



# FCC RADIO TEST REPORT

FCC ID	: 2ATQRSMODBV3
Equipment	: SkydioLink Third Generation Radio Module
Brand Name	: Skydio
Model Name	: SMODBV3
Applicant	: Skydio, Inc. 3000 Clearview Way San Mateo, CA 94402
Manufacturer	: Skydio, Inc. 3000 Clearview Way San Mateo, CA 94402
Standard	: FCC PART 15 Subpart C §15.247

The product was received on Mar. 03, 2023 and testing was performed from May 25, 2023 to Jun. 07, 2023. We, Sporton International (USA) Inc., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval from Sporton International (USA) Inc., the test report shall not be reproduced except in full.

Approved by: David Hung

Sporton International (USA) Inc.

1175 Montague Expressway, Milpitas, CA 95035



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# History of this test report

Report No.	Version	Description	Issue Date
FR230303001A	01	Initial issue of report	Jun. 23, 2023
FR230303001A	02	<ol> <li>Revise Antenna Directional Gain, appendix C, appendix D and appendix E</li> <li>Add Test mode remark 3</li> <li>This report is an updated version, replacing the report issued on Jun. 23, 2023.</li> </ol>	Aug. 08, 2023



# Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
3.1	15.247(a)(2)	6dB Bandwidth	Pass	-
3.1	2.1049	99% Occupied Bandwidth	Reporting only	-
3.2	15.247(b)	Power Output Measurement	Pass	-
3.3	15.247(e)	Power Spectral Density	Pass	-
2.4		Conducted Band Edges	Pass	-
3.4 15.247(d)		Conducted Spurious Emission	Pass	-
3.5	15.247(d)	Radiated Band Edges and Radiated Spurious Emission	Pass	0.12 dB under the limit at 2483.52 MHz for Low Gain Antenna 0.20 dB under the limit at 2483.50 MHz for High Gain Antenna
3.6	15.207	AC Conducted Emission	Pass	16.51 dB under the limit at 0.79 MHz
3.7	15.203	Antenna Requirement	Pass	-

#### Conformity Assessment Condition:

 The test results (PASS/FAIL) with all measurement uncertainty excluded are presented against the regulation limits or in accordance with the requirements stipulated by the applicant/manufacturer who shall bear all the risks of non-compliance that may potentially occur if measurement uncertainty is taken into account.

2. The measurement uncertainty please refer to each test result in the section "Measurement Uncertainty".

#### Disclaimer:

The product specifications of the EUT presented in the test report that may affect the test assessments are declared by the manufacturer who shall take full responsibility for the authenticity.



# **1** General Description

# **1.1 Product Feature of Equipment Under Test**

#### **Product Feature**

#### **General Specs**

Wi-Fi 2.4GHz 802.11g/n/ac/ax, Wi-Fi 5GHz 802.11a/n/ac/ax.

### Antenna Type

WLAN: Dipole Antenna Antenna 0: 2.4GHz/5GHz band Tx/Rx Antenna 1: Rx only Antenna 2: 2.4GHz/5GHz band Tx/Rx Antenna 3: Rx only

FW version: P2GoldenSPC\_ver1.1.0 HW version: 360-207231-000-3

Antenna information (Low Gain Antenna)						
Туре	Dipole Antenna					
Model	360-205976-000					
2400 MHz ~ 2483.5 MHz	Peak Gain (dBi)	Ant. 0: 1.91 Ant. 2: 1.90				

Antenna information (High Gain Antenna)							
ype Dipole Antenna							
Model	360-208447-000						
2400 MHz ~ 2483.5 MHz	Peak Gain (dBi)	Ant. 0: 4.57 Ant. 2: 4.62					

#### Remark:

- 1. This device is a software define radio (SDR), in which the operation modes can be configured to work as a master or a slave while integrated into specific hosts.
- 2. The EUT's information above is declared by manufacturer. Please refer to Disclaimer in report summary.



### 1.1.1 Antenna Directional Gain

#### <For CDD Mode>

Follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01 F)2)f)ii)

Directional gain =  $G_{ANT}$  + Array Gain, where Array Gain is as follows:

For power measurements on IEEE 802.11 devices,

Directional gain =  $10^{10} \log[(10^{G1/10} + 10^{G2/10} + ... + 10^{GN/10}) / N_{ANT}] dBi$ 

Where G1, G2....GN denote single antenna gain

For PSD measurements, the directional gain calculation.

$$DirectionalGain = 10 \cdot \log \left[ \frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$$

where

Each antenna is driven by no more than one spatial stream;

 $N_{SS}$  = the number of independent spatial streams of data;

 $N_{ANT}$  = the total number of antennas

 $g_{j,k} = 10^{G_k/20}$  if the *k*th antenna is being fed by spatial stream *j*, or zero if it is not;  $G_k$  is the gain in dBi of the kth antenna.

As minimum N<sub>SS</sub>=1 is supported by EUT, the formula can be simplified as: Directional gain =  $10*\log[(10^{G1/20} + 10^{G2/20} + ... + 10^{GN/20})^2 / N_{ANT}] dBi$ Where G1, G2....GN denote single antenna gain.

The directional gain "DG" is calculated as following table.



