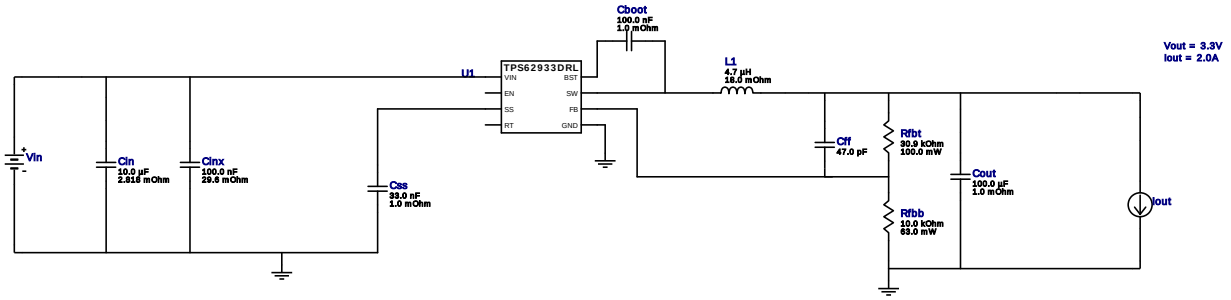
VinMin = 14.0V
VinMax = 22.0V
Vout = 3.3V
Iout = 2.0A

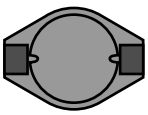
Device = TPS62933DRLR
Topology = Buck
Created = 2023-08-23 05:51:16.719
BOM Cost = $0.76
BOM Count = 10
Total Pd = 0.76W

WEBENCH® Design Report

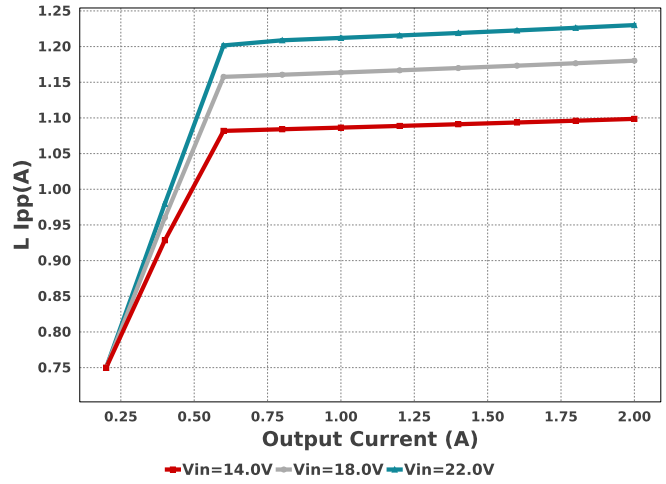
Design : 2468 TPS62933DRLR
TPS62933DRLR 8V-30V to 5.00V @ 3A



