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Project No.:	12CA42753
File No.:	TC9191
Report No.:	12CA42753-6-FCC
Date:	January 8, 2012
Model No.:	SPP-R400
FCC ID.:	U5MSPP-R400

FCC Maximum Permissible Exposure Report

in accordance with
FCC Part 1 Subpart I §1.1307(b) & §1.1310

for

Mobile Printer

BIXOLON CO.,LTD.

7th~8th FL, Miraeasset Venture Tower, 685, Sampyeong-dong,
Bundang-gu, Seongnam-si, Korea

Summary of Test Results:

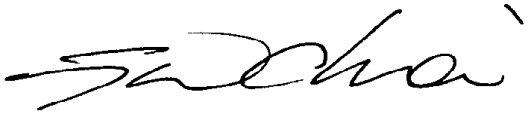
The following tests were performed on a sample submitted for evaluation of compliance with FCC Part 1 Subpart I Section 1.1307(b) & 1.1310

No	Reference Clause No.	Conformance Requirements	Result Verdict	Remark
1	1.1307(b)(1) 1.1310	Maximum Permissible Exposure (Exposure of Humans to RF Fields)	Complied	

Conclusion:

The tests listed in the Summary of Testing section of this report have been performed and the results recorded by UL Korea Ltd. in accordance with the procedures stated in each test requirement and specification. The test list was determined by the Applicant as being applicable to the Equipment Under Test. As a result, the subject product has been verified to comply or not comply as noted in the Summary of Testing with each test specification. The test results relate only to the items tested.

Reported by
Kyung Duk Ko, WiSE Project Engineer
UL Verification Services- 3014ASEO
UL Korea Ltd.
January 8, 2012



Reviewed by
Jeawoon, Choi, WiSE Engineering Leader
UL Verification Services- 3014ASEO
UL Korea Ltd.
January 8, 2012

Test Report Details

Witnessed By:	UL Korea Ltd. 33rd FL. GFC Center, 737 Yeoksam-dong, Gangnam-gu, Seoul, 135-984, Korea
Test Site:	CTK Co. Ltd. 386-1, Ho-dong, cheoin-gu, Yongin-si, Gyeonggi-do, 449-100 Korea
Applicant:	BIXOLON CO.,LTD. 7th~8th FL, Miraeasset Venture Tower, 685, Sampyeong-dong, Bundang-gu, Seongnam-si, Korea
Applicant Contact:	Son, Hyunsuk
Title:	QM Manager
Phone:	+82 31 218 5582
E-mail:	hs@bixolon.com
Product Type:	Mobile Printer
Model Number:	SPP-R400
Trademark	BIXOLON®
Sample Serial Number:	N/A
Test standards:	FCC Part 1 Subpart I Section 1.1307(b) & 1.1310 Maximum Permissible Exposure (Exposure of Humans to RF Fields)
Sample Serial Number:	N/A
Sample Receive Date:	May 31, 2011
Testing Start Date:	June 6, 2011
Date Testing Complete:	July 4, 2011
Overall Results:	**Pass**

UL Korea Ltd. reports apply only to the specific test samples and test results submitted for UL's review. All samples tested were in good operating condition throughout the entire test program. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. UL Korea Ltd. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from UL Korea Ltd. issued reports. This report shall not be used to claim, constitute or imply product certification, approval, or any agency of the National Authorities. This report may contain test results that are not covered by the NVLAP or KOLAS accreditation.

Report Directory

1. General Product Information

1.1. Equipment Description

SPP-R400 is the module that integrates Wireless LAN (WLAN). This embedded module is optimized for WLAN enabled handheld mobile device.

1.2. Details of Test Equipment (EUT)

- Equipment Type : Mobile Printer
- Model No. : SPP-R400
- Trade name : BIXOLON
- Type of test Equipment : Portable type
- Operating characteristic : Short range wireless device operating in the 2400 – 2483.5 ISM frequency band
- Factory : EVERINT Co., Ltd.
  129, Chungjusandan 13(sipsam)-ro, Chungju-si,
  Chungcheongbuk-do, Korea
-

1.3. Equipment Configuration

The EUT is consisted of the following component provided by the manufacturer.

