TEST REPORT

Applicant:	GUANGZHOU SENYUE ELECTRONIC CO., LTD.
Address of Applicant:	RM302, 2 of No.3 GangTangXi Road, TianHe District, Guangzhou, Guangdong, China
Manufacturer:	GUANGZHOU SENYUE ELECTRONIC CO., LTD.
Address of Manufacturer:	RM302, 2 of No.3 GangTangXi Road, TianHe District, Guangzhou, Guangdong, China
Product name:	TWO-WAY REMOTE CONTROL SWITCH KIT
Model:	YK110V-2
Rating(s):	DC 3V battery
Trademark:	SENYUE
Standards:	47 CFR PART 15 Subpart C: section 15.231
FCC ID:	2ATISYK110-2SENYUE
Data of Receipt:	2019-04-19
Date of Test:	2019-04-19~2019-05-24
Date of Issue:	2019-05-25
Test Result	**Pass***

* In the configuration tested, the test item complied with the standards specified above.

Authorized for issue by:

Test by:			***Reviewed by:***		
May.25, 2019	Eleven Liang Project Engineer	Eleven Liang	May.25, 2019	Pauler Li Project Engineer	Pauler Li
Date	*Name/Position*	*Signature*	*Date*	*Name/Position*	*Signature*

ITL CO. LTD. ITL *

Possible test case verdicts:

test case does not apply to the test object ..:	N/A
test object does meet the requirement .....:	P (Pass)
test object does not meet the requirement ..:	F (Fail)

Testing Laboratory information:

Testing Laboratory Name ..... :	ITL Co., Ltd.
Address.....:	No.8, JinQianLing street 5, DongHuan Road, Huangjiang Town, Dongguan, China.
Testing location :	Same as above
Tel :	0086-769-39001678
Fax :	0086-20-62824387
E-mail :	itl@i-testlab.com

General remarks:

The test results presented in this report relate only to the object tested.

The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.

This report would be invalid test report without all the signatures of testing technician and approver.

This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

General product information:

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1 Test Summary

Test	Test Requirement	Test method	Result
Radiated Emission	FCC PART 15 section 15.231(b)	ANSI C 63.10: Clause 6.4, 6.5 and 6.6	PASS
Occupied Bandwidth	FCC PART 15 section 15.231(c)	ANSI C 63.10	PASS
Dwell Time	FCC PART 15 section 15.231(a)	FCC PART 15: Section 15.231(a)	PASS
Conducted Emission	RSS-Gen Issue 4	/	N/A

Remark:

N/A: because the device is battery operated.
EUT: In this whole report EUT means Equipment Under Test.
Tx: In this whole report Tx (or tx) means Transmitter.
Rx: In this whole report Rx (or rx) means Receiver.
RF: In this whole report RF means Radio Frequency.
ANSI C63.10: the detail version is ANSI C63.10:2013 in the whole report.

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3 General Information

3.1 Client Information

Applicant:	GUANGZHOU SENYUE ELECTRONIC CO., LTD.
Address of Applicant:	RM302, 2 of No.3 GangTangXi Road, TianHe District, Guangzhou, Guangdong, China

3.2 General Description of E.U.T.

Name:	TWO-WAY REMOTE CONTROL SWITCH KIT
Model No.:	YK110V-2
Trade Mark:	SENYUE
Operating Frequency:	433.92 MHz
Type of Modulation	OOK
Function:	/
Antenna Type:	PCB antenna
Antenna gain:	3 dBi

3.3 Details of E.U.T.

EUT Power Supply:	DC 3V battery
Test mode:	transmitting
Power cord:	/

3.4 Description of Support Units

The EUT has been tested as an independent unit for fixed frequency by testing lab.

3.5 Test Location

All tests were performed at:

ITL Co., Ltd.
No.8, JinQianLing street 5, DongHuan Road, Huangjiang Town, Dongguan, China.
0086-769-39001678
itl@i-testlab.com

No tests were sub-contracted.

3.6 Deviation from Standards

Biconical and log periodic antennas were used instead of dipole antennas.

3.7 Abnormalities from Standard Conditions

None.

3.8 Other Information Requested by the Customer

None.

3.9 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **CNAS(Lab code:L9342)**
- **FCC (Resignation No.:CN5035)**
- **IC (Registration NO.: CN0025)**

3.10 Measurement Uncertainty

The below measurement uncertainties given below are based on a 95% confidence level (base on a coverage factor (k=2).)

Parameter	Uncertainty
Radio frequency	$\pm 1.06 \times 10^{-7}$
total RF power, conducted	1.37 dB
RF power density , conducted	2.89 dB
All emissions, radiated	±3.35 dB
Temperature	±0.23 °C
Humidity	±0.3 %
DC and low frequency voltages	±0.3 %

4 Instruments Used during Test

No.	Test Equipment	Manufacturer	Model	Serial No.	Last Cal.	Cal. Due
ITL-114	Spectrum Analyzer	Agilent	N9010A	MY51250936	2019/01/28	2020/01/27
ITL-154	EMI test receiver 9kHz to 26.5GHz	R&S	ESR26	101257	2019/01/29	2020/01/28
ITL-116	Pre Amplifier	HP	8447F	3113A05905	2019/01/28	2020/01/27
ITL-117	Wideband Amplifier Super Ultra	Mini-circuits	ZVA-183-S+	469101134	2019/01/28	2020/01/27
ITL-164	Trilog-Broadband Antenna	Schwarzbeck	VULB 9168	9168-0844	2017/11/16	2020/11/16
ITL-110	Horn Antenna	A-INFOMW	JXTXLB-10180-N	J2031090612133	2019/01/28	2020/01/27
ITL-102	EMI Test receiver	R&S	ESCI	100910	2018/06/19	2019/06/18
ITL-103	Two-line v-network	R&S	ENV216	100120	2018/06/19	2019/06/18
ITL-115	50Ω Coaxial Cable	Mini-circuits	CBL	C001	2018/06/19	2019/06/18
ITL-100	Semi-Anechoic chamber	ETS•Lindgren	FACT3 2.0	CT09015	2018/12/29	2021/12/28
ITL-101	Shielded Room	ETS•Lindgren	8*4*3	CT09010	2018/01/27	2021/01/26
ITL-165	Power Meter	R&S	NRVS	838246/026	2018/09/28	2019/09/27

