

WEBENCH® Power Architect

Project Report

Project : 4009018/20 : PA_Project_502 (modified from 501)

Created : 2016-08-14 05:31:33.762

Optimize project optFactor=5

Project Summary

1. Total System Efficiency	91.659 %
2. Total System BOM Count	12.0
3. Total System Footprint	262.0 mm2
4. Total System BOM Cost	\$2.50
5. Total System Power Dissipation	91.0 mW

--> Launch WEBENCH Power Architect.

Sequencer Flag Table

Supply	Sequencer Flag	Load	Load Name
SUPPLY_1	0	LOAD_1	LOAD #1

Power Supplies

#	Name	NSID	Description	Vout	Iout	Efficiency	Foot-print	Cost	Design	Page
1.	SUPPLY_1	LM43601	Switcher : SIMPLE SWITCHER Buck Regulator	5 V	0.2 A	91.6%	262	\$2.50	111	4

Power Loads

#	Name	VLoad	ILoad	Description
1.	LOAD #1	5 V	0.2 A	VoutRipple=10%

Project Diagram

WEBENCH® Power Architect Project ID : 20_PA_Project_502 (modified from 501) Power Architect 2016-08-14 05:31:33.762



Electrical Procurement BOM

Manufacturer	Part Number	Description	Quantity	Budgetary Price	Footprint (mm ²)
Vishay-Dale	CRCW04021M00FKED	0402	1	\$0.01	3
Vishay-Dale	CRCW0402205KFKED	0402	1	\$0.01	3
Vishay-Dale	CRCW0402255KFKED	0402	1	\$0.01	3
MuRata	GRM0225C1C220JD05L	01005	1	\$0.01	2
MuRata	GRM155C80J474KE19D	0402	1	\$0.01	3
MuRata	GRM155R60J225ME15D	0402	1	\$0.02	3
MuRata	GRM21BR61E475KA12L	0805	1	\$0.02	7
MuRata	GRM21BR71H105KA12L	0805	1	\$0.05	7
MuRata	GRM32ER61A476KE20L	1210_280	1	\$0.24	15
MuRata	GRM32ER71H475KA88L	1210	1	\$0.19	15
Texas Instruments	LM43601PWPR	PWP0016F	1	\$1.60	59
Bourns	SRU1048-560Y	SRU1048	1	\$0.33	144
Total			12	\$2.50	262.38

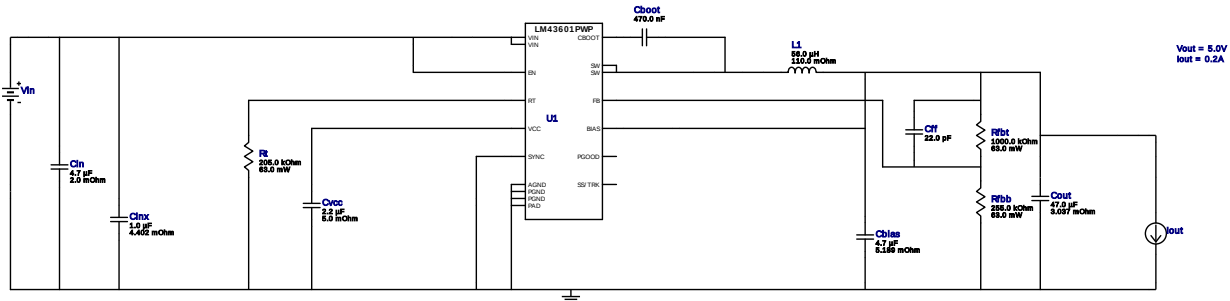


Vout = 5.0V
Iout = 0.2A

Device = LM43601PWPR
Topology = Buck
Created = 8/14/16 5:31:33 AM
BOM Cost = \$2.50
BOM Count = 12
Total Pd = 0.09W

