

JianYan Testing Group Shenzhen Co., Ltd.

Report No: JYTSZ-R12-2200114

FCC REPORT

(WCDMA)

Applicant: Aratek Biometrics Co., Ltd.

Address of Applicant: 2F, T2-A Building, ShenZhen Software Park South Area, Hi-

Tech Park

Equipment Under Test (EUT)

Product Name: Automated Election Device

Model No.: VC33, BD1300

Trade mark: Aratek

FCC ID: 2AGUJ-VC331

Applicable standards: FCC CFR Title 47 Part 2

FCC CFR Title 47 Part 22 Subpart H FCC CFR Title 47 Part 24 Subpart E

Date of sample receipt: 12 Jan., 2022

Date of Test: 13 Jan., to 13 Feb., 2022

Date of report issued: 22 Feb., 2022

Test Result: PASS*

Authorized Signature:



Bruce Zhang Laboratory Manager

This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product and does not permit the use of the JYT product certification mark. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.

This report may only be reproduced and distributed in full. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards.

This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

^{*} In the configuration tested, the EUT complied with the standards specified above.





2. Version

Version No.	Date	Description
00	14 Feb., 2022	Original
01	22 Feb., 2022	add model

Mike. DU

Test Engineer Tested by: 22 Feb., 2022 Date:

Reviewed by: Date: 22 Feb., 2022

Project Engineer





3. Contents

			Page
1.	CO	VER PAGE	1
2.	VE	RSION	2
3.		ONTENTS	
		ST SUMMARY	
4.			
5.	GE	NERAL INFORMATION	5
į	5.1	CLIENT INFORMATION	5
	5.2	GENERAL DESCRIPTION OF E.U.T.	
	5.3	TEST ENVIRONMENT AND MODE	7
	5.4	DESCRIPTION OF TEST AUXILIARY EQUIPMENT	
	5.5	MEASUREMENT UNCERTAINTY	
,	5.6 ADDITIONS TO, DEVIATIONS, OR EXCLUSIONS FROM THE METHOD		
,	5.7	LABORATORY FACILITY	7
	5.8	LABORATORY LOCATION	
;	5.9	TEST INSTRUMENTS LIST	8
6.	TES	ST RESULTS	9
(6.1	CONDUCTED OUTPUT POWER, ERP AND EIRP	9
(6.2	PEAK-TO-AVERAGE POWER RATIO	10
(6.3	OCCUPY BANDWIDTH	11
(6.4	MODULATION CHARACTERISTIC	12
(6.5	OUT OF BAND EMISSION AT ANTENNA TERMINALS	
(6.6	FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT	
	6.7	FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT	
(6.8	FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT	17
7	TES	ST SETUP PHOTO	18
8	EU.	T CONSTRUCTIONAL DETAILS	2.0
_			

Tel: +86-755-23118282, Fax: +86-755-23116366





4. Test Summary

Test Item	Section in CFR 47	Result
RF Exposure (SAR)	Part 1.1307 Part 2.1093	Pass (Please refer to SAR Report)
RF Output Power	Part 2.1046 Part 22.913 (a)(5) Part 24.232 (c)	Appendix A - WCDMA
Peak-to-Average Power Ratio	Part 24.232 (d)	Appendix B - WCDMA
Modulation Characteristics	Part 2.1047	Pass
99% & -26 dB Occupied Bandwidth	Part 2.1049 Part 22.917(b) Part 24.238(b)	Appendix C - WCDMA
Out of band emission at antenna terminals	Part 2.1053 Part 22.917 (a) Part 24.238 (a)	Appendix D – WCDMA Appendix E - WCDMA
Field strength of spurious radiation	Part 22.917 (a) Part 24.238 (a)	Pass
Frequency stability vs. temperature	Part 22.355 Part 24.235 Part 2.1055(a)(1)(b)	Appendix F - WCDMA
Frequency stability vs. voltage	Part 22.355 Part 24.235 Part 2.1055(d)(2)	Appendix F - WCDMA

Remark:

2. The cable insertion loss used by "RF Output Power" and other conduction measurement items is 0.5dB(Fundamental Frequency below 1GHz)/1.0dB(Fundamental Frequency above 1GHz) (provided by the customer).

