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TEST REPORT

Report No.: 13051881HKG-009

Liricco Technologies Limited

Application
For
Certification
(Original Grant)
(FCC ID: 2ABAV0103001)
(IC: 11561A-0103001)

Transceiver

Prepared and Checked by:

Approved by:

Chan Kwan Ho, Alex
Assistant Engineer

Chan Chi Hung, Terry
Supervisor
Date: January 15, 2014

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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-etlsemko.com



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GENERAL INFORMATION

Liricco Technologies Limited
BRAND NAME: Valta v-Hub
MODEL: 0103001011, 0103001012, 0103001013
FCC ID: 2ABAV0103001
IC: 11561A-0103001

Grantee:	Liricco Technologies Limited
Grantee Address:	Rm. 213, 2/F., Enterprise Place, Hong Kong Science Park, Shatin, New Territories, Hong Kong.
Contact Person:	Angela Ng
Tel:	(852) 26903691
Fax:	(852) 26903693
e-mail:	angela.ng@liricco.com
Manufacturer:	Dongguan Richtek Electronics Co., Ltd
Manufacturer Address:	508, Bldg.4, Tech Innovation Park, Songshan Lake National Hi-Tech Industrial Development Zone, Dongguan, Guangdong 523808, China.
Brand Name:	Valta v-Hub
Model:	0103001011, 0103001012, 0103001013
Type of EUT:	Transceiver
Description of EUT:	Valta v-Hub
Serial Number:	N/A
FCC ID / IC:	2ABAV0103001 / 11561A-0103001
Date of Sample Submitted:	Oct 21, 2013
Date of Test:	Oct 29, 2013 to December 04, 2013
Report No.:	13051881HKG-009
Report Date:	January 13, 2014
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%

Report No.: 13051881HKG-009

FCC ID: 2ABAV0103001

IC: 11561A-0103001

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SUMMARY OF TEST RESULT

Liricco Technologies Limited
BRAND NAME: Valta v-Hub
MODEL: 0103001011, 0103001012, 0103001013
FCC ID: 2ABAV0103001
IC: 11561A-0103001

TEST SPECIFICATION	REFERENCE	RESULTS
Transmitter Power Line Conducted Emissions	15.207 / RSS-Gen 7.2.4	Pass
Transmitter Field Strength and Bandwidth Requirement	15.249 / RSS-210 A2.9	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.

Report No.: 13051881HKG-009
FCC ID: 2ABAV0103001
IC: 11561A-0103001

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1.0 **General Description**

1.1 Product Description

The Equipment Under Test (EUT) is transceiver and it is a control hub for the control corresponding transceiver (i.e. RF socket). The EUT operates in the frequency is 921.250MHz (single channel). The EUT is powered by an external AC/DC adaptor (Model: FLD052-0501000-UV, Input: 100-240VAC, Output: 5.0VDC, 1.0A).

When the EUT is powered on, the red LED will light on accordingly. The blue LED that indicates LAN data transmission. The corresponding RF socket will search and connect with the EUT for communication.

The Model: 0103001012 and 0103001013 are the same as the Model: 0103001011 in hardware aspect except different color. The difference in model number serves as marketing strategy.

Antenna Type : Internal, Integral

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

1.2 Related Submittal(s) Grants

This is a single application for certification of a transceiver.

The Certification procedure of transceiver (Valta Socket) (with FCC ID: 2ABAV0203001 and IC: 11561A-0203001) for this transceiver (Valta v-Hub) is being processed as the same time of this application.

The Verification procedure of the receiver portion for this transceiver is being processed as the same time for this application.



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1.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2009). All radiated measurements were performed in an Open Area Test Site. Preliminary scans were performed in the Open Area Test Site only 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 open area test site and conducted measurement facility used to collect the radiated data is located at Garment Centre, 576 Castle Peak Road, Kowloon, Hong Kong. This test facility and site measurement data have been placed on file with the FCC and IC.

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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 AC/DC adaptor (Model: FLD052-0501000-UV, Input: 100-240VAC, Output: 5.0VDC, 1.0A).

