Advanced
Compliance Laboratory

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ELECTROMAGNETIC EMISSION COMPLIANCE REPORT

of

PRODUCT NAME: Tube Connect RTL Smart Bridge
MODEL/PARTS: 2371202
FCC ID: DWNMYRTL IC:12049A-MYRTL

August 28, 2020

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 System Inc.
Report prepared by: Advanced Compliance Lab
Report number: 0048-200810-01 Rev. A

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

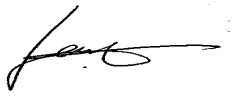
EUT:	TUBE CONNECT RTL SMART BRIDGE
Model/Parts #:	2371202
Applicant:	SOMFY SYSTEMS INC
Standards:	FCC Part 15.231(e) IC RSS-210 (Issue 10), Annex D
Result:	PASS
Tested by:	ADVANCED COMPLIANCE LABORATORY
Test Completion Date:	August 28, 2020
Report Number:	0048-200810-01

The above equipment was tested by Advanced Compliance Laboratory for compliance with the requirement set forth in FCC Part 15, subpart C & Canada RSS-210. This said equipment in the configuration described in the report, shows the maximum emission levels emitting from equipment are within the compliance requirements based on the following Decision Rule. The testing results are only related to the items tested.

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. Any results falling within the following values are deemed to be marginal.

	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

Decision Rule For Emission Tests: Pass or Fail
Pass: when emission level is ON or LESS THAN the related standard limit with zero dB margin OR customer specified margin to the limit;
Fail: when emission level is LESS THAN the related standard limit with zero dB margin OR customer specified margin to the limit.



Wei Li
Lab Manager
Advanced Compliance Lab

Date: August 28, 2020

1.2 Equipment Modifications

N/A

1.3 Product Information

System Configuration

ITEM	DESCRIPTION	ID	CABLE
Product	TUBE CONNECT RTL SMART BRIDGE (1)	FCC ID: DWNMYRTL IC:12049A-MYRTL	
Housing	PLASTICS		
Power Supply	AC 115V		
Operation Freq.	433.92 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 (Designation Number US5347) 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	15/10/20
EMCO	3104C	9307-4396	20-300MHz Biconical Antenna	15/01/21
EMCO	3146	9008-2860	200-1000MHz Log-Periodic Antenna	15/01/21
Electro-Meterics	ALR-25M/30	289	10KHz-30MHz Active Loop Antenna	28/05/21
Fischer Custom	LISN-2	900-4-0008	Line Impedance Stabilization Networks	18/03/21
Fischer Custom	LISN-2	900-4-0009	Line Impedance Stabilization Networks	24/03/21
EMCO	3115	4945	Double Ridge Guide Horn Antenna	22/01/21
Agilent	E4440A	US40420700	PSA Spectrum Analyzer	25/08/21

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 System Inc **Tube Connect RTL Smart Bridge**
Model: 2371202

FCC ID: DWNMYRTL IC:12049A-MYRTL
Contains FCC ID: S9J4144 IC:4979A-4144

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)

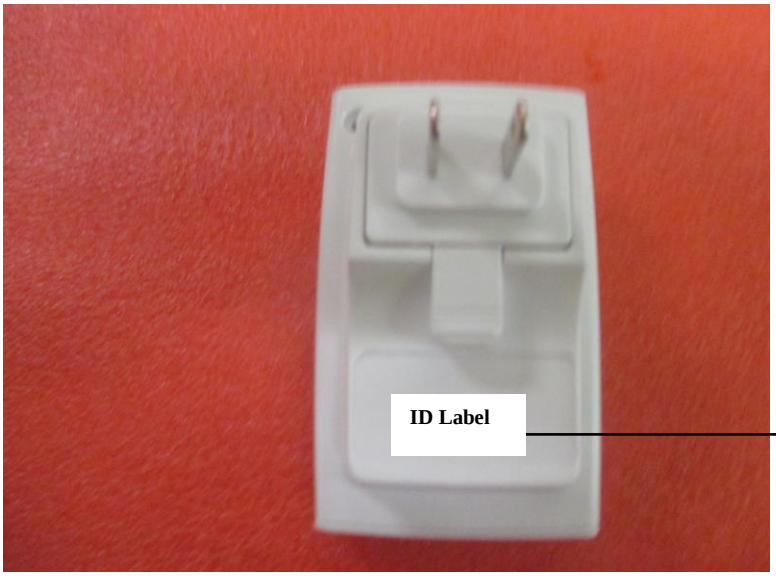


Figure 2.2 ID Label Location

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 433.92 MHz +/- 100 KHz. The power level of the RF circuit has been set to operate at the level described in FCC 15.231(e) & RSS-210.

