FCC Test Report

Report No.: AGC00918150301FE01

FCC ID	:	2ABSTPADLOCK
APPLICATION PURPOSE	:	Original Equipment
PRODUCT DESIGNATION	:	The QuickLock Padlock
BRAND NAME	:	QuickLock
MODEL NAME	:	Padlock
CLIENT	:	RPH Engineering, LLC
DATE OF ISSUE	:	Apr.02,2015
STANDARD(S)	:	FCC Part 15 Rules
REPORT VERSION	:	V1.0

Attestation of ***G***lobal ***C***ompliance (Shenzhen) Co., Ltd

Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Apr.02,2015	Valid	Original Report

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1. VERIFICATION OF COMPLIANCE

Applicant	RPH Engineering, LLC
Address	1601 N STATE ST Suite 1A LEHI UT United States
Manufacturer	Iton Technology Crop.
Address	Room 1302-1303, Block A, Building 4, Tianan Cyber Park, Huangge Road, Longgang District, Shenzhen, China, Post Code 518172
Product Designation	The QuickLock Padlock
Brand Name	QuickLock
Test Model	Padlock
Date of test	Mar.26, 2015 to Apr.02, 2015
Deviation	None
Condition of Test Sample	Normal

WE HEREBY CERTIFY THAT:

The above equipment was tested by Shenzhen STS Test Services Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2003) and the energy emitted by the sample EUT tested as described in this report is in compliance with requirement of FCC Part 15 Rules requirement.

Prepared By	Matt Zhang	
	Matt Zhang	Apr.02,2015
Checked By	Kidd Yang	
	Kidd Yang	Apr.02,2015
Authorized By	Solger Zhang	
	Solger Zhang	Apr.02,2015

2. EUT DESCRIPTION

The EUT is a short range, lower power, Wireless transmitter.

Details of technical specification refer to the description in follows:

Product Designation:	The QuickLock Padlock
Brand Name:	QuickLock
Test Model:	Padlock
Hardware Version:	3.0
Software Version:	1.0
Operation Frequency:	13.56MHz
Number of Channels:	1 Channel
Antenna Type:	PCB Antenna
Power Supply:	DC 3.7V by battery

NOTE: For more information, please refer to User's Manual.

3. DESCRIPTION OF TEST MODES

The EUT has been tested under Normal Operating and standby condition.

4. TEST FACILITY

Shenzhen STS Test Services Co., Ltd.
Add.: 1/F, Building 2, Zhuoke Science Park, Chongqing Road, Fuyong, Baoan District, Shenzhen, China.
FCC Registration No.: 842334; IC Registration No.: 12108A-1

ALL TEST EQUIPMENT LIST

Description	Manufacturer	Model	S/N	Cal. Date	Cal. Due
Power Probe	Anritsu	MA2411B	100309	2014.10.25	2015.10.24
RF attenuator	N/A	RFA20db	68	N/A	N/A
Spectrum Analyzer	Agilent	E4407B	MY50140340	2014.10.25	2015.10.24
Amplifier	EM	EM-30180	060538	2014.12.22	2015.12.21
Horn Antenna	Schwarzbeck	BBHA 9170	9170-181	2014.07.06	2015.07.05
Horn Antenna	R&S	9120D	152265	2014.10.27	2015.10.26
EMI Test Receiver	R&S	102086	102086	2014.10.25	2015.10.24
Bilogical Antenna	TESEQ	CBL6111D	34678	2014.10.27	2015.10.26
LISN	R&S	ENV216	101242	2014.10.25	2015.10.24
Loop Antenna	ARA	PLA-1030/B	1029	2014.06.08	2015.06.07

5. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§ 15.207	Conducted emission	Compliant
§15.35/15.205/ 15.209/15.225	Radiated Emission	Compliant
§15.225(e)	Frequency Stability	Compliant
§15.215	Occupied Bandwidth	Compliant
§15.203	Antenna Requirment	Compliant

6. MEASUREMENT UNCERTAINTY

No.	Item	MU
1	Radio Frequency	±1×10-9
2	Temperature	±0.1℃
3	Humidity	±1.0%
4	RF power, conducted	±0.34dB
5	RF power density, conducted	±2.75dB
6	Spurious emissions, conducted	±3.70dB
7	All emissions, radiated	±3.20dB

7. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Transmitting

Note:
1. All the test modes can be supply by DC 3.7V, only the result of the worst case was recorded in the report if no any records.
2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.

8. ANTENNA REQUIREMENT

8.1. STANDARD APPLICABLE

For intentional device, according to FCC 47 CFR Section 15.203, 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.

8.2. TEST RESULT

This product has a Integral antenna, fulfill the requirement of this section.

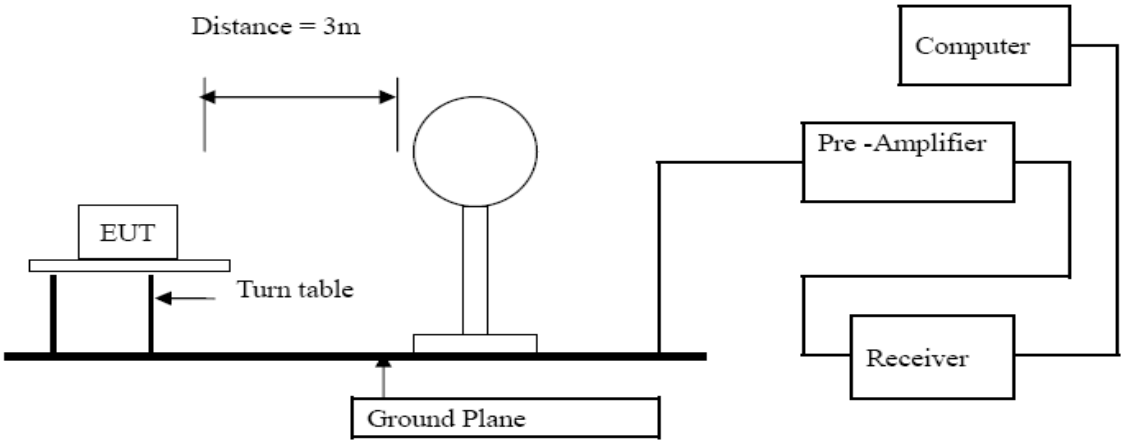
9. RADIATED EMISSION

9.1 MEASUREMENT PROCEDURE

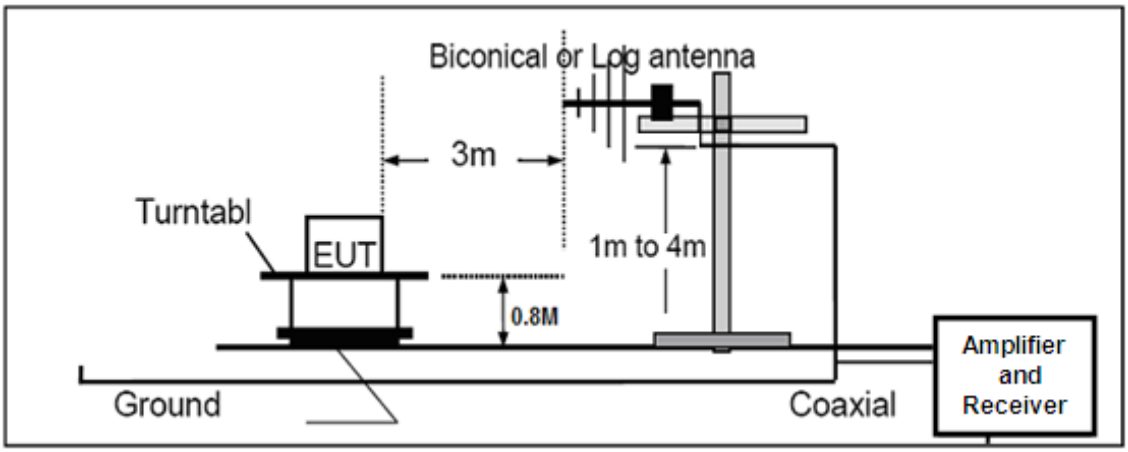
1. Configure the EUT according to ANSI C63.4. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. The frequency spectrum from 9kHz to 5GHz was investigated. All readings from 9kHz to 30MHz are quasi-peak values with a resolution bandwidth of 10 kHz, measured with loop antenna. All readings from 30MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 kHz, measured with Bi-log antenna.All readings are above 1 GHz are peak values with a resolution bandwidth of 1 MHz, measured with horn antenna.

