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## Revision history

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<tr>
<td>March 2018</td>
<td>2.0</td>
<td>Updated due to new software</td>
</tr>
<tr>
<td>July 2017</td>
<td>1.1</td>
<td>Updated to match PPK v1.1.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Settings window updated:</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• A new tab added, see Using Power Profiler Kit application on page 24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Logging feature added, see File menu options</td>
</tr>
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<td>October 2016</td>
<td>1.0</td>
<td>First release</td>
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Introduction

The Power Profiler Kit (PPK) is an affordable, flexible tool that measures the real-time power consumption of your designs.

The PPK measures power consumption for a connected nRF5x Development Kit or any external board. It measures current from 1 μA up to 70 mA and gives a detailed picture of the current profile for the user application.

The PPK can be used in conjunction with the nRF5x DK to measure current on the nRF5x DK or on an external board. The hardware is delivered with an application that is installed using nRF Connect for desktop. There are several measurement configurations, which are described in this user guide.

Key features

- Variable power supply voltage ranging from 1.8 V to 3.6 V (software configurable)
- Maximum 70 mA current measurement
- Resolution down to 0.2 μA
- Automatic switching between three current measurement ranges ensuring optimal resolution
- Measurement accuracy better than +/-20 % (average currents measurement)
- Desktop application for measurement analysis
- Real-time current measurement display
- Recording display up to two minutes
- Real-time display with a resolution down to 13 µs
- Internal/external trigger

Applications

- Quick power consumption measurements on a firmware running on an nRF5x DK
- Quick power consumption measurements on a firmware running on an external board
- Accumulative measurements, such as average, peak, maximum
- Instantaneous measurements presented as waveform plots

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Environmental Protection

Waste electrical products should not be disposed of with household waste.

Please recycle where facilities exist. Check with your local authority or retailer for recycling advice.
Minimum requirements

Before you start setting up the Power Profiler Kit (PPK), check that you have the required hardware and software.

**Hardware requirements**

- USB cable for connecting the PPK to a USB port of a computer
- nRF5x Development Kit (DK) or a SEGGER J-Link debugger

**Software requirements**

The supported operating systems are:

- Microsoft Windows 7/8/10
- Mac OS
- Linux

To install the PPK software package, the nRF Connect desktop application is needed. It can be downloaded from the nRF Connect for desktop product page. For more information, see the nRF Connect documentation.
Kit content

The Power Profiler Kit consists of hardware and access to software components, reference design files, and documentation.

3.1 Hardware content

The Power Profiler Kit (PPK) hardware content consists of the PPK board PCA63511.

Figure 1: Power Profiler Kit (PPK) board (PCA63511)

3.2 Downloadable content

The downloadable content for PPK consists of hardware files and this user guide.

You can download the hardware files from the Power Profiler Kit product page.

The hardware zip file contains the following files for the PCA63511 board:

- Altium Designer files
- Production files (bill of materials and assembly, drill, Gerber, and pick-and-place files)
- PCB layout files and schematics in PDF format

You also need nRF Connect for desktop.

3.3 Related documentation

In addition to the information in this document, you may need to consult other documents.
Nordic documentation

- nRF51 Development Kit
- nRF52 Development Kit
- nRF52840 Preview Development Kit
Quick start

Complete a few steps to set up your Power Profiler Kit (PPK). In the simplest configuration, the PPK is connected to an nRF5x Development Kit (DK, not included in the package).

In this quick start, the PPK measures current on the nRF5x DK device, which also acts as a power supply and sends data to the Power Profiler application.

See Nordic Semiconductor Infocenter for information on the nRF51 Series and nRF52 Series.

Complete the following steps:

1. Prepare the nRF5x DK for current measurements by cutting the PCB track shorting solder bridge SB9 according to Preparing the development kit board. Do not short the solder bridge SB11/SB12.
2. Connect the PPK to the nRF5x DK as shown in the following figure.

