

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT

Test Report No. : E118R-006

AGR No. : A111A-086

Applicant : HONG International Corp.

Address : MARIO TOWER #1416, 222-12, Guro-dong, Guro-gu, Seoul, Korea

Manufacturer : HONG International Corp.

Address : MARIO TOWER #1416, 222-12, Guro-dong, Guro-gu, Seoul, Korea

Type of Equipment : Digital Dart Machine

FCC ID : ZUZ-VSPHOENIX

IC Certification No. : 9811A-VSPHOENIX

Model Name : VSPHOENIX

Serial number : N/A

Total page of Report : 22 pages (including this page)

Date of Incoming : May 09, 2011

Date of Issuing : August 04, 2011


SUMMARY

The equipment complies with the requirements of *FCC CFR 47 PART 15 SUBPART C, SECTION 15.225 and IC RSS-210 Issue 8 and RSS-Gen Issue 3.*

This test report contains only the result of a single test of the sample supplied for the examination.

It is not a general valid assessment of the features of the respective products of the mass-production.

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Revision History

Issue Report No.	Issued Date	Revisions	Effect Section
E118R-006	August 04, 2011	Initial Release	All

1. VERIFICATION OF COMPLIANCE

-. APPLICANT : HONG International Corp.
 -. ADDRESS : MARIO TOWER #1416, 222-12, Guro-dong, Guro-gu, Seoul, Korea
 -. CONTACT PERSON : Mr. Jeong-Woo, Park / Assistant Manager
 -. TELEPHONE NO : +82-2-890-6767
 -. FCC ID : ZUZ-VSPHOENIX
 -. IC CERTIFICATION NO. : 9811A-VSPHOENIX
 -. MODEL NO/NAME : VSPHOENIX
 -. SERIAL NUMBER : N/A
 -. DATE : August 04, 2011

DEVICE TYPE	FCC: DXX - Low Power Communication Device Transmitter IC: Category I Equipment
E.U.T. DESCRIPTION	Digital Dart Machine - Intentional Radiator
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	FCC: ANSI C63.4: 2009 IC: RSS-Gen Issue 3
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SUBPART C, Section 15.225 RSS-210 Issue 8, RSS-Gen Issue 3
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	Yes
FINAL TEST WAS CONDUCTED ON	3 m open area test site

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC and IC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

2. GENERAL INFORMATION

2.1 Product Description

The HONG International Corp., Model VSPHOENIX (referred to as the EUT in this report) is a Digital Dart Machine that is included a RF card reader. The product specification described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	Non-Metal
TX FREQUENCY	13.56 MHz
MODULATION	ASK
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1 MHz)	Main Board: 14.3MHz, Connector Board: 4MHz, Audio Board: 28.63636 MHz, Audio Control Board: 10MHz RF Board: 13.56MHz, RF LED Board: 20MHz
ANTENNA TYPE	Inserted into the main board (Pattern Antenna)
RATED SUPPLY VOLTAGE	120 V~, 50/60 Hz, 220 W
NUMBER OF PCB LAYERS	8 Layers: Main Board 4 Layers: Connector Board, Audio Board, Audio Control Board, RF Board and RF LED Board

2.2 Model Differences:

-. None

2.3 Related Submittal(s) / Grant(s)

-. Original

2.4 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the regulation stated in section 15.225 and the IC requirements stated in section 6 of the regulation, RSS-Gen Issue 3.

2.5 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4: 2009 and RSS-210, Issue 8 & RSS-Gen Issue 3. Radiated testing was performed at a distance of 3 m from EUT to the antenna.

2.6 Test Facility

The open area test site and conducted measurement facilities are located on at 307-51 Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do, 464-862, Korea. Description details of test facilities were submitted to the Commission on August 21, 2008. (Registration Number: 340658) and were submitted to the Industry Canada on April 14, 2009. (Registration Number: IC 3736A-2)

3. SYSTEM TEST CONFIGURATION

3.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
Main Board	GIGABYTE	GA-G31M-ES2L	DoC
Connector Board	HONG International Corp.	REV 1.61	N/A
Audio Board	HONG International Corp.	1.1	N/A
Audio Control Board	HONG International Corp.	1.1	N/A
RF Board	HONG International Corp.	N/A	N/A
RF LED Board	HONG International Corp.	LED_MD	N/A
LED Interface Board	HONG International Corp.	HONG-LED-INTERFACE VER1.2	N/A
Power Board	Open Digital Power	OFS75	N/A

