

FOR ENERGY EFFICIENT INNOVATIONS

THINK ON.

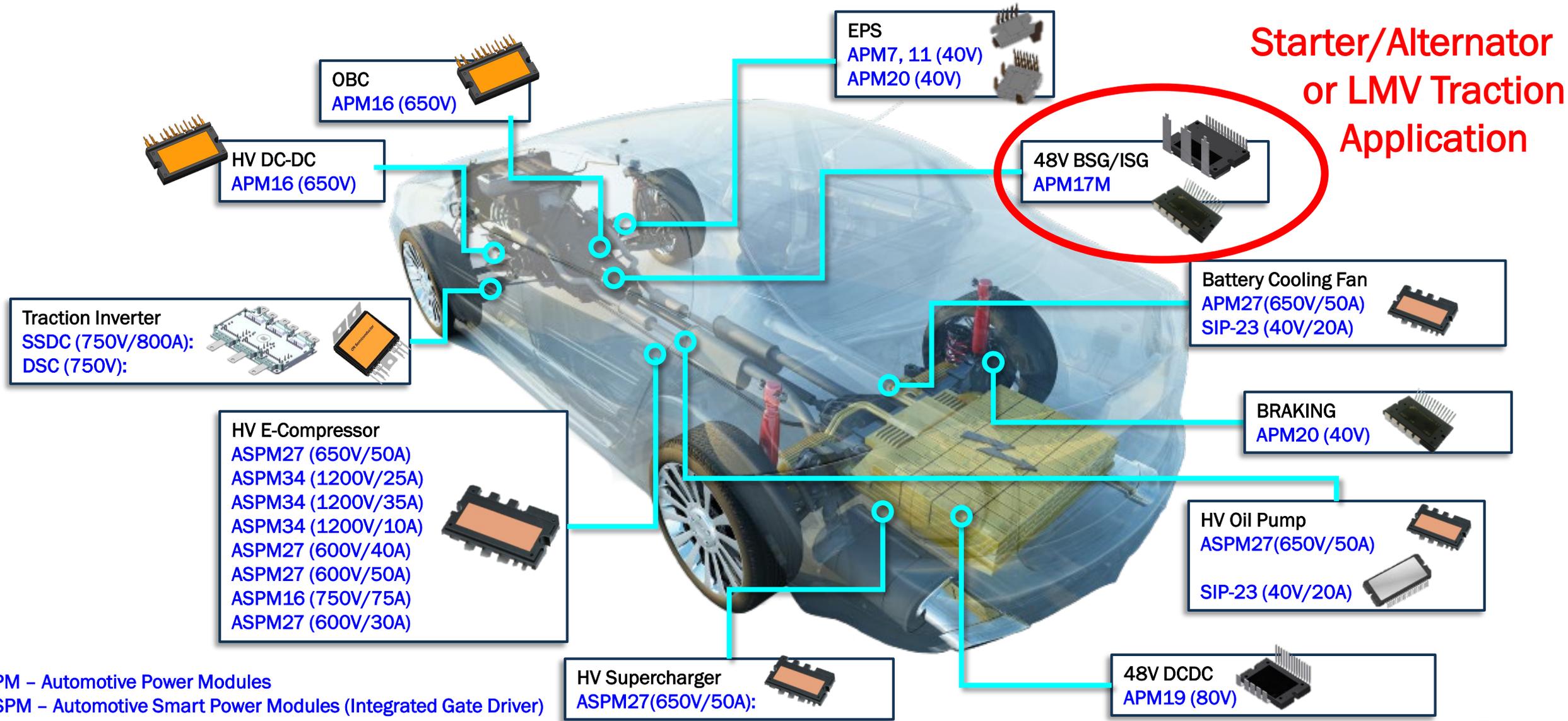
www.onsemi.com

25KW APM17M ISG

Public Information



APM Solutions for Automotive xEV

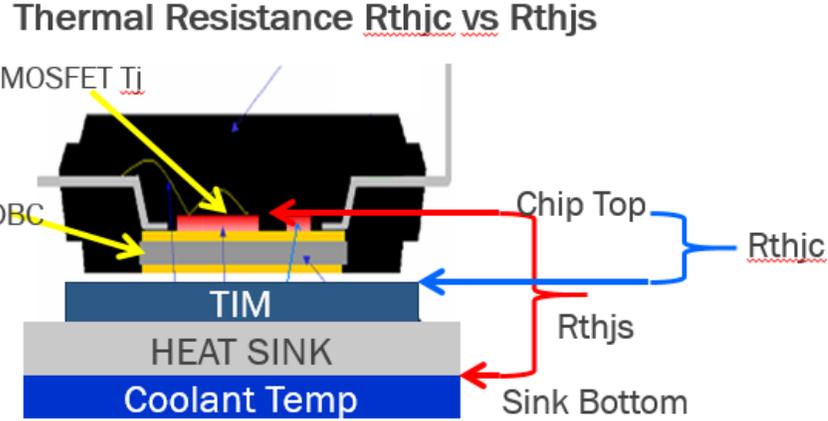


APM – Automotive Power Modules
ASPM – Automotive Smart Power Modules (Integrated Gate Driver)



APM Performance benefits

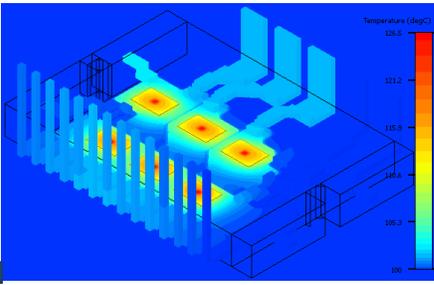
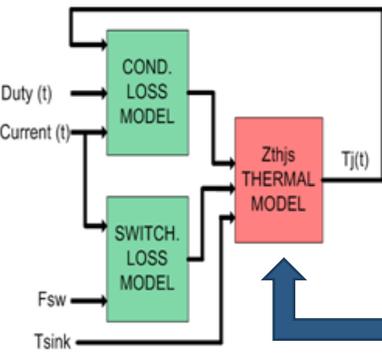
[Thermal Performance]



	APM	Discrete
R_{thjc}		>
R_{thjs}		<

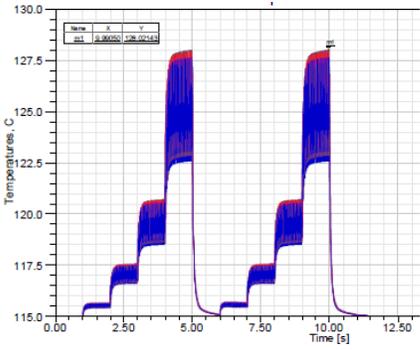
Lower R_{thjs} of APM => Lower T_j => Lower R_{dson} => Higher Power Density => Compact Size

