

## RF Exposure

G3-EB-OM-NA-P is an IoT device in the Bluetooth/UMTS/LTE system. The Bluetooth function is BLE single mode and operating in 2402-2480MHz. The UMTS frequency band are band II / V. The LTE frequency band is Band II / IV / XII. The IoT device implements such functions as RF signal receiving/transmitting, LTE/UMTS protocol. Internally it provides SIM card interface. The EUT is powered by DC 3.7V from inner battery which can be charged by DC36V via DC cable. DC 36V is the power supply from E-Bike. For more detailed features description, please refer to the user's manual.

### Limits

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f <sup>2</sup> )	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	f/300	6
1500-100,000	/	/	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 <sup>2</sup> )	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

F=frequency in MHz

\*=Plane-wave equivalent power density

RF exposure compliance will need to be determined with respect to 1.1307(c) and (d) of the FCC rules. The emissions should be within the limits at 300kHz in Table 1 of 1.1310(use the 300kHz limits for 150kHz:614V/m,1.63A/m).

### Friis Formula

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

Where

$P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = 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

$P_d$  is the limit of MPE, 1 mW/cm<sup>2</sup>. 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.

**EUT RF Exposure Evaluation:**

Operating Band	Frequency (MHz)	Antenna Gain (dBi)	Max EIRP (dBm)	Max Measured EIRP (dBm)	Max Pout (Output Power to Antenna) (dBm)	Pout*G (Max EIRP) (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	conclusion
BLE	2440.00	3.00	-10.00	-12.93	-13	0.1000	0.00002	1.0000	PASS
WCDMA B2	1907.60	2.07	26.07	24.52	24	404.5759	0.08053	1.0000	PASS
WCDMA B5	836.40	0.83	26.83	25.17	26	481.9478	0.09593	0.5576	PASS
LTE B2	1860.00	2.07	25.07	24.87	23	321.3661	0.06397	1.0000	PASS
LTE B4	1715.00	2.14	26.14	25.5	24	411.1497	0.08184	1.0000	PASS
LTE B12	715.30	0.83	24.83	24.39	24	304.0885	0.06053	0.4769	PASS

- Max EIRP is the specified Max EIRP, the max measured EIRP is within the Max EIRP.
- Max Pout is the specified Max conducted power to antenna.

- For measured power of Bluetooth BLE please refer to 220328043SZN-004:  
The maximum peak radiated emission for the EUT is 82.3dBµV/m at 3m in the frequency 2440MHz, The EIRP = [(FS\*D) ^2 / 30] mW = -12.93dBm
- For measured power of WCDMA B2, B5 please refer to Appendix of 220328043SZN-3G;
- For measured power of LTE B2, B4, B12 please refer to Appendix of 220328043SZN-4G

**Simultaneous Transmission:**

For Simultaneous transmitting of Bluetooth BLE and WCDMA transmitter, according to 865664D02 2.2 d) 1):

The sum of the ratios of the spatially averaged results to the applicable frequency dependent MPE limits = 0.00002 / 1 + 0.09593 / 0.5576 = 0.172 < 1

For Simultaneous transmitting of Bluetooth BLE and LTE transmitter, according to 865664D02 2.2 d) 1):

The sum of the ratios of the spatially averaged results to the applicable frequency dependent MPE limits = 0.00002 / 1 + 0.07924 / 0.4769 = 0.127 < 1

Since the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in the device is ≤ 1.0, the EUT is considered to satisfy MPE compliance for simultaneous transmission operations.

The following RF exposure statement or similar sentence is proposed to be included in the user manual:

“FCC RF Radiation Exposure Statement Caution: This Transmitter must be installed to provide a separation distance of at least 20 cm from all persons.”