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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:

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Date: October 27, 2014

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GENERAL INFORMATION

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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

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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 excepted variations in temperature and supply voltage were considered.

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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.

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.

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

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



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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

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.

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.



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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.

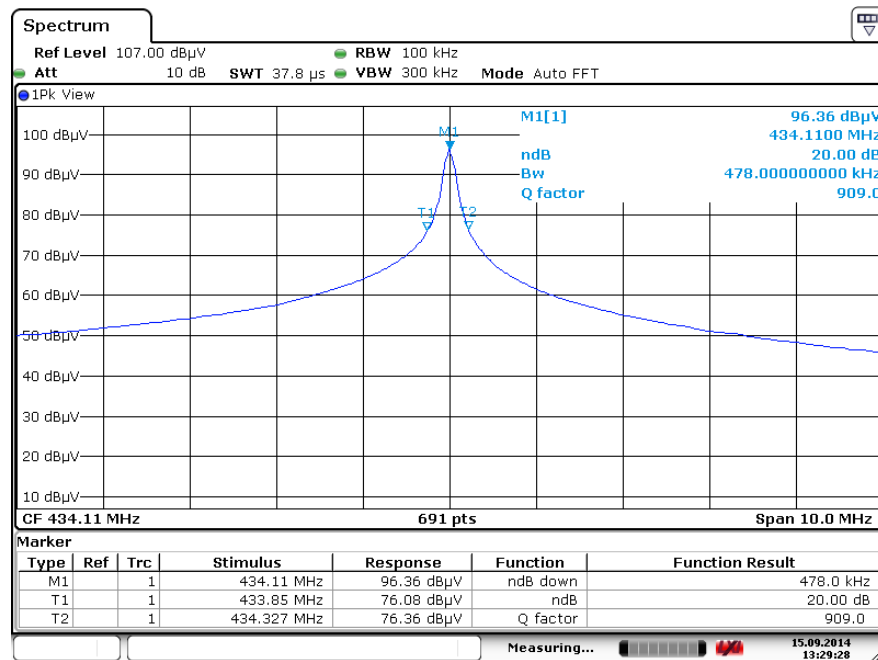
This manual will be provided to the end-user with each unit sold/leased in the United States and Canada.

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

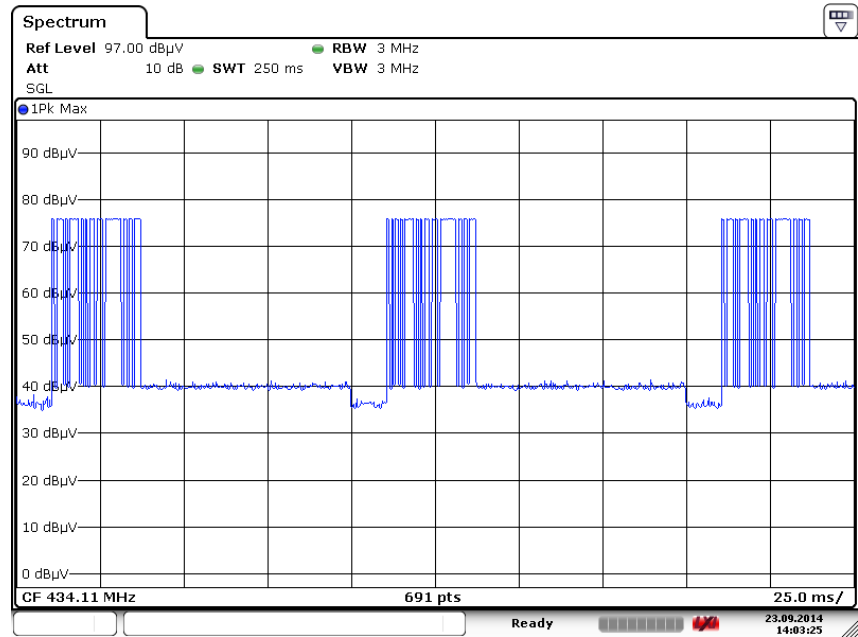
The duty cycle is simply the on-time divided by the period:

The duration of one cycle = 100ms

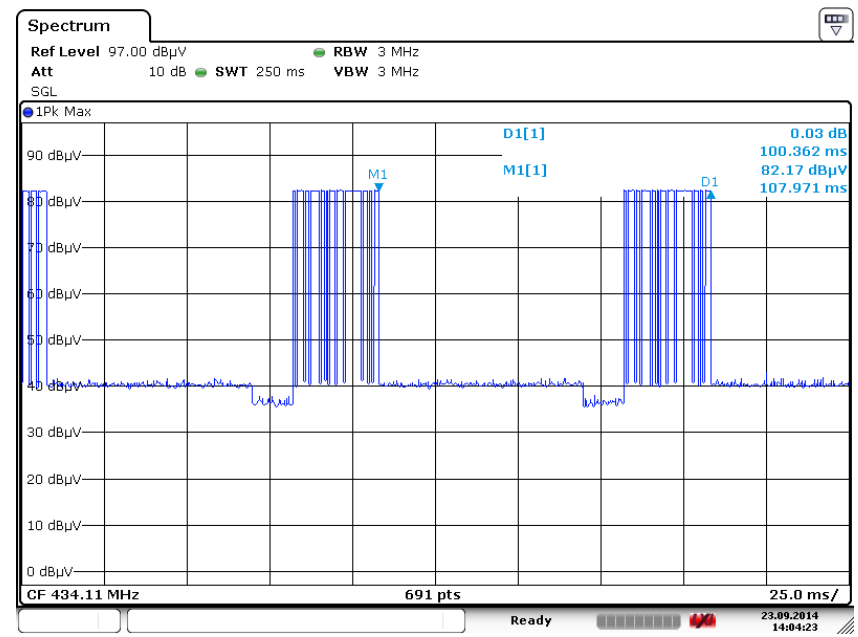
Effective period of the cycle = $0.6522 \times 16 + 0.3623 \times 5 + 0.2899 \times 4 = 13.406\text{ms}$

DC = $13.406/100 = 0.1341$

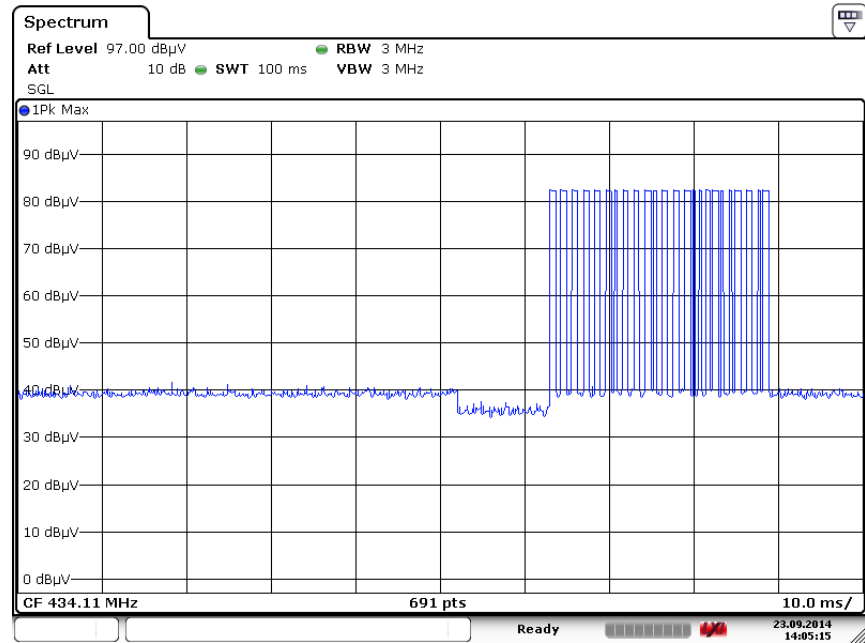
Therefore, the averaging factor is found by $20\log 0.1341 = -17.45\text{dB}$.



