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: A28AM4000D12

FCC Rules:	FCC Part 27
Product Description:	LTE Outdoor CPE
Tested Model:	AirMaster 4000D B12/17
Report No.:	STR16118193I-1
Tested Date:	2016-11-22 to 2016-11-25
Issued Date:	2016-11-28
Tested By:	Iven Guo / Engineer
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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
Brand Name:	AirMaster
Model No.:	AirMaster 4000D B12/17
Adding Model(s):	My-PRO-KZ-B12-B17, AirMaster 4000P B12/17 AirMaster 4000M B12/17
Power Adapter:	Model: G0549-480-032 Input: 100-240V,50/60Hz, Output: DC48V,0.32A
Rated Voltage:	DC 48V
Device Category:	Fixed Device
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 B12/17, but the circuit and the electronic construction do not change, declared by the manufacturer.	

Technical Characteristics of EUT: Main board	
4G	
Support Networks:	FDD-LTE
Support Band:	FDD-LTE Band 12, 17
Uplink Frequency:	FDD-LTE Band 12: Tx: 699-716MHz, FDD-LTE Band 17: Tx: 704-716MHz
Downlink Frequency:	FDD-LTE Band 12: Rx: 729-746MHz, FDD-LTE Band 17: Rx: 734-746MHz
RF Output Power(Conducted):	FDD-LTE Band 12: 23.89Bm, FDD-LTE Band 17: 24.43dBm
Type of Emission:	FDD-LTE Band 12: 9M00G7D, 9M00W7D FDD-LTE Band 17: 9M01G7D, 9M02W7D
Type of Modulation:	QPSK, 16QAM
Antenna Type:	Integral Antenna
Antenna Gain:	FDD-LTE Band 12: 5.0dBi, FDD-LTE Band 17:5.0dBi,

1.2 Test Standards

The following report is prepared on behalf of the KZ BroadBand Technologies, Ltd. in accordance with FCC Part 27 of the Federal Communication Commissions rules.

The objective is to determine compliance with 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. The measurement guide KDB 971168 D01 Power Meas License Digital Systems v02r02 shall be performed also.

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	FDD-LTE Band12	Low, Middle, High Channels
TM2	FDD-LTE Band 17	Low, Middle, High Channels

EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
Adapter Cable	0.6	Shielded	Without Ferrite

Auxiliary Equipment List and Details

Description	Manufacturer	Model	Serial Number
/	/	/	/

Special Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
/	/	/	/

1.6 Measurement Uncertainty

Measurement uncertainty		
Parameter	Conditions	Uncertainty
RF Output Power	Conducted	±0.42dB
Occupied Bandwidth	Conducted	±1.5%
Frequency Stability	Conducted	2.3%
Transmitter Spurious Emissions	Radiated	±5.1dB
Transmitter Spurious Emissions	Conducted	±0.42dB

1.7 Test Equipment List and Details

No.	Description	Manufacturer	Model	Serial No.	Cal Date	Due. Date
SEMT-1075	Communication Tester	Rohde & Schwarz	CMW500	148650	2016-06-04	2017-06-03
SEMT-1034	GSM Tester	Rohde & Schwarz	CMU200	104036	2016-06-04	2017-06-03
SEMT-1072	Spectrum Analyzer	Agilent	E4407B	MY41440400	2016-06-04	2017-06-03
SEMT-1079	Spectrum Analyzer	Agilent	N9020A	US47140102	2016-06-04	2017-06-03
SEMT-1080	Signal Generator	Agilent	83752A	3610A01453	2016-06-04	2017-06-03
SEMT-1081	Vector Signal Generator	Agilent	N5182A	MY47070202	2016-06-04	2017-06-03
SEMT-1028	Power Divider	Weinschel	1506A	PM204	2016-06-04	2017-06-03
SEMT-1082	Power Divider	RF-Lambda	RFLT4W5M18G	14110400027	2016-06-04	2017-06-03
SEMT-1031	Spectrum Analyzer	Rohde & Schwarz	FSP30	836079/035	2016-06-04	2017-06-03
SEMT-1007	EMI Test Receiver	Rohde & Schwarz	ESVB	825471/005	2016-06-04	2017-06-03
SEMT-1008	Amplifier	Agilent	8447F	3113A06717	2016-06-04	2017-06-03
SEMT-1043	Amplifier	C&D	PAP-1G18	2002	2016-06-04	2017-06-03
SEMT-1069	Loop Antenna	Schwarz beck	FMZB 1516	9773	2016-06-04	2017-06-03
SEMT-1068	Broadband Antenna	Schwarz beck	VULB9163	9163-333	2016-06-04	2017-06-03
SEMT-1042	Horn Antenna	ETS	3117	00086197	2016-06-04	2017-06-03
SEMT-1121	Horn Antenna	ETS	3116B	00088203	2016-06-04	2017-06-03

