



PARTIAL FCC TEST REPORT (PART 27)

REPORT NO.: RF140820C14-1

MODEL NO.: TOBY-L200

FCC ID: XPYTOBYL200

RECEIVED: Aug. 20, 2014

TESTED: Aug. 26, 2014

ISSUED: Sep. 15, 2014

APPLICANT: u-blox GMBH

ADDRESS: Zürcherstrasse 68, CH-8800 Thalwil, Switzerland

ISSUED BY: Bureau Veritas Consumer Products Services
(H.K.) Ltd., Taoyuan Branch

LAB ADDRESS: No. 47, 14th Ling, Chia Pau Vil., Lin Kou Dist.,
New Taipei City, Taiwan, R.O.C.

TEST LOCATION: No. 19, Hwa Ya 2nd Rd, Wen Hwa Tsuen, Kwei
Shan Hsiang, Taoyuan Hsien 333, Taiwan, R.O.C.

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RELEASE CONTROL RECORD

| ISSUE NO. | REASON FOR CHANGE | DATE ISSUED |
|---------------|-------------------|---------------|
| RF140820C14-1 | Original release | Sep. 15, 2014 |



1 CERTIFICATION

PRODUCT: GSM/UMTS/HSPA/LTE Data Module
MODEL NO.: TOBY-L200
BRAND: ublox
APPLICANT: u-blox GMBH
TESTED: Aug. 26, 2014
TEST SAMPLE: Production Unit
TEST STANDARDS: **FCC Part 27, Subpart C, M**
FCC Part 2
ANSI C63.4-2003

The above equipment (model: TOBY-L200) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

PREPARED BY : Ivonne Wu , **DATE:** Sep. 15, 2014
Ivonne Wu / Supervisor

APPROVED BY : Sam Chen , **DATE:** Sep. 15, 2014
Sam Chen / Senior Project Engineer

2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

| STANDARD SECTION | TEST TYPE AND LIMIT | RESULT | REMARK |
|--------------------|-----------------------------|--------|---|
| 2.1053 27.53(l) | Radiated Spurious Emissions | PASS | Meet the requirement of limit. Minimum passing margin is -18.21dB at 5070.00MHz. |

2.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

| MEASUREMENT | FREQUENCY | UNCERTAINTY |
|--------------------|-----------------|-------------|
| Radiated emissions | 30MHz ~ 200MHz | 2.93 dB |
| | 200MHz ~1000MHz | 2.95 dB |
| | 1GHz ~ 18GHz | 2.26 dB |
| | 18GHz ~ 40GHz | 1.94 dB |

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

2.2 TEST SITE AND INSTRUMENTS

| DESCRIPTION & MANUFACTURER | MODEL NO. | SERIAL NO. | DATE OF CALIBRATION | DUE DATE OF CALIBRATION |
|--|--|---------------------|---------------------|-------------------------|
| Test Receiver ROHDE & SCHWARZ | ESCI | 100744 | Apr. 15, 2014 | Apr. 14, 2015 |
| Spectrum Analyzer ROHDE & SCHWARZ | FSU43 | 101261 | Dec. 21, 2013 | Dec. 20, 2014 |
| BILOG Antenna SCHWARZBECK | VULB9168 | 9168-472 | Feb. 27, 2014 | Feb. 26, 2015 |
| HORN Antenna SCHWARZBECK | BBHA 9120 D | 9120D-969 | Feb. 19, 2014 | Feb. 18, 2015 |
| HORN Antenna SCHWARZBECK | BBHA 9170 | 9170-480 | Dec. 18, 2013 | Dec. 17, 2014 |
| Preamplifier EMCI | EMC 012645 | 980115 | Dec. 26, 2013 | Dec. 25, 2014 |
| Preamplifier EMCI | EMC 184045 | 980116 | Jan. 13, 2014 | Jan. 12, 2015 |
| Preamplifier EMCI | EMC 330H | 980112 | Dec. 27, 2013 | Dec. 26, 2014 |
| RF signal cable HUBER+SUHNNER | SUCOFLEX 104 | 309219/4 2950114 | Oct. 18, 2013 | Oct. 17, 2014 |
| RF signal cable HUBER+SUHNNER | SUCOFLEX 104 | 250130/4 | Oct. 18, 2013 | Oct. 17, 2014 |
| RF signal cable Worken | RG-213 | NA | Nov. 07, 2013 | Nov. 06, 2014 |
| Software BV ADT | E3 6.120103 | NA | NA | NA |
| Antenna Tower MF | MFA-440H | NA | NA | NA |
| Turn Table MF | MFT-201SS | NA | NA | NA |
| Antenna Tower & Turn Table Controller MF | MF-7802 | NA | NA | NA |
| Power Splitter Woken | 2-18GHz 2Way SMA Fwd.:30W/Rev.:2W Isolated Power | COM412W5E3 | Apr. 17, 2014 | Apr. 16, 2015 |
| JFW 20dB attenuation | 50HF-020-SMA | NA | NA | NA |
| Communications Tester-Wireless | E5515C | MY52102544 | Sep. 05, 2012 | Sep. 04, 2014 |
| Radio Communication Analyzer | MT8820C | 6201300640 | Aug. 01, 2013 | Jul. 31, 2015 |

