Acorn Electron ULA - MAX 10 Board - V1.05
Bill of Materials

Note: This board can only be fitted to a PGA68 socket on the Electron board. This requires that the original ULA and socket are removed and replaced with a turned pin PGA68 socket. This can be made from turned pin headers which is included in the BOM below

Tips
1. Fit the ULA socket pins last (17)
2. Soldering the MAX 10 FPGA - Place some solder paste on the large central pad and then place the chip accordingly with gel flux applied to the pads as per point 3. Drag solder the pins first and then solder the central pad from the opposite side of the board through the hole under the FPGA
3. I recommend using a gel like flux for the SMD chips. Run plenty along each row of pads and then align the chip correctly, the gel helps keep the chip in place. Tag each corner by soldering one or two pins and then drag solder the rest. See guide below
4. All the passives (capacitors, resistors), comparator and regulator etc are best done with solder flux and a hot air gun. I would avoid doing this to the SW1 switch however as it may melt it. The switch is best done with the soldering iron

Excellent drag soldering guide here "https://www.youtube.com/watch?v=nyele3CIs-U". Makes it look easy though !

Id	Designator	Package	Quantity	Designation	Description	Supplier and ref
1	R20, R21, R22, R23	R_0603_1608Metric_Pad1.05x0.95mm_HandSolder	4	4.7K Resistor	Pullups for Keyboard input	
2	D1,D2	D_SOD-323_HandSoldering	2	Schottky Diode	BAT54	https://www.digikey.co.uk/product-detail/en/on-semiconductor/BAT54HT1G/BAT54HT1GOSCT-ND/917809
3	U2	TSSOP-14_4.4x5mm_P0.65mm	1	74HCT125D	Quad Buffer	https://www.digikey.co.uk/product-detail/en/nexperia-usa-inc/74HCT125PW,118/1727-4087-1-ND/1965389
4	R1, R2, R3, R4, R5, R6, R7, R8, R10, R11, R12, R13, R17, R24, R26, R27, R28, R29, R30	R_0603_1608Metric_Pad1.05x0.95mm_HandSolder	19	10K Resistor		
5	SW1	SW_DIP_SPSTx04_Slide_Copal_CHS-04B_W7.62mm_P1.27mm	1	SW_DIP_x04	Configuration Switch	https://www.digikey.co.uk/product-detail/en/nidec-copal-electronics/CHS-04TB/563-1008-1-ND/948417
6	J1	PinHeader_1x02_P2.54mm_Vertical	1	Conn_01x02	5V Power Input Normal Square Pins	
7	JTAG1	PinHeader_2x05_P2.54mm_Vertical	1	Conn_02x05_Odd_Even	JTAG Pins Normal Square Pins	
8	C1, C2, C3, C4, C5, C6, C7, C8, C9, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C21, C22, C23, C24, C26, C28, C30, C31	C_0603_1608Metric_Pad1.05x0.95mm_HandSolder	26	0.1uf Capacitor		
9	X1	Crystal_SMD_7050_4Pads	1	Oscillator	16Mhz Oscillator	Not required unless Electron 16Mhz signal is very poor. FPGA will require an update to use the on board 16Mhz signal
10	C27	C_0805_2012Metric_Pad1.15x1.40mm_HandSolder	1	10uF Capacitor Tantalum		
11	U9	SOT-223	1	AP2114H-3.3TRG1	Regulator	https://www.digikey.co.uk/product-detail/en/diodes-incorporated/AP2114H-3.3TRG1/AP2114H-3.3TRG1DICT-ND/4505142?utm_adgroup=PMIC%20-%20Voltage%20Regulators%20-%20Linear&utm_source=google&utm_medium=cpc&utm_campaign=Google%20Shopping_Integrated%20Circuits%20%28ICs%29&utm_term=&productid=4505142&gclid=EAIaIQobChMIkoq-teuO6gIVC4myCh0O7wooEAQYASABEgJpyfD_BwE
12	C20,C25,C29	C_0805_2012Metric_Pad1.15x1.40mm_HandSolder	3	0.1uf Capacitor		
13	R9, R14, R15, R16, R18, R31	R_0805_2012Metric_Pad1.15x1.40mm_HandSolder	5	10K Resistor		
14	R19	R_0805_2012Metric_Pad1.15x1.40mm_HandSolder	1	4.7K Resistor	nNMI 5V Pullup	
15	U1	EQFP	1	10M08SCE144C8G	Intel MAX 10 FPGA	https://www.digikey.co.uk/products/en?keywords=10M08SCE144C8G
16	U3, U4, U5, U6, U7, U8	TSSOP-24_4.4x7.8mm_P0.65mm	6	74LVC4245APW	Octal Transceiver	https://www.digikey.co.uk/product-detail/en/nexperia-usa-inc/74LVC4245APW-118/1727-4308-1-ND/2209918
17	U10	ULA Socket Pins - 1x40 - 2.54mm Pin Headers	2	PGA 68 Pin Layout	ULA Socket Pins Turned Pin Type	https://hobbycomponents.com/connectors/439-01-254mm-40way-sil-turned-pin-m-m-headers-pack-of-5
18	CMP1	SOT-23-5	1	MIC7221YM5-TR	Comparator	https://www.digikey.co.uk/product-detail/en/microchip-technology/MIC7221YM5-TR/576-2901-1-ND
19	R25	R_0805_2012Metric_Pad1.15x1.40mm_HandSolder	1	100R Resistor	CPU Clock Noise Reducer	
20	J2	Hirose 8 Way Right Angle Micro SD Memory Card Connector	1	Micro SD Card Holder	SD Card Holder	https://uk.rs-online.com/web/p/memory-card-connectors/7388809
21	Turned pin socket headers to make ULA socket for Electron circuit board	ULA Socket for Electron circuit board	1		Pack of 5 x 40 pin	https://hobbycomponents.com/connectors/392-01-254mm-40way-sil-turned-pin-m-f-headers-pack-of-5
22	R32, R33, R34, R35, R36, R37, R38, R39	R_0603_1608Metric_Pad1.05x0.95mm_HandSolder	8	33 Ohm Resistor	Slow down Data Buffers to reduce noise	