![Figure 2: Connecting the PPK to the nRF5x DK](image)

3. Connect the USB cable to the nRF5x DK and a computer.

![Figure 3: Typical configuration for measuring current on the nRF5x DK](image)

4. Set the switches on the PPK as shown in the figure above.
5. Install the PPK software as described in Installing Power Profiler Kit software package on page 23.
6. Start the Power Profiler application as described in Using Power Profiler Kit application on page 24.

The PPK is ready to use.
5 Power Profiler Kit overview

The Power Profiler Kit (PPK) contains both hardware and software components.

5.1 Measurement system

The PPK is driven by the nRF52832 SoC, which uses its ADC (analog-to-digital converter) to measure a voltage drop over a series of measurement resistors. Resistor values are used to calculate the power consumption. The PPK has three different measurement ranges, which are managed by an automatic switch circuitry.

To send the data to the desktop application, the nRF52832 SoC on the PPK uses the SEGGER RTT (Real-Time Transfer). By connecting the PPK to an nRF5x DK, the SEGGER J-Link debug probe available on the nRF5x DK can be used for the computer connection. Alternatively, an external SEGGER J-Link debugger can be used.

5.1.1 Block diagram

The Power Profiler Kit (PPK) block diagram illustrates the overall system and connections between the various blocks.

![Block Diagram](image)

Figure 4: Block diagram

5.1.2 Power supply

There are three power supply options for the the Power Profiler Kit (PPK) digital logic and for the device under test (DUT).

The power supply options are:

- DK interface
- PPK onboard voltage regulator
- External supply

The power supply is selected using the power select switch (SW4).

The PPK onboard voltage regulator is supplied by the 5 V USB power supply. Its output can be adjusted between 1.8 V and 3.6 V through the Power Profiler application.
If an external power supply is used, the voltage is applied directly to the circuits without regulation. This voltage must be limited to the 1.8–3.6 V range.

When the DK is selected as the power supply, the DK supplies the PPK circuitry.

The analog part of the automatic switch circuitry requires a 5 V power supply. When the PPK is connected to an nRF5x DK, the 5 V is supplied by the DK. When the PPK is used standalone, a USB cable has to be connected to supply the 5 V required by the circuitry.

5.1.3 Measurement ranges and switch levels

To achieve a high measurement dynamic range, the PPK features three calibrated parallel measurement means realizing the three measurement ranges simultaneously. An automatic range switching mechanism always selects the correct measurement range depending on the instantaneous current draws by the DUT.

If your DUT has a power consumption that is close to a switching point, it can cause rapid switching between the ranges, creating measurement errors and distorted plots. A hysteresis is applied at the switching point in order to avoid distorted measurements as shown in the following figure.

There are four switch levels:

Switch up LOW
Switches up from low to medium range

Switch up HIGH
Switches up from medium to high range

Switch down HIGH
Switches down from high to medium range

Switch down LOW
Switches down from medium to low range

![Figure 5: Measurement ranges and switch levels](image)

5.1.4 DUT output

For device under test (DUT) output, the PPK supports two modes of operation that can can be selected using the DUT select switch (SW2).

The two modes of operation are the following:

- Measuring current on the nRF5x DK device
- Supplying power and measuring current on an external board
The DUT can be turned on and off using the power switch (Power OFF) in the Power Profiler application. See Figure 15: Settings and Plots view in the Power Profiler application on page 24.

5.1.5 EEPROM
On the PPK, there is an EEPROM memory connected to the nRF52832 SoC. The EEPROM is used to store calibration data.

