

## Canada Test Report

(802.15.4)

**Report No.:** ICCDBM-WTW-P22060902-1

**IC:** 5123A-GM240S

**Test Model:** MGM240S22A

**Series Model:** BGM240S22A (Refer to item 3.1 for more details)

**Received Date:** Jul. 06, 2022

**Test Date:** Jul. 15 ~ Jul. 29, 2022

**Issued Date:** Oct. 11, 2022

**Applicant:** Silicon Laboratories Finland Oy

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**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
Lin Kou Laboratories

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33383, Taiwan

**ISED# / CAB Identifier:** 7450F / TW2021



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### Release Control Record

Issue No.	Description	Date Issued
ICCDBM-WTW-P22060902-1	Original release	Oct. 11, 2022

## 1 Certificate of Conformity

**Product:** Bluetooth Low Energy and 802.15.4 wireless radio module

**Brand:** SILICON LABS

**Test Model:** MGM240S22A

**Series Model:** BGM240S22A (Refer to item 3.1 for more details)

**Sample Status:** Engineering samples fully representing the production modules

**Applicant:** Silicon Laboratories Finland Oy

**Test Date:** Jul. 15 ~ Jul. 29, 2022

**Standards:** Canada RSS-247 Issue 2, February 2017  
Canada RSS-Gen Issue 5, Amendment 2, February 2021  
ANSI C63.10:2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

**Prepared by :** Polly Chien , **Date:** Oct. 11, 2022  
Polly Chien / Specialist

**Approved by :** Jeremy Lin , **Date:** Oct. 11, 2022  
Jeremy Lin / Project Engineer

## 2 Summary of Test Results

RSS-247; RSS-Gen			
Standard Section	Test Item	Result	Remarks
RSS-Gen 8.8	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -15.73dB at 0.15800MHz.
RSS-Gen 6.7	Occupied Bandwidth Measurement	Pass	Meet the requirement of limit.
RSS-247 5.5	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -2.6dB at 2483.50MHz.
RSS-247 5.2 (a)	6dB bandwidth	Pass	Meet the requirement of limit.
RSS-247 5.4 (d)	Maximum Peak Output Power	Pass	Meet the requirement of limit.
RSS-247 5.2 (b)	Power Spectral Density	Pass	Meet the requirement of limit.

Note:

1. For 2.4G band compliance with rule RSS-247 of the band-edge items, the test plots were recorded in Annex A. Test Procedures refer to report 4.1.3.
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

### 2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) ( $\pm$ )
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.79 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.59 dB
	30MHz ~ 200MHz	3.60 dB
	200MHz ~ 1000MHz	2.29 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	3.59 dB

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

Product (PMN)	Bluetooth Low Energy and 802.15.4 wireless radio module
Brand	SILICON LABS
Test Model (HVIN)	MGM240S22A
Series Model	BGM240S22A
Model Difference	Refer to note
Test Software Version	TeraTerm 4.79 using testing macro provided by manufacturer
FW Version	Firmware version 4.0.x (Gecko SDK)
Sample Status	Engineering samples fully representing the production modules
Power Supply Rating	1.8V to 3.8V, with nominal supply voltage of 3.0V
Modulation Type	O-QPSK
Modulation Technology	DSSS
Transfer Rate	250 kbps
Operating Frequency	2405 ~ 2480MHz
Number of Channel	16
Output Power	11.246mW
Antenna Type	Refer to note
Antenna Connector	Refer to note
Accessory Device	NA
Cable Supplied	NA

Note:

1. The models difference are as below.

1. The models difference are as below.				
Product Spec.	Model			
	Main Model: MGM240S22A		Series Model: BGM240S22A	
	Power rating: Low-Power Wireless protocols: BLE and 802.15.4		Power rating: Low-Power Wireless protocols: BLE	
Test mode	To be tested as DTS for both 802.15.4 and BLE In the case of BLE, three PHYs to test: 2Mbps, 1Mbps and 125Kbps		Testing of the Main Model will cover this Series Model / In fact, the hardware and software are exactly the same, except for one single software-related difference: the 802.15.4 protocol is disabled in the factory for marketing differentiation	
RF nominal max TX output power	10dBm			
Antenna type	Integral antenna	RF pin	Integral antenna	RF pin

Hardware	Hardware-wise, the main model and the first series model are identical. Supply voltage range: 1V8 to 3V8 (nominal 3V0) / Fully internally regulated, including the RF PA. Temperature range: -40C to +105C.
	The BLE wireless protocol is identical in all the models. The 802.15.4 wireless protocol is made available only for the main model.
	The module's RF OUT pin exposes the 50Ω-matched RF port of the embedded radio chipset. Conducted measurements are taken at the module's RF OUT pin.
	The RF OUT pin can be further connected either to the adjacent RF ANT IN pin (using a 0Ω resistor), so that the integral antenna can be used, or directly to an external antenna. All radiated tests are taken both with a sample using the integral antenna, and with a sample where the RF signal from the RF OUT pin is routed instead to an external reference dipole antenna.

2. The antenna information is listed as below.

No.	Type	Connector	Gain (dBi)	Remark
1	Integral antenna	NA	1.48	-
2	External reference dipole antenna**	RP-SMA	2.80	-

\*The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

\*\* The dipole antenna is not sold with the EUT, but is used during testing as a reference antenna for radiated measurements of the parts making use of the RF pin.

3. BT LE and 802.15.4 modes technology cannot transmit at same time.

4. Power setting is as below:

Test Mode	MGM240S22A
CH 11	100
CH 19	100
CH 26	100

### 3.2 Description of Test Modes

16 channels are provided to this EUT:

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



### 3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable to				Description
	RE $\geq$ 1G	RE<1G	PLC	APCM	
A	√	√	√	-	EUT + Integral antenna
B	√	√	√	√	EUT + Dipole antenna

Where RE $\geq$ 1G: Radiated Emission above 1GHz & Bandedge Measurement  
PLC: Power Line Conducted Emission

RE<1G: Radiated Emission below 1GHz  
APCM: Antenna Port Conducted Measurement

Note:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y-plane** for Mode A and **X-plane** for Mode B.
2. Radiated emission (below 1GHz) and power line conducted emission test items chosen the worst maximum power.
3. "-" means no effect.

#### **Radiated Emission Test (Above 1GHz):**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
A, B	11 to 26	11, 19, 26	O-QPSK

#### **Radiated Emission Test (Below 1GHz):**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
A	11 to 26	26	O-QPSK
B	11 to 26	19	O-QPSK

#### **Power Line Conducted Emission Test:**

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
A	11 to 26	26	O-QPSK
B	11 to 26	19	O-QPSK

#### **Antenna Port Conducted Measurement:**

- ☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
- ☒ Following channel(s) was (were) selected for the final test as listed below.

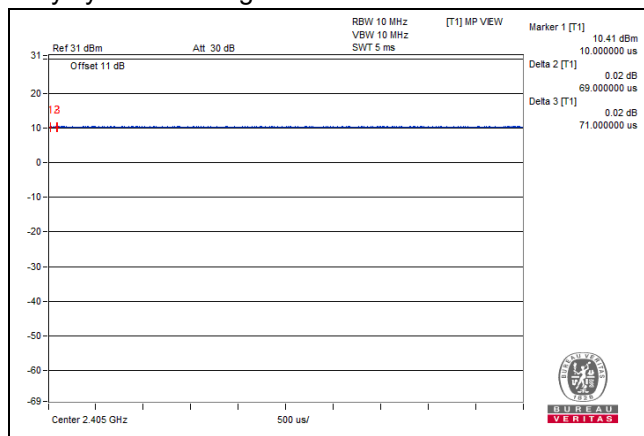
EUT Configure Mode	Available Channel	Tested Channel	Modulation Type
B	11 to 26	11, 19, 26	O-QPSK

### Test Condition:

Applicable to	Environmental Conditions	Input Power (System)	Tested by
RE $\geq$ 1G	21 deg. C, 69% RH	120Vac, 60Hz	Rex Wang
RE<1G	21 deg. C, 69% RH	120Vac, 60Hz	Rex Wang
PLC	25 deg. C, 75% RH	120Vac, 60Hz,	Rex Wang
APCM	25 deg. C, 60% RH	120Vac, 60Hz	Chun Wu

### 3.3 Duty Cycle of Test Signal

Duty cycle of test signal is 100%.



