

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT

Test Report No. : E145R-026

AGR No. : A141A-151

Applicant : IDP Corp., Ltd.
Address : (Guro-dong, Buycksan digital valley 7), 601, 50, Digital-ro33-gil, Guro-gu, Seoul, South Korea

Manufacturer : IDP Corp., Ltd.
Address : (Guro-dong, Buycksan digital valley 7), 601, 50, Digital-ro33-gil, Guro-gu, Seoul, South Korea

Type of Equipment : Card Printer

FCC ID : VU2-SMART-30D

Model Name : SMART-30D

Multiple Model Name : SOLID-300D

Serial number : N/A

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

Date of Incoming : February 24, 2014

Date of Issuing : May 15, 2014

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.

Reviewed by: 

 Ki-Hong, Nam / Senior Engineer
 ONETECH Corp.

Approved by: 

 Gea-Won, Lee / Managing Director
 ONETECH Corp.

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Revision History

Issue Report No.	Issued Date	Revisions	Effect Section
E145R-026	May 15, 2014	Initial Release	All

1. VERIFICATION OF COMPLIANCE

- APPLICANT : IDP Corp., Ltd.
- ADDRESS : (Guro-dong, Buycksan digital valley 7), 601, 50, Digital-ro33-gil, Guro-gu, Seoul, South Korea
- CONTACT PERSON : Yong tae, Kim / Deputy General Manager
- TELEPHONE NO : +82-02-6099-3724
- FCC ID : VU2-SMART-30D
- MODEL NO/NAME : SMART-30D
- SERIAL NUMBER : N/A
- DATE : May 15, 2014

DEVICE TYPE	DXX - Low Power Communication Device Transmitter
E.U.T. DESCRIPTION	Card Printer- Intentional Radiator
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 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 IDP Corp., Ltd., Model SMART-30D (referred to as the EUT in this report) is an Card Printer, which has function for printer with 13.558 5 MHz RF board for detection cartridge in the printer. Product specification information described herein was obtained from product data sheet or user’s manual.

DEVICE TYPE	Fixed Device
MODULATION	ASK
TRANSMITTING FREQUENCY	13.558 5 MHz
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1 MHz)	13.56 MHz
ANTENNA TYPE	PCB Antennas
USED AC/DC ADAPTER	Output: DC 24 V, 2.71 A Model No: ATS065-P241 Manufacturer: Adapter Technology Co., Ltd
NUMBER OF LAYERS	6 Layers
EXTERNAL CONNECTOR	DC Jack , USB Port

2.2 Model Differences:

The following lists consist of the added model and their differences.

Model Name	Differences	Tested
SMART-30D	Basic Model	<input checked="" type="checkbox"/>
SOLID-300D	The model is identical to basic model except for the exterior color.	<input type="checkbox"/>

Note: 1. Applicant consigns only basic model to test, therefore this test report just guarantees the units which have been tested.

2. The Applicant/manufacturer is responsible for the compliance of all variants.

2.3 Related Submittal(s) / Grant(s)

Original submittal only

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 C63.10: 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 is located at 307-51 Daessangryung-ri, Chowol-eup, Gwangju-si, Gyeonggi-do and 10 m Semi Anechoic Chamber (SAC) and conducted measurement facilities are located at 301-14, Daessangryung-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 under APEC TEL MAR between the RRA and the FCC.

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	I&A SYSTEM CO., LTD.	SMART B,D Rev, 0.57	N/A
RF TAG BOARD	I&A SYSTEM CO., LTD.	RF Tag B,D Rev, 0.2	N/A
ROTATOR BOARD	I&A SYSTEM CO., LTD.	ROTATOR B,D Rev, 0.2	N/A

3.2 Peripheral equipment

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

Model	Manufacturer	Description	Connected to
SMART-30D	IDP Corp., Ltd.	Card Printer (EUT)	-
ATS065-P241	Adapter Technology Co., Ltd.	Adapter	EUT

3.3 Mode of operation during the test

-. The EUT has 13.558 5 MHz RF boards for printer for making IC Card and the power of the EUT shall be supplied by AC/DC adapters, so the test was performed for program was used for making continuous transmission mode during the test.

3.4 Equipment Modifications

-. None

3.5 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 C63.10: 2009 to determine the worse operating conditions.

