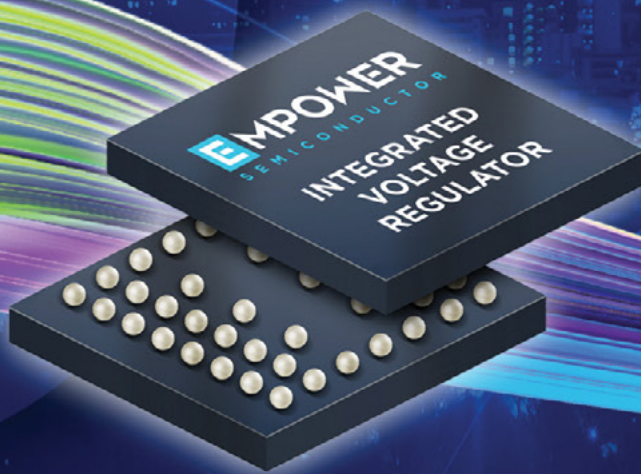


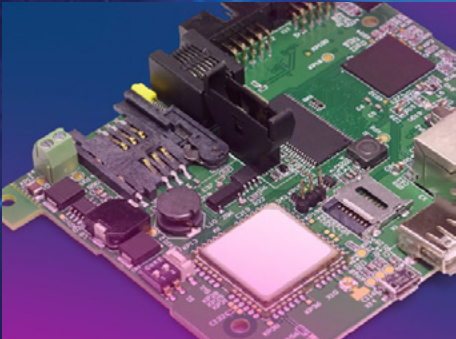
**We Minimize the Energy Footprint
of the Digital Economy**



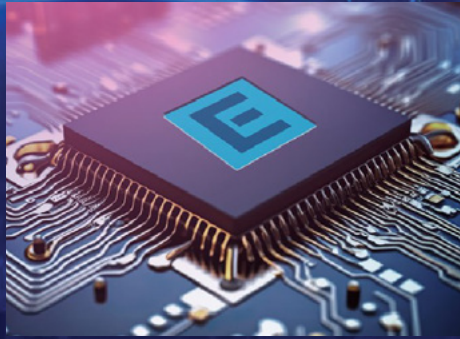
EMPOWER
SEMICONDUCTOR

Power Management Solutions for High Density Data Intensive Applications

- Industry's smallest and fastest Integrated Voltage Regulators (IVRs)
 - 3x smaller solution, 1,000x faster power delivery
 - Single chip DC to DC converters
 - High frequency – Zero external discrete components
- Power and signal integrity Silicon Capacitors
 - 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



Embedded Systems



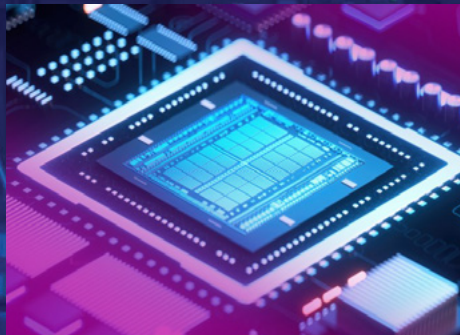
High-Performance Computing



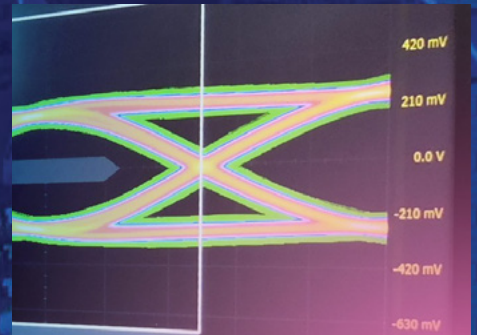
Datcom—Data Centers



Healthcare & Medical



SoC Power Integration

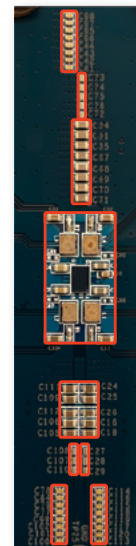


Power & Signal Integrity

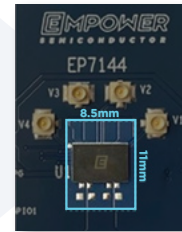
Empowering Density

3x 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.



