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RF Exposure Evaluation Report

Application No.:	KSCR2407001449AT
FCC ID:	ROR2002
Applicant:	Blinq Networks Inc.
Address of Applicant:	140 Renfrew Drive, Suite 200, Markham, L3R 6B3, Canada
Manufacturer:	Blinq Networks Inc.
Address of Manufacturer:	140 Renfrew Drive, Suite 200, Markham, L3R 6B3, Canada
Factory:	VVDN Technologies Private Limited
Address of Factory:	Plot No: CP-07, Sector 8, IMT Manesar, Gurugram, Haryana
Equipment Under Test (EUT):	
EUT Name:	PCW-400i
Model No.:	PCW-400i
Standard(s) :	FCC Rules 47 CFR §1.1310 KDB 447498 D04 interim General RF Exposure Guidance v01
Date of Receipt:	2024-07-31
Date of Test:	2024-08-01 to 2025-02-17
Date of Issue:	2025-02-19
Test Result:	**Pass***

* In the configuration tested, the EUT complied with the standards specified above.

Revision Record			
Version	**Description**	***Date***	***Remark***
00	Original	2025-02-19	/

Authorized for issue by:				
Tested By				
		Eric Liu /Project Engineer		
Approved By				
		Terry Hou /Reviewer		

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3 General Information

3.1 General Description of E.U.T.

Power supply:	44-57V DC By POE

3.2 Technical Specifications

5G NR

Antenna Type:	Sector Antenna (Uncorrelated)
Antenna Gain:	8.0 dBi (Provided by manufacturer)
Power Supply:	44-57V DC By POE
Test Voltage:	120V, 60Hz
Sample Type:	Category A CBSD
Support Bandwidth:	10MHz,20MHz,30MHz,40MHz,50MHz,60MHz,70MHz,80MHz,90MHz, 100MHZ
Type of Modulation	5G NR: CP-OFDM: QPSK, 256QAM
Frequency Band:	5GNR N48, N77, N78
Frequency Range:	3450MHz-3980MHz
Normal Output Power:	30dBm
Antenna Delivery:	4T4R MIMO

WIFI 2.4G

Operation Frequency:	802.11b/g/n(HT20)/ax(HEW20)/be(EHT): 2412MHz to 2462MHz 802.11n(HT40)/ax(HEW40)/be(EHT): 2422MHz to 2452MHz
Modulation Type:	802.11b: DSSS (CCK, DQPSK, DBPSK), 802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK), 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) 802.11be: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM)
Number of Channels:	802.11b/g/n(HT20)/ax(HEW20)/be(EHT):11 802.11n(HT40)/ax(HEW40)/be(EHT):7
Channel Spacing:	5MHz
Antenna Type:	Metal Antenna
Antenna Gain:	ANT1: 6.22dBi (Provided by the manufacturer) ANT2: 6.22dBi (Provided by the manufacturer) Directional gain: 6.22dBi

WIFI 5G

Operation Frequency/Number of channels (20MHz):	U-NII-1: 5180-5240MHz (4 Channels) U-NII-2A: 5260-5320MHz (4 Channels) U-NII-2C: 5500-5700MHz (11 Channels) U-NII-3: 5745-5825MHz (5 Channels)
Operation Frequency/Number of channels/(40MHz):	U-NII-1: 5190-5230MHz (2 Channels) U-NII-2A: 5270-5310MHz (2 Channels) U-NII-2C: 5510-5670MHz (5 Channels) U-NII-3: 5755-5795MHz (2 Channels)
Operation Frequency/Number of channels (80MHz):	U-NII-1: 5210MHz (1 Channel) U-NII-2A: 5290MHz (1 Channel) U-NII-2C: 5530-5610MHz (2 Channel) U-NII-3: 5775MHz (1 Channel)
Operation Frequency/Number of channels (160MHz):	U-NII-2A: 5250MHz (1 Channel) U-NII-2C: 5570MHz (1 Channel)
Modulation Type:	802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK) 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) 802.11ax: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM) 802.11be: OFDMA (BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM)
Channel Spacing:	802.11a/n/ac/ax/be 20: 20MHz 802.11n/ac/ax/be 40: 40MHz 802.11ac/ax/be 80: 80MHz 802.11ac/ax/be 160: 160MHz
DFS Function:	Master
TPC Function:	Not Support TPC function
Antenna Type:	Metal Antenna
Antenna Gain:	5150MHz~5850MHz: ANT1: 6.66dBi (Provided by the manufacturer) ANT2: 6.66dBi (Provided by the manufacturer) Directional Gain: 6.66dBi (The transmitted signal is Uncorrelated)

