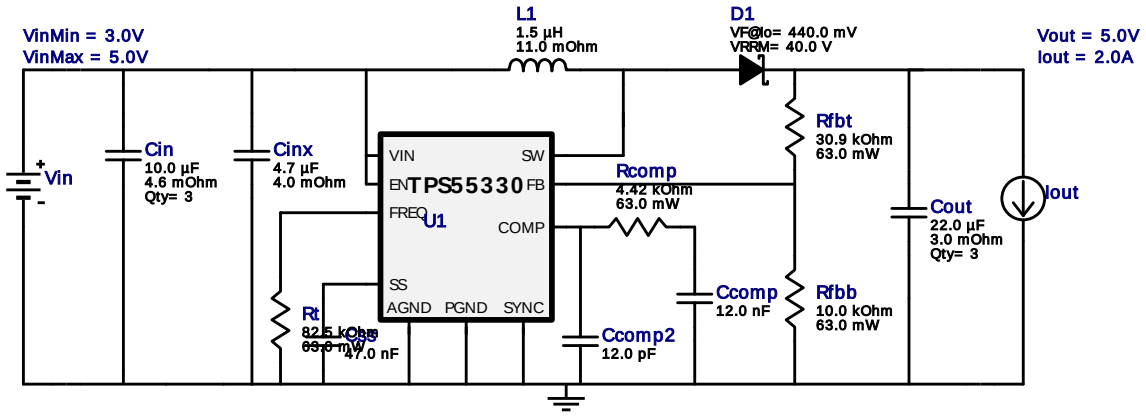
WEBENCH® Design Report

VinMin = 3.0V
VinMax = 5.0V
Vout = 5.0V
Iout = 2.0A

Device = TPS55330RTER
Topology = Boost
Created = 10/14/13 11:54:41 AM
BOM Cost = $4.99
Total Pd = 1.69W
Footprint = 389.0mm2
BOM Count = 17

Design : 1819924/10 TPS55330RTER
TPS55330RTER 3.0V-5.0V to 5.0V @ 2.0A



Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Ccomp	MuRata	GRM155R71C123KA01D Series= X7R	Cap= 12.0 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0402 3mm2
2.	Ccomp2	MuRata	GRM1555C1E120JA01D Series= C0G/NP0	Cap= 12.0 pF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0402 3mm2
3.	Cin	TDK	C3216X5R1A106M Series= X5R	Cap= 10.0 µF ESR= 4.6 mOhm VDC= 10.0 V IRMS= 2.7 A	3	$0.06	1206 11mm2
4.	Cinx	Kemet	C0805C475K8PACTU Series= X5R	Cap= 4.7 µF ESR= 4.0 mOhm VDC= 10.0 V IRMS= 9.89 A	1	$0.03	0805 7mm2
5.	Cout	MuRata	GRM32ER71C226ME18L Series= X7R	Cap= 22.0 µF ESR= 3.0 mOhm VDC= 16.0 V IRMS= 3.2 A	3	$0.81	1210 15mm2
6.	Css	Taiyo Yuden	TMK212B7473KD-T Series= X7R	Cap= 47.0 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7mm2
7.	D1	Vishay-Semiconductor	SL44-E3/57T	VF@Io= 440.0 mV VRRM= 40.0 V	1	$0.32	SMC 83mm2
8.	L1	Bourns	SRN8040-1R5Y	L= 1.5 µH DCR= 11.0 mOhm	1	$0.21	SRN8040 100mm2
9.	Rcomp	Vishay-Dale	CRCW04024K42FKED Series= CRCW..e3	Res= 4.42 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3mm2
10.	Rfbb	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3mm2

