RF TEST REPORT

Test report No.:	**EMC- FCC- R0006**
FCC ID:	**WMJ-RF101C**
Type of equipment:	**RFID System**
Brand Name:	**IL SUNG PRECISION**
Model Name:	**RF-101C**
Applicant:	**IL SUNG PRECISION**
FCC Rule Part(s):	**FCC Part Subpart C: 2008**
Frequency Range:	**13.56 MHz**
Test result:	**Complied**

The above equipment was tested by EMC compliance Testing Laboratory for compliance with the requirements of FCC Rules and Regulations.
The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Date of test: July 15, 2008 ~ July 22 , 2008

Issued date: July 22 , 2008

Tested by: NA, KAB JIN

Approved by: YOO, SUNG YOUNG .

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1. Client information

Applicant: IL SUNG PRECISION
Address: 182-2, Jegi-ri, Jeongnam-Myeon, Hwaseong-si, Geonggi-do, Korea
Telephone number: +82-31-354-1031
Facsimile number : +8231-354-1035
Contact person: Charles Park / Director

Manufacturer: IL SUNG PRECISION
Address: 182-2, Jegi-ri, Jeongnam-Myeon, Hwaseong-si, Geonggi-do, Korea
Telephone number: +82-31-354-1031
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Contact person: Charles Park / Director

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2. Laboratory information

Address
EMC Compliance Ltd.
82-1, JEIL-RI, YANGJI-MYUN, CHURINGU, YONGIN-CITY, KYUNGGI-DO,
KOREA 449-825
Telephone Number: 82 31 336 9919 Facsimile Number: 82 31 336 4767

Certificate
CBTL Testing Laboratory, KOLAS NO.: 231
FCC Filing No.: 793334
VCCI Registration No.: C-1713, R-1606, T-258

SITE MAP

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3. Description of E.U.T.

3.1 Product description

Applicant :	IL SUNG PRECISION
Address of Applicant:	182-2, Jegi-ri, Jeongnam-Myeon, Hwaseong-si, Gyeonggi-do, Korea
Type of equipment:	RFID System
Basic Model:	RF-101C
Variant Model:	-
CPU	ARM9 2440 32Bits 400MHz(133MHz)
Memory Module	Flash(BIOS):128kByte, Flash(APP):128kByte RAM(Working):256kByte,RAM(Data):512kByte Flash
LCD	Graphic LCD, 128 x 64 Dots, Black Light Blue
LED	OK, Error 2 lamp(red, green)
keyboard	10 Numeric key
Communication	RS-232c/485, TCP/IP, Wiegand
Voice	Message :12 ea (10 language)
Operating Time	Card reading :30 ms(13.56MHz), Verification :Less then 0.3 sec, Identification: Less then 2 sec
Operating Temperature	LCD: :-20° to +70° RF module: :-35° to +65°
Operating Humidity	10% to 90% relative humidity non-condensing
I/O port	In port:2 port(Exit button, Door sensor) Out port: 4 port (Door NC/NO,Siren NC/NO)
Input power	12V DC(main), 12V DC(I/O)
Humidity	10% ~90% RH
Dimension / Weight	130mm(L) x 130mm(W) x 39mm(H) / 375g
Baud rate	19,200 bps(recommended) / 9,600 bps / 38,400 bps / 57,600 bps selectable

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3.2 Basic description

Frequency Range	13.56 MHz
Frequency alignment range	13.110 ~ 14.010 MHz
Channel switching Frequency range	Fixed frequency :13.56 MHz
Channel spacing	Wide band
Duty Cycle	Up to 100%
Antenna Type	Internal (pattern antenna)
Type of Modulation	ASK
Number of channel	1 ch
Type of Unit	Radio equipment for Fixed use

