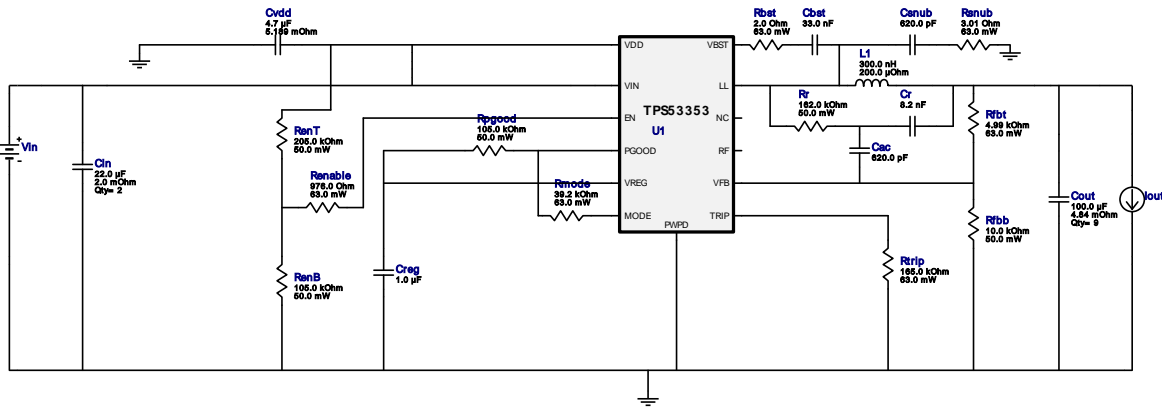


**WEBENCH® Design Report**

 Design : 4861726/193 TPS53353DQPR  
 TPS53353DQPR 11.0V-12.0V to .90V @ 20.0A

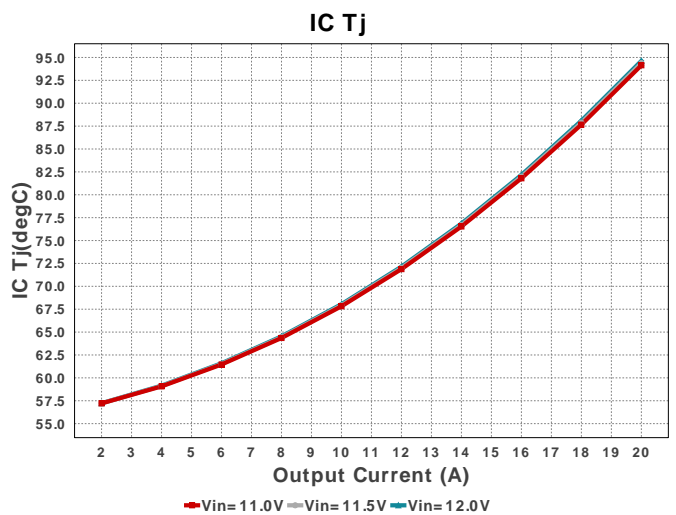
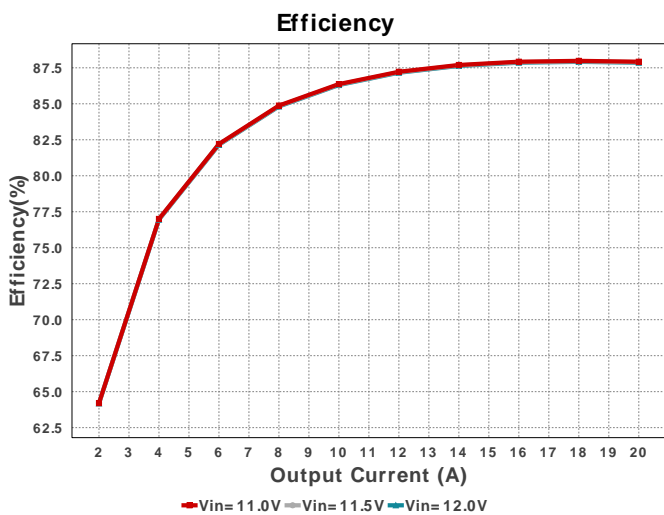
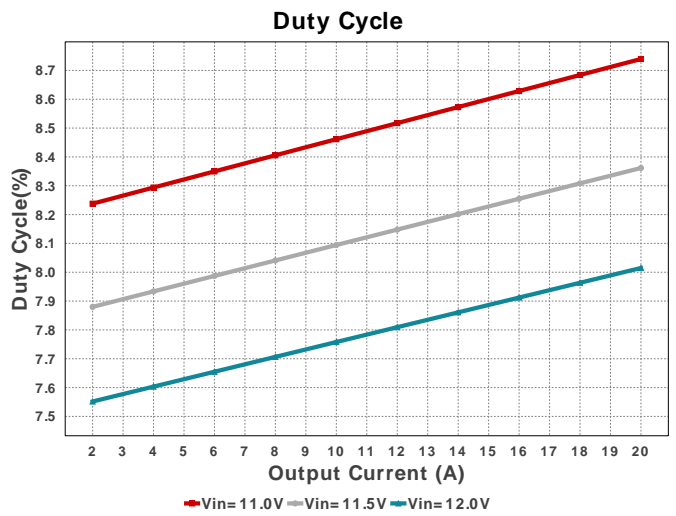
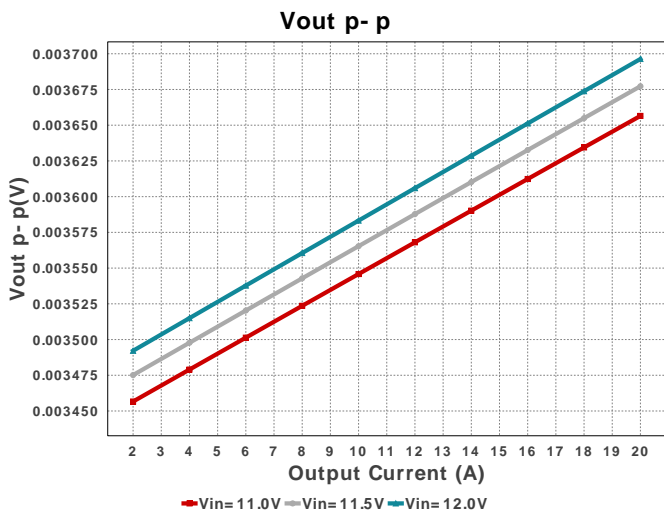
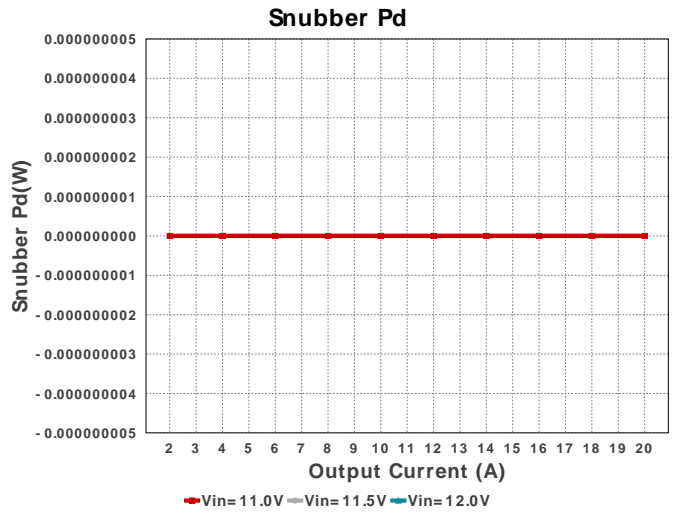
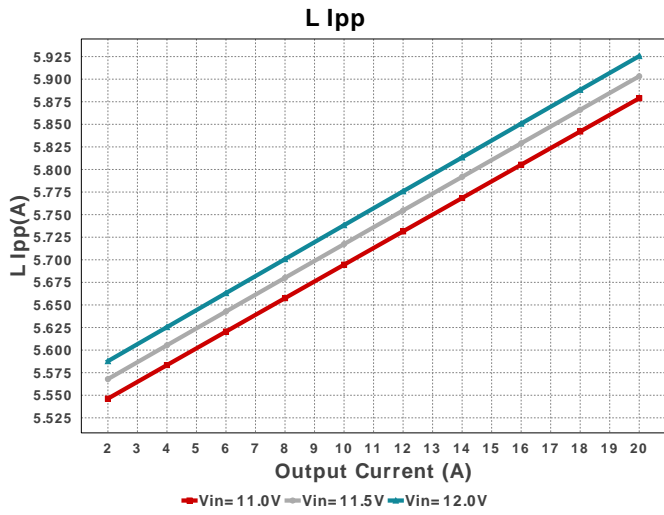
 Vout = 0.9V  
 Iout = 20.0A

**My Comments**

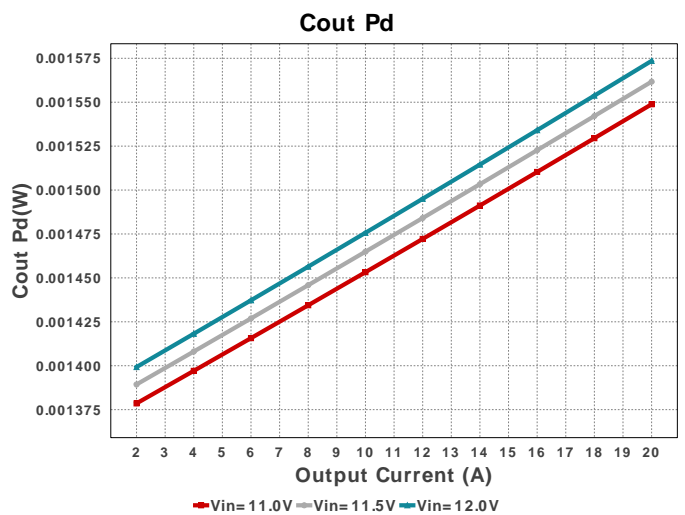
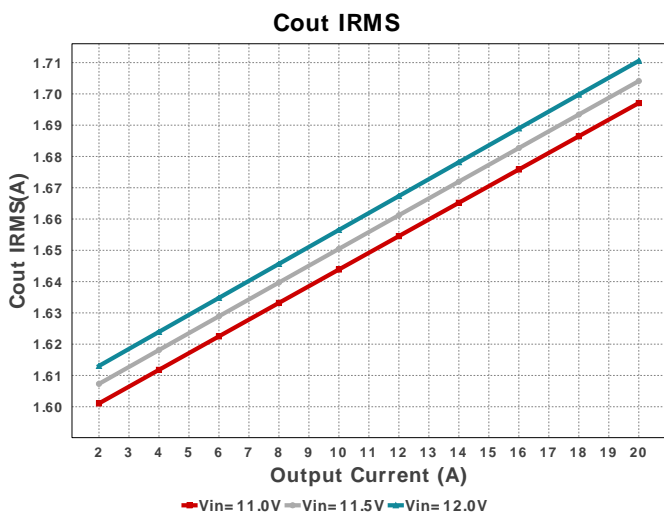
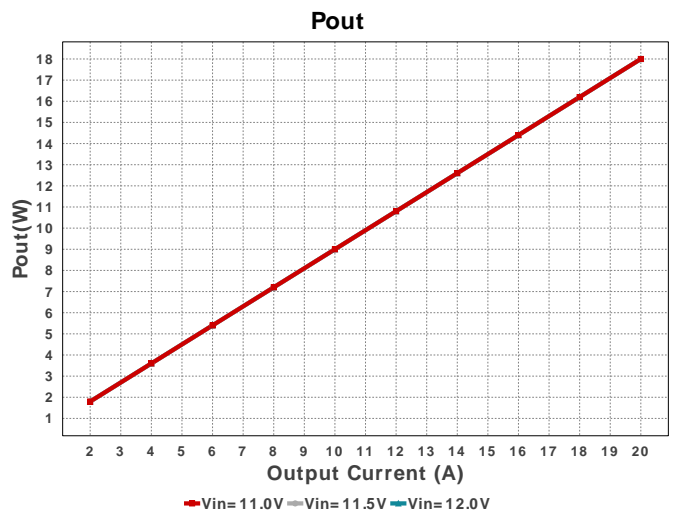
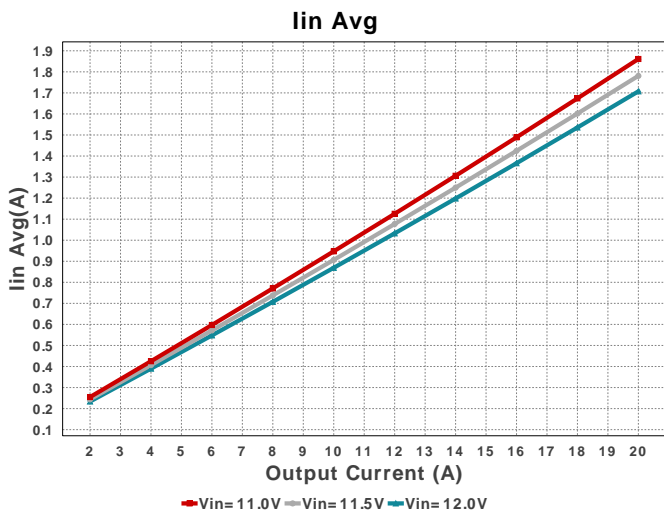
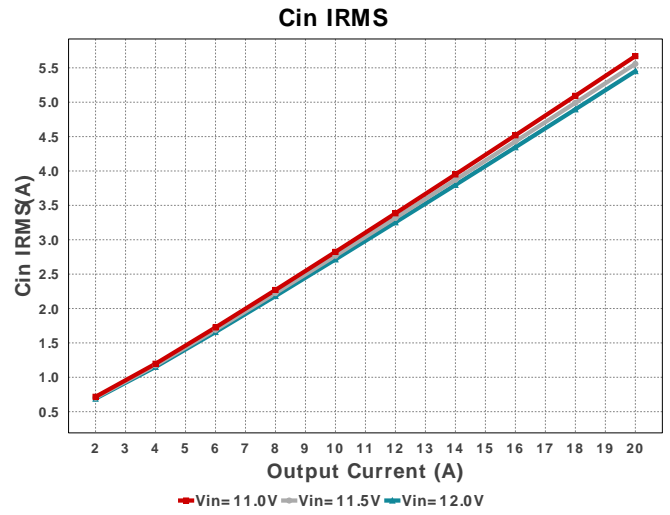
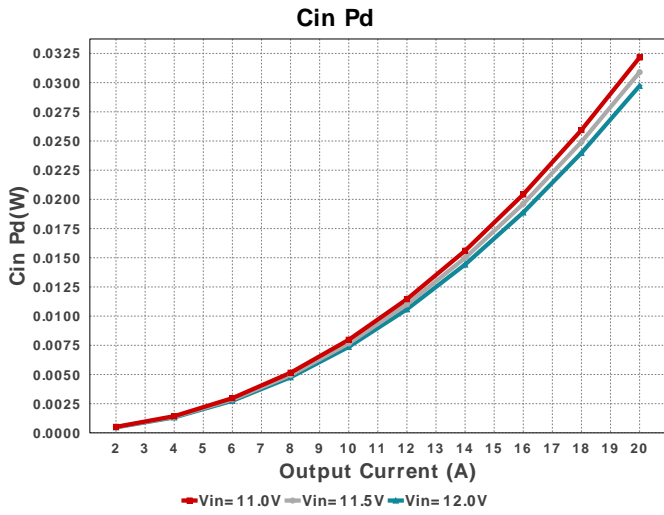
No comments

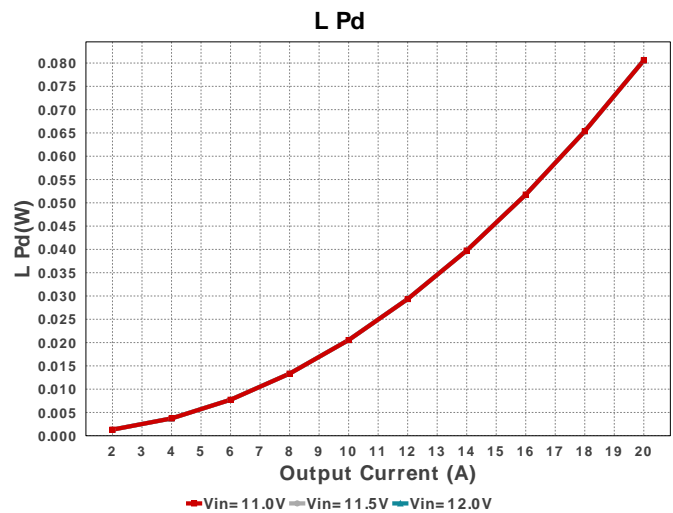
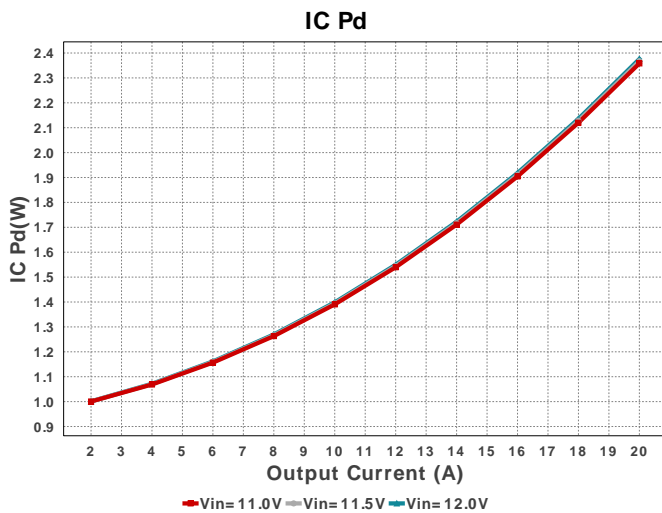
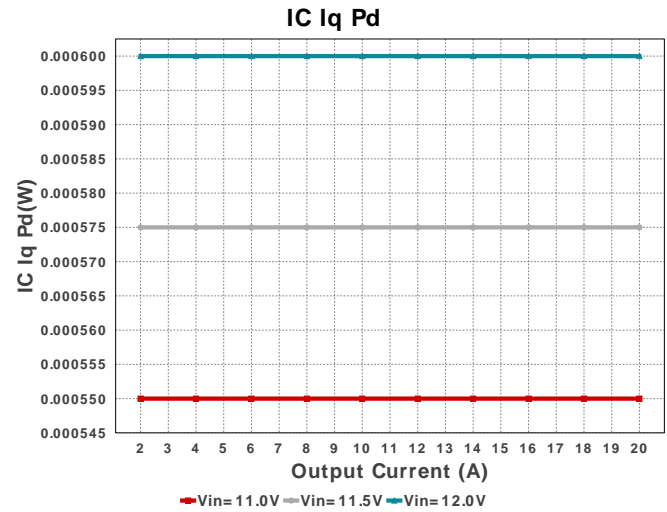