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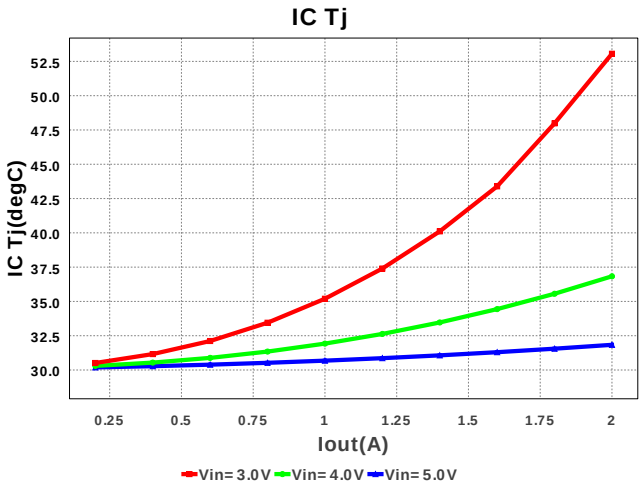
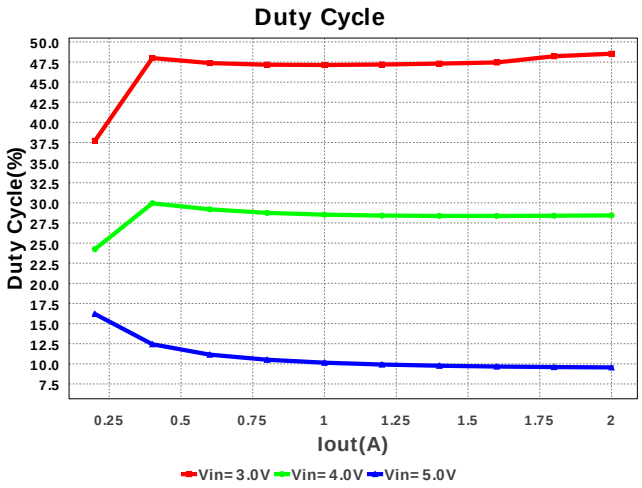
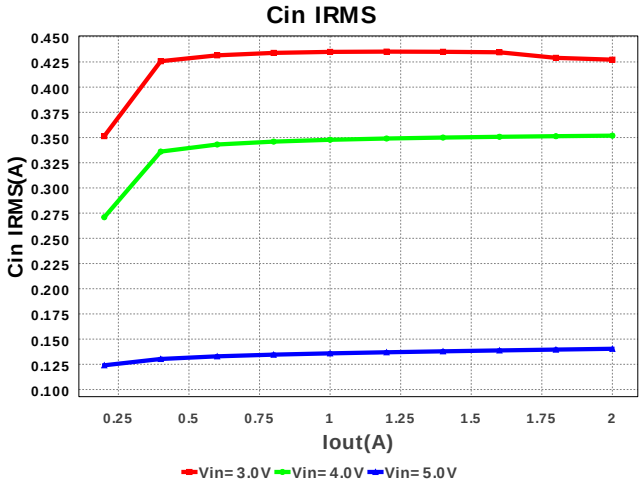
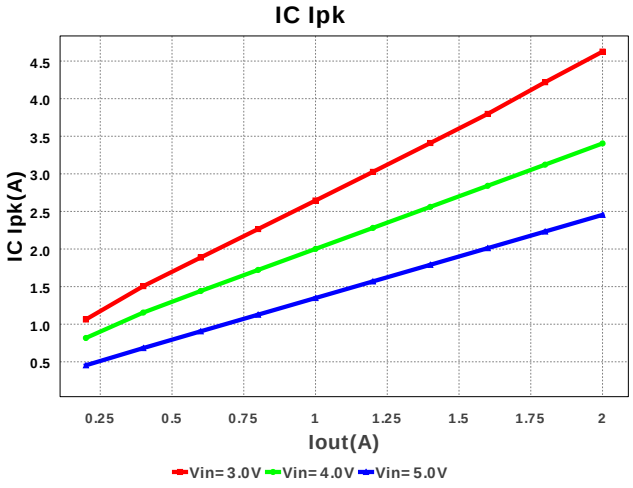
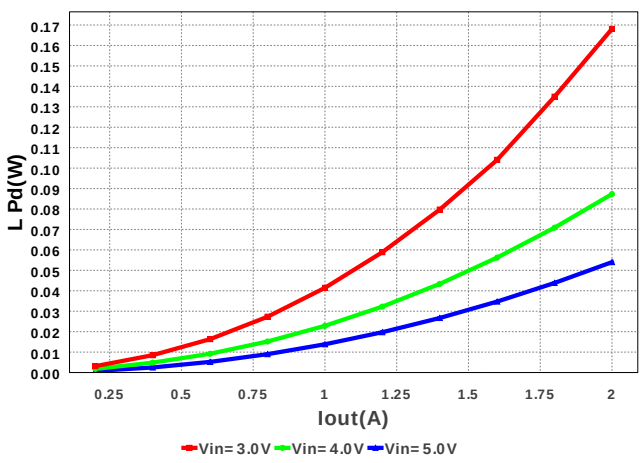
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	Rfbt	Vishay-Dale	CRCW040230K9FKED Series= CRCW..e3	Res= 30.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3mm2
12.	Rt	Vishay-Dale	CRCW040282K5FKED Series= CRCW..e3	Res= 82.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3mm2
13.	U1	Texas Instruments	TPS55330RTER	Switcher	1	$1.75	MPQF149C 17mm2

