

# ELECTROMAGNETIC EMISSION COMPLIANCE REPORT

**Test Report No.** : E125R-118

**AGR No.** : A110A-102R

**Applicant** : McPay Corp.

**Address** : 912, Byuksan3-cha Digitalvalley 271, Digital-ro, Guro-gu, Seoul, Korea

**Manufacturer** : McPay Corp.

**Address** : 912, Byuksan3-cha Digitalvalley 271, Digital-ro, Guro-gu, Seoul, Korea

**Type of Equipment** : Mobile(Card Acceptance) Printer

**FCC ID** : O6GMPT700

**Model Name** : MPT-700

**Serial number** : N/A

**Total page of Report** : 19 pages (including this page)

**Date of Incoming** : February 06, 2012

**Date of Issuing** : May 23, 2012

## SUMMARY

The equipment complies with the requirements of *FCC CFR 47 PART 15 SUBPART C, SECTION 15.225*

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
E125R-118	May 23, 2012	Initial Release	All

## 1. VERIFICATION OF COMPLIANCE

-. APPLICANT : McPay Corp.  
 -. ADDRESS : 912, Byuksan3-cha Digitalvalley 271, Digital-ro, Guro-gu, Seoul, Korea  
 -. CONTACT PERSON : Mr. Jusung Hong / Team Manager  
 -. TELEPHONE NO : +82-70-7784-1353  
 -. FCC ID : O6GMPT700  
 -. MODEL NO/NAME : MPT-700  
 -. SERIAL NUMBER : N/A  
 -. DATE : May 23, 2012

DEVICE TYPE	DXX - Low Power Communication Device TransmitterLow Power Communication Device Transmitter
E.U.T. DESCRIPTION	Mobile(Card Acceptance) Printer - Intentional Radiator
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.4: 2009
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
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	None
FINAL TEST WAS CONDUCTED ON	10 m Semi Anechoic Chamber

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC 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 McPay Corp., Model MPT-700 (referred to as the EUT in this report) is a Mobile(Card Acceptance) Printer . The EUT has a function of RFID and Bluetooth. This report is for RFID function and the report for the Bluetooth will be issued by another report. The product specification described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	Non-Metal
MODULATION	ASK
TRANSMITTING FREQUENCY	13.56 MHz
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1 MHz)	27.12 MHz and 8 MHz
ANTENNA TYPE	Inserted into the main board (Pattern Antenna)
RATED SUPPLY VOLTAGE	Manufacturer: W&T, Model Name: AD18W084080K Input: 100-240 V~, 47-63 Hz, 0.5 A, Output: DC 8.4 V, 0.65 A

### 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.

### 2.5 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4: 2009. 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 301-14, Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do, 464-862, Korea. The Onetech Corp. has been accredited as a Conformity Assessment Body (CAB) with designation number KR0013.

### 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	N/A	MPT-700 MAIN REV3.1	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
MPT-700	McPay Corp.	O6GMPT700	Mobile(Card Acceptance) Printer (EUT)	-
AD18W084080K	W&T	N/A	Adaptor	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 passive card shall be used with the EUT and tested with together.
- The used adapter with the EUT shall be used for charging mode only, so the conducted emission was performed at charging mode.

#### 3.4 Equipment Modifications

- None

### 3.6 Configuration of Test System

**Line Conducted Test:** The EUT was connected to adaptor and the power of adaptor was connected to LISN. All supporting equipments were connected to another LISN. Preliminary Power line Conducted Emission test was 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 13.4.1 to determine the worse operating conditions. The radiated emissions measurements were performed on the 3 m open area test site.

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, 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 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)
Charging 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)
Charging mode	-
Standby Mode	-
TX mode	X



## 5. FINAL RESULT OF MEASUREMENT

### 5.1 Conducted Emission Test

Humidity Level : 41 % R.H.

Temperature: 23 °C

Limits apply to : FCC CFR 47, PART 15, SUBPART B, SECTION 15.107(a)

Result : PASSED BY -10.90 dB at 0.53 MHz under quasi-peak detector mode

EUT : Mobile(Card Acceptance) Printer

Date: April 19, 2012

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)

Frequency (MHz)	Line	Quasi-Peak (dBμV)		Margin (dB)
		Emission level	Q.P Limits	
0.18	N	41.70	64.30	-22.60
0.30	N	38.30	60.20	-21.90
0.33	N	39.70	59.30	-19.60
0.53	N	45.10	56.00	-10.90
0.56	N	39.30	56.00	-16.70
0.98	H	33.40	56.00	-22.60
Frequency (MHz)	Line	Average (dBμV)		Margin (dB)
		Emission level	Limits	
0.52	N	28.60	46.00	-17.40
0.57	N	20.70	46.00	-25.30
1.05	N	17.60	46.00	-28.40
1.54	N	18.10	46.00	-27.90

