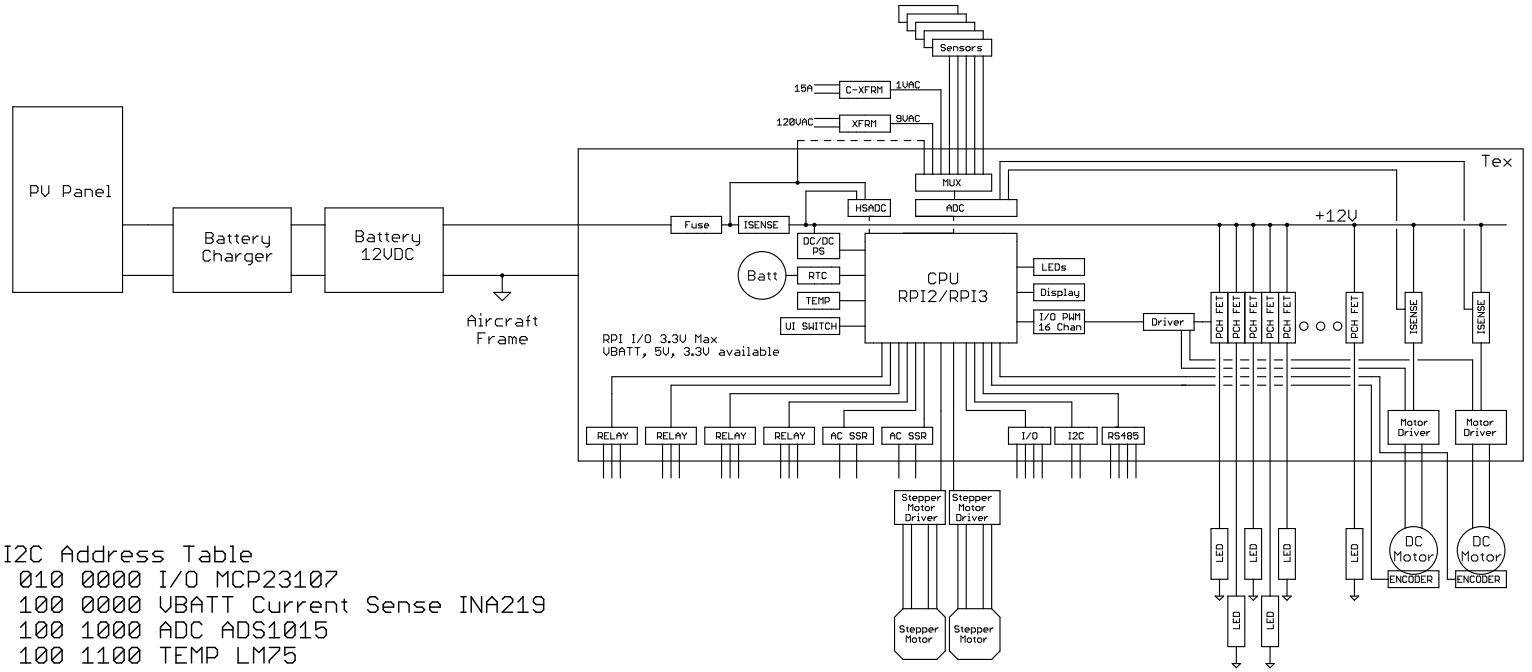
Description
The Tex Hat is a multi-purpose expansion board. This page is overall block diagram. Each page contains brief descriptions outlining individual functionality. The board does not require full component population to function. System designers can pick and choose what capabilities required.

Also, see "use cases.ods" for additional functionally descriptions.



