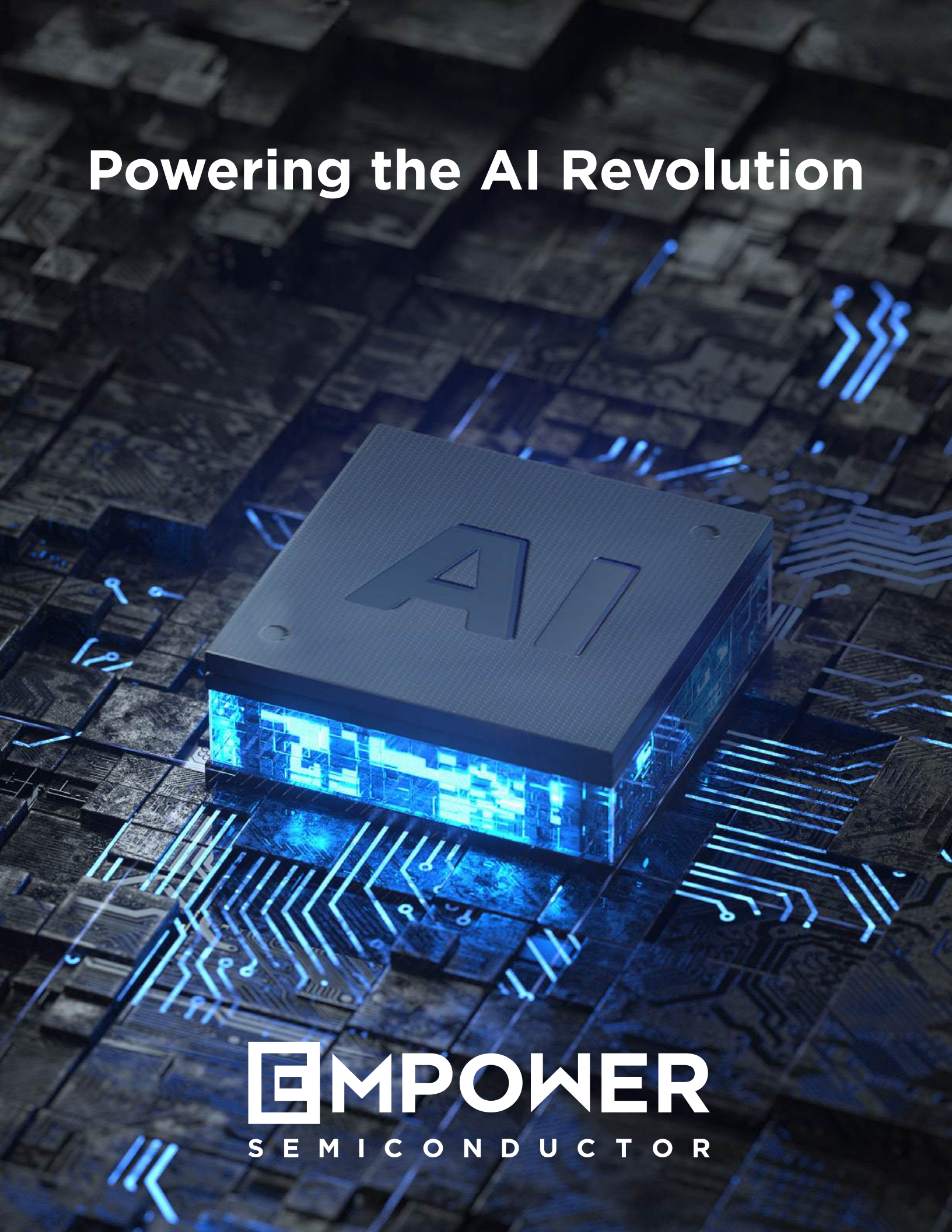
Powering the AI Revolution

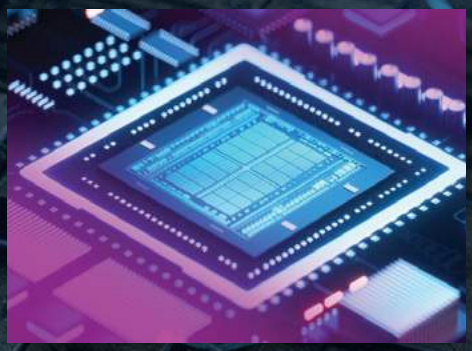


EMPOWER
SEMICONDUCTOR

Power Management Solutions for AI, HPC, xPU Processors and High Density Data Intensive Applications

