

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT

Test Report No. : E138R-008

AGR No. : A135A-154

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-30S

Model Name : SMART-30S

Serial number : N/A

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

Date of Incoming : June 18, 2013

Date of Issuing : August 06, 2013

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
E138R-008	August 06, 2013	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 : Kim yong tae / Deputy General Manager
- . TELEPHONE NO : +82-02-6099-3724
- . FCC ID : VU2-SMART-30S
- . MODEL NO/NAME : SMART-30S
- . SERIAL NUMBER : N/A
- . DATE : August 06, 2013

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-30S (referred to as the EUT in this report) is an Card Printer, which has function for printer with 13.56 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	13.562 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, 2.7 A Model No: STD-2427P Manufacturer: Adapter Technology Co., Ltd
NUMBER OF LAYERS	6 Layers
EXTERNAL CONNECTOR	DC Jack , USB Port

2.2 Model Differences:

-. None

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
Printer Main Board	IDP Co.,Ltd	Smart Board V 0.57	N/A
RF Tag Board for Printer	IDP Co.,Ltd	RF Tag Board V 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-30S	IDP Corp., Ltd.	Card Printer (EUT)	-
STD-2427P	Adapter Technology Co., Ltd.	Adapter	EUT

3.3 Mode of operation during the test

-. The EUT has 13.56 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

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: July 25, 2013
 Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)

Frequency (MHz)	Line	Quasi-Peak (dBµV)		Margin (dB)
		Emission level	Q.P Limits	
0.25	N	35.98	61.76	25.78
0.94	N	31.95	56.00	24.05
4.49	N	29.98	56.00	26.02
12.08	N	34.30	60.00	25.70
13.56	H	46.09	60.00	13.91
27.13	H	42.66	60.00	17.34
Frequency (MHz)	Line	Average (dBµV)		Margin (dB)
		Emission level	Limits	
0.94	N	31.27	46.00	14.73
12.08	N	27.91	50.00	22.09
13.56	N	44.08	50.00	5.92
27.13	H	41.73	50.00	8.27

Line Conducted Emissions Tabulated Data

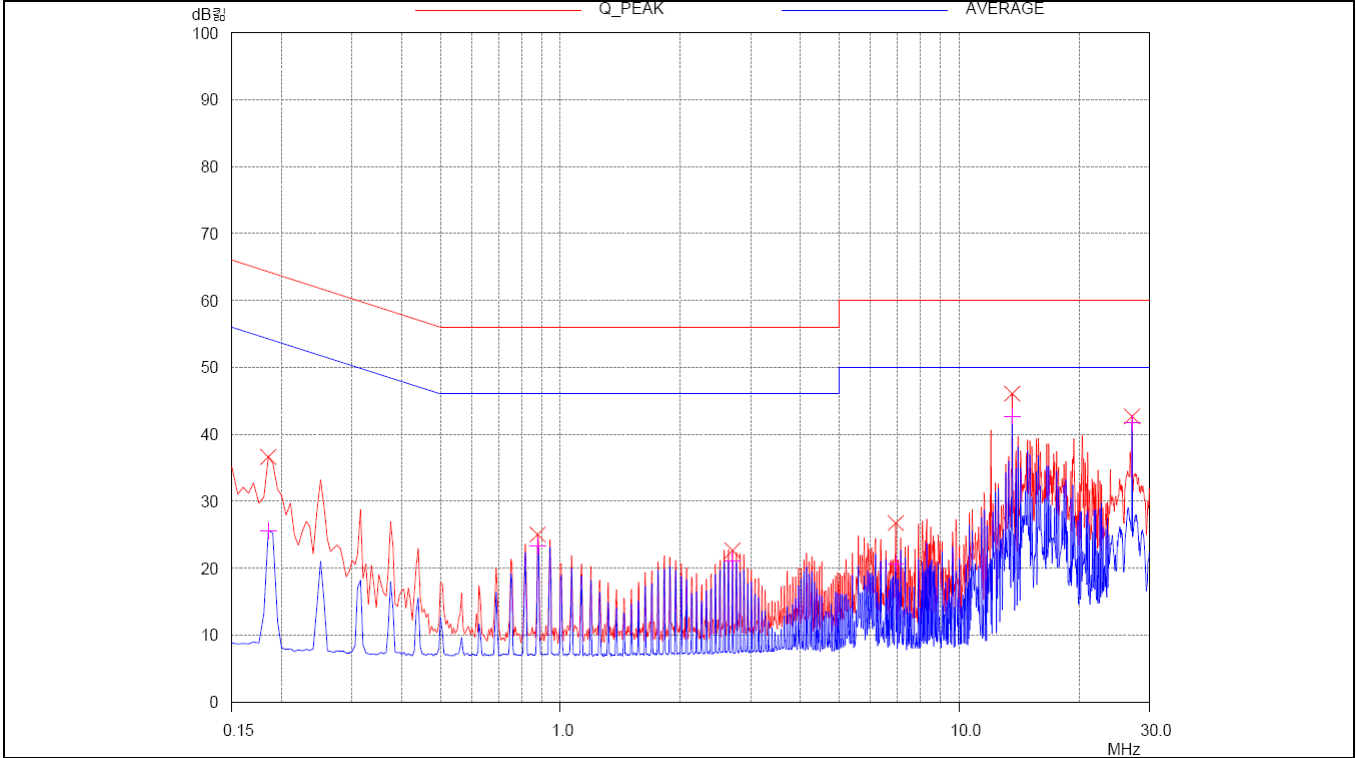
Remark: "H": Hot Line, "N": Neutral Line.

