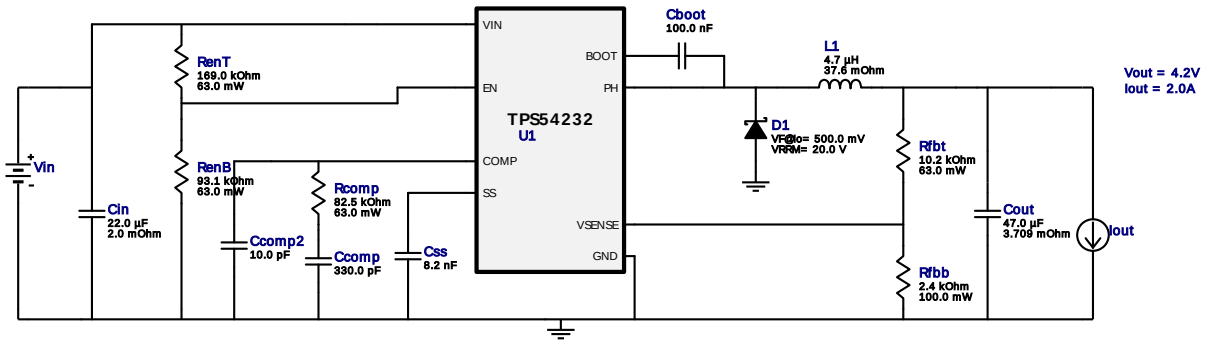
WEBENCH® Design Report

VinMin = 6.0V
VinMax = 8.4V
Vout = 4.2V
Iout = 2.0A

Device = TPS54232DR
Topology = Buck
Created = 7/17/16 11:02:03 PM
BOM Cost = $1.15
BOM Count = 14
Total Pd = 1.03W

Design : 4743359/42 TPS54232DR
TPS54232DR 6.0V-8.4V to 4.20V @ 2.0A



Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	MuRata	GRM155R61A104KA01D Series= X5R	Cap= 100.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
2.	Ccomp	Samsung Electro-Mechanics	CL21C331JBANFNC Series= C0G/NP0	Cap= 330.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
3.	Ccomp2	Kemet	C0805C100K5GACTU Series= C0G/NP0	Cap= 10.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
4.	Cin	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
5.	Cout	MuRata	GRM31CR61A476KE15L Series= X5R	Cap= 47.0 uF ESR= 3.709 mOhm VDC= 10.0 V IRMS= 4.2862 A	1	$0.15	1206_190 11 mm²
6.	Css	MuRata	GRM033R61A822KA01D Series= X5R	Cap= 8.2 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0201 2 mm²
7.	D1	Diodes Inc.	B220-13-F	VF@Io= 500.0 mV VRRM= 20.0 V	1	$0.08	SMB 44 mm²
8.	L1	Bourns	SRN6045-4R7Y	L= 4.7 µH DCR= 37.6 mOhm	1	$0.16	SRN6045 64 mm²
9.	Rcomp	Vishay-Dale	CRCW040282K5FKED Series= CRCW..e3	Res= 82.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
10.	RenB	Vishay-Dale	CRCW040293K1FKED Series= CRCW..e3	Res= 93.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
11.	RenT	Vishay-Dale	CRCW0402169KFKED Series= CRCW..e3	Res= 169.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

