LTA
Laboratory for Test & Approval Co.,Ltd.

243 Jubug-Ri,Yangji-Myeon, Yongin-Si, Gyeonggi-Do, Korea 449-822
Tel: +82-31-323-6008 Fax: +82-31-323-6010
http://www.ltalab.com

Dates of Tests: December 01 ~ 06, 2016
Test Report S/N: LR500111612E
Test Site : LTA CO., LTD.

CERTIFICATION OF COMPLIANCE

FCC ID **W6YHP100**

APPLICANT **PASSTECH CO., LTD**

FCC Classification	:	**Part 15 Low Power Communication Device Transmitter**
Manufacturing Description	:	**Hotel Door locks**
Manufacturer	:	**PASSTECH CO., LTD**
Model name	:	**HP100**
Test Device Serial No.:	:	**Identical prototype**
Rule Part(s)	:	**FCC Part 15.225 Subpart C; ANSI C-63.4-2014**
Frequency Range	:	**13.56 MHz**
RF power	:	**52.07 dBuV/m @ 3m**
Data of issue	:	**December 7, 2016**

This test report is issued under the authority of:

Yong-Cheol, Wang / Manager

The test was supervised by:

Young-jin Lee, Test Engineer

This test result only responds to the tested sample. It is not allowed to copy this report even partly without the allowance of the test laboratory. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

NVLAP LAB Code.: 200723-0

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1. General information

1-1 Test Performed

Company name : LTA Co., Ltd.
Address : 243, Jubug-ri,Yangji-Myeon,Youngin-Si, Kyunggi-Do, Korea. 449-822
Web site : http://www.ltalab.com
E-mail : chahn@ltalab.com
Telephone : +82-31-323-6008
Facsimile : +82-31-323-6010

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the "General requirements for the competents of calibration and testing laboratory".

1-2 Accredited agencies

LTA Co., Ltd. is approved to perform EMC testing by the following agencies:

Agency	Country	Accreditation No.	Validity	Reference
NVLAP	U.S.A	200723-0	2017-09-30	ECT accredited Lab.
RRA	KOREA	KR0049	-	EMC accredited Lab.
FCC	U.S.A	610755	2017-04-21	FCC filing
FCC	U.S.A	649054	2017-04-13	FCC CAB
VCCI	JAPAN	R2133(10 m), C2307	2017-06-21	VCCI registration
VCCI	JAPAN	T-2009	2016-12-23	VCCI registration
VCCI	JAPAN	G-563	2018-12-13	VCCI registration
IC	CANADA	5799A-1	UPDATING	IC filing
KOLAS	KOREA	NO.551	2017-01-08	KOLAS accredited Lab.

2. Information about test item

2-1 Client& Manufacturer

Company name	:	PASSTECH CO., LTD
Address	:	No. B-402, Geumgang Penterium IT Tower, 215, Galmachi-ro, Jungwon-gu, Seongnam-si, Gyeonggi-do, 13217 Rep. of KOREA
Tel / Fax	:	TEL No : +82-31-743-7277 / FAX No : +82-31-743-7276

2-2 Equipment Under Test (EUT)

Trade name	:	Hotel Door locks
Model name	:	HP100
Serial number	:	Identical prototype
Date of receipt	:	March 4, 2016
EUT condition	:	Pre-production, not damaged
Antenna type	:	Loop Antenna
Frequency Range	:	13.56 MHz
RF output power	:	52.07 dBuV/m @ 3m
Power Source	:	DC 6V by Battery
Firmware Version	:	V 1.0.0

2-3 Tested frequency

	LOW	MID	HIGH
Frequency (MHz)	-	13.56	-

3. Test Report

3.1 Summary of tests

FCC Part Section(s)	Parameter	Test Condition	Status (note 1)
15.225(a)	Electric Field Strength - Fundamental Emission	Radiated	C
15.225(b) (c)	Electric Field Strength - Outside the Band		C
15.225(d) / 15.209	Electric Field Strength - Spurious Emission		C
15.225(e)	Frequency Tolerance		C
15.215(c)	20 dB Bandwidth		C
15.207 /15.107	AC Conducted Emissions	Line Conducted	N/A

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

Note 2: The data in this test report are traceable to the national or international standards.

The sample was tested according to the following specification:

FCC Parts 15.225; ANSI C-63.4-2003

3.2 Transmitter requirements

3.2.1 Electric Field Strength

Procedure: About the Fundamental Emission, Outside the Band and Spurious Emission

The Radiated Electric Field Strength intensity has been measured with a ground plane and at a distance of 3m.

