FCC PART 15.231

TEST REPORT

For

Somfy Systems

121 Herrod Blvd, Dayton, New Jersey, United States

FCC ID: DWNMYLINK

Report Type:	Product Type:
Original Report	myLink

Report Number:	RSZ160930002-00
Report Date:	2016-11-17
Reviewed By:	Oscar Ye Engineer
Prepared By:	Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road, Kunshan, Jiangsu province, China Tel: +86-0512-86175000 Fax: +86-0512-88934268 www.baclcorp.com.cn

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *Somfy Systems 's* product, model number: *1811403(FCC ID: DWNMYLINK)* (or the "EUT") in this report was a *myLink*, which was measured approximately:90mm (L) x 70 mm (W) x 57 mm (H), rated input voltage: AC 110V .

**All measurement and test data in this report was gathered from production sample serial number: 1603360. (Assigned by BACL, Kunshan). The EUT supplied by the applicant was received on 2016-09-30.*

Objective

This test report is prepared on behalf of *Somfy Systems*. All the test measurements were performed according to the measurement procedure described in ANSI C63.10 - 2013.

The tests were performed in order to determine compliance with FCC Part 15, Subpart C, section 15.203, 15.205, 15.209, 15.35(c) and 15.231 rules.

Related Submittal(s)/Grant(s)

FCC Part 15.247 DTS and FCC Part 15.407 NII submissions with FCC ID: S9J4144.

Test Methodology

All measurements contained in this report were conducted with ANSI C63.10-2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		±3.26 dB
RF conducted test with spectrum		±0.9dB
RF Output Power with Power meter		±0.5dB
Radiated emission	30MHz~1GHz	±5.91dB
	Above 1G	±4.92dB
Occupied Bandwidth		±0.5kHz
Temperature		±1.0℃
Humidity		±6%

Test Facility

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the Chenghu Lake Road, Kunshan Development Zone No.248, Kunshan, Jiangsu, China

Test site at Bay Area Compliance Laboratories Corp. (Kunshan) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 06, 2014. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 815570. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

SYSTEM TEST CONFIGURATION

Justification

The system was configured for testing in a typical fashion (as normally used by a typical user).

Special Accessories

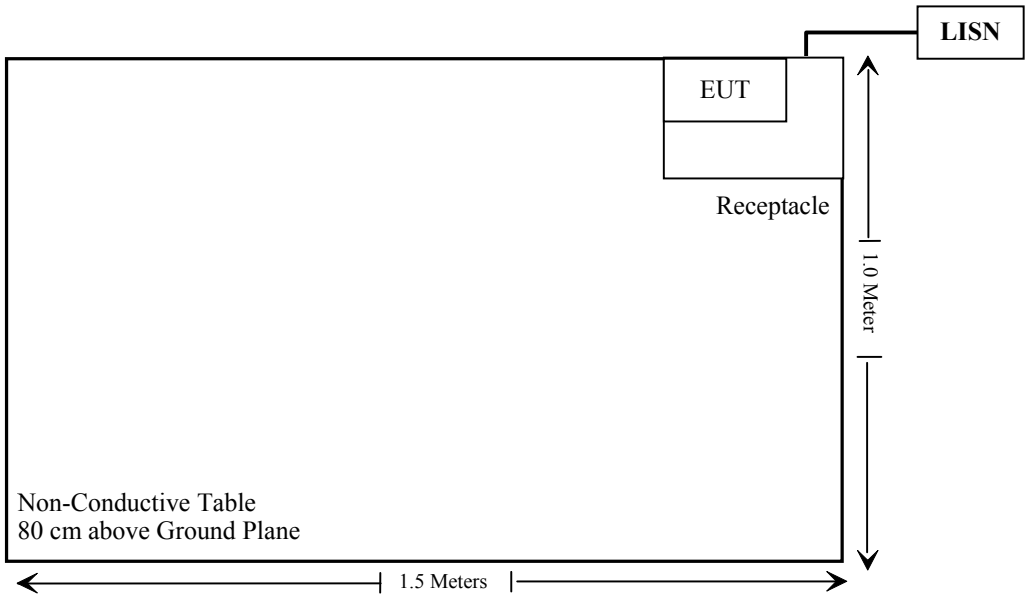
No special accessories was used

Equipment Modifications

No modification was made to the EUT.

Block Diagram of Test Setup

Conducted emissions



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§15.203	Antenna Requirement	Compliance
§15.207 (a)	Conducted Emissions	Compliance
§15.205, §15.209, §15.231(e)	Radiated Emissions	Compliance
§15.231 (c)	20dB Emission Bandwidth	Compliance
§15.231 (e)	Transmission Time, Silent period	Compliance

