FCC TEST REPORT

FOR

Shenzhen Witstec Technology Co.,LTD

Wireless communication Zigbee module

Test Model: WT5169P0-M1

Prepared for	:	Shenzhen Witstec Technology Co.,LTD
Address	:	4F, No.4BLD, He Ping Industry Park, Chang Yong RD. Long Hua, Shenzhen, China
Prepared by	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
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Date of receipt of test sample	:	Nov. 10, 2017
Number of tested samples	:	1
Serial number	:	Prototype
Date of Test	:	Nov. 10, 2017–Nov. 20, 2017
Date of Report	:	Nov. 20, 2017

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FCC TEST REPORT FCC CFR 47 PART 15 C(15.247): 2017		
Report Reference No.	**:**	**LCS170831044AE7**
Date of Issue	:	Nov. 20, 2017
Testing Laboratory Name.....	**:**	**Shenzhen LCS Compliance Testing Laboratory Ltd.**
Address	:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure	:	Full application of Harmonised standards ■ Partial application of Harmonised standards □ Other standard testing method □
Applicant's Name.....	**:**	**Shenzhen Witstec Technology Co.,LTD**
Address	:	4F, No.4BLD, He Ping Industry Park, Chang Yong RD. Long Hua, Shenzhen, China
Test Specification		
Standard	:	FCC CFR 47 PART 15 C(15.247): 2017
Test Report Form No.	:	LCSEMC-1.0
TRF Originator.....	:	Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF.....	:	Dated 2011-03

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Test Item Description.	**:**	Wireless communication Zigbee module
Trade Mark	:	N/A
Test Model	:	WT5169P0-M1
Ratings	:	DC 2.0- 3.6V
Result	**:**	**Positive**

Compiled by:	**Supervised by:**	**Approved by:**
Ada Liang/ File administrators	Glin Lu/ Technique principal	Gavin Liang/ Manager

FCC -- TEST REPORT

Test Report No. : **LCS170831044AE7**	2017-11-20 Date of issue

Test Model.....	: WT5169P0-M1
EUT.....	: Wireless communication Zigbee module
Applicant.....	**: Shenzhen Witstec Technology Co.,LTD**
Address.....	: 4F, No.4BLD, He Ping Industry Park, Chang Yong RD. Long Hua, Shenzhen, China
Telephone.....	: /
Fax.....	: /
Manufacturer.....	**: Shenzhen Witstec Technology Co.,LTD**
Address.....	: 4F, No.4BLD, He Ping Industry Park, Chang Yong RD. Long Hua, Shenzhen, China
Telephone.....	: /
Fax.....	: /
Factory.....	: **Shenzhen Witstec Technology Co.,LTD**
Address.....	: 4F, No.4BLD, He Ping Industry Park, Chang Yong RD. Long Hua, Shenzhen, China
Telephone.....	: /
Fax.....	: /

Test Result	**Positive**

The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

Revision History

Revision	Issue Date	Revisions	Revised By
00	Nov. 20, 2017	Initial Issue	Gavin Liang

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1. SUMMARY

1.1. TEST STANDARDS

The tests were performed according to following standards:

FCC Rules Part 15.247: Frequency Hopping, Direct Spread Spectrum and Hybrid Systems that are in operation within the bands of 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

ANSI C63.10: 2013: American National Standard for Testing Unlicensed Wireless Devices

KDB558074 D01 V03r05: Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247

1.2. Test Description

FCC PART 15.247		
FCC Part 15.207	AC Power Conducted Emission	PASS
FCC Part 15.247(a)(2)	6dB Bandwidth	PASS
FCC Part 15.247(d)	Spurious RF Conducted Emission	PASS
FCC Part 15.247(b)	Maximum Conducted Output Power	PASS
FCC Part 15.247(e)	Power Spectral Density	PASS
FCC Part 15.109/ 15.205/ 15.209	Radiated Emissions	PASS
FCC Part 15.247(d)	Band Edge	PASS
FCC Part 15.203/15.247 (b)	Antenna Requirement	PASS

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1.3. Test Facility

1.3.1 Address of the test laboratory

Shenzhen LCS Compliance Testing Laboratory Ltd.
1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen,Guangdong, China

There is one 3m semi-anechoic chamber fulfils CISPR 16-1-4 according to ANSI C63.10:2013 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.

1.3.2 Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:
CNAS Registration Number. is L4595.
FCC Registration Number. is 254912.
Industry Canada Registration Number. is 9642A-1.
ESMD Registration Number. is ARCB0108.
UL Registration Number. is 100571-492.
TUV SUD Registration Number. is SCN1081.
TUV RH Registration Number. is UA 50296516-001

1.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Test Item		Frequency Range	Uncertainty	Note
Radiation Uncertainty	:	9KHz~30MHz	3.10dB	(1)
		30MHz~200MHz	2.96dB	(1)
		200MHz~1000MHz	3.10dB	(1)
		1GHz~26.5GHz	3.80dB	(1)
		26.5GHz~40GHz	3.90dB	(1)
Conduction Uncertainty	:	150kHz~30MHz	1.63dB	(1)
Power disturbance	:	30MHz~300MHz	1.60dB	(1)

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

2. GENERAL INFORMATION

2.1. Environmental conditions

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

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

2.2. General Description of EUT

Product Name:	Wireless communication Zigbee module
Model/Type reference:	WT5169P0-M1
Power supply:	DC 2.8-3.6V
Test power	DC 3.6V
Zigbee	
Modulation:	OQPSK (DSSS)
Operation frequency:	2405MHz to 2480MHz
Channel number:	16
Channel separation:	5 MHz
Antenna type:	PCB Antenna
Antenna gain:	0dBi

Note: For more details, please refer to the user's manual of the EUT.

2.3. Description of Test Modes and Test Frequency

The Applicant provides communication tools software to control the EUT for staying in continuous transmitting (Duty Cycle more than 98%) and receiving mode for testing.

There are 16 channels provided to the EUT of Zigbee and Channel 11/18/26 were selected for testing.

Operation Frequency Zigbee：

Channel	Frequency	Channel	Frequency
11	**2405 MHz**	19	2445 MHz
12	2410 MHz	20	2450 MHz
13	2415 MHz	21	2455 MHz
14	2420 MHz	22	2460 MHz
15	2425 MHz	23	2465 MHz
16	2430 MHz	24	2470 MHz
17	2435 MHz	25	2475 MHz
18	**2440 MHz**	**26**	**2480 MHz**

Note: Test performed at the lowest/middle/highest frequencies selected in the list above for EUT supported while working on specified mode.

