

FPGA Boot Camp \$20 FPGA kit with full user IO, some assembly required: soldering & breadboard wiring

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item	avail	web link	2nd web link	need	part #	high vol price	# per order	min quant price	per kit cost	# per kit	dx mm	dy mm	IO	K LUTs	Mb block RAM	MB D-RAM	MB flash	Q	vendor	mfg	comments
Seed Tang Nano-9K	yes	https://www.aliexpress.us/item/3256804089225102.html		FPGA board	Tang Nano-9K	\$13.04	1	\$13.04	13.04	1.0	25.4	60.0	36	8.6	0.48	8.0	8.0	Y	AliExpress	gowinsem	2PB, 6LED, HDMI & LCD conn, 27MHz os
8 7-seg, 8 PB, 8 LED	yes	https://handsontec.com/index.php/product/tm1638-7-segment-display-keypadled-modul		User IO	TM1638 7-Segment Dis	\$2.90	1	\$2.90	2.90	1.0	50.8	76.2	5 pins						HandsOn Tech		user IO except slide switches, used in apj
16 PCS 400 Pin Solderless Board	yes	https://www.amazon.com/MCIGICM-Breadboard-Solderless-Prototype-Protoboard/dp/B087QXMXWR2/ref=sppa_dk_detail_2		Breadboard	MCIGICM Breadboard 4	\$19.99	16	\$6.69	1.249	1.0	58.0	83.8							amazon	MCIGICM	connectable, e.g. connect two for more !
12 position DIP switch	yes	https://www.digikey.com/en/products/detail/cts-electrocomponents/210-12MS/250378		12 pos slide switch	CT21012MS-ND	\$2,747.45	5000	\$1.06	0.549	1.0	8.0	32.0							digikey	ctscorp	DIP size pins, Newark has closeout prices
male-female Jumper Cables	yes	https://www.digikey.com/en/products/detail/adafruit-industries-llc/1954/6827087		(40) m/f jumpers	1954	\$156.00	100	\$1.95	0.312	5.0	2.5	152.4							adafruit	adafruit	6" long, insulated
Seed Tang Nano-9K	yes	https://www.pcbway.com/project/gifts_detail/Sipeed_Tang_Nano_9K_FPGA_kits_with_3		FPGA board	Tang Nano-9K	\$22.99	1	\$20.64	22.99	1.0	25.4	60.0	36	8.6	0.48	8.0	8.0	Y	pcbway	gowinsem	includes 1.14" LCD screen
Seed Tang Nano-9K	no	https://www.seedstudio.com/Tang-Nano-9K-FPGA-board-Go	https://www.cnx-software.com/Products/Seed-Tang-Nano-9K-FPGA-board-Go/	FPGA board	Tang Nano-9K	\$14.90	1	\$14.90	14.90	1.0	25.4	60.0	36	8.6	0.48	8.0	8.0	Y	Seed	gowinsem	2PB, 6LED, HDMI & LCD conn, 27MHz os
10 PCS 830 Point Solderless Board	yes	https://www.amazon.com/MCIGICM-Breadboard-Solderless-Protoboard-Electronics/dp/B087QXMXWR2/ref=sppa_dk_detail_3		Breadboard	MCIGICM Breadboard 8	\$19.99	10	\$9.99	1.999	1.0	58.0	167.4							amazon	MCIGICM	longer board, more room for other stuff
2+2 400 & 830 Point Solderless Board	yes	https://www.amazon.com/dp/B086C9HK7V/ref=sppa_dk_detail_3		Breadboard	Deke Home	\$9.99	4	\$9.99	2.498	1.0	58.0	167.4							amazon	Deke Hom	two short & two long
8 PCS 830 Point Solderless Board	yes	https://www.amazon.com/Pcs-MCIGICM-Points-Solderless-Breadboard/dp/B07PCJP9DY/		Breadboard	MCIGICM Breadboard 8	\$16.60	8	\$9.99	2.075	1.0	58.0	167.4							amazon	MCIGICM	longer board, more room for other stuff
30 PCS 400 Pin Solderless Board	yes	https://www.amazon.com/dp/B08RGZD7FR/ref=sr_1_1		Breadboard	VILLCASE Breadboard 4	\$46.67	30	\$6.69	1.556	1.0	58.0	83.8							amazon	VILLCASE	connectable, e.g. connect two for more !
4 PCS 400 Point Solderless Board	yes	https://www.amazon.com/Pcs-MCIGICM-Points-Solderless-Breadboard/dp/B07PCJP9DY/		Breadboard	MCIGICM Breadboard 8	\$6.69	4	\$6.69	1.673	1.0	58.0	83.8							amazon	MCIGICM	best price for quant 4
