FCC Test Report

APPLICANT: SHADOWTRACK TECHNOLOGIES, INC.

EQUIPMENT : GPS Watch
BRAND NAME : Compass XR

MODEL NAME : XR-22

FCC ID : 2ARH7-COMPASS-XR-22 STANDARD : 47 CFR Part 15 Subpart B

CLASSIFICATION : Certification TEST DATE(S) : Mar. 23, 2022

We, Sporton International Inc. (Shenzhen), would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI C63.4-2014 and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. (Shenzhen), the test report shall not be reproduced except in full.

Reviewed by: Derreck Chen / Supervisor

Frie Shih

Dogula Cher

Approved by: Eric Shih / Manager

Sporton International Inc. (ShenZhen)

1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan Shenzhen, 518055
People's Republic of China

Sporton International Inc. (ShenZhen)

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Report Version : Rev. 01

Cert #5145.01

Report No.: FC221520

Report Template No.: BU5-FC15B Version 3.0

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APPENDIX A. SETUP PHOTOGRAPHS

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FC221520	Rev. 01	Initial issue of report	Apr. 11, 2022

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SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
					Under limit
3.1	15.107	AC Conducted Emission	< 15.107 limits	PASS	6.20 dB at
					0.640 MHz
					Under limit
3.2	15.109 Radiated Er	Radiated Emission	< 15.109 limits	PASS	13.45 dB at
					47.460 MHz

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

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1. General Description

1.1. Applicant

SHADOWTRACK TECHNOLOGIES, INC.

One Lakeway, 3900 North Causeway Boulevard, Suite 1200, Metairie, LA 72000, United States

Report No.: FC221520

1.2. Manufacturer

SHADOWTRACK TECHNOLOGIES, INC.

One Lakeway, 3900 North Causeway Boulevard, Suite 1200, Metairie, LA 72000, United States

1.3. Product Feature of Equipment Under Test

	Product Feature
Equipment	GPS Watch
Brand Name	Compass XR
Model Name	XR-22
FCC ID	2ARH7-COMPASS-XR-22
	WCDMA/LTE/GNSS,
EUT supports Radios application	WLAN 2.4GHz 802.11b/g/n HT20/HT40
	Bluetooth BR/EDR/LE
IMEI Code	Conduction: 868862040710034
IMEI Code	Radiation: 868862040710117
HW Version	S10_V9.6.2
SW Version	4GYL
EUT Stage	Production Unit

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

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1.4. Product Specification of Equipment Under Test

Standards-related Product Specification					
Gtan	WCDMA Band II: 1850 MHz ~ 1910 MHz				
Tx Frequency	WCDMA Band II. 1630 MHz ~ 1910 MHz WCDMA Band IV: 1710 MHz ~ 1755 MHz WCDMA Band V: 824 MHz ~ 849 MHz LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz				
1X Troquency	LTE Band 12 : 699 MHz ~ 716 MHz LTE Band 13 : 777 MHz ~ 787 MHz LTE Band 17 : 704 MHz ~ 716 MHz LTE Band 66 : 1710 MHz ~ 1780 MHz LTE Band 71: 663 MHz ~ 698 MHz				
Rx Frequency	WCDMA Band II: 1930 MHz ~ 1990 MHz WCDMA Band IV: 2110 MHz ~ 2155 MHz WCDMA Band V: 869 MHz ~ 894 MHz LTE Band 2: 1930 MHz ~ 1990 MHz LTE Band 4: 2110 MHz ~ 2155 MHz LTE Band 5: 869 MHz ~ 894 MHz LTE Band 12: 729 MHz ~ 746 MHz LTE Band 13: 746 MHz ~ 756 MHz LTE Band 17: 734 MHz ~ 746 MHz LTE Band 66: 2110 MHz~ 2180 MHz LTE Band 71: 617 MHz ~ 652 MHz Bluetooth: 2400 MHz ~ 2483.5 MHz GNSS: 1559 MHz ~ 1610 MHz				
Antenna Type	WWAN : PCB Antenna GNSS: Ceramic Antenna Bluetooth/WLAN: Ceramic Antenna				
Type of Modulation	WCDMA: BPSK HSDPA/DC-HSDPA: QPSK HSUPA: QPSK HSPA+: 16QAM (16QAM uplink is not supported) DC-HSDPA: 64QAM LTE: QPSK / 16QAM 802.11b: DSSS (DBPSK / DQPSK / CCK) 802.11g/n: OFDM (BPSK / QPSK / 16QAM / 64QAM) Bluetooth LE: GFSK Bluetooth (1Mbps): GFSK Bluetooth (2Mbps): π/4-DQPSK Bluetooth (3Mbps): 8-DPSK GNSS: BPSK				

Note: The device supports for Bluetooth/WLAN 2.4GHz Rx mode only.