2.4. Equipments Used during the Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
1	EMC Receiver	R&S	ESCS 30	100174	2017-06-18	2018-06-17
2	Signal analyzer	Agilent	E4448A(External mixers to 40GHz)	US44300469	2017-07-16	2018-06-17
3	Spectrum Analyzer	Agilent	N9020A	MY50510140	2017-10-27	2018-10-26
4	LISN	MESS Tec	NNB-2/16Z	99079	2017-06-18	2018-06-17
5	LISN	EMCO	3819/2NM	9703-1839	2017-06-18	2018-06-17
6	RF Cable-CON	UTIFLEX	3102-26886-4	CB049	2017-06-18	2018-06-17
7	ISN	SCHAFFNER	ISN ST08	21653	2017-06-18	2018-06-17
8	3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	2017-06-18	2018-06-17
9	Amplifier	SCHAFFNER	COA9231A	18667	2017-06-18	2018-06-17
10	Amplifier	Agilent	8449B	3008A02120	2017-06-16	2018-06-15
11	Amplifier	MITEQ	AMF-6F-260400	9121372	2017-06-16	2018-06-15
12	Loop Antenna	R&S	HFH2-Z2	860004/001	2017-06-18	2018-06-17
13	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2017-06-10	2018-06-09
14	Horn Antenna	EMCO	3115	6741	2017-06-10	2018-06-09
15	Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	2017-06-10	2018-06-09
16	RF Cable-R03m	Jye Bao	RG142	CB021	2017-06-18	2018-06-17
17	RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	2017-06-18	2018-06-17
18	Power Sensor	R&S	NRV-Z81	100458	2017-06-18	2018-06-17
19	Power Sensor	R&S	NRV-Z32	10057	2017-06-18	2018-06-17
20	Power Meter	R&S	NRVS	100444	2017-06-18	2018-06-17

The calibration interval was one year

2.5. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

2.6. Modifications

No modifications were implemented to meet testing criteria.

3. TEST CONDITIONS AND RESULTS

3.1. Conducted Emissions Test

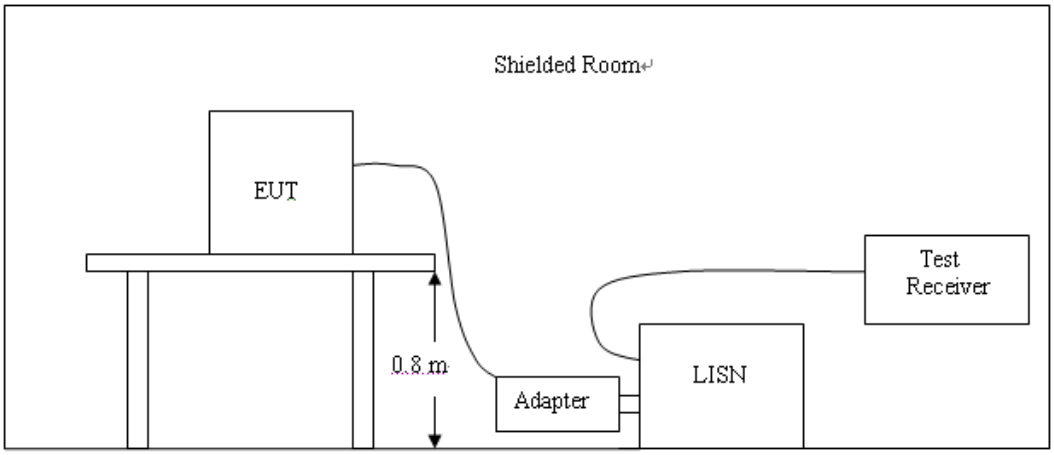
LIMIT

FCC CFR Title 47 Part 15 Subpart C Section 15.207

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

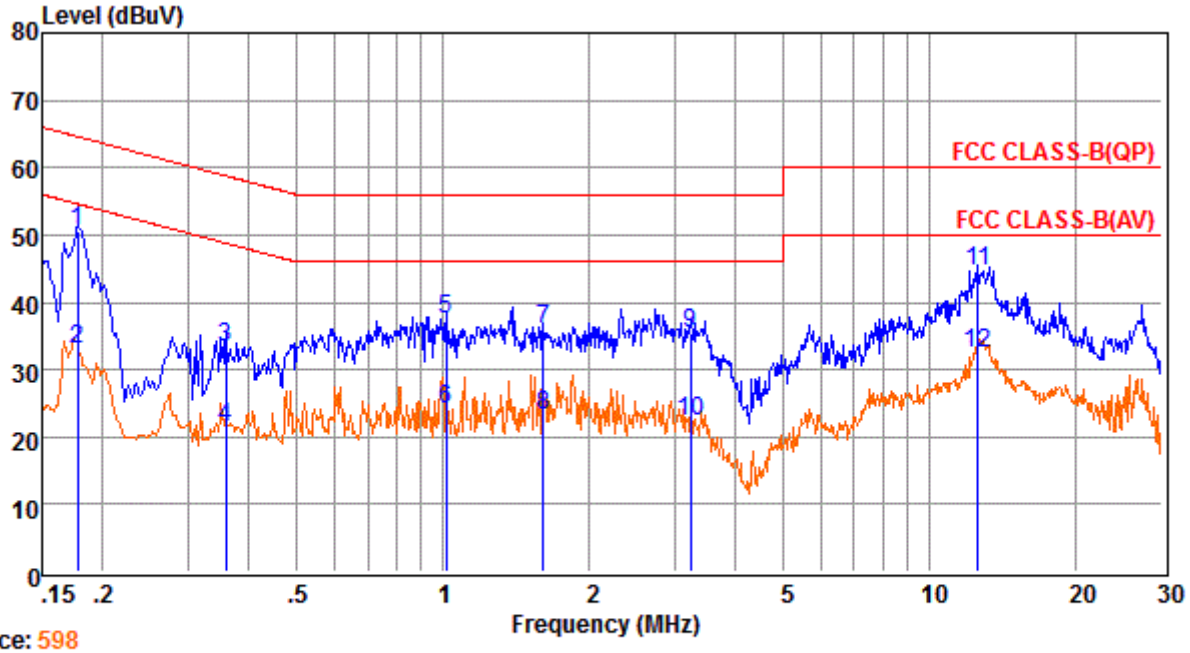
TEST CONFIGURATION



TEST PROCEDURE

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. The EUT is a tabletop system; a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10:2013.
2. Support equipment, if needed, was placed as per ANSI C63.10:2013.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10:2013.
4. The adapter received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
5. All support equipments received AC power from a second LISN, if any.
6. The EUT test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 KHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.