5.1.6 Display interface and joystick
Reserved for future use.

5.2 Connectors
Access to the Power Profiler Kit (PPK) is available from a set of connectors.

The PPK has five connectors on the top side:
- Two connectors for the power supply:
  - P16 to connect an external device under test (DUT)
  - J1 for the USB
- P22 for connecting the custom/external hardware
- P20 for connecting an external trigger
- P21 connector for connecting an external SEGGER J-Link

![PPK Connectors Diagram](image)

Figure 6: PPK connectors

The connectors on the bottom side are for connecting the PPK to an nRF5x DK, which supplies both data interface and power to the PPK.
<table>
<thead>
<tr>
<th>Connector</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>External 5 V power supply input (USB; J1)</td>
<td>This USB connector on the PPK supplies the onboard analog measurement circuitry and the onboard regulator with 5 V provided by a USB host. This connector is used when the PPK is used standalone or any time the USB on the nRF5x DK is not connected.</td>
</tr>
<tr>
<td>Note: When used with an nRF5x DK with USB connection, this connector must not be used.</td>
<td></td>
</tr>
<tr>
<td>External DUT output (P16)</td>
<td>The External DUT connector provides power to the DUT.</td>
</tr>
<tr>
<td>External DUT supply input (P22)</td>
<td>A lab power supply from 1.8 to 3.6 V can be connected here to provide precise control of the voltage.</td>
</tr>
<tr>
<td>External trigger (P20)</td>
<td>This connector allows you to:</td>
</tr>
<tr>
<td>• Feed an external trigger to the PPK (15 V max)</td>
<td></td>
</tr>
<tr>
<td>• Have the PPK send a trigger signal to external instruments</td>
<td></td>
</tr>
<tr>
<td>The voltage of the TRIG OUT pin can be configured by the TRIG REF on the PPK board which has the following options:</td>
<td></td>
</tr>
<tr>
<td>• VDD: default</td>
<td></td>
</tr>
<tr>
<td>• 5 V: cut SB7 and solder SB8</td>
<td></td>
</tr>
<tr>
<td>• External voltage: cut SB7 and SB8 (if shorted) and connect to TPS (EXT)</td>
<td></td>
</tr>
<tr>
<td>External SEGGER J-Link (P21)</td>
<td>Used to connect an external SEGGER J-Link for communicating with the desktop application when:</td>
</tr>
<tr>
<td>• The PPK is used standalone</td>
<td></td>
</tr>
<tr>
<td>• The SEGGER J-Link on the nRF5x DK is used for debugging of the nRF5x chip on the DK</td>
<td></td>
</tr>
<tr>
<td>If this connector is in use and the PPK is connected to an nRF5x DK board, the COM switch (SW3) must be in the &quot;EXT&quot; position to disconnect the PPK from the SEGGER J-Link on the DK. How to connect and use is described in Table 2: PPK switches on page 14.</td>
<td></td>
</tr>
</tbody>
</table>

Table 1: PPK connectors

5.3 Switches

The Power Profiler Kit (PPK) has three switches: One for selecting the device under test (DUT) on which current is measured, one for the power supply, and one for the SEGGER J-Link connection.
### Power Profiler Kit overview

**Figure 7: PPK switches**

<table>
<thead>
<tr>
<th>Switch</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>DUT select (SW2)</strong></td>
<td>Selects if the measurements are performed on the nRF5x DK or on an external/custom hardware.</td>
</tr>
<tr>
<td>Options:</td>
<td></td>
</tr>
<tr>
<td>• <strong>DK</strong>: The measurements are performed on the nRF5x DK.</td>
<td></td>
</tr>
<tr>
<td>• <strong>External</strong>: The measurements are performed on the external/custom hardware connected to the External DUT (P16) connector.</td>
<td></td>
</tr>
<tr>
<td><strong>Power select (SW4)</strong></td>
<td>Selects the power source for the PPK and DUT.</td>
</tr>
<tr>
<td>Options:</td>
<td></td>
</tr>
<tr>
<td>• <strong>DK</strong>: The power source is the nRF5x DK. Used when measuring current on the nRF5x DK (that is, when the DUT select switch is in the &quot;DK&quot; position).</td>
<td></td>
</tr>
<tr>
<td>• <strong>Reg.</strong>: The power source is the onboard regulator powering the PPK and the external DUT. Used when measuring current on the external/custom hardware (that is, when the DUT select (SW2) switch is in the &quot;External&quot; position).</td>
<td></td>
</tr>
<tr>
<td>• <strong>External</strong>: An external power supply is the power source connected to the External DUT supply (P22) connector of the PPK.</td>
<td></td>
</tr>
</tbody>
</table>

**Note:**

- The Power Profiler application can be used to adjust the power supply voltage only when the Power select (SW4) switch is in the "Reg" position, that is, when the power is supplied by the PPK onboard regulator.
- It is not recommended to use the PPK onboard regulator (SW4 in the "Reg" position) when measuring current on the nRF5x DK unless the PPK onboard regulator voltage exactly matches the nRF5x DK voltage. Otherwise, current leakage may occur and lead to erroneous current readings.

