

FCC Test Report

Report No.: AGC00552200802FE03

FCC ID	: 2AHZ5NOTE20PRO	
APPLICATION PURPOSE	: Original Equipment	
PRODUCT DESIGNATION	: Smart Phone	
BRAND NAME	: CUBOT	
MODEL NAME	: NOTE 20 PRO	
APPLICANT	: Shenzhen Huafurui Technology Co., L	.td.
DATE OF ISSUE	: Sep. 08, 2020	
STANDARD(S)	: FCC Part 15.247	
REPORT VERSION	: V1.0	

Attestation of Global Compliance (Shenzhen) Co., Ltd



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REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	. /	Sep. 08, 2020	Valid	Initial Release

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1. VERIFICATION OF CONFORMITY

Applicant	Shenzhen Huafurui Technology Co., Ltd.	
Address	Unit 1401 14/F, Jin qi zhi gu mansion Liu xian street ,Xili, Nan shan district Shenzhen,China	
Manufacturer	Shenzhen Huafurui Technology Co., Ltd.	
Address	Unit 1401 14/F, Jin qi zhi gu mansion Liu xian street ,Xili, Nan shan district Shenzhen,China	
Factory	Shenzhen Huafurui Technology Co., Ltd.	
Address	Unit 1401 14/F, Jin qi zhi gu mansion Liu xian street ,Xili, Nan shan district Shenzhen,China	
Product Designation	Smart Phone	
Brand Name	СИВОТ	
Test Model	NOTE 20 PRO	
Date of test	Aug. 13, 2020~Sep. 08, 2020	
Deviation	No any deviation from the test method	
Condition of Test Sample	Normal	
Test Result	Pass	
Report Template	AGCRT-US-BR/RF	

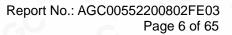
We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC PART 15.247.

Donjon. Huang Prepared By Donjon Huang Sep. 08, 2020 (Project Engineer) Max Zhang **Reviewed By** Max Zhang Sep. 08, 2020 (Reviewer) Forrest in Approved By Forrest Lei Sep. 08, 2020 (Authorized Officer)

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as "Bluetooth Module". It is designed by way of utilizing the GFSK, Pi/4 DQPSK and 8DPSK technology to achieve the system operation.

A major technical description of EUT is described as following

Operation Frequency	2.402 GHz to 2.480 GHz	
RF Output Power	-0.486dBm (Max)	
Bluetooth Version	V 4.2	
Modulation	BR ⊠GFSK, EDR ⊠π /4-DQPSK, ⊠8DPSK BLE □GFSK 1Mbps □GFSK 2Mbps	
Number of channels	79	
Hardware Version	LV966_MB_V1.0	
Software Version	CUBOT_NOTE 20 PRO_A013C_V02_20200729	
Antenna Designation	PIFA Antenna (Comply with requirements of the FCC part 15.203)	
Antenna Gain	0dBi	
Power Supply	DC 3.85V	

2.2. TABLE OF CARRIER FREQUENCYS

Frequency Band	Channel Number	Frequency
	0	2402 MHz
		2403 MHz
0		
	38	2440 MHz
2402~2480MHz	39	2441 MHz
	40	2442 MHz
	77	2479 MHz
	78	2480 MHz

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2.3. RECEIVER INPUT BANDWIDTH

The input bandwidth of the receiver is 1.3MHz, in every connection one Bluetooth device is the master and the other one is slave. The master determines the hopping sequence. The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master. Additionally, the type of connection (e.g. single of multi slot packet) is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing according to the packet type of the connection. Also, the slave of the connection will use these settings. Repeating of a packet has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case. That means, a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence.

2.4. EXAMPLE OF A HOPPING SEQUENCY IN DATA MODE

Example of a hopping sequence in data mode: 40,21,44,23,42,53,46,55,48,33,52,35,50,65,54,67 56,37,60,39,58,69,62,71,64,25,68,27,66,57,70,59 72,29,76,31,74,61,78,63,01,41,05,43,03,73,07,75 09,45,13,47,11,77,15,00,64,49,66,53,68,02,70,06 01, 51, 03, 55, 05, 04

2.5. EQUALLY AVERAGE USE OF FREQUENCIES AND BEHAVIOUR

The generation of the hopping sequence in connection mode depends essentially on two input values:

1. LAP/UAP of the master of the connection.

2. Internal master clock.

The LAP (lower address part) are the 24 LSB's of the 48 BD_ADDRESS. The BD_ADDRESS is an unambiguous number of every Bluetooth unit. The UAP (upper address part) are the 24MSB's of the 48BD_ADDRESS

The internal clock of a Bluetooth unit is derived from a free running clock which is never adjusted and is never turned off. For behavior action with other units only offset is used. It has no relation to the time of the day. Its resolution is at least half the RX/TX slot length of 312.5us. The clock has a cycle of about one day(23h30). In most case it is implemented as 28 bits counter. For the deriving of the hopping sequence the entire. LAP (24 bits),4LSB's(4bits) (Input 1) and the 27MSB's of the clock (Input 2) are used. With this input values different mathematical procedures (permutations, additions, XOR-operations) are performed to generate the Sequence. This will be done at the beginning of every new transmission.

Regarding short transmissions the Bluetooth system has the following behavior:

The first connection between the two devices is established, a hopping sequence was generated. For Transmitting the wanted data the complete hopping sequence was not used. The connection ended. The second connection will be established. A new hopping sequence is generated. Due to the fact the

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Bluetooth clock has a different value, because the period between the two transmission is longer (and it Cannot be shorter) than the minimum resolution of the clock(312.5us). The hopping sequence will always differ from the first one.

2.6. RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2AHZ5NOTE20PRO** filing to comply with the FCC PART 15.247 requirements.

2.7. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013). Radiated testing was performed at an antenna to EUT distance 3 meters.

2.8. SPECIAL ACCESSORIES

Refer to section 5.2.

2.9. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

2.10. ANTENNA REQUIREMENT

This intentional radiator is designed with a permanently attached antenna of an antenna to ensure that no antenna other than that furnished by the responsible party shall be used with the device. For more information of the antenna, please refer to the APPENDIX B: PHOTOGRAPHS OF EUT.

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3. MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement y ±U, where expended uncertainty U is based on a standard

uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95%.

