FCC Part 27
Measurement and Test Report

For

KZ Broadband Technologies, Ltd.

1601 Tower C, Skyworth Building,High-tech Industrial Park,Nanshan District, Shenzhen, China

FCC ID: A28AM4000DB41

FCC Rules:	FCC Part 27
Product Description:	LTE Outdoor CPE
Tested Model:	AirMaster 4000D B41
Report No.:	STR16048223I-1
Tested Date:	2016-04-29 to 2016-05-12
Issued Date:	2016-05-12
Tested By:	Iven Guo / Engineer
Reviewed By:	Silin Chen / EMC Manager
Approved & Authorized By:	Jandy So / PSQ Manager

Prepared By:

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant:	KZ Broadband Technologies, Ltd.
Address of applicant:	1601 Tower C, Skyworth Building, High-tech Industrial Park, Nanshan District, Shenzhen, China
Manufacturer:	KZ Broadband Technologies, Ltd.
Address of manufacturer:	1601 Tower C, Skyworth Building, High-tech Industrial Park, Nanshan District, Shenzhen, China

General Description of EUT	
Product Name:	LTE Outdoor CPE
Trade Name:	AirMaster
Model No.:	AirMaster 4000D B41
Adding Model(s):	GLC130D-41, GWG130WV, AirMaster 4000M B41, AM4000D XXX, AM4000M XXX
IMEI:	864423020276464
Rated Voltage:	DC 24V/0.5A by PoE port
Power Adaptor:	Model: G0549-240-050
	INPUT: AC100-240V 50/60Hz OUTPUT: DC24V/0.5A
Device Category:	Fixed
Note: The test data is gathered from a production sample provided by the manufacturer. The appearance of others models listed in the report is different from main-test model AirMaster 4000D B41 but the circuit and the electronic construction do not change, declared by the manufacturer.	

Technical Characteristics of EUT	
Support Networks:	TDD-LTE
Support Band:	TDD-LTE Band 41
Uplink Frequency:	Tx: TDD-LTE Band 41: 2496-2690MHz
Downlink Frequency:	Rx: TDD-LTE Band 41: 2496-2690MHz
RF Output Power:	29.13dBm
Type of Emission:	17M9G7D, 17M9W7D
Type of Modulation:	QPSK, 16QAM
Antenna Type:	Integral Antenna
Antenna Gain:	13dBi

1.2 Test Standards

The following report is prepared on behalf of the KZ Broadband Technologies, Ltd. in accordance with FCC Part 2 subpart J, FCC Part 24 subpart E and FCC Part 27 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 2 subpart J, FCC Part 24 subpart E and FCC Part 27 of the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.3 Test Methodology

All measurements contained in this report were conducted with ANSI/TIA-603-D: 2010 and ANSI C63.4-2014, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

1.4 Test Facility

- **FCC – Registration No.: 934118**
  Shenzhen SEM.Test Technology Co., Ltd. EMC Laboratory 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 and the Registration is 934118.

- **Industry Canada (IC) Registration No.: 11464A**
  The 3m Semi-anechoic chamber of Shenzhen SEM.Test Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 11464A.

- **CNAS Registration No.: L4062**
  Shenzhen SEM.Test Technology Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 1/F, Building A, Hongwei Industrial Park, Liuxian 2nd Road, Bao'an District, Shenzhen, P.R.C (518101)

1.5 EUT Setup and Test Mode

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. All testing shall be performed under maximum output power condition, and to measure its highest possible emissions level, more detailed description as follows:

Test Mode List		
Test Mode	Description	Remark
TM1	TDD-LTE Band 41	Low, Middle, High Channels

EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
Adapter Cable	0.8	Unshielded	Without Ferrite
RJ45	2.0	Unshielded	Without Ferrite

Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
RJ45	1.5	Unshielded	Without Ferrite

Special Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
PC	DELL	OPTIPLEX 380	/

