Power Manager Integration

Wi-Fi Connectivity Engineering

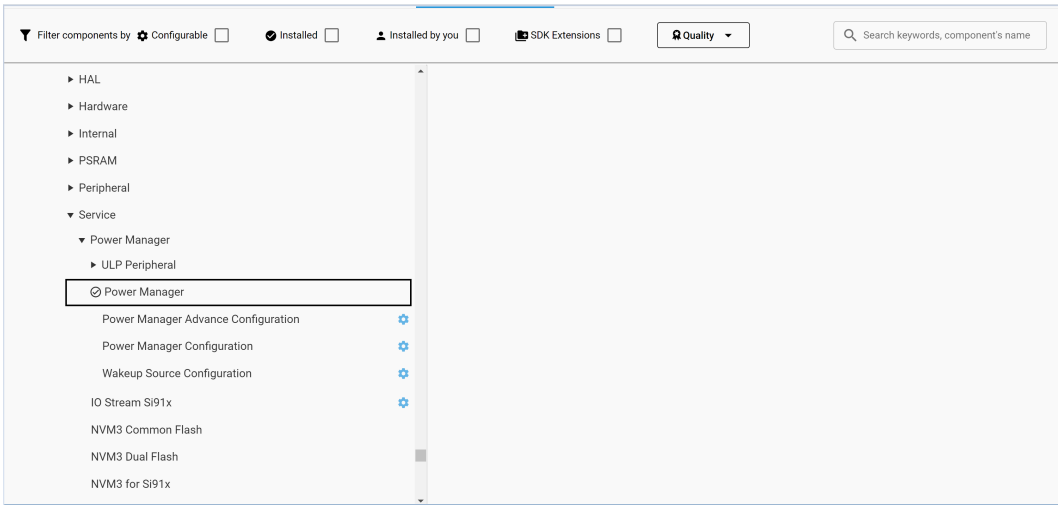
Exported on 03/06/2024

Table of Contents

Table of Contents:

1 Install Power Manager Component

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



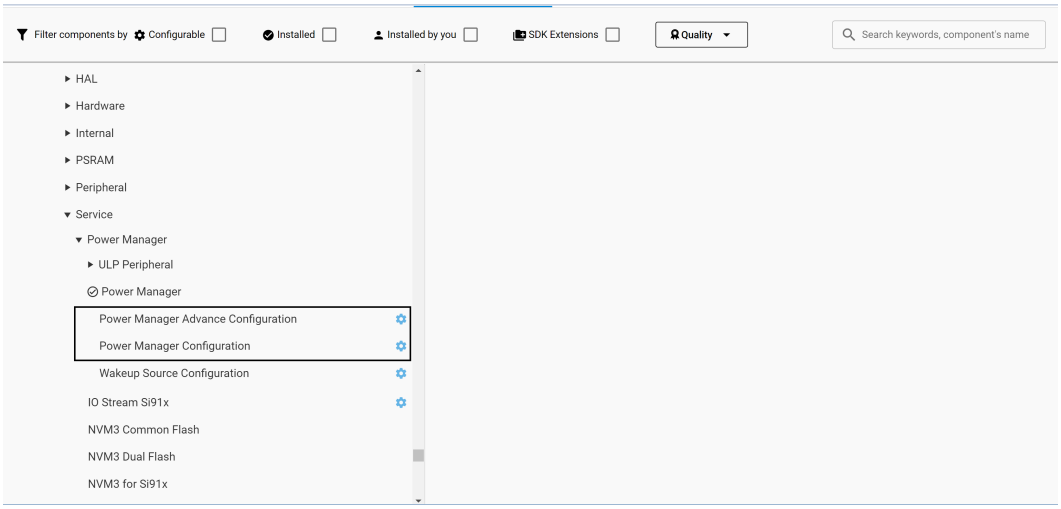
1 Power Manager Component

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

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

2 Install Power Manager Configuration Component

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



2 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.