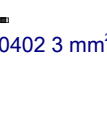
WEBENCH[®] Design Report

Design : 4009018/111 LM43601PWPR
LM43601PWPR 18.0V-32.0V to 5.00V @ 0.2A

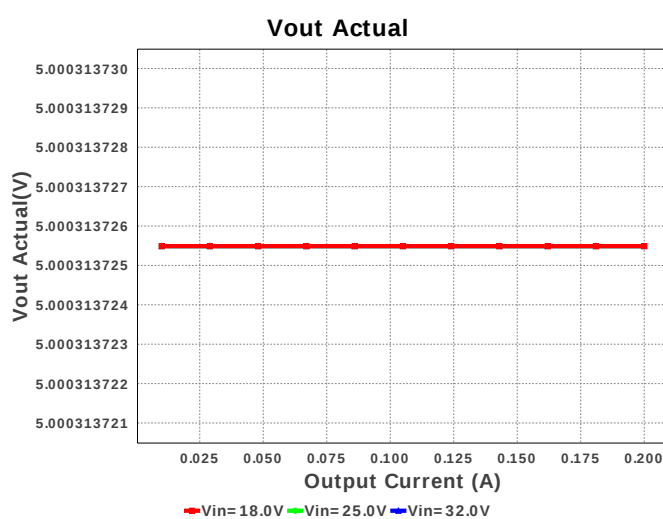
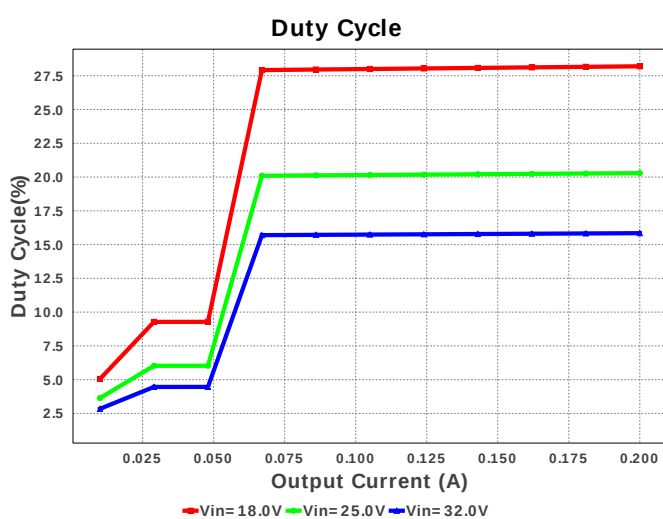
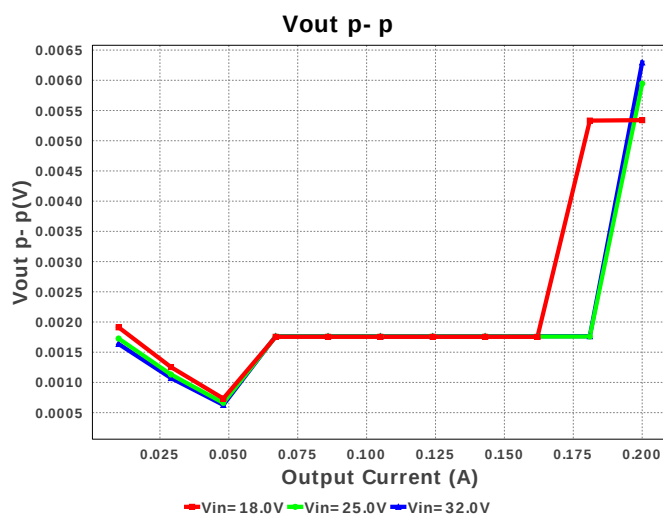
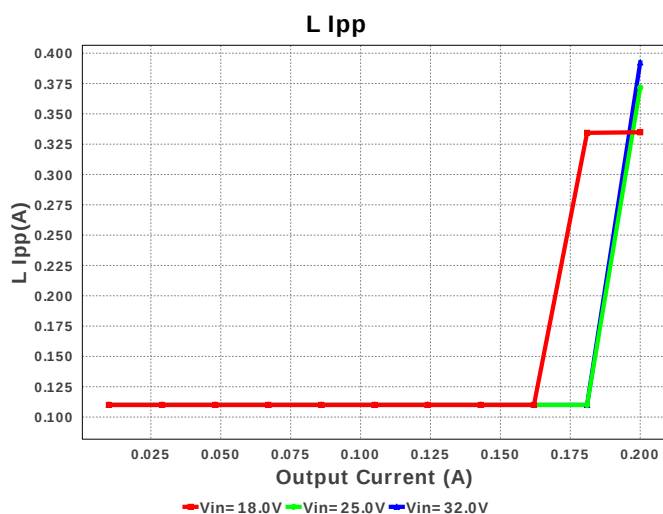


