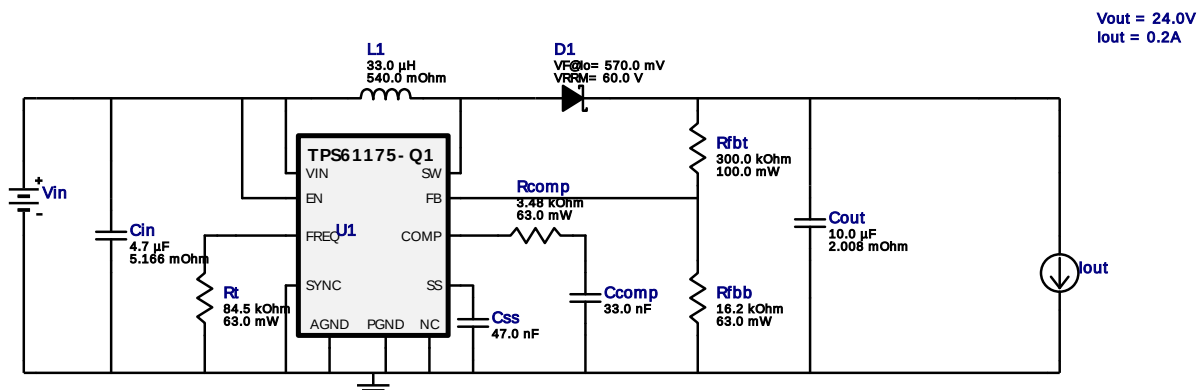


WEBENCH® Design Report

Design : 4742013/39 TPS61175QPWPRQ1
TPS61175QPWPRQ1 11.0V-13.0V to 24.00V @ 0.2A

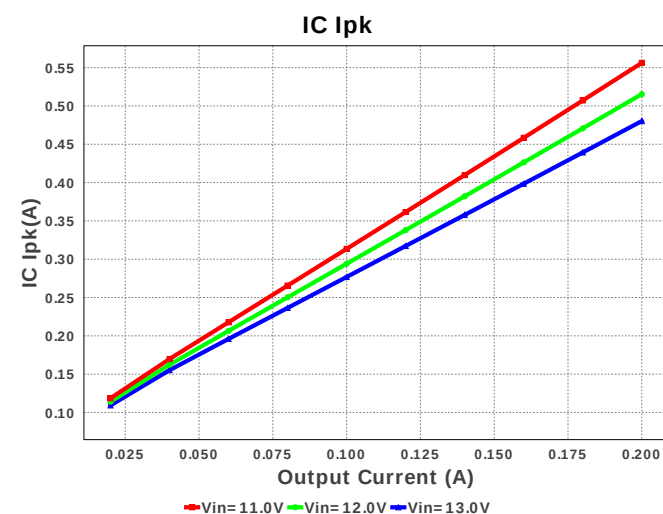
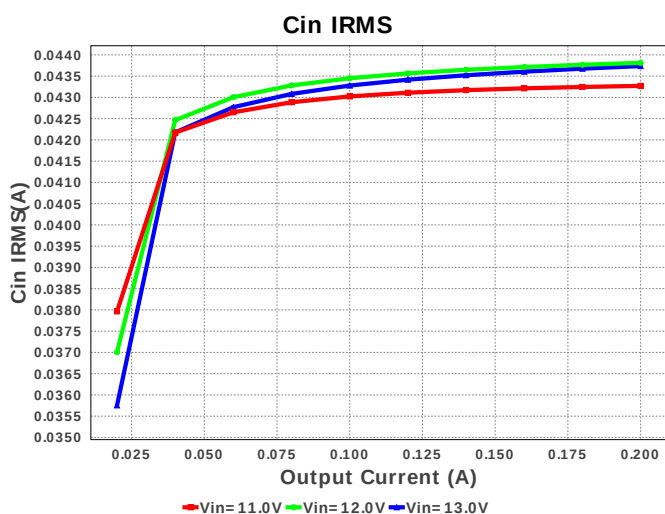
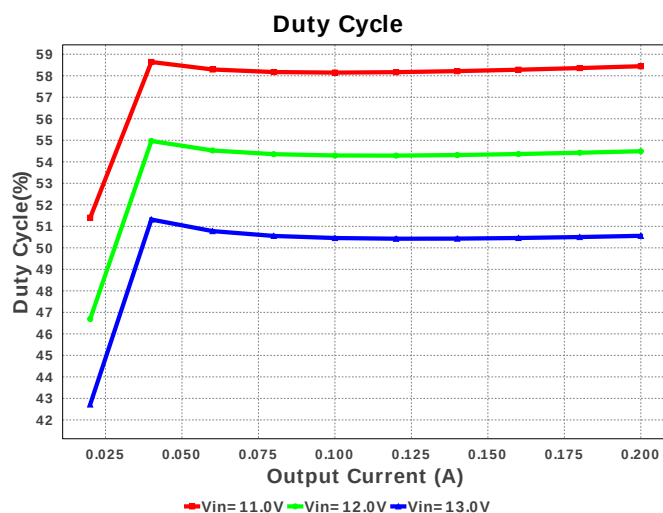
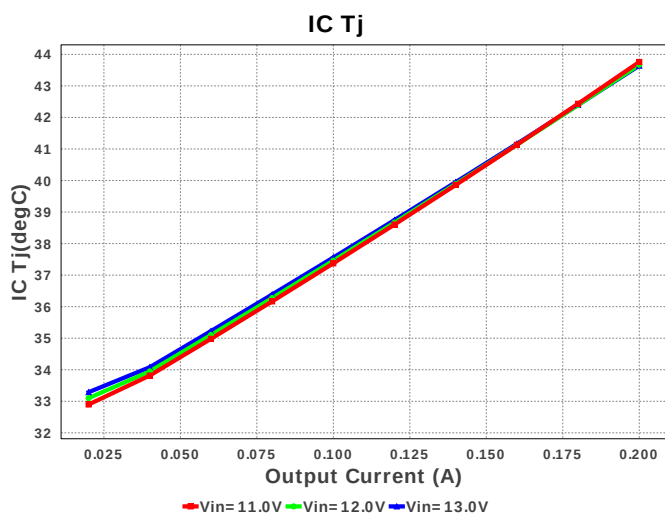


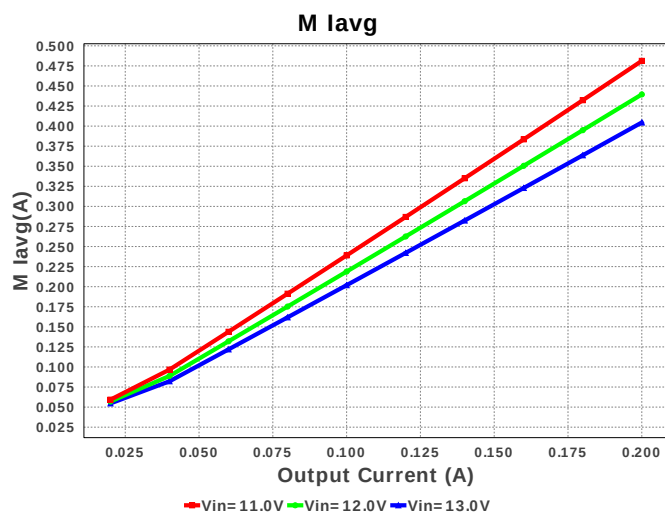
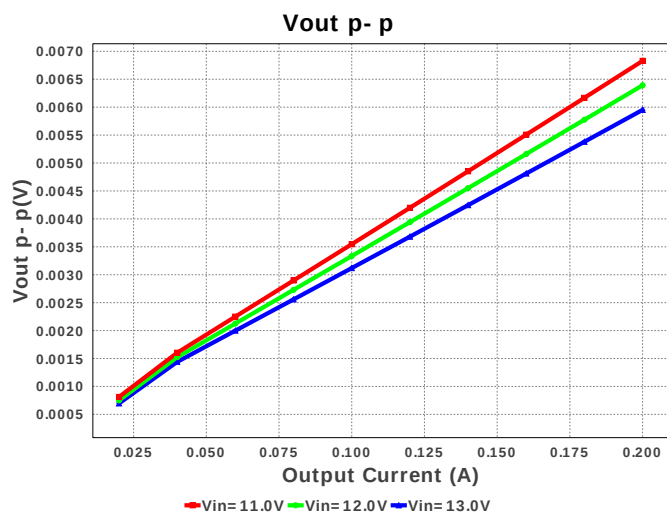
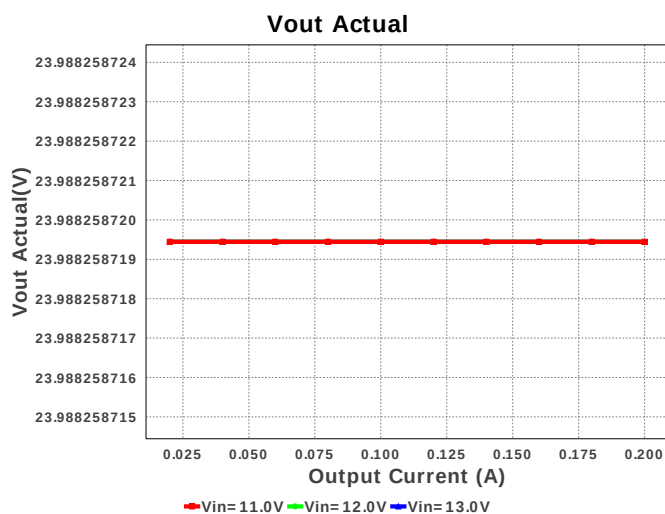
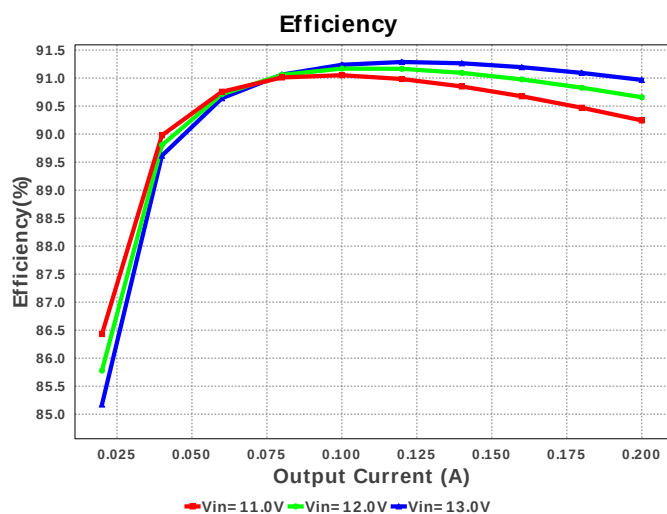
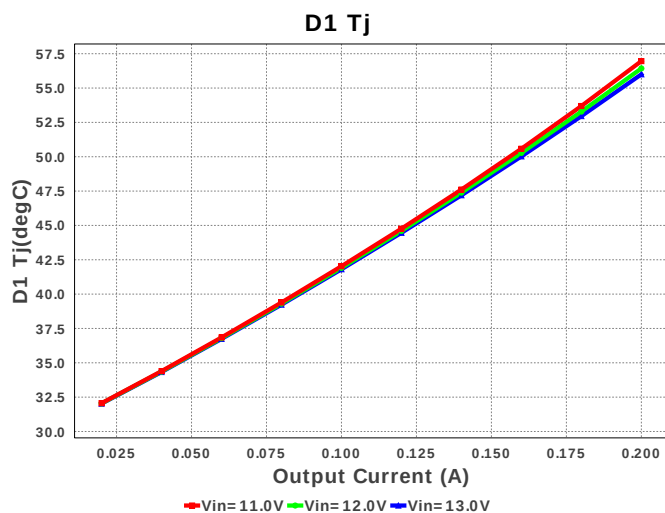
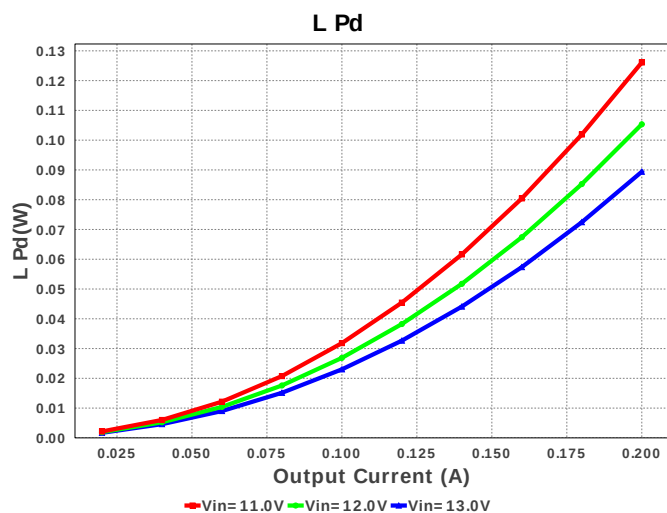
1. This regulator device is qualified for Automotive applications. All passives and other components selected in this design may not be qualified