2. SUMMARY OF TEST RESULTS

FCC Rules	Description of Test Item	Result
§ 1.1307, § 2.1093	RF Exposure	Compliant
§27.50	RF Output Power	Compliant
§ 27.50	Peak-to-average Ratio (PAR) of Transmitter	Compliant
§ 27.53	Emission Bandwidth	Compliant
§ 27.53	Spurious Emissions at Antenna Terminal	Compliant
§ 27.53	Spurious Radiation Emissions	Compliant
§ 27.53	Out of Band Emissions	Compliant
§ 27.54	Frequency Stability	Compliant

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 RF exposure report.

4. RF Output Power

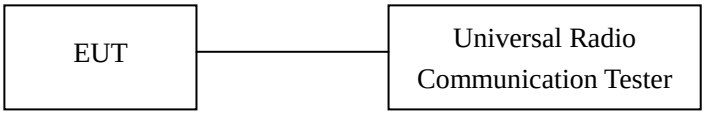
4.1 Standard Applicable

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.

According to §27.50(c)(10), Portable stations (hand-held devices) in the 698-746 MHz band are limited to 3 watts ERP.

4.2 Test Procedure

Conducted output power test method:



Radiated power test method:

1.The setup of EUT is according with per ANSI/TIA Standard 603D 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:

FDD-LTE Band 12

Channel Bandwidth: 5 MHz			
Modulation	Channel	E.r.p [dBm]	Verdict
QPSK	LCH	24.14	PASS
	MCH	24.72	PASS
	HCH	23.73	PASS
16QAM	LCH	23.74	PASS
	MCH	24.16	PASS
	HCH	23.96	PASS
Channel Bandwidth: 10 MHz			
Modulation	Channel	E.r.p [dBm]	Verdict
QPSK	LCH	24.01	PASS
	MCH	24.11	PASS
	HCH	24.82	PASS
16QAM	LCH	24.07	PASS
	MCH	23.28	PASS
	HCH	23.45	PASS

FDD-LTE Band 17

Channel Bandwidth: 5 MHz			
Modulation	Channel	E.r.p [dBm]	Verdict
QPSK	LCH	23.53	PASS
	MCH	23.14	PASS
	HCH	24.60	PASS
16QAM	LCH	23.41	PASS
	MCH	24.61	PASS
	HCH	24.17	PASS
Channel Bandwidth: 10 MHz			
Modulation	Channel	E.r.p [dBm]	Verdict
QPSK	LCH	23.94	PASS
	MCH	23.81	PASS
	HCH	24.66	PASS
16QAM	LCH	24.09	PASS
	MCH	24.82	PASS
	HCH	23.98	PASS

Max. Conducted Output Power

Please refer to Appendix A: Average Power Output Data

Test result: Pass

5. Peak-to-average Ratio (PAR) of Transmitter

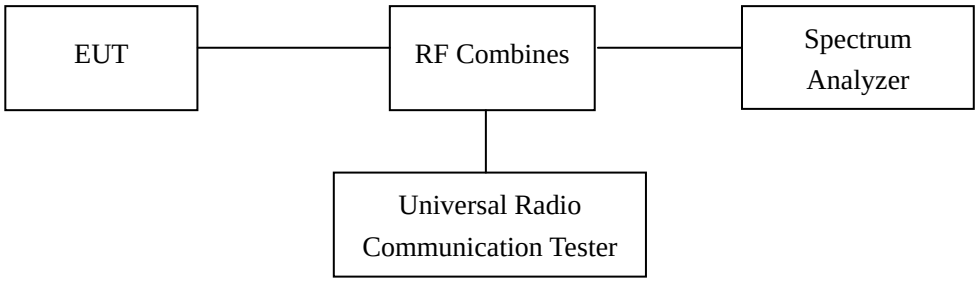
5.1 Standard Applicable

According to §27.50(B), the peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB. The PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that PAPR will not exceed 13 dB for more than 0.1 percent of the time or other Commission approved procedure. The measurement must be performed using a signal corresponding to the highest PAPR expected during periods of continuous transmission.

