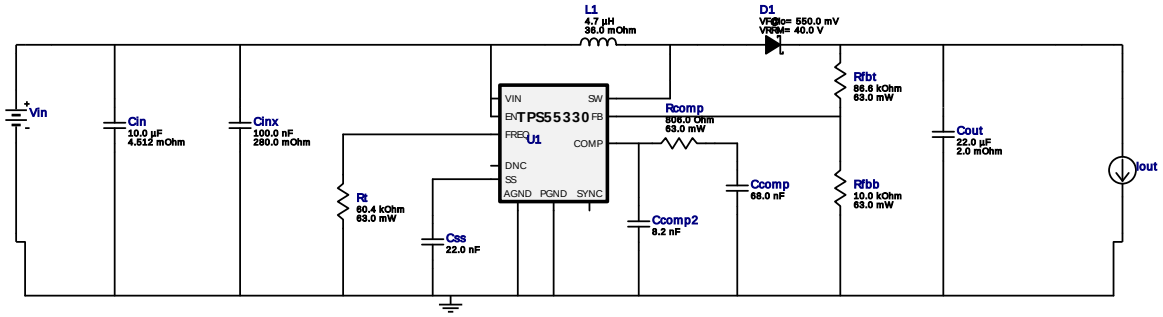
WEBENCH® Design Report

VinMin = 5.0V
VinMax = 10.0V
Vout = 12.0V
Iout = 1.5A

Device = TPS55330RTER
Topology = Boost
Created = 7/14/16 5:13:35 PM
BOM Cost = $2.81
BOM Count = 14
Total Pd = 2.23W

Design : 906020/2236 TPS55330RTER
TPS55330RTER 5.0V-10.0V to 12.00V @ 1.5A



Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Ccomp	MuRata	GRM155R61A683KA01D Series= X5R	Cap= 68.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
2.	Ccomp2	MuRata	GRM033R61A822KA01D Series= X5R	Cap= 8.2 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0201 2 mm²
3.	Cin	MuRata	GRM31CR61E106KA12L Series= X5R	Cap= 10.0 uF ESR= 4.512 mOhm VDC= 25.0 V IRMS= 2.447 A	1	$0.05	1206_190 11 mm²
4.	Cinx	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
5.	Cout	MuRata	GRM32ER61C226ME20L Series= X5R	Cap= 22.0 uF ESR= 2.0 mOhm VDC= 16.0 V IRMS= 3.68 A	1	$0.12	1210 15 mm²
6.	Css	MuRata	GRM033C80J223KE01D Series= X6S	Cap= 22.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0201 2 mm²
7.	D1	Diodes Inc.	B540C-13-F	VF@Io= 550.0 mV VRRM= 40.0 V	1	$0.17	SMC 83 mm²
8.	L1	Coilcraft	XAL5030-472MEB	L= 4.7 µH DCR= 36.0 mOhm	1	$0.63	XAL5030 54 mm²
9.	Rcomp	Vishay-Dale	CRCW0402806RFKED Series= CRCW..e3	Res= 806.0 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
11.	Rfbt	Vishay-Dale	CRCW040286K6FKED Series= CRCW..e3	Res= 86.6 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