TEST RESULTS

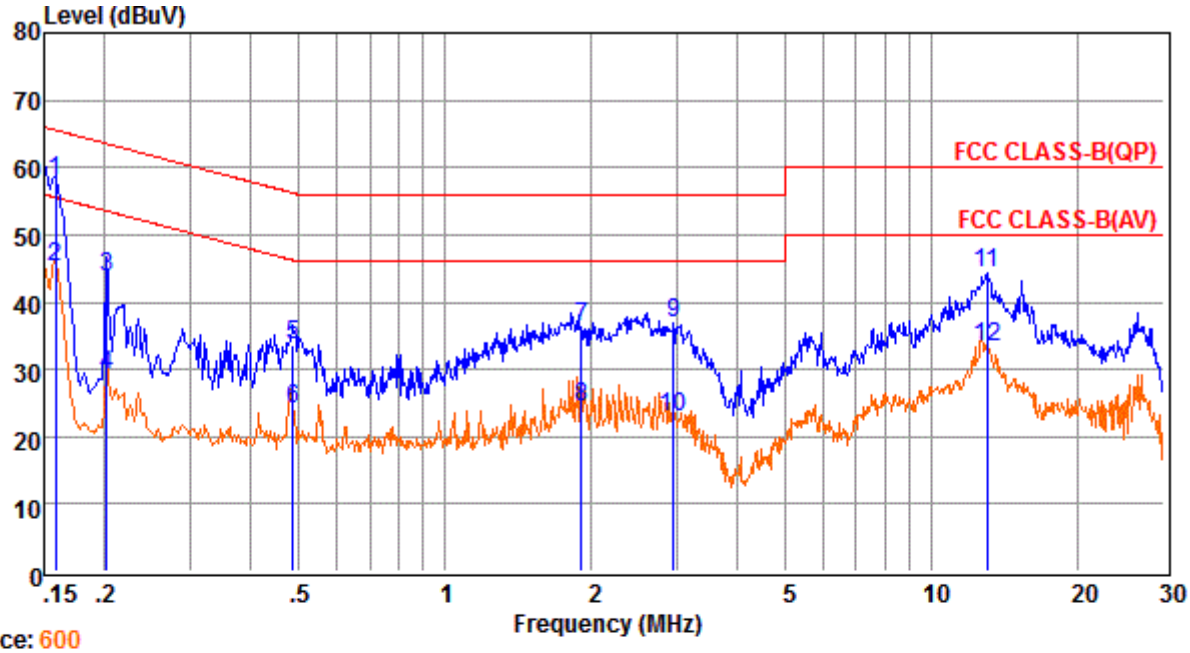


Trace: 598

Env. Ins: 24*/56%
EUT: 3
M/N:
Power Rating: AC 120V/60Hz
Test Mode: On
Operator: WANGCHANG
Memo:
Pol: NEUTRAL

	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB
1	0.18	30.91	9.64	0.02	10.00	50.57	64.59	-14.02	QP
2	0.18	13.38	9.63	0.02	10.00	33.03	64.59	-31.56	Average
3	0.36	13.63	9.61	0.03	10.00	33.27	58.78	-25.51	QP
4	0.36	1.81	9.61	0.03	10.00	21.45	58.78	-37.33	Average
5	1.02	17.93	9.63	0.05	10.00	37.61	56.00	-18.39	QP
6	1.02	4.26	9.63	0.05	10.00	23.94	56.00	-32.06	Average
7	1.61	16.26	9.63	0.05	10.00	35.94	56.00	-20.06	QP
8	1.61	3.47	9.63	0.05	10.00	23.15	56.00	-32.85	Average
9	3.22	15.83	9.65	0.06	10.00	35.54	56.00	-20.46	QP
10	3.22	2.50	9.65	0.06	10.00	22.21	56.00	-33.79	Average
11	12.58	24.78	9.73	0.09	10.00	44.60	60.00	-15.40	QP
12	12.58	12.60	9.73	0.09	10.00	32.42	60.00	-27.58	Average

Remarks: 1. Measured = Reading + LISNFac + Cable Loss + Aux2 Fac.
2. The emission levels that are 20dB below the official limit are not reported.



Trace: 600

Env. Ins: 24*/56%
EUT: 3
M/N:
Power Rating: AC 120V/60Hz
Test Mode: On
Operator: WANGCHANG
Memo:
Pol: LINE

	Freq	Reading	LISNFac	CabLos	Aux2Fac	Measured	Limit	Over	Remark
	MHz	dBuV	dB	dB	dB	dB	dBuV	dBuV	dB
1	0.16	38.29	9.58	0.02	10.00	57.89	65.56	-7.67	QP
2	0.16	25.59	9.58	0.02	10.00	45.19	55.55	-10.36	Average
3	0.20	23.98	9.63	0.02	10.00	43.63	63.54	-19.91	QP
4	0.20	9.58	9.63	0.02	10.00	29.23	53.53	-24.30	Average
5	0.49	13.96	9.62	0.04	10.00	33.62	56.23	-22.61	QP
6	0.49	4.31	9.62	0.04	10.00	23.97	46.23	-22.26	Average
7	1.91	16.65	9.64	0.05	10.00	36.34	56.00	-19.66	QP
8	1.91	4.81	9.64	0.05	10.00	24.50	46.00	-21.50	Average
9	2.95	17.03	9.64	0.06	10.00	36.73	56.00	-19.27	QP
10	2.95	3.25	9.64	0.06	10.00	22.95	46.00	-23.05	Average
11	12.99	24.39	9.70	0.09	10.00	44.18	60.00	-15.82	QP
12	12.99	13.49	9.70	0.09	10.00	33.28	50.00	-16.72	Average

Remarks: 1. Measured = Reading + LISNFac + Cable Loss + Aux2 Fac.
2. The emission levels that are 20dB below the official limit are not reported.

3.2. Radiated Emissions and Band Edge

Limit

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emission out of authorized band shall not exceed the following table at a 3 meters measurement distance.

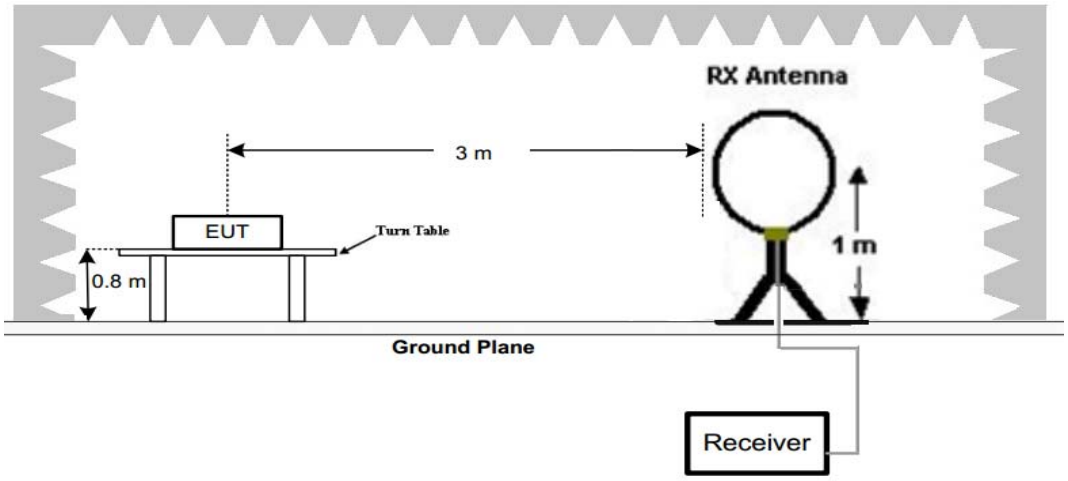
In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a)

