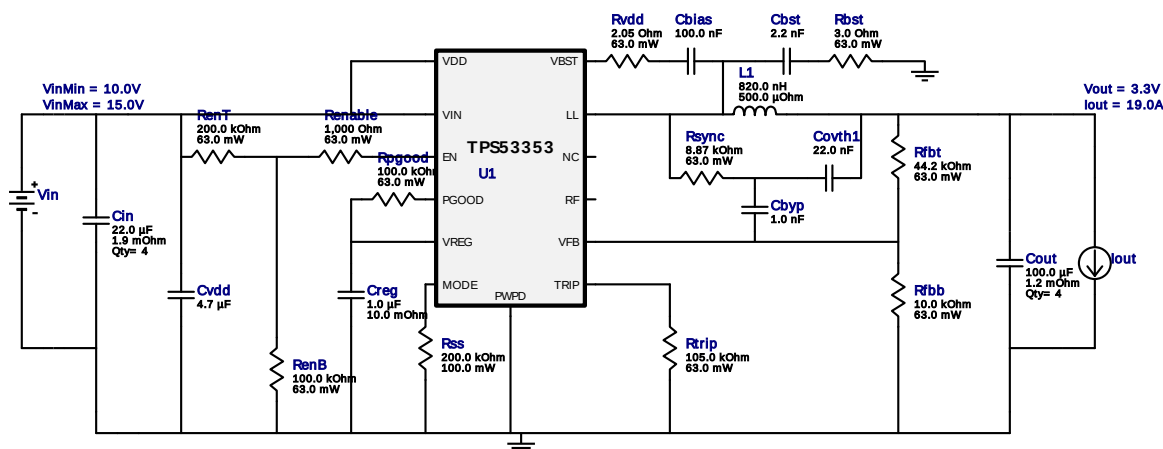


WEBENCH® Design Report

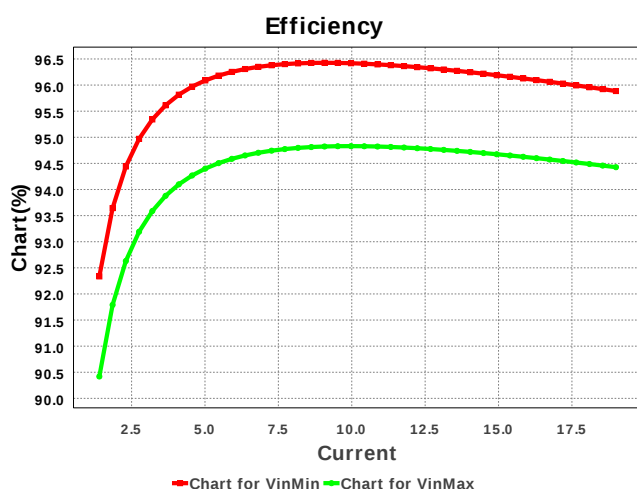
Design : 1209005/187 TPS53353DQPR
TPS53353DQPR 10.0V-15.0V to 3.3V @ 19.0A



Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbias	Kemet	C0603C104K5RACTU Series= X7R	Cap= 100.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0603 10mm2
2.	Cbst	Kemet	C0603C222K5RAC Series= X7R	Cap= 2.2 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.03	0603 10mm2
3.	Cbyp	Kemet	C0603C102J5GAC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.04	0603 10mm2
4.	Cin	TDK	C4532X7R1C226M Series= X7R	Cap= 22.0 µF ESR= 1.9 mOhm VDC= 16.0 V IRMS= 3.6 A	4	\$0.41	1812 39mm2
5.	Cout	TDK	C4532X5R0J107M Series= X5R	Cap= 100.0 µF ESR= 1.2 mOhm VDC= 6.3 V IRMS= 4.6 A	4	\$0.74	1812 39mm2
6.	Covth1	Kemet	C0603C223K5RACTU Series= X7R	Cap= 22.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0603 10mm2
7.	Creg	TDK	C3216X7R1H105K Series= X7R	Cap= 1.0 µF ESR= 10.0 mOhm VDC= 50.0 V IRMS= 3.2 A	1	\$0.04	1206 19mm2
8.	Cvd	MuRata	GRM21BC81E475KA12L Series= 379	Cap= 4.7 µF VDC= 25.0 V IRMS= 0.0 A	1	\$0.04	0805 13mm2
9.	L1	Würth Elektronik eiSos	7443556082	L= 820.0 nH DCR= 500.0 µOhm	1	\$6.34	WE-HCB-18X8.9 410mm2

