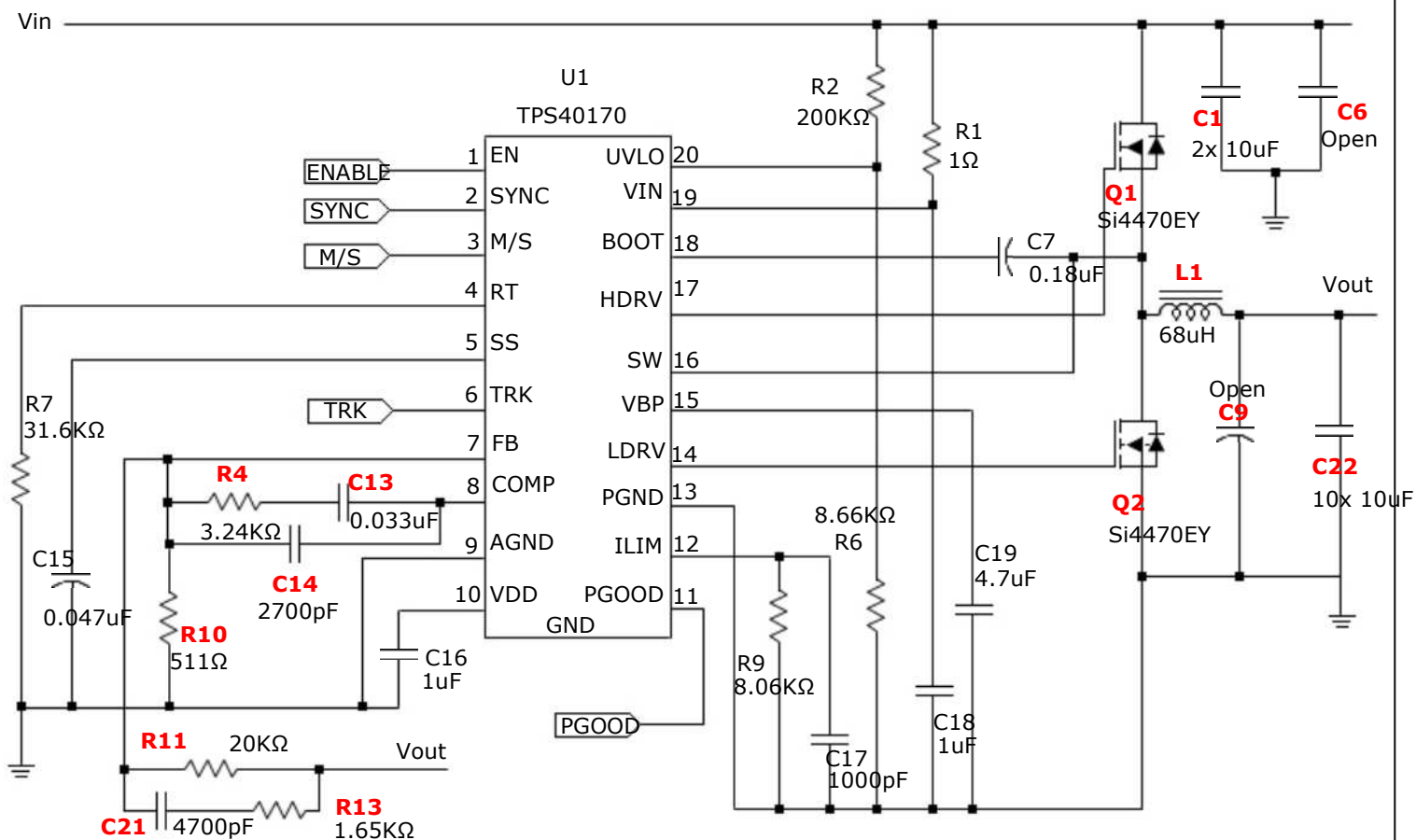


SwitcherPro Design Report Schematic

Design Name: TPS40170

Part: TPS40170

VinMin: 27V **VinMax:** 40V **Vout:** 24V **Iout:** 3A



SwitcherPro Design Report

Analysis - Main

Design Name: TPS40170

Part: TPS40170

VinMin: 27V **VinMax:** 40V **Vout:** 24V **Iout:** 3A

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	27.00	-	40.00	-	-	-	-	-	-
Input Ripple mVp-p - mVp-p	-	-	-	-	-	800	-	-	136.3
UVLO(Start) Volts - V	-	-	-	-	-	-	-	21.69	-
UVLO(Stop) Volts - V	-	-	-	-	-	-	-	20.69	-
Switching Frequency KHz - KHz	-	-	-	-	300	-	-	-	-
Slow Start ms - ms	-	-	-	-	4.00	-	-	-	-
Estimated PCB Area mm ² - mm ²	-	-	-	-	-	-	-	5509	-
Max Component Height mm - mm	-	-	-	-	-	25	-	-	20

SwitcherPro Design Report

Analysis - Output1

Design Name: TPS40170

Part: TPS40170

VinMin: 27V **VinMax:** 40V **Vout:** 24V **Iout:** 3A

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	-	24.000	-	-	-	-	23.264	-	24.926
Output Ripple mVp-p - mVp-p	-	-	-	-	-	480	-	-	2.4