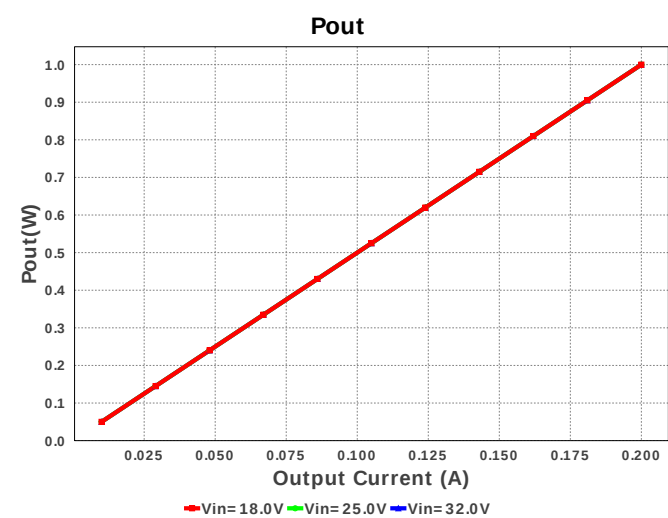
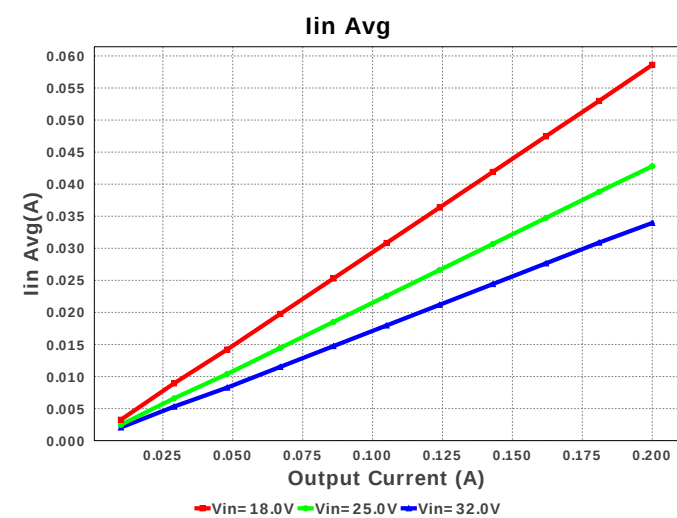
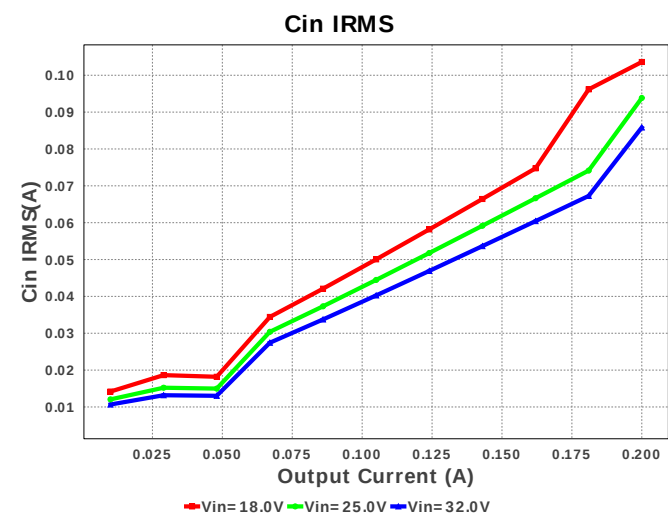
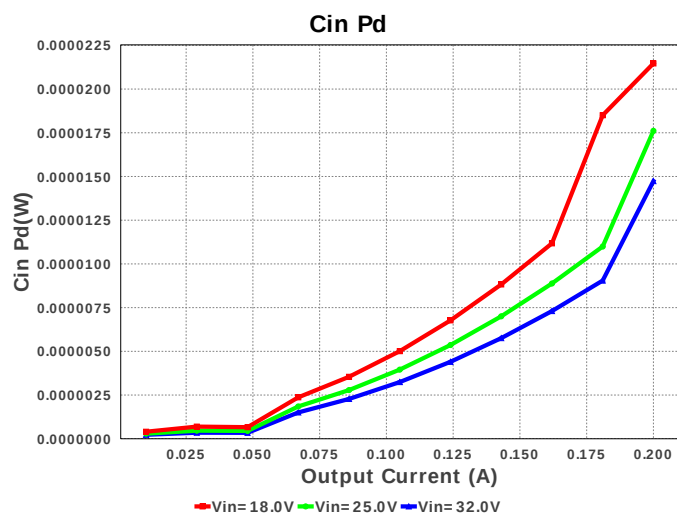
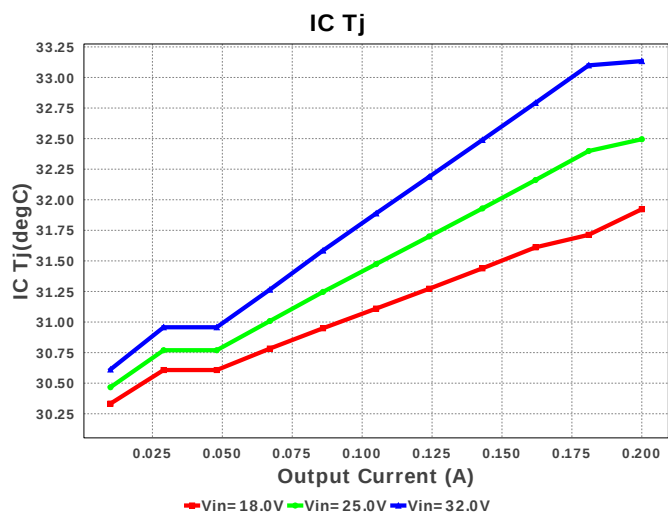
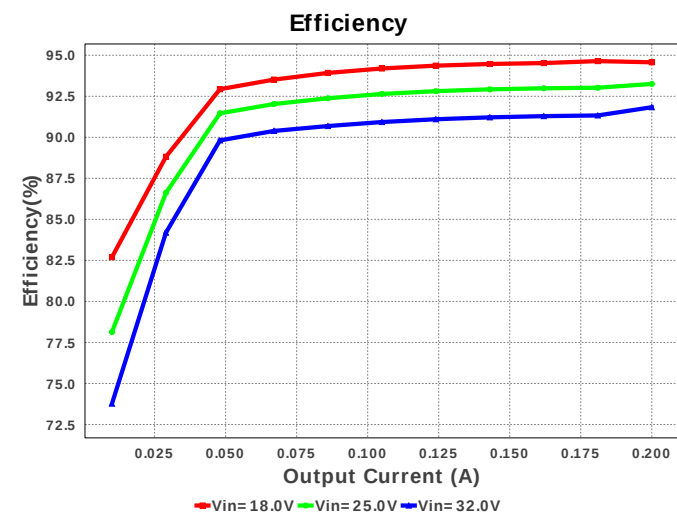
1. The input capacitor included in the BOM only contains a small filter capacitor that should be placed near the IC. Depending on where the power supply is laid out in the system additional bulk capacitance may need to be added to filter the line ripple.
2. If there is no VinTyp specified, WEBENCH will 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.

