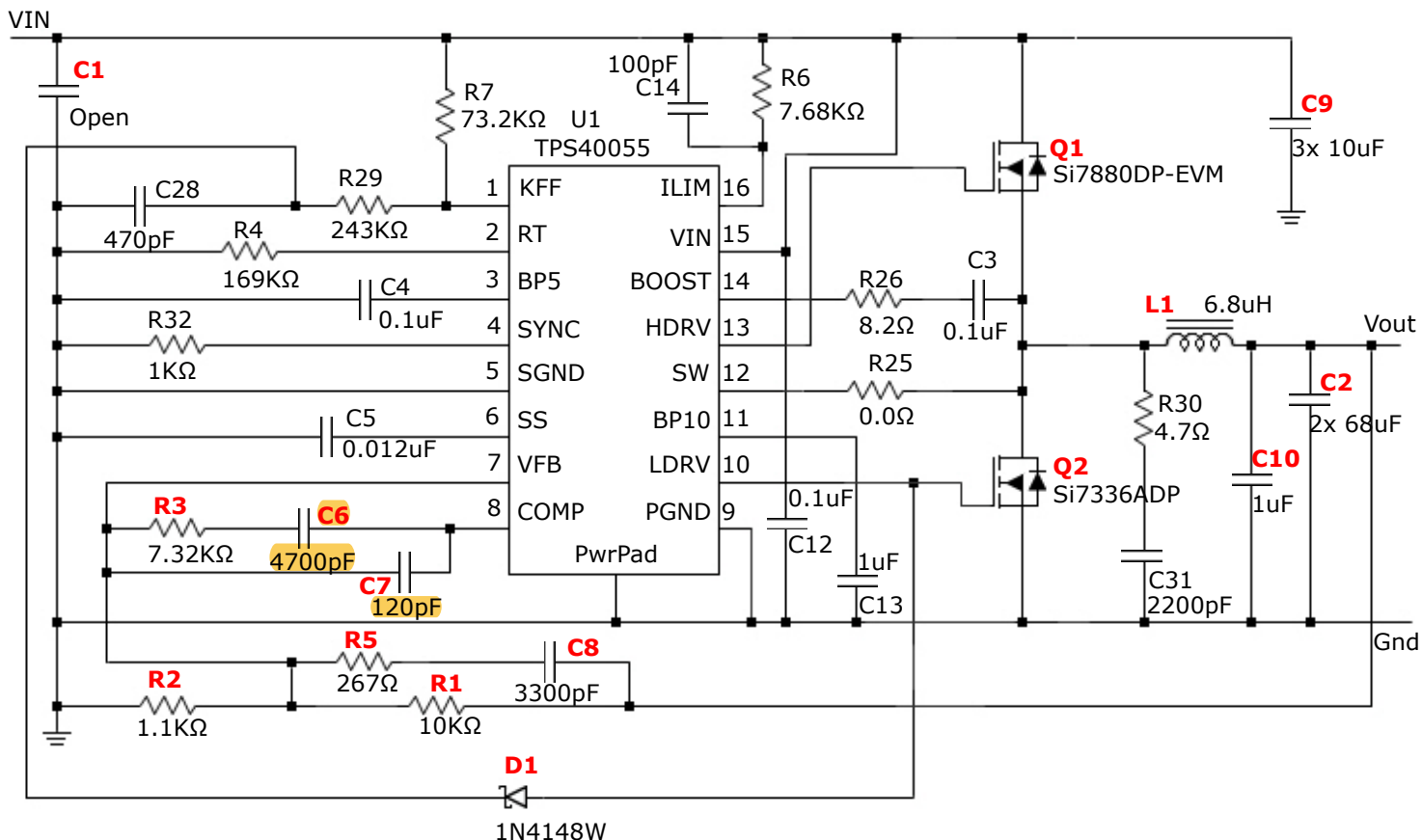


SwitcherPro Design Report Schematic

Design Name: TPS40055 25V to 7V @ 15A

Part: TPS40055

VinMin: 10V **VinMax:** 25V **Vout:** 7V **Iout:** 15A



SwitcherPro Design Report

Analysis - Main

Design Name: TPS40055 25V to 7V @ 15A

Part: TPS40055

VinMin: 10V **VinMax:** 25V **Vout:** 7V **Iout:** 15A

Parameter Units-Symbol	User Input Minimum	User Input Nominal	User Input Maximum	Default Input Minimum	Default Input Nominal	Default Input Maximum	Calculated Minimum	Calculated Nominal	Calculated Maximum
Input Voltage Volts - V	10.00	-	25.00	-	-	-	-	-	-
Input Ripple mVp-p - mVp-p	-	-	-	-	-	500	-	-	478.8
UVLO(Start) Volts - V	-	-	-	-	-	-	-	8.00	-
UVLO(Stop) Volts - V	-	-	-	-	-	-	-	8.00	-
Switching Frequency KHz - KHz	-	-	-	-	300	-	-	-	-
Slow Start ms - ms	-	-	-	-	4.00	-	-	-	-
Estimated PCB Area mm ² - mm ²	-	-	-	-	-	-	-	2268	-
Max Component Height mm - mm	-	-	-	-	-	25	-	-	20

SwitcherPro Design Report

Analysis - Output1

Design Name: TPS40055 25V to 7V @ 15A

Part: TPS40055

VinMin: 10V **VinMax:** 25V **Vout:** 7V **Iout:** 15A

Parameter Units-Symbol	User Input Minimum	User Input Nominal	User Input Maximum	Default Input Minimum	Default Input Nominal	Default Input Maximum	Calculated Minimum	Calculated Nominal	Calculated Maximum
