RF Exposure Evaluation Declaration

FCC ID:	2AEB4AMV01
APPLICANT:	Connected Holdings LLC

Application Type:	Certification
Product:	LTE Cat-M GPS Tracker
Model No.:	AR-4MA
Marketing Name:	Arrow-M
FCC Classification:	Licensed Non-Broadcast Station Transmitter (TNB)

Reviewed By : (Kevin Guo)

Approved By : (Robin Wu)

Revision History

Report No.	Version	Description	Issue Date	Note
1806RSU011-U1	Rev. 01	Initial report	07-12-2018	Valid

1. PRODUCT INFORMATION

1.1. Equipment Description

Product Name:	LTE Cat-M GPS Tracker
Model No.:	AR-4MA
Marketing Name:	Arrow-M
Hardware Version:	P1
Software Version:	V1
LTE Cat-M Operation Band (s):	FDD Band 4 / 13
GPS:	1575.42MHz
Working Voltage	DC 12V

1.2. Product Specification Subjective to this Report

Tx Frequency Range	Band 4: 1710.7MHz ~ 1754.3MHz Band 13: 779.5MHz ~ 784.5MHz
Rx Frequency Range	Band 4: 2110.7MHz ~ 2154.3MHz Band 13: 748.5MHz ~ 753.5MHz
Bandwidth	Band 4: 1.4MHz Band 13: 1.4MHz
Type of Modulation	QPSK / 16-QAM

1.3. Description of Available Antennas

Antenna Type	Frequency Band	Max Peak Gain (dBi)
GPS Internal Antenna		
Chip	1575.42MHz	2
LTE Cat-M Internal Antenna		
Chip	FDD-Band 4	1
	FDD- Band 13	1

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	6
1500-100,000	--	--	1	30

f= Frequency in MHz

Calculation 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, $1mW/cm^2$. 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.

2.2. Test Result of RF Exposure Evaluation

Product	LTE Cat-M GPS Tracker
Test Item	RF Exposure Evaluation

Test Mode	Frequency Band (MHz)	Maximum Out power (dBm)	Maximum EIRP (dBm)	Power Density at R = 20 cm (mW/cm^2)	Limit (mW/cm^2)
Band 4	1710.7 ~1754.3	23.90	24.90	0.0615	1
Band 13	779.5 ~784.5	23.16	24.14	0.0516	0.52

CONCULISON:

The max Power Density at R (20 cm) = 0.0615mW/cm^2 < 1 mW/cm^2 for Cat-M Band.

Therefore, the Min Safety Distance is 20cm.

The End