



FCC- TEST REPORT

Report Number : **64.790.19.02409.01** Date of Issue: March 31, 2020

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 : **■ Positive** **Negative**

Total pages including Appendices : 29

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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,
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Shenzhen City, 518052,
P. R. China

FCC Registration Number: 514049

IC Registration Number: 10320A

Telephone: 86 755 8828 6998
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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.



4 Summary of Test Standards

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

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



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.



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:

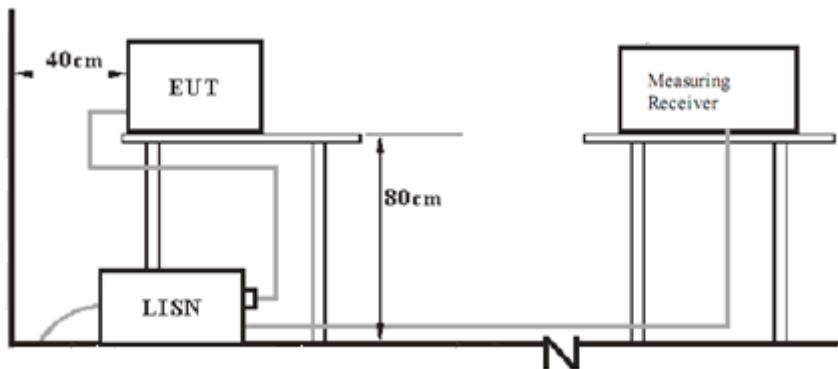
Peter Jia

Matt Zhang

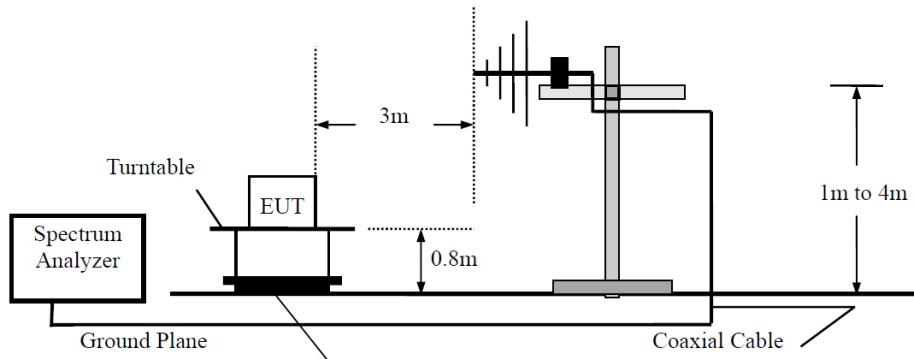
Tree Zhan

7 Test Setups

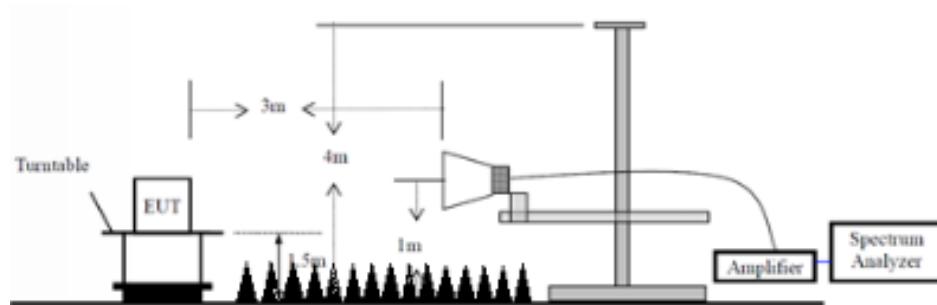
7.1 AC Power Line Conducted Emission test setups



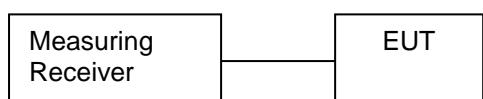
7.2 Radiated test setups Below 1GHz



Above 1GHz



7.3 Conducted RF test setups





8 Systems test configuration

Auxiliary Equipment Used during Test:

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



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 MHz	QP Limit dB μ V	AV Limit dB μ V
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