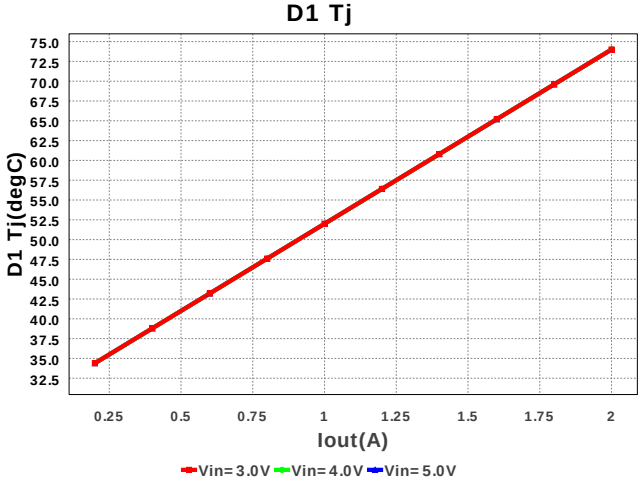












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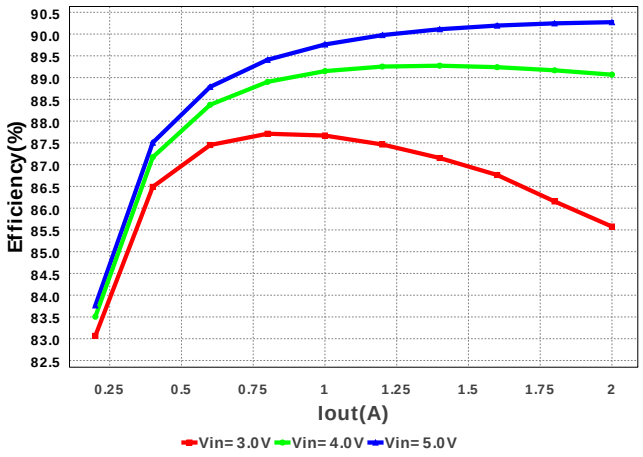
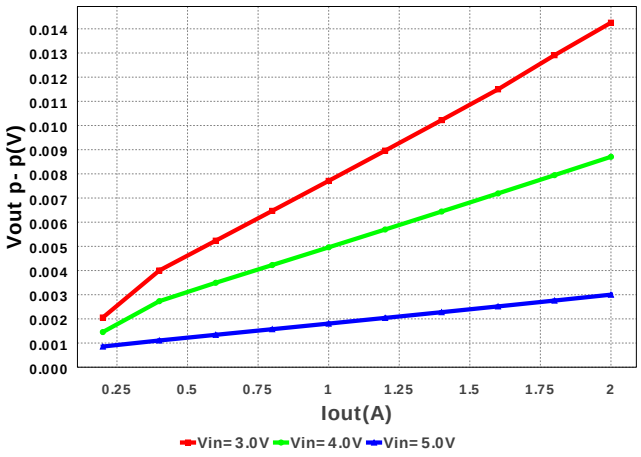
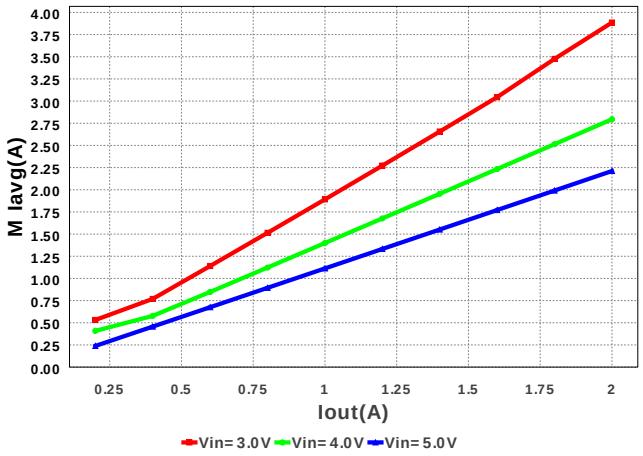
Efficiency



