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FCC TEST REPORT

REPORT NO.: RF990628D12

MODEL NO.: ZT-RPT433

FCC ID: YNVZTRPT433

RECEIVED: June 28, 2010

TESTED: July 6, 2010

ISSUED: July 15, 2010

APPLICANT: WellAWARE Systems Inc.

ADDRESS: 5500 Cox Rd, Glen Allen, VA23060

ISSUED BY: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

LAB LOCATION: No. 47, 14th Ling, Chia Pau Tsuen, Lin Kou Hsiang, Taipei Hsien 244, Taiwan

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Testing Laboratory
2021



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1. CERTIFICATION

PRODUCT: Signal repeater
BRAND NAME:  WellAware™ System
MODEL NO.: ZT-RPT433
APPLICANT: WellAware Systems Inc.
TESTED: July 6, 2010
TEST SAMPLE: MASS-PRODUCTION
STANDARDS: FCC Part 15, Subpart C (Section 15.231)
ANSI C63.4-2003

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 : Annie Chang , **DATE:** July 15, 2010
(Annie Chang / Senior Specialist)

**TECHNICAL
ACCEPTANCE :** Jamison Chan , **DATE:** July 15, 2010
Responsible for RF (Jamison Chan / Supervisor)

APPROVED BY : Ken Liu , **DATE:** July 15, 2010
(Ken Liu / Assistant Manager)



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2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

| APPLIED STANDARD: FCC Part 15, Subpart C (Section 15.231) | | | |
|---|--------------------------------|--------|---|
| STANDARD SECTION | TEST TYPE AND LIMIT | RESULT | REMARK |
| 15.207 | Conducted Emission Test | PASS | Minimum passing margin is -32.61dB at 26.281MHz |
| 15.209 15.231(b) | Radiated Emission Test | PASS | Minimum passing margin is -2.0dB at 433.92MHz |
| 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:

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

| Measurement | Frequency | Uncertainty |
|---------------------|----------------|-------------|
| Conducted emissions | 150kHz ~ 30MHz | 2.41 dB |
| Radiated emissions | 30MHz ~ 1GHz | 3.72 dB |
| | Above 1GHz | 2.89 dB |



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3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

| | |
|----------------------------|--------------------------|
| EUT | Signal repeater |
| MODEL NO. | ZT-RPT433 |
| FCC ID | YNVZTRPT433 |
| POWER SUPPLY | 5Vdc from adapter |
| MODULATION TYPE | FSK |
| OPERATING FREQUENCY | 433.92MHz |
| NUMBER OF CHANNEL | 1 |
| ANTENNA TYPE | Monopole antenna |
| ANTENNA CONNECTOR | N/A |
| DATA CABLE | N/A |
| I/O PORTS | N/A |
| ASSOCIATED DEVICES | Refer to note 2 as below |

NOTE:

1. The EUT is a transceiver.

2. The EUT was power supplied from the following power adapter:

| | |
|----------------------|----------------------------------|
| Brand Name | AHEAD |
| Model No. | ADA-0500100 |
| AC I/P Rating | 120V 60Hz 3W |
| DC O/P Rating | DC 5V 100mA |
| Power Cord | Non-shielded DC (1.8m), AC 2-pin |

3. We had verified that the EUT demodulates the signal and re-transmit the corresponding sensor signal only. It doesn't response or repeat other signal.

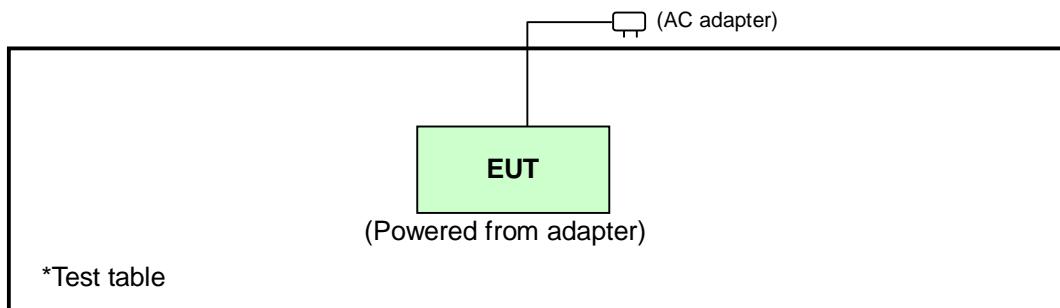
4. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

1 channel was provided to this EUT.

| Channel | Frequency |
|---------|-----------|
| 1 | 433.92MHz |

3.2.1 CONFIGURATION OF SYSTEM UNDER TEST





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3.2.2 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL:

| EUT configure mode | Applicable to | | | | | Description |
|--------------------------|---------------|-------|--------------------|----|----|-------------|
| | PLC | RE<1G | RE ³ 1G | EB | DT | |
| - | √ | √ | √ | √ | √ | - |

Where PLC: Power Line Conducted Emission

RE³1G: Radiated Emission above 1GHz

DT: Deactivation Time Measurement

RE<1G: Radiated Emission below 1GHz

EB: 20dB Bandwidth Measurement

POWER LINE CONDUCTED EMISSION TEST:

Following channel(s) was (were) selected for the final test as listed below.

