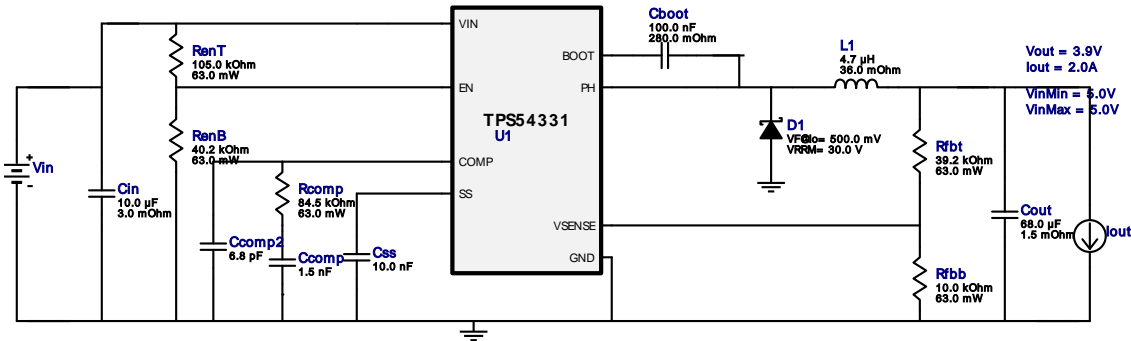


WEBENCH® Design Report

 Design : 3446249/119 TPS54331DR
 TPS54331DR 5.0V-5.0V to 3.9V @ 2.0A

Electrical BOM

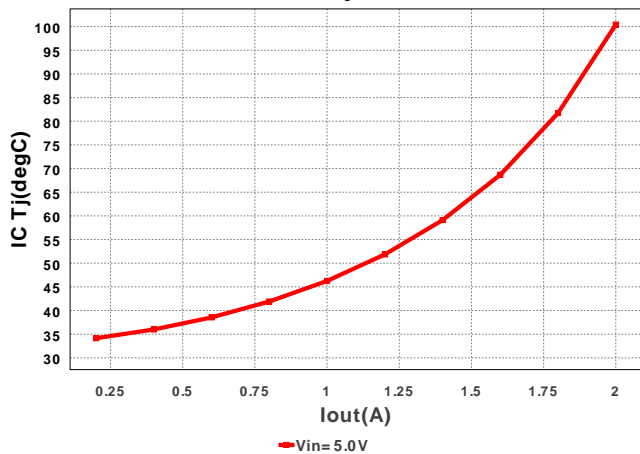
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0805 7mm2
2.	Ccomp	Yageo America	CC0805KRX7R9BB152 Series= X7R	Cap= 1.5 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7mm2
3.	Ccomp2	MuRata	GRM1555C1H6R8CA01D Series= C0G/NP0	Cap= 6.8 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0402 3mm2
4.	Cin	Kemet	C0805C106K8PACTU Series= X5R	Cap= 10.0 uF ESR= 3.0 mOhm VDC= 10.0 V IRMS= 11.43 A	1	\$0.05	0805 7mm2
5.	Cout	TDK	C5750X5R1A686M Series= X5R	Cap= 68.0 uF ESR= 1.5 mOhm VDC= 10.0 V IRMS= 4.1 A	1	\$1.05	2220 60mm2
6.	Css	MuRata	GRM155R61A103KA01D Series= X5R	Cap= 10.0 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	0402 3mm2
7.	D1	Diodes Inc.	B130-13-F	VF@Io= 500.0 mV VRRM= 30.0 V	1	\$0.06	SMA 37mm2
8.	L1	Coilcraft	XAL5030-472MEB	L= 4.7 uH DCR= 36.0 mOhm	1	\$0.55	XAL5030 54mm2
9.	Rcomp	Vishay-Dale	CRCW040284K5FKED Series= CRCW..e3	Res= 84.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3mm2
10.	RenB	Vishay-Dale	CRCW040240K2FKED Series= CRCW..e3	Res= 40.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3mm2
11.	RenT	Vishay-Dale	CRCW0402105KFKED Series= CRCW..e3	Res= 105.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3mm2
12.	Rfbb	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3mm2