I2C Address Table
 010 0000 I/O MCP23107
 100 0000 VBATT Current Sense INA219
 100 1000 ADC ADS1015
 100 1100 TEMP LM75
 110 0000 LED PCA9685
 110 1111 RTC MCP7940
 111 1000 Display SSD1306 Banggood

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Overview	
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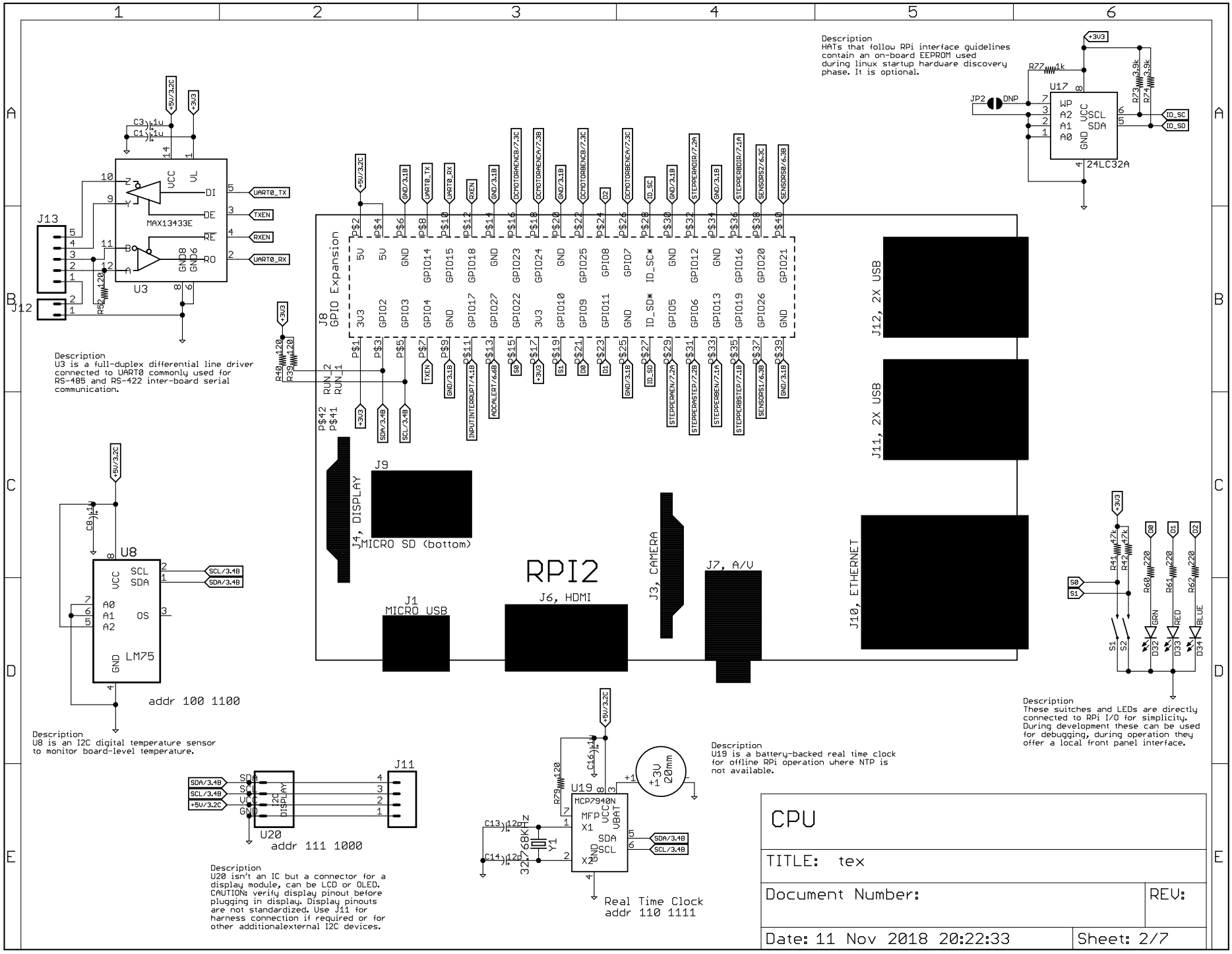
Description
HATs that follow RPi interface guidelines contain an on-board EEPROM used during linux startup hardware discovery phase. It is optional.
U17
24LC32A
JP2
DNP
Description
U3 is a full-duplex differential line driver connected to UART0 commonly used for RS-485 and RS-422 inter-board serial communication.
U3
MAX13433E
J13
J12
J8
GPIO Expansion
J12, 2X USB
J11, 2X USB
J10, ETHERNET
J9
J4, DISPLAY
J4, MICRO SD (bottom)
RPI2
J6, HDMI
J1
MICRO USB
J3, CAMERA
J7, A/V
U8
LM75
addr 100 1100
Description
