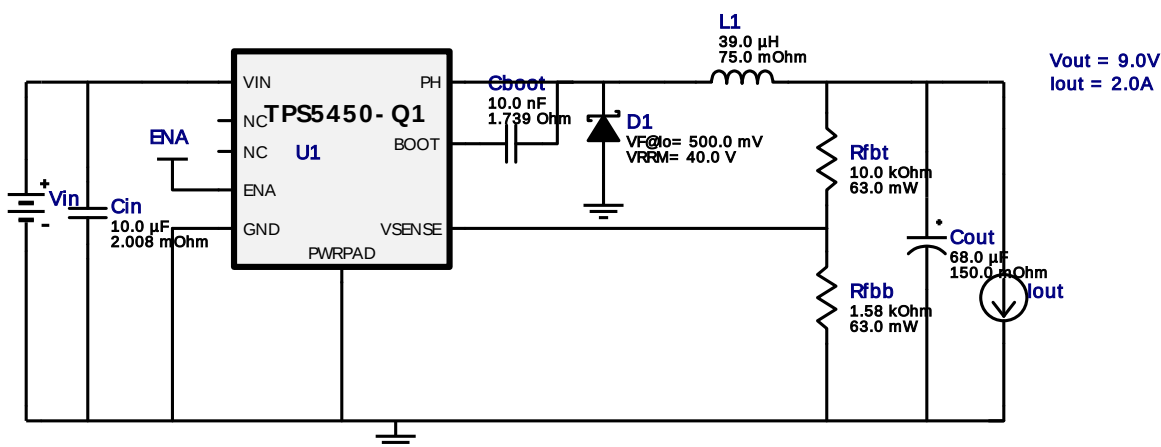


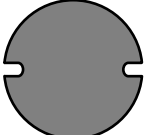
WEBENCH® Design Report

Design : 4742013/22 TPS5450QDDARQ1
TPS5450QDDARQ1 14.0V-25.0V to 9.00V @ 2.0A



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.

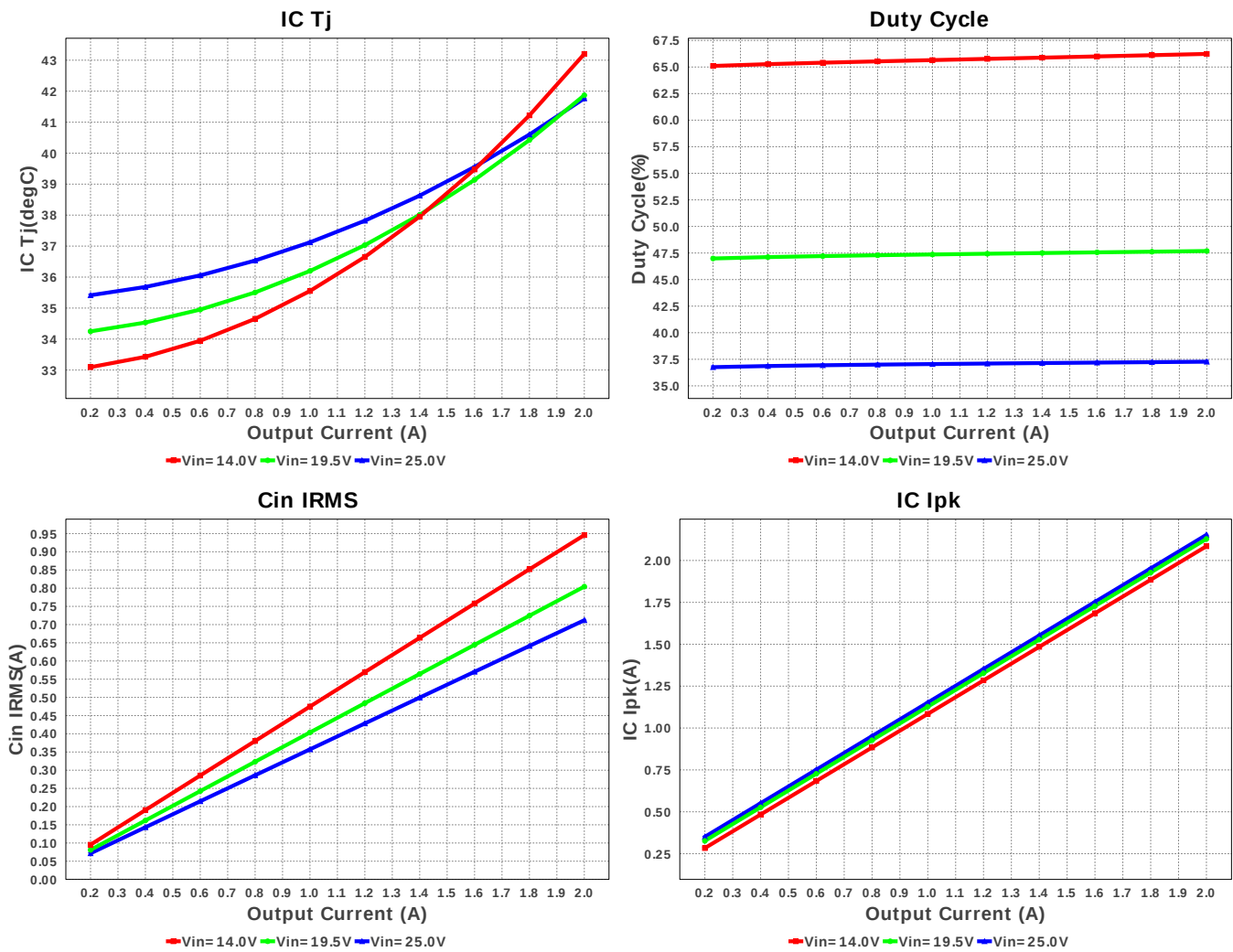
Electrical BOM

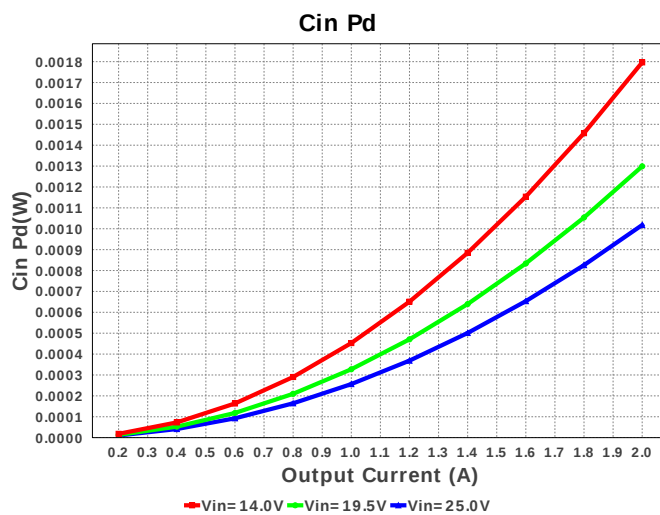
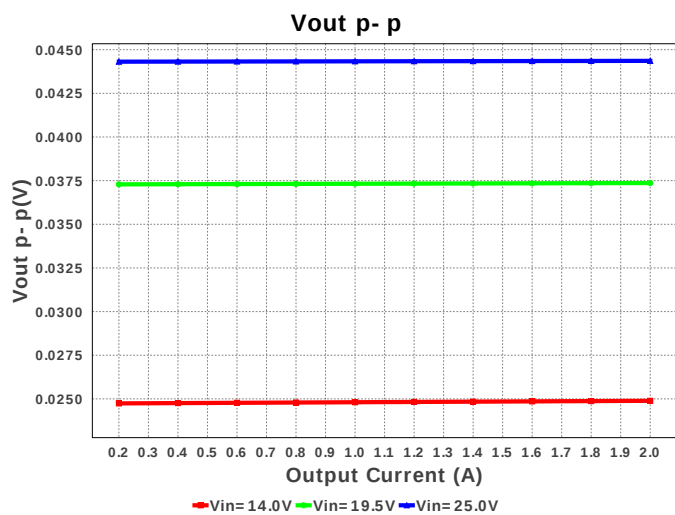
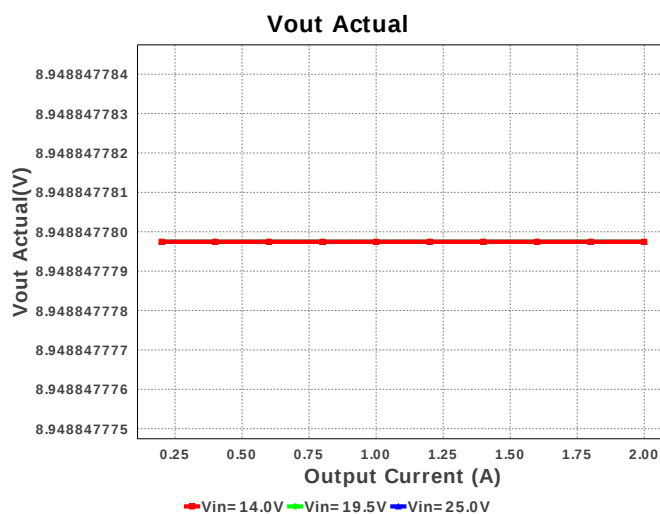
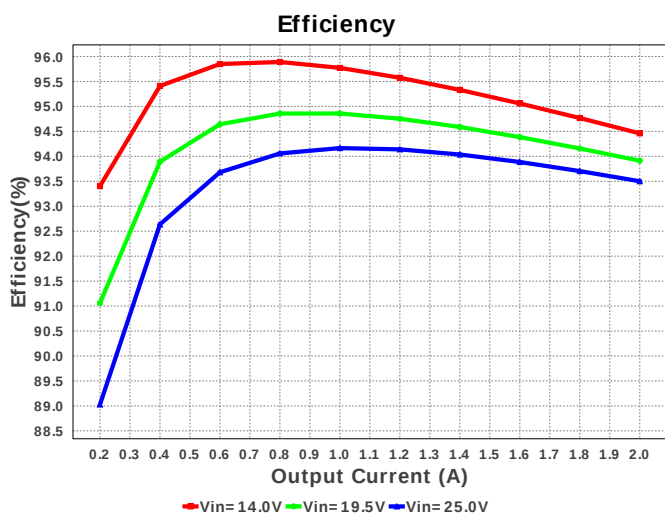
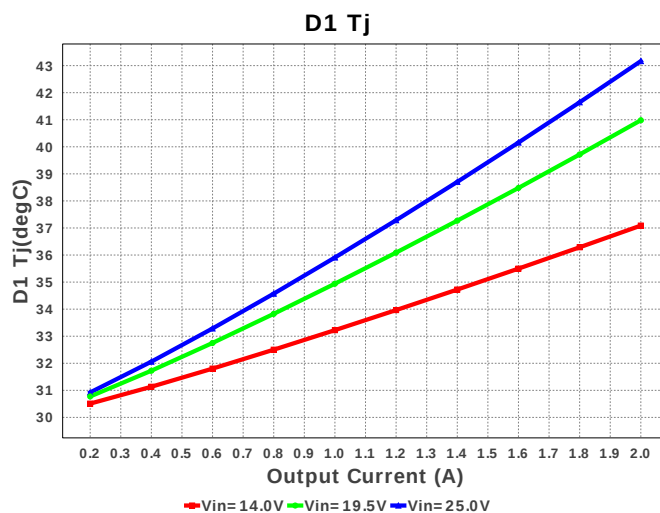
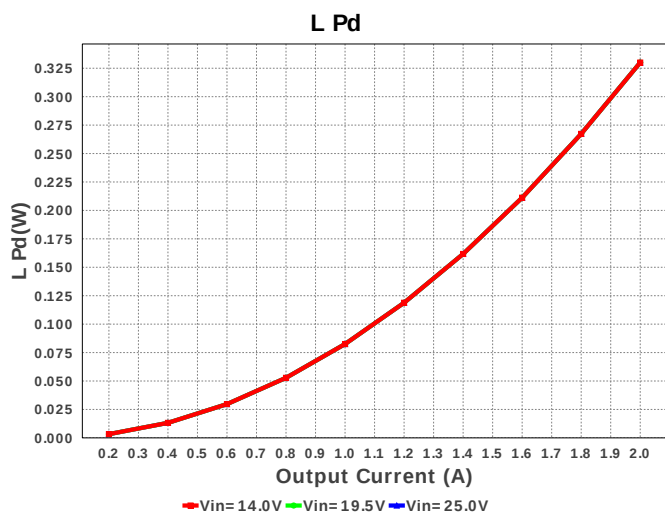
