LAB EMBEDDED SYSTEM DESIGN 2 PROJECT

Measured currents at the end of the code development

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All measurements are done at $3,29 - 3,3\ V$

1 Sleep currents

The following currents represent the mean current consumed by the whole board between wake-ups using the RTC. An interval of 130 s was used to calculate this mean value. The accelerometer is enabled and measuring at ODR 12,5 Hz and can send an interrupt to wake-up the MCU.

- **Sleeping in EM3 using ULFRCO** (3600 s wake-up interval) $\approx 4,06\ \mu A$
- **Sleeping in EM2 using LFXO** (500 s wake-up interval) $\approx 4,12\ \mu A$

2 ADXL362

The following currents represent the currents consumed by the accelerometer and MCU in various measuring modes. The settings are maintained for one second ($\approx$ 800 ms due to the ULFRCO not being very accurate) to calculate the mean current. The MCU is sleeping in EM3. Measurement mode is enabled for all values except when the accelerometer is in standby.

- **Standby** (after soft reset) $\approx 1,60\ \mu A$
- **ODR 12,5 Hz** $\approx 3,37\ \mu A$
- **ODR 25 Hz** $\approx 3,43\ \mu A$
- **ODR 50 Hz** $\approx 3,50\ \mu A$
- **ODR 100 Hz** $\approx 3,79\ \mu A$
- **ODR 200 Hz** $\approx 4,32\ \mu A$
- **ODR 400 Hz** $\approx 5,53\ \mu A$

3 LoRaWAN spreading factor (RN2483)

The following (mean) currents are the result of sending 6 measurements using various LoRaWAN spreading factors. *Use the pictures of the current profiles to better understand the 'peak' currents.*

- **SF12:** $I_{mean} \approx 19,88\ mA\ (6,95\ s)$
  - $I_{peak\ 1} \approx 41,16\ mA\ (2,63\ s)$
  - $I_{peak\ 2} \approx 15,37\ mA\ (150\ ms)$
  - $I_{peak\ 3} \approx 15,46\ mA\ (250\ ms)$
  - $I_{between\ peaks} \approx 5,10\ mA$
- **SF11:** $I_{mean} \approx 14,47\ mA\ (5,80\ s)$
  - $I_{peak\ 1} \approx 40,76\ mA\ (1,4\ s)$ (not too sure about the '1,4 s'...)
  - $I_{peak\ 2}$... (same currents and time as above for all the second and third peaks following, the 150 ms peak gets a bit shorter the lower the selected spreading factor.)
- **SF10:** $I_{mean} \approx 10,41\ mA\ (5,03\ s)$
  - $I_{peak\ 1} \approx 40,53\ mA\ (650\ ms)$
- **SF9:** $I_{mean} \approx 8,30\ mA\ (4,72\ s)$
  - $I_{peak\ 1} \approx 37,09\ mA\ (360\ ms)$
- **SF8:** $I_{mean} \approx 7,28\ mA\ (4,56\ s)$
  - $I_{peak\ 1} \approx 37,33\ mA\ (200\ ms)$
- **SF7:** $I_{mean} \approx 6,59\ mA\ (4,46\ s)$
  - $I_{peak\ 1} \approx 36,42\ mA\ (100\ ms)$

4 Active current

The following (mean) current was measured when the MCU gets woken up using a button interupt and takes measurements once. *The DS18B20 temperature sensor used does very fast conversions, when using another one this timing might be different.*

- $I_{mean} \approx 1,27\ mA\ (81,60\ ms)$
- $I_{peak\ 1} \approx 2,83\ mA$