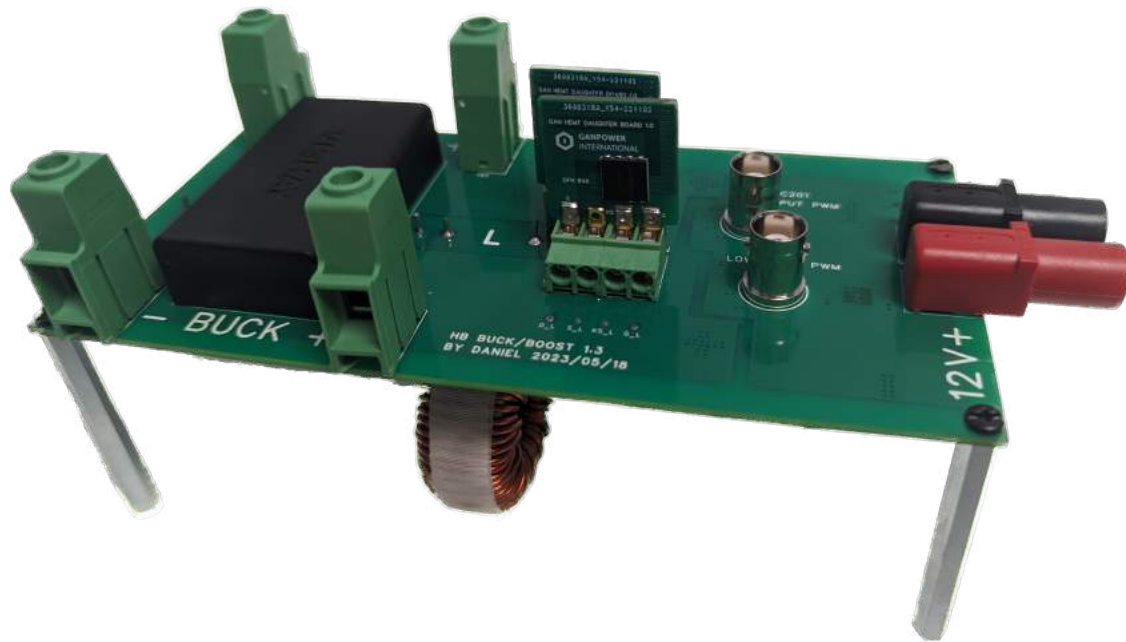


GaNPower Half-Bridge(HB) Buck/Boost EVB 1.3

Technical Manual

June 2023

By Daniel, Oliver, Spencer



Contents

1	HB Buck/Boost Evaluation Board Overview	3
2	Overview of HB Buck/Boost EVB	4
2.1	Schematic	4
2.2	Bill of Materials	5
3	Quick Start Guide	6
4	Evaluation Results	7
4.1	Waveforms	7
4.2	Efficiency	10