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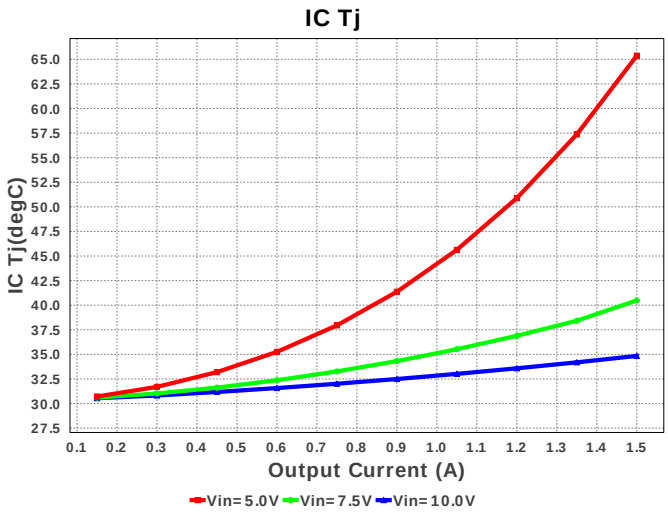
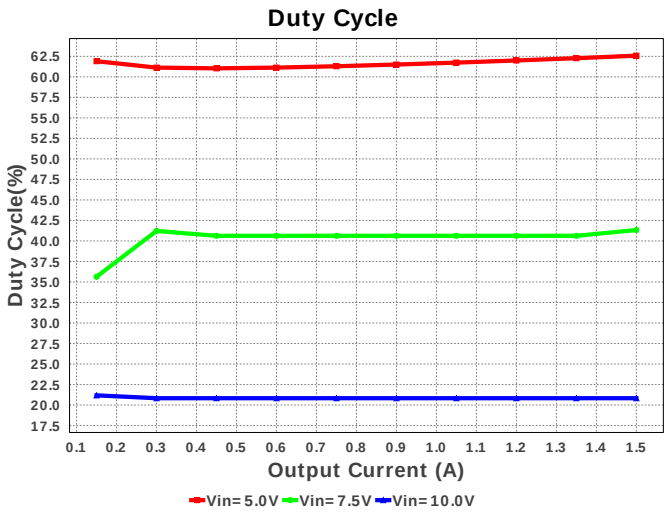
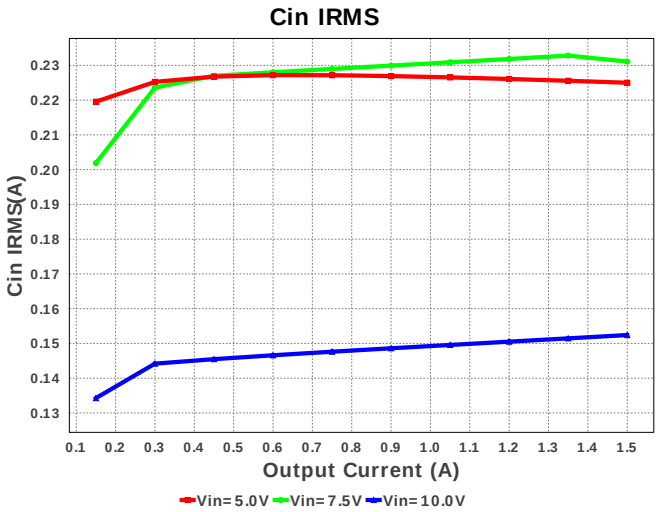
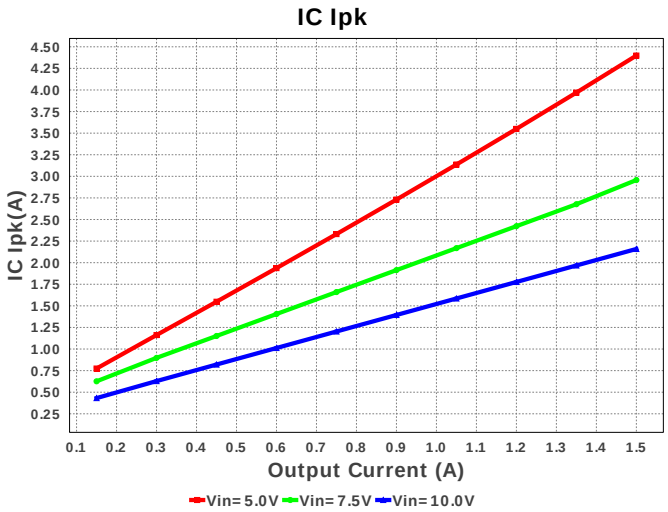
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
12.	Rt	Vishay-Dale	CRCW040260K4FKED Series= CRCW..e3	Res= 60.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
13.	U1	Texas Instruments	TPS55330RTER	Switcher	1	$1.75	S-PWQFN-N16 17 mm^2









