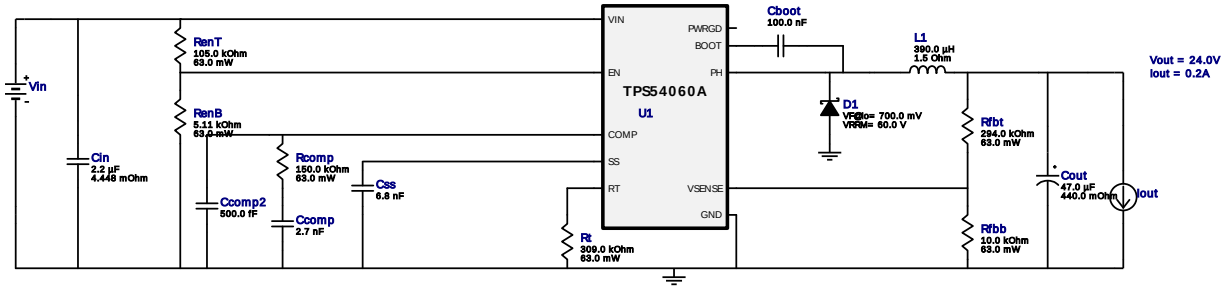
TEXAS INSTRUMENTS

WEBENCH® Design Report

VinMin = 30.0V
VinMax = 30.0V
Vout = 24.0V
Iout = 0.2A

Device = TPS54060ADGQR
Topology = Buck
Created = 11/21/16 1:30:56 AM
BOM Cost = $2.00
BOM Count = 15
Total Pd = 0.18W