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

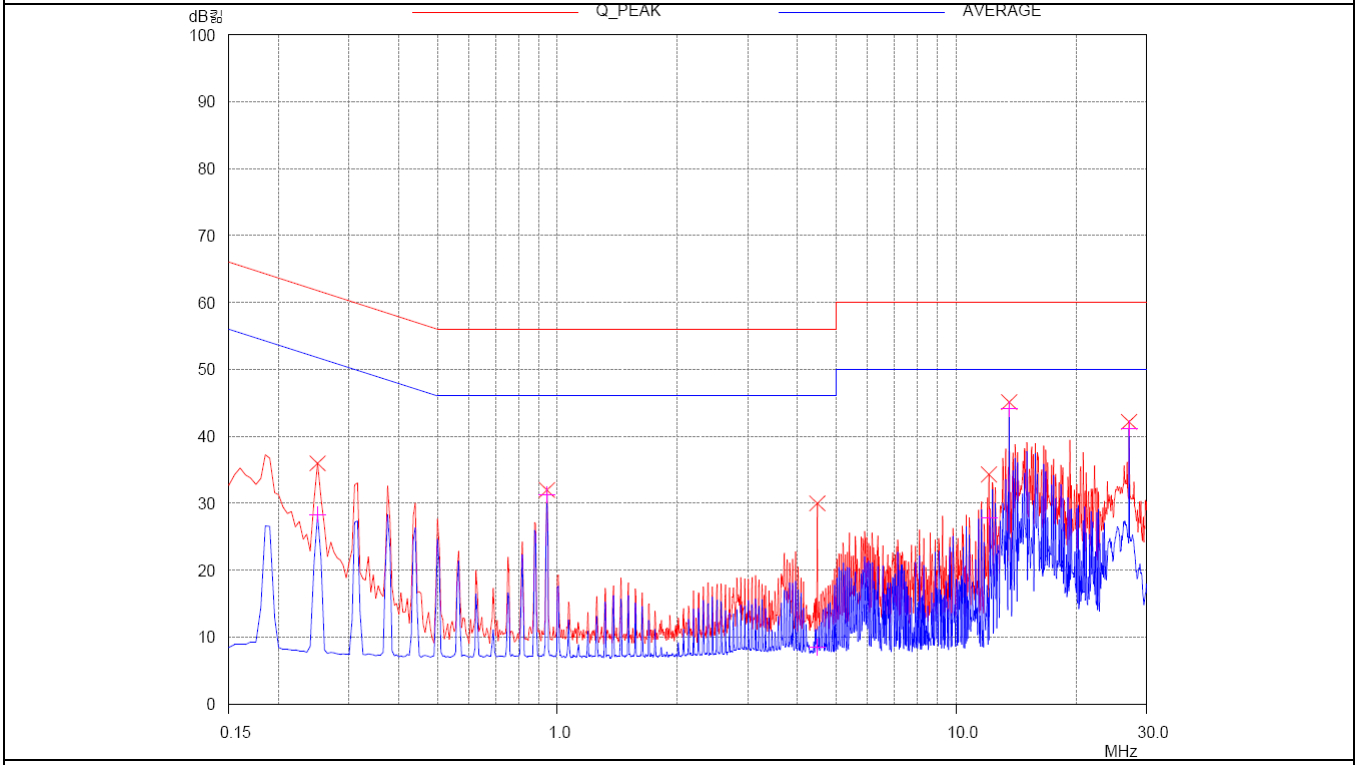


Tested by: Tae-Ho, Kim / Project Engineer

Graphical representation of Conducted Emission



HOT LINE



NEUTRAL LINE

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 : 44 % R.H. Temperature: 23 °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: August 06, 2013
 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)
13.562 5	28.58	H	18.40	0.30	47.28	124	76.72
13.562 5	22.35	V	18.40	0.30	41.05	124	82.95

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