6 PCS 400 Point Solderless Board	yes	https://www.amazon.com/DEYUE-breadboard-Set-Prototype-Board/dp/B07LFD4L6/ref=sppa_dk_detail_2		Breadboard	DEYUE breadboard	\$9.99	6	\$9.99	1.665	1.0	58.0	83.8							amazon	DEYUE	best price for quant 6
rotary dip switch	yes	https://www.digikey.com/en/products/detail/cts-electrocomponents/220ADC16/474385		HEX rotary switch	CT3070-ND	\$5,755.75	5000	\$2.28	1.151	1.0									digikey	ctscorp	has knob, also surface mount
5 position DIP switch	yes	https://www.digikey.com/en/products/detail/cui-devices/DS02C-254-1L-05BE/11310939		5X slide switch	DS02C-254-1L-05BE	\$2,092.72	4917	\$0.82	0.851	0.5									mouser	CUI	two per kit, piano shape
8 position DIP switch	yes	https://www.harlington.com/products/p-1071817		(20) 8pos slide switch		\$3,250.00	8125		0.400	1.0									several	uxcell	DIP leads
8 position DIP switch	yes	https://www.newark.com/multicomp/mcei-08/switch-dip-8-position-spst-raised/dp/74M		8 pos slide switch	MCEIR-08	\$0.20	1	\$0.20	0.203	1.0									newark	multicomp	DIP leads, end stackable
100 male-female Jumper Cables	yes	https://www.digikey.com/en/products/detail/schmartboard-inc/920-0023-01/9556952		(100) m/f jumpers	920-0023-01-ND	\$45.00	1	\$7.00	3.750	12.0									digikey		5" long, has heatshrink covering
20 male-female Jumper Cables	yes	https://www.digikey.com/en/products/detail/adafruit-industries-llc/1954/6827087		(20) m/f jumpers	1528-1964-ND	\$1.95	1	\$1.95	0.650	3.0									digikey	adafruit	5" long, insulated
Breadboard Jumper Cables Kit	yes	https://www.amazon.com/dp/B07QXMXWR2/ref=sppa_dk_detail_2		360 jumpers	Elegoo-EL-CP-004	\$10.99	1	\$6.98	0.733	15.0									amazon	ELEGOO	8X M/M, M/F, F/F per kit?
male-female Jumper Cables	yes	https://www.digikey.com/en/products/detail/adafruit-industries-llc/1954/6827087		(40) m/f jumpers	1528-1964-ND	\$156.00	100	\$1.95	0.312	5.0	2.5	152.4							digikey	adafruit	10cm long, insulated
male-male Jumper Cables	yes	https://tinkererssupply.com/products/10-cm-40-pin-solderless-jumper-wires-male-to-male		(40) m/m jumpers	10 CM 40 Pin Solderless	\$2.49	1	\$2.49	0.623	4.0									tinkersupply		10 per kit?
HOOK-UP 22AWG SOLID - 5FT	yes	https://www.digikey.com/en/products/detail/cnc-tech/10982	digikey	breadboarding	1175-2683-5-ND	\$318.54	500	\$0.99	0.637	1.0									digikey	CNC Tech	green insulation
1.14" 1.14 inch 135x240 Full Color	yes	https://www.aliexpress.us/item/3256803585877182.html				\$1.93	1	\$1.93	1.930	1.0									AliExpress		full color, 8-pin
narrow FPGA boards		https://shop.trenz-electronic.de/en/Products/Trenz-Electronic/																			
cheap FPGA boards		https://www.joelw.id.au/FPGA/CheapFPGADevelopmentBoards																			

DIP switch mounted on breadboard spanning plugboard ground bus and rows connected to FPGA IOs

Gowin IDE has low level placement tools, supports VHDL, Verilog and constraint files
Seed Tang Nano-9K includes unsoldered pins, USB cable & case; has 27MHz oscillator
Tang Nano-9K also supported by Litex: <https://github.com/enjoy-digital/litex>

Required parts \$18.051

Low volume cost, some extra parts \$25.64

DIP switch only item with high volume price break, some very low prices at Newark

FPGA board has DRAM, Flash & SD socket

PCBway version includes small LCD display

Breadboards work best with 22awg solid copper and full DIP pin slide switches