

Power Electronics Summer Research Internship

University of Toronto

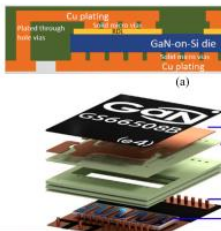
Laboratory for Advanced Power Conversion and Systems Analysis

*Note: due to IP constraints, some images are blurred out and/or are not
representative of the final design*

Literature Reviews, Research Papers, Textbooks, Application Notes, Datasheets

2714

Voltage (V)	Manufacturer	Current (A)
200	EPC	4
500	Fujitsu	3
600	Panasonic	2
	MicroGaN	3
	Infineon	3
	Sanken	3
650	TI	5
	GaN Systems	3
	Transphorm	9
	ExaGaN	7
	VisiC	20
	Navitas	2
	IGaNPower	6
900	Transphorm	5
1200	IGaNPower	1
	ExaGaN	10



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GULSUNA et al.: DESIGN AND ANALYSIS OF A GAN-BASED MEGAHERTZ

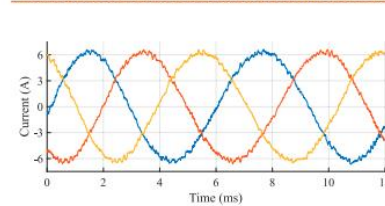


Fig. 12. Phase currents of the motor captured with integrated drive system at the rated torque and 1000 rpm.

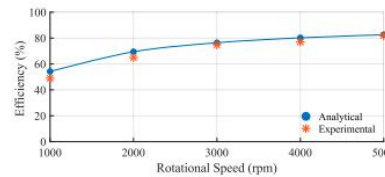


Fig. 13. Efficiency plot of the whole system with respect to the rotational speed at full load torque.



Fig. 14. Experimental setup for the motoring tests with the therm camera view, under rated load. (1) Resistive load for the dc generator, (2) field supply for the dc generator, (3) torque display, (4) dc generator, (5) high bandwidth current probe, (6) torque sensor, (7) prototype unit, (8) oscilloscope, (9) temperature logger, and (10) dc supply.

100 kHz, and speed measurement at 10 kHz. A feed-forward compensator is implemented to increase the controller stability at high rotational speeds. Due to the system's compact integration, external measurements with an oscilloscope are not

204 CHAPTER 8 SWITCH-MODE dc-ac INVERTER

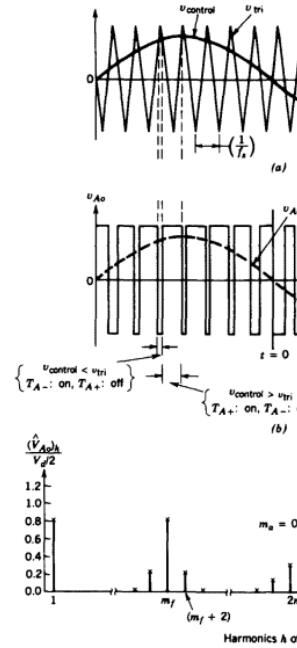


Figure 8-5 Pulse-width modulation.

The frequency modulation ratio m_f is defined as

$$m_f = \frac{f_{\text{sw}}}{f_{\text{ref}}}$$

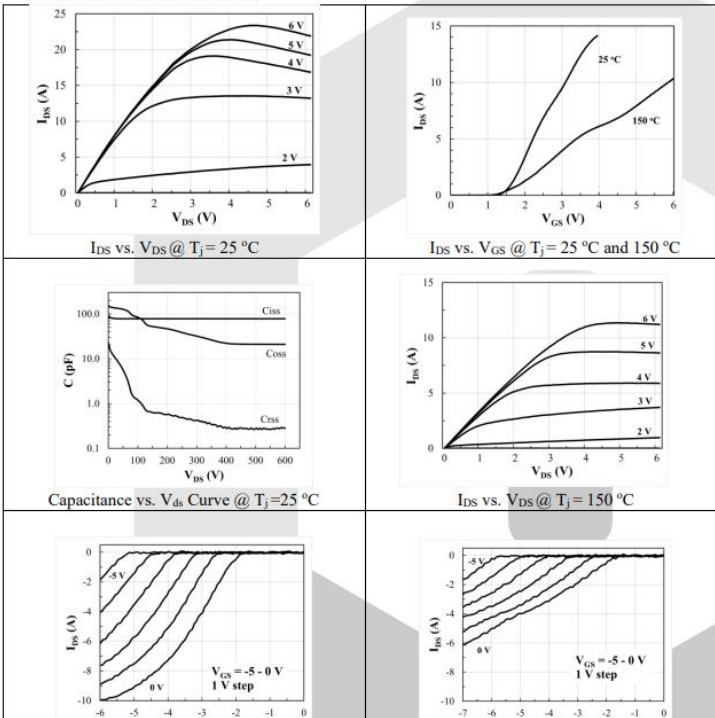
In the inverter of Fig. 8-4b, the switcher comparison of v_{control} and v_{tri} , and the following direction of i_o :

$$v_{\text{control}} > v_{\text{tri}} \quad T_{A+}$$

GaNPOWER
GaNPower International Inc.

