

Prüfbericht-Nr.: <i>Test report no.:</i>	60415352 005	Auftrags-Nr.: <i>Order no.:</i>	168279564	Seite 1 von 12 Page 1 of 12
Kunden-Referenz-Nr.: <i>Client reference no.:</i>	N/A	Auftragsdatum: <i>Order date:</i>	2020-11-01	
Auftraggeber: <i>Client:</i>	SPECTRA Technologies Holdings Co., Ltd. Unit 1301-09, 19-20, Tower II, Grand Century Place, Kowloon, Hong Kong			
Prüfgegenstand: <i>Test item:</i>	Android POS			
Bezeichnung / Typ-Nr.: <i>Identification / Type no.:</i>	APOLLO			
Auftrags-Inhalt: <i>Order content:</i>	Test Report			
Prüfgrundlage: <i>Test specification:</i>	CFR47 FCC Part15: Subpart E Section 15.407			
Wareneingangsdatum: <i>Date of sample receipt:</i>	2020-11-01	Refer to Product Photos		
Prüfmuster-Nr.: <i>Test sample no.:</i>	A002920755-006			
Prüfzeitraum: <i>Testing period:</i>	2020-11-01 – 2020-12-28			
Ort der Prüfung: <i>Place of testing:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von: <i>tested by:</i> Lin Lin	genehmigt von: <i>authorized by:</i> Winnie Hou		Winnie Hou	
Datum: <i>Date:</i> 2020-12-30	Ausstellungsdatum: <i>Issue date:</i> 2020-12-30			
Stellung / Position:	Senior Project Manager	Stellung / Position:	Technical Certifier	
Sonstiges / Other: This report is for 5GHz WiFi DFS only. FCC ID: VWZTA10Q				
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
* Legende: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet * Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor P(ass) = passed a.m. test specification(s) F(ail) = failed a.m. test specification(s) N/A = not applicable N/T = not tested				
Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. <i>This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.</i>				

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Test Summary

5.1.1 Dynamic Frequency Selection (DFS)

RESULT: *Pass*

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1. General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendixes:
Appendix A: Photographs of the Test Set-up
Appendix B: Test data of DFS

2. Test Sites

2.1 Test Facilities

TÜV Rheinland (Shenzhen) Co., Ltd.

No. 362 Huanguan Road Middle, Longhua District, Shenzhen 518110, People's Republic of China

FCC Accreditation Designation No.: CN1260

2.2 List of Test and Measurement Instruments

Table 1: List of Test and Measurement Equipment

Radio Spectrum Testing (TS8997)				
Equipment	Manufacturer	Model	Serial No.	Cal. until
Wireless Connectivity Tester	R&S	CMW270	101375	19.08.2021
Signal Analyzer	R&S	FSV 40	101441	19.08.2021
Vector Signal Generator	R&S	SMBV100A	263301	20.08.2021
Signal Generator	R&S	SMB100A	115186	21.08.2020
OSP	R&S	OSP 150	101017	16.12.2021
Control PC	DELL	OptiPlex 7050	FTJZ9P2	N/A
Test Software	R&S	WMS32 (V11.00.00)	N/A	N/A
Power Meter	R&S	NRP2	107105	16.12.2021
Wideband Power Sensor	R&S	NRP-Z81	105350	16.12.2021
Humid & Temp Programmable Tester	BOST	NTH090-60	19040801	10.04.2021
Shielding Room 8#	Albatross	SR8	APC17151-SR8	22.07.2021
Unwanted Emission Testing (TS8996)				
Equipment	Manufacturer	Model	Serial No.	Cal. until
Signal Generator	R&S	SMB100A	180840	19.08.2021
Wideband Radio Communication Tester	R&S	CMW500	165339	19.08.2021
Signal Analyzer	R&S	FSV 40	101440	20.08.2021
System Controller Interface	R&S	SCI-100	S10010036	N/A
OSP	R&S	OSP 120	102041	N/A
OSP	R&S	OSP 150	101385	17.12.2020
Pre-amplifier	R&S	SCU08F1	08320030	19.08.2021
Amplifier	R&S	SCU-18F	180079	19.08.2021
Trilog Broadband Antenna (30 MHz - 7 GHz)	Schwarzbeck	VULB 9162	192	01.09.2021
Double-Ridged Antenna (1 -18 GHz)	ETS-LINDGREN	3117	00218719	01.09.2021
Wideband Ridged Horn Antenna (12-18 GHz)	Steatite	QMS-00208	18312	01.09.2021
Biconical Broadband Antenna (30 MHz - 1 GHz)	Schwarzbeck	VUBA 9117	357	01.09.2021
Double Ridged Broadband Horn Antenna (1 – 18 GHz)	Schwarzbeck	BBHA 9120 D	01760	01.09.2021
Broadband Horn Antenna (15 – 40 GHz)	Schwarzbeck	BBHA 9170	00862	01.09.2021
Test software	R&S	EMC32 (V10.50.40)	N/A	N/A
Control PC	Dell	OptiPlex 7050	36NW9P2	N/A

3m Fully Anechoic Chamber	Albatross	FAC-3m	APC17151-FAC	06.07.2021
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2.3 Traceability

All measurement equipment calibrations are traceable to NIM (National Institute of Metrology) or where calibration is performed in other countries, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basis using in house standards or comparisons.

