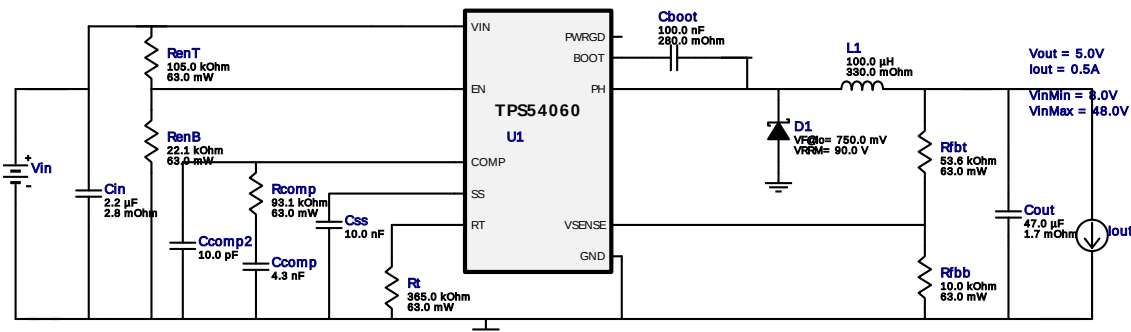


WEBENCH® Design Report

Design : 3810016/33 TPS54060DGQR
TPS54060DGQR 8.0V-48.0V to 5.0V @ 0.5A

VinMin = 8.0V
VinMax = 48.0V
Vout = 5.0V
Iout = 0.5A

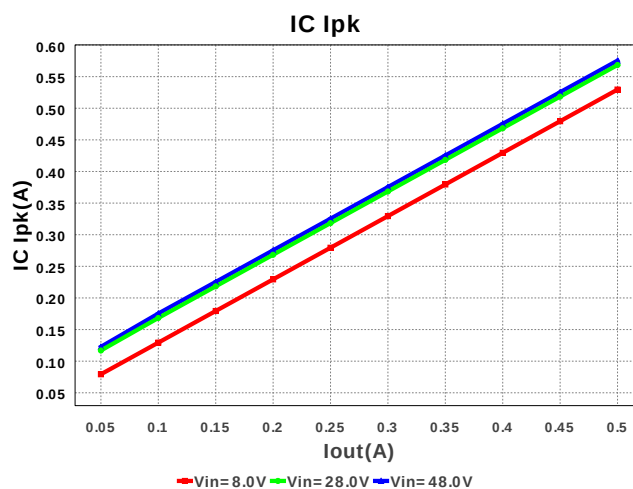
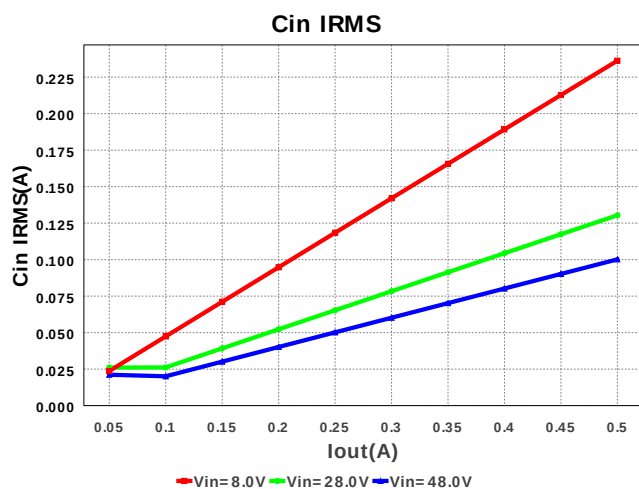
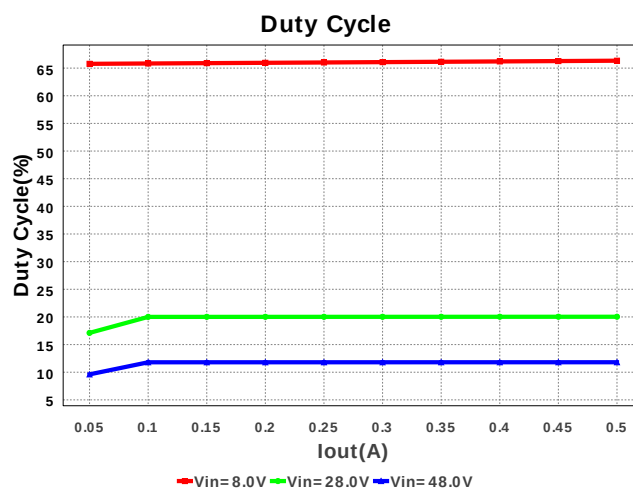
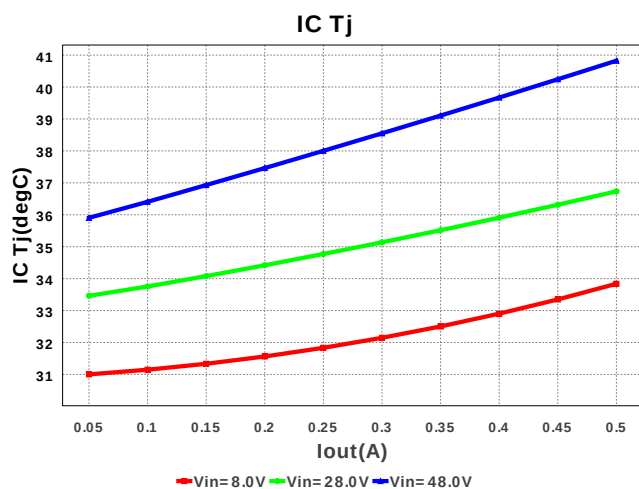
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Topology = Buck
Created = 11/26/13 6:09:26 AM
BOM Cost = \$2.70
Total Pd = 0.6W
Footprint = 270.0mm2
BOM Count = 15

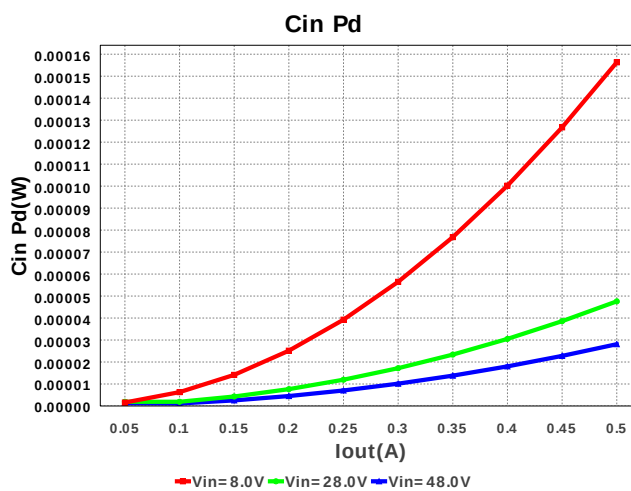
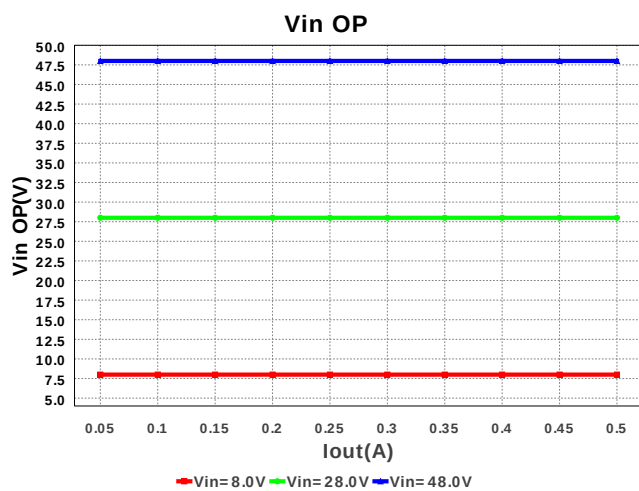
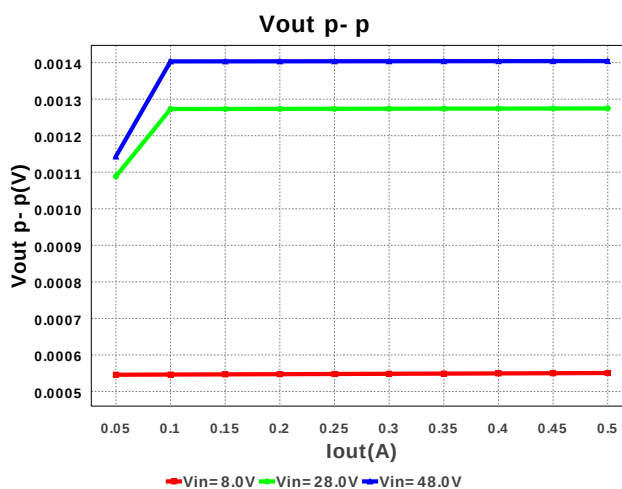
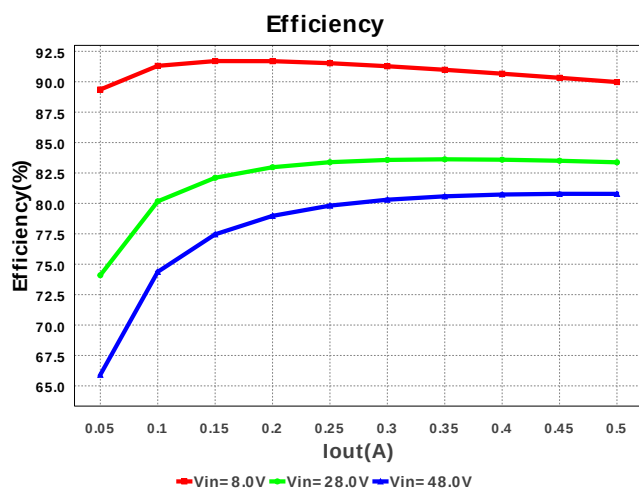
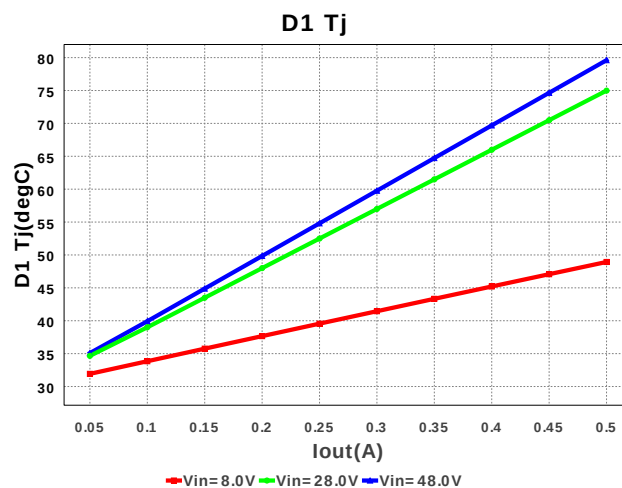
