



ADVANCED
COMPLIANCE LABORATORY

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ELECTROMAGNETIC EMISSION COMPLIANCE REPORT

of

RTS SENSOR
MODEL: RTS
FCC ID: DWNRTS

February 01, 2002

This report concerns (check one): Original grant ☒ Class II change ☐ Equipment type: <u>Low Power TRANSMITTER</u>	
Deferred grant requested per 47 CF 0.457(d)(1)(ii)? yes ☐ no ☒ 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 ☒ 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:	0048-020123-01



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

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1. GENERAL INFORMATION

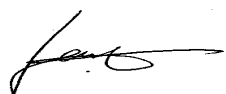
1.1 Verification of Compliance

EUT: **RTS SENSOR**
 Model: **RTS**
 Applicant: **SOMFY SYSTEM, INC.**
 Test Type: **FCC Part 15C CERTIFICATION**
 Result: **PASS**
 Tested by: **ADVANCED COMPLIANCE LAB**
 Test Date: **Jan. 23, 2002**
 Report Number: **0048-020123-01**

The above equipment was tested by Advanced Technologies Lab. Compliance Laboratory 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: Feb. 1, 2002

1.2 Equipment Modifications

N/A

1.3 Product Information

System Configuration

ITEM	DESCRIPTION	FCC ID	CABLE
Product	RTS Sensor	DWNRTS(1)	
Housing	PLASTICS		
Power Supply	24V DC		
Clock/OSC Freq.	433.4MHz		
Device Type	Periodic Operation		

(1) EUT submitted for grant.

1.4 Test Methodology

Radiated tests were performed according to the procedures in ANSI C63.4-1992 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 50 Randolph Road, Somerset, 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	18/01/02	18/01/03
Fischer Custom	LISN-2	900-4-008	Line Impedance Stabilization Networks	14/06/01	14/06/02
Fischer Custom	LISN-2	900-4-009	Line Impedance Stabilization Networks	14/06/01	14/06/02
EMCO	3115	4945	Double Ridge Guide Horn Antenna	24/01/01	24/01/02
AILTECH	94455-1	0933	30-200MHz Biconical Antenna	31/08/01	31/08/02
EMCO	3146	2860	200-1000MHz Log-Periodic Antenna	16/08/01	16/08/02

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

See attachment: fcclabel.jpg

Fig 2.1 FCC ID Label

Fig. 2.2 Location of Label

3. SYSTEM TEST CONFIGURATION

3.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it). It's normally installed horizontally and its antenna was permanently attached to the EUT (made on the PCB). This transmitter will deactivate within 5 sec. after it's triggered by sun light or wind.

Testing was performed in either "UP order" mode or " Down order" mode.

3.2 Special Accessories

N/A

3.3 Configuration of Tested System

Figure 3.1to Figure 3.4 illustrate this system, which is tested standing along.

See attachment: radtest-f.jpg

Figure 3.1 Radiated Front

See attachment: radtest-r.jpg

Figure 3.2 Radiated Rear

See attachment: condtest-f.jpg

Figure 3.3 Conducted Front

See attachment: condtest-r.jpg

Figure 3.4 Conducted Rear/Side

4. SYSTEM SCHEMATICS

See attachment: schematic.jpg

Figure 4.1 System Schematics

5. CONDUCTED EMISSION DATA

5.1 Test Methods and Conditions

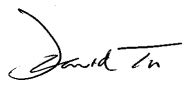
The EUT exercise program was loaded during the conducted emission test. EMI Receiver was scanned from 450KHz to 30MHz with maximum hold mode for maximum emission. The IF Bandwidth is 9KHz. Recorded data was sent to the plotter to generate output in linear format. At the input of the spectrum analyzer, a HP transient limiter is inserted for protective purpose. This limiter has a 10 dB attenuation in the range of 450KHz to 30MHz. That factor was automatically compensated by the receiver, so the readings are the corrected readings. The reference of the plot is the FCC Class B limit 250 μ V in Figure 5.1 through **Figure 5.2**.

