ATM34/e Series EVK
Power Consumption Evaluation

User Guide

SUMMARY: This document provides instructions for ATM34/e Evaluation Kit (EVK) users to perform a power consumption evaluation of the ATM34/e Wireless SoC Series. Test setup and power consumption profiles are included in this document.

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Acronyms and Abbreviations

Acronyms	Definition
ATM34	ATM3425 ATM3405
ATM34e	ATM3430e
ATM34/e	ATM34/ATM34e
EVB	Evaluation Board
EVK	Evaluation Kit
SDK	Software Development Kit
SoC	System-on-Chip

1. Overview

This guide provides instructions for EVK users to perform a power consumption evaluation of the ATM34/e Wireless SoC Series.

2. Hardware and Software Requirements

Refer to the Reference Documents section for related documents.

2.1 Supported EVKs

EVK	SoC	SoC Part Number	Kit Part Number
Evaluation Kit for ATM3405	40-pin 5x5 mm QFN	ATM3405-2PCAQK	ATMEVK-3405-PQK-2
Evaluation Kit for ATM3425	40-pin 5x5 mm QFN	ATM3425-2PCAQK	ATMEVK-3425-PQK-2
Evaluation Kit for ATM3430e	56-pin 7x7 mm QFN	ATM3430E-2WCAQN	ATMEVK-3430e-WQN-2

Table 1 - ATM34/e Series EVKs

2.2 Supported SDK

The Atmosic SDK 6.0.0 or later can be used with the EVK. Refer to the **SDK User Guide** for more information.

3. Evaluation Board Setup

Figure 1 shows the power consumption setup for the ATM3430e EVB.