Radiated emission limits

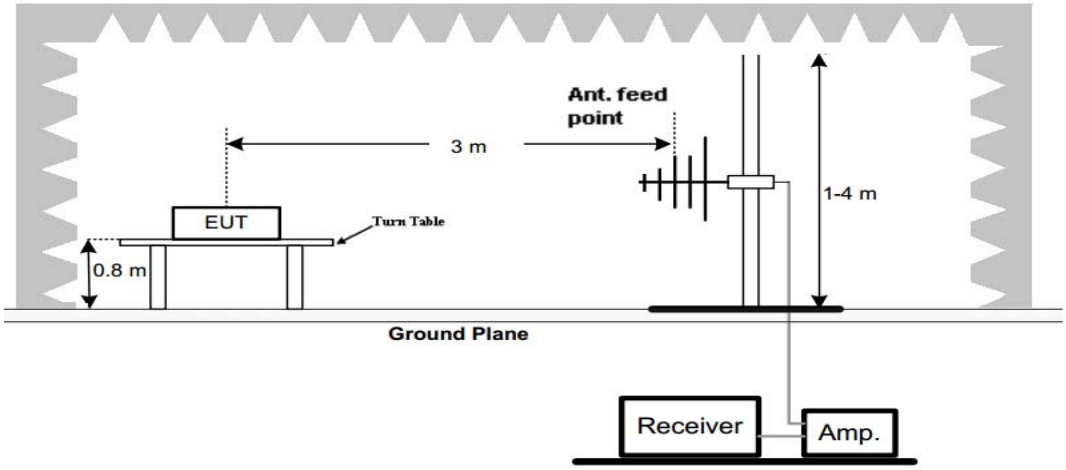
Frequency (MHz)	Distance (Meters)	Radiated (dBμV/m)	Radiated (μV/m)
0.009-0.49	3	20log(2400/F(KHz))+40log(300/3)	2400/F(KHz)
0.49-1.705	3	20log(24000/F(KHz))+ 40log(30/3)	24000/F(KHz)
1.705-30	3	20log(30)+ 40log(30/3)	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

TEST CONFIGURATION

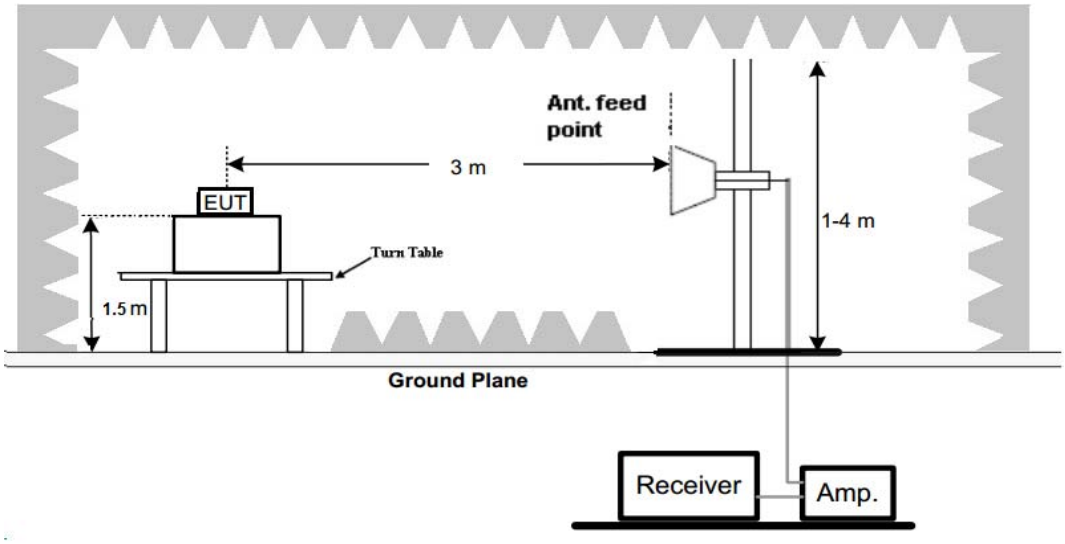
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



(B) Radiated Emission Test Set-Up, Frequency below 1000MHz



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz



Test Procedure

1. Below 1GHz measurement the EUT is placed on a turntable which is 0.8m above ground plane, and above 1GHz measurement EUT was placed on a low permittivity and low loss tangent turn table which is 1.5m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0° to 360° to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.

TEST RESULTS

Remark:
1. Radiated emission test from 9 KHz to 10th harmonic of fundamental was verified, and no emission found except system noise floor in 9 KHz to 30MHz and not recorded in this report.

For 30MHz-1GHz

Horizontal

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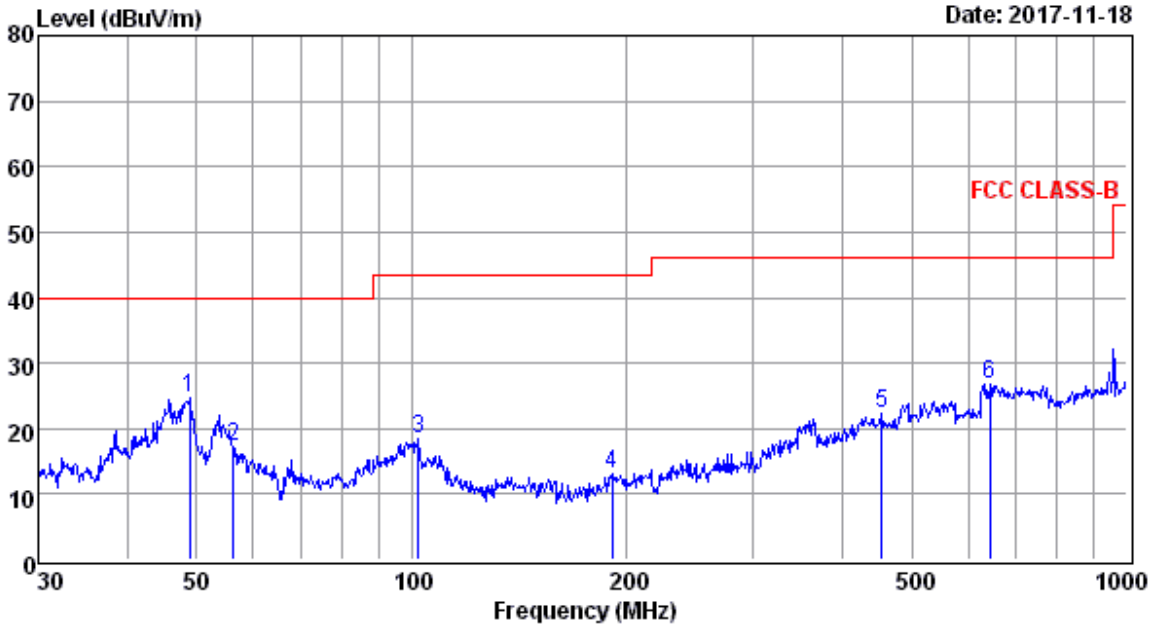
Data: 417 File: E:\2017 Test Report\WC.EM6 (417)



Env./Ins: 24℃/56%
EUT:
M/N:
Power Rating: DC
Test Mode: On
Operator: WC.WANG
Memo:
pol: HORIZONTAL

	Freq MHz	Reading dBuV	CabLos dB	Antfac dB/m	Measured dBuV/m	Limit dBuV/m	Over dB	Remark
1	48.84	11.00	0.35	13.32	24.67	40.00	-15.33	QP
2	56.20	3.80	0.47	12.94	17.21	40.00	-22.79	QP
3	102.00	4.89	0.60	12.98	18.47	43.50	-25.03	QP
4	190.41	1.62	0.86	10.56	13.04	43.50	-30.46	QP
5	454.31	5.40	1.39	15.58	22.37	46.00	-23.63	QP
6	642.86	6.64	1.55	18.60	26.79	46.00	-19.21	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