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4. Summary of test results

4.1 Standards & results

Rule Reference	Parameter	Status
Part 15 Subpart C		
15.225 (a)	In-band Emission	C
15.225 (b)	In-band Emission	C
15.225 (c)	In-band Emission	C
15.225 (d) 15.209	Out-of –band Emission	C
15.225 (e)	Frequency Stability Tolerance	C
15.207	Conducted Emissions	C

Note: C=complies
NC= Not complies
NT=Not tested
NA=Not Applicable

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5. Test system configuration

5.1 Operation environment

		Temperature	Humidity	Pressure
OATS	:	28 °C	40 %	-
Shielded room	:	23 °C	35 %	-

Test site

These testing items were performed following locations;

Shielded Room : Conducted Emission
OATS (3 m) : Radiated Emission (#1)

5.2 Measurement Uncertainty

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Parameter	Uncertainty
Frequency Stability Tolerance	$\pm 0.067 \times 10^{-6}$
In-Band Emission, Radiated	±3.797 [dB]
Out-of-band Emission, Radiated	30-300 MHz ; ±3.53 [dBuV/m] 300-1000 MHz ; ±3.70 [dBuV/m]
Conducted emission	9kHz-150 kHz : ± 3.052 [dBuV] 150kHz-30 MHz : ± 2.532 [dBuV]

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6. Test results

6.1 In-band Emission (15.225 (a))

6.1.1 Minimum Standard

15.225 (a) The field strength of any emission within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

6.1.2 Test Result

- Complies

EUT	RFID System		
Operating Frequency	13.56MHz	**Model Name**	RF-101C
Operationg Mode	Transmitter Mode	**Modulation Technology**	ASK
Environmental Condition	28℃/40%	**Test Channel**	1ch
Tested By	Na Kab Jin	**Power Rate**	110 V AC

Frequency	Reading (dBuV)	Correction Factor		field strength dBμV/m at 3 m
		Ant(dB)	Cable(dB)	
13.56MHz	56.96	9.58	0.08	66.62
Maximum Level(dBμA/m)				66.62
Limit(dBuV/m) at 3m				124 dBuV/m
margin				57.38

Note: Field strength limit was calculated with 40dB/decade linear distance extrapolation factor.

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6.2 In-band Emission (15.225 (b)(c))

6.2.1 Minimum Standard

15.225 (b) With in the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

15.225 (c) With in the bands 13.110-13.410 MHz and 13.710-14.010 MHz, the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

6.2.2 Test Result

- Complied

Measurement Distance :3 m (OATS)

Freq (MHz)	Reading (dBuV)	Correction Factor (dB)	Emission level (dBuV/m)	Limit at 3m (dBuV/m)	Margin (dB)
13.509	6.61	9.61	16.28	90.47	74.19
13.612	5.61	9.66	15.27	90.47	75.20
13.348	31.27	9.66	40.93	80.50	39.27
13.771	35.60	9.66	45.26	80.50	35.24

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6.3 Out-of-band Emission (15.225 (d),15.209)

6.3.1 Minimum Standard

15.225 (d) The Field Strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in 15.209

Frequency (MHz)	Field Strength (uV/m)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30(29.54dBuV/m)	30
30.0-88.0	100(40 dBuV/m)	3
88-216	150(43.5 dBuV/m)	3
216-960	200 (46 dBuV/m)	3
Above 960	500 (53.98 dBuV/m)	

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6.3.2 Test Result

- Complied

Measurement Distance :3m (OATS)