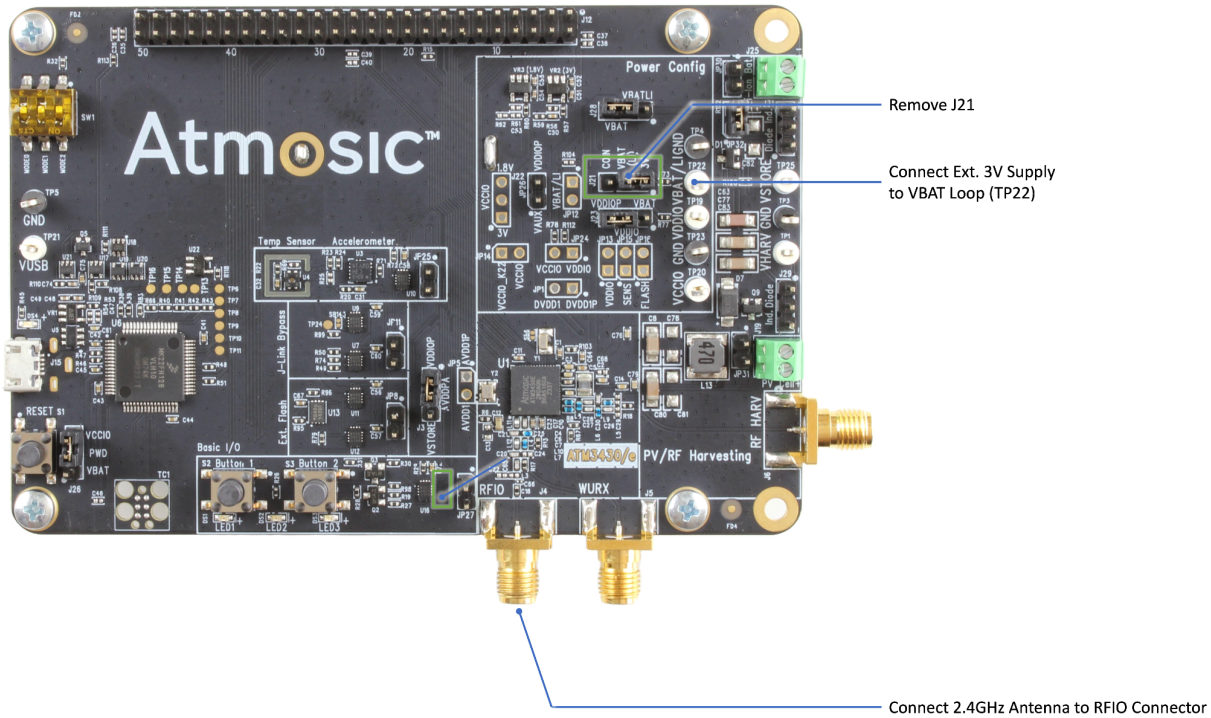

Figure 1 - ATM3430e Evaluation Board Power Consumption Setup

All ATM34/e EVBs can use the same instructions listed below:

1) Attach the 2.4 GHz antenna to the RFIO connector of the EVB.
2) Remove the jumper on J21 and connect an external 3 V power supply to TP22 at the right side of the board.
3) Connect a DC power analyzer (e.g. Keysight N6705C or Joulescope JS220), 6-1/2 digit multimeter (e.g. Keysight 34465A), or 10 Ω resistor and oscilloscope for power measurements.

3.1 Evaluation Board Configuration