Test Method: ANSI/TIA-603-E-2016 ANSI C63.26-2015

Tel: +86-755-23118282, Fax: +86-755-23116366

^{1.} Pass: The EUT complies with the essential requirements in the standard.





5. General Information

5.1 Client Information

Applicant:	Aratek Biometrics Co., Ltd.		
Address:	2F, T2-A Building, ShenZhen Software Park South Area, Hi-Tech Park		
Manufacturer:	Aratek Biometrics Co., Ltd.		
Address:	2F, T2-A Building, ShenZhen Software Park South Area, Hi-Tech Park		
Factory:	Aratek Biometrics Co., Ltd.		
Address:	Block 4, 1st Industrial Park of Nan Gang, 1029# Song Bai Road of Bai Mang, Nan Shan District, Shenzhen 518055, China.		

5.2 General Description of E.U.T.

	5.1 Octional 20001. p. 101.11					
Product Name:	Automated Election Device					
Model No.:	VC33, BD1300					
Operation Frequency range:	WCDMA Band V: 826.4MHz-846.6MHz					
	WCDMA Band II: 1852.4 MHz-1907.6 MHz					
Modulation type:	3G ⊠RMC(QPSK) ⊠HSUPA(QPSK) ⊠HSDPA(QPSK,16QAM)					
Antenna type:	Internal Antenna					
Antenna gain:	WCDMA Band V: 0.6 dBi(declare by Applicant)					
	WCDMA Band II: 1.0 dBi(declare by Applicant)					
Power supply:	Rechargeable Li-ion Battery DC11.1V, 13Ah					
AC adapter:	Model: AK120WG-2400500W2					
	Input: AC100-240V, 50/60Hz, 2.0A					
	Output: DC 24.0V, 5.0A					
Remark:	Model No.: VC331, BD1300 were identical inside, the electrical circuit					
	design, layout, components used and internal wiring, with only difference being model name.					
Test Sample Condition:	The test samples were provided in good working order with no visible					
rest sample solidition.	defects.					

Operation Frequency List:

Operation i requeitly List.						
WC	DMA Band V	WCDMA Band II				
Channel	Frequency (MHz)	Channel	Frequency (MHz)			
4132	826.40	9262	1852.40			
4133	826.60	9263	1852.60			
4182	836.40	9399	1879.80			
4183	836.60	9400	1880.00			
4184	836.80	9401	1880.20			
		•••				
4232	846.40	9537	1907.40			
4233	846.60	9538	1907.60			

Regards to the operating frequency range over 10 MHz, the Lowest frequency, the middle frequency, and the highest frequency of channel were selected to perform the test, and the selected channel see below:

	WCDMA Band \	/	WCDMA Band II			
Channel		Frequency(MHz)	Channel		Frequency(MHz)	
Lowest 4132		826.40	Lowest	9262	1852.40	
Middle	4183	836.60	Middle	9400	1880.00	
Highest 4233		846.60	Highest	9538	1907.60	

Tel: +86-755-23118282, Fax: +86-755-23116366







5.3 Test environment and mode

Operating Enviror	Operating Environment:				
Temperature:	Temperature: Normal: 15° C ~ 35° C, Extreme: -30° C ~ $+50^{\circ}$ C				
Humidity:	20 % ~ 75 % RH				
Atmospheric Pressure:	' 1008 mpar				
Voltage:	Nominal: 11.1Vdc, Extreme: Low 9.44 Vdc, High 12.77 Vdc				
Test mode:					
RMC mode	Keep the EUT communication with simulated station in RMC mode				
HSDPA	Keep the EUT communication with simulated station in HSDPA mode				
HSUPA	HSUPA Keep the EUT communication with simulated station in HSUPA mode				
D TI FUT	Description of the first contract of the contr				

Remark: The EUT has been tested under continuous transmitting mode. Channel Low, Mid and High for each type band with rated data rate were chosen for full testing. The field strength of spurious radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for these modes. Just the worst case position (H mode) shown in report.

