

# INTEL<sup>®</sup> ENPIRION<sup>®</sup> POWER SOLUTIONS


# INTEL® ENPIRION® POWER SOLUTIONS

PART NUMBER	MAX I <sub>OUT</sub> (A)	V <sub>IN</sub> RANGE (V)	V <sub>OUT</sub> RANGE (V)	SWITCHING FREQUENCY (MHZ)	PKG (PINS)	PKG SIZE (MM)			SOLUTION SIZE (MM <sup>2</sup> ) <sup>(1)</sup>	V <sub>OUT</sub> SET: VOLTAGE ID (VID)	POWER GOOD / POK FLAG	PROGRAMMABLE SOFT-START	PRECISION ENABLE	INPUT SYNCHRONIZATION	OUTPUT SYNCHRONIZATION	PARALLEL CAPABILITY	PROGRAMMABLE FREQUENCY	LIGHT LOAD MODE	AUTOMOTIVE-GRADE AVAILABLE
						L	W	H											
<b>FOOTPRINT-OPTIMIZED POWERSoCs</b>																			
EP5348UI	0.4	2.5 – 5.5	0.6 – V <sub>IN</sub> <sup>(2)</sup>	9.0	uQFN14	2.0	1.75	0.9	21										
EP5357/8HUI <sup>(3)</sup>	0.6	2.4 – 5.5	1.8 – 3.3	5.0	QFN16	2.5	2.25	1.1	14	•								•	•
EP5357/8LUI <sup>(3)</sup>	0.6	2.4 – 5.5	0.6 – V <sub>IN</sub> <sup>(2)</sup>	5.0	QFN16	2.5	2.25	1.1	14	•								•	•
EP5368QI	0.6	2.4 – 5.5	0.6 – V <sub>IN</sub> <sup>(2)</sup>	4.0	QFN16	3.0	3.0	1.1	21	•									
EP5388QI	0.8	2.4 – 5.5	0.6 – V <sub>IN</sub> <sup>(2)</sup>	4.0	QFN16	3.0	3.0	1.1	28	•									
EP53A7/8HQI <sup>(3)</sup>	1.0	2.4 – 5.5	1.8 – 3.3	5.0	QFN16	3.0	3.0	1.1	21	•								•	•
EP53A7/8LQI <sup>(3)</sup>	1.0	2.4 – 5.5	0.6 – V <sub>IN</sub> <sup>(2)</sup>	5.0	QFN16	3.0	3.0	1.1	21	•								•	•
EN5311QI	1.0	2.4 – 6.6	0.6 – V <sub>IN</sub> <sup>(2)</sup>	4.0	QFN20	4.0	5.0	1.1	36	•									
EP53F8QI	1.5	2.4 – 5.5	0.6 – V <sub>IN</sub> <sup>(2)</sup>	4.0	QFN16	3.0	3.0	1.1	40		•								
EN5319QI	1.5	2.4 – 5.5	0.6 – V <sub>IN</sub> <sup>(2)</sup>	3.2	QFN24	4.0	6.0	1.1	50		•								
EN5322QI	2.0	2.4 – 5.5	0.6 – V <sub>IN</sub> <sup>(2)</sup>	4.0	QFN24	4.0	6.0	1.1	58	•	•								
EN5329QI	2.0	2.4 – 5.5	0.6 – V <sub>IN</sub> <sup>(2)</sup>	3.2	QFN24	4.0	6.0	1.1	50		•								
EN5337QI	3.0	2.4 – 5.5	0.75 – V <sub>IN</sub> <sup>(2)</sup>	5.0	QFN38	4.0	7.0	1.85	75		•	•		•					
EN5339QI	3.0	2.4 – 5.5	0.6 – V <sub>IN</sub> <sup>(2)</sup>	3.2	QFN24	4.0	6.0	1.1	55		•								
EN5365/6QI <sup>(4)</sup>	6.0	2.4 – 5.5	0.75 – 3.3/V <sub>IN</sub> <sup>(2)</sup>	5.0	QFN58	10.0	12.0	1.85	229	•	•	•				•			
EN5367QI	6.0	2.5 – 5.5	0.75 – V <sub>IN</sub> <sup>(2)</sup>	4.0	QFN54	5.5	10.0	3.0	160		•	•		•		•			
EN5395/6QI <sup>(4)</sup>	9.0	2.4 – 5.5	0.75 – 3.3/V <sub>IN</sub> <sup>(2)</sup>	5.0	QFN58	10.0	12.0	1.85	277	•	•	•				•			
<b>PERFORMANCE-OPTIMIZED AND WIDE V<sub>IN</sub> POWERSoCs</b>																			
EN6310QI	1.0	2.7 – 5.5	0.6 – 3.3	2.2	QFN30	4.0	5.0	1.85	65		•	•							•
EN5335/6QI <sup>(4)</sup>	3.0	2.4 – 6.6	0.75 – 3.3/V <sub>IN</sub> <sup>(2)</sup>	5.0	QFN44	7.5	10.0	1.85	157	•	•	•							
EN6337QI	3.0	2.5 – 6.6	0.75 – V <sub>IN</sub> <sup>(2)</sup>	1.9	QFN38	4.0	7.0	1.85	75		•	•		•				•	•
EN6347QI	4.0	2.5 – 6.6	0.75 – V <sub>IN</sub> <sup>(2)</sup>	3.0	QFN38	4.0	7.0	1.85	75		•	•		•				•	•
EN2342QI	4.0	4.5 – 14.0	0.75 – 5.0	0.9 – 1.8	QFN68	8.0	11.0	3.0	200		•	•	•	•	•			•	
EN5364QI	6.0	2.4 – 6.6	0.6 – V <sub>IN</sub> <sup>(2)</sup>	4.0	QFN68	8.0	11.0	1.85	160		•	•	•	•	•			•	
EN6362QI	6.0	3.0 – 6.5	0.6 – V <sub>IN</sub> <sup>(2)</sup>	0.9 – 1.5	QFN56	8.0	8.0	3.0	160		•	•	•	•	•			•	
EN6382QI	8.0	3.0 – 6.5	0.6 – V <sub>IN</sub> <sup>(2)</sup>	1.2 – 1.7	QFN56	8.0	8.0	3.0	160		•	•	•	•	•			•	
EN6360QI	8.0	2.5 – 6.6	0.6 – V <sub>IN</sub> <sup>(2)</sup>	0.9 – 1.5	QFN68	8.0	11.0	3.0	190		•	•	•	•	•	•		•	•
EN5394QI	9.0	2.4 – 6.6	0.6 – V <sub>IN</sub> <sup>(2)</sup>	4.0	QFN68	8.0	11.0	1.85	190		•	•	•	•	•	•		•	
EN63A0QI	12.0	2.5 – 6.6	0.6 – V <sub>IN</sub> <sup>(2)</sup>	0.9 – 1.5	QFN76	10.0	11.0	3.0	225		•	•	•	•	•	•		•	•
EM2120x01QI	20.0	4.5 – 16	0.7 – 5.0	0.8 or 1.33	QFN100	11.0	17.0	6.76	360	•	•	•							
EM2130P01QI	30.0	4.5 – 16	0.7 – 3.6	0.8 or 1.33	QFN100	11.0	17.0	6.76	360	•	•	•							
EM2140P01QI	40.0	4.5 – 16	0.7 – 1.325	0.8	QFN100	11.0	17.0	6.76	360	•	•	•							

