TEST REPORT

Report No.: 14041199HKG-001R1

Hallmark Cards, Inc.

Application
For
Certification
(Original Grant)
(FCC ID: SQ9XKT1412)
(IC: 5768A-XKT1412)

Transceiver

This report supersedes previous report with report number 14041199HKG-001 dated July 02, 2014, no application is required and no certificate will issue

Prepared and Checked by:	Approved by:
Signed On File	Digitally signed by Kenneth Wong Location: Intertek Testing Services Hong Kong Ltd.
Leung Sung Tak, Andy	Wong Kwok Yeung, Kenneth
Assistant Engineer	Lead Engineer
	Date: July 21, 2014

GENERAL INFORMATION

Grantee:	Hallmark Cards, Inc.
Grantee Address:	2501 McGee, MD166, PO Box 419580, Missouri, Kansas City, US
Contact Person:	Rick Schaff
Tel:	1-816-274-7213
Fax:	N/A
e-mail:	Rick.schaff@hallmark.com
Manufacturer:	Hallmark Cards Inc.
Manufacturer Address:	2501 McGee, MD166, PO Box 419580, Kansas City Missouri 64141 United States
Vendor:	Fowind
Brand Name:	Hallmark
Model:	XKT1412
Asst. No.:	XKT2424
Type of EUT:	Transceiver
Description of EUT:	Christmas Concert Snowmen: Continuity 4-Top star
Serial Number:	N/A
FCC ID / IC:	SQ9XKT1412 / 5768A-XKT1412
Date of Sample Submitted:	April 23, 2014
Date of Test:	April 23, 2014 to May 09, 2014
Report No.:	14041199HKG-001R1
Report Date:	July 21, 2014
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%

SUMMARY OF TEST RESULT

TEST SPECIFICATION	REFERENCE	RESULTS
Radiated Emission Radiated Emission on the Bandedge	15.249 / RSS-210 A2.9	Pass
Radiated Emission in Restricted Bands	15.205 / RSS-210 2.2	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 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.

Table of Contents

1.0 **General Description** 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 **System Test Configuration** 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 **Emission Results** 3
3.1 Field Strength Calculation 3
3.2 Radiated Emission Configuration Photograph 4
3.3 Radiated Emission Data 4

4.0 **Equipment Photographs** 8

5.0 **Product Labelling** 8

6.0 **Technical Specifications** 8

7.0 **Instruction Manual** 8

8.0 **Miscellaneous Information** 9
8.1 Radiated Emission on the Bandedge 9
8.2 Discussion of Pulse Desensitization 12
8.3 Calculation of Average Factor 12
8.4 Emissions Test Procedures 15

9.0 **Equipment List** 17

1.0 General Description

1.1 Product Description

The Equipment Under Test (EUT) is the Wireless Christmas Concert Snowmen: Continuity 4 Top star operating at 2408MHz, 2428MHz and 2450MHz only. The EUT is powered by 4.5VDC (3 X1.5V AAA batteries). It will play songs and flashing the light in time to the song. There are totally five sets snowman styles. When it is put together with other members of the band, they communicate wirelessly to flashing the light and play along with each other's songs. After powered up, the EUT will scan the ambient field strength among those three channels. Then it will select the channel with the least ambient field strength to operate.

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 for this transceiver (with FCC ID: SQ9XKT1409, SQ9XKT1410, SQ9XKT1411 and SQ9XKT2405) is being processed as the same time of this application.

1.3 Test Methodology

Radiated emission measurements was 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 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.

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 new 3 x 1.5V AAA batteries.

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.

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.

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 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
RR = 18.0 dBµV
LF = 9.0 dB
FS = RR + LF
FS = 18 + 9 = 27 dBµV/m

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

3.2 Radiated Emission Configuration Photograph

The worst case in radiated emission was found at 4816.000 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 12.5 dB

Applicant: Hallmark Cards, Inc. Date of Test: May 09, 2014
Model: XKT1412
Worst-Case Operating Mode: Transmitting

Table 1

Radiated Emissions
Pursuant to FCC Part 15 Section 15.249/RSS-210 A2.9 Requirement