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 peak-to-average ratio (PAR) of the transmission was recorded. Record the maximum PAPR level associated with a probability of 0.1%.

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

Please refer to Appendix B: Peak-to-Average Ratio

Test result: Pass

6. Emission Bandwidth

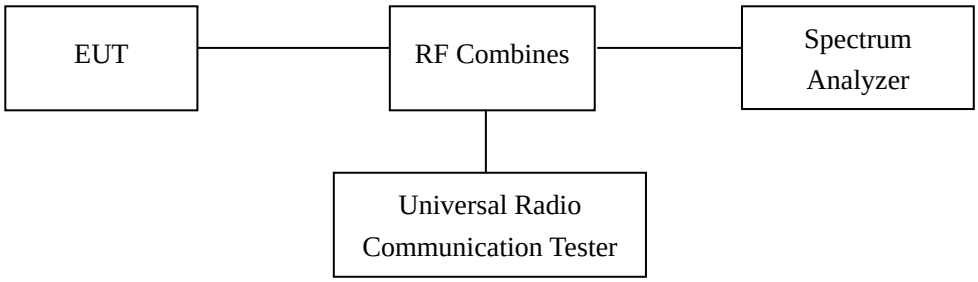
6.1 Standard Applicable

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.

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 30kHz and the 26dB bandwidth was recorded.

Test Configuration for the emission bandwidth testing:



6.3 Environmental Conditions

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

6.4 Summary of Test Results/Plots

Please refer to Appendix C: 26dB Bandwidth and Occupied Bandwidth

Test result: Pass

7. Out of Band Emissions at Antenna Terminal

7.1 Standard Applicable

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.

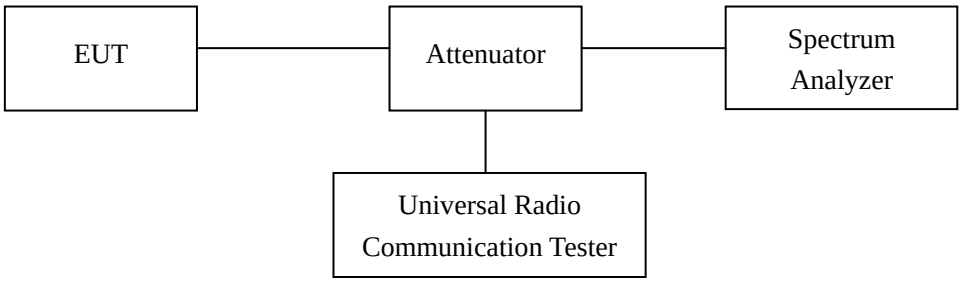
According to §27.53 (g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB.

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.

7.2 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:



7.3 Environmental Conditions

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

7.4 Summary of Test Results/Plots

Please refer to Appendix D & E: Band Edge & Conducted Spurious Emission

Test result: Pass

8. Spurious Radiated Emissions

8.1 Standard Applicable

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.

8.2 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)

8.3 Environmental Conditions

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

8.4 Summary of Test Results/Plots

According to the data below, the FCC Part 27.53 standards, and had the worst margin of:

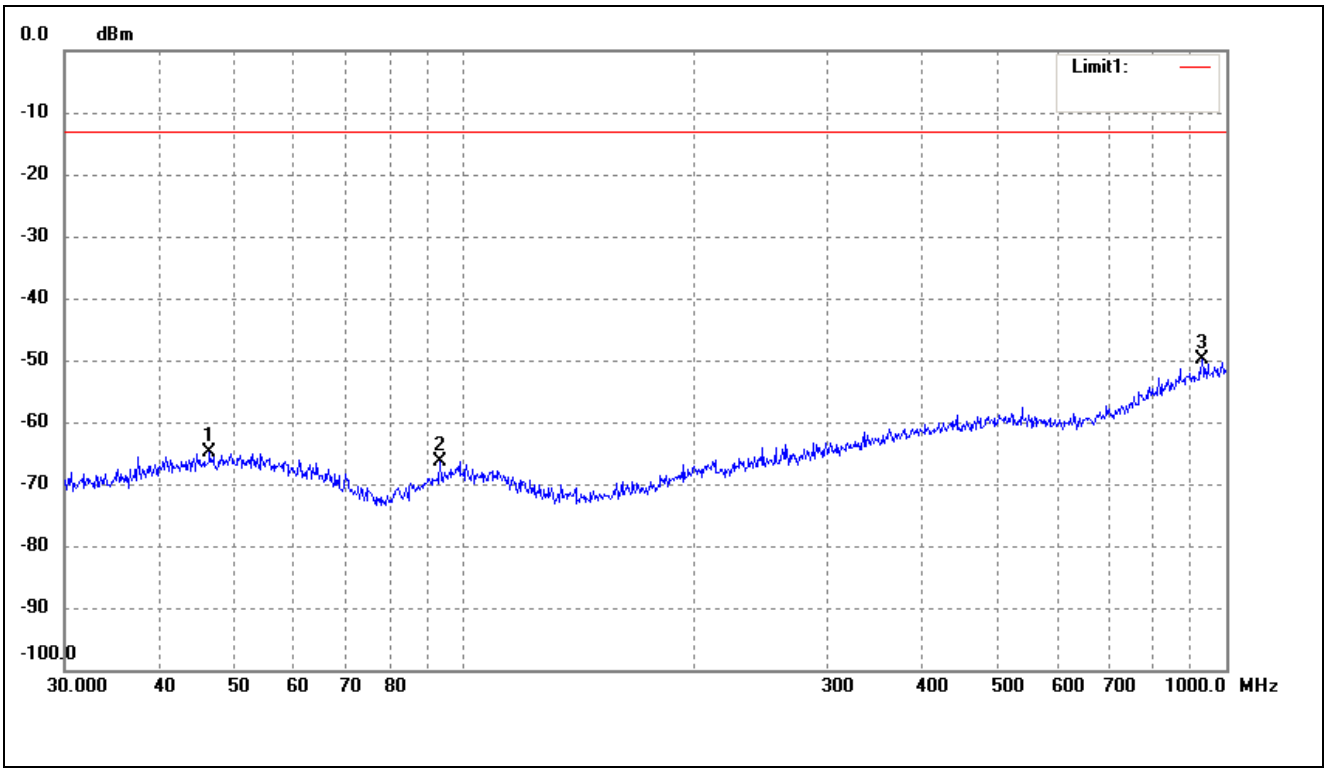
Note: 1. this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

