Evaluation board for SiC MOSFET SCT4036KW7

HB2637L-EVK-301

This quick start guide will help you understand the connection, operating Instructions and important notices and warnings that need to be carefully reviewed prior to use of the board (Figure 1). For further information please refer to the user guide (No. 65UG002E Rev.001).

The evaluation board is configured in a half bridge set up and thus allows evaluations in different operations modes such as buck, boost, synchronous buck/boost and inverter operations. The board is equipped with two SiC MOSFETs (SCT4036KW7), isolated gate driver BM61S41RFV-C, isolated power supply required for the gate driver, LDO for 5V supply and easy to interface connectors for PWM signals.

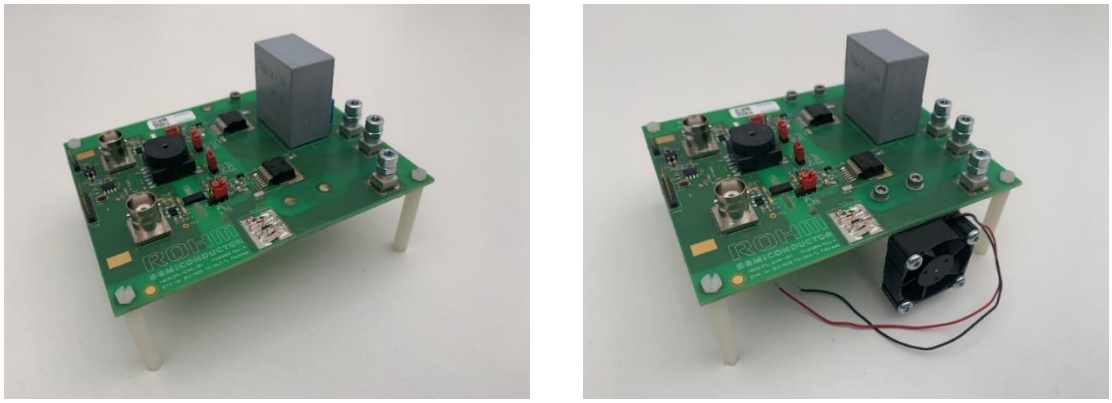

Figure 1: Evaluation board without heatsink (left) and with heatsink (right)

Important Notice

This evaluation board is intended for **product evaluation in a research and development context only** and is not intended for resale to end consumers and it is not authorized for end customer or household use. This board may not comply with CE or similar standards (including, but not limited to the EMC directive 2004/EC/108) and may not fulfil other requirements of the country it will be operated in by the user. The user shall ensure that the evaluation board will be handled in a way that is compliant with all the standards and regulations in the country it will be operated in.

The evaluation board provided here has only been subjected to functional testing under typical load conditions. The design of this evaluation board is tested by ROHM only as described in the user guide for this board. The design is not qualified in terms of safety requirements, manufacturing and operation over the entire operating temperature range or lifetime.

This evaluation board may only be used by authorized personnel that is properly trained in recognizing and dealing with the dangers of testing high voltage equipment and generally experimenting with high voltage circuits. Ensure you review this user guide as it contains important safety warnings. At all times, follow the applicable safety rules for dealing with high voltages. Do not connect or disconnect any wires or probes to the evaluation board, while it is connected to a power supply. Take care that capacitors on the board have discharged fully before touching any part of the board. Always place the evaluation board under appropriate covers, such as in a Perspex box, to protect against accidental touching of high voltage parts BEFORE applying a voltage supply to the board.

＜High Voltage Safety Precautions＞

◇ Read all safety precautions before use

Please note that this document covers only the SCT4036KW7 evaluation board and its functions. For additional information, please refer to the datasheet.

To ensure safe operation, please carefully read all precautions before handling the evaluation board

Depending on the configuration of the board and voltages used,

Potentially lethal voltages may be generated.

Therefore, please make sure to read and observe all safety precautions described in the red box below.

Before Use

[1] Verify that the parts/components are not damaged or missing (i.e. due to the drops).
[2] Check that there are no conductive foreign objects on the board.
[3] Be careful when performing soldering on the module and/or evaluation board to ensure that solder splash does not occur.
[4] Check that there is no condensation or water droplets on the circuit board.

During Use

[5] Be careful to not allow conductive objects to come into contact with the board.
[6] **Brief accidental contact or even bringing your hand close to the board may result in discharge and lead to severe injury or death.**

Therefore, DO NOT touch the board with your bare hands or bring them too close to the board.

In addition, as mentioned above please exercise extreme caution when using conductive tools such as tweezers and screwdrivers.

[7] If used under conditions beyond its rated voltage, it may cause defects such as short-circuit or, depending on the circumstances, explosion or other permanent damages.
[8] Be sure to wear insulated gloves when handling is required during operation.

After Use

[9] The ROHM Evaluation Board contains the circuits which store the high voltage. Since it stores the charges even after the connected power circuits are cut, please discharge the electricity after using it, and please deal with it after confirming such electric discharge.
[10] Protect against electric shocks by wearing insulated gloves when handling.

This evaluation board is intended for use only in research and development facilities and should by handled **only by qualified personnel familiar with all safety and operating procedures.**

We recommend carrying out operation in a safe environment that includes the use of high voltage signage at all entrances, safety interlocks, and protective glasses.

Safety Precautions

Caution: This evaluation board may only be used by authorized personnel that is properly trained in recognizing and dealing with the dangers of testing high voltage equipment and generally experimenting with high voltage circuits. This board should only be used in a lab facility properly equipped for the safe testing of power electronic systems at the relevant voltage levels. Failure to comply may result in damage to equipment, personal injury or death.

