

# FCC Test Report

Product Name : Insyde  
Trade Name : Cardo  
Model No. : Insyde  
FCC ID : Q95ER27

Applicant : Cardo Systems, LTD

Address : 101 E. Park Blvd., Suite 600, Plano TX, 75074, USA

Date of Receipt : Aug. 25, 2020  
Issued Date : Feb. 04, 2021  
Report No. : 2080779R-E3032110110  
Report Version : V1.0



The test results relate only to the samples tested.

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# Test Report Certification

Issued Date : Feb. 04, 2021

Report No. : 2080779R-E3032110110



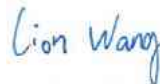
Product Name : Insyde  
Applicant : Cardo Systems, LTD  
Address : 101 E. Park Blvd., Suite 600, Plano TX, 75074, USA  
Manufacturer : Cardo Systems, LTD  
Address : 101 E. Park Blvd., Suite 600, Plano TX, 75074, USA  
Trade Name : Cardo  
Model No. : Insyde  
FCC ID : Q95ER27  
EUT Test Voltage : DC 5V (Power by USB)  
DC 3.7V (Power by Battery)  
Testing Voltage : AC 120V/60Hz  
Applicable Standard : FCC CFR Title 47 Part 15 Subpart C Section 15.247: 2019  
ANSI C63.10: 2013  
Laboratory Name : Hsin Chu Laboratory  
Address : No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu  
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TEL: +886-3-582-8001 / FAX: +886-3-582-8958  
Test Result : Complied

Documented By :



( Demi Chang / Senior Engineering Adm. Specialist )

Tested By :



( Lion Wang / Senior Engineer )

Approved By :



( Louis Hsu / Deputy Manager )

**Revision History**

Version	Description	Issued Date
V1.0	Initial issue of report	Feb. 04, 2021

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## 1. General Information

### 1.1. EUT Description

Product Name	Insyde
Product Type	Zigbee
Trade Name	Cardo
Model No.	Insyde
Frequency Range/ Channel Number	2405 / 1 Channels
Type of Modulation	OQPSK
Data Speed	1Mbps

Antenna Information				
No.	Manufacturer	Model No.	Antenna Type	Antenna Gain
0	N/A	N/A	PCB Antenna	0.1 dBi

Accessories Information	
Microphone	1pcs, Non-Shielded, 0.2m
Headphone	1pcs, Non-Shielded, 0.55m
USB Cable	Shielded, 0.5 m

Working Frequency of Each Channel	
Channel	Frequency
1	2405MHz

#### Note:

1. This device is a Insyde including Zigbee, BT2.0 and BT 5.0 transmitting functions.
2. These test results on a sample of the device are for the purpose of demonstrating Compliance with Part 15 Subpart C Paragraph 15.247.
3. Regards to the frequency band operation; the lowest, middle and highest frequency of channel were selected to perform the test, and then shown on this report.
4. The spurious emission was measured in three position (X, Y & Z axis), and the worst case (X axis) was recorded in the report.
5. The EUT description is from the customer declaration.

## 1.2. Test Mode

DEKRA has verified the construction and function in typical operation. The preliminary tests were performed in different data rate, and to find the worst condition, which was shown in this test report. The following table is the final test mode.

Test Mode	Mode 1: Transmit mode
-----------	-----------------------

Test Items	Modulation	Channel	Antenna	Result
Conducted Emission	OQPSK	1	0	Complies
Maximum peak conducted output power	OQPSK	1	0	Complies
Radiated Emission	OQPSK	1	0	Complies
RF antenna conducted test	OQPSK	1	0	Complies
Bandedge	OQPSK	1	0	Complies
DTS Bandwidth	OQPSK	1	0	Complies
Occupied Bandwidth	OQPSK	1	0	Complies
Power Density	OQPSK	1	0	Complies

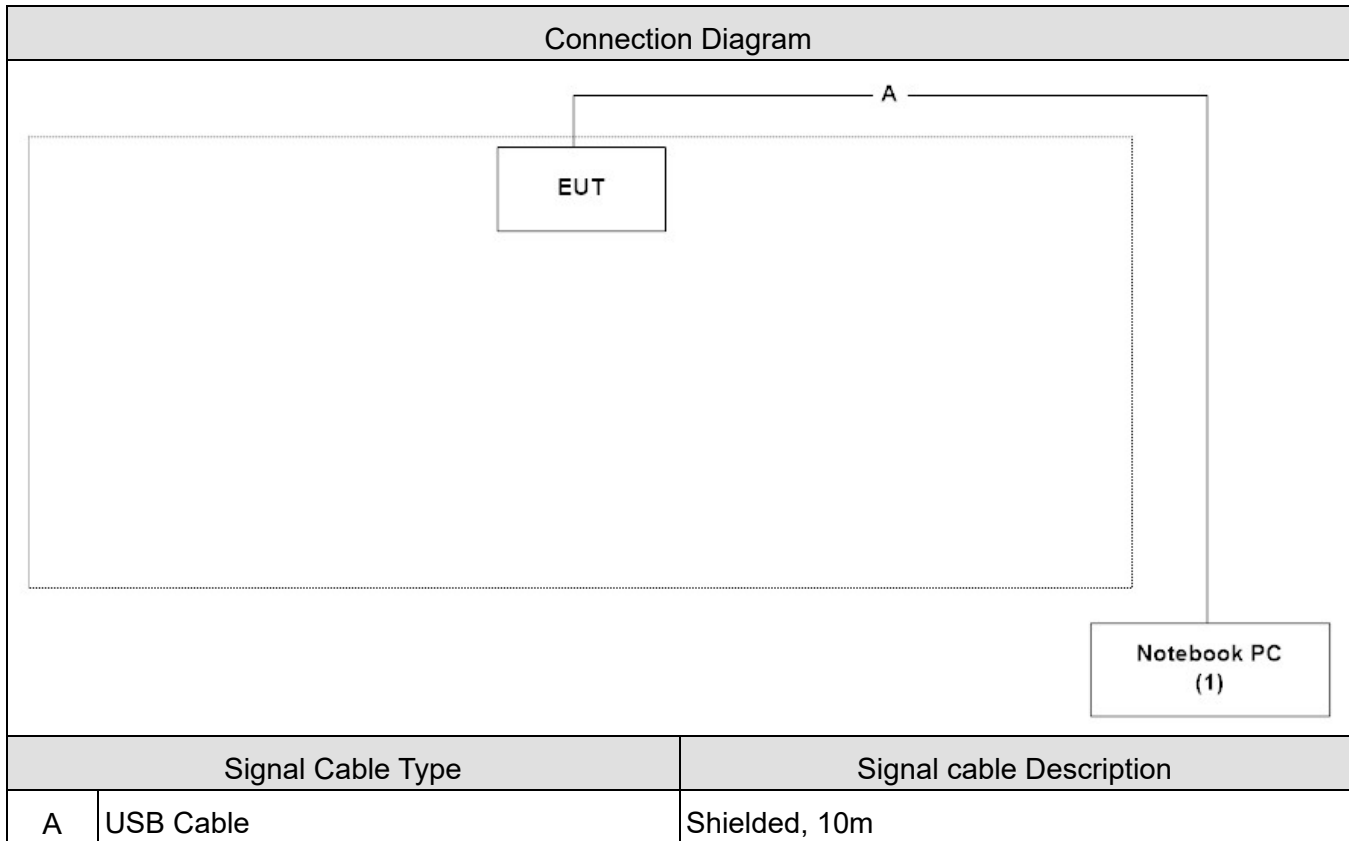
Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

### 1.3. Tested System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	FCC ID	Power Cord
1   Notebook PC	Lenovo	Thinkpad	N/A	DoC	Non-Shielded, 1.8m, one ferrite core bonded.

### 1.4. Configuration of tested System



### 1.5. EUT Exercise Software

1	Set the EUT as shown.
2	Configure test mode, test channel and packet.
3	Let the EUT start transmitting signal continuously.
4	Verify that device is working properly



## 1.6. Test Facility

Ambient conditions in the laboratory:

Items	Test Item	Required	Test Site
Temperature (°C)	FCC PART 15 C 15.207	15 - 35	2
Humidity (%RH)	Conducted Emission	25 - 75	
Temperature (°C)	FCC PART 15 C 15.247	15 - 35	1
Humidity (%RH)	Maximum peak conducted output power	25 - 75	
Temperature (°C)	FCC PART 15 C 15.247	15 - 35	1
Humidity (%RH)	Radiated Emission	25 - 75	
Temperature (°C)	FCC PART 15 C 15.247	15 - 35	1
Humidity (%RH)	RF antenna conducted test	25 - 75	
Temperature (°C)	FCC PART 15 C 15.247	15 - 35	1
Humidity (%RH)	Bandedge	25 - 75	
Temperature (°C)	FCC PART 15 C 15.247	15 - 35	1
Humidity (%RH)	Occupied Bandwidth & DTS Bandwidth	25 - 75	
Temperature (°C)	FCC PART 15 C 15.247	15 - 35	1
Humidity (%RH)	Power Density	25 - 75	

Note: Test Site information refers to Laboratory Information.

