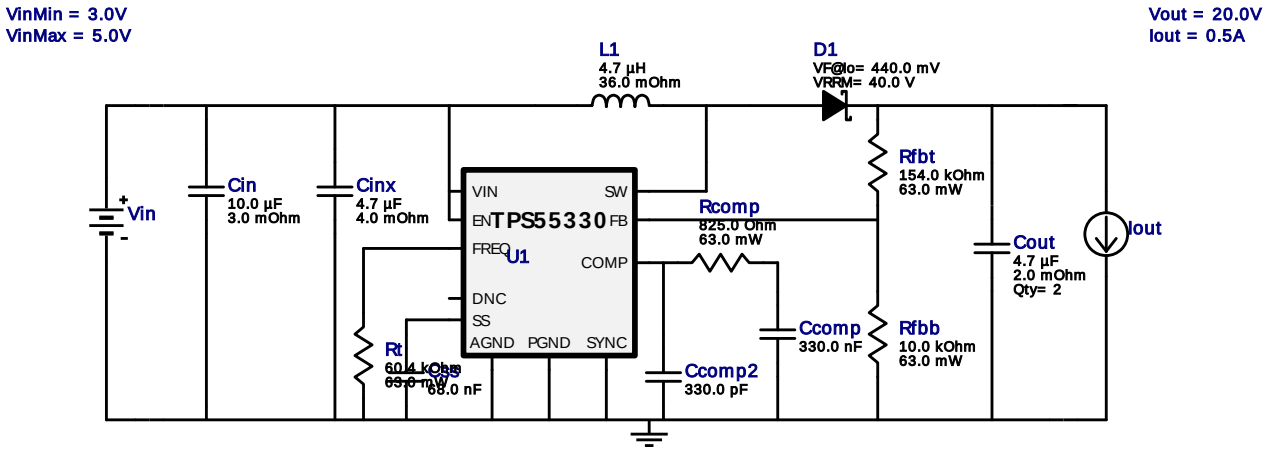
WEBENCH® Design Report

VinMin = 3.0V
VinMax = 5.0V
Vout = 20.0V
Iout = 0.5A

Device = TPS55330RTER
Topology = Boost
Created = 11/11/14 11:06:37 AM
BOM Cost = $2.93
Footprint = 206.0 mm²
BOM Count = 14
Total Pd = 2.08W

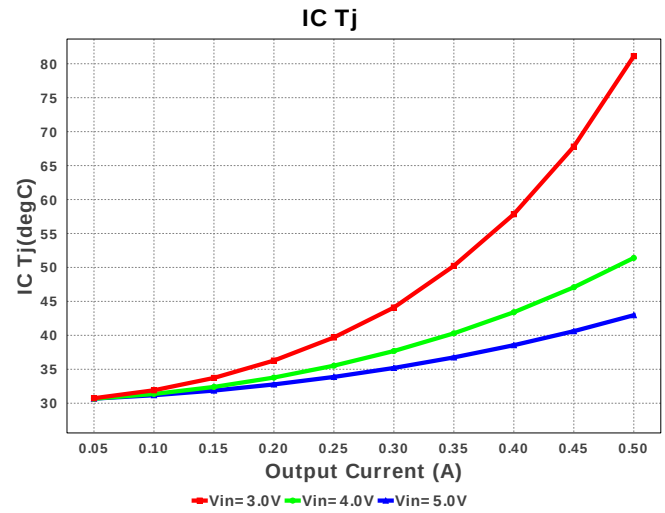
Design : 1244294/70 TPS55330RTER
TPS55330RTER 3.0V-5.0V to 20.00V @ 0.5A

