



Valued Quality. Delivered.

Issued

TEST REPORT

Report No.: 14081210HKG-001

Binatone Electronics International Ltd.

Application
For
Certification
(Original Grant)
(FCC ID: VLJ-T200T)
(IC: 4522A-T200T)

Transmitter

Prepared and Checked by:

Wong Kwok Yeung, Kenneth
Lead Engineer

Approved by:

Chan Chi Hung, Terry
Supervisor
Date: October 27, 2014

- Intertek's standard Terms and Conditions can be obtained at our website <http://www.intertek.com/terms/>.
- This report shall not be reproduced, except in full.
- This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

Intertek Testing Services Hong Kong Ltd.

2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.

Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-ettsemko.com



Valued Quality. Delivered.

GENERAL INFORMATION

| | |
|---------------------------|--|
| Grantee: | Binatone Electronics International Ltd. |
| Grantee Address: | Floor 23A, 9 Des Voeux Road West, Sheung Wan, Hong Kong. |
| Contact Person: | Karl Heinz Mueller |
| Tel: | (852) 2802-2738 |
| Fax: | (852) 2802-8138 |
| e-mail: | kh.mueller@binatoneglobal.com |
| Manufacturer: | Foshan Shunde Alford Electronics Co. Ltd |
| Manufacturer Address: | Xinjiao Industrial Park, DaLiang, ShunDe, Foshan City, Guangdong Province, China |
| Brand Name: | Motorola |
| Model: | TRAINER200UTU |
| Type of EUT: | Transmitter |
| Description of EUT: | Pet Training System (Trainer) |
| Serial Number: | N/A |
| FCC ID / IC: | VLJ-T200T / 4522A-T200T |
| Date of Sample Submitted: | August 29, 2014 |
| Date of Test: | September 03, 2014 to October 23, 2014 |
| Report No.: | 14081210HKG-001 |
| Report Date: | October 27, 2014 |
| Environmental Conditions: | Temperature: +10 to 40°C Humidity: 10 to 90% |

Report No.: 14081210HKG-001

FCC ID: VLJ-T200T

IC: 4522A-T200T

i

Intertek Testing Services Hong Kong Ltd.

2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.

Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-ettsemko.com



Valued Quality. Delivered.

SUMMARY OF TEST RESULT

| TEST SPECIFICATION | REFERENCE | RESULTS |
|---|---------------------------------------|---------|
| Radiated Emission in Restricted Bands | 15.205/RSS-210 2.2 | Pass |
| Transmitter Field Strength, Bandwidth and Timing Requirement | 15.231(a) (b) (c) / RSS-210 A1.1.1 | Pass |

The equipment under test is found to be complying with the following standards:
FCC Part 15, October 1, 2012 Edition
RSS-210 Issue 8, December 2010
RSS-Gen Issue 3, December 2010

- Note: 1. The EUT uses a permanently attached antenna which, in accordance to section 15.203, is considered sufficient to comply with the provisions of this section.
2. Pursuant to FCC part 15 Section 15.215(c), the 20 dB bandwidth of the emission was contained within the frequency band designated (mentioned as above) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over expected variations in temperature and supply voltage were considered.

Report No.: 14081210HKG-001
FCC ID: VLJ-T200T
IC: 4522A-T200T

ii

Intertek Testing Services Hong Kong Ltd.

2/F., Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong.
Tel: (852) 2173 8888 Fax: (852) 2785 5487 Website: www.hk.intertek-ettsemko.com



Valued Quality. Delivered.

