

Produkte
Products

Prüfbericht - Nr.: **14046520 001**
Test Report No.:

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Auftraggeber: **Megabyte Limited**
Client:
Unit 507, Building 12W, No. 12 Science Park West Avenue
Hong Kong Science Park, Shatin, N.T., Hong Kong

Gegenstand der Prüfung: **UHF RFID fixed reader**
Test Item:

Bezeichnung: **L2-U, L1-U** **Serien-Nr.:** **Engineering sample**
Identification: **Serial No.:**

Wareneingangs-Nr.: **A000399714-001** **Eingangsdatum:** **26.07.2016**
Receipt No.: **Date of Receipt:**

Prüfort: **TÜV Rheinland Hong Kong Ltd.**
Testing Location: 8/F, First Group Centre, 14 Wang Tai Road, Kowloon Bay, Kowloon, Hong Kong
Hong Kong Productivity Council
HKPC Building, 78 Tat Chee Avenue, Kowloon, Hong Kong

Zustand des Prüfgegenstandes bei Anlieferung: **Test samples are not damaged and suitable for testing.**
Condition of test item at delivery:

Prüfgrundlage: **FCC Part 15 Subpart B**
Test Specification: **ANSI C63.4-2014**

Prüfergebnis: **Das vorstehend beschriebene Gerät wurde geprüft und entspricht oben genannter Prüfgrundlage.**
Test Results: The above mentioned product was tested and **passed**.

Prüflaboratorium: **TÜV Rheinland Hong Kong Ltd.**
Testing Laboratory: 8 - 10/F., Goldin Financial Global Square, 7 Wang Tai Road, Kowloon Bay, Kowloon, Hong Kong

geprüft/ tested by: **kontrolliert/ reviewed by:**

07.12.2016	David Cheng Test Engineer		07.12.2016	Benny Lau Senior Project Manager	
Datum Date	Name/Stellung Name/Position	Unterschrift Signature	Datum Date	Name/Stellung Name/Position	Unterschrift Signature

Sonstiges: **FCC ID: XEK-MLOG**
Other Aspects

Abkürzungen: **P(pass)** = entspricht Prüfgrundlage
F(fail) = entspricht nicht Prüfgrundlage
N/A = nicht anwendbar
N/T = nicht getestet

Abbreviations: **P(pass)** = **passed**
F(fail) = **failed**
N/A = **not applicable**
N/T = **not tested**

Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.
This test report relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.

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Product information

Manufacturers declarations

	Transmitter
Operating frequency range	902.75 - 927.25 MHz
Type of modulation	DSB-ASK
Number of channels	50
Channel separation	500 kHz
Type of antenna	Integral Plate Antenna
Antenna gain (dBi)	0.0 dBi
Power level	fix
Type of equipment	stand alone radio device
Connection to public utility power line	Yes
Nominal voltage	100-240VAC
Independent Operation Modes	Transmitting, Receiving

Product function and intended use

The equipment under test (EUT) is an UHF RFID reader operating in 902 -928MHz. It is a logistics tray used in jewellery shop to read the ID tag of every shock item and send the information to the application software in the PC. It is powered by AC-DC adaptor.

The manufacturer declared that the model: L2-U are identical to the model L1-U except the plastic housing.

FCC ID: XEK-MLOG

Models	Product description
L2-U, L1-U	UHF RFID fixed reader

Submitted documents

Circuit Diagram
 Block Diagram
 Technical Description
 User manual
 Label

Independent Operation Modes

The basic operation modes are:

- PC linked mode

For further information refer to User Manual

Related Submittal(s) Grants

This device is a composite device.

This is a single application for certification of the PC peripherals.

The UHF RFID transceiver is authorized under the certification procedure and verification procedure (refer to test report 14046519 001 issued by TÜV Rheinland HK Ltd on 07.12.2016).

Remark

The test results in this test report are only relevant to the tested sample and does not involve any assessment in the production.

Test Set-up and Operation Mode

Principle of Configuration Selection

Emission: The equipment under test (EUT) was configured to measure its highest possible radiation level. The test modes were adapted accordingly in reference to the instructions for use.

Test Operation and Test Software

Test operation should refer to test methodology.

- During test, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the maximum output power level. The maximum RF output power and the operating frequencies was selected according to the instruction given by the manufacturer. The setting of the maximum RF output power and the operating frequency range expected by the customer shall be fixed on the firmware of the final end product.

