



INTEL® ENPIRION® POWER SOLUTIONS

Powering Your Innovation



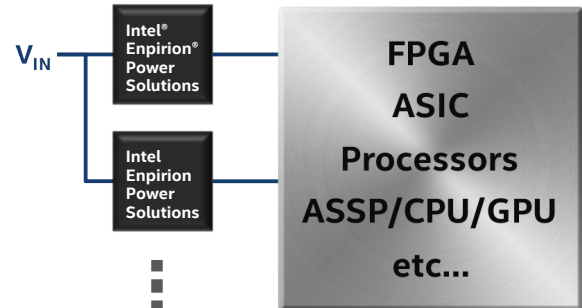
INTEL® ENPIRION® POWER SOLUTIONS

Expertise in Solving Your Toughest Power Challenges

Intel® Enpirion® Power Solutions are high-frequency DC-DC step-down power converters optimized for FPGAs, processors, ASICs, and other semiconductor devices.

Intel 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 fast time to market

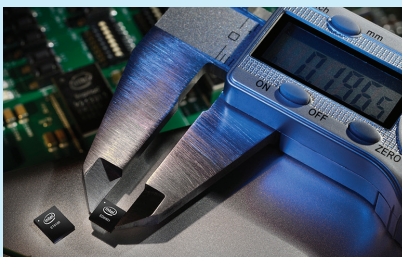


PART NUMBER	MAX I _{OUT} (A)	V _{IN} RANGE (V)	V _{OUT} RANGE (V)	SWITCHING FREQUENCY (MHZ)	PACKAGE (PINS)	PACKAGE SIZE (MM)			SOLUTION SIZE (MM ²) ⁽¹⁾	DIGITAL V _{OUT} SET (VID OR PMBus*)	POWER GOOD / POK FLAG	PROGRAMMABLE SOFT-START	PRECISION ENABLE	INPUT SYNCHRONIZATION	OUTPUT SYNCHRONIZATION	PARALLEL CAPABILITY	PROGRAMMABLE FREQUENCY	LIGHT LOAD MODE	AUTOMOTIVE-GRADE AVAILABLE
						L	W	H											
POWERSOCS UP TO 6.6V INPUT																			
	EP5348UI	0.4	2.5 – 5.5	0.6 – V _{IN} ⁽²⁾	9.0	uQFN14	2.0	1.75	0.9	21									
	EP5357/8HUJ ⁽³⁾	0.6	2.4 – 5.5	1.8 – 3.3	5.0	QFN16	2.5	2.25	1.1	14	•							•	•
	EP5357/8LUJ ⁽³⁾	0.6	2.4 – 5.5	0.6 – V _{IN} ⁽²⁾	5.0	QFN16	2.5	2.25	1.1	14	•							•	•
	EP5368QI	0.6	2.4 – 5.5	0.6 – V _{IN} ⁽²⁾	4.0	QFN16	3.0	3.0	1.1	21	•								
	EP5388QI	0.8	2.4 – 5.5	0.6 – V _{IN} ⁽²⁾	4.0	QFN16	3.0	3.0	1.1	28	•								
	EP53A7/8HQI ⁽³⁾	1.0	2.4 – 5.5	1.8 – 3.3	5.0	QFN16	3.0	3.0	1.1	21	•							•	•
	EP53A7/8LQI ⁽³⁾	1.0	2.4 – 5.5	0.6 – V _{IN} ⁽²⁾	5.0	QFN16	3.0	3.0	1.1	21	•							•	•
	EN5311QI	1.0	2.4 – 6.6	0.6 – V _{IN} ⁽²⁾	4.0	QFN20	4.0	5.0	1.1	36	•								
	EN6310QI	1.0	2.7 – 5.5	0.6 – 3.3	2.2	QFN30	4.0	5.0	1.85	65		•	•						•
