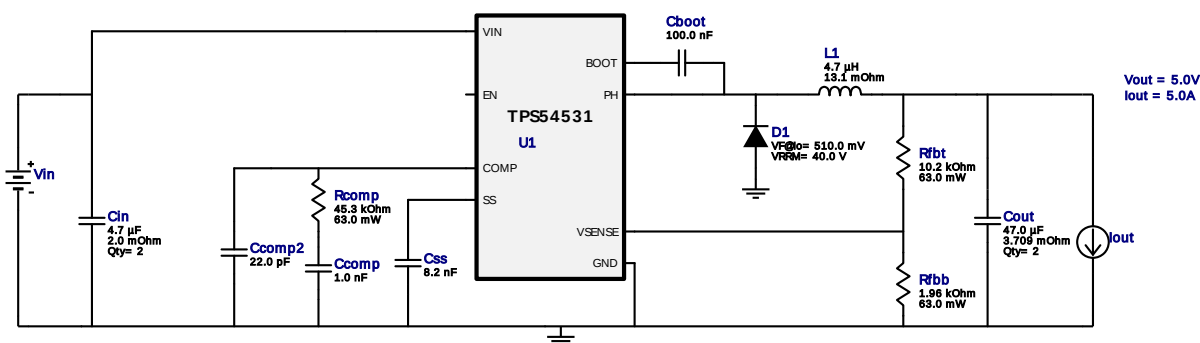


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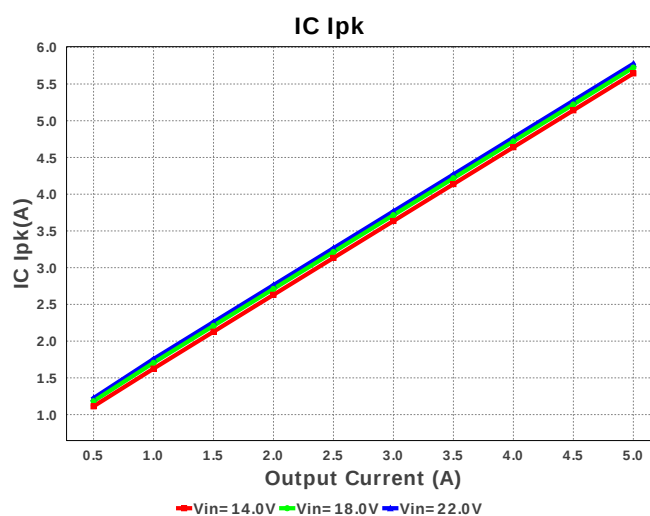
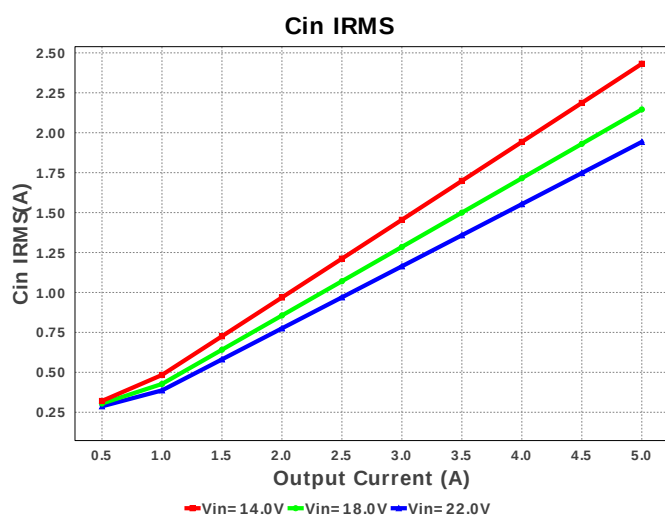
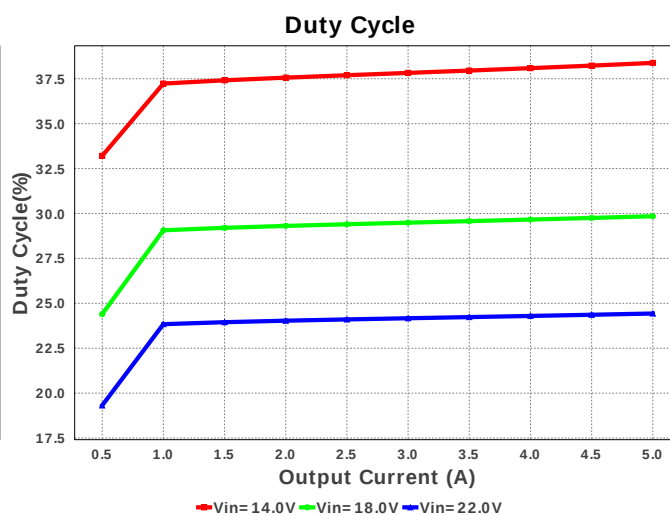
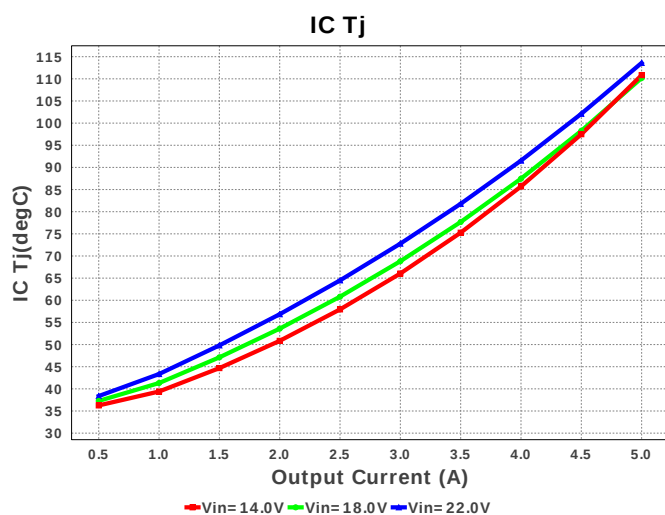
Design : 4739804/7 TPS54531DDAR
TPS54531DDAR 14.0V-22.0V to 5.00V @ 5.0A

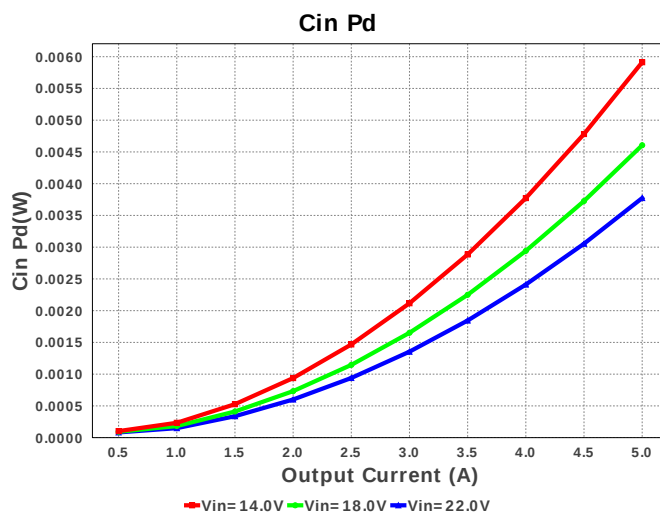
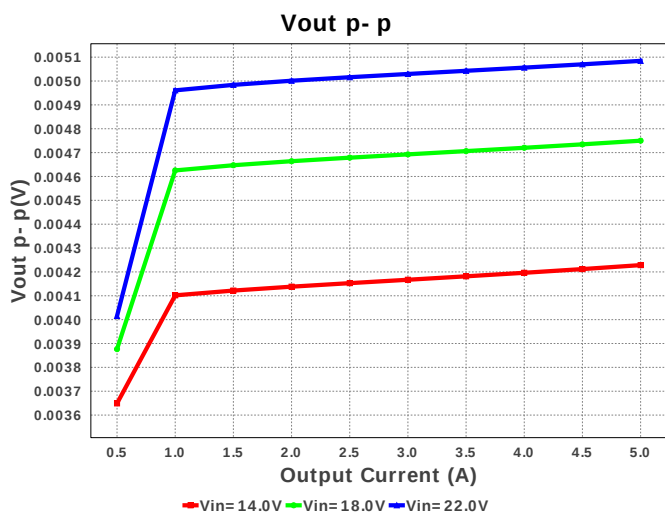
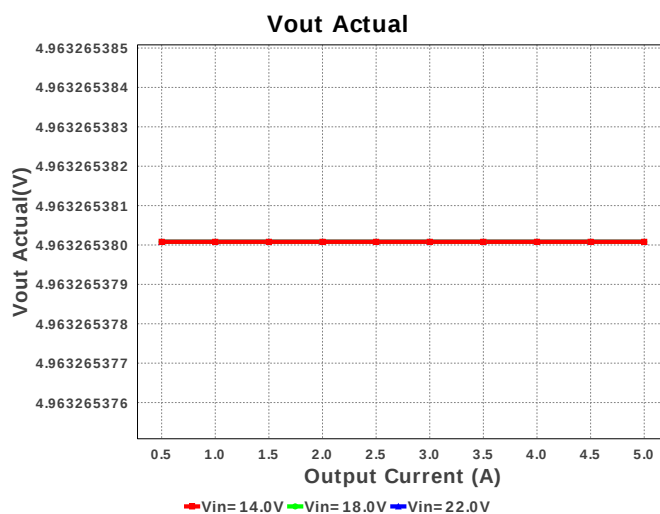
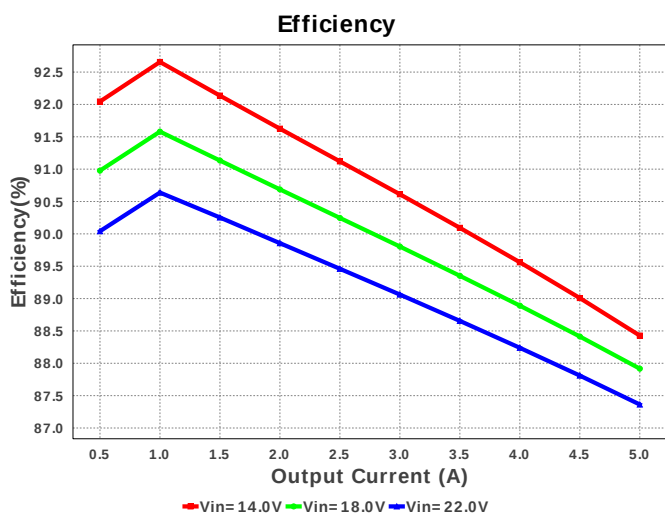
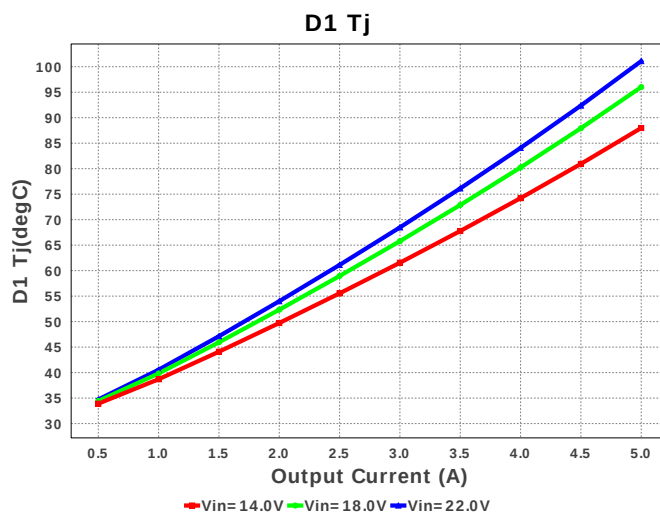
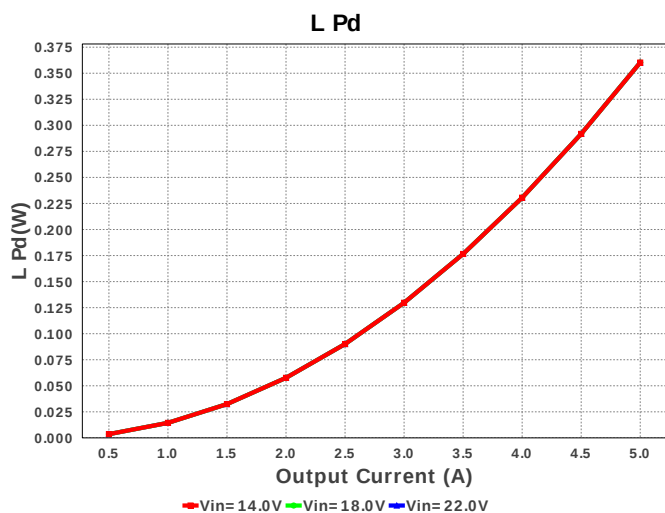


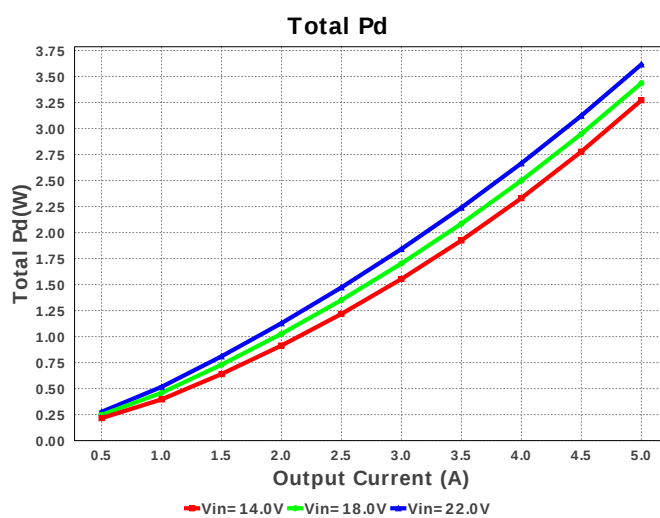
