Advanced
Compliance Laboratory

210 Cougar Court
Hillsborough, NJ 08844
Tel: (908) 927 9288
Fax: (908) 927 0728

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT

of

PRODUCT NAME: SUNIS RTS WIREFREE
MODEL: **9020412**
FCC ID: DWNSWF IC: 12049A-SWF

March 15th, 2017

This report concerns (check one): Original grant __x__ Class II change _____
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 SYSTEMS Inc.
Report prepared by: Advanced Compliance Lab
Report number: 0048-170301-01

NVLAP®

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

Table of Contents

Figures

1. GENERAL INFORMATION

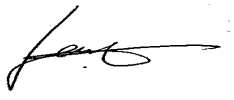
1.1 Verification of Compliance

EUT:	SUNIS RTS WIREFREE
Model:	9020412
Applicant:	SOMFY SYSTEMS INC.
Standards:	FCC Part 15.231(a) & IC RSS-210 Issue 8/RSS-Gen Issue 4
Result:	PASS
Tested by:	ADVANCED COMPLIANCE LABORATORY
Test Completion Date:	March 15th, 2017
Report Number:	0048-170301-01

The above equipment was tested by Compliance Laboratory, Advanced Technologies, Inc. for compliance with the requirement set forth in the FCC & IC rules and regulations. 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: March 15th, 2017

1.2 Equipment Modifications

N/A

1.3 Product Information

System Configuration

ITEM	DESCRIPTION	ID	CABLE
Product	SUNIS RTS WIREFREE (1)	FCC ID: DWNSWF IC: 12049A-SWF	
Housing	PLASTICS		
Power Supply	3Vdc ALKALINE Battery		
Operation Freq.	433.42 MHz		
Device Type	Periodic Operation		

(1) EUT submitted for grant.

1.4 Test Methodology

Radiated tests were performed according to the procedures in ANSI C63.4-2014/C63.10-2013 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, USA. This site is accepted by FCC to perform measurements under Part 15 or 18 (Registration # 90601) and also designated by IC as " site IC 3130A". The NVLAP Lab code for accreditation of FCC EMC Test Method is: 200101-0.

1.6 Test Equipment

Manufacture	Model	Serial No.	Description	Cal Due dd/mm/yy
Hewlett-Packard	HP8546A	3448A00290	EMI Receiver	15/10/17
EMCO	3104C	9307-4396	20-300MHz Biconical Antenna	15/01/18
EMCO	3146	9008-2860	200-1000MHz Log-Periodic Antenna	15/01/18
Electro-Meterics	ALR-25M/30	289	10KHz-30MHz Active Loop Antenna	28/05/17
Fischer Custom	LISN-2	900-4-0008	Line Impedance Stabilization Networks	18/03/17
Fischer Custom	LISN-2	900-4-0009	Line Impedance Stabilization Networks	24/03/17
EMCO	3115	4945	Double Ridge Guide Horn Antenna	22/01/18
Agilent	E4440A	US40420700	PSA Spectrum Analyzer	25/08/17

All Test Equipment Used are Calibrated Traceable to NIST Standards.
Standard Calibration interval: 2 year.

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. & Canada Governments.

2. PRODUCT LABELING

SOMFY SUNIS RTS WIREFREE
Model: 9020412

FCC ID: DWNSWF
IC: 12049A-SWF

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 ID Label (statement shown in the manual)

