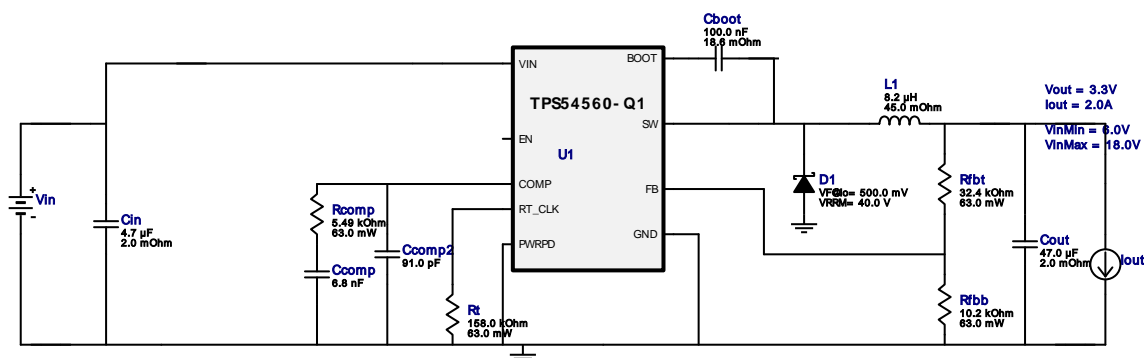


## WEBENCH® Design Report

Design : 3550864/16 TPS54560QDDARQ1  
TPS54560QDDARQ1 6.0V-18.0V to 3.3V @ 2.0A

VinMin = 6.0V  
VinMax = 18.0V  
Vout = 3.3V  
Iout = 2.0A


Device = TPS54560QDDARQ1  
Topology = Buck  
Created = 2/3/14 4:10:20 PM  
BOM Cost = \$3.93  
Total Pd = 1.11W  
Footprint = 285.0mm2  
BOM Count = 12



1. This regulator device is qualified for Automotive applications. All passives and other components selected in this design may not be qualified for Automotive applications. The user is required to verify that all components in the design meet the qualification and safety requirements for their specific application. View WEBENCH(R) Disclaimer.

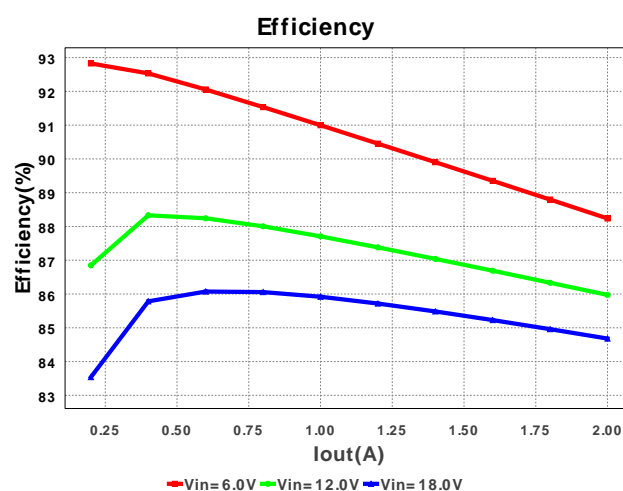
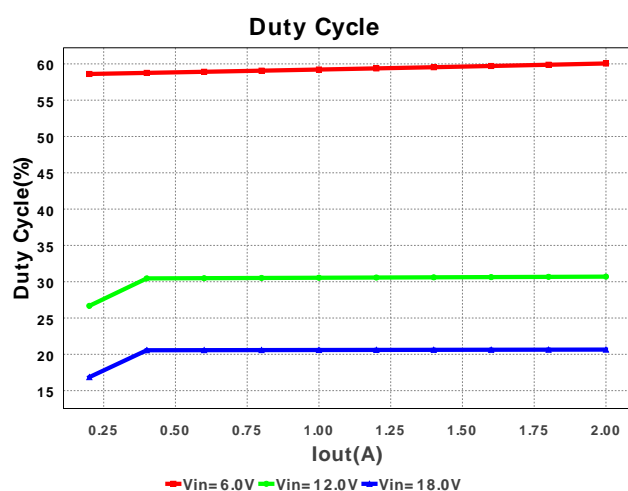
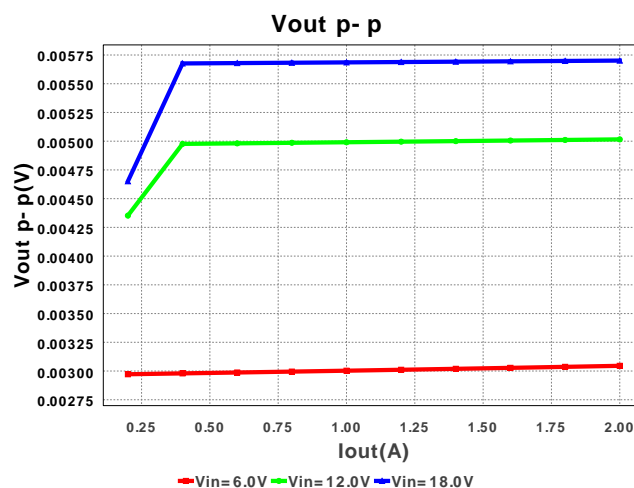
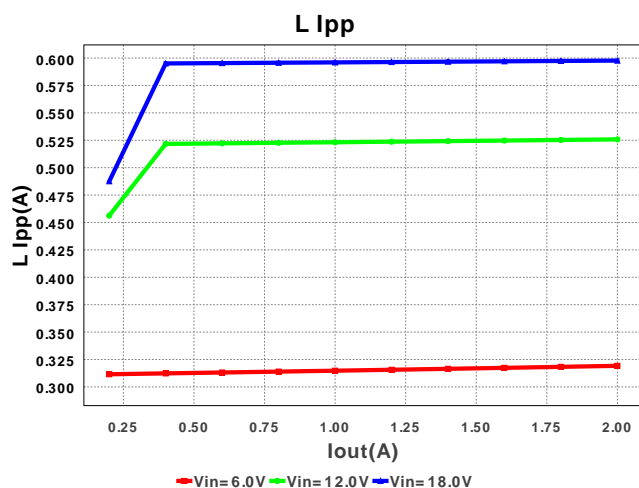
### Electrical BOM