The default power configuration jumpers are shown in Figure 2, which sets the VBAT to 3.0 V (J21) and VDDIO to the internally generated 1.8 V (J23). The other headers are by default not populated.

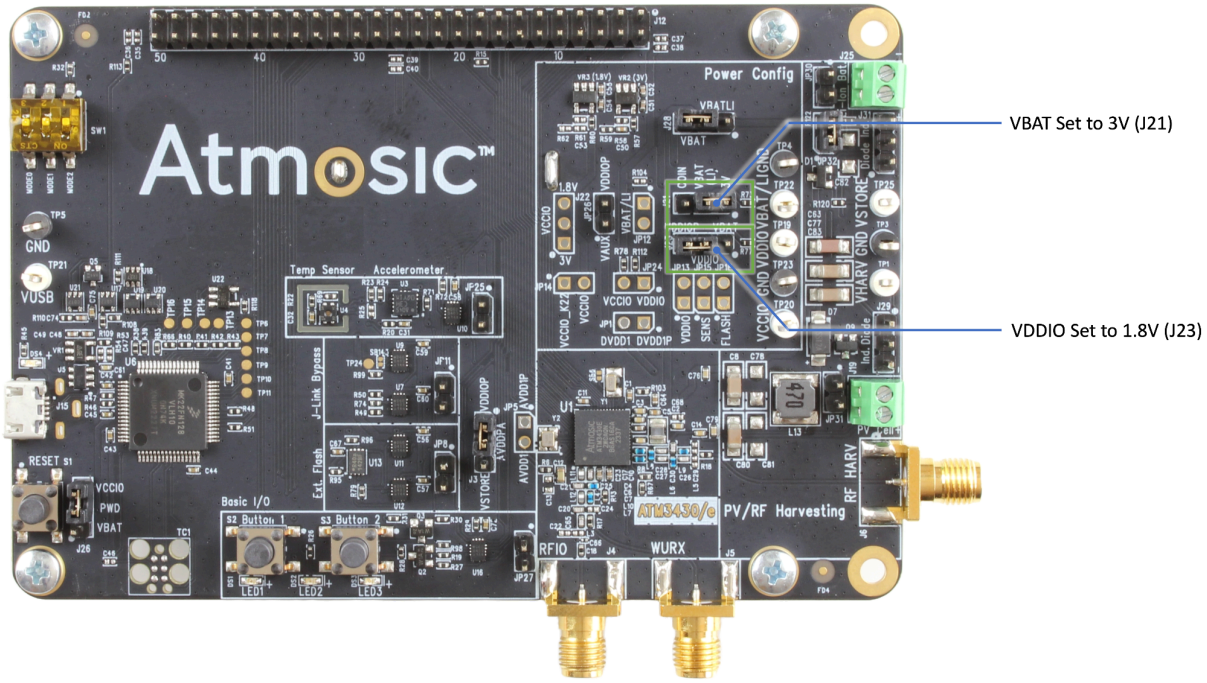

Figure 2 - ATM3430e Evaluation Board Default Configuration Jumpers

To configure the EVB for power measurements, please follow these instructions:

1) Connect the USB cable from a PC with the SDK installed into the port on the left edge of the EVB. The USB port is used to supply support circuitry on the EVB on a separate power domain from the ATM34/e.

