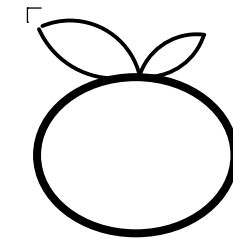


Rev	Date	Name	Description
XA1	24Apr2020	WA2DFI	Initial Drawing
XA2	26Apr2020	WA2DFI	Added Build property for LD, changed RM-3100 to sockets
XA3	29Apr2020	WA2DFI	Added LD interrupt capabiity; auto addressing
XA4	3May2020	WA2DFI	Changed interrupt jumper to 3-pin
XA5	4May2020	WA2DFI	Change PU, add capacitance
XA6	7May2020	WA2DFI	Remove AS3935 lightning detector; rename to MagneoPiHat
XA7	26May2020	WA2DFI	Fix pins on MagI2C
XA8	28May2020	WA2DFI	Fix J10 property.
XA9	31May2020	WA2DFI	Update layout, J1 p/n
XB1	20Aug2020	WA2DFI	Add C5, D2, R2, C6, C19. Change C16 to 220uF. Change U1 to ULDO Reg.

Pg	Contents
1	Cover
2	MagnetoPiHat Placement, addressing and build options
3	MagnetoPiHat Schematic



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The MagnetoPiHat can operate in three different modes:

1. STANDALONE TEST
2. LOCAL
3. REMOTE

In normal operation, a pair of MagnetoPiHat boards are used, one in LOCAL mode and the other in REMOTE MODE. The PNI sensor module is plugged into the REMOTE, and J5/J6 are empty on the LOCAL unit. Jumper the LOCAL and REMOTE units as shown below. STANDALONE TEST mode is only used to test the communications and power connections. DATA OBTAINED IN STANDALONE TEST MODE WHERE THE MAGNETOMETER IS LOCATED INDOORS IS NOT TO BE TRUSTED.

STANDALONE TEST MODE (I2C ADDRESSES set to LOCAL)

The STANDALONE TEST mode is used to test the Magnetometer module and is NOT INTENDED to be used to collect data. In order to get accurate readings, the Magnetometer module MUST BE LOCATED OUTSIDE, AWAY FROM ALL ELECTRICAL AND MAGNETIC SOURCES.

Configuration: Single MagnetoPiHat plugged onto RPi I/O expansion header
RM-3100 Magnetometer board plugged into J5/J6
Addresses automatically set to "local"

JMP3 pins: none
JMP6 pins: none

LOCAL MODE (I2C ADDRESSES set to LOCAL)

Configuration: Single MagnetoPiHat plugged onto RPi I/O expansion header
No RM-3100 Magnetometer board plugged into J5/J6
Addresses automatically set to "local"

JMP3 pins: 1-2
JMP6 pins: 1-2

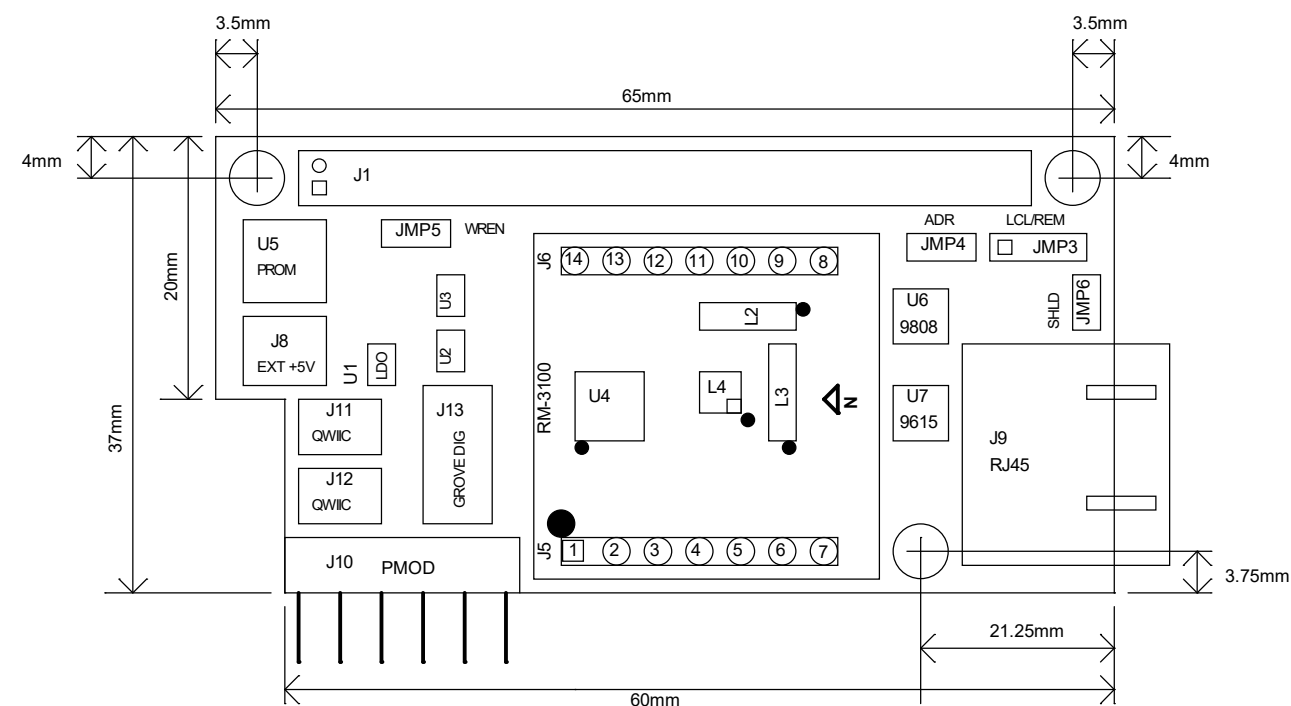
REMOTE MODE (I2C ADDRESSES set to REMOTE)

