

FCC Test Report

Report No.: RF200605C50-2

FCC ID: 2AH7L-UPSB

Test Model: PAS600L

Received Date: Jun. 10, 2020

Test Date: Jul. 06 ~ Dec. 21, 2020

Issued Date: Dec. 24, 2020

Applicant: Schneider Electric Industries SAS

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**FCC Registration /
Designation Number:** 788550 / TW0003



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Release Control Record

Issue No.	Description	Date Issued
RF200605C50-2	Original Release	Dec. 24, 2020

1 Certificate of Conformity

Product: Ecostruxure Panel Server

Brand: Schneider Electric

Test Model: PAS600L

Sample Status: Identical Prototype

Applicant: Schneider Electric Industries SAS

Test Date: Jul. 06 ~ Dec. 21, 2020

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
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 : Gina Liu , **Date:** Dec. 24, 2020
Gina Liu / Specialist

Approved by : Dylan Chiou , **Date:** Dec. 24, 2020
Dylan Chiou / Senior Project Engineer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -7.2 dB at 30.00 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -13.53 dB at 17.91704 MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.247(a)(2)	6 dB Bandwidth	Pass	Meet the requirement of limit.
15.247(b)	Conducted power	Pass	Meet the requirement of limit.
15.247(e)	Power Spectral Density	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	No antenna connector is used.

Note:

- Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
- For 2400-2483.5MHz band compliance with rule 15.247(d) of the band-edge items, the test plots were recorded in Annex A. Test Procedures refer to report 4.1.3.

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) (±)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.79 dB
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	3.04 dB
	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Ecostruxure Panel Server
Brand	Schneider Electric
Test Model	PAS600L
Status of EUT	Identical Prototype
Power Supply Rating	24 Vdc
Modulation Type	O-QPSK
Modulation Technology	DSSS
Transfer Rate	250 kbps
Operating Frequency	2405 ~ 2475 MHz
Number of Channel	15
Output Power	4.285 mW
Antenna Type	Antenna 1: PCB antenna with 4.4 dBi gain Antenna 2: PCB antenna with 5.1 dBi gain
Antenna Connector	N/A
Accessory Device	External antenna for 2.4G (Brand: Schneider Electric; Model: PASA-ANT1)
Data Cable Supplied	N/A

Note:

1. The EUT support 1TX diversity function in transmitter part.
2. 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.
3. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

15 channels are provided to this EUT:

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

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE $\geq$ 1G	RE<1G	PLC	APCM	
A	√	√	√	√	Antenna 1
B	√	-	-	-	Antenna 2

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

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

NOTE: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane**.
NOTE: "-" means no effect.

Radiated Emission Test (Above 1 GHz):

- ☒ 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 Technology	Modulation Type
A, B	11 to 26	11, 18, 26	DSSS	O-QPSK

Radiated Emission Test (Below 1 GHz):

- ☒ 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 Technology	Modulation Type
A	11 to 26	26	OFDM	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 Technology	Modulation Type
A	11 to 26	26	OFDM	O-QPSK

Bandedge Measurement:

- ☒ 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 Technology	Modulation Type
A, B	11 to 26	11, 26	OFDM	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 Technology	Modulation Type
A	11 to 26	11, 18, 26	OFDM	O-QPSK

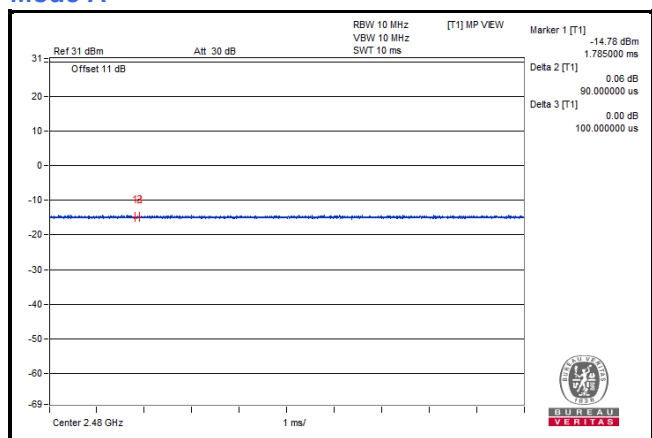
Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested by
RE $\geq$ 1G	25 deg. C, 65 % RH	24 Vdc	Greg Lin
RE<1G	25 deg. C, 65 % RH	24 Vdc	Greg Lin
PLC	25 deg. C, 65 % RH	120 Vac, 60 Hz	Greg Lin
APCM	25 deg. C, 65 % RH	24 Vdc	Ivan Tseng

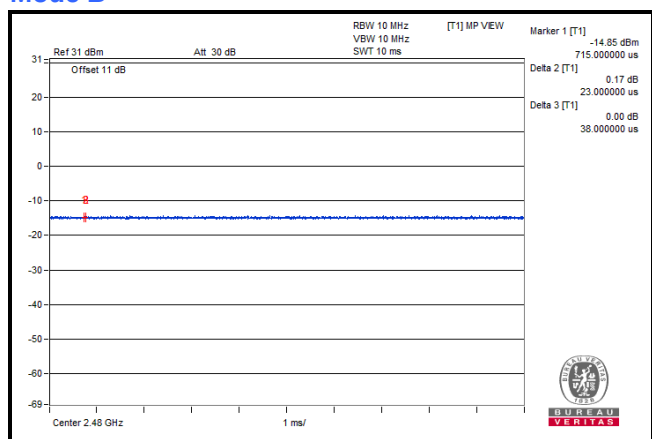
3.3 Duty Cycle of Test Signal

Duty cycle of test signal is 100 %

Mode A



Mode B



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.

