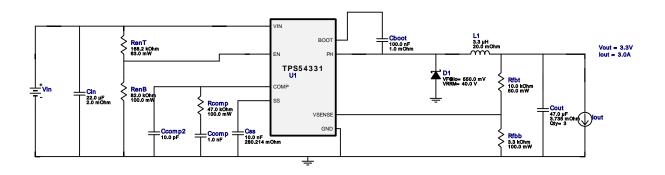
VinMin = 4.5V VinMax = 5.5V Vout = 3.3V Iout = 3.0A Device = TPS54331DDAR Topology = Buck Created = 2022-01-06 05:55:26.189 BOM Cost = NA BOM Count = 16 Total Pd = 1.48W

WEBENCH® Design Report

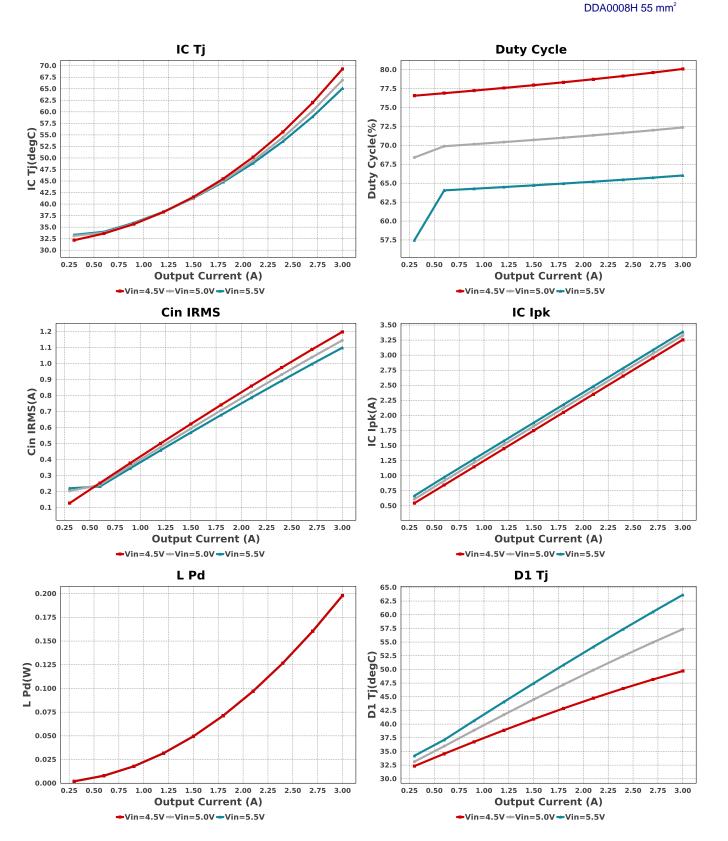
Design: 4 TPS54331DDAR TPS54331DDAR 5V-5V to 3.30V @ 3A