**Laboratory Information**

<b>USA</b>	<b>: FCC Registration Number: TW3024</b>
<b>Canada</b>	<b>: IC Registration Number: 22397-1 / 22397-2 / 22397-3</b>

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: <http://www.dekra.com.tw>

If you have any comments, please don't hesitate to contact us. Our test sites as below:

Test Laboratory	DEKRA Testing and Certification Co., Ltd.
Address	1. No.372, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C. 2. No.372-2, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County 31061, Taiwan, R.O.C.
Phone number	1. +886-3-582-8001 2. +886-3-582-8001
Fax number	1. +886-3-582-8958 2. +886-3-582-8958
E mail address	<a href="mailto:info.tw@dekra.com">info.tw@dekra.com</a>
Website	<a href="http://www.dekra.com.tw">http://www.dekra.com.tw</a>

## 1.7. List of Test Equipment

### Conducted Emission / SR2-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Artificial Mains Network	R&S	ENV4200	848411/010	2020/01/08	2021/01/07
Test Receiver	R&S	ESCS 30	836858/022	2020/02/25	2021/02/24
LISN	R&S	ENV216	100092	2020/06/22	2021/06/21

### Maximum peak conducted output power / SR12-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
High Speed Peak Power Meter Dual Input	Anritsu	ML2496A	1602004	2020/11/30	2021/11/29
Pulse Power Sensor	Anritsu	MA2411B	1531043	2020/11/30	2021/11/29
Pulse Power Sensor	Anritsu	MA2411B	1531044	2020/11/30	2021/11/29
Power Meter	Keysight	8990B	MY51000248	2020/05/20	2021/05/19
Power Sensor	Keysight	N1923A	MY57240005	2020/05/20	2021/05/19

### Radiated Emission / CB2-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Signal Analyzer	R&S	FSVA40	101455	2020/10/12	2021/10/11
Signal & Spectrum Analyzer	R&S	FSV40	101049	2020/03/30	2021/03/29
EXA Signal Analyzer	Keysight	N9010A	MY51440132	2020/02/21	2021/02/20
Bilog Antenna	Teseq	CBL6112D	23191	2020/06/12	2021/06/11
Horn Antenna	Schwarzbeck	BBHA 9120D	639	2020/06/04	2021/06/03
Horn Antenna	Schwarzbeck	BBHA 9170	202	2020/12/16	2021/12/15
Pre-Amplifier	DEKRA	AP-025C	12183122	2020/09/03	2021/09/02
Pre-Amplifier	EMCI	EMC11830I	980366	2020/11/30	2021/11/29
Pre-Amplifier	DEKRA	AP-400C	201801231	2020/11/16	2021/11/15
Horn Antenna	Schwarzbeck	BBHA 9120D	01656	2020/10/14	2021/10/13
Band Reject Filter	Micro-Tronics	BRM50702	G192	2020/03/09	2021/03/08
Signal Analyzer	R&S	FSV40	101435	2020/06/24	2021/06/23
Coaxial Cable(13m)	Huber+Suhner	SF104	CB2-H	2020/07/25	2021/07/24
DEKRA Testing System	DEKRA	Version 1.2	CB2-H	NA	NA

## RF antenna conducted test / SR12-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Spectrum Analyzer	Keysight	N9030B	MY57140404	2020/06/03	2021/06/02
Spectrum Analyzer	Keysight	N9010B	MY57110159	2020/04/15	2021/04/14
Spectrum Analyzer	Agilent	N9010A	US47140172	2020/06/18	2021/06/17
Signal & Spectrum Analyzer	R&S	FSV40	101049	2020/03/30	2021/03/29

## Bandedge / SR12-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Spectrum Analyzer	Keysight	N9030B	MY57140404	2020/06/03	2021/06/02
Spectrum Analyzer	Keysight	N9010B	MY57110159	2020/04/15	2021/04/14
Spectrum Analyzer	Agilent	N9010A	US47140172	2020/06/18	2021/06/17
Signal & Spectrum Analyzer	R&S	FSV40	101049	2020/03/30	2021/03/29

## Occupied Bandwidth / SR12-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Spectrum Analyzer	Keysight	N9030B	MY57140404	2020/06/03	2021/06/02
Spectrum Analyzer	Keysight	N9010B	MY57110159	2020/04/15	2021/04/14
Spectrum Analyzer	Agilent	N9010A	US47140172	2020/06/18	2021/06/17
Signal & Spectrum Analyzer	R&S	FSV40	101049	2020/03/30	2021/03/29

## DTS Bandwidth / SR12-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Spectrum Analyzer	Keysight	N9030B	MY57140404	2020/06/03	2021/06/02
Spectrum Analyzer	Keysight	N9010B	MY57110159	2020/04/15	2021/04/14
Spectrum Analyzer	Agilent	N9010A	US47140172	2020/06/18	2021/06/17
Signal & Spectrum Analyzer	R&S	FSV40	101049	2020/03/30	2021/03/29

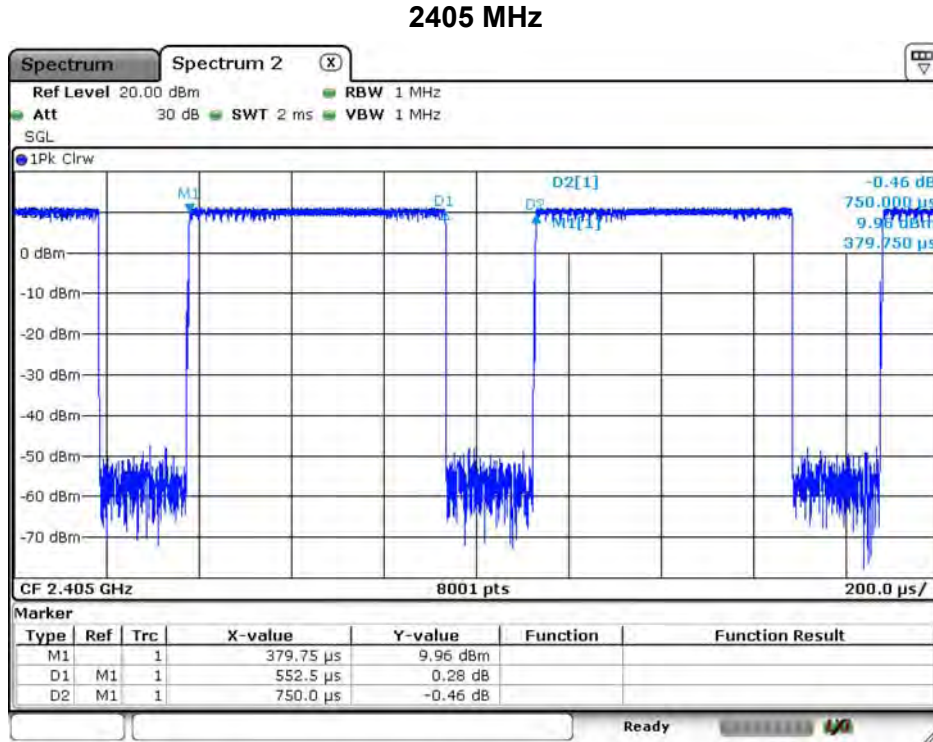
## Power Density / SR12-H

Instrument	Manufacturer	Model No.	Serial No.	Cal. Date	Next Cal. Date
Spectrum Analyzer	Keysight	N9030B	MY57140404	2020/06/03	2021/06/02
Spectrum Analyzer	Keysight	N9010B	MY57110159	2020/04/15	2021/04/14
Spectrum Analyzer	Agilent	N9010A	US47140172	2020/06/18	2021/06/17
Signal & Spectrum Analyzer	R&S	FSV40	101049	2020/03/30	2021/03/29

Note: All equipment upon which need to calibrated are with calibration period of 1 year.

### 1.8. Duty Cycle

Zigbee mode						
Mode	On Time (ms)	On+Off Time(ms)	Duty Cycle (%)	Duty Factor(dB) linear voltage	Duty Factor(dB) Power	1/T Minimum VBW (kHz)
IEEE 802.15.1	0.552	0.750	73.60%	2.662444	1.33	1.812



Date: 27.OCT.2020 19:32:50

**1.9. Uncertainty**

Test item	Uncertainty
Maximum peak conducted output power	$\pm 1.27$ dB
Radiated Emission	30MHz~1GHz as $\pm 3.43$ dB 1GHz~26.5GHz as $\pm 3.65$ dB
RF antenna conducted test	$\pm 1.27$ dB
Bandedge	$\pm 1.27$ dB
DTS Bandwidth	$\pm 50$ Hz
Occupied Bandwidth	$\pm 50$ Hz
Power Density	$\pm 1.27$ dB

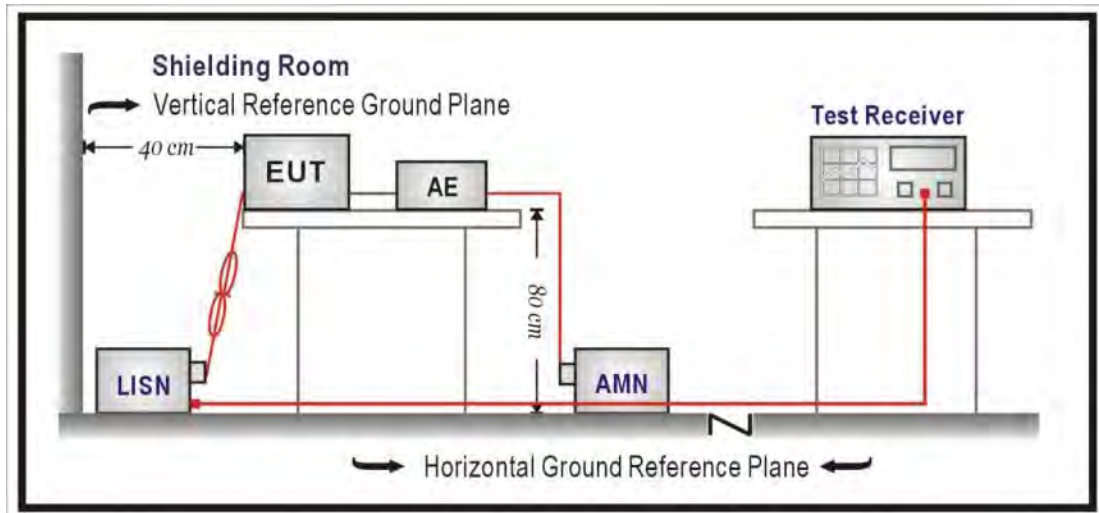
## 2. **Aetenna Requirements**

According to FCC 47CFR 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.