WWW.IGANPOWER.COM
230-3410 LOUGHEED HWY
VANCOUVER, BC, V5M 2A4 CANADA

Electrical Performance



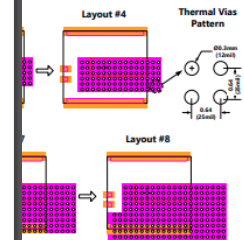
hance, the first step is to and how many vias are t of copper area or number of puts were chosen for the

Layout #1), which is the same can be fitted under the

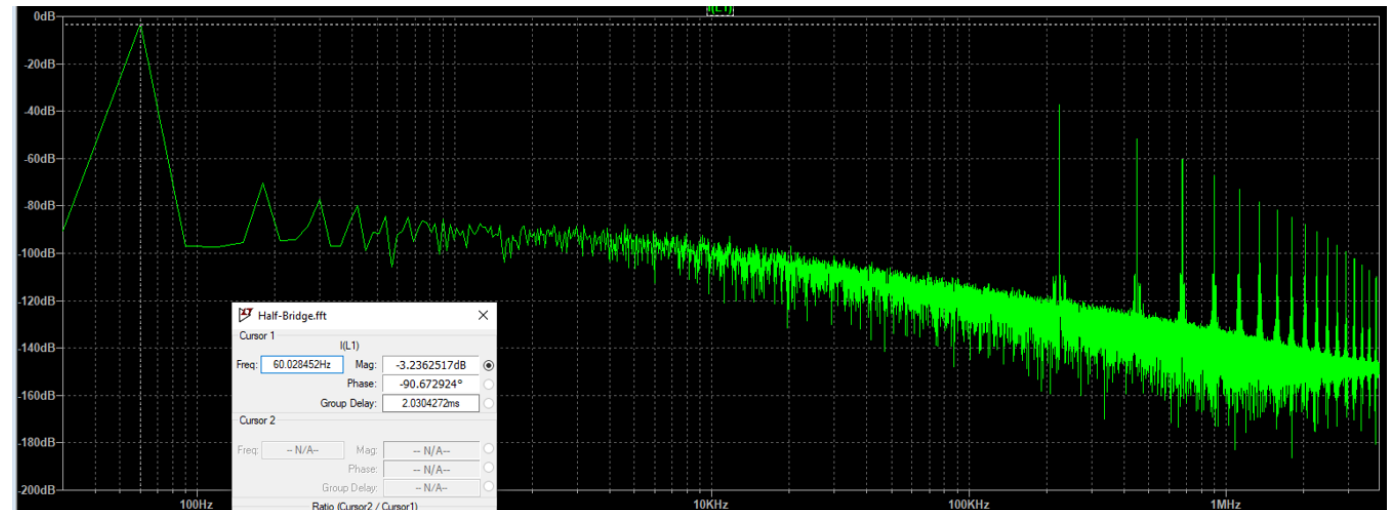
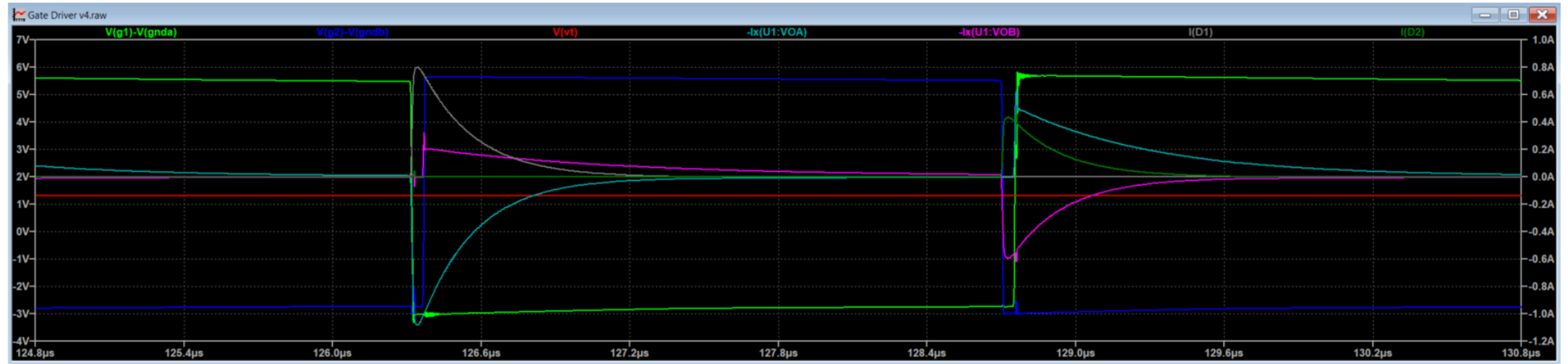
opper area is increased

