

FCC Part 22H & 24E & 27 Measurement and Test Report

For

JALA ASIA LTD.

SUITE 1004, 10TH FLOOR, BANK OF AMERICA TOWER, 12

HARCOURT ROAD, CENTRAL, HONGKONG

FCC ID: 2AFYR-ENTELE5

FCC Rules: FCC Part 24H, FCC Part 24E, FCC Part 27

Product Description: Smart phone

Tested Model: Entel E5

Report No.: STR15098139I-2

Tested Date: 2015-09-21 to 2015-09-19

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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen SEM. Test Technology Co., Ltd.

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1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: JALA ASIA LTD.
Address of applicant: SUITE 1004, 10TH FLOOR, BANK OF AMERICA TOWER, 12 HARCOURT ROAD, CENTRAL, HONGKONG
Manufacturer: JALA ASIA LTD.
Address of manufacturer: SUITE 1004, 10TH FLOOR, BANK OF AMERICA TOWER, 12 HARCOURT ROAD, CENTRAL, HONGKONG

General Description of EUT:	
Product Name:	Smart phone
Brand Name:	entel
Model No.:	Entel E5
Adapter Model:	Entel
	INPUT:100-240V,50/60Hz,0.5A; OUTPUT:5V,1A/2.1A
Hardware version:	N316B-13
Software version:	V158.100YP.1.10092015
Rated Voltage:	DC 3.8V Li-ion Battery
Battery Capacity:	2200mAh
Device Category:	Portable Device
<i>The EUT Main board support GSM850/900/DCS1800/PCS1900, WCDMA Band 2/5, LTE Band 4 function. It is intended for speech, Multimedia Message Service (MMS) transmission and Entel E5 It is equipped with GPRS/EDGE class 12 for GSM850/900/DCS1800/PCS1900, GPS, FM, Bluetooth and Wi-Fi functions. For more information see the following datasheet</i>	
<i>Note: The test data is gathered from a production sample provided by the manufacturer.</i>	

Technical Characteristics of EUT: Main board	
4G	
Support Networks:	FDD-LTE
Support Band:	FDD-LTE Band 4
Uplink Frequency:	FDD-LTE Band 4: Tx: 1710-1755MHz,
Downlink Frequency:	FDD-LTE Band 4: Rx: 2110-2155MHz,
RF Output Power:	FDD-LTE Band 4: 23.83dBm,
Type of Emission:	FDD-LTE Band 4: 17M9G7D, 17M9W7D
Type of Modulation:	QPSK, 16QAM
Antenna Type:	Integral Antenna
Antenna Gain:	FDD-LTE Band 4: -0.4dBi,

1.2 Test Standards

The following report is prepared on behalf of the JALA ASIA 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 TIA/EIA 603-C: 2004 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	FDD-LTE Band 2	Low, Middle, High Channels
TM2	FDD-LTE Band 4	Low, Middle, High Channels
TM3	FDD-LTE Band 5	Low, Middle, High Channels

EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
USB Cable	1.5	Shielded	Without Ferrite
OTG Cable	0.15	Unshielded	Without Ferrite
Earphone	1.1	Unshielded	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 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
Loop Antenna	Schwarz beck	FMZB 1516	9773	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	Peak-to-average Radio (PAR) of Transmitter	Compliant
§ 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
§ 22.917 (a), § 24.238 (a), § 27.53(h)	Out of Band Emissions	Compliant
§ 22.355, § 24.235, § 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 SAR report.

4. RF Output Power

4.1 Standard Applicable

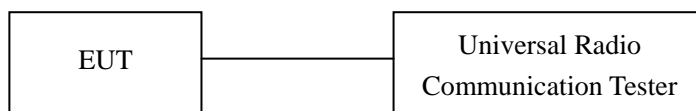
According to §22.913(a)(2), The ERP of mobile and portable stations transmitters and auxiliary test transmitters must not exceed 7 Watts.

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 TIA/EIA Standard 603C 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 4

Channel Bandwidth: 1.4 MHz			
Modulation	Channel	E.i.r.p [dBm]	Verdict
QPSK	LCH	23.07	PASS
	MCH	23.05	PASS
	HCH	22.89	PASS
16QAM	LCH	22.32	PASS
	MCH	22.38	PASS
	HCH	22.05	PASS
Channel Bandwidth: 3 MHz			
Modulation	Channel	E.i.r.p [dBm]	Verdict
QPSK	LCH	22.85	PASS
	MCH	22.88	PASS
	HCH	22.76	PASS
16QAM	LCH	22.27	PASS
	MCH	22.25	PASS
	HCH	22.19	PASS

