



Power Management Solutions for Altera's FPGAs and CPLDs

Altera's PowerPlay Power Estimation Tools are available to help determine power consumption before and during the design process.

Stratix® II, Stratix® II GX, Cyclone® II							Core Voltage: 1.2V
<i>Input Supply</i>	<i>≤200mA</i>	<i>≤500mA</i>	<i>≤1A – 1.5A</i>	<i>≤2A – 5A</i>	<i>5A – 10A</i>	<i>Up to 25A</i>	
1.8V	LT3020 Linear LTC3035 Linear LTC3549 Buck	LT3021 Linear LT1763 Linear LTC3409 Buck	LTC3026 Linear	LTC3713 Controller	LTC3713 Controller	LTC3713 Controller	
2.5V to 5V	LT3020 Linear LTC3035 Linear LTC3410 Buck LTC3549 Buck	LT3021 Linear LT1763 Linear LTC3406 Buck LTC3409 Buck	LTC3026 Linear LTC3411 Buck LTC3412A Buck	LTC3414 Buck LTC3808/9 Controller LTC3801 Controller LTC1773 Controller	LTC3418 Buck LTM4600 μModule™* LTC1778 Controller LTC3822 Controller	LTC3713 Controller LTC3832 Controller LTC1778 Controller LTC3778 Controller	
≤12V to 24V	-	LT1933 Buck LT1767 Buck LT3493 Buck	LT3493 Buck LT1936 Buck	LT1765 Buck LTC1771 Controller LTC1778 Controller LTC3770 Controller	LTM4600 μModule LTC3772 Controller LTC1778 Controller LTC3770 Controller	LTC1778 Controller LTC3770 Controller 2 x LTM4600 μModule	

Stratix®, Stratix® GX, Cyclone®							Core Voltage: 1.5V
<i>Input Supply</i>	<i>≤200mA</i>	<i>≤500mA</i>	<i>≤1A – 1.5A</i>	<i>≤2A – 5A</i>	<i>5A – 10A</i>	<i>Up to 25A</i>	
1.8V	LT3020 Linear LTC3035 Linear LT1962 Linear LTC3549 Buck	LT3021 Linear LT1763 Linear LTC3409 Buck	LTC3026 Linear	LT3150 Linear Controller LTC3713 Controller	LTC3713 Controller	LTC3713 Controller	
2.5V to 5V	LT3020 Linear LTC3035 Linear LTC3405A Buck LTC3549 Buck	LT3021 Linear LT1763 Linear LTC3406 Buck	LTC3026 Linear LT1963A Linear LTC3411 Buck LTC3412A Buck	LTC3412A Buck LTC3414 Buck LTC3801 Controller LTC3808/9 Controller	LTC3418 Buck LTM4600 μModule* LTC1778 Controller LTC3822 Controller	LTC3713 Controller LTC3832 Controller LTC1778 Controller LTC3778 Controller	
≤12V to 24V	LT3470 Buck LT1616 Buck	LT1616 Buck LT1933 Buck LT1767 Buck LT3493 Buck	LT3493 Buck LT1936 Buck LT3481 Buck	LT1765 Buck LTC1771 Controller LTC1778 Controller LTC3770 Controller	LTM4600 μModule LTC3772 Controller LTC1778 Controller LTC3770 Controller	LTC1778 Controller LTC3770 Controller 2 x LTM4600 μModule	

MAX® II							Core Voltage: 1.8V
<i>Input Supply</i>	<i>≤200mA</i>	<i>≤500mA</i>	<i>≤1A – 1.5A</i>	<i>≤2A – 5A</i>	<i>5A – 10A</i>	<i>Up to 25A</i>	
0.9V to 1.8V	LT3020 Linear LTC3025 Linear LT1962 Linear LTC3549 Buck	LT3021 Linear LT1763 Linear LTC3409 Buck	LTC3026 Linear	LTC3713 Controller	LTC3713 Controller	-	
2.5V to 5V	LT3020 Linear LTC3035 Linear LT1962 Linear LTC3410 Buck	LT3021 Linear LT1763 Linear LTC3406-1.8 Buck	LTC3026 Linear LT1963A Linear LTC3412A Buck	LTC3414 Buck LTC3808/9 Controller LTC3801 Controller LTC1773 Controller	LTC3418 Buck LTM4600 μModule* LTC3822 Controller	LTC3713 Controller LTC3832 Controller LTC1778 Controller LTC3778 Controller	
≤12V to 24V	LT3470 Buck LT1934 Buck LT1616 Buck LT1933 Buck	LT1616 Buck LT1933 Buck LT1767 Buck LT3493 Buck	LT3493 Buck LT1936 Buck LT3481 Buck	LT1765 Buck LTC1771 Controller LTC1778 Controller LTC3770 Controller	LTM4600 μModule LTC1778 Controller	LTC1778 Controller LTC3770 Controller 2 x LTM4600 μModule	