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
AC Line Conducted test					
Rohde & Schwarz	EMI Test Receiver	ESCS30	934115/007	2015-11-12	2016-11-11
Rohde & Schwarz	LISN	ESH3-Z5	862770/011	2015-11-12	2016-11-11
Rohde & Schwarz	Pulse limiter	ESH3-Z2	879940/0058	2016-06-19	2017-06-18
MICRO-COAX	Coaxial line	UFB-293B-1-0480-50X50	97F0173	2016-09-01	2017-09-01
Rohde & Schwarz	CE Test software	EMC 32	V 09.10.0	NCR	NCR
Radiation test					
Sonoma Instrunent	Amplifier	330	171377	2016-09-16	2017-09-16
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2015-11-12	2016-11-11
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2015-11-07	2016-11-06
Mini	Pre-amplifier	ZVA-183-S+	857001418	2016-09-16	2017-09-15
DUCOMMUN	Pre-amplifier	ALN-22093530-01	990147	2016-09-16	2017-09-15
EMCO	Horn Antenna	3116	9510-2384	2015-11-07	2016-11-06
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2015-11-12	2016-11-11
Rohde & Schwarz	Signal Analyzer	FSV40	101116	2016-07-04	2017-07-03
ETS	Horn Antenna	3115	6229	2015-11-07	2016-11-06
R&S	Auto test Software	EMC32	V 09.10.0	NCR	NCR
BACL	RF cable	KS-LAB-012	KS-LAB-012	2015-12-16	2016-12-15
BACL	RF cable	KS-LAB-010	KS-LAB-010	2015-12-16	2016-12-15
RF Conducted test					
BACL	TS 8997 Cable-01	T-KS-EMC086	T-KS-EMC086	2015-12-10	2016-12-09
BACL	RF cable	KS-LAB-012	KS-LAB-012	2015-12-16	2016-12-15
WEINSCHEL	3dB Attenuator	5326	N/A	2016-06-18	2017-06-18
Rohde & Schwarz	OSP120 BASE UNIT	OSP120	101247	2016-07-04	2017-07-03
Rohde & Schwarz	Power Sensor	NRP-Z91	200014	2015-08-01	2017-07-31
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131	2016-09-21	2017-09-21

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §15.203 - ANTENNA REQUIREMENT

Applicable Standard

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

Antenna Connector Construction

The EUT have a couple of ceramic chip antenna arrangement which were permanently attached and the antenna gain is 0 dBi; fulfill the requirement of this section. Please refer to EUT photos.

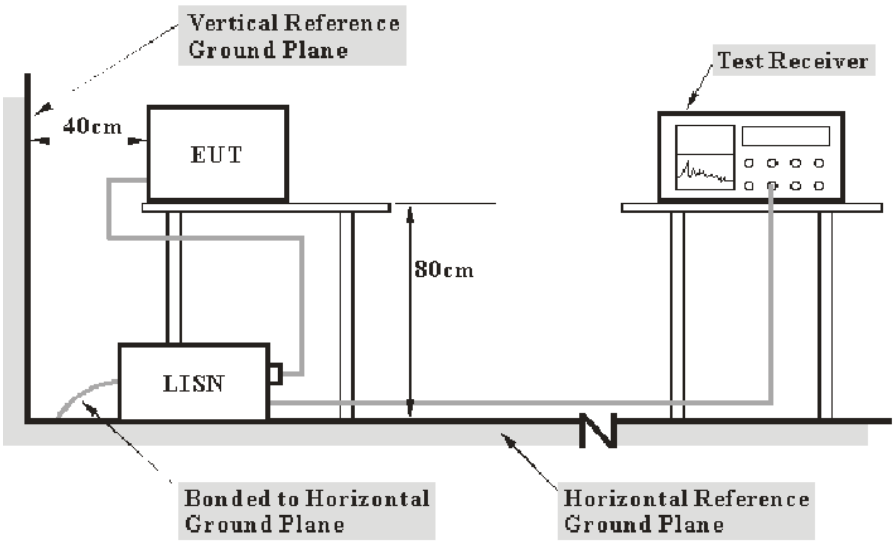
Result: Compliant.

FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS

Applicable Standard

FCC§15.207

EUT Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.4-2014 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The adapter was connected to a 120 VAC/60 Hz power source.

EMI Test Receiver Setup

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Test Procedure

During the conducted emission test, the adapter was connected to the outlet of the LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All final data was recorded in the Quasi-peak and average detection mode.

Corrected Factor & Margin Calculation

The Corrected factor is calculated by adding LISN VDF (Voltage Division Factor), Cable Loss and Transient Limiter Attenuation. The basic equation is as follows:

Correction Factor = LISN VDF + Cable Loss + Transient Limiter Attenuation

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7 dB means the emission is 7 dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Test Results Summary

According to the recorded data in following table, the EUT complied with the FCC Part 15.207,

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m + U_{(Lm)} \leq L_{lim} + U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than U_{cispr}, if L_m is less than L_{lim}, it implies that the EUT complies with the limit.