ted towards the drain side in thermal and Drain pads. Also 0.5 mm distance from Gate ded on the left side the iver circuit.

thermal and Source pads. and separated from the Source sis. In the actual circuit the ed to the Source.



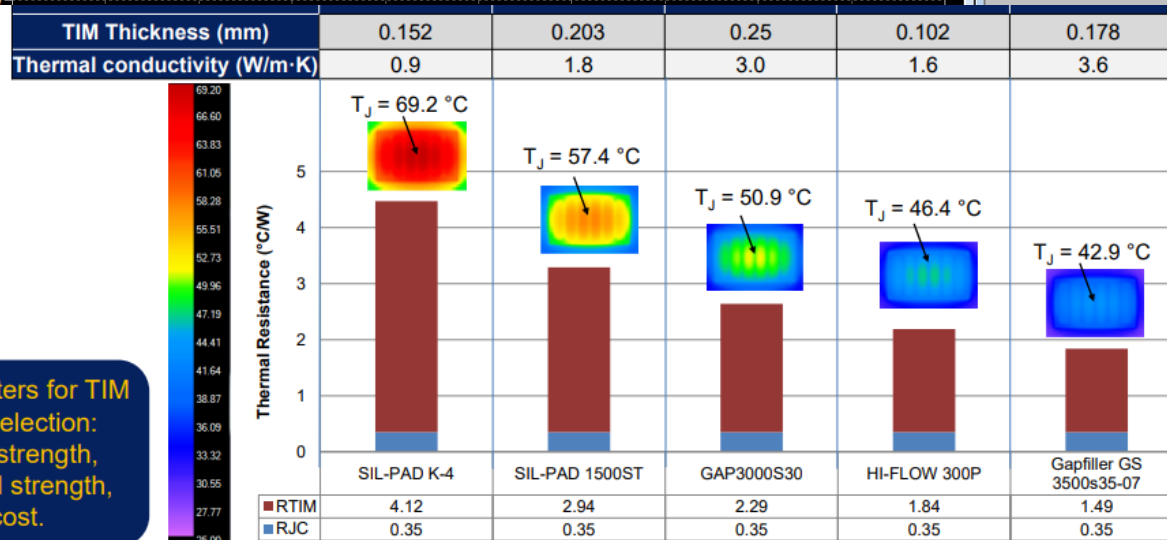
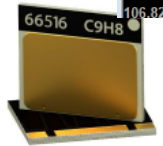
Spice Simulation: GaN switches & gate driver



