

SGS-CSTC STANDARDS TECHNICAL SERVICES (XI 'AN) CO., LTD.

Report No.: AR/2021/3001502 Page: 1 of 24

TEST REPORT

Test Result:	Pass*			
Date of Issue:	2021/7/19			
Date of Test:	2021/3/18 to 2021/4/14			
Date of Receipt:	2020/12/18			
Standard(s) :	7 CFR Part 15, Subpart B			
FCC ID:	YQEC1002			
Trade Mark:	FIH			
Model No.:	EA1002, EC1002			
EUT Description:	WCDMA/LTE Mobile Phone			
Address of Manufacturer:	No.4, Mingsheng St., Tu-Cheng Dist., New Taipei City 23679, Taiwan			
Manufacturer:	FIH CO., LTD			
Address of Applicant	Io.4, Mingsheng St., Tu-Cheng Dist., New Taipei City 23679, Taiwan			
Applicant:	FIH CO., LTD			
Application No:	AR/2021/30015			

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

Authorized Signature:

Simon Ling

Simon Ling Wireless Laboratory Manager



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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2021/4/29		Original
02		2021/7/19	Daniel wang	Update the battery and adaptor information

Authorized for issue by:	
Prepared By	Leah Chen (Leah Chen) / Engineer
Checked By	Daniel Wang (Daniel Wang) /Reviewer



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Test Summary

Emission Part				
Item	Standard	Method	Requirement	Result
Conducted Emissions at Mains Terminals (150kHz-30MHz)	47 CFR Part 15, Subpart B	ANSI C63.4:2014	Class B	Pass
Radiated Emissions (30MHz-1GHz)	47 CFR Part 15, Subpart B	ANSI C63.4:2014	Class B	Pass
Radiated Emissions (above 1GHz)	47 CFR Part 15, Subpart B	ANSI C63.4:2014	Class B	Pass

Internal Source	Upper Frequency
Below 1.705MHz	30MHz
1.705MHz to 108MHz	1GHz
108MHz to 500MHz	2GHz
500MHz to 1GHz	5GHz
Above 1GHz	5th harmonic of the highest frequency or 40GHz, whichever is lower



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Member of the SGS Group (SGS SA)

Remark:

This test report (Report No.: SAR/2021/3001506) is base on the original test report (Report No.: AR/2020/C000806) issued on 2021-03-08.

Review this report and original report, this report just changing the parts according to the declaration letter from client.

Considering to the difference, pre-scan were performed on the sample in this report to find the items which can be influential to the result in the original test report for fully retest.

Therefore in this report Conducted Emissions and Radiated Emissions were performed based on the worst case of the original report with report number AR/2020/C000806 and other test data in this report are base on the previous report with report number AR/2020/C000806.



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1 General Information

Product Name:	WCDMA/LTE Mobile Phon	e		
Model No.(EUT):	EA1002, EC1002			
Trade Mark:	FIH			
Hardware Version:	HW 3.0			
Software Version:	EA1002_01N0_1_180, EC	1002_00N0_1_180		
	Band	Tx (MHz)	Rx (MHz)	
	WCDMA Band II	1850~1910	1930~1990	
	WCDMA Band IV	1710~1755	2110~2155	
Frequency Bands:	WCDMA Band V	824~849	869~894	
	LTE Band 2	1850~1910	1930~1990	
	LTE Band 4	1710~1755	2110~2155	
	LTE Band 5	824~849	869~894	
	LTE Band 12	699~716	729~746	
	LTE Band 14	788~798	746~756	
	LTE Band 30	2305~2315	2350~2360	
	LTE Band 66	1710~1780	2110~2200	
	Wi-Fi 2.4G	2400~2483.5	2400~2483.5	
	Bluetooth	2400~2483.5	2400~2483.5	
	Wi-Fi 5G	5150~5850	5150~5850	
	FM	80-108		
	GNSS(GPS/Glonass/Bei dou/Galileo/SBAS)	1559~1610		



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Accessory:

Battery					
Battery	Zhongshan Tianmao Battery Co.,LTD	HE399	3.85V,3900mAh/15.01Wh		
Battery 2 nd	Dongguan Milai Electronics Co., Ltd.	HE399	3.85V,3900mAh/15.01Wh		
		USB Cable			
USB Cable	YuYang	HPAC0335	/		
Adapter					
Adapter	Jiangsu chenyang Electron Co.,Ltd.	UC13US	/		
Adapter 2 nd	RongTaiFeng Technology Co.,Ltd	RT-C6	/		
		Earphone			
Earphone	FIT	WH-108	/		



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1.1 Description of Support Units

Description	Manufacturer	Model No.	Serial No.
Laptop	Lenovo	L480	REF. No.SEA1800
Mouse	Lenovo	3D optical Mouse	REF. No.:SEA2400
Router	NETGEAR	R6020	REF. No.SEA2200

1.2 Test Location

All tests were performed at:

Company:	SGS-CSTC STANDARDS TECHNICAL SERVICES (XI 'AN) CO., LTD.
Address:	1/F, Unit D, Building 1, Kanghong Orange Technology Park, No.137, Keyuan 3rd Road, Fengdong New City, Xi'an, Shaanxi China
Post code:	710086
Test engineer:	Leah Chen, Ken Liu, Andy Yao

No tests were sub-contracted.

