

Produkte
 Products

Prüfbericht - Nr.: 14043219 001

Test Report No.:

Seite 1 von 11

Page 1 of 11

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 Portable RFID Reader
Test Item:

Bezeichnung: mDongle-D1-BU
Identification: D1B-01-39, D1B-01-MB **Serien-Nr.:** Serial No.: **Engineering sample**

Wareneingangs-Nr.: A000386196-008 **Eingangsdatum:** 30.06.2016
Receipt No.: **Date of Receipt:**

Prüfort: Hong Kong Productivity Council
Testing Location: 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:

30.11.2016	David Cheng Test Engineer		30.11.2016	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-MDONGLED1
 Other Aspects

Abkürzungen: P(ass) = entspricht Prüfgrundlage
 F(all) = entspricht nicht Prüfgrundlage
 N/A = nicht anwendbar
 N/T = nicht getestet

Abbreviations: P(ass) = passed
 F(all) = 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.

Table of Content

	Page
Cover Page	1
Table of Content	2
Product information.....	3
Manufacturers declarations	3
Product function and intended use.....	3
Submitted documents.....	3
Independent Operation Modes	3
Related Submittal(s) Grants.....	4
Remark	4
Test Set-up and Operation Mode.....	5
Principle of Configuration Selection	5
Test Operation and Test Software.....	5
Special Accessories and Auxiliary Equipment.....	5
Countermeasures to achieve EMC Compliance.....	5
Test Methodology	6
Radiated Emission	6
Field Strength Calculation.....	6
Test Setup Diagram	7
Measurement Uncertainty	9
Results FCC Part 15 – Subpart B	10
FCC 15.107 – Conducted Emission on AC Mains	Pass.....
10	
FCC 15.109 – Radiated Emission.....	Pass.....
11	
Appendix 1 – Test protocols	2 pages
Appendix 2 – Test setup	2 pages
Appendix 3 – EUT External Photos	3 pages
Appendix 4 – EUT Internal Photos	6 pages

Product information

Manufacturers declarations

	Transmitter
Type of equipment	PC peripherals
Equipment Class	Class B
Connection to public utility power line	Yes
Nominal voltage	100-240VAC
Independent Operation Modes	USB Link operation

Product function and intended use

The equipment under test (EUT) is a portable RFID reader. It is a compact NFC and RFID reader and OS independent. It can be connected to PC through USB cable and it has Bluetooth connectivity to any mobile devices.

The manufacturer declared that the model: D1B-01-39 and D1B-01-MB are identical to the model mDongle-D1-BU except the logo plate.

FCC ID: XEK-MDONGLED1

Models	Product description
mDongle-D1-BU D1B-01-39, D1B-01-MB	UHF Portable RFID Reader

Submitted documents

Circuit Diagram
 Block Diagram
 Technical Description
 Bill of material
 User manual
 Label

Independent Operation Modes

The basic operation modes are:

- USB link operating 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 Class B PC peripherals.
- The Bluetooth portion is authorized under the certification procedure (refer to test report 14045652 001 and 14045653 001 issued by TÜV Rheinland HK Ltd on 30.11.2016).
- The NFC portion is authorized under the certification procedure (refer to test report 14045655 001 issued by TÜV Rheinland HK Ltd on 30.11.2016).
- The RFID function is authorized under the certification procedure (refer to test report 14045654 001 issued by TÜV Rheinland HK Ltd on 30.11.2016).
- The receiving function of the RFID transceiver is authorized under verification procedure (refer to test report 14045654 001 issued by TÜV Rheinland HK Ltd on 30.11.2016)

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.

- An application PC program provide by the applicant was used to exercise the USB link of the device.

Special Accessories and Auxiliary Equipment

- AC-DC adaptor Model: EA1024AR-050 Input: 100-240 VAC 50/60 Hz; Output: 5.0VDC 2A)
(Provided by the applicant)
- HP Notebook (Provided by TUV)

Countermeasures to achieve EMC Compliance

- none

Test Methodology

Radiated Emission

The radiated emission measurements of the transmitter part were performed according to the procedures in ANSI C63.10-2013. The radiated emission measurements of the digital part 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. During the testing, the EUT was operated standalone and arranged for maximum emissions. The EUT was tested in three orthogonal planes.

