RF Exposure Report

EUT Name: Tile Pro – Wireless Transceiver

Model No.: T6001W/T6001B

CFR 47 Part 15.247: 2017

Prepared for:

Tile Inc.
2121 South El Camino Real Suite 900
San Mateo CA 94403
Tel: (415) 902-9629

Prepared by:

TÜV Rheinland of North America, Inc.
1279 Quarry Lane
Pleasanton, CA 94566
Tel: (925) 249-9123
Fax: (925) 249-9124
http://www.TÜV.com/

Report/Reissue	0
Date:	September 12, 2018
Job #	0000160199
Report Number:	31863512.001-MPE

Report Number: 31863512.001-MPE
EUT: Tile Pro Wireless Transceiver
Model: T6001W/T6001B
Report Date: September 14, 2018

Page 1 of 7

FCCID: 2ABXLT6001

Revisions

Revision No.	Date MM/DD/YYYY	Reason for Change	Author
0	09/12/2018	Original Document	N/A
1	9/14/2018	Updated antenna gain	IA

Note: Latest revision report will replace all previous reports.

Report Number: 31863512.001-MPE   Page 2 of 7
EUT: Tile Pro Wireless Transceiver
Model: T6001W/T6001B
Report Date: September 14, 2018

FCCID: 2ABXLT6001

1 Test Methodology

1.1 SAR Standalone Test Exclusion

SAR evaluation is not required when SAR test exclusion conditions are satisfied as per KDB 447998 D01 v06 section 4.3 General SAR test exclusion considerations. The SAR Test Exclusion is calculated using the following:

$$\text{SAR Exclusion Threshold (SET)} \leq \frac{P}{d}\sqrt{f}$$

Where:
P ≡ Max Power of channel, including tune-up tolerance (mW)
d ≡ minimum test separation distance (mm)
f ≡ RF channel transmit frequency (GHz)
SET ≡ 3.0 for 1-g SAR and 7.5 for 10-g SAR

This calculation is made for devices that are used between 5 mm to 50 mm from the head or body (portable use).

2   FCC RF Exposure Evaluation

Requirements of this section are a consequence of Commission responsibilities under the National Environmental Policy Act to evaluate the environmental significance of its actions. See subpart I of part 1 of this chapter, in particular §1.1307(b).

For purposes of this section, a portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user.

The SAR limits for general population/uncontrolled exposure are 0.08 W/kg, as averaged over the whole body, and a peak spatial-average SAR of 1.6 W/kg, averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the parts of the human body treated as extremities, such as hands, wrists, feet, ankles, and pinnae, where the peak spatial-average SAR limit is 4 W/kg, averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube). Exposure may be averaged over a time period not to exceed 30 minutes to determine compliance with general population/uncontrolled SAR limits.

2.1 RF Exposure Calculations

The EUT is categorized as **General Population / Uncontrolled Exposure**

KDB 447498 D01 v06 Section 4.3 General SAR test exclusion guidance and section and section *6.3 Low transmission duty factor devices* have been applied.

The device is a BLE (2.4 GHz) radio which has two exclusive operating modes: 1) Advertising Mode and 2) Normal Mode. Advertising mode is active when the device is broadcasting advertisement packets while connected mode is active when the device is connected to master device. Data transfer between the master and slave happens every 1.9 seconds. In advertising mode the beaconing interval is every 25 ms.

The duty cycle for each mode of operation is calculated using the payload size, observation window (100 ms), number of beacons in the observation window and the number of channels used during a beaconing event and data exchange rate between the master and slave.

Payload time calculation:

$$Payload_{time} = \text{Payload}_{\text{bytes}} \left(\frac{8\ bits}{1\ byte} \right) \left(\frac{1\ \mu s}{1\ bit} \right)$$

Advertising mode duty cycle calculation:

$$Duty\ Cycle = \frac{\text{Payload}_{\text{time}}(Number\ of\ Beacons)(Number\ of\ Channels)}{100\ ms} * 100\%$$

In connected mode the duty cycle is calculated using the data exchange rate (data exchange payload) between the master and the slave.

Connected mode duty cycle is then calculated as follows

$$Duty\ Cycle = \frac{\text{Payload}_{\text{time}}}{100\ ms} * 100\%$$

Please see operational description for details. Table 2 provides the RF information for the two modes of operation.

Table 1 – Device RF Information

Frequency Band	Operating Mode	Duty Cycle (%)	Target Power/Tolerance	Antenna Gain	EIRP
2400 – 2483.5 MHz	Advertising	4.42	11 dBm/± 1 dB	1.65 dBi	13.7 dBm (23.2 mW)
2400 – 2383.5 MHz	Connected	0.19	11 dBm /± 1 dB	1.65 dBi	13.7 dBm (23.2 mW)

Notes:

Report Number: 31863512.001-MPE
EUT: Tile Pro Wireless Transceiver
Model: T6001W/T6001B
Report Date: September 14, 2018

Page 5 of 7

FCCID: 2ABXLT6001

2.1.1 Test Exclusion Calculation

The test exclusion is calculated using equation below. This device has a low duty factor as per KDB 447498 v06 section 6.3. A duty cycle factor is calculated using the equations below and is applied to SAR Exclusion Threshold as shown below. A Sample calculation is also provide.

Duty Cycle factor:

$$Duty\ Cycle\ Factor = \frac{Duty\ Cycle}{100}$$

Test Threshold Calculation:

$$SAR\ Exclusion\ Threshold\ (SET) \leq \frac{Power}{Distance}\sqrt{f}\ *(Duty\ Cycle\ Factor)$$

Advertising Mode calculation:

$$SAR\ Exclusion\ Threshold\ (SET) \leq \frac{(23.2\ mW)}{5\ mm}\sqrt{2.480\ GHz}\ *(0.0442) = 0.37\ \frac{W\sqrt{GHz}}{m}$$

Connected Mode calculation:

$$SAR\ Exclusion\ Threshold\ (SET) \leq \frac{(23.2\ mW)}{5\ mm}\sqrt{2.480\ GHz}\ *(0.0019) = 0.016\ \frac{W\sqrt{GHz}}{m}$$

Table 2 – Test Exclusion Thresholds

Frequency (GHz)	Duty Cycle Factor	Power (mW)	Separation Distance (mm)	Calculated Threshold ([W*GHz$^{1/2}$]/m)	Limit ([W*GHz$^{1/2}$]/m)	Notes
Advertising Mode						
2.480	0.0442	23.2	5	0.32	3.0	Pass
Connected Mode						
2.480	0.0019	23.2	5	0.01	3.0	Pass

Report Number: 31863512.001-MPE   Page 6 of 7
EUT: Tile Pro Wireless Transceiver
Model: T6001W/T6001B
Report Date: September 14, 2018

FCCID: 2ABXLT6001