2) Enable the external 3 V power supply for the EVB.

3) Use the SDK to build and program the BLE_adv application with the power_profile configuration onto the ATM34/e (refer to Configure the BLE_adv application). Figure 4 shows the reference beacon power profile.

4) Add a jumper on JP11 to disconnect the MK22 and prevent it from drawing power from or providing power to the ATM34/e (see Figure 3). Remove this jumper once the power measurement is done.

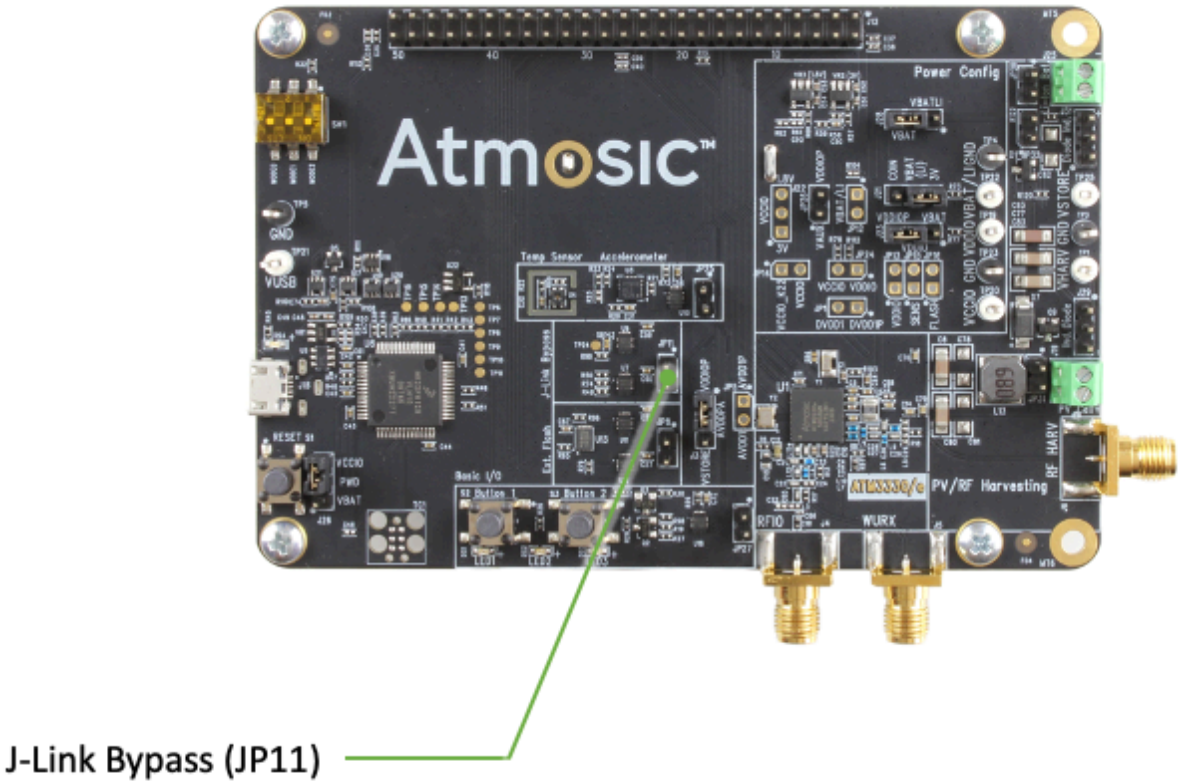

Figure 3 - EVB Power Measurement Jumpers Configuration - J-Link Bypass

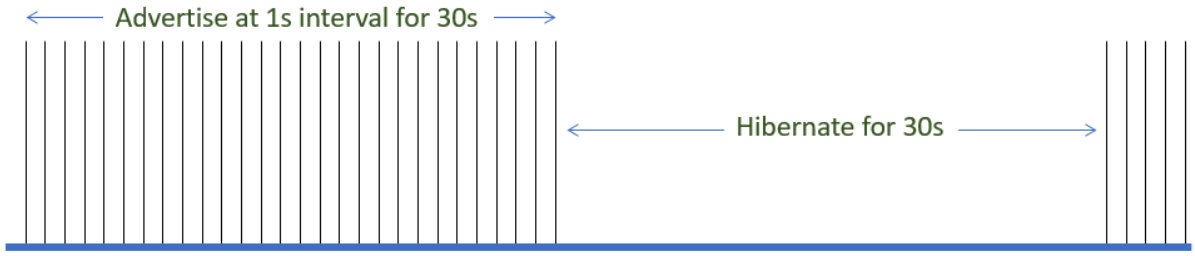

Figure 4 - Reference Beacon Power Profile

3.2 Configure the BLE_adv Application

Please see the **SDK User Guide** for more information on building and programming applications using the SDK.

- Go to the BLE_adv SDK application in the platform/atm34/ATM34xx-2\examples\BLE_adv directory.
- Type the following command (replacing ATMEVK_3430e_WQN_2 with ATMEVK_3405_PQK_2 or ATMEVK_3425_PQK_2 as appropriate) to build and program BLE_adv application with the power_profile configuration onto the ATM34/e:

```
make clean BOARD=ATMEVK_3430e_WQN_2 REF_BCN=power_profile run_all DEBUG=
```

4. Power Measurement Procedures

4.1 Average Power Measurement with Multimeter

To make an average power measurement with a 6½ digit multimeter, please follow these instructions:

1) Connect the multimeter in series with the external 3 V supply.
2) Set the multimeter for DC Current and increase averaging to as long as possible. For example, the Keysight 34465A averaging time can be set to 1s.

4.2 Approximate Power Profile Measurement

To make an approximate power profile measurement with a 10 Ω resistor and oscilloscope, please follow these instructions:

1) Connect the resistor in series between the ground of the external 3 V supply with the ground of the EVB.

2) Put an oscilloscope probe across the resistor.

3) The oscilloscope will show a periodic beacon profile (3 pulses for 3 channels) during the advertising phase followed by the retention phase without beacons (see Figure 5).

