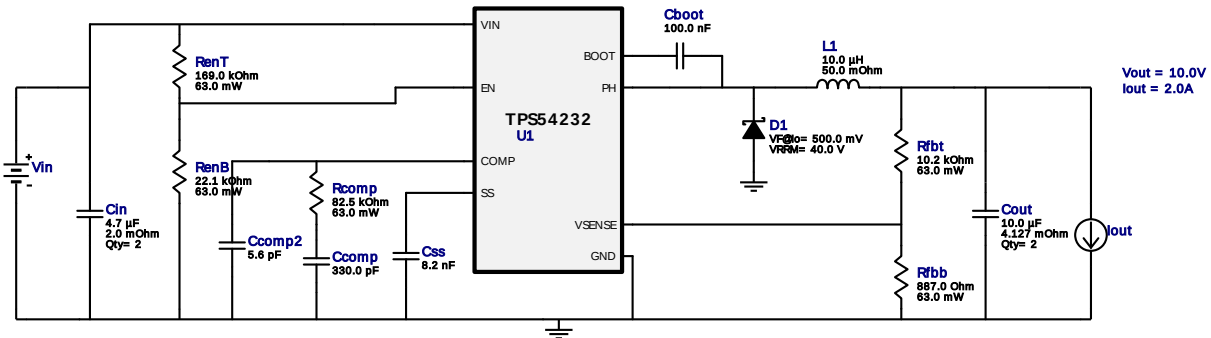


WEBENCH® Design Report

Design : 4764957/3 TPS54232DR
TPS54232DR 18.0V-22.0V to 10.00V @ 2.0A



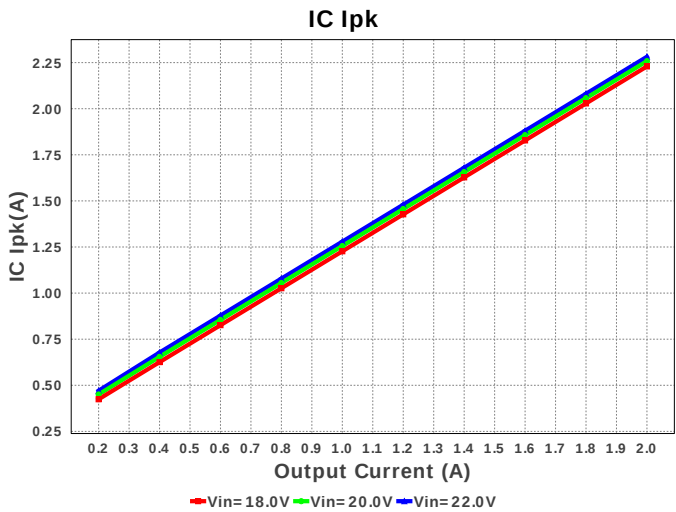
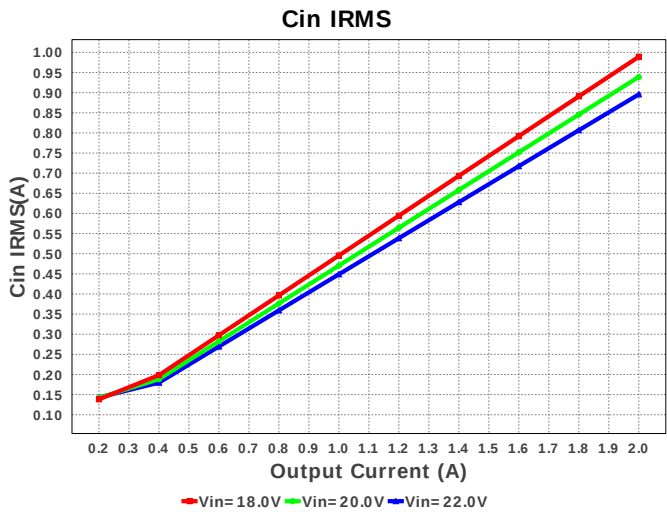
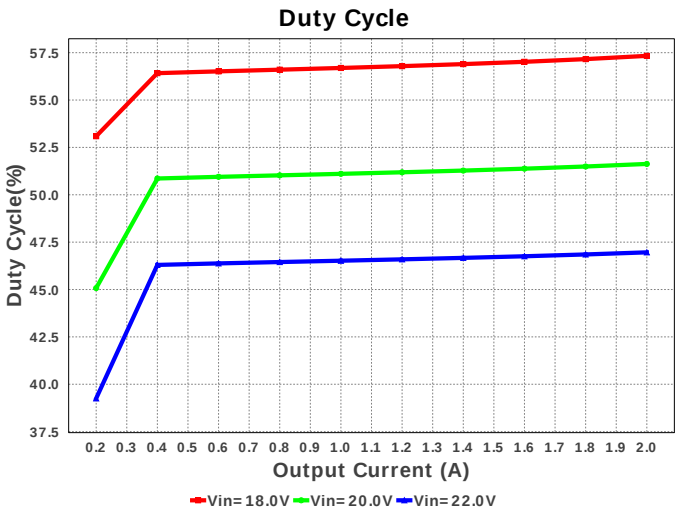
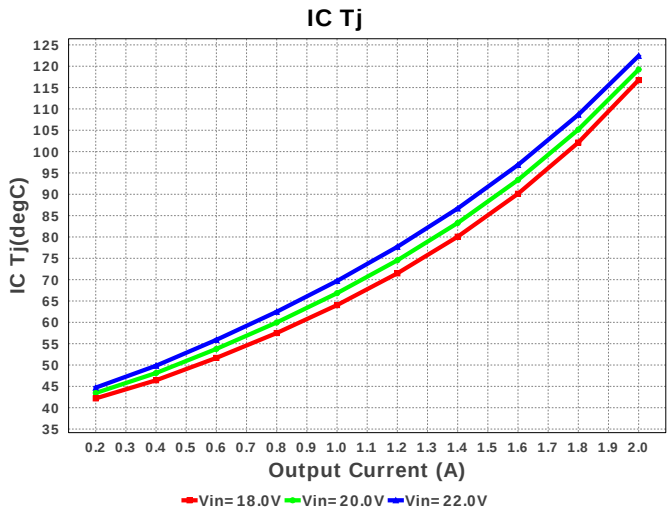
Electrical BOM

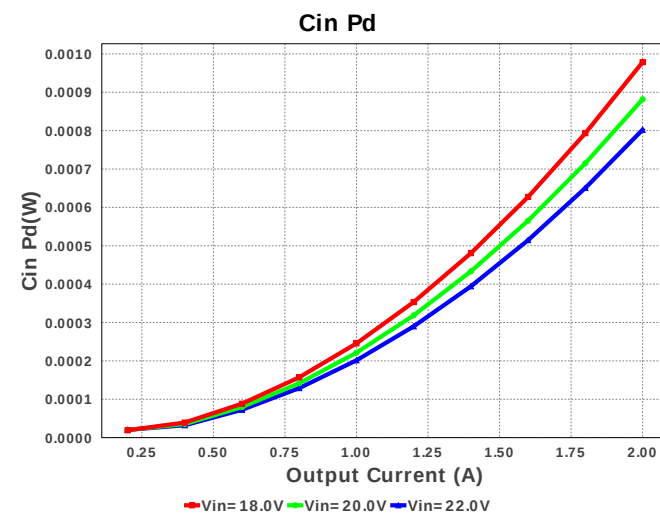
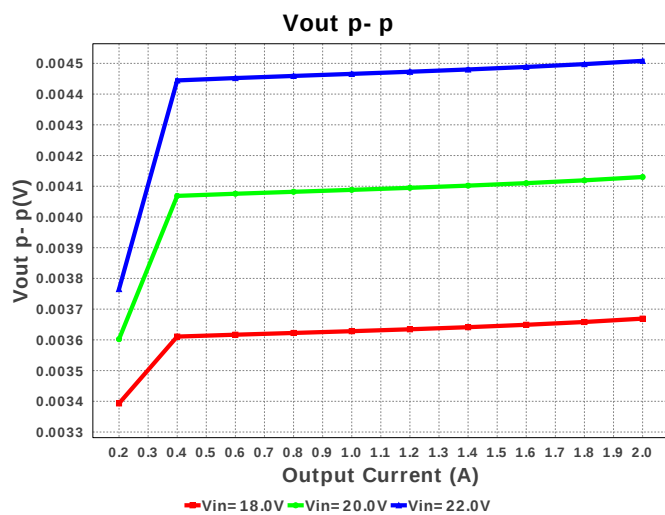
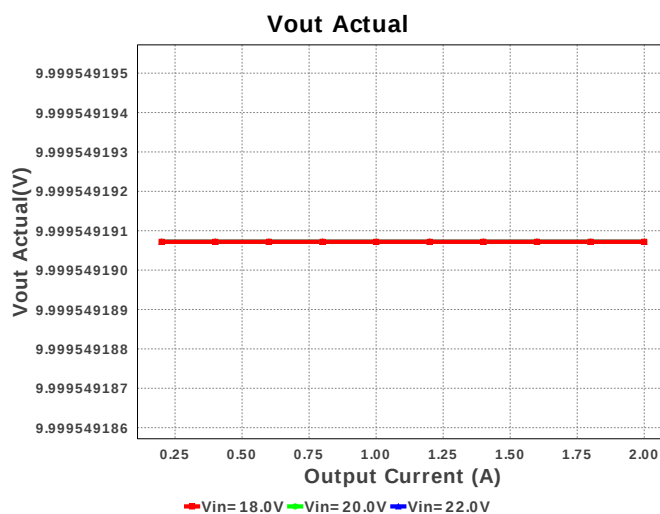
