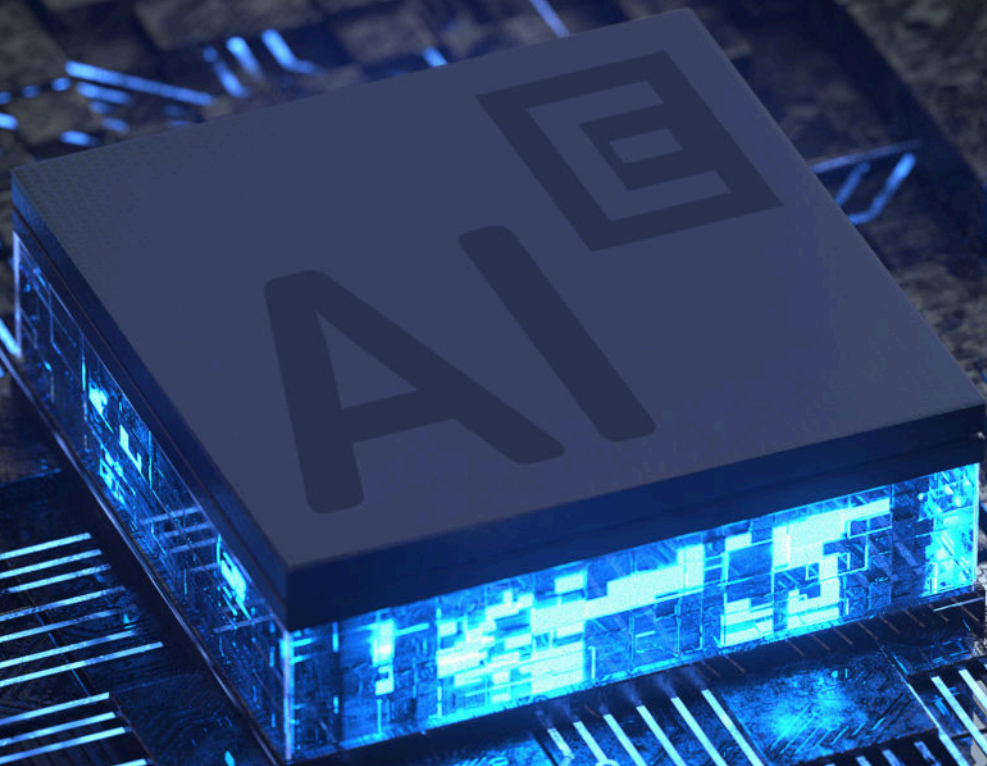


Powering the AI Revolution



EMPOWER
SEMICONDUCTOR

Power Management Solutions for kilowatt-class AI, HPC, xPU Processors

kilowatt-class Vertical Power Delivery

- Powering the AI revolution
- kilowatt-class vertical power delivery
- Chiplet and System Power Integrated Voltage Regulators (IVR)
- Ultimate power and signal integrity Silicon Capacitors
 - Ultra-low ESL for high frequency decoupling
- FinFast™ powered industry's most compact and fastest step-down converters
- World class wafer foundry, assembly and test
- Headquartered in Milpitas, California, USA
- Worldwide Sales Representatives and Distributors

Crescendo

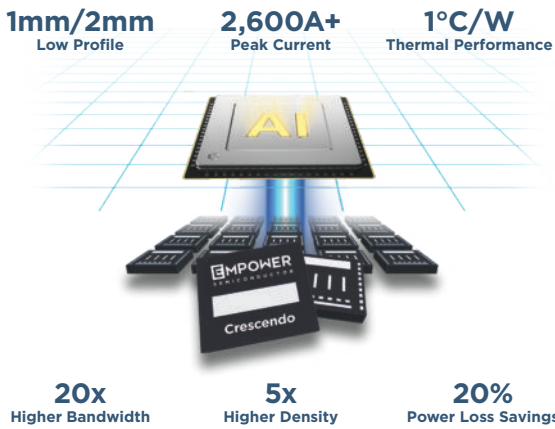
2.6kA+ Scalable On-demand Vertical Power Delivery Platform