Table of Contents

| | | |
|-----|--|----|
| 1.0 | <u>General Description</u> | 1 |
| 1.1 | Product Description | 1 |
| 1.2 | Related Submittal(s) Grants..... | 1 |
| 1.3 | Test Methodology | 1 |
| 1.4 | Test Facility | 1 |
| 2.0 | <u>System Test Configuration</u> | 2 |
| 2.1 | Justification..... | 2 |
| 2.2 | EUT Exercising Software..... | 2 |
| 2.3 | Special Accessories | 2 |
| 2.4 | Measurement Uncertainty..... | 2 |
| 2.5 | Support Equipment List and Description..... | 2 |
| 3.0 | <u>Emission Results</u> | 3 |
| 3.1 | Field Strength Calculation..... | 3 |
| 3.2 | Radiated Emission Configuration Photograph | 4 |
| 3.3 | Radiated Emission Data | 4 |
| 4.0 | <u>Equipment Photographs</u> | 7 |
| 5.0 | <u>Product Labelling</u> | 7 |
| 6.0 | <u>Technical Specifications</u> | 7 |
| 7.0 | <u>Instruction Manual</u> | 7 |
| 8.0 | <u>Miscellaneous Information</u> | 8 |
| 8.1 | Measured Bandwidth..... | 8 |
| 8.2 | Discussion of Pulse Desensitization | 9 |
| 8.3 | Calculation of Average Factor..... | 9 |
| 8.4 | Emissions Test Procedures..... | 14 |
| 9.0 | <u>Equipment List</u> | 16 |



Valued Quality. Delivered.

1.0 General Description

1.1 Product Description

The Equipment Under Test (EUT) is a wireless remote control unit of pet training system. It operates at frequency of 434MHz. The device was powered by a new CR2032 battery.

Antenna Type: Internal, Integral

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

1.2 Related Submittal(s) Grants

The corresponding receiver for this transmitter has been authorized by Declaration of the Conformity procedure

1.3 Test Methodology

Radiated emission measurements were performed according to the procedures in ANSI C63.4 (2009). Preliminary scans were performed to determine worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the “**Justification Section**” of this Application.

1.4 Test Facility

The radiated measurement facility used to collect the radiated data is located at 6/F., Block D, Huahan Building, Langshan Road, Nanshan District, Shenzhen, China 518057. This test facility and site measurement data have been placed on file with the FCC and IC.



Valued Quality. Delivered.

2.0 **System Test Configuration**

2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (2009).

The device was powered by a new CR2032 battery.

For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data reported in Exhibit 3.0.

The unit was operated standalone and placed in the center of the turntable.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was mounted to a plastic stand if necessary and placed on the wooden turntable, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

2.2 EUT Exercising Software

There was no special software to exercise the device. Once the unit is powered up, it transmits the RF signal continuously until key released.

2.3 Special Accessories

There are no special accessories necessary for compliance of this product.

2.4 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

Uncertainty and Compliance - Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value.

2.5 Support Equipment List and Description

N/A.

3.0 Emission Results

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

3.1 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any), Average Factor (optional) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG - AV$$

where

- FS = Field Strength in dB μ V/m
- RA = Receiver Amplitude (including preamplifier) in dB μ V
- CF = Cable Attenuation Factor in dB
- AF = Antenna Factor in dB
- AG = Amplifier Gain in dB
- AV = Average Factor in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows:

$$FS = RR + LF$$

where

- FS = Field Strength in dB μ V/m
- RR = RA - AG - AV in dB μ V
- LF = CF + AF in dB

Assume a receiver reading of 52.0 dB μ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB are added. The amplifier gain of 29 dB and average factor of 5 dB are subtracted, giving a field strength of 27 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

$$\begin{aligned} RA &= 52.0 \text{ dB}\mu\text{V/m} \\ AF &= 7.4 \text{ dB} & RR &= 18.0 \text{ dB}\mu\text{V} \\ CF &= 1.6 \text{ dB} & LF &= 9.0 \text{ dB} \\ AG &= 29.0 \text{ dB} \\ AV &= 5.0 \text{ dB} \\ FS &= RR + LF \\ FS &= 18 + 9 = 27 \text{ dB}\mu\text{V/m} \end{aligned}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm } [(27 \text{ dB}\mu\text{V/m})/20] = 22.4 \mu\text{V/m}$$



Valued Quality. Delivered.

3.2 Radiated Emission Configuration Photograph

The worst case in radiated emission was found at 434.110 MHz

For electronic filing, the worst case radiated emission configuration photographs are saved with filename: radiated photos.pdf.

3.3 Radiated Emission Data

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Judgment: Passed by 4.0 dB compared with average limit



Valued Quality. Delivered.