- NOTE:** 1. The calibration interval of the above test instruments is 12 / 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 10.
3. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 690701.
5. The IC Site Registration No. is IC 7450F-10.

3 GENERAL INFORMATION

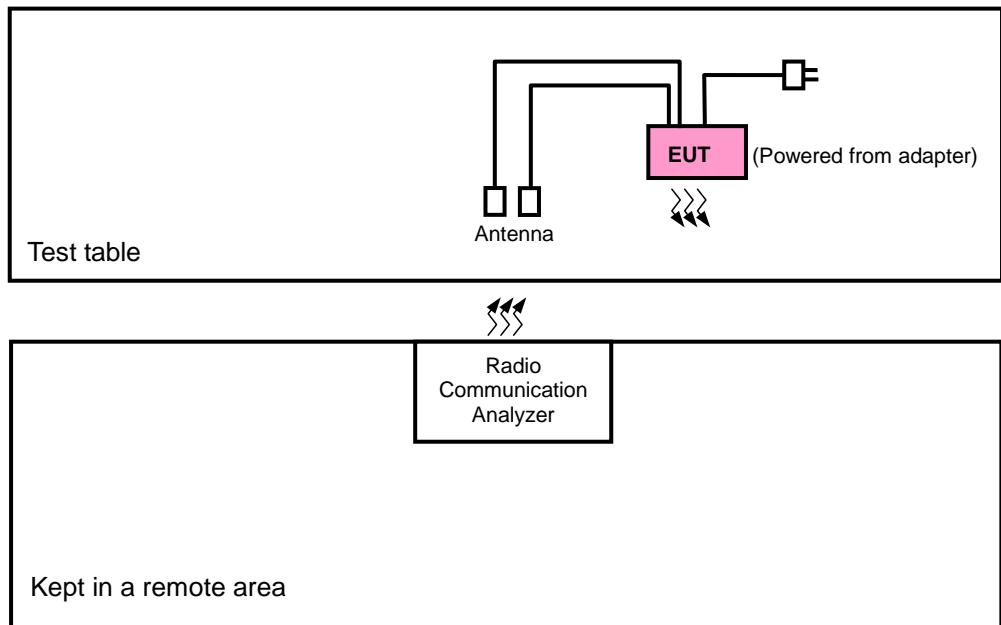
3.1 GENERAL DESCRIPTION OF EUT

| | |
|------------------------------|-------------------------------|
| PRODUCT | GSM/UMTS/HSPA/LTE Data Module |
| MODEL NO. | TOBY-L200 |
| POWER SUPPLY | 12Vdc (adapter) |
| MODULATION TECHNOLOGY | QPSK, 16QAM |
| FREQUENCY RANGE | 2510MHz ~ 2560MHz |
| ANTENNA TYPE | PCB Antenna |
| DATA CABLE | Refer to Note as below |
| I/O PORTS | Refer to users' manual |
| ACCESSORY DEVICES | Refer to Note as below |