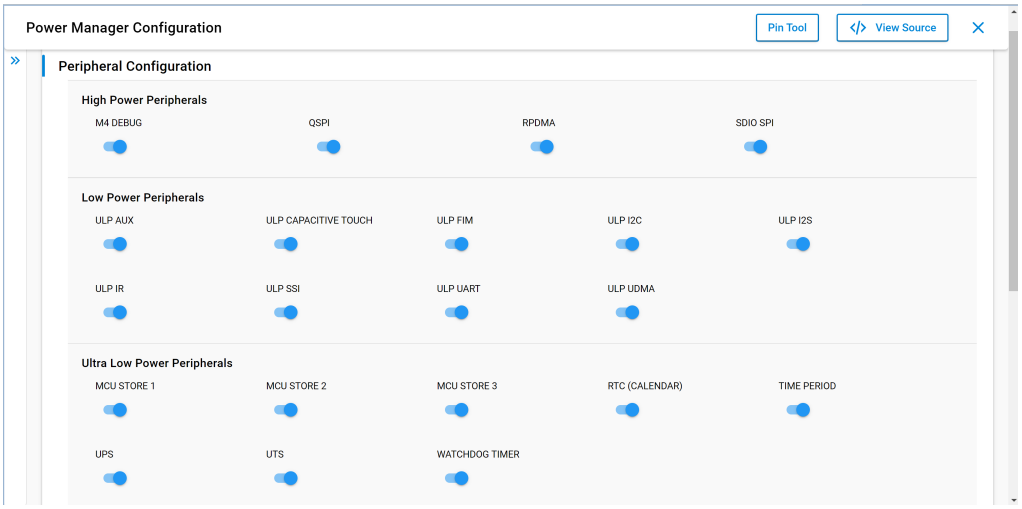
Peripheral Configuration includes:

→ High Power Peripherals (PS4/PS3)

→ Low Power Peripherals (PS2)

→ Ultra Low Power Peripherals (All power states)

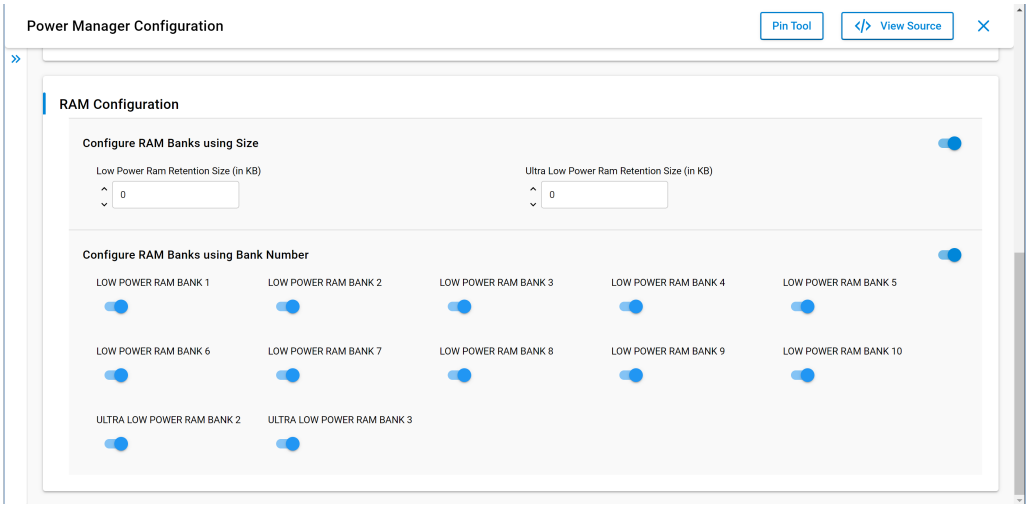
Note: If QSPI is turned off from High Power Peripheral then mcu cannot communicate with TA.



3 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.



4 Power Manager Configuration: RAM Configuration

2.2 Power Manager Advance Configuration

This component is an advance configuration component in which the unwanted peripherals and RAM Banks are powered off. LDO configuration is also made to get the optimum power save current.