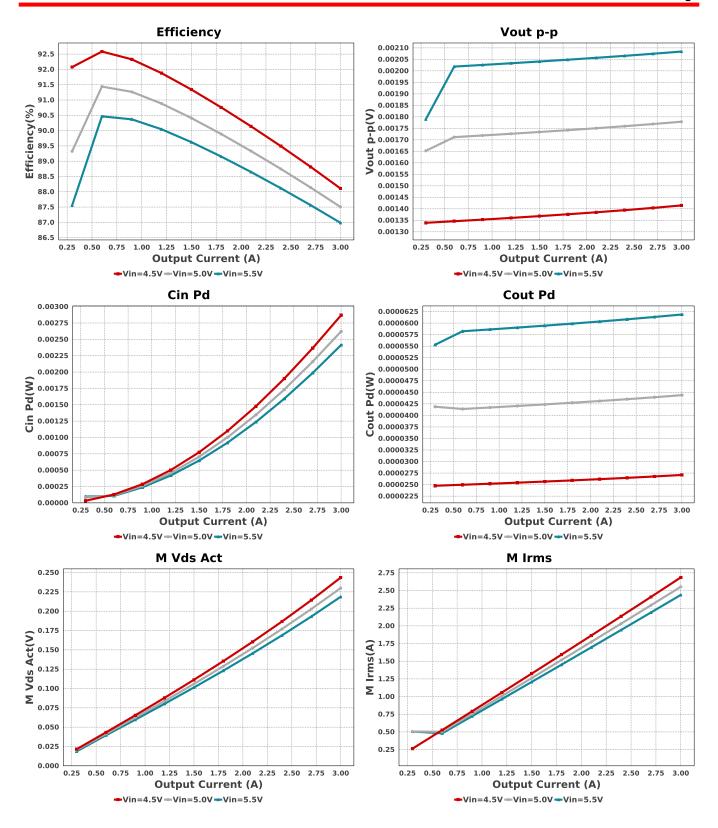


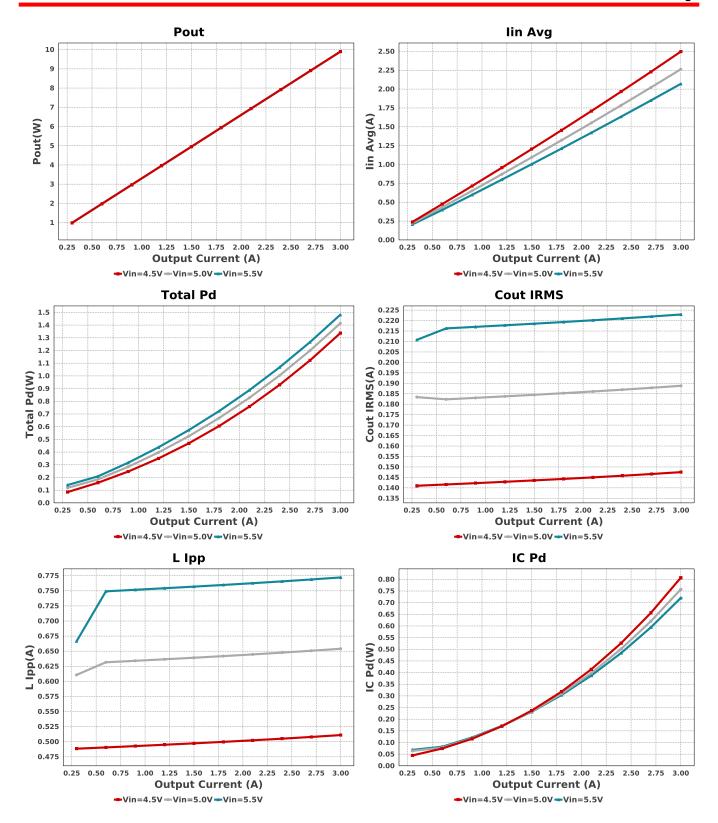
Electrical BOM

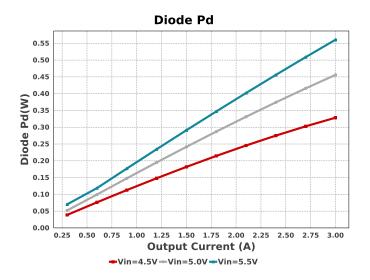
Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Cboot	MuRata	GRM155R71A104KA01D Series= X7R	Cap= 100.0 nF ESR= 1.0 mOhm VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm ²
Ccomp	MuRata	GRM1555C1H102JA01J Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm ²
Ccomp2	MuRata	GRM0335C1H100JA01D Series= C0G/NP0	Cap= 10.0 pF VDC= 5.0 V IRMS= 0.0 A	1	\$0.01	0201 2 mm ²
Cin	MuRata	GRM32ER61C226ME20L Series= X5R	Cap= 22.0 uF ESR= 2.0 mOhm VDC= 16.0 V IRMS= 3.68 A	1	\$0.55	1210 15 mm ²
Cout	MuRata	GRM31CR60J476ME19L Series= X5R	Cap= 47.0 uF ESR= 3.735 mOhm VDC= 6.3 V IRMS= 4.091 A	3	\$0.23	1206_190 11 mm ²
Css	TDK	CGA1A2X7R1A103K030BA Series= X7R	Cap= 10.0 nF ESR= 280.21 mOhm VDC= 10.0 V IRMS= 245.72 mA	1	\$0.01	0201_033 2 mm ²
D1	Fairchild Semiconductor	SS24FL	VF@Io= 550.0 mV VRRM= 40.0 V	1	\$0.05	SOD-123F 12 mm ²
L1	TDK	VLP8040T-3R3N	L= 3.3 μH 20.0 mOhm	1	\$0.22	
						VLP8040 113 mm ²
Rcomp	Yageo	RC0603FR-0747KL Series= ?	Res= 47.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	0603 5 mm ²
RenB	Yageo	RC0603FR-0782KL Series= ?	Res= 82.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	0603 5 mm ²
RenT	CUSTOM	CUSTOM Series= CRCWe3	Res= 168.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	NA	0402 0 mm ²

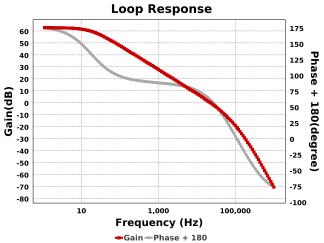
Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
Rfbb	Yageo	RC0603FR-073K3L Series= ?	Res= 3.3 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	0603 5 mm ²
Rfbt	Yageo	RC0201FR-0710KL Series= ?	Res= 10.0 kOhm Power= 50.0 mW Tolerance= 1.0%	1	\$0.01	0201 2 mm ²
U1	Texas Instruments	TPS54331DDAR	Switcher	1	\$0.56	











