

**FCC - TEST REPORT**Report Number : **708881974819-00** Date of Issue: September 9, 2019Model : TYZS4Product Type : TYZS4 Zigbee ModuleFCC ID : 2ANDL-TYZS4Applicant : Hangzhou Tuya Information Technology Co.,LtdAddress of Applicant : Room701,Building3,More Center,No.87 GuDun: Road, Hangzhou, Zhejiang ChinaManufacturer : Hangzhou Tuya Information Technology Co.,LtdAddress of Manufacturer : Room701,Building3,More Center,No.87 GuDun: Road, Hangzhou, Zhejiang ChinaFactory : Same as applicantAddress of Factory : Same as applicantTest Result : ☒ **Positive** ☐ **Negative**Total pages including  
Appendices : 34

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## 1 Table of Contents

1	Table of Contents.....	2
2	Details about the Test Laboratory .....	3
3	Description of the Equipment under Test.....	4
4	Summary of Test Standards .....	5
5	Summary of Test Results.....	6
6	General Remarks.....	7
7	Test Setups.....	8
8	Systems test configuration .....	11
9	Technical Requirement .....	12
9.1	Conducted Emission .....	12
9.2	Conducted peak output power .....	15
9.3	6dB bandwidth Occupied Bandwidth.....	17
9.4	Power spectral density .....	19
9.5	Conducted Band Edge and Out-of-Band Emissions .....	21
9.6	Spurious radiated emissions for transmitter .....	25
10	Test Equipment List.....	31
11	System Measurement Uncertainty .....	32
12	Photographs of Test Set-ups.....	33
13	Photographs of EUT .....	34



## 2 Details about the Test Laboratory

### Details about the Test Laboratory

#### Test Site 1

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shanghai  
Branch  
No.16 Lane, 1951 Du Hui Road,  
Shanghai 201108,  
P.R. China  
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Telephone: +86 21 6141 0123  
Fax: +86 21 6140 8600

### 3 Description of the Equipment under Test

#### Description of the Equipment Under Test

Product: TYZS4 Zigbee Module

Model no.: TYZS4

FCC ID: 2ANDL-TYZS4

Trade Mark: NA

Options and accessories: NA

Input Rated Voltage: DC 1.8V-3.8V

RF Transmission Frequency: 2405~2480MHz

No. of Operated Channel: Zigbee: 16

Channel list:

Operation Frequency each of channel			
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

Radio technology: IEEE802.15.4

Modulation: 16-ary orthogonal modulation, O-QPSK PHY

Data speed (IEEE 802.15.4): 250kbps MAX

Antenna Type: PCB antenna

Antenna Gain: 2.2dBi for PCB antenna

Description of the EUT: The Equipment Under Test (EUT) is a TYZS4 Zigbee Module.



China

4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators

All the test methods were according to KDB558074 D01 DTS Measurement Guidance v04 and ANSI C63.10 (2013).

## 5 Summary of Test Results

Technical Requirements						
FCC Part 15 Subpart C						
Test Condition		Pages	Test Site	Test Result		
				Pass	Fail	N/A
§15.207	Conducted emission AC power port	12-14	---	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.247 (b) (1)	Conducted peak output power	15-16	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.247(a)(1)	20dB bandwidth	---	---	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
§15.247(a)(1)	Carrier frequency separation	---	---	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
§15.247(a)(1)(iii)	Number of hopping frequencies	---	---	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
§15.247(a)(1)(iii)	Dwell Time	---	---	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
§15.247(e)	Power spectral density	19-20	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.247(a)(2)	6dB bandwidth and 99% Occupied Bandwidth	17-18	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.247(d)	Spurious RF conducted emissions	21-24	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.247(d)	Spurious radiated emissions and Band edge for transmitter	25-30	Site 1	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
§15.203	Antenna requirement	See note 1		<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Remark 1: N/A – Not Applicable.

Note 1: The EUT uses a permanently integral antenna, which gain is 2.2dBi. According to §15.203, it is considered sufficiently to comply with the provisions of this section.

15.203 requirement: 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, 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. 15.247(c) (1)(i) requirement: (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

## 6 General Remarks

### Remarks

This submittal(s) (test report) is intended for FCC ID: 2ANDL-TYZS4, complies with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C Rules.

### SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

□ - **Not** Performed

The Equipment under Test

■ - **Fulfills** the general approval requirements.

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

Sample Received Date: July 24, 2019

Testing Start Date: July 26, 2019

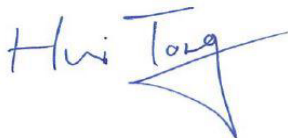
Testing End Date: September 3, 2019

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

Reviewed by:

Prepared by:

Tested by:



Hui TONG  
EMC Section Manager



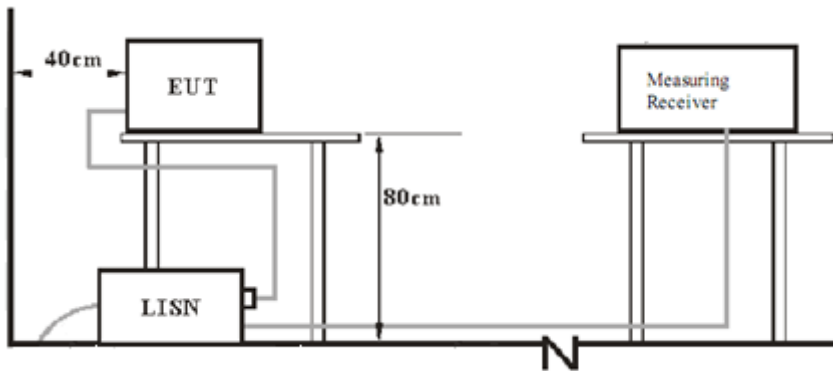
Jiayi XU  
EMC Project Engineer



Wenqiang LU  
EMC Test Engineer

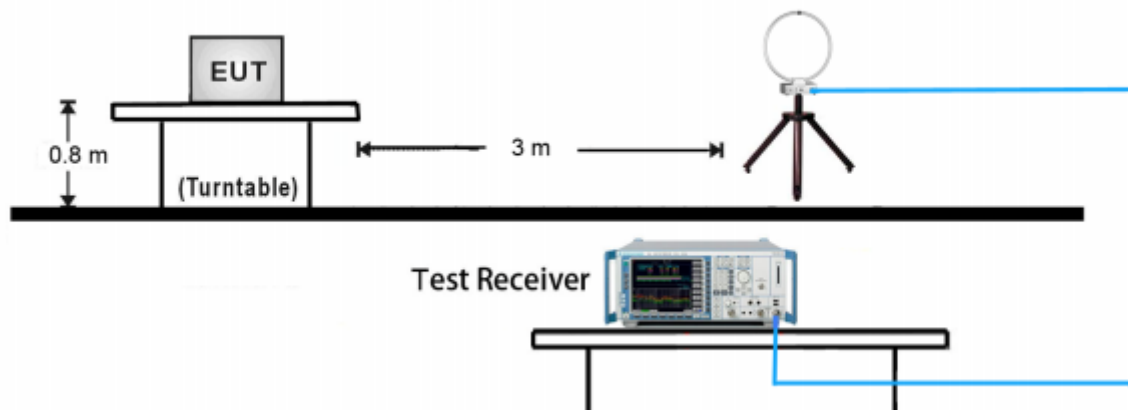
## 7 Test Setups

### 7.1 AC Power Line Conducted Emission test setups



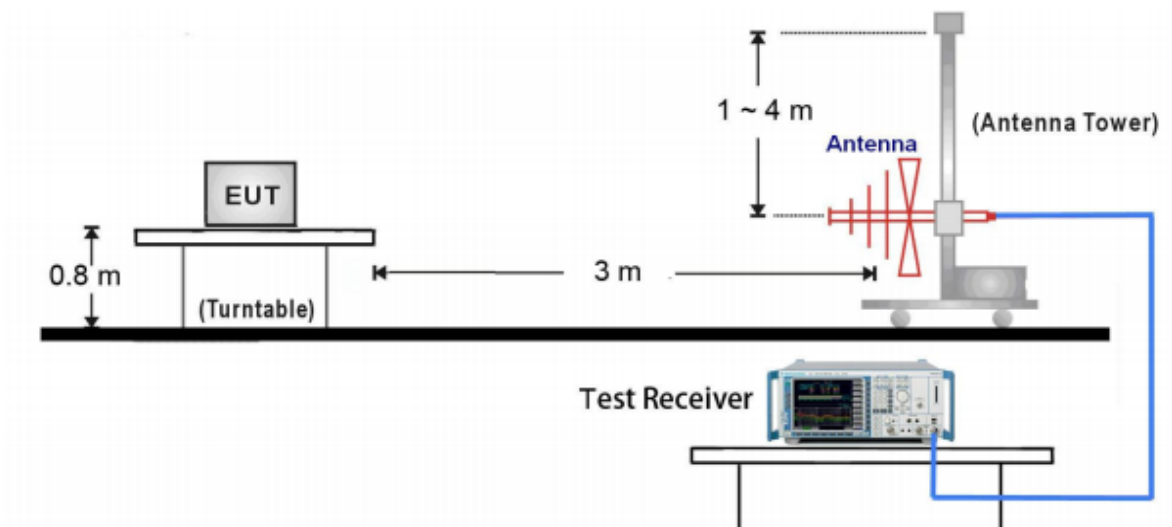
### 7.2 Radiated test setups

#### 9kHz ~ 30MHz Test Setup:

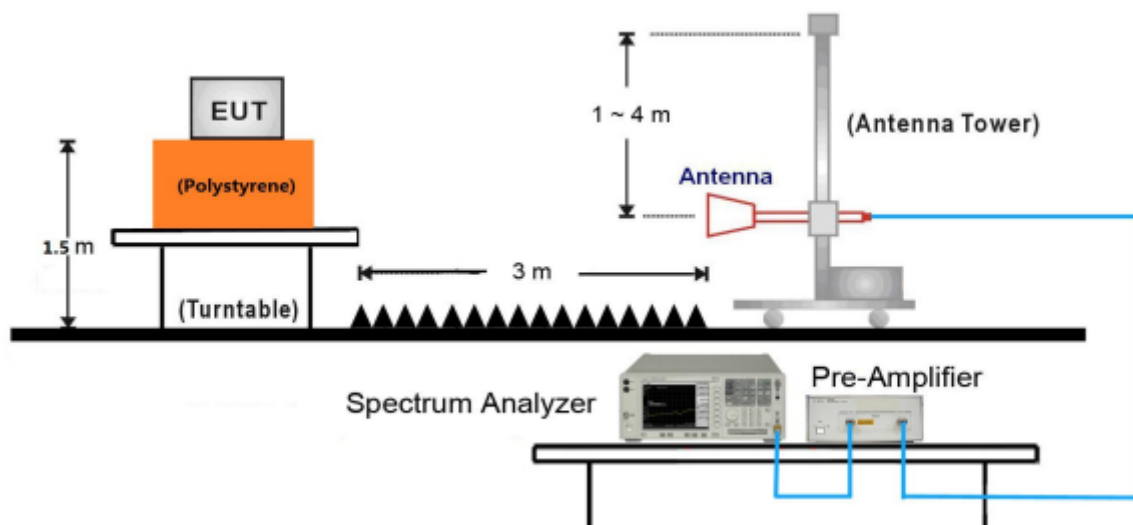




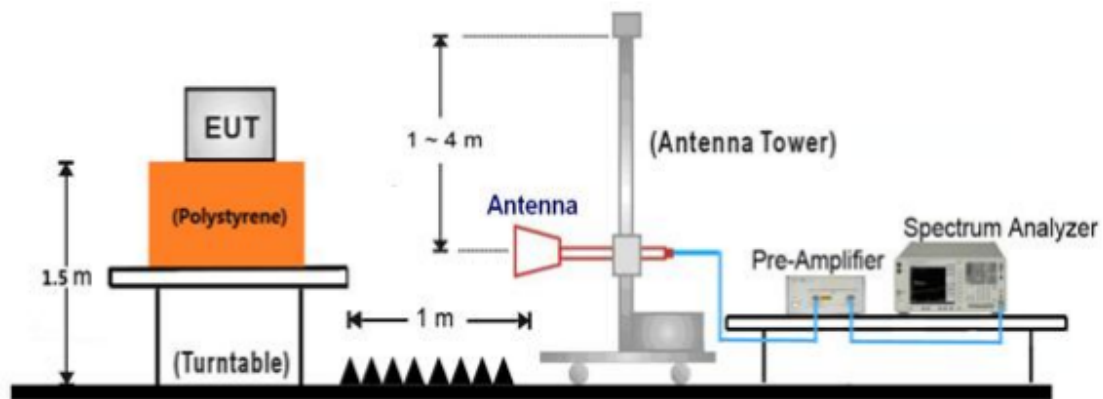
### 30MHz ~ 1GHz Test Setup:



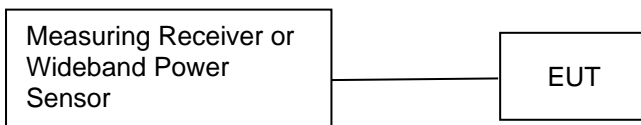
### 1GHz ~ 18GHz Test Setup:



### 18GHz ~ 25GHz Test Setup:



### 7.3 Conducted RF test setups



## 8 Systems test configuration

Auxiliary Equipment Used during Test:

DESCRIPTION	MANUFACTURER	MODEL NO.(SHIELD)
Notebook	Lenove	X240

Test channel & mode:

The EUT configured using a proprietary communication interface provided by the client. The interface allows channel control required to support the evaluation.

Test software	SecureCRT
---------------	-----------

Test mode	Channel	Frequency (MHz)
Tx	11	2405
Tx	20	2450
Tx	26	2480

### Device Capabilities

This device contains the following capabilities:

ZigBee Module Device.