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

Emission test was performed as 433.92MHz Tx was operated continuously (where applicable, fresh batteries shall be used during the test).

This product contains certified RF module, RTX4144 with FCC ID:S9J4144, IC:4979A-4144. It will not transmit the RF ignal with 433MHz band Transmitter simultaneously.

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 (X)

Figure 3.1 Radiated Test Setup

Figure 3.2 Conducted Test Setup

4. SYSTEM SCHEMATICS

See Attachment.

Figure 4.1 System Schematics

5. CONDUCTED EMISSION DATA

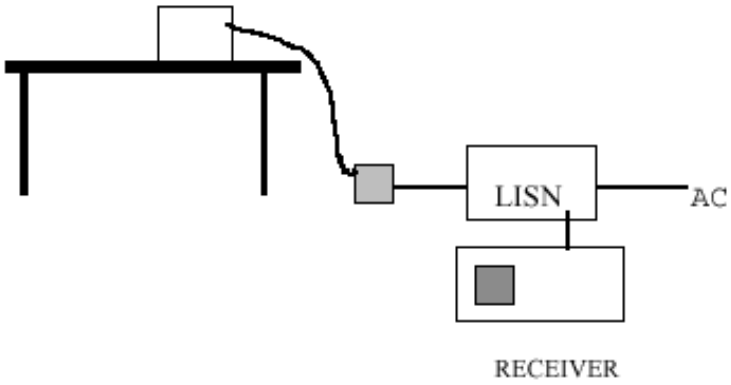
5.1 Test Methods and Conditions

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.

Highest Data for AC Main Conducted Emissions 115Vac						
Frequency (KHz)	370	470	1140	2630		
Peak Reading (dBuV) from Line*	41.34	43.45	38.49	39.37		
Averagr Reading (dBuV) from Line*						
Frequency (KHz)	470	500	1460	2560		
Peak Reading(dBuV) from Neutral *	42.77	42.29	38.20	39.03		
Averagr Reading (dBuV) from Neutral*						

