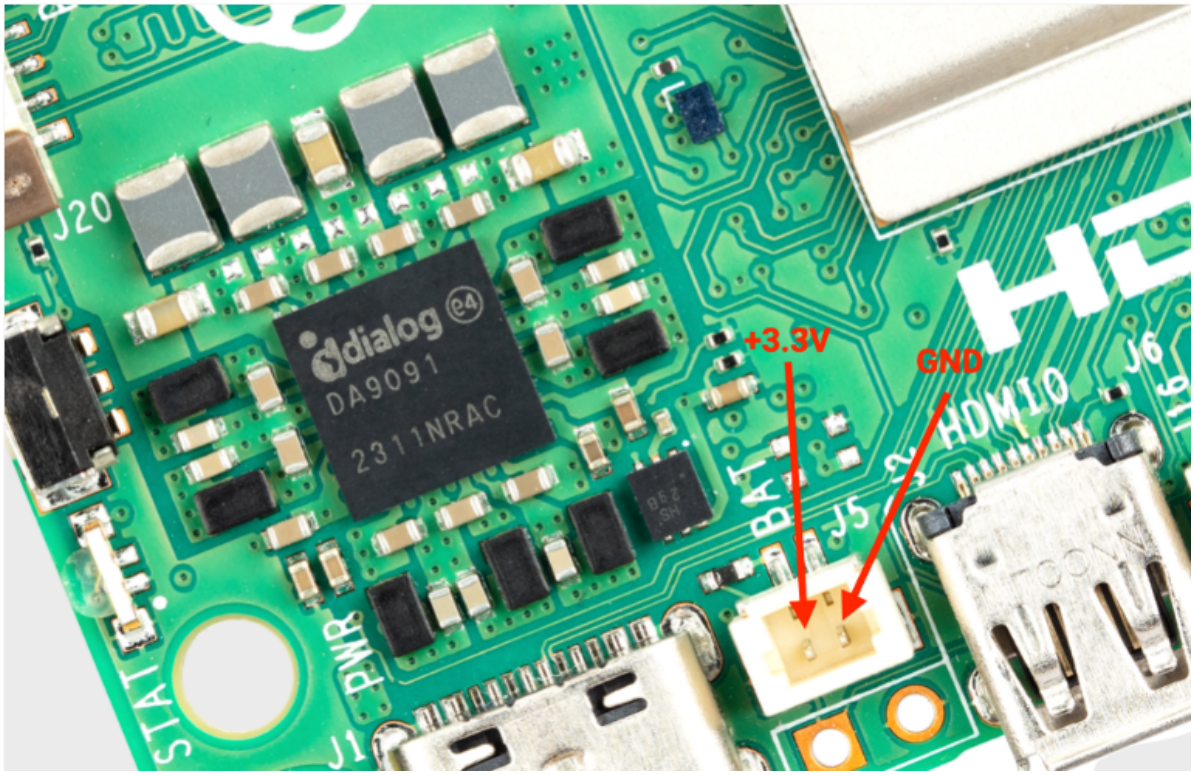
11.Real-time clock（RTC）

The Raspberry Pi 5 includes an RTC module. This can be battery powered via the J5 (BAT) connector on the board located to the right of the USB-C power connector.



The J5 battery connector

You can set a wake alarm which will switch the board to a very low-power state (approximately 3mA). When the alarm time is reached, the board will power back on. This can be useful for periodic jobs like time-lapse imagery.

To support the low-power mode for wake alarms you should edit the bootloader config:

```
sudo -E rpi-eeprom-config --edit
```

adding the following two lines.

```
POWER_OFF_ON_HALT=1
WAKE_ON_GPIO=0
```

You can test the functionality with:

