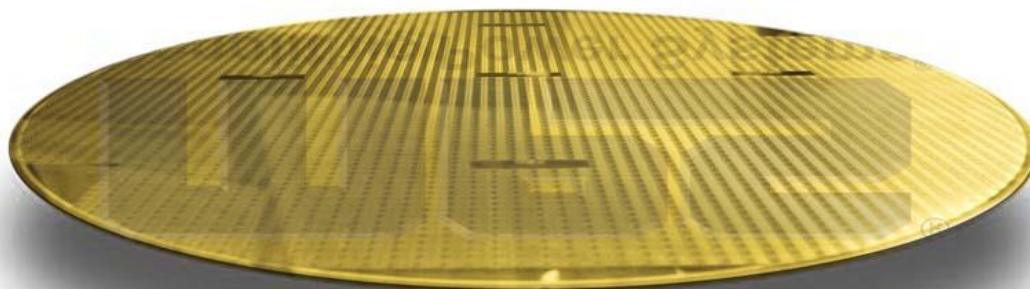


MPS[®]

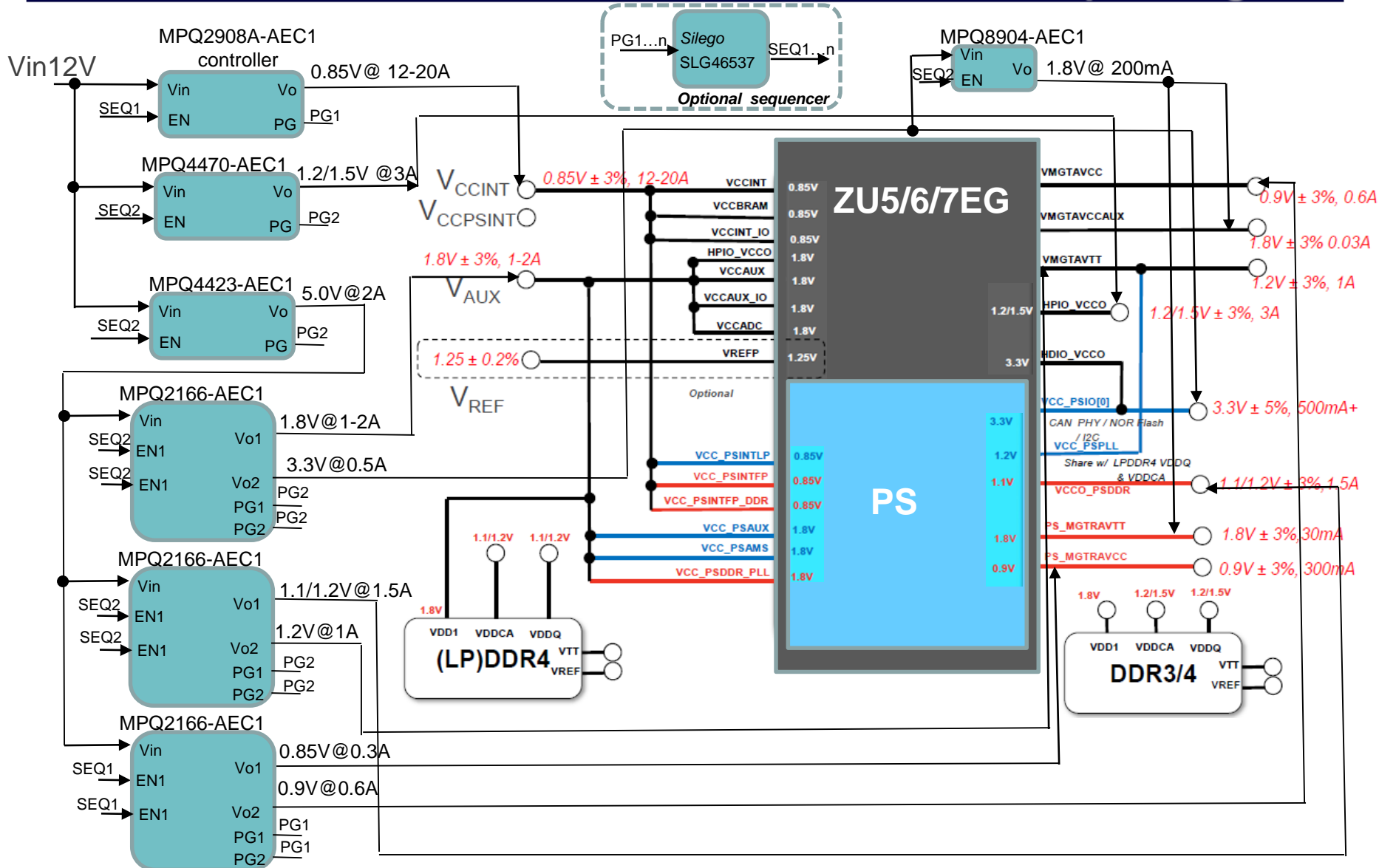
MPS[®]