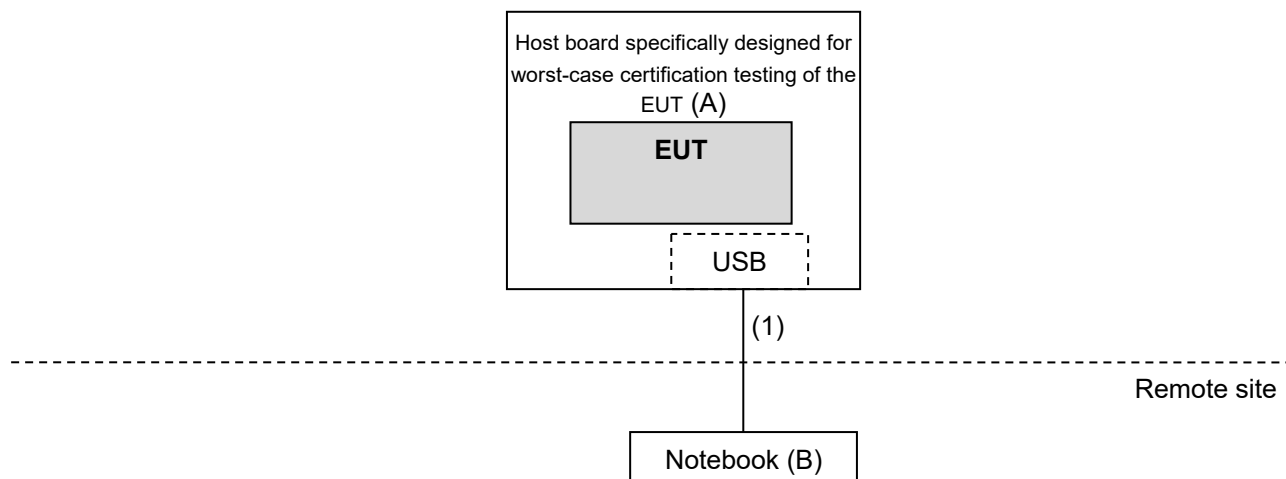
### 3.4 Description of Support Units

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.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Host board specifically designed for worst-case certification testing of the EUT	Silicon Labs	NA	NA	NA	Provided by client
B.	Notebook	Lenovo	L440	R9-0GFJJK	FCC DoC Approved	Provided by Lab

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB Cable	1	1.5	Yes	0	Supplied by applicant

#### 3.4.1 Configuration of System under Test



### 3.5 General Description of Applied Standards and References

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards and references:

#### Test Standard:

**Canada RSS-247 Issue 2, February 2017**

**Canada RSS-Gen Issue 5, Amendment 2, February 2021**

ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

#### References Test Guidance:

**KDB 558074 D01 15.247 Meas Guidance v05r02**

All test items have been performed as a reference to the above KDB test guidance.

## 4 Test Types and Results

### 4.1 Radiated Emission and Bandedge Measurement

#### 4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20 dB below the highest level of the desired power:

Frequencies (MHz)	Magnetic field strength (H-Field) ( $\mu\text{A/m}$ )	Measurement distance (meters)
0.009 ~ 0.490	6.37/F (F in kHz)	300
0.490 ~ 1.705	63.7/F (F in kHz)	30
1.705 ~ 30.0	0.08	30
Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level ( $\mu\text{V/m}$ ).
3. For frequencies above 1000 MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20 dB under any condition of modulation.
4. The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

#### 4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver KEYSIGHT	N9038A	MY55420137	Apr. 27, 2022	Apr. 28, 2023
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Sep. 15, 2021	Sep. 14, 2022
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Oct. 28, 2021	Oct. 27, 2022
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Nov. 14, 2021	Nov. 13, 2022
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Oct. 26, 2021	Oct. 25, 2022
Loop Antenna TESEQ	HLA 6121	45745	Jul. 21, 2021	Jul. 20, 2022
			Jul. 27, 2022	Jul. 26, 2023
Preamplifier Agilent (Below 1GHz)	8447D	2944A10638	May 14, 2022	May 13, 2023
Preamplifier Agilent (Above 1GHz)	8449B	3008A01962	Oct. 05, 2021	Oct. 04, 2022
RF signal cable HUBER+SUHNER&EMCI	SUCOFLEX 104 & EMC104-SM-SM80 00	CABLE-CH9-02 (248780+171006)	Jan. 15, 2022	Jan. 14, 2023
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/4)	Jan. 15, 2022	Jan. 14, 2023
RF signal cable Woken	8D-FB	Cable-CH9-01	May 14, 2022	May 13, 2023
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower & Turn BV ADT	AT100	AT93021705	NA	NA
Turn Table BV ADT	TT100	TT93021705	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Pre-amplifier (18GHz-40GHz) EMC	EMC184045B	980175	Sep. 04, 2021	Sep. 03, 2022
Peak Power Analyzer KEYSIGHT	8990B	MY51000485	Jan. 18, 2022	Jan. 17, 2023
Wideband Power Sensor KEYSIGHT	N1923A	MY58190002	May 06, 2022	May 05, 2023

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
2. The test was performed in HwaYa Chamber 9.  
3. Tested data: Jul. 15 ~ Jul. 19, 2022 & Jul. 29, 2022

### 4.1.3 Test Procedures

#### For Radiated emission below 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

#### For Radiated emission above 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. 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.
- d. 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.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

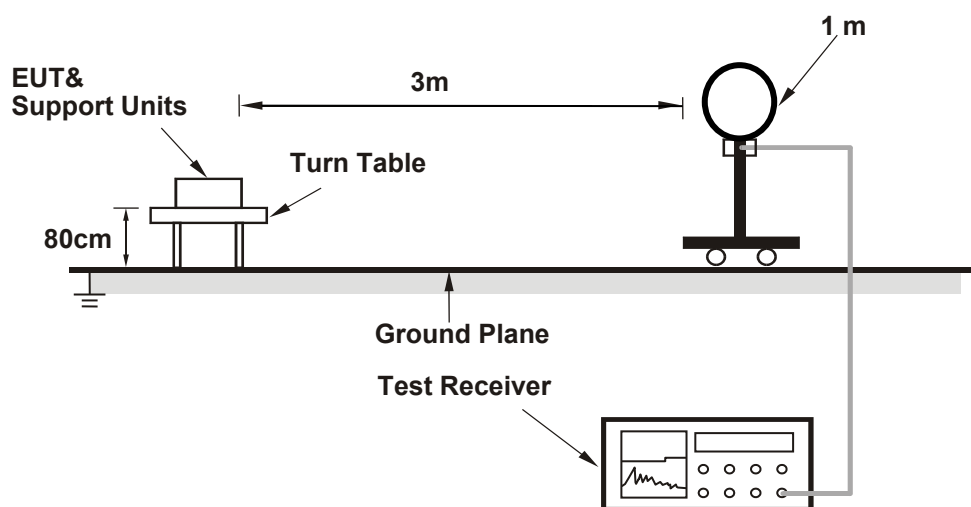
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle < 98%) or 10Hz (Duty cycle  $\geq 98\%$ ) for Average detection (AV) at frequency above 1GHz. (RBW = 1MHz, VBW = 10Hz)
4. All modes of operation were investigated and the worst-case emissions are reported.

### 4.1.4 Deviation from Test Standard

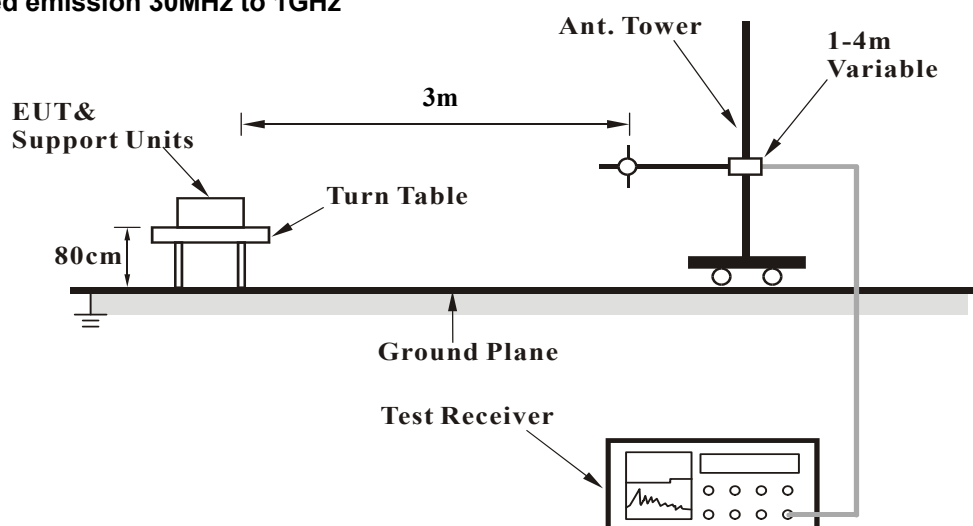
No deviation.

