

FCC - TEST REPORT

Report Number : **60.790.18.051.01R01** Date of Issue : January 15, 2019

Model : Door Lock, Glass Lock, Plunger Lock

Product Type : Digital Lock

Applicant : Mobile Technologies Inc.

Address : 1050 NE 67th Ave, Hillsboro, OR 97124

Production Facility : PS Gmbh

Address : Melisau 1255, Autria, 6863 Egg.

Test Result : ☒ **Positive** ☐ **Negative**

Total pages including Appendices : 17

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2 Description of Equipment Under Test

Description of the Equipment Under Test

Product:	Digital Lock
Model no.:	Door Lock, Glass Lock, Plunger Lock
FCC ID:	2AA2X-1500011824
Rating:	3V DC (CR 123A battery)
Frequency:	125kHz (Tx and Rx)
Modulation:	AM

3 Summary of Test Standards

Test Standards
FCC Part 15 Subpart C 10-1-17 Edition Federal Communications Commission, PART 15 — Radio Frequency Devices, Subpart C — Unintentional Radiators

All the tests were performed using the procedures from ANSI C63.4(2014) and ANSI C63.10 (2013).

4 Details about the Test Laboratory

Site 1

Company name: TÜV SÜD Hong Kong Ltd.
3/F, West Wing, Lakeside 2,
10 Science Park West Avenue,
Science Park, Shatin, Hong Kong

Site 2

Company name: TÜV SÜD Certification and Testing (China) Co., Ltd. Shenzhen Branch
Building 12&13 Zhiheng Wisdomland Business Park,
Nantou Checkpoint Road 2,
Shenzhen 518052, P.R.China
FCC Registration Number: 514049

Emission Tests	
Test Item	Test Site
FCC Part 15 Subpart C	
FCC Title 47 Part 15.205, 15.209 Spurious Radiated Emission	Site 2
FCC Title 47 Part 15.207 Conduct Emission	NA
FCC Title 47 Part 15.215 20dB Bandwidth	Site 2

4.1 Test Equipment Site List

Radiated emission Test – Site 2

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 26	101269	2019-7-6
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100398	2019-7-6
Trilog Super Broadband Test Antenna	Schwarzbeck	VULB 9163	707	2019-6-28
Horn Antenna	Rohde & Schwarz	HF907	102294	2019-6-28
Pre-amplifier	Rohde & Schwarz	SCU 18	102230	2019-7-6
Signal Generator	Rohde & Schwarz	SMY01	839369/005	2019-7-6
Attenuator	Agilent	8491A	MY39264334	2019-7-6
3m Semi-anechoic chamber	TDK	9X6X6	----	2020-7-7
Test software	Rohde & Schwarz	EMC32	Version 9.15.00	N/A

Conducted Emission Test – Site 2

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
EMI Test Receiver	Rohde & Schwarz	ESR 3	101782	2019-7-6
LISN	Rohde & Schwarz	ENV4200	100249	2019-7-6
LISN	Rohde & Schwarz	ENV432	101318	2019-7-6
LISN	Rohde & Schwarz	ENV216	100326	2019-7-6
ISN	Rohde & Schwarz	ENY81	100177	2019-7-6
ISN	Rohde & Schwarz	ENY81-CA6	101664	2019-7-6
High Voltage Probe	Rohde & Schwarz	TK9420(VT94 20)	9420-584	2019-6-30
RF Current Probe	Rohde & Schwarz	EZ-17	100816	2019-6-30
Attenuator	Shanghai Huaxiang	TS2-26-3	080928189	2019-7-6
Test software	Rohde & Schwarz	EMC32	Version9.15.00	N/A

20dB Bandwidth– Site 2

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DUE DATE
Signal Analyzer	Rohde & Schwarz	FSV40	101030	2019-7-6

4.2 Measurement System Uncertainty

Measurement System Uncertainty Emissions

System Measurement Uncertainty	
Items	Extended Uncertainty
Uncertainty for Radiated Emission in 3m chamber 9kHz-30MHz	4.46dB
Uncertainty for Radiated Emission in 3m chamber 30MHz-1000MHz	Horizontal: 4.91dB; Vertical: 4.89dB;
Uncertainty for Radiated Emission in 3m chamber 1000MHz-18000MHz	Horizontal: 4.80dB; Vertical: 4.79dB;
Uncertainty for Conducted Emission at AC Power Line 150kHz-30MHz	3.21dB
Uncertainty for frequency test	0.6×10^{-7}

5 Summary of Test Results

Emission Tests				
FCC Part 15 Subpart C				
Test Condition	Pages	Test Result		
		Pass	Fail	N/A
FCC Title 47 Part 15.205, 15.209 Spurious Radiated Emission	12-14	☒	☐	☐
FCC Title 47 Part 15.207 Conduct Emission (1)	NIL	☐	☐	☒
FCC Title 47 Part 15.215 20dB Bandwidth	16	☒	☐	☐

Remark:

(1) Conducted Emission testing is not applicable for battery operating device.

