

Cirel Systems Pvt Ltd

# CSPM3001 Module Board Design Guide

10/7/2015

## I. Introduction

Reduced form factor designs are required for Smartphone, Tablet, Wearable's, IOT and other portable applications. CSPM3001 module board enables the user to power there next generation applications with minimum possible area on the PCB with all required passives integrated. CSPM3001 detailed specifications are available in datasheet at [www.cirelsystems.com](http://www.cirelsystems.com).

The module board has a reduced form factor design in a 22.5mm x 25.5mm area.

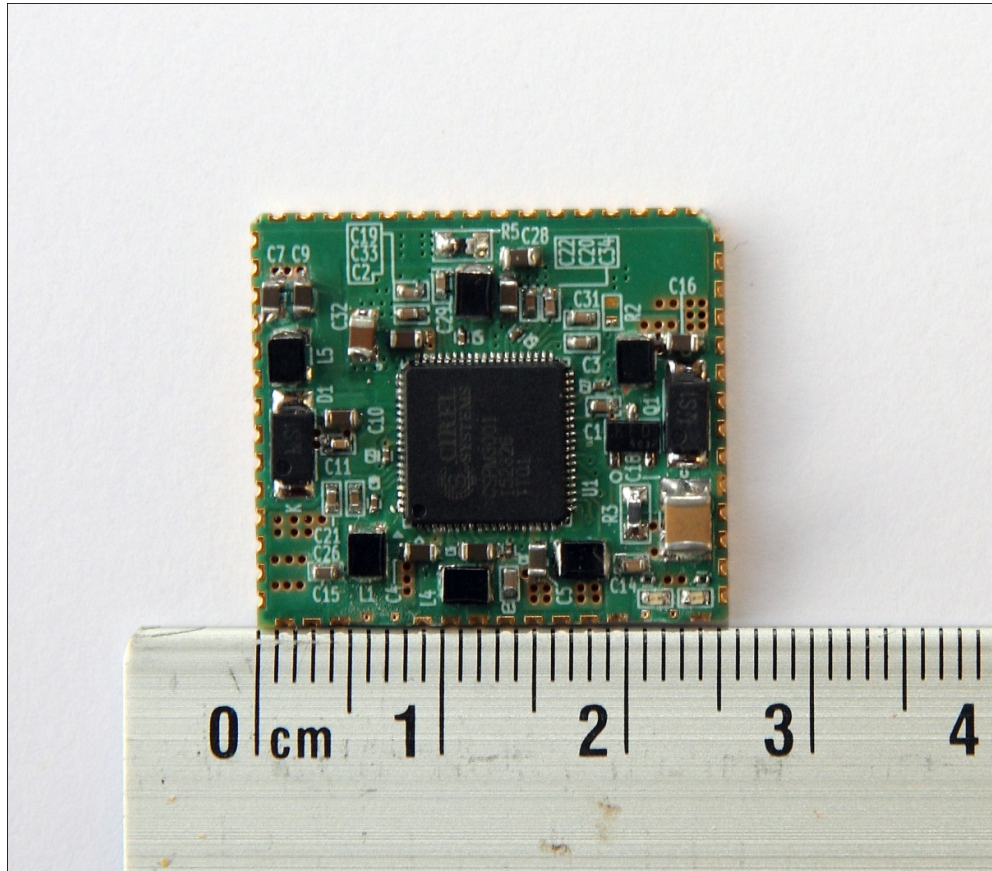


Figure I-1: CSPM3001 Module Board

The module board can be dropped on the go into any reference design, since all the inputs and outputs are brought out on easy to connect pads on the edge of the board. The reference schematic for using the board is shown in the next section.

The Module board enables the user to quickly solder and use the PMIC with minimum design efforts and low PCB manufacturing cost. The features of the module board include:

- Easy to solder 60-Pin connector with high pitch.
- All power rails mapped to the 60pin connector which enables quick and easy fan-out.



The Following table shows the pin mapping of the module board.