- FinFast™ powered industry's smallest and fastest step-down converters
  - Single chip Integrated Voltage Regulator (IVR)
  - 5x higher power density, 20x faster, lower system losses
- Ultimate power and signal integrity Silicon Capacitors – ECAPs
  - Ultra-low ESL for high frequency decoupling
  - Industry's thinnest and most flexible capacitor solution
- World class wafer foundry, assembly and test
- Headquartered in San Jose, California, USA
- Worldwide Sales Representatives and Distributors

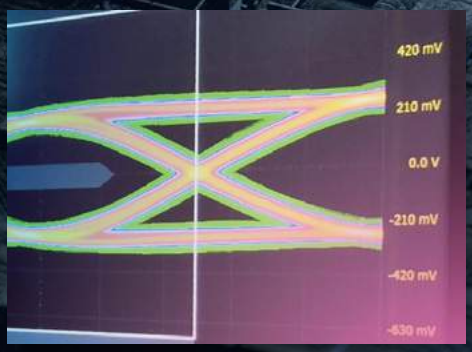
AI - HPC - xPU Power



Chiplet Power

Data Centers

Networking



Power Integrity

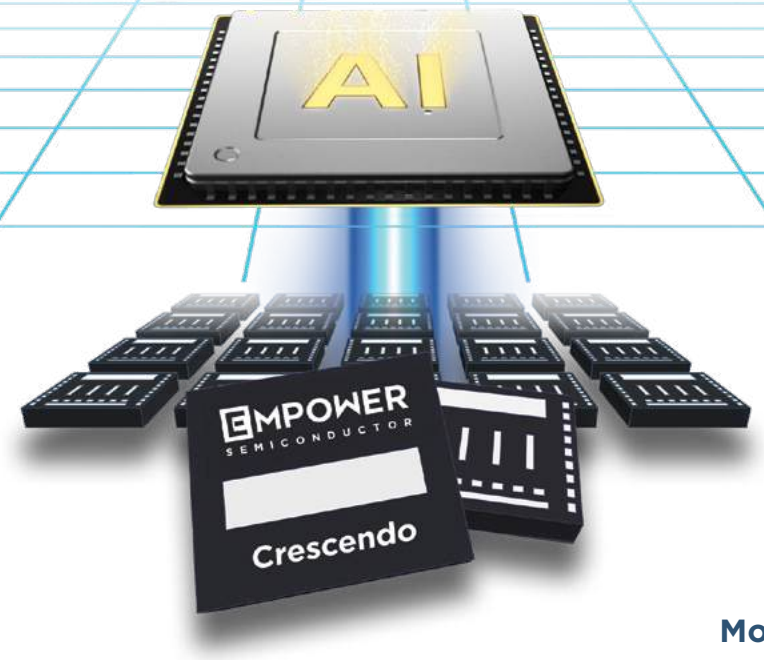
Crescendo

Scalable On-Demand kW Vertical Power

3,000A+
Peak Current

1mm/2mm
Low Profile

Under 2°C/W
Thermal Performance



20x
Higher Bandwidth

5x
Higher Density

More Than 10%
Power Loss Savings

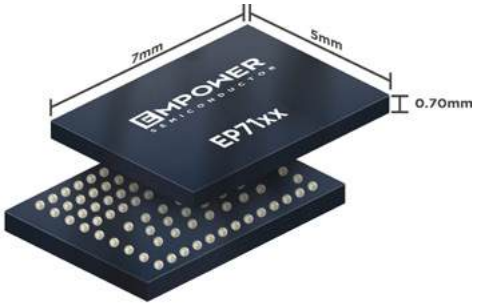
SPEED & BANDWIDTH

- Integrates all power components
- Eliminates capacitor bank
- Fits underneath the xPU
- Tightens load voltage regulation

System Power

Industry's Smallest and Fastest Integrated Voltage Regulators!

