Advanced Compliance Laboratory

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ELECTROMAGNETIC EMISSION COMPLIANCE REPORT

of

EOLIS
MODEL: WIREFREE 3D
FCC ID: DWNEWF3D

October 17, 2008

This report concerns (check one): Original grant _____ Class II change __x__
Equipment type: Low Power Intentional Radiator

Deferred grant requested per 47 CF 0.457(d)(1)(ii)? yes _____ no __x__
If yes, defer until: _____ (date)
Company agrees to notify the Commission by _____ (date)
of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37? yes _____ no __x__
If no, assumed Part 15, Subpart B for unintentional radiators - the new 47 CFR [10-1-90 Edition] provision.

Report prepared for:	Somfy System, Inc.
Report prepared by:	Advanced Compliance Lab
Report number:	0048-081002-01

NVLAP®

The test result in this report IS supported and covered by the NVLAP accreditation

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1. GENERAL INFORMATION

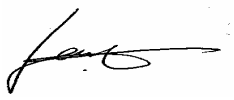
1.1 Verification of Compliance

EUT:	EOLIS
Model:	WIREFREE 3D
Applicant:	SOMFY SYSTEM, INC.
Test Type:	FCC Part 15C CERTIFICATION (15.231: a)
Result:	PASS
Tested by:	ADVANCED COMPLIANCE LABORATORY
Test Date:	October 5-15, 2007
Report Number:	0048-081002-01

The above equipment was tested by Compliance Laboratory, Advanced Technologies, Inc. for compliance with the requirement set forth in the FCC rules and regulations Part 15 subpart C. This said equipment in the configuration described in the report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

The estimated uncertainty of the test result is given as following. The method of uncertainty calculation is provided in Advanced Compliance Lab. Doc. No. 0048-01-01.

	Prob. Dist.	Uncertainty(dB)	Uncertainty(dB)	Uncertainty(dB)
		30-1000MHz	1-6.5GHz	Conducted
Combined Std. Uncertainty u_c	norm.	±2.36	±2.99	±1.83



Wei Li
Lab Manager
Advanced Compliance Lab

Date: October 17, 2008

1.2 Equipment Modifications

N/A

1.3 Product Information

System Configuration

ITEM	DESCRIPTION	FCC ID	CABLE
Product	EOLIS WIREFREE 3D (1)	DWNEWF3D	
Housing	PLASTICS		
Power Supply	3V Battery		
Operation Freq.	433.42 HMz		
Device Type	Periodic Operation		
Receiver	SENSOR Receiver	DoC	

(1) EUT submitted for grant.

1.4 Test Methodology

Radiated tests were performed according to the procedures in ANSI C63.4-2003 at an antenna to EUT distance of 3 meters.

1.5 Test Facility

The open area test site and conducted measurement facility used to collect the radiated and conducted data are located at Hillsborough, New Jersey. This site has been accepted by FCC to perform measurements under Part 15 or 18 in a letter dated May 19, 1997 (Refer to: 31040/PRV 1300F2). The NVLAP Lab code for accreditation of FCC EMC Test Method is: 200101-0.

1.6 Test Equipment

Manufacture	Model	Serial No.	Description	Last Cal dd/mm/yy	Cal Due dd/mm/yy
Hewlett-Packard	HP8546A	3625A00341	EMI Receiver	12/01/08	12/01/09
EMCO	3115	4945	Double Ridge Guide Horn Antenna	12/02/08	12/02/09
EMCO	3104C	9307-4396	20-300MHz Biconical Antenna	09/02/08	09/02/09
EMCO	3146	9008-2860	200-1000MHz Log-Periodic Antenna	11/08/08	11/08/09

All Test Equipment Used are Calibrated Traceable to NIST Standards.

1.7 Statement for the Document Use

This report shall not be reproduced except in full, without the written approval of the laboratory. And this report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government.

