

FCC Test Report

Report No.: RF160427C13-1

FCC ID: HFS-P91

Test Model: Sensor Version 2

Received Date: Apr. 27, 2016

Test Date: May 20, 2016 ~ Jul. 21, 2016

Issued Date: Jul. 27, 2016

Applicant: Quanta Computer Inc.

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

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(R.O.C)

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Release Control Record

| Issue No. | Description | Date Issued |
|---------------|------------------|---------------|
| RF160427C13-1 | Original Release | Jul. 27, 2016 |

1 Certificate of Conformity

Product: Parkifi Sensor Version 2

Brand: Parkifi

Test Model: Sensor Version 2

Sample Status: Production Unit

Applicant: Quanta Computer Inc.

Test Date: May 20, 2016 ~ Jul. 21, 2016

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.231)

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 EMC characteristics under the conditions specified in this report.

Prepared by : Evonne Liu, **Date:** Jul. 27, 2016

Evonne Liu / Specialist

Approved by : Stanley Wu, **Date:** Jul. 27, 2016

Stanley Wu / Assistant Manager

2 Summary of Test Results

| 47 CFR FCC Part 15, Subpart C (SECTION 15.231) | | | |
|--|--------------------------------|--------|---|
| FCC Clause | Test Item | Result | Remarks |
| 15.207 | AC Power Conducted Emission | N/A | Without AC power port of the EUT |
| 15.209 15.231(b) | Radiated Emission Test | PASS | Meet the requirement of limit. Minimum passing margin is -3.98dB at 433MHz. |
| 15.231(c) | Emission Bandwidth Measurement | PASS | Meet the requirement of limit. |
| 15.231(a) | De-activation | PASS | Meet the requirement of limit. |

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) (±) |
|--------------------------------|-----------------|--------------------------------|
| Radiated Emissions up to 1 GHz | 30MHz ~ 200MHz | 0.00 dB |
| | 200MHz ~1000MHz | 0.00 dB |
| Radiated Emissions above 1 GHz | 1GHz ~ 18GHz | 0.00 dB |
| | 18GHz ~ 40GHz | 0.00 dB |

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

| | |
|---------------------|------------------------------------|
| Product | Parkifi Sensor Version 2 |
| Brand | Parkifi |
| Test Model | Sensor Version 2 |
| Status of EUT | Production Unit |
| Power Supply Rating | 3Vdc (Li-ion battery) |
| Modulation Type | GFSK |
| Transfer Rate | 9.6 kbps |
| Operating Frequency | 433 ~ 434 MHz |
| Number of Channel | 21 |
| Antenna Type | Monopole antenna with 1.9 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 |
|-------------|--------|-----------------|-----------------|
| Battery | JHT | JHT-AT5E6004-A | 3 Vdc, 2000 mAh |
| BT Chip | Nordic | NRF51822-QFAC-R | -- |
| 433MHz Chip | TI | CC1120RHBR | -- |

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

21 channels are provided to this EUT:

| Channel | Freq. (MHz) |
|---------|-------------|---------|-------------|---------|-------------|---------|-------------|
| 0 | 433.00 | 6 | 433.30 | 11 | 433.55 | 16 | 433.80 |
| 1 | 433.05 | 7 | 433.35 | 12 | 433.60 | 17 | 433.85 |
| 2 | 433.10 | 8 | 433.40 | 13 | 433.65 | 18 | 433.90 |
| 3 | 433.15 | 9 | 433.45 | 14 | 433.70 | 19 | 433.95 |
| 4 | 433.20 | 10 | 433.50 | 15 | 433.75 | 20 | 434.00 |
| 5 | 433.25 | | | | | | |

3.2.1 Test Mode Applicability and Tested Channel Detail

| EUT CONFIGURE MODE | APPLICABLE TO | | | | | DESCRIPTION |
|--------------------|---------------|-----------|-----|----|----|-------------|
| | RE \geq 1G | RE $<$ 1G | PLC | EB | DT | |
| - | ✓ | ✓ | - | ✓ | ✓ | |

Where **RE \geq 1G**: Radiated Emission above 1GHz **RE $<$ 1G**: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission

EB: 20dB Bandwidth measurement

DT: Deactivation Time 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 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 | AXIS |
|--------------------|-------------------|----------------|-----------------|------|
| - | 0 to 20 | 0, 20 | GFSK | Z |

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 | DATA RATE (Mbps) |
|--------------------|-------------------|----------------|-----------------|------------------|
| - | 0 to 20 | 0, 20 | GFSK | Z |

Emission Bandwidth 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 | DATA RATE (Mbps) |
|--------------------|-------------------|----------------|-----------------|------------------|
| - | 0 to 20 | 0 | GFSK | Z |