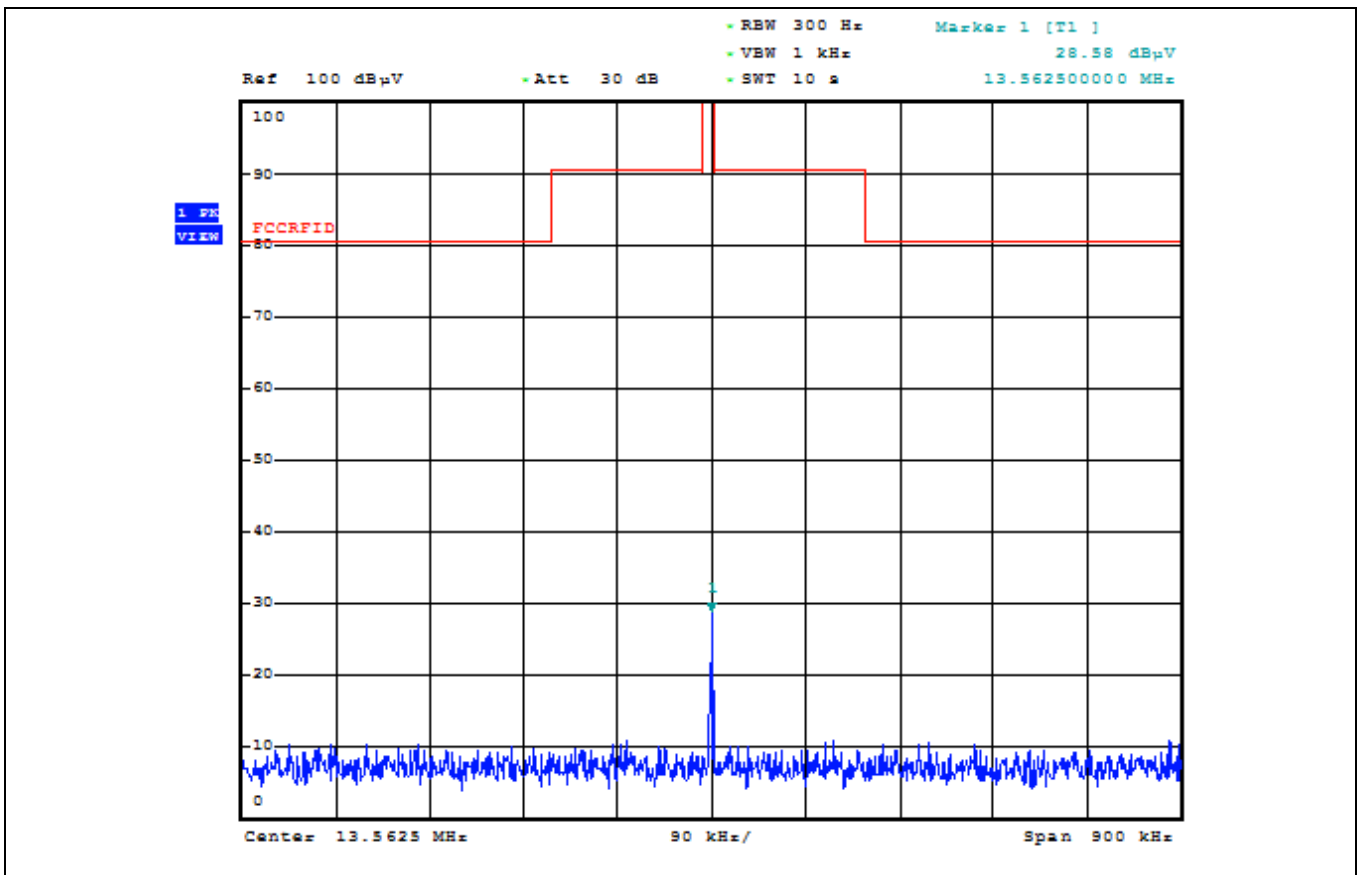
Tested by: Tae-Ho, Kim / Project Engineer

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 : 44 % R.H. Temperature: 23 °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: August 06, 2013
 Operating Condition : Transmitting Mode



Acc. to above test data, the field strength level of 13. 562 5 MHz is 47.28 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 % R.H. Temperature: 23 °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: August 05, 2013
 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.									