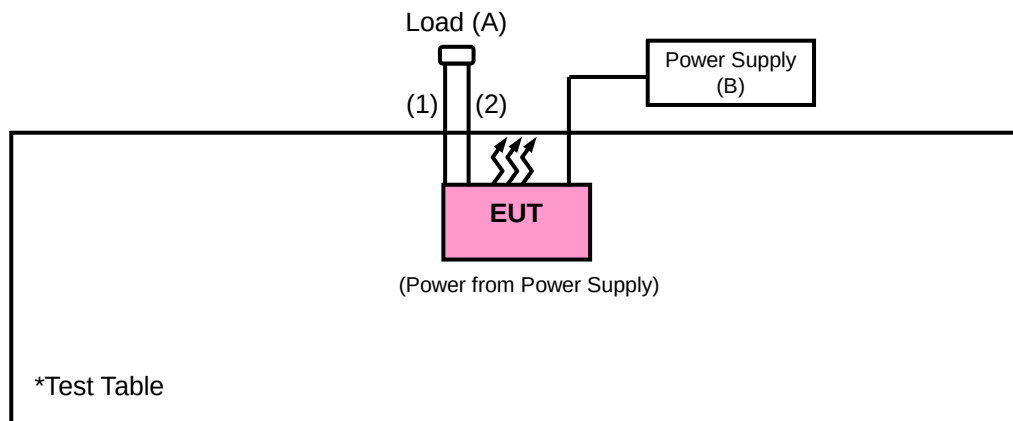
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
1.	Load	N/A	N/A	N/A	N/A	--
2.	DC Power Supply	Topward	33010D	807748	N/A	--

Note:

1. All power cords of the above support units are non-shielded (1.8m).

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	LAN Cable	1	1.5	N	0	--
2.	LAN Cable	1	1.5	N	0	--

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:

FCC Part 15, Subpart C (15.247)

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)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F (kHz)	300
0.490 ~ 1.705	24000/F (kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/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.

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
Test Receiver KEYSIGHT	N9038A	MY55420137	Apr. 16, 2020	Apr. 15, 2021
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Jun. 12, 2020	Jun. 11, 2021
Spectrum Analyzer ROHDE & SCHWARZ	FSV40	100980	Apr. 20, 2020	Apr. 19, 2021
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Nov. 07, 2019	Nov. 06, 2020
			Nov. 06, 2020	Nov. 05, 2021
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Nov. 24, 2019	Nov. 23, 2020
			Nov. 22, 2020	Nov. 21, 2021
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 24, 2019	Nov. 23, 2020
			Nov. 22, 2020	Nov. 21, 2021
Preamplifier Agilent (Below 1GHz)	8447D	2944A10638	Jun. 08, 2020	Jun. 07, 2021
Preamplifier Agilent (Above 1GHz)	8449B	3008A02367	Feb. 18, 2020	Feb. 17, 2021
RF signal cable HUBER+SUHNER&EMCI	SUCOFLEX 104 & EMC104-SM-SM80 00	CABLE-CH9-02 (248780+171006)	Feb. 18, 2020	Feb. 17, 2021
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(25079 5/4)	Jan. 18, 2020	Jan. 17, 2021
RF signal cable Woken	8D-FB	Cable-CH9-01	Jun. 08, 2020	Jun. 07, 2021
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	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
Power Meter Anritsu	ML2495A	1232003	Dec. 30, 2019	Dec. 29, 2020

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.

4.1.3 Test Procedures

For Radiated Emission below 30 MHz

- 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 9 kHz at frequency below 30 MHz.

For Radiated Emission above 30 MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30 MHz ~ 1 GHz) / 1.5 meters (for above 1 GHz) 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 detected 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:

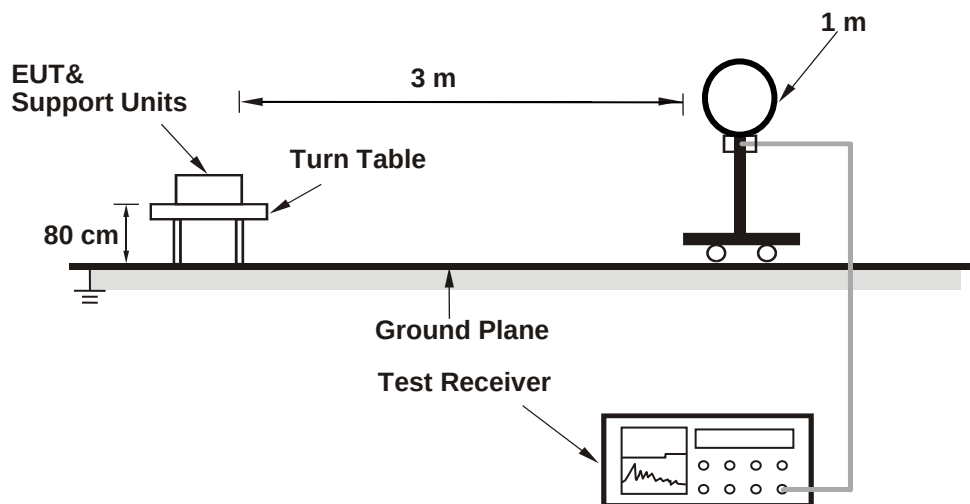
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.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

4.1.4 Deviation from Test Standard

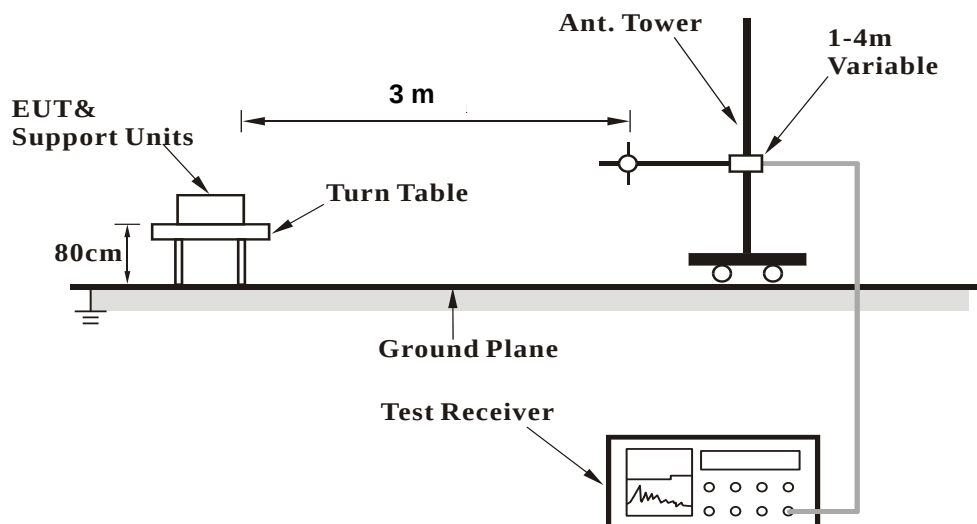
No deviation.