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
13.	Rfbt	Vishay-Dale	CRCW040239K2FKED Series= CRCW..e3	Res= 39.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3mm2
14.	U1	Texas Instruments	TPS54331DR	Switcher	1	\$0.60	

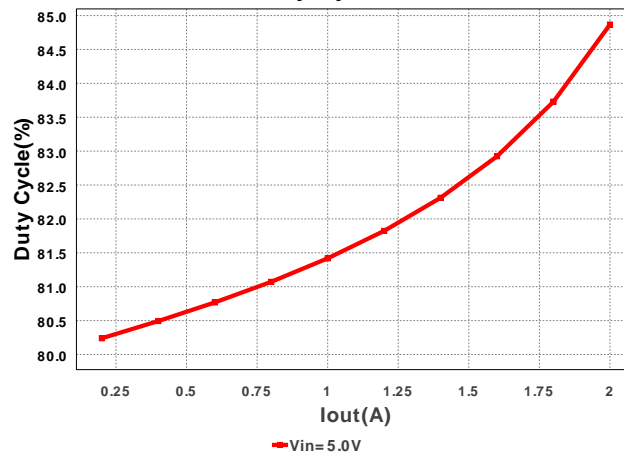


R-PDSO-G8 57mm2

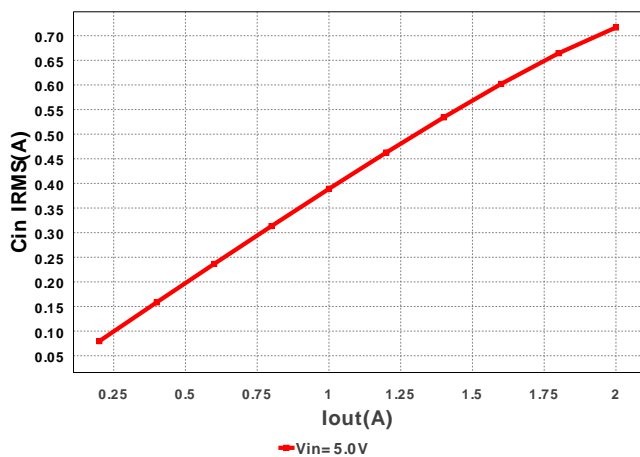
IC Tj



