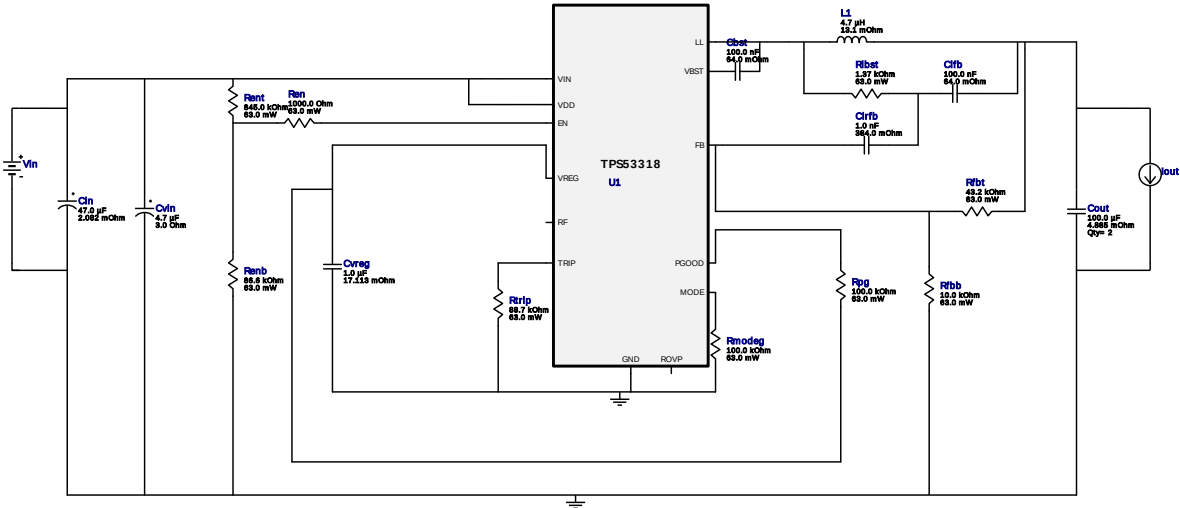


WEBENCH® Design Report

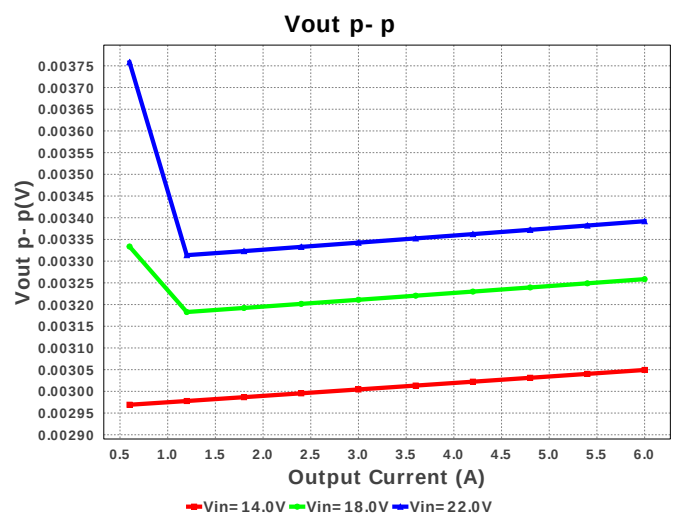
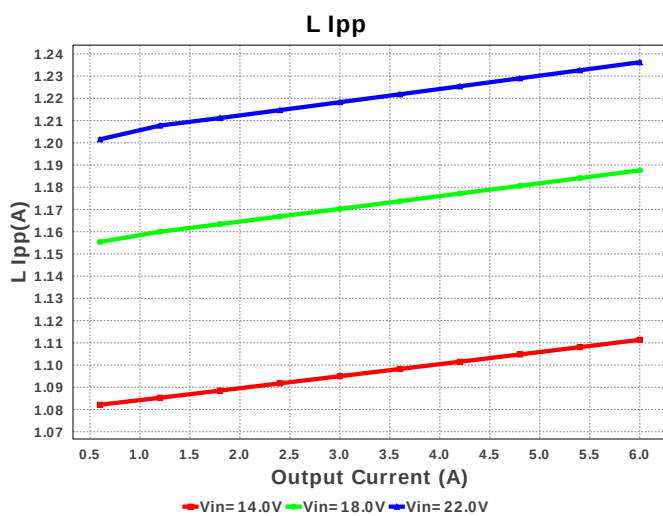
Design : 4756988/2 TPS53318DQPR
TPS53318DQPR 14.0V-22.0V to 3.30V @ 6.0A