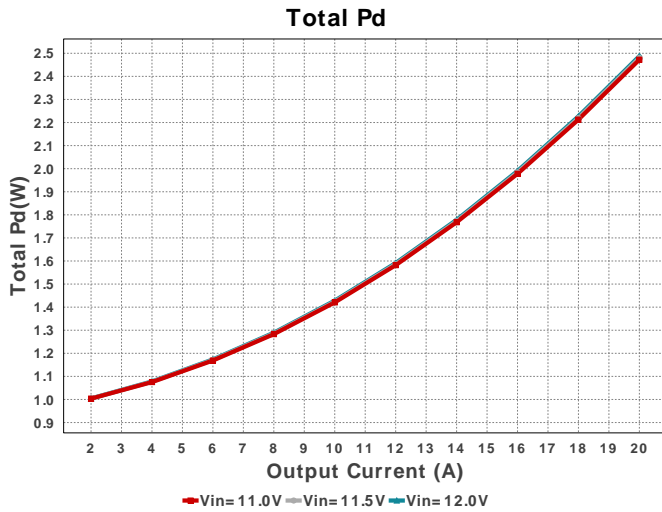
**Electrical BOM**

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cac	Samsung Electro-Mechanics	CL21C621JBCNNNC Series= C0G/NP0	Cap= 620.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm <sup>2</sup>
2.	Cbst	TDK	CGA4J2C0G1H333J125AA Series= C0G/NP0	Cap= 33.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.09	0805 7 mm <sup>2</sup>
3.	Cin	MuRata	GRM32ER61C226KE20L Series= X5R	Cap= 22.0 uF ESR= 2.0 mOhm VDC= 16.0 V IRMS= 3.68 A	2	\$0.15	1210 15 mm <sup>2</sup>
4.	Cin	MuRata	GRM32ER61C226KE20L Series= X5R	Cap= 22.0 uF ESR= 2.0 mOhm VDC= 16.0 V IRMS= 3.68 A	2	\$0.15	1210 15 mm <sup>2</sup>
5.	Cout	MuRata	GRM31CD80G107ME39L Series= X6T	Cap= 100.0 uF ESR= 4.84 mOhm VDC= 4.0 V IRMS= 4.3381 A	9	\$0.17	1206_190 11 mm <sup>2</sup>