Operation Mode: Normal

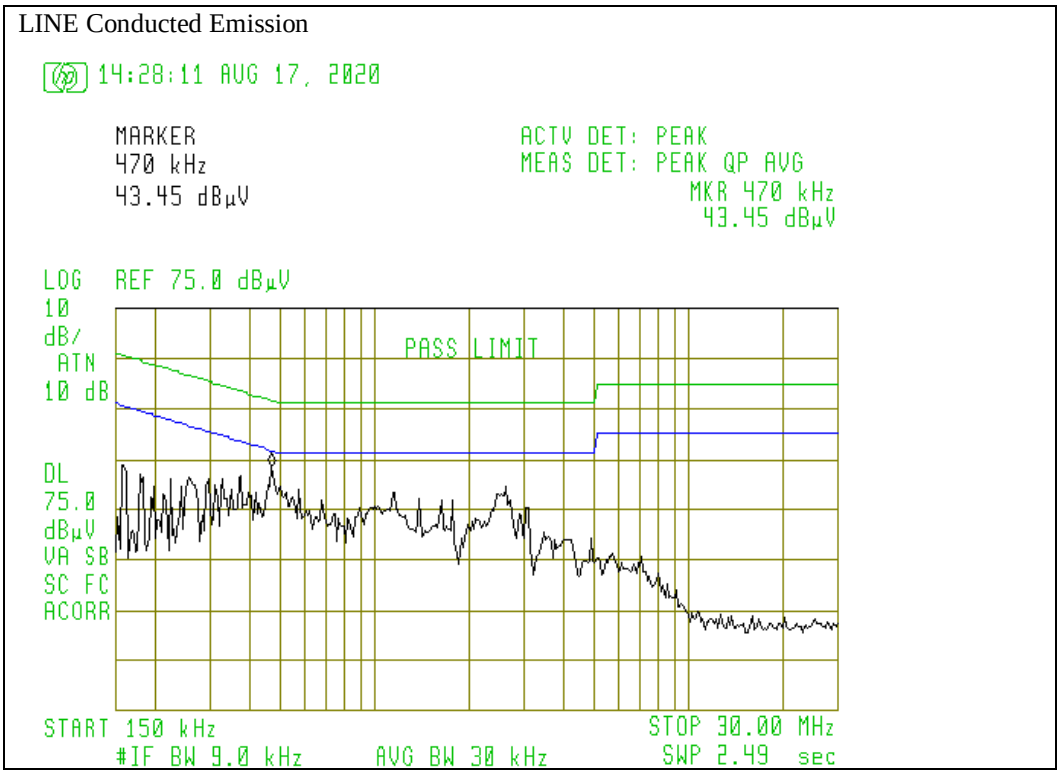


Figure 5.1 LINE Conducted Emission

NEUTRAL Conducted Emission:

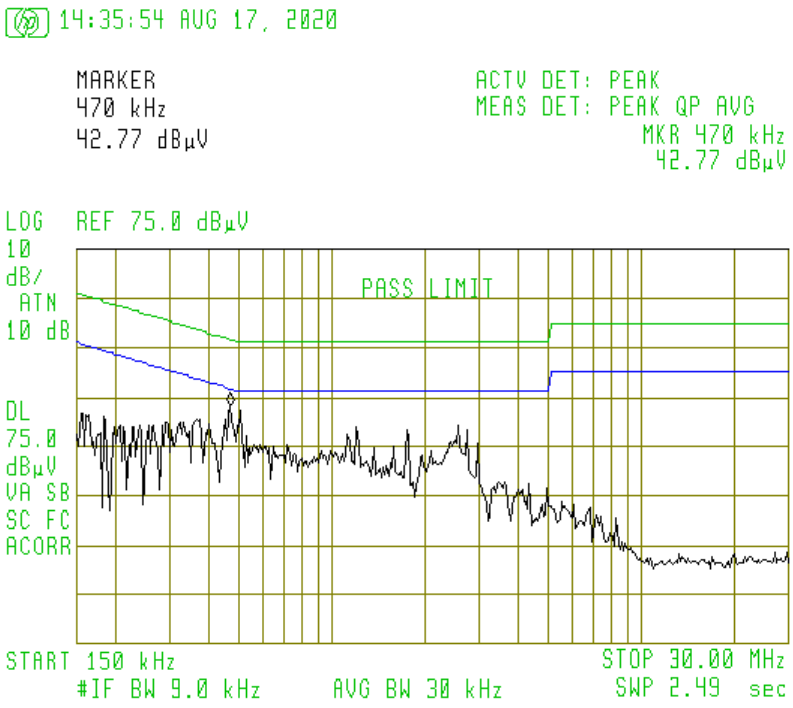


Figure 5.2 NEUTRAL Conducted Emission

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 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/IC 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: August 28, 2020