- Uncertainty of Conducted Emission, Uc = ±3.2 dB
- Uncertainty of Radiated Emission below 1GHz, Uc = ±3.9 dB
- Uncertainty of Radiated Emission above 1GHz, Uc = ±4.8 dB
- Uncertainty of total RF power, conducted, $Uc = \pm 0.8$ dB
- Uncertainty of spurious emissions, conducted, Uc = ±2.7dB
- Uncertainty of Occupied Channel Bandwidth: Uc = ±2 %
- Uncertainty of Dwell Time: Uc = ± 2 %
- Uncertainty of Frequency: $Uc = \pm 2 \%$

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4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Low channel GFSK
2	Middle channel GFSK
3	High channel GFSK
4	Low channel π/4-DQPSK
5	Middle channel π/4-DQPSK
6	High channel π/4-DQPSK
7	Low channel 8DPSK
8	Middle channel 8DPSK
9	High channel 8DPSK
10	Hopping mode GFSK
11	Hopping mode π/4-DQPSK
12	Hopping mode 8DPSK

Note:

1. Only the result of the worst case was recorded in the report, if no other cases.

2. For Radiated Emission, 3axis were chosen for testing for each applicable mode.

3. For Conducted Test method, a temporary antenna connector is provided by the manufacture.

4. The test software is the Blue Test3 which can set the EUT into the individual test modes.

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5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Radiated Emission Configure:

EUT

Conducted Emission Configure:

	5	
EUT		AE

5.2. EQUIPMENT USED IN TESTED SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	Smart Phone	NOTE 20 PRO	FCC ID: 2AHZ5NOTE20PRO	EUT
2	Adapter	HJ-0502000W2-US	DC 5.0V 2A	AE
3	Battery	NOTE 20	DC 3.85V 4200mAh	AE
4	USB Cable	N/A	N/A	AE

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
15.247 (b)(1)	Peak Output Power	Compliant
15.247 (a)(1)	20 dB Bandwidth	Compliant
15.247 (d)	Conducted Spurious Emission	Compliant
15.209	Radiated Emission	Compliant
15.247 (a)(1)(iii)	Number of Hopping Frequency	Compliant
15.247 (a)(1)(iii)	Time of Occupancy	Compliant
15.247 (a)(1)	Frequency Separation	Compliant
15.207	Conducted Emission	Compliant

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6. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd	
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China	
Designation Number	CN1259	
FCC Test Firm Registration Number	975832	
A2LA Cert. No.	5054.02	
Description	Attestation of Global Compliance (Shenzhen) Co., Ltd is accredited by A2LA	

TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	Cal. Date	Cal. Due	
TEST RECEIVER	R&S	ESPI	101206	May 15, 2020	May 14, 2022
LISN	R&S	ESH2-Z5	100086	Jul. 03, 2020	Jul. 02, 2021
Test software	R&S	ES-K1(Ver.V1.71)	N/A	N/A	N/A

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due	
TEST RECEIVER	R&S	ESCI	10096	May 15, 2020	May 14, 2022	
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 12, 2019	Dec. 11, 2020	
2.4GHz Filter	EM Electronics	2400-2500MHz	N/A	Mar. 23, 2020	Mar. 22, 2022	
Attenuator	ZHINAN	E-002	N/A	Aug. 24, 2020	Aug. 23, 2021	
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep. 09, 2019	Sep. 08, 2021	
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	May 22, 2020	May 21, 2022	
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May 17, 2019	May 16, 2021	
Broadband Preamplifier	ETS LINDGREN	3117PA	00225134	Oct. 15, 2019	Oct. 16, 2020	
ANTENNA	SCHWARZBECK	VULB9168	494	Jan. 09, 2019	Jan. 08, 2021	
Test software	Tonscend	JS32-RE (Ver.2.5)	N/A	N/A	N/A	

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7. PEAK OUTPUT POWER

7.1. MEASUREMENT PROCEDURE

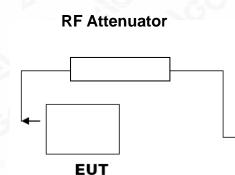
For peak power test:

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel.
- 3. RBW > 20 dB bandwidth of the emission being measured.
- 4. VBW \geq RBW.
- 5. Sweep: Auto.
- 6. Detector function: Peak.
- 7. Trace: Max hold.

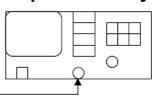
Allow trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power, after any corrections for external attenuators and cables.

7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

PEAK POWER TEST SETUP



Spectrum Analyzer



RF Cable

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7.3. LIMITS AND MEASUREMENT RESULT

PEAK OUTPUT POWER MEASUREMENT RESULT									
FOR GFSK MOUDULATION									
Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail						
2.402	-1.371	21	Pass						
2.441	-0.486	21	Pass						
2.480	-2.709	21	Pass						

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PEAK OUTPUT POWER MEASUREMENT RESULT FOR Π/4-DQPSK MODULATION									
Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail						
2.402	-2.392	21	Pass						
2.441	-1.562	21	Pass						
2.480	-3.342	21	Pass						



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PEAK OUTPUT POWER MEASUREMENT RESULT FOR 8-DPSK MODULATION									
Frequency (GHz)	Peak Power (dBm)	Applicable Limits (dBm)	Pass or Fail						
2.402	-2.559	21	Pass						
2.441	-1.518	21	Pass						
2.480	-3.321	21	Pass						



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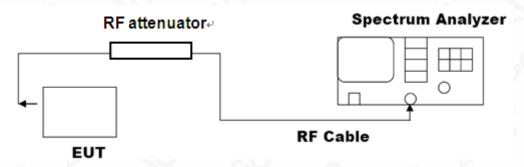


8. 20DB BANDWIDTH

8.1. MEASUREMENT PROCEDURE

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2, Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 3. Set Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a hoping channel The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW; Sweep = auto; Detector function = peak
- 4. Set SPA Trace 1 Max hold, then View.

8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



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8.3. LIMITS AND MEASUREMENT RESULTS

MEASUREMENT RESULT FOR GFSK MOUDULATION									
Appliachte Limite		Measurement Resul	t						
Applicable Limits	Test Data	Criteria							
	Low Channel	0.823	PASS						
N/A	Middle Channel	0.822	PASS						
	High Channel	0.831	PASS						

05:09:10 PM Aug 14, 2020 Radio Std: None Frequency Center Freq: 2.402000000 GHz 402000000 GHz Avg|Hold>100/100 Trig: Free Run #Atten: 30 dB Radio Device: BTS Ref 20.00 dBm **Center Freq** 2.402000000 GHz Center 2.402 GHz #Res BW 30 kHz Span 3 MHz Sweep 3.2 ms **CF** Step #VBW 100 kHz 300.000 kH <u>Auto</u> Ma Occupied Bandwidth **Total Power** 4.56 dBm 857.50 kHz Freq Offset 0 Hz -2.268 kHz **Transmit Freq Error OBW Power** 99.00 % x dB Bandwidth 822.7 kHz x dB -20.00 dB

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL

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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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MEASUREMENT RESULT FOR II /4-DQPSK MODULATION									
Annlieghte Limite	Measurement Result								
Applicable Limits	Test Data	Test Data (MHz)							
	Low Channel	1.119	PASS						
N/A	Middle Channel	1.141	PASS						
	High Channel	1.114	PASS						