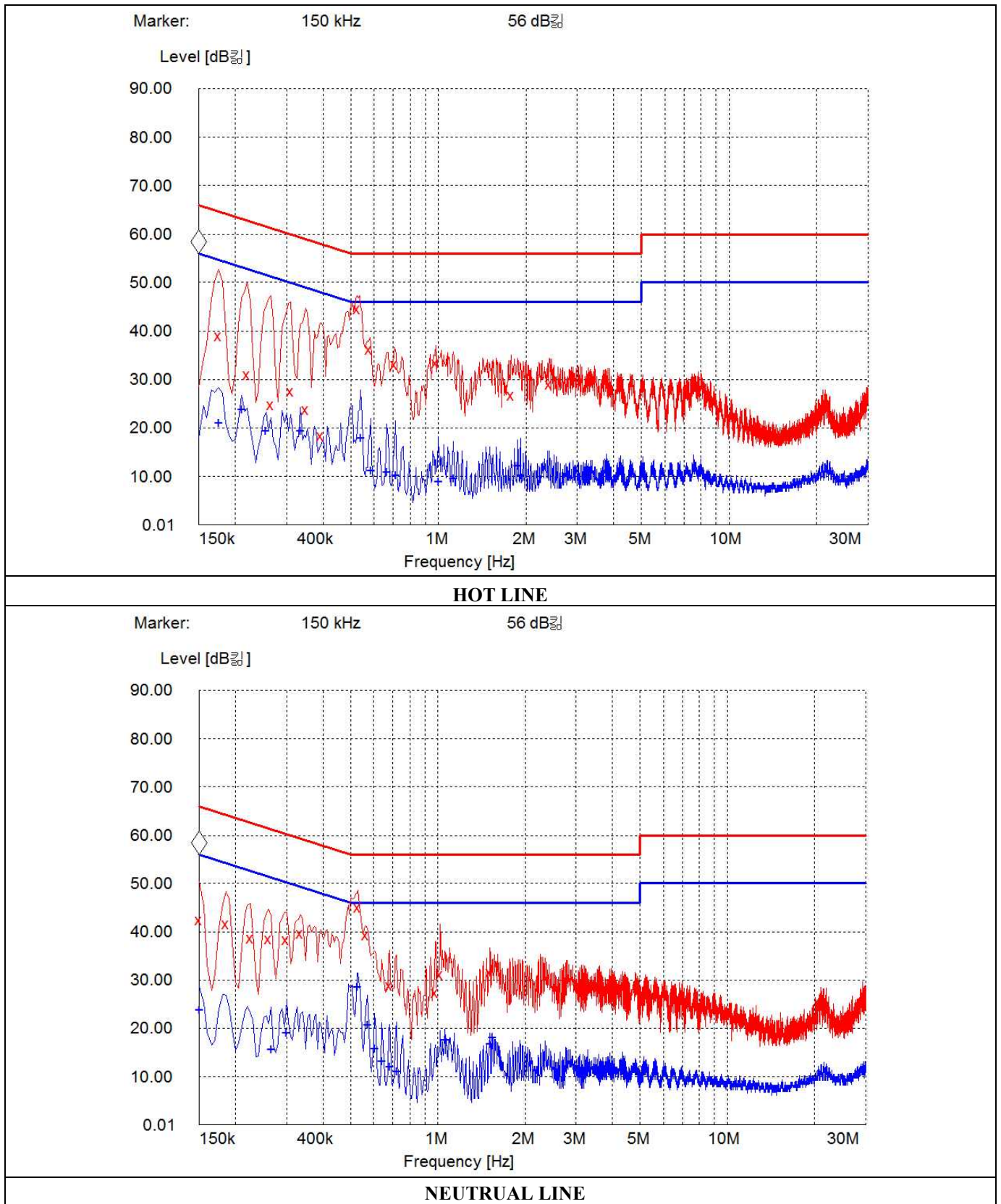
Line Conducted Emissions Tabulated Data

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

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



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## 5.2 Field Strength of the Operating Frequency Band

### 5.2.1 Operation frequency band: (13.553 ~ 13.567) MHz

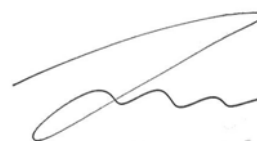
The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Humidity Level : 44 % R.H. Temperature: 22 °C  
 Limits apply to : PART 15, SUBPART C, SECTION 15.225(a)  
 Type of Test : Low Power Communication Device Transmitter  
 Result : PASSED BY -82.58 dB at 13.56 MHz

