Issuing Laboratory:
Intertek Testing Services Hong Kong Limited

Hong Kong Accreditation Service (HKAS) has accredited this laboratory under the Hong Kong Laboratory Accreditation Scheme (HOKLAS) for specific laboratory activities as listed in the HOKLAS directory of accredited laboratories. The results shown in this report were determined by this laboratory in accordance with its terms of accreditation.

HOKLAS 005
TEST

TEST REPORT

Report No.: 13031420HKG-001

Musical Electronics Ltd.

Application
For
Certification
(Original Grant)
(FCC ID: AUI3300281T)

Transmitter

Prepared and Checked by:

Lee Shui Tim, Tim
Assistant Engineer

Approved by:

Chan Chi Hung, Terry
Assistant Supervisor
Date: May 24, 2013

GENERAL INFORMATION

Musical Electronics Ltd.
BRAND NAME: AUVIO, MODEL: 3300281

FCC ID: AUI3300281T

Grantee:	Musical Electronics Ltd.
Grantee Address:	Flat H,J,K, 12/F., WorldTech Center, 95 How Ming Street, Kwun Tong, Kowloon, Hong Kong.
Contact Person:	Jin Liu
Tel:	852-2341 9281 ext 173
Fax:	N/A
e-mail:	N/A
Manufacturer:	Musical Electronics (Qing Yuan) Limited
Manufacturer Address:	Tai He Industrial Park, Qing Xin County, Qing Yuan, Guang Dong, China.
Brand Name:	AUVIO
Model:	3300281
Type of EUT:	Transmitter
Description of EUT:	Wireless Stereo Headphones
Serial Number:	N/A
FCC ID:	AUI3300281T
Remarks:	SKU version (F version)
Date of Sample Submitted:	March 28, 2013
Date of Test:	April 30, 2013
Report No.:	13031420HKG-001
Report Date:	May 24, 2013
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%

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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SUMMARY OF TEST RESULT

Musical Electronics Ltd.
BRAND NAME: AUVIO, MODEL: 3300281

FCC ID: AUI3300281T

TEST SPECIFICATION	REFERENCE	RESULTS
Transmitter Power Line Conducted Emissions	15.207	Pass
Transmitter Field Strength and Bandwidth Requirement	15.249	Pass
Digital Device Radiated Emissions	15.109	Pass

The equipment under test is found to be complying with the following standards:
FCC Part 15, October 1, 2011 Edition

Note: 1. The EUT uses a permanently attached antenna which, in accordance to section 15.203, is considered sufficient to comply with the pervisions 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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Table of Contents

1.0 General Description

1.1 Product Description

The Equipment Under Test (EUT) is a 900MHz stereo wireless transmitter for it corresponding headphone and using two discrete (left and right channel) radio carriers rather than the conventional FM multiplex system. Transmit carriers are generated by two VCO and controlled by a microprocessor. The operating frequencies are 911.400MHz and 915.600MHz for Left and Right channel respectively.

It is powered by an AC/DC adaptor (Model: U120025D, Input: 120VAC, Output: 12VDC, 250mA). The unit can be activated at the back of the unit. At the same time the power on LED (red colour) in front of the unit will be lighted.

Antenna Type : Internal, Integral

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

1.2 Related Submittal(s) Grants

The receiver for this transmitter (with FCC ID: AAO330281R) has been authorized by Certification procedure.

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.

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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: SJB1200200PU, Input: 100-240VAC 50/60Hz 300mA, Output: 12VDC 200mA).

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.

2.4 Equipment Modification

Any modifications installed previous to testing by Musical Electronics Ltd. will be incorporated in each production model sold/leased in the United States.

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. iPod (Provided by Intertek)
2. Associate Headphone (Provided by Applicant)
3. 91.4cm RCA cable (Provided by Applicant)

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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 dBµV/m
RA = Receiver Amplitude (including preamplifier) in dBµV
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 dBµV/m
RR = RA - AG - AV in dBµV
LF = CF + AF in dB

Assume a receiver reading of 52.0 dBµV 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 dBµV/m. This value in dBµV/m was converted to its corresponding level in µV/m.

