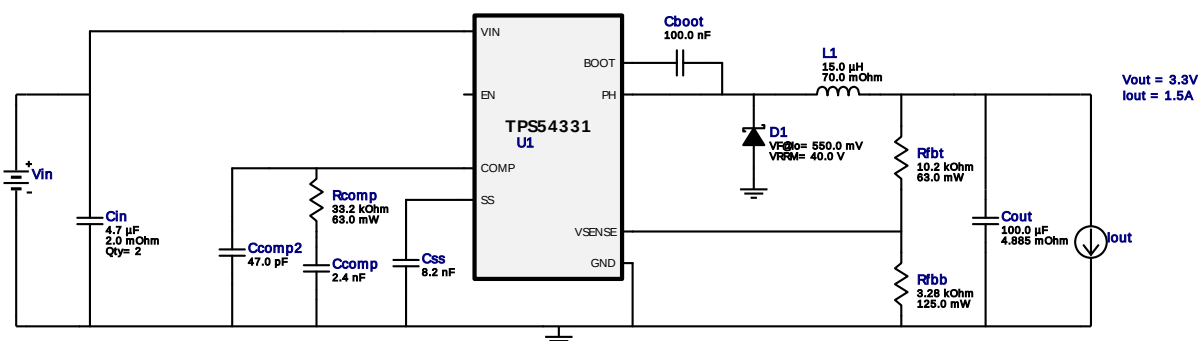


WEBENCH® Design Report

Design : 1209005/520 TPS54331DDAR
TPS54331DDAR 5.0V-25.0V to 3.30V @ 1.5A



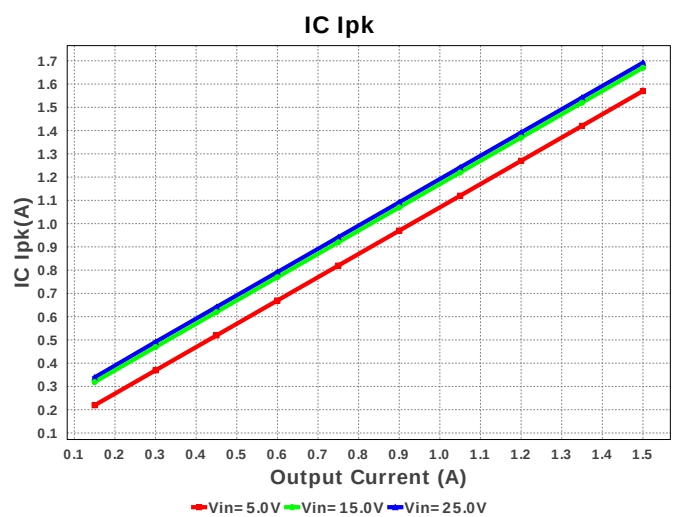
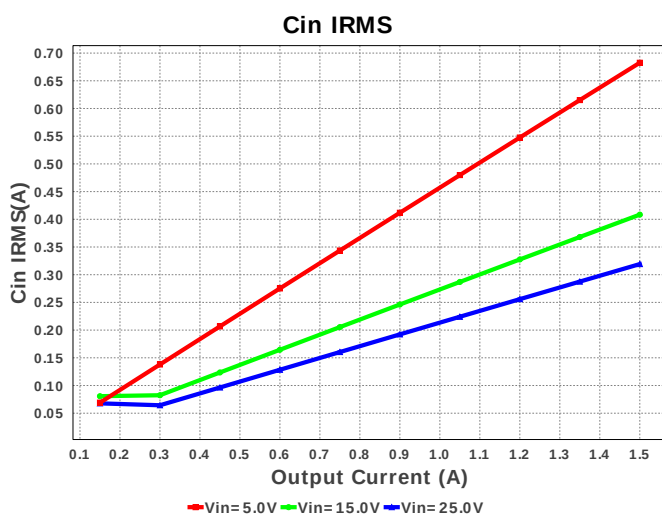
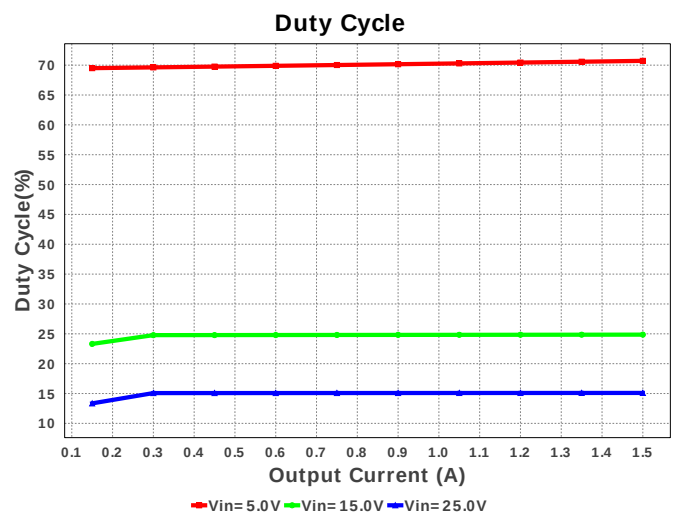
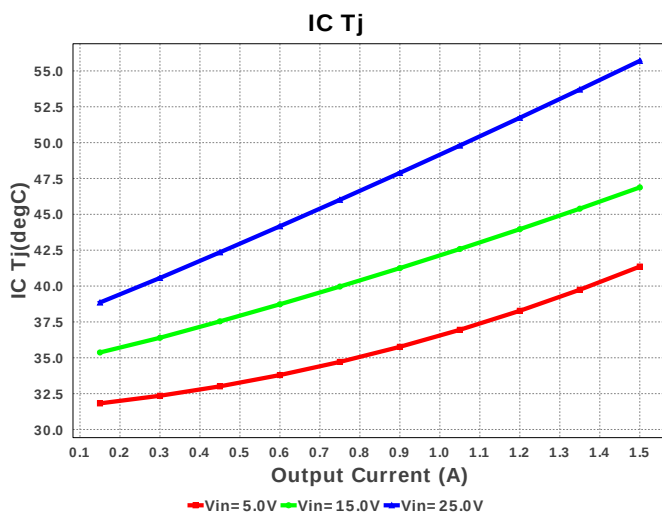
My Comments

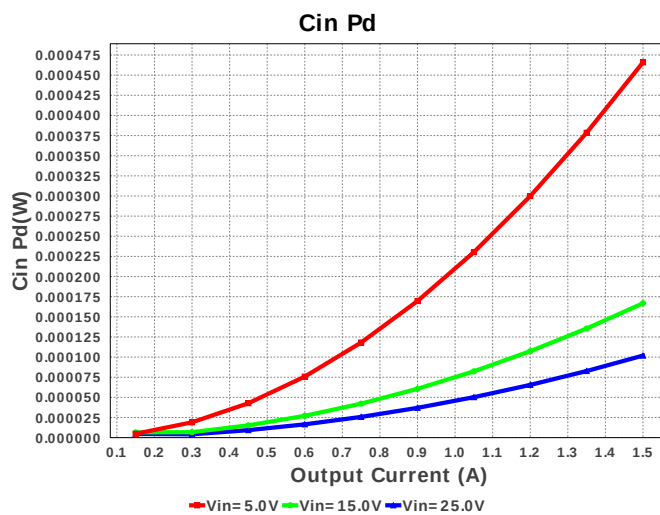
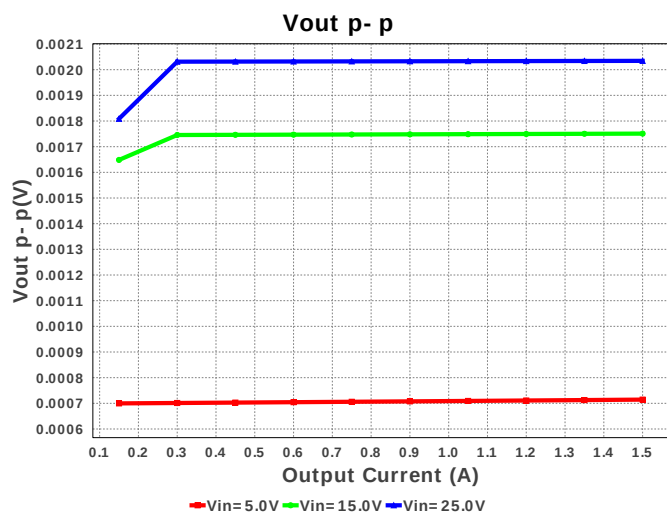
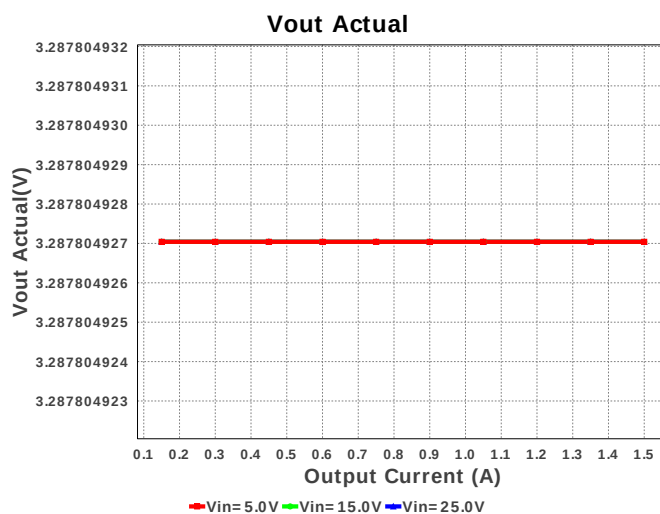
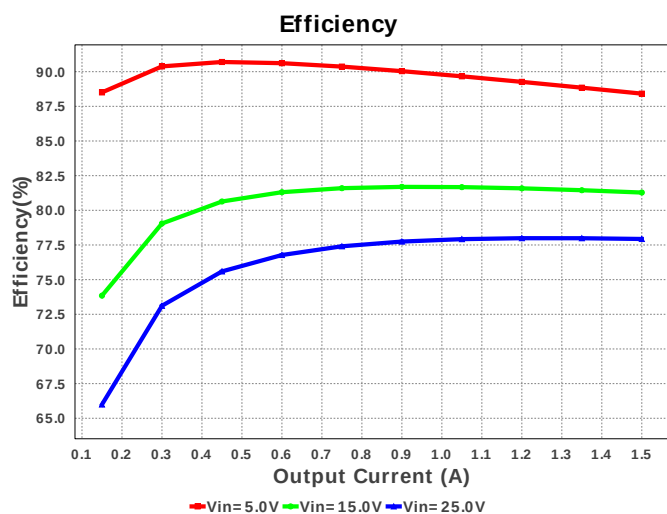
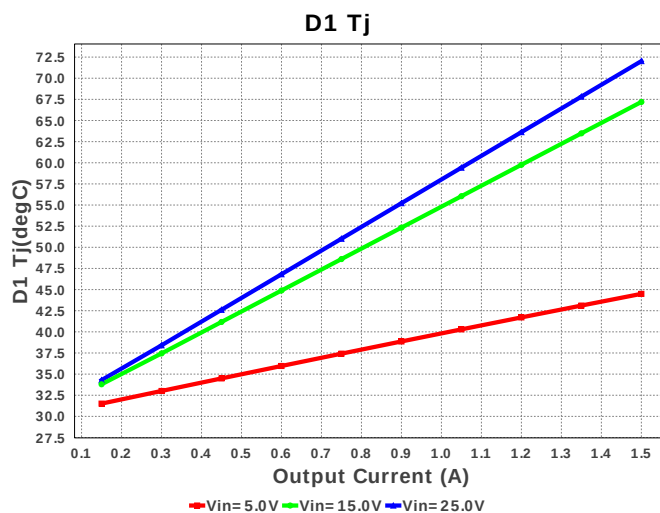
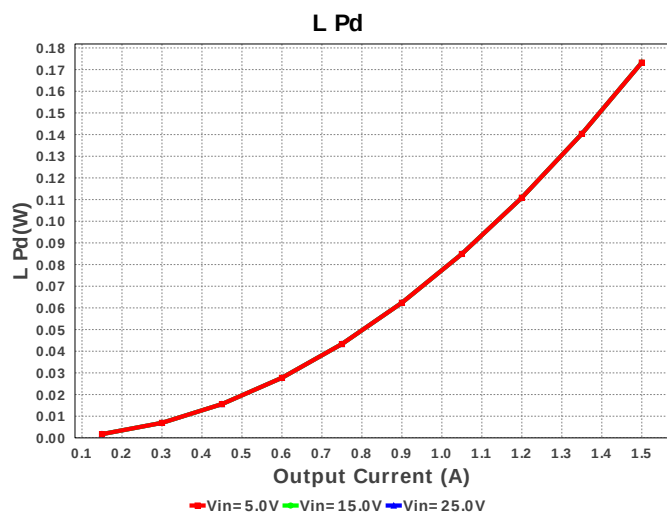
No comments

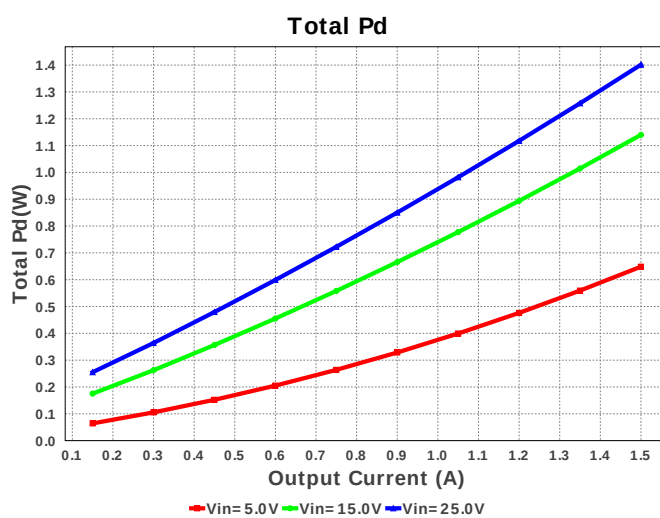
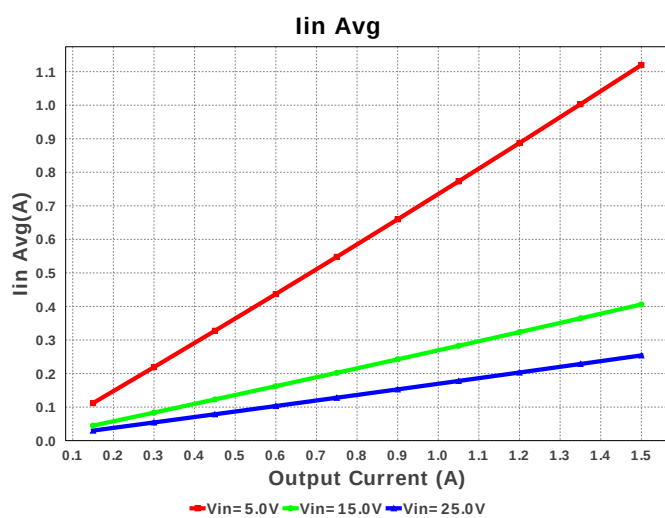
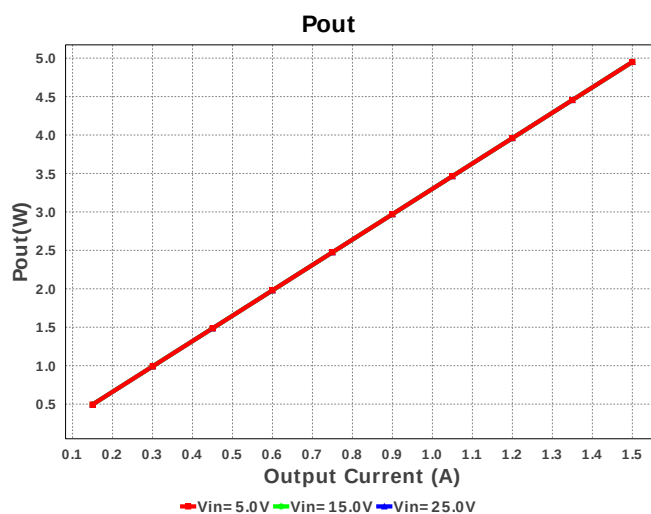