### 3. Conducted Emission

#### 3.1. Test Setup



#### 3.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 Limits (dBuV)		
Frequency MHz	QP	AV
0.15 - 0.50	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30	60	50

Remarks: In the above table, the tighter limit applies at the band edges.

### **3.3. Test Procedure**

The EUT was setup according to ANSI C63.4: 2014 and tested according to DTS test procedure of KDB558074 for compliance to FCC 47CFR 15.247 requirements.

The EUT was placed on a platform of nominal size, 1 m by 1.5 m, raised 80 cm above the conducting ground plane. The vertical conducting plane was located 40 cm to the rear of the EUT. All other surfaces of EUT were at least 80 cm from any other grounded conducting surface. The EUT and simulators are connected to the main power through a line impedance stabilization network (LISN). The LISN provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN. (Please refer to the block diagram of the test setup and photographs.)

Each current-carrying conductor of the EUT power cord, except the ground (safety) conductor, was individually connected through a LISN to the input power source.

The excess length of the power cord between the EUT and the LISN receptacle were folded back and forth at the center of the lead to form a bundle not exceeding 40 cm in length.

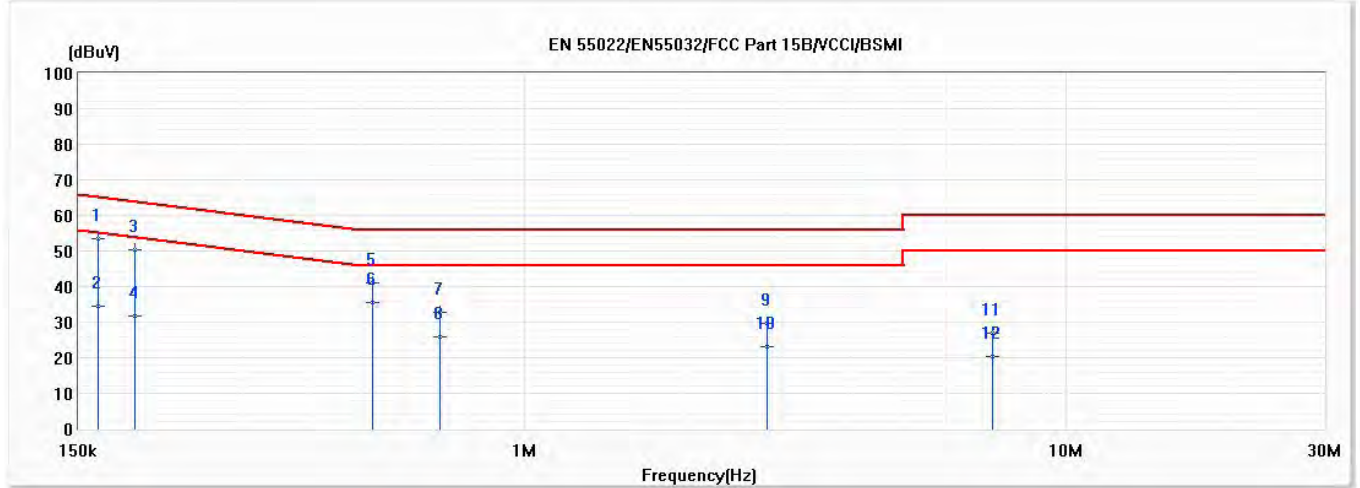
Conducted emissions were investigated over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9 kHz.

### **3.4. Test Specification**

According to FCC Part 15 Subpart C Paragraph 15.207: 2019

### 3.5. Test Result

Model No	Insyde	Site	SR2-H
Test Voltage	AC 120V/60Hz	Test Date	2020/12/22
Test Mode	Mode 1: Transmit mode	Engineer	Lion Wang
Phase	L	Temperature (°C)	20.4
Test Condition	CE_2405MHz	Humidity (%RH)	52.3

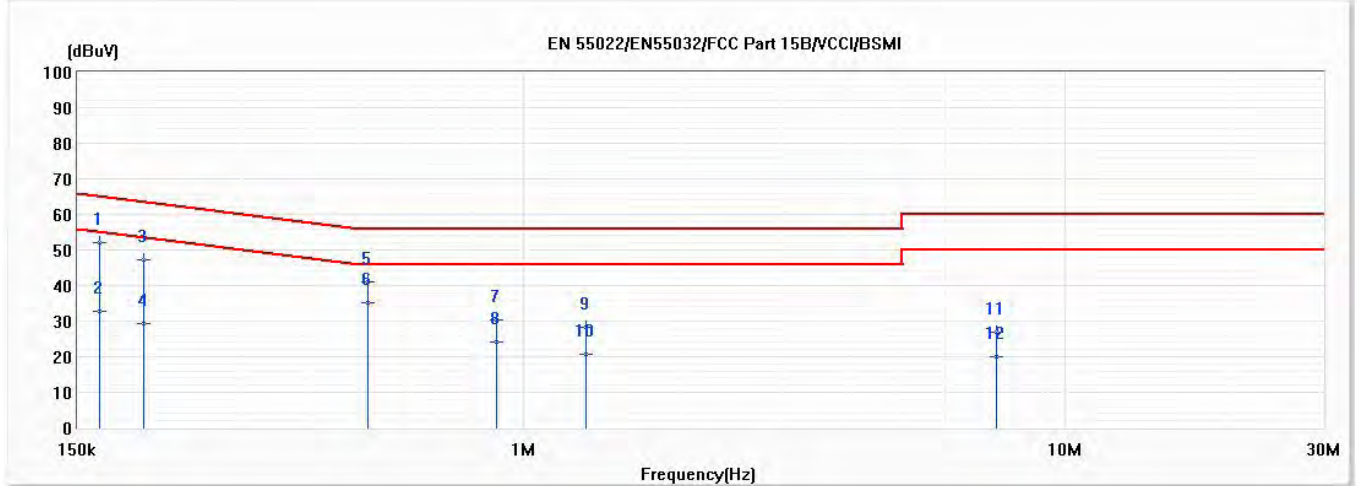


No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.163	53.28	65.31	-12.03	43.63	9.65	QP
2	0.163	34.48	55.31	-20.84	24.83	9.65	AV
3	0.191	50.22	64.01	-13.79	40.57	9.64	QP
4	0.191	31.78	54.01	-22.22	22.14	9.64	AV
5	0.524	41.19	56.00	-14.81	31.49	9.69	QP
*6	0.524	35.52	46.00	-10.48	25.83	9.69	AV
7	0.696	32.82	56.00	-23.18	23.11	9.71	QP
8	0.696	25.70	46.00	-20.30	15.99	9.71	AV
9	2.809	29.73	56.00	-26.27	19.90	9.83	QP
10	2.809	23.12	46.00	-22.88	13.29	9.83	AV
11	7.311	26.99	60.00	-33.01	16.96	10.03	QP
12	7.311	20.26	50.00	-29.74	10.24	10.03	AV

Remark:

1. "\*" means this data is the worst emission level.
2. Emission Level = Reading Level + Correct Factor (Correct Factor = LISN Insertion Loss + Cable Loss).
3. Margin = Emission Level - Limit.

Model No	Insyde	Site	SR2-H
Test Voltage	AC 120V/60Hz	Test Date	2020/12/22
Test Mode	Mode 1: Transmit mode	Engineer	Lion Wang
Phase	N	Temperature (°C)	20.4
Test Condition	CE_2405MHz	Humidity (%RH)	52.3



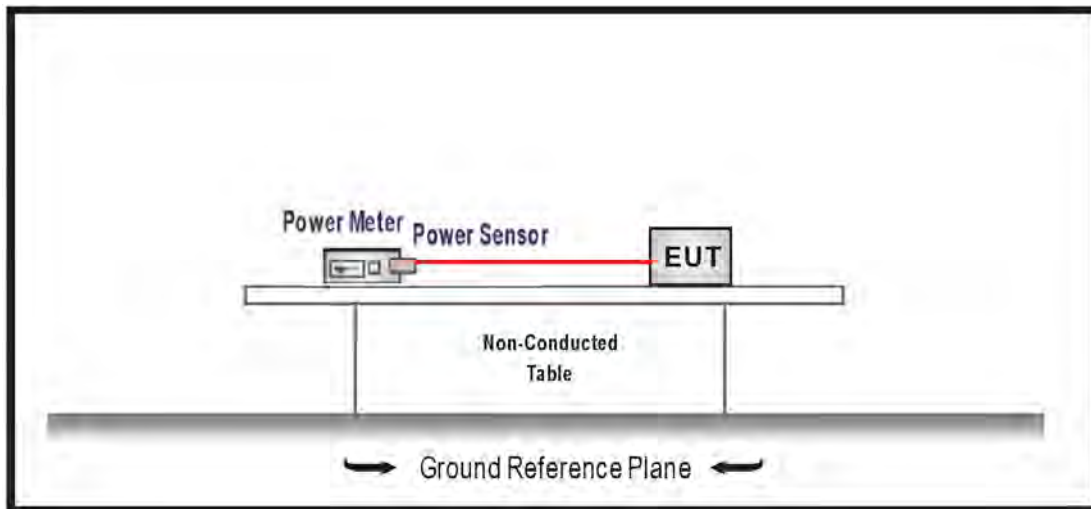
No	Frequency (MHz)	Emission Level (dBuV)	Limit (dBuV)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	0.165	52.07	65.20	-13.13	42.43	9.64	QP
2	0.165	32.74	55.20	-22.46	23.10	9.64	AV
3	0.198	47.18	63.68	-16.50	37.55	9.64	QP
4	0.198	29.45	53.68	-24.23	19.82	9.64	AV
5	0.515	40.90	56.00	-15.10	31.21	9.68	QP
*6	0.515	35.31	46.00	-10.69	25.63	9.68	AV
7	0.893	30.38	56.00	-25.62	20.67	9.71	QP
8	0.893	24.16	46.00	-21.84	14.45	9.71	AV
9	1.301	28.39	56.00	-27.61	18.65	9.74	QP
10	1.301	20.56	46.00	-25.44	10.82	9.74	AV
11	7.479	27.02	60.00	-32.98	16.98	10.04	QP
12	7.479	20.09	50.00	-29.91	10.06	10.04	AV

Remark:

1. "\*" means this data is the worst emission level.
2. Emission Level = Reading Level + Correct Factor (Correct Factor = LISN Insertion Loss + Cable Loss).
3. Margin = Emission Level - Limit.