Lowest Channel

Polari-zation	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	2408.000	89.9	33	29.4	86.3	18.1	68.2	94.0	-25.8
H	***4816.000***	***57.7***	***33***	***34.9***	***59.6***	***18.1***	***41.5***	***54.0***	***-12.5***
H	7224.000	47.8	33	37.9	52.7	18.1	34.6	54.0	-19.4
H	9632.000	46.5	33	40.4	53.9	18.1	35.8	54.0	-18.2
H	***12040.000***	***47.0***	***33***	***40.5***	***54.5***	***18.1***	***36.4***	***54.0***	***-17.6***
H	14448.000	48.9	33	40.0	55.9	18.1	37.8	54.0	-16.2

Polari-zation	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	2408.000	89.9	33	29.4	86.3	114.0	-27.7
H	***4816.000***	***57.7***	***33***	***34.9***	***59.6***	***74.0***	***-14.4***
H	7224.000	47.8	33	37.9	52.7	74.0	-21.3
H	9632.000	46.5	33	40.4	53.9	74.0	-20.1
H	***12040.000***	***47.0***	***33***	***40.5***	***54.5***	***74.0***	***-19.5***
H	14448.000	48.9	33	40.0	55.9	74.0	-18.1

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.

6. RBW of 3MHz is used for measurement of radiated emissions test.

Applicant: Hallmark Cards, Inc. Date of Test: May 09, 2014
Model: XKT1412
Worst-Case Operating Mode: Transmitting

Table 2

Radiated Emissions
Pursuant to FCC Part 15 Section 15.249/RSS-210 A2.9 Requirement

Middle Channel

Polari-zation	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	2428.000	89.6	33	29.4	86.0	18.1	67.9	94.0	-26.1
H	***4856.000***	***57.5***	***33***	***34.9***	***59.4***	***18.1***	***41.3***	***54.0***	***-12.7***
H	***7284.000***	***47.9***	***33***	***37.9***	***52.8***	***18.1***	***34.7***	***54.0***	***-19.3***
H	9712.000	46.4	33	40.4	53.8	18.1	35.7	54.0	-18.3
H	***12140.000***	***47.3***	***33***	***40.5***	***54.8***	***18.1***	***36.7***	***54.0***	***-17.3***
H	14568.000	50.3	33	38.4	55.7	18.1	37.6	54.0	-16.4

Polari-zation	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	2428.000	89.6	33	29.4	86.0	114.0	-28.0
H	***4856.000***	***57.5***	***33***	***34.9***	***59.4***	***74.0***	***-14.6***
H	***7284.000***	***47.9***	***33***	***37.9***	***52.8***	***74.0***	***-21.2***
H	9712.000	46.4	33	40.4	53.8	74.0	-20.2
H	***12140.000***	***47.3***	***33***	***40.5***	***54.8***	***74.0***	***-19.2***
H	14568.000	50.3	33	38.4	55.7	74.0	-18.3

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.

6. RBW of 3MHz is used for measurement of radiated emissions test.

Applicant: Hallmark Cards, Inc. Date of Test: May 09, 2014
Model: XKT1412
Worst-Case Operating Mode: Transmitting

Table 3

Radiated Emissions
Pursuant to FCC Part 15 Section 15.249/RSS-210 A2.9 Requirement

Highest Channel

Polari-zation	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	2450.000	89.8	33	29.4	86.2	18.1	68.1	94.0	-25.9
H	***4900.000***	***57.6***	***33***	***34.9***	***59.5***	***18.1***	***41.4***	***54.0***	***-12.6***
H	***7350.000***	***48.0***	***33***	***37.9***	***52.9***	***18.1***	***34.8***	***54.0***	***-19.2***
H	9800.000	46.3	33	40.4	53.7	18.1	35.6	54.0	-18.4
H	***12250.000***	***47.4***	***33***	***40.5***	***54.9***	***18.1***	***36.8***	***54.0***	***-17.2***
H	14700.000	50.4	33	38.4	55.8	18.1	37.7	54.0	-16.3

Polari-zation	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	2450.000	89.8	33	29.4	86.2	114.0	-27.8
H	***4900.000***	***57.6***	***33***	***34.9***	***59.5***	***74.0***	***-14.5***
H	***7350.000***	***48.0***	***33***	***37.9***	***52.9***	***74.0***	***-21.1***
H	9800.000	46.3	33	40.4	53.7	74.0	-20.3
H	***12250.000***	***47.4***	***33***	***40.5***	***54.9***	***74.0***	***-19.1***
H	14700.000	50.4	33	38.4	55.8	74.0	-18.2

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.

