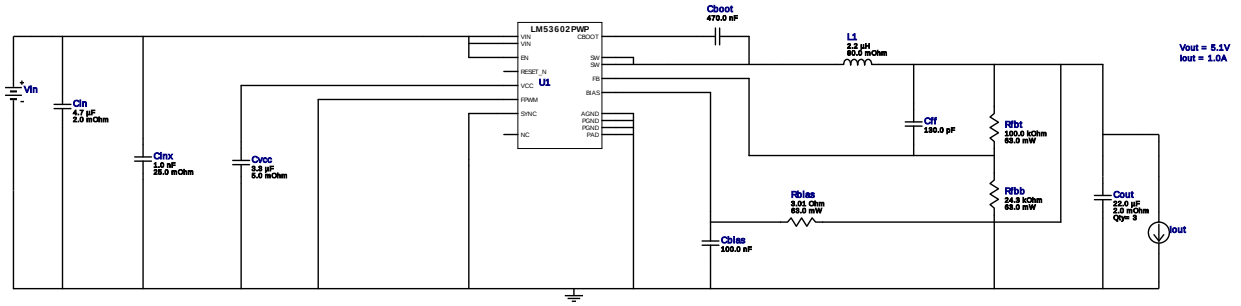
VinMin = 18.0V
VinMax = 36.0V
Vout = 5.1V
Iout = 1.0A

Device = LM53602AMPWPR
Topology = Buck
Created = 2017-05-29 03:39:48.043
BOM Cost = $2.42
BOM Count = 14
Total Pd = 0.98W

WEBENCH® Design Report

Design : 3965648/899 LM53602AMPWPR
LM53602AMPWPR 18.0V-36.0V to 5.10V @ 1.0A



1. The input capacitor included in the BOM only contains a small filter capacitor that should be placed near the IC. Depending on where the power supply is laid out in the system additional bulk capacitance may need to be added to filter the line ripple.

2. If there is no VinTyp specified, WEBENCH will use the VinMax value. To change the VinTyp value, click on the "Change Design Inputs" button under the Optimization Tuning knob. In some applications, while the design requires the input voltage to be a wide range, for a majority of the time, it is operating at a much lower voltage than the maximum input voltage. Sizing the inductor based on the maximum input voltage may yield an inductance much larger than typically needed, causing a larger footprint for the overall design. At the same time, components such as the input capacitor must be rated based on the maximum input voltage. WEBENCH now supports the use of this additional input voltage specification.

