



TEST REPORT

APPLICANT	: BLU Products, Inc.
PRODUCT NAME	: Smart Phone
MODEL NAME	: G51S
BRAND NAME	: BLU
FCC ID	: YHLBLUG51S
STANDARD(S)	: 47 CFR Part 15 Subpart C
RECEIPT DATE	: 2021-08-11
TEST DATE	: 2021-08-18 to 2021-08-30
ISSUE DATE	: 2021-09-16

Edited by:

Pong Mi

Peng Mi (Rapporteur)

Shon Approved by: -Shen Junsheng (Supervisor)

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Change History				
Version	Version Date Reason for change			
1.0 2021-09-16		First edition		





1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	BLU Products, Inc.
Applicant Address:	10814 NW 33rd St # 100 Doral, FL 33172, USA
Manufacturer: BLU Products, Inc.	
Manufacturer Address:	10814 NW 33rd St # 100 Doral, FL 33172, USA

1.2. Equipment Under Test (EUT) Description

Product Name:	Smart Phone		
Sample No.:	3#		
Hardware Version:	FS185-MB-V5.0		
Software Version:	BLU_G0590WW_\	/11.0.G.01.00_GENERIC 04-08-2021 17:37	
Modulation Technology:	DSSS, OFDM		
Modulation Type:	Refer to section1.3		
Operating Frequency Range:	802.11b/g/ n (HT20)): 2412MHz–2472MHz	
Antenna Type:	PIFA Antenna		
Antenna Gain:	0.70dBi		
	Battery		
	Brand Name:	BLU	
	Model No.:	C856343400P	
	Serial No.:	N/A	
Accessory Information:	Capacity:	4000mAh	
	Rated Voltage:	3.85V	
	Charge Limit:	4.4V	
	Manufacturer:	Shenzhen jiuliyuan electronic technology Co., Ltd	





	AC Adapter		
	Brand Name:	BLU	
	Model No.:	US-HY-2000	
Accessory Information:	Serial No.:	N/A	
	Rated Output:	5.0V==2.0A	
	Rated Input:	100-240V~50/60Hz, 0.35A	
	Manufacturer:	Chongqing Lianmao Electronics Co., Ltd	

Note 1: We use the dedicated software to control the EUT continuous transmission.

Note 2: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

1.3. Modulation Type and Data Rate of EUT

Modulation technology	Modulation Type	Data Rate (Mbps) Note1
	DBPSK	1
DSSS (802.11b)	DQPSK	2
	CCK	5.5/ 11
	BPSK	6 / 9
	QPSK	12 / 18
OFDM (802.11g)	16QAM	24 / 36
	64QAM	48 / 54
	BPSK	6.5
OFDM	QPSK	13/19.5
(802.11n (HT20))	16QAM	26/39
	64QAM	52/58.5/65

Note1: The worst-case mode (bold face) in all data rates has been determined during the pre-scan, only the test data of the worst-case were recorded in this report.





1.4. The Channel Number and Frequency

Test Mode	Channel	Frequency (MHz)	Channel	Frequency (MHz)
	1	2412	8	2447
	2	2417	9	2452
	3	2422	10	2457
802.11b/g/n (HT20)	4	2427	11	2462
	5	2432	12	2467
	6	2437	13	2472
	7	2442		

Note 1: The black bold channels were selected for test.





1.5. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C for the EUT FCC ID Certification:

No	. Identity	Document Title
1	47 CFR Part 15	Radio Frequency Devices

Test detailed items/section required by FCC rules and results are as below:

No.	Section	Description	Test Date	Test Engineer	Result	Method Determination /Remark
1	15.203	Antenna Requirement	N/A	N/A	PASS	No deviation
2	N/A	Duty Cycle of Test Signal	Aug 20, 2021	Su Xiaoxian	PASS	No deviation
3	15.247(b)	Maximum Peak and Average Conducted Output Power	Aug 18, 2021	Su Xiaoxian	PASS	No deviation
4	15.247(a)	Bandwidth	Aug 20, 2021	Su Xiaoxian	PASS	No deviation
5	15.247(d)	Conducted Spurious Emission and Band Edge	Aug 20, 2021	Su Xiaoxian	PASS	No deviation
6	15.247(e)	Power Spectral Density	Aug 20, 2021	Su Xiaoxian	PASS	No deviation
7	15.207	Conducted Emission	Aug 19, 2021	Su Zhan	PASS	No deviation
8	15.247(d)	Restricted Frequency Bands	Aug 18&20, 2021	Lin Jiayong	PASS	No deviation
9	15.209, 15.247(d)	Radiated Emission	Aug 18, 2021	Lin Jiayong	PASS	No deviation
	Note 1: The tests were performed according to the method of measurements prescribed in					rescribed in
	ANSIC63.10-2013, KDB558074 D01 v05r02.					
Note 2: The path loss during the RF test is calibrated to correct the results by the offset setting						





in the test equipments. The ref offset 11.5dB contains two parts that cable loss 1.5dB and Attenuator 10dB.

Note 3: Additions to, deviation, or exclusions from the method shall be judged in the "method determination" column of add, deviate or exclude from the specific method shall be explained in the "Remark" of the above table.

Note 4: When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% confidence intervals.

1.6. Environmental Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15-35
Relative Humidity (%):	30-60
Atmospheric Pressure (kPa):	86-106





2.47 CFR Part 15C Requirements

2.1. Antenna Requirement

2.1.1. Applicable Standard

According 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.

2.1.2. Result: Compliant

Inside of the EUT has a PIFA antenna coupled with the metal shrapnel. Please refer to the EUT internal photos.





2.2. Duty Cycle of Test Signal

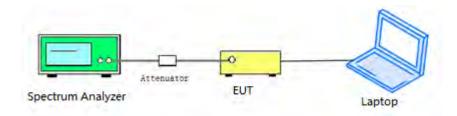
2.2.1. Requirement

Preferably, all measurements of maximum conducted (average) output power will be performed with the EUT transmitting continuously (i.e., with a duty cycle of greater than or equal to 98%). When continuous operation cannot be realized, then the use of sweep triggering/signal gating techniques can be used to ensure that measurements are made only during transmissions at the maximum power control level. Such sweep triggering/signal gating techniques will require knowledge of the minimum transmission duration (T) over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation. Sweep triggering/signal gating techniques can be set such that it does not exceed T at any time that data are being acquired (i.e., no transmitter OFF-time is to be considered).

When continuous transmission cannot be achieved and sweep triggering/signal gating cannot be implemented, alternative procedures are provided that can be used to measure the average power; however, they will require an additional measurement of the transmitter duty cycle (D). Within this subclause, the duty cycle refers to the fraction of time over which the transmitter is ON and is transmitting at its maximum power control level. The duty cycle is considered to be constant if variations are less than ±2%; otherwise, the duty cycle is considered to be nonconstant.

2.2.2. Test Description

Test Setup:



ANSI C63.10 2013 Clause 11.6 was used in order to prove compliance.





2.2.3. Test Result

A. Test Verdict:

Test Mode	Duty Cycle (%) (D)	Duty Factor (10*lg[1/D])
802.11b	100.00	0.00
802.11g	100.00	0.00
802.11n (HT20)	100.00	0.00

B. Test Plot:

1	SENSE: PULSE SOU		09:44:54 AM Aug 20, 2021	Peak Search
PNO: Fast	Trig: Free Run Atten: 30 dB	Avg Type: Log-Pwr	TRACE 2 4 TYPE WAARMAN DET P N R N N N	
			Mkr1 31.60 ms 6.60 dBm	NextPeak
¢1				Next Pk Righ
				Next Pk Lef
				Marker Delt
				Mkr→C
				Mkr→RefLv
#VBW	8.0 MHz	Sweep 1	Span 0 Hz 00.0 ms (1001 pts)	Mon 1 of
	IFGain:Low	PNO: Fast 😱 Trig: Free Run	Avg Type: Log-Pwr IFGain:Low Atten: 30 dB	PNO: Fast Trig: Free Run Atten: 30 dB Mkr1 31.60 ms 6.60 dBm

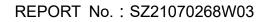
(Channel 1, 802.11b)



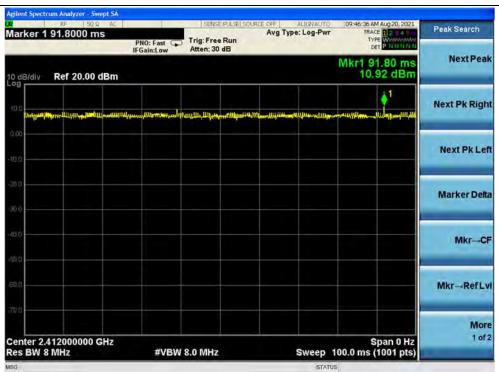
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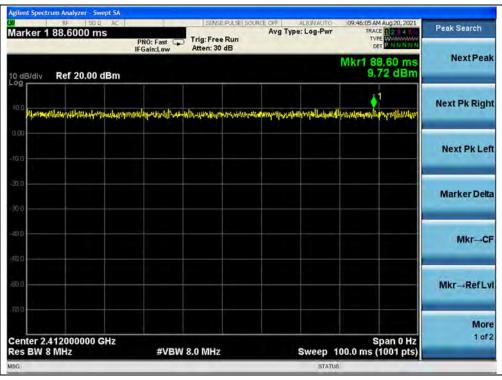
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(Channel 1, 802.11g)



(Channel 1, 802.11n (HT20))

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2.3. Maximum Peak and Average Conducted Output Power

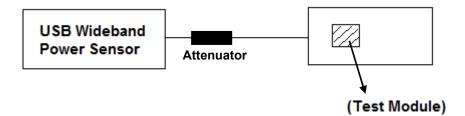
2.3.1. Requirement

According to FCC section 15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: The maximum peak conducted output power of the intentional radiator shall not exceed1 Watt.

