Introduction

1.1. Purpose of the PowerMiser

Hey there, makers and DIY enthusiasts! Are you tired of constantly worrying about your project's battery life? Do you struggle to find the perfect balance between power and portability?

Well, we've got the solution for you! PowerMiser is a revolutionary technology that can extend the life of your batteries by an astonishing 200% to 500%! That's right - with PowerMiser, you can say goodbye to dead batteries and hello to endless project possibilities!

Let's put some numbers into perspective. Imagine your current battery life is just 3 months. With PowerMiser, that could be extended to a whopping 6 months or even an incredible 2 years! That means you'll have more time to focus on what matters most - bringing your creative vision to life.

But don't just take our word for it! Here are some real-world examples of how PowerMiser can make a difference:

- A maker builds a smart home system that's supposed to sleep when not in use, but with PowerMiser, the system stays powered for an entire year without losing any data or functionality!

- A DIY enthusiast creates a wireless sensor network that monitors environmental conditions and sends alerts when something goes wrong. With PowerMiser, the sensors can run for months on end without needing replacement or recharging.

- A student builds a robotic pet that's designed to sleep during the day and come back to life at night. With PowerMiser, the robot's battery life is extended from 8 hours to an entire week!

Try PowerMiser today and unlock the full potential of your projects! Whether you're a seasoned maker or just starting out, our technology will give you the freedom to focus on what you love - without worrying about running out of juice.

1.2. Overview of power-saving techniques

PowerMiser's innovative technology employs a unique combination of techniques to optimize battery life in projects that require periodic sleep modes. At the heart of PowerMiser's approach lies its patented "NanoSleep" feature, which reduces power consumption during sleep mode to an astonishing 50 nanoamps. This minuscule current draw is achieved by cutting power to the primary device and allowing it to enter a dormant state. When it's time for the device to wake up, PowerMiser returns full power, ensuring seamless operation.

But that's not all - PowerMiser also enables the primary device to initiate sleep mode early if its work is complete. This feature, known as "AutoSleep," allows the device to conserve energy when it's no longer needed, extending battery life even further. And, in cases where an external source needs to wake up the device, PowerMiser's "EarlyWake" capability springs into action. For example, if a motion sensor detects movement, PowerMiser can terminate sleep mode early and restore full power to the device, ensuring it's ready to respond promptly.

These advanced techniques work together in harmony to provide an unparalleled level of battery life extension. By leveraging the power-saving benefits of deep sleep modes, PowerMiser's innovative approach ensures that your projects stay powered up for longer periods, without sacrificing performance or reliability. Whether you're building a smart home system, a robotic pet, or a wireless sensor network, PowerMiser's technology can help you achieve your goals while minimizing battery replacement and recharging hassles.

Theory of Operation

2.1. Power consumption in electronic circuits

Electronic devices are notorious for their voracious appetite for power. From smartphones to laptops, tablets to smart home devices, the amount of energy they consume can be staggering. In fact, according to the U.S. Energy Information Administration (EIA), electric-powered devices account for nearly 20% of total household energy consumption.

One major culprit behind this high energy demand is the constant need for power-hungry components like processors, memory, and displays. Modern electronics rely on these components to perform complex tasks like processing information, storing data, and rendering graphics. As a result, they require a significant amount of electricity to operate efficiently. For example, a modern smartphone can consume as much as 10-15 watts of power when its processor is busy handling demanding tasks.

Another factor contributing to high energy consumption in electronic devices is the constant need for power-hungry peripherals like charging ports and Wi-Fi modules. These components are always "awake" and ready to provide power to your device, even when it's not actively being used. This means that even when your device is supposedly asleep or idle, it can still be sipping away at battery life, slowly but surely draining its power reserves.

But what if there was a way to optimize power usage in electronic devices? PowerMiser, a revolutionary new technology, helps to reduce energy consumption by leveraging advanced sleep modes and auto-off capabilities. By using only 50 nanoamps during sleep mode, PowerMiser's patented "NanoSleep" feature minimizes standby power consumption, allowing devices to rest while still conserving energy. Additionally, PowerMiser's "EarlyWake" capability enables devices to wake up quickly when needed, reducing the time spent in low-power modes and minimizing battery drain.