MAX II, MAX® 7000B							Core Voltage: 2.5V
<i>Input Supply</i>	<i>≤200mA</i>	<i>≤500mA</i>	<i>≤1A – 1.5A</i>	<i>≤2A – 5A</i>	<i>5A – 10A</i>	<i>Up to 25A</i>	
1.8V	LTC3429 Boost LTC3499 Boost LTC3525 Boost LTC3427 Boost	LTC3426 Boost LTC3402 Boost LTC3422 Boost LTC3499 Boost	LTC3421 Boost LTC3428 Boost LTC3426 Boost LTC3402 Boost	LTC3421 Boost LTC3425 Boost LTC1872 Boost Controller LTC1700 Boost Controller	LTC3713 Controller	LTC3713 Controller	
2.5V to 5V	LT3020 Linear LTC3035 Linear LT1962 Linear LTC3410 Buck	LT3021 Linear LT1763 Linear LTC3406-1.8 Buck	LTC3411 Buck LTC3412A Buck LT1619 SEPIC Controller	LTC3414 Buck LTC3808/9 Controller LTC3801 Controller LT1619 SEPIC Controller	LTC3418 Buck LTM4600 μModule* LTC3822 Controller	LTC3713 Controller LTC3832 Controller LTC1778 Controller LTC1682 + LTC1778	
≤12V to 24V	LT3470 Buck LT1934 Buck LT1616 Buck LT1933 Buck	LT1616 Buck LT1933 Buck LT1767 Buck LT3493 Buck	LT3493 Buck LT1936 Buck LT3481 Buck	LT1765 Buck LTC1771 Controller LTC1778 Controller LTC3770 Controller	LTM4600 μModule LTC1778 Controller	LTC1778 Controller LTC3770 Controller 2 x LTM4600 μModule	

MAX II, MAX 7000AE, MAX 3000A

Core Voltage: 3.3V

Input Supply	≤200mA	≤500mA	≤1A – 1.5A	≤2A – 5A	5A – 10A	Up to 25A
1.8V to 2.5V	LTC3525 Boost LTC3429 Boost LTC3499 Boost LTC3400 Boost	LTC3426 Boost LTC3421 Boost LTC3422 Boost LTC3499 Boost	LTC3426 Boost LTC3421 Boost LTC3428 Boost	LTC3428 Boost LTC3425 Boost LT1619 Boost Controller LTC1871 Boost Controller	LT1619 Boost Controller LTC1871 Boost Controller	LTC3713 Boost Controller LT1619 Boost Controller
Li-Ion 2.7V to 4.2V	LTC3531 Buck-Boost LTC3440 Buck-Boost LTC3530 Buck-Boost	LTC3440 Buck-Boost LTC3443 Buck-Boost LTC3530 Buck-Boost	LTC3442 Buck-Boost LTC3443 Buck-Boost LTC1871 SEPIC Controller LT1372 SEPIC	LTC1871 SEPIC Controller LTC1872 SEPIC Controller LT1619 SEPIC Controller	LT1619 SEPIC Controller	LTC1682 + LTC1778
≤5V	LT3020 Linear LTC3035 Linear LT1962 Linear LTC3405A Buck	LT3021 Linear LT1763 Linear LTC3406 Buck	LTC3026 Linear LT1963A Linear LTC3412A Buck	LTC3414 Buck LTC3808/9 Controller	LTC3418 Buck LTC1778 Controller	LTC3832 Controller LTC1778 Controller LTC3770 Controller
≤12V to 24V	LT3470 Buck LT1934 Buck LT1616 Buck LT1933 Buck	LT1616 Buck LT1933 Buck LT1767 Buck LTC3493 Buck	LTC3493 Buck LT1936 Buck LTC3481 Buck	LT1765 Buck LTC1771 Controller LT1778 Controller LTC3770 Controller	LTM4600 μModule LTC1771 Controller LTC1778 Controller	LTC1778 Controller LTC3770 Controller 2 x LTM4600 μModule