#### 4. Maximum peak conducted output power

##### 4.1. Test Setup



##### 4.2. Test procedures

The EUT was tested according to DTS test procedure section 9.1.2 of KDB 558074 D01 V05 Measurement to FCC 47CFR 15.247 requirements.

##### 4.3. Limits

The maximum peak power shall be less 1 Watt.

##### 4.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247: 2019

#### 4.5. Test Result

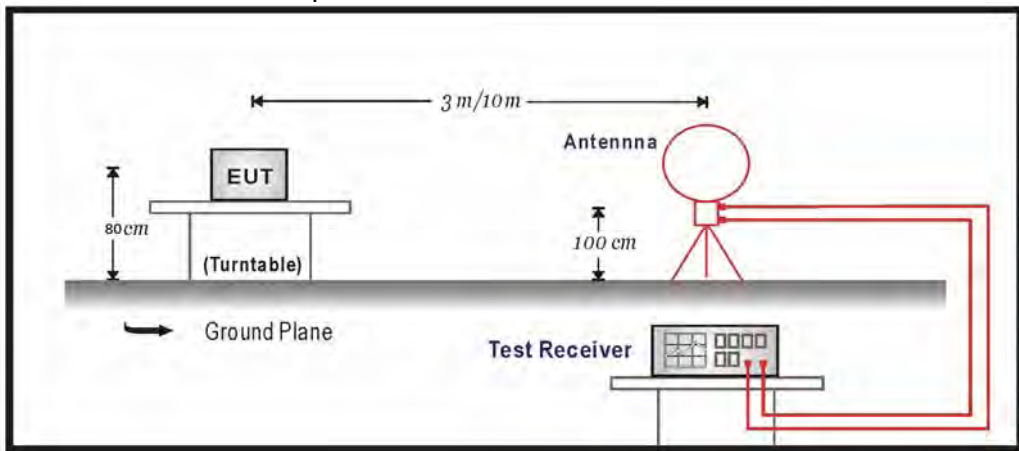
Product	Insyde		
Test Item	Maximum peak conducted output power		
Test Mode	Mode 1: Transmit mode		
Date of Test	2020/10/27	Test Site	SR12-H
Temperature(°C)	24	Humidity (%RH)	62

IEEE 802.15.1 _Zigbee			
Channel No.	Frequency (MHz)	Measure Value (dBm)	Limit (dBm)
1	2405	12.730	≤30

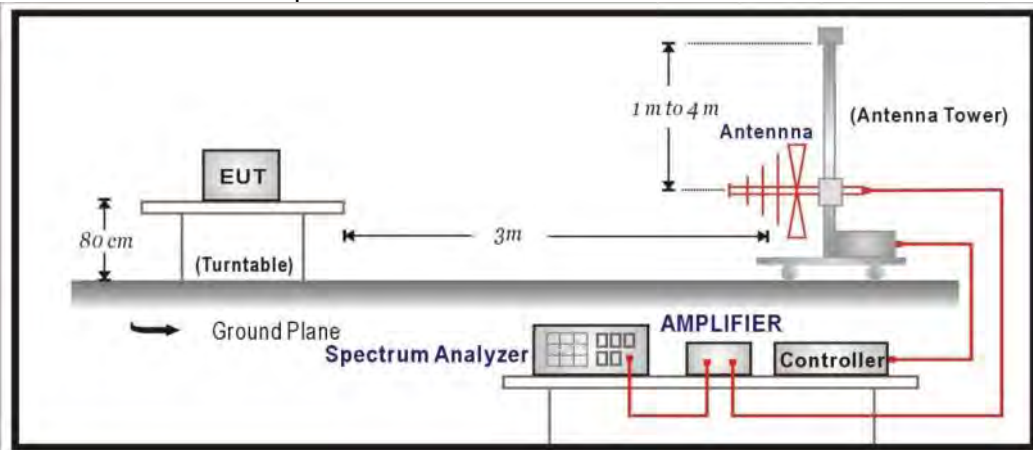
## 5. Radiated Emission

### 5.1. Test Setup

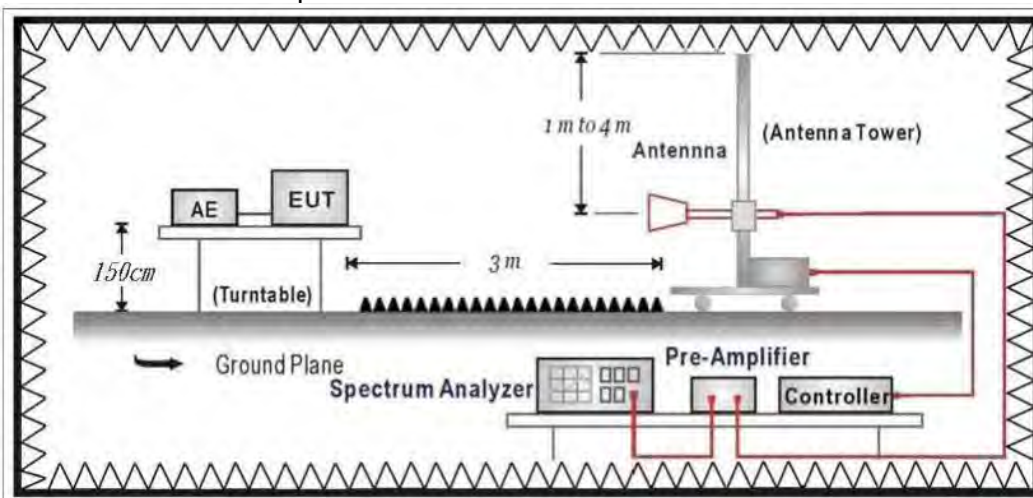
Under 30MHz Test Setup:



Under 1GHz Test Setup:



Above 1GHz Test Setup:



## 5.2. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

<b>FCC Part 15 Subpart C Paragraph 15.209 Limits</b>		
Frequency (MHz)	uV/m	dBuV/m
30-88	100	40
88-216	150	43.5
216-960	200	46
Above 960	500	54

Remarks: E field strength (dBuV/m) = 20 log E field strength (uV/m)

## 5.3. Test Procedure

The EUT was setup according to ANSI C63.10:2013 and tested according to DTS test procedure of KDB 558074 D01 V05 for compliance to FCC 47CFR 15.247 requirements. The EUT and its simulators are placed on a turn table which is 1.5 meter above ground (under 1GHz) or 1.5 meter above ground (above 1GHz). The turn table can rotate 360 degrees to determine the position of the maximum emission level.

The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.10:2013 on radiated measurement.

On any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a quasi-peak detector function and on any frequency or frequencies above 1000 MHz the radiated limits shown are based upon the use of measurement instrumentation employing an average detector function. When average radiated emission measurement are included emission measurement below 1000 MHz, there also is a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit. The bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

## 5.4. Test Specification

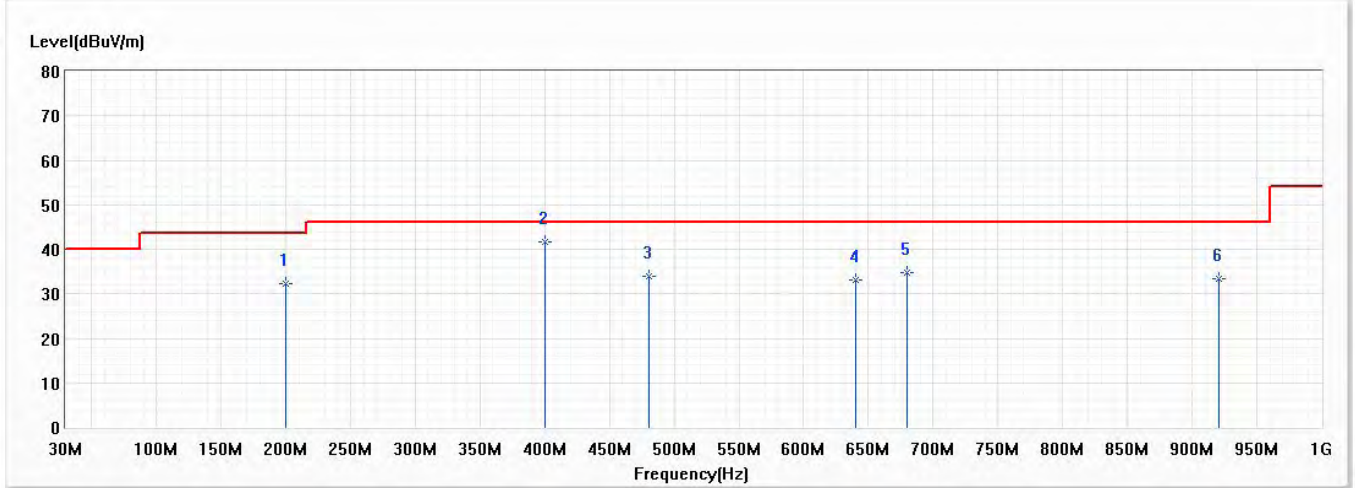
According to FCC Part 15 Subpart C Paragraph 15.247: 2019