1.3 Test Facility

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

• A2LA (Certificate No. 4854.01)

SGS-CSTC STANDARDS TECHNICAL SERVICES (XI 'AN) CO., LTD. is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 4854.01.

Test Site No.:	SGS Xian Site No.		FCC Designation No.
	CO01-XA	03CH01-XA	CN1271

1.4 Deviation from Standards None

1.5 Abnormalities from Standard Conditions

None



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2 Emission Test Results

2.1 Conducted Emissions at Mains Terminals (150kHz-30MHz)

2.1.1 E.U.T. Operation

Operating Environment:

Temperature:	18.9 °C	Humidity:	55.1 % RH	Atmospheric Pressure:	1000	mbar					
Pretest these modes to find the worst case:	a: Transfer data between the EUT and the PC+USB cable1										
	b: WCDMA Band V Idle +BT+WLAN +GPS Rx+playing MP4 (SD card) +earphone+battery1+Cable+adapter1										
	c: LTE Band 5 Idle+BT+WLAN +GPS Rx+playing MP4 (SD card) +earphone+battery(worst)+ Cable+adapter(worst)										
	d: LTE Band 12 Idle+BT+WLAN +GPS Rx+camera (Front) +earphone+battery(worst)+ Cable+adapter(worst)										
	e: LTE Band 14 Idle+BT+WLAN +GPS Rx+camera (Front) +earphone+battery(worst)+ Cable+adapter2										
The worst case	b: WCDMA Bar	nd V Idle +B	T+WLAN +GPS R	8x+playing MP4 (SD carc	I)						

for final test: +earphone+battery1+Cable+adapter1



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2.1.2 Test Setup Procedures

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.



2.1.3 Measurement Data

An initial pre-scan was performed with peak detector.Quasi-Peak or Average measurement were performed at the frequencies with maximized peak emission were detected.



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Test on the worst case:



Test Graph

Final Data List									
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]	
1	0.1506	10.10	47.65	65.96	18.31	34.16	55.96	21.80	
2	0.1897	10.10	45.73	64.05	18.32	38.57	54.05	15.48	
3	0.2931	10.10	37.48	60.44	22.96	31.24	50.44	19.20	
4	0.4321	10.10	44.29	57.21	12.92	42.09	47.21	5.12	
5	14.8411	10.11	36.48	60.00	23.52	28.55	50.00	21.45	
6	23.9012	10.11	48.86	60.00	11.14	39.25	50.00	10.75	



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Mode:b; Line:Neutral Line



Test Graph

Final Data List									
NO.	Freq. [MHz]	Factor [dB]	QP Value [dBµV]	QP Limit [dBµV]	QP Margin [dB]	AV Value [dBµV]	AV Limit [dBµV]	AV Margin [dB]	
1	0.1506	10.10	47.53	65.96	18.43	35.25	55.96	20.71	
2	0.1947	10.10	43.15	63.83	20.68	34.94	53.83	18.89	
3	0.2649	10.10	41.72	61.28	19.56	31.97	51.28	19.31	
4	0.4320	10.10	46.22	57.21	10.99	44.21	47.21	3.00	
5	14.8607	10.11	36.38	60.00	23.62	28.44	50.00	21.56	
6	23.8942	10.11	48.47	60.00	11.53	38.93	50.00	11.07	



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2.2 Radiated Emissions (30MHz-1GHz)

Test Requirement:	47 CFR Part 15, Subpart B
Test Method:	ANSI C63.4:2014
Frequency Range:	30MHz to 1GHz
Measurement Distance:	3m
Limit:	
30MHz -88MHz	40.0(dBμV/m) quasi-peak
88MHz-216MHz	43.5(dBμV/m) quasi-peak
216MHz-960MHz	46.0(dBμV/m) quasi-peak
960MHz-1000MHz	54.0(dBμV/m) quasi-peak
Detector:	Peak for pre-scan (120kHz resolution bandwidth) 30M to1000MHz

2.2.1 E.U.T. Operation

Operating Environment:

Temperature:	25 °C	Humidity:	66.5 % RH	Atmospheric Pressure: 1010	mbar						
Pretest these modes to find the worst case:	a: Transfer b: WCDMA +earphone-	a: Transfer data between the EUT and the PC+USB cable b: WCDMA Band V Idle +BT+WLAN +GPS Rx+playing MP4 (SD card) +earphone+battery1+Cable+adapter1									
	c: LTE Ban +earphone-	c: LTE Band 5 Idle+BT+WLAN +GPS Rx+playing MP4 (SD card) +earphone+battery(worst)+ Cable+adapter(worst)									
	d: LTE Ban +earphone-	d: LTE Band 12 Idle+BT+WLAN +GPS Rx+camera (Front) +earphone+battery(worst)+ Cable+adapter(worst)									
	e: LTE Ban +earphone-	e: LTE Band 14 Idle+BT+WLAN +GPS Rx+camera (Front) +earphone+battery(worst)+ Cable+adapter2									
The worst case	a: Transfer	data between th	ne EUT and the	PC+USB cable							

for final test:



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2.2.2 Test Setup Procedures

1. The EUT was placed in a semi Anechoic Chamber as show below

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 height is adjusted between 1 to 4 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 with specified bandwidth with Maximum Hold Mode, and the trace was allowed to stabilize.

7. If the emission level of the EUT in peak mode was 6 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.



2.2.3 Measurement Data

An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Quasipeak measurements were conducted based on the peak sweep graph. The EUT was measured by BiConiLog antenna with 2 orthogonal polarities.

The three polarities of X,Y,Z were measured by EUT, but only the worst data had been displayed.



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Test on the worst case:

Mode:a; Polarization:Horizontal





Suspected List

Suspected List										
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity		
1	41.4483	25.83	-22.08	40.00	14.17	214	219	Horizontal		
2	82.0024	28.32	-26.74	40.00	11.68	216	95	Horizontal		
3	167.961	33.35	-25.25	43.50	10.15	226	286	Horizontal		
4	240.920	39.06	-21.14	46.00	6.94	189	282	Horizontal		
5	290.788	37.51	-19.47	46.00	8.49	198	338	Horizontal		
6	797.423	33.14	-9.10	46.00	12.86	175	358	Horizontal		



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Suspected List

Suspected List										
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity		
1	41.2543	25.42	-22.11	40.00	14.58	187	247	Vertical		
2	81.8084	26.91	-26.79	40.00	13.09	203	22	Vertical		
3	167.961	31.19	-25.25	43.50	12.31	199	18	Vertical		
4	240.726	36.49	-21.15	46.00	9.51	175	358	Vertical		
5	681.194	33.64	-11.14	46.00	12.36	165	148	Vertical		
6	913.458	39.57	-7.53	46.00	6.43	254	2	Vertical		



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2.3 Radiated Emissions (above 1GHz)

47 CFR Part 15, Subpart B
ANSI C63.4:2014
Above 1GHz
3m
74(dBµV/m) peak, 54(dBµV/m) average
Peak for pre-scan (1000kHz resolution bandwidth) 1000M to18000MHz

2.3.1 E.U.T. Operation

Operating Environment:

Temperature:	21.7 °C	Humidity:	56.4 % RH	Atmospheric Pressure:	1010	mbar					
Pretest these modes to find the worst case:	a: Transfer data between the EUT and the PC+USB cable										
	b: WCDMA Bar +earphone+bat	b: WCDMA Band V Idle +BT+WLAN +GPS Rx+playing MP4 (SD card) +earphone+battery1+Cable+adapter1									
	c: LTE Band 5 +earphone+bat	c: LTE Band 5 Idle+BT+WLAN +GPS Rx+playing MP4 (SD card) +earphone+battery(worst)+ Cable+adapter(worst)									
	d: LTE Band 12 Idle+BT+WLAN +GPS Rx+camera (Front) +earphone+battery(worst)+ Cable+adapter(worst)										
	e: LTE Band 14 Idle+BT+WLAN +GPS Rx+camera (Front) +earphone+battery(worst)+ Cable+adapter2										
The worst case for final test:	c: LTE Band 5 +earphone+bat	dle+BT+WL tery(worst)+	AN +GPS Rx+pla Cable+adapter1	aying MP4 (SD card)							



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2.3.2 Test Setup Procedures

1. The EUT was placed in a full Anechoic Chamber as show below

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 height is adjusted between 1 to 4 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 and AV Detect Function with specified bandwidth with Maximum Hold Mode, and the trace was allowed to stabilize.



2.3.3 Measurement Data

An initial pre-scan was performed in the chamber using the spectrum analyser in peak detection mode. Average measurements were conducted based on the peak sweep graph. The EUT was measured by Horn antenna with 2 orthogonal polarities.

The three polarities of X,Y,Z were measured by EUT, but only the worst data had been displayed.

Scan from 1GHz to 30GHz, the disturbance above 18GHz was very low. The points marked on above plots are the highest emissions could be found when testing, so only above points had been displayed.