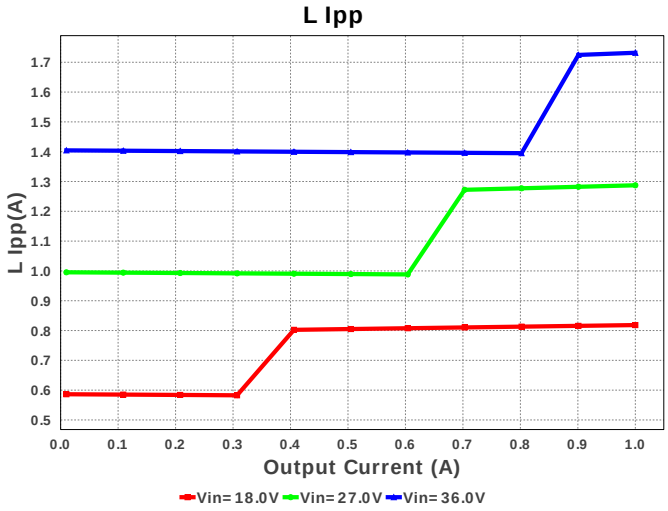
My Comments

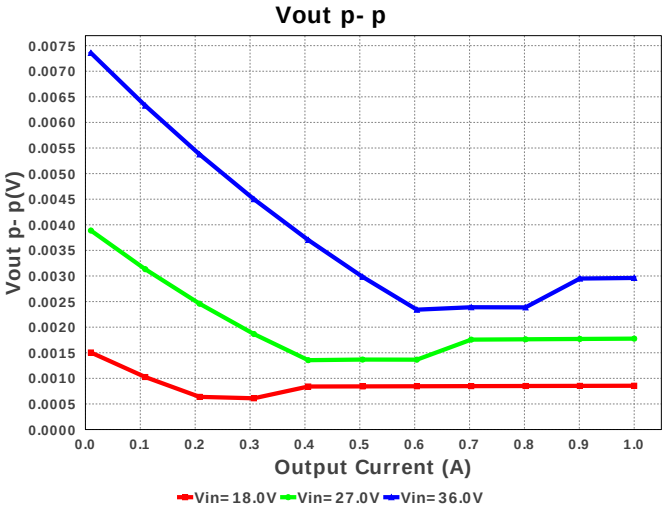
No comments

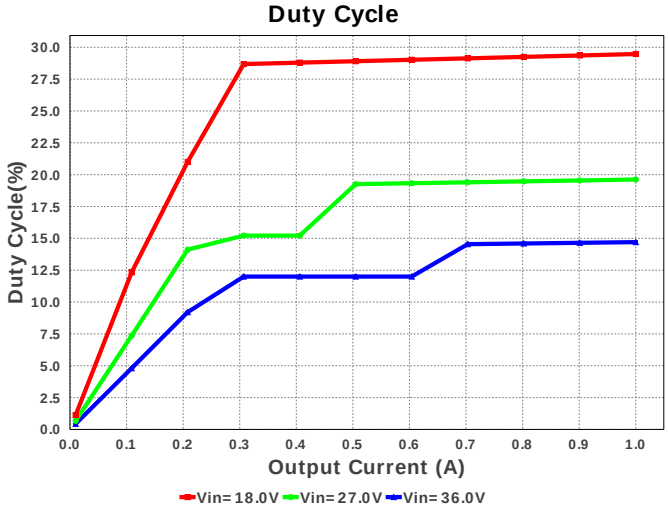
Electrical BOM

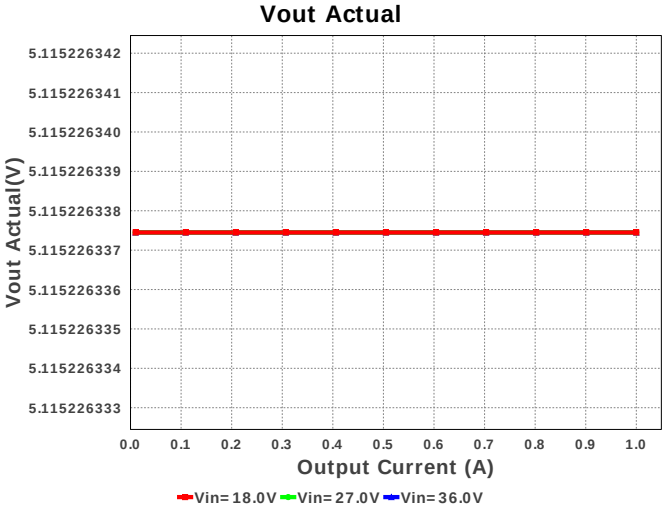
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbias	MuRata	GRM155R61A104KA01D Series= X5R	Cap= 100.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
2.	Cboot	MuRata	GRM21BR72A474KA73L Series= X7R	Cap= 470.0 nF VDC= 100.0 V IRMS= 0.0 A	1	$0.14	0805 7 mm²
3.	Cff	Samsung Electro-Mechanics	CL21C131JBANNNC Series= C0G/NP0	Cap= 130.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
4.	Cin	MuRata	GRM32ER71H475KA88L Series= X7R	Cap= 4.7 uF ESR= 2.0 mOhm VDC= 50.0 V IRMS= 5.35 A	1	$0.20	1210 15 mm²
5.	Cinx	Kemet	C0805C102J5GACTU Series= C0G/NP0	Cap= 1.0 nF ESR= 25.0 mOhm VDC= 50.0 V IRMS= 1.71 A	1	$0.02	0805 7 mm²
6.	Cout	MuRata	GRM32ER61C226ME20L Series= X5R	Cap= 22.0 uF ESR= 2.0 mOhm VDC= 16.0 V IRMS= 3.68 A	3	$0.13	1210 15 mm²
7.	Cvcc	Kemet	C0805C335K8PACTU Series= X5R	Cap= 3.3 uF ESR= 5.0 mOhm VDC= 10.0 V IRMS= 8.13 A	1	$0.05	0805 7 mm²
8.	L1	MuRata	LQM2HPN2R2MG0L	L= 2.2 µH DCR= 80.0 mOhm	1	$0.12	1008 10 mm²
9.	Rbias	Vishay-Dale	CRCW04023R01FKED Series= CRCW..e3	Res= 3.01 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	Rfbb	Vishay-Dale	CRCW040224K3FKED Series= CRCW..e3	Res= 24.3 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
11.	Rfbt	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
12.	U1	Texas Instruments	LM53602AMPWPR	Switcher	1	$1.45	PWP0016H_N 59 mm²

