

JianYan Testing Group Shenzhen Co., Ltd.

Report No: JYTSZB-R12-2101995

FCC REPORT (WCDMA)

Applicant: Smartmatic International Corporation

Address of Applicant: Pine Lodge, #26 Pine Road St. Michael, W.I. BB Barbados

Equipment Under Test (EUT)

Product Name: Voter Identification Unit

Model No.: VIU-500 Model 700

Trade mark: SMARTMATIC

FCC ID: 2AGVK-VIU-500A70

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: 28 Sep., 2021

Date of Test: 29 Sep., to 20 Oct., 2021

Date of report issued: 21 Oct., 2021

Test Result: PASS*

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

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.

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2. Version

Version No.	Date	Description
00	21 Oct., 2021	Original

Tested by:	Mikeru	Date:	21 Oct., 2021	

Test Engineer

Winner Thang
Project Engineer Reviewed by: Date: 21 Oct., 2021





3. Contents

		Page
1. C	OVER PAGE	1
2. VE	ERSION	2
3. C	ONTENTS	3
4. TE	EST SUMMARY	4
5. GI	ENERAL INFORMATION	5
5.1	CLIENT INFORMATION	5
5.2	GENERAL DESCRIPTION OF E.U.T	
5.3	TEST ENVIRONMENT AND MODE	
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	
5.8	LABORATORY LOCATION	
5.9	TEST INSTRUMENTS LIST	7
6. TE	EST RESULTS	8
6.1	CONDUCTED OUTPUT POWER, ERP AND EIRP	8
6.2	PEAK-TO-AVERAGE POWER RATIO	
6.3	OCCUPY BANDWIDTH	
6.4	MODULATION CHARACTERISTIC	
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	
7 TE	EST SETUP PHOTO	17
8 FI	IT CONSTRUCTIONAL DETAILS	10

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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:

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

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

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5. General Information

5.1 Client Information

Applicant:	Smartmatic International Corporation
Address:	Pine Lodge, #26 Pine Road St. Michael, W.I. BB Barbados
Manufacturer:	Aratek Biometrics Co., Ltd.
Address:	2F, T2-A Building, ShenZhen Software Park, South Area, Hi-Tech Park, Shenzhen, Guangdong, China
Factory:	Aratek Biometrics Co., Ltd.
Address:	4F, 2th building, Nangang first industrial park, Baimang Songbai Road #1029, Nanshan district, Shenzhen, Guangdong, China.

5.2 General Description of E.U.T.

Product Name:	Voter Identification Unit				
Model No.:	VIU-500 Model 700				
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: 0.52 dBi(declare by Applicant)				
	WCDMA Band II: 1.23 dBi(declare by Applicant)				
Power supply:	Rechargeable Li-ion Battery DC3.7V, 10000mAh				
AC adapter:	Model: ES568U050200XYF				
	Input: AC100-240V, 50/60Hz, 0.15A				
	Output: DC 5.0V, 2000mA				
Test Sample Condition:	The test samples were provided in good working order with no visible defects.				

Operation Frequency List:

WCDMA Band V		WCDMA Band II		
Channel	Channel Frequency (MHz)		Frequency (MHz)	
4132	826.40	9262	1852.40	
4133	826.60	9263	1852.60	
4182	4182 836.40		1879.80	
4183	4183 836.60		1880.00	
4184	4184 836.80		1880.20	
4232	4232 846.40		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 V			WCDMA Band II			
Char	nnel	Frequency(MHz)	Channel Frequ		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	



5.3 Test environment and mode

Operating Enviror	Operating Environment:			
Temperature:	Normal: 15° C ~ 35° C, Extreme: -30° C ~ $+50^{\circ}$ C			
Humidity:	20 % ~ 75 % RH			
Atmospheric Pressure:	1008 mbar			
Voltage:	Nominal: 3.7Vdc, Extreme: Low 3.5 Vdc, High 4.20 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	Keep the EUT communication with simulated station in HSUPA mode			
D 1 T1 FUT				

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 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.