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Test on the worst case:

Mode:c; Polarization:Horizontal





Suspected List

Suspe	Suspected List										
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity			
1	3004.40	29.81	-22.30	54.00	24.19	186	193	Horizontal			
2	3009.50	40.06	-22.25	74.00	33.94	247	154	Horizontal			
3	11232.8	45.56	-1.40	54.00	8.44	206	9	Horizontal			
4	12221.4	56.23	0.68	74.00	17.77	274	78	Horizontal			
5	15670.8	57.32	1.19	74.00	16.68	265	123	Horizontal			
6	15753.3	47.48	1.08	54.00	6.52	254	275	Horizontal			



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Suspected List

Suspected List										
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity		
1	2864.99	30.68	-22.96	54.00	23.32	223	282	Vertical		
2	2882.84	39.83	-23.09	74.00	34.17	214	122	Vertical		
3	10720.2	54.95	-2.33	74.00	19.05	158	146	Vertical		
4	12444.9	47.45	0.82	54.00	6.55	198	2	Vertical		
5	14976.3	57.08	2.37	74.00	16.92	167	2	Vertical		
6	16410.4	46.90	-1.05	54.00	7.10	215	282	Vertical		



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3 Equipment List

CE Test System										
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date					
Shielding Room	Brilliant-emc	N/A	XAW03-35-01	2019-09-11	2022-09-10					
Test receiver	ROHDE&SCHWARZ	ESR	XAW01-08-01	2020-09-11	2021-09-10					
Artificial network	ROHDE&SCHWARZ	ENV216	XAW01-04-01	2020-08-04	2021-08-03					
5G UXM	Keysight	E7515B	XAW01-19-02	2020-09-11	2021-09-10					
Temperature and humidity meter	MingGao	TH101B	XAW01-01-01	2020-11-06	2021-11-05					
Measurement Software	Tonscend	TS+ CE V2.5	XAW02-05-02	NCR	NCR					



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RE Test System						
Equipment	Manufacturer	Model No.	Inventory No.	Cal Date	Cal Due Date	
Semi-Anechoic Chamber	Brilliant-emc	N/A	XAW03-35-01	2019-09-11	2022-09-10	
MXA signal analyzer	Keysight	N9020A	XAW01-06-01	2021-04-01	2022-03-31	
				2020-04-02	2021-04-01	
Spectrum Analyzer	Keysight	N9020B	XAW01-11-03	2019-06-28	2020-06-27	
				2020-04-15	2021-04-14	
Radio communication analyzer	ROHDE&SCHWARZ	CMW 500	XAW01-03-02	2021-04-01	2022-03-31	
				2020-04-02	2021-04-01	
Test receiver	ROHDE&SCHWARZ	ESR	XAW01-08-01	2020-09-11	2021-09-10	
Receiving antenna (30MHz-3GHz)	Schwarzbeck	VULB 9163	XAW01-09-01	2019-10-13	2021-10-12	
Receiving antenna (1GHz~18GHz)	Schwarzbeck	BBHA 9120D	XAW01-09-02	2019-10-13	2021-10-12	
Receiving antenna (15GHz~40GHz)	Schwarzbeck	BBHA 9170	XAW01-09-03	2019-10-13	2021-10-12	
Directional antenna rack controller	Max-Full	MF-7802BS	XAW03-03-01	NCR	NCR	
High-speed antenna rack controller	Max-Full	MF-7802	XAW03-04-01	NCR	NCR	
Amplifier	Tonscend	TAP00903040	XAW01-41-01	2020-10-26	2021-10-25	
Amplifier	Tonscend	TAP01018048	XAW01-41-02	2020-10-26	2021-10-25	
Amplifier	Tonscend	TAP18040048	XAW01-41-03	2020-10-27	2021-10-26	
Amplifier	Shanghai Steed	YX28980930	XAW01-41-06	2020-10-26	2021-10-25	
5G UXM	Keysight	E7515B	XAW01-04-01	2020-09-11	2021-09-10	
Temperature and humidity meter	MingGao	TH101B	XAW01-01-01	2020-11-06	2021-11-05	
Measurement Software	Tonscend	TS+ RE V3.0.0.2	XAW02-05-01	NCR	NCR	



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4 Measurement Uncertainty

No.	Item	Measurement Uncertainty		
1	Conduction Emission	± 3.0dB (150kHz to 30MHz)		
2		± 4.8dB (Below 1GHz)		
	Dedicted Emission	± 4.8dB (1GHz to 6GHz)		
	Radiated Emission	± 4.5dB (6GHz to 18GHz)		
		± 5.02dB (Above 18GHz)		



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5 Photographs

5.1 Test Setup

Refer to Appendix A JBP Setup Photos.

5.2 EUT Constructional Details (EUT Photos)

Refer to Photographs of EUT Constructional Details

- End of the Report -



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