Duty Cycle: 100%

## 9 Technical Requirement

### 9.1 Conducted Emission

#### Test Method

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

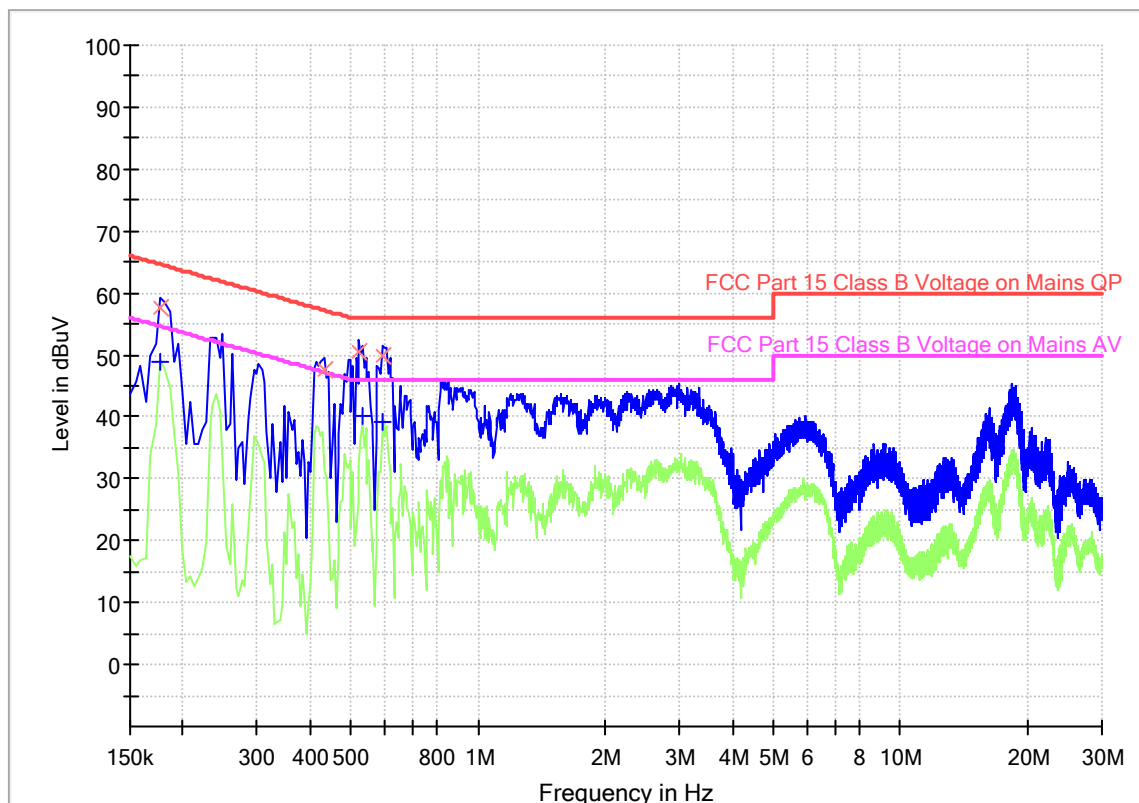
#### Limit

Frequency MHz	QP Limit dB $\mu$ V	AV Limit dB $\mu$ V
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

Decreasing linearly with logarithm of the frequency

## Conducted Emission

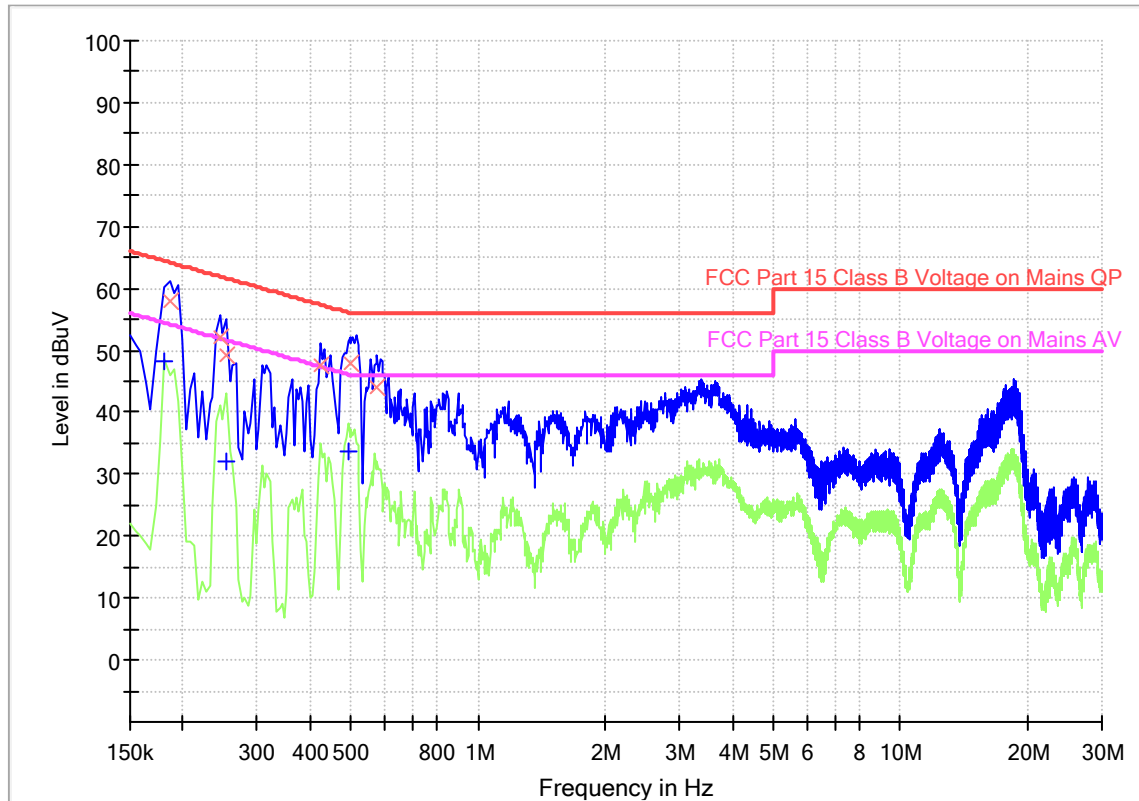
Product Type : TYZS4 Zigbee Module  
 M/N : TYZS4  
 Operating Condition : Mode 1: Tx\_2405MHz  
 Test Specification : FCC\_Part15.207  
 Comment : L-line, AC 120V/60Hz (powered by notebook)



## Final Result

Frequency (MHz)	Quasi Peak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.177000	---	48.73	54.63	5.90	1000.0	9.000	L1	19.4
0.177000	57.54	---	64.63	7.09	1000.0	9.000	L1	19.4
0.433500	47.48	---	57.19	9.71	1000.0	9.000	L1	19.4
0.523500	50.55	---	56.00	5.45	1000.0	9.000	L1	19.4
0.532500	---	40.09	46.00	5.91	1000.0	9.000	L1	19.4
0.591000	---	39.04	46.00	6.96	1000.0	9.000	L1	19.4
0.595500	49.70	---	56.00	6.30	1000.0	9.000	L1	19.4

Product Type : TYZS4 Zigbee Module  
 M/N : TYZS4  
 Operating Condition : Mode 1: Tx\_2405MHz  
 Test Specification : FCC\_Part15.207  
 Comment : N-line, AC 120V/60Hz (powered by notebook)



## Final Result

Frequency (MHz)	Quasi Peak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.181500	---	48.32	54.42	6.10	1000.0	9.000	N	19.6
0.186000	58.08	---	64.21	6.13	1000.0	9.000	N	19.6
0.244500	52.24	---	61.94	9.70	1000.0	9.000	N	19.6
0.253500	---	32.15	51.64	19.49	1000.0	9.000	N	19.6
0.253500	49.27	---	61.64	12.37	1000.0	9.000	N	19.6
0.424500	47.66	---	57.36	9.70	1000.0	9.000	N	19.6
0.492000	---	33.52	46.13	12.61	1000.0	9.000	N	19.5
0.496500	47.75	---	56.06	8.31	1000.0	9.000	N	19.5
0.577500	44.16	---	56.00	11.84	1000.0	9.000	N	19.5

## 9.2 Conducted peak output power

### Test Method

1. Connect the spectrum analyzer to the EUT
  - a) Set the RBW  $\geq$  DTS bandwidth.
  - b) Set VBW  $\geq$  3xRBW.
  - c) Set span  $\geq$  3xRBW
  - d) Sweep time = auto couple.
  - e) Detector = peak.
  - f) Trace mode = max hold.
  - g) Allow trace to fully stabilize.
  - h) Use peak marker function to determine the peak amplitude level.

