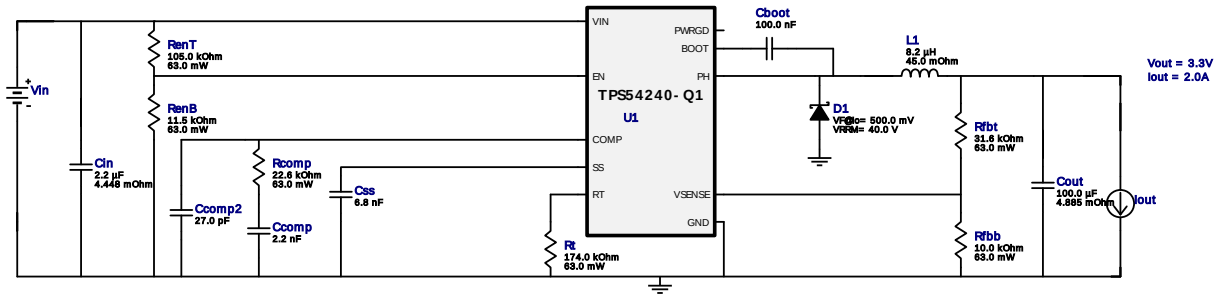
VinMin = 14.0V
VinMax = 22.0V
Vout = 3.3V
Iout = 2.0A

Device = TPS54240QDGQRQ1
Topology = Buck
Created = 7/12/16 2:08:18 AM
BOM Cost = $2.38
BOM Count = 15
Total Pd = 1.8W

WEBENCH® Design Report

Design : 4737567/79 TPS54240QDGQRQ1
TPS54240QDGQRQ1 14.0V-22.0V to 3.30V @ 2.0A

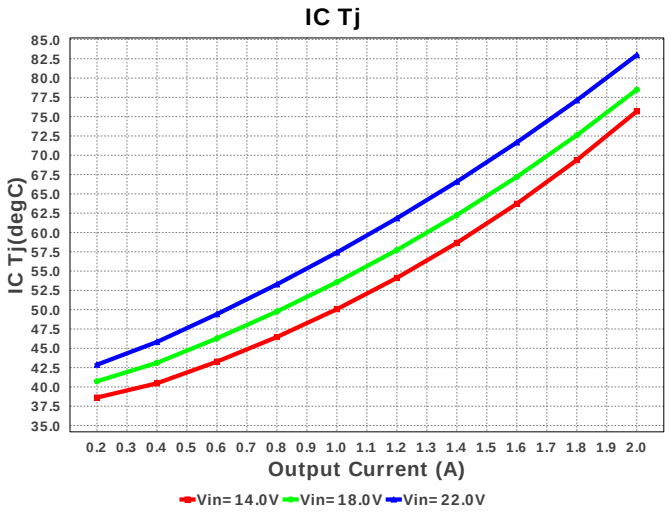


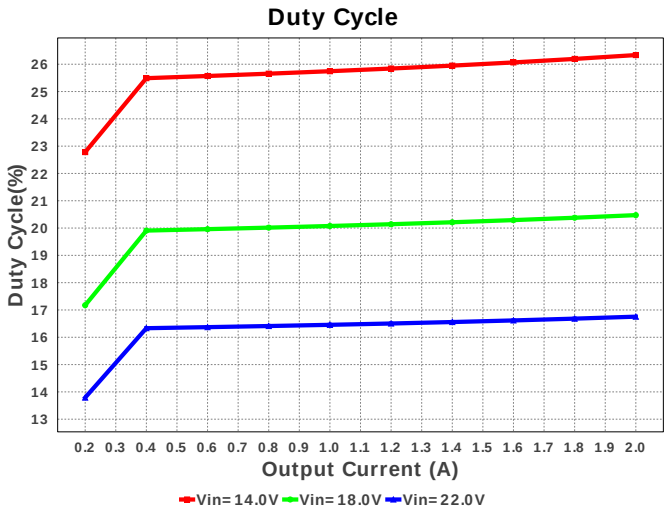
1. This regulator device is qualified for Automotive applications. All passives and other components selected in this design may not be qualified for Automotive applications. The user is required to verify that all components in the design meet the qualification and safety requirements for their specific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

