Prüfbericht-Nr.: *Test Report No.:*	**50323268 001**	**Auftrags-Nr.:** *Order No.:*	238110492	Seite 1 von 20 *Page 1 of 20*
Kunden-Referenz-Nr.: *Client Reference No.:*	N/A	**Auftragsdatum:** *Order date:*	26-Sep-2019	
Auftraggeber: *Client:*	Pamex Inc. PAMEX INC, 4680 VINITA CT, CHINO, CA, 91710, UNITED STATES			
Prüfgegenstand: *Test item:*	Enkore			
Bezeichnung / Typ-Nr.: *Identification / Type No.:*	KE1-LNP5C			
Auftrags-Inhalt: *Order content:*	FCC Part 15C Test report (RFID)			
Prüfgrundlage: *Test specification:*	FCC 47CFR Part 15: Subpart C Section 15.225			

Wareneingangsdatum: *Date of receipt:*	04-Dec-2019
Prüfmuster-Nr.: *Test sample No.:*	A001037229-001,002
Prüfzeitraum: *Testing period:*	05-Dec-2019 - 31-Jan-2020
Ort der Prüfung: *Place of testing:*	EMC/RF Laboratory Taipei
Prüflaboratorium: *Testing laboratory:*	TUV Rheinland Taiwan Ltd.
Prüfergebnis*: *Test result*:*	Pass

Report date / *tested by*:

03-Feb-2020 Mars Y.J. Lin/ Project Engineer

Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*

kontrolliert von / *reviewed by*:

03-Feb-2020 Ryan Chen/ Project Manager

Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*

Sonstiges / *Other*:

Zustand des Prüfgegenstandes bei Anlieferung: Prüfmuster vollständig und unbeschädigt
Condition of the test item at delivery: *Test item complete and undamaged*

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
Legend:	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m. test specification(s)		*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

TEST SUMMARY

5.1.1 ANTENNA REQUIREMENT
RESULT: Passed

5.1.2 FIELD STRENGTH OF FUNDAMENTAL
RESULT: Passed

5.1.3 FREQUENCY STABILITY
RESULT: Passed

5.1.4 SPURIOUS EMISSION
RESULT: Passed

6.1.1 ELECTROMAGNETIC FIELDS
RESULT: Passed

Contents

1. General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:
Appendix P: Photo Documentation
(File Name: 50323268 001 APPENDIX P)
Appendix D: Test Result of Radiated Emissions
(File Name: 50323268 001 APPENDIX D)

Test Specifications
The following standards were applied (in bold: product standards, otherwise: basic standards).

Table 1: Applied Standard and Test Levels

Radio
FCC CFR47 Part 15: Subpart C Section 15.225
FCC CFR47 Part 2: Subpart J Section 2.1091
KDB447498 D01 General RF Exposure Guidance v06
ANSI C63.10:2013

1.2 Complementary Materials

The decision rule of conformity of this test report is following the requirements of the requested standard in the quotation, and agreed among testing laboratory and manufacturer (applicant) to exclude the consideration of Measurement Uncertainty, unless it is required by the specific standard.

2. Test Sites

2.1 Test Laboratory

TUV Rheinland Taiwan Ltd.

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)

2.2 Test Facility

TUV Rheinland Taiwan Ltd.

No. 458-18, Sec 2, Fenliao., Linkou Dist.
New Taipei City 244
Taiwan (R.O.C.)

FCC Registration No.: 226631
IC Canada Registration No.: 25563
TAF Accredited NCC Test Lab. No.:3567
TAF ISO17025 Certification effective period: 6th-May-2019 to 05th-May-2022

