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FCC TEST REPORT (WLAN 15.247)

REPORT NO.: RF110830D08C

MODEL NO.: INWL01c

FCC ID: EHA-INWL01C

RECEIVED: Sep. 12, 2013

TESTED: Sep. 23, 2013

ISSUED: Nov. 19, 2013

APPLICANT: Intermec Technologies Corporation

ADDRESS: 550 Second street SE Cedar Rapids Iowa
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ISSUED BY: Bureau Veritas Consumer Products Services
(H.K.) Ltd., Taoyuan Branch

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RELEASE CONTROL RECORD

| ISSUE NO. | REASON FOR CHANGE | DATE ISSUED |
|--------------|-------------------|---------------|
| RF110830D08C | Original release | Nov. 19, 2013 |



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1. CERTIFICATION

PRODUCT: WLAN/BT board
BRAND NAME: Intermec
MODEL NO.: INWL01c
APPLICANT: Intermec Technologies Corporation
TESTED: Sep. 23, 2013
TEST SAMPLE: ENGINEERING SAMPLE
STANDARDS: **FCC Part 15, Subpart C (Section 15.247)**
ANSI C63.10-2009

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 : Celia Chen , **DATE:** Nov. 19, 2013
(Celia Chen / Senior Specialist)

APPROVED BY : Rex Lai , **DATE:** Nov. 19, 2013
(Rex Lai / Assistant Manager)



2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

| APPLIED STANDARD: FCC PART 15, SUBPART C (SECTION 15.247) | | | |
|---|-----------------------------|--------|---|
| STANDARD SECTION | TEST TYPE | RESULT | REMARK |
| 15.207 | AC Power Conducted Emission | NA | Refer to NOTE below |
| 15.247(d) 15.209 | Radiated Emissions | PASS | Meet the requirement of limit. Minimum passing margin is -7.0dB at 665.59MHz. |
| 15.247(d) | Band Edge Measurement | NA | Refer to NOTE below |
| 15.247(a)(2) | 6dB bandwidth | NA | Refer to NOTE below |
| 15.247(b) | Conducted power | NA | Refer to NOTE below |
| 15.247(e) | Power Spectral Density | NA | Refer to NOTE below |
| 15.203 | Antenna Requirement | PASS | Antenna connector is SMA (MALE-RP) not a standard connector. |

NOTE: Test item for Radiated Emission Test was performed for this addendum. Other testing data refer to original report.

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:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k = 2$.

| Measurement | Frequency | Uncertainty |
|--------------------|--------------|-------------|
| Radiated emissions | 30MHz ~ 1GHz | 4.30 dB |
| | Above 1GHz | 3.36 dB |



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3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

| | |
|------------------------------|---|
| EUT | WLAN/BT board |
| MODEL NO. | INWL01c |
| POWER SUPPLY | 5Vdc |
| MODULATION TYPE | CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM |
| MODULATION TECHNOLOGY | DSSS, OFDM |
| TRANSFER RATE | 802.11b:11/5.5/2/1Mbps 802.11g: 54/48/36/24/18/12/9/6Mbps 802.11n: up to 72.2Mbps |
| OPERATING FREQUENCY | 2412.0 ~ 2462.0MHz |
| NUMBER OF CHANNEL | 11 |
| OUTPUT POWER | 251.2mW |
| ANTENNA TYPE | Refer to note below |
| ANTENNA CONNECTOR | Refer to note below |
| DATA CABLE | Refer to User's manual |
| I/O PORTS | Refer to User's manual |
| ACCESSORY DEVICES | NA |

NOTE:

1. This report is a supplementary report of the original one (BV CPS report no.: RF110830D08) issued on Oct. 7, 2011 to verify test result for the new antenna source (additional as shaded area):

| Brand name | Model name | Type | Connector | Gain (dBi) | Remark |
|------------------------|------------|--------|---------------|------------|------------|
| Amphenol | Kilimanjro | Dipole | IPEX U.FL | 2 | Original |
| KINSUN INDUSTRIES INC. | 6603A03081 | Dipole | SMA (MALE-RP) | 2.32 | Additional |

2. The changes are meeting the antenna changes of the permissive changes rules; therefore this report is prepared for FCC class II permissive change.
3. The EUT is a WLAN/BT board, the WLAN & Bluetooth function can't transmit simultaneously.