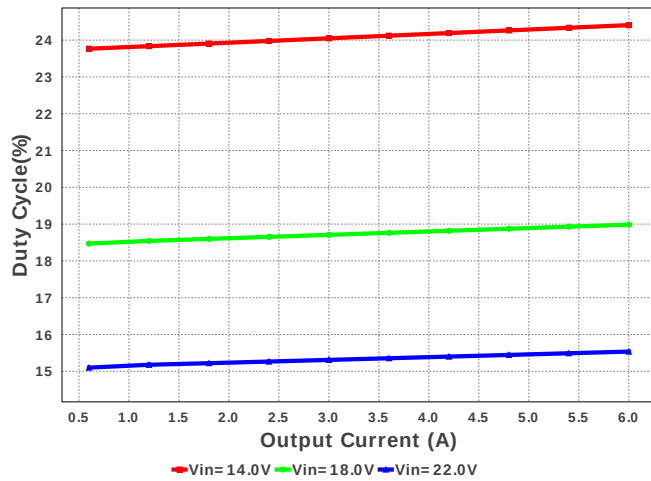
Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbst	Kemet	C0805C104K5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	\$0.01	0805 7 mm ²
2.	Cin	TDK	C3216X5R1E476M160AC Series= X5R	Cap= 47.0 uF ESR= 2.082 mOhm VDC= 25.0 V IRMS= 5.0279 A	1	\$0.35	1206 11 mm ²
3.	Clfb	Kemet	C0805C104K5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	\$0.01	0805 7 mm ²
4.	Clrfb	Kemet	C0805C102K5RACTU 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
5.	Cout	MuRata	GRM31CR60J107ME39L Series= X5R	Cap= 100.0 uF ESR= 4.885 mOhm VDC= 6.3 V IRMS= 4.4118 A	2	\$0.14	1206_190 11 mm ²
6.	Cvin	Chemi-Con	EMVY350ADA4R7MD55G Series= MVY	Cap= 4.7 uF ESR= 3.0 Ohm VDC= 35.0 V IRMS= 60.0 mA	1	\$0.08	CAPSMT_62_D55 28 mm ²
7.	Cvreg	MuRata	GRM188R61E105KA12D Series= X5R	Cap= 1.0 uF ESR= 17.113 mOhm VDC= 25.0 V IRMS= 979.39 mA	1	\$0.01	0603 5 mm ²
8.	L1	Coilcraft	XAL6060-472MEB	L= 4.7 uH DCR= 13.1 mOhm	1	\$0.82	XAL6060 72 mm ²

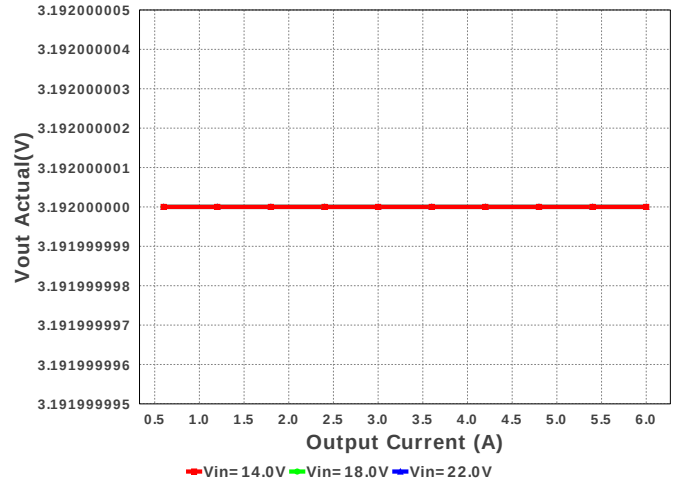
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	Ren	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1000.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
10.	Renb	Vishay-Dale	CRCW040286K6FKED Series= CRCW..e3	Res= 86.6 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
11.	Rent	Vishay-Dale	CRCW0402845KFKED Series= CRCW..e3	Res= 845.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
12.	Rfbb	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
13.	Rfbt	Vishay-Dale	CRCW040243K2FKED Series= CRCW..e3	Res= 43.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
14.	Rlbt	Vishay-Dale	CRCW04021K37FKED Series= CRCW..e3	Res= 1.37 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
15.	Rmodeg	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
16.	Rpg	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
17.	Rtrip	Vishay-Dale	CRCW040288K7FKED Series= CRCW..e3	Res= 88.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
18.	U1	Texas Instruments	TPS53318DQPR	Switcher	1	\$3.05	 DQP0022A 56 mm²



