

#### 11. Maximum Peak Output Power

#### 11.1 Block Diagram Of Test Setup



#### 11.2 Limit

		FCC Part15 (15.247),	Subpart C	
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(1)	Peak Output Power	0.125 watt or 21dBm	2400-2483.5	PASS

## 11.3 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

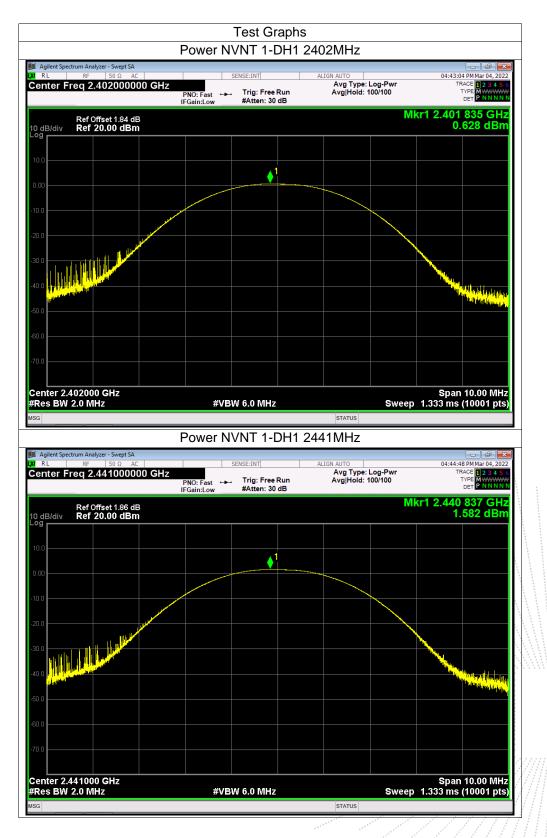
- 2. Set the spectrum analyzer: RBW = 3MHz. VBW = 3MHz. Sweep = auto; Detector Function = Peak.
- 3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.



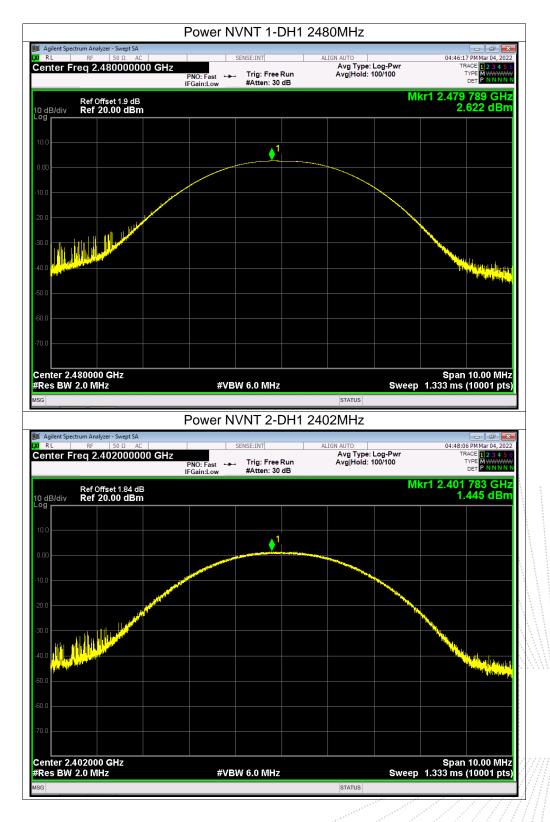
## 11.4 Test Result

Temperature :	<b>26</b> °C	Relative Humidity :	54%	
Test Voltage :	DC 3.7V	Remark:	N/A	
Modulation	Test Channel	Output Power (dBm)		Limit (dBm)
GFSK	Low	0.63		21
GFSK	Middle	1.58		21
GFSK	High	2.62		21
π/4DQPSK	Low	1.45		21
π/4DQPSK	Middle	2.4		21
π/4DQPSK	High	3.44		21