Pin No	Pin Name	Pin Type	Description
1	VSYSOUT	Power Output	System PowerPath Output
2	VSYSOUT	Power Output	System PowerPath Output
3	VBAT_p	Power Input	Battery Supply input
4	VBAT_p	Power Input	Battery Supply input
5	VBAT_p	Power Input	Battery Supply input
6	GND	Ground	
7	CCNODE	Signal Input	Coulomb counter sense input+
8	VSSREF	Signal Input	Coulomb counter sense input-
9	VOUTUSB	Power Output	USB Boost Output
10	No Connect	-	-
11	VDD_LDO12AB	Power Input	LDO12AB Input supply 2.7V - 5.5V
12	VOUT_LDO1	Power Output	LDO1 Output
13	VOUT_LDO2B	Power Output	LDO2B Output
14	ENABLE	Signal Input	Control Signal - Active High
15	GND	Ground	
16	USBSUSPEND	Signal Input	Control Signal - Active High
17	VOUT_BK1	Power Output	Buck1 Output
18	VOUT_BK1	Power Output	Buck1 Output
19	GND	Ground	
20	No Connect	-	-
21	VDDIO	Power Input	Supply for IO buffer 1.8V-3.5V
22	VOUT_BK4	Power Output	Buck4 Output
23	I2C_SCL_DVS	Signal Input	I2C DVS Interface
24	I2C_SDA_DVS	Signal I/O	I2C DVS Interface
25	I2C_SCL	Signal Input	I2C Interface
26	I2C_SDA	Signal I/O	I2C Interface
27	VOUT_BK2	Power Output	Buck2 Output
28	No Connect	-	-
29	CHG_LED	Signal Output	Charger Status LED
30	GND	Ground	
31	SLEEP	Signal Input	Control Signal - Active High
32	INTR	Signal Output	Interrupt output
33	CLK32KHZ	Signal Output	32.768kHz Clock Output
34	RESETN	Signal Output	Chip Status - Active High
35	WLED BST	Power Output	WLED Backlight driver output
36	WLED3_Cathode	Power Input	WLED Backlight cathode connection for String 3
37	WLED2_Cathode	Power Input	WLED Backlight cathode connection for String 2
38	WLED1_Cathode	Power Input	WLED Backlight cathode connection for String 1
39	GND	Ground	
40	VDDRTC	Power Output	RTC LDO output
41	Xtal_IN_dev	Crystal	Crystal
42	Xtal_OUT_dev	Crystal	Crystal
43	NTC	Signal Input	Temperature sensor input
44	Onkey	Signal Input	Control Signal - Active Low

45	USB_DM1	Signal Input	USB D+ Line in
46	VCOIN	Power Input	Backup Battery input
47	USB_DP1	Signal Input	USB D- Line in
48	VOUT_LDO4	Power Output	LDO4 Output
49	VOUT_LDO6C	Power Output	LDO6C Output
50	VDD_LDO346C	Power Input	LDO346C Input Supply 2.7V - 5.5V
51	VOUT_LDO3	Power Output	LDO3 Output
52	GND	Ground	
53	VOUT_LDO5	Power Output	LDO5 Output
54	VOUT_LDO6A	Power Output	LDO6A Output
55	VDD_LDO56AB	Power Input	LDO56AB Input Supply 2.7V - 5.5V
56	VOUT_LDO6B	Power Output	LDO6B Output
57	VINADAPT	Power Input	Adapter Input Supply
58	VINADAPT	Power Input	Adapter Input Supply
59	VINADAPT	Power Input	Adapter Input Supply
60	VSYSOUT	Power Output	System PowerPath Output

Also some points to be noted while using the module board are

1. VDDIO should be connected to a rail which is 1.8V or higher
2. ENABLE should be pulled high
3. SLEEP and USB SUSPEND should be pulled low for Active state operation
4. VDDRTC cannot provide more than 5mA current
5. CCNODE and VSSREF should be routed differentially from the sense resistor (for measuring battery current for coulomb counting)
  - a. Recommended sense resistor part is LVK12R020DER
6. Default address for I2C is 0x25