Monolithic Power Systems[®]



Xilinx Zynq US+ Auto ADAS power delivery

Last update
Feb 9, 2017





Design specifications – Central compute engine

Rail	MPS part#	MPS specs Vin max, Iout	Vin	Vout	Load	Seq up/down	Footprint
VCCINT	MPQ2908A controller	60Vin (controller)	12V	0.85V ±3%	12-20A	1/2	QFN20 (3x4mm)
VAUX	MPQ2166	6Vin, dual 2A/2A, 3A/1A	5V Intermediate	1.8V ±3%	1-2A	2/1	QFN18 (2x3mm)
VCC_PSIO			5V Intermediate	3.3V ±5%	0.5A+	2/1	
VCCO_PSDDR (VDDQ & VDDCA)	MPQ2166	6Vin, dual 2A/2A, 3A/1A	5V Intermediate	1.1/1.2V ±3%	1.5A	2/1	QFN18 (2x3mm)
VCC_PSPDLL VMGTAVTT			5V Intermediate	1.2V ±3%	1A	2/1	
VPS_MGTRAVCC	MPQ2166	6Vin, dual 2A/2A, 3A/1A	5V Intermediate	0.85V ±3%	0.3A	1/2	QFN18 (2x3mm)
VMGTAVCC			5V Intermediate	0.9V ±3%	0.6A	1/2	
VCCO_PLDDR (VDDQ & VDDCA)	MPQ4470	36Vin, 5A	12V	1.2/1.5V ±3%	3A	2/1	QFN20 (3x4mm)
VPS_MGTRAVTT	MPQ8904	40Vin, 150mA	VCC_PSIO	1.8V ±3%	0.1A	2/1	QFN8 (2x3mm)
VMGTAVCCAUX					0.1A		
5V Intermediate	MPQ4423	36Vin, 3A	12V	5V		1/2	QFN8 (3x3mm)

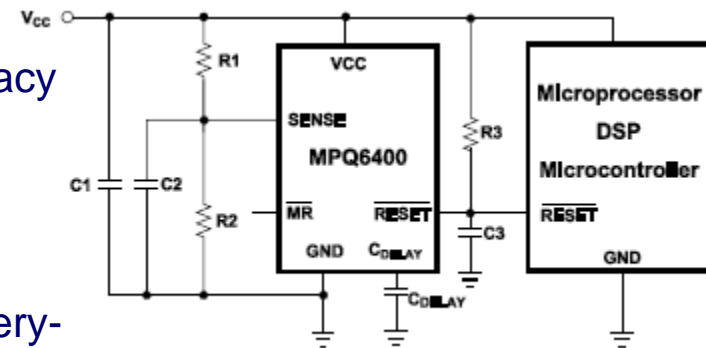
- MPS products offer many integrated monitoring features

	Over Voltage Protection	Over Current Protection	Thermal Shutdown	Power Good	Under Voltage Lockout
MPQ4423H	no	yes	yes	yes	yes
MPQ2167	yes	yes	yes	yes	yes
MPQ2166	no	yes	yes	yes	yes
MPQ8904	yes	yes	yes	yes	no
MPQ2013A	yes	yes	yes	no	no
MPQ2019	yes	yes	yes	yes	no
MPQ2908A	yes	yes	yes	yes	yes
MPQ4470	yes	yes	yes	yes	yes
MPQ4423	no	yes	yes	yes	yes

