S T S L A B

RADIO TEST REPORT

Report No: STS1704022F01

Issued for

Pinghu Jintong Electric Technology Company Limited

No. 658 Xingping Road, Pinghu Economic Development Zone,
Jiaxing City, Zhejiang Province, China

Product Name:	2.4G Electric Kid's Car Controller
Brand Name:	LEO
Model Name:	G6T1
Series Model:	N/A
FCC ID:	2ALSB-G6T1
Test Standard:	FCC Part 15.247

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TEST RESULT CERTIFICATION

Applicant's name ..... : Pinghu Jintong Electric Technology Company Limited

Address ..... : No. 658 Xingping Road, Pinghu Economic Development Zone, Jiaxing City, Zhejiang Province, China

Manufacture's Name ..... : Pinghu Jintong Electric Technology Company Limited

Address ..... : No. 658 Xingping Road, Pinghu Economic Development Zone, Jiaxing City, Zhejiang Province, China

Product description

Product name ..... : 2.4G Electric Kid's Car Controller

Model and/or type reference : LEO

Series Model ..... : G6T1

Standards ..... : FCC Part15.247

Test procedure ..... ANSI C63.10-2013

This device described above has been tested by STS, the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.
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Date of Test ..... :

Date (s) of performance of tests ..... : 12 Apr. 2017 ~ 02 May. 2017

Date of Issue ..... : 02 May. 2017

Test Result ..... : **Pass**

Testing Engineer :

(Leo li)

Technical Manager :

(Tony liu)

Authorized Signatory :

(Vita Li)

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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:
KDB 558074 D01 DTS Meas Guidance v03r05

FCC Part 15.247,Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	--	--
15.247 (a)(2)	6dB Bandwidth	PASS	--
15.247 (b)(3)	Output Power	PASS	--
15.247 (c)	Radiated Spurious Emission	PASS	--
15.247 (d)	Conducted Spurious & Band Edge Emission	PASS	--
15.247 (e)	Power Spectral Density	PASS	--
15.205	Restricted Band Edge Emission	PASS	--
Part 15.247(d)/part 15.209(a)	Band Edge Emission	PASS	--
15.203	Antenna Requirement	PASS	--

NOTE:

(1) ”N/A” denotes test is not applicable in this Test Report

(2) All tests are according to ANSI C63.10-2013

1.1 TEST FACTORY

BZT Testing Technology Co., Ltd.
Add. : Buliding 17, Xinghua Road Xingwei industrial Park Fuyong,
Baoan District, Shenzhen, Guangdong, China
FCC Registration No.: 701733

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U** , where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2** , providing a level of confidence of approximately **95** %。

No.	Item	Uncertainty
1	Conducted Emission (9KHz-150KHz)	±2.88dB
2	Conducted Emission (150KHz-30MHz)	±2.67dB
3	RF power,conducted	±0.70dB
4	Spurious emissions,conducted	±1.19dB
5	All emissions,radiated(<30M) (9KHz-30MHz)	±2.45dB
6	All emissions,radiated(<1G) 30MHz-200MHz	±2.83dB
7	All emissions,radiated(<1G) 200MHz-1000MHz	±2.94dB
8	All emissions,radiated(>1G)	±3.03dB
9	Temperature	±0.5°C
10	Humidity	±2%

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	2.4G Electric Kid's Car Controller
Trade Name	LEO
Model Name	G6T1
Series Model	N/A
Model Difference	N/A
Product Description	The EUT is a 2.4G Electric Kid's Car Controller Operation Frequency: 2405~2480 MHz Modulation Type: GFSK Number Of Channel 24CH Antenna Designation: Please see Note 3. Antenna Gain (dBi) 0.94 dbi
Channel List	Please refer to the Note 2.
Power Rating	DC 3V
Hardware version number	7C21
Software version number	V1.651
Connecting I/O Port(s)	N/A

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.

Channel List							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2405	09	2430	17	2457		
02	2409	10	2436	18	2462		
03	2412	11	2439	19	2465		
04	2416	12	2443	20	2469		
05	2420	13	2447	21	2473		
06	2423	14	2450	22	2476		
07	2426	15	2453	23	2479		
08	2429	16	2455	24	2480		

3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	LEO	G6T1	PCB Antenna	N/A	0.94

2.2 DESCRIPTION OF TEST MODES

For conducted test items and radiated spurious emissions
Each of these EUT operation mode(s) or test configuration mode(s) mentioned below was evaluated respectively..

Worst Mode	Description	Data/Modulation
Mode 1	TX CH01(2405MHz)	1 MHz/GFSK
Mode 2	TX CH12(2443MHz)	1 MHz/GFSK
Mode 3	TX CH24(2480MHz)	1 MHz/GFSK

Note:

(1) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported

(2) The EUT was programmed to be in continuously transmitting with a modulated carrier at maximum power on bottom/middle/top channels as required using the supported data rates/modulation types and the transmit duty cycle is not less than 98%.

(3) Controlled using a bespoke application on the laptop PC supplied by the customer. The application was used to enable a continuous transmission mode and to select the test channels, data rates and modulation schemes as required.

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious Emission Test

E-1
EUT

NOTE: New battery is used during all test

2.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Mfr/Brand	Model/Type No.	Serial No.	Note
E-1	2.4G Electric Kid's Car Controller	LEO	G6T1	N/A	EUT

Item	Shielded Type	Ferrite Core	Length	Note

Note:

(1) The support equipment was authorized by Declaration of Confirmation.

(2) For detachable type I/O cable should be specified the length in cm in 『Length』 column.

(3) "YES" is means "shielded" "with core"; "NO" is means "unshielded" "without core".

2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
Spectrum Analyzer	Agilent	E4407B	MY50140340	2016.10.23	2017.10.22
Test Receiver	R&S	ESCI	101427	2016.10.23	2017.10.22
Bilog Antenna	TESEQ	CBL6111D	34678	2014.11.24	2017.11.23
Horn Antenna	Schwarzbeck	BBHA 9120D(1201)	9120D-1343	2015.03.05	2018.03.04
Horn Antenna	Schwarzbeck	BBHA 9170	9170-0741	2016.03.06	2019.03.05
50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2016.06.06	2017.06.05
PreAmplifier	Agilent	8449B	60538	2016.10.23	2017.10.22
Loop Antenna	EMCO	6502	9003-2485	2016.03.06	2019.03.05
Preamplifier	Agilent	8449B	60538	2016.10.23	2017.10.22
Low frequency cable	EM	R01	N/A	NCR	NCR
High frequency cable	SCHWARZBECK	AK9515H	SN-96286/96287	NCR	NCR
Semi-anechoic chamber	Changling	966	N/A	2016.10.23	2017.10.22

Conduction Test equipment

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
EMI Test Receiver	R&S	ESPI	102086	2016.10.23	2017.10.22
LISN	R&S	ENV216	101242	2016.10.23	2017.10.22
LISN	EMCO	3810/2NM	000-23625	2016.10.23	2017.10.22
Conduction Cable	EM	C01	N/A	NCR	NCR
Shielding Room	Changling	854	N/A	2016.10.23	2017.10.22

RF Connected Test

Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until
USB RF power sensor	DARE	RPR3006W	15I00041SNO03	2016.10.23	2017.10.22
Spectrum Analyzer	Agilent	E4407B	MY50140340	2016.10.23	2017.10.22
Signal Analyzer	Agilent	N9020A	MY49100060	2016.10.23	2017.10.22

Note: The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION LIMITS

operating frequency band. In case the emission fall within the restricted band specified on Part 207(a) limit in the table below has to be followed.

FREQUENCY (MHz)	Conducted Emission limit (dBuV)	
	Quasi-peak	Average
0.15 -0.5	66 - 56 *	56 - 46 *
0.50 -5.0	56.00	46.00
5.0 -30.0	60.00	50.00

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

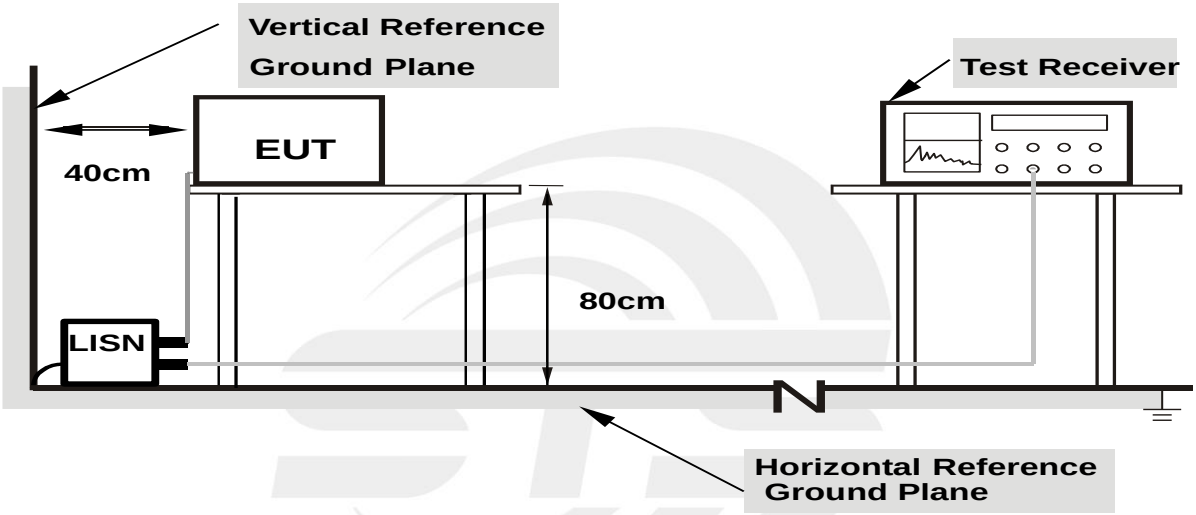
The following table is the setting of the receiver

Receiver Parameters	**Setting**
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

3.2 TEST PROCEDURE

a. The EUT was 0.8 meters from the horizontal ground plane and 0.4 meters from the vertical ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.3 TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.4 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

3.5 TEST RESULTS

Temperature:	26 ℃	Relative Humidity:	54%
Pressure:	1010hPa	Phase:	L/N
Test Voltage:	DC 3V	Test Mode:	N/A

Note: denotes test is not applicable in this test report.