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 through **Figure 5.2** show the neutral and line conducted emissions.

Test Personnel:

Tester Signature 

Date: Feb.1 , 2002

Typed/Printed Name: **David Tu**

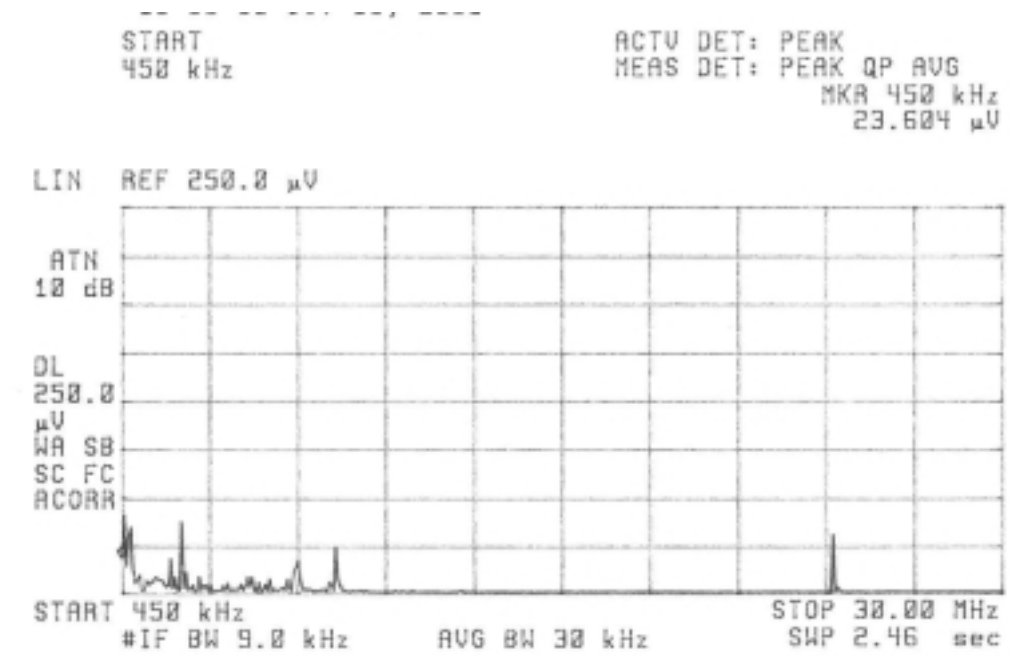


Figure 5.1 Neutral Conducted Emission

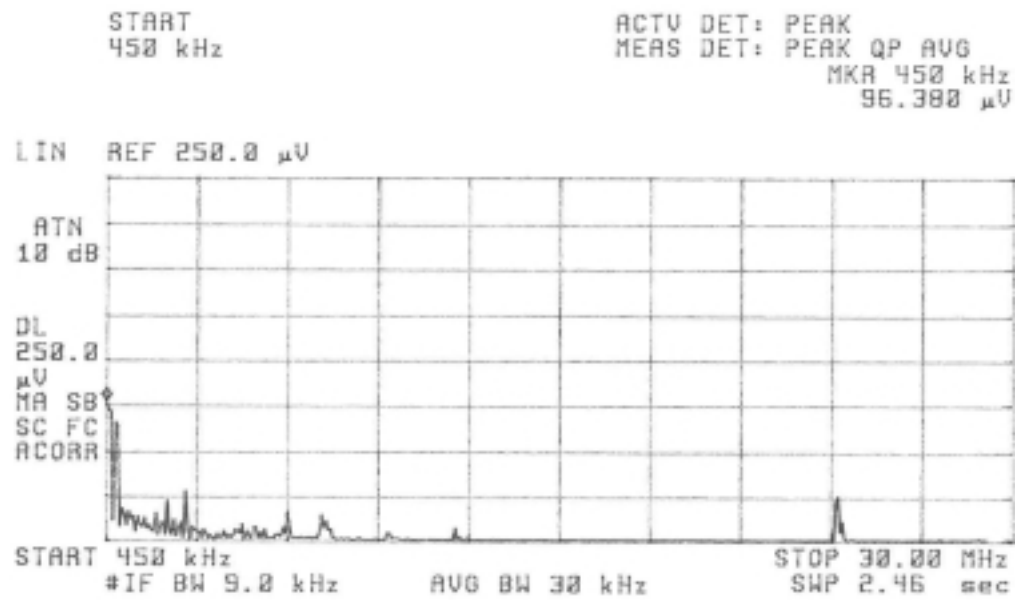


Figure 5.2 Line Conducted Emission

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 dB μ V/m

RA: Amplitude of EMI Receiver before correction in dB μ V

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 6.1.

The pulse train timing plots as follows:

The total time for each pulse train is 139.62 ms, The short pulse is 0.640ms, The middle pulse is 2.5 ms, The long pulse is 4.8ms.

Coeff. = $20 \log((0.640 \times 56 + 4.8 \times 1 + 2.5 \times 5)/100) = -5.49\text{dB}$

The maximum average field strength should be 0.5314 of the peak field strength measured for 100ms duration. So we use peak value minus 5.49dB as calculated maximum average field strength.

6.2 Test Methods and Conditions

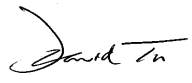
The EUT exercise program was loaded during the radiated emission test. The initial step in collecting radiated data is a EMI Receiver scan of the measurement range 30MHz - 5GHz using peak detector. IF bandwidth is 120kHz and video bandwidth is 300kHz for measuring 30MHz-1GHz. Both bandwidth are 1MHz for above 1GHz measurement.