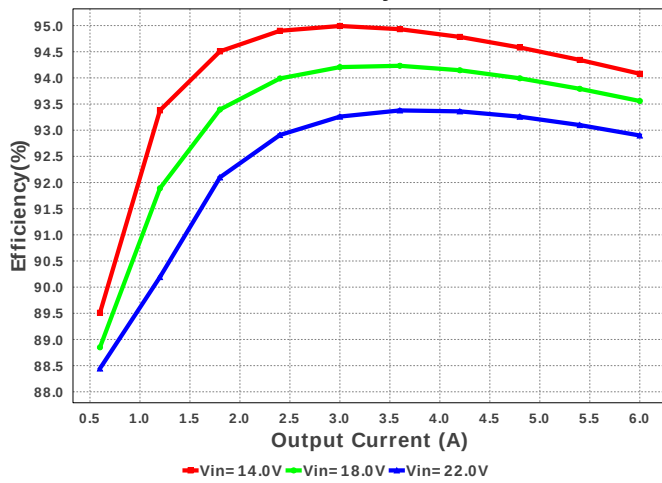
Duty Cycle



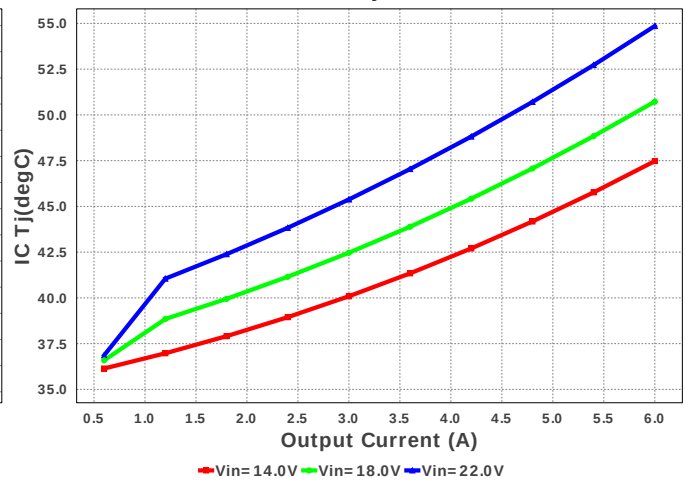
Vout Actual



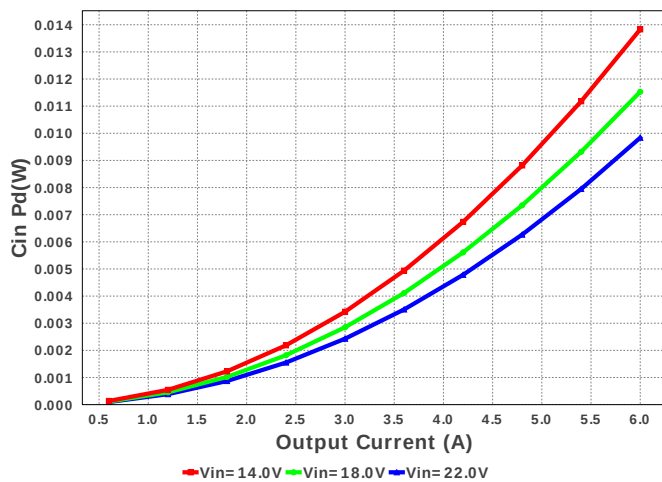
Efficiency



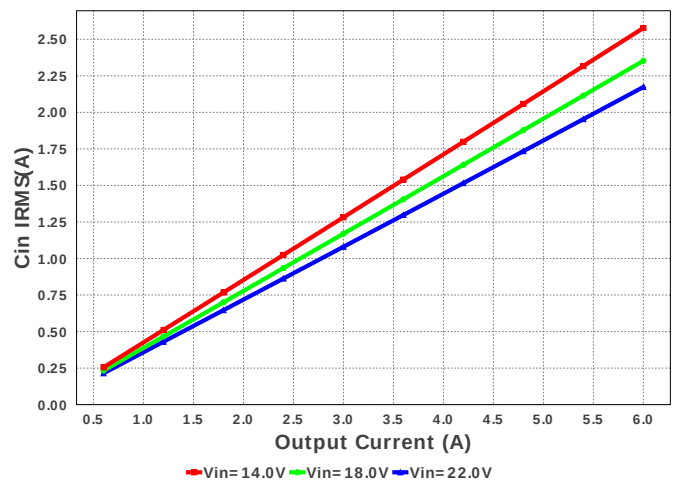
IC Tj