	EP53F8QI	1.5	2.4 – 5.5	0.6 – V _{IN} ⁽²⁾	4.0	QFN16	3.0	3.0	1.1	40		•							
Footprint Compatible	EN5319QI	1.5	2.4 – 5.5	0.6 – V _{IN} ⁽²⁾	3.2	QFN24	4.0	6.0	1.1	50		•							
	EN5329QI	2.0																	
	EN5339QI	3.0																	
	EN5322QI	2.0	2.4 – 5.5	0.6 – V _{IN} ⁽²⁾	4.0	QFN24	4.0	6.0	1.1	58	•	•							
	EN5335/6QI ⁽⁴⁾	3.0	2.4 – 6.6	0.75 – 3.3/V _{IN} ⁽²⁾	5.0	QFN44	7.5	10.0	1.85	157	•	•	•						
	EN5337QI	3.0	2.4 – 5.5	0.75 – V _{IN} ⁽²⁾	5.0	QFN38	4.0	7.0	1.85	75		•	•		•				
	EN6338QI	3.0	2.7 – 6.6	0.75 – V _{IN} ⁽²⁾	1.9	LGA19	3.75	3.75	1.9	45		•	•		•			•	
Footprint Compatible	EN6337QI	3.0	2.5 – 6.6	0.75 – V _{IN} ⁽²⁾	1.9	QFN38	4.0	7.0	1.85	75		•	•		•			•	•
	EN6347QI	4.0																	
	EN6340QI	4.0																	
Footprint Compatible	EN6363QI	6.0	2.7 – 6.6	0.6 – V _{IN} ⁽²⁾	2.0	QFN34	4.0	6.0	2.5	60		•	•	•					
	EN5365/6QI ⁽⁴⁾	6.0	2.4 – 5.5	0.75 – 3.3/V _{IN} ⁽²⁾	5.0	QFN58	10.0	12.0	1.85	229	•	•	•				•		
	EN5367QI	6.0	2.5 – 5.5	0.75 – V _{IN} ⁽²⁾	4.0	QFN54	5.5	10.0	3.0	160		•	•		•		•		
Footprint Compatible	EN6362QI	6.0	3.0 – 6.5	0.6 – V _{IN} ⁽²⁾	0.9 – 1.5	QFN56	8.0	8.0	3.0	160		•	•	•				•	
	EN6382QI	8.0																	
	Footprint Compatible	EN5364QI	6.0	2.4 – 6.6	0.6 – V _{IN} ⁽²⁾	4.0	QFN68	8.0	11.0	1.85	160		•	•	•	•	•		
EN5394QI		9.0	190																
	EN6360QI	8.0	2.5 – 6.6	0.6 – V _{IN} ⁽²⁾	0.9 – 1.5	QFN68	8.0	11.0	3.0	190		•	•	•	•	•	•		•
	EN5395/6QI ⁽⁴⁾	9.0	2.4 – 5.5	0.75 – 3.3/V _{IN} ⁽²⁾	5.0	QFN58	10.0	12.0	1.85	277	•	•	•				•		
	EN63A0QI	12.0	2.5 – 6.6	0.6 – V _{IN} ⁽²⁾	0.9 – 1.5	QFN76	10.0	11.0	3.0	225		•	•	•	•	•	•		•