5 Test Results

5.1 E.U.T. test conditions

Test Voltage: DC 3V

Temperature: 20.2 -25.0 °C

Humidity: 38-50 % RH

Atmospheric Pressure: 1000 -1010 mbar

Requirements: **15.31(e):** For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

Test frequencies and frequency range: According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

According to the 15.33 (a) For an intentional radiator, the spectrum shall be investigated from the lowest radio frequency signal generated in the device, without going below 9 kHz, up to at least the frequency shown in the following table:

Number of fundamental frequencies to be tested in EUT transmit band

Frequency range in which	Number of	Location in frequency range
1 MHz or less	1	Middle
1 MHz to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top, 1 near middle and 1 near bottom

Frequency range of radiated emission measurements

Lowest frequency generated	Upper frequency range of measurement
9 kHz to below 10 GHz	10th harmonic of highest fundamental frequency or to 40 GHz,
At or above 10 GHz to below	5th harmonic of highest fundamental frequency or to 100 GHz,
At or above 30 GHz	5th harmonic of highest fundamental frequency or to 200 GHz,

Remark: Test frequency is 433.92 MHz.

5.2 Radiated Emissions

Test Requirement: FCC Part 15 C section 15.231(b)

Test Method: ANSI C63.10: Clause 6.4, 6.5 and 6.6

Test Status: Test the transmitter in continuous transmitting mode.

Limit: The field strength of emissions from intentional radiators operated under this Section shall not exceed the following:

Fundamental Frequency MHz	Field Strength of Fundamental (dBμV/m @ 3 m)	Field Strength of Harmonics and Spurious Emissions (dBμV/m @ 3 m)
40.66 to 40.70	67.04	47.04
70 to 130	61.94	41.94
130 to 174	61.94 to 71.48**	41.94 to 51.48**
174 to 260	71.48	51.48
260 to 470	71.48 to 81.94**	51.48 to 61.94**
Above 470	81.94	61.94

** linear interpolations

No fundamental is allowed in the restricted bands.

The fundamental frequency of the EUT is 433.92 MHz

The limit for average field strength for the fundamental emission is 80.12 dBμV/m.

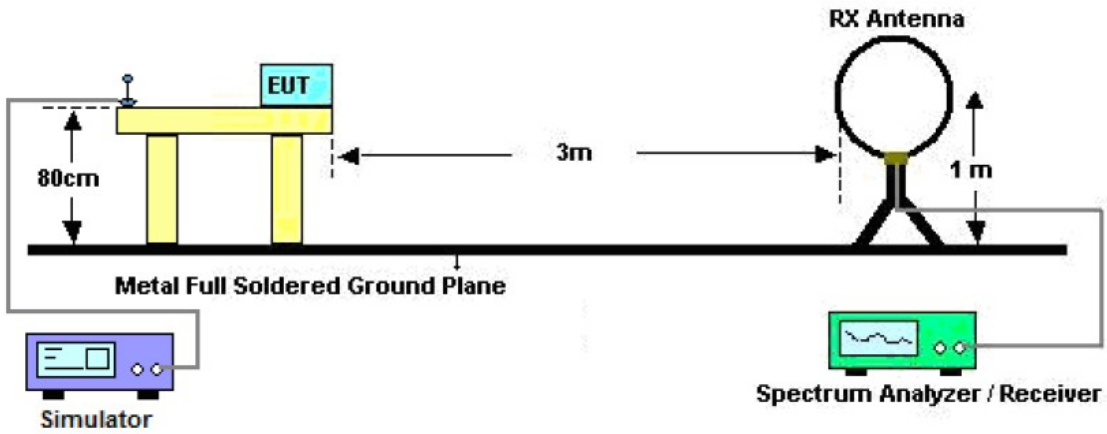
The limit for average field strength for the spurious emission is 61.94 dBuV/m.

Intentional radiators operating under the provisions of this section shall demonstrate compliance with the limits on the field strength of emissions, as shown in the above table, based on the average value of the measured emissions. As an alternative, compliance with the limits in the above table may be based on the use of measurement instrumentation with a CISPR quasi-peak detector.

