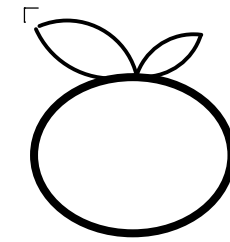


Rev	Date	Name	Description
XA1	24Apr2020	WA2DFI	Initial Drawing
XA2	26Apr2020	WA2DFI	Added Build property for LD, changed RM-3100 to sockets
XA3	29Apr2020	WA2DFI	Added LD interrupt capability; auto addressing
XA4	3May2020	WA2DFI	Changed interrupt jumper to 3-pin
XA5	4May2020	WA2DFI	Change PU, add capacitance
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.
XB2	25Aug2020	WA2DFI	Change D2 BAT54 to 0603. Renumber.
XC1	9Sep2020	WA2DFI	Add 0-ohm option connecting GPIO5 to the 9615 enable pin
XC2	23Sep2020	WA2DFI	Change R7 from 100 ohm 1/2W to 220 ohm 1/4W
XD1	11Oct2020	WA2DFI	Swap U7-2 and U7-3. Rotate J6 and substitute latch-up version; add HamSCI and NSF logos. R19 & R21 change to 0.1W
XE1	9Jun2021	WA2DFI	Major revisions for useability in 1.5" pipe
XE2	13Jul2021	WA2DFI	Fix J1 p/n, J10 connectivity
XE3	14Jul2021	WA2DFI	Change fan header J11 -> SMT vert
XE4	30Jul2021	WA2DFI	Update placement, DNI

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



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Z Zephyr Engineering Inc.	Title	
	TangerineSDR MagnetoPiHat	
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C	<Doc>	XE4
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The MagnetoPiHat can operate in three different modes:

1. STANDALONE TEST
2. NORMAL
3. EXTENDED

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.

In NORMAL operation, a pair of MagnetoPiHat boards are used. The LOCAL board is mounted on the RPi and the REMOTE board is mounted in a pipe and buried outside. The PNI sensor module is plugged into the REMOTE board and J1/J8 are empty on the LOCAL board. No jumpers are needed except JMP4 to connect the CAT5 shield to logic ground.

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: LOCAL MagnetoPiHat plugged onto RPi I/O expansion header
RM-3100 Magnetometer board plugged into J1/J8

Addresses automatically set to "local" when plugged onto RPi

LOCAL board:

- JMP1 pins: none
- JMP2: not placed
- JMP3: not placed
- JMP4: placed

NORMAL MODE (default I2C addresses set)

Configuration: LOCAL MagnetoPiHat plugged onto RPi I/O expansion header
No RM-3100 Magnetometer board plugged into LOCAL board J1/J8
REMOTE board connected to LOCAL board with shielded CAT5 cable

- | | |
|---------------------|----------------------|
| LOCAL board: | REMOTE board: |
| JMP1 pins: none | JMP1 pins: none |
| JMP2: not placed | JMP2: not placed |
| JMP3: not placed | JMP3: not placed |
| JMP4: placed | JMP4: placed |

EXTENDED MODE (alternate I2C ADDRESSES with JMP1)

Configuration: LOCAL MagnetoPiHat plugged onto RPi I/O expansion header
No RM-3100 Magnetometer board plugged into LOCAL board J1/J8
Multiple REMOTE boards connected to LOCAL board with shielded CAT5 cable

- | | |
|---------------------|---|
| LOCAL board: | REMOTE board: |
| JMP1 pins: none | JMP1: 1-2, 3-4, 5-6 for added I2C addresses |
| JMP2: not placed | JMP2: not placed |
| JMP3: not placed | JMP3: not placed |
| JMP4: placed | JMP4: placed |

A2	A1	A0	PLUGGED ONTO RPi	PNI RM3100	MCP9808	JMP1 1-2	JMP1 3-4	JMP1 5-6
0	0	X	Y	0x20	0x18	X	Y	Y
0	0	0	N	0x20	0x18	Y	Y	Y
0	0	1	N	0x21	0x19	N	Y	Y
0	1	X	Y	0x22	0x1A	X	N	Y
0	1	0	N	0x22	0x1A	Y	N	Y
0	1	1	N	0x23	0x1B	N	N	Y
1	0	X	Y	0x20	0x1C	X	Y	N
1	0	0	N	0x20	0x1C	Y	Y	N
1	0	1	N	0x21	0x1D	N	Y	N
1	1	X	Y	0x22	0x1E	X	N	N
1	1	0	N	0x22	0x1E	Y	N	N
1	1	1	N	0x23	0x1F	N	N	N

