MPE Calculation

Product:	Bluetooth Module
Model no.:	ZL-BLE-002
FCC ID:	2BA9M-ZLBLE002
Rating:	Input: 3.3VDC
RF Transmission Frequency:	Bluetooth BR+EDR: 2402-2480MHz Bluetooth LE: 2402-2480MHz
Antenna Type:	Integrated Antenna
Max Antenna Gain:	-0.58dBi
Description of the EUT:	EUT is Bluetooth Module which supports Bluetooth Low Energy/Bluetooth BDR+EDR functions

According to subpart 15.247(i)and subpart §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091, KDB447498 D01 General RF Exposure Guidance v06)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm2)	Averaging Time (minutes)
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
300–1,500	/	/	f/1500	30
1,500–100,000	/	/	1.0	30

f = frequency in MHz; * = Plane-wave equivalent power density;

According to §1.1310 and §2.1091 RF exposure is calculated.
Calculated Formulary:
Predication of MPE limit at a given distance
$S = PG/4\pi R^2$ = power density (in appropriate units, e.g. mW/cm²);
P = power input to the antenna (in appropriate units, e.g., mW);
G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain;
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

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Calculated Data:

For BR+EDR

Maximum peak output power at antenna input terminal (dBm):	**2.28**
Maximum peak output power at antenna input terminal (mW):	**1.69**
Prediction distance (cm):	**20**
Antenna Gain, typical (dBi):	**-0.58**
Maximum Antenna Gain (numeric):	**0.87**
The worst case is power density at predication frequency at 20 cm (mW/cm^2):	**0.0003**
MPE limit for general population exposure at prediction frequency (mW/cm^2):	1.0

For BLE

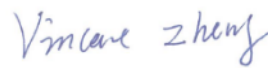|	
Maximum peak output power at antenna input terminal (dBm):	**1.54**
Maximum peak output power at antenna input terminal (mW):	**1.43**
Prediction distance (cm):	**20**
Antenna Gain, typical (dBi):	**-0.58**
Maximum Antenna Gain (numeric):	**0.87**
The worst case is power density at predication frequency at 20 cm (mW/cm^2):	**0.0002**
MPE limit for general population exposure at prediction frequency (mW/cm^2):	1.0

Result: Compliant

TUV SUD China, Shenzhen Branch

Reviewed by: Prepared By:

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