

Subject: Schematic of Schmitt Trigger
Date: Wednesday, March 27, 2019 at 12:45:52 PM Central Daylight Time
From: Subraveti, Chenchal
To: Haniff, Isaac J
CC: Schall, Jeffrey D
Attachments: Schematic_SchmittTrigger.pdf

Hi Isaac:

Attached is a schematic of Schmitt trigger circuit I have used. Most parts are listed on the circuit itself. Other parts needed are:

1. Prototyping board → (Qty: 1) Jameco.com part no: 105100 (<https://www.jameco.com/webapp/wcs/stores/servlet/ProductDisplay?catalogId=10001&freeText=105100&langId=-1&storeId=10001&productId=105100&krypto=lpqmUEhefwdqvVaAFYB5amsALHiCiOogJ5lhG2U1i0pIYnNIJT5vIXifJ702Ij4tzbZpzklZIKxWWYTakaTPhvPEEUQeyVQSKOOw8f3Cn3g%3D&ddkey=https%3AStoreCatalogDrillDownView>)
2. Housing for PCB → (Qty: 1) Jameco.com part no: 18922 (https://www.jameco.com/z/H2855-R-Case-ABS-Speedy-3-125x2x-875_18922.html)
3. BNC panel mount connectors → (Qty: 5 + 2 (for 2-photocells)) Jameco.com part no: 421331 (https://www.jameco.com/z/227726-3-TE-Connectivity-Connector-BNC-Receptacle-50-Ohm-Solder-Cup-Straight-Panel-Mount-Gold_421331.html?CID=MERCH)
4. Photovoltaic Cell → (Qty: 2) digikey.com part no: KXOB22-01X8F (<https://www.digikey.com/products/en?keywords=%E2%80%8EKXOB22-01X8L>)
5. Hex Schmitt Trigger Inverting → (Qty: 1) amazon.com CD40106BE (https://www.amazon.com/Texas-Instruments-CD40106BE-CD40106-Triggers/dp/B00MMVWPCG/ref=pd_day0_hl_0_2/140-7285941-5638506?_encoding=UTF8&pd_rd_i=B00MMVWPCG&pd_rd_r=143c4c31-50b1-11e9-b40d-c5ba70b48a31&pd_rd_w=SfqOu&pd_rd_wg=IAkz6&pf_rd_p=ad07871c-e646-4161-82c7-5ed0d4c85b07&pf_rd_r=CXE1X3JF1525AY02FM8Q&psc=1&refRID=CXE1X3JF1525AY02FM8Q)
6. DS supply → (Qty: 1) 1-5V – 5V. I used 3-12 V universal ac-dc adapter from amazon (https://www.amazon.com/gp/product/B07J4H5ZNH/ref=ppx_yo_dt_b_asin_title_o08_s00?ie=UTF8&psc=1) and then used a voltage divider to provide a close to 1.5V supply to the Schmitt Trigger circuit.
7. Miscellaneous → shrink-wrap tubing, solder, wires etc., may be a 14-pin IC socket instead of directly soldering the IC to the prototype board(?). I soldered directly to the prototype board

Although the Schmitt trigger IC input voltage specification is 5V, I use an input voltage of close to 1.25-1.5V, because the photocell output is much less than 3.4 V, so using a 5V will not generate the desired gating. So decreasing the input voltage decreases the hi-threshold for triggering-on, and increase the lo-threshold (which is now close to hi-threshold) for triggering-off, leading to an approximately 2-2.5ms trigger/gate on window. It is critical that the gated width be at least 2 ms, given that TEMPO data acquisition is 1000Hz, hence we can get at least 2 samples of gated signal. Trigger-off state will hence be around 1.2-1.5 Volts (Input voltage) while the trigger-on state will be close to 0 Volts

Circuit laid out on <http://easydea.com>

Hope this information will be helpful to get you started. I would purchase a few extra photovoltaic cells since they could be damaged during soldering process etc., The ICs seemed pretty robust as I was able to de-solder and re-solder.

Regards
Chenchal