FCC- TEST REPORT **Report Number** 64.790.19.02409.01 Date of Issue: March 31, 2020 1 Model : IC1.5 Product Type : SPIN BIKE Applicant : Health In Motion LLC Manufacturer : Health In Motion LLC Address 255 Airport Circle, Suite 101 Corona, California 92880, United States Test Result □ Negative Positive • Total pages including Appendices 29

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SUD

2 Details about the Test Laboratory

Details about the Test Laboratory

Test Site 1

Company name:	TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch Building 12&13, Zhiheng Wisdomland Business Park, Nantou Checkpoint Road 2, Nanshan District, Shenzhen City, 518052, P. R. China
FCC Registration Number:	514049
IC Registration Number:	10320A
Telephone: Fax:	86 755 8828 6998 86 755 828 5299

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3 Description of the Equipment under Test

Product: SPIN BIKE

Model no.: IC1.5

FCC ID: 2ATO8INSPIREIC105

Battery type: 3V, CR2477

Operating Frequency Range: 2402~2480MHz

Modulation: GFSK

Antenna Type: PCB Antenna

Antenna Gain: 0.69dBi

Description of the EUT: EUT is a SPIN BIKE, Bluetooth 4.0 BLE technology was used for communicating.

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4 Summary of Test Standards

Test Standards						
FCC Part 15 Subpart C	PART 15 - RADIO FREQUENCY DEVICES					
10-1-2017 Edition	Subpart C - Intentional Radiators					

All the test methods were according to KDB558074 D01 v05 and ANSI C63.10 (2013).

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5 Summary of Test Results

	Technical Requirements			
FCC Part 15 Subpart C				
Test Condition		Pages	Test Result	Test Site
§15.207	Conducted emission AC power port	10	N/A	N/A
§15.247(b)(1)	Conducted peak output power	11-12	Pass	Site 1
§15.247(e)	Power spectral density	17-18	Pass	Site 1
§15.247(a)(2)	6dB bandwidth and 99% occupied bandwidth	13-16	Pass	Site 1
§15.247(d)	Spurious RF conducted emissions	19-22	Pass	Site 1
§15.247(d)	Band edge	23-24	Pass	Site 1
§15.247(d) & §15.209 &	Spurious radiated emissions for transmitter and receiver	25-27	Pass	Site 1
§15.203	Antenna requirement	See note 1	Pass	

Note 1: The EUT uses an PCB Antenna, which gain is 0.69dBi. According to §15.203, it is considered sufficiently to comply with the provisions of this section.

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6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: 2ATO8INSPIREIC105 complies with Section 15.207, 15.247 of the FCC Part 15, Subpart C. This report is for the BLE part.

SUMMARY:

All tests according to the regulations cited on page 5 were

Performed

□ - Not Performed

The Equipment under Test

■ - Fulfills the general approval requirements.

□ - **Does not** fulfill the general approval requirements.

Sample Received Date:

May 10, 2019

Testing Start Date: September 30, 2019

Testing End Date:

November 15, 2019

- TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou Branch -

Reviewed by:

Prepared by:

Tested by:

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Matt zhang

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Peter Jia

Matt Zhang

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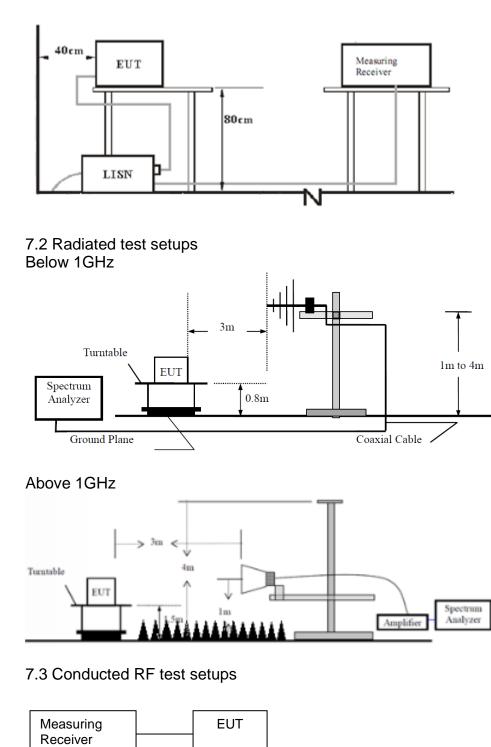
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7 Test Setups