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Kemet	C0805C103K5RACTU Series= X7R	Cap= 10.0 nF ESR= 1.739 Ohm VDC= 50.0 V IRMS= 411.0 mA	1	\$0.01	 0805 7 mm ²
2.	Cin	MuRata	GRM32ER7YA106KA12L Series= X7R	Cap= 10.0 uF ESR= 2.008 mOhm VDC= 35.0 V IRMS= 4.6772 A	1	\$0.22	 1210_280 15 mm ²
3.	Cout	Kemet	T495D686K020ATE150 Series= T495	Cap= 68.0 uF ESR= 150.0 mOhm VDC= 20.0 V IRMS= 900.0 mA	1	\$0.50	 7343-31 59 mm ²
4.	D1	Diodes Inc.	B240A-13-F	VF@Io= 500.0 mV VRRM= 40.0 V	1	\$0.09	 SMA 37 mm ²
5.	L1	Bourns	SDR1307-390KL	L= 39.0 uH DCR= 75.0 mOhm	1	\$0.35	 SDR1307 227 mm ²
6.	Rfbb	Vishay-Dale	CRCW04021K58FKED Series= CRCW..e3	Res= 1.58 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
7.	Rfbb	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²

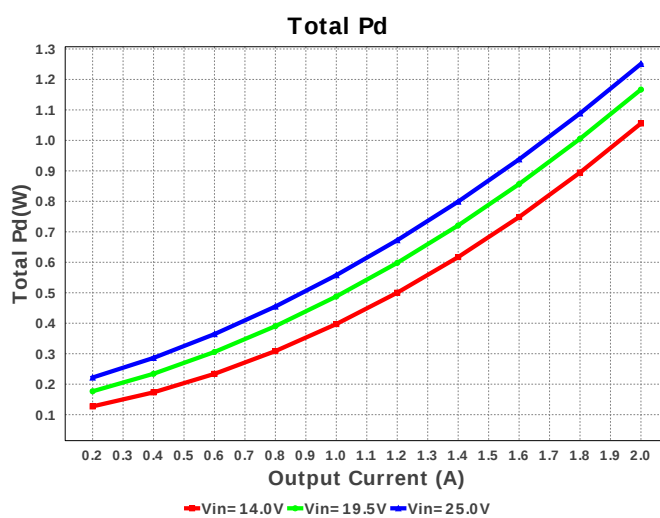
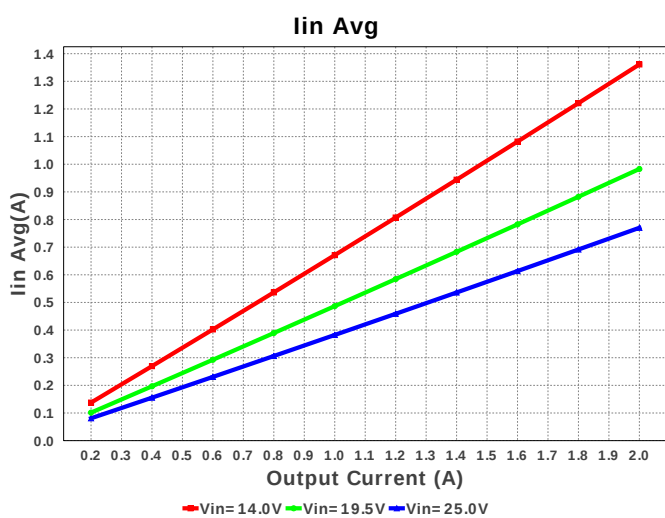
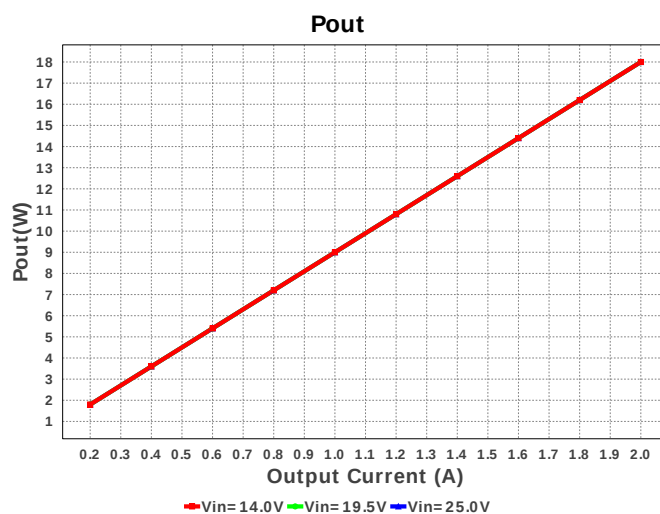
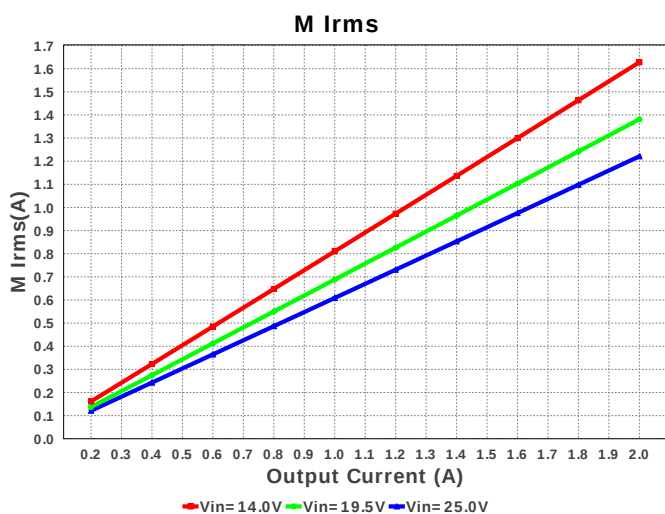
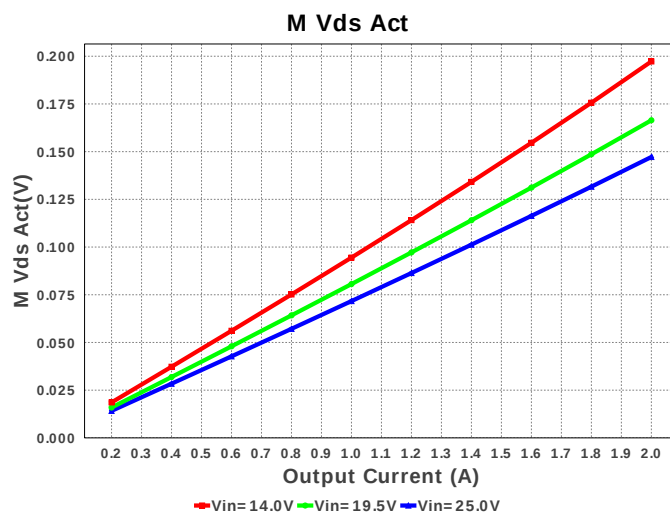
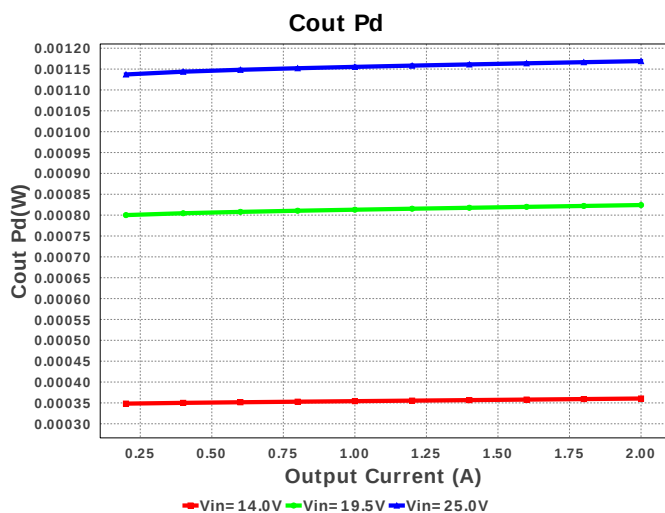
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
8.	U1	Texas Instruments	TPS5450QDDARQ1	Switcher	1	\$2.65	

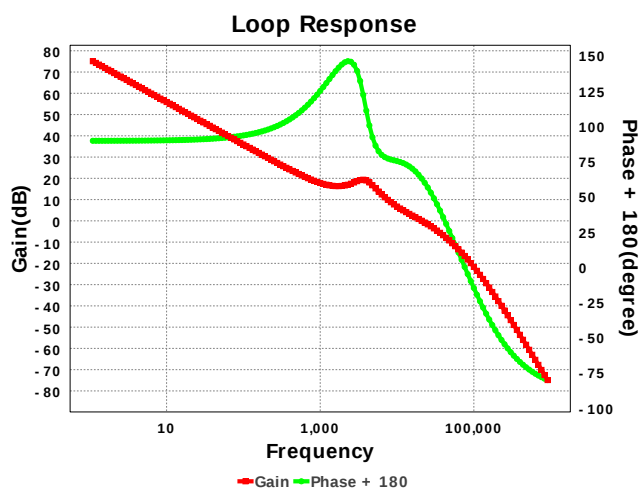
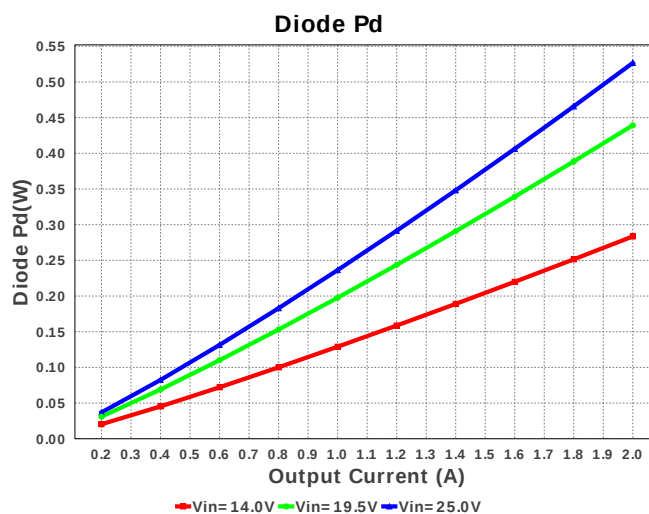
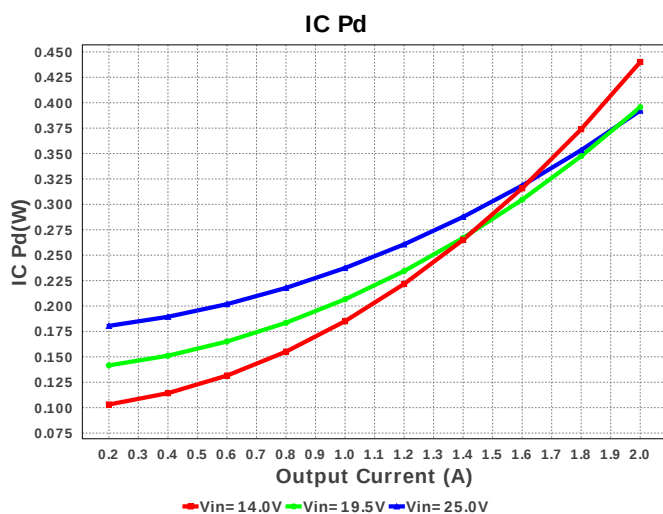
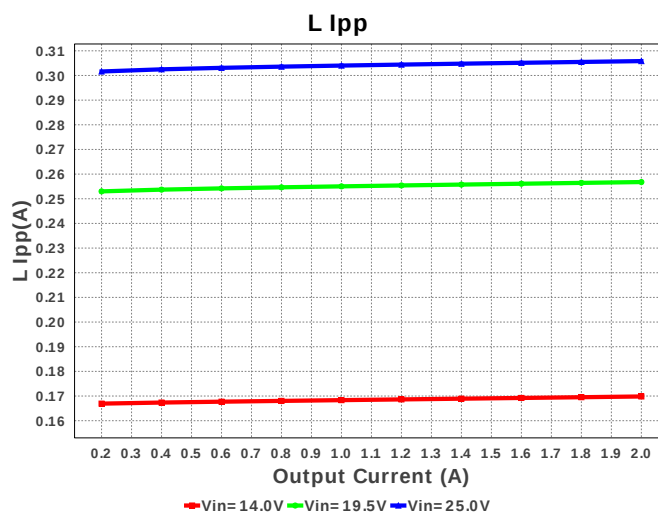
