

SPECTRUM REPORT

(FM)

Applicant: Shenzhen Huafurui Technology Co., Ltd.

Address of Applicant: Unit 1401 & 1402, 14/F, Jinqi zhigu mansion (No. 4 building of Chongwen Garden), Crossing of the Liuxian street and Tangling road, Taoyuan street, Nanshan district, Shenzhen, P. R. China

Equipment Under Test (EUT)

Product Name: Smart phone

Model No.: GT20

Trade mark: HAFURY

Applicable standards: ETSI EN 303 345-1 V1.1.1 (2019-06)
Draft ETSI EN 303 345-3 V1.1.0 (2019-11)

Date of sample receipt: 22 May, 2020

Date of Test: 23 May, to 15 Jun., 2020

Date of report issue: 13 Jul., 2020

Test Result: PASS*

* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EC Declaration of Conformity and compliance with all relevant EC Directives. The protection requirements with respect to electromagnetic compatibility contained in Directive 2014/53/EU are considered.



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 CCIS 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.

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2 Version

Version No.	Date	Description
00	13 Jul., 2020	Original

Remark:
This report was revised by CCISE200507409 report, which was released and tested by Shenzhen Zhongjian Nanfang Testing Co., Ltd. The differences between them as below: Update model, trademark and software version. So no needs to be retested.

Tested by:

Yao Wu

Date:

13 Jul., 2020

Test Engineer

Reviewed by:

Winner Zhang

Date:

13 Jul., 2020

Project Engineer

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4 Test Summary

Test Items	Test Requirement	Test method	Limit/Severity	Result
Sensitivity	ETSI EN 303 345-3 Clause 4.2	ETSI EN 303 345-1 Clause 5.3.4.1	ETSI EN 303 345-3 Clause 4.2.2	PASS
Receiver adjacent channel selectivity and blocking	ETSI EN 303 345-3 Clause 4.3	ETSI EN 303 345-1 Clause 5.3.5.1	ETSI EN 303 345-3 Clause 4.3.2	PASS
Remark: Pass: Meet the requirement				

5 General Information

5.1 Client Information

Applicant:	Shenzhen Huafurui Technology Co., Ltd.
Address:	Unit 1401 &1402, 14/F, Jinqi zhigu mansion (No. 4 building of Chongwen Garden), Crossing of the Liuxian street and Tangling road, Taoyuan street, Nanshan district, Shenzhen, P. R. China
Manufacturer/ Factory:	Shenzhen Huafurui Technology Co., Ltd.
Address:	Unit 1401 &1402, 14/F, Jinqi zhigu mansion (No. 4 building of Chongwen Garden), Crossing of the Liuxian street and Tangling road, Taoyuan street, Nanshan district, Shenzhen, P. R. China

5.2 General Description of E.U.T.

Product Name:	Smart phone
Model No.:	GT20
Hardware version:	V965_MB_V2.0_20200415
Software version:	HAFURY_GT20_A031CH_V01_20200715
Operation Frequency:	VHF band II: 87.5 MHz to 108 MHz
Modulation Technology:	Frequency modulation(FM)
Antenna Type:	Earphone as antenna
Power supply:	Rechargeable Li-ion polymer Battery DC3.85V/4200mAh
AC adapter:	Model No.:HJ-0502000W2-EU Input: AC100-240V, 50/60Hz 0.3A Output: DC 5.0V, 2.0A

5.3 Test environment and mode

Operating Environment:	
Temperature:	15°C ~ 35 °C
Humidity:	20 % ~ 75%
Atmospheric Pressure:	1008 mbar
Test mode:	
Receiving mode:	Keep the EUT in continuously Receiving mode with modulation.