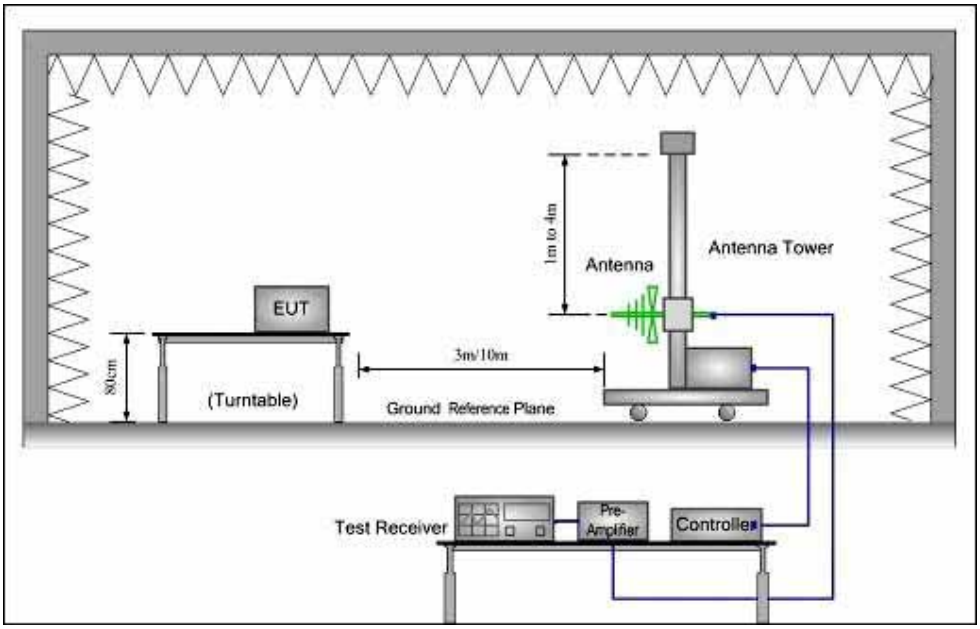
The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test.

Test Configuration:

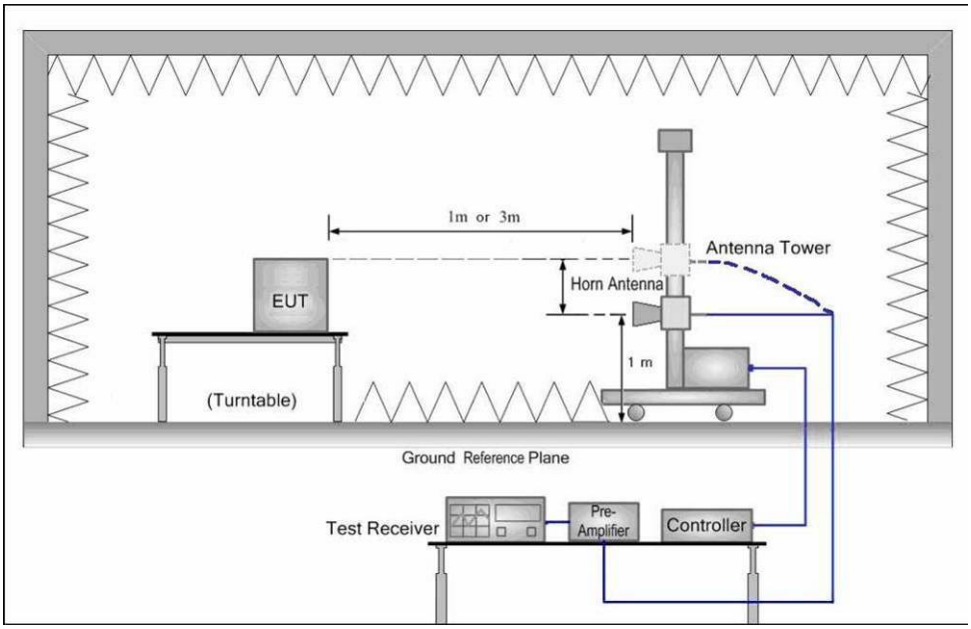
1) 9 kHz to 30 MHz emissions:



2) 30 MHz to 1 GHz emissions:



3) 1 GHz to 40 GHz emissions:



Test Procedure:

1) 9 kHz to 30 MHz emissions:

For testing performed with the loop antenna. The centre of the loop was positioned 1 m above the ground and positioned with its plane vertical at the special distance from the EUT. During testing the loop was rotated about its vertical axis for maximum response at each azimuth and also investigated with the loop positioned in the horizontal plane.

2) 30 MHz to 1 GHz emissions:

For testing performed with the bi-log type antenna. The measurement is performed with the EUT rotated 360º, the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurement for both the horizontal and vertical antenna polarizations.

3) 1 GHz to 40 GHz emissions:

Test site with RF absorbing material covering the ground plane that met the site validation criterion called out in CISPR 16-1-4:2007 was used to perform radiated emission test above 1 GHz.

For testing performed with the horn antenna. The measurement is performed with the EUT rotated 360º, the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurement for both the horizontal and vertical antenna polarizations.

The field strength of radiation emission was measured in the following position: EUT stand-up position (Y axis), lie-down position (X, Z axis). The worst case of X axis was reported.

Detector:

Resolution bandwidth for Peak and Quasi-Peak value:

200 Hz for 9 kHz to 150 kHz

9 kHz for 150 kHz to 30 MHz

120 kHz for 30 MHz to 1GHz

1 MHz for above 1 GHz,

VBW ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

For AV value:

Average = Peak value + 20log (Duty cycle)

The average correction factor is computed by analyzing the on time in one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds, therefore the average value of fundamental frequency is: Average = Peak value + 20log (Duty cycle), where the duty factor is calculated from following formula:

The duration of one cycle=56.6ms

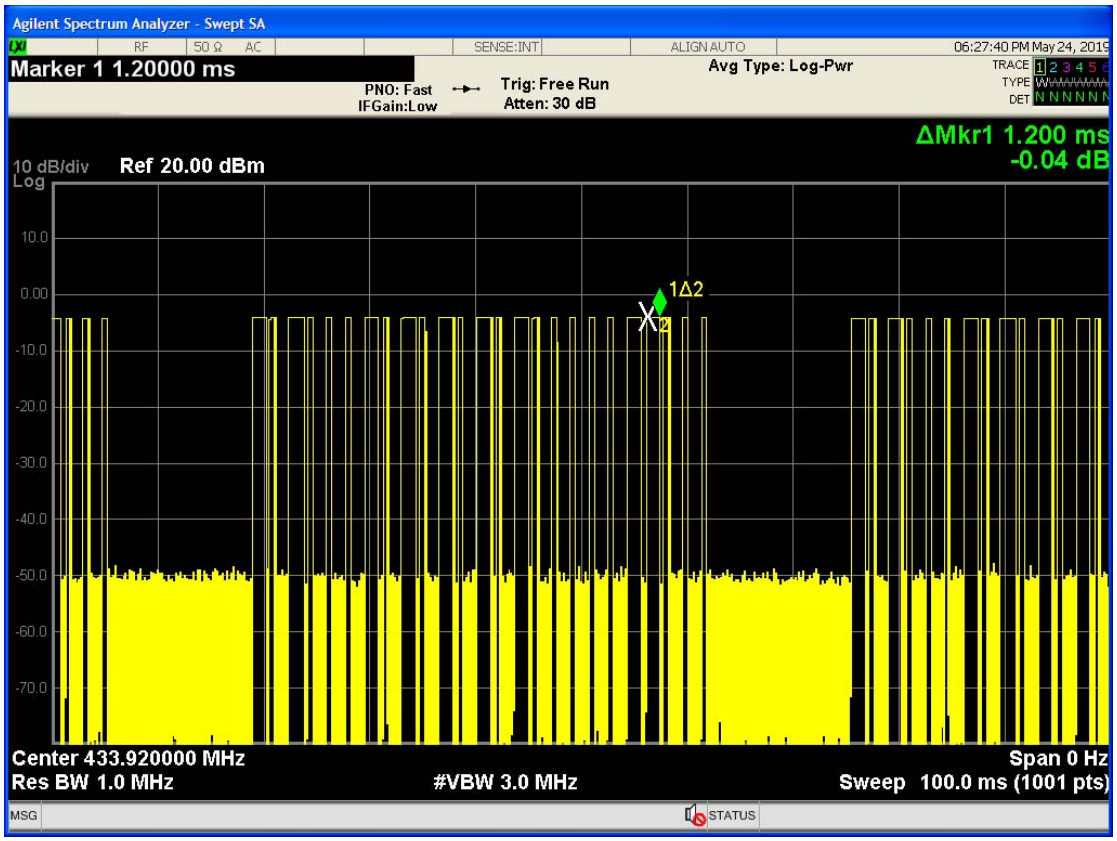
Effective period of the cycle =(1.2x9+0.3x16) ms=15.6ms

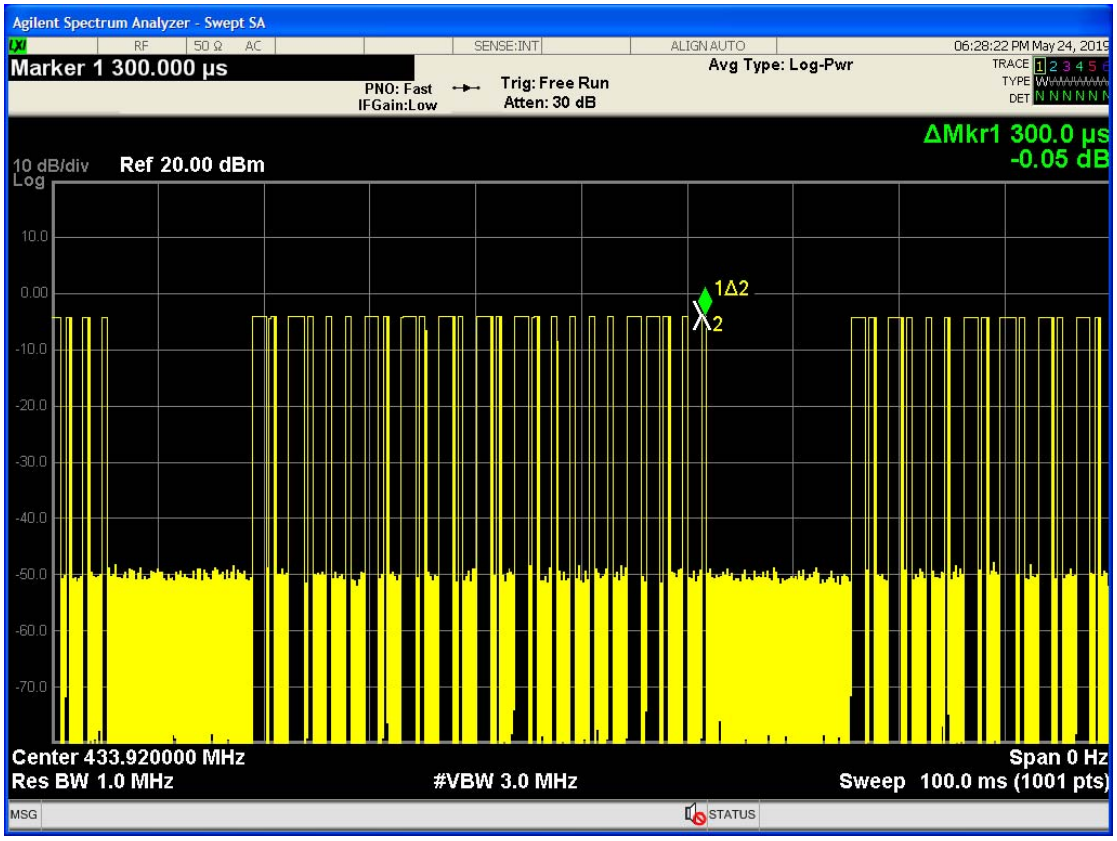
DC=15.6/56.6=0.27561 or 27.561%

Therefore, the averaging factor is found by 201g0.27561=-11.19

-11.19dB Duty Cycle Correction Factor was used in this report.