Special Accessories and Auxiliary Equipment

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

- AC-DC adaptor Model: EA1024BR-065 Input: 100-240 VAC 50/60 Hz; Output: 6.5VDC 3A)
(Provided by the applicant)
- 3 meter long USB cable incorporating a ferrite core (Provided by the applicant)

Countermeasures to achieve EMC Compliance

- Nil

Test Methodology

Radiated Emission

The radiated emission measurements were performed according to the procedures in ANSI C63.4-2014.

For measurement below 1GHz - the equipment under test (EUT) was placed at the middle of the 80 cm height turntable. For measurement above 1GHz - the EUT was placed at the middle of the 1.5 m height turntable and RF absorbing material was placed on ground plane between turntable and measuring antenna.

The investigation is performed with the EUT rotated 360 °, the antenna height scanned between 1m and 4m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations. Repeat the measurement steps until the maximum emissions were obtained.

All radiated tests were performed at an antenna to EUT with 3 meters distance, unless stated otherwise in particular parts of this test report.

Field Strength Calculation

The field strength at 3 m was established by adding the meter reading of the spectrum analyzer to the factors associated with antenna correction factor, cable loss, preamplifiers and filter attenuation.

The equation is expressed as follow:

$$FS = R + AF + CF + FA - PA$$

Where FS = Field Strength in dBuV/m at 3 meters.

R = Reading of Spectrum Analyzer in dBuV.

AF = Antenna Factor in dB.

CF = Cable Attenuation Factor in dB.

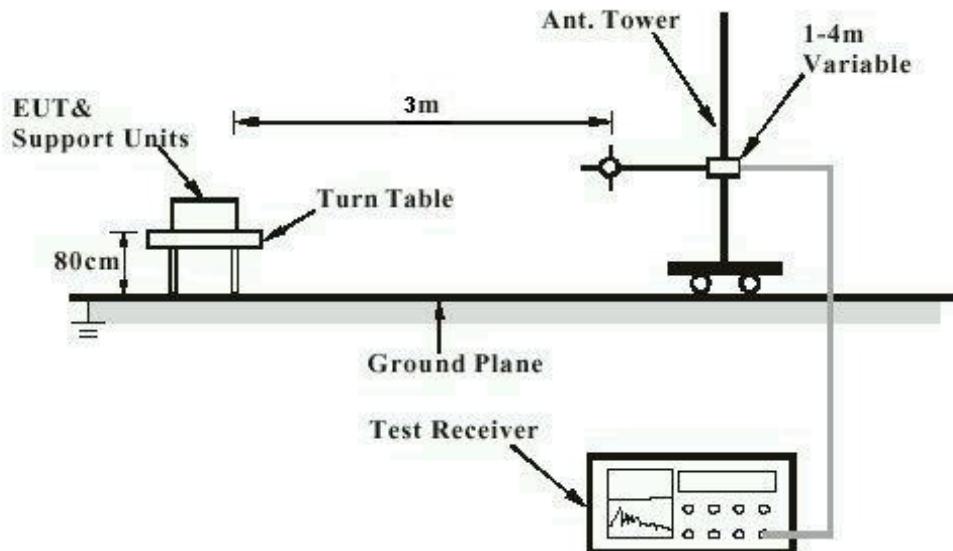
FA = Filter Attenuation Factor in dB.

PA = Preamplifier Factor in dB.

FA and PA are only be used for the measuring frequency above 1 GHz.

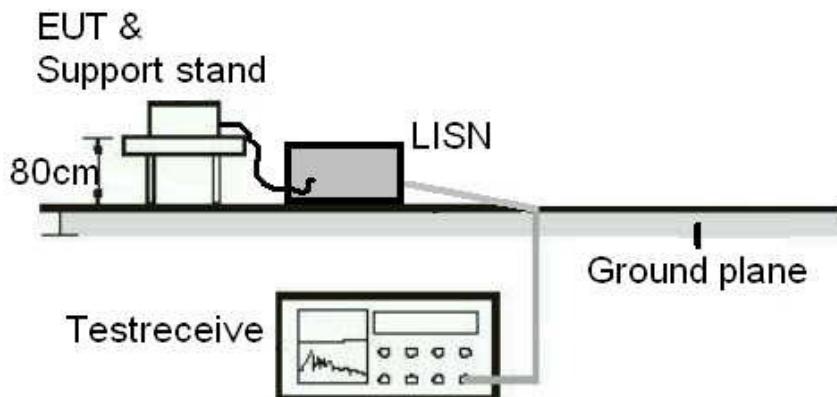
Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 1 GHz are done with a table height of 1.5m. In addition, there is RF absorbing material on the floor of the test site for above 1GHz measurement.

