

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

$\pi = 3.1416$

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

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

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.