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 rear of unit shall be flushed with the rear of the table.

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.

2.3 Special Accessories

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



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2.4 Equipment Modification

Any modifications installed previous to testing by Liricco Technologies Limited will be incorporated in each production model sold/leased in the United States and Canada.

No modifications were installed by Intertek Testing Services Hong Kong Ltd.

2.5 Measurement Uncertainty

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

2.6 Support Equipment List and Description

1 X LAN Cable of 1m long (Provided by Intertek)

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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.

$RA = 52.0$ dB μ V/m	
$AF = 7.4$ dB	$RR = 18.0$ dB μ V
$CF = 1.6$ dB	$LF = 9.0$ dB
$AG = 29.0$ dB	
$AV = 5.0$ dB	
$FS = RR + LF$	
$FS = 18 + 9 = 27$ dB μ V/m	

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

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3.2 Radiated Emission Configuration Photograph

The worst case in radiated emission was found at 921.250 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 1.5 dB

3.4 Conducted Emission Configuration Photograph

The worst case in line-conducted emission was found at 0.150 MHz

For electronic filing, the worst case line-conducted configuration photographs are saved with filename: conducted photo.pdf.

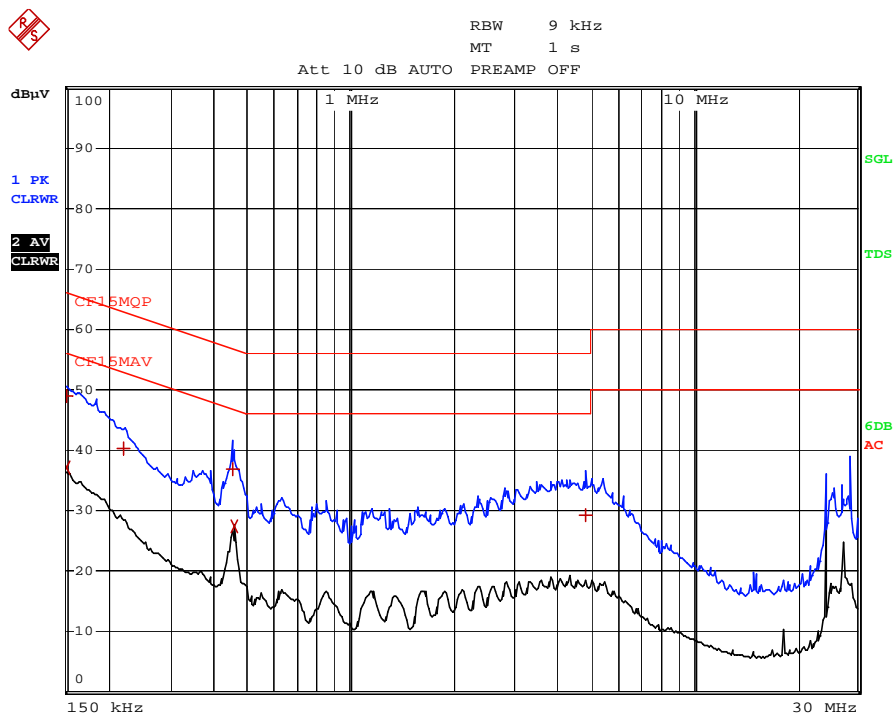
3.5 Conducted Emission Data

For the graph and data table of conducted emission is shown as below;

Judgment: Pass by 17.05 dB

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EDIT PEAK LIST (Final Measurement Results)				
Trace1:	CF15MQP			
Trace2:	CF15MAV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL dBμV	DELTA LIMIT dB	
1 Quasi Peak	150 kHz	48.94 L1 gnd	-17.05	
2 CISPR Average	150 kHz	37.02 L1 gnd	-18.97	
1 Quasi Peak	222 kHz	40.40 L1 gnd	-22.33	
1 Quasi Peak	451.5 kHz	36.93 N gnd	-19.91	
2 CISPR Average	456 kHz	27.54 N gnd	-19.22	
1 Quasi Peak	4.857 MHz	29.16 N gnd	-26.83	