#### 4.1.5 Test Setup

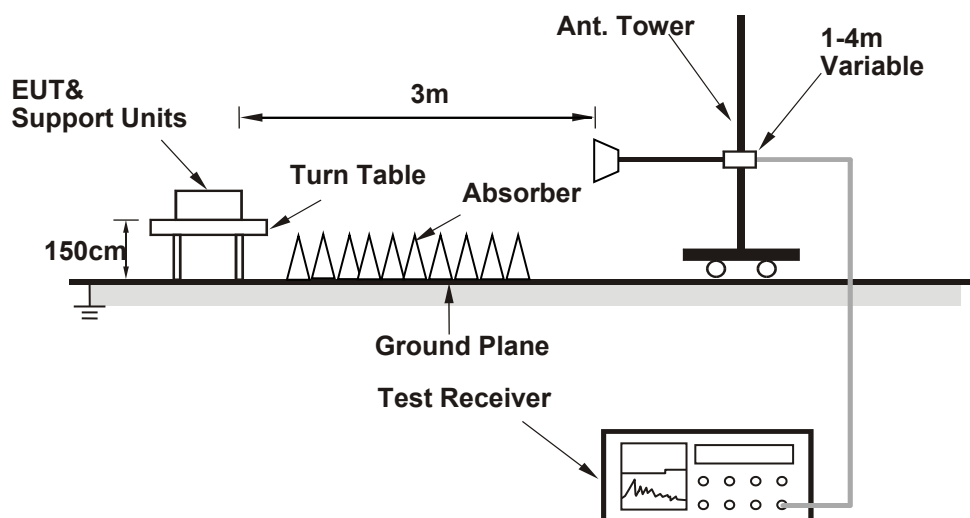
##### For Radiated emission below 30MHz



##### For Radiated emission 30MHz to 1GHz



### For Radiated emission above 1GHz



For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### 4.1.6 EUT Operating Conditions

- Placed the EUT on the testing table.
- Set the EUT under transmission condition continuously at specific channel frequency.



#### 4.1.7 Test Results

Mode A

Above 1 GHz Data:

RF Mode	TX 802.15.4	Channel	CH 11 : 2405 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	58.0 PK	74.0	-16.0	1.42 H	190	25.2	32.8
2	2390.00	44.4 AV	54.0	-9.6	1.42 H	190	11.6	32.8
3	*2405.00	105.7 PK			1.42 H	190	72.9	32.8
4	*2405.00	101.8 AV			1.42 H	190	69.0	32.8
5	4810.00	47.3 PK	74.0	-26.7	1.55 H	2	41.5	5.8
6	4810.00	34.1 AV	54.0	-19.9	1.55 H	2	28.3	5.8
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	57.4 PK	74.0	-16.6	1.04 V	272	24.6	32.8
2	2390.00	44.3 AV	54.0	-9.7	1.04 V	272	11.5	32.8
3	*2405.00	100.0 PK			1.04 V	272	67.2	32.8
4	*2405.00	96.1 AV			1.04 V	272	63.3	32.8
5	4810.00	46.8 PK	74.0	-27.2	1.00 V	224	41.0	5.8
6	4810.00	33.9 AV	54.0	-20.1	1.00 V	224	28.1	5.8

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " \* ": Fundamental frequency.

RF Mode	TX 802.15.4	Channel	CH 19 : 2445 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2445.00	104.2 PK			1.42 H	168	71.4	32.8
2	*2445.00	100.7 AV			1.42 H	168	67.9	32.8
3	4880.00	47.1 PK	74.0	-26.9	1.59 H	44	41.6	5.5
4	4880.00	33.8 AV	54.0	-20.2	1.59 H	44	28.3	5.5
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2445.00	99.1 PK			1.08 V	270	66.3	32.8
2	*2445.00	95.2 AV			1.08 V	270	62.4	32.8
3	4880.00	46.3 PK	74.0	-27.7	1.05 V	229	40.8	5.5
4	4880.00	33.5 AV	54.0	-20.5	1.05 V	229	28.0	5.5

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " \* " : Fundamental frequency.

RF Mode	TX 802.15.4	Channel	CH 26 : 2480 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2480.00	106.0 PK			1.60 H	186	73.1	32.9
2	*2480.00	102.2 AV			1.60 H	186	69.3	32.9
3	2483.50	62.8 PK	74.0	-11.2	1.60 H	186	29.9	32.9
4	2483.50	51.1 AV	54.0	-2.9	1.60 H	186	18.2	32.9
5	4960.00	47.3 PK	74.0	-26.7	1.54 H	12	41.6	5.7
6	4960.00	34.2 AV	54.0	-19.8	1.54 H	12	28.5	5.7
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2480.00	102.1 PK			1.20 V	282	69.2	32.9
2	*2480.00	98.2 AV			1.20 V	282	65.3	32.9
3	2483.50	61.8 PK	74.0	-12.2	1.20 V	282	28.9	32.9
4	2483.50	49.0 AV	54.0	-5.0	1.20 V	282	16.1	32.9
5	4960.00	46.8 PK	74.0	-27.2	1.03 V	225	41.1	5.7
6	4960.00	33.9 AV	54.0	-20.1	1.03 V	225	28.2	5.7

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " \* ": Fundamental frequency.

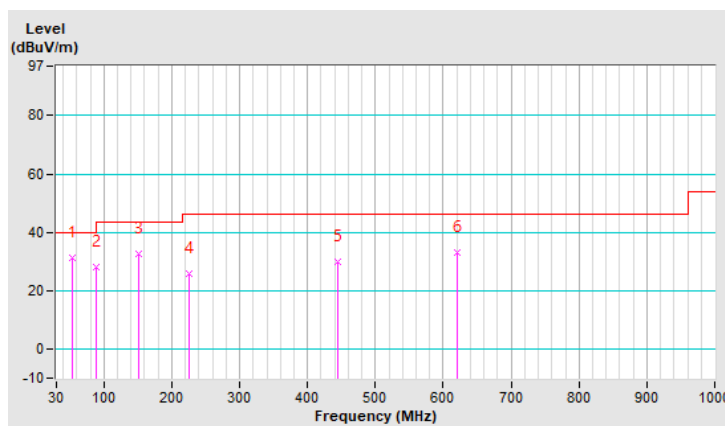
Below 1GHz worst-case data:

RF Mode	TX 802.15.4	Channel	CH 26 : 2480 MHz
Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	53.28	31.3 QP	40.0	-8.7	2.00 H	24	40.4	-9.1
2	88.20	28.2 QP	43.5	-15.3	1.51 H	40	42.9	-14.7
3	151.25	32.4 QP	43.5	-11.1	1.51 H	14	41.3	-8.9
4	224.97	25.9 QP	46.0	-20.1	1.51 H	96	37.2	-11.3
5	444.19	30.0 QP	46.0	-16.0	2.00 H	105	33.7	-3.7
6	620.73	33.2 QP	46.0	-12.8	2.00 H	121	33.3	-0.1

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. The other emission levels were very low against the limit of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value.
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

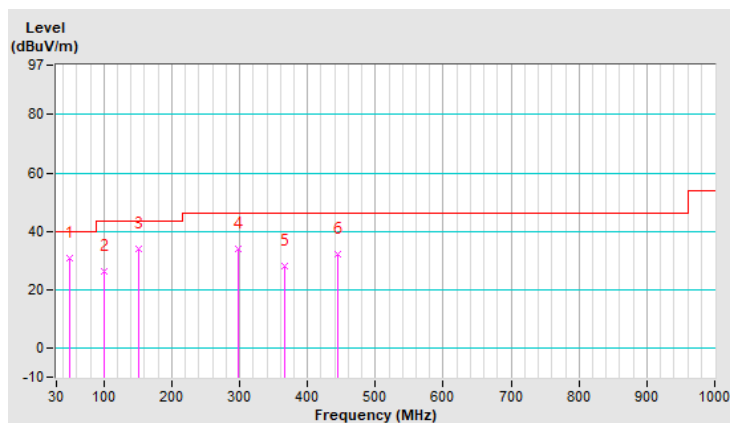


RF Mode	TX 802.15.4	Channel	CH 26 : 2480 MHz
Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	49.40	30.9 QP	40.0	-9.1	2.00 V	280	39.9	-9.0
2	99.84	26.3 QP	43.5	-17.2	1.49 V	6	40.0	-13.7
3	151.25	34.0 QP	43.5	-9.5	1.24 V	42	42.9	-8.9
4	297.72	34.2 QP	46.0	-11.8	1.24 V	14	41.2	-7.0
5	365.62	28.1 QP	46.0	-17.9	1.49 V	191	33.8	-5.7
6	444.19	32.0 QP	46.0	-14.0	1.00 V	166	35.7	-3.7

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. The other emission levels were very low against the limit of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value.
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



## Mode B

### Above 1 GHz Data:

RF Mode	TX 802.15.4	Channel	CH 11 : 2405 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	57.9 PK	74.0	-16.1	2.53 H	266	25.1	32.8
2	2390.00	44.5 AV	54.0	-9.5	2.53 H	266	11.7	32.8
3	*2405.00	107.0 PK			2.53 H	266	74.2	32.8
4	*2405.00	102.9 AV			2.53 H	266	70.1	32.8
5	4810.00	48.6 PK	74.0	-25.4	2.25 H	271	42.8	5.8
6	4810.00	36.4 AV	54.0	-17.6	2.25 H	271	30.6	5.8
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	57.6 PK	74.0	-16.4	3.85 V	5	24.8	32.8
2	2390.00	44.4 AV	54.0	-9.6	3.85 V	5	11.6	32.8
3	*2405.00	103.2 PK			3.85 V	5	70.4	32.8
4	*2405.00	99.3 AV			3.85 V	5	66.5	32.8
5	4810.00	47.3 PK	74.0	-26.7	3.34 V	1	41.5	5.8
6	4810.00	36.2 AV	54.0	-17.8	3.34 V	1	30.4	5.8

#### Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " \* ": Fundamental frequency.

