

# **Power Manager Integration**

Wi-Fi Connectivity Engineering

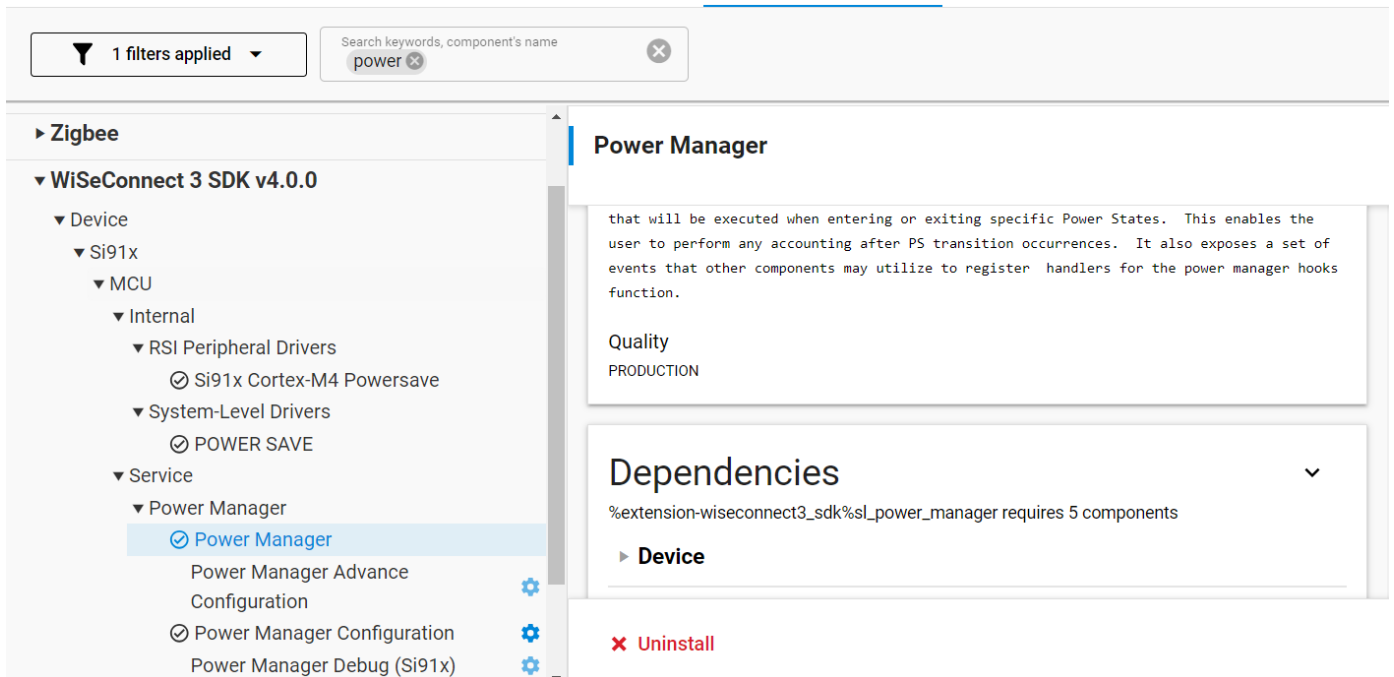
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# 1 Install Power Manager Component

Install Power Manager Component present under Software Components → Wiseconnect 3 SDK → Device → Si91x → MCU → Service → Power Manager.



This component fetches the power manager dependencies and contributes the event handler template.

Event handler updates are triggered during state transitions, such as NVIC interrupts or context switches.

Power Manager service is initialized with the installation of this component, user intervention is not required for initializing the Power Manager service.

**Note:-** The Power Manager Configuration and Wakeup Source Configuration components are automatically installed along with the Power Manager component.

## 2 Power Manager Configuration Component

There are two components present under Software Components → Wiseconnect 3 SDK → Device → Si91x → MCU → Service → Power Manager

**Power Manager**

**Description**  
Initiates the Power Manager (PM) component to manage the MCU's power usage. The system is initially set to PS3 power-save mode. The PM also allows the user to specify callbacks that will be executed when entering or exiting specific Power States. This enables the user to perform any accounting after PS transition occurrences. It also exposes a set of events that other components may utilize to register handlers for the power manager hooks function.