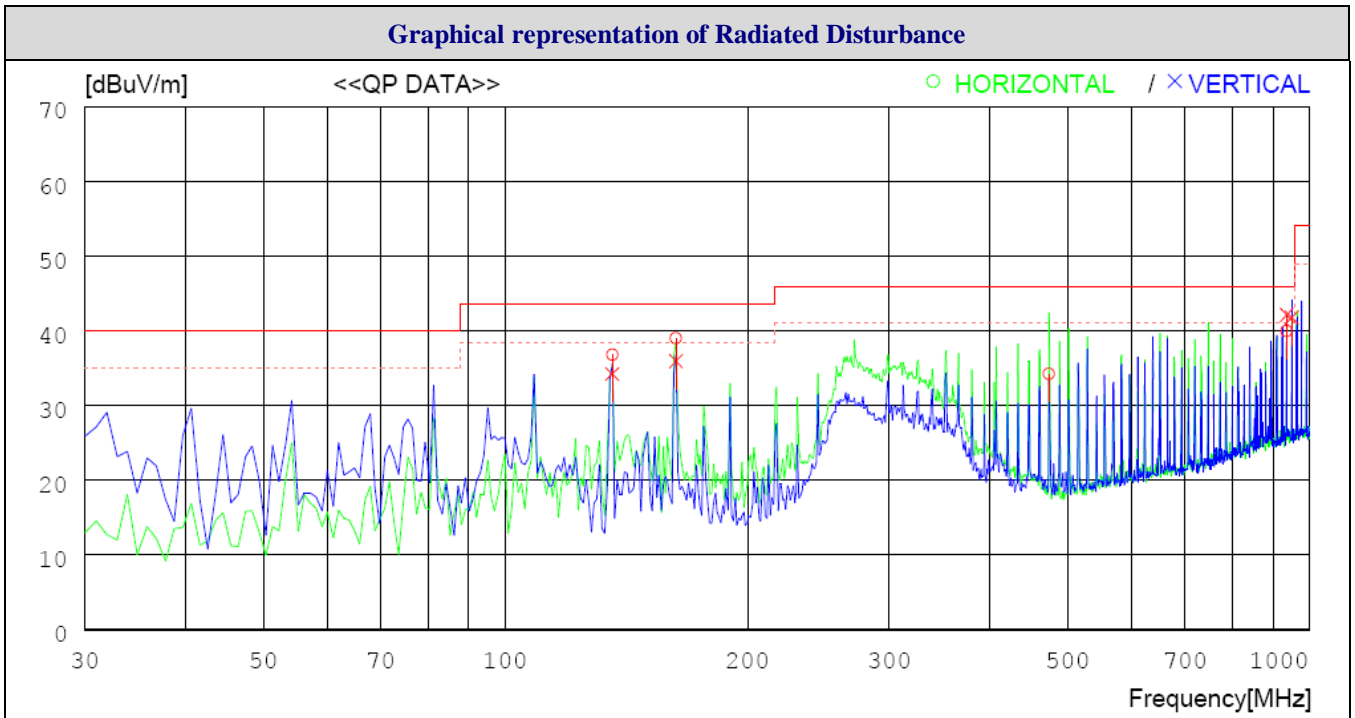
Tested by: Tae-Ho, Kim / Project Engineer

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	: <u>(44 ~ 45) % R.H.</u>	Temperature: <u>(23 ~ 24) °C</u>
Limits apply to	: <u>FCC CFR 47, PART 15, SUBPART C, SECTION 15.225(d)</u>	
Type of Test	: <u>Low Power Communication Device Transmitter</u>	
Frequency range	: 30 MHz ~ 1 000 MHz	
Result	: <u>PASSED</u>	

EUT	: Card Printer	Date: August 06, 2013
Operating Condition	: Transmitting Mode	
Distance	: 3 m	