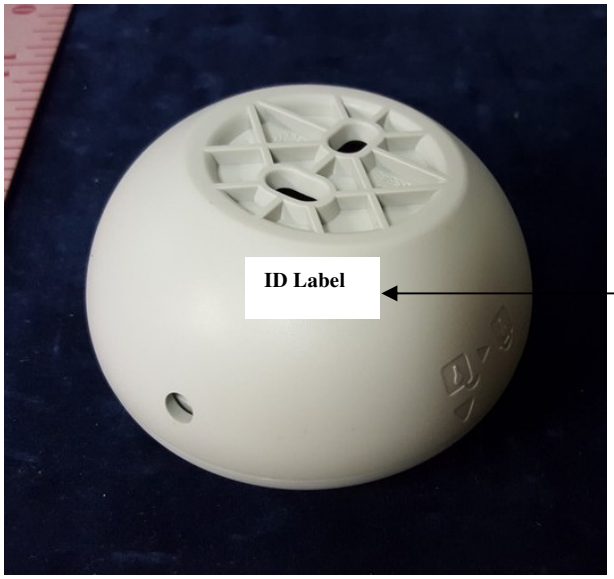


Figure 2.2 ID Label Location

3. SYSTEM TEST CONFIGURATION

3.1 Justification

The product was configured for testing in a typical fashion (as a customer would normally use it). EUT was properly orientated for being tested in the correct plane. Its antenna is permanently connected to PCB.

For this certification, the RTX module drives an external RF circuit whose carrier frequency is 433.42 MHz +/- 100 KHz. The power level of the RF circuit has been set to operate at the level described in FCC 15.231(a). It does not send data.

In normal operation mode, the transmission does stop within 5 seconds after the transmission is deactivated.

Emission test was performed as 433.42MHz Tx was operated continuously . Fresh batteries were used during the test.

3.2 Special Accessories

N/A

3.3 Configuration of Tested System

Figure 3.x illustrate this system, which is tested standing along.

Standard Orientation (Z)

Figure 3.1 Radiated Test Setup

N/A

Figure 3.2 Conducted Test Setup

4. SYSTEM SCHEMATICS

See Attachment.

Figure 4.1 System Schematics

5. CONDUCTED EMISSION DATA

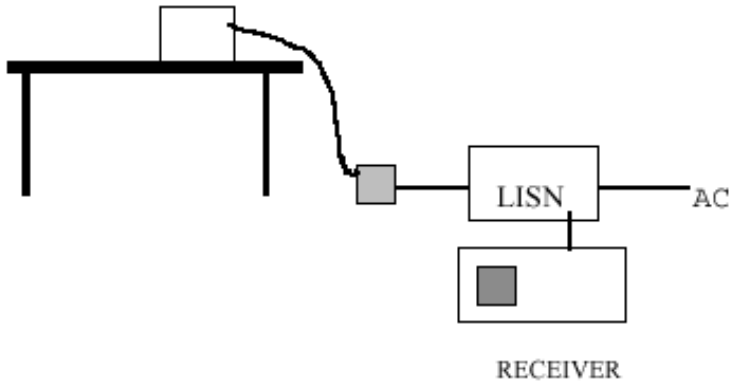
5.1 Test Methods and Conditions

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 Measurement Instrument Configuration for Conducted Emission



5.3 Testing Data

The following plots show the neutral and line conducted emissions for the typical operation condition (Transmitting and receiving). The conducted test data shows the worst case emissions still below the FCC Part 15/CISPR22 Class B limits.

Not applicable to this product.

Operation Mode: Normal

Fig. 5.1 Line Conducted Emission

NA

Operation Mode: Normal

Fig. 5.2 Neutral Conducted Emission

NA

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 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. =(55x0.640+1x4.8+5x2.5)/100=0.525
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 under 1GHz, 120KHz IF bandwidth / 120KHz video bandwidth are used. Both bandwidths are 1MHz for above 1GHz measurement. The frequency range from the lowest clock frequency in EUT circuitry 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: March 15th, 2017,