→ From 9 kHz to 30 MHz at distance 3 m

The EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for each antenna angle 0 deg., 45 deg. and 90 deg.

→ From 30 MHz to 1000 MHz at distance 3 m

The measuring antenna height was varied between 1 and 4 m and EUT was rotated a full revolution in order to obtain the maximum value of the electric field intensity.

The measurements were performed for both vertical and horizontal antenna polarization.

Bandwidth settings per frequency range;

	From 9 kHz to 150 kHz	From 150 kHz to 30 MHz	From 30 MHz to 1000 MHz
IF Bandwidth	200 Hz	9 kHz	120 kHz

Part 15 Section 15.31 (f)(2) (9 kHz ~ 30 MHz)

9 kHz ~ 490 kHz [Limit at 3 m] = [Limit at 300 m]-20log(3[m]/300[m])

490 kHz ~ 30 MHz [Limit at 3 m] = [Limit at 30 m]-20log(3[m]/30[m])

3.2.1.1 Electric Field Strength - Fundamental Emission

Test method : Part 15.225(a)

Tx Frequency : 13.56 MHz

Result : **Complies**

Measurement data:

Freq (MHz)	Pol.	Reading (dBµV/m)	T.F (dB)	Field Strength @3 m (dBµV/m)	Limit @3 m (dBuV/m)	Margin (dB)
13.56	H	55.02	-2.95	52.07	104	-51.93
13.56	V	54.45	-2.95	51.50	104	-52.50

-- Note 1--

Field strength of 13.553 MHz to 13.567 MHz Limit@3m = 84 dBuV/m + 20log30 m/3 m

= 104 dBuV/m

-- Note 2--

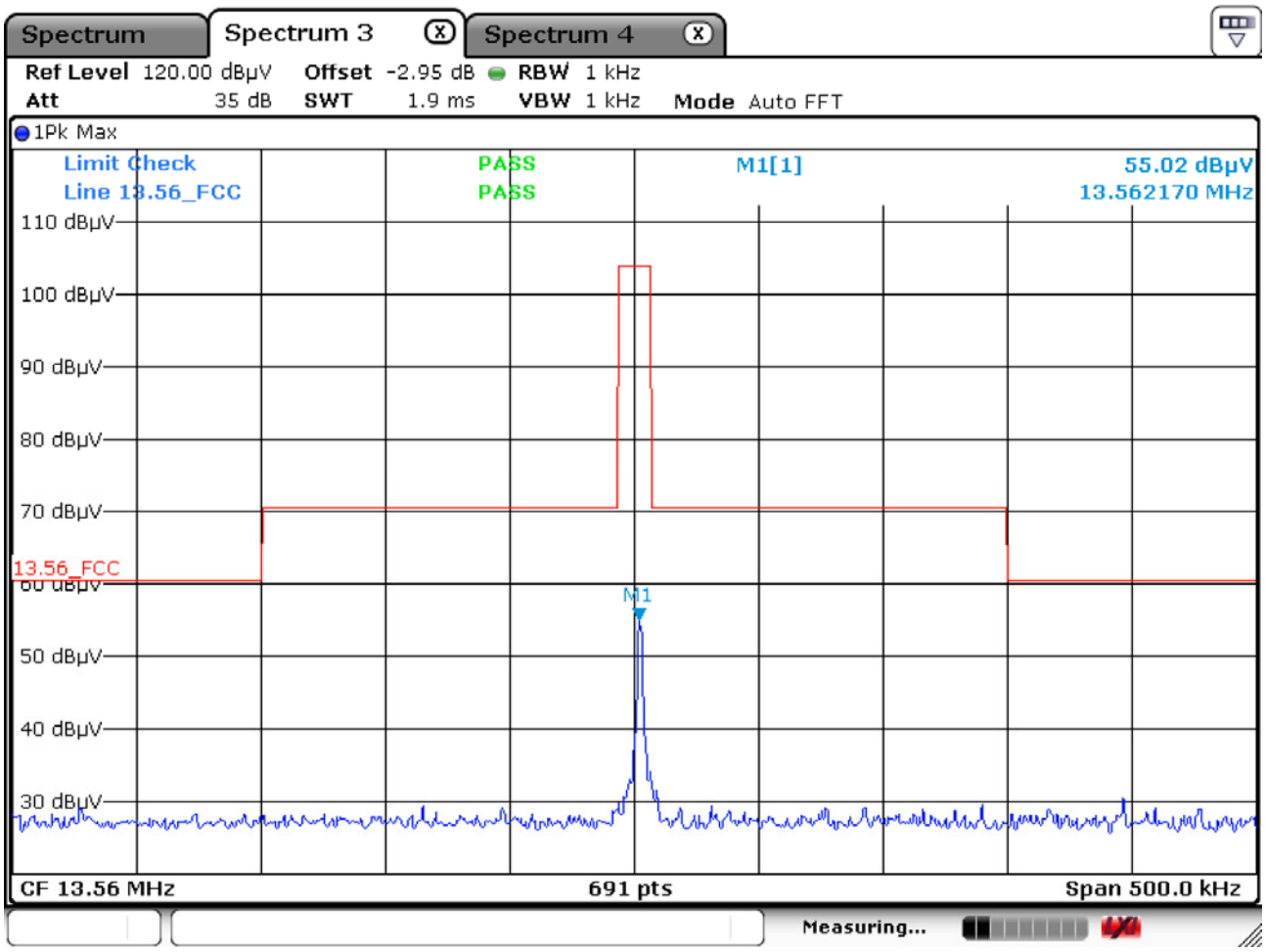
T.F(Total Factor) = Antenna Factor + Cable Loss –Amp Gain