6. RBW of 3MHz is used for measurement of radiated emissions test.

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.

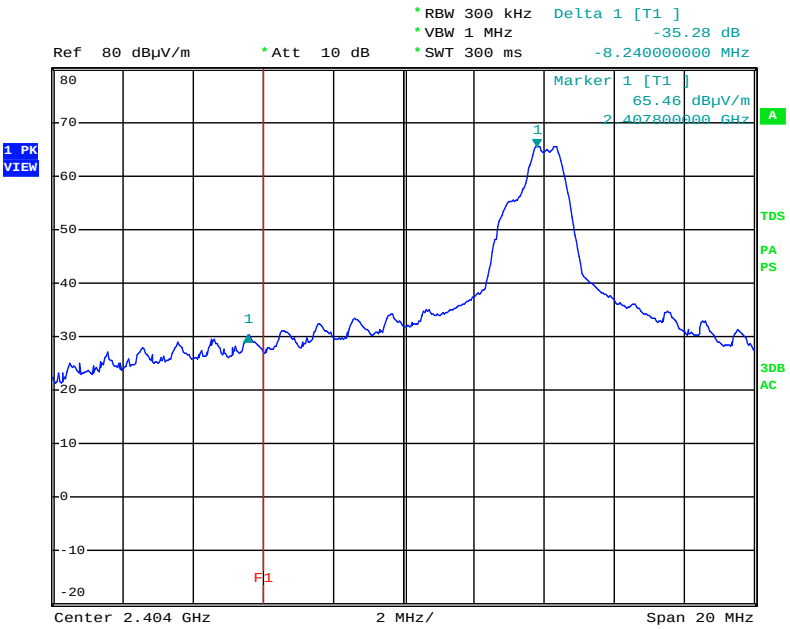
8.0 Miscellaneous Information

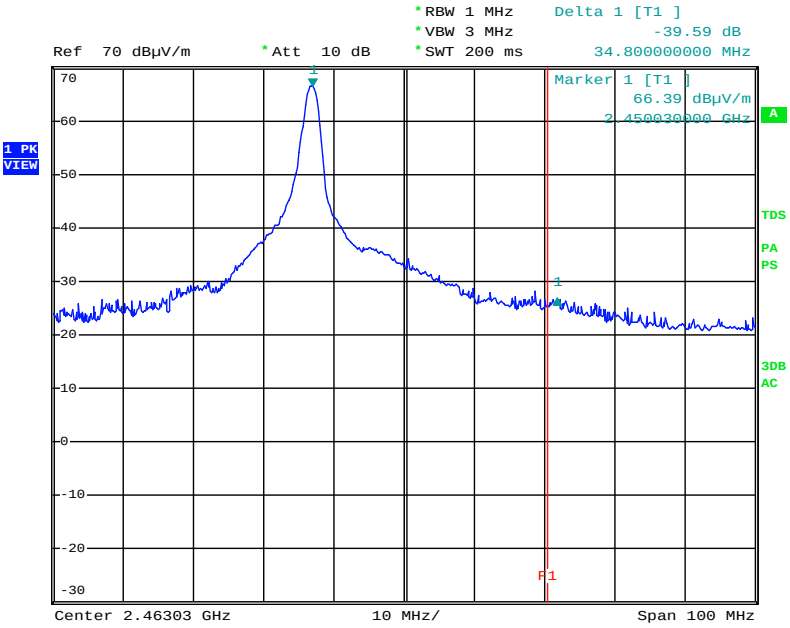
This miscellaneous information includes details of the stabilizing process (including a plot of the stabilized waveform), the test procedure and calculation of the factors such as pulse desensitization and averaging factor.

8.1 Radiated Emission on the Bandedge

From the following plots, they show that the fundamental emissions are confined in the specified band (2400MHz to 2483.5MHz). 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/RSS-Gen Section 7.2.5, whichever is the lesser attenuation, which meet the requirement of part 15.249(d)/RSS-210.