* Decreasing linear

Test result: Not Performed



9.2 Conducted peak output power

Test Method

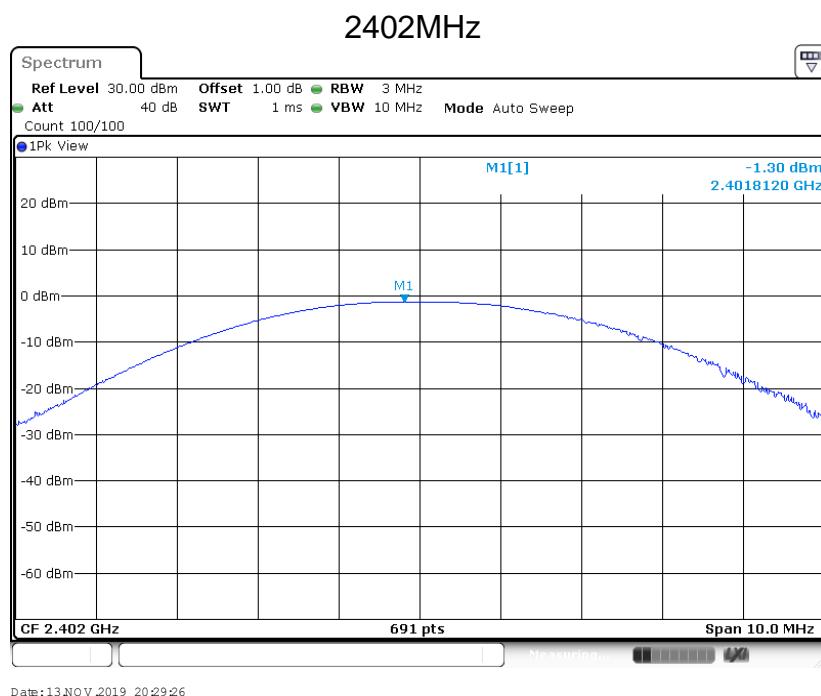
1. Use the following spectrum analyzer settings:
RBW > the 6 dB bandwidth of the emission being measured, VBW \geq 3RBW, Span \geq 3RBW
Sweep = auto, Detector function = peak, Trace = max hold.
2. Add a correction factor to the display.
3. Allow the trace to stabilize. Use the marker-to-peak function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