U8 is an I2C digital temperature sensor to monitor board-level temperature.
U20
addr 111 1000
Description
U20 isn't an IC but a connector for a display module, can be LCD or OLED. CAUTION: verify display pinout before plugging in display. Display pinouts are not standardized. Use J11 for harness connection if required or for other additionalexternal I2C devices.
U19
MCP7940N
Real Time Clock
addr 110 1111
Description
U19 is a battery-backed real time clock for offline RPi operation where NTP is not available.
Description
These switches and LEDs are directly connected to RPi I/O for simplicity. During development these can be used for debugging, during operation they offer a local front panel interface.
CPU
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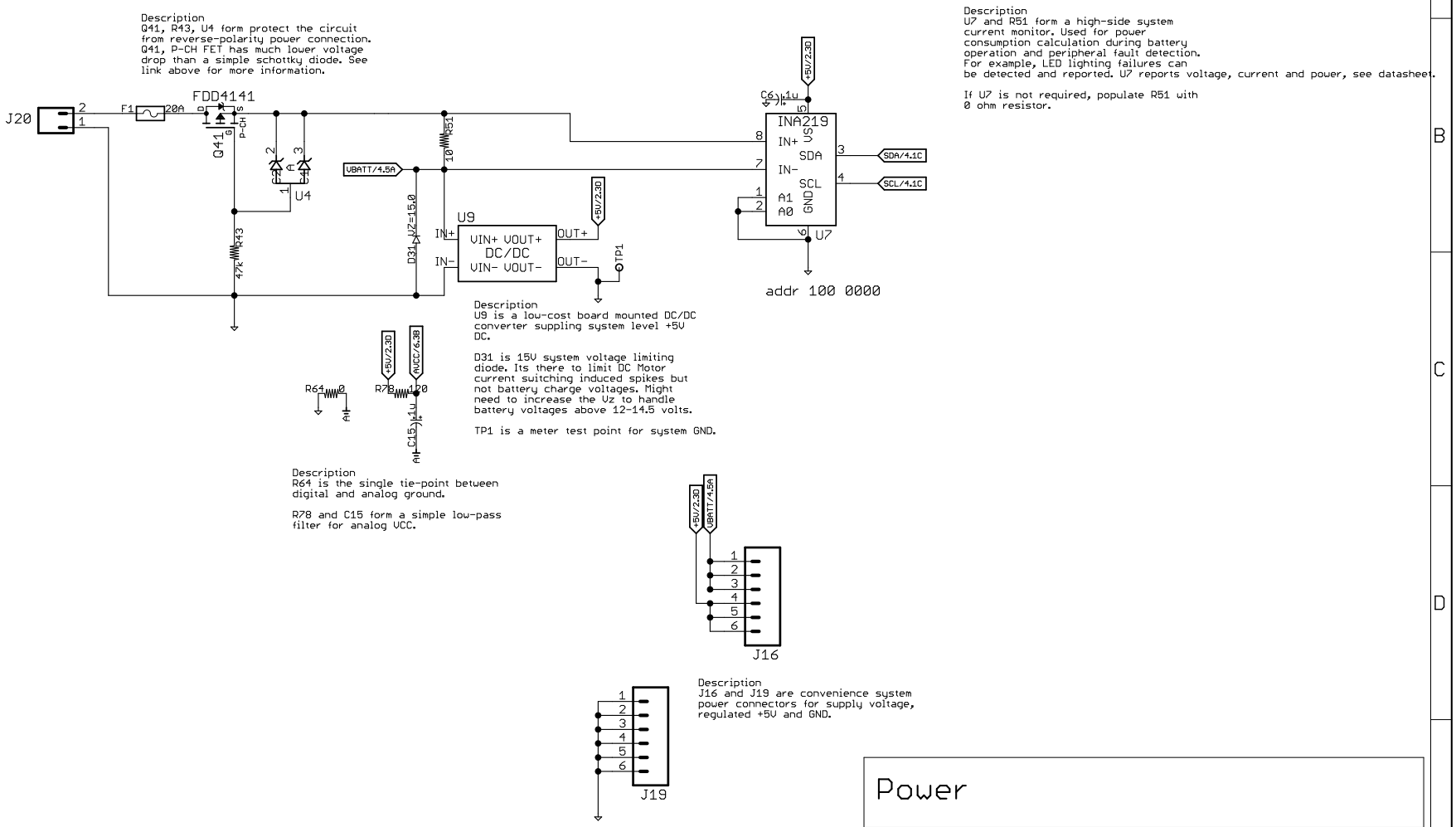
http://hackaday.com/2011/12/06/reverse-voltage-protection-with-a-p-fet/
Reverse Protection