Radiated Test Data

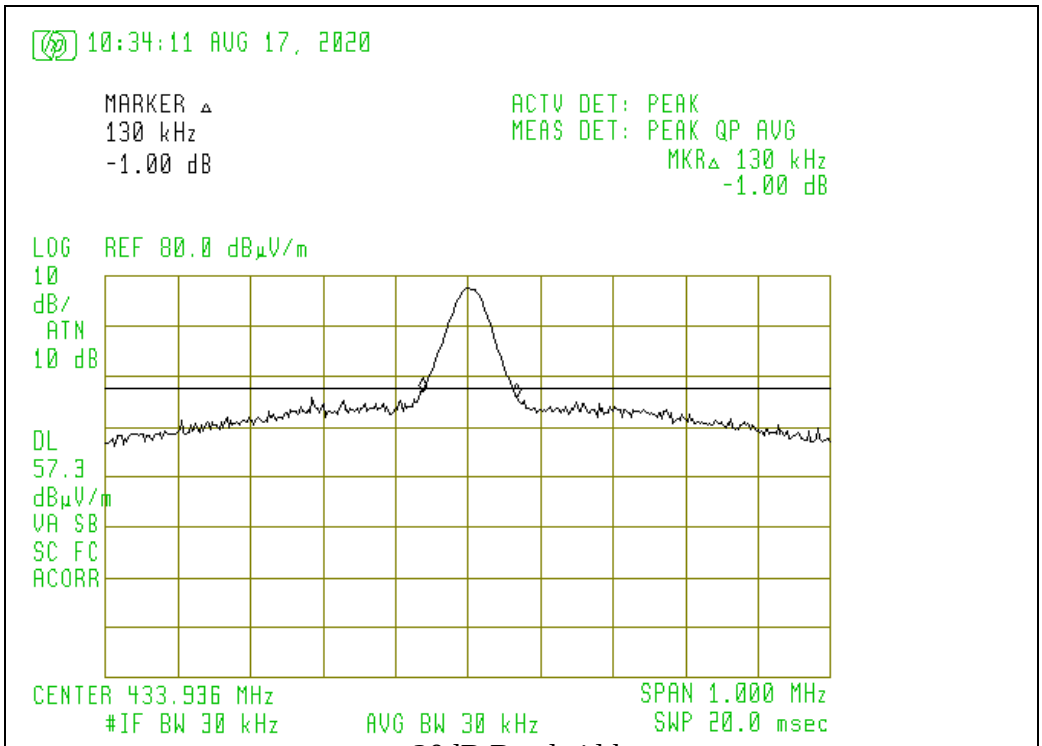
X- Polarization

Freq. (MHz)	Worst H/V	Height. (m)	Azimuth	Peak* @3m (dBuV/m)	QP/Avg @3m (dBuV/m)		QP /Avg. Limit (dBuV/m)		QP /Avg.Margin (dBuV/m)
433.9	HX(1)	1.0	190	72.8	67.2		72.9(3)		-5.7
867.8	HX	1.0	230	29.8	24.2		52.9(4)		-28.7
1301.7	HX	1.1	260	38.0	32.4		52.9(2)		-20.5
1735.6	HX	1.1	250	40.7	35.1		52.9		-17.8
433.9	VX	1.1	000	67.6	62.0		72.9		-10.9
867.8	VX	1.1	190	30.8	25.2		52.9		-27.7
1301.7	VX	1.1	000	38.2	32.6		52.9		-20.3
1735.6	VX	1.1	020	40.7	35.1		52.9		-17.8

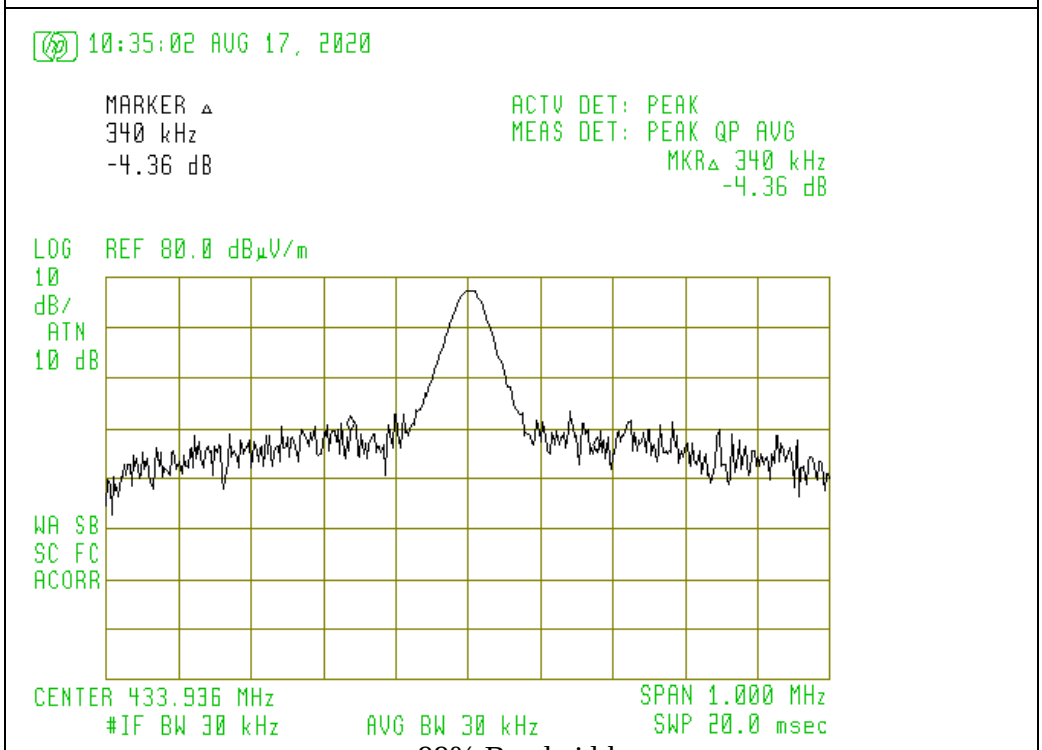
(1) See Figure 3.1, 3.2 and 3.3 for definition of position.
(2) Limit in Restricted band per FCC 15.209 or 15.231(e)/RSS-Gen or RSS-210, whichever is lower.
(3) Fundamental limit is 1500-5000 microvolts/meter linear interpolations (average reading) for 260-470 MHz fundamental frequency range; 4383uV/m for 433.4MHz Fundamental per FCC 15.231(e) & RSS-210 .
(4) Spurious limit is 150-500 microvolts/meter linear interpolations (average reading) per 15.231(e).
* In this case, since duty cycle factor is much lower than 20dB, therefor peak value of each emission shall meet Peak Value limit, which is equal to average limit +20dB.