Design : 4232493/33 TPS54060ADGQR
TPS54060ADGQR 30.0V-30.0V to 24.00V @ 0.2A



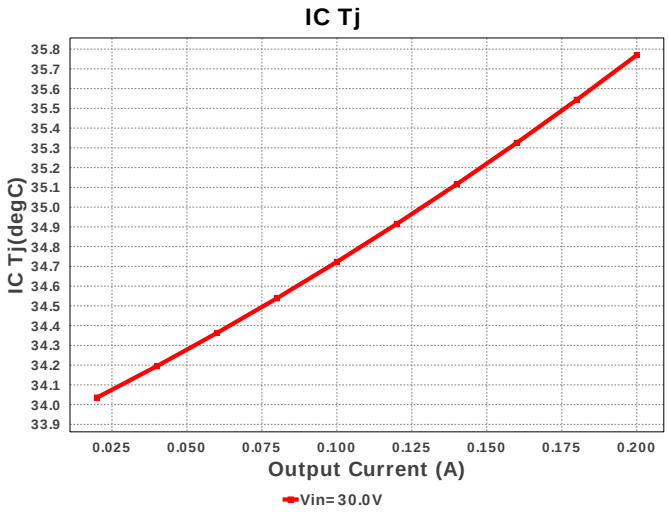
My Comments

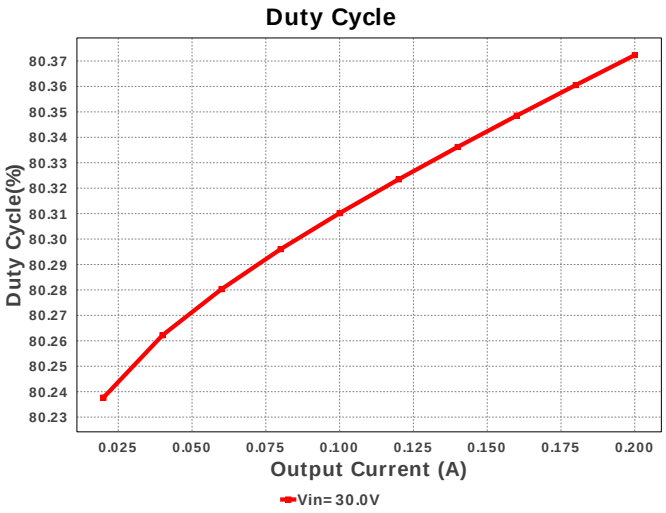
No comments

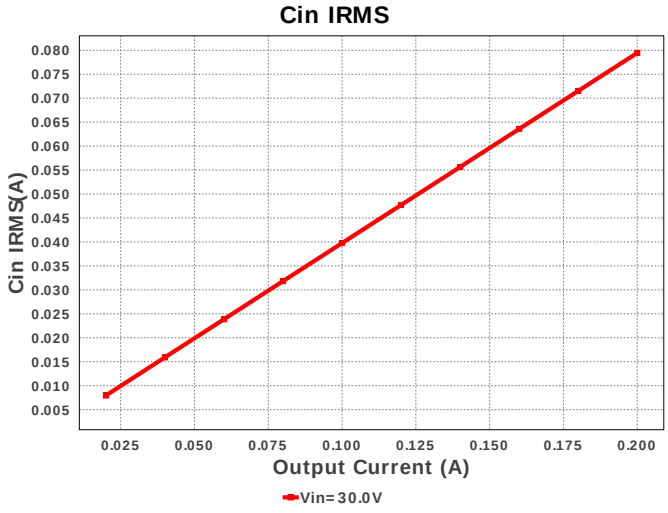
Electrical BOM

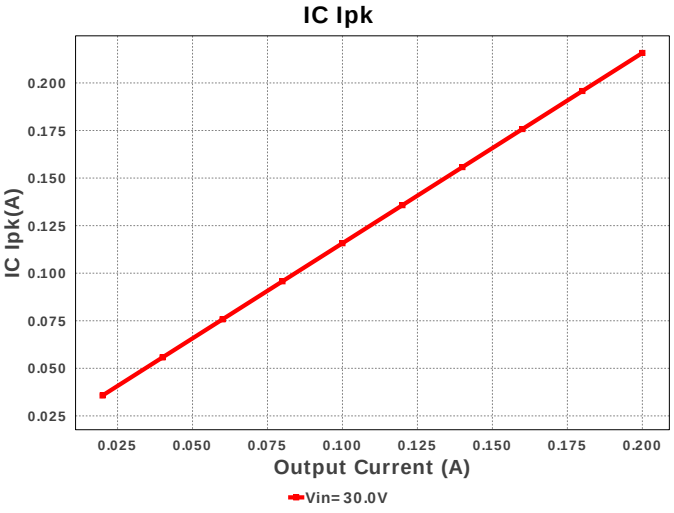
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	MuRata	GRM155R61A104KA01D Series= X5R	Cap= 100.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
2.	Ccomp	Yageo America	CC0805KRX7R9BB272 Series= X7R	Cap= 2.7 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
3.	Ccomp2	MuRata	GQM2195C2AR50CB01D Series= C0G/NP0	Cap= 500.0 fF VDC= 100.0 V IRMS= 0.0 A	1	$0.15	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	Nichicon	UUD1V470MCL1GS Series= uD	Cap= 47.0 uF ESR= 440.0 mOhm VDC= 35.0 V IRMS= 230.0 mA	1	$0.11	SM_RADIAL_6.3AMM 80 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.	B160-13-F	VF@Io= 700.0 mV VRRM= 60.0 V	1	$0.05	SMA 37 mm²
8.	L1	Panasonic	ELL-6UH391M	L= 390.0 µH DCR= 1.5 Ohm	1	$0.28	ELL6UH 67 mm²
9.	Rcomp	Vishay-Dale	CRCW0402150KFKED Series= CRCW..e3	Res= 150.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
10.	RenB	Vishay-Dale	CRCW04025K11FKED Series= CRCW..e3	Res= 5.11 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