Test Data

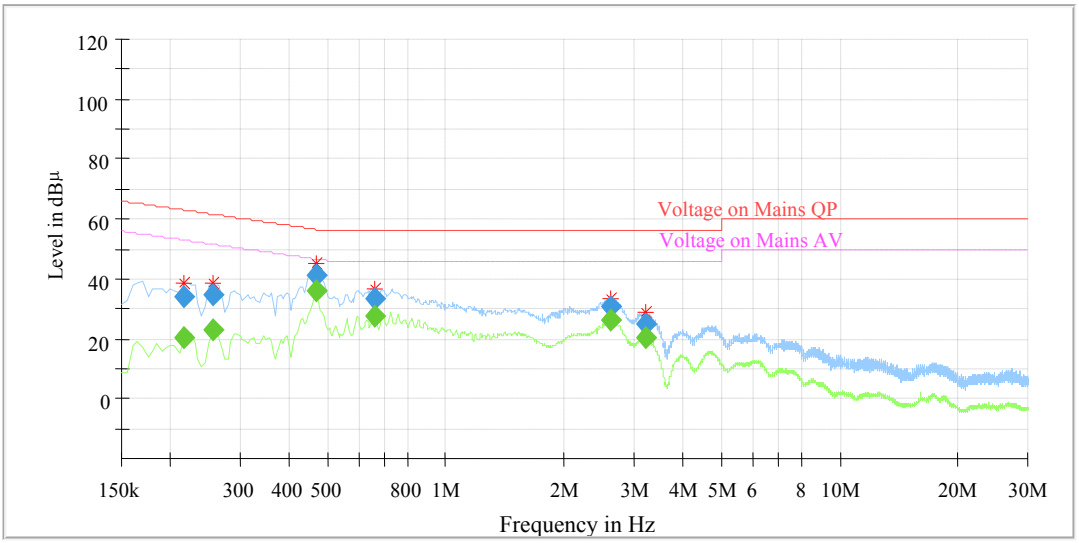
Environmental Conditions

Temperature:	26.8 ℃
Relative Humidity:	54.9 %
ATM Pressure:	101.0 kPa

The testing was performed by Chris Wang on 2016-10-31.

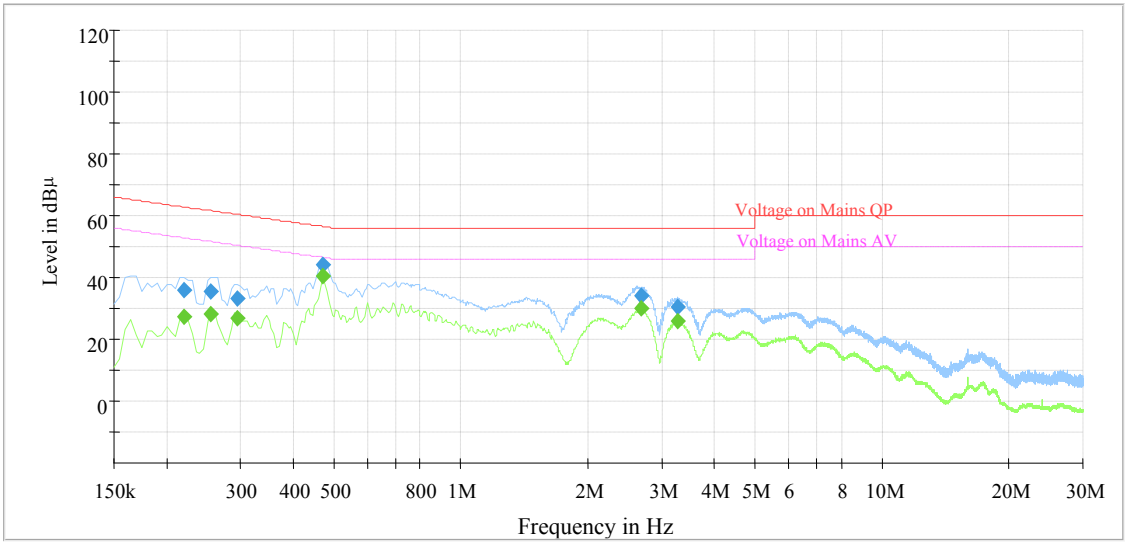
EUT operation mode: Transmitting

AC 120V/60 Hz, Line



Frequency (MHz)	QuasiPeak (dBµV)	Average (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.215000	---	20.29	9.000	L1	10.3	32.72	53.01	Compliance
0.215000	34.28	---	9.000	L1	10.3	28.73	63.01	Compliance
0.255000	---	23.11	9.000	L1	10.3	28.48	51.59	Compliance
0.255000	34.66	---	9.000	L1	10.3	26.93	61.59	Compliance
0.470000	---	36.07	9.000	L1	10.3	10.44	46.51	Compliance
0.470000	41.42	---	9.000	L1	10.3	15.09	56.51	Compliance
0.660000	---	27.46	9.000	L1	10.3	18.54	46.00	Compliance
0.660000	33.44	---	9.000	L1	10.3	22.56	56.00	Compliance
2.630000	---	26.07	9.000	L1	10.4	19.93	46.00	Compliance
2.630000	30.56	---	9.000	L1	10.4	25.44	56.00	Compliance
3.200000	---	20.36	9.000	L1	10.5	25.64	46.00	Compliance
3.200000	25.02	---	9.000	L1	10.5	30.98	56.00	Compliance

AC 120V/60 Hz, Neutral



Frequency (MHz)	QuasiPeak (dBµV)	Average (dB µ V)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.220000	---	27.48	9.000	N	10.3	25.34	52.82	Compliance
0.220000	35.87	---	9.000	N	10.3	26.95	62.82	Compliance
0.255000	---	28.20	9.000	N	10.3	23.39	51.59	Compliance
0.255000	35.65	---	9.000	N	10.3	25.94	61.59	Compliance
0.295000	---	26.97	9.000	N	10.3	23.41	50.38	Compliance
0.295000	32.96	---	9.000	N	10.3	27.42	60.38	Compliance
0.470000	---	40.32	9.000	N	10.3	6.19	46.51	Compliance
0.470000	43.97	---	9.000	N	10.3	12.54	56.51	Compliance
2.675000	---	29.96	9.000	N	10.5	16.04	46.00	Compliance
2.675000	34.14	---	9.000	N	10.5	21.86	56.00	Compliance
3.275000	---	25.80	9.000	N	10.5	20.20	46.00	Compliance
3.275000	30.43	---	9.000	N	10.5	25.57	56.00	Compliance

Note:
1) Correction Factor =LISN VDF (Voltage Division Factor) + Cable Loss + Transient Limiter Attenuation
2) Corrected Amplitude = Reading + Correction Factor
3) Margin = Limit – Corrected Amplitude

