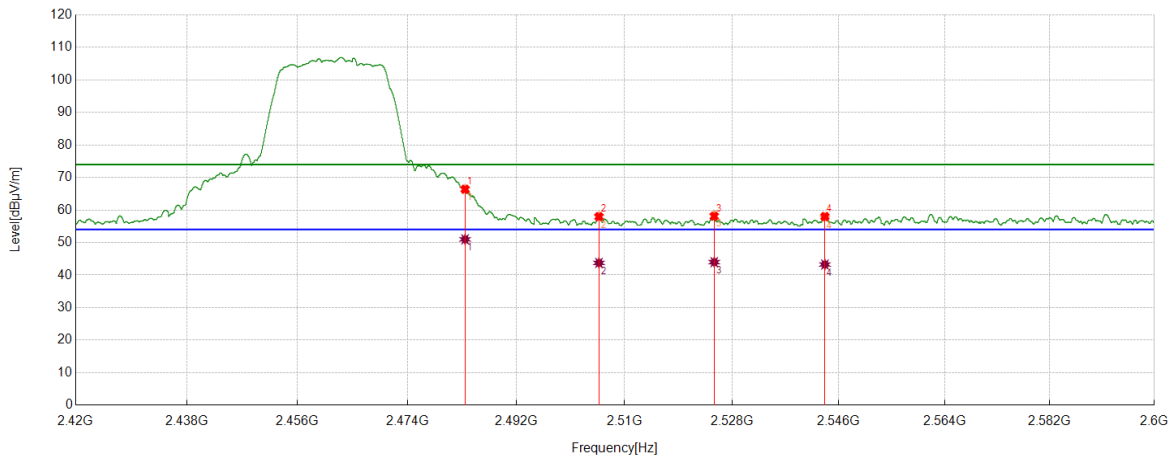
### AV Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	2483.5	32.61	12.97	45.58	54.00	-8.42	Horizontal
2	2508.5711	30.47	13.19	43.66	54.00	-10.34	Horizontal
3	2543.4279	30.58	13.40	43.98	54.00	-10.02	Horizontal
4	2572.9516	29.77	13.45	43.22	54.00	-10.78	Horizontal

- Note: 1. Peak result: Peak detector, RBW: 1 MHz, VBW: 3 MHz.  
2. Average result: Peak detector, RBW: 1 MHz, VBW: 1/T MHz (refer to clause 7.1.).  
3. Measurement = Reading Level + Correct Factor.  
4. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.



Test Mode	Channel	Polarization	Verdict
11N HT20	2462 MHz	Vertical	PASS



PK Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	2483.5	53.47	12.97	66.44	74.00	-7.56	Vertical
2	2505.7132	44.79	13.18	57.97	74.00	-16.03	Vertical
3	2524.9981	45.01	13.32	58.33	74.00	-15.67	Vertical
4	2543.653	44.33	13.39	57.72	74.00	-16.28	Vertical

AV Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	2483.5	38.01	12.97	50.98	54.00	-3.02	Vertical
2	2505.7132	30.57	13.18	43.75	54.00	-10.25	Vertical
3	2524.9981	30.67	13.32	43.99	54.00	-10.01	Vertical
4	2543.653	29.87	13.39	43.26	54.00	-10.74	Vertical

- Note: 1. Peak result: Peak detector, RBW: 1 MHz, VBW: 3 MHz.  
2. Average result: Peak detector, RBW: 1 MHz, VBW: 1/T MHz (refer to clause 7.1.).  
3. Measurement = Reading Level + Correct Factor.  
4. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.





### 7.3.5.SPURIOUS EMISSIONS

#### TEST RESULTS TABLE

1) For 1GHz~18GHz

Test Mode	Antenna Type	Channel	Puw(dBm)	Verdict
11G	External Dipole Antenna	2427 MHz	<Limit	PASS

2) For 9kHz~30MHz

Test Mode	Antenna Type	Channel	Puw(dBm)	Verdict
11B	External Dipole Antenna	2462 MHz	<Limit	PASS

3) For 30MHz~1GHz

Test Mode	Antenna Type	Channel	Puw(dBm)	Verdict
11B	External Dipole Antenna	2462 MHz	<Limit	PASS

4) For 18GHz~26.5GHz

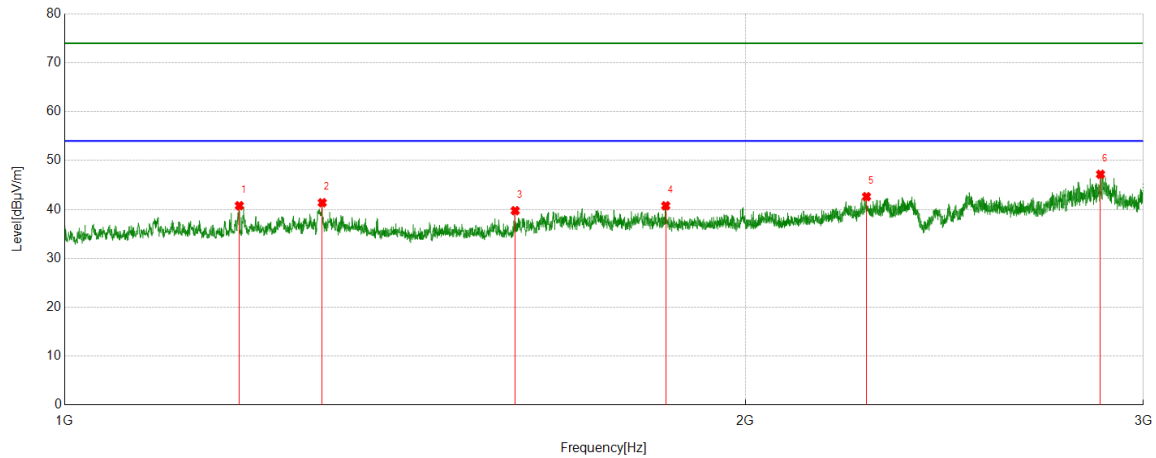
Test Mode	Antenna Type	Channel	Puw(dBm)	Verdict
11B	External Dipole Antenna	2462 MHz	<Limit	PASS



