






# MPE TEST REPORT

**Report No.** ..... : **CHTEW19030181**      Report verification :   
**Project No.** ..... : **SHT1903007901EW**  
**FCC ID**..... : **2AST3TBR-280-4**  
**Applicant's name** ..... : **Shenzhen JiuNuo Communication Technology Co., Ltd.**  
 Address..... : 2 / F, Building 1, Lihe Industrial Park, 1055 Songbai Road, Nanshan District, Shenzhen  
 Manufacturer..... : Shenzhen JiuNuo Communication Technology Co., Ltd.  
 Address..... : 2 / F, Building 1, Lihe Industrial Park, 1055 Songbai Road, Nanshan District, Shenzhen  
**Test item description** ..... : **Digital transceiver**  
 Trade Mark ..... : JIUNUO  
 Model/Type reference..... : TBR-280-4  
 Listed Model(s) ..... : -  
**Standard** ..... : **FCC Per 47 CFR 2.1091(b) KDB447498 v05r02**  
 Date of receipt of test sample..... : Mar.11, 2019  
 Date of testing..... : Mar.11, 2019- Mar.21, 2019  
 Date of issue..... : Mar.22, 2019  
**Result**..... : **PASS**

Compiled by  
 ( position+printed name+signature)..: File administrators Fanghui Zhu   
 Supervised by  
 ( position+printed name+signature)..: Project Engineer Edward Pan   
 Approved by  
 ( position+printed name+signature)....: RF Manager Hans Hu 

**Testing Laboratory Name** ..... : **Shenzhen Huatongwei International Inspection Co., Ltd**  
 Address..... : 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

**Shenzhen Huatongwei International Inspection Co., Ltd. All rights reserved.**  
 This publication may be reproduced in whole or in part for non-commercial purposes as long as the Shenzhen Huatongwei International Inspection Co., Ltd. is acknowledged as copyright owner and source of the material. Shenzhen Huatongwei International Inspection Co., Ltd. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.  
*The test report merely correspond to the test sample.*

## Contents

<b>1.</b>	<b><u>SUMMARY</u></b>	<b>3</b>
1.1.	Client Information	3
1.2.	Report version information	3
1.3.	Product Description	4
1.4.	Test frequency list	5
1.5.	EUT operation mode	5
1.6.	EUT configuration	5
1.7.	Modifications	5
<b>2.</b>	<b><u>TEST ENVIRONMENT</u></b>	<b>6</b>
2.1.	Address of the test laboratory	6
2.2.	Environmental conditions	6
2.3.	Statement of the measurement uncertainty	6
2.4.	Equipments Used during the Test	6
<b>3.</b>	<b><u>METHOD OF MEASUREMENT</u></b>	<b>7</b>
3.1.	Applicable Standard	7
3.2.	Limit	7
3.3.	MPE Calculation Method	7
3.4.	Antenna Information	8
3.5.	Measurement Procedure	8
3.6.	Test Results	9
3.7.	Conclusion	10
3.8.	Test Setup Photos of the EUT	10

## 1. SUMMARY

### 1.1. Client Information

Applicant:	Shenzhen JiuNuo Communication Technology Co., Ltd.
Address:	2 / F, Building 1, Lihe Industrial Park, 1055 Songbai Road, Nanshan District, Shenzhen
Manufacturer:	Shenzhen JiuNuo Communication Technology Co., Ltd.
Address:	2 / F, Building 1, Lihe Industrial Park, 1055 Songbai Road, Nanshan District, Shenzhen

### 1.2. Report version information

Revision No.	Date of issue	Description
N/A	2019-03-22	Original

### 1.3. Product Description

Name of EUT:	Digital transceiver
Trade mark:	JIUNUO
Model/Type reference:	TBR-280-4
Listed model(s):	-
Power supply:	DC 12V
<b>RF Specification</b>	
Operation Frequency Range:	400MHz~470MHz
Permitted frequency range:	400MHz~406MHz, 406.1MHz~470MHz
Rated Output Power:	<input checked="" type="checkbox"/> High Power: 20W <input checked="" type="checkbox"/> Low Power: 5W
Modulation Type:	4FSK
Channel Separation:	<input checked="" type="checkbox"/> 12.5kHz <input type="checkbox"/> 25kHz
Emission Designator:	<input checked="" type="checkbox"/> 12.5kHz Channel Separation: 7K60FXW, 7K60FXD
Antenna Type:	External

#### 1.4. Test frequency list

Frequency Bands (MHz)	Test Frequency (MHz)	
400MHz ~ 406MHz	CH <sub>L</sub>	400.0125
	CH <sub>M1</sub>	405.9875
406.1MHz ~470MHz	CH <sub>M2</sub>	406.1125
	CH <sub>M3</sub>	438.0125
	CH <sub>H</sub>	469.9875

#### 1.5. EUT operation mode

Test Mode	Transmitting	Digital	Power Level	
		12.5kHz	High	Low
TX-DNH	■	■	■	
TX-DNL	■	■		■

√: is operation mode.