Radiated Test Data

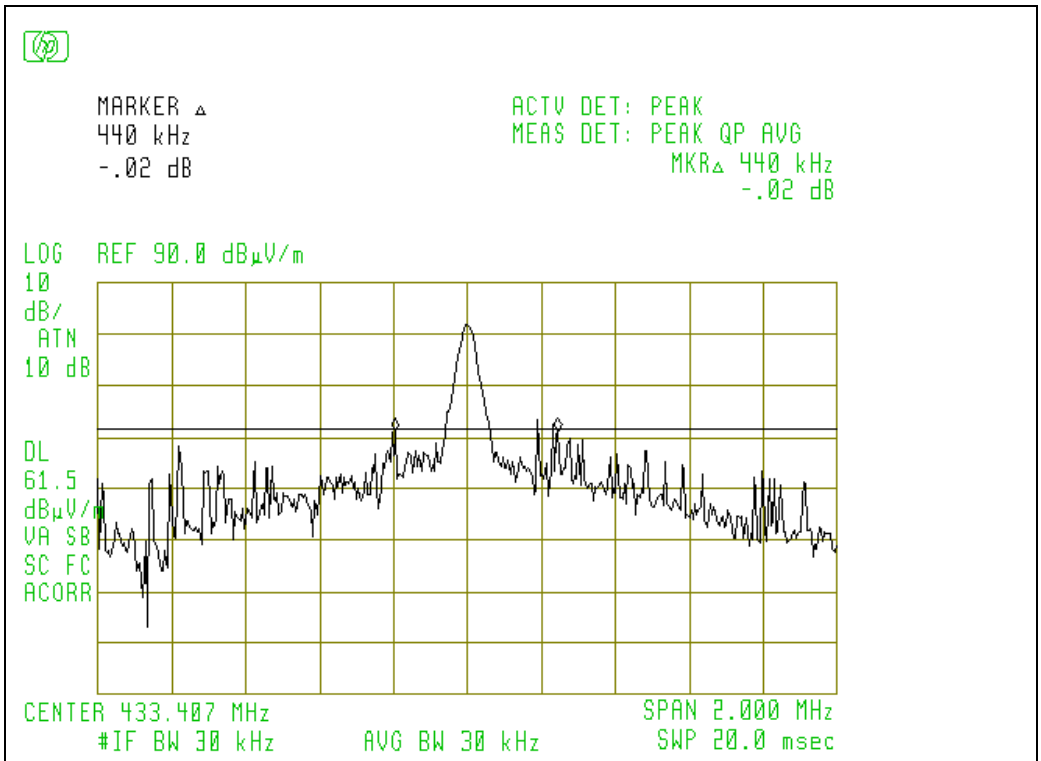
Z - Polarization

Freq. (MHz)	Worst H/V, Z(1)	Height. (m)	Azimuth	Peak@3m (dBuV/m)	QP/Avg @3m (dBuV/m)	PK Lim (dBuV /m)	QP /Avg. Lim (dBuV/m)	PK Mar (dBuV/ m)	QP /Avg.Mar. (dBuV/m)
433.4(3)	H	1.0	090	82.67	77.07	100.80	80.80	-17.63	-3.23
866.9(4)	H	1.0	135	44.07	38.47	80.80	60.80	-36.73	-22.33
1300.4(2)	H	1.1	045	50.30	44.7	74	54.0	-23.7	-9.3
1733.9	H	1.1	180	52.84	47.24	80.80	60.80	-27.96	-13.56
2167.4	H	1.1	270	56.40	50.8	80.80	60.80	-24.4	-10
2600.7	H	1.1	180	56.09	50.49	80.80	60.80	-24.71	-10.31
433.4	V	1.2	200	77.44	71.84	100.80	80.80	-23.36	-8.96
866.9	V	1.2	045	43.88	38.28	80.80	60.80	-36.92	-22.52
1300.4	V	1.1	090	55.20	49.6	74	54.0	-18.8	-4.4
1733.9	V	1.1	180	61.01	55.41	80.80	60.80	-19.79	-5.39
2167.4	V	1.1	000	64.64	59.04	80.80	60.80	-16.16	-1.76
2600.7	V	1.1	000	58.00	52.4	80.80	60.80	-22.80	-8.40