**III. Recommended Land pattern**

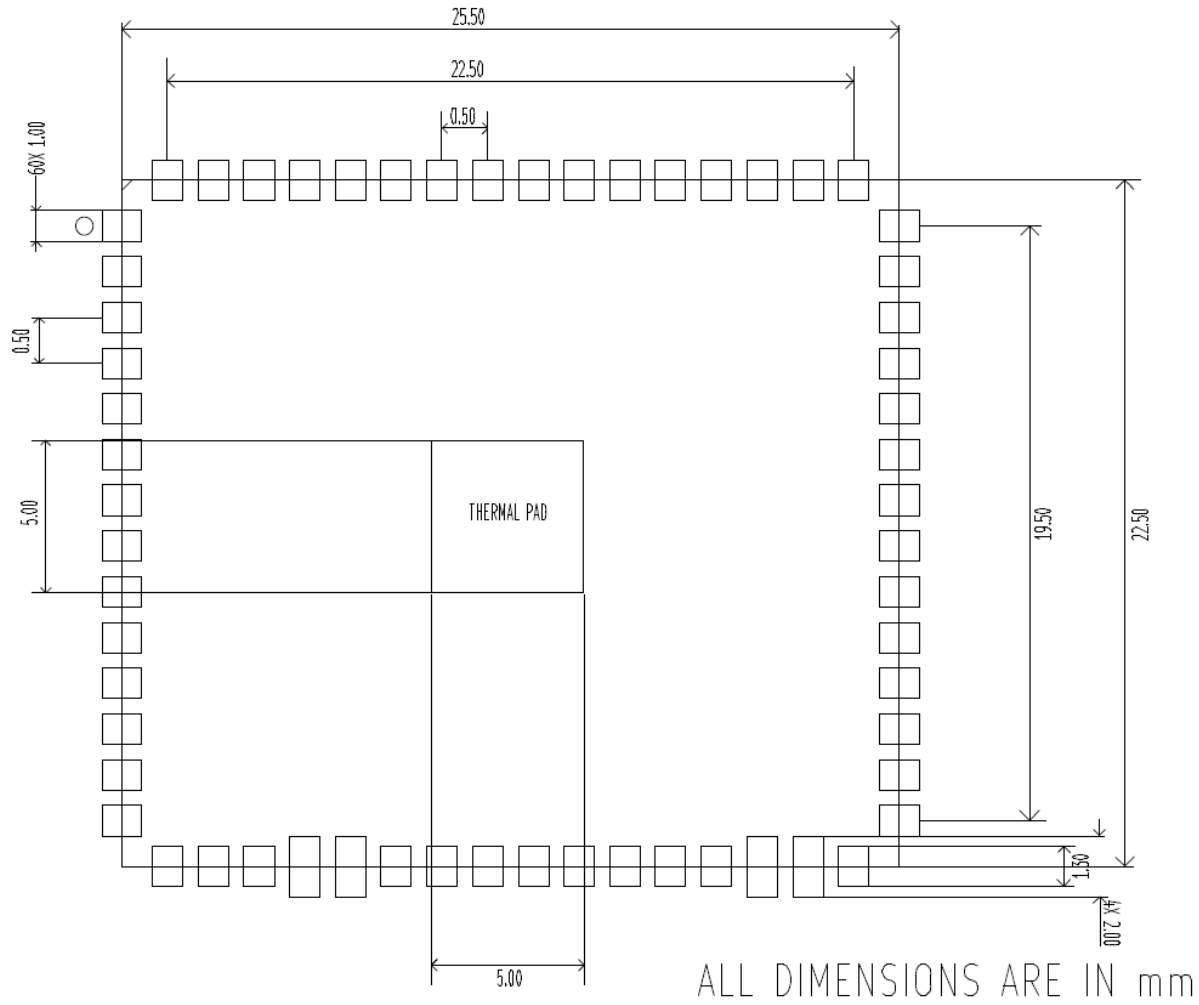


Figure III-1: Recommended Land Pattern

IV. Module Board Schematic

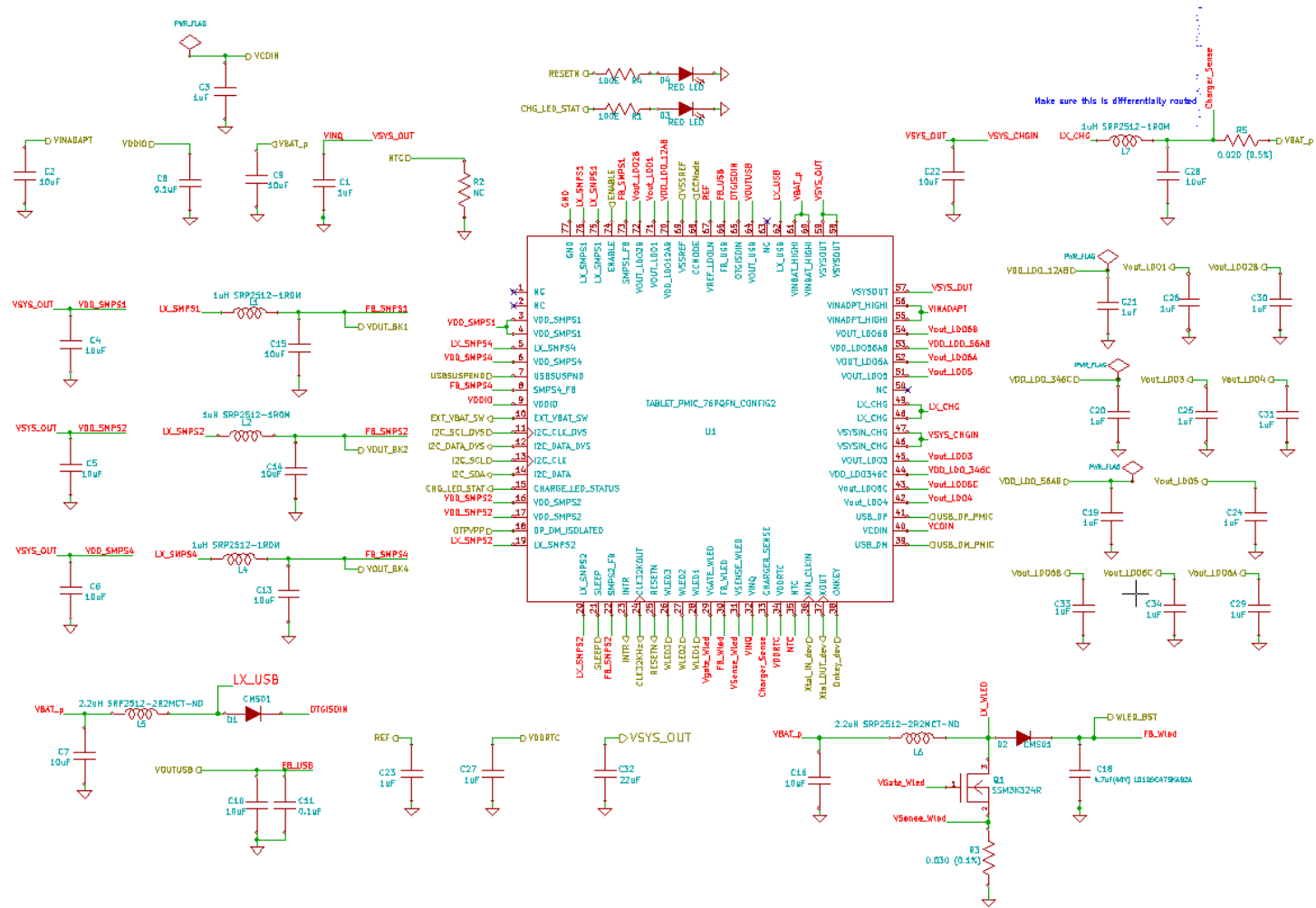


Figure IV-1: CSPM3001 Schematic

## Placement

The recommended placement for CSPM3001 is shown in the figure below; all passive components are placed on the top layer in order to facilitate the modern ultra-low thickness designs.