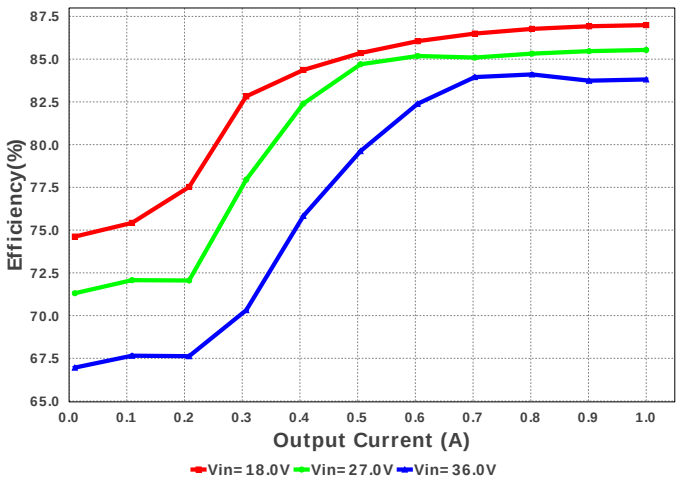




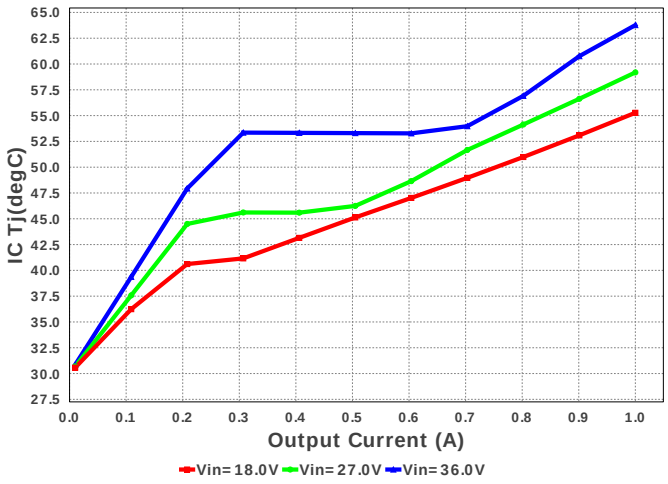




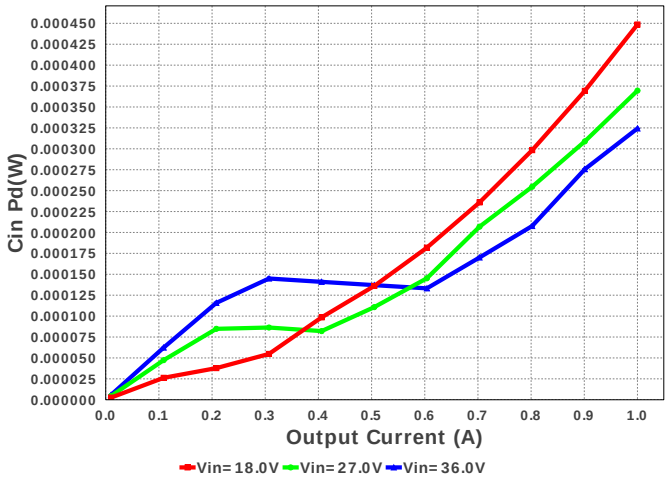
Efficiency



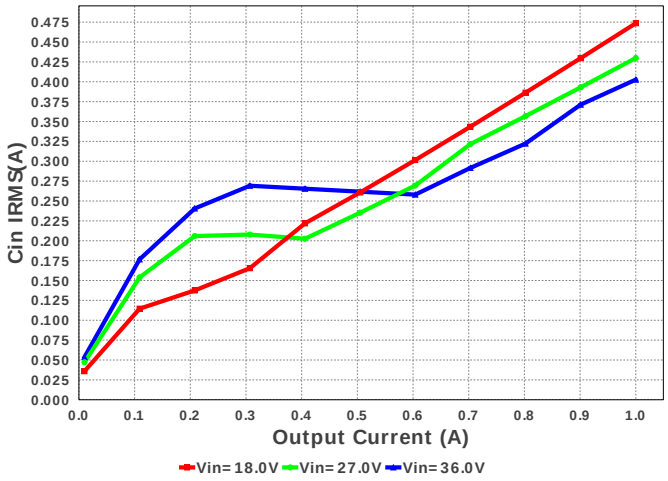
IC Tj



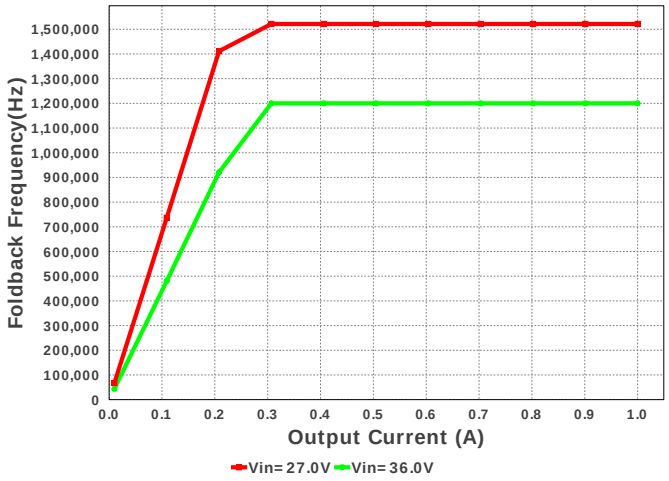
Cin Pd



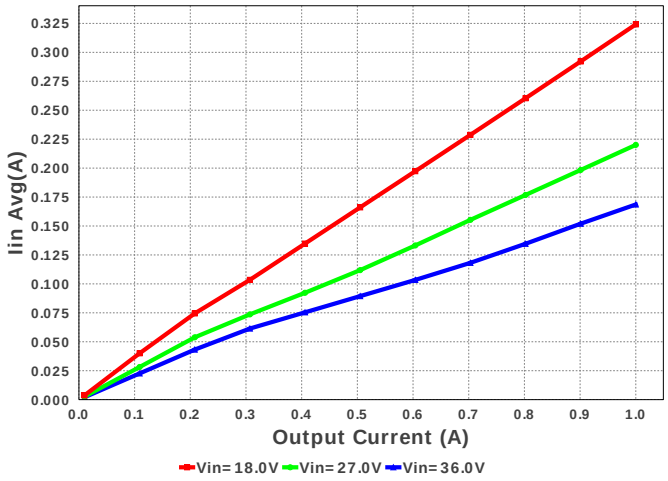
Cin IRMS

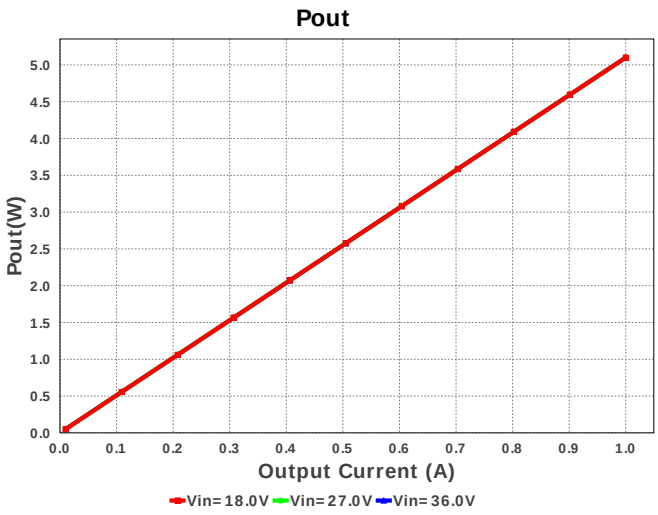


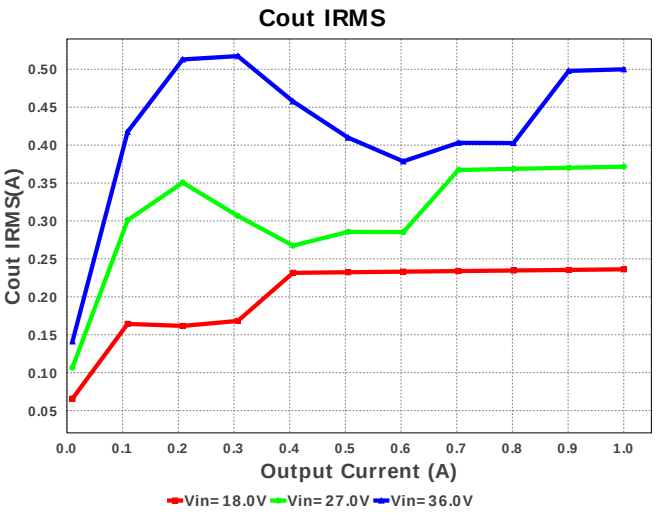
Foldback Frequency

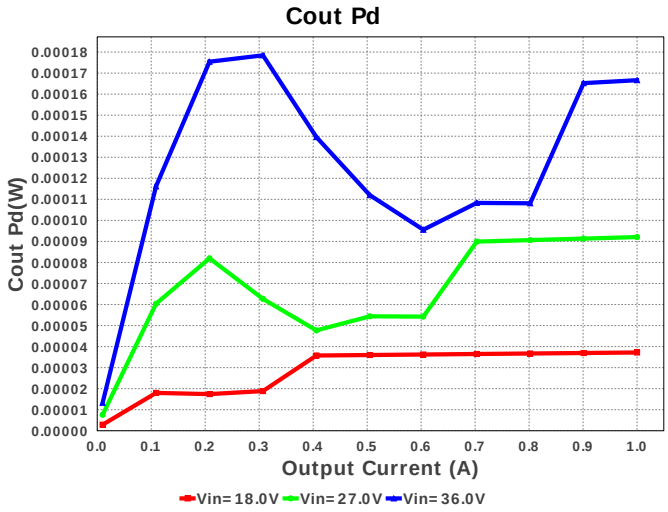


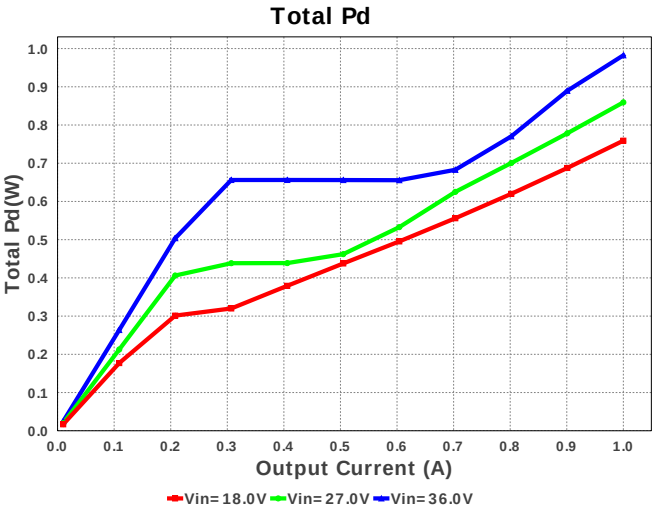
Iin Avg

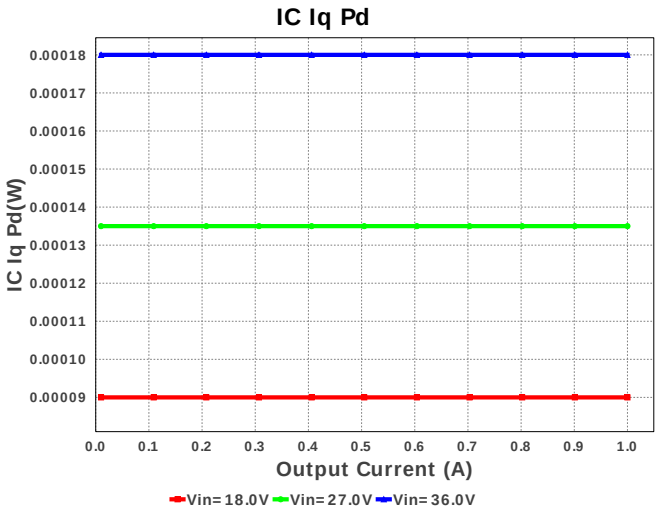


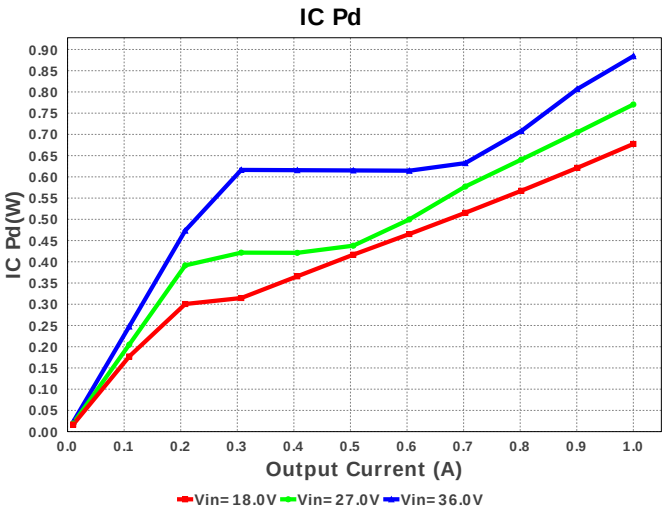