3.2 Peripheral equipment

Defined as equipment needed for correct operation of the EUT, but not considered as tested:

Model	Manufacturer	FCC ID	Description	Connected to
VSPHOENIX	HONG International Corp.	ZUZ-VSPHOENIX	Digital Dart Machine (EUT)	-
PP04X	Dell Computer	DoC	Notebook PC	EUT

3.3 Mode of operation during the test

-. To get a maximum radiated emission from the EUT, the EUT was continuously transmitted RF carrier and the card shall be used with the EUT and tested with together. And the ping testing mode was performed at the same time during the test.

3.4 Cable Description for the EUT

Ports Name	Shielded	Ferrite Bead	Metal Shell	Length (m)	Connected to
LAN	N	N	N	3.0	Notebook PC

3.5 Equipment Modifications

For getting Class B Limit, following modifications were made by the applicant.

- . Internal cable was changed to shielded type and ferrite core was added.
- . The gasket was added to the internal of PC case.
- . The ferrite core was added to the power cable of LCD monitor.
- . The ferrite core was added to the speaker cable.

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3.6 Configuration of Test System

Line Conducted Test: The power of EUT was connected to LISN. All supporting equipments were connected to another LISN. Preliminary Power line Conducted Emission tests were performed by using the procedure in ANSI C63.4: 2009 7.3.3 to determine the worse operating conditions.

Radiated Emission Test: Preliminary radiated emissions test were conducted using the procedure in ANSI C63.4: 2009 8.3.1.1 and 13.1.4.1 to determine the worse operating conditions. The radiated emissions measurements were performed on the 3 m, EMI chamber and open-field test site. The EUT was placed on the ground plane as typical applications.

For frequencies from 150 kHz to 30 MHz measurements were made of the magnetic H field. The measuring antenna is an electrically screened loop antenna.

The frequency spectrum from 30 MHz to 1 000 MHz was scanned and maximum emission levels maximized at each frequency recorded. The system was rotated 360°, and the antenna was varied in the height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

3.7 Antenna Requirement

For intentional device, according to §15.203 and RSS-Gen Issue 3, section 7.1.2, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Antenna Construction:

The transmitter antenna of the EUT is a PCB pattern antenna in the EUT, so there is no consideration of replacement by the user.

4. PRELIMINARY TEST

4.1 AC Power line Conducted Emissions Tests

During Preliminary Tests, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
Standby Mode	-
TX mode	X

4.2 Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

Operation Mode	The Worse operating condition (Please check one only)
Standby Mode	-
TX mode	X

5. FINAL RESULT OF MEASUREMENT

5.1 Conducted Emission Test

Humidity Level : 40 % R.H. Temperature: 24 °C
 Limits apply to : FCC CFR 47, PART 15 Section 15.207 and IC RSS-Gen, Section 7.2.4
 Result : PASSED BY -4.85 dB at 13.56 MHz under average mode

EUT : Digital Dart Machine Date: June 22, 2011
 Operating Condition : Transmitting Mode
 Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)

Frequency (MHz)	Line	Peak (dBμV)		Margin (dB)
		Emission level	Q.P Limits	
0.17	H	43.03	64.96	- 21.93
0.18	H	50.17	64.49	- 14.32
6.03	N	37.96	60.00	- 22.04
13.56	N	50.73	60.00	- 9.27
13.73	H	48.06	60.00	- 11.94
14.24	H	49.38	60.00	- 10.62
Frequency (MHz)	Line	Average (dBμV)		Margin (dB)
		Emission level	Limits	
6.03	H	34.18	50.00	- 15.82
13.56	N	45.15	50.00	- 4.85
13.73	H	39.75	50.00	- 10.25
14.24	H	40.56	50.00	- 9.44