1.5. Modification of EUT

No modifications are made to the EUT during all test items.

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1.6. Test Location

Sporton International Inc. (Shenzhen) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.01.

Test Firm	Sporton International Inc. (Shenzhen)				
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan, Shenzhen, 518055 People's Republic of China TEL: +86-755-86379589 FAX: +86-755-86379595				
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.		
	CO01-SZ	CN1256	421272		

Test Firm	Sporton International Inc. (Shenzhen)			
Test Site Location	101, 1st Floor, Block B, Building 1, No. 2, Tengfeng 4th Road, Fenghuang Community, Fuyong Street, Baoan District, Shenzhen City Guangdong Province China 518103 TEL: +86-755-33202398			
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.	
	03CH05-SZ	CN1256	421272	

1.7. Test Software

Item	Site	Manufacturer	Name	Version
1.	03CH05-SZ	AUDIX	E3	6.2009-8-24
2.	CO01-SZ	AUDIX	E3	6.120613b

1.8. Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- 47 CFR Part 15 Subpart B
- ANSI C63.4-2014

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

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2. Test Configuration of Equipment Under Test

2.1. Test Mode

The EUT has been associated with peripherals pursuant to ANSI C63.4-2014 and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

Frequency range investigated: conduction emission (150 kHz to 30 MHz), radiation emission (30MHz to the 5th harmonic of the highest frequency or to 40 GHz, whichever is lower).

Test Items	Function Type			
AC Conducted Emission	Mode 1: LTE Band 5 Idle(High CH)+ Power Cable(Charging from Adapter)+ Bluetooth RX+ WIFI RX+ Battery + GNSS RX			
Radiated	Mode 1: WCDMA Band 5 Idle(Low CH)+ Power Cable(Charging from Adapter)+ Bluetooth RX+ WIFI RX+ Battery + GNSS RX			
Emissions	Mode 2: LTE Band 5 Idle(High CH)+ Power Cable(Charging from Power bank)+ Bluetooth RX+ WIFI RX+ Battery + GNSS RX			

Remark:

- 1. The worst case of AC is mode 1; only the test data of this mode is reported.
- 2. The worst case of RE is mode 1; only the test data of this mode is reported.
- 3. Pre-scanned for LTE Band 5/12/13/17, as LTE Band 5 of worse mode to test.
- 4. Pre-scanned Low/Middle/High channel, the worst channel was recorded in this report.
- **5.** There are two kinds of Power cable, the one (two pins) is for power supply, the other (four pins) is for writing programs. For adapter charging mode, we only evaluate Power cable of two pins to test.

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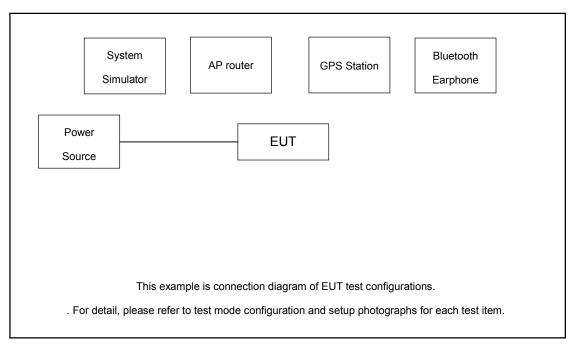
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2.2. Connection Diagram of Test System



The EUT has been associated with peripherals pursuant to ANSI C63.4-2014 and configuration operated in a manner tended to maximize its emission characteristics in a typical application

2.3. Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	Base Station	Anritsu	MT8820C	N/A	N/A	Unshielded,1.8m
2.	Base Station	Anritsu	MT8821C	N/A	N/A	Unshielded,1.8m
3.	GPS Station	T&E	GS-50	N/A	N/A	Unshielded,1.8m
4.	WLAN AP	D-Link	DIR-820L	KA2IR820LA1	N/A	Unshielded,1.8m
_	Bluetooth	Computer	EO MC000	NI/A	N/A	NI/A
5.	Earphone	Samsung	EO-MG900	N/A	IN/A	N/A

2.4. EUT Operation Test Setup

The EUT was in WCDMA or LTE idle mode during the testing. The EUT was synchronized to the BCCH, and is in continuous receiving mode by setting system simulator's paging reorganization.

