



MPE TEST REPORT

Report No. : **CHTEW1912019601** Report verification : 

Project No. : **SHT1911026501EW**

FCC ID : **Q9SAWR-DM7700**

Applicant's name : **Northfield Telecommunications, Inc. d/b/a Advanced Wireless Communications**

Address : 20809 Kensington Blvd, Lakeville, Minnesota, United States 55044

Manufacturer : ABELL INDUSTRIES CO., LTD.

Address : 2/F, Bldg. 14, ZhongXing Industrial City, NanShan Dist. ShenZhen, P.R. China

Test item description : **Digital Mobile Radio**

Trade Mark : AWC

Model/Type reference : AWR-DM7700

Listed Model(s) : -

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

Date of receipt of test sample : Nov.29, 2019

Date of testing : Nov.29, 2019- Dec.25, 2019

Date of issue : Dec.26, 2019

Result : **PASS**

Compiled by
(position+printed name+signature) .. : File administrators Echo Wei 

Supervised by
(position+printed name+signature) .. : Project Engineer Gaosheng 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

<u>1.</u>	<u>SUMMARY</u>	<u>3</u>
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
<u>2.</u>	<u>TEST ENVIRONMENT</u>	<u>6</u>
2.1.	Address of the test laboratory	6
2.2.	Environmental conditions	6
2.3.	Statement of the measurement uncertainty	6
<u>3.</u>	<u>METHOD OF MEASUREMENT</u>	<u>7</u>
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	9
3.8.	Test Setup Photos of the EUT	10

1. SUMMARY

1.1. Client Information

Applicant:	Northfield Telecommunications, Inc. d/b/a Advanced Wireless Communications
Address:	20809 Kensington Blvd, Lakeville, Minnesota, United States 55044
Manufacturer:	ABELL INDUSTRIES CO.,LTD.
Address:	2/F, Bldg. 14, ZhongXing Industrial City, NanShan Dist. ShenZhen, P.R. China

1.2. Report version information

Revision No.	Date of issue	Description
N/A	2019-12-26	Original

1.3. Product Description

Name of EUT:	Digital Mobile Radio		
Trade mark:	AWC		
Model/Type reference:	AWR-DM7700		
Listed model(s):	-		
Power supply:	DC 13.8V		
Battery information:	-		
Charger information:	-		
Adapter information:	-		
Hardware version:	SV4		
Software version:	V1.01.01		
RF Specification			
Support Frequency Range:	400MHz~470MHz		
Permitted frequency range: * ¹	400MHz~406MHz, 406.1MHz~470MHz		
Rated Output Power:	☒ High Power: 50W	☒ Mid Power: 25W	☒ Low Power: 5W
Modulation Type:	Analog:	FM	
	Digital :	4FSK	
Supported Digital Protocol: * ²	DMR		
Channel Separation:	Analog:	☒ 12.5kHz	
	Digital :	☒ 12.5kHz	
Emission Designator: * ³	Analog:	11K0F3E	
	Digital:	7K60FXW, 7K60FXD	
Support data rate:	9.6kbps		
Antenna Type:	External Antenna		

1.4. Test frequency list

Frequency Bands (MHz)	Test Frequency (MHz)	
400MHz ~ 406MHz	CH _L	400.0125
	CH _{M1}	405.9875
406.1MHz ~470MHz	CH _{M2}	406.1125
	CH _{M3}	438.0125
	CH _H	469.9875

1.5. EUT operation mode

Test mode	Transmitting	Analog
		12.5kHz
TX1	√	√

√: 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:	<u>15-35 ° C</u>
Humidity:	<u>30-60 %</u>
Atmospheric pressure:	<u>950-1050mbar</u>

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

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)
400.0125	47.6	57543.99	3.9	2.45	1.333	91.74
405.9875	47.7	58884.37	3.9	2.45	1.353	92.11
406.1125	47.7	58884.37	3.9	2.45	1.354	92.08
438.0125	47.5	56234.13	3.9	2.45	1.460	86.66
469.9875	47.5	56234.13	3.9	2.45	1.567	83.65

Note:

- 1) If the antenna gain is 3.9 dBi, The exposure safety distance is at least 92.11 cm.

3.4. Antenna Information

Frequency:	400MHz-470MHz
Antenna Type:	External (Whip Antenna)
Antenna Gain:	3.9dBi

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)			
	3.9dBi Antenna 92.11cm	3.9dBi Antenna 102.11cm	3.9dBi Antenna 112.11cm	3.9dBi Antenna 122.11cm
10	0.12	0.09	0.07	0.07
20	0.31	0.19	0.14	0.12
30	0.53	0.44	0.33	0.18
40	0.71	0.55	0.46	0.33
50	0.81	0.61	0.52	0.41
60	0.88	0.83	0.69	0.48
70	0.95	0.90	0.76	0.54
80	0.91	0.81	0.63	0.57
90	0.86	0.77	0.65	0.59
100	0.82	0.71	0.68	0.64
110	0.73	0.68	0.63	0.55
120	0.69	0.66	0.58	0.44
130	0.64	0.53	0.41	0.30
140	0.53	0.41	0.29	0.27
150	0.41	0.37	0.25	0.13
160	0.33	0.21	0.19	0.10
170	0.21	0.15	0.14	0.08
180	0.18	0.11	0.09	0.07
190	0.15	0.07	0.05	0.03
200	0.09	0.05	0.03	0.03

EME for Body Parts:

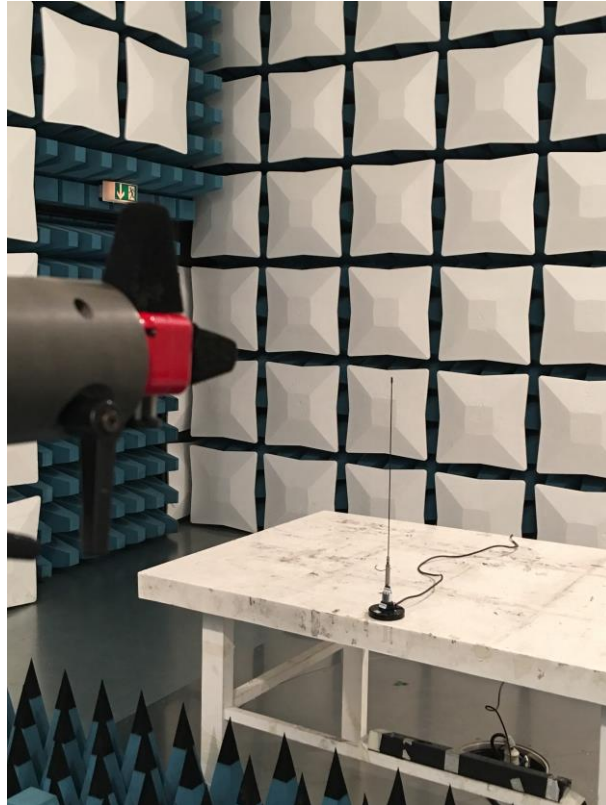
Part of the body/averaging points (m)	FCC Part 2.1091	
	Controlled RF Exposure	
	3.9dBi Antenna 92.11cm (mW/cm ²)	
Whole body (0.1 to 2.0)	0.95	
Lower body (0.1 to 0.9)	0.95	
Upper body (1.0 to 2.0)	0.82	

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 3.9dBi, the minimum mobile separation distance $R_{safe} = 92.11\text{cm}$.

3.8. Test Setup Photos of the EUT



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