2.3.2. Test Description

The measured output power was calculated by the reading of the USB Wideband Power Sensor and calibration.

Test Setup:



The EUT (Equipment under the test) which is coupled to the USB Wideband Power Sensor; the RF load attached to the EUT antenna terminal is 500hm; the path loss as the factor is calibrated to correct the reading.





2.3.3. Test Result

Maximum Peak Conducted Output Power

802.11b Mode

Channel	Channel Frequency (MHz)		Measured Output Peak Power		Limit		
Channel			W	dBm	W	Verdict	
1	2412	15.20	0.033			PASS	
7	2442	15.36	0.034	30	1	PASS	
13	2472	15.24	0.033			PASS	

802.11g Mode

Channel	Channel Frequency (MHz)		Measured Output Peak Power		Limit	
Channel	Frequency (IVITZ)	dBm	W	dBm	W	Verdict
1	2412	21.74	0.149			PASS
7	2442	21.27	0.134	30	1	PASS
13	2472	21.23	0.133			PASS

802.11n (HT20) Mode

Channel	Channel Frequency (MHz)		Measured Output Peak Power		Limit		
Channel	Frequency (IVITZ)	dBm	W	dBm	W	Verdict	
1	2412	21.36	0.137			PASS	
7	2442	21.18	0.131	30	1	PASS	
13	2472	20.94	0.124			PASS	



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Maximum Average Conducted Output Power

802.11b Mode

	Fraguanay	Average Power				Average Power Limit		
Channel	Frequency (MHz)	Measured	Duty	Duty Factor Calculated		m	Verdict	
	(INITZ)	dBm	Factor	dBm	W	dBm	W	
1	2412	12.02		12.02	0.016			PASS
7	2442	12.57	0.00	12.57	0.018	30	1	PASS
13	2472	12.09		12.09	0.016			PASS

802.11g Mode

	Frequency		Averag	je Power		Lie	mit	
Channel	Frequency (MHz)	Measured	Duty	Duty Factor	^r Calculated	– Limit		Verdict
	(INITZ)	dBm	Factor	dBm	W	dBm	W	
1	2412	12.13		12.13	0.016			PASS
7	2442	12.38	0.00	12.38	0.017	30	1	PASS
13	2472	12.21		12.21	0.017			PASS

802.11n (HT20) Mode

	Fraguanay		Average Power				mit	
Channel	Frequency (MHz)	Measured	Duty	Duty Factor	^r Calculated	Limit		Verdict
	(INITZ)	dBm	Factor	dBm	W	dBm	W	
1	2412	12.08		12.08	0.016			PASS
7	2442	12.47	0.00	12.47	0.018	30	1	PASS
13	2472	12.09		12.09	0.016			PASS



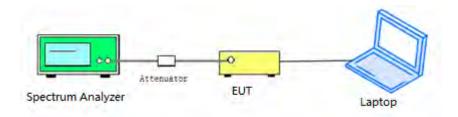


2.4.1. Requirement

According to FCC section 15.247(a) (2), Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 - 2483.5 MHz, and 5725 - 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

2.4.2. Test Description

Test Setup:



The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 500hm; the path loss as the factor is calibrated to correct the reading.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

2.4.3. Test Procedure

KDB 558074 Section 8.2 was used in order to prove compliance.





2.4.4. Test Result

802.11b Mode

A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
1	2412	9.089	≥500	PASS
7	2442	9.254	≥500	PASS
13	2472	9.075	≥500	PASS

B. Test Plot:



(Channel 1, 802.11b)



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(Channel 7, 802.11b)



(Channel 13, 802.11b)



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802.11g Mode

A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
1	2412	16.43	≥500	PASS
7	2442	16.43	≥500	PASS
13	2472	16.35	≥500	PASS

B. Test Plot:



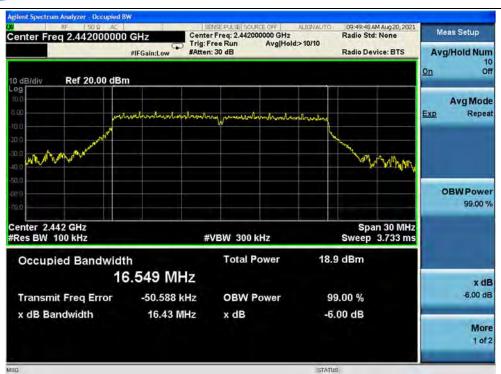
(Channel 1, 802.11g)



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(Channel 7, 802.11g)



(Channel 13, 802.11g)



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802.11n (HT20) Mode

A. Test Verdict:

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limits(kHz)	Result
1	2412	17.61	≥500	PASS
7	2442	17.59	≥500	PASS
13	2472	17.56	≥500	PASS

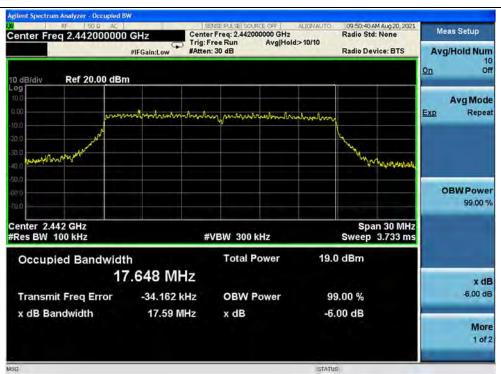
B. Test Plot:

enter Freq 2.412000000	GHz Cente		ALIGNAUTO	Radio Ste			eas Setup
	#IFGain:Low #Atte	n: 30 dB		Radio De	vice: BTS	Av	g/Hold Num
o dB/div Ref 20.00 dBn	1					On	Off
og 0 D							AvgMode
m mut	madrentrentrenent	mountantinution	trubunin			Exp	Repea
0				A.			
a way way way water				Mer	hourser		
0						3	OBWPowe
no							99.00 %
enter 2.412 GHz Res BW 100 kHz	#	VBW 300 kHz			an 30 MHz 3.733 ms		
Occupied Bandwidt	h	Total Power	18.	7 dBm			
17	.669 MHz						x dB
Transmit Freq Error	37.996 kHz	OBW Power	9	9.00 %			-6,00 dB
x dB Bandwidth	17.61 MHz	x dB	-6.	00 dB			
							More 1 of 2
							1.01.2
G			STATU	S.	_	-	

(Channel 1, 802.11n (HT20))







(Channel 7, 802.11n (HT20))

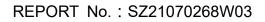


(Channel 13, 802.11n (HT20))



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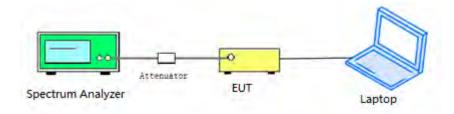
2.5. Conducted Spurious Emissions and Band Edge

2.5.1. Requirement

According to FCC section 15.247(c), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

2.5.2. Test Description

Test Setup:



The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 500hm; the path loss as the factor is calibrated to correct the reading.

Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. In order to make an accurate measurement, set the span greater than RBW.

2.5.3. Test Procedure

KDB 558074 Section 8.5 and 8.7 was used in order to prove compliance.