Additional monitoring features available

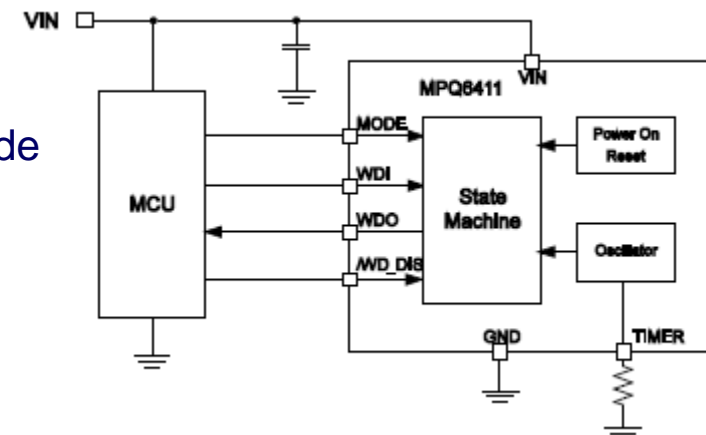
MPQ6400-AEC1

- Can monitor and provide reset function for system voltages from 0.4V
- Precision reference to achieve +/- 1% threshold accuracy
- Programmable Reset Delay Time: 2.1ms to 10s
- Can monitor multiple system voltages
- SENSE Voltage Transients Immunity
- Low Quiescent Current – 1.6uA makes it ideal for battery-powered applications

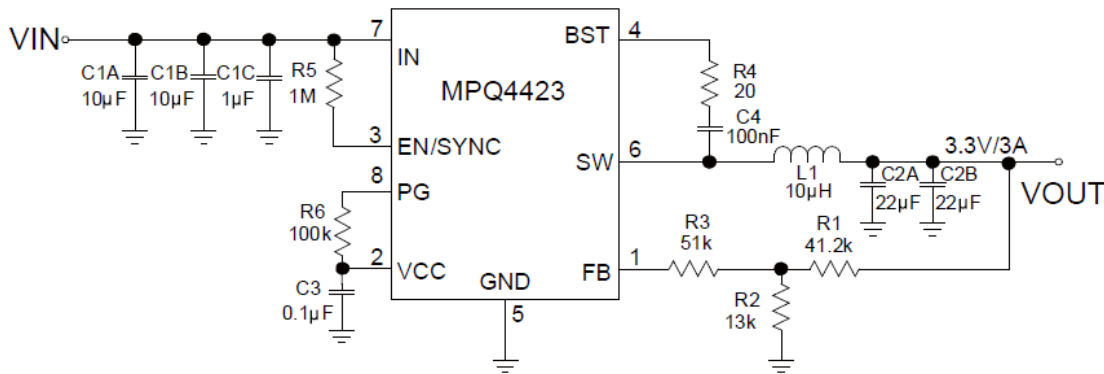


MPQ6411-AEC1

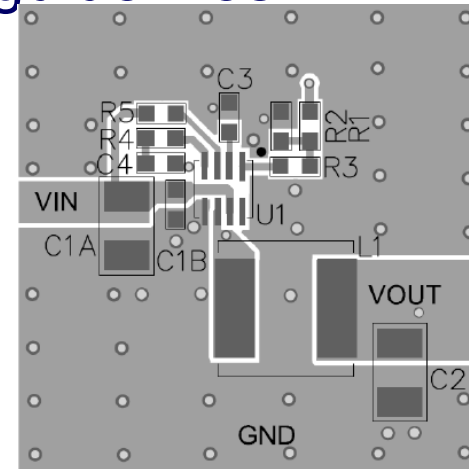
- Monitor MCU Synchronization Signal
- Programmable Short Window Mode/Long Window Mode
- Watchdog Disable Function
- WDI Error
- Low Shutdown Mode Current
- Power-On Reset during Power-Up and Under Voltage



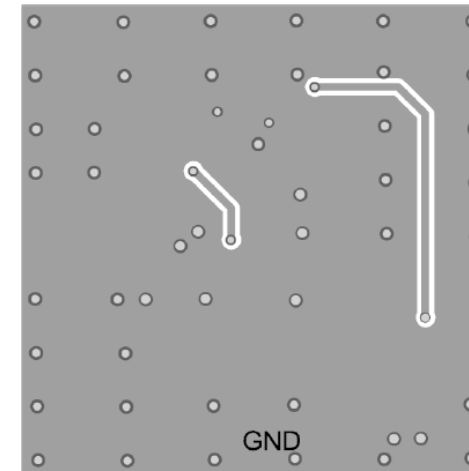
Schematics (Typical)