6.4 Occupied Bandwidth

The bandwidth of the emission shall be no wider than 0.25% of the center frequency, in this case, 1.0848Hz(433.92x0.25%). 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

6.5 Transmission and Silent Period Per FCC 15.231(e) & RSS-210

Devices operated under this provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

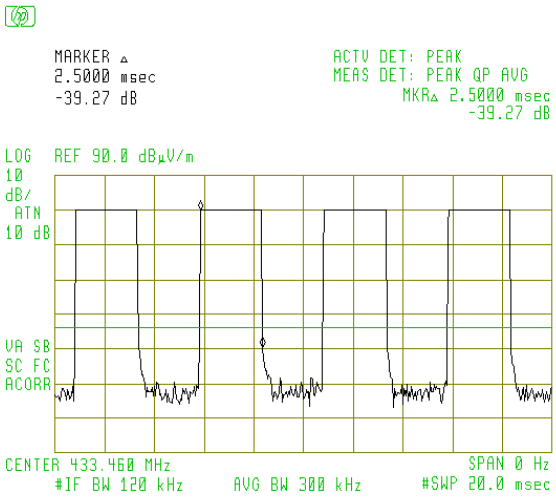
Deactivation

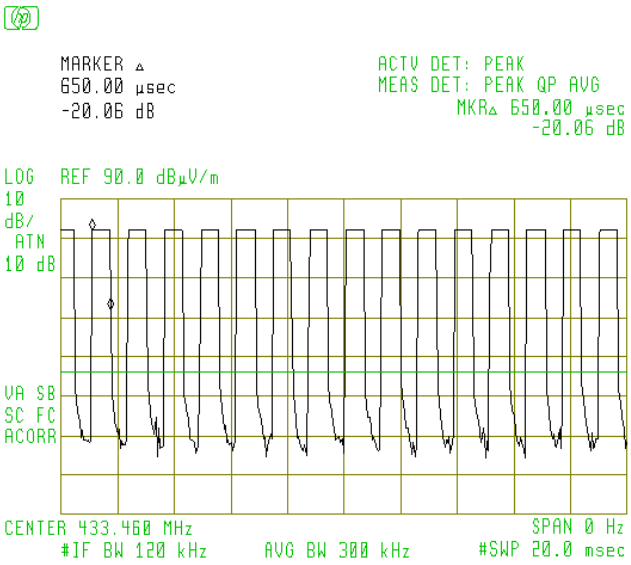
Transmission Period (s)	Limit (s)	Result
0.573	<1	Pass