Power	
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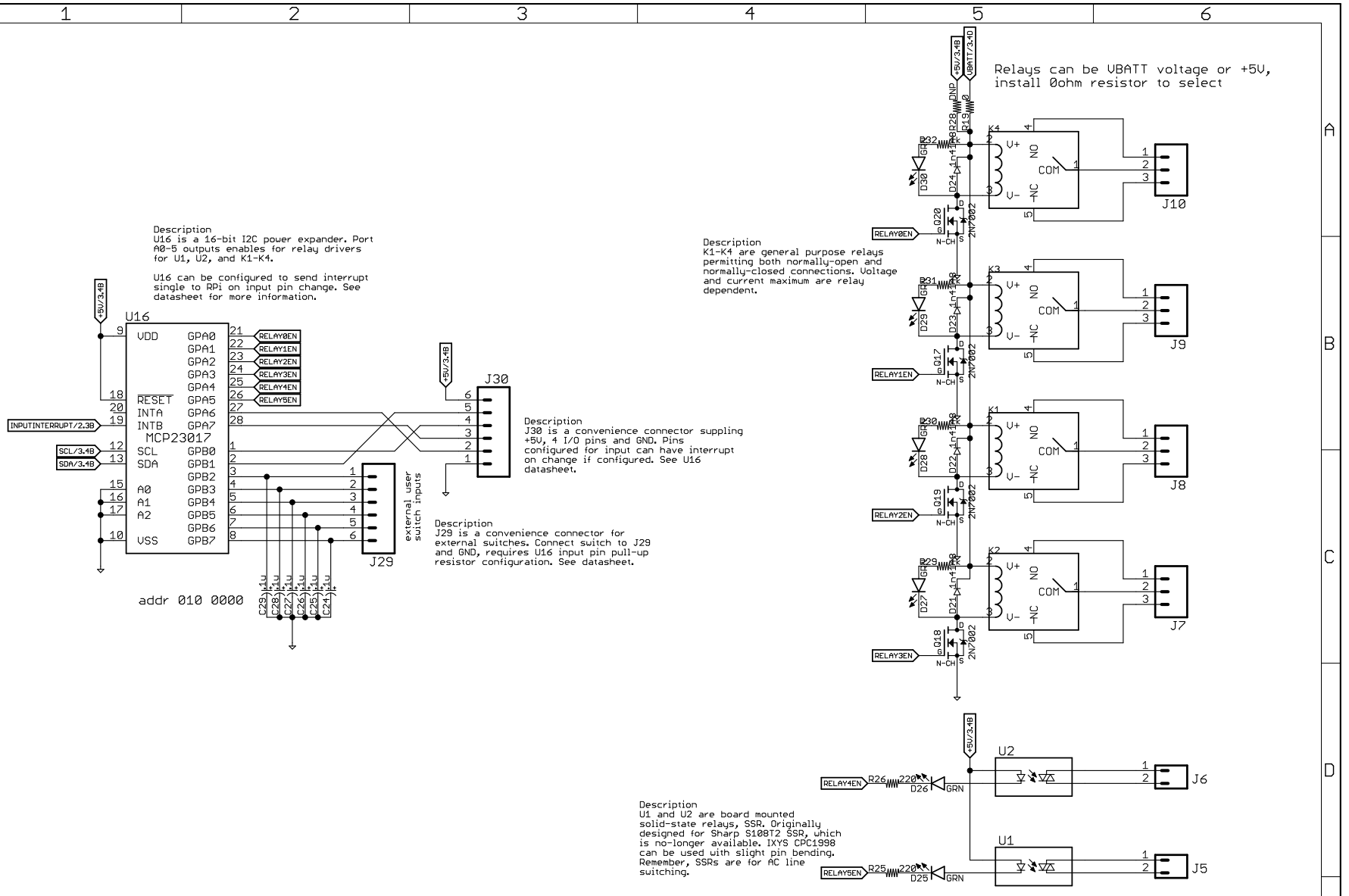

