WEBENCH® Design Report

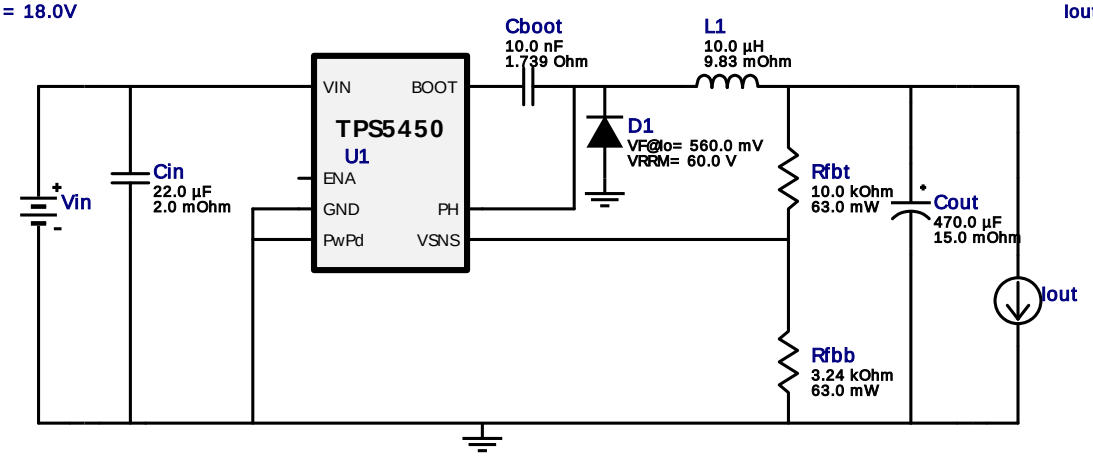
VinMin = 18.0V
VinMax = 18.0V
Vout = 5.0V
Iout = 5.0A

Device = TPS5450DDAR
Topology = Buck
Created = 9/27/14 6:28:08 PM
BOM Cost = $4.44
Footprint = 473.0mm2
BOM Count = 8
Total Pd = 3.42W