7.1 AC Power Line Conducted Emission test setups



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8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)	S/N(LENGTH)
Mobile Phone	SAMSUNG	SAMSUNG Note2	

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9 Technical Requirement

9.1 Conducted Emission

Test Method

- 1. The EUT was placed on a table, which is 0.8m above ground plane
- 2. The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
- 3. Maximum procedure was performed to ensure EUT compliance
- 4. A EMI test receiver is used to test the emissions from both sides of AC line

Limit

Frequency	QP Limit	AV Limit
MHz	dBµV	dBµV
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

* Decreasing linear

Test result: Not Performed

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9.2 Conducted peak output power

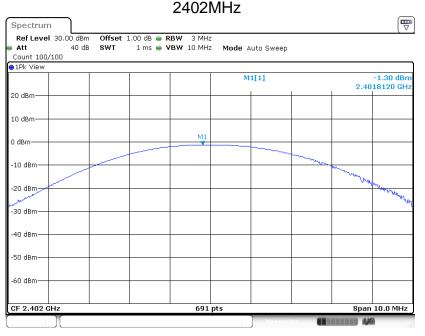
Test Method

- Use the following spectrum analyzer settings: RBW > the 6 dB bandwidth of the emission being measured, VBW≥3RBW, Span≥3RBW Sweep = auto, Detector function = peak, Trace = max hold.
- 2. Add a correction factor to the display.
- 3. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.

Limits

	Frequency Range	Limit	Limit						
	MHz	W	dBm						
	2400-2483.5	≤1	≤30						
Test result as below table									

	Conducted Peak	
Frequency	Output Power	Result
MHz	dBm	
Low channel 2402MHz	-1.30	Pass
Middle channel 2440MHz	-2.27	Pass
High channel 2480MHz	-2.21	Pass

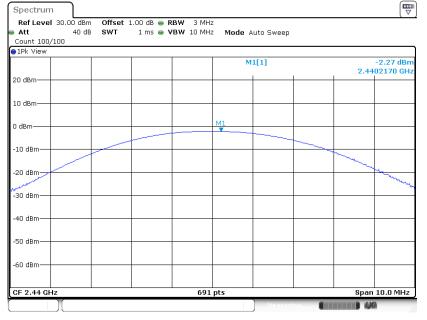


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Date:13.NOV.2019 20:55:11

2480MHz

Ref Level 30.00 dBn		1.00 dB 👄 🖪					
Att 40 di	SWT	1 ms 😑 🖌	'BW 10 MH	z Mode	Auto Sweep		
Count 100/100 1Pk View							
TEK AIGM					41[1]		-2.21 dBr
					01[1]		01590 GH
20 dBm					+	 	
10 dBm							
0 dBm				M1			
				-	+		
-10 dBm							
	F					ward and and	
-20 dBm						and the	~~
Maria							www.www.
-30 dBm							
-40 dBm							
-50 dBm							
-60 dBm							
25.0.10.011				I			
CF 2.48 GHz			691	pts		Span	10.0 MHz

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9.3 6dB bandwidth and 99% Occupied Bandwidth

Test Method

- 1. Use the following spectrum analyzer settings:
- RBW=100K, VBW≥3RBW, Sweep = auto, Detector function = peak, Trace = max hold 2. Use the automatic bandwidth measurement capability of an instrument, may be
- employed using the X dB bandwidth mode with X set to 6 dB, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be \geq 6 dB.
- 3. Allow the trace to stabilize, record the X dB Bandwidth value.

Limit

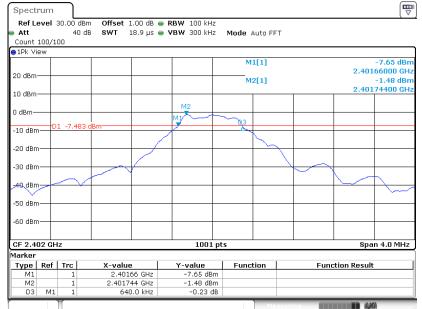
Limit [kHz]

≥500

Test result

··.													
	TestMode	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Verdict							
[2402	0.640	2401.660	2402.300	PASS							
	BLE	2440	0.684	2439.632	2440.316	PASS							
		2480	0.640	2479.660	2480.300	PASS							