Deactivation Time 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 | DATA RATE (Mbps) |
|--------------------------|-------------------|----------------|-----------------|------------------|
| - | 0 to 20 | 0 | GFSK | Z |

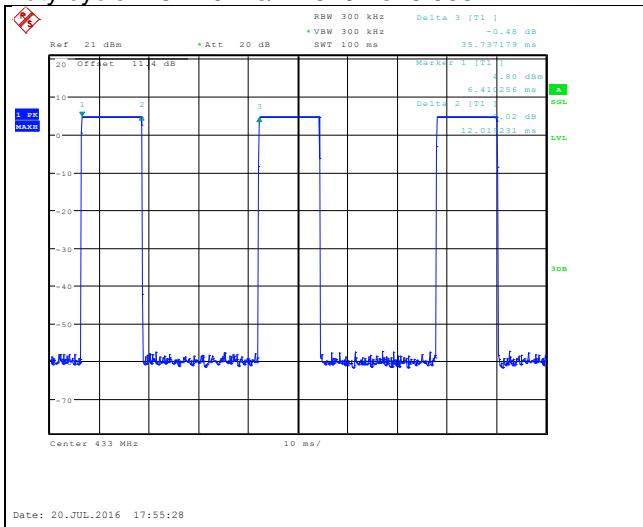
TEST CONDITION:

| Applicable To | Environmental Conditions | Input Power | Tested By |
|---------------|--------------------------|-------------|------------|
| RE \geq 1G | 25deg. C, 65%RH | 3 Vdc | Getaz Yang |
| RE<1G | 25deg. C, 65%RH | 3 Vdc | Getaz Yang |
| EB/DT | 21deg. C, 60%RH | 3 Vdc | Taylor Liu |

3.3 Duty Cycle of Test Signal

Duty cycle of test signal is <98%

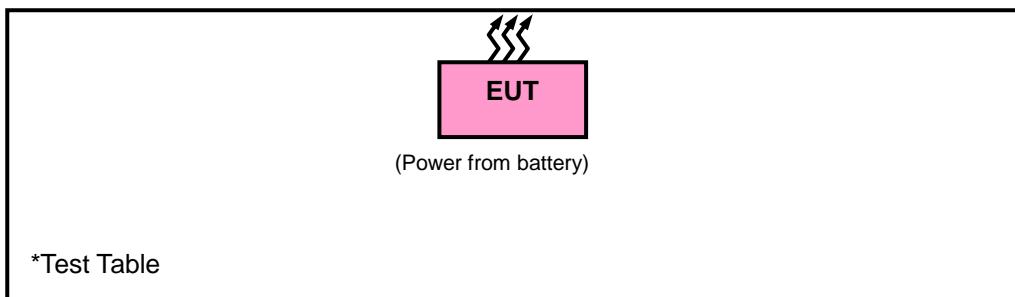
Duty cycle = 6.410 ms/12.019ms=0.533



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 (15.231)

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 Measurement

4.1.1 Limits of Radiated Emission Measurement

| Fundamental Frequency (MHz) | Field Strength of Fundamental | | Field Strength of Spurious | |
|-----------------------------|-------------------------------|---------------|----------------------------|---------------|
| | uV/meter | dBuV/meter | uV/meter | dBuV/meter |
| 40.66 ~ 40.70 | 2250 | 67.04 | 225 | 48.04 |
| 70 ~ 130 | 1250 | 61.94 | 125 | 41.94 |
| 130 ~ 174 | 1250 ~ 3750 | 61.94 ~ 71.48 | 125 ~ 375 | 41.94 ~ 51.48 |
| 174 ~ 260 | 3750 | 71.48 | 375 | 51.48 |
| 260 ~ 470 | 3750 ~ 12500 | 71.48 ~ 81.94 | 375 ~ 1250 | 51.48 ~ 61.94 |
| Above 470 | 12500 | 81.94 | 1250 | 61.94 |

NOTE:

1. Where F is the frequency in MHz, the formula for calculating the maximum permitted fundamental field strengths are as follows: for the band 130-174 MHz, $\text{uV/m at 3 meters} = 56.81818(F) - 6136.3636$; for the band 260-470 MHz, $\text{uV/m at 3 meters} = 41.6667(F) - 7083.3333$. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.
2. The above field strength limits are specified at a distance of 3meters. The tighter limits apply at the band edges.