### Limits

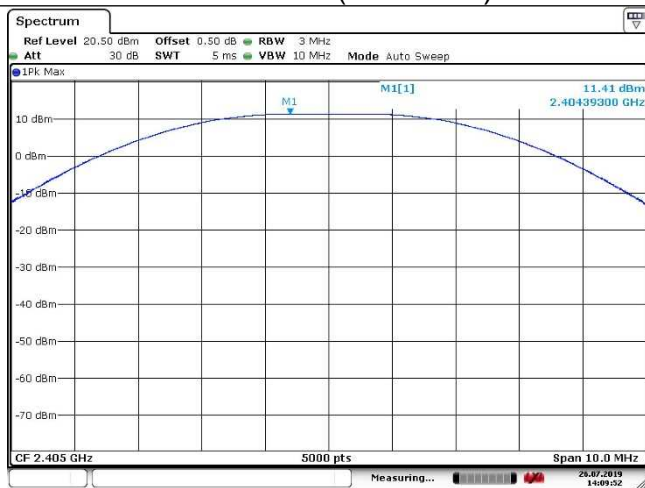
Frequency Range MHz	Limit W	Limit dBm
2400-2483.5	$\leq 1$	$\leq 30$

Test result as below table

Model	Ch.	Freq. (MHz)	Peak Power (dBm)	Limit (dBm)
O-QPSK	11	2405	11.41	30
	20	2450	11.41	30
	26	2480	11.34	30

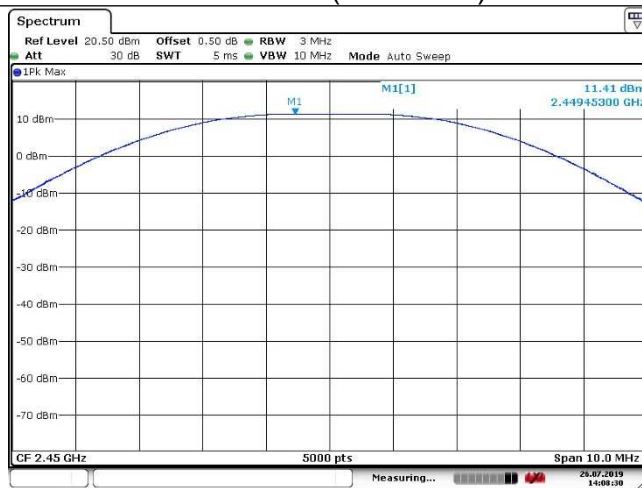
## Zigbee O-QPSK peak output power

Channel 11 (2405MHz)



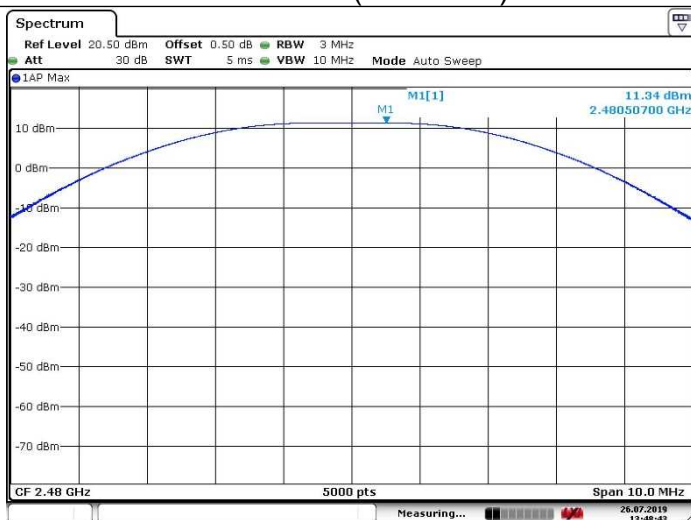
Date: 26.JUL.2019 14:09:52

Channel 20 (2450MHz)



Date: 26.JUL.2019 14:08:31

Channel 26 (2480MHz)



Date: 26.JUL.2019 13:48:43



### 9.3 6dB bandwidth Occupied Bandwidth

#### Test Method

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

#### Limit

Limit [kHz]

≥500

#### Test result

Test Mode	Channel No.	Freq. (MHz)	6db Bandwidth (MHz)	Limit (MHz)	Result
O-QPSK	11	2405	1.6496	$\geq 0.5$	Pass
	20	2450	1.648	$\geq 0.5$	Pass
	26	2480	1.648	$\geq 0.5$	Pass



China

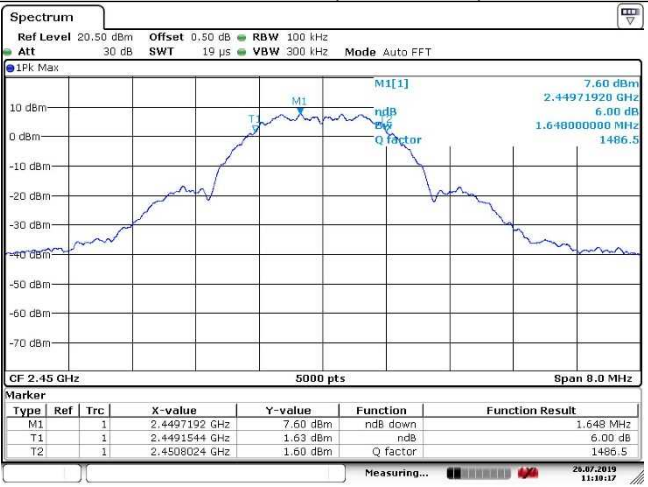
Zigbee O-QPSK 6dB Bandwidth

Channel 11 (2405MHz)



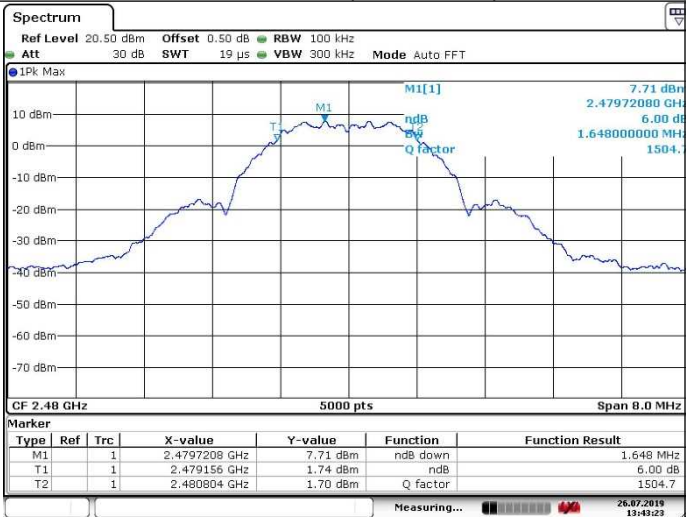
Date: 26 JUL 2019 10:58:51

Channel 20 (2450MHz)



Date: 26 JUL 2019 11:10:18

Channel 26 (2480MHz)



Date: 26 JUL 2019 13:43:24

## 9.4 Power spectral density

### Test Method

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

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

### Limit

Limit [dBm]

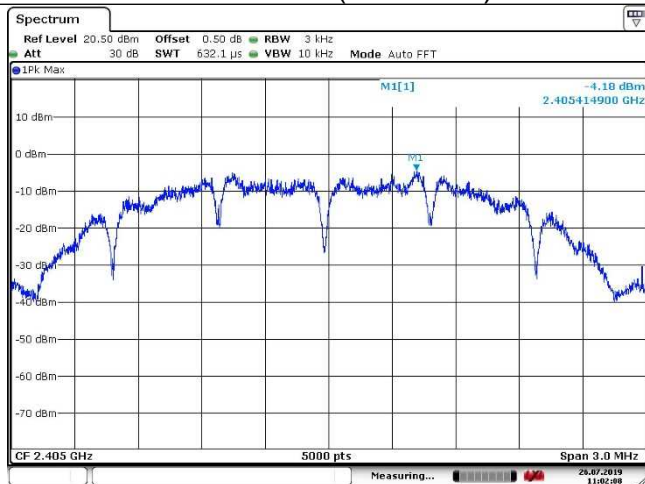
$\leq 8$

Test result

Test Mode	Channel No.	Freq. (MHz)	PKPSD (dBm / 10kHz)	Limit (dBm/3kHz)	Result
O-QPSK	11	2405	-4.18	$\leq 8$	Pass
	20	2450	-4.09	$\leq 8$	Pass
	26	2480	-4.04	$\leq 8$	Pass