9.2 TEST SETUP

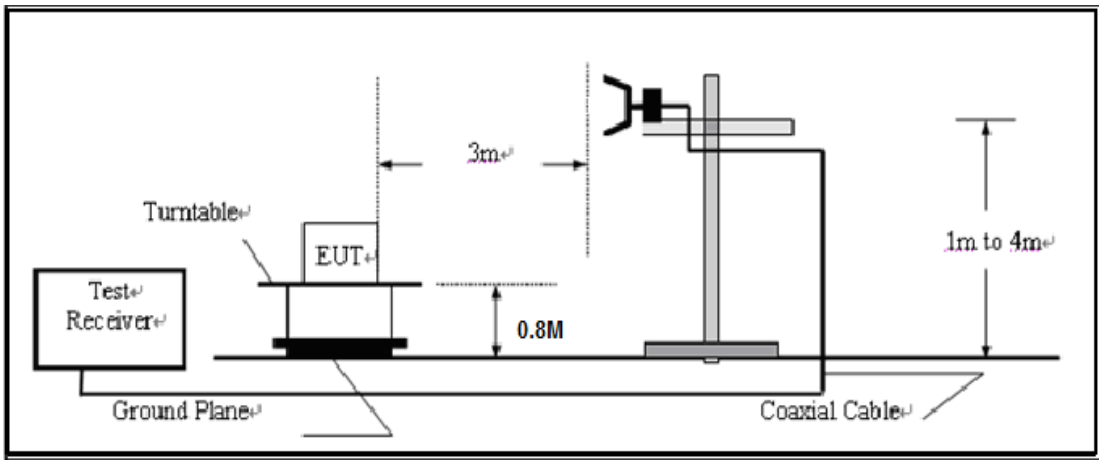
RADIATED EMISSION TEST SETUP BELOW 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



9.3 LIMITS AND MEASUREMENT RESULT

According to 15.225,

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

Frequencies (MHz)	Field Strength at 30m (micorvolts/meter)	Field Strength at 30m (dBuV/m)	Field Strength at 3m (dBuV/m)
13.553~13.567	15.848	84	124
13.410~13.553 13.567~13.710	334	50.5	90.5
13.110~13.410 13.710~14.010	106	40.5	80.5

According to 15.35, on any frequency or frequencies below or equal to 1000 MHz, the limits Shown are based on measuring equipment employing a CISPR quasi-peak detector function and related measurement bandwidths, unless otherwise specified the limit on peak radio frequency emissions is 20dB above the maximum permitted average emission limit applicable to the equipment under test.

According to 15.225,

(d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

Frequencies in restricted band are complied to limit on Paragraph 15.209.

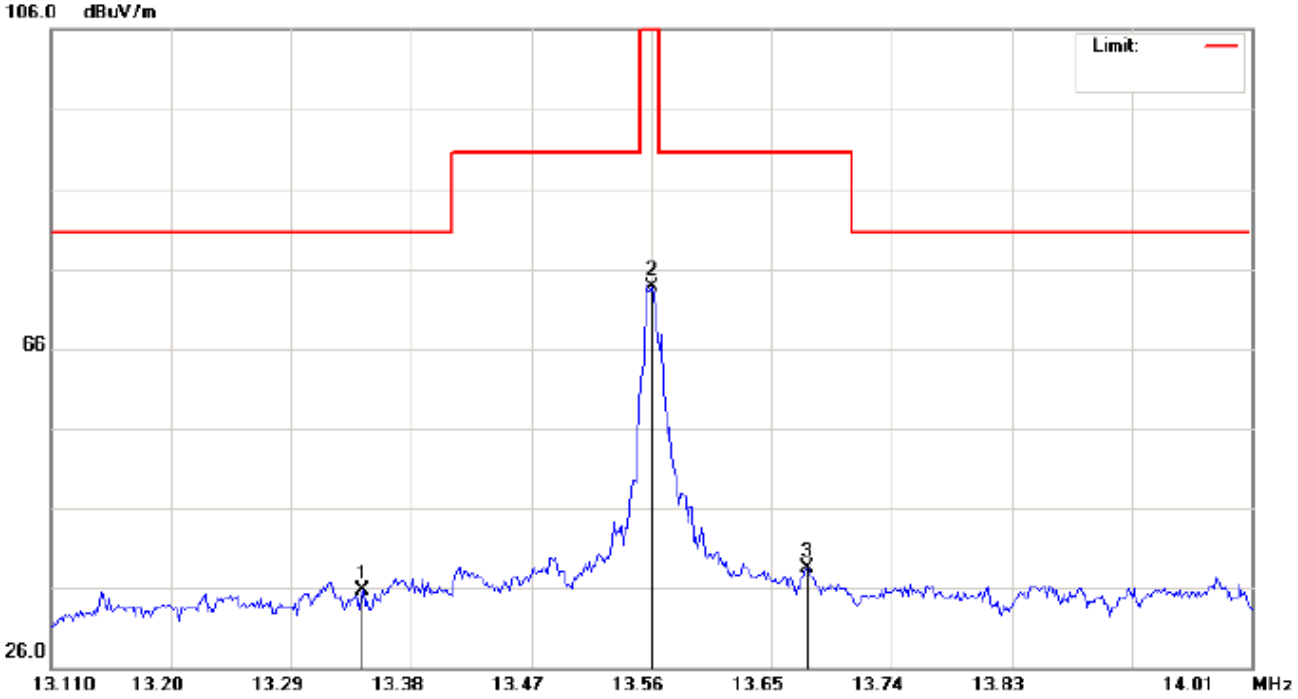
Frequency Range (MHz)	Distance (m)	Field Strength at 30m (micorvolts/meter)
0.009-0.490	3	20log 2400/F (kHz) + 80
0.490-1.705	3	20log 24000/F (kHz) + 40
1.705-30	3	20log 30 + 40
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

Note: 1) RF Voltage (dBuV) = 20 log RF Voltage (uV)
2) In the Above Table, the tighter limit applies at the band edges.
3) Distance refers to the distance in meters between the measuring instrument antenna and the EUT
4)The radiated emissions should be tested under 3-axes position (Lying, Side, and Stand), After pre-test. It was found that the worse radiated emission was get at the lying position.
5) If measurement is made at 3m distance, then F.S Limitation at 3m distance is adjusted by using the formula Ld1 = Ld2 * (d2/d1)

9.4 TEST RESULT

RADIATED EMISSION BELOW 30MHZ

RADIATED EMISSION TEST- (13.110MHZ-14.010MHZ) –HORIZONTAL



Site: site #1
Limit: part 225 13.11M-14.010M
EUT: The QuickLock Padlock
M/N: Padlock
Mode: Transmitting
Note:

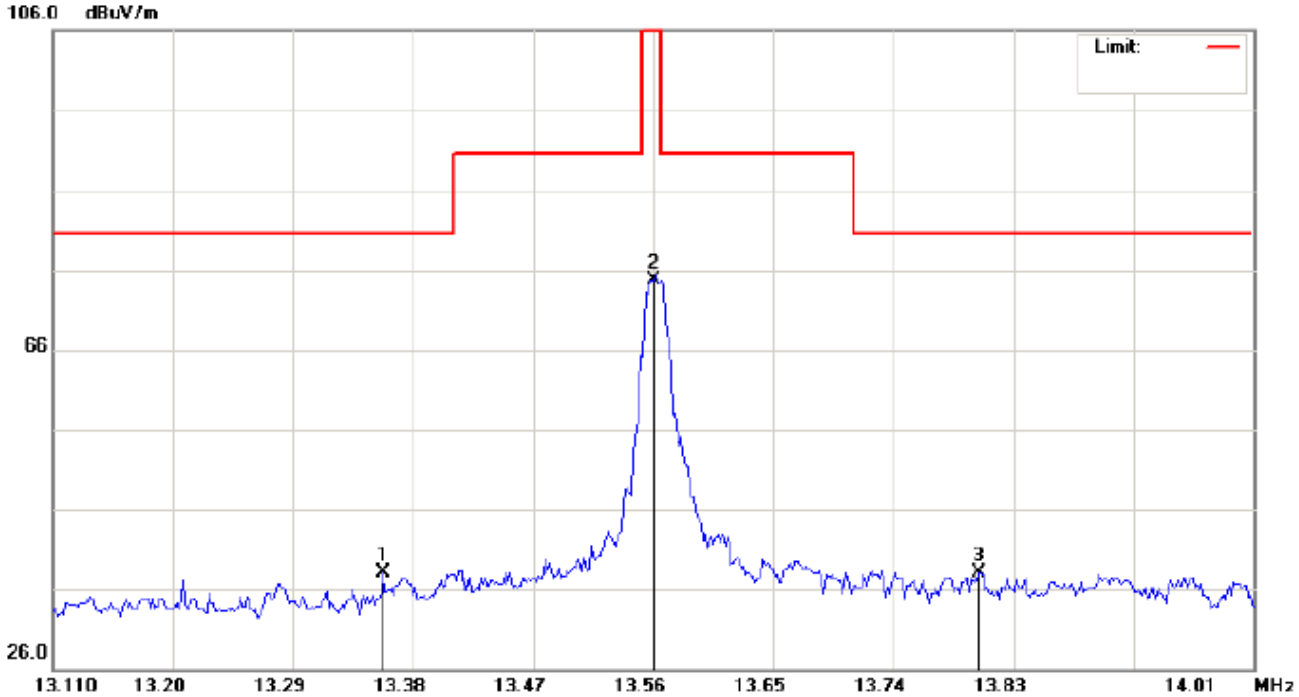
Polarization: *Horizontal*
Power:
Distance:

Temperature: 26
Humidity: 60 %

No.	Freq.	Reading	Factor	Measurement	Limit	Over
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB
1	13.3437	35.64	9.51	45.15	80.50	-35.35
2	13.5600	73.74	9.71	83.45	124.00	-40.55
3	13.6768	38.49	9.62	48.11	90.50	-42.39

RESULT: PASS

RADIATED EMISSION TEST- (13.110MHZ-14.010MHZ) –VERTICAL



Site: site #1
Limit: part 225 13.11M-14.010M
EUT: The QuickLock Padlock
M/N: Padlock
Mode: Transmitting
Note:

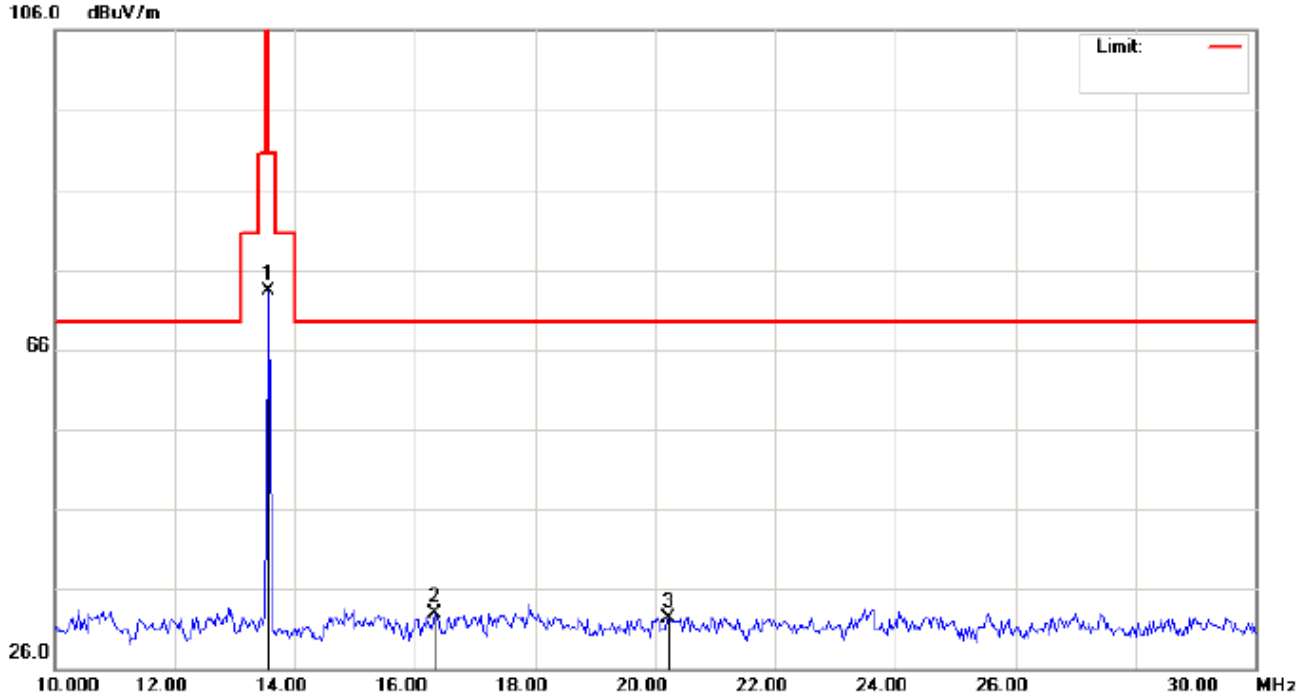
Polarization: *Vertical*
Power:
Distance:

Temperature: 26
Humidity: 60 %

No.	Freq.	Reading	Factor	Measurement	Limit	Over
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB
1	13.3574	38.12	9.68	46.94	80.50	-33.56
2	13.5600	74.76	9.71	84.47	124.00	-39.53
3	13.8045	38.09	9.67	47.76	80.50	-32.74

RESULT: PASS

RADIATED EMISSION TEST- (10MHZ-30MHZ) –HORIZONTAL



Site: site #1
Limit: part 225 10M-30M
EUT: The QuickLock Padlock
M/N: Padlock
Mode: Transmitting
Note:

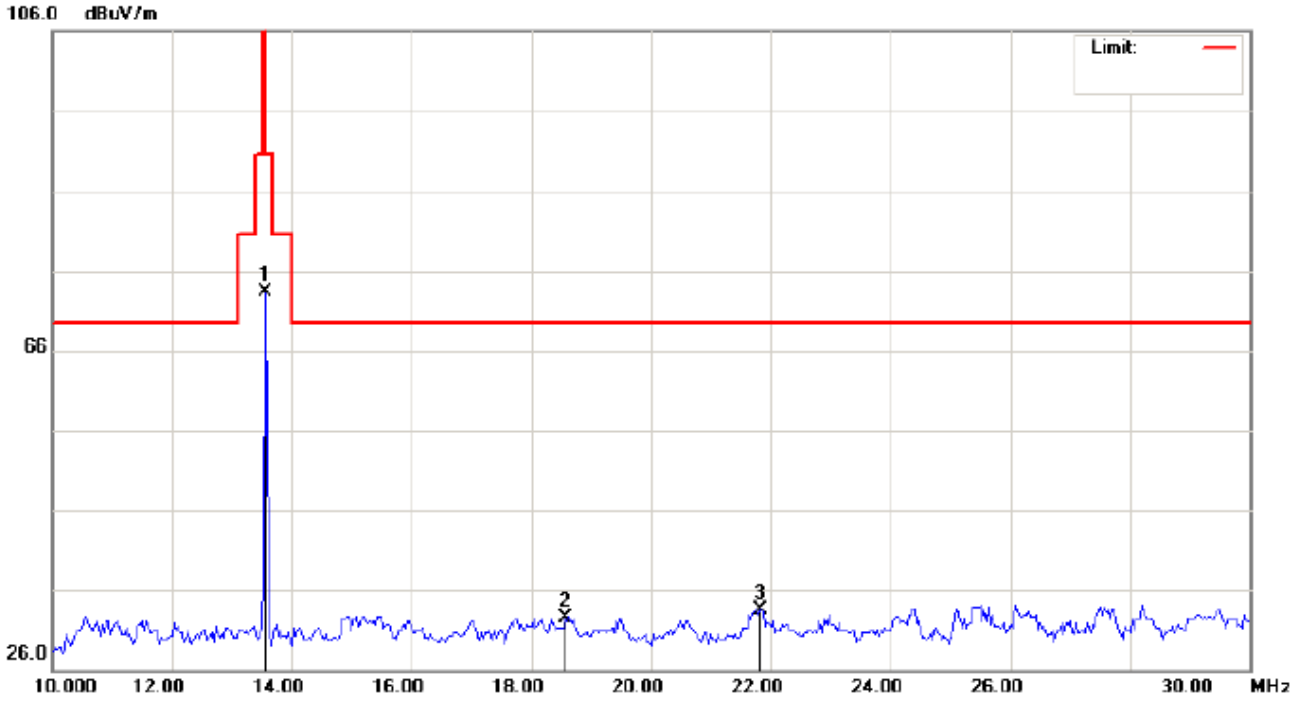
Polarization: *Horizontal*
Power:
Distance:

Temperature: 26
Humidity: 60 %

No.	Freq.	Reading	Factor	Measurement	Limit	Over
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB
1	13.5600	73.23	9.71	82.94	124	-41.06
2	16.3333	32.95	9.69	42.64	69.54	-26.9
3	20.2332	32.27	9.65	41.92	69.54	-27.62

RESULT: PASS

RADIATED EMISSION TEST- (10MHZ-30MHZ) –VERTICAL



Site: site #1
Limit: part 225 10M-30M
EUT: The QuickLock Padlock
M/N: Padlock
Mode: Transmitting
Note:

Polarization: *Vertical*
Power:
Distance:

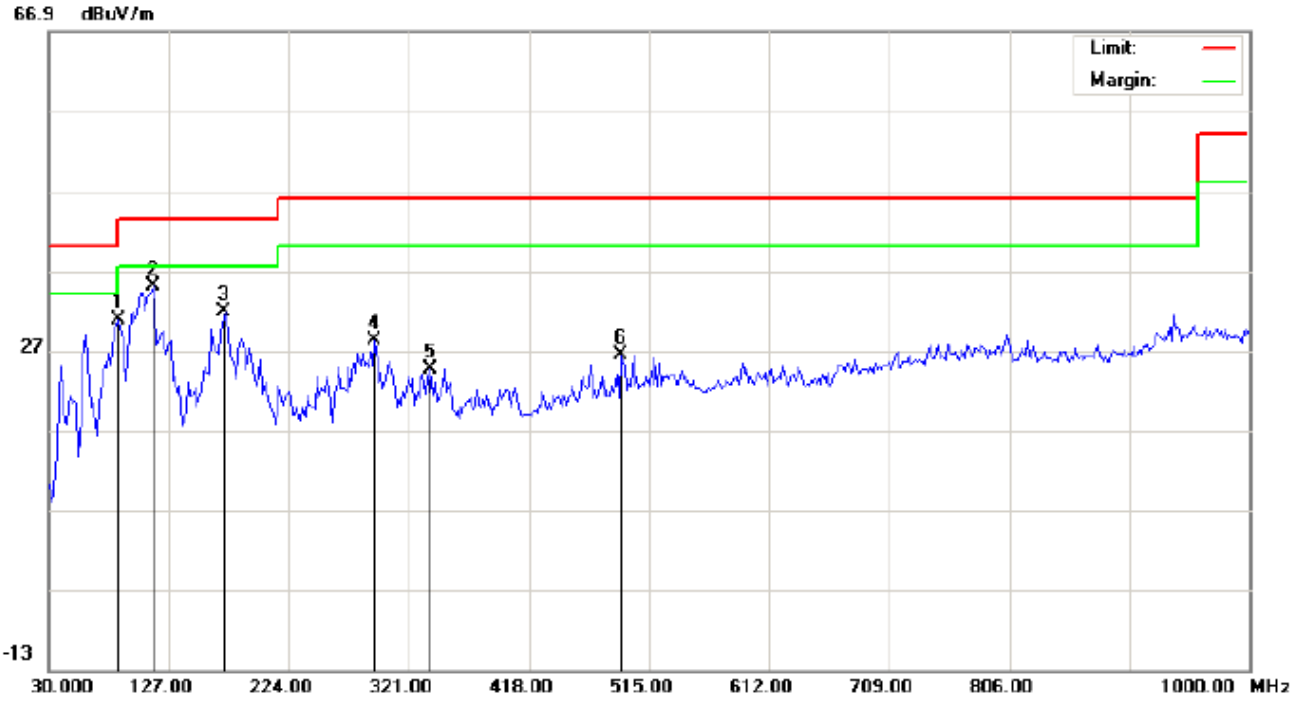
Temperature: 26
Humidity: 60 %

No.	Freq.	Reading	Factor	Measurement	Limit	Over
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB
1	13.5600	73.21	9.71	82.92	124	-41.08
2	18.5667	32.51	9.62	42.13	69.54	-27.41
3	21.8333	33.65	9.65	43.30	69.54	-26.24

RESULT: PASS

RADIATED EMISSION BELOW 1GHZ

RADIATED EMISSION TEST- (30MHZ-1GHZ) - HORIZONTAL



Site: site #1
Limit: FCC Class B 3M Radiation
EUT: The QuickLock Padlock
M/N: Padlock
Mode: Transmitting
Note:

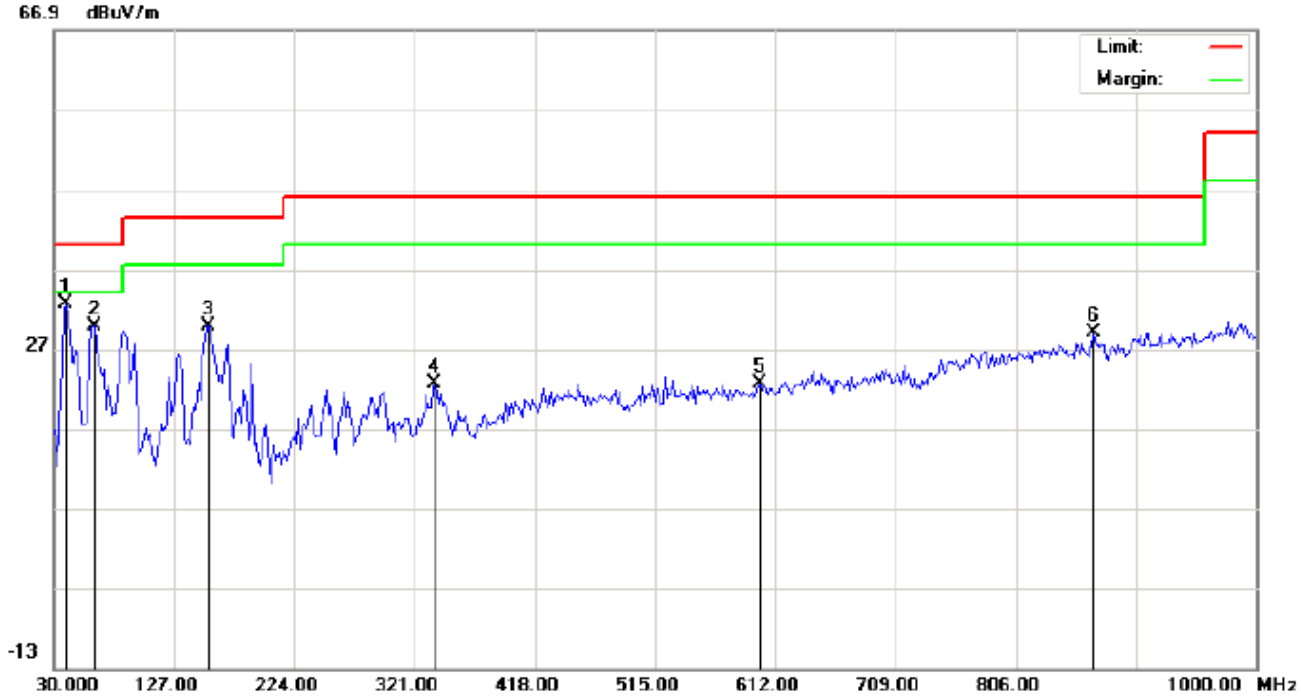
Polarization: *Horizontal*
Power:
Distance: 3m

Temperature: 26
Humidity: 60 %

No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1		86.5832	21.19	9.52	30.71	40.00	-9.29	peak			
2	*	114.0667	23.47	11.45	34.92	43.50	-8.58	peak			
3		172.2666	18.99	12.72	31.71	43.50	-11.79	peak			
4		293.5167	12.93	15.21	28.14	46.00	-17.86	peak			
5		338.7833	6.65	17.99	24.64	46.00	-21.36	peak			
6		492.3667	5.40	21.05	26.45	46.00	-19.55	peak			

RESULT: PASS

RADIATED EMISSION TEST- (30MHZ-1GHZ) -VERTICAL



Site: site #1
Limit: FCC Class B 3M Radiation
EUT: The QuickLock Padlock
M/N: Padlock
Mode: Transmitting
Note:

Polarization: *Vertical*
Power:
Distance: 3m

Temperature: 26
Humidity: 60 %

No.	Mk.	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB		cm	degree	
1	*	39.7000	24.01	8.51	32.52	40.00	-7.48	peak			
2		62.3333	22.47	7.24	29.71	40.00	-10.29	peak			
3		154.4832	14.60	15.29	29.89	43.50	-13.61	peak			
4		337.1666	4.76	17.89	22.65	46.00	-23.35	peak			
5		599.0667	-0.12	22.73	22.61	46.00	-23.39	peak			
6		869.0500	1.12	27.81	28.93	46.00	-17.07	peak			

RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.
2. The “Factor” value can be calculated automatically by software of measurement system.