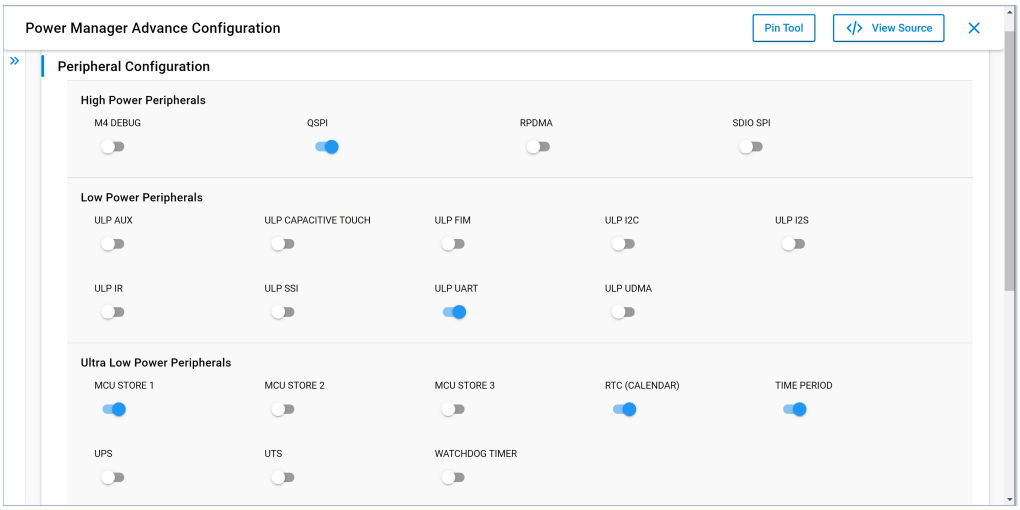
The user can still configure the peripheral configuration which includes:

→ High Power Peripherals (PS4/PS3)

→ Low Power Peripherals (PS2)

→ Ultra Low Power Peripherals (All power states)

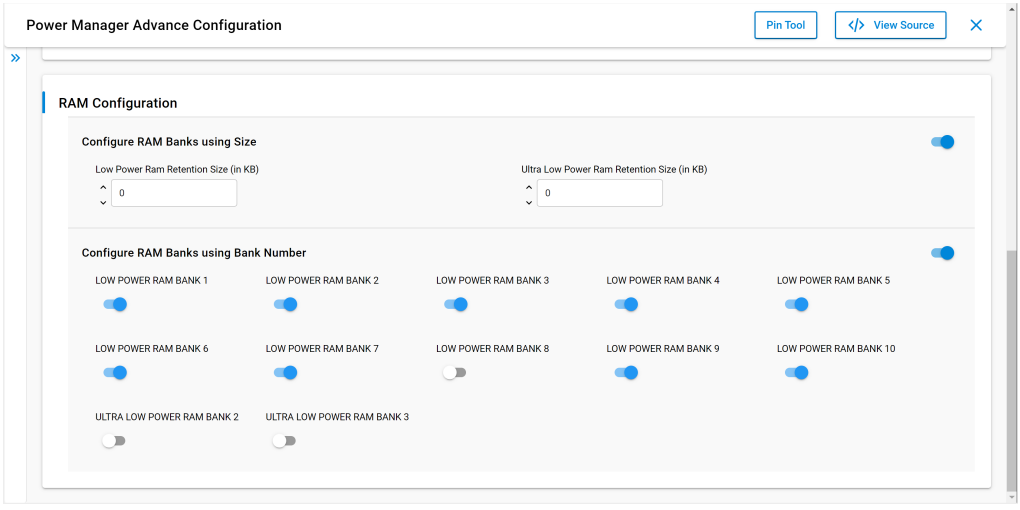
Note: MCU Current may vary as per the selection of peripherals in addition to the default configuration.



5 Power Manager Advance Configuration: Peripheral Configuration

The default configuration for RAM retention is already configured to provide the lowest mcu current but if it is required, the user can configure the RAM Banks using size or bank number.

Note: MCU Current may vary as per the selection of RAM Banks in addition to the default configuration.