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

| Frequencies (MHz) | Field Strength (microvolts/meter) | Measurement Distance (meters) |
|-------------------|-----------------------------------|-------------------------------|
| 0.009 ~ 0.490 | $2400/F(\text{kHz})$ | 300 |
| 0.490 ~ 1.705 | $24000/F(\text{kHz})$ | 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) = $20 \log \text{Emission level (uV/m)}$.
3. For frequencies above 1000MHz, 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 20dB 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 | MY51210203 | Jan. 21, 2016 | Jan. 20, 2017 |
| Spectrum Analyzer Agilent | N9010A | MY52220314 | Sep.03, 2015 | Sep.02, 2016 |
| Spectrum Analyzer ROHDE & SCHWARZ | FSU43 | 101261 | Dec. 17, 2015 | Dec. 16, 2016 |
| BILOG Antenna SCHWARZBECK | VULB9168 | 9168-472 | Jan. 07, 2016 | Jan. 06, 2017 |
| HORN Antenna SCHWARZBECK | BBHA 9120 D | 9120D-969 | Jan. 04, 2016 | Jan. 03, 2017 |
| HORN Antenna SCHWARZBECK | BBHA 9170 | 9170-480 | Jan. 08, 2016 | Jan. 07, 2017 |
| Loop Antenna | EM-6879 | 269 | Jul. 31, 2015 | Jul. 30, 2016 |
| Preamplifier EMCI | EMC 012645 | 980115 | Dec. 21, 2015 | Dec. 20, 2016 |
| Preamplifier EMCI | EMC 184045 | 980116 | Dec. 21, 2015 | Dec. 20, 2016 |
| Preamplifier EMCI | EMC 330H | 980112 | Dec. 28, 2015 | Dec. 27, 2016 |
| Power Meter Anritsu | ML2495A | 1232002 | Sep. 21, 2015 | Sep. 20, 2016 |
| Power Sensor Anritsu | MA2411B | 1207325 | Sep. 21, 2015 | Sep. 20, 2016 |
| RF signal cable HUBER+SUHNNER | SUCOFLEX 104 | 309219/4 2950114 | Oct. 12, 2015 | Oct. 11, 2016 |
| RF signal cable HUBER+SUHNNER | SUCOFLEX 104 | 250130/4 | Oct. 12, 2015 | Oct. 11, 2016 |
| RF Coaxial Cable Worken | 8D-FB | Cable-Ch10-01 | Oct. 12, 2015 | Oct. 11, 2016 |
| 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 1GHz if tested.
4. The FCC Site Registration No. is 690701.
5. 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 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:

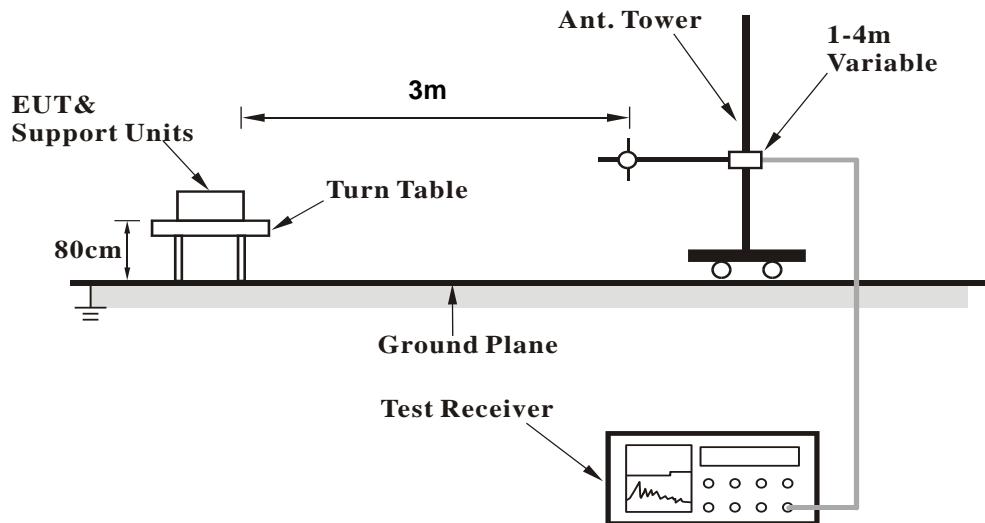
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (no less than 1 Hz) for Average detection (AV) at frequency above 1GHz
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