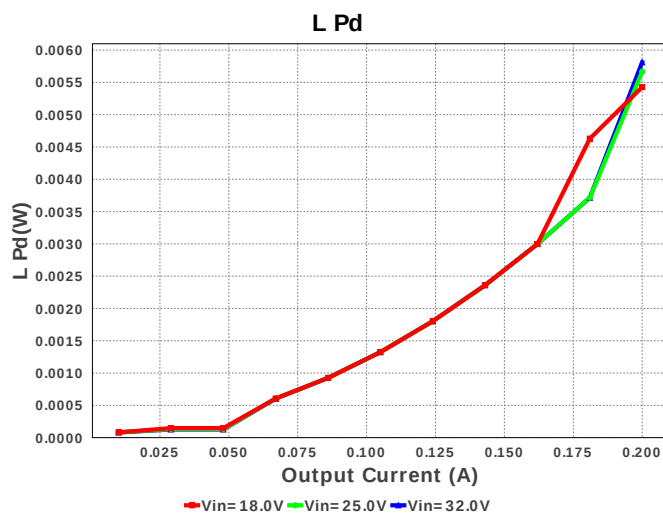
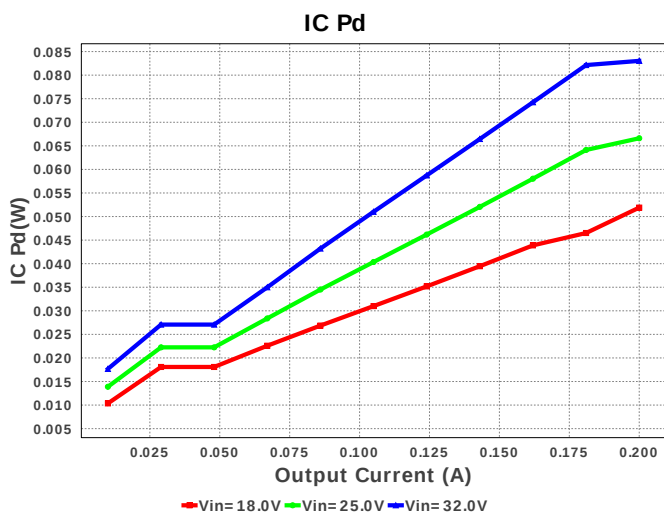
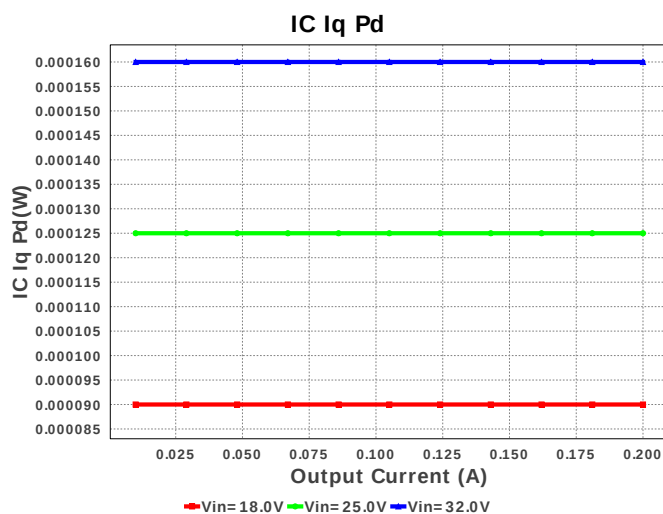
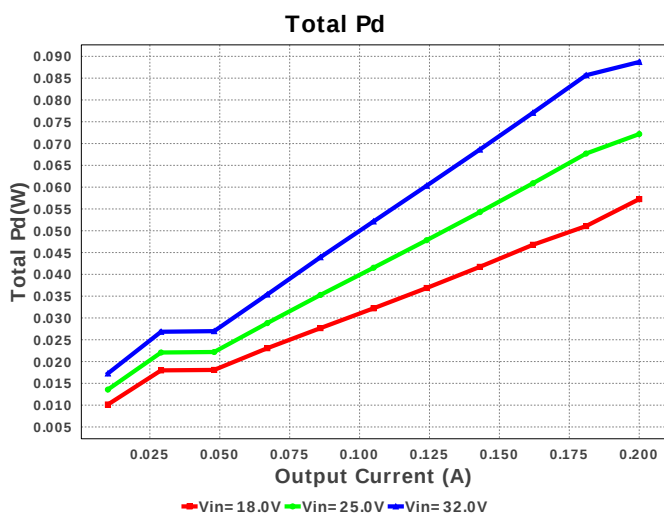
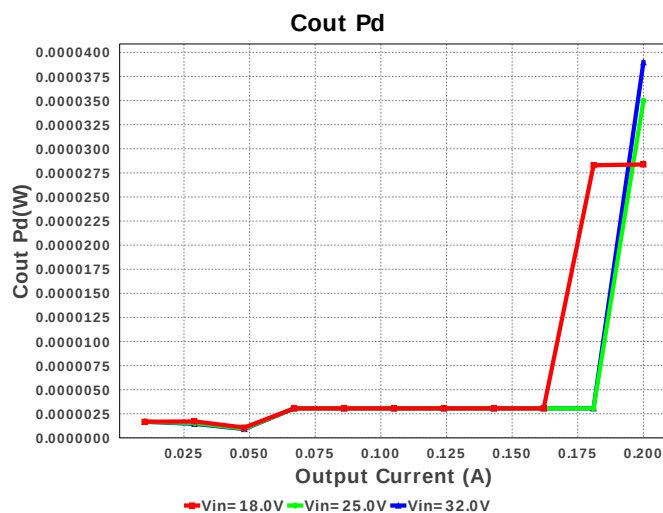
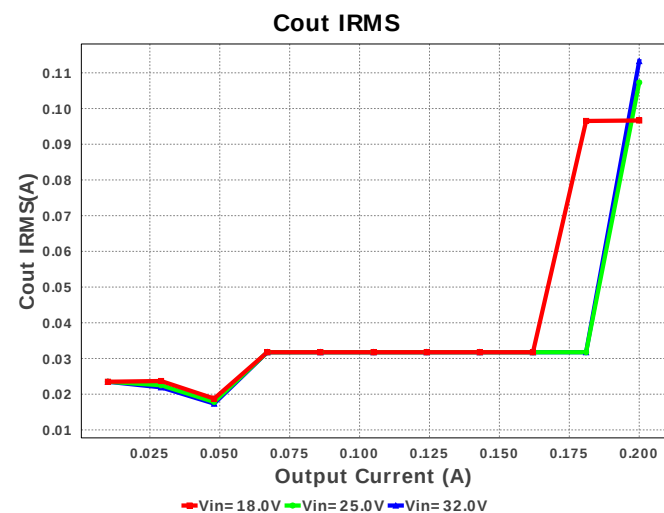
Electrical BOM