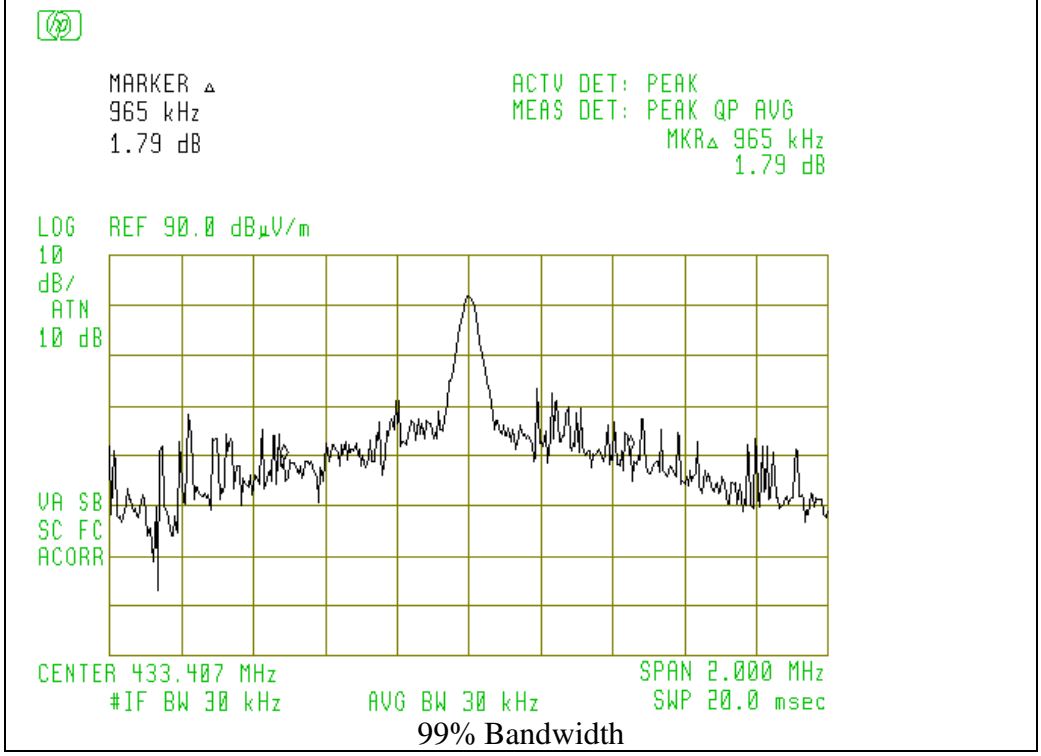
(1) See Figure 3.1, 3.2 and 3.3 for definition of position
(2) Restricted band.
(3) Fundamental limit is 1500-5000 microvolts/meter linear interpolations (average reading) for 260-470 MHz fundamental frequency range; 10965uV/m for 433.4MHz Fundamental. Per FCC 15.231(b) & RSS-210 A1.1 Table A.
(4) Spurious limit is 150-500 microvolts/meter linear interpolations (average reading). Per 15.231(b) & RSS-210 A1.1 Table A.

6.4 Occupied Bandwidth

The bandwidth of the emission shall be no wider than 0.25% of the center frequency, in this case, 1.0835Hz(433.42x0.25%). Bandwidth is determined at the points 20dB down from the modulated carrier or by containing 99% of the total power of the signal. The occupied bandwidth plots are given as following.