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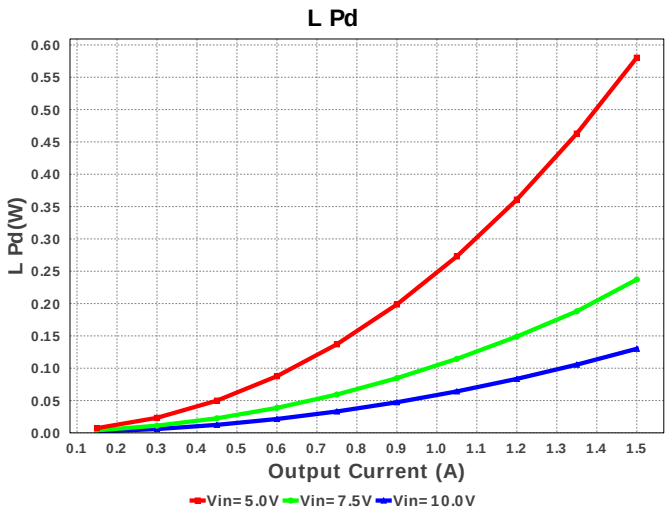

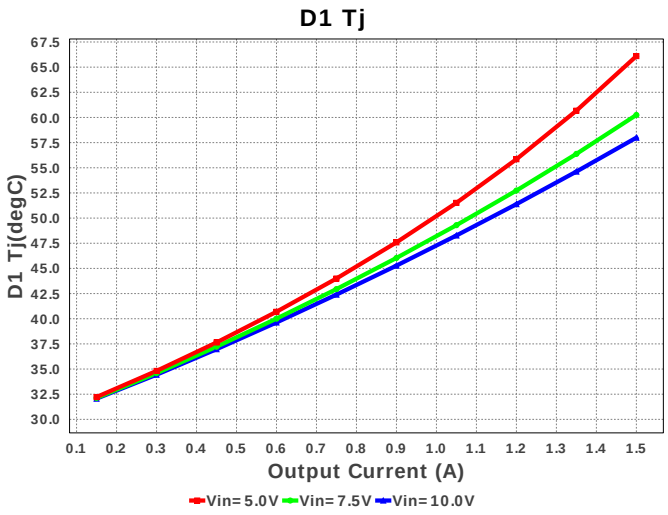

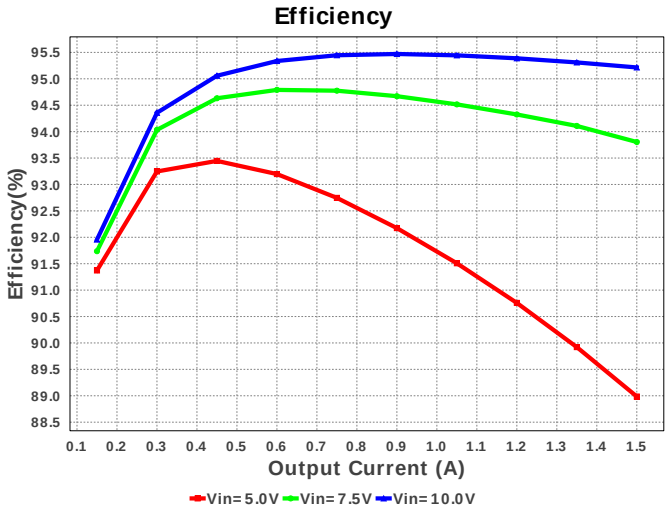

