UG484: Si828x-HB-EVB User's Guide

The Si828x-HB-EVB (Si828x Half-Bridge EVB) is a versatile platform for demonstrating the features of the Si828x with SiC/IGBT devices in a half-bridge circuit configuration. The board includes the Si8285 to drive the high-side switch and an Si8284 to drive the low-side switch.

The Si8284 has an integrated dc-dc circuit that operates with an external MOSFET and a transformer to generate two pairs of isolated positive and negative voltages to power both the Si8285 and the Si8284.

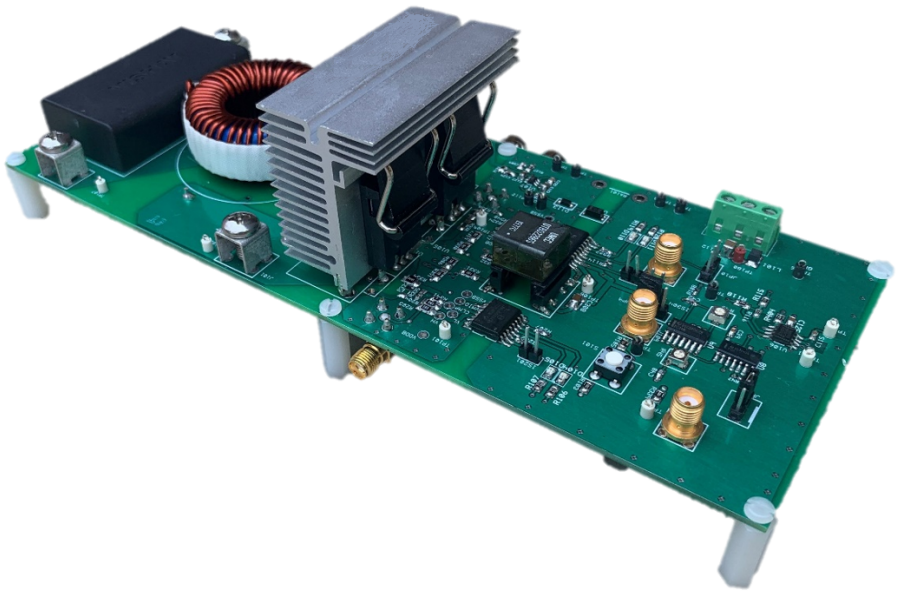
The Si828x-HB-EVB has a "non-overlap" circuit to take PWM signal input from a single-channel function generator to produce complimentary PWM signals with programable dead time control to drive the inputs of the Si8285 and Si8284 gate drivers. The input circuit can also be configured to operate with two channel function generators to drive the input of the Si8285 and Si8284 directly.

There are terminals on the outputs of the half-bridge power circuit that can be arranged to support double pulse (switching loss), crosstalk, and Si828x DESAT short circuit protection tests. Also, the board can be configured to operate with an external inductor (not included) in half-bridge buck or boost operation for dv/dt and dc-dc efficiency testing.

The board has connections for current and voltage probes to support data collection during tests. Operating the board is simple with the assistance of the LED indicators (RDY, /FLT), current sensor (not included), voltage measurement (BNC, SMA) connectors, and the /FLT reset button.

KEY FEATURES

- Half-bridge demonstration board for SiC/IGBT
- Operates up to 1 kV DC-Rail input
- Demonstrates half-bridge operations (double pulse, buck, boost)
- Demonstrates desaturation protection
- Demonstrates adjustable soft shutdown capability
- Onboard "non-overlap" circuit to convert single PWM signal into complementary signals with independent adjustable deadtime
- Demonstrates Si8284 integrated dc-dc to generate all necessary voltages to power both high- and low-side gate drivers
- Supports IGBT/SiC in TO-247 packages in standard 3-pin and 4-pin configurations with Kelvin Source connection
- Supports gate current booster option