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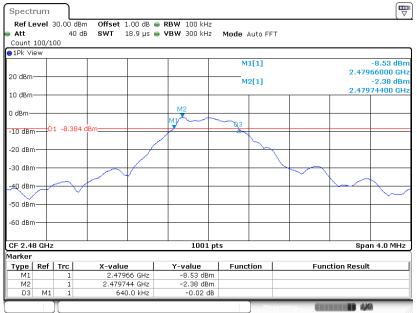
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Ref Lev Att Count 1		40			₩ 100 kHz ₩ 300 kHz	Mode 4	uto FFT			
1Pk Viet										
						M	1[1]			-8.51 dBr
20 dBm—							2[1]		2.439	63200 GH -2.48 dBr
						INE:	2[1]		2.440	-2.48 aBh 100000 GH
10 dBm—										
0 dBm—					M2					
o abiii				141	\sim t					
-10 dBm-	=D:	1 -8.48	5 dBm	_		<u> </u>				
-20 dBm-										
-30 dBm-	_							$ \longrightarrow $		
		_						T	$ \sim $	
-40 dBm-			, 						~~~~	
-50 dBm-										
-30 ubiii-										
-60 dBm-	_									
CF 2.44	GHz				1001 pt	s		-	Spa	n 4.0 MHz
/larker										
Type I	Ref		X-value		-value	Funct	tion	Fund	tion Result	:
M1		1	2.439632 GH		-8.51 dBm					
M2 D3	М1	1	2.44 GH 684.0 kH		-2.48 dBm -0.54 dB					

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2480MHz



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TestMode	Channel	OCB [MHz]	FL[MHz]	FH[MHz]	Verdict
	2402	1.019	2401.493	2402.511	PASS
BLE	2440	1.119	2439.473	2440.591	PASS
	2480	1.015	2479.489	2480.503	PASS



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2440MHz



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9.4 Power spectral density

Test Method

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance:

- Set analyzer center frequency to DTS channel center frequency. RBW=10kHz,VBW≥3RBW,Span=1.5 times DTS bandwidth, Detector=Peak, Sweep=auto, Trace= max hold.
- 2. Allow trace to fully stabilize, use the peak marker function to determine the maximum amplitude level within the RBW.
- 3. Repeat above procedures until other frequencies measured were completed.

Limit

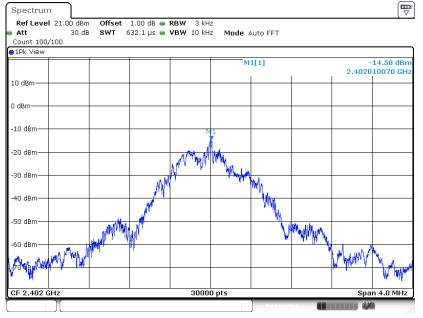
Limit [dBm]

≤8

Test result

	Power spectral	
Frequency	density	Result
MHz	dBm	
Top channel 2402MHz	-14.58	Pass
Middle channel 2440MHz	-17.97	Pass
Bottom channel 2480MHz	-15.12	Pass



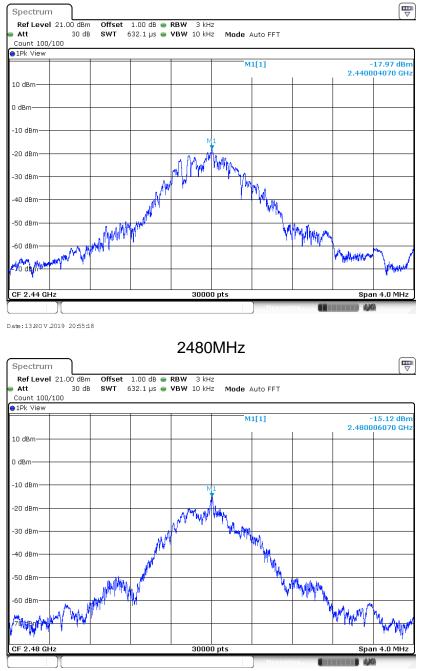


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9.5 Spurious RF conducted emissions

Test Method

- 1. Establish a reference level by using the following procedure:
 - a. Set RBW=100 kHz. VBW≥3RBW. Detector =peak, Sweep time = auto couple, Trace mode = max hold.
 - b. Allow trace to fully stabilize, use the peak marker function to determine the maximum PSD level.
- 2. Use the maximum PSD level to establish the reference level.
 - a. Set the center frequency and span to encompass frequency range to be measured.
 - b. Use the peak marker function to determine the maximum amplitude level. Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements, report the three highest emissions relative to the limit.
- 3. Repeat above procedures until other frequencies measured were completed.