**Part 1: 1GHz~3GHz**

**HARMONICS AND SPURIOUS EMISSIONS**

Test Mode	Channel	Polarization	Verdict
11G	2427 MHz	Horizontal	PASS



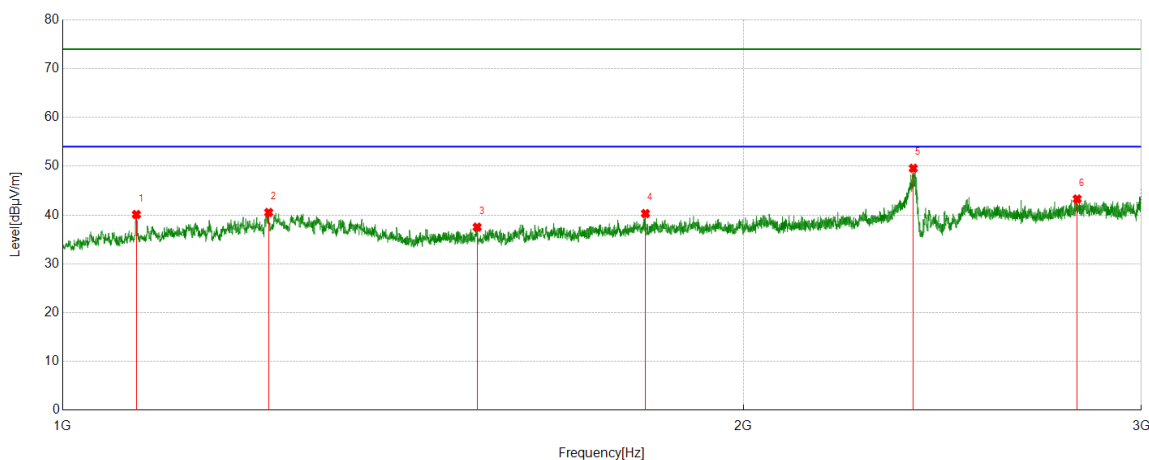
**PK Result:**

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	1194.1275	46.34	-5.57	40.77	74.00	-33.23	Horizontal
2	1300.0121	47.22	-5.84	41.38	74.00	-32.62	Horizontal
3	1582.1267	45.09	-5.34	39.75	74.00	-34.25	Horizontal
4	1844.2482	44.47	-3.71	40.76	74.00	-33.24	Horizontal
5	2263.2801	44.73	-2.11	42.62	74.00	-31.38	Horizontal
6	2872.3588	47.02	0.17	47.19	74.00	-26.81	Horizontal

- Note: 1. Measurement = Reading Level + Correct Factor.  
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.  
4. Peak: Peak detector.  
5. For below 3GHz part, filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.  
6. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.



Test Mode	Channel	Polarization	Verdict
11G	2427 MHz	Vertical	PASS



PK Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	1078.1190	45.52	-5.41	40.11	74.00	-33.89	Vertical
2	1233.2052	46.15	-5.63	40.52	74.00	-33.48	Vertical
3	1525.3708	43.14	-5.63	37.51	74.00	-36.49	Vertical
4	1810.2561	44.37	-4.07	40.30	74.00	-33.70	Vertical
5	2378.3492	50.67	-1.09	49.58	74.00	-24.42	Vertical
6	2810.4221	43.51	-0.23	43.28	74.00	-30.72	Vertical

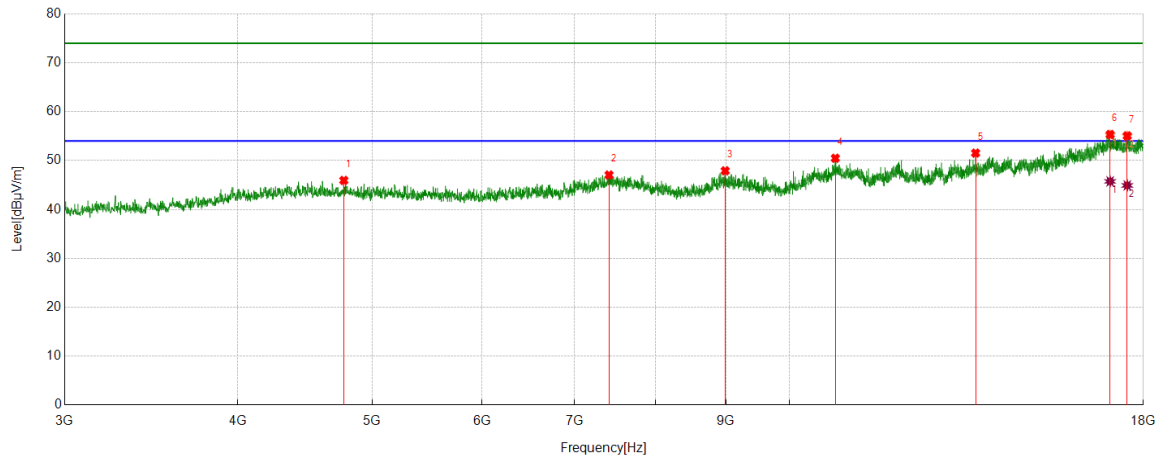
- Note: 1. Measurement = Reading Level + Correct Factor.  
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
3. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.  
4. Peak: Peak detector.  
5. For below 3GHz part, filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for Band Reject Filter losses.  
6. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.