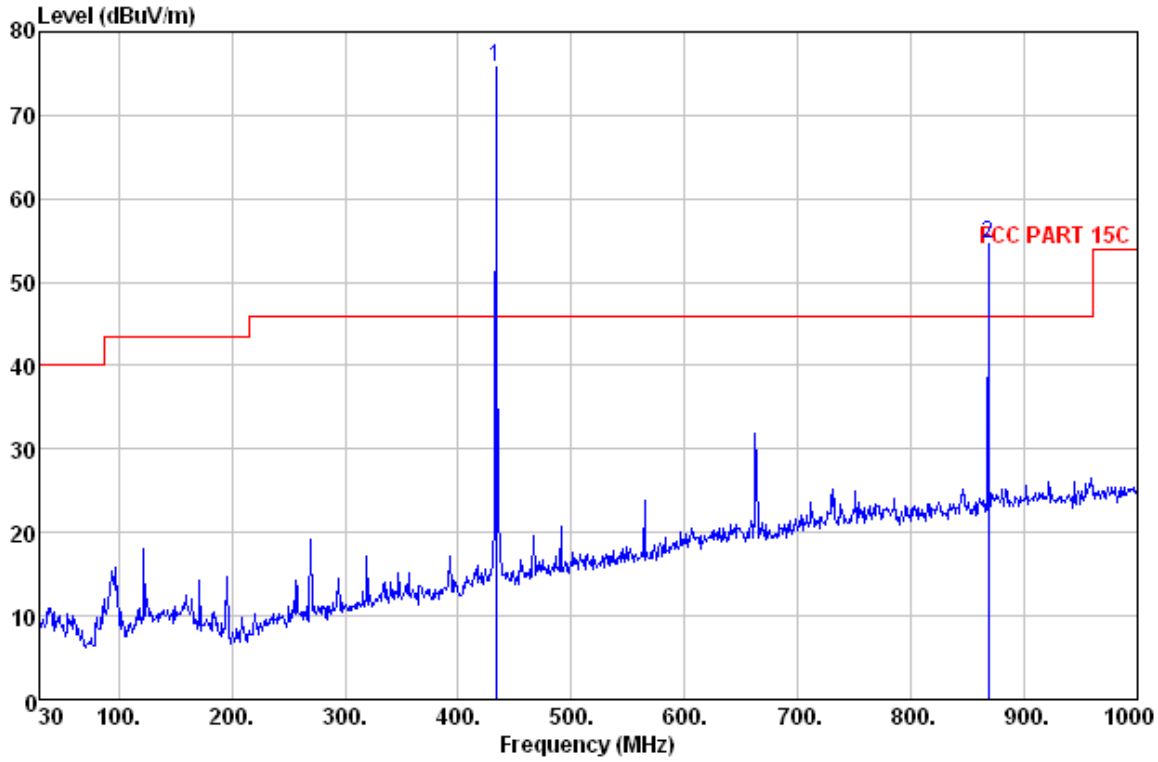
Please refer to below plots for more details.


Agilent Spectrum Analyzer - Swept SA
RF 50 Ω AC
SENSE:INT
ALIGN AUTO
06:27:40 PM May 24, 2019
Marker 1 1.20000 ms
Avg Type: Log-Pwr
TRACE 1 2 3 4 5 6
TYPE W
DET N N N N N N
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 30 dB
ΔMkr1 1.200 ms
-0.04 dB
10 dB/div
Log
Ref 20.00 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
1Δ2
2
Center 433.920000 MHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 100.0 ms (1001 pts)
MSG
STATUS


Agilent Spectrum Analyzer - Swept SA
RF 50 Ω AC
SENSE:INT
ALIGN AUTO
06:28:22 PM May 24, 2019
Marker 1 300.000 µs
Avg Type: Log-Pwr
TRACE 1 2 3 4 5 6
TYPE W
DET N N N N N N
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 30 dB
ΔMkr1 300.0 µs
-0.05 dB
10 dB/div
Log
Ref 20.00 dBm
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
1Δ2
2
Center 433.920000 MHz
Res BW 1.0 MHz
#VBW 3.0 MHz
Span 0 Hz
Sweep 100.0 ms (1001 pts)
MSG
STATUS

Horizontal:

Peak scan



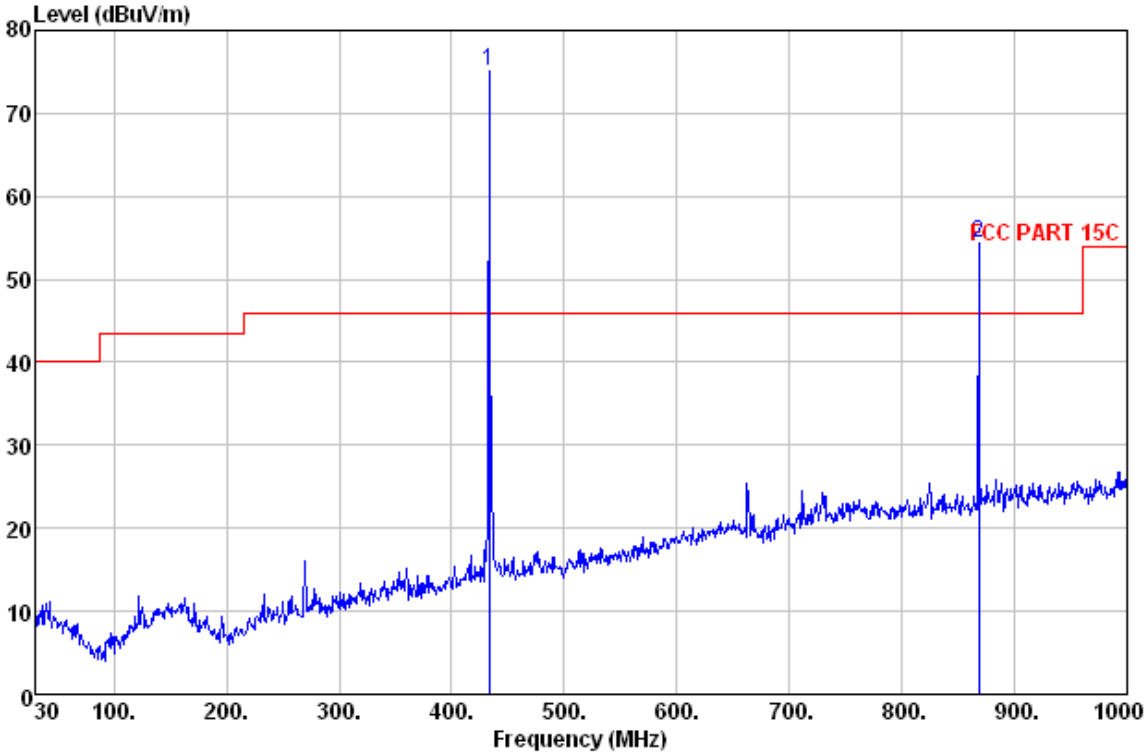
No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Duty cycle Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Detector
1	433.920	85.61	-9.86	N/A	75.75	100.8	-25.05	0	100	Peak
				-11.19	64.56	80.8	-16.24	0	100	Average
2	868.080	56.07	-1.55	N/A	54.52	80.8	-26.28	0	100	Peak
				-11.19	43.33	60.8	-17.47	0	100	Average

Above 1GHz

No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Dutycycle Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Detector
1	1301	45.73	-1.14	N/A	44.59	74.0	-29.41	0	100	Peak
				-11.19	33.40	54.0	-20.60	0	100	Average

Vertical:

Peak scan



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB/m)	Dutycycle Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (°)	Height (cm)	Detector
1	433.920	85.00	-9.86	N/A	75.14	100.8	-25.66	0	100	Peak
				-11.19	63.95	80.8	-16.85	0	100	Average
2	868.080	56.02	-1.55	N/A	54.47	80.8	-26.33	0	100	Peak
				-11.19	43.28	60.8	-17.52	0	100	Average

Above 1GHz

No.	Frequency	Reading	Correct	Dutycycle	Result	Limit	Margin	Degree	Height	Detector
	(MHz)	(dBuV)	(dB/m)	Factor (dB)	(dBuV/m)	(dBuV/m)	(dB)	(°)	(cm)	
1	1301	46.45	-1.14	N/A	45.31	74.0	-28.69	0	100	Peak
				-11.19	34.12	54.0	-19.88	0	100	Average

Note: Testing is carried out with frequency rang 9kHz to the tenth harmonics, which above 4^{h} Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured. The measurements greater than 20dB below the limit from 9kHz to 30MHz.

The fundamental frequency is 433.92 the fundamental and spurious emissions radiated limit base on the operating frequency 433.92 MHz.

5.3 Occupied Bandwidth

Test Requirement: FCC Part 15 C section 15.231 (c)

Test Method: ANSI C63.10: Clause 6.9

Test Status: Test in transmitting mode at lowest and highest channel.

Requirements: 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. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

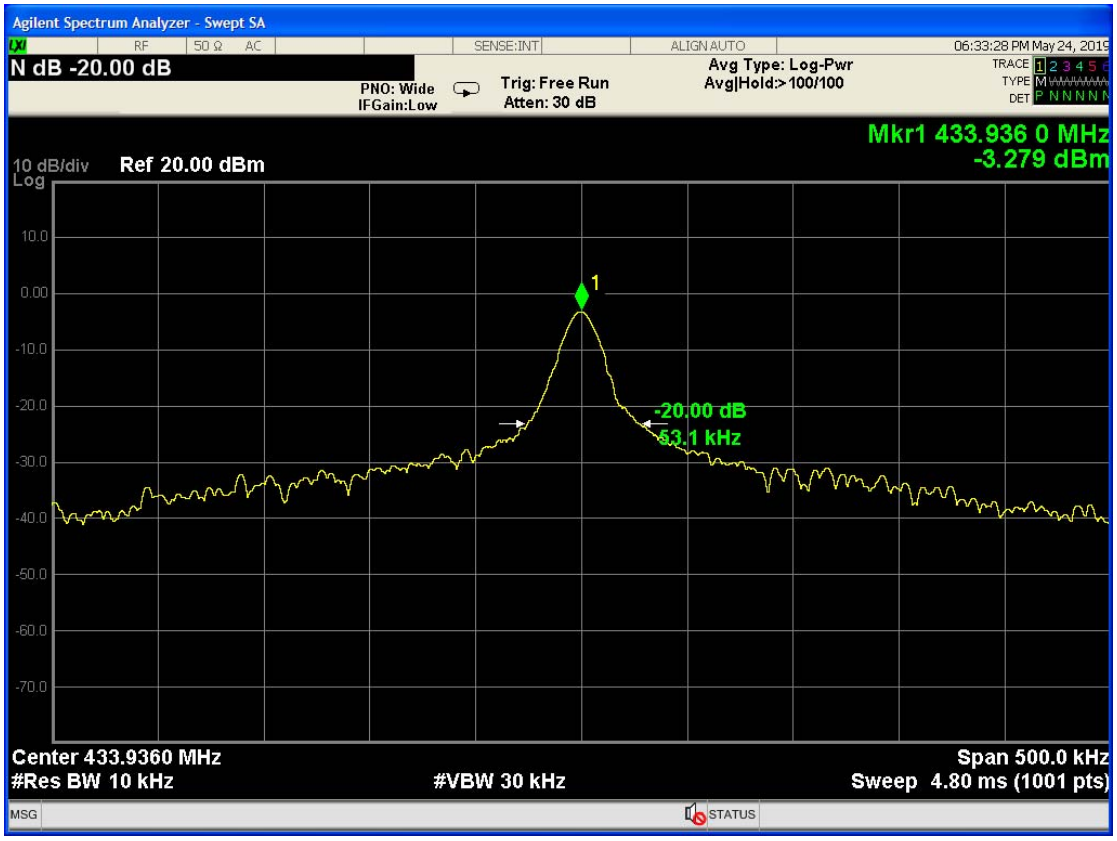
Method of measurement: The useful radiated emission from the EUT was detected by the spectrum analyzer with peak detector. Record the 20 dB bandwidth of the carrier.