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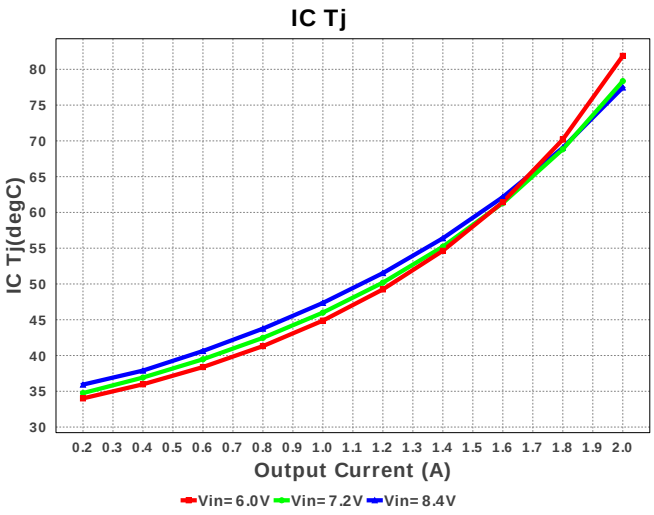
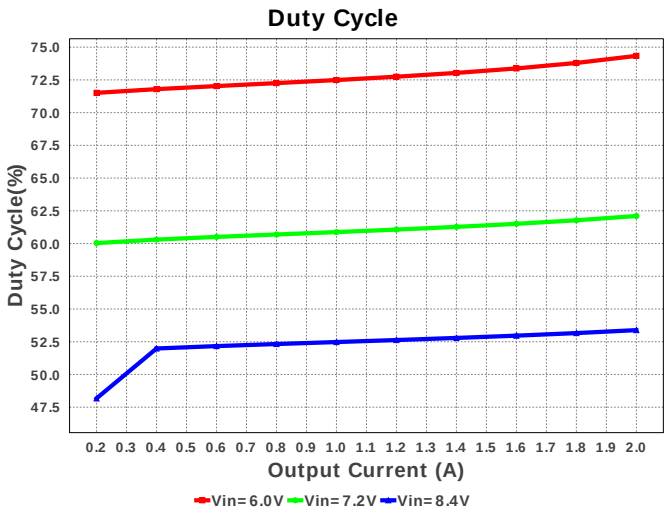
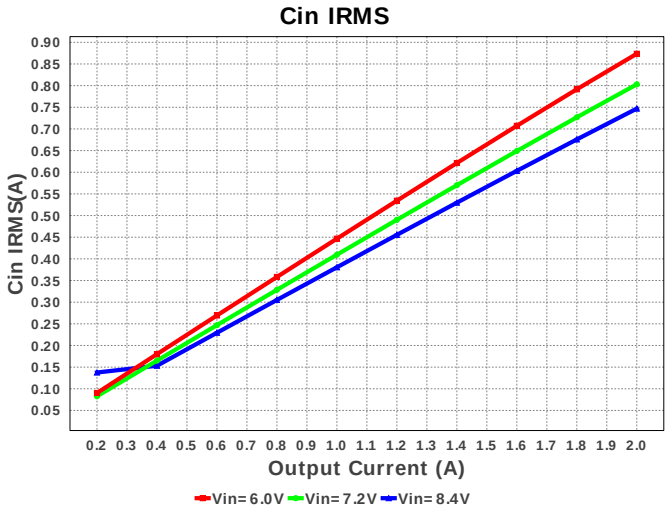
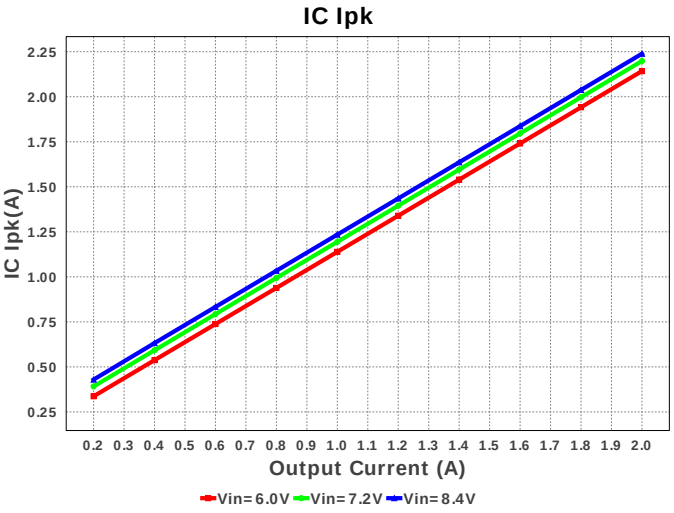
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
12.	Rfbb	Yageo America	RC0603FR-072K4L Series= ?	Res= 2.4 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	0603 5 mm^2
13.	Rfbt	Vishay-Dale	CRCW040210K2FKED Series= CRCW..e3	Res= 10.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
14.	U1	Texas Instruments	TPS54232DR	Switcher	1	$0.55	D0008A 57 mm^2