Layout guidelines



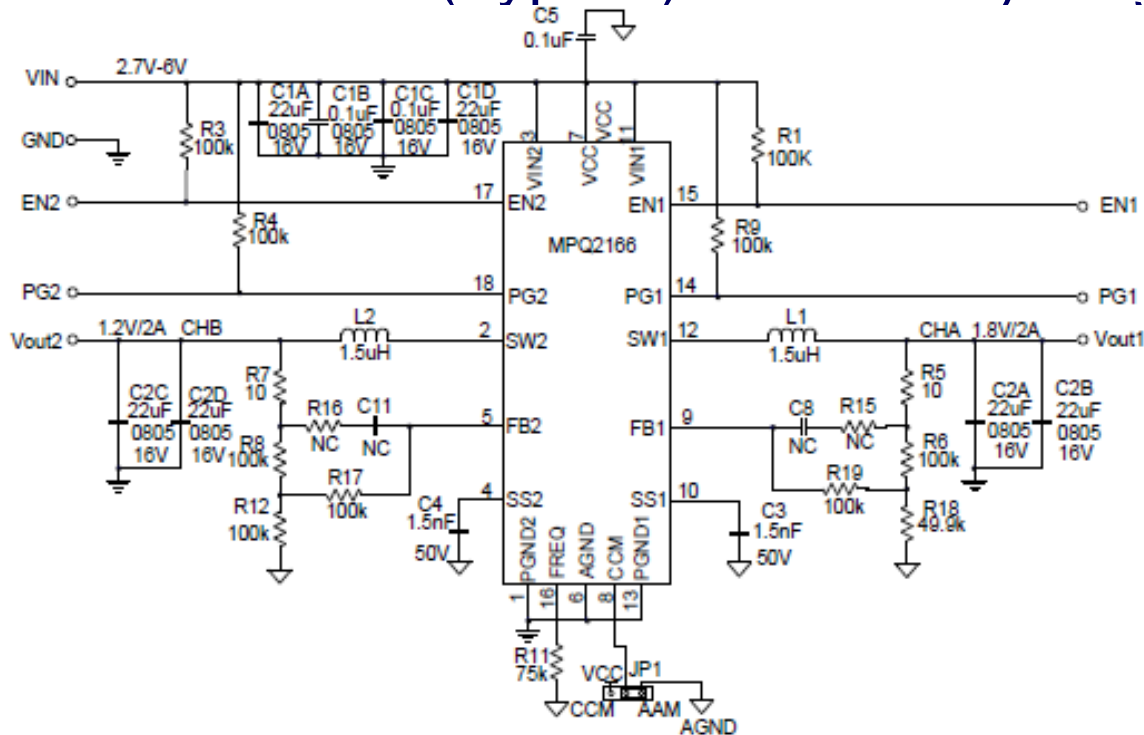
Top Layer



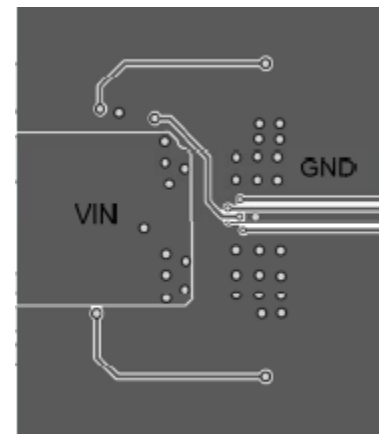
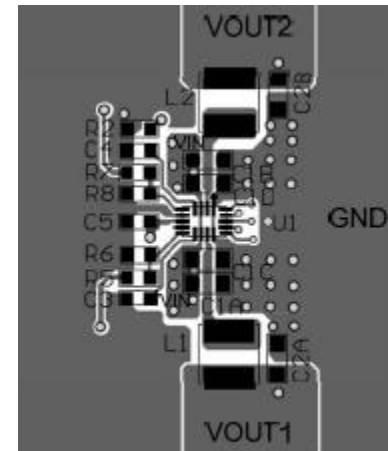
Bottom Layer