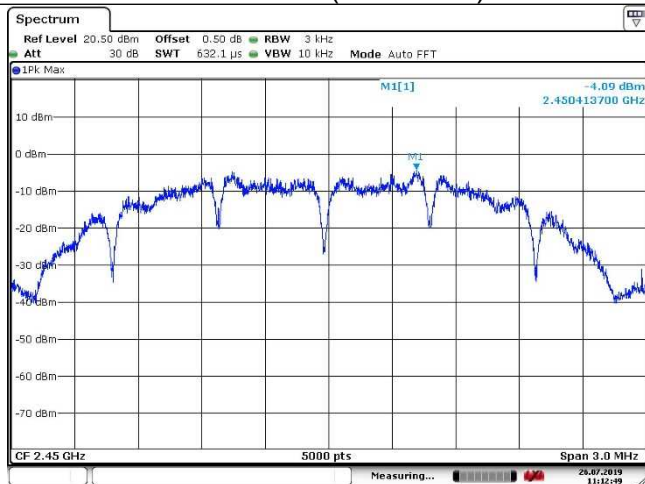
## Zigbee O-QPSK PK PSD

Channel 11 (2405MHz)



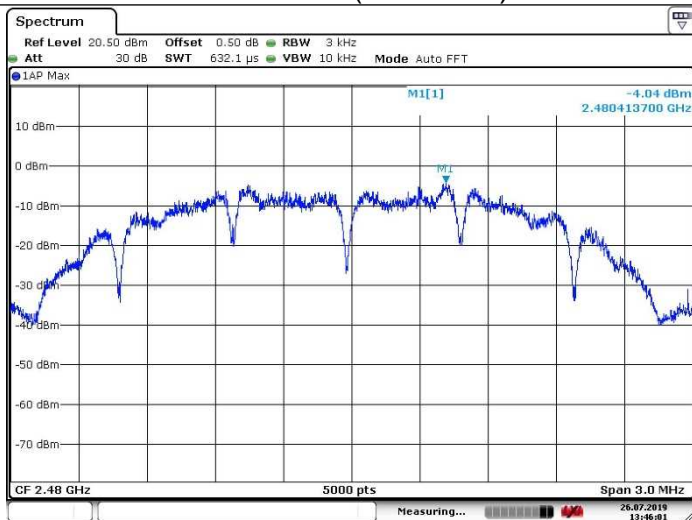
Date: 26.JUL.2019 11:02:07

Channel 20 (2450MHz)



Date: 26.JUL.2019 11:12:49

Channel 26 (2480MHz)



Date: 26.JUL.2019 13:46:00

## 9.5 Conducted Band Edge and Out-of-Band Emissions

### Test Method

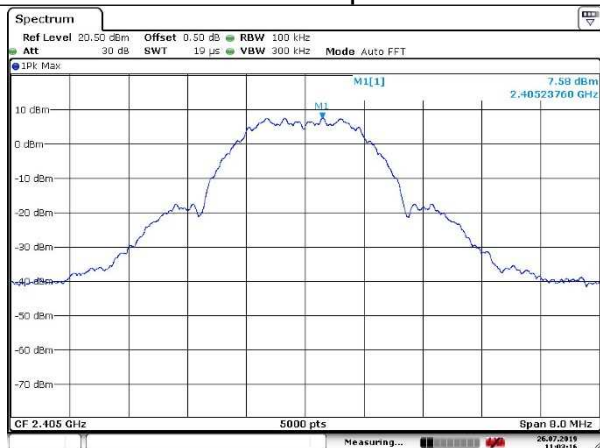
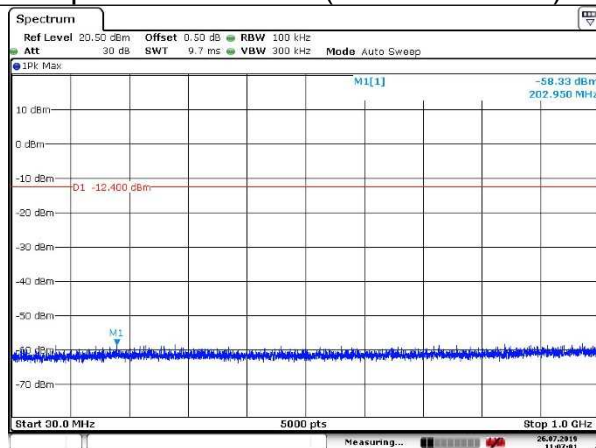
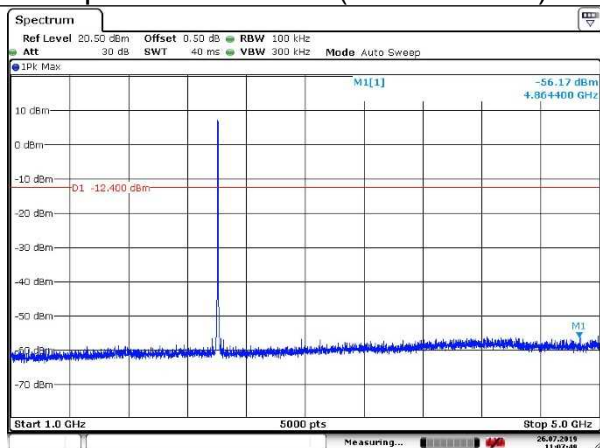
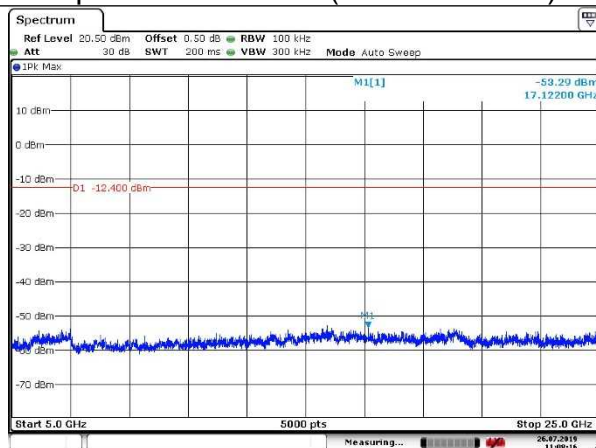
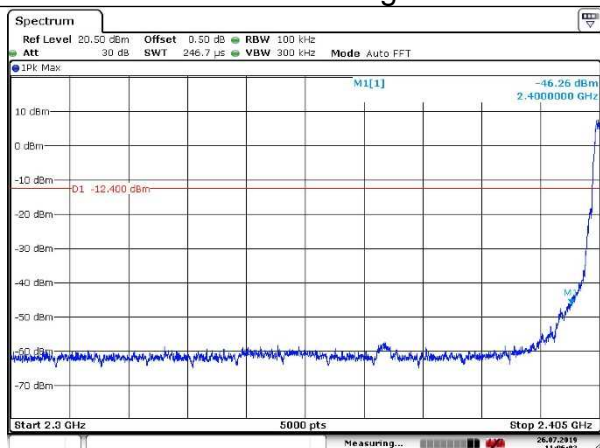
1. Establish a reference level by using the following procedure:
  - a. Set RBW=100 kHz. VBW $\geq$ 3RBW. Detector =peak, Sweep time = auto couple, Trace mode = max hold.
  - b. Allow trace to fully stabilize, use the peak marker function to determine the maximum PSD level.
2. Use the maximum PSD level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