Applicant: Binatone Electronics International Ltd.
Model: TRAINER200UTU
Worst-Case Operating Mode: Transmission

Date of Test: October 23, 2014

Table 1

Radiated Emissions
Pursuant to FCC Part 15 Section 15.231(a) Requirement

| Polarization | Frequency (MHz) | Reading (dBµV) | Pre-Amp (dB) | Antenna factor (dB) | Net at 3m Peak (dBµV/m) | Peak Limit at 3m (dBµV/m) | Margin (dB) |
|--------------|-----------------|----------------|--------------|---------------------|-------------------------|---------------------------|--------------|
| H | 434.110 | 85.3 | 16 | 25.0 | 94.3 | 100.8 | -6.5 |
| H | 868.220 | 29.2 | 16 | 31.0 | 44.2 | 80.8 | -36.6 |
| H | 1302.330 | 52.4 | 34 | 26.1 | 44.5 | 74.0 | -29.5 |
| H | 1736.440 | 55.2 | 34 | 27.2 | 48.4 | 80.8 | -32.4 |
| H | 2170.550 | 55.8 | 34 | 29.4 | 51.2 | 80.8 | -29.6 |
| H | 2604.660 | 61.2 | 34 | 30.4 | 57.6 | 80.8 | -23.2 |
| H | 3038.770 | 53.3 | 34 | 31.9 | 51.2 | 80.8 | -29.6 |
| H | 3472.880 | 52.4 | 34 | 31.9 | 50.3 | 80.8 | -30.5 |
| H | 3906.990 | 51.7 | 34 | 33.3 | 51.0 | 74.0 | -23.0 |
| H | 4341.100 | 51.0 | 34 | 34.8 | 51.8 | 74.0 | -22.2 |

- NOTES: 1. Peak Detector Data unless otherwise stated.
2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative sign in the column shows value below limit.
4. Horn antenna is used for the emission over 1000MHz.
5. Emission (the row indicated by **bold italic**) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-210 Section 2.2.



Valued Quality. Delivered.

Applicant: Binatone Electronics International Ltd.
Model: TRAINER200UTU
Worst-Case Operating Mode: Transmission

Date of Test: October 23, 2014

Table 2

**Radiated Emissions
Pursuant to FCC Part 15 Section 15.231(a) Requirement**

| Polarization | Frequency (MHz) | Reading (dBµV) | Pre-Amp (dB) | Antenna factor (dB) | Average Factor (dB) | Net at 3m Average (dBµV/m) | Average Limit at 3m (dBµV/m) | Margin (dB) |
|--------------|-----------------|----------------|--------------|---------------------|---------------------|----------------------------|------------------------------|--------------|
| H | 434.110 | 85.3 | 16 | 25.0 | 17.5 | 76.8 | 80.8 | -4.0 |
| H | 868.220 | 29.2 | 16 | 31.0 | 17.5 | 26.7 | 60.8 | -34.1 |
| H | 1302.330 | 51.4 | 33 | 26.1 | 17.5 | 27.0 | 54.0 | -27.0 |
| H | 1736.440 | 54.2 | 33 | 27.2 | 17.5 | 30.9 | 60.8 | -29.9 |
| H | 2170.550 | 54.8 | 33 | 29.4 | 17.5 | 33.7 | 60.8 | -27.1 |
| H | 2604.660 | 60.2 | 33 | 30.4 | 17.5 | 40.1 | 60.8 | -20.7 |
| H | 3038.770 | 52.3 | 33 | 31.9 | 17.5 | 33.7 | 60.8 | -27.1 |
| H | 3472.880 | 51.4 | 33 | 31.9 | 17.5 | 32.8 | 60.8 | -28.0 |
| H | 3906.990 | 50.7 | 33 | 33.3 | 17.5 | 33.5 | 54.0 | -20.5 |
| H | 4341.100 | 50.0 | 33 | 34.8 | 17.5 | 34.3 | 54.0 | -19.7 |

NOTES: 1. Peak Detector Data unless otherwise stated.

2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative sign in the column shows value below limit.

4. Horn antenna is used for the emission over 1000MHz.

5. Emission (the row indicated by **bold italic**) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-210 Section 2.2.



Valued Quality. Delivered.