**Quality**  
PRODUCTION

**Dependencies**  
%extension-wiseconnect3\_sdk%sl\_power\_manager requires 5 components

**Uninstall**

1 Power Manager Configuration Components

These components provide control over peripheral enable/disable and RAM retention.

These components contribute to the event handler with the parameter selected in UC and call the required APIs in the event handler template.

Peripheral and RAM retention is configured with the installation of this component, user intervention is not required.

### 2.1 Power Manager Configuration

This component is a basic configuration component in which the user can select which peripherals need to be powered on/off according to the domain of the peripheral.

Peripheral Configuration includes:

- High Power Peripherals (PS4/PS3)
- Low Power Peripherals (PS2)
- Ultra Low Power Peripherals (All power states)

Note: If QSPI is turned off from High Power Peripheral then mcu cannot communicate with TA.

## Power Manager Configuration

Pin Tool

&lt;/&gt; View Source



## Peripheral Configuration

## High Power Peripherals

M4 DEBUG



QSPI



RPDMA



SDIO SPI



## Low Power Peripherals

ULP AUX



ULP FIM



ULP I2C



ULP I2S



ULP IR



ULP SSI



ULP UART



ULP UDMA



## Ultra Low Power Peripherals

MCU STORE 1



MCU STORE 2



MCU STORE 3



RTC (CALENDAR)



TIME PERIOD



UPS



UTS



WATCHDOG TIMER



## 2 Power Manager Configuration: Peripheral Configuration

This component also provides configuration for RAM retention. Two options are provided to configure the RAM Banks i.e. using size or using bank number.

The user needs to select any one option. If both options are selected then the power manager service configures RAM using the bank number.

## Power Manager Configuration

Pin Tool

&lt;/&gt; View Source



## RAM Configuration

## Configure RAM Banks using Size

Low Power Ram Retention Size (in KB)

0

Ultra Low Power Ram Retention Size (in KB)

0

## Configure RAM Banks using Bank Number

LOW POWER RAM BANK 1



LOW POWER RAM BANK 2



LOW POWER RAM BANK 3



LOW POWER RAM BANK 4



LOW POWER RAM BANK 5



LOW POWER RAM BANK 6



LOW POWER RAM BANK 7



LOW POWER RAM BANK 8



LOW POWER RAM BANK 9



LOW POWER RAM BANK 10



ULTRA LOW POWER RAM BANK 2



ULTRA LOW POWER RAM BANK 3



## 3 Power Manager Configuration: RAM Configuration

### 3 Wakeup Source Configuration Component

Wakeup Source Configuration component is present under Software Components → Wiseconnect 3 SDK → Device → Si91x → MCU → Service → Power Manager → pm wakeup source configuration

Note: To use the wakeup source configuration, it is mandatory to install components using the above method for the required peripherals.

The screenshot shows a software component management interface. At the top, there is a search bar with the text "Search keywords, component's name" and a filter button showing "1 filters applied" with a dropdown arrow. The search results show a tree structure under "WiSeConnect 3 SDK v4.0.0":

- Device
  - Si91x
    - MCU
      - Service
        - Power Manager
          - UULP Wakeup Sources
            - PM UULP Wireless Wakeup
              - PM Wakeup Source Configuration** (highlighted with a blue bar and a gear icon)

To the right of the tree, the details for the "PM Wakeup Source Configuration" component are shown:

- PM Wakeup Source Configuration** (with a "Configure" button)
- Description**:
 

Wakeup Source Configuration component will enable the NPSS peripherals as wakeup source. This also initializes the peripheral and configure as a wakeup source as per the selection in User Configuration.

Install the appropriate component based on the configured wakeup source.

Note: The default sleep time for the deep sleep timer is 10 ms because reducing it further does not result in any decrease in sleep current.
- Quality**: PRODUCTION
- Dependencies**:
 

%extension-wiseconnect3\_sdk%wakeup\_source\_config requires 1 components
- Uninstall** (with a red 'x' icon)

#### 4 Wakeup Source Configuration Component

This component provides the initialization and configuration for the NPSS wakeup sources used in PS4 sleep/PS3 sleep/PS2 sleep.

By default, the Alarm Wakeup source is configured with the 5-second alarm trigger

### 3.1 Calendar Wakeup

Second based wake-up source can be enabled using the toggle

Alarm based wake-up source can be enabled and configured in terms of seconds and milliseconds.