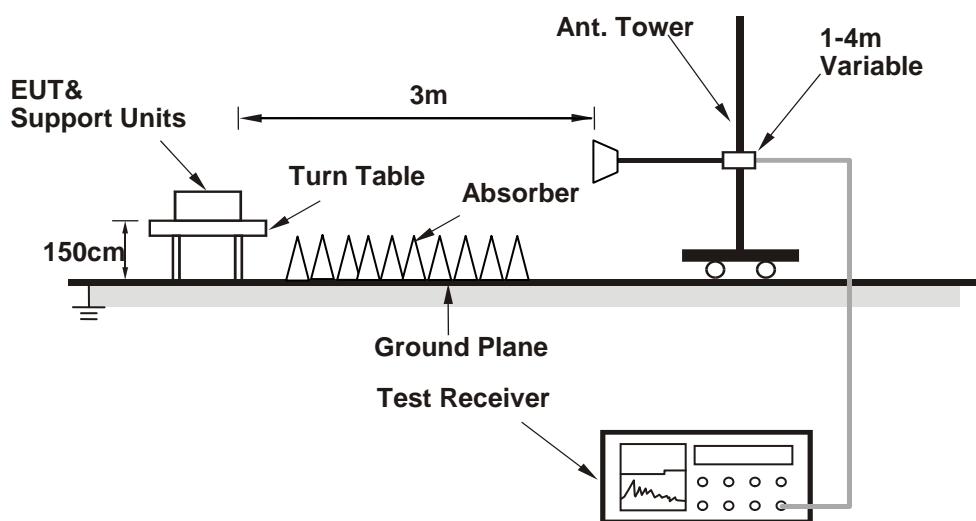
No deviation.

4.1.5 Test Set Up

<Frequency Range below 1GHz>



<Frequency Range 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

BELOW 1GHz WORST-CASE DATA

| EUT Test Condition | | Measurement Detail | | | | | |
|--------------------------|--------------------|--------------------|--|--|------------------------------|--|--|
| Channel | Channel 0 | Frequency Range | | | 30 MHz ~ 1 GHz | | |
| Input Power | 3 Vdc | 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 |
| 168.71 | 37.13 | 55.85 | 43.5 | -6.37 | 11.86 | 1.16 | 31.74 | 135 | 4 | QP |
| 305.48 | 38.61 | 55.78 | 46 | -7.39 | 13.08 | 1.65 | 31.9 | 117 | 163 | QP |
| 385.99 | 38.41 | 53.53 | 46 | -7.59 | 15.01 | 1.87 | 32 | 102 | 244 | QP |
| 433 | 96.5 | 110.57 | 100.48 | -3.98 | 15.98 | 1.96 | 32.01 | 107 | 150 | Peak |
| 699.3 | 35.69 | 44.22 | 46 | -10.31 | 20.81 | 2.45 | 31.79 | 111 | 126 | QP |
| 866 | 71.33 | 77.52 | 80.48 | -9.15 | 23.08 | 2.7 | 31.97 | 113 | 168 | 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 |
| 167.74 | 32.27 | 50.92 | 43.5 | -11.23 | 11.96 | 1.15 | 31.76 | 110 | 173 | QP |
| 304.51 | 38.17 | 55.35 | 46 | -7.83 | 13.06 | 1.65 | 31.89 | 132 | 27 | QP |
| 361.74 | 38.83 | 54.56 | 46 | -7.17 | 14.43 | 1.8 | 31.96 | 127 | 87 | QP |
| 433 | 94.07 | 108.14 | 100.48 | -6.41 | 15.98 | 1.96 | 32.01 | 127 | 66 | Peak |
| 699.3 | 36.34 | 44.87 | 46 | -9.66 | 20.81 | 2.45 | 31.79 | 104 | 48 | QP |
| 866 | 60.1 | 66.29 | 80.48 | -20.38 | 23.08 | 2.7 | 31.97 | 124 | 169 | Peak |

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

Margin value = Emission level – Limit value

| EUT Test Condition | | | Measurement Detail | | |
|---------------------------------|--|--------------------|--------------------|--------------------------|--|
| Channel | | Channel 20 | | Frequency Range | |
| Input Power | | 3 Vdc | | Detector Function | |
| Environmental Conditions | | 25 deg. C, 65 % RH | | Tested By | |

| 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 |
| 167.74 | 34.85 | 53.5 | 43.5 | -8.65 | 11.96 | 1.15 | 31.76 | 120 | 308 | QP |
| 304.51 | 38.6 | 55.78 | 46 | -7.4 | 13.06 | 1.65 | 31.89 | 114 | 352 | QP |
| 360.77 | 38.96 | 54.73 | 46 | -7.04 | 14.4 | 1.8 | 31.97 | 106 | 131 | QP |
| 434 | 96.53 | 110.58 | 100.52 | -3.99 | 16 | 1.96 | 32.01 | 113 | 235 | Peak |
| 695.42 | 35.74 | 44.34 | 46 | -10.26 | 20.76 | 2.45 | 31.81 | 117 | 52 | QP |
| 868 | 72 | 78.18 | 80.52 | -8.52 | 23.1 | 2.71 | 31.99 | 118 | 320 | 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 |
| 168.71 | 33.77 | 52.49 | 43.5 | -9.73 | 11.86 | 1.16 | 31.74 | 107 | 203 | QP |
| 305.48 | 38.16 | 55.33 | 46 | -7.84 | 13.08 | 1.65 | 31.9 | 126 | 41 | QP |
| 348.16 | 38.09 | 54.07 | 46 | -7.91 | 14.1 | 1.76 | 31.84 | 124 | 160 | QP |
| 434 | 91.4 | 105.45 | 100.52 | -9.12 | 16 | 1.96 | 32.01 | 107 | 269 | Peak |
| 698.33 | 37.22 | 45.77 | 46 | -8.78 | 20.8 | 2.45 | 31.8 | 133 | 16 | QP |
| 868 | 57.57 | 63.75 | 80.52 | -22.95 | 23.1 | 2.71 | 31.99 | 125 | 288 | Peak |

