Xilinx Artix-7 Reference design
• Block Diagram – Artix-7 Power
• Design Specifications
• MPS solution
• Schematics, Layout
• Design Highlights
• MPS Contacts
Artix-7 block diagram
### Design Specifications

#### Artix-7

<table>
<thead>
<tr>
<th>Rail #</th>
<th>Rail</th>
<th>Voltage (V)</th>
<th>Load (A)</th>
<th>Comment</th>
<th>MPS part#</th>
<th>Seq</th>
<th>Max curr (A)</th>
<th>Package</th>
<th>Price (100ku)</th>
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</thead>
<tbody>
<tr>
<td>V5V</td>
<td>5V</td>
<td>5V</td>
<td></td>
<td>intermediate rail (Required only when Vin&gt;5V)</td>
<td>MP8756</td>
<td>N/A</td>
<td>6A</td>
<td>QFN-12 (2mmx3mm)</td>
<td></td>
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<tr>
<td>1a</td>
<td>VCCINT</td>
<td>0.95/1V ±5%</td>
<td>0.3-6A</td>
<td></td>
<td>mini PMIC MP5403</td>
<td>1/3</td>
<td>6A</td>
<td>UTQFN-20 (2.5x3mm)</td>
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<tr>
<td>1b</td>
<td>VCCBRAM</td>
<td>0.95/1V ±5%</td>
<td>0.1A</td>
<td>Normally tied to VCCINT, except for -2LE devices</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2</td>
<td>VCCAUX&amp;VCCADC</td>
<td>1.8V ±5%</td>
<td>0.15-0.35A</td>
<td>Additional current may be needed to support 1.8V IO</td>
<td></td>
<td></td>
<td></td>
<td>QFN-28 (4x4mm)</td>
<td></td>
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<tr>
<td>4</td>
<td>VMGTAVCC</td>
<td>1.2V ±3%</td>
<td>0.15-1A</td>
<td>10mV pk-pk ripple at FPGA pins</td>
<td>PMIC MP5416</td>
<td></td>
<td>2A</td>
<td>QFN-28 (4x4mm)</td>
<td></td>
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<tr>
<td>5</td>
<td>VCC_IO</td>
<td>1.8/2.5/3.3V ±5%</td>
<td>0.2-2.5A</td>
<td>IO current varies widely depending on application</td>
<td></td>
<td></td>
<td>2A</td>
<td></td>
<td></td>
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<tr>
<td>6</td>
<td>VCC_DDR</td>
<td>1.5/1.35V ±5%</td>
<td>2A</td>
<td>DDR3 or DDR3L</td>
<td></td>
<td></td>
<td>4A</td>
<td></td>
<td></td>
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<td>DDR_VTT</td>
<td>DDR_DDR/2</td>
<td>VCC_DDR/2</td>
<td>DDR TERM Source sink</td>
<td>MP20075</td>
<td>3/1</td>
<td>+/-3A</td>
<td>MSOP8E (3x3mm)</td>
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<tr>
<td>3</td>
<td>VMGTAVTT</td>
<td>1V ±2.5%</td>
<td>0.05-0.4A</td>
<td>10mV pk-pk ripple at FPGA pins</td>
<td>MP8904</td>
<td>2/2</td>
<td>0.5A</td>
<td>QFN8 (2 x 3mm)</td>
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</tbody>
</table>
The Future of Analog IC Technology

Block Diagram – Artix-7 reference design
PMIC with 4xBucks and 5xLDOs

**FEATURES:**
- High Efficiency Step-Down Converters
  - 4.5A / 2.5A / 4A / 2A Bucks
  - 2.7V to 5.5V Operating Input Range
  - Adjustable Switching Frequency
  - Programmable Forced PWM/Auto PFM/PWM Mode
  - Hiccup Over Current Protection
- Low Dropout Regulators
  - One RTC Dedicate LDO
  - Four Low Noise LDOs
  - Two Separate Input Power Supplies
  - 100mV Dropout at 300mA Load
- System
  - I2C Bus and OTP
  - Power On/off Button
  - Power On Reset Output
  - Flexible Power On/off Sequence via OTP
  - Flexible DC/DC. LDO On/off via OTP

**Efficiency vs. Load Current**

- $V_{IN}=5V,\text{ Auto PFM/PWM Mode}$

**Package:** QFN28 - 4mmx4mm
MP5403

mini PMIC with 2xBucks and Load switch

FEATURES

- Low Iq: 85μA for Two Switchers Total
- Two Buck Converters
  - 3.5A with 55mΩ/20mΩ R_{DS(ON)}
  - 2.5A with 60mΩ/22mΩ R_{DS(ON)}
  - 1.5MHz Switching Frequency
  - 180° Interleaving Operation
  - 100% Duty Cycle
- One Load Switch
  - 3A with 20mΩ R_{DS(ON)}
  - Soft Start and Output Discharge
  - Over-Current Protection (OCP)
- EN and Power Good for Power Sequencing
- Input Power Failure Indicator (PFL) with Adjustable Threshold and Delay
- Thermal Shutdown

![Efficiency Graph](chart.png)

Package: QFN20-2.5mmx3mm

Application Circuit
Two Bucks and One Load Switch
• For Rails:
• Solution footprint: 156mm²
• External Components: 19

• Efficiency: 95%  (Vin=12V, Vout=5V, Io=6A)
Schematics (Typical)

- For Rails:
- Solution footprint: 19mm$^2$
- External Components: 5
• Regulator footprint: QFN8 (2x3mm)
• External Components: 5
• Estimated PCB Area (sq mm): 10
MPS design highlights

- Cost effective PMIC based solution
- Flexible Power Up/Down Sequencing
- OTP and I2C
- Smallest Solution Size
- Minimum External Components
- Full schematics and BOM can be provided upon request
Thank you

For additional information please contact

MPS Reference Design Team
at referencedesign@monolithicpower.com

For general information

http://www.monolithicpower.com