### 5.5. Test Result

#### 30MHz-1GHz Spurious

Model No	Insyde	Site	CB2-H
Test Voltage	AC 120V/60Hz	Test Date	2020/12/17
Test Mode	Mode 1: Transmit mode	Engineer	Ling Chen
Polarity	Horizontal	Temperature (°C)	23.5
Test Condition	RE_Zigbee,Ch 1,2.405G	Humidity (%RH)	58.0

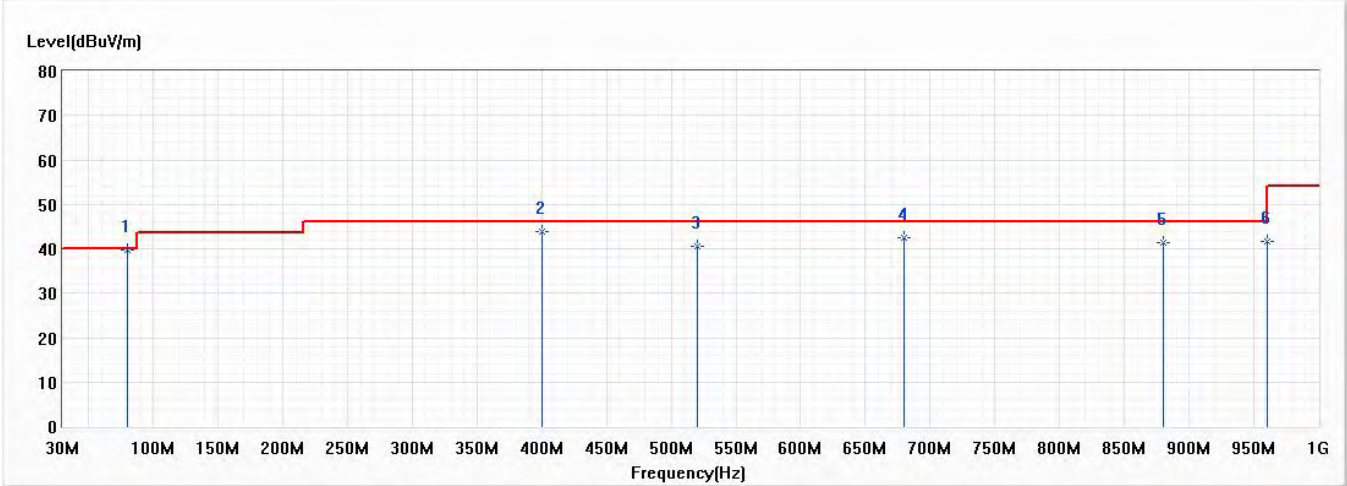


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	199.750	32.33	43.50	-11.17	37.18	-4.85	QP
* 2	400.055	41.60	46.00	-4.40	39.58	2.02	QP
3	480.080	33.82	46.00	-12.18	30.38	3.44	QP
4	640.130	33.00	46.00	-13.00	27.51	5.49	QP
5	679.900	34.65	46.00	-11.35	28.76	5.89	QP
6	920.460	33.36	46.00	-12.64	24.44	8.92	QP

Note:

1. All reading levels is Quasi-Peak value.
2. “ \* ”, means this data is the worst value.
3. Emission Level = Reading Level + Correct Factor
4. The emission under 30MHz were not included is because their levels are lower than 20dB from limit.

Model No	Insyde	Site	CB2-H
Test Voltage	AC 120V/60Hz	Test Date	2020/12/17
Test Mode	Mode 1: Transmit mode	Engineer	Ling Chen
Polarity	Vertical	Temperature (°C)	23.5
Test Condition	RE_Zigbee,Ch 1,2.405G	Humidity (%RH)	58.0



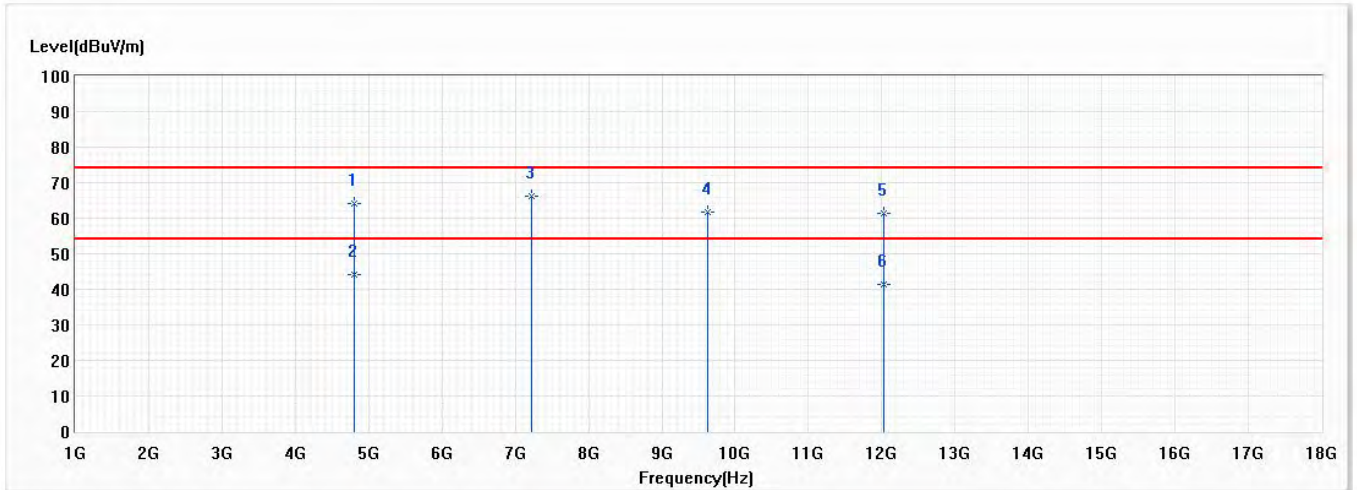
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	79.955	39.75	40.00	-0.25	47.50	-7.75	QP
2	400.055	43.92	46.00	-2.08	41.90	2.02	QP
3	519.850	40.51	46.00	-5.49	36.47	4.04	QP
4	679.900	42.58	46.00	-3.42	36.69	5.89	QP
5	880.205	41.39	46.00	-4.61	33.05	8.34	QP
6	960.230	41.58	54.00	-12.42	32.01	9.57	QP

Note:

1. All reading levels is Quasi-Peak value.
2. “ \* ”, means this data is the worst value.
3. Emission Level = Reading Level + Correct Factor
4. The emission under 30MHz were not included is because their levels are lower than 20dB from limit.

**Above 1GHz Spurious**

Model No	Insyde	Site	CB2-H
Test Voltage	AC 120V/60Hz	Test Date	2020/12/16
Test Mode	Mode 1: Transmit mode	Engineer	Ling Chen
Polarity	Horizontal	Temperature (°C)	23.5
Test Condition	RF_Zigbee,Ch 1,2.405G	Humidity (%RH)	58.0

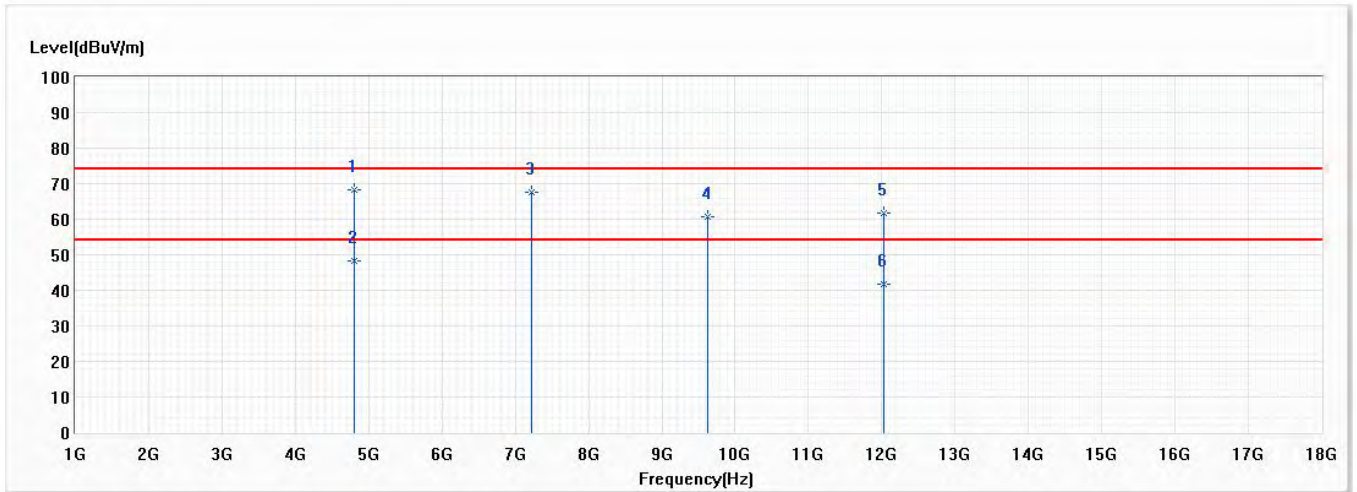


No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
1	4810.000	63.97	74.00	-10.03	75.99	-12.02	PK
2	4810.000	43.97	54.00	-10.03	55.99	-12.02	AV
* 3	7215.000	66.36	74.00	-7.64	71.02	-4.66	PK
4	9620.000	61.73	74.00	-12.27	63.06	-1.33	PK
5	12025.000	61.52	74.00	-12.48	58.74	2.78	PK
6	12025.000	41.52	54.00	-12.48	38.74	2.78	AV

**Note:**

- 1.All reading above 1GHz is performed with peak and/or average measurements as necessary.
2. “ \* ”, means this data is the worst value.
- 3.Emission Level = Reading Level + Correct Factor.
- 4.The average measurement was not performed when the peak measured data under the limit of average detection.
- 5.The emission above 13GHz were not included is because their levels are lower than 20dB form limit.