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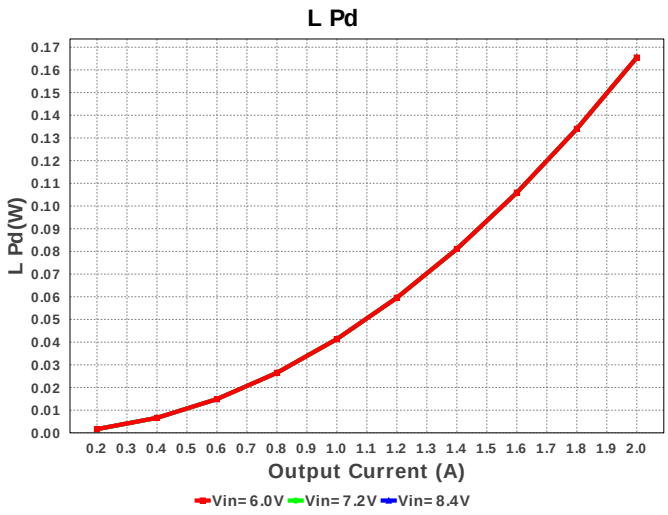

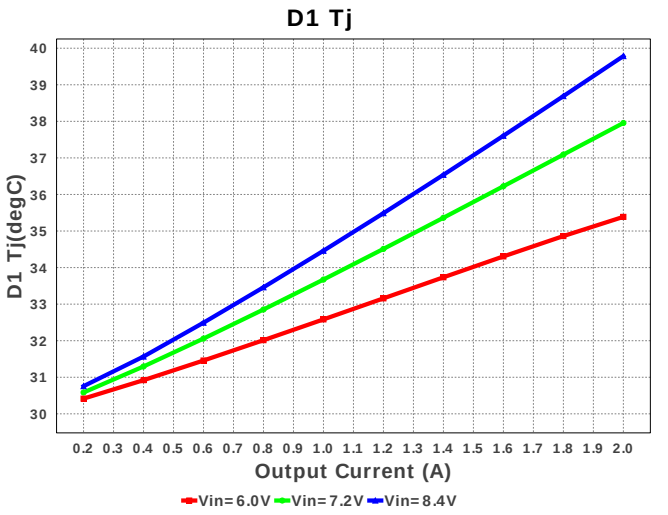

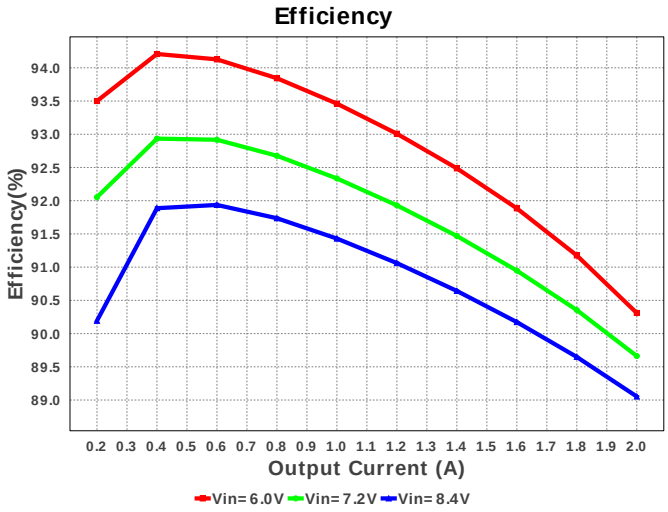