Use*	Product Type	Factory	Model	Comments
EUT	Mobile Printer	EVERINT Co., Ltd.	SPP-R400	-
Note: Use = EUT - Equipment Under Test, AE - Auxiliary/Associated Equipment. SIM - Simulator (Not Subjected to Test)				

1.4. Technical Data

Item	Type of Mobile Printer
Frequency Ranges	2400 – 2483.5 MHz
Kind of modulation (s)	11b(DSSS) : CCK, DQPSK, DBPSK 11g(OFDM) : BPSK, QPSK, 16QAM, 64QAM
Channel	11 channel
Antenna Gain	3.46 dBi
Working temperature	-20 ~ 70 ℃
Supply Voltage	DC 7.4 V

Note ;
1. All the technical data described above were provided by the manufacturer.

1.5. Antenna Information

Antenna Model Name : ECC-41B20-0000AA
Antenna Type : Chip Antenna
Manufacturer : EMW Co., Ltd.
Transmit Gain dBi : Max. 3.46 dBi
Azimuth Beam Pattern : Linear

1.6. Equipment Type :

☐ Radio and ancillary equipment for fixed or semi-fixed use
☐ Radio and ancillary equipment for vehicular mounted use
☐ Radio and ancillary equipment for portable or handheld use

☒ Stand alone ☐ Host connected ☐ Host connected

☐ Self contained single unit ☒ Module with associated connection or interface

1.7. Technical descriptions and documents

The following documents was provided by the manufacturer.

No.	Document Title and Description
1	User Manual
2	Product Specification for Antenna / EMW Co. Ltd.

2. Test Specification

The following test specifications and standards have been applied and used for testing.

KDB 447498 D01 : Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies

3. Test Conditions

3.1. Equipment Used During Test

Use*	Product Type	Manufacturer	Model	Comments
EUT	Mobile Printer	EVERINT Co., Ltd.	SPP-R400	-
AE	Personal Computer	Samsung Electronics Co., Ltd	DB-A150	-
AE	LCD Monitor	Lite-ON Technology Corp.	VS17	-
AE	Keyboard (PS/2)	Samsung Electro-Mechanics Co., Ltd.	SEM-DT35	-
AE	Mouse(USB)	Logitech Inc.	M-BT96a	-
Note: Use = EUT - Equipment Under Test, AE - Auxiliary/Associated Equipment. SIM - Simulator (Not Subjected to Test)				

3.2. Input/Output Ports

No	Port Name	Type*	Cable Max. >3m (Y/N)	Cable Shielded (Y/N)	Comments
1	Power Input	DC	N	N	Connected to DC Power supply
2	Radio Antenna	I/O	N	Y	-

Note:
*AC = AC Power Port DC = DC Power Port N/E = Non-Electrical
I/O = Signal Input or Output Port (Not Involved in Process Control)
TP = Telecommunication Ports

3.3. Power Interface

Mode #	**Voltage (V)**	**Current (A)**	**Power (W)**	**Frequency (DC/AC-Hz)**	**Phases (#)**	**Comments**
Rated	3.3 V	-	-	DC	-	Normal operating voltage

3.4. Operating Frequencies

Mode #	Frequency tested
1	- Low : 2412 MHz / CH = 1 - Mid : 2437 MHz / CH = 6 - Top : 2462 MHz / CH= 11

3.5. Operation Modes

Mode #	Description
1	Carrier on mode: Signal from the Mobile Printer was generated continuously for the representative channels (Low, Mid, High) by the test program incorporated