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE |
|----------------------|-------------------|--------------------|
| 1 | 1 | FSK |

RADIATED EMISSION TEST (BELOW 1 GHz):

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).

Following channel(s) was (were) selected for the final test as listed below.

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE |
|----------------------|-------------------|--------------------|
| 1 | 1 | FSK |

RADIATED EMISSION TEST (ABOVE 1 GHz):

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).

Following channel(s) was (were) selected for the final test as listed below.

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE |
|----------------------|-------------------|--------------------|
| 1 | 1 | FSK |



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EMISSION BANDWIDTH MEASUREMENT:

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

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE |
|-------------------|----------------|-----------------|
| 1 | 1 | FSK |

DEACTIVATION TIME MEASUREMENT:

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

| AVAILABLE CHANNEL | TESTED CHANNEL | MODULATION TYPE |
|-------------------|----------------|-----------------|
| 1 | 1 | FSK |

TEST CONDITION:

| APPLICABLE TO | ENVIRONMENTAL CONDITIONS | INPUT POWER | TESTED BY |
|--------------------|---------------------------|---------------|-----------|
| PLC | 29deg. C, 65% RH, 1003hPa | 120Vac, 60 Hz | Chad Lee |
| RE<1G | 27deg. C, 77% RH, 1003hPa | 120Vac, 60 Hz | Nick Chen |
| RE ³ 1G | 27deg. C, 77% RH, 1003hPa | 120Vac, 60 Hz | Nick Chen |
| EB | 28deg. C, 78% RH, 1003hPa | 120Vac, 60 Hz | Chad Lee |
| DT | 28deg. C, 78% RH, 1003hPa | 120Vac, 60 Hz | Chad Lee |



3.3 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 C63.4-2003

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

3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with its adapter.



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4. TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

| FREQUENCY OF EMISSION (MHz) | CONDUCTED LIMIT (dB μ V) | |
|-----------------------------|------------------------------|----------|
| 0.15-0.5 | Quasi-peak | Average |
| 0.5-5 | 66 to 56 | 56 to 46 |
| 5-30 | 56 | 46 |
| | 60 | 50 |

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

4.1.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|--|-----------------|--------------|-----------------|------------------|
| ROHDE & SCHWARZ Test Receiver | ESCS 30 | 100276 | Dec. 15, 2009 | Dec. 14, 2010 |
| ROHDE & SCHWARZ Artificial Mains Network (for EUT) | ESH3-Z5 | 100218 | Nov. 24, 2009 | Nov. 23, 2010 |
| LISN With Adapter (for EUT) | AD10 | C10Ada-001 | Nov. 24, 2009 | Nov. 23, 2010 |
| ROHDE & SCHWARZ Artificial Mains Network (for peripherals) | ESH3-Z5 | 100219 | Nov. 23, 2009 | Nov. 22, 2010 |
| Software | ADT_Cond_V7.3.7 | NA | NA | NA |
| Software | ADT_ISN_V7.3.7 | NA | NA | NA |
| RF cable (JYEBAO) | 5D-FB | Cable-C10.01 | Feb. 23, 2010 | Feb. 22, 2011 |
| SUHNER Terminator (For ROHDE & SCHWARZ LISN) | 65BNC-5001 | E1-010773 | Feb. 23, 2010 | Feb. 22, 2011 |

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 Shielded Room No. 10.
3. The VCCI Site Registration No. C-1852.



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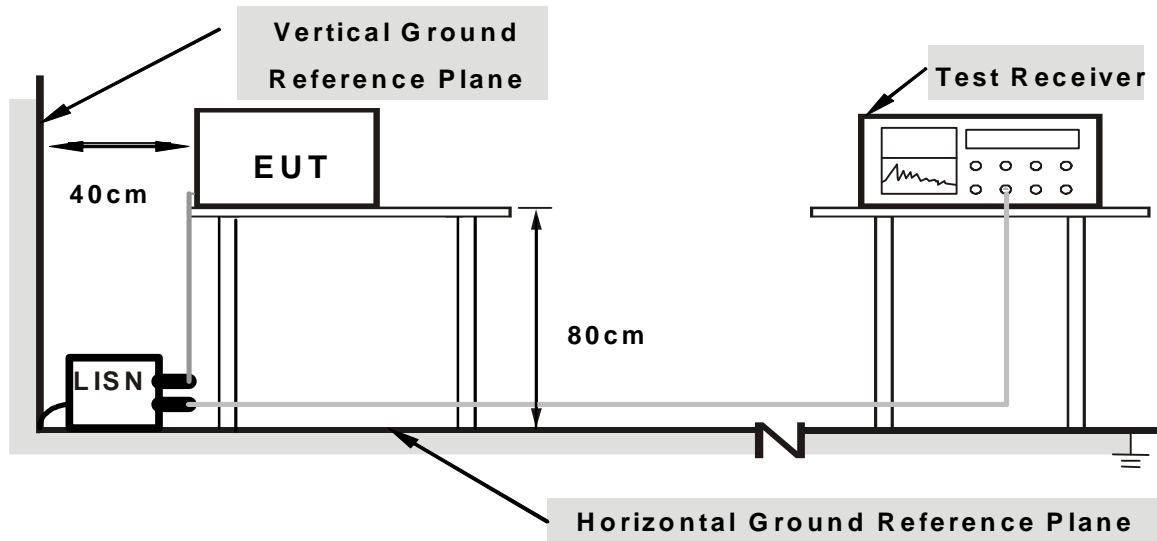
4.1.3 TEST PROCEDURES

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

4.1.4 DEVIATION FROM TEST STANDARD

No deviation.

