RF Exposure report

The equipment under test (EUT) is a Baby Monitor - Baby Unit with 2.4GHz wireless control and Bluetooth functions. The EUT is powered by DC5V via micro USB port which can be connected to adapter with 100-240VAC. For more detail information pls. refer to the user manual.

2.4GHz wireless control function operates in 2417-2468MHz. There are total 24 channels.

Modulation Type: GFSK
Antenna Type: Integral antenna
Antenna Gain: 0dBi
The nominal radiated output power (e.i.r.p) specified: 12dBm (Tolerance: +/-3dB)
The nominal conducted output power specified: 12dBm (Tolerance: +/-3dB)

The maximum radiated emission for the EUT is 108.0dBμV/m at 3m in the frequency 2.443GHz = [(FS*D) ^2 / 30] mW
= 12.77dBm which is within the production variation

The minimum radiated emission for the EUT is 104.7dBμV/m for at 3m in the frequency 2.468GHz = [(FS*D) ^2 / 30] mW
= 9.47dBm which is within the production variation

According to FCC Part 2.1091, this unlicensed transmitting devices is categorically excluded from routine environmental evaluation for RF exposure prior to equipment authorization or use.

For Maximum Permissible Exposure (MPE) evaluation of the product, the maximum power density at 20 cm from this transmitter shall be less than the General Population / Uncontrolled MPE limit in FCC Part 1.1310.

The maximum EIRP= 15.0Bm=31.6mW
The source-based time averaged maximum radiated power = 31.6mW x Duty Cycle = 31.6mW x 15.217% = 4.8mW

From above data, the exposed power density at a distance (R) of 20cm from the center of radiation of the antenna can be calculated according to OET 65 as follow:
= PG/4πR^2
= EIRP/4πR^2 = 4.8/ 4πR^2
= 0.001 mW/cm^2

The MPE limit is 1.0 mW/cm^2 for general population and uncontrolled exposure in the 2.4GHz frequency range according to FCC Part 1.1310. As the measured power density at 20cm from the transmitter is lower than the MPE limit, the compliance to the MPE limit can be ensured by indicating the minimum 20cm separation between the transmitter's radiating structure and body of the user or nearby persons.

Transmitter Duty Cycle Calculation
The duration of one cycle = 100 ms
Effective period of the cycle = 15.217 ms
DC = 15.217 ms / 100 ms = 0.15217 or 15.217%

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.”

For Bluetooth function operating at 2402-2480MHz.

Modulation Type: GFSK
Antenna Type: Integral antenna
Antenna Gain: 0dBi
The nominal radiated output power (e.i.r.p) specified: 1dBm (Tolerance: +/-3dB)
The nominal conducted output power specified: 1dBm (Tolerance: +/-3dB)

The maximum radiated emission for the EUT is 96.8dBμV/m at 3m in the frequency 2.440GHz = [(FS*D) ^2 / 30] mW
= 1.57dBm which is within the production variation

The minimum radiated emission for the EUT is 95.8dBμV/m for at 3m in the frequency 2.480GHz = [(FS*D) ^2 / 30] mW
= 0.57dBm which is within the production variation

According to FCC Part 2.1091, this unlicensed transmitting devices is categorically excluded from routine environmental evaluation for RF exposure prior to equipment authorization or use,

For Maximum Permissible Exposure (MPE) evaluation of the product, the maximum power density at 20 cm from this transmitter shall be less than the General Population / Uncontrolled MPE limit in FCC Part 1.1310.

The maximum EIRP= 4dBm=2.5mW
The source-based time averaged maximum radiated power = 2.5mW x Duty Cycle = 2.5mW

From above data, the exposed power density at a distance (R) of 20cm from the center of radiation of the antenna can be calculated according to OET 65 as follow:
= PG/4πR^2
= EIRP/4πR^2 =2.5/ 4πR^2
=0.0005 mW/cm^2

The MPE limit is 1.0 mW/cm^2 for general population and uncontrolled exposure in the 2.4GHz frequency range according to FCC Part 1.1310. As the measured power density at 20cm from the transmitter is lower than the MPE limit, the compliance to the MPE limit can be ensured by indicating the minimum 20cm separation between the transmitter's radiating structure and body of the user or nearby persons.

