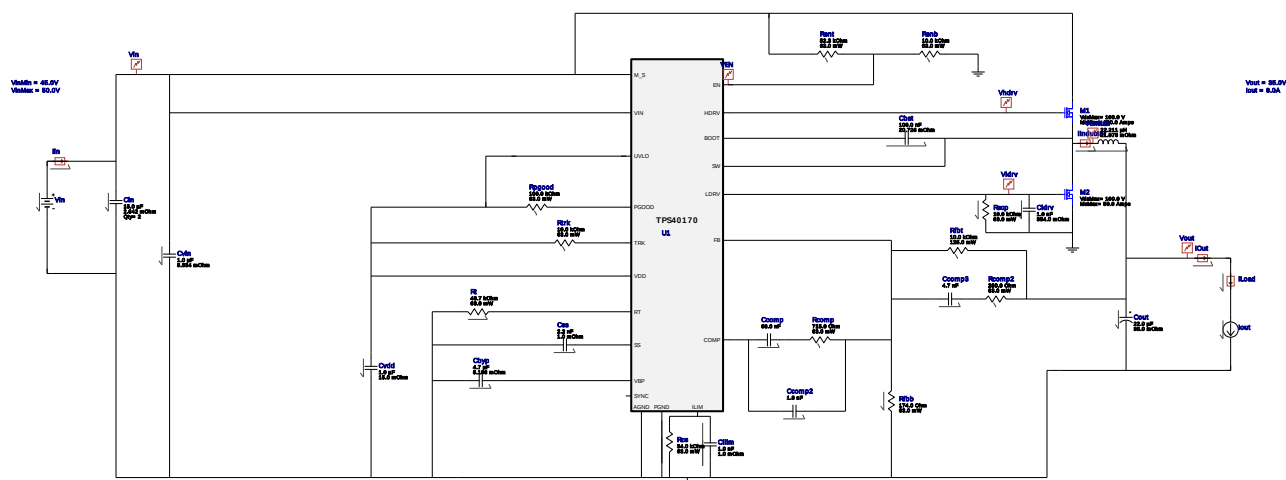


WEBENCH® Electrical Simulation Report



Electrical BOM

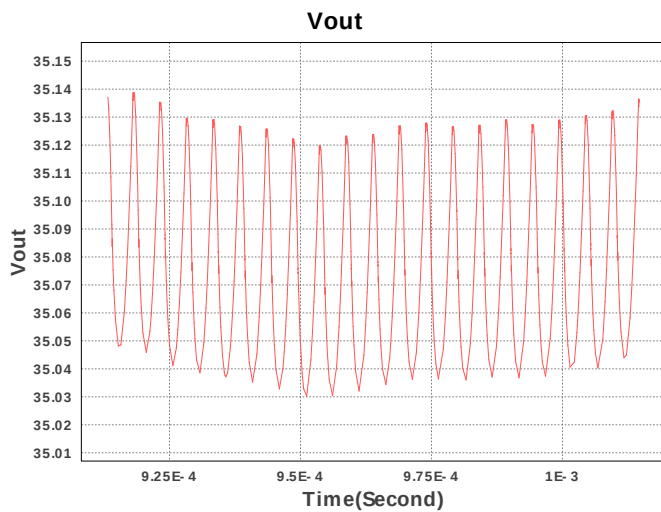
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbst	TDK	C2012X5R2A104K125AA Series= X5R	Cap= 100.0 nF ESR= 20.726 mOhm VDC= 100.0 V IRMS= 1.456 A	1	\$0.04	0805 7 mm ²
2.	Cbyp	MuRata	GRM21BR61C475KA88L Series= X5R	Cap= 4.7 µF ESR= 5.166 mOhm VDC= 16.0 V IRMS= 1.854 A	1	\$0.03	0805 7 mm ²
3.	Ccomp	TDK	C3216C0G1H683K160AA Series= C0G/NP0	Cap= 68.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.20	1206 11 mm ²
4.	Ccomp2	TDK	C2012C0G1H182K060AA Series= C0G/NP0	Cap= 1.8 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.03	0805 7 mm ²
5.	Ccomp3	TDK	C2012C0G1H472J060AA Series= C0G/NP0	Cap= 4.7 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.04	0805 7 mm ²
6.	Cilim	MuRata	GRM216R71E102KA01D Series= X7R	Cap= 1.0 nF ESR= 1.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
7.	Cin	TDK	CGA9P3X7S2A156M250KB Series= X7S	Cap= 15.0 µF ESR= 2.642 mOhm VDC= 100.0 V IRMS= 5.616 A	2	\$1.36	2220_280 54 mm ²
8.	Cldr	Kemet	C0805C102M5RACTU Series= X7R	Cap= 1.0 nF ESR= 384.0 mOhm VDC= 50.0 V IRMS= 214.0 mA	1	\$0.01	0805 7 mm ²
9.	Cout	Panasonic	35SVPF22M Series= SVPF	Cap= 22.0 µF ESR= 35.0 mOhm VDC= 35.0 V IRMS= 2.6 A	1	\$0.45	CAPSMT_62_F61 74 mm ²
10.	Css	MuRata	GRM155R60J222KA01D Series= X5R	Cap= 2.2 nF ESR= 1.0 mOhm VDC= 6.3 V IRMS= 0.0 A	1	\$0.01	0402 3 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	Cvdd	Kemet	C0805C105K4RACTU Series= X7R	Cap= 1.0 μ F ESR= 15.0 mOhm VDC= 16.0 V IRMS= 8.19 A	1	\$0.02	 0805 7 mm ²
12.	Cvin	MuRata	GRM31CR72A105KA01L Series= X7R	Cap= 1.0 μ F ESR= 5.334 mOhm VDC= 100.0 V IRMS= 1.554 A	1	\$0.14	 1206_190 11 mm ²
