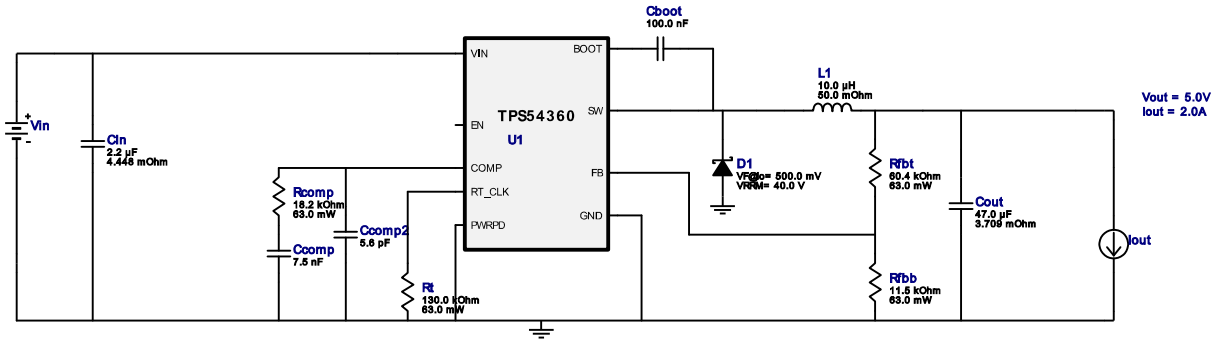
TEXAS INSTRUMENTS

WEBENCH® Design Report

VinMin = 14.0V
VinMax = 22.0V
Vout = 5.0V
Iout = 2.0A

Device = TPS54360DDAR
Topology = Buck
Created = 8/23/16 6:37:38 PM
BOM Cost = $2.73
BOM Count = 12
Total Pd = 1.22W

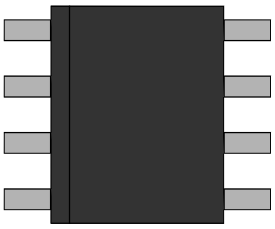
Design : 4774910/3 TPS54360DDAR
TPS54360DDAR 14.0V-22.0V to 5.00V @ 2.0A