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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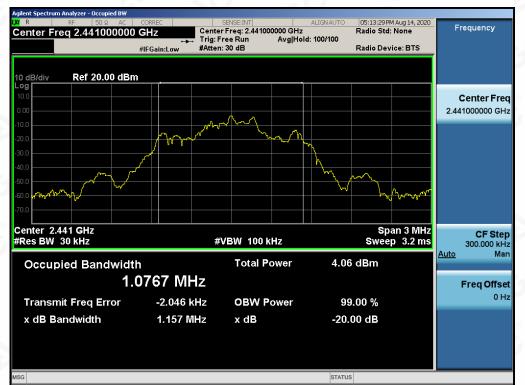
MEASUREMENT RESULT FOR 8-DPSK MODULATION									
Annlinghla Limita		Measurement Result							
Applicable Limits	Test Dat	Test Data (MHz)							
	Low Channel	1.128	PASS						
N/A	Middle Channel	1.157	PASS						
	High Channel	1.113	PASS						

TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



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TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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9. CONDUCTED SPURIOUS EMISSION

9.1. MEASUREMENT PROCEDURE

- 1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- 2. Set the EUT Work on the top, the Middle and the bottom operation frequency individually.
- Set the Span = wide enough to capture the peak level of the in-band emission and all spurious emissions from the lowest frequency generated in the EUT up through the 10th harmonic.
 RBW = 100 kHz; VBW= 300 kHz; Sweep = auto; Detector function = peak.
- 4. Set SPA Trace 1 Max hold, then View.

9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 8.2

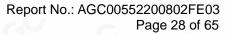
9.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

9.4. LIMITS AND MEASUREMENT RESULT

LIMITS AND MEASUREMENT RESULT										
Annlinghta Limita	Measurement Result									
Applicable Limits	Test Data	Criteria								
In any 100 kHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency	At least -20dBc than the limit Specified on the BOTTOM Channel	PASS								
power that is produce by the intentional radiator shall be at least 20 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power. In addition, radiation emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in§15.209(a))	At least -20dBc than the limit Specified on the TOP Channel	PASS								

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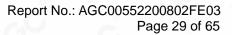




TEST RESULT FOR ENTIRE FREQUENCY RANGE TEST PLOT OF OUT OF BAND EMISSIONS WITH THE WORST CASE OF 8DPSK MODULATION IN LOW CHANNEL



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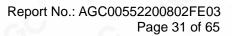
 Tel: +86-755 2523 4088
 E-mail: agc@agc-cert.com





TEST PLOT OF OUT OF BAND EMISSIONS OF 8DPSK MODULATION IN MIDDLE CHANNEL

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	ipectrum	Analy	zer - Swep	t SA											
l XI R		RF	50 S		CORREC	_	SEN	JSE:INT			ALIGN AUTO		M Aug 14, 2020	Г	Frequency
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															13.741750000 GHZ
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-20.0													-22.40 dBm		Start Freq
-30.0															2.483500000 GHz
-40.0													1.		2.40000000000
-50.0 -							المراجع بع	مراطلة بام بار	المرجعة أوريط ومع						Stop Freq
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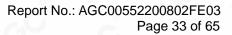
Web: http://cn.agc-cert.com/





TEST PLOT OF OUT OF BAND EMISSIONS OF 8DPSK MODULATION IN HIGH CHANNEL

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Agilent Spect	trum A													
xı Center	Fre	RF α 1	50 Ω 3 7500		GH7		SEN	NSE:INT	Avg T	ALIGN /		TRAC	4 Aug 14, 2020	Frequency
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	_	_	_		IFGain:Lov	w	Atten: 30	ab			Miland			Auto Tune
	Mkr1 20.630 4 GHz dB/div Ref 20.00 dBm -48.920 dBm													
10 dB/div Log		æ	20.00 0	aBm										
10.0														Center Freq
0.00														13.750000000 GHz
-10.0														
-20.0													-23.78 dBm	Start From
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-60.0			an and the state	and the star		di na sa								Stop Freq
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Start 2.	50 G	Hz										Stop 2	5.00 GHz	CF Step
#Res B۱	N 10	00 k	kHz		#\	/BW	300 kHz			Swe	eep 2	2.152 s (3	0000 pts)	2.25000000 GHz
MKR MODE				×			Y		ICTION	FUNCTION	WIDTH	FUNCTIO	ON VALUE	<u>Auto</u> Man
1 N 2	1	f		20.63	0 4 GHz		-48.920 dE	3m						
3	ک ا	ر ک						کی						Freq Offset
4														0 Hz
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•		_												
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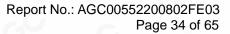
Note: The 8DPSK modulation is the worst case and only those data recorded in the report.

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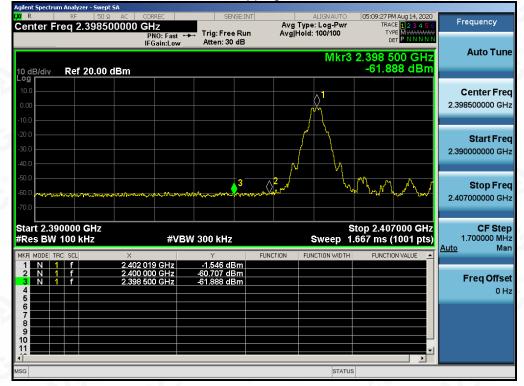