5.4 Description of Support Units

Manufacturer	Description	Model	S/N	FCC ID/DoC
Lenovo	PC	ThinkPad E450	PF-OKTSQQ 16/06	DoC

5.5 Measurement Uncertainty

Parameter	Expanded Uncertainty (Confidence of 95%)
Conducted Measurement	±1.0 dB
Radiated Emission (30MHz ~ 1000MHz)	±4.32 dB
Radiated Emission (1GHz ~ 18GHz)	±5.16 dB

5.6 Laboratory Facility

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

- **FCC - Designation No.: CN1211**

Shenzhen Zhongjian Nanfang Testing 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 Shenzhen Zhongjian Nanfang Testing 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 17025:2005 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>

5.7 Laboratory Location

Shenzhen Zhongjian Nanfang Testing Co., Ltd.

Address: No.110~116, Building B, Jinyuan Business Building, Xixiang Road, Bao'an District, Shenzhen, Guangdong, China

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

Email: info@ccis-cb.com, Website: <http://www.ccis-cb.com>

5.8 Test Instruments list

Conducted method:					
Test Equipment	Manufacturer	Model No.	Serial No.	Cal. Date (mm-dd-yy)	Cal. Due date (mm-dd-yy)
Signal Generator	Rohde & Schwarz	SMX	835454/016	03-05-2020	03-04-2021
Cell Site Test Set	HP	8921A	3606A07821	03-05-2020	03-04-2021
Spectrum Analyzer	Rohde & Schwarz	FSP 30	101454	03-05-2020	03-04-2021
Impedance converter	SUNLIGHT	ST-5075	N/A	03-05-2020	03-04-2021

6 Radio Technical Specification in ETSI EN 303 345

6.1 Sensitivity

Test Requirement:	ETSI EN 303 345-3 clause 4.2												
Test Method:	ETSI EN 303 345-1 clause 5.3.4.1												
Limit:	<p>The limits for sensitivity specified in table 2 shall apply. Each figure quoted is the required level of wanted signal which provides a given level of audio quality. The audio impairment criteria relevant for these tests is that the audio SNR ≥ 40 dBQ ref $\pm 60,8$ kHz deviation, and that there shall be 10 seconds of audio with no subjective impairments (e.g. clicks resulting from FM threshold effects).</p> <p style="text-align: center;">Table 2: FM sensitivity requirements</p> <table><tr><th rowspan="2">De-modulation</th><th rowspan="2">Tuned frequency band</th><th rowspan="2">Wanted signal centre frequency (MHz)</th><th colspan="2">Required sensitivity limit</th></tr><tr><th>Conducted (dBm)</th><th>Radiated (dBμV/m)</th></tr><tr><td>FM</td><td>VHF band II</td><td>98</td><td>-90</td><td>50 (see note)</td></tr></table> <p>NOTE: For products with an integral antenna, the requirement is relaxed to 67 dBμV/m.</p>	De-modulation	Tuned frequency band	Wanted signal centre frequency (MHz)	Required sensitivity limit		Conducted (dBm)	Radiated (dB μ V/m)	FM	VHF band II	98	-90	50 (see note)
De-modulation	Tuned frequency band				Wanted signal centre frequency (MHz)	Required sensitivity limit							
		Conducted (dBm)	Radiated (dB μ V/m)										
FM	VHF band II	98	-90	50 (see note)									
Test setup:	<pre>graph LR subgraph Wanted_Path [] SG1[Signal generator 1 (wanted)] --- VA1[Variable attenuator 1] end subgraph Unwanted_Path [] SG2[Signal generator 2 (unwanted)] --- VA2[Variable attenuator 2] end VA1 --- C[Combiner] VA2 --- C C --- R((R)) R --- P[6 dB pad] P --- C2((C)) C2 --- RU[Receiver under test] RU --- MD[Measurement device]</pre>												
Test procedure:	<p>AM and FM sensitivity measurements:</p> <ol style="list-style-type: none">1) The 'unwanted' signal generator remains switched off for the duration of the test.2) The 'wanted' signal generator is set to the required modulation method, test signal configuration and centre frequency. The signal level is adjusted with the modulation disabled to the required sensitivity level plus 6 dB, as measured at ©. The modulation is enabled.3) The receiver is tuned to the frequency of the 'wanted' signal generator. For a receiver without a digital frequency display, the receiver shall be tuned for optimum THD+N (i.e. as it would be tuned by a user for best quality). The receiver's audio level shall be set so as to provide clean 1 kHz audio tone at the audio output (minimum distortion, that is typically less than 3 % total harmonic distortion, but no more than 10 % total harmonic distortion) but of sufficient level to drive the measurement device.4) The level of the 'wanted' signal generator is reduced by 6 dB.5) The audio output, measured using the measurement device, is recorded as the signal level, S.6) The modulating audio signal for the 'wanted' signal generator is removed. The audio output, measured using the measurement device, is recorded as the noise level, N.												
Test Instruments:	See section 5.8												
Test mode:	Receiving mode												
Test Result:	Pass												