4.1.5 TEST SETUP



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

2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.1.6 EUT OPERATING CONDITIONS

Set the transmitter part of EUT under transmission condition continuously at specific channel frequency.

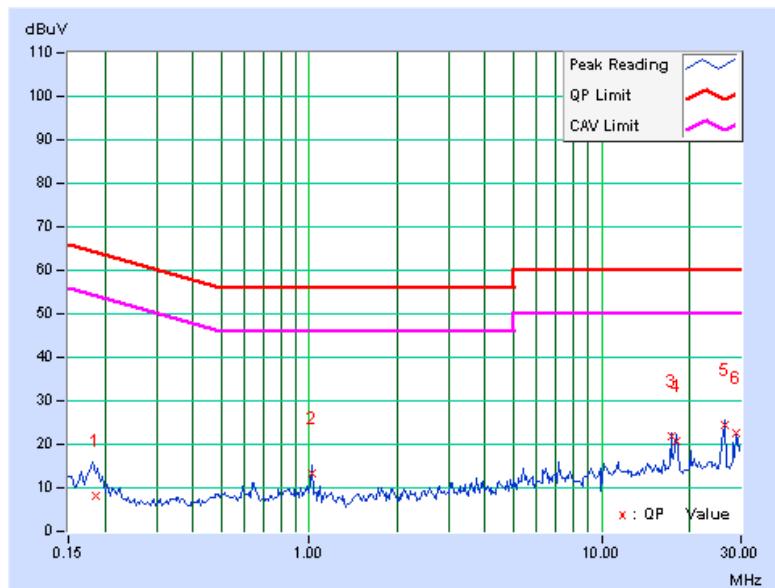
4.1.7 TEST RESULTS

| PHASE | Line 1 | 6dB BANDWIDTH | 9kHz |
|-------|--------|---------------|------|
|-------|--------|---------------|------|

| No | Freq. [MHz] | Corr. (dB) | Reading Value | | Emission Level | | Limit | | Margin | |
|----|----------------|---------------|---------------|-----|-------------------|-----|-------|-------|--------|-----|
| | | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.187 | 0.19 | 7.91 | - | 8.10 | - | 64.18 | 54.18 | -56.08 | - |
| 2 | 1.027 | 0.31 | 12.90 | - | 13.21 | - | 56.00 | 46.00 | -42.79 | - |
| 3 | 17.406 | 1.14 | 20.88 | - | 22.02 | - | 60.00 | 50.00 | -37.98 | - |
| 4 | 18.093 | 1.17 | 19.57 | - | 20.74 | - | 60.00 | 50.00 | -39.26 | - |
| 5 | 26.279 | 1.38 | 22.96 | - | 24.34 | - | 60.00 | 50.00 | -35.66 | - |
| 6 | 29.009 | 1.48 | 21.18 | - | 22.66 | - | 60.00 | 50.00 | -37.34 | - |

REMARKS:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
3. The emission levels of other frequencies were very low against the limit.
4. Margin value = Emission level - Limit value
5. Correction factor = Insertion loss + Cable loss
6. Emission Level = Correction Factor + Reading Value.



| PHASE | | Line 2 | | 6dB BANDWIDTH | | 9kHz | |
|-------|--|--------|--|---------------|--|------|--|
|-------|--|--------|--|---------------|--|------|--|

| No | Freq. [MHz] | Corr. Factor (dB) | Reading Value | | Emission Level | | Limit | | Margin | |
|----------|----------------|-------------------------|------------------|----------|-------------------|----------|--------------|--------------|---------------|----------|
| | | | [dB (uV)] | | [dB (uV)] | | [dB (uV)] | | (dB) | |
| | | | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. | Q.P. | AV. |
| 1 | 0.173 | 0.29 | 16.72 | - | 17.01 | - | 64.79 | 54.79 | -47.79 | - |
| 2 | 0.400 | 0.38 | 21.92 | - | 22.30 | - | 57.85 | 47.85 | -35.55 | - |
| 3 | 7.164 | 0.63 | 15.43 | - | 16.06 | - | 60.00 | 50.00 | -43.94 | - |
| 4 | 18.086 | 1.00 | 20.14 | - | 21.14 | - | 60.00 | 50.00 | -38.86 | - |
| 5 | 23.859 | 1.07 | 22.46 | - | 23.53 | - | 60.00 | 50.00 | -36.47 | - |
| 6 | 26.281 | 1.11 | 26.28 | - | 27.39 | - | 60.00 | 50.00 | -32.61 | - |
| 7 | 29.824 | 1.20 | 26.11 | - | 27.31 | - | 60.00 | 50.00 | -32.69 | - |

REMARKS: 1. Q.P. and AV. are abbreviations of quasi-peak and average individually.