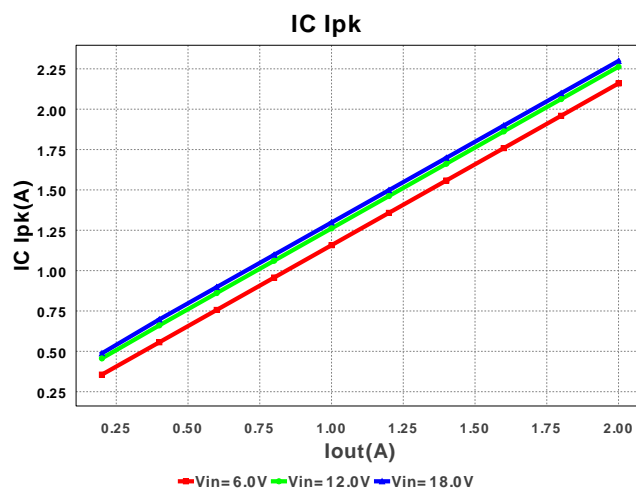
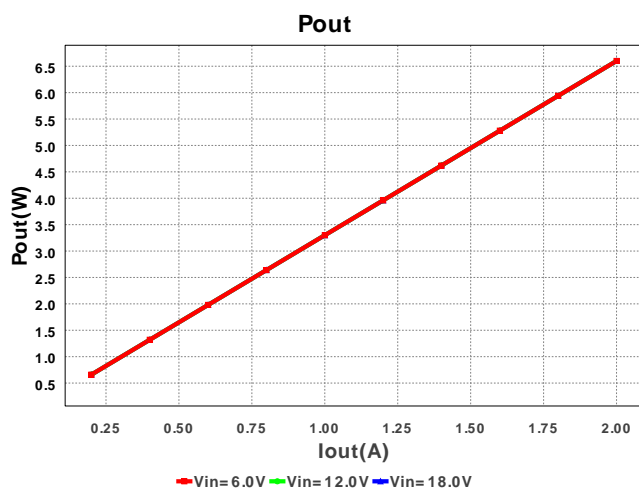
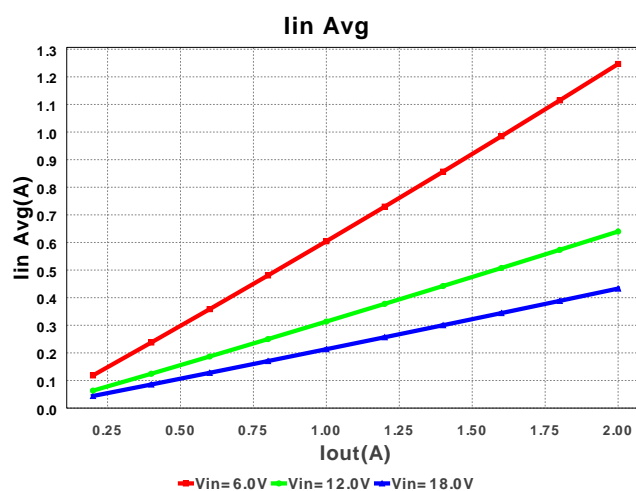
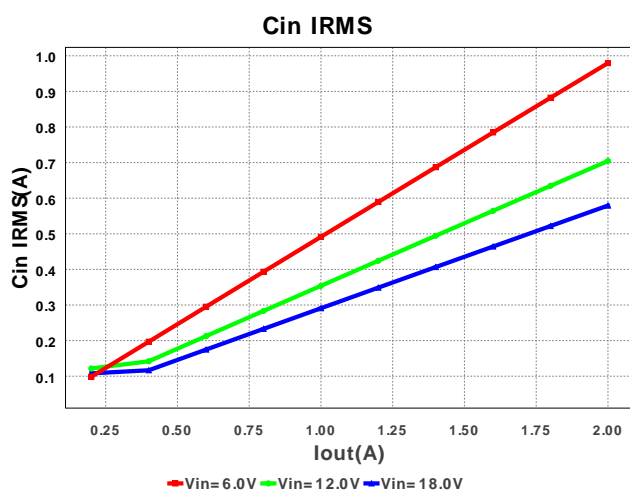
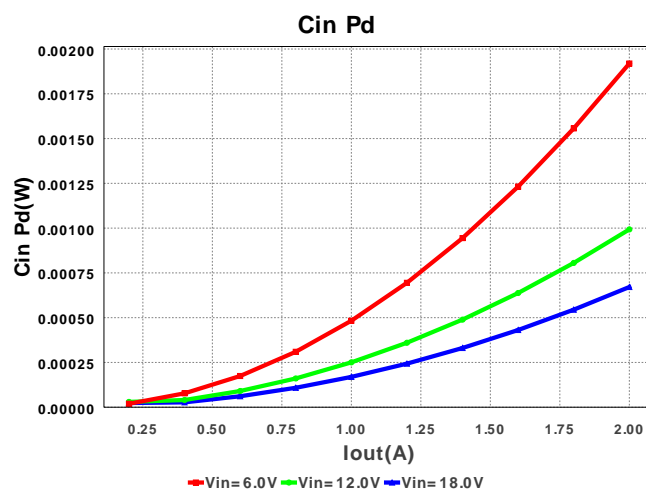
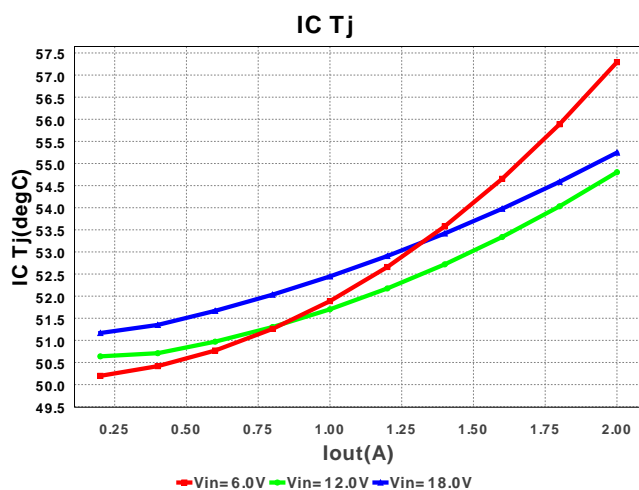
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	TDK	C1005X5R1A104K Series= X5R	Cap= 100.0 nF ESR= 18.6 mOhm VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	 0402 3mm2
2.	Ccomp	Yageo America	CC0805KRX7R9BB682 Series= X7R	Cap= 6.8 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7mm2
3.	Ccomp2	MuRata	GRM1885C1H910JA01D Series= C0G/NP0	Cap= 91.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0603 5mm2
4.	Cin	MuRata	GRM21BR61E475MA12L Series= X5R	Cap= 4.7 µF ESR= 2.0 mOhm VDC= 25.0 V IRMS= 7.29 A	1	\$0.06	 0805 7mm2
5.	Cout	TDK	C3216X5R0J476M Series= X5R	Cap= 47.0 µF ESR= 2.0 mOhm VDC= 6.3 V IRMS= 4.1 A	1	\$0.21	 1206 11mm2
6.	D1	Vishay-Semiconductor	SS34-E3/57T	Vf@Io= 500.0 mV VRRM= 40.0 V	1	\$0.18	 SMC 83mm2
7.	L1	Bourns	SRN8040-8R2Y	L= 8.2 µH DCR= 45.0 mOhm	1	\$0.21	 SRN8040 100mm2
8.	Rcomp	Vishay-Dale	CRCW04025K49FKED Series= CRCW..e3	Res= 5.49 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
9.	Rfbb	Vishay-Dale	CRCW040210K2FKED Series= CRCW..e3	Res= 10.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
10.	Rfbt	Vishay-Dale	CRCW040232K4FKED Series= CRCW..e3	Res= 32.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2