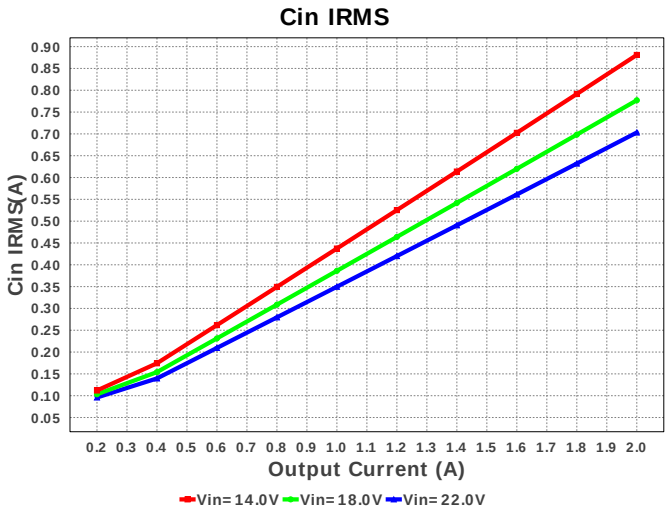
Electrical BOM

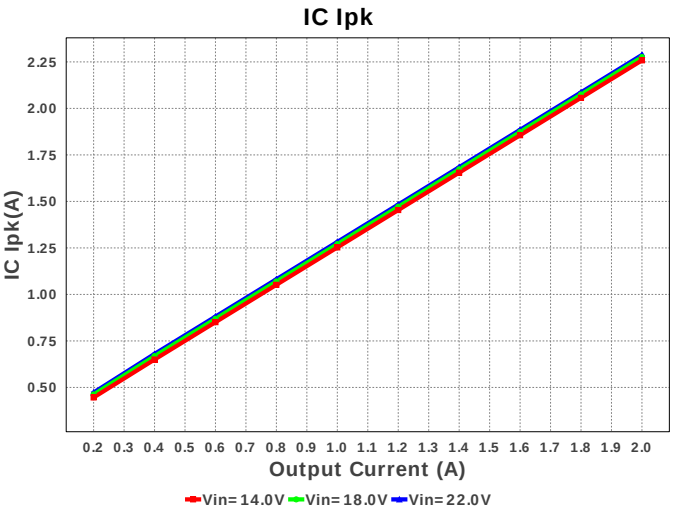
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	MuRata	GRM155R61A104KA01D Series= X5R	Cap= 100.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
2.	Ccomp	Yageo America	CC0805KRX7R9BB222 Series= X7R	Cap= 2.2 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
3.	Ccomp2	Kemet	C0805C270K5GACTU Series= C0G/NP0	Cap= 27.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
4.	Cin	MuRata	GRM31CR71H225KA88L Series= X7R	Cap= 2.2 uF ESR= 4.448 mOhm VDC= 50.0 V IRMS= 2.2252 A	1	$0.05	1206_190 11 mm²
5.	Cout	MuRata	GRM31CR60J107ME39L Series= X5R	Cap= 100.0 uF ESR= 4.885 mOhm VDC= 6.3 V IRMS= 4.4118 A	1	$0.14	1206_190 11 mm²
6.	Css	Yageo America	CC0805KRX7R9BB682 Series= X7R	Cap= 6.8 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
7.	D1	Diodes Inc.	B340A-13-F	VF@Io= 500.0 mV VRRM= 40.0 V	1	$0.11	SMA 37 mm²
8.	L1	Bourns	SRN8040-8R2Y	L= 8.2 µH DCR= 45.0 mOhm	1	$0.22	SRN8040 100 mm²
9.	Rcomp	Vishay-Dale	CRCW040222K6FKED Series= CRCW..e3	Res= 22.6 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
10.	RenB	Vishay-Dale	CRCW040211K5FKED Series= CRCW..e3	Res= 11.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
11.	RenT	Vishay-Dale	CRCW0402105KFKED Series= CRCW..e3	Res= 105.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