Operating Values

# Name Value Category Description 1. BOM Count 16 2. Total BOM NA 3. Cin IRMS 1.099 A Capacitor 4. Cin Pd 2.414 mW Capacitor 5. Cout IRMS 22.912 mA Capacitor 6. Cout Pd 61.864 µW Capacitor 7. D1 Tj 63.638 degc Diode 8. Diode Pd 560.63 mW Diode 9. IC Ipk 3.386 A IC Peak switch current in IC Centrol (Comput Capacitor) 10. IC Pd 720.07 mW IC IC Centrol (Comput Capacitor) 11. IC Tj 65.088 degc IC IC IC (power dissipation) 12. ICThetaJA 48.7 degc/W IC IC (power dissipation) 13. In Avg 2.069 A IC Average input current in IC IC (power dissipation) 14. L Ipp 1772.19 mA Inductor Paak-to-paak inductor ripple current in IC IC (power dissipation) 15. L Pd 198.0 mW Inductor Inductor power dissipation 16. Mirms 2.438 A Mosfet Mosfet Voltage drop across the MosFET Input capacitor power dissipation 17. M Vds Act 218.629 mV Mosfet Voltage drop across the MosFET Input capacitor power dissipation 18. Cin Pd 2.414 mW Power Unductor power dissipation 19. Cout Pd 61.864 µW Power Output capacitor power dissipation 20. Diode Pd 560.63 mW Power Output capacitor power dissipation 21. IC Pd 720.07 mW Power Input capacitor power dissipation 22. L Pd 198.0 mW Power Output capacitor power dissipation 23. Total Pd 1.481 W Power Input capacitor power dissipation 24. Cross Freq 22.309 kHz System Information 25. Duty Cycle 66.022 % System Information 26. Efficiency 86.986 % System Information 27. FootPrint 257.0 mm' System Information 28. Frequency 570.0 kHz System Information 39. Iout 3.0 A System Information 30. Iout 3.0 A System Information 31. Low Freq Gain 62.671 dB System Information 32. Mode CCM System Information 33. Phase Marg 62.769 deg System Information 34. Pout 9.9 W System Information 35. Vin 5.5 V System Information 36. Vout 3.3 V System Information 37. Vout Actual 3.24 V System Information 38. Vout Actual 3.24 V System Information 39. Vout Actual 3.24 V Output Voltage Operations Output Voltage Operat	Spo	rainig valaoo			
2. Total BOM	#	Name	Value	Category	Description
1. Cin RMS	1.	BOM Count	16		Total Design BOM count
Cin Pd	2.	Total BOM	NA		Total BOM Cost
6. Cout IRMS 222,912 mA Capacitor Output capacitor power dissipation 7. D1 Tj 63.638 degC Diode 8. Diode Pd 560.63 mW Diode Diode power dissipation 9. IC Ipk 3.386 A IC Peak switch current in IC 10. IC Pd 720.07 mW IC IC power dissipation 11. IC Tj 65.088 degC IC IC punction temperature 12. ICThetaJA 48.7 degC/W IC IC punction temperature 13. Ilin Avg 2.069 A IC IC punction-to-ambient thermal resistance 14. L Ipp 772.19 mA Inductor Inductor power dissipation 15. L Pd 198.0 mW Inductor Peak-to-peak inductor ripple current 16. M Irms 2.438 A Mosfet MOSFET RMS ripple current 17. M Vds Act 218.629 mV Mosfet Mosfet 18. Cin Pd 2.414 mW Power Power 19. Cout Pd 560.63 mW Power Injunctopacity regarding power dissipation 10. Pd 720.77 mW Power Diode power dissipation </td <td>3.</td> <td>Cin IRMS</td> <td>1.099 A</td> <td>Capacitor</td> <td>Input capacitor RMS ripple current</td>	3.	Cin IRMS	1.099 A	Capacitor	Input capacitor RMS ripple current
5. Cout IRMS 222,912 mA Capacitor Output capacitor power dissipation 7. D1 Tj 63.638 degC Diode 8. Diode Pd 550.63 mW Diode 9. IC Ipk 3.386 A IC 10. IC Pd 720.07 mW IC 11. IC Tj 65.088 degC IC 12. ICThetaJA 48.7 degC/W IC 13. Iin Avg 2.069 A IC 14. L Ipp 772.19 mA Inductor 15. L Pd 198.0 mW Inductor 16. M Irms 2.438 A Mosfet 17. M Vds Act 218.629 mV Mosfet 18. Cin Pd 2.414 mW Power 19. Cout Pd 61.864 µW Power 20. Diode Pd 560.63 mW Power 21. IC Pd 720.07 mW Power 22. L Pd 1.481 W Power 23. Total Pd 1.481 W Power 24. Cross Freq 22.309 kHz System Information 25. Duty Cycle 66.022 % System Information	4.	Cin Pd	2.414 mW	Capacitor	Input capacitor power dissipation
7. Dt T	5.	Cout IRMS	222.912 mA	Capacitor	· · · · · · · · · · · · · · · · · · ·
7. D1 Tj 63.638 degC Diode Diode Diode power dissipation 8. Diode Pd 560.63 mW Diode Diode power dissipation 9. IC IpH 3.386 A IC Peak switch current in IC 10. IC Ped 720.07 mW IC IC power dissipation 11. IC Tj 65.068 degC IC IC junction-te-ambient thermal resistance 12. ICThetaJA 48.7 degC/W IC IC junction-to-ambient thermal resistance 13. In Avg 2.069 A IC IC junction-to-ambient thermal resistance 14. L Ipp 772.19 mA Inductor Inductor power dissipation 15. L Pd 198.0 mW Inductor Peak-to-peak inductor inple current 16. M Irms 2.438 A Mosfet Mosfet MOSFET RMS ripple current 17. M Vds Act 218.629 mV Mosfet Mosfet MOSFET RMS ripple current 18. Cin Pd 2.414 mW Power Injust capacitor power dissipation 19. Cout Pd	6.	Cout Pd	61.864 µW	Capacitor	Output capacitor power dissipation