3x Size Reduction
Zero Discrete Components



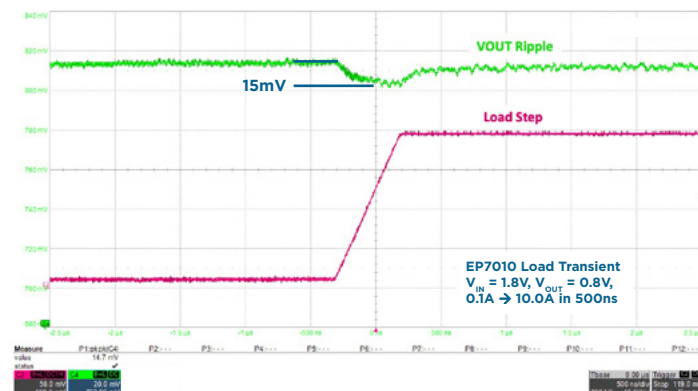
Competition
335mm²
75 Components

Empowering Performance

1,000x Faster

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

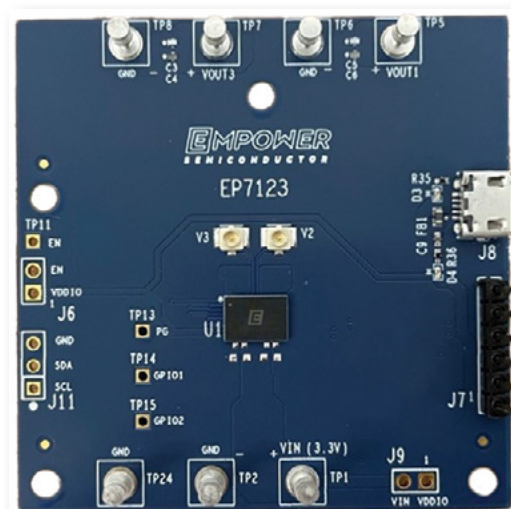
EP7010 - Output Voltage Transient Load Response, 0.8V Output, 1.8V Input, 100mA to 10A Load in 500ns



Empowering Simplicity

Place One and Done!

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

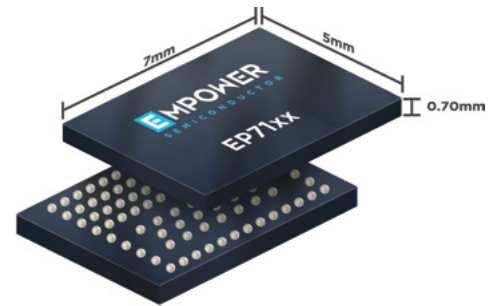


EP7123 Demo Board



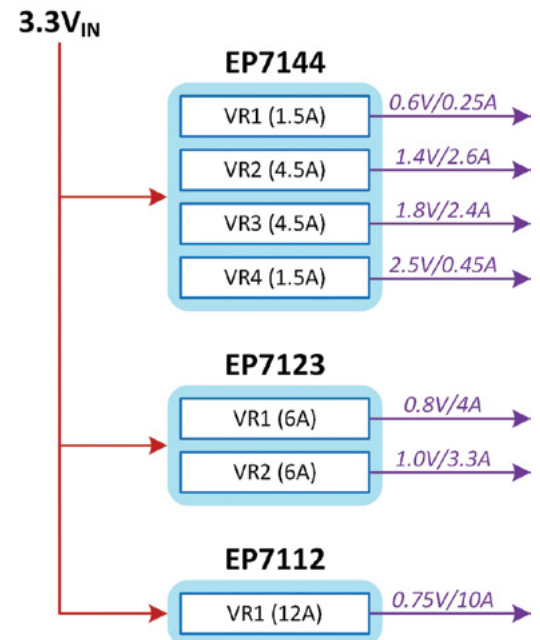
Industry's Smallest and Fastest Integrated Voltage Regulators!

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 total current
- 1-4 outputs
- 3.3V_{IN} optimized
- I²C 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 mm² top side area
- 0.75 mm solution height



Fastest Design

EPM51xx PCB Interposer

- Single component solution
- 145 mm² top side area
- 2.35 mm solution height



Highest Efficiency

EP71xx with Magnetic Inductors

- 9-14 components BOM
- 100 mm² top side area
- 0.8 mm solution height





Integrated Voltage Regulators (IVRs) Eliminate External Regulators in Chiplet-based and SoC systems!



Empower patented IVR technology allows for seamless integration of power converters into any SoC or chiplet-based architecture.