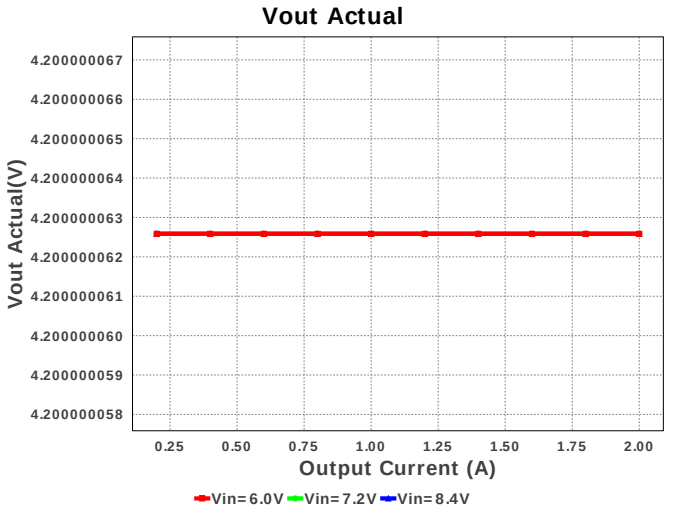

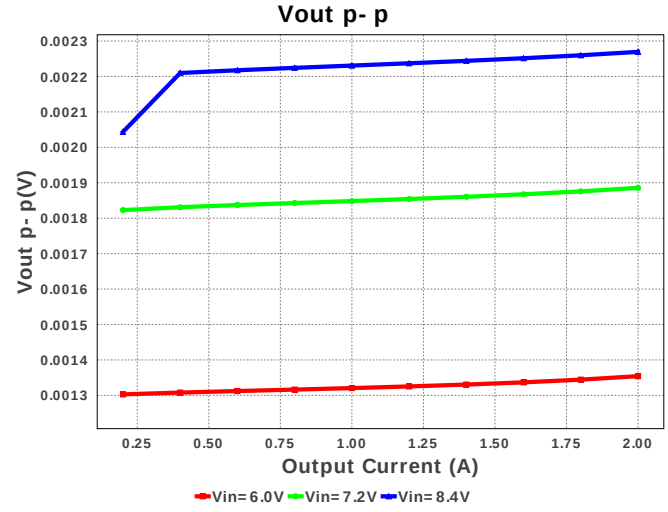

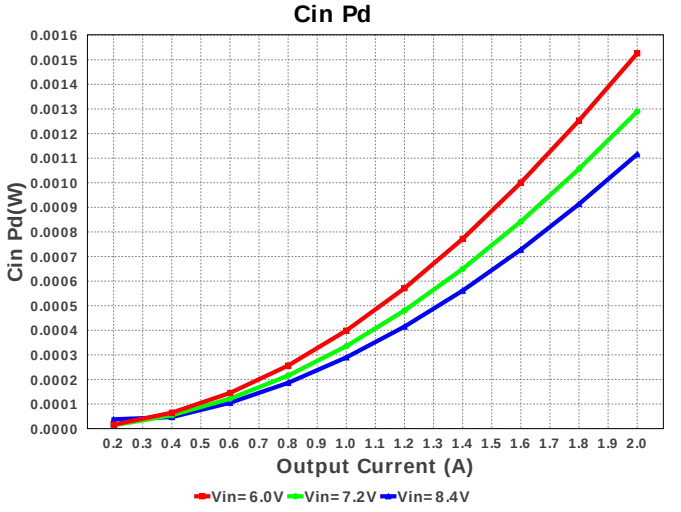

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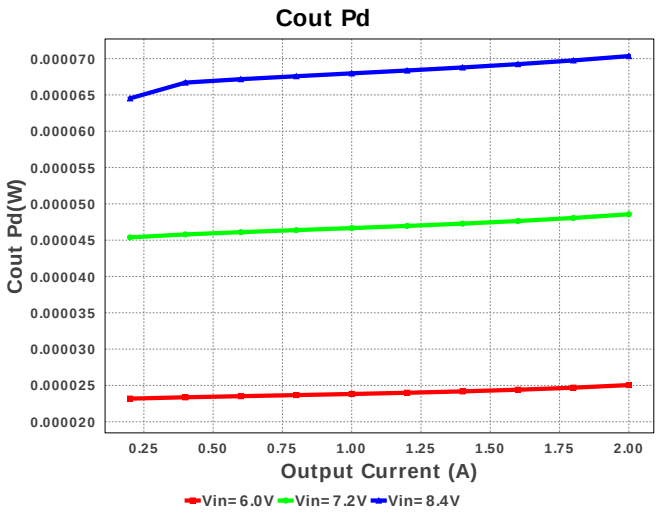