Freq (MHz)	POL	Reading (dBuV)	Correction Factor (dB)	Emission level (dBuV/m)	Limit at 3m (dBuV/m)	Margin (dB)
79.10	H	16.7	10.37	27.07	40.0	12.93
79.10	V	11.6	10.37	21.97	40.0	18.03
149.88	H	20.8	15.94	36.74	43.5	6.76
149.88	V	21.0	15.94	36.94	43.5	6.56
187.34	H	27.8	13.98	41.78	43.5	1.72
187.34	V	28.1	13.98	42.08	43.5	1.42
212.33	H	26.2	13.43	39.63	43.5	3.87
212.33	V	25.8	13.43	39.23	43.5	4.27
299.77	H	27.4	17.08	44.48	46.0	1.52
299.77	V	25.4	17.08	42.48	46.0	3.52
624.51	H	14.9	25.81	40.71	46.0	5.29
624.51	V	18.2	25.81	44.01	46.0	1.99
649.48	H	12.7	26.22	38.92	46.0	7.08
649.48	V	16.0	26.22	42.22	46.0	3.78
699.44	H	14.2	27.03	41.23	46.0	4.77
699.44	V	16.3	27.03	43.33	46.0	2.67
899.29	H	11.3	30.47	41.77	46.0	4.23
899.29	V	16.7	30.47	40.47	46.0	5.53

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6.4 Frequency tolerance (15.225 (e))

6.4.1 Minimum Standard

15.225 (e) The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency over a temperature variation of −20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

6.4.2 Test Result

- Complied

VOLTAGE (%)	POWER (V)	TEMP (°C)	FREQ (Hz)	FREQ.DEV (Hz)	Deviation (%)
100	110	20	13560441	-59	-0.00044
		-20	13560592	92	0.00068
		-10	13560568	68	0.00050
		0	13560545	45	0.00033
		10	13560515	15	0.00011
		20	13560448	-52	-0.00038
		25	13560492	-8	-0.00006
		30	13560425	-75	-0.00055
		40	13560342	-158	-0.00117
		50	13560278	-222	-0.00164
85	93.5	20	13560431	-69	-0.00051
115	126.5	20	13560435	-65	-0.00048

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6.5 Conducted Emissions (15.207)

6.5.1 Minimum Standard

Frequency [MHz]	Coducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66-56 *	56-46*
0.5 - 5	56	46
5 - 30	60	50

*The limit decreases linearly with the logarithm of frequency.

6.5.2 Test Result

- Complied

Freq. [MHz]	Correction Factor			Quasi-peak			Average		
	LISN	Cable		Limit [dBuV]	Reading [dBuV]	Result [dBuV]	Limit [dBuV]	Reading [dBuV]	Result [dBuV]
0.174	0.07	0.4	N	64.77	53.93	54.40	54.77	38.88	39.35
0.177	0.08	0.4	H	64.63	55.39	55.87	54.63	40.74	41.22
0.237	0.08	0.4	H	62.20	49.17	49.65	52.20	34.83	35.31
0.297	0.07	0.5	N	60.33	42.47	43.04	50.33	27.28	27.85
0.357	0.07	0.5	N	58.80	34.73	35.30	48.80	21.22	21.79
0.417	0.08	0.4	N	57.51	35.08	35.56	47.51	20.00	20.48
0.534	0.08	0.4	H	56.00	37.05	37.53	46.00	25.56	26.04
0.537	0.08	0.4	N		35.48	35.96		23.04	23.52
1.068	0.10	0.5	H		36.57	37.17		22.70	23.30
1.125	0.10	0.5	H		40.12	40.72		24.99	25.59
1.128	0.09	0.5	N		39.86	40.45		24.86	25.45
1.185	0.09	0.5	N		36.79	37.38		23.43	24.02
16.230	0.90	0.4	H	60.00	28.26	29.56	50.00	23.13	24.43
20.260	1.09	0.5	H	60.00	31.83	33.42	50.00	26.84	28.43
23.130	1.28	0.7	H	60.00	36.44	38.42	50.00	32.88	34.86

- Minimum limit margin is 8.76 dB at 0.177 MHz. (Quasi-peak)

