

Nolan Clark

# 16-Channel RGB LED Controller

# Design

- Each RGB led color connects to a different 16-channel driver (total of 3 primary drivers)
- 3 16-channel drivers daisy chained together to communicate over SPI via an ATMEGA644A
- RGB LEDs source 20mA 3.2V
- Control driver current with current limit resistor on driver IC 3kohm for 20mA

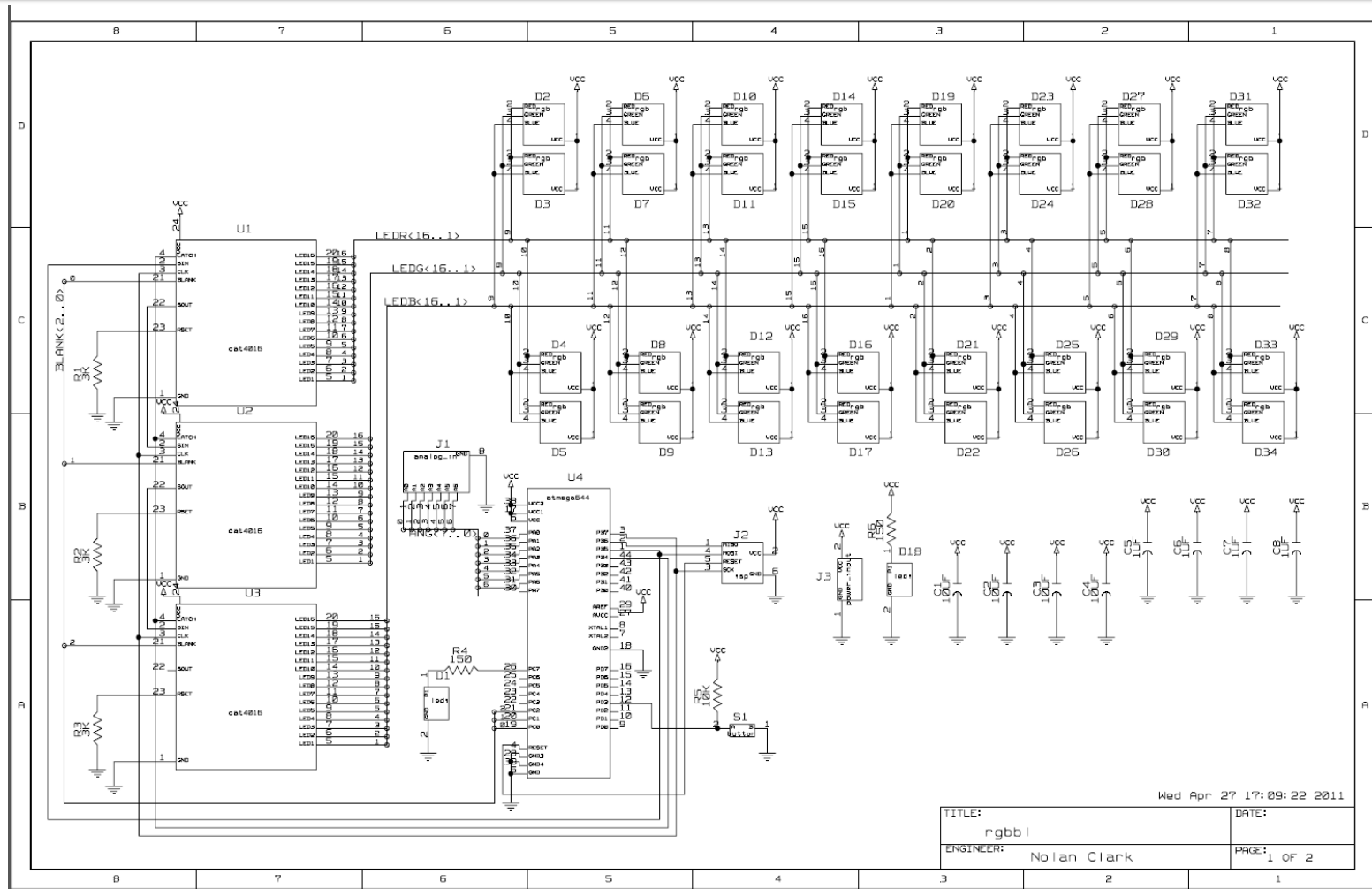
# Components

COUNT	REFDES	DESCRIPTION	VALUE/PART#	PACKAGE	MANUFACTURE	MANUFACTURE PART #
4	C1, C2, C3, C4	Electrolytic Capacitor 16V	10uf +/-20%	SM_6032	std	std
4	C5, C6,C6,C8	Tantalum Capacitor	1uf +/-20%	SM_1206	std	std
2	D1, D18	Green LED	LED 3,2V	SM_1206	std	std
32	D2, D3, D4, D5, D6, D7, D8, D9, D10, D11, D12, D13, D14, D15, D16, D17, D19, D20, D21, D22, D23, D24, D25, D26, D27, D28, D29, D30, D31, D32, D33, D34	High Brightness RGB LED 20mA 5x5mm package	SMLW56	RGB*	ROHM Seimiconductor	SRGB-SMLW56