Configuration: Single MagnetoPiHat at end of CAT5 cable
RM-3100 Magnetometer board plugged into J5/J6
Addresses automatically set to "remote"

JMP3 pins: 2-3
JMP6 pins: none

I2C ADDRESS TABLE

	LOCAL Board	REMOTE Board
	These addresses are used to address the parts on the LOCAL board when the MagnetometerPiHat is plugged onto an RPi expansion header or JMP4 is installed.	These addresses are used to address the parts on the REMOTE board when the MagnetometerPiHat is not plugged onto an RPi expansion header and JMP4 is not installed. The REMOTE board must be connected to the LOCAL board with CAT5 cable.
PNI MAGIC2 ASIC	0x22 (test only)	0x23
MCP9808 TEMP SENSOR	0x18	0x19



See <https://github.com/raspberrypi/hats> for outline details

BUILD OPTIONS

The following components are not installed from the factory. To enable the functions below, install the named components.

Extended remote option R6	To extend the LOCAL/REMOTE distance 50% by using two conductors in the CAT5 cable for power, install a zero-ohm 0402 resistor at R6. This will disable the remote REM_DRDY_IRQn interrupt to the RPi. If you add this option, remove JMP3 to insure that pins 2-3 NEVER get jumpered. This will prevent destruction of Q1.
Power option JMP4, J8	To power the MagnetoPiHat in LOCAL or STANDALONE TEST mode without plugging into a RPi (or with another SBC that has an incompatible expansion header pinout), install 2-pin 0.1" headers at JMP4 and J8. Power the board by connecting +5V to J8 (mind polarity!) and jumper JMP4 fo LOACL/STANDALONE TEST mode. This option is not used in REMOTE mode.
Grove option J13	To communicate with the MagnetoPiHat in LOCAL or STANDALONE TEST mode without plugging into a RPi (or with another SBC that has an incompatible expansion header pinout), install a 4-pin Grove connector at J13. Connect the I2C port to the board by connecting a 4-wire cable between connector J13 and the I2C port on the SBC. This option is not used in REMOTE mode.
QWIIIC option J11, J12	To communicate with the MagnetoPiHat in LOCAL or STANDALONE TEST mode without plugging into a RPi (or with another SBC that has an incompatible expansion header pinout), install one or both 4-pin QWIIIC connectors at J11 and/or J12. Connect the I2C port to the board by connecting a 4-wire QWIIIC cable between connector J11/J12 and the I2C port on the SBC. You can use the second QWIIIC connector as a pass-through connection. This option is not used in REMOTE mode.
PMOD option J10	To communicate with the MagnetoPiHat in LOCAL or STANDALONE TEST mode without plugging into a RPi (or with another SBC that has an incompatible expansion header pinout), install a 12-pin PMOD connector at J10. Plug the MagnetoPiHat into a PMOD connector on the SBC. This option is not used in REMOTE mode.
Onboard Mag option C17, C18, R17-R23, L2-L4, U4	To install the magnetometer components directly to the board (instead of using a plug-in module on J5/J6), install the following parts: C17, C18, R17-R23, L2-L4, U4. Once you do this DO NOT install a magnetometer module on J5/J6.
Additional +5V capacitance C19	To add additional capacitance on the +5V rail to help with transient response, install a 220uF 6.3V 1206 capacitor at C19.

