

FCC Part 27 Measurement and Test Report

For

JACS Solutions, LLC

8808 Centre Park Drive, Suite 305, Columbia, MD21045, USA

FCC ID: 2AGCD-JACS800V

FCC Rules: FCC Part 27

Product Description: <u>Tablets</u>

Tested Model: TT800V

Report No.: <u>STR16018131I-4</u>

Tested Date: <u>2016-04-10 to 2016-04-25</u>

Issued Date: <u>2016-04-25</u>

Tested By: Iven Guo / Engineer

Reviewed By: Silin Chen / EMC Manager

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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: JACS Solutions, LLC

Address of applicant: 8808 Centre Park Drive, Suite 305, Columbia,

MD21045, USA

Manufacturer:

Address of manufacturer: Xiamen Candour Co., Ltd

19F C&D International Building 1669 Huandao East

Road, Xiamen, Fujian, China

General Description of EUT	
Product Name:	Tablets
Trade Name:	JACS SOLUTIONS
Model No.:	TT800V
Adding Model(s):	/
Hardware Version:	BS-M81FPG-V1.0
Software Version:	TT800VF1204USV01
IMEI:	354019060171495
Rated Voltage:	Battery: DC 3.7V(6200mAh)

Note: The test data is gathered from a production sample, provided by the manufacturer. All test data carry on SIM1 which is the worst case.

Technical Characteristics of EUT: Main board			
4G			
Support Networks:	FDD-LTE		
Support Band:	FDD-LTE Band 4, Band 13		
Unlink Fraguency	Tx: FDD-LTE Band 4: 1710-1755 MHz		
Uplink Frequency:	FDD-LTE Band 13: 777-787 MHz		
Downlink Frequency:	Rx: FDD-LTE Band 4: 2110-2155 MHz		
	FDD-LTE Band 13: 746-756 MHz		
DE Output Dower	FDD-LTE Band 4: 24.48dBm,		
RF Output Power:	FDD-LTE Band 13: 23.28dBm,		
Type of Emission:	FDD-LTE Band 4: 17M9G7D, 17M9W7D		
Type of Emission:	FDD-LTE Band 13: 8M99G7D, 8M99W7D		
Type of Modulation:	QPSK, 16QAM		
Antenna Type:	Integral Antenna		
Automo Ocino	FDD-LTE Band 4: 1.98dBi,		
Antenna Gain:	FDD-LTE Band 13: 1.97dBi,		



1.2 Test Standards

The following report is prepared on behalf of the JACS Solutions, LLC in accordance with FCC Part 2 subpart J, and FCC Part 27 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 2 subpart J, 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)

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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 4	Low, Middle, High Channels		
TM2	FDD-LTE Band 13	Low, Middle, High Channels		

EUT Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
Car charging Cable	4.0	Shielded	Without Core
Adapter #1 Cable	1.0	Shielded	Without Core
Adapter #2 Cable	1.0	Shielded	Without Core

Auxiliary Equipment List and Details

Description	Description Manufacturer		Serial Number	
/ /		/	/	

Special Cable List and Details

Cable Description	Length (M)	Shielded/Unshielded	With Core/Without Core
Earphone Cable	1.2	Unshielded	Without Core

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1.6 Test Equipment List and Details

Kind of Equipment	Manufacturer	Туре	S/N	Cal Date	Due Date	
Equipment list of < Shenzl	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
§27.50(b), §27.50(d)	RF Output Power	Compliant
§ 27.50	Peak-to-average Radio (PAR) of Transmitter	Compliant
§ 27.53	Emission Bandwidth	Compliant
§ 27.50(c), § 27.53(h)	Spurious Emissions at Antenna Terminal	Compliant
§27.50(c), § 27.53(h)	Spurious Radiation Emissions	Compliant
§27.50(c), § 27.53(h)	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 SAR report.



