Excellence in Compliance Testing

Certification Exhibit

FCC ID: P2SCMIU-VZW-1

FCC Rule Part: 47 CFR Part 2.1091

ACS Project Number: 16-3031

Manufacturer: Neptune Technology Group
Model: CMIU-ATT

RF Exposure

General Information:

Applicant: Neptune Technology Group
Device Category: Mobile
Environment: General Population/Uncontrolled Exposure

The CMIU is collocated and transmits simultaneously with the Telit LTE radio.

Technical Information:

Table 1: Technical Information

	Telit Communications, S.p.A. LTE modem Model LE910-NA FCC ID: RI7LE910NA	**Neptune Group Bluetooth LE Radio FCC ID: P2SCMIU-VZW-1**
Frequency Bands (MHz) & Conducted Power (dBm)	LTE Band 17: 706.5 MHz - 713.5 MHz Conducted Power = 25.00 dBm	2402 MHz - 2480 MHz Conducted Power = 0 dBm
	GSM 850: 824.2 MHz - 848.2 MHz Conducted Power = 33.50 dBm	
	UMTS/HSPA: 826.4 MHz – 846.6 MHZ Conducted Power = 25.00 dBm	
	LTE Band 5: 826.5 MHz – 846.5 MHz Conducted Power = 25.00 dBm	
	LTE Band 4: 1712.5 MHz – 1752.5 MHz Conducted Power = 25.00 dBm	
	GSM 1900: 1850.2 MHz – 1909.8 MHz Conducted Power = 30.50 dBm	
	UMTS/HSPA: 1852.4 MHz – 1907.6 MHz Conducted Power = 25.00 dBm	
	LTE Band 2: 1852.5 MHz – 1907.5 MHz Conducted Power = 25.00 dBm	
Antenna Type(s)	Ethertronics 1003450D0-AS10L0613	Loaded Monopole
Antenna Gain (dBi)	700MHz Band = 4.06	-1.5
	800MHz Band = 4.72	
	1700MHz Band = 4.22	
	1900MHz Band = 1.66	

MPE Calculation:
The Power Density (mW/cm^2) is calculated as follows:

$$S = \frac{PG}{4\pi R^2}$$

Where:
S = 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
R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

Table 2: MPE Calculation (Including Collocated Devices)

Transmit Frequency (MHz)	Radio Power (dBm)	Power Density Limit (mW/cm^2)	Radio Power (mW)	Antenna Gain (dBi)	Antenna Gain (mW eq.)	Distance (cm)	Power Density (mW/cm^2)	Radio
706.5*	25	0.47	316.23	4.06	2.547	20	0.160	A
824.2*	33.5	0.55	559.68**	4.72	2.965	20	0.330	B
1712.5*	25	1.00	316.23	4.22	2.642	20	0.166	C
1850.2*	25	1.00	316.23	1.66	1.466	20	0.092	D
2402	0	1.00	1.00	-1.5	0.708	20	0.000	E

*The Telit RF Exposure report filed with FCC ID RI7LE910NA was used to determine the worst case for each frequency band.
**Peak output power for GSM850 is 33.5 dBm with a 25% duty cycle. 559.68 mW is the source-based time-averaging power.

Summation of MPE ratios – Simultaneous Transmissions
This device contains multiple transmitters which can operate simultaneously; therefore the maximum RF exposure is determined by the summation of MPE ratios. The limit is such that the summation of MPE ratios is ≤ 1.0.

Table 3: Summation of MPE Ratios

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Radio A (Telit LTE Band 17)	x			
Radio B (Telit GSM850)		x		
Radio C (Telit LTE Band 4)			x	
Radio D (Telit LTE Band 2)				x
Radio E (CMIU BTLE)	x	x	x	x
Radio A MPE Ratio	0.340180361			
Radio B MPE Ratio		0.600798143		
Radio C MPE Ratio			0.166237939	
Radio D MPE Ratio				0.092199835
Radio E MPE Ratio	0.000140841	0.000140841	0.000140841	0.000140841
MPE Ratio Summation:	0.340321202	0.600938984	0.16637878	0.092340677