NOTE:

1. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 CONFIGURATION OF SYSTEM UNDER TEST



3.3 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| NO. | PRODUCT | BRAND | MODEL NO. | SERIAL NO. | FCC ID |
|-----|------------------------------|---------|-------------|------------|--------|
| 1 | Antenna | N/A | N/A | N/A | N/A |
| 2 | Adapter | UNIFIVE | UUX324-1215 | N/A | N/A |
| 3 | Radio Communication Analyzer | Anritsu | MT8820C | 6201240431 | N/A |

| NO. | SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS |
|-----|---|
| 1 | N/A |
| 2 | 1.55m cable |

NOTE:

1. All power cords of the above support units are non shielded (1.8m).
2. Items 1&2 were provided by client.

3.4 DESCRIPTION OF TEST MODES

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports. Following channel(s) was (were) selected for the final test as listed below:

LTE BAND 7

| EUT CONFIGURE MODE | TEST ITEM | AVAILABLE CHANNEL | TESTED CHANNEL | CHANNEL BANDWIDTH | MODULATION | MODE |
|--------------------|-------------------|-------------------|----------------|-------------------|------------|--------------------|
| - | RADIATED EMISSION | 20850 to 21350 | 21100 | 20MHz | QPSK | 1 RB / 0 RB Offset |

Note: This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

TEST CONDITION:

| TEST ITEM | ENVIRONMENTAL CONDITIONS | INPUT POWER | TESTED BY |
|-------------------|--------------------------|--------------|-----------|
| RADIATED EMISSION | 25deg. C, 65%RH | 120Vac, 60Hz | Will Chen |

3.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC 47 CFR Part 2

FCC 47 CFR Part 27

ANSI C63.4-2003

ANSI/TIA/EIA-603-C 2004

NOTE: All test items have been performed and recorded as per the above standards.

4 TEST TYPES AND RESULTS

4.1 RADIATED EMISSION MEASUREMENT

4.1.1 LIMITS OF RADIATED EMISSION MEASUREMENT

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $55 + 10 \log_{10}(P)$ dB. The limit of emission is equal to -25dBm.

4.1.2 TEST PROCEDURES

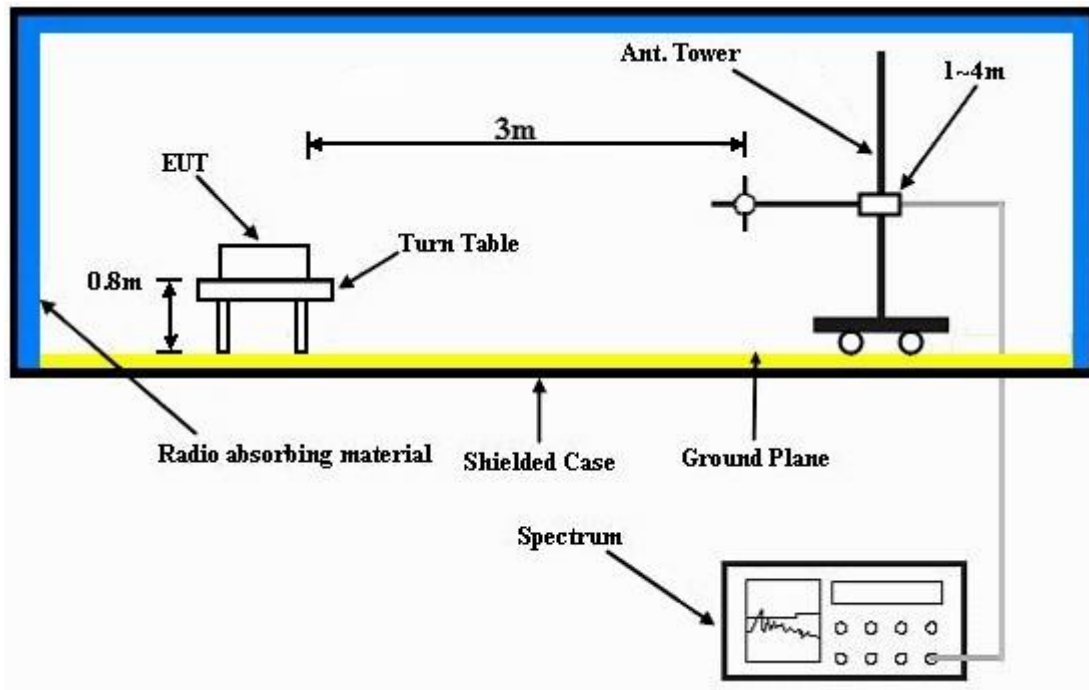
- a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- b. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value " of step a. Record the power level of S.G.
- c. $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$.
- d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, $E.R.P \text{ power} = E.I.P.R \text{ power} - 2.15\text{dBi}$.