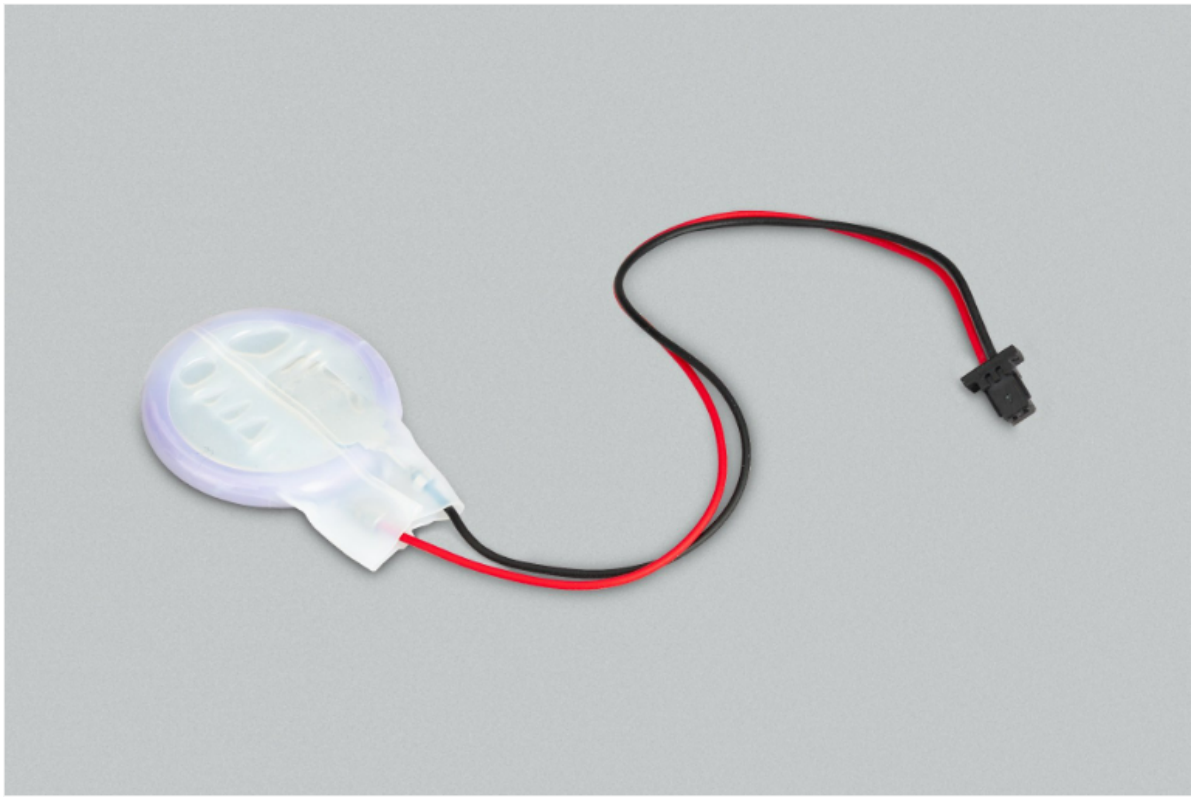
```
echo +600 | sudo tee /sys/class/rtc/rtc0/wakealarm
sudo halt
```

That will halt the board into a very low-power state, then wake and restart after 10 minutes.

The RTC also provides the time on boot e.g. in `dmesg`:

```
[    1.295799] rpi-rtc soc:rpi_rtc: setting system clock to 2023-08-16T15:58:50
UTC (1692201530)
```

Note: The RTC is still usable even when there is no backup battery attached to the J5 connector.



Lithium-manganese rechargeable RTC battery

The official battery part is a rechargeable lithium manganese coin cell, with a pre-fitted two-pin JST plug and an adhesive mounting pad. This is suitable for powering the Raspberry Pi 5 RTC when the main power supply for the board is disconnected, with a power-off current draw measuring in single-digit µA, giving a retention time that can be measured in months.

Enabling trickle charging

Trickle charging of the battery is disabled by default. There are `sysfs` files that show the current trickle charging voltage and limits:

```
/sys/devices/platform/soc/soc:rpi_rtc/rtc/rtc0/charging_voltage:0
/sys/devices/platform/soc/soc:rpi_rtc/rtc/rtc0/charging_voltage_max:4400000
/sys/devices/platform/soc/soc:rpi_rtc/rtc/rtc0/charging_voltage_min:1300000
```

If you add `rtc_bbat_vchg` to `/boot/firmware/config.txt`:

```
dtparam=rtc_bbat_vchg=3000000
```

and reboot, you'll see:

```
/sys/devices/platform/soc/soc:rpi_rtc/rtc/rtc0/charging_voltage:3000000
/sys/devices/platform/soc/soc:rpi_rtc/rtc/rtc0/charging_voltage_max:4400000
/sys/devices/platform/soc/soc:rpi_rtc/rtc/rtc0/charging_voltage_min:1300000
```

The battery will be trickle charging. Remove the `dtparam` line from `config.txt` to stop the trickle charging.