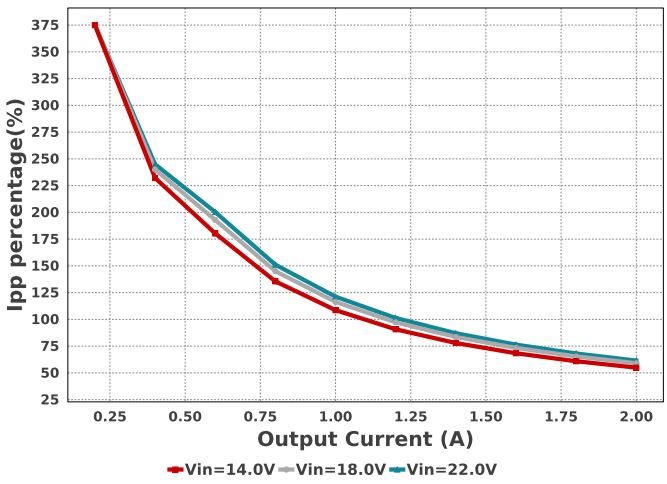
Electrical BOM

Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Cboot	MuRata	GRM155R71A104KA01D Series= X7R	Cap= 100.0 nF ESR= 1.0 mOhm VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
Cff	MuRata	GRM0335C1E470JA01D Series= C0G/NP0	Cap= 47.0 pF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0201 2 mm²
Cin	TDK	C2012X5R1V106K085AC Series= X5R	Cap= 10.0 uF ESR= 2.818 mOhm VDC= 35.0 V IRMS= 3.8868 A	1	$0.12	0805 7 mm²
Cinx	TDK	CGA3E2X7R1H104K080AA Series= X7R	Cap= 100.0 nF ESR= 29.6 mOhm VDC= 50.0 V IRMS= 971.99 mA	1	$0.01	0603 5 mm²
Cout	MuRata	GRM32EC80J107ME20L Series= X6S	Cap= 100.0 uF ESR= 1.0 mOhm VDC= 6.3 V IRMS= 6.0 A	1	$0.17	1210_270 15 mm²
Css	MuRata	GRM155R71A333KA01D Series= X7R	Cap= 33.0 nF ESR= 1.0 mOhm VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
L1	NIC Components	NPI31W4R7MTRF	L= 4.7 µH 18.0 mOhm	1	$0.23	 IND_NPI31W 172 mm²
Rfbb	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
Rfbt	Vishay-Dale	CRCW060330K9FKEA Series= CRCW..e3	Res= 30.9 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	0603 5 mm²
U1	Texas Instruments	TPS62933DRLR	Switcher	1	$0.18	DRL0008A-MFG 9 mm²

