

**Shenzhen Global Test Service Co.,Ltd.**

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RF Exposure evaluation**Report Reference No..... : GTSR15100015-MPE****FCC ID..... : 2AF80-VB87M**

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Date of issue.....: Oct . 21, 2015

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Shenzhen, Guangdong**Testing Laboratory Name : Shenzhen CTL Testing Technology Co., Ltd**Address.....: 1/F.-A, Baisha Technology Park, No.3011, Shaheixi Road, Nanshan
District, Shenzhen, Guangdong, China**Applicant's name.....: Shenzhen ZhiHaiHe Tech Co.,Ltd**Address.....: Unit 401D, 4/F, Buliding A, Dong Lian Industry Park,
No.268,Chuang Ye Road 2nd,Bao'an 23th District, Shenzhen
518101, GuangDong ,P.R.China**Test specification**Standard: **47CFR §2.1093(d)/KDB447498 v05r02**

TRF Originator.....: Shenzhen Global Test Service Co.,Ltd.

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Test item description Varmilo Bluetooth mechanical keyboardTrade Mark: **Varmilo**Manufacturer: **Shenzhen ZhiHaiHe Tech Co.,Ltd**

Model/Type reference.....: VB87M

Listed Models: /

Modulation Type.....: GFSK

Operation Frequency.....: From 2402MHz to 2480MHz

Exposure category.....: General population/uncontrolled environment

EUT Type: Production Unit

Device Type.....: Portable Device

Rating: DC 5.0V

Result.....: **PASS**

TEST REPORT

Test Report No. :	GTSR15100015-MPE	Oct . 21, 2015
		Date of issue

Equipment under Test : Varmilo Bluetooth mechanical keyboard

Model /Type : VB87M

Listed Models : /

Applicant : **Shenzhen ZhiHaiHe Tech Co.,Ltd**

Address : Unit 401D, 4/F, Buliding A, Dong Lian Industry Park,
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Manufacturer : **Shenzhen ZhiHaiHe Tech Co.,Ltd**

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Shenzhen 518101, Guangdong ,P.R.China

Test Result:	PASS
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The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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1. SUMMARY

1.1. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer

○ - supplied by the lab

☐	Power Cable	Length (m) :	/
☐		Shield :	/
☐		Detachable :	/

1.2. Note

1. The EUT is a Varmilo Bluetooth mechanical keyboard with Bluetooth function, The functions of the EUT listed as below:

	Test Standards	Reference Report
Bluetooth-BLE	FCC Part 15 Subpart C	GTSR15100015- BLE
MPE	FCC Per 47 CFR 2.1093(d)	GTSR15100015-MPE

2. TEST ENVIRONMENT

2.1. Address of the test laboratory

Shenzhen CTL Testing Technology Co., Ltd

1/F.-A, Baisha Technology Park, No.3011, Shahexi Road, Nanshan District, Shenzhen, Guangdong, China

2.2. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

FCC-Registration No.: 899208

Test Lab: Shenzhen LCS Compliance Testing Laboratory Ltd. has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 899208

2.3. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

2.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM);Uncertainties in the measurement of mobile radio equipment characteristics; Part 2 " and is documented in the Shenzhen CTL Testing Technology Co., Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen CTL Testing Technology Co., Ltd is reported:

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.57 dB	(1)

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

3. Method of measurement

3.1. Applicable Standard

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

According to §1.1310 and §2.1093 RF exposure requirement

KDB447498 v05r02: Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies

3.2. Requirement

According to KDB447498 D01 General RF Exposure Guidance v05r01 Section 4.3.1 Standalone SAR test exclusion considerations: "Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Test Exclusion Threshold condition, listed below, is satisfied. These test exclusion conditions are based on source-based time-averaged maximum conducted output power of the RF channel requiring evaluation, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions.²² The minimum test separation distance is determined by the smallest distance from the antenna and radiating structures or outer surface of the device, according to the host form factor, exposure conditions and platform requirements, to any part of the body or extremity of a user or bystander (see 5) of section 4.1). To qualify for SAR test exclusion, the test separation distances applied must be fully explained and justified by the operating configurations and exposure conditions of the transmitter and applicable host platform requirements, typically in the SAR measurement or SAR analysis report, according to the required published RF exposure KDB procedures. When no other RF exposure testing or reporting is required, a statement of justification and compliance must be included in the equipment approval, in lieu of the SAR report, to qualify for the SAR test exclusion. When required, the device specific conditions described in the other published RF exposure KDB procedures must be satisfied before applying these SAR test exclusion provisions; for example, handheld PTT two-way radios, handsets, laptops & tablets etc.²³ "

$$\left[\frac{(\text{max. power of channel, including tune-up tolerance, mW})}{(\text{min. test separation distance, mm})} \right] \cdot [\sqrt{f} \text{ (GHz)}] \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR, where:}$$

- f (GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison
- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 5) in section 4.1 is applied to determine SAR test exclusion.

3.3. Conducted Power Results

BT

Mode	Channel	Frequency (MHz)	Data rate	Conducted Output Power (dBm)	
				Peak	Average
GFSK	0	2402	1 Mbps	-4.22	-5.04
	19	2440	1 Mbps	-4.08	-5.21
	39	2480	1 Mbps	-4.54	-5.87

Manufacturing tolerance

BT

GFSK-LE (Average)			
Frequency	2402	2440	2480
Target (dBm)	-5.0	-5.0	-5.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0

4. Evaluation Result

Evaluation Results

Band/Mode	f (GHz)	Antenna Distance (mm)	RF output power (including tune-up tolerance)		SAR Test Exclusion Threshold	SAR Test Exclusion
			dBm	mW		
BT*	2.450	5	-4.0	0.3981	0.1<3.0	Yes

BT*-BT including BLE (lower power BT)

5. Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1093 for the uncontrolled RF Exposure and SAR Exclusion Threshold per KDB 447498 v05r02.

.....**End of Report**.....