13.	L1	CUSTOM	CUSTOM	L= 22.211 μ H DCR= 21.875 mOhm	1	NA	CUSTOM 0 mm ²
14.	M1	Texas Instruments	CSD19531Q5A	VdsMax= 100.0 V IdsMax= 100.0 Amps	1	\$0.60	 TRANS_NexFET_Q5A 55 mm ²
15.	M2	Texas Instruments	CSD19537Q3	VdsMax= 100.0 V IdsMax= 50.0 Amps	1	\$0.41	 DQG0008A 18 mm ²
16.	Rcomp	Vishay-Dale	CRCW0402715RFKED Series= CRCW..e3	Res= 715.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
17.	Rcomp2	Vishay-Dale	CRCW0402280RFKED Series= CRCW..e3	Res= 280.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
18.	Rcs	Vishay-Dale	CRCW040234K0FKED Series= CRCW..e3	Res= 34.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
19.	Renb	Stackpole Electronics Inc	RMCF0402FT10K0 Series= ?	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
20.	Rent	Vishay-Dale	CRCW040252K3FKED Series= CRCW..e3	Res= 52.3 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
21.	Rfbb	Vishay-Dale	CRCW0402174RFKED Series= CRCW..e3	Res= 174.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
22.	Rfbt	Yageo America	RT0805DRE0710KL Series= ?	Res= 10.0 kOhm Power= 125.0 mW Tolerance= 0.5%	1	\$0.01	 0805 7 mm ²
23.	Rpgood	Vishay-Dale	CRCW0402100KFED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
24.	Rscp	Stackpole Electronics Inc	RMCF0402FT10K0 Series= ?	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
25.	Rt	Vishay-Dale	CRCW040248K7FKED Series= CRCW..e3	Res= 48.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
26.	Rtrk	Stackpole Electronics Inc	RMCF0402FT10K0 Series= ?	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
27.	U1	Texas Instruments	TPS40170RGYR	Switcher	1	\$2.40	 RGY0020A 25 mm ²

