

FCC Test Report

Report No.: RF180312C26-3

FCC ID: VUITX061AEI

Test Model: TX061AEI

Received Date: Mar. 12, 2018

Test Date: Feb. 27, 2018 ~ Mar. 16, 2018

Issued Date: Mar. 31, 2018

Applicant: PEGATRON CORPORATION

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

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(R.O.C)

Test Location: No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei Shan Hsiang, Taoyuan
Hsien 333, Taiwan, R.O.C.

FCC Registration /
Designation Number: 788550 / TW0003



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Release Control Record

| Issue No. | Description | Date Issued |
|---------------|------------------|---------------|
| RF180312C26-3 | Original Release | Mar. 31, 2018 |

1 Certificate of Conformity

Product: Networked Client Set-Top BOX

Brand: technicolor

Test Model: TX061AEI

Sample Status: ENGINEERING SAMPLE

Applicant: PEGATRON CORPORATION

Test Date: Feb. 27, 2018 ~ Mar. 16, 2018

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 : Evonne Liu, **Date:** Mar. 31, 2018
Evonne Liu / Specialist

Approved by : Dylan Chiou, **Date:** Mar. 31, 2018
Dylan Chiou / 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 -11.51 dB at 0.16564 MHz. |
| 15.205 / 15.209 / 15.247(d) | Radiated Emissions and Band Edge Measurement | Pass | Meet the requirement of limit. Minimum passing margin is -3.32 dB at 2387.84 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. |

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT:

The listed uncertainties are the worst case uncertainty for the entire range of measurement. Please note that the uncertainty values are provided for informational purposes only and are not used in determining the PASS/FAIL results.

| Measurement | Frequency | Expanded Uncertainty (k=2) (±) |
|------------------------------------|-------------------|--------------------------------|
| Conducted Emissions at mains ports | 150 kHz ~ 30 MHz | 2.44 dB |
| Radiated Emissions up to 1 GHz | 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 | Networked Client Set-Top BOX |
| Brand | technicolor |
| Test Model | TX061AEI |
| Status of EUT | ENGINEERING SAMPLE |
| Power Supply Rating | 5.0 Vdc (adapter) |
| Modulation Type | O-QPSK |
| Modulation Technology | DSSS |
| Transfer Rate | 250 kbps |
| Operating Frequency | 2405 ~ 2475 MHz |
| Number of Channel | 15 |
| Output Power | 4.406 mW |
| Antenna Type | PCB antenna with 2.7 dBi gain |
| Antenna Connector | N/A |
| Accessory Device | Refer to Note as below |
| Data Cable Supplied | Refer to Note as below |

Note:

1. The EUT contains following accessory devices.

| Product | Brand | Model | Description |
|-----------|---------|--------|---|
| Adapter 1 | Lite-On | EPS-10 | I/P: 100-120 Vac, 60 Hz, 0.8 A O/P: 5 Vdc, 3 A |
| Adapter 2 | Comcast | EPS-10 | I/P: 100-120 Vac, 60 Hz, 0.8 A O/P: 5 Vdc, 3 A |
| Adapter 3 | AcBel | EPS-10 | I/P: 100-120 Vac, 60 Hz, 0.4 A O/P: 5 Vdc, 3 A |

2. The above EUT information is declared by manufacturer and for more detailed features description, please refer 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 | |
| - | √ | √ | √ | √ | - |

Where **RE \geq 1G**: Radiated Emission above 1 GHz **RE<1G**: Radiated Emission below 1 GHz
PLC: Power Line Conducted Emission **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 **X-plane**.

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 |
|--------------------|-------------------|----------------|-----------------------|-----------------|
| - | 11 to 25 | 11, 17, 25 | 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 |
|--------------------|-------------------|----------------|-----------------------|-----------------|
| AcBel | 11 to 25 | 11 | 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 |
|--------------------|-------------------|----------------|-----------------------|-----------------|
| - | 11 to 25 | 11 | 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 |
|--------------------|-------------------|----------------|-----------------------|-----------------|
| - | 11 to 25 | 11, 25 | 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 |
|--------------------|-------------------|----------------|-----------------------|-----------------|
| - | 11 to 25 | 11, 17, 25 | OFDM | O-QPSK |

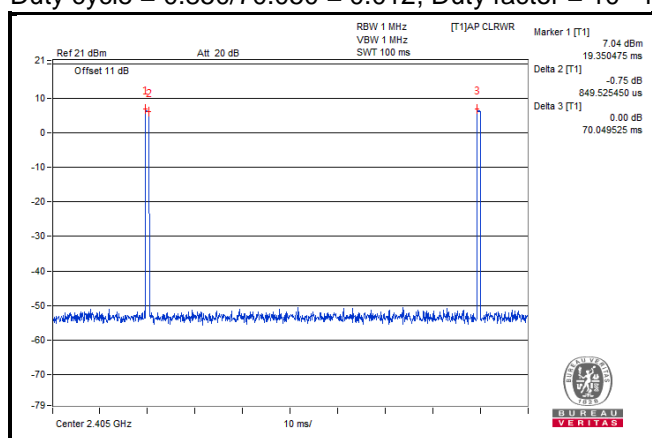
Test Condition:

| Applicable To | Environmental Conditions | Input Power | Tested by |
|---------------|--------------------------|----------------|--------------|
| RE \geq 1G | 25 deg. C, 65 % RH | 120 Vac, 60 Hz | Getaz Yang |
| RE<1G | 25 deg. C, 65 % RH | 120 Vac, 60 Hz | Getaz Yang |
| PLC | 25 deg. C, 65 % RH | 120 Vac, 60 Hz | Getaz Yang |
| APCM | 25 deg. C, 65 % RH | 120 Vac, 60 Hz | Vincent Yang |