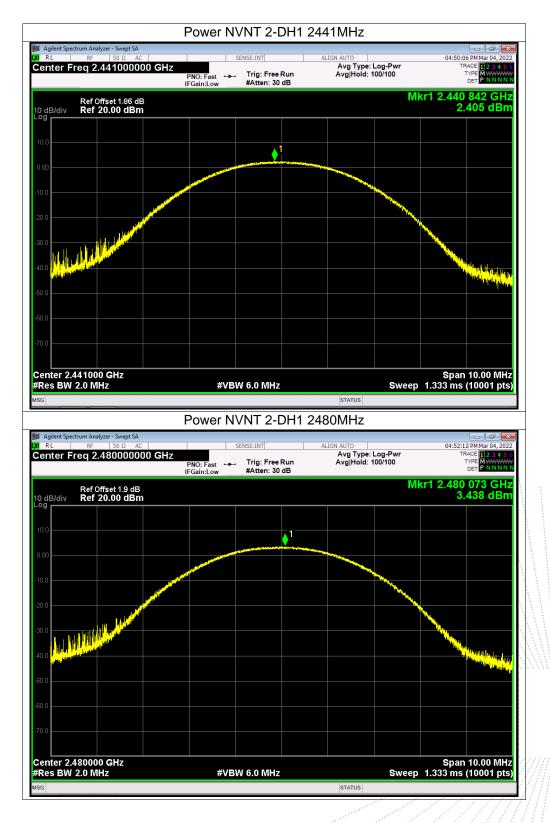














#### **12. Hopping Channel Separation**

#### 12.1 Block Diagram Of Test Setup



#### 12.2 Limit

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 0.125W.

#### 12.3 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

2. Set the spectrum analyzer: RBW = 30kHz. VBW = 100kHz , Span = 2.0MHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.

3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

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## 12.4 Test Result

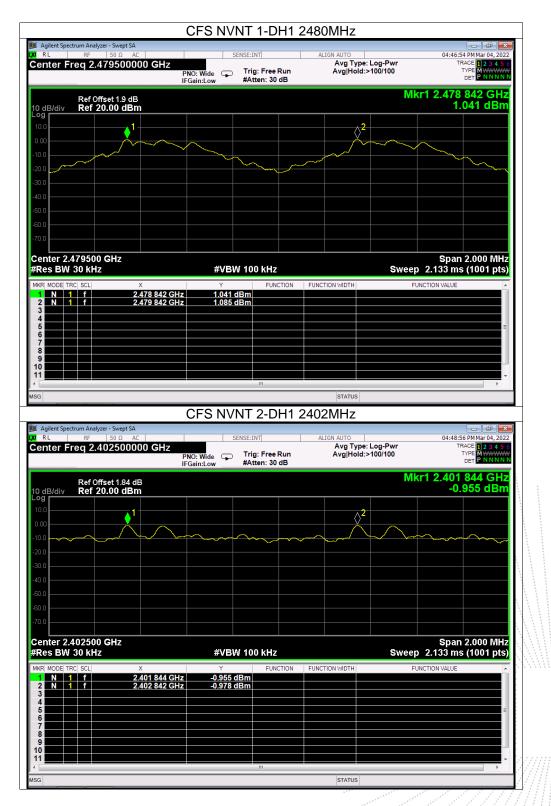
Modulation	Test Channel	Separation (MHz)	Limit(MHz)	Result
GFSK	Low	1.002	0.878	PASS
GFSK	Middle	1	0.852	PASS
GFSK	High	1	0.868	PASS
π/4DQPSK	Low	0.998	0.817	PASS
π/4DQPSK	Middle	1	0.809	PASS
π/4DQPSK	High	1	0.830	PASS