1	J1	8 PIN Jumper Connection	8 PIN	Through-hole	std	std
1	J2	6 PIN Jumper Connection	6 PIN	Through-hole	std	std
1	J3	2 PIN Jumper Connection	2 PIN	Through-hole	std	std
3	R1	Resistor	3k 5%	SM_0805	std	std
2	R4	Resistor	150 5%	SM_0805	std	std
1	R5	Resistor	10k 5%	SM_0805	std	std
1	S1	SWITCH TACT 4MM SQ	SWITCH	CUSTOM	std	7914G-000ECT-ND
3	U1, U2, U3	LED Current Driver	CAT4016	SOIC24W	ON Semiconductor	CAT4016W-T1CT-ND
1	U4	Microcontroller	ATMEGA644A	PQFP44	Atmel	ATMEGA644-20AU
NOTES:						
* RGB: Custom Footprint for component						
** Resistor values subject to change depending on input voltage						

# Parameters

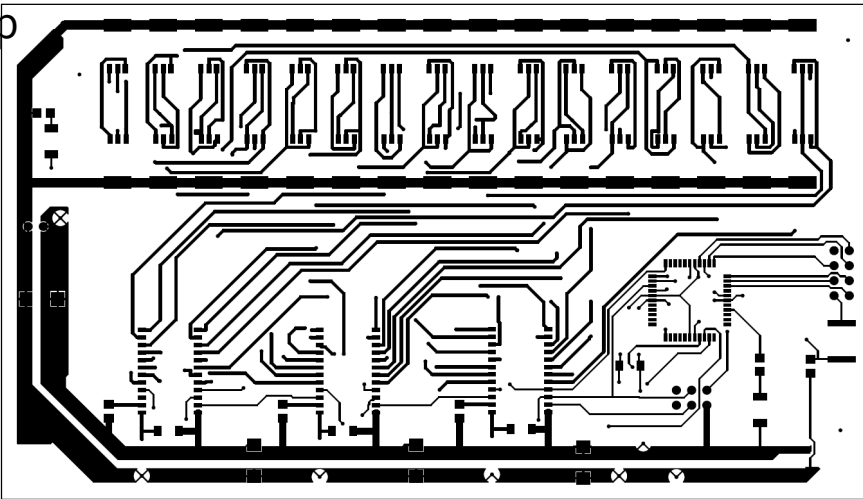
- Complete design in Cadence ALLEGRO
- 10-20mil traces with 10 mil spacing
- 15mil via
- 15 mil annular ring for via
- Board dimensions 4000x6000mil