**Part 2: 3GHz~18GHz**

**HARMONICS AND SPURIOUS EMISSIONS**

Test Mode	Channel	Polarization	Verdict
11G	2427 MHz	Horizontal	PASS



**PK Result:**

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	4770.2213	40.54	5.40	45.94	74.00	-28.06	Horizontal
2	7410.5513	38.39	8.66	47.05	74.00	-26.95	Horizontal
3	8987.6235	38.95	8.95	47.90	74.00	-26.10	Horizontal
4	10791.599	38.38	12.09	50.47	74.00	-23.53	Horizontal
5	13623.2029	38.50	13.03	51.53	74.00	-22.47	Horizontal
6	17034.2543	36.23	18.97	55.20	74.00	-18.80	Horizontal
7	17525.5657	37.16	17.83	54.99	74.00	-19.01	Horizontal

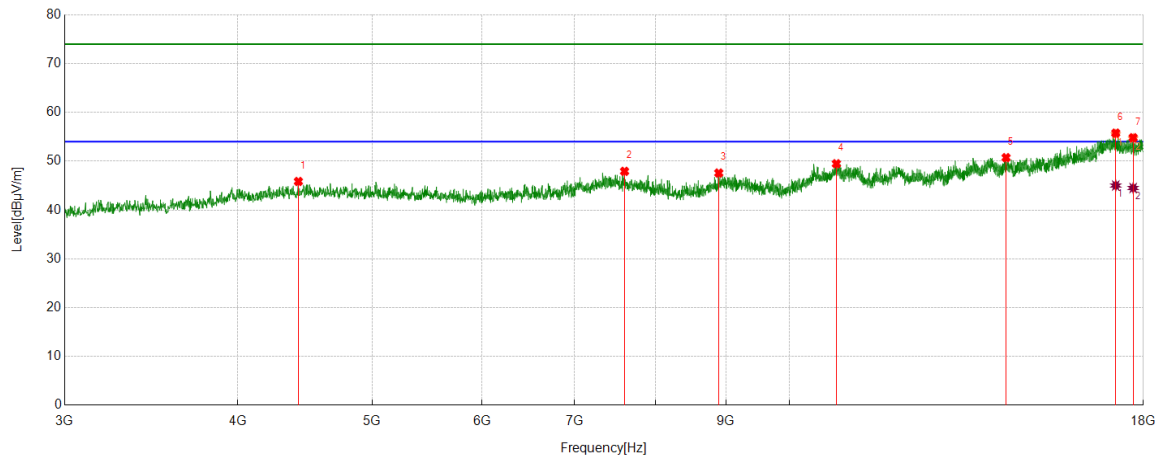
**AV Result:**

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	17034.2543	26.77	18.97	45.74	54.00	-8.26	Horizontal
2	17525.5657	27.09	17.83	44.92	54.00	-9.08	Horizontal

- Note: 1. Measurement = Reading Level + Correct Factor.  
2. If peak result complies with AV limit, AV Result is deemed to comply with AV limit.  
3. Peak result: Peak detector, RBW: 1 MHz, VBW: 3 MHz.  
4. Average result: Peak detector, RBW: 1 MHz, VBW: 1/T MHz(refer to clause 7.1.).  
5. For above 3GHz part, filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for HPF losses.  
6. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.



Test Mode	Channel	Polarization	Verdict
11G	2427 MHz	Vertical	PASS



PK Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	4423.3029	40.64	5.21	45.85	74.00	-28.15	Vertical
2	7603.7005	39.28	8.65	47.93	74.00	-26.07	Vertical
3	8891.9865	39.16	8.42	47.58	74.00	-26.42	Vertical
4	10810.3513	37.27	12.21	49.48	74.00	-24.52	Vertical
5	14330.1663	36.61	14.12	50.73	74.00	-23.27	Vertical
6	17193.6492	37.25	18.24	55.49	74.00	-18.51	Vertical
7	17698.0873	36.83	17.80	54.63	74.00	-19.37	Vertical

AV Result:

No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	17193.6492	26.78	18.24	45.02	54.00	-8.98	Vertical
2	17698.0873	26.71	17.80	44.51	54.00	-9.49	Vertical

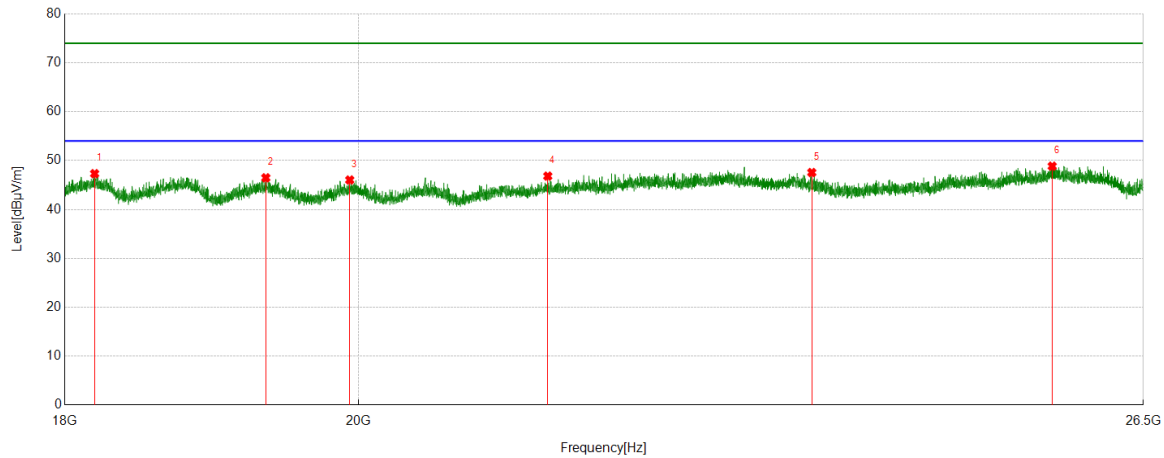
- Note: 1. Measurement = Reading Level + Correct Factor.  
2. If peak result complies with AV limit, AV Result is deemed to comply with AV limit.  
3. Peak result: Peak detector, RBW: 1 MHz, VBW: 3 MHz.  
4. Average result: Peak detector, RBW: 1 MHz, VBW: 1/T MHz(refer to clause 7.1.).  
5. For above 3GHz part, filter losses were only considered in the spurious frequency bands and the authorized band was not corrected for HPF losses.  
6. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.