Design : 3779120/653 TPS5450DDAR
TPS5450DDAR 18.0V-18.0V to 5.0V @ 5.0A

VinMin = 18.0V
VinMax = 18.0V

Vout = 5.0V
Iout = 5.0A

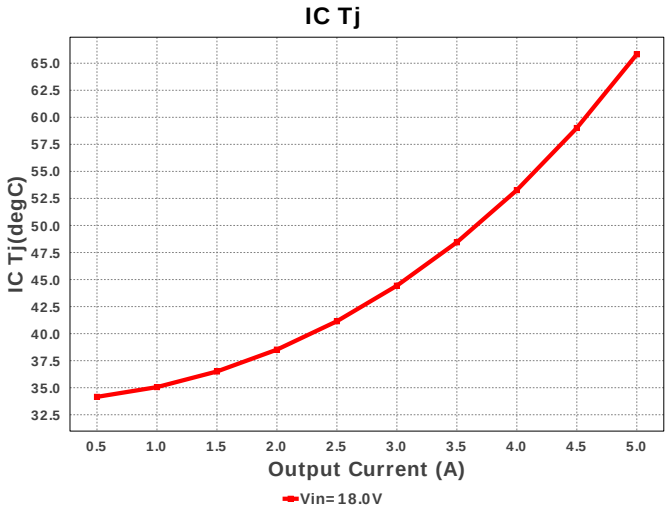


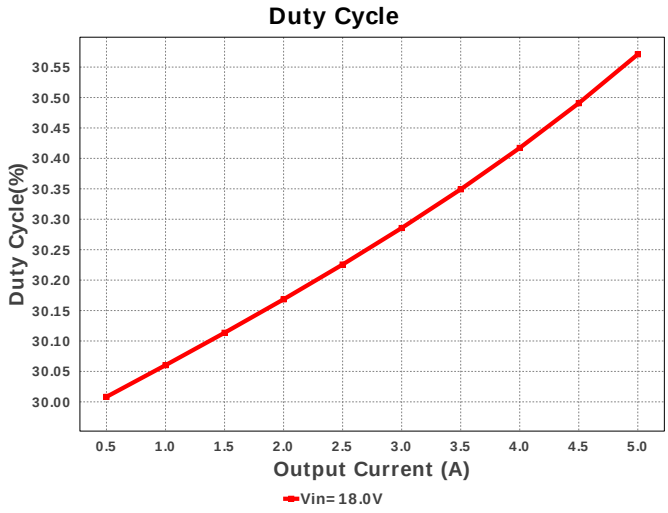
Electrical BOM

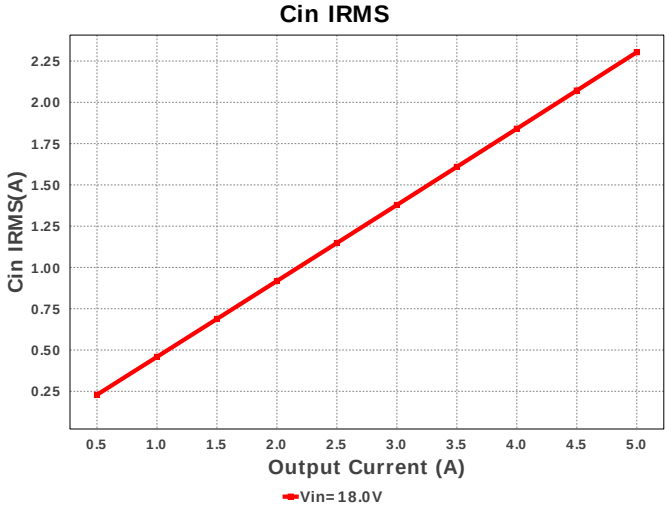
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Kemet	C0805C103K5RACTU Series= X7R	Cap= 10.0 nF ESR= 1.739 Ohm VDC= 50.0 V IRMS= 411.0 mA	1	$0.01	0805 7mm2
2.	Cin	MuRata	GRM32ER61E226KE15L Series= X5R	Cap= 22.0 uF ESR= 2.0 mOhm VDC= 25.0 V IRMS= 3.67 A	1	$0.28	1210 15mm2
3.	Cout	Panasonic	6SVP470M Series= 261	Cap= 470.0 uF ESR= 15.0 mOhm VDC= 6.3 V IRMS= 4.21 A	1	$0.56	SM_RADIAL_8MM 113mm2
4.	D1	Diodes Inc.	PDS760-13	VF@Io= 560.0 mV VRRM= 60.0 V	1	$0.60	PowerDI5 50mm2
5.	L1	Coilcraft	SER1360-103KLB	L= 10.0 µH DCR= 9.83 mOhm	1	$0.72	SER1360 225mm2
6.	Rfbb	Vishay-Dale	CRCW04023K24FKED Series= CRCW..e3	Res= 3.24 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3mm2
7.	Rfbt	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3mm2

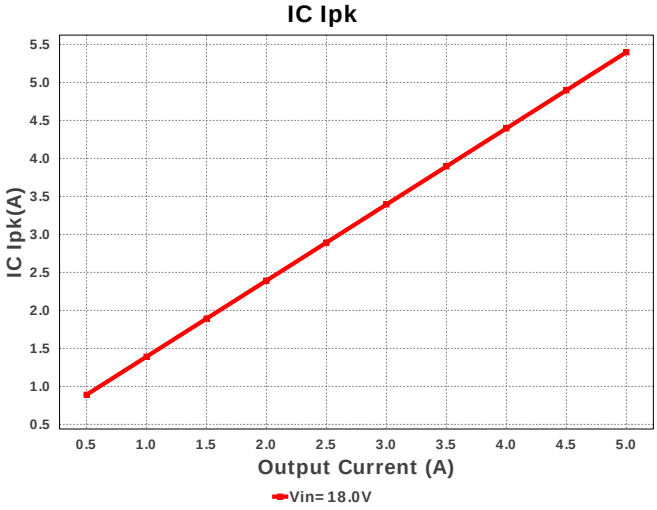
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
8.	U1	Texas Instruments	TPS5450DDAR	Switcher	1	$2.25	