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Applicant: Liricco Technologies Limited
Model: 0103001011
Worst-Case Operating Mode: Transmitting

Date of Test: December 04, 2013

Table 1
Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBμV/m)	Average Factor (dB)	Calculated at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
H	921.250	75.5	16	33.0	92.5	--	92.5	94.0	-1.5

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBμV/m)	Average Factor (dB)	Calculated at 3m (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
H	1842.500	54.3	33	27.2	48.5	14.1	34.4	54.0	-19.6
H	2763.750	46.8	33	30.4	44.2	14.1	30.1	54.0	-23.9
H	3685.000	44.7	33	33.3	45.0	14.1	30.9	54.0	-23.1
H	4606.250	56.9	33	34.9	58.8	14.1	44.7	54.0	-9.3
H	5527.500	41.1	33	36.6	44.7	14.1	30.6	54.0	-23.4
H	6448.750	28.3	33	36.9	46.3	14.1	32.2	54.0	-21.8
H	7370.000	41.0	33	37.9	60.0	14.1	45.9	54.0	-8.1
V	8291.250	35.5	33	39.0	55.6	14.1	41.5	54.0	-12.5
H	9212.500	25.7	33	40.4	47.2	14.1	33.1	54.0	-20.9

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
H	1842.500	54.3	33	27.2	48.5	74.0	-25.5
H	2763.750	46.8	33	30.4	44.2	74.0	-29.8
H	3685.000	44.7	33	33.3	45.0	74.0	-29.0
H	4606.250	56.9	33	34.9	58.8	74.0	-15.2
H	5527.500	41.1	33	36.6	44.7	74.0	-29.3
H	6448.750	42.4	33	36.9	46.3	74.0	-27.7
H	7370.000	55.1	33	37.9	60.0	74.0	-14.0
V	8291.250	49.6	33	39.0	55.6	74.0	-18.4
H	9212.500	39.8	33	40.4	47.2	74.0	-26.8



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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.



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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 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.



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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).

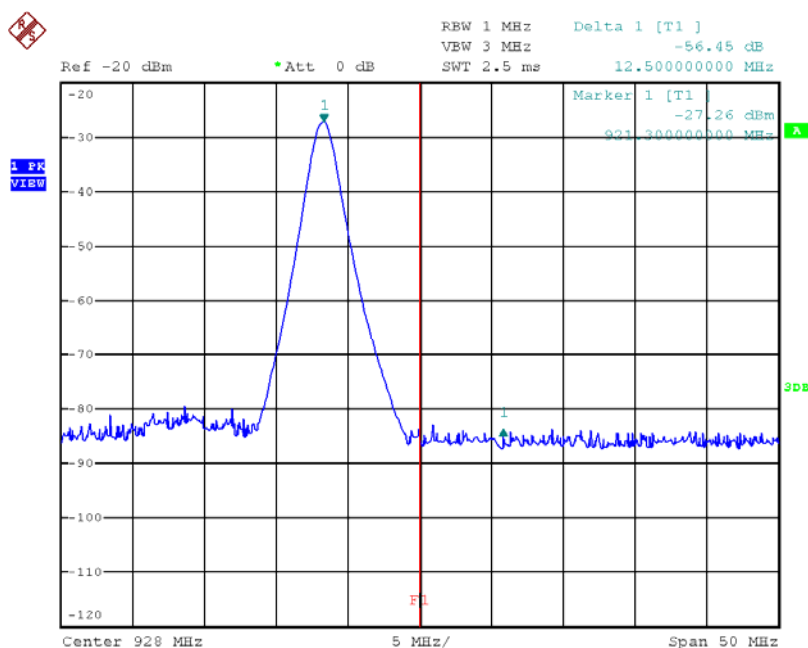
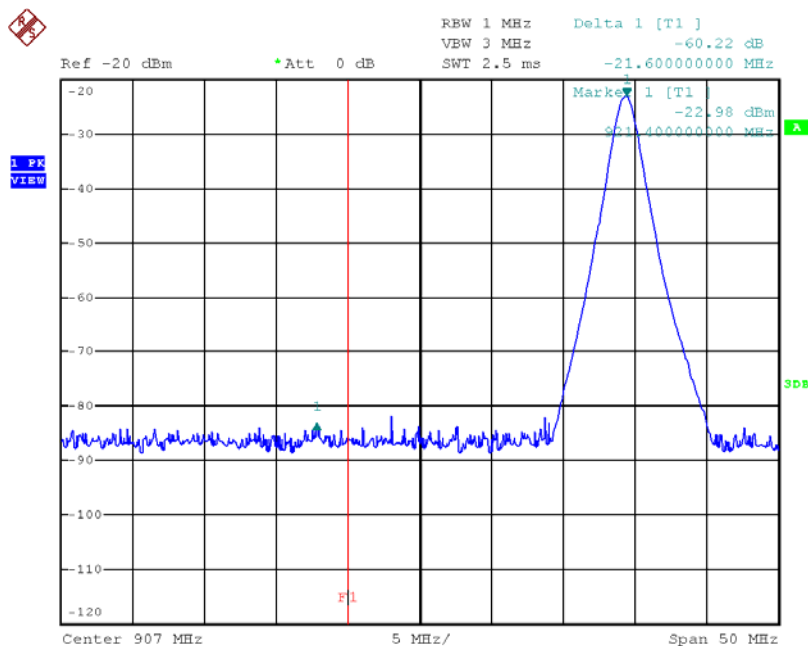
8.1 Measured Bandwidth