3.3 Duty Cycle of Test Signal

Duty cycle of test signal is < 98 %

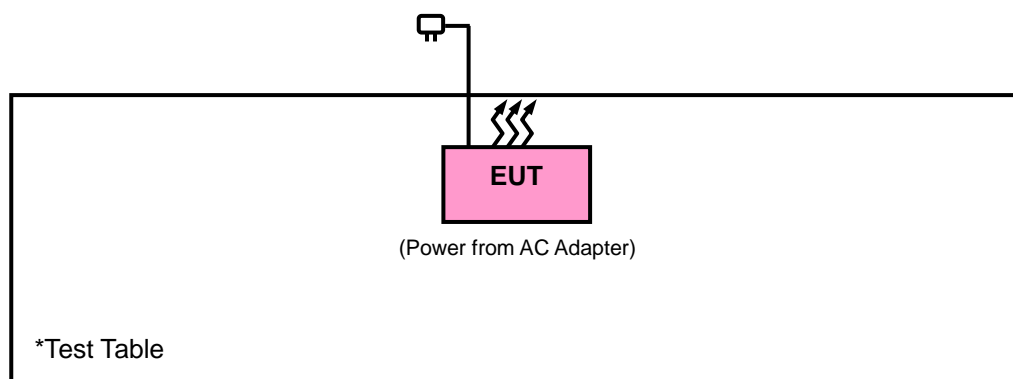
Duty cycle = $0.850/70.050 = 0.012$, Duty factor = $10 * \log(1/0.012) = 19.16$



3.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units.

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards

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

FCC Part 15, Subpart C (15.247)

558074 D01 DTS Meas Guidance v04

ANSI C63.10-2013

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

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 Agilent | N9038A | MY51210137 | Jun. 23, 2017 | Jun. 22, 2018 |
| Spectrum Analyzer Agilent | N9010A | MY52220314 | Nov. 24, 2017 | Nov. 23, 2018 |
| Spectrum Analyzer ROHDE & SCHWARZ | FSU43 | 101261 | Jan. 11, 2018 | Jan. 10, 2019 |
| BILOG Antenna SCHWARZBECK | VULB9168 | 9168-472 | Dec. 06, 2017 | Dec. 05, 2018 |
| HORN Antenna SCHWARZBECK | BBHA 9120 D | 9120D-969 | Dec. 12, 2017 | Dec. 11, 2018 |
| HORN Antenna SCHWARZBECK | BBHA 9170 | 9170-480 | Dec. 01, 2017 | Nov. 30, 2018 |
| Fixed Attenuator Mini-Circuits | MDCS18N-10 | MDCS18N-10-01 | Apr. 17, 2017 | Apr. 16, 2018 |
| Loop Antenna | HLA 6121 | 45745 | May 19, 2017 | May 18, 2018 |
| Preamplifier EMCI | EMC001340 | 980201 | Nov. 01, 2017 | Oct. 31, 2018 |
| Bluetooth Tester | CBT | 100946 | Jul. 29, 2016 | Jul. 28, 2018 |
| Preamplifier EMCI | EMC 012645 | 980115 | Oct. 20, 2017 | Oct. 19, 2018 |
| Preamplifier EMCI | EMC 184045 | 980116 | Oct. 20, 2017 | Oct. 19, 2018 |
| Preamplifier EMCI | EMC 330H | 980112 | Oct. 13, 2017 | Oct. 12, 2018 |
| Power Meter Anritsu | ML2495A | 1012010 | Aug. 15, 2017 | Aug. 14, 2018 |
| Power Sensor Anritsu | MA2411B | 1315050 | Aug. 15, 2017 | Aug. 14, 2018 |
| RF Coaxial Cable HUBER+SUHNNER | EMC104-SM-SM-8 000&3000 | 140811+170717 | Oct. 20, 2017 | Oct. 19, 2018 |
| RF Coaxial Cable HUBER+SUHNNER | SUCOFLEX 104 | EMC104-SM-SM- 1000(140807) | Oct. 20, 2017 | Oct. 19, 2018 |
| RF Coaxial Cable Worken | 8D-FB | Cable-Ch10-01 | Oct. 20, 2017 | Oct. 19, 2018 |
| Software BV ADT | E3 6.120103 | NA | NA | NA |
| Antenna Tower MF | MFA-440H | NA | NA | NA |
| Turn Table MF | MFT-201SS | NA | NA | NA |
| Antenna Tower & Turn Table Controller MF | MF-7802 | 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 Chamber 10.
3. The horn antenna and preamplifier (model: EMC 184045) are used only for the measurement of emission frequency above 1 GHz if tested.
4. The IC Site Registration No. is IC7450F-10.

4.1.3 Test Procedures

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 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:

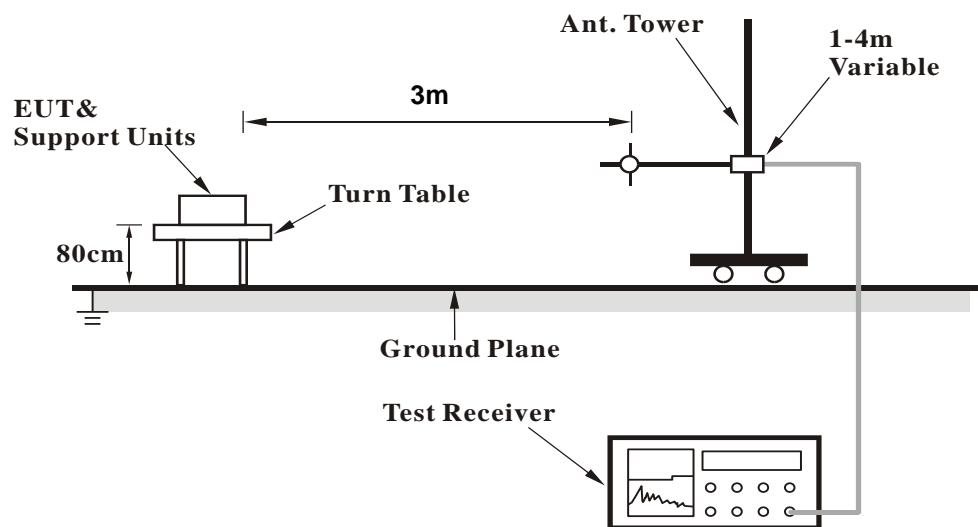
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz & 360 KHz for Quasi-peak detection (QP) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 1/T for Average (Duty cycle < 98 %) detection at frequency above 1 GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10 Hz (Duty cycle ≥ 98 %) for Average detection (AV) at frequency above 1 GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