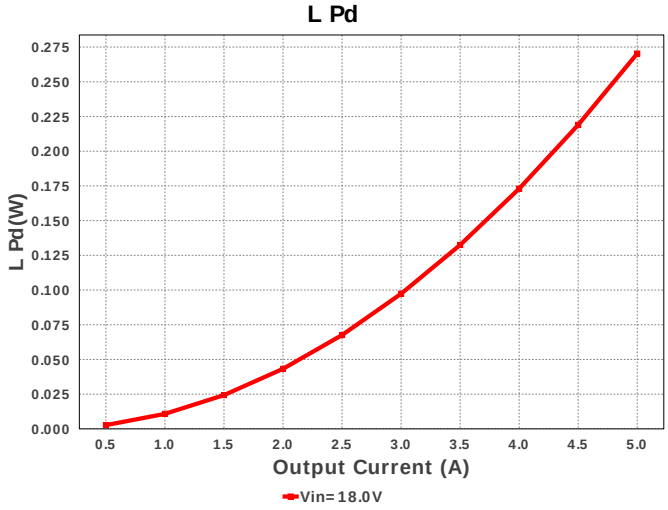
R-PDSO-G8 57mm2

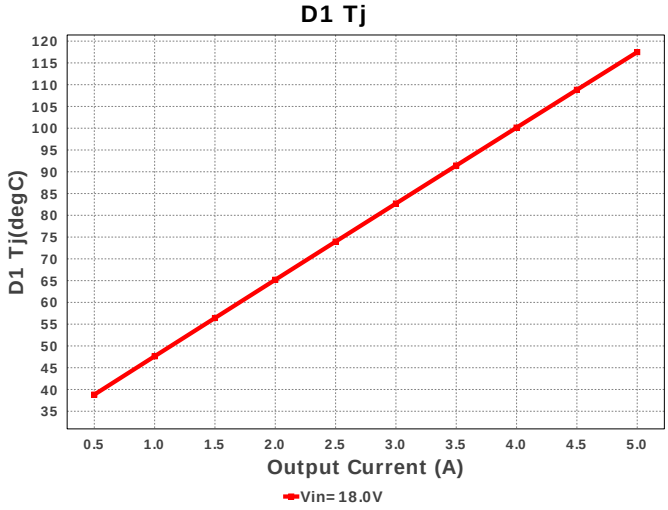


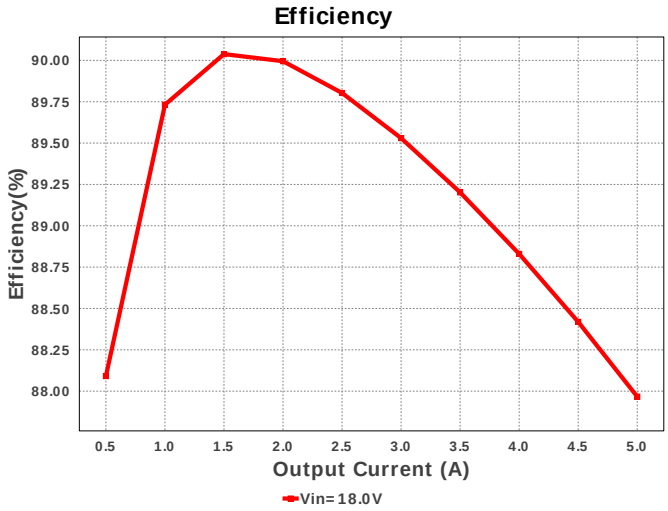


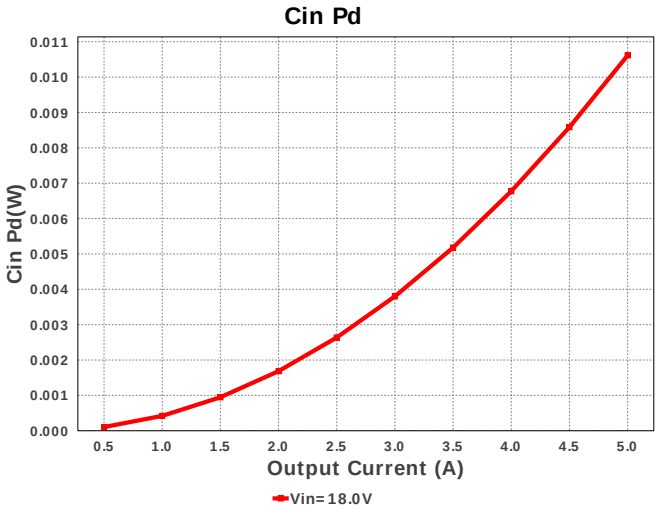


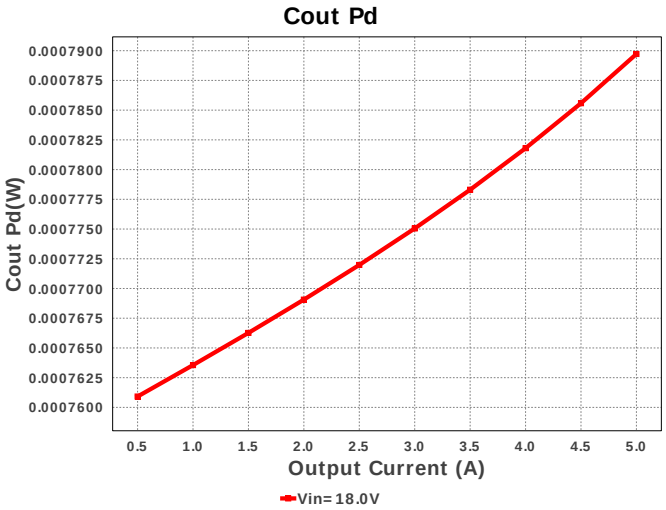


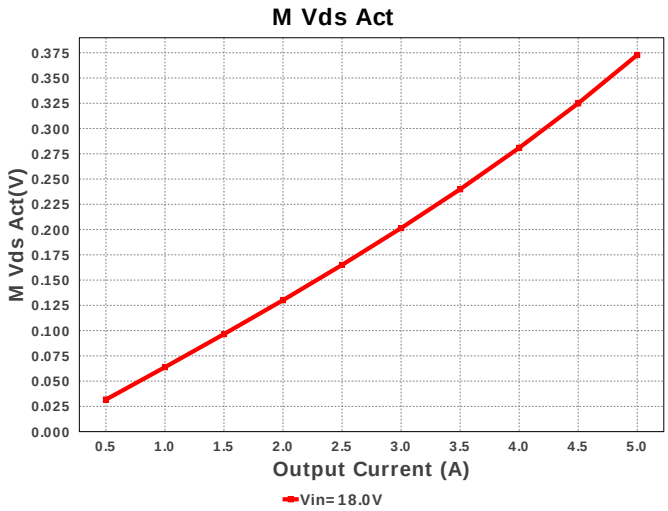


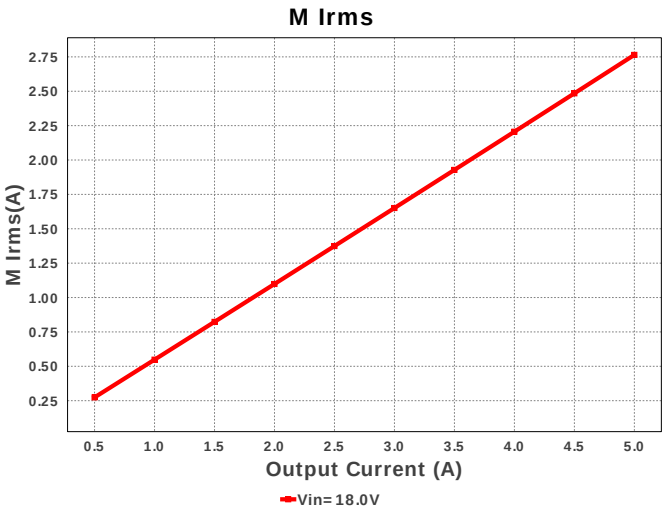


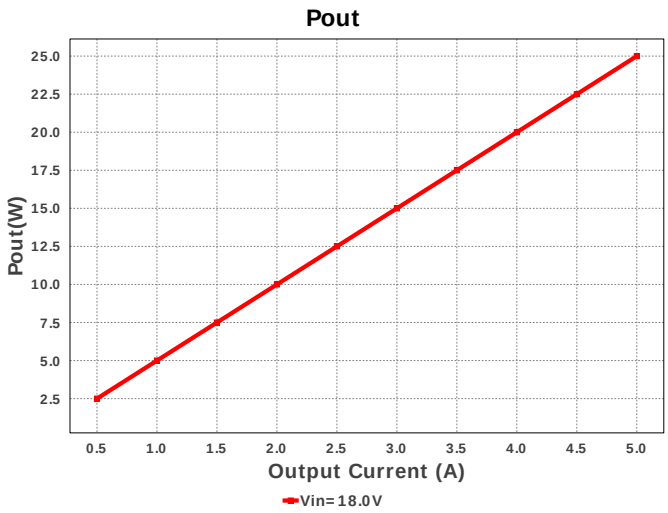


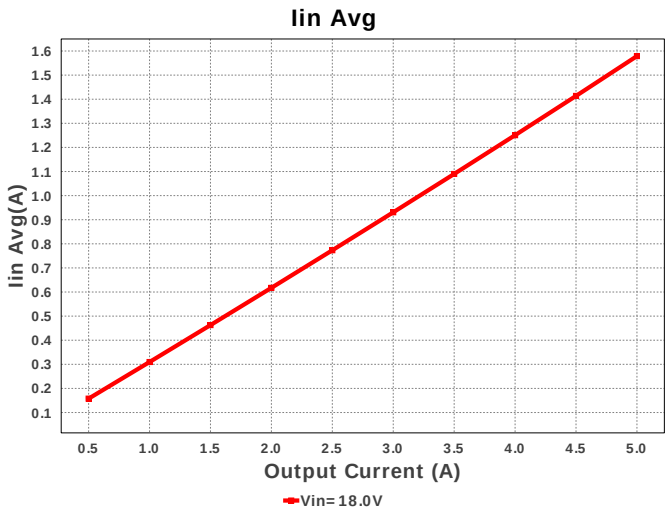


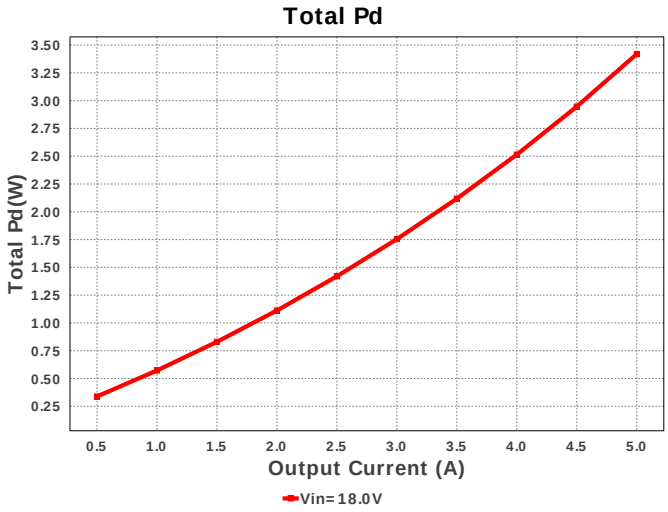


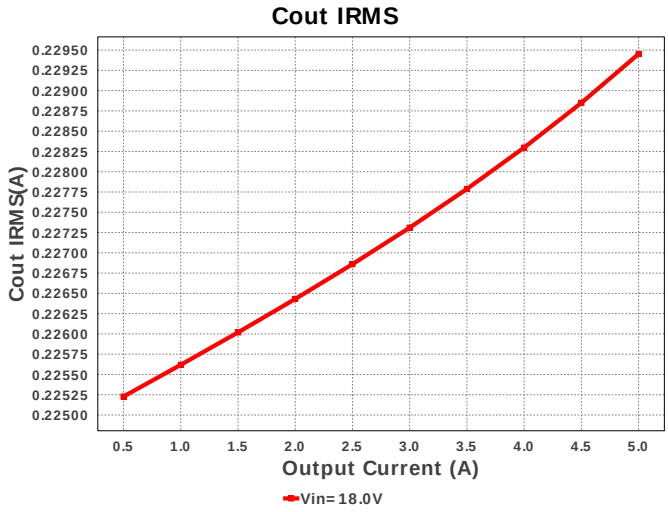


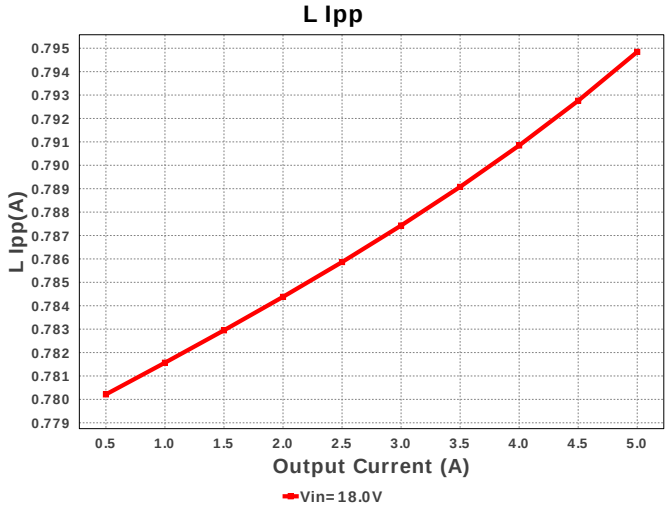


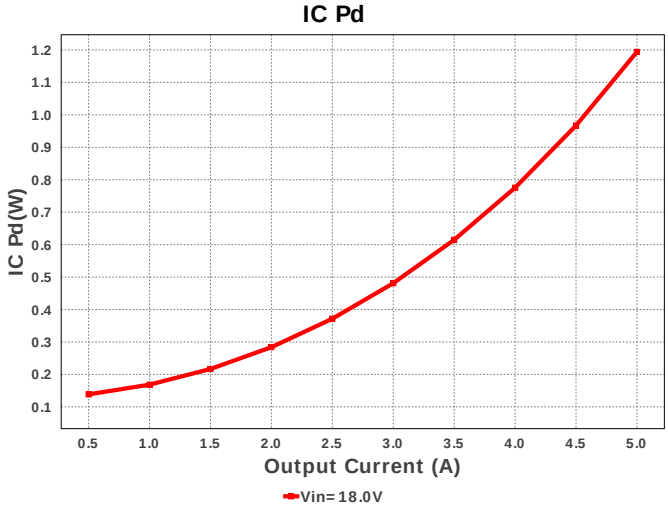