RA = 52.0 dBµV/m
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
AV = 5.0 dB
FS = RR + LF
FS = 18 + 9 = 27 dBµV/m

RR = 18.0 dBµV
LF = 9.0 dB

Level in µV/m = Common Antilogarithm [(27 dBµV/m)/20] = 22.4 µV/m

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3.2 Radiated Emission Configuration Photograph

The worst case in radiated emission was found at 2734.000 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 1.7 dB

3.4 Conducted Emission Configuration Photograph

The worst case in line-conducted emission was found at 0.312 MHz

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

3.5 Conducted Emission Data

The graph and data table of conducted emission as shown.

Judgment: Pass by 20.9 dB

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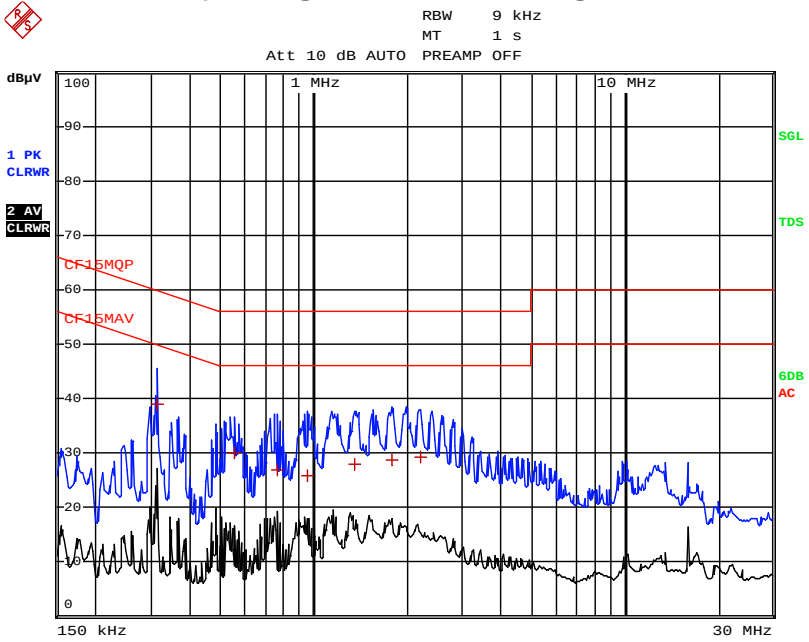
Applicant: Musical Electronics Ltd. Date of Test: April 30, 2013
Model: 3300281
Worst-Case Operating Mode: Transmitting



EDIT PEAK LIST (Final Measurement Results)

Trace1: CF15MQP
Trace2: CF15MAV
Trace3: ---

	TRACE	FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
1	Quasi Peak	312 kHz	39.02	L1	-20.89
1	Quasi Peak	555 kHz	29.96	L1	-26.03
1	Quasi Peak	762 kHz	26.85	L1	-29.14
1	Quasi Peak	951 kHz	25.80	L1	-30.19
1	Quasi Peak	1.3515 MHz	27.90	L1	-28.09
1	Quasi Peak	1.7835 MHz	28.73	L1	-27.26
1	Quasi Peak	2.2155 MHz	29.18	L1	-26.82