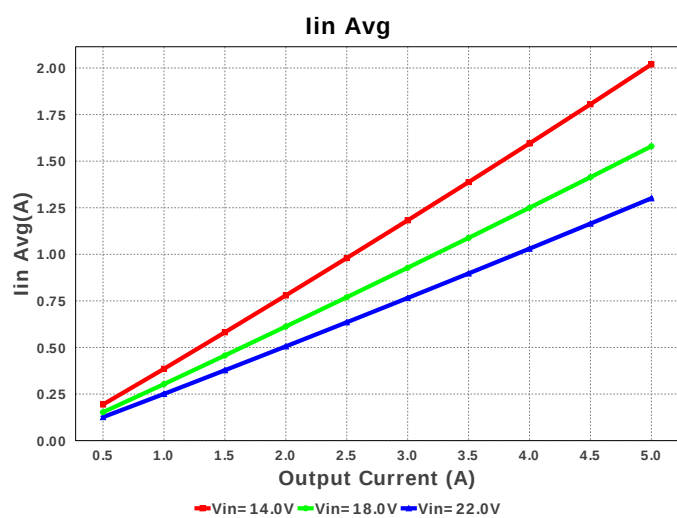
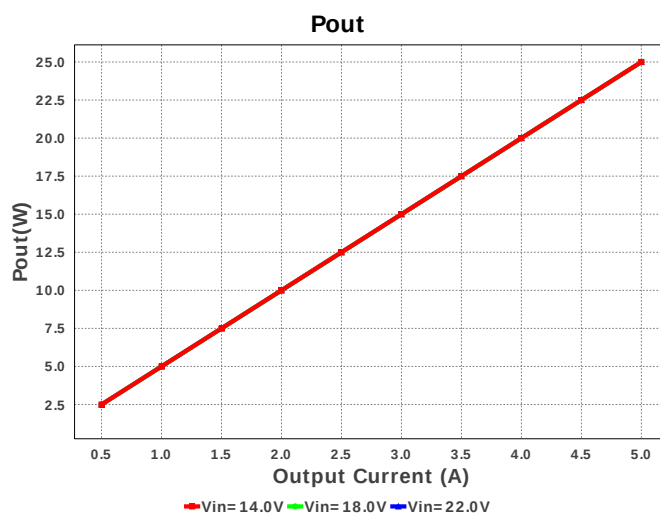
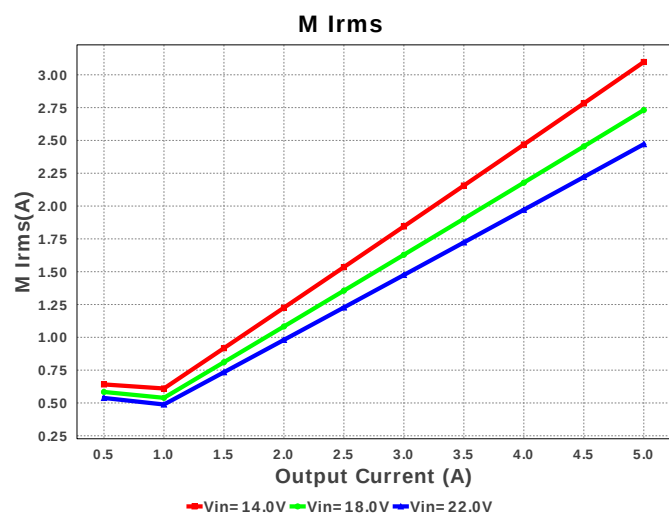
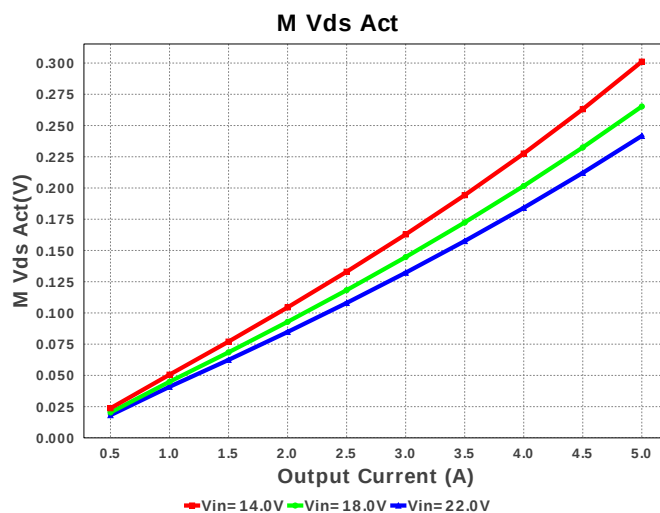
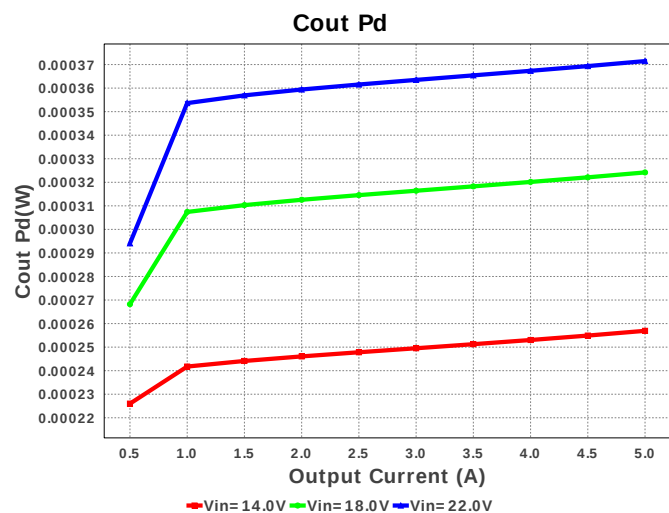
Electrical BOM

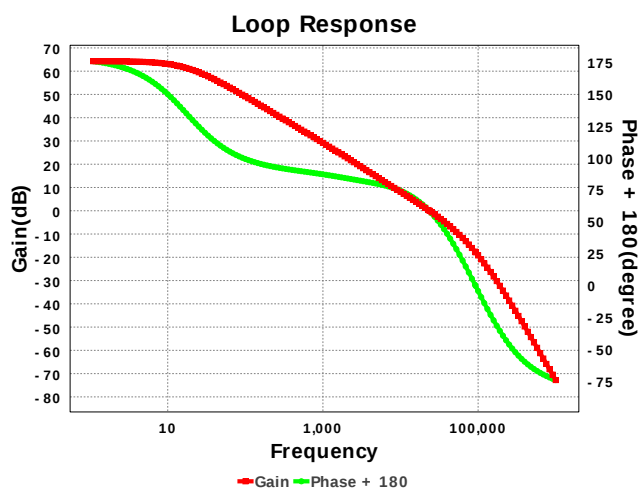
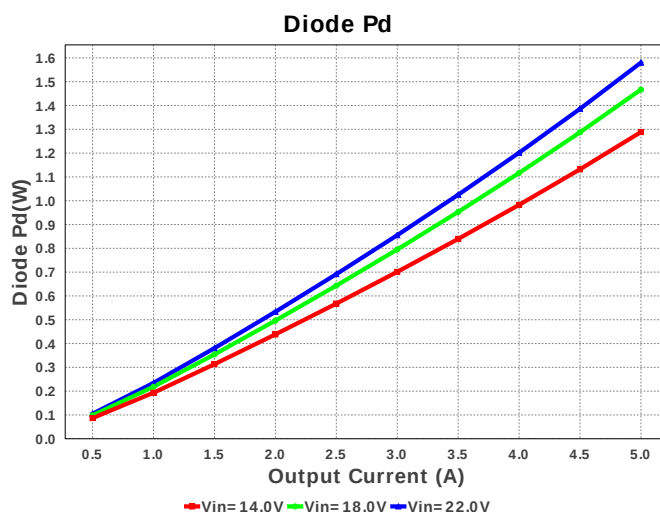
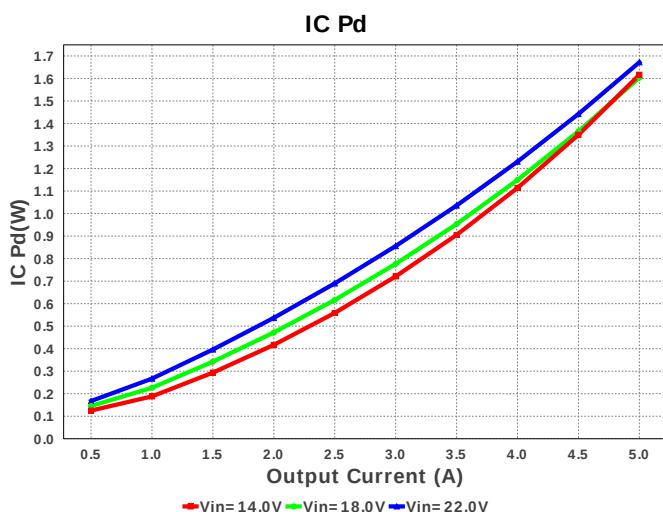
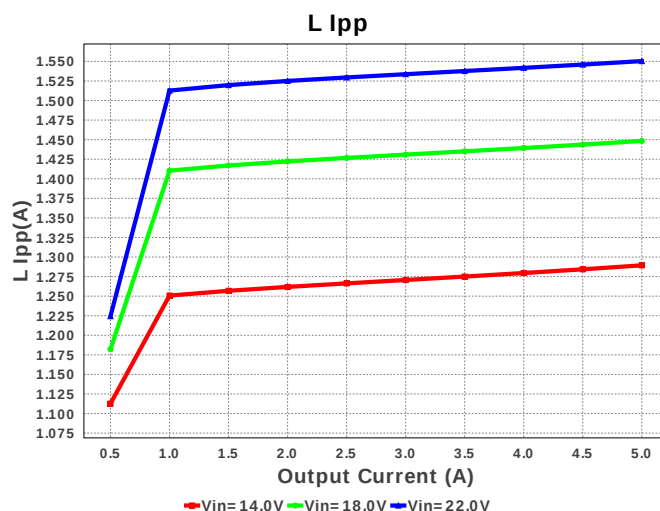
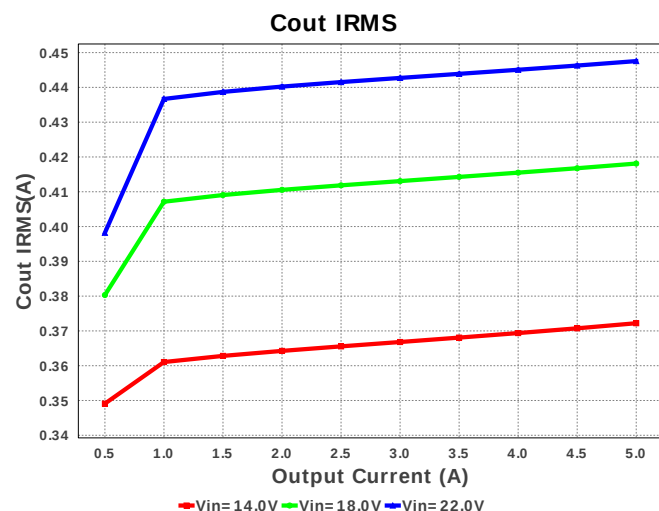
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	MuRata	GRM155R61A104KA01D Series= X5R	Cap= 100.0 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm ²
2.	Ccomp	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