Empower patented IVR technology eliminates dozens of discrete components. The result is power delivery with unprecedented simplicity, speed, accuracy, and no discrete components.



EP71xx IVR Series

12A/25W total current/power

1-4 outputs

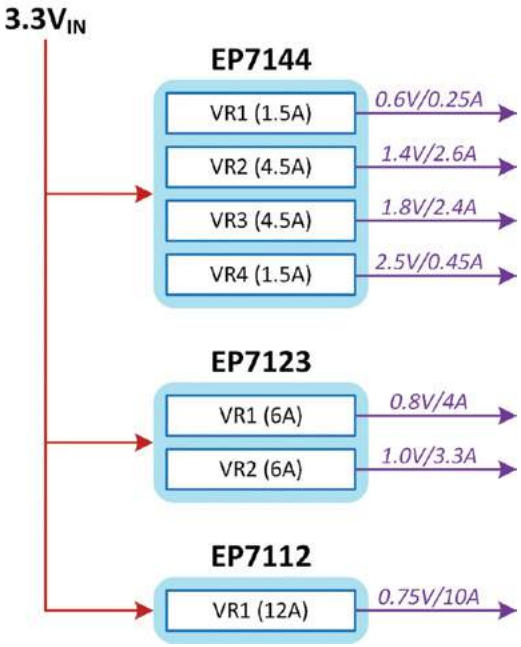
$3.3V_{IN}$ optimized

I^2C interface

Flexible sequencing

Multi-time programming

5 x 7 x 0.7 mm package



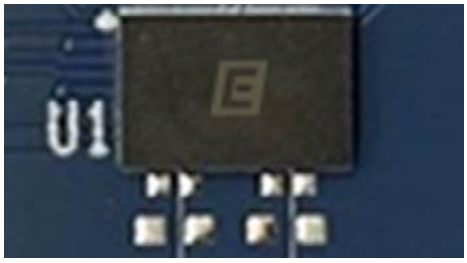
3 devices generate 7 power rails with full sequencing

Flexible Design Options

Smallest BOM and Footprint

EP71xx + PCB Inductors

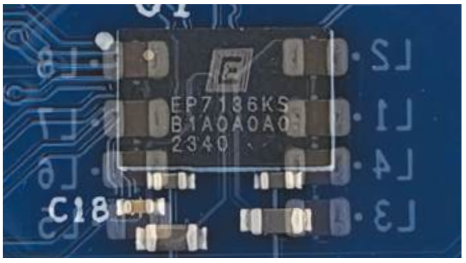
- <5 components BOM
- 35-40 mm^2 top side area
- 0.75 mm solution height



Highest Efficiency

EP71xx with Magnetic Inductors

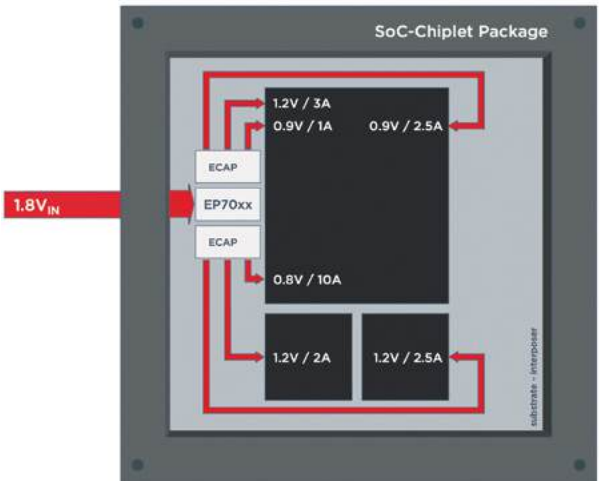
- 9-14 components BOM
- 60 mm^2 top side area
- 0.8 mm solution height



SoC-Chiplet Power

Seamless Integration of Power Converters into Chiplet-based and SoC systems!