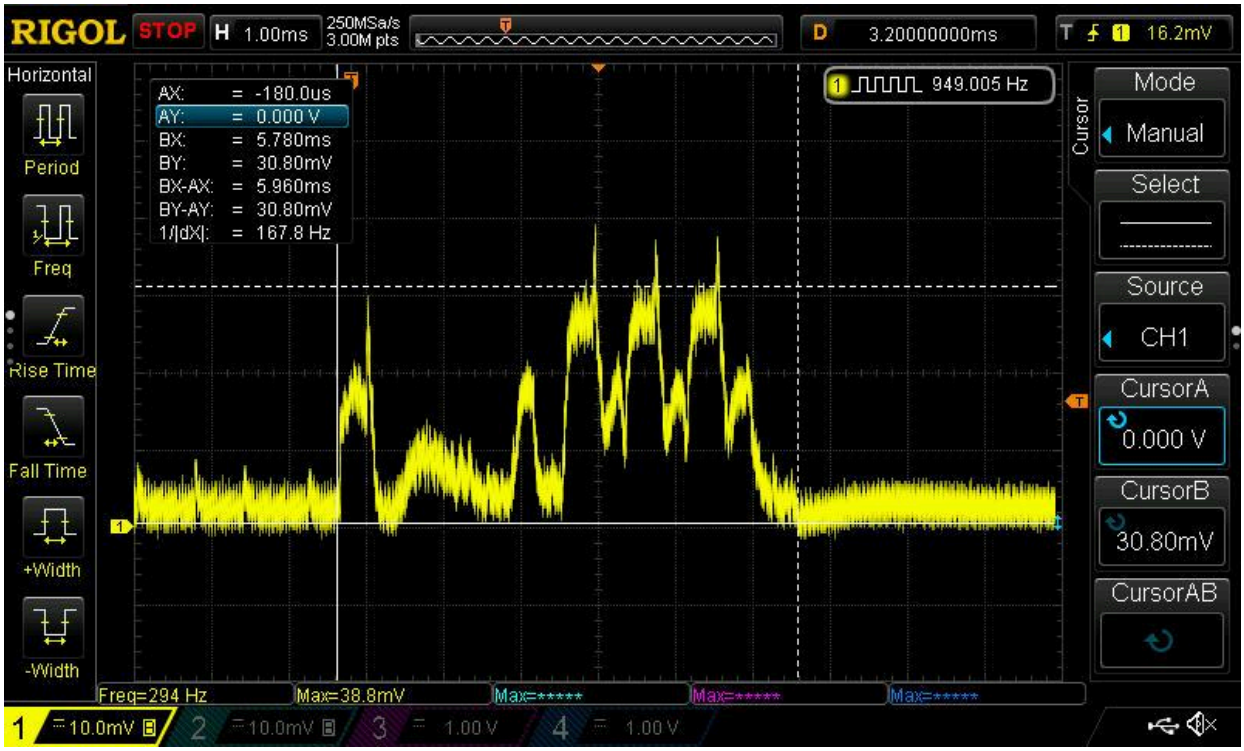

Figure 5 - Approximate Power Profile Measurement

4) The approximate maximum transmit power can be approximated by dividing the measured peak voltage across the 10 Ω resistor. It should be approximately 3.0 mA. Note that the oscilloscope method may not provide enough resolution to measure other power states.

4.3 More Accurate Power Profile Measurement

Measuring the dynamic current more accurately requires a DC power analyzer such as the Keysight N6705C or Joulescope JS220. For the Keysight N6705C, it is important to use auto-ranging and the maximum number of horizontal data points to observe the most accurate power profile. Figures 6 to Figure 10 show current consumption measurements of various states using a Joulescope.