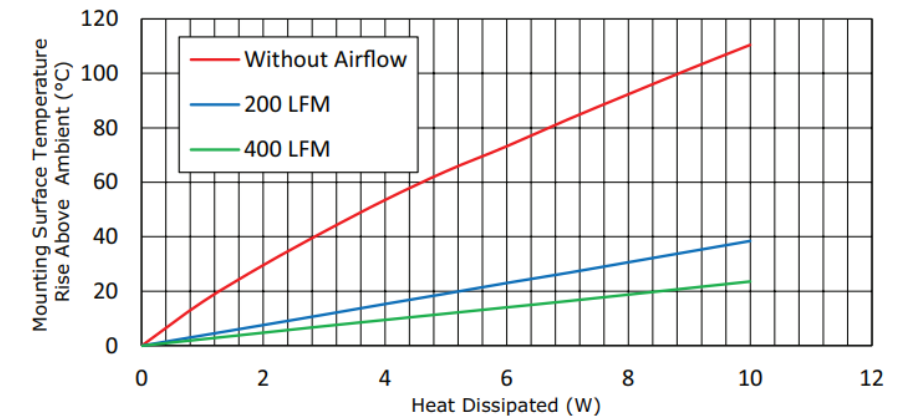
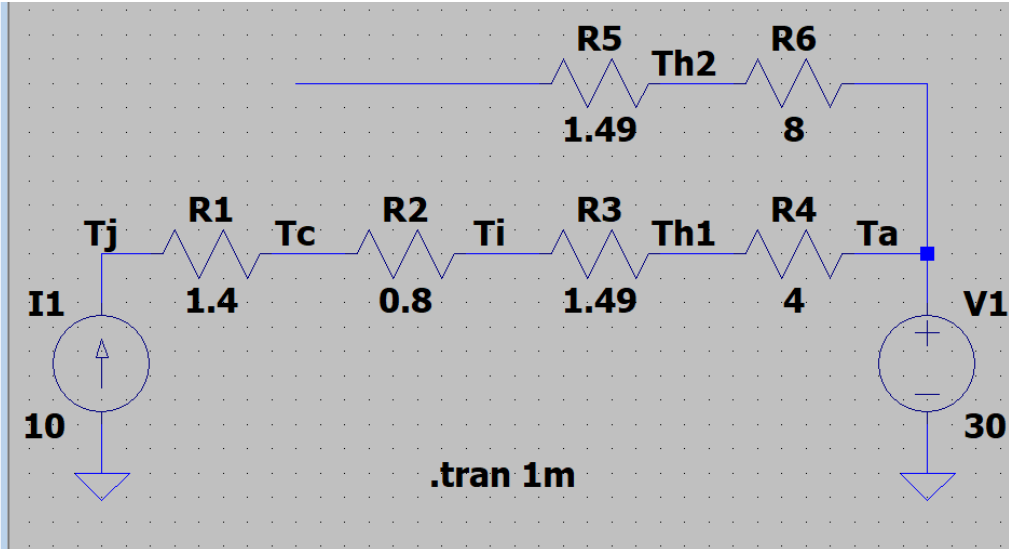
Thermal Design and Analysis