2.5.4. Test Result

802.11b Mode

A. Test Verdict:

		Measured Max. Out	Limit		
Channel	Frequency (MHz)	of Band Emission	Carrier	Calculated	Verdict
		(dBm)	Level	-20dBc Limit	
1	2412	-41.62	3.62	-16.38	PASS
7	2442	-42.70	3.40	-16.60	PASS
13	2472	-43.22	3.57	-16.43	PASS

B. Test Plot:



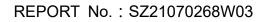
(30MHz to 25GHz, Channel 1, 802.11b)



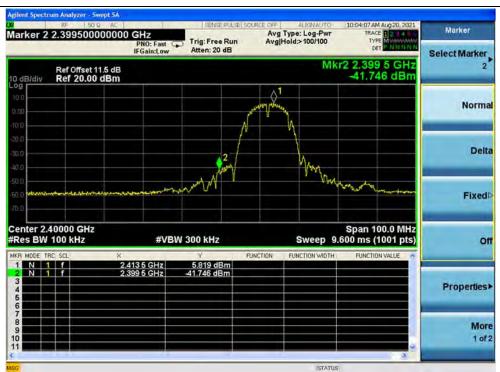
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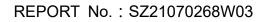
(Band Edge, Channel 1, 802.11b)



(30MHz to 25GHz, Channel 7, 802.11b)



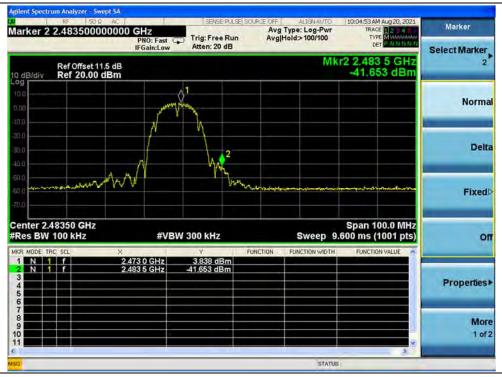
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	10:05:21 AM Aug 20, 2021 TRACE 2 2 4 4 TYPE M MANAMAN DET P N 101 N 11	pe: Log-Pwr d: 3/10	Avg	SENSE:PULS Trig: Free Run Atten: 20 dB	PNO: Fast G	300000	24.54804	ker 2
Next Pea	24.548 0 GHz -43.217 dBm	Mkr2					Ref Offset	B/div
Next Pk Righ							\$ ¹	
Next Pk Le								
	www.www	-	فللسعيمية			www.		-
Marker Del								
Marker Del Mkr→C	Stop 25.00 GHz 387 s (10001 pts)			300 kHz	#VBN		IOO kHz	_
	Stop 25.00 GHz 387 s (10001 pts) FUNCTION VALUE	Sweep 2.3	FUNCTION		59 6 GHz		SCL	S BW
	387 s (10001 pts)		FUNCTION	¥		2.4	SCL	S BW

(30MHz to 25GHz, Channel 13, 802.11b)



(Band Edge, Channel 13, 802.11b)



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802.11g Mode

A. Test Verdict:

		Measured Max. Out	Limi	t (dBm)	
Channel	Frequency (MHz)	of Band Emission	Carrier	Calculated	Verdict
		(dBm)	Level	-20dBc Limit	
1	2412	-42.90	-1.64	-21.64	PASS
7	2442	-42.24	-1.36	-21.36	PASS
13	2472	-42.15	-1.56	-21.56	PASS

B. Test Plot:



(30MHz to 25GHz, Channel 1, 802.11g)







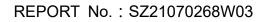


(Band Edge, Channel 1, 802.11g)

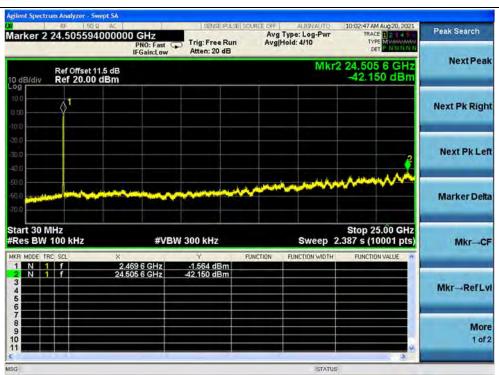


(30MHz to 25GHz, Channel 7, 802.11g)









(30MHz to 25GHz, Channel 13, 802.11g)



(Band Edge, Channel 13, 802.11g)



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802.11n (HT20) Mode

A. Test Verdict:

	Measured Max. Out		Limi		
Channel	Frequency (MHz)	of Band Emission	Carrier	Calculated	Verdict
		(dBm)	Level	-20dBc Limit	
1	2412	-42.80	-0.91	-20.91	PASS
7	2442	-43.22	-0.73	-20.73	PASS
13	2472	-42.99	-1.40	-21.40	PASS

B. Test Plot:



(30MHz to 25GHz, Channel 1, 802.11n (HT20))

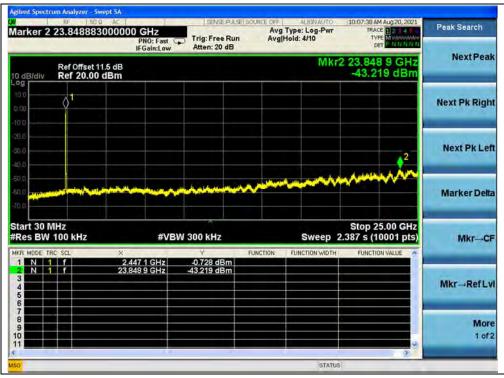


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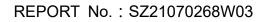


(Band Edge, Channel 1, 802.11n (HT20))



(30MHz to 25GHz, Channel 7,802.11n (HT20))







Peak Search	MAUg20,2021 NCE 12 14 F YPE MUMMAAAAA DET PIN INN N N	TRA	ALIGNAUTO pe: Log-Pwr Id: 5/10	Avg 1	SENSE:PULSE Frig: Free Run Atten: 20 dB	GHz PNO: Fast G FGain:Low	AC 000000		r 2 24	rke
Next Pea	0 5 GHz 91 dBm	2 24.60	Mkr					Offset 11 f 20.00		IB/d
Next Pk Righ								1		
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	ALL APRIL	. A and								1
Marker Delt				فليتميعي	and a stand and				in the second	
Marker Delt Mkr→C	25.00 GHz 10001 pts)	Stop 2		^{مغير} مي	DO KHZ	#VBV		kHz	80 MH 3W 10	rt 3
	25.00 GHz	Stop 2 2.387 s (1		UNCTION	00 kHz Y 1.396 dBm	6 GHz			BW 10	nt 3 es E MOD
	25.00 GHz 10001 pts)	Stop 2 2.387 s (1	Sweep 2		DO KHZ		2.47		BW 10	ITT 3 es E

(30MHz to 25GHz, Channel 13, 802.11n (HT20))



(Band Edge, Channel 13, 802.11n (HT20))



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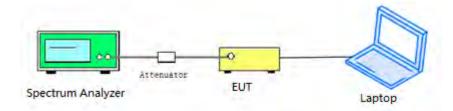
2.6. Power Spectral Density

2.6.1. Requirement

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

2.6.2. Test Description

Test Setup:



The EUT is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 500hm; the path loss as the factor is calibrated to correct the reading.

2.6.3. Test Procedure

KDB 558074 Section 8.4 was used in order to prove compliance.





2.6.4. Test Result

802.11b Mode

A. Test Verdict:

Spectral power density (dBm/3kHz)									
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict					
1	2412	-10.67	8	PASS					
7	2442	-1.33	8	PASS					
13	2472	2.66	8	PASS					

B. Test Plot:

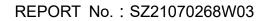


(Channel 1, 802.11b)



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(Channel 7, 802.11b)



(Channel 13, 802.11b)



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Fax: 86-755-36698525 E-mail: service@morlab.cn

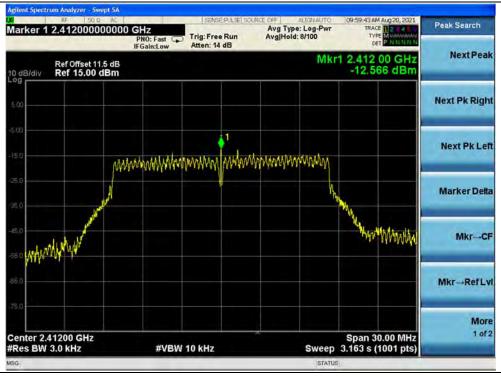


802.11g Mode

A. Test Verdict:

Spectral power density (dBm/3kHz)									
Channel	Frequency (MHz)	Measured PSD (dBm/3kHz)	Limit (dBm/3kHz)	Verdict					
1	2412	-12.57	8	PASS					
7	2442	-11.03	8	PASS					
13	2472	-12.49	8	PASS					

B. Test Plot:

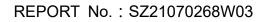


(Channel 1, 802.11g)

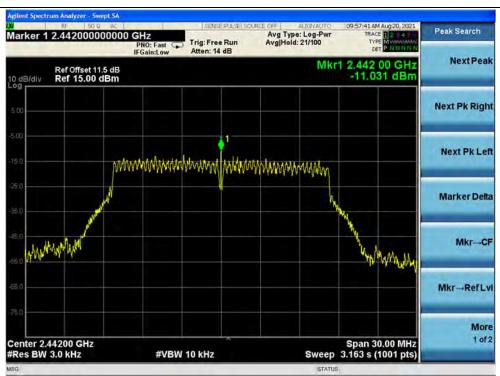


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(Channel 7, 802.11g)



