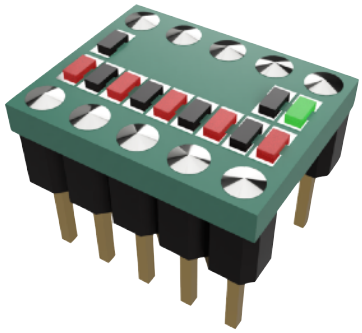
# Blinker™

## Preliminary Specification



Tuesday, May 25, 2021

## Summary


- **Five digital input channels:**
  - Monitor short pulses or high-frequency signals
  - Short pulses extended to 30 ms duration
  - Red LEDs aligned with the input pins
- **One voltage rail monitor channel:**
  - Indicate voltage is within ±5% of the target voltage
  - Built-in support for 1.8V and 3.3V target voltages
  - Short out-of-range events extended to 100 ms duration
  - Dedicated green LED
- **Separate reference and power (LED) voltages:**
  - External reference voltage ($V_{REF}$) for the digital input channels
  - Power / LED voltage ($V_{DD}$) independent of the reference voltage
- **Small size:**
  - Suitable for breadboarding


## Overview

Electronic designers often use LEDs for simple signal monitoring—but such LEDs are useless with short pulses or high-frequency signals. Short pulses of a few microseconds or even a few milliseconds are too fast for the human eyes to register. And high-frequency signals in the kHz or MHz range just slightly dim the LED brightness.

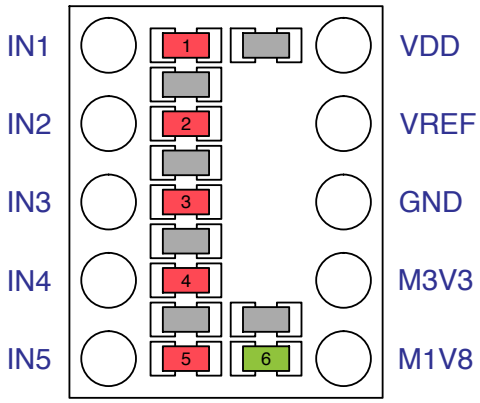
Each Blinker module provides five digital input channels with on-board LEDs. The input channels are specifically designed for indicating short pulses and high-frequency signals. When a pulse is detected, its duration is extended to approximately 30 ms, which makes the LED blink easy to observe. Rapid LED blinking indicates signals toggling with high frequency. The LEDs also indicate the static logic level of the input signals.

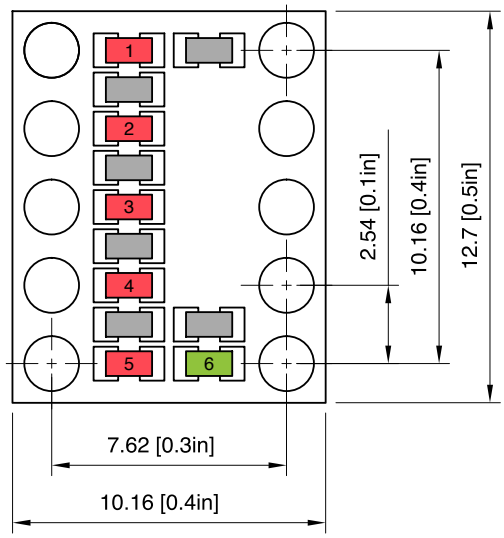
Using the Blinker modules it is possible to see activity on variety of digital busses such as UART, SPI, I2C, I2S, and TDM, as well as individual signal lines like MCU interrupt requests. For example, a single Blinker module with its five input channels can monitor an entire SPI bus including MISO, MOSI, SCK, and a couple of chip select signals.

Lastly, each Blinker module also includes a voltage rail monitor channel with a dedicated LED indicator. It works as a window comparator that accepts voltages within ±5% of the selected nominal value. Any short out-of-range events are extended to 100 ms duration for easier observation. Two input pins allow selection of 1.8V or 3.3V nominal input voltage; monitoring other voltage levels is possible by adding an external resistor.

# Pinout and Dimensions

The drawings below show the Blinker module pinout, dimensions, and LED positions. The five red LEDs indicate input channel status, while the green LED reflects the status of the voltage rail monitor. The small overall size and standard 0.1-inch pin spacing facilitate using the Blinker module for quick prototyping breadboarding projects.




The Blinker module pin functions are described in the following table:

| Pin | Function |
|---|---|
| **IN1–IN5** | Digital input channels 1–5. Each channel has a 1 MΩ pull-down resistor. |
| **VDD** | Blinker / LED power supply (3.0–5.5V), $V_{DD} \geq V_{REF}$. On-board 0.1 µF capacitor. |
| **VREF** | IN1–IN5 reference voltage (1.8–5.0V), $V_{DD} \geq V_{REF}$. On-board 0.1 µF capacitor. |
| **GND** | System ground. |
| **M3V3** | Voltage rail monitor input configured for 3.3V ± 5%. |
| **M1V8** | Voltage rail monitor input configured for 1.8V ± 5%. |

# Application Information

Please consider the following application advice when using Blinker modules:

- $V_{DD}$ must be present for correct operation. It is recommended to use an independent always-on debug power rail. Also note the $V_{DD} \geq V_{REF}$ requirement when choosing $V_{DD}$.
- Routing high-frequency signals over long traces to reach the Blinker modules may reduce signal integrity. Consider adding 1-kΩ resistors close to the signal sources.
- Instead of soldering the Blinker modules directly to the target PCB, it is best to use a couple of 5-pin female headers to allow removal and reuse of the modules.