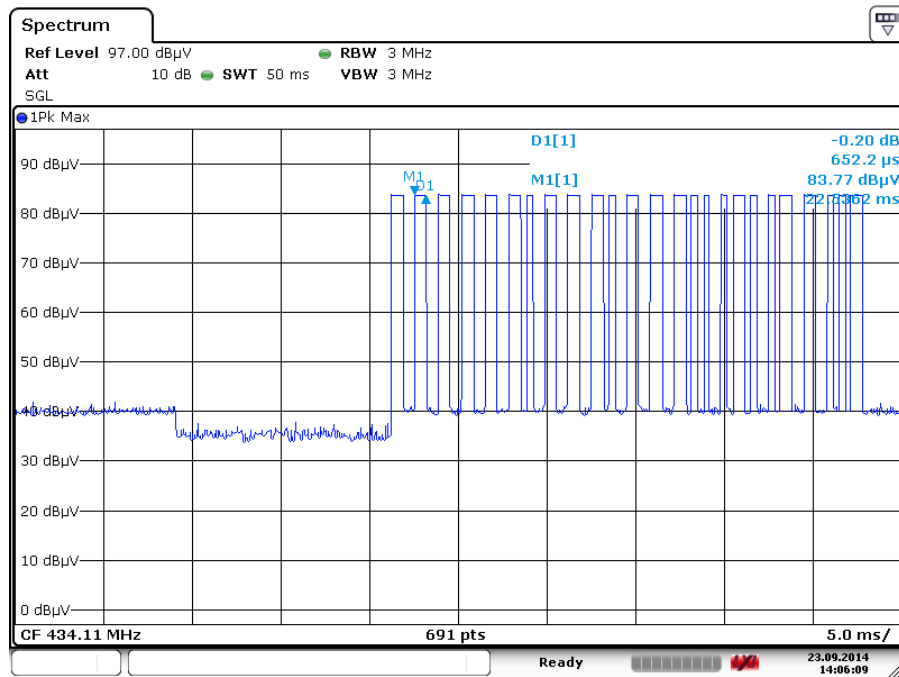
Date: 23.SEP.2014 14:03:26



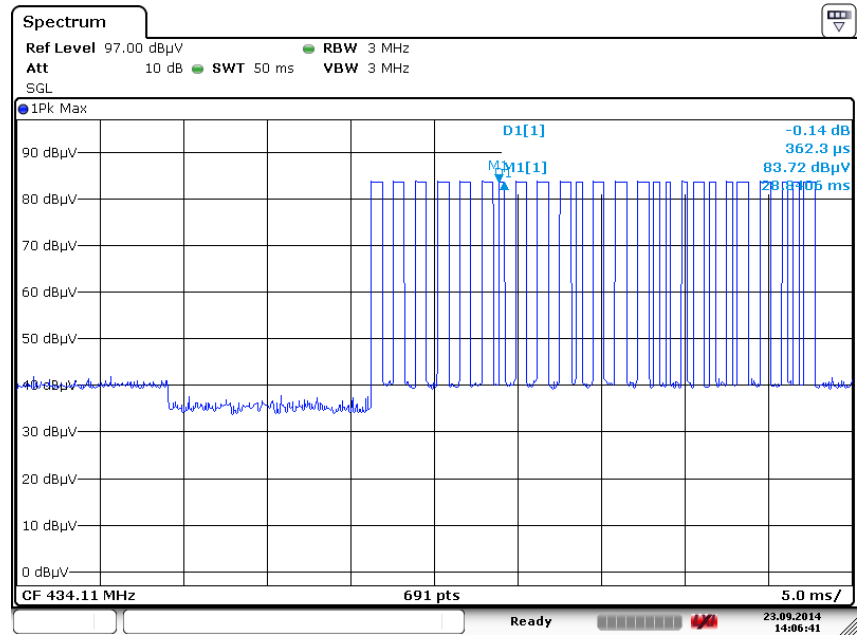
Date: 23.SEP.2014 14:04:22



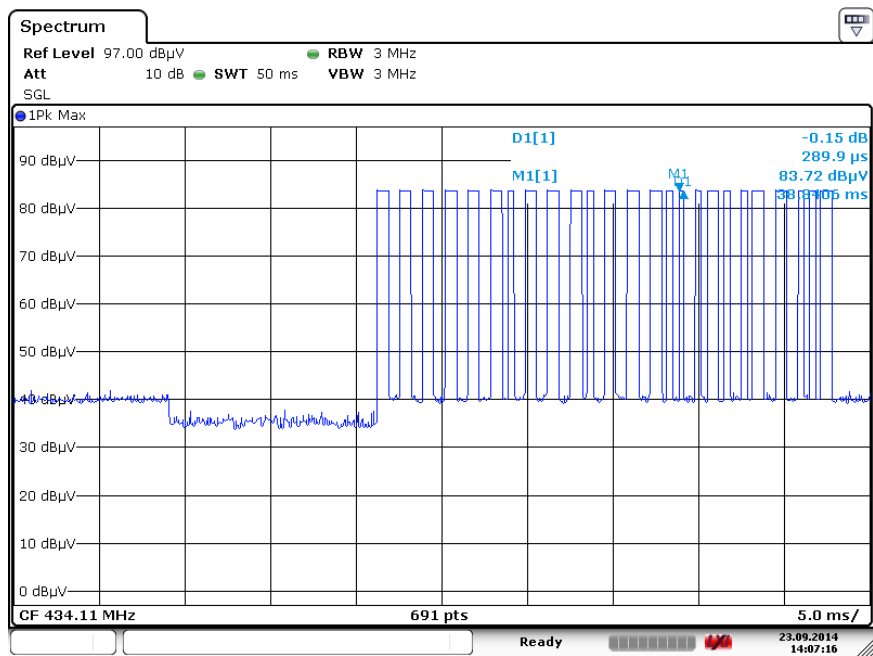
Date: 23.SEP.2014 14:05:15



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

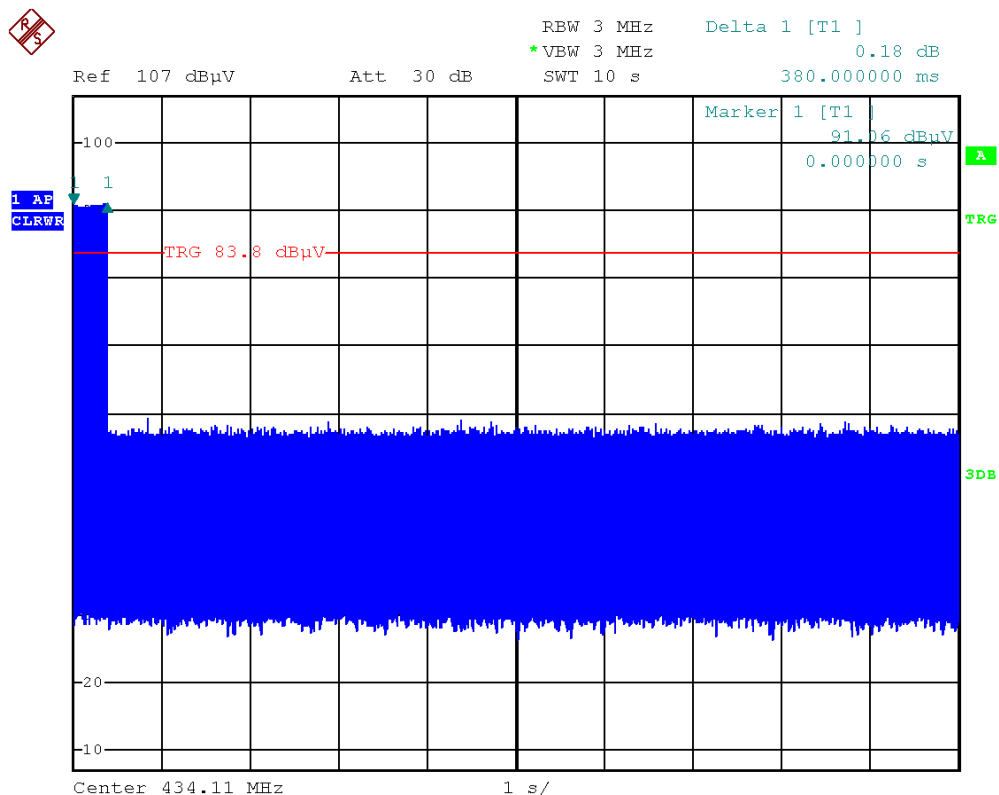


Date: 23.SEP.2014 14:06:41



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

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



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

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.

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.

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