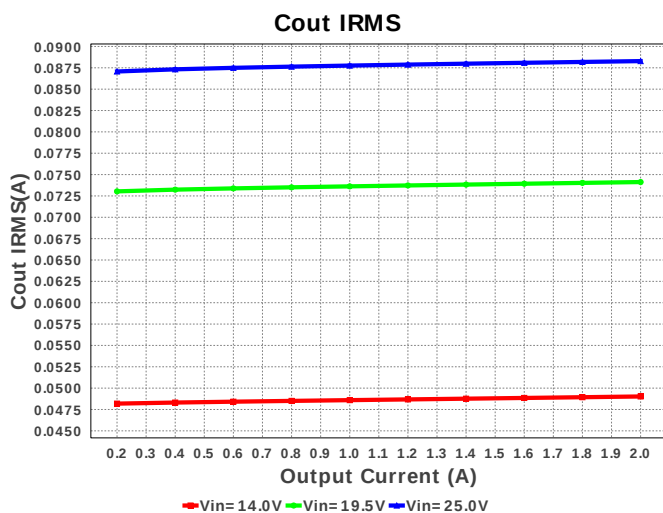


R-PDSO-G8 57 mm²









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	711.984 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	88.285 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.153 A	Current	Peak switch current in IC
4.	Iin Avg	770.04 mA	Current	Average input current
5.	L Ipp	305.83 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	1.221 A	Current	Q lavg
7.	BOM Count	8	General	Total Design BOM count
8.	FootPrint	407.0 mm ²	General	Total Foot Print Area of BOM components
9.	Frequency	500.0 kHz	General	Switching frequency