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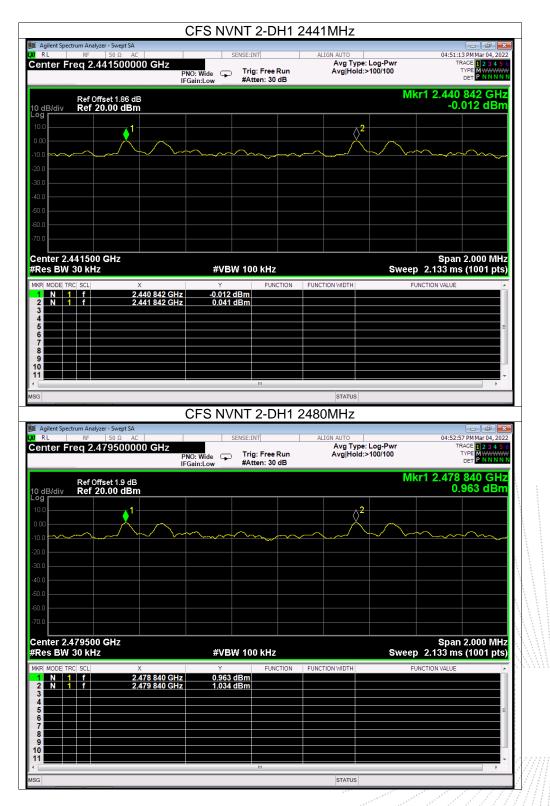


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dB/div Ref 20.0						-0.922 dBm
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enter 2.402500 GH Res BW 30 kHz		#VBW 100	kHz		Sweep 2.	Span 2.000 MHz 133 ms (1001 pts)
R MODE TRC SCL		Y -0.922 dBm	FUNCTION	FUNCTION WIDTH	FUNCTIO	N VALUE
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D 1						
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3	C					•
		FS NVNT <sup>/</sup>				
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Agilent Spectrum Analyzer - S R L RF 50	wept SA D Q AC 500000 GHz PNO		1-DH1 24	441MHz	-g-Pwr 0/100	04:45:22 PM Mar 04, 2022
Agilent Spectrum Analyzer - S RL RF 50 enter Freq 2.441	wept SA D Ω AC 5000000 GHz PNO IFGa		1-DH1 24 Free Run	441MHz Align Auto Avg Type: Lo	0/100	04:45:22 PM Mar 04, 2022 TRACE 1 2 3 4 5 6 TYPE MWWWW DET PNNNN 2.440 842 GHz
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#### **13. Number Of Hopping Frequency**

#### 13.1 Block Diagram Of Test Setup



#### 13.2 Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

#### 13.3 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

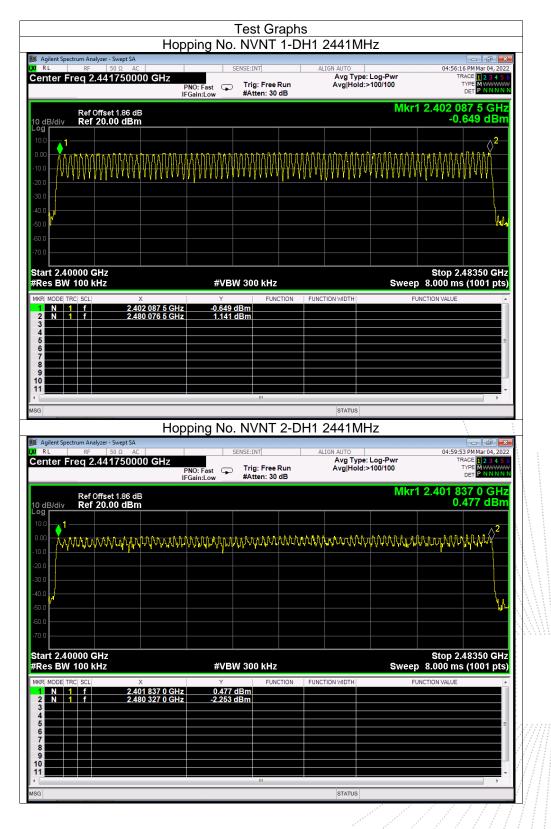
2. Set the spectrum analyzer: RBW = 100kHz. VBW = 300kHz. Sweep = auto; Detector Function = Peak. Trace = Max hold.