**Part 3: 18GHz~26.5GHz**

**SPURIOUS EMISSIONS 18GHz TO 26.5GHz (WORST-CASE CONFIGURATION)**

Test Mode	Channel	Polarization	Verdict
11B	2462 MHz	Horizontal	PASS

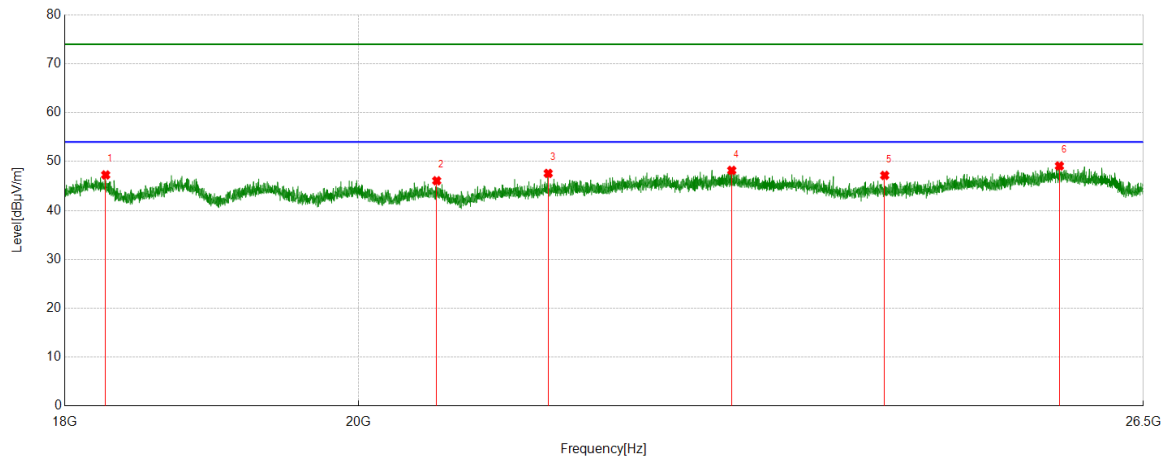


No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	18194.6695	48.78	-1.46	47.32	74.00	-26.68	Peak
2	19346.5347	47.78	-1.31	46.47	74.00	-27.53	Peak
3	19937.3437	46.99	-0.96	46.03	74.00	-27.97	Peak
4	21404.5905	47.61	-0.79	46.82	74.00	-27.18	Peak
5	23529.803	47.96	-0.41	47.55	74.00	-26.45	Peak
6	25648.2148	48.28	0.57	48.85	74.00	-25.15	Peak

Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.  
3. Measurement = Reading Level + Correct Factor.  
4. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.



Test Mode	Channel	Polarization	Verdict
11B	2462 MHz	Vertical	PASS



No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	18266.9267	48.69	-1.43	47.26	74.00	-26.74	Peak
2	20568.9569	47.09	-1.02	46.07	74.00	-27.93	Peak
3	21407.9908	48.36	-0.78	47.58	74.00	-26.42	Peak
4	22864.1864	47.49	0.70	48.19	74.00	-25.81	Peak
5	24152.9153	48.55	-1.38	47.17	74.00	-26.83	Peak
6	25714.5215	48.44	0.66	49.10	74.00	-24.90	Peak

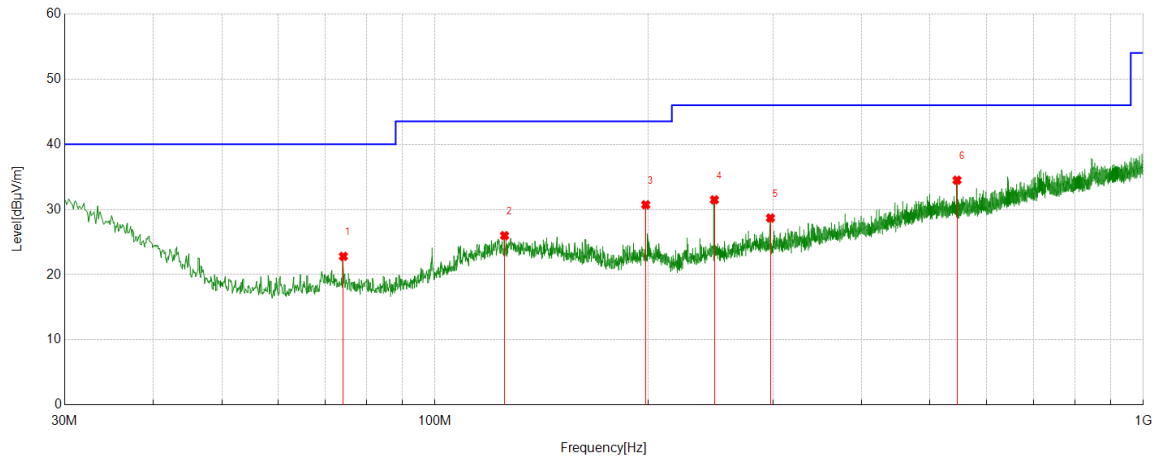
- Note: 1. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.  
2. Test setup: RBW: 1 MHz, VBW: 3 MHz, Sweep time: auto.  
3. Measurement = Reading Level + Correct Factor.  
4. Only the worst case emission was recorded, if it complies with the limit, the other emissions deemed to comply with the limit.