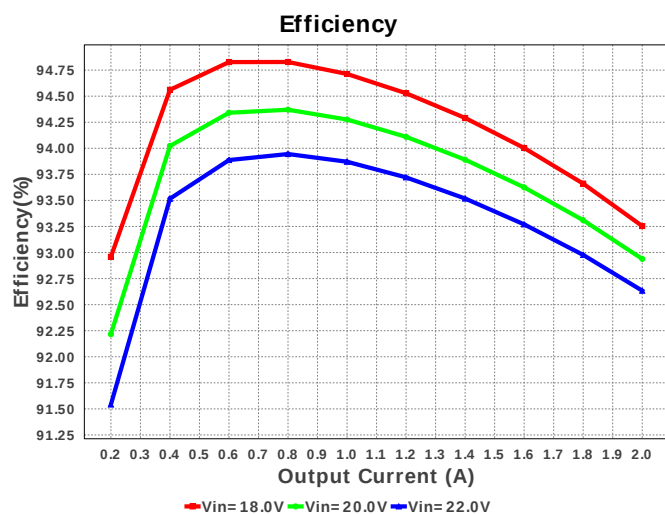
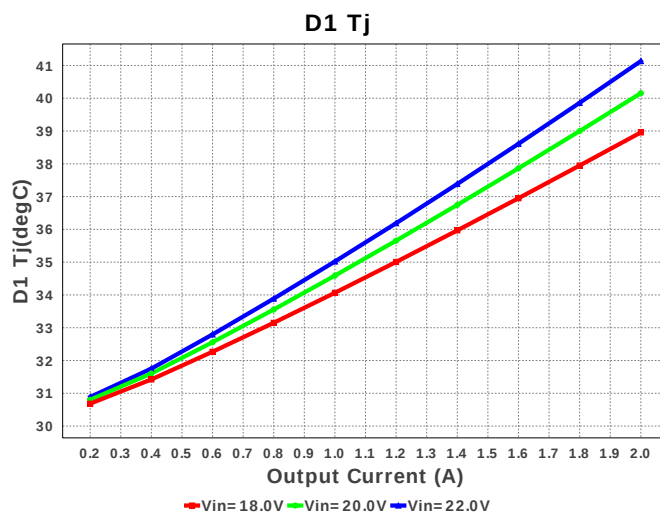
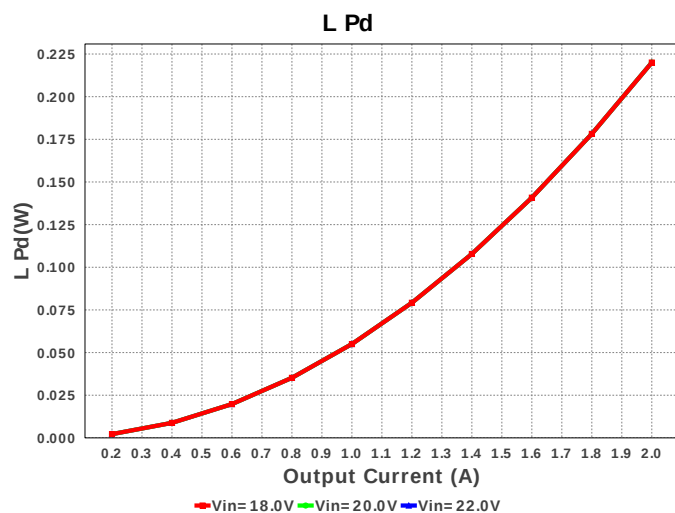
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	MuRata	GRM155R61A104KA01D Series= X5R	Cap= 100.0 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	 0402 3 mm ²
2.	Ccomp	Samsung Electro-Mechanics	CL21C331JBANFNC Series= C0G/NP0	Cap= 330.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²