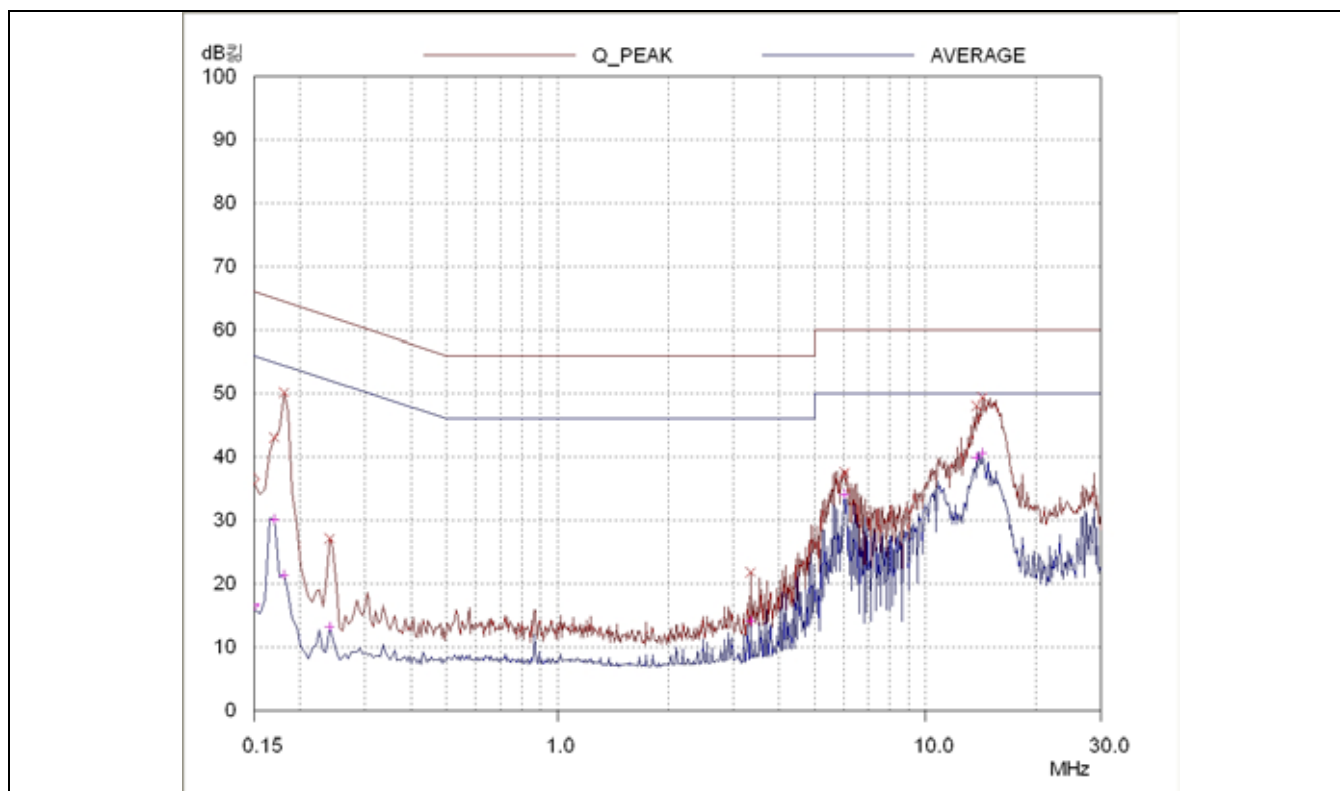
Line Conducted Emission Tabulated Data

Remark : "H": Hot Line, "N": Neutral Line.