Radiated Emission Test : Preliminary radiated emissions test were conducted using the procedure in ANSI C63.10: 2009 to determine the worse operating conditions. The radiated emissions measurements were performed on the 10 m Semi Anechoic Chamber.
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.

3.6 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

Continuous Transmitting Mode	The Worse operating condition (Please check one only)
Printing Mode	X

4.2 Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

Continuous Transmitting Mode	The Worse operating condition (Please check one only)
Printing Mode	X

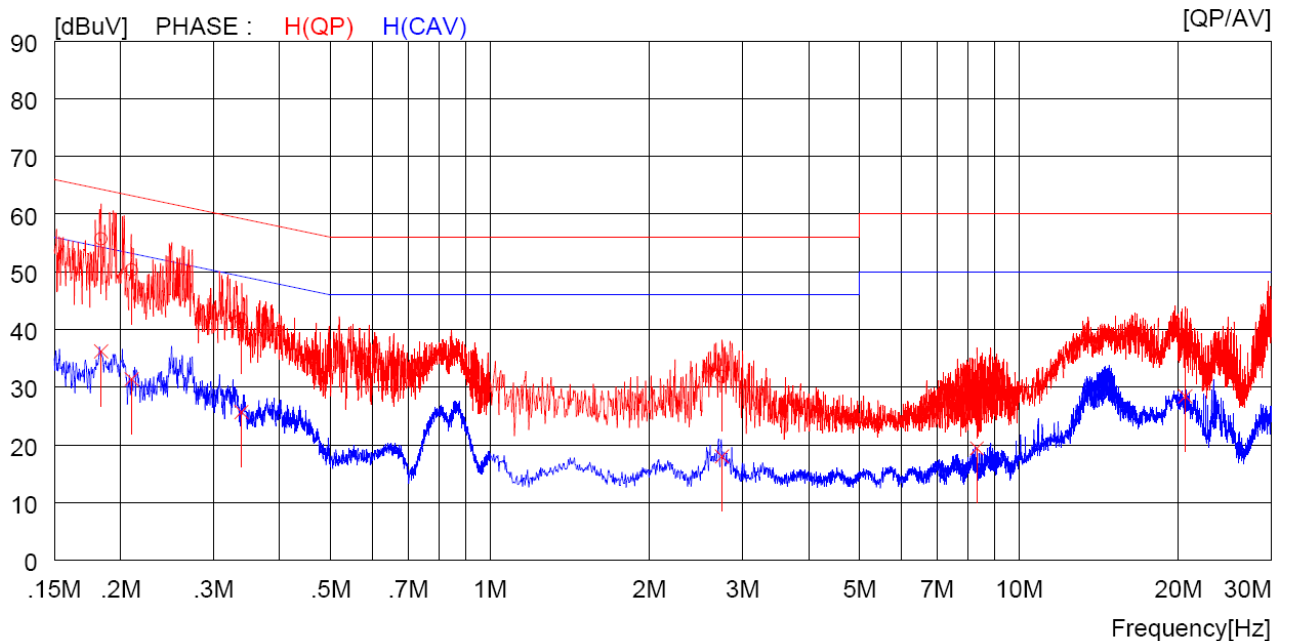
5. FINAL RESULT OF MEASUREMENT

Preliminary test was done in normal operation mode. And the final measurement was selected for the maximized emission level.