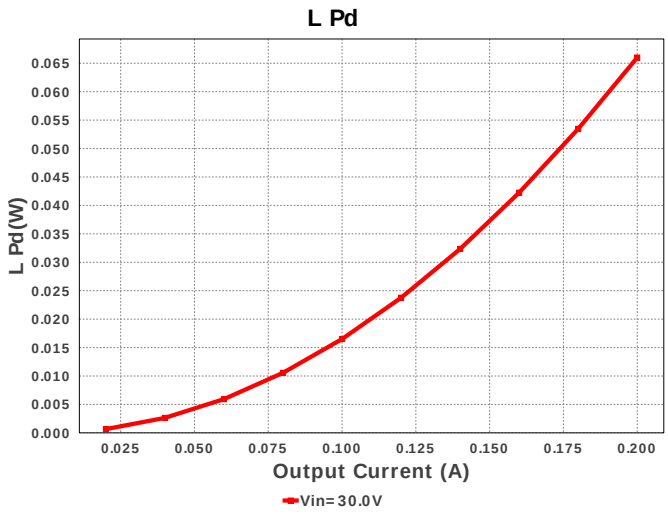
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
12.	Rfbb	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
13.	Rfbt	Vishay-Dale	CRCW0402294KFKED Series= CRCW..e3	Res= 294.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
14.	Rt	Vishay-Dale	CRCW0402309KFKED Series= CRCW..e3	Res= 309.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
15.	U1	Texas Instruments	TPS54060ADGQR	Switcher	1	$1.27	S-PDSO-G10 24 mm^2