FCC §15.205, §15.209,§15.231 (e) - RADIATED EMISSIONS

Applicable Standard

FCC §15.205, §15.209, §15.231 (e)

According to §15.231 (e), intentional radiators may operate at a periodic rate exceeding that specified in paragraph (a) of this section and may be employed for any type of operation, including operation prohibited in paragraph (a) of this section, provided the intentional radiator complies with the provisions of paragraphs (b) through (d) of this section, except the field strength table in paragraph (b) of this section is replaced by the following:

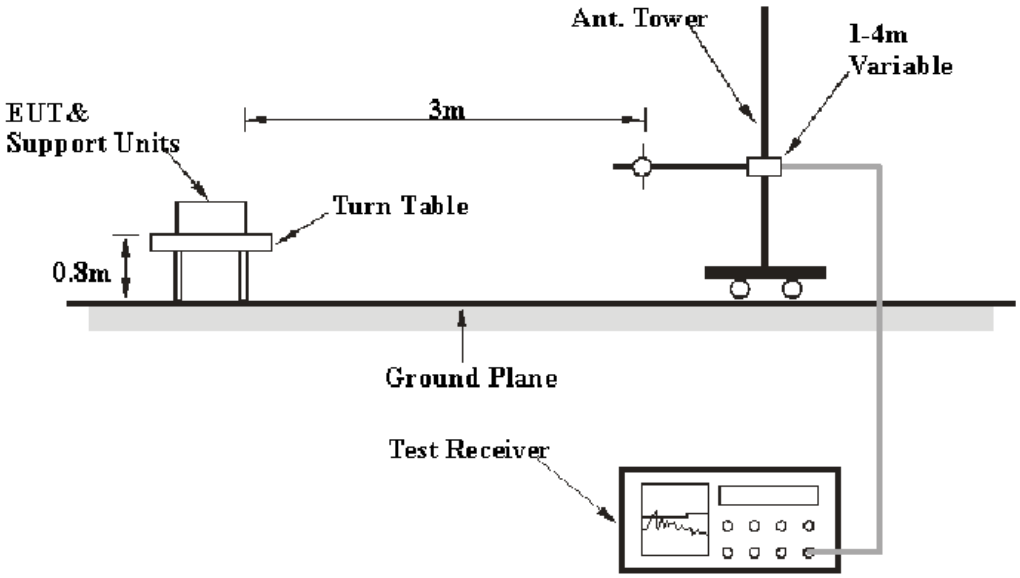
Fundamental frequency (MHz)	Field Strength of Fundamental (Microvolts /meter)	Field Strength of spurious emissions (Microvolts /meter)
40.66-40.70	1000	100
70-130	500	50
130-174	500 to 1500**	50 to 150**
174-260	1500	150
260-470	1500 to 5000**	150 to 500**
Above 470	5000	500

**Linear interpolations.

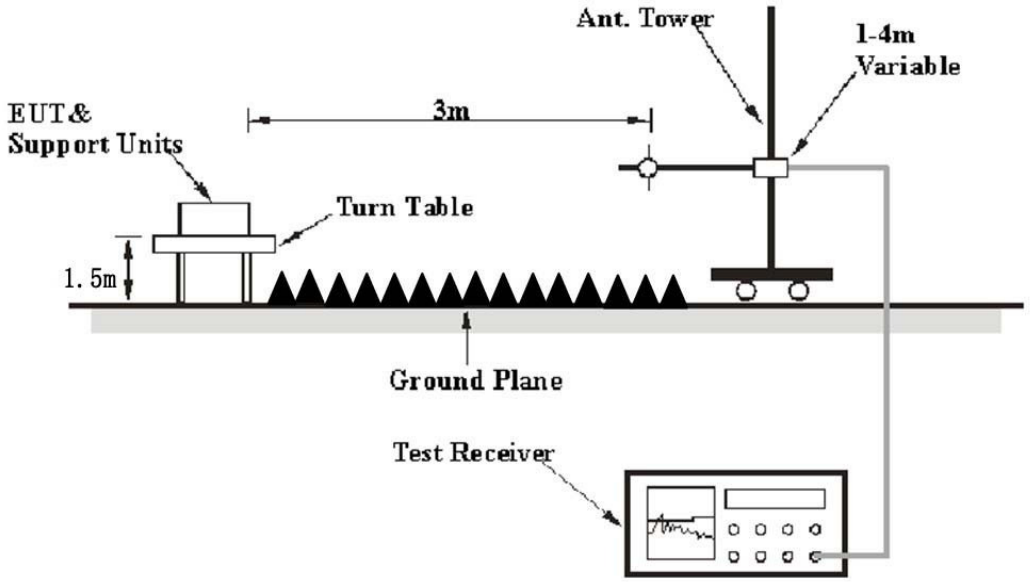
The above field strength limits are specified at a distance of 3-meters the tighter limits apply at the band edges.

EUT Setup

Below 1 GHz:



Above 1 GHz:



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10 - 2013. The specification used was the FCC 15 § 15.209, 15.205 and 15.231.

EMI Test Receiver Setup

The system was investigated from 30 MHz to 4.5 GHz.

During the radiated emission test, the test receiver was set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30MHz – 1000 MHz	100 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1 MHz	3 MHz	/	PK
	1 MHz	10 Hz	/	Ave.

Test Procedure

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

All final data was recorded in the Quasi-peak detection mode from 30MHz to 1GHz, Peak detection mode above 1 GHz.

Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Loss and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude = Meter Reading + Antenna Loss + Cable Loss - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 5.8 dB means the emission is 5.8 dB below the limit. The equation for margin calculation is as follows:

Margin = Limit –Corrected Amplitude

Test Results Summary

According to the data in the following table, the EUT complied with the FCC §15.205, §15.209, §15.231 (e),

Refer to CISPR16-4-2:2011 and CISPR 16-4-1:2009, the measured level complies with the limit if

$$L_m ++ U_{(Lm)} \leq L_{lim} ++ U_{cispr}$$

In BACL, $U_{(Lm)}$ is less than + U_{cispr}, if L_m is less than L_{lim}, it implies that the EUT complies with the limit.

Test Data

Environmental Conditions

Temperature:	28 ℃
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Chris Wang on 2016-10-19.

Test mode: Transmitting (The device has two antennas, only one will be used while working. So we tested two antennas and displayed the worst one in the report. The worst case was ANT 1 transmitting)

30 MHz- 4.5 GHz:

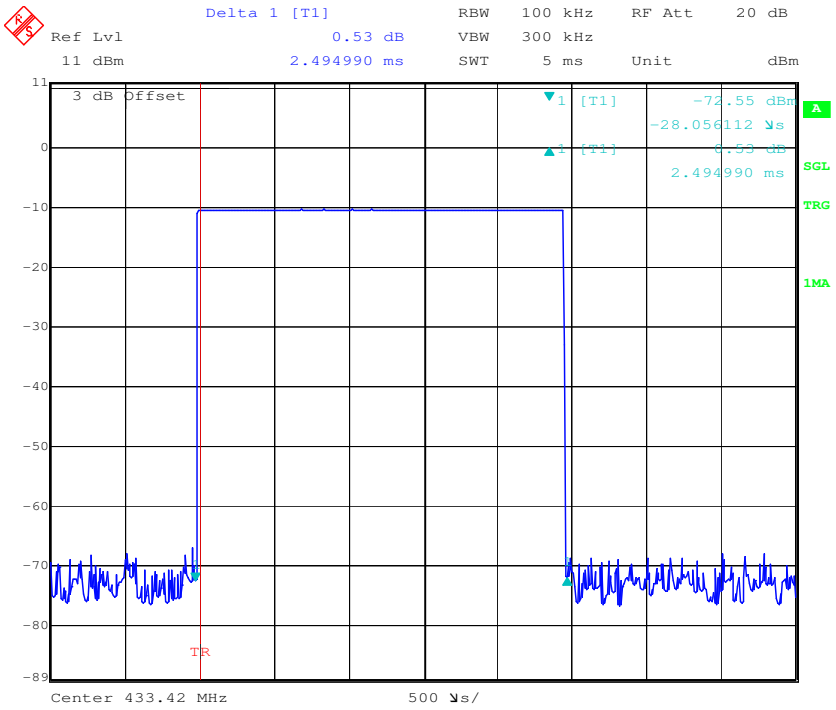
Frequency (MHz)	Receiver		Turntable Degree	Rx Antenna		Corrected Factor (dB)	Corrected Amplitude (dBμV/m)	FCC Part 15.231(e)/205/209		
	Reading (dBμV)	Detector (PK/QP/Ave.)		Height (m)	Polar (H/V)			Limit (dBμV/m)	Margin (dB)	Comment
433.42	85.34	PK	132	1.3	H	-7.34	78.00	92.9	14.90	Fundamental
433.42	84.84	PK	89	1.2	V	-7.34	77.50	92.9	15.40	Fundamental
866.84	34.96	PK	129	1.3	H	-1.10	33.86	72.9	39.04	Harmonic
866.84	34.82	PK	37	1.4	V	-1.10	33.72	72.9	39.18	Harmonic
1300.26	38.68	PK	174	1.4	H	-3.87	34.81	72.9	38.09	Harmonic
1300.26	37.89	PK	339	1.6	V	-3.87	34.02	72.9	38.88	Harmonic

Field Strength of Average Emission							
Frequency (MHz)	Peak Measurement @3m (dBμV/m)	Polar (H/V)	Duty Cycle Correction Factor (dB)	Corrected Ampitude (dBμV/m)	FCC Part 15.231(e)/205/209		
					Limit (dBμV/m)	Margin (dB)	Comment
433.42	78.00	H	-5.47	72.53	72.9	0.37	Fundamental
433.42	77.50	V	-5.47	72.03	72.9	0.87	Fundamental
866.84	33.86	H	-5.47	28.39	52.9	24.51	Harmonic
866.84	33.72	V	-5.47	28.25	52.9	24.65	Harmonic
1300.26	34.81	H	-5.47	29.34	52.9	23.56	Harmonic
1300.26	34.02	V	-5.47	28.55	52.9	24.35	Harmonic

Note 1:
Corrected Amplitude = Corrected Factor + Reading
Corrected Factor = Antenna factor (Rx) + cable loss – amplifier factor
Margin = Limit - Corr. Amplitude