PART NUMBER	MAX I _{OUT} (A)	V _{IN} RANGE (V)	V _{OUT} RANGE (V)	SWITCHING FREQUENCY (MHZ)	PKG (PINS)	PKG SIZE (MM)			SOLUTION SIZE (MM ²) ⁽¹⁾	V _{OUT} SET: VOLTAGE ID (VID)	POWER GOOD / POK FLAG	PROGRAMMABLE SOFT-START	PRECISION ENABLE	INPUT SYNCHRONIZATION	OUTPUT SYNCHRONIZATION	PARALLEL CAPABILITY	PROGRAMMABLE FREQUENCY	LIGHT LOAD MODE	PMBUS
POWERSOCS UP TO 12V INPUT																			
EN2342QI	4.0	4.5 – 14.0	0.75 – 5.0	0.9 – 1.8	QFN68	8.0	11.0	3.0	200		•	•		•	•		•		
EN29A0QI	10.0	9.0 – 16.0	0.75 – 3.3	0.45 – 2.0	QFN84	12.0	14.0	4.0	450		•	•	•	•	•		•		
Footprint Compatible	EM2030xQI	30.0	4.5 – 16.0	0.5 – 1.3	QFN100	11.0	17.0	6.8	360		•	•							
	EM2040xQI	40.0							360		•	•							
Footprint Compatible	EM2120xQI	20.0	4.5 – 16.0	0.7 – 5.0	QFN100	11.0	17.0	6.8	360	PMBus or RV Set	•	VTRACK or PMBus							•
	EM2130xQI	30.0		0.7 – 3.6					360		•								
	EM2140xQI	40.0		0.5 – 1.325					360		•								
Footprint Compatible	EM2260xQI	60.0	4.5 – 16.0	0.5 – 1.3	QFN152	18.0	23.0	5.0	650	PMBus or RV Set	•	VTRACK or PMBus	•	•					•
	EM2280xQI	80.0						6.8											
MULTI-OUTPUT POWERSOCS																			
Footprint Compatible	EZ6301QI	1.5	2.7 – 6.6	0.6 – V _{IN} ⁽²⁾	2.5	QFN40	4.0	7.0	1.85	120		•	•	•					
		0.3	1.6 – 5.5	0.9 – V _{IN} ⁽²⁾						120		•		•					
		0.3	1.6 – 5.5	0.9 – V _{IN} ⁽²⁾						120		•		•					
	EZ6303QI	2.2	2.7 – 3.6	0.6 – V _{IN} ⁽²⁾	2.5	QFN40	4.0	7.0	1.85	120		•	•	•					
		0.3	1.6 – 5.5	0.9 – V _{IN} ⁽²⁾						120		•		•					
		0.3	1.6 – 5.5	0.9 – V _{IN} ⁽²⁾						120		•		•					
BUS CONVERTERS																			
EC2650QI	6.0	8.0-13.2	4-V _{IN} ⁽²⁾	0.1	QFN36	5.5	5.5	0.9	150		•			•	•	•	•		
MULTI-PHASE CONTROLLERS + POWER STAGE																			
ED8401 + 2xET6160	100 ⁽⁵⁾	4.5 – 16.0	0.5 – 1.3	0.5	QFN40	5.0	6.0	0.9	1800	PMBus or RV Set	•	VTRACK or PMBus	•	•					•
					LGA	5.0	5.0	0.7											
ED8401 + 3xET6160	150 ⁽⁵⁾	4.5 – 16.0	0.5 – 1.3	0.5	QFN40	5.0	6.0	0.9	2300	PMBus or RV Set	•	VTRACK or PMBus	•	•					•
					LGA	5.0	5.0	0.7											
ED8401 + 4xET6160	200 ⁽⁵⁾	4.5 – 16.0	0.5 – 1.3	0.5	QFN40	5.0	6.0	0.9	2900	PMBus or RV Set	•	VTRACK or PMBus	•	•					•
					LGA	5.0	5.0	0.7											
LOW DROPOUT REGULATORS (LDOS)																			
EY1602SI-ADJ	0.05	6.0 – 40.0	2.5 – 12.0		SOIC8	6.2	5.0	1.68	~45										
DC-DC REGULATORS																			
ER3105DI	0.5	3.0 – 36.0	0.6 – 34.0	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		•	•		•			•		
ER6230QI	3.0	2.7 – 6.6	0.75 – V _{IN} ⁽²⁾	1.9	QFN24	4.0	4.0	0.85	85		•	•		•			•	•	
HIGH EFFICIENCY DDR MEMORY TERMINATION (VTT)																			
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		•	•	•	•	•	•	•		

