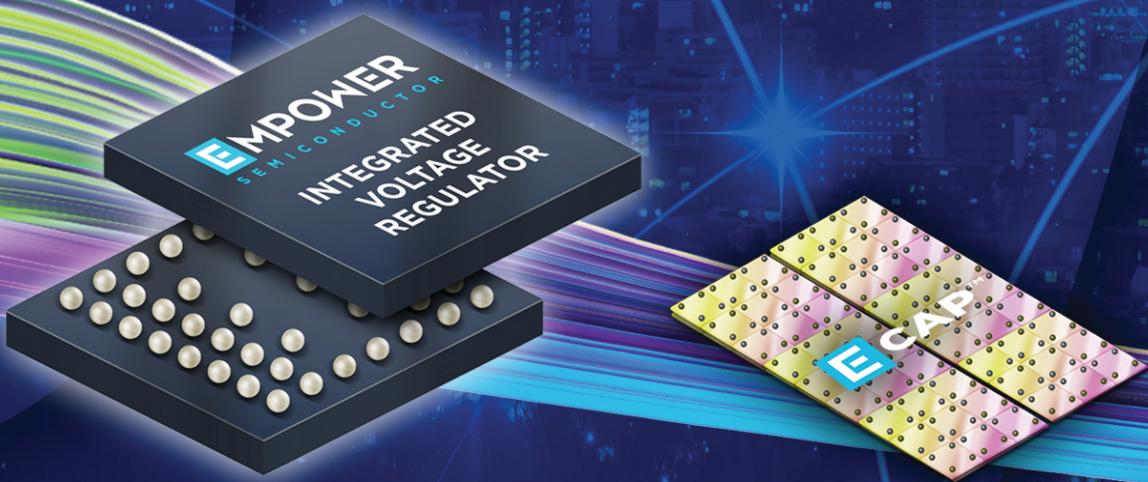


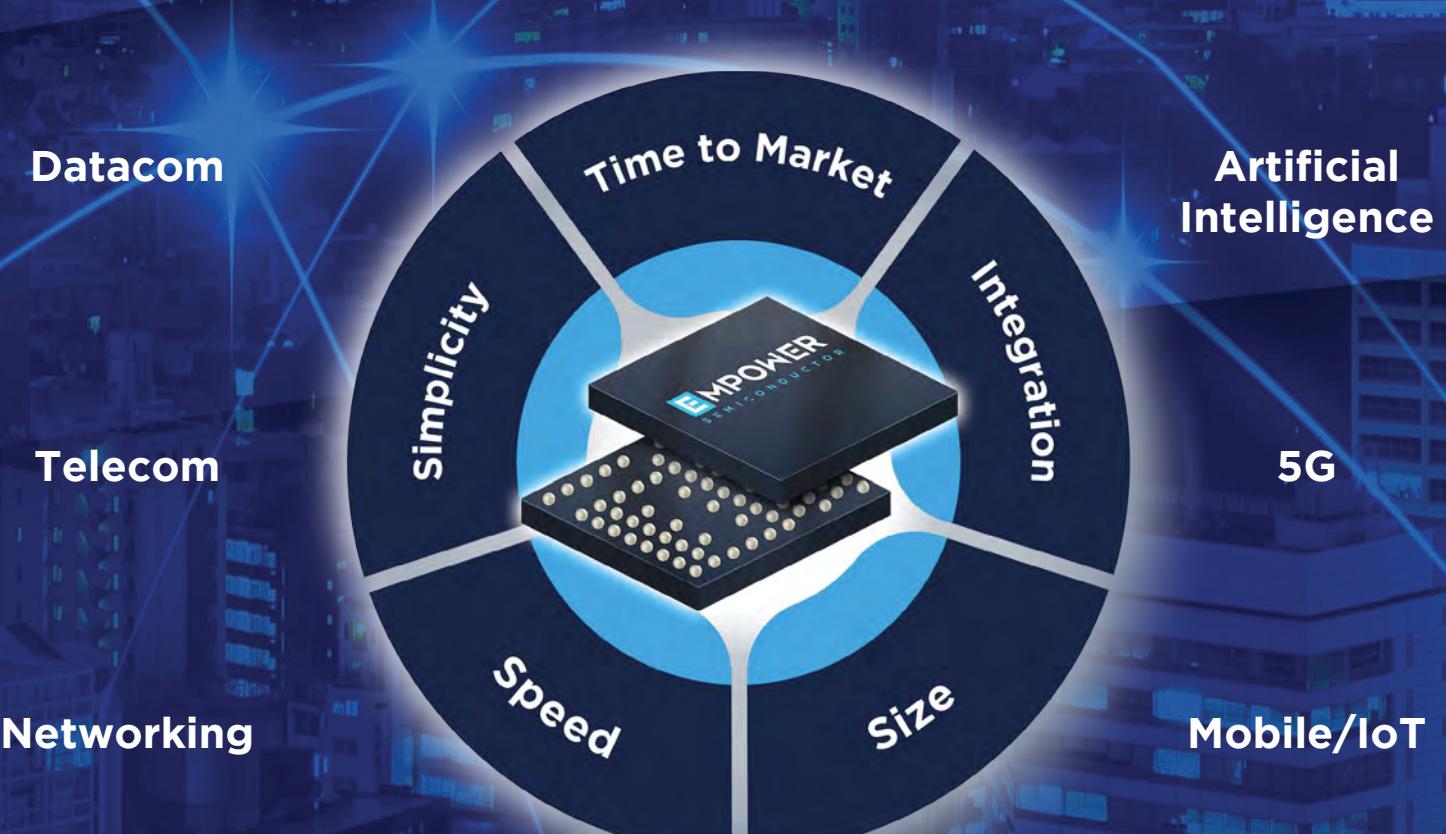
# We Minimize the Energy Footprint of the Digital Economy

