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# FCC Test Report

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Report No.: AGC04983200901FE07

**FCC ID** : 2AQTVSMARTLOCKX  
**APPLICATION PURPOSE** : Original Equipment  
**PRODUCT DESIGNATION** : Altro Smart Lock  
**BRAND NAME** : Altro Smart  
**MODEL NAME** : ModelX  
**APPLICANT** : ALTRO SMART INC  
**DATE OF ISSUE** : Sep. 17, 2020  
**STANDARD(S)** : FCC Part 15.407  
**TEST PROCEDURE(S)** : KDB 905462 D02  
**REPORT VERSION** : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd



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### Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Sep. 17, 2020	Valid	Initial Release

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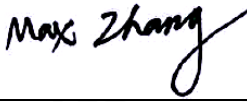
### 1. VERIFICATION OF CONFORMITY

<b>Applicant</b>	ALTRO SMART INC
<b>Address</b>	1551 McCarthy Blvd, Suite 212, Milpitas, CA 95035
<b>Manufacturer</b>	ALTRO SMART INC.
<b>Address</b>	1551 McCarthy Blvd, Suite 212, Milpitas, CA 95035
<b>Factory</b>	VINROX TECHNOLOGIES PVT LTD
<b>Address</b>	336/22, GIDC, MAKARPURA, VADODARA-390010, GUJARAT, INDIA
<b>Product Designation</b>	Altro Smart Lock
<b>Brand Name</b>	Altro Smart
<b>Test Model</b>	ModelX
<b>Date of test</b>	Sep. 08, 2020 to Sep. 17, 2020
<b>Deviation</b>	No any deviation from the test method
<b>Condition of Test Sample</b>	Normal
<b>Test Result</b>	Pass
<b>Report Template</b>	AGCRT-US-BGN/RF

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) 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 KDB 905462 D02.

Prepared By   
 \_\_\_\_\_  
 Sky Dong  
 (Project Engineer) Sep. 17, 2020

Reviewed By   
 \_\_\_\_\_  
 Max Zhang  
 (Reviewer) Sep. 17, 2020

Approved By   
 \_\_\_\_\_  
 Forrest Lei  
 (Authorized Officer) Sep. 17, 2020

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## 2. GENERAL INFORMATION

The EUT is designed as “Client without Radar Detection”. It is designed by way of utilizing the OFDM technology to achieve the system operation.

<b>Operation Frequency</b>	5150 MHz ~ 5250MHz; 5260 MHz ~ 5340MHz, 5500 MHz ~ 5700MHz, 5725 MHz ~ 5850MHz
<b>Output Power</b>	IEEE 802.11a20:18.51dBm
<b>Modulation</b>	BPSK, QPSK, 16QAM, 64QAM, 128QAM, 256QAM, OFDM
<b>Number of channels</b>	39
<b>Hardware Version</b>	A
<b>Software Version</b>	A
<b>Antenna Designation</b>	Integral Antenna
<b>Number of transmit chain</b>	1(802.11a support SISO )
<b>Antenna Gain</b>	4dBi
<b>Power Supply</b>	DC 3.6V by battery

**Note:** The device do not support TPC.

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### 3. DESCRIPTION OF TEST MODES

The tests in this section are run sequentially and the UUT must pass all tests successfully. If the UUT fails any one of the tests it will count as a failure of compliance.

To show compliance, all tests must be performed with waveforms randomly generated as specified with test results meeting the required percentage of successful detection criteria.

One frequency will be chosen from the operating Channels of the UUT within the 5250-5350 MHz or 5470-5725 MHz bands.

### 4. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.407(h)(2)	Dynamic Frequency Selection Channel Move Time and Channel Closing Transmission Time	Compliant

### 5. TEST FACILITY

<b>Test Site</b>	Attestation of Global Compliance (Shenzhen) Co., Ltd
<b>Location</b>	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
<b>Designation Number</b>	CN1259
<b>FCC Test Firm Registration Number</b>	975832
<b>A2LA Cert. No.</b>	5054.02
<b>Description</b>	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA

Description	Manufacturer	Model No.	S/N	Calibration Due.	Calibration Due.
MXG X-Series Vector Signal Generator	Agilent	N5182B	MY53050647	Aug. 21, 2020	Aug. 20, 2021
EXA Signal Analyzer	Agilent	N9020A	MY49100060	Aug. 21,2020	Aug. 20,2021
Attenuator	ZHINAN	E-002	N/A	Sep. 03, 2020	Sep. 02, 2022
Power splitter	Mini-Circuits	ZFRSC-183-s	3122	N/A	N/A
RF Cable	Harbour	SHWCB-3000-N	N/A	May 15, 2020	May 14, 2022
DFS waveform Generator software	Keysight	N7607C V2.0.0.0	N/A	N/A	N/A
DFS data Analyzer software	Tonscend	JS1120-2	N/A	N/A	N/A
AP(Master)	ZTE	ZXHN F670	N/A	N/A	N/A

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## 6. DYNAMIC FREQUENCY SELECTION (DFS)

### 6.1. APPLICABILITY OF DFS REQUIREMENTS

Table 1: Applicability of DFS Requirements Prior to Use of a Channel

Requirement	Operational Mode		
	<input type="checkbox"/> Master	<input checked="" type="checkbox"/> Client Without Radar Detection	<input type="checkbox"/> Client With Radar Detection
Non-Occupancy Period	Yes	Not required	Yes
DFS Detection Threshold	Yes	Not required	Yes
Channel Availability Check Time	Yes	Not required	Not required
U-NII Detection Bandwidth	Yes	Not required	Yes

Table 2: Applicability of DFS requirements during normal operation

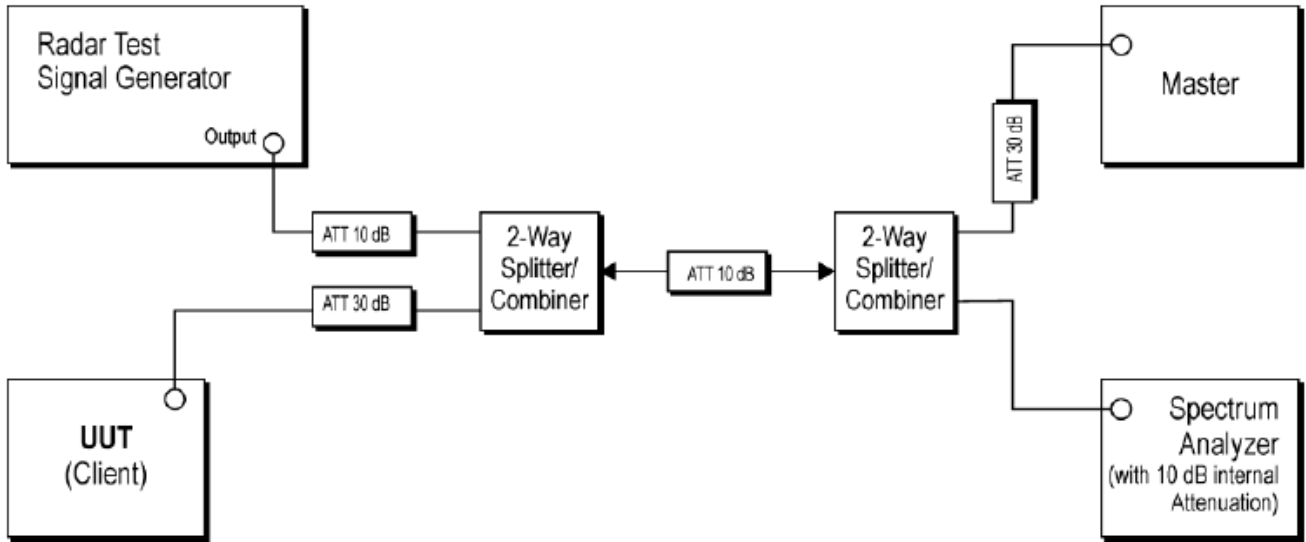
Requirement	Operational Mode	
	<input type="checkbox"/> Master Device or Client with Radar Detection	<input checked="" type="checkbox"/> Client Without Radar Detection
DFS Detection Threshold	Yes	Not required
Channel Closing Transmission Time	Yes	Yes
Channel Move Time	Yes	Yes
U-NII Detection Bandwidth	Yes	Not required

Additional requirements for devices with multiple bandwidth modes	<input type="checkbox"/> Master Device or Client with Radar Detection	<input checked="" type="checkbox"/> Client Without Radar Detection
U-NII Detection Bandwidth and Statistical Performance Check	All BW modes must be tested	Not required
Channel Move Time and Channel Closing Transmission Time	Test using widest BW mode available	Test using the widest BW mode available for the link
All other tests	Any single BW mode	Not required

Note: Frequencies selected for statistical performance check (Section 7.8.4) should include several frequencies within the radar detection bandwidth and frequencies near the edge of the radar detection bandwidth. For 802.11 devices it is suggested to select frequencies in each of the bonded 20 MHz channels and the channel center frequency.