RF Mode	TX 802.15.4	Channel	CH 19 : 2445 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2445.00	107.1 PK			2.75 H	267	74.3	32.8
2	*2445.00	103.2 AV			2.75 H	267	70.4	32.8
3	4880.00	48.4 PK	74.0	-25.6	2.29 H	270	42.9	5.5
4	4880.00	36.1 AV	54.0	-17.9	2.29 H	270	30.6	5.5
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2445.00	102.1 PK			3.36 V	14	69.3	32.8
2	*2445.00	98.3 AV			3.36 V	14	65.5	32.8
3	4880.00	48.0 PK	74.0	-26.0	3.35 V	6	42.5	5.5
4	4880.00	35.8 AV	54.0	-18.2	3.35 V	6	30.3	5.5

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " \* ": Fundamental frequency.

RF Mode	TX 802.15.4	Channel	CH 26 : 2480 MHz
Frequency Range	1GHz ~ 25GHz	Detector Function	Peak (PK) Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2480.00	106.9 PK			3.60 H	265	74.0	32.9
2	*2480.00	102.9 AV			3.60 H	265	70.0	32.9
3	2483.50	64.5 PK	74.0	-9.5	3.60 H	265	31.6	32.9
4	<b>2483.50</b>	<b>51.4 AV</b>	<b>54.0</b>	<b>-2.6</b>	<b>3.60 H</b>	<b>265</b>	<b>18.5</b>	<b>32.9</b>
5	4960.00	48.9 PK	74.0	-25.1	2.30 H	269	43.2	5.7
6	4960.00	36.6 AV	54.0	-17.4	2.30 H	269	30.9	5.7
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2480.00	102.5 PK			3.61 V	2	69.6	32.9
2	*2480.00	98.5 AV			3.61 V	2	65.6	32.9
3	2483.50	60.2 PK	74.0	-13.8	3.61 V	2	27.3	32.9
4	2483.50	48.8 AV	54.0	-5.2	3.61 V	2	15.9	32.9
5	4960.00	48.3 PK	74.0	-25.7	3.38 V	0	42.6	5.7
6	4960.00	36.2 AV	54.0	-17.8	3.38 V	0	30.5	5.7

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " \* ": Fundamental frequency.



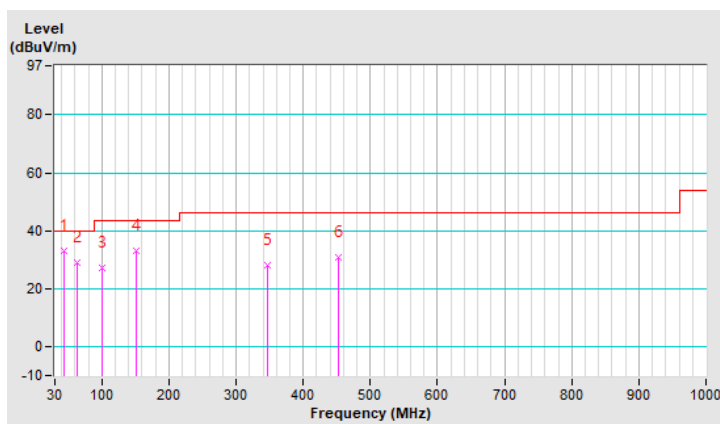
Below 1GHz worst-case data:

RF Mode	TX 802.15.4	Channel	CH 18 : 2440 MHz
Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	44.55	33.0 QP	40.0	-7.0	1.00 H	67	42.3	-9.3
2	63.95	28.9 QP	40.0	-11.1	1.00 H	135	38.9	-10.0
3	100.81	27.4 QP	43.5	-16.1	1.24 H	342	40.8	-13.4
4	151.25	33.2 QP	43.5	-10.3	1.24 H	334	42.1	-8.9
5	346.22	28.1 QP	46.0	-17.9	1.00 H	9	34.2	-6.1
6	451.95	30.7 QP	46.0	-15.3	2.00 H	94	34.1	-3.4

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. The other emission levels were very low against the limit of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value.
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

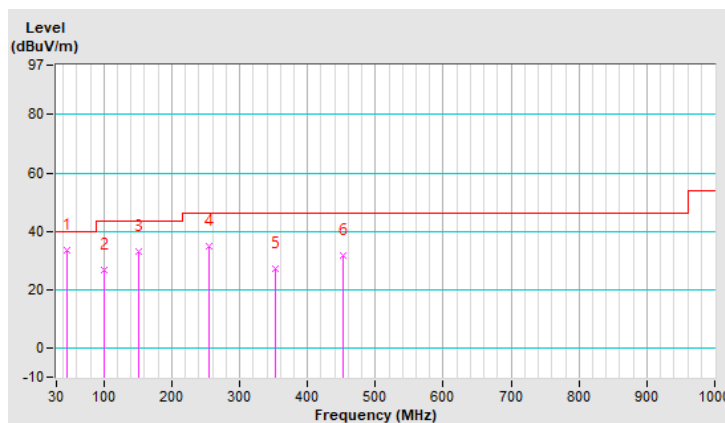


RF Mode	TX 802.15.4	Channel	CH 18 : 2440 MHz
Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	45.52	33.5 QP	40.0	-6.5	1.01 V	14	42.7	-9.2
2	99.84	26.9 QP	43.5	-16.6	1.01 V	215	40.6	-13.7
3	151.25	33.2 QP	43.5	-10.3	1.51 V	14	42.1	-8.9
4	255.04	34.7 QP	46.0	-11.3	1.51 V	150	43.5	-8.8
5	352.04	27.1 QP	46.0	-18.9	1.25 V	180	33.1	-6.0
6	451.95	31.9 QP	46.0	-14.1	1.01 V	102	35.3	-3.4

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB).
3. The other emission levels were very low against the limit of frequency range 30MHz ~ 1000MHz.
4. Margin value = Emission Level – Limit value.
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



## 4.2 Conducted Emission Measurement

### 4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

### 4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESR3	102412	Jan. 22, 2022	Jan. 21, 2023
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Sep. 04, 2021	Sep. 03, 2022
V-LISN SCHWARZBECK (EUT)	NNBL 8226-2	8226-142	Aug. 20, 2021	Aug. 19, 2022
LISN ROHDE & SCHWARZ (Peripheral)	ESH2-Z5	100100	Feb. 17, 2022	Feb. 16, 2023
Software ADT	BV ADT_Cond_ V7.3.7.4	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Shielded Room 2 (Conduction 2).

3. The VCCI Site Registration No. is C-12047.

4. Tested date: Jul. 19, 2022

### 4.2.3 Test Procedures

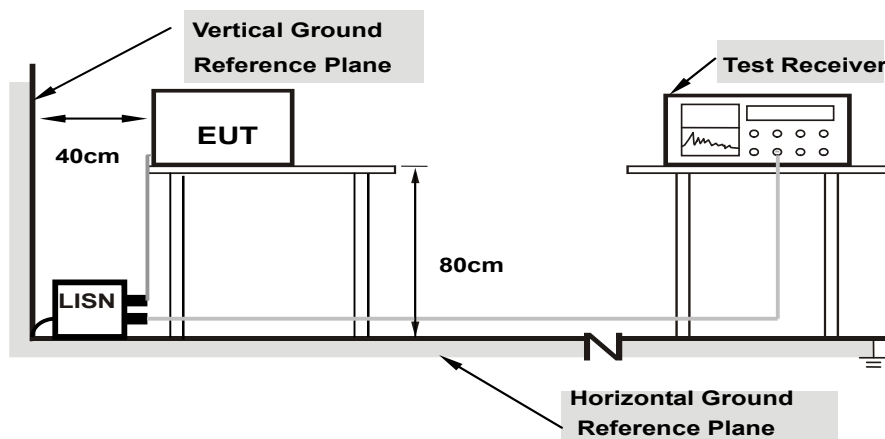
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

Note: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

### 4.2.4 Deviation from Test Standard

No deviation.

### 4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

For the actual test configuration, please refer to the attached file (Test Setup Photo).

### 4.2.6 EUT Operating Conditions

Same as 4.1.6.