Key Benefits

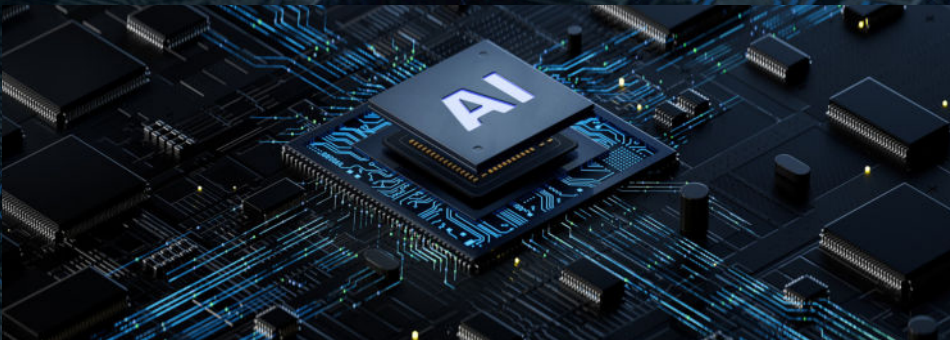
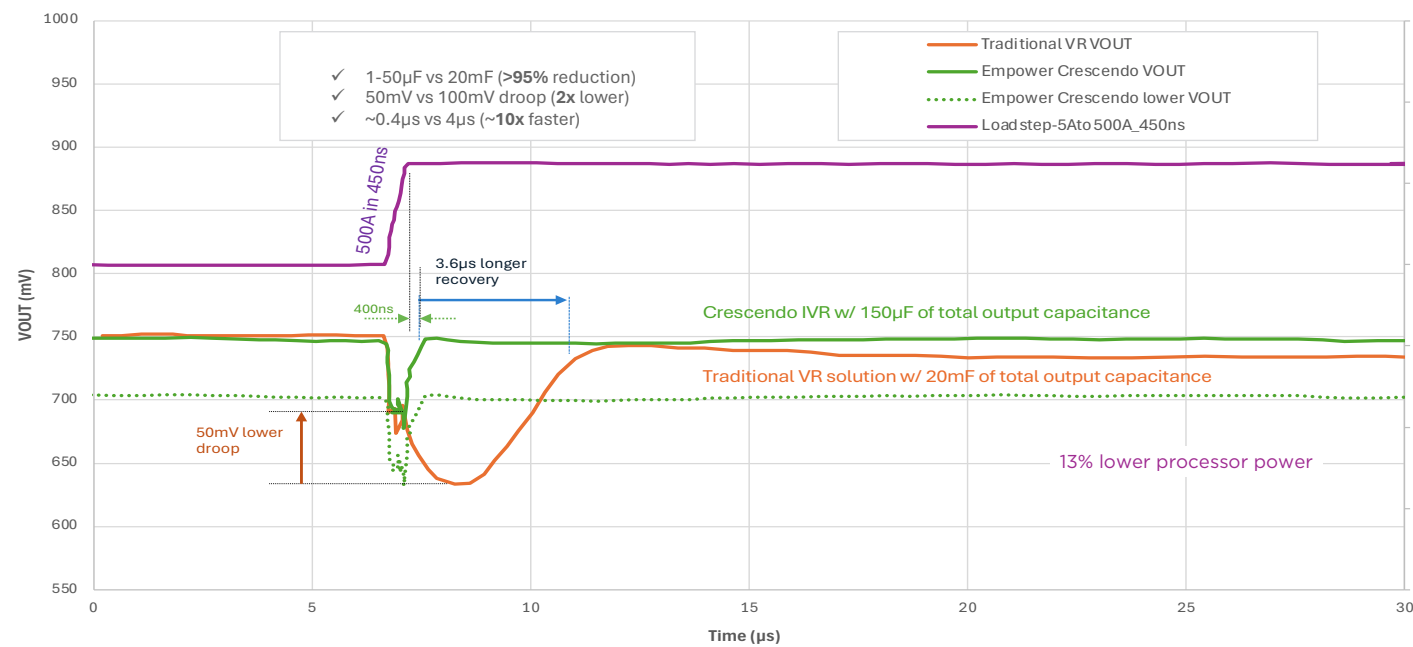
- Scalable to **2,600A** peak **current**
 - 65A output current per power leaf
 - **~1°C/W** thermal performance
 - Meets AI/HPC xPU power demands
- True **vertical power** delivery
 - Ultra-wide bandwidth, fast transient response
 - Eliminates decoupling capacitor bank
 - 5x higher total solution density (A/mm²)
- Integrated inductor and input capacitors
- 2.2 mm ultra-low profile package
 - Backside cooling compatible
- 6 x 7 mm thermally enhanced package
 - EP9501 Supervisor
 - 6x6 mm 40-pin QFN package
- Minimize energy footprint
 - Eliminates lateral power delivery losses
 - >90% efficiency, vertical current flow
 - Reduced voltage margining

