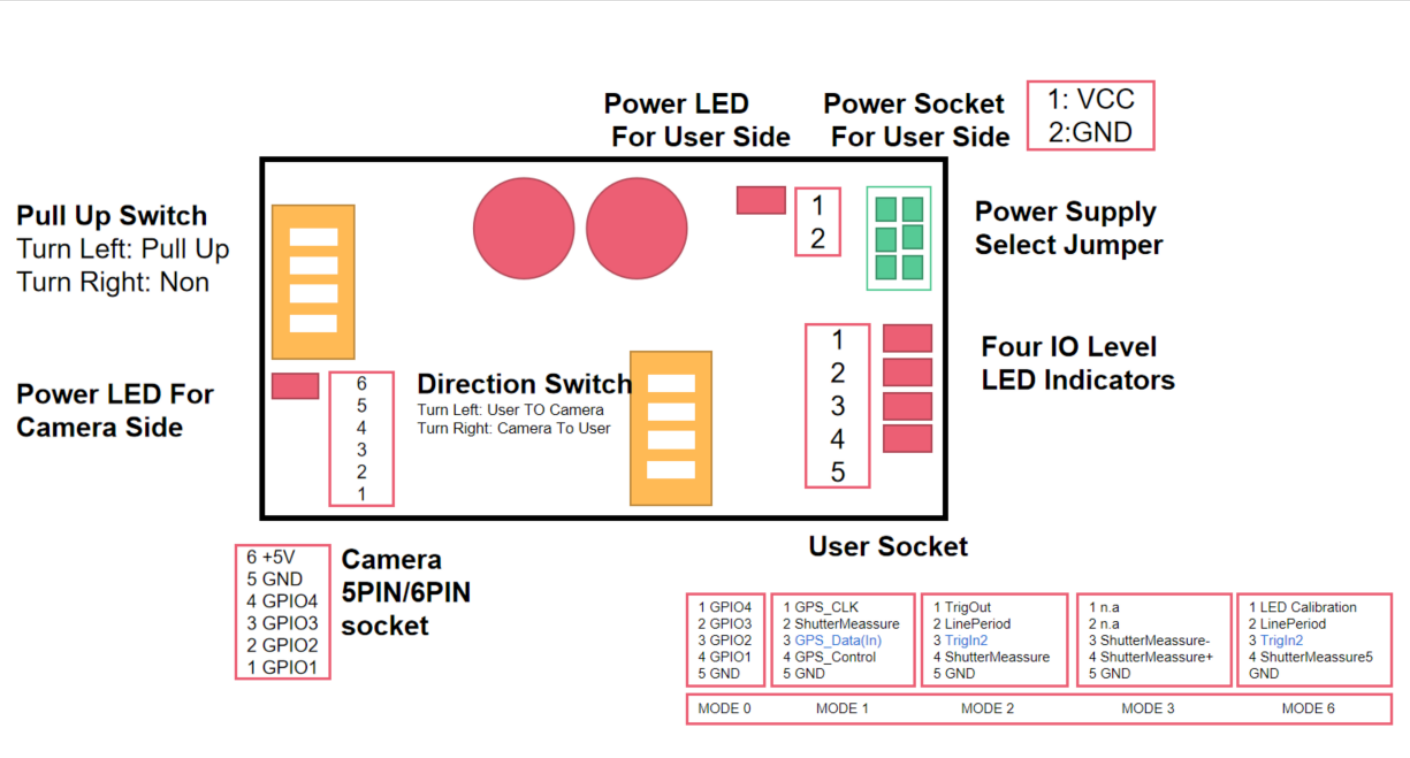
Introduction

Some QHYCCD Camera has the 4pin, 5pin, or 6pin high-speed GPIO socket which can supply the shuttermeassure signal and many other signals. Because the signal is output/input direction from/to the main FPGA of the camera. It has the high-speed feature, to compare with the two SMA port which using the Opto-coupler.

But the socket is the 1.8V/2.5V TTL level. It may not compatible with the user's circuit. And also the pin is connected directly with FPGA, although there is the EMI protect diode on the PCB board to protect the FPGA pin. But it still has the risk that connects directly with the user circuit. The over-voltage / shortcut / high EMI voltage will cause the FPGA IO port to get damaged and it needs to replace the mainboard, which is a lot of costs

In order to get this port more friendly to be using and reduce the damage risk. QHYCCD designed a level convert board. The major part of this board is four CMOS gates. The gate's direction can be controlled by the DIP switch. It can be configured as output direction or input direction, to match the different modes of the four IO pins.

Different IO voltage can be applied to this gate. So on the user side, it can be configured to different VCC voltage. The range is from +1.8V to +5V. The output signal in the user socket will be the voltage of the VCC



How to Use

(1) Configure the direction.

You can turn the direction DIP to left or to right to configure the direction. If the signal is output from the camera and to the user side. You should turn right of the switch. If the signal is from user side and input to camera, you should turn left of the swith. See above image for the directions.