Allow the trace to stabilize. It may prove necessary to break the span up to sections. in order to clearly show all of the hopping frequencies. The limit is specified in one of the subparagraphs of this Section.
 Set the spectrum analyzer: Start Frequency = 2.4GHz, Stop Frequency = 2.4835GHz. Sweep=auto;

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## 13.4 Test Result





#### 14. Dwell Time

#### 14.1 Block Diagram Of Test Setup



#### 14.2 Limit

Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

#### 14.3 Test Procedure

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.

2. Set spectrum analyzer span = 0. Centred on a hopping channel;

3. Set RBW = 1MHz and VBW = 3MHz.Sweep = as necessary to capture the entire dwell time per hopping channel. Set the EUT for DH5, DH3 and DH1 packet transmitting.

4. Use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation. The limit is specified in one of the subparagraphs of this Section. Submit this plot(s).

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## 14.4 Test Result

Condition	Mode	Frequency (MHz)	Pulse Time (ms)	Total Dwell Time (ms)	Burst Count	Period Time (ms)	Limit (ms)	Verdict
NVNT	1-DH1	2441	0.382	121.476	318	31600	400	Pass
NVNT	1-DH3	2441	1.639	258.962	158	31600	400	Pass
NVNT	1-DH5	2441	2.887	317.57	110	31600	400	Pass
NVNT	2-DH1	2441	0.392	124.656	318	31600	400	Pass
NVNT	2-DH3	2441	1.643	259.594	158	31600	400	Pass
NVNT	2-DH5	2441	2.892	326.796	113	31600	400	Pass