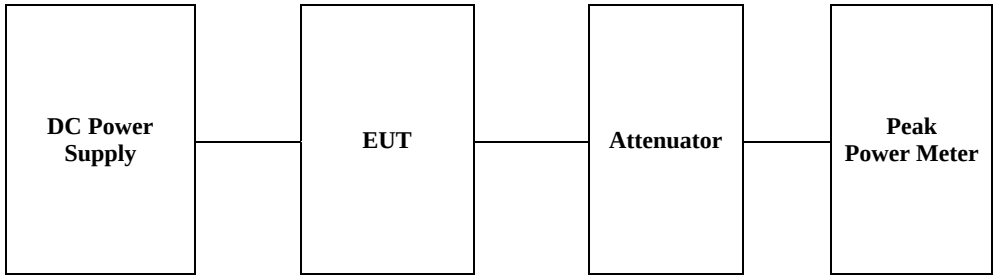
Note :
1. The worst-case condition is determined by the baseline measurement of RF output power out of various modulations and data rates. Therefore all applicable requirements were tested to the two type of higher output power data rate (11 Mbps and 24 Mbps)

3.6. Environment Conditions

Parameters	Normal condition
Temperature	+ 15℃ ~ +35℃
Humidity	20% ~ 75%
Supply voltage	3.3 Vdc (Rated nominal voltage)

Note ;
- The operating condition for humidity requirement has not been declared in the manufacturer's specification.
- Test has been carried out for three frequencies specified above under the normal.

3.7. Test Configurations

Mode #	Description
1	

3.8. List of Test Equipment

No	Description	Manufacturer	Model	Identifier	Cal. Due
2	EPM Series Power Meter	HP	E4418A	GB38272734	2011.11.12
3	Power Sensor	HP	8487A	3318A03524	2012.07.07
4	DC Power Supply	Agilent	E3632A	MY40011638	2011.11.12

4. Test Results of RF Exposure Evaluation

TEST: RF Exposure Evaluation			
Method	RF Exposure Evaluation of the EUT were measured according to the dictates in KDB 447498 Pd the limit of MPE, 1 ㎽/㎠. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached. **Friis transmission formula: Pd = (Pout*G)/(4*pi*R^2)** Where Pd = power density in mW/cm^2 Pout = output power to antenna in ㎽ G = gain of antenna in linear scale Pi = 3.1416 R = distance between observation point and center of the radiator in cm **General SAR test exclusion guidance** The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at *test separation distances* ≤ 50 mm are determined by: [(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)]*[√$f_{(GHz)}$] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where $f_{(GHz)}$ is the RF channel transmit frequency in GHz Power and distance are rounded to the nearest mW and mm before calculation[17] The result is rounded to one decimal place for comparison When the minimum *test separation distance* is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.		
Reference Clause	Part1 I Section 1.1307(b) & 1.1310		
Parameters recorded during the test	Laboratory Ambient Temperature	22 °C	
	Relative Humidity	36 %	
	Frequency range	Measurement Point	
Fully configured sample scanned over the following frequency range	2 412 MHz – 2 462 MHz	Antenna port	

Configuration Settings

Power Interface Mode # (See Section 3.3)	EUT Operation Mode # (See Section 3.5)	Test Configurations Mode # (See Section 3.7)
Rated	1	1
Supplementary information: None		

Limits

Environmental evaluation and exposure limit according to FCC Part 1, Subpart I, Section 1.1307(b) & 1.1310

According to Section 1.1310, The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in §1.1307(b)

Frequency Range (MHz)	Electric Field Strength(V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time
(A) Limits for Occupational /Control Exposures				
300 – 1 500	--	--	F/300	6
1 500 – 100 000	--	--	5	6
(B) Limits for General Population/Uncontrol Exposures				
300 – 1 500	--	--	F/1500	6
1 500 – 100 000	**--**	**--**	**1**	**30**

4.1. Output Power into Antenna & RF Exposure Evaluation Distance

4.1.1. Evaluation at 20 cm for Portable mode without Belt clip

Operation Mode	Data Rate (Mbps)	Channel	Channel Frequency (MHz)	Output Peak Power (dBm)	Duty Cycle (%)	Antenna Gain (dBi)	Power Density at 20 ㎝ (mW/cm^2)	LIMITS (mW/cm^2)
802.11b	11	Low	2412	7.46	100	3.46	0.002 460	1
		Middle	2437	7.18	100	3.46	0.002 306	
		High	2462	6.74	100	3.46	0.002 084	
802.11g	24	Low	2412	3.47	100	3.46	0.000 982	
		Middle	2437	3.27	100	3.46	0.000 937	
		High	2462	2.91	100	3.46	0.000 863	