EUT : Mobile(Card Acceptance) Printer Date: May 15, 2012  
 Operating Condition : Transmitting Mode  
 Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)  
 Distance : 3 m

Radiated Emission		Ant	Correction Factors		Total	FCC	
Freq. (MHz)	Amplitud (dBμV)	Pol.	Antenna (dB/m)	Cable (dB)	Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)
13.56	22.72	H	18.4	0.3	41.42	124	-82.58
13.56	16.6	V	18.4	0.3	35.3	124	-88.7

Remark. The EUT was tested at 3 m, so conversion 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

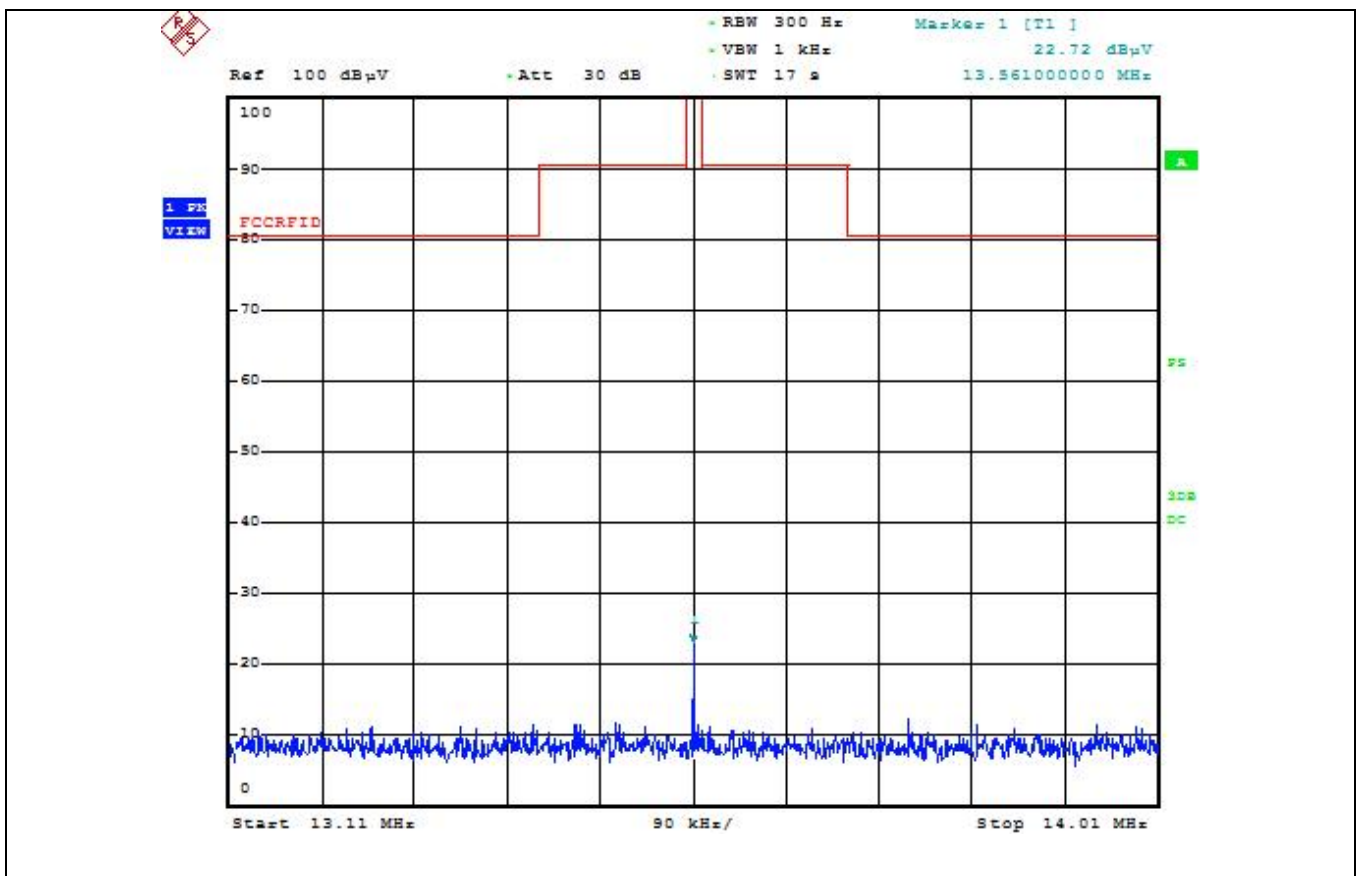
The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Humidity Level	: 44 % R.H.	Temperature: 22 °C
Limits apply to	: PART 15, SUBPART C, SECTION 15.225(b)	
Type of Test	: Low Power Communication Device Transmitter	
Result	: <u>PASSED</u>	