5.1 Conducted Emission Test

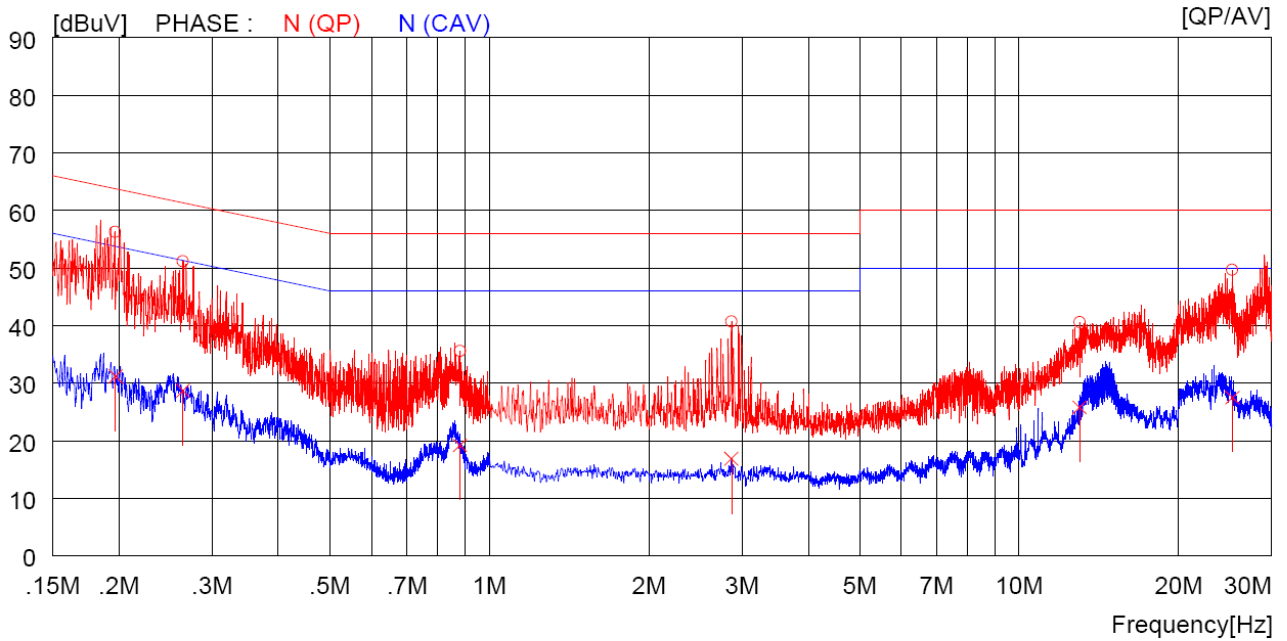
Humidity Level : (41 ~ 42) % R.H. Temperature: (22 ~ 23) °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART B, SECTION 15.207(a)
 Result : PASSED

EUT : Card Printer Date: April 28, 2014
 Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)
 Tested Line : HOT LINE



NO	FREQ [MHz]	READING		C. FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.18400	45.7	----	10.0	55.7	----	64.3	----	8.6	----	H (QP)
2	0.21000	40.3	----	10.0	50.3	----	63.2	----	12.9	----	H (QP)
3	0.33900	31.8	----	10.0	41.8	----	59.2	----	17.4	----	H (QP)
4	2.74400	21.8	----	10.1	31.9	----	56.0	----	24.1	----	H (QP)
5	8.33000	20.6	----	10.1	30.7	----	60.0	----	29.3	----	H (QP)
6	20.63000	27.3	----	10.8	38.1	----	60.0	----	21.9	----	H (QP)
7	0.18400	----	26.1	10.1	----	36.2	----	54.3	----	18.1	H (CAV)
8	0.21000	----	21.2	10.2	----	31.4	----	53.2	----	21.8	H (CAV)
9	0.33900	----	15.5	10.2	----	25.7	----	49.2	----	23.5	H (CAV)
10	2.74400	----	7.6	10.4	----	18.0	----	46.0	----	28.0	H (CAV)
11	8.33000	----	9.1	10.3	----	19.4	----	50.0	----	30.6	H (CAV)
12	20.63000	----	17.7	10.7	----	28.4	----	50.0	----	21.6	H (CAV)

Tested Line : NEUTRAL LINE



NO	FREQ [MHz]	READING		C. FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	AV [dBuV]		QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	QP [dBuV]	AV [dBuV]	
1	0.19700	46.2	----	10.1	56.3	----	63.7	----	7.4	----	N (QP)
2	0.26400	41.0	----	10.2	51.2	----	61.3	----	10.1	----	N (QP)
3	0.88100	25.4	----	10.2	35.6	----	56.0	----	20.4	----	N (QP)
4	2.86400	30.3	----	10.4	40.7	----	56.0	----	15.3	----	N (QP)
5	13.01000	30.2	----	10.4	40.6	----	60.0	----	19.4	----	N (QP)
6	25.31000	38.7	----	11.0	49.7	----	60.0	----	10.3	----	N (QP)
7	0.19700	----	21.1	10.1	----	31.2	----	53.7	----	22.5	N (CAV)
8	0.26400	----	18.5	10.2	----	28.7	----	51.3	----	22.6	N (CAV)
9	0.88100	----	9.0	10.2	----	19.2	----	46.0	----	26.8	N (CAV)
10	2.86400	----	6.5	10.4	----	16.9	----	46.0	----	29.1	N (CAV)
11	13.01000	----	15.4	10.4	----	25.8	----	50.0	----	24.2	N (CAV)
12	25.31000	----	16.5	11.0	----	27.5	----	50.0	----	22.5	N (CAV)

Remark: Margin (dB) = Limit – Level (Result)

The emission level in above table is included the transducer factor that means insertion loss (LISN), cable loss and attenuator.