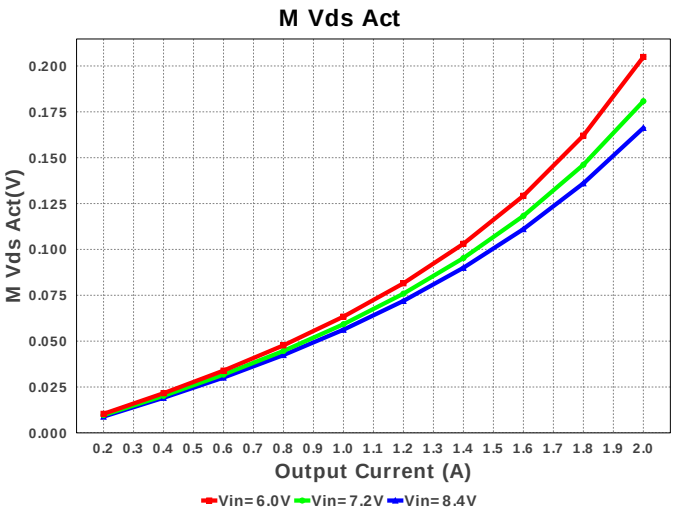

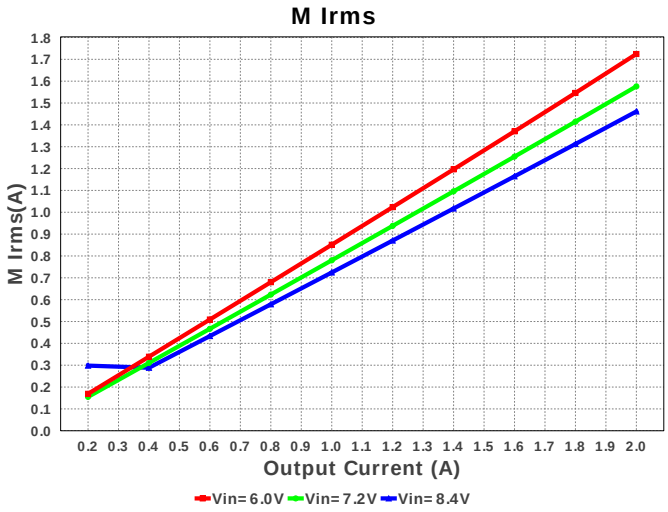

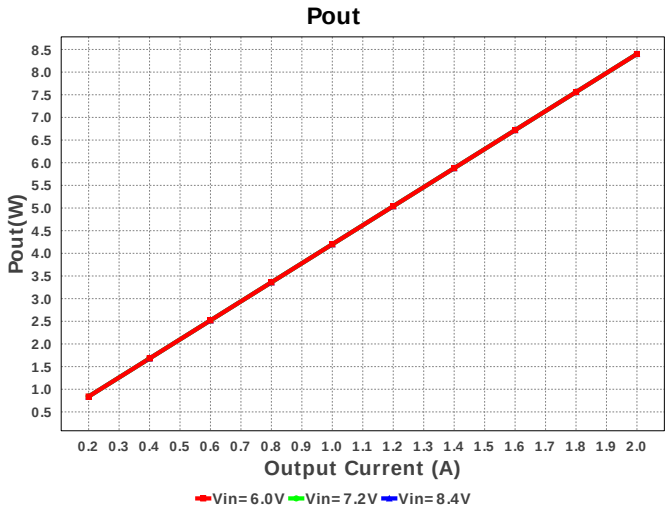

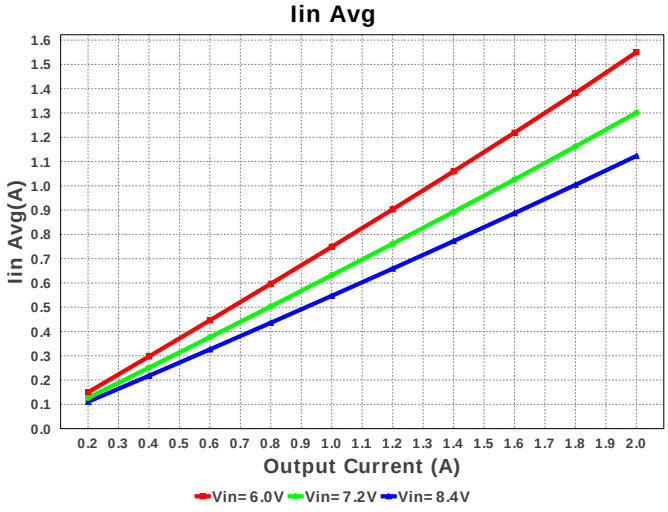

