

TEST REPORT

of

FCC Part 15 Subpart C §15.249 Class II Permissive Change

FCC ID : WEK-SKR-02

Equipment Under Test : Screen Keeper Wireless Tag
Model Name : SKR-02 (the additional model name : SKR-03)
Serial No. : N/A
Applicant : Semilink Inc.
Manufacturer : Semilink Inc.
Date of Test(s) : 2011.11.05 ~ 2011.11.15
Date of Issue : 2011.11.15

In the configuration tested, the EUT complied with the standards specified above.

Tested By:



Date

2011.11.15

Duke Ko

Approved By:



Date

2011.11.15

Charles Kim

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1. General information

1.1 Testing laboratory

SGS Testing Korea Co., Ltd.

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1.2 Details of applicant

Applicant : Semilink Inc.
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Gyeonggi-do, Korea 431-070
Contact Person : Caley Kim
Phone No. : +82 31 440 9330
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1.3. Description of EUT

Kind of Product	Screen Keeper Wireless Tag
Model Name	SKR-02 (the additional model name : SKR-03)
Serial Number	N/A
Power Supply	DC 3 V (Lithium Battery)
Frequency Range	2 402 MHz ~ 2 480 MHz
Modulation Technique	GFSK
Number of Channels	79
Antenna Type	Fixed Type
Antenna Gain	-11.25 dBi
H/W version	V 0.2.0
S/W version	V 0.1.0

1.4 Details of modification

- The PCB of EUT is exactly same as for the original version.
- A battery is added for expending usage time as parallel, not serial.
- Applicant changes the battery socket to connect 2 batteries physically.

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1.5. Test equipment list

Equipment	Manufacturer	Model	S/N	Cal Due.
Spectrum Analyzer	R & S	FSV30	101004	Jul. 06, 2012
PXA Signal Analyzer	Agilent	N9030A	US51350132	Oct. 28, 2012
High Pass Filter	Wainwright	WHK3.0/18G-10SS	344	Jul. 07, 2012
Preamplifier	H.P.	8447F	2944A03909	Jul. 04, 2012
Preamplifier	R & S	SCU 18	10117	Mar. 23, 2012
Test Receiver	R & S	ESU26	100109	Feb. 21, 2012
Bilog Antenna	SCHWARZBECK MESSELEKTRONIK	VULB9163	396	Apr. 27, 2013
Horn Antenna	R & S	HF 906	100229	May. 04. 2012
Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170431	Mar. 17, 2012
Antenna Master	EMCO	1050	N.C.R.	N.C.R.
Turn Table	Daeil EMC	DI-1500	N.C.R.	N.C.R.
Anechoic Chamber	SY Corporation	L x W x H (9.6 m x 6.4 m x 6.6 m)	N.C.R.	N.C.R.

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1.6. Summary of test results

The EUT has been tested according to the following specifications:

Applied Standard : FCC Part15, Subpart C		
Standard Section	Test Item	Result
15.209(a) 15.249(a) 15.249(d) 15.205	Fundamental, Spurious emission and edge band radiated emission	Complied