4. RADIATED EMISSION MEASUREMENT

4.1 RADIATED EMISSION LIMITS

in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the Restricted band specified on Part15.205(a)&209(a) limit in the table and according to ANSI C63.10-2013 below has to be followed.

LIMITS OF RADIATED EMISSION MEASUREMENT (Frequency Range 9kHz-1000MHz)

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
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

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	(dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

(1) The limit for radiated test was performed according to FCC PART 15C.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

For Radiated Emission

Spectrum Parameter	Setting
Attenuation	Auto
Detector	Peak
Start Frequency	1000 MHz(Peak/AV)
Stop Frequency	10th carrier hamonic(Peak/AV)
RB / VB (emission in restricted band)	1 MHz / 3 MHz

For Band edge

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	Lower Band Edge: 2370 to 2410 MHz Upper Band Edge: 2479 to 2500 MHz
RB / VB (emission in restricted band)	1 MHz / 3 MHz

Receiver Parameter	Setting
Start ~ Stop Frequency	9kHz~90kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	90kHz~110kHz / RB 200Hz for QP
Start ~ Stop Frequency	110kHz~490kHz / RB 200Hz for PK & AV
Start ~ Stop Frequency	490kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

4.2 TEST PROCEDURE

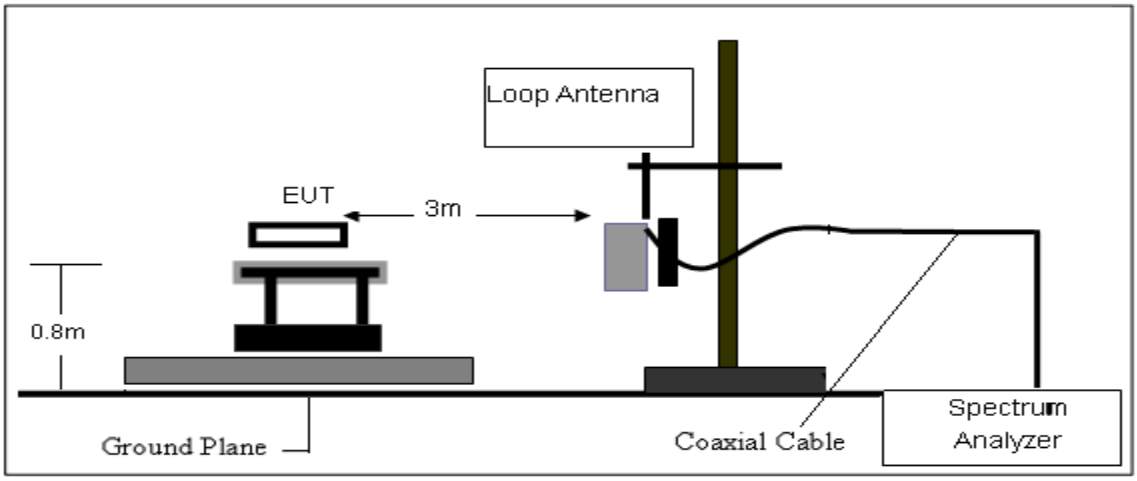
a. The measuring distance of at 3 m shall be used for measurements at frequency 0.009MHz up to 1GHz, and above 1GHz.
b. The EUT was placed on the top of a rotating table 0.8 meters(above 1GHz is 1.5 m) above the ground at a 3 meter anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment shall be 0.8 m(above 1GHz is 1.5 m); the height of the test antenna shall vary between 1 m to 4 m. Horizontal and vertical polarizations of the antenna are set to make the measurement
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

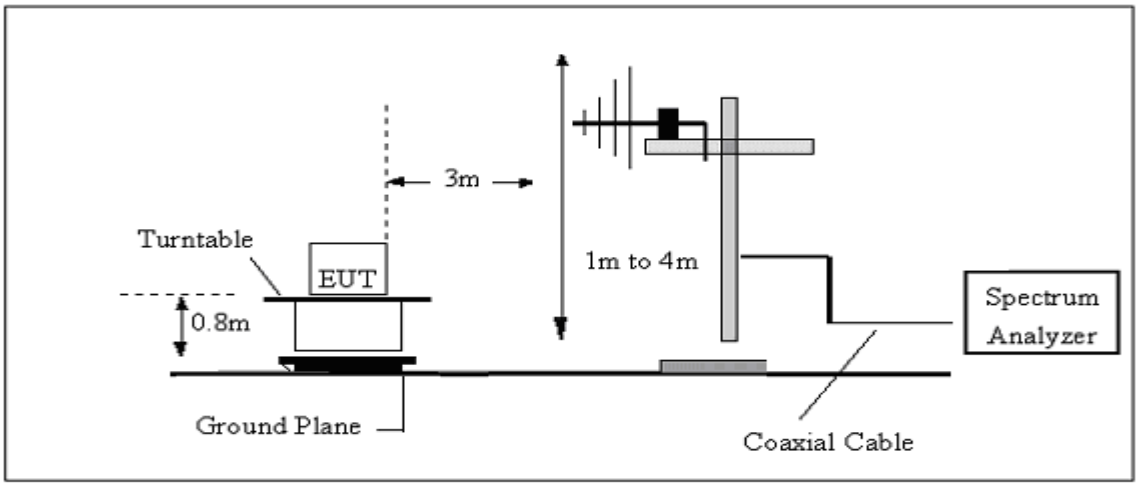
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

4.3 TEST SETUP

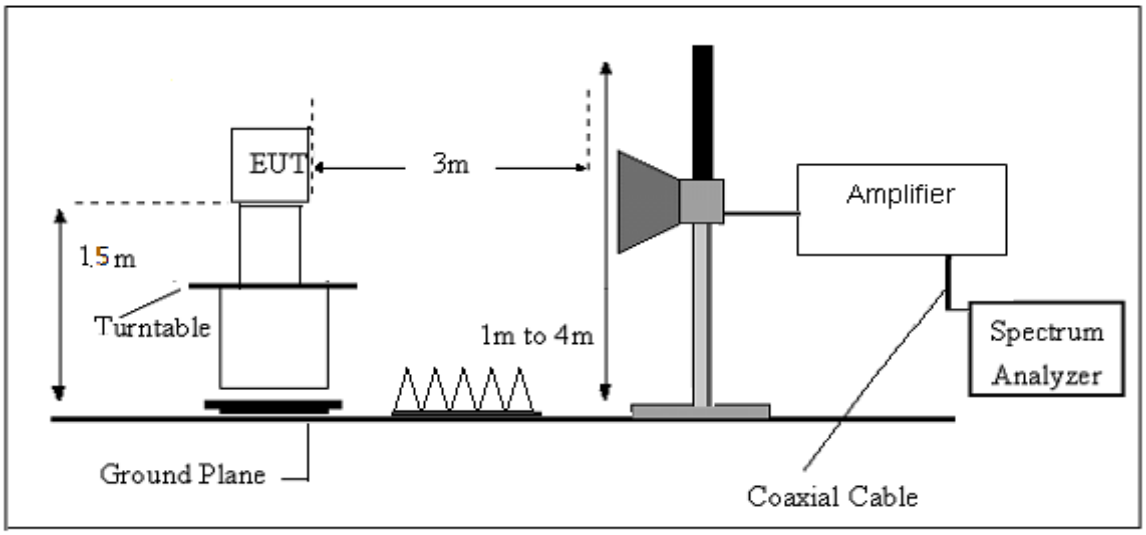
（A）Radiated Emission Test-Up Frequency Below 30MHz



（B）Radiated Emission Test-Up Frequency 30MHz~1GHz



（C）Radiated Emission Test-Up Frequency Above 1GHz



4.4 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

4.5 TEST RESULTS

(Between 9KHz – 30 MHz)