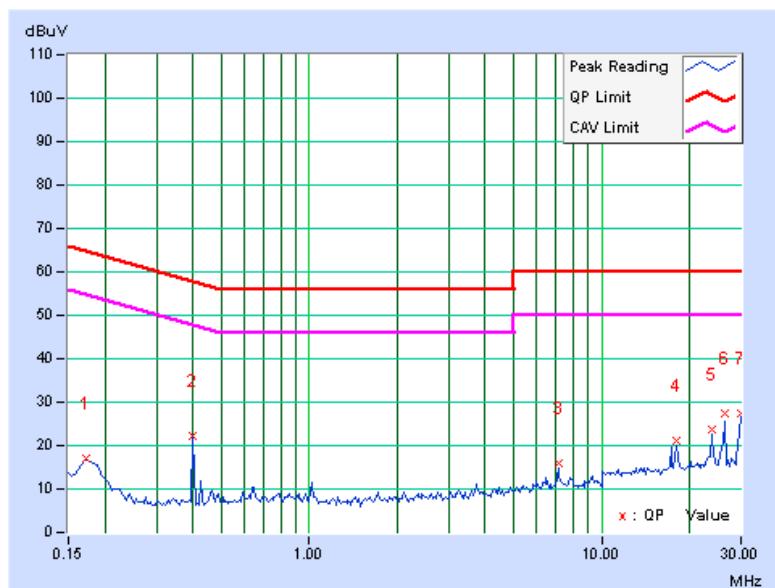
2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.

3. The emission levels of other frequencies were very low against the limit.

4. Margin value = Emission level - Limit value

5. Correction factor = Insertion loss + Cable loss

6. Emission Level = Correction Factor + Reading Value.





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4.2 RADIATED EMISSION MEASUREMENT

4.2.1 LIMITS OF RADIATED EMISSION MEASUREMENT

According to 15.231 the field strength of emissions from intentional radiators operated under these frequencies bands shall not exceed the following:

| 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 | 75 | 37.50 |
| 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, uV/m at 3 meters = 56.81818(F)-6136.3636; for the band 260-470 MHz, 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.



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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(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. As shown in 15.35(b), 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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4.2.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | CALIBRATED DATE | CALIBRATED UNTIL |
|-----------------------------------|---------------------------|-------------------|-----------------|------------------|
| HP Preamplifier | 8447D | 2432A03504 | May 06, 2010 | May 05, 2011 |
| HP Preamplifier | 8449B | 3008A01924 | Aug. 31, 2009 | Aug. 30, 2010 |
| HP Preamplifier | 8449B | 3008A01292 | Aug. 10, 2009 | Aug. 09, 2010 |
| ROHDE & SCHWARZ TEST RECEIVER | ESU26 | 100005 | Jun. 10, 2010 | Jun. 09, 2011 |
| Schwarzbeck Antenna | VULB 9168 | 137 | Apr. 29, 2010 | Apr. 28, 2011 |
| Schwarzbeck Antenna | VHBA 9123 | 480 | Apr. 29, 2010 | Apr. 28, 2011 |
| EMCO Horn Antenna | 3115 | 6714 | Oct. 26, 2009 | Oct. 25, 2010 |
| EMCO Horn Antenna | 3115 | 9312-4192 | Apr. 23, 2010 | Apr. 22, 2011 |
| 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 | SF104-26.5 | CABLE-CH6-17m -01 | Aug. 20, 2009 | Aug. 19, 2010 |
| ROHDE & SCHWARZ Spectrum Analyzer | FSP 40 | 100036 | Apr. 06, 2010 | Apr. 05, 2011 |

NOTE:

1. The calibration interval of the above test instruments is 12/24 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.



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4.2.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter semi- anechoic. 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 quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- 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 method or average method as specified and then reported in data sheet.

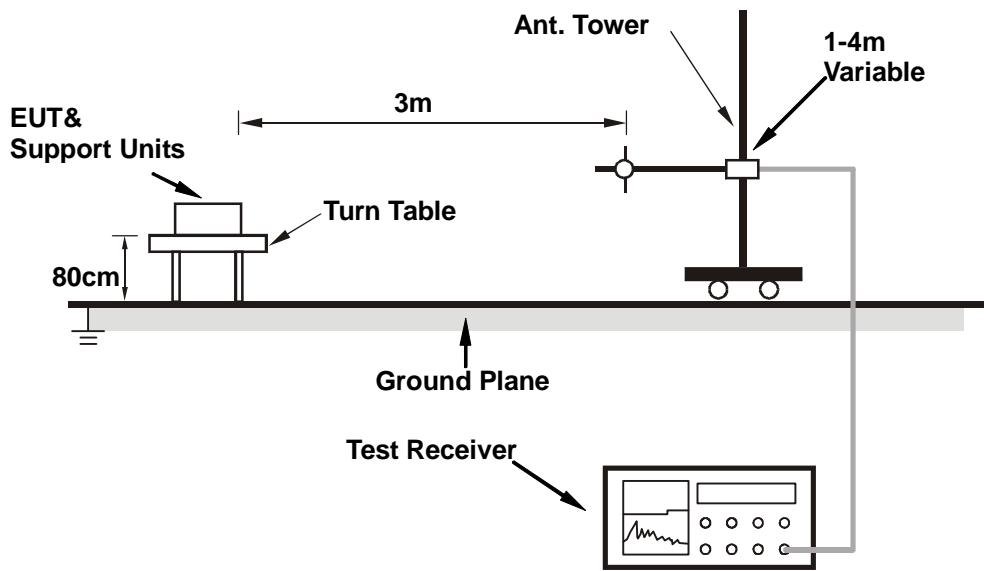
NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz 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 10Hz for Average detection (AV) at frequency above 1GHz.
4. 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



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.2.6 EUT OPERATING CONDITIONS

Set the transmitter part of EUT under transmission condition continuously at specific channel frequency.