Limits

Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	≤ 1	≤ 30

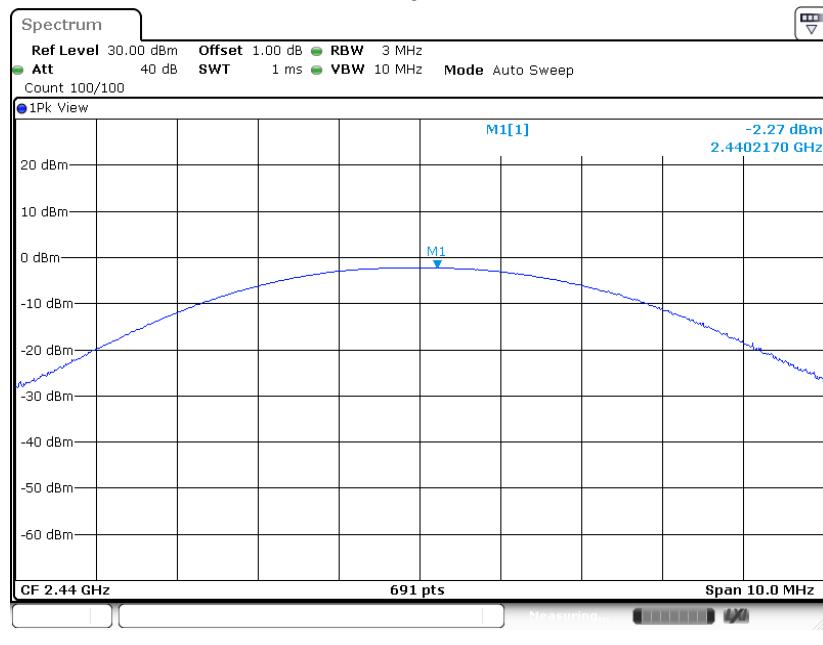
Test result as below table

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

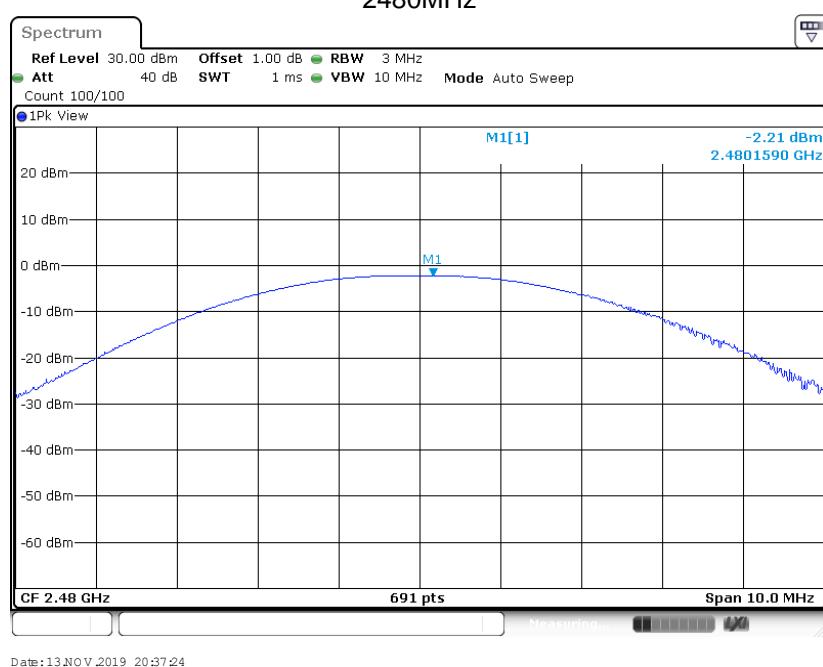




2440MHz



2480MHz





9.3 6dB bandwidth and 99% Occupied Bandwidth

Test Method

1. Use the following spectrum analyzer settings:
RBW=100K, VBW \geq 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

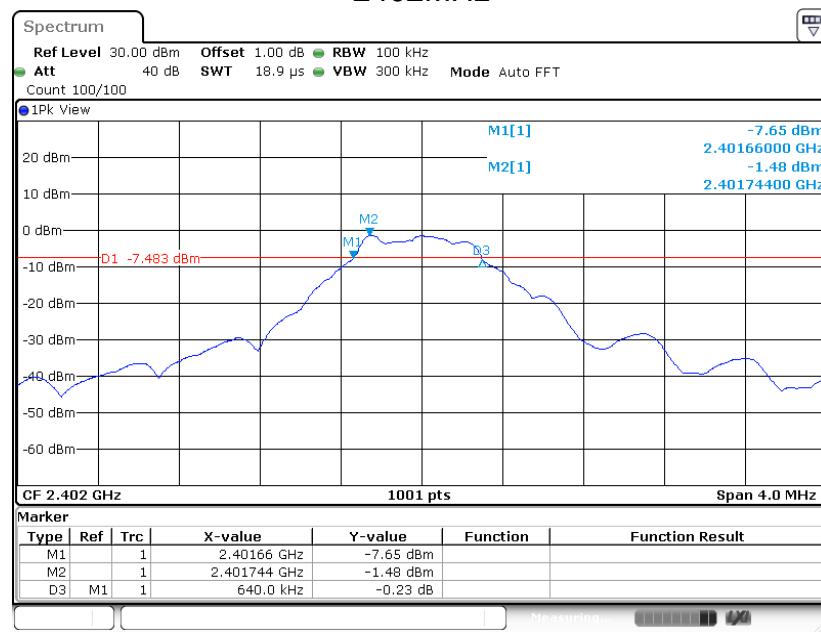
Limit [kHz]

≥ 500

Test result

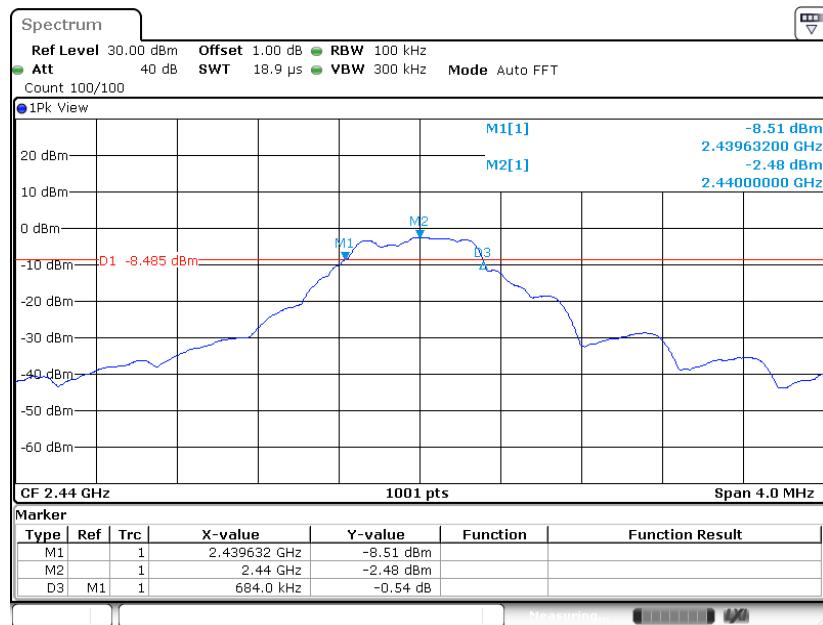
TestMode	Channel	DTS BW [MHz]	FL[MHz]	FH[MHz]	Verdict
BLE	2402	0.640	2401.660	2402.300	PASS
	2440	0.684	2439.632	2440.316	PASS
	2480	0.640	2479.660	2480.300	PASS