2.5 Uncertainty of Measurement

The value of the measurement uncertainty of each parameter is listed as below:

Table 2: Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-7}$
RF Power (conducted)	± 2.5 dB
Radiated Emission of Transmitter, valid up to 26.5 GHz	± 6 dB
Radiated Emission of Receiver, valid up to 26.5 GHz	± 6 dB
Conducted Emission, (9kHz to 150kHz)/(150kHz to 30MHz)	± 3.70 dB / ± 3.30 dB
Radiated Emission (3m SAC), 30MHz to 1000MHz	± 4.52 dB
Radiated Emission (3m SAC), above 1000MHz	± 4.37 dB
Temperature	± 1 °C
Humidity	± 5 %
Voltage (DC)	± 1 %
Voltage (AC, <10kHz)	± 2 %

2.6 Location of Original Data

The original copies of all test data taken during actual testing were attached at Appendix A and Appendix B of this report and delivered to the applicant. A copy has been retained in the TÜV Rheinland (Shenzhen) file for certification follow-up purposes.

2.7 Status of Facility Used for Testing

The TÜV Rheinland (Shenzhen) Co., Ltd. Test facility located at No. 362 Huanguan Road Middle, Longhua District, Shenzhen 518110, People's Republic of China is listed on the US Federal Communications Commission list of facilities approved to perform measurements.

3. General Product Information

3.1 Product Function and Intended Use

The EUT is an Android POS which supports Bluetooth, 2.4G Wi-Fi 802.11 b/g/n, 5G Wi-Fi 802.11a/n, NFC and GSM/WCDMA/LTE wireless technology.

For details refer to user manual and circuit diagram.

3.2 Ratings and System Details

Table 3: Technical Specification

Product Name	Android POS
Model No.(EUT)	APOLLO
FCC ID	VWZTA10Q
Device Dimension	Overall (Length x Width x High): 175 x 80 x 60 mm
	Overall Diagonal: 204 mm
	Display Diagonal: 140 mm
HW Version	msm8909
SW Version	7.1.2.01.001
Tx Frequency Bands	GSM850: 824.2 to 848.8 MHz PCS1900: 1850.2 to 1909.8 MHz WCDMA850: 826.4 to 846.6 MHz WCDMA1700: 1712.4 to 1752.6 MHz WCDMA1900: 1852.4 to 1907.6 MHz LTE BAND2: 1850.7 to 1909.3 MHz LTE BAND4: 1710.7 to 1754.3 MHz LTE BAND5: 824.7 to 848.3 MHz LTE BAND7: 2502.5 to 2567.5 MHz LTE BAND12: 699.7 to 715.3 MHz LTE BAND13: 779.5 to 784.5 MHz LTE BAND25: 1850.7 to 1914.3 MHz LTE band 26: 814.7 to 848.3 MHz WLAN: 2412 to 2462MHz, 5180 to 5240MHz, 5260 to 5320MHz, 5500 to 5700MHz, 5745 to 5825MHz Bluetooth: 2402 to 2480MHz NFC: 13.56MHz
Rx Frequency Bands	GSM850: 869.2 to 893.8 MHz PCS1900: 1930.2 to 1989.8 MHz WCDMA850: 871.4 to 891.6 MHz WCDMA1700: 1932.4 to 1987.6 MHz WCDMA1900: 2112.4 to 2152.6 MHz LTE BAND2: 1930.7 to 1989.3 MHz LTE BAND4: 2110.7 to 2154.3 MHz LTE BAND5: 869.7 to 893.3 MHz LTE BAND7: 2622.5 to 2687.5 MHz LTE BAND12: 729.7 to 745.3 MHz LTE BAND13: 748.5 to 753.5 MHz LTE BAND25: 1930.7 to 1994.3 MHz LTE band 26: 859.7 to 893.3 MHz WLAN: 2412 to 2462MHz, 5180 to 5240MHz, 5260 to 5320MHz, 5500 to 5700MHz, 5745 to 5825MHz Bluetooth: 2402 to 2480MHz NFC: 13.56MHz
Bandwidth	GSM850: 200KHz PCS1900: 200KHz WCDMA850: 200KHz