Industry Standard Interfaces

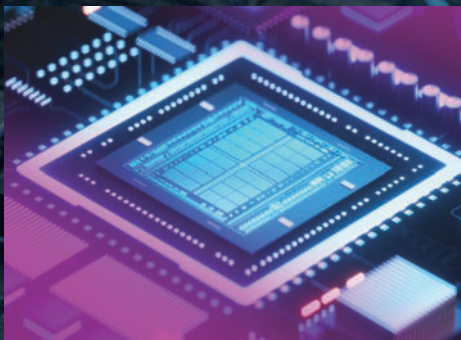
- PMBus and AVSBus
- Telemetry and remote diagnostics
 - Current, voltage and temperature
- Complete fault protection and warnings
 - Temperature, input/output voltage and short circuit protections
- Configurable multi-function GPIOs



EP7502 vs Traditional VR: Load Transient 5A to 500A in 450ns



kilowatt-class AI - HPC - xPU Power



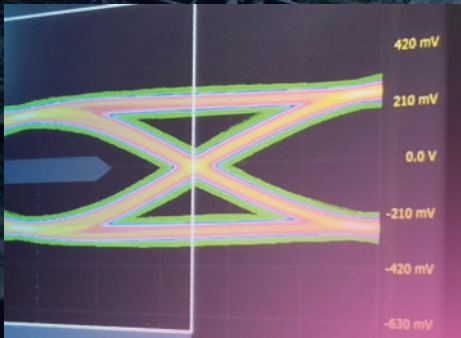
Chiplet & System Power



Data Centers



Networking



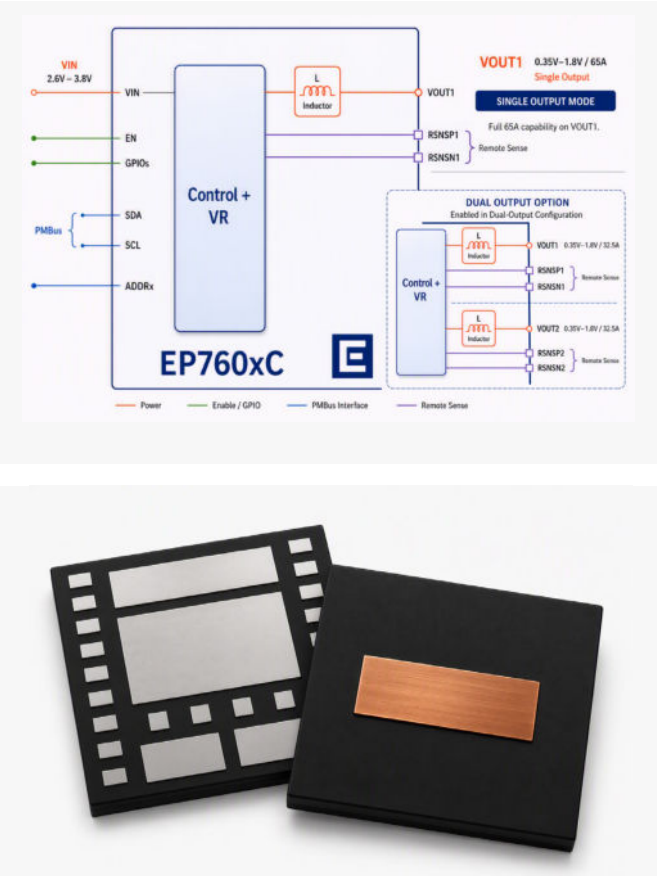
Power Integrity

Chiplet & System Power Integrated Voltage Regulators (IVR)

