

Prüfbericht-Nr.: Test report no.:	CN224AD0 004	Auftrags-Nr.: Order no.:	168367617	Seite 1 von 10 Page 1 of 10
Kunden-Referenz-Nr.: Client reference no.:	N/A	Auftragsdatum: Order date:	2022-04-20	
Auftraggeber: Client:	Vestel Elektronik Sanayi ve Ticaret A.S. Organize Sanayi Bolgesi, 45030 Manisa TURKEY			
Prüfgegenstand: Test item:	17WFM26 WI-FI + BT combo module			
Bezeichnung / Typ-Nr.: Identification / Type no.:	V1.0			
Auftrags-Inhalt: Order content:	Test Report			
Prüfgrundlage: Test specification:	47 CFR FCC Part 2.1091		RSS-102 Issue 5	
Wareneingangsdatum: Date of sample receipt:	2022-04-20	Please refer to Photo Document		
Prüfmuster-Nr.: Test sample no:	A003240432-001~008 A003234567-001			
Prüfzeitraum: Testing period:	2022-04-21 - 2022-05-20			
Ort der Prüfung: Place of testing:	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüflaboratorium: Testing laboratory:	TÜV Rheinland (Shenzhen) Co., Ltd.			
Prüfergebnis*: Test result*:	Pass			
geprüft von: tested by:			genehmigt von: authorized by:	
Datum: Date:	2022-07-04 Signed by: Bell Hu		Ausstellungsdatum: Issue date:	2022-07-04 Signed by: Lin Lin
Stellung / Position:	Project Manager		Stellung / Position:	Reviewer
Sonstiges / Other:	FCC ID: 2AVQS-17WFM26, IC: 25888-17WFM26, HVIN: V1.0, PMN: 17WFM26 WI-FI + BT combo module			
Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:	Prüfmuster vollständig und unbeschädigt Test item complete and undamaged			
* Legende:	1 = sehr gut P(ass) = entspricht o.g. Prüfgrundlage(n)	2 = gut F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	3 = befriedigend N/A = nicht anwendbar	4 = ausreichend N/T = nicht getestet
* Legend:	1 = very good P(ass) = passed a.m. test specification(s)	2 = good F(ail) = failed a.m. test specification(s)	3 = satisfactory N/A = not applicable	4 = sufficient 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>				

Prüfbericht - Nr.: CN224AD0 004
Test Report No.:

Seite 2 von 10
Page 2 of 10

TEST SUMMARY

3.1.1 RF EXPOSURE COMPLIANCE

RESULT: Pass

Prüfbericht - Nr.: CN2272N8 003

Test Report No.:

Seite 3 von 10

Page 3 of 10

CONTENTS

1.	TEST SITES.....	4
1.1	TEST FACILITIES	4
1.2	LIST OF TEST AND MEASUREMENT INSTRUMENTS	4
1.3	TRACEABILITY	4
1.4	CALIBRATION.....	4
1.5	LOCATION OF ORIGINAL DATA	4
1.6	STATUS OF FACILITY USED FOR TESTING	4
2.	GENERAL PRODUCT INFORMATION	5
2.1	GENERAL DESCRIPTION	5
2.2	RATING AND SYSTEM DETAILS	5
3.	TEST RESULTS	7
3.1	TRANSMITTER REQUIREMENTS & TEST SUITES.....	7
3.1.1	RF Exposure Compliance.....	7
3.1.1.1	FCC Part 1.1310, Part 2.1091	8
3.1.1.2	RSS-102 Exemption Limits for Routine Evaluation – RF Exposure Evaluation	9
4.	LIST OF TABLES.....	10

1. TEST SITES

1.1 TEST FACILITIES

TÜV Rheinland (Shenzhen) Co., Ltd.

Address: No. 362 Huanguan Road Middle, Longhua District, Shenzhen 518110, P.R. China

FCC Registration No.: 694916

ISED Wireless Device Testing Laboratory: 25069

1.2 LIST OF TEST AND MEASUREMENT INSTRUMENTS

Table 1: List of Test and Measurement Equipment

Radio Spectrum Testing				
Equipment	Manufacturer	Model	Serial No.	Cal. until
Wireless Connectivity Tester	R&S	CMW270	101375	2022-08-09
Signal Analyzer	R&S	FSV 40	101441	2022-08-09

1.3 Traceability

All measurement equipment calibrations are traceable to NIST or where calibration is performed outside the United States, to equivalent nationally recognized standards organizations.

1.4 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.

1.5 Location of Original Data

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

1.6 Status of Facility Used for Testing

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

2. GENERAL PRODUCT INFORMATION

2.1 GENERAL DESCRIPTION

The Product is WI-FI + BT combo module, which supports Bluetooth, 2.4GHz Wi-Fi 802.11 b/g/n and 5GHz Wi-Fi 802.11a/b/g/n/ac wireless technology.

For details refer to the User Manual, Technical Description and Circuit Diagram.