3.	Ccomp2	Kemet	C0805C220K3GACTU Series= C0G/NP0	Cap= 22.0 pF VDC= 25.0 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	GRM31CR61A476KE15L Series= X5R	Cap= 47.0 uF ESR= 3.709 mOhm VDC= 10.0 V IRMS= 4.2862 A	2	\$0.15	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	Vishay-Semiconductor	50WQ04FNPBF	VF@Io= 510.0 mV VRRM= 40.0 V	1	\$0.40	DPAK 102 mm ²
8.	L1	Coilcraft	XAL6060-472MEB	L= 4.7 uH DCR= 13.1 mOhm	1	\$0.82	XAL6060 72 mm ²
9.	Rcomp	Vishay-Dale	CRCW040245K3FKED Series= CRCW..e3	Res= 45.3 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
10.	Rfbb	Vishay-Dale	CRCW04021K96FKED Series= CRCW..e3	Res= 1.96 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
11.	Rfht	Vishay-Dale	CRCW040210K2FKED Series= CRCW..e3	Res= 10.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
12.	U1	Texas Instruments	TPS54531DDAR	Switcher	1	\$0.75	 DDA0008E 57 mm ²









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	1.943 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	447.555 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	5.775 A	Current	Peak switch current in IC
4.	Iin Avg	1.301 A	Current	Average input current
5.	L Ipp	1.55 A	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	2.471 A	Current	Q lavg
7.	BOM Count	14	General	Total Design BOM count