#### <Low Gain Antenna>

			DG	DG	Power	PSD
			for	for	Limit	Limit
	Ant 0	Ant 2	Power	PSD	Reduction	Reduction
	(dBi)	(dBi)	(dBi)	(dBi)	(dB)	(dB)
2.4GHz	1.91	1.90	1.91	4.92	0.00	0.00

Calculation example:

If a device has two antenna, G<sub>ANT1</sub>= 1.91dBi; G<sub>ANT2</sub>=1.90dBi

Directional gain of power measurement is derived from following formula:

 $10 \times \log \{ [10^{(1.91/10)} + 10^{(1.90/10)}] / 2 \} = 1.91 \text{ dBi}$ 

Directional gain of PSD is derived from following formula:

10 x log { { [ 10^ (1.91 dBi / 20) + 10^ (1.90 dBi / 20) ] ^ 2 } / 2 }

= 4.92 dBi

Power and PSD limit reduction = Composite gain - 6dBi, (min = 0)

#### <High Gain Antenna>

			DG	DG	Power	PSD
			for	for	Limit	Limit
	Ant 0	Ant 2	Power	PSD	Reduction	Reduction
	(dBi)	(dBi)	(dBi)	(dBi)	(dB)	(dB)
2.4GHz	4.57	4.62	4.60	7.61	0.00	1.61

Calculation example:

If a device has two antenna, G<sub>ANT1</sub>= 4.57dBi; G<sub>ANT2</sub>=4.62dBi

Directional gain of power measurement is derived from following formula:

 $10 \times \log \{ [10^{(4.57/10)} + 10^{(4.62/10)}] / 2 \} = 4.60 \text{ dBi}$ 

Directional gain of PSD is derived from following formula:

10 x log { { [ 10^ (4.57 dBi / 20) + 10^ (4.62 dBi / 20) ] ^ 2 } / 2 }

= 7.61 dBi

Power and PSD limit reduction = Directional gain - 6dBi, (min = 0)

#### <For STBC Mode>

In STBC mode all transmit signals are completely uncorrelated.

Following FCC KDB 662911 D01 Multiple Transmitter Output v02r01 F)2)d)ii), if all transmit signals are completely uncorrelated, then

Directional gain =  $10^{10} \log[(10^{G1/10} + 10^{G2/10} + ... + 10^{GN/10}) / N_{ANT}] dBi$ 

The directional gain "DG" is calculated as following table.

#### <Low Gain Antenna>

			DG	DG	Power	PSD
			for	for	Limit	Limit
	Ant. 0	Ant. 2	Power	PSD	Reduction	Reduction
	(dBi)	(dBi)	(dBi)	(dBi)	(dB)	(dB)
2.4 GHz	1.91	1.90	1.91	1.91	0.00	0.00

Calculation example:

If a device has two antenna,  $G_{ANT1}$ = 1.91dBi;  $G_{ANT2}$ =1.90dBi

Directional gain of power and PSD measurement is derived from following formula:

10 x log { [ 10^(1.91/10) + 10^(1.91/10) ] / 2 } = 1.91 dBi

#### <High Gain Antenna>

			DG	DG	Power	PSD
			for	for	Limit	Limit
	Ant. 0	Ant. 2	Power	PSD	Reduction	Reduction
	(dBi)	(dBi)	(dBi)	(dBi)	(dB)	(dB)
2.4 GHz	4.57	4.62	4.60	4.60	0.00	0.00

Calculation example:

If a device has two antenna, G<sub>ANT1</sub>= 4.57dBi; G<sub>ANT2</sub>=4.62dBi

Directional gain of power and PSD measurement is derived from following formula:

 $10 \times \log \{ [10^{(4.57/10)} + 10^{(4.62/10)}] / 2 \} = 4.60 \text{ dBi}$ 

# **1.2 Modification of EUT**

No modifications made to the EUT during the testing.



# **1.3 Testing Location**

Test Site	Sporton International (USA) Inc.
Test Site Location	1175 Montague Expressway, Milpitas, CA 95035 TEL : 408 9043300
Test Site No.	Sporton Site No.
	TH01-CA, CO01-CA, 03CH02-CA

Note: The test site complies with ANSI C63.4 2014 requirement.

FCC designation No.: US 1250

# **1.4 Applicable Standards**

According to the specifications declared by the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart C §15.247
- + FCC KDB Publication No. 558074 D01 15.247 Meas Guidance v05r02
- FCC KDB 414788 D01 Radiated Test Site v01r01.
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- ANSI C63.10-2013

#### Remark:

- 1. All the test items were validated and recorded in accordance with the standards without any modification during the testing.
- 2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

# 2 Test Configuration of Equipment Under Test

- a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, the measured emission level of the EUT was maximized by rotating the EUT on a turntable, adjusting the orientation of the EUT and EUT antenna in three orthogonal axis (X: flat, Y: portrait, Z: landscape) for High Gain Antenna, and two config (Ant. Degree 0 and Ant. Degree 90) for Low Gain Antenna, and adjusting the measurement antenna orientation, following C63.10 exploratory test procedures and only the worst case emissions were reported in this report.
- b. AC power line Conducted Emission was tested under maximum output power.