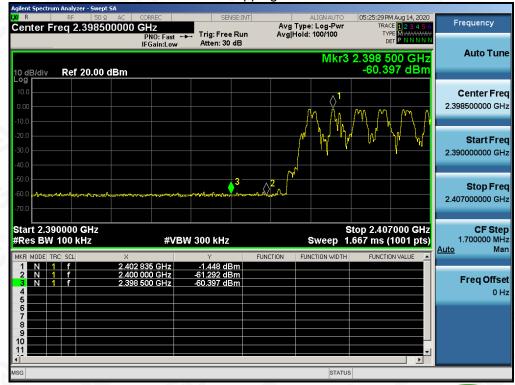
TEST RESULT FOR BAND EDGE

GFSK MODULATION IN LOW CHANNEL

Hopping off

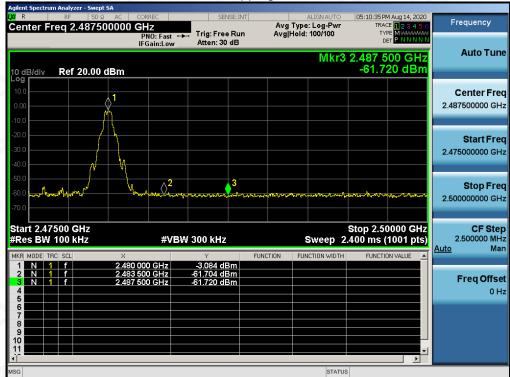


Hopping on

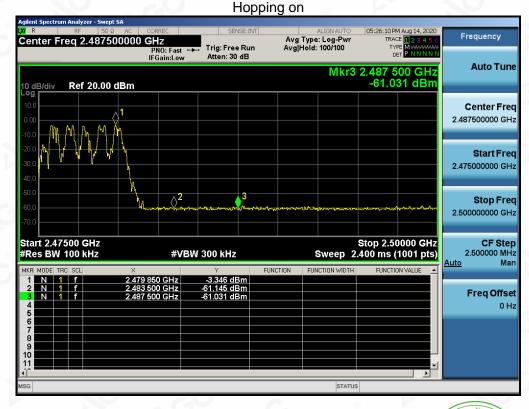


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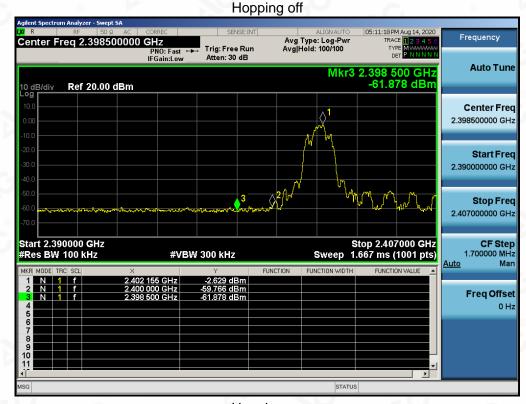


GFSK MODULATION IN HIGH CHANNEL Hopping off



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π /4-DQPSK MODULATION IN LOW CHANNEL

Hopping on



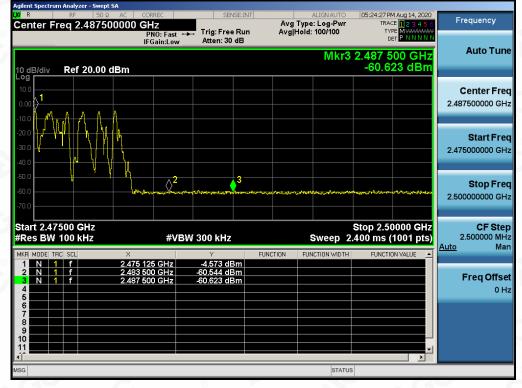
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π /4-DQPSK MODULATION IN HIGH CHANNEL Hopping off

Hopping on



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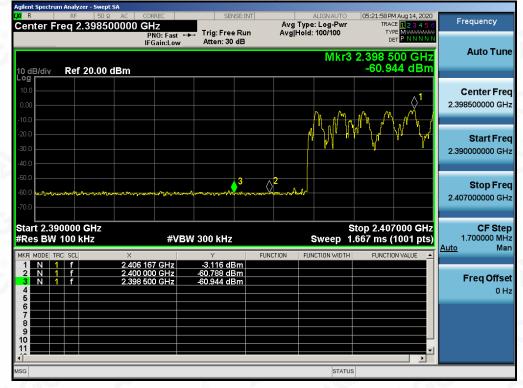




8-DPSK MODULATION IN LOW CHANNEL

Hopping off

Hopping on



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8-DPSK MODULATION IN HIGH CHANNEL

Hopping off

Hopping on



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10. RADIATED EMISSION

10.1. MEASUREMENT PROCEDURE

- 1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
- 2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
- 3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
- 4. For each suspected emission, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
- 5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
- 6. For emissions above 1GHz, use 1MHz RBW and 3MHz VBW for peak reading. Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.
- 7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum values.
- 8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
- 9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
- 10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High Low scan is not required in this case.

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The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Start ~Stop Frequency	1GHz~26.5GHz 1MHz/3MHz for Peak, 1MHz/3MHz for Average

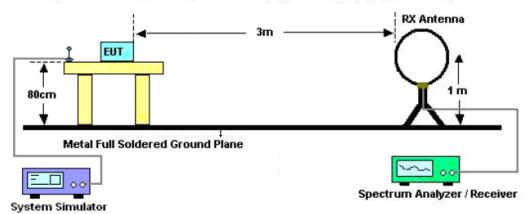
Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

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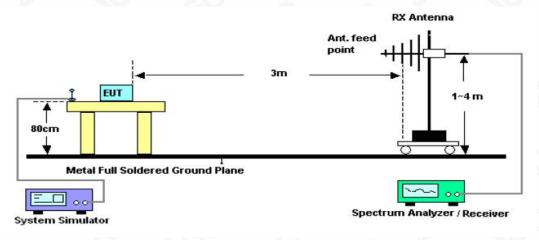


10.2. TEST SETUP

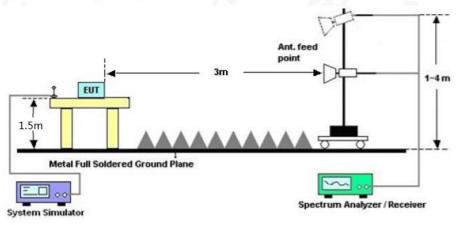
Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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10.3. LIMITS AND MEASUREMENT RESULT

15.209 Limit in the below table has to be followed

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Note: All modes were tested for restricted band radiated emission, the test records reported below are the worst result compared to other modes.

10.4. TEST RESULT

RADIATED EMISSION BELOW 30MHz

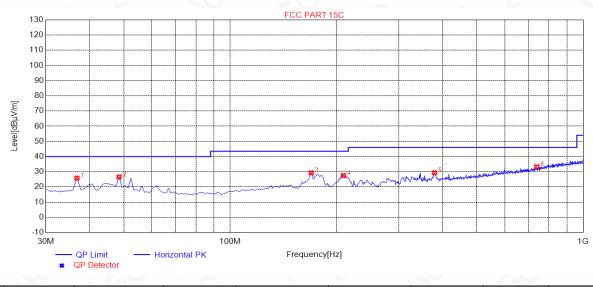
The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported.

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RADIATED EMISSION BELOW 1GHz

EUT	Smart Phone	Model Name	NOTE 20 PRO
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 4	Antenna	Horizontal



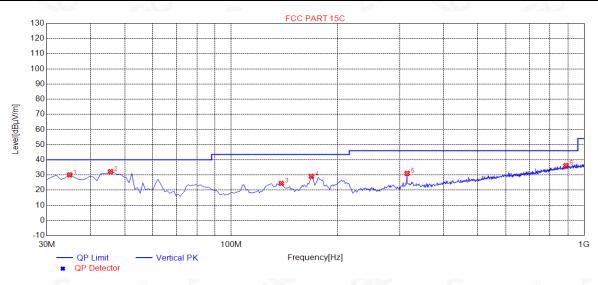
NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	36.7900	25.81	11.16	40.00	14.19	100	359	Horizontal
2	48.4300	26.55	11.71	40.00	13.45	100	100	Horizontal
3	169.6800	29.31	13.98	43.50	14.19	100	350	Horizontal
4	209.4500	27.50	12.63	43.50	16.00	100	324	Horizontal
5	379.2000	29.34	19.00	46.00	16.66	100	117	Horizontal
6	739.0700	33.28	26.95	46.00	12.72	100	228	Horizontal

RESULT: PASS

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EUT	Smart Phone	Model Name	NOTE 20 PRO
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 4	Antenna	Vertical



NO.	Freq. [MHz]	Level [dBµV/m]	Factor [dB]	Limit [dBµV/m]	Margin [dB]	Height [cm]	Angle [°]	Polarity
1	34.8500	30.06	10.70	40.00	9.94	100	0	Vertical
2	45.5200	32.19	11.80	40.00	7.81	100	166	Vertical
3	138.6400	24.47	14.78	43.50	19.03	100	90	Vertical
4	168.7100	29.08	14.08	43.50	14.42	100	90	Vertical
5	315.1800	31.02	16.48	46.00	14.98	100	286	Vertical
6	888.4500	36.19	29.96	46.00	9.81	100	117	Vertical

RESULT: PASS

Note: 1. Factor=Antenna Factor + Cable loss, Margin= Limit-Measurement.