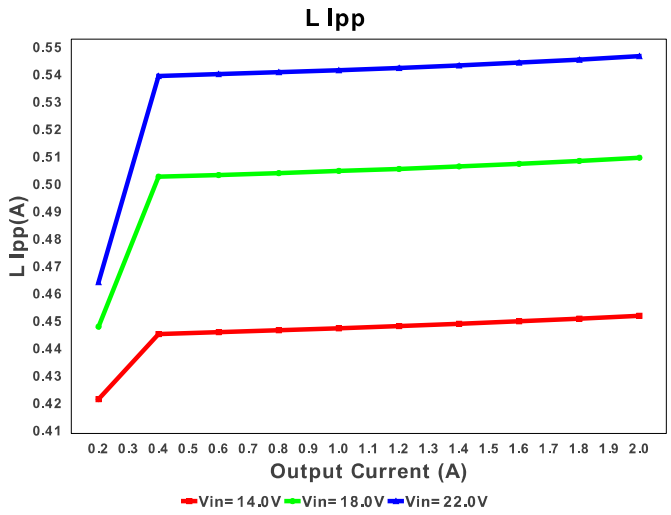
Electrical BOM

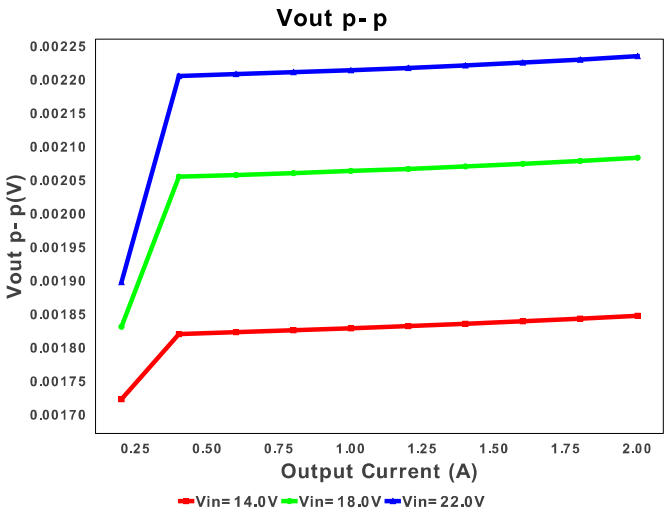
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	MuRata	GRM155R61A104KA01D Series= X5R	Cap= 100.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
2.	Ccomp	MuRata	GRM2195C1H752JA01D Series= C0G/NP0	Cap= 7.5 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.04	0805 7 mm²
3.	Ccomp2	MuRata	GRM1555C1H5R6CA01D Series= C0G/NP0	Cap= 5.6 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0402 3 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	GRM31CR61A476KE15L Series= X5R	Cap= 47.0 uF ESR= 3.709 mOhm VDC= 10.0 V IRMS= 4.2862 A	1	$0.15	1206_190 11 mm²
6.	D1	Diodes Inc.	B340A-13-F	VF@Io= 500.0 mV VRRM= 40.0 V	1	$0.11	SMA 37 mm²
7.	L1	Bourns	SRN8040-100M	L= 10.0 µH DCR= 50.0 mOhm	1	$0.22	SRN8040 100 mm²
8.	Rcomp	Vishay-Dale	CRCW040218K2FKED Series= CRCW..e3	Res= 18.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
9.	Rfbb	Vishay-Dale	CRCW040211K5FKED Series= CRCW..e3	Res= 11.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
10.	Rfbt	Vishay-Dale	CRCW040260K4FKED Series= CRCW..e3	Res= 60.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
11.	Rt	Vishay-Dale	CRCW0402130KFKED Series= CRCW..e3	Res= 130.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

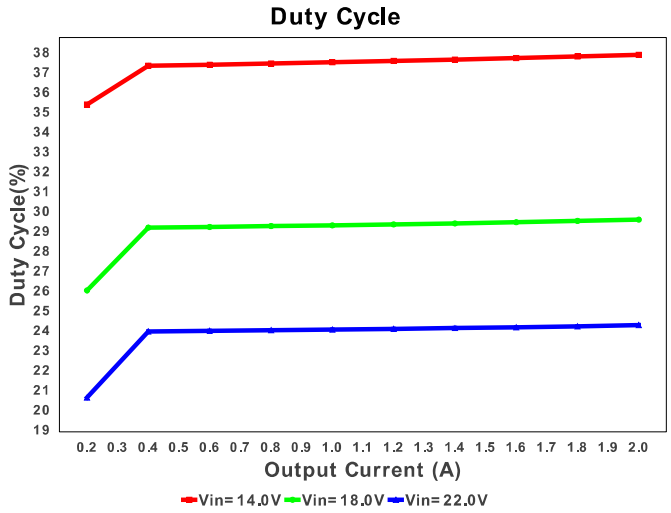
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
12.	U1	Texas Instruments	TPS54360DDAR	Switcher	1	$2.10	