4. RF Output Power

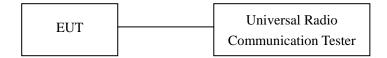
4.1 Standard Applicable

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 (b)(10), Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands 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-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

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4.4 Summary of Test Results/Plots

Max. Radiated Power:

FDD-LTE Band 4

	FDD-LTE Band 4 Channel Bandwidth: 1.4 MHz				
Modulation	Channel	E.i.r.p [dBm]	Verdict		
	LCH	24.29	PASS		
QPSK	MCH	23.33	PASS		
	HCH	23.30	PASS		
	LCH	23.39	PASS		
16QAM	MCH	22.55	PASS		
	HCH	22.66	PASS		
	Char	nnel Bandwidth: 3 MHz			
Modulation	Channel	E.i.r.p [dBm]	Verdict		
	LCH	24.08	PASS		
QPSK	MCH	23.14	PASS		
	HCH	23.33	PASS		
	LCH	23.33	PASS		
16QAM	MCH	22.41	PASS		
	HCH	22.61	PASS		
	Chai	nnel Bandwidth: 5 MHz			
Modulation	Channel	E.i.r.p [dBm]	Verdict		
	LCH	24.25	PASS		
QPSK	MCH	23.37	PASS		
	HCH	23.26	PASS		
	LCH	23.50	PASS		
16QAM	MCH	22.59	PASS		
	HCH	22.37	PASS		
	Chan	nel Bandwidth: 10 MHz			
Modulation	Channel	E.i.r.p [dBm]	Verdict		
	LCH	24.35	PASS		
QPSK	MCH	23.53	PASS		
	HCH	23.66	PASS		
	LCH	23.59	PASS		
16QAM	MCH	22.83	PASS		
	НСН	22.94	PASS		
Channel Bandwidth: 15 MHz					
Modulation	Channel	E.i.r.p [dBm]	Verdict		



	LCH	24.30	PASS
QPSK	MCH	23.76	PASS
	HCH	23.71	PASS
	LCH	23.69	PASS
16QAM	MCH	23.14	PASS
	HCH	23.00	PASS
	Cha	nnel Bandwidth: 20 MHz	
Modulation	Channel	E.i.r.p [dBm]	Verdict
	LCH	24.48	PASS
QPSK	MCH	23.90	PASS
	HCH	23.60	PASS
	LCH	23.70	PASS
16QAM	MCH	23.05	PASS
	HCH	22.90	PASS

FDD-LTE Band 13

	Channel Bandwidth: 5 MHz						
Modulation	Channel	E.r.p [dBm]	Verdict				
	LCH	22.77	PASS				
QPSK	MCH	22.80	PASS				
	HCH	22.84	PASS				
	LCH	22.28	PASS				
16QAM	MCH	21.96	PASS				
	HCH	22.00	PASS				
	Cha	nnel Bandwidth: 10 MHz					
Modulation	Channel	E.r.p [dBm]	Verdict				
	LCH	23.28	PASS				
QPSK	MCH	23.22	PASS				
	HCH	23.02	PASS				
	LCH	22.43	PASS				
16QAM	MCH	22.44	PASS				
	HCH	22.05	PASS				

Max. Conducted Output Power

Please refer to Appendix of_LTE Band 4/13 Appendix A: Average Power Output Data

Test result: Pass



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

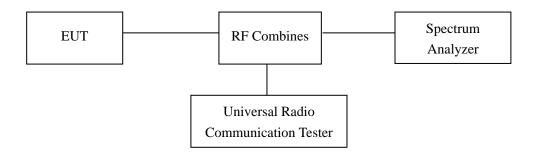
5.1 Standard Applicable

According to §27.50(d)(5), Equipment employed must be authorized in accordance with the provisions of §24.51. 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 (d)(6) of this section. 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 of LTE Band 4 Appendix B: Peak-to-Average Ratio

Test result: Pass



6. Emission Bandwidth

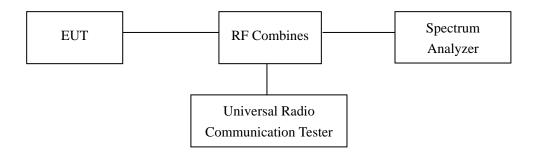
6.1 Standard Applicable

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 of LTE Band 4/13 Appendix C/B: 26dB Bandwidth and Occupied Bandwidth

Test result: Pass

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7. Out of Band Emissions at Antenna Terminal

7.1 Standard Applicable

According to §27.53 (h)(1) General protection levels. Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, 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.