### Limit

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

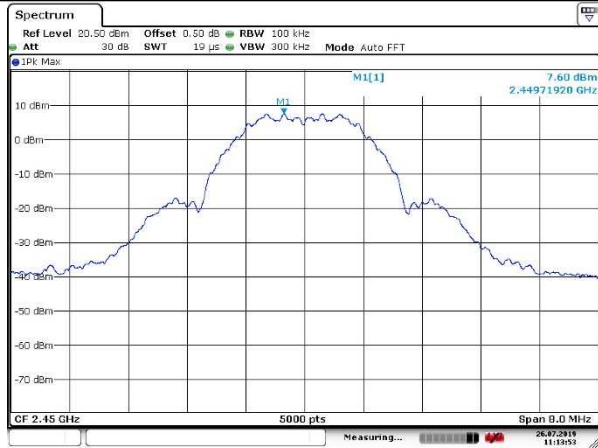
### Test result

Test Mode	Channel No.	Freq. (MHz)	Limit	Result
O-QPSK	11	2405	20dBc	Pass
	20	2450	20dBc	Pass
	26	2480	20dBc	Pass

**Spurious RF conducted emissions****Zigbee O-QPSK Out-of-Band Emissions  
Channel 11 (2405MHz)****Reference point****Spurious Emission (30MHz – 1GHz)****Spurious Emission (1GHz – 5GHz)****Spurious Emission (5GHz – 25GHz)****Low band edge**

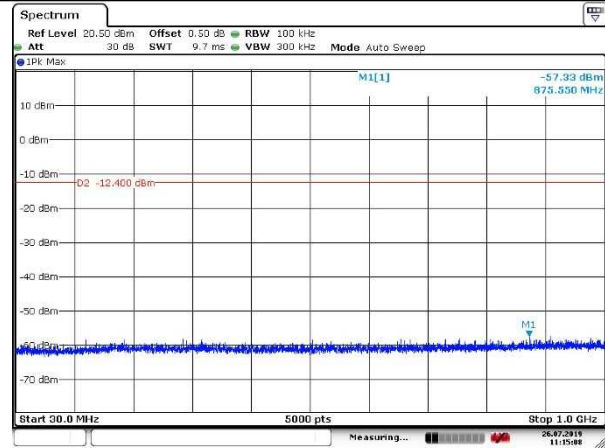
## Zigbee O-QPSK Out-of-Band Emissions Channel 20 (2450MHz)

### Reference point



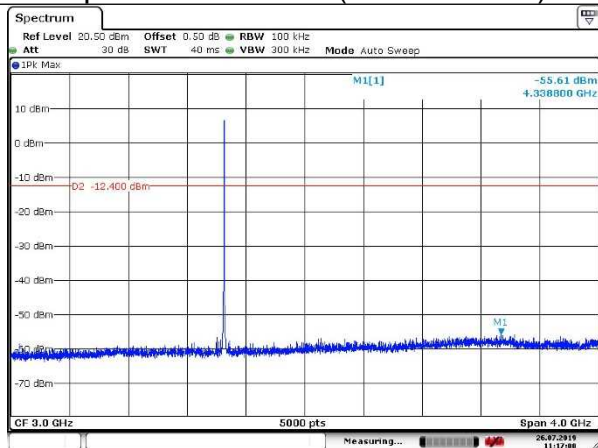
Date: 26 JUL 2019 11:13:54

### Spurious Emission (30MHz – 1GHz)



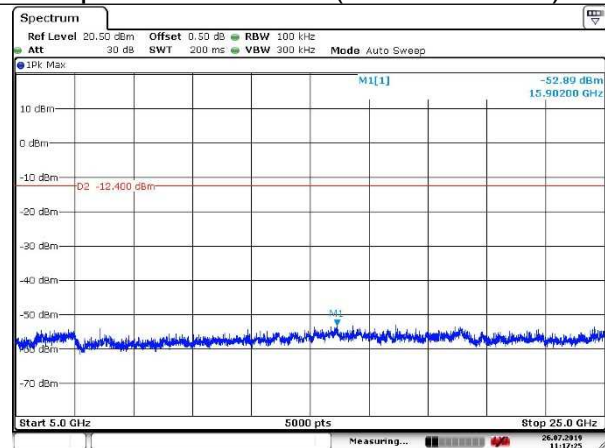
Date: 26 JUL 2019 11:15:08

### Spurious Emission (1GHz – 5GHz)



Date: 26 JUL 2019 11:17:00

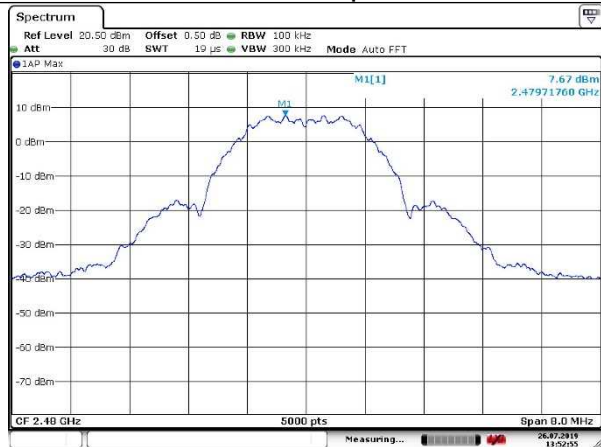
### Spurious Emission (5GHz – 25GHz)



Date: 26 JUL 2019 11:17:25

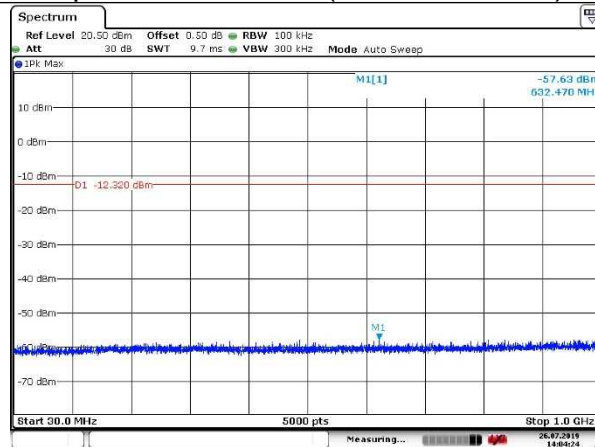
## Zigbee O-QPSK Out-of-Band Emissions Channel 26 (2480MHz)