6.	Cr	Samsung Electro-Mechanics	CL21C822JBFNNNE Series= C0G/NP0	Cap= 8.2 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.02	0805 7 mm <sup>2</sup>
7.	Creg	Panasonic	EPCU1C105MA5 Series= EPCU(A)	Cap= 1.0 uF VDC= 16.0 V IRMS= 0.0 A	1	\$0.20	1210 15 mm <sup>2</sup>
8.	Csub	Samsung Electro-Mechanics	CL21C621JBCNNNC Series= C0G/NP0	Cap= 620.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm <sup>2</sup>
9.	Cvdd	MuRata	GRM21BR61E475KA12L Series= X5R	Cap= 4.7 uF ESR= 5.189 mOhm VDC= 25.0 V IRMS= 2.03531 A	1	\$0.03	0805 7 mm <sup>2</sup>

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	L1	Coilcraft	SLC1175-301MEB	L= 300.0 nH DCR= 200.0 $\mu$ Ohm	1	\$0.48	 SLC1175 125 mm <sup>2</sup>
11.	Rbst	Vishay-Dale	CRCW04022R00FKED Series= CRCW..e3	Res= 2.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
12.	RenB	Yageo America	RC0201FR-07105KL Series= ?	Res= 105.0 kOhm Power= 50.0 mW Tolerance= 1.0%	1	\$0.01	 0201 2 mm <sup>2</sup>
13.	RenT	Yageo America	RC0201FR-07205KL Series= ?	Res= 205.0 kOhm Power= 50.0 mW Tolerance= 1.0%	1	\$0.01	 0201 2 mm <sup>2</sup>
14.	Renable	Vishay-Dale	CRCW0402976RFKED Series= CRCW..e3	Res= 976.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
15.	Rfbb	Yageo America	RC0201FR-0710KL Series= ?	Res= 10.0 kOhm Power= 50.0 mW Tolerance= 1.0%	1	\$0.01	 0201 2 mm <sup>2</sup>
16.	Rfbt	Vishay-Dale	CRCW04024K99FKED Series= CRCW..e3	Res= 4.99 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
17.	Rmode	Vishay-Dale	CRCW040239K2FKED Series= CRCW..e3	Res= 39.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
18.	Rpgood	Yageo America	RC0201FR-07105KL Series= ?	Res= 105.0 kOhm Power= 50.0 mW Tolerance= 1.0%	1	\$0.01	 0201 2 mm <sup>2</sup>