Tested by: Tae-Ho, Kim / Project Engineer

5.2 Radiated Emission Test

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 : 43.4 % 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

EUT : Card Printer Date: April 28, 2014
 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)
13.558 5	27.98	H	18.40	0.30	46.68	124	77.32
13.558 5	20.84	V	18.40	0.30	39.54	124	84.46

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



Tested by: Tae-Ho, Kim / Project Engineer

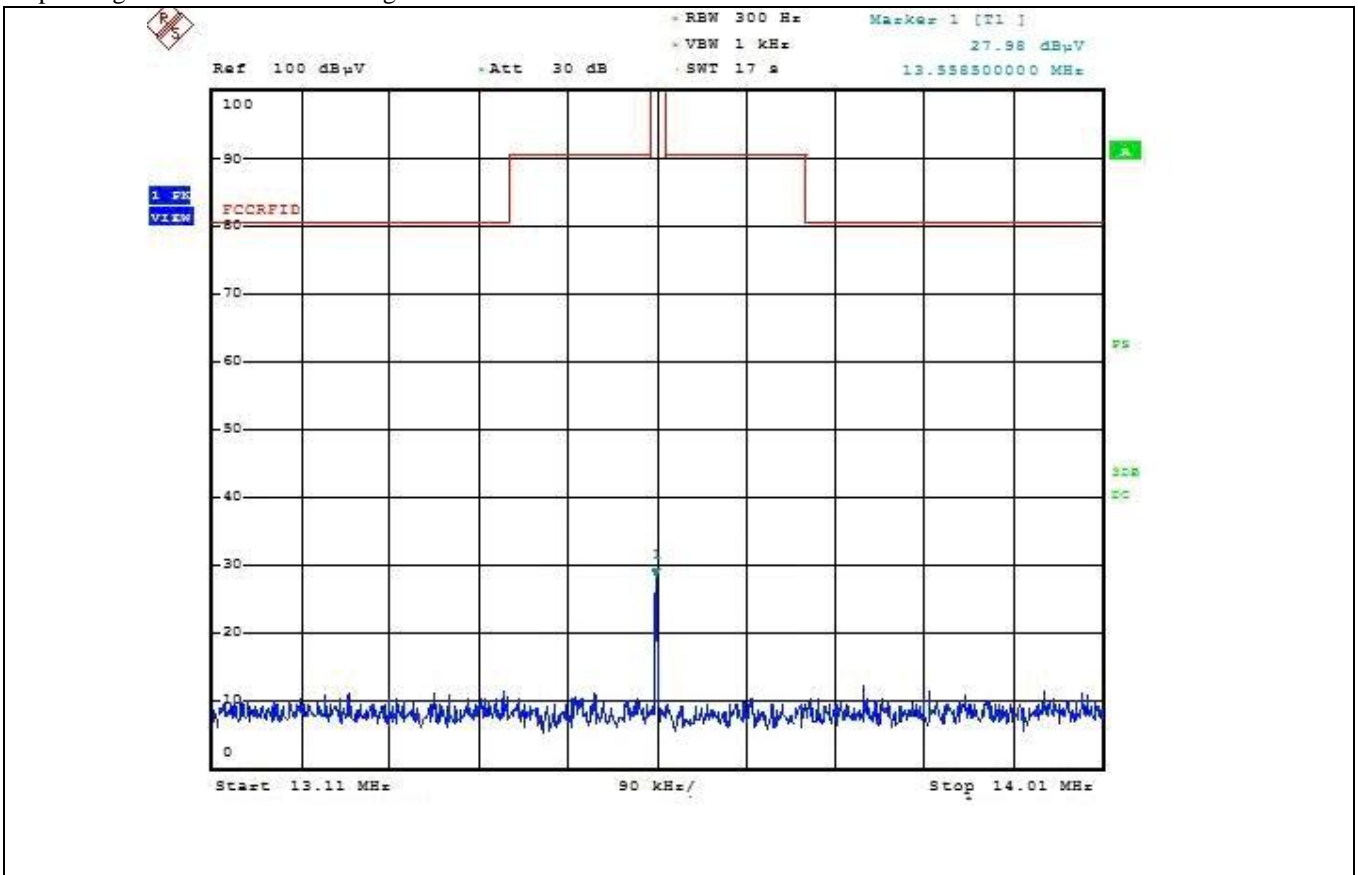
5.2.2 Operation frequency band: Below 13.553 MHz and above 13.567 MHz