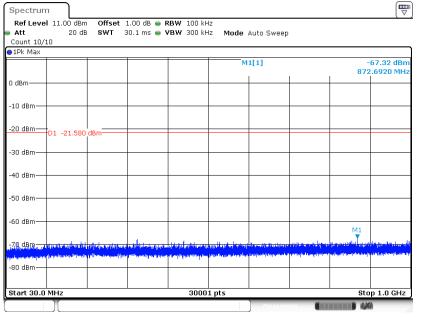
Limit

Frequency Range MHz	Limit (dBc)
30-25000	-20

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Spurious RF conducted emissions





Date:13.NOV.2019 20:30:50

Spectrum								
Ref Level 20.00 dB		1.00 dB 👄 R 255 ms 👄 V			Auto Sweep			
Count 9/10	oni	200 110 🖕 1	BH SOOKI	- moue /	Nuto Sweep			
1Pk Max								
				М	1[1]			-52.11 dBn
10 dBm							20.0	037450 GH
) dBm								
-10 dBm								
20 dBm-01 -21.58	10 dBm							-
30 dBm								
40 dBm								
ie asin								
-50 d6m						M1		-
به سار		المريان المقادية والمرا	يت المراجع ال	والأطارة والالمعديه	States by Hand	بمحاصا أطباهج	المحادي والمراجع المحاد المحاد	وساولا إدرادية وساقي
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days when the public sector of the sector								
70 dBm								+
Start 1.0 GHz			3000	1 pts			Stop	26.5 GHz

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1Pk Max				_				
				M	1[1]			68.26 dBn).3540 MH
) dBm								
LO dBm								
20 dBm-01 22	.420 dBm							
	.420 0611							
30 dBm								
10 dBm		_						
50 dBm								
ou aem								
i0 dBm								
70 dB	1.10.11					11	M1	and the state
	er i de la constante de la cons La constante de la constante de	in al france in the second	a postativny postati z plany a S history postati z plany a	and the state of the	a se post de la conserva de la cons La conserva de la cons	l territori di stato de la constanta de la constanta di sentenda di sentenda di sentenda di sentenda di senten Nationali di sentenda di sen	muchine and a second	ين و در دو ميرو ميرو ميرو در و در دو ميرو ميرو ميرو در
80 dBm	ed a confriend a confriend Confriend a confriend a conf	Ballon (Secondaria)	eg nediktiveg jin stillen en elektrike		and the second sec	n an an Air Air an A		
Start 30.0 MHz			3000	1 pts			Sto	p 1.0 GH:

Date:13.NOV.2019 20:55:33

Att Count 9/10	30 dB	SWT	255 ms 👄 ۷	/BW 300 kH	z Mode /	Auto Sweep			
1Pk Max									
					м	1[1]			-52.39 dBi 30600 GH
LO dBm								10.0	
dBm									
10 dBm									
20 dBm	01 -22.420	dBm							
30 dBm									
40 dBm									
50 dBm					M	1			
	. I I Harden			القرب الحال والثان والتروير والت	والمنصف من مطوران	a the state of the	ومرويط وألفاناه وال	(detter datal press	
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70 dBm									
/o usm									
Start 1.0 G				3000					26.5 GHz

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Count 10/10 1Pk Max							
IFK MAA				M1[1]			-67.80 dBm 3.6140 MH;
dBm							
10 dBm							
20 dBm	22.510 dBm						
30 dBm							
i0 dBm							
i0 dBm							
i0 dBm							N
'O dBm	ang bian bigging and ang tigging	- duration for the state	alater market fills	and a description of the particular	, and have the plant of the second	partition , do it ha	
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Date:13.NOV.2019 20:38:47

Spectrum					
Ref Level 20.00 dBm Att 30 dB Count 9/10			1ode Auto Sweep		,
●1Pk Max			M1[1]		-52.77 dBm 16.272800 GHz
10 dBm					
0 dBm					
-10 dBm					
-20 dBm-D1 -22.510	dBm				
-30 dBm					
-40 dBm					
-50 dBm	and the second	والمحمد والم	M1.	Allow Section of a United	ala a landon a ant
60. deta da la	and the second s		dial distant and a straight	<u>a</u>	
-70 dBm					
Start 1.0 GHz		30001 pts			Stop 26.5 GHz
			Measuri	ing	100

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9.6 Band edge

Test Method

1 Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious RBW = 100 kHz, VBW \geq RBW, Sweep = auto, Detector function = peak, Trace = max hold.