EUT : Mobile(Card Acceptance) Printer

Date: May 15, 2012

Operating Condition : Transmitting Mode



Acc. to above test data, the field strength level of 13.56 MHz is 41.42 dBuV/m and the worst limit subject to 15.225 (b) and (c) is 80.5 dBuV/m, so the EUT meets the requirement.

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### 5.3 Spurious Emission Test

#### 5.3.1 Spurious Radiated Emission below 1 GHz

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

Humidity Level : 43 % R.H. Temperature: 24 °C  
 Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.225(d)  
 Type of Test : Low Power Communication Device Transmitter  
 Frequency range : 30 MHz ~ 1 000 MHz  
 Result : PASSED BY -6.62 dB at 881.65 MHz

EUT : Mobile(Card Acceptance) Printer Date: May 14, 2012  
 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)
257.95	18.90	H	1.00	80.00	12.68	3.40	34.98	46.02	-11.04
284.14	14.10	V	1.00	85.00	19.63	3.44	37.17	46.02	-8.85
786.59	10.40	H	1.00	70.00	20.82	6.21	37.43	46.02	-8.59
813.75	10.50	H	1.00	10.00	21.17	6.57	38.24	46.02	-7.78
841.88	10.40	V	1.00	15.00	21.53	6.90	38.83	46.02	-7.19
881.65	10.10	H	1.00	240.00	22.05	7.25	39.40	46.02	-6.62

Remark: Margin (dB) = Limit – Result and Result = Reading QP + Antenna Factor + Loss - Gain

Loss and Gain in above table means Cable Loss and Pre-amplifier gain.



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### 5.3.2 Test Data for Below 30 MHz

Humidity Level : 43 % R.H. Temperature: 24 °C  
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.225(d)  
Type of Test : Low Power Communication Device Transmitter  
Frequency range : 9 kHz ~ 30 MHz  
Resolution bandwidth : 200 Hz (from 9 kHz to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)  
Result : PASSED

EUT : Mobile(Card Acceptance) Printer Date: May 14, 2012  
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)
It was not observed any emissions from the EUT.									



Tested by: Chang-Uk, Jun / Engineer

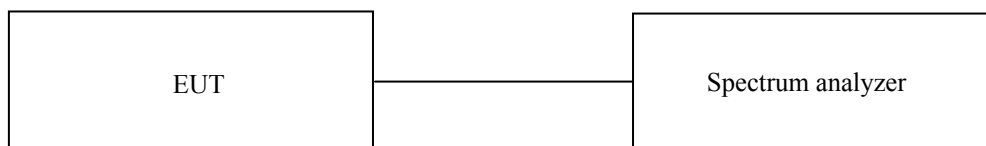
## 6. 20 dB BANDWIDTH

### 6.1 Operating environment

Temperature : 22 °C  
Relative humidity : 44 % 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.