for Automotive applications. The user is required to verify that all components in the design meet the qualification and safety requirements for their specific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

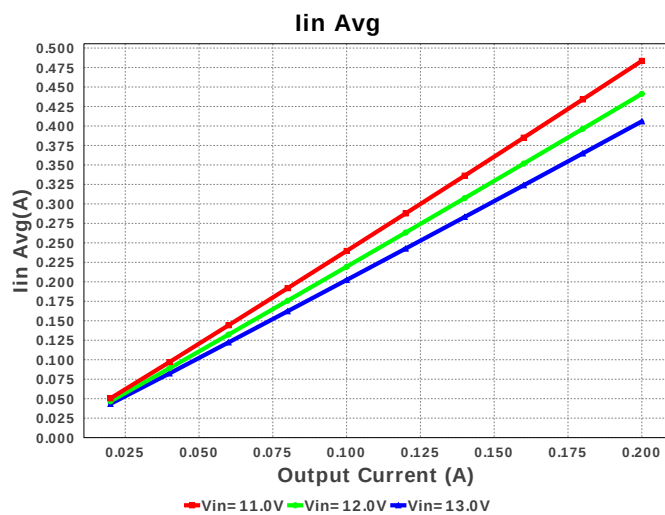
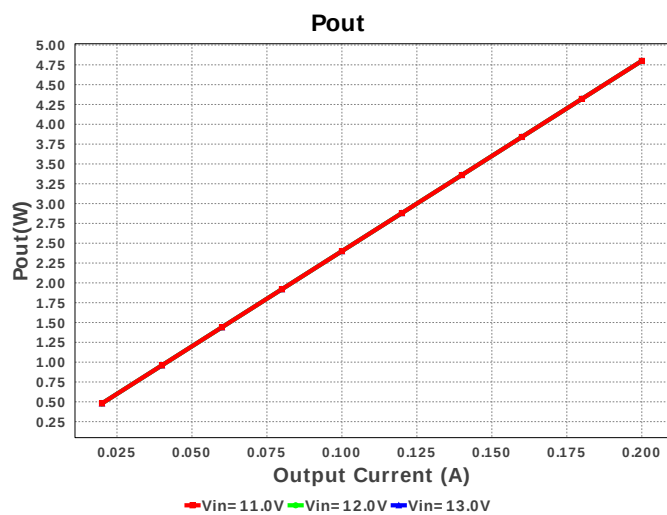
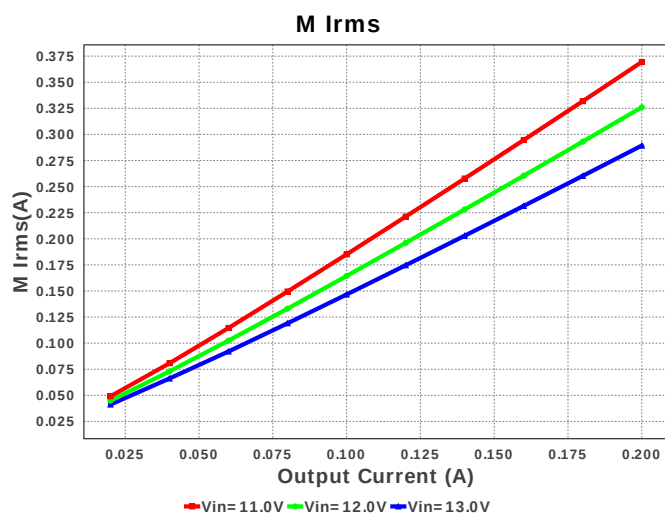
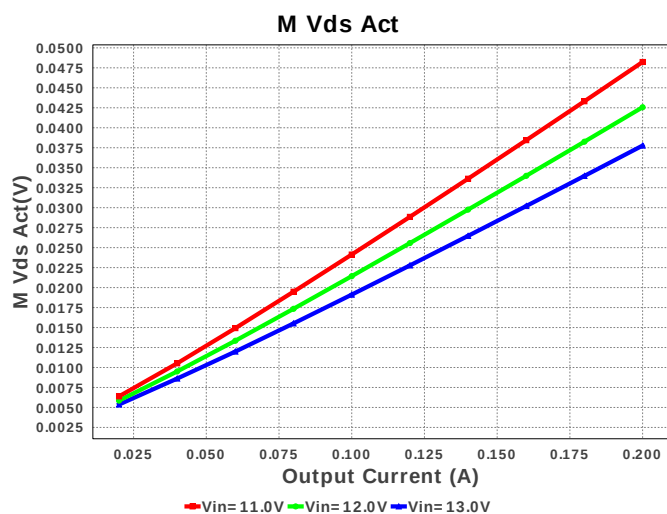
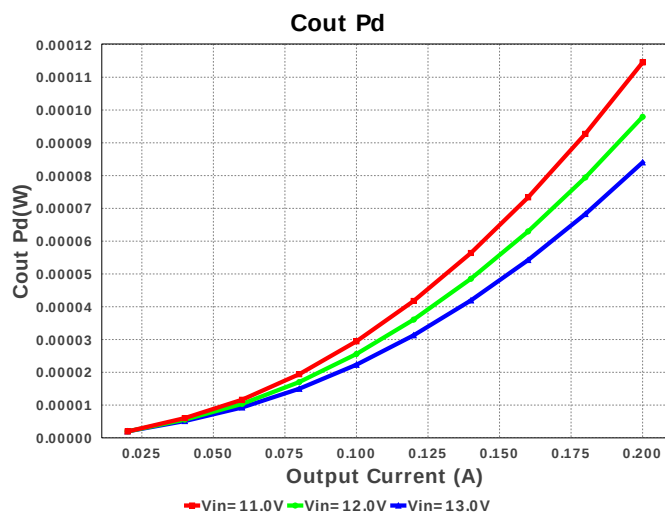
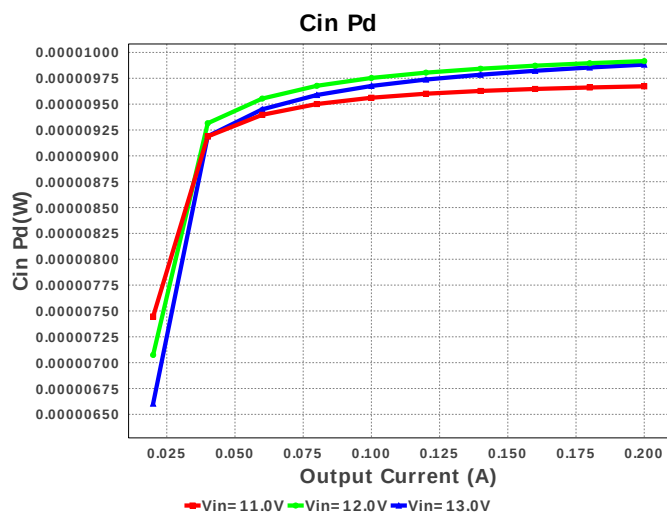
Electrical BOM

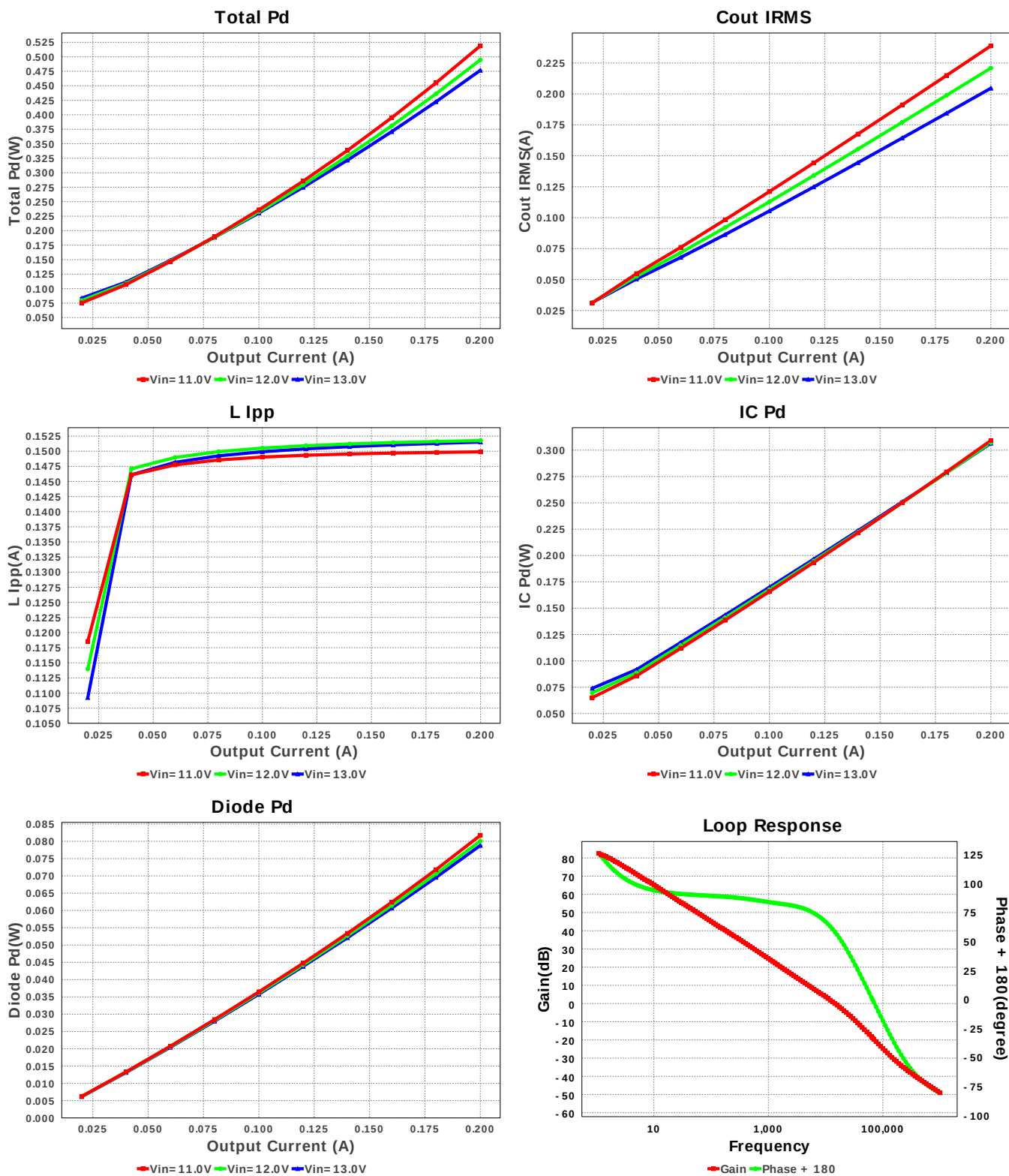
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Ccomp	MuRata	GRM033R60J333KE01D Series= X5R	Cap= 33.0 nF VDC= 6.3 V IRMS= 0.0 A	1	\$0.01	0201 2 mm ²