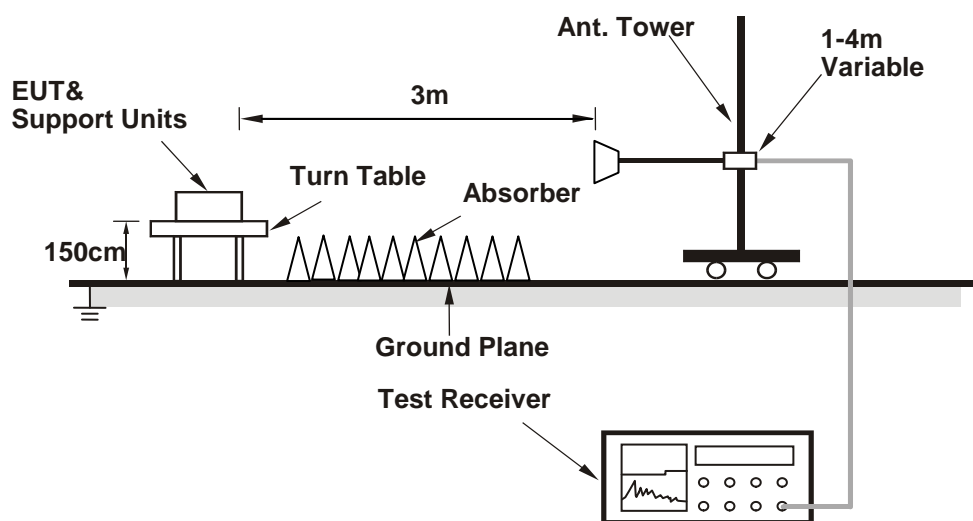
No deviation.

4.1.5 Test Set Up

<Frequency Range below 1 GHz>



<Frequency Range 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 :

| EUT Test Condition | | Measurement Detail | |
|--------------------------|--------------------|--------------------|---------------------------|
| Channel | Channel 11 | Frequency Range | 1 GHz ~ 25 GHz |
| Input Power | 120 Vac, 60 Hz | Detector Function | Peak (PK) Average (AV) |
| Environmental Conditions | 25 deg. C, 65 % RH | Tested By | Getaz Yang |

| Antennal Polarity & Test Distance: Horizontal at 3 m | | | | | | | | | | |
|--|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|---------|
| Frequency (MHz) | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 2387.84 | 50.68 | 56.97 | 54 | -3.32 | 26.86 | 4.35 | 37.5 | 102 | 206 | Average |
| 2387.84 | 63.74 | 69.97 | 74 | -10.26 | 26.91 | 4.36 | 37.5 | 102 | 206 | Peak |
| 2405 | 100.39 | 106.58 | | | 26.96 | 4.37 | 37.52 | 102 | 206 | Average |
| 2405 | 103.41 | 109.6 | | | 26.96 | 4.37 | 37.52 | 102 | 206 | Peak |
| 4810 | 32.62 | 47.75 | 54 | -21.38 | 30.97 | 6.8 | 52.9 | 106 | 44 | Average |
| 4810 | 42.36 | 57.49 | 74 | -31.64 | 30.97 | 6.8 | 52.9 | 106 | 44 | Peak |
| Antennal Polarity & Test Distance: Vertical at 3 m | | | | | | | | | | |
| Frequency (MHz) | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 2389.94 | 38.19 | 44.44 | 54 | -15.81 | 26.91 | 4.36 | 37.52 | 139 | 8 | Average |
| 2389.94 | 55.14 | 61.39 | 74 | -18.86 | 26.91 | 4.36 | 37.52 | 139 | 8 | Peak |
| 2405 | 96.8 | 102.99 | | | 26.96 | 4.37 | 37.52 | 139 | 8 | Average |
| 2405 | 100.07 | 106.26 | | | 26.96 | 4.37 | 37.52 | 139 | 8 | Peak |
| 4810 | 32.42 | 47.75 | 54 | -21.58 | 30.97 | 6.8 | 53.1 | 111 | 209 | Average |
| 4810 | 42.8 | 58.13 | 74 | -31.2 | 30.97 | 6.8 | 53.1 | 111 | 209 | Peak |

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2405 MHz: Fundamental frequency.

| EUT Test Condition | | Measurement Detail | |
|--------------------------|--------------------|--------------------|---------------------------|
| Channel | Channel 17 | Frequency Range | 1 GHz ~ 25 GHz |
| Input Power | 120 Vac, 60 Hz | Detector Function | Peak (PK) Average (AV) |
| Environmental Conditions | 25 deg. C, 65 % RH | Tested By | Getaz Yang |