### 6.2. TEST SET-UP



### 6.3. LIMITS

Table 3: DFS Detection Thresholds for Master Devices and Client Devices with Radar Detection

Maximum Transmit Power	Value (See Notes 1, 2, and 3)
EIRP $\geq$ 200 milliwatt	-64 dBm
EIRP < 200 milliwatt and power spectral density < 10 dBm/MHz	-62 dBm
EIRP < 200 milliwatt that do not meet the power spectral density requirement	-64 dBm

Note 1: This is the level at the input of the receiver assuming a 0 dBi receive antenna.

Note 2: Throughout these test procedures an additional 1 dB has been added to the amplitude of the test transmission waveforms to account for variations in measurement equipment. This will ensure that the test signal is at or above the detection threshold level to trigger a DFS response.

Note3: EIRP is based on the highest antenna gain. For MIMO devices refer to KDB Publication 662911 D01.

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Table 4: DFS Response Requirement Values

Parameter	Value
Non-occupancy period	Minimum 30 minutes
Channel Availability Check Time	60 seconds
Channel Move Time	10 seconds See Note 1.
Channel Closing Transmission Time	200 milliseconds + an aggregate of 60 milliseconds over remaining 10 second period. See Notes 1 and 2.
U-NII Detection Bandwidth	Minimum 100% of the U-NII 99% transmission power bandwidth. See Note 3.

Note 1: Channel Move Time and the Channel Closing Transmission Time should be performed with Radar Type 0. The measurement timing begins at the end of the Radar Type 0 burst.

Note 2: The Channel Closing Transmission Time is comprised of 200 milliseconds starting at the beginning of the Channel Move Time plus any additional intermittent control signals required to facilitate a Channel move (an aggregate of 60 milliseconds) during the remainder of the 10 second period. The aggregate duration of control signals will not count quiet periods in between transmissions.

Note 3: During the U-NII Detection Bandwidth detection test, radar type 0 should be used. For each frequency step the minimum percentage of detection is 90 percent. Measurements are performed with no data traffic.

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#### 6.4. RADAR TEST WAVEFORMS

**Table 5 – Short Pulse Radar Test Waveforms**

Radar Type	Pulse Width (μsec)	PRI (μsec)	Number of Pulses	Minimum Percentage of Successful Detection	Minimum Number of Trials
0	1	1428	18	See Note 1	See Note 1
1	1	Test A: 15 unique PRI values randomly selected from the list of 23 PRI values in Table 5a	Roundup $\left\{ \begin{array}{l} \left( \frac{1}{360} \right) \cdot \\ \left( \frac{19 \cdot 10^6}{PRI_{\mu\text{sec}}} \right) \end{array} \right\}$	60%	30
		Test B: 15 unique PRI values randomly selected within the range of 518-3066 μsec, with a minimum increment of 1 μsec, excluding PRI values selected in Test A			
2	1-5	150-230	23-29	60%	30
3	6-10	200-500	16-18	60%	30
4	11-20	200-500	12-16	60%	30
Aggregate (Radar Types 1-4)				80%	120

**Note 1:** Short Pulse Radar Type 0 should be used for the detection bandwidth test, channel move time, and channel closing time tests.

**Table 6 – Long Pulse Radar Test Waveform**

Radar Type	Pulse Width (μsec)	Chirp Width (MHz)	PRI (μsec)	Number of Pulses per Burst	Number of Bursts	Minimum Percentage of Successful Detection	Minimum Number of Trials
5	50-100	5-20	1000-2000	1-3	8-20	80%	30

**Table 7 – Frequency Hopping Radar Test Waveform**

Radar Type	Pulse Width (μsec)	PRI (μsec)	Pulses per Hop	Hopping Rate (kHz)	Hopping Sequence Length (msec)	Minimum Percentage of Successful Detection	Minimum Number of Trials
6	1	333	9	0.333	300	70%	30

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### 6.5. TEST PROCEDURE

1. When a Client Device without Radar Detection is the UUT, the Master Device is the Radar Detection Device.
2. A spectrum analyzer is used to establish the test signal level for each radar type.
3. During this process, there are no transmissions by either the Master Device or Client Device.
4. The spectrum analyzer is switched to the zero span (time domain) mode at the frequency of the Radar Waveform generator. The peak detector function of the spectrum analyzer is utilized. The spectrum analyzer resolution bandwidth (RBW) and video bandwidth (VBW) are set to at least 3 MHz.
5. The measured channels are 5530MHz in 80MHz Bandwidth and 5290MHz in 80MHz Bandwidth. The Radar signal was the same as transmitted channels, and injected into the antenna port of AP(master) ,measured the DFS parameters. The master transmitted the test data to client, the transmitted duty cycle is 30.8%.