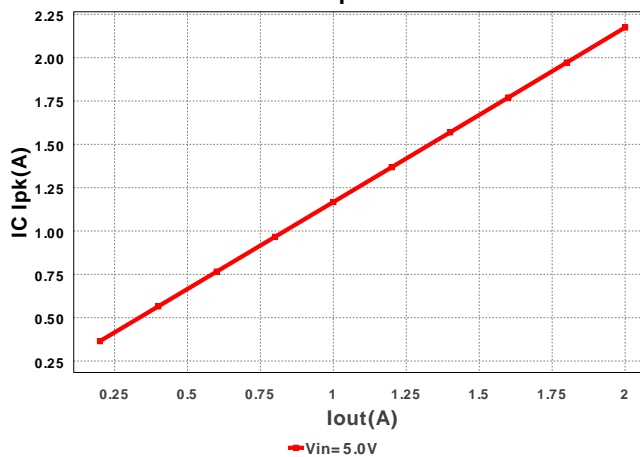
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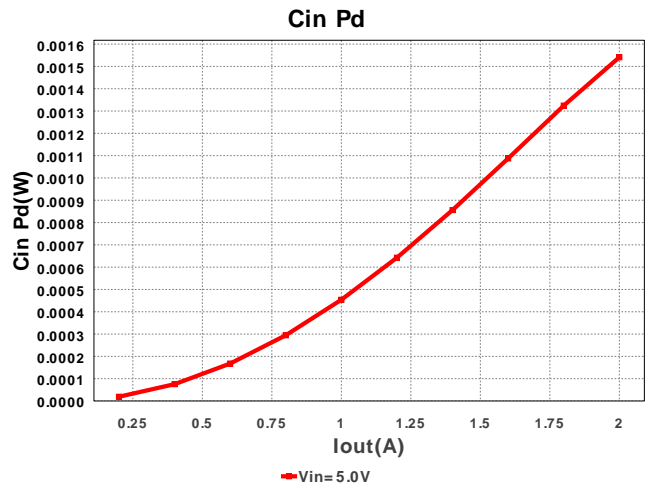
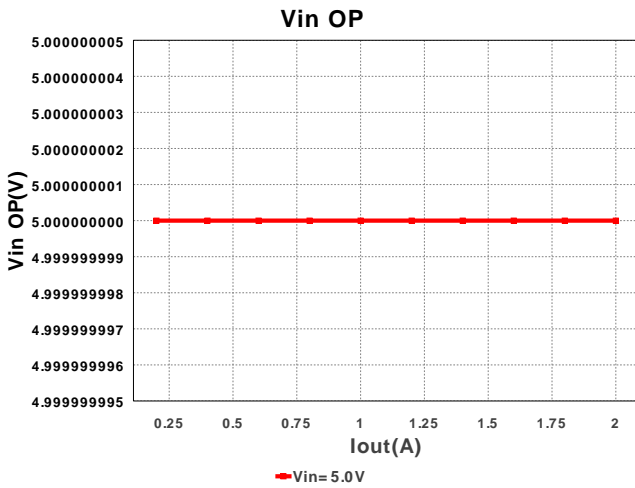
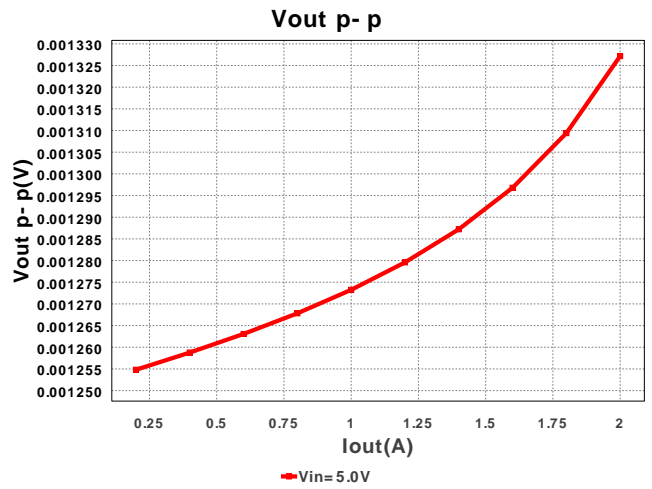
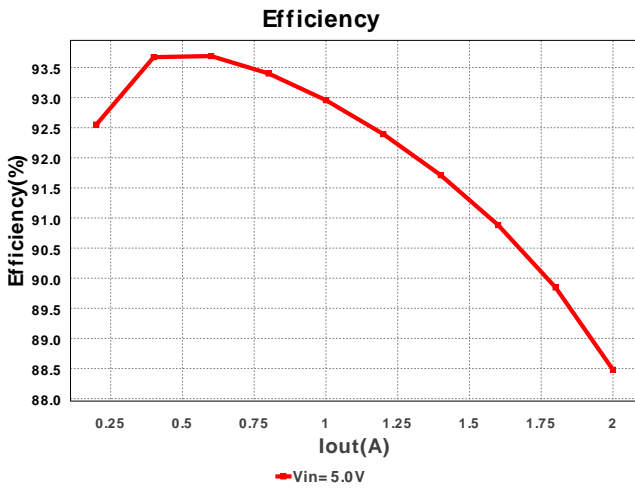
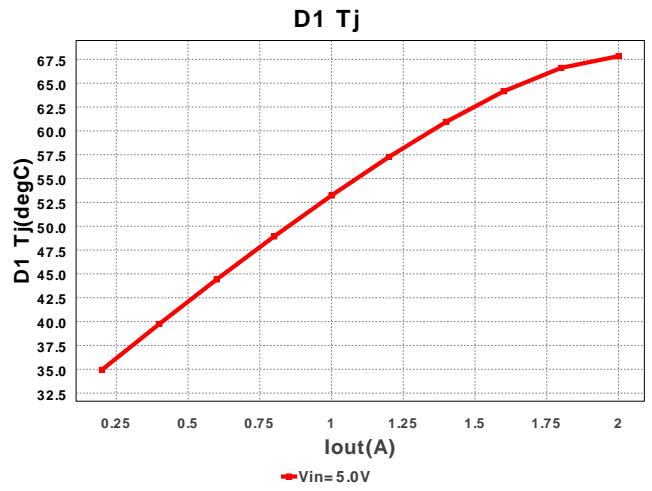
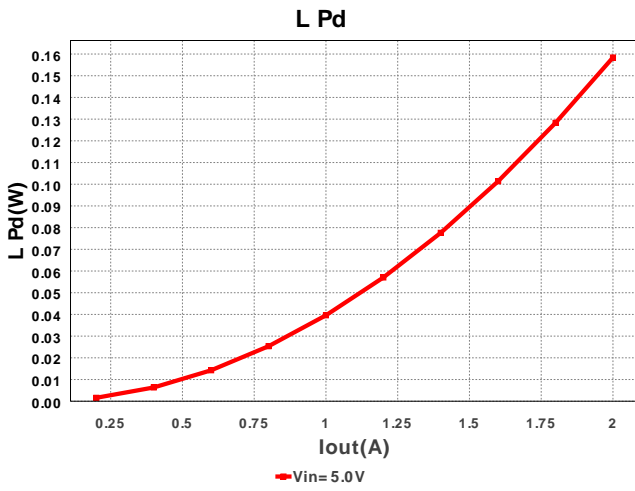