Simulation Block Diagram



[Electrical Performance]

- Lower circuit resistance (i.e., double the number of wire bonds comparing with standard discrete package) allows customer to provide higher torque output
- Reduced stray inductances as a result of physical proximity of the devices
- Better dynamic and EMI performance
- High Isolation Voltage saving additional insulation layer



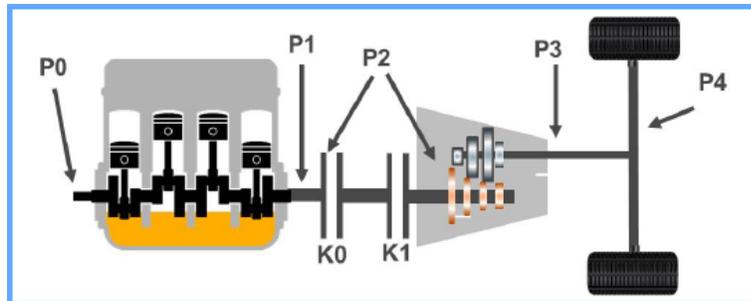
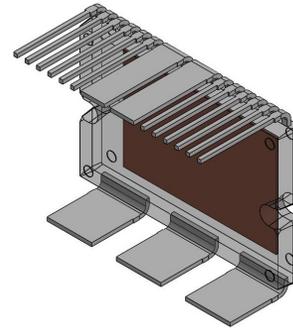
Highly optimized thermal performance → APM can reach $R_{thjs} \ll 1 \text{ K/W}$