1.7. Test report revision

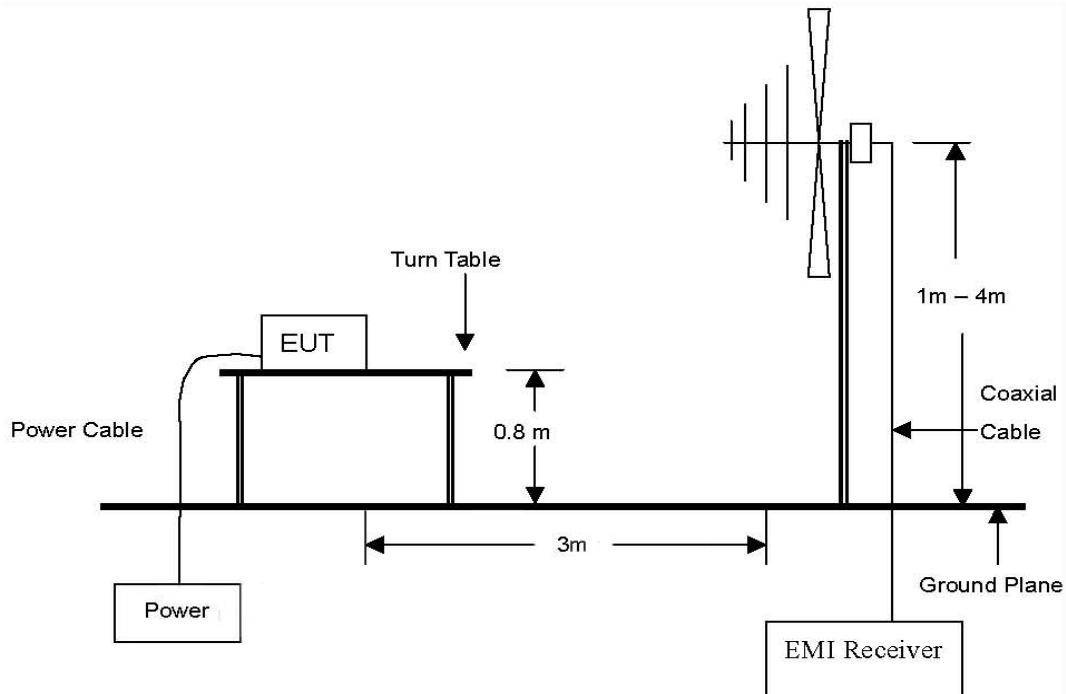
Revision	Report number	Description
0	F690501/RF-RTL005107	Initial
1	F690501/RF-RTL005107-1	- Add a horn antenna "BBHA 9170"(p. 4) - Retest the band edge signal level at 2400 MHz and revise. (p. 10)

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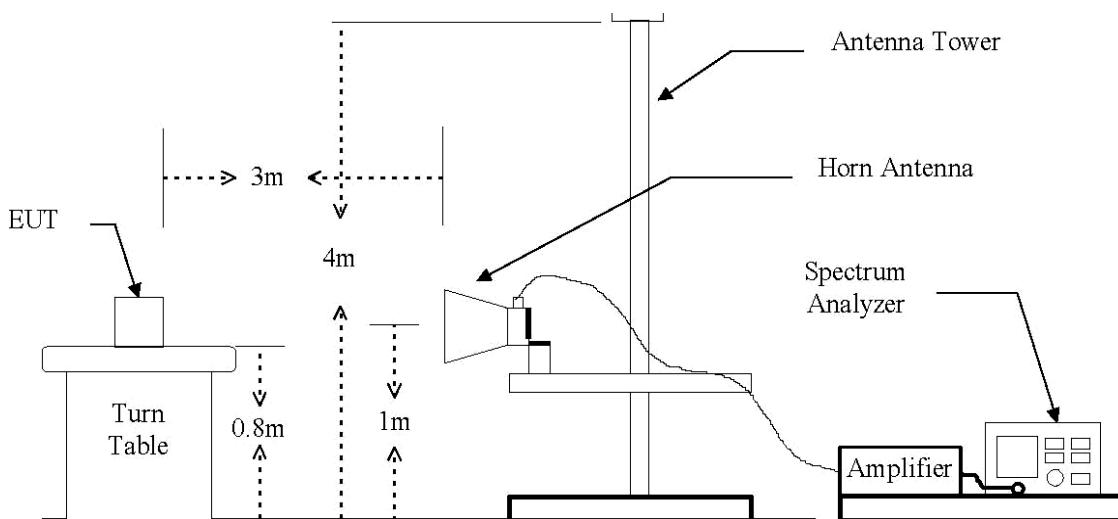
2. Fundamental, Spurious emission and edge band radiated emission

2.1. Test setup

The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to 24.8 GHz Emissions.