(Channel 13, 802.11g)



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802.11n (HT20) Mode

A. Test Verdict:

	S	pectral power density (dBm/3kHz)			
Channel	Frequency	Macourod DSD (dPm/2kHz)	Limit	Verdict	
Channel	(MHz)	Measured PSD (dBm/3kHz)	(dBm/3kHz)	verdict	
1	2412	-11.81	8	PASS	
7	7 2442 -10.63 8		8	PASS	
13	2472	-13.17	8	PASS	

B. Test Plot:

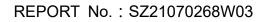


(Channel 1, 802.11n (HT20))

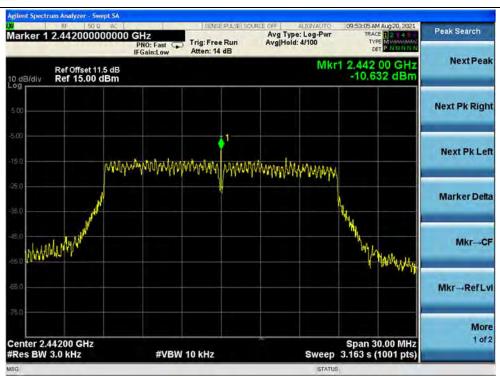


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(Channel 7, 802.11n (HT20))



(Channel 13, 802.11n (HT20))

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2.7. Conducted Emission

2.7.1. Requirement

According to FCC section 15.207, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency within the band 150kHz to 30MHz shall not exceed the limits in the following table, as measured using a 50μ H/ 50Ω line impedance stabilization network (LISN).

Frequency Range (MHz) 0.15 - 0.50 0.50 - 5	Conducted	Limit (dBµV)
Frequency Range (MHZ)	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

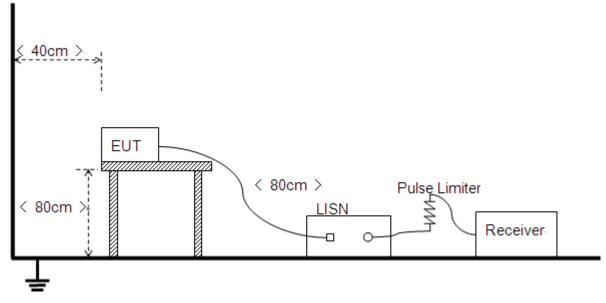
Note:

(a) The lower limit shall apply at the band edges.

(b) The limit decreases linearly with the logarithm of the frequency in the range 0.15 - 0.50MHz.

2.7.2. Test Description

Test Setup:



The Table-top EUT was placed upon a non-metallic table 0.8m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.10 2013.

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2.7.3. Test Result

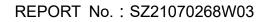
The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Set RBW=9kHz, VBW=30kHz. Refer to recorded points and plots below.

Note: Both of the test voltage AC 120V/60Hz and AC 230V/50Hz were considered and tested respectively, only the results of the worst case AC 120V/60Hz were recorded in this report.

A. Test Setup:

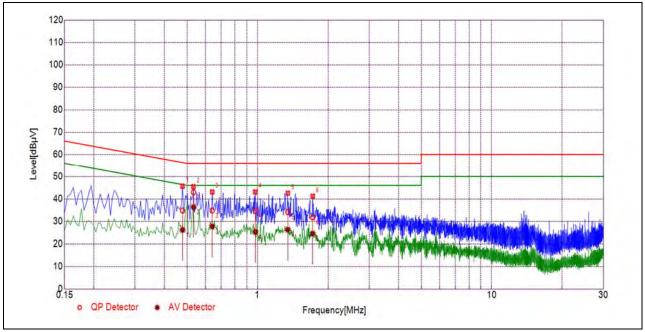
Test Mode: <u>EUT+adapter+headhone+WIFI TX</u> Test Voltage: <u>AC 120V/60Hz</u> The measurement results are obtained as below: E [dB μ V] =U_R + L_{Cable loss} [dB] + A_{Factor} U_R: Receiver Reading A_{Factor}: Voltage division factor of LISN







B. Test Plot:

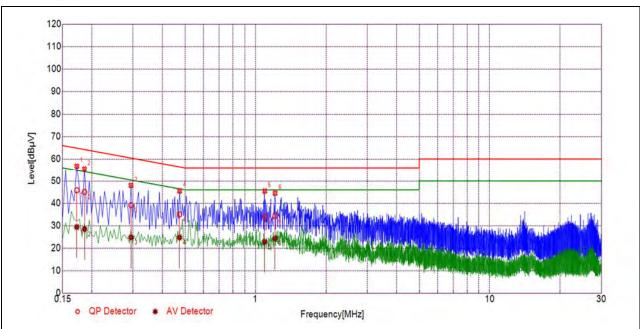


(L Phase)

No.	Fre.	Emission L	evel (dBµV)	Limit (dBµV)	Power-line	Verdict
	(MHz)	Quai-peak	Average	Quai-peak	Average		
1	0.4783	34.80	26.15	56.37	46.37		PASS
2	0.5329	42.92	36.35	56.00	46.00		PASS
3	0.6402	34.76	27.71	56.00	46.00	Line	PASS
4	0.9790	34.69	25.23	56.00	46.00	Line	PASS
5	1.3467	34.12	26.30	56.00	46.00]	PASS
6	1.7193	31.78	24.54	56.00	46.00		PASS



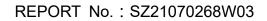




(N	Phase)
	1 11400)

No.	Fre.	J-7\	Limit (dBµV)	Power-line	Verdict	
	(MHz)	Quai-peak	Average	Quai-peak	Average		
1	0.1725	45.84	29.37	64.84	54.84		PASS
2	0.1861	45.05	28.43	64.21	54.21		PASS
3	0.2939	39.14	24.72	60.41	50.41	Noutral	PASS
4	0.4736	35.02	24.73	56.45	46.45	Neutral	PASS
5	1.0941	34.01	22.72	56.00	46.00		PASS
6	1.2110	34.32	24.22	56.00	46.00		PASS







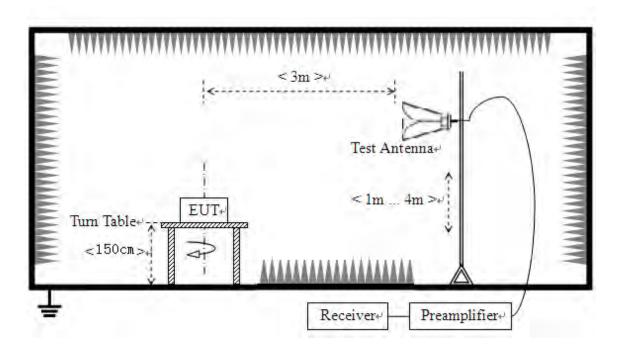
2.8. Restricted Frequency Bands

2.8.1. Requirement

According to FCC section 15.247(d), in any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in 15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

2.8.2. Test Description

Test Setup



The EUT is located in a 3m Semi-Anechoic Chamber; the antenna factors, cable loss and so on of the site as factors are calculated to correct the reading.

For the Test Antenna:

Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground to determine the maximum value of the field strength.





2.8.3. Test Procedure

KDB 558074 Section 8.6 and 8.7 was used in order to prove compliance.

2.8.4. Test Result

The lowest and highest channels are tested to verify Restricted Frequency Bands.

The measurement results are obtained as below:

 $E [dB\mu V/m] = U_R + A_T + A_{Factor} [dB]; A_T = L_{Cable loss} [dB] - G_{preamp} [dB]$

A_T: Total correction Factor except Antenna

U_R: Receiver Reading

G_{preamp}: Preamplifier Gain

AFactor: Antenna Factor at 3m

Note: Restricted Frequency Bands were performed when antenna was at vertical and horizontal polarity, and only the worse test condition (vertical) was recorded in this test report.