Output Current Amps - A	-	-	3.000	0.060	-	-	-	-	-
Inductor Peak to Peak Current Amps - A	-	-	-	-	-	-	0.135	-	0.520
Current Limit Threshold Amps - A	-	-	-	-	1.100	-	-	-	-
Gain Margin dB - dB	-	-	-	-10	-	-	-	-15	-
Phase Margin Deg. - Deg.	-	-	-	30	-	-	-	32	-
Upper FET RDSon mOhms - mΩ	-	-	-	-	-	-	14	-	15
Lower FET RDSon mOhms - mΩ	-	-	-	-	-	-	14	-	14
Duty Cycle % - %	-	-	-	-	-	-	60.6	-	89.8
On Time Min (switch) ns - ns	-	-	-	-	-	-	1837.0	-	3326.0
Cross Over Frequency KHz - KHz	-	-	-	-	-	-	-	6	-

SwitcherPro Design Report

Stress Results

Design Name: TPS40170

Part: TPS40170

VinMin: 27V **VinMax:** 40V **Vout:** 24V **Iout:** 3A

Device	Rated Voltage	Calculated Voltage	Rated Current (RMS)	Calculated Current (RMS)	Error Message	Power	Calculated Max Temp
C1 (High Freq. Input Cap)	250V	40.4V	4A	0.73A	-	3mW	-
C22 (Bulk Output Cap)	250V	24.2V	4A	15mA	-	7uW	-
L1 (Output Inductor)	-	-	4.05A	3A	-	614mW	-
Q1 (Power Switch)	60V	40.4V	12.7A	2.84A	-	1.4W	117°C
Q2 (Sync. Rectifier)	60V	40.4V	12.7A	1.88A	-	1W	91°C