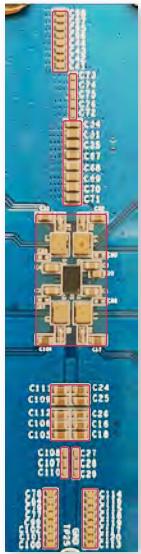


**EMPOWER**  
SEMICONDUCTOR

# Power Management Solutions for High Density Data Intensive Applications

- Industry's smallest and fastest Integrated Voltage Regulators (IVRs)
  - 3x smaller, 1,000x faster
  - Improves system's efficiency
  - Single chip dc to dc converters
  - High frequency – Zero external discrete components
- Highest density Silicon Capacitors
- World class wafer foundry, assembly and test
- Headquartered in San Jose, California
- Worldwide Sales Representatives and Distributors





**3x** Size Reduction  
**Zero** Discrete Components

Competition  
335mm<sup>2</sup>  
75 Components

## Empowering Density

### 3x Smaller...

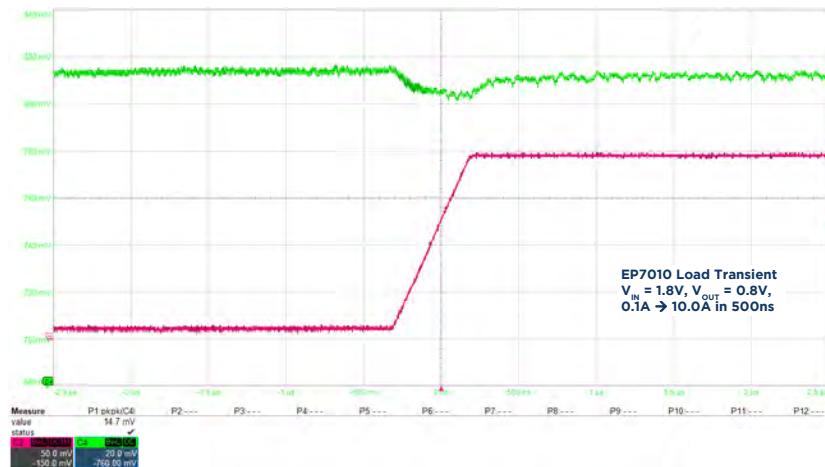
- Industry's smallest step-down regulator packs the highest power in the smallest footprint.
- High density E-CAP™ shrinks banks of high-speed decoupling MLCC capacitors.

## Empowering Performance

### 1,000x Faster

World's fastest regulator with 15mV droop in 500ns full load step and ExpressV™ DVS up to 5mV/ns provide less commutation losses for greater system efficiency.

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



EP7123 Demo Board

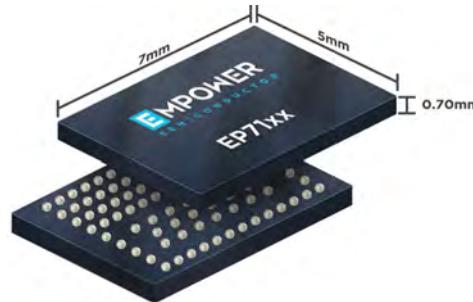
## Empowering Simplicity

### Place One and Done!

- Single component Bill-of-Material
- I<sup>2</sup>C field re-configuration
- Fastest time to market design
- Increased reliability