At the same time, the EUT was attached to the Bluetooth earphone or WLAN AP, and the following programs installed in the EUT were programmed during the test.

1. Turn on GNSS function to make the EUT receive continuous signals from GNSS station.

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3. Test Result

3.1. Test of AC Conducted Emission Measurement

3.1.1 Limits of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

<Class B Limit>

Frequency of emission	Conducted	limit (dBuV)
(MHz)	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

^{*}Decreases with the logarithm of the frequency.

3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedure

- 1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
- 2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
- 3. All the support units are connecting to the other LISN.
- 4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
- 5. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
- 6. Both sides of AC line were checked for maximum conducted interference.
- 7. The frequency range from 150 kHz to 30 MHz was searched.
- 8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

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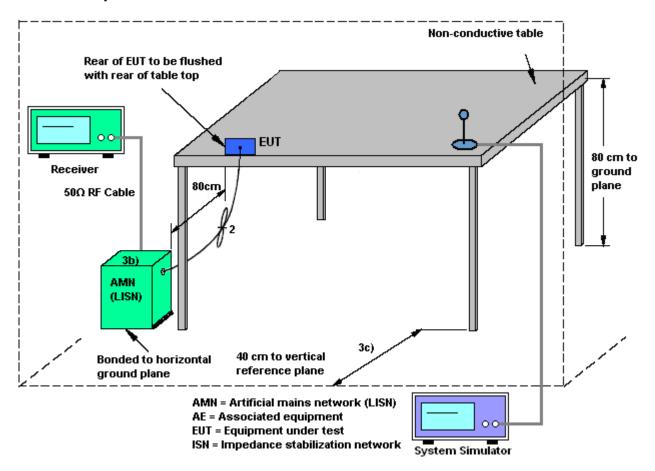
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3.1.4 Test Setup



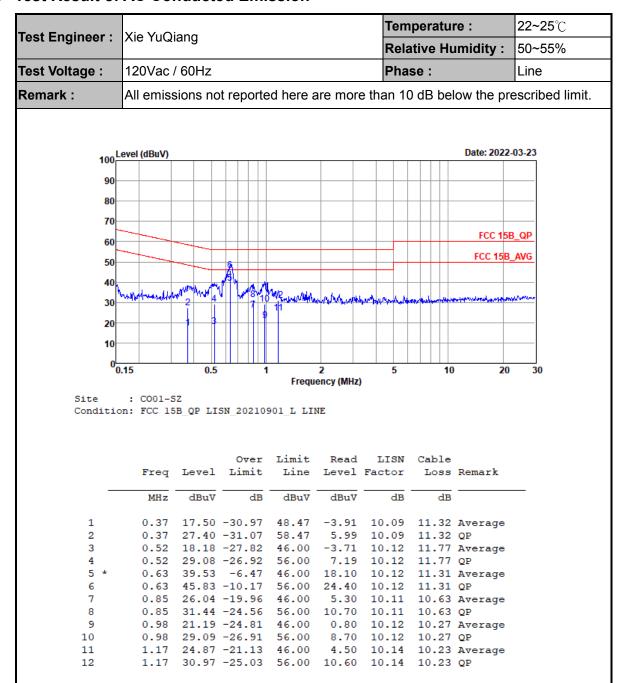
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3.1.5 Test Result of AC Conducted Emission