4.1.5 Test Set Up

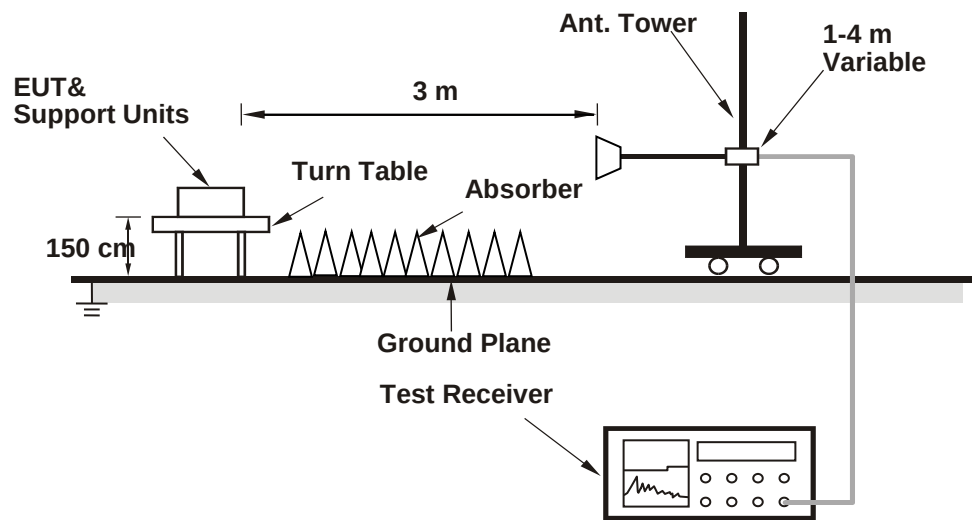
<Radiated Emission below 30 MHz>



<Radiated Emission 30 MHz to 1 GHz>



<Radiated Emission above 1 GHz>



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

4.1.6 EUT Operating Conditions

- Placed the EUT on a testing table.
- Use the software to control the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1 GHz Data :

Mode A

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	55.3 PK	74.0	-18.7	2.80 H	192	24.1	31.2
2	2390.00	43.3 AV	54.0	-10.7	2.80 H	192	12.1	31.2
3	#2405.00	107.0 PK			2.80 H	192	75.8	31.2
4	#2405.00	102.3 AV			2.80 H	192	71.1	31.2
5	4810.00	48.2 PK	74.0	-25.8	2.62 H	243	46.1	2.1
6	4810.00	38.1 AV	54.0	-15.9	2.62 H	243	36.0	2.1
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	55.4 PK	74.0	-18.6	2.36 V	250	24.2	31.2
2	2390.00	43.5 AV	54.0	-10.5	2.36 V	250	12.3	31.2
3	#2405.00	109.7 PK			2.36 V	250	78.5	31.2
4	#2405.00	104.9 AV			2.36 V	250	73.7	31.2
5	4810.00	47.2 PK	74.0	-26.8	2.39 V	188	45.1	2.1
6	4810.00	36.7 AV	54.0	-17.3	2.39 V	188	34.6	2.1

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

CHANNEL	TX Channel 18	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	#2440.00	105.8 PK			2.74 H	193	74.7	31.1
2	#2440.00	101.2 AV			2.74 H	193	70.1	31.1
3	4880.00	48.3 PK	74.0	-25.7	2.67 H	253	46.3	2.0
4	4880.00	38.2 AV	54.0	-15.8	2.67 H	253	36.2	2.0

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	#2440.00	108.6 PK			2.41 V	251	77.5	31.1
2	#2440.00	103.8 AV			2.41 V	251	72.7	31.1
3	4880.00	47.2 PK	74.0	-26.8	2.50 V	242	45.2	2.0
4	4880.00	36.4 AV	54.0	-17.6	2.50 V	242	34.4	2.0

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.

CHANNEL	TX Channel 26	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		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	#2405.00	103.0 PK			2.76 H	194	71.8	31.2
2	#2405.00	98.2 AV			2.76 H	194	67.0	31.2
3	2483.50	59.5 PK	74.0	-14.5	2.76 H	194	28.4	31.1
4	2483.50	49.8 AV	54.0	-4.2	2.76 H	194	18.7	31.1
5	4810.00	47.9 PK	74.0	-26.1	2.59 H	247	45.5	2.4
6	4810.00	38.3 AV	54.0	-15.7	2.59 H	247	35.9	2.4
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	105.5 PK			2.47 V	267	74.4	31.1
2	#2480.00	100.6 AV			2.47 V	267	69.5	31.1
3	2483.50	63.3 PK	74.0	-10.7	2.47 V	267	32.2	31.1
4	2483.50	52.9 AV	54.0	-1.1	2.47 V	267	21.8	31.1
5	4810.00	46.9 PK	74.0	-27.1	2.54 V	233	44.8	2.1
6	4810.00	36.4 AV	54.0	-17.6	2.54 V	233	34.3	2.1

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.

Mode B

CHANNEL	TX Channel 11	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (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	55.5 PK	74.0	-18.5	2.03 H	28	24.3	31.2
2	2390.00	43.6 AV	54.0	-10.4	2.03 H	28	12.4	31.2
3	*2405.00	91.6 PK			2.03 H	28	60.5	31.1
4	*2405.00	85.6 AV			2.03 H	28	54.5	31.1
5	4810.00	43.6 PK	74.0	-30.4	3.67 H	238	41.7	1.9
6	4810.00	32.7 AV	54.0	-21.3	3.67 H	238	30.8	1.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (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	55.9 PK	74.0	-18.1	1.53 V	328	24.7	31.2
2	2390.00	43.8 AV	54.0	-10.2	1.53 V	328	12.6	31.2
3	*2405.00	92.7 PK			1.53 V	328	61.6	31.1
4	*2405.00	86.7 AV			1.53 V	328	55.6	31.1
5	4810.00	45.3 PK	74.0	-28.7	1.96 V	274	43.4	1.9
6	4810.00	35.7 AV	54.0	-18.3	1.96 V	274	33.8	1.9

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.

CHANNEL	TX Channel 18	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2440.00	92.3 PK			3.08 H	32	61.2	31.1
2	*2440.00	86.3 AV			3.08 H	32	55.2	31.1
3	4880.00	44.2 PK	74.0	-29.8	3.73 H	224	42.2	2.0
4	4880.00	33.4 AV	54.0	-20.6	3.73 H	224	31.4	2.0
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*2440.00	93.2 PK			1.59 V	332	62.1	31.1
2	*2440.00	87.2 AV			1.59 V	332	56.1	31.1
3	4880.00	45.7 PK	74.0	-28.3	1.99 V	272	43.7	2.0
4	4880.00	36.0 AV	54.0	-18.0	1.99 V	272	34.0	2.0

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.

