RF Exposure Evaluation Report

FCC 47 CFR § 2.1091

for

N300 4G Smart Router

Model Name.: G403

Prepared for:

D-Link Corporation
14420 Myford Road Suite 100 Irvine California United States 92606

Prepared by

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Issue Date: December 8, 2023

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Revision History

Rev.	Issue Date	Revisions	Effect Page	Revised By
00	December 8, 2023	Initial Issue	ALL	Peggy Tsai

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1 Attestation of Test Results

Applicant Name	D-Link Corporation
Model Name	G403
Applicable Standards	FCC 47 CFR § 2.1091 FCC 47 CFR § 1.1307 FCC 47 CFR § 1.1310 Published RF exposure KDB procedures
Receive EUT Date:	October 18, 2023
Compliance Certification Services Inc. , tested the above equipment in accordance with the requirements set forth in the above standards. Determination of compliance is based on the results of the compliance measurement,not taking into account measurement instrumentation uncertainy.All indications of Pass/Fail in this report are opinions expressed by Compliance Certification Services Inc, based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.	
Approved & Released By: 	
Sky Zhou Asst. Section Manager Compliance Certification Services Inc.	

2 Test Specification, Methods and Procedures

The tests documented in this report were performed in accordance with FCC 47 CFR § 2.1091, the following FCC Published RF exposure KDB procedures:

- 447498 D04 Interim General RF Exposure Guidance v01
- 865664 D02 RF Exposure Reporting v01r02

3 Device Under Test (DUT) Information

3.1 DUT Description

Product	N300 4G Smart Router
Trade Name	D-Link
Model No.	G403
Model Discrepancy	N/A
Hardware Version	N/A
Software Version	N/A
Sample Stage	Identical prototype

3.2 Wireless Technologies

Frequency bands	☐ Bluetooth: 2402MHz-2480MHz ☒ 802.11b/g/n HT20/: 2412MHz ~ 2462 MHz ☒ 802.11n HT40/: 2422MHz ~ 2452MHz ☐ 802.11a/n HT20: 5180MHz ~ 5240MHz / 5260MHz ~ 5320MHz / 5500MHz ~ 5700MHz / 5745MHz ~ 5825MHz ☐ 802.11ac VHT20: 5180MHz ~ 5240MHz / 5260MHz ~ 5320MHz / 5500MHz ~ 5700MHz / 5745MHz ~ 5825MHz ☐ 802.11n HT40: 5190MHz ~ 5230MHz / 5270MHz ~ 5310MHz / 5510MHz ~ 5670MHz / 5755MHz ~ 5795MHz ☐ 802.11ac VHT 40: 5190MHz ~ 5230MHz / 5270MHz ~ 5310MHz / 5510MHz ~ 5670MHz / 5755MHz ~ 5795MHz ☐ 802.11ac VHT80: 5210MHz / 5290MHz / 5530MHz ~ 5610MHz / 5775MHz ☒ GSM:850 MHz / 1900 MHz ☒ WCDMA Band II: 1852.4MHz ~1907.6MHz ☒ WCDMA Band IV: 1712.4MHz ~ 1752.6MHz ☒ WCDMA Band V: 826.4 ~ 846.6MHz ☒ LTE Band 2: 1850-1910MHz ☒ LTE Band 4: 1710-1755MHz ☒ LTE Band 5: 824-849MHz ☒ LTE Band 7: 2500-2570MHz ☒ LTE Band 66: 1710.7-1779.3MHz ☒ LTE Band 40: 2305-2315MHz / 2350-2360MHz ☐ Others
Exposure classification	☐ Occupational/Controlled exposure ☒ General Population/Uncontrolled exposure

Antenna Specification	Antenna Type: Dipole Antenna **WIFI 2.4GHz:** Chain 0: INPAQ / RFDPA191707IMAB301 Gain: 4.75 dBi Chain 1: INPAQ / RFDPA191716IMAB301 Gain: 4.27 dBi Power Directional Gain: 7.52 dBi **GSM:** RX: Chain 0: INPAQ / RFDPA191723IMTB301 GPRS / EDGE 850: Gain: 0.59 dBi GPRS / EDGE 1900: Gain: 4.27 dBi TX: Chain 1: INPAQ / RFDPA191708IMTB301 GPRS / EDGE 850: Gain: 2.15 dBi GPRS / EDGE 1900: Gain: 4.35 dBi **WCDMA:** RX: Chain 0: INPAQ / RFDPA191723IMTB301 Band II: Gain: 4.27 dBi Band IV: Gain: 2.21 dBi Band V: Gain: 0.59 dBi TX: Chain 1: INPAQ / RFDPA191708IMTB301 Band II: Gain: 4.35 dBi Band IV: Gain: 3.99 dBi Band V: Gain: 2.15 dBi **LTE:** RX: Chain 0: INPAQ / RFDPA191723IMTB301 LTE Band 2: Gain: 4.27 dBi LTE Band 4: Gain: 2.21 dBi LTE Band 5: Gain: 1.48 dBi LTE Band 7: Gain: 2.34 dBi LTE Band 40: Gain: 4.36 dBi LTE Band 66: Gain: 4.15 dBi TX: Chain 1: INPAQ / RFDPA191708IMTB301 LTE Band 2: Gain: 4.35 dBi LTE Band 4: Gain: 3.99 dBi LTE Band 5: Gain: 2.71 dBi LTE Band 7: Gain: 3.21 dBi LTE Band 40: Gain: 4.9 dBi LTE Band 66: Gain: 3.99 dBi

