MODIFICATION INSTRUCTION
REF01-HB

This whitepaper shares the modification introduction for R-Ref01-HB. You can use the same DC/DC converter to generate a single ended 18V supply with some minor modifications to the board.

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INTRODUCTION TO R-REF01-HB MODIFICATION

Infineon has recently released the new M1H series of SiC Mosfets. With this generation, Infineon recommends a different gate-source drive voltage than that used with their other series or those used by other manufacturers. The recommended turn-off voltage is zero volts, and the turn-on voltage is close to +18V.

The absolute maximum gate drive voltage limits are -7/+23V.

The standard R-Ref01-HB design could be used to evaluate these transistors using the included +15/-3V DC/DC converter (R12P21503D). However, the M1H transistors would not operate when fully enhanced. So, although the existing layout would work, compared to the recommended +18V gate-source voltage, there would be significantly more conduction losses.

RECOM's DC/DC power supplies are very flexible. Instead of using the +15 /-3V asymmetric outputs, you can use the same DC/DC converter to generate a single-ended 18V supply. However, as the R-Ref01-HB was designed to work with a dual supply, you would need to make some minor modifications to the board.

1. Open the box with the R-Ref01-HB, and take out two of the R12P21503D DC/DC converters from the DC/DC converters included in the kit.

   (Alternatively, you can also use two R12P209D instead that are not included in the R-Ref01-HB kit.)

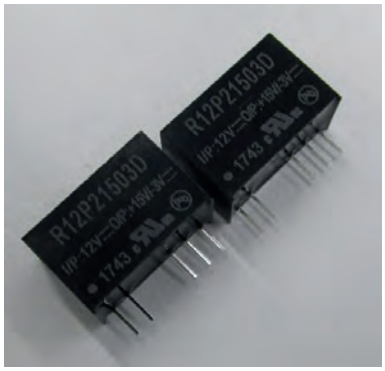

Figure 1: Select the right converter

2. Snip off the GND pin on the +15V/-3V side of the converters. Make sure that the pin is cut as short as possible. The pin should not make contact with the uppermost PCB pad of the R-Ref01-HB.

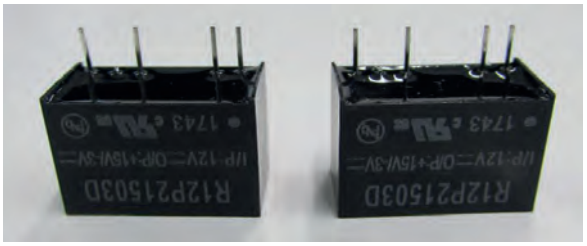

Figure 2: Remove GND pins

(Note: If you make your PCB layout using these converters, it is not compulsory to remove this pin—just leave it disconnected [NC] in the layout.)

3. Insert the converters into the R-REF01-HB PCB.

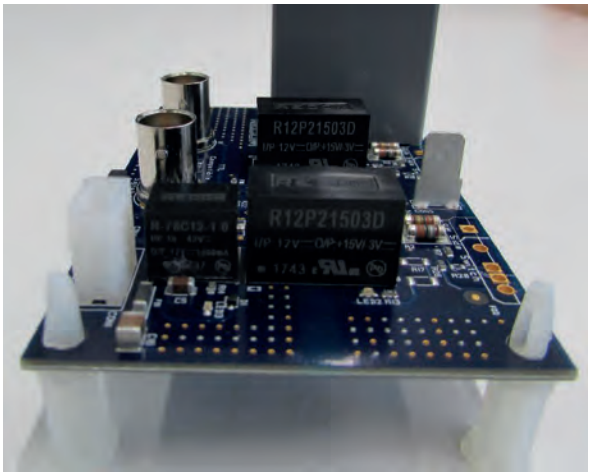

Figure 3: Mount the converters

4. Solder the pads on the bottom side of the PCB, leaving the middle GND pad unsoldered for now.

Figure 4: Solder converters

The next stage is to make a solder bridge between the GND pad and the -Vout pad. Take care that too much solder does not flow too deep into the hole of the GND pin because it could make contact with the cut-off GND pin on the other side. A quick soldering action is recommended so that the solder stays on the surface of the pads.

Figure 5: Create the solder bridge

If there is some concern about making a solder bridge between the -Vout and GND pads, it is also possible to populate R16 and R18 with

a zero-ohm resistor instead. This increases the gate-source track length, so there might be some issues with very high switching speeds, but for many applications, either method (solder bridge or zero-ohm resistors) works equally well.

TEST RESULTS

The following oscilloscope printout shows that the gate-source drive voltage is now 0/+18V instead of -3/+15V.

Gate-Source Voltage:

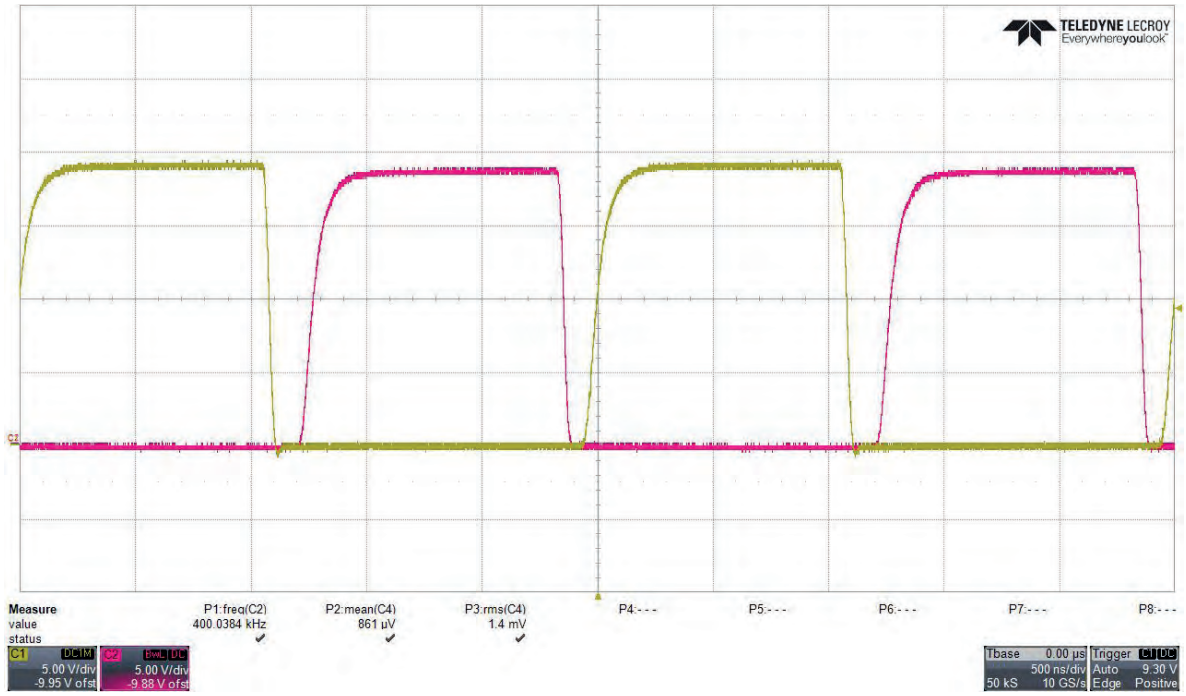

Figure 6: Gate Source Voltage after modification

Red Ch.1:	Gate-source voltage low side, 5V/div
Green Ch.2:	Gate-source voltage high side, 5V/div
Conditions:	400kHz @ 2.2nF gate-source capacitance

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