1.6 Test Equipment List and Details

Kind of Equipment	Manufacturer	Type	S/N	Cal Date	Due Date
Equipment list of < Shenzhen SEM.Test Technology Co., Ltd.>					
Test SIM card	-	-	-	N/A	
Communication Tester	Rohde & Schwarz	CMW500	148650	2015-06-17	2016-06-16
Spectrum Analyzer	Agilent	E4407B	MY41440400	2015-06-17	2016-06-16
Spectrum Analyzer	Agilent	N9020A	US47140102	2015-06-17	2016-06-16
Signal Generator	Agilent	83752A	3610A01453	2015-06-17	2016-06-16
Vector Signal Generator	Agilent	N5182A	MY47070202	2015-06-17	2016-06-16
Power Divider	Weinschel	1506A	PM204	2015-06-17	2016-06-16
Power Divider	RF-Lambda	RFLT4W5M18G	14110400027	2015-06-17	2016-06-16
Spectrum Analyzer	Rohde & Schwarz	FSP	836079/035	2015-06-17	2016-06-16
EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2015-06-17	2016-06-16
Amplifier	Agilent	8447F	3113A06717	2015-06-17	2016-06-16
Amplifier	C&D	PAP-1G18	2002	2015-06-17	2016-06-16
Broadband Antenna	Schwarz beck	VULB9163	9163-333	2015-06-17	2016-06-16
Horn Antenna	ETS	3117	00086197	2015-06-17	2016-06-16
Horn Antenna	ETS	3116B	00088203	2015-06-17	2016-06-16

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 1.1307, § 2.1093	RF Exposure	Compliant
§ 22.913 (a), § 24.232 (c), §27.50(d)	RF Output Power	Compliant
§ 24.51, § 27.50	Peak-to-average Radio (PAR) of Transmitter	N/A
§ 22.917 (b), § 24.238 (b), § 27.53	Emission Bandwidth	Compliant
§ 22.917 (a), § 24.238 (a), § 27.53(h)	Spurious Emissions at Antenna Terminal	Compliant
§ 22.917 (a), § 24.238 (a), § 27.53(h)	Spurious Radiation Emissions	Compliant
§ 27.53(m)	Out of Band Emissions	Compliant
§ 22.355, § 24.235, § 27.54	Frequency Stability	Compliant

N/A: not applicable

3. RF Exposure

3.1 Standard Applicable

According to § 1.1307 and § 2.1093, the portable transmitter must comply the RF exposure requirements.

3.2 Test Result

This product complied with the requirement of the RF exposure, please see the SAR report.

4. RF Output Power

4.1 Standard Applicable

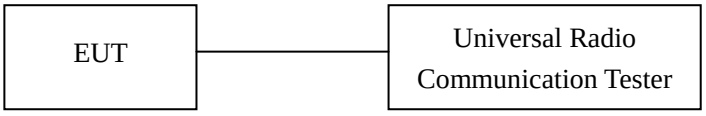
According to §22.913(a)(2), The ERP of mobile and portable stations transmitters and auxiliary test transmitters must not exceed 7 Watts.

According to §24.232 (c), Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

According to §27.50(d)(4), Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.

4.2 Test Procedure

Conducted output power test method:



Radiated power test method:

1.The setup of EUT is according with per ANSI/TIA-603-D: 2010 and ANSI C63.4-2014 measurement procedure.
2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.
3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.

4. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

4.3 Environmental Conditions

Temperature:	24 °C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

4.4 Summary of Test Results/Plots

Max. Radiated Power:

TDD-LTE Band 41

Channel Bandwidth: 5 MHz			
Modulation	Channel	E.i.r.p [dBm]	Verdict
QPSK	LCH	28.93	PASS
	MCH	27.07	PASS
	HCH	27.56	PASS
16QAM	LCH	28.62	PASS
	MCH	27.58	PASS
	HCH	27.86	PASS
Channel Bandwidth: 10 MHz			
Modulation	Channel	E.i.r.p [dBm]	Verdict
QPSK	LCH	28.77	PASS
	MCH	27.03	PASS
	HCH	27.61	PASS
16QAM	LCH	27.33	PASS
	MCH	28.53	PASS
	HCH	28.75	PASS
Channel Bandwidth: 15 MHz			
Modulation	Channel	E.i.r.p [dBm]	Verdict
QPSK	LCH	27.28	PASS
	MCH	28.32	PASS
	HCH	27.45	PASS
16QAM	LCH	28.42	PASS
	MCH	28.63	PASS
	HCH	28.04	PASS
Channel Bandwidth: 20 MHz			
Modulation	Channel	E.i.r.p [dBm]	Verdict
QPSK	LCH	28.48	PASS
	MCH	28.23	PASS
	HCH	28.56	PASS
16QAM	LCH	28.98	PASS
	MCH	29.13	PASS
	HCH	28.61	PASS