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RL RF 50 Ω	AC	SE	NSE:INT Trig Delay-50		LIGN AUTO Avg Type:	Log-Pwr	T	25 PM Mar 04, 2022 RACE 1 2 3 4 5 6
RL RF 50 Ω	AC 0000 GHz PN	O: Fast ↔		10.0 µs	LIGN AUTO Avg Type:	Log-Pwr	T	
RL RF 50 Ω enter Freq 2.441000 Ref Offset 1.86	AC 0000 GHz PN IFG	0:Fast ↔	Trig Delay-50 Trig: Video	10.0 µs		Log-Pwr	TF	25 PM Mar 04, 2022 RACE 1 2 3 4 5 6 TYPE PNNNN 2.892 ms
RL RF 50 Ω enter Freq 2.441000 Ref Offset 1.86	AC 0000 GHz PN IFG	0:Fast ↔	Trig Delay-50 Trig: Video	10.0 µs		Log-Pwr	TF	25 PM Mar 04, 2022 RACE 1 2 3 4 5 6 TYPE WWWWWW DET PNNNN
RL         RF         50 Ω           enter Freq 2.441000         Ref Offset 1.86           dB/div         Ref 20.00 d           9         0.0	AC 0000 GHz PN IFG	0: Fast ↔→	Trig Delay-50 Trig: Video	10.0 µs		Log-Pwr	TF	25 PM Mar 04, 2022 RACE 1 2 3 4 5 6 TYPE PNNNN 2.892 ms
RL         RF         50 0           enter Freq 2.441000         Ref Offset 1.84           dB/div         Ref 20.00 d           0         0           0         0           0         0	AC 0000 GHz PN PN IFG 6 dB Bm	0: Fast ↔→ ain:Low	Trig Delay-50 Trig: Video	10.0 µs		Log-Pwr	TF	25 PM Mar 04, 2022 RACE 1 2 3 4 5 6 TYPE PNNNN 2.892 ms
RL         RF         50 Ω           enter Freq 2.441000         Ref Offset 1.86           dB/div         Ref 20.00 d           0	AC 0000 GHz PN IFG	0: Fast ↔→ ain:Low	Trig Delay-50 Trig: Video	10.0 µs		Log-Pwr	TF	25 PM Mar 04, 2022 RACE   2 3 4 5 6 TYPE WWWWWW DET P NNN N 2.892 ms 0.67 dB
Ref Offset 1.80 Ref Offset 1.80 Ref 20.00 d	AC 0000 GHz PN PN IFG 6 dB Bm	0: Fast ↔→ ain:Low	Trig Delay-50 Trig: Video	10.0 µs		Log-Pwr	TF	25 PM Mar 04, 2022 RACE   2 3 4 5 6 TYPE WWWWWW DET P NNN N 2.892 ms 0.67 dB
RL RF 500 enter Freq 2.44100( Ref Offset 1.84 Ref 20.00 d 00 00 00 00 00 00 00 00 00 00 00 00 00	AC 0000 GHz PN PN IFG 6 dB Bm	C: Fast →→	Trig Delay-50 Trig: Video #Atten: 30 dE	00.0 μs 3	Avg Type:			25 PM Mar 04, 2022 RACE   2 3 4 5 6 TYPE WWWWWW DET P NNN N 2.892 ms 0.67 dB
RL RF 50 0 enter Freq 2.441000 dB/div Ref Offset 1.8 Ref Offset 1.8 Ref 20.00 d g g g g g g g g g g g g g g g g g g g	AC 0000 GHz PN PN IFG 6 dB Bm	C: Fast →→	Trig Delay-50 Trig: Video #Atten: 30 dE	00.0 μs 3	Avg Type:			5 PM Mar 04, 2022 RACE    2 3 4 3 6 PM MAR 04 DET P NNNNN 2.892 ms 0.67 dB
RL RF 50 0 enter Freq 2.441000 dB/div Ref Offset 1.84 Ref Offset 1.84 Ref 20.00 d	AC 0000 GHz PN PN IFG 6 dB Bm	C: Fast →→	Trig Delay-50 Trig: Video #Atten: 30 dE	00.0 μs 3				5 PM Mar 04, 2022 RACE    2 3 4 3 6 PM M M M M M M M M M M M M M M M M M M
RL         RF         50 00           enter Freq 2.441000         Ref Offset 1.80           dB/div         Ref Offset 1.80           dB/div         Ref 20.00 d           00	AC 0000 GHz PN IFG 6 dB Bm (Manufactorial of the second of the sec	C: Fast →→	Trig Delay-50 Trig: Video #Atten: 30 dE	00.0 μs 3	Avg Type:			25 PM Mar 04, 2022 MacE 11 2 34 3 5 6 PM MAR 14 2 34 3 5 6 PM MAR 14 14 14 14 14 14 14 14 14 14 14 14 14
RL         RF         50 0           enter Freq 2.441000         Ref Offset 1.84           dB/div         Ref 0	AC 0000 GHz PN IFG 6 dB Bm (Manufactorial of the second of the sec	D: Fast →	Trig Delay-50 Trig: Video #Atten: 30 dE	00.0 μs 3	Avg Type:			5 PM Mar 04, 2022 RACE    2 3 4 3 6 PM M M M M M M M M M M M M M M M M M M
RL         RF         50 00           enter Freq 2.441000         Ref Offset 1.80         Ref Offset 1.80           dB/div         Ref 20.00 d         Ref 20.00 d           00	AC 0000 GHz PN PN IFG 6 dB 8m 6 db 1 6 db 1 6 db 1 7 db 1	O: Fast in:Low 1Δ2 1Δ2 1Δ2 1Δ2 411 414	Trig Delay-50 Trig: Video #Atten: 30 de #Atten: 30 de #Atten: 40 de #Att	0.0 μs 3 <sup>11</sup> 12 μ <sup>μ</sup> (φφ	Avg Type:	And products		5 PM Mar 04, 2022 RACE    2 3 4 5 6 TP P WINN N 2.892 ms 0.67 dB TRIS LVL 100 m 4 from 100 100 m 4 from 1000 100 m 4 from 100 100 m 4 from 100 100