Temperature:	20 ℃	Relative Humidtity:	48%
Pressure:	1010 hPa	Test Voltage:	DC3V
Test Mode:	TX Mode	Polarization:	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	PASS
--	--	--	--	PASS

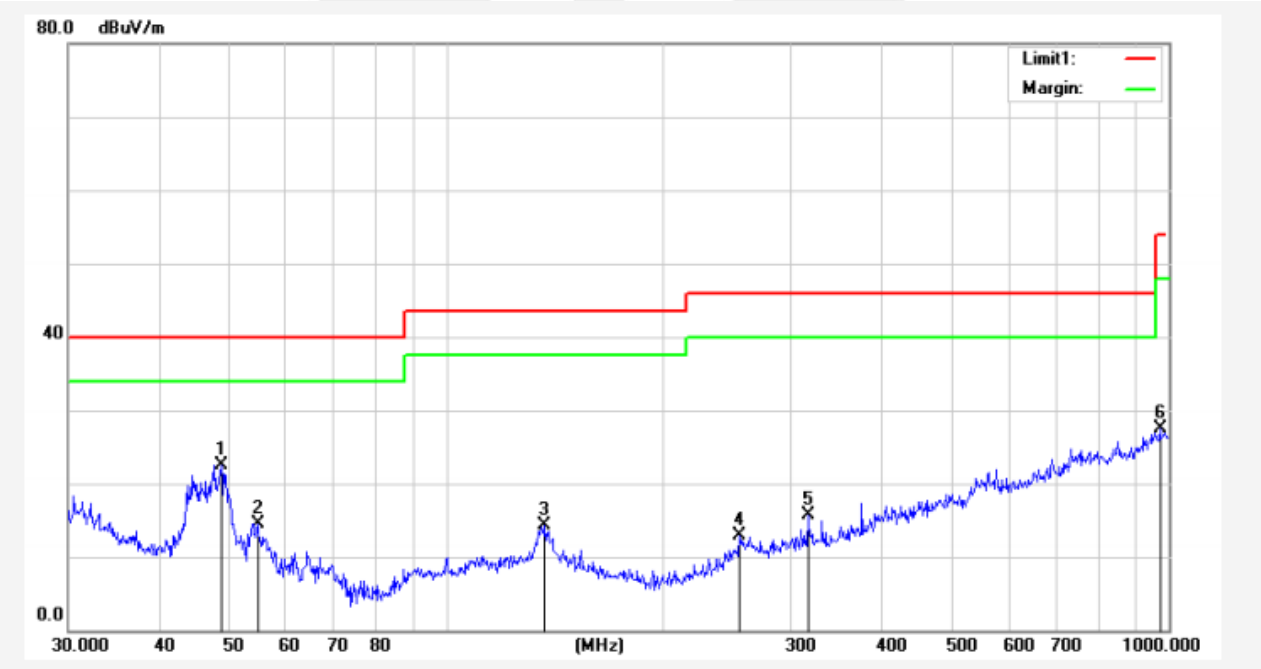
Note:
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor =40 log (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

(30MHz -1000MHz)

Temperature:	26 ℃	Relative Humidity:	60%
Pressure:	1010hPa	Phase:	Horizontal
Test Voltage:	DC3V	Test Mode:	Mode1/2/3 (Mode 3-1M worst mode)

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
48.8430	43.46	-20.89	22.57	40.00	-17.43	QP
54.8348	37.40	-22.86	14.54	40.00	-25.46	QP
136.9391	31.73	-17.52	14.21	43.50	-29.29	QP
254.7283	28.64	-15.73	12.91	46.00	-33.09	QP
316.5890	30.05	-14.28	15.77	46.00	-30.23	QP
972.3374	27.71	-0.14	27.57	54.00	-26.43	QP

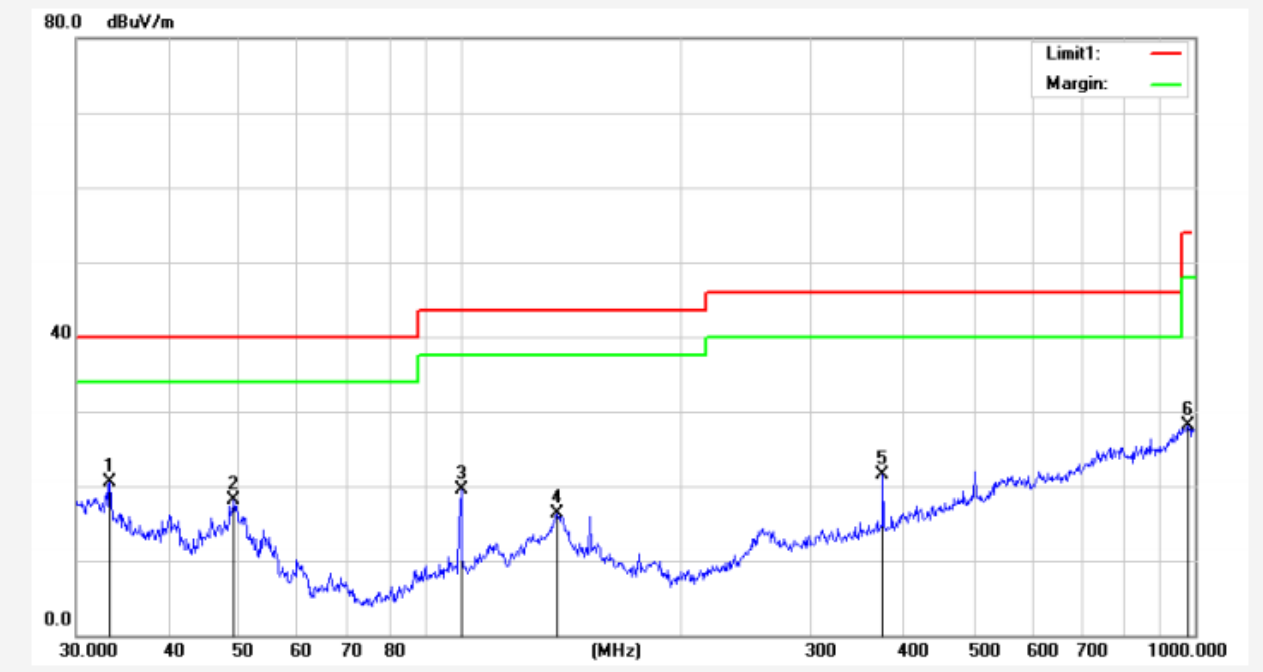
Remark:
1. Margin = Result (Result =Reading + Factor)–Limit



Temperature:	26 ℃	Relative Humidity:	60%
Pressure:	1010hPa	Phase:	Vertical
Test Voltage:	DC3V	Test Mode:	Mode1/2/3 (Mode 3-1M worst mode)

Frequency (MHz)	Reading (dBuV)	Correct Factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark
33.3278	33.36	-12.90	20.46	40.00	-19.54	QP
49.1865	39.18	-21.06	18.12	40.00	-21.88	QP
100.2286	38.65	-19.17	19.48	43.50	-24.02	QP
135.5062	33.90	-17.52	16.38	43.50	-27.12	QP
375.9384	34.28	-12.73	21.55	46.00	-24.45	QP
979.1802	28.22	-0.16	28.06	54.00	-25.94	QP