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1. Schematics

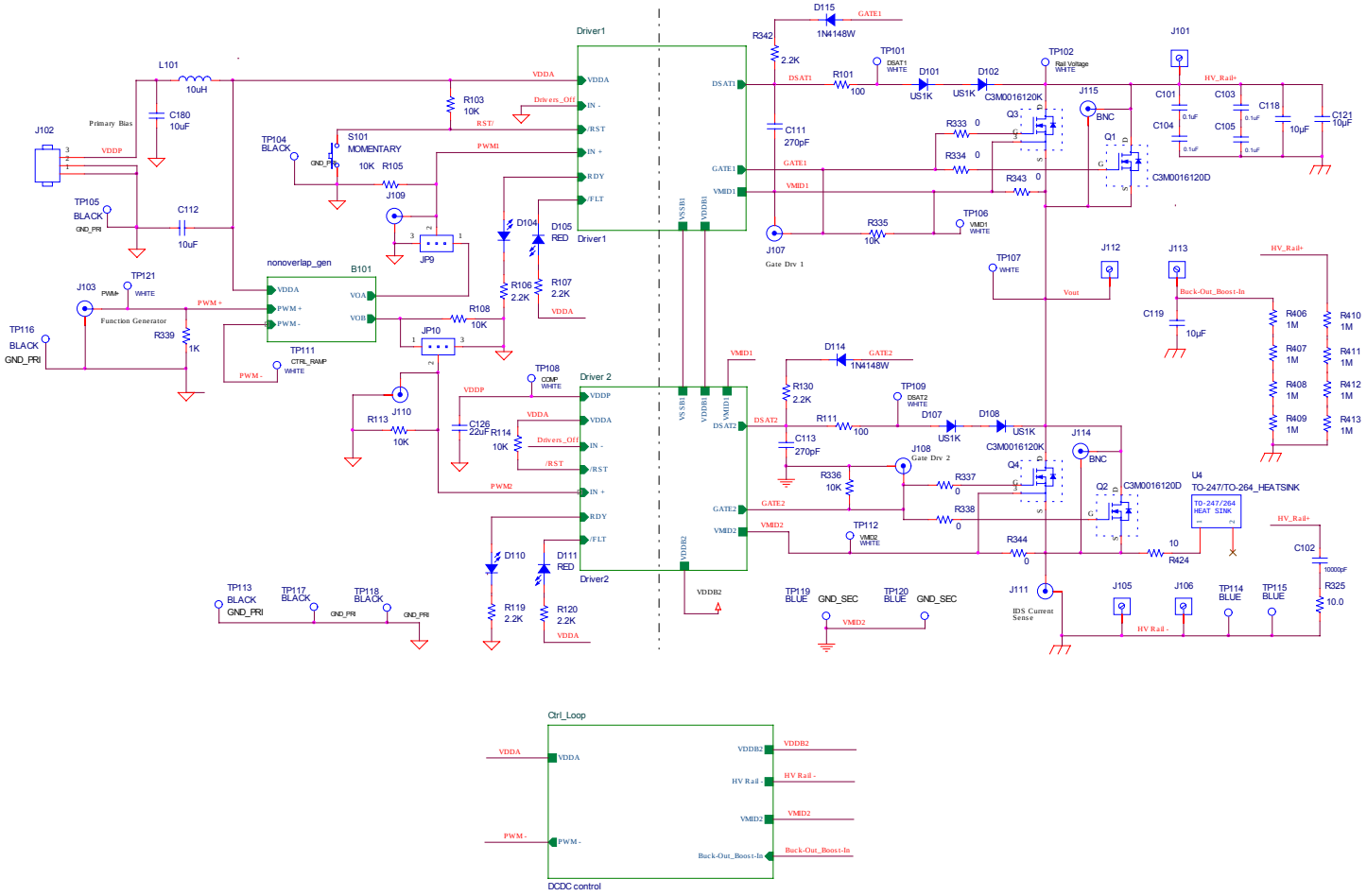

Figure 1.1. Si828x-HB- EVB Half-Bridge Circuit

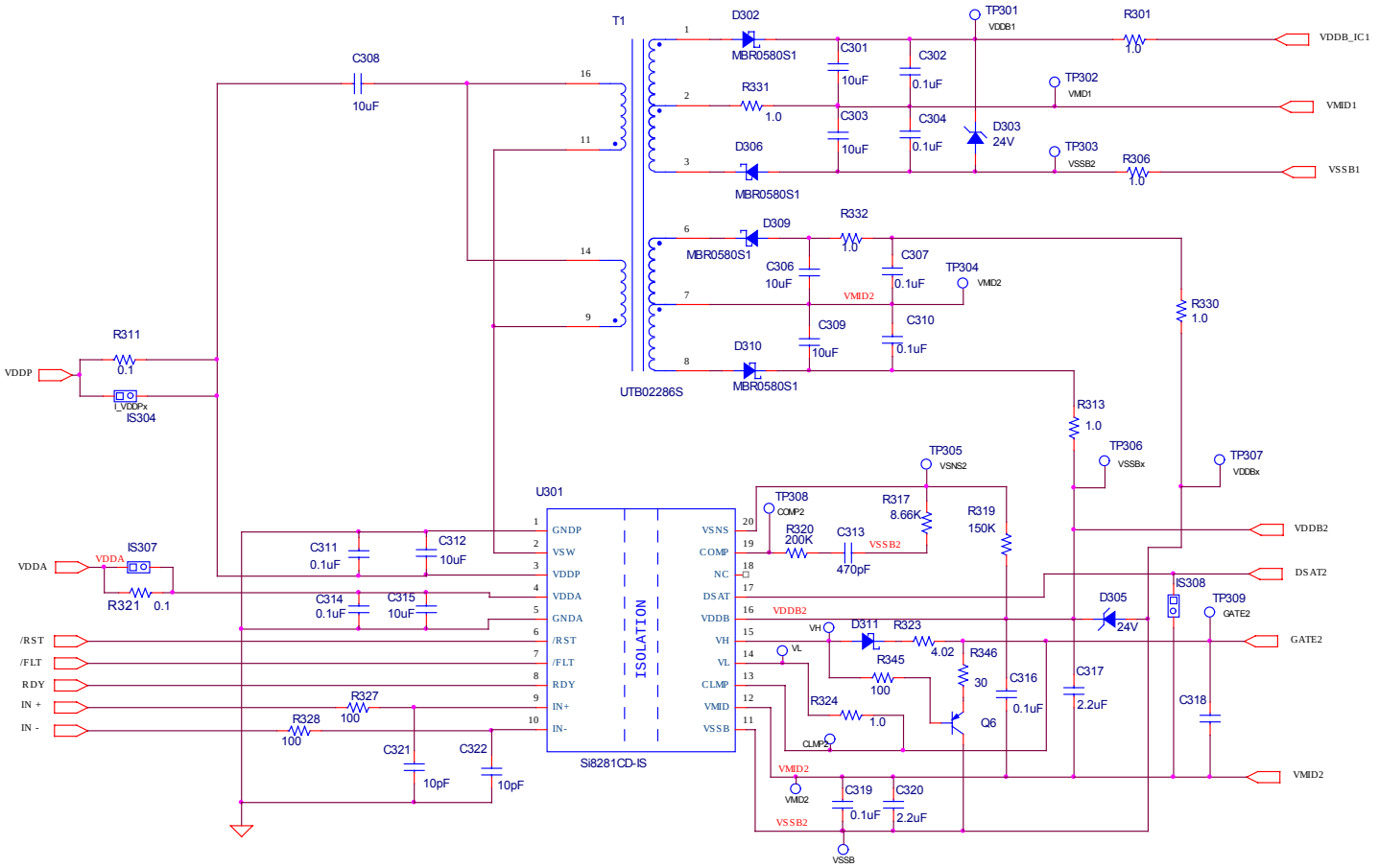

Figure 1.2. Low-Side Si8284 Gate Driver (Driver 2) with Integrated DC-DC

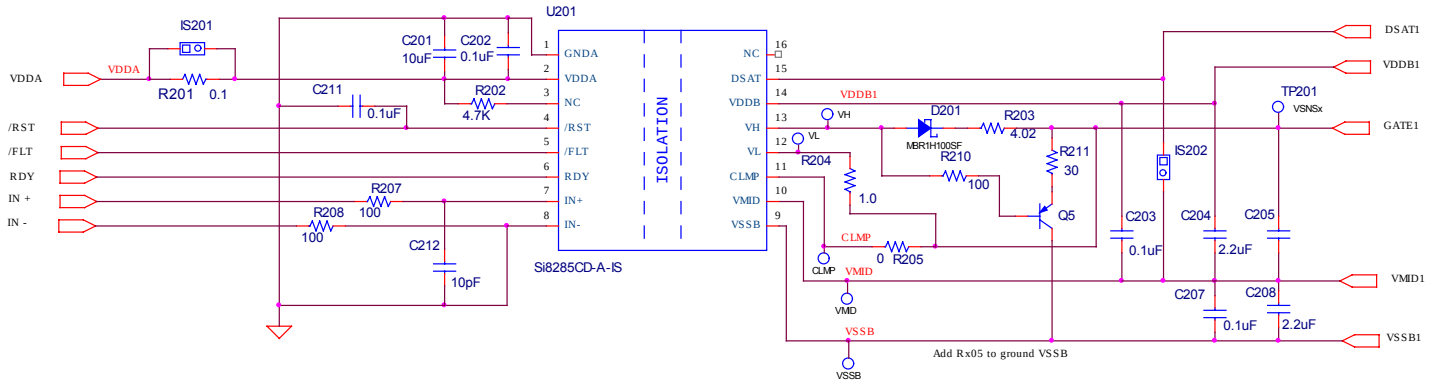

Figure 1.3. High-Side Si8285 Gate Driver (Driver 1)

