

Featherweight Millisecond Clock

User's Manual

Rev 2018_Jan_22

Introduction

The Featherweight Millisecond Clock is designed to provide a high-resolution visual time reference for high-speed video, with 1 msec resolution and 60 seconds of range. It can be disciplined by an external 1-pulse-per-second input and have its seconds synced with a second interface.

Connections

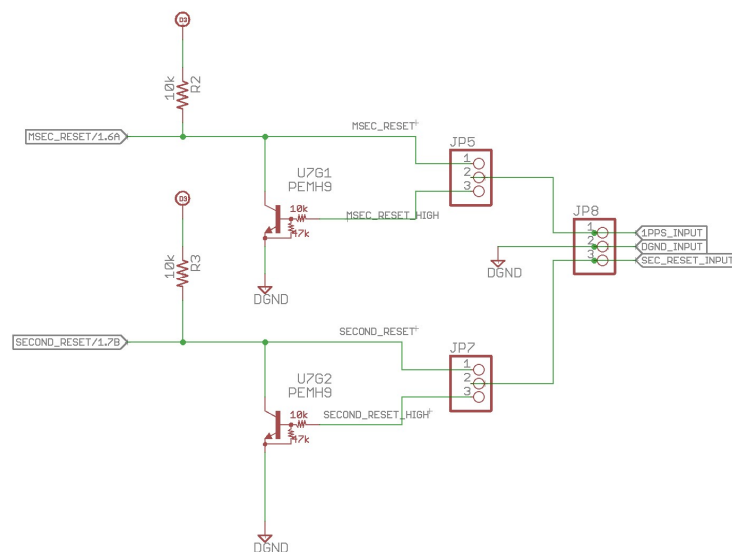
See the connections diagram on the following page.

Power

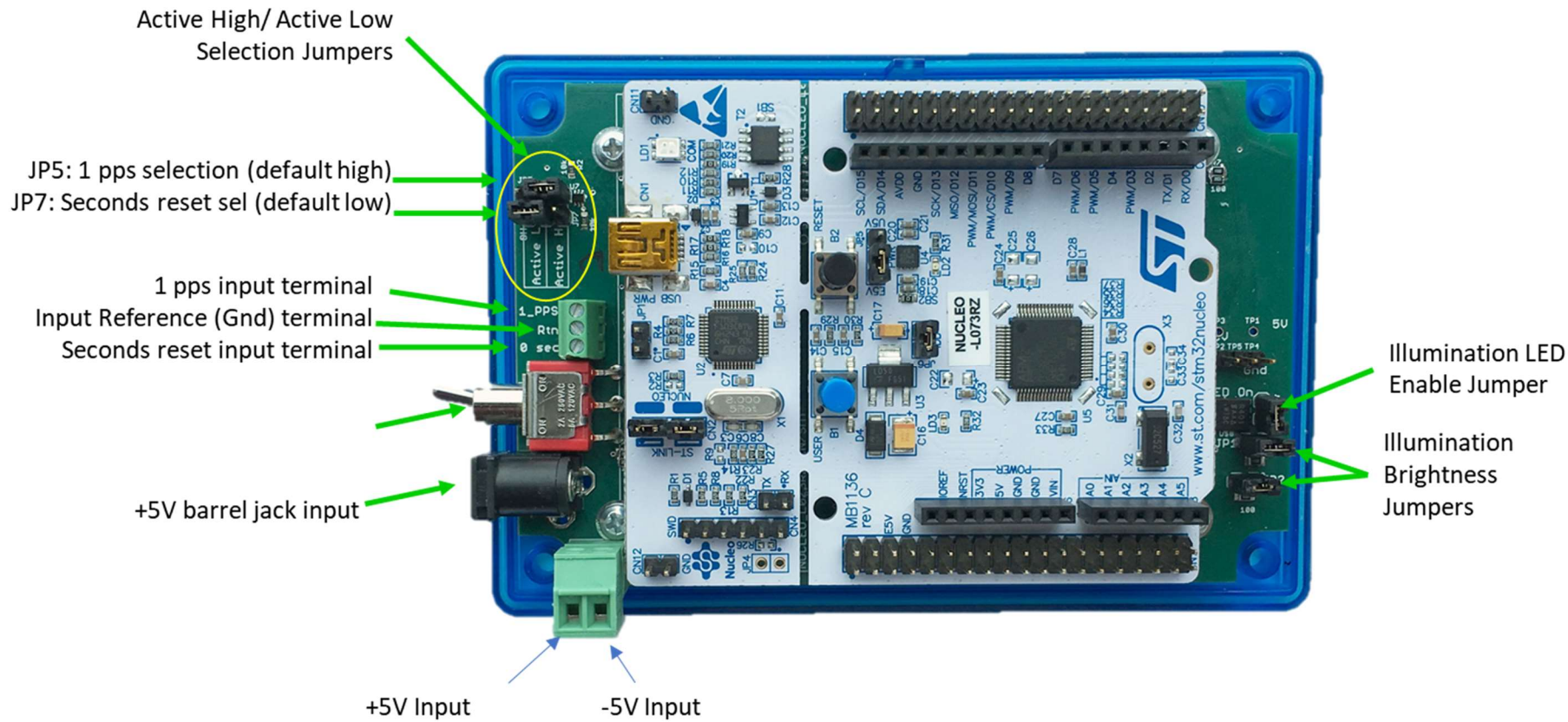
The clock can be powered by the included AC wall adapter, which provides +5V to the center pin of a 5.1mm barrel jack, or by an external power connector, which connects via a plug with screw terminals inside the box. The supply current at 5V input with all LEDs at full brightness is approximately 0.7 Amps average, 0.76 Amps peak. The supply input range is from 2.8V to 5.0 Volts, though input voltages less than 5.0V will result in dimmer displays. The current consumption at 4.0 Volts (as would be expected with a 1s Lithium polymer battery) is 0.4 Amps.