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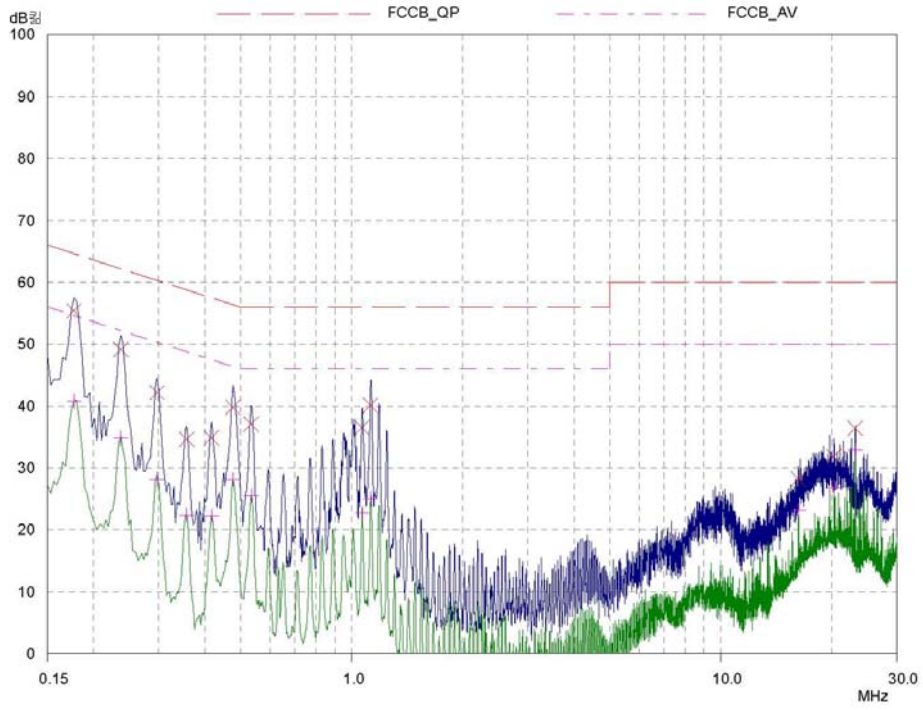
6.5.3 Test plots

EMC Compliance LTD

EUT:	RF-101C
Manuf:	일성정일
Op Cond:	H
Operator:	
Test Spec:	FCC B Conducted Emission
Comment:	
Result File:	05110_h.dat : RF-101C_H
Scan Settings	(2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	3MHz	3kHz	10kHz	PK+AV	10msec	Auto	OFF	60dB
3MHz	30MHz	10kHz	10kHz	PK+AV	5msec	Auto	OFF	60dB

Final Measurement:		
	Detectors:	X QP / + AV
	Meas Time:	1sec
	Peaks:	8
	Acc Margin:	25 dB



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EMC Compliance LTD

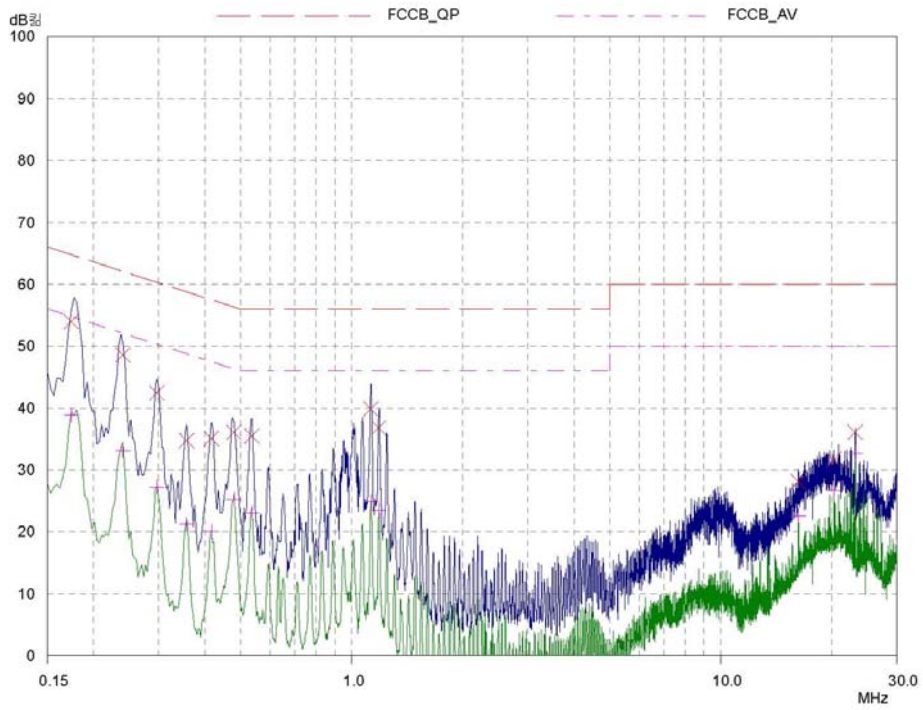
EUT: RF-101C
Manuf: 일성정밀
Op Cond: N
Operator:
Test Spec: FCC B Conducted Emission
Comment:

Result File: 05110_n.dat : RF-101C_N

Scan Settings (2 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	3MHz	3kHz	10kHz	PK+AV	10msec	Auto	OFF	60dB
3MHz	30MHz	10kHz	10kHz	PK+AV	5msec	Auto	OFF	60dB

Final Measurement: Detectors: X QP / + AV
Meas Time: 1sec
Peaks: 8
Acc Margin: 25 dB



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6. Test equipment used for test

	Description	Manufacture	Model No.	Serial No.	Next Cal Date.
■	Temp & humidity chamber	taekwang	TK-04	TK001	08.12.12
□	Temp & humidity chamber	taekwang	TK-500	TK002	08.09.06
■	Power Meter	Agilent	E4416A	GB41292365	08.11.02
■	Frequency Counter	HP	5351B	3049A01295	08.11.02
■	Spectrum Analyzer	Agilent	E4407B	US39010142	08.11.02
■	Spectrum Analyzer	R & S	FSP40	100209	08.11.19
■	Signal Generator	HP	E4432B	GB39340611	08.11.02
■	Modulation Analyzer	HP	8901B	3538A05527	08.11.08
■	Function Generator	Agilent	33120A	US36018826	08.11.02
■	Audio Analyzer	HP	8903B	3011A10372	08.11.02
□	Audio Analyzer	HP	8903B	3729A18248	08.11.02
□	AC Power Supply	KIKUSUI	PCR2000W	GB001619	08.11.02
□	DC Power Supply	HP	6032A	2920A-04499	09.01.26
■	DC Power Supply	Tektronix	PS2520G	TW50517	08.02.12
□	DC Power Supply	Tektronix	PS2521G	TW53135	08.11.02
□	Dummy Load	BIRD	8141	7560	-
□	Dummy Load	BIRD	8401-025	799	-
■	EMI Test Receiver	R&S	ESCI	100001	08.11.16
■	Attenuator	HP	8494A	2631A09825	08.11.06
■	Attenuator	HP	8496A	3308A16640	08.11.06
■	Attenuator	R&S	RBS1000	D67079	08.11.05
□	Attenuator	BIRD	50-A-MFN-20	0403002	08.11.02
■	Attenuator	HP	11581A	29738	09.01.08
■	Power sensor	Agilent	E9321A	US40390422	08.11.03
□	Power sensor	Agilent	E9325A		08.11.03
■	LOOP Antenna	EMCO	EMCO6502	9205-2745	09.05.28
■	BILOG Antenna	Schwarzbeck	VULB 9160	3138	09.02.21
□	HORN Antenna	ETS	3115	00062589	09.12.26
□	Power Divider	HP	11636A	05441	08.11.07
■	Signal Generator	HP	E4421B	GB40052295	08.11.02
□	Power Divider	Weinschel	1580-1	NX375	08.11.07
□	Power Divider	Weinschel	1580-1	NX380	08.11.16
■	Test Receiver	R&S	ESHS10	843276/003	09.05.29
■	LISN	R&S	ESH3-Z5	100267	09.07.04

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