6 General Remarks

Remarks

Client informs that the **Glass Lock and Plunger Lock** have the same technical construction including circuit diagram and electrical construction, with **Digital Lock, Door Lock**. The difference lies only in the outlook/color, PCB Layout, components, component layout and mechanical construction of the different models. (Client's conformation letter shown at appendix A)

EMC tests were performed on all three models, only the Door Lock's data was shown on this report, which is the worst case.

This submittal(s) (test report) is intended for **FCC ID: 2AA2X-1500011824**, complies with Section 15.205, 15.207, 15.209, 15.215 of the FCC Part 15, Subpart C rules.

The TX and RX range is 125kHz.

SUMMARY:

- All tests according to the regulations cited on page 8 were

■ - Performed

□ - **Not** Performed

- The Equipment Under Test

■ - **Fulfills** the general approval requirements.

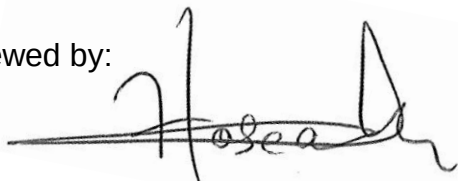
□ - **Does not** fulfill the general approval requirements.

Sample Received Date: October 10, 2018

Testing Start Date: October 16, 2018

Testing End Date: January 7, 2019

Reviewed by:



Hosea CHAN
EMC Project Engineer

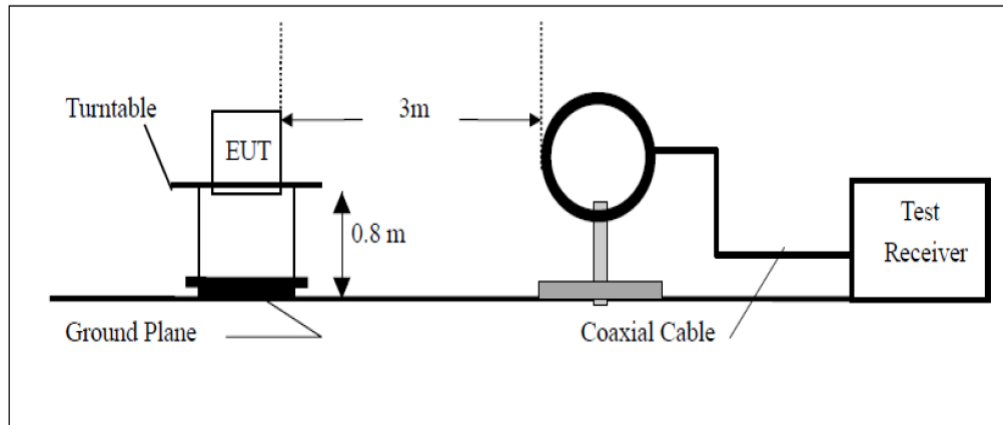
Prepared by:



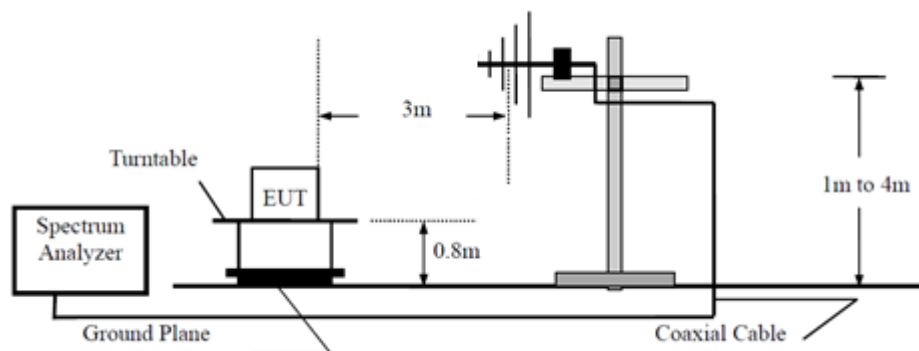
Eric LI
EMC Senior Project Engineer

7 Test Setups

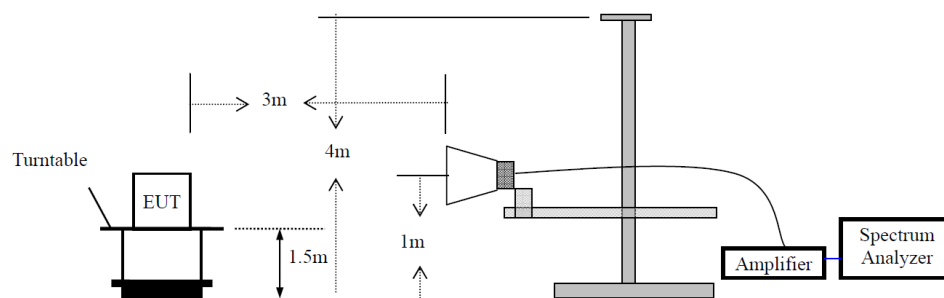
7.1 Radiated test setups 9kHz-30MHz



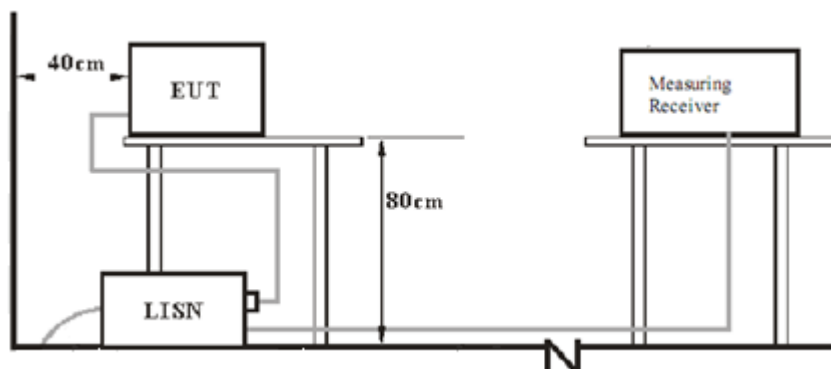
7.2 Radiated test setups Below 1GHz



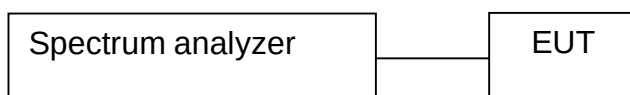
7.3 Radiated test setups Above 1GHz



7.4 AC Power Line Conducted Emission test setups



7.5 Conducted RF test setups



8 Emission Test Results

8.1 Spurious Radiated Emission

EUT: Door Lock
Op Condition: Operated, TX Mode
Test Specification: FCC15.205, 15.209
Comment: 3V DC
Remark: 9kHz to 30MHz

Test Result

☒ Passed☐ Not Passed

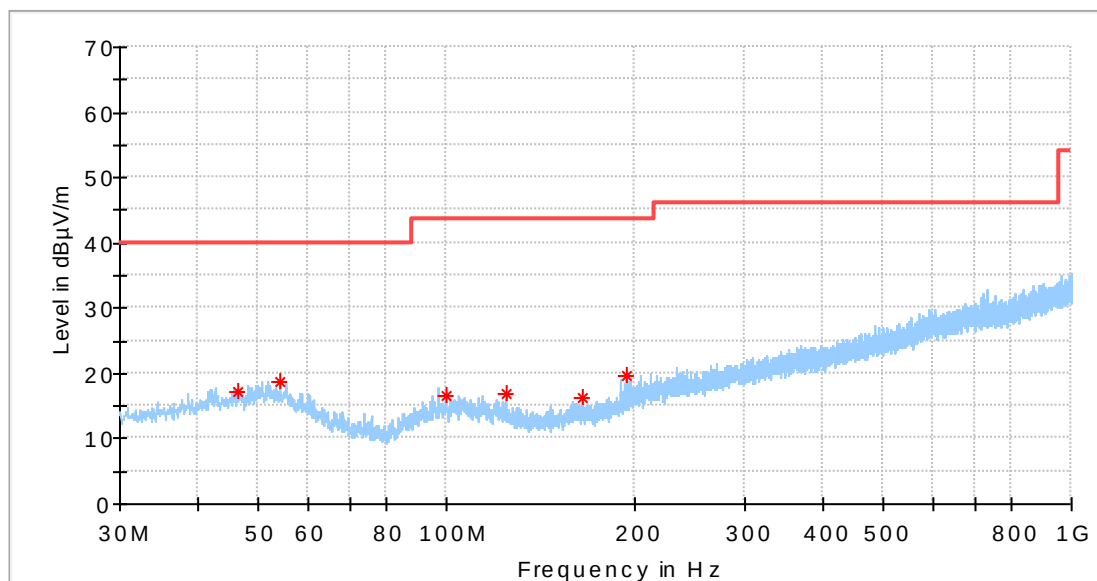
Frequency MHz	Result dB μ V/m	Limit dB μ V/m	Margin dB	Detector PK/QP/AV
0.125	49.52	105.67	-56.15	Peak
0.250	48.23	99.65	-51.42	Peak
0.468	51.23	94.20	-42.97	Peak

