



## Power Management Solutions for Altera's FPGAs, CPLDs and Structured ASICs

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

### Stratix® III Selectable Core Voltage: 0.9V to 1.1V

Input Supply	≤200mA	≤500mA	≤1A – 1.5A	≤2A – 5A	5A – 10A	Up to 25A
1.8V	LT <sup>®</sup> 3020 Linear LTC <sup>®</sup> 3549 Buck	<b>LT3080 Linear</b> LTC3409 Buck	<b>LT3080 Linear</b> LTC3026 Linear	LTC3713 Controller	LTC3713 Controller	N/A
2.5V to 5V	LT3020 Linear LTC3549 Buck LTC3410 Buck	<b>LT3080 Linear</b> <b>LTC3406A Buck</b> LTC3542 Buck	<b>LTC3561 Buck</b> <b>LTC3411A Buck</b> <b>LTC3564 Buck</b> <b>LTC3568 Buck</b>	LTC3412A Buck LTC3414 Buck LTC3801 Controller LTC3809 Controller	LTC3418 Buck LTC3822 Controller <b>LTM<sup>®</sup>4601 μModule™*</b> LTC1778 Controller	LTC3822 Controller LTC3713 Controller LTC3832 Controller LTC1778 Controller
≤12V to 24V	<b>LT3502 Buck</b>	<b>LT3502 Buck</b>	LT3493 Buck <b>LT3685 Buck</b> LT3481 Buck <b>LT3505 Buck</b>	<b>LT3680 Buck</b> LTC1771 Controller LTC1778 Controller LTC3770 Controller	<b>LTM4601 μModule*</b> LTC3832 Controller LTC1778 Controller <b>LTC3823 Controller</b>	<b>2 x LTM4601 μModule*</b> LTC1778 Controller <b>LTC3823 Controller</b>

### HardCopy® II, Stratix II, Stratix II GX, Cyclone® III, Cyclone II, Arria™ GX Core Voltage: 1.2V

Input Supply	≤200mA	≤500mA	≤1A – 1.5A	≤2A – 5A	5A – 10A	Up to 25A
1.8V	LT1761 Linear LTC3035 Linear LTC3549 Buck	<b>LT1965 Linear</b> <b>LT3080 Linear</b> LT1763 Linear LTC3409 Buck	<b>LT1965 Linear</b> <b>LT3080 Linear</b> LTC3026 Linear	LTC3713 Controller	LTC3713 Controller	LTC3713 Controller
2.5V to 5V	LT3020 Linear LTC3035 Linear LTC3410 Buck LTC3549 Buck	<b>LT1965 Linear</b> LT1763 Linear <b>LTC3542 Buck</b> <b>LTC3560 Buck</b>	<b>LT1965 Linear</b> <b>LT3080 Linear</b> <b>LTC3411A Buck</b> <b>LTC3564/8 Bucks</b>	LTC3412A Buck LTC3414 Buck LTC3801/9 Controllers LTC1773 Controller	LTC3418 Buck LTC3822 Controller <b>LTM4601 μModule*</b> LTC1778 Controller	LTC3713 Controller LTC3832 Controller LTC1778 Controller LTC3778 Controller
≤12V to 24V	<b>LT3502 Buck</b>	LT1933 Buck LT3493 Buck <b>LT3502 Buck</b>	<b>LT3503 Buck</b> <b>LT3505 Buck</b> LT1936 Buck LT3481 Buck	<b>LT3680 Buck</b> LTC1771 Controller <b>LTM4603 μModule*</b> LTC1778 Controller	<b>LTM4601 μModule*</b> LTC3772 Controller LTC1778 Controller <b>LTC3823 Controller</b>	<b>2 x LTM4601 μModule*</b> LTC1778 Controller <b>LTC3823 Controller</b>