5.4 Description of Test Auxiliary Equipment

Test Equipment	Manufacturer	Model No.	Serial No.
Simulated Station	Anritsu	MT8820C	6201026545

5.5 Measurement Uncertainty

Parameter	Expanded Uncertainty (Confidence of 95%)
Radiated Emission (9kHz ~ 30MHz electric field) for 3m SAC	3.13 dB
Radiated Emission (9kHz ~ 30MHz magnetic field) for 3m SAC	3.13 dB
Radiated Emission (30MHz ~ 1GHz) for 3m SAC	4.45 dB
Radiated Emission (1GHz ~ 18GHz) for 3m SAC	5.34 dB
Radiated Emission (18GHz ~ 40GHz) for 3m SAC	5.34 dB

5.6 Additions to, deviations, or exclusions from the method

No

5.7 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

• FCC - Designation No.: CN1211

JianYan Testing Group Shenzhen Co., Ltd. has been accredited as a testing laboratory by FCC(Federal Communications Commission). The test firm Registration No. is 727551.

• ISED - CAB identifier.: CN0021

The 3m Semi-anechoic chamber and 10m Semi-anechoic chamber of JianYan Testing Group Shenzhen Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 10106A-1.

CNAS - Registration No.: CNAS L15527

JianYan Testing Group Shenzhen Co., Ltd. is accredited to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L15527.

A2LA - Registration No.: 4346.01

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. The test scope can be found as below link: https://portal.a2la.org/scopepdf/4346-01.pdf

Tel: +86-755-23118282, Fax: +86-755-23116366





5.8 Laboratory Location

JianYan Testing Group Shenzhen Co., Ltd.

Address: No.101, Building 8, Innovation Wisdom Port, No.155 Hongtian Road, Huangpu Community,

Xinqiao Street, Bao'an District, Shenzhen, Guangdong, People's Republic of China.

Tel: +86-755-23118282, Fax: +86-755-23116366 Email: info-JYTee@lets.com, Website: http://jyt.lets.com

5.9 Test Instruments list

Radiated Emission:	Radiated Emission:						
Test Equipment	Manufacturer	Model No.	Serial No.	Cal.Date (mm-dd-yy)	Cal.Due date (mm-dd-yy)		
3m SAC	ETS	RFD-100	Q1984	04-14-2021	04-13-2024		
Loop Antenna	SCHWARZBECK	FMZB 1519 B	1519B-044	03-07-2021	03-06-2022		
BiConiLog Antenna	SCHWARZBECK	VULB9163	9163-1246	03-07-2021	03-06-2022		
Biconical Antenna	SCHWARZBECK	VUBA 9117	9117#359	06-17-2021	06-17-2022		
Horn Antenna	SCHWARZBECK	BBHA9120D	912D-916	03-07-2021	03-06-2022		
Broad-Band Horn Antenna	SCHWARZBECK	BBHA9170	1067	04-02-2021	04-01-2022		
Broad-Band Horn Antenna	SCHWARZBECK	BBHA9170	1068	04-02-2021	04-01-2022		
EMI Test Receiver	Rohde & Schwarz	ESRP7	101070	03-03-2021	03-02-2022		
Spectrum analyzer	Rohde & Schwarz	FSP30	101454	03-03-2021	03-02-2022		
Spectrum analyzer	Keysight	N9010B	MY60240202	10-27-2021	10-26-2022		
Simulated Station	Anritsu	MT8820C	6201026545	03-03-2021	03-02-2022		
Low Pre-amplifier	SCHWARZBECK	BBV9743B	00305	03-07-2021	03-06-2022		
High Pre-amplifier	SKET	LNPA_0118G-50	MF280208233	03-07-2021	03-06-2022		
Cable	Qualwave	JYT3M-1G-NN-8M	JYT3M-1	03-07-2021	03-06-2022		
Cable	Qualwave	JYT3M-18G-NN-8M	JYT3M-2	03-07-2021	03-06-2022		
Cable	Qualwave	JYT3M-1G-BB-5M	JYT3M-3	03-07-2021	03-06-2022		
Cable	Bost	JYT3M-40G-SS-8M	JYT3M-4	04-02-2021	04-01-2022		
EMI Test Software	Tonscend	TS+	Version:3.0.0.1				