4. The EUT incorporates a SISO function. Physically, the EUT provides one completed transmitter and one receiver.

| MODULATION MODE | TX FUNCTION |
|------------------------|--------------------|
| 802.11b | 1TX |
| 802.11g | 1TX |
| 802.11n (20MHz) | 1TX |

5. The above EUT information was 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

11 channels are provided for 802.11b, 802.11g and 802.11n (20MHz):

| CHANNEL | FREQUENCY | CHANNEL | FREQUENCY |
|----------------|------------------|----------------|------------------|
| 1 | 2412MHz | 7 | 2442MHz |
| 2 | 2417MHz | 8 | 2447MHz |
| 3 | 2422MHz | 9 | 2452MHz |
| 4 | 2427MHz | 10 | 2457MHz |
| 5 | 2432MHz | 11 | 2462MHz |
| 6 | 2437MHz | | |



3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

| EUT CONFIGURE MODE | APPLICABLE TO | | | | DESCRIPTION |
|--------------------|--------------------|-------|------|------|-------------|
| | RE ³ 1G | RE<1G | PLC | APCM | |
| - | √ | √ | Note | Note | - |

Where **RE³1G**: Radiated Emission above 1GHz **RE<1G**: Radiated Emission below 1GHz
PLC: Power Line Conducted Emission **APCM**: Antenna Port Conducted Measurement

NOTE: No need to re-test the test item due to the change should not influence test result.

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, XYZ axis and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

| MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) | AXIS |
|-----------------|-------------------|----------------|-----------------------|-----------------|------------------|------|
| 802.11b | 1 to 11 | 1, 6, 11 | DSSS | DBPSK | 1.0 | Z |
| 802.11g | 1 to 11 | 1, 6, 11 | OFDM | BPSK | 6.0 | Z |
| 802.11n (20MHz) | 1 to 11 | 1, 6, 11 | OFDM | BPSK | 6.5 | 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, XYZ axis and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

| MODE | AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TECHNOLOGY | MODULATION TYPE | DATA RATE (Mbps) | AXIS |
|---------|-------------------|----------------|-----------------------|-----------------|------------------|------|
| 802.11g | 1 to 11 | 11 | OFDM | BPSK | 6.0 | Z |

TEST CONDITION:

| APPLICABLE TO | ENVIRONMENTAL CONDITIONS | INPUT POWER (SYSTEM) | TESTED BY |
|--------------------|--------------------------|----------------------|-----------|
| RE ³ 1G | 25deg. C, 75% RH | 120Vac, 60Hz | Joey Liu |
| RE <1G | 25deg. C, 75% RH | 120Vac, 60Hz | Joey Liu |

3.3 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.