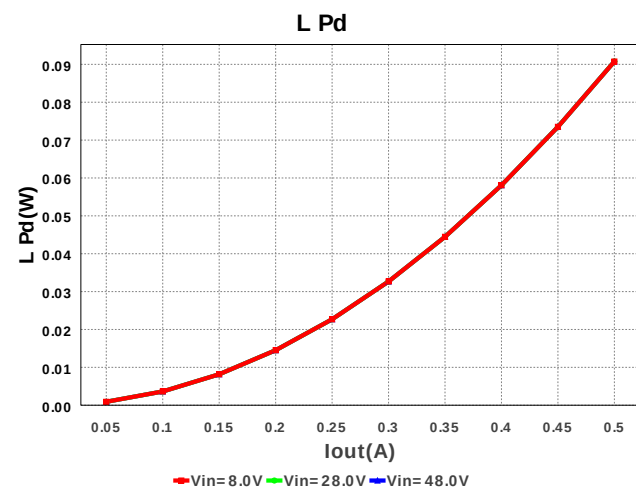


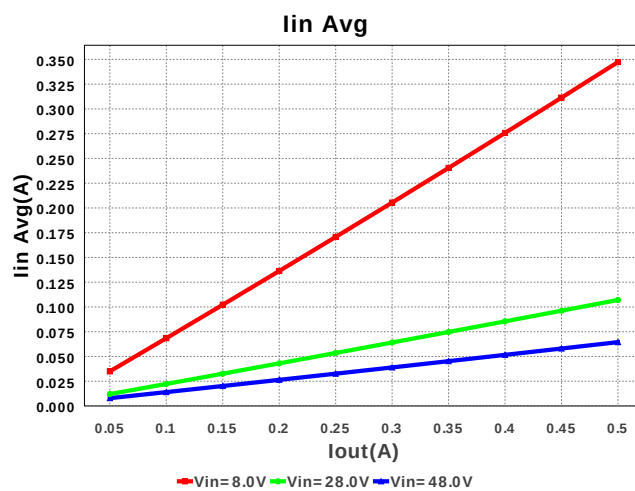
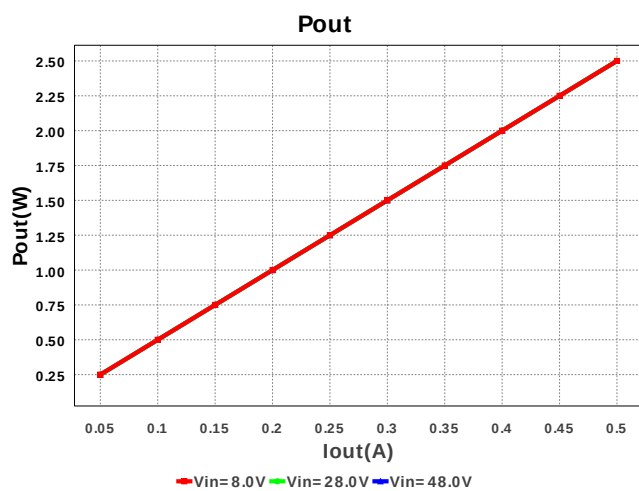
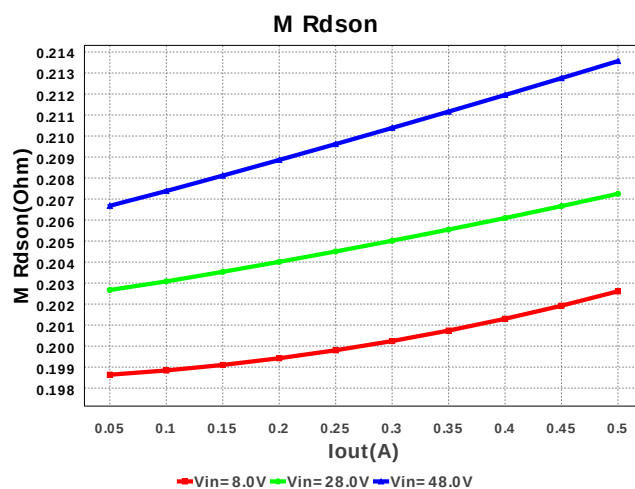
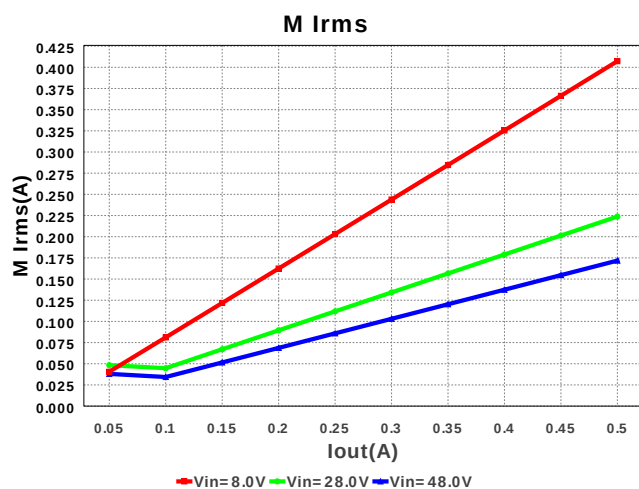
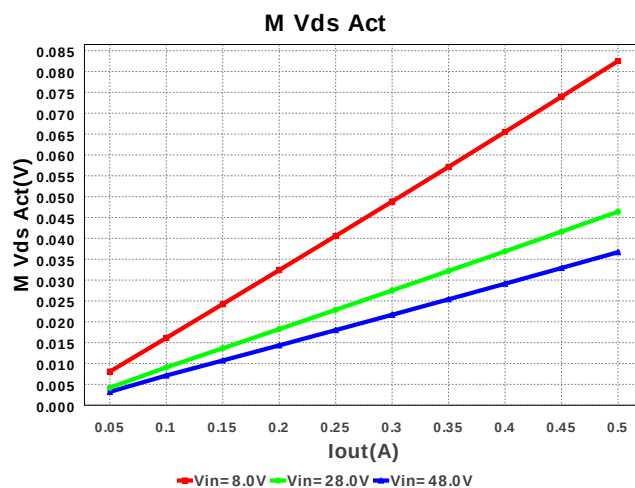
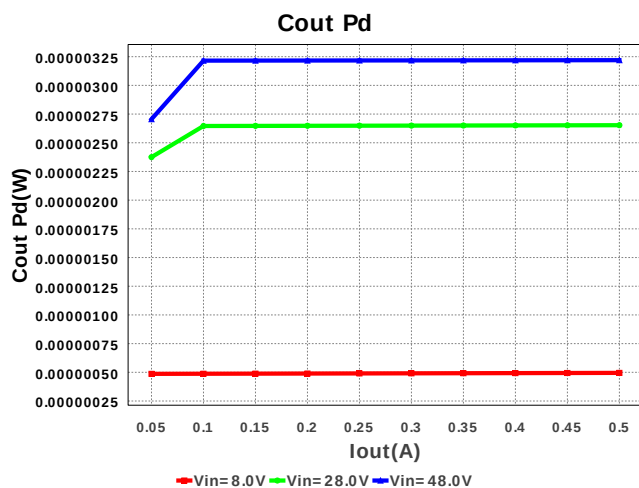
Electrical BOM

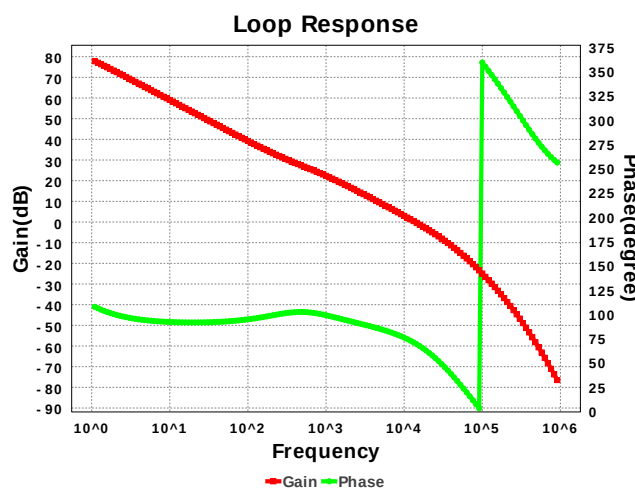
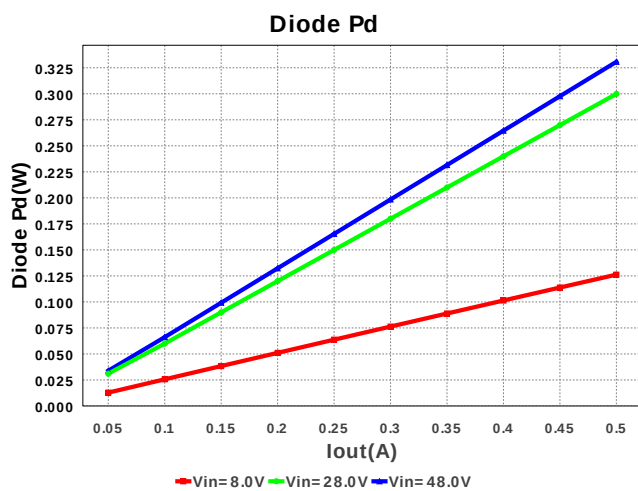
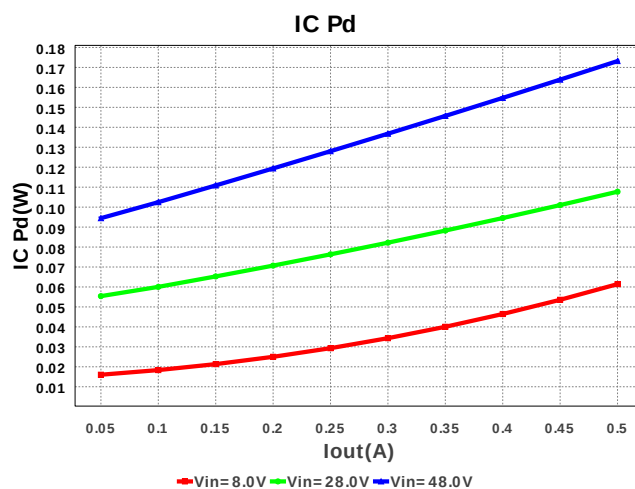
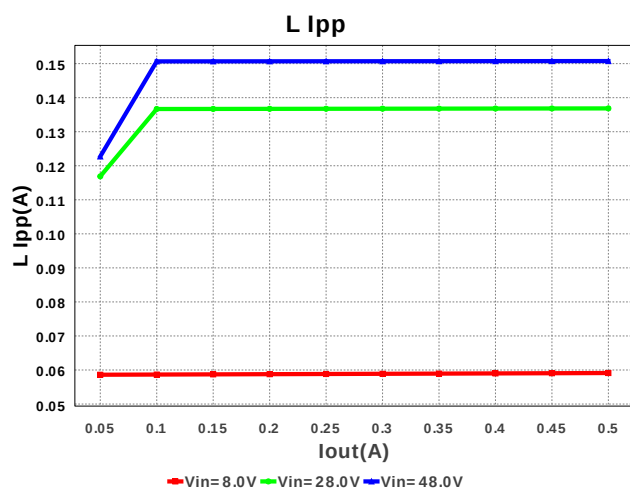
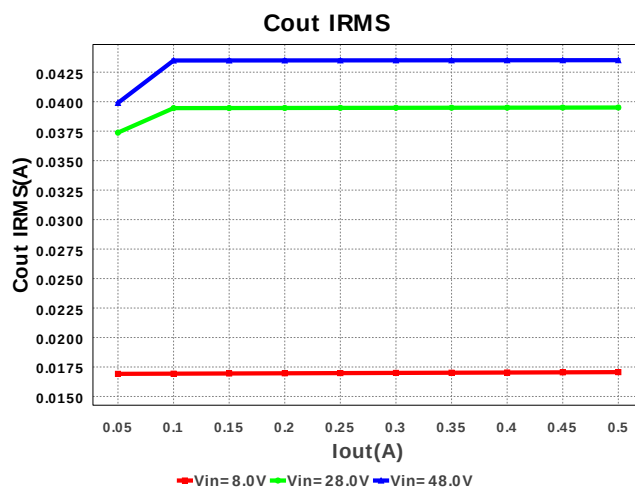
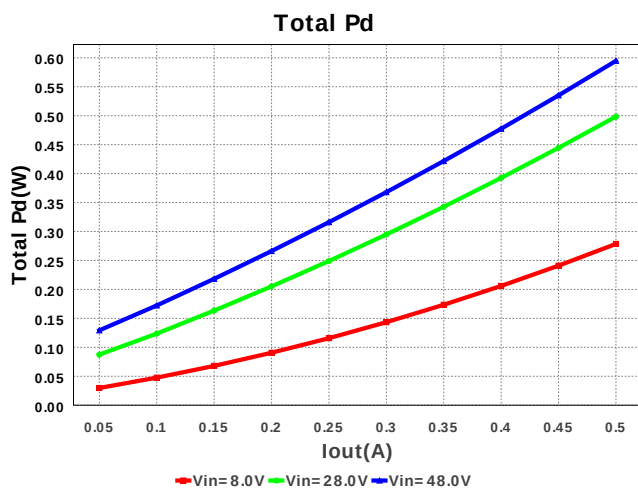
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	 0805 7mm2
2.	Ccomp	MuRata	GRM2165C1H432JA01D Series= C0G/NP0	Cap= 4.3 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.04	 0805 7mm2