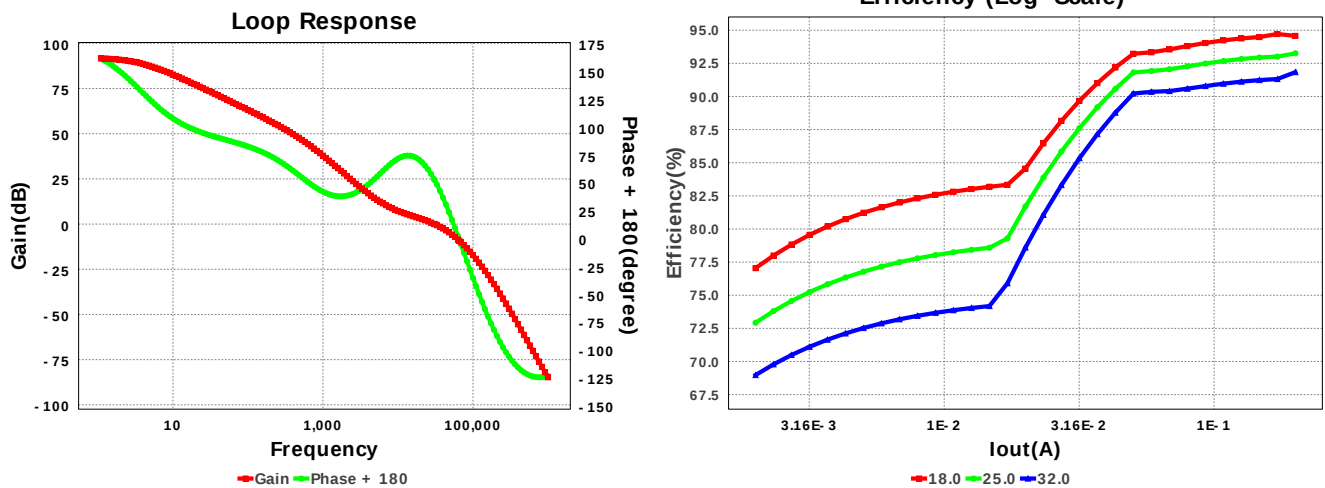
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbias	MuRata	GRM21BR61E475KA12L Series= X5R	Cap= 4.7 uF ESR= 5.189 mOhm VDC= 25.0 V IRMS= 2.03531 A	1	\$0.02	 0805 7 mm ²
2.	Cboot	MuRata	GRM155C80J474KE19D Series= X6S	Cap= 470.0 nF VDC= 6.3 V IRMS= 0.0 A	1	\$0.01	 0402 3 mm ²
3.	Cff	MuRata	GRM0225C1C220JD05L Series= C0G/NP0	Cap= 22.0 pF VDC= 16.0 V IRMS= 0.0 A	1	\$0.01	 01005 2 mm ²
4.	Cin	MuRata	GRM32ER71H475KA88L Series= X7R	Cap= 4.7 uF ESR= 2.0 mOhm VDC= 50.0 V IRMS= 5.35 A	1	\$0.19	 1210 15 mm ²
5.	Cinx	MuRata	GRM21BR71H105KA12L Series= X7R	Cap= 1.0 uF ESR= 4.402 mOhm VDC= 50.0 V IRMS= 1.677 A	1	\$0.05	 0805 7 mm ²
6.	Cout	MuRata	GRM32ER61A476KE20L Series= X5R	Cap= 47.0 uF ESR= 3.037 mOhm VDC= 10.0 V IRMS= 4.6162 A	1	\$0.24	 1210_280 15 mm ²
7.	Cvcc	MuRata	GRM155R60J225ME15D Series= X5R	Cap= 2.2 uF ESR= 5.0 mOhm VDC= 6.3 V IRMS= 3.67 A	1	\$0.02	 0402 3 mm ²
8.	L1	Bourns	SRU1048-560Y	L= 56.0 uH DCR= 110.0 mOhm	1	\$0.33	 SRU1048 144 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	Rfbb	Vishay-Dale	CRCW0402255KFKED Series= CRCW..e3	Res= 255.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
10.	Rfbt	Vishay-Dale	CRCW04021M00FKED Series= CRCW..e3	Res= 1000.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
11.	Rt	Vishay-Dale	CRCW0402205KFKED Series= CRCW..e3	Res= 205.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
12.	U1	Texas Instruments	LM43601PWPR	Switcher	1	\$1.60	 PWP0016F 59 mm ²