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4.2.7 TEST RESULTS

ABOVE 1GHz DATA

| EUT TEST CONDITION | | MEASUREMENT DETAIL | | |
|--------------------------|--|-----------------------------|--|---|
| CHANNEL | | Channel 1 | | FREQUENCY RANGE 1 ~ 25GHz |
| INPUT POWER | | 120Vac, 60Hz | | DETECTOR FUNCTION Peak (PK) Average (AV) |
| ENVIRONMENTAL CONDITIONS | | 27deg. C, 77% RH 1003hPa | | TESTED BY Nick Chen |

| 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 | 1301.76 | 57.2 PK | 80.8 | -23.6 | 1.13 H | 84 | 28.80 | 28.44 |
| 2 | 1301.76 | 40.5 AV | 60.8 | -20.3 | 1.13 H | 84 | 12.10 | 28.44 |
| 3 | 2169.66 | 55.0 PK | 80.8 | -25.8 | 1.00 H | 113 | 23.93 | 31.05 |
| 4 | 2169.66 | 38.3 AV | 60.8 | -22.5 | 1.00 H | 113 | 7.23 | 31.05 |
| 5 | 5640.52 | 51.3 PK | 80.8 | -29.5 | 1.05 H | 34 | 11.12 | 40.17 |
| 6 | 5640.52 | 34.6 AV | 60.8 | -26.2 | 1.05 H | 34 | -5.58 | 40.17 |
| 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 | 1301.76 | 50.4 PK | 80.8 | -30.4 | 1.00 V | 299 | 22.00 | 28.44 |
| 2 | 1301.76 | 33.7 AV | 60.8 | -27.1 | 1.00 V | 299 | 5.30 | 28.44 |
| 3 | 2169.58 | 52.6 PK | 80.8 | -28.2 | 1.00 V | 17 | 21.52 | 31.05 |
| 4 | 2169.58 | 35.9 AV | 60.8 | -24.9 | 1.00 V | 17 | 4.82 | 31.05 |
| 5 | 5641.20 | 59.0 PK | 80.8 | -21.8 | 1.00 V | 170 | 18.82 | 40.17 |
| 6 | 5641.20 | 42.3 AV | 60.8 | -18.5 | 1.00 V | 170 | 2.12 | 40.17 |

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).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:

$$20\log(\text{Duty cycle}) = 20\log \frac{14.65\text{ms} \times 1}{100 \text{ ms}} = -16.7\text{dB}$$

Please see page 23 for plotted duty.



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BELOW 1GHz WORST-CASE DATA

| EUT TEST CONDITION | | MEASUREMENT DETAIL | | |
|--------------------------|--|-----------------------------|--|-------------------|
| CHANNEL | | Channel 1 | | FREQUENCY RANGE |
| INPUT POWER (SYSTEM) | | 120Vac, 60Hz | | DETECTOR FUNCTION |
| ENVIRONMENTAL CONDITIONS | | 27deg. C, 77%RH 1003 hPa | | TESTED BY |
| | | | | Nick Chen |

| 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 | 67.32 | 33.7 QP | 60.8 | -27.1 | 1.03 H | 65 | 21.10 | 12.61 |
| 2 | 101.51 | 21.2 QP | 60.8 | -39.6 | 1.24 H | 128 | 11.86 | 9.36 |
| 3 | 190.11 | 14.8 QP | 60.8 | -46.0 | 1.24 H | 108 | 3.35 | 11.45 |
| 4 | *433.92 | 95.5 PK | 100.8 | -5.3 | 1.92 H | 144 | 76.53 | 18.98 |
| 5 | *433.92 | 78.8 AV | 80.8 | -2.0 | 1.92 H | 144 | 59.83 | 18.98 |
| 6 | 485.46 | 23.8 QP | 60.8 | -37.0 | 1.12 H | 154 | 3.38 | 20.39 |
| 7 | 867.84 | 51.0 PK | 80.8 | -29.8 | 1.06 H | 324 | 23.57 | 27.42 |
| 8 | 867.84 | 34.3 AV | 60.8 | -26.5 | 1.06 H | 324 | 6.87 | 27.42 |
| 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 | 36.22 | 25.3 QP | 60.8 | -35.5 | 1.10 V | 293 | 12.23 | 13.03 |
| 2 | 90.63 | 25.9 QP | 60.8 | -34.9 | 1.10 V | 287 | 17.37 | 8.51 |
| 3 | 194.78 | 25.3 QP | 60.8 | -35.6 | 1.00 V | 51 | 14.04 | 11.21 |
| 4 | *433.92 | 93.1 PK | 100.8 | -7.8 | 1.30 V | 200 | 74.07 | 18.98 |
| 5 | *433.92 | 76.4 AV | 80.8 | -4.5 | 1.30 V | 200 | 57.37 | 18.98 |
| 6 | 709.31 | 39.9 QP | 60.8 | -20.9 | 1.01 V | 201 | 14.93 | 24.97 |
| 7 | 867.84 | 51.6 PK | 80.8 | -29.2 | 1.09 V | 223 | 24.19 | 27.42 |
| 8 | 867.84 | 34.9 AV | 60.8 | -25.9 | 1.09 V | 223 | 7.49 | 27.42 |

