Introduction:

This document introduces the current profile that can be expected when running the TTK1000-TDoA Tag application software on DWM1001 or DWM1004 hardware as delivered in the release.

Note that the user can implement further optimisations in order to reach the best current consumption allowed by the hardware.

The data below is valid for the release: **TTK1000_RELEASE_1.3.**

In order to measure the lowest current on DWM1001/DWM1004 development board, the following must be performed:

- Unsolder J3 (disconnect GPIOs LEDs)
- Unsolder J5 (disconnect TX/RX LEDs)
- Unsolder J4 and supply current to DWM1001 through J2-Pin 1 -- Isolate DWM1001 power circuit from Segger and other components on the dev board
- Unsolder J17 (disconnect SWD - cannot flash or debug)
- Unsolder J18 (disconnect SWD - cannot flash or debug)
- Unsolder J6 (disconnect SWD - cannot flash or debug)

In order to improve the quality of their measurement and remove ringing, a 470uF capacitor can be added between J2-1 and GND

TTK1000 TDoA Tag current profile:

The figure 1 presents a typical TTK1000 TDoA Tag application current profile and introduces the interesting points of measurements:
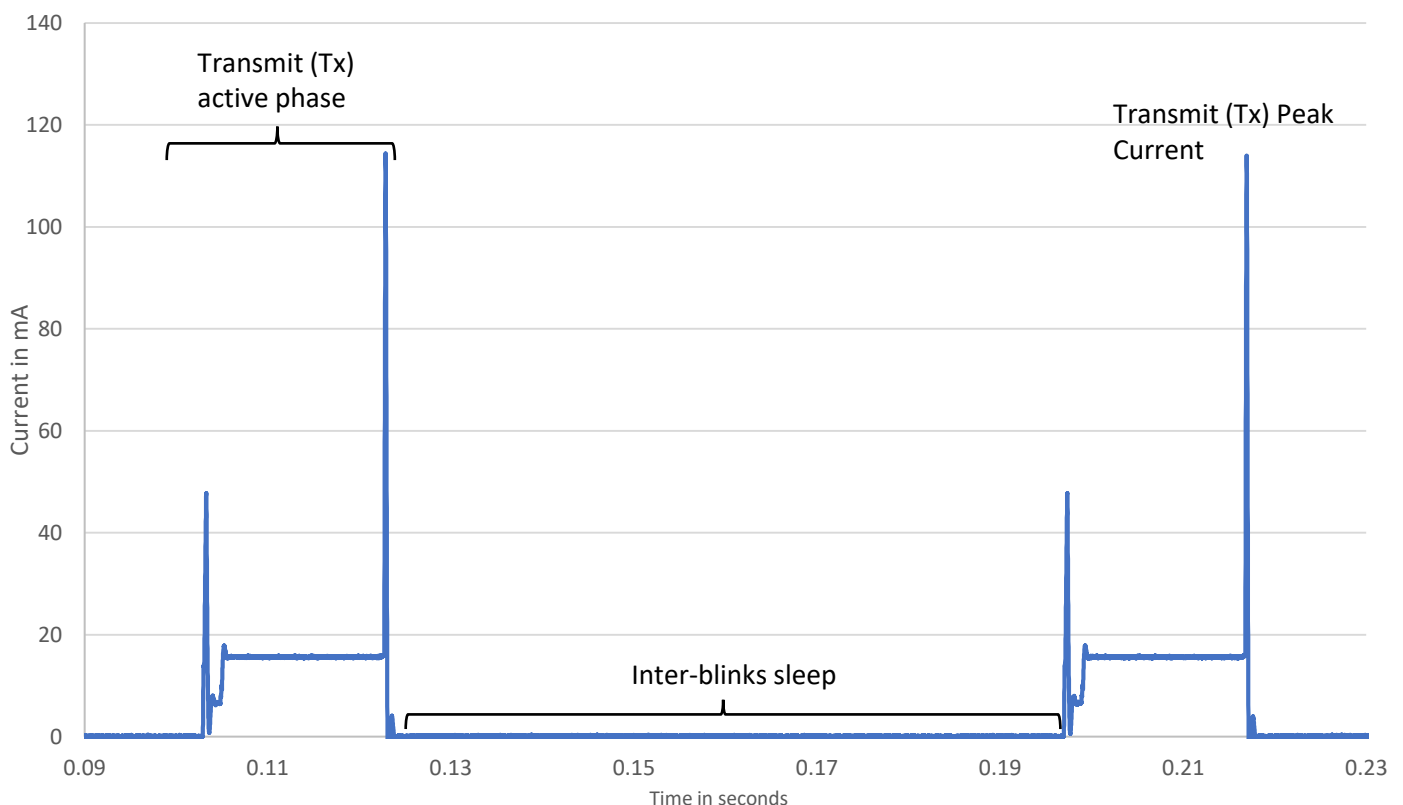

Figure 1: TTK 1000 TDoA Tag Application Power Profile

DWM1001/1004 current performances:

The table 1 presents the currents that can be expected when running TTK1000-TDoA Tag application software

Table 1: Summary of current measurement for TTK1000 TDoA Tag Application

Firmware (hex)	Hardware	Blink period	Tx Current		Sleep Current
			Peak	**Active Phase**	**Average**
DWM1001C_TDoA_Tag_LED_ON	DWM1001	5s	111.36 mA	85ms	9.89 uA
DWM1001C_TDoA_Tag_LED_ON	DWM1001	100ms	112.88 mA	25ms	181.33 uA
DWM1001C_TDoA_Tag_LED_OFF	DWM1001	5s	112.5 mA	25ms	9.67 uA
DWM1001C_TDoA_Tag_LED_OFF	DWM1001	100ms	112.91 mA	25ms	180.72 uA
DWM1004C-TDoA-Tag	DWM1004	5s	113.06 mA	20ms	4.92 uA
DWM1004C-TDoA-Tag	DWM1004	100ms	114.41mA	20ms	46.31 uA

The DWM1004 fits the STM32L041G6 microcontrollers which is very power efficient. It provides the best current in sleep mode when running the TDoA Tag application.

The DWM1001 fits the nRF52832 which is not as power efficient. Particularly, the following behaviour must be highlighted:

- With a fast blink period (less than 1s), the nRF52832 uses a 1ms RTC for wake-up and the sleep current is about 180uA
- With a slow blink period (above 1s), the nrf52832 uses a 65ms RTS for wake-up and the sleep current is about 9.89uA. This figure remains twice higher than the current with DWM1004 in similar mode.

The TTK1000_RELEASE_1.3 provides two binary files for the DWM1001 TDoA Tag application:

- DWM1001C_TDoA_Tag_LED_ON.hex
- DWM1001C_TDoA_Tag_LED_OFF.hex

The main difference between these two firmware is the supports of LED blinks on transmission.

- When led blink is enabled, the duration of the transmit active phase for a blink period above 1s will be 85ms. This have a strong impact on the overall tag power consumption.

- When led blink is enabled, the duration of the transmit active phase for a blink period above 1s will be about 25ms, which is much more acceptable.

For the best power consumption behaviour, the user is recommended to turn-off LED support. This can be performed in the *instance.c* source file, setting ENABLE_LED define to 0.

```
#define ENABLE_LED     0
```

Note that this firmware behaviour with DWM1001 is not expected and will be fixed in future release.