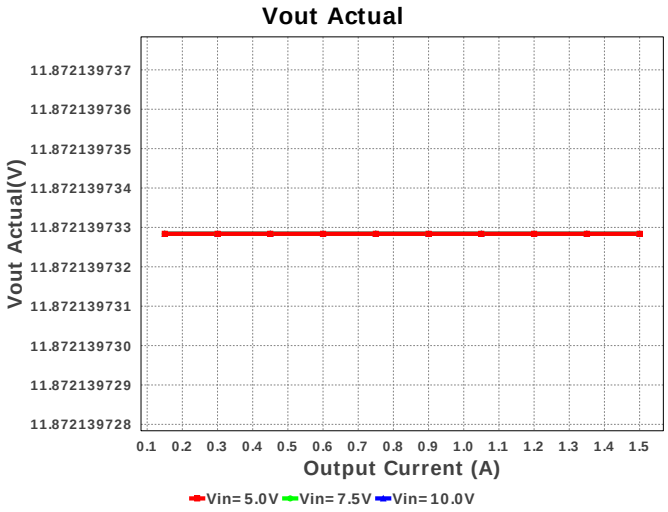

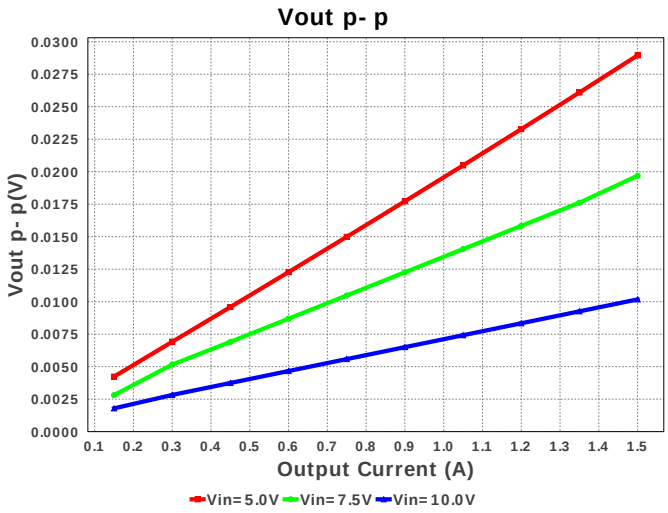

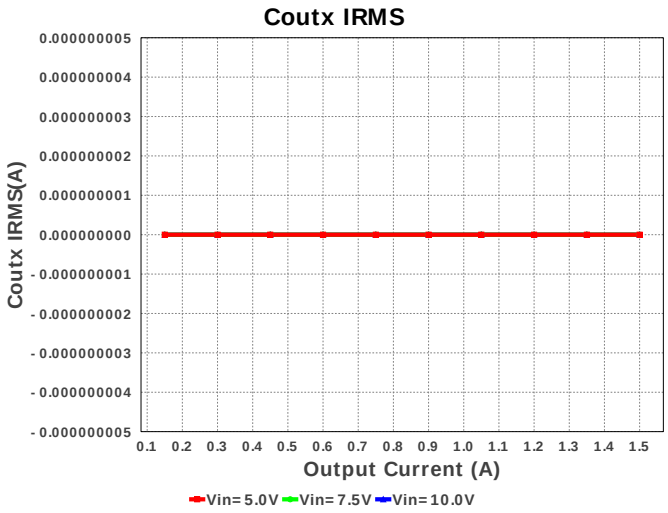

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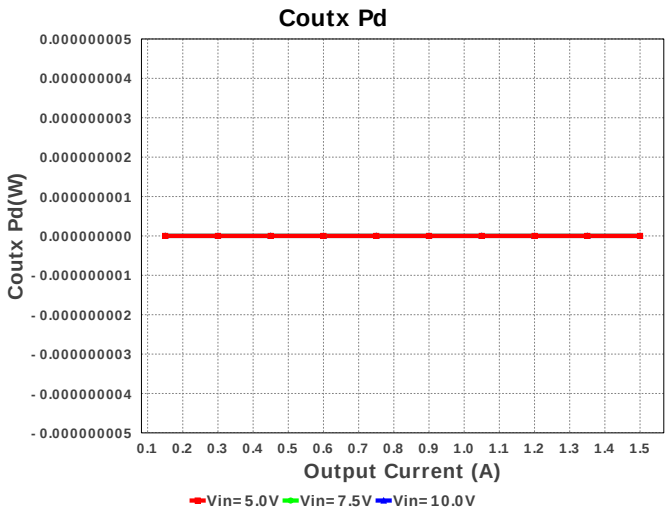