The voltage is usually somewhere between 2.9 V and 3 V. To be sure, it is recommended to measure the DK voltage. This configuration, although possible, is not recommended.
Switch | Description
--- | ---
COM (SW3) | This switch selects the SEGGER J-Link connection.

Options:
- **DK**: The SEGGER J-Link on the nRF5x DK kit is used.
- **EXT**: An external SEGGER J-Link is used and connected to the **Debug in** (P21) connector. This will disconnect the PPK from the SEGGER J-Link on the nRF5x DK.

**Note:**
- To program the DUT on the DK, the switch must be in the "EXT" position. When programming with the switch in the "DK" position, the PPK will be programmed.
- When the PPK uses the nRF5x DK SEGGER J-Link, it cannot be used to debug the nRF5x SoC on the DK at the same time. To debug the nRF5x DK SoC on the DK, set the **COM (SW3)** switch to the “EXT” position.

*Table 2: PPK switches*
Configuring Power Profiler Kit

Four different configuration setups and methods for measuring current can be used for the Power Profiler Kit (PPK).

To configure the PPK, complete the following steps:

1. Adjust measurement accuracy as described in Optimizing measurement accuracy on page 16.
2. Choose a use case and implement a configuration for the PPK. The options are presented in the following table.

<table>
<thead>
<tr>
<th>Use case</th>
<th>Configuration setup/measurement method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design phase, no custom hardware</td>
<td>Measuring current on nRF5x DK on page 17.</td>
</tr>
<tr>
<td>Design and optimization phase, no custom hardware, with debugging</td>
<td>Measuring current on nRF5x DK while debugging on page 18.</td>
</tr>
<tr>
<td>Design phase, using external/custom hardware</td>
<td>Measuring current on custom hardware with nRF5x DK on page 19.</td>
</tr>
<tr>
<td></td>
<td>Measuring current on custom hardware without nRF5x DK on page 20.</td>
</tr>
</tbody>
</table>

Table 3: PPK use cases

6.1 Optimizing measurement accuracy

When measuring current with the PPK, some adjustments are needed to optimize the measurement accuracy. The nRF5x DK must be prepared for the measurement.

6.1.1 Power Profiler Kit use with nRF5x DK

When the PPK is used with an nRF5x DK, it is recommended to use the Power select (SW4) switch in the "DK" position.

It is not recommended to use the PPK onboard regulator as the power source (the Power select switch (SW4) in the "Reg." position) as this may lead to erroneous current readings.

**Note:** If you want to improve the USB noise filtering, you need to use the PPK onboard regulator as the power source. Make sure that the PPK regulator voltage exactly matches the nRF5x DK voltage. Otherwise, current leakage may occur and lead to erroneous current readings.

6.1.2 Current measurement on external DUTs

When measuring current on external devices, it is important to keep in mind that large filtering capacitors, which may be present on the DUT circuit, will smooth out the variations in power consumption.

This yields a good result for the average power consumption, but the short current bursts will be filtered out and the plot might differ from what you see on the measurements done on the nRF5x DK during development.
You must include decoupling capacitors to ensure correct operation of the devices. However, as a good practice, keep extra decoupling capacitors to a minimum when measuring detailed current draw.

### 6.2 Connecting Power Profiler Kit to nRF5x DK

For all of the PPK configurations, except when the PPK is running standalone, the PPK needs to be connected to the nRF5x Development Kit (DK).

Connect your PPK to the nRF5x DK as shown in the following figure.