- 2 Allow the trace to stabilize, use the peak and delta measurement to record the result.
- 3 The level displayed must comply with the limit specified in this Section.

Limit

In any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. 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) (see Section 15.205(c)).

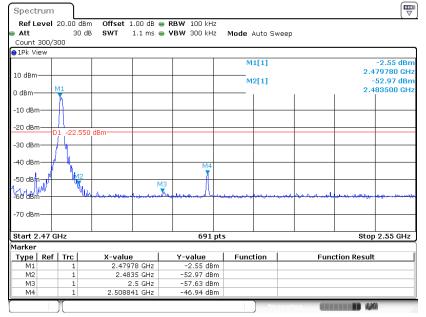
Test result

				2402N	/Hz		
Spectr	um						
Ref Le	vel 2	20.00 dB	m Offset 1.00 d	B 画 RBW 100 kHz			
Att		30 0	iB SWT 246.5μ	s 👄 VBW 300 kHz	Mode Auto P	FT	
Count 3		00					
1Pk Vie	ew		1 1				
					M1[1]		-1.54 dBi 2.401730 GF
10 dBm-					M2[1]		-43.66 dBi
					mz[1]		2.400000 ^{NG}
0 dBm—							2.400000
-10 dBm							
-20 dBm		1 -21.54	0.40 m				
		1 -21.54	U dBm				
-30 dBm	_						
-40 dBm							Ma
							, T
-50 dBm							M3 aunter
-60 ABW	mon	myelo	mayne haynes	yer warder warmen	Wollhow row	mynimity	a drog a good a ha
-70 dBm			· · ·				
-70 ubm							
Start 2	.3 GH	z		691 pt	s		Stop 2.405 GHz
1arker							
Туре	Ref	Trc	X-value	Y-value	Function	Fun	ction Result
M1		1	2.40173 GHz	-1.54 dBm			
M2		1	2.4 GHz				
MЗ		1	2.39 GHz				
M4		1	2.399978 GHz	-44.20 dBm			

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9.7 Spurious radiated emissions for transmitter

Test Method

1: The EUT was place on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3-meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

2: The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.

3: The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

4: For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

5: Use the following spectrum analyzer settings According to C63.10:

For Above 1GHz

Span = wide enough to capture the peak level of the in-band emission and all spurious RBW = 1MHz, VBW≥RBW for peak measurement and VBW = 10Hz for average measurement, Sweep = auto, Detector function = peak, Trace = max hold.

For Below 1GHz

Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious RBW = 100 KHz, VBW≥RBW for peak measurement, Sweep = auto, Detector function = peak, Trace = max hold.

Note:

1: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Quasi-peak detection (QP) at frequency below 1GHz.

2: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for peak detection (PK) at frequency above 1GHz.

3: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average ((duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor (20log(1/duty cycle)).

4: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.

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TÜV SÜD Certification and Testing (China) Co., Ltd. Guangzhou Branch

5F,Communication Building,163 Pingyun Rd, Huangpu Ave. West Guangzhou, P.R.China TEL: +86 20 3832 0668 FAX: +86 20 3832 0478



Limit

The radio emission outside the operating frequency band shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Radiated emissions which fall in the restricted bands, as defined in section15.205, must comply with the radiated emission limits specified in section 15.209.

Frequency	Field Strength	Field Strength	Detector
MHz	uV/m	dBµV/m	
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

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Spurious radiated emissions for transmitter

According to C63.10, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement, so AV emission value did not show in below table if the peak value complies with average limit.