NOTE: The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.

4.1.3 DEVIATION FROM TEST STANDARD

No deviation

4.1.4 TEST SETUP



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.5 TEST RESULTS

LTE BAND 7

CHANNEL BANDWIDTH: 20MHz / QPSK

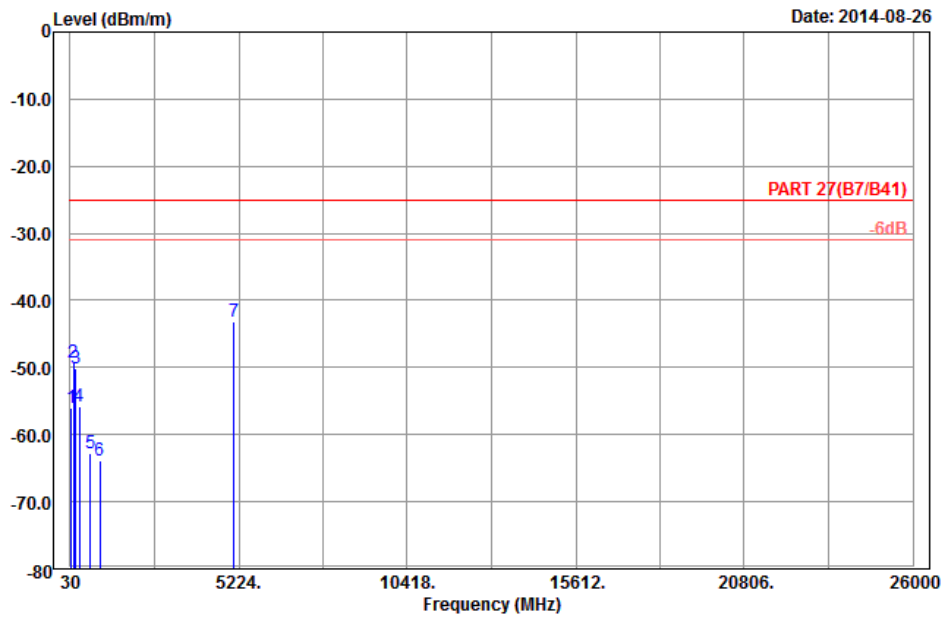


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

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Data: 13

Date: 2014-08-26



Site : 966 chamber 5
 Condition: PART 27(B7/B41) 3m Horizontal
 Remark : LTE_Band 7_QPSK(1,0)_20M_CH21100
 Tested by: Will Chen

| | Read | Limit | Over | | | | |
|------|---------|--------|--------|--------|--------|--------|------|
| Freq | Level | Level | Line | Limit | Factor | Remark | |
| MHz | dBm/m | dBm | dBm/m | dB | dB/m | | |
| 1 | 58.62 | -56.00 | -41.94 | -25.00 | -31.00 | -14.06 | Peak |
| 2 | 133.68 | -49.23 | -41.57 | -25.00 | -24.23 | -7.66 | Peak |
| 3 | 195.51 | -50.18 | -44.18 | -25.00 | -25.18 | -6.00 | Peak |
| 4 | 318.90 | -55.71 | -49.97 | -25.00 | -30.71 | -5.74 | Peak |
| 5 | 657.70 | -62.78 | -62.61 | -25.00 | -37.78 | -0.17 | Peak |
| 6 | 952.40 | -63.80 | -68.92 | -25.00 | -38.80 | 5.12 | Peak |
| 7 pp | 5070.00 | -43.21 | -62.60 | -25.00 | -18.21 | 19.39 | Peak |