- 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)

11A total current (die)

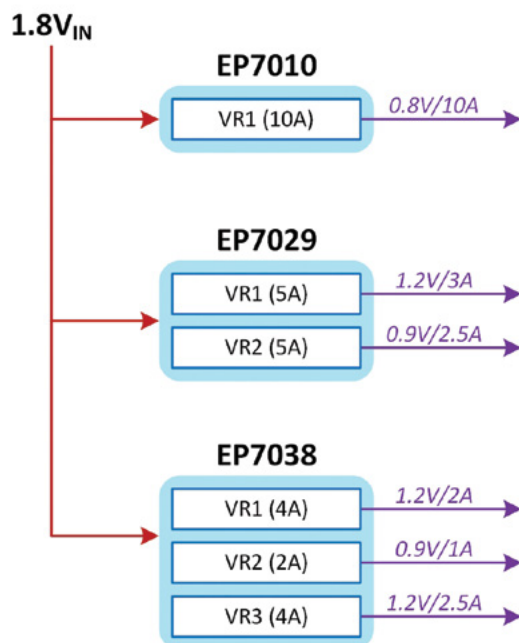
1-3 outputs

1.8V_{IN} optimized

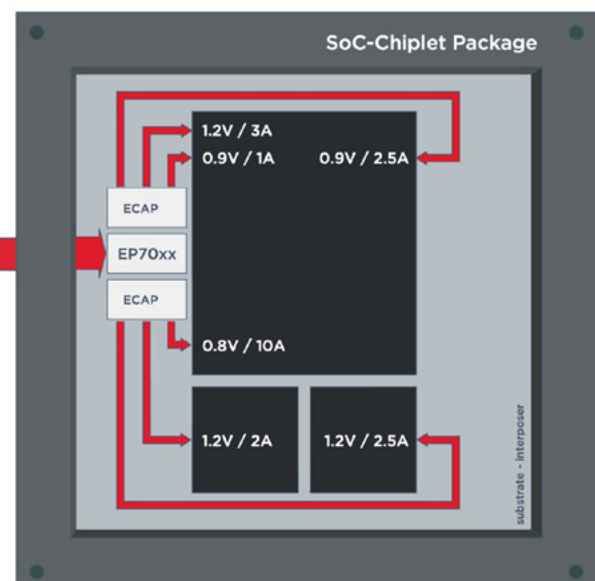
I²C interface

5 x 5 x 0.8 mm package

6.7 mm² Die form



SoC/Chiplet integration of EP70xx IVR
removes 6 external regulators

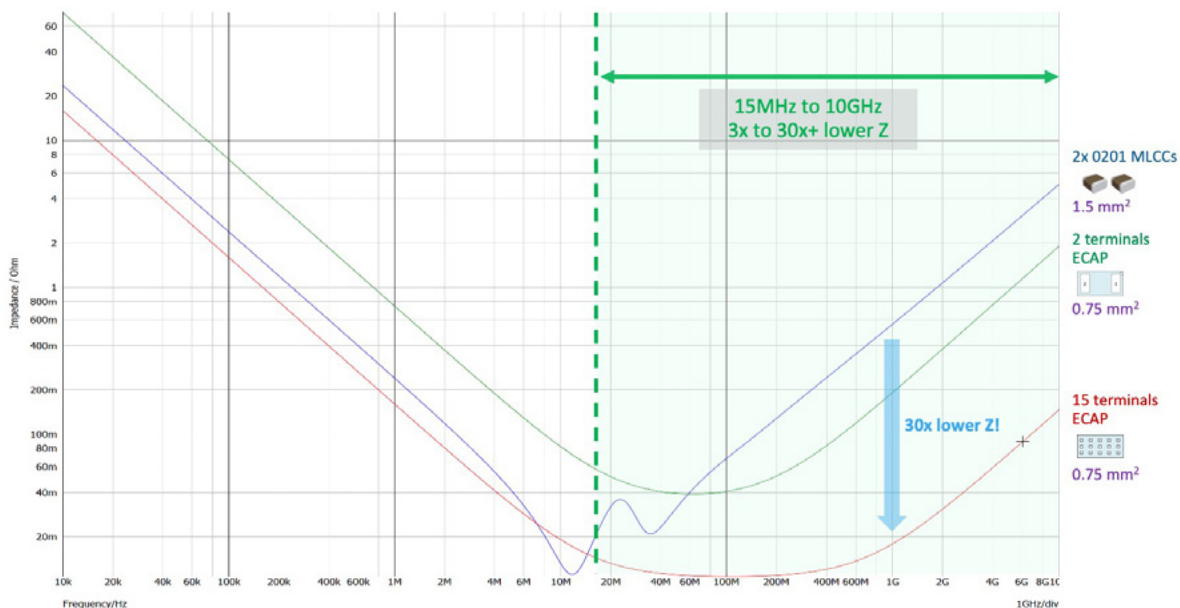
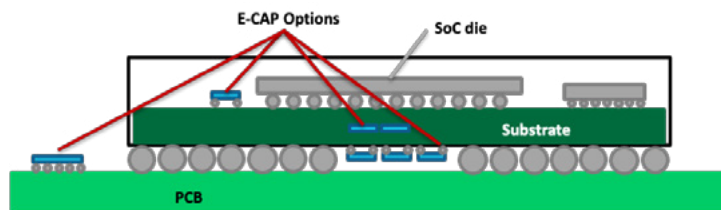
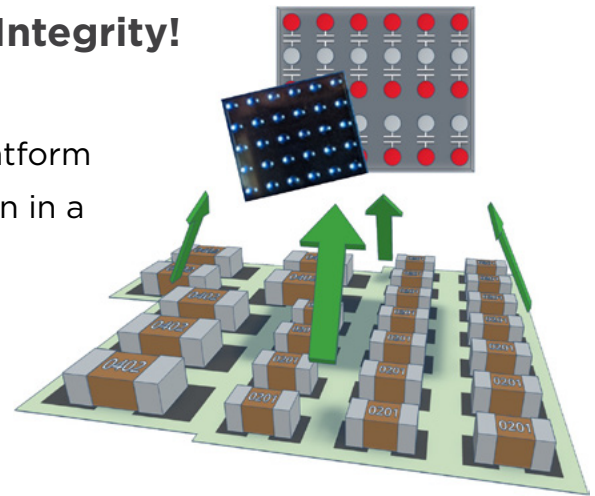