I/O	
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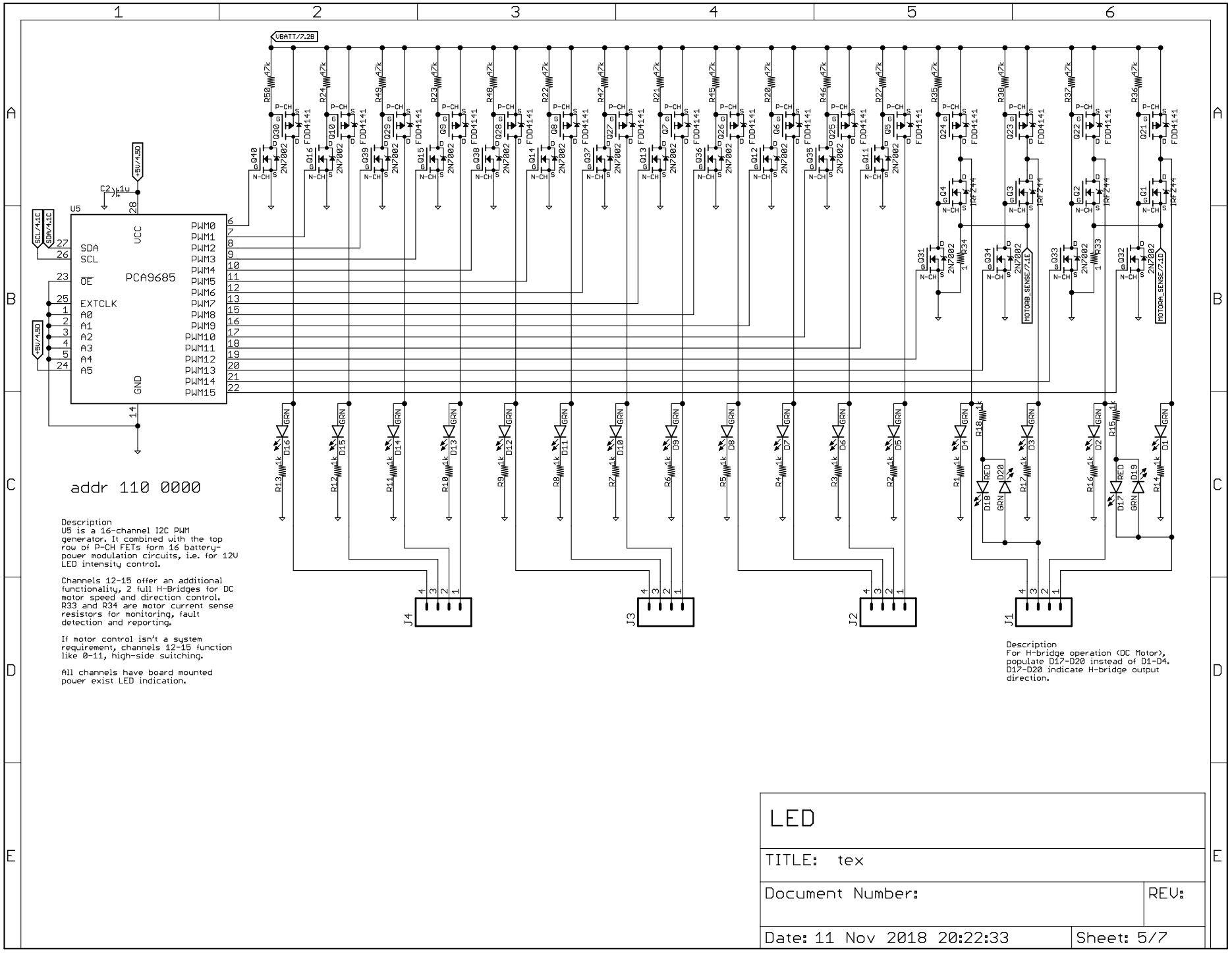

Description
U5 is a 16-channel I2C PWM generator. It combined with the top row of P-CH FETs form 16 battery-power modulation circuits, i.e. for 12V LED intensity control.