CHANNEL	TX Channel 26	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 25GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (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	92.6 PK			2.01 H	32	61.5	31.1
2	*2480.00	86.6 AV			2.01 H	32	55.5	31.1
3	2483.50	55.5 PK	74.0	-18.5	2.01 H	32	24.3	31.2
4	2483.50	43.3 AV	54.0	-10.7	2.01 H	32	12.1	31.2
5	4960.00	44.2 PK	74.0	-29.8	3.73 H	229	41.9	2.3
6	4960.00	33.3 AV	54.0	-20.7	3.73 H	229	31.0	2.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (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	93.4 PK			2.30 V	327	62.3	31.1
2	*2480.00	87.4 AV			2.30 V	327	56.3	31.1
3	2483.50	56.0 PK	74.0	-18.0	2.30 V	327	24.8	31.2
4	2483.50	44.1 AV	54.0	-9.9	2.30 V	327	12.9	31.2
5	4960.00	45.9 PK	74.0	-28.1	2.03 V	282	43.6	2.3
6	4960.00	36.1 AV	54.0	-17.9	2.03 V	282	33.8	2.3

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.

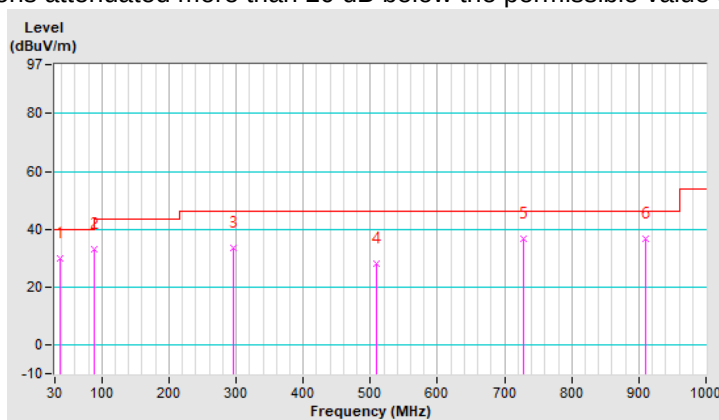
Below 1 GHz Worst-Case Data:

CHANNEL	TX Channel 26	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	37.76	29.9 QP	40.0	-10.1	1.50 H	72	39.9	-10.0
2	88.20	33.0 QP	43.5	-10.5	1.00 H	16	47.5	-14.5
3	296.75	33.5 QP	46.0	-12.5	1.25 H	137	40.7	-7.2
4	509.18	28.3 QP	46.0	-17.7	1.25 H	181	31.1	-2.8
5	727.43	36.9 QP	46.0	-9.1	1.00 H	232	35.7	1.2
6	909.79	36.7 QP	46.0	-9.3	1.00 H	13	31.8	4.9

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 of frequency range 30MHz~1000MHz.
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.

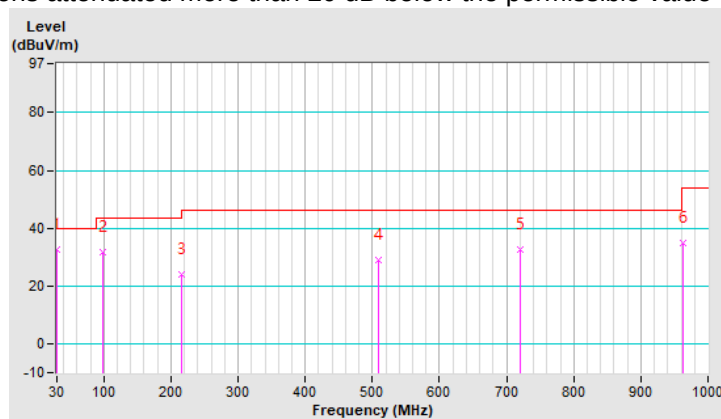


CHANNEL	TX Channel 26	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	30.00	32.8 QP	40.0	-7.2	1.25 V	122	43.3	-10.5
2	97.90	31.6 QP	43.5	-11.9	1.00 V	131	45.4	-13.8
3	215.27	23.8 QP	43.5	-19.7	1.25 V	112	34.9	-11.1
4	508.21	28.9 QP	46.0	-17.1	1.25 V	27	31.7	-2.8
5	720.64	32.6 QP	46.0	-13.4	1.50 V	281	31.5	1.1
6	963.14	35.0 QP	54.0	-19.0	1.50 V	108	29.3	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 of frequency range 30MHz~1000MHz.
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 0.50 MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Dec. 11, 2019	Dec. 10, 2020
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Sep. 05, 2019	Sep. 04, 2020
LISN ROHDE & SCHWARZ (EUT)	ENV216	101826	Feb. 20, 2020	Feb. 19, 2021
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 22, 2019	Aug. 21, 2020
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 1.
 3. The VCCI Site Registration No. is C-12040.

4.2.3 Test Procedures

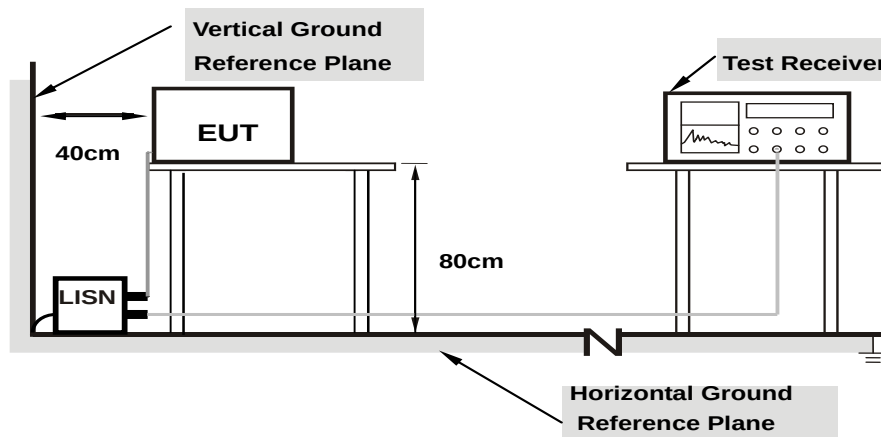
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling impedance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

Note: All modes of operation were investigated and the worst-case emissions are reported.

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

- Placed the EUT on a testing table.
- Use the software to control the EUT under transmission condition continuously at specific channel frequency.