**Part 4: 30MHz~1GHz**

**SPURIOUS EMISSIONS 30M TO 1GHz (WORST-CASE CONFIGURATION)**

Test Mode	Channel	Polarization	Verdict
11B	2462 MHz	Horizontal	PASS



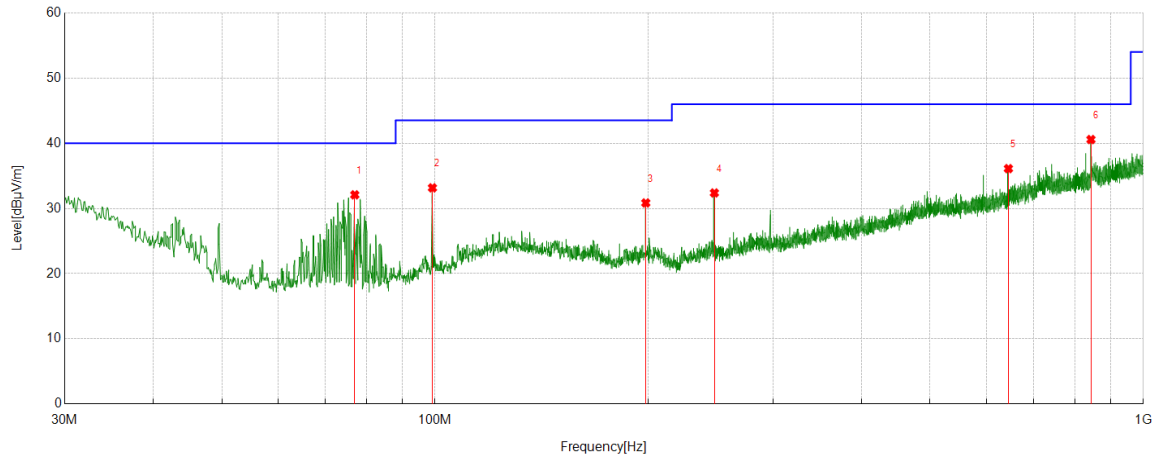
No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	74.2364	8.20	14.61	22.81	40.00	-17.19	Peak
2	125.3605	5.71	20.28	25.99	43.50	-17.51	Peak
3	198.4088	11.65	19.07	30.72	43.50	-12.78	Peak
4	247.9808	12.52	18.96	31.48	46.00	-14.52	Peak
5	297.5528	8.21	20.48	28.69	46.00	-17.31	Peak
6	545.7036	8.40	26.09	34.49	46.00	-11.51	Peak

Note: 1. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.  
2. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.  
3. Measurement = Reading Level + Correct Factor.





Test Mode	Channel	Polarization	Verdict
11B	2462 MHz	Vertical	PASS



No.	Frequency	Reading Level	Correct Factor	Result	Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	
1	77.0497	17.61	14.48	32.09	40.00	-7.91	Peak
2	99.1679	16.49	16.67	33.16	43.50	-10.34	Peak
3	198.4088	11.78	19.07	30.85	43.50	-12.65	Peak
4	247.9808	13.42	18.96	32.38	46.00	-13.62	Peak
5	644.9445	8.65	27.46	36.11	46.00	-9.89	Peak
6	843.4263	10.21	30.36	40.57	46.00	-5.43	Peak

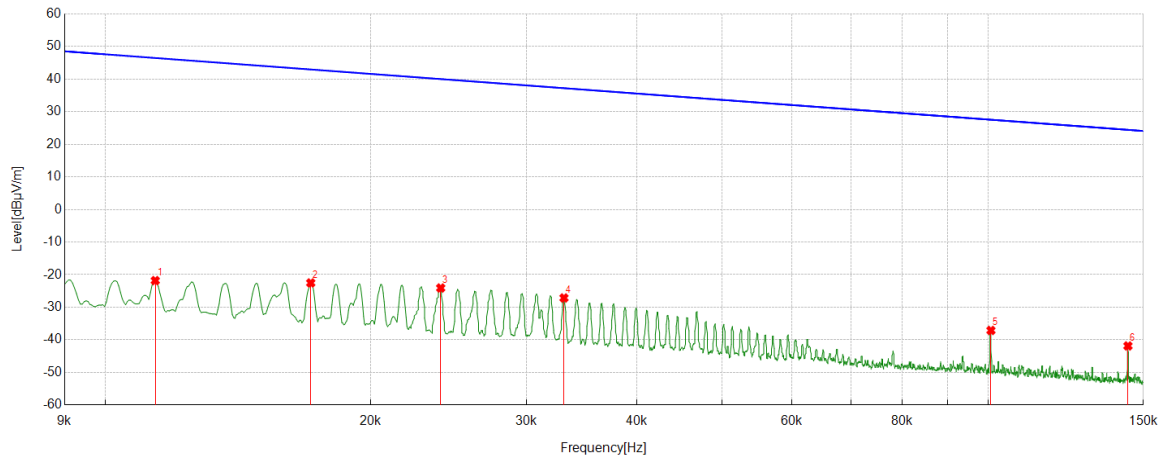
Note: 1. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.  
2. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.  
3. Measurement = Reading Level + Correct Factor.