# Schematic

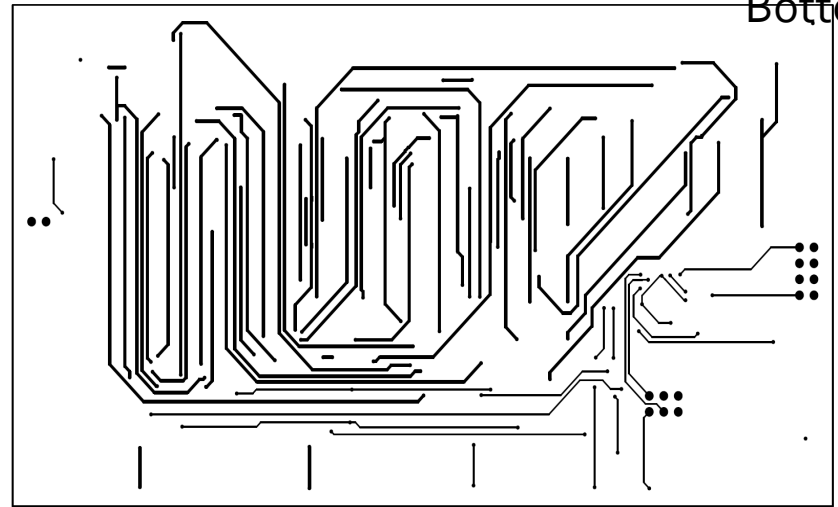


# 2-layer design

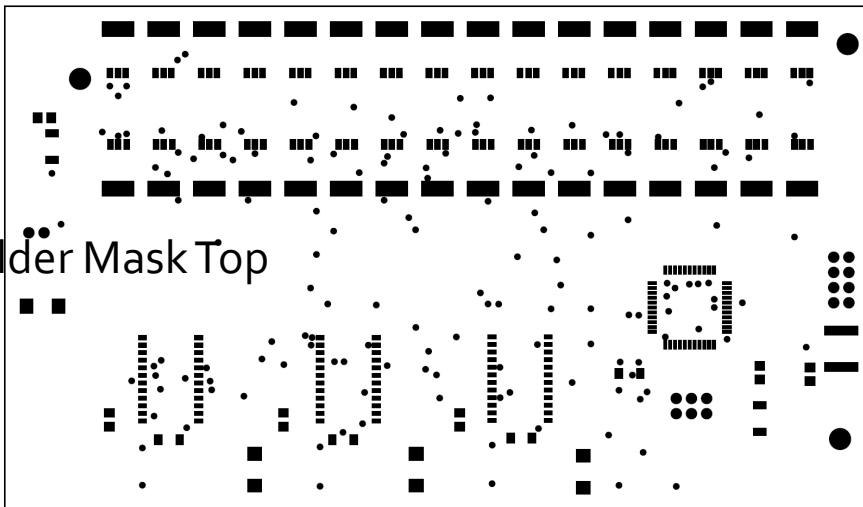
Top