#### 1.6. EUT configuration

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

● - supplied by the manufacturer

○ - supplied by the lab

<input type="radio"/>	Power Cable	Length (m) :	/
		Shield :	/
		Detachable :	/
<input type="radio"/>	Multimeter	Manufacturer :	/
		Model No. :	/

#### 1.7. Modifications

No modifications were implemented to meet testing criteria.

## 2. TEST ENVIRONMENT

### 2.1. Address of the test laboratory

1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China  
Phone: 86-755-26748019 Fax: 86-755-26748089

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 (2009) and CISPR Publication 22.

### 2.2. Environmental conditions

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

Temperature: 15-35 ° C

Humidity: 30-60 %

Atmospheric pressure: 950-1050mbar

### 2.3. 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 Huatongwei International Inspection 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 Huatongwei laboratory is reported:

Test Items	Measurement Uncertainty	Notes
Transmitter power conducted	0.57 dB	(1)
Transmitter power Radiated	2.20 dB	(1)

- (1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

### 2.4. Equipments Used during the Test

Name of Equipment	Manufacturer	Model	Serial Number	Last Cal.
Field Probe	ETS-LINDGREN	HI-6005	00064170	2018/11/13
Field Meter	AR	FM 5004	300239	2018/11/13

The calibration interval was one year.

### **3. Method of measurement**

#### **3.1. Applicable Standard**

According to FCC Part 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 FCC Part 1.1310 and FCC Part 2.1091 RF exposure is calculated.

IEEE Std C95.1: 2005: "IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz – 300 GHz".

FCC OET Bulletin 65, Edition 97-01: "Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields".

FCC Supplement C to OET Bulletin 65, Edition 01-01: "Additional Information for Evaluating Compliance of Mobile and Portable Devices with FCC Limits for Human Exposure to Radiofrequency Emission".

IEEE Std C95.3: 2002: "IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields with Respect to Human Exposure to Such Fields, 100 kHz – 300 GHz",

#### **3.2. Limit**

FCC Part 1.1310(e):

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
<b>(A) Limits for Occupational/Controlled Exposure</b>				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	*900/f <sup>2</sup>	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			5	6
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
0.3-1.34	614	1.63	*100	30
1.34-30	824/f	2.19/f	*180/f <sup>2</sup>	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
1,500-100,000			1.0	30

f=frequency in MHz

\*=Plane-wave equivalent power density

#### **3.3. MPE Calculation Method**

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

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

Where: S=power density

P=power input to antenna

G=power gain of the antenna in the direction of interest relative to an isotropic radiator

R=distance to the center of radiation of the antenna

TX-DNH						
Test Frequency (MHz)	Max Output Power (dBm)	Max Output Power (mW)	Antenna Gain (dBi)	Antenna Gain (Numeric)	Power Density Limit (mW/cm <sup>2</sup> )	Safety Distance(cm)
400.0125	43.1	20417.38	3.5	2.24	1.333	52.25
405.9875	43.3	21379.62	3.5	2.24	1.353	53.07
406.1125	43.3	21379.62	3.5	2.24	1.354	53.05
438.0125	43.1	20417.38	3.5	2.24	1.460	49.93
469.9875	42.7	18620.87	3.5	2.24	1.567	46.02

Note:

- 1) If the antenna gain is 3.5dBi, The exposure safety distance is at least 53.07cm.