**Part 5: 9kHz~30MHz**

**SPURIOUS EMISSIONS Below 30MHz (WORST CASE CONFIGURATION-FACE ON)**

Test Mode	Channel	Frequency Range	Verdict
11B	2462 MHz	9kHz~150kHz	PASS

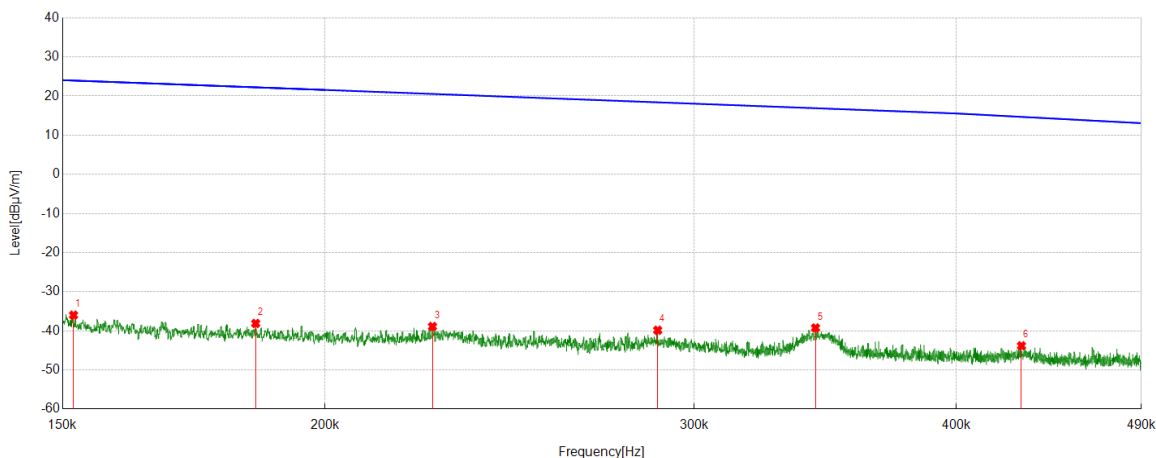


No.	Frequency	Reading Level	Correct Factor	FCC Result	FCC Limit	ISED Result	ISED Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dBuA/m]	[dBuA/m]	[dB]	
1	0.0114	39.29	-61.11	-21.82	46.46	-73.32	-5.04	-68.28	Peak
2	0.0171	38.40	-60.93	-22.53	42.92	-74.03	-8.58	-65.45	Peak
3	0.0240	36.78	-60.87	-24.09	40.00	-75.59	-11.50	-64.09	Peak
4	0.0331	33.79	-60.93	-27.14	37.20	-78.64	-14.30	-64.34	Peak
5	0.1008	23.63	-60.73	-37.10	27.53	-88.60	-23.97	-64.63	Peak
6	0.1441	19.39	-61.25	-41.86	24.43	-93.36	-27.07	-66.29	Peak

- Note: 1. Measurement = Reading Level + Correct Factor.  
2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.  
3. All 3 polarizations(Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.



Test Mode	Channel	Frequency Range	Verdict
11B	2462 MHz	150kHz~490kHz	PASS

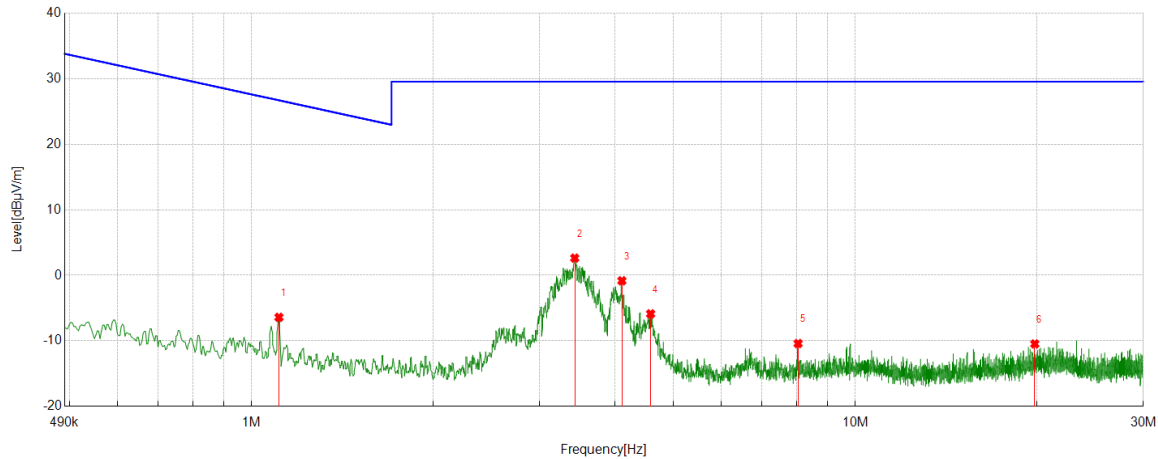


No.	Frequency	Reading Level	Correct Factor	FCC Result	FCC Limit	ISED Result	ISED Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dBuA/m]	[dBuA/m]	[dB]	
1	0.1518	25.33	-61.31	-35.98	23.98	-87.48	-27.52	-59.96	Peak
2	0.1854	23.03	-61.14	-38.11	22.24	-89.61	-29.26	-60.35	Peak
3	0.2251	22.04	-60.93	-38.89	20.55	-90.39	-30.95	-59.44	Peak
4	0.2882	20.92	-60.77	-39.85	18.41	-91.35	-33.09	-58.26	Peak
5	0.3427	21.47	-60.73	-39.26	16.90	-90.76	-34.60	-56.16	Peak
6	0.4296	16.83	-60.65	-43.82	14.69	-95.32	-36.81	-58.51	Peak

- Note: 1. Measurement = Reading Level + Correct Factor.  
2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.  
3. All 3 polarizations(Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.



