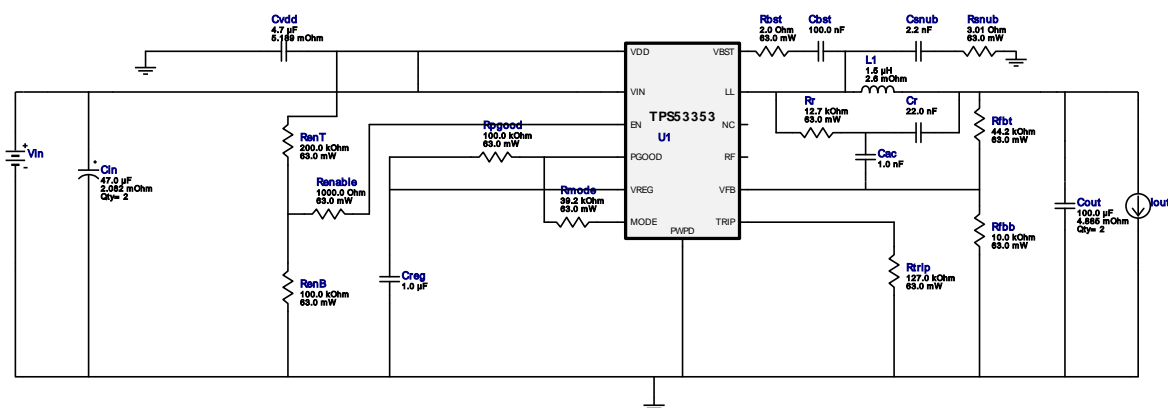


WEBENCH[®] Design Report

Design : 4058737/175 TPS53353DQPR
TPS53353DQPR 12.0V-15.0V to 3.30V @ 15.0A

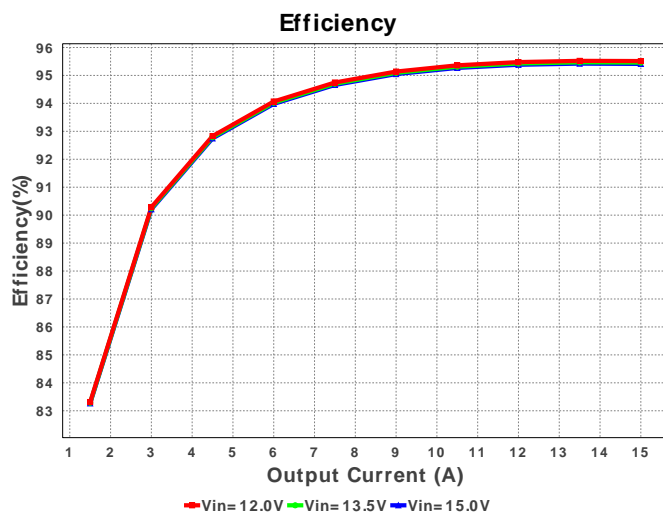
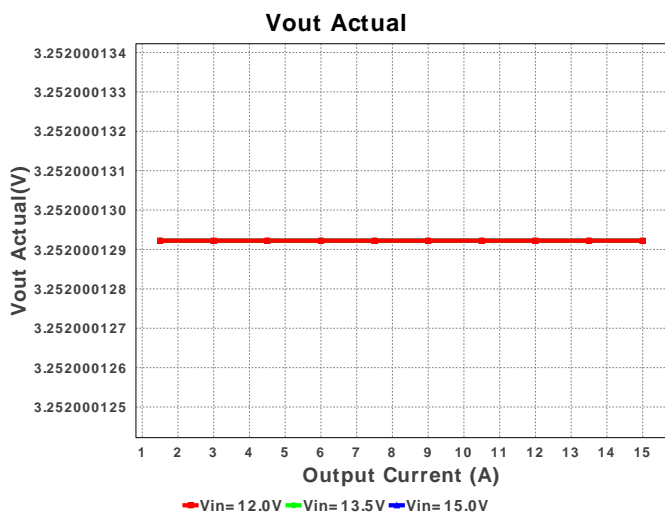
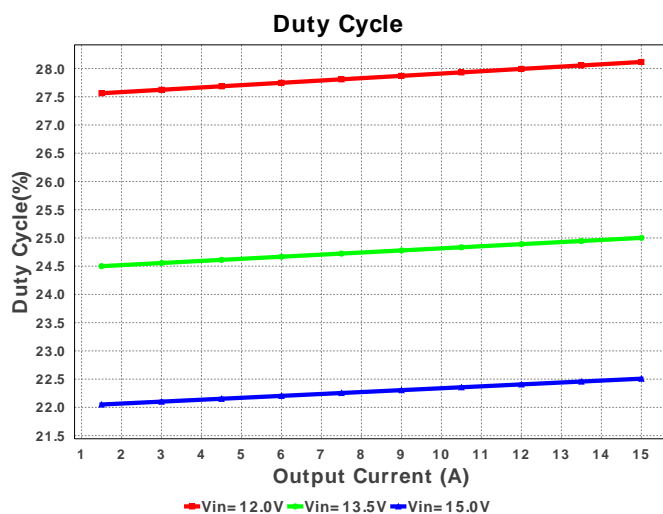
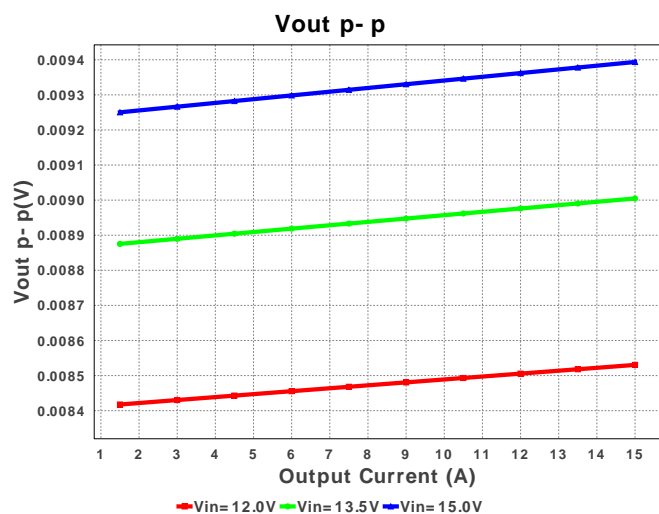
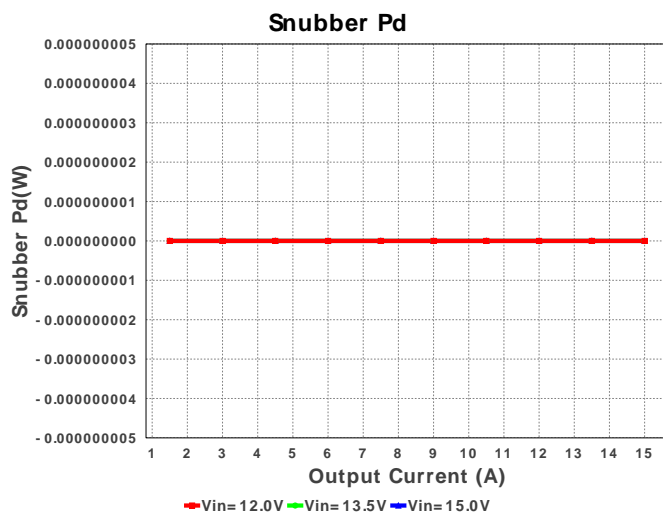
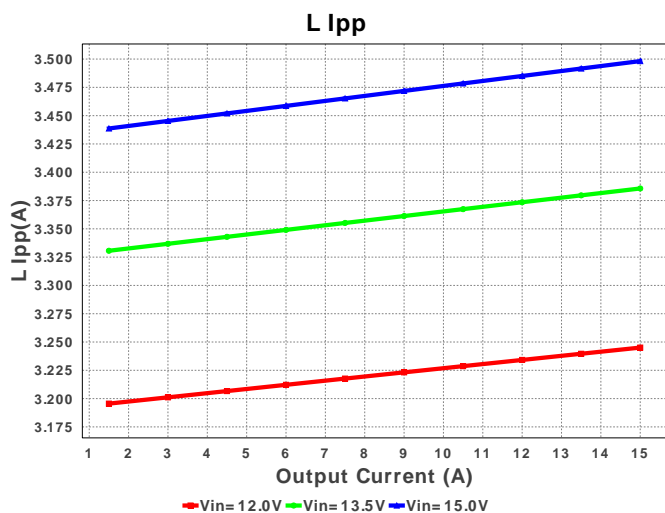
Vout = 3.3V
Iout = 15.0A


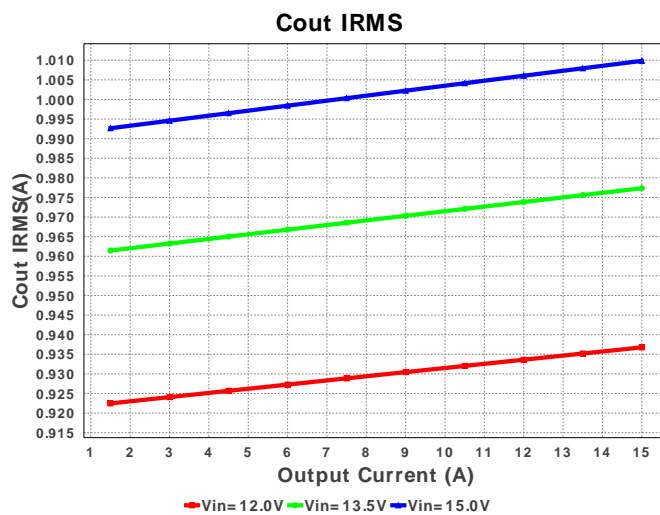
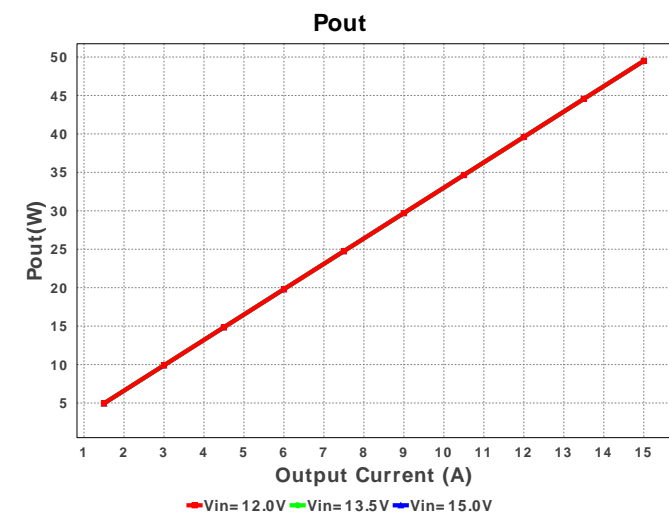
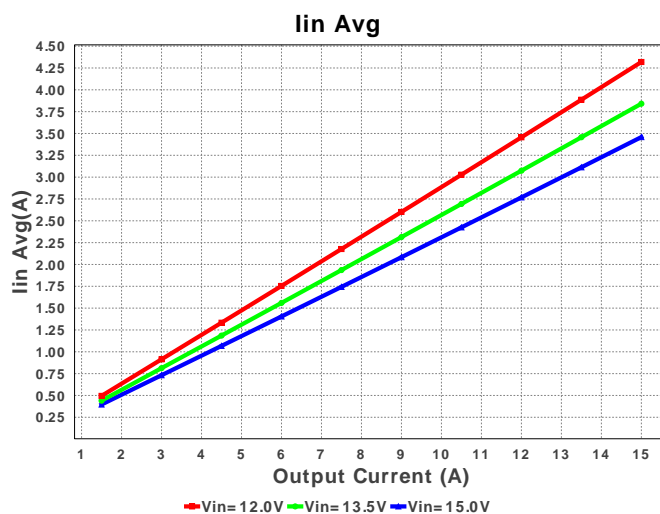
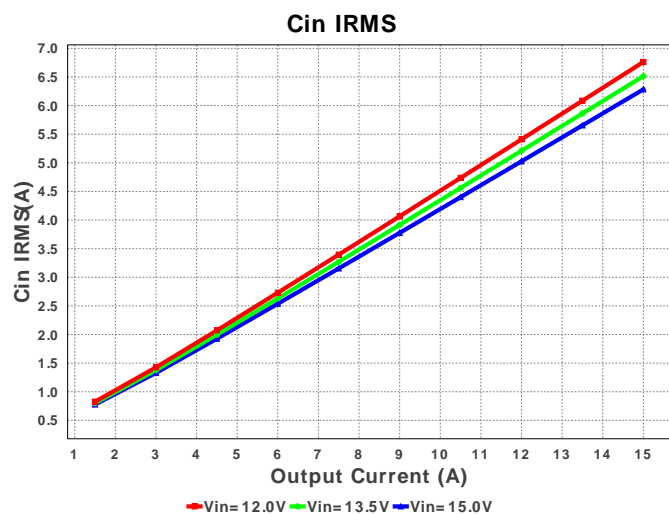
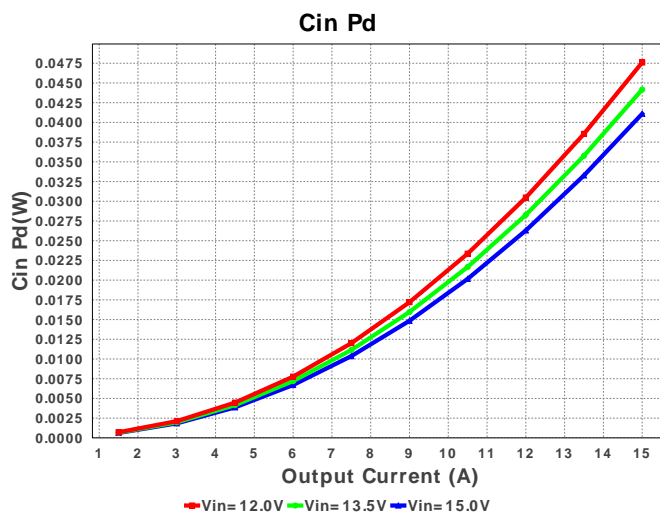
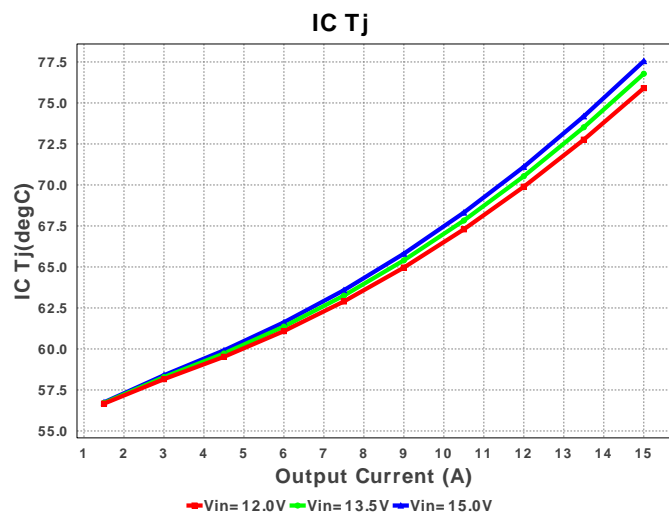
Electrical BOM

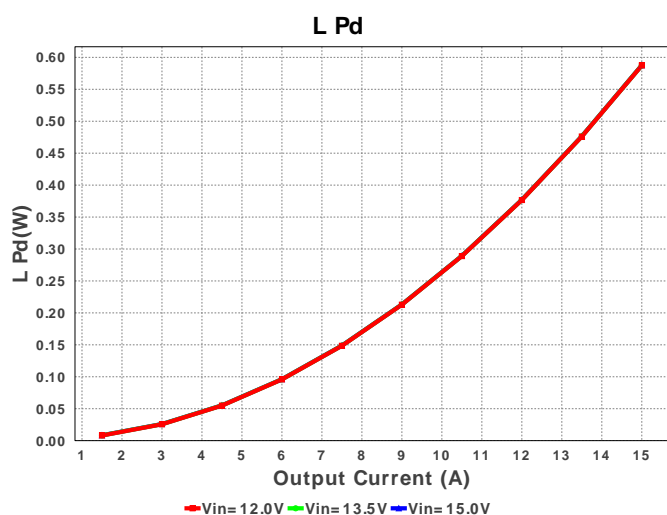
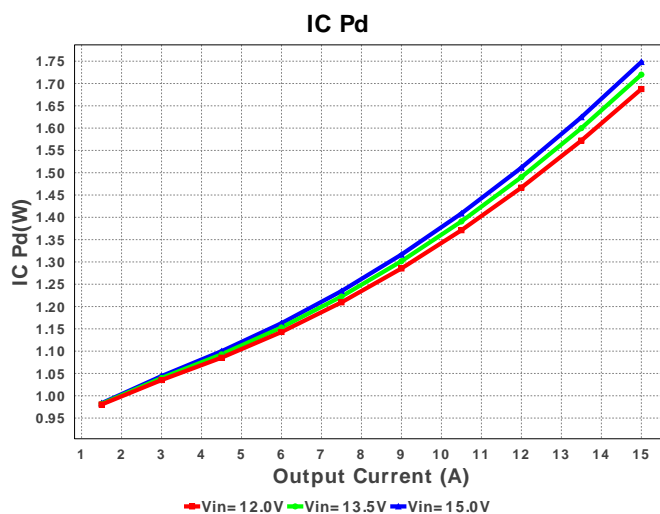
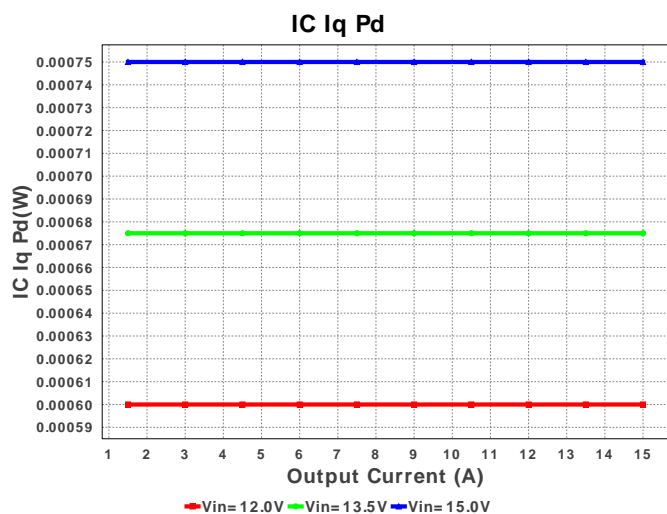
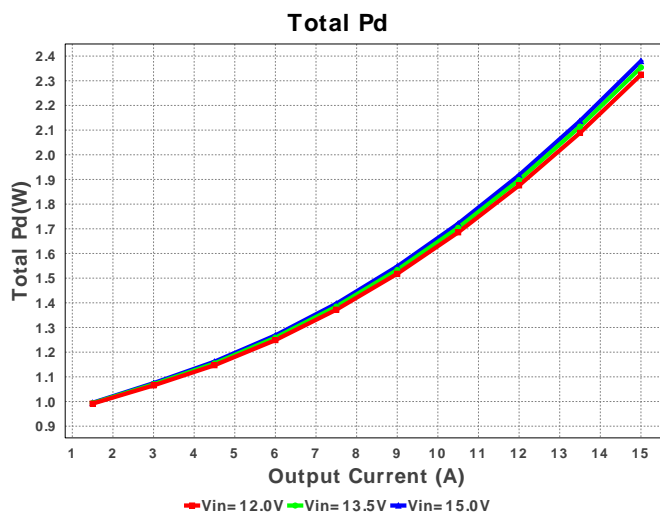