Output Voltage Volts - V	-	7.000	-	-	-	-	6.868	-	7.264
Output Ripple mVp-p - mVp-p	-	-	-	-	-	140	-	-	14.6
Output Current Amps - A	-	-	15.000	0.100	-	-	-	-	-
Inductor Peak to Peak Current Amps - A	-	-	-	-	-	-	1.116	-	2.771
Current Limit Threshold Amps - A	-	-	-	-	18.000	-	-	-	-
Gain Margin dB - dB	-	-	-	-10	-	-	-	-23	-
Phase Margin Deg. - Deg.	-	-	-	60	-	-	-	63	-
Upper FET RDSon mOhms - mΩ	-	-	-	-	-	-	2	-	3
Lower FET RDSon mOhms - mΩ	-	-	-	-	-	-	4	-	4
Duty Cycle % - %	-	-	-	-	-	-	28.5	-	71.0
On Time Min (switch) ns - ns	-	-	-	-	-	-	862.2	-	2631.0
Cross Over Frequency KHz - KHz	-	-	-	-	-	-	-	27	-

SwitcherPro Design Report

Stress Results

Design Name: TPS40055 25V to 7V @ 15A

Part: TPS40055

VinMin: 10V **VinMax:** 25V **Vout:** 7V **Iout:** 15A

Device	Rated Voltage	Calculated Voltage	Rated Current (RMS)	Calculated Current (RMS)	Error Message	Power	Calculated Max Temp
C9 (High Freq. Input Cap)	250V	25.1V	4A	2.5A	-	56mW	-
C2 (Bulk Output Cap)	10V	7.04V	4.4A	0.4A	-	480uW	-
L1 (Output Inductor)	-	-	21A	15A	-	925mW	-
Q1 (Power Switch)	30V	25.1V	25A	12.6A	-	1.5W	124°C
Q2 (Sync. Rectifier)	30V	25.1V	30A	12.7A	-	1.4W	96°C

