



中国认可
国际互认
检测
TESTING
CNAS L2264

MPE TEST REPORT

Applicant UAB TELTONIKA
FCC ID 2AJLOTM2500TLT
Product GSM/GPRS/GNSS/BLEETOOTH module
Model TM2500
Report No. RXA1606-0123MPE01R1
Issue Date September 19, 2016

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC 47 CFR Part 1 1.1310**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

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1 Test Laboratory

1.1 Notes of the Test Report

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1.2 Test facility

CNAS (accreditation number:L2264)

TA Technology (Shanghai) Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS).

FCC (recognition number is 428261)

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

IC (recognition number is 8510A)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Canada to perform electromagnetic emission measurement.

VCCI (recognition number is C-4595, T-2154, R-4113, G-766)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Japan to perform electromagnetic emission measurement.

A2LA (Certificate Number: 3857.01)

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.



1.3 Testing Location

Company: TA Technology (Shanghai) Co., Ltd.
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1.4 Laboratory Environment

Temperature	Min. = 18°C, Max. = 25 °C
Relative humidity	Min. = 30%, Max. = 70%
Ground system resistance	< 0.5 Ω
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

2 Description of Equipment under Test

Client Information

Applicant	UAB TELTONIKA
Applicant address	Saltoniskiu st. 10c, Vilnius, Lithuania
Manufacturer	UAB TELTONIKA
Manufacturer address	Saltoniskiu st. 10c, Vilnius, Lithuania

General Technologies

Model	TM2500
Product IMEI:	357454070000011
Hardware Version	TM2500_01
Software Version	TM25_D_00.00.01.00
Date of Testing:	July 28, 2016 ~ August 26, 2016

3 Maximum conducted output power (measured) and antenna Gain

Band	The maximum tune up Power (dBm)	Antenna Gain (dBi)
GSM 850	34	2
GSM 1900	31	2
Bluetooth	-3	1.69

Band	Burst Average maximum tune up Power (dBm)	Division Factors (dB)	source-based time-averaged maximum power (dBm)
GSM 850	34	-9.03	24.97
GSM 1900	31	-9.03	21.97

According to section 1.1310 of FCC 47 CFR Part 1, limits for maximum permissible exposure (MPE) are as following

TABLE 1 – LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3-30	1842/f	4.89/f	*(900/f ²)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

Note1. Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational / controlled limits apply provided he or she is made aware of the potential for exposure.

Note2: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.



The maximum permissible exposure for 1500~100,000MHz is 1.0. So

Band	The maximum permissible exposure
GSM 850	0.56mW/cm ²
GSM 1900	1.00mW/cm ²
Bluetooth	1.00mW/cm ²

IMPORTANT NOTE: To comply with the FCC RF exposure compliance requirements, the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. No change to the antenna or the device is permitted. Any change to the antenna or the device could result in the device exceeding the RF exposure requirements and void user's authority to operate the device.

RF Exposure Calculations:

The following information provides the minimum separation distance for the highest gain antenna provided. This calculation is based on the conducted power, considering maximum power and antenna gain. The formula shown in KDB 865664 D01 is used in the calculation.

Equation from KDB 865664 D01, Edition 97-01 is:

$$S = PG / 4\pi R^2$$

Where: S = power density (in appropriate units, e.g. mW/cm²)

P = Time-average maximum tune up procedure (in appropriate units, e.g., mW)

G = the numeric gain of the antenna

R = distance to the center of radiation of the antenna (20 cm = limit for MPE)

GSM 850: PG = 24.97dBm + (2dB) = 26.97 dBm = 497.74mW

GSM 1900: PG = 21.97dBm + (2dB) = 23.97 dBm = 249.46mW

Bluetooth: PG = -3.0dBm + (1.69dB) = -1.31 dBm = 0.74mW

R = 20 cm

π = 3.1416

Solving for S, the power density at 20 cm is

Band	PG (mW)	Test Result (mW/cm ²)	Limit Value (mW/cm ²)	The MPE ratio
GSM 850	497.74	0.099	0.56	0.1768
GSM 1900	249.46	0.050	1.0	0.0500
Bluetooth	0.74	0.00015	1.0	0.0002
Note: The MPE ratio = Mac Test Result ÷ Limit Value				

So the simultaneous transmitting antenna pairs as below:

Σ of MPE ratios = GSM + Bluetooth = 0.1768 + 0.0002 = 0.177 < 1

Note: For transmitters, minimum separation distance is 20cm, even if calculations indicate MPE distance is less.