6.3 Test Data

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

Test Personnel:

Tester Signature



Typed/Printed Name: **David Tu**

Date: **Feb. 1, 2002**

Radiated Test Data

Frequency (MHz)	Polarity [H or V], Position (X,Y,Z)	Height (m)	Azimuth (Degree)	Peak Reading (dBμV/m)	Calculated Average Reading (dBμV/m)	FCC 3m Limit (dBμV/m)	Difference from limit (dB)
433.4	H	1.1	180	77.2	71.71	80.8(2)	-9.09
1300.3	H	1.0	175	53.6	48.11	54.0(1)	-5.89
1733.8	H	1.0	175	51.0	45.51	60.8(3)	-15.29
2167.1	H	1.0	175	50.2	44.71	60.8	-16.09
433.4	V	1.2	180	78.6	73.11	80.8	-7.69
866.8	V	1.1	180	50.5	45.01	60.8	-15.79
1300.3	V	1.0	190	54.0	48.51	54.0	-5.49
1733.8	V	1.2	180	52.3	46.81	60.8	-13.99
2167.1	V	1.0	180	50.3	44.81	60.8	-15.99
2600.6	V	1.0	180	49.8	44.31	60.8	-16.49

- (1) Restricted band.
- (2) Fundamental limit is 3750-12500 microvolts/meter linear interpolations.
- (3) Spurious limit is 375-1250 microvolts/meter linear interpolations.

6.4 Occupied Bandwidth

The bandwidth of the emission shall be no wider than 0.25% of the center frequency, in this case, 1.084MHz(433.4x0.25%). Bandwidth is determined at the points 20dB down from the modulated carrier. Figure 6.2 shows the occupied bandwidth plot.