| Antennal Polarity & Test Distance: Horizontal at 3 m | | | | | | | | | | |
|--|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|---------|
| Frequency (MHz) | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 2386.58 | 32.79 | 39.09 | 54 | -21.21 | 26.86 | 4.34 | 37.5 | 119 | 212 | Average |
| 2386.58 | 56.22 | 62.45 | 74 | -17.78 | 26.91 | 4.36 | 37.5 | 119 | 212 | Peak |
| 2437 | 100.36 | 106.36 | | | 27.06 | 4.4 | 37.46 | 119 | 212 | Average |
| 2437 | 103.44 | 109.44 | | | 27.06 | 4.4 | 37.46 | 119 | 212 | Peak |
| 2500 | 42.69 | 48.3 | 54 | -11.31 | 27.2 | 4.44 | 37.25 | 119 | 212 | Average |
| 2500 | 52.13 | 57.82 | 74 | -21.87 | 27.2 | 4.43 | 37.32 | 119 | 212 | Peak |
| 4870 | 32.4 | 47.35 | 54 | -21.6 | 31.06 | 6.85 | 52.86 | 103 | 49 | Average |
| 4870 | 40.46 | 55.41 | 74 | -33.54 | 31.06 | 6.85 | 52.86 | 103 | 49 | Peak |
| Antennal Polarity & Test Distance: Vertical at 3 m | | | | | | | | | | |
| Frequency (MHz) | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 2389.1 | 35.14 | 41.61 | 54 | -18.86 | 26.72 | 4.28 | 37.47 | 152 | 8 | Average |
| 2389.1 | 47.39 | 53.62 | 74 | -26.61 | 26.91 | 4.36 | 37.5 | 152 | 8 | Peak |
| 2435 | 97.87 | 103.93 | | | 27.01 | 4.39 | 37.46 | 152 | 8 | Average |
| 2435 | 100.92 | 106.98 | | | 27.01 | 4.39 | 37.46 | 152 | 8 | Peak |
| 2499.96 | 45.05 | 50.66 | 54 | -8.95 | 27.2 | 4.44 | 37.25 | 152 | 8 | Average |
| 2499.96 | 51.6 | 57.34 | 74 | -22.4 | 27.15 | 4.43 | 37.32 | 152 | 8 | Peak |
| 4870 | 32.51 | 47.65 | 54 | -21.49 | 31.06 | 6.85 | 53.05 | 116 | 215 | Average |
| 4870 | 40.99 | 56.13 | 74 | -33.01 | 31.06 | 6.85 | 53.05 | 116 | 215 | Peak |

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2435 MHz: Fundamental frequency.

| EUT Test Condition | | Measurement Detail | |
|--------------------------|--------------------|--------------------|---------------------------|
| Channel | Channel 25 | Frequency Range | 1 GHz ~ 25 GHz |
| Input Power | 120 Vac, 60 Hz | Detector Function | Peak (PK) Average (AV) |
| Environmental Conditions | 25 deg. C, 65 % RH | Tested By | Getaz Yang |

| Antennal Polarity & Test Distance: Horizontal at 3 m | | | | | | | | | | |
|--|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|---------|
| Frequency (MHz) | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 2475 | 99.71 | 105.46 | | | 27.15 | 4.42 | 37.32 | 103 | 242 | Average |
| 2475 | 102.52 | 108.27 | | | 27.15 | 4.42 | 37.32 | 103 | 242 | Peak |
| 2492.32 | 43.62 | 49.36 | 54 | -10.38 | 27.15 | 4.43 | 37.32 | 103 | 242 | Average |
| 2492.32 | 63.2 | 68.82 | 74 | -10.8 | 27.2 | 4.43 | 37.25 | 103 | 242 | Peak |
| 4950 | 32.45 | 47.34 | 54 | -21.55 | 31.14 | 6.89 | 52.92 | 108 | 49 | Average |
| 4950 | 42.65 | 57.54 | 74 | -31.35 | 31.14 | 6.89 | 52.92 | 108 | 49 | Peak |
| Antennal Polarity & Test Distance: Vertical at 3 m | | | | | | | | | | |
| Frequency (MHz) | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 2475 | 98.53 | 104.28 | | | 27.15 | 4.42 | 37.32 | 155 | 10 | Average |
| 2475 | 101.39 | 107.14 | | | 27.15 | 4.42 | 37.32 | 155 | 10 | Peak |
| 2499.96 | 45.24 | 50.85 | 54 | -8.76 | 27.2 | 4.44 | 37.25 | 155 | 10 | Average |
| 2499.96 | 62.68 | 68.37 | 74 | -11.32 | 27.2 | 4.43 | 37.32 | 155 | 10 | Peak |
| 4950 | 32.65 | 47.66 | 54 | -21.35 | 31.14 | 6.89 | 53.04 | 113 | 215 | Average |
| 4950 | 42.25 | 57.26 | 74 | -31.75 | 31.14 | 6.89 | 53.04 | 113 | 215 | Peak |

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value
- 2475 MHz: Fundamental frequency.

Below 1 GHz Worst-Case Data:

| EUT Test Condition | | Measurement Detail | |
|--------------------------|--------------------|--------------------|------------------------------|
| Channel | Channel 11 | Frequency Range | Below 1000 MHz |
| Input Power | 120 Vac, 60 Hz | Detector Function | Peak (PK) Quasi-peak (QP) |
| Environmental Conditions | 25 deg. C, 65 % RH | Tested By | Getaz Yang |

| Antennal Polarity & Test Distance: Horizontal at 3 m | | | | | | | | | | |
|--|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|--------|
| Frequency (MHz) | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 119.24 | 22.33 | 42.45 | 43.5 | -21.17 | 10.93 | 0.84 | 31.89 | 100 | 166 | Peak |
| 216.24 | 18.34 | 38.64 | 46 | -27.66 | 10.05 | 1.31 | 31.66 | 112 | 267 | Peak |
| 322.94 | 23.47 | 40.08 | 46 | -22.53 | 13.5 | 1.76 | 31.87 | 121 | 27 | Peak |
| 537.31 | 24.54 | 35.44 | 46 | -21.46 | 18.17 | 2.65 | 31.72 | 142 | 295 | Peak |
| 629.46 | 28.87 | 38.03 | 46 | -17.13 | 19.96 | 3.02 | 32.14 | 142 | 138 | Peak |
| 900.09 | 36.28 | 40.75 | 46 | -9.72 | 23.51 | 4.03 | 32.01 | 114 | 140 | Peak |
| Antennal Polarity & Test Distance: Vertical at 3 m | | | | | | | | | | |
| Frequency (MHz) | Emission Level (dBuV/m) | Read Level (dBuV) | Limit (dBuV/m) | Margin (dB) | Antenna Factor (dB/m) | Cable Loss (dB) | Preamp Factor (dB) | Antenna Height (cm) | Table Angle (Degree) | Remark |
| 42.61 | 28.47 | 45.47 | 40 | -11.53 | 13.58 | 0.5 | 31.08 | 109 | 109 | Peak |
| 119.24 | 19.87 | 39.99 | 43.5 | -23.63 | 10.93 | 0.84 | 31.89 | 148 | 36 | Peak |
| 232.73 | 21.28 | 40.98 | 46 | -24.72 | 10.75 | 1.39 | 31.84 | 132 | 347 | Peak |
| 322.94 | 19.65 | 36.26 | 46 | -26.35 | 13.5 | 1.76 | 31.87 | 117 | 190 | Peak |
| 544.1 | 29.01 | 39.83 | 46 | -16.99 | 18.33 | 2.67 | 31.82 | 134 | 211 | Peak |
| 857.41 | 27.18 | 32.24 | 46 | -18.82 | 22.96 | 3.87 | 31.89 | 125 | 77 | Peak |