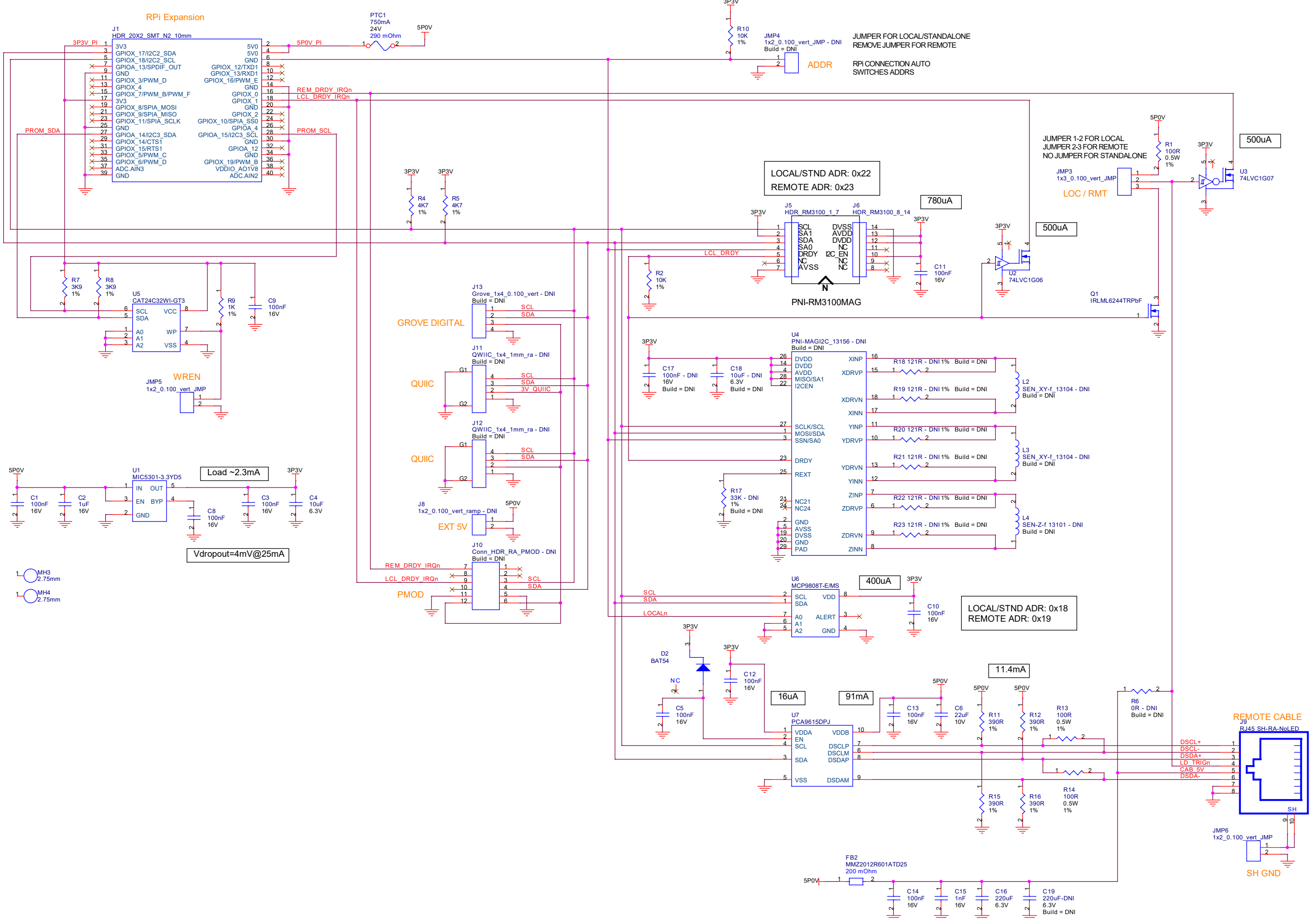
JUMPER FUNCTIONS

JMP3	PLACE JMP3 pins 1-2 to enable the RPi interrupt from the remote on the CAT5 cable PLACE JMP3 pins 2-3 to enable remote DRDY to drive the CAT5 cable Do not place JMP3 in STANDALON mode.
JMP4	Place JMP4 to shift I2C addresses to their local values. If the MagnetoPi Hat is plugged directly onto the RPi, addresses are shifted automatically and JMP4 is ignored.
JMP5	Place JMP5 to enable writes to the on-board RPi Hat eeprom. Normally users will never do this.
JMP6	Place JMP6 to connect the J9 (CAT5)shield to logic ground. Place JMP6 on the local board only in a LOCAL/REMOTE setup.

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Z Zephyr Engineering Inc. Title
TangerineSDR MagnetoPiHat Layout

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