EP7602M

High performance single 65A / dual 32.5A step-down voltage regulator with integrated controller, inductors and input capacitors

- Step-down voltage regulator
- Single 65A / dual 32.5A output
- Compact solution
 - Integrated controller
 - Integrated inductors and input capacitors
- $3.3V_{IN} / 0.35V_{OUT}$ to $1.8V_{OUT}$
- High-accuracy regulation
- PMBus interface
- Dynamic voltage scaling
- Ultra-fast transient response
- Top-side cooling
- Comprehensive fault protection
- Telemetry
- 8.1 x 6.4 x 2.22 mm package

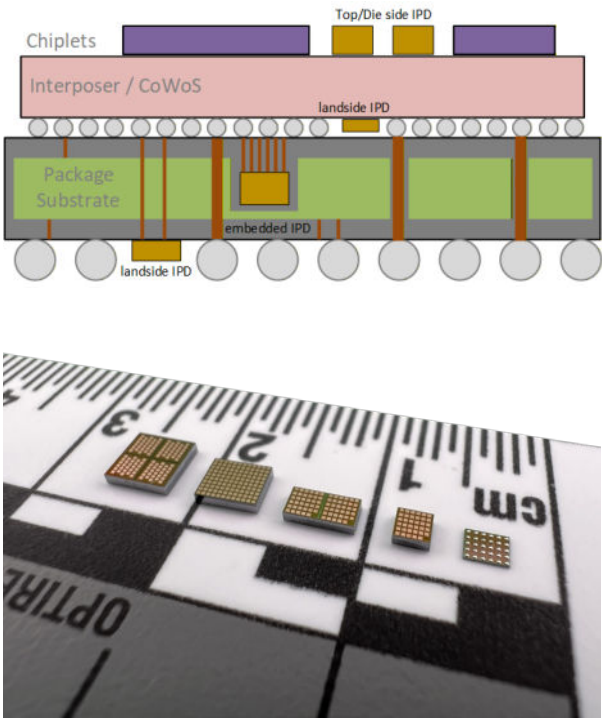


Power Integrity – Silicon Capacitors

ECAPs

Enabling new levels of Power and Signal Integrity

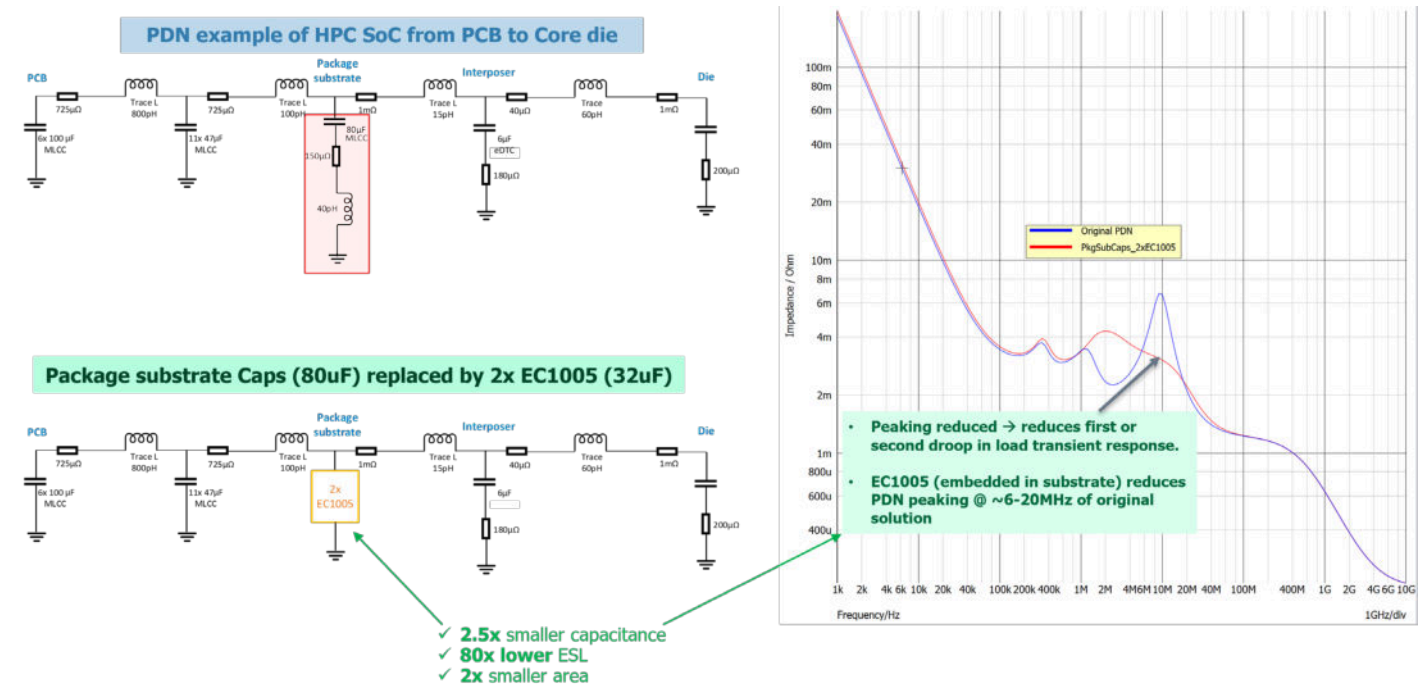
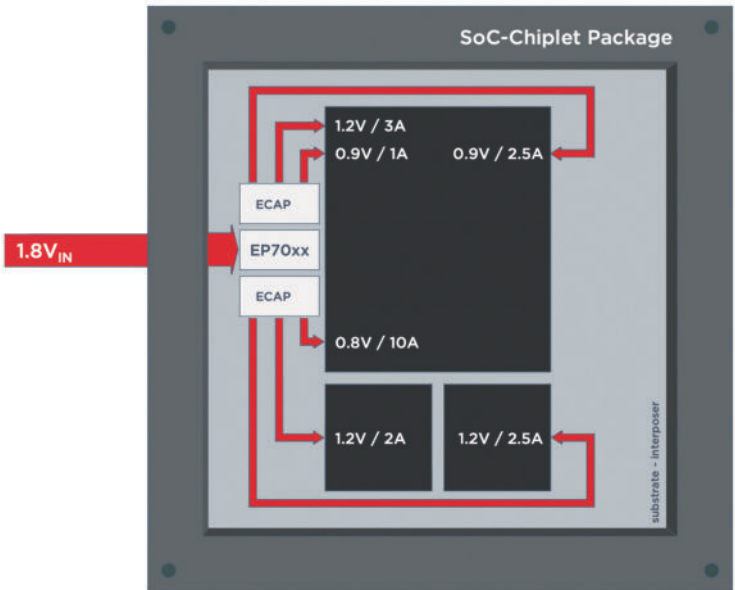
- Deep trench capacitor technology
- Single or multi-domains capacitors
- Ultra-low ESL
 - Less than 5pH
- Ultra-low ESR
- Wide bandwidth 10MHz-10GHz
- High capacitance density form factor
- Ultra-thin profile: down to 50µm
 - Custom profile available
- Substrate embedding
- Die/land side mounting
 - No DC or AC derating
 - No aging or temperature derating
- Standard & custom solutions



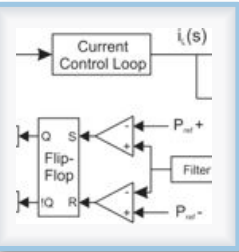
EP70xx IVR Series

Seamless Integration into Chiplet-based and SoC systems

- 10A (package)/10A (die) total current
- 1-3 outputs
- 1.8VIN
- I2C interface
- 5 x 5 x 0.8 mm package
- 6.7mm² die form

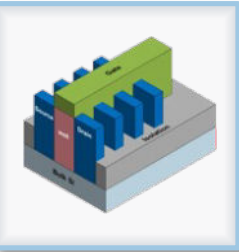


The FinFast™ technology operates with benchmark efficiency at blazing speeds utilizing cutting-edge silicon combined with novel control architectures, high-frequency magnetics, wide-bandwidth capacitors and best-in-class power packaging.