Model No	Insyde	Site	CB2-H
Test Voltage	AC 120V/60Hz	Test Date	2020/12/16
Test Mode	Mode 1: Transmit mode	Engineer	Ling Chen
Polarity	Vertical	Temperature (°C)	23.5
Test Condition	RF_Zigbee,Ch 1,2.405G	Humidity (%RH)	58.0



No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Reading Level (dBuV)	Correct Factor (dB)	Detector Type
* 1	4810.000	68.20	74.00	-5.80	80.22	-12.02	PK
2	4810.000	48.20	54.00	-5.80	60.22	-12.02	AV
3	7215.000	67.54	74.00	-6.46	72.20	-4.66	PK
4	9620.000	60.65	74.00	-13.35	61.98	-1.33	PK
5	12025.000	61.89	74.00	-12.11	59.11	2.78	PK
6	12025.000	41.89	54.00	-12.11	39.11	2.78	AV

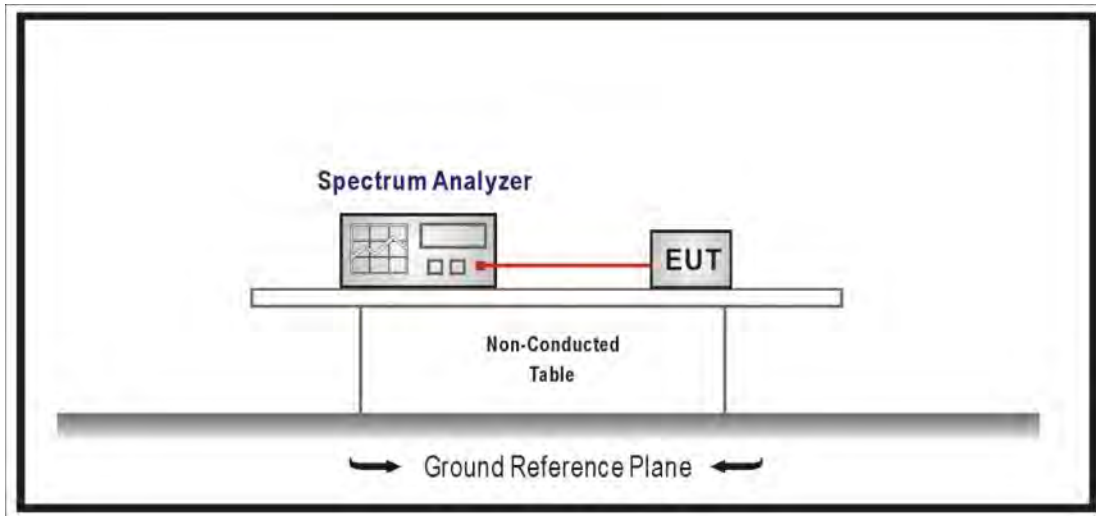
Note:

- 1.All reading above 1GHz is performed with peak and/or average measurements as necessary.
2. “ \* ”, means this data is the worst value.
- 3.Emission Level = Reading Level + Correct Factor.
- 4.The average measurement was not performed when the peak measured data under the limit of average detection.
- 5.The emission above 13GHz were not included is because their levels are lower than 20dB form limit.

## 6. RF antenna conducted test

### 6.1. Test Setup

RF Antenna Conducted Measurement:



### 6.2. Limits

In any 100 kHz bandwidth outside the frequency band 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 an RF conducted or radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

### 6.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure section 11.2 of KDB 558074 D01 V05 for compliance to FCC 47CFR 15.247 requirements. Set RBW = 100 kHz, Set VBW > RBW, scan up through 10th harmonic.

### 6.4. Test Specification

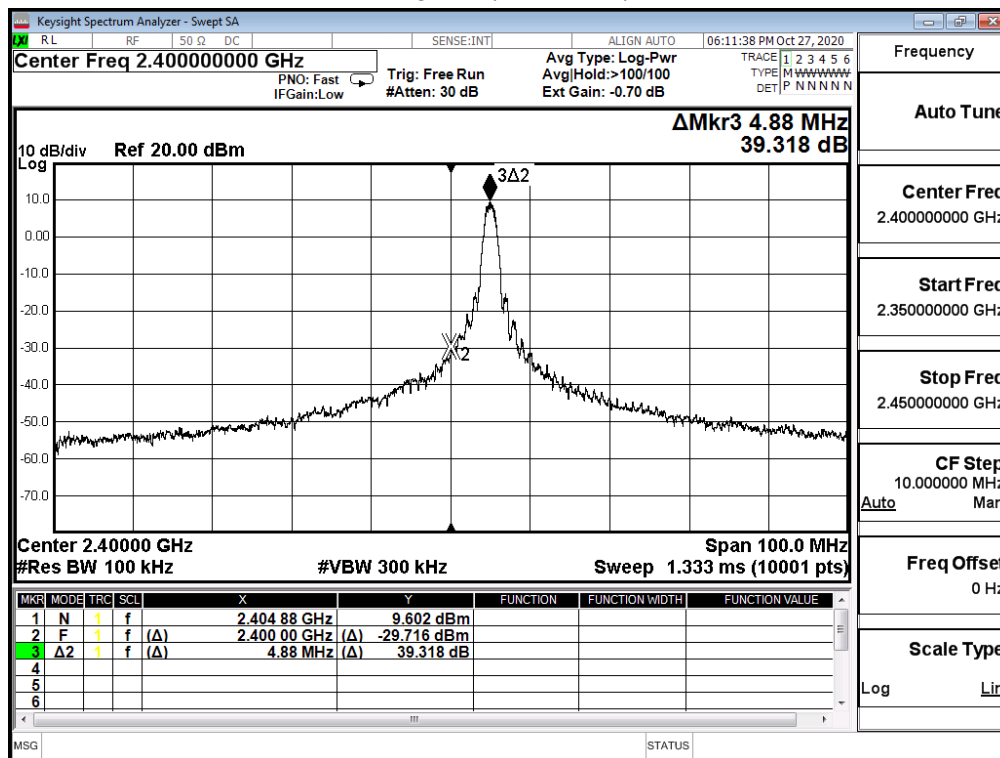
According to FCC Part 15 Subpart C Paragraph 15.247: 2019

### 6.5. Test Result

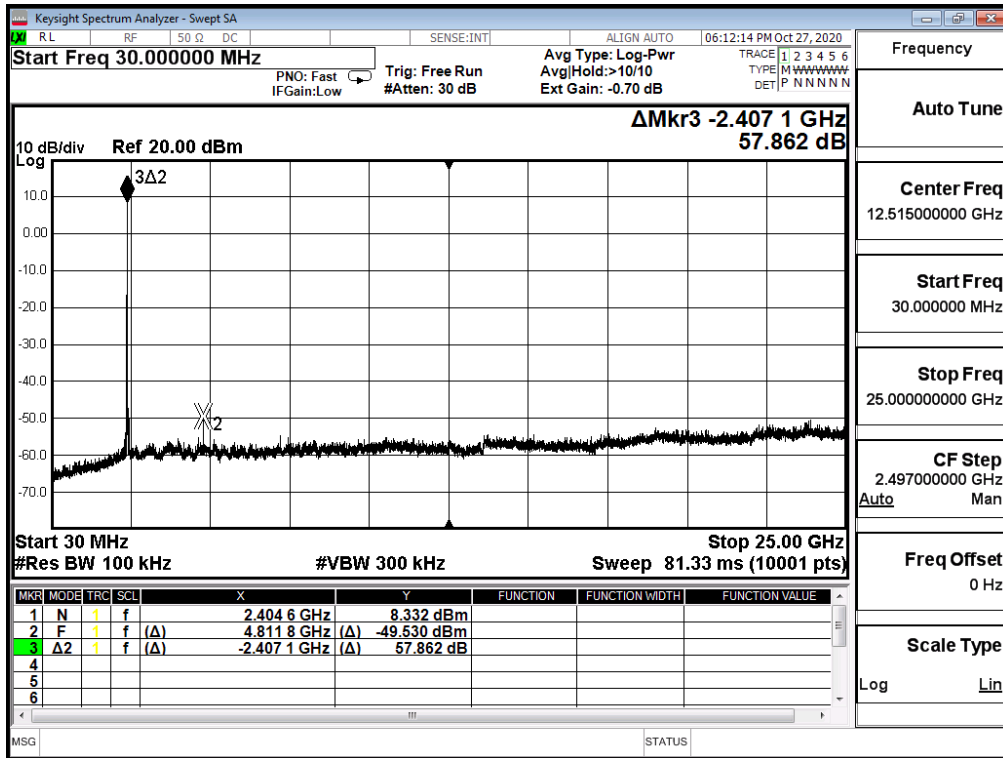
Product	Insyde		
Test Item	RF antenna conducted test		
Test Mode	Mode 1: Transmit mode		
Date of Test	2020/10/27	Test Site	SR12-H
Temperature(°C)	24	Humidity (%RH)	62