1 HB Buck/Boost Evaluation Board Overview



Figure 1: GaNPower Evaluation Board Top View



Figure 2: GaNPower Evaluation Board Bottom View

2 Overview of HB Buck/Boost EVB

2.1 Schematic

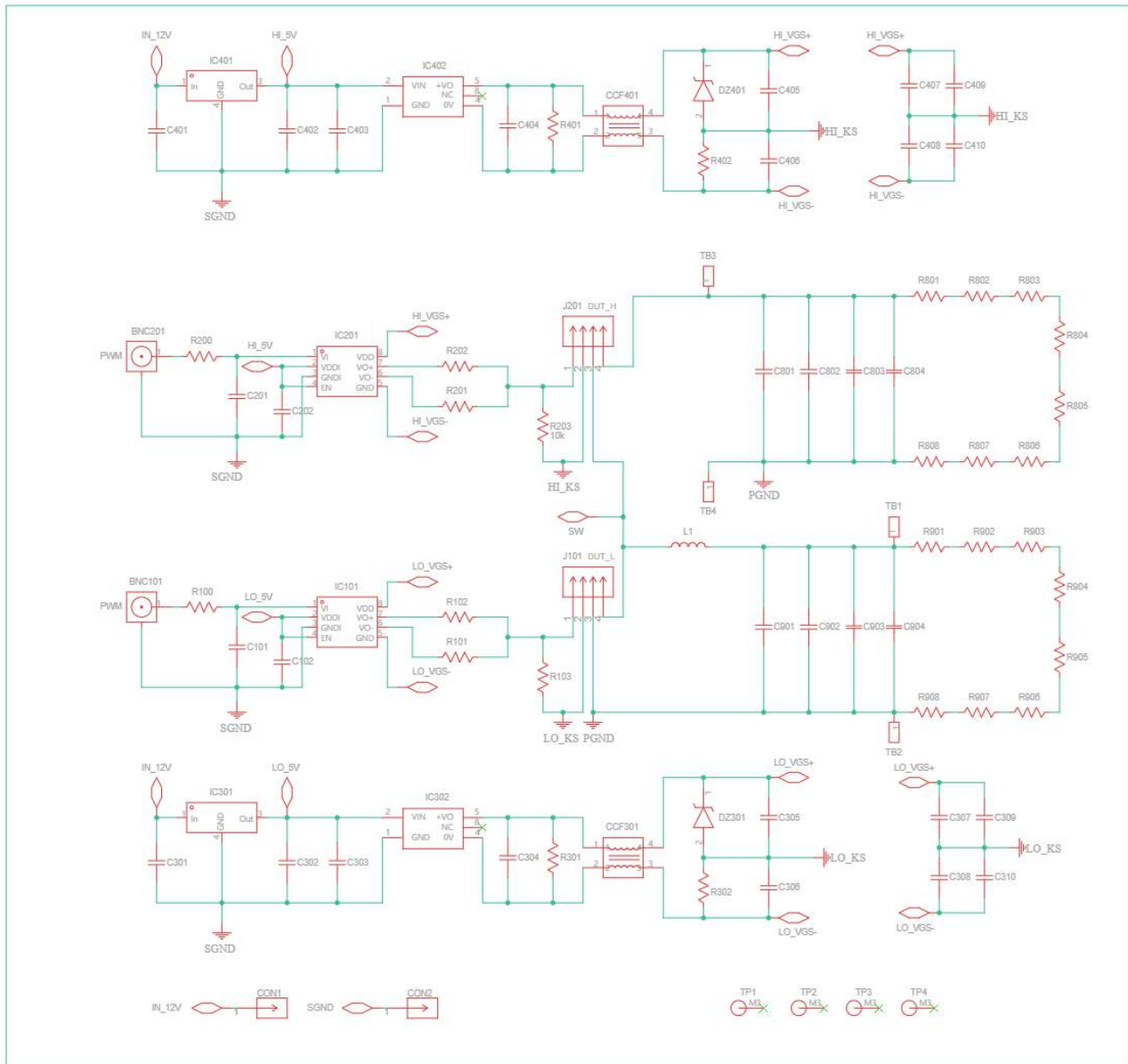


Figure 3: Schematic of HB Buck/Boost 1.3 EVB

2.2 Bill of Materials

#ITEM	Designator	Value	Description
1	BNA1-2	BNA Socket	12V Input
2	BNC101/BNC201	BNC Socket	PWM Input
3	TB1-4	1P Socket	Terminals for Buck/Boost
4	J101/J201	4P Socket	GaN Terminal
5	C803/C903	10u HV	Film Capacitor
6	R801-808/R901-908	1M Ω	SMD Resistor
7	L1	650uH	Power Inductor
8	R100/R200	300 Ω	SMD Resistor
9	R101/R201	0 Ω	SMD Resistor
10	R102/R202	10 Ω	SMD Resistor
11	R103/R203	10k Ω	SMD Resistor
12	R301/R401	47k Ω	SMD Resistor
13	R302/R402	1k Ω	SMD Resistor
14	C101/C201	-	No Connection
15	C102/C202	0.1u	MLCC
16	C307-308/C407-408	0.1u	MLCC
17	C301/C401	0.33u	MLCC
18	C302/C402	1u	MLCC
19	C303-306/C403-406	4.7u	MLCC
20	C309-310/C409-410	10u	MLCC
21	DZ301/DZ401	6V2	Zener Diode
22	CCF301/CCF401	-	Common Mode Choke
23	IC101/IC201	-	Gate Driver
24	IC301/IC401	12V-5V	LDO
25	IC302/IC402	5V-9V	DC-DC

Table 1: Bill of Materials for the GaNPower HB Buck/Boost Evaluation Board

3 Quick Start Guide

The general guidelines for operating the evaluation board are listed below. Follow the steps to configure the hardware properly.