Test Mode	Channel	Frequency Range	Verdict
11B	2462 MHz	490kHz~30MHz	PASS



No.	Frequency	Reading Level	Correct Factor	FCC Result	FCC Limit	ISED Result	ISED Limit	Margin	Remark
	[MHz]	[dBuV/m]	[dB]	[dBuV/m]	[dBuV/m]	[dBuA/m]	[dBuA/m]	[dB]	
1	1.1098	13.94	-20.34	-6.40	26.70	-57.9	-24.8	-33.10	Peak
2	3.4295	22.92	-20.29	2.63	29.54	-48.87	-21.96	-26.91	Peak
3	4.1053	19.23	-20.06	-0.83	29.54	-52.33	-21.96	-30.37	Peak
4	4.5805	14.28	-20.15	-5.87	29.54	-57.37	-21.96	-35.41	Peak
5	8.0394	8.97	-19.37	-10.40	29.54	-61.90	-21.96	-39.94	Peak
6	19.8298	6.93	-17.39	-10.46	29.54	-61.96	-21.96	-40.00	Peak

- Note: 1. Measurement = Reading Level + Correct Factor.  
2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.  
3. All 3 polarizations(Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

## 8. AC POWER LINE CONDUCTED EMISSIONS

### LIMITS

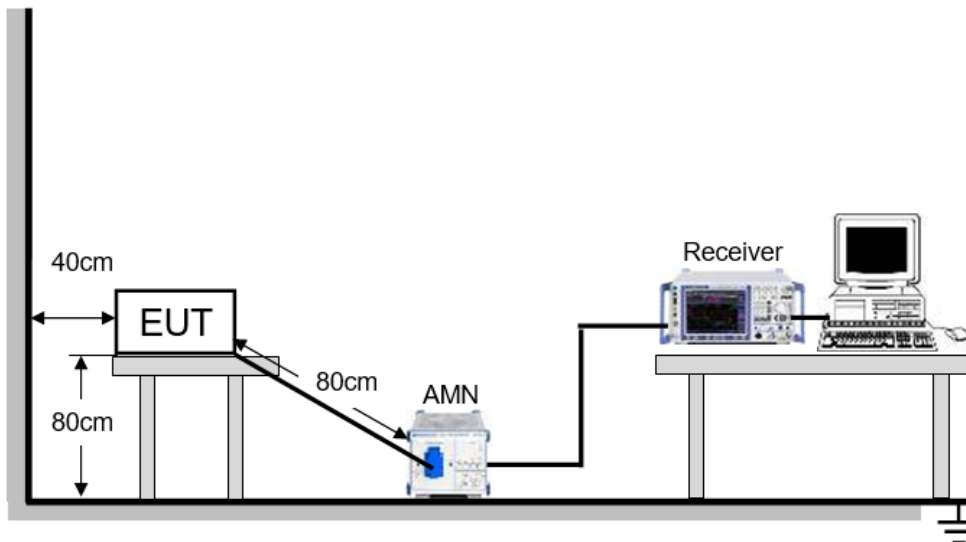
Please refer to FCC §15.207 (a)

FREQUENCY (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

### TEST ENVIRONMENT

Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V

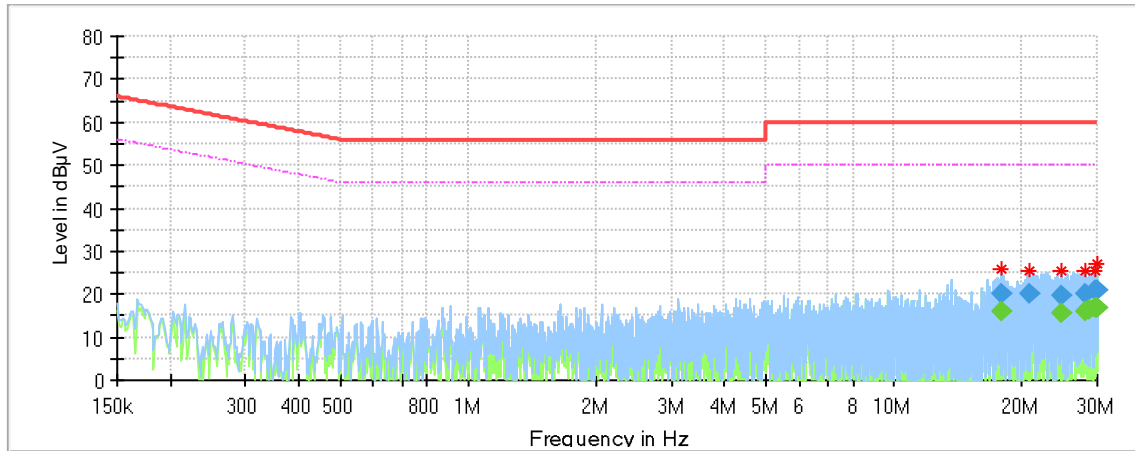
### TEST SETUP AND PROCEDURE



The EUT is put on a table of non-conducting material that is 80cm high. The vertical conducting wall of shielding is located 40cm to the rear of the EUT. The power line of the EUT is connected to the AC mains through an Artificial Mains Network (A.M.N.). A EMI Measurement Receiver (R&S Test Receiver ESR3) is used to test the emissions from both sides of AC line. According to the requirements in Section 6.2 of ANSI C63.10-2013. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and average detector mode. The bandwidth of EMI test receiver is set at 9kHz.

The arrangement of the equipment is installed to meet the standards and operating in a manner, which tends to maximize its emission characteristics in a normal application.

