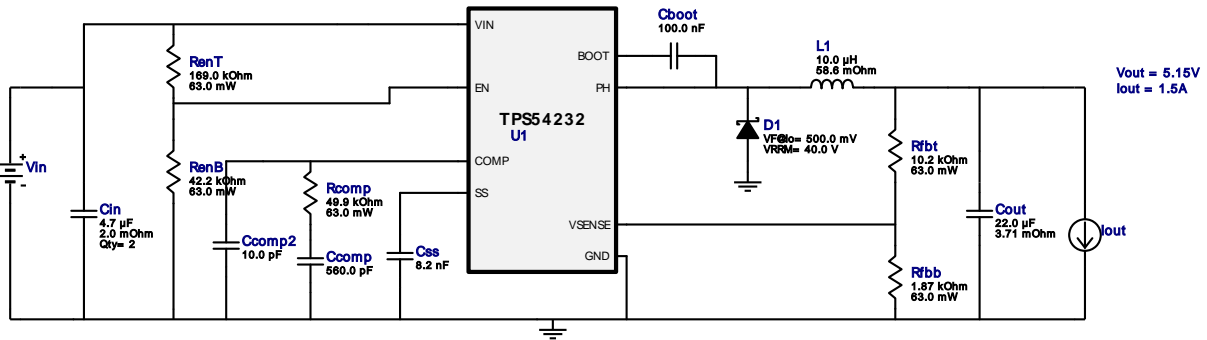


WEBENCH® Design Report

 Design : 4494754/23 TPS54232DR
 TPS54232DR 10.5V-27.0V to 5.15V @ 1.5A

My Comments

No comments

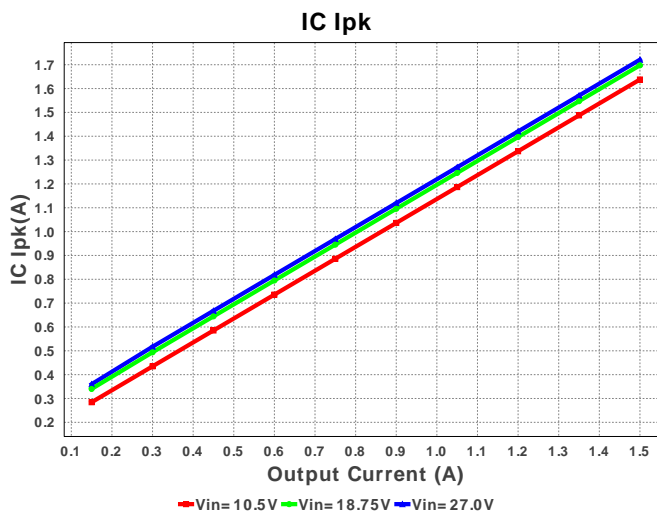
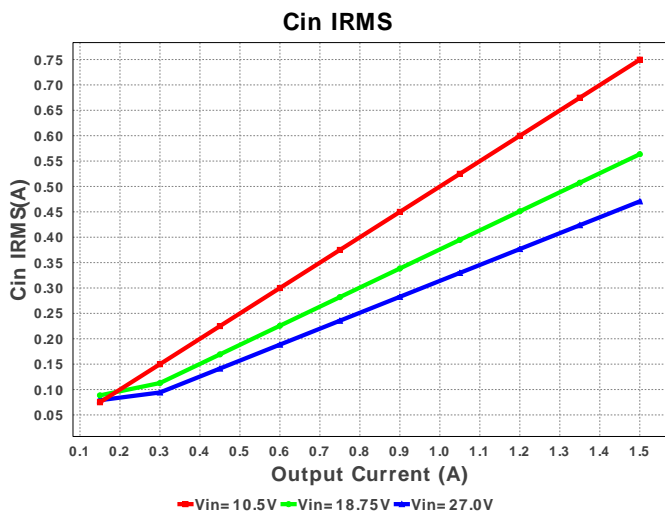
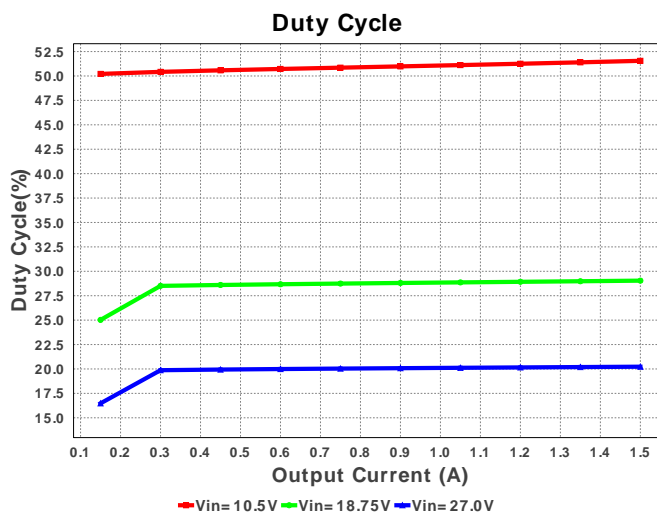
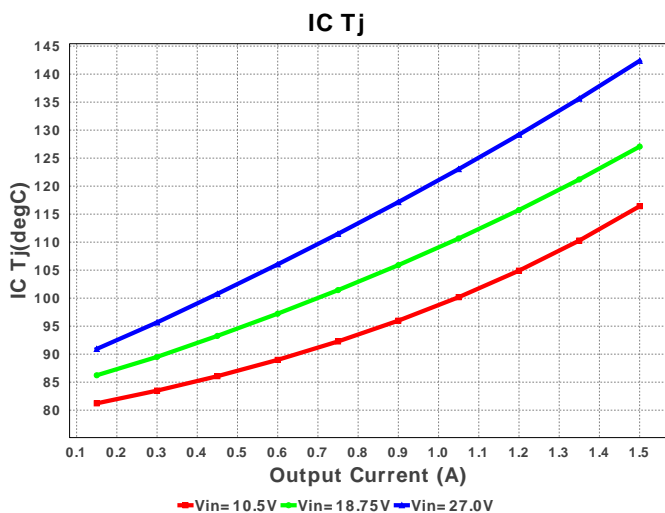
Electrical BOM

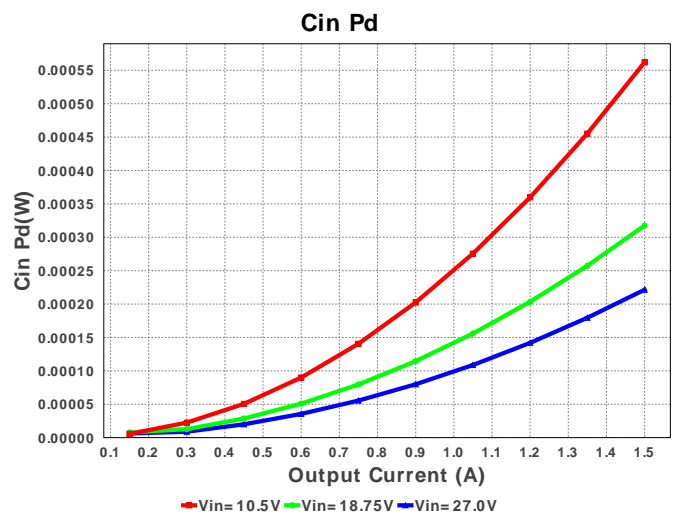
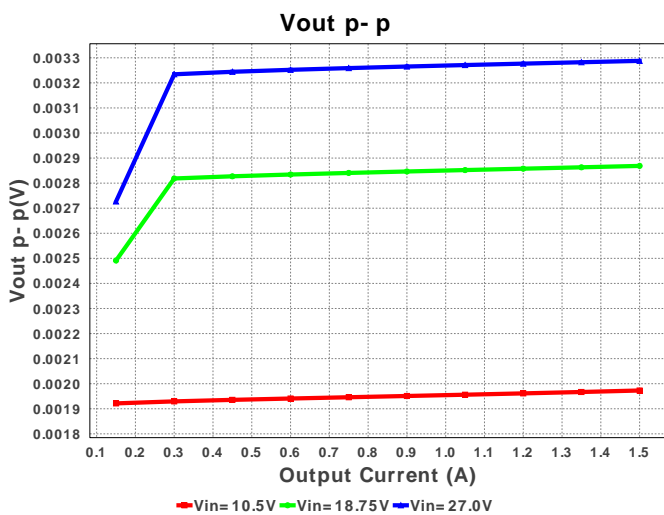
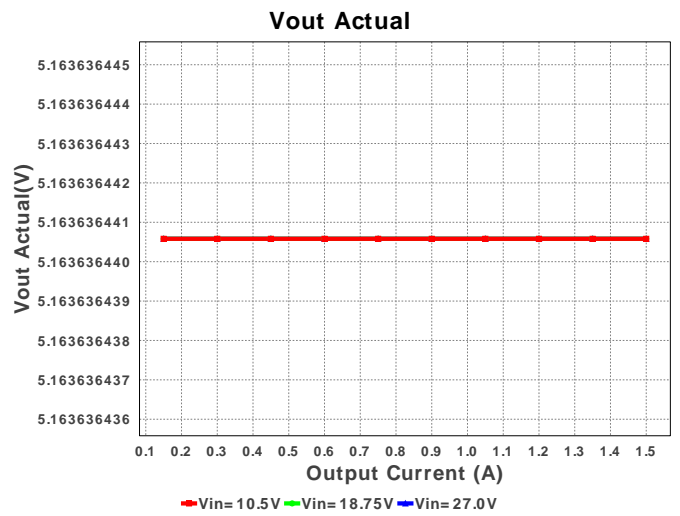
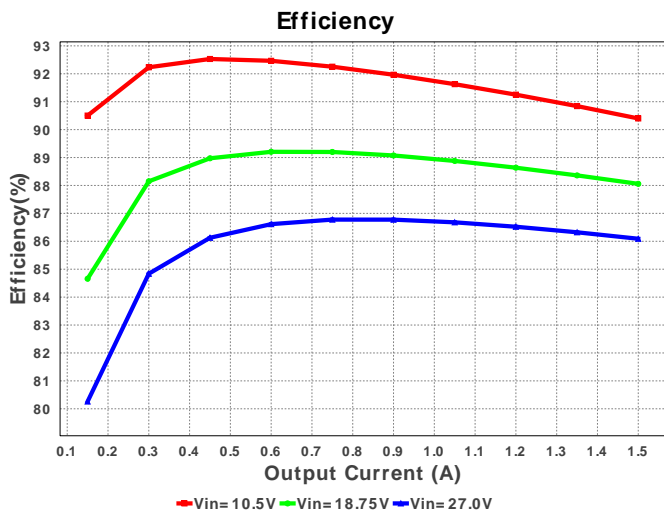
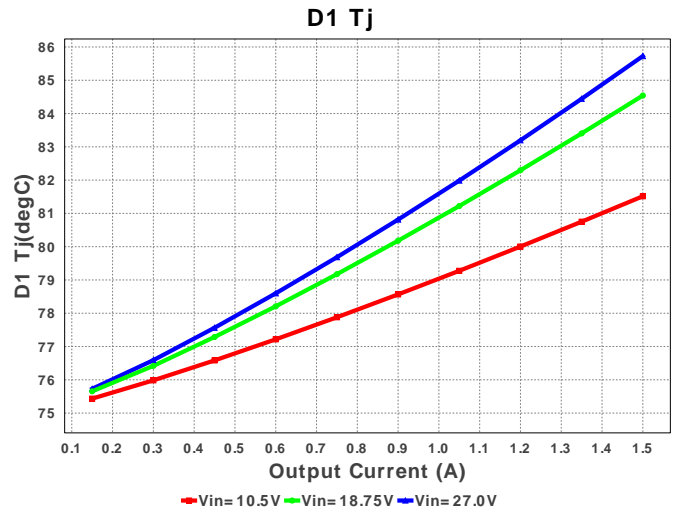
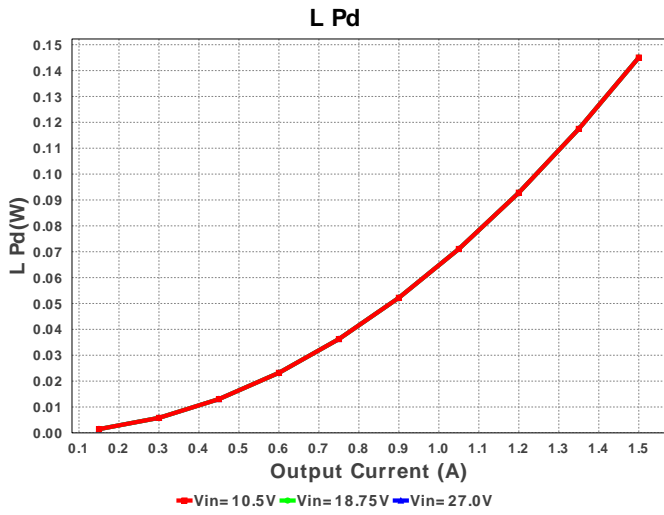
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	MuRata	GRM155R61A104KA01D Series= X5R	Cap= 100.0 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm ²