Remarks:

- Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor
Margin value = Emission level – Limit value

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 | Nov. 23, 2017 | Nov. 22, 2018 |
| RF signal cable (with 10dB PAD) Woken | 5D-FB | Cable-cond1-01 | Sep. 05, 2017 | Sep. 04, 2018 |
| LISN/AMN ROHDE & SCHWARZ (EUT) | ESH3-Z5 | 835239/001 | Mar. 10, 2017 | Mar. 09, 2018 |
| LISN/AMN ROHDE & SCHWARZ (Peripheral) | ESH3-Z5 | 100311 | Aug. 15, 2017 | Aug. 14, 2018 |
| Software ADT | BV ADT_Cond_ V7.3.7.3 | 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-2040.

4.2.3 Test Procedures

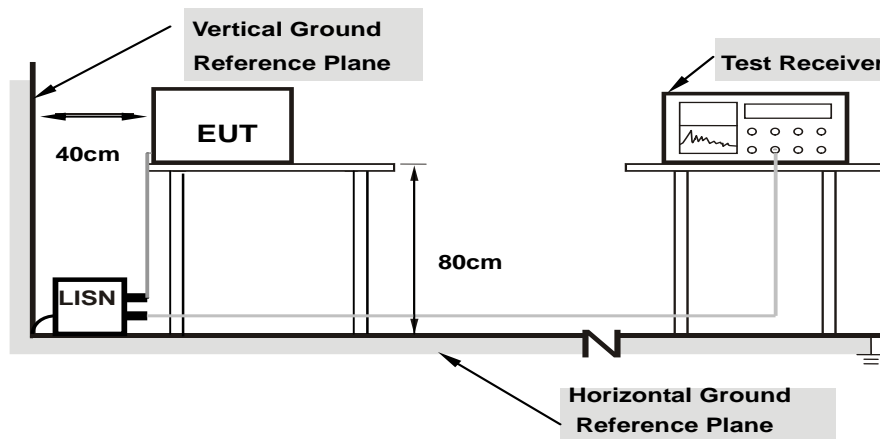
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling impedance 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.

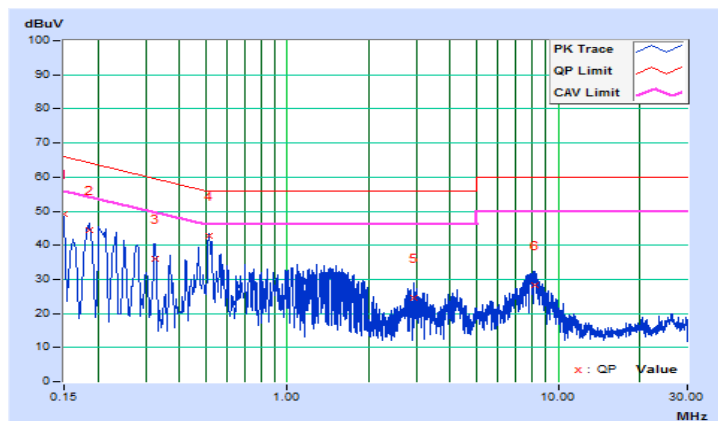
4.2.7 Test Results

| | | | |
|-----------------|----------------|--|--------------------------------------|
| Frequency Range | 150kHz ~ 30MHz | Detector Function & Resolution Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power | 120Vac, 60Hz | Environmental Conditions | 25°C, 65%RH |
| Tested by | Getaz Yang | Test Date | 2018/3/15 |

| 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 | 0.15000 | 10.10 | 39.03 | 22.46 | 49.13 | 32.56 | 66.00 | 56.00 | -16.87 | -23.44 |
| 2 | 0.18600 | 10.10 | 34.48 | 18.48 | 44.58 | 28.58 | 64.21 | 54.21 | -19.63 | -25.63 |
| 3 | 0.32600 | 10.11 | 26.02 | 9.80 | 36.13 | 19.91 | 59.55 | 49.55 | -23.42 | -29.64 |
| 4 | 0.51400 | 10.12 | 32.58 | 23.10 | 42.70 | 33.22 | 56.00 | 46.00 | -13.30 | -12.78 |
| 5 | 2.95000 | 10.23 | 14.44 | 3.11 | 24.67 | 13.34 | 56.00 | 46.00 | -31.33 | -32.66 |
| 6 | 8.17000 | 10.52 | 17.77 | 5.78 | 28.29 | 16.30 | 60.00 | 50.00 | -31.71 | -33.70 |

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

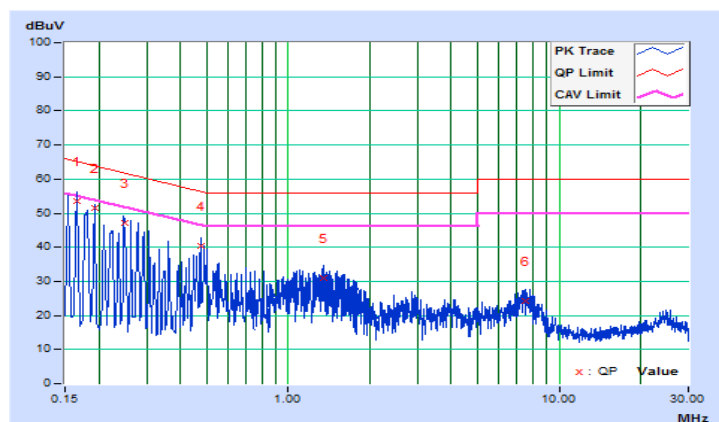


| | | | |
|-----------------|----------------|--|--------------------------------------|
| Frequency Range | 150kHz ~ 30MHz | Detector Function & Resolution Bandwidth | Quasi-Peak (QP) / Average (AV), 9kHz |
| Input Power | 120Vac, 60Hz | Environmental Conditions | 25°C, 65%RH |
| Tested by | Getaz Yang | Test Date | 2018/2/27 |