Diagram of Measurement Equipment Configuration for Mains Conduction Measurement (if applicable)



List of Test and Measurement Instruments

Hong Kong Productivity Council (FCC Registration number: 90656)

Radiated Emission

Equipment	Manufacturer	Type	Cal. Date	Due Date
Semi-anechoic Chamber	Frankonia	Nil	25-Apr-16	25-Apr-17
New Fully Ancheonic Chamber	TDK	N/A	19-Apr-16	19-Apr-17
Cable	Hubersuhner	SUCOFLEX 104	31-Mar-16	31-Mar-18
Test Receiver	R & S	ESU26	7-Dec-15	7-Dec-16
Bi-conical Antenna	R & S	HK116	1-Sep-15	1-Sep-17
Log Periodic Antenna	R & S	HL223	1-Sep-15	1-Sep-17
Coaxial cable	Harbour	LL335	10-Jun-16	10-Jun-18
Microwave amplifier 0.5-26.5GHz, 25dB gain	HP	83017A	18-Jul-16	18-Jul-18
High Pass Filter (cutoff freq. =1000MHz)	Trilithic	23042	28-Oct-15	28-Oct-17
Horn Antenna	EMCO	3115	26-Aug-15	26-Aug-17
Active Loop Antenna	EMCO	6502	27-Oct-16	27-Oct-17

AC Mains Conducted Emission

Equipment	Manufacturer	Type	Cal. Date	Due Date
Test Receiver	R & S	ESU40	7-Dec-15	7-Dec-16
RF Voltage Probe	Schwarzbeck	TK9416	11-Feb-16	11-Feb-17
LISN	R&S	ESH3-Z5	15-Jun-16	15-Jun-17
Double Shield Cable	Radiall	RG142	14-Sep-15	14-Sep-17
Pulse Limiter	R&S	ESH3-Z2	3-Jun-16	3-Jun-18

Measurement Uncertainty

The estimated combined standard uncertainty for power-line conducted emissions measurements is $\pm 3.43\text{dB}$.

The estimated combined standard uncertainty for radiated emissions measurements is $\pm 5.10\text{dB}$ (30MHz to 200MHz) and $\pm 5.08\text{dB}$ (200MHz to 1000MHz) and is $\pm 5.10\text{dB}$ (30MHz to 200MHz) and $\pm 5.08\text{dB}$ (above 1GHz).

The estimated combined standard uncertainty for antenna conducted emission is $\pm 1.56\text{dB}$

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of $k=2$, which for the level of confidence is approximately 95%.

Results FCC Part 15 – Subpart B

FCC 15.107 – Conducted Emission on AC Mains						Pass
Test Specification : ANSI C63.4 – 2014						
Mode of operation : PC linked mode						
Port of testing : AC Mains input port of power supply						
Supply voltage : 120Vac 60Hz						
Temperature : 23°C						
Humidity : 50%						
Requirement: 15.107(a)						
Results: Pass						
Live measurement						
Frequency range (MHz)	Frequency (MHz)	Quasi-peak dB μ V	Average dB μ V	Limit QP (dB μ V)	Limit AV (dB μ V)	Verdict
0,15 – 0,5	0.150	56.4	38.2	66 - 56	56 - 46	Pass
> 0,5 - 5	No peak found	---	---	56	46	Pass
> 5 - 30	No peak found	---	---	60	50	Pass
Neutral measurement						
Frequency range (MHz)	Frequency (MHz)	Quasi-peak dB μ V	Average dB μ V	Limit QP (dB μ V)	Limit AV (dB μ V)	Verdict
0,15 – 0,5	0.154	55.5	37.3	66 - 56	56 - 46	Pass
> 0,5 - 5	No peak found	---	---	56	46	Pass
> 5 - 30	No peak found	---	---	60	50	Pass

FCC 15.109 – Radiated Emission		Pass
Test Specification	:	ANSI C63.4 – 2014
Mode of operation	:	PC linked mode
Port of testing	:	Enclosure
Supply voltage	:	120VAC
Frequency range	:	30MHz to 1GHz
Temperature	:	23°C
Humidity	:	50%
FCC Requirement: 15.109(a)		
Results:	Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and data rate.	
Vertical Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
54.212	21.7	40.0 / QP
192.210	29.9	43.5 / QP
480.000	24.1	46.0 / QP
No peak found	---	54.0 / PK
Horizontal Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
54.212	21.3	40.0 / QP
480.000	24.6	43.5 / QP
832.850	29.8	46.0 / QP
No peak found	---	54.0 / PK