2.	Cin	MuRata	GRM21BC81E475KA12L Series= X6S	Cap= 4.7 uF ESR= 5.166 mOhm VDC= 25.0 V IRMS= 2.03531 A	1	\$0.02	0805 7 mm ²
3.	Cout	MuRata	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
4.	Css	Taiyo Yuden	TMK212B7473KD-T Series= X7R	Cap= 47.0 nF VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
5.	D1	NXP Semiconductor	PMEG6010CEH,115	VF@Io= 570.0 mV VRRM= 60.0 V	1	\$0.04	SOD-123F 12 mm ²
6.	L1	Würth Elektronik	744773133	L= 33.0 uH DCR= 540.0 mOhm	1	\$1.20	WE-PD2-S 28 mm ²
7.	Rcomp	Vishay-Dale	CRCW04023K48FKED Series= CRCW..e3	Res= 3.48 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
8.	Rfbb	Vishay-Dale	CRCW040216K2FKED Series= CRCW..e3	Res= 16.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
9.	Rfbb	Yageo America	RC0603FR-07300KL Series= ?	Res= 300.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	0603 5 mm ²
10.	Rt	Vishay-Dale	CRCW040284K5FKED Series= CRCW..e3	Res= 84.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11. U1		Texas Instruments	TPS61175QPWPRQ1	Switcher	1	\$1.65	 R-PDSO-G14 61 mm ²









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	43.271 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	238.814 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	556.217 mA	Current	Peak switch current in IC
4.	Iin Avg	483.54 mA	Current	Average input current
5.	L Ipp	149.89 mA	Current	Peak-to-peak inductor ripple current
6.	M Iavg	481.27 mA	Current	MOSFET Average current
