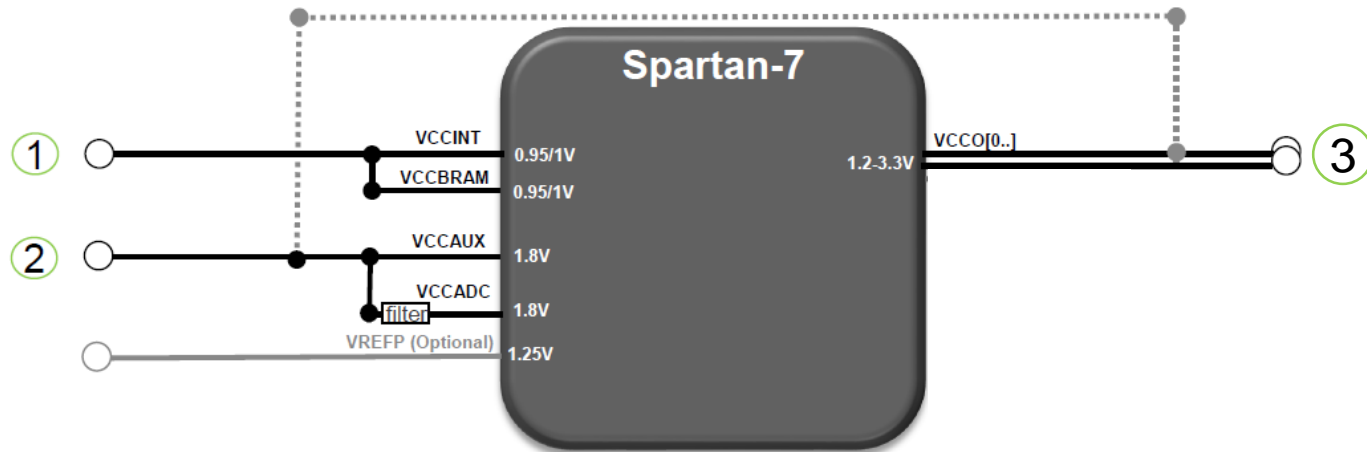


Low Power Reference designs for Spartan-7 (XC7S6 to XC7S50)

Prepared by Thomas Fenn  
June 14, 2018

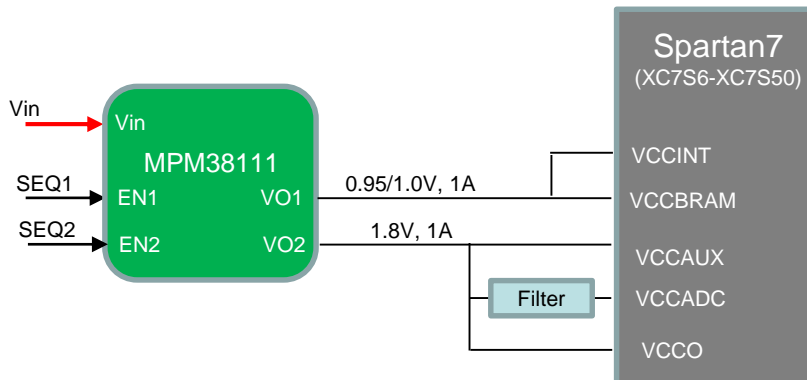


- Spartan-7 Power Consolidation
- Design Specifications and MPS solutions
- Schematics, Layout
- Design Highlights
- MPS Contacts