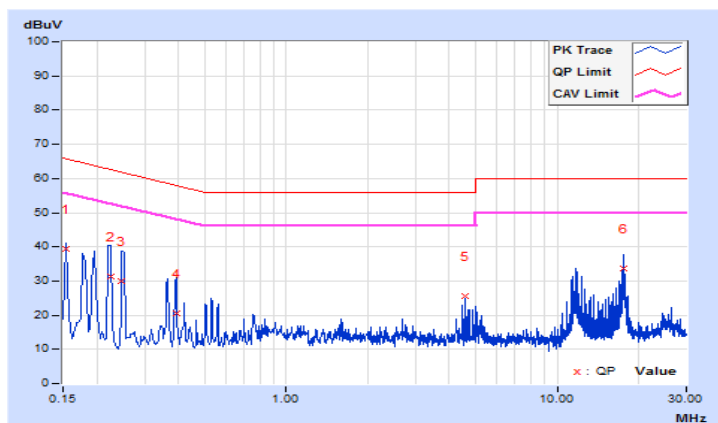
4.2.7 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 75%RH
Tested by	Greg Lin	Test Date	2020/7/16
Test Mode	Mode A		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	9.56	29.87	13.52	39.43	23.08	65.79	55.79	-26.36	-32.71
2	0.22429	9.55	21.81	11.22	31.36	20.77	62.66	52.66	-31.30	-31.89
3	0.24775	9.55	20.33	11.51	29.88	21.06	61.83	51.83	-31.95	-30.77
4	0.39242	9.57	11.11	4.55	20.68	14.12	58.01	48.01	-37.33	-33.89
5	4.56830	9.73	15.76	11.87	25.49	21.60	56.00	46.00	-30.51	-24.40
6	17.51431	9.83	23.85	21.24	33.68	31.07	60.00	50.00	-26.32	-18.93

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

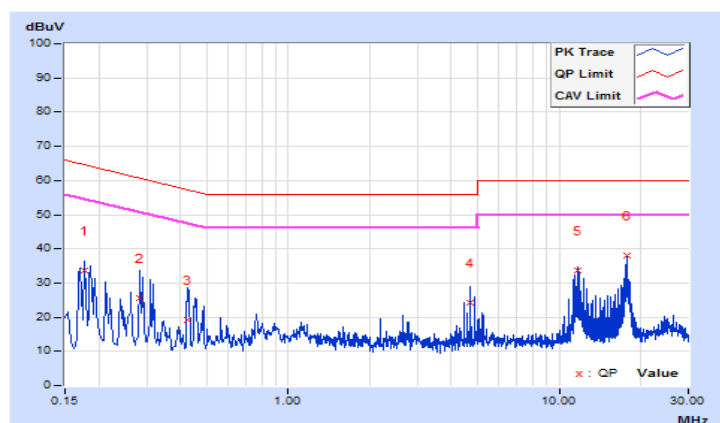


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	25°C, 75%RH
Tested by	Greg Lin	Test Date	2020/7/16
Test Mode	Mode A		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17737	9.53	24.07	11.42	33.60	20.95	64.61	54.61	-31.01	-33.66
2	0.28288	9.54	16.09	9.53	25.63	19.07	60.73	50.73	-35.10	-31.66
3	0.42370	9.55	9.62	3.77	19.17	13.32	57.38	47.38	-38.21	-34.06
4	4.67387	9.71	14.54	6.20	24.25	15.91	56.00	46.00	-31.75	-30.09
5	11.67668	9.81	23.96	22.92	33.77	32.73	60.00	50.00	-26.23	-17.27
6	17.91704	9.87	28.01	26.60	37.88	36.47	60.00	50.00	-22.12	-13.53

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

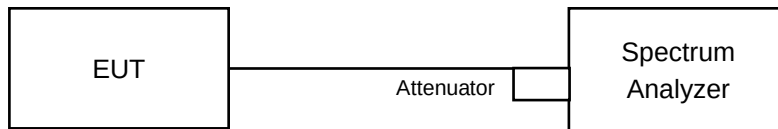


4.3 6 dB Bandwidth Measurement

4.3.1 Limits of 6 dB Bandwidth Measurement

The minimum of 6 dB 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) = 100 kHz
- 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

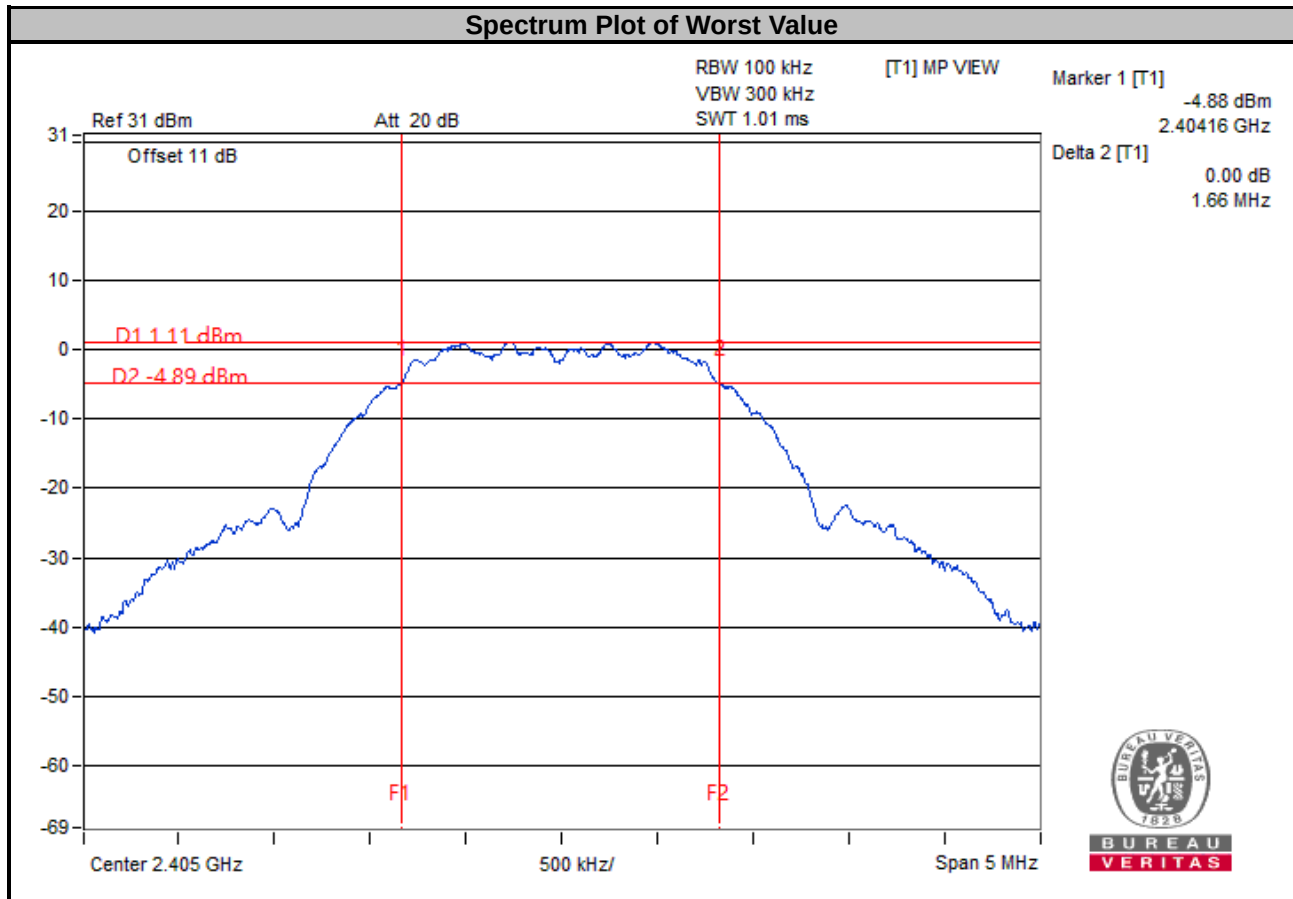
No deviation.