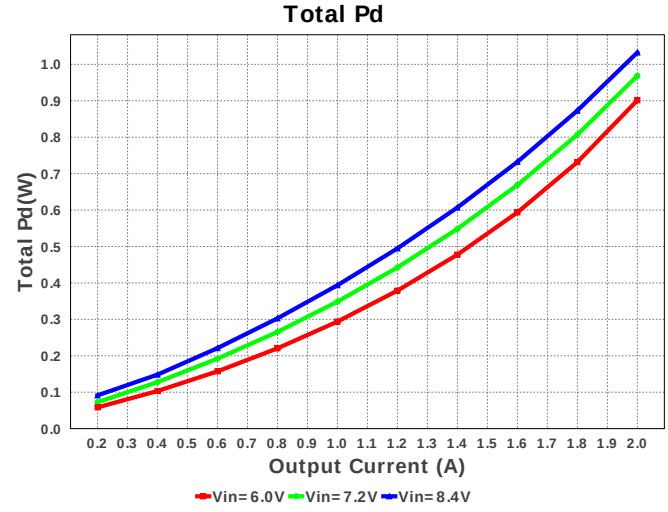

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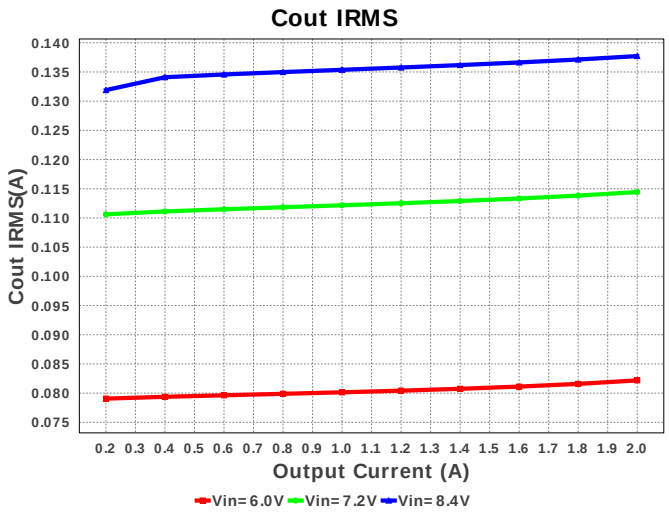