# 2.1 Carrier Frequency and Channel

<for 802.11ax="" 802.11g="" and="" ax="" full="" he20="" mode="" mode<="" n="" ru="" single="" th=""><th>e&gt;</th></for>	e>
---	----

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
	1	2412	7	2442
	2	2417	8	2447
2400 2482 5 MU-	3	2422	9	2452
2400-2483.5 MHZ	4	2427	10	2457
	5	2432	11	2462
	6	2437		

#### <For 802.11ax HE10 Full RU, 802.11ax HE10 Single RU Mode>

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
	0	2407	7	2442
2400-2483.5 MHz	1	2412	8	2447
	2	2417	9	2452
	3	2422	10	2457
	4	2427	11	2462
	5	2432	12	2467
	6	2437	13	2472



### <802.11ax HE5 Full RU Mode>

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
	0	2407	7	2442
	0.5	2409.5	7.5	2444.5
	1	2412	8	2447
	1.5	2414.5	8.5	2449.5
	2	2417	9	2452
	2.5	2419.5	9.5	2454.5
2400 2492 5 MU-	3	2422	10	2457
2400-2463.3 MITZ	3.5	2424.5	10.5	2459.5
	4	2427	11	2462
	4.5	2429.5	11.5	2464.5
	5	2432	12	2467
	5.5	2434.5	12.5	2469.5
	6	2437	13	2472
	6.5	2439.5		



# 2.2 Test Mode

The SISO mode conducted power is covered by MIMO mode per chain, so only the MIMO mode is tested.

The power for 802.11n and 802.11ac mode is smaller than 802.11ax HE20 Full RU mode, so all other conducted and radiated test is covered by 802.11ax HE20 Full RU mode.

### The final test modes include the worst data rates for each modulation shown in the table below.

#### MIMO Mode

Mod	Date Rate		
802.11g	-	-	6Mbps
802.11n HT20 (Covered by HE20)	-	-	MCS0
802.11ac VHT20 (Covered by HE20)	-	-	MCS0
802.11ax mode	HE20	Full RU	MCS0
802.11ax 1/2 BW mode	HE10	Full RU	MCS0
802.11ax 1/4 BW mode	HE5	Full RU	MCS0
802.11ax mode	HE20	Single RU	MCS0
802.11ax 1/2 BW mode	HE10	Single RU	MCS0

#### Remark:

- 1. The conducted power level of each chain in MIMO mode is equal or higher than SISO mode.
- 2. 802.11g is operating in CDD mode, whereas 802.11n, 802.11ac, 802.11ax are operating in STBC mode.
- 3. After assessment on conducted power, CSD mode is covered by CDD mode.

Test Cases						
	Mode 1 :EUT with low gain antenna + WLAN (2.4GHz) Link + Type C-USB Cable					
	(Charging from Adapter)					
۸۵	Mode 2 :EUT with low gain antenna + WLAN (5GHz) Link + Type C-USB Cable					
Conducted	(Charging from Adapter)					
Emission	Mode 3 :EUT with high gain antenna + WLAN (2.4GHz) Link + Type C-USB Cable					
EIIIISSIOII	(Charging from Adapter)					
	Mode 4 :EUT with high gain antenna + WLAN (5GHz) Link + Type C-USB Cable					
	(Charging from Adapter)					
Remark: The	e worst case of Conducted Emission is mode 2; only the test data of it was reported.					

### <CDD Mode>

Ch. #	2400-2483.5 MHz
	802.11g
	01
Low	02
	03
Middle	06
	08
High	09
	10
	11

#### <STBC Mode>

Ch. #	2400-2483.5 MHz			
	802.11ax HE20 Full RU	802.11ax HE20 Single RU		
	01	01		
Low	02	01		
	03	02		
Middle	06	06		
High	09	09		
	10	10		
	11	11		

Ch. #	2400-2483.5 MHz				
	802.11ax HE10 Full RU	802.11ax HE5 Full RU	802.11ax HE10 Single RU		
	00	00	00		
Low	01	0.5	01		
	02	0.5			
Middle	06	06	06		
	10	10	11		
High	11	12	11		
	12	12.5	12		
	13	13	13		

**Remark:** For radiation spurious emission, the modulation and the data rate picked for testing are determined by the Max. RF conducted power.



# 2.3 Connection Diagram of Test System





#### <WLAN Tx Mode>



# 2.4 Support Unit used in test configuration and system

ltem	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Notebook	DELL	P91F	PD9AX201D2	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
2.	Notebook	DELL	P61G	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
3.	Notebook	Acer	N18Q13	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	Adapter	Google	G9BR1	NA	NA	NA
5.	Fixture	Skydio	J1701	NA	NA	NA
6.	Type C-USB cable	NA	NA	NA	Unshielded 1.5m	NA

# 2.5 EUT Operation Test Setup

The RF test items, utility "QSPR Version 5.0-00202" was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting signals.



# 2.6 Measurement Results Explanation Example

#### For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Example:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.  $Offset = RF \ cable \ loss + \ attenuator \ factor.$ Following shows an offset computation example with cable loss 4.2 dB and 10 dB attenuator.

 $Offset(dB) = RF \ cable \ loss(dB) + attenuator \ factor(dB).$ = 4.2 + 10 = 14.2 (dB)



# 3 Test Result

# 3.1 6dB and 99% Bandwidth Measurement

# 3.1.1 Limit of 6dB and 99% Bandwidth

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

### **3.1.2 Measuring Instruments**

Please refer to the measuring equipment list in this test report.