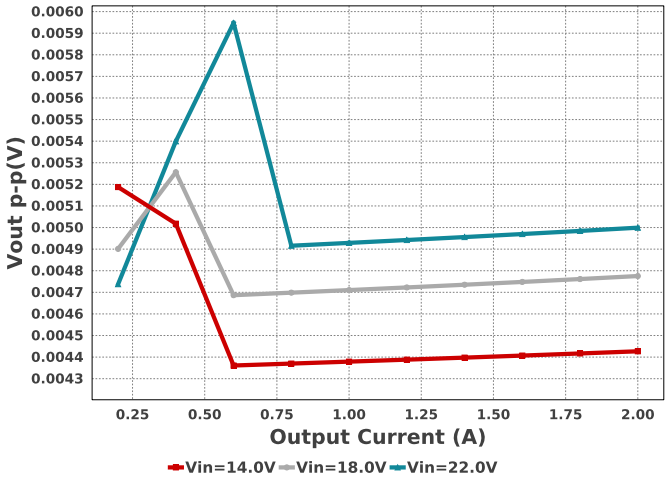
L Ipp



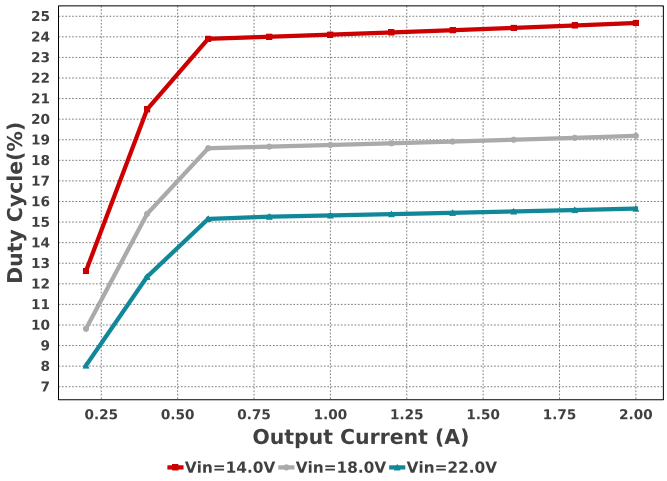
Ipp percentage



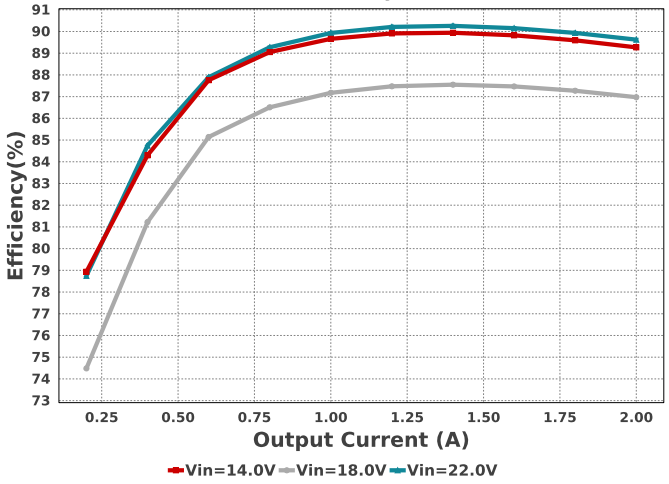
Vout p-p



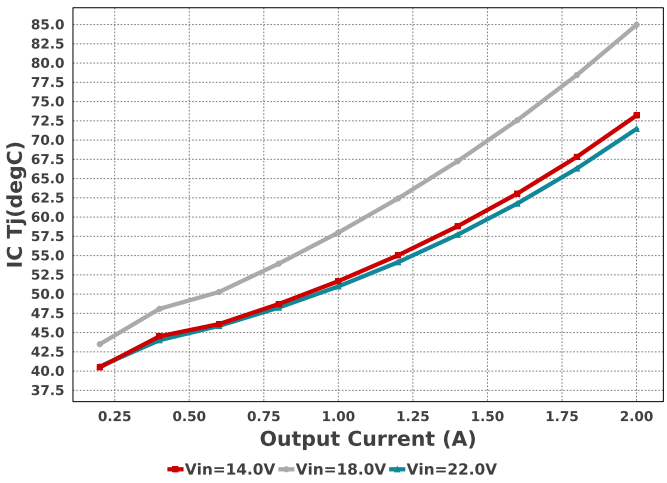
Duty Cycle

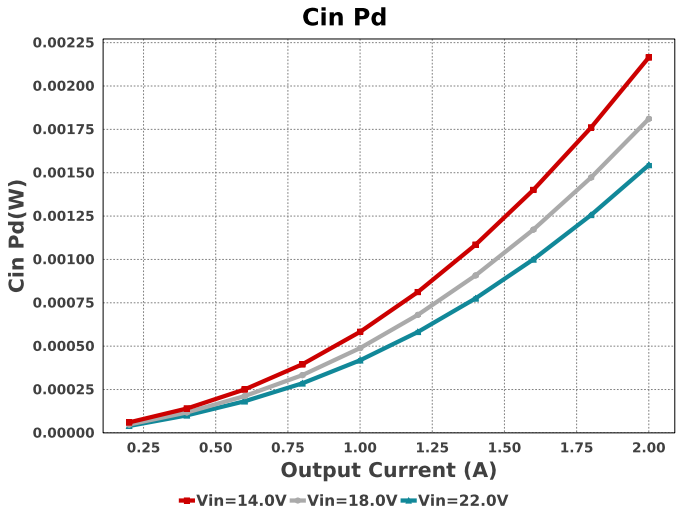


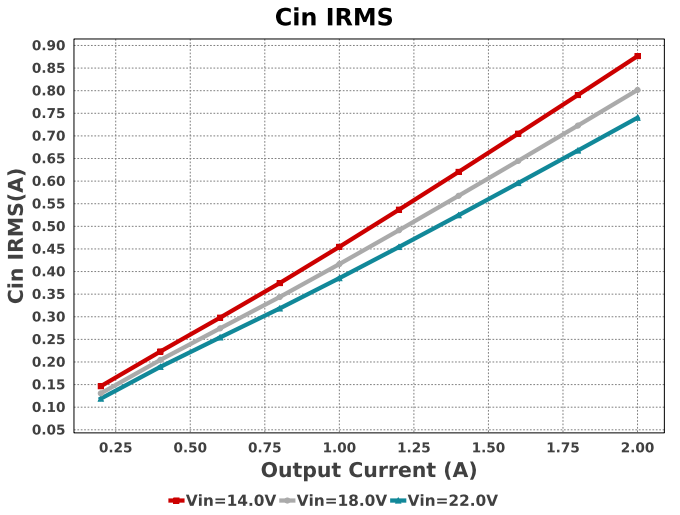
Efficiency

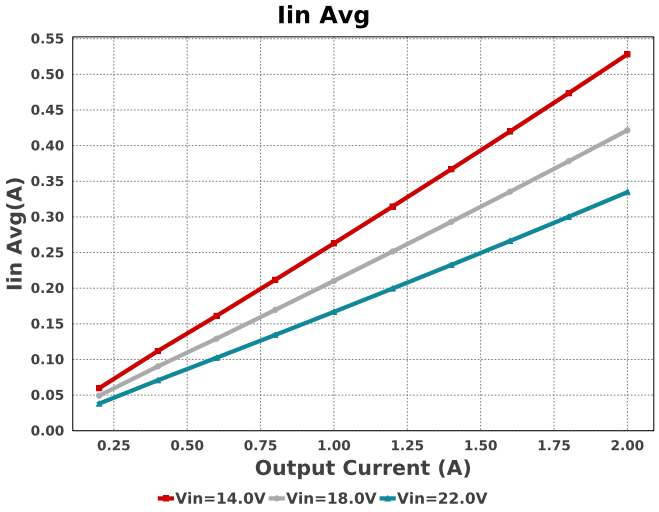


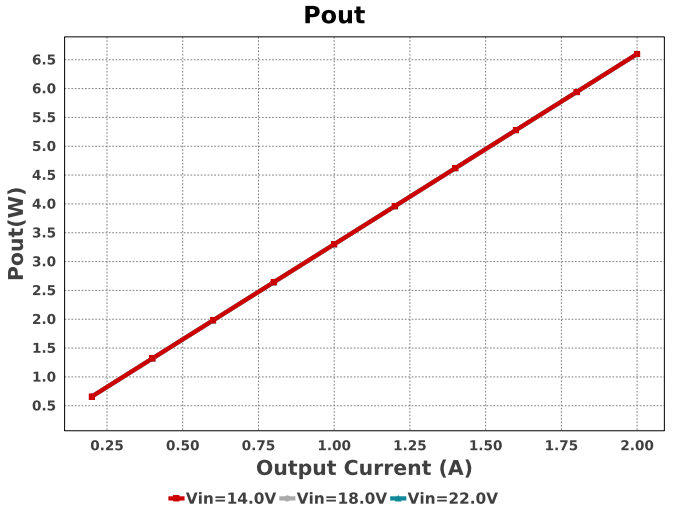
IC Tj

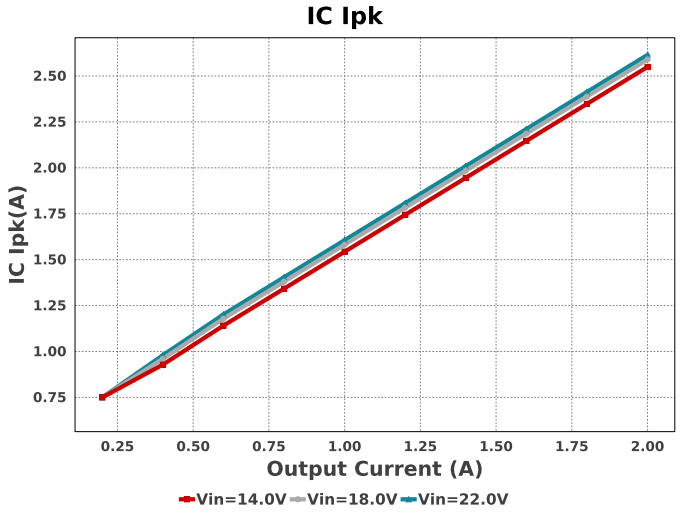


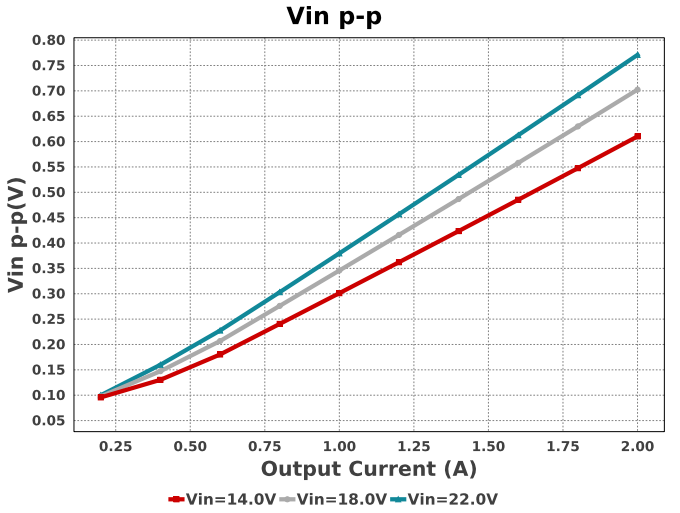


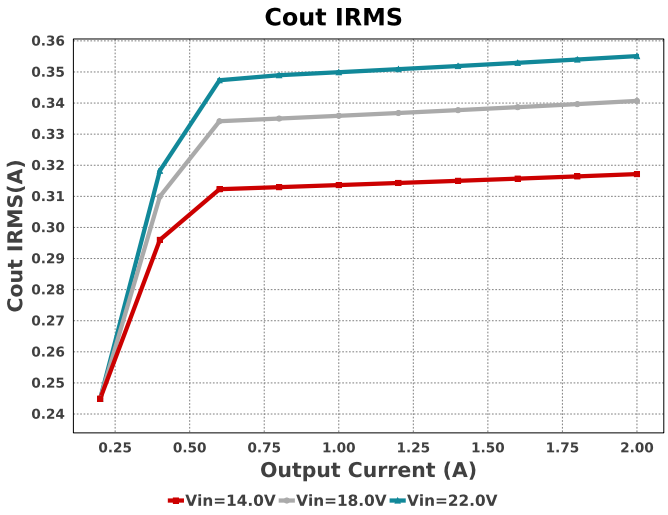


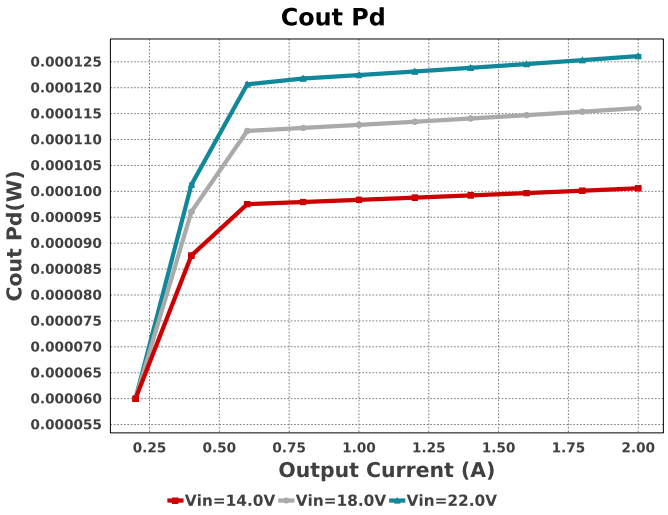


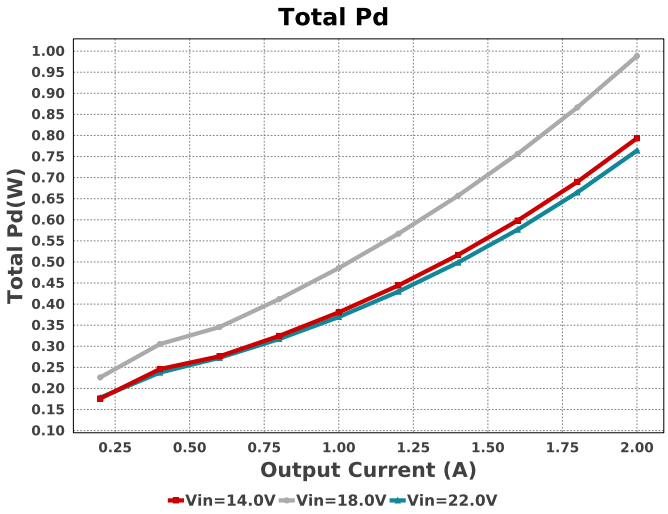


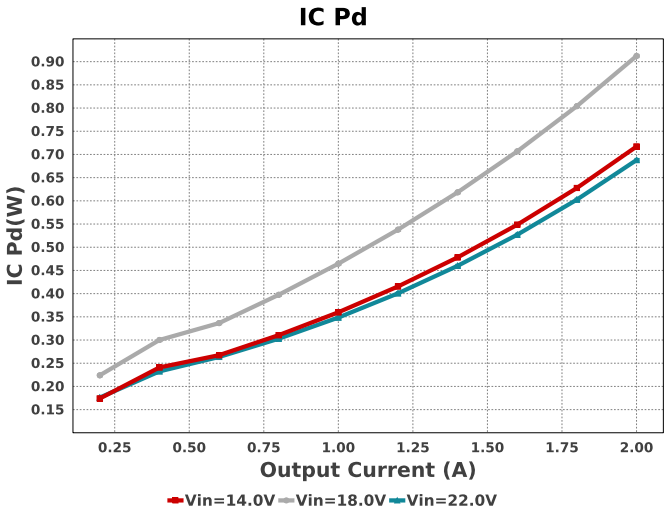


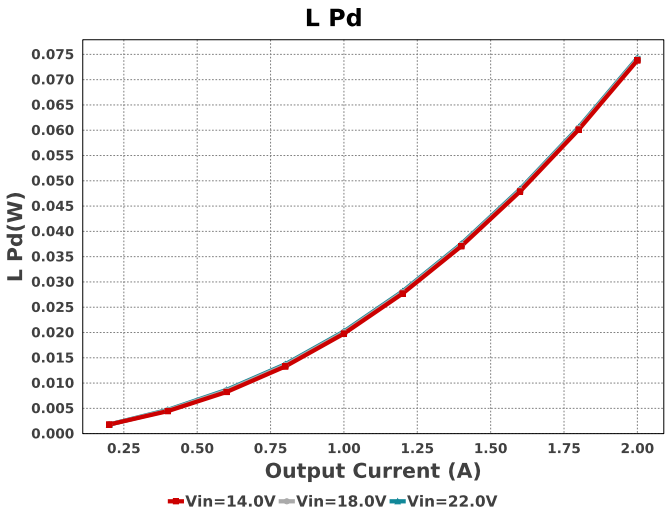


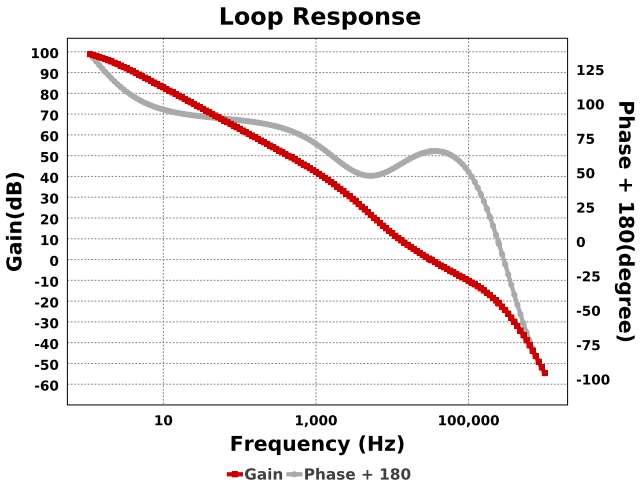


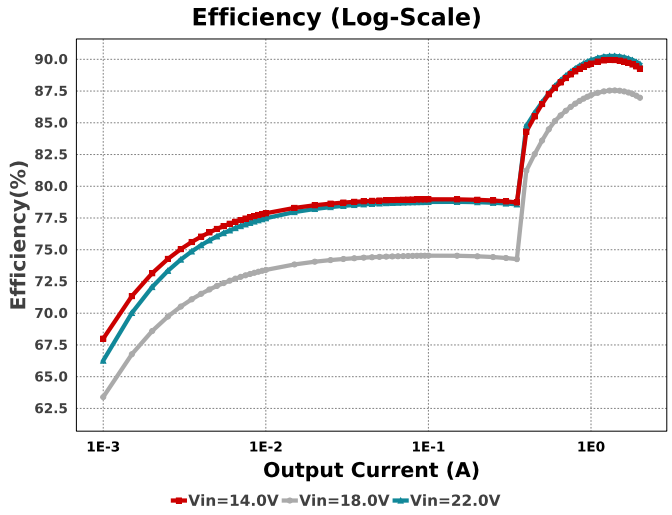












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	740.215 mA	Capacitor	Input capacitor RMS ripple current