2. PRODUCT LABELING

FCC ID: DWNEWF3D

This device complies with part 15 of the FCC Rules. Operating is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Figure 2.1 FCC ID Label
(FCC statement will be shown in the user manual)

Figure 2.2 FCC ID Label Location

3. SYSTEM TEST CONFIGURATION

3.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it). And its antenna was on PCB.

Testing was performed as EUT was operated continuously.

3.2 Special Accessories

N/A

3.3 Configuration of Tested System

Figure 3.1 to Figure 3.5 illustrate this system, which is tested standing along.

Figure 3.1 Radiated Test Setup, position 1-X

Figure 3.2 Radiated Test Setup, position 2-Y

Figure 3.3 Radiated Test Setup, position 3-Z

N/A

Figure 3.4 Conducted Setup- Front

N/A

Figure 3.5 Conducted Setup- Rear

4. SYSTEM SCHEMATICS

See Attachment.

Figure 4.1 System Schematics

5. CONDUCTED EMISSION DATA

5.1 Test Methods and Conditions

The EUT was under normal operational mode during the conducted emission test. EMI Receiver was scanned from 150KHz to 30MHz with maximum hold mode for maximum emission. Recorded data was sent to the plotter to generate output in linear format. At the input of the spectrum analyzer, a HP transient limiter is inserted for protective purpose. This limiter has a 10 dB attenuation in the range of 150KHZ to 30MHZ. That factor was automatically compensated by the receiver, so the readings are the corrected readings. The reference of the plot is the CISPR 22 Class B limit in Figure 5.1 through Figure 5.2.

Conducted Emission Technical Requirements				
	Class A		Class B	
Frequency Range	Quasi-Peak dBuV	Average dBuV	Quasi-Peak DBuV	Average dBuV
150kHz –0.5MHz	79 (8912uV)	66 (1995uV)	66-56	56-46
0.5MHz-30MHz	73 (4467uV)	60 (1000uV)	---	---
0.5MHz- 5MHz	---	---	56	46 (250uV)
5MHz-30MHz	---	---	60	50

Emissions that have peak values close to the specification limit (if any) are also measured in the quasi-peak mode to determine compliance.

5.2 Test Data

Figure 5.1-5.2 show the neutral and line conducted emissions for the standard operation.

N/A

Test Personnel:

Tester Signature: _____ Date: _____

Typed/Printed Name: Edward Lee

N/A

Fig. 5.1 Conducted Emission-Line

N/A

Fig. 5.2 Conducted Emission- Neutral

6. RADIATED EMISSION DATA

6.1 Field Strength Calculation

The corrected field strength is automatically calculated by EMI Receiver using following:

$$FS = RA + AF + CF + AG$$

where FS: Corrected Field Strength in dBμV/m
RA: Amplitude of EMI Receiver before correction in dBμV
AF: Antenna Factor in dB/m
CF: Cable Attenuation Factor in dB
AG: Built-in Preamplifier Gain in dB (Stored in receiver as part of the calibration data)

The pulse train timing plots are showed in Figure 6.2.

The provision in §15.35© of the FCC part 15, the power correction factor for the modulation is –5.6dB. See attached plot for details.
The maximum average field strength should be 0.525 of the peak field strength measured. So we use peak value minus 5.6dB as calculated maximum average field strength.

6.2 Test Methods and Conditions

The initial step in collecting radiated data is a EMI Receiver scan of the measurement range below 30MHz using peak detector and 9KHz IF bandwidth / 30KHz video bandwidth. For the range 30MHz - 1GHz, 120KHz IF bandwidth / 120KHz video bandwidth are used. Both bandwidths are 1MHz for above 1GHz measurement. Up to 10^{th} harmonics were investigated.

6.3 Test Data

The following data lists the significant emission frequencies, polarity and position, peak reading of the EMI Receiver, the FCC limit, and the difference between the peak reading and the limit. Explanation of the correction and calculation are given in section 6.1.

