

## Procedure of Fabricating and Assembling UMass Moo 1.1

### Fabrication of Moo PCB:

1. To fabricate Moo PCBs, a bunch of Gerber files and some fabrication setting options are needed.
2. Contact a PCB factor to ask for a price, such as Sierra ProtoExpress. An email to [rosyb@protoexpress.com](mailto:rosyb@protoexpress.com) can be sent to ask for a quotation. The email should include:
  - a) Quantity: such as 10, 100, 1000
  - b) # of days: such as 3, 4, 5, or more
  - c) Material Type: FR4
  - d) Finish thickness: 31 mil.
  - e) Copper Weight (inner): 1oz
  - f) Copper Weight (outer): 2oz
  - g) Silk Screen Color: White
  - h) Solder Mask Color: Green
  - i) Surface finishing: HASL
  - j) The Gerber files of Moo as attachments. The following contents will talk about how to obtain these files.
3. Download the Moo hardware design file package Moo1.1\_03102011.zip from URL:  
<http://www.github.com/spqr/umassmoo>
4. Uncompressed the package, all gerber files needed to fabricate Moo PCBs are in the directory of Moo1.1\_03102011\Gerbers.
5. If you want to do change of PCB layout and generate new gerber files, the following steps are needed:
  - a) Install a CAD software to design Schematics and PCBs, such as Altium Designer Winter 2009, or later version.
  - b) Use the Altium Designer software to edit the PCB layout of Moo.
  - c) Export new gerber files by following the tutorial of URL:  
<http://www.olimex.com/pcb/How%20to%20export%20Gerber%20files%20from%20Altium%20Designer%202009.pdf>

### Assemble of Moo:

1. Assembling is a procedure of soldering the parts onto the print circuit board. The obtaining of Moo PCB has already been described above. The other parts can be obtained in any one of two ways:
  - 1) Purchase by yourself;
  - 2) Some PCB assemblers provide service of parts purchasing/collecting service.

2. A bill of materials (BOM) is necessary to collecting the parts. The BOM of Moo is attached at the end of this document.
3. If you want to purchase the parts by yourself, you order everything listed in the BOM, otherwise, you need buy the service of the assembler, the factor which provides PCB assembling services for you.
4. Contact an assembler to ask for a quotation, such as Sierra ProtoExpress. In the email, the following documents should be sent as attachments:
  - d) PDF file of your PCB
  - e) Bill Of Materials (BOM), which includes part manufacturer #, designator, description, quantity.
5. Once got the PCBs and all parts, and quotation for assembling, mail the PCBs and parts in one box to assembler and just wait for the return of them.

Part Name / Manufacturer ID	Designator	Description	Quantity Needed	Quantity Available
0805YD106KAT2A	C1	Ceramic Capacitor - Standard, 10uF	10	22
C1005X7R1C104K	C2, C4, C5, C6, C9, C13	Ceramic Capacitor - Standard, 0.1uF	60	100
GRM1555C1H100JZ01D	C10, C11, Cp1, Cp2, Cp3, Cp4	Ceramic Capacitor - Standard, 10pF	60	69
GRM1555C1H101JZ01D	C12	Ceramic Capacitor - Standard, 100pF	10	20
GRM155R61A105KE15D	C14, C20	Ceramic Capacitor - Standard, 1uF	20	27
GRM1555C1H7R0DZ01D	Cs1, Cs2, Cs3, Cs4, Cs5	Ceramic Capacitor - Standard, 7pF	50	60
GKRP20066	CV1	Variable Capacitor 603 Compatible, DK: 490-2009 & SG2026CT, 5~20pF	10	15
HSMS-285C-BLK	D1, D2, D3, D4, D5	Agilent Schottky Diode, Bridge Quad, HSMS-285C, Vrrm = 2V	50	100
RB751S40T1G	D6, D7	Agilent Schottky Diode, Bridge Quad, HSMS-285C, Schottky Diode, Vr = 30V	20	22
SML-311UTT86	DA1	LED 630NM RED WTR CLR 0603 SMD	10	12
ESD5Z3.3T1G	ED	5V Overvoltage Protection Zener	10	15
ELJ-RE6N8JFA	L1	Inductor, 6.8nH	10	26
MSP430F2618TPMR	MCU1	64PM MSP430F2618	10	10
851-93-050-20-001000	P1	Header, 10-Pin	100	125
BFT25A,215	Q1	NPN 5 GHz wideband transistor	10	10
NTK3134NT1G	Q2, Q3, Q5	Power MOSFET 20V, 890mA, single N-channel	30	33
BF1212WR,115	Q4	N-Channel Dual Gate Transistor	10	22
ERJ-2GE0R00X	R1	Thick Film Chip Resistor, 0 ohm	10	12

ERJ-2RKF1001X	R2, R4	Thick Film Chip Resistor, 1k ohm	20	30
ERJ-2GEJ202X	R3	Thick Film Chip Resistor, 2k ohm	10	12
CRCW0402100RFKED	R5	Thick Film Chip Resistor, 100 ohm	10	29
CRCW040233K0FKED	R6, R17	Thick Film Chip Resistor, 33k ohm	20	22
ERJ-2RKF1002X	R10, R11	Thick Film Chip Resistor, 10k ohm	20	22
ERJ-2RKF2003X	R16	Thick Film Chip Resistor, 200k ohm	10	22
ERJ-2RKF1004X	R18	Thick Film Chip Resistor, 1M ohm	10	30
ERJ-2RKF6652X	R19	Thick Film Chip Resistor, 66k ohm	10	12
CRT0603-BY-10R0ELF	Rs	RES 10 OHM 1/10W .1% 0603 SMD	10	14
LM94021	TMP	Temperature Sensor	10	12
<a href="#">NCS2200SQ2T2G</a>	U1	On Semi 10uA Comparator	10	12
NLSV1T244MUTBG	U2, U4	Level Shifter: 1-Bit Dual-Supply Non-Inverting Level Translator	20	22
NCP583SQ18T1G	U3	Ultra-Low Iq 150mA CMOS LDO Regulator with Enable, 1.8V, SC82-AB	10	10
S-1000C20-I4T1G	U5	Ultra-small package High precision protection(SNT-4A)	10	22
TS5A3166	U6	TI Analog Switch 100nA 1ohm Normally Open	10	22
SST25WF040-40-5I-SAF	U7	4Mb 40MHz SPI 8-Lead SOIC Flash	10	10
ADXL330	XL	Analog Devices 3-axis accelerometer	10	10
FC-135 32.7680KA-A3	Y1	FC-135 Crystal D-K SE2416CT (MC-146), 32KHz Crystal	10	10
	PCB	Moo 1.1 PCB	10	10