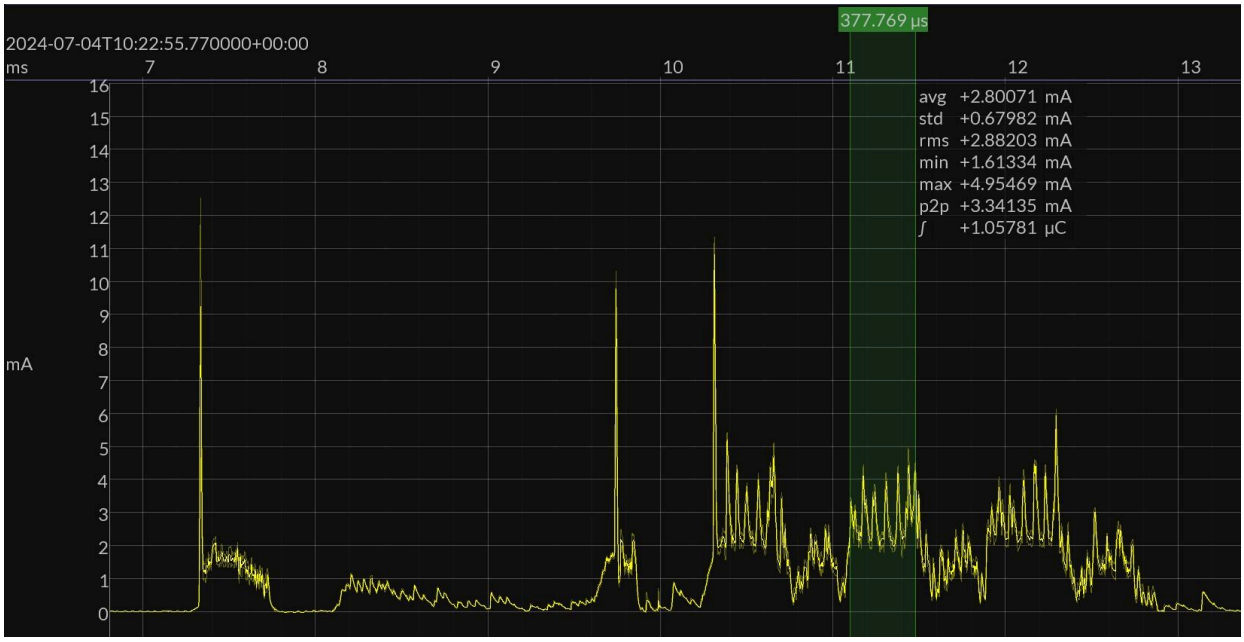

Figure 6 - Transmit Current Profile

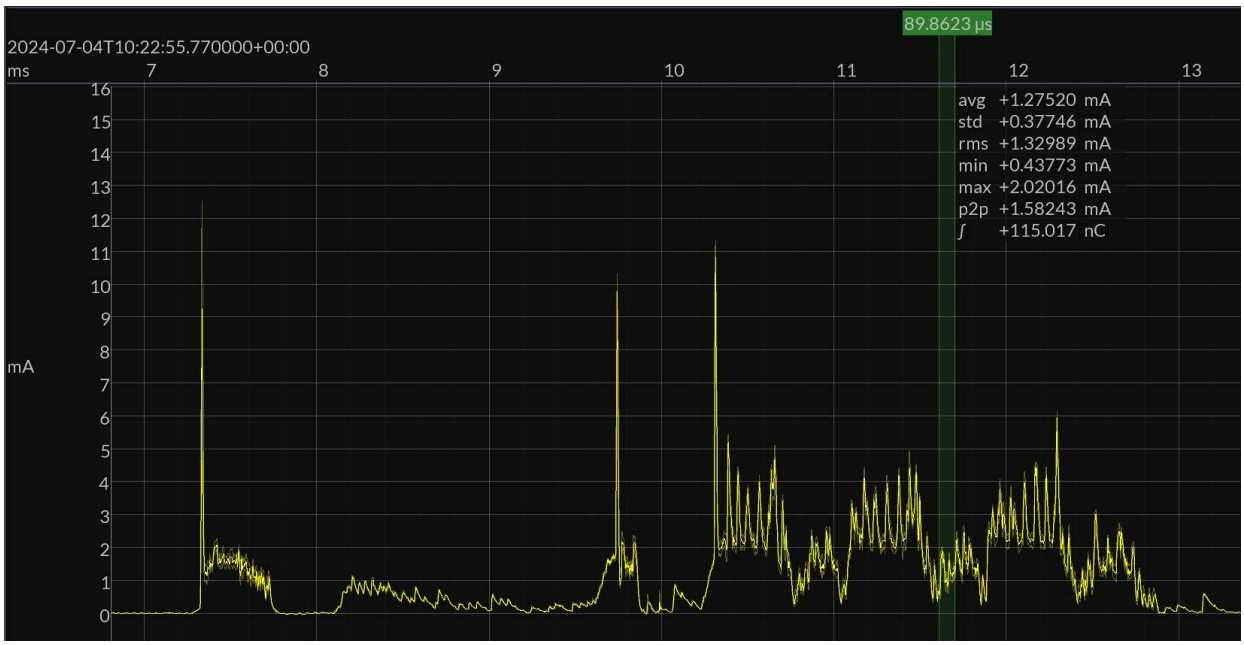

Figure 7 - Receive Current Profile

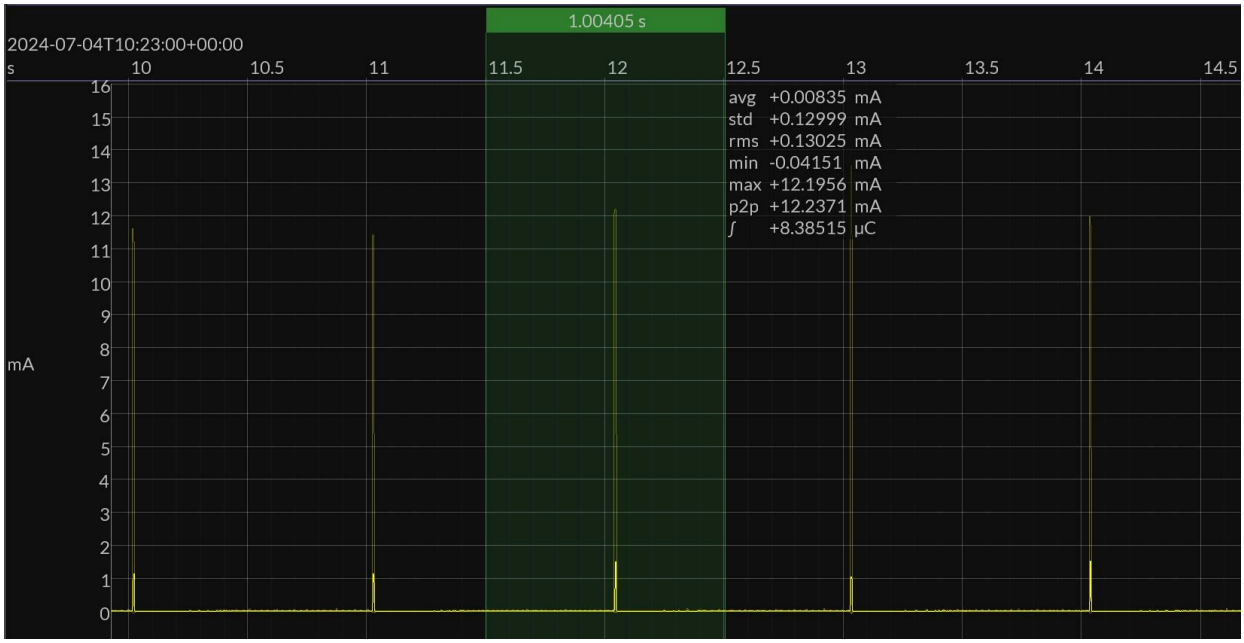

Figure 8 - Current Profile Over 1s Interval During Advertising Phase

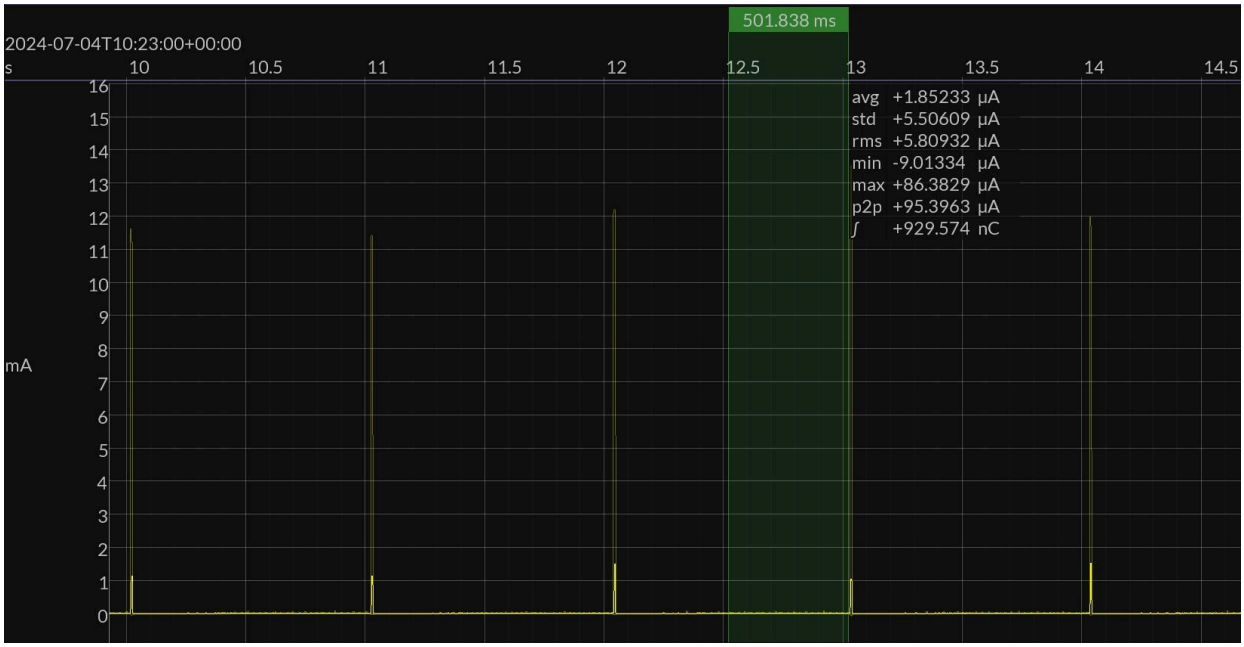