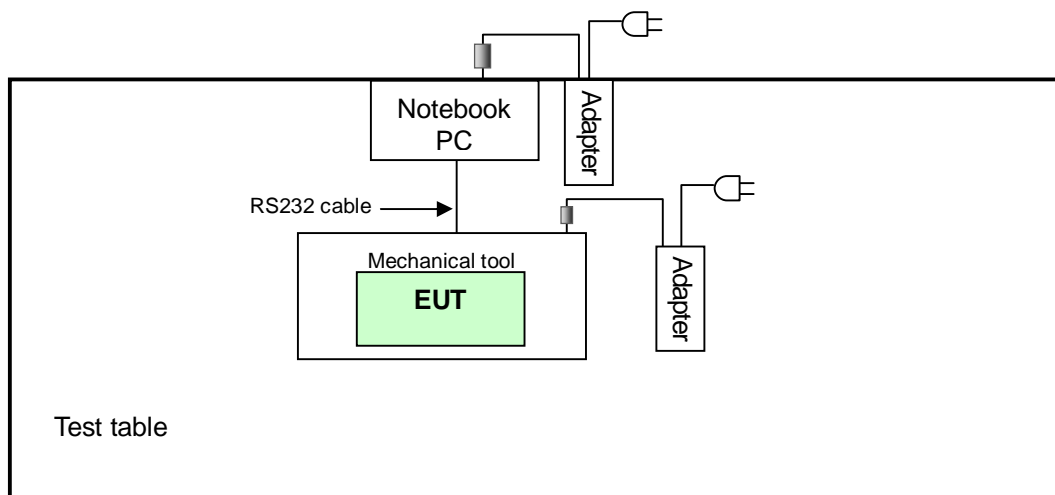
| NO. | PRODUCT | BRAND | MODEL NO. | SERIAL NO. | FCC ID |
|-----|---------------------------|-------|------------|------------|------------------|
| 1 | NOTEBOOK COMPUTER | DELL | 510m | 1KZ1G1S | FCC DoC Approved |
| 2 | Mechanical tool | N/A | N/A | N/A | N/A |
| 3 | Mechanical tool's Adapter | FSP | FSP070-RAA | N/A | Verification |

| NO. | SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS |
|-----|---|
| 1 | N/A |
| 2 | One RS232 cable (1.8m) |
| 3 | Non-shielded DC cable (1.8m) |

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

(2) The support units 2 & 3 were provided by client.

3.3.1 CONFIGURATION OF SYSTEM UNDER TEST





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3.4 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 v03r01

ANSI C63.10-2009

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 20dB 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 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.



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4.1.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|--|------------------------------|------------|-----------------|------------------|
| HP Preamplifier | 8447D | 2432A03504 | Feb. 26, 2013 | Feb. 25, 2014 |
| HP Preamplifier | 8449B | 3008A01201 | Feb. 26, 2013 | Feb. 25, 2014 |
| Agilent TEST RECEIVER | N9038A | MY51210129 | Jan. 03, 2013 | Jan. 02, 2014 |
| Schwarzbeck Antenna | VULB 9168 | 137 | Mar. 20, 2013 | Mar. 19, 2014 |
| Schwarzbeck Antenna | VHBA 9123 | 480 | May 29, 2013 | May 28, 2014 |
| ADT. Turn Table | TT100 | 0306 | NA | NA |
| ADT. Tower | AT100 | 0306 | NA | NA |
| Software | ADT_Radiated_V 7.6.15.9.2 | NA | NA | NA |
| SUHNER RF cable | SF102 | CABLE-CH6 | Aug. 16, 2013 | Aug. 15, 2014 |
| Schwarzbeck Horn Antenna | BBHA 9120-D1 | D130 | May 13, 2013 | May 12, 2014 |
| Highpass filter Wainwright Instruments | WHK 3.1/18G-10SS | SN 8 | 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 horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Chamber No. 6.
4. The Industry Canada Reference No. IC 7450E-6.
5. The FCC Site Registration No. is 447212.



4.1.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters semi-anechoic chamber. 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 antenna is a broadband antenna, and its height 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 Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

NOTE:

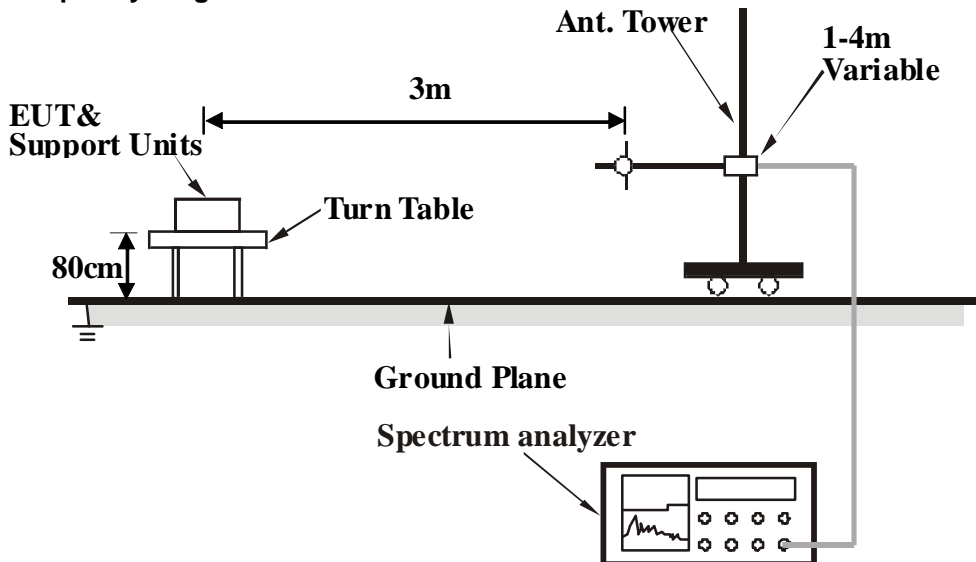
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98%) or 10Hz (Duty cycle > 98%) 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

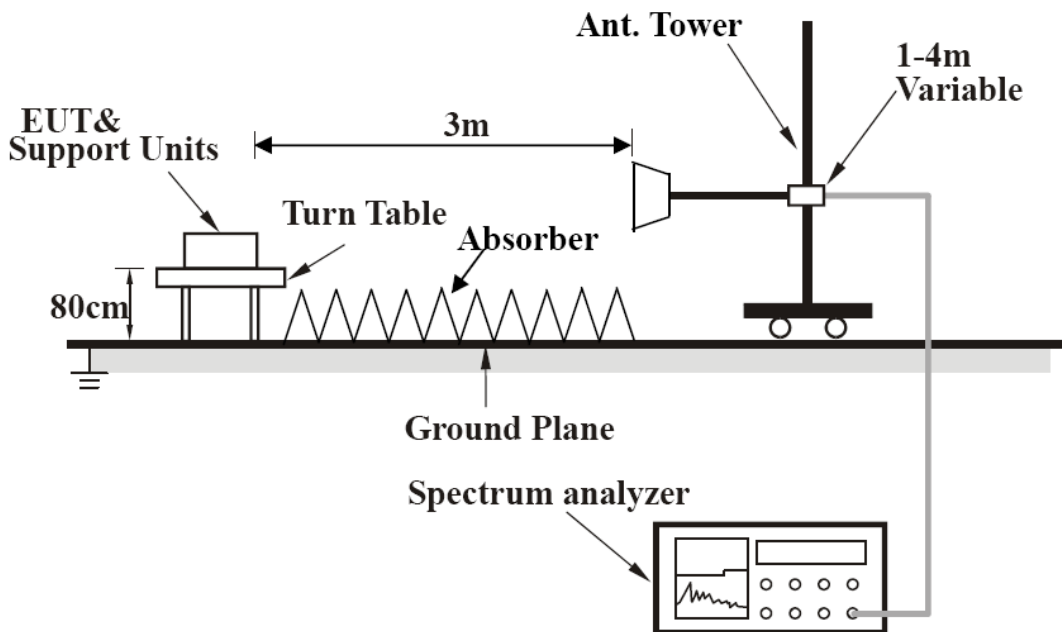
No deviation.

4.1.5 TEST SETUP

Frequency range 30MHz~1GHz



Frequency range above 1GHz



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



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4.1.6 EUT OPERATING CONDITIONS

- a. Turn on the power of all equipment.
- b. Connected the EUT with Notebook PC via Mechanical tool placed on testing table.
- c. Notebook PC ran a test program (provided by manufacture) to enable EUT under transmitting condition at specific channel continuously.