IEEE 802.15.1 _Zigbee				
Channel	Frequency (MHz)	Measure Level (dBc)	Limit (dBc)	Result
1	2405	39.318	≥20	Pass

Zigbee (2405MHz)

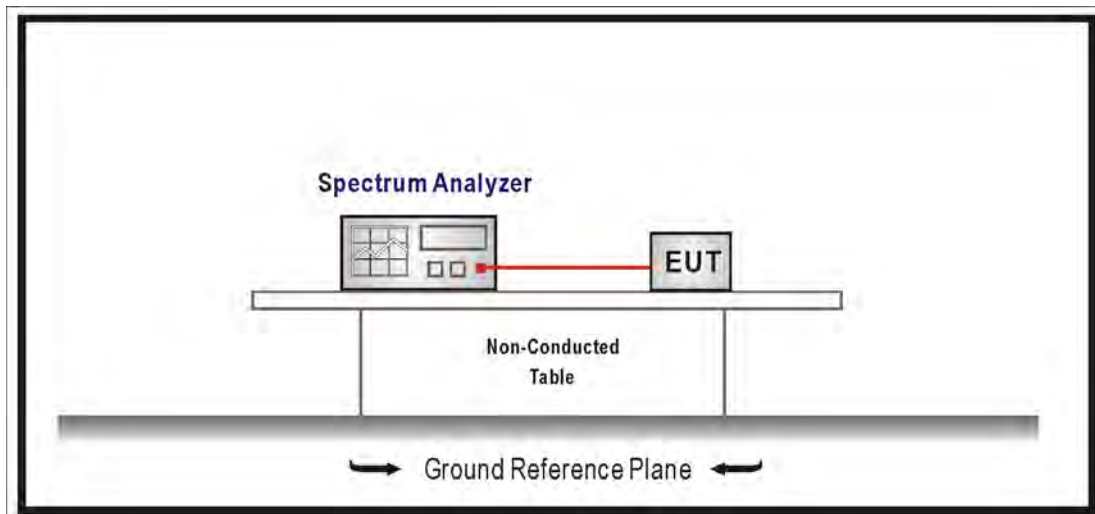


2405MHz (30MHz-25GHz)- IEEE 802.15.1



## 7. Bandedge

### 7.1. Test Setup



### 7.2. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

### 7.3. Test Procedure

The EUT was setup according to ANSI C63.10: 2013 and tested according to DTS test procedure of KDB 558074 D01 V05 for compliance to FCC 47CFR 15.247 requirements.

### 7.4. Test Specification

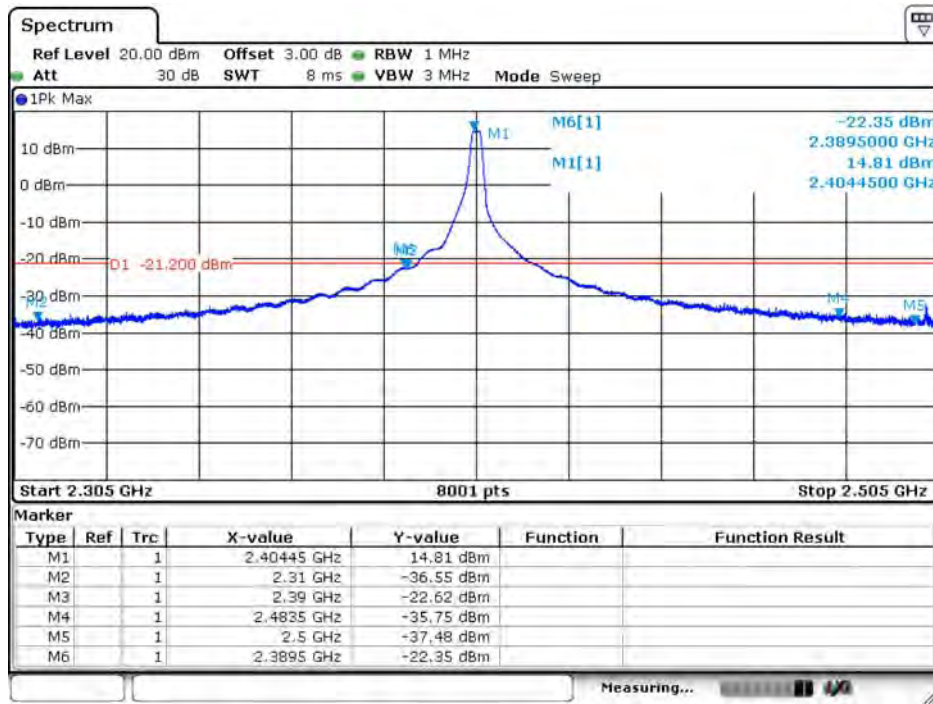
According to FCC Part 15 Subpart C Paragraph 15.247: 2019



### 7.5. Test Result

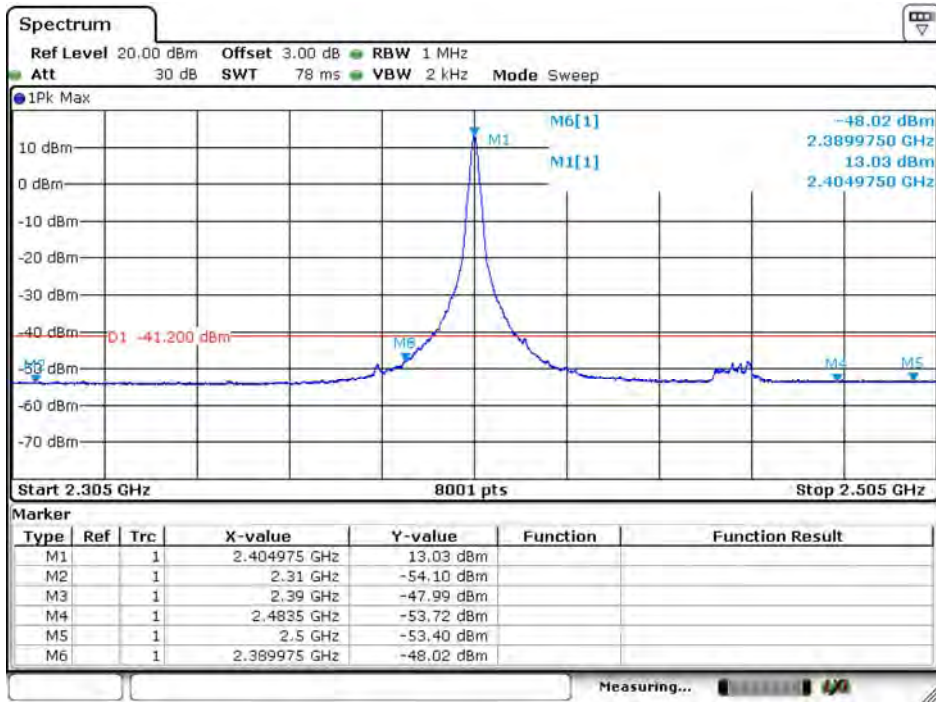
Product	Insyde		
Test Item	Bandedge		
Test Mode	Mode 1: Transmit mode		
Date of Test	2020/10/27	Test Site	SR12-H
Temperature(°C)	24	Humidity (%RH)	62

2405MHz (PK)- IEEE 802.15.1



Date: 27.OCT.2020 19:27:42.

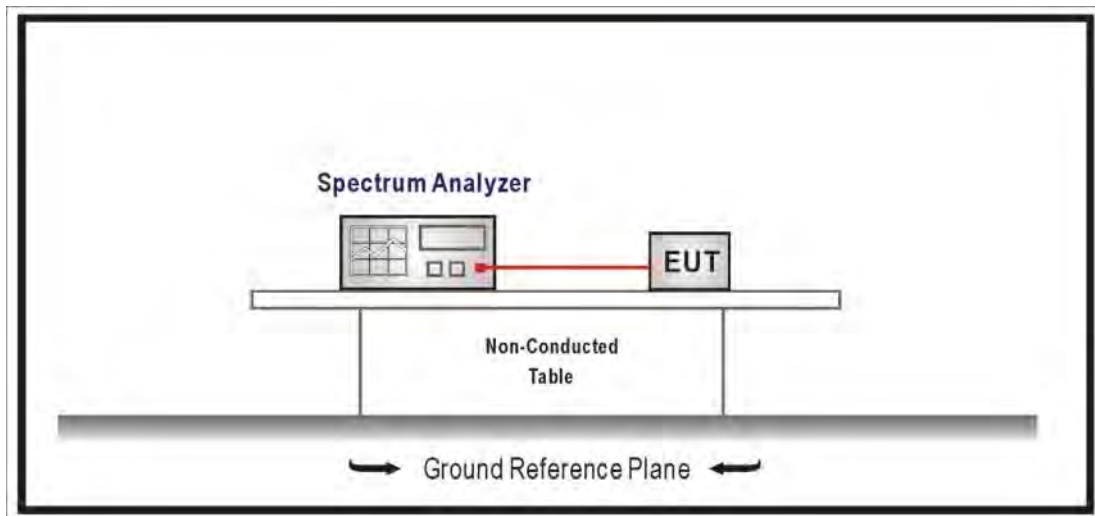
2405MHz (AV)- IEEE 802.15.1



Date: 27 OCT 2020 19:34:42

## 8. Occupied Bandwidth & DTS Bandwidth

### 8.1. Test Setup



### 8.2. Test Procedures

The EUT was setup according to ANSI C63.10: 2013; tested procedure section 8.1 of KDB 558074 D01 V05 for compliance to FCC 47CFR 15.247 requirements. Set RBW = 100KHz, Set the VBW  $\geq 3 \times$  RBW, Sweep Time=Auto, Set Peak Detector.

