Acorn Electron ULA - MAX 10 Board - V1.03
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
https://www.ebay.co.uk/i/292483310138?chn=ps&norover=1&mkevt=1&mkrid=710-134428-41853-0&mkcid=2&itemid=292483310138&targetid=908661474856&device=c&mktype=pla&googleloc=9046613&poi=&campaignid=10195651586&mkgroupid=107296210212&rlsatarget=pla-908661474856&abcId=1145987&merchantid=7398364&gclid=EAIaIQobChMI6ru5t-WQ6gIVzoKyCh1oBwxIEAQYCiABEgImJvD_BwE

Tips
1. Fit the ULA socket pins last (15). I would recommend "tinning" the pins which go into the ULA socket before fitting to the board otherwise they are a loose fit in the socket. **Check on your socket before doing this though just in case**
2. Soldering the MAX 10 FPGA - Place a small amount of 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 heat the chip from the other side of the board with a hot air gun to hopefully melt the solder paste. I'm not sure this is the correct technique but thats the process I used.
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"

Id	Designator	Package	Quantity	Designation	Description	Supplier and ref
1	R29,R28,R27,R26	R_0603_1608Metric_Pad1.05x0.95mm_HandSolder	4	4.7K Resistor	Pullups for Keyboard input	
2	D2,D1	D_SOD-323_HandSoldering	2	Schottky Diode	BAT54	https://www.digikey.co.uk/product-detail/en/on-semiconductor/BAT54HT1G/BAT54HT1GOSCT-ND/917809
3	U10	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	R25,R20,R24,R23,R22,R21,R19,R18,R17,R16,R15,R14,R13,R12,R11,R10,R9,R8,R7	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	C29,C27,C25,C23,C22,C21,C19,C18,C13,C12,C10,C8,C6,C4,C9,C7,C5,C3,C2,C11,C16,C30,C17,C15,C14,C1	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	C28	C_0805_2012Metric_Pad1.15x1.40mm_HandSolder	1	10uF Capacitor Tantalum		
11	U8	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,C26,C31	C_0805_2012Metric_Pad1.15x1.40mm_HandSolder	3	0.1uf Capacitor		
13	R2,R1,R5,R4,R3	R_0805_2012Metric_Pad1.15x1.40mm_HandSolder	5	10K Resistor		
14	U1	EQFP	1	10M08SCE144C8G	Intel MAX 10 FPGA	https://www.digikey.co.uk/products/en?keywords=10M08SCE144C8G
15	U5,U7,U3,U6,U4,U2	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
16	U9	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
17	CMP1	SOT-23-5	1	MIC7221YM5-TR	Comparator	https://www.digikey.co.uk/product-detail/en/microchip-technology/MIC7221YM5-TR/576-2901-1-ND
18	R6	R_0805_2012Metric_Pad1.15x1.40mm_HandSolder	1	100R Resistor		