2. All test modes had been pre-tested. The mode 4 is the worst case and recorded in the report.

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RADIATED EMISSION ABOVE 1GHz

EUT	Smart Phone	Model Name	NOTE 20 PRO
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type
4804.000	45.92	0.08	46	74	-28	peak 💿
4804.000	37.51	0.08	37.59	54	-16.41	AVG
7206.000	40.28	2.21	42.49	74	-31.51	peak
7206.000	32.43	2.21	34.64	54	-19.36	AVG
No.	60			No.	-00	
Remark:			3			
actor = Anter	nna Factor + Cable	e Loss – Pre-	amplifier.	0		

EUT	Smart Phone	Model Name	NOTE 20 PRO
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin 💿	Value Type
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	value Type
4804.000	44.59	0.08	44.67	74	-29.33	peak
4804.000	36.17	0.08	36.25	54	-17.75	AVG
7206.000	39.47	2.21	41.68	74	-32.32	peak
7206.000	30.12	2.21	32.33	54	-21.67	AVG
	G	-0			0	60
nark:	200	<u>_</u>	6	®		G

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EUT	Smart Phone	Model Name	NOTE 20 PRO
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 2	Antenna	Horizontal

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Value Tree
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	- Value Type
4882.000	45.28	0.14	45.42	74	-28.58	peak 💿
4882.000	38.46	0.14	38.6	54	-15.4	AVG
7323.000	41.27	2.36	43.63	74	-30.37	peak
7323.000	34.59	2.36	36.95	54	-17.05	AVG
	20			6	20	
emark:		<u> </u>	0			60

EUT	Smart Phone	Model Name	NOTE 20 PRO
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 2	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Malua Tima
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	- Value Type
4882.000	45.92	0.14	46.06	74	-27.94	peak
4882.000	37.48	0.14	37.62	54	-16.38	AVG
7323.000	40.28	2.36	42.64	74	-31.36	peak
7323.000	31.46	2.36	33.82	54	-20.18	AVG
	0					
	8					

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

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EUT	Smart Phone	Model Name	NOTE 20 PRO
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Horizontal

Value Type
peak
AVG
peak
AVG

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

EUT	Smart Phone	Model Name	NOTE 20 PRO
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Vertical

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	
(MHz)	(dBµV)	(dB)	(dBµV/m)	(dBµV/m)	(dB)	Value Type
4960.000	45.26	0.22	45.48	74	-28.52	peak
4960.000	38.13	0.22	38.35	54	-15.65	AVG
7440.000	41.07	2.64	43.71	74	-30.29	peak
7440.000	33.54	2.64	36.18	54	-17.82	AVG
			(6)			
				8		

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

RESULT: PASS

Note:

The amplitude of other spurious emissions from 1G to 25 GHz which are attenuated more than 20 dB below the permissible value need not be reported.

Factor = Antenna Factor + Cable loss - Amplifier gain, Over= Limit-Measure.

The "Factor" value can be calculated automatically by software of measurement system.

All test modes had been tested. The GFSK modulation is the worst case and recorded in the report.

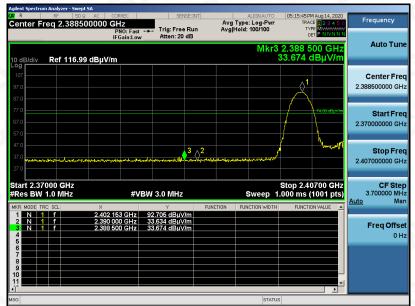
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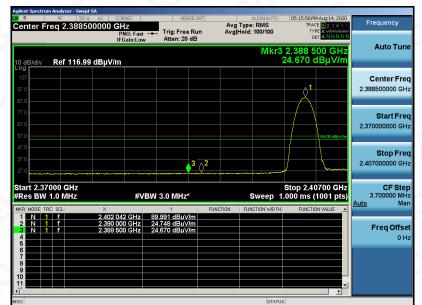
EUT	Smart Phone	Model Name	NOTE 20 PRO	
Temperature	25°C	Relative Humidity	55.4%	
Pressure	960hPa	Test Voltage	Normal Voltage	
Test Mode	Mode 1	Antenna	Horizontal	

TEST RESULT FOR RESTRICTED BANDS REQUIREMENTS

PK



AV



RESULT: PASS

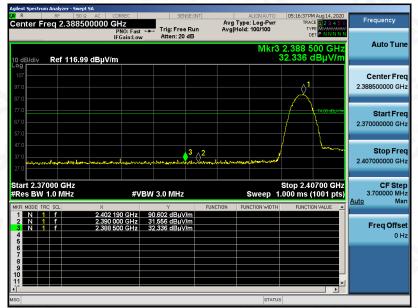
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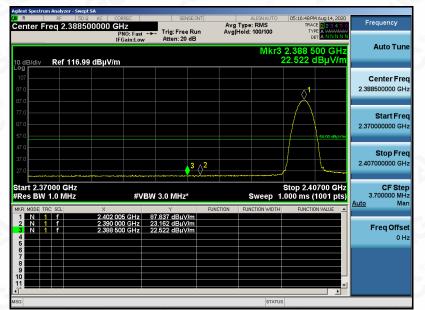
Report No.: AGC00552200802FE03 Page 50 of 65

EUT	Smart Phone	Model Name	NOTE 20 PRO
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 1	Antenna	Vertical

PK



AV



RESULT: PASS

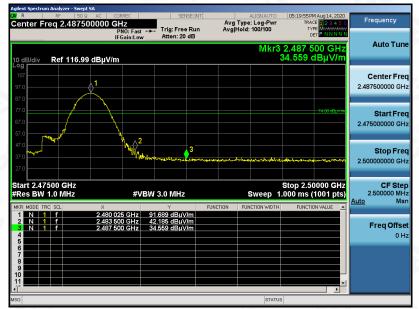
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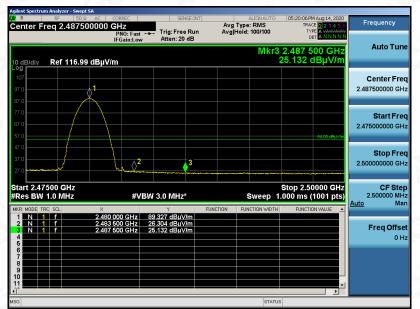
Report No.: AGC00552200802FE03 Page 51 of 65