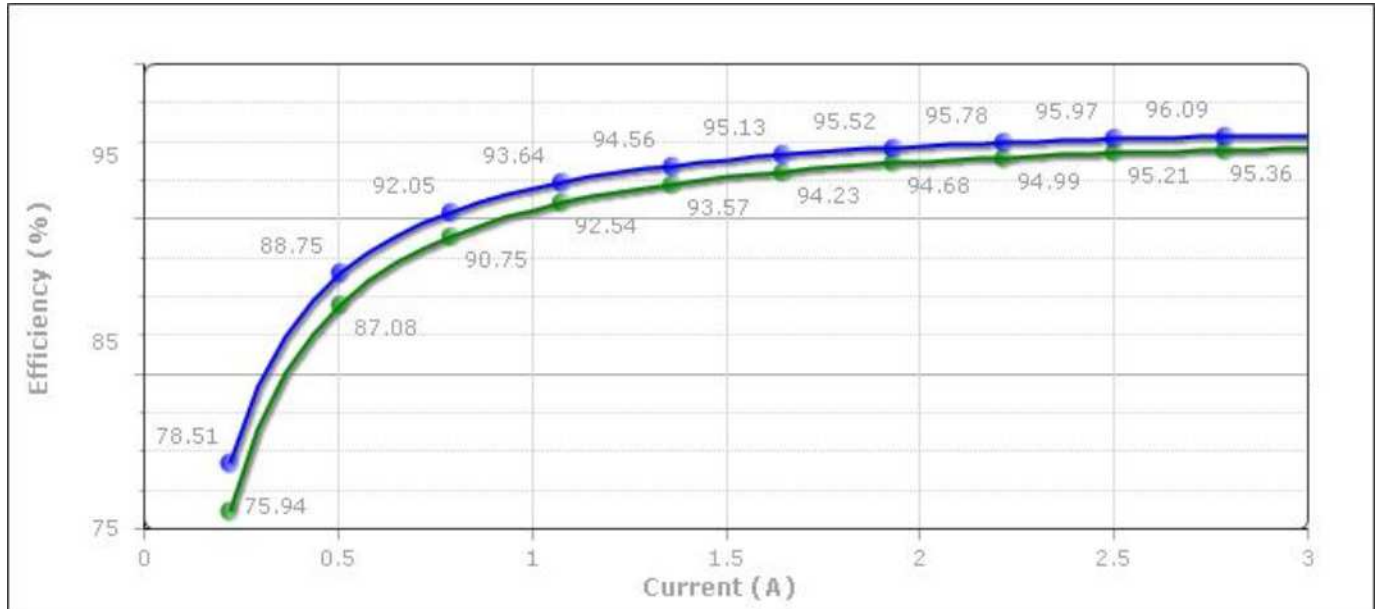
SwitcherPro Design Report

Efficiency

Design Name: TPS40170

Part: TPS40170

VinMin: 27V **VinMax:** 40V **Vout:** 24V **Iout:** 3A



— Efficiency For Vin Max
— Efficiency For Vin Min

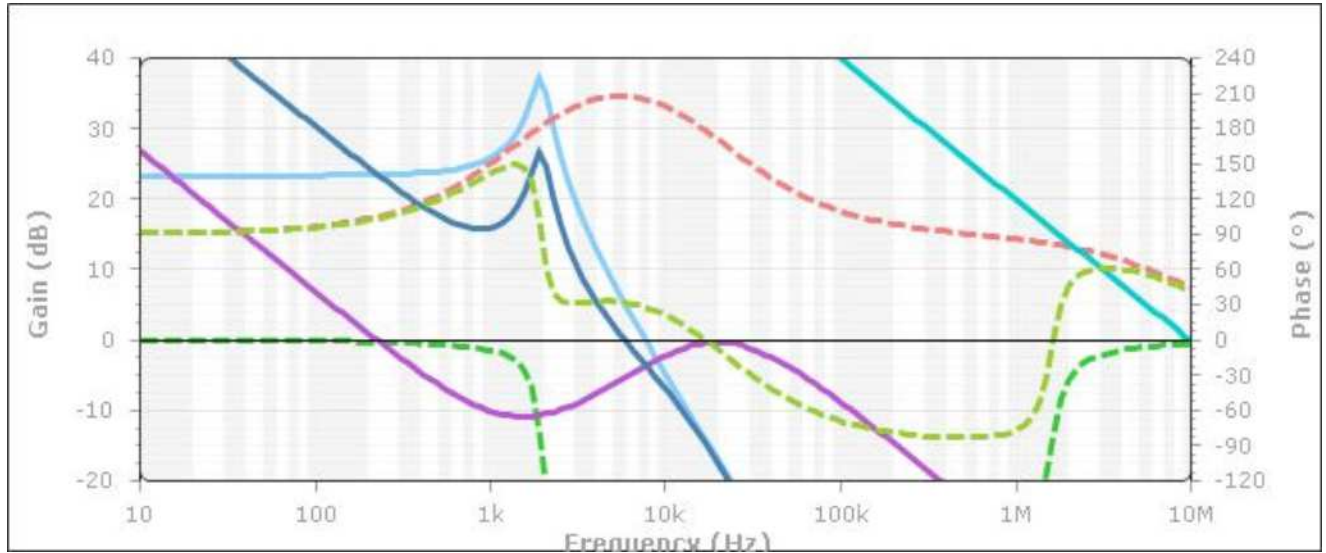
SwitcherPro Design Report

Loop Response

Design Name: TPS40170

Part: TPS40170

VinMin: 27V **VinMax:** 40V **Vout:** 24V **Iout:** 3A



- 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: TPS40170

Part: TPS40170

VinMin: 27V **VinMax:** 40V **Vout:** 24V **Iout:** 3A

Name	Quantity	Part Number	Description	Manufacturer	Package	Area(mm ²)	Height(mm)
C1	2	KHD251E106M99C0B00	Capacitor, Electrolytic, 10uF, 250V, 20%	NIPPON CHEMI-CON	Radial	213	20
C13	1	Standard	Capacitor, Ceramic, 0.033uF, 50V, 20%	Standard	0603	2	1
C14	1	Standard	Capacitor, Ceramic, 2700pF, 50V, 20%	Standard	0603	2	1
C15	1	Standard	Capacitor, Ceramic, 0.047uF, 63V, 20%	Standard	2820	36	3
C16	1	Standard	Capacitor, Ceramic, 1uF, 20V, 10%	Standard	0603	2	1
C17	1	Standard	Capacitor, Ceramic, 1000pF, 63V, 10%	Standard	2820	36	3
C18	1	Standard	Capacitor, Ceramic, 1uF, 100V, 10%	Standard	1210	8	1