APM17M for 48V Mild Hybrid Main inverter

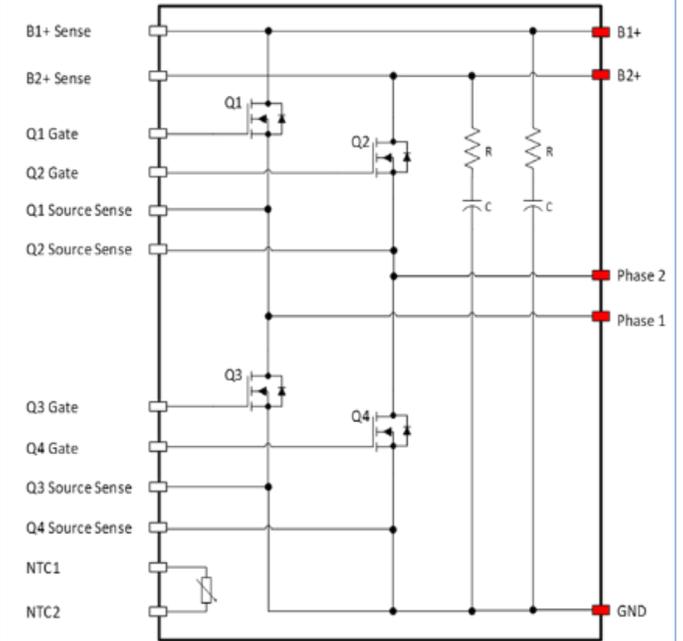
Description

- High Power 48V Main Inverter solutions
- Flexible application both 3 phase and 6 phase motor system by 3 APMs
- Low junction-sink thermal resistance
- Highly integrated compact design
- Low electrical resistance
- Low stray Inductance
- Better EMI with snubber inside module.
- Electrical isolation over 3KV
- Easy and reliable installation
- High current handling
- Improved overall system reliability
- Temperature sensing
- Pb Free
- Automotive qualified – AQG324



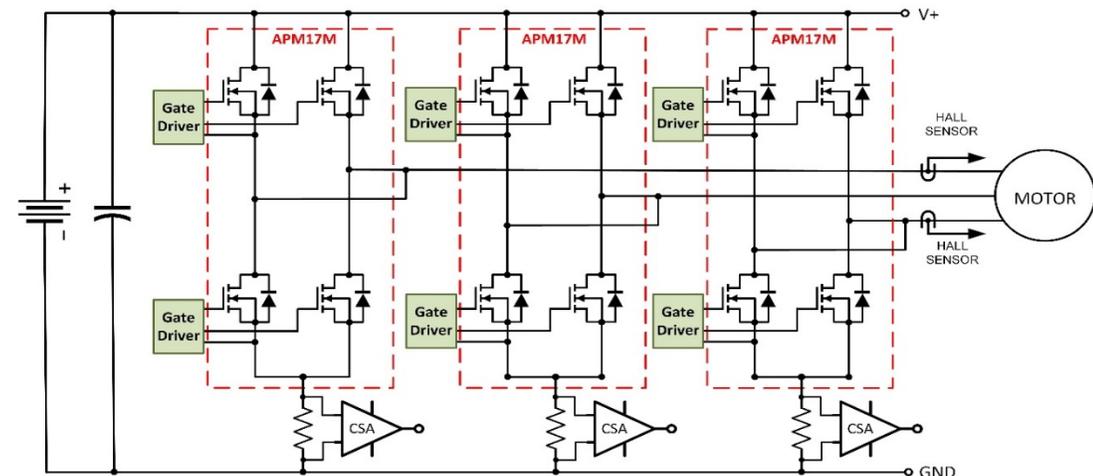
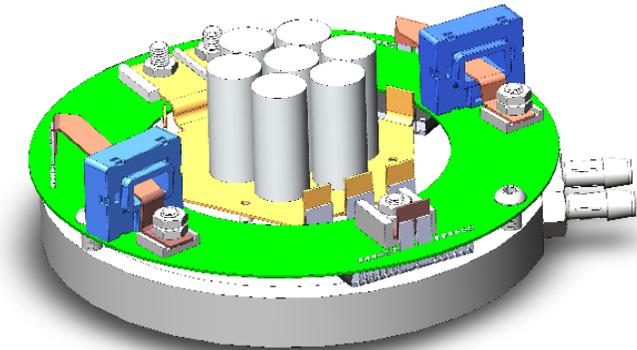
- P0 / P1 - 6kw, 12kw
- P2, P3, P4 - ~ 24kw