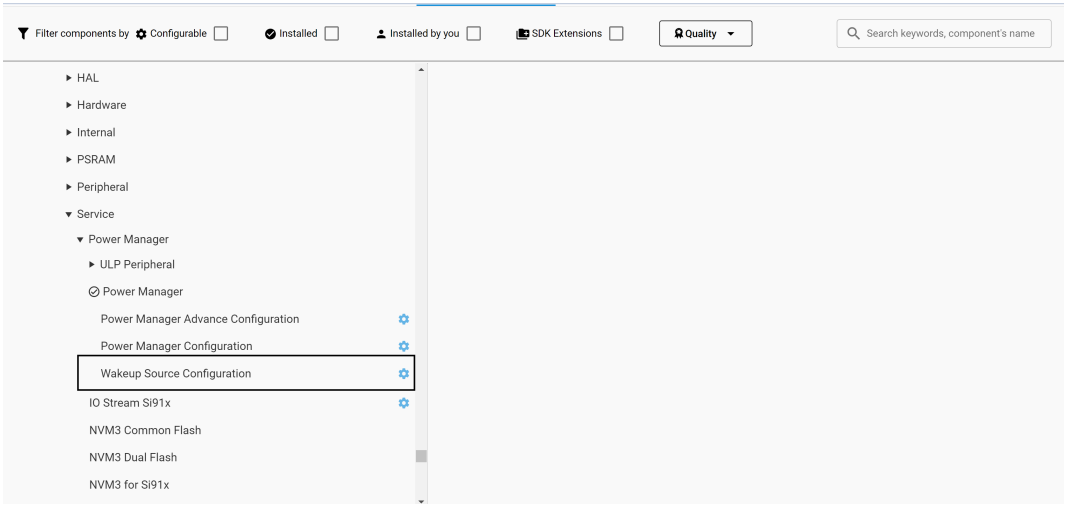
6 Power Manager Advance Configuration: RAM Configuration

3 Install Wakeup Source Configuration Component

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

Refer to Power Manager Low Power Component Installation[1] for component installation of ULP peripheral/ wake-up source

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



7 Wakeup Source Configuration Component

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

Note: It is mandatory to install either Power Manager Configuration or Power Manager Advance Configuration before installing this component.