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4.1.7 TEST RESULTS

BELOW 1GHz WORST-CASE DATA

802.11g

| | | | |
|-----------------|---------------|----------------------|-----------------|
| CHANNEL | TX Channel 11 | 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 | 133.11 | 29.5 QP | 43.5 | -14.0 | 1.43 H | 79 | 43.80 | -14.31 |
| 2 | 199.74 | 34.9 QP | 43.5 | -8.6 | 1.58 H | 263 | 50.85 | -15.93 |
| 3 | 397.39 | 33.8 QP | 46.0 | -12.2 | 1.07 H | 354 | 43.41 | -9.60 |
| 4 | 589.69 | 35.7 QP | 46.0 | -10.3 | 1.88 H | 201 | 41.24 | -5.50 |
| 5 | 665.59 | 39.0 QP | 46.0 | -7.0 | 1.63 H | 242 | 43.27 | -4.27 |
| 6 | 997.14 | 38.2 QP | 54.0 | -15.8 | 1.24 H | 84 | 37.53 | 0.69 |
| 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 | 79.71 | 31.7 QP | 40.0 | -8.3 | 1.12 V | 227 | 49.37 | -17.67 |
| 2 | 200.14 | 34.6 QP | 43.5 | -8.9 | 1.37 V | 2 | 50.53 | -15.95 |
| 3 | 589.84 | 34.2 QP | 46.0 | -11.8 | 1.46 V | 237 | 39.71 | -5.49 |
| 4 | 665.63 | 38.7 QP | 46.0 | -7.3 | 1.18 V | 1 | 42.93 | -4.27 |
| 5 | 830.26 | 36.8 QP | 46.0 | -9.2 | 1.33 V | 40 | 38.32 | -1.50 |
| 6 | 993.18 | 37.3 QP | 54.0 | -16.7 | 1.23 V | 64 | 36.70 | 0.64 |

REMARKS:

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



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ABOVE 1GHz DATA

802.11b

| | | | |
|------------------------|--------------|------------------------------|--------------|
| CHANNEL | TX Channel 1 | 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 | 42.9 PK | 74.0 | -31.1 | 1.00 H | 352 | 46.68 | -3.75 |
| 2 | 2390.00 | 31.7 AV | 54.0 | -22.3 | 1.00 H | 352 | 35.45 | -3.75 |
| 3 | *2412.00 | 102.5 PK | | | 1.00 H | 352 | 106.13 | -3.64 |
| 4 | *2412.00 | 99.0 AV | | | 1.00 H | 352 | 102.59 | -3.64 |
| 5 | 4824.00 | 45.0 PK | 74.0 | -29.0 | 1.00 H | 354 | 41.25 | 3.73 |
| 6 | 4824.00 | 36.5 AV | 54.0 | -17.5 | 1.00 H | 354 | 32.80 | 3.73 |
| 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 | 44.8 PK | 74.0 | -29.2 | 1.06 V | 133 | 48.52 | -3.75 |
| 2 | 2390.00 | 35.5 AV | 54.0 | -18.6 | 1.06 V | 133 | 39.20 | -3.75 |
| 3 | *2412.00 | 104.1 PK | | | 1.06 V | 133 | 107.72 | -3.64 |
| 4 | *2412.00 | 99.8 AV | | | 1.06 V | 133 | 103.46 | -3.64 |
| 5 | 4824.00 | 45.4 PK | 74.0 | -28.6 | 1.00 V | 132 | 41.67 | 3.73 |
| 6 | 4824.00 | 36.5 AV | 54.0 | -17.5 | 1.00 V | 132 | 32.77 | 3.73 |

REMARKS:

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



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| | | | |
|------------------------|--------------|------------------------------|--------------|
| CHANNEL | TX Channel 6 | 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 | *2437.00 | 102.1 PK | | | 1.00 H | 353 | 105.62 | -3.53 |
| 2 | *2437.00 | 98.5 AV | | | 1.00 H | 353 | 101.99 | -3.53 |
| 3 | 4874.00 | 44.0 PK | 74.0 | -30.0 | 1.00 H | 345 | 40.21 | 3.75 |
| 4 | 4874.00 | 34.9 AV | 54.0 | -19.1 | 1.00 H | 345 | 31.12 | 3.75 |
| 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 | *2437.00 | 105.1 PK | | | 1.03 V | 133 | 108.67 | -3.53 |
| 2 | *2437.00 | 100.9 AV | | | 1.03 V | 133 | 104.39 | -3.53 |
| 3 | 4874.00 | 45.2 PK | 74.0 | -28.8 | 1.03 V | 133 | 41.45 | 3.75 |
| 4 | 4874.00 | 36.9 AV | 54.0 | -17.1 | 1.03 V | 133 | 33.18 | 3.75 |

REMARKS:

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



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| | | | |
|------------------------|---------------|--------------------------|--------------|
| 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 | *2462.00 | 100.7 PK | | | 1.00 H | 353 | 104.07 | -3.41 |
| 2 | *2462.00 | 97.0 AV | | | 1.00 H | 353 | 100.44 | -3.41 |
| 3 | 2483.50 | 40.5 PK | 74.0 | -33.6 | 1.00 H | 354 | 43.77 | -3.32 |
| 4 | 2483.50 | 26.9 AV | 54.0 | -27.1 | 1.00 H | 354 | 30.25 | -3.32 |
| 5 | 4924.00 | 46.4 PK | 74.0 | -27.6 | 1.00 H | 355 | 42.67 | 3.74 |
| 6 | 4924.00 | 35.5 AV | 54.0 | -18.5 | 1.00 H | 355 | 31.72 | 3.74 |
| 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 | *2462.00 | 105.1 PK | | | 1.00 V | 169 | 108.47 | -3.41 |
| 2 | *2462.00 | 101.3 AV | | | 1.00 V | 169 | 104.74 | -3.41 |
| 3 | 2483.50 | 41.0 PK | 74.0 | -33.1 | 1.00 V | 169 | 44.27 | -3.32 |
| 4 | 2483.50 | 27.6 AV | 54.0 | -26.4 | 1.00 V | 169 | 30.91 | -3.32 |
| 5 | 4924.00 | 45.3 PK | 74.0 | -28.7 | 1.00 V | 172 | 41.52 | 3.74 |
| 6 | 4924.00 | 37.1 AV | 54.0 | -16.9 | 1.00 V | 172 | 33.34 | 3.74 |

REMARKS:

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



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802.11g

| | | | |
|------------------------|--------------|------------------------------|--------------|
| CHANNEL | TX Channel 1 | 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 | 44.0 PK | 74.0 | -30.0 | 1.00 H | 351 | 47.72 | -3.75 |
| 2 | 2390.00 | 27.3 AV | 54.0 | -26.7 | 1.00 H | 351 | 31.01 | -3.75 |
| 3 | *2412.00 | 102.9 PK | | | 1.00 H | 351 | 106.58 | -3.64 |
| 4 | *2412.00 | 92.2 AV | | | 1.00 H | 351 | 95.82 | -3.64 |
| 5 | 4824.00 | 45.1 PK | 74.0 | -29.0 | 1.00 H | 355 | 41.32 | 3.73 |
| 6 | 4824.00 | 35.5 AV | 54.0 | -18.5 | 1.00 H | 355 | 31.76 | 3.73 |
| 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 | 44.6 PK | 74.0 | -29.4 | 1.00 V | 135 | 48.37 | -3.75 |
| 2 | 2390.00 | 27.7 AV | 54.0 | -26.3 | 1.00 V | 135 | 31.43 | -3.75 |
| 3 | *2412.00 | 105.3 PK | | | 1.00 V | 135 | 108.90 | -3.64 |
| 4 | *2412.00 | 94.0 AV | | | 1.00 V | 135 | 97.68 | -3.64 |
| 5 | 4824.00 | 44.4 PK | 74.0 | -29.6 | 1.00 V | 137 | 40.63 | 3.73 |
| 6 | 4824.00 | 35.2 AV | 54.0 | -18.8 | 1.00 V | 137 | 31.46 | 3.73 |