802.11b Mode

A. Test Verdict:

	Frequency	Detector	Receiver Reading	A _T	A _{Factor}	Max. Emission	Limit	Verdict
Channel	(MHz)	PK/ AV	U _R (dBµV)	(dB)	(dB@3m)	E (dBµV/m)	(dBµV/m)	Verdiet
1	2382.32	PK	26.72	6.74	27.20	60.66	74	PASS
1	3290.00	AV	13.37	6.74	27.20	47.31	54	PASS
13	2483.50	PK	30.14	6.74	27.20	64.08	74	PASS
13	2483.50	AV	15.66	6.74	27.20	49.60	54	PASS



B. Test Plot:

	RF PRESEL	50 Q DC	247	SENSE:INT	Ave	ALIGN OFF		MAug 18, 2021 CE 1 2 3 4 5 0	Marker
arker z	PREAMP		PNO: Fast (IFGain:Low	Trig: Free Run #Atten: 10 dB		Hold:>100/100	T		Select Marker
dB/div	Ref 86.	99 dBµV				Mk	2 2.382 26.72	32 GHz 24 dBμV	2
7.0 7.0									Norma
7.0 7.0 7.0									Delt
7.0	ar	-managenthe age and	- and an American	inger an er fallene i vel anlen vel	1	lamber and anno	A		
90									Fixed
	000 GHz (CISPR)	1 MHz	#VB	W 3.0 MHz	FUNCTION	Sweep	1.000 ms	1200 GHz (1001 pts)	0
1 N 1 2 N 1 3 4 5	CLOSEL.	2.390	00 GHz 32 GHz	24.656 dBµV 26.724 dBµV	- Site new			E	Properties
6 7 8 9 9 0									Moi 1 of
1				In			-	1.1	

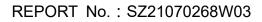
(PEAK, Channel 1, 802.11b)



(AVERAGE, Channel 1, 802.11b)



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Marker	01:29:54 PM Aug 18, 2021 TRACE 1 2 3 4 5 0 TYPE N	ALIGN OFF Type: Voltage Hold:>100/100	A	SENSE:II		50 12 DC	2.48354
Select Marker	DET PNNNNN			#Atten: 10 dB	PNO: Fast CP IFGain:Low		PREAMP
2	2.483 546 GHz 29.382 dBµV	Mkr2				99 dBµV	Ref 86.9
Norm							
Delt							/
Den		-	2				
Fixed							
0	Stop 2.50000 GHz .000 ms (1001 pts)			3.0 MHz	#VBW		200 GHz (CISPR)
	FUNCTION VALUE	FUNCTION WIDTH	FUNCTION	γ 30.137 dBμV		× 2.483	C SCL
Properties	=			29.382 dBµV	546 GHz	2.483	
Mor							
1 of	-			-			
-		STATUS					

(PEAK, Channel 13, 802.11b)



(AVERAGE, Channel 13, 802.11b)



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802.11g Mode

A. Test Verdict:

Channel	Frequency	Detector	Receiver Reading	A _T	A _{Factor}	Max. Emission	Limit	Verdict
Channel	(MHz)	PK/ AV	U _R (dBµV)	(dB)	(dB@3m)	E (dBµV/m)	(dBµV/m)	verdict
1	2390.00	PK	28.91	6.74	27.20	62.85	74	PASS
1	2390.00	AV	14.13	6.74	27.20	48.07	54	PASS
13	2484.99	PK	35.13	6.74	27.20	69.07	74	PASS
13	2483.50	AV	17.53	6.74	27.20	51.47	54	PASS

B. Test Plot:

	RF PRESEL 50 0 2.3880320 PREAMP	00000 GHz PNO: Fast IFGain:Low	Trig: Free Run #Atten: 10 dB	Avg Type: Voltage Avg Hold:>100/100	01:47:34 PM Aug 18, 2021 TRACE 2 3 4 5 0 TVPE MUNICIPAL OF P N N N N N	Marker Select Marker
dBídiv	Ref 86.99	dBµV		Mkr	2 2.388 03 GHz 28.660 dBµV	2
а 0						Norm
					21	Del
10 99 91						Fixed
	0000 GHz (CISPR) 1 M	x			Stop 2.41200 GHz 000 ms (1001 pts) FUNCTION VALUE	o
		2.390 00 GHz 2.388 03 GHz	28.909 dBµV 28.660 dBµV			Properties
						Mo 1 of

(PEAK, Channel 1, 802.11g)





TRACE 2 3 4 5 0	Type: Voltage	Av	Trig: Free Run	PNO: Fast	03200000	2 2.3880	
	Mkr2		#Atten: 10 dB	IFGain:Low			dB/div
							0
	•						0 9
top 2.41200 GHz 6.58 s (1001 pts)	Sweep		10 Hz*	#VBW			es BW
FUNCTION VALUE	FUNCTION WIDTH	FUNCTION				TRC SCL 1 f 1 f	N N
	2 2.388 03 GHz 13.881 dBµV	B Type: Voltage Hold:>100/100 Trace 2.388 03 GHz 13.881 dBµV 21 21 21 21 21 21 21 21 21 21 21 21 21	Avg Type: Voltage Avg Hold:>100/100 TYPE DET Mkr2 2.388 03 GHz 13.881 dBµV 21 21 21 500 2.41200 GHz Sweep 16.58 s (1001 pts)	Avg Type: Voltage Trace Trace <thtrace< th=""> Trace Trace</thtrace<>	0 GHz PNO: Fast IFGain:Low Trig: Free Run #Atten: 10 dB	32000000 GHz Avg Type: Voltage Trace B 2 2 4 3 5 0 0 GHz PN0: Fast Trig: Free Run #Atten: 10 dB Avg Type: Voltage Tree B 2 2 4 3 5 0 0 GHz .99 dBµV Mkr2 2.388 03 GHz 13.831 dBµV .99 dBµV 13.831 dBµV .99 dBµV 2 1 .91 dBµV 2 1 .92 dBµV 2 1 .93 dBµV .93 dBµV .94 dBµV .94 dBµV .95 dBµV .95 dBµV .97 dBµV .97 dBµV .98 dBµV .97 dBµV .99 dBµV .97 dBµV .90 dBµV .97 dBµV .97 dBµV .97 dBµV .97 dBµV .97 dBµV	2.388032000000 GHz Trig: Free Run Avg Type: Voltage Avg Hold:>100/100 Trice Type I and the second secon

(AVERAGE, Channel 1, 802.11g)



(PEAK, Channel 13, 802.11g)



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0.0							nalyzer - Sv		sight Sp
Marker	11:44:30 PM Aug 18, 2021 TRACE 1 2 3 4 5 0 TVPE MUMANNA	ALIGN OFF Type: Voltage Hold:>100/100		SENSE:II	GHZ PNO: Fast	DC 00000	49900		er 2
Select Marke	484 990 GHz	MICTO		#Atten: 10 dB	IFGain:Low		MP	PREA	_
	16.626 dBµV	IVIKT2				dBµV	86.99	Ref	div
Norm									
Norm									
Delta									-1
De									
100									
Fixed									
Fixed	op 2.50000 GHz	*						5200	
C	FUNCTION VALUE	Sweep	FUNCTIO	10 Hz*	#VBW	VIHz ×	PR) 1 M	(CIS	
	FUNCTION VALUE	FUNCTION WIDTH	FUNCTIO	17,529 dBµV	500 GHz	2.483			N
Properties									
_									
Mo									
10				11					
		STATUS						_	-

(AVERAGE, Channel 13, 802.11g)



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802.11 n (HT20) Mode

A. Test Verdict:

Channel	Frequency Detector		Receiver Reading	Reading A _T		Max. Emission E	Limit	Verdict
	(MHz)	PK/ AV	ο _R (dBμV)	U _R (dB) IBµV)	(dB@3m)	⊏ (dBµV/m)	(dBµV/m)	
1	2390.00	PK	28.60	6.74	27.20	62.54	74	PASS
1	2390.00	AV	14.18	6.74	27.20	48.12	54	PASS
13	2484.76	PK	33.37	6.74	27.20	67.31	74	PASS
13	2483.50	AV	18.50	6.74	27.20	52.44	54	PASS

B. Test Plot:



(PEAK, Channel 1, 802.11n (HT20))





ker 2 2.389488	BOOOOOO GHZ PNO: Fast	Trig: Free Run	Avg Type: Voltage Avg Hold:>100/100	TRACE 1 2 3 4 5 0	Marker
PREAMP IB/div Ref 86.9	IFGain:Low	#Atten: 10 dB	Mk	r2 2.389 49 GHz 14.085 dBµV	Select Marker 2
					Norma
					Delt
				2	Fixed
rt 2.30000 GHz	MHz #VB	W 10 Hz*			C
N 1 f N 1 f	2.390 00 GHz 2.389 49 GHz	14.180 dBµV 14.085 dBµV			Properties
					Mo 1 of

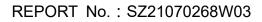
(AVERAGE, Channel 1, 802.11n (HT20))



(PEAK, Channel 13, 802.11n (HT20))



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Aug 18, 2021 Aug 18, 2021 Au
Avg/Hold Num Avg/Hold Num Avg/Hold Num 100 100 100 100 100 100 100 10
7 dBµV Avg Type Voltage Auto Mar Limits
Auto Mar Limits
N dB Points
-3.01 d On <u>O</u>
NVALUE - Ma
ADC Dithe Medium
Mor 1 of
-
/BW 10 Hz* Sweep 5.625 s (1 Y FUNCTION FUNCTION WIDTH FUNCTION 18.498 dBµV 16.927 dBµV 16.927 dBµV STATUS

(AVERAGE, Channel 13, 802.11n (HT20))



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2.9. Radiated Emission

2.9.1. Requirement

According to FCC section 15.247(d), radiated emission outside the frequency band attenuation below the general limits specified in FCC section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in FCC section 15.205(a), must also comply with the radiated emission limits specified in FCC section 15.209(a).