2.	Ccomp	Samsung Electro-Mechanics	CL21C561JBANFNC Series= C0G/NP0	Cap= 560.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
3.	Ccomp2	Kemet	C0805C100K5GACTU Series= C0G/NP0	Cap= 10.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
4.	Cin	MuRata	GRM32ER71H475KA88L Series= X7R	Cap= 4.7 uF ESR= 2.0 mOhm VDC= 50.0 V IRMS= 5.35 A	2	\$0.19	1210 15 mm ²
5.	Cout	TDK	C1608X5R1A226M080AC Series= X5R	Cap= 22.0 uF ESR= 3.71 mOhm VDC= 10.0 V IRMS= 2.69936 A	1	\$0.11	0603 5 mm ²
6.	Css	MuRata	GRM033R61A822KA01D Series= X5R	Cap= 8.2 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	0201 2 mm ²
7.	D1	Diodes Inc.	B240A-13-F	VF@Io= 500.0 mV VRRM= 40.0 V	1	\$0.09	 SMA 37 mm ²
8.	L1	Bourns	SRN6045-100M	L= 10.0 uH DCR= 58.6 mOhm	1	\$0.16	 SRN6045 64 mm ²
9.	Rcomp	Vishay-Dale	CRCW040249K9FKED Series= CRCW..e3	Res= 49.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
10.	RenB	Vishay-Dale	CRCW040242K2FKED Series= CRCW..e3	Res= 42.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²

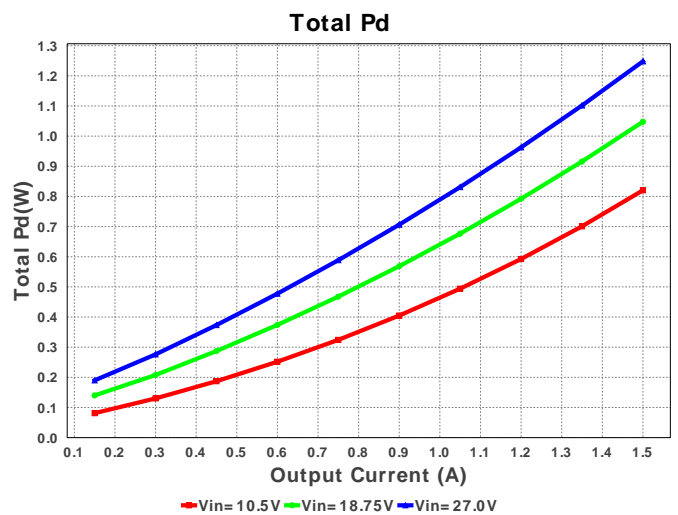
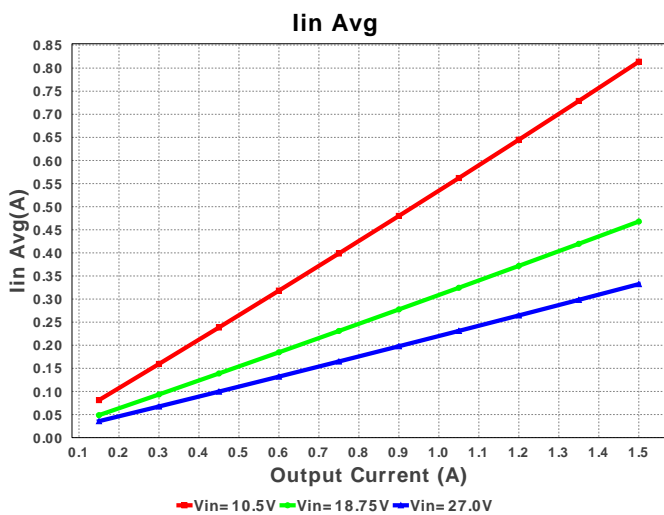
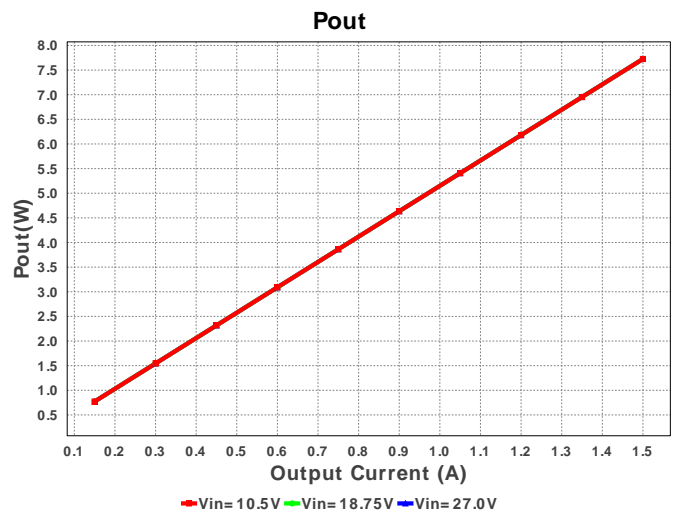
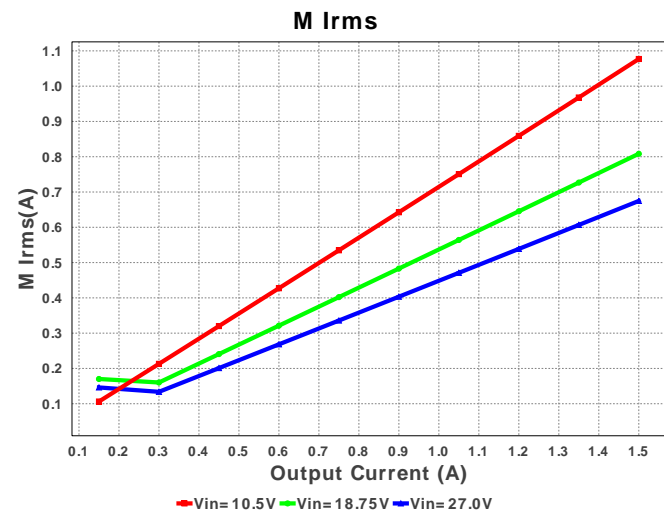
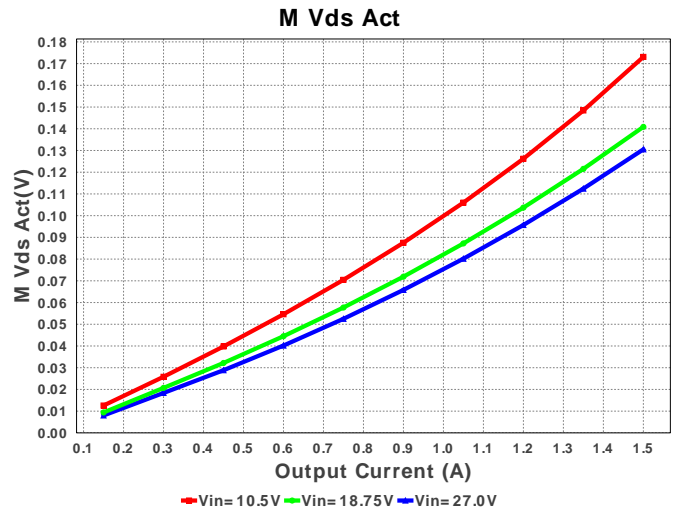
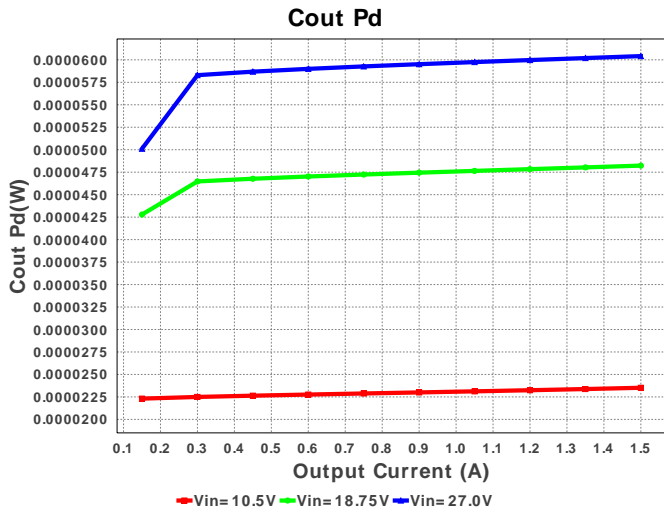