Conducted method:							
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)		
Spectrum Analyzer	Keysight	N9020B	MY57431500	07-02-2021	07-01-2022		
Simulated Station	Rohde & Schwarz	CMW500	108209	07-02-2021	07-01-2022		
RF Control Unit	Tonscend	JS0806-1	N/A	N/A	N/A		
Band Reject Filter Group	Tonscend	JS0806-F	21A8060360	N/A	N/A		
Test Software Tonscend TS+ Version: 2.6.9.0526				6			

Tel: +86-755-23118282, Fax: +86-755-23116366



6. Test results

6.1 Conducted Output Power, ERP and EIRP

Test Requirement:	FCC part 22.913(a)(5), FCC part 24.232(c)				
Limit:	WCDMA Band V: 7W, WCDMA Band II: 2W				
Test setup:	System simulator ATT EUT				
Test Procedure:	The transmitter output was connected to a calibrated attenuator, the other end of which was connected to the simulated station. Transmitter output power was read off in dBm.				
Test Instruments:	Refer to section 5.9 for details				
Test mode:	Refer to section 5.3 for details				
Test results:	Passed				

Measurement Data: Refer to Appendix A - WCDMA



6.2 Peak-to-Average Power Ratio

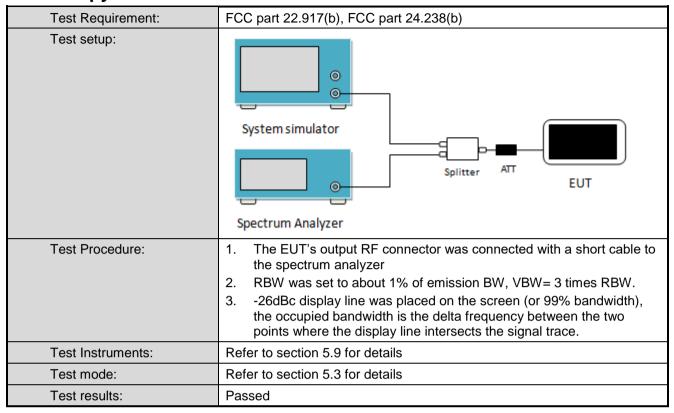
Test Requirement:	FCC part 24.232(d)			
Limit:	The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.			
Test setup:	System simulator Splitter ATT EUT Spectrum Analyzer			
Test Procedure:	 The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. Set the CCDF option in spectrum analyzer, RBW ≥ OBW, Set the EUT working in highest power level, measured and recorded the 0.1% as PAPR level. Repeat step 1~3 at other frequency and modulations. 			
Test Instruments:	Refer to section 5.9 for details			
Test mode:	Refer to section 5.3 for details			
Test results:	Passed			

Measurement Data: Refer to Appendix B - WCDMA

Tel: +86-755-23118282, Fax: +86-755-23116366



6.3 Occupy Bandwidth



Measurement Data: Refer to Appendix C - WCDMA

Tel: +86-755-23118282, Fax: +86-755-23116366



6.4 Modulation Characteristic

According to FCC § 2.1047(d), Part 22H & 24E there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

6.5 Out of band emission at antenna terminals

Test Requirement:	FCC part 22.917(a), FCC part 24.238(a)			
Limit:	-13dBm			
Test setup:	System simulator Splitter ATT EUT			
	Spectrum Analyzer			
Test Procedure:	 The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. For the out of band: For GSM850&WCDMA850 set the RBW=100 kHz, VBW=300 kHz and for PCS1900 & WCDMA1900 set the RBW=1MHz, VBW=3MHz when below 1 GHz, RBW =1 MHz, VBW=3 MHz when above 1 GHz, Start=30MHz, Stop= 10th harmonic. Band Edge Requirements: In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to measure the out of band Emissions. 			
Test Instruments:	Refer to section 5.9 for details			
Test mode:	Refer to section 5.3 for details			
Test results:	Passed			

Measurement Data:

Band edge emission: Refer to Appendix D - WCDMA

Spurious emission: Refer to Appendix E - WCDMA

Tel: +86-755-23118282, Fax: +86-755-23116366



6.6 Field strength of spurious radiation measurement

Test Requirement:	FCC part 22.917(a), FCC part 24.238(a)
Limit:	-13dBm
Test setup:	Below 1GHz Camera Antenna Tower
	Ground Reference Plane Signal Generator Amplifier Above 1GHz
	Antenna Tower Ground Reference Plane Test Receiver Amptier Controller
Test Procedure:	 The EUT was placed on the top of a rotating table 0.8m(below 1GHz)/1.5m(above 1GHz) above the ground at a 3 meter camber. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations. The frequency range up to tenth harmonic was investigated for each of three fundamental frequency (low, middle and high channels). Once spurious emission was identified, the power of the emission was determined using the substitution method. The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency. ERP / EIRP = S.G. output (dBm) + Antenna Gain(dB/dBi) – Cable Loss (dB)
Test Instruments:	Refer to section 5.9 for details
Test mode:	Refer to section 5.3 for details.
Test results:	Passed

Page 13 of 20



Measurement Data (worst case):

		WCDMA BAN	D V 12.2k RMC			
Lowest channel						
Frequency (MHz)	Spurous Emission level (dBm)	Factor (dB)	Level at antenna terminals (dBm)	Limit Line (dBm)	Margin (dB)	Polarization
1652.80	-48.28	-11.11	-59.39	-13.00	46.39	Vertical
2479.20	-49.64	-6.21	-55.85	-13.00	42.85	Vertical
3305.60	-48.43	-4.97	-53.40	-13.00	40.40	Vertical
1652.80	-43.17	-11.01	-54.18	-13.00	41.18	Horizonta
2479.20	-46.26	-6.54	-52.80	-13.00	39.80	Horizonta
3305.60	-43.95	-5.25	-49.20	-13.00	36.20	Horizonta
Middle channel						
Frequency (MHz)	Spurous Emission level (dBm)	Factor (dB)	Level at antenna terminals (dBm)	Limit Line (dBm)	Margin (dB)	Polarization
1673.20	-48.10	-11.13	-59.23	-13.00	46.23	Vertical
2509.80	-49.31	-6.20	-55.51	-13.00	42.51	Vertical
3346.40	-48.04	-5.02	-53.06	-13.00	40.06	Vertical
1673.20	-42.84	-11.04	-53.88	-13.00	40.88	Horizonta
2509.80	-45.85	-6.51	-52.36	-13.00	39.36	Horizonta
3346.40	-43.71	-5.23	-48.94	-13.00	35.94	Horizonta
		Highest	channel			
Frequency (MHz)	Spurous Emission level (dBm)	Factor (dB)	Level at antenna terminals (dBm)	Limit Line (dBm)	Margin (dB)	Polarizatio
1697.60	-48.37	-11.14	-59.51	-13.00	46.51	Vertical
2546.40	-49.44	-6.09	-55.53	-13.00	42.53	Vertical
3395.20	-48.65	-5.08	-53.73	-13.00	40.73	Vertical
1697.60	-42.71	-11.08	-53.79	-13.00	40.79	Horizonta
2546.40	-45.59	-6.40	-51.99	-13.00	38.99	Horizonta
3395.20	-43.82	-5.21	-49.03	-13.00	36.03	Horizonta

Remark:

Tel: +86-755-23118282, Fax: +86-755-23116366

^{1.} The emission levels of below 1 GHz are lower than the limit 20dB and not show in test report.