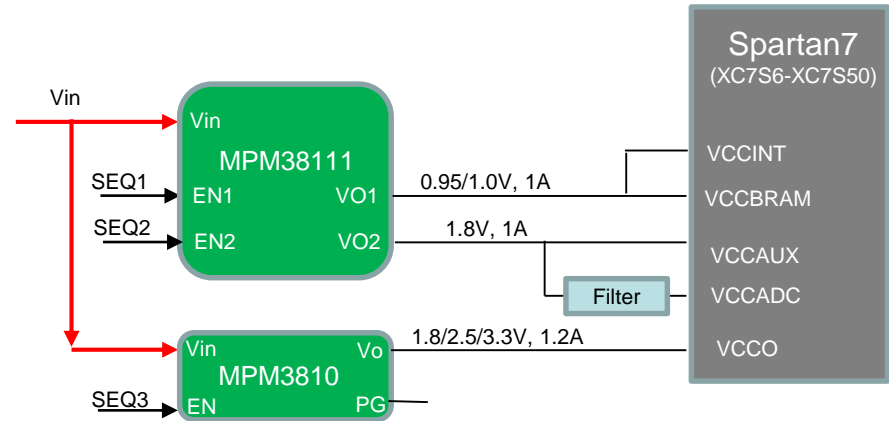


Vin = 2.7V to 6.0V

Rail#	Rails	Vout (VDC)	Tolerance (+/- %)	MPS Part#	Sequence Up/Down	Max Load (A)	Footprint (Package)	PCB Area
1	VCCINT, VCCBRAM	0.95/1.0	5	MPM38111	1/3	1A	QFN-14 (4.0x4.0x1.6mm)	29mm <sup>2</sup>
2	VCCAUX, VCCADC	1.8	5		2/2	1A		
3	VCCO	1.8/2.5/3.3	5	MPM3810 (optional)	3/1	1.2A	QFN-12 (2.5x3.0x0.9mm)	17mm <sup>2</sup>



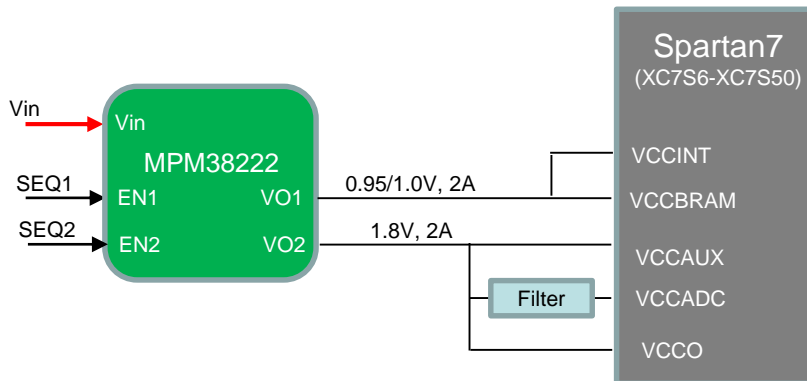
Config-1 Shown with VCCO consolidated



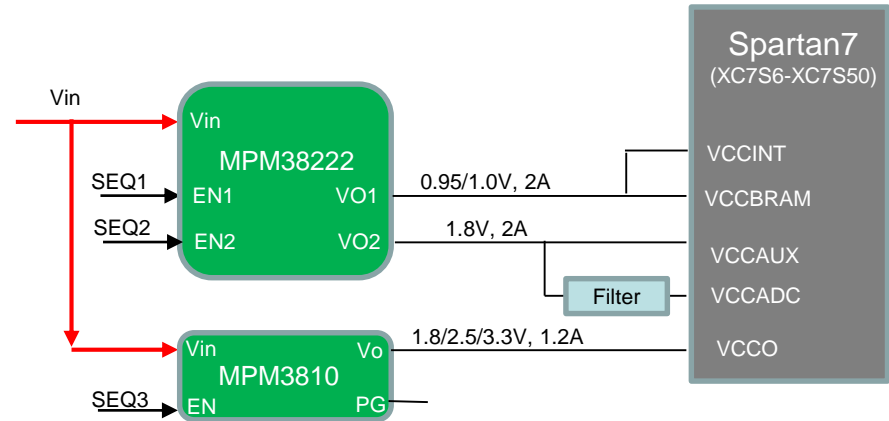
Config-2 Shown with separate VCCO

Vin = 2.7V to 6.0V

Rail#	Rails	Vout (VDC)	Tolerance (+/- %)	MPS Part#	Sequence Up/Down	Max Load (A)	Footprint (Package)	PCB Area
1	VCCINT, VCCBRAM	0.95/1.0	5	MPM38222	1/3	2A	QFN-14 (4.0x4.0x1.6mm)	29mm <sup>2</sup>
2	VCCAUX, VCCADC	1.8	5		2/2	2A		
3	VCCO	1.8/2.5/3.3	5	MPM3810 (optional)	3/1	1.2A	QFN-12 (2.5x3.0x0.9mm)	17mm <sup>2</sup>