2402MHz

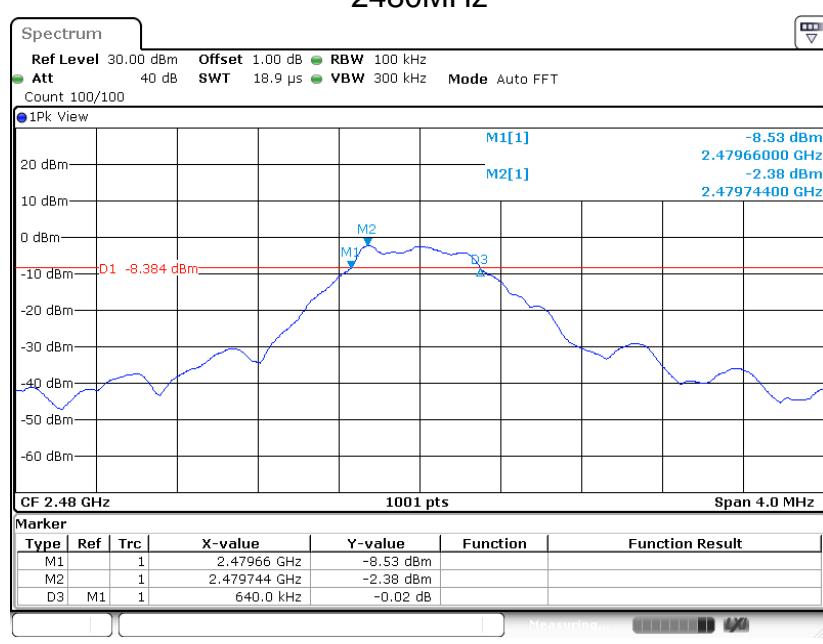




2440MHz



2480MHz





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

2402MHz



2440MHz





2480MHz





9.4 Power spectral density

Test Method

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

1. 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

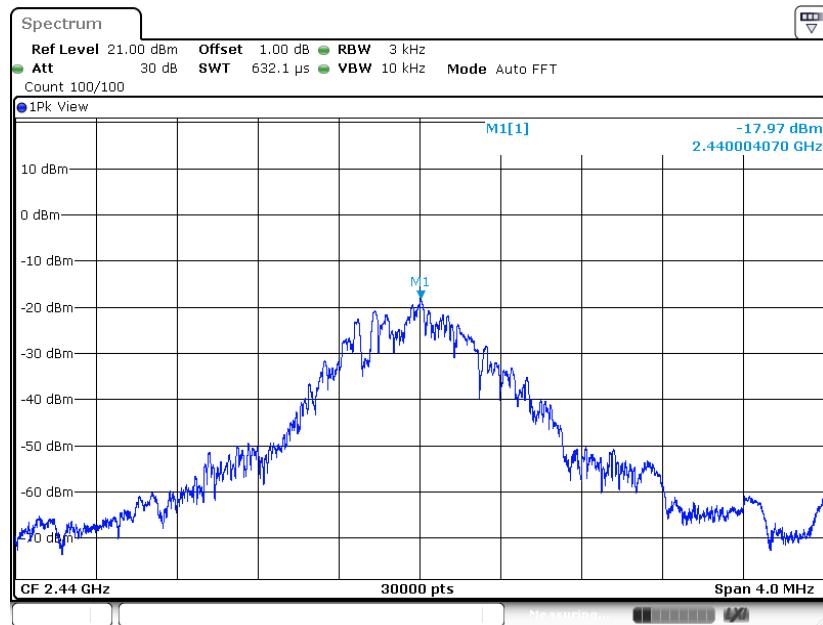
Frequency MHz	Power spectral density dBm	Result
Top channel 2402MHz	-14.58	Pass
Middle channel 2440MHz	-17.97	Pass
Bottom channel 2480MHz	-15.12	Pass