### LINE L RESULTS (WORST-CASE CONFIGURATION)

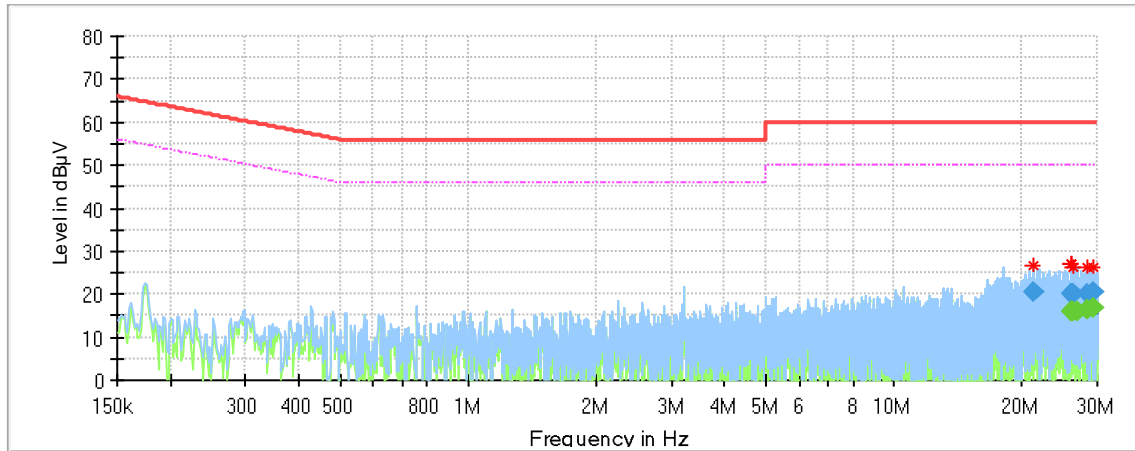


### Final\_Result

Frequency [MHz]	QuasiPeak [dBμV]	Average [dBμV]	Limit [dBμV]	Margin [dB]	Meas. Time [ms]	Bandwidth [kHz]	Line	Filter	Corr. [dB]
17.786873	---	15.88	50.00	34.12	1000.0	9.000	L1	OFF	9.7
17.786873	20.07	---	60.00	39.93	1000.0	9.000	L1	OFF	9.7
20.859930	20.18	---	60.00	39.82	1000.0	9.000	L1	OFF	9.8
24.695655	---	15.53	50.00	34.47	1000.0	9.000	L1	OFF	9.8
24.695655	19.52	---	60.00	40.48	1000.0	9.000	L1	OFF	9.8
28.022438	---	16.02	50.00	33.98	1000.0	9.000	L1	OFF	9.8
28.022438	19.93	---	60.00	40.07	1000.0	9.000	L1	OFF	9.8
28.870178	---	16.38	50.00	33.62	1000.0	9.000	L1	OFF	9.8
29.768663	20.90	---	60.00	39.10	1000.0	9.000	L1	OFF	9.8
29.768663	---	16.90	50.00	33.10	1000.0	9.000	L1	OFF	9.8
29.998508	---	16.99	50.00	33.01	1000.0	9.000	L1	OFF	9.8
29.998508	20.80	---	60.00	39.20	1000.0	9.000	L1	OFF	9.8

- Note: 1. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.  
2. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).  
3. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.  
4. The extension cord/outlet strip was calibrated with the LISN as required by ANSI C63.10:2013 Clause 6.2.2.  
5. The EUT was test with two type antennas, the result of the EUT with type 2 antenna was worse case and recorded in this report.  
6. Pre-testing all test modes and channels, and find the 2437MHz of 11B which is the worst case, so only the worst case is included in this test report.

### LINE N RESULTS (WORST-CASE CONFIGURATION)



### Final\_Result

Frequency [MHz]	QuasiPeak [dBμV]	Average [dBμV]	Limit [dBμV]	Margin [dB]	Meas. Time [ms]	Bandwidth [kHz]	Line	Filter	Corr. [dB]
21.294248	20.44	---	60.00	39.56	1000.0	9.000	N	OFF	10.0
25.998608	---	16.07	50.00	33.93	1000.0	9.000	N	OFF	9.9
25.998608	19.94	---	60.00	40.06	1000.0	9.000	N	OFF	9.9
26.040398	---	16.06	50.00	33.94	1000.0	9.000	N	OFF	9.9
26.040398	19.91	---	60.00	40.09	1000.0	9.000	N	OFF	9.9
26.331435	---	16.10	50.00	33.90	1000.0	9.000	N	OFF	9.8
26.331435	19.96	---	60.00	40.04	1000.0	9.000	N	OFF	9.8
26.935898	---	16.20	50.00	33.80	1000.0	9.000	N	OFF	9.8
28.570185	20.21	---	60.00	39.79	1000.0	9.000	N	OFF	9.8
28.570185	---	16.30	50.00	33.70	1000.0	9.000	N	OFF	9.8
29.341808	---	16.64	50.00	33.36	1000.0	9.000	N	OFF	9.7
29.341808	20.68	---	60.00	39.32	1000.0	9.000	N	OFF	9.7

- Note: 1. If QP Result complies with AV limit, AV Result is deemed to comply with AV limit.  
2. Test setup: RBW: 200 Hz (9 kHz—150 kHz), 9 kHz (150 kHz—30 MHz).  
3. Step size: 80Hz (0.009MHz-0.15MHz), 4 kHz (0.15MHz-30MHz), Scan time: auto.  
4. The extension cord/outlet strip was calibrated with the LISN as required by ANSI C63.10:2013 Clause 6.2.2.  
5. The EUT was test with two type antennas, the result of the EUT with type 2 antenna was worse case and recorded in this report.  
6. Pre-testing all test modes and channels, and find the 2437MHz of 11B which is the worst case, so only the worst case is included in this test report.



## 9. ANTENNA REQUIREMENTS

### APPLICABLE REQUIREMENTS

Please refer to FCC §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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Please refer to FCC §15.247(b)(4)

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### ANTENNA GAIN

The antenna gain of EUT is less than 6 dBi

**END OF REPORT**