### HardCopy, Stratix, Stratix GX, Cyclone Core Voltage: 1.5V

Input Supply	≤200mA	≤500mA	≤1A – 1.5A	≤2A – 5A	5A – 10A	Up to 25A
1.8V	LTC1844 Linear LTC3035 Linear LT1962 Linear LTC3549 Buck	LT1763 Linear <b>LT1965 Linear</b> <b>LT3080 Linear</b> LTC3409 Buck	<b>LT1965 Linear</b> <b>LT3080 Linear</b> LTC3026 Linear	LTC3713 Controller	LTC3713 Controller	LTC3713 Controller
2.5V to 5V	LT1762 Linear LTC3035 Linear LTC3410 Buck LTC3549 Buck	<b>LT1965 Linear</b> <b>LT3080 Linear</b> LT1763 Linear <b>LTC3542 Buck</b> <b>LTC3406A Buck</b>	<b>LT1965 Linear</b> <b>LT3080 Linear</b> LT1963A Linear <b>LTC3561 Buck</b> <b>LTC3411A Buck</b>	LTC3412A Buck LTC3414 Buck LTC3801 Controller LTC3809 Controller	LTC3418 Buck LTC3822 Controller <b>LTM4601 μModule*</b> LTC1778 Controller	LTC3713 Controller LTC3832 Controller LTC1778 Controller LTC3778 Controller
≤12V to 24V	LT3470 Buck <b>LT3502 Buck</b> LT1616 Buck	LT1616 Buck LT1933 Buck LT3493 Buck	<b>LT3503 Buck</b> <b>LT3505 Buck</b> <b>LT3481 Buck</b> <b>LT3684 Buck</b>	<b>LT3680 Buck</b> LTC1771 Controller <b>LTM4603 μModule*</b> LTC1778 Controller	<b>LTM4601 μModule*</b> <b>LTC3610 Buck</b> LTC3772 Controller LTC1778 Controller LTC3823 Controller	<b>2 x LTM4601 μModule*</b> LTC1778 Controller LTC3823 Controller LT1952 Controller

### MAX® IIG Core Voltage: 1.8V

Input Supply	≤200mA	≤500mA	≤1A – 1.5A	≤2A – 5A	5A – 10A	Up to 25A
0.9V to 1.8V	LTC3525 Boost LTC3429 Boost LTC3526 Boost	LT1613 Boost	N/A	N/A	N/A	N/A
2.5V to 5V	LTC1844 Linear LTC3035 Linear LT1762 Linear LTC3405A Buck LTC3410 Buck	<b>LT1965 Linear</b> <b>LT3080 Linear</b> <b>LTC3542 Buck</b> <b>LTC3406A Buck</b>	<b>LT1965 Linear</b> <b>LT3080 Linear</b> LT1963A Linear <b>LTC3561 Buck</b> <b>LTC3411A Buck</b>	LTC3414 Buck LTC3801/9 Controllers <b>LTM4603 μModule*</b> LTC1773 Controller	LTC3418 Buck LTC3822 Controller <b>LTM4601 μModule*</b> <b>LTC3610 Buck</b>	LTC3822 Controller LTC3713 Controller LTC3832 Controller LTC3778 Controller
≤12V to 24V	LT3470 Buck LT1934 Buck LT1616 Buck <b>LT3502 Buck</b>	LT1616 Buck <b>LT3502 Buck</b> LT1933 Buck LT3493 Buck	<b>LT3503 Buck</b> <b>LT3505 Buck</b> LT3481 Buck <b>LT3684 Buck</b>	<b>LT3680 Buck</b> LTC1771 Controller <b>LTM4603 μModule*</b> LTC1778 Controller	<b>LTM4601 μModule*</b> <b>LTC3610 Buck</b> LTC1778 Controller LTC3823 Controller	<b>2 x LTM4601 μModule*</b> LTC1778 Controller LTC3823 Controller LT1952 Controller

\*Additional products in μModule Family now available. New products highlighted in bold.