### 3.1.3 Test Procedures

- 1. The testing follows the ANSI C63.10 Section 6.9.3 (OBW) and 11.8.1 (6dB BW).
- 2. The RF output of EUT is connected to the spectrum analyzer by RF cable and attenuator. The path loss is compensated to the results for each measurement.
- 3. Set the maximum power setting and enable the EUT to transmit continuously.
- Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 kHz.
- 5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1-5% of the emission bandwidth and set the Video bandwidth (VBW)  $\ge$  3 \* RBW.
- 6. Measure and record the results in the test report.

# 3.1.4 Test Setup



EUT

Spectrum Analyzer



## 3.1.5 Test Result of 6dB and 99% Occupied Bandwidth

Please refer to Appendix A.

#### <With Low Gain Antenna>

#### MIMO <Ant. 0+2>

#### <CDD Mode>

#### <802.11g>



Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

#### <STBC Mode>

#### <802.11ax HE20 Full RU>



Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.



#### <802.11ax HE10 Full RU>



Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.



#### <802.11ax HE5 Full RU>





#### <802.11ax HE20 Single RU>



Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.



#### <802.11ax HE10 Single RU>





#### <With High Gain Antenna>

#### MIMO <Ant. 0+2>

#### <CDD Mode>

#### <802.11g>



Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

#### <STBC Mode>



# Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.

# <802.11ax HE20 Full RU>



#### <802.11ax HE10 Full RU>



Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.



#### <802.11ax HE5 Full RU>





#### <802.11ax HE20 Single RU>



Note: The occupied channel bandwidth is maintained within the band of operation for all of the modulations.



#### <802.11ax HE10 Single RU>





# 3.2 Output Power Measurement

### 3.2.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5 MHz, the limit for output power is 30 dBm. If transmitting antenna with directional gain greater than 6 dBi is used, the output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

### 3.2.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

### 3.2.3 Test Procedures

- 1. For Peak Power, the testing follows ANSI C63.10 Section 11.9.1.3 PKPM1
- 2. For Average Power, the testing follows ANSI C63.10 Section 11.9.2.3.2 Method AVGPM-G
- 3. The RF output of EUT is connected to the power meter by RF cable and attenuator. The path loss is compensated to the results for each measurement.
- 4. Set the maximum power setting and enable the EUT to transmit continuously.
- 5. Measure the conducted output power and record the results in the test report.
- 6. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

### 3.2.4 Test Setup



# 3.2.5 Test Result of Average Output Power

Please refer to Appendix A.



# 3.3 Power Spectral Density Measurement

# 3.3.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8 dBm in any 3 kHz band at any time interval of continuous transmission.

# 3.3.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

# 3.3.3 Test Procedures

- 1. The testing follows the ANSI C63.10 Section 11.10.5 Method AVGPSD-2.
- 2. The RF output of EUT is connected to the spectrum analyzer by RF cable and attenuator. The path loss is compensated to the results for each measurement.
- 3. Set the maximum power setting and enable the EUT to transmit continuously.
- Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz.
   Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW).
- Number of points in sweep ≥ 2 Span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins).
- 6. Detector = RMS, Sweep time = auto couple.
- 7. Trace average at least 100 traces in power averaging mode.
- Add 10 log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add 10 log(1/0.25) = 6 dB if the duty cycle is 25 percent.
- 9. Measure and record the results in the test report.
- 10. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v02r01.

Method (c): Measure and add 10  $log(N_{ANT})$  dB.

With this technique, spectrum measurements are performed at each output of the device, but rather than summing the spectra or the spectral peaks across the outputs, the quantity 10  $log(N_{ANT})$  dB is added to each spectrum value before comparing to the emission limit. The addition of 10  $log(N_{ANT})$  dB serves to apportion the emission limit among the  $N_{ANT}$  outputs so that each output is permitted to contribute no more than  $1/N_{ANT}$  <sup>th</sup> of the PSD limit.



# 3.3.4 Test Setup



# 3.3.5 Test Result of Power Spectral Density

Please refer to Appendix A.

#### <With Low Gain Antenna>

### <CDD Modes>

#### <802.11g>

Worst Case Power Density (dBm/3kHz)					
MIMO Ant. 0	MIMO Ant. 2				
Spectrum         Image: Constraint of the sector of th	Spectrum         Image: Constraint of the sector of t				
20 dBm 2.4299360 GHz 10 dBm 10 dBm 11 -10 dBm 11 -10 dBm 11 -20 dBm 11 -30 dB	20 dbm         2.4307160 GHz           10 dbm				
CF 2.437 CHz 1001 pts Span 24.558 MHz	CF 2.437 GHz 1001 pts Spon 24.57 MHz				



#### <STBC Mode>

#### <802.11ax HE20 Full RU>



#### <802.11ax HE10 Full RU>





#### <802.11ax HE5 Full RU>



#### <802.11ax HE20 Single RU>





#### <802.11ax HE10 Single RU>



#### <With High Gain Antenna>

#### <CDD Modes>

#### <802.11g>





#### <STBC Mode>

#### <802.11ax HE20 Full RU>



#### <802.11ax HE10 Full RU>





#### <802.11ax HE5 Full RU>



#### <802.11ax HE20 Single RU>





#### <802.11ax HE10 Single RU>



# 3.4 Conducted Band Edges and Spurious Emission Measurement

# 3.4.1 Limit of Conducted Band Edges and Spurious Emission Measurement

In any 100 kHz bandwidth outside of the authorized frequency band, the emissions which fall in the non-restricted bands shall be attenuated at least 20 dB / 30dB relative to the maximum PSD level in 100 kHz by RF conducted measurement.

