



RADIO EXPOSURE TEST REPORT

FCC ID : RAXKVD21
Equipment : 5G Gateway
Brand Name : T-Mobile
Model Name : KVD21
Applicant : Arcadyan Technology Corporation
No.8, Sec.2, Guangfu Rd.,Hsinchu, 30071 Taiwan
Manufacturer : Arcadyan Technology Corporation
No.8, Sec.2, Guangfu Rd.,Hsinchu, 30071 Taiwan
Standard : 47 CFR Part 2.1091

The product was received on Sep. 02, 2021, and testing was started from Oct. 05, 2021 and completed on Oct. 20, 2021. We, Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR Part 2.1091 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Hsinchu Laboratory, the test report shall not be reproduced except in full.

Approved by: Cliff Chang

Sporton International Inc. Hsinchu Laboratory

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Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
2	-	Exposure evaluation	PASS	-

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Sam Chen

Report Producer: Jessie Wei



1 General Description

1.1 EUT General Information

RF General Information (WLAN, Bluetooth)			
Evaluation Mode	Frequency Range (MHz)	Operating Frequency (MHz)	Modulation Type
2.4GHz WLAN	2400-2483.5	2412-2462	802.11b: DSSS (DBPSK, DQPSK, CCK) 802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) VHT: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
5GHz WLAN	5150-5250 5725-5850	5180-5240 5745-5825	802.11a/n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM)
Bluetooth	2400-2483.5	2402-2480	BR / EDR: FHSS (GFSK / $\pi/4$ -DQPSK / 8DPSK) LE: GFSK

RF General Information (WWAN)				
Evaluation Mode	Band	Uplink Frequency Range (MHz)	Downlink Frequency Range (MHz)	Modulation Type
LTE	2	1850-1910	1930-1990	QPSK, 16QAM, 64QAM, 256QAM
	4	1710-1755	2110-2155	
	5	824-849	869-894	
	12	699-716	729-746	
	41	2496-2690	2496-2690	
	66	1710-1780	2110-2200	
	71	663-698	617-652	
5G NR	n25	1850-1915	1930-1995	PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM
	n41	2496-2690	2496-2690	
	n66	1710-1780	2110-2200	
	n71	663-698	617-652	



1.2 Antenna Information

For WLAN and Bluetooth Function:

Ant.	Port			Brand	Model Name	Antenna Type	Connector	Gain (dBi)
	WLAN 2.4GHz	WLAN 5GHz	Bluetooth					
1	1	1	-	Maglayers	PCA-2510-25GC6-A1	Dipole	I-PEX	Note1
2	2	2	-	Maglayers	PCA-2510-25GC6-A2	Dipole	I-PEX	
3	3	3	-	Maglayers	PCA-2510-25GC6-A3	Dipole	I-PEX	
4	4	4	-	Maglayers	PCA-2510-25GC6-A4	Dipole	I-PEX	
5	-	-	1	Maglayers	PCA-2510-2G4C6-A1	Dipole	I-PEX	

Note 1:

Ant.	Port			Antenna Gain (dBi)					
	WLAN 2.4GHz	WLAN 5GHz	Bluetooth	WLAN 2.4GHz	WLAN 5GHz UNII 1	WLAN 5GHz UNII 2A	WLAN 5GHz UNII 2C	WLAN 5GHz UNII 3	Bluetooth
1	1	1	-	0.92	2.86	2.91	2.39	1.9	-
2	2	2	-	3.78	3.48	4.07	4.84	5.09	-
3	3	3	-	4.13	3.52	3.1	2.85	2.93	-
4	4	4	-	3.61	1.42	2.74	3.1	2.58	-
5	-	-	1	-	-	-	-	-	4.39

Note 2: The above information was declared by manufacturer.

For WLAN 2.4GHz:

For IEEE 802.11b/g/n/VHT/ax mode (4TX/4RX):

Port 1, Port 2, Port 3 and Port 4 can be used as transmitting/receiving antenna.

Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.

For WLAN 5GHz:

For IEEE 802.11a/n/ac/ax mode (4TX/4RX):

Port 1, Port 2, Port 3 and Port 4 can be used as transmitting/receiving antenna.

Port 1, Port 2, Port 3 and Port 4 could transmit/receive simultaneously.

For Bluetooth (1TX/1RX):

Only Port 1 can be used as transmitting/receiving antenna.