Test result:

Test Frequency MHz	20dB Bandwidth kHz	Limit kHz	Result
433.92	53.1	1084	PASS

Limit = Fundamental Frequency X 0.25%=433.92 x 0.0025 = 1084 kHz

Test plot:


Agilent Spectrum Analyzer - Swept SA
RF 50 Ω AC
SENSE:INT
ALIGN AUTO
06:33:28 PM May 24, 2019
N dB -20.00 dB
PNO: Wide
IFGain:Low
Trig: Free Run
Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
TRACE 1 2 3 4 5
TYPE M
DET P N N N N
Mkr1 433.936 0 MHz
-3.279 dBm
10 dB/div Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
1
-20.00 dB
53.1 kHz
Center 433.9360 MHz
#Res BW 10 kHz
#VBW 30 kHz
Span 500.0 kHz
Sweep 4.80 ms (1001 pts)
MSG
STATUS

5.4 Dwell Time

Test Requirement: FCC Part 15 C section 15.231(a)

Test Method: FCC Part 15 C section 15.231(a)

Test Status: Test in normal operation mode.

Requirements:

1. **Regulation 15.231 (a)** The provisions of this Section are restricted to periodic operation within the band 40.66 40.70 MHz and above 70 MHz. Except as shown in paragraph (e) of this Section, the intentional radiator is restricted to the transmission of a control signal such as those used with alarm systems, door openers, remote switches, etc. Radio control of toys is not permitted. Continuous transmissions, such as voice or video, and data transmissions are not permitted. The prohibition against data transmissions does not preclude the use of recognition codes. Those codes are used to identify the sensor that is activated or to identify the particular component as being part of the system.

Result:

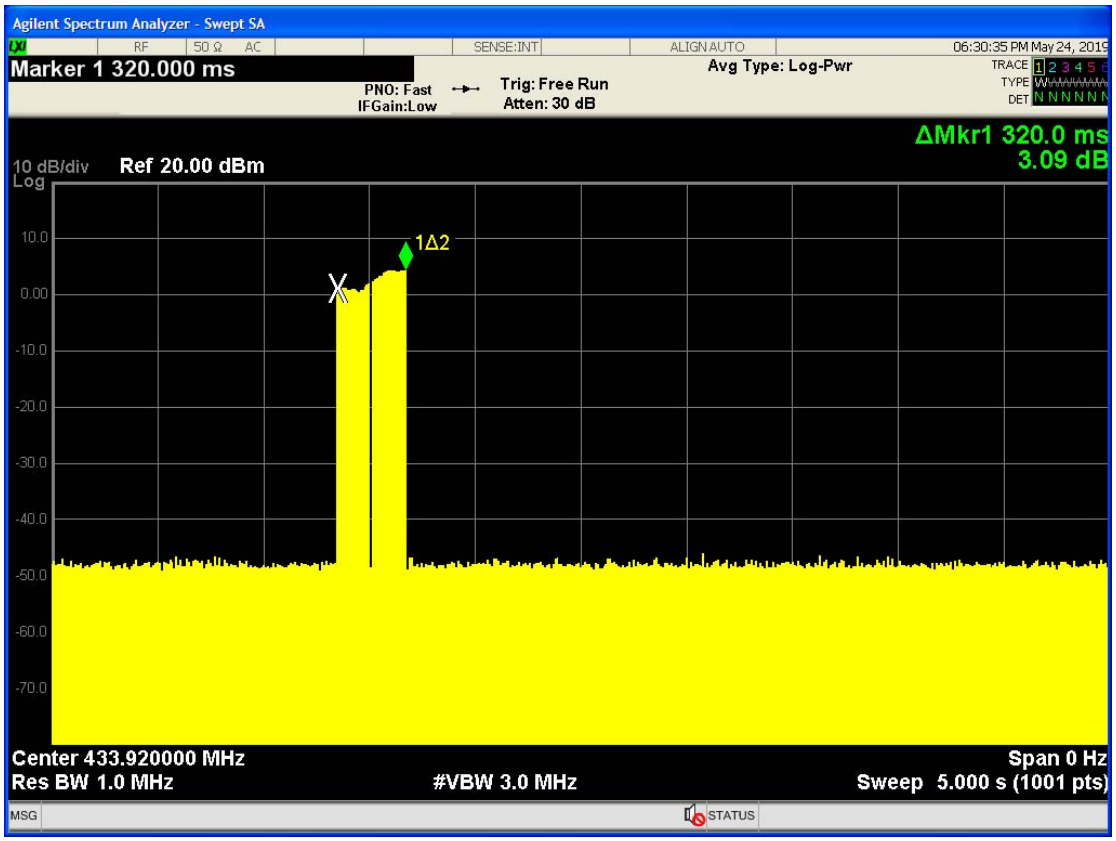
The EUT is a remote switch without audio or video transmitted.
The EUT meets the requirements of this section.

