MPE Calculation : Field Disturbance Sensor

Host device MN(Mode)	Tx Frequency (MHz)	Field Strength at 3m (dBuV/m)	Conversion Factor (dB)[Note]	Maximum EIRP (dBm)	Maximum EIRP (mW)	Maximum power density (mW/cm^2)	Requriment (mW/cm^2)
CIOT-L7FM(Motion sensor)	10523	84.80	-95.26	-10.46	0.090	0.00002	1.000
CIOT-L20M(Motion sensor)	10523	80.64	-95.26	-14.62	0.035	0.00001	1.000

Note: EIRP(dBm) = E(dBuV/m) + 20logD -104.8; Where D is the measurement distance in meters.

The EUT will only be used with a separation of 20 centimeters or greater between the antenna and the body of the user.

The MPE sample calculation for this exposure is shown below.

▪ S = EIRP / (4 R^2 π)

= 0.09 / (4 X 20^2 X π)

= 0.00002 mW/cm^2

- Note

S= Maximum power density(mW/cm^2)

EIRP= Equivalent Isotropic Radiated Power(mW)

R= Distance to the center of the radiation of the antenna(20cm)

▪ **Limits for General Population/Uncontrolled Exposure**

Frequency range (MHz)		Electric Field strength (V/m)	Magnetic field strength (A/m)	Power Density (mW/cm^2)	Averageing time (minutes)
0.3 ~ 1.34		614	1.63	*100	30
1.34 ~ 30		824/f	2.19 / f	*180 / f^2	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

Conclusion : The exposure condition of this device is compliant with FCC

MPE Calculation : BLE

Host device MN(Mode)	Transmitting Frequency (MHz)	Max. Target Power (dBm)	ANT Gain (dBi)	Maximum EIRP (dBm)	Maximum EIRP (mW)	Maximum power density (mW/cm^2)	Requriment (mW/cm^2)
CIOT-L7FM(BLE)	2402.00	-3.50	3.14	-0.36	0.921	0.00020	1.000
CIOT-L20M(BLE)	2402.00	-3.50	3.14	-0.36	0.921	0.00020	1.000

The EUT will only be used with a separation of 20 centimeters or greater between the antenna and the body of the user.

The MPE sample calculation for this exposure is shown below.

▪ S = EIRP / (4 R^2 π)

= 0.921 / (4 X 20^2 X π)

= 0.0002 mW/cm^2

- Note

S= Maximum power density(mW/cm^2)

EIRP= Equivalent Isotropic Radiated Power(mW)

R= Distance to the center of the radiation of the antenn

▪ Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)		Electric Field strength (V/m)	Magnetic field strength (A/m)	Power Density (mW/cm^2)	Averageing time (minutes)
0.3	~ 1.34	614	1.63	*100	30
1.34	~ 30	824/f	2.19 / f	*180 / f^2	30
30	~ 300	27.5	0.073	0.2	30
300	~ 1,500			f / 1500	30
1,500	~ 100,000			1.0	30

Conclusion : The exposure condition of this device is compliant with FCC

RF Exposure Compliance for simultaneous operations

▪ **Configurations for simultaneous operation**

Model for host device	CIOT-L7FM		CIOT-L20M		-	-	-	Σ of MPE ratios
RF function or mode	Motion Sensor	BLE	Motion Sensor	BLE	-	-	-	
Band	10.525GHz	2.4GHz	10.525GHz	2.4GHz	-	-	-	
Power Density (mW/cm2)	0.00002	0.00020	0.00001	0.00020	-	-	-	
Requirement (mW/cm2)	1.00000	1.00000	1.00000	1.00000	-	-	-	
MPE ratio (Power Density/Requirement)	0.00002	0.00020	0.00001	0.00020	-	-	-	
CIOT-L7FM (MPE ratio)	0.00002	0.00020	-	-	-	-	-	**0.00022**
CIOT-L20M (MPE ratio)	-	-	0.00001	0.00020	-	-	-	**0.00021**
	-	-	-	-	-	-	-	-
	-	-	-	-	-	-	-	-

Note: The maximum power density in each RF function was used for above table.

▪ **Requirment = Σ of MPE ratios ≤ 1**

Conclusion : The exposure condition of this device is compliant with FCC rules.