## MAX II

Core Voltage: 2.5V

Input Supply	≤200mA	≤500mA	≤1A – 1.5A	≤2A – 5A	5A – 10A	Up to 25A
1.8V	LTC3525 Boost LTC3427 Boost LTC3429 Boost LTC3499 Boost	LTC3499 Boost LTC3426 Boost LTC3422 Boost	LTC3421 Boost LTC3428 Boost LTC3426 Boost	LTC3425 Boost LTC1872 Boost Controller LTC1700 Boost Controller	N/A	N/A
2.5V to 5V	LTC1844 Linear LTC3035 Linear LT1962 Linear LTC3410 Buck	<b>LT3080 Linear</b> LT1763 Linear <b>LT1965 Linear</b> <b>LTC3542 Buck</b> <b>LTC3560 Buck</b>	<b>LTC3561 Buck</b> <b>LTC3411A Buck</b> LT1619 SEPIC Controller	LTC3414 Buck LTC3801 Controller LTC3809 Controller LT1619 SEPIC Controller	LTC3418 Buck <b>LTM4601 μModule*</b> <b>LTC3610 Buck</b> LTC3822 Controller	LTC3822 Controller LTC3713 Controller LTC3832 Controller LTC1778 Controller
≤12V to 24V	LT3470 Buck LT1934 Buck LT1616 Buck <b>LT3502 Buck</b>	LT1616 Buck <b>LT3502 Buck</b> LT1933 Buck LTC3493 Buck	<b>LT3503 Buck</b> <b>LT3505 Buck</b> <b>LT3684 Buck</b> LT1936 Buck	<b>LT3680 Buck</b> LTC1771 Controller <b>LTM4603 μModule*</b> LTC1778 Controller	<b>LTM4601 μModule*</b> <b>LTC3610 Buck</b> LTC1778 Controller LTC3823 Controller	<b>2 x LTM4601 μModule*</b> LTC1778 Controller <b>LTC3823 Controller</b> <b>LT1952 Controller</b>

## 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 LTC3526 Boost LTC3429 Boost	LTC3426 Boost LTC3421 Boost LTC3422 Boost LTC3499 Boost	LTC3426 Boost LTC3421 Boost LTC3428 Boost	LTC3428 Boost LTC3425 Boost LTC1871 Boost Controller	N/A	N/A
Li-Ion 2.7V to 4.2V	LTC3531 Buck-Boost LTC3530 Buck-Boost LTC3440 Buck-Boost	LTC3530 Buck-Boost LTC3440 Buck-Boost <b>LTC3538 Buck-Boost</b>	LTC3442 Buck-Boost LTC3443 Buck-Boost LTC1871 SEPIC Controller	<b>LTC3785 Buck-Boost Controller</b> LTC1872 SEPIC Controller LTC1871 SEPIC Controller LT1619 SEPIC Controller	<b>LTC3785 Buck-Boost Controller</b> LT1619 SEPIC Controller	LTC1682 + LTC1778
≤5V	LTC1844 Linear LTC3035 Linear LT1962 Linear LTC3410 Buck	<b>LT1965 Linear</b> <b>LT3080 Linear</b> LT1763 Linear <b>LTC3560 Buck</b>	LT1963A Linear <b>LTC3561 Buck</b> <b>LTC3411A Buck</b>	LTC3414 Buck LTC3415 Buck LTC3809 Controller <b>LTM4603 μModule*</b>	LTC3418 Buck <b>LTM4601 μModule*</b> <b>LTC3610 Buck</b> LTC3778 Controller	LTC3830 Controller LTC3832 Controller LTC3770 Controller LTC3778 Controller
≤12V to 24V	LT3470 Buck LT1934 Buck LT1616 Buck <b>LT3502 Buck</b>	LT1616 Buck <b>LT3502 Buck</b> LT1933 Buck LTC3493 Buck	<b>LT3503 Buck</b> <b>LT3505 Buck</b> LT1936 Buck <b>LT3684 Buck</b>	<b>LT3680 Buck</b> LTC1771 Controller <b>LTM4603 μModule*</b> LTC1778 Controller	<b>LTM4601 μModule*</b> <b>LTC3610 Buck</b> LTC1778 Controller <b>LTC3823 Controller</b>	<b>2 x LTM4601 μModule*</b> LTC1778 Controller <b>LTC3823 Controller</b> <b>LT1952 Controller</b>