2.	Cin Pd	1.544 mW	Capacitor	Input capacitor power dissipation
3.	Cout IRMS	355.101 mA	Capacitor	Output capacitor RMS ripple current
4.	Cout Pd	126.1 µW	Capacitor	Output capacitor power dissipation
5.	IC Ipk	2.615 A	IC	Peak switch current in IC
6.	IC Pd	687.89 mW	IC	IC power dissipation
7.	IC Tj	71.445 degC	IC	IC junction temperature
8.	IC Tolerance	16.0 mV	IC	IC Feedback Tolerance
9.	ICThetaJA Effective	60.25 degC/W	IC	Effective IC Junction-to-Ambient Thermal Resistance
10.	Iin Avg	334.73 mA	IC	Average input current
11.	Ipp percentage	61.505 %	Inductor	Inductor ripple current percentage (with respect to average inductor current)
12.	L Ipp	1.23 A	Inductor	Peak-to-peak inductor ripple current
13.	L Pd	74.27 mW	Inductor	Inductor power dissipation
14.	Cin Pd	1.544 mW	Power	Input capacitor power dissipation
15.	Cout Pd	126.1 µW	Power	Output capacitor power dissipation
16.	IC Pd	687.89 mW	Power	IC power dissipation
17.	L Pd	74.27 mW	Power	Inductor power dissipation
18.	Total Pd	764.095 mW	Power	Total Power Dissipation
19.	BOM Count	10	System Information	Total Design BOM count
20.	Cross Freq	31.898 kHz	System Information	Bode plot crossover frequency
21.	Duty Cycle	15.655 %	System Information	Duty cycle
22.	Efficiency	89.624 %	System Information	Steady state efficiency
23.	FootPrint	223.0 mm^2	System Information	Total Foot Print Area of BOM components
24.	Frequency	500.0 kHz	System Information	Switching frequency
25.	Gain Marg	-20.794 dB	System Information	Bode Plot Gain Margin
26.	Inductor ripple current requirement used for Inductor selection	40.0 %	System Information	Custom Inductor ripple current (% of average inductor current) requirement used for Inductor selection
27.	Iout	2.0 A	System Information	Iout operating point