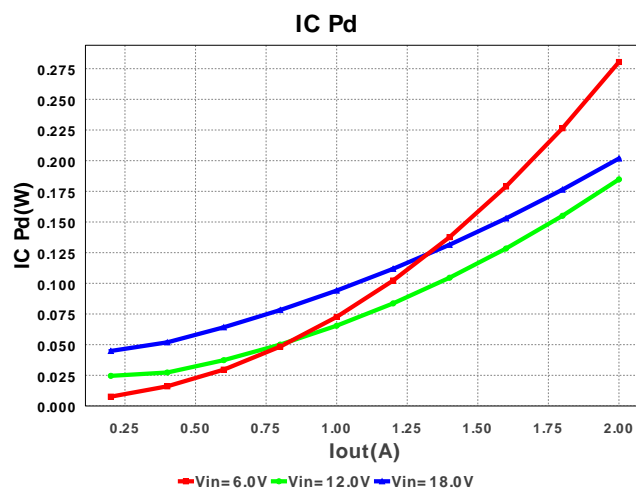
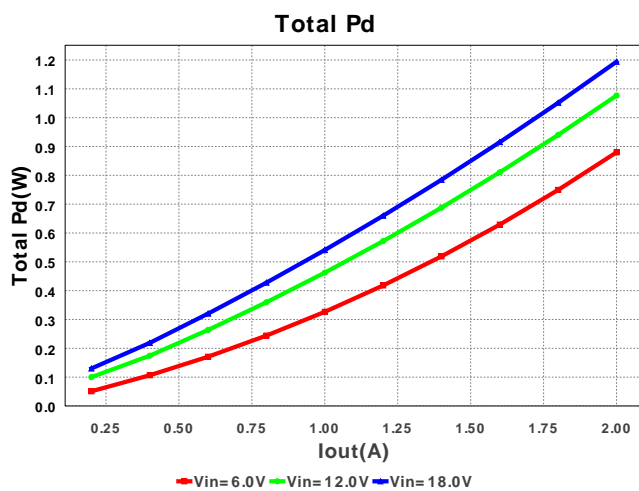
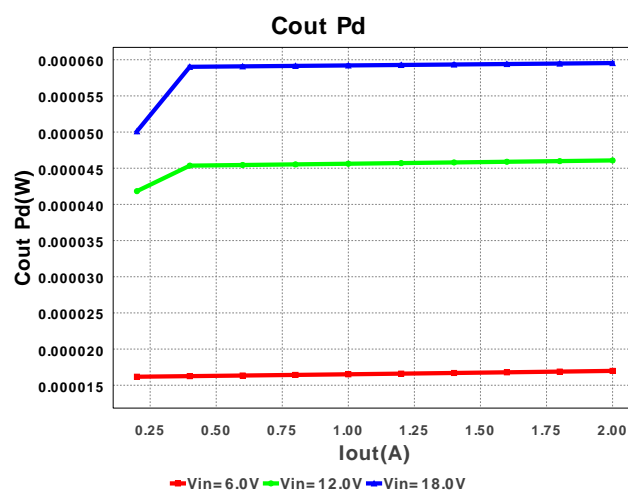
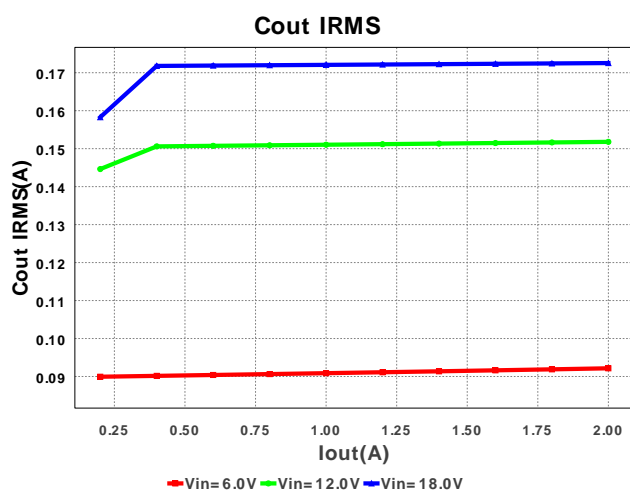
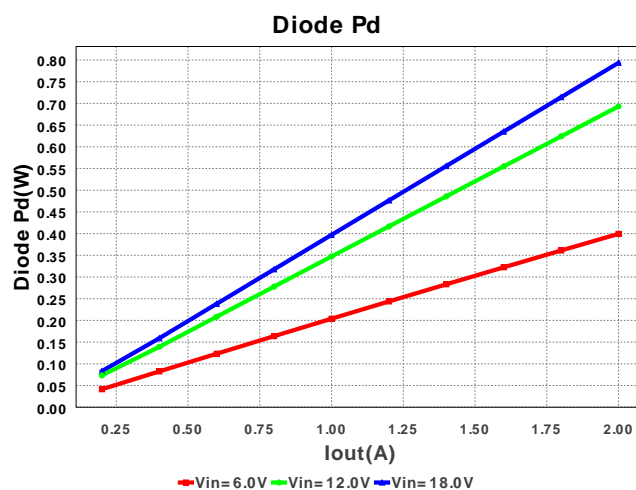
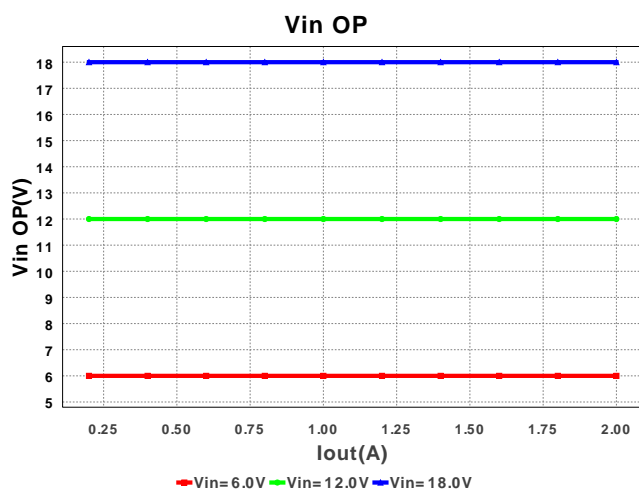
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	Rt	Vishay-Dale	CRCW0402158KFKED Series= CRCW..e3	Res= 158.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
12.	U1	Texas Instruments	TPS54560QDDARQ1	Switcher	1	\$3.20	