Antenna Specification	**2.4GHz:**					
	Chain 0	Gain :	4.75 dBi	(Numeric gain:	2.99)	Worst
	Chain 1	Gain :	4.27 dBi	(Numeric gain:	2.67)	Worst
		Directional Gain :	7.52 dBi	(Numeric gain:	5.65)	Worst
	GSM:					
	GPRS / EDGE 850:	Gain :	2.15 dBi	(Numeric gain:	1.64)	Worst
	GPRS / EDGE 1900:	Gain :	4.35 dBi	(Numeric gain:	2.72)	Worst
	WCDMA:					
	WCDMA Band II	Gain :	4.35 dBi	(Numeric gain:	2.72)	Worst
	WCDMA Band IV	Gain :	3.99 dBi	(Numeric gain:	2.51)	Worst
	WCDMA Band V	Gain :	2.15 dBi	(Numeric gain:	1.64)	Worst
	LTE:					
	LTE Band 2	Gain :	4.35 dBi	(Numeric gain:	2.72)	Worst
	LTE Band 4	Gain :	3.99 dBi	(Numeric gain:	2.51)	Worst
	LTE Band 5	Gain :	2.71 dBi	(Numeric gain:	1.87)	Worst
	LTE Band 7	Gain :	3.21 dBi	(Numeric gain:	2.09)	Worst
	LTE Band 40	Gain :	4.90 dBi	(Numeric gain:	3.09)	Worst
	LTE Band 66	Gain :	3.99 dBi	(Numeric gain:	2.51)	Worst

Maximum tune up power

WIFI 2.4GHz		
IEEE 802.11b_Chain0	18.00 dBm	(63.096 mW)
IEEE 802.11b_Chain1	18.00 dBm	(63.096 mW)
IEEE 802.11g_Chain0	17.00 dBm	(50.119 mW)
IEEE 802.11g_Chain1	17.00 dBm	(50.119 mW)
IEEE 802.11n HT 20 (MIMO)	20.00 dBm	(100.000 mW)
IEEE 802.11n HT 40 (MIMO)	19.00 dBm	(79.433 mW)
WWAN:		
GSM850 (1 Slots)_Burst Power	33.50 dBm	(2238.721 mW)
GSM850 (1 Slots)_Frame Power	24.50 dBm	(281.838 mW)
PCS1900 (1 Slots)_Burst Power	30.50 dBm	(1122.018 mW)
PCS1900 (1 Slots)_Frame Power	21.50 dBm	(141.254 mW)
WCDMA Band II	24.00 dBm	(251.189 mW)
WCDMA Band IV	24.00 dBm	(251.189 mW)
WCDMA Band V	22.50 dBm	(177.828 mW)
LTE Band 2	25.00 dBm	(316.228 mW)
LTE Band 4	25.00 dBm	(316.228 mW)
LTE Band 5	25.00 dBm	(316.228 mW)
LTE Band 7	25.00 dBm	(316.228 mW)
LTE Band 40	25.00 dBm	(316.228 mW)
LTE Band 66	25.00 dBm	(316.228 mW)

Notes:

1. For more details, please refer to the User's manual of the EUT.
2. Disclaimer: Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.
3. The tune up power referred the AVG power of the test report TMWK2310003857KR, TMWK2310003859KR , TMWK2310003860KR and TMWK2310003861KR for RF Exposure assessment purpose.