## 4.2.7 Test Results

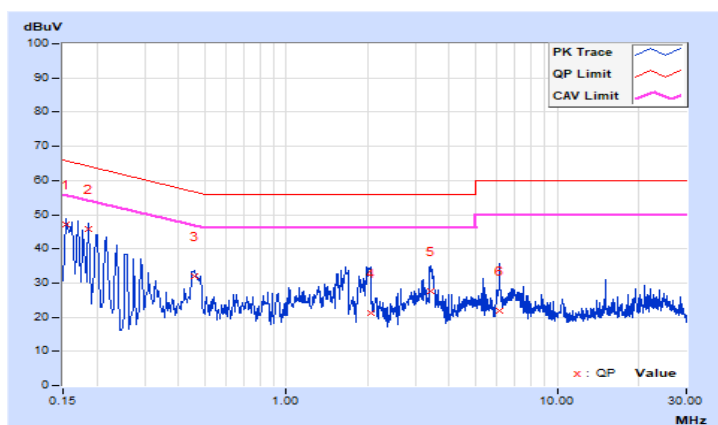
Worst-case data:

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
	[MHz]		[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15400	10.13	36.88	20.88	47.01	31.01	65.78	55.78	-18.77	-24.77
2	0.18600	10.14	35.55	17.30	45.69	27.44	64.21	54.21	-18.52	-26.77
3	0.45800	10.16	21.99	15.18	32.15	25.34	56.73	46.73	-24.58	-21.39
4	2.04200	10.22	11.05	1.53	21.27	11.75	56.00	46.00	-34.73	-34.25
5	3.42200	10.24	17.50	8.21	27.74	18.45	56.00	46.00	-28.26	-27.55
6	6.11800	10.26	11.49	2.09	21.75	12.35	60.00	50.00	-38.25	-37.65

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

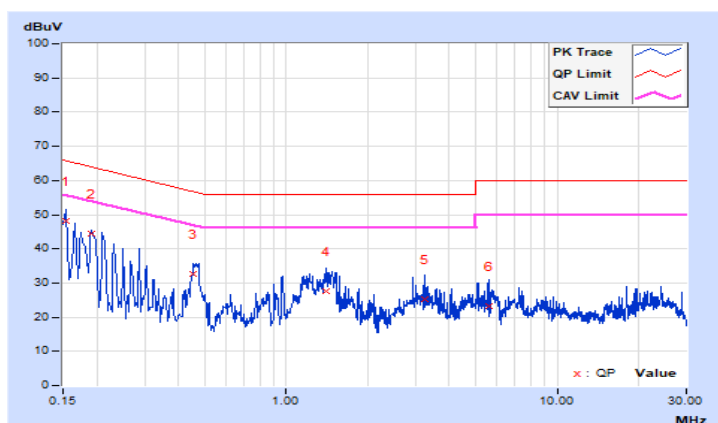


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15400	10.14	38.12	23.41	48.26	33.55	65.78	55.78	-17.52	-22.23
2	0.19000	10.15	34.15	16.63	44.30	26.78	64.04	54.04	-19.74	-27.26
3	0.45400	10.17	22.63	16.27	32.80	26.44	56.80	46.80	-24.00	-20.36
4	1.41000	10.21	17.31	8.56	27.52	18.77	56.00	46.00	-28.48	-27.23
5	3.25400	10.26	14.95	7.43	25.21	17.69	56.00	46.00	-30.79	-28.31
6	5.57400	10.29	12.99	3.03	23.28	13.32	60.00	50.00	-36.72	-36.68

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

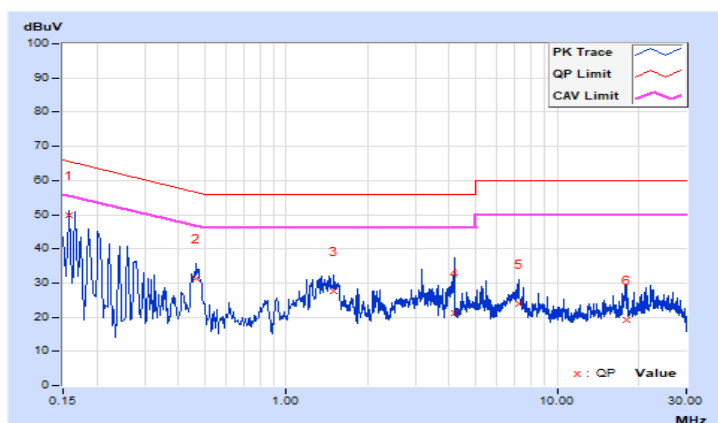


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
	[MHz]	(dB)	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15800	10.13	39.71	21.82	49.84	31.95	65.57	55.57	-15.73	-23.62
2	0.46600	10.16	21.28	16.00	31.44	26.16	56.58	46.58	-25.14	-20.42
3	1.49800	10.20	17.30	7.81	27.50	18.01	56.00	46.00	-28.50	-27.99
4	4.16600	10.25	11.06	2.65	21.31	12.90	56.00	46.00	-34.69	-33.10
5	7.18600	10.27	13.59	7.46	23.86	17.73	60.00	50.00	-36.14	-32.27
6	17.98200	10.37	8.93	0.71	19.30	11.08	60.00	50.00	-40.70	-38.92

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

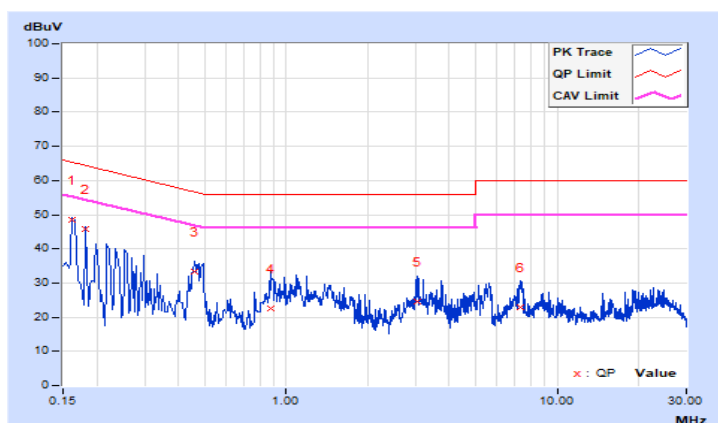


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16200	10.14	38.45	21.38	48.59	31.52	65.36	55.36	-16.77	-23.84
2	0.18200	10.15	35.64	19.23	45.79	29.38	64.39	54.39	-18.60	-25.01
3	0.45800	10.17	23.17	18.01	33.34	28.18	56.73	46.73	-23.39	-18.55
4	0.87400	10.19	12.27	1.25	22.46	11.44	56.00	46.00	-33.54	-34.56
5	3.04200	10.25	14.49	6.42	24.74	16.67	56.00	46.00	-31.26	-29.33
6	7.28600	10.31	12.65	4.96	22.96	15.27	60.00	50.00	-37.04	-34.73

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.



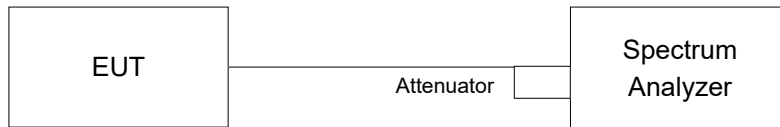


### 4.3 6dB Bandwidth Measurement

#### 4.3.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

#### 4.3.2 Test Setup



#### 4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

#### 4.3.4 Test Procedure

- Set resolution bandwidth (RBW) = 100kHz.
- Set the video bandwidth (VBW)  $\geq 3 \times$  RBW, Detector = peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

#### 4.3.5 Deviation from Test Standard

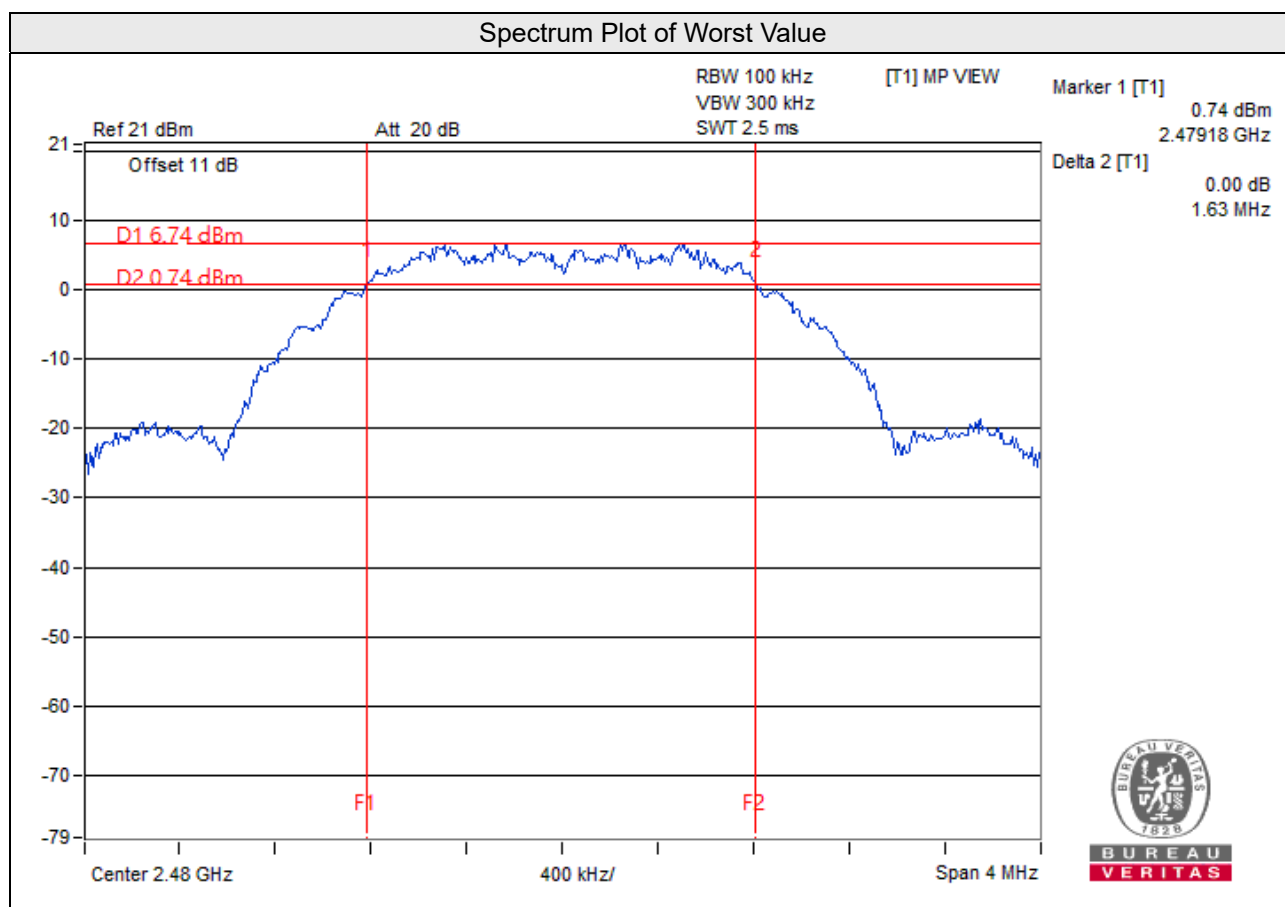
No deviation.