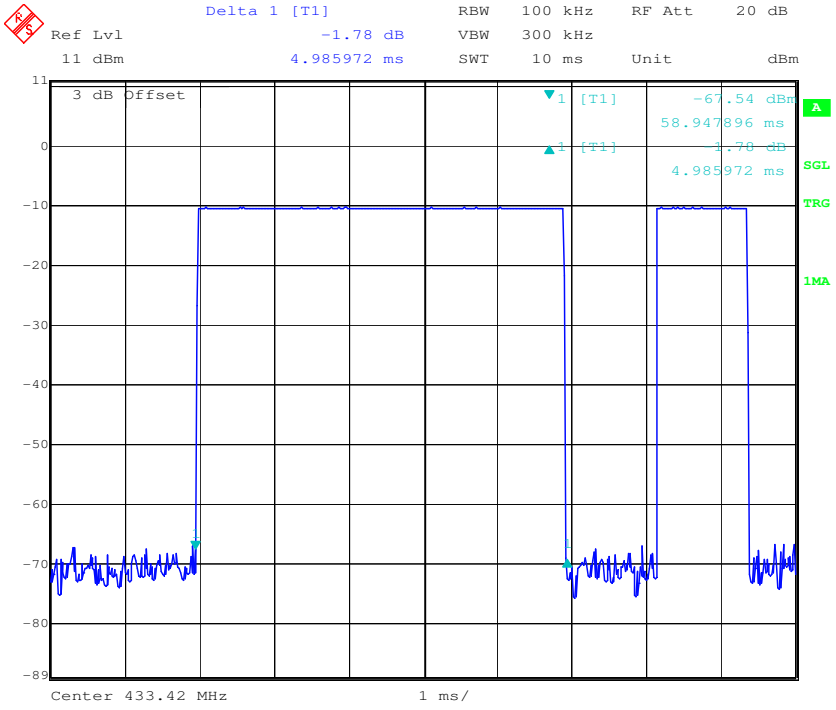
Note 2:
Calculate Average value based on Duty Cycle correction factor:
Ton1 = 12*Pulses=12*2.495ms = 29.94ms
Ton2 = 1*Pulses=1*4.986ms =4.986 ms
Ton3 = 10*Pulses=10*1.258ms =12.58ms
Ton4 = 9*Pulses=9*0.642ms =5.778ms
Tp = 100ms
Duty cycle = (Ton1+ Ton2+ Ton3+Ton4)/Tp = 53.284/100 = 0.533
Duty Cycle Corrected Factor = 20lg (Duty cycle) = 20lg(0.533) = -5.47 dB
Ave = PK + 20*lg(Duty Cycle)

Duty Cycle 1



Date: 19.OCT.2016 22:28:09

Duty Cycle 2



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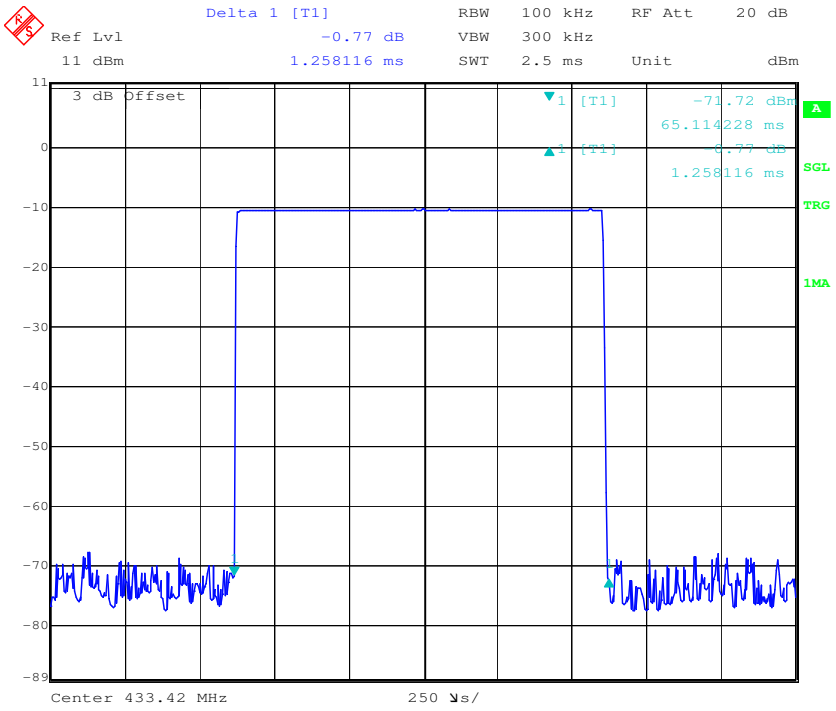
Duty Cycle 3



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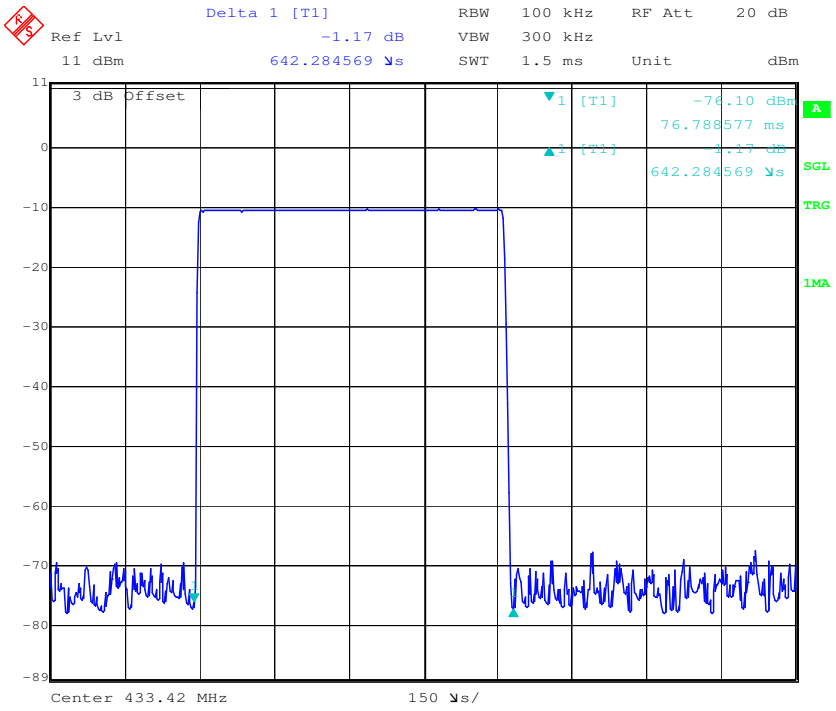
Duty Cycle 4