Vertical

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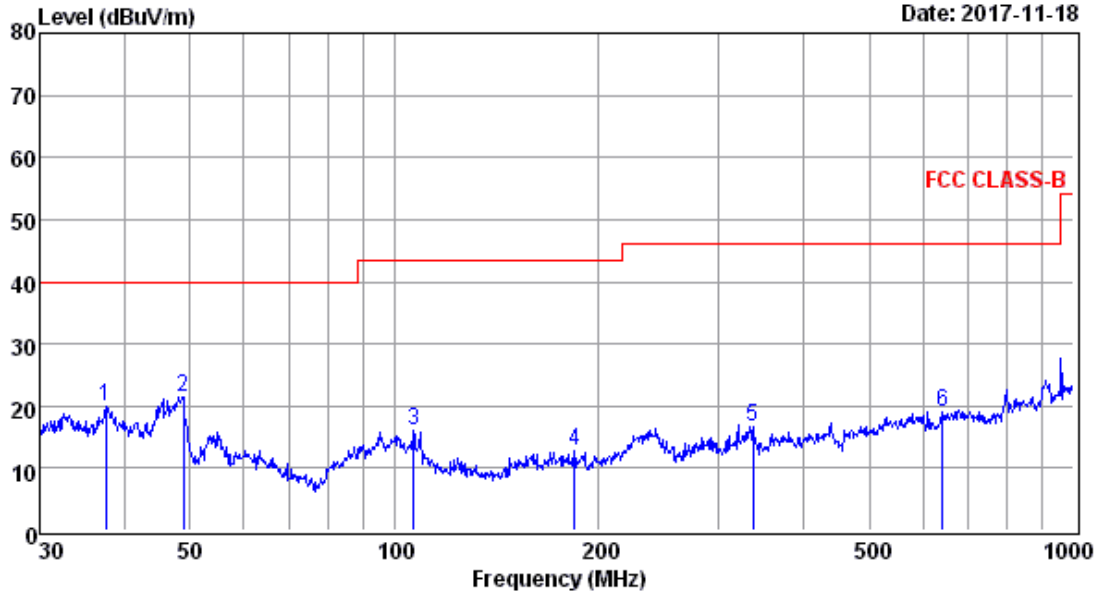
Data: 416 File: E:\2017 Test Report\WC.EM6 (417)



Env./Ins: 24℃/56%
EUT:
M/N:
Power Rating: DC
Test Mode: On
Operator: WC.WANG
Memo:
pol: VERTICAL

	Freq MHz	Reading dBuV	CabLos dB	Antfac dB/m	Measured dBuV/m	Limit dBuV/m	Over dB	Remark
1	37.55	6.69	0.38	12.95	20.02	40.00	-19.98	QP
2	48.84	7.86	0.35	13.32	21.53	40.00	-18.47	QP
3	106.76	2.96	0.68	12.54	16.18	43.50	-27.32	QP
4	183.84	1.99	0.70	10.02	12.71	43.50	-30.79	QP
5	337.22	1.50	1.09	14.01	16.60	46.00	-29.40	QP
6	640.61	-1.02	1.55	18.60	19.13	46.00	-26.87	QP

Note: 1. All readings are Quasi-peak values.
2. Measured= Reading + Antenna Factor + Cable Loss
3. The emission that ate 20db blow the offficial limit are not reported

For 1GHz to 25GHz

Frequency(MHz):			2405		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4810.00	52.16	PK	74.00	21.84	47.65	33.49	6.91	35.89	4.51
4810.00	--	AV	54.00	--	--	--	--	--	--
5126.50	43.28	PK	74.00	30.72	36.07	34.38	7.10	34.27	7.21
5126.50	--	AV	54.00	--	--	--	--	--	--
7215.00	47.65	PK	74.00	26.35	36.55	36.95	9.18	35.03	11.10
7215.00	--	AV	54.00	--	--	--	--	--	--

Frequency(MHz):			2405		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4810.00	52.32	PK	74.00	21.68	47.81	33.49	6.91	35.89	4.51
4810.00	--	AV	54.00	--	--	--	--	--	--
5126.50	44.71	PK	74.00	29.29	37.15	34.69	7.23	34.36	7.56
5126.50	--	AV	54.00	--	--	--	--	--	--
7215.00	47.82	PK	74.00	26.18	36.72	36.95	9.18	35.03	11.10
7215.00	--	AV	54.00	--	--	--	--	--	--

Frequency(MHz):			2440		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4880.00	51.62	PK	74.00	22.38	45.37	33.60	6.95	34.30	6.25
4880.00	--	AV	54.00	--	--	--	--	--	--
5238.75	45.11	PK	74.00	28.89	37.48	34.57	7.16	34.10	7.63
5238.75	--	AV	54.00	--	--	--	--	--	--
7320.00	48.04	PK	74.00	25.96	36.35	37.46	9.23	35.00	11.69
7320.00	--	AV	54.00	--	--	--	--	--	--

Frequency(MHz):			2440		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4880.00	50.74	PK	74.00	23.26	44.49	33.60	6.95	34.30	6.25
4880.00	--	AV	54.00	--	--	--	--	--	--
5238.75	44.52	PK	74.00	29.48	36.88	34.58	7.16	34.10	7.64
5238.75	--	AV	54.00	--	--	--	--	--	--
7320.00	47.47	PK	74.00	26.53	35.78	37.46	9.23	35.00	11.69
7320.00	--	AV	54.00	--	--	--	--	--	--

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Frequency(MHz):			2480		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4960.00	51.49	PK	74.00	22.51	46.57	33.84	7.00	35.92	4.92
4960.00	--	AV	54.00	--	--	--	--	--	--
5320.50	43.28	PK	74.00	30.72	35.74	34.67	7.22	34.35	7.54
5320.50	--	AV	54.00	--	--	--	--	--	--
7440.00	47.61	PK	74.00	26.39	35.66	37.64	9.28	34.97	11.95
7440.00	--	AV	54.00	--	--	--	--	--	--

Frequency(MHz):			2480		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
4960.00	50.74	PK	74.00	23.26	45.82	33.84	7.00	35.92	4.92
4960.00	--	AV	54.00	--	--	--	--	--	--
5320.50	44.06	PK	74.00	29.94	36.87	34.36	7.10	34.27	7.19
5320.50	--	AV	54.00	--	--	--	--	--	--
7440.00	48.12	PK	74.00	25.88	36.17	37.64	9.28	34.97	11.95
7440.00	--	AV	54.00	--	--	--	--	--	--

REMARKS:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.
6. RBW 1MHz VBW 3MHz Peak detector is for PK value; RBW 1MHz VBW10Hz Peak detector is for AV value.