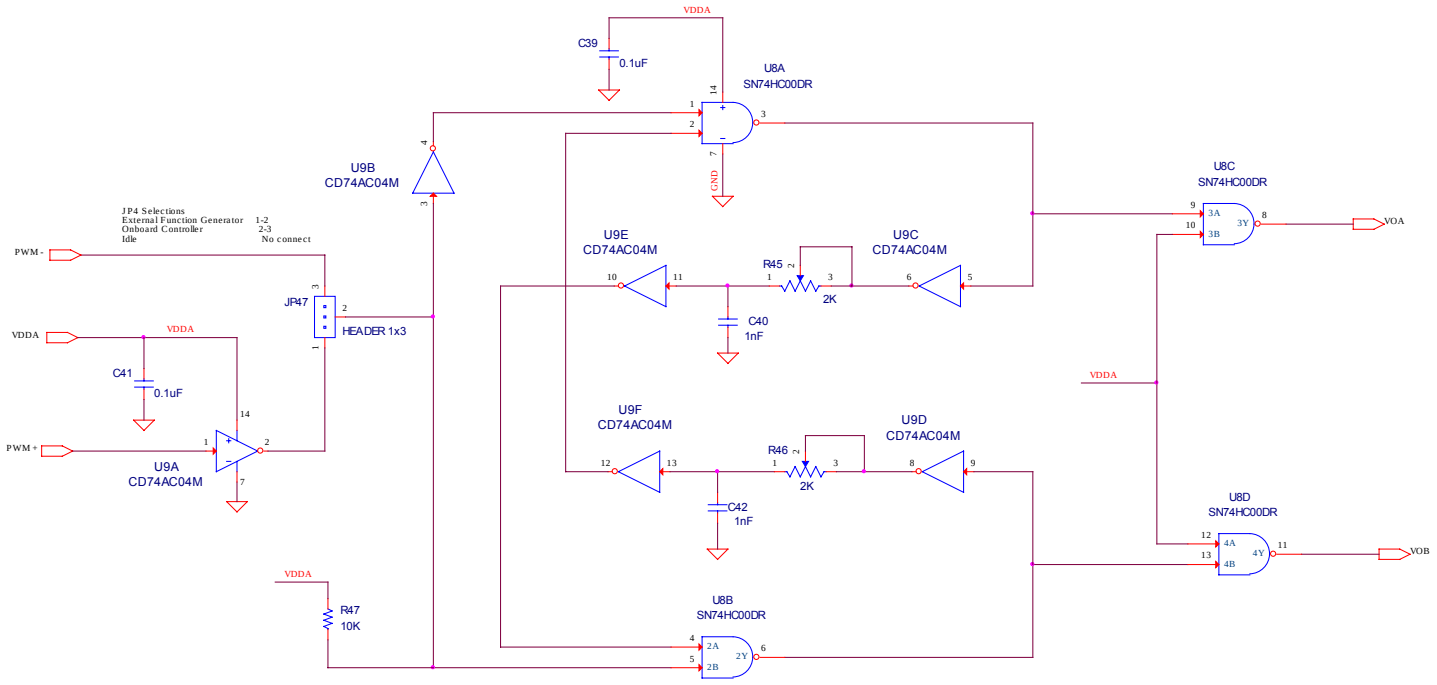

Figure 1.4. Non-Overlap Dead Time Generator Circuit

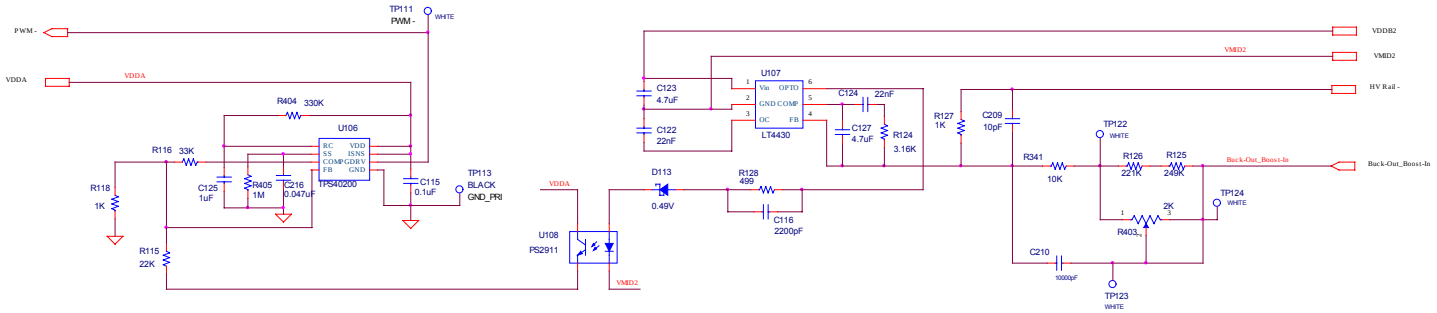

Figure 1.5. Control Loop for Buck Converter (Not Installed)

2. Si828x-HB-EVB Connections for Testing

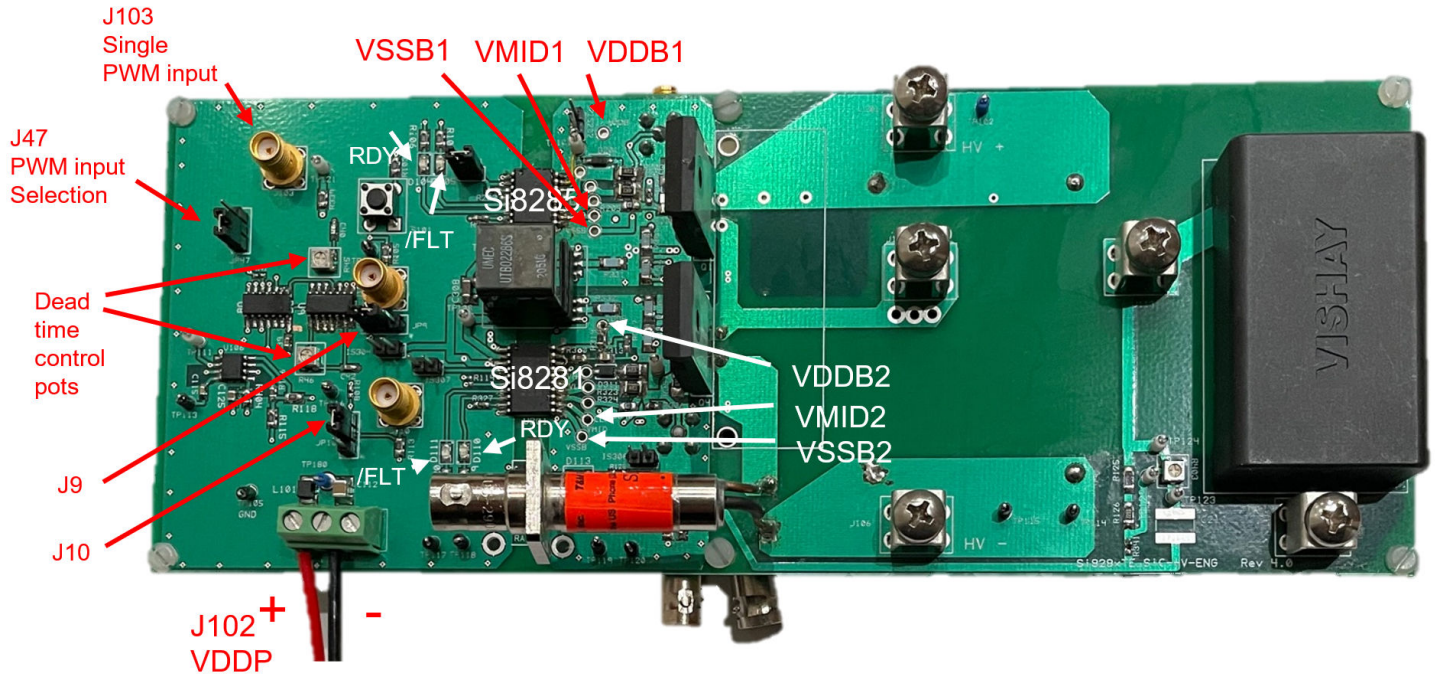

Figure 2.1. Si828x-HB-EVB Input Power and Input Signals

DANGER! This board may contain high voltages of up to 1000 V.
Do not touch the board after the high-voltage section has been energized!

2.1 Input Power

The Si828x-HB-EVB is powered by applying VDDP = 5 V (± 10%) to pin 3 (+) and Pin 2 (–) of the J102 connector. The Si8281 with integrated dc-dc generates voltages to power both the Si8281 and Si8285 gate drivers. The RDY green LEDs (D104, D110) are lit when proper VDDA, VDDBs, and VSSBs (VSSB is a negative voltage polarity) are present. There are test points to check the VDDB and VSSB voltage levels (reference to VMID). The VDDB and VSSB voltage levels can be adjusted by selecting the R319 and R317 values.

$$VDDB - VSSB = 1.05 \times \left(\frac{R319}{R317} + 1\right)$$

The ratio between VDDB and VSSB voltages is determined by the T1 transformer turns ratio between the two secondary windings (see UMEC UTB02286S transformer data sheet for details).

$$VDDB = (VDDB - VSSB) \times \frac{W_{7-8}}{W_{7-8} + W_{6-7}}$$

2.2 Input Signals

The Si828x-HB-EVB has flexible PWM input signal connections to support all testing configurations.

2.2.1 Single PWM Input

J103 (SMA) provides connection for single PWM input to drive both Si8285 and Si8281. The onboard nonoverlapped circuit comprises of U8 and U9 generates complimentary PWM signals to drive Si8281 and Si8285. The potentiometers R45 and R46 provide dead time adjustment controls (both pots are set for 170 ns dead time at the factory). Below are connections for J47, J9 and J10 to support single PWM input operation (as shown in Figure 2.1 Si828x-HB-EVB Input Power and Input Signals on page 6).