![Figure 8: Connecting the PPK to the nRF5x DK](image)

### 6.3 Measuring current on nRF5x DK

This setup is to be used during the design phase when custom hardware is not available yet.

For the PPK, this is a typical configuration that allows quick setup and current measurements in reference applications from the SDK or in custom applications.

In this case, the connection to the Power Profiler application is provided by the SEGGER J-Link on the nRF5x DK with a power supply applied on the DK. The configuration for this use case is shown in the following figure.

![Figure 9: Measuring current on the nRF5x DK](image)

Make sure that the following are configured:

- The PPK board (PCA63511) is connected to the nRF5x DK board as described in Connecting Power Profiler Kit to nRF5x DK on page 17.
• The DUT select switch (SW2) is in the "DK" position.
• The Power select switch (SW4) is in the "DK" position.
• The COM switch (SW3) is in the "DK" position.
• The USB cable is plugged into the USB connector on the nRF5x DK and connected to a computer with the Power Profiler application.

6.4 Measuring current on nRF5x DK while debugging

This setup is to be used during the design and optimization phase when no custom hardware is available yet. The SEGGER J-Link debugger on the nRF5x DK is used for debugging.

Because the SEGGER J-Link of the nRF5x DK is used for debugging, an additional SEGGER J-Link is needed to connect the PPK to your computer. This could be either another nRF5x DK with an onboard SEGGER J-Link or a standalone SEGGER J-Link which can be purchased separately from SEGGER J-Link Software.

The configuration for this use case is shown in the following figure.

![Figure 10: Measuring current on the nRF5x DK with debugging](image)

Make sure that the following are configured:

• The PPK board (PCA63511) is connected to the nRF5x DK board as described in Connecting Power Profiler Kit to nRF5x DK on page 17.

• The DUT select switch (SW2) is in the "DK" position.

• The Power select switch (SW4) is in the "DK" position.

• The USB cable is plugged into the USB connector on the nRF5x DK and connected to a computer running the debugging software.

• The additional SEGGER J-Link is connected to the Debug in connector (P21) on the PPK, using the 10-pin flat cable. The USB cable is plugged into the SEGGER J-Link and connected to a computer running the Power Profiler application.

• The COM switch (SW3) is in the "EXT" position.

**Note:** Power consumption may be higher for devices during debugging than in normal operation. The difference depends on what is active at any given time. This is caused by the clocking of the debug interface and constantly powering sections of the device that are independent of the operation of the part. When debugging, accurate power consumption cannot be measured, but software issues can be detected.
6.5 Measuring current on custom hardware with nRF5x DK

This setup is to be used during the design phase on custom hardware acting as the device under test (DUT) with the nRF5x DK.

In this use case, the PPK measures the current on the external DUT. The PPK is connected to the nRF5x DK which is used as a SEGGER J-Link interface to the computer running the Power Profiler application.

The power supply is provided either by the PPK onboard regulator, or an external power source. See the figures below.

The power supply is applied to the nRF5x DK, which in turn powers the PPK board. This is used to supply power to the onboard analog measurement circuitry and the onboard regulator with 5 V. This will supply the external DUT when using the onboard regulator. If an external power source is used to supply the custom hardware, the USB connection will still be needed to supply the measurement circuitry of the PPK.

Make sure that the following are configured:
• The PPK board (PCA63511) is connected to the nRF5x DK board as described in Configuring Power Profiler Kit to nRF5x DK on page 17.
• The USB cable is plugged into the USB connector on the nRF5x DK and connected to a computer running the Power Profiler application.
• The DUT select switch (SW2) is in the "External" position.
• The custom hardware is connected to the External DUT connector (P16) of the PPK.
• The power source is one of the following:
  • The PPK onboard regulator: Set the Power select switch (SW4) in the "Reg" position.
  • External power supply: In addition to the USB cable plugged into the nRF5x DK, make sure that the external power is connected to the External DUT supply connector (P22) of the PPK (voltage range from 1.8 V to 3.6 V). Set the Power select switch (SW4) in the "External" position.
• The COM switch (SW3) is in the "DK" position.