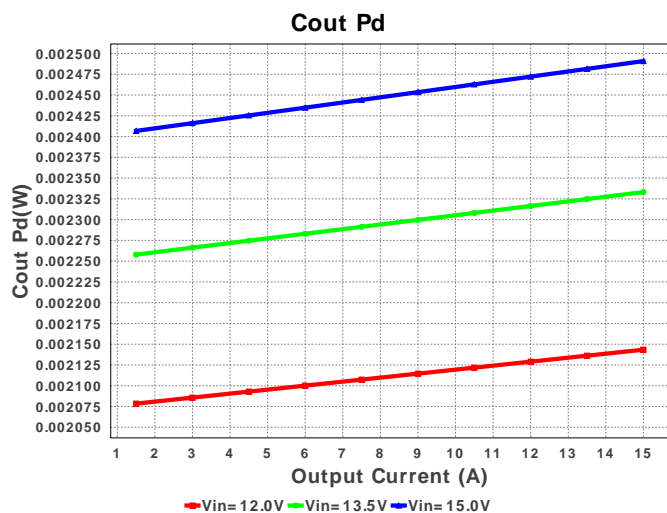
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cac	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
2.	Cbst	MuRata	GRM21BR71E104KA01L Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
3.	Cin	TDK	C3216X5R1E476M160AC Series= X5R	Cap= 47.0 µF ESR= 2.082 mOhm VDC= 25.0 V IRMS= 5.0279 A	2	\$0.35	1206 11 mm ²
4.	Cout	MuRata	GRM31CR60J107ME39L Series= X5R	Cap= 100.0 µF ESR= 4.885 mOhm VDC= 6.3 V IRMS= 4.4118 A	2	\$0.14	1206_190 11 mm ²
5.	Cr	Yageo America	CC0805KRX7R9BB223 Series= X7R	Cap= 22.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
6.	Creg	Taiyo Yuden	EMK212B7105KG-T Series= X7R	Cap= 1.0 µF VDC= 16.0 V IRMS= 0.0 A	1	\$0.02	0805 7 mm ²
7.	Csnub	Yageo America	CC0805KRX7R9BB222 Series= X7R	Cap= 2.2 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