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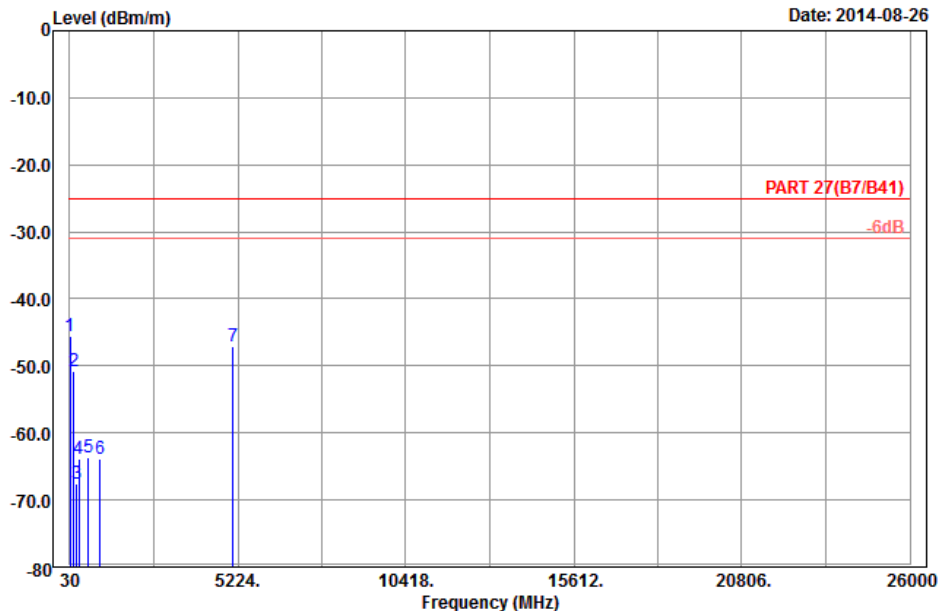


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Data: 14

Date: 2014-08-26



Site : 966 chamber 5
 Condition: PART 27(B7/B41) 3m Vertical
 Remark : LTE_Band 7_QPSK(1,0)_20M_CH21100
 Tested by: Will Chen

| | Freq | Level | Read Level | Limit | Over | Factor | Remark |
|---|------|---------|------------|--------|--------|--------|-------------|
| | MHz | dBm/m | dBm | dBm/m | dB | dB/m | |
| 1 | pp | 47.55 | -45.64 | -32.53 | -25.00 | -20.64 | -13.11 Peak |
| 2 | | 147.18 | -50.81 | -42.93 | -25.00 | -25.81 | -7.88 Peak |
| 3 | | 241.95 | -67.55 | -61.94 | -25.00 | -42.55 | -5.61 Peak |
| 4 | | 318.90 | -63.95 | -58.21 | -25.00 | -38.95 | -5.74 Peak |
| 5 | | 594.70 | -63.63 | -63.82 | -25.00 | -38.63 | 0.19 Peak |
| 6 | | 973.40 | -63.77 | -68.95 | -25.00 | -38.77 | 5.18 Peak |
| 7 | | 5070.00 | -47.08 | -66.47 | -25.00 | -22.08 | 19.39 Peak |



5 INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab:

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab:

Tel: 886-3-5935343

Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety Lab:

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.adt.com.tw

The address and road map of all our labs can be found in our web site also.



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6 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No modifications were made to the EUT by the lab during the test.

---END---