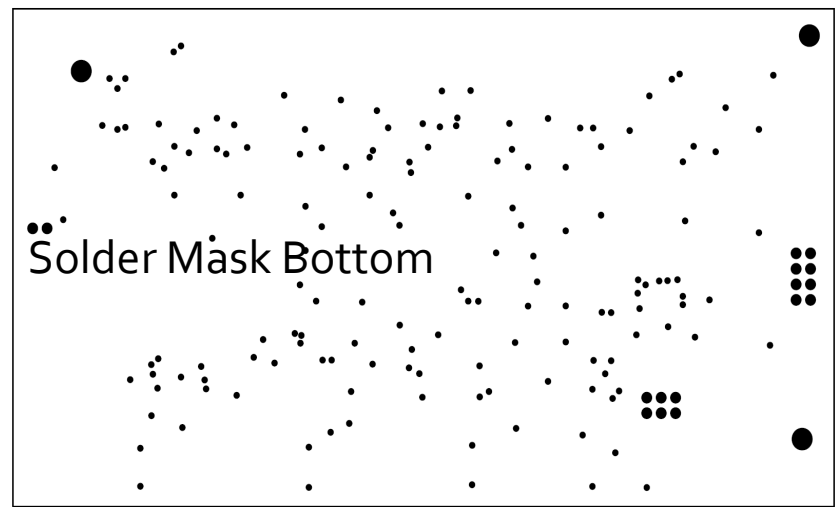
Bottom



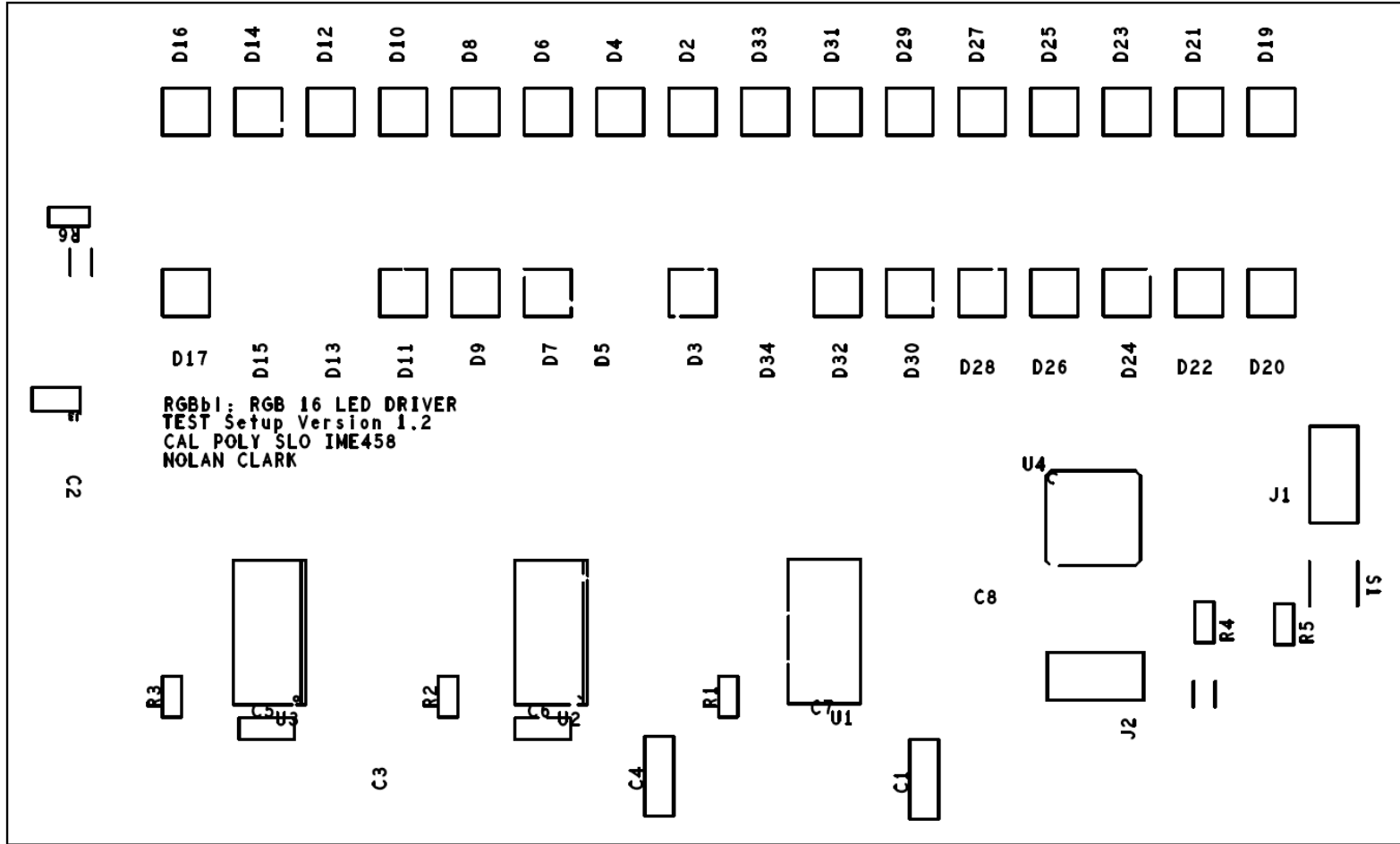
Solder Mask Top