8.	Cvdd	MuRata	GRM21BR61E475KA12L Series= X5R	Cap= 4.7 µF ESR= 5.189 mOhm VDC= 25.0 V IRMS= 2.03531 A	1	\$0.02	0805 7 mm ²
9.	L1	Bourns	SRP1270-1R5M	L= 1.5 µH DCR= 2.6 mOhm	1	\$0.60	SRP1270 246 mm ²


SRP1270 246 mm²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	Rbst	Vishay-Dale	CRCW04022R00FKED Series= CRCW..e3	Res= 2.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
11.	RenB	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
12.	RenT	Vishay-Dale	CRCW0402200KFKED Series= CRCW..e3	Res= 200.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
13.	Renable	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1000.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
14.	Rfbb	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
15.	Rfbt	Vishay-Dale	CRCW040244K2FKED Series= CRCW..e3	Res= 44.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
16.	Rmode	Vishay-Dale	CRCW040239K2FKED Series= CRCW..e3	Res= 39.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
17.	Rpgood	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
18.	Rr	Vishay-Dale	CRCW040212K7FKED Series= CRCW..e3	Res= 12.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
19.	Rsnub	Vishay-Dale	CRCW04023R01FKED Series= CRCW..e3	Res= 3.01 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
20.	Rtrip	Vishay-Dale	CRCW0402127KFKED Series= CRCW..e3	Res= 127.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
21.	U1	Texas Instruments	TPS53353DQPR	Switcher	1	\$3.50	 DQP0022A 56 mm ²







Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	6.283 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	1.01 A	Current	Output capacitor RMS ripple current
3.	Iin Avg	3.459 A	Current	Average input current