3. Top-

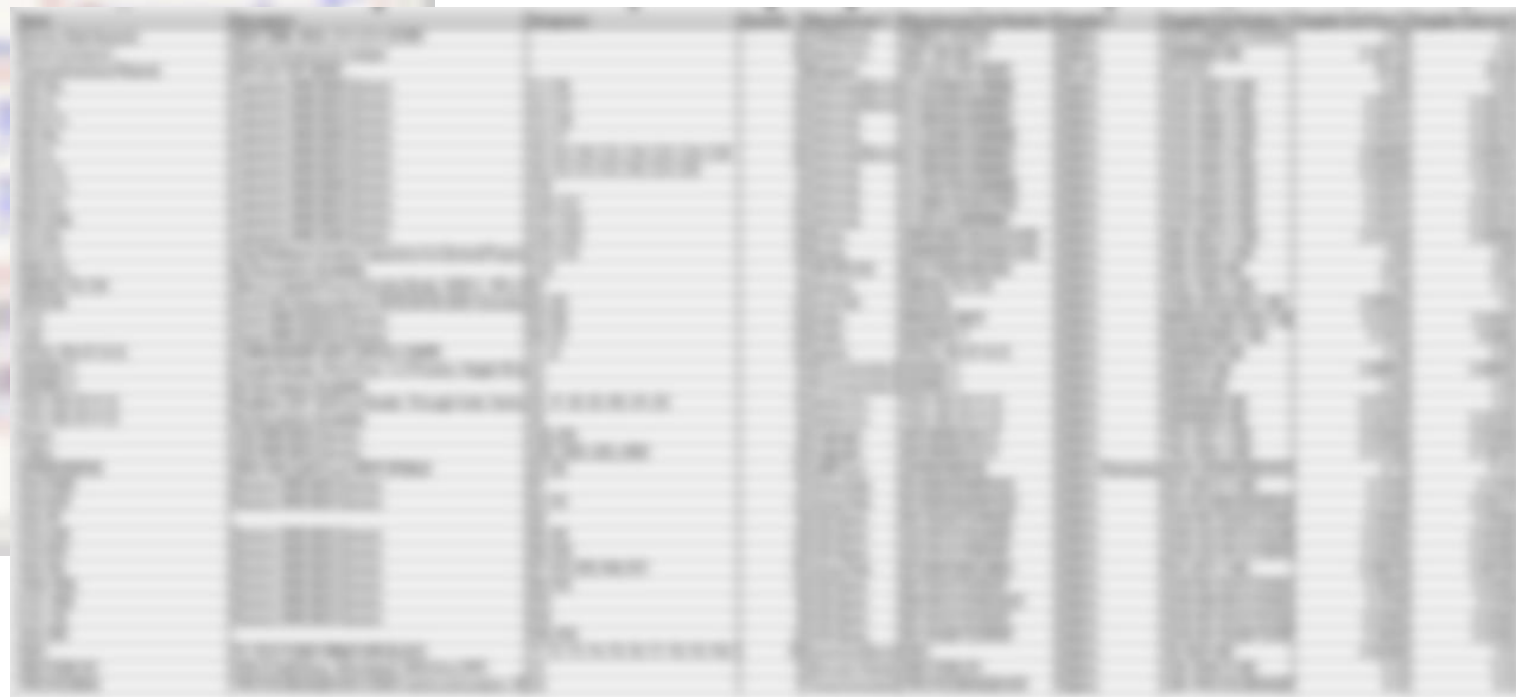
- Thermal s
- GS66516
- $T_{HS} = 25$



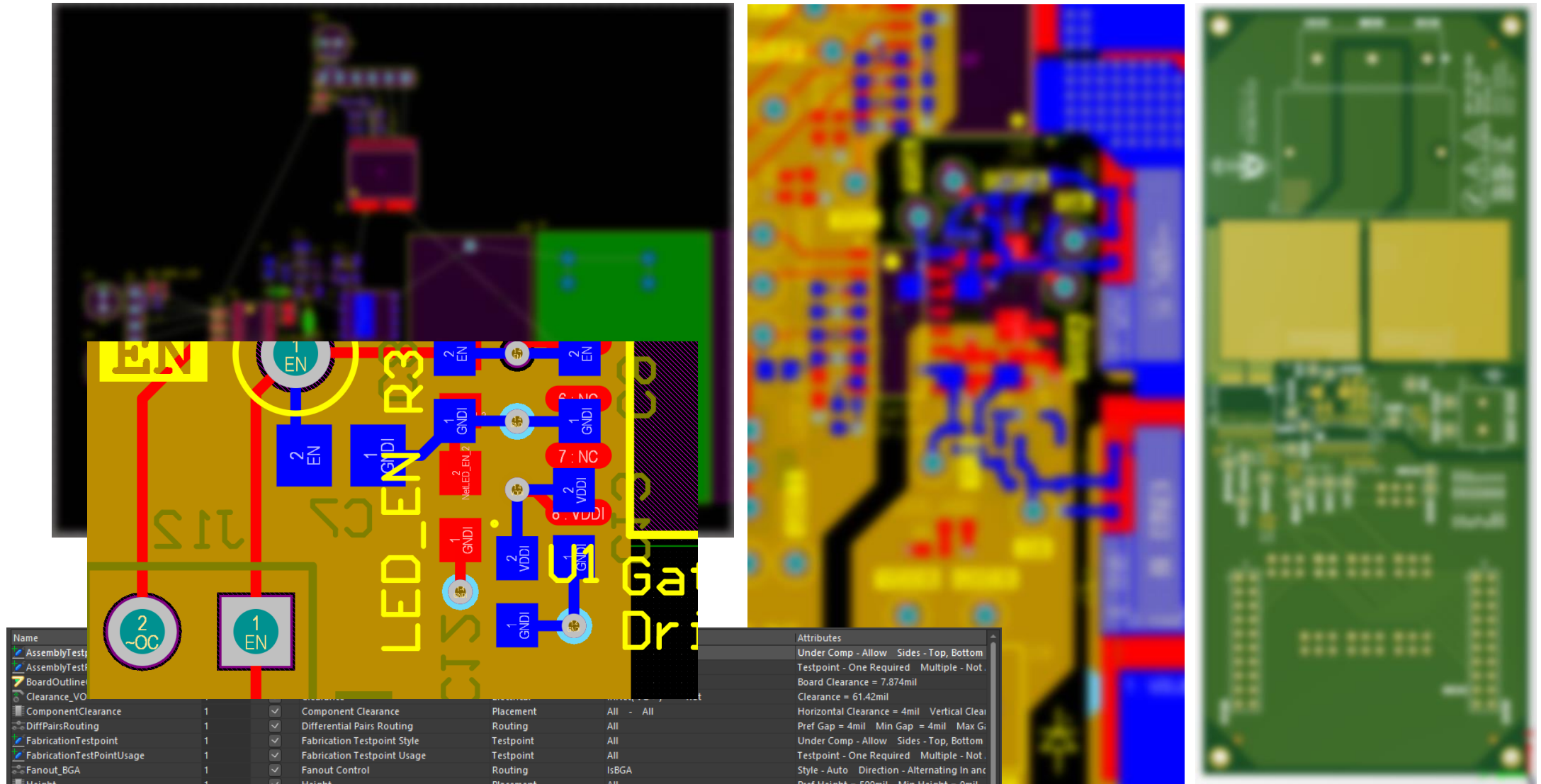
Key parameters for TIM material selection: dielectric strength, mechanical strength, and cost.