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

Humidity Level : 43.4 % R.H. Temperature: 22 °C
 Limits apply to : PART 15, SUBPART C, SECTION 15.225(b) and (c)
 Type of Test : Low Power Communication Device Transmitter
 Result : PASSED

EUT : Card Printer Date: April 28, 2014

Operating Condition : Transmitting Mode



cc. to above test data, the field strength level of 13.558 5 MHz is 46.68 dBuV/m and the worst limit subject to 15.225 (b) and (c) is 80.5 dBuV/m, so the EUT meets the requirement.

Tested by: Tae-Ho, Kim / Project Engineer

5.3 Spurious Emission Test

5.3.1 Spurious Radiated Emission Below 30 MHz

Humidity Level : (44 ~ 45) % R.H. Temperature: (23 ~ 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
 Result : PASSED

EUT : Card Printer Date: April 28, 2014

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: Tae-Ho, Kim / Project Engineer

5.3.2 Spurious Radiated Emission below 1 GHz

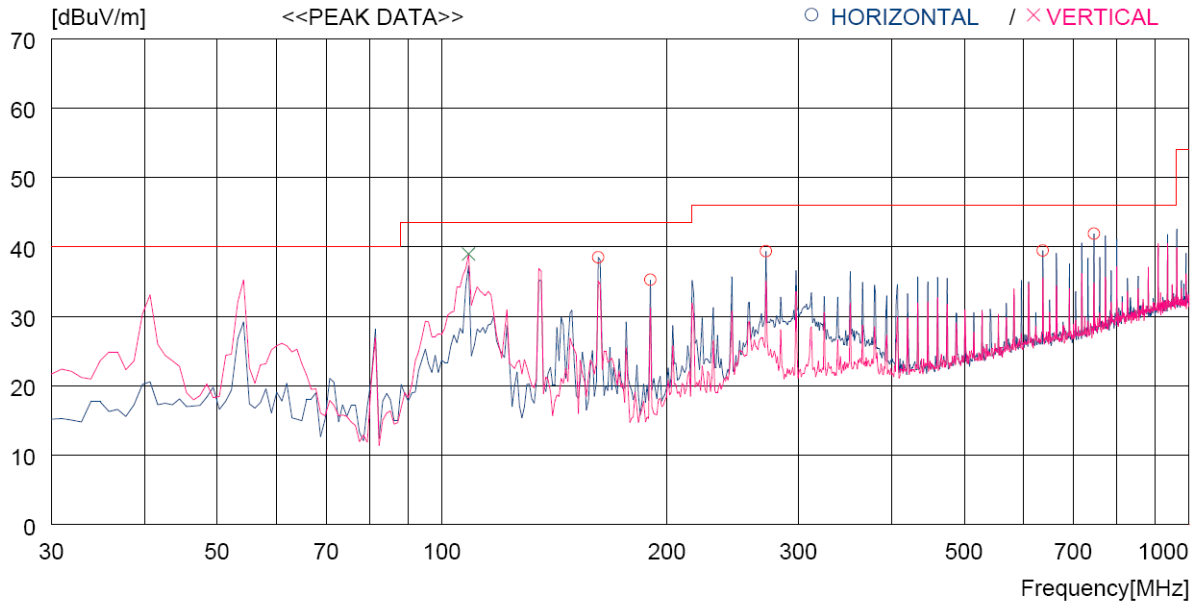
The following table shows the highest levels of radiated emissions on both polarizations of horizontal and vertical.