4 Maximum Permissible Exposure

4.1 Limits for Maximum Permissible Exposure (MPE)

Table 1 - Limits for Maximum Permissible Exposure (MPE)

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 Exposure				
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
300-1,500			f/300	6
1,500-100,000			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
300-1,500			f/1500	30
1,500-100,000			1.0	30

4.2 MPE Calculation Method

Calculation

Given $E = \frac{\sqrt{30 \times P \times G}}{d}$ & $S = \frac{E^2}{377}$

Where E = Field strength in Volts / meter
P = Power in Watts
G = Numeric antenna gain
d = Distance in meters
S = Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

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

Changing to units of mW and cm, using:

P (mW) = P (W) / 1000 and

d (cm) = d(m) / 100

Yields

$$S = \frac{30 \times (P/1000) \times G}{377 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2}$$ **Equation 1**

Where d = Distance in cm
P = Power in mW
G = Numeric antenna gain
S = Power density in mW / cm^2

If, Substituting the MPE safe distance using d = 20 cm into Equation 1:

$$S = 0.000199 \times P \times G$$

4.3 MPE EXEMPTION

(A) The available maximum time-averaged power is no more than 1 mW

(B) The available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold *Pth* (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). *Pth* is given by:

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

Where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\ cm}\sqrt{f}}\right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20\ cm}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases}$$

d = the separation distance (cm);

(C) Using Table 1 and 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 λ/2π, 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 λ/4 or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

Single RF Sources Subject to Routine Environmental Evaluation	
RF Source frequency (MHz)	**Threshold ERP (watts)**
0.3-1.34	1,920 R^2.
1.34-30	3,450 R^2/f^2.
30-300	3.83 R^2.
300-1,500	0.0128 R^2f.
1,500-100,000	19.2R^2.
Note: R is in meters, f is in MHz.	

4.4 Multiple RF sources

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),

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

5 MPE Exemption Option B

WIFI 2.4GHz (DTS)

Mode	Frequency (MHz)	R(m)	Max Tune-up power (dBm)	G(dBi)	Max Tune-up EIRP (dBm)	Max Tune-up ERP (dBm)	Max Tune-up ERP (mW)	ERP Threshold (mW)	MPE Exemption
IEEE 802.11b_Chain0	2467.00	0.2	18.0	4.75	22.75	20.60	114.815	3060	Complies
IEEE 802.11b_Chain1	2467.00	0.2	18.0	4.27	22.27	20.12	102.802	3060	Complies
IEEE 802.11g_Chain0	2462.00	0.2	17.0	4.75	21.75	19.60	91.201	3060	Complies
IEEE 802.11g_Chain1	2462.00	0.2	17.0	4.27	21.27	19.12	81.658	3060	Complies
IEEE 802.11n HT 20 (MIMO)	2437.00	0.2	20.0	7.52	27.52	25.37	344.350	3060	Complies
IEEE 802.11n HT 40 (MIMO)	2437.00	0.2	19.0	7.52	26.52	24.37	273.527	3060	Complies

WWAN

Mode	Frequency (MHz)	R(m)	Max Tune-up power (dBm)	G(dBi)	Max Tune-up EIRP (dBm)	Max Tune-up ERP (dBm)	Max Tune-up ERP (mW)	ERP Threshold (mW)	MPE Exemption
GSM850 (1 Slots)	849.00	0.2	24.5	2.15	26.65	24.50	281.838	1732	Complies
PCS1900 (1 Slots)	1910.00	0.2	21.5	4.35	25.85	23.70	234.423	3060	Complies
WCDMA Band II	1910.00	0.2	24.0	4.35	28.35	26.20	416.869	3060	Complies
WCDMA Band IV	1755.00	0.2	24.0	3.99	27.99	25.84	383.707	3060	Complies
WCDMA Band V	849.00	0.2	22.5	2.15	24.65	22.50	177.828	1732	Complies
LTE Band 2	1910.00	0.2	25.0	4.35	29.35	27.20	524.807	3060	Complies
LTE Band 4	1755.00	0.2	25.0	3.99	28.99	26.84	483.059	3060	Complies
LTE Band 5	849.00	0.2	25.0	2.71	27.71	25.56	359.749	1732	Complies
LTE Band 7	2570.00	0.2	25.0	3.21	28.21	26.06	403.645	3060	Complies
LTE Band 40	2400.00	0.2	25.0	4.90	29.90	27.75	595.662	3060	Complies
LTE Band 66	1780.00	0.2	25.0	3.99	28.99	26.84	483.059	3060	Complies

6 Simultaneous Transmission Analysis

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),

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

Simultaneous Transmission Condition

Mode	Frequency (MHz)	Max Tune-up ERP(mW)	ERP Threshold(mW)	simultaneous Transmission	simultaneous Transmission Limit
WiFi 2.4GHz	2437.00	344.350	3060	0.320	≤1
LTE Band 5	849.00	359.749	1732		

7 Facilities

All measurement facilities used to collect the measurement data are located at

☒ No.11, Wugong 6th Rd., Wugu Dist., New Taipei City, Taiwan.

☐ No. 12, Ln. 116, Wugong 3rd Rd., Wugu Dist., New Taipei City, Taiwan.

--End of Test Report--