### 8.3. Limits

The 6 dB bandwidth:  $\geq 500$  kHz.

Occupied Bandwidth: NA

### 8.4. Test Specification

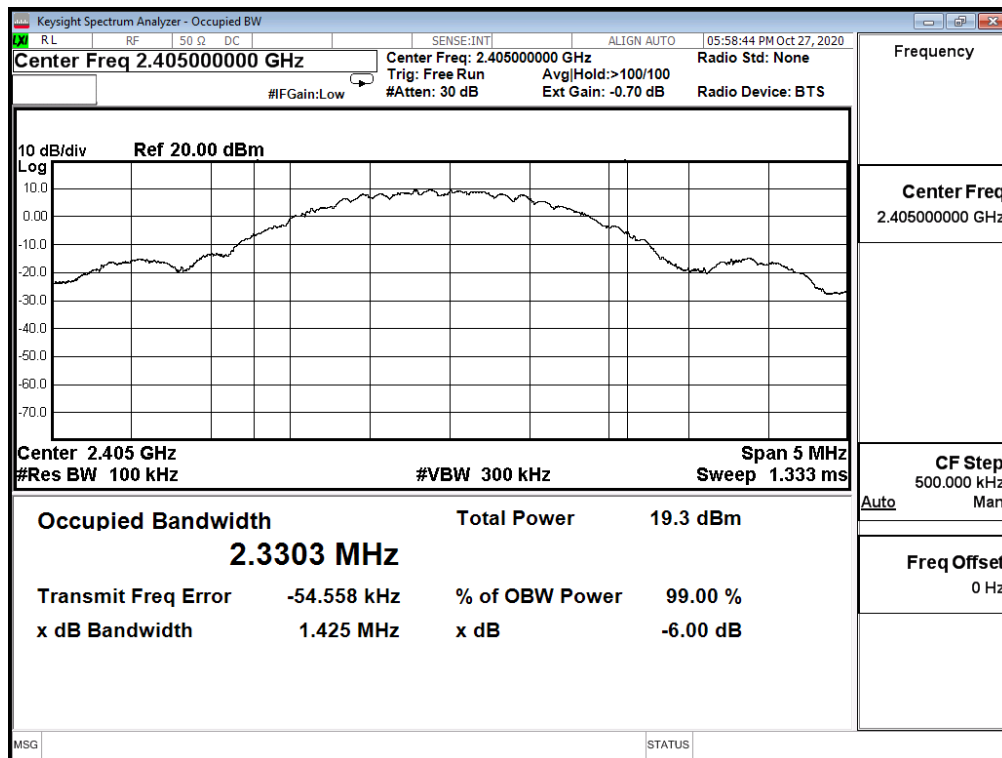
According to FCC Part 15 Subpart C Paragraph 15.247: 2019

### 8.5. Test Result

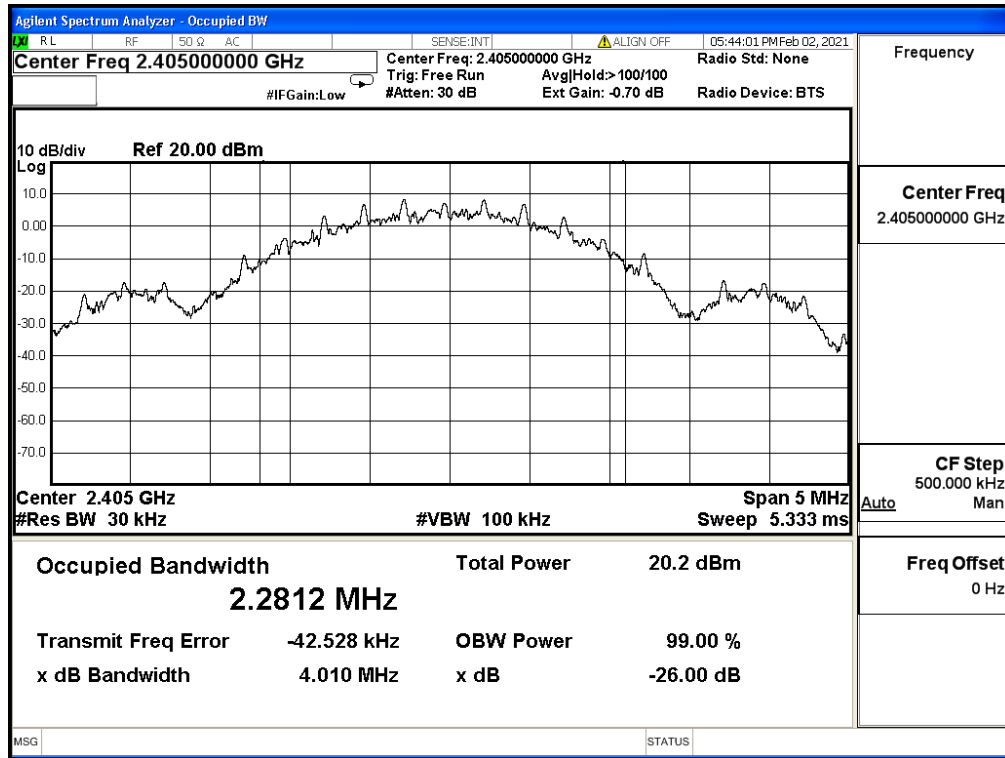
Product	Insyde		
Test Item	DTS Bandwidth		
Test Mode	Mode 1: Transmit mode		
Date of Test	2020/10/27 ~ 2021/02/02	Test Site	SR12-H
Temperature(°C)	22	Humidity (%RH)	69

IEEE 802.15.1_Zigbee					
Channel No.	Frequency (MHz)	Measure Level (MHz)		Limit (MHz)	
		Occupied Bandwidth	DTS Bandwidth	Occupied Bandwidth	DTS Bandwidth
1	2405	2.281	1.425	--	≥ 500

(2405MHz)

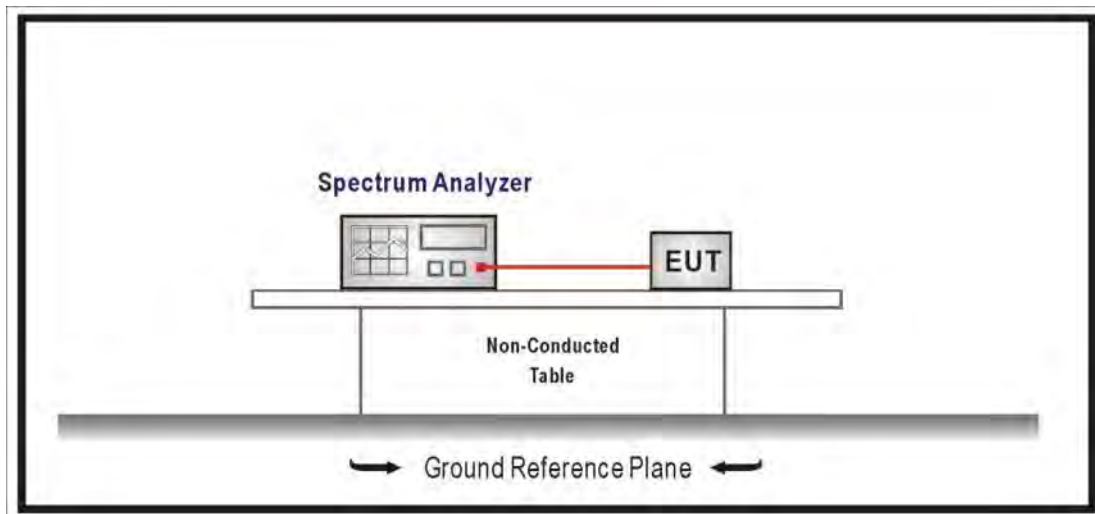


(2405MHz)



## 9. Power Density

### 9.1. Test Setup



### 9.2. Limits

The peak power spectral density conducted from the intentional radiated to the antenna shall not be greater than +8dBm in any 3kHz band during any time interval of continuous transmission.

### 9.3. Test Procedures

The EUT was setup according to ANSI C63.10: 2013; tested according to DTS test procedure section 10.2 of KDB 558074 D01 V05 for compliance to FCC 47CFR 15.247 requirements. Set  $3\text{kHz} \leq \text{RBW} \leq 100\text{ kHz}$ , Set  $\text{VBW} \geq 3 \times \text{RBW}$ , Sweep time=Auto, Set Peak detector.

### 9.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.247: 2019

### 9.5. Uncertainty

The measurement uncertainty is defined as  $\pm 1.27\text{dB}$ .

### 9.6. Test Result

Product	Insyde		
Test Item	Power Density		
Test Mode	Mode 1: Transmit mode		
Date of Test	2020/10/27	Test Site	SR12-H
Temperature(°C)	24	Humidity (%RH)	62

IEEE 802.15.1 _Zigbee				
Channel No.	Frequency (MHz)	Measure Value (dBm/3kHz)	Limit (dBm/3kHz)	Result
1	2405	7.236	≤8	Pass

(2405MHz)