Measurement Data:

Modulation	Tuned Frequency Band	Wanted Signal		S (mV)	N (mV)	SNR (dBQ)	Limit (dBQ)	Audio	Result
		Frequency (MHz)	Level at © (dBm)						
FM	VHF Band II	98.00	-90.00	254.30	1.89	42.58	≥40	Clean Audio	Pass

Note:

1. The wanted signal used FM modulation with ± 60.8 kHz deviation and 1 kHz tone. According to the pre-calibration, the actual level of signal generator is -70 dBm
2. The earphone antenna connector Impedance for 75Ω, by Impedance Converter(50 – 75 Ω) connect to test instrument.

6.2 Adjacent channel selectivity and blocking

Test Requirement:	ETSI EN 303 345-3 clause 4.2.3																																	
Test Method:	ETSI EN 303 345-1 clause 5.3.5.1																																	
Limit:	<p>The limits for selectivity and blocking specified in table 4 shall apply with the channel spacings given in table 3. Each figure quoted is the minimum acceptable level of unwanted signal, relative to that of the wanted signal, which provides a given level of audio quality. The audio impairment criteria relevant for these tests is that the audio SNR ≥ 40 dBQ ref $\pm 60,8$ kHz deviation, and that there shall be 10 seconds of audio with no subjective impairments (e.g. clicks resulting from FM threshold effects).</p> <p>Table 4: Adjacent channel selectivity and blocking requirements</p> <table><tr><th rowspan="2">De-modulation (see note 1)</th><th rowspan="2">Tuned frequency band</th><th rowspan="2">C Wanted signal centre frequency (MHz)</th><th colspan="2">C Wanted signal level</th><th colspan="4">Required I/C ratio (see notes 2 and 3)</th></tr><tr><th>Conducted (dBm)</th><th>Radiated (dBμV/m)</th><th>N = 2 (dB)</th><th>N = 3 (dB)</th><th>N = 4 (dB)</th><th>Blocking (dB)</th></tr><tr><td>FM (built-in or integral antenna)</td><td>VHF band II</td><td>98</td><td>n/a</td><td>56 (see note 4)</td><td>-15</td><td>-3</td><td>8</td><td>20</td></tr><tr><td>FM (external antenna)</td><td>VHF band II</td><td>98</td><td>-84</td><td>n/a</td><td>3</td><td>17</td><td>30</td><td>30</td></tr></table> <p>NOTE 1: The ACS and blocking requirements are currently separated into different limits for radiated and conducted testing methods. These limits are likely to be unified in a future revision of the present document. Users of the present document should consult frequently the latest list published in the Official Journal of the European Union.</p> <p>NOTE 2: The frequency of the interferer shall be calculated using the channel spacing data in table 3 for each of the 6 defined adjacent channels N = (-4, -3, -2, +2, +3, +4) and the two blocking offsets. Each row of table 4 thus defines 8 individual tests.</p> <p>NOTE 3: The minimum level of I for the relevant level of impairment is calculated by adding the I/C ratio to the wanted C level.</p> <p>NOTE 4: The wanted signal level for receivers with integral antenna is 73 dBμV/m.</p>	De-modulation (see note 1)	Tuned frequency band	C Wanted signal centre frequency (MHz)	C Wanted signal level		Required I/C ratio (see notes 2 and 3)				Conducted (dBm)	Radiated (dB μ V/m)	N = 2 (dB)	N = 3 (dB)	N = 4 (dB)	Blocking (dB)	FM (built-in or integral antenna)	VHF band II	98	n/a	56 (see note 4)	-15	-3	8	20	FM (external antenna)	VHF band II	98	-84	n/a	3	17	30	30
De-modulation (see note 1)	Tuned frequency band				C Wanted signal centre frequency (MHz)	C Wanted signal level		Required I/C ratio (see notes 2 and 3)																										
		Conducted (dBm)	Radiated (dB μ V/m)	N = 2 (dB)		N = 3 (dB)	N = 4 (dB)	Blocking (dB)																										
FM (built-in or integral antenna)	VHF band II	98	n/a	56 (see note 4)	-15	-3	8	20																										
FM (external antenna)	VHF band II	98	-84	n/a	3	17	30	30																										
Test setup:																																		
Test procedure:	<ol style="list-style-type: none">1) The 'wanted' signal generator is set to the required modulation method, test signal configuration, and centre frequency. The signal level is adjusted with the modulation disabled to the specified wanted signal level, as measured at ©, with the 'unwanted' generator switched off.2) The 'unwanted' signal generator is set to the required modulation method, test signal configuration, and centre frequency calculated from the wanted signal centre frequency and the required frequency offset. The signal level is adjusted with the modulation disabled to provide the level calculated from the wanted signal level and the required level offset, as measured at ©, with the 'wanted' generator switched off.3) The 'wanted' signal generator is switched back on. Modulation is enabled for both signal generators.<ol style="list-style-type: none">4) The receiver is tuned to the frequency of the 'wanted' signal generator. For a receiver without a digital frequency display, the receiver shall be tuned for optimum THD+N (i.e. as it would be tuned by a user for best quality). The receiver's audio level shall be set so as to provide clean 1 kHz audio tone at the audio output (minimum distortion, that is typically less than 3 % total harmonic distortion, but no more than 10 % total harmonic distortion) but of sufficient level to																																	