7.	M1 Irms	369.406 mA	Current	Q Iavg
8.	BOM Count	11	General	Total Design BOM count
9.	FootPrint	144.0 mm ²	General	Total Foot Print Area of BOM components
10.	Frequency	1.148 MHz	General	Switching frequency
11.	IC Tolerance	20.0 mV	General	IC Feedback Tolerance

#	Name	Value	Category	Description
12.	M Vds Act	48.231 mV	General	Voltage drop across the MosFET
13.	Pout	4.8 W	General	Total output power
14.	Total BOM	\$3.19	General	Total BOM Cost
15.	D1 Tj	56.962 degC	Op_Point	D1 junction temperature
16.	Low Freq Gain	82.547 dB	Op_Point	Gain at 10Hz
17.	Vout Actual	23.988 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
18.	Vout OP	24.0 V	Op_Point	Operational Output Voltage
19.	Cross Freq	9.877 kHz	Op_point	Bode plot crossover frequency
20.	Duty Cycle	58.443 %	Op_point	Duty cycle
21.	Efficiency	90.244 %	Op_point	Steady state efficiency
22.	Gain Marg	-19.596 dB	Op_point	Bode Plot Gain Margin
23.	IC Tj	43.759 degC	Op_point	IC junction temperature
24.	ICThetaJA	44.5 degC/W	Op_point	IC junction-to-ambient thermal resistance
25.	IOUT_OP	200.0 mA	Op_point	Iout operating point
26.	Phase Marg	62.283 deg	Op_point	Bode Plot Phase Margin
27.	VIN_OP	11.0 V	Op_point	Vin operating point
28.	Vout p-p	5.39 mV	Op_point	Peak-to-peak output ripple voltage
29.	Cin Pd	9.673 μW	Power	Input capacitor power dissipation
30.	Cout Pd	114.52 μW	Power	Output capacitor power dissipation
31.	Diode Pd	81.702 mW	Power	Diode power dissipation
32.	IC Pd	309.18 mW	Power	IC power dissipation
33.	L Pd	126.086 mW	Power	Inductor power dissipation
34.	Total Pd	518.916 mW	Power	Total Power Dissipation
35.	Vout Tolerance	3.575 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	200.0 m	Maximum Output Current
2.	VinMax	13.0	Maximum input voltage
3.	VinMin	11.0	Minimum input voltage
4.	Vout	24.0	Output Voltage
5.	base_pn	TPS61175-Q1	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. The TPS61175-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. **TPS61175-Q1** Product Folder : <http://www.ti.com/product/TPS61175%2DQ1> : contains the data sheet and other resources.

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