PM Wakeup Source Configuration Pin Tool </> View Source ×

Calendar Wakeup

- GPIO Wakeup
- Deep Sleep Timer Wakeup
- Wireless Wakeup

Calendar Wakeup

Enable Second Wakeup Source
☐

Enable Alarm Wakeup Source
☐

Alarm Time (in milliseconds)

GPIO Wakeup ☐

Deep Sleep Timer Wakeup ☐

Wireless Wakeup ☐

### 3.2 GPIO Wakeup

There are 4 NPSS GPIO available which can act as a wake-up source. Enabling the GPIO Wakeup allows the user to select the desired GPIO pin as a wakeup source

PM Wakeup Source Configuration Pin Tool </> View Source ×

Calendar Wakeup

- GPIO Wakeup
- Deep Sleep Timer Wakeup
- Wireless Wakeup

Calendar Wakeup ☐

GPIO Wakeup ☒

Enable NPSS GPIO 0 ☐

Enable NPSS GPIO 1 ☐

Enable NPSS GPIO 2 ☐

Enable NPSS GPIO 3 ☐

Deep Sleep Timer Wakeup ☐

Wireless Wakeup ☐

Wakeup Source Configuration Component – 6

### 3.3 Deep Sleep Timer

Deep Sleep Timer can be enabled using the toggle and the sleep time is also configurable.

PM Wakeup Source Configuration Pin Tool </> View Source ×

>>

Calendar Wakeup ☐

GPIO Wakeup ☐

Deep Sleep Timer Wakeup ☒

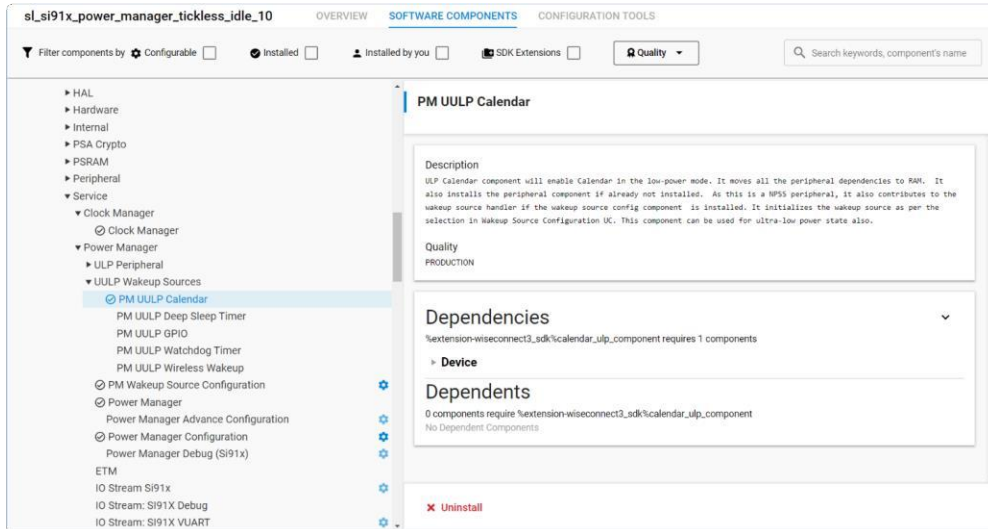
Sleep Time (in microseconds)

^ 10000 v



## 4 Install the NPSS peripheral component for the selected wake-up source

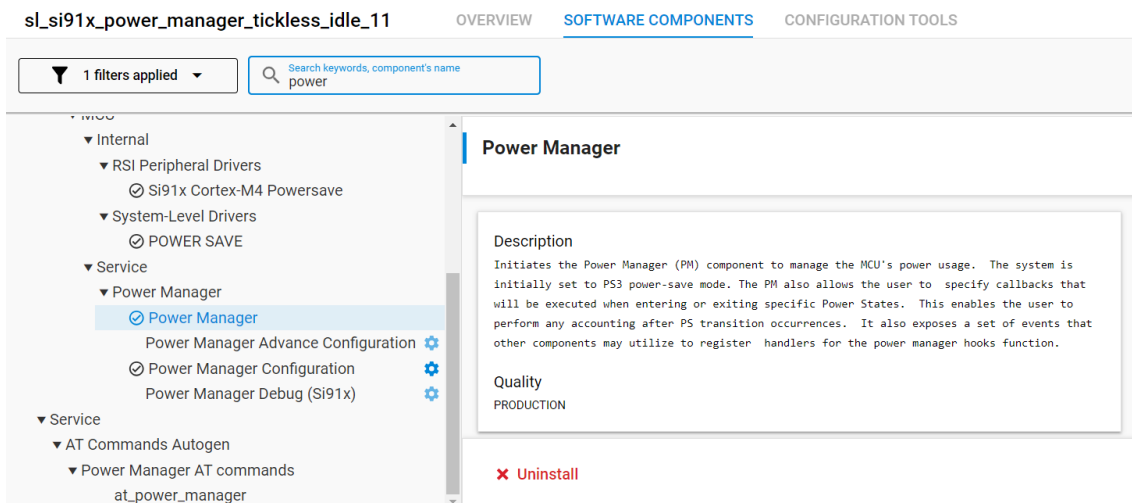
Install the components that are selected as a wakeup source.