PowerMiser also empowers devices to initiate sleep mode early if their work is complete, thanks to its "AutoSleep" feature. This means that devices can conserve energy when they're no longer needed, extending battery life even further. By leveraging PowerMiser's innovative technology, manufacturers can create more power-efficient devices that reduce environmental impact and extend battery life, making it a game-changer for the electronic industry.

2.2. Sleep and wake-up modes

The sleep and awake modes are crucial components of PowerMiser's technology, allowing devices to optimize their energy consumption and extend battery life. The first key aspect is selecting the correct awake time for a device to complete its task before entering sleep mode. This ensures that the device has sufficient time to process information, store data, or render graphics without being interrupted by the need to conserve energy. By picking the optimal awake time, PowerMiser's devices can efficiently accomplish their tasks while minimizing standby power consumption.

The second vital aspect is selecting the optimal time for a device to sleep in between work tasks. This requires careful consideration of factors such as usage patterns, task complexity, and environmental conditions. For instance, if a device is used primarily during the morning hours, it may be beneficial to set its awake mode to coincide with this peak usage period. Conversely, if the device is not being utilized during late-night hours, PowerMiser's sleep mode can optimize energy consumption by minimizing standby power consumption.

By carefully managing the transition between awake and sleep modes, PowerMiser's technology enables devices to strike a delicate balance between performance and power efficiency. This results in extended battery life, reduced environmental impact, and improved overall device performance. By optimizing these two critical modes, PowerMiser empowers manufacturers to create more sustainable and efficient electronic devices that meet the evolving demands of consumers.

Product Overview

## 3.1. Key features and specifications

PowerMiser features:

- Ability keep your device awake 1 – 1023 (Seconds, Minutes, Hours, Days)

- Ability put your device to sleep 1 – 1023 (Seconds, Minutes, Hours, Days)

- Ability to go to force early sleep if workload gets done early via GPIO toggle

- Ability to wake up early if required via GPIO toggle

3.2. Block diagram and component description

Here is a picture of the top side of the PowerMiser.

There
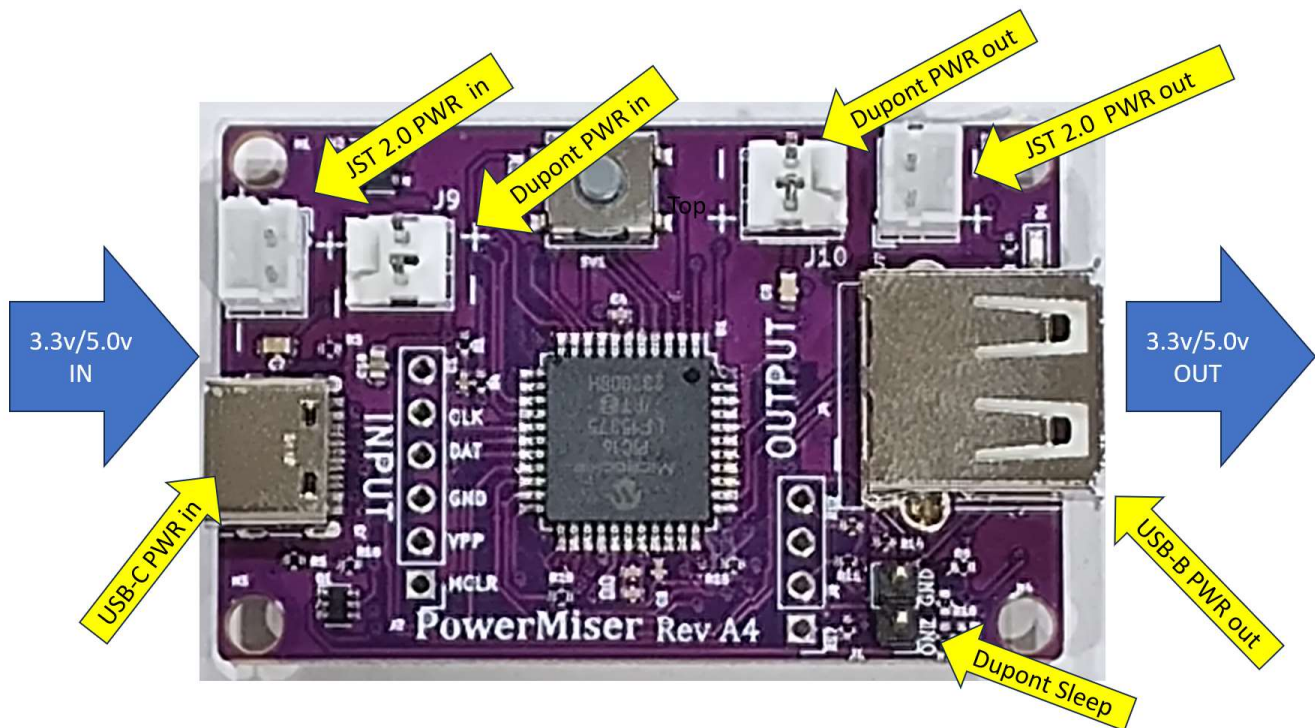
There are a few key notes to consider here:

1. Only one input power source can be used, the USB-C connector, the JST 2.0 battery connector or the Dupont wire connector.
2. The only button on the unit is a reboot button
3. Only one output source should be used, the Dupont pwr out, the JST 2.0 pwr out or the USB-B port.
4. The dupont Sleep/Wake pin is used to goto sleep early or wake up early.
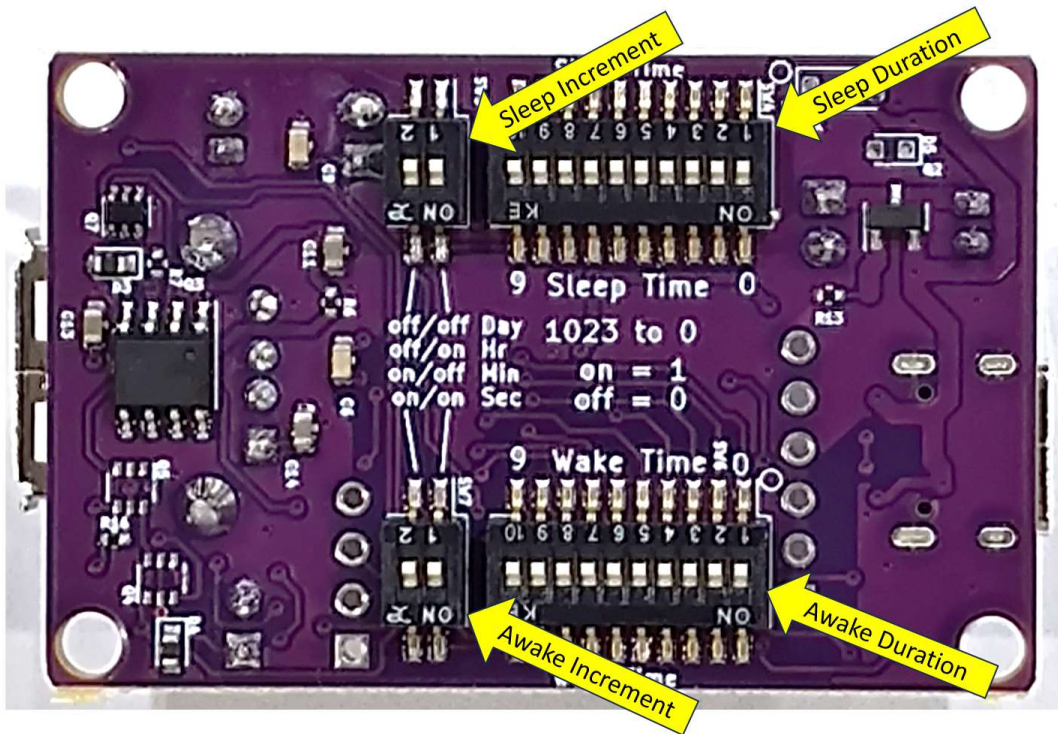
NOTE: When holding the board so you can read the text as picture above, you can see the top shows the Sleep Increment and Sleep count, and the bottom shows the Awake increment and Awake amount.   It is important to note that a dipswitch button in UP position is OFF or ZERO, and button in DOWN position is ON or ONE.   This may not seem obvious so please be careful. In the above picture the Sleep and Awake increment are both set to DAYS, and the count for both Sleep and Awake are set to 0 days.   (More examples below in next section)

Configuration of Sleep and Awake Time

4.1. Sleep time / Awake time configuration

To setup sleep you need to set the sleep increment (seconds, minutes, hours, days) and then the dips switches for sleep count. Below are several examples to help you select the increment and count for sleep.   The dark indicates the dip switch button location.