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	RenT	Vishay-Dale	CRCW0402169KFKED Series= CRCW..e3	Res= 169.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
12.	Rfbb	Vishay-Dale	CRCW04021K87FKED Series= CRCW..e3	Res= 1.87 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 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	

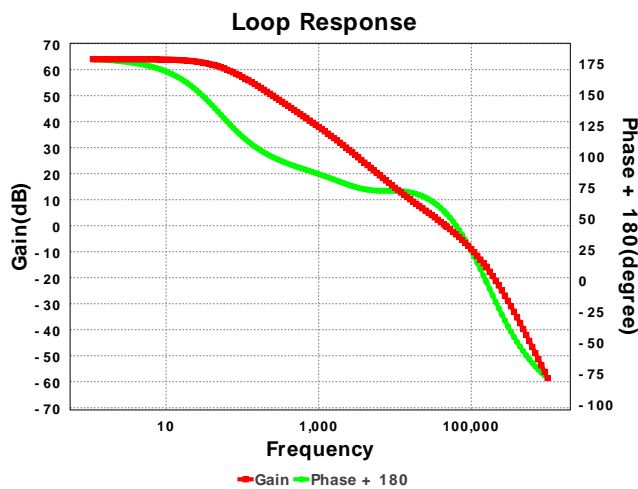
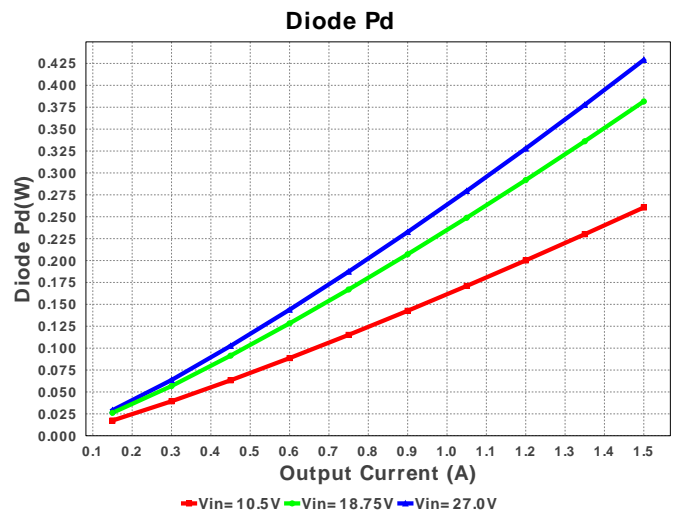
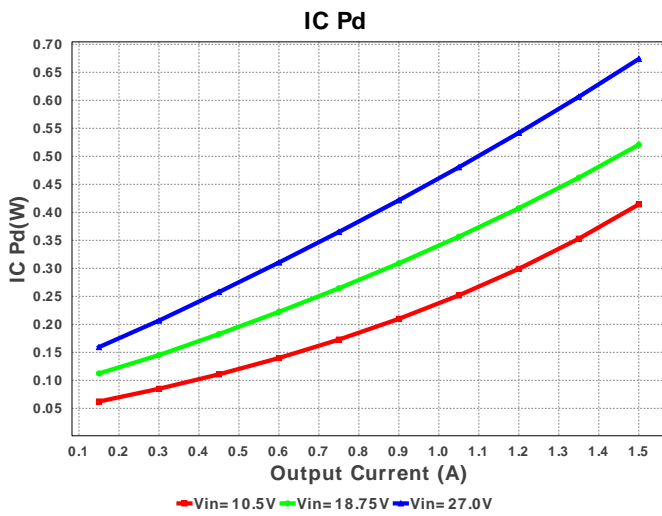
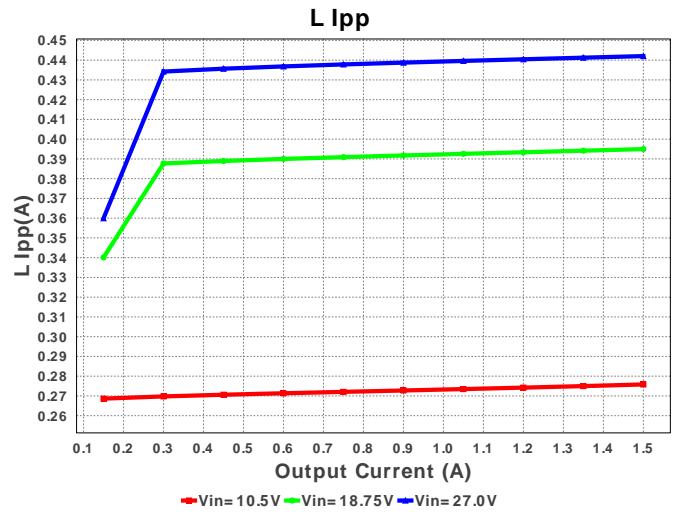
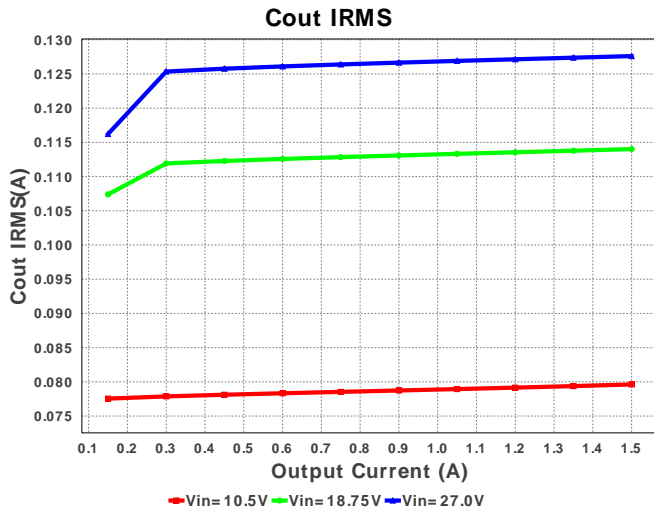


D0008A 57 mm²









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	470.604 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	127.609 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	1.721 A	Current	Peak switch current in IC