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

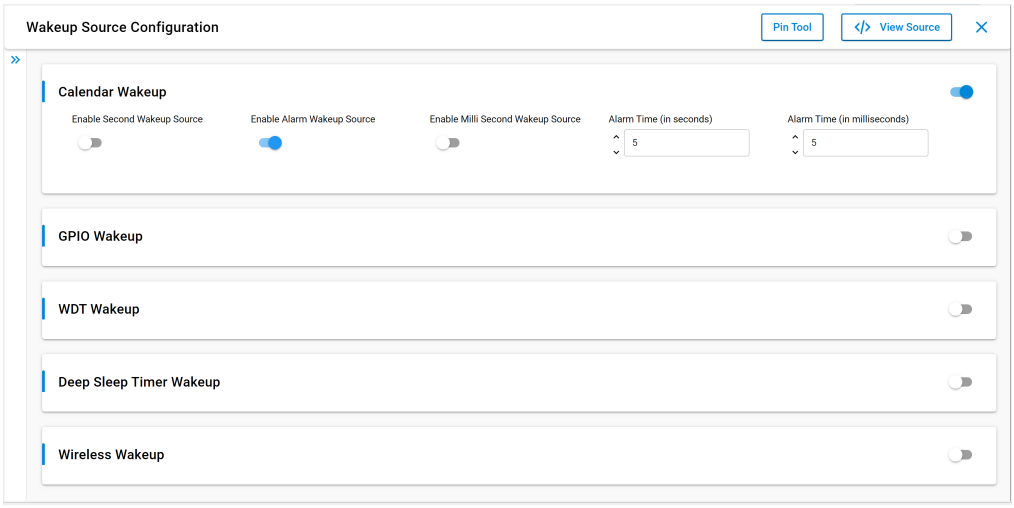
Calendar Wakeup

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

MilliSecond based wake-up source can also be enabled using the toggle

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

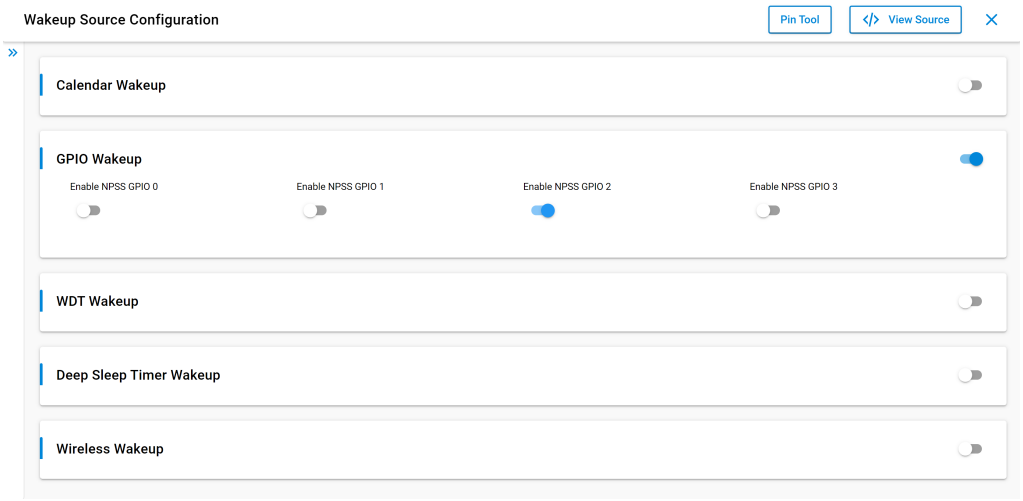
1 https://confluence.silabs.com/display/EN/Power+Manager+Low+Power+Component+Installation



8 Wakeup Source Configuration: Calendar Wakeup

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.



9 Wakeup Source Configuration: GPIO Wakeup

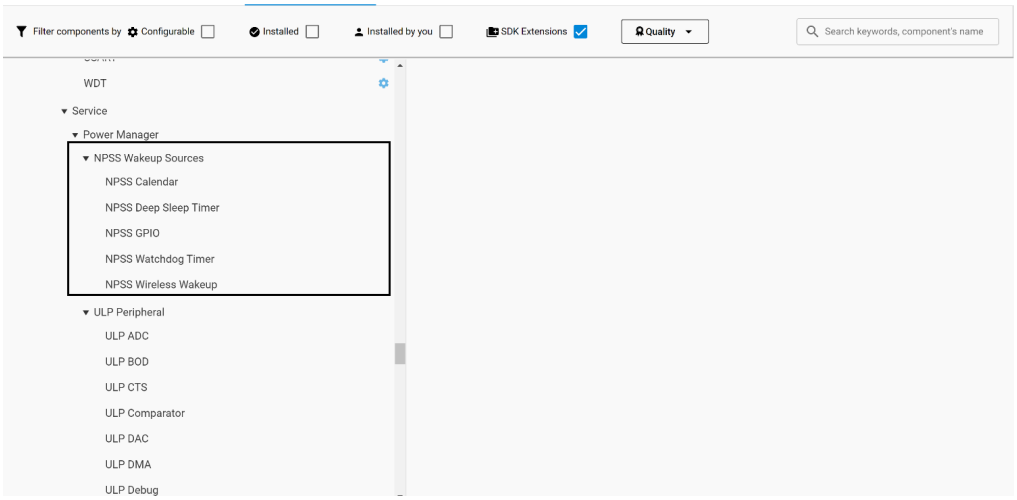
Deep Sleep Timer

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

10 Wakeup Source Configuration: Deep Sleep Timer

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

Install the components that are selected as a wakeup source.