REMARKS:

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



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| | | | |
|------------------------|--------------|------------------------------|--------------|
| CHANNEL | TX Channel 6 | 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 | *2437.00 | 102.0 PK | | | 1.00 H | 360 | 105.48 | -3.53 |
| 2 | *2437.00 | 91.4 AV | | | 1.00 H | 360 | 94.92 | -3.53 |
| 3 | 4874.00 | 44.8 PK | 74.0 | -29.2 | 1.00 H | 360 | 41.01 | 3.75 |
| 4 | 4874.00 | 35.3 AV | 54.0 | -18.7 | 1.00 H | 360 | 31.51 | 3.75 |
| 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 | *2437.00 | 105.2 PK | | | 1.00 V | 270 | 108.76 | -3.53 |
| 2 | *2437.00 | 94.7 AV | | | 1.00 V | 270 | 98.20 | -3.53 |
| 3 | 4874.00 | 44.6 PK | 74.0 | -29.4 | 1.00 V | 273 | 40.82 | 3.75 |
| 4 | 4874.00 | 35.2 AV | 54.0 | -18.8 | 1.00 V | 273 | 31.44 | 3.75 |

REMARKS:

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



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| | | | |
|------------------------|---------------|------------------------------|--------------|
| 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 | *2462.00 | 101.3 PK | | | 1.00 H | 352 | 104.75 | -3.41 |
| 2 | *2462.00 | 89.7 AV | | | 1.00 H | 352 | 93.07 | -3.41 |
| 3 | 2483.50 | 42.1 PK | 74.0 | -31.9 | 1.00 H | 352 | 45.46 | -3.32 |
| 4 | 2483.50 | 27.0 AV | 54.0 | -27.0 | 1.00 H | 352 | 30.32 | -3.32 |
| 5 | 4924.00 | 44.8 PK | 74.0 | -29.2 | 1.00 H | 355 | 41.10 | 3.74 |
| 6 | 4924.00 | 34.9 AV | 54.0 | -19.2 | 1.00 H | 355 | 31.11 | 3.74 |

| 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 | *2462.00 | 105.7 PK | | | 1.00 V | 171 | 109.07 | -3.41 |
| 2 | *2462.00 | 95.0 AV | | | 1.00 V | 171 | 98.45 | -3.41 |
| 3 | 2483.50 | 47.6 PK | 74.0 | -26.4 | 1.00 V | 177 | 50.92 | -3.32 |
| 4 | 2483.50 | 28.2 AV | 54.0 | -25.8 | 1.00 V | 177 | 31.52 | -3.32 |
| 5 | 4924.00 | 45.5 PK | 74.0 | -28.5 | 1.00 V | 177 | 41.77 | 3.74 |
| 6 | 4924.00 | 35.2 AV | 54.0 | -18.8 | 1.00 V | 177 | 31.45 | 3.74 |

REMARKS:

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



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802.11n (20MHz)