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:

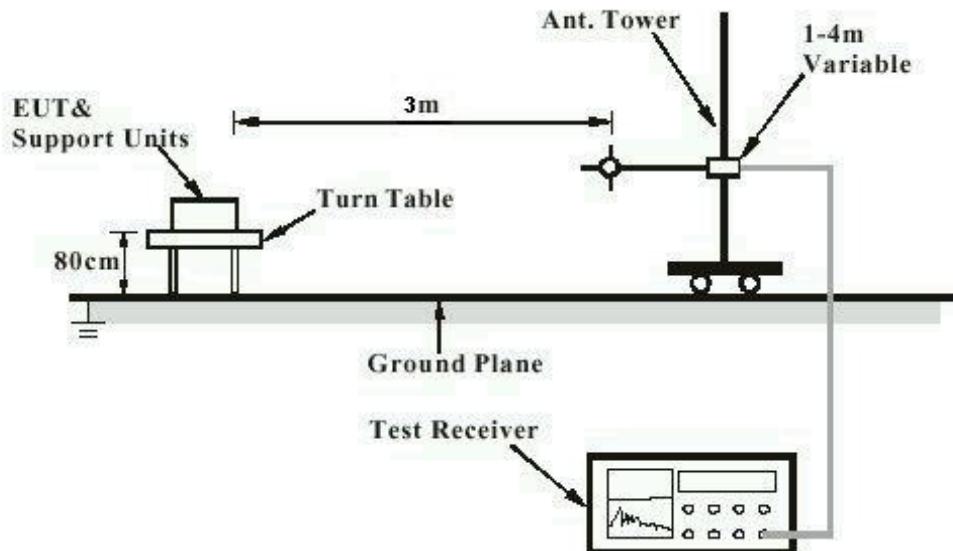
$$FS = R + AF + CF + FA - PA$$

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.

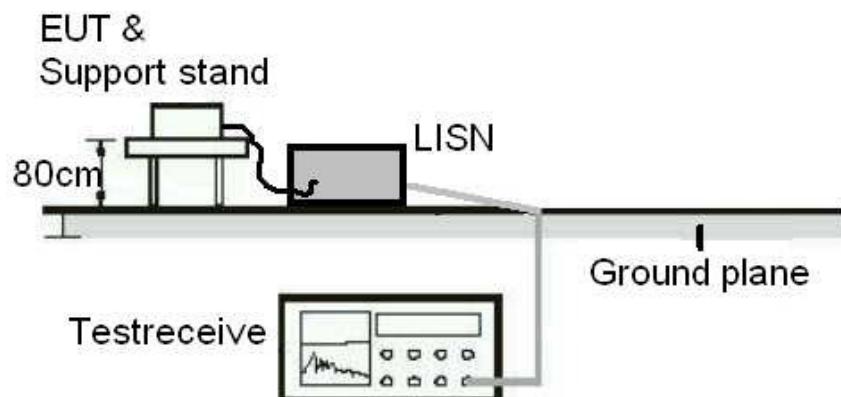
Test Setup Diagram

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 (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 Anechoic 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 : Normal PC linked Operating mode						
Port of testing : AC Mains input port of PC						
Detector : Quasi-peak and Average						
RBW : 9 kHz						
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	0.198	49.2	34.3	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	0.190	49.7	36.9	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	:	Normal PC linked Operating mode
Port of testing	:	Enclosure
Detector	:	QP
RBW/VBW	:	120 kHz for f < 1 GHz 1 MHz / 3 MHz for f > 1 GHz
Supply voltage	:	120VAC
Temperature	:	23°C
Humidity	:	50%
FCC Requirement: 15.109(a)		
Results:	Pass	
Vertical Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
69.838	34.6	40.0 / QP
192.497	33.2	43.5 / QP
227.619	33.9	46.0 / QP
456.830	32.1	46.0 / QP
Horizontal Polarization		
Freq MHz	Level dBuV/m	Limit/ Detector dBuV/m
69.840	36.2	40.0 / QP
195.607	35.9	43.5 / QP
325.190	31.3	46.0 / QP
455.960	34.2	46.0 / QP