Spurious Radiated Emission

EUT: Door Lock
 Op Condition: Operated, TX Mode
 Test Specification: FCC15.205, 15.209
 Comment: 3V DC
 Remark: 30MHz to 1GHz, Antenna: Horizontal

Test Result

☒ Passed

☐ Not Passed


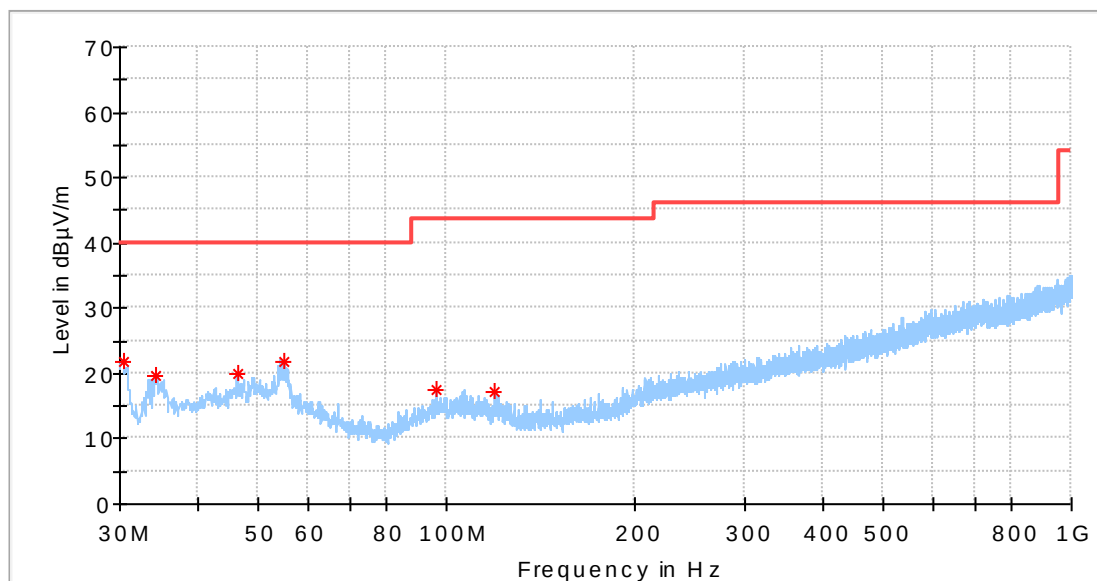
Frequency (MHz)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)
46.247500	17.30	40.00	-22.70
54.250000	18.81	40.00	-21.19
99.597500	16.49	43.50	-27.01
124.271875	16.78	43.50	-26.72
164.587500	16.21	43.50	-27.29
193.748125	19.66	43.50	-23.84

Spurious Radiated Emission

EUT: Door Lock
 Op Condition: Operated, TX Mode
 Test Specification: FCC15.205, 15.209
 Comment: 3V DC
 Remark: 30MHz to 1GHz, Antenna: Vertical

Test Result

☒ Passed

☐ Not Passed


Frequency (MHz)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)
30.424375	21.71	40.00	-18.29
34.365000	19.62	40.00	-20.38
46.247500	19.82	40.00	-20.18
55.098750	21.67	40.00	-18.33
96.141875	17.50	43.50	-26.00
118.936875	17.18	43.50	-26.32