EUT	Smart Phone	Model Name	NOTE 20 PRO
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Horizontal

PK



AV



RESULT: PASS

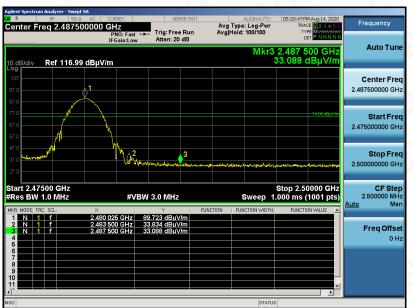
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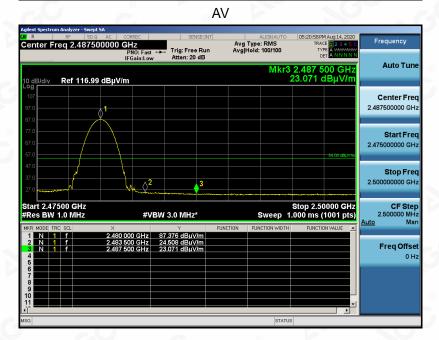


Report No.: AGC00552200802FE03 Page 52 of 65

EUT	Smart Phone	Model Name	NOTE 20 PRO
Temperature	25°C	Relative Humidity	55.4%
Pressure	960hPa	Test Voltage	Normal Voltage
Test Mode	Mode 3	Antenna	Vertical



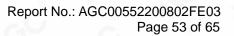
PK



RESULT: PASS

Note: The factor had been edited in the "Input Correction" of the Spectrum Analyzer. The GFSK modulation is the worst case and recorded in the report.

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11. NUMBER OF HOPPING FREQUENCY

11.1. MEASUREMENT PROCEDURE

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

1. Span: The frequency band of operation. Depending on the number of channels the device supports, it may be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen.

2. RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller.

3. VBW \geq RBW. Sweep: Auto. Detector function: Peak. Trace: Max hold.

4. Allow the trace to stabilize.

11.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

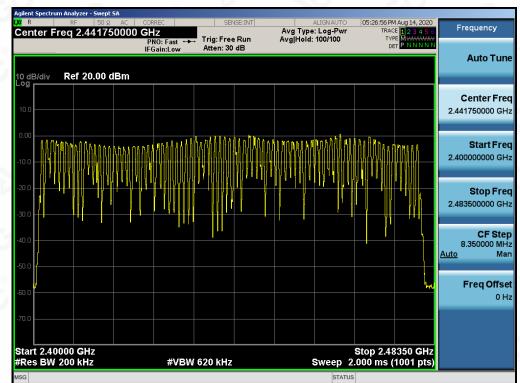
Same as described in section 8.2

11.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

11.4. LIMITS AND MEASUREMENT RESULT

TOTAL NO. OF	LIMIT (NO. OF CH)	MEASUREMENT (NO. OF CH)	RESULT
HOPPING CHANNEL	>=15	79	PASS



TEST PLOT FOR NO. OF TOTAL CHANNELS

Note: The GFSK modulation is the worst case and recorded in the report.

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12. TIME OF OCCUPANCY (DWELL TIME)

12.1. MEASUREMENT PROCEDURE

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

1. Span: Zero span, centered on a hopping channel.

2. RBW shall be \leq channel spacing and where possible RBW should be set >> 1 / T, where T is the expected dwell time per channel.

3. Sweep: As necessary to capture the entire dwell time per hopping channel; where possible use a video trigger and trigger delay so that the transmitted signal starts a little to the right of the start of the plot. The trigger level might need slight adjustment to prevent triggering when the system hops on an adjacent channel; a second plot might be needed with a longer sweep time to show two successive hops on a channel.

4. Detector function: Peak. Trace: Max hold.

5. Use the marker-delta function to determine the transmit time per hop.

6. Repeat the measurement using a longer sweep time to determine the number of hops over the period specified in the requirements. The sweep time shall be equal to, or less than, the period specified in the requirements. Determine the number of hops over the sweep time and calculate the total number of hops in the period specified in the requirements, using the following equation:

(Number of hops in the period specified in the requirements) = (number of hops on spectrum analyzer) \times (period specified in the requirements / analyzer sweep time)

7. The average time of occupancy is calculated from the transmit time per hop multiplied by the number of hops in the period specified in the requirements.

12.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 8.2

12.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6

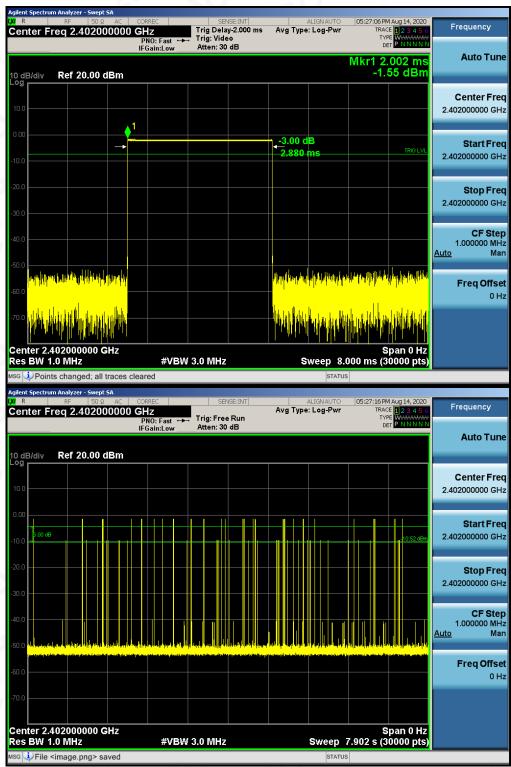
12.4. LIMITS AND MEASUREMENT RESULT

Channel	Time of Pulse for DH5 (ms)	Number of hops in the period specified in the requirements	Sweep Time (ms)	Limit (ms)
Low	2.880	28*4	322.598	400
Middle	2.880	31*4	357.146	400
High	2.880	28*4	322.560	400

Note: The GFSK modulation is the worst case and recorded in the report.