	WCDMA1700: 200KHz WCDMA1900: 200KHz LTE BAND2: 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE BAND4: 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE BAND5: 1.4MHz, 3MHz, 5MHz, 10MHz LTE BAND7: 5MHz, 10MHz, 15MHz, 20MHz LTE BAND12: 1.4MHz, 3MHz, 5MHz, 10MHz LTE BAND13: 5MHz, 10MHz LTE BAND25: 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz, 20MHz LTE band 26: 1.4MHz, 3MHz, 5MHz, 10MHz, 15MHz WLAN: 20MHz, 40MHz Bluetooth: 1MHz, 2MHz NFC: 13.56MHz
Modulation	GSM & GPRS: GMSK EDGE: GMSK/8PSK WCDMA: QPSK LTE: QPSK, 16QAM 802.11b: DSSS 802.11a/g/n: OFDM Bluetooth: GFSK, PI/4-DQPSK, 8-DPSK NFC: ASK
Power Class	4, tested with power level 5(GSM850) 1, tested with power level 0(GSM1900) 3, tested with power control "all 1"(UMTS Bands) 3, tested with power control all Max.(LTE Bands) Max output power for WLAN and Bluetooth
Device Class	B
Device Type	Slave device without Radar detection
Wireless Router (Hotspot)	Not Support
VOIP	Not Support
Antenna Type	WWAN: Dipole Antenna WLAN/Bluetooth: PIFA Antenna
EUT Stage	Identical Prototype
Battery	Model Name LARGE18650
	Power Rating 7.2Vdc, 2600mAh
	Type Li-ion
AC/DC Adapter	Model Name UWP-10W-0520S
	Rating Input: 100-240Vac, 50/60Hz Output: 5Vdc, 2A
Earphone	3.5mm Earphone
USB-C Cable	Shielding, Length: 1m

3.3 Independent Operation Modes

The basic operation modes are:

- A. Normal operation on band 5.3GHz and 5.6GHz

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.5 Submitted Documents

- | | |
|----------------------|-------------------------|
| - Application Form | - Technical Description |
| - Circuit Diagram | - Bill of Material |
| - Instruction Manual | - Rating Label |
| - Photo Documents | |

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

Radio Spectrum: The equipment under test (EUT) was configured at its highest power output in order to measure its highest possible radiation and conducted level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation

Test operation refers to test setup in chapter 5. All testing were performed according to the procedures in ANSI C63.10:2013.

4.3 Special Accessories and Auxiliary Equipment

Table 4: List of Accessories and Auxiliary Equipment

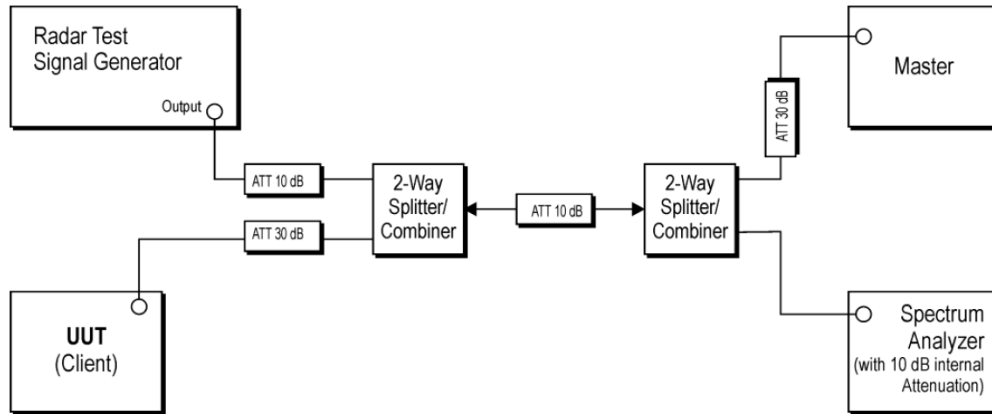
Description	Manufacturer	Model	FCC ID
Router	NETGEAR	R7000	PY313200233

4.4 Countermeasures to Achieve ERM Compliance

The test sample which has been tested contained the noise suppression parts as described in the Technical Construction File (TCF). No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Dynamic Frequency Selection (DFS)



5. Test Results

5.1 Radio Test Requirement & Test Suites

5.1.1 Dynamic Frequency Selection (DFS)

RESULT: **Pass**

Test Specification

Test standard	: FCC Part 15.407(h) 5250-5350MHz, 5470-5725MHz Channel Move Time: Within 10 seconds.
Limits	: Channel Closing Transmission Time: 200ms+aggregate of 60ms over remaining 10s period; Non-Occupancy Period: at least 30 minutes.
Kind of test site	: Shielded Room

Test Setup

Date of testing	: 2020-12-01 to 2020-12-25
Input voltage	: Fully charged li-ion battery charged by power adapter (Adapter input AC 120V@60Hz)
Operation mode	: A
Test channel	: CH62 and CH102
Ambient temperature	: 24 °C
Relative humidity	: 51 %
Atmospheric pressure	: 101 kPa

Refer to attached Appendix B for details of test data.

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