REMARKS:

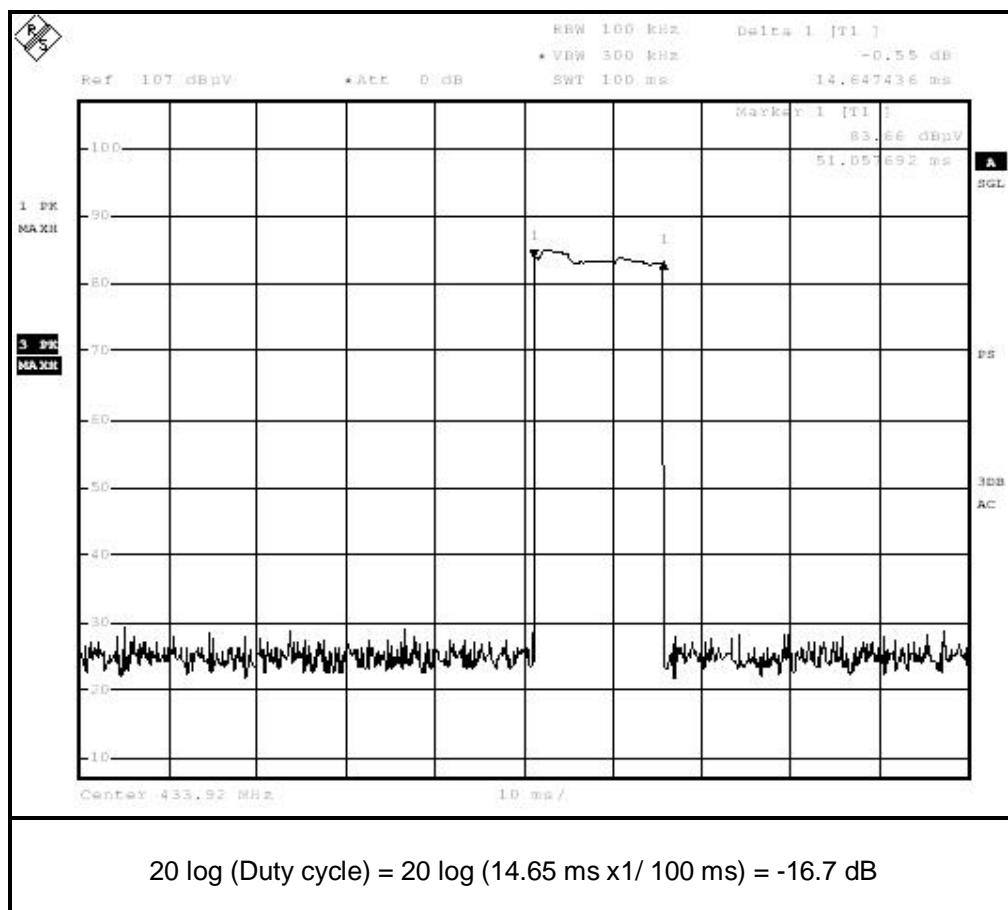
1. Emission level (dBuV/m) = Raw Value (dBuV) + Correction Factor (dB/m).
2. Correction Factor (dB/m) = Antenna Factor (dB/m) + Cable Factor (dB).
3. The other emission levels were very low against the limit.
4. Margin value = Emission level – Limit value.
5. “*”: Fundamental frequency
6. The average value of fundamental frequency is: Average = Peak value + 20log(Duty cycle) Where the duty factor is calculated from following formula:

$$20\log(\text{Duty cycle}) = 20\log \frac{14.65\text{ms} \times 1}{100 \text{ ms}} = -16.7\text{dB}$$

Please see page 23 for plotted duty.



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4.3 20dB OCCUPIED BANDWIDTH MEASUREMENT

4.3.1 LIMITS OF EMISSION 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) |
|-----------------------------|----------------------------------|
| 433.92 | 1084.80 |

4.3.2 TEST INSTRUMENTS

| Description & Manufacturer | Model No. | Serial No. | Calibrated Date | Calibrated Until |
|----------------------------|-----------|------------|-----------------|------------------|
| SPECTRUM ANALYZER | FSP 40 | 100036 | Apr. 27, 2010 | Apr. 26, 2011 |

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

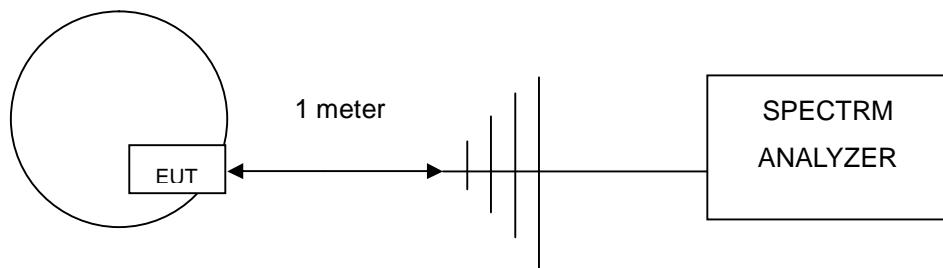
4.3.3 TEST PROCEDURE

- a. The EUT was placed on the turn table.
- b. The signal was coupled to the spectrum analyzer through an antenna.
- c. Set the resolution bandwidth to 100kHz and video bandwidth to 300kHz then select Peak function to scan the channel frequency.
- d. The emission bandwidth was measured and recorded.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