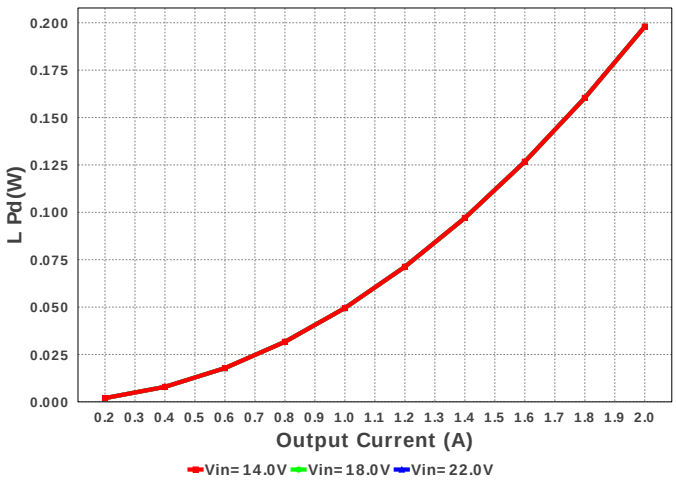
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
12.	Rfbb	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
13.	Rfbt	Vishay-Dale	CRCW040231K6FKED Series= CRCW..e3	Res= 31.6 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
14.	Rt	Vishay-Dale	CRCW0402174KFKED Series= CRCW..e3	Res= 174.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
15.	U1	Texas Instruments	TPS54240QDGQRQ1	Switcher	1	$1.76	S-PDSO-G10 24 mm^2