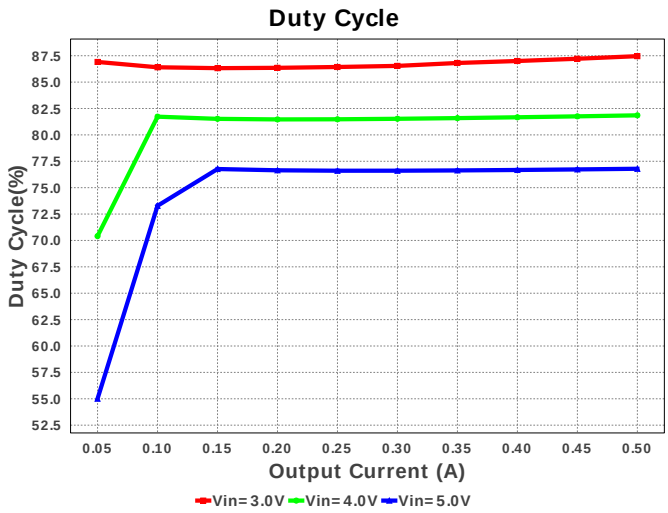


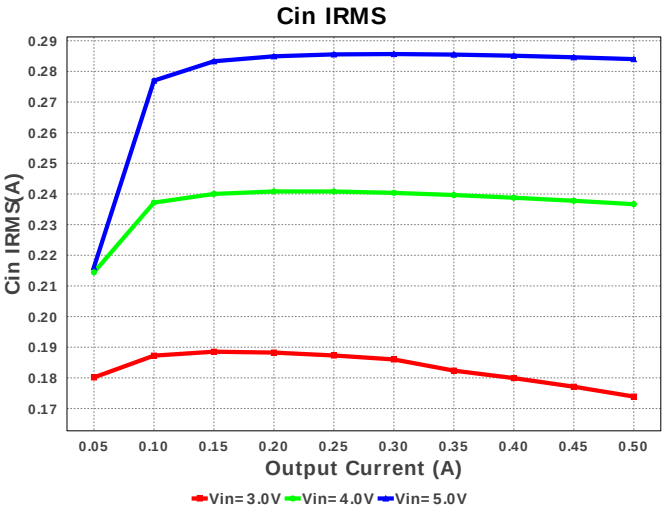
Electrical BOM

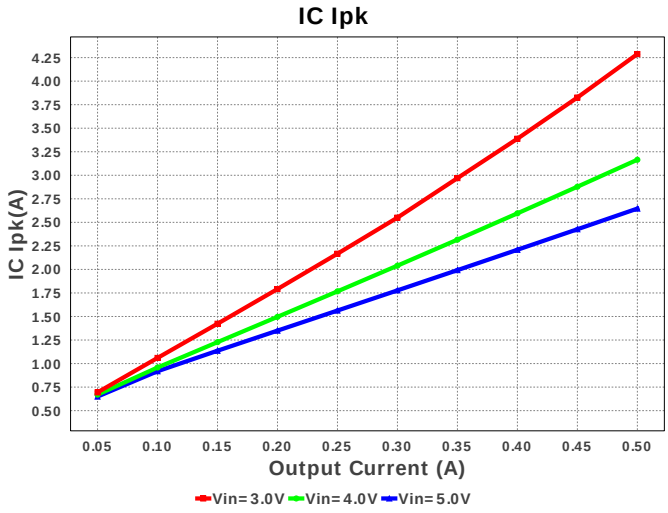
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Ccomp	MuRata	GRM21BR71C334KA01L Series= X7R	Cap= 330.0 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.03	0805 7 mm²
2.	Ccomp2	MuRata	GRM033R71E331KA01D Series= X7R	Cap= 330.0 pF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0201 2 mm²
3.	Cin	Kemet	C0805C106K8PACTU Series= X5R	Cap= 10.0 uF ESR= 3.0 mOhm VDC= 10.0 V IRMS= 11.43 A	1	$0.04	0805 7 mm²
4.	Cinx	Kemet	C0805C475K8PACTU Series= X5R	Cap= 4.7 uF ESR= 4.0 mOhm VDC= 10.0 V IRMS= 9.89 A	1	$0.03	0805 7 mm²
5.	Cout	MuRata	GRM21BR61E475MA12L Series= X5R	Cap= 4.7 uF ESR= 2.0 mOhm VDC= 25.0 V IRMS= 7.29 A	2	$0.06	0805 7 mm²
6.	Css	MuRata	GRM155R61A683KA01D Series= X5R	Cap= 68.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
7.	D1	Vishay-Semiconductor	SL44-E3/57T	VF@Io= 440.0 mV VRRM= 40.0 V	1	$0.32	SMC 83 mm²
8.	L1	Coilcraft	XAL5030-472MEB	L= 4.7 µH DCR= 36.0 mOhm	1	$0.58	XAL5030 54 mm²
9.	Rcomp	Vishay-Dale	CRCW0402825RFKED Series= CRCW..e3	Res= 825.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
10.	Rfbb	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