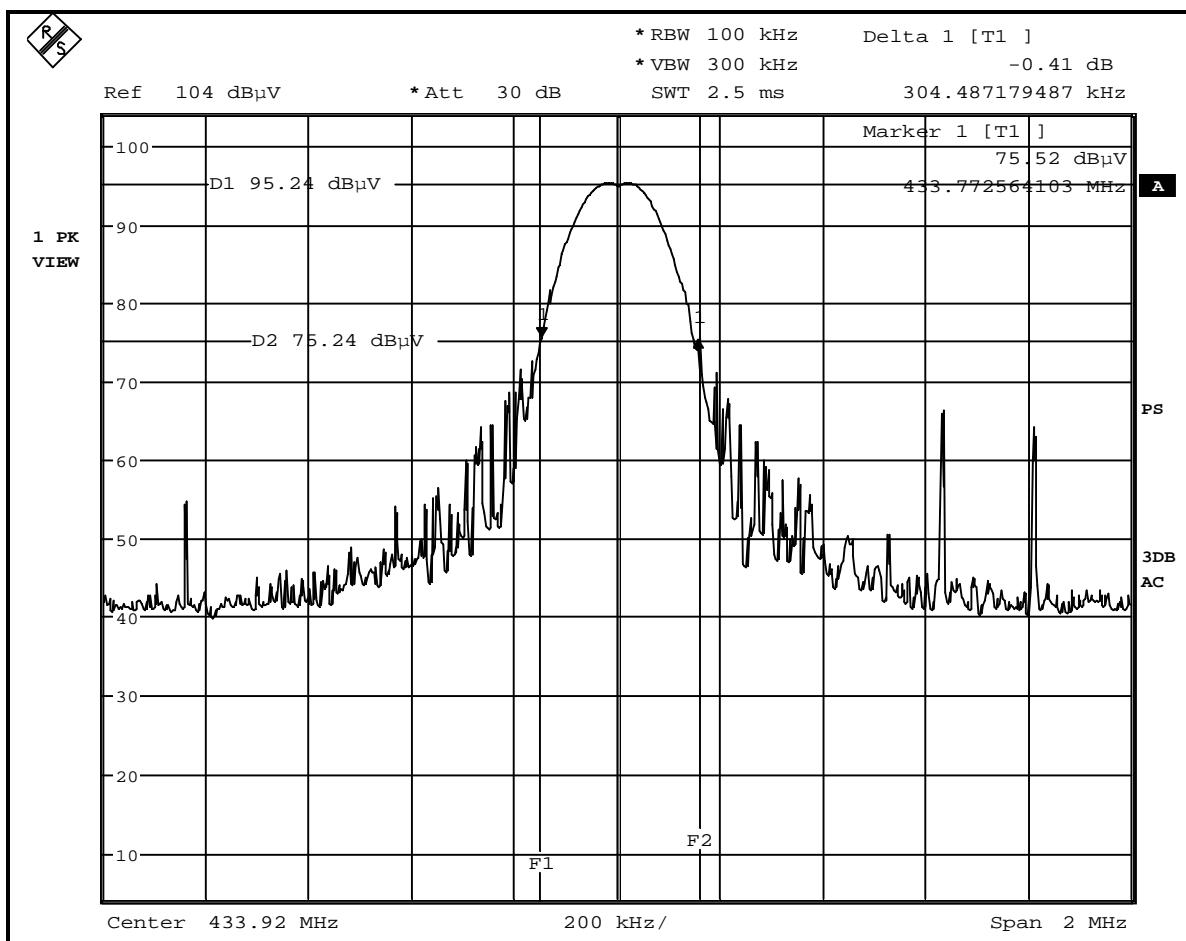
4.3.5 TEST SETUP



4.3.6 TEST RESULTS

| Frequency (MHz) | 20dB Bandwidth (kHz) | Maximum Limit (kHz) | PASS/FAIL |
|-----------------|----------------------|---------------------|-----------|
| 433.92 | 304.48 | 1084.80 | PASS |

The plot of test result is attached as below.





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4.4 DEACTIVATION TIME

4.4.1 LIMITS OF DEACTIVATION TIME MEASUREMENT

A transmitter activated automatically shall cease transmission within 5 seconds after activation.