## 5 Low Power Component Installation

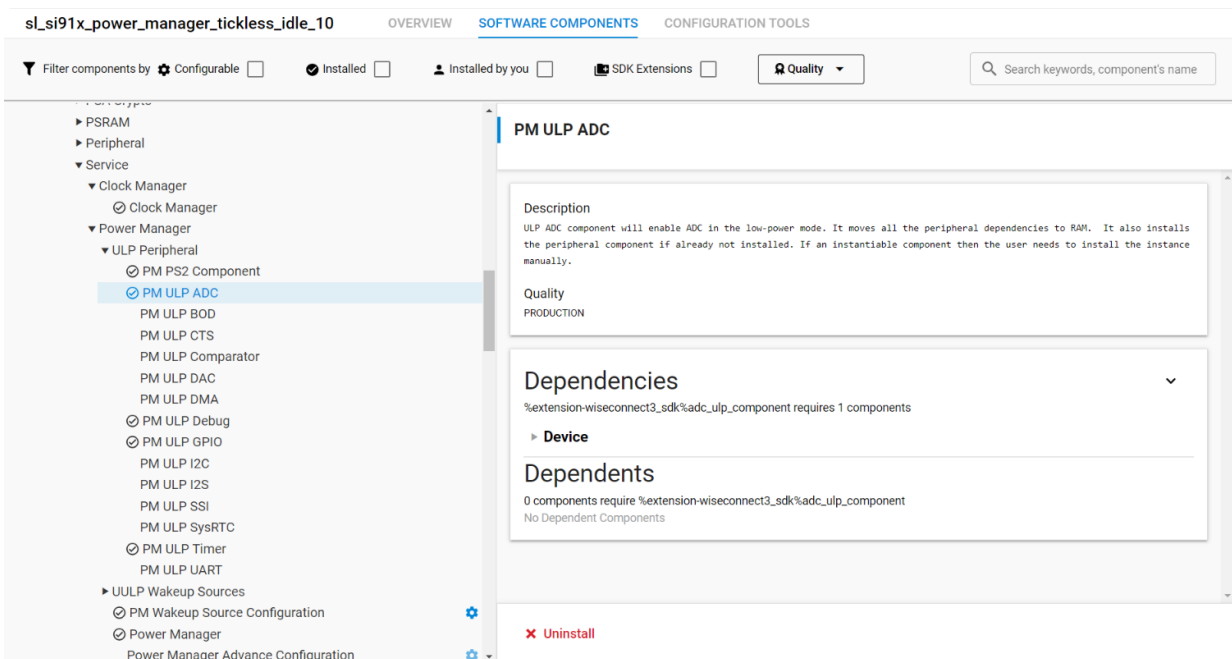
### 5.1 Install Power Manager Component

Install Power Manager Component present under Software Components → Wiselink 3 SDK → Device → Si91x → MCU → Service → Power Manager.