WIFI 6G

IEEE 802.11 WLAN Mode Supported:	☒ 802.11a (20 MHz channel bandwidth) ☒ 802.11ax/be (20 MHz channel bandwidth) ☒ 802.11ax/be (40 MHz channel bandwidth) ☒ 802.11ax/be (80 MHz channel bandwidth) ☒ 802.11ax/be (160 MHz channel bandwidth) ☒ 802.11be (320 MHz channel bandwidth)	
Operation Frequency:	IEEE 802.11 a/ax/be(HE20/40/80/160/320): 5925 MHz ~ 6425 MHz IEEE 802.11 a/ax/be(HE20/40/80/160/320): 6425 MHz ~ 6525 MHz IEEE 802.11 a/ax/be(HE20/40/80/160/320): 6525 MHz ~ 6875 MHz IEEE 802.11 a/ax/be(HE20/40/80/160/320): 6875 MHz ~ 7115 MHz	
Type of Modulation:	OFDM/OFDMA	
Antenna Type:	Metal Antenna	
Antenna Ports:	☒ Ant 1, ☒ Ant 2	
Smart System:	☒ SISO	802.11a/ax/be
	☒ MIMO	802.11ax: 2Tx & 2Rx
Antenna Gain:	ANT1: 6.8dBi, ANT2: 6.8dBi(Provided by the manufacturer) Directional Gain: Directional Gain=6.8dBi	

3.3 Separation Distance

Separation distance between the antenna to person (R):	＞20cm
Remark: This minimum test separation distance is determined by the smallest distance from the antenna and radiating structures or outer surface of the device, according to the host form factor, exposure conditions and platform requirements, to any part of the body or extremity of a user or bystander. R has been stated in user manual.	

3.4 Test Location

All tests were performed at:
Compliance Certification Services (Kunshan) Inc.
No.10 Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.
Tel: +86 512 5735 5888 Fax: +86 512 5737 0818

No tests were sub-contracted.
Note:
1.SGS is not responsible for wrong test results due to incorrect information (e.g. max. clock frequency, highest internal frequency, antenna gain, cable loss, etc) is provided by the applicant. (if applicable).
2.SGS is not responsible for the authenticity, integrity and the validity of the conclusion based on results of the data provided by applicant. (if applicable).
3. Sample source: sent by customer.

3.5 Test Facility

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

• A2LA

Compliance Certification Services (Kunshan) Inc. is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 2541.01.

• FCC

Compliance Certification Services (Kunshan) Inc. has been recognized as an accredited testing laboratory. Designation Number: CN1172.

• ISED

Compliance Certification Services (Kunshan) Inc. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory. Company Number: 2324E

• VCCI

The 3m and 10m Semi-anechoic chamber and Shielded Room of Compliance Certification Services (Kunshan) Inc. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-20134, R-11600, C-11707, T-11499, G-10216 respectively.

4 RF Exposure Test Exemptions

Test exemptions apply for devices used in general population/uncontrolled exposure environments, according to the SAR-based, or MPE-based exemption thresholds.

4.1 RF Exposure Test Exemptions for single RF sources

4.1.1 Blanket 1 mW Blanket Exemption

The 1 mW Blanket Exemption of §1.1307(b)(3)(i)(A) applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power of no more than 1 mW, regardless of separation distance.

The 1-mW blanket exemption applies at separation distances less than 0.5 cm, including where there is no separation. This exemption shall not be used in conjunction with other exemption criteria other than those for multiple RF sources in paragraph §1.1307(b)(3)(ii)(A).

The 1-mW exemption is independent of service type and covers the full range of 100 kHz to 100 GHz, but it shall not be used in conjunction with other exemption criteria or in devices with higher-power transmitters operating in the same time-averaging period. Exposure from such higher-power transmitters would invalidate the underlying assumption that exposure from the lower-power transmitter is the only contributor to SAR in the relevant volume of tissue.

Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);

4.1.2 MPE-based Exemption

General frequency and separation-distance dependent MPE-based effective radiated power (ERP) thresholds are in Table B.1 [Table 1 of §1.1307(b)(1)(i)(C)] to support an exemption from further evaluation from 300 kHz through 100 GHz. The minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, **R must be at least $\lambda/2\pi$**, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

Table B.1—Thresholds For Single RF Sources Subject to Routine Environmental Evaluation

RF Source Frequency			Minimum Distance			Threshold ERP
f_L MHz		f_H MHz	$\lambda_L / 2\pi$		$\lambda_H / 2\pi$	W
0.3	–	1.34	159 m	–	35.6 m	1,920 R^2
1.34	–	30	35.6 m	–	1.6 m	3,450 R^2/f^2
30	–	300	1.6 m	–	159 mm	3.83 R^2
300	–	1,500	159 mm	–	31.8 mm	0.0128 R^2f
1,500	–	100,000	31.8 mm	–	0.5 mm	19.2R^2
Subscripts L and H are low and high; λ is wavelength. R:Separation distance between the antenna to person						

The table applies to any RF source (i.e. single fixed, mobile, and portable transmitters) and specifies power and distance criteria for each of the five frequency ranges used for the MPE limits. These criteria apply at separation distances from any part of the radiating structure of at least λ/2π. The thresholds are based on the general population MPE limits with a single perfect reflection, outside of the reactive near-field, and in the main beam of the radiator.