Max. Conducted Output Power

Please refer to Appendix of_LTE Band 41 Appendix A: Average Power Output Data

Test result: Pass

5. Emission Bandwidth

5.1 Standard Applicable

According to §22.917(b), The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

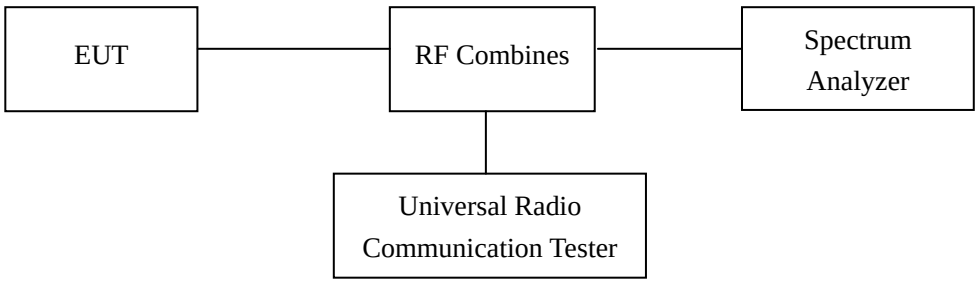
According to §24.238(b), The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

According to §27.53, The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

5.2 Test Procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 30kHz and the 26dB bandwidth was recorded.

Test Configuration for the emission bandwidth testing:



5.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

5.4 Summary of Test Results/Plots

Please refer to Appendix of_LTE Band 41 Appendix B: 26dB Bandwidth and Occupied Bandwidth

Test result: Pass

6. Out of Band Emissions at Antenna Terminal

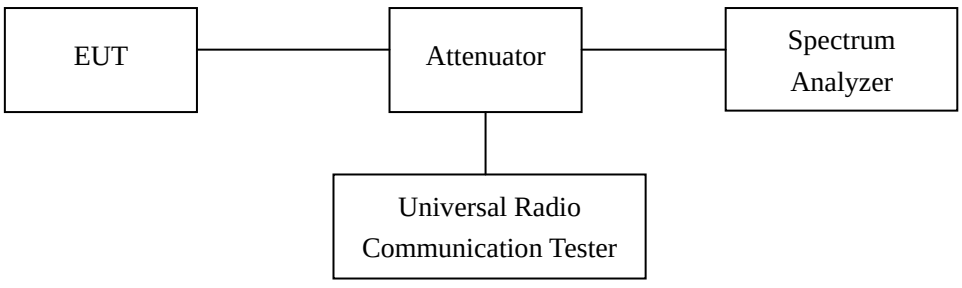
6.1 Standard Applicable

According to §27.53 (m), (4) For mobile digital stations, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.
(6) Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed; for mobile digital stations, in the 1 megahertz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed, except when the 1 megahertz band is 2495-2496 MHz, in which case a resolution bandwidth of at least one percent may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 megahertz or 1 percent of emission bandwidth, as specified; or 1 megahertz or 2 percent for mobile digital stations, except in the band 2495-2496 MHz). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. With respect to television operations, measurements must be made of the separate visual and aural operating powers at sufficiently frequent intervals to ensure compliance with the rules.

6.2 Test Procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 100kHz and 1MHz for the scan frequency from 30MHz to 1GHz and the scan frequency from 1GHz to up to 10th harmonic.