From the following plots, they show that the fundamental emissions are confined in the specified band (902MHz and 928MHz). In case of the fundamental emissions are within two standard bandwidths from the bandedge, the delta measurement technique is used for determining bandedge compliance. Standard bandwidth is the bandwidth specified by ANSI C63.4 (2009) for frequency being measured.

Emissions radiated outside of the specified frequency bands, except harmonics, are attenuated by 50dB below the level of the fundamental or to the general radiated emissions limits in Section 15.209, whichever is the lesser attenuation, which meet the requirement of part 15.249(d).

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8.2 Discussion of Pulse Desensitization

The effective period (T_{eff}) is approximately 19.65ms for a digital “1” bit which illustrated on technical specification, with a resolution bandwidth (3dB) of 1MHz, so the pulse desensitization 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

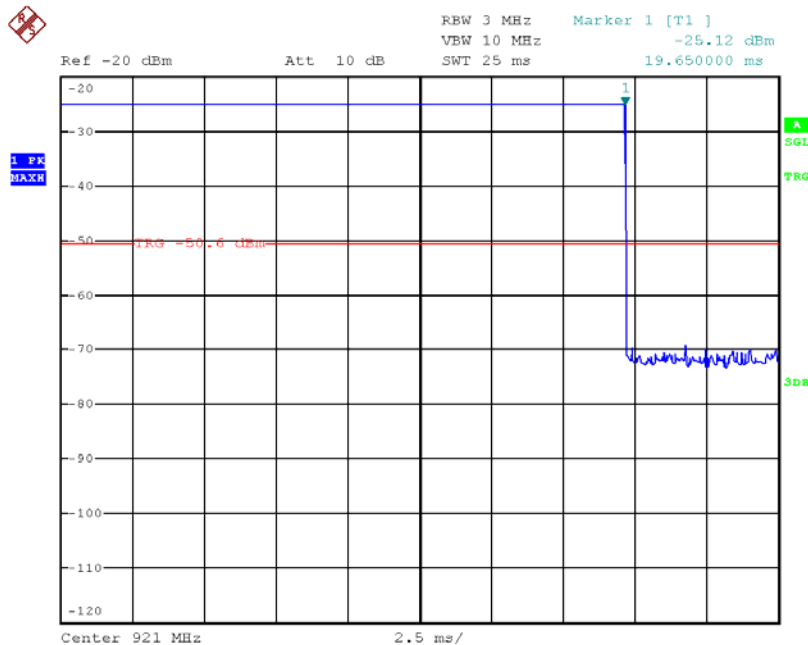
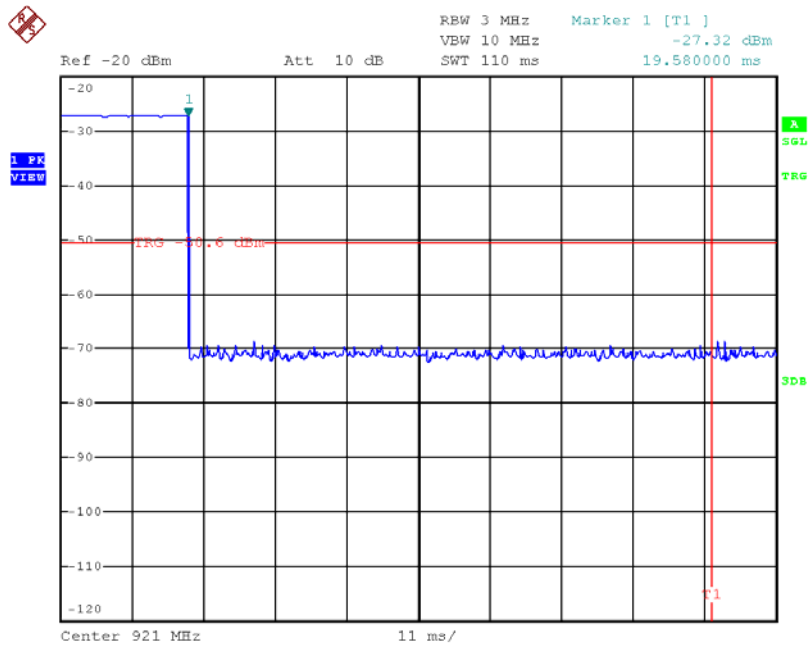
Effective period of the cycle = 19.65ms

$DC = 19.65 / 100ms = 0.1965$

Therefore, the averaging factor is found by $20\log 0.1965 = -14.1dB$.

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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. For line conducted emissions, the range scanned is 150 kHz to 30 MHz.