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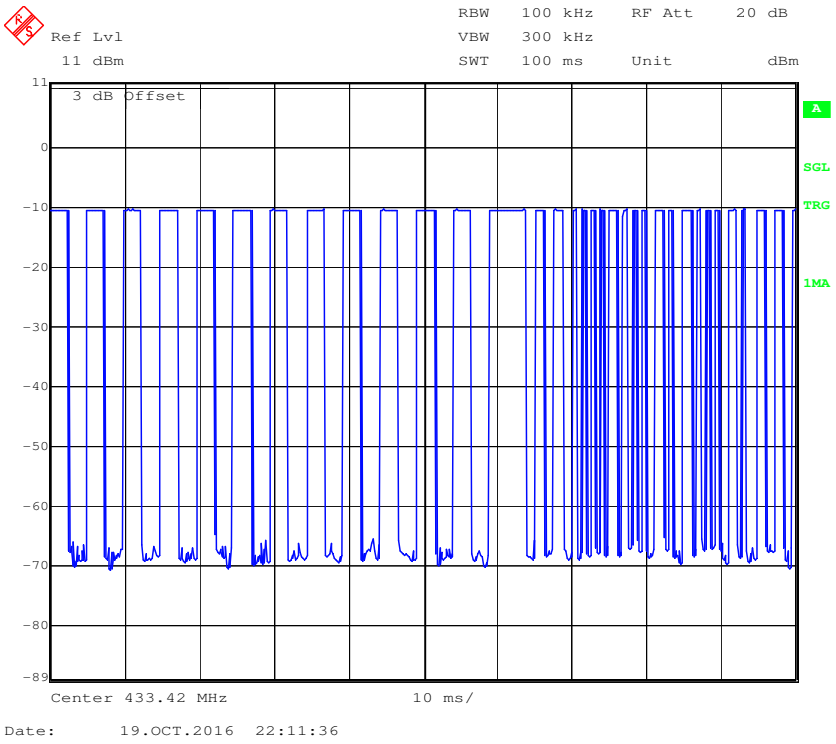
100 ms


RBW 100 kHz
RF Att 20 dB
Ref Lvl
VBW 300 kHz
11 dBm
SWT 100 ms
Unit dBm
3 dB Offset
11
0
-10
-20
-30
-40
-50
-60
-70
-80
-89
A
SGL
TRG
1MA
Center 433.42 MHz
10 ms/
Date: 19.OCT.2016 22:11:36

FCC §15.231(c) – 20 dB EMISSION BANDWIDTH TESTING

Applicable Standard

Per 15.231(c), The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Test Procedure

With the EUT's antenna attached, the waveforzm was received by the test antenna which was connected to the spectrum analyzer, plot the 20 dB bandwidth.

Test Data

Environmental Conditions

Temperature:	27 ℃
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Chris Wang on 2016-10-31.

Test Mode: Transmitting

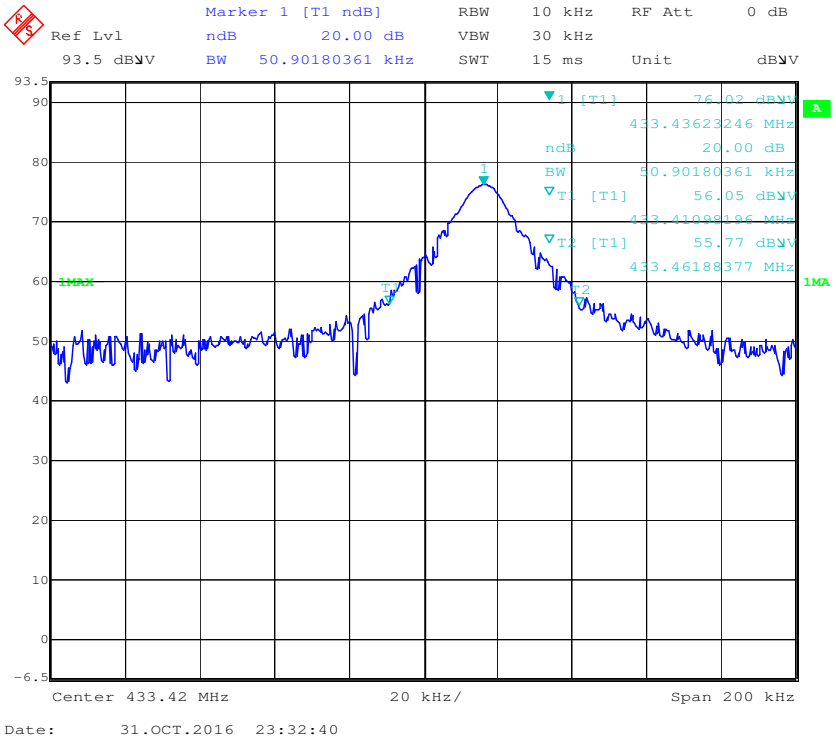
Please refer to following table and plot.