Channel Bandwidth: 5 MHz			
Modulation	Channel	E.i.r.p [dBm]	Verdict
QPSK	LCH	23.03	PASS
	MCH	22.97	PASS
	HCH	23.12	PASS
16QAM	LCH	23.07	PASS
	MCH	23.12	PASS
	HCH	23.04	PASS
Channel Bandwidth: 10 MHz			
Modulation	Channel	E.i.r.p [dBm]	Verdict
QPSK	LCH	23.12	PASS
	MCH	23.07	PASS
	HCH	22.97	PASS
16QAM	LCH	22.94	PASS
	MCH	23.04	PASS
	HCH	23.10	PASS
Channel Bandwidth: 15 MHz			
Modulation	Channel	E.i.r.p [dBm]	Verdict
QPSK	LCH	23.04	PASS
	MCH	23.06	PASS
	HCH	22.93	PASS
16QAM	LCH	22.92	PASS
	MCH	22.95	PASS
	HCH	23.03	PASS
Channel Bandwidth: 20 MHz			
Modulation	Channel	E.i.r.p [dBm]	Verdict
QPSK	LCH	23.02	PASS
	MCH	22.95	PASS
	HCH	22.93	PASS
16QAM	LCH	22.98	PASS
	MCH	23.04	PASS
	HCH	23.10	PASS

Max. Conducted Output Power

Please refer to Appendix A: Average Power Output Data

Test result: Pass

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

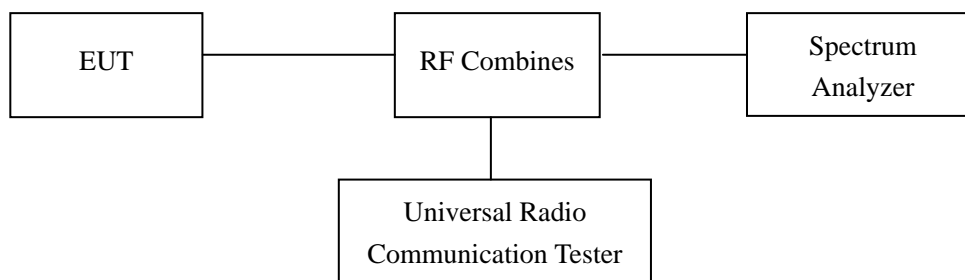
5.1 Standard Applicable

According to §24.232(d), Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

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.

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 §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.

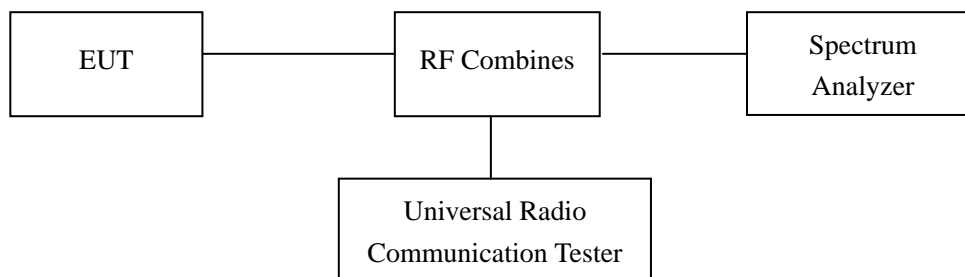
According to §24.238(b), The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

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.

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 §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.

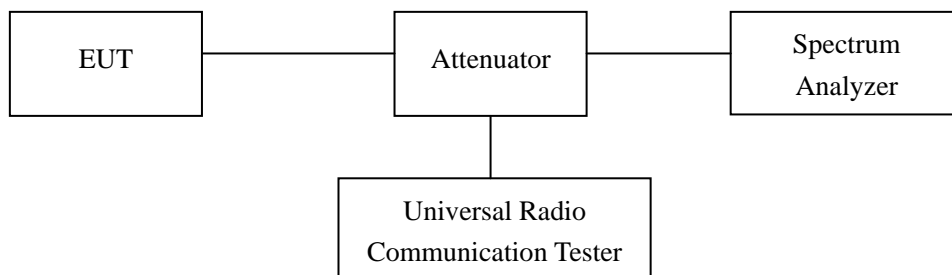
According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

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 $43 + 10 \log_{10}(P)$ dB.

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: Band Edge

Test result: Pass

8. Spurious Radiated Emissions

8.1 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.

8.2 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 $43 + 10 \log_{10}(P)$ dB.