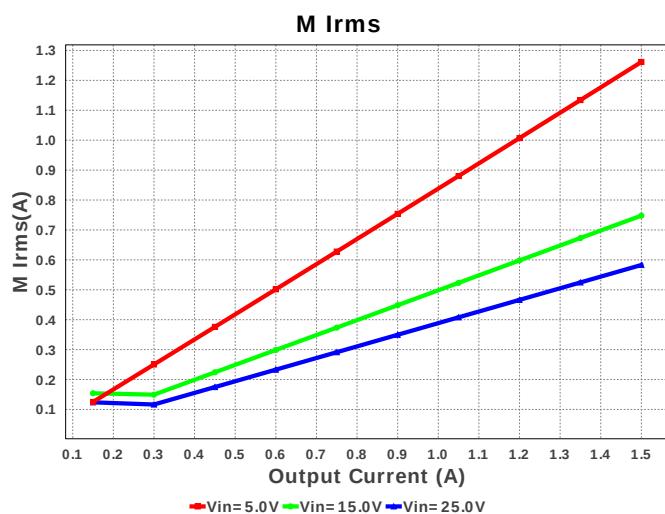
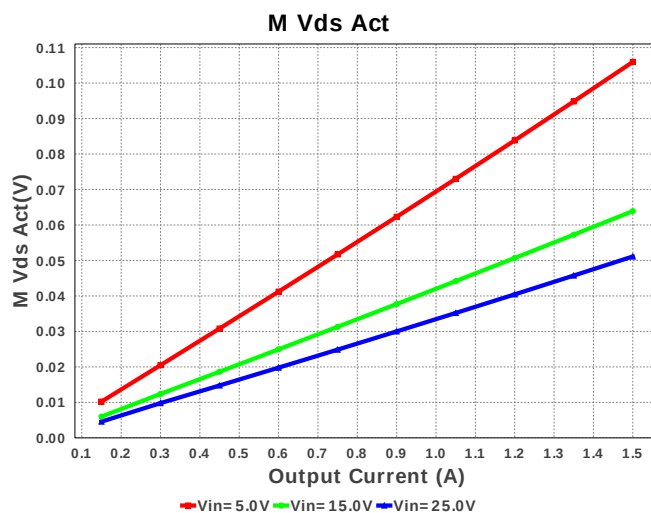
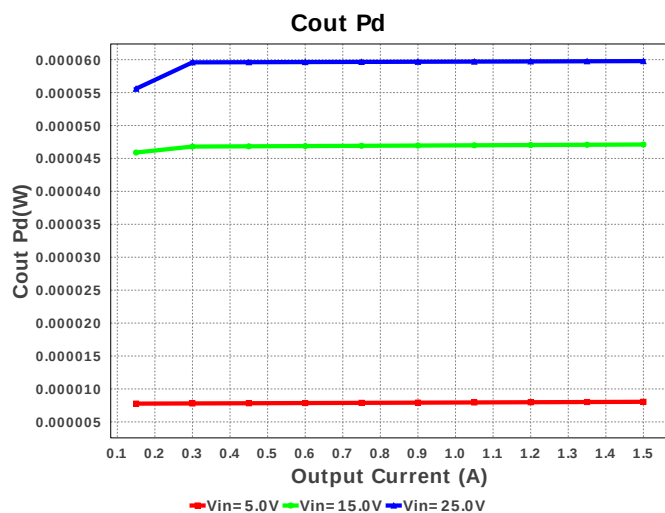
Electrical BOM

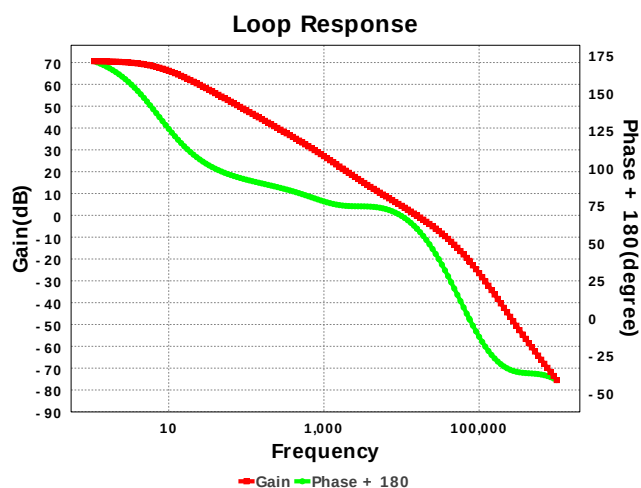
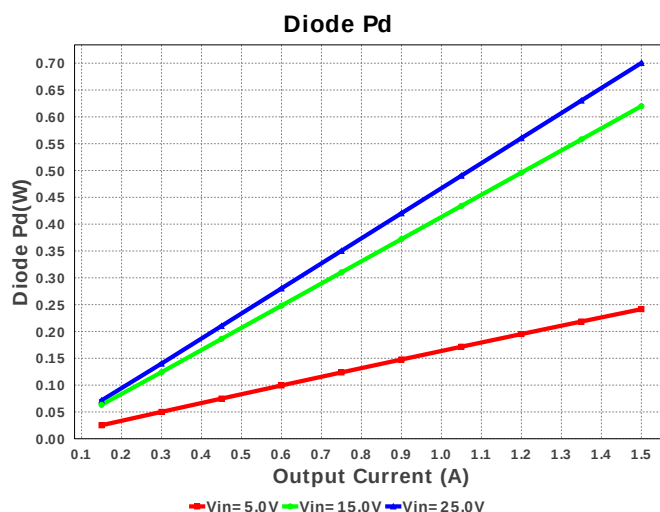
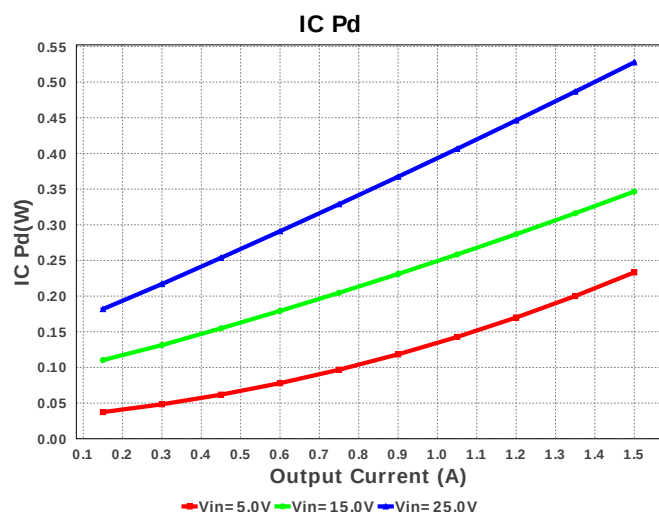
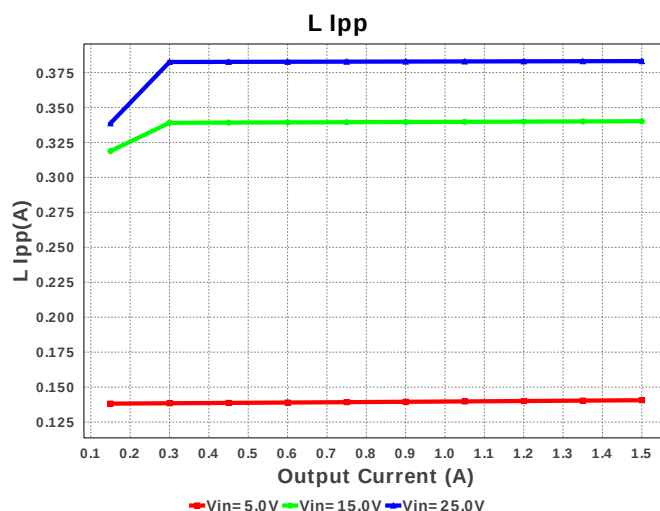
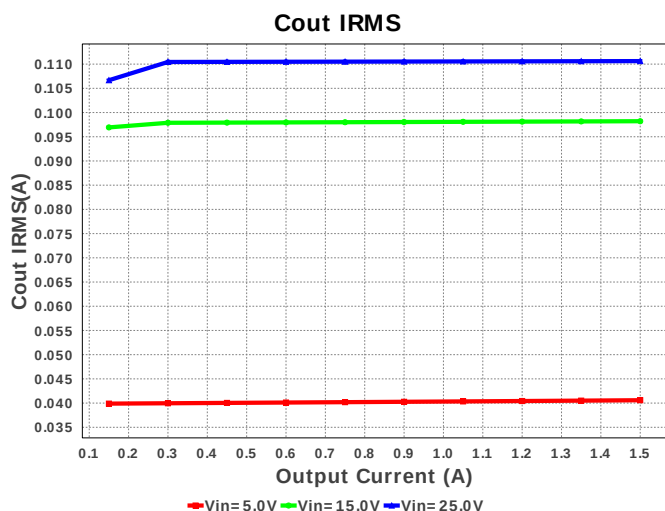
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	MuRata	GRM155R61A104KA01D Series= X5R	Cap= 100.0 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm ²
2.	Ccomp	MuRata	GRM1885C1H242JA01D Series= C0G/NP0	Cap= 2.4 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0603 5 mm ²