4.	L Ipp	3.498 A	Current	Peak-to-peak inductor ripple current
5.	BOM Count	23	General	Total Design BOM count
6.	FootPrint	420.0 mm ²	General	Total Foot Print Area of BOM components
7.	Frequency	500.0 kHz	General	Switching frequency
8.	Pout	49.5 W	General	Total output power
9.	Total BOM	\$5.27	General	Total BOM Cost
10.	Vout Actual	3.252 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
11.	Vout OP	3.3 V	Op_Point	Operational Output Voltage

#	Name	Value	Category	Description
12.	Duty Cycle	22.508 %	Op_point	Duty cycle
13.	Efficiency	94.936 %	Op_point	Steady state efficiency
14.	IC Tj	77.552 degC	Op_point	IC junction temperature
15.	ICThetaJA	27.2 degC/W	Op_point	IC junction-to-ambient thermal resistance
16.	IOUT_OP	15.0 A	Op_point	Iout operating point
17.	VIN_OP	15.0 V	Op_point	Vin operating point
18.	Vout p-p	9.394 mV	Op_point	Peak-to-peak output ripple voltage
19.	Cin Pd	41.092 mW	Power	Input capacitor power dissipation
20.	Cout Pd	2.491 mW	Power	Output capacitor power dissipation
21.	IC Iq Pd	750.0 μ W	Power	IC Iq Pd
22.	IC Pd	1.748 W	Power	IC power dissipation
23.	L Pd	587.651 mW	Power	Inductor power dissipation
24.	Snubber Pd	247.5 mW	Power	Snubber Power Dissipation
25.	Total Pd	2.627 W	Power	Total Power Dissipation
26.	Vout Tolerance	1.647 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	15.0	Maximum Output Current
2.	VinMax	15.0	Maximum input voltage
3.	VinMin	12.0	Minimum input voltage
4.	Vout	3.3	Output Voltage
5.	base_pn	TPS53353	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

1. TPS53353 Product Folder : <http://www.ti.com/product/TPS53353> : contains the data sheet and other resources.

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