TAF
Testing Laboratory
3567

2.3 List of Test and Measurement Instruments

Table 2: List of Test and Measurement Equipment

Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
EMI Test Receiver	R&S	ESR7	102108	2019/2/06	2020/2/05
Spectrum Analyzer	R&S	FSV40	101508	2019/2/05	2020/2/04
Pre-Amplifier	Agilent	8447D	2944A10772	2019/2/22	2020/2/21
Pre-Amplifier	EMCI	EMC051845SE	980633	2019/2/25	2020/2/24
Pre-Amplifier	EMCI	EMC184045SE	980657	2019/2/23	2020/2/22
Bilog Antenna	SCHWARZBECK	VULB-9168	00951	2020/1/14	2021/1/13
Horn Antenna	ETS-Lindgren	3117	00218930	2020/12/27	2021/12/26
Horn Antenna	SCHWARZBECK	BBHA 9170	00887	2019/4/12	2020/4/11
Loop Antenna	EMCI	LPA600	287	2019/12/20	2020/12/19
Test Software	Audix	e3	Ver. 9	N/A	N/A
Test Cable	HUBER+SUHNER	SUCOFLEX 104EA_9k~18G	800056/4EA	2019/4/18	2020/4/17
Test Cable	HUBER+SUHNER	SUCOFLEX 104_9k~18G	804680/4	2019/4/18	2020/4/17
Test Cable	HUBER+SUHNER	SUCOFLEX 104_9k~18G	MY37202/4	2019/4/18	2020/4/17
Test Cable	HUBER+SUHNER	SUCOFLEX 102EA_1G~40G	800898/2EA	2019/4/18	2020/4/17
Test Cable	HUBER+SUHNER	SUCOFLEX 102EA_1G~40G	800901/2EA	2019/4/18	2020/4/17
Test Cable	HUBER+SUHNER	SUCOFLEX 102EA_1G~40G	801027/2EA	2019/4/18	2020/4/17
Spectrum Analyzer	R&S	FSV40	101513	2019/2/8	2020/2/8
Thermo Chamber	Giant Force	GHT-150-40-CP-SD	MAA1902-010	2019/2/1	2020/2/1

2.4 Traceability

All measurement equipment calibrations are traceable to NML(Taiwan)/NIST(USA) or where calibration is performed outside Taiwan, to equivalent nationally recognized standards organizations.

2.5 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basics using in house standards or comparisons.

2.6 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements are ±3dB.

Table 3: Emission Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	± 1 x 10^{-7}
RF power, conducted	± 1.5 dB
Radiated emission of transmitter, valid up to 26 GHz	± 6 dB
Radiated emission of receiver, valid up to 26 GHz	± 6 dB
Temperature	± 2 ºC
Humidity	± 10 %

3. General Product Information

3.1 Product Function and Intended Use

The EUT is a Door Lock , working at 13.56 MHz with RFID function.
For details refer to the User Guide, Data Sheet and Block Diagram.

3.2 Ratings and System Details

Table 4: Basic Information of EUT

Item	EUT information
Kind of Equipment/Test Item	Enkore
Type Identification	KE1-LNP5C
FCC ID	2AQ8A-KE1LNP5C

Table 5: Technical Specification of EUT

Technical Specification	Value
Operating Frequency	13.56 MHz
Operation Voltage	6Vdc (only Battery-powered)
Modulation	ASK
Antenna Type	Loop antenna

3.3 Independent Operation Modes

Basic operation modes are:

A. Transmitting

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.5 Submitted Documents

- Circuit Diagram
- Instruction Manual
- Rating Label
- Technical Description

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

The equipment under test (EUT) was configured to measure its maximum emission level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Setup for testing: The EUT has a serial interface which makes it possible to read data from the RFID reader. The RFID reader is permanently on.