Tabulated Results for Radiated Disturbance										
No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	135.730	57.8	9.6	2.5	33.1	36.8	43.5	6.7	200	0
2	162.890	59.8	9.5	2.7	33.0	39.0	43.5	4.5	200	0
3	935.968	42.2	23.6	6.4	32.2	40.0	46.0	6.0	200	0
4	474.261	44.8	18.0	4.5	33.1	34.2	46.0	11.8	400	0
----- Vertical -----										
5	135.730	55.2	9.6	2.5	33.1	34.2	43.5	9.3	300	0
6	162.890	56.7	9.5	2.7	33.0	35.9	43.5	7.6	300	0
7	935.968	44.3	23.6	6.4	32.2	42.1	46.0	3.9	100	0
8	949.547	43.7	23.7	6.5	32.1	41.8	46.0	4.2	200	352

Remark: Margin (dB) = Limit – Result and Result = Reading Quasi-Peak + Antenna Factor + Loss – Gain
Loss and Gain in above table means Cable Loss and Pre-amplifier gain



Tested by: Tae-Ho, Kim / Project Engineer

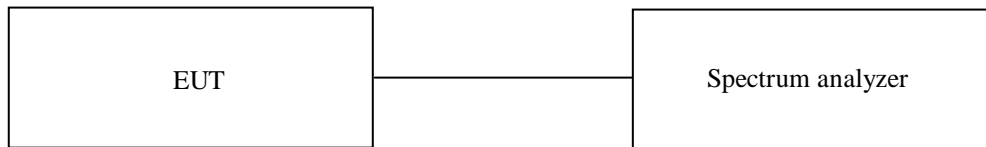
6. 20 dB BANDWIDTH

6.1 Operating environment

Temperature : 23 °C
Relative humidity : 45 % 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.