- J103 (SMA): Input PWM signal
- J47: pin 1 to pin 2
- J9: pin 1 to pin 2
- J10: pin 1 to pin 2

2.2.2 Direct PWMs Connection to Si8285 and Si8281

SMA connectors J109 and J110 provide PWM input connections to the IN+ of the Si8285 (high-side gate driver) and Si8281 (low-side gate driver), respectively. Dual channel function generator with proper setting (dead time...) should be used to drive both gate drivers simultaneously. The J9 and J10 connections to support direct PWMs connections to J109 and J110 are listed below:

- J109 (SMA): Si8285 IN+
- J110 (SMA): Si8281 IN+
- J9: Pin 2 to Pin 3
- J10: Pin 2 to Pin 3

It is also possible to drive one gate driver directly from the function generator while keeping the second gate driver in the off state by placing a jumper on J9 or J10 to keep the IN+ at the logical low level. The J9 and J10 jumper connections to connect the IN+ signal to GND are listed below:

- J9: Pin 2 to Pin 1 (high-side SI8285 driver)
- J10: Pin 2 to Pin 1 (low-side Si8281 driver)

3. Scope Probe Connections and DESAT Configurations

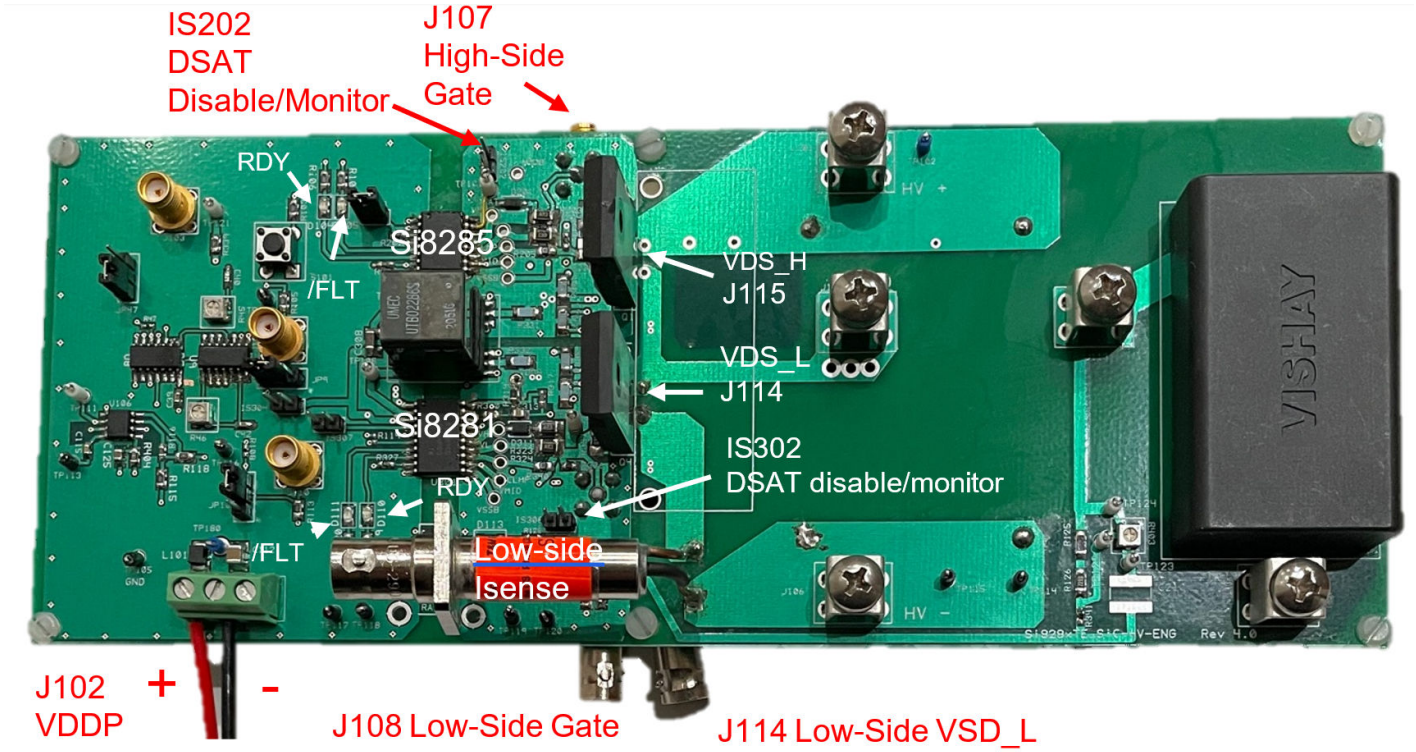

Figure 3.1. Si828x-HB- EVB Scope Probe and DESAT Connections

3.1 Gate, VDS, and Low-Side Current Monitors

The Si828x-HB-EVB has the following connections to support voltage and current measurements

- J107 (SMA), top-side Si8285 gate (bottom mounted, requires isolated probe)
- J108 (SMA), low-side Si8281 gate (bottom mounted)
- J115, high-side VDS (bottom mounted BNC, requires isolated probe)
- J114, low-side VDS (bottom mounted BNC)
- J111, low-side Isense; recommending T&M Research (0.005V/A) SDN-005 BNC (not included)

3.2 DESAT Monitor/Disable

The two pin headers IS202 and IS308 are used to provide scope probe connections for DESAT monitors or for DESAT disable control

- IS202 top-side Si8285 DESAT: Pin 1: DESAT1, Pin 2: VMID1; DESAT1 is disabled when Pin 1 is shorted to Pin 2
- IS308 low-side Si8281 DESAT: Pin 1: DESAT2, Pin 2: VMID2; DESAT2 is disabled when Pin 1 is shorted to Pin 2

4. Test Configurations

The Si828x-HB-EVB has configurable connections to support most half-bridge performance tests for both top and bottom switching devices.

4.1 Double Pulse Test

The Si828x-HB-EVB can be configurated to evaluate the power switching devices in half bridge double pulse test at different current levels. By adjusting the switching on time and the time between the PWM pulses, the Device Under Test (DUT) can be controlled and measured over the full range of operating conditions. In this test, the PWM signal is injected directly to the IN+ of the first gate driver to operate its switching device while the IN+ of the second gate driver is shorted to GND to keep its switching device in the off state. The body diode of the off state switching device works in conjunction with the active switching device to provide realistic switching characteristics of the half bridge circuit.

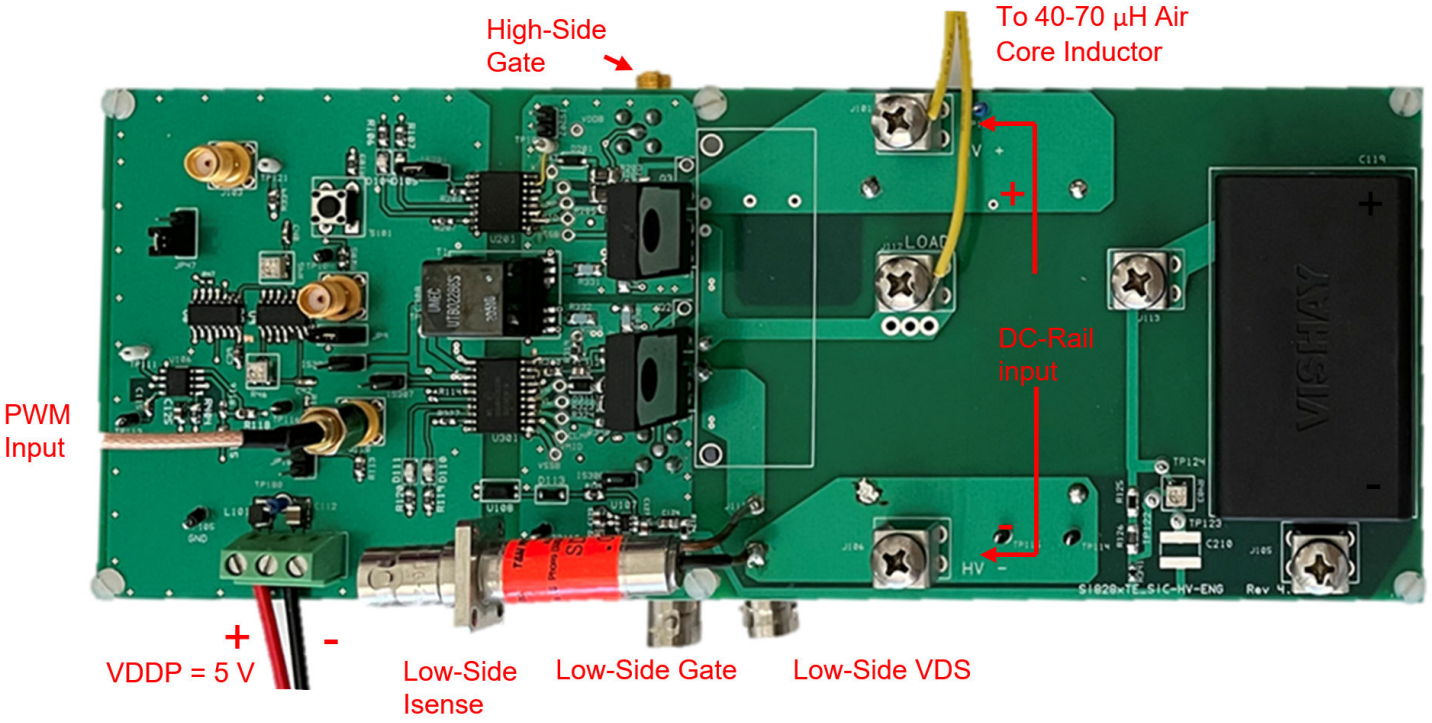

Figure 4.1. Si828x-HB- EVB Connections for Double Pulse Test

4.1.1 Double Pulse Test on Low-Side Switching Device

Figure 4.1 Si828x-HB- EVB Connections for Double Pulse Test on page 9 provides connections for the double pulse test for the low-side switching device.