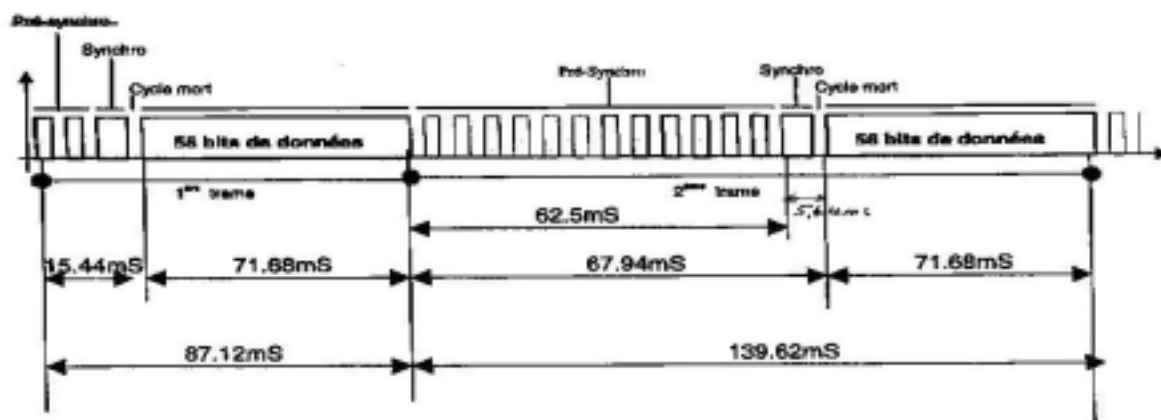


Figure 6.1 Pulse Train Timing

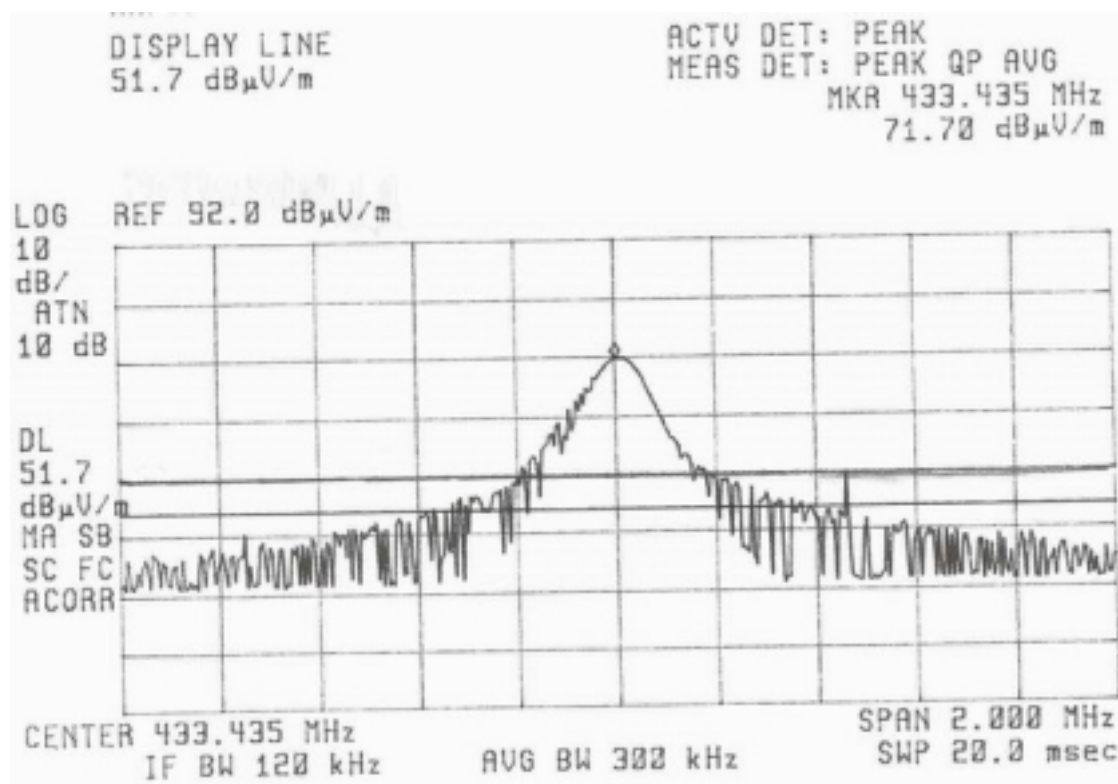


Figure 6.2 Occupied Bandwidth

7. PHOTOS OF TESTED EUT

The following photos show the inside details of the EUT.

See Attachments: front.jpg, rear.jpg, inside.jpg, component.jpg, foil.jpg