According to FCC section 15.209 (a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (µV/m)	Measurement Distance (m)
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
Above 960	500	3

Note1: For above 1000MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit. **Note2:** For above 1000MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK). In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), also should comply with the radiated emission limits specified in Section 15.209(a)(above table).

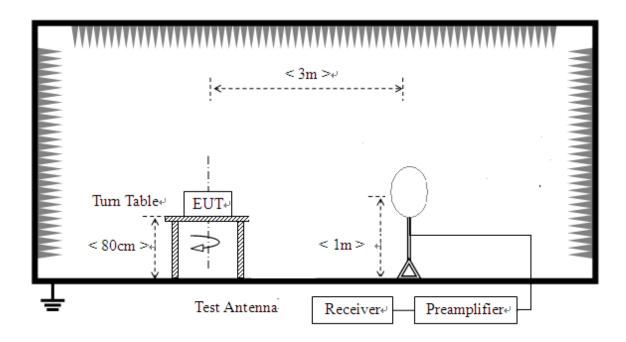




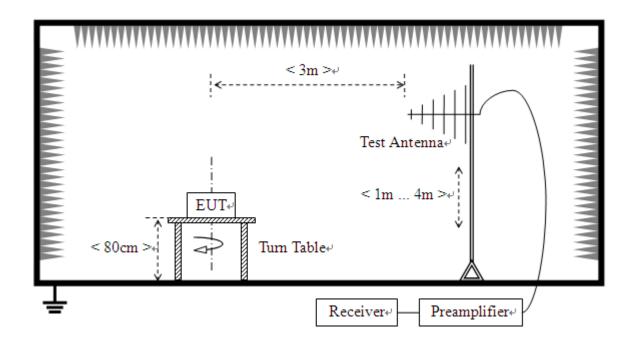
2.9.2. Test Description

Test Setup:

1) For radiated emissions from 9kHz to 30MHz



2) For radiated emissions from 30MHz to1GHz

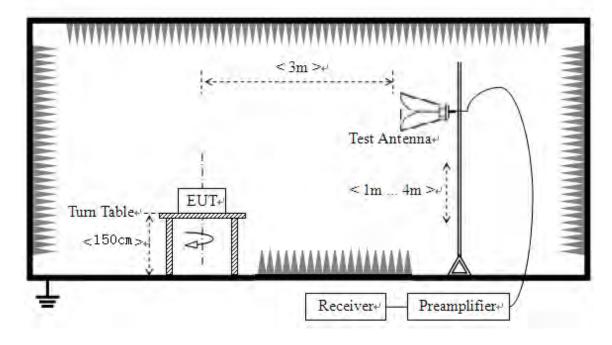




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3) For radiated emissions above 1GHz



The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz; 1.5 m above the ground plane for measurement above 1GHz.The antenna to EUT distance is 3meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

For measurements below 30MHz, the emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9kHz-90 kHz, 110kHz-490 kHz. Radiated emission limits in these two bands are based on measurements employing an average detector.

For measurements below 1GHz the resolution bandwidth is set to 100kHz for peak detection measurements or 120kHz for quasi-peak detection measurements. Peak detection is used unless otherwise noted as quasi-peak.

For measurements above 1GHz the resolution bandwidth is set to 1MHz, the video band width is set to 3MHz for peak measurements and as applicable for average measurements.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.





2.9.3. Test Result

According to ANSI C63.10, because of peak detection will yield amplitudes equal to or greater than amplitudes measured with the quasi-peak (or average) detector, the measurement data from a spectrum analyzer peak detector will represent the worst-case results, if the peak measured value complies with the quasi-peak (or average) limit, it is unnecessary to perform an quasi-peak measurement (or average).

The measurement results are obtained as below:

 $E [dB\mu V/m] = U_R + A_T + A_{Factor} [dB]; A_T = L_{Cable loss} [dB] - G_{preamp} [dB]$

A_T: Total correction Factor except Antenna

U_R: Receiver Reading

G_{preamp}: Preamplifier Gain

A_{Factor}: Antenna Factor at 3m

During the test, the total correction Factor A_T and A_{Factor} were built in test software.

Note1: All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

Note2: For the frequency, which started from 9kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.

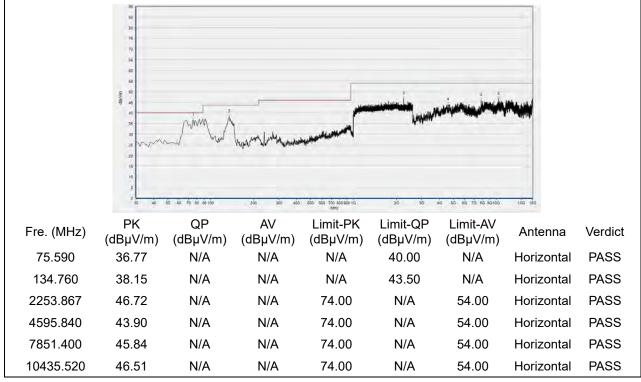
Note3: For the frequency, which started from 18GHz to 40GHz, was pre-scanned and the result which was 20dB lower than the limit was not recorded.



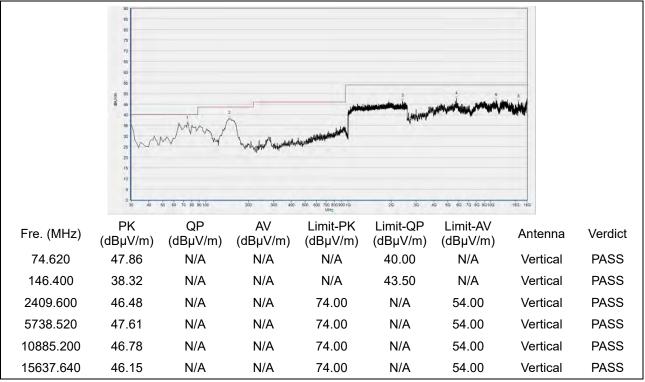


802.11b Mode

Plot for Channel 1



(Antenna Horizontal, 30MHz to 18GHz)



(Antenna Vertical, 30MHz to 18GHz)



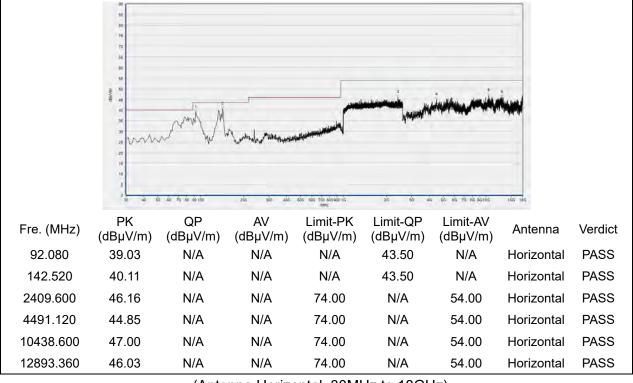
Shenzhen Morlab Communications Technology Co., Ltd. FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555

Fax: 86-755-36698525

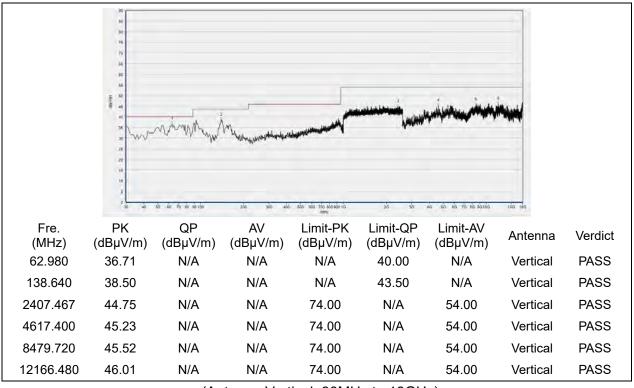
Http://www.morlab.cn



Plot for Channel 7



(Antenna Horizontal, 30MHz to 18GHz)



(Antenna Vertical, 30MHz to 18GHz)