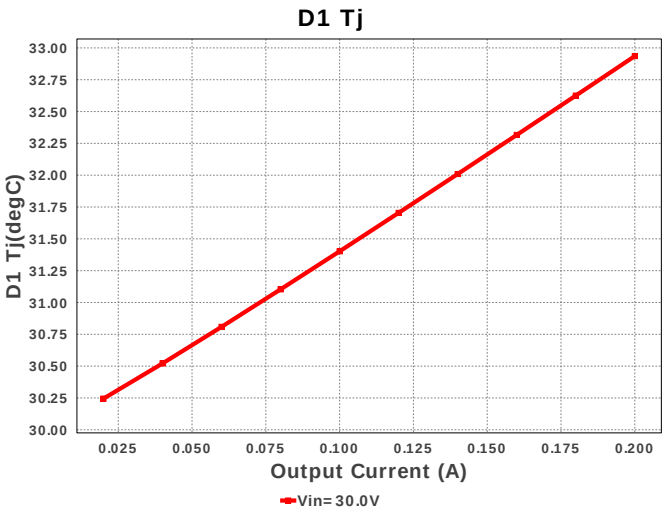


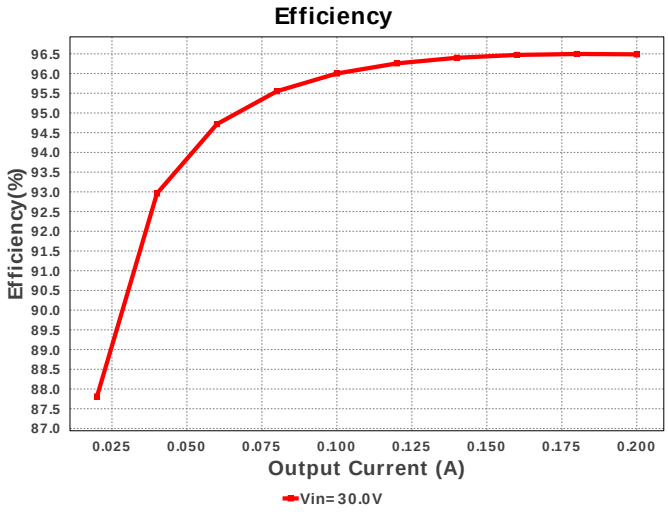


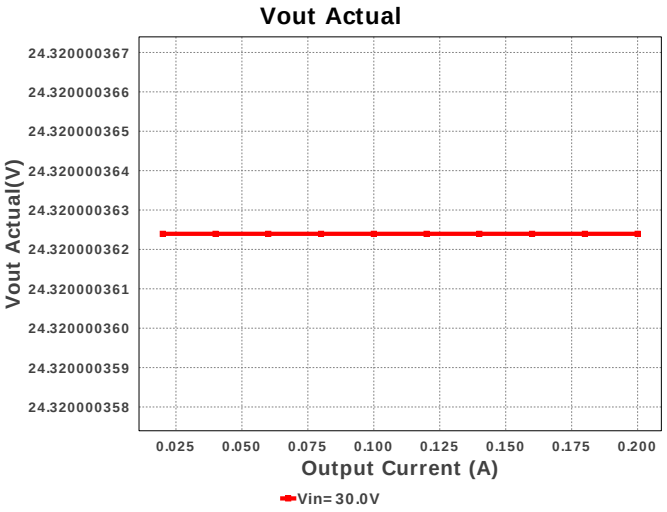


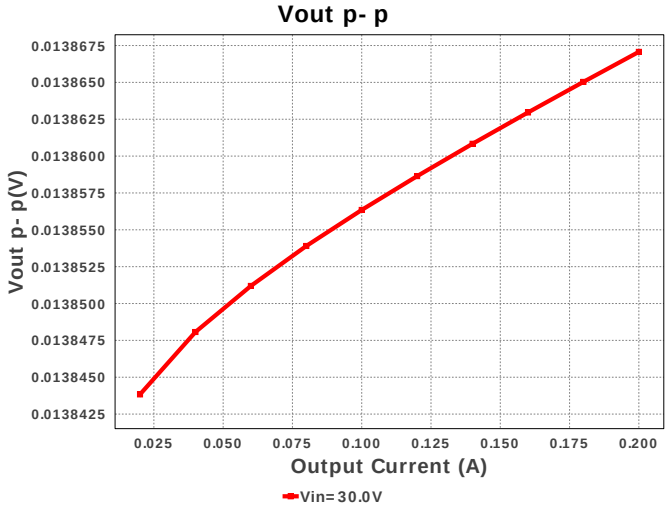


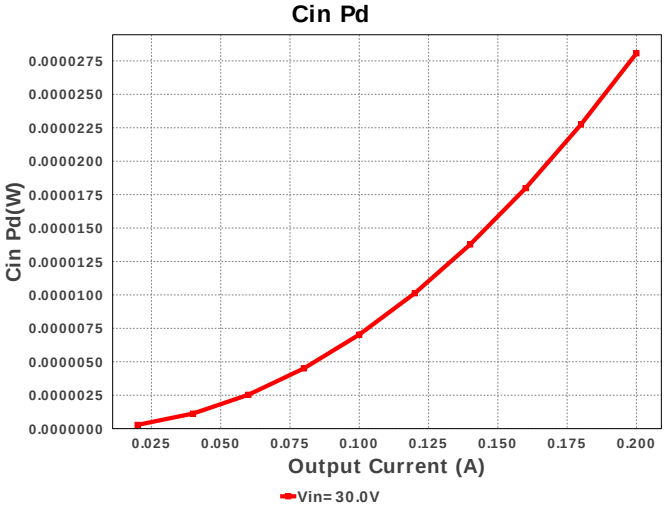


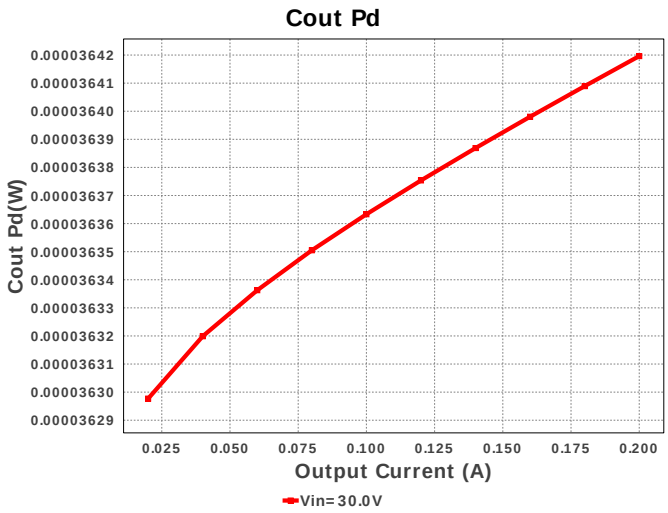


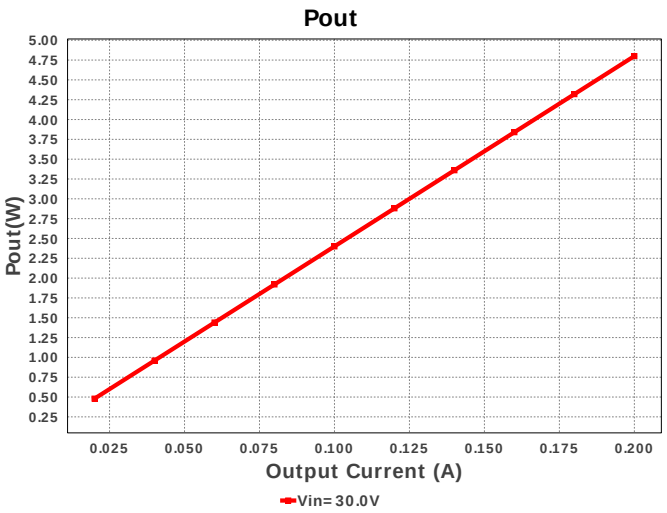


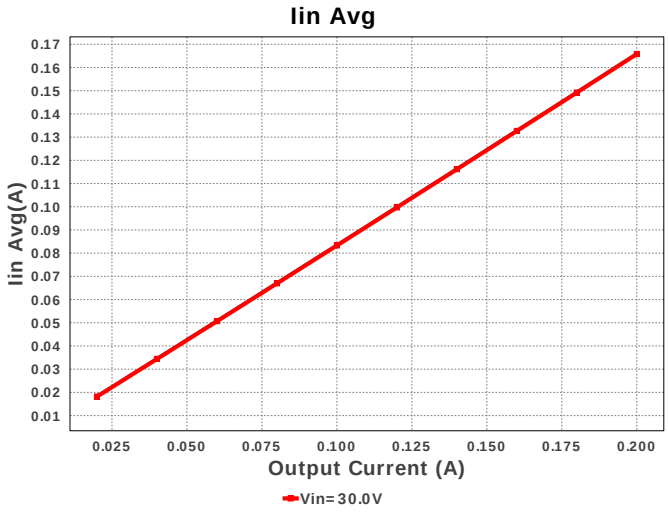


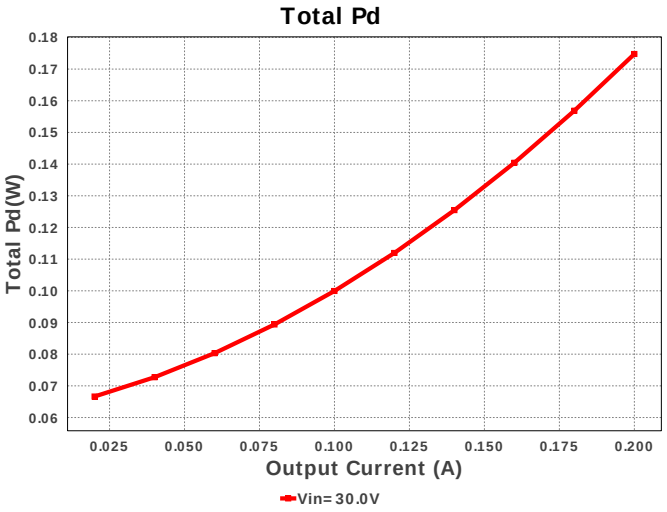


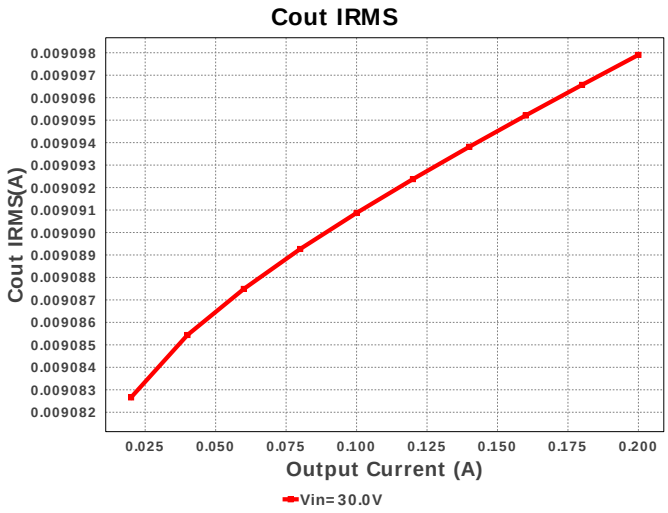


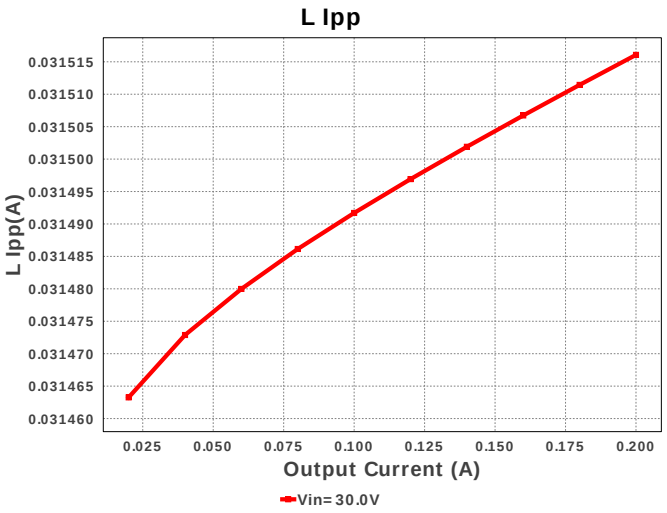


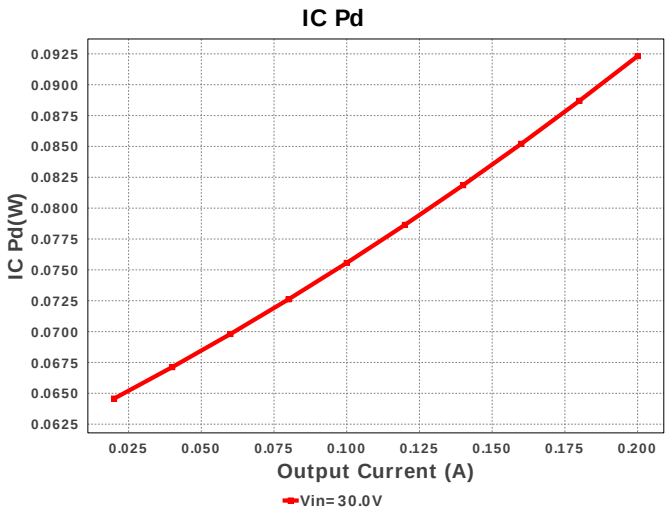


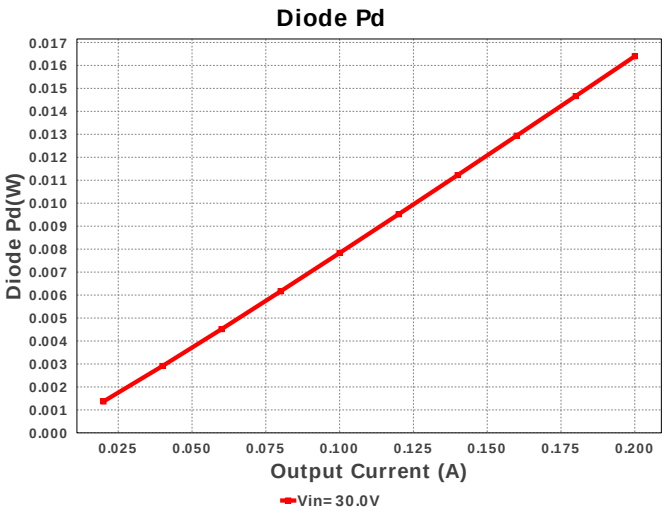


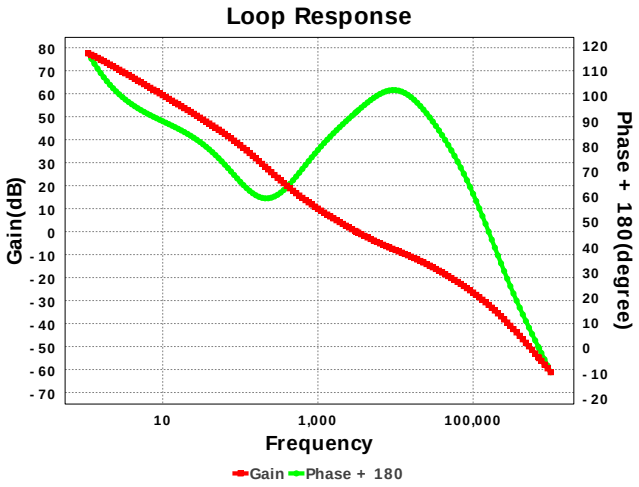












