Development Board EPC9063 Quick Start Guide

EPC2107

100 V Half Bridge with Sync FET Bootstrap Gate Drive

Revision 1.0

EFFICIENT POWER CONVERSION

DESCRIPTION

The EPC9063 development board is a 100 V maximum device voltage, 1.5 A maximum output current, half bridge with onboard gate drives, featuring the EPC2107 enhancement mode (eGaN®) half bridge. The gate driver has been configured with a synchronous FET bootstrap circuit included in the EPC2107 device that eliminates high side device losses induced by the reverse recovery losses of the internal bootstrap diode of the gate driver. The purpose of this development board is to simplify the evaluation process of the EPC2107 eGaN half bridge by including all the critical components on a single board that can be easily connected into any existing converter. The inclusion of the synchronous FET bootstrap circuit enables significant increase in operating frequency capability of the half bridge circuit.

The EPC9063 development board is 2″ x 1.5″ and has one EPC2107 eGaN device in a half bridge configuration using Texas Instruments LM5113 gate driver with supply and bypass capacitors. The board contains all critical components and layout for optimal switching performance. There are also various probe points to facilitate simple waveform measurement and efficiency calculation. The board includes pads for the inclusion of customer components to facilitate testing in a Buck converter or ZVS Class D amplifier configurations. A complete block diagram of the circuit is given in figure 1.

For more information on the EPC2107 eGaN half bridge please refer to the datasheet available from EPC at www.epc-co.com. The datasheet should be read in conjunction with this quick start guide.

QUICK START PROCEDURE

Development board EPC9063 is easy to set up to evaluate the performance of the EPC2107 eGaN half bridge. Refer to figure 2 for proper connect and measurement setup and follow the procedure below:

1.

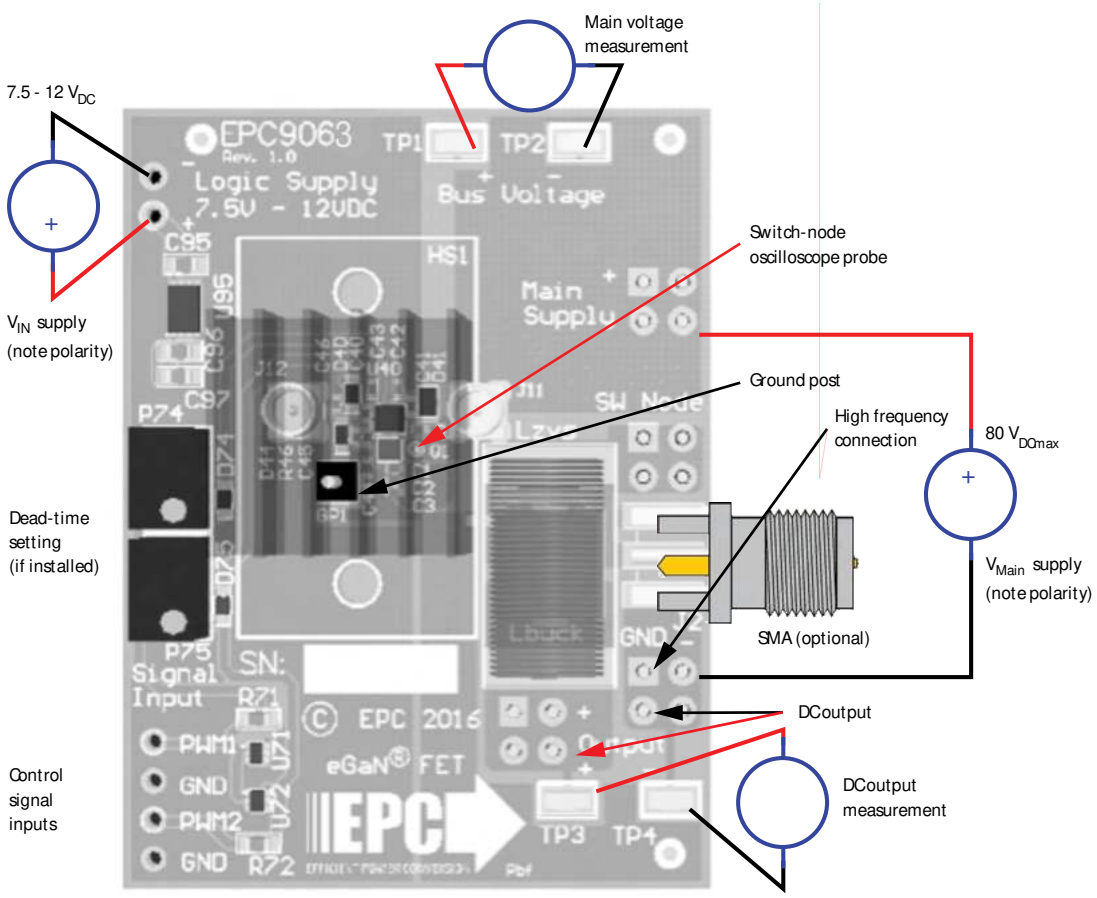

Figure 2: Proper connection and measurement setup

Figure 3: Proper measurement of the switch nodes

MEASUREMENT CONSIDERATIONS

The EPC9063 development board has been provided with specially designed high frequency (up to 1 GHz minimum) capable measurement connections using MMCX connectors located at J11 & J12 with direct access to the gate signals of both the upper and lower FETs. These nodes can be measured directly using the Tektronix IsoVu probe shown in figure 4. Figure 5 shows typical gate waveforms measured using the IsoVu probe.