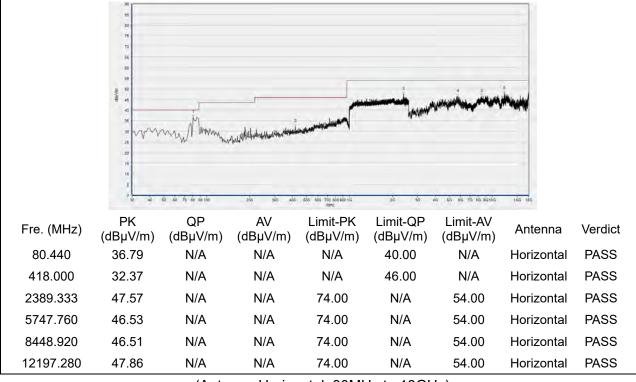
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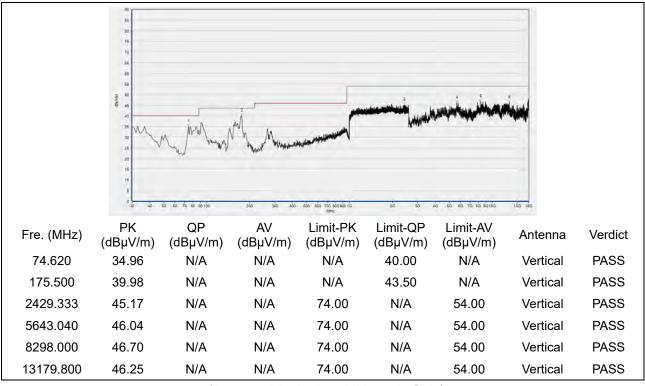
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Plot for Channel 13



(Antenna Horizontal, 30MHz to 18GHz)



(Antenna Vertical, 30MHz to 18GHz)



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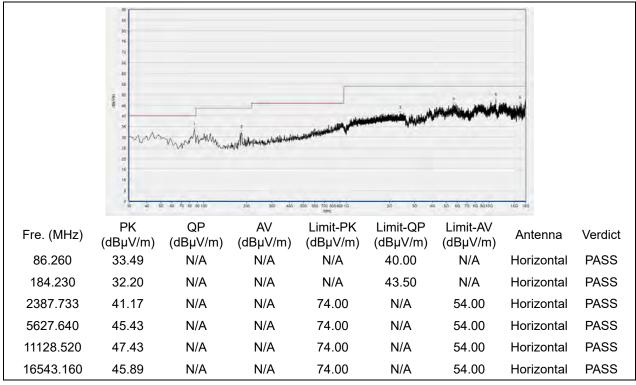
Fax: 86-755-36698525

Http://www.morlab.cn

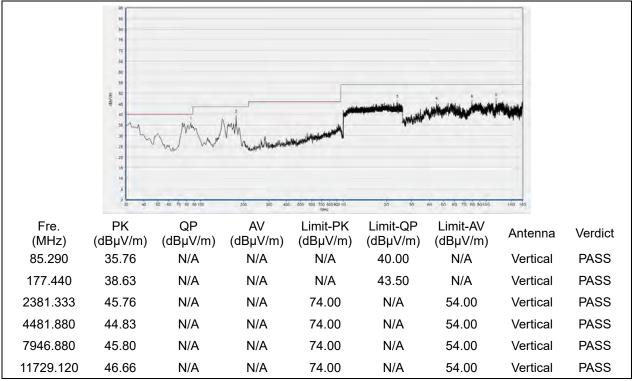


802.11g Mode





(Antenna Horizontal, 30MHz to 18GHz)



(Antenna Vertical, 30MHz to 18GHz)



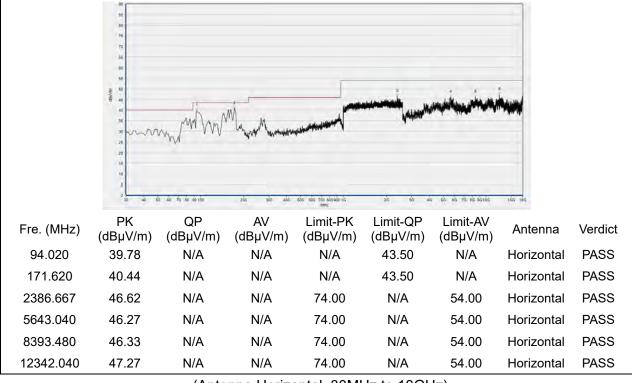
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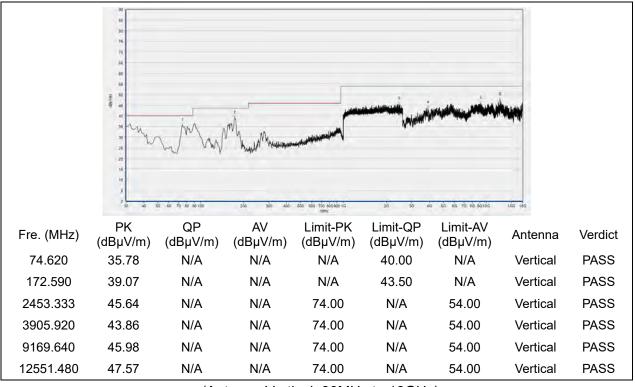
Http://www.morlab.cn



Plot for Channel 7



(Antenna Horizontal, 30MHz to 18GHz)



(Antenna Vertical, 30MHz to 18GHz)



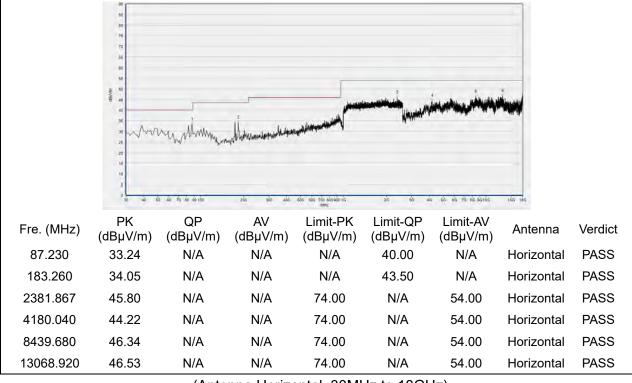
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Fax: 86-755-36698525

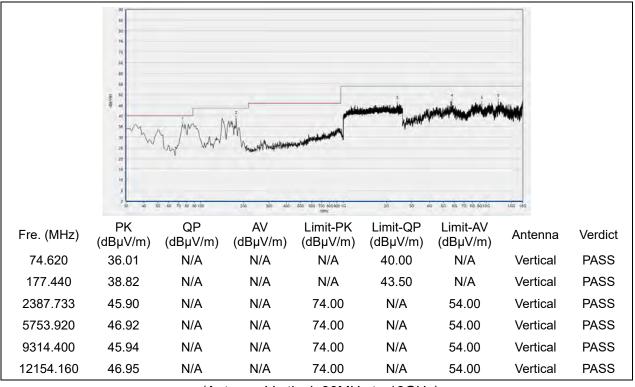
Http://www.morlab.cn



Plot for Channel 13



(Antenna Horizontal, 30MHz to 18GHz)



(Antenna Vertical, 30MHz to 18GHz)



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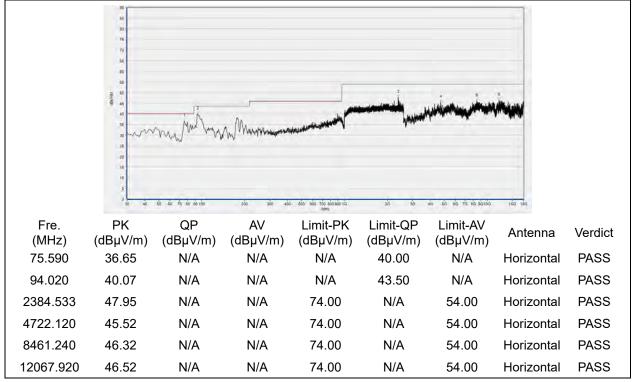
Fax: 86-755-36698525

Http://www.morlab.cn

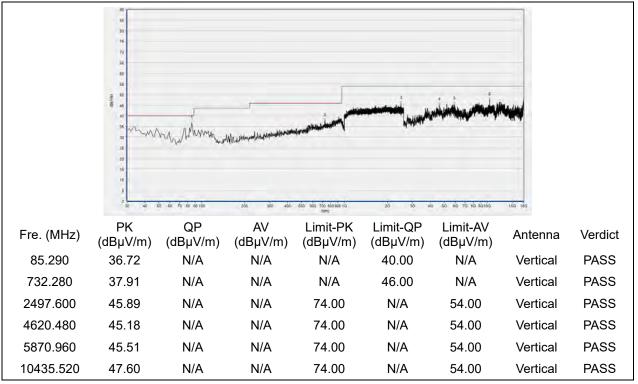


802.11n (HT20) Mode





(Antenna Horizontal, 30MHz to 18GHz)



