RF Exposure Evaluation declaration

Product Name : M2M Router

Model No. : ER2000T-VZ-CAT1

FCC ID : 2AMRIER2000TNAC1

Applicant : Connected IO Inc.

Address : 573 University Ave. Los Gatos, CA 95032

Date of Receipt : Oct. 30, 2017

Date of Declaration : Nov. 15, 2017

Report No. : 17A0398R-SAUSP03V00

Report Version : V1.0

Testing Laboratory

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1. GENERAL INFORMATION

1.1. EUT Description

Product Name	M2M Router
Model No.	ER2000T-VZ-CAT1
Trade Name	Connected IO Inc.
FCC ID	2AMRIER2000TNAC1
Contain FCC ID	RI7LE910SVV2
Frequency Range	2412-2462MHz for 802.11b/g/n-20BW, 2422-2452MHz for 802.11n-40BW
Number of Channels	802.11b/g/n-20MHz: 11, n-40MHz: 7
Data Speed	802.11b: 1-11Mbps, 802.11g: 6-54Mbps, 802.11n: up to 300Mbps
Type of Modulation	802.11b: DSSS (DBPSK, DQPSK, CCK) 802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM)
Antenna Type	Dipole Antenna
Antenna Gain	Refer to the table “Antenna List”
Channel Control	Auto

1.2. Antenna List :

No	Manufacturer	Part No	Antenna Type	Peak Gain
1	Grand-Tek	OA-LTE-01-01-GTT (WLAN)	Dipole Antenna	3.1dBi for 2.4 GHz
2	Gtt Europe	OA-LTE-01-01-GTT (WWAN)	Dipole Antenna	0.7 dBi for 698-960 MHz 3.8 dBi for 1710-2170 MHz

2. RF Exposure Evaluation

2.1. Limits

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).

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 (Minutes)
(A) Limits for Occupational/ Control Exposures				
300-1500	--	--	F/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	--	--	F/1500	30
1500-100,000	--	--	1	30

F= Frequency in MHz

Friis Formula

Friis transmission formula: $Pd = (Pout*G)/(4*Pi*R^2)$

Where

Pd = power density in mW/cm^2

Pout = 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, 1 mW/cm^2. 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.

Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in a host device is ≤ 1.0

2.2. Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

The temperature and related humidity: 21℃and 55％ RH.

2.3. Test Result of RF Exposure Evaluation

Product : M2M Router
Test Item : RF Exposure Evaluation
Test Site : N/A

WLAN 2.4G Peak Gain: 3.1dBi

Band	Frequency	Conducted Peak Power (dBm)	Duty Cycle (%)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)	Pass/Fail
802.11b	2412	20.53	100	113.0	0.046	1	Pass
802.11g	2437	24.65	100	291.7	0.119	1	Pass
802.11n-20M	2437	26.38	100	434.5	0.176	1	Pass
802.11n-40M	2437	26.17	100	414.0	0.168	1	Pass

Note: The conducted output power is refer to report No.: 1770133R-RFUSP26V00 from the DEKRA.

LTE Band Peak Gain: 0.7 dBi for 698-960 MHz ; 3.8 dBi for 1710-2170 MHz

Band	Frequency (MHz)	Conducted Peak Power (pre tune-up) (dBm)	Maximum EIRP (W)	Maximum EIRP Limit(W)	Duty Cycle (%)	Conducted Average Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm2)	Limit (mW/cm2)	Pass/Fail
2	1850.7	24	0.6026	2	100	24	251.2	0.12	1	Pass
4	1710.7	24	0.6026	1	100	24	251.2	0.12	1	Pass
13	777	24	0.1799	3	100	24	251.2	0.05	0.52	Pass

Note: The conducted output power is refer to Original RF Exposure Report for FCC ID: RI7LE910SVV2.

2.4. Calculations for Multi-Transsmitter

Mode	Exposure Calculations	result	Limit	Pass/Fail
WLAN	0.1765	0.2964	1	Pass
WWAN	0.1199			