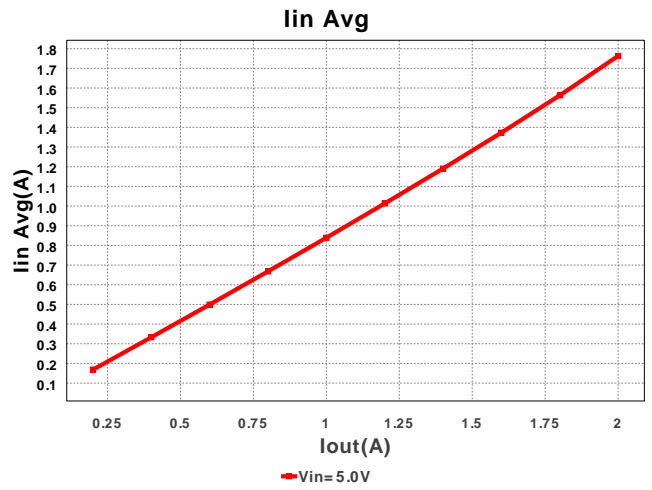
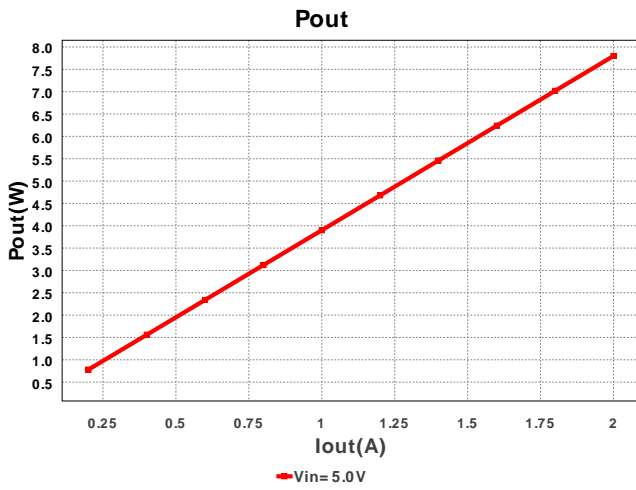
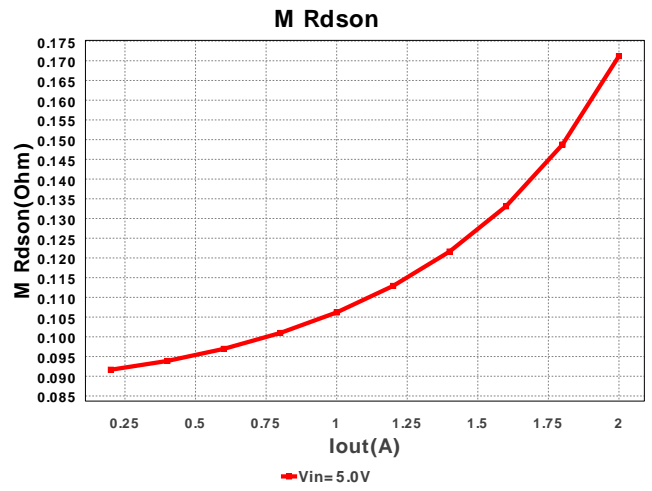