For WWAN Function:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
6	Maglayers	PCA-8116-4G0C6-A1	Monopole	I-PEX	Note1
7	Maglayers	PCA-1420-4G0C6-A1	Microstrip antenna	I-PEX	
8	Maglayers	PCA-5512-4G0C6-A1	Dipole	I-PEX	
9	Maglayers	PCA-5512-4G0C6-A2	Dipole	I-PEX	

Note1:

Ant.	Antenna Gain (dBi)										
	LTE Band 2	LTE Band 4	LTE Band 5	LTE Band 12	LTE Band 41	LTE Band 66	LTE Band 71	5G NR n25	5G NR n41	5G NR n66	5G NR n71
6	3.07	3.55	1.09	1.12	-	3.56	1.63	4.66	5.45	4.84	1.63
7	-	-	-	-	5.15	-	-	-	5.45	-	-
8	-	-	-	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-	-	-	-

1.3 Accessories

Accessories			
Equipment Name	Brand Name	Model Name	Rating
Adapter	LUCENT TRANS	1A78	INPUT: 100-240V~1.2A, 50/60Hz OUTPUT: 5.0V, 3.0A, 15.0W 9.0V, 3.0A, 27.0W 15.0V, 3.0A, 45.0W

1.4 Testing Location

Testing Location Information	
Test Lab. : Sporton International Inc. Hsinchu Laboratory	
Hsinchu	ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)
(TAF: 3787)	TEL: 886-3-656-9065 FAX: 886-3-656-9085
Test site Designation No. TW3787 with FCC.	
Conformity Assessment Body Identifier (CABID) TW3787 with ISED.	



2 Maximum Permissible Exposure

2.1 Limit of Maximum Permissible Exposure

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
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

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
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

Note: f = frequency in MHz ; *Plane-wave equivalent power density

2.2 MPE Calculation Method

The MPE was calculated at 28 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \qquad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

E = Electric field (V/m)

P = RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$



2.3 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

For WLAN and Bluetooth:

Mode	DG (dBi)	Maximum Tune-up Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
2.4G;D1D	7.14	28.80	35.94	3.92645	28	0.78112	1.00000
5.2G;D1D	6.53	29.00	35.53	3.57273	28	0.71075	1.00000
5.8G;D1D	8.10	27.85	35.95	3.93550	28	0.78292	1.00000
2.4G;BT-BR	4.39	9.50	13.89	0.02449	28	0.00487	1.00000
2.4G;BT-LE	4.39	9.00	13.39	0.02183	28	0.00434	1.00000

For WWAN - LTE:

Mode	DG (dBi)	Maximum Tune-up Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
B2	3.07	22.00	25.07	0.32137	28	0.03262	1.00000
B4	3.55	22.00	25.55	0.35892	28	0.03643	1.00000
B5	1.09	22.50	23.59	0.22856	28	0.02320	0.55267
B12	1.12	22.50	23.62	0.23014	28	0.02336	0.46767
B41	5.15	25.00	30.15	1.03514	28	0.10507	1.00000
B66	3.56	22.00	25.56	0.35975	28	0.03651	1.00000
B71	1.63	22.50	24.13	0.25882	28	0.02627	0.44533

For WWAN - 5G NR:

Mode	DG (dBi)	Maximum Tune-up Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)
n25	4.66	23.50	28.16	0.65464	28	0.06645	1.00000
n41	5.45	26.00	31.45	1.39637	28	0.14173	1.00000
n66	4.84	23.50	28.34	0.68234	28	0.06926	1.00000
n71	1.63	23.50	25.13	0.32584	28	0.03307	0.44367



Simultaneous Transmission Analysis Mode: WLAN 2.4GHz+WLAN 5GHz+Bluetooth+WWAN

Mode	DG (dBi)	Maximum Tune-up Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Distance (cm)	S (mW/cm ²)	S Limit (mW/cm ²)	Ratio (S/Limit)
2.4G;D1D	7.14	28.80	35.94	3.92645	28	0.39853	1.00000	0.39853
5.8G;D1D	8.10	27.85	35.95	3.93550	28	0.39945	1.00000	0.39945
2.4G;BT-BR	4.39	9.50	13.89	0.02449	28	0.00249	1.00000	0.00249
n41	5.45	26.00	31.45	1.39637	28	0.14173	1.00000	0.14173
							Sum Ratio	0.94220
							Ratio Limit	1

Note: The above antenna gain was declared by manufacturer.