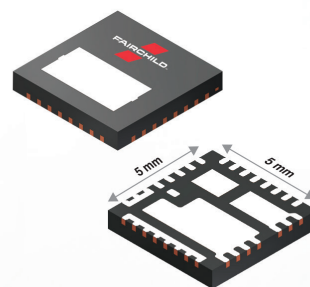# Smart Power Stage (SPS) Portfolio

Next-Generation, Multi-Chip Module

The SPS module family is a next-generation, ultra-compact, integrated MOSFET plus driver power stage solution. Compared to competitive modules, the family offers three-percent greater efficiency, unique monitoring and protection features, all in 33-percent less space. This family leverages Fairchild's DrMOS expertise to deliver high efficiency, high-power density and high-switching frequency in applications such as synchronous buck DC-DC converters for high-performance computing and telecom systems.

With an integrated approach, the complete switching power stage is optimized for driver and MOSFET dynamic performance, system inductance and power MOSFET $R_{DS(ON)}$. SPS modules use our high-performance PowerTrench® MOSFET technology to reduce ringing, eliminating the need for a snubber circuit in most buck converter applications.

Unique Features

- Ultra-compact 5 mm x 5 mm x 0.8 mm PQFN with Dual Cool™ packaging technology
- Three-state 3.3V PWM and 5V PWM input gate driver
- Integrated Zero Cross Detect (ZCD) or FCCM circuitry for better light load efficiency
- Dual-mode enable and catastrophic fault reporting pin
- Under-voltage lockout (UVLO) protection
- Optimized for switching frequencies, up to 2 MHz
- Low shutdown current < 3 μA
- Improved power stage dynamic performance, system inductance
- PowerTrench® MOSFET technology to reduce ringing, eliminate snubber in most buck converter designs
- Thermal monitoring, programmable thermal shutdown

DC-DC Power Delivery Applications

- Servers and workstations
- Telecom ASIC power
- High-performance notebooks
- Game consoles
- POL modules

Smart Power Stage Portfolio

| Part Number	Dual Cool	V_{IN} (V)	Max I_{OUT}	PWM Input (V)	Thermal Monitoring	Thermal Warning	Thermal Shutdown	Max Shutdown Current	ZCD or FCCM	Catastrophic Fault Detect
FDMF3035	—	4.5 to 24	50	5.0	—	—	—	10 µA	FCCM	—
FDMF3037	—	4.5 to 24	35	5.0	—	—	—	10 µA	FCCM	—
FDMF5820DC	✔	4.5 to 16	60	3.3	✔	—	Programmable	3 µA	ZCD	✔
FDMF5821DC	✔	4.5 to 16	60	5.0	✔	—	Programmable	3 µA	ZCD	✔
FDMF5822DC	✔	4.5 to 16	55	3.3	—	125°C	150°C	3 µA	ZCD	✔
FDMF5823DC	✔	4.5 to 16	55	5.0	—	125°C	150°C	3 µA	ZCD	✔
FDMF5826DC	✔	4.5 to 16	60	5.0	✔	—	Programmable	2 mA	ZCD	✔
FDMF5833	—	4.5 to 24	50	5.0	—	125°C	150°C	3 µA	ZCD	✔
FDMF5839	—	4.5 to 24	35	5.0	—	125°C	150°C	3 µA	ZCD	✔

The Coolest Power Delivery Module Solution

The flip LS design enables GND as the primary bottom-side thermal plane, with the Dual Cool™ package used for efficient top-side cooling. The diagram shows heat dissipation through multiple vias under GND and V_{IN} pads on the PCB, and through top of the module.

SPS Heat Dissipation
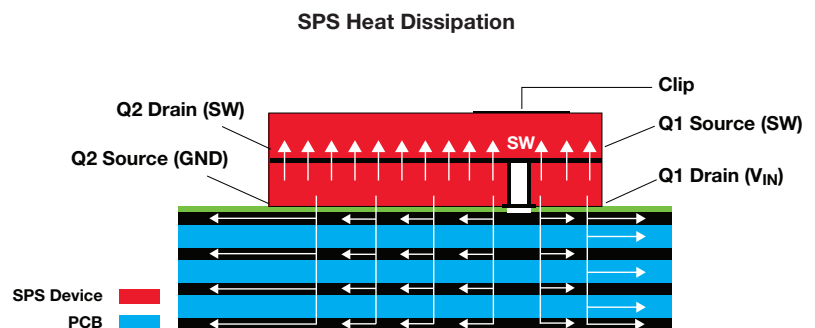
Better than 95% Efficiency

SPS efficiency on single-phase open loop board V_{IN} = 12V, V_{OUT} = 1.8V, L = 250 nH, FSW = 300 kHz/1 MHz, Ta = 25°C
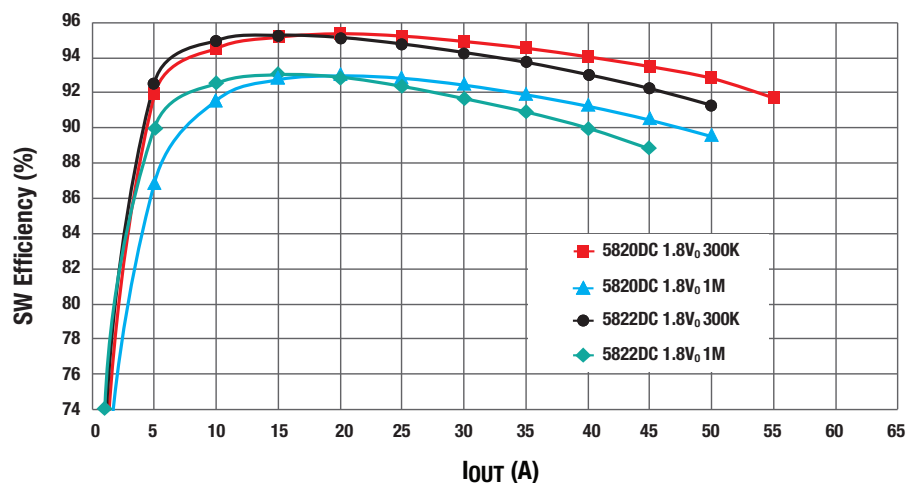
For more information on the high-efficiency PoL regulator solutions, visit **fairchildsemi.com/smartpowerstage**

PB4000-002