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)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
11	2405	1.66	0.5	Pass
17	2435	1.69	0.5	Pass
25	2475	1.69	0.5	Pass

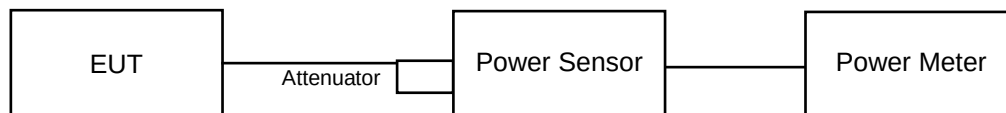


4.4 Conducted Output Power Measurement

4.4.1 Limits of Conducted Output Power Measurement

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

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedures

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.

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Conditions

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

4.4.7 Test Results

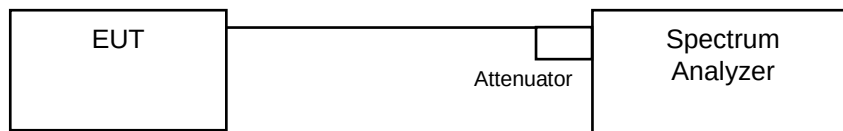
Channel	Freq. (MHz)	Peak Power		Power Limit (dBm)	Pass / Fail
		(mW)	(dBm)		
11	2405	4.285	6.32	30	Pass
17	2435	3.855	5.86	30	Pass
25	2475	3.296	5.18	30	Pass

4.5 Power Spectral Density Measurement

4.5.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8 dBm.

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 Procedure

- Set the RBW = 3 kHz, VBW = 10 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.

4.5.5 Deviation from Test Standard

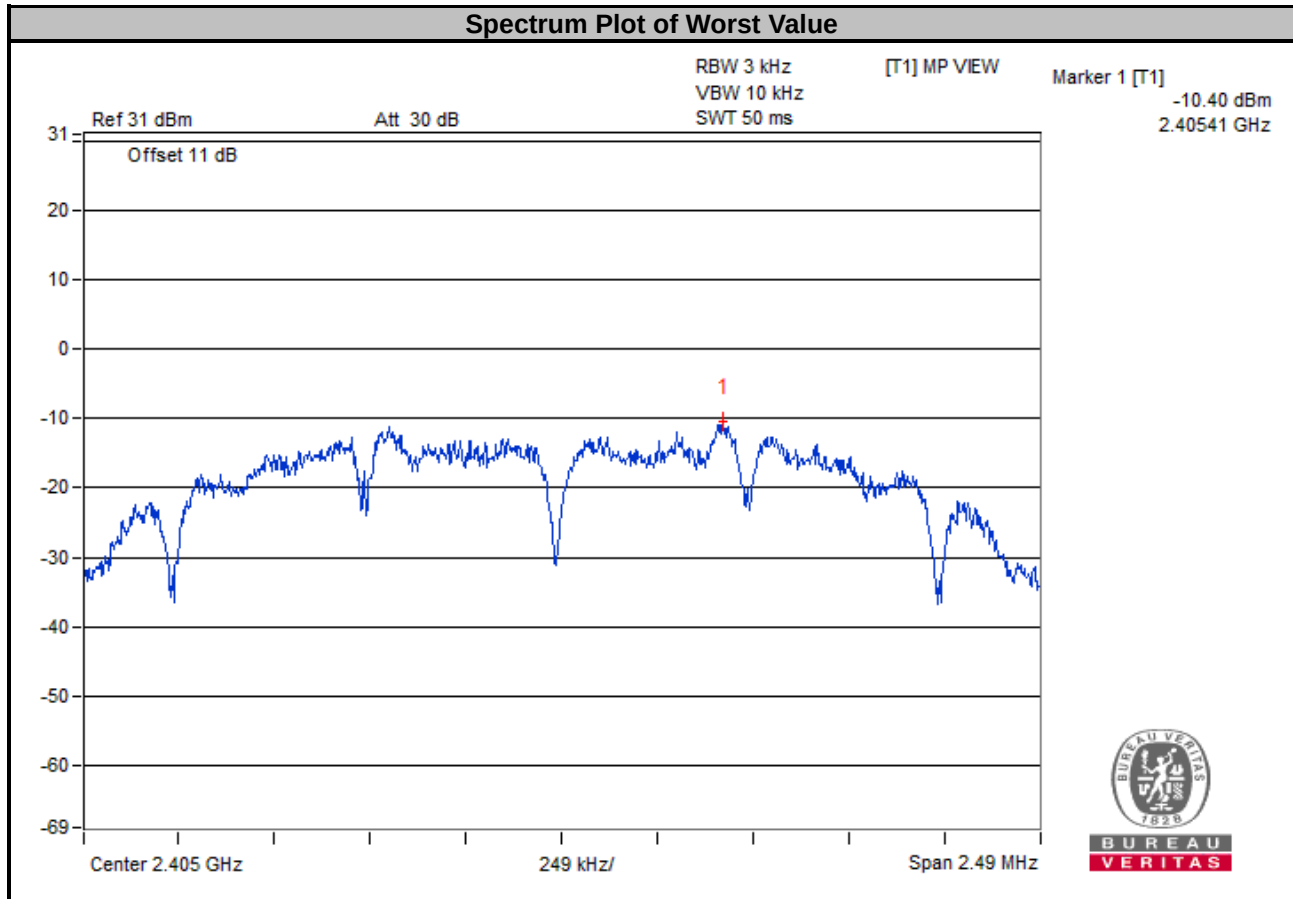
No deviation.