## Industry's Smallest and Fastest Integrated Voltage Regulator



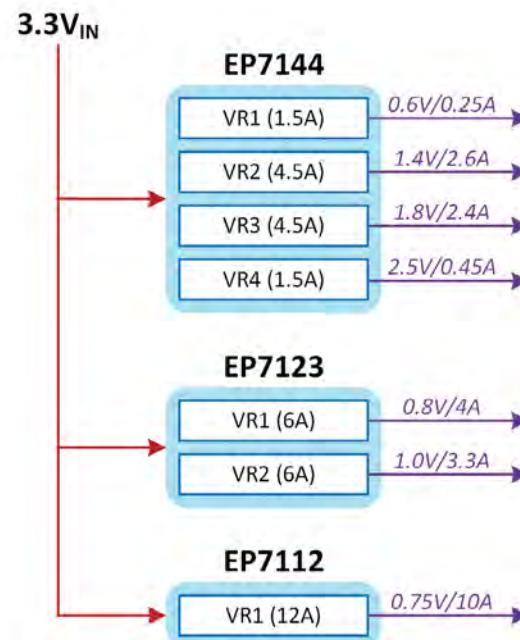
Empower's patented IVR™ technology eliminates dozens of discrete components. The result is power delivery with unprecedented simplicity, speed, accuracy, and no discrete components!

### EP70xx

- 10A total current
- 1-3 outputs
- $1.8V_{IN}$  optimized
- I<sup>2</sup>C interface
- 5x5x0.8mm package

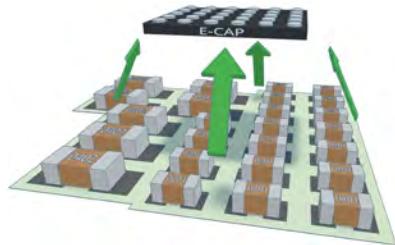
### EP71xx

- 12A total current
- 1-4 outputs
- $3.3V_{IN}$  optimized
- I<sup>2</sup>C interface
- 5x7x0.7mm package



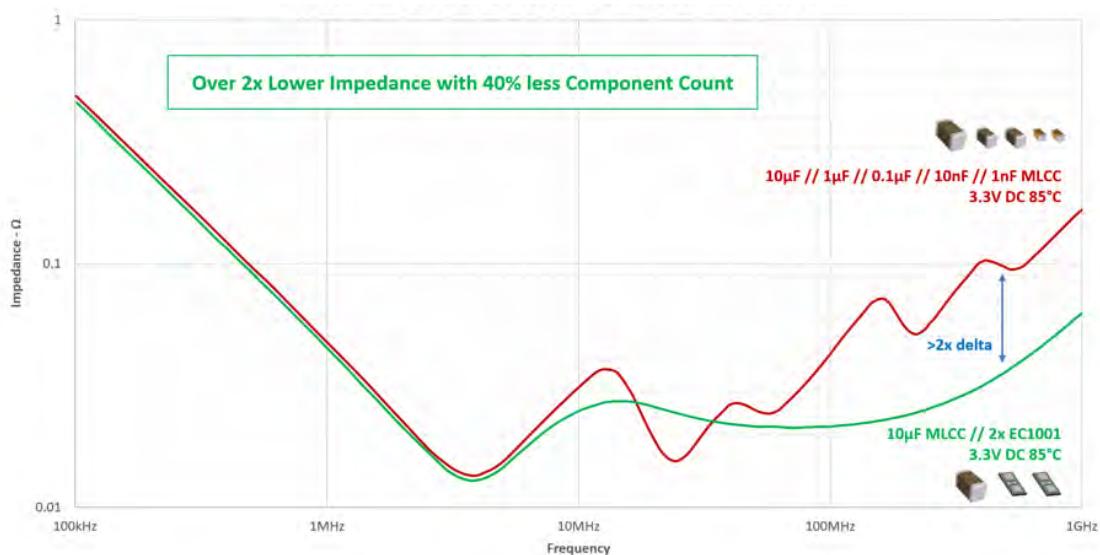
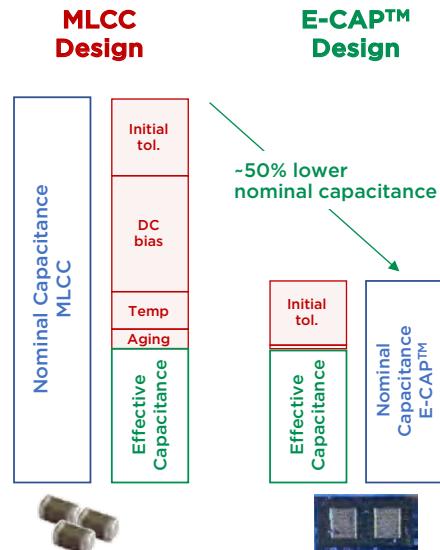


## Enabling New Levels of Power and Signal Integrity!



Empower's E-CAP™ is a revolutionary silicon capacitor platform enabling multi-capacitors integration in a single device for PCB and SoC in-package mounting.