4.0 **Equipment Photographs**

For electronic filing, the photographs are saved with filename: external photos.pdf and internal photos.pdf.

5.0 **Product Labelling**

For electronics filing, the FCC ID and IC label artwork and the label location are saved with filename: label.pdf..

6.0 **Technical Specifications**

For electronic filing, the block diagram and schematic of the tested EUT are saved with filename: block.pdf and circuit.pdf respectively.

7.0 **Instruction Manual**

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

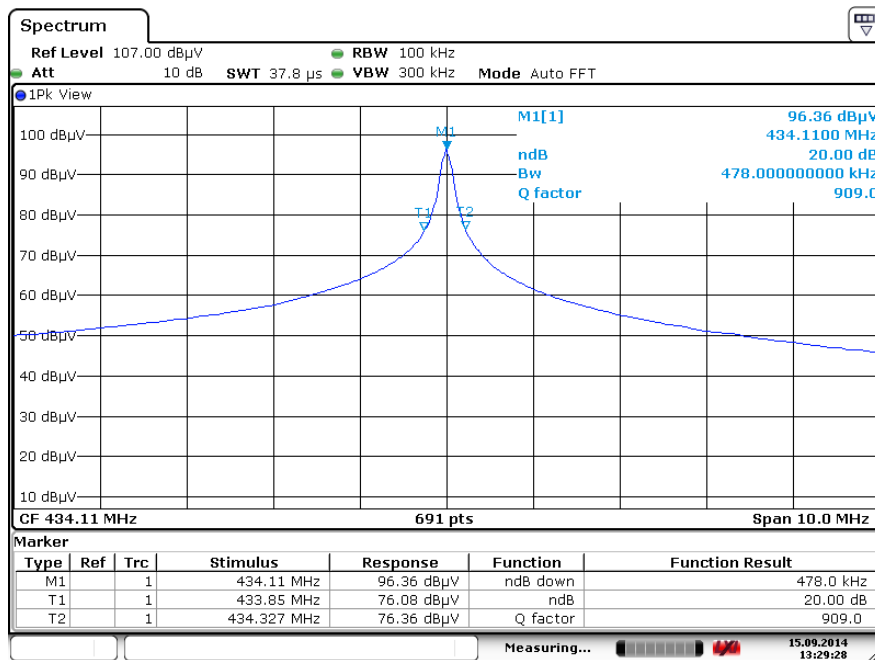
This manual will be provided to the end-user with each unit sold/leased in the United States and Canada.

8.0 Miscellaneous Information

The miscellaneous information includes details of the test procedure and measured bandwidth / calculation of factor such as pulse desensitization and averaging factor (calculation and timing diagram).

8.1 Measured Bandwidth

This plot shows the fundamental emission when modulated. From the plot, the bandwidth is observed to be 478kHz, at 20dBc where the bandwidth limit is 1085.1kHz. It fulfils the requirement of 15.231(c).



8.2 Discussion of Pulse Desensitization

Pulse desensitivity is not applicable for this device. The effective period (Teff) is approximately 0.2899ms for a digital "1" bit which illustrated on technical specification, with a resolution bandwidth (3dB) of 100kHz, so the pulse desensitivity factor is 0dB.

8.3 Calculation of Average Factor

The duty cycle is simply the on-time divided by the period:

The duration of one cycle = 100ms

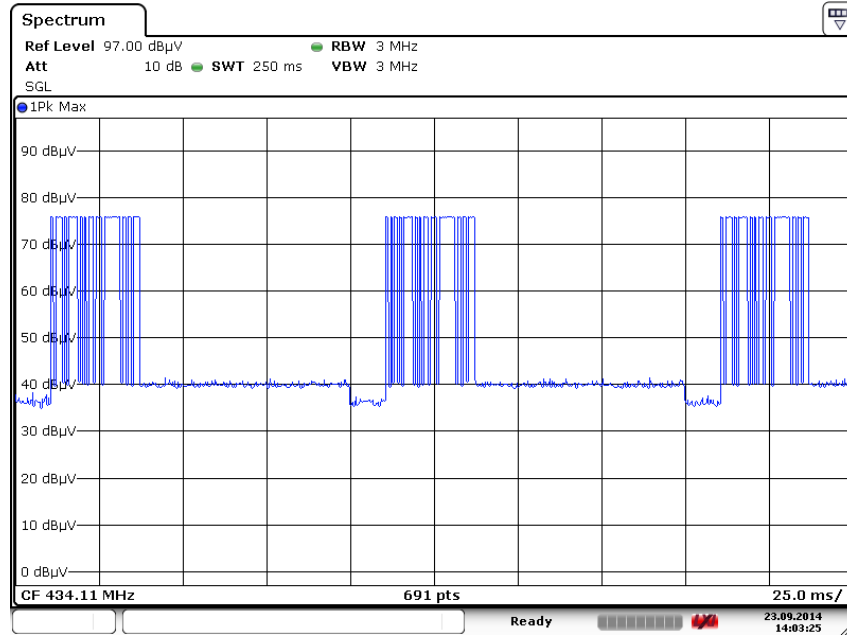
Effective period of the cycle = $0.6522 \times 16 + 0.3623 \times 5 + 0.2899 \times 4 = 13.406\text{ms}$

DC = $13.406 / 100 = 0.1341$

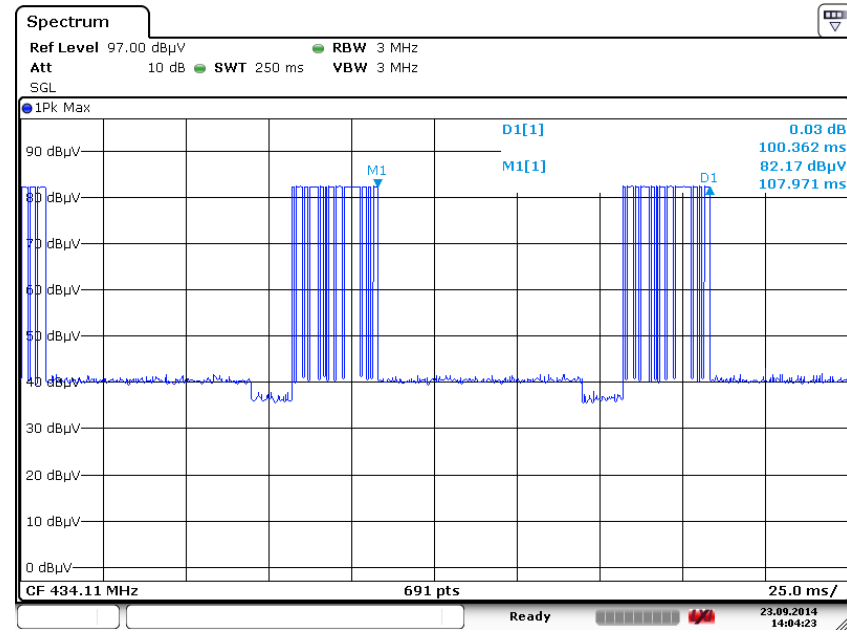
Therefore, the averaging factor is found by $20 \log 0.1341 = -17.45\text{dB}$.



Valued Quality. Delivered.