4.5.6 EUT Operating Condition

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

4.5.7 Test Results

Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
11	2405	-10.40	8	Pass
17	2435	-11.36	8	Pass
25	2475	-11.66	8	Pass

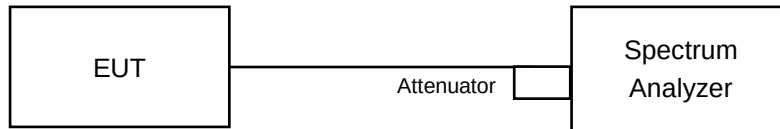


4.6 Conducted Out of Band Emission Measurement

4.6.1 Limits of Conducted Out of Band Emission Measurement

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

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

MEASUREMENT PROCEDURE REF

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

MEASUREMENT PROCEDURE OOB

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

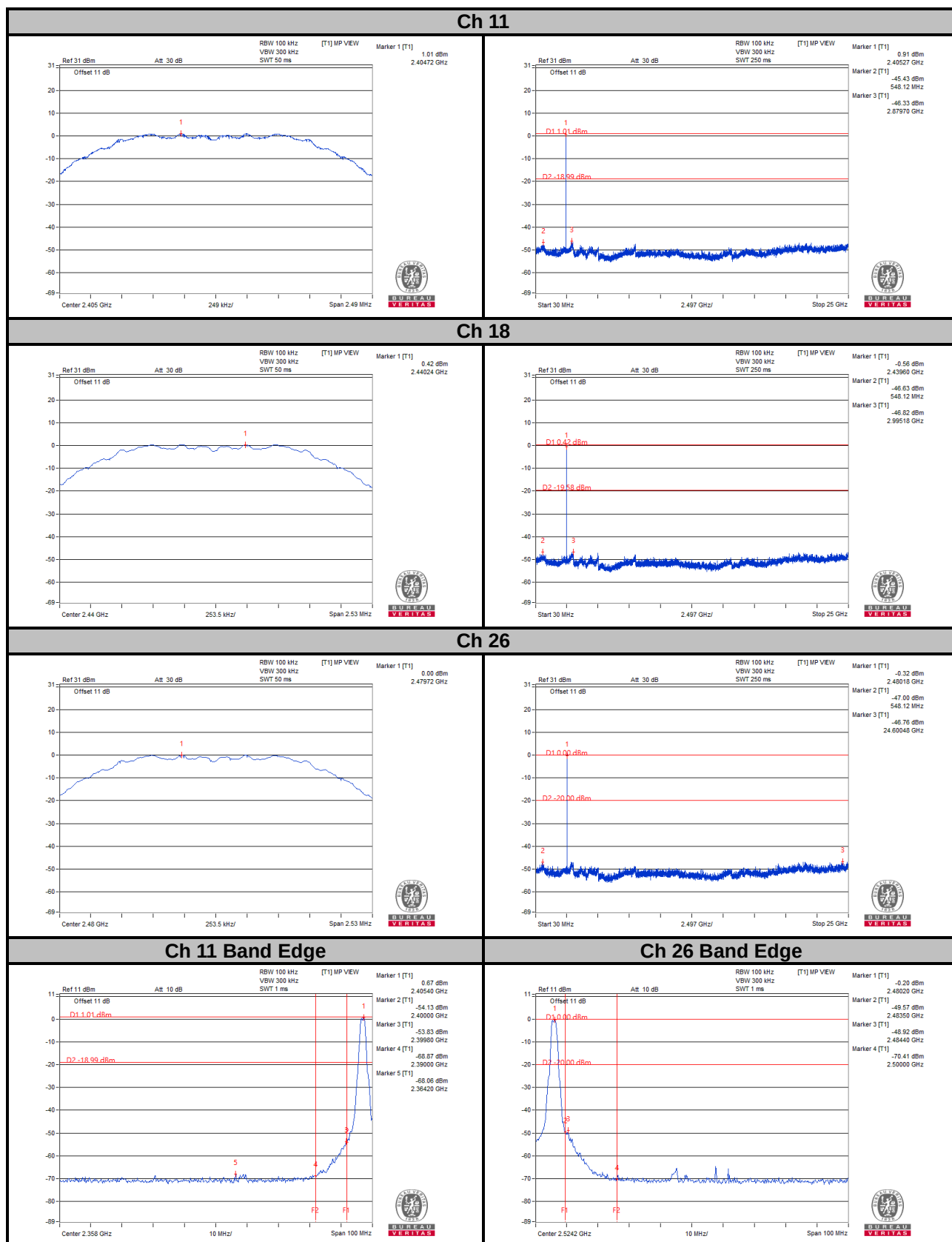
4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