Channels 12-15 offer an additional functionality, 2 full H-Bridges for DC motor speed and direction control. R33 and R34 are motor current sense resistors for monitoring, fault detection and reporting.

If motor control isn't a system requirement, channels 12-15 function like 0-11, high-side switching.

All channels have board mounted power exist LED indication.

Description
For H-bridge operation (DC Motor), populate D17-D20 instead of D1-D4. D17-D20 indicate H-bridge output direction.

LED	
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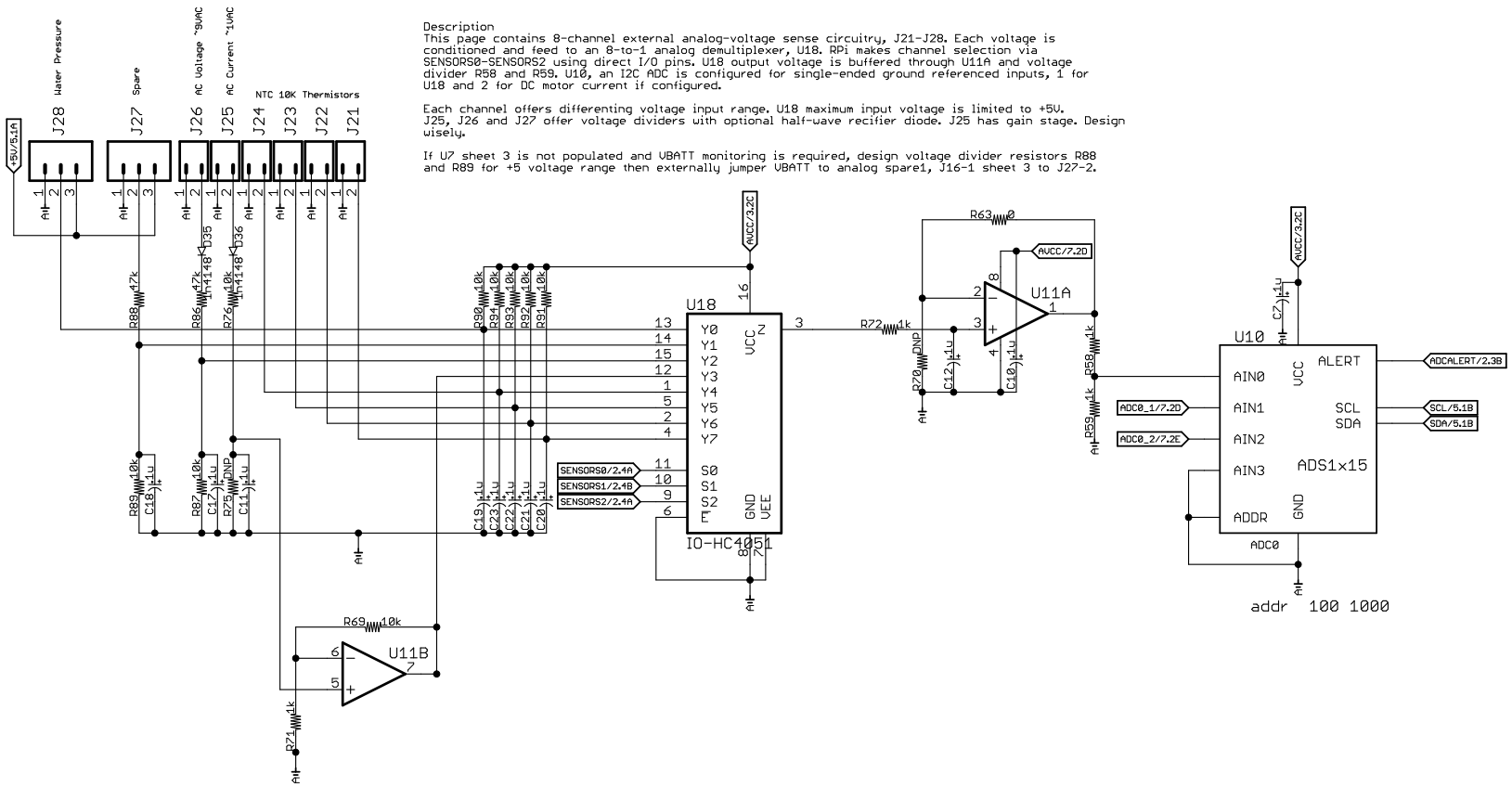