Example 1: Sleep 60 Minutes and awake 15 seconds

Sleep Increment

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•	

Sleep Time

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				•	•	•	•		

Awake Increment

•	•

Awake Time

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						•	•	•	•

Example 2: Sleep 100 Days and awake 2 hours

Sleep Increment

•	•

Sleep Time

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			•	•			•		

Awake Increment

•	
	•

Awake Time

| •	•	•	•	•	•	•	•		•
								•	

Using the Sleep/Awake Pin

5.1. Hardware-controlled sleep and wake-up

There are times when your device needs to wake-up early from the sleep cycle or go to sleep early if work task finishes early. There is an interrupt pin on the board labeled "ONZ". (See picture below) If you are in awake mode and wish to go to sleep early, just toggle the "ONZ" pin ON and OFF from your project board and Sleep mode will immediately begin

If you are in Sleep mode and you have a sensor that needs to wake you up (i.e. motion sensor), then have that sensor interrupt pin connected to the ONZ pin and toggle the pin ON and OFF and you will immediately have power restored to you project board.

(NOTE: if device toggling the ONZ pin is on different power source, then you may need to also connect the GND pin to your source as well as the ONZ pin. The GND pin is right next to the ONZ pin. "see picture below")
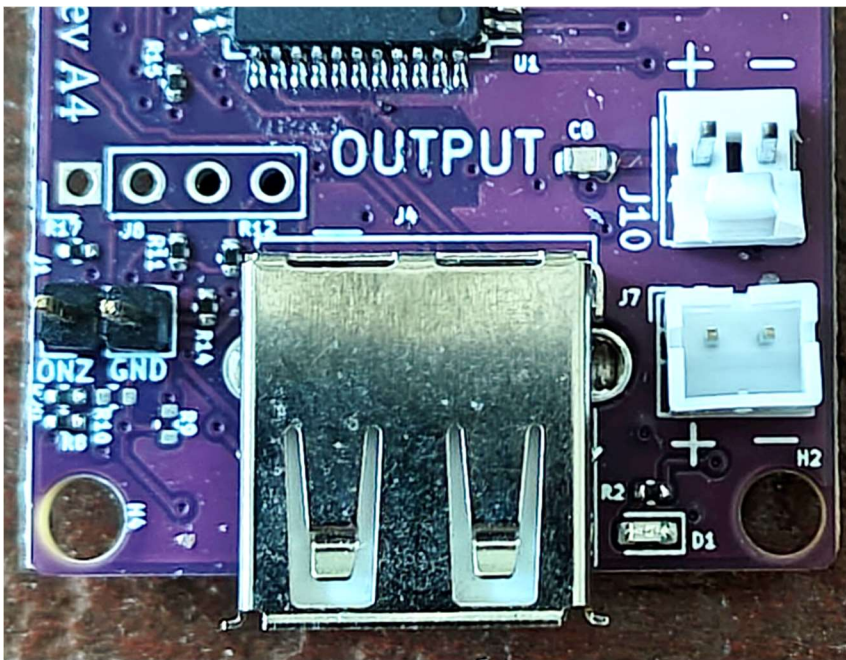
Some common examples of going to sleep early:

1. If the task your device is conducting finishes early and you want to save the extra battery time.
2. If you are running a device like a Raspberry pi and want to make sure you can perform a graceful shutdown before the PowerMiser shuts down power, just add extra Awake time with the PowerMiser dip switches and then have your power down sequence toggle the ONZ pin at the end of power down on the Raspberry Pi.

Some common examples of waking up early:

1. You would like an external Light sensor to wake you up early.
2. You would like a motion sensor to wake you up early
3. Some people have made sure there is a battery monitor on their battery and if it reaches critical low level they want that to wake up device so they can send signal to replace battery. For example, you set PowerMiser to Sleep your device for 365 days, and during that time the battery gets critically low, then ONZ can be toggled by your battery meter so it can wake-up and send low battery alert.