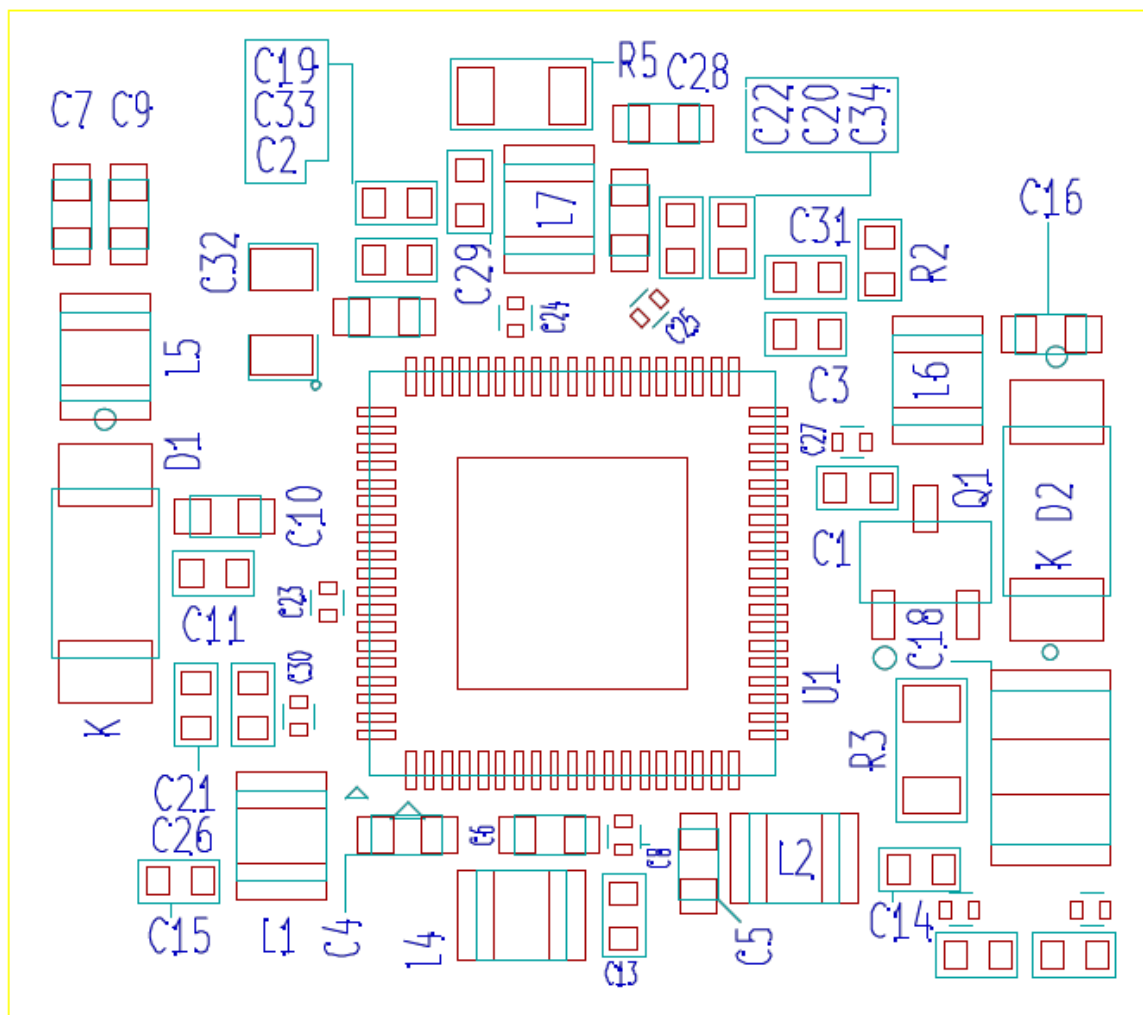


Figure IV-2: Recommended component placement

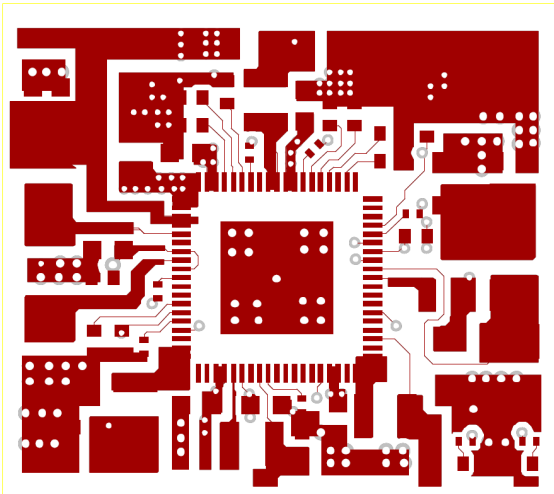
## Layout

The PCB layer stack-up for the above board is

1. Top- Component critical routing and fan out.
2. Inner 1 – Ground
3. Inner 2 – Power
4. Bottom- Ground and Feedback routing