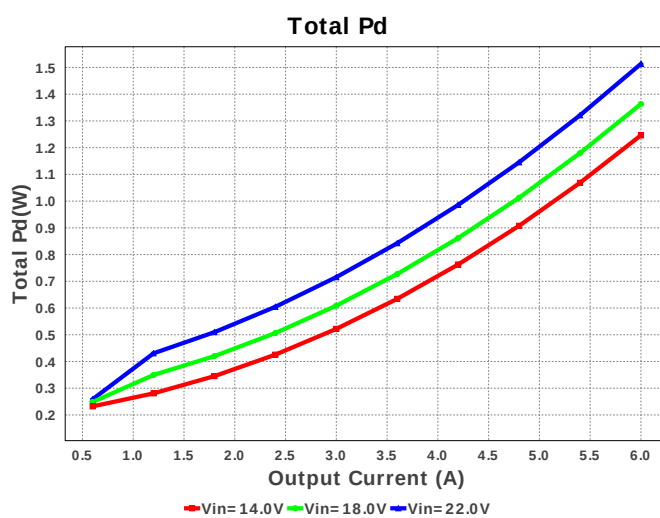
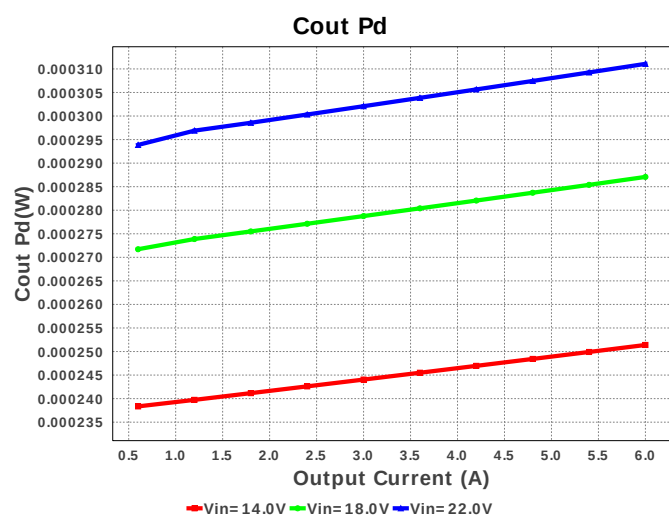
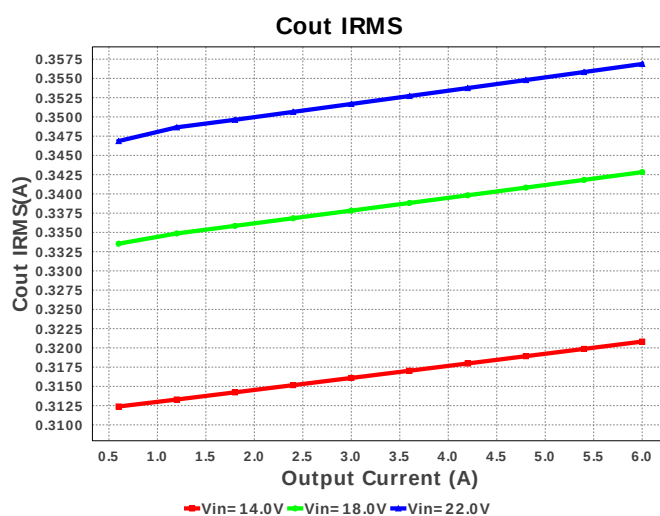
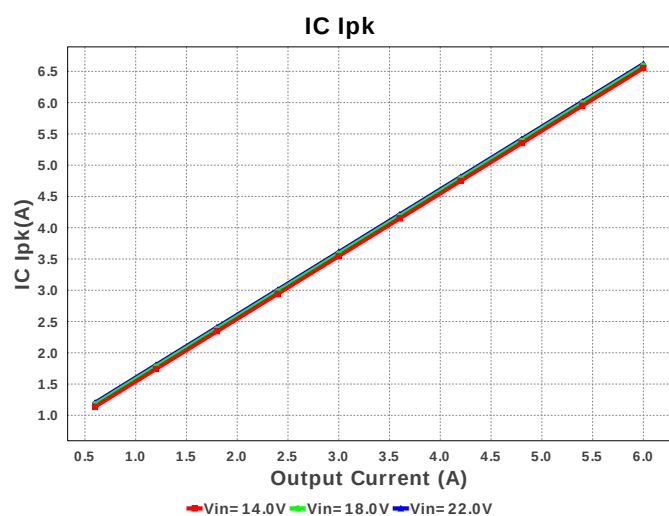
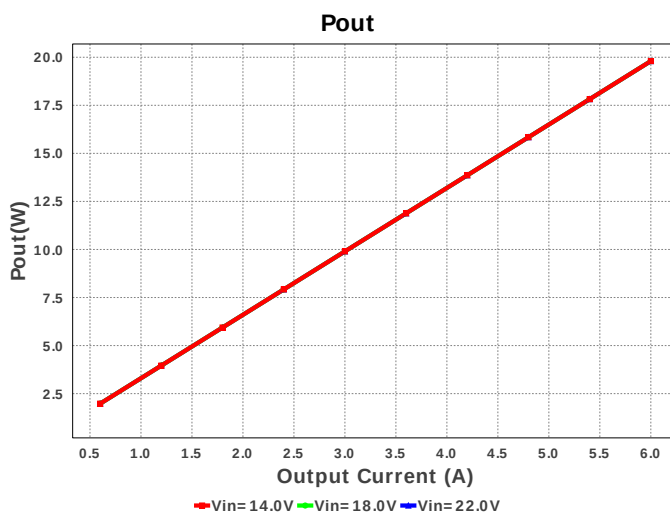
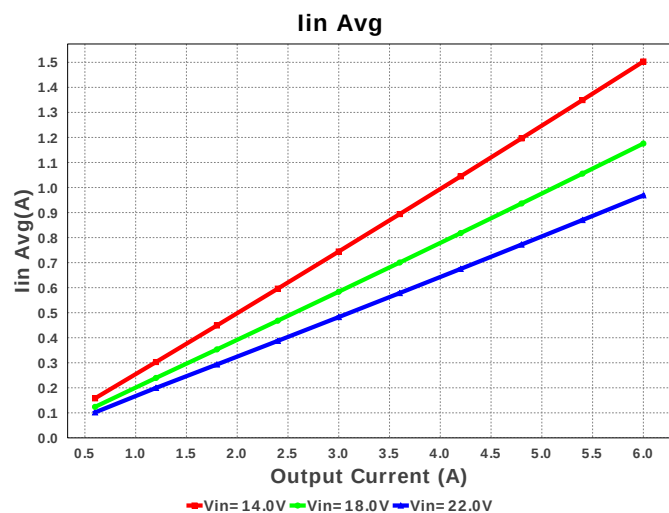