- For Rails: 5V Intermediate
- Regulator footprint: QFN8 (3x3mm)
- External Components: 14
- Efficiency: $V_{in} = 12V$, $V_{out} = 5V$, $I_{out} = 3A$, 89%
- Estimated PCB Area (sq mm): 83

Schematics (Typical)

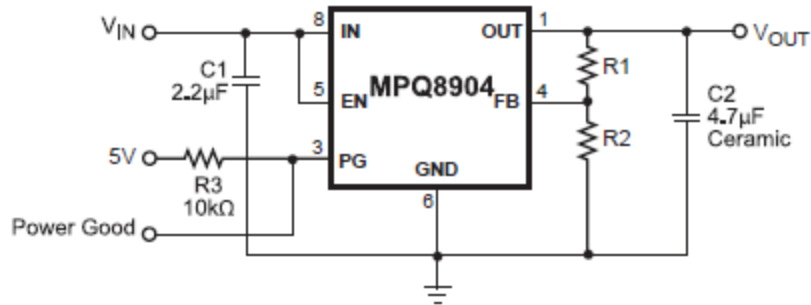


Layout guidelines

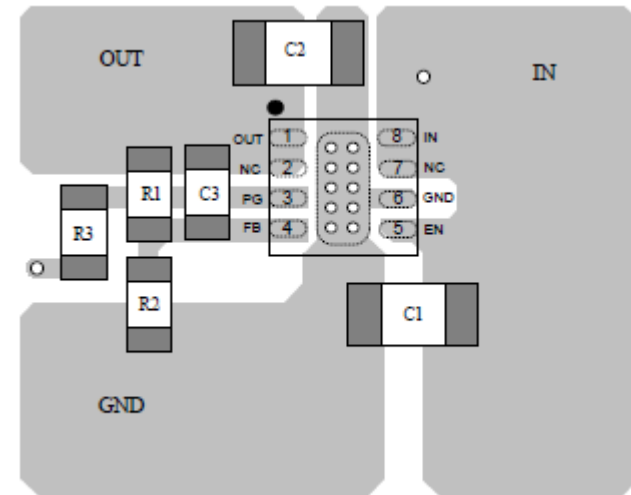


- For Rails: VAUX, VCCPSINT, VCCPSIO, VCCPSDDR
- Dual Regulator footprint : QFN18 (2x3mm)
- External Components: 14 per regulator
- Efficiency: $V_{in} = 5V$, $V_{out} = 1.8V$, $I_{out} = 1A$, 91%
- Estimated PCB Area (sq mm): 27.5 per regulator

Schematics (Typical)