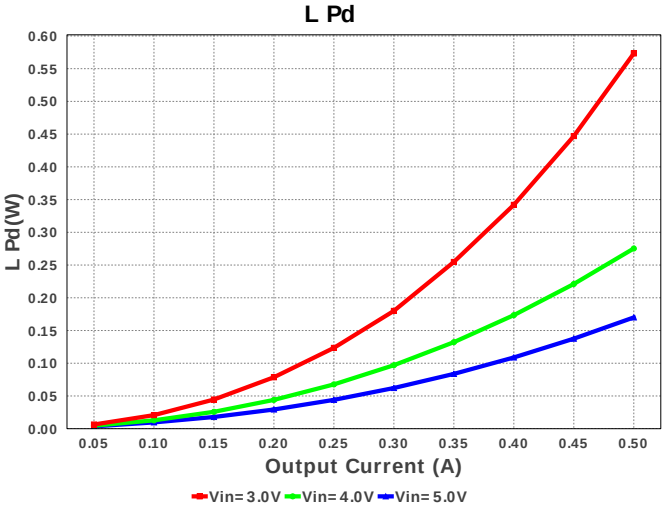
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	Rfbt	Vishay-Dale	CRCW0402154KFKED Series= CRCW..e3	Res= 154.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
12.	Rt	Vishay-Dale	CRCW040260K4FKED Series= CRCW..e3	Res= 60.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
13.	U1	Texas Instruments	TPS55330RTER	Switcher	1	$1.75	S-PWQFN-N16 17 mm^2