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Temperature: **22~25**℃ Test Engineer: Xie YuQiang **Relative Humidity:** 50~55% Test Voltage: 120Vac / 60Hz Phase: Neutral Remark: All emissions not reported here are more than 10 dB below the prescribed limit. 100 Level (dBuV) Date: 2022-03-23 90 80 70 FCC 15B_QP 60 FCC 15B_AVG 50 40 30 20 0<mark>0.15</mark> 20 0.5 10 Frequency (MHz) : CO01-SZ Condition: FCC 15B_QP LISN_20210901_N NEUTRAL Over Limit Read LISN Cable Freq Level Limit Line Level Factor Loss Remark dB dBuV dBuV dB MHz dBuV 0.50 31.15 -14.86 46.01 9.10 10.19 11.86 Average 0.50 38.15 -17.86 56.01 16.10 10.19 11.86 QP 0.64 39.80 -6.20 46.00 18.30 10.23 11.27 Average 0.64 48.70 -7.30 56.00 27.20 10.23 11.27 QP 3 * 0.84 24.65 -21.35 46.00 3.80 10.22 10.63 Average 5 0.84 32.35 -23.65 56.00 11.50 10.22 10.63 QP 1.14 25.57 -20.43 46.00 5.10 10.24 10.23 Average 1.14 34.07 -21.93 56.00 13.60 10.24 10.23 QP 7 8 1.71 23.65 -22.35 46.00 3.19 10.22 10.24 Average 1.71 32.65 -23.35 56.00 12.19 10.22 10.24 QP 10 11 2.00 22.93 -23.07 46.00 2.50 10.19 10.24 Average 2.00 31.63 -24.37 56.00 11.20 10.19 10.24 QP 12

Note:

- 1. Level($dB\mu V$) = Read Level($dB\mu V$) + LISN Factor(dB) + Cable Loss(dB)
- 2. Over Limit(dB) = Level(dB μ V) Limit Line(dB μ V)

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3.2. Test of Radiated Emission Measurement

3.2.1. Limit of Radiated Emission

The emissions from an unintentional radiator shall not exceed the field strength levels specified in the following table:

<Class B Limit>

Frequency	Field Strength	Measurement Distance
(MHz)	(microvolts/meter)	(meters)
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.2.2. Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

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3.2.3. Test Procedures

- 1. The EUT was placed on a turntable with 0.8 meter above ground.
- 2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
- 3. The table was rotated 360 degrees to determine the position of the highest radiation.
- 4. The antenna is a Bi-Log antenna and its height is adjusted between one to four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
- 5. For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
- 6. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode (RBW=120kHz/VBW=300kHz for frequency below 1GHz; RBW=1MHz VBW=3MHz (Peak), RBW=1MHz/VBW=10Hz (Average) for frequency above 1GHz).
- 7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, peak values of EUT will be reported. Otherwise, the emission will be repeated by using the quasi-peak method and reported.
- 8. Emission level (dB μ V/m) = 20 log Emission level (μ V/m)
- 9. Corrected Reading: Antenna Factor + Cable Loss + Read Level Preamp Factor = Level
- 10. Exploratory radiated emissions testing of handheld and/or body-worn devices shall include rotation of the EUT through three orthogonal axes (X/Y/Z Plane) to determine the orientation (attitude) that maximizes the emissions.

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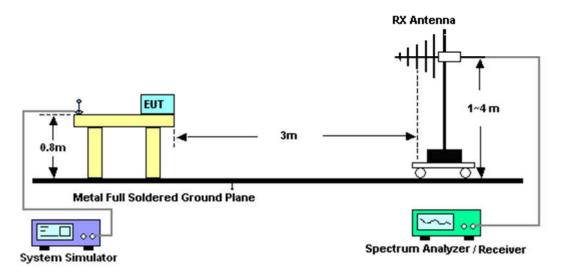
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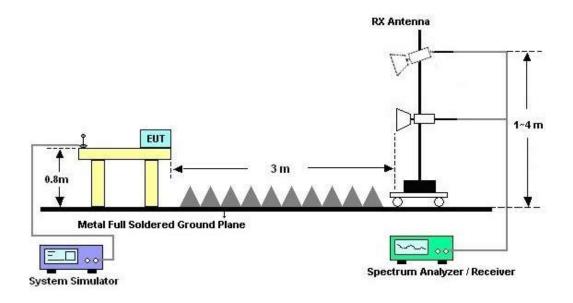
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3.2.4. Test Setup of Radiated Emission

For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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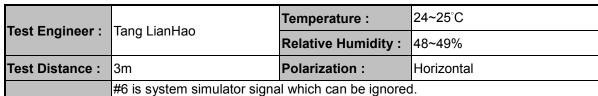
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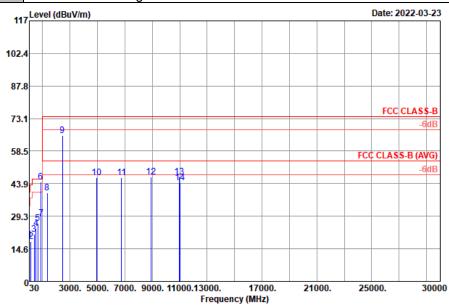
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3.2.5. Test Result of Radiated Emission



Remark: #9 is RF signals which come from WLAN Access Point used to connect the EUT,

and which can be ignored.