Simulation Parameters

#	Name	Parameter Name	Description	Values
1.	Cbst	IC	Initial Voltage	8.5 V
2.	Cbyp	IC	Initial Voltage	8 V
3.	Cout	IC	Initial Voltage	35.0 V
4.	Css	IC	Initial Voltage	2.5 V

#	Name	Parameter Name	Description	Values
5.	Cvdd	IC	Initial Voltage	3.3 V
6.	L1	IC	Initial Current	8.0 A
7.	Iout	I	Load Current	8.0 A



Design Inputs

#	Name	Value	Description
1.	Iout	8.0 A	Maximum Output Current
2.	VinMax	50.0 V	Maximum input voltage
3.	VinMin	45.0 V	Minimum input voltage
4.	Vout	35.0 V	Output Voltage
5.	base_pn	TPS40170	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0 degC	Ambient temperature
8.	UserFsw	197.239 kHz	Customer Selected Frequency

Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	3.662 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	693.102 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	5.696 A	Current	Average input current
4.	L Ipp	2.401 A	Current	Peak-to-peak inductor ripple current
5.	SW Ipk	9.2 A	Current	Peak switch current
6.	BOM Count	28	General	Total Design BOM count
7.	FootPrint	447.0 mm ²	General	Total Foot Print Area of BOM components
8.	Frequency	197.239 kHz	General	Switching frequency
9.	IC Tolerance	6.0 μ V	General	IC Feedback Tolerance
10.	Mode	CCM	General	Conduction Mode
11.	Pout	280.0 W	General	Total output power
12.	Total BOM	\$0.0	General	Total BOM Cost
13.	Cross Freq	19.06 kHz	Op Point	Bode plot crossover frequency
14.	Duty Cycle	70.123 %	Op Point	Duty cycle
15.	Efficiency	98.317 %	Op Point	Steady state efficiency
16.	Gain Marg	-68.863 dB	Op Point	Bode Plot Gain Margin
17.	IC Tj	59.828 degC	Op Point	IC junction temperature
18.	IOUT_OP	8.0 A	Op Point	Iout operating point
19.	Low Freq Gain	69.824 dB	Op Point	Gain at 1Hz
20.	M1 Tj	116.032 degC	Op Point	M1 MOSFET junction temperature
21.	M2 Tj	76.873 degC	Op Point	M2 MOSFET junction temperature
22.	Phase Marg	65.535 deg	Op Point	Bode Plot Phase Margin
23.	VIN_OP	50.0 V	Op Point	Vin operating point
24.	Vout Actual	35.083 V	Op Point	Vout Actual calculated based on selected voltage divider resistors
25.	Vout Tolerance	1.49 %	Op Point	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
26.	Vout p-p	99.617 mV	Op Point	Peak-to-peak output ripple voltage
27.	Cin Pd	17.713 mW	Power	Input capacitor power dissipation
28.	Cout Pd	16.814 mW	Power	Output capacitor power dissipation
29.	IC Pd	852.219 mW	Power	IC power dissipation
30.	L Pd	1.411 W	Power	Inductor power dissipation
31.	M1 Pd	1.71 W	Power	M1 MOSFET total power dissipation

#	Name	Value	Category	Description
32.	M1 PdCond	544.374 mW	Power	M1 MOSFET conduction losses
33.	M1 PdSw	1.165 W	Power	M1 MOSFET switching losses
34.	M2 Pd	785.714 mW	Power	M2 MOSFET total power dissipation
35.	M2 PdCond	327.483 mW	Power	M2 MOSFET conduction losses
36.	M2 PdSw	458.231 mW	Power	M2 MOSFET switching losses
37.	Total Pd	4.793 W	Power	Total Power Dissipation

Design Assistance

1. **TPS40170** Product Folder : <http://www.ti.com/product/TPS40170> : contains the data sheet and other resources.

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