Remark:
1. Margin = Result (Result =Reading + Factor)–Limit



(1GHz-25GHz)Restricted band and Spurious emission Requirements

GFSK Low Channel

Frequency (MHz)	Reading (dBμV)	Amplifier (dB)	Loss (dB)	Antenna Factor (dB/m)	Corrected Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
Low Channel (2405 MHz)										
3264.86	48.30	44.70	6.70	28.20	-9.80	38.50	74.00	-35.50	PK	Vertical
3264.86	39.40	44.70	6.70	28.20	-9.80	29.60	54.00	-24.40	AV	Vertical
3264.65	49.15	44.70	6.70	28.20	-9.80	39.35	74.00	-34.65	PK	Horizontal
3264.65	38.14	44.70	6.70	28.20	-9.80	28.34	54.00	-25.66	AV	Horizontal
4804.46	58.11	44.20	9.04	31.60	-3.56	54.55	74.00	-19.45	PK	Vertical
4804.46	38.14	44.20	9.04	31.60	-3.56	34.58	54.00	-19.42	AV	Vertical
4804.37	59.16	44.20	9.04	31.60	-3.56	55.60	74.00	-18.40	PK	Horizontal
4804.37	38.37	44.20	9.04	31.60	-3.56	34.81	54.00	-19.19	AV	Horizontal
5359.81	46.32	44.20	9.86	32.00	-2.34	43.98	74.00	-30.02	PK	Vertical
5359.81	37.13	44.20	9.86	32.00	-2.34	34.79	54.00	-19.21	AV	Vertical
5359.60	45.65	44.20	9.86	32.00	-2.34	43.31	74.00	-30.69	PK	Horizontal
5359.60	38.18	44.20	9.86	32.00	-2.34	35.84	54.00	-18.16	AV	Horizontal
7205.84	51.47	43.50	11.40	35.50	3.40	54.87	74.00	-19.13	PK	Vertical
7205.84	33.16	43.50	11.40	35.50	3.40	36.56	54.00	-17.44	AV	Vertical
7205.79	50.90	43.50	11.40	35.50	3.40	54.30	74.00	-19.70	PK	Horizontal
7205.79	32.52	43.50	11.40	35.50	3.40	35.92	54.00	-18.08	AV	Horizontal
11035.85	40.79	43.60	14.30	39.50	10.20	50.99	74.00	-23.01	PK	Vertical
11035.85	30.48	43.60	14.30	39.50	10.20	40.68	54.00	-13.32	AV	Vertical
11036.21	40.37	43.60	14.30	39.50	10.20	50.57	74.00	-23.43	PK	Horizontal
11036.21	30.52	43.60	14.30	39.50	10.20	40.72	54.00	-13.28	AV	Horizontal
13299.31	40.18	42.60	15.90	38.90	12.20	52.38	74.00	-21.62	PK	Vertical
13299.31	28.54	42.60	15.90	38.90	12.20	40.74	54.00	-13.26	AV	Vertical
13299.31	40.72	42.60	15.90	38.90	12.20	52.92	74.00	-21.08	PK	Horizontal
13299.31	29.25	42.60	15.90	38.90	12.20	41.45	54.00	-12.55	AV	Horizontal
15999.85	39.94	42.70	18.00	37.10	12.40	52.34	74.00	-21.66	PK	Vertical
15999.85	28.64	42.70	18.00	37.10	12.40	41.04	54.00	-12.96	AV	Vertical
15999.67	41.01	42.70	18.00	37.10	12.40	53.41	74.00	-20.59	PK	Horizontal
15999.67	28.91	42.70	18.00	37.10	12.40	41.31	54.00	-12.69	AV	Horizontal
17997.73	31.17	42.70	19.40	46.50	23.20	54.37	74.00	-19.63	PK	Vertical
17997.73	19.14	42.70	19.40	46.50	23.20	42.34	54.00	-11.66	AV	Vertical
17997.56	31.24	42.70	19.40	46.50	23.20	54.44	74.00	-19.56	PK	Horizontal
17997.56	18.91	42.70	19.40	46.50	23.20	42.11	54.00	-11.89	AV	Horizontal

GFSK Mid Channel

Frequency (MHz)	Reading (dBμV)	Amplifier (dB)	Loss (dB)	Antenna Factor (dB/m)	Corrected Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
Mid Channel (2443 MHz)										
3264.84	47.85	44.70	6.70	28.20	-9.80	38.05	74.00	-35.95	PK	Vertical
3264.84	38.41	44.70	6.70	28.20	-9.80	28.61	54.00	-25.39	AV	Vertical
3264.84	48.26	44.70	6.70	28.20	-9.80	38.46	74.00	-35.54	PK	Horizontal
3264.84	37.93	44.70	6.70	28.20	-9.80	28.13	54.00	-25.87	AV	Horizontal
4880.39	59.39	44.20	9.04	31.60	-3.56	55.83	74.00	-18.17	PK	Vertical
4880.39	38.28	44.20	9.04	31.60	-3.56	34.72	54.00	-19.28	AV	Vertical
4880.41	58.40	44.20	9.04	31.60	-3.56	54.84	74.00	-19.16	PK	Horizontal
4880.41	38.65	44.20	9.04	31.60	-3.56	35.09	54.00	-18.91	AV	Horizontal
5359.88	45.49	44.20	9.86	32.00	-2.34	43.15	74.00	-30.85	PK	Vertical
5359.88	38.19	44.20	9.86	32.00	-2.34	35.85	54.00	-18.15	AV	Vertical
5359.83	45.55	44.20	9.86	32.00	-2.34	43.21	74.00	-30.79	PK	Horizontal
5359.83	37.07	44.20	9.86	32.00	-2.34	34.73	54.00	-19.27	AV	Horizontal
7310.77	50.59	43.50	11.40	35.50	3.40	53.99	74.00	-20.01	PK	Vertical
7310.77	33.43	43.50	11.40	35.50	3.40	36.83	54.00	-17.17	AV	Vertical
7310.87	51.18	43.50	11.40	35.50	3.40	54.58	74.00	-19.42	PK	Horizontal
7310.87	32.62	43.50	11.40	35.50	3.40	36.02	54.00	-17.98	AV	Horizontal
9607.93	40.26	43.60	14.30	39.50	10.20	50.46	74.00	-23.54	PK	Vertical
9607.93	30.60	43.60	14.30	39.50	10.20	40.80	54.00	-13.20	AV	Vertical
9607.99	40.80	43.60	14.30	39.50	10.20	51.00	74.00	-23.00	PK	Horizontal
9607.99	30.15	43.60	14.30	39.50	10.20	40.35	54.00	-13.65	AV	Horizontal
13299.14	39.94	42.60	15.90	38.90	12.20	52.14	74.00	-21.86	PK	Vertical
13299.14	28.54	42.60	15.90	38.90	12.20	40.74	54.00	-13.26	AV	Vertical
13299.44	40.06	42.60	15.90	38.90	12.20	52.26	74.00	-21.74	PK	Horizontal
13299.44	29.48	42.60	15.90	38.90	12.20	41.68	54.00	-12.32	AV	Horizontal
15999.86	40.72	42.70	18.00	37.10	12.40	53.12	74.00	-20.88	PK	Vertical
15999.86	28.64	42.70	18.00	37.10	12.40	41.04	54.00	-12.96	AV	Vertical
15999.77	39.71	42.70	18.00	37.10	12.40	52.11	74.00	-21.89	PK	Horizontal
15999.77	29.91	42.70	18.00	37.10	12.40	42.31	54.00	-11.69	AV	Horizontal
17997.76	31.14	42.70	19.40	46.50	23.20	54.34	74.00	-19.66	PK	Vertical
17997.76	19.61	42.70	19.40	46.50	23.20	42.81	54.00	-11.19	AV	Vertical
17997.53	31.09	42.70	19.40	46.50	23.20	54.29	74.00	-19.71	PK	Horizontal
17997.53	18.51	42.70	19.40	46.50	23.20	41.71	54.00	-12.29	AV	Horizontal

GFSK High Channel

Frequency (MHz)	Reading (dBμV)	Amplifier (dB)	Loss (dB)	Antenna Factor (dB/m)	Corrected Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
High Channel (2480 MHz)										
3264.65	49.08	44.70	6.70	28.20	-9.80	39.28	74.00	-34.72	PK	Vertical
3264.65	39.68	44.70	6.70	28.20	-9.80	29.88	54.00	-24.12	AV	Vertical
3264.72	48.16	44.70	6.70	28.20	-9.80	38.36	74.00	-35.64	PK	Horizontal
3264.72	38.14	44.70	6.70	28.20	-9.80	28.34	54.00	-25.66	AV	Horizontal
4960.54	59.46	44.20	9.04	31.60	-3.56	55.90	74.00	-18.10	PK	Vertical
4960.54	39.51	44.20	9.04	31.60	-3.56	35.95	54.00	-18.05	AV	Vertical
4960.59	58.47	44.20	9.04	31.60	-3.56	54.91	74.00	-19.09	PK	Horizontal
4960.59	39.16	44.20	9.04	31.60	-3.56	35.60	54.00	-18.40	AV	Horizontal
5359.68	46.37	44.20	9.86	32.00	-2.34	44.03	74.00	-29.97	PK	Vertical
5359.68	37.04	44.20	9.86	32.00	-2.34	34.70	54.00	-19.30	AV	Vertical
5359.80	45.12	44.20	9.86	32.00	-2.34	42.78	74.00	-31.22	PK	Horizontal
5359.80	38.08	44.20	9.86	32.00	-2.34	35.74	54.00	-18.26	AV	Horizontal
7439.93	50.86	43.50	11.40	35.50	3.40	54.26	74.00	-19.74	PK	Vertical
7439.93	33.72	43.50	11.40	35.50	3.40	37.12	54.00	-16.88	AV	Vertical
7439.70	50.60	43.50	11.40	35.50	3.40	54.00	74.00	-20.00	PK	Horizontal
7439.70	33.13	43.50	11.40	35.50	3.40	36.53	54.00	-17.47	AV	Horizontal
9919.76	40.31	43.60	14.30	39.50	10.20	50.51	74.00	-23.49	PK	Vertical
9919.76	30.79	43.60	14.30	39.50	10.20	40.99	54.00	-13.01	AV	Vertical
9920.27	40.67	43.60	14.30	39.50	10.20	50.87	74.00	-23.13	PK	Horizontal
9920.27	29.71	43.60	14.30	39.50	10.20	39.91	54.00	-14.09	AV	Horizontal
13299.22	40.60	42.70	18.00	37.10	12.40	53.00	74.00	-21.00	PK	Vertical
13299.22	28.54	42.70	18.00	37.10	12.40	40.94	54.00	-13.06	AV	Vertical
13299.37	40.26	42.70	18.00	37.10	12.40	52.66	74.00	-21.34	PK	Horizontal
13299.37	29.32	42.70	18.00	37.10	12.40	41.72	54.00	-12.28	AV	Horizontal
17997.72	30.35	42.70	19.40	46.50	23.20	53.55	74.00	-20.45	PK	Vertical
17997.72	18.74	42.70	19.40	46.50	23.20	41.94	54.00	-12.06	AV	Vertical
17997.55	31.12	42.70	19.40	46.50	23.20	54.32	74.00	-19.68	PK	Horizontal
17997.55	19.03	42.70	19.40	46.50	23.20	42.23	54.00	-11.77	AV	Horizontal