## Power Supplies for I/O

I/O Voltage	Input Voltage	500mA	1A	2A – 5A	6A – 10A	20A
3.3V	12V	LT1616, LT1933	LT1936, LT1767	<b>LT3680</b> , LTC1778, LTC3770	<b>LTM4601</b> , LTC1778	<b>2 x LTM4601</b> , LTC1778
	5V	<b>LTC3406A</b> , LT1962, <b>LT1965</b>	<b>LT1965</b> , <b>LTC3411A</b>	LTC3412/A, LTC3414, LTC3809	LTC3415, LTC3418, LTC1778	LTC1778
2.5V	12V	LT1616, LT1933	LT1936, LT1767	<b>LT3680</b> , LTC1778, LTC3770	<b>LTM4601</b> , LTC1778	LTC1778
	5V	<b>LTC3560</b> , LT1962, <b>LT1965</b>	LT1963A, <b>LT1965</b> , <b>LTC3411A</b>	LTC3412/A, LTC3414, LTC3809	<b>LTM4601</b> , LTC3415, LTC3418	<b>2 x LTM4601</b> , LTC1778
	3.3V	<b>LTC3560</b> , LT1962, <b>LT1965</b>	LT1963A, <b>LT1965</b> , <b>LTC3411A</b>	LTC3412/A, LTC3414, LTC3809	LTC3832, LTC3822, LTC3418	<b>LTC3836</b> , <b>LT3740</b>
1.8V	5V	<b>LTC3560</b>	<b>LTC3411A</b> , LT1767	LTC3412/A, LTC3414, LTC3809	<b>LTM4601</b> , LTC3418	<b>2 x LTM4601</b> , LTC1778
	3.3V	<b>LTC3560</b>	LT1963A, <b>LT1965</b> , <b>LTC3411A</b>	LTC3412/A, LTC3414, LTC3809	LTC3832, LTC3822, LTC3418	<b>LTC3836</b> , <b>LT3740</b>
	2.5V	<b>LTC3560</b> , <b>LTC3406A</b> , <b>LT1965</b>	LT1963A, <b>LT1965</b> , <b>LTC3411A</b>	LTC3412/A, LTC3414, LTC3801	LTC3418, <b>LT3740</b>	<b>LT3740</b>
1.5V	5V	<b>LTC3560</b>	<b>LTC3411A</b> , LT1767	LTC3412/A, LTC3414, LTC3809	<b>LTM4601</b> , LTC3418	<b>2 x LTM4601</b> , LTC1778
	3.3V	<b>LTC3560</b>	LT1963A, <b>LT1965</b> , <b>LTC3411A</b>	LTC3412/A, LTC3414, LTC3809	LTC3832, LTC3822, LTC3418	<b>LTC3836</b> , <b>LT3740</b>
	2.5V	<b>LTC3560</b> , <b>LTC3406A</b> , LT3021	LT1963A, <b>LT1965</b> , <b>LTC3411A</b>	LTC3412/A, LTC3414, LTC3801	LTC3415, LTC3418, <b>LT3740</b>	<b>LT3740</b>
	1.8V	<b>LTC3406A</b> , LT3021, <b>LT1965</b>	<b>LT3080</b> , <b>LT1965</b> , LT1764A	LT1764A, <b>2 x LT3080</b> , LT3150	LT3150, LTC3713	LTC3713

## Dual Output Switching Regulators

Part Number	Architecture	V <sub>IN</sub> Range (V)	Max I <sub>OUT(1)</sub> /I <sub>OUT(2)</sub> (A)	Part Number	Architecture	V <sub>IN</sub> Range (V)	Max I <sub>OUT(1)</sub> /I <sub>OUT(2)</sub> (A)
<b>LTC3547</b>	Monolithic	2.5 – 5.5	0.3/0.3	<b>LTC3546</b>	Monolithic	2.25 – 5.5	2/2 or 3/1
LTC3548	Monolithic	2.5 – 5.5	0.4/0.8	LT3501	Monolithic	3 – 30	3/3
<b>LTC3419</b>	Monolithic	2.5 – 5.5	0.6/0.6	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	<b>LTC3850</b>	Controller	4 – 24	20/20
LTC3417A	Monolithic	2.25 – 5.5	1.0/1.5	LTC3728	Controller	4 – 36	20/20
<b>LT3508</b>	Monolithic	3.7 – 36	1.4/1.4	LTC3708	Controller	4 – 36	20/20
LT1940	Monolithic	3.6 – 25	1.4/1.4	LTC3728	Controller	4 – 36	20/20
LT3506/A	Monolithic	3.6 – 25	1.6/1.6	LTC3827	Controller	4 – 36	25/25
LT3510	Monolithic	3.3 – 25	2/2	LTC3727	Controller	4.5 – 36	25/25

## Additional Power Support Products

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



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