8.3 Test Procedure

1. The setup of EUT is according with per TIA/EIA Standard 603C 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 = $43 + 10 \log_{10}(\text{power out in Watts})$

8.4 Environmental Conditions

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

8.5 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:

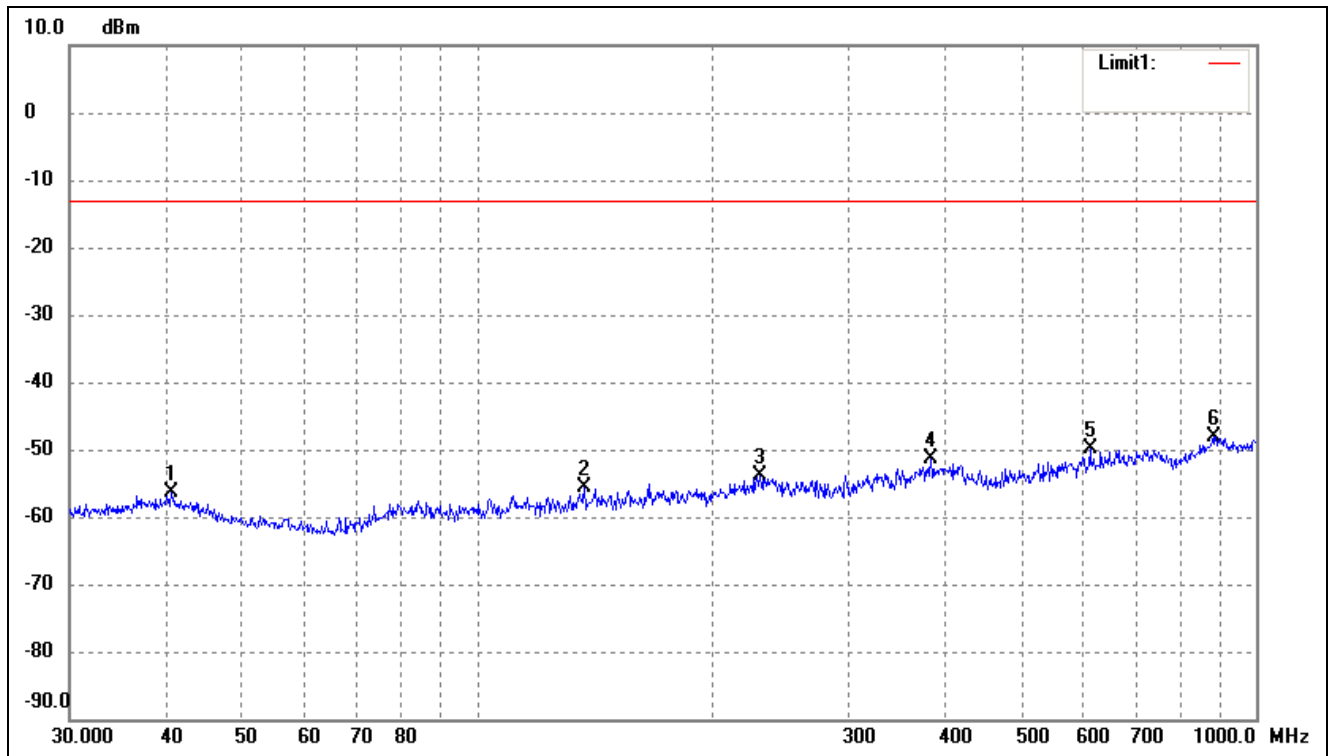
Note: 1. this EUT was tested in 3 orthogonal positions and the worst case position (Vertical) data was reported.