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

Margin value = Emission level – Limit value

ABOVE 1GHz DATA :

| EUT Test Condition | | | Measurement Detail | | | | | |
|---------------------------------|--|--------------------|--------------------------|--|--|---------------------------|--|--|
| Channel | | Channel 0 | Frequency Range | | | 1 GHz ~ 6 GHz | | |
| Input Power | | 3 Vdc | 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 |
|-----------------|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|---------|
| 1299 | 23.79 | 48.64 | 60.48 | -36.69 | 25.3 | 3.32 | 53.47 | 128 | 296 | Average |
| 1299 | 37.83 | 62.68 | 80.48 | -42.65 | 25.3 | 3.32 | 53.47 | 128 | 296 | Peak |
| 1732 | 26.76 | 50.78 | 60.48 | -33.72 | 25.69 | 3.87 | 53.58 | 100 | 122 | Average |
| 1732 | 36.47 | 60.49 | 80.48 | -44.01 | 25.69 | 3.87 | 53.58 | 100 | 122 | Peak |
| 2165 | 27.81 | 50.8 | 60.48 | -32.67 | 26.28 | 4.37 | 53.64 | 103 | 234 | Average |
| 2165 | 37.78 | 60.77 | 80.48 | -42.7 | 26.28 | 4.37 | 53.64 | 103 | 234 | Peak |
| 2598 | 26.79 | 48.19 | 60.48 | -33.69 | 27.46 | 4.74 | 53.6 | 105 | 212 | Average |
| 2598 | 38.09 | 59.49 | 80.48 | -42.39 | 27.46 | 4.74 | 53.6 | 105 | 212 | Peak |
| 3031 | 26.83 | 47.05 | 60.48 | -33.65 | 28.51 | 5.12 | 53.85 | 100 | 147 | Average |
| 3031 | 38.49 | 58.71 | 80.48 | -41.99 | 28.51 | 5.12 | 53.85 | 100 | 147 | 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 |
|-----------------|-------------------------|-------------------|----------------|-------------|-----------------------|-----------------|--------------------|---------------------|----------------------|---------|
| 1299 | 25.55 | 50.4 | 60.48 | -34.93 | 25.3 | 3.32 | 53.47 | 139 | 189 | Average |
| 1299 | 37.71 | 62.56 | 80.48 | -42.77 | 25.3 | 3.32 | 53.47 | 139 | 189 | Peak |
| 1732 | 29.51 | 53.53 | 60.48 | -30.97 | 25.69 | 3.87 | 53.58 | 140 | 185 | Average |
| 1732 | 39.41 | 63.43 | 80.48 | -41.07 | 25.69 | 3.87 | 53.58 | 140 | 185 | Peak |
| 2165 | 30.15 | 53.14 | 60.48 | -30.33 | 26.28 | 4.37 | 53.64 | 128 | 160 | Average |
| 2165 | 38.88 | 61.87 | 80.48 | -41.6 | 26.28 | 4.37 | 53.64 | 128 | 160 | Peak |
| 2598 | 29.8 | 51.2 | 60.48 | -30.68 | 27.46 | 4.74 | 53.6 | 103 | 24 | Average |
| 2598 | 38.72 | 60.12 | 80.48 | -41.76 | 27.46 | 4.74 | 53.6 | 103 | 24 | Peak |
| 3031 | 27.25 | 47.47 | 60.48 | -33.23 | 28.51 | 5.12 | 53.85 | 116 | 203 | Average |
| 3031 | 39.54 | 59.76 | 80.48 | -40.94 | 28.51 | 5.12 | 53.85 | 116 | 203 | Peak |