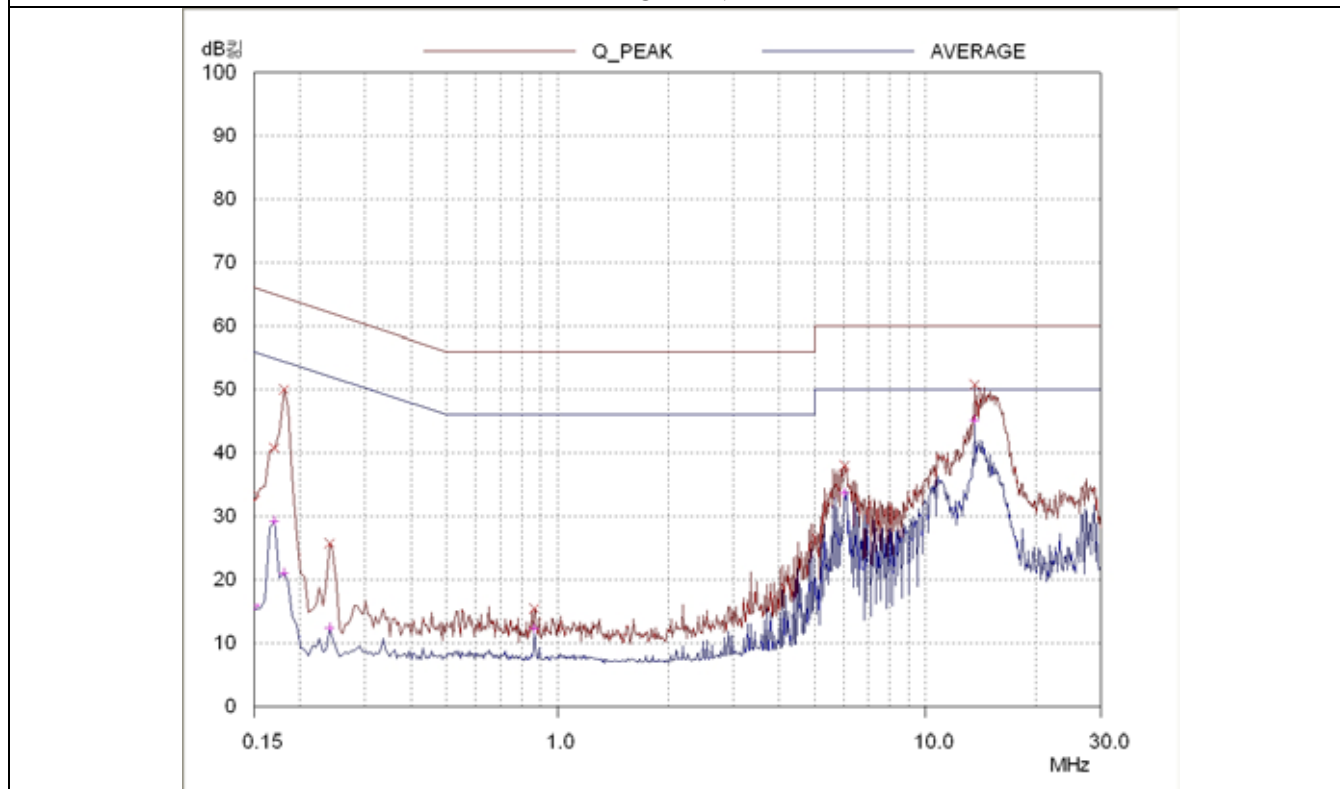
See next page for an overview sweep performed with peak and average detector.



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HOT LINE



NEUTRAL LINE

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5.2 Field Strength of the Operating Frequency Band

5.2.1 Operation frequency band: (13.553 ~ 13.567) MHz

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Humidity Level : 44 % R.H. Temperature: (24 ~ 25) °C
 Limits apply to : PART 15, SUBPART C, SECTION 15.225(a) and IC RSS-210, Section A2.6
 Type of Test : Low Power Communication Device Transmitter
 Result : PASSED BY -59.82 dB at 13.56 MHz

EUT : Digital Dart Machine Date: June 23, 2011
 Operating Condition : Transmitting Mode
 Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)
 Distance : 3 m

Radiated Emission		Ant	Correction Factors		Total	FCC/IC	
Freq. (MHz)	Amp. (dBμV)	Pol.	Antenna (dB/m)	Cable (dB)	Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
13.56	42.42	V	18.04	0.50	60.96	124.00	-63.04
13.56	36.54	H	18.04	0.50	55.08	124.00	-68.92

Remark. The EUT was tested at 3 meters, so conversation factor was included at above limit.