Site : 03CH05-SZ

Condition : FCC CLASS-B 3m VULB9168-01001 HORIZONTAL

Plane	:	У									
			0ver	Limit	ReadA	ntenna	Cable	Preamp	A/Pos	T/Pos	
	Freq	Level	Limit	Line	Level	Factor	Loss	Factor			Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB	cm	deg	
1	47.46	18.48	-21.52	40.00	31.11	20.27	2.17	35.07			Peak
2	155.13	18.01	-25.49	43.50	31.25	19.29	2.57	35.10			Peak
3	383.08	21.07	-24.93	46.00	30.88	21.74	3.28	34.83			Peak
4	517.91	23.72	-22.28	46.00	30.62	24.23	3.53	34.66			Peak
5	655.65	25.93	-20.07	46.00	30.16	26.37	3.90	34.50			Peak
6 *	871.40	44.73			46.15	28.73	4.15	34.30			Peak
7	891.36	28.29	-17.71	46.00	29.35	29.01	4.23	34.30			Peak
8	1332.00	39.83	-34.17	74.00	57.14	26.26	6.40	49.97			Peak
9	2437.00	65.44			80.39	27.65	7.86	50.46			Peak
10	4950.00	46.59	-27.41	74.00	54.10	31.50	10.50	49.51			Peak
11	6764.00	46.73	-27.27	74.00	50.09	34.68	11.55	49.59			Peak
12	8910.00	46.97	-27.03	74.00	46.04	37.57	12.90	49.54			Peak
13	10968.00	46.91	-27.09	74.00	39.53	40.56	14.85	48.03			Peak
14	11030.00	44.32	-29.68	74.00	36.74	40.59	14.98	47.99			Peak

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To at Empires	Tang LianHao				Temperature :		24~2	24~25°C				
Test Engineer :	rang L	ianHao 			Relative Humidity :			: 48~4	48~49%			
Test Distance :	3m				Polarization :			Vert	ical			
Remark :	#9 is R and wh	system simulator signal which can be ignored. RF signals which come from WLAN Access Poirwhich can be ignored.							oint used to connect the EUT			
11	7 Level (dB	BuV/m)							Date:	2022-03-	23	
102	4											
87.	.8											
73.	.1								FC	C CLASS		
	9									-00	<u></u>	
58.	.5								FCC CLA	SS-B (AV	G)	
		10	11 12	13	14					-6d		
43.	9 6 8			13								
	ľ [
29.	3 5											
	3											
14.	.6											
	.13000.	17000	0. 21	1000.	25000.	30	0000					
					Freque	ncy (MHz)						
Site		: 03CH0!				004.450						
Conditio	on :	FCC CL	ASS-B 31	m VULBS	108-010	001 VERT	IICAL					
Plane	:	: y	0	1 4 4	D	An+a	Calair	Dno	A /D	T /D		
	Freq	Level		Limit Line		Antenna Factor			A/Pos	1/205	Remark	
_	MHz	dBuV/m	——dB	dBuV/m	dBuV	dB/m	——dB	——dB		deg		
	4- 4-	06.55	43.45	40.00	20.45	20.25	0.45	25.05		_		
1 2						20.27					Peak	
3						17.08 21.04					Peak Peak	
4						24.32		34.65			Peak	
5						27.05					Peak	
6 *		44.14				28.73		34.30			Peak	
7				46.00		29.74		34.21			Peak	
	1954.00							50.18			Peak	
	2437.00					27.65		50.46			Peak	
10	1016 00	10 07	27 22	74 00	E4 20	24 40	10 50	40 51			Darat.	