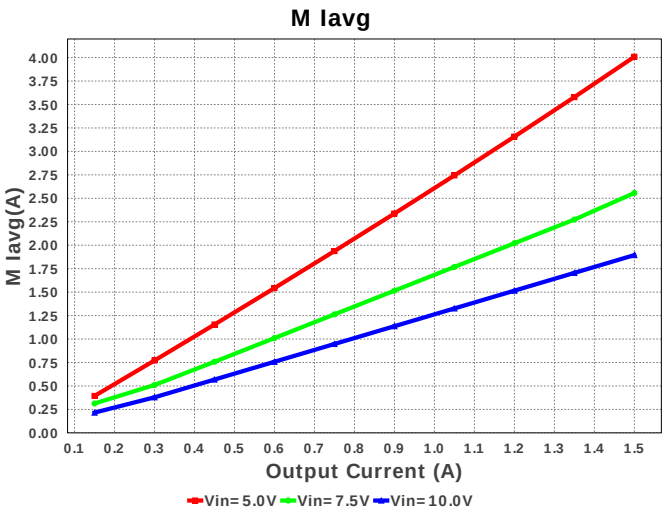

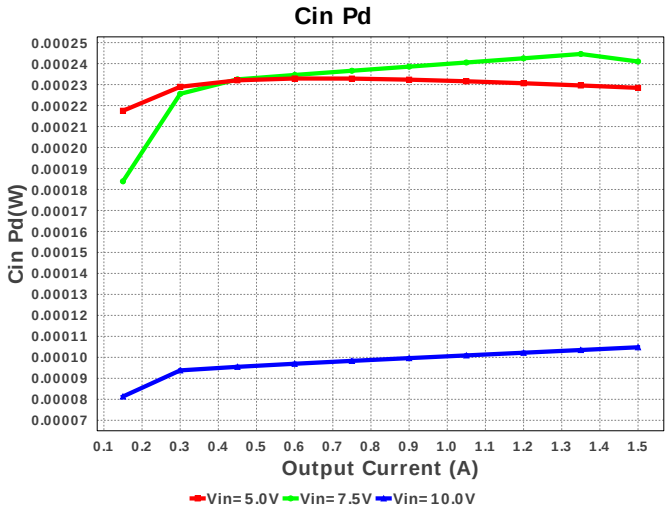

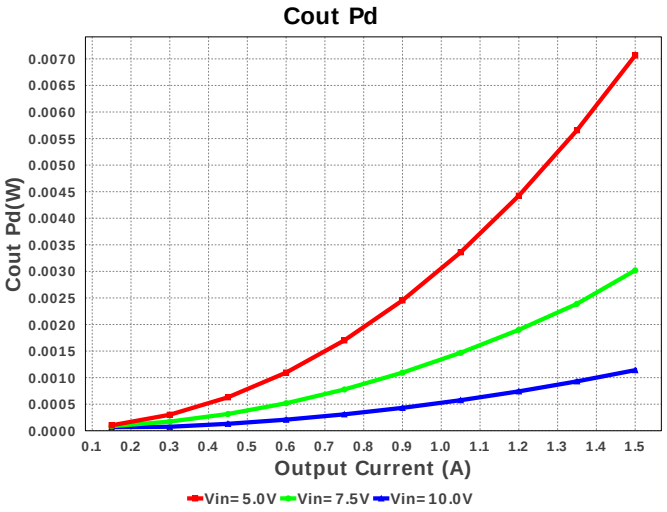

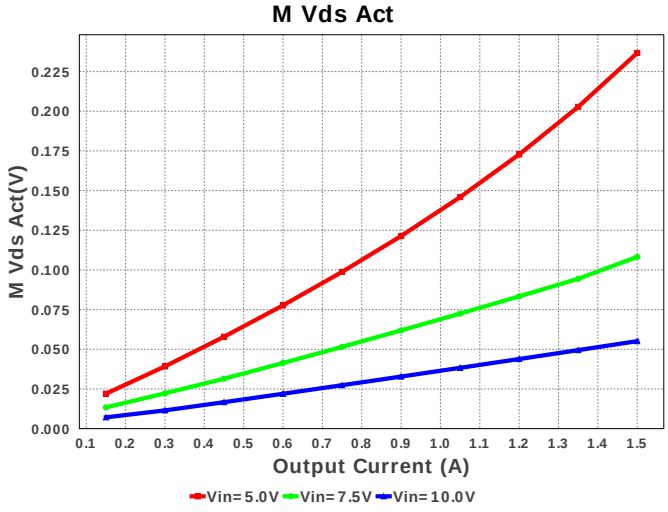

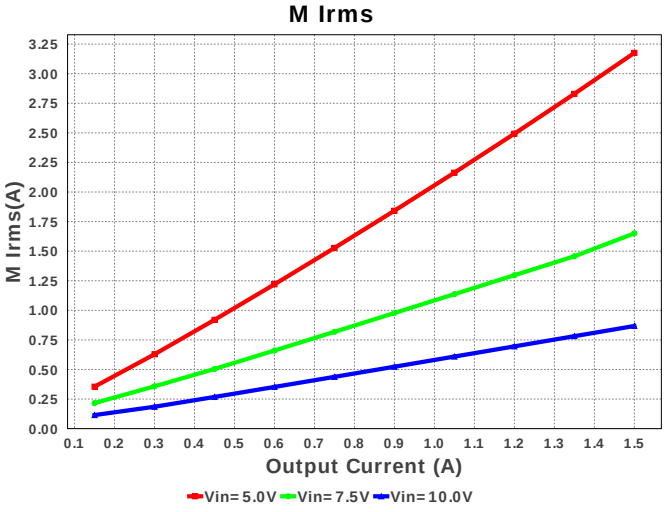

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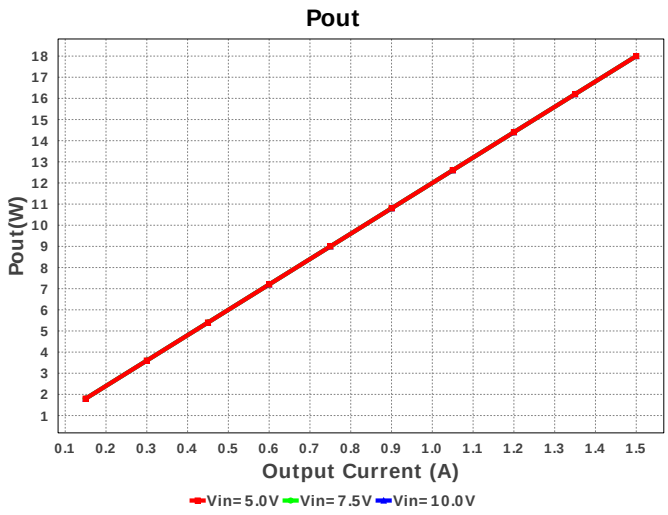