4.3 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

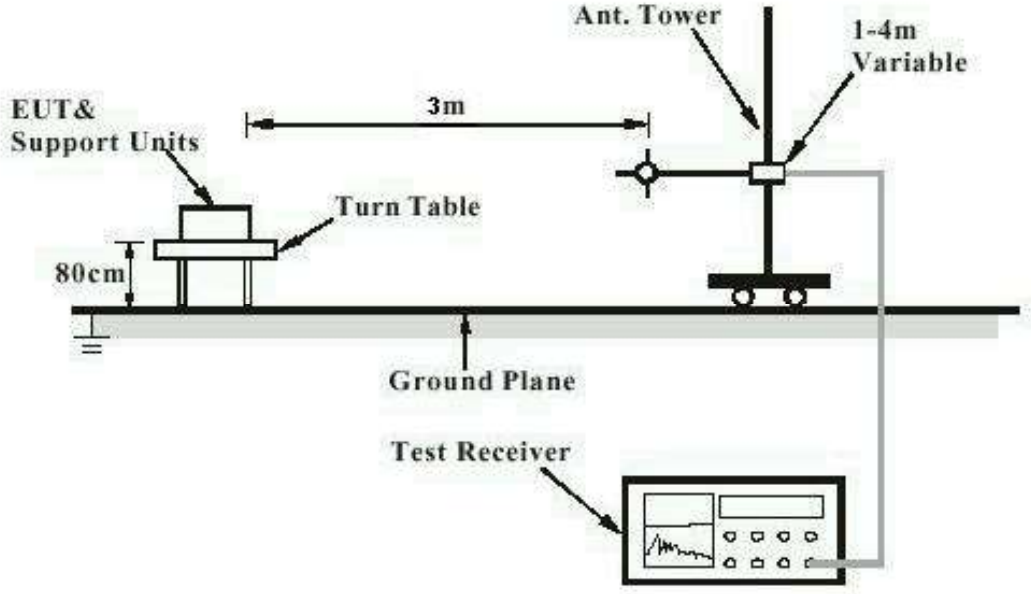
N/A

4.4 Countermeasures to achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT: **Passed**

Standard	:	Part 15.203
Requirement	:	use of approved antennas only

The antenna is Loop antenna with no possibility of replacement with a non-approved antenna by the end-user. Therefore, the EUT is considered to comply with this provision.

Refer to EUT photo for details.

5.1.2 Field strength of fundamental

RESULT: **Passed**

Test standard	:	FCC Part 15.225
Basic standard	:	ANSI C63.10:2013

Test setup

Test Frequency	:	13.56 MHz
Operation Mode	:	A

Ambient temperature	:	23℃
Relative humidity	:	53.1%
Atmospheric pressure	:	100-103 kPa

For details refer to Appendix D.

5.1.3 Frequency Stability

RESULT: **Passed**

Test standard : LP0002(2018) 3.2.1(3)
FCC Part 15. 225(e)
RSS-210 B.6

Basic standard : ANSI C63.10:2013
Kind of test site : Shielded room

Test setup

Test Frequency : 13.56 MHz
Operation Mode : A

Ambient temperature : 22-26 °C
Relative humidity : 50-65 %
Atmospheric pressure : 100-103 kPa

Table 6: Test result of Frequency Stability

Condition		Test Time	Test Time	Test Time	Test Time	Freq Error (ppm)	Freq Error (ppm)	Freq Error (ppm)	Freq Error (ppm)
Extreme	Modulation Mode	0min	2min	5min	10 min	0min	2min	5min	10 min
$T_{20°C}$Vmax	CW	13.56000				0.00			
$T_{20°C}$Vmin	CW	13.56000				0.00			
$T_{50°C}$Vnom	CW	13.55994	13.55991	13.55991	13.55991	-4.28	-6.42	-6.42	-6.42
$T_{40°C}$Vnom	CW	13.55994	13.55994	13.55994	13.55994	-4.28	-4.28	-4.28	-4.28
$T_{30°C}$Vnom	CW	13.55997	13.55994	13.55994	13.55994	-2.14	-4.28	-4.28	-4.28
$T_{20°C}$Vnom	CW	13.56000	13.56000	13.56000	13.56000	0.00	0.00	0.00	0.00
$T_{10°C}$Vnom	CW	13.56003	13.56003	13.56003	13.56003	2.14	2.14	2.14	2.14
$T_{0°C}$Vnom	CW	13.56003	13.56003	13.56003	13.56003	2.14	2.14	2.14	2.14
$T_{-10°C}$Vnom	CW	13.56003	13.56003	13.56003	13.56003	2.14	2.14	2.14	2.14
$T_{-20°C}$Vnom	CW	13.56003	13.56003	13.56003	13.56003	2.14	2.14	2.14	2.14
Limit (ppm)		-				100			

5.1.4 Spurious Emission

RESULT: **Passed**

Test standard	:	FCC part 15.209 FCC part 15.225
Basic standard	:	ANSI C63.10:2013
Limits	:	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.
Kind of test site	:	3m Semi-Anechoic Chamber

Test setup

Operation mode	:	A
Ambient temperature	:	see Appendix D
Relative humidity	:	see Appendix D
Atmospheric pressure	:	see Appendix D

Factor (dB/m)=Antenna Factor(dB/m)+Cable loss (dB)

Level(dBuV/m)=Reading(dBuV)+ Factor(dB/m)

Testing was carried out within frequency range 9kHz to the tenth harmonic. For details refer to Appendix D. The Radiated Emissions testing was performed in the X, Y and Z axis orientation. The worst-case Axis orientation is recorded in this test report.