Gate driver power:

- Connect 5 V to J102.

DC-Rail input:

- Connect DC-Rail voltage between J101–J106.
- Connect J113 to J101 to increase the DC-Rail bypass cap from 10 µF to 20 µF.

PWM input signal:

- Connect PWM input to J110 SMA connector.
- JP9: Jumper between Pin 2–3 to short Si8285 IN+ to GND.
- JP10: No jumper.

Inductor:

Connect inductor (air core preferred) with appropriate value from 25 µH to 75 µH between J101–J112 (keep the inductor at least two feet away from Si828x-HB-EVB and test instrumentation to avoid interferences).

Oscilloscope connections:

Figure 4.1 Si828x-HB- EVB Connections for Double Pulse Test on page 9 shows probe scope connections for this test. Also, see 3.1 Gate, VDS, and Low-Side Current Monitors for a list of scope probe connections for voltage and current measurements.

4.1.2 Double Pulse Test on High-Side Switching Device

Connections for double pulse test on high-side switching device are similar to the connections for testing the low-side switching device (as described in 4.1.1 Double Pulse Test on Low-Side Switching Device) except for the following connections:

PWM input signal:

- Connect PWM input to J109 SMA connector.
- JP9: No jumper.
- JP10: Jumper between Pins 2–3 to short Si8281 IN+ to GND.

Inductor:
Connect inductor (air core preferred) with appropriate value between J112–J106 (keep the inductor at least two feet away from Si828x-HB-EVB and test instrumentation to avoid interference).

4.2 Cross Talk Testing

Data for the crosstalk test can be collected during the double pulse test described in 4.1 Double Pulse Test. Crosstalk data is the voltage spike on the gate of the off-state device (J107 or J108) during switching operations. This voltage spike provides information on how the gate driver copes with the dv/dt induced Miller current during switching operation.

4.3 DESAT Shorted Circuit Test

The Si828x-HB-EVB has connections to support DESAT shorted circuit test on either the low-side or high-side switching device. During test, a PWM signal is injected directly to the IN+ of the low-side or high-side switching device (the first device) while a short connection is placed across the D-S terminals of the second device. When a PWM signal turns on the first switching device, there is a large shoot-through current originated from the + terminal of the DC-Rail across the first switching device and the short on the second device toward the negative terminal of the DC-Rail. The DESAT circuit of the gate driver must work effectively to protect the first switching device from this short condition. DESAT detection response time is adjustable through the value of the R130 and R342 resistors while soft shutdown speed is adjustable through the value of the R211 and R346 resistors (manufactory default resistor value is 30 Ω). See "AN1288: Si828x External Enhancement Circuits" for more details.

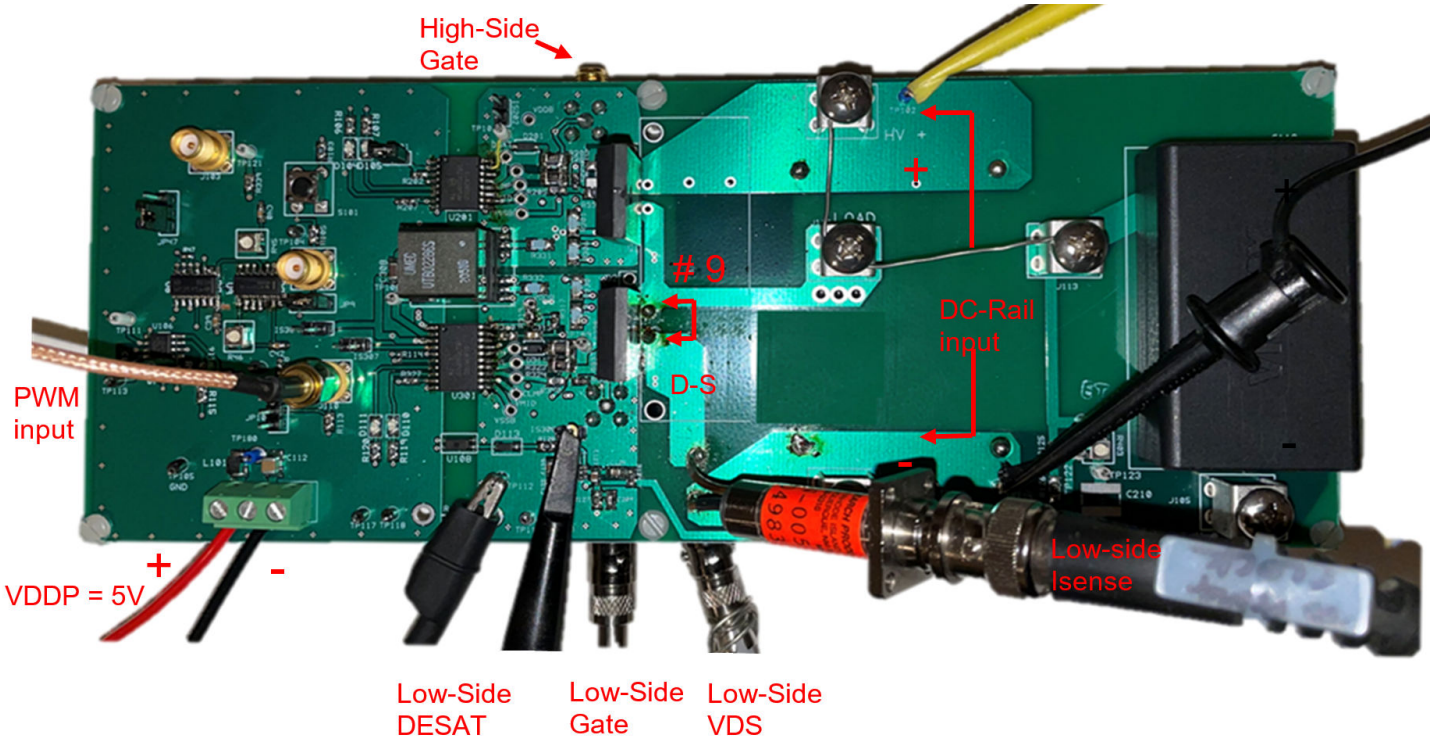

Figure 4.2. Si828x-HB- EVB Probe Connections DESAT Shorted Circuit Test

4.3.1 DESAT Shorted Circuit Test on Low-Side Switching Device

4.3 DESAT Shorted Circuit Test provides connections for the double pulse test for the low-side switching device.

Gate driver power:

- Connect 5 V to J102.

DC-Rail:

- Connect DC-Rail voltage between J101–J106.
- Screw bus wire between J101, J112 and J113 to increase the DC-Rail bypass cap from 10 µF to 20 µF and to place short on the high-side switching device.

PWM input signal:

- Connect PWM input to J110 SMA connector.
- JP9: place jumper between Pins 2–3 to short Si8285 IN+ to GND.
- JP10: no jumper.

Oscilloscope connections: 4.3 DESAT Shorted Circuit Test shows probe scope connections for this test. See 3.1 Gate, VDS, and Low-Side Current Monitors for a list of probe scope connections for voltage and current measurements.

4.3.2 DESAT Shorted Circuit Test on High Side Switching Device

Connections for DESAT test on high side switching device are similar to the connections for testing the low side switching device (as described in 4.3.1 DESAT Shorted Circuit Test on Low-Side Switching Device) except for the following connections:

DC-Rail:

- Connect DC-Rail voltage between J101–J106.
- Screw bus wire between J101, J113 to increase the DC-Rail bypass cap from 10 µF to 20 µF.
- Solder a wire across the D-S terminals of the low-side switching device as indicated by Item #9 of Figure 4.2 Si828x-HB- EVB Probe Connections DESAT Shorted Circuit Test on page 11.

