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Report No.: SHEM160800539504  
 Page: 1 of 9

**1 Cover Page**

**FCC MPE REPORT**

<b>Application No.:</b>	SHEM1608005395CR
<b>Applicant:</b>	MINE SITE TECHNOLOGIES PTY LTD
<b>FCC ID:</b>	N73-PRX-CTRL
<b>IC:</b>	7449B-PRXCTRL
<b>Equipment Under Test (EUT):</b>	
<b>NOTE:</b> The following sample(s) was/were submitted and identified by the client as	
<b>Product Name:</b>	Proximity Controller
<b>Model No.(EUT):</b>	PRX-CTRL
<b>Standards:</b>	FCC Rules 47 CFR §2.1091 KDB447498 D01 General RF Exposure Guidance v06 RSS-102 Issue 5
<b>Date of Receipt:</b>	2015-10-10
<b>Date of Test:</b>	2017-12-29 to 2018-03-10
<b>Date of Issue:</b>	2018-03-15
<b>Test Result:</b>	<b>Pass*</b>

\*In the configuration tested, the EUT detailed in this report complied with the standards specified above.



**Parlam Zhan**  
**E&E Section Manager**  
**SGS-CSTC (Shanghai) Co., Ltd.**

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

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## 2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
00	/	2018-03-15	/	Original

<b>Authorized for issue by:</b>			
<b>Engineer</b>		Vincent Zhu _____	 _____
<b>Reviewer</b>		Parlam Zhan _____	 _____

### **3 Contents**

	Page
<b>1 COVER PAGE.....</b>	<b>1</b>
<b>2 VERSION.....</b>	<b>2</b>
<b>3 CONTENTS.....</b>	<b>3</b>
<b>4 GENERAL INFORMATION.....</b>	<b>4</b>
4.1 CLIENT INFORMATION.....	4
4.2 GENERAL DESCRIPTION OF E.U.T.....	4
4.3 DETAILS OF E.U.T.....	4
4.4 TEST LOCATION.....	5
4.5 TEST FACILITY.....	5
<b>5 TEST STANDARDS AND LIMITS.....</b>	<b>6</b>
5.1 FCC RADIOFREQUENCY RADIATION EXPOSURE LIMITS:.....	6
5.2 IC RADIOFREQUENCY RADIATION EXPOSURE LIMITS:.....	6
<b>6 MEASUREMENT AND CALCULATION.....</b>	<b>7</b>
6.1 MAXIMUM TRANSMIT POWER.....	7
6.2 MPE CALCULATION.....	8

## 4 General Information

### 4.1 Client Information

Applicant:	MINE SITE TECHNOLOGIES PTY LTD
Address of Applicant:	Level 5, 113 Wicks Rd., North Ryde NSW 2113

### 4.2 General Description of E.U.T.

Product Description:	Mobile Product with 2.4GHz band WIFI and Zigbee function
Power Supply:	DC 24V by battery

### 4.3 Details of E.U.T.

Operation Frequency:	WiFi: 802.11 b/g: 2412-2462MHz Zigbee: 2405MHz-2470MHz
Modulation Technique:	WiFi: 802.11b: DSSS(CCK, DQPSK, DBPSK) 802.11g: OFDM(64QAM, 16QAM, QPSK, BPSK) Zigbee: DSSS
Data Rate:	WiFi: 802.11b: 1/2/5.5/11Mbps, 802.11g: 6/9/12/18/36/48/54Mbps Zigbee: 250kbps
Number of Channel:	WiFi: 802.11 b/g: 11 Zigbee: 14
Antenna Type:	WiFi: Ceramic antenna Zigbee: Whip antenna
Antenna Gain:	WiFi: 3.2dBi Zigbee: 3 dBi

#### **4.4 Test Location**

All tests were performed at:

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China

Tel: +86 21 6191 5666

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#### **4.5 Test Facility**

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

- **CNAS (No. CNAS L0599)**

CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **NVLAP (Certificate No. 201034-0)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP). Certificate No. 201034-0.