# 3.4.2 Measuring Instruments

Please refer to the measuring equipment list in this test report.

### 3.4.3 Test Procedures

- 1. The testing follows the ANSI C63.10 Section 11.11.3 Emission level measurement
- 2. The RF output of EUT is connected to the spectrum analyzer by RF cable and attenuator. The path loss is compensated to the results for each measurement.
- 3. Set the maximum power setting and enable the EUT to transmit continuously.
- 4. Set RBW = 100 kHz, VBW = 300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
- 5. Measure and record the results in the test report.
- 6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

# 3.4.4 Test Setup





# 3.4.5 Test Result of Conducted Band Edges and Spurious Emission

Test Engineer :	Venkata Kondepudi	Temperature :	<b>18.6~21.8</b> ℃
		Relative Humidity :	44.5~57.3%

### <With Low Gain Antenna>

# Number of TX = 2, Ant. 0 (Measured)







Test Mode :	802.11g		Test Channel :	03	
100	kHz PSD refere	nce Level	C	Channel Plot	
Spectrum           Ref Level         30.00 dBm         Offset           • IPk         Max         90 dB         SWT           • IPk         Max         90 dB         SWT           • 10 dBm         ut         10 dBm         10 dBm           • 10 dBm         ut         10 dBm         10 dBm           • 10 dBm         ut         10 dBm         10 dBm           • 20 dBm         • 30 dBm         • 40 dBm         • 50 dBm           • 50 dBm         • 60 dBm         • 60 dBm         • 60 dBm           • 60 dBm         • 10 dBm         • 10 dBm         • 10 dBm	21.30 dB      RBW 100 kHz     1 ms     VBW 300 kHz     Mode      N	2 Sweep 11[1] 14.06 dBm 2.4294960 GHz 1410 400 1410	Spectrum           Ref Level 30.00 dBm         Offset 21.30 dB           Att         20 dB         9 ms           IPk Max         9 ms         9 ms           IPk Max         9 ms         9 ms           ID dBm         9 ms         9 ms           10 dBm         9 ms         9 ms           -10 dBm         9 ms         9 ms           -20 dBm         9 ms         9 ms           -30 dBm         9 ms         9 ms           -40 dBm         9 ms         9 ms           -60 dBm         9 ms         9 ms           -60 dBm         9 ms         9 ms           -20 dBm         9 ms         9 ms           -30 dBm         9 ms         9 ms           -60 dBm         9 ms         9 ms           -20 ms         9 ms         9 ms           -30 dBm         9 ms         9 ms           -60 dBm         9 ms         9 ms           -20 ms         9 ms         9 ms           -30 dBm         9 ms         9	RBW         100         kHz         Mode         Sweep           VBW         300         kHz         Mode         Sweep           M1[1]	-27.42 dBm 2.3998900 GHz

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Test Mode :	802.11g	Test Channel :	06
100k	Hz PSD reference Level	CI	hannel Plot
Spectrum           Ref Lovel         30.00 dbm         Offset 21           • Att         20 dB         SWT           • IPk Max         10 dbm         M1           10 dbm         M1         0 dbm           0 dbm         M1         10 dbm           -20 dbm         -30 dbm         -30 dbm           -30 dbm         -50 dbm         -50 dbm           -50 dbm         -50 dbm         -50 dbm           -80 dbm         -20 dbm         -50 dbm	30 dB @ RBW 100 kHz           1 ms @ VBW 300 kHz           MI[1]           1.4.91 dBm           2.4307930 GHz           MI[1]           1.4.91 dBm           4.4.91 dBm           MI[1]           1.4.91 dBm           4.91 dBm		Left Blank
Spuriou	us Emission 30MHz~3GHz	Spurious Er	nission 2GHz~25GHz
Spectrum           Ref Level 20.00 dBm         Offset 21           Att         15 dB         SWT         2           IPk View         10 dBm         10 dBm         10 dBm         10 dBm           10 dBm         0 dBm         0 dBm         10 dBm         10 dBm           -10 dBm         01 -15.090 dBm         -30 dBm         -30 dBm         -50 dBm         -70 dBm	.30 d8 e R8W 100 kHz           .7 ms e V8W 300 kHz           .7 ms e V8W 300 kHz           M1[1]           M1[1]           M1[1]           M1[1]           M1[1]           M1[1]           M1[1]           M2[1]           M2[1]           M2[1]           M2[1]           M2[1]           M2[1]           M2           M3           M3           M4           M3           M4           M3           M4           M3           M4           M3           M3           M3           M4           M3           M4           M3           M4           M3           M4           M3           M4           M4	Spectrum           Ref Level 20.00 dBm           Att           15 dB           M1           10 dBm           -0 dBm           -50 dBm           -70 dBm           -70 dBm	IBW 100 kHz         Mode Sweep           /BW 300 kHz         Mode Sweep           ////////////////////////////////////
Date: 6.MAY.2023 00:50:04		Date: 6 MAY 2023 00:50:36	