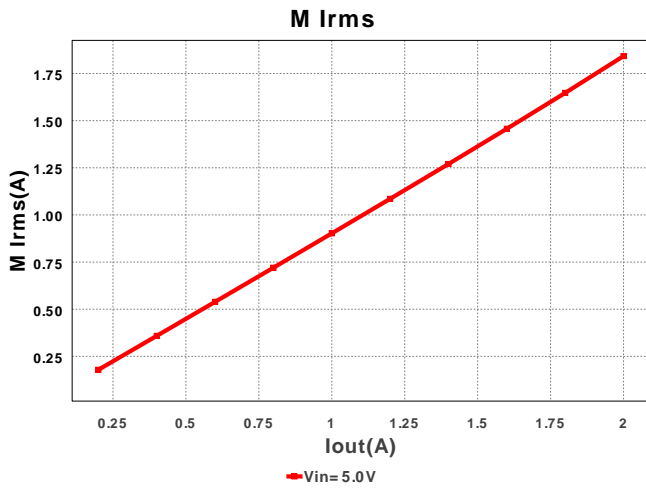
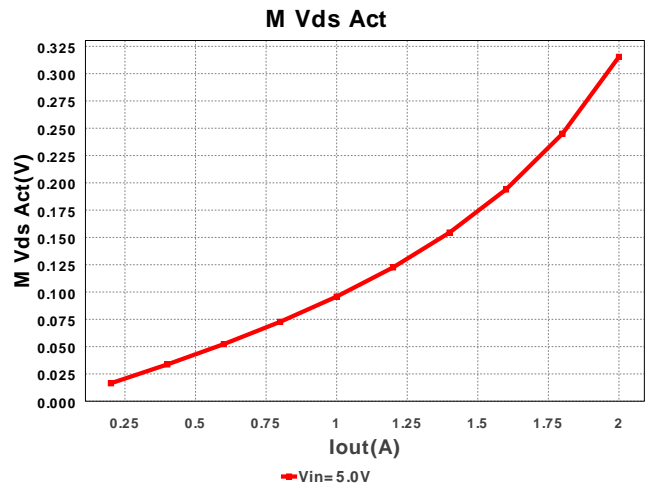
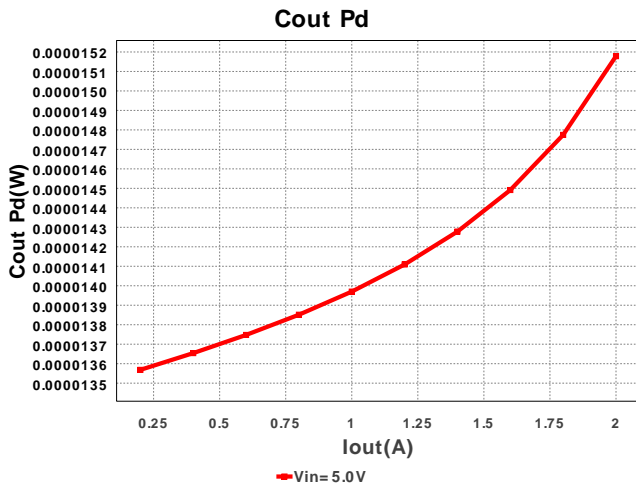
Cin IRMS