3.	Ccomp2	Kemet	C0805C470K5GACTU Series= C0G/NP0	Cap= 47.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
4.	Cin	MuRata	GRM32ER71H475KA88L Series= X7R	Cap= 4.7 uF ESR= 2.0 mOhm VDC= 50.0 V IRMS= 5.35 A	2	\$0.19	1210 15 mm ²
5.	Cout	MuRata	GRM31CR60J107ME39L Series= X5R	Cap= 100.0 uF ESR= 4.885 mOhm VDC= 6.3 V IRMS= 4.4118 A	1	\$0.14	1206_190 11 mm ²
6.	Css	MuRata	GRM033R61A822KA01D Series= X5R	Cap= 8.2 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	0201 2 mm ²
7.	D1	Fairchild Semiconductor	SS24FL	VF@Io= 550.0 mV VRRM= 40.0 V	1	\$0.07	SOD-123F 12 mm ²
8.	L1	Bourns	SRN8040-150M	L= 15.0 µH DCR= 70.0 mOhm	1	\$0.22	SRN8040 100 mm ²
9.	Rcomp	Vishay-Dale	CRCW040233K2FKED Series= CRCW..e3	Res= 33.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
10.	Rfbb	Yageo America	RT0805BRD073K28L Series= RT0805	Res= 3.28 kOhm Power= 125.0 mW Tolerance= 0.1%	1	\$0.05	0805 7 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	Rfbt	Vishay-Dale	CRCW040210K2FKED Series= CRCW..e3	Res= 10.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
12.	U1	Texas Instruments	TPS54331DDAR	Switcher	1	\$0.65	 DDA0008H 57 mm²









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	319.168 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	110.622 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	1.692 A	Current	Peak switch current in IC
4.	Iin Avg	254.06 mA	Current	Average input current