100kHz PSD reference Level         Channel Plot           Spectrum         Trip = 1000 dbm offset 21.30 db = RBW 100 kHz         Trip = 1000 dbm offset 21.30 db = RBW 100 kHz           Max         20 db SWT         1 ms = VBW 300 kHz         Mode Sweep           OPK Max         0 dbm offset 21.30 db = RBW 100 kHz         Mode Sweep           0 dbm offset 21.30 db = RBW 100 kHz         Mode Sweep         Trip = 100 kHz           0 dbm offset 21.30 db = RBW 100 kHz         Mode Sweep         Trip = 100 kHz           0 dbm offset 21.30 db = RBW 100 kHz         Mode Sweep         Trip = 100 kHz           0 dbm offset 21.30 db = RBW 100 kHz         Mode Sweep         Trip = 100 kHz           0 dbm offset 21.30 db = RBW 100 kHz         Mode Sweep         Trip = 100 kHz           0 dbm offset 21.30 db = RBW 100 kHz         Mode Sweep         Trip = 100 kHz           0 dbm offset 21.30 db = RBW 100 kHz         Mode Sweep         Trip = 100 kHz           10 dbm offset 21.30 db = RBW 100 kHz         Mode Sweep         Trip = 100 kHz           10 dbm offset 21.30 db = RBW 100 kHz         Mode Sweep         Trip = 100 kHz           10 dbm offset 21.30 db = RBW 100 kHz         Mode Sweep         Trip = 100 kHz           10 dbm offset 21.30 db = RBW 100 kHz         Mode Sweep         Trip = 100 kHz           10 dbm offset 21.30 db = RBW 100 kHz	Test Mode :	802.11g	Test Channel : 10	
Spectrum         Spectrum           Ref Lavel 30.00 dBm         Offset 21.30 dB         RBW 100 kHz           0 JPk Max         M1[1]         9.79 dBm           20 dB         SWT         8 m2           0 JPk Max         M1[1]         9.79 dBm           10 dBm         10 dBm         11           10 dBm         10 dBm         10 dBm           -20 dBm         10 dBm         10 dBm           -30 dBm         10 dBm         10 dBm           -20 dBm         10 dBm         10 dBm           -30 dBm         10 dBm         10 dBm	100	kHz PSD reference Level	Channel Plot	
60 d8m         -60 d8m         -60 d8m         -60 d8m         -71           CF 2.457 GHz         1001 pts         Span 24.57 MHz         -60 d8m         -71           Date: 6 MAY.2023 01:02:34         -60 d8m         -71         -60 d8m         -71	Spectrum           Ref Level 30.00 dBm           Att           20 dB           10 dBm           10 dBm           -20 dBm           -30 dBm           -30 dBm           -50 dBm           -60 dBm           -60 dBm           -20 dBm           -30 dBm           -30 dBm           -30 dBm           -50 dBm           -60 dBm           -20 dBm           -30 dBm           -30 dBm           -30 dBm           -50 dBm           -60 dBm           -60 dBm           -70 dBm	21.30 d8 @ RBW 100 kH2 1 ms @ VBW 300 kH2 Mode Sweep	Spectrum           Ref Level 30.00 dBm         Offset 21.30 dB         RBW 100 kHz           Att         20 dB         SWT         9 ms         VBW 300 kHz         Mode Swd           IPK Max         Mil[1]         20 dBm         Mil[1]         Mil[1]         Mil[1]         Mil[1]         Mil[1]           20 dBm         0 dBm         0	eep 1 -44.65 dBm 2,4844910 GHz 1 -44.65 dBm 2,4844910 GHz 3,4844910 GHz 1 -44.65 dBm 2,4844910 GHz 3,4844910 GHz 3,4844910 GHz 4,4844910 GHz 4,4944910 GHz 4,49449

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Test Mode :	802.11ax HE20 Full RU	Test Channel : 01
100k	Hz PSD reference Level	Channel Plot
Spectrum         Offset 21           Ref Lovel 30.00 dBm         Offset 21           Att         20 dB           IPI: Max         0           20 dBm         0           10 dBm         0           -10 dBm	.30 dB @ RBW 100 kHz         Mode Sweep           .30 dB @ RBW 100 kHz         Mode Sweep           .11 ms @ VBW 300 kHz         Mode Sweep	Spectrum         Image: Construction of the constructi
CF 2.412 GHz	1001 pts Span 28.635 MHz	Btart 2.31 GHz 8001 pts Stop 2.445 GHz
Spuriou	us Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
Spectrum           Ref Level         20.00 dBm         Offset         21           Att         10 dB         SWT         22           ID         D         D         D         D           ID         dBm         0         dBm         0         dBm           ID         dBm         0         dB	.30 dB @ RBW 100 kHz         Mode Sweep           9.7 ms @ VBW 300 kHz         Mode Sweep           M1[1]         8.02 dBm           M2[1]         M1           .50 pts         Stop 3.0 GHz	Spectrum         Image: Constraint of the sector of th
Date: 4.MAY.2023 22:52:36	Mercenter Canada 44	Dete: 4 MAY 2023 22:52:54