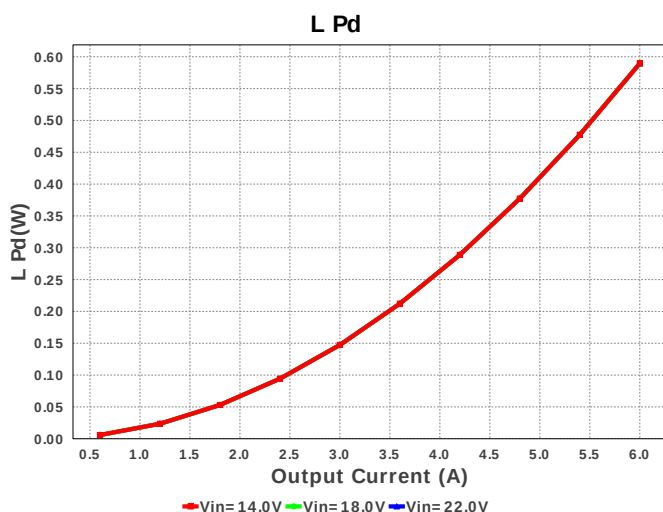
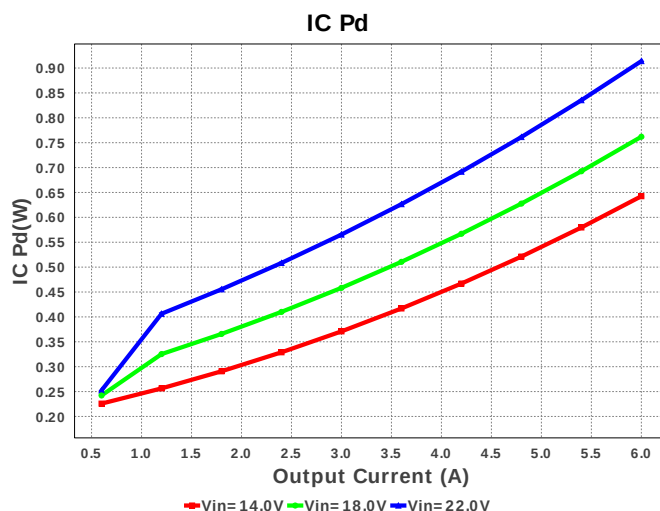
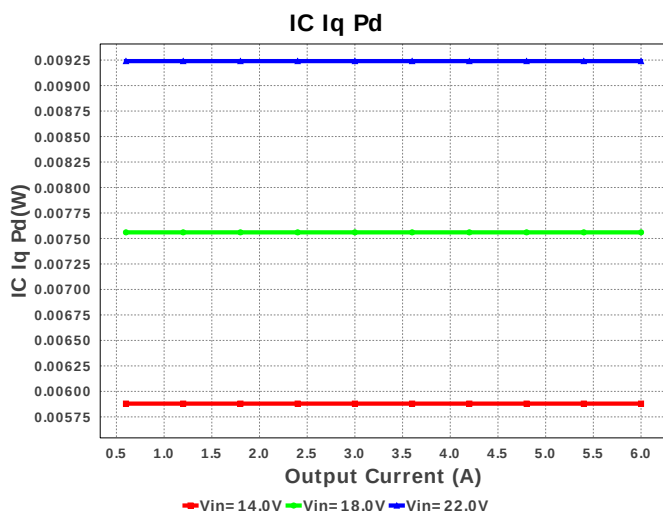
Cin Pd