- Increased design flexibility
- Increased performance
  - Efficient power delivery to the chiplets
  - Fast transient response
- Simplified routing and packaging
- Faster and lower cost development

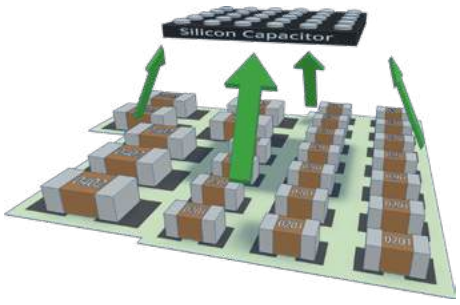


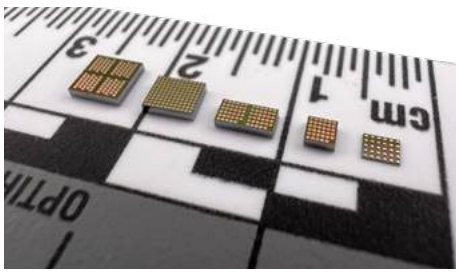
EP70xx IVR Series	
10A total current (package)	I²C interface
11A total current (die)	5 x 5 x 0.8 mm package
1-3 outputs	6.7 mm² Die form
1.8V$_{IN}$ optimized	

Silicon Capacitors

Enabling New Levels of Power and Signal Integrity!

- Deep trench capacitor technology
- Ultra-low ESL
  - Less than 5pH
- Ultra-low ESR
- Wide bandwidth 10MHz-10GHz
- High capacitance density form factor
- Ultra-thin profile: down to 50µm
- Die/land side or substrate embedding
- Stability and reliability
  - No DC or AC bias derating
  - No aging or temperature derating

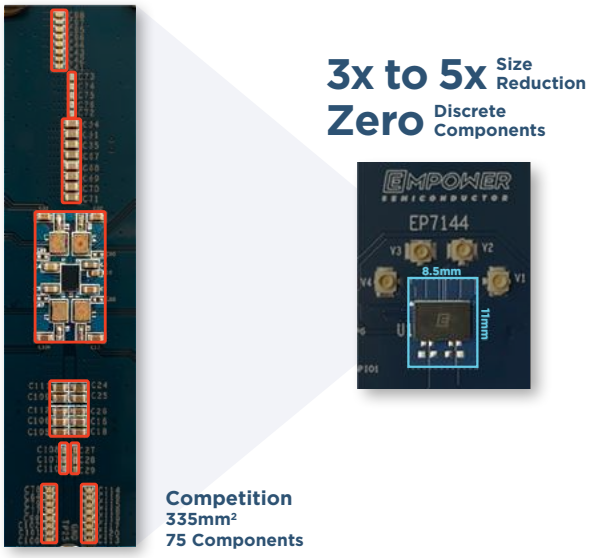




Empowering Density

3x to 5x Smaller

- Industry's smallest step-down regulator packs the highest power in the smallest footprint.
- High density ECAP shrinks banks of high-speed decoupling MLCC capacitors.

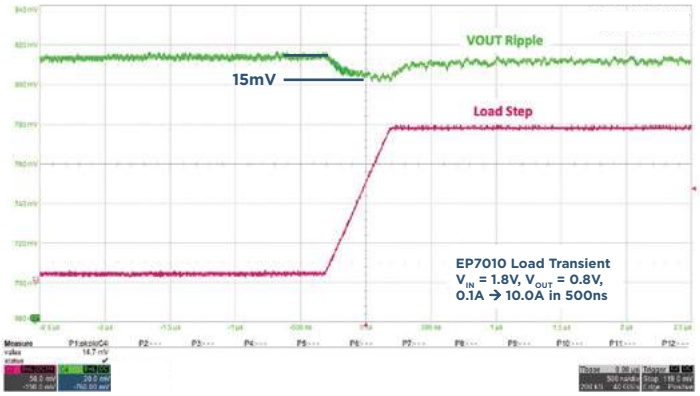


Empowering Performance

1,000x Faster

World's fastest and widest bandwidth regulator can achieve 15mV droop for a 20A/µs full load step.