6.6 Measuring current on custom hardware without nRF5x DK

This setup is to be used during the design phase on custom hardware without using the nRF5x DK. The power supply is provided either by the PPK onboard regulator or an external power source. See the figures below.

The External 5V supply USB connector (J1) of the PPK is used to supply power to the onboard analog measurement circuitry and the onboard regulator with 5 V. This will supply the custom hardware (DUT). If an external power source is used to supply the custom hardware, the USB connection will still be needed to supply the measurement circuitry of the PPK.

Figure 13: Measuring current with the onboard regulator as the power source without an nRF5x DK
Make sure that the following are configured:

- The DUT select switch (SW2) is in the "External" position.
- The custom hardware (DUT) is connected to the External DUT connector (P16) of the PPK.
- The power source is one of the following:
  - The PPK onboard regulator: Make sure that a USB cable with power is plugged into the External 5V supply USB connector (J1) of the PPK. Set the Power select switch (SW4) in the "Reg" position.
  - External power supply: In addition to the USB cable plugged into the External 5V supply USB connector (J1), make sure that the external power is connected to the External DUT supply connector (P22) of the PPK (voltage range from 1.8 V to 3.6 V). Set the Power select switch (SW4) in the "External" position.
- The additional SEGGER J-Link is connected to the Debug in connector (P21) on the PPK using the 10-pin flat cable. The USB cable is plugged into the SEGGER J-Link and connected to a computer running the Power Profiler application.
- The COM switch (SW3) is in the "EXT" position.
Connecting Power Profiler Kit to a computer

You need to connect the Power Profiler Kit (PPK) to a computer with a USB cable in order to use it.

1. Connect the PPK to your computer using a USB cable.
   - If the PPK is connected to an nRF5x DK, connect the USB cable to the nRF5x DK.
   - If the PPK is running standalone, connect the USB cable to the PPK (J1). See Figure 6: PPK connectors on page 12.

2. If you are using an external SEGGER J-Link in your configuration, use a USB cable to connect it to your computer.

3. If you are using the nRF5x DK, slide the nRF5x power switch to "ON".
   - If Windows driver installation starts for the inserted DK, wait until it finishes before continuing.

4. Verify that the LED2 is lit on the PPK.

Your PPK is now connected to the computer. You are ready to start the Power Profiler application.
Installing Power Profiler Kit software package

The Power Profiler Kit (PPK) software package is installed using nRF Connect.

Before you start, check Minimum requirements on page 6.

1. Open nRF Connect.
2. Click Add/remove apps.
3. Click Install.

For information about using the software, see Using Power Profiler Kit application on page 24.
Using Power Profiler Kit application

The Power Profiler Kit (PPK) must be configured correctly, connected to your computer, and powered before the Power Profiler application can be started.

1. Start the Power Profiler application using nRF Connect.

   ![Figure 15: Settings and Plots view in the Power Profiler application](image)

2. Click Select serial port (in the top left corner) and select the serial number corresponding to the connected DK.

   After some initial set-up, the Start button changes color, and you can start measuring current.

   The application will check if the required firmware is present and show a firmware upgrade dialog if needed.

   To show advanced controls for switch levels and resistor calibration, press CTRL+ALT+SHIFT+A.
10 Electrical specifications

These specifications contain the property values that are essential for using the Power Profiler Kit (PPK).

10.1 Environmental specifications

These environmental specifications contain the values that are essential for using the Power Profiler Kit (PPK).

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature</td>
<td>Op_Temp</td>
<td>15</td>
<td></td>
<td>30</td>
<td>°C</td>
<td></td>
</tr>
</tbody>
</table>

Table 4: Environmental specifications

10.2 Power supply specifications

These power supply values are essential for using the Power Profiler Kit (PPK).