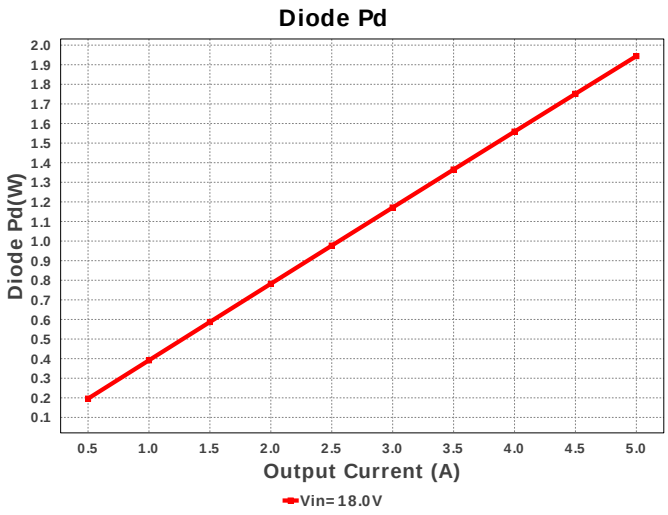


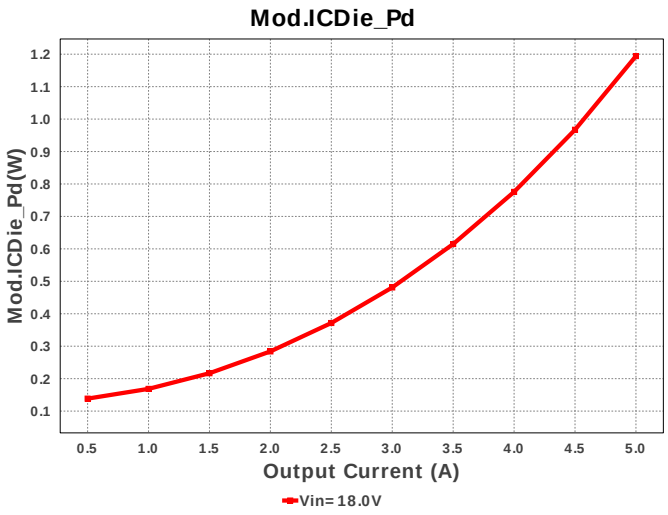


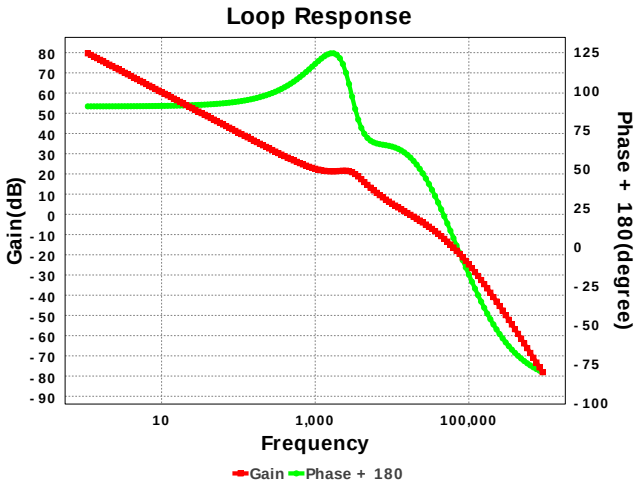












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	2.304 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	229.452 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	5.397 A	Current	Peak switch current in IC
4.	Iin Avg	1.579 A	Current	Average input current
5.	L Ipp	794.845 mA	Current	Peak-to-peak inductor ripple current
6.	M Irms	2.765 A	Current	MOSFET RMS current
7.	BOM Count	8	General	Total Design BOM count
8.	FootPrint	473.0 mm2	General	Total Foot Print Area of BOM components