Results of Band Edges Test (Radiated)

Frequency(MHz):			2405		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2405.00	99.04	PK	--	--	65.65	28.78	4.61	0.00	33.39
2405.00	92.45	AV	--	--	59.06	28.78	4.61	0.00	33.39
2348.75	43.08	PK	74.00	30.92	10.00	28.52	4.56	0.00	33.08
2348.75	--	AV	54.00	--	--	--	--	--	--
2390.00	48.74	PK	74.00	25.26	15.42	28.72	4.60	0.00	33.32
2390.00	--	AV	54.00	--	--	--	--	--	--
2400.00	49.21	PK	74.00	24.79	15.82	28.78	4.61	0.00	33.39
2400.00	--	AV	54.00	--	--	--	--	--	--

Frequency(MHz):			2405		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2405.00	100.18	PK	--	--	66.79	28.78	4.61	0.00	33.39
2405.00	92.71	AV	--	--	59.32	28.78	4.61	0.00	33.39
2348.75	43.64	PK	74	30.36	10.56	28.52	4.56	0.00	33.08
2348.75	--	AV	54	--	--	--	--	--	--
2390.00	47.27	PK	74	26.73	13.95	28.72	4.60	0.00	33.32
2390.00	--	AV	54	--	--	--	--	--	--
2400.00	50.02	PK	74	23.98	16.63	28.78	4.61	0.00	33.39
2400.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2480		Polarity:			HORIZONTAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2480.00	99.27	PK	--	--	65.65	28.92	4.70	0.00	33.62
2480.00	91.05	AV	--	--	57.43	28.92	4.70	0.00	33.62
2483.50	43.69	PK	74	30.31	10.06	28.93	4.70	0.00	33.63
2483.50	--	AV	54	--	--	--	--	--	--
2491.25	42.81	PK	74	31.19	9.15	28.95	4.71	0.00	33.66
2491.25	--	AV	54	--	--	--	--	--	--
2500.00	43.08	PK	74	30.92	9.4	28.96	4.72	0.00	33.68
2500.00	--	AV	54	--	--	--	--	--	--

Frequency(MHz):			2480		Polarity:			VERTICAL	
Frequency (MHz)	Emission Level (dBuV/m)		Limit (dBuV/m)	Margin (dB)	Raw Value (dBuV)	Antenna Factor (dB/m)	Cable Factor (dB)	Pre-amplifier (dB)	Correction Factor (dB/m)
2480.00	100.24	PK	--	--	66.62	28.92	4.70	0.00	33.62
2480.00	92.02	AV	--	--	58.4	28.92	4.70	0.00	33.62
2483.50	43.48	PK	74	30.52	9.85	28.93	4.70	0.00	33.63
2483.50	--	AV	54	--	--	--	--	--	--
2489.05	43.15	PK	74	30.85	9.49	28.95	4.71	0.00	33.66
2489.05	--	AV	54	--	--	--	--	--	--
2500.00	42.27	PK	74	31.73	8.59	28.96	4.72	0.00	33.68
2500.00	--	AV	54	--	--	--	--	--	--

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REMARKS:

1. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
2. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
3. Margin value = Limit value- Emission level.
4. -- Mean the PK detector measured value is below average limit.
5. The other emission levels were very low against the limit.
6. RBW 1MHz VBW 3MHz Peak detector is for PK value; RBW 1MHz VBW 10Hz Peak detector is for AV value.

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3.3. Maximum Peak Output Power

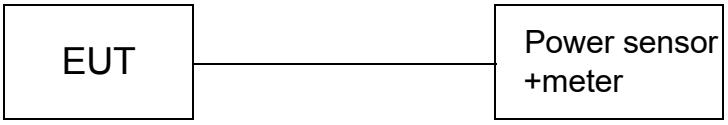
Limit

The Maximum Peak Output Power Measurement is 30dBm.

Test Procedure

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Power meter .

Test Configuration



Test Results

Type	Channel	Output power (dBm)	Limit (dBm)	Result
OQPSK (DSSS)	11	6.445	30.00	Pass
	18	6.839		
	26	6.180		

Note: 1.The test results including the cable lose.

3.4. Power Spectral Density

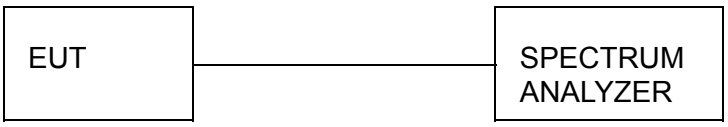
Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

Test Procedure

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW ≥ 3 kHz.
3. Set the VBW ≥ 3× RBW.
4. Set the span to 1.5 times the DTS channel bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum power level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
11. The resulting peak PSD level must be 8dBm.

Test Configuration



Test Results

Type	Channel	Power Spectral Density (dBm/3KHz)	Limit (dBm/3KHz)	Result
OQPSK (DSSS)	11	-6.359	8.00	Pass
	18	-7.039		
	26	-8.827		

Test plot as follows:

CH11

CH18

CH26

3.5. 6dB Bandwidth

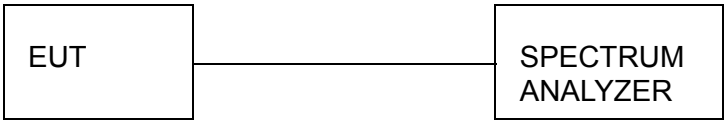
Limit

For digital modulation systems, the minimum 6 dB bandwidth shall be at least 500 kHz

Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 KHz RBW and 300 KHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

Test Configuration

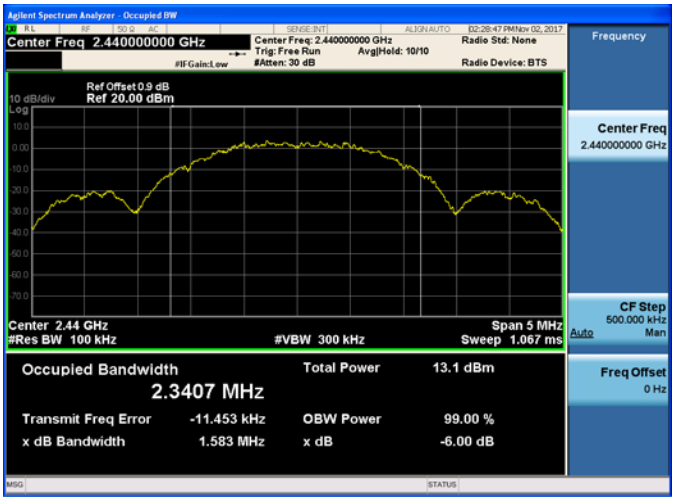


Test Results

Type	Channel	6dB Bandwidth (MHz)	99% OBW (MHz)	Limit (KHz)	Result
OQPSK (DSSS)	11	1.286	2.2020	≥500	Pass
	18	1.583	2.3407		
	26	1.573	2.3760		

Test plot as follows:

CH11



CH18

CH26

3.6. Out-of-band Emissions

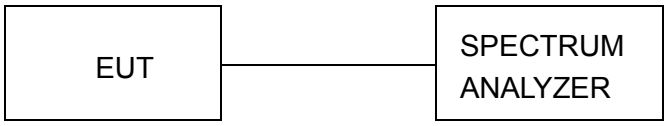
Limit

In any 100 kHz 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 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 con-ducted or a radiated measurement, pro-vided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter com-plies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required.

Test Procedure

Connect the transmitter output to spectrum analyzer using a low loss RF cable, and set the spectrum analyzer to RBW=100 kHz, VBW= 300 kHz, peak detector , and max hold. Measurements utilizing these setting are made of the in-band reference level, bandedge and out-of-band emissions.