Emission test data 9kHz-30MHz. Except for the main frequency, all other signals are back ground.

6. Safety Human exposure

6.1 Radio Frequency Exposure Compliance

6.1.1 Electromagnetic Fields

RESULT: **Passed**

Test standard : FCC KDB Publication 447498 D01 Appendix C

The Power calculation formula is as follows:

$$EIRP = p_t \times g_t = (E \times d)^2 / 30$$

p_t is the transmitter output power in watts
g_t is the numeric gain of the transmitting antenna (dimensionless)
E is the electric field strength in V/m
d is the measurement distance in meters (m)

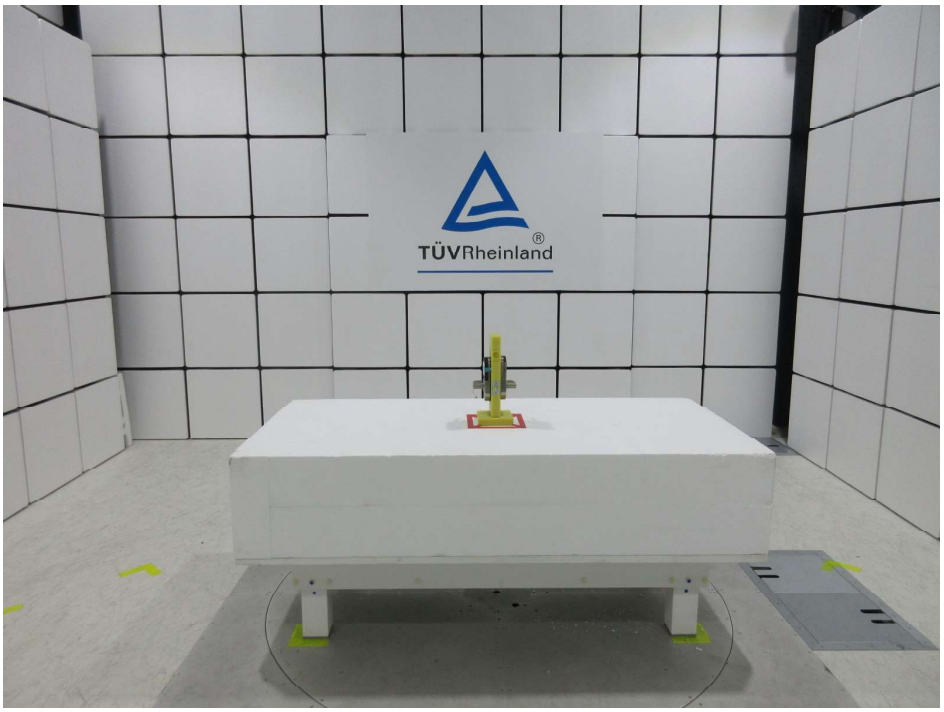
The electric field strength in V/m is 55.37dBuV/m@3m = 0.000587V/m@3m
The d is 3m