RL         RF         50 Ω           enter Freq 2.44100(         Ref Offset 1.8(         Ref Offset 1.8(	AC 0000 GHz PNI IFG	C: Fast → in:Low 1Δ2 1Δ2 4 4 4 4 4 4 4 4 4 4 4 4 4	Trig Delay-50 Trig: Video #Atten: 30 de #Atten: 30 de #Atten: 40 de #Att	0.0 μs 3 <sup>11</sup> 12 μ <sup>μ</sup> (φφ	Avg Type:	And products	Tr AMkr1	5 PM Mar 04, 2022 RACE    2 3 4 5 6 TP P WINN N 2.892 ms 0.67 dB TRIS LVL 100 m 4 from 100 100 m 4 from 1000 100 m 4 from 100 100 m 4 from 100 100
RL         RF         50 0           enter Freq 2.441000         Ref Offset 1.80         Ref Offset 1.80           dB/div         Ref 20.00 d         Ref 20.00 d           0	AC 0000 GHz PN PROFILE 6 dB Bm 6 dB 0000 GHz PN PROFILE 6 dB 0000 GHZ PN FROM 000000000000000000000000000000000000	O: Fast in:Low 1Δ2 1Δ2 1Δ2 1Δ2 411 414	Trig Delay-50 Trig: Video #Atten: 30 de #Atten: 30 de #Atten: 40 de #Att	0.0 μs 3 <sup>11</sup> 12 μ <sup>μ</sup> (φφ	Avg Type:	And products	Tr AMkr1	5 PM Mar 04, 2022 RACE    2 3 4 5 6 TP P WINN N 2.892 ms 0.67 dB TRIS LVL 100 m 4 from 100 100 m 4 from 1000 100 m 4 from 100 100 m 4 from 100 100
RL         RF         50 0           enter Freq 2.441000         Ref Offset 1.84           dB/div         Ref 20.00 d           00	AC 0000 GHz PN PROFILE 6 dB Bm 6 dB 0000 GHz PN PROFILE 6 dB 0000 GHZ PN FROM 000000000000000000000000000000000000	O: Fast in:Low 1Δ2 1Δ2 1Δ2 1Δ2 411 414	Trig Delay-50 Trig: Video #Atten: 30 de #Atten: 30 de #Atten: 40 de #Att	0.0 μs 3 <sup>11</sup> 12 μ <sup>μ</sup> (φφ	Avg Type:	And products	Tr AMkr1	5 PM Mar 04, 2022 RACE    2 3 4 5 6 TP P WINN N 2.892 ms 0.67 dB TRIS LVL 100 m 4 from 100 100 m 4 from 1000 100 m 4 from 100 100 m 4 from 100 100
RL         RF         50 00           enter Freq 2.441000         Ref Offset 1.80         Ref Offset 1.80           0 dB/div         Ref 20.00 d         Ref 0 ffset 1.80           0 dB/div         Ref 20.00 d         Ref 0 ffset 1.80           0 dB/div         Ref 0 ffset 1.80         Ref 0 ffset 1.80           0 dB/div         Ref 0 ffset 1.80         Ref 0 ffset 1.80           0 dB/div         Ref 0 ffset 1.80         Ref 0 ffset 1.80           0 dB/div         Ref 0 ffset 1.80         Ref 0 ffset 1.80           0 dB/div         Ref 0 ffset 1.80         Ref 0 ffset 1.80           0 dV         Ref 0 ffset 1.80         Ref 0 ffset 1.80           0 dV         Ref 0 ffset 1.80         Ref 0 ffset 1.80           0 dV         Ref 0 ffset 1.80         Ref 0 ffset 1.80           0 dV         Ref 0 ffset 1.80         Ref 0 ffset 1.80           0 dV         Ref 0 ffset 1.80         Ref 0 ffset 1.80           0 dV         Ref 0 ffset 1.80         Ref 0 ffset 1.80           0 dV         Ref 0 ffset 1.80         Ref 0 ffset 1.80           0 dV         Ref 0 ffset 1.80         Ref 0 ffset 1.80           0 dV         Ref 0 ffset 1.80         Ref 0 ffset 1.80	AC 0000 GHz PN PROFILE 6 dB Bm 6 dB 0000 GHz PN PROFILE 6 dB 0000 GHZ PN FROM 000000000000000000000000000000000000	O: Fast in:Low 1Δ2 1Δ2 1Δ2 1Δ2 411 414	Trig Delay-50 Trig: Video #Atten: 30 de #Atten: 30 de #Atten: 40 de #Att	0.0 μs 3 <sup>11</sup> 12 μ <sup>μ</sup> (φφ	Avg Type:	And products	Tr AMkr1	5 PM Mar 04, 2022 RACE    2 3 4 5 6 TP P WINN N 2.892 ms 0.67 dB TRIS LVL 100 m 4 from 100 100 m 4 from 1000 100 m 4 from 100 100 m 4 from 100 100