Note:

1) Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Emission Level = Reading + Factor

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4.6 TEST RESULTS (Restricted Bands Requirements)

Frequency (MHz)	Reading (dBμV)	Amplifier （dB）	Loss （dB）	Antenna Factor （dB/m）	Corrected Factor （dB）	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
GFSK										
2390.00	68.22	43.80	4.91	25.90	-12.99	55.23	74	-18.77	PK	Vertical
2390.00	53.94	43.80	4.91	25.90	-12.99	40.95	54	-13.05	AV	Vertical
2390.00	69.54	43.80	4.91	25.90	-12.99	56.55	74	-17.45	PK	Horizontal
2390.00	52.26	43.80	4.91	25.90	-12.99	39.27	54	-14.73	AV	Horizontal
2483.50	69.32	43.80	5.12	25.90	-12.78	56.54	74	-17.46	PK	Vertical
2483.50	52.55	43.80	5.12	25.90	-12.78	39.77	54	-14.23	AV	Vertical
2483.50	69.31	43.80	5.12	25.90	-12.78	56.53	74	-17.47	PK	Horizontal
2483.50	52.12	43.80	5.12	25.90	-12.78	39.34	54	-14.66	AV	Horizontal
Low measurement frequencies is range from 2370 to 2410 MHz, high measurement frequencies is range from 2479 to 2500 MHz. Only show the worst point data of the emissions in the frequency 2370-2410 MHz and 2479-2500 MHz.										

5. CONDUCTED SPURIOUS & BAND EDGE EMISSION

5.1 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, based on either an RF conducted or a radiated measurement.

5.2 TEST PROCEDURE

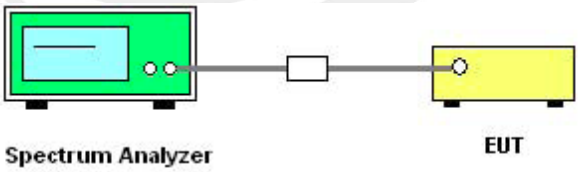
Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	30 MHz to 10th carrier harmonic
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

.

For Band edge

Spectrum Parameter	Setting
Detector	Peak
Start/Stop Frequency	Lower Band Edge: 2370 – 2410 MHz Upper Band Edge: 2479 – 2500 MHz
RB / VB (emission in restricted band)	100 KHz/300 KHz
Trace-Mode:	Max hold

5.3 TEST SETUP



The EUT which is powered by the Battery, is coupled to the Spectrum Analyzer; the RF load attached to the EUT antenna terminal is 50 Ohm; 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.

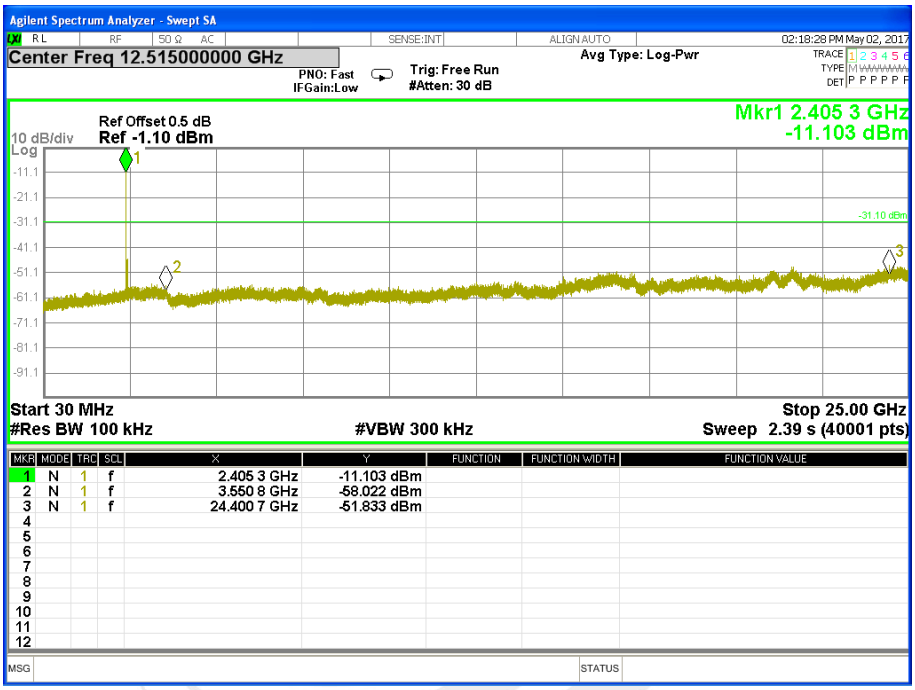
5.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

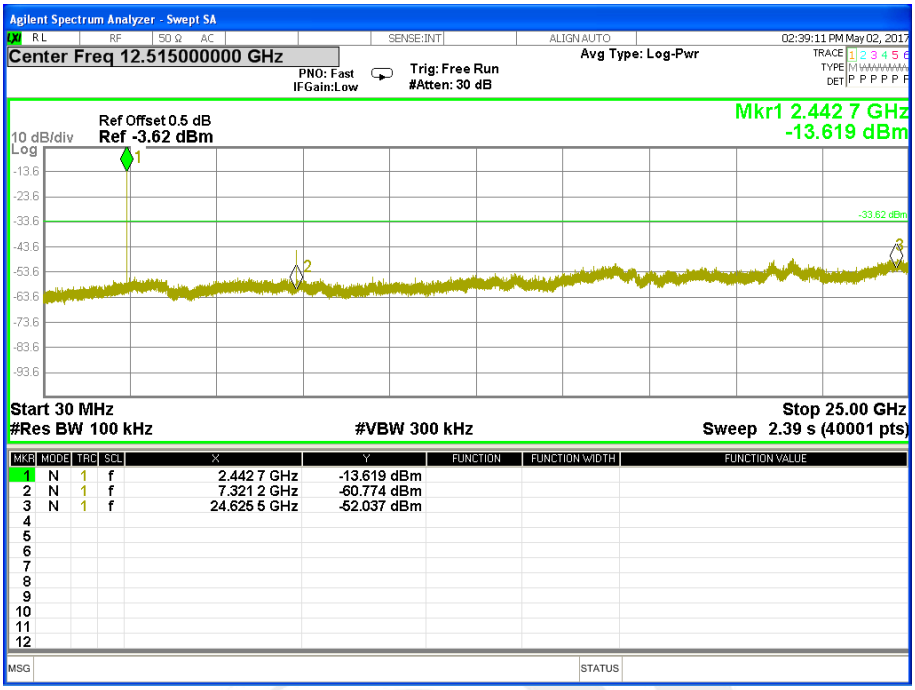
5.5 TEST RESULTS

Temperature:	25 ℃	Relative Humidity:	50%
Pressure:	1012 hPa	Test Voltage:	DC 3V
Test Mode:	TX Mode /CH03, CH41, CH78		