PWM input signal:

- Connect PWM input to J109 SMA connector.
- JP9: No jumper.
- JP10: Jumper between Pins 2–3 to short Si8281 IN+ to GND.

4.4 Buck/Boost DCDC Testing

The Si828x-HB-EVB can be configured to operate with an external inductor in dc-dc buck or boost operation. The two bulk filter capacitors, C118 and C119, can operate as input or output caps depending on whether a buck or boost configuration is used. The rating of the external inductor must be properly selected to support the operating voltages, output loading, and switching frequency. When operating at high output power, a heat sink with proper insulation and clip must be installed to dissipate heat from the two switching devices. Air flow may be required on the heat sink for very-high-power operation.

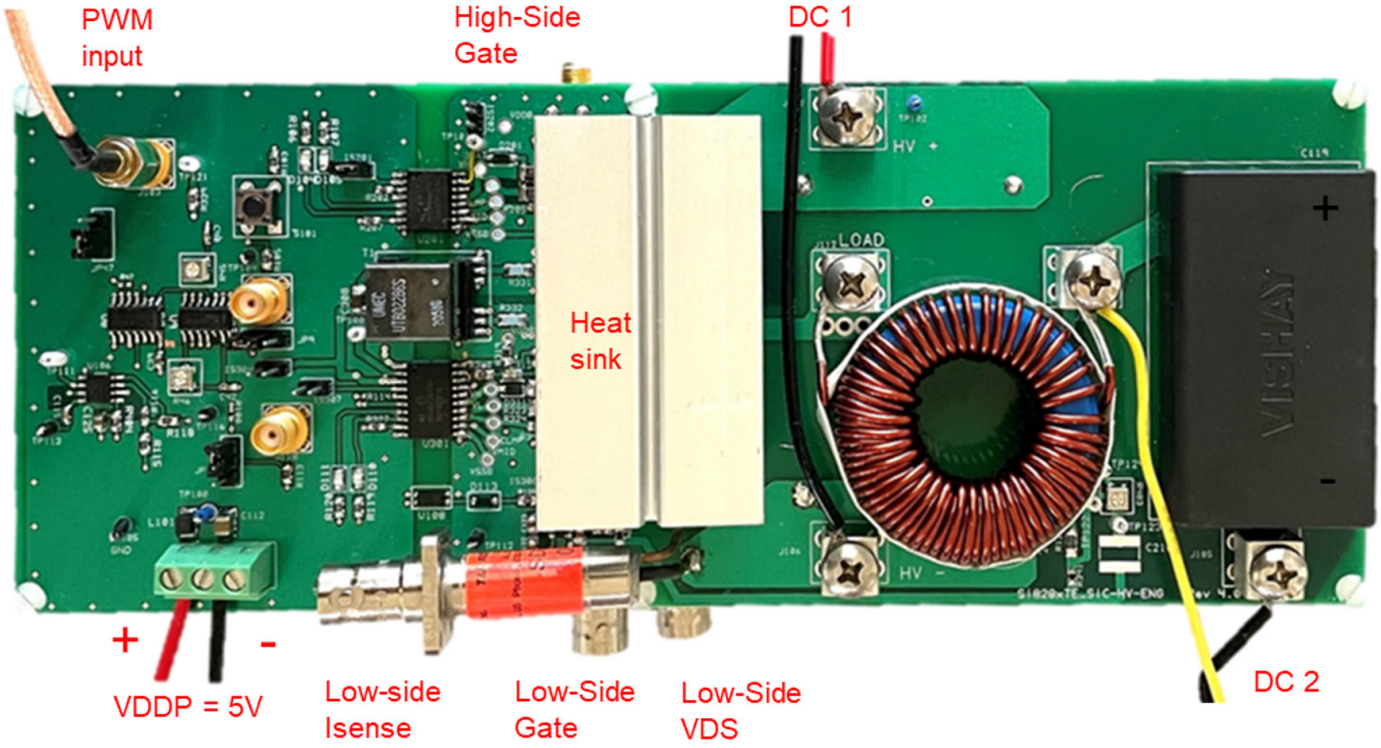

Figure 4.3. Si828x-HB-EVB Buck/Boost DC-DC Operation

4.4.1 Si828x-HB-EVB in Buck DC-DC Operation

Figure 4.3 Si828x-HB-EVB Buck/Boost DC-DC Operation on page 12 shows the connections for operating the Si828x-HB-EVB in buck mode.

Gate driver power: Connect 5 V to J102.

Inductor: Connect inductor between J112–J113.

DC-Rail input DC1: connect DC-Rail voltage between J101-J106

DC output, DC2: buck mode dc output

PWM input signal: see 2.2.1 Single PWM Input and 2.2.2 Direct PWMs Connection to Si8285 and Si8281 for two methods of connecting PWM signal to the Si828x-HB-EVB. Asynchronous and synchronous buck operation are possible by using proper PWM signals combines with the jumper setting on JP9 and JP10

Oscilloscope connections: Figure 4.3 Si828x-HB-EVB Buck/Boost DC-DC Operation on page 12 shows scope probe connections for this test. Also, see 3.1 Gate, VDS, and Low-Side Current Monitors for a list of probe scope connections for voltage and current measurements.

4.4.2 Si828x-HB-EVB in Boost DC-DC Operation

The connections for the Si828x-HB-EVB to operate in boost mode operation is the same as connection for the buck mode operation (see 4.4.1 Si828x-HB-EVB in Buck DC-DC Operation). The only difference is the swapping of the dc input and dc output connection as shown below:

DC-Rail input DC2: connect DC-Rail voltage between J101–J106

DC output, DC1: boost mode dc output

5. Current Booster Option

The Si828x-HB-EVB has VH, VL, MCLP, VMID, VDDB, and VSSB test points that can be connected to an external current booster daughter card. The gate resistors can be removed to insert the current booster circuit between the gate driver and the SiC. This option increases the current drive capability of the gate driver to more than 15 A. This circuit is optional and available on request. See "AN1288: Si828x External Enhancement Circuits" for more information on the Si828x current booster circuit.