4.1.2. Evaluation of Exclusion of SAR testing for Belt Clip mode

- For Belt clip mode, the distance from EUT to human body can be below 5 mm so a distance of 5 mm is applied to determine SAR testing exclusion.
- 7.46 dBm (5.57 mW) at 2412 MHz is the highest power level and it is applied for evaluation.

[(*max. power of channel, including tune-up tolerance, mW*)/(*min. test separation distance, mm*)]*[$\sqrt{f_{(GHz)}}$]

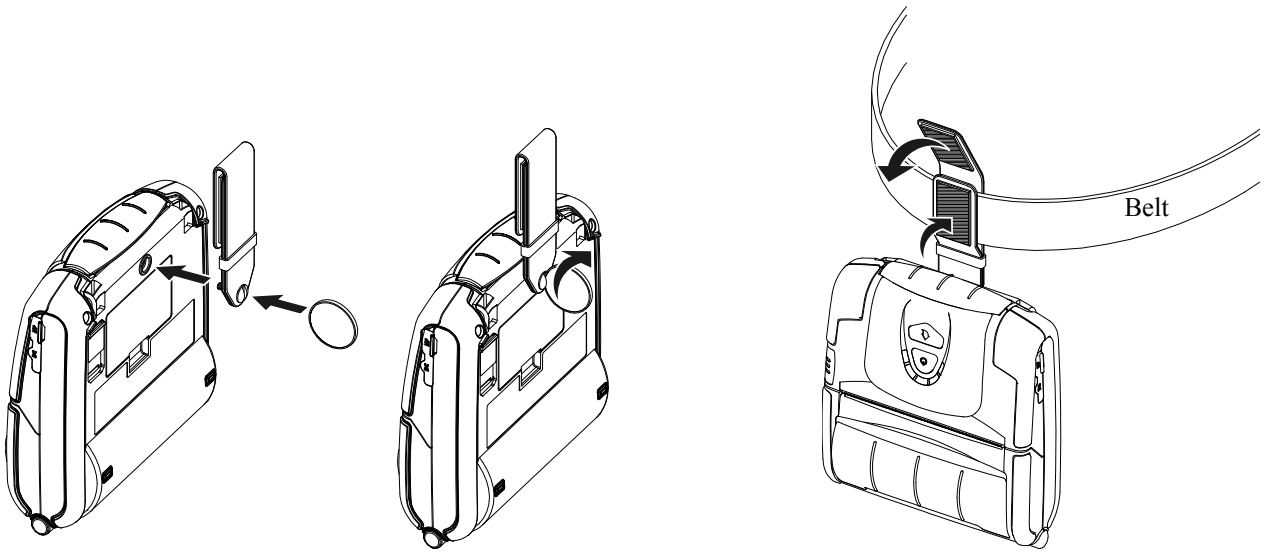
= (5.57 / 5) * √2.412 = 1.73

The evaluation 1.73 is lower than 3.0 for 1-g SAR and SAR test is excluded.

Note :

1. The power density at a distance of 20 ㎝ calculated from the friis transmission formula is far below each limits.

Figure 1.Description of Belt clip mode



APPENDIX A. Accreditations and Authorizations

CTK Co., Ltd. has been accredited / filed / authorized by the agencies listed in the following table;

Certificate	Nation	Agency	Code	Mark
Site Filing	USA	FCC	805871	Test Facility list & NSA Data
	Japan	VCCI	C-986 R-948 T-1843	Test Facility list & NSA Data
Certification	Korea	KC	KR0025	Test Facility list & NSA Data

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the "General requirements for the competent of calibration and testing laboratory".