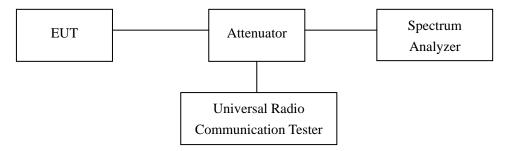
According to \$27.53 (g), the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB.

According to $\S27.53$ (c)(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P) dB$.

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 of_LTE Band 4/13 Appendix D&E/C&D: Band Edge & Conducted Spurious Emission Test result: Pass

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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 §27.53 (h)(1) General protection levels. Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, 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.

According to $\S27.53$ (c)(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P) dB$

8.3 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 = $43+10 \text{ Log}_{10}$ (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:

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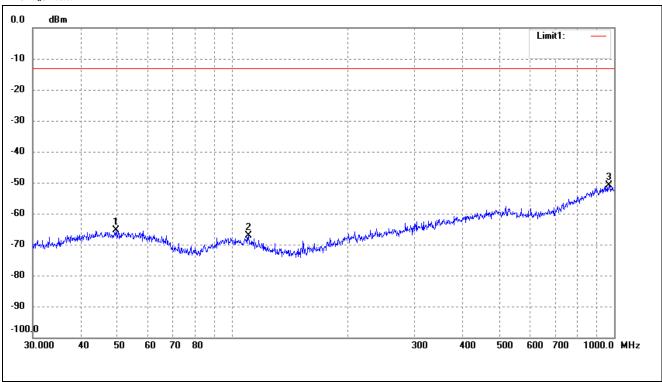
Note: 1. this EUT was tested in 3 orthogonal positions and the worst case position (Vertical) data was reported.

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:

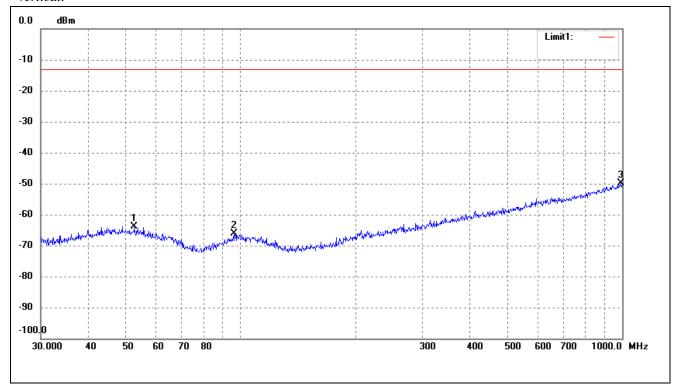


	No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
		(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
	1	49.5328	-69.71	4.35	-65.36	-13.00	-52.36	ERP
Ī	2	110.1816	-69.27	2.17	-67.10	-13.00	-54.10	ERP
	3	968.9338	-68.86	18.01	-50.85	-13.00	-37.85	ERP

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Vertical:

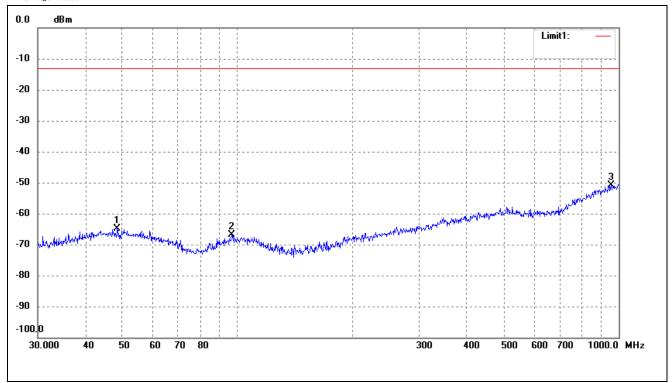


No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	52.7600	-67.91	4.07	-63.84	-13.00	-50.84	ERP
2	96.4362	-67.90	1.81	-66.09	-13.00	-53.09	ERP
3	993.0114	-68.26	18.38	-49.88	-13.00	-36.88	ERP