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	Rbst	Vishay-Dale	CRCW04023R00JNED Series= CRCW..e3	Res= 3.0 Ohm Power= 63.0 mW Tolerance= 5.0%	1	\$0.07	 0402 8mm2
11.	RenB	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 8mm2
12.	RenT	Vishay-Dale	CRCW0402200KFKED Series= CRCW..e3	Res= 200.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 8mm2
13.	Renable	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1,000 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 8mm2
14.	Rfbb	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 8mm2
15.	Rfbb	Vishay-Dale	CRCW040244K2FKED Series= CRCW..e3	Res= 44.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 8mm2
16.	Rpgood	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 8mm2
17.	Rss	Vishay-Dale	CRCW0603200KFKEA Series= CRCW..e3	Res= 200.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 10mm2
18.	Rsync	Vishay-Dale	CRCW04028K87FKED Series= CRCW..e3	Res= 8.87 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 8mm2
19.	Rtrip	Vishay-Dale	CRCW0402105KFKED Series= CRCW..e3	Res= 105.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 8mm2
20.	Rvdd	Vishay-Dale	CRCW04022R05FKED Series= CRCW..e3	Res= 2.05 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 8mm2
21.	U1	Texas Instruments	TPS53353DQPR	Switcher	1	\$3.95	 R-PSON-N22 58mm2



Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	2.26 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	570.0 mA	Current	Output capacitor RMS ripple current
3.	IC Irms	19.1 A	Current	Calculated current across IC
4.	L Ipp Max	7.962 A	Current	Inductor Peak to Peak Current calculated Max
5.	L Ipp Min	6.831 A	Current	Inductor Peak to Peak Current calculated Min

#	Name	Value	Category	Description
6.	L1 Irms	19.1 A	Current	Inductor ripple current
7.	BOM Count	27	General	Total Design BOM count
8.	FootPrint	934.0 mm2	General	Total Foot Print Area of BOM components
9.	Frequency	500.0 kHz	General	Switching frequency
10.	IC Tolerance	600.0 mV	General	IC Feedback Tolerance
11.	Pout	62.7 W	General	Total output power
12.	Total BOM	\$15.24	General	Total BOM Cost
13.	Cin Vdrop	15.1 V	Op_Point	Calculated voltage across input cap
14.	Cout Vdrop	3.32 V	Op_Point	Calculated voltage across output capacitor
15.	IC Vdrop	15.1 V	Op_Point	Calculated voltage across IC
16.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
17.	Duty Cycle	22.4 %	Op_point	Duty cycle
18.	Efficiency	94.428 %	Op_point	Steady state efficiency
19.	IC Tj	80.0 degC	Op_point	IC junction temperature
20.	IOUT_OP	19.0 A	Op_point	Iout operating point
21.	VIN_OP	15.0 V	Op_point	Vin operating point
22.	Vout p-p	8.7 mV	Op_point	Peak-to-peak output ripple voltage
23.	Cin Pd	39.0 mW	Power	Input capacitor power dissipation
24.	Cout Pd	2.0 mW	Power	Output capacitor power dissipation
25.	IC Pd	3.1 W	Power	IC power dissipation
26.	M1 Rdson Max	5.0 mOhm	Power	High side FET Rdson max
27.	M1 Rdson Min	5.0 mOhm	Power	High side FET Rdson min
28.	M2 Rdson Max	2.0 mOhm	Power	Low side FET Rdson Max
29.	M2 Rdson Min	2.0 mOhm	Power	Low side FET Rdson Min
30.	Total Pd	3.1 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	19.0 A	Maximum Output Current
2.	Iout1	19.0 Amps	Output Current #1
3.	VinMax	15.0 V	Maximum input voltage
4.	VinMin	10.0 V	Minimum input voltage
5.	Vout	3.3 V	Output Voltage
6.	Vout1	3.3 Volt	Output Voltage #1
7.	base_pn	TPS53353	Base Product Number
8.	source	DC	Input Source Type
9.	Ta	30.0 degC	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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