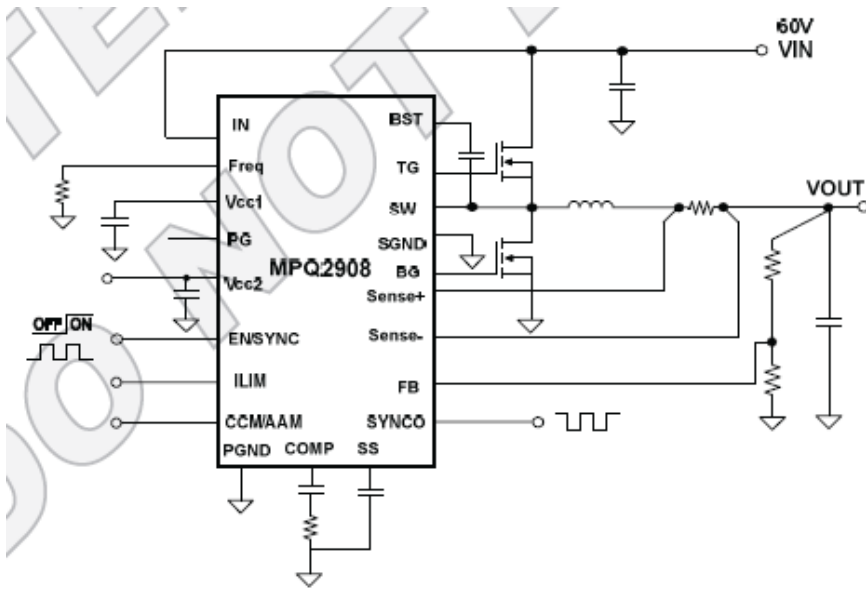


Layout guidelines



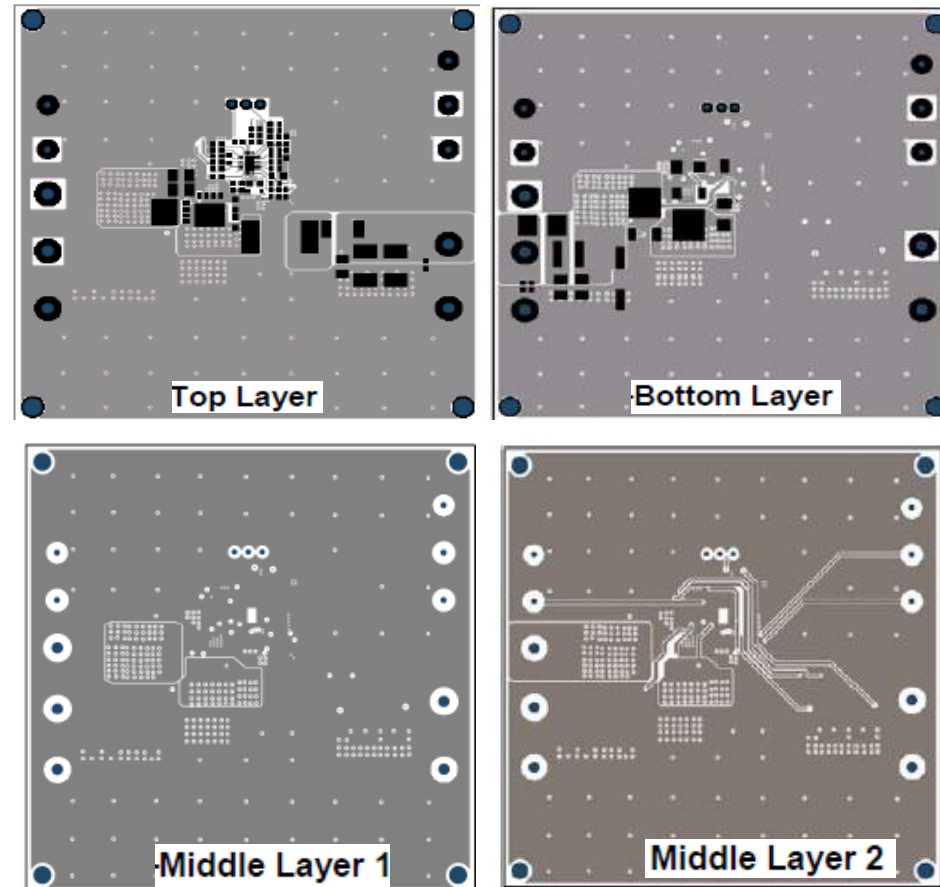
- For Rails: VPS_MGTRAVCC
- Regulator footprint: QFN8 (2x3mm)
- External Components: 5
- Efficiency: $V_{in} = 3.3V$, $V_{out} = 0.9V$, 27.3%
- Estimated PCB Area (sq mm): 10

Schematics (Typical)