3.	Ccomp2	Yageo America	CC0805JRNP09BN100 Series= C0G/NP0	Cap= 10.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7mm2
4.	Cin	TDK	C3225X7R2A225K230AB Series= X7R	Cap= 2.2 µF ESR= 2.8 mOhm VDC= 100.0 V IRMS= 9.825 A	1	\$0.19	 1210 15mm2
5.	Cout	TDK	C4532X5R1A476M Series= X5R	Cap= 47.0 µF ESR= 1.7 mOhm VDC= 10.0 V IRMS= 3.8 A	1	\$0.63	 1812 27mm2
6.	Css	MuRata	GRM155R61A103KA01D Series= X5R	Cap= 10.0 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	 0402 3mm2
7.	D1	Vishay-Semiconductor	BYS12-90-E3/TR	VF@Io= 750.0 mV VRRM= 90.0 V	1	\$0.08	 SMA 37mm2
8.	L1	TDK	VLP8040T-101M	L= 100.0 µH DCR= 330.0 mOhm	1	\$0.22	 VLP8040 113mm2
9.	Rcomp	Vishay-Dale	CRCW040293K1FKED Series= CRCW..e3	Res= 93.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
10.	RenB	Vishay-Dale	CRCW040222K1FKED Series= CRCW..e3	Res= 22.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
11.	RenT	Vishay-Dale	CRCW0402105KFKED Series= CRCW..e3	Res= 105.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
12.	Rfbb	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
13.	Rfbt	Vishay-Dale	CRCW040253K6FKED Series= CRCW..e3	Res= 53.6 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
14.	Rt	Vishay-Dale	CRCW0402365KFKED Series= CRCW..e3	Res= 365.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
15.	U1	Texas Instruments	TPS54060DGQR	Switcher	1	\$1.45	 S-PDSO-G10 36mm2