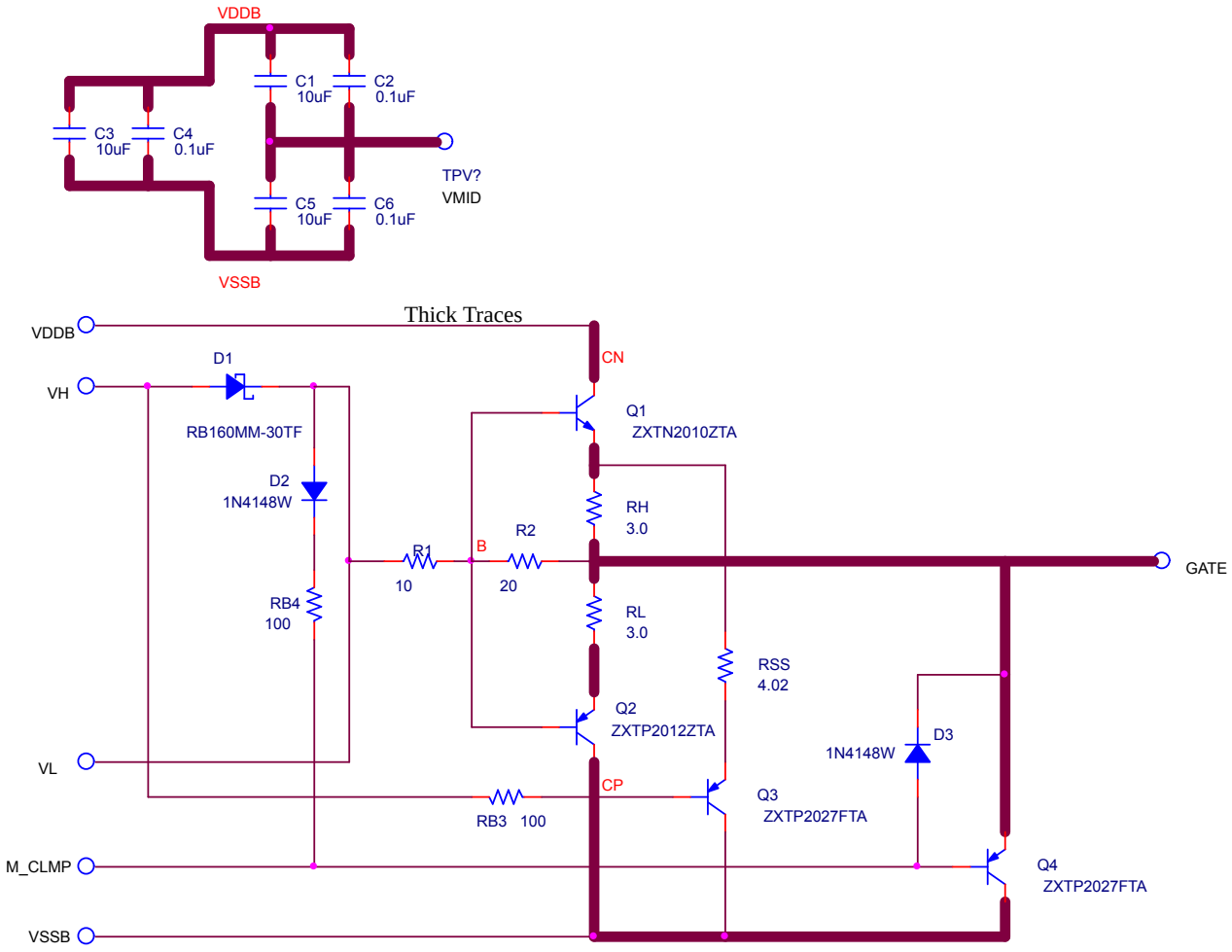

Figure 5.1. Current Booster Circuit

6. Bill of Materials

Table 6.1. Si828x-HB-EVB Bill Of Materials

Reference	Description	Manufacturer	Manufacturer Part Number
C39, C41, C203, C207, C302, C304, C307, C310, C316, C319	Capacitor, 0.1 µF, 25 V, ±20%, X7R, 0603	Venkel	C0603X7R250-104M
C40, C42	Capacitor, 1 nF, 100 V, ±10%, X7R, 0603	Venkel	C0603X7R101-102K
C101, C103, C104, C105	Capacitor, 0.1 µF, 1000 V, ±10%, X7R, 1825	AVX	1825AC104KAT1A
C111, C113	Capacitor, 270 pF, 50 V, ±10%, X7R, 0603	Kemet	C0603C271K5RACTU
C112, C180	Capacitor, 10 µF, 50 V, ±20%, X7R, 1210	Venkel	C1210X7R500-106M
C118, C119, C121	Capacitor, 10 µF, 1000 V, ±5%, PolyFilm, PTH	Vishay	MKP1848S61010JY2B
C126	Capacitor, 22 µF, 25 V, ±10%, X7R, 1210	Venkel	C1210X7R250-226M
C201, C308, C315	Capacitor, 10 µF, 10 V, ±20%, X7R, 1206	Venkel	C1206X7R100-106M
C202, C211, C311, C314	Capacitor, 0.1 µF, 10 V, ±10%, X7R, 0402	Venkel	C0402X7R100-104K
C204, C208, C317, C320	Capacitor, 2.2 µF, 25 V, ±20%, X7R, 0805	Venkel	C0805X7R250-225M
C205, C318	Capacitor, 1 nF, 100 V, ±10%, X7R, 0603	Venkel	C0603X7R101-102K
C212, C321, C322	Capacitor, 10 pF, 50 V, ±0.5 pF, C0G, 0603	Venkel	C0603C0G500-100D
C301, C303, C306, C309, C312	Capacitor, 10 µF, 25 V, ±20%, X7R, 1210	Venkel	C1210X7R250-106M
C313	Capacitor, 470 pF, 200 V, ±20%, X7R, 0805	Venkel	C0805X7R201-471M
D101, D102, D107, D108	Diode, Switch, Ultra Fast, 800 V, 1.0 A, SMA	Diodes Inc.	US1K-13-F
D104, D110	LED, Green, 0805	Lite-On Inc.	LTST-C170GKT
D105, D111	LED, Red, 631 nM, 30 mA, 2 V, 54 mcd, 0805	Lite-On Tech	LTST-C170KRKT
D114, D115	Diode, Fast, 100 V, 2 A, SOD123	Diodes Inc.	1N4148W
D201, D311	Diode, Schottky, 100V, 1A, SOD123	On Semi	MBR1H100SF
D302, D306, D309, D310	Diode, Schottky, 80 V, 500 mA, SOD123	Diodes Inc.	MBR0580S1
D303, D305	Diode, Zener, 24 V, 1000 mW, SMA	Diodes Inc.	SMAZ24-13-F

Reference	Description	Manufacturer	Manufacturer Part Number
IS201, IS202, IS304, IS307, IS308	Header, 2x1, 0.1in pitch, Tin Plated	Samtec	TSW-102-07-T-S
JP9, JP10, JP47	Header, 3x1, 0.1in pitch, Tin Plated	Samtec	TSW-103-07-T-S
J101, J105, J106, J112, J113	CONN, Term Screw, 10-32, PTH	Keystone Electronics	8174
J102	CONN, Term Block 3POS, 5.08 mm, RT PCB	Phoenix Contact	1729131
J103, J109, J110	CONN, SMA 50 Ω, Straight, PTH	Johnson Components	142-0701-201
J107, J108	CONN SMA Jack R/A 50 Ω SMD	Amphenol RF	132136-12
J114, J115	CONN, BNC, Test Lead, 4in. Leads , PTH	Mueller Electric Co.	BU-5200-A-4-0
L101	Inductor, 1210	TDK	NLCV32T-100K-PF
PCB1	PCB, Bare Board, Si8281-HPWR-ENG REV 1.0	Skyworks	SI828XTE_SIC-HV PCB
Q1, Q2	SiC, 1200 V, 115 A, 16 mΩ, TO-247 3-pin	CREE	C3M0016120D
Q3, Q4	SiC, 1200 V, 115 A, 16 mΩ, TO-247 4-pin	CREE	C3M0016120K
Q5, Q6	Transistor, PNP, –60 V, 600 mA, SOT23	NXP Semiconductors	PMBT2907A
R45, R46	Trim pot, 2 kΩ, 1T, Top ADJ, SMD	Murata	PVG3A202C01R00
R47, R108, R114	Resistor, 10 kΩ, 1/16W, ±5%, Thick Film, 0402	Venkel	CR0402-16W-103J
R101, R111	Resistor, 100 Ω, 1/10W, ±1%, Thick Film, 0805	Venkel	CR0805-10W-1000F
R103, R105, R113	Resistor, 10 kΩ, 1/8 W, ±1%, Thick Film, 0805	Venkel	CR0805-8W-1002F
R106, R107, R119, R120	Resistor, 2.2 kΩ, 1/10 W, ±5%, Thick Film, 0805	Venkel	CR0805-10W-222J
R130, R342	Resistor, 2.2 kΩ, 1/10 W, ±1%, Thick Film, 0603	Yageo	RC0603FR-072K2L
R201, R311, R321	Resistor, 0.1 Ω, 1/2 W, ±1%, Thick Film, 1210	Venkel	LCR1210-R100F
R202	Resistor, 4.7 kΩ, 1/10 W, ±1%, Thick Film, 0603	Venkel	CR0603-10W-4701F
R203, R323	Resistor, 4.02 Ω, 1/4 W, ±1%, Thick Film, 1206	Venkel	CR1206-4W-4R02F
R204, R324	Resistor, 1.0 Ω, 1/4 W, ±1%, Thick Film, 1206	Venkel	CR1206-4W-1R00F
R205	Resistor, 0 Ω, 2 A, Thick Film, 0805	Venkel	CR0805-10W-000