8. Dlode Pd 560,63 mW Diode Diode power dissipation 9. C Lpk 3.386 A IC Peak switch current in IC 10. IC Pd 720.07 mW IC Peak switch current in IC 11. IC TJ 65.068 degC IC IC power dissipation 12. ICThetaJA 48.7 degCW IC IC junction-to-ambient thermal resistance 13. Iin Avg 2.069 A IC Average input current 14. L Ipp 772.19 mA Inductor 15. L Pd 198.0 mW Inductor 16. M Irms 2.438 A Mosfet 17. M Vds Act 218,629 mV Mosfet 18. Cin Pd 2.414 mW Power 19. Cout Pd 61.864 µW Power Output capacitor power dissipation 10. L Pd 720.07 mW Power Diode power dissipation 11. IC Pd 720.07 mW Power Output capacitor power dissipation 12. L Pd 198.0 mW Power Information 24. Cross Freq 22.309 kHz System Information 25. Duty Cycle	7.	D1 Tj	•		
C Dk	8.	Diode Pd	560.63 mW	Diode	·
10. C Pd 720.07 mW IC C power dissipation	9.	IC lpk		IC	·
11. IC Tj 65.088 degC M IC IC junction temperature 12. ICThetaJA 48.7 degC/W IC IC junction-to-ambient thermal resistance 13. Iin Avg 2.069 A IC Average input current 14. L Ipp 772.19 mA Inductor Peak-to-peak inductor ripple current 16. M Irms 2.438 A Mosfet MOSFET RMS ripple current 18. Cin Pd 2.414 mW Power Voltage drop across the MosFET 19. Cout Pd 61.884 μW Power Output capacitor power dissipation 10. Diode Pd 560.63 mW Power Diode power dissipation 21. Ic Pd 720.07 mW Power Diode power dissipation 22. L Pd 198.0 mW Power Diode power dissipation 23. Total Pd 1.481 W Power Total Power Dissipation 25. Duty Cycle 66.022 % System Information 27. FootPrint 257.0 mm² System Information 28. Frequency 570.0 kHz System Information 30. lout 3.0 A System Information 31. Low Freq Ga	10.		720.07 mW		IC power dissipation
12 ICThetaJA	11.	IC Ti	65.068 deaC	IC	·
13. lin Avg 2.069 Å IC Avérage input current 14. L lpp 772.19 mA Inductor Peak-to-peak inductor ripple current 15. L Pd 198.0 mW Inductor Peak-to-peak inductor ripple current 16. M Irms 2.438 A Mosfet MOSFET RMS ripple current 17. M Vds Act 218.629 mV Mosfet Voltage drop across the MosFET 18. Cin Pd 2.414 mW Power Input capacitor power dissipation 19. Cout Pd 61.864 µW Power Input capacitor power dissipation 19. Cout Pd 560.63 mW Power Output capacitor power dissipation 11. IC Pd 720.07 mW Power Ic power dissipation 12. L Pd 720.07 mW Power Ic power dissipation 13. L Pd 19.0 mW Power Inductor power dissipation 14. L Pd 19.0 mW Power Inductor power dissipation 15. Urbq 19.0 mW System Inductor power		•	•		•
14. Lipp			ū		•
15. L Pd 198.0 mW Inductor Inductor power dissipation 16. M Irms 2.438 A Mosfet MOSFET RMS ripple current 17. M Vds Act 218.629 mV Mosfet Voltage drop across the MosFET 18. Cin Pd 2.414 mW Power Input capacitor power dissipation 19. Cout Pd 61.864 µW Power Output capacitor power dissipation 20. Diode Pd 560.63 mW Power Diode power dissipation 21. IC Pd 720.07 mW Power Diode power dissipation 22. L Pd 198.0 mW Power Inductor power dissipation 23. Total Pd 1.481 W Power Total Power Dissipation 24. Cross Freq 22.309 kHz System Information System System System Steady state efficiency 25. Duty Cycle 66.022 % System Information System System Information 28. Frequency 570.0 kHz System Information Switching frequency 30. Iout Fee Gain		•			5 ,
16. M Irms 2,438 A Mosfet MOSFET RMS ripple current 17. M Vds Act 218,629 mV Mosfet Vottage drop across the MosFET 18. Cin Pd 2,414 mW Power Input capacitor power dissipation 19. Cout Pd 61,864 μW Power Output capacitor power dissipation 10. Diode Pd 560,63 mW Power Diode power dissipation 21. IC Pd 720.07 mW Power IC power dissipation 12. L Pd 198.0 mW Power Inductor power dissipation 12. Total Pd 1,481 W Power Total Power Dissipation 23. Total Power Dissipation Duty cycle 66.022 % System Bode plot crossover frequency 25. Duty Cycle 66.022 % System Duty cycle Steady state efficiency 26. Efficiency 86.986 % System Switching frequency 27. FootPrint 257.0 mm² System Switching frequency 28. Frequency 570.6 kHz System Information 29. Gain Ma					· · · · · · · · · · · · · · · · · · ·
17. M Vds Act Cin Pd 218.629 mV Mosfet Voltage drop across the MosFET Input capacitor power dissipation 18. Cin Pd 2.414 mW Power Input capacitor power dissipation 19. Cout Pd 61.864 µW Power Output capacitor power dissipation 20. Diode Pd 560.63 mW Power Diode power dissipation 21. IC Pd 720.07 mW Power Inductor power dissipation 22. L Pd 198.0 mW Power Inductor power dissipation 23. Total Pd 1.481 W Power Inductor power dissipation 24. Cross Freq 22.309 kHz System Bode plot crossover frequency 25. Duty Cycle 66.022 % System Information 26. Efficiency 86.986 % System Information 27. FootPrint 257.0 mm² System Information System System Information 28. Frequency 570.0 kHz System Information System Information 30. lout 3.0 A System Information 31. Low Freq Gain 62.671 dB System Information					·
18. Cin Pd 2.414 mW Power Input capacitor power dissipation 19. Cout Pd 61.864 µW Power Output capacitor power dissipation 20. Diode Pd 560.63 mW Power Diode power dissipation 21. IC Pd 720.07 mW Power IC power dissipation 22. L Pd 198.0 mW Power Inductor power dissipation 23. Total Pd 1.481 W Power Total Power Dissipation 24. Cross Freq 22.309 kHz System Bode plot crossover frequency 25. Duty Cycle 66.022 % System Duty cycle 26. Efficiency 86.986 % System Steady state efficiency 27. FootPrint 257.0 mm² System Switching frequency 28. Frequency 570.0 kHz System Switching frequency 30. Iout 3.0 A System Information 31. Low Freq Gain 62.671 dB System Gain at 1Hz 32.					• • • • • • • • • • • • • • • • • • • •