Test Mode : 802.11ax HE20 Full RU	Test Channel :03
100kHz PSD reference Level	Channel Plot
Spectrum         Mile           Ref Level 30.00 dbm         Offset 21.30 db e RBW 100 kHz           Att         20 db           20 dbm         Mile           10 dbm         Mile           0 dbm         Mile           10 dbm         Mile           -10 dbm         Mile           -20 dbm         Mile           -10 dbm         Mile           -10 dbm         Mile           -10 dbm         Mile           -20 dbm         Mile           -20 dbm         Mile           -20 dbm         Mile           -10 dbm         Mile           -20 dbm         Mile           -30 dbm         Mile           -50 dbm         Mile           -50 dbm         Mile           -20 dbm	Spectrum         Image: Construction of the second sec

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Test Mode :	802.11ax HE20 Full RU	Test Channel :	06
100k	Hz PSD reference Level	CI	hannel Plot
Spectrum           Ref Level 30.00 dBm           Att           20 dB           IPI: Max           20 dBm           10 dBm           0 dBm           -20 dBm           -30 dBm           -50 dBm           -60 dBm           -60 dBm           -60 dBm           -20 dBm	30 dB = RBW 100 kHz           1.1 ms = VBW 300 kHz           M1[1]           2.4307435 GHz           4.400 Mig           4.400 Mig           1001 pts		Left Blank
Spuriou	us Emission 30MHz~3GHz	Spurious Er	nission 2GHz~25GHz
Spectrum           Ref Level 20.00 dBm         Offset 21           • IPk View         15 dB           • IPk View         10 dBm           10 dBm         10 dBm           -20 dBm         -13.710 dBm           -30 dBm         -13.710 dBm           -50 dBm         -50 dBm	30 dB @ RBW 100 kHz           3.7 ms @ VBW 300 kHz           Mode Sweep           M11           M11           M11           2.75400 GHz           M11           2.75400 GHz           M11           2.42790 GHz           M11           M11 <td< th=""><th>Spectrum           Ref Level 20.00 dBm           Att           15 dB           WI           17           18           19           19           19           19           10           19           15           17           18           19           19           10           11           12           13           14           15           15           16           16           16           16           16           17</th><th>BW 100 kHz         Mode Sweep           BW 300 kHz         Mode Sweep           M1[1]         9.54 dBm           2.4360 GHz        </th></td<>	Spectrum           Ref Level 20.00 dBm           Att           15 dB           WI           17           18           19           19           19           19           10           19           15           17           18           19           19           10           11           12           13           14           15           15           16           16           16           16           16           17	BW 100 kHz         Mode Sweep           BW 300 kHz         Mode Sweep           M1[1]         9.54 dBm           2.4360 GHz
Date: 5.MAY.2023 00:24:42		Date: 5 MAY.2023 00:25:18	





Test Mode :         802.11ax HE20 Full RU         1				Test 0	Chan	nel :		10					
100	0kHz PSD re	eference L	evel					C	hanr	nel Plo	ot		
Spectrum           Ref Level 30.00 dbm           Att           20 dbm           10 dbm           10 dbm           -10 dbm           -20 dbm           -30 dbm           -50 dbm           -60 dbm           -60 dbm           -20 dbm           -20 dbm           -30 dbm           -20 dbm           -30 dbm           -30 dbm           -50 dbm           -60 dbm           -50 dbm	t 21.30 dB • RBW 100 ki 1.1 ms • VBW 300 ki 	42 Male Sweep M1[1]	2 M1 Mm Spon	10.49 dBm 2.4644913 GHz	Spectrum           Ref Leve           Att           1PK Max           20 dBm           10 dBm           0 dBm           -10 dBm           -20 dBm           -30 dBm           -50 dBm           -50 dBm           -50 dBm           Date: 12 MAY	GHz 2023 19:33 2	dBm	21.30 dB = 8 ms =	RBW 100 VBW 300	KHZ Mode	Sweep 1[1]	2.48 2.48 1000 1000 1000 1000 1000 1000	(1)
Date: 5.MAY.2023 01:38:59					Date: 12.MAY.	2023 19:33:2	26						

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Test Mode :	802.11ax HE20 Full RU	Test Channel :	11
100k	Hz PSD reference Level	C	hannel Plot
Spectrum           Ref Level 30.00 dBm         Offset 2:           Att         20 dB         SWT           IPK Max         0         0           10 dBm         0         0           -10 dBm         -20 dBm         -10	1.30 dB • RBW 100 Hz 1.1ms • VBW 300 Hz Mode Sweep M1[1] 2.4695235 Gl M1 Multiple Sweep M1 Multiple Sweep M1 Multiple Sweep M1 Multiple Sweep M1 M1 Multiple Sweep M1 M1 M1 M1 M1 M1 M1 M1 M1 M1	Spectrum     Ref Level 30.00 dBm Offset 21.30 dB      Att 20 dB SWT 8 ms      In dBm     O	Will
-30 dBm -40 dBm -50 dBm -50 dBm -50 dBm CF 2.462 CHz CF 2.462 CHz Date: 5 MAY 2023 01:54.49	1001 pts Span 20.635 MH	-30 dBm -40 dBm -40 dBm -60	8001 pts Stop 2.565 GHz
Spurio	us Emission 30MHz~3GHz	Spurious Er	nission 2GHz~25GHz
Spectrum           Ref Level 20.00 dBm         Offset 2: SWT           • Att         10 dB           • IPk View         10 dBm           • 0 dBm         -           • 0 dBm         -           • -10 dBm         -           • -30 dBm         -           • -70 dBm         -           • -70 dBm         -           • Stort 30.0 MHz         -	1.30 dB         RBW 100 HH:           19.7 ms         VBW 300 HH:           M0de Sweep         2.46940 distribution           M1[1]         5.57 ds           M2[1]         M1           M1         5.57 ds           M2[1]         M1           M1         5.57 ds           M2[1]         M1           M2[1]         M1           M1         0.57.95 db           B45.10 MI         645.10 MI           M2         0.00 MI           M2         0.00 MI           S01 pts         Stop 3.0 GH	Spectrum           Ref Level 20.00 dbm         Offset 21.30 db e f           • Att         10 db         SWT         230 ms e           • Ibk View         Io         Io         Io         Io           • Io         dbm         Io         Io         Io           • Io         Io         Io<	IDD IAIC           //WW 100 IAIC           //WW 300 IAIC           M2[1]           -54.14 dBm           6.5660 GHz           M1[1]           2.4360 GHz
Date: 5.MAY.2023 01:57:08		Date: 5.MAY.2023 01:57:49	