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

Margin value = Emission level – Limit value

| EUT Test Condition | | | Measurement Detail | | | | | | |
|--------------------------|--|--------------------|--------------------|--|-------------------|--|---------------------------|--|--|
| Channel | | Channel 20 | | | Frequency Range | | 1 GHz ~ 6 GHz | | |
| Input Power | | 3 Vdc | | | 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 |
| 1302 | 23.88 | 48.72 | 60.52 | -36.64 | 25.3 | 3.33 | 53.47 | 100 | 132 | Average |
| 1302 | 34.72 | 59.56 | 80.52 | -45.8 | 25.3 | 3.33 | 53.47 | 100 | 132 | Peak |
| 1736 | 26.53 | 50.53 | 60.52 | -33.99 | 25.69 | 3.89 | 53.58 | 100 | 120 | Average |
| 1736 | 35.99 | 59.99 | 80.52 | -44.53 | 25.69 | 3.89 | 53.58 | 100 | 120 | Peak |
| 2170 | 27.27 | 50.26 | 60.52 | -33.25 | 26.28 | 4.37 | 53.64 | 102 | 256 | Average |
| 2170 | 38.24 | 61.23 | 80.52 | -42.28 | 26.28 | 4.37 | 53.64 | 102 | 256 | Peak |
| 2604 | 27.38 | 48.76 | 60.52 | -33.14 | 27.46 | 4.76 | 53.6 | 102 | 148 | Average |
| 2604 | 38.85 | 60.23 | 80.52 | -41.67 | 27.46 | 4.76 | 53.6 | 102 | 148 | Peak |
| 3038 | 27.67 | 47.86 | 60.52 | -32.85 | 28.52 | 5.14 | 53.85 | 100 | 135 | Average |
| 3038 | 38.4 | 58.59 | 80.52 | -42.12 | 28.52 | 5.14 | 53.85 | 100 | 135 | 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 |
| 1302 | 25.64 | 50.48 | 60.52 | -34.88 | 25.3 | 3.33 | 53.47 | 100 | 185 | Average |
| 1302 | 34.53 | 59.37 | 80.52 | -45.99 | 25.3 | 3.33 | 53.47 | 100 | 185 | Peak |
| 1736 | 28.64 | 52.64 | 60.52 | -31.88 | 25.69 | 3.89 | 53.58 | 112 | 315 | Average |
| 1736 | 38.78 | 62.78 | 80.52 | -41.74 | 25.69 | 3.89 | 53.58 | 112 | 315 | Peak |
| 2170 | 29.89 | 52.88 | 60.52 | -30.63 | 26.28 | 4.37 | 53.64 | 101 | 239 | Average |
| 2170 | 41.71 | 64.7 | 80.52 | -38.81 | 26.28 | 4.37 | 53.64 | 101 | 239 | Peak |
| 2604 | 29.9 | 51.28 | 60.52 | -30.62 | 27.46 | 4.76 | 53.6 | 103 | 108 | Average |
| 2604 | 38.69 | 60.07 | 80.52 | -41.83 | 27.46 | 4.76 | 53.6 | 103 | 108 | Peak |
| 3038 | 27.87 | 48.06 | 60.52 | -32.65 | 28.52 | 5.14 | 53.85 | 100 | 42 | Average |
| 3038 | 38.09 | 58.28 | 80.52 | -42.43 | 28.52 | 5.14 | 53.85 | 100 | 42 | Peak |

Remarks:

1. Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

Margin value = Emission level – Limit value

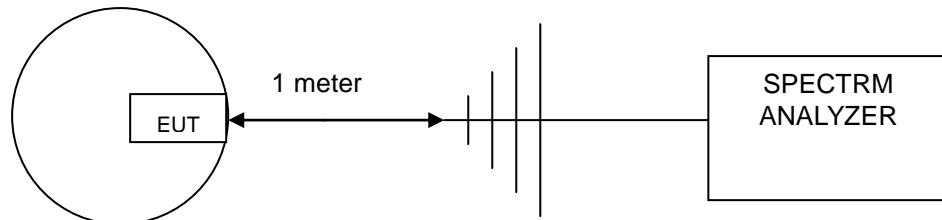
4.2 20dB Bandwidth Measurement

4.2.1 Limits of 20dB Bandwidth Measurement

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for device operating above 70 MHz and below 900 MHz.

| Fundamental Frequency (MHz) | Limit Of Emission Bandwidth (kHz) |
|-----------------------------|-----------------------------------|
| 433 | 980 |

4.2.2 Test Setup



4.2.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.2.4 Test Procedure

- The EUT was placed on the turn table.
- The signal was coupled to the spectrum analyzer through an antenna.
- Set the resolution bandwidth to 300 kHz and video bandwidth to 300 kHz then select Peak function to scan the channel frequency.
- The emission bandwidth was measured and recorded.

