



MPE TEST REPORT

Report No. : **CHTEW20040146** Report verification : 

Project No. : **SHT2004013801EW**

FCC ID..... : **2AE6CEM8100U5**

Applicant's name : **Shenzhen Excera Technology Co., Ltd.**

Address..... : 3rd Floor, Jiada R&D Building, No.5 Songpingshan Road ,
Hi-Tech Park North, Nanshan District , Shenzhen , China

Manufacturer..... : Shenzhen Excera Technology Co., Ltd.

Address..... : 3rd Floor, Jiada R&D Building, No.5 Songpingshan Road ,
Hi-Tech Park North, Nanshan District , Shenzhen , China

Test item description : **Digital Mobile Radio**

Trade Mark : EXCERA

Model/Type reference..... : EM8100 U5

Listed Model(s) : -

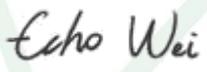
Standard : **FCC Per 47 CFR 2.1091(b); KDB447498 v05r02**

Date of receipt of test sample..... : Apr.07, 2020

Date of testing..... : Apr.07, 2020- Apr.17, 2020

Date of issue..... : Apr.20, 2020

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

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Testing Laboratory Name : **Shenzhen Huatongwei International Inspection Co., Ltd**

Address..... : 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road,
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The test report merely correspond to the test sample.

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1. SUMMARY

1.1. Client Information

Applicant:	Shenzhen Excera Technology Co., Ltd.
Address:	3rd Floor, Jiada R&D Building, No.5 Songpingshan Road , Hi-Tech Park North, Nanshan District , Shenzhen , China
Manufacturer:	Shenzhen Excera Technology Co., Ltd.
Address:	3rd Floor, Jiada R&D Building, No.5 Songpingshan Road , Hi-Tech Park North, Nanshan District , Shenzhen , China

1.2. Report version information

Revision No.	Date of issue	Description
N/A	2020-04-20	Original

1.3. Product Description

Name of EUT:	Digital Mobile Radio	
Trade mark:	EXCERA	
Model/Type reference:	EM8100 U5	
Listed model(s):	-	
Power supply:	DC 13.6V	
Battery information:	-	
Charger information:	-	
Adapter information:	-	
Hardware version:	A	
Software version:	1.3.00.11P	
Support Frequency Range:	806MHz~ 824MHz	
Permitted frequency range: *1	806MHz~ 824MHz	
Rated Output Power:	<input checked="" type="checkbox"/> High Power: 35W <input checked="" type="checkbox"/> Low Power: 5W	
Modulation Type:	Analog: FM	
	Digital : 4FSK	
Channel Separation:	Analog: <input checked="" type="checkbox"/> 12.5kHz <input checked="" type="checkbox"/> 25kHz	
	Digital : <input checked="" type="checkbox"/> 12.5kHz	
Emission Designator:	Analog:	11K0F3E
	Digital:	7K60FXW, 7K60FXD
Support data rate:	9.6kbps	
Antenna Type:	Sucker antenna	
Bluetooth		
Version:	V4.1	
Supported Type:	EDR, BLE	
Modulation type:	GFSK, $\pi/4$ QPSK, 8DPSK for EDR	
	GFSK for BLE	

1.4. Test frequency list

Frequency Bands (MHz)	Test Frequency (MHz)	
806MHz ~ 824MHz	CH _L	806.025
	CH _{M1}	815.025
	CH _H	823.975
2402MHz~2480MHz	CH00	2402
	CH19/CH39	2440/2441
	CH39/CH78	2480

1.5. EUT operation mode

Test mode	Transmitting	Analog		Digital
		12.5kHz	25kHz	12.5kHz
TX1	√	√		√
TX2	√		√	
For RF test items(EDR):				
The engineering test program was provided and enabled to make EUT continuous transmitting.				
Test Item	Modulation / Data Rate			
	GFSK 1Mbps	$\pi/4$ DQPSK 2Mbps	8DPSK 3Mbps	
Conducted test item	√	√	√	
Radiated test item	√	-	-	
Remark:				
<ul style="list-style-type: none"> - For radiated test item, the worst mode data rate 3Mbps was reported only, because this data rate has the highest RF output power at preliminary tests. - The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data recorded in the report. 				
For RF test items(BLE):				
The engineering test program was provided and enabled to make EUT continuous transmit.				
For Radiated spurious emissions test item:				
The engineering test program was provided and enabled to make EUT continuous transmit. The EUT in each of three orthogonal axis emissions had been tested, but only the worst case (X axis) data Recorded in the report.				