4.	Iin Avg	332.34 mA	Current	Average input current
5.	L Ipp	442.05 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	674.687 mA	Current	Q lavg
7.	BOM Count	15	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	130.513 mV	General	Voltage drop across the MosFET
11.	Mode	CCM	General	Conduction Mode

#	Name	Value	Category	Description
12.	Pout	7.725 W	General	Total output power
13.	Total BOM	\$1.38	General	Total BOM Cost
14.	D1 Tj	85.726 degC	Op_Point	D1 junction temperature
15.	Low Freq Gain	64.028 dB	Op_Point	Gain at 10Hz
16.	Vout Actual	5.164 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
17.	Vout OP	5.15 V	Op_Point	Operational Output Voltage
18.	Cross Freq	45.988 kHz	Op_point	Bode plot crossover frequency
19.	Duty Cycle	20.231 %	Op_point	Duty cycle
20.	Efficiency	86.091 %	Op_point	Steady state efficiency
21.	Gain Marg	-15.683 dB	Op_point	Bode Plot Gain Margin
22.	IC Tj	142.375 degC	Op_point	IC junction temperature
23.	ICThetaJA	100.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
24.	IOUT_OP	1.5 A	Op_point	Iout operating point
25.	Phase Marg	54.932 deg	Op_point	Bode Plot Phase Margin
26.	VIN_OP	27.0 V	Op_point	Vin operating point
27.	Vout p-p	3.288 mV	Op_point	Peak-to-peak output ripple voltage
28.	Cin Pd	221.468 μW	Power	Input capacitor power dissipation
29.	Cout Pd	60.414 μW	Power	Output capacitor power dissipation
30.	Diode Pd	429.038 mW	Power	Diode power dissipation
31.	IC Pd	673.753 mW	Power	IC power dissipation
32.	L Pd	145.035 mW	Power	Inductor power dissipation
33.	Total Pd	1.248 W	Power	Total Power Dissipation
34.	Vout Tolerance	5.267 %		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	27.0	Maximum input voltage
3.	VinMin	10.5	Minimum input voltage
4.	Vout	5.15	Output Voltage
5.	base_pn	TPS54232	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	75.0	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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