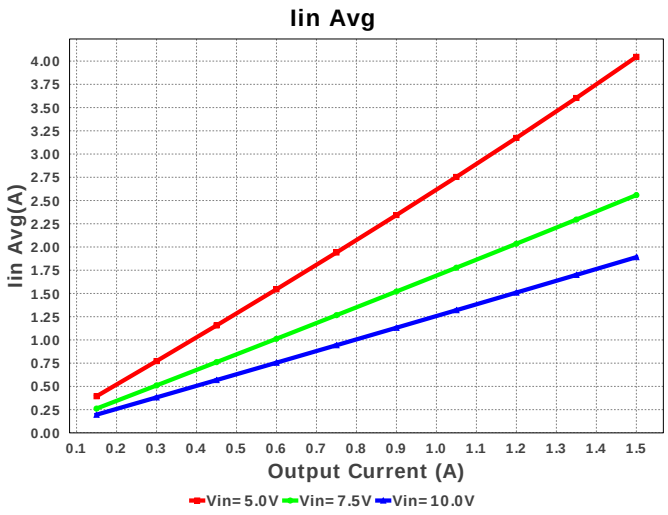

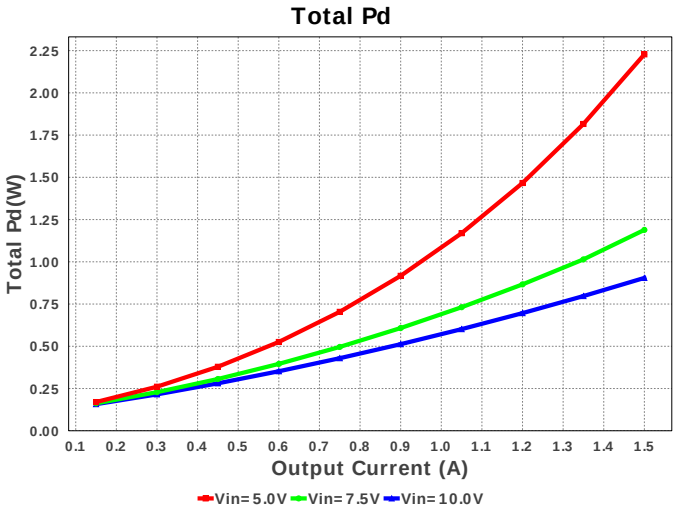

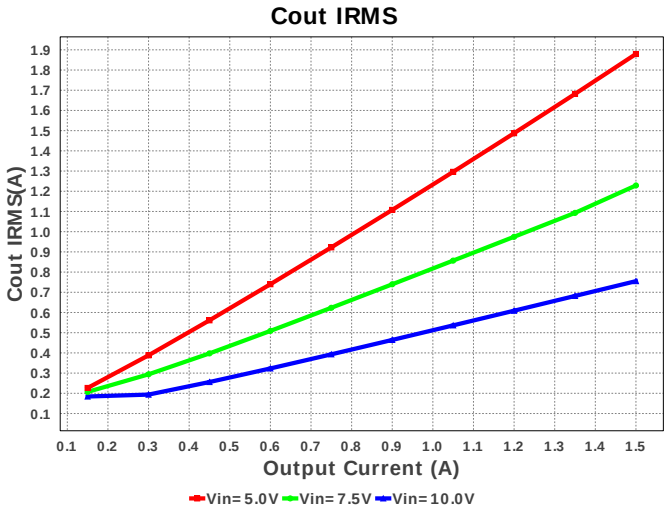

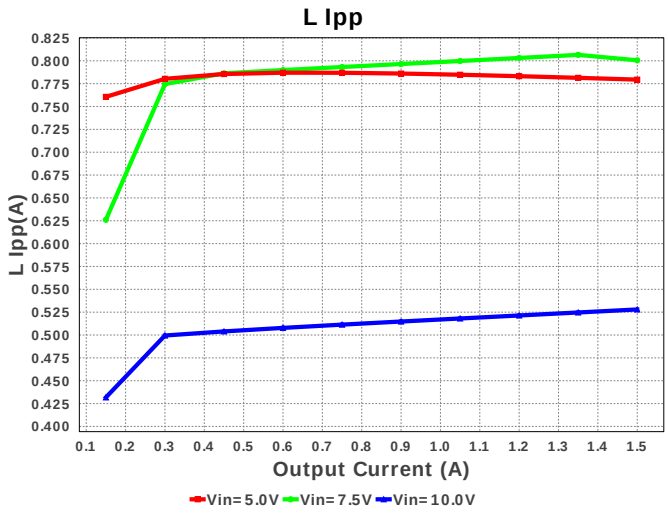

