

# SILICON CARBIDE IN HVAC



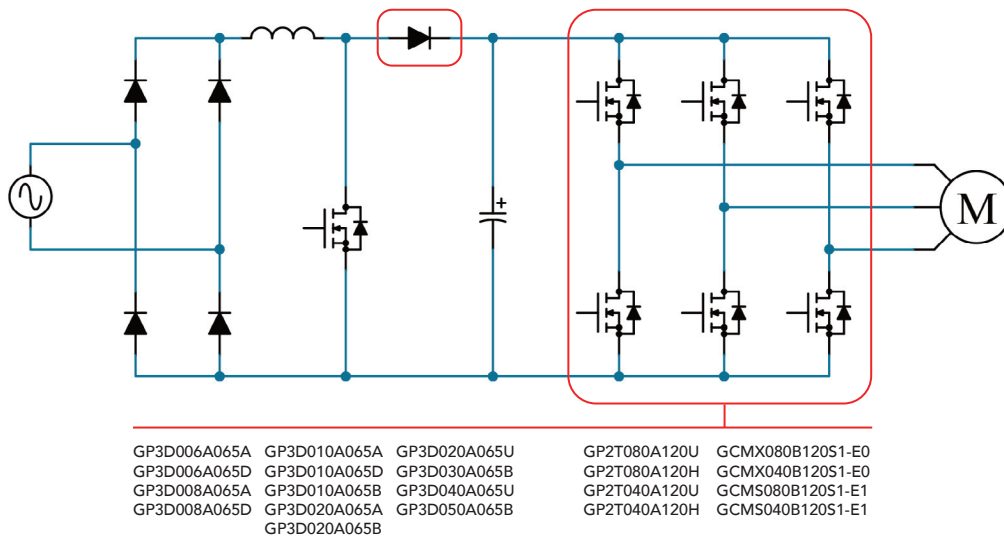
Over the last two decades and especially in the last decade, we have seen real growth in high efficiency HVAC systems. The first stage of improvements was simply moving to active control of the compressor and blower motors. These drivers were Silicon based (IGBTs and Diodes) with a significant realized benefit. For the next stage of improvements, Silicon Carbide (SiC) power devices are the natural choice.

## Benefits of SemiQ SiC in HVAC

- ◊ Increased Efficiency
- ◊ Lower Losses = Lower Temperatures
- ◊ Lower Noise and EMI
- ◊ Higher Frequency Operation and Smaller Size
- ◊ Over 20 Million Hours of HTRB/H3TRB Testing

## Typical HVAC Schematic

Both Power Factor Correction (PFC) and Inverter stages can benefit from Silicon Carbide. Although shown as a full SiC MOSFET Inverter, Hybrid versions using Silicon IGBTs with SiC Diodes are also widely used.



In applications that require Power Factor Correction, SiC has shown it's advantages for reducing switching loss and increasing efficiency by as much as 1.2%. The main inverter stage also benefits from Silicon Carbide. Typically, Silicon IGBTs and Diodes have been used but recently there has been a shift to hybrid and full SiC devices for this application. Hybrid designs involve changing the Silicon anti parallel diodes with SiC Schottky rectifiers. Full SiC designs replace the Silicon devices with SiC MOSFETs. Both choices increase efficiency with the latter having the largest impact.

In these applications, increased efficiency creates lower operating costs for the end user. Customers in the consumer and industrial markets can readily see the benefits and payback to high efficiency designs. Regulatory and consumer standards make the push to high efficiency a clear win overall.

SemiQ has a broad offering of Silicon Carbide Schottky Diodes at 650V that can help you raise efficiency of the PFC and Inverter stages of your designs as well as a full suite of SiC MOSFET options in discrete and module packaging. Contact us directly or through one of our partners and let us know how we can help.

## SemiQ SiC 1200V and 650V Product Family

SemiQ Part Number	Voltage	RDS-On mΩ	Package	Description
1200V Discrete MOSFETs				
GP2T080A120U	1200V	80	TO-247-3L	SiC MOSFET
GP2T080A120H	1200V	80	TO-247-4L	SiC MOSFET
GP2T040A120U	1200V	40	TO-247-3L	SiC MOSFET
GP2T040A120H	1200V	40	TO-247-4L	SiC MOSFET
1200V SOT-227 MOSFET Modules				
GCMX080B120S1-E0	1200V	80	SOT-227	SiC MOSFET
GCMX040B120S1-E0	1200V	40	SOT-227	SiC MOSFET
GCMS080B120S1-E1	1200V	80	SOT-227	SiC MOSFET w/SiC SBD
GCMS040B120S1-E1	1200V	40	SOT-227	SiC MOSFET w/SiC SBD
SemiQ Part Number	Voltage	Current Rating Per Diode	Package	Description
650V Discrete Diodes				
GP3D010A065A	650V	6	TO-220-2L	SiC Schottky Diode
GP3D010A065D	650V	6	TO-263-2L	SiC Schottky Diode
GP3D008A065A	650V	8	TO-220-2L	SiC Schottky Diode
GP3D008A065D	650V	8	TO-263-2L	SiC Schottky Diode
GP3D010A065A	650V	10	TO-220-2L	SiC Schottky Diode
GP3D010A065D	650V	10	TO-263-2L	SiC Schottky Diode
GP3D010A065B	650V	10	TO-247-2L	SiC Schottky Diode
GP3D020A065A	650V	20	TO-220-2L	SiC Schottky Diode
GP3D020A065B	650V	20	TO-247-2L	SiC Schottky Diode
GP3D020A065U	650V	2x10	TO-247-3L	SiC Schottky Diode
GP3D030A065B	650V	30	TO-247-2L	SiC Schottky Diode
GP3D040A065U	650V	2x20	TO-247-3L	SiC Schottky Diode
GP3D050A065B	650V	50	TO-247-2L	SiC Schottky Diode



SemiQ is a designer and manufacturer of Silicon Carbide power semiconductors, focused on delivering industry-leading performance of the highest quality and reliability with a fully redundant supply chain. We have a broad product offering fitting many end applications and provide global support from design through production.