Field Strength @3 m = Reading + T.F

3.2.1.2 Electric Field Strength - Outside the Allocated Band

Test method	:	Part 15.225(b) (c)
Tx Frequency	:	13.56 MHz
Result	:	**Complies**

Measurement Data:



3.2.1.3 Electric Field Strength – Spurious Emission

Test method : Part 15.225(d) / Part 15.209

Tx Frequency : 13.56 MHz

Result : **Complies**

Measurement Data:

Freq (MHz)	Pol.	Reading (dBµV/m)	T.F (dB)	Field Strength @ 3 m (dBµV/m)	Limit @3 m (dBuV/m)	Margin (dB)
629.10	V	32.62	-4.12	28.50	46.40	17.90
654.60	H	31.98	-3.43	28.55	46.40	17.85
709.14	H	31.46	-1.94	29.52	46.40	16.88
737.61	V	31.12	-0.91	30.21	46.40	16.19
766.32	H	33.01	-0.16	32.85	46.40	13.55

-- Note 1--

T.F(Total Factor) = Antenna Factor + Cable Loss –Amp Gain

Field Strength @3 m = Reading + T.F

-- Note 2--

No other emissions were detected at a level greater than 20 dB below limit.

3.2.1.4 Emission Bandwidth

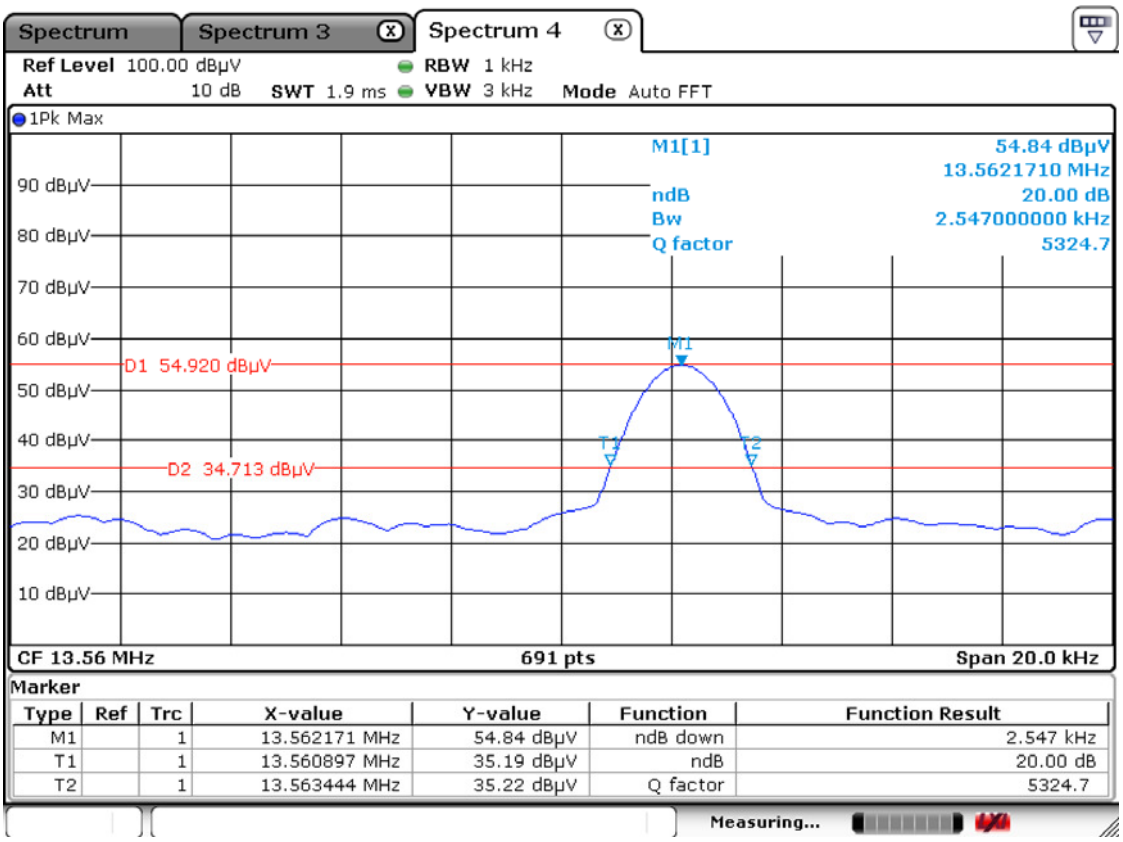
Test method : Part 15.215 (c)