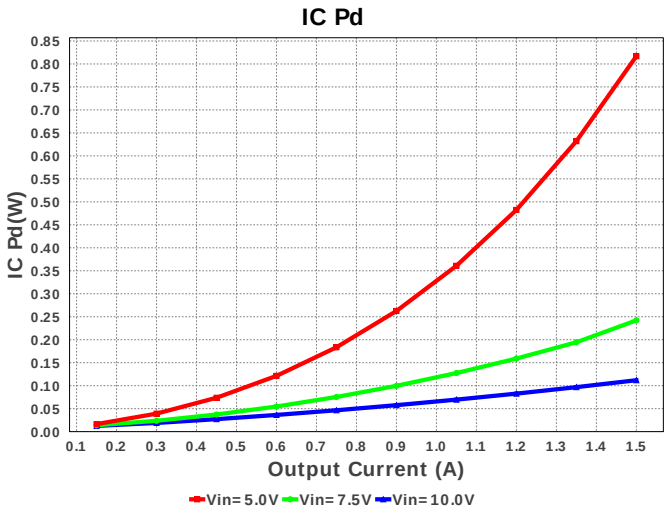

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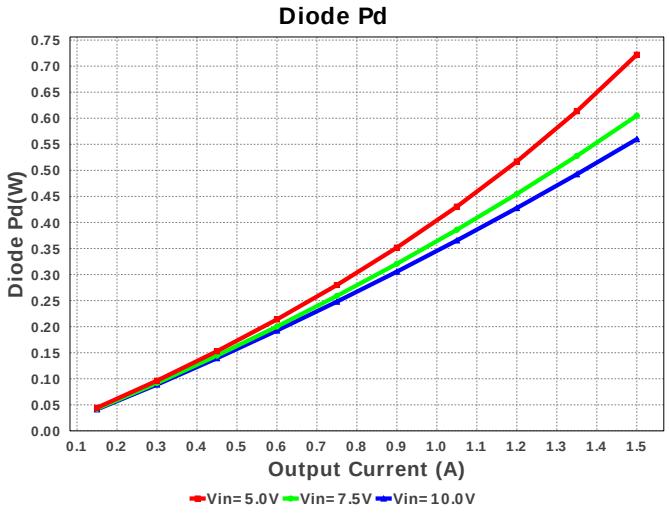