#### 4.3.6 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

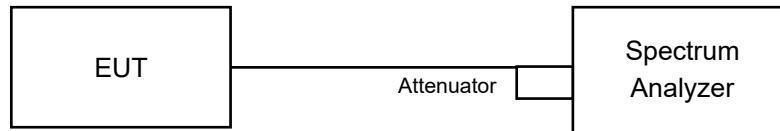
#### 4.3.7 Test Result

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
11	2405	1.64	0.5	Pass
19	2445	1.63	0.5	Pass
26	2480	1.63	0.5	Pass



## 4.4 Occupied Bandwidth Measurement

### 4.4.1 Test Setup



### 4.4.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.4.3 Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth and set the detector to sampling. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the total mean power of a given emission.

### 4.4.4 Deviation from Test Standard

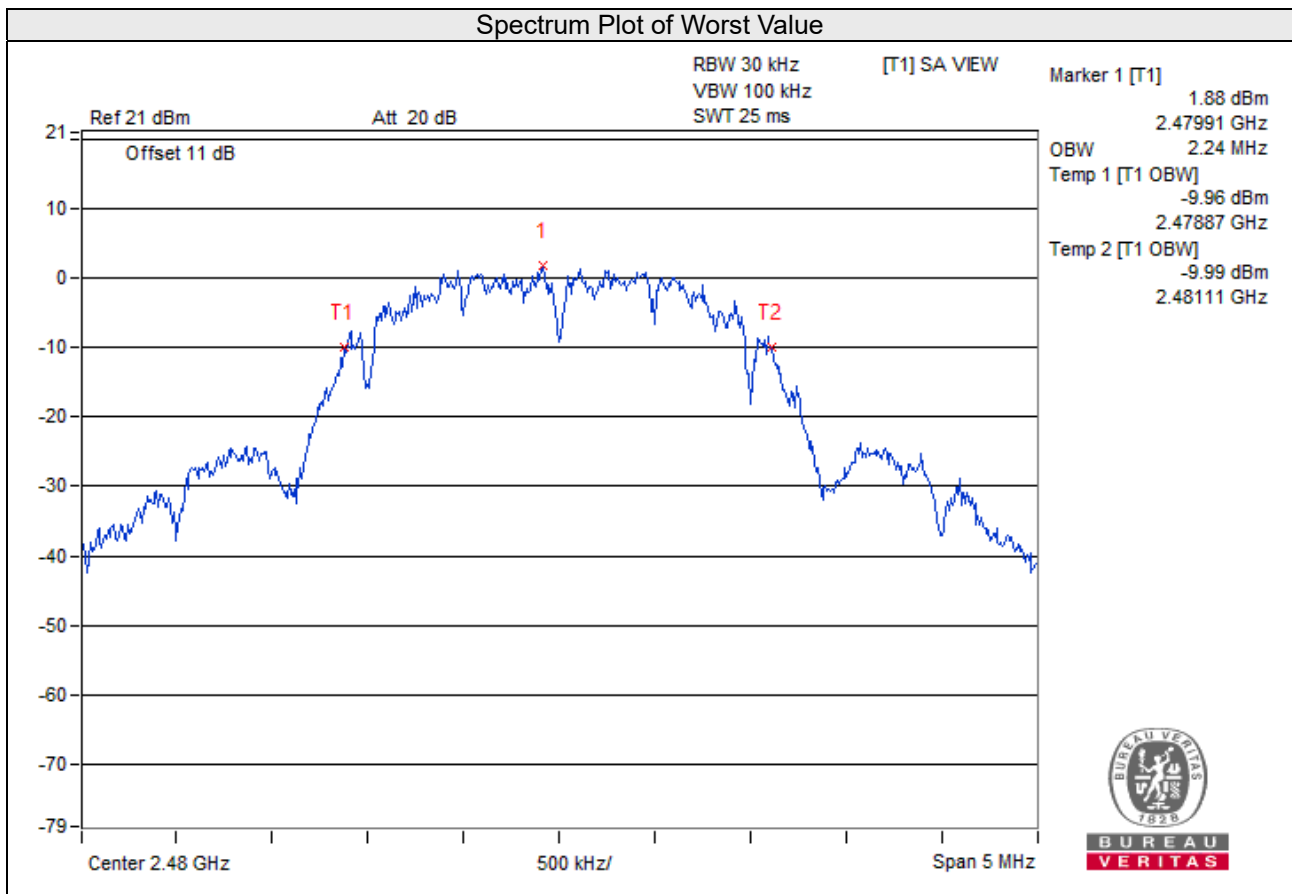
No deviation.

### 4.4.5 EUT Operating Conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

#### 4.4.6 Test Results

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)
11	2405	2.23
19	2445	2.24
26	2480	2.24

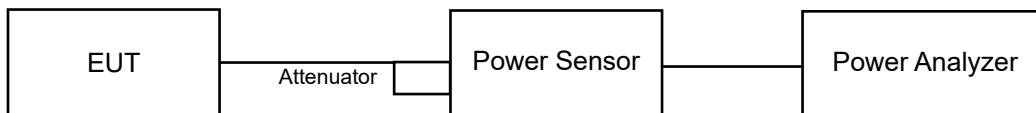


## 4.5 Conducted Output Power Measurement

### 4.5.1 Limits of Conducted Output Power Measurement

For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

### 4.5.2 Test Setup



### 4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.5.4 Test Procedures

For Peak Power

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

For Average Power

Average power sensor was used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

### 4.5.5 Deviation from Test Standard

No deviation.

### 4.5.6 EUT Operating Conditions

Same as item 4.3.6.

#### 4.5.7 Test Results

##### For Peak Power

Channel	Frequency (MHz)	Peak Power (mW)	Peak Power (dBm)	Limit (dBm)	Pass/Fail
11	2405	<b>11.246</b>	10.51	30.00	Pass
19	2445	10.765	10.32	30.00	Pass
26	2480	10.641	10.27	30.00	Pass

##### For Average Power

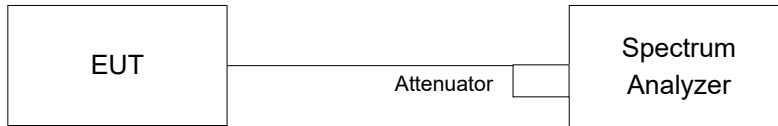
Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)
11	2405	10.789	10.33
19	2445	10.351	10.15
26	2480	10.280	10.12

## 4.6 Power Spectral Density Measurement

### 4.6.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8dBm per 3kHz.

### 4.6.2 Test Setup



### 4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.6.4 Test Procedure

- Set analyzer center frequency to DTS channel center frequency.
- Set the span to 1.5 times the DTS bandwidth.
- Set the RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
- Set the VBW  $\geq 3 \times \text{RBW}$ .
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level within the RBW.