5 Adding User Files to RAM (if any)

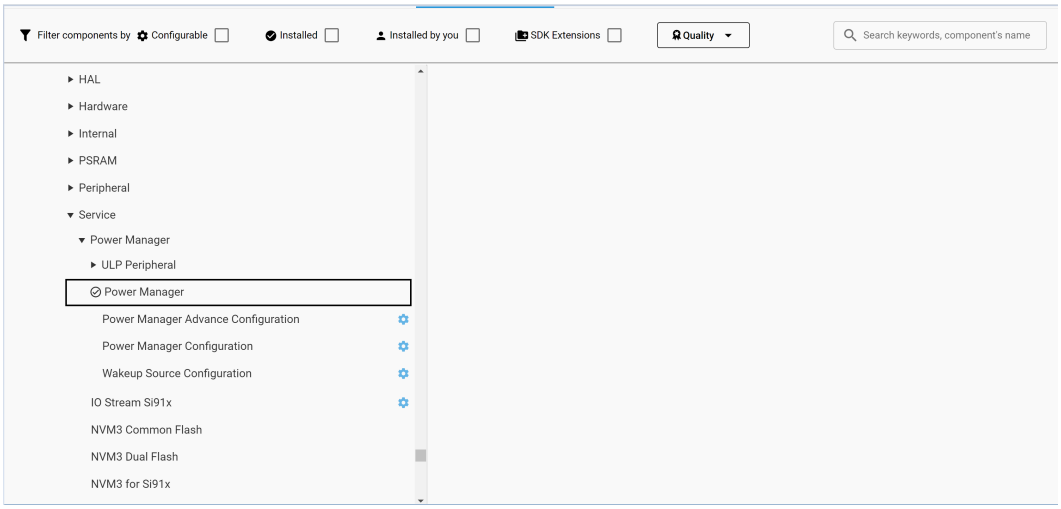
The following code can be referred to add user files to RAM. It demonstrates the template contribution from the project configuration (.slcp) file

```
template_contribution:
  - name: user_files_ps2
    value: power_manager_m4_wireless_example.o
  - name: user_files_ps2
    value: sl_si91x_button.o
  - name: user_files_ps2
    value: sl_si91x_button_instances.o
  - name: user_files_ps2
    value: app.o
  - name: user_files_ps2
    value: main.o
```

6 Low Power Component Installation

6.1 Install Power Manager Component

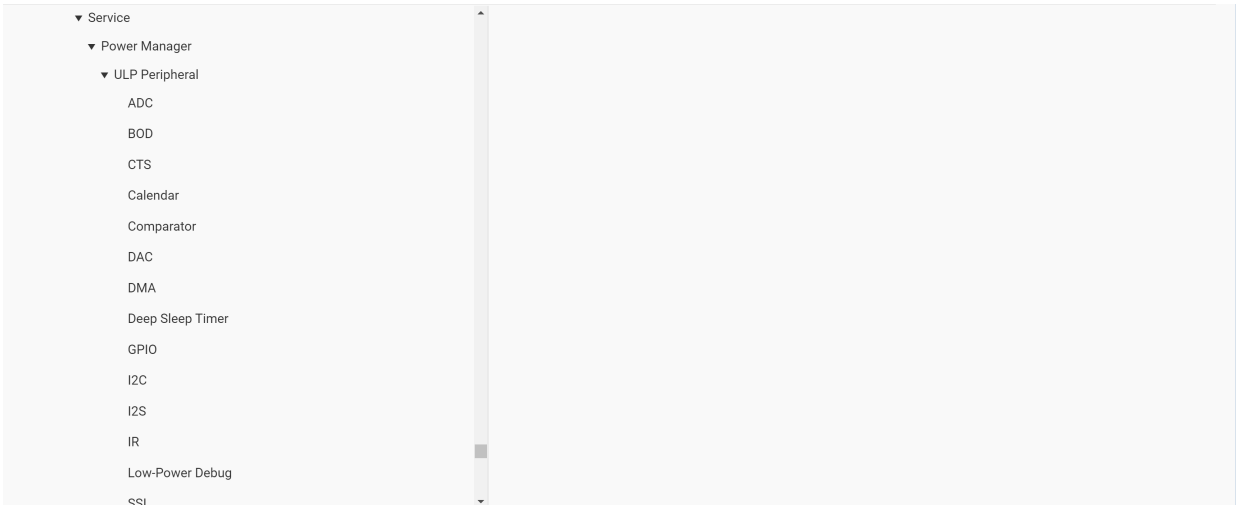
Install Power Manager Component present under Software Components →Wiseconnect 3 SDK → Device → Si91x → MCU → Service → Power Manager.