(Antenna Vertical, 30MHz to 18GHz)



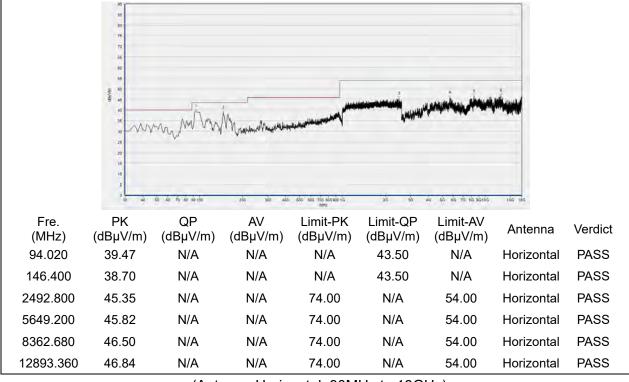
Shenzhen Morlab Communications Technology Co., Ltd. FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555

Fax: 86-755-36698525

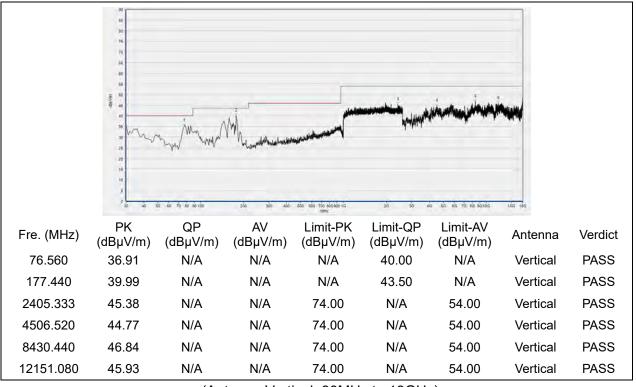
Http://www.morlab.cn



Plot for Channel 7



(Antenna Horizontal, 30MHz to 18GHz)



(Antenna Vertical, 30MHz to 18GHz)



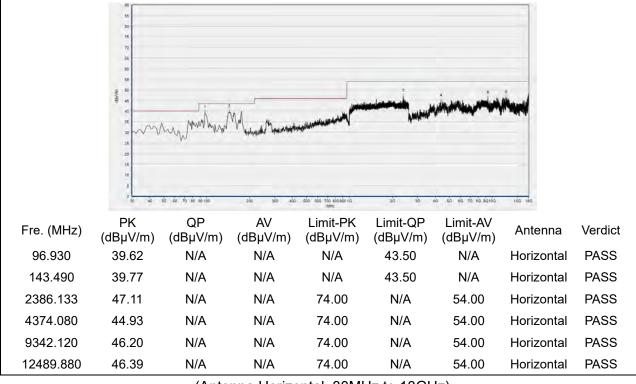
Shenzhen Morlab Communications Technology Co., Ltd. FL1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China Tel: 86-755-36698555

Fax: 86-755-36698525

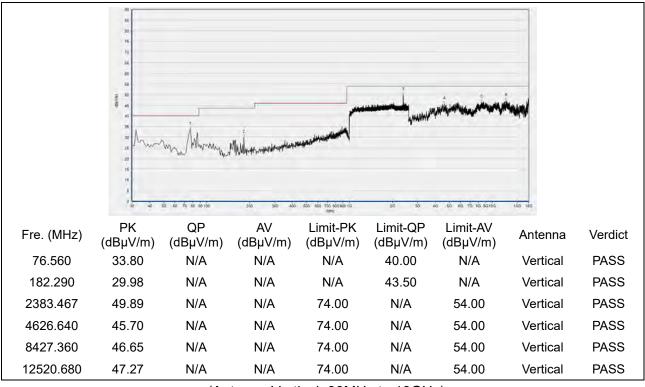
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Plot for Channel 13



(Antenna Horizontal, 30MHz to 18GHz)



(Antenna Vertical, 30MHz to 18GHz)



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Annex A Test Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for test performed on the EUT as specified in CISPR 16-1-2:

Test Items	Uncertainty
Peak Output Power	±2.22dB
Power Spectral Density	±2.22dB
Bandwidth	±5%
Conducted Spurious Emission	±2.77dB
Restricted Frequency Bands	±5%
Radiated Emission	±2.95dB
Conducted Emission	±2.44dB

This uncertainty represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.



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Annex B Testing Laboratory Information

1. Identification of the Responsible Testing Laboratory

Laboratory Name:	Shenzhen Morlab Communications Technology Co., Ltd.		
	FL.3, Building A, FeiYang Science Park, No.8 LongChang		
Laboratory Address:	Road, Block 67, BaoAn District, ShenZhen, GuangDong		
	Province, P. R. China		
Telephone:	+86 755 36698555		
Facsimile:	+86 755 36698525		

2. Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd.		
	FL.3, Building A, FeiYang Science Park, No.8 LongChang		
Address:	Road, Block 67, BaoAn District, ShenZhen, GuangDong		
	Province, P. R. China		

3. Facilities and Accreditations

All measurement facilities used to collect the measurement data are located at FL.3, Building A, FeiYang Science Park, Block 67, BaoAn District, Shenzhen, 518101 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.10-2013 and CISPR Publication 22; the FCC designation number is CN1192, the test firm registration number is 226174.





4. Test Equipments Utilized

4.1 Conducted Test Equipments

Equipment Name	Serial No.	Туре	Manufacturer	Cal. Date	Due Date
Attenuator 1	(N/A.)	10dB	Resent	N/A	N/A
EXA Signal	MY53470836	N9010A	Agilent	2021.03.25	2022.03.24
Analyzer					
USB Wideband	MY54210011	U2021XA	Agilent	2020.10.23	2021.10.22
Power Sensor			5		
RF Cable	CB01	RF01	Morlab	N/A	N/A
(30MHz-26GHz)	CBUT	KFU1	wonab	N/A	IN/A
Coaxial Cable	CB02	RF02	Morlab	N/A	N/A
SMA Connector	CN01	RF03	HUBER-SUHNER	N/A	N/A
Computer	T430i	Think Pad	Lenovo	N/A	N/A

4.2 Conducted Emission Test Equipments

Equipment Name	Serial No.	Туре	Manufacturer	Cal. Date	Due Date
Receiver	MY56400093	N9038A	KEYSIGHT	2020.03.26	2021.03.25
	010744	NSLK	Schwarzbeck	2020.03.26	2021.03.25
LISN	812744	8127			
Pulse Limiter	VTSD 9561	VTSD	Schwarzbeck	2021.07.21	2022.07.20
(10dB)	F-B #206	9561-F	Schwarzbeck	2021.07.21	2022.07.20
Coaxial					
Cable(BNC)	CB01	EMC01	Morlab	N/A	N/A
(30MHz-26GHz)					

4.3 List of Software Used

Description	Manufacturer	Software Version
Test System	Townsend	V2.5.77.0418
MORLAB EMCR V1.2	MORLAB	V1.0
TS+ -[JS32-CE]	Tonscend	V2.5.0.0





4.4 Radiated Test Equipments

Equipment	Serial No.	Туре	Manufacturer	Cal. Date	Due Date
Name					
Receiver	MY54130016	N9038A	Agilent	2021.07.16	2022.07.15
Test Antenna - Bi-Log	9163-519	VULB 9163	Schwarzbeck	2019.05.24	2022.05.23
Test Antenna - Loop	1519-022	FMZB1519	Schwarzbeck	2019.02.14	2022.02.13
Test Antenna – Horn	01774	BBHA 9120D	Schwarzbeck	2019.07.26	2022.07.25
Test Antenna – Horn	BBHA9170 #774	BBHA9170	Schwarzbeck	2019.07.26	2022.07.25
Coaxial Cable (N male) (9KHz-30MHz)	CB04	EMC04	Morlab	N/A	N/A
Coaxial Cable (N male) (30MHz-26GHz)	CB02	EMC02	Morlab	N/A	N/A
Coaxial Cable (N male) (30MHz-26GHz)	CB03	EMC03	Morlab	N/A	N/A
Coaxial Cable (N male) (30MHz-40GHz)	CB05	EMC05	Morlab	N/A	N/A
1-18GHz pre-Amplifier	61171/61172	S020180L32 03	Tonscend	2021.07.15	2022.07.14
18-26.5GHz pre-Amplifier	46732	S10M100L38 02	Tonscend	2021.07.15	2022.07.14
26-40GHz pre-Amplifier	56774	S40M400L40 02	Tonscend	2021.07.15	2022.07.14
Notch Filter	N/A	WRCG-2400- 2483.5-60SS	Wainwright	2021.07.15	2022.07.14
Anechoic Chamber	N/A	9m*6m*6m	CRT	2020.01.06	2023.01.05

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