Tx Frequency : 13.56 MHz

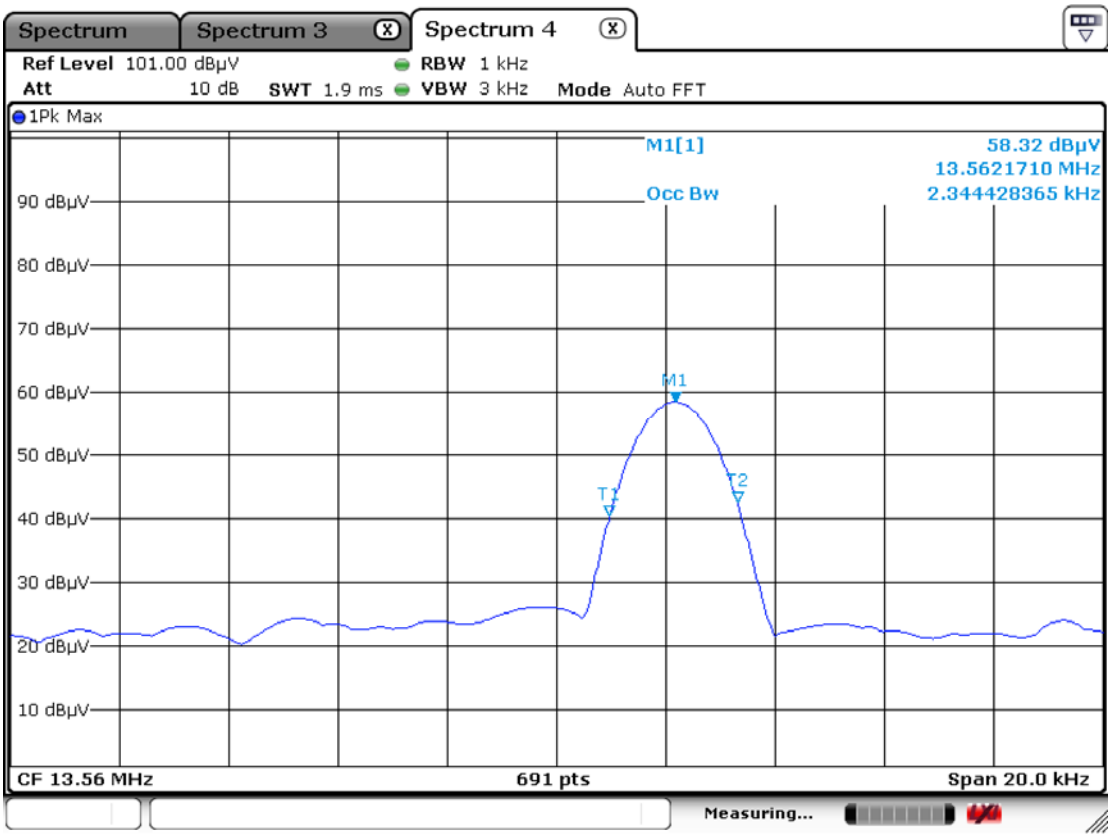
Result : **Complies**

Occupied Channel Bandwidth Result			
Modulation Mode	**Frequency (MHz)**	**20 dB Bandwidth (kHz)**	**99% Bandwidth (kHz)**
ASK	13.56	2.55	2.34
Limit		N/A	N/A
Result		PASS	

20 dB Bandwidth



99% Bandwidth



3.2.2 Frequency Tolerance

Procedure:

The temperature test was started after the temperature stabilization time of 30 minutes.

Requirement:

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.