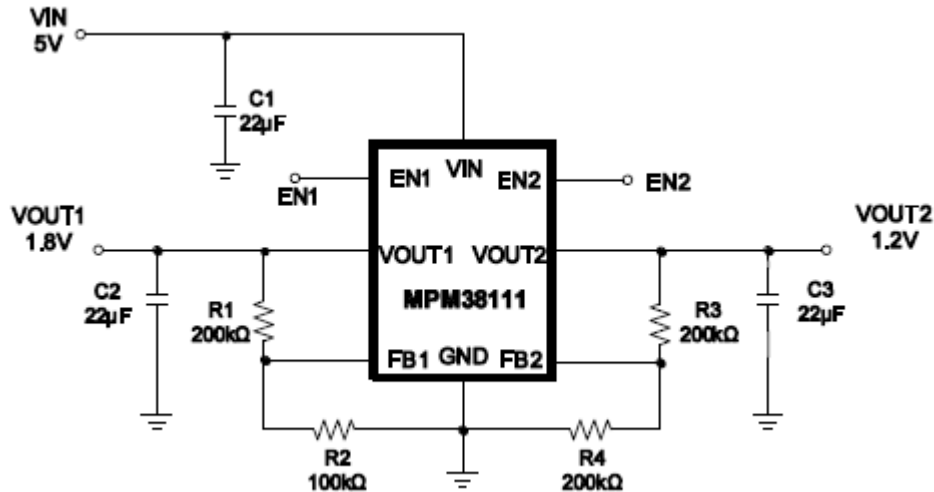


**Config-3** Shown with VCCO consolidated

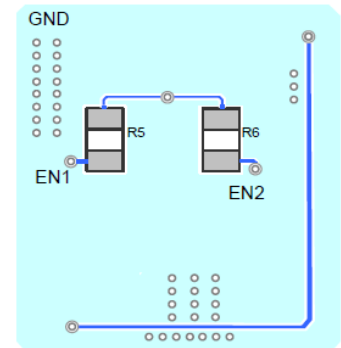
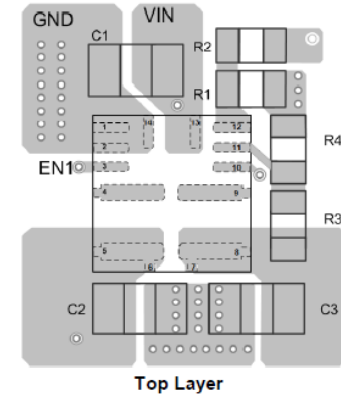


**Config-4** Shown with separate VCCO

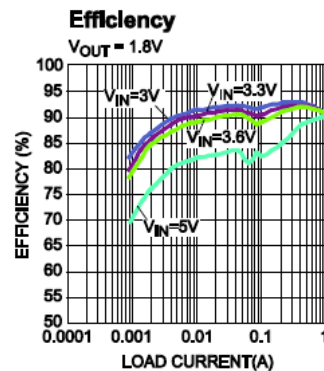
### Schematics (Typical)



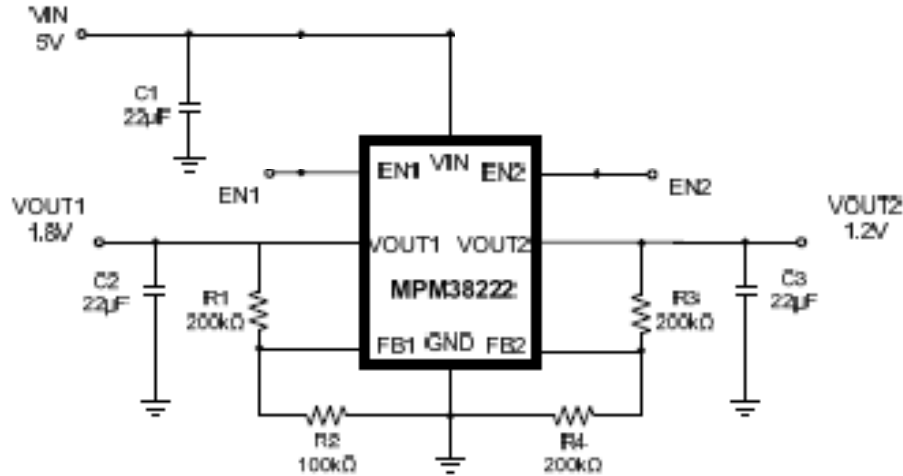
### Layout guidelines



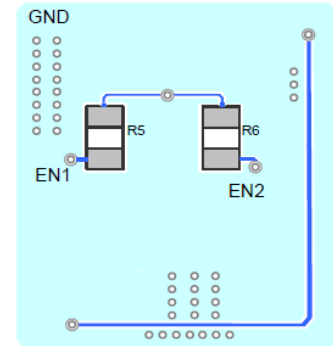
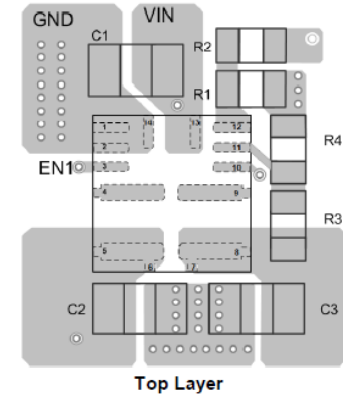
- Solution footprint: 29mm<sup>2</sup> (Includes all 0402 Resistors, 0805 Caps)
- External Components: 7 (for 2x rails)
- Efficiency: 90% (Vin=5V, Vout=1.8V, Io=1A)