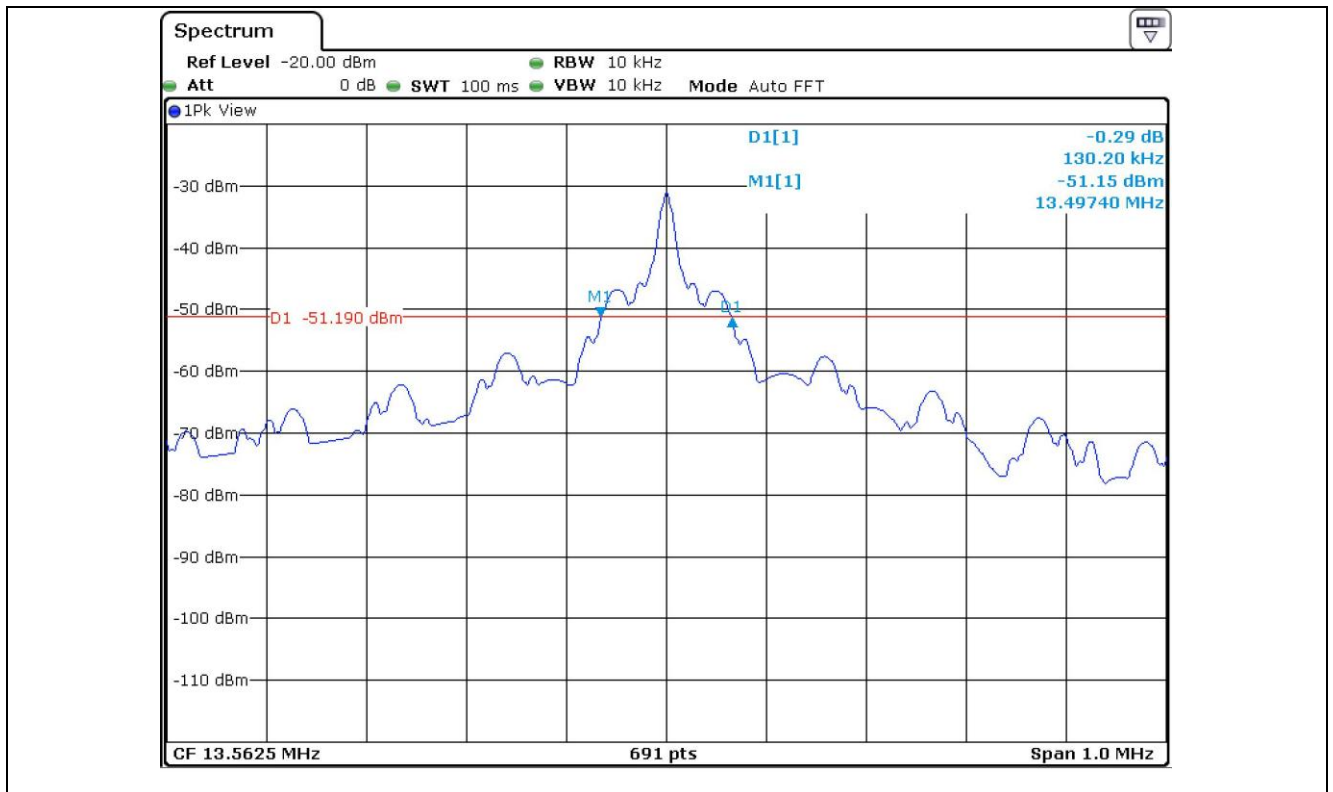


6.3 Test data

- Test Date : July 29, 2013

- 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
13.562 5	130.20	900	PASS



Tested by: Tae-Ho, Kim / Project Engineer

7. FREQUENCY STABILITY WITH TEMPERATURE VARIATION

7.1 Operating environment

Temperature : 25 °C
 Relative humidity : 46 % 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 : July 30, 2013
 -. Result : PASSED

Temperature (°C)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Margin (Hz)	Limit (Hz)
-20	13 562 500	13.562 597	1 259.25	± 1 356.25
-10		13.562 574	1 282.25	
0		13.562 528	1 328.25	
10		13.562 486	1 342.25	
20		13.562 455	1 311.25	
30		13.562 443	1 299.25	
40		13.562 425	1 281.25	
50		13.562 411	1 267.25	



Tested by: Tae-Ho, Kim / Project Engineer

8. FREQUENCY STABILITY WITH VOLTAGE VARIATION

8.1 Operating environment

Temperature : 25 °C
 Relative humidity : 46 % 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 : July 30, 2013
 -. Result : PASSED

Voltage (Vac)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Margin (Hz)	Limit (Hz)
126.5(115 %)	13 562 500	13 562 455	1 311.25	± 1 356.25
110(100 %)		13 562 448	1 304.25	
93.5(85 %)		13 562 440	1 296.25	



Tested by: Tae-Ho, Kim / Project Engineer

9. FIELD STRENGTH CALCULATION

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

+	Meter reading	(dB μ V)
+	Cable Loss	(dB)
+	Antenna Factor	(dB/m)
-	Amplifier Gain	(dB)
=	Corrected Reading	(dB μ V/m)
	Specification Limit	(dBuV/m)
-	Corrected Reading	(dBuV/m)
=	dB Relative to Limit	(\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	FEB/13	12MONTH	■
2.		R/S	ESU	100261	MAY/13	12MONTH	■
3.		R/S	ESHS10	834467/007	JUL/13	12MONTH	■
4.	Spectrum analyzer	R/S	FSV30	101372	MAY/13	12MONTH	■
5.	Amplifier	Sonoma Instrument	310N	312544	MAY/13	12MONTH	■
6.	Amplifier	Sonoma Instrument	310N	312545	MAY/13	12MONTH	■
7.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	VULB9163-202	DEC/12	24MONTH	■
8.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-419	FEB/12	24MONTH	■
9.	Controller	Innco System	CO2000	619/27030611/L	N/A	N/A	■
10.	LISN	EMCO	3825/2	9109-1867	MAY/13	12MONTH	■
				9109-1869	MAY/13		-
		Schwarzbeck	NSLK8126	8126404	MAY/13		-
		Schwarzbeck	NSLK8128	8128-216	JUN/13		■
11.	Turn Table	Innco System	DT3000	930611	N/A	N/A	■
12.	Antenna Master	Innco System	MA4000-EP	3320611	N/A	N/A	■
13.	Antenna Master	Innco System	MA4000-EP	3350611	N/A	N/A	■
14.	Loop Antenna	R/S	HFH2-Z2	889285/26	DEC/12	24MONTH	■
15.	Frequency Counter	HP	53152A	US39270295	DEC/12	12MONTH	■
16.	Chamber	Sam Kun	SSE-43CI-A	060712	MAY/13	12MONTH	■
17.	DC Power Supply	Digital Electronics	DRP-305DN	4030191	SEP/12	12MONTH	■