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 1GHz

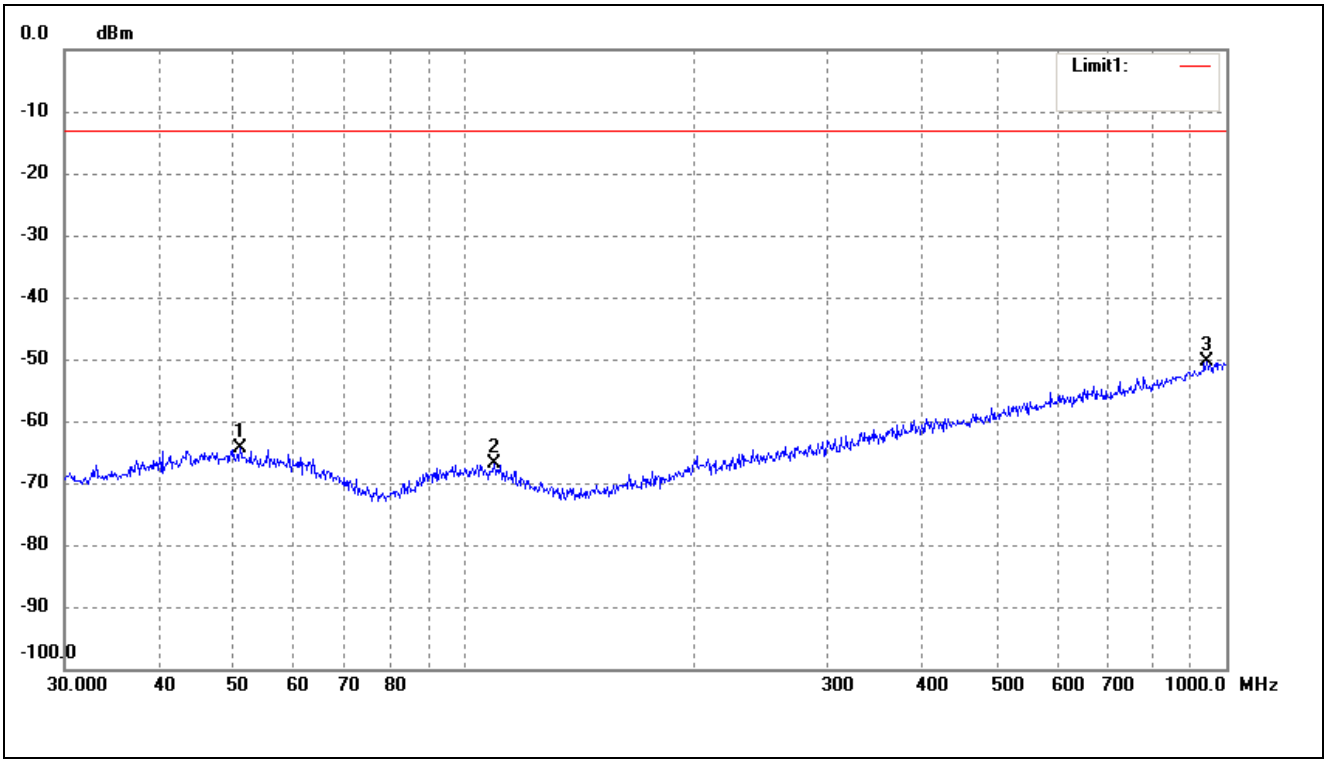
For FDD_LTE Band 12 Mode

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	46.5030	-69.18	4.34	-64.84	-13.00	-51.84	ERP
2	93.1132	-67.56	1.23	-66.33	-13.00	-53.33	ERP