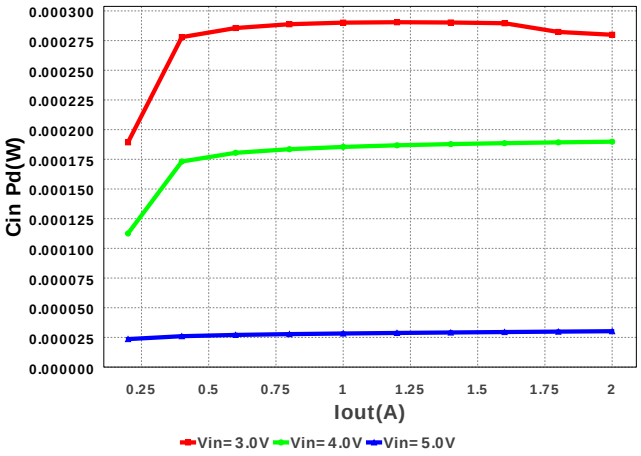
Vout p- p



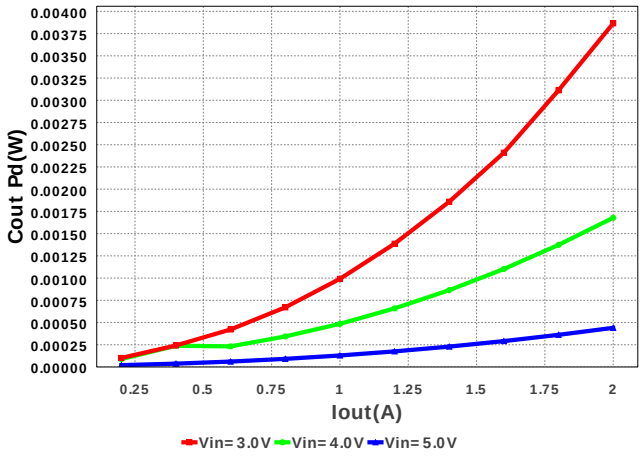
M Iavg



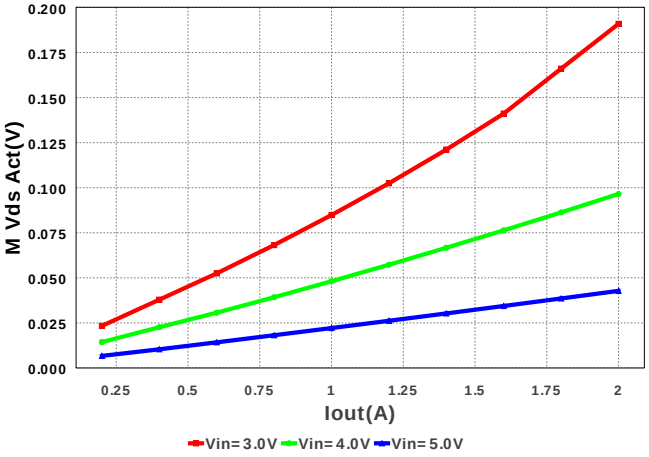
Cin Pd



Cout Pd



M Vds Act



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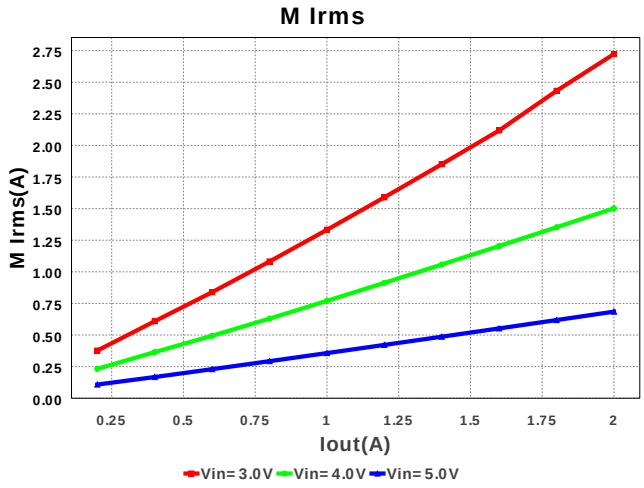