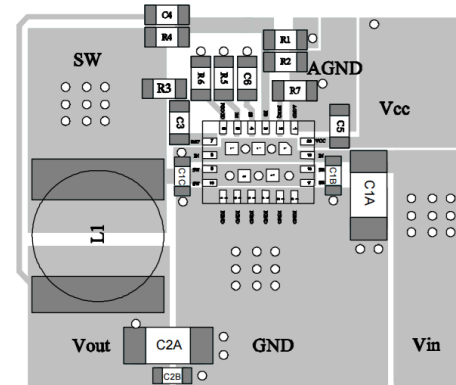
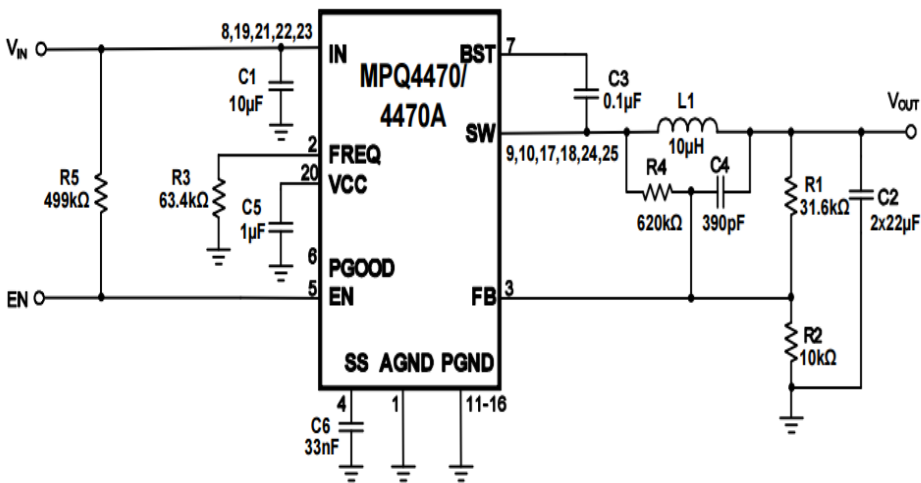
- For Rails: VCCINT (Central compute)
- Regulator footprint: QFN20 (3x4mm)
- External Components: 15
- Efficiency: $V_{in} = 12V$, $V_{out} = 5$, $I_{out} = 10A$, 88%
- Estimated PCB Area (sq mm): 143

Layout guidelines (MPQ2918 shown as reference)

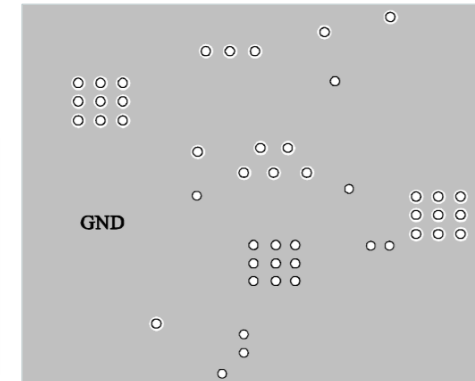


Schematics (Typical)

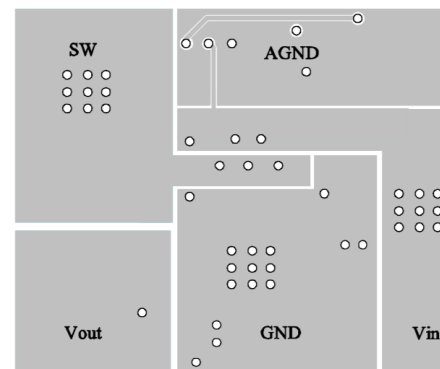
Layout guidelines



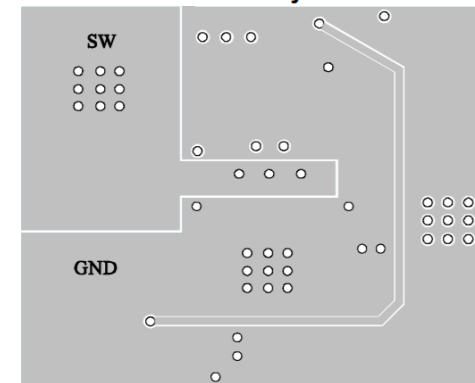
Top Layer



Inner1 Layer



Bottom Layer



Inner2 Layer

- For Rails: VCCO_PLDDR (VDDQ & VDDCA)
- Regulator footprint: QFN8 (3x4mm)
- External Components: 13
- Efficiency: $V_{in} = 12V$, $V_{out} = 3.3$, $I_{out} = 3A$, 95%
- Estimated PCB Area (sq mm): 42

- All parts are AEC-Q100 Grade1
- Industry leading smallest footprints
- Dual buck regulators for further reduced footprint
- Separate regulators for VCCINT and VCCPSINT for maximum flexibility
- Enable and Power Good signals for simple power up sequencing. Easy to add Silego sequencer for more complex requirements (AECQ qual pending)
- Over-current protection and thermal shutdown for added safety

Thank you

For additional information please contact
MPS Reference Design Team
at referencedesign@monolithicpower.com

For general information
<http://www.monolithicpower.com>