8.	FootPrint	309.0 mm ²	General	Total Foot Print Area of BOM components
9.	Frequency	570.0 kHz	General	Switching frequency
10.	M Vds Act	241.693 mV	General	Voltage drop across the MosFET
11.	Pout	25.0 W	General	Total output power

#	Name	Value	Category	Description
12.	Total BOM	\$2.72	General	Total BOM Cost
13.	D1 Tj	101.103 degC	Op_Point	D1 junction temperature
14.	Low Freq Gain	64.282 dB	Op_Point	Gain at 10Hz
15.	Vout Actual	4.963 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
16.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
17.	Cross Freq	23.672 kHz	Op_point	Bode plot crossover frequency
18.	Duty Cycle	24.432 %	Op_point	Duty cycle
19.	Efficiency	87.363 %	Op_point	Steady state efficiency
20.	Gain Marg	-17.872 dB	Op_point	Bode Plot Gain Margin
21.	IC Tj	113.596 degC	Op_point	IC junction temperature
22.	ICThetaJA	50.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
23.	IOUT_OP	5.0 A	Op_point	Iout operating point
24.	Phase Marg	58.722 deg	Op_point	Bode Plot Phase Margin
25.	VIN_OP	22.0 V	Op_point	Vin operating point
26.	Vout p-p	5.084 mV	Op_point	Peak-to-peak output ripple voltage
27.	Cin Pd	3.774 mW	Power	Input capacitor power dissipation
28.	Cout Pd	371.467 μW	Power	Output capacitor power dissipation
29.	Diode Pd	1.58 W	Power	Diode power dissipation
30.	IC Pd	1.672 W	Power	IC power dissipation
31.	L Pd	360.25 mW	Power	Inductor power dissipation
32.	Total Pd	3.616 W	Power	Total Power Dissipation
33.	Vout Tolerance	5.254 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	5.0	Maximum Output Current
2.	VinMax	22.0	Maximum input voltage
3.	VinMin	14.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	base_pn	TPS54531	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **TPS54531** Product Folder : <http://www.ti.com/product/TPS54531> : contains the data sheet and other resources.

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