FEATURED PRODUCTS

ED8401 + ET6160



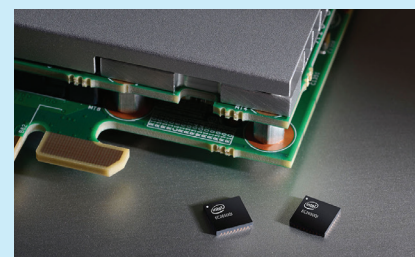
Multi-Phase Digital Controller with Power Stage

EM2260 / EM2280



Footprint and Scalable Fully Digital PowerSoCs

EC2650



12V DC-DC Step Down Voltage Bus Converter

Notes:

- Size estimate for example single-sided PCB including all suggested external components. Smaller size may be possible with double-sided PCB design.
- Maximum V_{OUT} = V_{IN} – V_{DROPOUT}, where V_{DROPOUT} = R_{DROPOUT} x Load Current. Reference device datasheet to calculate V_{DROPOUT}.
- Only “7” version features Light Load Mode. Only “8” version available in automotive grade.
- Only “5” version features V_{OUT} set by VID.
- Based on good thermal design practices. May require airflow.

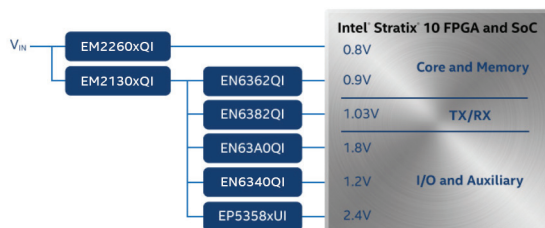
Also available:

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

For a complete list of Intel® Enpirion® power products, please visit www.intel.com/enpirion

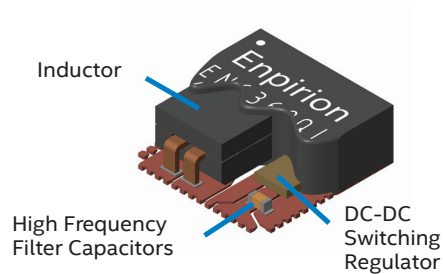
Optimized for FPGA

With programmable logic and power expertise, Intel knows how to power FPGAs



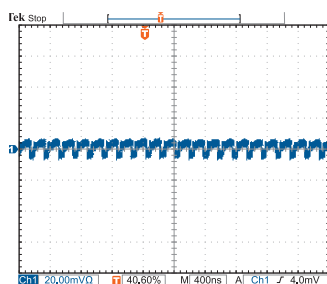
Designed and Validated as a Complete Power Solution

Highly integrated and achieves >80,000 year mean time between failures (MTBF) reliability†



Excellent AC+DC Noise Performance

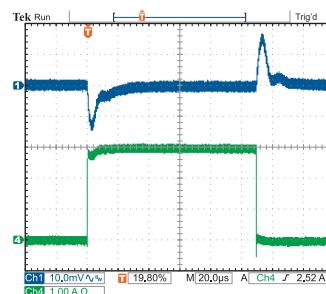
Achieve <10 mV_{pp} ripple and ≤2% accuracy for most devices†



5 V input, 3.3 V output, 500 MHz bandwidth

Fast Transient Response

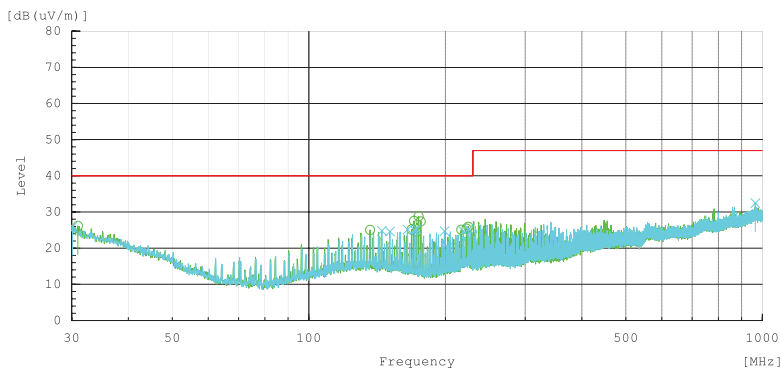
Reduce large, expensive bulk capacitance



5 V input, 3.3 V output, <16 mV deviation

Low EMI Performance

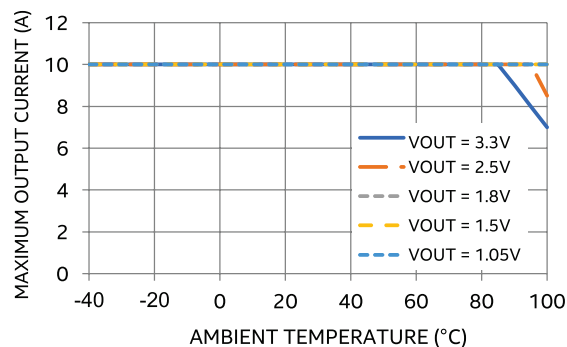
Exceeds CISPR 32 Class B Emissions



Conditions: $V_{IN} = 12\text{ V}$, $V_{OUT} = 1.2\text{ V}$

No Thermal Derating

Minimal thermal derating up to 85°C



Conditions: $V_{IN} = 12\text{ V}$, $T_{JMAX} = 125^{\circ}\text{C}$, $\Theta_{JA} = 10^{\circ}\text{C/W}$, No Air Flow



www.intel.com/enpirion

†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.

© Intel Corporation. Intel, the Intel logo, the Intel Inside mark and logo, the Intel. Experience What's Inside mark and logo, Altera, Arria, Cyclone, Enpirion, Intel Atom, Intel Core, Intel Xeon, MAX, Nios, Quartus, Stratix, and Agilex are trademarks of Intel Corporation or its subsidiaries in the U.S. and/or other countries. See Trademarks on intel.com for full list of Intel trademarks.

*Other marks and brands may be claimed as the property of others.