### 3.4. Antenna Information

Frequency:	TQC-400FC	400MHz-470MHz
Antenna Type:	External (Whip Antenna)	
Antenna Gain:	3.5dBi	

### 3.5. Measurement Procedure

1. Polarization of the EUT's antenna was vertical, which is its polarization in actual use.
2. The EUT at the chosen modulation was set to transmit at the chosen frequency at maximum RF power and at 50% duty cycle (50% duty cycle is simulated either by lowering the radio's power by 3dB or by using a 3 dB pad on the output of the radio). During preliminary measurements, we set the distance between the power density probe and the investigated EUT's antenna equal to the average calculated R<sub>safe</sub> applicable either for controlled or uncontrolled environments.
3. Power density measurements were taken at different heights of the probe from the ground (0.1 to 2 meters) while rotating versus azimuth (from 0° to 360°) the antenna.
4. The azimuth between the probe and the antenna position corresponding to the highest MPE level was chosen as the "worst case" position for the final measurements.
5. For the final measurements, we adjusted the distance between the test probe and the tested antenna to the real safe distance, R<sub>real</sub>, such that the measured highest power density in the "worst case" position was the same or slightly less than the test limit.
6. The measurement results of final measurements conducted at the chosen azimuth and different heights of the probe above the ground.
7. Average values of power density were calculated for the imaginary whole human body (0.1–2.0 m), for the lower part of the body (0.1–0.9 m) and for the upper part of the body (1.0–2.0 m).



### 3.6. Test Results

EME Data:

Measuring Antenna Height (cm)	FCC Part 2.1091			
	Controlled RF Exposure(mW/cm <sup>2</sup> )			
	3.5dBi Antenna 53.07cm	3.5dBi Antenna 63.07cm	3.5dBi Antenna 73.07cm	3.5dBi Antenna 83.07cm
10	0.10	0.08	0.05	0.05
20	0.29	0.18	0.08	0.07
30	0.56	0.42	0.27	0.18
40	0.64	0.49	0.41	0.29
50	0.79	0.58	0.48	0.33
60	0.87	0.82	0.67	0.50
70	0.96	0.88	0.78	0.45
80	0.93	0.80	0.64	0.49
90	0.82	0.79	0.68	0.52
100	0.80	0.72	0.70	0.62
110	0.75	0.70	0.65	0.57
120	0.70	0.69	0.57	0.46
130	0.66	0.55	0.45	0.33
140	0.57	0.45	0.32	0.30
150	0.42	0.34	0.28	0.16
160	0.29	0.25	0.25	0.12
170	0.24	0.10	0.19	0.10
180	0.19	0.09	0.08	0.06
190	0.11	0.08	0.06	0.04
200	0.07	0.06	0.04	0.02

EME for Body Parts:

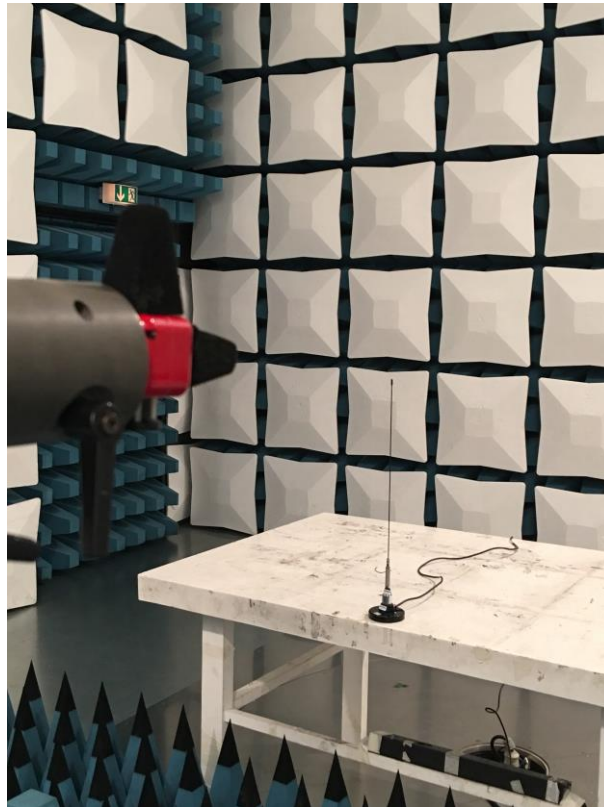
Part of the body/averaging points (m)	FCC Part 2.1091	
	Controlled RF Exposure	
	3.5dBi Antenna 53.07cm (mW/cm <sup>2</sup> )	
Whole body (0.1 to 2.0)	0.96	
Lower body (0.1 to 0.9)	0.96	
Upper body (1.0 to 2.0)	0.80	

### 3.7. Conclusion

The User Manual shall include RF radiation safety warnings:

The antenna of this device must be installed on the roof or trunk of the vehicle. If the gain of the used antenna is 3.5dBi, the minimum mobile separation distance  $R_{safe} = 53.07\text{cm}$ .

### 3.8. Test Setup Photos of the EUT



-----End of Report-----