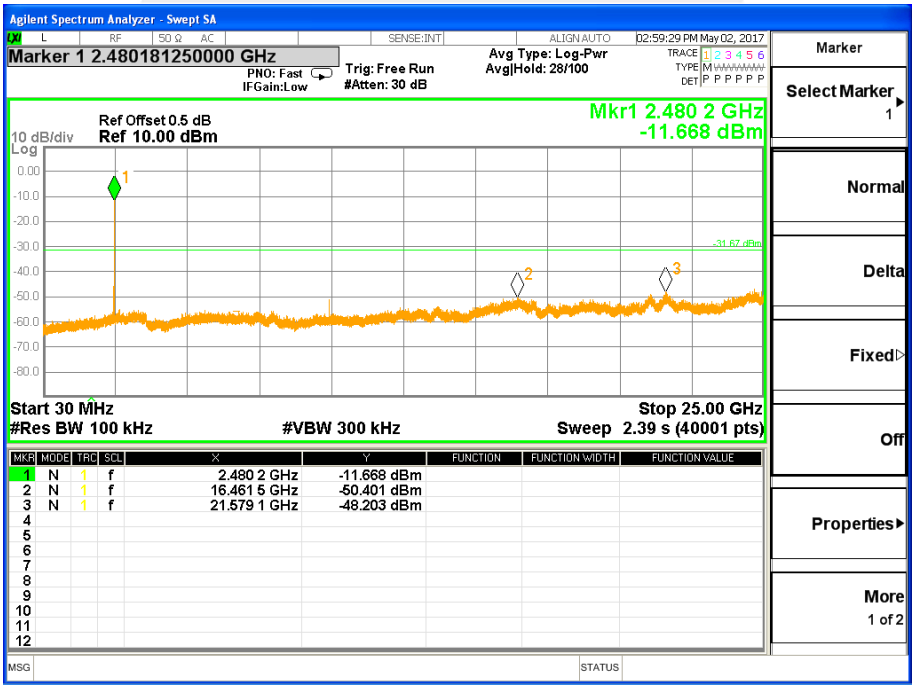
CH 01



CH 12

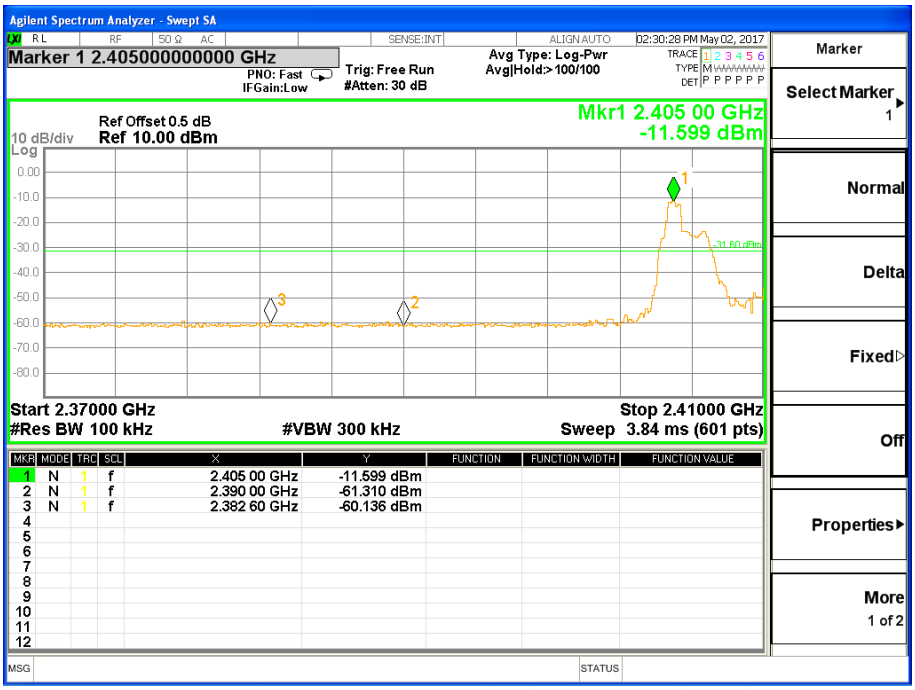

Agilent Spectrum Analyzer - Swept SA
Center Freq 12.515000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
02:39:11 PM May 02, 2017
Ref Offset 0.5 dB
10 dB/div
Ref -3.62 dBm
Mkr1 2.442 7 GHz
-13.619 dBm
-33.62 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.39 s (40001 pts)
1 N 1 f 2.442 7 GHz -13.619 dBm
2 N 1 f 7.321 2 GHz -60.774 dBm
3 N 1 f 24.625 5 GHz -52.037 dBm

CH 24

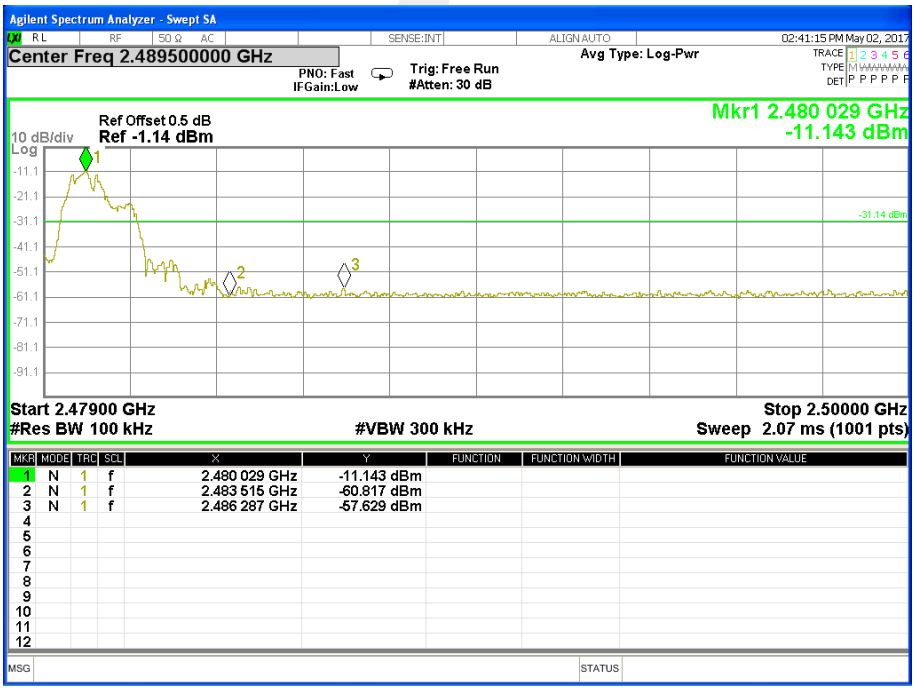

Agilent Spectrum Analyzer - Swept SA
Marker 1 2.480181250000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold: 28/100
02:59:29 PM May 02, 2017
Ref Offset 0.5 dB
10 dB/div
Ref 10.00 dBm
Mkr1 2.480 2 GHz
-11.668 dBm
-31.67 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.39 s (40001 pts)
1 N 1 f 2.480 2 GHz -11.668 dBm
2 N 1 f 16.461 5 GHz -50.401 dBm
3 N 1 f 21.579 1 GHz -48.203 dBm
Marker
Select Marker 1
Normal
Delta
Fixed
Off
Properties
More 1 of 2

For Band edge

CH 01



CH 24



6. POWER SPECTRAL DENSITY TEST

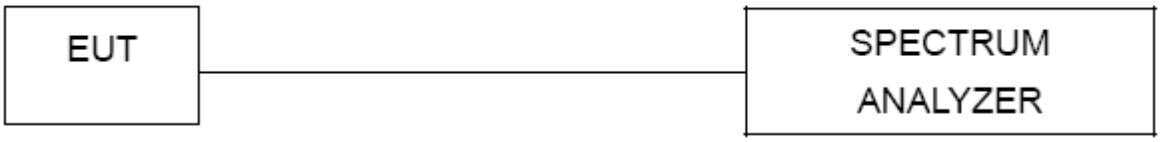
6.1 APPLIED PROCEDURES / LIMIT

FCC Part 15.247,Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(e)	Power Spectral Density	≤8 dBm (RBW≥3KHz)	2400-2483.5	PASS

6.2 TEST PROCEDURE

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. Set the RBW to: 100 kHz ≥ RBW ≥ 3 kHz.
4. Set the VBW ≥ 3 x RBW.
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 amplitude level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

6.3 TEST SETUP



6.4 EUT OPERATION CONDITIONS

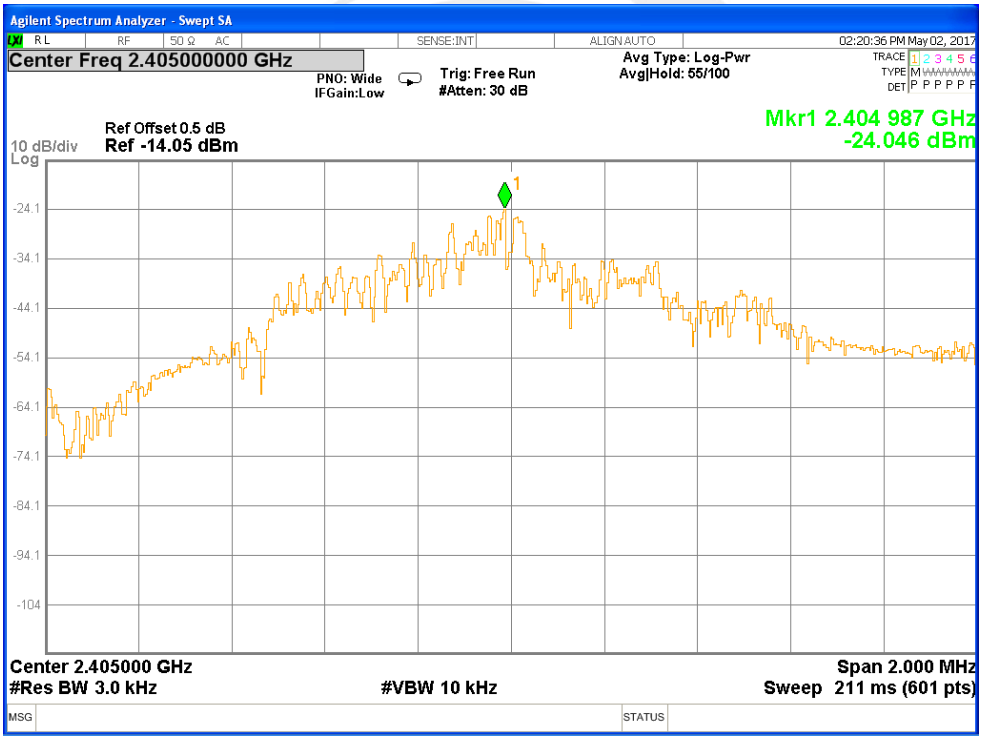
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