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22.L Pd198.0 mWPower 1.481 WPower PowerInductor power dissipation24.Cross Freq22.309 kHzSystem InformationBode plot crossover frequency25.Duty Cycle66.022 %System InformationDuty cycle26.Efficiency86.986 %System InformationSystem InformationSteady state efficiency27.FootPrint257.0 mm²System InformationTotal Foot Print Area of BOM components28.Frequency570.0 kHzSystem InformationSwitching frequency29.Gain Marg-21.287 dBSystem InformationBode Plot Gain Margin30.lout3.0 ASystem Informationlout operating point31.Low Freq Gain62.671 dBSystem InformationGain at 1Hz32.ModeCCMSystem InformationConduction Mode33.Phase Marg62.769 degSystem InformationBode Plot Phase Margin34.Pout9.9 WSystem InformationTotal output power35.Vin5.5 VSystem InformationVin operating point36.Vout3.3 VSystem InformationOperational Output Voltage37.Vout Actual3.224 VSystemVout Actual calculated based on selected voltage divider resistors					·
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Information System Duty cycle 66.022 % System Information 26. Efficiency 86.986 % System Information 27. FootPrint 257.0 mm² System Information 28. Frequency 570.0 kHz System Information 29. Gain Marg -21.287 dB System Information 30. lout 3.0 A System Information 31. Low Freq Gain 62.671 dB System Information 32. Mode CCM System Information 33. Phase Marg 62.769 deg System Information 34. Pout 9.9 W System Information 35. Vin 5.5 V System Vin operating point Information 36. Vout Actual 3.24 V System Vout Actual calculated based on selected voltage divider resistors					
Information System Steady state efficiency System Information System Information System Total Foot Print Area of BOM components Information System Information Switching frequency S70.0 kHz System Switching frequency System Information System Bode Plot Gain Margin Information System System Sode Plot Gain Margin Information System Gain at 1Hz Conduction Mode CCM System System Bode Plot Phase Margin System Information System Information System System Total output power System Switching frequency Switchin	24.	Closs Fleq	22.309 KI IZ	,	bode plot crossover frequency
26. Efficiency 86.986 % System Information 27. FootPrint 257.0 mm² System Information 28. Frequency 570.0 kHz System Information 29. Gain Marg -21.287 dB System Information 30. lout 3.0 A System Information 31. Low Freq Gain 62.671 dB System Gain at 1Hz Information 32. Mode CCM System Conduction Mode Information 33. Phase Marg 62.769 deg System Bode Plot Phase Margin Information 34. Pout 9.9 W System Total output power Information 35. Vin 5.5 V System Vin operating point Information 36. Vout Actual 3.224 V System Operational Output Voltage Information Vout Actual System Operational Output Voltage Information Vout Actual System Vin Actual System Operational Output Voltage Information Vout Actual System Vin Actual System Vin System Vin Calculated based on selected voltage divider resistors	25.	Duty Cycle	66.022 %	•	Duty cycle
Information System Total Foot Print Area of BOM components	26	Efficiency	96 096 9/		Stoody state officiancy
27.FootPrint257.0 mm²System InformationTotal Foot Print Area of BOM components28.Frequency570.0 kHzSystem InformationSwitching frequency29.Gain Marg-21.287 dBSystem InformationBode Plot Gain Margin30.Iout3.0 ASystem InformationIout operating point31.Low Freq Gain62.671 dBSystem InformationGain at 1Hz32.ModeCCMSystem InformationConduction Mode33.Phase Marg62.769 degSystem InformationBode Plot Phase Margin34.Pout9.9 WSystem InformationTotal output power35.Vin5.5 VSystem InformationVin operating point36.Vout3.3 VSystem InformationOperational Output Voltage37.Vout Actual3.224 VSystemVout Actual calculated based on selected voltage divider resistors	20.	Efficiency	80.980 %	•	Steady state eniciency
Information System Switching frequency System Information System Syste	27	FootDrint	257.0		Total Foot Drint Area of DOM components
28. Frequency 570.0 kHz System Information 29. Gain Marg -21.287 dB System Bode Plot Gain Margin Information 30. lout 3.0 A System Information 31. Low Freq Gain 62.671 dB System Information 32. Mode CCM System Conduction Mode Information 33. Phase Marg 62.769 deg System Information 34. Pout 9.9 W System Information 35. Vin 5.5 V System Vin operating point 36. Vout 3.3 V System Operating point 37. Vout Actual 3.224 V System Vout Actual calculated based on selected voltage divider resistors	21.	FOOLPHINL	257.0 mm	•	Total Foot Pfint Area of BOIM components
Information System Bode Plot Gain Margin	20	Fraguesa.	570 0 kH l=		Curitahing fraguency