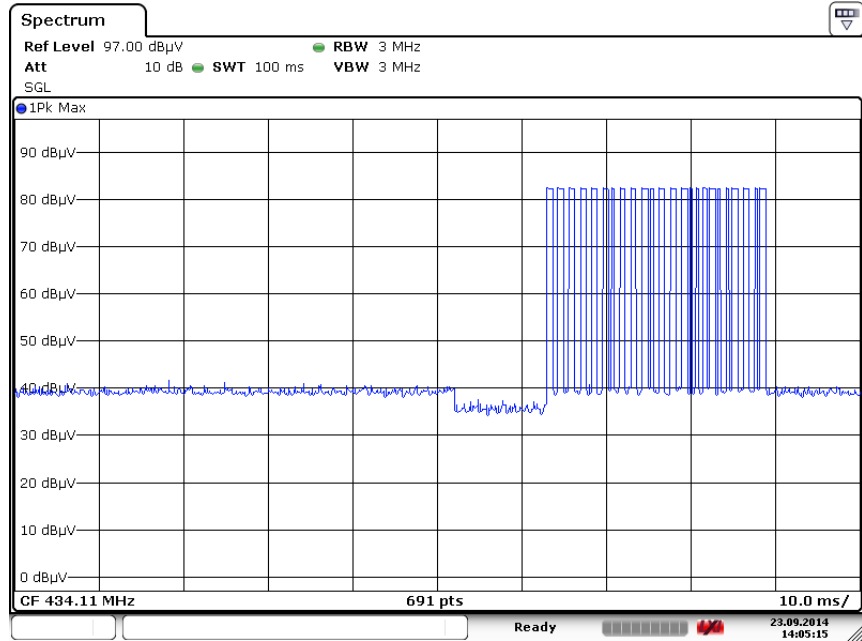
Date: 23.SEP.2014 14:03:26



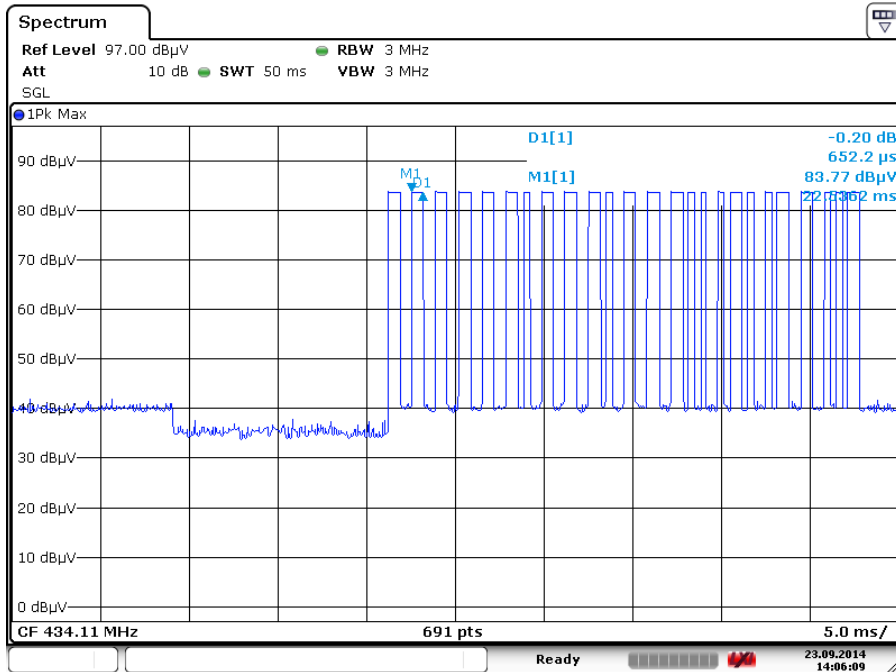
Date: 23.SEP.2014 14:04:22

Report No.: 14081210HKG-001
FCC ID: VLJ-T200T
IC: 4522A-T200T

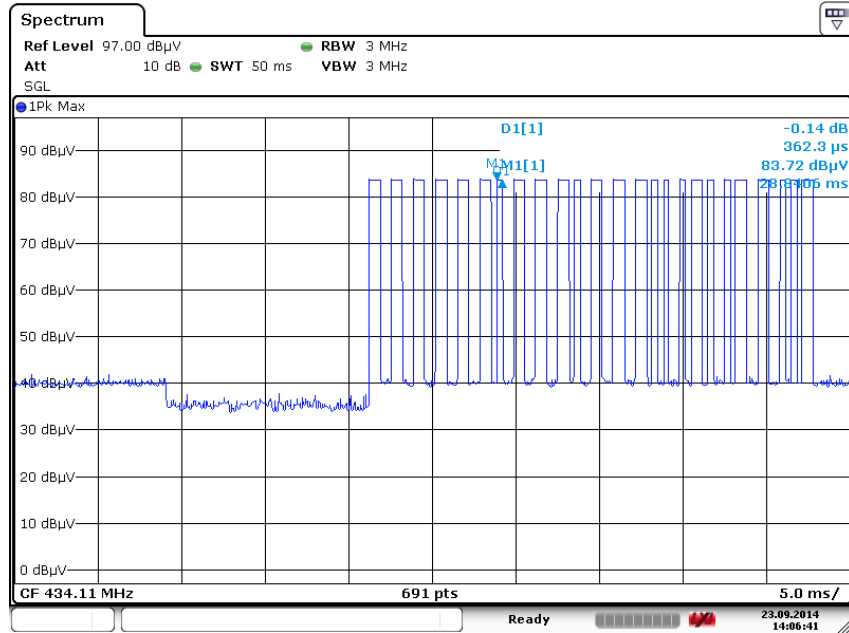
10



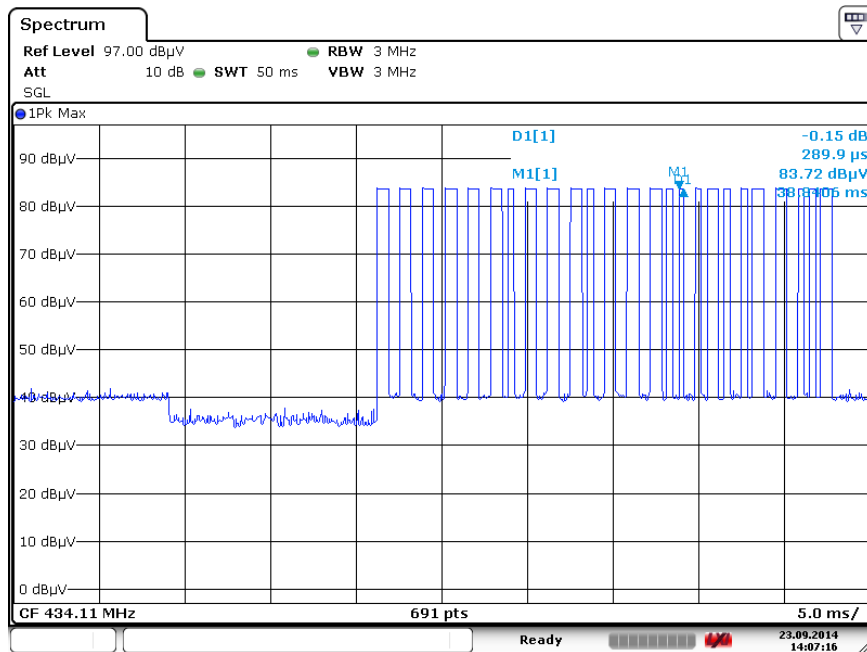
Date: 23.SEP.2014 14:05:15



Date: 23.SEP.2014 14:06:10



Date: 23.SEP.2014 14:06:41

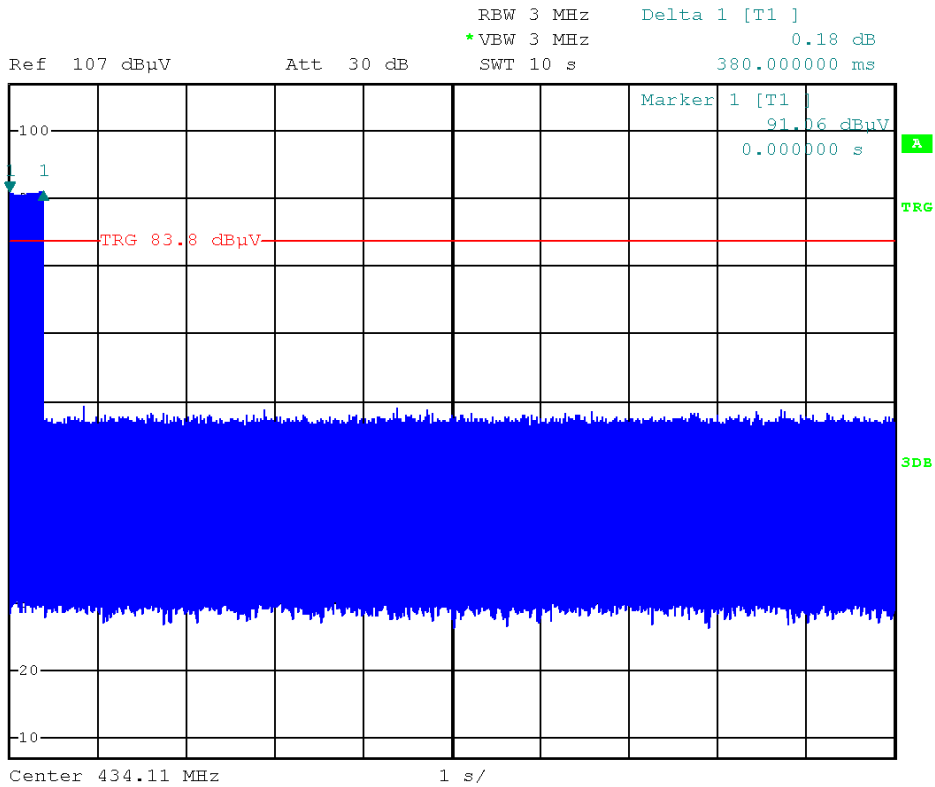


Date: 23.SEP.2014 14:07:16

Timing Plot – Pursuant to FCC part15 Section 15.231(a)



Valued Quality. Delivered.



Date: 3.NOV.2014 12:17:17

Time Restriction =380.0ms

Result : The emission was found to cease within 5 seconds after key release.

Comment: Pass



Valued Quality. Delivered.

8.4 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services Hong Kong Ltd. in the measurements of transmitter operating under the Part 15, Subpart C rules.

The transmitting equipment under test (EUT) is placed on a wooden turntable which is four feet in diameter and approximately one meter in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The EUT is adjusted through all three orthogonal axis to obtain maximum emission levels. The antenna height and polarization are also varied during the testing to search for maximum signal levels. The height of the antenna is varied from one to four meters.