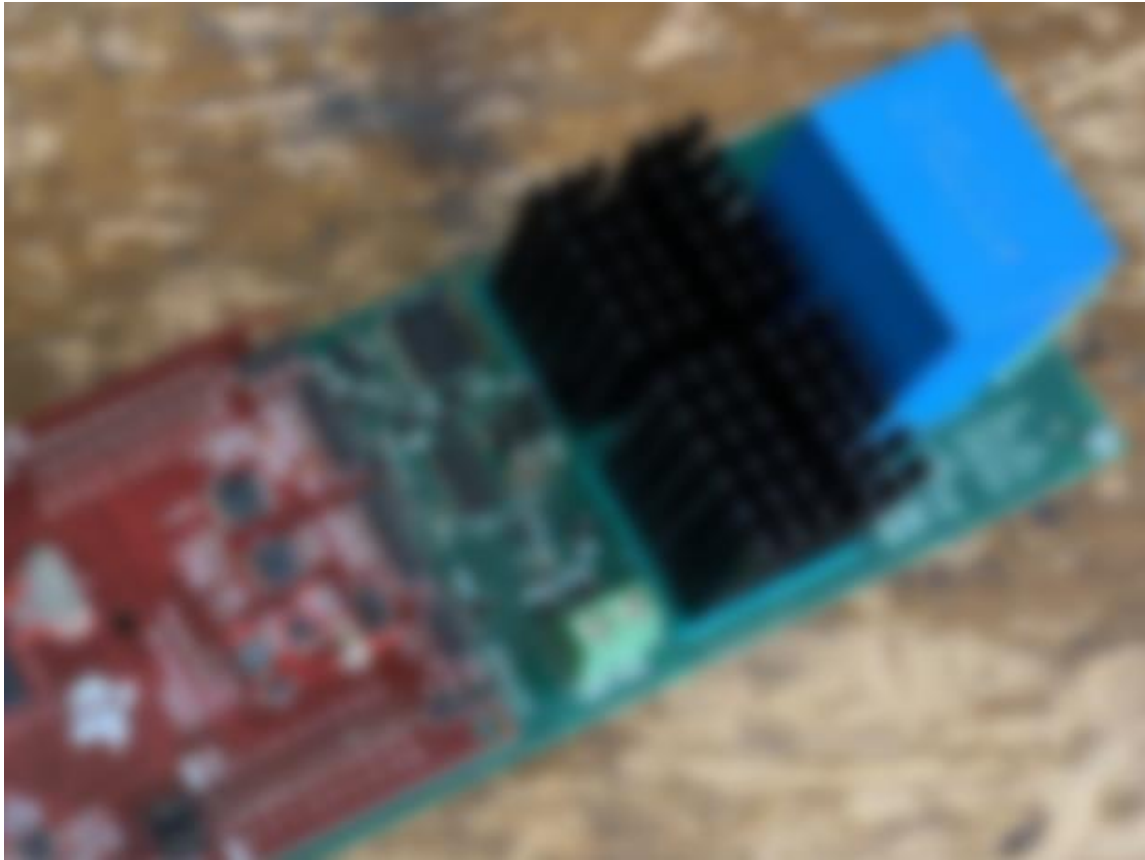
Schematic Capture, BOM



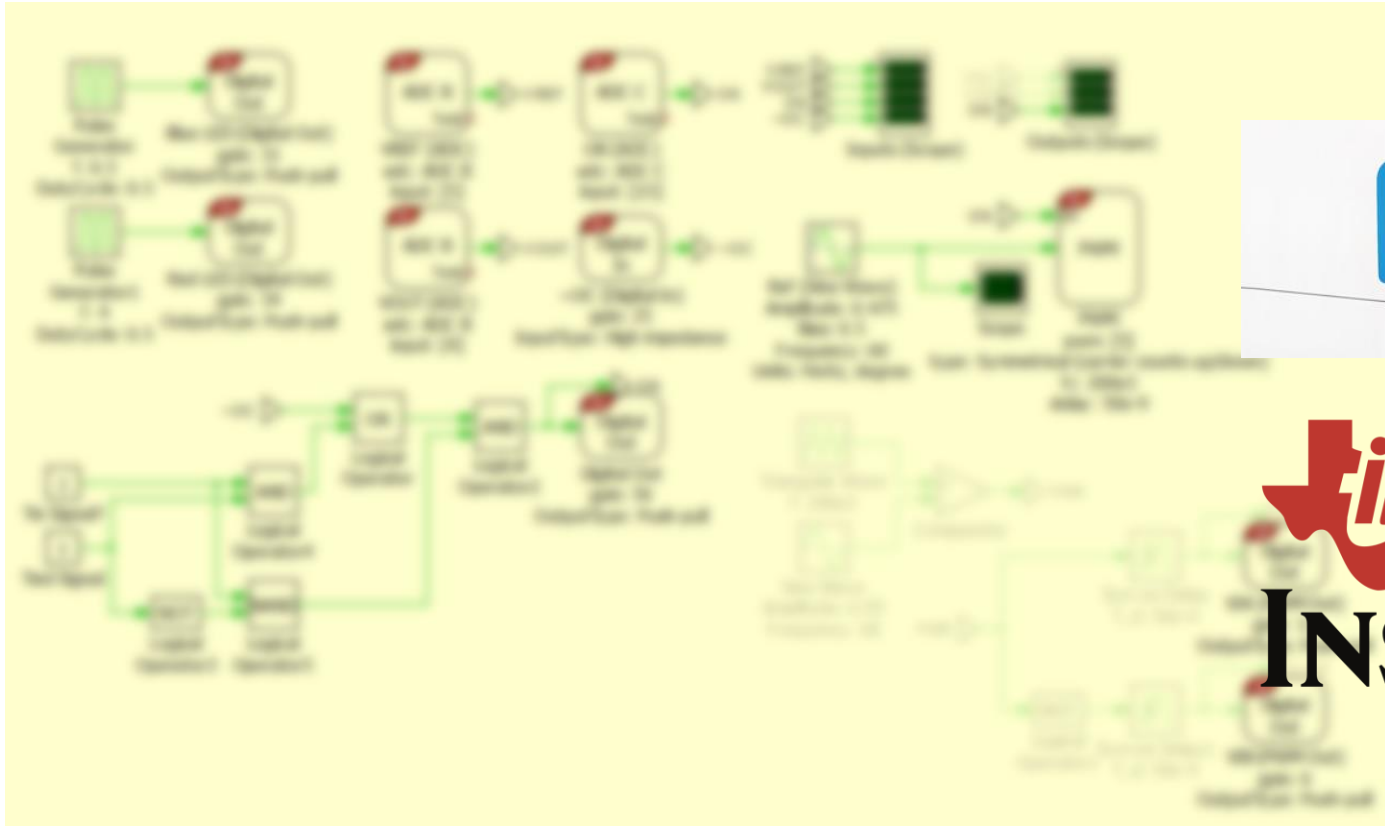
PCB Layout and Routing