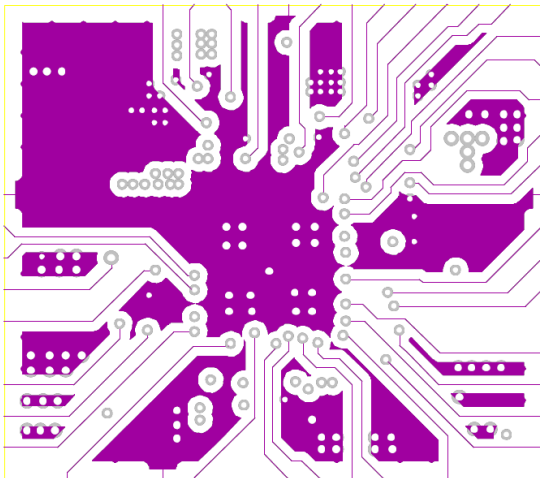
Top



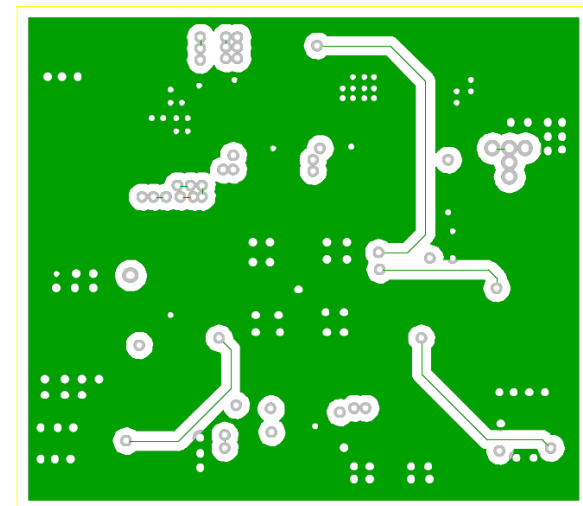
Inner 2



Inner 1



Bottom



**V. Bill of Materials- Reduced Form factor**

SL#	Qty	Total Qty	Ckr Ref	Description	Part#	Package
1	1	5	C8	CAP CER 0.1UF 16V 10% X7R 0201	C0603X5R1C104K030BC	C0201
2	1	5	C11	CAP CER 0.1 UF 16V 10% X7R 0402	NA	C0402
3	5	25	C23 , C24 , C25 , C27 , C30	CAP CER 1 UF 6.3V 20% X5R 0201	C0603X5R0J105M030BC	C0201
4	10	50	C1 , C19 , C20 , C21 , C26 , C29 , C3 , C31 , C33 , C34	CAP CER 1UF 10V 10% JB 0402	C1005JB1A105K050BB	C0402
5	3	15	C13 , C14 , C15	CAP CER 10UF 6.3V 20% X5R 0402	C1005X5R0J106M050BC	C0402
6	10	50	C10 , C16 , C2 , C22 , C28 , C4 , C5 , C6 , C7 , C9	CAP CER 10UF 16V 20% X5R 0603	C1608X5R1C106M080AB	C0603
7	1	5	C18	CAP CER 4.7UF 50V 10% X7R 1210	LD105C475KAB2A	C1210
8	1	5	C32	CAP CER 22UF 25V 20% X5R 0805	C2012X5R1E226M125AC	C0805
9	2	10	R1,R4	RES 100E/5%/1/20W Resister	RC0201JR-07100RL	R0201
10	1	5	R2	NC	NA	R0402
11	1	5	R5	RES SMD 0.02 OHM 1% 1/4W 0603	RU1608FR020CS	R0603
12	1	5	R3	RES SMD 0.03 OHM 1% 0.4W 0603	WSP0603R0300FEB	R0603
13	2	10	D3,D4	LED 0402 RED 50MW 20MA SMD	SML-P11VTT86	D0402
14	2	10	D1,D2	DIODE SCHOTTKY 30V 3A MFLAT	CMS01(TE12L,Q,M)	2P MFLAT
15	1	5	Q1	MOSFET N-CH 30V 4A SOT-23F	SSM3K324R,LF	SOT-23F
16	4	20	L1,L2,L4,L7	FIXED IND 1UH 3.1A 48 MOHM SMD	SRP2512-1R0M	2P SMD
17	2	10	L5,L6	FIXED IND 2.2UH 2.3A 102 MOHM	SRP2512-2R2MCT-ND	2P SMD
18	1	5	U1	IC TABLET PMIC	CSPM3001	76QFN

Table V-1: Bill of Materials Reduced Form factor Board