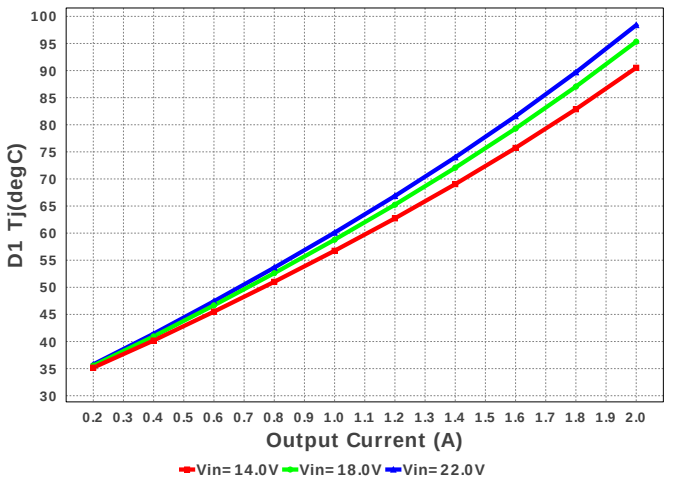


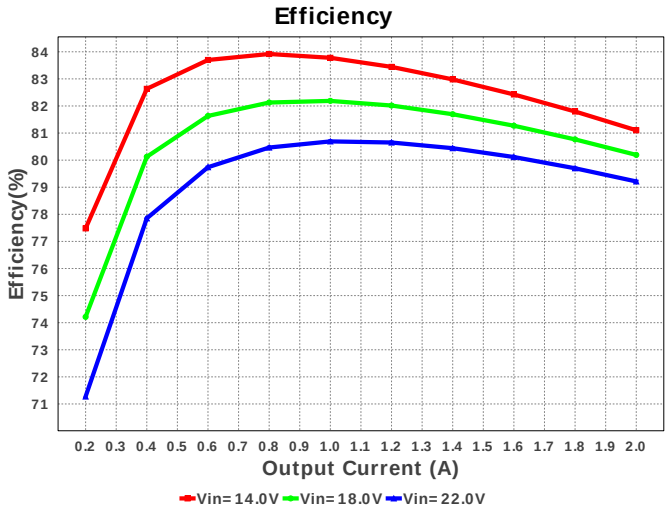


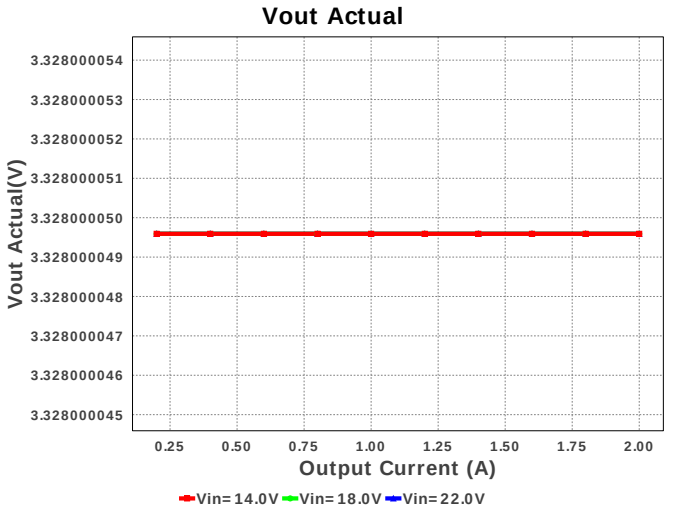


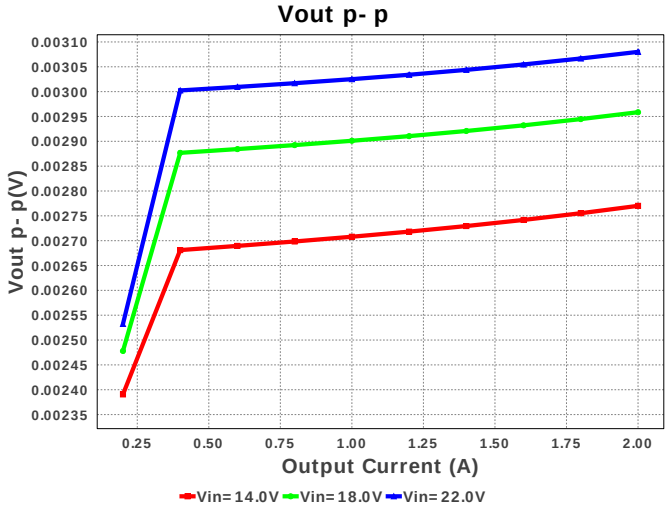


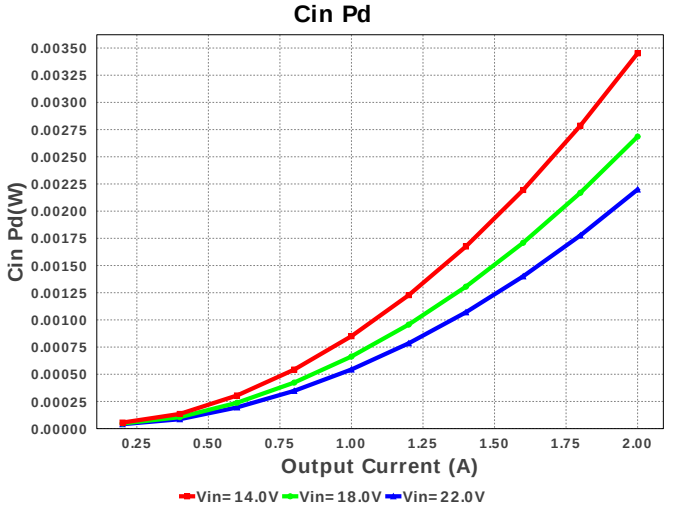


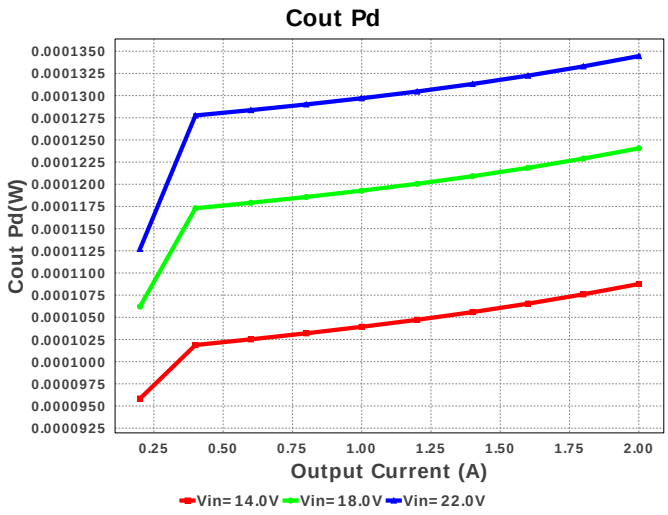


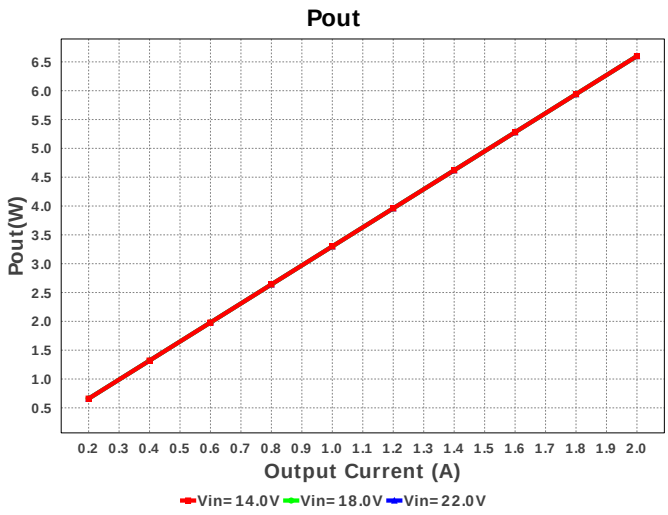


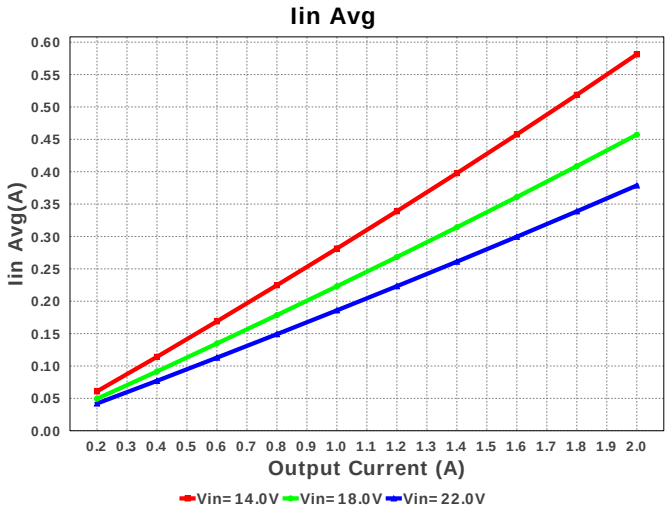


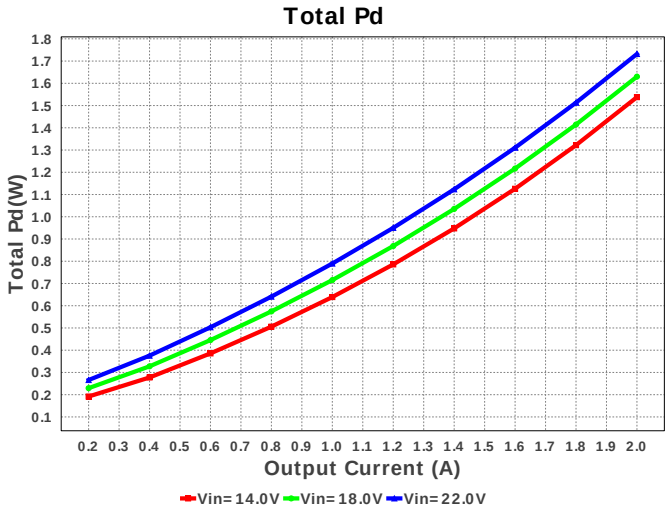


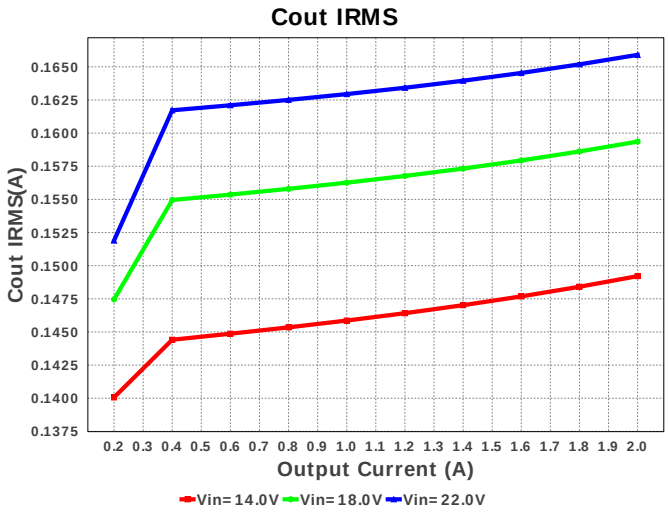


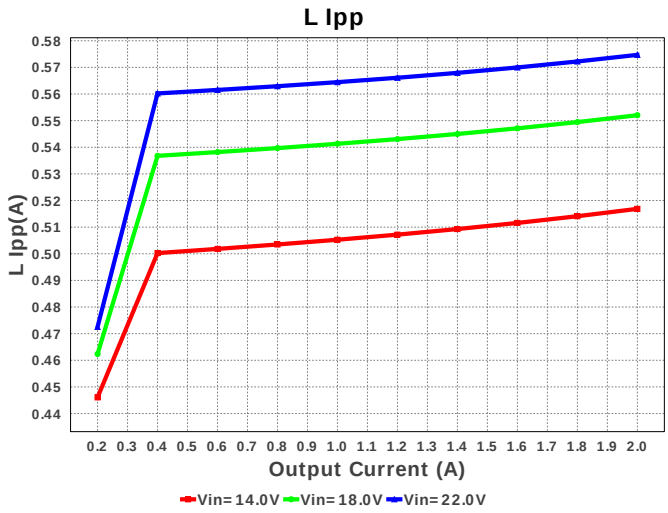


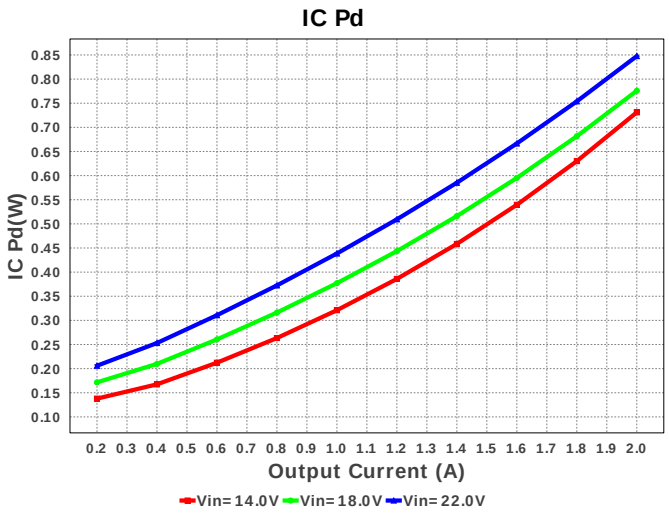


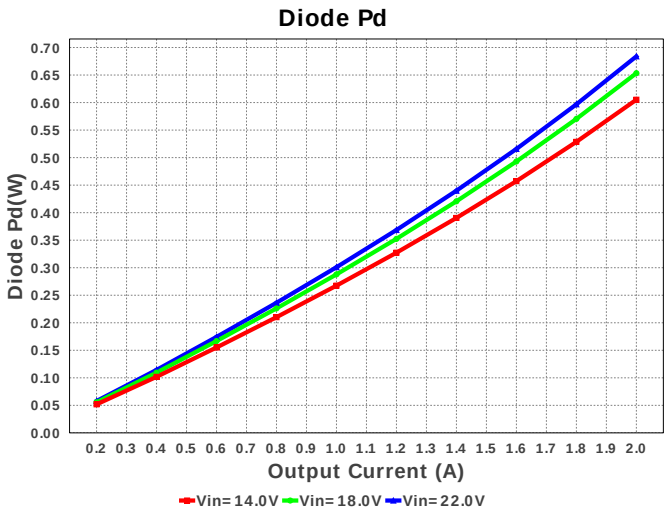


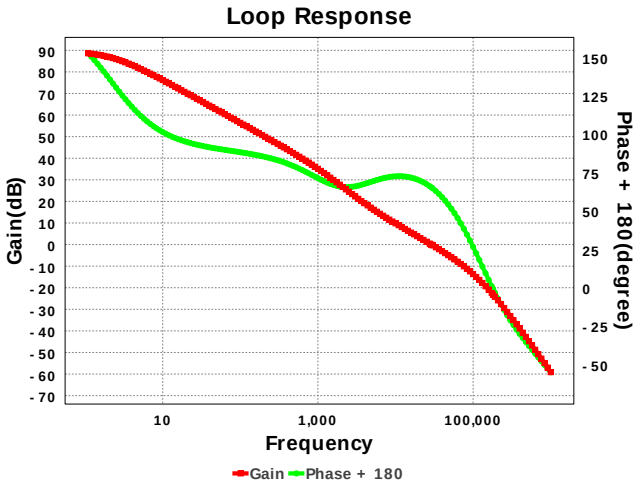