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2.2. Test procedures

Radiated emissions from the EUT were measured according to the dictates of ANSI C63.4:2003

1. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic Chamber The table was rotated 360 degrees to determine the position of the highest radiation.
2. During performing radiated emission above 1 GHz, the EUT was set 3 meter away from the interference-receiving antenna.
3. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarization of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

Note :

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection and frequency above 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1 GHz.

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2.3. Limit

In the section 15.249(a) :

Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (mV/m)	Field strength of harmonics (μV/m)
902 ~ 928 MHz	50	500
2 400 ~ 2 483.5 MHz	50	500
5 725 ~ 5 875 MHz	50	500
24.0 ~ 24.25 GHz	250	2 500

Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Fundamental frequency (MHz)	Field strength (μV/m)	Measurement distance (m)
30 ~ 88	100*	3
88 ~ 216	150*	3
216 ~ 960	200*	3
Above 960	500	3

Remark:

Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.

In the above emission table, the tighter limit applies at the band edges.

Fundamental frequency (MHz)	Field strength (μV/m at 3 meter)	Field strength (dBμV/m at 3 meter)
30 ~ 88	100	40
88 ~ 216	150	43.5
216 ~ 960	200	46
Above 960	500	54

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2.4. Test result

Ambient temperature : (23 ± 2) °C
Relative humidity : 46 % R.H.

2.4.1. Below 1 GHz

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	AF (dB/m)	AMP + CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
Below 1 000.000	Not Detected	-	-	-	-	-	-	-

Remark

1. To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ and YZ planes.(Worst case is XZ-plane)
2. All spurious emission at channels are almost the same below 1 GHz, so that the channel was chosen at representative in final test.

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2.4.2. Above 1 GHz

A. Low Channel (2 402 MHz)

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
2 402.000	51.74	Peak	H	28.50	5.38	85.62	114.00	28.38
*2 390.000	24.27	Peak	H	28.47	5.23	57.97	74.00	16.03
*2 390.000	12.33	Average	H	28.47	5.23	46.03	54.00	7.97
2 400.00	35.54	Peak	H	28.49	5.39	69.42	74.00	4.58
2 400.00	17.33	Average	H	28.49	5.39	51.21	54.00	2.79

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
4 803.96	58.38	Peak	H	32.80	-36.54	54.64	74.00	19.36
4 803.96	39.78	Average	H	32.80	-36.54	36.04	54.00	17.96
Above 4 900.000	Not Detected	-	-	-	-	-	-	-

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B. Middle Channel (2 439 MHz)

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
2 439.000	51.60	Peak	H	28.59	5.19	85.38	114.00	28.62

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dB μ N)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Actual (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
4 877.93	59.77	Peak	H	33.01	-36.67	56.11	74.00	17.89
4 877.93	40.21	Average	H	33.01	-36.67	36.55	54.00	17.45
Above 4 900.000	Not Detected	-	-	-	-	-	-	-

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C. High Channel (2 480 MHz)

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dB μ V)	Detect Mode	Pol.	AF (dB/m)	CL (dB)	Actual (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)
2 480.000	50.38	Peak	H	28.70	5.35	84.43	114.00	29.57
*2 483.500	26.94	Peak	H	28.71	5.37	61.02	74.00	12.98
*2 483.500	11.67	Average	H	28.71	5.37	45.75	54.00	8.25

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dB μ N)	Detect Mode	Pol.	AF (dB/m)	AMP+CL (dB)	Actual (dB μ N/m)	Limit (dB μ N/m)	Margin (dB)
4 959.99	57.09	Peak	H	33.25	-36.35	53.99	74.00	20.01
4 959.99	39.19	Average	H	33.25	-36.35	36.09	54.00	17.91
Above 5 000.000	Not Detected	-	-	-	-	-	-	-

Remarks :

- “*” means the restricted band.
- To get a maximum emission level from the EUT, the EUT was moved throughout the x, y and z-axis. (Worst case is y-axis.)
- Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental Frequency.
- Radiated emissions measured in frequency above 1 000 MHz were made with an instrument using peak/average detector mode.
- Average test would be performed if the peak result were greater than the average limit.
- Actual = Reading + AF - Amp Gain + CL

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