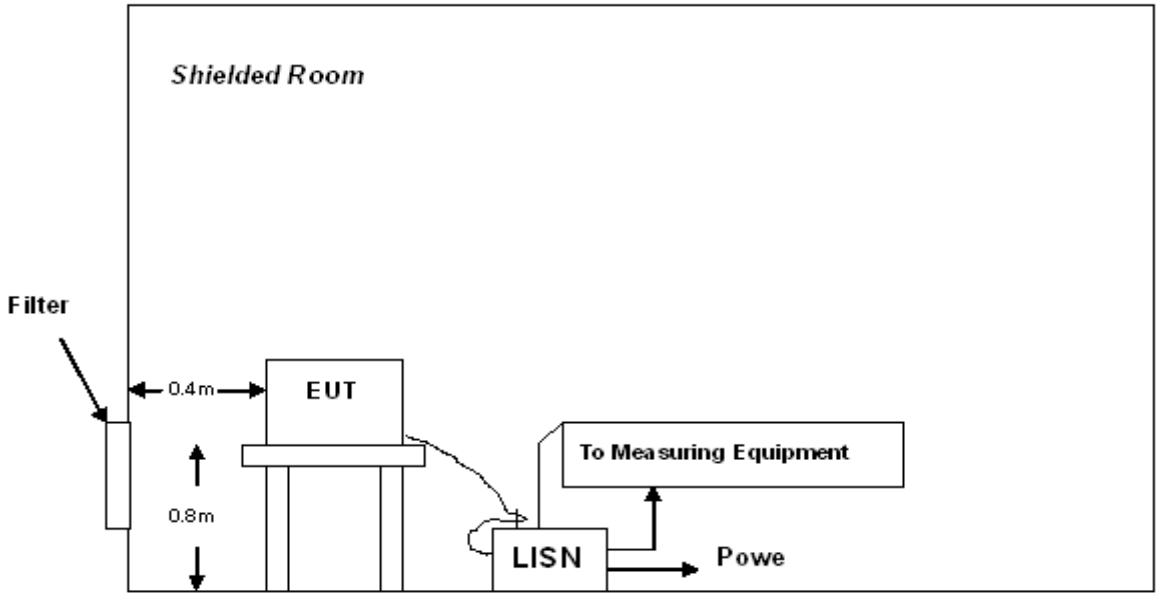
10. FCC LINE CONDUCTED EMISSION TEST

10.1 LIMITS

Frequency	Maximum RF Line Voltage	
	Q.P.(dBuV)	Average(dBuV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

***Note:** 1. The lower limit shall apply at the transition frequency.*
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz

10.2 TEST SETUP



A: Powered through filter

10.3 PRELIMINARY PROCEDURE

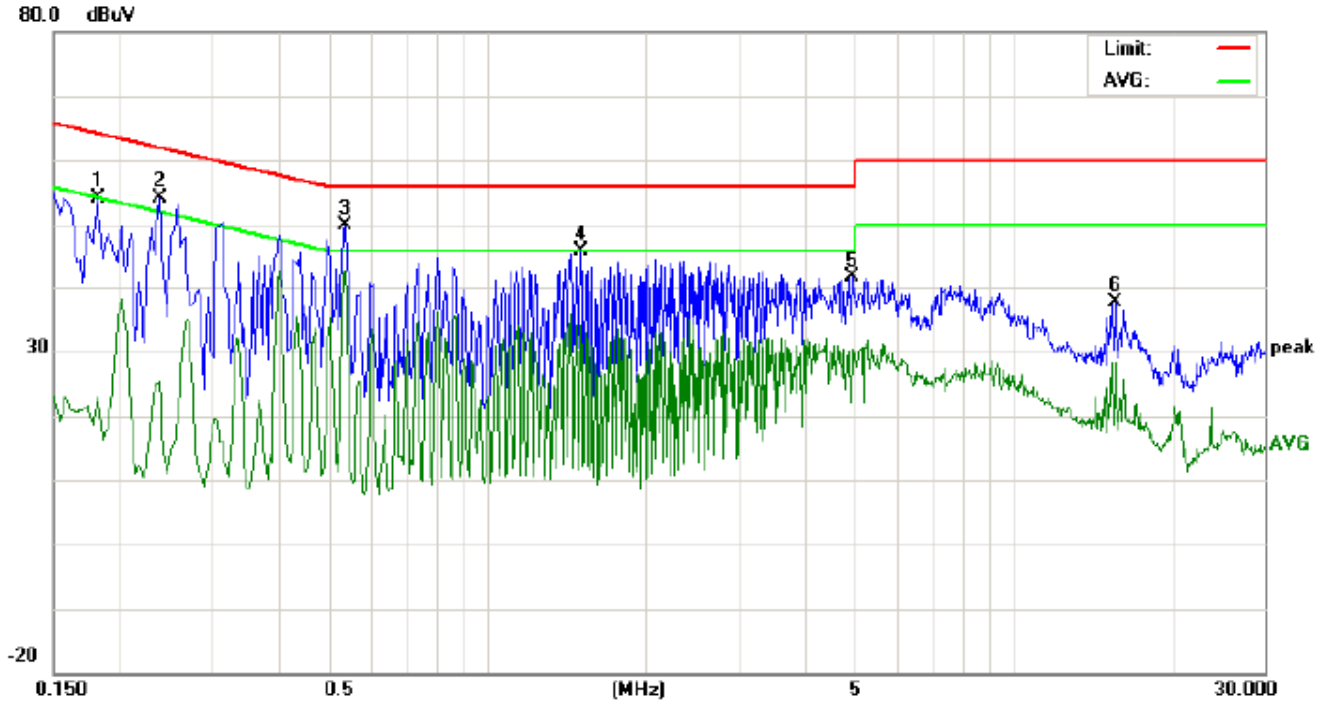
1) The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.4 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2) Support equipment, if needed, was placed as per ANSI C63.4.
3) All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4.
4) All support equipments received AC120V/60Hz power from a LISN, if any.
5) The EUT received power by adapter which received power by a LISN.
6) The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7) Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8) During the above scans, the emissions were maximized by cable manipulation.
9) The following test mode(s) were scanned during the preliminary test.
   Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

10.4 FINAL TEST PROCEDURE

10) EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
11) 2) A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less –2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
12) 3) The test data of the worst case condition(s) was reported on the Summary Data page.