| | | | |
|------------------------|--------------|--------------------------|--------------|
| CHANNEL | TX Channel 1 | 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 | 45.1 PK | 74.0 | -28.9 | 1.00 H | 353 | 48.83 | -3.75 |
| 2 | 2390.00 | 27.5 AV | 54.0 | -26.5 | 1.00 H | 353 | 31.26 | -3.75 |
| 3 | *2412.00 | 102.1 PK | | | 1.00 H | 353 | 105.69 | -3.64 |
| 4 | *2412.00 | 91.2 AV | | | 1.00 H | 353 | 94.85 | -3.64 |
| 5 | 4824.00 | 45.4 PK | 74.0 | -28.6 | 1.00 H | 357 | 41.71 | 3.73 |
| 6 | 4824.00 | 35.0 AV | 54.0 | -19.0 | 1.00 H | 357 | 31.30 | 3.73 |
| 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 | 48.1 PK | 74.0 | -25.9 | 1.00 V | 270 | 51.83 | -3.75 |
| 2 | 2390.00 | 28.2 AV | 54.0 | -25.8 | 1.00 V | 270 | 31.95 | -3.75 |
| 3 | *2412.00 | 105.3 PK | | | 1.00 V | 270 | 108.89 | -3.64 |
| 4 | *2412.00 | 95.0 AV | | | 1.00 V | 270 | 98.68 | -3.64 |
| 5 | 4824.00 | 45.1 PK | 74.0 | -28.9 | 1.00 V | 273 | 41.33 | 3.73 |
| 6 | 4824.00 | 34.8 AV | 54.0 | -19.3 | 1.00 V | 273 | 31.02 | 3.73 |

REMARKS:

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



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| | | | |
|------------------------|--------------|------------------------------|--------------|
| CHANNEL | TX Channel 6 | 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 | *2437.00 | 100.8 PK | | | 1.00 H | 360 | 104.31 | -3.53 |
| 2 | *2437.00 | 90.2 AV | | | 1.00 H | 360 | 93.68 | -3.53 |
| 3 | 4874.00 | 45.3 PK | 74.0 | -28.7 | 1.00 H | 360 | 41.54 | 3.75 |
| 4 | 4874.00 | 35.1 AV | 54.0 | -18.9 | 1.00 H | 360 | 31.36 | 3.75 |
| 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 | *2437.00 | 105.6 PK | | | 1.00 V | 270 | 109.15 | -3.53 |
| 2 | *2437.00 | 95.2 AV | | | 1.00 V | 270 | 98.74 | -3.53 |
| 3 | 4874.00 | 45.5 PK | 74.0 | -28.5 | 1.00 V | 275 | 41.73 | 3.75 |
| 4 | 4874.00 | 35.0 AV | 54.0 | -19.0 | 1.00 V | 275 | 31.23 | 3.75 |

REMARKS:

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



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| | | | |
|------------------------|---------------|--------------------------|--------------|
| 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 | *2462.00 | 99.4 PK | | | 1.00 H | 189 | 102.79 | -3.41 |
| 2 | *2462.00 | 87.9 AV | | | 1.00 H | 189 | 91.33 | -3.41 |
| 3 | 2483.50 | 44.3 PK | 74.0 | -29.7 | 1.00 H | 189 | 47.66 | -3.32 |
| 4 | 2483.50 | 27.1 AV | 54.0 | -26.9 | 1.00 H | 189 | 30.38 | -3.32 |
| 5 | 4924.00 | 45.1 PK | 74.0 | -28.9 | 1.00 H | 193 | 41.33 | 3.74 |
| 6 | 4924.00 | 34.8 AV | 54.0 | -19.2 | 1.00 H | 193 | 31.09 | 3.74 |
| 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 | *2462.00 | 106.6 PK | | | 1.00 V | 271 | 110.03 | -3.41 |
| 2 | *2462.00 | 96.1 AV | | | 1.00 V | 271 | 99.54 | -3.41 |
| 3 | 2483.50 | 52.5 PK | 74.0 | -21.5 | 1.00 V | 271 | 55.84 | -3.32 |
| 4 | 2483.50 | 28.5 AV | 54.0 | -25.5 | 1.00 V | 271 | 31.78 | -3.32 |
| 5 | 4924.00 | 45.2 PK | 74.0 | -28.8 | 1.00 V | 267 | 41.49 | 3.74 |
| 6 | 4924.00 | 35.0 AV | 54.0 | -19.0 | 1.00 V | 267 | 31.30 | 3.74 |

REMARKS:

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



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5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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



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6. 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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7. APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No modifications were made to the EUT by the lab during the test.

---END---