Power Supplies for I/O

I/O Voltage	Input Voltage	500mA	1A	2A – 5A	6A – 10A	20A
3.3V	12V	LT1616, LT1933	LT1936, LT1767	LT1765, LTC1778, LTC3770	LTM4600, LTC1778	2 x LTM4600, LTC1778
	5V	LTC3406, LT3021, LT1962	LT1963A, LTC3026, LTC3411	LTC3412/A, LTC3414, LTC3809	LTC3415, LTC3418, LTC1778	LTC1778
2.5V	12V	LT1616, LT1933	LT1936, LT1767	LT1765, LTC1778, LTC3770	LTM4600, LTC1778	LTC1778
	5V	LTC3406, LT3021, LT1962	LT1963A, LTC3026, LTC3411	LTC3412/A, LTC3414, LTC3809	LTM4600, LTC3415, LTC3418	2 x LTM4600, LTC1778
	3.3V	LTC3406, LT3021, LT1962	LT1963A, LTC3026, LTC3411	LTC3412/A, LTC3414, LTC3809	LTC3832, LTC3822, LTC3418	LTC3832
1.8V	5V	LTC3406	LTC3411, LT1767	LTC3412/A, LTC3414, LTC3809	LTM4600, LTC3418	2 x LTM4600, LTC1778
	3.3V	LTC3406	LT1963A, LTC3026, LTC3411	LTC3412/A, LTC3414, LTC3809	LTC3832, LTC3822, LTC3418	LTC3832
	2.5V	LTC3406, LTC3409, LT3021	LT1963A, LTC3026, LTC3411	LTC3412/A, LTC3414, LTC3801	LTC3713, LTC3418	LTC3713
1.5V	5V	LTC3406	LTC3411, LT1767	LTC3412/A, LTC3414, LTC3809	LTM4600, LTC3418	2 x LTM4600, LTC1778
	3.3V	LTC3406	LT1963A, LTC3026, LTC3411	LTC3412/A, LTC3414, LTC3809	LTC3832, LTC3822, LTC3418	LTC3713
	2.5V	LTC3406, LTC3409, LT3021	LT1963A, LTC3026, LTC3411	LTC3412/A, LTC3414, LTC3801	LTC3713, LTC3415, LTC3418	LTC3713
	1.8V	LTC3409, LT3021	LTC3026, LTC3713	LT1764A, LT3150, LTC3713	LT3150, LTC3713	LTC3713

Resistor Programmable Silicon Oscillators for Power Supply Synchronization

Part Number	Oscillator Frequency Range	Frequency Accuracy Max at 25°C (%)	Package	Number of Phase Outputs	Phases	Spread Spectrum for Reduced EMI	Jitter Timing (%)
LTC6902	5kHz to 20MHz	1.5	MSOP-10	4	0°/90°/180°/270°	Yes	0.1
LTC6908-1	50kHz to 10MHz	1.5	SOT-23, DFN-6	2	0°/90°	Yes	0.1
LTC6908-2	50kHz to 10MHz	1.5	SOT-23, DFN-6	2	0°/180°	Yes	0.1

Dual Output Switching Regulators

Part Number	Architecture	V _{IN} Range (V)	Max I _{OUT(1)} /I _{OUT(2)} (A)	Part Number	Architecture	V _{IN} Range (V)	Max I _{OUT(1)} /I _{OUT(2)} (A)
LTC3547	Monolithic	2.5 – 5.5	0.3/0.3	LTC3501	Monolithic	3 – 30	3/3
LTC3548	Monolithic	2.5 – 5.5	0.4/0.8	LTC3736/-1	Controller	2.7 – 9.8	5/5
LTC3407-2	Monolithic	2.5 – 5.5	0.8/0.8	LTC3737	Controller	2.7 – 9.8	5/5
LTC3417	Monolithic	2.25 – 5.5	0.8/1.4	LTC3708	Controller	4 – 36	20/20
LTC3417A	Monolithic	2.25 – 5.6	1.0/1.5	LTC3828	Controller	4.5 – 28	20/20
LT1940	Monolithic	3.6 – 25	1.4/1.4	LTC3728	Controller	4 – 36	20/20
LTC3506/A	Monolithic	3.6 – 25	1.6/1.6	LTC3770	Controller	4 – 32	20/20
LTC3510	Monolithic	3.3 – 25	2/2	LTC3827/-1	Controller	4 – 36	25/25

Triple Output Switching Regulators

Part Number	Architecture	V _{IN} Range (V)	Max I _{OUT(1)} /I _{OUT(2)} /I _{OUT(3)} (A)
LTC3446	Monolithic Plus Two LDOs	2.7 – 5.5	1/0.3/0.3
LTC3445	Monolithic Plus Two LDOs	2.5 – 5.5	0.6/0.05/0.05
LTC3773	Controller	3.3 – 30	20/20/20

Additional Power Support Products

- Trackers/Sequencers
- Margining Controllers
- Silicon Oscillators
- μP/DSP/FPGA Supervisor Circuits
- PMBus Interface Products

SwitcherCAD/LTspice is a SPICE simulator for power supply, amplifier and filter designs



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