### 6.6. TEST RESULT

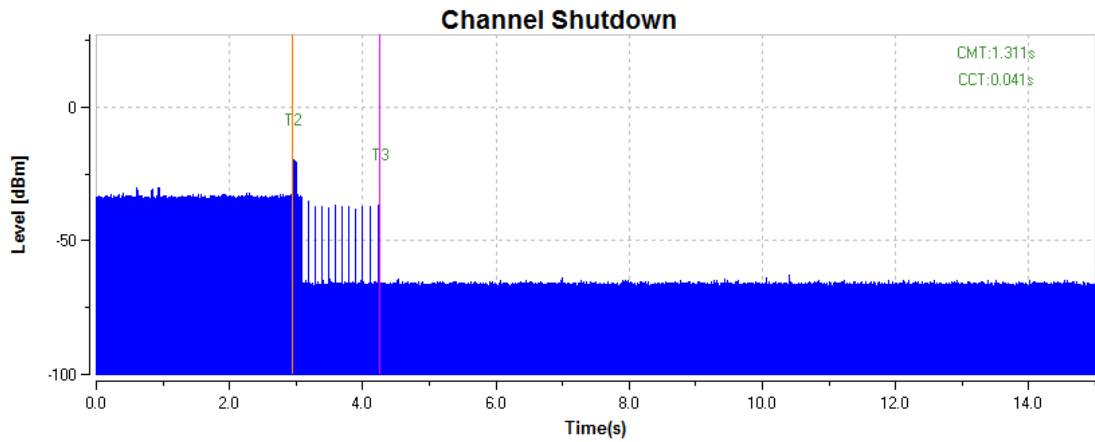
Channel Move Time and Channel Closing Transmission Time

Test Frequency	Requirement	Measurement Level	Limit
5530MHz	Channel Closing Transmission Time	1.311s	≤10s
	Channel Move Time	0.041s	≤0.26s
5290MHz	Channel Closing Transmission Time	1.069s	≤10s
	Channel Move Time	0.009s	≤0.26s

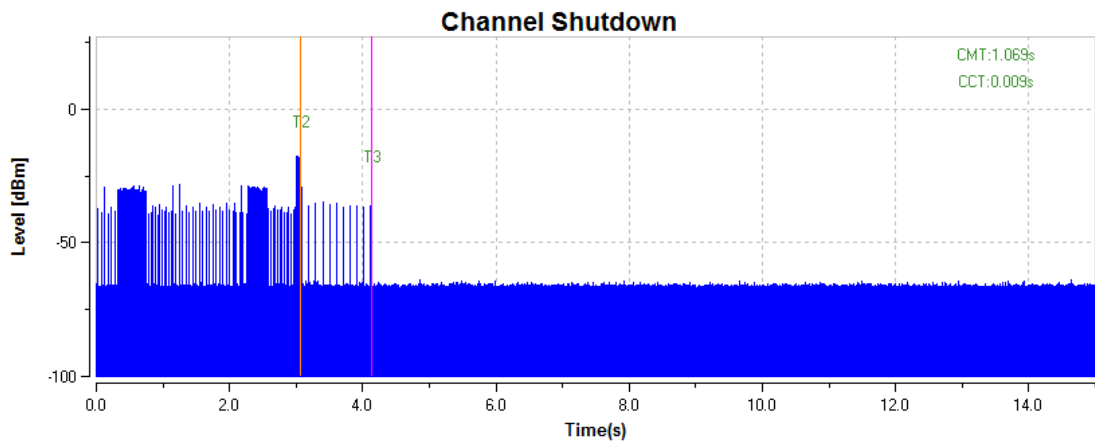
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Radar Type 0(20MHz/5530MHz)



Radar Type 0(20MHz/5290MHz)



**RESULT: PASS**

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### APPENDIX A: PHOTOGRAPHS OF TEST SETUP



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## APPENDIX B: PHOTOGRAPHS OF EUT

Refer to the Report No.: AGC04983200901AP01

----END OF REPORT----

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