| 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 | 0.16564 | 10.10 | 43.57 | 25.05 | 53.67 | 35.15 | 65.18 | 55.18 | -11.51 | -20.03 |
| 2 | 0.19301 | 10.10 | 41.30 | 23.69 | 51.40 | 33.79 | 63.91 | 53.91 | -12.51 | -20.12 |
| 3 | 0.24796 | 10.11 | 37.08 | 20.22 | 47.19 | 30.33 | 61.83 | 51.83 | -14.64 | -21.50 |
| 4 | 0.47453 | 10.12 | 30.30 | 19.35 | 40.42 | 29.47 | 56.43 | 46.43 | -16.01 | -16.96 |
| 5 | 1.35819 | 10.15 | 20.80 | 10.38 | 30.95 | 20.53 | 56.00 | 46.00 | -25.05 | -25.47 |
| 6 | 7.46952 | 10.41 | 13.74 | 3.87 | 24.15 | 14.28 | 60.00 | 50.00 | -35.85 | -35.72 |

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

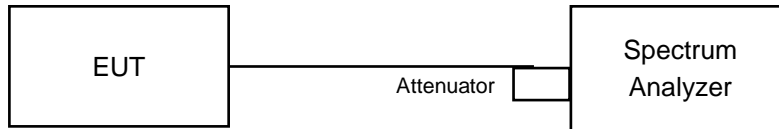


4.3 6 dB Bandwidth Measurement

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

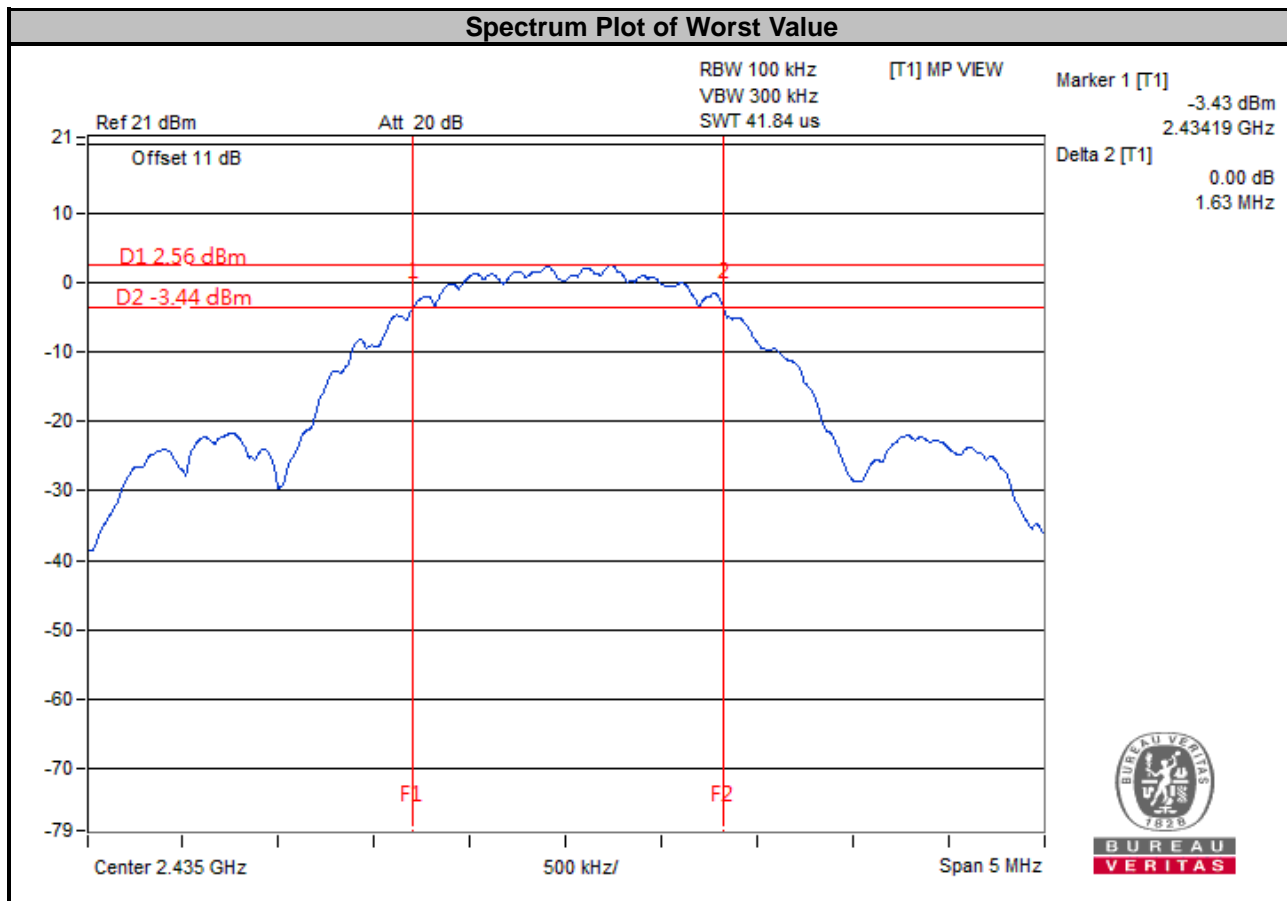
No deviation.