2. **Regulation 15.231 (a) (1)** A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released. **Regulation 15.231 (a2)** A transmitter activated automatically shall cease transmission within 5 seconds after activation.

Result:

Carrier Frequency MHz	Transmission Time seconds	Limit s	Result
433.92	0.320	5	PASS

Result plot:



Result:

The EUT does not have automatic transmission.

4. Regulation15.231 (a3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions to determine system integrity of transmitters used in security or safety applications are allowed if the periodic rate of transmission does not exceed one transmission of not more than one second duration per hour for each transmitter.

Result:

The EUT does not employ periodic transmission.

5. Regulation 15.231 (a4) Intentional radiators which are employed for radio control purposes during emergencies involving fire, security, and safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition.

Result:

This section is not applicable to the EUT.

5.5 Conducted Emissions at Mains Terminals 150 kHz to 30MHz (N/A)

Test Requirement: FCC Part 15 C section 15.207

Test Method: ANSI C63.10: Clause 6.2

Frequency Range: 150 kHz to 30 MHz

Detector: Peak for pre-scan (9 kHz Resolution Bandwidth)

Test Limit

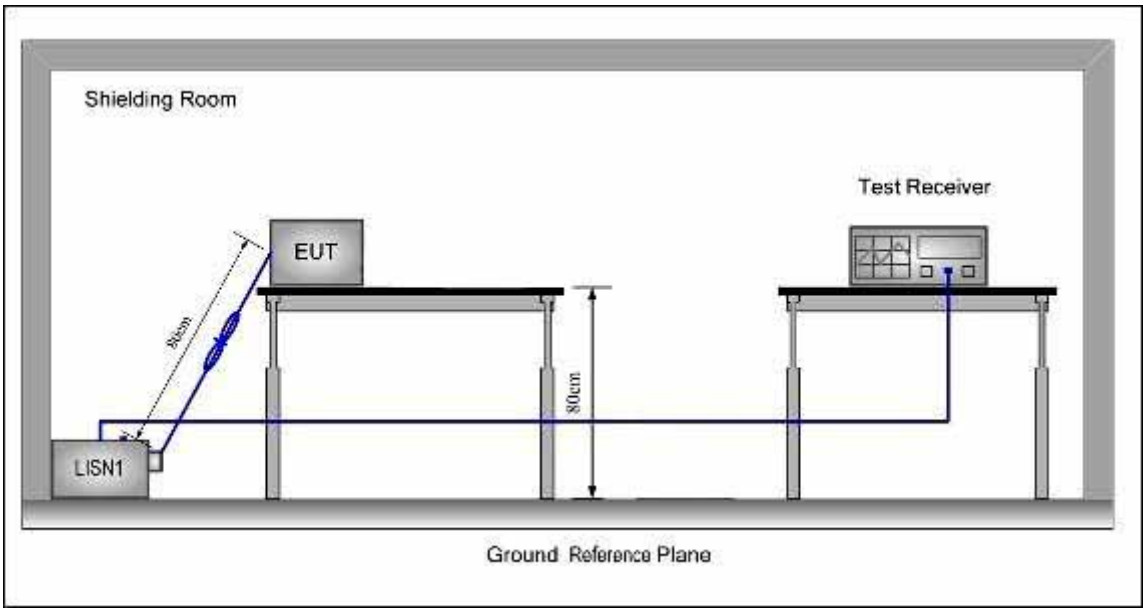
Limits for conducted disturbance at the mains ports of class B

Frequency Range (MHz)	Class B Limit dB(μV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
NOTE 1 The limit decreases linearly with the logarithm of the frequency in the range 0,15 MHz to 0,50 MHz.		

EUT Operation: Test in normal operating mode. For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage.

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, channels and antenna ports (if EUT with antenna diversity architecture).

Test Configuration:



Test procedure:

1. The mains terminal disturbance voltage test was conducted in a shielded room.

2. The EUT was connected to AC power source through a LISN (Line Impedance Stabilization Network) which provides a 50Ω/50μH + 5Ω linear impedance. A multiple socket outlet strip was used to connect multiple power cables to a single LISN provided the rating of the LISN was not exceeded.

3. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation.

4. The test was performed with a vertical ground reference plane. The rear of the EUT shall be 0,4 m from the vertical ground reference plane. The vertical ground reference plane was bonded to the horizontal ground reference plane. The LISN was placed 0,8 m from the boundary of the unit under test and bonded to a ground reference plane for LISNs mounted on top of the ground reference plane. This distance was between the closest points of the LISN 1 and the EUT..

Measurement Data

An initial pre-scan was performed on the live and neutral lines with peak detector.

Quasi-Peak and Average measurement were performed at the frequencies with maximized peak emission were detected. For EUT the communicating was worst case mode.

The following Quasi-Peak and Average measurements were performed on the EUT

Live line

Peak Scan:

Level (dBμV)

/

Quasi-peak and Average measurement

/

Neutral Line

Peak Scan:

Level (dBμV)

/

Quasi-peak and Average measurement

/

-- End of test report --