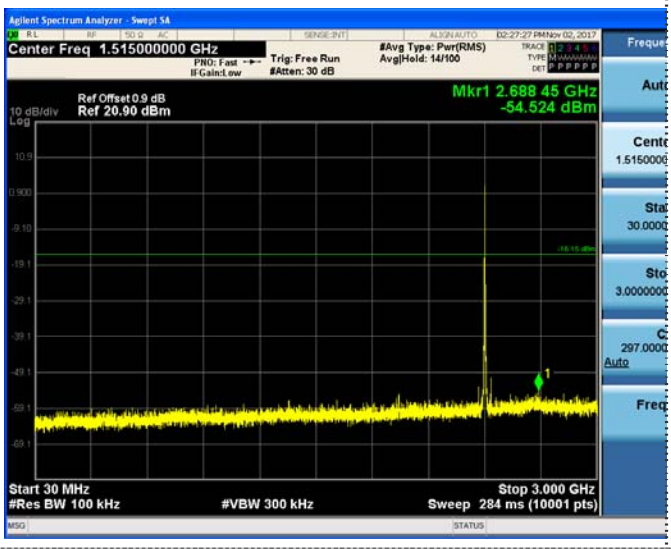
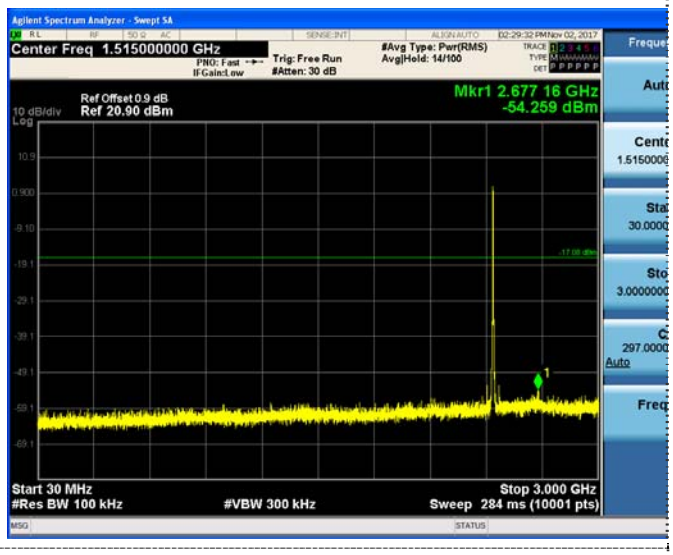
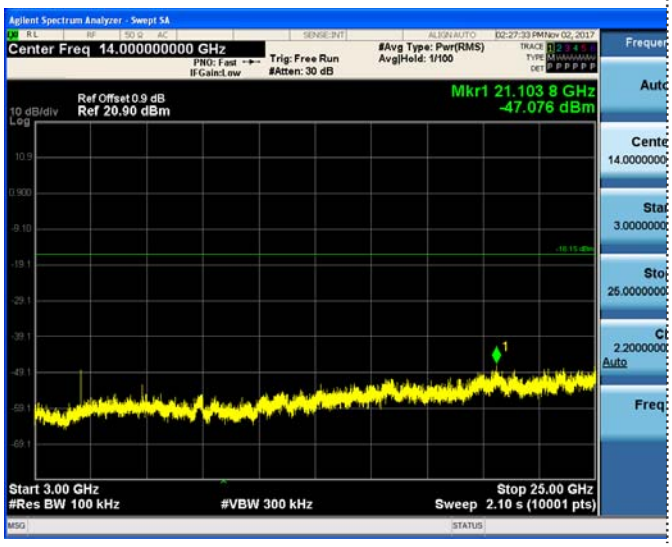
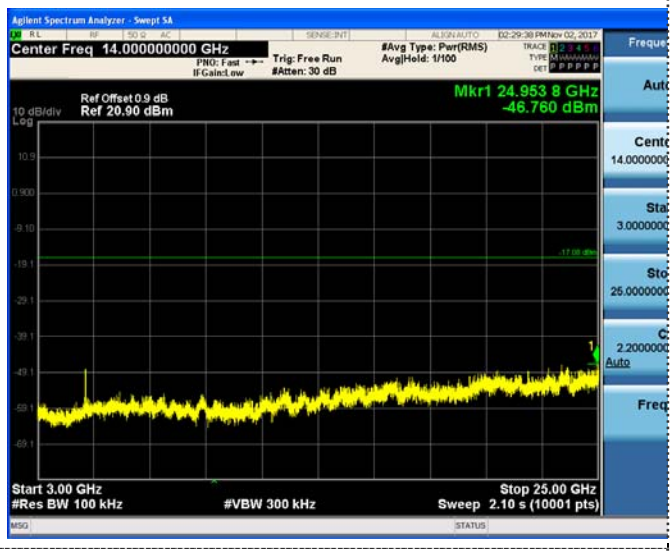
Test Configuration



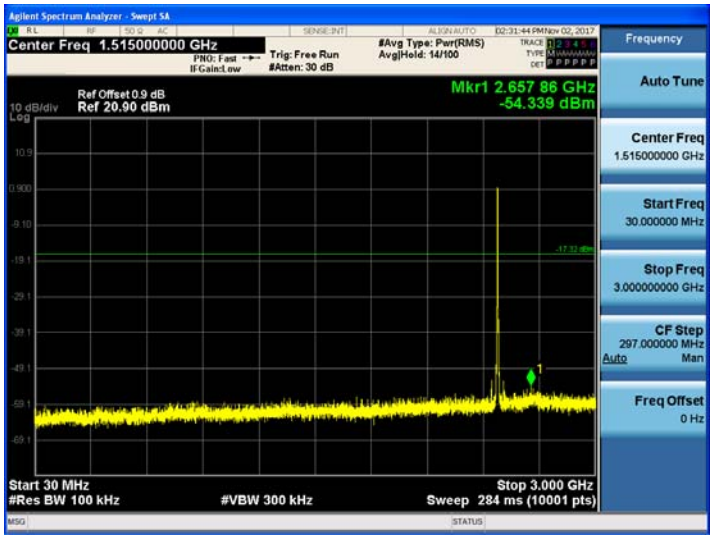
Test Results

Remark: The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandage measurement data.

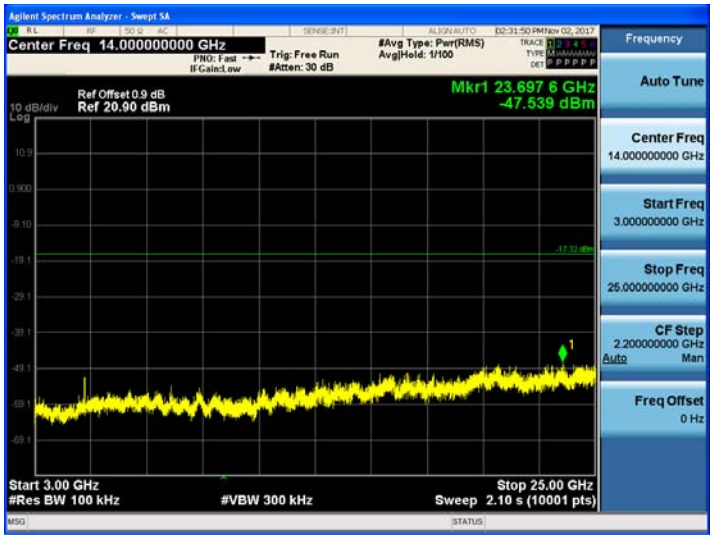
Test plot as follows:

CH11	CH18
	
30MHz-3GHz	30MHz-3GHz
	
3GHz-25GHz	3GHz-25GHz

CH26



30MHz-3GHz



3GHz-25GHz

Band-edge Measurements for RF Conducted Emissions:

Left bandedge

Right bandedge

3.7. Antenna Requirement

Standard Applicable

For intentional device, according to FCC 47 CFR Section 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.