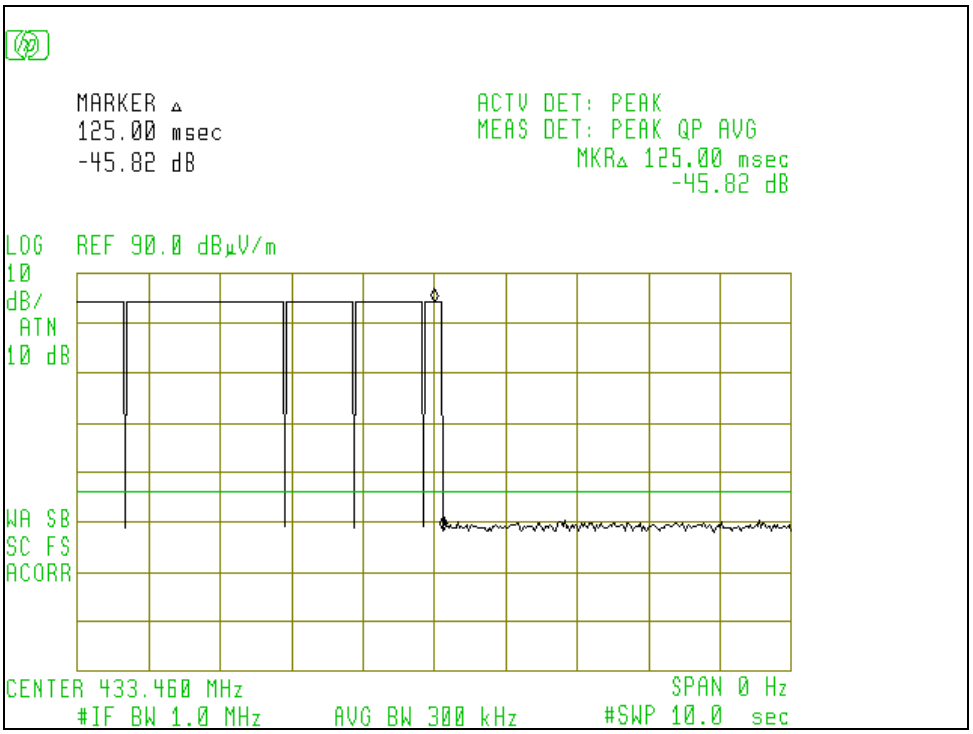


20dB Bandwidth

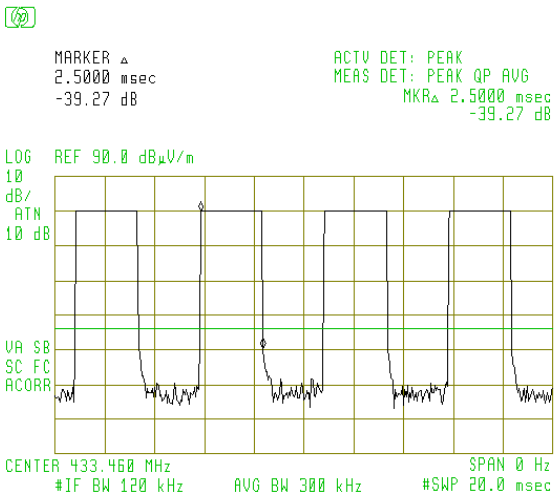


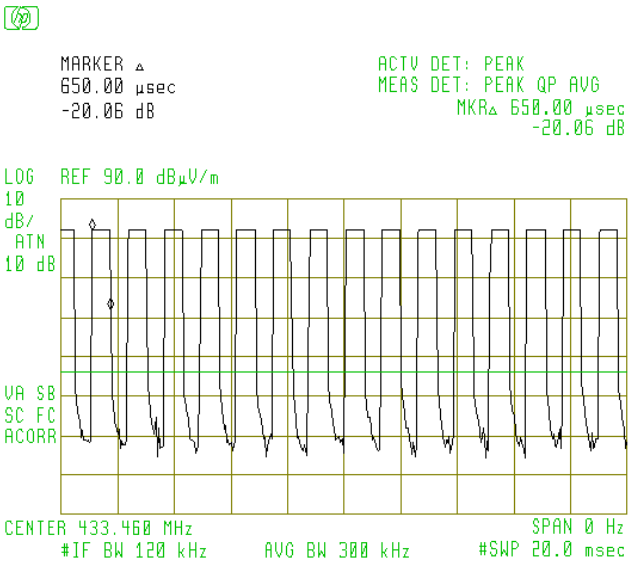
99% Bandwidth

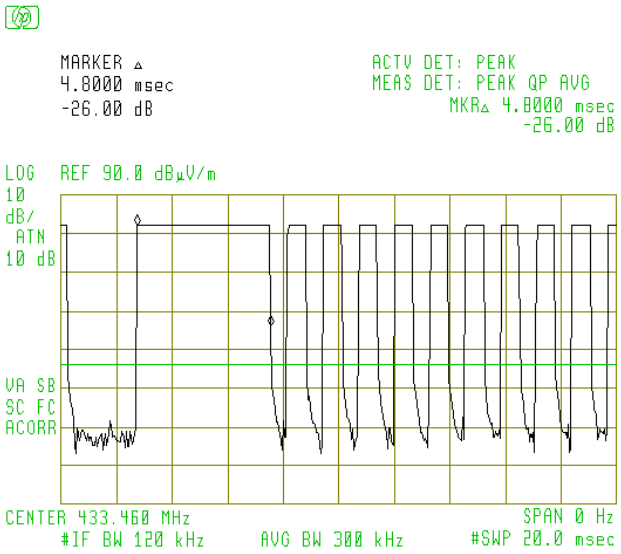
Figure 6.1 Occupied Bandwidth

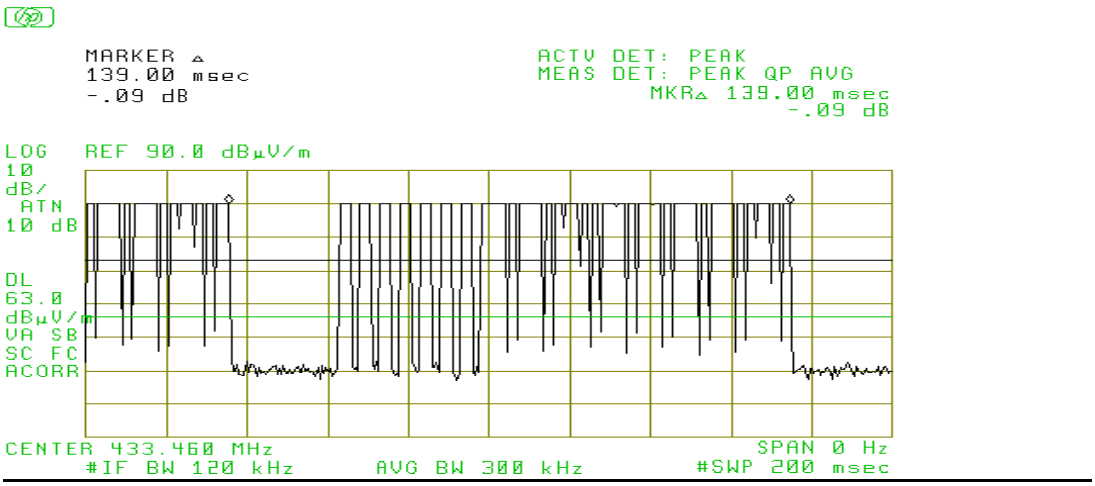


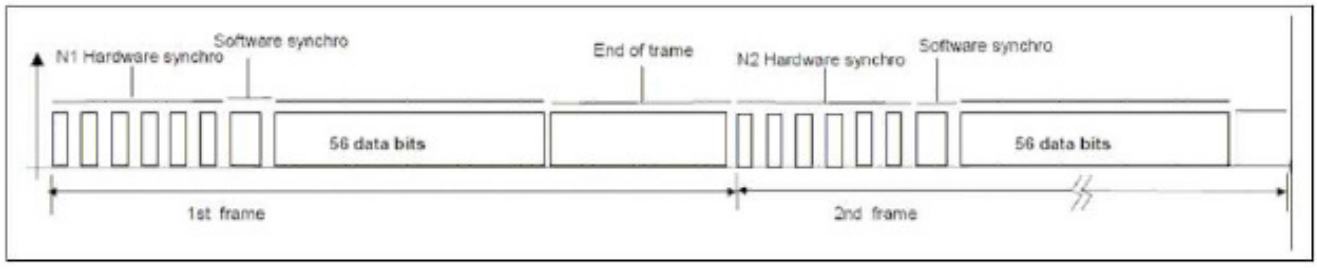
Tx stopped within 5s after deactivated


MARKER Δ
2.5000 msec
-39.27 dB
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRΔ 2.5000 msec
-39.27 dB
LOG REF 90.0 dBµV/m
10
dB/
ATN
10 dB
VA SB
SC FC
ACORR
CENTER 433.460 MHz
SPAN 0 Hz
#IF BW 120 kHz
AVG BW 300 kHz
#SWP 20.0 msec


MARKER Δ
650.00 µsec
-20.06 dB
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRΔ 650.00 µsec
-20.06 dB
LOG REF 90.0 dBµV/m
10
dB/
ATN
10 dB
VA SB
SC FC
ACORR
CENTER 433.460 MHz
SPAN 0 Hz
#IF BW 120 kHz
AVG BW 300 kHz
#SWP 20.0 msec







Details and calculations are provided in Operational Description File.

Figure 6.2 Pulse Train Timing