

RF Exposure Evaluation Report

1 RF EXPOSURE

Product Name: smart lock

Model No.: NL3116, D326, D328, Q8, D8, G1pro, HP-1, HP-2, LPL001, LPL004, D347, MDS001, MDS002, MDS003, MDS004, MDS005, MDS006, MS001, MS002, MS003, MS004

FCC ID: 2BLC4-NL3116

2. RF Exposure Evaluation

FCC KDB447498 D01 General RF Exposure Guidance v06: Mobile and Portable Device, RF Exposure, Equipment Authorization Procedures.

FCC CFR 47 part1 1.1310: Radiofrequency radiation exposure limits.

FCC CFR 47 part2 2.1091: Radiofrequency radiation exposure evaluation: mobile devices.

2.1 LIMITS

According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in part1.1307(b)

Table 1 to § 1.1310(e)(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)
(i) 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
(ii) 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

F= Frequency in MHz Friis Formula

Friis transmission formula: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2)$ Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d is the limit of MPE . If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

2.2 EUT RF EXPOSURE EVALUATION

BT/WIFI ANT: 1.43dBi; NFC PCB Loop Antenna:0.0dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.0 in linear scale.

The Max Conducted Peak Output Power data refer to report DACE240910001RF001 & DACE240910001RF002

BLE worst mode and channel:						
Test channel (MHz)	PK Power (dBm)	Maximum tune-up Power (dbm)	Maximum tune-up Power (dbm)	Maximum tune-up Power (mW)	Calculated value (mW/cm ²)	Limit (mW/cm ²)
BLE-2480	0.51	1.0±1	2.0	1.585	0.0004	1.0
13.56	-26.65	/	-26.65	0.002	0.000	1.0

Remark: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2) = (1.585 \cdot 1.39) / (4 \cdot 3.1415 \cdot 20 \cdot 20) = 0.0004$, $G = 10^{gain/10} = 1.39$

dbm=dbuv/m-95.2, so the power is 68.55-95.2 = -26.65dBm

RF Exposure Evaluation simultaneous transmission operations:

According to 865664D02 2.2 d) 1):

The sum of the ratios of the spatially averaged results to the applicable frequency dependent MPE limits :

Simultaneous transmission mode	The sum of the ratios	SUM	Limit
BT+NFC	0.0004+0	≈0.0004	1.0
Conclusion: 0.0004 < 1.0, So there is no sar requirement			

NOTE: EUT BT module is more than 20cm away from the human body.

Conclusion:

the sum of the ratios is less than the limit value of 1.0, so there is no sar requirement.