### Reference point



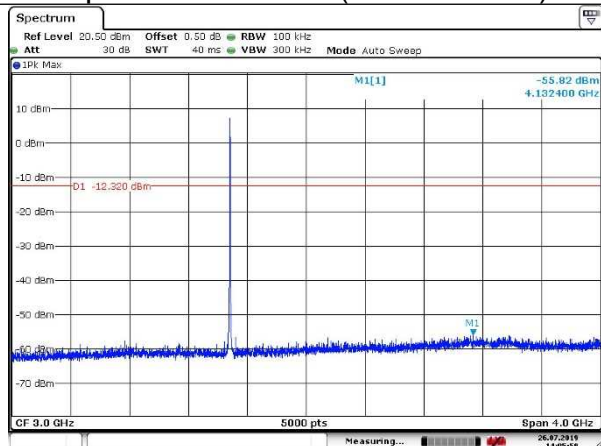
Date: 26 JUL 2019 13:52:55

### Spurious Emission (30MHz – 1GHz)



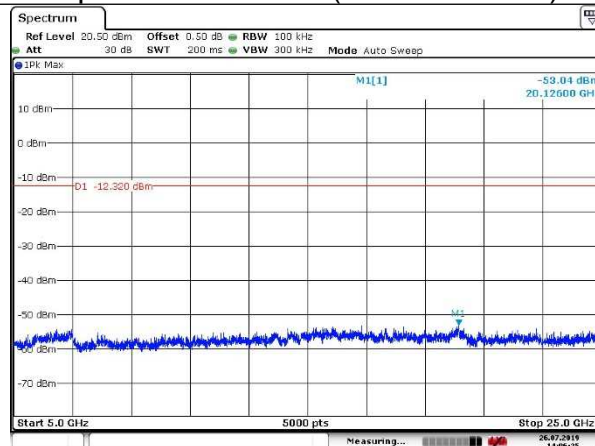
Date: 26 JUL 2019 14:04:24

### Spurious Emission (1GHz – 5GHz)



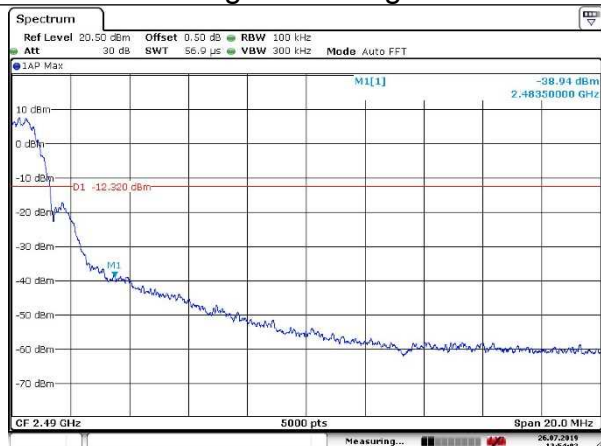
Date: 26 JUL 2019 14:06:00

### Spurious Emission (5GHz – 25GHz)



Date: 26 JUL 2019 14:06:26

### High band edge



Date: 26 JUL 2019 13:54:04



## 9.6 Spurious radiated emissions for transmitter

### Test Method

- 1: The EUT was placed on a turn table which is 1.5m above ground plane for above 1GHz and 0.8m above ground for below 1GHz at 3-meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- 2: The EUT was set 3 meters away from the interference – receiving antenna, which was mounted on the top of a variable – height antenna tower.
- 3: The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- 4: For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

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

For Above 1GHz

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

For Below 1GHz

Use the following spectrum analyzer settings:

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

### Note:

- 1: The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 KHz for Quasi-peak detection (QP) at frequency below 1GHz.
- 2: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for peak detection (PK) at frequency above 1GHz.
- 3: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average ((duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor ( $20\log(1/\text{duty cycle})$ ).
- 4: The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.

### Limit

The radio emission outside the operating frequency band shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power. Radiated emissions which fall in the restricted bands, as defined in section 15.205, must comply with the radiated emission limits specified in section 15.209.

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

Frequency MHz	Field Strength uV/m	Measured Distance Meters
0.009~0.490	2400/F (kHz)	300
0.490~1.705	24000/F (kHz)	30
1.705~30	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

#### LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

Frequency MHz	Field Strength (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)=20logEmission level (uV/m).

### Spurious radiated emissions for transmitter

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

#### Transmitting spurious emission test result as below:

**Remark 1:** There are the ambient noise within frequency range 9kHz ~ 30MHz and 18GHz ~ 25GHz, the permissible value is not show in the report.

**Remark 2:** Average measurement was not performed if peak level lower than average limit.

**Remark 3:** Other frequency was 20dB below limit line with 1-18GHz, there is not show in the report.

## Test Result

Model: TYZS4

Test mode: Zigbee O-QPSK					
Channel 11 (2405MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
2367.2	43.4	74.0	-30.6	Peak	Horizontal
4890.0	45.8	74.0	-28.2	Peak	Horizontal
2396.8	51.3	74.0	-22.7	Peak	Vertical
4891.3	43.4	74.0	-30.6	Peak	Vertical

Test mode: Zigbee O-QPSK					
Channel 20 (2450MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
4890.0	45.6	74.0	-28.4	Peak	Horizontal
4900.9	42.8	74.0	-31.2	Peak	Vertical

Test mode: Zigbee O-QPSK					
Channel 26 (2480MHz)					
Frequency (MHz)	Measure Level (dBuV/m)	Limit (dBuV/M)	Margin (dB)	Detector	Polarization
2483.5	63.9	74.0	-10.1	Peak	Horizontal
2483.5	49.1	54.0	-4.9	Average	Horizontal
4958.8	44.0	74.0	-30	Peak	Horizontal
2483.5	52.6	74.0	-21.4	Peak	Vertical
4959.4	43.8	74.0	-30.2	Peak	Vertical

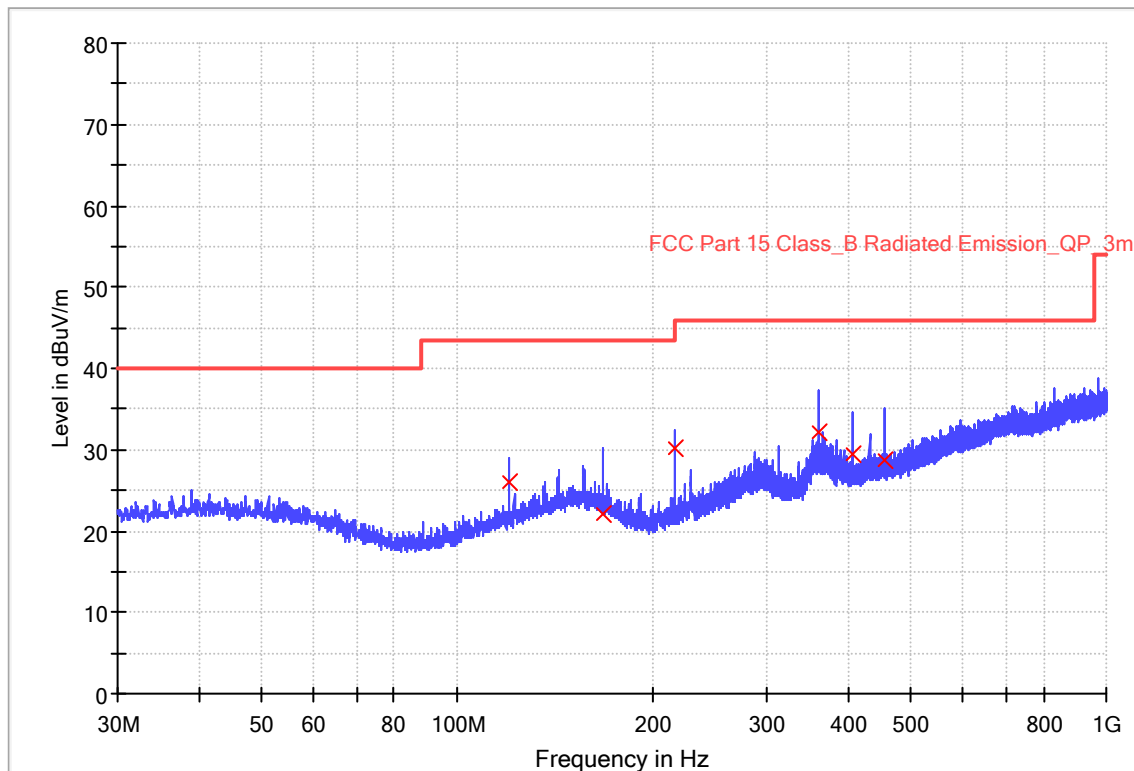
## Remark:

- (1) Emission level= Original Receiver Reading + Correct Factor
- (2) Correct Factor = Antenna Factor + Cable Loss -Amplifier gain
- (3) Margin = limit – Corrected Reading

## The worst case of Radiated Emission below 1GHz:

Site: 3 meter chamber	Time: 2019/07/27 - 10:11
Limit: FCC_Part15.209_RE(3m)_ClassB	Engineer: Jiaxi XU
Probe: VULB9168	Polarity: Horizontal
EUT: TYZS4 Zigbee Module, Model no: TYZS4	Power: 120VAC, 60Hz
Note: Transmit by Zigbee at channel 2405MHz.	
Note: There is the worst case within frequency range 30MHz~1GHz.	