Note:

10

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13

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1. Level(dB μ V/m) = Read Level(dB μ V) + Antenna Factor(dB/m) + Cable Loss(dB) - Preamp Factor(dB)

4946.00 46.67 -27.33 74.00 54.20 31.48 10.50 49.51

6468.00 45.81 -28.19 74.00 49.50 33.96 11.26 48.91

8322.00 45.63 -28.37 74.00 45.41 37.18 12.85 49.81

10018.00 44.88 -29.12 74.00 41.99 39.03 12.93 49.07 13082.00 45.83 -28.17 74.00 37.11 39.23 16.16 46.67

--- Peak

--- Peak

--- Peak

--- Peak

2. Over Limit(dB) = Level(dB μ V/m) – Limit Line(dB μ V/m)

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4. List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
EMI Receiver	R&S	ESR7	101630	9kHz~7GHz;	Mar. 08, 2022	Mar. 23, 2022	Mar. 07, 2023	Conduction (CO01-SZ)
AC LISN	R&S	ENV216	100063	9kHz~30MHz	Sep. 01, 2021	Mar. 23, 2022	Aug. 31, 2022	Conduction (CO01-SZ)
AC LISN (for auxiliary equipment)	EMCO	3816/2SH	00103892	9kHz~30MHz	Oct. 28, 2021	Mar. 23, 2022	Oct. 27, 2022	Conduction (CO01-SZ)
AC Power Source	Chroma	61602	61602000089 1	100Vac~250Vac	Jul. 14, 2021	Mar. 23, 2022	Jul. 13, 2022	Conduction (CO01-SZ)
EMI Test Receiver	R&S	ESR7	102261	9kHz~7GHz	May 21, 2021	Mar. 23, 2022	May 20, 2022	Radiation (03CH05-SZ)
EXA Spectrum Analyzer	KEYSIGHT	N9010B	MY59071191	10Hz~44GHz	Apr. 07, 2021	Mar. 23, 2022	Apr. 06, 2022	Radiation (03CH05-SZ)
Log-periodic Antenna	SCHWARZBE CK	VULB 9168	01001	20MHz~1.5GHz	Mar. 25, 2021	Mar. 23, 2022	Mar. 24, 2022	Radiation (03CH05-SZ)
Amplifier	EM Electronics	EM330	060756	0.01Hz ~3000MHz	Apr. 07, 2021	Mar. 23, 2022	Apr. 06, 2022	Radiation (03CH05-SZ)
Double Ridge Horn Antenna	SCHWARZBE CK	BBHA9120D	9120D-2206	1GHz~18GHz	Apr. 11, 2021	Mar. 23, 2022	Apr. 10, 2022	Radiation (03CH05-SZ)
HF Amplifier	EM Electronics	EM01G18GA	060781	1GHz~18GHz	Apr. 07, 2021	Mar. 23, 2022	Apr. 06, 2022	Radiation (03CH05-SZ)
HF Amplifier	EM Electronics	EM18G40G	060778	18GHz~40GHz	Apr. 07, 2021	Mar. 23, 2022	Apr. 06, 2022	Radiation (03CH05-SZ)
Horn Antenna	SCHWARZBE CK	BBHA9170	00983	15GHz~40GHz	Apr. 11, 2021	Mar. 23, 2022	Apr. 10, 2022	Radiation (03CH05-SZ)
AC Power Source	APC	AFV-S-600	F119050013	N/A	NCR	Mar. 23, 2022	NCR	Radiation (03CH05-SZ)
Turn Table	EMEC	T-200-S-1	060925-T	0~360 degree	NCR	Mar. 23, 2022	NCR	Radiation (03CH05-SZ)
Antenna Mast	EMEC	MBS-400-1	060927	1 m~4 m	NCR	Mar. 23, 2022	NCR	Radiation (03CH05-SZ)

NCR: No Calibration Required

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5. Uncertainty of Evaluation

Uncertainty of Conducted Emission Measurement (150 kHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence	2.2dB
of 95% (U = 2Uc(y))	2.200

<u>Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)</u>

Measuring Uncertainty for a Level of Confidence	4.2dB
of 95% (U = 2Uc(y))	4.2ub

<u>Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)</u>

Measuring Uncertainty for a Level of Confidence	5.1dB
of 95% (U = 2Uc(y))	5.1ub

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence	4.1dB
of 95% (U = 2Uc(y))	4. IUB

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