Cin IRMS







Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	2.173 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	356.874 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	6.618 A	Current	Peak switch current in IC
4.	Iin Avg	968.8 mA	Current	Average input current
5.	L Ipp	1.236 A	Current	Peak-to-peak inductor ripple current
6.	BOM Count	19	General	Total Design BOM count
7.	FootPrint	240.0 mm ²	General	Total Foot Print Area of BOM components
8.	Frequency	500.0 kHz	General	Switching frequency
9.	Pout	19.8 W	General	Total output power
10.	Total BOM	\$4.71	General	Total BOM Cost
11.	Vout Actual	3.192 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
12.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
13.	Duty Cycle	15.536 %	Op_point	Duty cycle
14.	Efficiency	92.899 %	Op_point	Steady state efficiency
15.	IC Tj	54.859 degC	Op_point	IC junction temperature
16.	ICThetaJA	27.2 degC/W	Op_point	IC junction-to-ambient thermal resistance
17.	IOUT_OP	6.0 A	Op_point	Iout operating point
18.	VIN_OP	22.0 V	Op_point	Vin operating point
19.	Vout p-p	3.521 mV	Op_point	Peak-to-peak output ripple voltage
20.	Cin Pd	9.835 mW	Power	Input capacitor power dissipation
21.	Cout Pd	311.074 μW	Power	Output capacitor power dissipation
22.	IC Iq Pd	9.24 mW	Power	IC Iq Pd
23.	IC Pd	913.918 mW	Power	IC power dissipation
24.	L Pd	589.5 mW	Power	Inductor power dissipation
25.	Total Pd	1.513 W	Power	Total Power Dissipation
26.	Vout Tolerance	2.149 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	6.0	Maximum Output Current
2.	VinMax	22.0	Maximum input voltage
3.	VinMin	14.0	Minimum input voltage
4.	Vout	3.3	Output Voltage
5.	base_pn	TPS53318	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **TPS53318** Product Folder : <http://www.ti.com/product/TPS53318> : contains the data sheet and other resources.

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