Test Personnel: 

Typed/Printed Name: Edward Lee Date: October 17, 2008

Radiated Test Data @3m

Frequency (MHz)	Polarity [H or V], Position (X,Y,Z)	Height (m)	Azimuth (Degree)	Peak Reading (dBmV/m)	Calculated Average Reading (dBmV/m	FCC 3m Limit (dBmV/m)	Difference from limit (dB)
433.42	H,X(1)	2.0	180	80.0	74.4	80.8(3)	-6.4
866.84	H,X	1.0	170	50.2	44.6	60.8(4)	-16.2
1300.26	H,X	1.2	150	57.9	52.3	54(2)	-1.7
1733.68	H,X	1.2	180	52.4	46.8	60.8	-14
2167.10	H,X	1.2	180	48.6	43	60.8	-17.8
433.42	V,X	2.5	200	72.9	67.3	80.8	-13.5
866.84	V,X	1.0	320	50.5	44.9	60.8	-15.9
1300.26	V,X	1.2	260	53.8	48.2	54	-5.8
1733.68	V,X	1.1	270	56.6	51	60.8	-9.8
2167.10	V,X	1.1	240	45.7	40.1	60.8	-20.7
433.42	H,Y	2.1	180	81.4	75.8	80.8	-5
866.84	H,Y	1.0	180	51.6	46	60.8	-14.8
1300.26	H,Y	1.3	180	55.5	49.9	54	-4.1
1733.68	H,Y	1.3	150	52.4	46.8	60.8	-14
2167.10	H,Y	1.3	160	45.4	39.8	60.8	-21
433.42	V,Y	2.6	200	74.0	68.4	80.8	-12.4
866.84	V,Y	1.9	210	50.0	44.4	60.8	-16.4
1300.26	V,Y	1.4	350	54.4	48.8	54	-5.2
1733.68	V,Y	1.4	210	55.6	50	60.8	-10.8
2167.10	V,Y	1.2	170	43.0	37.4	60.8	-23.4
433.42	H,Z	2.7	220	70.5	64.9	80.8	-15.9
866.84	H,Z	1.1	300	47.5	41.9	60.8	-18.9
1300.26	H,Z	1.4	230	51.8	46.2	54	-7.8
1733.68	H,Z	1.3	230	49.8	44.2	60.8	-16.6
2167.10	H,Z	1.3	240	40.0	34.4	60.8	-26.4
433.42	V,Z	1.2	190	85.5	79.9	80.8	-0.9
866.84	V,Z	1.2	200	57.8	52.2	60.8	-8.6
1300.26	V,Z	1.3	230	56.9	51.3	54	-2.7
1733.68	V,Z	1.1	220	55.3	49.7	60.8	-11.1
2167.10	V,Z	1.2	210	47.0	41.4	60.8	-19.4

(1) See Figure 3.1, 3.2 and 3.3 for definition of position X-1, Y-2, Z-3.
(2) Restricted band.
(3) Fundamental limit is 3750-12500 microvolts/meter linear interpolations (average reading). Per FCC 15.231(a).
(4) Spurious limit is 375-1250 microvolts/meter linear interpolations (average reading). Per 15.231(a).

5.4 Occupied Bandwidth

The bandwidth of the emission shall be no wider than 0.25% of the center frequency, in this case, 1.084MHz(433.5x0.25%). Bandwidth is determined at the points 20dB down from the modulated carrier. Figure 5.2 shows the occupied bandwidth plot.