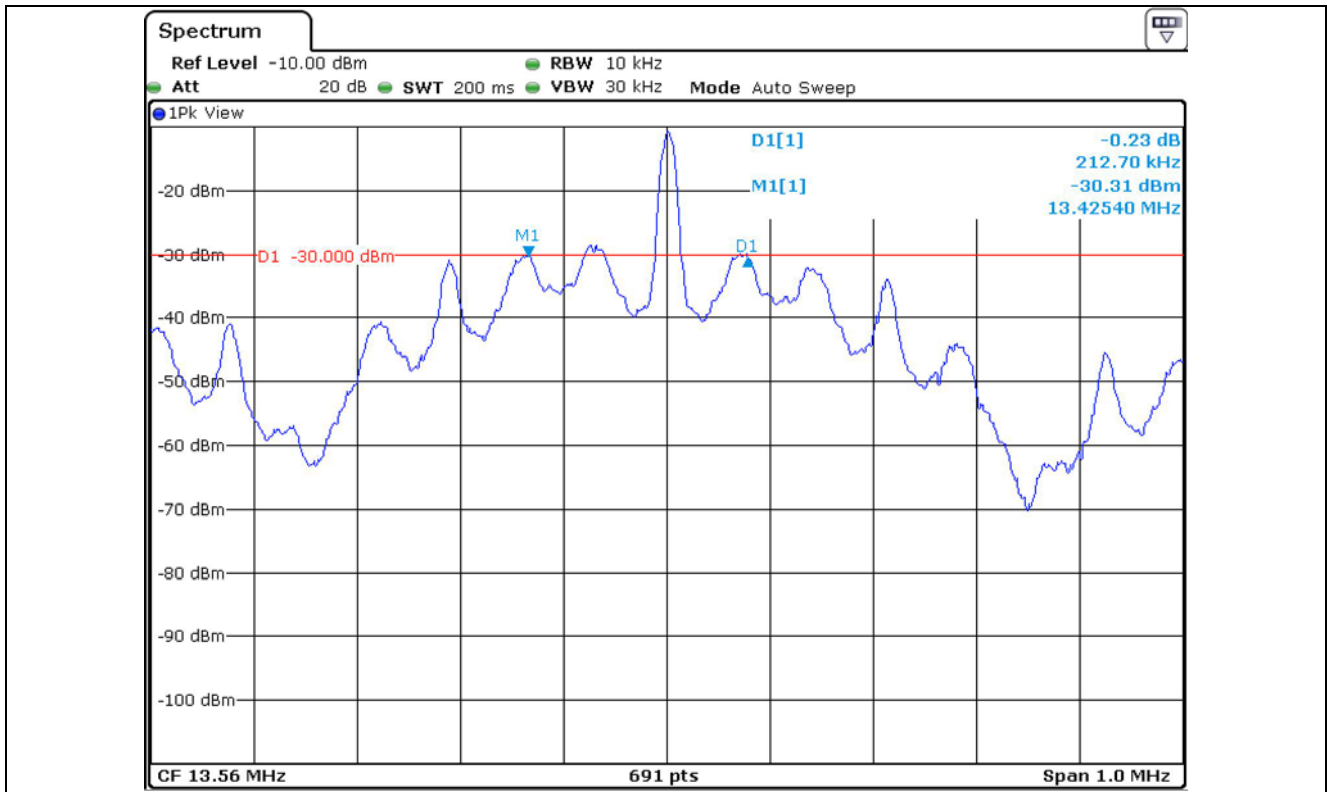
### 6.3 Test data for Bandwidth

-. Test Date : May 10, 2012  
-. Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.215(c)

Operating Freq. (MHz)	Measured Value (kHz)	Assigned Operating Frequency Band (kHz)	Result
13.56	212.7	900	PASS

Remark: See next page for 20 dB Bandwidth test data

Tested by: Chang-Uk, Jun / Engineer





## 7. FREQUENCY STABILITY WITH TEMPERATURE VARIATION

### 7.1 Operating environment

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

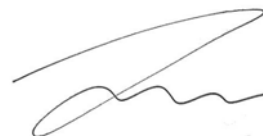
### 7.2 Test set-up

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 : May 10~11, 2012  
-. Result : PASSED BY -257 Hz at 0 °C

Temperature (°C)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Margin (Hz)	Limit (Hz)
-20	13 560 000	13 561 085	271	± 1 356.00
-10		13 561 089	267	
0		13 561 099	257	
10		13 561 091	265	
20		13 561 036	320	
30		13 561 028	328	
40		13 561 004	352	
50		13 560 968	388	



Tested by: Chang-Uk, Jun / Engineer

## 8. FREQUENCY STABILITY WITH VOLTAGE VARIATION

### 8.1 Operating environment

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

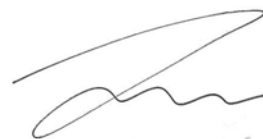
### 8.2 Test set-up

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 : May 10, 2012  
-. Result : PASSED BY -323 Hz

Voltage (Vdc)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Margin (Hz)	Limit (Hz)
8.51(115 %)	13 560 000	13 561 023	333	± 1 356.00
7.4(100 %)		13 561 033	323	
6.29(85 %)		13 561 020	336	



**Tested by: Chang-Uk, Jun / Engineer**

## 9. FIELD STRENGTH CALCULATION

Receiver readings are compared to the specification limit correcting for antenna factor, pre-amplifier gain and cable losses.

+	Receiver reading	(dB $\mu$ V)
+	Cable Loss	(dB)
+	Antenna Factor	(dB/m)
-	Pre-Amplifier Gain	(dB)
<hr/>		
=	Reading	(dB $\mu$ V/m)
	Specification Limit	(dB $\mu$ V/m)
-	Reading	(dB $\mu$ V/m)
<hr/>		
=	dB Relative to Spec	( $\pm$ dB)