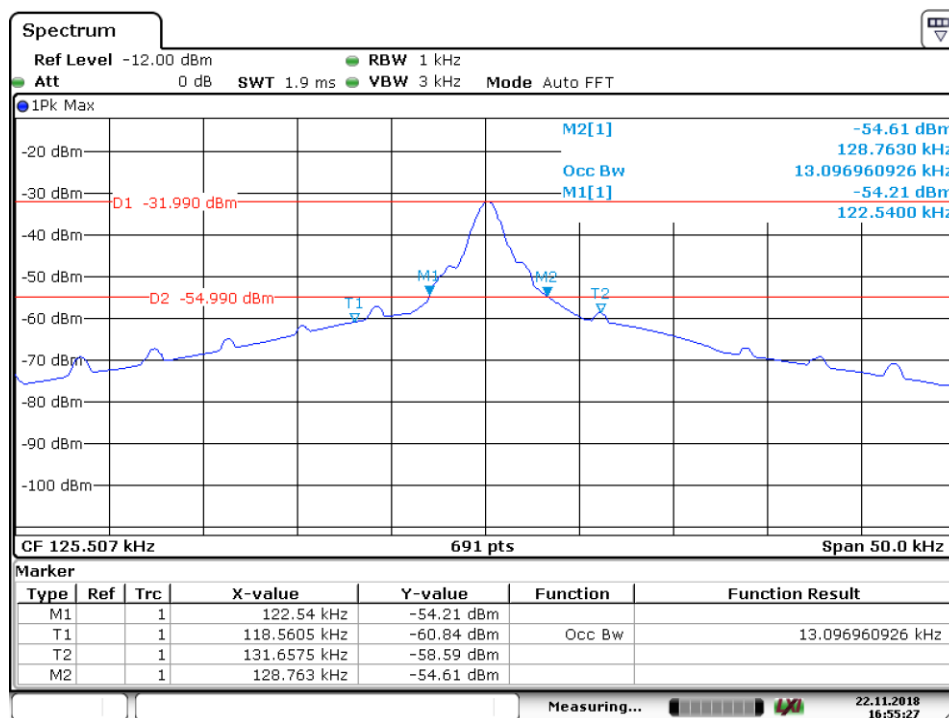
8.2 6dB & 99% Bandwidth

EUT: Door Lock
 Op Condition: Operated, TX Mode
 Test Specification: FCC15.215, 20dB Bandwidth
 Comment: 3V DC

Test Result

☒ Passed

☐ Not Passed



Date: 22.NOV.2018 16:55:27

Bandwidth	Measured Value
20dB bandwidth	6.2 kHz
99% bandwidth	13.1 kHz

9 Appendix A General Product Information

Radiofrequency radiation exposure evaluation

According to KDB 447498 D01v06 section 4.3.1, For frequencies below 100 MHz and test separation distances ≤ 50 mm, the Numeric threshold is determined as:

Step a)

$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR

Step b)

$\{[\text{Power allowed at numeric threshold for 50mm in step a)}] + [(\text{test separation distance} - 50\text{mm}) \cdot (f(\text{MHz})/150)]\}$ mW

Step c) 1)

For test separation distances $> 50\text{mm}$ and $< 200\text{mm}$, the power threshold at the corresponding test separation distance at 100MHz in step b) is multiplied by $[1 + \log(100/f(\text{MHz}))]$

Step c) 2)

For test separation distances $\leq 50\text{mm}$, the power threshold determined by the equation in c) 1) for 50mm and 100MHz is multiplied by $\frac{1}{2}$.

>> The fundamental frequency of the EUT is 125kHz, the test separation distance is $\leq 50\text{mm}$.
(Manufacturer specified the separation distance is: 20mm)

Step a)

>> Numeric threshold, $\text{mW} / 50\text{mm} \cdot \sqrt{0.1\text{GHz}} \leq 3.0$
Numeric threshold $\leq 474.3\text{mW}$

Step b)

>> Numeric threshold $\leq 474.3\text{mW} + (50\text{mm} - 50\text{mm} \cdot 100\text{MHz}/150)$
Numeric threshold $\leq 474.3\text{mW}$

Step c) 1) & c) 2)

>> Numeric threshold $\leq 474.3\text{mW} \cdot [1 + \log 100/100\text{MHz}] \cdot \frac{1}{2}$
Numeric threshold $\leq 237.15\text{mW}$

>> The transmitter strength of EUT measured is: 49.52 dB μ V/m

The power calculated is 0.000001786487mW

Which is smaller than the Numeric threshold.

Therefore, the device is exempt from stand-alone SAR test requirements.

General Product Information

Declaration letter of model difference



Mobile Technologies Inc.
EMPOWERING THE USE OF MOBILE DEVICES

To: TÜV SÜD Hong Kong Limited

Attention: Mr. Edmond Fung

From: Audy Tse

Date: January 21, 2019

Fax No:

Total Page (Cover Included): 1

Project No.:

Subject: **Declaration letter**

We: **Mobile Technologies Inc.**

Officially notify TÜV SÜD Hong Kong Limited that the Door Lock and Plunger Lock have the same technical construction including circuit diagram and electrical construction, with Digital Lock, Glass Lock. The difference lies only in the outlook/color, PCB Layout, components, component layout and mechanical construction of the different models.

Model A: **Door Lock**

Model B: **Plunger Lock**

Model C: **Glass Lock**

Product: **Digital Lock**

Applicant:

Jan 21, 2019

(Date)



(Applicant's authorized signature and company Chop)