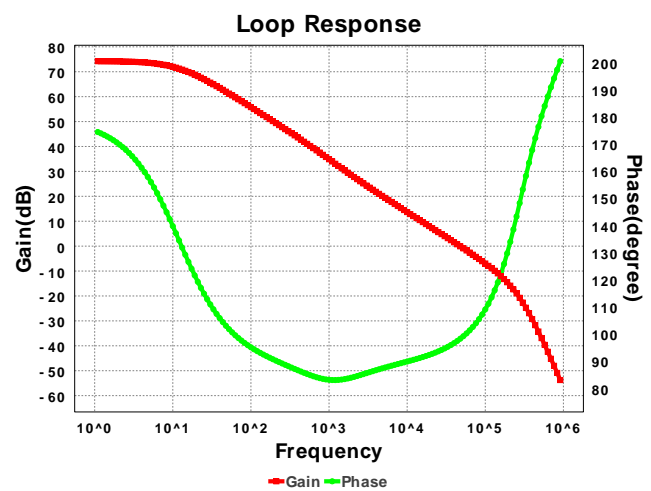
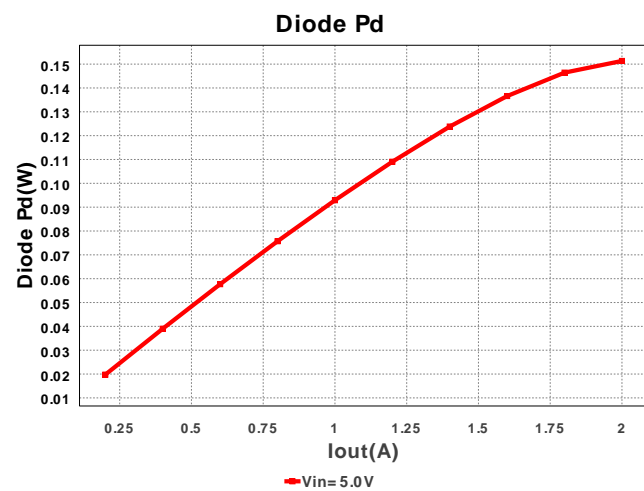
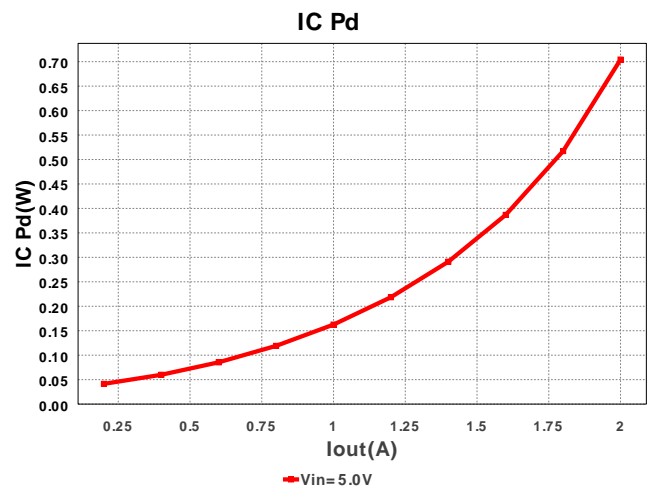
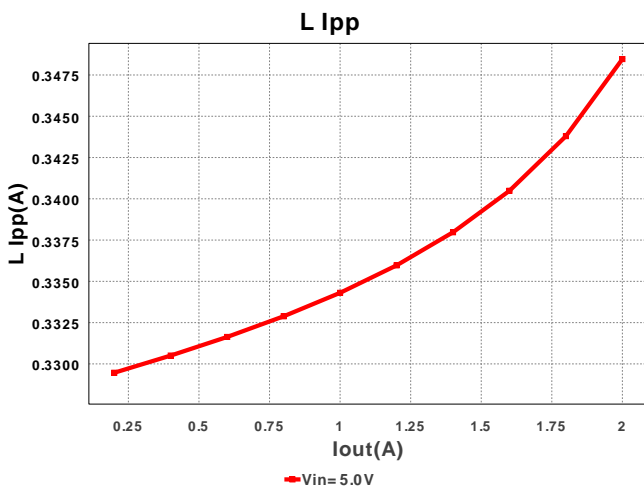
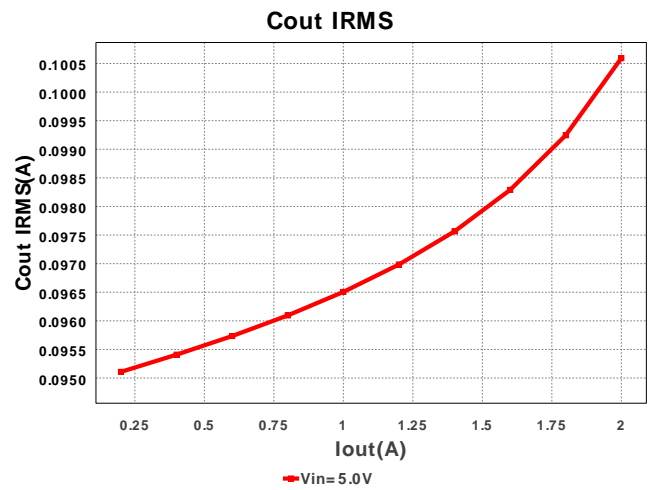
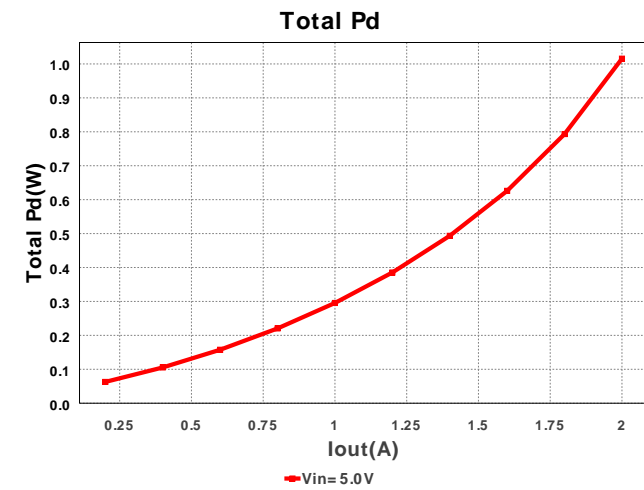