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

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.

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Email: info-JYTee@lets.com, Website: http://www.ccis-cb.com





5.9 Test Instruments list

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	11-27-2020	11-26-2021
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+	Ve	ersion: 2.6.9.0526	3		

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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 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 Spectrum Analyzer 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			

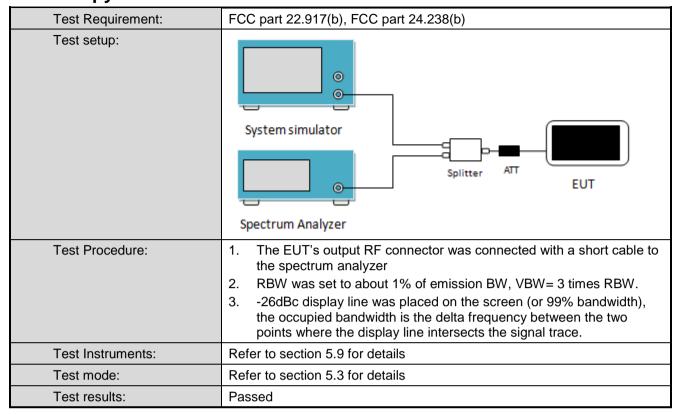
Measurement Data: Refer to Appendix B - WCDMA

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6.3 Occupy Bandwidth



Measurement Data: Refer to Appendix C - WCDMA

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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 Spectrum Analyzer 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

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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
	Antenna Tower Ground Reference Plane Ground Reference Plane Signal Generator Monitor Amplifier
	ADOVE TOTAL
	Ground Reference Plane Test Receiver
Test Procedure:	1. 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





Measurement Data (worst case):

	WCDMA BAND 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	-47.53	-9.89	-57.42	-13.00	44.42	Vertical	
2479.20	-42.68	-5.57	-48.25	-13.00	35.25	Vertical	
3305.60	-44.94	-2.09	-47.03	-13.00	34.03	Vertical	
1673.00	-48.29	-9.89	-58.18	-13.00	45.18	Horizontal	
2509.00	-47.90	-5.57	-53.47	-13.00	40.47	Horizontal	
3346.00	-43.36	-2.09	-45.45	-13.00	32.45	Horizontal	
		Middle	channel				
Frequency (MHz)	Spurous Emission level (dBm)	Factor (dB)	Level at antenna terminals (dBm)	Limit Line (dBm)	Margin (dB)	Polarization	
1673.20	-47.82	-9.88	-57.70	-13.00	44.70	Vertical	
2509.80	-42.53	-5.23	-47.76	-13.00	34.76	Vertical	
3346.40	-44.69	-2.07	-46.76	-13.00	33.76	Vertical	
1673.20	-48.10	-9.88	-57.98	-13.00	44.98	Horizontal	
2509.80	-47.44	-5.29	-52.73	-13.00	39.73	Horizontal	
3346.40	-43.74	-2.05	-45.79	-13.00	32.79	Horizontal	
		Highest	channel				
Frequency (MHz)	Spurous Emission level (dBm)	Factor (dB)	Level at antenna terminals (dBm)	Limit Line (dBm)	Margin (dB)	Polarization	
1697.60	-47.36	-9.87	-57.23	-13.00	44.23	Vertical	
2546.40	-42.63	-5.13	-47.76	-13.00	34.76	Vertical	
3395.20	-44.51	-1.97	-46.48	-13.00	33.48	Vertical	
1697.60	-48.20	-9.87	-58.07	-13.00	45.07	Horizontal	
2546.40	-47.62	-5.13	-52.75	-13.00	39.75	Horizontal	
3395.20	-43.29	-1.97	-45.26	-13.00	32.26	Horizontal	

Remark:

^{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	-47.61	-1.28	-48.89	-13.00	35.89	Vertical	
5557.20	-49.99	5.27	-44.72	-13.00	31.72	Vertical	
3704.80	-47.91	-1.28	-49.19	-13.00	36.19	Horizontal	
5557.20	-48.87	5.27	-43.60	-13.00	30.60	Horizontal	
	Middle channel						
Frequency (MHz)	Spurous Emission level (dBm)	Factor (dB)	Level at antenna terminals (dBm)	Limit Line (dBm)	Margin (dB)	Polarization	
3760.00	-48.07	-1.01	-49.08	-13.00	36.08	Vertical	
5640.00	-49.63	5.77	-43.86	-13.00	30.86	Vertical	
3760.00	-48.02	-1.01	-49.03	-13.00	36.03	Horizontal	
5640.00	-49.33	5.77	-43.56	-13.00	30.56	Horizontal	
		Highest	channel				
Frequency (MHz)	Spurous Emission level (dBm)	Factor (dB)	Level at antenna terminals (dBm)	Limit Line (dBm)	Margin (dB)	Polarization	
3815.20	-47.17	-0.83	-48.00	-13.00	35.00	Vertical	
5722.80	-49.84	6.72	-43.12	-13.00	30.12	Vertical	
3815.20	-47.94	-0.83	-48.77	-13.00	35.77	Horizontal	
5722.80	-49.11	6.72	-42.39	-13.00	29.39	Horizontal	

Remark:

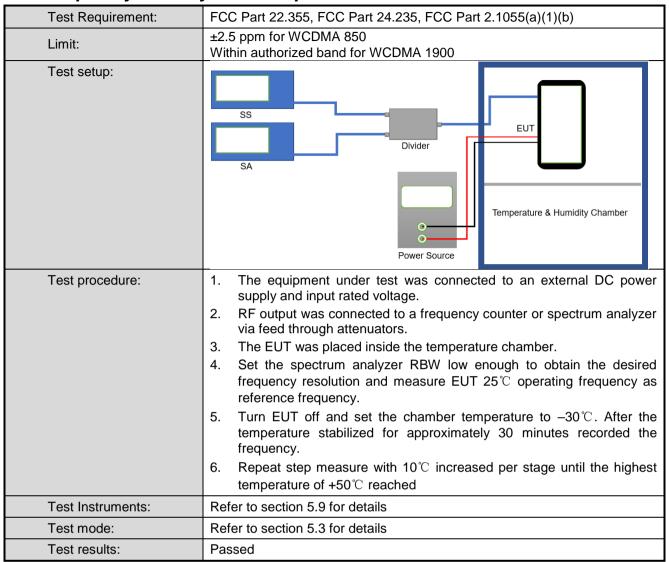
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^{1.} The emission levels of below 1 GHz are lower than the limit 20dB and not show in test report.





6.7 Frequency stability V.S. Temperature measurement



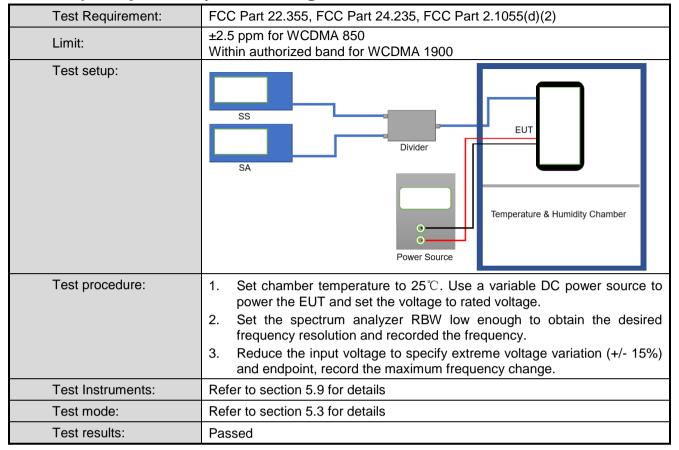
Measurement Data: Refer to Appendix F - WCDMA

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6.8 Frequency stability V.S. Voltage measurement



Measurement Data: Refer to Appendix F - WCDMA

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8 EUT Constructional Details

Reference to the test report No.: JYTSZB-R12-2101994.

-----End of report-----