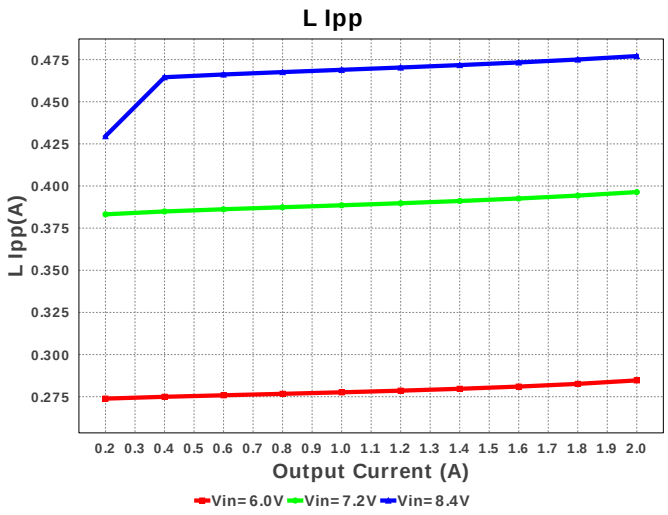

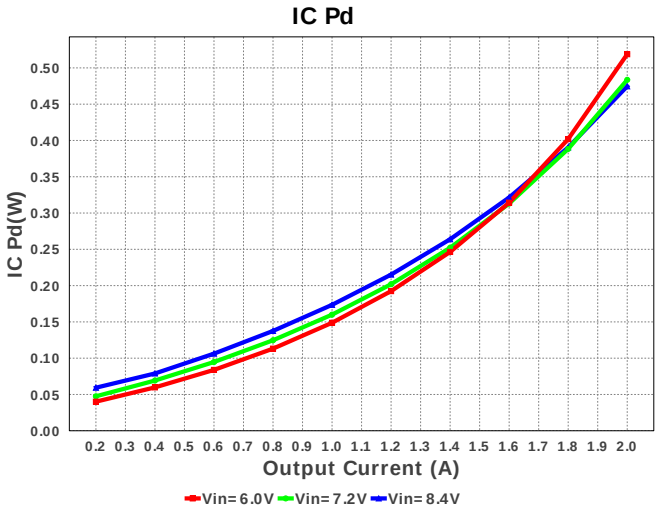

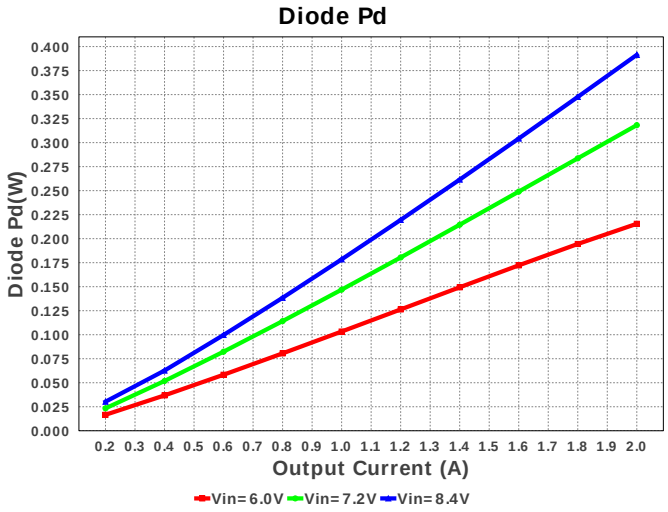

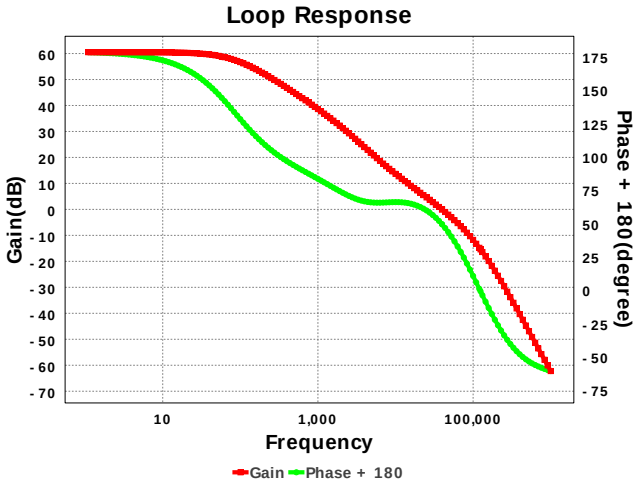

Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	746.921 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	137.718 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.239 A	Current	Peak switch current in IC
4.	Iin Avg	1.123 A	Current	Average input current
5.	L Ipp	477.07 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	1.461 A	Current	Q Iavg
7.	BOM Count	14	General	Total Design BOM count
8.	FootPrint	226.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	1000.0 kHz	General	Switching frequency
10.	M Vds Act	166.236 mV	General	Voltage drop across the MosFET
11.	Pout	8.4 W	General	Total output power

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#	Name	Value	Category	Description
12.	Total BOM	$1.15	General	Total BOM Cost
13.	D1 Tj	39.784 degC	Op_Point	D1 junction temperature
14.	Low Freq Gain	60.511 dB	Op_Point	Gain at 10Hz
15.	Vout Actual	4.2 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
16.	Vout OP	4.2 V	Op_Point	Operational Output Voltage
17.	Cross Freq	39.703 kHz	Op_point	Bode plot crossover frequency
18.	Duty Cycle	53.386 %	Op_point	Duty cycle
19.	Efficiency	89.053 %	Op_point	Steady state efficiency
20.	Gain Marg	-15.401 dB	Op_point	Bode Plot Gain Margin
21.	IC Tj	77.46 degC	Op_point	IC junction temperature
22.	ICThetaJA	100.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
23.	IOUT_OP	2.0 A	Op_point	Iout operating point
24.	Phase Marg	50.284 deg	Op_point	Bode Plot Phase Margin
25.	VIN_OP	8.4 V	Op_point	Vin operating point
26.	Vout p-p	2.269 mV	Op_point	Peak-to-peak output ripple voltage
27.	Cin Pd	1.116 mW	Power	Input capacitor power dissipation
28.	Cout Pd	70.345 µW	Power	Output capacitor power dissipation
29.	Diode Pd	391.377 mW	Power	Diode power dissipation
30.	IC Pd	474.596 mW	Power	IC power dissipation
31.	L Pd	165.44 mW	Power	Inductor power dissipation
32.	Total Pd	1.033 W	Power	Total Power Dissipation
33.	Vout Tolerance	5.193 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	2.0	Maximum Output Current
2.	VinMax	8.4	Maximum input voltage
3.	VinMin	6.0	Minimum input voltage
4.	Vout	4.2	Output Voltage
5.	base_pn	TPS54232	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **TPS54232** Product Folder : http://www.ti.com/product/TPS54232 : contains the data sheet and other resources.

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