6.5 TEST RESULTS

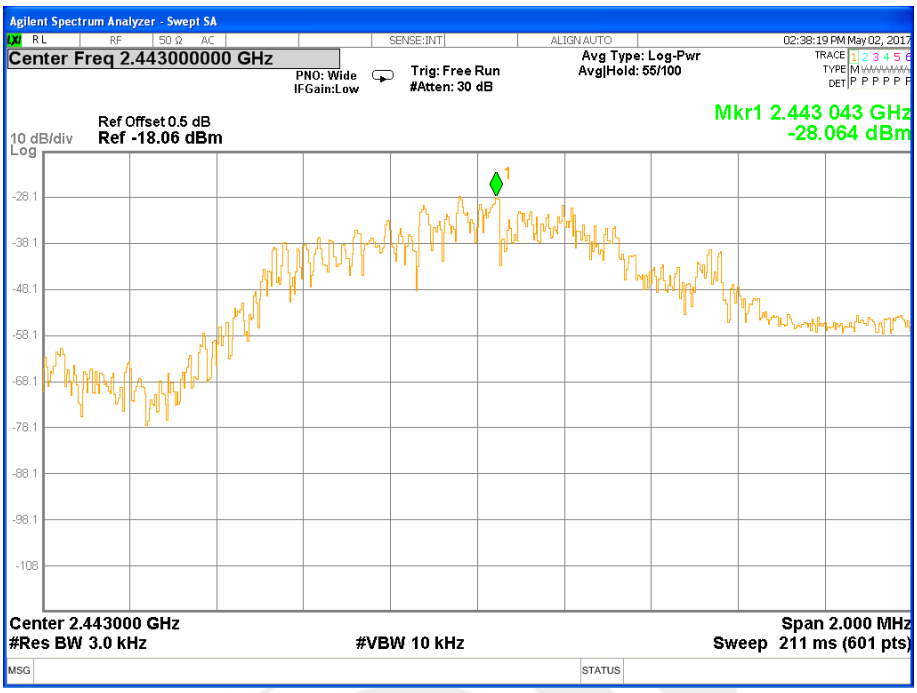
Temperature:	25 ℃	Relative Humidity:	60%
Pressure:	1015 hPa	Test Voltage:	DC 3V
Test Mode:	TX Mode /CH03, CH41, CH78		

Frequency	Power Density (dBm/3kHz)	Limit (dBm/3KHz)	Result
2405 MHz	-24.046	≤8	PASS
2443 MHz	-28.064	≤8	PASS
2480 MHz	-25.664	≤8	PASS

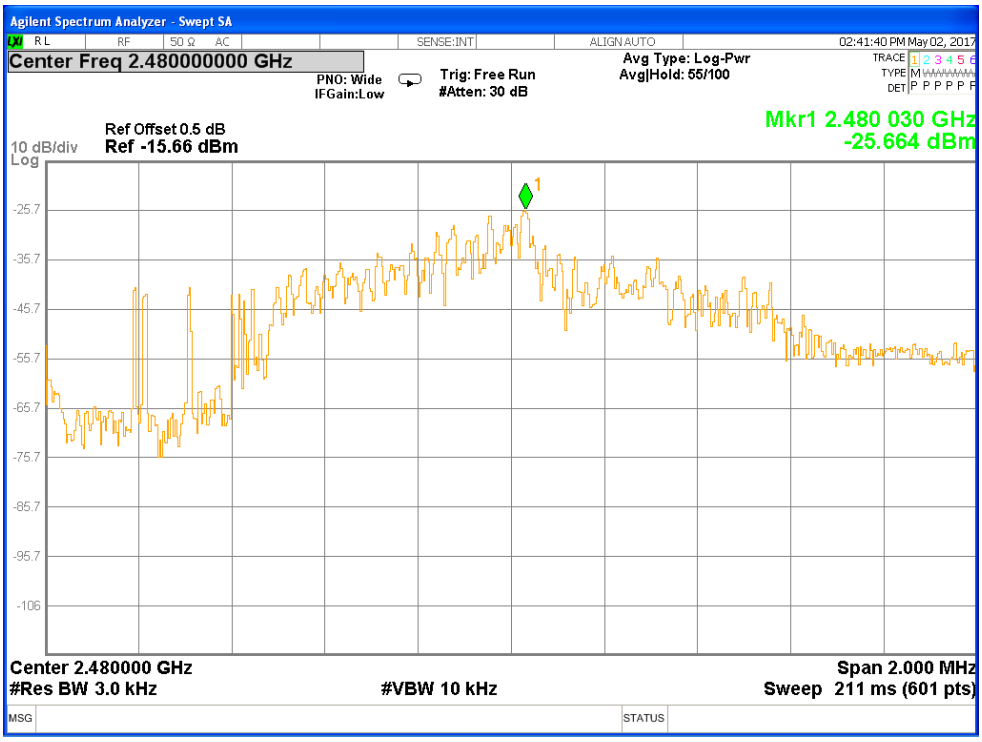
TX CH01



TX CH12



TX CH24



7. BANDWIDTH TEST

7.1 APPLIED PROCEDURES / LIMIT

FCC Part 15.247,Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	>= 500KHz (6dB bandwidth)	2400-2483.5	PASS

7.2 TEST PROCEDURE

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW≥3RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be≥6 dB.

7.3 TEST SETUP

7.4 EUT OPERATION CONDITIONS

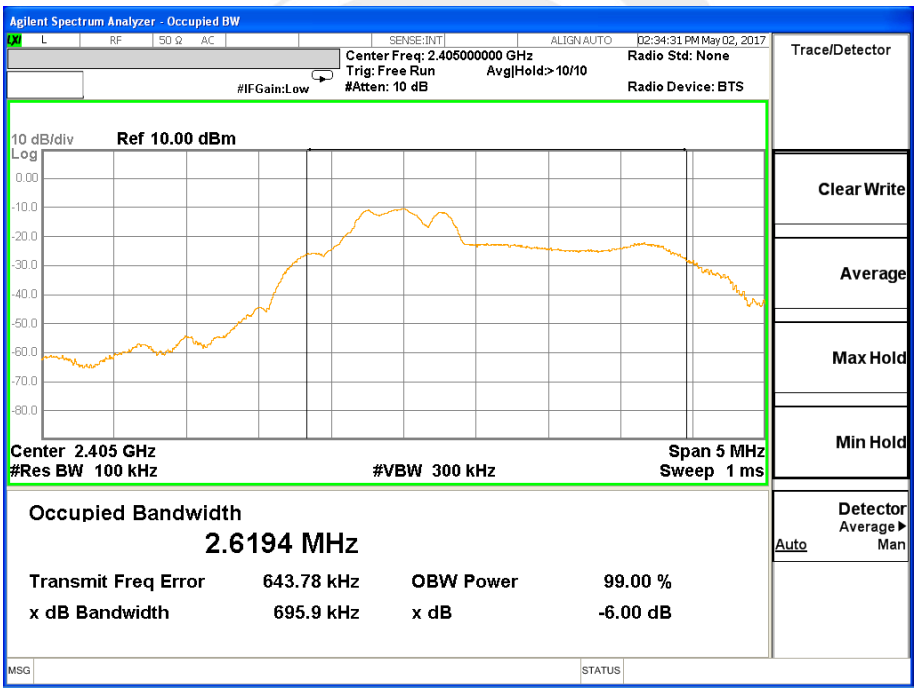
The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

7.5 TEST RESULTS

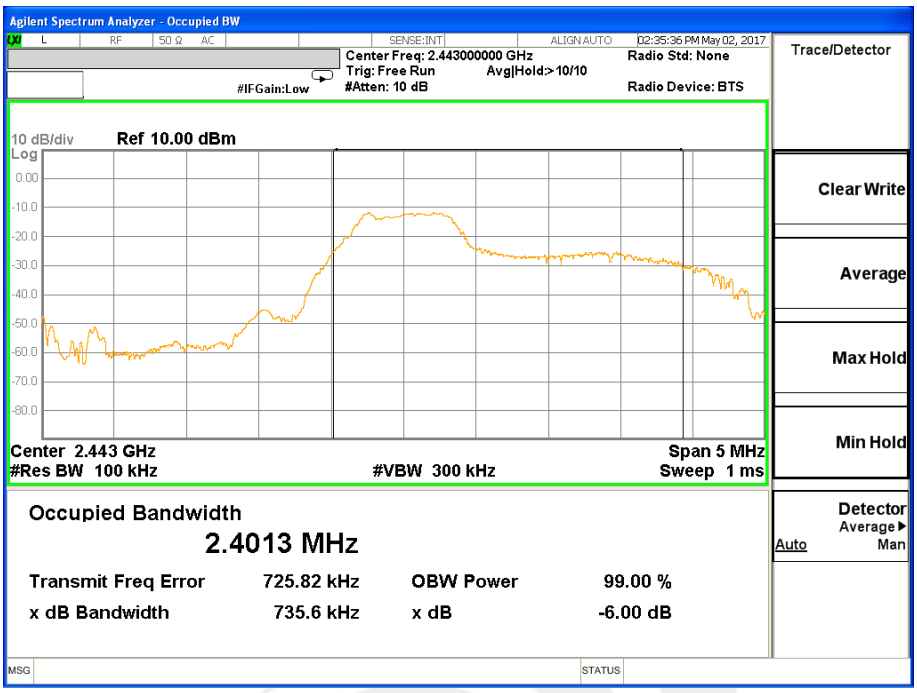
Temperature:	25 ℃	Relative Humidity:	60%
Pressure:	1012 hPa	Test Voltage:	DC 3V
Test Mode:	TX Mode /CH03, CH41, CH78		