Warning: The DC link and input voltage of this board may reach up to 900 V. Ensure that only suitable high voltage differential probes are used to measure at this voltage. Failure to do so may result in damage to equipment, personal injury or death.

Warning: This evaluation board contains DC bus capacitors which take time to discharge after removal of the power supplies. Before working on the evaluation board wait at least six minutes after deactivating all connected power supplies to ensure that the capacitors have discharged to a safe level.

Warning: Ensure that you use only appropriate measurement equipment for the voltage levels present on the board. Ensure not to ground live parts through unsuitable measurement probes or tie different grounds together using passive probes. Suitable high voltage differential probes should be used. Failure to do so may result in damage to equipment, personal injury or death.

Warning: Before disconnecting, connecting or reconnecting wires or measurement probes to the board or before touching the board or performing any manipulations on the board ensure that all external power is removed or disconnected from the board and at least six minutes have passed to ensure the capacitors have discharged to a safe level and then ensure that the capacitor voltages have dropped to a safe level.
Failure to do so may result in damage to equipment, personal injury or death.

Caution: The heatsink and some component surfaces on the evaluation board may become hot during testing and remain hot for a certain time after turn-off. Take appropriate measures while handling the board after use. Failure to do so may cause personal injury.

Caution: Incorrect connection of power supplies or loads can damage the board. Carefully review the information in this document.

Board details

The main specifications for the evaluation board are summarized in Table 1 below.

Parameter	Description	Value
V_{HVDC}	Input voltage	≤ 900 V (DC)
V_{OUT}	Output voltage	≤ 900 V (DC)
LV_VCC	Board Supply Voltage	15V to 18V
f_{SW}	Switching frequency	≤ 100 kHz
I_{OUT}	Output current (Note: continuous in buck/boost/inverter operation)	≤ 10A (Note: derate if necessary, add heatsink, keep an eye on the case temperature of MOSFET)
V_{GS-ON}	Turn on gate voltage	16V to 20V
V_{GS-OFF}	Turn off gate voltage	0V to -4V
HS_PWM	High side PWM Input voltage	0V to 5.5V
LS_PWM	Low side PWM Input voltage	0V to 5.5V
T_{OPR}	Operating temperature	-25°C to 85°C

Table 1: Specification of evaluation board

Evaluation board overview

Locations of connectors and Jumpers in the evaluation board

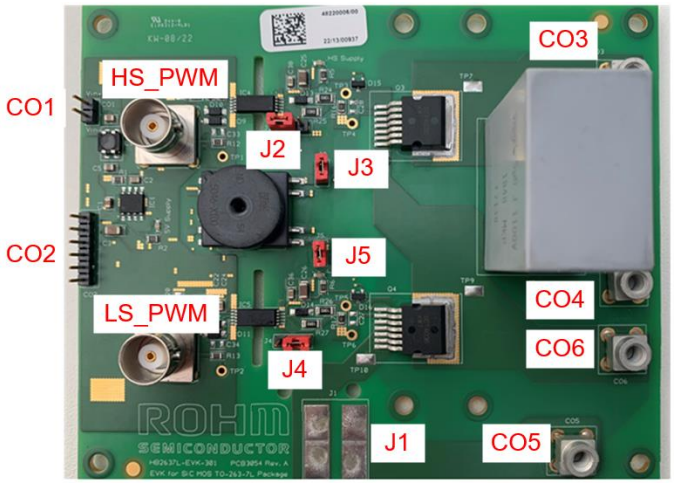

Figure 2: Top view of the evaluation board highlighting connectors, Jumpers and input interfaces

Operating Instructions

The below procedures must be followed before beginning with the tests.

1. Mounting spacers and screws have been provided in a separate packet along with the board. Before starting any kind of tests, these spacers must be mounted.
2. Solder pin headers on all the necessary test points of the signals that are to be measured.
3. If the device current is to be measured with a Rogowski coil, ensure that jumper J1 is shorted and if co-axial shunt is used then it must be soldered on to J1.
4. Decide if a 0V turn off or negative gate turn off is necessary and then place the jumpers J2, J3, J4 and J5 accordingly. Do not leave the jumpers J2 and J4 open.
5. Decide if a simple double pulse measurement is to be performed or if a measurement in continuous power operation has to be performed. For double pulse tests heatsink need not be mounted, but for continuous operation heatsink might be needed.
6. Supply 15-18V at the connector CO1 and check for correct polarity.
7. Three LEDs: 5V Supply, HS Supply and LS Supply must be lit.
8. Digital pulse signal interfaces for high side or low side should be connected to CO2 (pin 1-2 and 5-6) or the BNC adaptors.
9. Connect DC+ of high voltage supply to CO3 and DC- to CO4. It has to be noted that a 5uF capacitor is available on board, but in most cases an external bulk capacitor has to connected for voltage stabilization. The applied voltage on this connector must not exceed 900V
10. Depending on type of the test and load, connect the load appropriately.
11. The board can now be tested.

Notes

1) The information contained herein is subject to change without notice.

2) Before you use our Products, please contact our sales representative and verify the latest specifications :

3) Although ROHM is continuously working to improve product reliability and quality, semiconductors can break down and malfunction due to various factors.
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7) For use of our Products in applications requiring a high degree of reliability (as exemplified below), please contact and consult with a ROHM representative : transportation equipment (i.e. cars, ships, trains), primary communication equipment, traffic lights, fire/crime prevention, safety equipment, medical systems, servers, solar cells, and power transmission systems.

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