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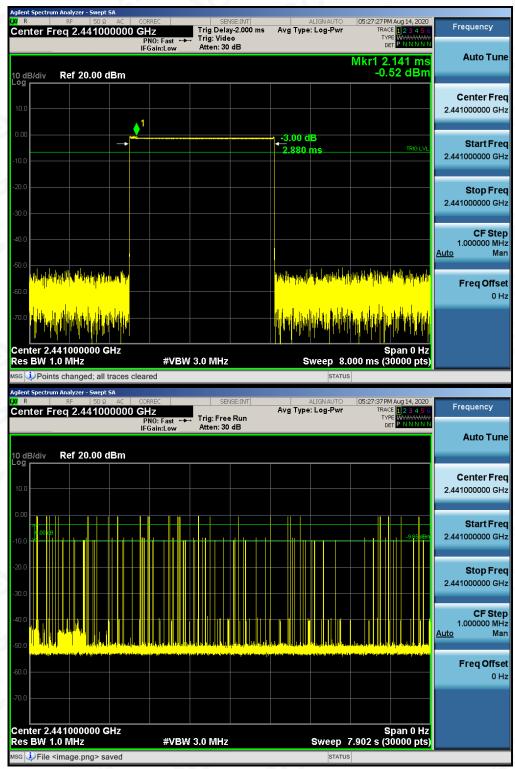




TEST PLOT OF LOW CHANNEL

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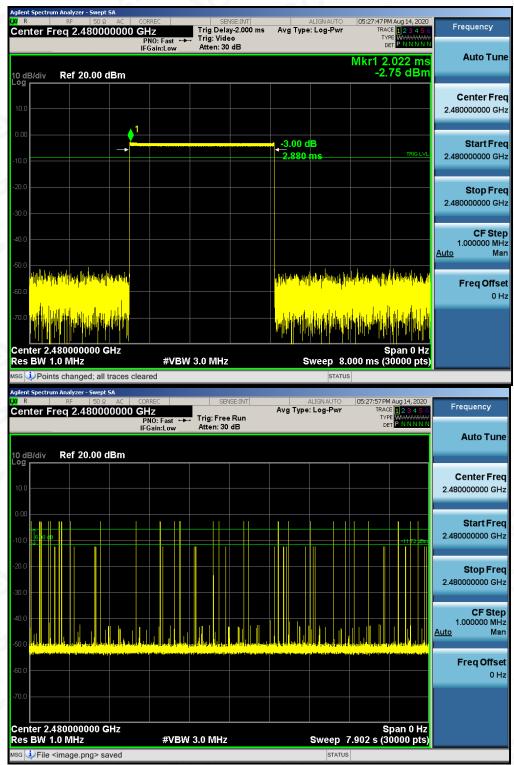




TEST PLOT OF MIDDLE CHANNEL

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TEST PLOT OF HIGH CHANNEL

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13. FREQUENCY SEPARATION

13.1. MEASUREMENT PROCEDURE

The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings:

1. Span: Wide enough to capture the peaks of two adjacent channels.

2. RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel.

3. Video (or average) bandwidth (VBW) \geq RBW.

4. Sweep: Auto. e) Detector function: Peak. f) Trace: Max hold. g) Allow the trace to stabilize.

Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

13.2. TEST SETUP (BLOCK DIAGRAM OF CONFIGURATION)

Same as described in section 6.2

13.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6.3

13.4. LIMITS AND MEASUREMENT RESULT

CHANNEL	CHANNEL SEPARATION	LIMIT	RESULT	
	MHz		Deep	
CH01-CH02	1.998	>= 2/3 20 dB BW	Pass	

15 PM Aug 14, 2020 Peak Search Marker 2 2.440837837838 GHz Avg Type: Log-Pv AvgiHold: 100/100 Trig: Free Run Atten: 30 dB PNO: Wide IFGain:Lov Next Peak Mkr2 2.440 838 GH -0.833 dBm Ref 20.00 dBm Next Pk Right Next Pk Left Marker Delta Center 2.441000 GHz #Res BW 30 kHz Span 4.000 MHz Sweep 4.262 ms (1000 pts) #VBW 100 kHz Mkr→CF 2.439 837 GHz 2.440 838 GHz -0.383 dBm -0.833 dBm Mkr→RefLvl More 1 of 2

TEST PLOT FOR FREQUENCY SEPARATION

Note: The GFSK modulation is the worst case and recorded in the report.

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14. FCC LINE CONDUCTED EMISSION TEST

14.1. LIMITS OF LINE CONDUCTED EMISSION TEST

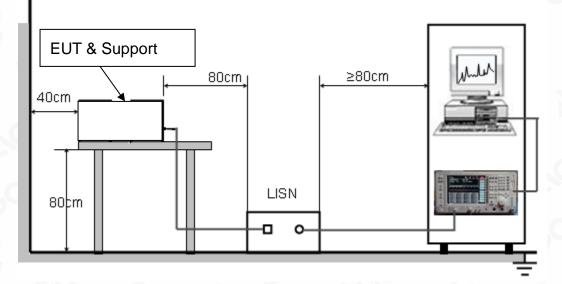
Frequency	Maximum RF Line Voltage				
Frequency	Q.P. (dBµV)	Average (dBµV)			
150kHz~500kHz	66-56	56-46			
500kHz~5MHz	56	46			
5MHz~30MHz	60	50			

Note:

1. The lower limit shall apply at the transition frequency.

2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

14.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



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14.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

- The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2. Support equipment, if needed, was placed as per ANSI C63.10.
- 3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
- 4. All support equipment received AC120V/60Hz power from a LISN, if any.
- 5. The EUT received DC 3.85V power from control board which received AC120V/60Hz power from a LISN.
- 6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
- 8. During the above scans, the emissions were maximized by cable manipulation.
- 9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

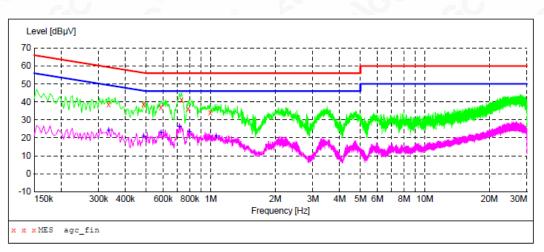
14.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

- 1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
- A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less – 2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
- 3. The test data of the worst case condition(s) was reported on the Summary Data page.