SENSORS	
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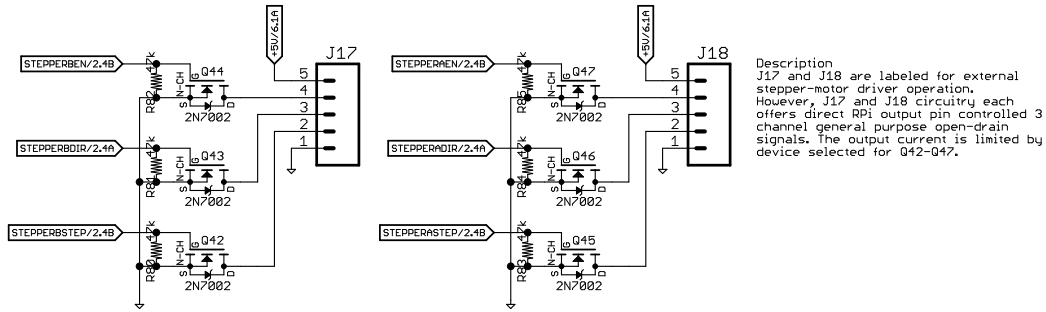
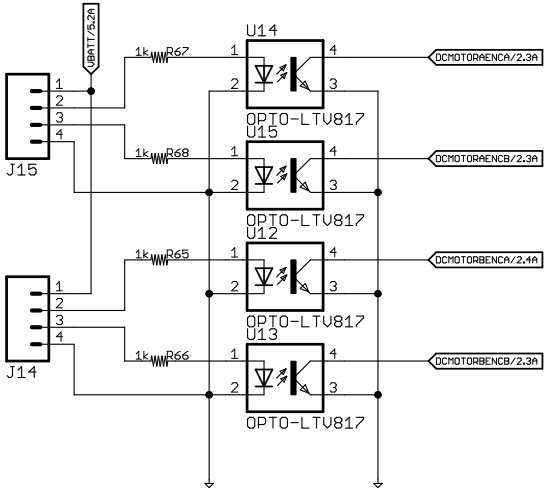
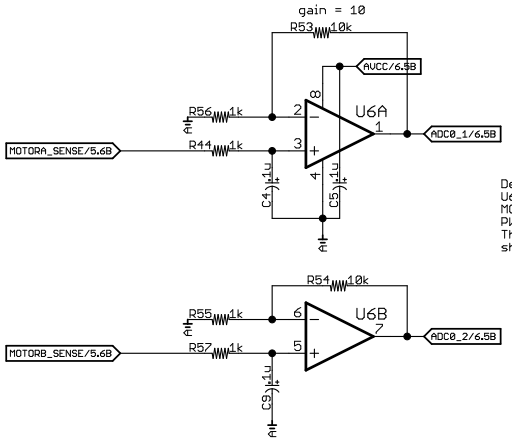


Description
J17 and J18 are labeled for external stepper-motor driver operation. However, J17 and J18 circuitry each offers direct RPi output pin controlled 3 channel general purpose open-drain signals. The output current is limited by device selected for Q42-Q47.



Description
J14, J15, U12-U14 provide 4 channels of optically isolated inputs connected directly to RPi input pins. These are labeled and DC motor encoder A-B inputs but they are general purpose inputs. R65-R68 need to current-limit opto input to less that 30mA if LTV817 is used.



Description
U6A-B are gain/filter stages for DC MOTORA and MOTORB powered by PWM-enabled H-Bridges on sheet 5. Their output is feed into U10 ADC on sheet 6.

MOTOR

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