4.2.5 Deviation from Test Standard

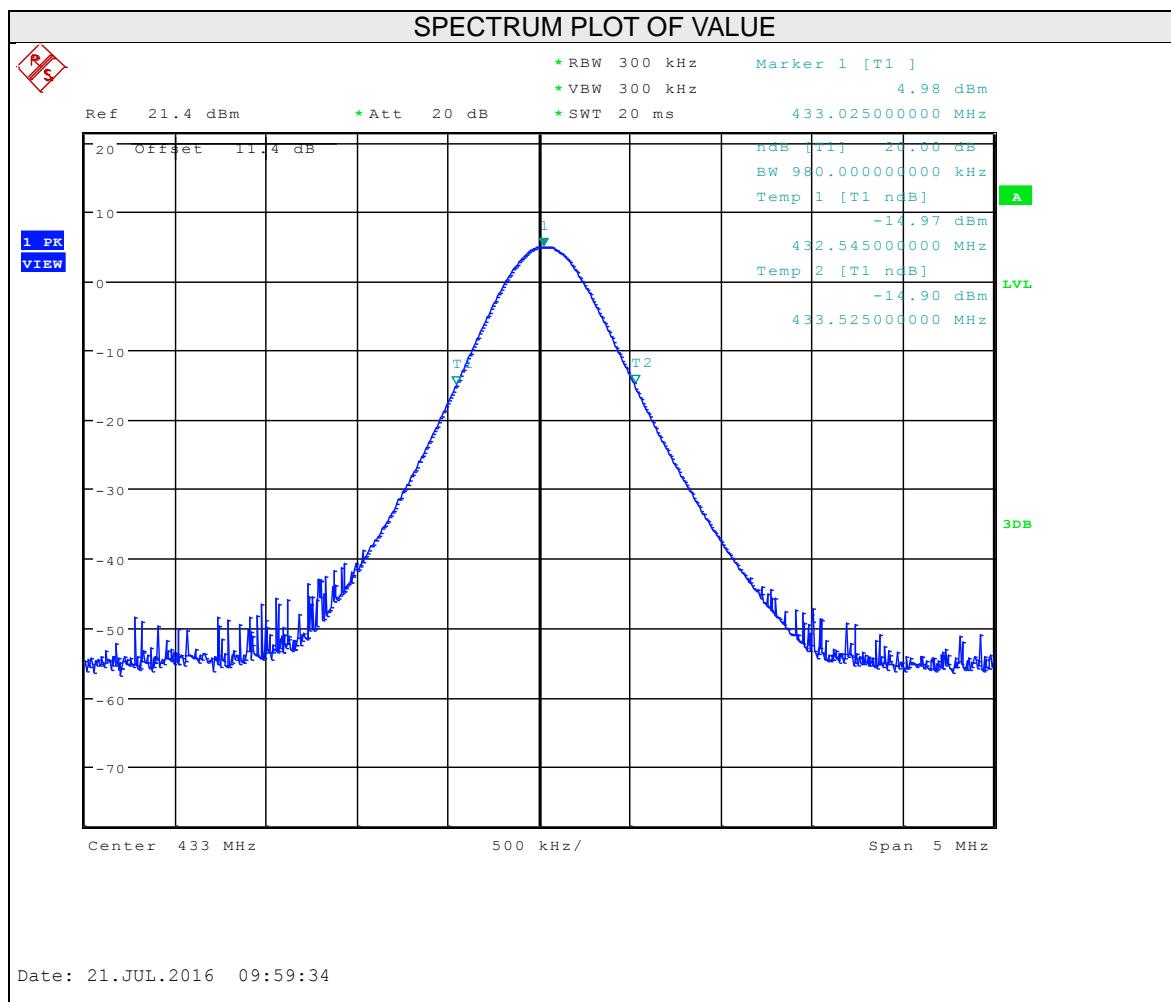
No deviation.

4.2.6 EUT Operating Conditions

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

4.2.7 Test Result

| Channel | Frequency (MHz) | 20dB Bandwidth (MHz) | Maximum Limit (MHz) | Pass / Fail |
|---------|-----------------|----------------------|---------------------|-------------|
| 1 | 433 | 0.98 | 1.0825 | Pass |

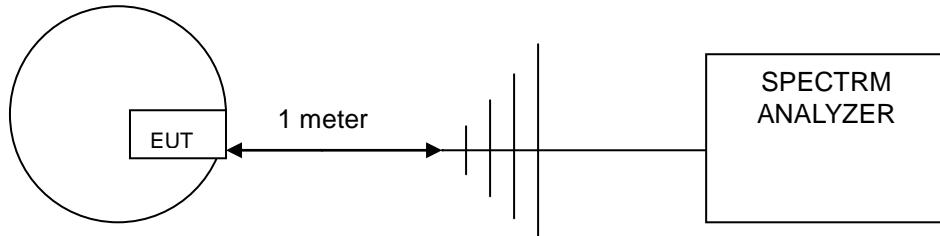


4.3 Deactivation Time Measurement

4.3.1 Limits Of Deactivation Time Measurement

A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

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 Procedures

- The EUT was placed on the turning table.
- The signal was coupled to the spectrum analyzer through an antenna.
- Set the resolution bandwidth to 100kHz and video bandwidth to 100kHz. The spectrum analyser was turned to the centre frequency of the transmitter's and the analyser's marker function was used to determine the duration of transmission.
- The transmission duration was measured and recorded.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