There is the current limitation resistor between the gate and the camera. So if you set to the wrong direction, like camera is output and you send to input . The resistor will take functions to avoid the short-cut current is too large to damage the FPGA or the gate.

Please double check the direction configuation before power up the camera. The wrong configuation will cause the current confilict and cause the camera power up has some issue. For the first time that the camera power up, it is default as mode 0 (GPIO mode) and four GPIO pin output is low level. So should avoid there is high signal output from the user side, if there is pin confiuared as input.

(2) Connect the camera .

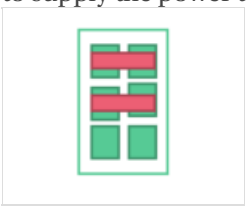
You camera may have 5pin high speed socket or 6pin high speed socket. The level convert board support both of them. For 6pin socket. The camera will output the +5V as power supply. So in this case, you can use this powersupply and also for the VCC on user side. But please note the power supply is only for this level convert board. We do not recommd to use this powersupply to power other circuit. Otherwise the other circuit may exceed the current that the camera circuit can supply, or any short-cut will cause this power supply in camera damaged, it need to replace the main board and it cost a lot.

You need to correctly configure the power supply select jumper. Please see the following configure

When use 6pin socket and use the +5V in 6pin socket to power this level board

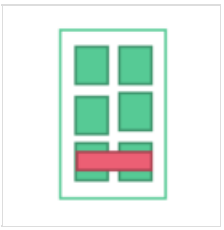
use +5V to power as the VCC for the gate of user side . User side no need to supply the power to this board and and signal level is +5V TTL

When use 6pin socket and use the +5V in 6pin socket to power this level board
There is a +1.8V LDO on this board. So you can use +1.8V to power as the VCC for the gate of user side . User side no need to supply the power to this board and and signal level is +1.8V TTL



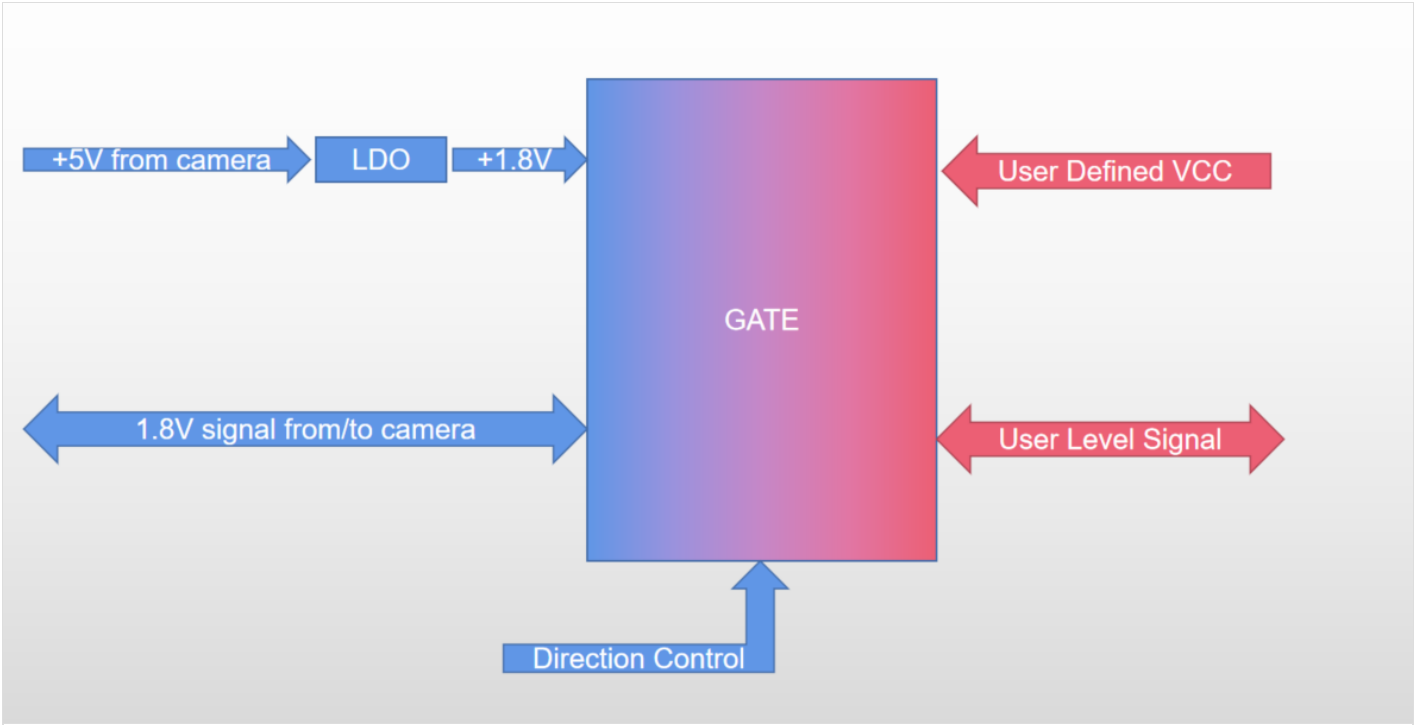
When use 6pin socket and use the +5V in 6pin socket to power this level board.
User the user supplied voltage to as the VCC for the gate of user side. You need to connect your power supply to the Power Socket for User Side. And us ohe following jumper configuartion.Your input voltage range should be +1.8V to +5.0V.