Humidity Level : (44 ~ 45) % R.H. Temperature: (23 ~ 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

EUT : Card Printer Date: April 28, 2014

Operating Condition : Transmitting Mode

Distance : 3 m



No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	161.920	53.5	9.5	8.5	33.0	38.5	43.5	5	200	103
2	190.050	48.6	11.0	8.7	33.0	35.3	43.5	8.2	100	123
3	271.530	49.0	14.1	9.3	33.0	39.4	46.0	6.6	100	110
4	637.217	41.0	20.5	11.3	33.3	39.5	46.0	6.5	100	146
5	745.854	41.9	21.4	11.8	33.2	41.9	46.0	4.1	100	146
----- Vertical -----										
6	108.570	51.3	12.7	8.1	33.1	39.0	43.5	4.5	100	359

Tested by: Tae-Ho, Kim / Project Engineer

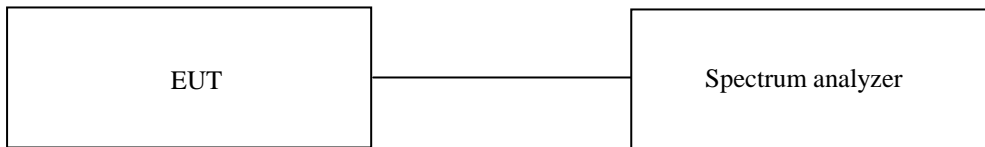
6. 20 dB BANDWIDTH

6.1 Operating environment

Temperature : 22 °C
 Relative humidity : 43.2 % 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.