29. Gain Marg -21.287 dB System Information 30. lout 3.0 A System Information 31. Low Freq Gain 62.671 dB System Gain at 1Hz CCM System Conduction Mode 1nformation 32. Mode CCM System Information 33. Phase Marg 62.769 deg System Bode Plot Gain Margin Gain at 1Hz Conduction Mode Total output power	28.	Frequency	570.0 KHZ	,	Switching frequency
Information 30. lout 3.0 A System lout operating point Information 31. Low Freq Gain 62.671 dB System Gain at 1Hz Information 32. Mode CCM System Conduction Mode Information 33. Phase Marg 62.769 deg System Bode Plot Phase Margin Information 34. Pout 9.9 W System Total output power Information 35. Vin 5.5 V System Vin operating point Information 36. Vout 3.3 V System Operational Output Voltage Information 37. Vout Actual 3.224 V System Vout Actual calculated based on selected voltage divider resistors	00	Coin More	04 007 AD		Pada Plat Cain Marain
30. lout 3.0 A System Information Gain at 1Hz 11. Low Freq Gain 62.671 dB System Gain at 1Hz 12. Mode CCM System Conduction Mode 13. Phase Marg 62.769 deg System Information 34. Pout 9.9 W System Information 35. Vin 5.5 V System Vin operating point 16. Vout Actual 3.224 V System Vout Actual calculated based on selected voltage divider resistors	29.	Gain iviarg	-21.28/ QB	•	bode Piol Gain Margin
Information System Gain at 1Hz	20	lat	2.0.4		laut an austin a maint
31. Low Freq Gain 62.671 dB System Information 32. Mode CCM System Conduction Mode Information 33. Phase Marg 62.769 deg System Information Information 34. Pout 9.9 W System Total output power Information 35. Vin 5.5 V System Vin operating point Information 36. Vout 3.3 V System Operational Output Voltage Information 37. Vout Actual 3.224 V System Vout Actual calculated based on selected voltage divider resistors	30.	IOUT	3.U A	•	iout operating point
Information System Conduction Mode	6.4	L F 0 :	00.074 JD		0-1
32. Mode CCM System Conduction Mode 33. Phase Marg 62.769 deg System Information 34. Pout 9.9 W System Information 35. Vin 5.5 V System Vin operating point Information 36. Vout 3.3 V System Operational Output Voltage Information 37. Vout Actual 3.224 V System Vout Actual calculated based on selected voltage divider resistors	31.	Low Freq Gain	62.6/1 dB	•	Gain at 1Hz
Information System Bode Plot Phase Margin System Information System Information System Information System Total output power Information System Vin operating point Information System Information System Operational Output Voltage Information System Information System Information System Operational Output Voltage Information System Operational Output Voltage Information System Operational Output Voltage Operation					
33. Phase Marg 62.769 deg System Information 34. Pout 9.9 W System Total output power Information 35. Vin 5.5 V System Vin operating point Information 36. Vout 3.3 V System Operational Output Voltage Information 37. Vout Actual 3.224 V System Vout Actual calculated based on selected voltage divider resistors	32.	Mode	CCM	•	Conduction Mode
Information 34. Pout 9.9 W System Information 35. Vin 5.5 V System Vin operating point Information 36. Vout 3.3 V System Information Operational Output Voltage Information 37. Vout Actual 3.224 V System Vout Actual calculated based on selected voltage divider resistors					
34. Pout 9.9 W System Total output power Information 35. Vin 5.5 V System Vin operating point Information 36. Vout 3.3 V System Operational Output Voltage Information 37. Vout Actual 3.224 V System Vout Actual calculated based on selected voltage divider resistors	33.	Phase Marg	62.769 deg	•	Bode Plot Phase Margin
Information 35. Vin 5.5 V System Vin operating point Information 36. Vout 3.3 V System Operational Output Voltage Information 37. Vout Actual 3.224 V System Vout Actual calculated based on selected voltage divider resistors					
35. Vin 5.5 V System Vin operating point Information 36. Vout 3.3 V System Operational Output Voltage Information 37. Vout Actual 3.224 V System Vout Actual calculated based on selected voltage divider resistors	34.	Pout	9.9 W	System	Total output power
Information 36. Vout 3.3 V System Operational Output Voltage Information 37. Vout Actual 3.224 V System Vout Actual calculated based on selected voltage divider resistors				Information	
36. Vout 3.3 V System Operational Output Voltage Information 37. Vout Actual 3.224 V System Vout Actual calculated based on selected voltage divider resistors	35.	Vin	5.5 V		Vin operating point
Information 37. Vout Actual 3.224 V System Vout Actual calculated based on selected voltage divider resistors				Information	
37. Vout Actual 3.224 V System Vout Actual calculated based on selected voltage divider resistors	36.	Vout	3.3 V	System	Operational Output Voltage
, ,				Information	
Information	37.	Vout Actual	3.224 V	System	Vout Actual calculated based on selected voltage divider resistors
				Information	