When user 5pin socket which has no power supply
In this case, you need to input the voltage to power this board. The input voltage should be +2.5V to +5.0V . The power supply should be input from the Power Socket For User Guide Port. The signal in user side will be the same level of the input voltage.



(3) Pull Up resistor
The gate has very high impendence. If it is floating, it is very easy to collect the EMI signal in enviroment and cause the gate output the un-expected signal. Even it is connect with the camera, the high impendence is not good for reduce the EMI signal. In this board there is a four resistor to pull-up the gate of camera side to +1.8V . The pull up resistor can be enabled / disabled with the Pull Up Switch. Please not the user side of the gate has no the pull up options. If it need to be pull-up depent the user circuit design.
(4)ESD protection
Both of camera side and user side has the ESD protection diode.
(5)capacitor for user side
In this board four SMD 0603 capacitor PAD is reserved. If you want to use some small capacitor to filter the signal. You can seal them by yourself. Remeber too big cap will cause the high frequency pulse missing. These PAD is on back side of the four LED indicator.
(6) LED indicator
There is totally six LEDs in this board. Two is power supply indicator and four is the user side level indicator. LED ON is high level and OFF is low level.
(7) User socket.
The user socket is a 5pin socket . One is GND and another four is the user side signal. We recommand to use the shield signal cable and the shield should connect with the GND pin of this socket. Which can reduce the EMI significantly. The EMI will cause the un-expected signal appear on this signal port and cause the wrong signal.

System Digram

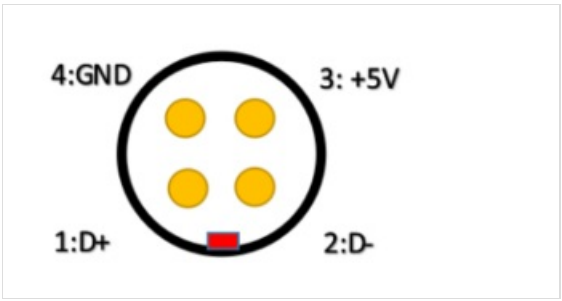


LEVEL_CONVERTOR
Circuit Design
QHY_Level translator_V2A

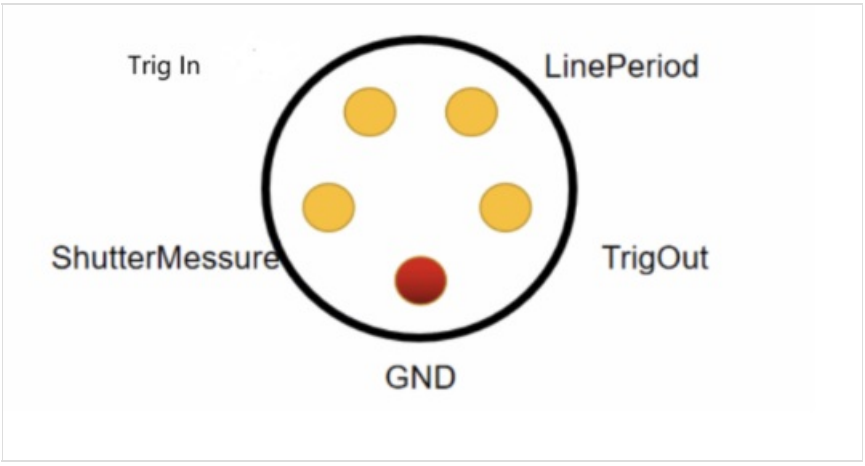
Pin Out of 4,5,6 pin socket

View Direction: Face to the socket on camera side

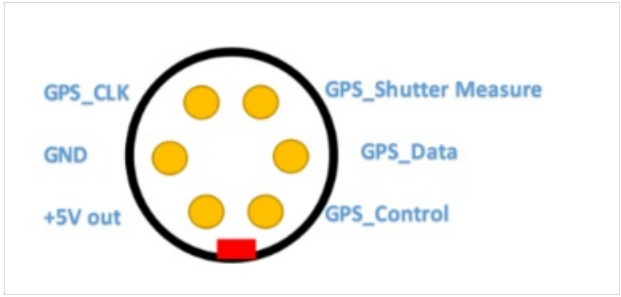
4PIN SOCKET



5PIN SOCKET



6PIN SOCKET


GPS_CLK
GPS_Shutter Measure
GND
GPS_Data
+5V out
GPS_Control