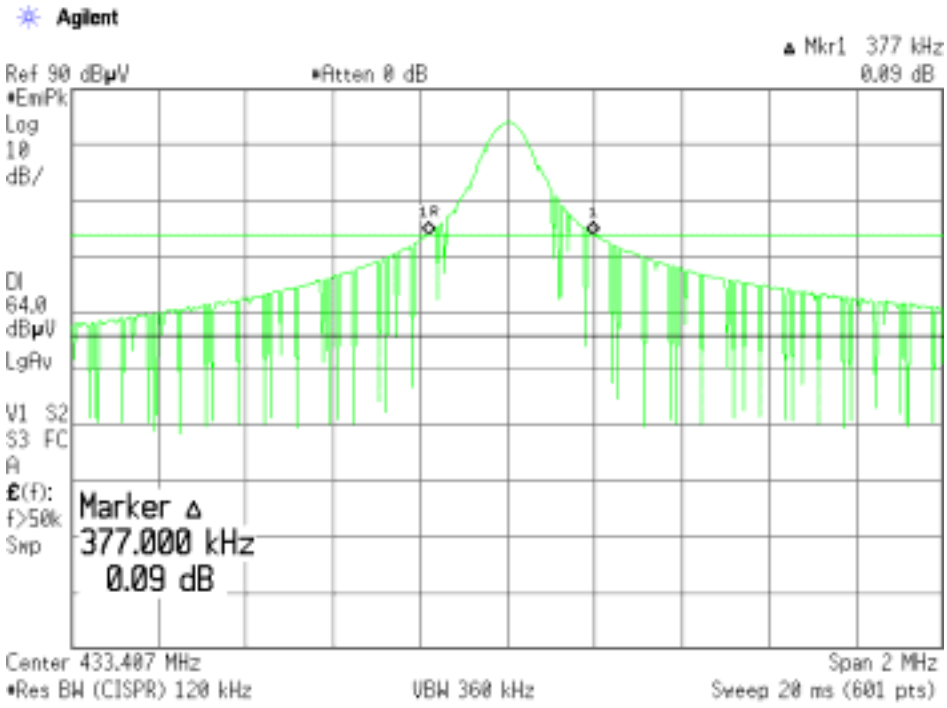
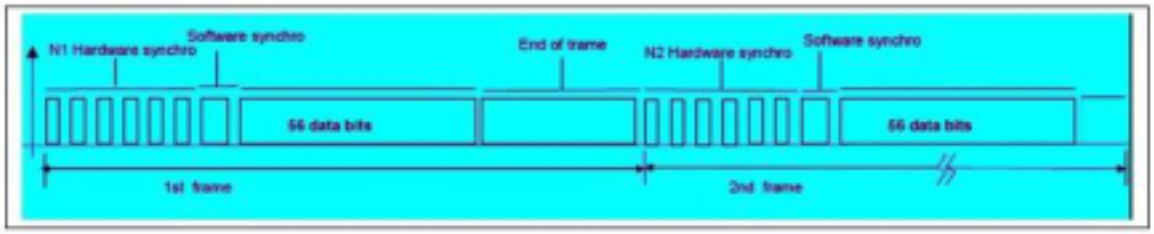


Figure 6.1 Occupied Bandwidth

The structure of the RTS frame is:

6 to 12 Hardware Synchronization Bits + 1 Software Synchronization Bits + 1 bit recognition time + 56 Data bits or 80 Data bits



As specified in the section 15.35 of the FCC Part15, the radiated emission have to be expressed in terms of the average value.

The length of the RTS frame is 139.6ms, so we have to take in consideration only a part of the frame corresponding to 0.1s during which the field strength is at the maximum value
Part which induces the maximum field strength:

5 Hardware Synchronization Bits + 1 Software Synchronization Bits + 1 bit recognition time + 55 Data bits

Numerical value:

- Length of hardware synchronization bit: 2.5ms ON , 2.5ms OFF
- Length of software synchronization bit: 4.8ms ON
- Length of recognition time bit: 0.64ms OFF
- Length of data bit: 0.64ms ON , 0.64ms OFF (Manchester code)

Average value during 0.1s : (5 x 2.5) + (1 x 4.8) + (55 x 0.64) / 100 = 0.525 = -5.6dB