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14.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST



Line Conducted Emission Test Line 1-L

MEASUREMENT RESULT: "agc_fin"

2020/8/14 10:	11					
Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Detector	Line
0.334000	38.50	9.3	59	20.9	QP	L1
0.486000	38.40	9.3	56	17.8	QP	ь1
0.586000	37.10	9.3	56	18.9	QP	ь1
0.730000	41.10	9.3	56	14.9	QP	ь1
0.786000	36.20	9.3	56	19.8	QP	ь1
0.994000	33.90	9.3	56	22.1	QP	ь1

MEASUREMENT RESULT: "agc fin2"

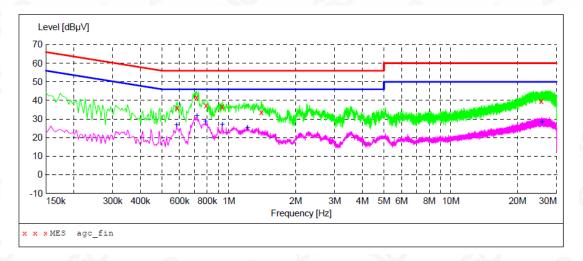
2020/8/14 10:	12					
Frequency	Level	Transd	Limit	Margin	Detector	Line
MHz	dBµV	dB	dBµV	dB		
0.334000	24.20	9.3	49	25.2	AV	ь1
0.486000	20.90	9.3	46	25.3	AV	ь1
0.586000	22.80	9.3	46	23.2	AV	L1
0.714000	26.30	9.3	46	19.7	AV	L1
0.794000	23.10	9.3	46	22.9	AV	L1
1.062000	20.80	9.3	46	25.2	AV	L1

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Line Conducted Emission Test Line 2-N

MEASUREMENT RESULT: "agc fin"

2020/8/14 10:19 Line Frequency Level Transd Limit Margin Detector dBµV MHz dBµV dB dB 0.586000 36.10 9.3 56 19.9 QP Ν 0.714000 41.60 9.3 56 14.4 QP Ν 0.790000 37.30 9.3 56 18.7 QP Ν 0.934000 36.50 56 19.5 9.3 Ν QP 1.402000 33.70 9.3 56 22.3 QP Ν 25.606000 39.50 60 20.5 Ν 11.6 QP

MEASUREMENT RESULT: "agc fin2"

2020/8/14 10:19							
Level	Transd	Limit	Margin	Detector	Line		
dBµV	dB	dBµV	dB				
26.70	9.3	46	19.3	AV	Ν		
31.80	9.3	46	14.2	AV	N		
28.70	9.3	46	17.3	AV	Ν		
26.90	9.3	46	19.1	AV	Ν		
25.50	9.3	46	20.5	AV	Ν		
28.30	11.6	50	21.7	AV	Ν		
	Level dBµV 26.70 31.80 28.70 26.90 25.50	Level Transd dBµV dB 26.70 9.3 31.80 9.3 28.70 9.3 26.90 9.3 25.50 9.3	Level Transd Limit dBµV dB dBµV 26.70 9.3 46 31.80 9.3 46 28.70 9.3 46 26.90 9.3 46 25.50 9.3 46	Level Transd Limit Margin dBµV dB dBµV dB 26.70 9.3 46 19.3 31.80 9.3 46 14.2 28.70 9.3 46 17.3 26.90 9.3 46 19.1 25.50 9.3 46 20.5	Level Transd Limit Margin Detector dBµV dB dBµV dB 26.70 9.3 46 19.3 AV 31.80 9.3 46 14.2 AV 28.70 9.3 46 17.3 AV 26.90 9.3 46 19.1 AV 25.50 9.3 46 20.5 AV		

RESULT: PASS

Note: All the test modes had been tested, the mode 1 was the worst case. Only the data of the worst case would be record in this test report.

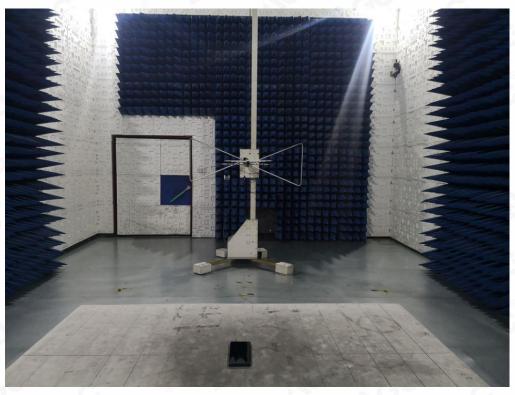
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APPENDIX A: PHOTOGRAPHS OF TEST SETUP RADIATED EMISSION TEST SETUP BELOW 1GHz



RADIATED EMISSION TEST SETUP ABOVE 1GHz



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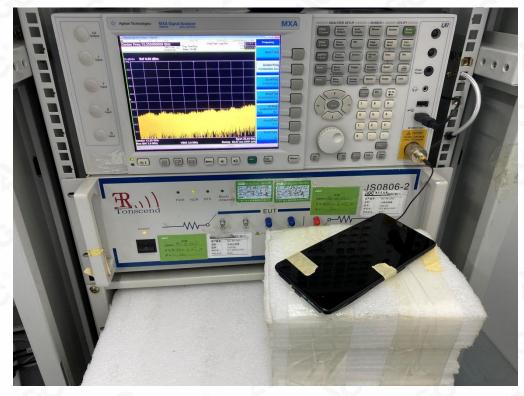


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CONDUCTED EMISSION TEST SETUP



CONDUCTED TEST SETUP



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APPENDIX B: PHOTOGRAPHS OF EUT

Refer to the Report No.: AGC00552200802AP01

----END OF REPORT----

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Conditions of Issuance of Test Reports

1. All samples and goods are accepted by the Attestation of Global Compliance (Shenzhen) Co., Ltd (the "Company") solely for testing and reporting in accordance with the following terms and conditions. The company provides its services on the basis that such terms and conditions constitute express agreement between the company and any person, firm or company requesting its services (the "Clients").

2. Any report issued by Company as a result of this application for testing services (the "Report") shall be issued in confidence to the Clients and the Report will be strictly treated as such by the Company. It may not be reproduced either in its entirety or in part and it may not be used for advertising or other unauthorized purposes without the written consent of the Company. The Clients to whom the Report is issued may, however, show or send it, or a certified copy thereof prepared by the Company to its customer, supplier or other persons directly concerned. The Company will not, without the consent of the Clients, enter into any discussion or correspondence with any third party concerning the contents of the Report, unless required by the relevant governmental authorities, laws or court orders.

3. The Company shall not be called or be liable to be called to give evidence or testimony on the Report in a court of law without its prior written consent, unless required by the relevant governmental authorities, laws or court orders.

4. The non-CMA report issued by AGC is only permitted to be used by the client as internal reference use and shall not be used for public demonstration purpose.

5. In the event of the improper use of the report as determined by the Company, the Company reserves the right to withdraw it, and to adopt any other additional remedies which may be appropriate.

6. Samples submitted for testing are accepted on the understanding that the Report issued cannot form the basis of, or be the instrument for, any legal action against the Company.

7. The Company will not be liable for or accept responsibility for any loss or damage however arising from the use of information contained in any of its Reports or in any communication whatsoever about its said tests or investigations.

8. Clients wishing to use the Report in court proceedings or arbitration shall inform the Company to that effect prior to submitting the sample for testing.

9. The Company is not responsible for recalling the electronic version of the original report when any revision is made to them. The Client assumes the responsibility to providing the revised version to any interested party who uses them.

10. Subject to the variable length of retention time for test data and report stored hereinto as otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of the test report for a period of six years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after retention period. Under no circumstances shall we be liable for damage of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.

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