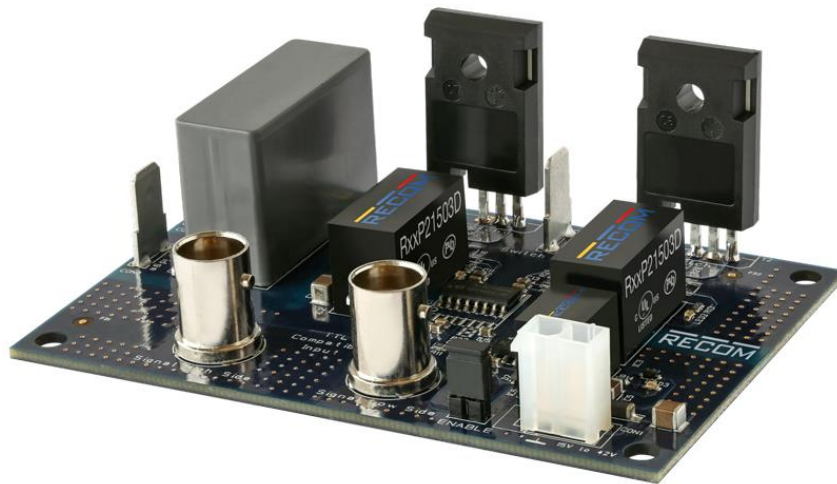




Whitepaper

**R-Ref01-HB Modification Instructions  
to create a single ended +18V supply  
to drive 18Vgs optimized SiC Mosfets  
(e.g. Infineon M1H)**



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## Modification R-Ref01-HB Introduction

Infineon have recently released the new M1H series of SiC Mosfets. With this generation, Infineon recommends a different gate source drive voltage than with their other series or those used by other manufacturers. The recommended turn off voltage is zero volts and the turn on voltage should be 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), but the M1H transistors would not operate 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. But as the R-Ref01-HB was designed to work with a dual supply you 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.

(Alternately, you can also use two R12P209D instead (not included in R-Ref01-HB kit)

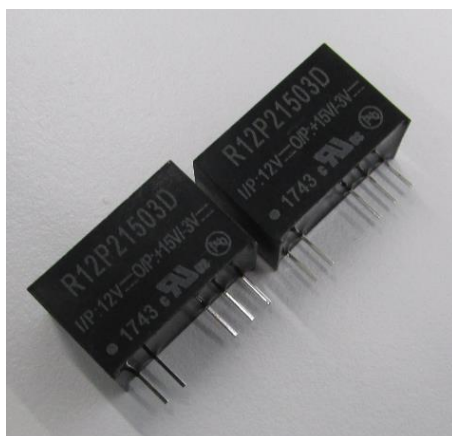


Figure 1: Select the right converters

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.

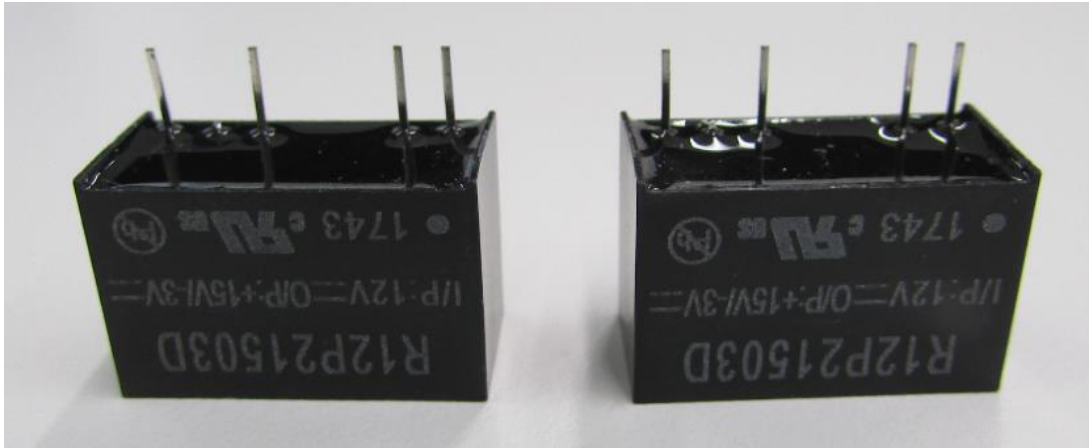


Figure 2: Remove GND pins

(Note: If you make your own PCB layout using these converters, it is not necessary to remove this pin - just leave it not connected (NC) in the layout)

