December 13, 2014

TUV SUD BABT TCB
Octagon House,
Segensworth Road,
Fareham,
Hampshire,
PO15 5RL

FCC ID: 2ACMJ-X100

Dear Sir or Madam,

We hereby attest that the VOYCE band WLAN transmitter qualifies for an exemption of the FCC's SAR testing requirements due to its low duty cycle based on our firmware controlling the transmission time.

The VOYCE WLAN transmitter attempts to upload the stored sensor data (maximum payload of 21 MB plus a 10% overhead of 2.1 MB = ~24 MB) to the cloud a maximum of six times per day or once every four hours. With a 1 Mbps link, the maximum WLAN transmitter on-time is 24 seconds. Handshaking, transmitter warm-up, as well as retries for low RSSI values will add additional transmitter on-time of 5 seconds. The minimum RSSI value for an acceptable link and the daily upload frequency limit are controlled by the VOYCE band firmware. Over a four hour period, this equates to a worst case duty cycle of 0.20%:

Over four hours (controlled by firmware):

   29 seconds on-time
   14400 seconds off-time

   Duty Cycle = 0.0020 = 0.20%

If we use a thirty minute time period:

   29 seconds on-time
   1800 seconds off-time

   Duty Cycle = 0.0161 = 1.61%

Applying a 1.5x safety factor on the worst case duty cycle above (1.61%) results in a duty cycle of **2.415**%.

Source based Time Averaging Power Calculations for WLAN and SAR Exemption Calculations

G=0.5dBi
Duty Factor = 0.02415 = 2.415%
Power levels reported are taken from TUV SUD America test report: DI1403643A

Frequency (MHz)	Maximum Conducted Power (dBm)	Maximum Conducted Power (mW)	Antenna Gain (dBi)	Duty Cycle Factor	Source-Based Time-Averaged Power (mW)	**Source-Based Time-Averaged EIRP (mW)**
2412	18.39	69.02	0.5	0.02415	1.67	**1.87**
2437	17.53	56.62	0.5	0.02415	1.37	**1.53**
2462	17.83	60.67	0.5	0.02415	1.47	**1.64**

Accounting for a source based time averaging duty cycle of 2.415%, the device does not require SAR testing as demonstrated by the following SAR exemption calculation based on FCC KDB 447398 D01 Section 4.3.1.1:-

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] [√f(GHz)] ≤ 3.0

$f_{(GHz)}$ is the RF channel transmit frequency in GHz
Power and distance are rounded to the nearest mW and mm before calculation
The result is rounded to one decimal place for comparison

A test separation distance of 5 mm has been applied to the SAR test exclusion calculation

Maximum power = 1.87mW
f(GHz) = 2.412
[(1.87mW)/(5, mm)] [√2.412(GHz)] ≤ 3.0
0.58 ≤ 3.0

Therefore, the device meets the FCC SAR exemption requirements.

Sincerely,

Paul Tupin
Director, Product Development

Telephone Number: 1-571-328-7979
Email: ptupin@i4cinnovations.com