10.5 TEST RESULT OF POWER LINE

Line Conducted Emission Test Line 1-L



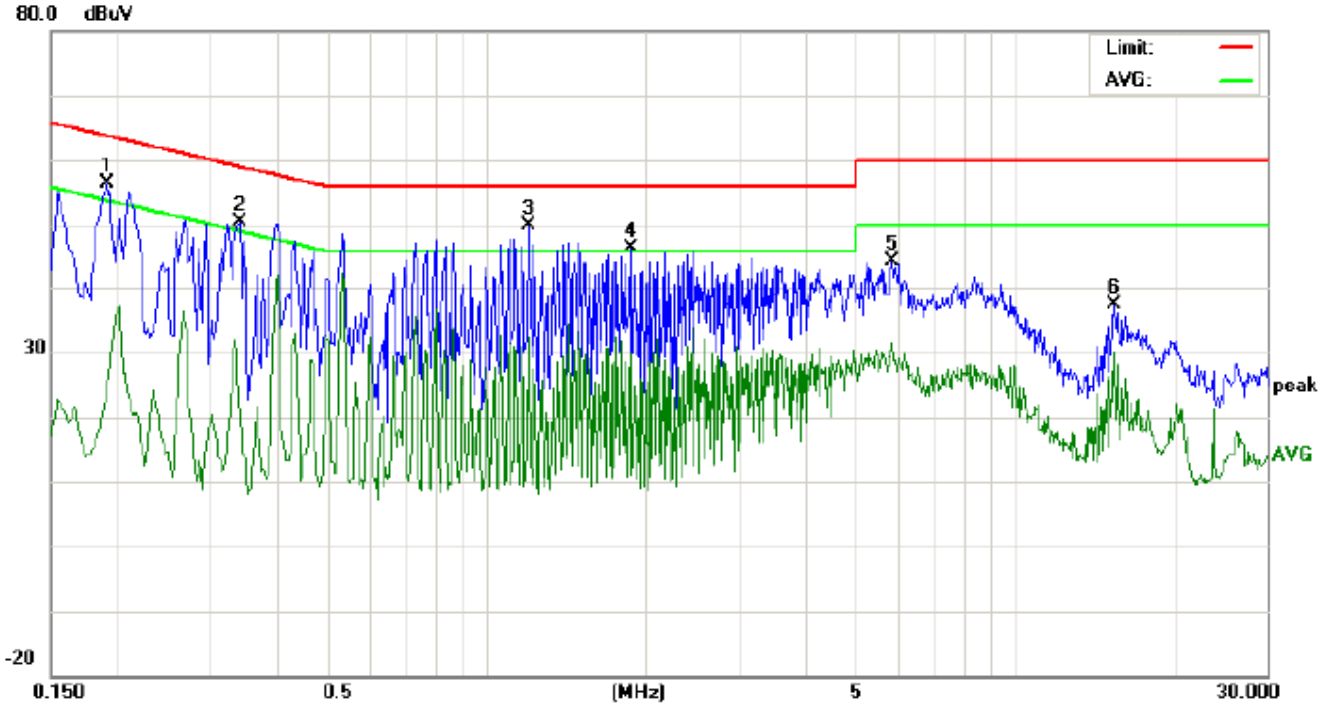
Site: Conduction
Limit: FCC Class B Conduction(QP)
EUT: The QuickLock Padlock
M/N: Padlock
Mode: Transmitting
Note:

Phase: *L1*
Power:

Temperature: 26
Humidity: 60 %

No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1819	44.02		12.69	10.20	54.22		22.89	64.39	54.39	-10.17	-31.50	P	
2	0.2380	43.86		15.10	10.26	54.12		25.36	62.16	52.16	-8.04	-26.80	P	
3	0.5380	39.39		32.22	10.37	49.76		42.59	56.00	46.00	-6.24	-3.41	P	
4	1.5100	35.47		23.82	10.38	45.85		34.20	56.00	46.00	-10.15	-11.80	P	
5	4.9299	31.46		20.07	10.24	41.70		30.31	56.00	46.00	-14.30	-15.69	P	
6	15.5779	27.44		18.32	10.11	37.55		28.43	60.00	50.00	-22.45	-21.57	P	

Line Conducted Emission Test Line 1-N



Site: Conduction
Limit: FCC Class B Conduction(QP)
EUT: The QuickLock Padlock
M/N: Padlock
Mode: Transmitting
Note:

Phase: *N*
Power:

Temperature: 26
Humidity: 60 %

No.	Freq. (MHz)	Reading_Level (dBuV)			Correct Factor	Measurement (dBuV)			Limit (dBuV)		Margin (dB)		P/F	Comment
		Peak	QP	AVG	dB	Peak	QP	AVG	QP	AVG	QP	AVG		
1	0.1913	46.29		14.75	10.21	56.50		24.96	63.98	53.98	-7.48	-29.02	P	
2	0.3420	40.05		8.81	10.31	50.36		19.12	59.15	49.15	-8.79	-30.03	P	
3	1.2020	39.43		21.90	10.37	49.80		32.27	56.00	46.00	-6.20	-13.73	P	
4	1.8700	36.05		19.65	10.26	46.31		29.91	56.00	46.00	-9.69	-16.09	P	
5	5.8379	34.08		21.23	10.27	44.35		31.50	60.00	50.00	-15.65	-18.50	P	
6	15.4619	27.14		19.91	10.12	37.26		30.03	60.00	50.00	-22.74	-19.97	P	

11. Occupied Bandwidth

11.1 LIMITS

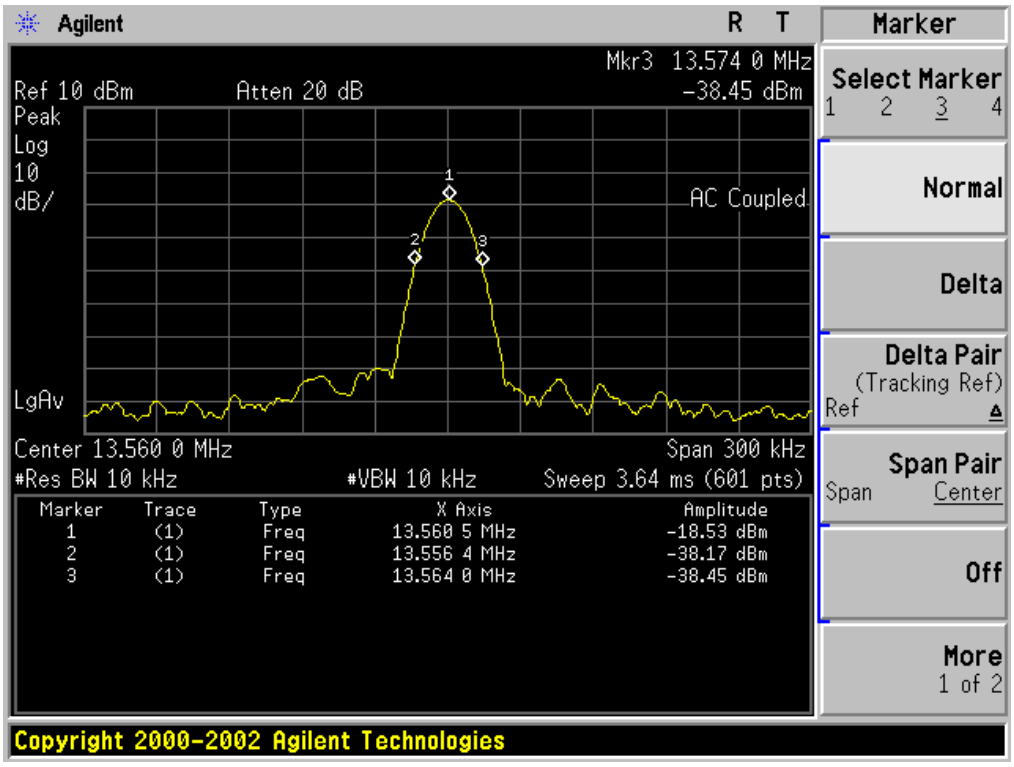
According to 15.215(c), Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

11.2 Test specification:

Environmental conditions: Temperature 23° CHumidity: 50% Atmospheric pressure: 960mbar

11.3 TEST RESULT

Frequency MHz	20dB Bandwidth (kHz)	Frequency range (MHz) fL＞13.553MHz	Frequency range (MHz) fH＜13.567MHz	Conclusion
13.56	7.6	13.5564	13.5640	PASS



12. Frequency Stability Measurement

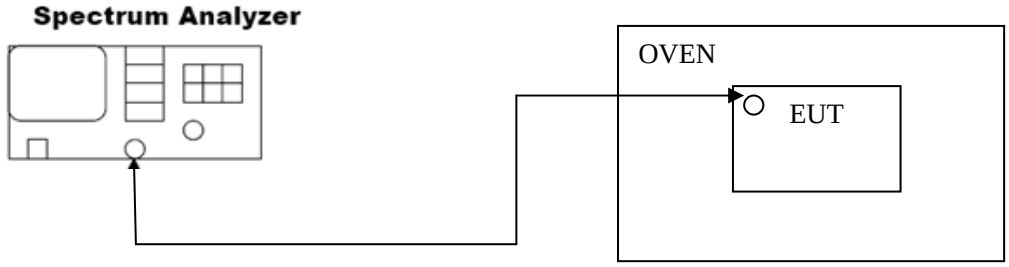
12.1 Limit

According to 15.225(e), The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

12.2 Test Method and test Procedure:

1) The transmitter output (antenna port) was connected to the spectrum analyzer.
2) EUT have transmitted absence of modulation signal and fixed channelize.
3) Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4) Set RBW = 1 kHz, VBW = 1 kHz with peak detector and max hold settings.
5) The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
6) Extreme temperature rule is -20°C~50°C.