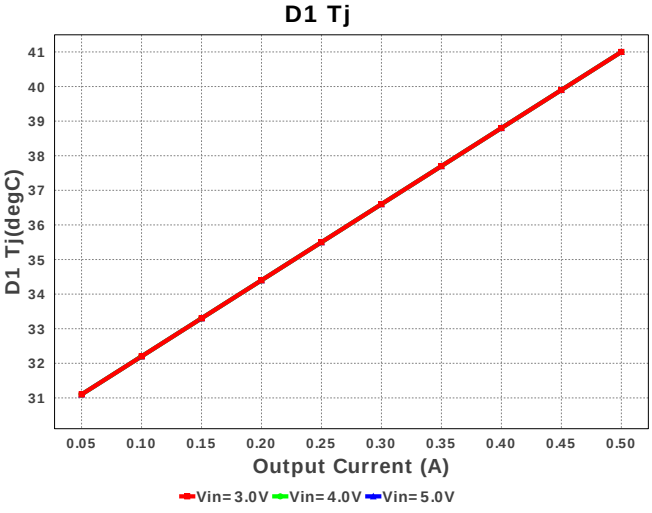


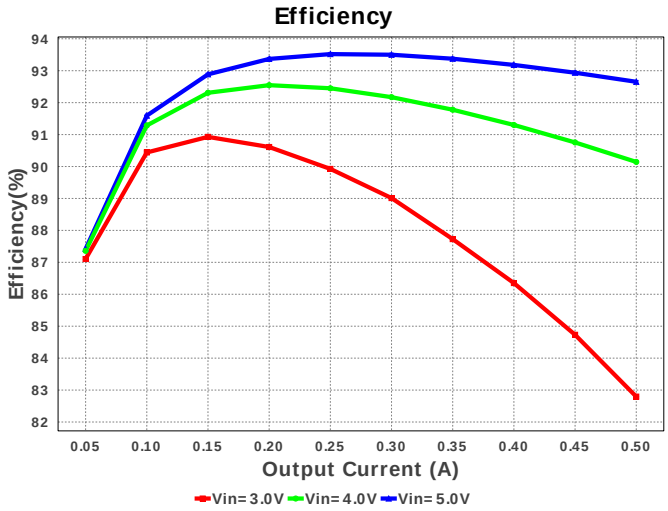


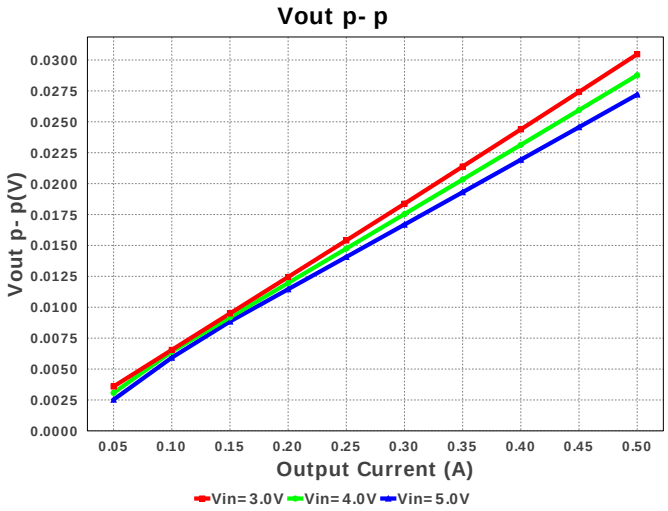


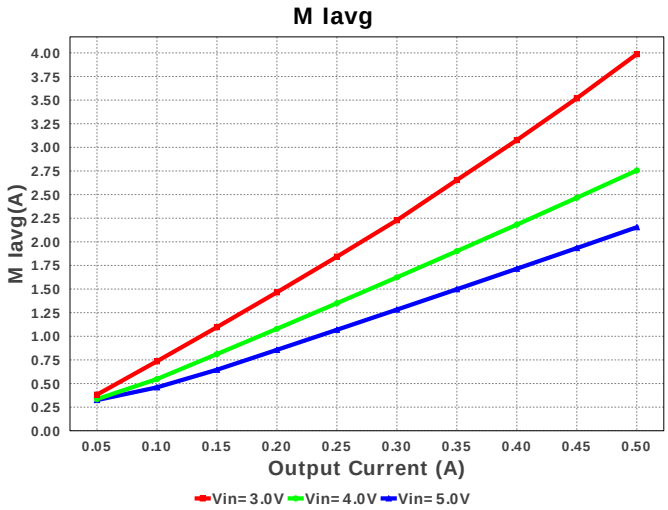


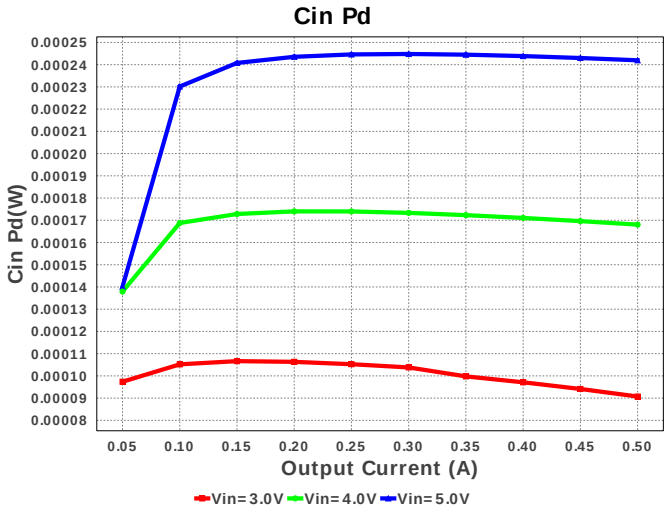


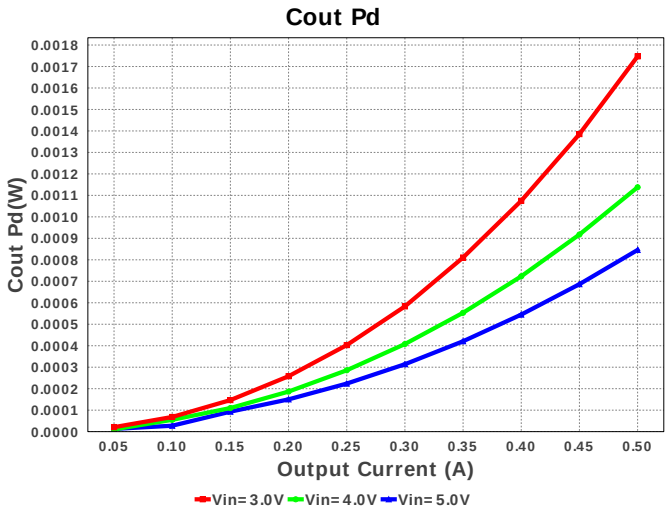


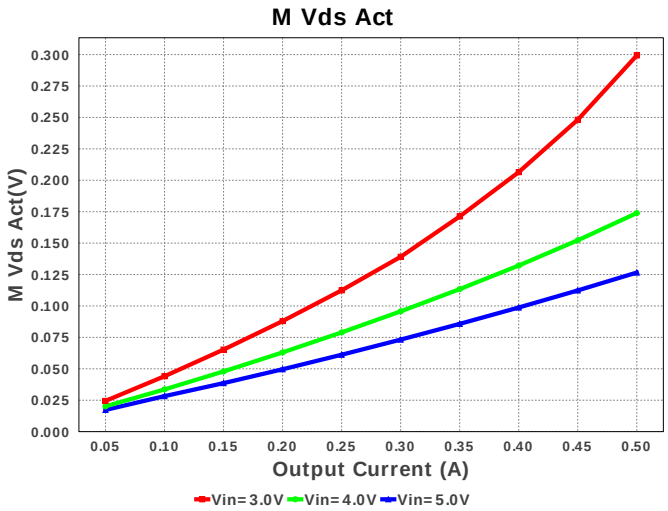


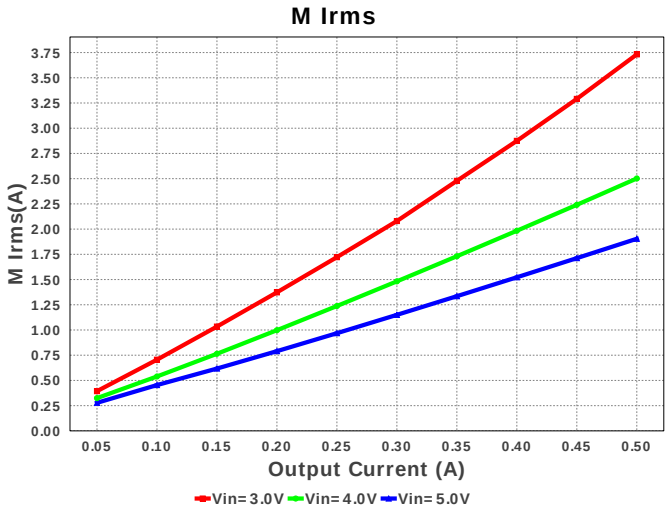


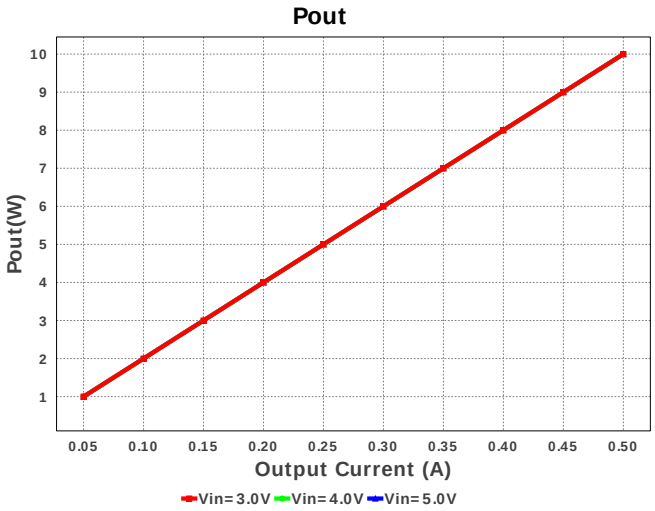


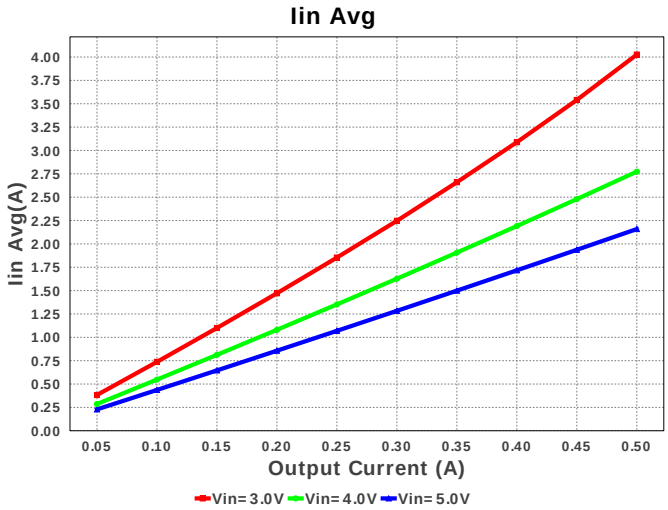


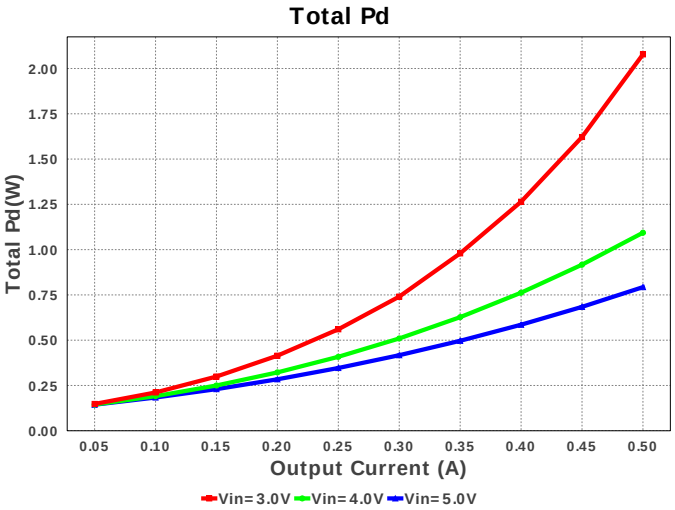


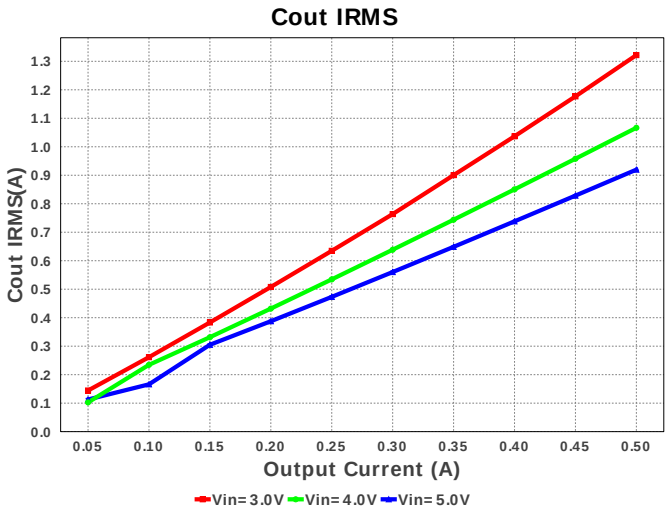


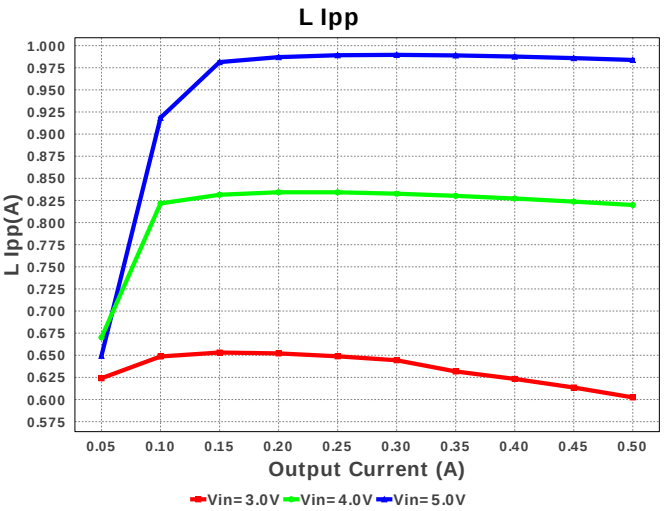


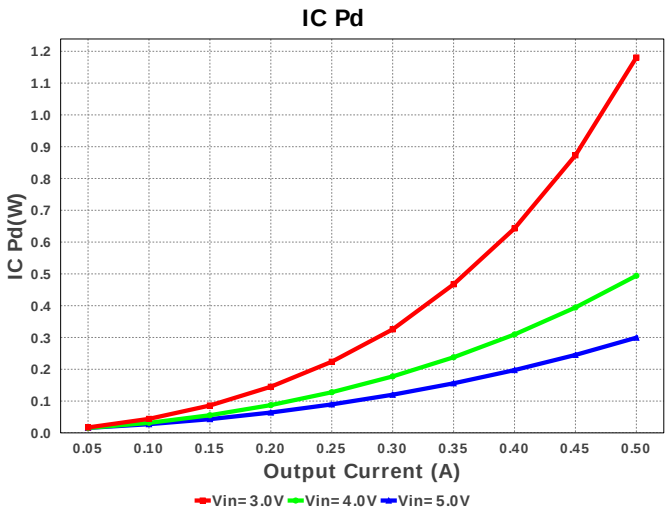