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

4.6.7 Test Results

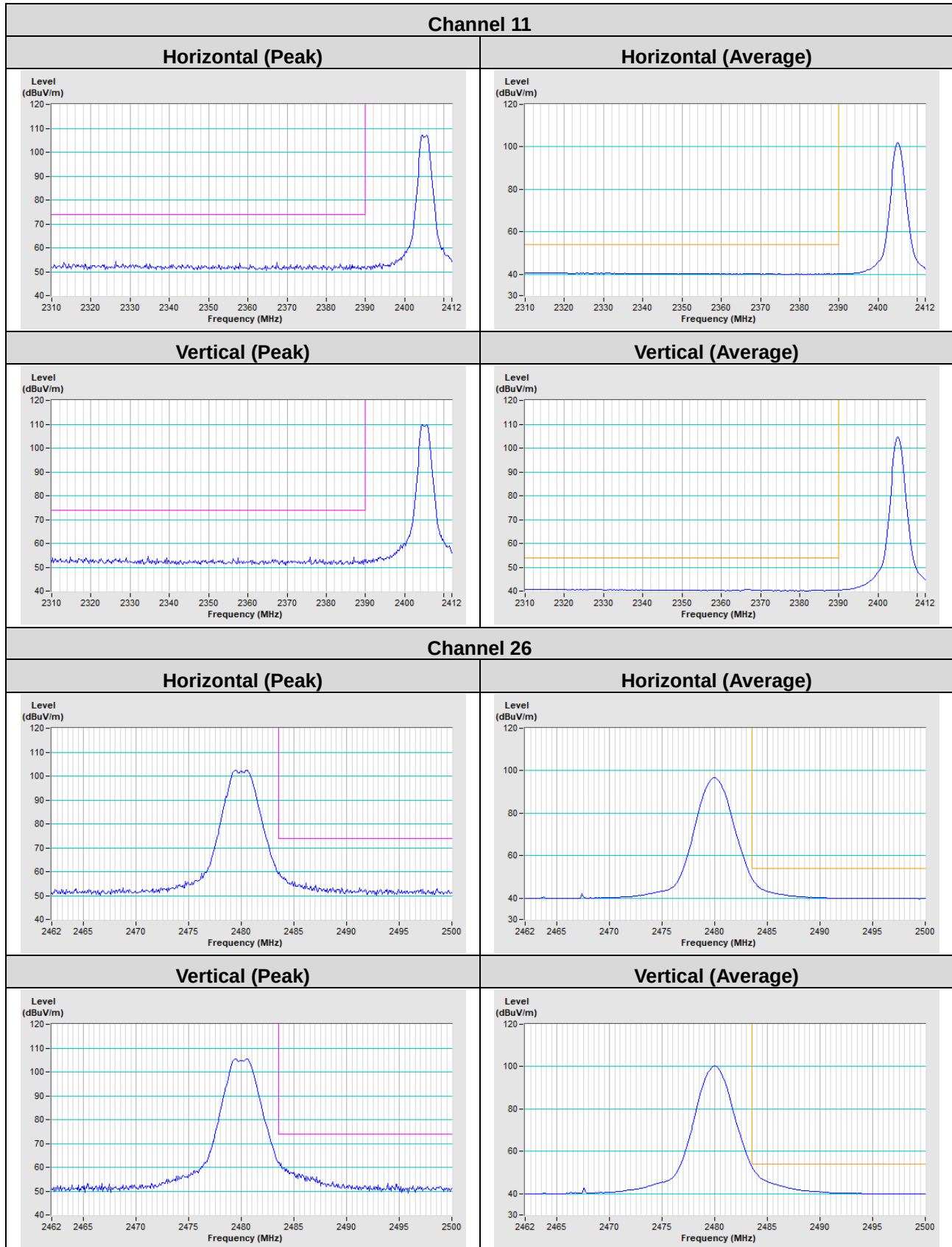


5 Pictures of Test Arrangements

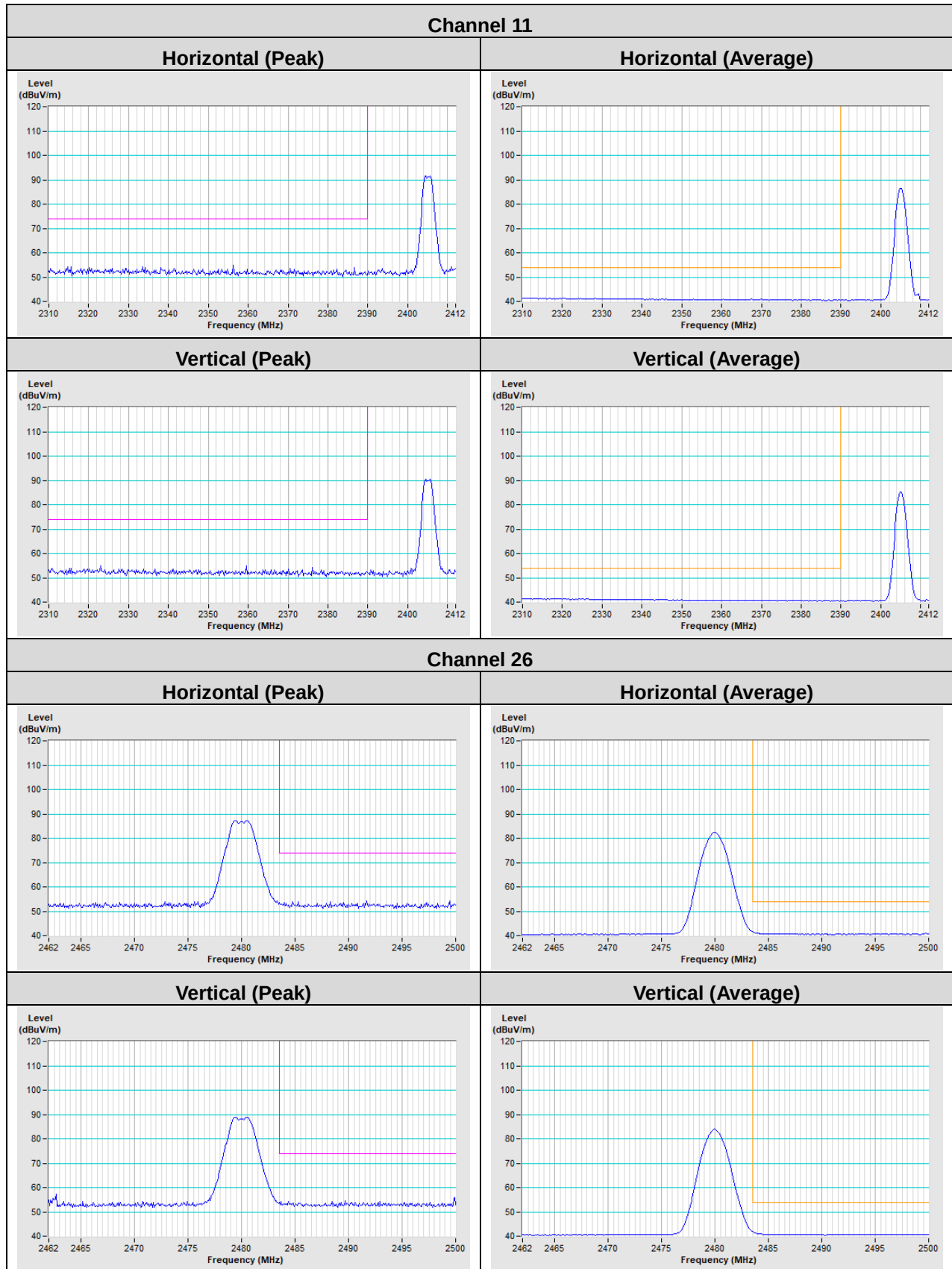
Please refer to the attached file (Test Setup Photo).

Annex A- Band-edge Measurement

Mode A



Mode B



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 according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

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

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