### 5.2 Navigate to the ULP Peripheral Section in the Software Components

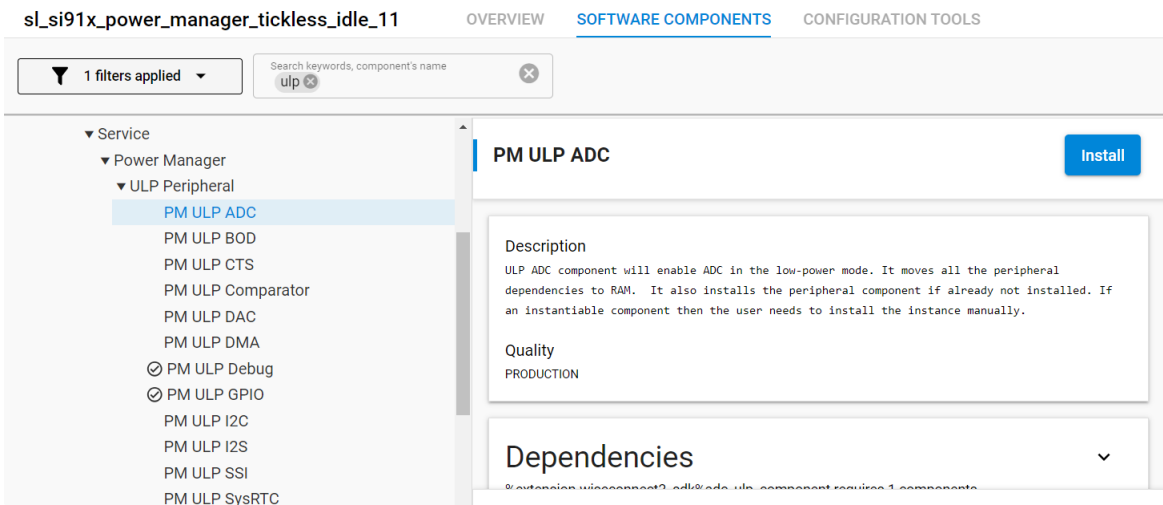
The ULP peripheral component list is present under Software Components → Wiselink 3 SDK → Device → Si91x → MCU → Service → Power Manager → ULP Peripheral



## 5.3 Install the required ULP Peripheral Component

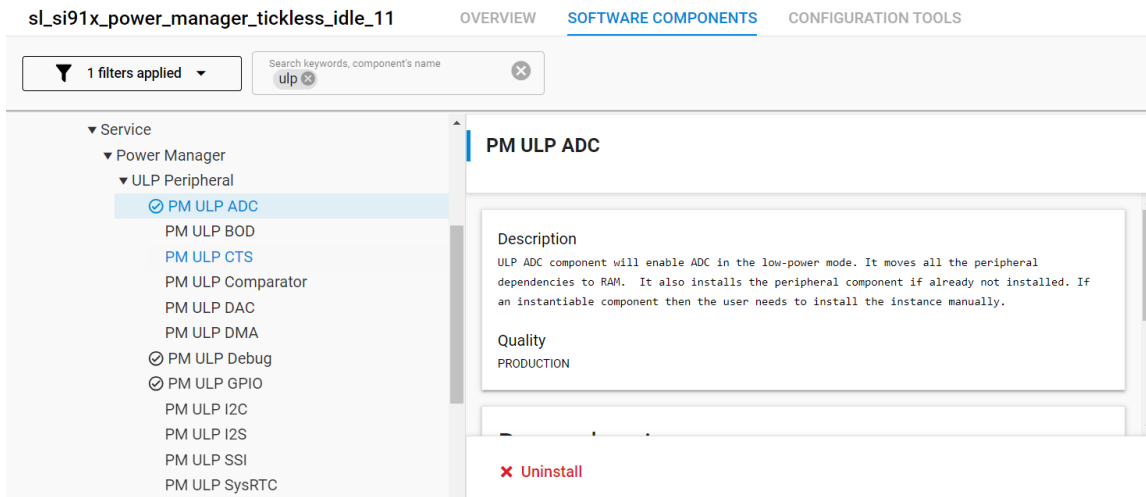
Choose the desired component and install it.

After installation, the basic required components and the dependencies of the peripheral are added to the RAM, i.e., excluded from the (.text) section and included in the (.data) section.



## 5.4 Uninstalling the ULP Peripheral Component

If any peripheral is no longer required, it can be uninstalled from the same path.



Here the linker file will be reverted to the stage how it was before installing the component

## 6 Example

### Steps for PS2 state change

- Install Power Manager Component
- Install required low-power peripheral component (if required)
- Include Power Manager header file
- Call the below power manager API

```
#include "sl_si91x_power_manager.h"

void application_function(void)
{
    sl_si91x_power_manager_add_ps_requirement(SL_SI91X_POWER_MANGER_PS2);
}
```