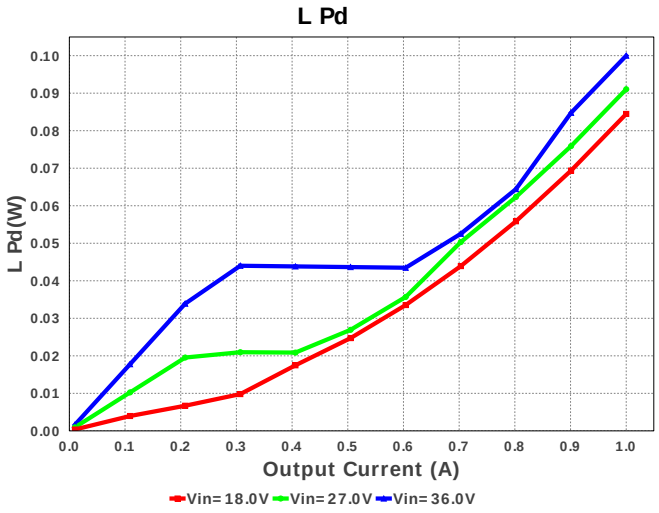


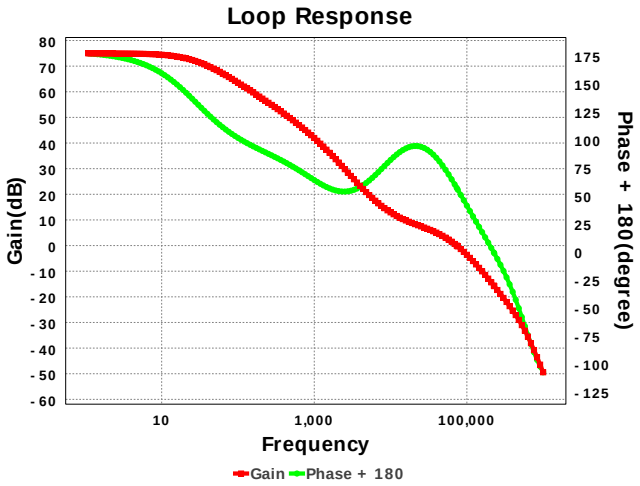


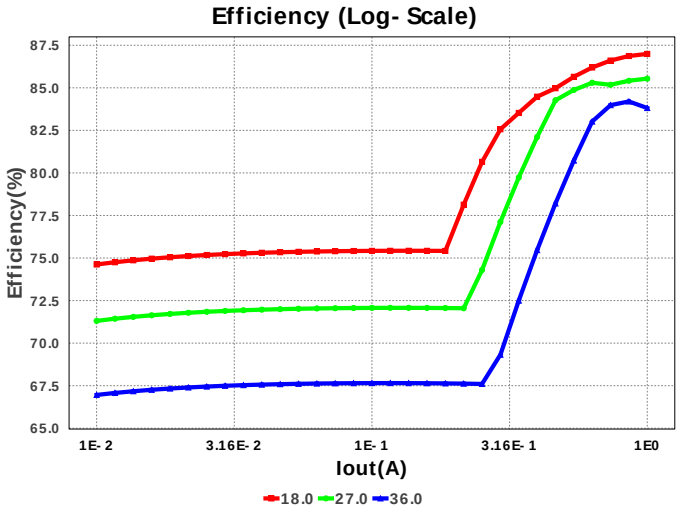












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	402.687 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	499.941 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	168.58 mA	Current	Average input current
4.	L Ipp	1.732 A	Current	Peak-to-peak inductor ripple current
5.	BOM Count	14	General	Total Design BOM count
6.	FootPrint	167.0 mm^2	General	Total Foot Print Area of BOM components
7.	Frequency	1.2 MHz	General	Switching frequency