9.	Frequency	500.0 kHz	General	Switching frequency
10.	IC Tolerance	18.315 mV	General	IC Feedback Tolerance
11.	M Vds Act	372.802 mV	General	Voltage drop across the MosFET
12.	Pout	25.0 W	General	Total output power
13.	Total BOM	$4.44	General	Total BOM Cost
14.	D1 Tj	117.481 degC	Op_Point	D1 junction temperature
15.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
16.	Cross Freq	16.977 kHz	Op_point	Bode plot crossover frequency
17.	Duty Cycle	30.571 %	Op_point	Duty cycle
18.	Efficiency	87.967 %	Op_point	Steady state efficiency
19.	IC Tj	65.824 degC	Op_point	IC junction temperature
20.	ICThetaJA	30.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
21.	IOUT_OP	5.0 A	Op_point	Iout operating point
22.	Phase Marg	57.709 deg	Op_point	Bode Plot Phase Margin
23.	VIN_OP	18.0 V	Op_point	Vin operating point
24.	Vout p-p	11.93 mV	Op_point	Peak-to-peak output ripple voltage
25.	Cin Pd	10.613 mW	Power	Input capacitor power dissipation
26.	Cout Pd	789.723 µW	Power	Output capacitor power dissipation
27.	Diode Pd	1.944 W	Power	Diode power dissipation
28.	IC Pd	1.194 W	Power	IC power dissipation
29.	L Pd	270.325 mW	Power	Inductor power dissipation
30.	Total Pd	3.42 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	5.0 A	Maximum Output Current
2.	Iout1	5.0 Amps	Output Current #1
3.	VinMax	18.0 V	Maximum input voltage
4.	VinMin	18.0 V	Minimum input voltage
5.	Vout	5.0 V	Output Voltage
6.	Vout1	5.0 Volt	Output Voltage #1
7.	base_pn	TPS5450	Texas Instruments Base Part Number
8.	source	DC	Input Source Type
9.	ta	30.0 degC	Ambient temperature

Design Assistance

1. Feature Highlights: 5A, 500kHz Fixed Switching Frequency, Internal Compensation

2. TPS5450 Product Folder : http://www.ti.com/product/tps5450 : contains the data sheet and other resources.