C19	1	Standard	Capacitor, Ceramic, 4.7uF, 20V, 10%	Standard	0805	3	1
C21	1	Standard	Capacitor, Ceramic, 4700pF, 50V, 20%	Standard	0603	2	1
C22	10	KHD251E106M99C0B00	Capacitor, Electrolytic, 10uF, 250V, 20%	NIPPON CHEMI-CON	Radial	213	20
C7	1	Standard	Capacitor, Ceramic, 0.18uF, 100V, 10%	Standard	1210	8	1
L1	1	RFS1317-683KL	Inductor, 68uH, 4.05A, 68mΩ	Coilcraft	RFS1317	185	16
Q1	1	Si4470EY	Transistor, NFET, 60V, 12.7A, 10Ω	Vishay	SO-8	32	1
Q2	1	Si4470EY	Transistor, NFET, 60V, 12.7A, 10Ω	Vishay	SO-8	32	1
R1	1	Standard	Resistor, SurfaceMount, 1Ω, 100mW, 1%	Standard	0603	2	1
R10	1	Standard	Resistor, SurfaceMount, 511Ω, 100mW, 1%	Standard	0603	2	1
R11	1	Standard	Resistor, SurfaceMount, 20KΩ, 100mW, 1%	Standard	0603	2	1
R13	1	Standard	Resistor, SurfaceMount, 1.65KΩ, 100mW, 1%	Standard	0603	2	1
R2	1	Standard	Resistor, SurfaceMount, 200KΩ, 100mW, 1%	Standard	0603	2	1
R4	1	Standard	Resistor, SurfaceMount, 3.24KΩ, 100mW, 1%	Standard	0603	2	1
R6	1	Standard	Resistor, SurfaceMount, 8.66KΩ, 100mW, 1%	Standard	0603	2	1
R7	1	Standard	Resistor, SurfaceMount, 31.6KΩ, 100mW, 1%	Standard	0603	2	1
R9	1	Standard	Resistor, SurfaceMount, 8.06KΩ, 100mW, 1%	Standard	0603	2	1