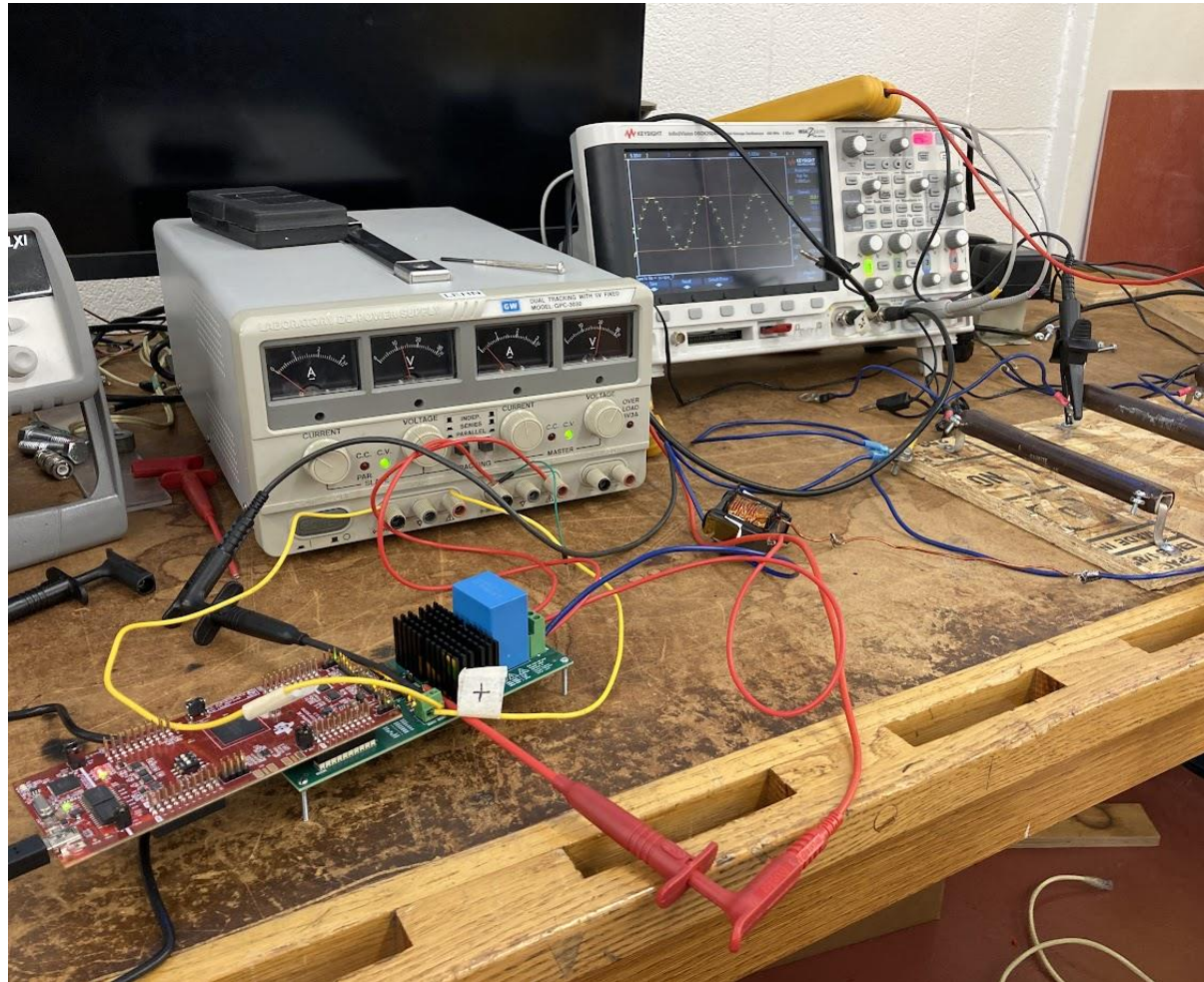
Fabrication and Assembly



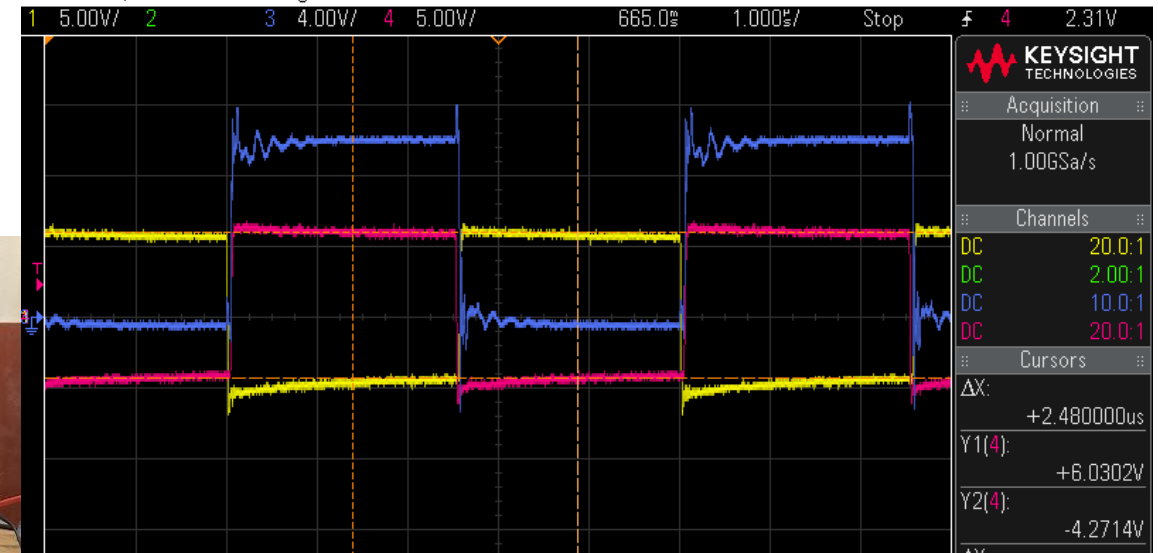
Microcontroller Programming



Lab Testing



DSO-X 2024A, MY58104307: Thu Aug 29 07:38:26 2024



DSO-X 2024A, MY58104307: Fri Aug 30 07:25:40 2024