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 JMP1 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

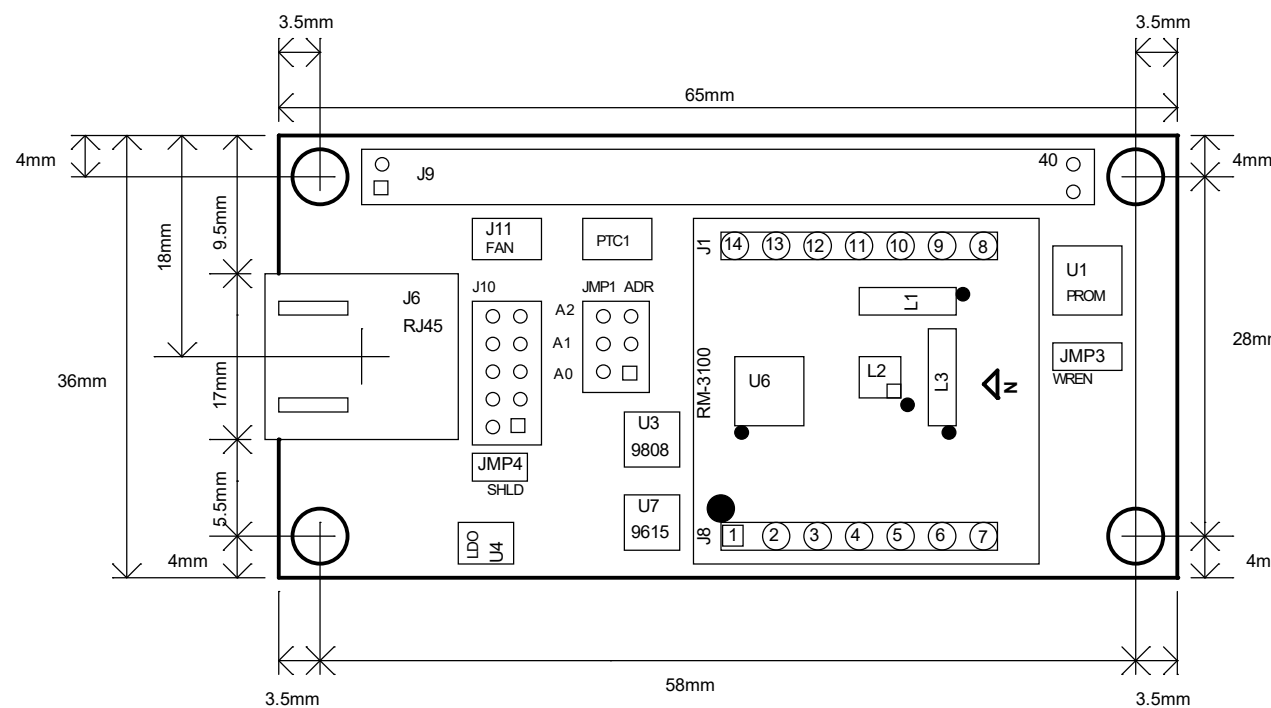
BUILD OPTIONS

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

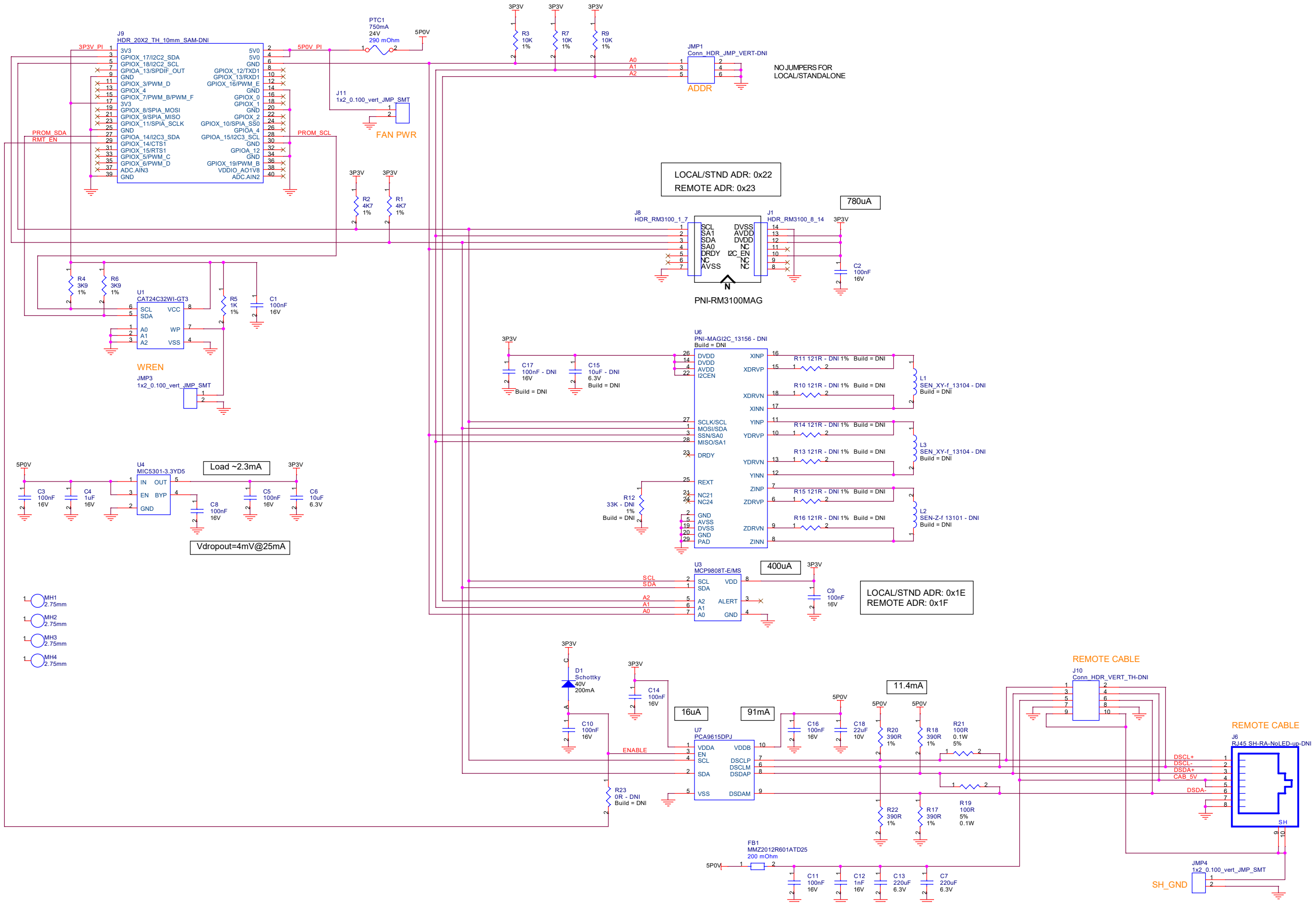
Onboard Mag option C15,C17, R10-R16, L1-L2, U6	To install the magnetometer components directly to the board (instead of using a plug-in module on J1/J8), install the following parts: C15, C17, R10-R16, L1-L3, U6. Once you do this DO NOT install a magnetometer module on J1/J8.
Additional +5V capacitance C7	To add additional capacitance on the +5V rail to help with transient response, install a 220uF 6.3V 1206 capacitor at C7.
Remote Enable R23	Install this 0402 zero-ohm resistor to allow the RPi GPIO5 (pin 29) to disable (GPIO5 low) or enable (GPIO5 high) the 9615 I2C extender under program control..

JUMPER FUNCTIONS

JMP1 - Pull A0/A1/A2 low Place JMP1 to shift I2C addresses to their local values. Note: If the MagnetoPi Hat is plugged directly onto the RPi, address A0 is pulled low automatically. JMP1 1-2=A0; JMP1 3-4=A1; JMP1 5-6=A2
JMP2 - disable RM-3100 I2C port PLACE JMP2 to disable the RM-3100 I2C port Used only when L1-L3, U6 and associated components are placed
JMP3 - enable eeprom writes Place JMP3 to enable writes to the on-board RPi Hat eeprom. Normally users will never do this.
JMP4 - connect CAT5 shield to logic ground Place JMP4 to connect the J6 (CAT5) shield to logic ground. Place JMP4 on the local board only in a LOCAL/REMOTE setup.



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



- 1 MH1 2.75mm
- 1 MH2 2.75mm
- 1 MH3 2.75mm
- 1 MH4 2.75mm

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	Title	
	TangerineSDR MagnetoPiHat	
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