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	85.308 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	110.747 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	34.022 mA	Current	Average input current
4.	L Ipp	383.64 mA	Current	Peak-to-peak inductor ripple current
5.	BOM Count	12	General	Total Design BOM count
6.	FootPrint	262.0 mm ²	General	Total Foot Print Area of BOM components
7.	Frequency	200.0 kHz	General	Switching frequency
8.	Mode	CCM	General	Conduction Mode
9.	Pout	1.0 W	General	Total output power
10.	Total BOM	\$2.5	General	Total BOM Cost
11.	Low Freq Gain	91.739 dB	Op_Point	Gain at 10Hz
12.	Vout Actual	5.0 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
13.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
14.	Cross Freq	30.778 kHz	Op_point	Bode plot crossover frequency
15.	Duty Cycle	15.846 %	Op_point	Duty cycle
16.	Efficiency	91.641 %	Op_point	Steady state efficiency
17.	Gain Marg	-9.35 dB	Op_point	Bode Plot Gain Margin
18.	IC Tj	33.225 degC	Op_point	IC junction temperature
19.	ICThetaJA	38.9 degC/W	Op_point	IC junction-to-ambient thermal resistance
20.	IOUT_OP	200.0 mA	Op_point	Iout operating point
21.	Phase Marg	54.217 deg	Op_point	Bode Plot Phase Margin
22.	VIN_OP	32.0 V	Op_point	Vin operating point
23.	Vout p-p	6.022 mV	Op_point	Peak-to-peak output ripple voltage
24.	Cin Pd	14.555 μW	Power	Input capacitor power dissipation
25.	Cout Pd	37.249 μW	Power	Output capacitor power dissipation
26.	IC Iq Pd	160.0 μW	Power	IC Iq Pd
27.	IC Pd	85.393 mW	Power	IC power dissipation
28.	L Pd	5.749 mW	Power	Inductor power dissipation
29.	Total Pd	91.005 mW	Power	Total Power Dissipation
30.	Vout Tolerance	2.61 %		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	32.0	Maximum input voltage
3.	VinMin	18.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	base_pn	LM43601	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

1. LM43601 Product Folder : <http://www.ti.com/product/LM43601> : contains the data sheet and other resources.

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