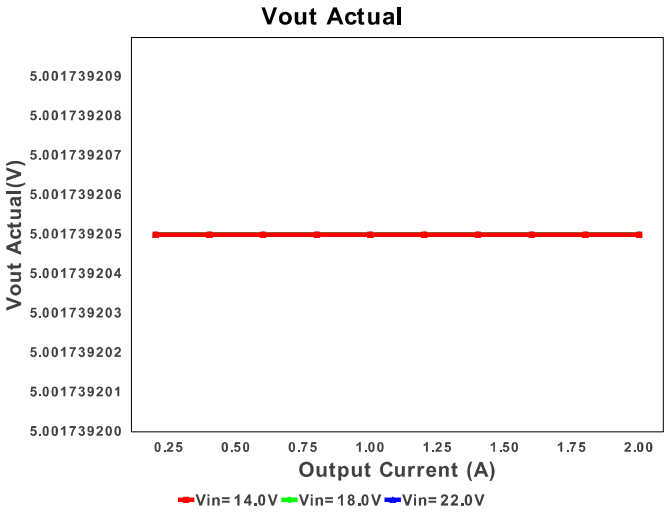


R-PDSO-G8 55 mm^2

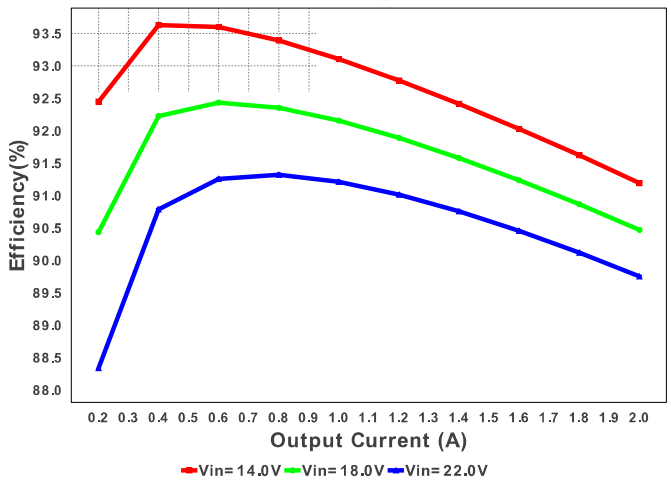




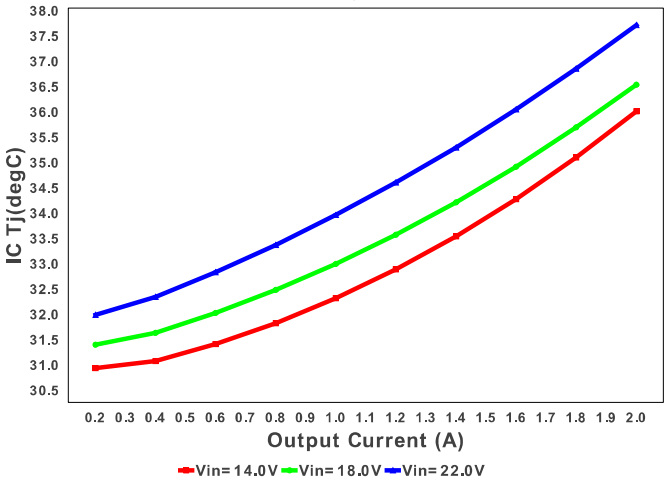




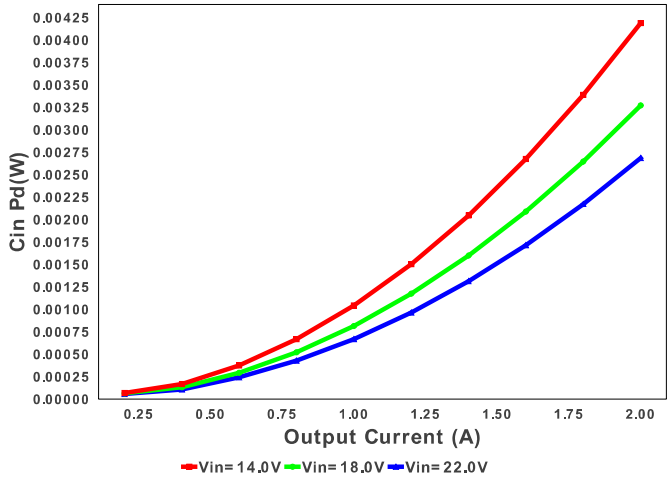
Efficiency



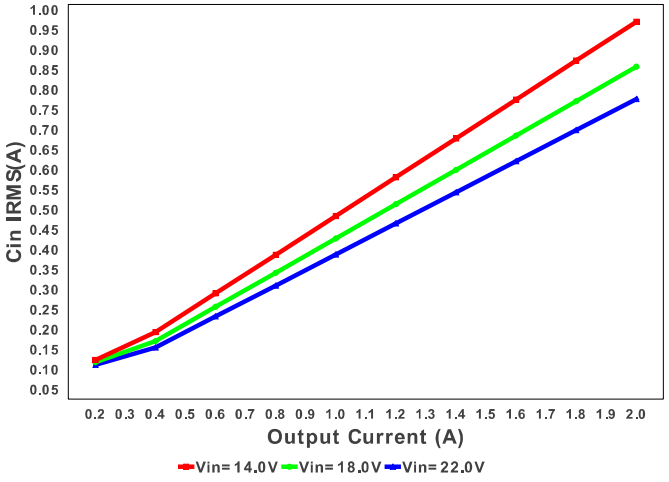
IC Tj



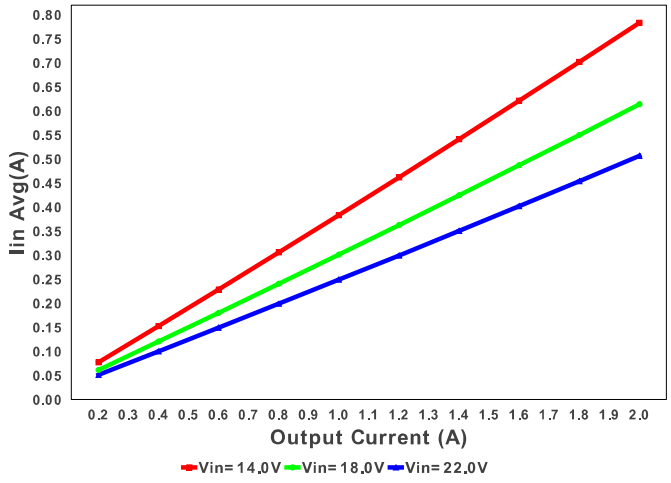
Cin Pd



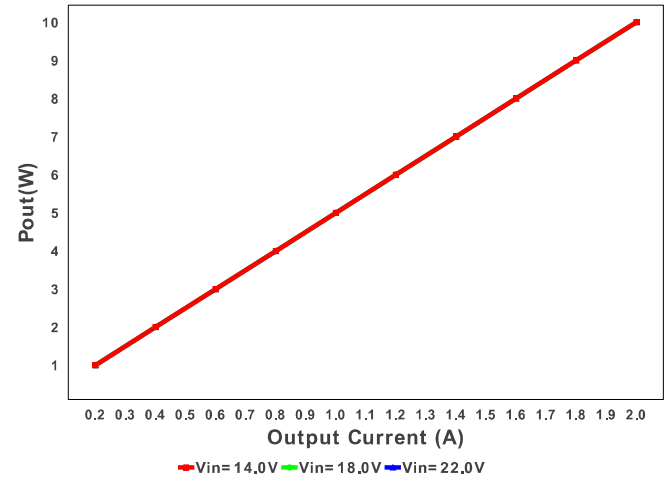
Cin IRMS

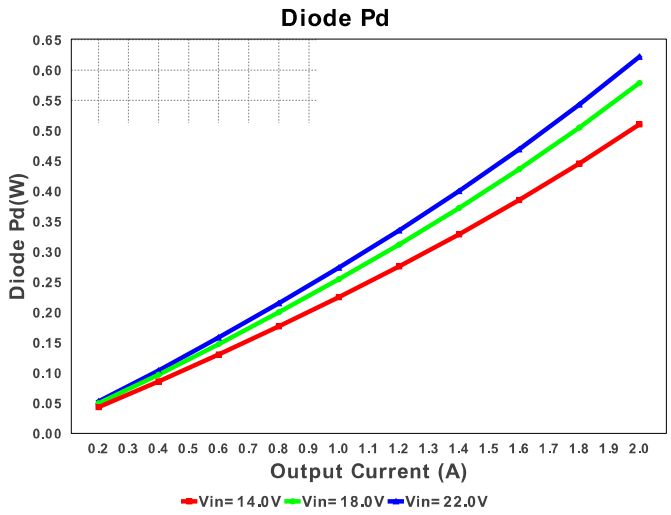


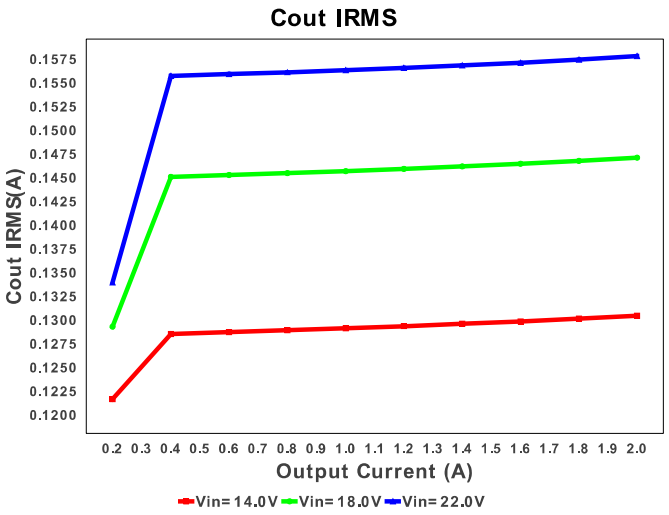
Iin Avg

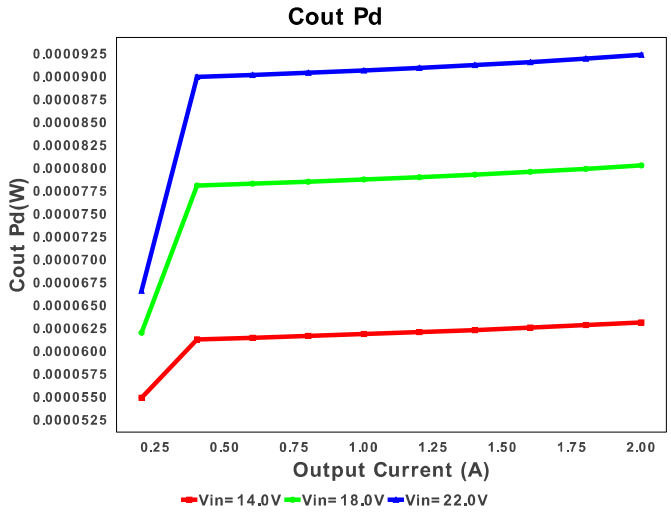


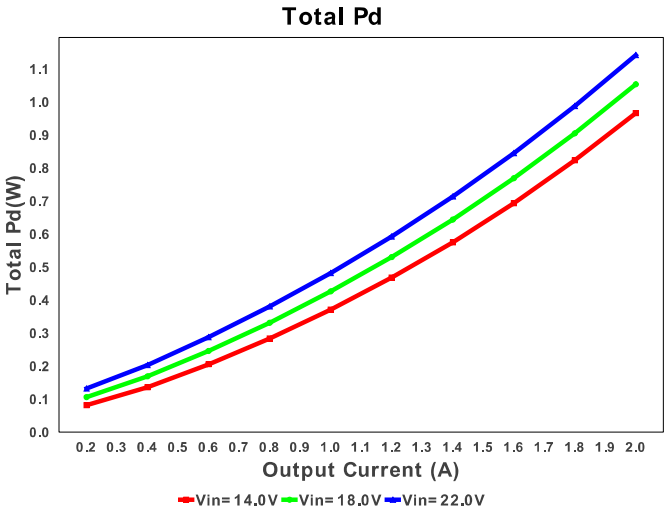
Pout

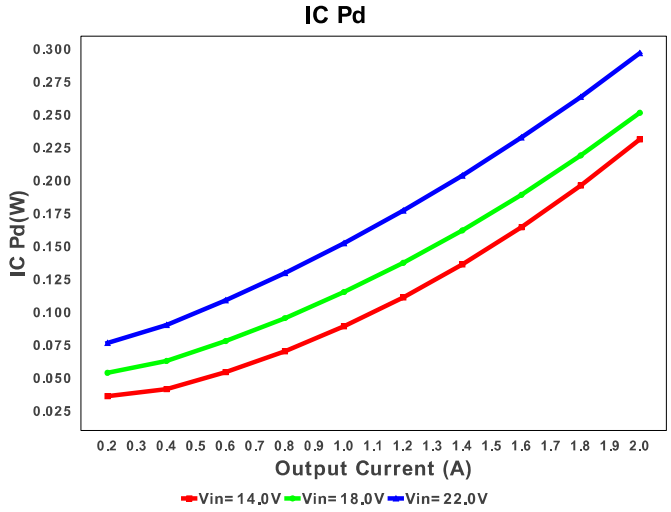


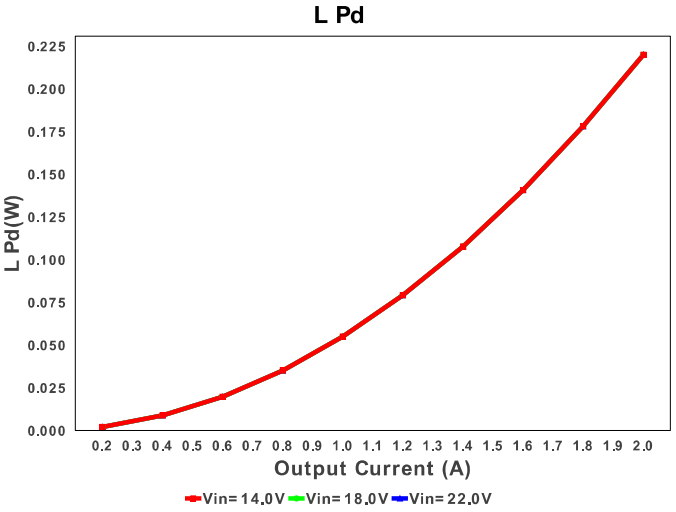


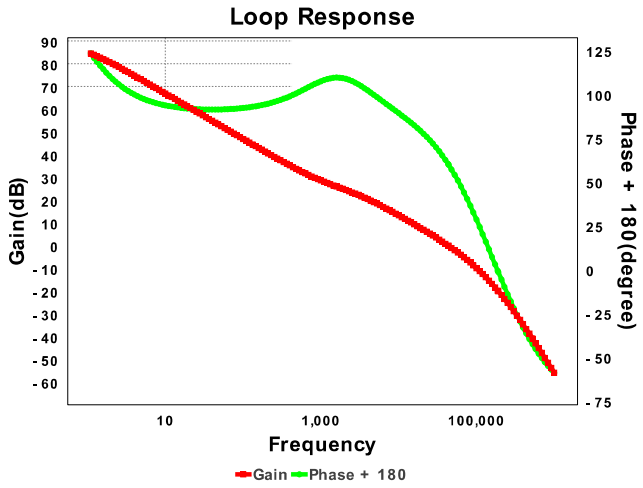