1. Set the desired frequency and duty cycle on your function generator.
2. Connect your high voltage (0-400V), low voltage (12V), PWM, load, and oscilloscope probes at the indicated locations.
3. With just the LV supply turned on, use the oscilloscope to verify the Vgs waveform through the low-side GaN device and compare it to the waveforms below.
4. With the function generator off, and the low voltage supply on, set the high voltage supply to 50V and turn it on.
5. Enable the function generator and verify the Vds of the GaN device.
6. Slowly increase the HV power supply to the desired voltage.
Note: The slow increase is to prevent a sudden increase in current that would damage the GaN device.
7. To turn off, shut down the HV supply first, followed by the function generator, and finally the LV supply.

4 Evaluation Results

The following evaluation data was taken in a buck configuration with a $10\mu\text{s}$ period, 50% Duty Cycle for high side, and 40% Duty Cycle for low side. The yellow waveform is the V_{gs} , and the pink is the V_{ds} of the GaN device.

4.1 Waveforms

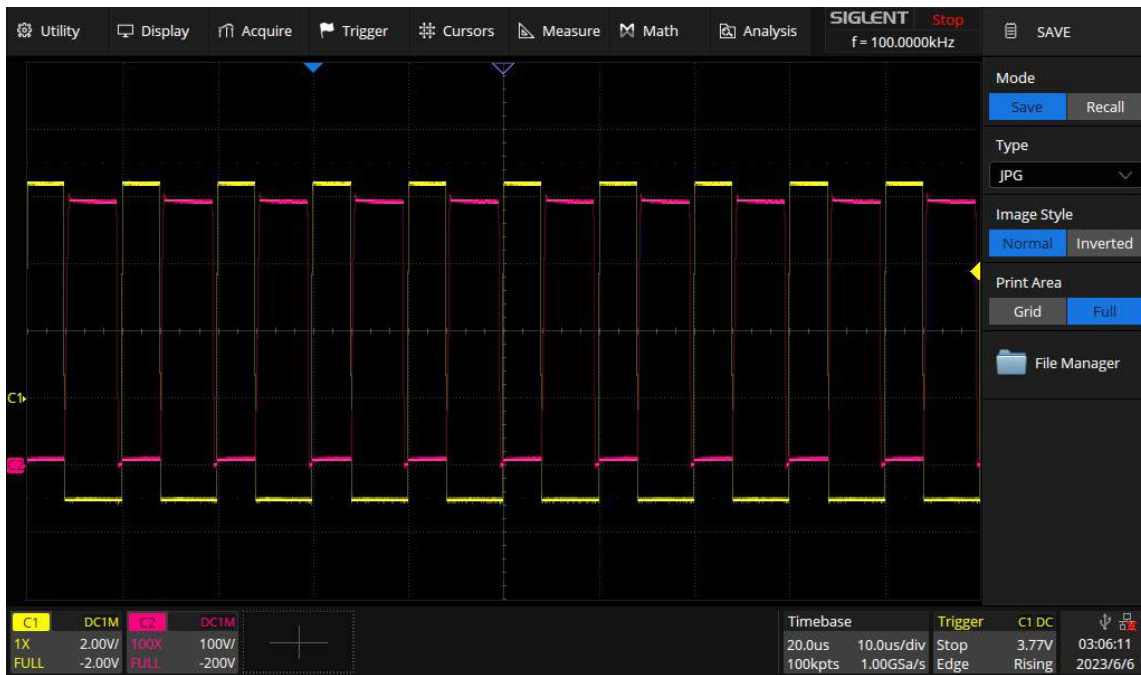


Figure 4: 400V V_{Bus} , 652Ω Load



Figure 5: 400V V_{Bus} , 39 Ω Load



Figure 6: 300V V_{Bus} , 900 Ω Load



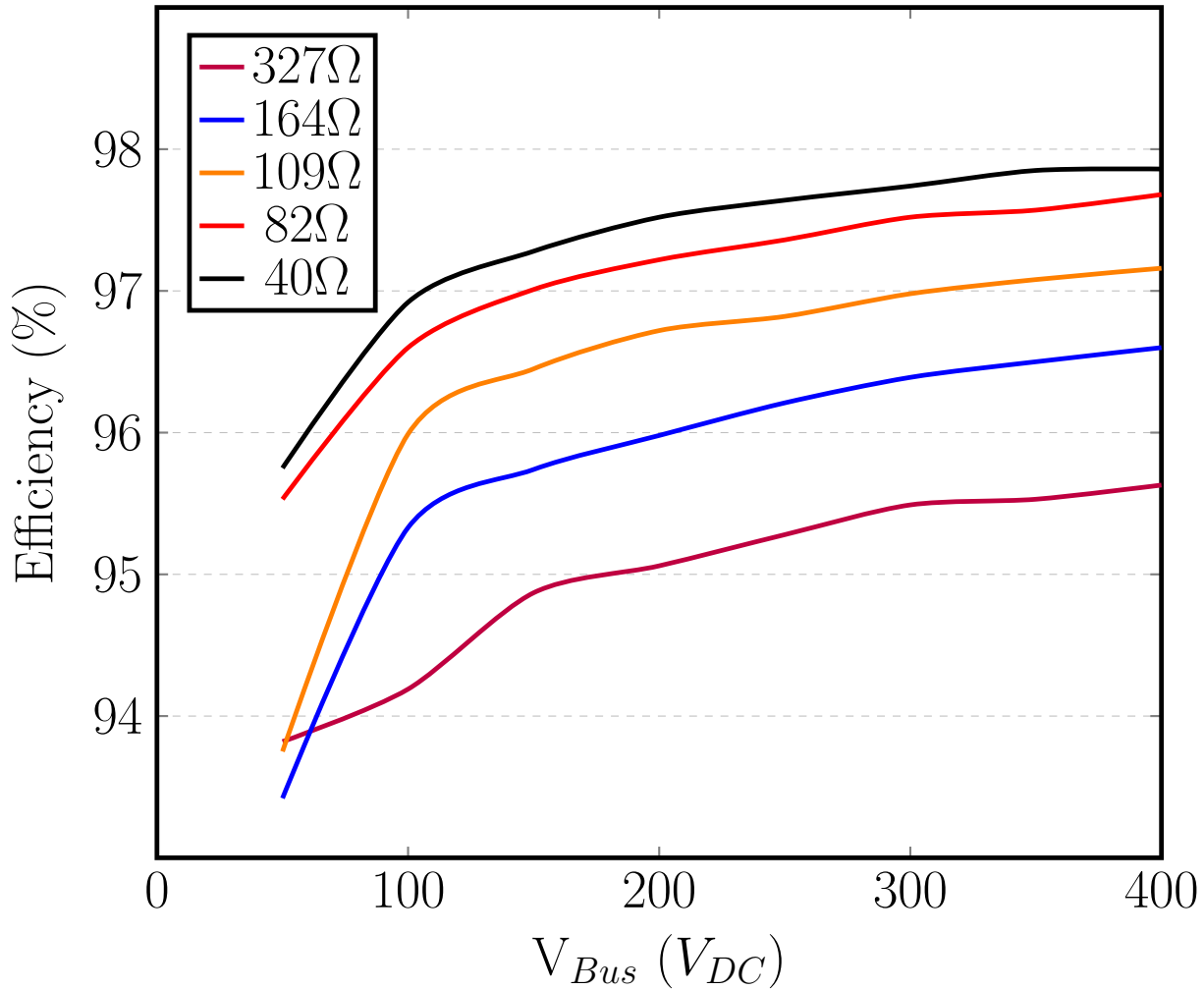
Figure 7: 200V V_{Bus} , 900Ω Load



Figure 8: 100V V_{Bus} , 900Ω Load

4.2 Efficiency

Efficiency vs V_{Bus} for Various Loads



Efficiency vs Output Power for Various V_{Bus}