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DUT voltage</td>
<td>VDD_DUT</td>
<td>1.8</td>
<td></td>
<td>3.6</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>External supply</td>
<td>VDD_EXT</td>
<td>1.8</td>
<td></td>
<td>3.6</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>voltage</td>
<td>Micro-USB</td>
<td>4.5</td>
<td></td>
<td>5.5</td>
<td>V</td>
<td>USB voltage tolerances</td>
</tr>
<tr>
<td>supply voltage</td>
<td>V5V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5: Power supply specifications

10.3 Measurement specifications

These measurement specifications contain the property values that are essential for using the Power Profiler Kit (PPK).

10.3.1 Maximum DUT admissible current

The maximum DUT admissible current specification contains the value that is essential for using the Power Profiler Kit (PPK).

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum DUT admissible current</td>
<td>Max_I</td>
<td></td>
<td>70</td>
<td></td>
<td>mA</td>
<td></td>
</tr>
</tbody>
</table>

Table 6: Maximum DUT admissible current
### 10.3.2 Measurement resolution

These measurement resolution values are essential for using the Power Profiler Kit (PPK).

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1–70 µA range</td>
<td>R1_Resol</td>
<td></td>
<td>0.2</td>
<td></td>
<td>µA</td>
<td></td>
</tr>
<tr>
<td>70 µA–1 mA</td>
<td>R2_Resol</td>
<td></td>
<td>3</td>
<td></td>
<td>µA</td>
<td></td>
</tr>
<tr>
<td>1–70 mA range</td>
<td>R3_Resol</td>
<td></td>
<td>50</td>
<td></td>
<td>µA</td>
<td></td>
</tr>
</tbody>
</table>

*Table 7: Measurement resolution*

### 10.3.3 Measurement accuracy

These measurement accuracy values are essential for using the Power Profiler Kit (PPK).

<table>
<thead>
<tr>
<th>Item</th>
<th>Name</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1–70 µA range</td>
<td>R1_Accuracy</td>
<td></td>
<td>+/- 20</td>
<td></td>
<td>%</td>
<td>Readout on Average value</td>
</tr>
<tr>
<td>1–70 µA range</td>
<td>R1_Offset</td>
<td></td>
<td>±2</td>
<td></td>
<td>R1_Resol</td>
<td></td>
</tr>
<tr>
<td>70 µA–1 mA</td>
<td>R2_Accuracy</td>
<td></td>
<td>+/- 15</td>
<td></td>
<td>%</td>
<td>Readout on Average value</td>
</tr>
<tr>
<td>70 µA–1 mA</td>
<td>R2_Offset</td>
<td></td>
<td>±2</td>
<td></td>
<td>R2_Resol</td>
<td></td>
</tr>
<tr>
<td>1–70 mA range</td>
<td>R3_Accuracy</td>
<td></td>
<td>+/- 15</td>
<td></td>
<td>%</td>
<td>Readout on Average value</td>
</tr>
<tr>
<td>1–70 mA range</td>
<td>R3_Offset</td>
<td></td>
<td>±2</td>
<td></td>
<td>R3_Resol</td>
<td></td>
</tr>
<tr>
<td>Sampling rate</td>
<td>Meas_Frequency</td>
<td></td>
<td>77</td>
<td></td>
<td>kHz</td>
<td>Fixed value</td>
</tr>
</tbody>
</table>

*Table 8: Measurement accuracy*
Here are some basic troubleshooting steps to help you fix issues you may encounter when using the Power Profiler Kit (PPK).

**PPK only measuring noise**
Make sure you have prepared the nRF5x DK for current measurements by cutting the **SB9** as described in Step 1 in Quick start.
Alternatively, check that the DUT select (**SW2**) switch is in the correct position for your configuration.

**Measurements fluctuate when there should be a steady current draw**
Your DUT may have a power consumption that is close to a switching point causing rapid switching between the ranges and creating measurement errors/distorted plots. Try adjusting the switching points.

**The graph response is very slow**
Avoid using USB hubs and docking stations. Also, if the trigger window is receiving a lot of updates, consider stopping this plot to have better throughput for the **Average** plot.

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