8.	Mode	CCM	General	Conduction Mode
9.	Pout	5.1 W	General	Total output power
10.	Total BOM	$2.42	General	Total BOM Cost
11.	Low Freq Gain	74.953 dB	Op_Point	Gain at 10Hz
12.	Vout Actual	5.115 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
13.	Vout OP	5.1 V	Op_Point	Operational Output Voltage
14.	Cross Freq	73.533 kHz	Op_point	Bode plot crossover frequency
15.	Duty Cycle	14.703 %	Op_point	Duty cycle
16.	Efficiency	83.813 %	Op_point	Steady state efficiency
17.	Gain Marg	-15.601 dB	Op_point	Bode Plot Gain Margin
18.	IC Tj	63.771 degC	Op_point	IC junction temperature
19.	ICThetaJA	38.9 degC/W	Op_point	IC junction-to-ambient thermal resistance
20.	IOUT_OP	1.0 A	Op_point	Iout operating point
21.	Phase Marg	57.715 deg	Op_point	Bode Plot Phase Margin
22.	VIN_OP	36.0 V	Op_point	Vin operating point
23.	Vout p-p	2.962 mV	Op_point	Peak-to-peak output ripple voltage
24.	Cin Pd	324.314 µW	Power	Input capacitor power dissipation
25.	Cout Pd	166.627 µW	Power	Output capacitor power dissipation
26.	IC Iq Pd	180.0 µW	Power	IC Iq Pd
27.	IC Pd	884.252 mW	Power	IC power dissipation
28.	L Pd	99.995 mW	Power	Inductor power dissipation
29.	Total Pd	982.37 mW	Power	Total Power Dissipation
30.	Foldback Frequency	1.2 MHz		Frequency reduced at high Vin

#	Name	Value	Category	Description
31.	Foldback Mode	Foldback Mode On		Foldback Mode
32.	Vout Tolerance	2.642 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	1.0	Maximum Output Current
2.	VinMax	36.0	Maximum input voltage
3.	VinMin	18.0	Minimum input voltage
4.	Vout	5.1	Output Voltage
5.	base_pn	LM53602A	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

1. LM53602A Product Folder : http://www.ti.com/product/LM53602 : contains the data sheet and other resources.