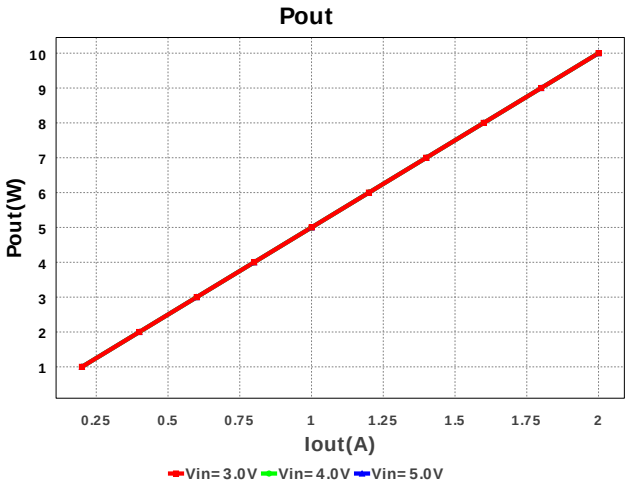

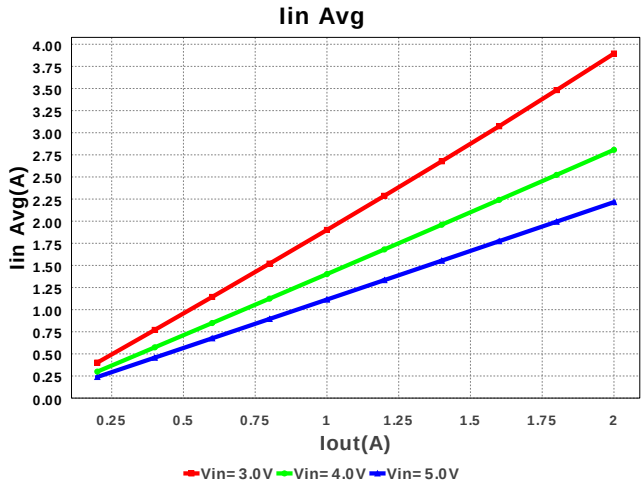

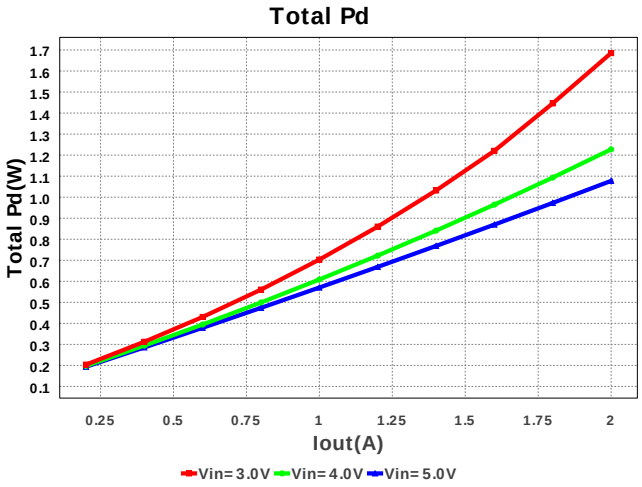

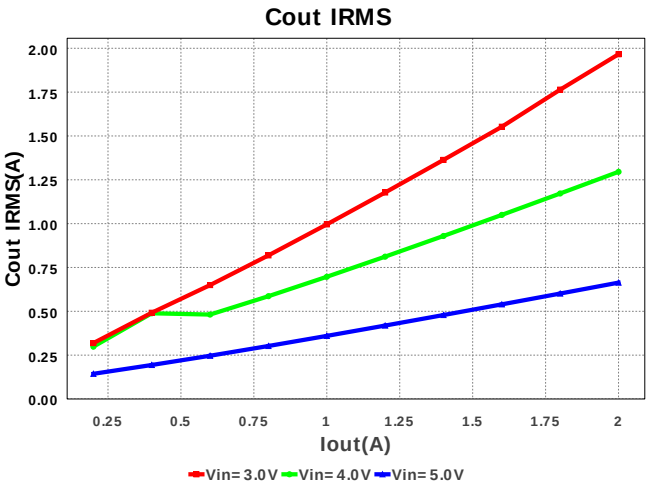