5.	L Ipp	383.21 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	582.856 mA	Current	Q lavg
7.	BOM Count	13	General	Total Design BOM count
8.	FootPrint	239.0 mm ²	General	Total Foot Print Area of BOM components
9.	Frequency	570.0 kHz	General	Switching frequency
10.	M Vds Act	51.117 mV	General	Voltage drop across the MosFET
11.	Mode	CCM	General	Conduction Mode

#	Name	Value	Category	Description
12.	Pout	4.95 W	General	Total output power
13.	Total BOM	\$1.57	General	Total BOM Cost
14.	D1 Tj	72.026 degC	Op_Point	D1 junction temperature
15.	Low Freq Gain	70.605 dB	Op_Point	Gain at 10Hz
16.	Vout Actual	3.288 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
17.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
18.	Cross Freq	15.718 kHz	Op_point	Bode plot crossover frequency
19.	Duty Cycle	15.099 %	Op_point	Duty cycle
20.	Efficiency	77.933 %	Op_point	Steady state efficiency
21.	Gain Marg	-20.858 dB	Op_point	Bode Plot Gain Margin
22.	IC Tj	55.701 degC	Op_point	IC junction temperature
23.	ICThetaJA	48.7 degC/W	Op_point	IC junction-to-ambient thermal resistance
24.	IOUT_OP	1.5 A	Op_point	Iout operating point
25.	Phase Marg	60.028 deg	Op_point	Bode Plot Phase Margin
26.	VIN_OP	25.0 V	Op_point	Vin operating point
27.	Vout p-p	2.034 mV	Op_point	Peak-to-peak output ripple voltage
28.	Cin Pd	101.868 µW	Power	Input capacitor power dissipation
29.	Cout Pd	59.779 µW	Power	Output capacitor power dissipation
30.	Diode Pd	700.436 mW	Power	Diode power dissipation
31.	IC Pd	527.731 mW	Power	IC power dissipation
32.	L Pd	173.25 mW	Power	Inductor power dissipation
33.	Total Pd	1.402 W	Power	Total Power Dissipation
34.	Vout Tolerance	4.362 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	1.5	Maximum Output Current
2.	VinMax	25.0	Maximum input voltage
3.	VinMin	5.0	Minimum input voltage
4.	Vout	3.3	Output Voltage
5.	base_pn	TPS54331	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **TPS54331** Product Folder : <http://www.ti.com/product/TPS54331> : contains the data sheet and other resources.

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