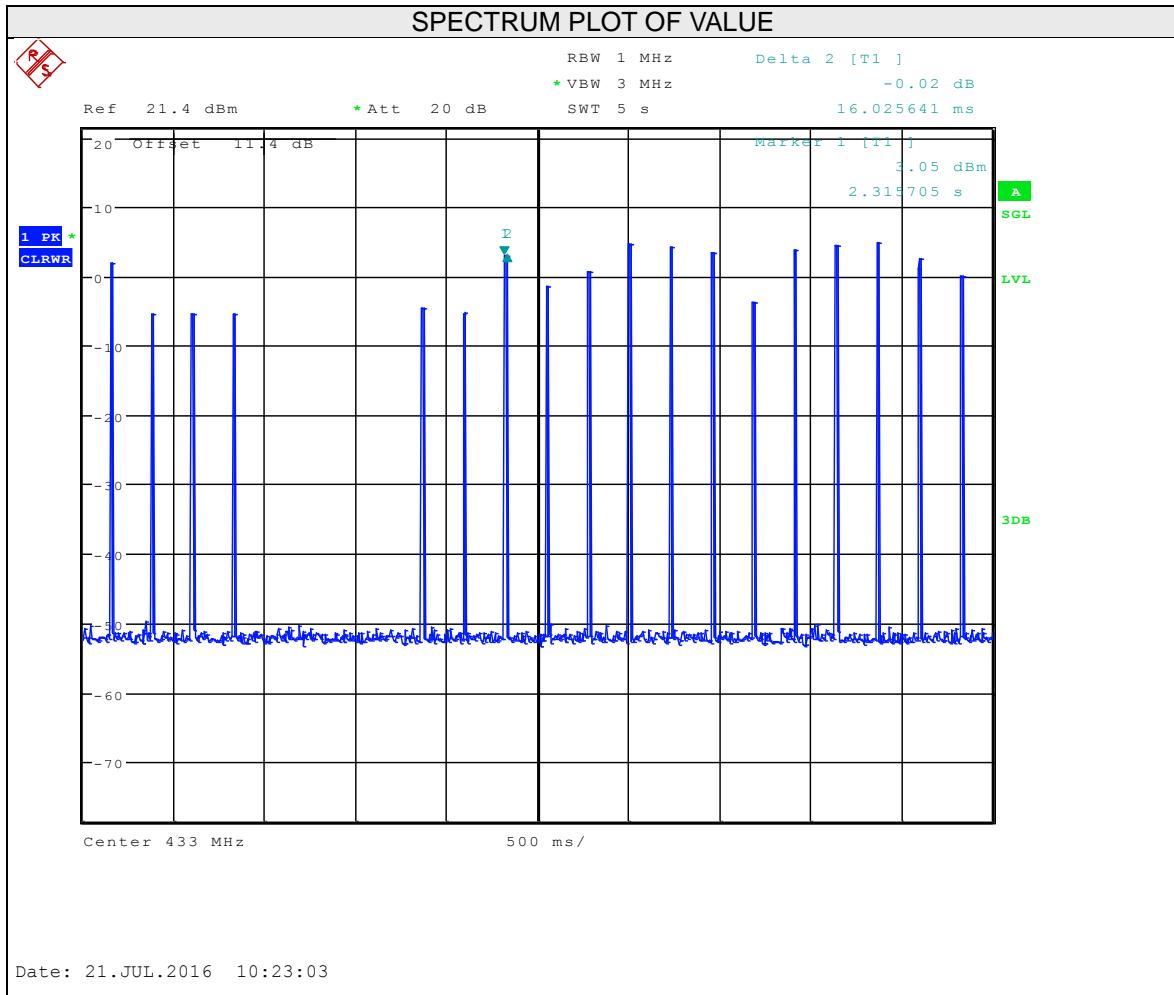
Same as Item 4.3.6.

4.3.7 Test Results

| Frequency (MHz) | Activation Time (s) | Limit: not more than 5 seconds of being released (s) | Conclusion |
|--------------------|------------------------|--|------------|
| 433 | 0.2884 | 5 | Pass |

* Activation Time=Ton*PLUSE

$$=16.025*18 = 0.2884$$



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 accredited and approved according to ISO/IEC 17025.

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

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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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