Transmitting spurious emission test result as below:

2402MHz (30	MHz – 1GHz)					
	Frequency	Emission Level	Polarization	Limit	Detector	Result
	MHz	dBuV/m		dBµV/m		
	943.30	35.50	Horizontal	46.00	QP	Pass
	949.23	33.21	Vertical	46.00	QP	Pass
2402MHz (Ab	ove 1GHz)					
, ,	Frequency	Emission Level	Polarization	Limit	Detector	Result
	MHz	dBuV/m		dBµV/m		
	1253.93	23.91	Horizontal	74.00	PK	Pass
	10032.31	40.02	Horizontal	74.00	PK	Pass
	3282.78	31.11	Vertical	74.00	PK	Pass
	11535.21*	40.93	Vertical	74.00	PK	Pass
2440MHz (Ab	ove 1GHz)					
	Frequency	Emission Level	Polarization	Limit	Detector	Result
		Level				
	MHz	dBuV/m		dBµV/m		
	MHz 2965.62*		Horizontal	dBµV/m 74	PK	Pass
		dBuV/m	Horizontal Horizontal	-		Pass Pass
	2965.62*	dBuV/m 29.79		74	PK	
	2965.62* 6042.62	dBuV/m 29.79 35.18	Horizontal	74 74	PK PK	Pass
2480MHz (Ab	2965.62* 6042.62 1241.18 4681.03*	dBuV/m 29.79 35.18 28.70	Horizontal Vertical	74 74 74	PK PK PK	Pass Pass
2480MHz (Ab	2965.62* 6042.62 1241.18 4681.03*	dBuV/m 29.79 35.18 28.70	Horizontal Vertical	74 74 74	PK PK PK	Pass Pass
2480MHz (Ab	2965.62* 6042.62 1241.18 4681.03* ove 1GHz)	dBuV/m 29.79 35.18 28.70 34.32 Emission	Horizontal Vertical Vertical	74 74 74 74	PK PK PK PK	Pass Pass Pass
2480MHz (Ab	2965.62* 6042.62 1241.18 4681.03* ove 1GHz) Frequency	dBuV/m 29.79 35.18 28.70 34.32 Emission Level	Horizontal Vertical Vertical	74 74 74 74 74	PK PK PK PK	Pass Pass Pass

Remark:

- (1) "*" means the emission(s) appear within the restrict bands shall follow the requirement of section 15.205.
- (2) Data of measurement within this frequency range shown "--" in the table above means the reading of emissions are the noise floor or attenuated more than 10dB below the permissible limits or the field strength is too small to be measured.
- (3) Above 1GHz: Corrector factor = Antenna Factor + Cable Loss- Amplifier Gain Below 1GHz: Corrector factor = Antenna Factor + Cable Loss

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10 Test Equipment List

	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
	EMI Test Receiver	Rohde & Schwarz	ESR 3	101782	2020-6-28
	LISN	Rohde & Schwarz	ENV4200	100249	2020-6-28
	LISN	Rohde & Schwarz	ENV216	100326	2020-6-28
	ISN	Rohde & Schwarz	ENY81	100177	2020-6-28
CE	ISN	Rohde & Schwarz	ENY81- CAT6	101664	2020-6-28
	High Voltage Proble	Rohde & Schwarz	TK9420(VT9 420)	9420-584	2020-6-24
	RF Current probe	Rohde & Schwarz	EZ-17	100816	2020-7-2
С	Signal Generator	Rohde & Schwarz	SMB100A	108272	2020-6-28
· ·	Signal Analyzer	Rohde & Schwarz	FSV40	101030	2020-6-28
	Vector Signal Generator	Rohde & Schwarz	SMU 200A	105324	2020-6-28
	RF Switch Module	Rohde & Schwarz	OSP120/OS P-B157	101226/10085 1	2020-6-28
	EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2020-6-28
55	Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2020-6-28
RE	Horn Antenna	Rohde & Schwarz	HF907	102294	2020-6-22
	Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2020-6-28
	3m Semi-anechoic chamber	TDK	9X6X6		2020-7-7

List of Test Instruments

C - Conducted RF tests

- Conducted peak output power
- 6dB bandwidth
- Power spectral density*
- Spurious RF conducted emissions
- Band edge
- Conducted emission AC power port

RE - Radiated RF tests

• Spurious radiated emissions for transmitter

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11 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty					
Test Items	Extended Uncertainty				
Uncertainty for Radiated Emission in 3m chamber 30MHz-	Horizontal: 4.91dB;				
1000MHz	Vertical: 4.89dB;				
Uncertainty for Radiated Emission in 3m chamber 1000MHz-	Horizontal: 4.80dB;				
18000MHz	Vertical: 4.79dB;				
Uncertainty for Conducted Emission 150KHz-30MHz	U=3.21dB				
RF Power Conducted:	1.16dB				
Frequency test involved:	0.6×10 ⁻⁷ or 1%				
Spurious emissions Conducted measurement	1.43dB				

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