#	Name	Value	Category	Description
38.	Vout Tolerance	5.072 %	System	Vout Tolerance based on IC Tolerance (no load) and voltage divider
			Information	resistors if applicable
39.	Vout p-p	2.084 mV	System	Peak-to-peak output ripple voltage
			Information	

Design Inputs

Name	Value	Description	
lout	3.0	Maximum Output Current	
SoftStart	4.0 ms	Soft Start Time (ms)	
VinMax	5.5	Maximum input voltage	
VinMin	4.5	Minimum input voltage	
Vout	3.3	Output Voltage	
base_pn	TPS54331	Base Product Number	
source	DC	Input Source Type	
Та	30.0	Ambient temperature	

WEBENCH® Assembly

Component Testing

Some published data on components in datasheets such as Capacitor ESR and Inductor DC resistance is based on conservative values that will guarantee that the components always exceed the specification. For design purposes it is usually better to work with typical values. Since this data is not always available it is a good practice to measure the Capacitance and ESR values of Cin and Cout, and the inductance and DC resistance of L1 before assembly of the board. Any large discrepancies in values should be electrically simulated in WEBENCH to check for instabilities and thermally simulated in WebTHERM to make sure critical temperatures are not exceeded.

Soldering Component to Board

If board assembly is done in house it is best to tack down one terminal of a component on the board then solder the other terminal. For surface mount parts with large tabs, such as the DPAK, the tab on the back of the package should be pre-tinned with solder, then tacked into place by one of the pins. To solder the tab town to the board place the iron down on the board while resting against the tab, heating both surfaces simultaneously. Apply light pressure to the top of the plastic case until the solder flows around the part and the part is flush with the PCB. If the solder is not flowing around the board you may need a higher wattage iron (generally 25W to 30W is enough).

Initial Startup of Circuit

It is best to initially power up the board by setting the input supply voltage to the lowest operating input voltage 4.5V and set the input supply's current limit to zero. With the input supply off connect up the input supply to Vin and GND. Connect a digital volt meter and a load if needed to set the minimum lout of the design from Vout and GND. Turn on the input supply and slowly turn up the current limit on the input supply. If the voltage starts to rise on the input supply continue increasing the input supply current limit while watching the output voltage. If the current increases on the input supply, but the voltage remains near zero, then there may be a short or a component misplaced on the board. Power down the board and visually inspect for solder bridges and recheck the diode and capacitor polarities. Once the power supply circuit is operational then more extensive testing may include full load testing, transient load and line tests to compare with simulation results.

Load Testing

The setup is the same as the initial startup, except that an additional digital voltmeter is connected between Vin and GND, a load is connected between Vout and GND and a current meter is connected in series between Vout and the load. The load must be able to handle at least rated output power + 50% (7.5 watts for this design). Ideally the load is supplied in the form of a variable load test unit. It can also be done in the form of suitably large power resistors. When using an oscilloscope to measure waveforms on the prototype board, the ground leads of the oscilloscope probes should be as short as possible and the area of the loop formed by the ground lead should be kept to a minimum. This will help reduce ground lead inductance and eliminate EMI noise that is not actually present in the circuit.