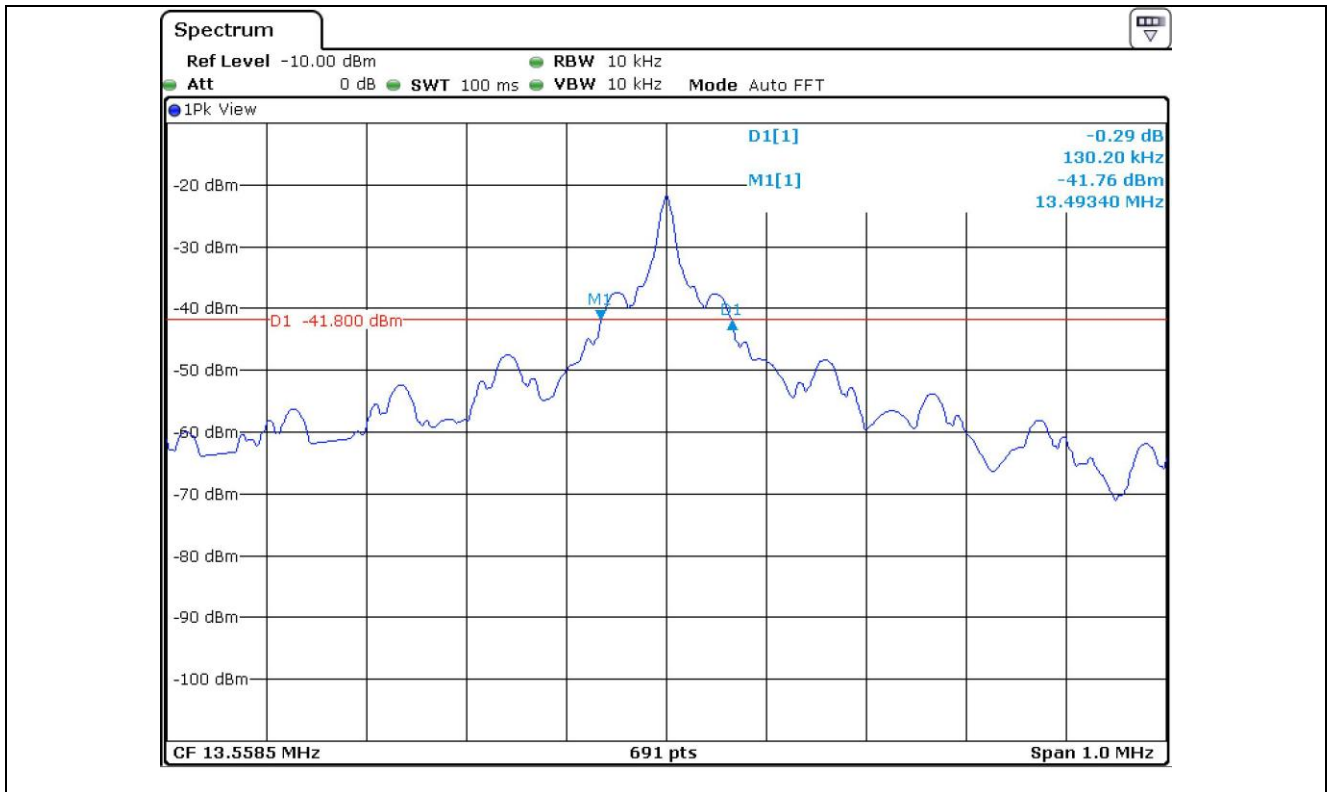


6.3 Test data

- Test Date : April 29, 2014

- 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
13.558 5	130.20	900	PASS



Tested by: Tae-Ho, Kim / Project Engineer

7. FREQUENCY STABILITY WITH TEMPERATURE VARIATION

7.1 Operating environment

Temperature : 22 °C
 Relative humidity : 43.4 % 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 : April 28, 2014
 -. Result : PASSED

Temperature (°C)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Margin (Hz)	Limit (Hz)
-20	13 558 500	13 558 531	1 324.85	± 1 355.85
-10		13 558 539	1 316.85	
0		13 558 541	1 314.85	
10		13 558 544	1 311.85	
20		13 558 547	1 308.85	
30		13 558 549	1 306.85	
40		13 558 552	1 303.85	
50		13 558 554	1 301.85	



Tested by: Tae-Ho, Kim / Project Engineer

8. FREQUENCY STABILITY WITH VOLTAGE VARIATION

8.1 Operating environment

Temperature : 22.1 °C
 Relative humidity : 43.3 % 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 : April 29, 2014
 -. Result : PASSED

Voltage (Vac)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Margin (Hz)	Limit (Hz)
126.5(115 %)	13 558 500	13 558 552	1 303.85	± 1 355.85
110(100 %)		13 558 547	1 308.85	
93.5(85 %)		13 558 541	1 314.85	



Tested by: Tae-Ho, Kim / Project Engineer

9. FIELD STRENGTH CALCULATION

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

+	Meter reading	(dB μ V)
-	Amplifier Gain	(dB)
+	Cable Loss	(dB)
-	Antenna Factor	(dB/m)
<hr/>		
=	Corrected Result	(dB μ V/m)
Margin (dB)		
	Specification Limit	(dB μ V/m)
-	Corrected Result	(dB μ V/m)
<hr/>		
=	dB Relative to Spec	(\pm dB)

10. LIST OF TEST EQUIPMENT

No.	EQUIPMENTS	MFR.	MODEL	SER. NO.	LAST CAL	DUE CAL	USE
1.	Test receiver	R/S	ESCI	101012	Nov. 18, 2013	One Year	■
2.		R/S	ESU	100261	Apr. 29, 2014	One Year	■
3.		R/S	ESHS10	834467/007	Jul. 02, 2013	One Year	■
4.	Spectrum analyzer	R/S	FSV30	101372	April 28, 2014	One Year	■
5.	Amplifier	Sonoma Instrument	310N	312544	Apr. 28, 2014	One Year	■
6.	Amplifier	Sonoma Instrument	310N	312545	Apr. 28, 2014	One Year	■
7.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-225	Sep. 12, 2012	Two Year	■
8.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-419	Apr. 02, 2014	Two Year	■
9.	Controller	Innco System	CO2000	619/27030611/L	N/A	N/A	■
10.	LISN	EMCO	3825/2	9109-1867	Apr. 29, 2014	One Year	■
				9109-1869	Apr. 29, 2014	One Year	-
		Schwarzbeck	NSLK8126	8126-404	Apr. 29, 2014	One Year	-
		Schwarzbeck	NSLK8128	8128-216	Jun. 07, 2013	One Year	■
11.	Turn Table	Innco System	DT3000	930611	N/A	N/A	■
12.	Antenna Master	Innco System	MA4000-EP	MA4000/332	N/A	N/A	■
13.	Antenna Master	Innco System	MA4000-EP	MA4000/335	N/A	N/A	■
14.	Loop Antenna	R/S	HFH2-Z2	889285/26	Dec. 11, 2012	Two Year	■
15.	Frequency Counter	HP	53152A	US39270295	Nov. 07, 2013	One Year	■
16.	Chamber	Sam Kun	SSE-43CI-A	060712	May 15, 2014	One Year	■
17.	DC Power Supply	Digital Electronics	DRP-305DN	4030195	Sep. 03, 2013	One Year	■