Transmitter Duty Cycle Calculation
The EUT transmit continuously during the test, the duty cycle is 1.

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

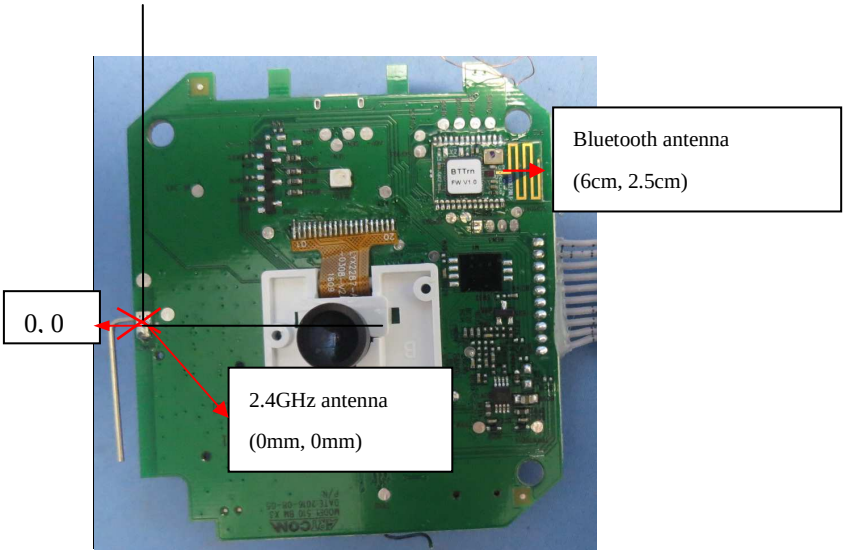
“FCC RF Radiation Exposure Statement Caution: This Transmitter must be installed to provide a separation distance of at least 20 cm from all persons.”

Simultaneous transmissions for both 2.4GHz function and Bluetooth function

According to the KDB 447498:

The information of operating frequency (MHz), power (W), antenna gain (dBi), location (X and Y coordinates showed on below antenna photo) for each antenna are entered in the MPE spreadsheet.

Antenna photo



The power densities of up to 2 antennas located within a 90 cm² region at 1cm intervals are estimated first. Then the power densities computed for each antenna are summed.

The plot “% MPE Contour” displays the result in percentages of the frequency-dependent power density limits. As the measured power density at 20cm from the transmitter is lower than the MPE limit (the compliance boundary for simultaneous transmission), the compliance to the MPE limit can be ensured by indicating the minimum 20cm separation between the radiating structures of the transmitter and body of the user or nearby persons.

Antenna No.		Total	1	2	3	4	5	6
Tx Status			On	On	Off	Off	Off	Off
Frequency	MHz		2450	2450	1900	2450	2450	5800
MPE Limit	mW/cm^2		1.00	1.00	0.00	0.00	0.00	0.00
Max % MPE	%	0.7	0.6	0.1	0.0	0.0	0.0	0.0
Power	(W)	0.035	0.032	0.003	0.000	0.000	0.000	0.000
Antenna Gain	dBi		0.00	0.00	3.00	1.50	0.50	1.00
EIRP	(W)	0.04	0.032	0.003	0.000	0.000	0.000	0.000
X	(cm)		0.0	6.0	12.0	4.0	-8.0	8.0
Y	(cm)		0.0	2.5	0.0	0.0	0.0	0.0
Sector			FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
Arc			FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
θ_1	degs	input	-120	-120	-120	-120	-120	-120
θ_2			60	60	60	60	60	60
θ_1		actual	-120	-120	-120	-120	-120	-120
θ_2			60	60	60	60	60	60