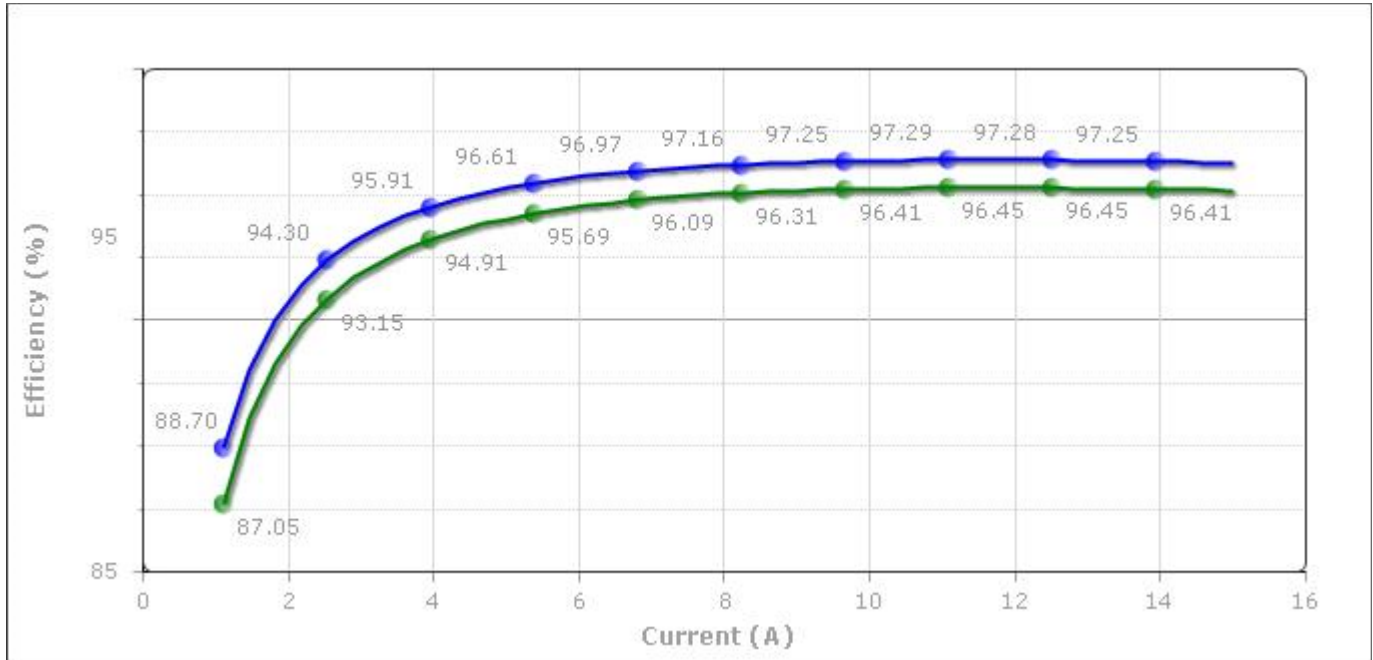
SwitcherPro Design Report

Efficiency

Design Name: TPS40055 25V to 7V @ 15A

Part: TPS40055

VinMin: 10V **VinMax:** 25V **Vout:** 7V **Iout:** 15A



— Efficiency For Vin Max
— Efficiency For Vin Min

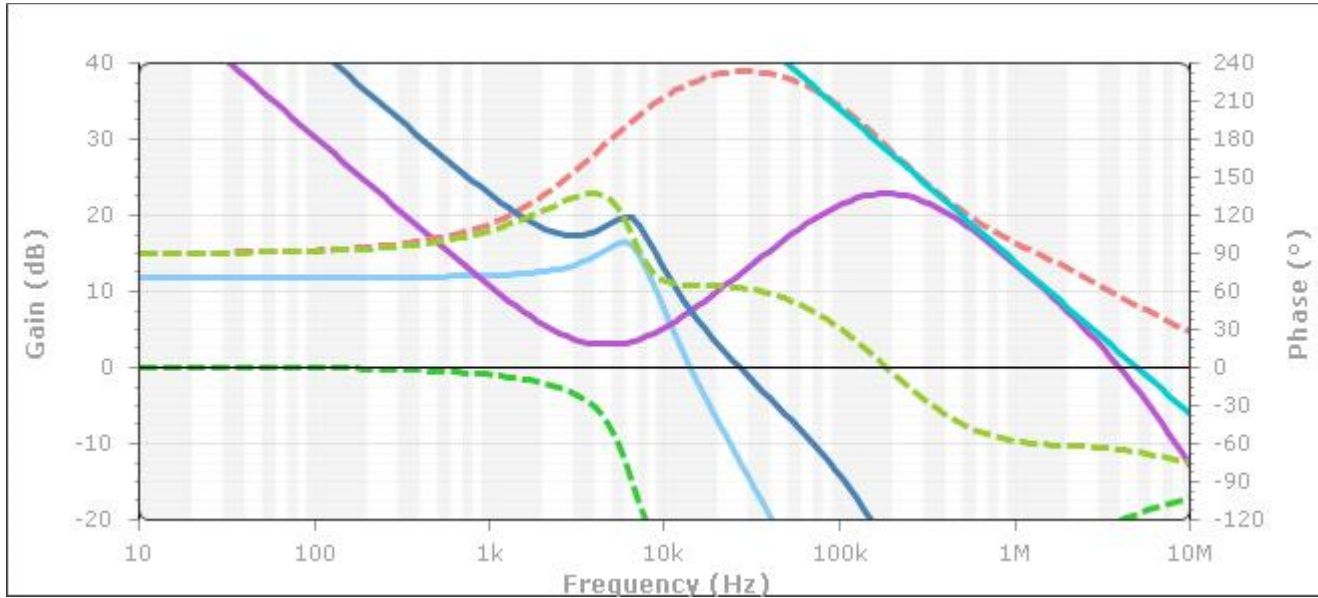
SwitcherPro Design Report

Loop Response

Design Name: TPS40055 25V to 7V @ 15A

Part: TPS40055

VinMin: 10V **VinMax:** 25V **Vout:** 7V **Iout:** 15A



- Power Stage Gain
- Power Stage Phase
- Compensation Gain
- Compensation Phase
- Error Amp Gain
- Total Gain
- Total Phase

SwitcherPro Design Report

Bill of Materials

Design Name: TPS40055 25V to 7V @ 15A

Part: TPS40055

VinMin: 10V **VinMax:** 25V **Vout:** 7V **Iout:** 15A

Name	Quantity	Part Number	Description	Manufacturer	Package	Area(mm ²)	Height(mm)
C10	1	Standard	Capacitor, Ceramic, 1uF, 10V, 10%	Standard	0603	2	1
C12	1	Standard	Capacitor, Ceramic, 0.1uF, 35V, 10%	Standard	0603	2	1
C13	1	Standard	Capacitor, Ceramic, 1uF, 16V, 1%	Standard	0603	2	1
C14	1	Standard	Capacitor, Ceramic, 100pF, 50V, 1%	Standard	0603	2	1
C2	2	C5750X5R1A686M	Capacitor, Ceramic, 68uF, 10V, 20%	TDK	C5750 2220	31	2
C28	1	Standard	Capacitor, Ceramic, 470pF, 25V, 1%	Standard	0603	2	1
C3	1	Standard	Capacitor, Ceramic, 0.1uF, 50V, 1%	Standard	1206	6	1