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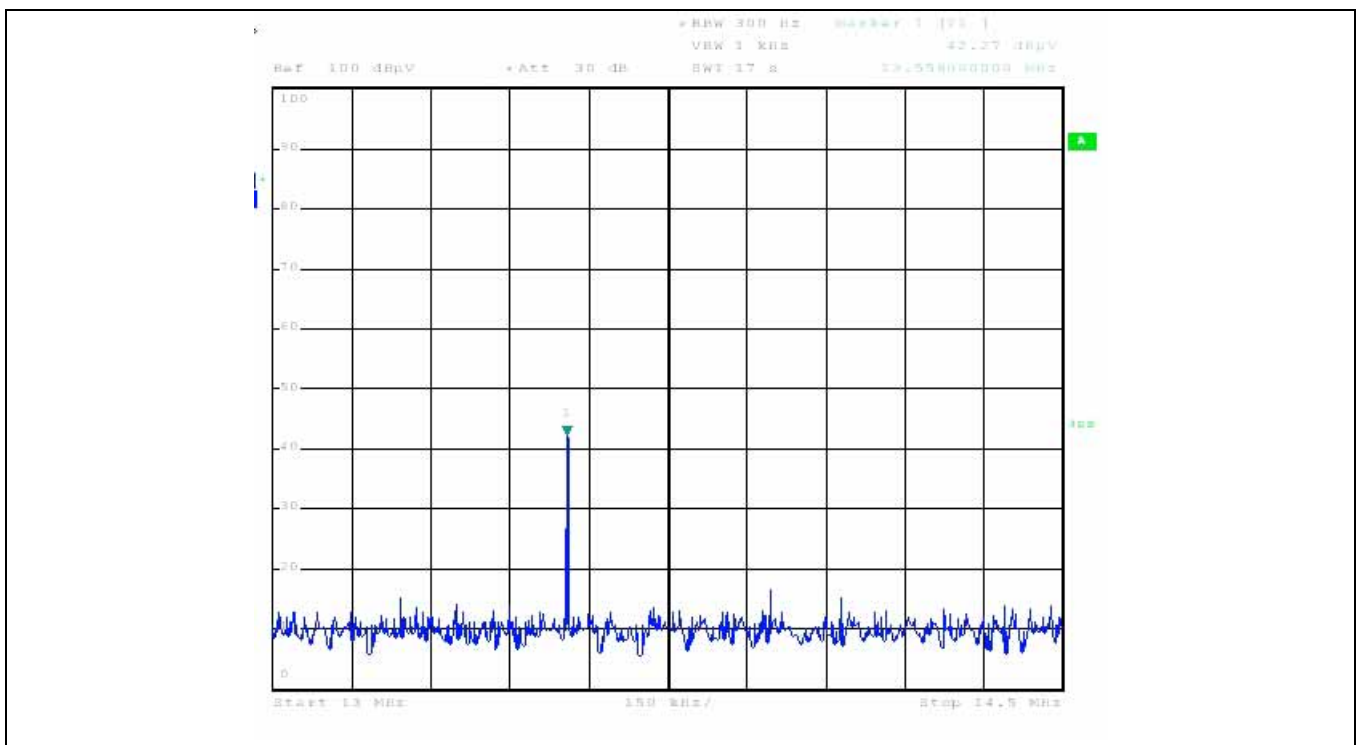
5.2.2 Operation frequency band: Below 13.553 MHz and above 13.567 MHz

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Humidity Level	: 44 % R.H.	Temperature: (24 ~ 25) °C
Limits apply to	: PART 15, SUBPART C, SECTION 15.225(b), (c) and IC RSS-210, Section A2.6	
Type of Test	: Low Power Communication Device Transmitter	
Result	: <u>PASSED</u>	

EUT	: Digital Dart Machine
Operating Condition	: Transmitting Mode

Date: June 23, 2011



Acc. to above photo, the field strength level for the frequency subjected to 15.225 (b) and (c) met the requirement, because the maximum carrier level, 13. 56 MHz was 60.96 dBuV/m and the worst limit is 80.5 dBuV/m.

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5.3 Spurious Emission Test

The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Humidity Level : (44 ~ 45) % R.H. Temperature: (23 ~ 24) °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.231(b) and RSS 210 Annex A2.9 (b)
 Type of Test : Low Power Communication Device Transmitter
 Result : PASSED BY -3.05 dB at 145.40 MHz

EUT : Digital Dart Machine Date: June 23, 2011
 Operating Condition : Transmitting Mode
 Distance : 3 m

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
57.28	19.00	H	1.20	220.00	9.79	1.55	30.34	40.00	-9.66
111.75	23.00	H	1.35	120.00	12.26	2.44	37.70	43.52	-5.82
145.40	23.00	H	1.00	80.00	14.82	2.65	40.47	43.52	-3.05
167.99	20.14	H	1.00	200.00	15.71	2.84	38.69	43.52	-4.83
257.72	14.00	V	1.15	155.00	17.74	3.40	35.14	46.02	-10.88
372.30	20.00	V	1.00	120.00	16.50	3.82	40.32	46.02	-5.70
623.27	17.33	V	1.20	310.00	20.45	5.15	42.93	46.02	-3.09
667.84	14.00	V	1.00	220.00	21.70	5.27	40.97	46.02	-5.05



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6. 20 dB BANDWIDTH

6.1 Operating environment

Temperature : 24 °C
Relative humidity : 41 % R.H.