11 Power Manager Component

6.2 Navigate to the ULP Peripheral Section in the Software Components

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

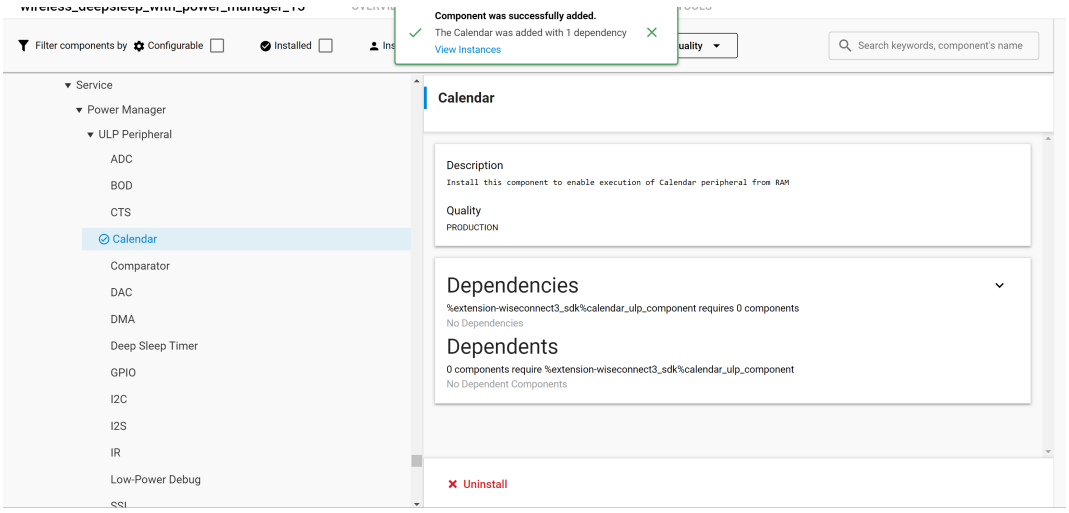


12 Power Manager ULP Peripheral Section

6.3 Install the required ULP Peripheral Component

Choose the desired component and install it.

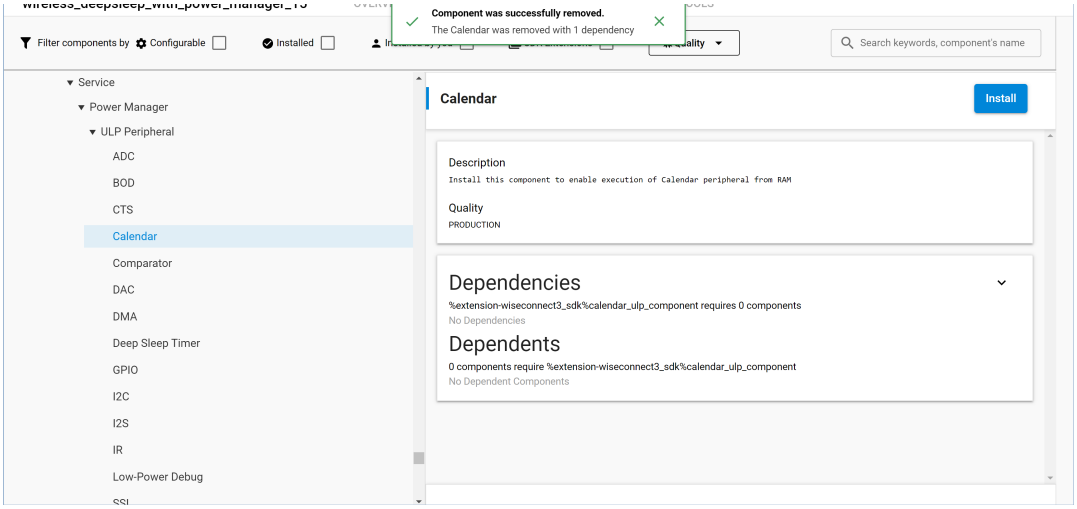
After installation, the basic required components and the dependencies of the peripheral are added to the RAM, i.e., excluded from the (.text) section and included in the (.data) section.



13 Installation of ULP Calendar Component

6.4 Uninstalling the ULP Peripheral Component

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



14 Un-Installation of ULP Calendar Component

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

7 Example

7.1 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);
}
```

7.2 Steps for PS4 sleep-wakeup

→ Install Power Manager Component

→ Install Power Manager Configuration Component or Power Manager Advance Configuration Component as per requirement

→ Install required low-power peripheral component

→ Install Wakeup Source Configuration Component (Change the wakeup source 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_sleep();
}
```