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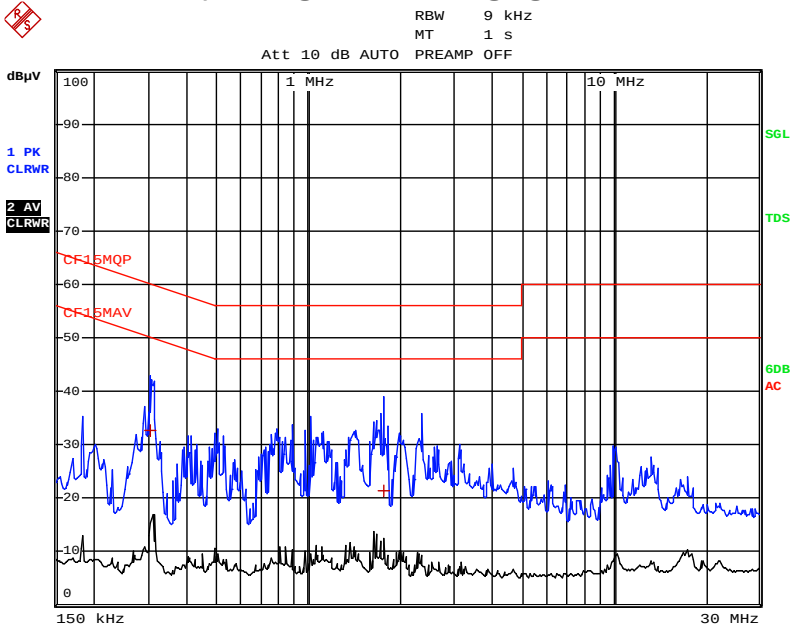
Applicant: Musical Electronics Ltd. Date of Test: April 30, 2013
Model: 3300281
Worst-Case Operating Mode: Charging



EDIT PEAK LIST (Final Measurement Results)

Trace1: CF15MQP
Trace2: CF15MAV
Trace3: ---

TRACE		FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
1	Quasi Peak	303 kHz	32.61	L1	-27.54
1	Quasi Peak	1.77 MHz	21.31	N	-34.68

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Applicant: Musical Electronics Ltd. Date of Test: April 30, 2013
Model: 3300281
Worst-Case Operating Mode: Transmitting

Table 1

Radiated Emissions
Pursuant to FCC Part 15 Section 15.249 Requirement

Lowest Channel

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
V	911.400	71.6	16	33.0	88.6	94.0	-5.4
V	1822.800	56.4	33	27.2	50.6	54.0	-3.4
V	2734.200	54.9	33	30.4	52.3	54.0	-1.7
V	3645.600	50.6	33	33.3	50.9	54.0	-3.1
V	4557.000	43.7	33	34.9	45.6	54.0	-8.4
V	5468.400	43.5	33	35.7	46.2	54.0	-7.8
V	6379.800	41.4	33	36.9	45.3	54.0	-8.7

Highest Channel

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
V	915.600	71.9	16	33.0	88.9	94.0	-5.1
V	1831.200	56.3	33	27.2	50.5	54.0	-3.5
V	2746.800	54.9	33	30.4	52.3	54.0	-1.7
V	3662.400	50.5	33	33.3	50.8	54.0	-3.2
V	4578.000	43.9	33	34.9	45.8	54.0	-8.2
V	5493.600	43.6	33	35.7	46.3	54.0	-7.7
V	6409.200	41.4	33	36.9	45.3	54.0	-8.7

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.

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Applicant: Musical Electronics Ltd. Date of Test: April 30, 2013
Model: 3300281
Worst-Case Operating Mode: Charging

Table 2

Radiated Emissions
Pursuant to FCC Part 15 Section 15.109 Requirement

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
V	36.456	39.6	16	10.0	33.6	40.0	-6.4
V	72.654	42.5	16	7.0	33.5	40.0	-6.5
H	109.254	36.1	16	14.0	34.1	43.5	-9.4
H	145.638	36.0	16	14.0	34.0	43.5	-9.5
H	218.269	32.9	16	17.0	33.9	46.0	-12.1
H	280.347	27.4	16	22.0	33.4	46.0	-12.6

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.

