**Window Comparator – OVP & UVP**

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# Overview

## Revision History

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| --- | --- | --- | --- |
| **Document Revision History** | **Date** | **Author** | **Revision No.** |
| Initial Draft | 7/02/2024 | Álvarez | 0.1 |
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Table 1 Document Revision History

## Introduction

This document outlines the proposed functionality of an overvoltage and undervoltage protection module.

This module will also have connectors to the relevant signals for testing.

### Features

The window comparator provides the following operations:

* Functional:
  + Overvoltage protection
  + Undervoltage protection
* Test:
  + Access to trigger signals for undervoltage and overvoltage.

## Technical Specifications

### Operating Conditions

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Parameter** | **Symbol** | **Min** | **Typ** | **Max** | **Unit** | **Comments** |
| Supply Voltage | VDD | 3.3 | 5 | 5 | V |  |
| Voltage to monitor | Vin | 2.97 | 12 | 18 | V |  |

### Absolute maximum ratings

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Parameter** | **Symbol** | **Min** | **Max** | **Unit** | **Comments** |
| Supply Current | IVDD | 8 | 20000 | A |  |
| INA Output | INA | 0 | 6.864 | V |  |
| INB Output | INB | 0 | 4.24 | V |  |
| Undervoltage Signal | OUTA | 0 | VDD | V |  |
| Overvoltage Signal | OUTB | 0 | VDD | V |  |

# Schematic

Figure 1‑1 Shows the schematic of the window comparator.

**A diagram of a window comparator

Description automatically generated**

**Figure 1 Schematic of the window comparator.**

The trigger voltages for each protection are set by the voltage divider. 3 of the resistors are variable to allow testing of the calculations. The resistor values depend on the voltage levels:

Rearranging:

Using these equations, the upper limits of the potentiometer were chosen to set a maximum of about 100kΩ. This is to ensure that not much power is drawn by the resistor network, but enough current is drawn to ensure proper operation. is set to a fixed value of 64.9kΩ to ensure safe operation of the chip. allows to change. sets the value for . A higher value will decrease . The lowest possible value would be 1.7V. Setting to 0, disables OV.

UV is dependent on and . A higher value will decrease . If is set to 0, UV will be disabled if OV is disabled as well. UV will always be equal or less than OV. If is set to 0, UV will be equal to OV.

was chosen to ensure that influence of the currents into INA and INB was minimum.

# Functional description

### Functional Operation

Outputs are active low. When Vin is within the operating range, both outputs are high. If Vin is above the overvoltage level, OUTB will be low and OUTA will be high. If Vin is below the undervoltage level, OUTB will be low and OUTA will be high.

The indicating LEDs are connected to ground through the output pins. Which means that they will light up when the output is low. This serves as a quick indication of what the module is doing.