Test Configuration for the out of band emissions testing:



6.3 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	53%
ATM Pressure:	1018 mbar

6.4 Summary of Test Results/Plots

Please refer to Appendix of_LTE Band 41 Appendix C&D: Band Edge & Conducted Spurious Emission
Test result: Pass

7. Spurious Radiated Emissions

7.1 Measurement Uncertainty

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is ±5.20 dB.

7.2 Standard Applicable

According to §22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

According to §27.53 (h), the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB.

According to §27.53 (g), the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB.

7.3 Test Procedure

1. The setup of EUT is according with per ANSI/TIA-603-D: 2010 and ANSI C63.4-2014 measurement procedure.
2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.
3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.
4. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious attenuation limit in dB =43+10 Log_{10} (power out in Watts)

7.4 Environmental Conditions

Temperature:	25 °C
Relative Humidity:	52%
ATM Pressure:	1012 mbar

7.5 Summary of Test Results/Plots

According to the data below, the FCC Part 22.917 and 24.238 standards, and had the worst margin of:

Note: 1. this EUT was tested in 3 orthogonal positions and the worst case position (Vertical) data was reported.

2. All test modes (different bandwidth and different modulation) are performed, but only the worst case is recorded in this report.

Spurious Emission From 30MHz to 26.5GHz
For TDD_LTE Band 41 Mode

Frequency	SG Reading	Angle	Height	Polar	Correct （dB）	Result dBm	Limit dBm	Margin dB
MHz	dBm	Degree	Meter	H/V				
Low Channel (2506MHz)								
110.18	-41.98	208	1.4	H	2.17	-39.81	-13	-26.81
110.18	-38.09	264	1.6	V	2.17	-35.92	-13	-22.92
5012.00	-35.56	274	1.6	H	11.34	-24.22	-13	-11.22
5012.00	-38.33	151	1.6	V	11.34	-26.99	-13	-13.99
7518.00	-43.28	247	1.5	H	13.25	-30.03	-13	-17.03
7518.00	-44.18	122	1.6	V	13.25	-30.93	-13	-17.93
Middle Channel (2593MHz)								
110.18	-35.06	214	1.4	H	2.17	-32.89	-13	-19.89
110.18	-40.40	131	1.5	V	2.17	-38.23	-13	-25.23
5186.00	-39.64	281	1.5	H	11.69	-27.95	-13	-14.95
5186.00	-35.34	152	1.5	V	11.69	-23.65	-13	-10.65
7779.00	-42.05	229	1.4	H	13.42	-28.63	-13	-15.63
7779.00	-43.87	210	1.6	V	13.42	-30.45	-13	-17.45
High Channel (2680MHz)								
110.18	-43.56	202	1.3	H	2.17	-41.39	-13	-28.39
110.18	-46.49	297	1.3	V	2.17	-44.32	-13	-31.32
5360.00	-35.07	169	1.4	H	11.71	-23.36	-13	-10.36
5360.00	-37.13	180	1.5	V	11.71	-25.42	-13	-12.42
8040.00	-42.62	193	1.6	H	13.91	-28.71	-13	-15.71
8040.00	-43.64	274	1.4	V	13.91	-29.73	-13	-16.73

Note: Result=Reading+ Correct, Margin= Result- Limit

Testing is carried out with frequency rang 9kHz to 20GHz, which above 3th Harmonics are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured, so the data is not display.

8. Frequency Stability

8.1 Standard Applicable

According to §22.355, the carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations

According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

According to §27.54 The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

8.2 Test Procedure

According to §2.1055, the following test procedure was performed.
The Frequency Stability is measured directly with a Frequency Domain Analyzer. Frequency Deviation in ppm is calculated from the measured peak to peak value.
The Carrier Frequency Stability over Power Supply Voltage and over Temperature is measured with a Frequency Domain Analyzer in histogram mode

Temperature:	Supply Voltage
20°C	AC 102-138V
-40°C to +55°C	Normal

8.3 Environmental Conditions

Temperature:	20°C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

8.4 Summary of Test Results/Plots

Please refer to Appendix of_LTE Band 41 Appendix E: Frequency Stability

Test result: Pass

******* END OF REPORT *******