Figure 9 - Retention Current Profile

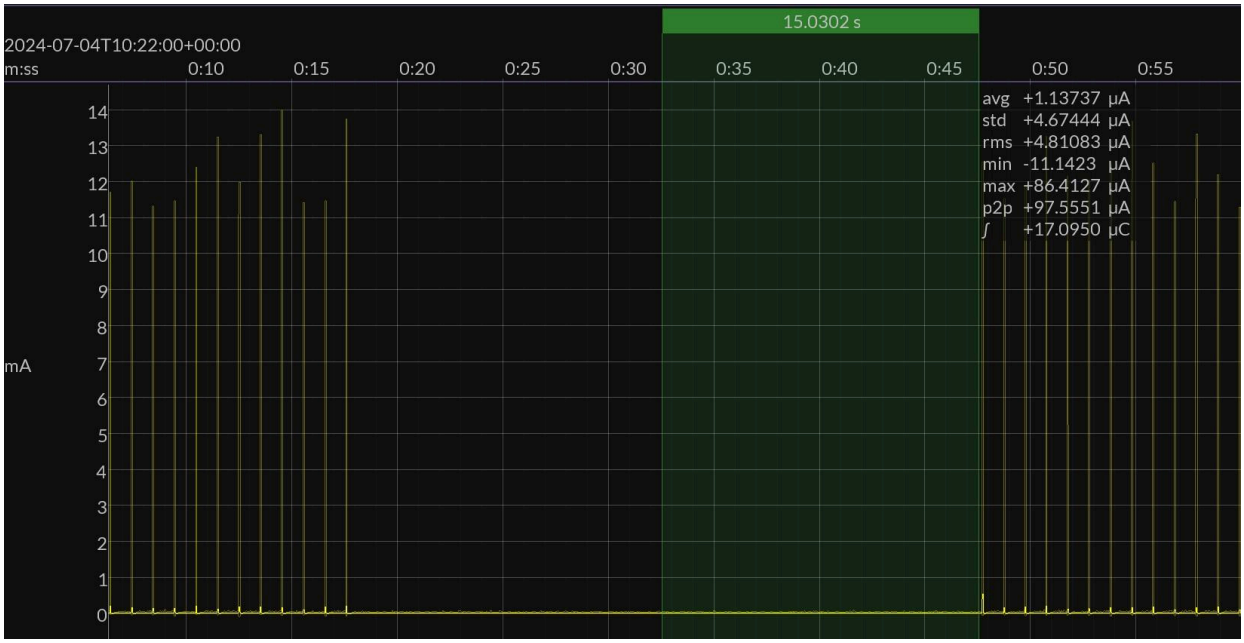

Figure 10 - Hibernation Current Profile

It is normal to observe periodic current peaks during all ATM34e operating modes. These peaks result from the typical operation of the DC/DC switching regulator and are generally harmless.

Reference Documents

Title	Document Number
ATM34/e Series Datasheet	6494-xxxx-xxxx
ATM34/e Series Evaluation Kit User Guide	6441-xxxx-xxxx
SDK User Guide	6844-xxxx-xxxx
Understanding Low Power Mode Application Notes	4288-xxxx-xxxx

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