4.1.3 SAR-based Exemption

SAR-based thresholds are derived based on frequency, power, and separation distance of the RF source. The formula defines the thresholds in general for either available maximum time-averaged power or maximum time-averaged ERP, whichever is greater.

If the ERP of a device is not easily determined, such as for a portable device with a small form factor, the applicant may use the available maximum time-averaged power exclusively if the device antenna or radiating structure does not exceed an electrical length of λ/4.

As for devices with antennas of length greater than λ/4 where the gain is not well defined, but always less than that of a half-wave dipole (length λ/2), the available maximum time-averaged power generated by the device may be used in place of the maximum time-averaged ERP, where that value is not known.

The separation distance is the smallest distance from any part of the antenna or radiating structure for all persons, during operation at the applicable ERP. In the case of mobile or portable devices, the separation distance is from the outer housing of the device where it is closest to the antenna.

The SAR-based exemption formula of §1.1307(b)(3)(i)(B), repeated here as Formula (B.2), applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power or effective radiated power (ERP), whichever is greater, of less than or equal to the threshold P_{th} (mW).

This method shall only be used at separation distances from **0.5cm to 40cm** and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by Formula (B.2).

$$P_{\text{th}}\,(\text{mW}) = \begin{cases} ERP_{20\text{ cm}}(d/20\text{ cm})^x & d \le 20\text{ cm} \\ ERP_{20\text{ cm}} & 20\text{ cm} < d \le 40\text{ cm} \end{cases} \qquad \text{(B.2)}$$

where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\,cm}\sqrt{f}}\right)$$

and *f* is in GHz, d is the separation distance (cm), and ERP_{20cm} is per Formula (B.1).

4.1.4 FCC Radiofrequency radiation exposure limits:

According to§1.1310, the limit for general population/uncontrolled exposures

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f2)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

4.2 RF Exposure Test Exemptions for Simultaneous Transmission

The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required). This exemption may not be used in conjunction with other exemption criteria other than those is paragraph (b)(3)(i)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(i)(A).

Either SAR-based or MPE-based exemption may be considered for test exemption for fixed, mobile, or portable device exposure conditions; therefore, the contributions from each exemption in conjunction with the measured SAR (Evaluatedk term) shall be used to determine exemption for simultaneous transmission. In the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^{a}\frac{P_i}{P_{\mathrm{th},i}}+\sum_{j=1}^{b}\frac{ERP_j}{ERP_{\mathrm{th},j}}+\sum_{k=1}^{c}\frac{Evaluated_k}{Exposure\ Limit_k}\leq 1$$

Where:

a = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(B) of this section for Pth, including existing exempt transmitters and those being added.

b = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(C) of this section for Threshold ERP, including existing exempt transmitters and those being added.

c = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters.

Pi = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source i at a distance between 0.5 cm and 40 cm (inclusive).

Pth,i = the exemption threshold power (Pth) according to paragraph (b)(3)(i)(B) of this section for fixed, mobile, or portable RF source i.

ERPj = the ERP of fixed, mobile, or portable RF source j.

ERPth,j = exemption threshold ERP for fixed, mobile, or portable RF source j, at a distance of at least $\lambda/2\pi$ according to the applicable formula of paragraph (b)(3)(i)(C) of this section.

Evaluatedk = the maximum reported SAR or MPE of fixed, mobile, or portable RF source k either in the device or at the transmitter site from an existing evaluation at the location of exposure.

Exposure Limitk = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source k, as applicable from § 1.1310 of this chapter.

5 Measurement and Calculation

5.1 Maximum transmit power

The Power Data is based on the RF Test Report KSCR240700144901, KSCR240700144902, KSCR240700144903, KSCR240700144904

5.2 RF Exposure Calculation

For single RF source :

	Evaluation method	Separation distance between the antenna to person (R)
☐	Blanket 1 mW Blanket Exemption	Regardless of separation distance
☐	MPE-based Exemption(ERP)	R≥(λ/2π)
☐	SAR-based Exemption(P_{th})	0.5cm<R<40cm
☒	Part 1.1310(e)(1)	R＞40cm

Band	Frequency (MHz)	Conducted Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Distance R (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)	Result	Ratio
5GNR	3450-3980	22.0	8.0	30.00	41.0	0.047	1.00	Pass	0.047
WLAN 2.4GHz	2412-2462	25.0	6.22	31.22	41.0	0.063	1.00	Pass	0.063
WLAN 5GHz	5150-5850	28.0	6.66	34.66	41.0	0.138	1.00	Pass	0.138
WLAN 6GHz	5925-7115	18.0	6.8	24.80	41.0	0.014	1.00	Pass	0.014

The 5G NR/WiFi can transmit simultaneously, but the maximum rate of MPE is 0.047+0.138=0.185≤1.
So, the device is to qualify for SAR test exemption, the exemption report is in lieu of the SAR report.

--End of the Report--