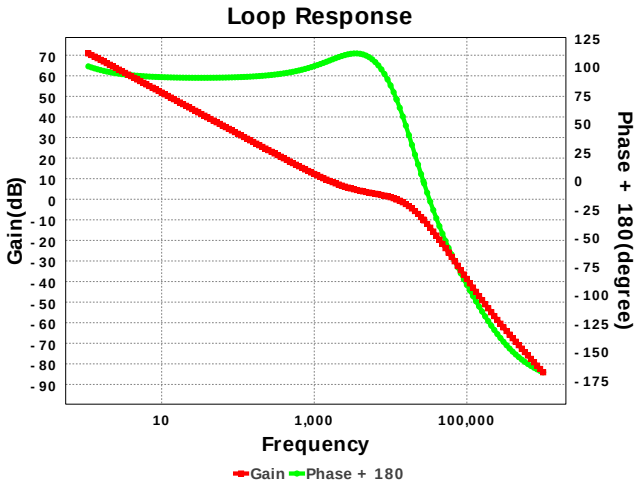

Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	225.007 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	1.854 A	Current	Output capacitor RMS ripple current
3.	Coutx IRMS	0.0 A	Current	Output capacitor_x RMS ripple current
4.	IC Ipk	4.398 A	Current	Peak switch current in IC
5.	Iin Avg	4.046 A	Current	Average input current
6.	L Ipp	779.45 mA	Current	Peak-to-peak inductor ripple current
7.	M Iavg	4.009 A	Current	MOSFET Average current
8.	M Irms	3.176 A	Current	MOSFET RMS current
9.	BOM Count	14	General	Total Design BOM count
10.	FootPrint	211.0 mm^2	General	Total Foot Print Area of BOM components
11.	Frequency	778.91 kHz	General	Switching frequency
12.	IC Tolerance	9.0 mV	General	IC Feedback Tolerance
13.	M Vds Act	236.723 mV	General	Voltage drop across the MosFET
14.	Pout	18.0 W	General	Total output power
15.	Total BOM	$2.81	General	Total BOM Cost
16.	D1 Tj	66.097 degC	Op_Point	D1 junction temperature
17.	Low Freq Gain	70.663 dB	Op_Point	Gain at 10Hz
18.	Vout Actual	11.872 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
19.	Vout OP	12.0 V	Op_Point	Operational Output Voltage
20.	Cross Freq	6.643 kHz	Op_point	Bode plot crossover frequency
21.	Duty Cycle	62.58 %	Op_point	Duty cycle
22.	Efficiency	88.987 %	Op_point	Steady state efficiency
23.	Gain Marg	-8.911 dB	Op_point	Bode Plot Gain Margin
24.	IC Tj	65.367 degC	Op_point	IC junction temperature
25.	ICThetaJA	43.3 degC/W	Op_point	IC junction-to-ambient thermal resistance
26.	IOUT_OP	1.5 A	Op_point	Iout operating point
27.	Phase Marg	66.384 deg	Op_point	Bode Plot Phase Margin
28.	VIN_OP	5.0 V	Op_point	Vin operating point
29.	Vout p-p	40.721 mV	Op_point	Peak-to-peak output ripple voltage
30.	Cin Pd	228.435 µW	Power	Input capacitor power dissipation
31.	Cout Pd	6.872 mW	Power	Output capacitor power dissipation
32.	Coutx Pd	0.0 W	Power	Output capacitor_x power loss
33.	Diode Pd	721.947 mW	Power	Diode power dissipation
34.	IC Pd	816.804 mW	Power	IC power dissipation
35.	L Pd	580.303 mW	Power	Inductor power dissipation
36.	Total Pd	2.228 W	Power	Total Power Dissipation
37.	Vout Tolerance	2.557 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	1.5	Maximum Output Current
2.	VinMax	10.0	Maximum input voltage
3.	VinMin	5.0	Minimum input voltage
4.	Vout	12.0	Output Voltage
5.	base_pn	TPS55330	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

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

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