3. Insert the converters into the R-Ref01-HB PCB...

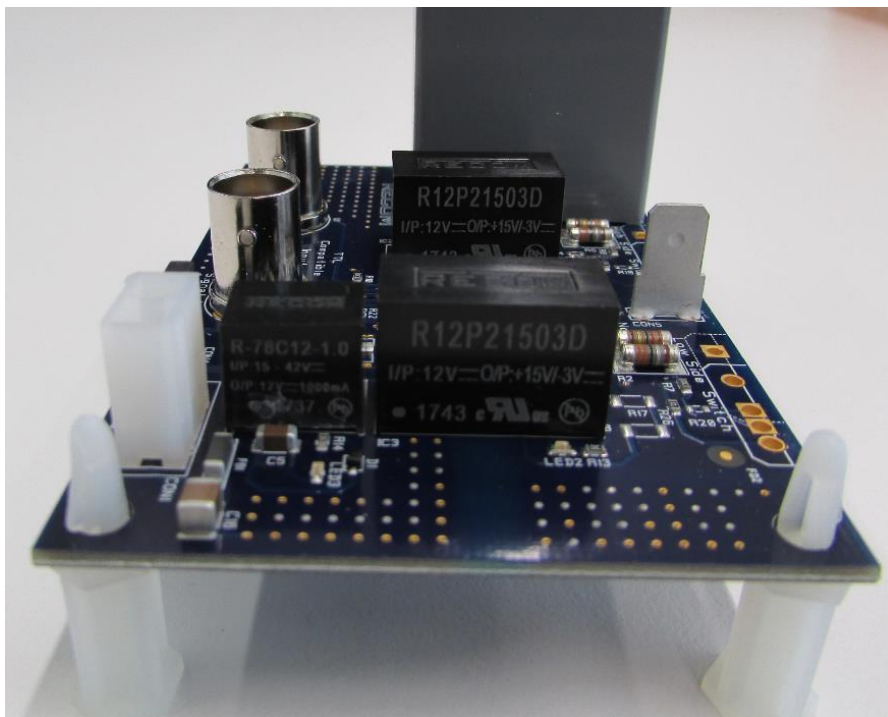


Figure 3: Mount the converters

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



Figure 4: Solder converters

5. 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 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 0 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) work 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:

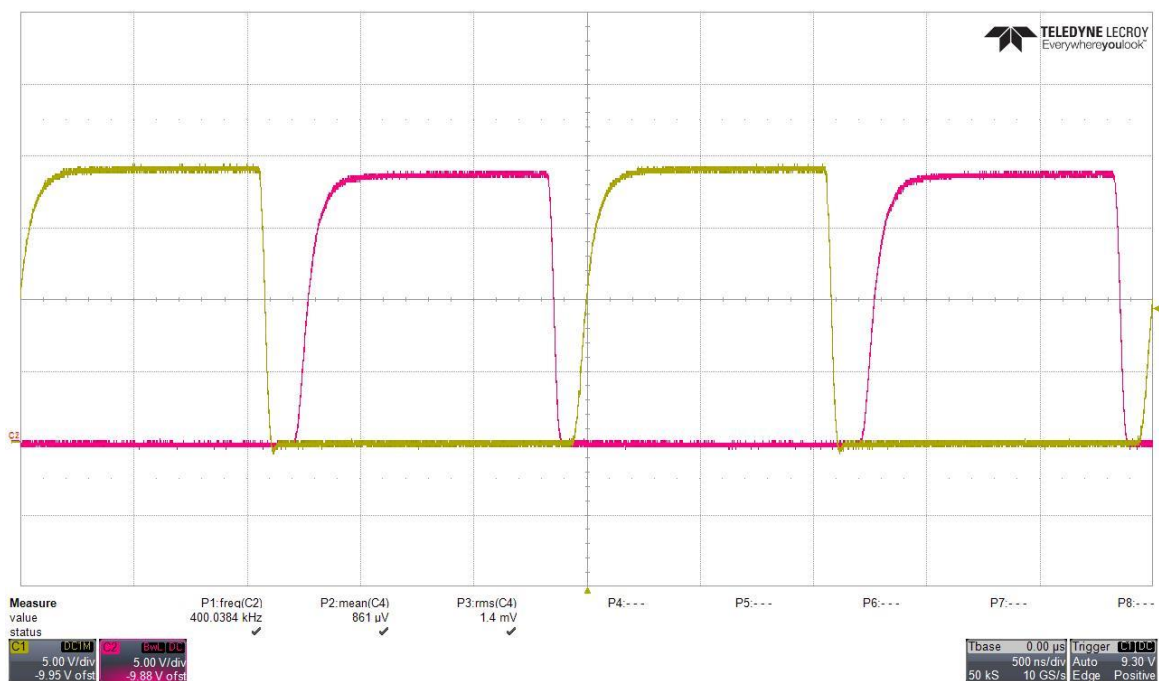


Figure 6: Gate Source Voltage after modification

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