- **FCC –Designation Number: CN5033**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been recognized as an accredited testing laboratory.

Designation Number: CN5033. Test Firm Registration Number: 479755.

- **Industry Canada (IC) – IC Assigned Code: 8617A**

The 3m Semi-anechoic chamber of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 8617A-1.

- **VCCI (Member No.: 3061)**

The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-3868, C-4336, T-12221, G-10830 respectively.

## 5 Test Standards and Limits

### 5.1 FCC Radiofrequency radiation exposure limits:

According to §1.1310, the limit for general population/uncontrolled exposures

Frequency	Power density(mW/cm <sup>2</sup> )	Averaging time(minutes)
300MHz~1.5GHz	f/1500	30
1.5GHz~100GHz	1.0	30

### 5.2 IC Radiofrequency radiation exposure limits:

According to RSS-102 section 2.5.2, RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);

- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than  $4.49/f^{0.5}$  W (adjusted for tune-up tolerance), where  $f$  is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than  $1.31 \times 10^{-2} f^{0.6834}$  W (adjusted for tune-up tolerance), where  $f$  is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

For 2.4G device, the limit of worse case is 2.68 W

## 6 Measurement and Calculation

### 6.1 Maximum transmit power

The WiFi Power Data is based on the RF Test Report SHEM160800539502.

Test mode	Test Frequency (MHz)	Output Power (dBm)	Output Power (mW)
802.11b	2412	15.02	31.77
	2437	15.73	37.41
	2462	15.09	32.28
802.11g	2412	18.47	70.31
	<b>2437</b>	<b>18.60</b>	<b>72.44</b>
	2462	17.89	61.52

The Zigbee Power Data is based on the RF Test Report SHEM160800539503.

Test Channel	Test Frequency (MHz)	Output Power (dBm)	Output Power (mW)
Lowest	2405	16.42	43.85
Middle	2440	16.47	44.36
Highest	2470	15.51	35.56

## 6.2 MPE Calculation

*FCC*

According to the formula  $S = \frac{PG}{4R^2\pi}$ , we can calculate S which is MPE.

Note:

- 1) P (Watts) = Power Input to antenna =  $10^{\frac{dBm}{10}} / 1000$
- 2) G (Antenna gain in numeric) =  $10^{(Antenna\ gain\ in\ dBi / 10)}$
- 3) R = distance to the center of radiation of antenna (in meter) = 20cm
- 4) MPE limit = 1mW/cm<sup>2</sup>

*For WIFI:*

The Max Conducted Peak Output Power is 72.44mW;

The best case gain of the antenna is 3.2dBi. 3.2dB logarithmic terms convert to numeric result is nearly 2.09.

$$S = \frac{PG}{4R^2\pi} = \frac{72.44 \times 2.09}{4 \times 400 \times 3.14} = 0.03 \text{ mW/cm}^2$$

*For Zigbee*

The Max Conducted Peak Output Power is 44.36mW;

The best case gain of the antenna is 3.0dBi. 3.0dB logarithmic terms convert to numeric result is nearly 2.0

$$S = \frac{PG}{4R^2\pi} = \frac{44.36 \times 2.0}{4 \times 400 \times 3.14} = 0.02 \text{ mW/cm}^2$$

The WIFI and the Zigbee modules can simultaneous transmitting at frequency 2.4GHz band. But the maximum rate of MPE is  $\frac{0.03}{1.0} + \frac{0.02}{1.0} = 0.05 \leq 1.0$ .

So the device is exclusion from SAR test.



IC:

For WIFI:

$$E.I.R.P.= P*G= 0.07244 \times 2.09=0.1514W$$

For Zigbee:

$$E.I.R.P.= P*G= 0.04436 \times 2.0=0.0887W$$

The WIFI and the Zigbee modules can simultaneous transmitting at frequency 2.4GHz band. But the maximum rate of MPE is  $\frac{0.1514}{2.68} + \frac{0.0887}{2.68} = 0.089 < 1.0$

So the device is exclusion from SAR test.

**--End of the Report--**