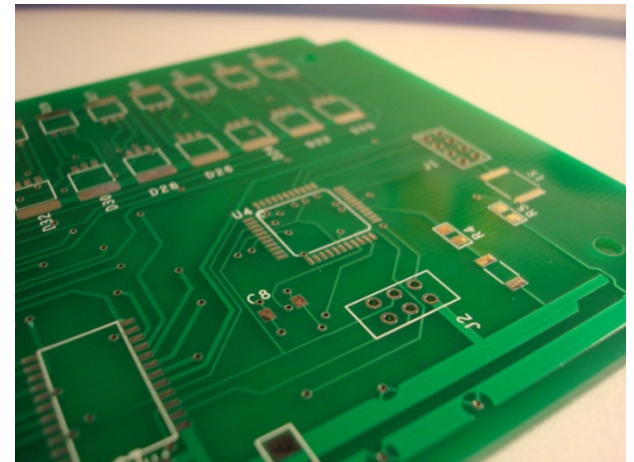
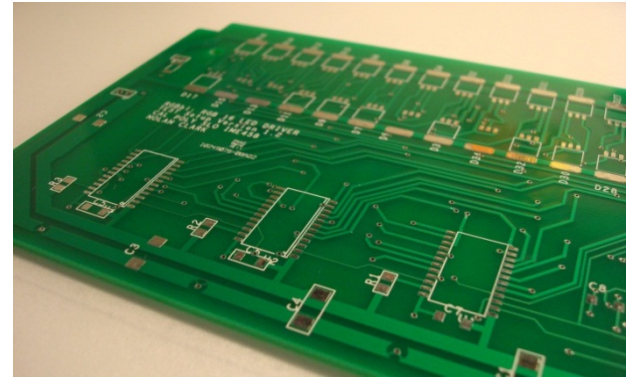
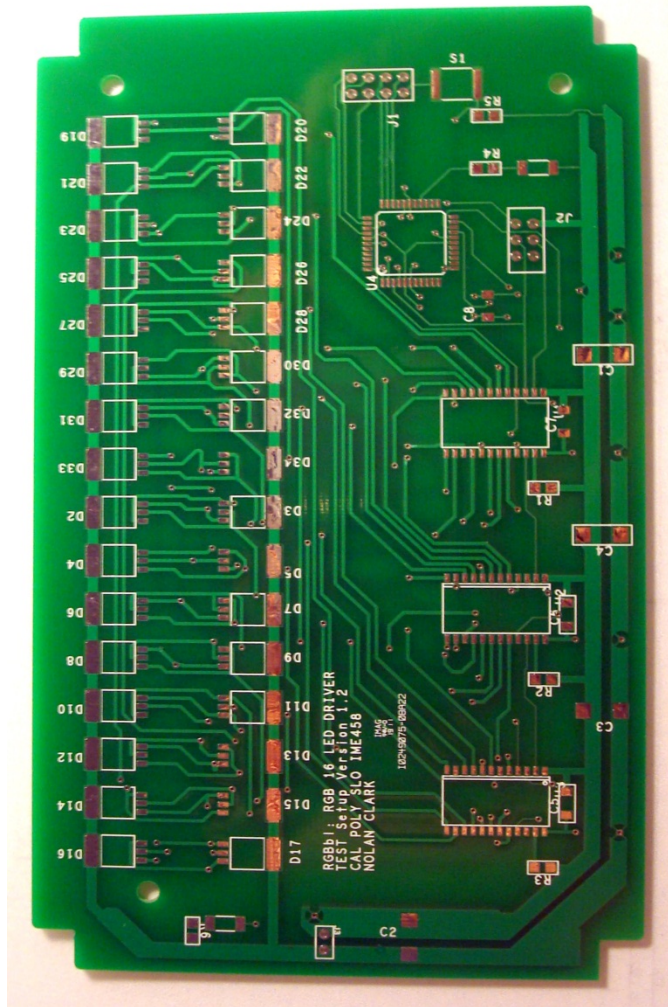
Solder Mask Bottom