3	929.0082	-67.31	17.50	-49.81	-13.00	-36.81	ERP

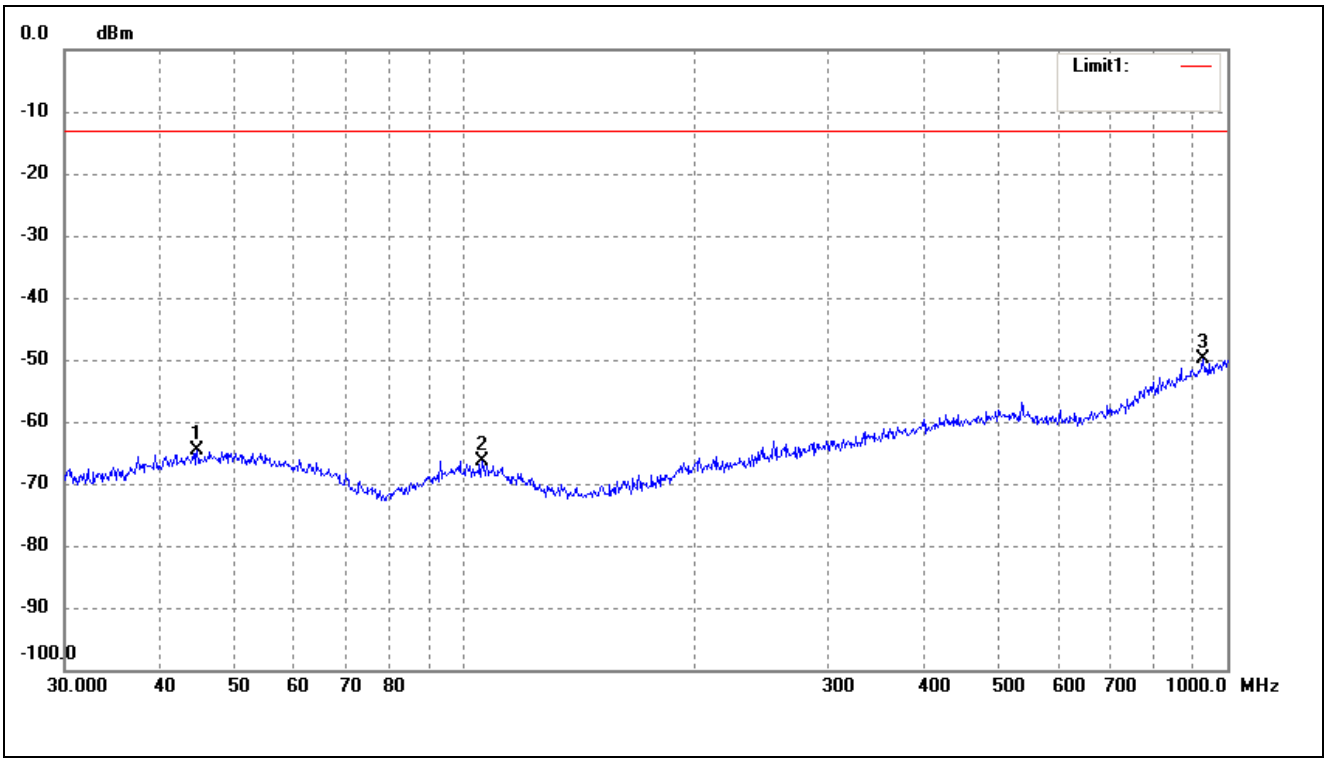
Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	50.9420	-68.67	4.26	-64.41	-13.00	-51.41	ERP
2	109.7960	-69.05	2.20	-66.85	-13.00	-53.85	ERP
3	942.1305	-67.99	17.64	-50.35	-13.00	-37.35	ERP