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	100.179 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	42.928 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	500.0 mA	Current	Peak switch current in IC
4.	Iin Avg	64.52 mA	Current	Average input current
5.	L Ipp	148.708 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	171.783 mA	Current	Q lavg
7.	BOM Count	15	General	Total Design BOM count
8.	FootPrint	270.0 mm2	General	Total Foot Print Area of BOM components
9.	Frequency	341.314 kHz	General	Switching frequency
10.	IC Tolerance	8.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	36.724 mV	General	Voltage drop across the MosFET

#	Name	Value	Category	Description
12.	Pout	2.5 W	General	Total output power
13.	Total BOM	\$2.7	General	Total BOM Cost
14.	D1 Tj	79.61 degC	Op_Point	D1 junction temperature
15.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
16.	Cross Freq	13.837 kHz	Op_point	Bode plot crossover frequency
17.	Duty Cycle	11.804 %	Op_point	Duty cycle
18.	Efficiency	80.725 %	Op_point	Steady state efficiency
19.	IC Tj	40.964 degC	Op_point	IC junction temperature
20.	ICThetaJA	62.5 degC/W	Op_point	IC junction-to-ambient thermal resistance
21.	IOUT_OP	500.0 mA	Op_point	Iout operating point
22.	Phase Marg	70.557 deg	Op_point	Bode Plot Phase Margin
23.	VIN_OP	48.0 V	Op_point	Vin operating point
24.	Vout p-p	1.367 mV	Op_point	Peak-to-peak output ripple voltage
25.	Cin Pd	28.1 μ W	Power	Input capacitor power dissipation
26.	Cout Pd	3.133 μ W	Power	Output capacitor power dissipation
27.	Diode Pd	330.736 mW	Power	Diode power dissipation
28.	IC Pd	175.419 mW	Power	IC power dissipation
29.	L Pd	90.75 mW	Power	Inductor power dissipation
30.	Total Pd	596.939 mW	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	48.0 V	Maximum input voltage
4.	VinMin	8.0 V	Minimum input voltage
5.	Vout	5.0 V	Output Voltage
6.	Vout1	5.0 Volt	Output Voltage #1
7.	base_pn	TPS54060	Base Product Number
8.	source	DC	Input Source Type
9.	Ta	30.0 degC	Ambient temperature

Design Assistance

1. **TPS54060** Product Folder : <http://www.ti.com/product/tps54060> : contains the data sheet and other resources.

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