Test Mode :	802.11ax HE10 Full RU	Test Channel : 06
100k	Hz PSD reference Level	Channel Plot
Spectrum           Ref Lovel 30.00 dbm         Offset 21           • Att         20 db           • IPk Max	.30 db e RBW 100 kHz 1.1 ms @ VBW 300 kHz Mode Sweep M1[1] 17.67 dBM 4.4413273 GHz 4.4413273	Left Blank
Spurio	us Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz
Spectrum           Ref Lovel 20.00 dbm         Offset 21           Att         10 dB           10 dbm         10           0 dbm         10           -10 dbm         10           -20 dbm	.30 d8 @ RBW 100 kHz         Mode Sweep           9.7 ms @ VBW 300 kHz         Mode Sweep           M1[1]         M1 1.6.58 dBm 2.43980 GHz	Spectrum         Image: Constraint of the second secon
Date: 19.MAY.2023 09:43:48	de territoria	Date: 19.MAY.2023 09:44:02





Test Mode :	802.11ax HE1	0 Full RU		Test C	Channel :	12	2			
100kHz PSD reference Level				Channel Plot						
Spectrum           Ref Level 30.00 dBm         Offset 2           Att         20 dB         SWT           ● IPk Max         20 dBm         M1           10 dBm         0 dBm         0 dBm           -10 dBm         -30 dBm         -30 dBm           -30 dBm         -50 dBm         -50 dBm           -60 dBm         -60 dBm         -50 dBm           -50 dBm         -50 dBm         -50 dBm	21.30 dB @ RBW 100 kHz 1.1 ms @ VBW 300 kHz Mod 	2 Sweep	I3.19 dBm           2.4632503 GHz           M           M           Spon 14.4375 MHz	Spectrum           Ref Level           Att           0 IPk Max           20 dBm           10 dBm           -10 dBm           -20 dBm           -30 dBm           -40 dBm           -60 dBm           -60 dBm           Bateric 2.43 C	30.00 dBm Offset 20 dB SWT	21.30 dB RBW 8 ms VBW	100 kHz 300 kHz Mode S M11	Sweep	2.49	(₩) 11.50 dBm 11.50 dBm 11.50 dFtz 11.50 dFtz 11.50 dFtz 11.50 dFtz

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Test Mode :	802.11ax HE5 Full RU	Test Channel : 06				
100k	Hz PSD reference Level	Channel Plot				
Spectrum         Image: Spectrum </th						
Spurio	us Emission 30MHz~3GHz	Spurious Emission 2GHz~25GHz				
Spectrum           Ref Level 26.30 dBm         Offset 21           15 dB         SWT           10 dBm         0           10 dBm         0           -10 dBm         0           -30 dBm	1.30 db. • RBW 100 kHz         Mode Sweep           19.7 ms. • VBW 300 kHz         Mode Sweep	Spectrum         Total           Ref Level 26.30 dBm         Offset 21.30 dB @ RBW 100 kHz           Att         15 dB           BWT         230 ms @ VBW 300 kHz           Main				
Date: 18.MAY.2023 21:07:57	1000000 (11111111) 444	Date: 18.MAY.2023 21:08:12				





Test Mode :	802.11ax HE5 Full R	U	Test Chann	nel :	12.5	
100k	Channel Plot					
Spectrum           Ref Level 30.00 dBm         Offset 20           Att         20 dB           #120 dBm         M1           10 dBm         M1           10 dBm         M1           -20 dBm	D.58 dB • RBW 100 kHz 1 ms • VBW 300 kHz Mode Sweep M1[1] M1[1	18.59 dBm 2.46757333 GHz	Spectrum           Ref Level 30.00 dBm           10 dBm           10 dBm           10 dBm           10 dBm           0 dBm           10 dBm           10 dBm           10 dBm           10 dBm           0 dBm           -10 dBm           0 dBm           -30 dBm           -30 dBm           -50 dBm           -60 dBm           Start 2.43 GHz           Date: 7.JUN.2023 11:0	Offset 20.58 dB • K SWT 8 ms • V	BW 100 kHz BW 300 kHz Mode Sweep M1[1] M1	-42.78 dbm 2.4836470 GHz

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