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 | 1.60 | 0.5 | Pass |
| 17 | 2435 | 1.63 | 0.5 | Pass |
| 25 | 2475 | 1.61 | 0.5 | Pass |

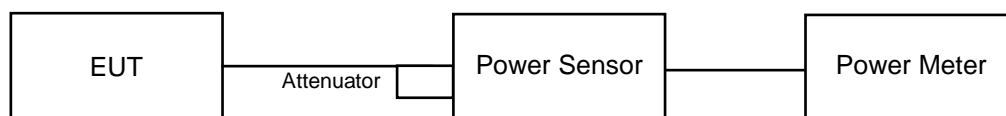


4.4 Conducted Output Power Measurement

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

<Peak Power>

| Channel | Frequency (MHz) | Peak Power (mW) | Peak Power (dBm) | Limit (dBm) | Pass / Fail |
|---------|-----------------|-----------------|------------------|-------------|-------------|
| 11 | 2405 | 4.406 | 6.44 | 30 | Pass |
| 17 | 2435 | 4.325 | 6.36 | 30 | Pass |
| 25 | 2475 | 4.169 | 6.20 | 30 | Pass |

<Average Power>

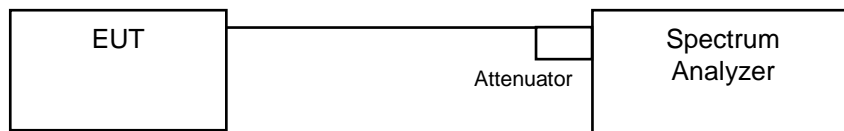
| Channel | Frequency (MHz) | Peak Power (mW) | Peak Power (dBm) | Limit (dBm) | Pass / Fail |
|---------|-----------------|-----------------|------------------|-------------|-------------|
| 11 | 2405 | 4.159 | 6.19 | 30 | Pass |
| 17 | 2435 | 4.121 | 6.15 | 30 | Pass |
| 25 | 2475 | 3.936 | 5.95 | 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

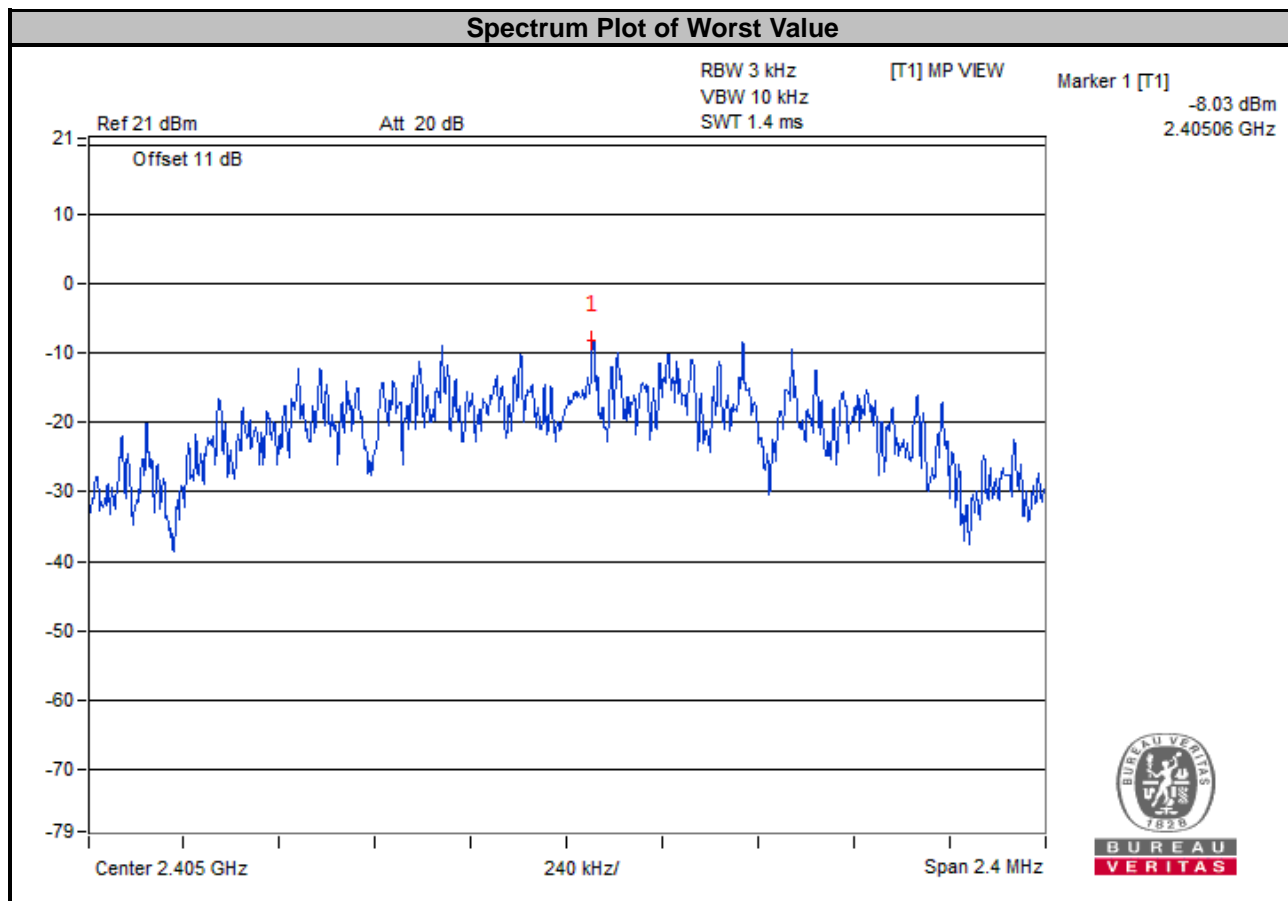
No deviation.

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 | -8.03 | 8 | Pass |
| 17 | 2435 | -8.52 | 8 | Pass |
| 25 | 2475 | -9.08 | 8 | Pass |

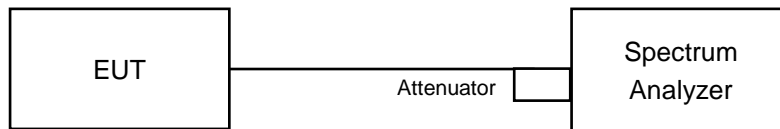


4.6 Conducted Out of Band Emission Measurement

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 OOBE

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.