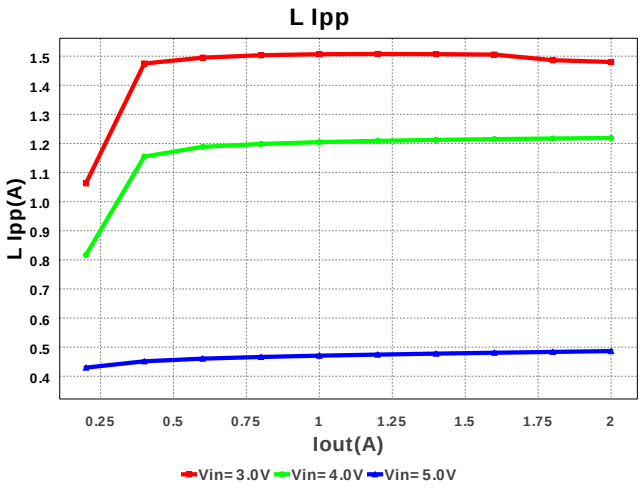

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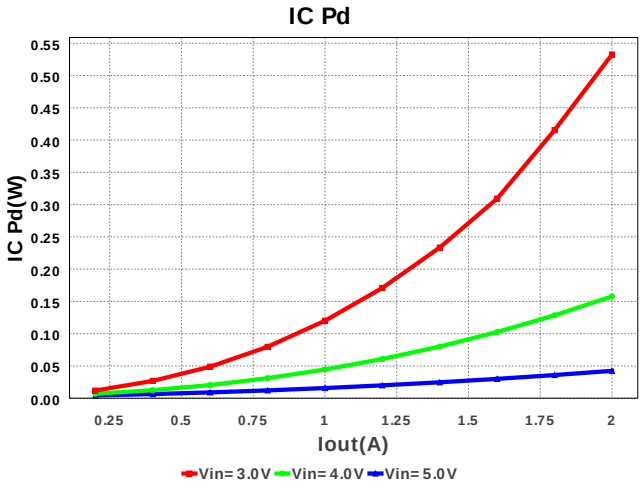