6.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 10 kHz, and peak detection was used. The 20 dB bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 20 dB.



6.3 Test data for 20 dB Bandwidth

-. Test Date : June 15, 2011

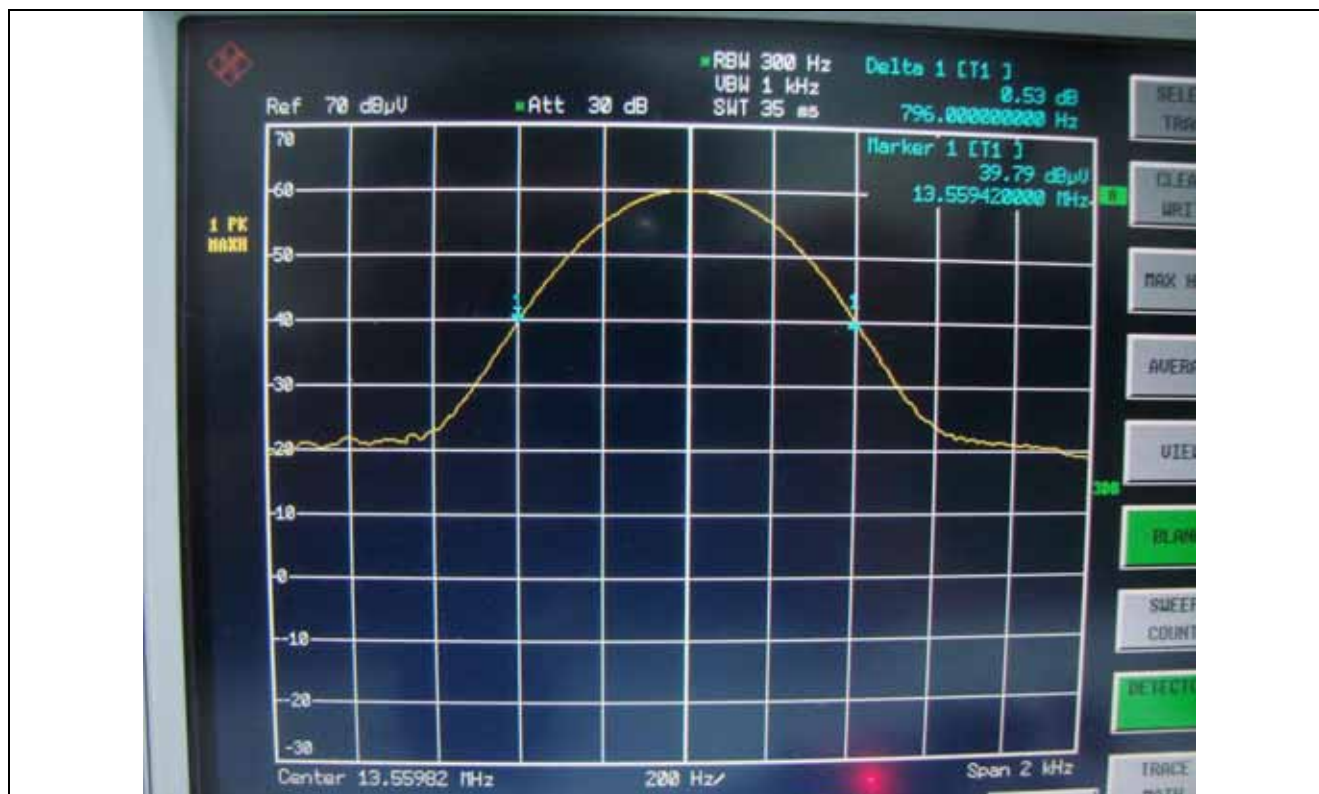
FREQUENCY (MHz)	MEASURED VLAUE (Hz)
13.56	796

Remark: Acc. to above test result, the 20 dB bandwidth is within the operating frequency band, so the EUT complied with the section 15.215(c).

See next page for an overview sweep performed with peak detector.