Schematic Diagram



Design Specifications

- APM17M module reference design
- Low inductance bus structure
- High performance pin-fin heat-sink
- Fully protected
 - Over-temp & over-current
 - Cross-conduction & dead-time
- Current sensors for motor control
- Parts demonstrated
 - APM17M – Power module
 - FAN7191 – Gate driver
 - FAN73832 – Gate driver
 - NCV213 – Current sense amp
 - FID9411 – Digital isolator



Power Inverter Circuit Diagram

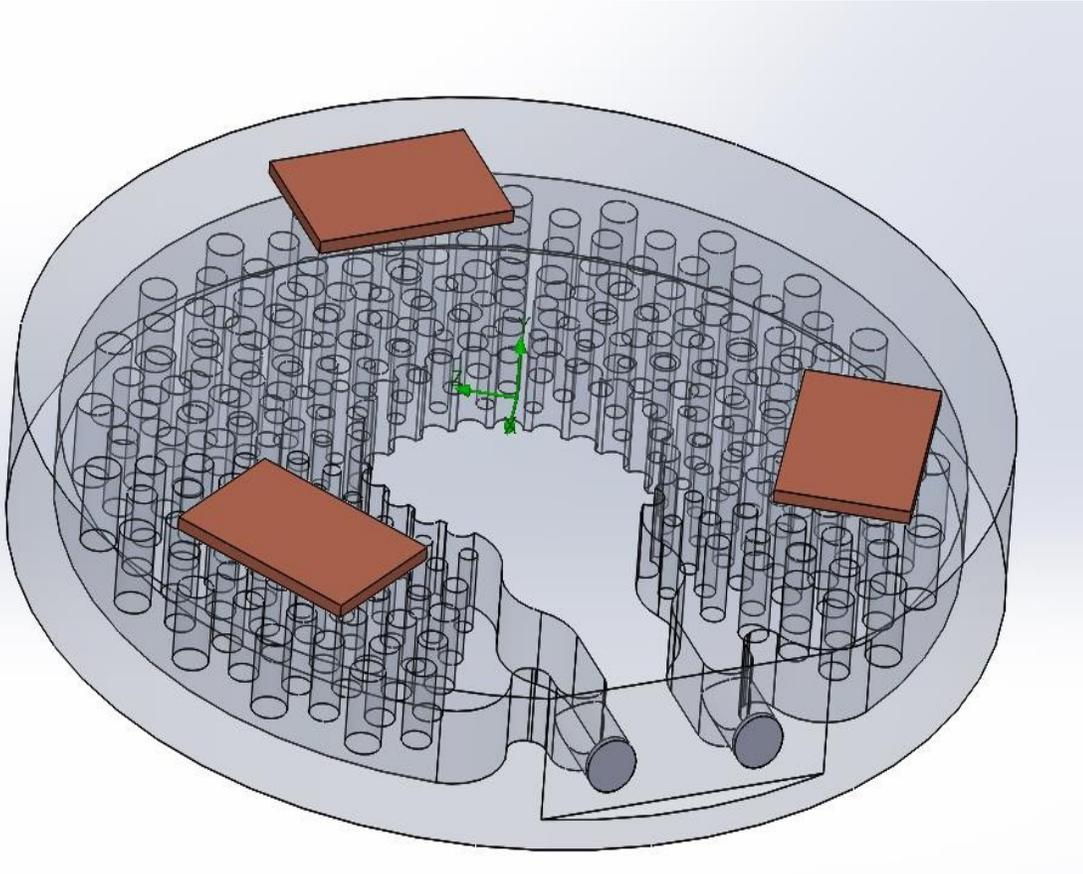
Electrical Specifications		
Three-phase design	$V_{DC(nom)} = 48V$	$36V \leq V_{DC} \leq 52V$
$BV_{DSS-Max} = 80V$	$I_{phase} (3Phase) = 700Arms$ for 30s	$I_{phase} (3Phase) = 400Arms$ cont.
$0Hz \leq f_{fund} \leq 900Hz$	$5kHz \leq f_{SW} \leq 20kHz$	$L_{STRAY} < 25$ nH (link + module)

System Level Specifications



Thermal Development

Heatsink pin-fin style 3D structure



Thermal simulation at full power