$(0.000587*3)^2/30$ = 1.034E-07W=1.034E-04mW

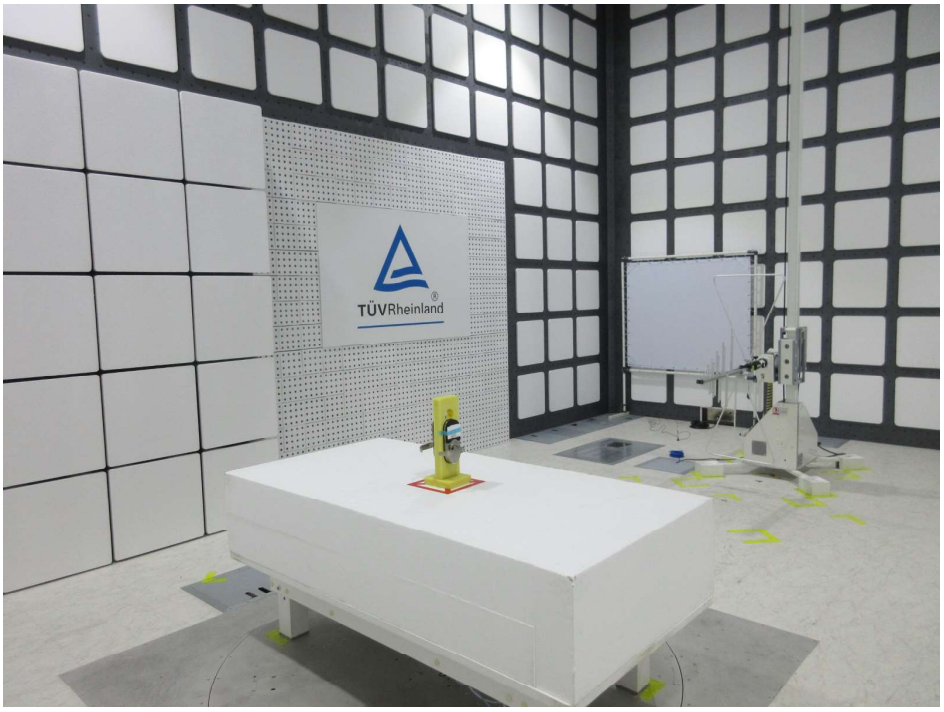
FCC:
Since the transmitter's maximum peak output power is 1.034E-04mW is much less than the limit, the EUT is excluded from the SAR assessment according to FCC KDB publication 447498: Mobile Portable RF Exposure.

7. Photographs of the Test Set-Up

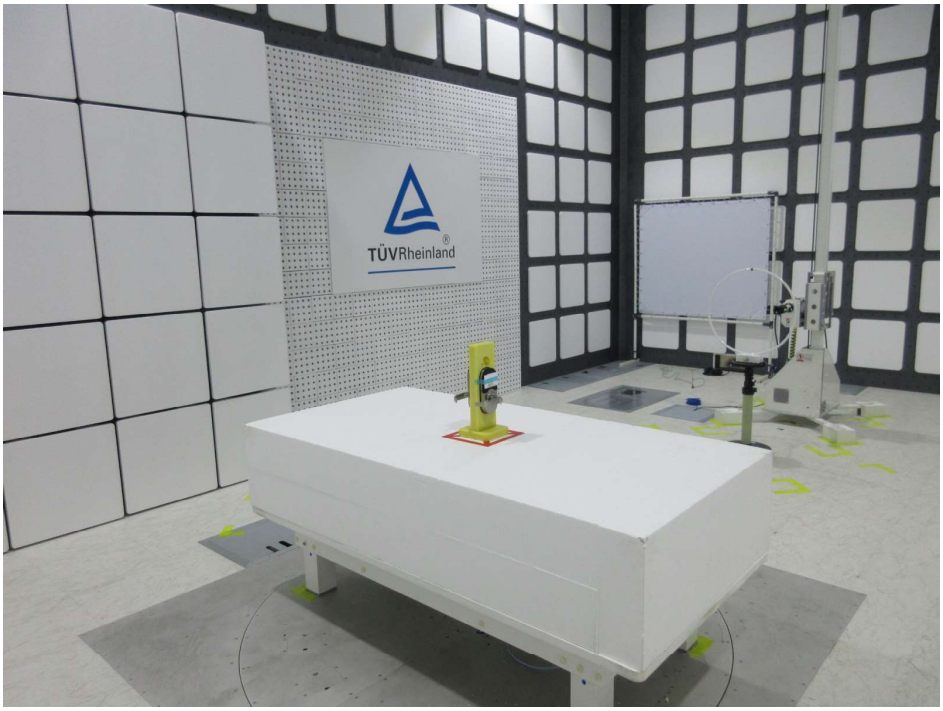
Photograph 1: Set-up for Spurious Emissions (Front View)



Photograph 2: Set-up for Spurious Emissions (Back View 1)



Photograph 3: Set-up for Spurious Emissions (Back View 2)



8. List of Tables

9. List of Photographs