2402MHz

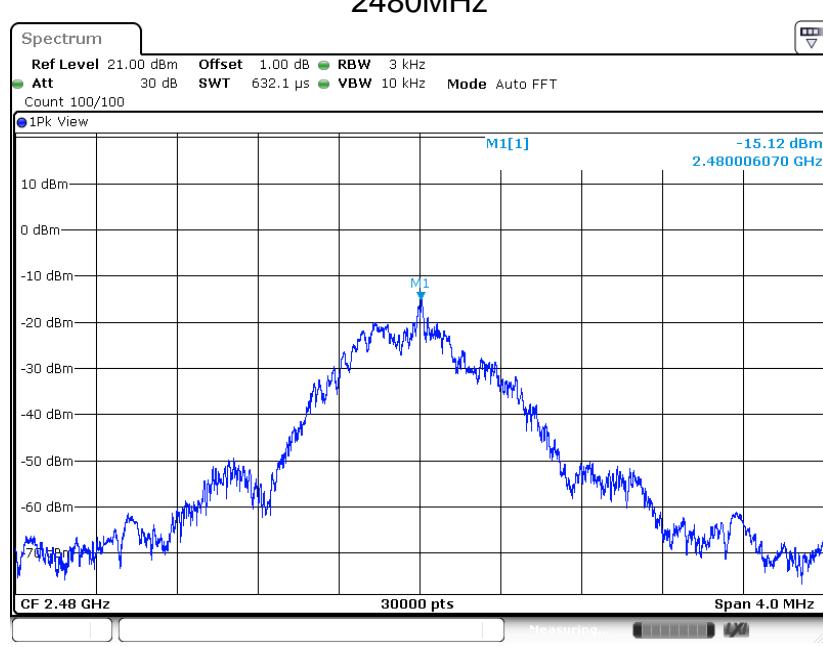




2440MHz



2480MHz





9.5 Spurious RF conducted emissions

Test Method

1. Establish a reference level by using the following procedure:
 - a. Set RBW=100 kHz. VBW \geq 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.

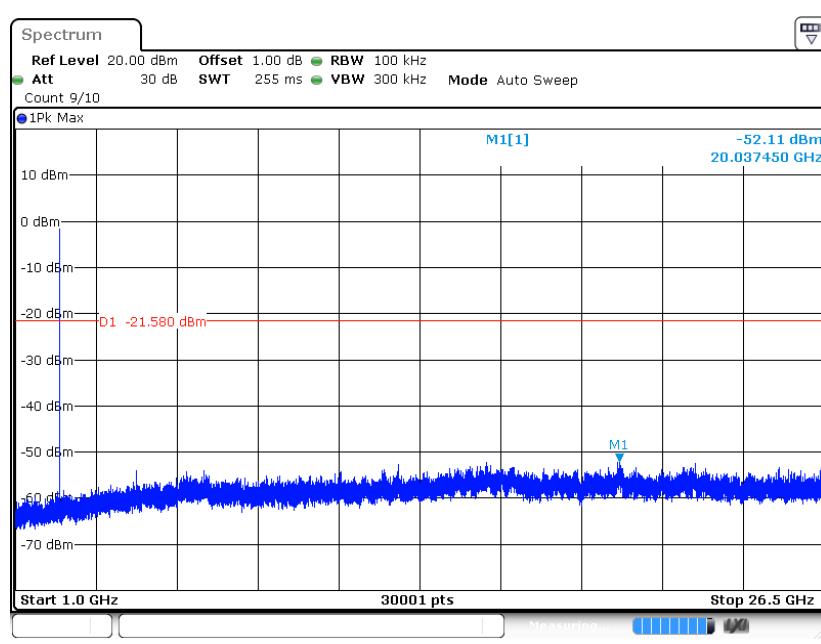
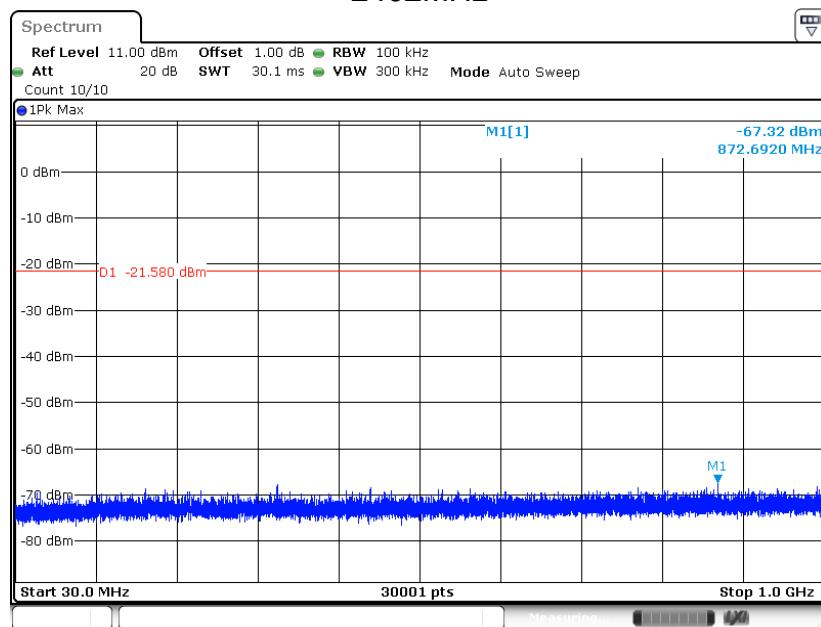
Limit

