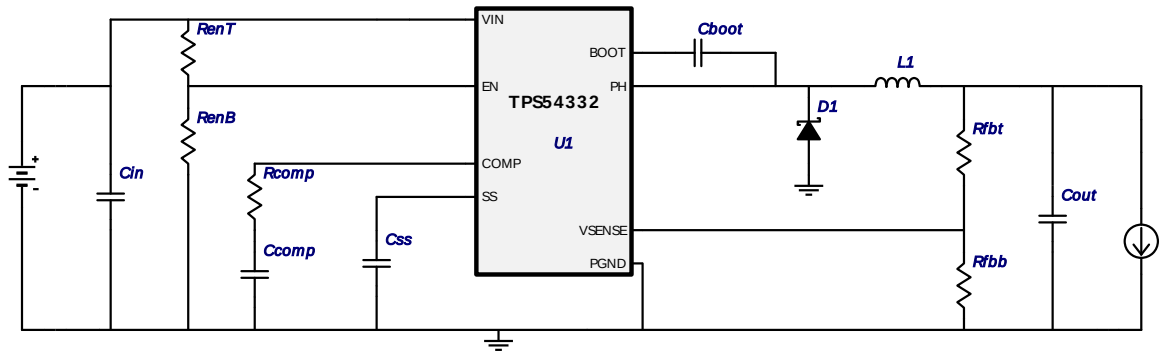
WEBENCH® Design Report

VinMin = 10.0V
VinMax = 27.0V
Vout = 5.0V
Iout = 1.5A

Device = TPS54332DDA
Topology = Buck
Created = 6/29/12 9:47:29 AM
BOM Cost = $2.64
Total Pd = 1.34 W
Footprint = 361.0 mm2
BOM Count = 13

Design : 1214885/21 TPS54332DDA
TPS54332DDA 10.0V-27.0V to 5.0V @ 1.5A



Electrical BOM

#	Name	Manufacturer	Part Number	Quantity	Price	Properties	Footprint
1.	Cboot	Kemet	C0603C104K3RACTU Series= X7R	1	$0.01	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	0603 10mm2
2.	Ccomp	MuRata	GRM1885C1H182JA01D Series= C0G/NP0	1	$0.02	Cap= 1.8 nF VDC= 50.0 V IRMS= 0.0 A	0603 10mm2
3.	Cin	TDK	C5750X7R1H106M Series= X7R	1	$0.68	Cap= 10.0 µF ESR= 3.0 mOhm VDC= 50.0 V IRMS= 5.5 A	2220 60mm2
4.	Cout	MuRata	GRM21BR60J226ME39L Series= X5R	1	$0.05	Cap= 22.0 µF ESR= 9.0 mOhm VDC= 6.3 V IRMS= 3.5 A	0805 13mm2
5.	Css	TDK	C1608C0G1E103J Series= C0G/NP0	1	$0.07	Cap= 10.0 nF VDC= 25.0 V IRMS= 0.0 A	0603 10mm2
6.	D1	Diodes Inc.	B240A-13-F	1	$0.09	VF@Io= 500.0 mV VRRM= 40.0 V	SMA 37mm2
7.	L1	Bourns	SRN6045-100M	1	$0.18	L= 10.0 µH DCR= 58.6 mOhm	SRN6045 64mm2
8.	Rcomp	Panasonic	ERJ3EKF1802V Series= CUSTOM	1	$0.01	Res= 18.0 kOhm Power= 100.0 mW Tolerance= 1%	CUSTOM 10mm2
9.	RenB	Panasonic	ERJ3EKF1802V Series= CUSTOM	1	$0.01	Res= 18.0 kOhm Power= 100.0 mW Tolerance= 1.0%	CUSTOM 10mm2
10.	RenT	Multicomp	MC0603SAF1053T5E Series= CUSTOM	1	$0.10	Res= 105.0 kOhm Power= 100.0 mW Tolerance= 1.0%	CUSTOM 10mm2
11.	Rfbb	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	1	$0.01	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	0402 8mm2
12.	Rfbt	Vishay-Dale	CRCW040253K6FKED Series= CRCW..e3	1	$0.01	Res= 53.6 kOhm Power= 63.0 mW Tolerance= 1.0%	0402 8mm2

#	Name	Manufacturer	Part Number	Quantity	Price	Properties	Footprint
13.	U1	Texas Instruments	TPS54332DDA	1	$1.40	Switcher	MPDS092E 57mm2

Operating Values

#	Name	Value	Category	Description
1.	BOM Count	13.0		Total Design BOM count
2.	Total BOM	$2.641		Total BOM Cost
3.	Cin IRMS	461.896 m A	Current	Input capacitor RMS ripple current
4.	Cout IRMS	127.31 m A	Current	Output capacitor RMS ripple current
5.	IC Ipk	1.721 A	Current	Peak switch current in IC
6.	Iin Avg	327.57 m A	Current	Average input current
7.	L Ipp	441.015 m A	Current	Peak-to-peak inductor ripple current
8.	M1 Irms	671.593 m A	Current	Q Iavg
9.	FootPrint	361.0 mm2	General	Total Foot Print Area of BOM components
10.	Frequency	1000.0 k Hz	General	Switching frequency
11.	IC Tolerance	28.0 m V	General	IC Feedback Tolerance
12.	M Vds Act	63.268 m V	General	Voltage drop across the MosFET
13.	Mode	CCM	General	Conduction Mode
14.	Pout	7.5 W	General	Total output power
15.	D1 Tj	44.991 degC	Op_Point	D1 junction temperature
16.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
17.	Cross Freq	61.073 k Hz	Op_point	Bode plot crossover frequency
18.	Duty Cycle	20.046 %	Op_point	Duty cycle
19.	Efficiency	84.799 %	Op_point	Steady state efficiency
20.	IC Tj	59.948 degC	Op_point	IC junction temperature
21.	ICThetaJA	50.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
22.	IOUT_OP	1.5 A	Op_point	Iout operating point
23.	Phase Marg	101.888 deg	Op_point	Bode Plot Phase Margin
24.	VIN_OP	27.0 V	Op_point	Vin operating point
25.	Vout p-p	7.783 m V	Op_point	Peak-to-peak output ripple voltage
26.	Cin Pd	640.043 µ W	Power	Input capacitor power dissipation
27.	Cout Pd	145.87 µ W	Power	Output capacitor power dissipation
28.	Diode Pd	599.654 m W	Power	Diode power dissipation
29.	IC Pd	598.96 m W	Power	IC power dissipation
30.	L Pd	145.035 m W	Power	Inductor power dissipation
31.	Total Pd	1.344 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	1.5 A	Maximum Output Current
2.	Iout1	1.5 Amps	Output Current #1
3.	VinMax	27.0 V	Maximum input voltage
4.	VinMin	10.0 V	Minimum input voltage
5.	Vout	5.0 V	Output Voltage
6.	Vout1	5.0 Volt	Output Voltage #1
7.	base_pn	TPS54332	Texas Instruments base part number
8.	Ta	30.0 degC	Ambient temperature

Design Assistance

1. **TPS54332** Product Folder : http://www.ti.com/product/tps54332 : contains the data sheet and other resources.