IC Ipk









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	716.742 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	100.593 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.0 A	Current	Peak switch current in IC
4.	Iin Avg	1.763 A	Current	Average input current
5.	L Ipp	348.464 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	1.842 A	Current	Q lavg
7.	BOM Count	14	General	Total Design BOM count
8.	FootPrint	250.0 mm ²	General	Total Foot Print Area of BOM components
9.	Frequency	570.0 kHz	General	Switching frequency
10.	IC Tolerance	0.0 V	General	IC Feedback Tolerance
11.	M Vds Act	315.411 mV	General	Voltage drop across the MosFET

#	Name	Value	Category	Description
12.	Pout	7.8 W	General	Total output power
13.	Total BOM	\$2.4	General	Total BOM Cost
14.	D1 Tj	67.833 degC	Op_Point	D1 junction temperature
15.	Vout OP	3.9 V	Op_Point	Operational Output Voltage
16.	Cross Freq	47.459 kHz	Op_point	Bode plot crossover frequency
17.	Duty Cycle	84.867 %	Op_point	Duty cycle
18.	Efficiency	88.48 %	Op_point	Steady state efficiency
19.	IC Tj	100.424 degC	Op_point	IC junction temperature
20.	ICThetaJA	100.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
21.	IOUT_OP	2.0 A	Op_point	Iout operating point
22.	Phase Marg	98.653 deg	Op_point	Bode Plot Phase Margin
23.	VIN_OP	5.0 V	Op_point	Vin operating point
24.	Vout p-p	1.327 mV	Op_point	Peak-to-peak output ripple voltage
25.	Cin Pd	1.541 mW	Power	Input capacitor power dissipation
26.	Cout Pd	15.178 μW	Power	Output capacitor power dissipation
27.	Diode Pd	151.331 mW	Power	Diode power dissipation
28.	IC Pd	704.242 mW	Power	IC power dissipation
29.	L Pd	158.4 mW	Power	Inductor power dissipation
30.	Total Pd	1.016 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	2.0 A	Maximum Output Current
2.	Iout1	2.0 Amps	Output Current #1
3.	VinMax	5.0 V	Maximum input voltage
4.	VinMin	5.0 V	Minimum input voltage
5.	Vout	3.9 V	Output Voltage
6.	Vout1	3.9 Volt	Output Voltage #1
7.	base_pn	TPS54331	Base Product Number
8.	source	DC	Input Source Type
9.	Ta	30.0 degC	Ambient temperature

Design Assistance

1. **TPS54331** Product Folder : <http://www.ti.com/product/tps54331> : contains the data sheet and other resources.

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