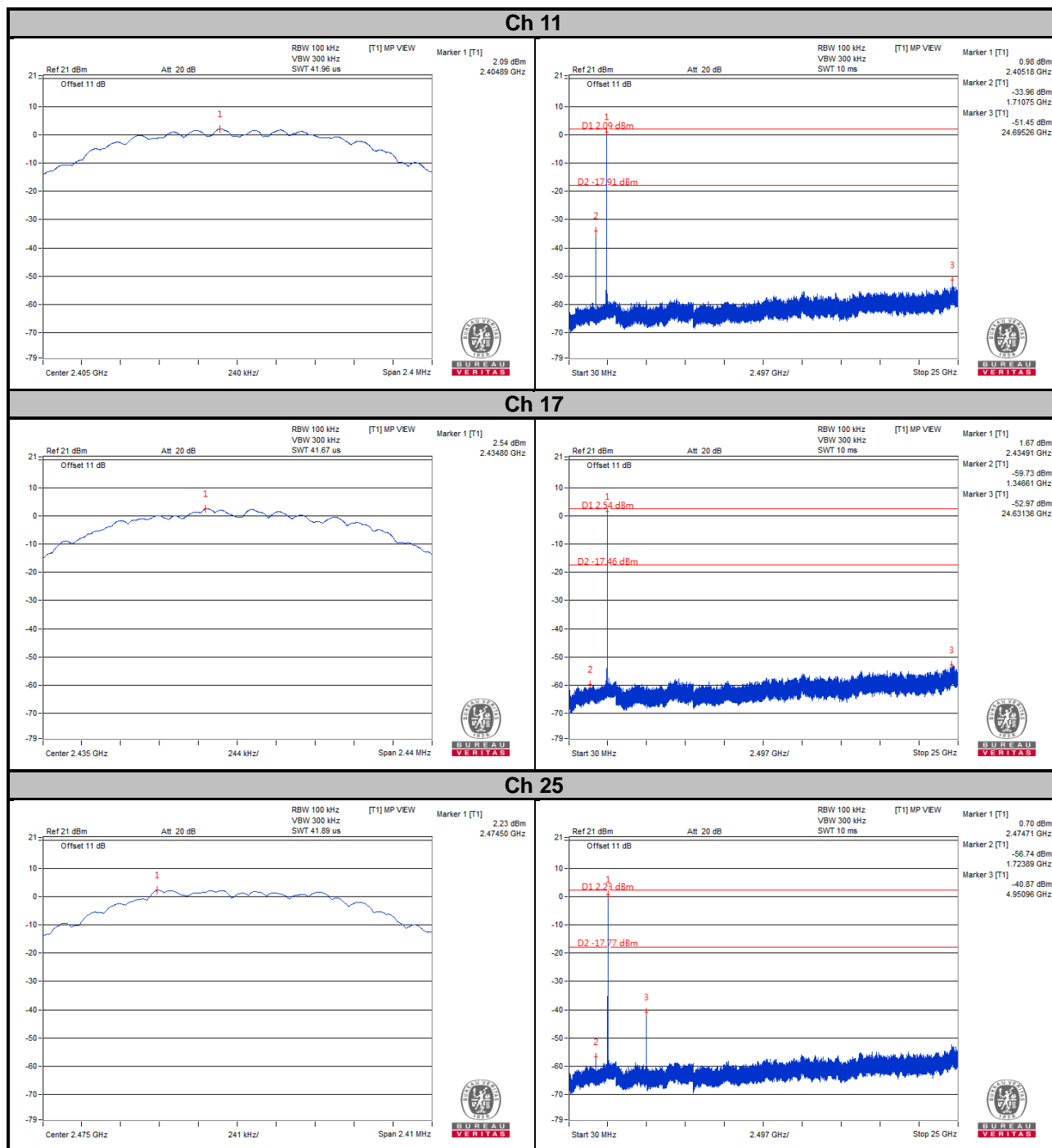
4.6.5 Deviation from Test Standard

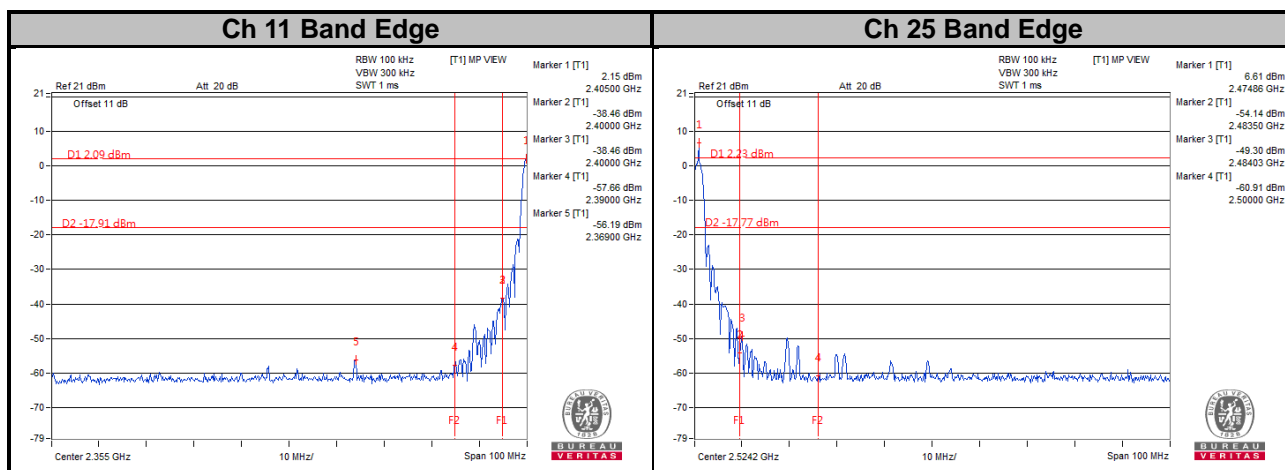
No deviation.

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).

Appendix – Information on 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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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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