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8.4 Emissions Test Procedures (cont'd)

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

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

Conducted measurements were made as described in ANSI C63.4 (2009).

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 **Confidentiality Request**

For electronic filing, a preliminary copy of the confidentiality request is saved with filename: request.pdf.

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10.0 Equipment List

1) Radiated Emissions Test

Equipment	EMI Test Receiver	Biconical Antenna	Log Periodic Antenna
Registration No.	EW-2500	EW-0954	EW-0447
Manufacturer	R&S	EMCO	EMCO
Model No.	ESCI	3104C	3146
Calibration Date	Mar. 22, 2013	Apr. 30, 2013	Aug. 19, 2013
Calibration Due Date	Feb. 28, 2014	Oct. 30, 2014	Feb. 19, 2015

Equipment	Spectrum Analyzer	Double Ridged Guide Antenna
Registration No.	EW-2253	EW-1133
Manufacturer	R&S	EMCO
Model No.	FSP40	3115
Calibration Date	Apr. 24, 2013	Oct. 05, 2012
Calibration Due Date	Apr. 24, 2014	Apr. 05, 2014

2) Conducted Emissions Test

Equipment	EMI Test Receiver	LISN
Registration No.	EW-2500	EW-2874
Manufacturer	R&S	R&S
Model No.	ESCI	ENV-216
Calibration Date	Mar. 22, 2013	Oct. 17, 2013
Calibration Due Date	Feb. 28, 2014	Aug. 17, 2014

3) Bandedge Measurement

Equipment	Spectrum Analyzer
Registration No.	EW-2249
Manufacturer	R&S
Model No.	FSP30
Calibration Date	Oct. 28, 2013
Calibration Due Date	Oct. 28, 2014