High Efficiency And Small Total Footprint Enables Maximum Power Density


## Intel® Enpirion® Power Solutions

Up to 600 mA  
2.25 mm x 2.5 mm




EP5357/58

600 mA to 1.5A  
3 mm x 3 mm




EP53A7/A8/F8

1.5A to 3A  
4 mm x 6 mm



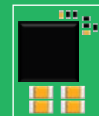
EN5319/29/39

3A to 4A  
4 mm x 7 mm



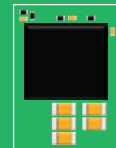
EN6337/47

4A to 8A  
8 mm x 8 mm



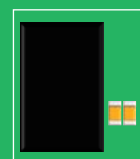
EN6362/82

8A to 12A  
10 mm x 11 mm




EN63A0

Digital up to 40A  
11 mm x 17 mm



EM2120/30/40



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						L	W	H											
<b>LOW DROPOUT REGULATORS (LDOs)</b>																			
EY1602SI-ADJ	0.05	6.0 – 40.0	2.5 – 12.0		SOIC8	6.2	5.0	1.68	~45										
EY1603TI-ADJ	0.15	6.0 – 40.0	2.5 – 12.0		TSSOP14	6.4	5.0	0.9	~45										
EY1501DI-ADJ	1.0	2.2 – 6.0	0.8 – 5.0		DFN10	3.0	3.0	1.0	~15		•	•							
<b>DC-DC REGULATORS</b>																			
ER3105QI	0.5	3.0 – 36.0	0.6 – 34.0	0.3 – 2.0	DFN12	4.0	3.0	1.0	~160		•	•	•				•	•	
ER3110QI	1.0	3.0 – 36.0	0.6 – 12.0	0.3 – 2.0	DFN12	4.0	3.0	1.0	~160		•	•	•				•	•	
ER2120QI	2.0	5.0 – 14.0	0.6 – 5.0	0.5 – 1.2	QFN24	4.0	4.0	0.9	~165		•	•	•				•		
ER3125QI <sup>(5)</sup>	2.5	3.0 – 36.0	0.8 – 36.0	0.2 – 2.2	DFN20	4.0	4.0	0.9	~225		•	•	•				•	•	
<b>HIGH EFFICIENCY DDR MEMORY TERMINATION (VTT)</b>																			
EV1320QI	2.0	0.95 – 1.8	0.5 – 0.9	0.625	QFN16	3.3	3.3	0.9	40		•	•				•			
EV1340QI	5.0	1.0 – 1.8	0.6 – 0.9	1.5	QFN54	5.5	10.0	3.0	125		•	•							
EV1380QI	8.0	1.2 – 1.65	0.6 – 0.825	1.25 – 1.75	QFN68	8.0	11.0	3.0	200		•	•	•	•	•	•	•		

For a complete list of Intel® Enpirion® power products, please visit [www.altera.com/enpirion-power-solutions.html](http://www.altera.com/enpirion-power-solutions.html).