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



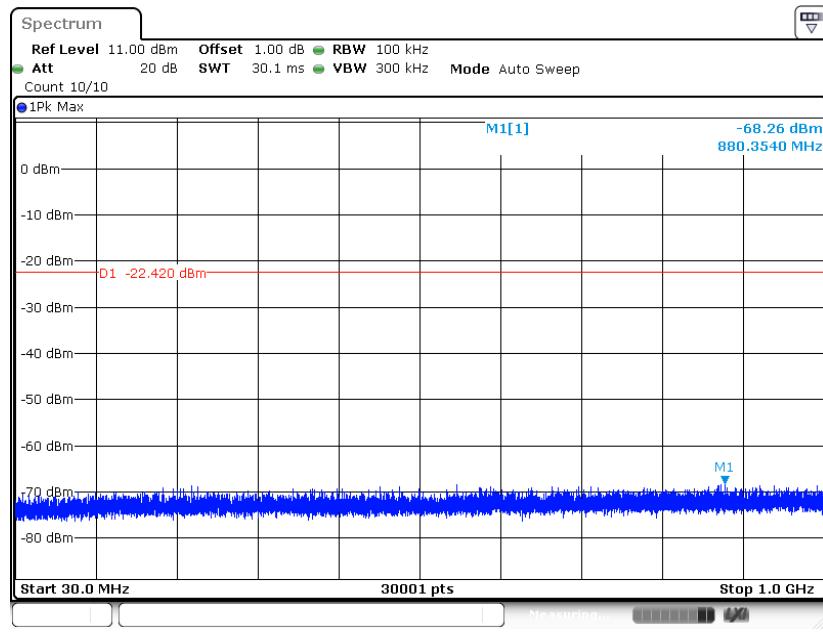
Spurious RF conducted emissions

2402MHz

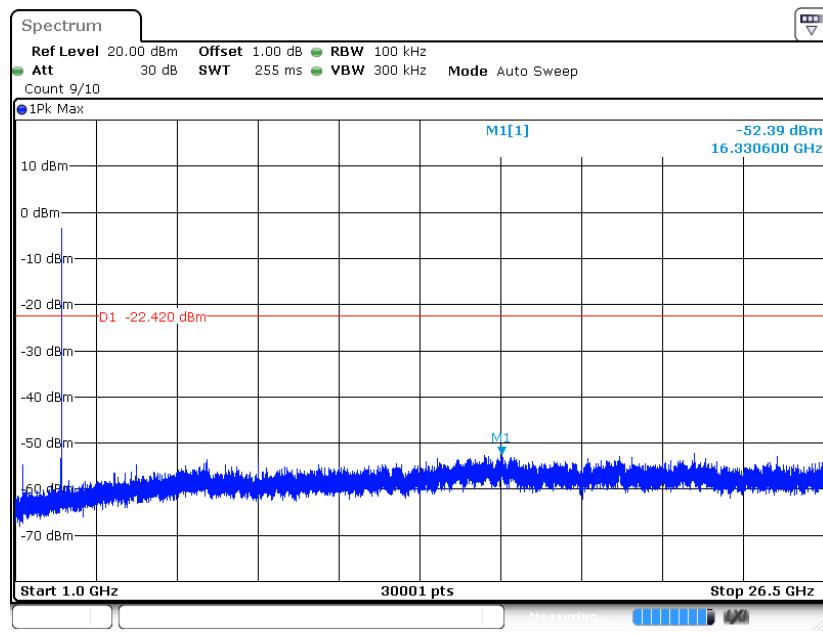




2440MHz



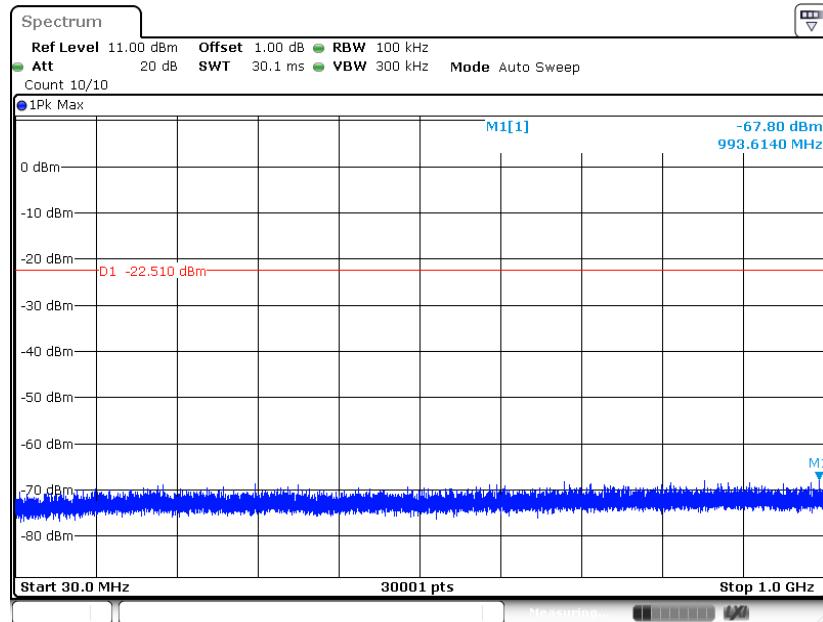
Date: 13 NOV 2019 20:55:33



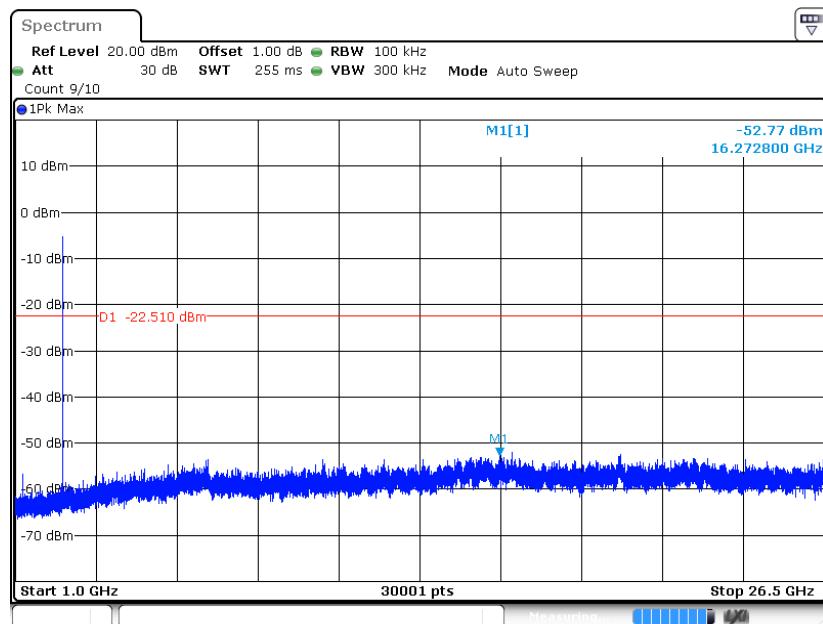
Date: 13 NOV 2019 20:55:45



2480MHz



Date: 13 NOV 2019 20:38:47



Date: 13 NOV 2019 20:38:59



9.6 Band edge

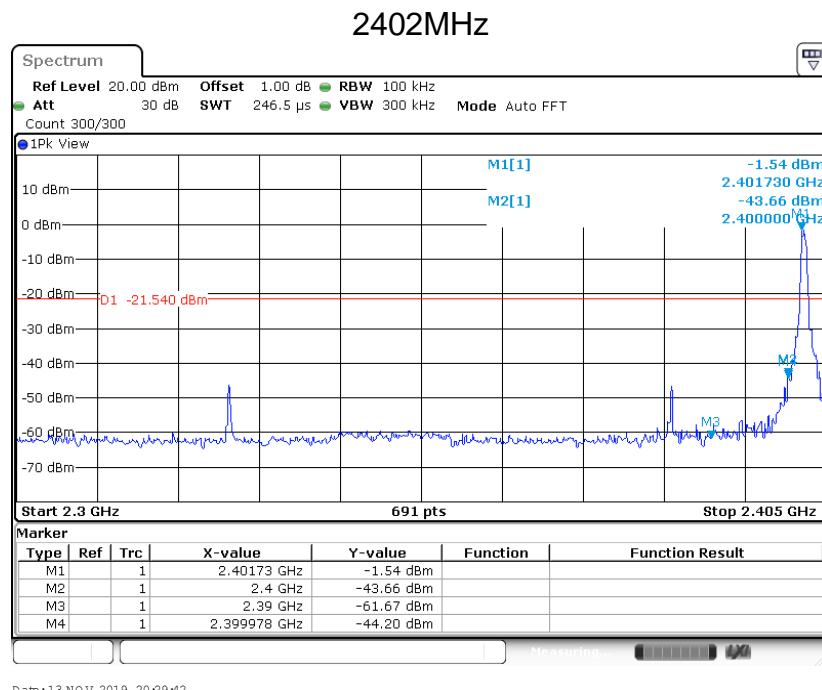
Test Method

- 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

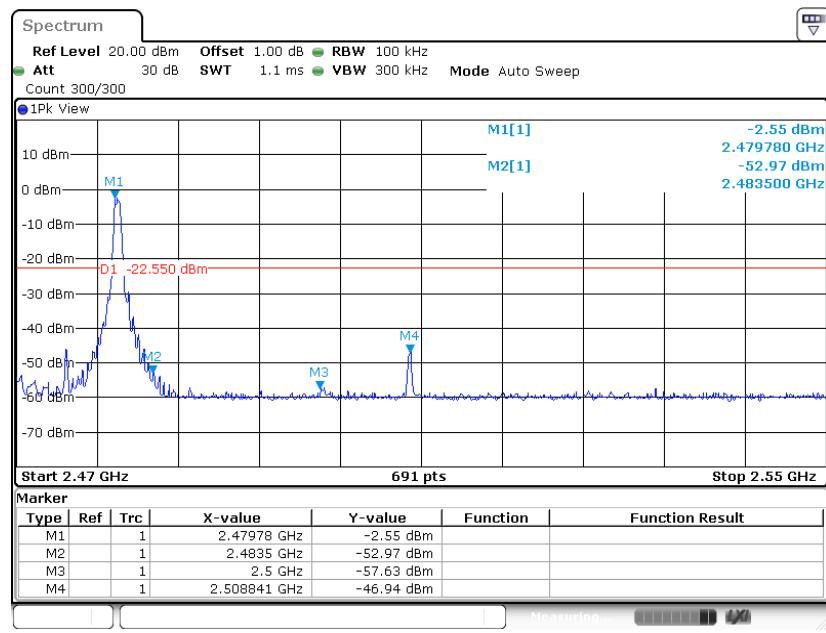
In any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the 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





2480MHz





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.



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 section 15.205, must comply with the radiated emission limits specified in section 15.209.

Frequency MHz	Field Strength uV/m	Field Strength dB μ V/m	Detector