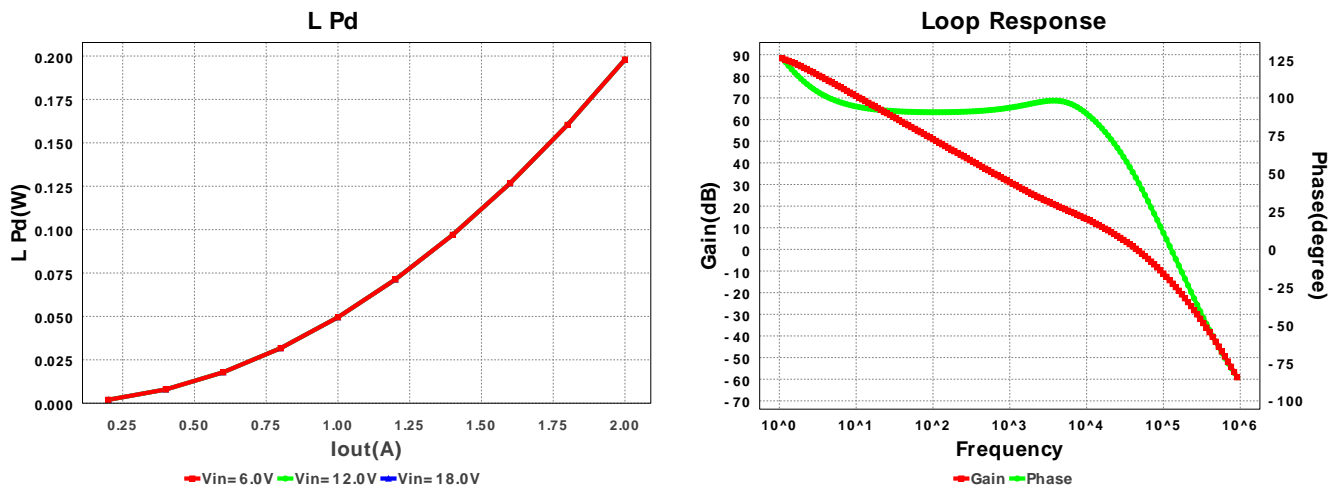


R-PDSO-G8 57mm2









## Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	578.512 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	169.676 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.294 A	Current	Peak switch current in IC
4.	Iin Avg	428.45 mA	Current	Average input current
5.	L Ipp	587.775 mA	Current	Peak-to-peak inductor ripple current
6.	BOM Count	12	General	Total Design BOM count
7.	FootPrint	285.0 mm2	General	Total Foot Print Area of BOM components
8.	Frequency	622.917 kHz	General	Switching frequency
9.	Pout	6.6 W	General	Total output power
10.	Total BOM	\$3.93	General	Total BOM Cost
11.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
12.	Cross Freq	44.84 kHz	Op_point	Bode plot crossover frequency
13.	Duty Cycle	20.424 %	Op_point	Duty cycle
14.	Efficiency	85.581 %	Op_point	Steady state efficiency
15.	IC Tj	55.236 degC	Op_point	IC junction temperature
16.	ICThetaJA	26.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
17.	IOUT_OP	2.0 A	Op_point	Iout operating point
18.	Phase Marg	46.574 deg	Op_point	Bode Plot Phase Margin
19.	VIN_OP	18.0 V	Op_point	Vin operating point
20.	Vout p-p	5.577 mV	Op_point	Peak-to-peak output ripple voltage
21.	Cin Pd	669.352 μW	Power	Input capacitor power dissipation
22.	Cout Pd	57.58 μW	Power	Output capacitor power dissipation
23.	Diode Pd	711.92 mW	Power	Diode power dissipation
24.	IC Pd	201.37 mW	Power	IC power dissipation
25.	L Pd	198.0 mW	Power	Inductor power dissipation
26.	Total Pd	1.112 W	Power	Total Power Dissipation

## Design Inputs

#	Name	Value	Description
1.	Iout	2.0 A	Maximum Output Current
2.	Iout1	2.0 Amps	Output Current #1
3.	VinMax	18.0 V	Maximum input voltage
4.	VinMin	6.0 V	Minimum input voltage
5.	Vout	3.3 V	Output Voltage
6.	Vout1	3.3 Volt	Output Voltage #1
7.	base_pn	TPS54560-Q1	Base Product Number
8.	source	DC	Input Source Type
9.	Ta	50.0 degC	Ambient temperature

## Design Assistance

1. The TPS54560-Q1 is qualified for Automotive applications. All passives and other components selected in this design may not be qualified for Automotive applications. The user is required to verify that all components in the design meet the qualification and safety requirements for their specific application

2. **TPS54560-Q1 Product Folder** : <http://www.ti.com/product/TPS54560-Q1> : contains the data sheet and other resources.

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