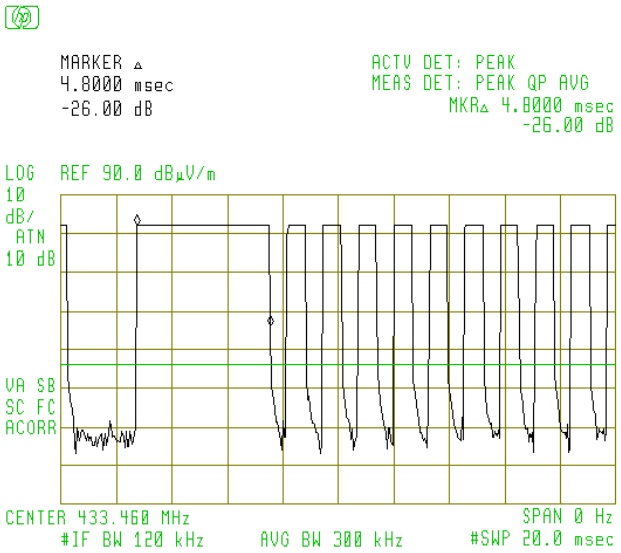
Silent Period

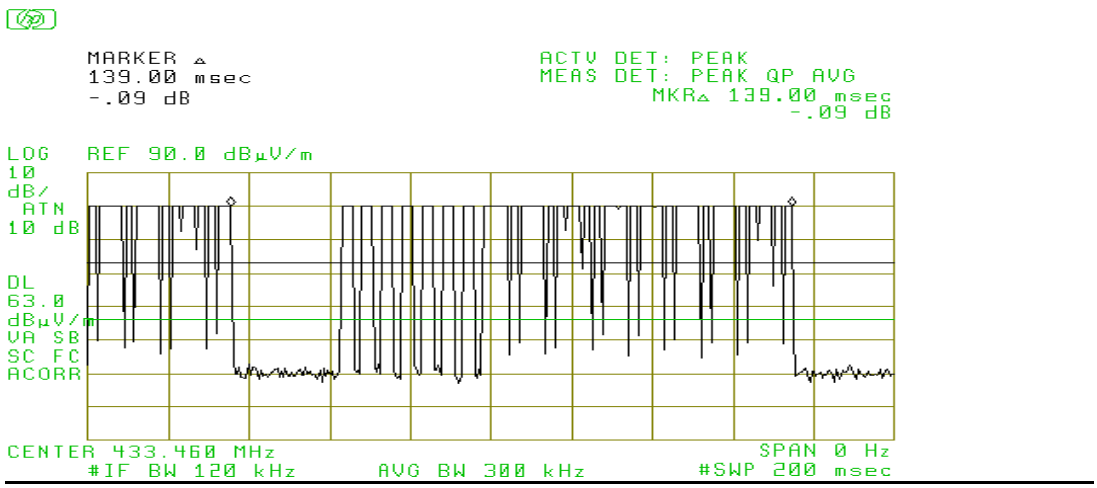
Silent Period (s)	Limit (s)	Result
17.194	>10	Pass

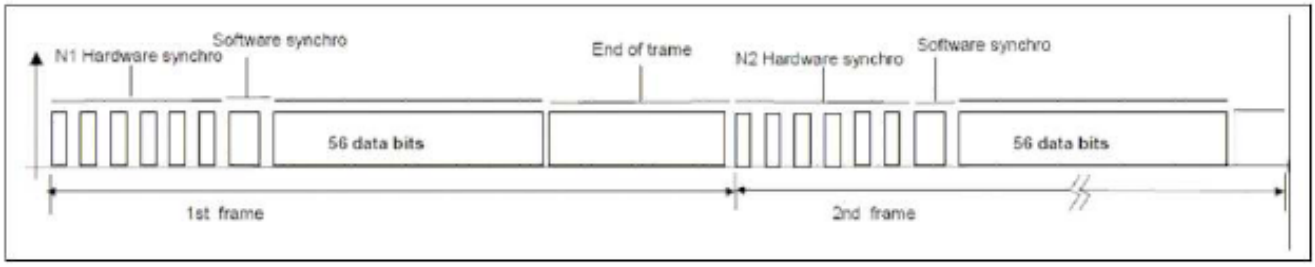
The duration time is 0.573s, so 0.573*30=17.19 s.




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


MARKER Δ
4.8000 msec
-26.00 dB
ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRΔ 4.8000 msec
-26.00 dB
LOG
10
dB/
ATN
10 dB
REF 90.0 dBµV/m
VA SB
SC FC
ACORR
CENTER 433.460 MHz
#IF BW 120 kHz
AVG BW 300 kHz
SPAN 0 Hz
#SWP 20.0 msec





Details and calculations are provided in Operational Description File.

Figure 6.2 Pulse Train Timing