Enabling New Levels of Power and Signal Integrity!

Empower ECAP is a revolutionary silicon capacitor platform enabling multi high performance capacitors integration in a single device for PCB and SoC in-package mounting.

- Power and Signal Integrity
- Low ESL/ESR Power Delivery Network
 - As low as 5pH ESL
- High silicon capacitor density
- Ultra-low profile
 - 50μm thickness capable
- Superior stability
 - No DC or AC bias derating
 - No aging and temperature derating
- No ferromagnetic material
- No audible noise susceptibility



Dual and multi terminals ECAP impedance versus MLCCs

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
EP7112	1	12A				3.3V	5 x 7 mm	35 mm ²	System Power
EP7124	2	10.5A	1.5A						
EP7122		9A	3A						
EP7125		7.5A	4.5A						
EP7123		6A	6A						
EP7139	3	9A	1.5A	1.5A					
EP7131		6A	4.5A	1.5A					
EP7136		6A	3A	3A					
EP7133		3A	3A	3A					
EP7148	4	7.5A	1.5A	1.5A	1.5A				
EP7144		4.5A	4.5A	1.5A	1.5A				
EP7145		4.5A	3A	3A	1.5A				
EP7143		3A	3A	3A	3A				
EP7142		1.5A	1.5A	1.5A	1.5A				
EP7010	1	10A				1.8V	5 x 5 mm	25 mm ²	System Power & SoC Power
EP7015		5A							
EP7027	2	8A	2A						
EP7028		6A	4A						
EP7029		5A	5A						
EP7024		3A	3A						
EP7037	3	6A	2A	2A					
EP7038		4A	4A	2A					
EP7032		2A	2A	2A					

Empower IVR - Interposers

Part Number	Outputs	Output 1	Output 2	Output 3	Output 4	VIN	Package Size	Solution Size	Optimized for
EPM5112	1	12A				3.3V	11 x 13.2 mm	145 mm ²	System Power
EPM5123	2	6A	6A						
EPM5136	3	6A	3A	3A					
EPM5144	4	4.5A	4.5A	1.5A	1.5A				
EPM5143	4	3A	3A	3A	3A				

Contact us for other options

ECAP - Silicon Capacitors

Part Number	# Capacitors	Capacitance	Operating Voltage	Package Size	Package Thickness
EC1001	1	200nF	4.0V	1.0 x 0.5 mm (0201 pads)	150 μm
EC1002	1	215nF	4.0V	1.0 x 0.5 mm (0402 pads)	150 μm
EC1004	1	240nF	4.0V	0.64 x 0.5 mm	150 μm
EC1005	1	16.6μF	2.0V	3.675 x 3.060 mm	800 μm
EC2012	2	2x 1.2nF	4.0V	0.5 x 0.25 mm	100 μm
EC1100	5	1x 145nF 1x 200nF 3x 110nF	4.0V	2.5 x 0.6 mm	150 μm
EC2047	17	1x 600nF 5x 400nF 11x 200nF	2.0V	2.3 x 1.9 mm	200 μm

Empower ECAP technology can be customized to fit specific design requirements: capacitance, form factor, pitch, configuration, etc. Contact us for more information.



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