**Notes:**

1. Size estimate for single-sided PCB including all suggested external components. Smaller size may be possible with double-sided PCB design.
2. Maximum V<sub>OUT</sub> = V<sub>IN</sub> - V<sub>DROPOUT</sub>, where V<sub>DROPOUT</sub> = R<sub>DROPOUT</sub> x Load Current. Reference device datasheet to calculate V<sub>DROPOUT</sub>.
3. Only "7" version features Light Load Mode. Only "8" version available in automotive grade.
4. Only "5" version features V<sub>OUT</sub> set by VID.
5. Supports both buck and buck-boost modes of operation.

**Also available:**

ES1030QI: Tiny, Low-Profile, Four-channel Power Rail Sequencer



## Featured Products

### EM2120 | EM2130 | EM2140

The EM2120, EM2130, and EM2140 are a family of pin-compatible 20A, 30A, and 40A fully digital DC-DC step-down converters designed to address growing FPGA and embedded system power challenges.

- Scalable, pin-compatible 20A, 30A, and 40A PowerSoCs
- Programmable and intelligent: digital control architecture and PMBus\* version 1.2 compatible communication interface with telemetry and system health monitoring
- Highly efficient with no thermal de-rating
- <0.5% accuracy and <1% ripple exceed FPGA steady-state power requirements<sup>†</sup>
- <3% transient deviation exceeds FPGA dynamic power requirements<sup>†</sup>
- Small 360 mm<sup>2</sup> total solution size

# Intel® Enpirion® Power Solutions

## Powering Your Innovation

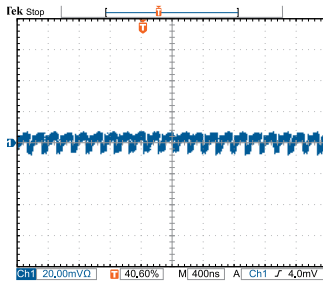
Intel Enpirion Power Solutions integrate nearly all the components needed to build a power supply without sacrificing performance or efficiency. These robust, easy-to-use products meet your most challenging power requirements, all in a small footprint. Focus on your overall design - not how to power it - with Intel Enpirion Power Solutions.

### Enpirion PowerSoCs enable:

- Low noise and fast transient response performance
- High power density and small footprint
- High efficiency and excellent thermal performance
- Low component count and high reliability
- Ease of design and fastest time to market

### Excellent AC+DC Noise Performance

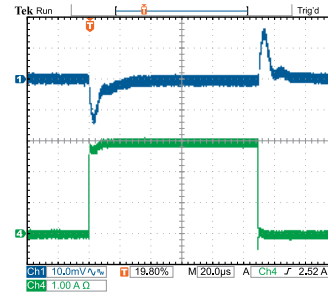
Achieve  $<10\text{ mV}_{pp}$  ripple and  $\leq 2\%$  accuracy for most devices†



5V input, 3.3V output, 500 MHz bandwidth

### Fast Transient Response

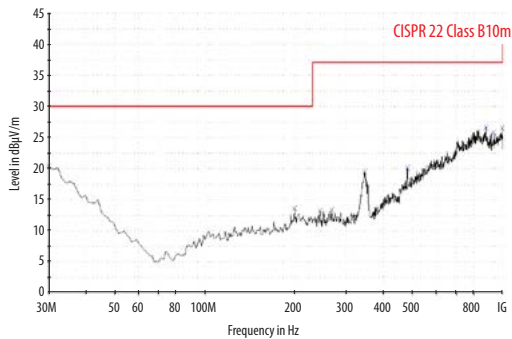
Reduce large, expensive bulk capacitance



5V input, 3.3V output,  $<16\text{ mV}$  deviation

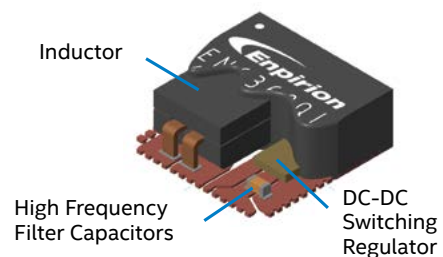
### Excellent EMI Performance

Exceeds CISPR 22 Class B and CISPR 25 requirements†



### Designed And Validated As A Complete Power

Highly integrated and achieves  $>45,000$  year MTBF reliability†



[www.altera.com/enpirion](http://www.altera.com/enpirion)

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†Tests measure performance of components on a particular test, in specific systems. Differences in hardware, software, or configuration will affect actual performance. Consult other sources of information to evaluate performance as you consider your purchase. For more complete information about performance and benchmark results, visit [www.intel.com/benchmarks](http://www.intel.com/benchmarks).