RE\_VULB9168\_pre\_Cont\_30-1000



Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
120.000000	26.0	1000.0	120.000	100.4	H	25.0	13.5
168.000000	22.2	1000.0	120.000	100.4	H	56.0	14.9
215.960000	30.1	1000.0	120.000	100.4	H	14.0	12.3
360.040000	32.1	1000.0	120.000	100.4	H	359.0	16.5
408.000000	29.4	1000.0	120.000	100.4	H	87.0	18.6
456.000000	28.7	1000.0	120.000	100.4	H	2.0	18.6

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

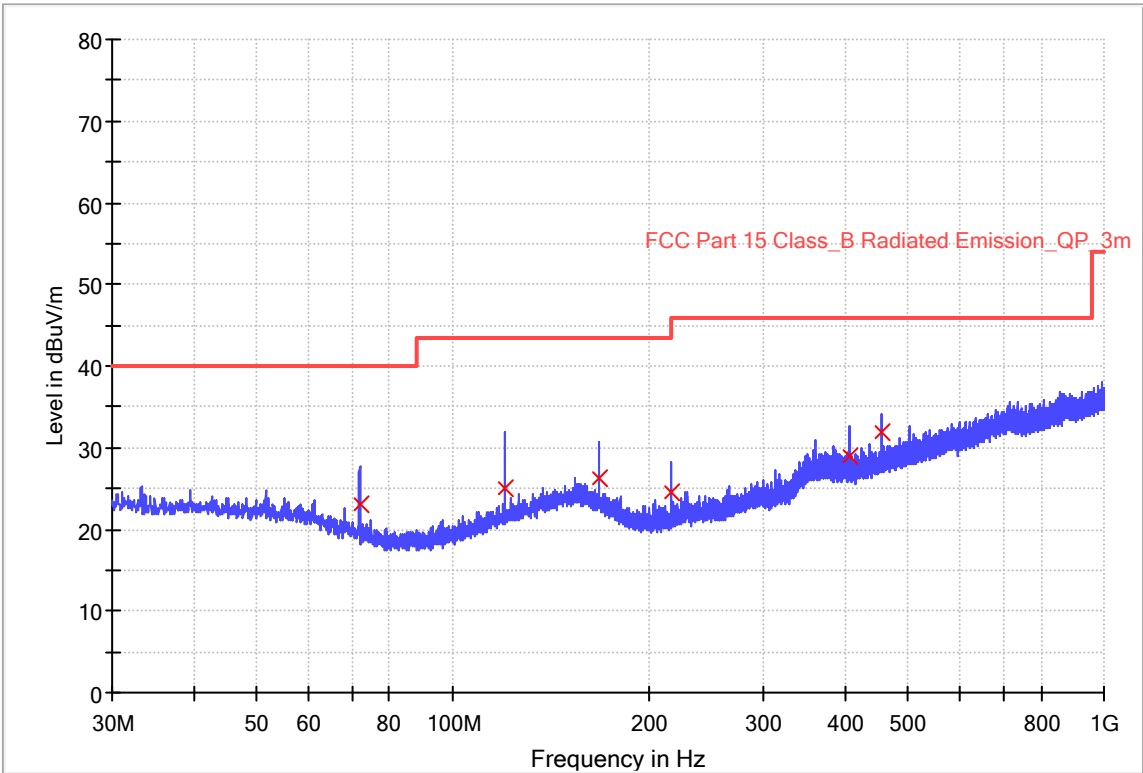
Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.



China

Site: 3 meter chamber	Time: 2019/07/27 - 10:19
Limit: FCC_Part15.209_RE(3m)_ClassB	Engineer: Jiaxi XU
Probe: VULB9168	Polarity: Vertical
EUT: TYZS4 Zigbee Module, Model no: TYZS4	Power: 120VAC, 60Hz
Note: Transmit by Zigbee at channel 2405MHz.	
Note: There is the worst case within frequency range 30MHz~1GHz.	

RE\_VULB9168\_pre\_Cont\_30-1000



Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
71.960000	23.0	1000.0	120.000	100.4	V	360.0	11.5
120.000000	25.1	1000.0	120.000	100.4	V	358.0	13.5
168.000000	26.3	1000.0	120.000	100.4	V	308.0	14.9
215.960000	24.5	1000.0	120.000	100.4	V	3.0	12.3
408.000000	29.0	1000.0	120.000	100.4	V	356.0	17.5
456.000000	31.9	1000.0	120.000	100.4	V	314.0	18.6

Note 1: Measure Level (dBuV/m) = Reading Level (dBuV) + Factor (dB)

Factor (dB) = Cable Loss (dB) + Antenna Factor (dB/m)

Note 2: The test trace is same as the ambient noise and the amplitude of the emissions are attenuated more than 20dB below the permissible (the test frequency range: 9kHz ~ 30MHz, 18GHz ~ 25GHz), therefore no data appear in the report.

## 10 Test Equipment List

List of Test Instruments  
Test Site1

	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
C	Signal Analyzer	Rohde & Schwarz	FSV40	101091	2020-8-4
	Wideband power sensor	Rohde & Schwarz	NRP-Z81	103140	2020-8-4
RE	EMI Test Receiver	Rohde & Schwarz	ESR3	101906	2020-8-4
	Signal Analyzer	Rohde & Schwarz	FSV40	101091	2020-8-4
	Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	848	2021-6-10
	Horn Antenna	Rohde & Schwarz	HF907	102393	2021-4-1
	Pre-amplifier	Rohde & Schwarz	SCU-18D	19006451	2020-8-4
	Loop antenna	Rohde & Schwarz	HFH2-Z2	100443	2020-6-27
	DOUBLE-RIDGED WAVEGUIDE HORN WITH PRE-AMPLIFIER (18 GHZ - 40 GHZ)	ETS-Lindgren	3116C-PA	E326	2021-1-28
	3m Semi-anechoic chamber	TDK	9X6X6	----	2021-5-10
CE	EMI Test Receiver	Rohde & Schwarz	ESR3	101907	2020-8-4
	LISN	Rohde & Schwarz	ENV216	101924	2020-8-4

### C - Conducted RF tests

- Conducted peak output power
- 6dB Occupied Bandwidth
- Power spectral density\*
- Spurious RF conducted emissions
- Conducted Band edge

## 11 System Measurement Uncertainty

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

### Test Site1

Items	Extended Uncertainty
Conducted Disturbance at Mains Terminals	150kHz to 30MHz, LISN, 3.16dB
Radiated Disturbance	30MHz to 1GHz, $\pm 5.03\text{dB}$ (Horizontal) $\pm 5.12\text{dB}$ (Vertical) 1GHz to 18GHz, $\pm 5.15\text{dB}$ (Horizontal) $\pm 5.12\text{dB}$ (Vertical) 18GHz to 25GHz, $\pm 4.76\text{dB}$





## 12 Photographs of Test Set-ups

Refer to the < Test Setup photos >.



## 13 Photographs of EUT

Refer to the < External Photos > & < Internal Photos >.

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THE END