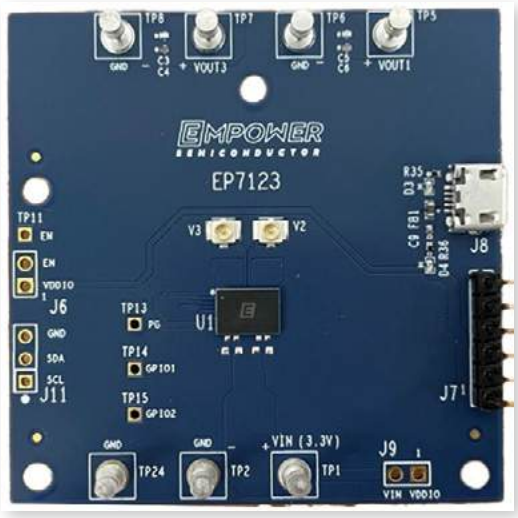
EP7010 - Output Voltage Transient Load Response, 0.8V Output, 1.8V Input, 100mA to 10A Load in 500ns



Empowering Simplicity

Place One and Done!

- Single component Bill of Material
- I²C field re-configurability
- Fastest time to market design
- Increased reliability



EP7123 Demo Board

Empower Product Families

Empower IVR - Integrated Voltage Regulators

Part Number	Outputs	Output 1	Output 2	Output 3	Output 4	VIN	Package Size	Solution Size	Optimized for
EP7112C	1	12A				3.3V	5 x 7 mm	35 mm²	System Power
EP7124C	2	10.5A	1.5A						
EP7122C		9A	3A						
EP7125C		7.5A	4.5A						
EP7123C		6A	6A						
EP7139C	3	9A	1.5A	1.5A					
EP7131C		6A	4.5A	1.5A					
EP7136C		6A	3A	3A					
EP7148C	4	7.5A	1.5A	1.5A	1.5A				
EP7144C		4.5A	4.5A	1.5A	1.5A				
EP7145C		4.5A	3A	3A	1.5A				
EP7143C		3A	3A	3A	3A				
EP7010C	1	10A				1.8V	5 x 5 mm	25 mm²	System Power & SoC 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	Mounting
EC2012B	2	2.4nF	2x 1.2nF	4.0V	0.5 x 0.25 mm²	166 µm	Die/land side
EC1001P	1	200nF		4.0V	1.0 x 0.5 mm²	160 µm	Die/land side & PCB
EC1002P	1	215nF		4.0V	1.0 x 0.5 mm²	160 µm	Die/land side & PCB
EC1004B	1	230nF		2.0V	0.64 x 0.5 mm²	121 µm	Die/land side
EC2004B	2	460nF	2x 230nF	2.0V	0.64 x 1.0 mm²	121 µm	Die/land side
EC1100P	5	670nF	1x 146nF 3x 110nF 1x 200nF	4.0V	2.5 x 0.6 mm²	200 µm	Die/land side
EC1007B	1	1.8µF		1.2V	1.12 x 0.98 mm²	121 µm	Die/land side
EC2047B	17	4.8µF	11x 200nF 5x 400nF 1x 600nF	2.0V	2.3 x 1.9 mm²	200 µm	Die/land side & PCB
EC2005P	2	9.34µF	2x 4.67µF	1.2V	2.0 x 2.0 mm²	762 µm	Embedded
EC1005P	1	16.7µF		1.5V	3.64 x 3.06 mm²	784 µm	Embedded
EC2025P	4	18.68µF	4x 4.67µF	1.2V	4.04 x 2.0 mm²	762 µm	Embedded
EC2006P	4	36.8µF	4x 9.2µF	1.2V	4.0 x 4.0 mm²	762 µm	Embedded

ECAP – Custom Silicon Capacitor Design Services

Empower Semiconductor offers custom design services for defining, designing and manufacturing silicon capacitors, enabling tailored solutions to meet specific application performance and physical/mechanical requirements.

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