	drive the measurement device. 5) The audio output, measured using the measurement device, is recorded as the signal level, S. 6) The modulating audio signal for the 'wanted' signal generator is removed. The audio output, measured using the measurement device, is recorded as the noise level, N.
Test Instruments:	See section 5.8
Test mode:	Receiving mode
Test Result:	Pass

Test Data:

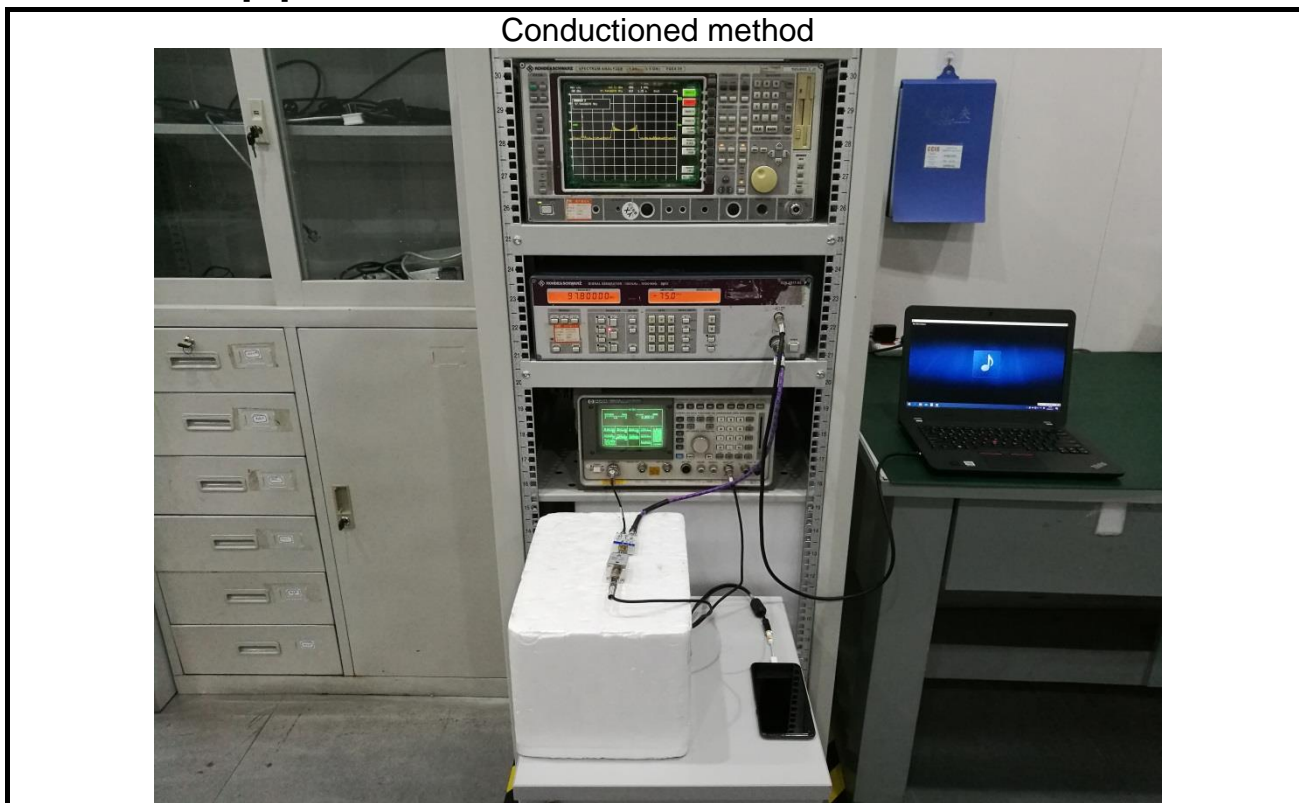
Test Data:

Modulation: FM, Tuned Frequency Band: VHF Band II										
Wanted Signal		Unwanted Signal		S (mV)	N (mV)	SNR (dBQ)	Limit (dBQ)	Audio	Result	
Frequency (MHz)	Level at © (dBm)	Frequency (MHz)	Level at © (dBm)							
98.00	-84.00	N=-2	97.80	-81.00	253.1	1.83	42.82	≥40	Clean Audio	Pass
		N=2	98.20	-81.00	253.2	1.85	42.73	≥40	Clean Audio	Pass
		N=-3	97.70	-67.00	253.4	1.87	42.64	≥40	Clean Audio	Pass
		N=3	98.30	-67.00	253.6	1.89	42.55	≥40	Clean Audio	Pass
		N=-4	97.60	-54.00	253.4	1.82	42.87	≥40	Clean Audio	Pass
		N=4	98.40	-54.00	252.9	1.86	42.67	≥40	Clean Audio	Pass
		Blocking	97.20	-54.00	253.5	1.87	42.64	≥40	Clean Audio	Pass
			98.80	-54.00	253.3	1.86	42.68	≥40	Clean Audio	Pass

Note:
1. The wanted signal used FM modulation with ±60.8 kHz deviation and 1 kHz tone. According to the precalibration, the actual level of signal generator is -69 dBm
2. For Adjacent channel selectivity test, the unwanted signal used FM modulation with weighted noise and 32 kHz quasi-peak deviation. The actual level of signal generator is -72 dBm when the level at © is -81 dBm.
3. For Blocking test, the unwanted signal used AM modulation with 1 kHz tone and 80% depth. The actual level of signal generator is -48 dBm when the level at © is -54 dBm.

7 Test setup photo

Conduction method



8 EUT Constructional Details

Reference to the test report No.: CCISE200703101.

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