### 4.6.5 Deviation from Test Standard

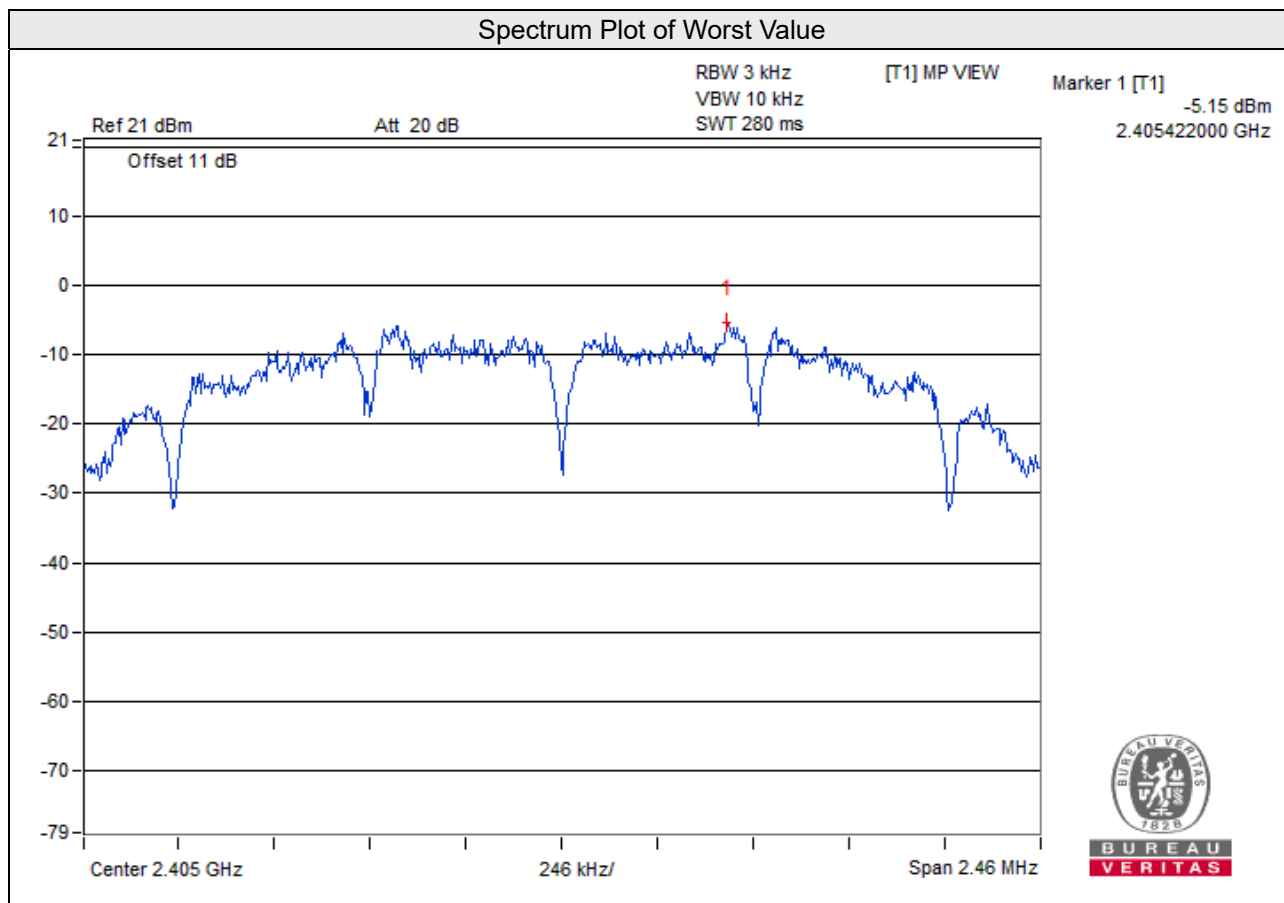
No deviation.

### 4.6.6 EUT Operating Condition

Same as item 4.3.6

#### 4.6.7 Test Results

Channel	Freq. (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass / Fail
11	2405	-5.15	8.00	Pass
19	2445	-5.21	8.00	Pass
26	2480	-5.39	8.00	Pass



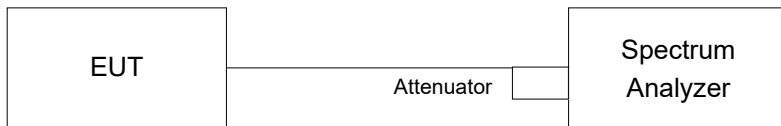


## 4.7 Conducted Out of Band Emission Measurement

### 4.7.1 Limits of Conducted Out of Band Emission Measurement

Below 20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

### 4.7.2 Test Setup



### 4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.7.4 Test Procedure

#### MEASUREMENT PROCEDURE REF

- Set the RBW = 100 kHz.
- Set the VBW  $\geq$  300 kHz.
- Detector = peak.
- Sweep time = auto couple.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

#### MEASUREMENT PROCEDURE OOB

- Set RBW = 100 kHz.
- Set VBW  $\geq$  300 kHz.
- Detector = peak.
- Sweep = auto couple.
- Trace Mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level.

### 4.7.5 Deviation from Test Standard

No deviation.

### 4.7.6 EUT Operating Condition

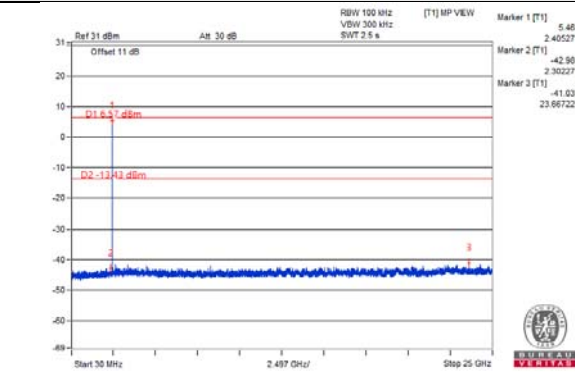
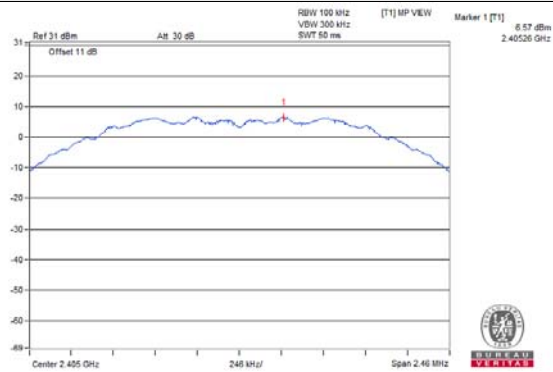
Same as item 4.3.6

### 4.7.7 Test Results

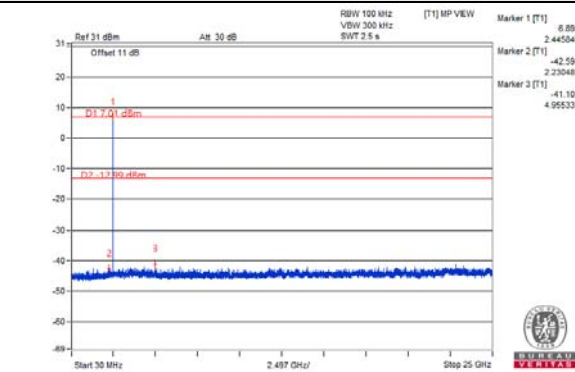
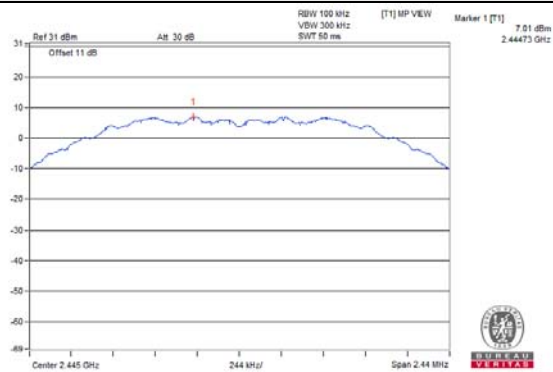
The conducted emission test is performed on each TX port of operating mode without summing or adding  $10\log(N)$  since the limit is relative emission limit.

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

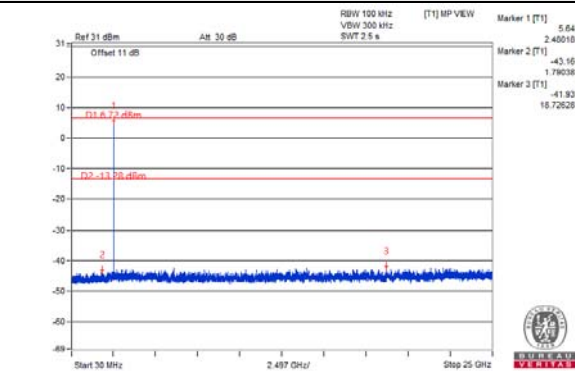
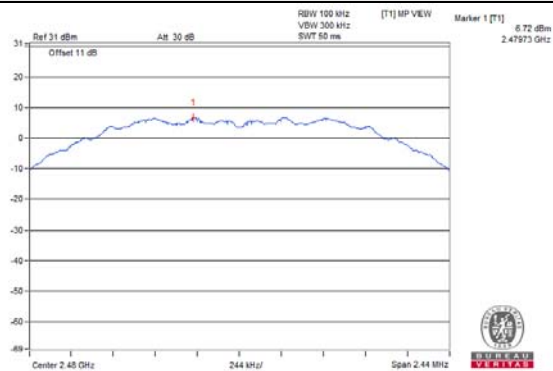
### CH 11