12.3 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



12.4 Test specification:

Environmental conditions: Temperature 23° CHumidity: 50% Atmospheric pressure: 960mbar

12.5 TEST RESULT

PASS

Operating frequency: 13.56MHz

Voltage vs. Frequency Stability (Test Temperature: 20℃)

Voltage(V)	Measurement Frequency (MHz)	Max. Deviation (MHz)	Limit(MHz)	Conclusion
3.7	13.5605	0.0008	0.001356	PASS
3.4	13.5608			
4.2	13.5606			

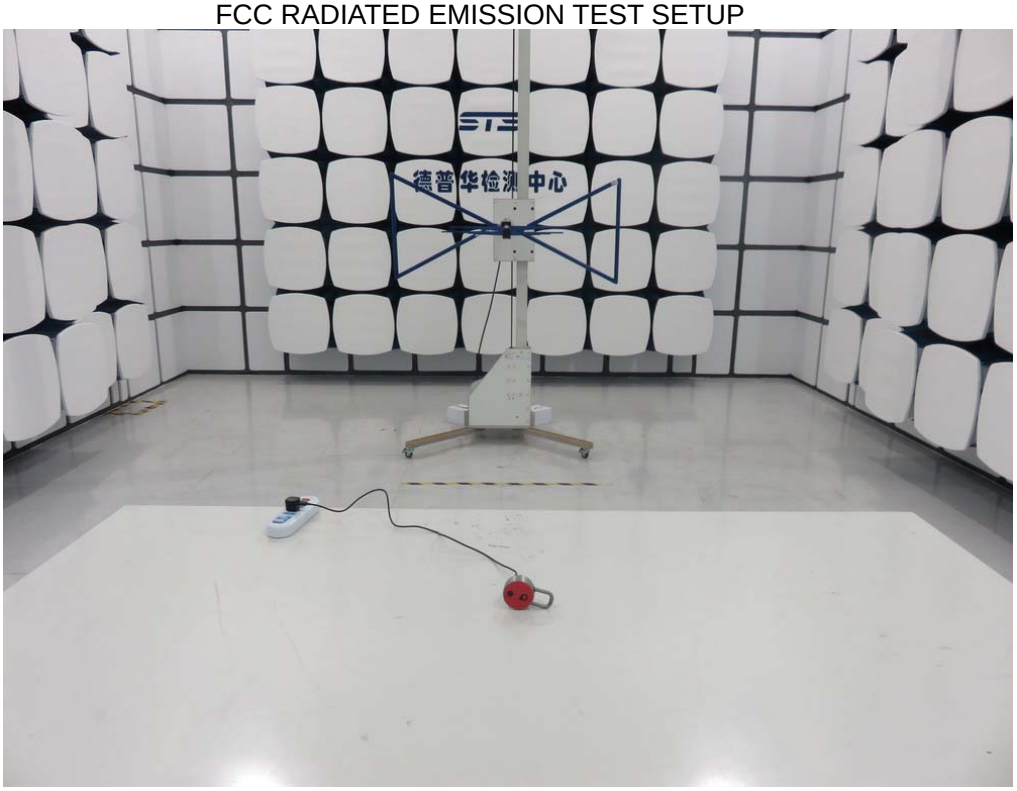
Temperature vs. Frequency Stability (Test Voltage: 3.7V)

Voltage(V)	Measurement Frequency (MHz)	Max. Deviation (MHz)	Limit(MHz)	Conclusion
- 20℃	13.56011	0.00018	0.001356	PASS
-10℃	13.56013			
0℃	13.56017			
10℃	13.56014			
20℃	13.56002			
30℃	13.56007			
40℃	13.56006			
50℃	13.56018			