10.	IC Tolerance	18.315 mV	General	IC Feedback Tolerance
11.	M Vds Act	147.201 mV	General	Voltage drop across the MosFET

#	Name	Value	Category	Description
12.	Pout	18.0 W	General	Total output power
13.	Total BOM	\$3.84	General	Total BOM Cost
14.	D1 Tj	43.167 degC	Op_Point	D1 junction temperature
15.	Vout Actual	8.949 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
16.	Vout OP	9.0 V	Op_Point	Operational Output Voltage
17.	Cross Freq	21.025 kHz	Op_point	Bode plot crossover frequency
18.	Duty Cycle	37.273 %	Op_point	Duty cycle
19.	Efficiency	93.501 %	Op_point	Steady state efficiency
20.	IC Tj	41.767 degC	Op_point	IC junction temperature
21.	ICThetaJA	30.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
22.	IOUT_OP	2.0 A	Op_point	Iout operating point
23.	Phase Marg	63.125 deg	Op_point	Bode Plot Phase Margin
24.	VIN_OP	25.0 V	Op_point	Vin operating point
25.	Vout p-p	45.888 mV	Op_point	Peak-to-peak output ripple voltage
26.	Cin Pd	1.018 mW	Power	Input capacitor power dissipation
27.	Cout Pd	1.169 mW	Power	Output capacitor power dissipation
28.	Diode Pd	526.666 mW	Power	Diode power dissipation
29.	IC Pd	392.237 mW	Power	IC power dissipation
30.	L Pd	330.0 mW	Power	Inductor power dissipation
31.	Total Pd	1.251 W	Power	Total Power Dissipation
32.	Vout Tolerance	3.271 %		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	25.0	Maximum input voltage
3.	VinMin	14.0	Minimum input voltage
4.	Vout	9.0	Output Voltage
5.	base_pn	TPS5450-Q1	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. Feature Highlights: Automotive Qualified 5A, 500kHz Fixed Switching Frequency, Internal Compensation
2. The TPS5450-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
3. **TPS5450-Q1** Product Folder : <http://www.ti.com/product/TPS5450%2DQ1> : contains the data sheet and other resources.

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