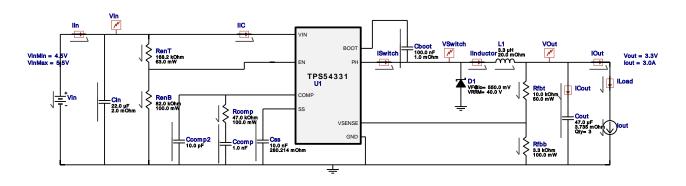


WEBENCH® Electrical Simulation Report

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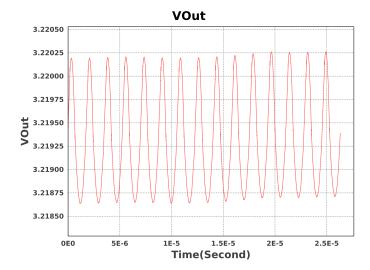
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Simulation Type = Steady State



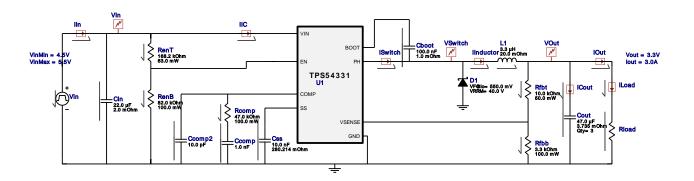
Simulation Parameters

	Name	Parameter Name	Description	Values
	Css	IC	Initial Voltage	1 V
2.	Cboot	IC	Initial Voltage	5.0 V
3.	L1	IC	Initial Current	3.0 A
4.	lout	1	Load Current	3.0 A



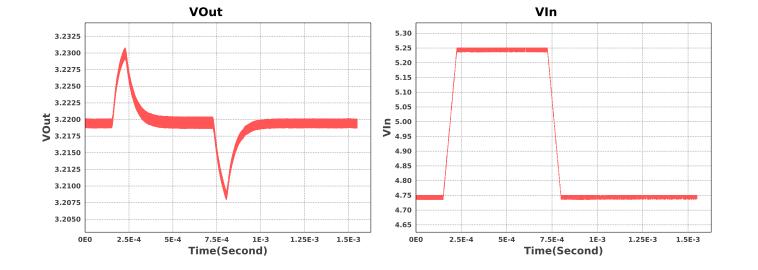
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Simulation Type = Input Transient



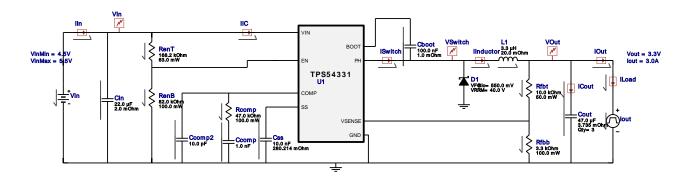
Simulation Parameters

	Name	Parameter Name	Description	Values
	Css	IC	Initial Condition	1 V
2.	Cboot	IC	Initial Voltage	5.0 V
3.	L1	IC	Initial Current	3.0 A
4.	Rload	R	Load Resistance	1.099999999999999 Ohm



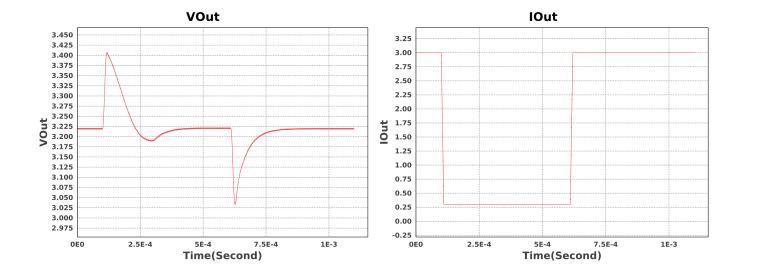
Design Id = 4 sim_id = 3

Simulation Type = Load Transient



Simulation Parameters

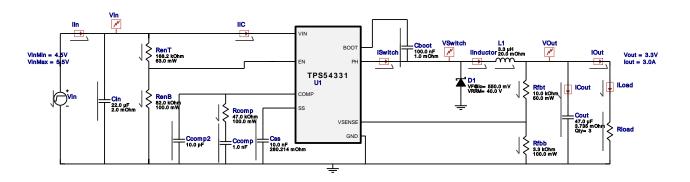
#	Name	Parameter Name	Description	Values
1.	Css	IC	Initial Voltage	1 V
2.	Cboot	IC	Initial Voltage	5.0 V
3.	L1	IC	Initial Current	3.0 A
4.	lout	signal_type I1 I2 Td Tf Tr	Signal Type Initial Load Current Minimum Load Current Initial Time Delay Fall Time Rise Time	PULSE 3.0 A 0.3 A 100u s 10u s 10u s
		Pw	Pulse Width	500u s



Design Id = 4

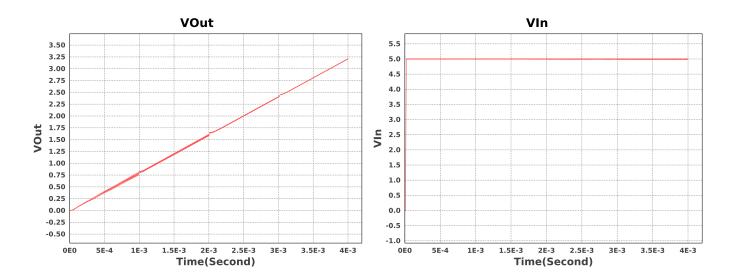
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Simulation Type = Startup



Simulation Parameters

#	Name	Parameter Name	Description	Values
1.	Rload	R	Load Resistance	1.099999999999999 Ohm



Design Assistance

- 1. Master key: CB899E537F3BB804[v1]
- 2. TPS54331 Product Folder: http://www.ti.com/product/TPS54331: contains the data sheet and other resources.

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