Power electronics

Power electronics is one of the most complex and also most costly components in the electrified powertrain: a pulse-controlled inverter that transforms the battery’s DC voltage to AC voltage as required by the electric motor.

The inconspicuous housing conceals a complex interior life. In the Audi Q5 hybrid quattro, for example, the pulse-controlled inverter has to process up to 40 kW of power at 264 volts – as if it had to continuously switch on and off as well as dim 650 light bulbs of 60 W each, in cycles of hundredths of a second. Its core is a module consisting of several interconnected semiconductor elements – the IGBTs (insulated gate bipolar transistors).

The interior of the power electronics attains temperatures over 100 degrees Celsius (212 degrees Fahrenheit). Liquid cooling in the metal housing dissipates the heat. The latest-generation pulse-controlled inverter used in the Audi Q5 hybrid quattro is lightweight and extremely compact. It already integrates the DC converter that supplies the 12V electrical system from the high-voltage system.

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