Test method : ANSI C63.4:2014

Tx Frequency : 13.56 MHz

Result : **Complies**

Measurement Data:

OPERATING FREQUENCY: **13,562,600** **Hz**

Freq. Tolerance Limit: **± 0.01** **%**

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQ (Hz)	Deviation (%)
100	**6.00**	**-20**	13,561,236	0.000101
100		**-10**	13,560,966	0.000120
100		**0**	13,561,186	0.000104
100		**10**	13,561,216	0.000102
100		**20**	13,561,160	0.000106
100		**30**	13,561,163	0.000106
100		**40**	13,561,093	0.000111
100		**50**	13,561,090	0.000111
85	**5.10**	**20**	13,561,132	0.000108
115	**6.90**	**20**	13,561,166	0.000106

3.2.3 AC Conducted Emissions

Procedure:

The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. While the measurement, EUT had its hopping function disabled at the middle channels in line with Section 15.31(m). Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

Measurement Data: N/A

- See next pages for actual measured spectrum plots.
- No emissions were detected at a level greater than 20 dB below limit.

Minimum Standard: FCC Part 15.207(a) / EN 55022

Class B

Frequency Range	quasi-peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency

APPENDIX

TEST EQUIPMENT USED FOR TESTS

	Description	Model No.	Serial No.	Manufacturer	Interval	Last Cal. Date
1	Signal Analyzer (9 kHz ~ 30 GHz)	FSV30	100757	R&S	1 year	2016-10-11
2	Signal Generator (~ 3.2 GHz)	8648C	3623A02597	HP	1 year	2016-03-21
3	SYNTHESIZED CW GENERATOR	83711B	US34490456	HP	1 year	2016-03-21
4	Attenuator (3 dB)	8491A	37822	HP	1 year	2016-09-12
5	Attenuator (10 dB)	8491A	63196	HP	1 year	2016-09-12
6	Test Receiver (~ 30 MHz)	ESHS10	828404/009	R&S	1 year	2016-03-21
7	EMI Test Receiver (~ 7 GHz)	ESCI7	100722	R&S	1 year	2016-09-12
8	RF Amplifier (~ 1.3 GHz)	8447D	2944A07974	HP	1 year	2016-09-12
9	RF Amplifier (1 ~ 26.5 GHz)	8449B	3008A02126	HP	1 year	2016-03-21
10	Horn Antenna (1 ~ 18 GHz)	3115	00114105	ETS	1 year	2016-04-21
11	DRG Horn (Small)(18GHz ~40GHz)	3116B	81109	ETS-Lindgren	1 year	2016-05-03
12	DRG Horn (Small) (18GHz ~40GHz)	3116B	133350	ETS-Lindgren	1 year	2016-05-03
13	TRILOG Antenna	VULB 9160	9160-3237	SCHWARZBECK	2 year	2015-04-21
14	Temp. Humidity Data Logger	SK-L200TH II A	00801	SATO	1 year	2016-03-22
15	Splitter	1580	SL769	WEINSCHEL	1 year	2016-03-22
16	Power Divider	11636A	06243	HP	1 year	2016-09-12
17	DC Power Supply	6674A	3637A01657	Agilent	-	-
18	Frequency Counter	5342A	2826A12411	HP	1 year	2016-03-21
19	Power Meter	EPM-441A	GB32481702	HP	1 year	2016-03-22
20	Power Sensor	8481A	3318A94972	HP	1 year	2016-01-05
21	Audio Analyzer	8903B	3729A18901	HP	1 year	2016-09-12
22	Modulation Analyzer	8901B	3749A05878	HP	1 year	2016-09-12
23	TEMP & HUMIDITY Chamber	YJ-500	LTAS06041	JinYoung Tech	1 year	2016-09-12
24	Stop Watch	HS-3	812Q08R	CASIO	2 year	2016-03-22
25	LISN	KNW-407	8-1430-1	Kyoritsu	1 year	2016-09-12
26	Two-Lime V-Network	ESH3-Z5	893045/017	R&S	1 year	2016-03-21
27	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	106243	R&S	1 year	2016-03-21
28	Highpass Filter	WHKX1.5/15G-10SS	74	Wainwright Instruments	1 year	2016-03-21
29	Highpass Filter	WHKX3.0/18G-10SS	118	Wainwright Instruments	1 year	2016-03-21
30	Active Loop Antenna	FMZB1519	1519-031	SCHWARZBECK	2 year	2016-01-12
31	OSP120 BASE UNIT	OSP120	101230	R&S	1 year	2016-03-22
32	Signal Generator(100 kHz ~ 40 GHz)	SMB100A	177621	R&S	1 year	2016-03-22
33	Signal Analyzer (10 Hz ~ 40 GHz)	FSV40	101367	R&S	1 year	2016-03-22