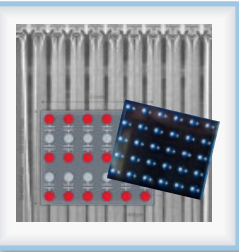
Innovative Architectures

- Very high frequency and low noise
- 1,000x faster power delivery
- High digital content for configurability



FinFast™ Power Design

- FinFET cells as power devices
- High current voltage stacking
- High speed efficient switching



Silicon Capacitors

- Industry’s most dense capacitance
- Low ESL/ESR power delivery network
- Land side, die side and embedding



Advanced Magnetics

- High frequency magnetic material
- Proprietary design/IP
- Air core design experts



Advanced Power Packaging

- Custom power packages
- High-frequency and power optimized
- As low as ~1°C/W dual side cooling

kilowatt-class Vertical Power Delivery

Part Number		Max Current	Bandwidth	VIN	Package Size	Height	
EP7502MC	Power Leaf	65A	Fast	3.3V	6 x 7 mm	2.2 mm	w/ thermal slug
EP9501	Controller				6 x 6 mm	0.7 mm	

IVR – Chiplet & System Power Regulators

Part Number	Outputs	Output 1	Output 2	Output 3	Output 4	VIN	Package Size	Solution Size	Optimized for
EP7602M	1 / 2	65A				3.3V	8.1 x 6.4 mm	52 mm²	System Power
EP7010C	1	10A				1.8V	5 x 5 mm	25 mm²	System Power & Chiplet Power
EP7027C	2	8A	2A						
EP7028C		6A	4A						
EP7029C		5A	5A						
EP7037C	3	6A	2A	2A					
EP7038C		4A	4A	2A					

ECAP - Silicon Capacitors

Part Number	# Capacitors	Capacitance		Max Operating Voltage	Package Size	Package + Pad Thickness
EC1004B	1	480nF		2.0V	0.64 x 0.5 mm	125 μm
EC2004B	2	480nF	2x 240nF	2.0V	0.64 x 1.0 mm	125 μm
EC1007B	1	1.88μF		1.2V	1.12 x 0.98 mm	125 μm
EC2047B	17	4.8μF	1x 600nF 5x 400nF 11x 200nF	2.0V	2.3 x 1.9 mm	200 μm
EC2027B	4	7.5μF	4x 1.88μF	1.2V	2.26 x 1.98 mm	250 μm
EC2005P	2	9.36μF	2x 4.68μF	1.2V	2.00 x 2.00 mm	762 μm
EC2008P	2	11.9μF	2x 5.95μF	1.2V	2.00 x 2.00 mm	762 μm
EC1005P	1	16.6μF		1.2V	3.66 x 3.05 mm	762 μm
EC2025P	4	18.72μF	4x 4.68μF	1.2V	4.04 x 2.00 mm	762 μm
EC2006P	4	36.4μF	4x 9.1μF	1.2V	4.00 x 4.00 mm	762 μm
EC2045P	8	37.44μF	8x 4.68μF	1.2V	4.04 x 4.04 mm	762 μm

Empower Semiconductor provides **custom design services** for silicon capacitors, enabling optimized solutions that address specific electrical, physical, and mechanical specifications.

EMPOWER

SEMICONDUCTOR

USA/Global HQ

888 Tasman Drive
Suite 200
Milpitas, CA 95035
USA

T: +1 408 957 8750

China and Asia Pacific

Room B217,
Rongchao Binhai Building No.2021
Haixiu Road,
Bao'an District,
Shenzhen City, China



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