Trigger Inputs

There are 2 independent trigger inputs, the 1 pulse per second (1PPS) signal, and the seconds reset signal. Both of these signals can be jumper-selected to be compatible with logic-high input (2.5-5V) or switch closure input. See below for schematic of input interface circuitry:



Interface circuitry for PPS and seconds reset



Inside of clock and interface connection locations

Startup Modes

Automatic startup

With the second reset input line shorted to input return and the input jumpers configured for active low (default), the clock automatically starts counting at power-up and the LEDs are enabled. The clock ships in this configuration to provide a simple check-out capability. A delay of a few seconds after power is applied before the clock starts running is normal behavior.

Triggered startup

With the input lines open or inactive, the clock powers up into a standby mode. As shown below, only the decimal points are illuminated:

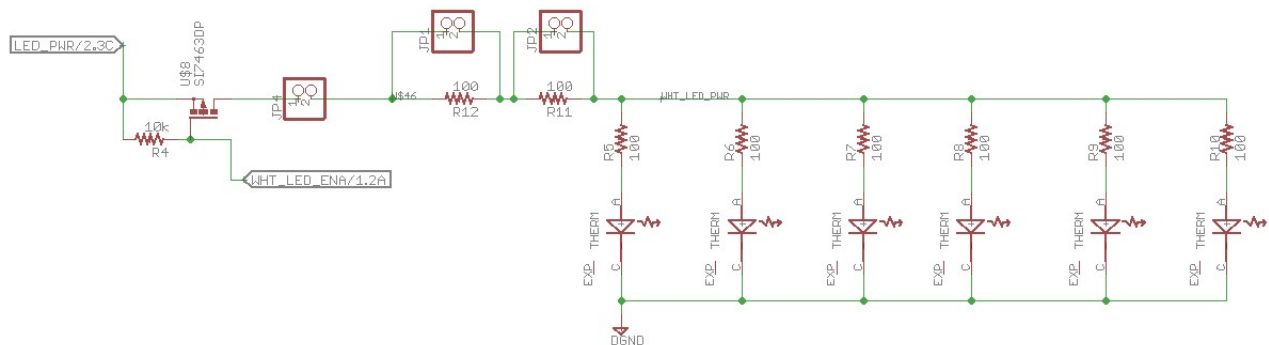


Clock in standby state

The clock starts counting as soon as either the PPS signal or the seconds reset signal becomes active. This allows the clock to be synced to an external source from the beginning of any display, or to be used as a triggered millisecond timer.

LED Illumination

Six white illumination LEDs can be turned on to help force a camera's auto exposure into the shorter exposure times that are necessary to resolve timing at the 1-msec level. The vertical jumper shown in the diagram is a series connection to the LEDs. Removing it disables the illumination LED function. The other two horizontal jumpers are in parallel with current-limiting resistors. They can be removed to reduce the power and brightness of the illumination LEDs. These jumpers are labeled JP4, JP1 and JP2, respectively, in the schematic below:



LED illumination circuit schematic

USB/UART serial connection

The USB connection to the STmicro L073 board outputs serial UART status. The connection parameters are:

- 115200 bps
- 8 data bits, 1 stop bit, no parity

The clock outputs the following status messages:

- pps: XXXXX to YYYYY
msec count before and after servicing the interrupt from the PPS input signal
- rollover: YYYYY
msec count after internal counter has rolled over to an even second
- sec reset: XXXXX to YYYYY
msec count before and after servicing interrupt from the second reset input signal

Contact Info

For questions or comments, please contact:

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