ASK modulation:

Channel Frequency (MHz)	20 dB Emission Bandwidth (kHz)	<Limit (MHz)	Result
433.42	50.9	1.08355	Pass

Note: Limit = 0.25% * center frequency = 0.25% * 433.42MHz = 1.08355 MHz

20 dB Emission Bandwidth



FCC §15.231(e) – TRANSMISSION AND SILENT PERIOD TESTING

Applicable Standard

Per FCC §15.231(e), devices operated under the 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.

Test Procedure

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set center frequency of spectrum analyzer=operating frequency.
3. Set the spectrum analyzer as RBW=100kHz, VBW=300kHz, Span=0Hz.
4. Repeat above procedures until all frequency measured was complete.

Test Data

Environmental Conditions

Temperature:	23~24 ℃
Relative Humidity:	50~54 %
ATM Pressure:	101.0~101.0 kPa

The testing was performed by Chris Wang on 2016-10-19 and 2016-10-27.

Test Mode: Transmitting

Deactivation

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

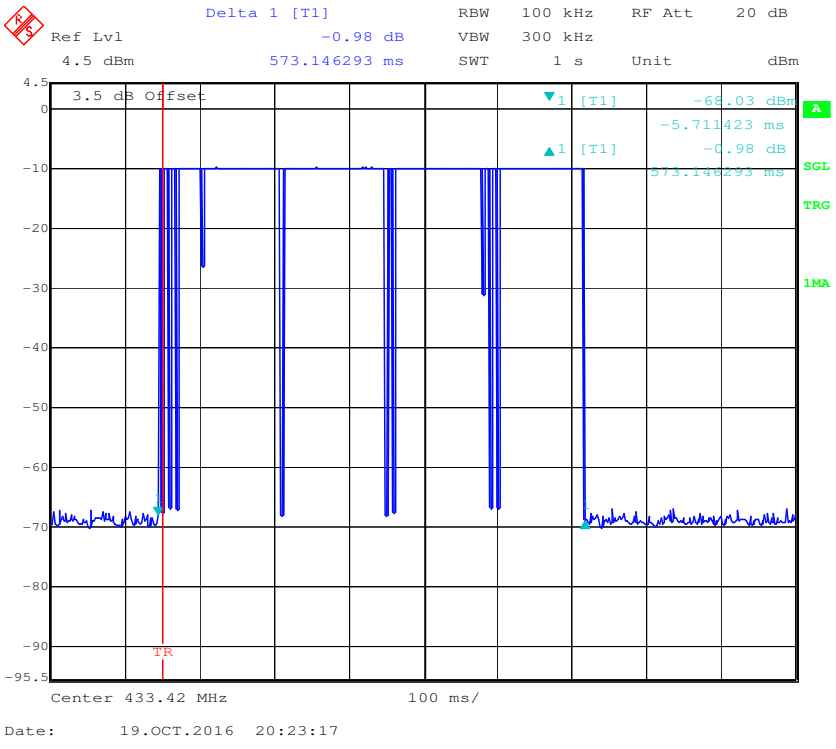
Silent period

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

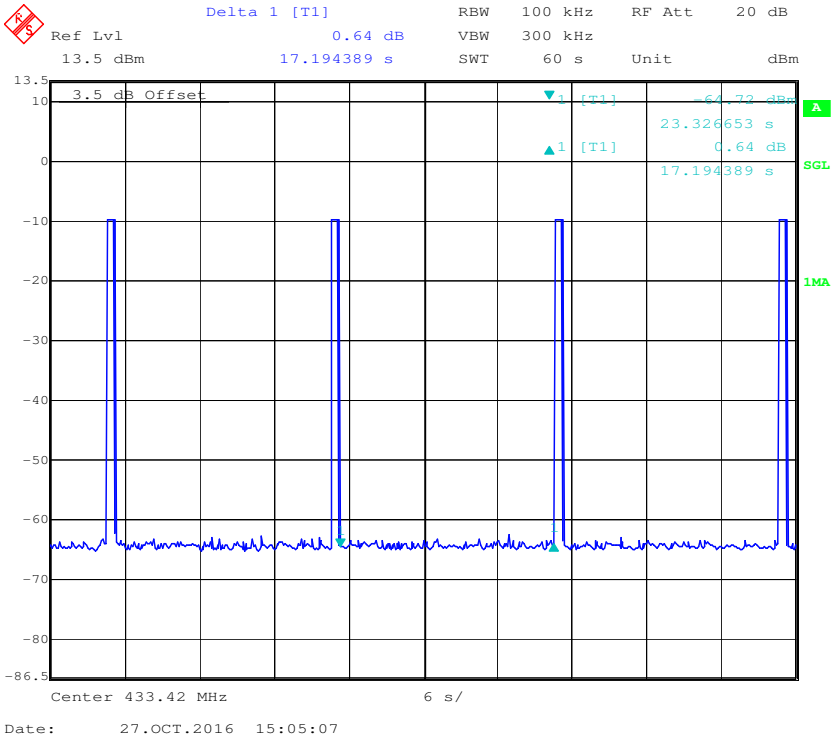
Note: The silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.
The duration time is 0.573 s，0.573*30=17.19 s.

Test Result: Compliant, please refer to following plot

Transmission period



Silent period



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