28.	Iout transient step used for Cout calculations	1.0 A	System Information	Custom Transient current step requirement that was used for Cout selection (A).
29.	Low Freq Gain	98.834 dB	System Information	Gain at 1Hz
30.	Mode	CCM	System Information	Conduction Mode
31.	Overshoot Value	11.235 mV	System Information	Theoretical Vout Overshoot Value
32.	Phase Marg	66.074 deg	System Information	Bode Plot Phase Margin
33.	Pout	6.6 W	System Information	Total output power
34.	Total BOM	$0.76	System Information	Total BOM Cost

#	Name	Value	Category	Description
35.	Undershoot Value	28.802 mV	System Information	Theoretical Vout Undershoot Value
36.	Vin	22.0 V	System Information	Vin operating point
37.	Vin p-p	770.938 mV	System Information	Peak-to-peak input voltage
38.	Vout	3.3 V	System Information	Operational Output Voltage
39.	Vout Actual	3.272 V	System Information	Vout Actual calculated based on selected voltage divider resistors
40.	Vout Ripple requirement used for Cout calculations	1.0 %	System Information	Custom maximum output ripple requirement that was used for Cout selection(% of Vout).
41.	Vout Tolerance	3.557 %	System Information	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
42.	Vout p-p	4.999 mV	System Information	Peak-to-peak output ripple voltage
43.	Vout transient requirement used for Cout calculations	3.0 %	System Information	Custom Transient voltage change requirement that was used for Cout selection (% of Vout).

Design Inputs

Name	Value	Description
Iout	2.0	Maximum Output Current
VinMax	22.0	Maximum input voltage
VinMin	14.0	Minimum input voltage
Vout	3.3	Output Voltage
base_pn	TPS62933	Base Product Number
source	DC	Input Source Type
Ta	30.0	Ambient temperature

WEBENCH® Assembly

Design Assistance

1. Master key : 4DBC92FC97185CFB[v1]
2. **TPS62933** Product Folder : http://www.ti.com/product/TPS62933 : contains the data sheet and other resources.