# Silkscreen

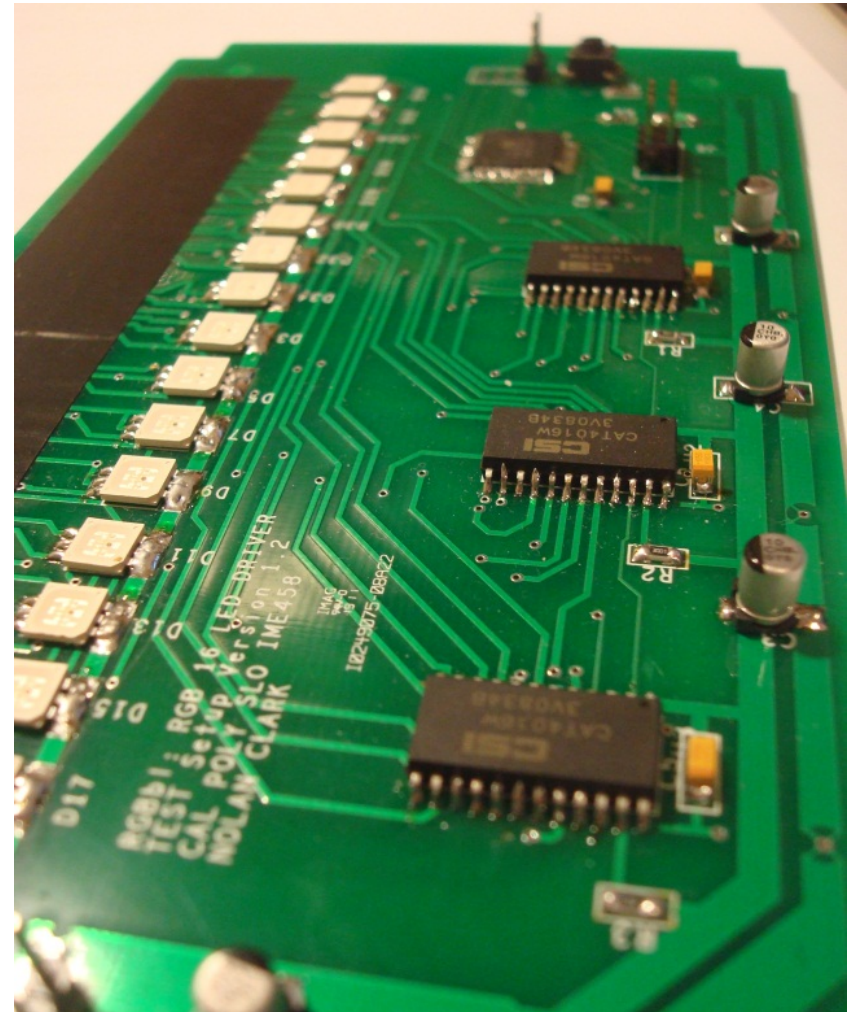
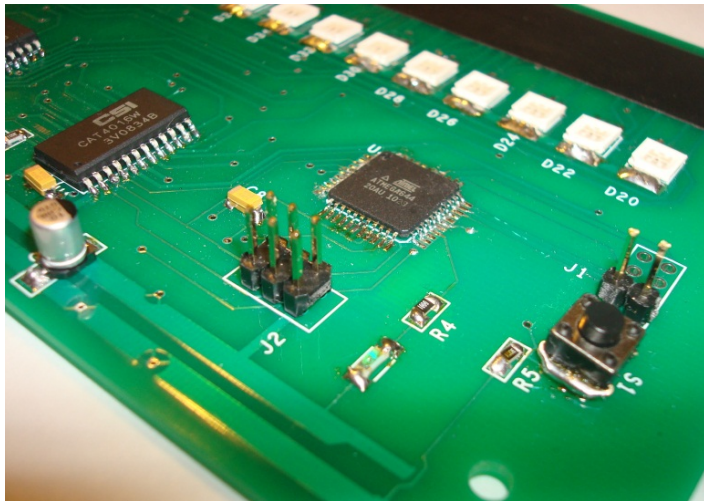
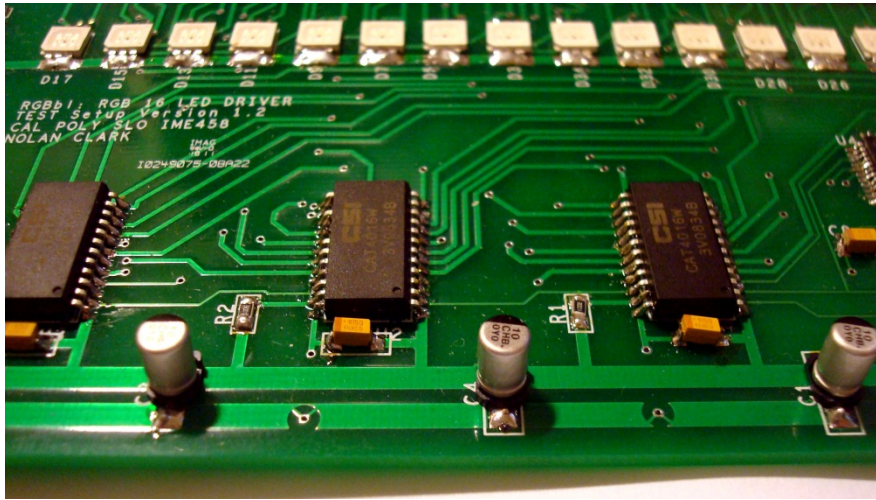


# Manufactured Board: Unpopulated





# Manufactured Board: Populated



# Conclusions

- Cadence Allegro very versatile program for schematic and PCB design
- Originally designed 4-layer board, too expensive to manufacture
- Redesign to 2-layer challenging because Allegro makes it difficult to undo major changes (such as deleting extra layers)
- Will use Allegro for future PCB design
- Circuit does work, only requires an AVR programmer to program the microcontroller