# 15. Antenna Requirement

#### 15.1 Limit

15.203 requirement: For intentional device, according to 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.

#### 15.2 Test Result

The EUT antenna is FPCB antenna, fulfill the requirement of this section.

Edition: A4



## 16. EUT Photographs

#### EUT Photo 1



#### EUT Photo 2







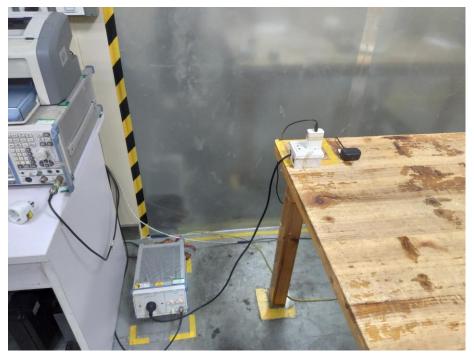
#### **EUT Photo 4**





## 17. EUT Test Setup Photographs

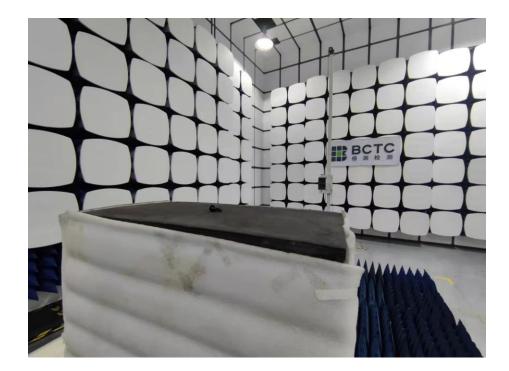
#### **Conducted emissions**



**Radiated Measurement Photos** 







No.: BCTC/RF-EMC-005



# **STATEMENT**

1. The equipment lists are traceable to the national reference standards.

2. The test report can not be partially copied unless prior written approval is issued from our lab.

3. The test report is invalid without stamp of laboratory.

4. The test report is invalid without signature of person(s) testing and authorizing.

5. The test process and test result is only related to the Unit Under Test.

6.The quality system of our laboratory is in accordance with ISO/IEC17025.

7.If there is any objection to report, the client should inform issuing laboratory within 15 days from the date of receiving test report.

Address:

1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Tangwei, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China

TEL: 400-788-9558

P.C.: 518103

FAX: 0755-33229357

Website: http://www.chnbctc.com

E-Mail: bctc@bctc-lab.com.cn

#### **\*\*\*\*\*\* END \*\*\*\*\***

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