

P1 PMOD (pin1 top left)

IOT_217 #139	IOT_219 #141
IOT_215 #137	IOT_216 #138
IOT_213 #135	IOT_214 #136
IOT_206 #130	IOT_212 #134
GND	GND
3.3V	3.3V

P2 PMOD (pin1 top left)

IOB_94 #56	IOB_91 #55
IOB_80 #48	IOB_79 #47
IOB_73 #45	IOB_72 #44
IOB_71 #43	IOB_64 #42
GND	GND
3.3V	3.3V

P3 PMOD (pin1 top left)

IOL_18B #26	IOB_63 #41
IOL_23B #29	IOB_61 #39
IOL_23A #28	IOB_57 #38
IOB_81_GBIN4 #52	IOB_56 #37
GND	GND
3.3V	3.3V

P4 PMOD (pin1 top left)

IOL_14A_GBIN6 #21	IOL_2A #1
IOL_13B_GBIN7 #20	IOT_222 #144
IOL_4B #8	IOT_221 #143
IOL_4A #7	IOT_220 #142
GND	GND
3.3V	3.3V

IS61WV25616EDBLL-10TLI 10ns 256K*16=4Mb=512KB (schematic shuffled A9,A10,A16,A17)

IceZero side	SRAM side
IOL_25B #34	A0 #1
IOL_25A #33	A1 #2
IOL_24B #32	A2 #3
IOL_24A #31	A3 #4
IOL_18A #25	A4 #5
IOL_5B #10	A5 #18
IOL_5A #9	A6 #19
IOL_3B #4	A7 #20
IOL_3A #3	A8 #21
IOB_95 #60	A9 #22
IOB_96 #61	A10 #23
IOR_166 #106	A11 #24
IOR_165 #105	A12 #25
IOR_164 #104	A13 #26
IOR_161 #102	A14 #27
IOB_102 #62	A15 #42
IOR_167 #107	A16 #43
IOL_2B #2	A17 #44
IOL_17B #24	CEn #6
IOL_8A #11	WEn #17
IOR_112 #76	OEn #41
IOR_117 #81	LBn #39
IOR_111 #75	UBn #40
IOR_148 #98	NC #28

Trenz electronic - IceZero - TE0876-02
 FPGA: **Lattice ICE40HX4K-TQ144** (inside HX8K)
 Package: 144-pin TQFP (20 x 20 mm)
 Pin spacing: 0.50 mm (107 IOs @ 3.3V)

Misc

LED1	IOT_168 #110
LED2	IOR_140_GBIN3 #93
LED3	IOR_141_GBIN2 #94
BTN	IOB_103_CBSEL0 #63
CLK (see *3)	IOB_81_GBIN5 #49

Raspberry Pi3 GPIO 40-pin header

rPi side	IceZero side
I2C SDA #3 *1	IOT_172 #115
I2C SCL #5 *1	IOT_171 #114
UART Tx #8	IOT_170 #113
UART Rx #10	IOT_169 #112
SPI_MOSI #19	IOR_138 #90
SPI_MISO #21	IOR_136 #87
SPI_SCK #23	IOR_115 #79
SPI_CEON #24	IOR_128 #85
SPI_CE1N #26	IOR_114 #78
GPIO25 #22	IOR_137 #88
GPIO24 #18	IOR_152 #99
GPIO22 #15	IOR_160 #101
ID_SD #27	IOR_109 #73
ID_SC #28	IOR_110 #74

Configuration through rPi header

rPi side	IceZero side
GPIO5 #29	CDONE #65
GPIO6 #31	IOB_106_SDI #68 *2
GPIO13 #33	IOB_105_SDO #67 *2
GPIO16 #36	IOB_107_SCK #70 *2
GPIO12 #32	IOB_108_SS #71 *2
GPIO26 #37	CRESET_B #66

J1 (pin1 top left)

IOT_179 #120	IOT_174 #117
IOT_181 #121	IOT_177 #118
IOT_173 #116	GND

J2

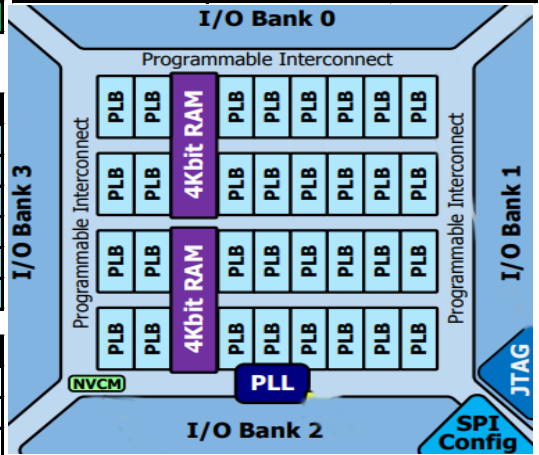
5V
GND

J3 FTDI TTL-232R-3.3V only!

IceZero side	FTDI side
GND (pin1)	GND
IOT_178 #119	→ CTS (low)
5V (be careful)	VCC (see *4)
IOT_190 #122	→ Tx (3.3V)
IOT_191 #124	← Rx (3.3V)
IOT_125 #125	← DTR (ignore)

*4 FTDI powered by 5V, but needs to interface at 3.3V!

Specs	HX4K official	HX8K inside
LC (LUT4+FF)	3520	7680
RAM4K Mem B.	20	32
RAM4K bits	80K	128K
PLLs	2	2
Max config bits	533 Kb	1057 Kb
Power @ 0 kHz	667 uA	1100 uA
Max IO	95	206
Max diff. pairs	12	26



```
icepll -i 100 -o 16 -p -v pll.v # to get 16MHz clock
yosys -p 'synth_ice40 -top top -blif a.blif -json a.json' top.v
wget https://pastebin.com/raw/BsVatb8b -O icezero.pcf
nextpnr-ice40 --hx8k --package tq144:4k --json a.json \
--pcf icezero.pcf --asc a.asc --freq 16 # better than archane-pnr
archane-pnr -d 8k -P tq144:4k -p icezero.pcf -o a.asc a.blif
icetime -d hx8k -c 16 a.asc # archane to test 16MHz timing
icepack a.asc a.bin && iceprog a.bin # RPI bitbang SPI
*1 rPi's I2C connected to 24LC64T-E/OT as well.
*2 Configuration 64M SPI FLASH (16Mx4)
N25Q064A13ESE40F or IS25LP064D-JBLE
connects to configuration pins as well
*3 SiT8008AI-73-XXS-100.00000E 100MHz clock.
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Anton Krug 2022/07/02
 Board rev2. Doc v7.