- 50µm + ultra low profile
- Lowest PDN impedance
- Highest silicon capacitor density
- Superior stability
  - No DC or AC bias derating
  - No aging and temperature derating
- 15pH ultra low ESL
- No ferromagnetic material
- No audible noise susceptibility



Characteristics of local de-coupling of MLCC combo vs E-CAP™

# 12V<sub>IN</sub> Solutions – Intermediate Bus Architecture

## EP60xx

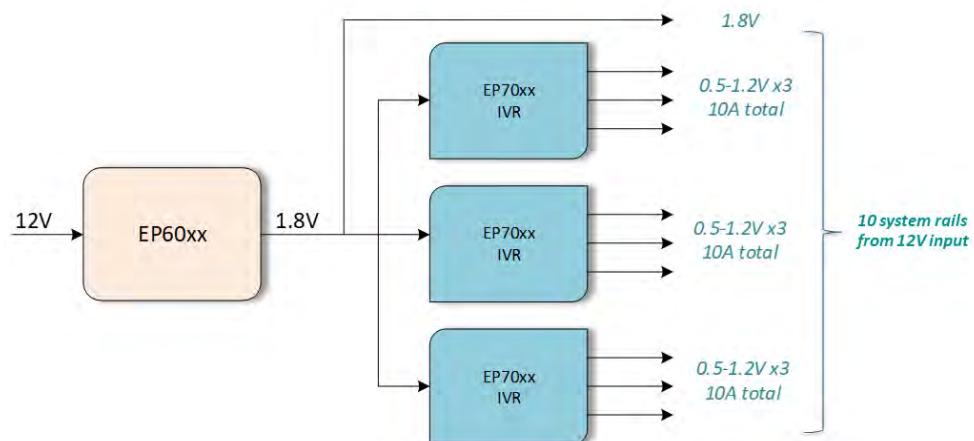
15A/30A total current

94% high efficiency

12V<sub>IN</sub> optimized

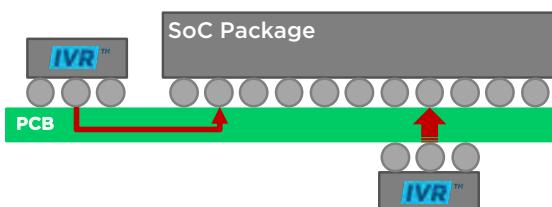
5mm x 5mm package

Optimal first stage for  
IBA applications

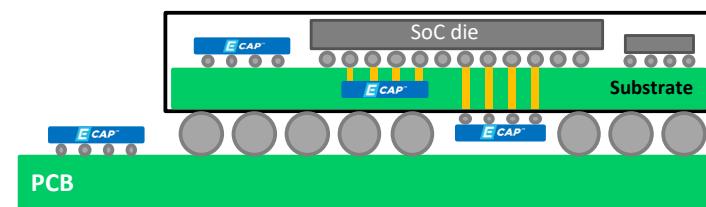


## Integration for Improved Performance

Empower's IVR™ and E-CAP™ solutions thinness allow for components to be placed as close as possible to the load. Shortening the distance between the decoupling capacitors or the power converter to the active load improves performance and reliability.



IVR™ can be mounted on back side of PCB to deliver low loss efficient vertical current to the SoC



E-CAP™ can be mounted in-package for best-in-class bypass and filtering

# Empower Product Families

## IVR™ and Power Converters

Part Number	Outputs	Output 1	Output 2	Output 3	Output 4	VIN	Package Size (mm²)	Solution Size (mm²)	Type
EP7112	1	12A	-	-	-	3.3V	5 x 7	35	IVR
EP7122	2	9A	3A	-	-				
EP7123		6A	6A	-	-				
EP7139	3	9A	1.5A	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	25	IVR
EP7015		5A	-	-	-				
EP7027	2	8A	2A	-	-				
EP7028		6A	4A	-	-				
EP7029		5A	5A	-	-				
EP7024	3	3A	3A	-	-				
EP7037		6A	2A	2A	-				
EP7038		4A	4A	2A	-				
EP7032		2A	2A	2A	-				
EP6069	1	30A	-	-	-	4.5V-24V	5 x 5	-350	Buck
EP6070		15A	-	-	-	6.5V-28V	4 x 4	-250	

## E-CAP™

Part Number	# Capacitors	Capacitance	Operating Voltage	Package Size (mm²)	Package Thickness (mm)
EC1001P	1	220nF	4.0V	1.0 x 0.5 (0402)	0.150
EC2012	2	2x 1.2nF	4.0V	0.5 x 0.25	0.100
EC1100P	5	3x 110nF 1x 145nF 1x 200nF	4.0V	2.5 x 0.6	0.150
EC2047B	17	1x 600nF 11x 200nF 5x 400nF	2.0V	2.3 x 1.9	0.200

Empower's E-CAP™ technology can be customized to fit specific design requirements: capacitance, form factor, pitch, configuration, etc. Contact us for more information



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