Detector function for radiated emissions is in peak mode. Average readings, when required, are taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings. A detailed description for the calculation of the average factor can be found in Exhibit 8.3.

The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower.



Valued Quality. Delivered.

8.4 Emissions Test Procedures (cont'd)

The EUT is warmed up for 15 minutes prior to the test.

The IF bandwidth used for measurement of radiated signal strength was 100 kHz or greater when frequency is below 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. A discussion of whether pulse desensitivity is applicable to this unit is included in this report (See Exhibit 8.1). Above 1000 MHz, a resolution bandwidth of 1 MHz is used.

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the forbidden bands and above 1 GHz, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, unless otherwise reported. Measurements taken at a closer distance are so marked.



Valued Quality. Delivered.

9.0 Equipment List

1) Radiated Emissions Test

| Equipment | EMI Test Receiver | Biconical Antenna | Pyramidal Horn Antenna |
|----------------------|-------------------|-------------------|------------------------|
| Registration No. | SZ061-03 | SZ061-03 | SZ061-07 |
| Manufacturer | R&S | ETS | ETS |
| Model No. | ESCI | 3142C | 3160-09 |
| Calibration Date | Mar. 10, 2014 | Jun. 28, 2014 | Sep. 03, 2014 |
| Calibration Due Date | Mar. 10, 2015 | Jun. 28, 2015 | Sep. 03, 2015 |

| Equipment | Spectrum Analyzer | Active Loop Antenna | Horn Antenna |
|----------------------|-------------------|---------------------|---------------|
| Registration No. | SZ056-03 | SZ061-06 | SZ061-08 |
| Manufacturer | R&S | Electro-Metric | ETS |
| Model No. | FSV 40 | EM-6876 | 3115 |
| Calibration Date | Jun. 09, 2014 | May 13, 2014 | Oct. 26, 2013 |
| Calibration Due Date | Jun. 09, 2015 | May. 15, 2015 | Oct. 26, 2014 |

2) Bandwidth Measurement

| Equipment | Spectrum Analyzer |
|----------------------|-------------------|
| Registration No. | SZ056-03 |
| Manufacturer | R&S |
| Model No. | FSV 40 |
| Calibration Date | Jun. 09, 2014 |
| Calibration Due Date | Jun. 09, 2015 |

END OF TEST REPORT