RF EXPOSURE EVALUATION

According to FCC 1.1310: 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 §1.1307(b)

FCC ID: 2BRGN-DL-BTSW

EUT Specification

EUT	Bluetooth switch module
Frequency band (Operating)	☒BLE: 2.402GHz ~ 2.480GHz
Device category	☐Portable (<20cm separation) ☒Mobile (>20cm separation)
Exposure classification	☐Occupational/Controlled exposure (S = 5mW/cm^2) ☒General Population/Uncontrolled exposure (S=1mW/cm^2)
Antenna diversity	☒Single antenna ☐Multiple antennas ☐Tx diversity ☐Rx diversity ☐Tx/Rx diversity
Max. output power	BLE BLE 1M: 2.86 dBm BLE 2M: 2.87 dBm
Antenna gain (Max)	-0.58dBi
Evaluation applied	☒MPE Evaluation ☐SAR Evaluation

Limits for Maximum Permissible Exposure(MPE)

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density(mW/cm^2)	Average Time
(A) Limits for Occupational/Control Exposures				
300-1500	--	--	F/300	6
1500-100000	--	--	5	6
(B) Limits for General Population/Uncontrol Exposures				
300-1500	--	--	F/1500	6
1500-100000	--	--	1	30

Friis transmission formula: P_d=(P_{out}*G)\(4*pi*R^2)

Where
P_d= Power density in mW/cm^2, 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=20cm
P_d the limit of MPE, 1mW/cm^2. If we know the maximum gain of the antenna and total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

For multiple RF sources: Multiple RF sources are exempt if:
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

$$\sum_{k=1}^{c} \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1$$

$Evaluated_k$: 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 $Limit_k$: either the general population/uncontrolled maximum permissible exposure (MPE) or specific Absorption rate (SAR) limit for each fixed, mobile, or portable RF source k.

Measurement Result

BLE:

Mode	Max Measured Power (dBm)	Tune up tolerance (dBm)	Max tune up conducted power(dBm)	Output Peak power (mW)	Ant. Gain (dBi)	Ant. Gain (numeric)	Power density at 20cm (mW/ cm^2)	Power density Limits (mW/ cm^2)
BLE 1M	2.86	2±1	3	1.995	-0.58	0.875	0.00035	1
BLE 2M	2.87	2±1	3	1.995	-0.58	0.875	0.00035	1

According to KDB 447498, no stand-alone required for BLE antenna, and no simultaneous SAR measurement is required.

Signature:

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