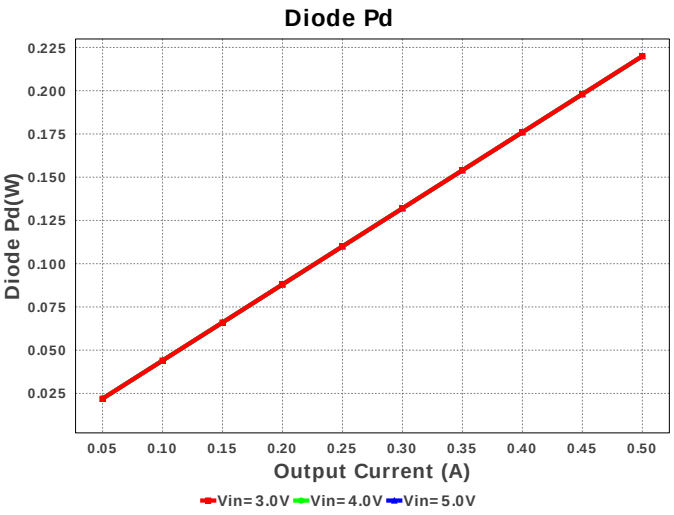


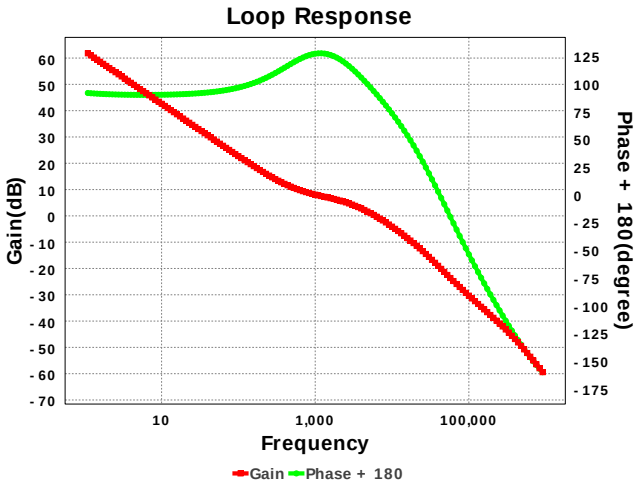












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	173.898 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	1.322 A	Current	Output capacitor RMS ripple current
3.	IC Ipk	4.288 A	Current	Peak switch current in IC
4.	Iin Avg	4.026 A	Current	Average input current
5.	L Ipp	602.402 mA	Current	Peak-to-peak inductor ripple current
6.	M Iavg	3.987 A	Current	MOSFET Average current
7.	M1 Irms	3.732 A	Current	Q Iavg
8.	BOM Count	14	General	Total Design BOM count