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	778.079 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	158.908 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	509.86 mA	Current	Average input current
4.	L Ipp	550.47 mA	Current	Peak-to-peak inductor ripple current
5.	BOM Count	12	General	Total Design BOM count
6.	FootPrint	239.0 mm^2	General	Total Foot Print Area of BOM components
7.	Frequency	754.173 kHz	General	Switching frequency
8.	Mode	CCM	General	Conduction Mode
9.	Pout	10.0 W	General	Total output power
10.	Total BOM	$2.73	General	Total BOM Cost
11.	ICThetaJA Effective	26.0 degC/W	Op_Point	Effective IC Junction-to-Ambient Thermal Resistance
12.	Low Freq Gain	84.479 dB	Op_Point	Gain at 10Hz
13.	Vout Actual	5.002 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
14.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
15.	Cross Freq	43.347 kHz	Op_point	Bode plot crossover frequency
16.	Duty Cycle	24.421 %	Op_point	Duty cycle
17.	Efficiency	89.15 %	Op_point	Steady state efficiency
18.	Gain Marg	-19.795 dB	Op_point	Bode Plot Gain Margin
19.	IC Tj	37.728 degC	Op_point	IC junction temperature
20.	IOUT_OP	2.0 A	Op_point	Iout operating point
21.	Phase Marg	60.901 deg	Op_point	Bode Plot Phase Margin
22.	VIN_OP	22.0 V	Op_point	Vin operating point
23.	Vout p-p	2.251 mV	Op_point	Peak-to-peak output ripple voltage
24.	Cin Pd	2.693 mW	Power	Input capacitor power dissipation
25.	Cout Pd	93.658 µW	Power	Output capacitor power dissipation
26.	Diode Pd	696.991 mW	Power	Diode power dissipation
27.	IC Pd	297.245 mW	Power	IC power dissipation
28.	L Pd	220.0 mW	Power	Inductor power dissipation
29.	Total Pd	1.217 W	Power	Total Power Dissipation
30.	Vout Tolerance	2.714 %		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	5.0	Output Voltage
5.	base_pn	TPS54360	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

1. TPS54360 Product Folder : http://www.ti.com/product/TPS54360 : contains the data sheet and other resources.