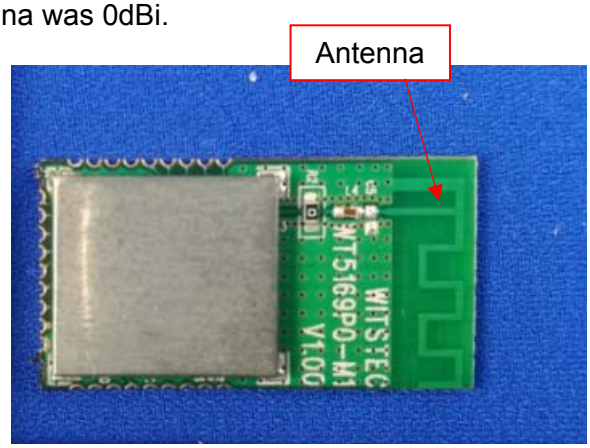
And according to FCC 47 CFR Section 15.247 (c), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Refer to statement below for compliance

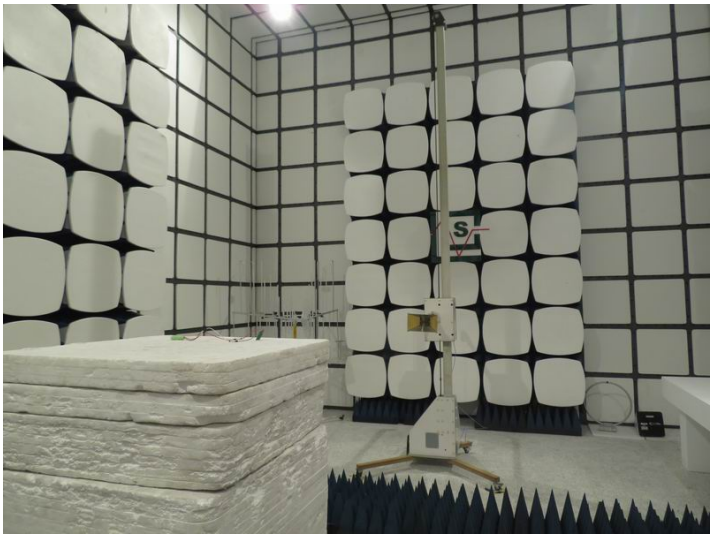
The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

Antenna Connected Construction

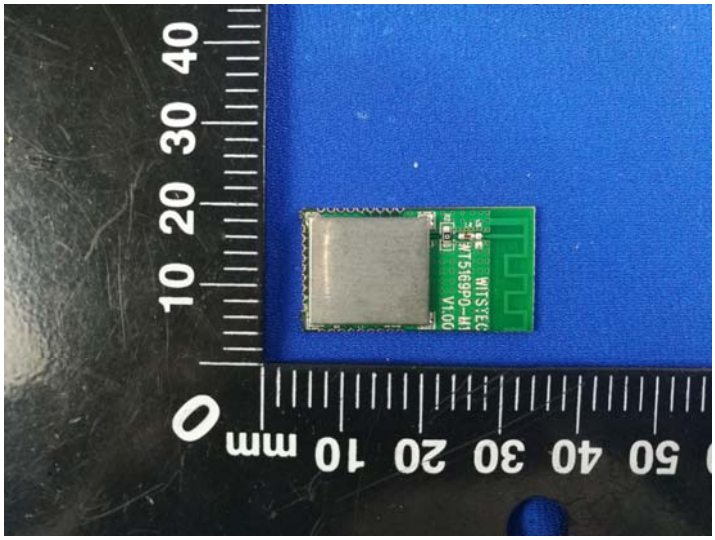
The maximum gain of antenna was 0dBi.

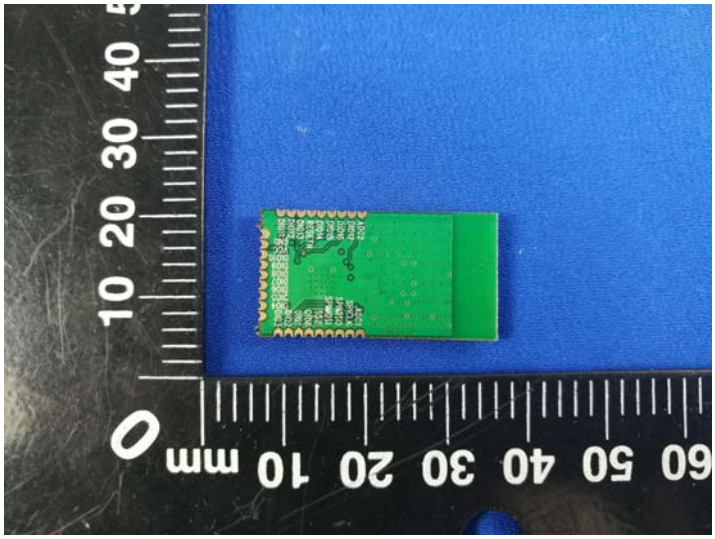


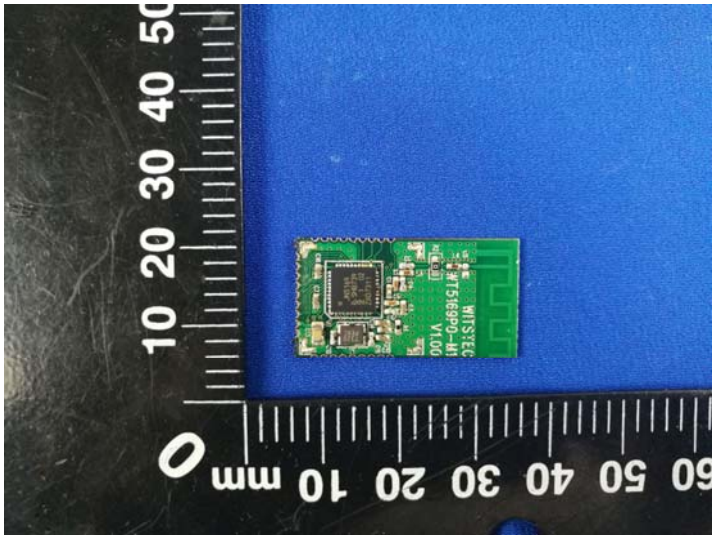
4. Test Setup Photos of the EUT



5. Photos of the EUT







********** End of Report **********