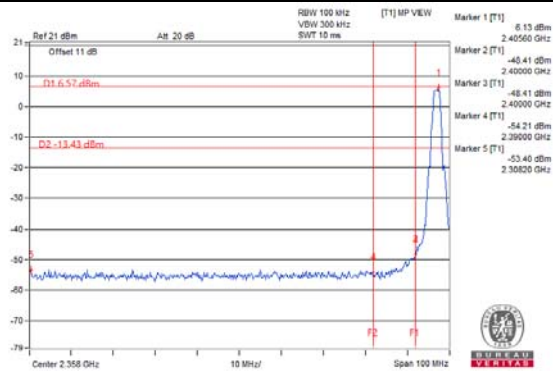
### CH 19



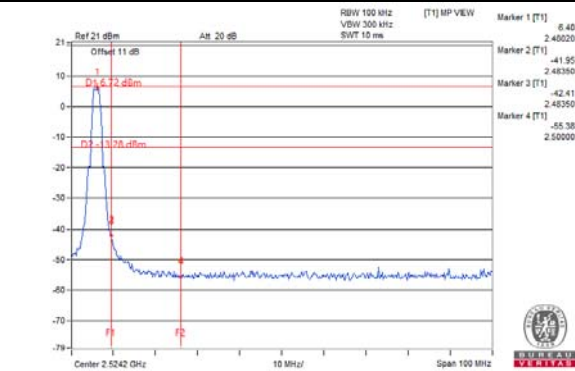
### CH 26



### CH 11 Band edge

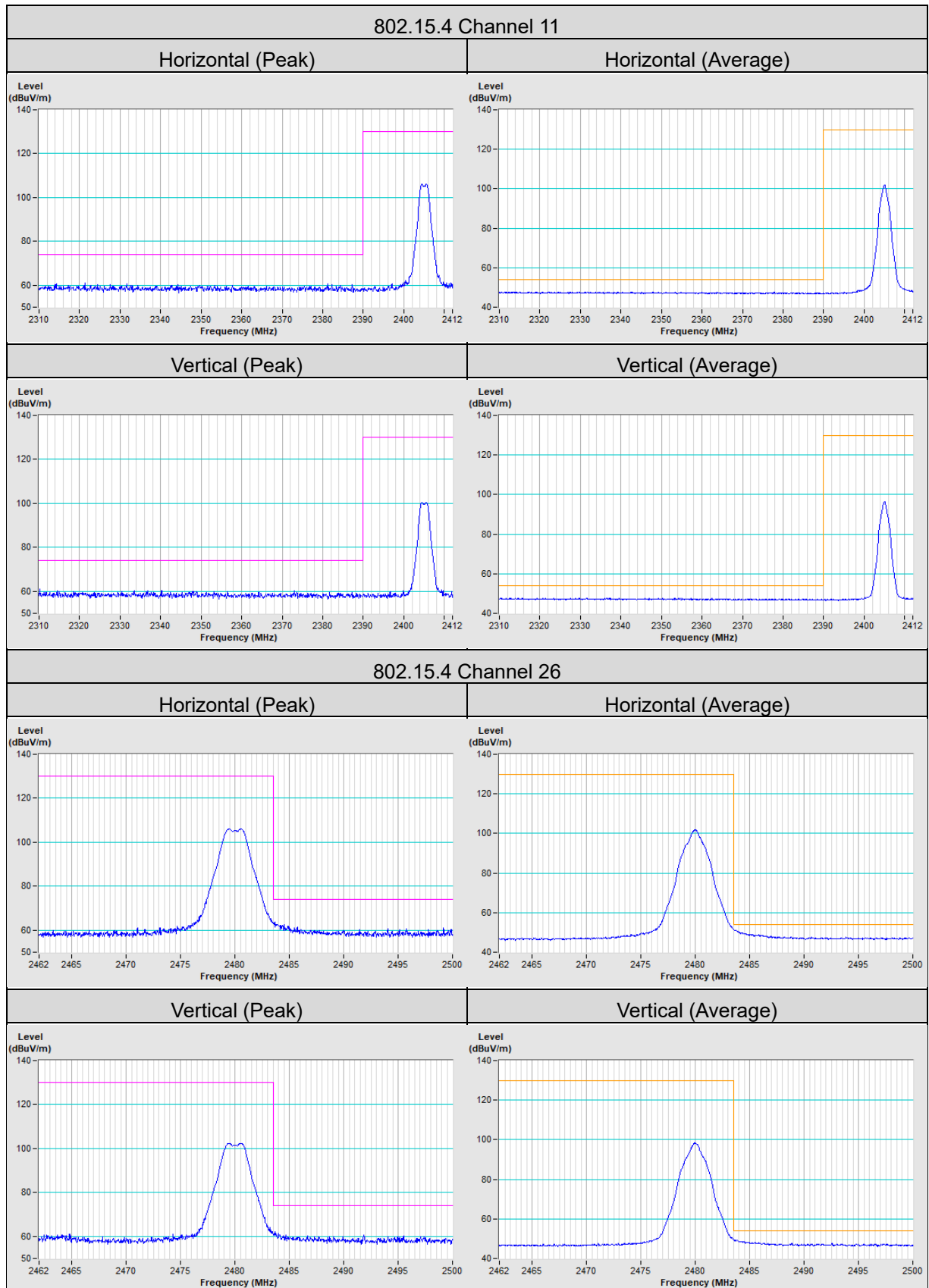


### CH 26 Band edge

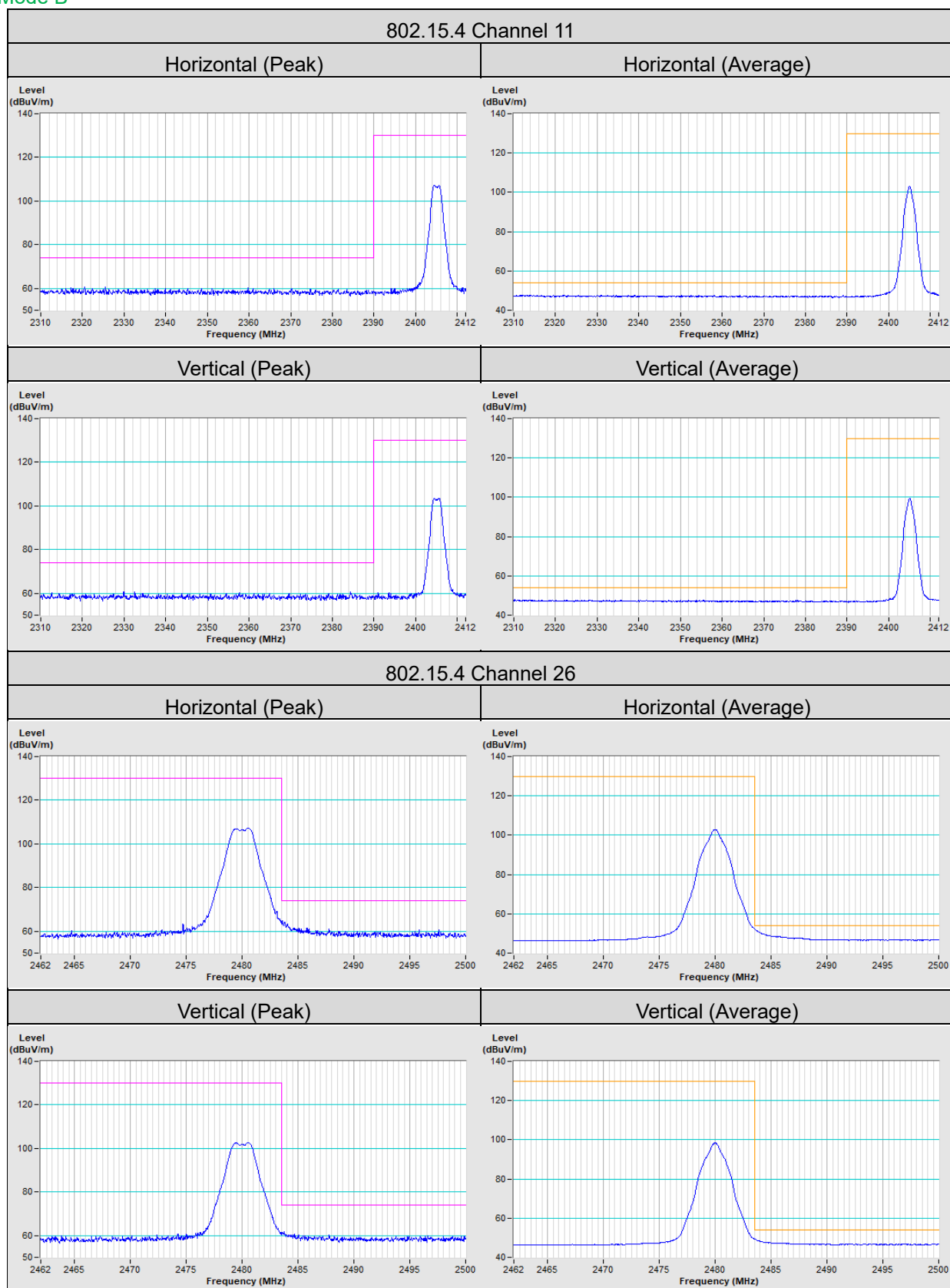


## Annex A - Band Edge Measurement

### Mode A



## Mode B



## 5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

## Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited and approved according to ISO/IEC 17025.

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The address and road map of all our labs can be found in our web site also.

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