	WCDMA Band II 12.2k RMC						
	Lowest channel						
Frequency (MHz)	Spurous Emission level (dBm)	Factor (dB)	Level at antenna terminals (dBm)	Limit Line (dBm)	Margin (dB)	Polarization	
3704.80	-47.93	-1.28	-49.21	-13.00	36.21	Vertical	
5557.20	-50.74	5.27	-45.47	-13.00	32.47	Vertical	
3704.80	-49.31	-1.28	-50.59	-13.00	37.59	Horizontal	
5557.20	-51.48	5.27	-46.21	-13.00	33.21	Horizontal	
	Middle channel						
Frequency (MHz)	Spurous Emission level (dBm)	Factor (dB)	Level at antenna terminals (dBm)	Limit Line (dBm)	Margin (dB)	Polarization	
3760.00	-47.76	-1.03	-48.79	-13.00	35.79	Vertical	
5640.00	-50.39	6.06	-44.33	-13.00	31.33	Vertical	
3760.00	-49.09	-1.03	-50.12	-13.00	37.12	Horizontal	
5640.00	-51.52	6.06	-45.46	-13.00	32.46	Horizontal	
		Highest	channel				
Frequency (MHz)	Spurous Emission level (dBm)	Factor (dB)	Level at antenna terminals (dBm)	Limit Line (dBm)	Margin (dB)	Polarization	
3815.20	-47.65	-0.83	-48.48	-13.00	35.48	Vertical	
5722.80	-50.62	6.72	-43.90	-13.00	30.90	Vertical	
3815.20	-49.33	-0.83	-50.16	-13.00	37.16	Horizontal	
5722.80	-51.78	6.72	-45.06	-13.00	32.06	Horizontal	

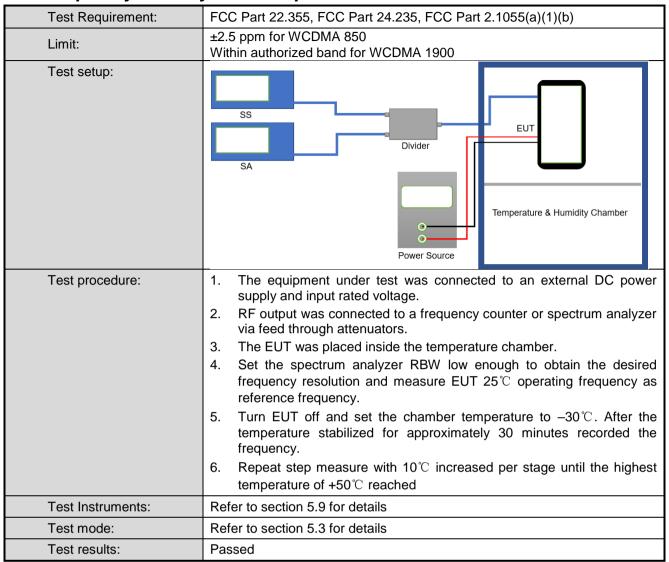
Remark:

Tel: +86-755-23118282, Fax: +86-755-23116366

^{1.} The emission levels of below 1 GHz are lower than the limit 20dB and not show in test report.



6.7 Frequency stability V.S. Temperature measurement

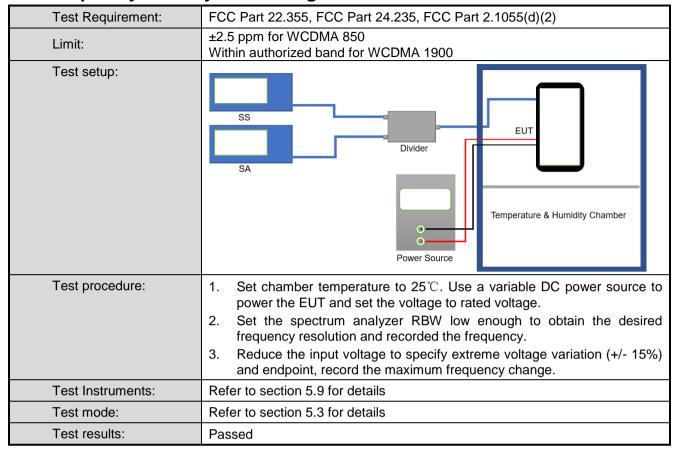


Measurement Data: Refer to Appendix F - WCDMA

Tel: +86-755-23118282, Fax: +86-755-23116366



6.8 Frequency stability V.S. Voltage measurement



Measurement Data: Refer to Appendix F - WCDMA

Tel: +86-755-23118282, Fax: +86-755-23116366