4.4.2 TEST INSTRUMENTS

| Description & Manufacturer | Model No. | Serial No. | Calibrated Date | Calibrated Until |
|----------------------------|-----------|------------|-----------------|------------------|
| SPECTRUM ANALYZER | FSP 40 | 100036 | Apr. 27, 2010 | Apr. 26, 2011 |

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

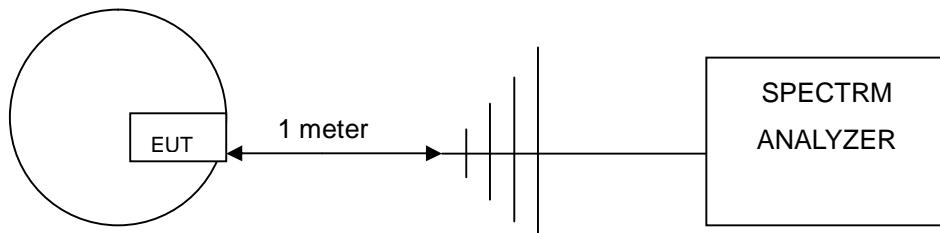
4.4.3 TEST PROCEDURES

- 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 300kHz. 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.

4.4.4 DEVIATION FROM TEST STANDARD

No deviation

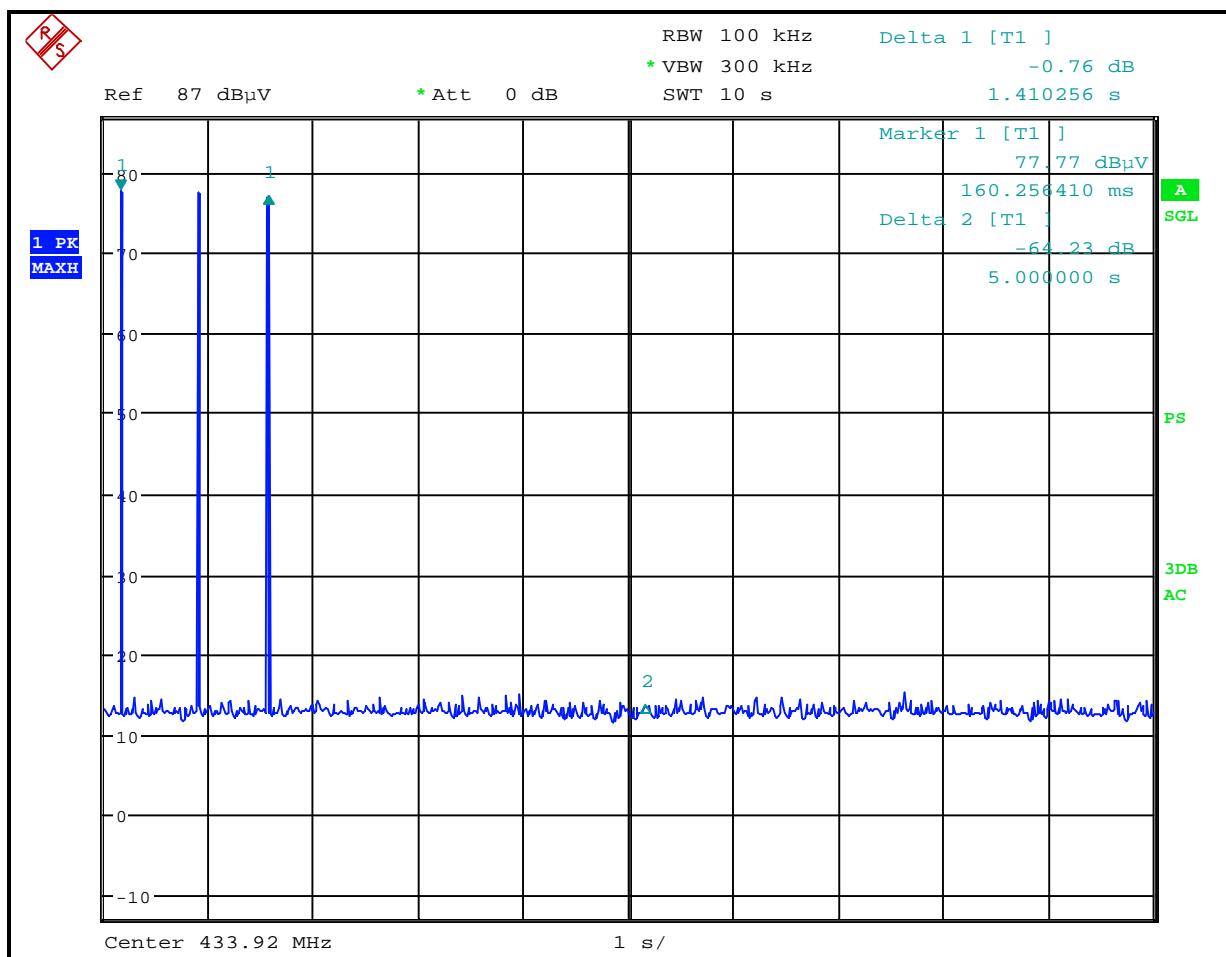
4.4.5 TEST SETUP



4.4.6 TESE RESULTS

| Trigger | Frequency (MHz) | Maximum limit (sec) | PASS/FAIL |
|---------|-----------------|---------------------|-----------|
| 1 | 433.92 | 5 | PASS |

The plots of test results are attached as below.





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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.

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: www.adt.com.tw/index.5/phtml. If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab:

Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF Lab:

Tel: 886-3-5935343
Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety Telecom Lab:

Tel: 886-3-3183232
Fax: 886-3-3185050

Web Site: www.adt.com.tw

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 any modifications are made to the EUT by the lab during the test.

---END---