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6.4 Test data for 99 % Occupied Bandwidth

-. Test Date : June 15, 2011

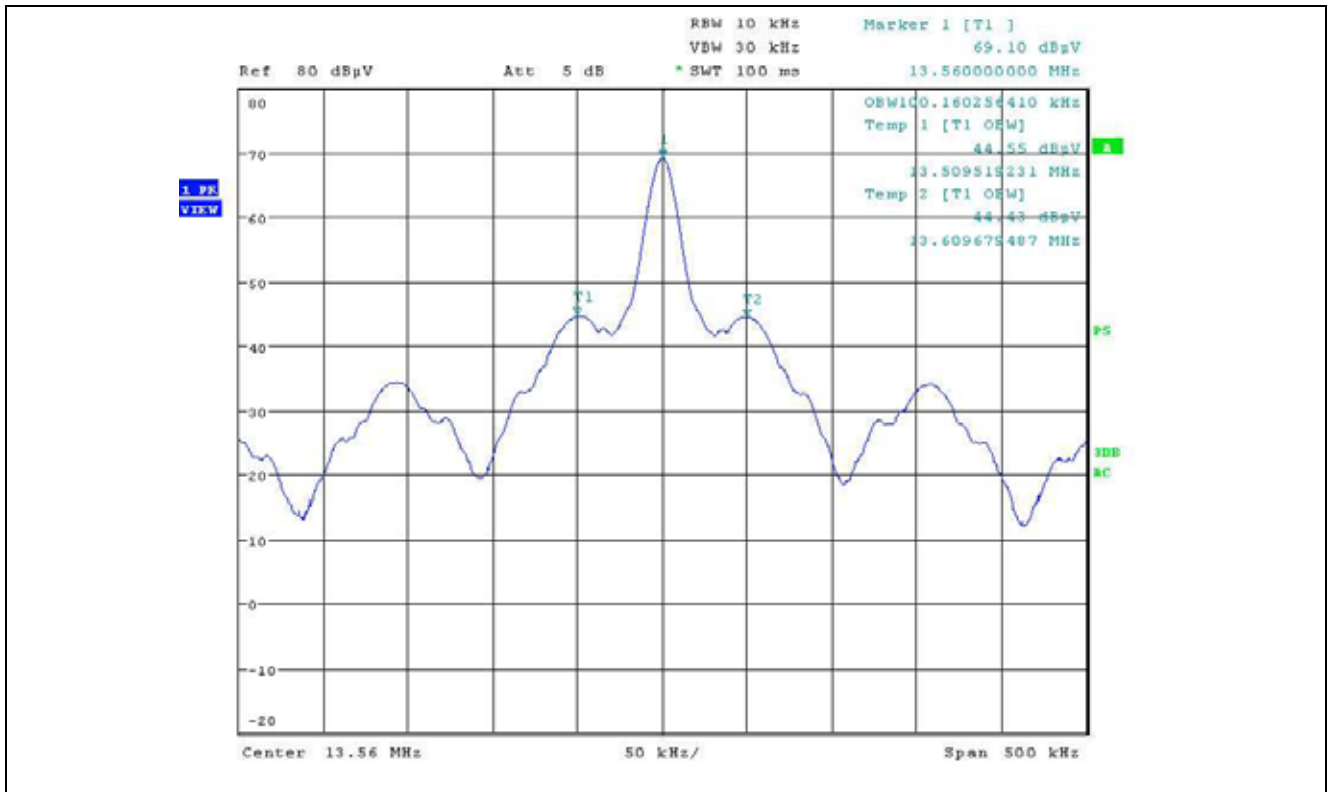
-. Test Result : Pass

FREQUENCY(MHz)	MEASURED VLAUE (kHz)
13.56	100.16

Remark: See next page for an overview sweep performed with peak detector.



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7. FREQUENCY STABILITY WITH TEMPERATURE VARIATION

7.1 Operating environment

Temperature : 20 °C
Relative humidity : 45 % R.H.

7.2 Test set-up

Turn EUT off and set chamber temperature to -20 °C and then allow sufficient time (approximately 20 to 30 minutes after chamber reach the assigned temperature) for EUT to stabilize. Turn ON EUT and measure the EUT operating frequency and then turn off the EUT after the measurement. The temperature in the chamber was raised 10 °C step from -20 °C to +50°C. Repeat above method for frequency measurements every 10 °C step and then record all measured frequencies on each temperature step.

7.3 Test data

-. Test Date : June 25, 2011
-. Result : PASSED BY -1 199.00 Hz at 0 °C

Temperature (°C)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Margin (Hz)	Limit (Hz)
-20	13 560 000	13 559 845	1 201.00	± 1 356.00
-10		13 559 844	1 200.00	
0		13 559 843	1 199.00	
10		13 559 845	1 201.00	
20		13 559 848	1 204.00	
30		13 559 846	1 202.00	
40		13 559 847	1 203.00	
50		13 559 844	1 200.00	



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8. FREQUENCY STABILITY WITH VOLTAGE VARIATION

8.1 Operating environment

Temperature : 22 °C
Relative humidity : 44 % R.H.