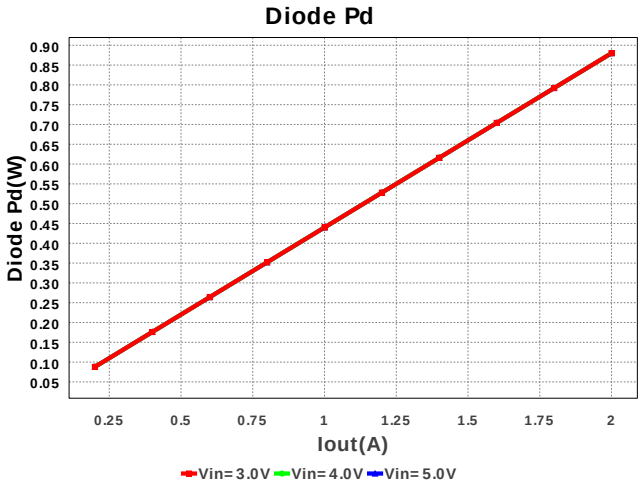

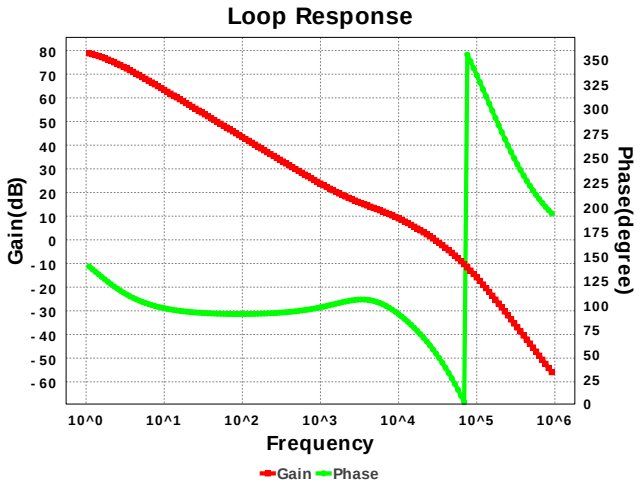

Operating Values

#	Name	Value	Category	Description
1.	BOM Count	17		Total Design BOM count
2.	Total BOM	$4.99		Total BOM Cost
3.	Cin IRMS	427.253 mA	Current	Input capacitor RMS ripple current
4.	Cout IRMS	1.966 A	Current	Output capacitor RMS ripple current
5.	IC Ipk	4.626 A	Current	Peak switch current in IC
6.	Iin Avg	3.895 A	Current	Average input current
7.	L Ipp	1.48 A	Current	Peak-to-peak inductor ripple current
8.	M Iavg	3.886 A	Current	MOSFET Average current
9.	M1 Irms	2.723 A	Current	Q Iavg
10.	FootPrint	389.0 mm2	General	Total Foot Print Area of BOM components
11.	Frequency	575.616 kHz	General	Switching frequency
12.	IC Tolerance	9.0 mV	General	IC Feedback Tolerance
13.	M Vds Act	190.894 mV	General	Voltage drop across the MosFET
14.	Pout	10.0 W	General	Total output power
15.	D1 Tj	74.0 degC	Op_Point	D1 junction temperature
16.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
17.	Cross Freq	16.974 kHz	Op_point	Bode plot crossover frequency
18.	Duty Cycle	48.528 %	Op_point	Duty cycle
19.	Efficiency	85.577 %	Op_point	Steady state efficiency
20.	IC Tj	53.058 degC	Op_point	IC junction temperature
21.	ICThetaJA	43.3 degC/W	Op_point	IC junction-to-ambient thermal resistance
22.	IOUT_OP	2.0 A	Op_point	Iout operating point
23.	Phase Marg	57.428 deg	Op_point	Bode Plot Phase Margin
24.	VIN_OP	3.0 V	Op_point	Vin operating point
25.	Vout p-p	14.254 mV	Op_point	Peak-to-peak output ripple voltage
26.	Cin Pd	279.902 µW	Power	Input capacitor power dissipation
27.	Cout Pd	3.865 mW	Power	Output capacitor power dissipation
28.	Diode Pd	880.0 mW	Power	Diode power dissipation
29.	IC Pd	532.514 mW	Power	IC power dissipation
30.	L Pd	168.088 mW	Power	Inductor power dissipation
31.	Total Pd	1.685 W	Power	Total Power Dissipation

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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	3.0 V	Minimum input voltage
5.	Vout	5.0 V	Output Voltage
6.	Vout1	5.0 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.

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