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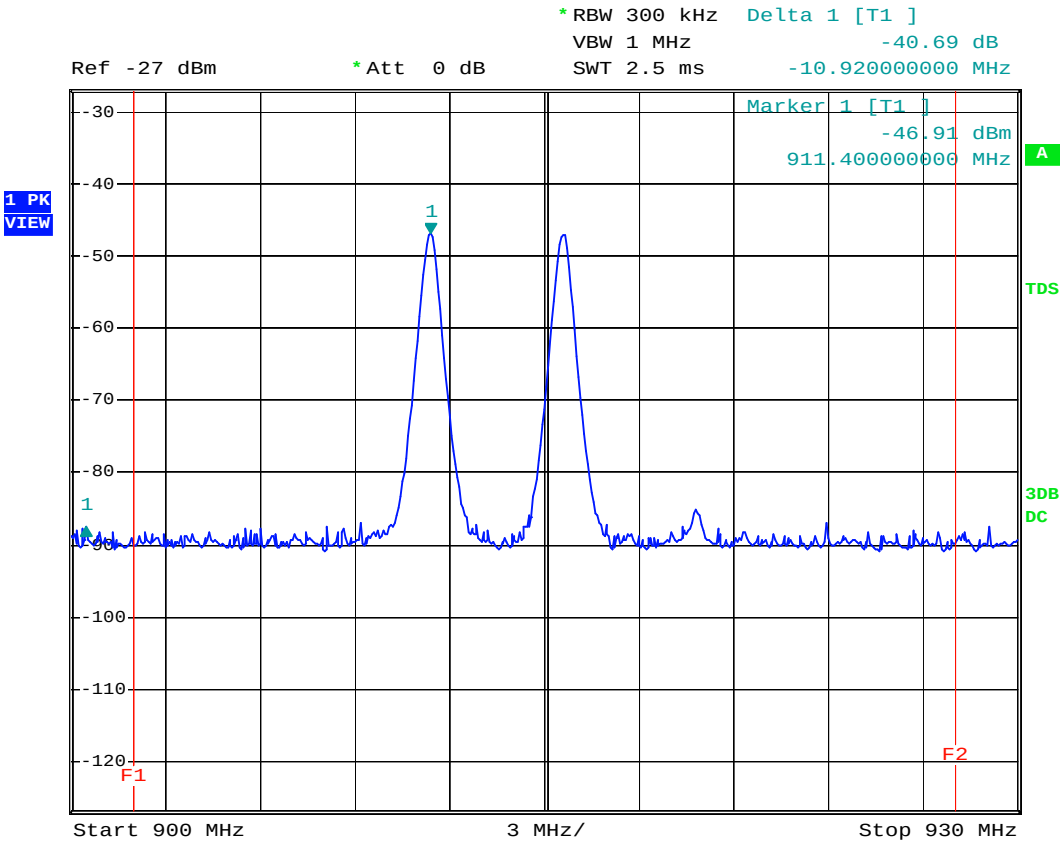
8.0 Miscellaneous Information

The miscellaneous information includes details of the test procedure and measured bandwidth.

8.1 Measured Bandwidth

The plot shows the fundamental emission which is applied audio input 1.5Vrms, 15kHz modulation. From the plot, it shows the emission is within the band edge 902MHz and 928MHz.



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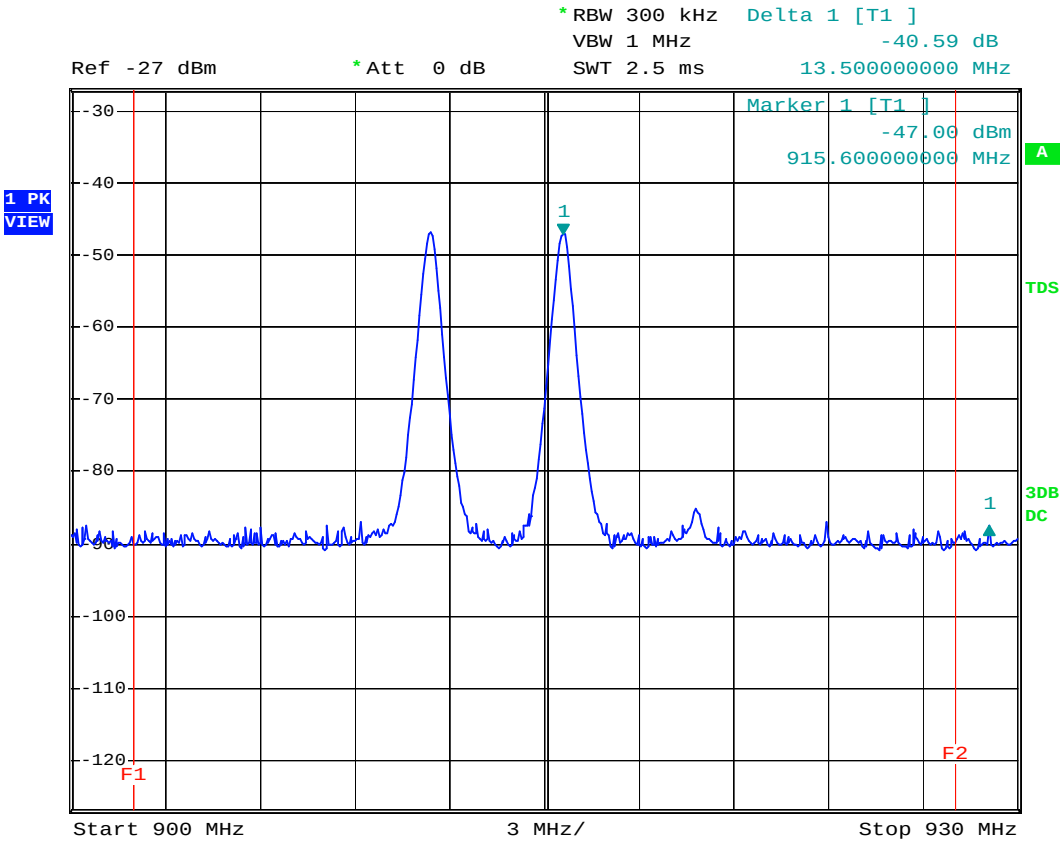