8.2 Test set-up

An external DC power supply was connected to the input of the EUT. The voltage of EUT set to 115 % of the nominal value and then was reduced to 85 % of nominal voltage. The output frequency was recorded at each step.

8.3 Test data

-. Test Date : June 24, 2011
-. Result : PASSED BY -1 204.00 Hz

Voltage (Vac)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Margin (Hz)	Limit (Hz)
126.5 (115 %)	13 560 000	13 559 848	1 204.00	± 1 356.00
110 (100 %)		13 559 848	1 204.00	
93.5 (85 %)		13 559 848	1 204.00	



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9. RADIO FREQUENCY EXPOSURE

9.1 EUT Description

Kind of EUT	Digital Dart Machine
Operating Frequency Band	13.56 MHz
Device Category	<input type="checkbox"/> Portable (< 20 cm separation) <input type="checkbox"/> Mobile (> 20 cm separation) <input checked="" type="checkbox"/> Others
Field Strength level	60.96 dB μ V/m
Used Antenna	Internal Pattern Antenna
Exposure Evaluation Applied	<input type="checkbox"/> MPE <input type="checkbox"/> SAR <input checked="" type="checkbox"/> N/A

9.2 Exemption from Routine Evaluation Limits

The EUT shall be used more or less than 20 cm from the user, but the operating frequency of the EUT is 13.56 MHz and output level is less than 2 W(33 dBm), so the EUT exempted from routine RF exposure evaluation according to the rule RSS-102, section 2.5.2.

10. FIELD STRENGTH CALCULATION

Meter readings are compared to the specification limit correcting for antenna and cable losses

+	Meter reading	(dB μ V)
+	Cable Loss	(dB)
+	Antenna Factor (Loss)	(dB/m)
=	Corrected Reading	(dB μ V/m)
-	Specification Limit	(dB μ V/m)
=	dB Relative to Spec	(\pm dB)

11. LIST OF TEST EQUIPMENT

No.	EQUIPMENTS	MFR.	MODEL	SER. NO.	LAST CAL	DUE CAL	USE
1.	Test receiver	R/S	ESiB26	100296	APR/11	12MONTH	■
2.	Test receiver	R/S	ESHS10	834467/007	JUN/11	12MONTH	
3.	Spectrum analyzer	HP	8566B	3407A08547	JUN/11	12MONTH	■
	Spectrum analyzer	R/S	FSP	100017	MAR/11	12MONTH	■
4.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	VULB9163 202	MAY/10	24MONTH	■
5.	Biconical antenna	Schwarzbeck	VHA9103	91031852	MAR/10	24MONTH	
6.	Log Periodic antenna	Schwarzbeck	9108-A(494)	62281001	MAR/10	24MONTH	■
7.	LISN	EMCO	3825/2	9109-1867	JUN/11	12MONTH	
				9109-1869	JUN/11		
		Schwarzbeck	NSLK 8126	8126-404	JUN/11		■
8.	Position Controller	HD GmbH	HD100	N/A	N/A	N/A	■
9.	Turn Table	HD GmbH	DS420S	N/A	N/A	N/A	■
10.	Antenna Master	HD GmbH	MA240	N/A	N/A	N/A	■
11.	RF Amplifier	HP	8447D	2727A04987	JUN/11	12MONTH	■
12.	Horn Antenna	Schwarzbeck	BBHA9120D	BBHA9120D294	JUL/11	24MONTH	
13.	Spectrum Analyzer	HP	8564E	3650A00756	JUN/11	12MONTH	■
14.	Frequency Converter	Digitel Power	VFS/DEFC	N/A	N/A	N/A	■
15.	Frequency Counter	HP	53152A	US39270295	DEC/10	12MONTH	■
16.	Slidacs (AC 0~300 V)	Dea Kwang	DH-60	N/A	SEP/10	12MONTH	■
17.	Chamber	Sam Kun	SSE-43CI-A	060712	JUN/11	12MONTH	■
18.	Loop Antenna	R/S	HFH 2-Z2	889 285 / 26	NOV/10	24 MONTH	■

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