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	79.429 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	9.098 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	215.759 mA	Current	Peak switch current in IC
4.	Iin Avg	165.84 mA	Current	Average input current
5.	L Ipp	31.518 mA	Current	Peak-to-peak inductor ripple current
6.	BOM Count	15	General	Total Design BOM count
7.	FootPrint	260.0 mm^2	General	Total Foot Print Area of BOM components
8.	Frequency	392.339 kHz	General	Switching frequency
9.	Mode	CCM	General	Conduction Mode
10.	Pout	4.8 W	General	Total output power
11.	Total BOM	$2.0	General	Total BOM Cost
12.	D1 Tj	32.985 degC	Op_Point	D1 junction temperature
13.	Low Freq Gain	77.412 dB	Op_Point	Gain at 10Hz
14.	Vout Actual	24.32 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
15.	Vout OP	24.0 V	Op_Point	Operational Output Voltage
16.	Cross Freq	3.129 kHz	Op_point	Bode plot crossover frequency
17.	Duty Cycle	80.377 %	Op_point	Duty cycle
18.	Efficiency	96.481 %	Op_point	Steady state efficiency
19.	Gain Marg	-55.385 dB	Op_point	Bode Plot Gain Margin
20.	IC Tj	35.77 degC	Op_point	IC junction temperature
21.	ICThetaJA	62.5 degC/W	Op_point	IC junction-to-ambient thermal resistance
22.	IOUT_OP	200.0 mA	Op_point	Iout operating point
23.	Phase Marg	93.651 deg	Op_point	Bode Plot Phase Margin
24.	VIN_OP	30.0 V	Op_point	Vin operating point
25.	Vout p-p	13.868 mV	Op_point	Peak-to-peak output ripple voltage
26.	Cin Pd	28.062 µW	Power	Input capacitor power dissipation
27.	Cout Pd	36.424 µW	Power	Output capacitor power dissipation
28.	Diode Pd	16.677 mW	Power	Diode power dissipation
29.	IC Pd	92.318 mW	Power	IC power dissipation
30.	L Pd	66.0 mW	Power	Inductor power dissipation
31.	Total Pd	175.077 mW	Power	Total Power Dissipation

#	Name	Value	Category	Description
32.	Vout Tolerance	2.973 %		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	30.0	Maximum input voltage
3.	VinMin	30.0	Minimum input voltage
4.	Vout	24.0	Output Voltage
5.	base_pn	TPS54060A	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

1. TPS54060A Product Folder : http://www.ti.com/product/TPS54060A : contains the data sheet and other resources.