C31	1	Standard	Capacitor, Ceramic, 2200pF, 10V, 20%	Standard	0603	2	1
C4	1	Standard	Capacitor, Ceramic, 0.1uF, 6.3V, 1%	Standard	0603	2	1
C5	1	Standard	Capacitor, Ceramic, 0.012uF, 4V, 20%	Standard	0603	2	1
C6	1	Standard	Capacitor, Ceramic, 4700pF, 16V, 20%	Standard	0603	2	1
C7	1	Standard	Capacitor, Ceramic, 120pF, 16V, 20%	Standard	0603	2	1
C8	1	Standard	Capacitor, Ceramic, 3300pF, 16V, 20%	Standard	0603	2	1
C9	3	KHD251E106M99C0B00	Capacitor, Electrolytic, 10uF, 250V, 20%	NIPPON CHEMI-CON	Radial	213	20
D1	1	1N4148W	Diode, Fast, 75V, 0.3A	Diodes Inc	SOD-123	6	1
L1	1	7443556680	Inductor, 6.8uH, 21A, 4.1mΩ	Würth Electronics	18x8.9	333	8
Q1	1	Si7880DP-EVM	Transistor, NFET, 30V, 25A, 6mΩ	Vishay	Low Thermal PowerPak	32	1
Q2	1	Si7336ADP	Transistor, NFET, 30V, 30A, 10Ω	Vishay	PowerPak SO-8	32	1
R1	1	Standard	Resistor, SurfaceMount, 10KΩ, 100mW, 1%	Standard	0603	2	1
R2	1	Standard	Resistor, SurfaceMount, 1.1KΩ, 100mW, 1%	Standard	0603	2	1
R25	1	Standard	Resistor, SurfaceMount, 0.0Ω, 100mW, 1%	Standard	0603	2	1
R26	1	Standard	Resistor, SurfaceMount, 8.2Ω, 62mW, 1%	Standard	0603	2	1
R29	1	Standard	Resistor, SurfaceMount, 243KΩ, 62mW, 1%	Standard	0603	2	1
R3	1	Standard	Resistor, SurfaceMount, 7.32KΩ, 62mW, 1%	Standard	0603	2	1
R30	1	Standard	Resistor, SurfaceMount, 4.7Ω, 1W, 5%	Standard	2512	21	1