Correction factor between peak and average value: -5.6dB

Figure 6.2 (a) Pulse Train Timing

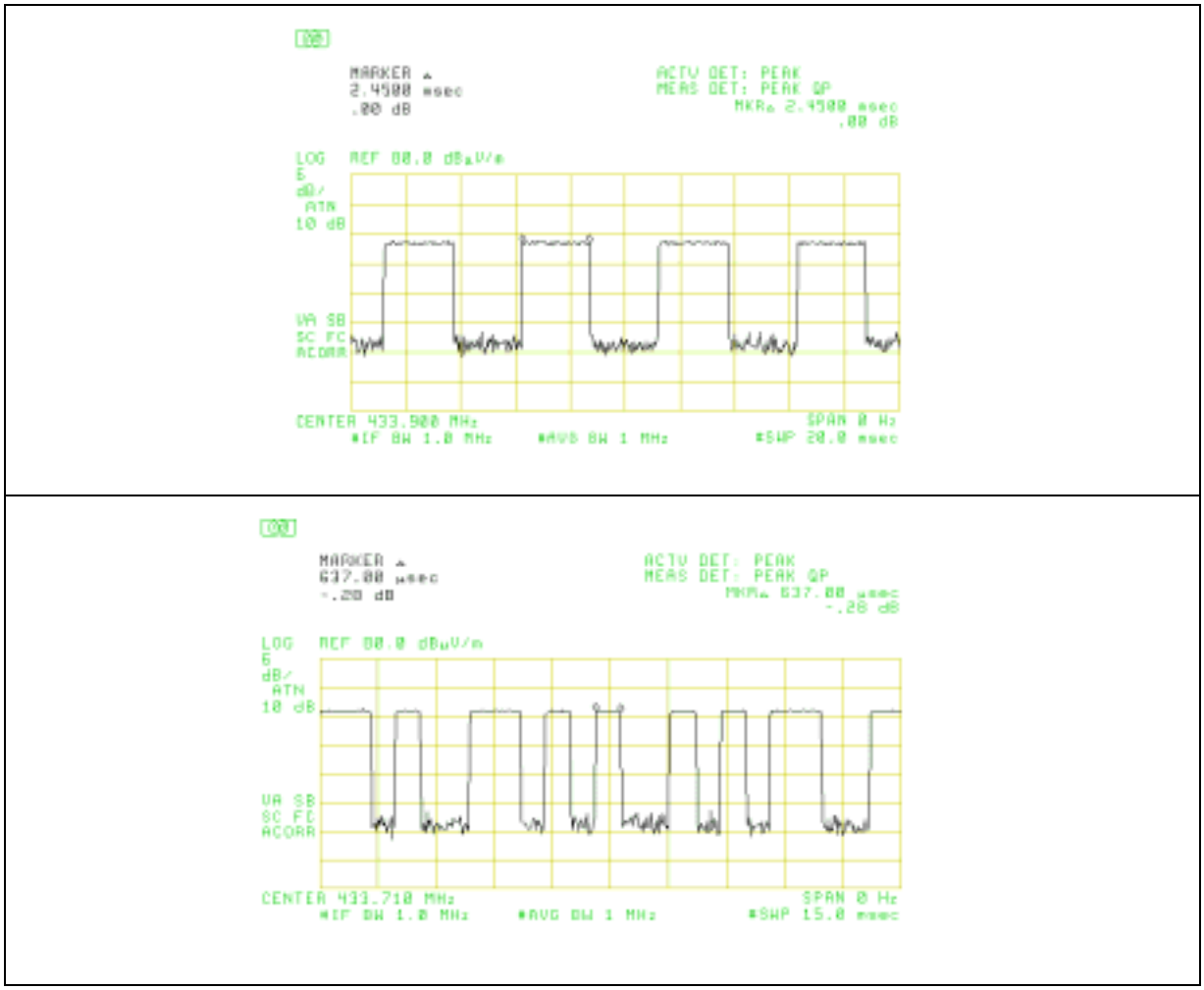


Figure 6.2 (b) Pulse Train Timing

7. PHOTOS OF TESTED EUT

The following photos show the inside details of the EUT.