Figure 4: Tektronix IsoVu measurement setup.

This native connection between the high and low side gate-source nodes to an IsoVu probe tip cable has less than 2 pF common mode loading and completely eliminates ground loops due to its galvanic isolation. These MMCX connectors offer a shielded coaxial environment to the test point which minimizes noise pickup.

Please contact EPC for special instructions on using these connections. To prevent an unterminated transmission line hanging on the gate it is recommended to remove resistors R1 & R2 when not using this feature. The maximum impedance loading of these nodes is 2.5 kΩ.

Tektronix is a leading manufacturer of power test solutions for design validation, characterization, and performance testing. EPC partnered with Tektronix to define the requirements for accurate measurements on GaN devices which led to the development of the Tektronix IsoVu measurement system. IsoVu is a galvanically isolated differential measurement system with 1 GHz bandwidth, 1 Million to 1 (120 dB) common mode rejection ratio, 50 V differential, and 2000 V common mode voltage range. Previously impossible differential measurements such as the high-side V_{GS} are now possible because of IsoVu's high common mode rejection across bandwidth.a4

THERMAL CONSIDERATIONS

The EPC9063 development board showcases the EPC2107 eGaN half bridge with integrated synchronous bootstrap. Although the electrical performance surpasses that for traditional silicon devices, their relatively smaller size does magnify the thermal management requirements. The EPC9063 is intended for bench evaluation with low ambient temperature and convection cooling. The addition of heat-sinking and forced air cooling can significantly increase the current rating of these devices, but care must be taken to not exceed the absolute maximum die temperature of 150°C. A heatsink kit can be used with this board and the assembly is shown in figure 6. Contact EPC for more information on the heatsink kit.

NOTE. The EPC9063 development board does not have any current or thermal protection on board.

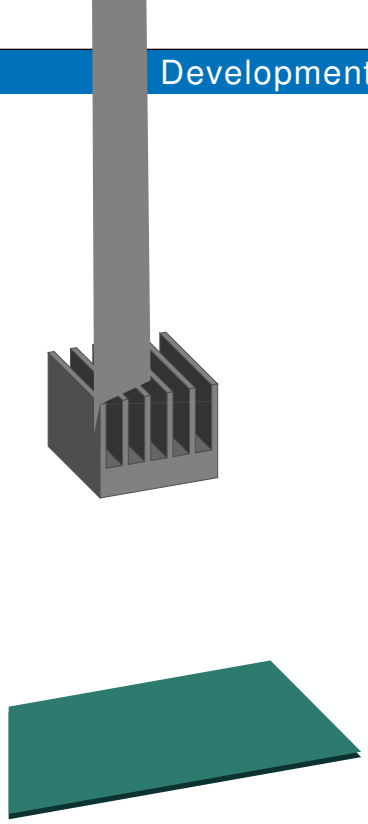

Figure 6: Assembly of the heatsink kit

Table 2: EPC9063 Board cont.

Item	Qty	Reference	Part Description	Manufacturer	Part Number
21	1	R45	20 Ω	Stackpole	RMCF0402JT20R0
22	1	R46	27 k	Panasonic	ERJ-2GEJ273X
23	1	R70	10 k	Yageo	RC0603JR-0710KL
24	1	R74	430 Ω	Panasonic	ERJ-2RKF4300X
25	1	R75	180 Ω	Panasonic	ERJ-2RKF1800X
26	4	TP1, TP2, TP3, TP4	SMD l SMD l		

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www.digikey.com

Demonstration Board Warning and Disclaimer

The EPC9063 board is intended for product evaluation purposes only and is not intended for commercial use. Replace components on the Evaluation Board only with those parts shown on the parts list (or Bill of Materials) in the Quick Start Guide. Contact an authorized EPC representative with any questions.

This board is intended to be used by certified professionals, in a lab environment, following proper safety procedures. Use at your own risk.

As an evaluation tool, this board is not designed for compliance with the European Union directive on electromagnetic compatibility or any other such directives or regulations. As board builds are at times subject to product availability, it is possible that boards may contain components or assembly materials that are not RoHS compliant. Efficient Power Conversion Corporation (EPC) makes no guarantee that the purchased board is 100% RoHS compliant.

The Evaluation board (or kit) is for demonstration purposes only and neither the Board nor this Quick Start Guide constitute a sales contract or create any kind of warranty, whether express or implied, as to the applications or products involved.

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