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



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 (30MHz – 1GHz)

Frequency MHz	Emission Level dB μ V/m	Polarization	Limit dB μ V/m	Detector	Result
943.30	35.50	Horizontal	46.00	QP	Pass
949.23	33.21	Vertical	46.00	QP	Pass

2402MHz (Above 1GHz)

Frequency MHz	Emission Level dB μ V/m	Polarization	Limit dB μ V/m	Detector	Result
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 (Above 1GHz)

Frequency MHz	Emission Level dB μ V/m	Polarization	Limit dB μ V/m	Detector	Result
2965.62*	29.79	Horizontal	74	PK	Pass
6042.62	35.18	Horizontal	74	PK	Pass
1241.18	28.70	Vertical	74	PK	Pass
4681.03*	34.32	Vertical	74	PK	Pass

2480MHz (Above 1GHz)

Frequency MHz	Emission Level dB μ V/m	Polarization	Limit dB μ V/m	Detector	Result
15958.40*	48.44	Horizontal	74.00	PK	Pass
15899.43*	49.01	Vertical	74.00	PK	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



10 Test Equipment List

List of Test Instruments

	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
CE	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
	ISN	Rohde & Schwarz	ENY81-CAT6	101664	2020-6-28
	High Voltage Probe	Rohde & Schwarz	TK9420(VT9 420)	9420-584	2020-6-24
	RF Current probe	Rohde & Schwarz	EZ-17	100816	2020-7-2
C	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
RE	EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2020-6-28
	Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2020-6-28
	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

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



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-1000MHz	Horizontal: 4.91dB; Vertical: 4.89dB;
Uncertainty for Radiated Emission in 3m chamber 1000MHz-18000MHz	Horizontal: 4.80dB; Vertical: 4.79dB;
Uncertainty for Conducted Emission 150KHz-30MHz	$U=3.21\text{dB}$
RF Power Conducted:	1.16dB
Frequency test involved:	0.6×10^{-7} or 1%
Spurious emissions Conducted measurement	1.43dB