Frequency	6dB Bandwidth (MHz)	Channel Separation (MHz)	Result
2405 MHz	0.6959	>=500KHz	PASS
2443 MHz	0.7356	>=500KHz	PASS
2480 MHz	1.8070	>=500KHz	PASS

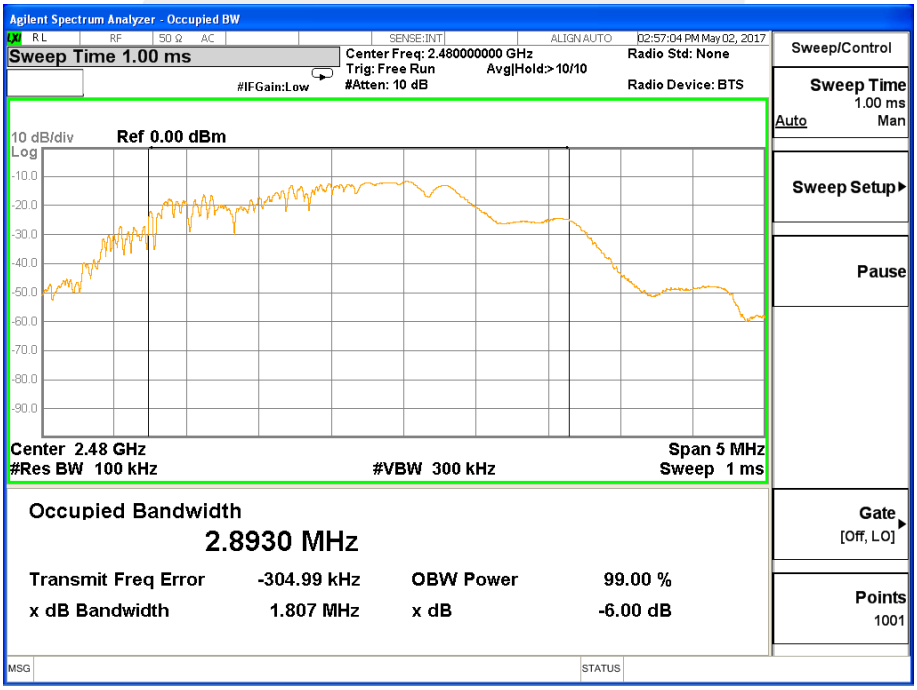
TX CH 01



TX CH 12



TX CH 24



8. PEAK OUTPUT POWER TEST

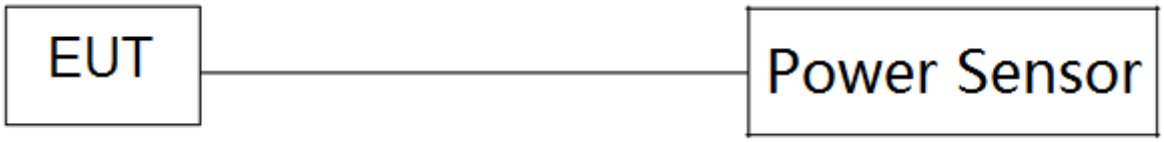
8.1 APPLIED PROCEDURES / LIMIT

FCC Part 15.247,Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Output Power	1 watt or 30dBm	2400-2483.5	PASS

8.2 TEST PROCEDURE

a. The EUT was directly connected to the Power Sensor&PC

8.3 TEST SETUP



8.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.3 Unless otherwise a special operating condition is specified in the follows during the testing.

8.5 TEST RESULTS

Temperature:	25 ℃	Relative Humidity:	60%
Pressure:	1012 hPa	Test Voltage:	DC 3V
Test Mode:	TX Mode /CH01, CH12, CH24		

TX Mode				
Test Channel	Frequency	Conducted Output Power		LIMIT
	(MHz)	Peak (dBm)	AVG (dBm)	dBm
CH01	2405	-10.89	-12.86	30
CH12	2443	-11.35	-13.38	30
CH24	2480	-11.08	-13.12	30

9. ANTENNA REQUIREMENT

9.1 STANDARD REQUIREMENT

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

9.2 EUT ANTENNA

The EUT antenna is Internal PCB Antenna. It comply with the standard requirement.

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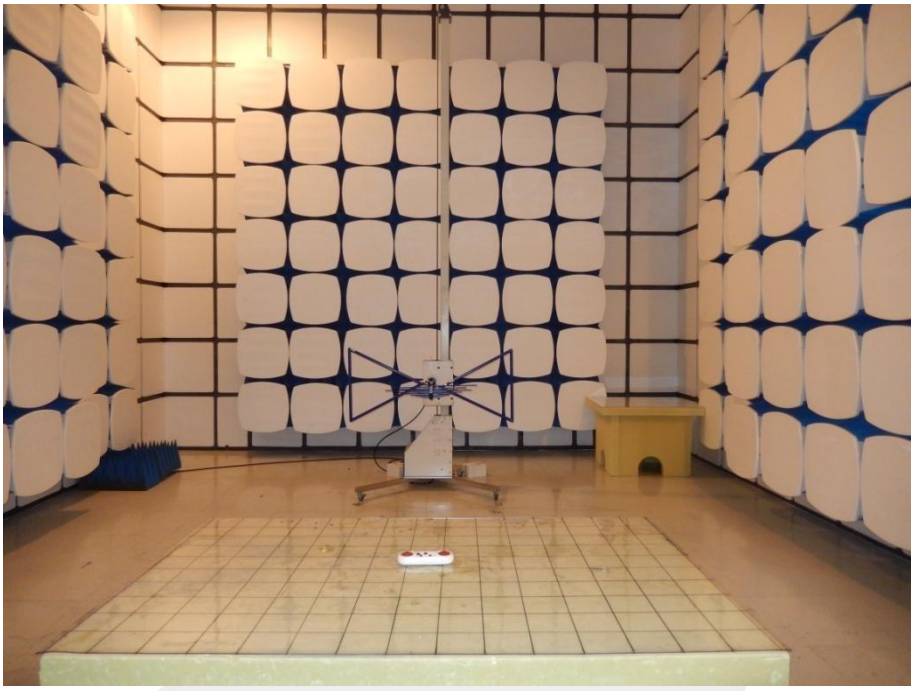
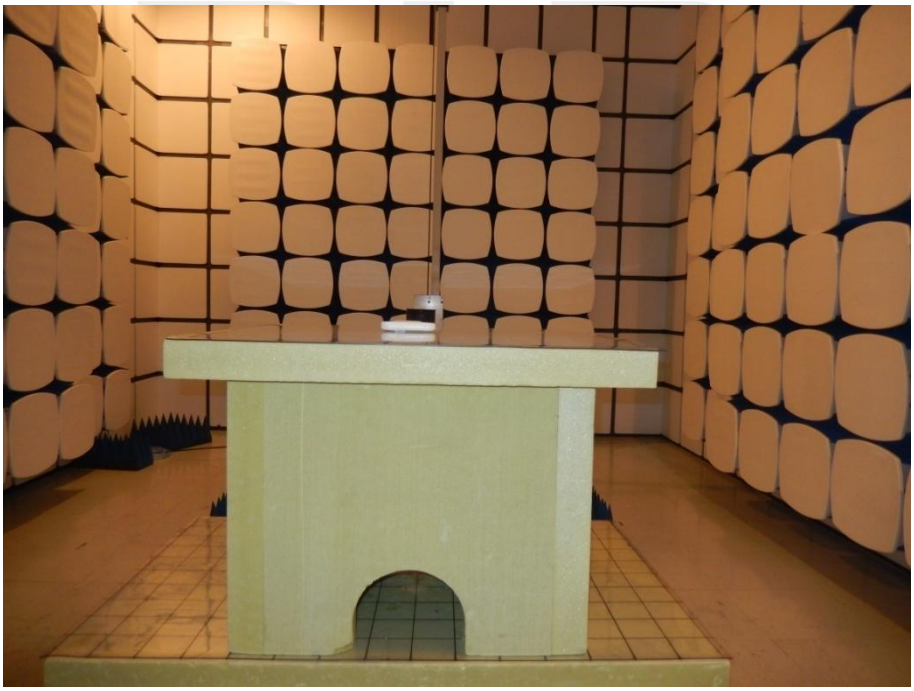
10. EUT TEST PHOTO

Radiated Measurement Photos





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