SwitcherPro Design Report

Bill of Materials

Design Name: TPS40170

Part: TPS40170

VinMin: 27V **VinMax:** 40V **Vout:** 24V **Iout:** 3A

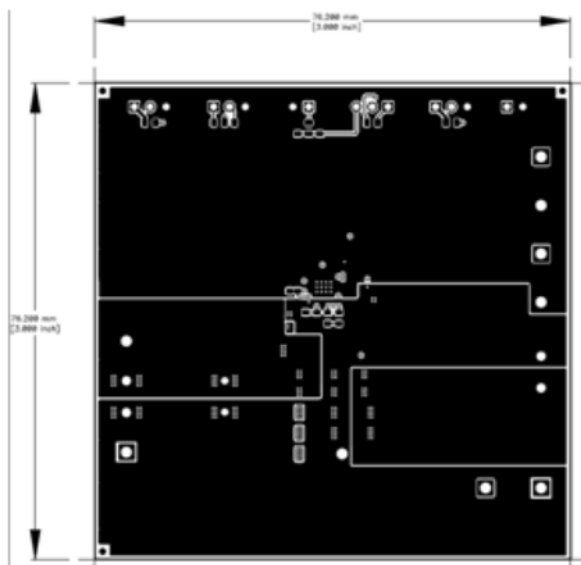
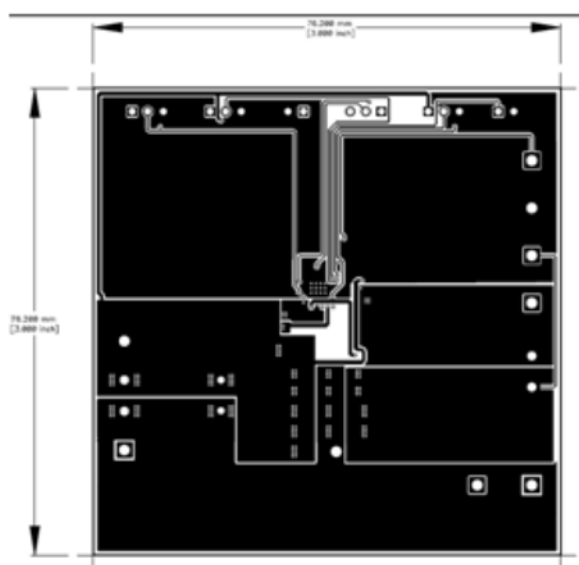
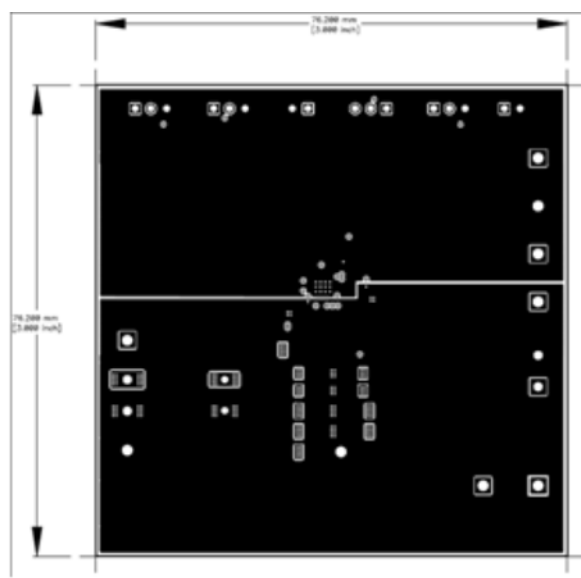
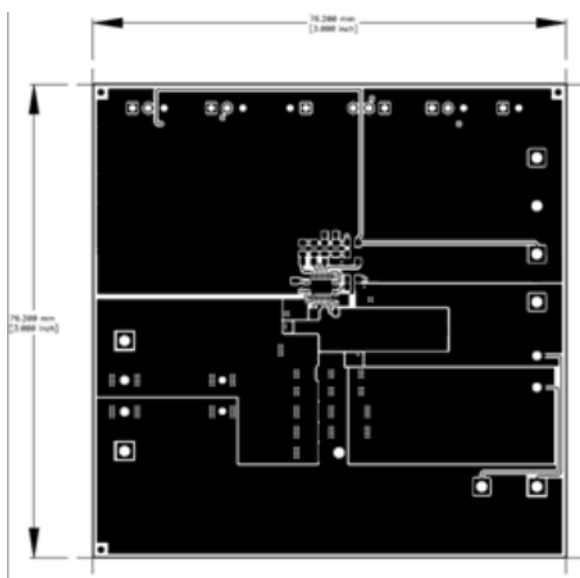
Name	Quantity	Part Number	Description	Manufacturer	Package	Area(mm ²)	Height(mm)
U1	1	TPS40170	IC, Controller, 20 pins	Texas Instruments, Inc.	20-Pin QFN	15	1

SwitcherPro Design Report Layout

Design Name: TPS40170

Part: TPS40170

VinMin: 27V **VinMax:** 40V **Vout:** 24V **Iout:** 3A



SwitcherPro Design Report

Layout Notes

Design Name: TPS40170

Part: TPS40170

VinMin: 27V **VinMax:** 40V **Vout:** 24V **Iout:** 3A

TPS40170

LayoutThe board layout for the TPS40170EVM-608 is shown in Figure.