2.2 RATING AND SYSTEM DETAILS

Table 2: Rating of EUT

General Information of EUT	Value
Kind of Equipment:	17WFM26 WI-FI + BT combo module
Type Designation:	V1.0
FCC ID:	2AVQS-17WFM26
IC:	25888-17WFM26
Operating Voltage:	DC 5V
Antenna Type:	Integral Antennas
Antenna Gain:	Wi-Fi Antenna 1#: Max gain 3.4dBi for 2.4GHz Wi-Fi Max gain 3.69dBi for 5GHz Wi-Fi Wi-Fi Antenna 2#: Max gain 2.14dBi for 2.4GHz Wi-Fi Max gain 3.68dBi for 5GHz Wi-Fi BT Antenna 3#: Max gain 0.29dBi for Bluetooth As for MIMO mode for Antenna 0# and Antenna 1#, Cyclic Delay Diversity mode Employed.
Technical Specification of Bluetooth (Dual Mode)	
Operating Frequency:	2402 MHz to 2480 MHz
Type of Modulation:	GFSK, $\pi/4$ -DQPSK, 8DPSK
Channel Number:	79 channels, BDR & EDR 40 channels, BLE
Channel Separation:	1MHz (for EDR & BDR), 2MHz (for BLE)
Technical Specification of Wi-Fi 802.11 b/g/n	
Operating Frequency:	2412 - 2462 MHz for 802.11b/g/n(HT20) 2422 - 2452 MHz for 802.11n(HT40)
Type of Modulation:	DSSS(DBPSK/DQPSK/CCK) OFDM(BPSK/QPSK/16QAM/64QAM)
Data Rate:	1/2/5.5/11 Mbps for 802.11b 6/9/12/18/24/36/48/54 Mbps for 802.11g MCS0 ~ MCS7 for 802.11n

Prüfbericht - Nr.: CN2272N8 003

Test Report No.:

Seite 6 von 10

Page 6 of 10

Channel Number:	11 channels for 802.11b/g/n(HT20) 7 channels for 802.11n(HT40)
Channel Separation:	5 MHz
MIMO and SISO mode:	SISO for 802.11b/g, MIMO and SISO for 802.11n.
Technical Specification of Wi-Fi 802.11 a/n/ac	
Operating Frequency:	5180-5320MHz, 5500-5720MHz
Type of Modulation:	OFDM(BPSK/QPSK/16QAM/64QAM/256QAM)
Channels:	5180-5320MHz, 802.11 a/n20/n40/ac20/ac40/ac80 5500-5720MHz, 802.11 a/n20/n40/ac20/ac40/ac80
Channel Separation	5 MHz
MIMO and SISO mode:	SISO for 802.11a, MIMO and SISO for 802.11n/ac, no beamforming.
DFS:	Slave without DFS Detection

3. Test Results

3.1 Transmitter Requirements & Test Suites

3.1.1 RF Exposure Compliance

RESULT:**Pass**

Test standard	:	RSS-102 Issue 5 FCC Part 1.1091
Limit	:	Table 1 of 47 CFR FCC Part 1.1310 Section 2.5.2 of RSS-102 Issue 5
Kind of test site	:	Shielded room

This device is mobile device, and the applicant declares that the minimum separation distance is greater than 20cm. Therefore MPE measurement or computational modelling should be used to determine compliance.

MPE Calculation is based on the conducted power, and considering maximum power and Antenna gain. The following formula is used to MPE evaluation.

$$Pd = \frac{P_{out} * G}{4R^2\pi}$$

Where

P_d = power density in mW/cm² or W/m²

P_{out} = output power to antenna in mW or W

G_{num} = Antenna gain in numeric

π = 3.14159

R = Distance between observation point and the center of radiator in cm or m

3.1.1.1 FCC Part 1.1310, Part 2.1091

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f ²)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

Table 3: Test Results of RF Exposure Calculations for FCC, Stand-alone mode

Operating Mode	Max. EIRP incl. tune-up (dBm)	Distance (cm)	MPE (mW/cm ²)	Limit (mW/cm ²)	Verdict
Bluetooth	8.19	20	0.0013	1.0	Pass
2.4GHz Wi-Fi	27.88	20	0.1222	1.0	Pass
5GHz Wi-Fi	20.68	20	0.0233	1.0	Pass

Table 4: Test Results of RF Exposure Calculations for FCC, Simultaneous mode

Co-location Mode	Sum of the MPE ratios	Limit	Verdict
2.4GHz Wi-Fi+ Bluetooth	0.1222/1+0.0013/1<1.0	1.0	Pass
5GHz Wi-Fi+ Bluetooth	0.0233/1+0.0013/1<1.0	1.0	Pass

3.1.1.2 RSS-102 Exemption Limits for Routine Evaluation – RF Exposure Evaluation

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

Table 5: Test Results of RF Exposure Calculations for ISED, Stand-alone

Operating Mode	Max. EIRP incl. tune-up (dBm)	Distance (cm)	Maximum EIRP (W)	Threshold power (W)	Verdict
Bluetooth	8.19	20	0.0066	2.68	Pass
2.4GHz Wi-Fi	27.88	20	0.614	2.70	Pass
5GHz Wi-Fi	20.68	20	0.117	4.52	Pass

Note: The maximum EIRP much lower than the threshold power in section 2.5.2, thus compliant.

Table 6: Test Results of RF Exposure Calculations for ISED, Simultaneous mode

Co-location Mode	Sum of the ratios	Limit	Verdict
2.4GHz Wi-Fi+ Bluetooth	$0.614/2.70 + 0.0066/2.68 < 1.0$	1.0	Pass
5GHz Wi-Fi+ Bluetooth	$0.117/4.52 + 0.0066/2.68 < 1.0$	1.0	Pass

4. List of Tables

Table 1: List of Test and Measurement Equipment	4
Table 2: Rating of EUT	5
Table 3: Test Results of RF Exposure Calculations for FCC, Stand-alone mode	8
Table 4: Test Results of RF Exposure Calculations for FCC, Simultaneous mode	8
Table 5: Test Results of RF Exposure Calculations for ISED	9
Table 6: Test Results of RF Exposure Calculations for ISED, Simultaneous mode	9