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 1GHz

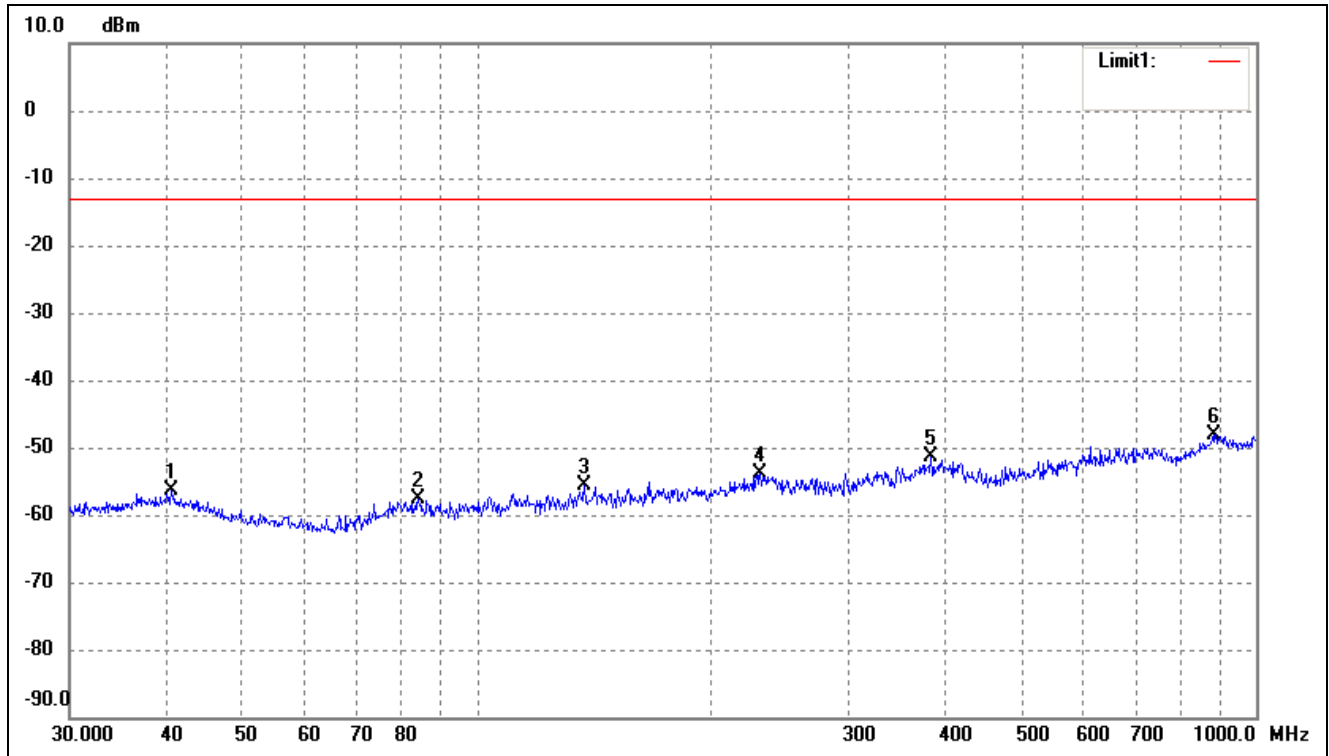
For FDD_LTE Band 4 Mode

Horizontal:



No.	Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	40.5591	-75.39	18.99	-56.40	-13.00	-43.40	ERP
2	137.4202	-69.93	14.41	-55.52	-13.00	-42.52	ERP
3	230.9068	-71.46	17.57	-53.89	-13.00	-40.89	ERP
4	382.5879	-72.45	21.12	-51.33	-13.00	-38.33	ERP
5	612.0642	-74.08	24.28	-49.80	-13.00	-36.80	ERP
6*	881.4067	-76.71	28.62	-48.09	-13.00	-35.09	ERP

Vertical:



No.	Frequency (MHz)	Reading (dBm)	Correct dB	Result (dBm)	Limit (dBm)	Margin (dB)	Remark
1	40.5591	-77.28	20.88	-56.40	-13.00	-43.40	ERP
2	84.1100	-71.40	13.88	-57.52	-13.00	-44.52	ERP
3	137.4202	-69.93	14.41	-55.52	-13.00	-42.52	ERP
4	230.9068	-71.46	17.57	-53.89	-13.00	-40.89	ERP
5	382.5879	-72.45	21.12	-51.33	-13.00	-38.33	ERP
6*	881.4067	-76.71	28.62	-48.09	-13.00	-35.09	ERP

Note: $\text{Margin} = (\text{Reading} + \text{Correct}) - \text{Limit}$

Spurious Emissions Above 1GHz

For FDD_LTE Band 4 Mode

Frequency	Reading	Correct	Result	Limit	Margin	Polar
(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	H/V
Low Channel (1710.0MHz)						
3420.00	-51.99	9.87	-42.12	-13	-29.12	H
5130.00	-59.24	13.02	-46.22	-13	-33.22	H
3420.00	-48.29	9.87	-38.42	-13	-25.42	V
5130.00	-52.66	13.02	-39.64	-13	-26.64	V
Middle Channel (1732.5MHz)						
3465.00	-52.08	9.96	-42.12	-13	-29.12	H
5197.50	-57.14	13.32	-43.82	-13	-30.82	H
3465.00	-47.39	9.96	-37.43	-13	-24.43	V
5197.50	-52.97	13.32	-39.65	-13	-26.65	V
High Channel (1755.0MHz)						
3510.00	-51.57	10.03	-41.54	-13	-28.54	H
5265.00	-56.97	14.03	-42.94	-13	-29.94	H
3510.00	-48.57	10.03	-38.54	-13	-25.54	V
5265.00	-53.79	14.03	-39.76	-13	-26.76	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 §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:

Frequency Tolerance for Cellular Band

Frequency range (MHz)	Base, fixed (ppm)	Mobile ≤3 watts (ppm)	Mobile ≤3 watts (ppm)
25 to 50	20.0	20.0	50.0
50 to 450	5.0	5.0	50.0
450 to 512	2.5	5.0	5.0
821 to 896	1.5	2.5	2.5
928 to 929	5.0	N/A	N/A
929 to 960	1.5	N/A	N/A
2110 to 2220	10.0	N/A	N/A

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.

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	85-115% of declared nominal voltage
-30°C to +50°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 *****