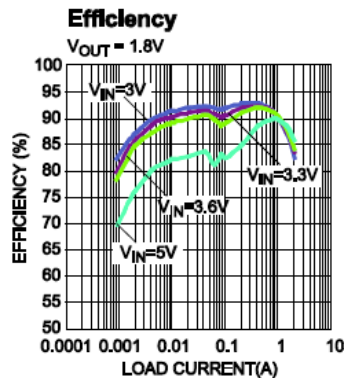
### Schematics (Typical)



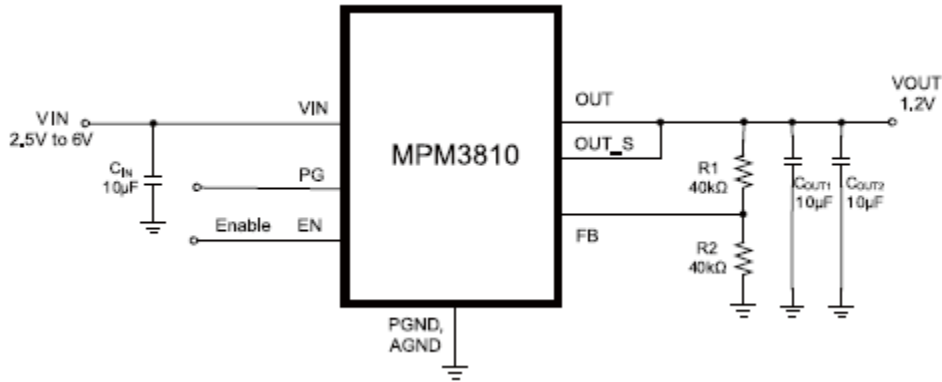
### Layout guidelines



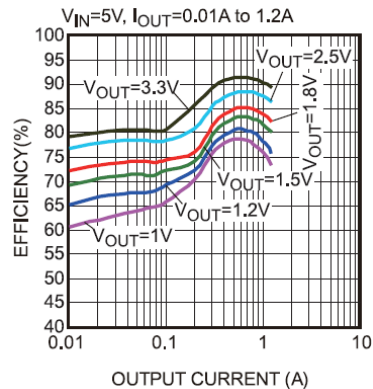
- Solution footprint: 29mm<sup>2</sup> (Includes all 0402 Resistors, 0805 Caps)
- External Components: 7 (for 2x rails)
- Efficiency: 87% (Vin=5V, Vout=1.8V, Io=1.5A)



## Schematics (Typical)



- Solution footprint: 17mm<sup>2</sup> (Includes all 0402 Resistors, 0805 Caps)
- External Components:5
- Efficiency: 90% (Vin=5V, Vout=3.3V, Io=1.0A)



## Layout guidelines

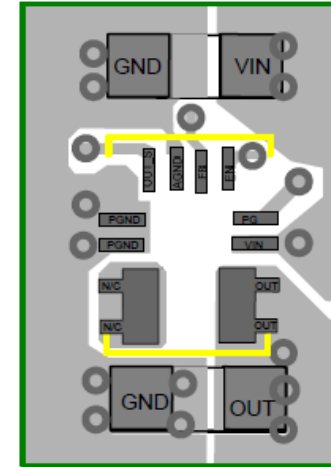


Figure 3: Top View of Layout Guide

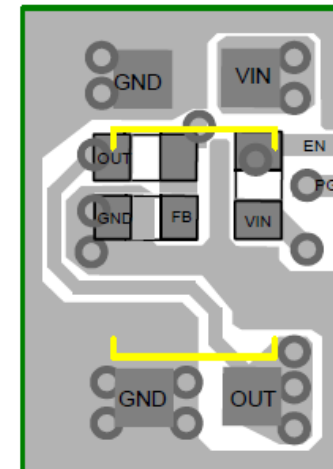


Figure 4: Bottom View of Layout Guide



- Smallest Solution Size
- Simple, easy implementation
- Minimum External Components (MPM modules include Inductors)
- Cost effective
- MPM38111 and MPM38222 share same footprint for easy design upgrades



Thank you

MPS Reference Design Team at [referencedesign@monolithicpower.com](mailto:referencedesign@monolithicpower.com)

For general information

<http://www.monolithicpower.com>