*RBW 300 kHz
*VBW 1 MHz
*SWT 300 ms
Delta 1 [T1]
-35.28 dB
-8.240000000 MHz
Ref 80 dBµV/m
*Att 10 dB
Marker 1 [T1]
65.46 dBµV/m
2.407800000 GHz
1 PK VIEW
A
TDS
PA
PS
3DB
AC
Center 2.404 GHz
2 MHz/
Span 20 MHz


*RBW 1 MHz
*VBW 3 MHz
*SWT 200 ms
Delta 1 [T1]
-39.59 dB
34.800000000 MHz
Ref 70 dBµV/m
*Att 10 dB
Marker 1 [T1]
66.39 dBµV/m
2.450030000 GHz
1 PK VIEW
A
TDS
PA
PS
3DB
AC
Center 2.46303 GHz
10 MHz/
Span 100 MHz

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

=86.3 dBµV/m – 35.3 dB
=51.0 dBµV/m

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

=68.2 dBµV/m – 35.3 dB
=32.9 dBµV/m

Upper bandedge

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

=86.2 dBµV/m – 39.6 dB
=46.6 dBµV/m

Average Resultant field strength = Fundamental emissions (average value) – delta from the plot

=68.1 dBµV/m – 39.6 dB
=28.5 dBµV/m

The resultant field strength meets the general radiated emission limit in Section 15.209/RSS-Gen Section 7.2.5, 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 0.32ms for a digital “1” bit which illustrated on technical specification, with a resolution bandwidth (3dB) of 1MHz, so the pulse desensitivity factor is 0dB.

8.3 Calculation of Average Factor

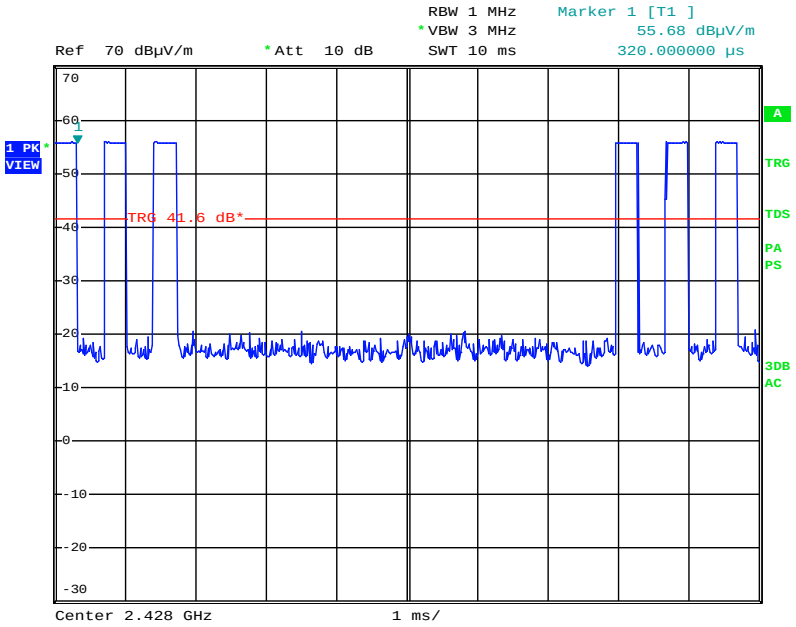
The duty cycle is simply the on-time divided by the period:

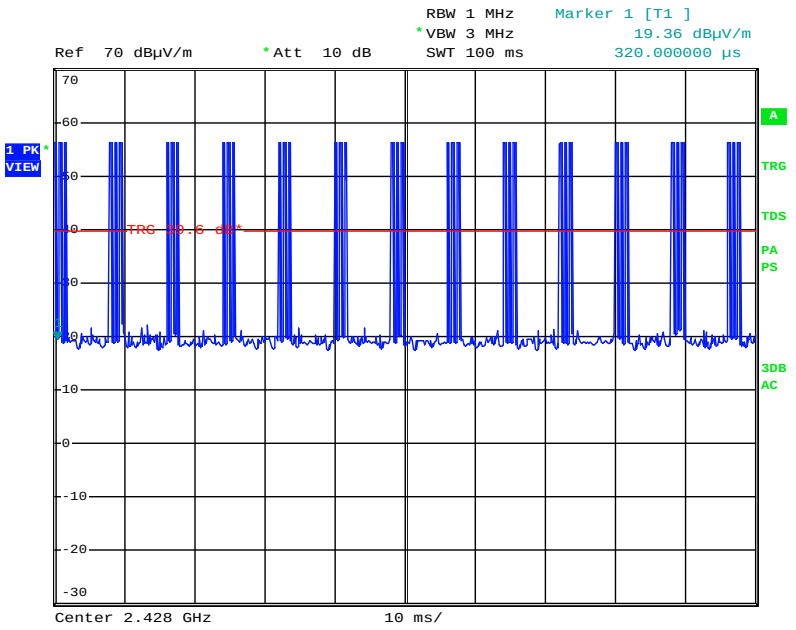
The duration of one cycle = 100 ms

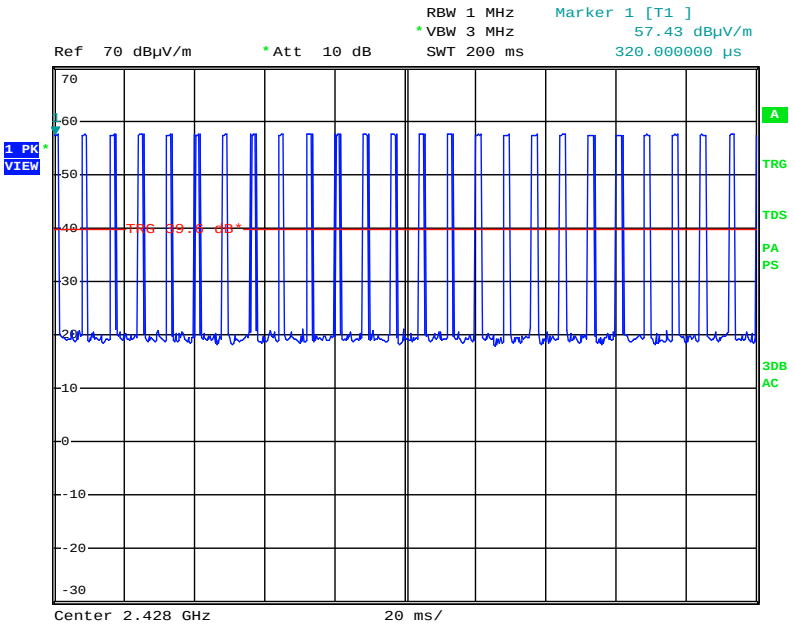
Effective period of the cycle = 39 X 0.32 = 12.48 ms

DC = 12.48/100 = 0.1248

Therefore, the averaging factor is found by 20log 0.1248 = -18.1dB.


RBW 1 MHz
Marker 1 [T1]
*VBW 3 MHz
55.68 dBµV/m
Ref 70 dBµV/m
*Att 10 dB
SWT 10 ms
320.000000 µs
1 PK VIEW
TRG 41.6 dB*
A
TRG
TDS
PA PS
3DB AC
Center 2.428 GHz
1 ms/


RBW 1 MHz
Marker 1 [T1]
*VBW 3 MHz
19.36 dBµV/m
Ref 70 dBµV/m
*Att 10 dB
SWT 100 ms
320.000000 µs
1 PK VIEW
TRG 39.6 dB*
A
TRG
TDS
PA PS
3DB AC
Center 2.428 GHz
10 ms/


RBW 1 MHz
Marker 1 [T1]
*VBW 3 MHz
57.43 dBµV/m
Ref 70 dBµV/m
*Att 10 dB
SWT 200 ms
320.000000 µs
70
60
50
40
30
20
10
0
-10
-20
-30
1 PK
VIEW
TRG 39.6 dB*
A
TRG
TDS
PA
PS
3DB
AC
Center 2.428 GHz
20 ms/

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.

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 Equipment List

1) Radiated Emissions Test

Equipment	EMI Test Receiver	Double Ridged Guide Antenna
Registration No.	EW-2666	EW-1015
Manufacturer	R&S	EMCO
Model No.	ESCI7	3115
Calibration Date	Jun. 20, 2013	Mar. 05, 2013
Calibration Due Date	Jun. 20, 2014	Sep. 05, 2014

Equipment	Biconical Antenna	Spectrum Analyzer	Log Periodic Antenna
Registration No.	EW-0571	EW-2466	EW-0572
Manufacturer	EMCO	R&S	EMCO
Model No.	3104C	FSP30	3146
Calibration Date	Nov. 01, 2013	Aug. 04, 2013	Jun. 26, 2013
Calibration Due Date	May 01, 2015	Aug. 14, 2014	Dec. 26, 2014

2) Bandedge and Average Factor 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

End Of Report