√: 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

○ Power Cable	Length (m) :	/
	Shield :	Unshielded
	Detachable :	Undetachable
○ 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)

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

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 ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	*900/f ²	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			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
300-1,500			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

Type	Conducted Average Power (dBm)	Power Density (mW/cm ²)	Limit (mW/cm ²)	Result
BT-EDR	5.83	0.0008	1.0000	Pass
BT-BLE	5.54	0.0007	1.0000	Pass

Note:

- 1) The maximum antenna gain is 0 dBi
- 2) The exposure evaluation safety distance is 20mm.

TX-ANH						
Test Frequency (MHz)	Max Output Power (dBm)	Max Output Power (mW)	Antenna Gain (dBi)	Antenna Gain (Numeric)	Power Density Limit (mW/cm ²)	Safety Distance(cm)
806.025	45.4	34673.69	3.5	2.24	2.69	47.93
815.025	44.9	30902.95	3.5	2.24	2.72	45.00
823.975	44.8	30199.52	3.5	2.24	2.75	44.24

Note:

- 1) If the antenna gain is 3.5 dBi, The exposure safety distance is at least 47.93 cm.

3.4. Antenna Information

Frequency:	806.-824MHz
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_{safe} 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_{real}, 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 ²)			
	3.5dBi Antenna 47.93cm	3.5dBi Antenna 57.93cm	3.5dBi Antenna 67.93cm	3.5dBi Antenna 77.93cm
10	0.11	0.08	0.06	0.06
20	0.28	0.17	0.13	0.11
30	0.48	0.40	0.30	0.16
40	0.65	0.50	0.42	0.30
50	0.74	0.56	0.47	0.37
60	0.80	0.76	0.63	0.44
70	0.87	0.82	0.69	0.49
80	0.83	0.74	0.57	0.52
90	0.78	0.70	0.59	0.54
100	0.75	0.65	0.62	0.58
110	0.67	0.62	0.57	0.50
120	0.63	0.60	0.53	0.40
130	0.58	0.48	0.37	0.27
140	0.48	0.37	0.26	0.25
150	0.37	0.34	0.23	0.12
160	0.30	0.19	0.17	0.09
170	0.19	0.14	0.13	0.07
180	0.16	0.10	0.08	0.06
190	0.14	0.06	0.05	0.03
200	0.08	0.05	0.03	0.03

EME for Body Parts:

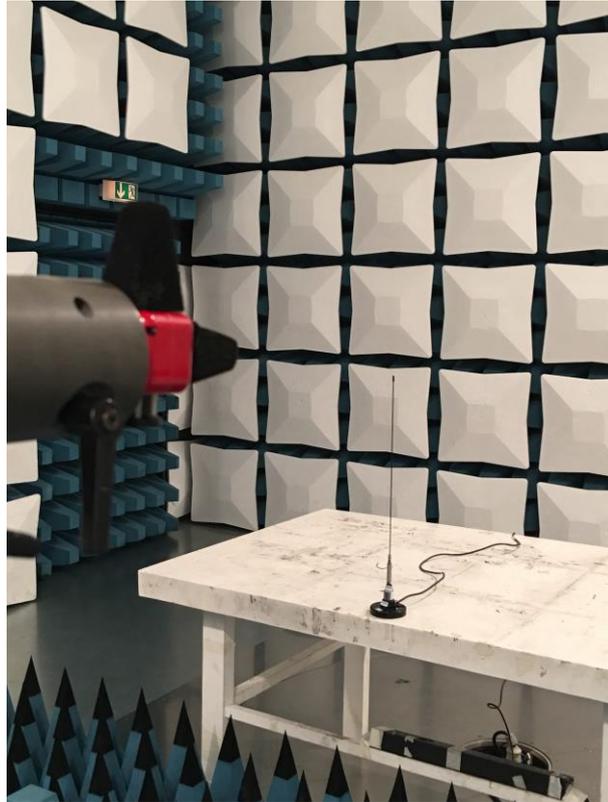
Part of the body/averaging points (m)	FCC Part 2.1091	
	Controlled RF Exposure	
	3.5dBi Antenna 47.93cm (mW/cm ²)	
Whole body (0.1 to 2.0)	0.87	
Lower body (0.1 to 0.9)	0.87	
Upper body (1.0 to 2.0)	0.75	

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 $R_{safe} = 47.93\text{cm}$.

3.8. Test Setup Photos of the EUT



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