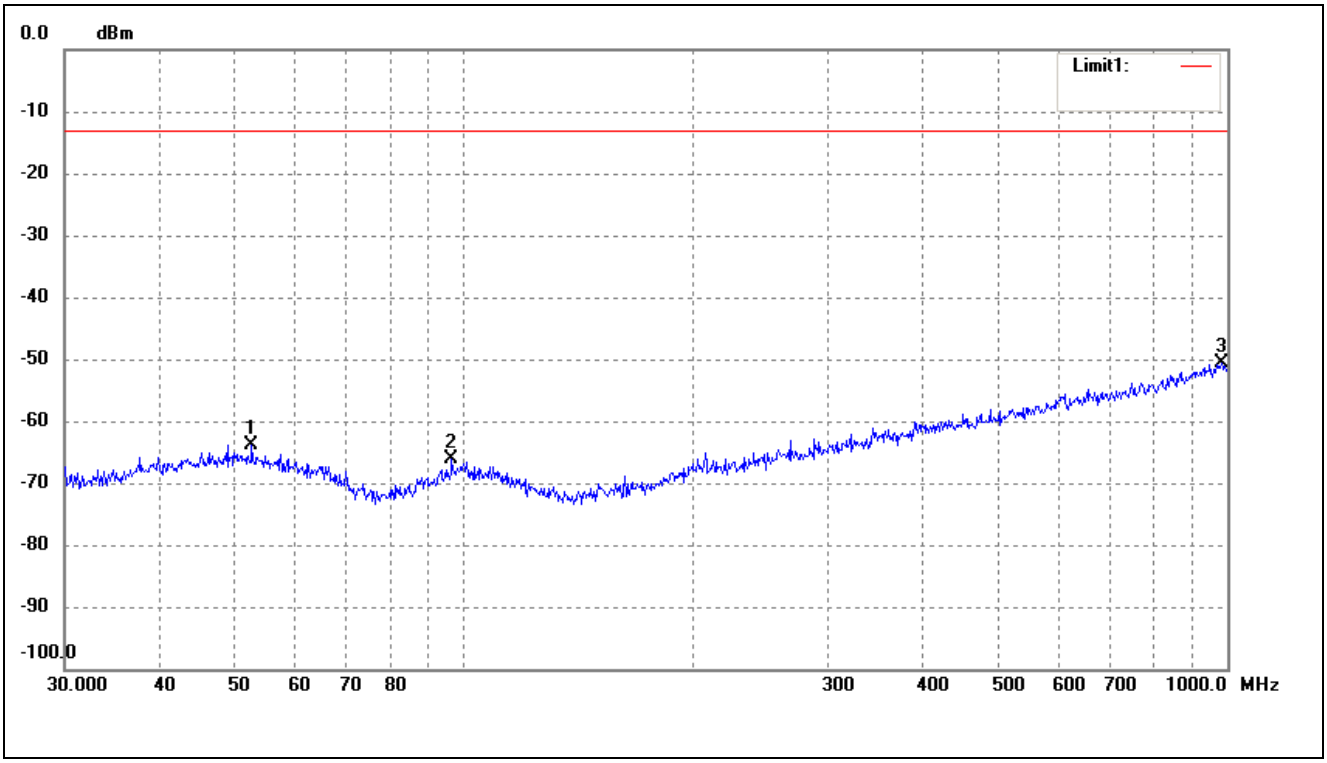
For FDD_LTE Band 17 Mode

Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	44.7434	-68.86	4.28	-64.58	-13.00	-51.58	ERP
2	105.6415	-68.50	2.22	-66.28	-13.00	-53.28	ERP
3	929.0082	-67.31	17.50	-49.81	-13.00	-36.81	ERP

Vertical:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	52.7600	-67.91	4.07	-63.84	-13.00	-50.84	ERP
2	96.4362	-67.90	1.81	-66.09	-13.00	-53.09	ERP
3	982.6200	-68.92	18.22	-50.70	-13.00	-37.70	ERP

Note: Margin= (Reading+ Correct)- Limit

Spurious Emissions Above 1GHz

For FDD_LTE Band 12Mode

Frequency	Reading	Correct	Result	Limit	Margin	Polar
(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	H/V
Low Channel (701.5MHz)						
1403.00	-32.44	3.81	-28.63	-13	-15.63	H
2104.50	-31.72	7.18	-24.54	-13	-11.54	H
1403.00	-32.8	3.81	-28.99	-13	-15.99	V
2104.50	-30.87	7.18	-23.69	-13	-10.69	V
Middle Channel (707.5MHz)						
1415.00	-29.07	3.85	-25.22	-13	-12.22	H
2122.50	-28.08	7.23	-20.85	-13	-7.85	H
1415.00	-30.31	3.85	-26.46	-13	-13.46	V
2122.50	-28.11	7.23	-20.88	-13	-7.88	V
High Channel (713.5MHz)						
1427.00	-28.31	4.17	-24.14	-13	-11.14	H
2140.50	-30.34	7.93	-22.41	-13	-9.41	H
1427.00	-30.19	4.17	-26.02	-13	-13.02	V
2140.50	-33.38	7.93	-25.45	-13	-12.45	V

For FDD_LTE Band 17 Mode

Frequency	Reading	Correct	Result	Limit	Margin	Polar
(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	H/V
Low Channel (706.5MHz)						
1413.00	-30.93	3.85	-27.08	-13	-14.08	H
2119.50	-32.8	7.23	-25.57	-13	-12.57	H
1413.00	-34.5	3.85	-30.65	-13	-17.65	V
2119.50	-28.61	7.23	-21.38	-13	-8.38	V
Middle Channel (710MHz)						
1420.00	-34.54	3.93	-30.61	-13	-17.61	H
2130.00	-31.5	7.46	-24.04	-13	-11.04	H
1420.00	-29.31	3.93	-25.38	-13	-12.38	V
2130.00	-30.22	7.46	-22.76	-13	-9.76	V
High Channel (713.5MHz)						
1427.00	-31.72	4.17	-27.55	-13	-14.55	H
2140.50	-33.59	7.93	-25.66	-13	-12.66	H
1427.00	-33.21	4.17	-29.04	-13	-16.04	V
2140.50	-27.51	7.93	-19.58	-13	-6.58	V

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.

9. Frequency Stability

9.1 Standard Applicable

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

9.2 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	DC 43-58V declared by manufacturer
-40°C to +55°C	Normal

9.3 Environmental Conditions

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

9.4 Summary of Test Results/Plots

Please refer to Appendix F: Frequency Stability

Test result: Pass

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