Reference	Description	Manufacturer	Manufacturer Part Number
R207, R208, R327, R328	Resistor, 100 Ω, 1/10 W, ±1%, Thick Film, 0603	Venkel	CR0603-10W-1000F
R210, R345	Resistor, 100 Ω, 1/16 W, ±1%, Thick Film, 0603	Venkel	CR0603-16W-1000F
R211, R346	Resistor, 30 Ω, 1/8 W, ±1%, Thick Film, 0805	Yageo	RC0805FR-0730RL
R301, R306, R313, R330, R331, R332	Resistor, 1.0 kΩ, 1/4 W, ±5%, Thick Film, 1206	Venkel	CR1206-4W-1R0J
R317	Resistor, 8.66 kΩ, 1/16 W, ±1%, Thick Film, 0603	Venkel	CR0603-16W-8661F
R319	Resistor, 150 kΩ, 1/10 W, ±1%, Thick Film, 0603	Panasonic	ERJ-3EKF1503V
R320	Resistor, 200 kΩ, 1/10 W, ±1%, Thick Film, 0805	Venkel	CR0805-10W-2003F
R325	Resistor, 10.0 Ω, 2 W, ±1%, Thick Film, 2512	Venkel	CR2512-2W-10R0FT-W
R333, R334, R337, R338, R343, R344	Resistor, 0 Ω, 4 A, Thick Film, 1210	Venkel	CR1210-4W-000
R335, R336	Resistor, 10 kΩ, 1/16 W, ±1%, Thick Film, 0603	Venkel	CR0603-16W-1002F
R339	Resistor, 1 kΩ, 1/10 W, ±1%, Thick Film, 0805	Venkel	CR0805-10W-1001F
R406, R407, R408, R409, R410, R411, R412, R413	Resistor, 1 MΩ, 1/8 W, ±1%, Thick Film, 1206	Venkel	CR1206-8W-1004F
R424	Resistor, 249 kΩ, 1/4 W, ±0.1%, ThinFilm, 1206	Panasonic	ERA-8AEB2493V
S101	Switch, PB, NO, Momentary, 6 mm, PTH	Panasonic	EVQ-PAD04M
TP101, TP102, TP106, TP107, TP108, TP109, TP111, TP112, TP121, TP201, TP202, TP203, TP204, TP205, TP206, TP301, TP302, TP303, TP304, TP305, TP306, TP307, TP308, TP309, TP310, TP311, TP312, TP313, TP314	Testpoint, White, PTH	Kobiconn	151-201-RC
TP104, TP105, TP113, TP116, TP117, TP118	Testpoint, Black, PTH	Kobiconn	151-203-RC
TP114, TP115, TP119, TP120	Testpoint, Blue, PTH	Kobiconn	151-205-RC
T1	Transformer, 1.5 µH, 10%, 3750VAC ISOL.	UMEC	UTB02286S
U4	Heatsink, TO-247, Aluminum	Ohmite	C40-058-VE
U8	IC, NAND, Quad, 2 Input, SO14	TI	SN74HC00DR
U9	IC, Inverter, Hex, SO14	TI	CD74AC04M
U201	IC, 4 Amp Isodriver, 12 V UV-LO, 5 kV, SOW16	Skyworks	Si8285CD-A-IS

Reference	Description	Manufacturer	Manufacturer Part Number
U301	IC, 4 A Isodriver with Isovolt, SO20 WB	Skyworks	Si8281CD-IS
J114, J115	CONN, BNC, Test Lead, 4 in. Leads , PTH	Mueller Electric Co.	BU-5200-A-4-0
Not Installed Components			
J111	CONN, Jack BNC VERT 10 mΩ current sense	T&M Research	SDN-414-01
C102, C210	Capacitor, 10000 pF, 1000 V, ±10%, X7R, 1825	AVX	1825AC103KAT1A
C115	Capacitor, 0.1 µF, 25 V, ±10%, X7R, 0603	Venkel	C0603X7R250-104K
C116	Capacitor, 2200 pF, 50 V, ±10%, X7R, 0402	Venkel	C0402X7R500-222K
C122, C124	Capacitor, 22 nF, 25 V, ±5%, C0G, 0805	Venkel	C0805C0G250-223J
C123, C127	Capacitor, 4.7 µF, 16 V, ±10%, X5R, 0805	Venkel	C0805X5R160-475K
C125	Capacitor, 1 µF, 50 V, ±1%, C0G, 0805	Venkel	C0805C0G500-105F
C209	Capacitor, 10 pF, 50 V, ±0.5 pF, C0G, 0603	Venkel	C0603C0G500-100D
C216	Capacitor, 0.047 µF, 100V, ±10%, X7R, 0805	Venkel	C0805X7R101-473K
D113	Diode, Schottky, 40 V, 1.0 A, SOD123	ST Semiconductor	STPS140Z
R115	Resistor, 22 kΩ, 1/8 W, ±1%, Thick Film, 0805	TE Connec.	CRGCQ0805F22K
R116	Resistor, 33 kΩ, 1/16 W, ±1%, Thick Film, 0603	Venkel	CR0603-16W-3302F
R118	Resistor, 1K, 1/8W, ±1%, Thick Film, 0805	Venkel	CR0805-8W-1001F
R124	Resistor, 3.16 kΩ, 1/8 W, ±0.1%, ThinFilm, 0805	Panasonic	ERA-6AEB3161V
R125	Resistor, 249 kΩ, 1/10 W, ±1%, Thick Film, 0603	Panasonic	ERJ-3EKF2493V
R126	Resistor, 221 kΩ, ¼ W, ±1%, Thick Film, 1206	Yageo	RC1206FR-07221KL
R127	Resistor, 1 kΩ, 1/10 W, ±1%, Thick Film, 0805	Venkel	CR0805-10W-1001F
R128	Resistor, 499 Ω, 1/4W, ±1%, ThinFilm, 0805	Stackpole Elec.	RNCP0805FTD499R
R341	Resistor, 10 kΩ, 1/16 W, ±1%, Thick Film, 0603	Venkel	CR0603-16W-1002F
R403	Trim pot, 2 K, 1T, Top ADJ, SMD	Murata	PVG3A202C01R00

Reference	Description	Manufacturer	Manufacturer Part Number
R404	Resistor, 330K, 1/8W, ±1%, Thick Film, 0805	TE Connec.	CRGCQ0805F330K
R405	Resistor, 1M, 1/8W, ±1%, Thick Film, 1206	Venkel	CR1206-8W-1004F
TP111, TP122, TP123, TP124	Testpoint, White, PTH	Kobiconn	151-201-RC
TP113	Testpoint, Black, PTH	Kobiconn	151-203-RC
U106	Voltage Mode Controller, 8-Pin SOIC	TI	TPS40200
U107	LT4430, Opto-Coupler Driver, 3V-20V	Linear T/AD	LT4430ES6#TRMPBF
U108	Photocoupler, 4-Pin Ultra Small	CEL	PS2911-1

Table 6.2. Si828x Current Booster Circuit Bill of Materials

Reference	Description	Manufacturer	Manufacturer Part Number
C1, C3, C5	Capacitor, 10 µF, 50 V, ±20%, X7R, 1210	Venkel	C1210X7R500-106M
C2, C4, C6	Capacitor, 0.1 µF, 50 V, ±10%, X7R, 0603	Yageo	CC0603KPX7R9BB104
D1	Diode, Schottky, 30 V, 1 A, SOD123	Rohm	RB160MM-30TF
D2, D3	Diode, Fast, 100 V, 2 A, SOD123	Diodes Inc.	1N4148W
Q1	Transistor, NPN, 60 V, 5 A, LO SAT, SOT89	Diodes Inc.	ZXTN2010Z
Q2	Transistor, PNP, –60 V, –4.3A, SOT89	Zetex	ZXTP2012Z
Q3, Q4	Transistor, PNP, –60 V, –4 A, SOT23	Diodes Inc.	ZXTP2027FTA
RB3, RB4	Resistor, 100 Ω, 1/10 W, ±1%, Thick Film, 0805	Venkel	CR0805-10W-1000F
RL,RH	Resistor, 3.0 Ω, 1 W, ±1%, Thick Film, 2010	Vishay	CRCW20103R00FKEFHP
RSS	Resistor, 4.02 Ω, 1/4 W, ±1%, ThickFilm, 1206	Venkel	CR1206-4W-4R02F
R1	Resistor, 10 Ω, 1/4 W, ±1%, Thick Film, 1206	Venkel	CR1206-4W-10R0F
R2	Resistor, 20 Ω, 1/4 W, ±1%, Thick Film, 1206	Venkel	CR1206-4W-20R0FT

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