SwitcherPro Design Report

Bill of Materials

Design Name: TPS40055 25V to 7V @ 15A

Part: TPS40055

VinMin: 10V **VinMax:** 25V **Vout:** 7V **Iout:** 15A

Name	Quantity	Part Number	Description	Manufacturer	Package	Area(mm ²)	Height(mm)
R32	1	Standard	Resistor, SurfaceMount, 1K Ω , 100mW, 10%	Standard	0603	2	1
R4	1	Standard	Resistor, SurfaceMount, 169K Ω , 100mW, 1%	Standard	0603	2	1
R5	1	Standard	Resistor, SurfaceMount, 267 Ω , 100mW, 1%	Standard	0603	2	1
R6	1	Standard	Resistor, SurfaceMount, 7.68K Ω , 100mW, 1%	Standard	0603	2	1
R7	1	Standard	Resistor, SurfaceMount, 73.2K Ω , 100mW, 1%	Standard	0603	2	1
U1	1	TPS40055	IC, Controller, 16 pins	Texas Instruments, Inc.	HTSSOP-Power PAD	34	2

SwitcherPro Design Report

Layout

Design Name: TPS40055 25V to 7V @ 15A

Part: TPS40055

VinMin: 10V **VinMax:** 25V **Vout:** 7V **Iout:** 15A

Layout Image Not Available For this Part

SwitcherPro Design Report

Layout Notes

Design Name: TPS40055 25V to 7V @ 15A

Part: TPS40055

VinMin: 10V **VinMax:** 25V **Vout:** 7V **Iout:** 15A

The TPS4005x provides separate signal ground (SGND) and power ground (PGND) pins. It is important that circuit grounds are properly separated. Each ground should consist of a plane to minimize its impedance if possible. The high power noisy circuits such as the output, synchronous rectifier, MOSFET driver decoupling capacitor (BP10), and the input capacitor should be connected to PGND plane at the input capacitor. Sensitive nodes such as the FB resistor divider, RT, and ILIM should be connected to the SGND plane. The SGND plane should only make a single point connection to the PGND plane. Component placement should ensure that bypass capacitors (BP10 and BP5) are located as close as possible to their respective power and ground pins. Also, sensitive circuits such as FB, RT and ILIM should not be located near high dv/dt nodes such as HDRV, LDRV, BOOST, and the switch node (SW).