19.	Rr	Yageo America	RC0201FR-07162KL Series= ?	Res= 162.0 kOhm Power= 50.0 mW Tolerance= 1.0%	1	\$0.01	 0201 2 mm <sup>2</sup>
20.	Rsnub	Vishay-Dale	CRCW04023R01FKED Series= CRCW..e3	Res= 3.01 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
21.	Rtrip	Vishay-Dale	CRCW0402165KFKED Series= CRCW..e3	Res= 165.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
22.	U1	Texas Instruments	TPS53353DQPR	Switcher	1	\$3.05	 DQP0022A 56 mm <sup>2</sup>







## Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	5.452 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	1.711 A	Current	Output capacitor RMS ripple current
3.	Iin Avg	1.707 A	Current	Average input current
4.	L Ipp	5.926 A	Current	Peak-to-peak inductor ripple current
5.	BOM Count	32	General	Total Design BOM count
6.	FootPrint	415.0 mm <sup>2</sup>	General	Total Foot Print Area of BOM components
7.	Frequency	500.0 kHz	General	Switching frequency
8.	Mode	CCM	General	Conduction Mode
9.	Pout	18.0 W	General	Total output power
10.	Total BOM	\$6.13	General	Total BOM Cost
11.	Duty Cycle	8.015 %	Op Point	Duty cycle
12.	Efficiency	87.639 %	Op Point	Steady state efficiency
13.	IC Tj	94.628 degC	Op Point	IC junction temperature
14.	ICThetaJA	27.2 degC/W	Op Point	IC junction-to-ambient thermal resistance
15.	IOUT_OP	20.0 A	Op Point	Iout operating point
16.	VIN_OP	12.0 V	Op Point	Vin operating point
17.	Vout Actual	899.4 mV	Op Point	Vout Actual calculated based on selected voltage divider resistors
18.	Vout OP	900.0 mV	Op Point	Operational Output Voltage
19.	Vout Tolerance	1.679 %	Op Point	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
20.	Vout p-p	3.696 mV	Op Point	Peak-to-peak output ripple voltage
21.	Cin Pd	29.724 mW	Power	Input capacitor power dissipation
22.	Cout Pd	1.574 mW	Power	Output capacitor power dissipation
23.	IC Iq Pd	600.0 μW	Power	IC Iq Pd
24.	IC Pd	2.376 W	Power	IC power dissipation
25.	L Pd	80.585 mW	Power	Inductor power dissipation
26.	Snubber Pd	44.64 mW	Power	Snubber Power Dissipation
27.	Total Pd	2.532 W	Power	Total Power Dissipation

## Design Inputs

#	Name	Value	Description
1.	Iout	20.0	Maximum Output Current
2.	VinMax	12.0	Maximum input voltage
3.	VinMin	11.0	Minimum input voltage
4.	Vout	900.0 m	Output Voltage
5.	base_pn	TPS53353	Base Product 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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