For FDD_LTE Band 13Mode

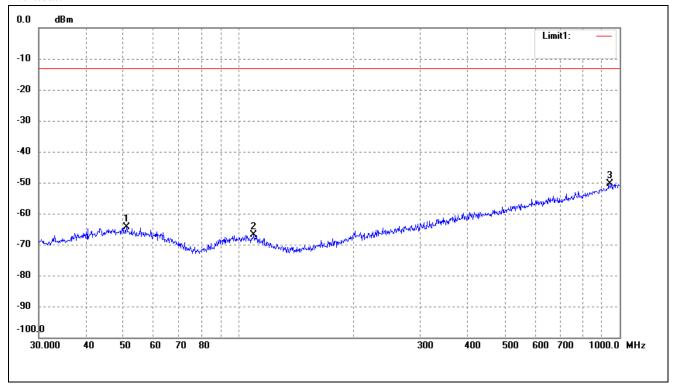
Horizontal:



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBm)	dB	(dBm)	(dBm)	(dB)	
1	48.5016	-69.10	4.35	-64.75	-13.00	-51.75	ERP
2	96.7749	-68.65	1.85	-66.80	-13.00	-53.80	ERP
3	955.4381	-68.75	17.81	-50.94	-13.00	-37.94	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

Note: Margin= (Reading+ Correct)- Limit



Spurious Emissions Above 1GHz

For FDD_LTE Band 4 Mode

Frequency	SG	Angle	Height	Polar	Correct	Result	Limit	Margin
	Reading				(dB)	dBm	dBm	dB
MHz	dBm	Degree	Meter	H/V	(0.2)	4.2	4.2	<u></u>
			Low Char	nnel (1710.0N	1Hz)			
3420.00	-43.64	187	1.7	Н	9.87	-33.77	-13	-20.77
3420.00	-44.44	242	1.3	V	9.87	-34.57	-13	-21.57
5130.00	-44.48	183	1.6	Н	13.02	-31.46	-13	-18.46
5130.00	-43.55	275	1.5	V	13.02	-30.53	-13	-17.53
			Middle Cha	annel (1732.5	MHz)			
3465.00	-36.00	234	1.8	Н	9.96	-26.04	-13	-13.04
3465.00	-37.00	293	1.6	V	9.96	-27.04	-13	-14.04
5197.50	-39.00	235	1.5	Н	13.32	-25.68	-13	-12.68
5197.50	-40.00	174	1.7	V	13.32	-26.68	-13	-13.68
			High Char	nnel (1755.0N	ЛHz)			
3510.00	-36.00	217	1.4	Н	10.03	-25.97	-13	-12.97
3510.00	-39.00	144	1.3	V	10.03	-28.97	-13	-15.97
5265.00	-36.00	205	1.3	Н	14.03	-21.97	-13	-8.97
5265.00	-37.00	255	1.2	V	14.03	-22.97	-13	-9.97



For FDD LTE Band 13 Mode

Frequency	SG Reading	Angle	Height	Polar	Correct	Result	Limit	Margin
MHz	dBm	Degree	Meter	H/V	(dB)	dBm	dBm	dB
			Low Cha	annel (777MH	lz)			
1554.00	-41.59	114	1.7	Н	4.78	-36.81	-13	-23.81
1554.00	-45.90	298	1.4	V	4.78	-41.12	-13	-28.12
2331.00	-47.37	204	1.6	Н	8.31	-39.06	-13	-26.06
2331.00	-43.78	309	1.3	V	8.31	-35.47	-13	-22.47
	Middle Channel (782MHz)							
1564.00	-42.56	300	1.5	Н	4.76	-37.80	-13	-24.80
1564.00	-45.06	159	1.3	V	4.76	-40.30	-13	-27.30
2346.00	-42.11	278	1.7	Н	8.02	-34.09	-13	-21.09
2346.00	-47.93	145	1.5	V	8.02	-39.91	-13	-26.91
			High Ch	annel (787Ml	Hz)			
1574.00	-45.16	229	1.5	Н	4.63	-40.53	-13	-27.53
1574.00	-44.57	272	1.2	V	4.63	-39.94	-13	-26.94
2361.00	-46.44	267	1.3	Н	7.85	-38.59	-13	-25.59
2361.00	-42.3	248	1.2	V	7.85	-34.45	-13	-21.45

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 3.3-4.2V of nominal voltage declared by manufacturer
-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 of_LTE Band 4/13 Appendix F/E: Frequency Stability

Test result: Pass

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