From the following plots, they show that the fundamental emissions are confined in the specified band (902MHz and 928MHz). In case of the fundamental emissions are within two standard bandwidths from the bandedge, the delta measurement technique is used for determining bandedge compliance. Standard bandwidth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

Bandedge compliance is determined by applying marker-delta method, i.e. (Bandedge Plot).

Lower bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

=88.6 dBµV/m - 40.7 dB
=47.9 dBµV/m

Upper bandedge

Peak Resultant field strength = Fundamental emissions (peak value) – delta from the plot

=88.9 dBµV/m - 40.6 dB
=48.3 dBµV/m

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 74 dBµV/m (Peak Limit) and 54 dBµV/m (Average Limit).

8.2 Discussion of Pulse Desensitization

Pulse desensitivity is not applicable for this device. The effective period (Teff) is approximately 6.25ms for a digital “1” bit which illustrated on technical specification, with a resolution bandwidth (3dB) of 1MHz, so the pulse desensitivity factor is 0dB.

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8.3 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 test set-up and procedures described below are designed to meet the requirements of ANSI C63.4 (2009). A typical or an unmodulated CW signal at the operating frequency of the EUT has been supplied to the EUT for all measurements. Such a signal is supplied by a signal generator and an antenna in close proximity to the EUT. The signal level is sufficient to stabilize the local oscillator of the EUT.

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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8.3 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	Spectrum Analyzer
Registration No.	EW-2666	EW-2188
Manufacturer	R&S	AGILENTTECH
Model No.	ESCI7	E4407B
Calibration Date	May 21, 2012	Nov. 05, 2012
Calibration Due Date	May 21, 2013	Nov. 05, 2013

Equipment	Biconical Antenna	Log Periodic Antenna
Registration No.	EW-2512	EW-0572
Manufacturer	EMCO	EMCO
Model No.	3104C	3146
Calibration Date	Nov. 15, 2011	Nov. 15, 2011
Calibration Due Date	May 15, 2013	May 15, 2013

2) Conducted Emissions Test

Equipment	EMI Test Receiver	LISN
Registration No.	EW-2666	EW-2874
Manufacturer	R&S	R&S
Model No.	ESCI7	ENV-216
Calibration Date	May 21, 2012	Aug. 15, 2012
Calibration Due Date	May 21, 2013	Aug. 15, 2013

3) Bandedge Measurement

Equipment	Spectrum Analyzer
Registration No.	EW-2249
Manufacturer	R&S
Model No.	FSP30
Calibration Date	Oct. 04, 2012
Calibration Due Date	Oct. 04, 2013

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