9.	FootPrint	206.0 mm^2	General	Total Foot Print Area of BOM components
10.	Frequency	778.91 kHz	General	Switching frequency
11.	IC Tolerance	9.0 mV	General	IC Feedback Tolerance
12.	M Vds Act	299.294 mV	General	Voltage drop across the MosFET
13.	Pout	10.0 W	General	Total output power
14.	Total BOM	$2.93	General	Total BOM Cost
15.	D1 Tj	41.0 degC	Op_Point	D1 junction temperature
16.	Vout OP	20.0 V	Op_Point	Operational Output Voltage
17.	Cross Freq	3.289 kHz	Op_point	Bode plot crossover frequency
18.	Duty Cycle	87.458 %	Op_point	Duty cycle
19.	Efficiency	82.795 %	Op_point	Steady state efficiency
20.	IC Tj	81.115 degC	Op_point	IC junction temperature
21.	ICThetaJA	43.3 degC/W	Op_point	IC junction-to-ambient thermal resistance
22.	IOUT_OP	500.0 mA	Op_point	Iout operating point
23.	Phase Marg	92.343 deg	Op_point	Bode Plot Phase Margin
24.	VIN_OP	3.0 V	Op_point	Vin operating point
25.	Vout p-p	42.074 mV	Op_point	Peak-to-peak output ripple voltage
26.	Cin Pd	90.722 µW	Power	Input capacitor power dissipation
27.	Cout Pd	1.747 mW	Power	Output capacitor power dissipation
28.	Diode Pd	220.0 mW	Power	Diode power dissipation
29.	IC Pd	1.181 W	Power	IC power dissipation
30.	L Pd	573.24 mW	Power	Inductor power dissipation
31.	Total Pd	2.078 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	500.0 mA	Maximum Output Current
2.	Iout1	500.0 mAmps	Output Current #1
3.	VinMax	5.0 V	Maximum input voltage
4.	VinMin	3.0 V	Minimum input voltage
5.	Vout	20.0 V	Output Voltage
6.	Vout1	20.0 Volt	Output Voltage #1
7.	base_pn	TPS55330	Base Product Number
8.	source	DC	Input Source Type
9.	Ta	30.0 degC	Ambient temperature

Design Assistance

1. **TPS55330** Product Folder : http://www.ti.com/product/tps55330 : contains the data sheet and other resources.