APPENDIX A: PHOTOGRAPHS OF TEST SETUP

FCC LINE CONDUCTED EMISSION TEST SETUP

FCC RADIATED EMISSION TEST SETUP



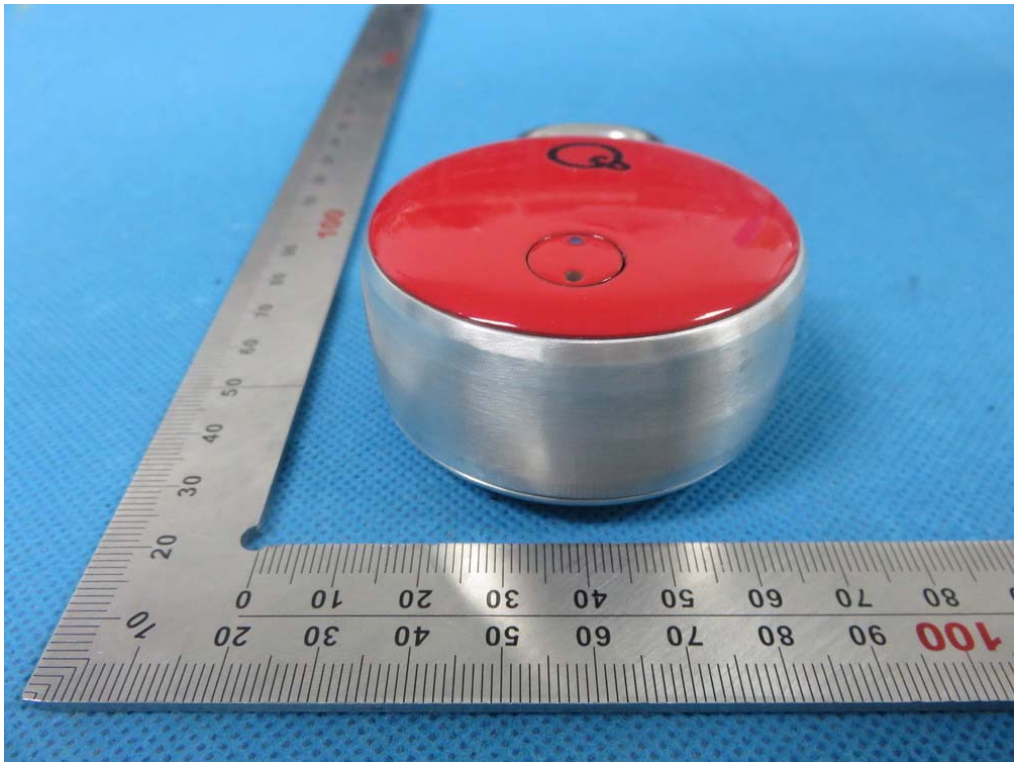
APPENDIX B: PHOTOGRAPHS OF EUT

ALL VIEW OF EUT

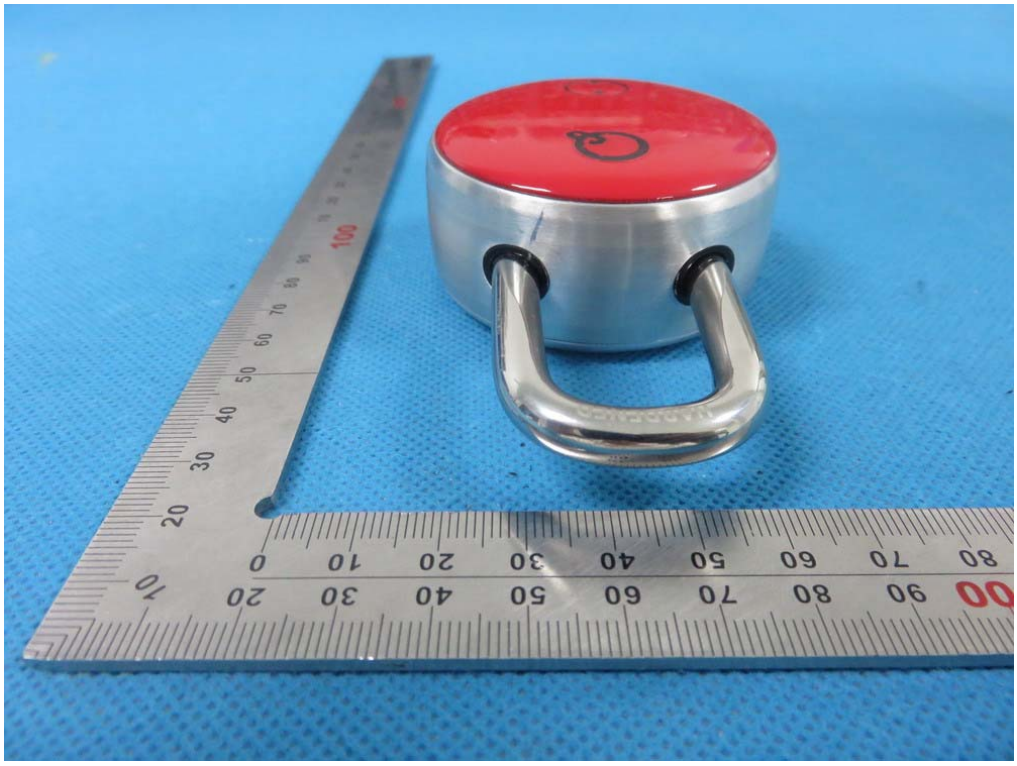
TOP VIEW OF EUT

BOTTOM VIEW OF EUT

FRONT VIEW OF EUT



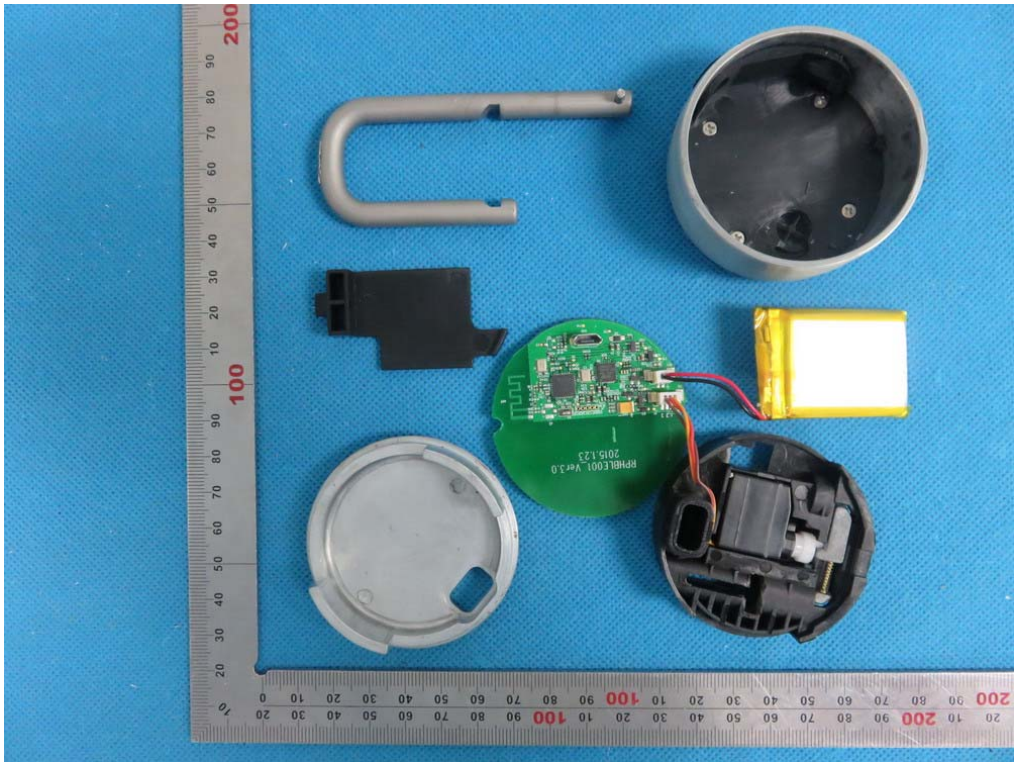
BACK VIEW OF EUT



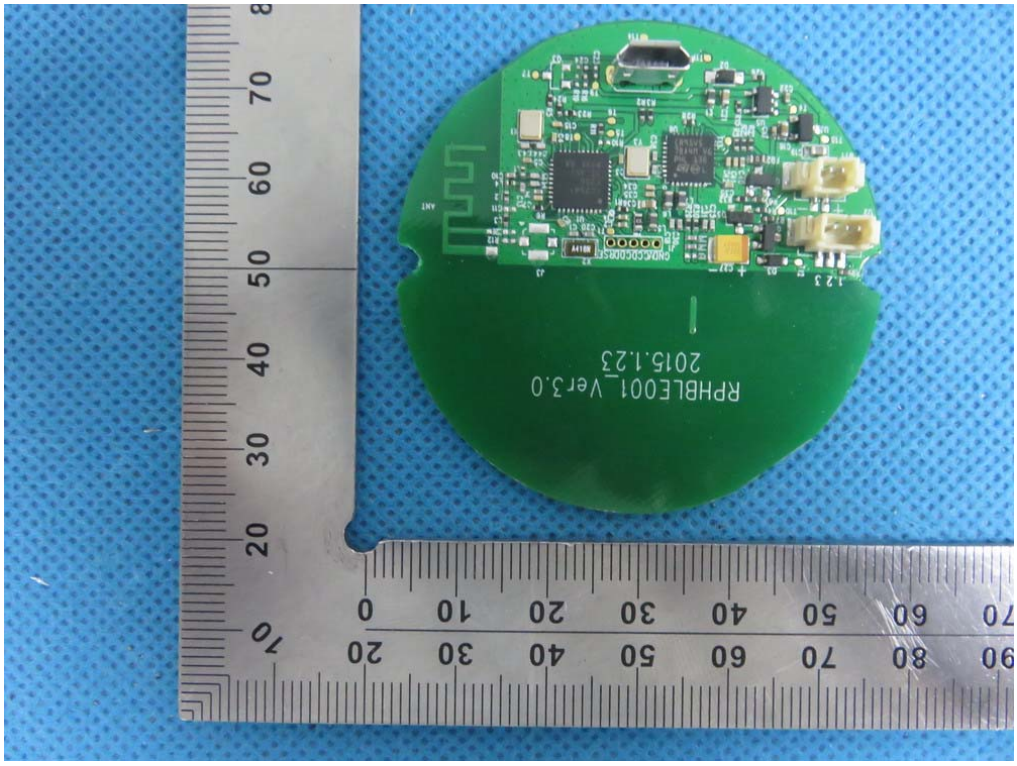
LEFT VIEW OF EUT

RIGHT VIEW OF EUT

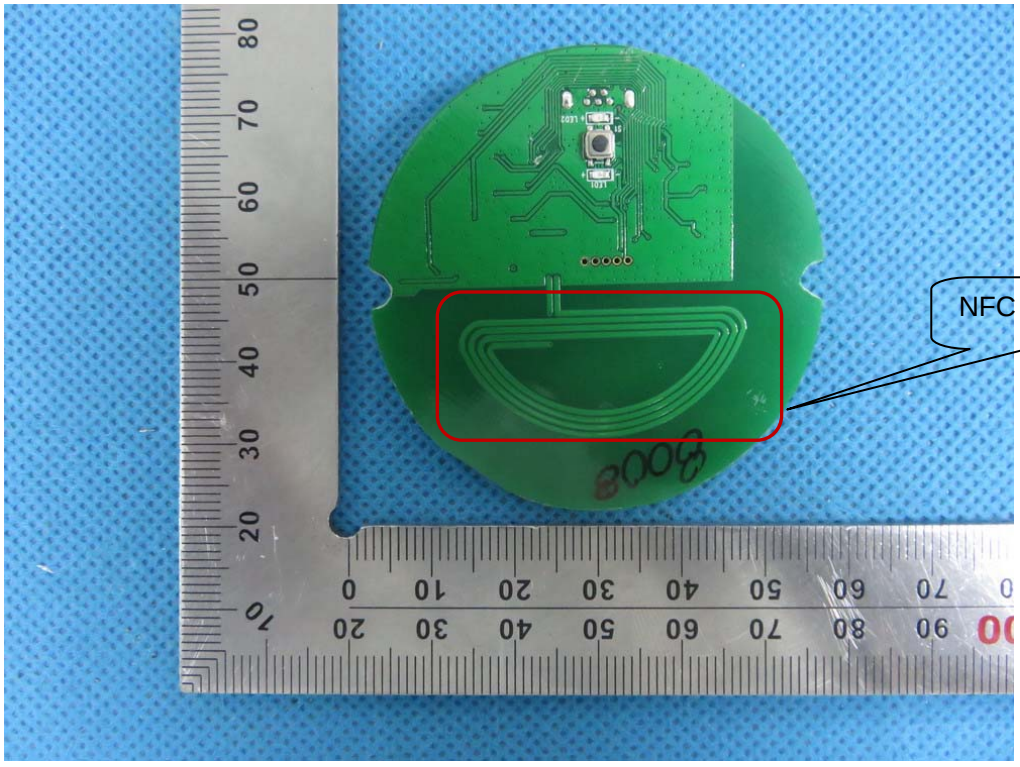
OPEN VIEW OF EUT-1



INTERNAL VIEW OF EUT-1



INTERNAL VIEW OF EUT-2



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