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	705.323 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	167.416 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.0 A	Current	Peak switch current in IC
4.	Iin Avg	381.82 mA	Current	Average input current
5.	L Ipp	579.95 mA	Current	Peak-to-peak inductor ripple current
6.	BOM Count	15	General	Total Design BOM count
7.	FootPrint	224.0 mm^2	General	Total Foot Print Area of BOM components
8.	Frequency	664.858 kHz	General	Switching frequency
9.	Pout	6.6 W	General	Total output power
10.	Total BOM	$2.38	General	Total BOM Cost
11.	D1 Tj	104.993 degC	Op_Point	D1 junction temperature
12.	Low Freq Gain	88.544 dB	Op_Point	Gain at 10Hz
13.	Vout Actual	3.328 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
14.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
15.	Cross Freq	28.919 kHz	Op_point	Bode plot crossover frequency
16.	Duty Cycle	16.908 %	Op_point	Duty cycle
17.	Efficiency	78.572 %	Op_point	Steady state efficiency
18.	Gain Marg	-23.145 dB	Op_point	Bode Plot Gain Margin
19.	IC Tj	83.107 degC	Op_point	IC junction temperature
20.	ICThetaJA	62.5 degC/W	Op_point	IC junction-to-ambient thermal resistance
21.	IOUT_OP	2.0 A	Op_point	Iout operating point
22.	Phase Marg	65.743 deg	Op_point	Bode Plot Phase Margin
23.	VIN_OP	22.0 V	Op_point	Vin operating point
24.	Vout p-p	3.108 mV	Op_point	Peak-to-peak output ripple voltage
25.	Cin Pd	2.213 mW	Power	Input capacitor power dissipation
26.	Cout Pd	136.917 µW	Power	Output capacitor power dissipation
27.	Diode Pd	749.929 mW	Power	Diode power dissipation
28.	IC Pd	849.713 mW	Power	IC power dissipation
29.	L Pd	198.0 mW	Power	Inductor power dissipation
30.	Total Pd	1.8 W	Power	Total Power Dissipation

#	Name	Value	Category	Description
31.	Vout Tolerance	2.55 %		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	22.0	Maximum input voltage
3.	VinMin	14.0	Minimum input voltage
4.	Vout	3.3	Output Voltage
5.	base_pn	TPS54240-Q1	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

1. The TPS54240-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. TPS54240-Q1 Product Folder : http://www.ti.com/product/TPS54240%2DQ1 : contains the data sheet and other resources.