3.	Ccomp2	MuRata	GRM1555C1H5R6CA01D Series= C0G/NP0	Cap= 5.6 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0402 3 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	GRM21BR61C106KE15L Series= X5R	Cap= 10.0 uF ESR= 4.127 mOhm VDC= 16.0 V IRMS= 2.46634 A	2	\$0.03	 0805 7 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	Diodes Inc.	B240A-13-F	VF@Io= 500.0 mV VRRM= 40.0 V	1	\$0.09	 SMA 37 mm ²
8.	L1	Bourns	SRN8040-100M	L= 10.0 uH DCR= 50.0 mOhm	1	\$0.22	 SRN8040 100 mm ²
9.	Rcomp	Vishay-Dale	CRCW040282K5FKED Series= CRCW..e3	Res= 82.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
10.	RenB	Vishay-Dale	CRCW040222K1FKED Series= CRCW..e3	Res= 22.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
11.	RenT	Vishay-Dale	CRCW0402169KFKED Series= CRCW..e3	Res= 169.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²

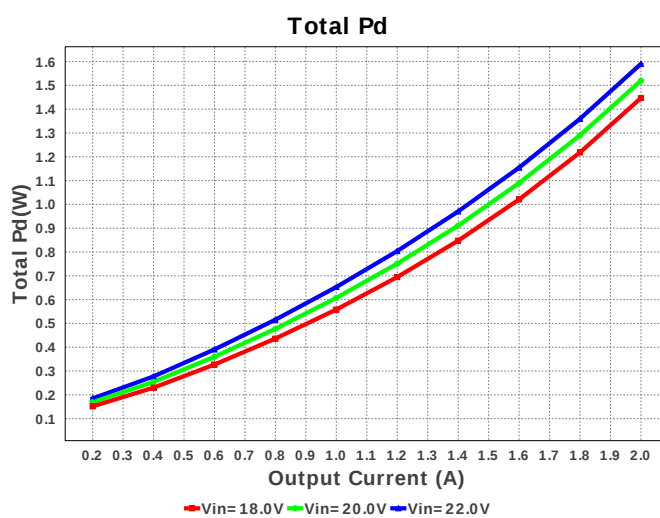
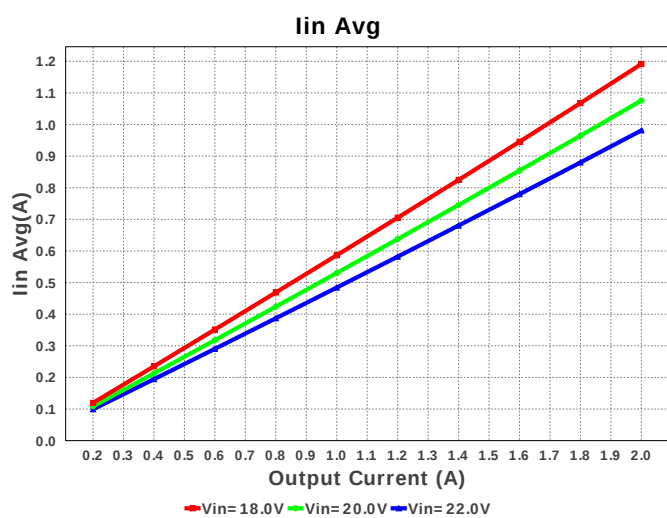
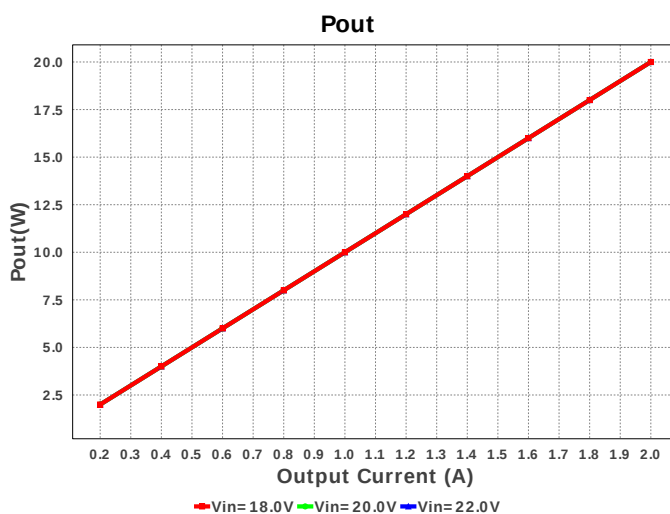
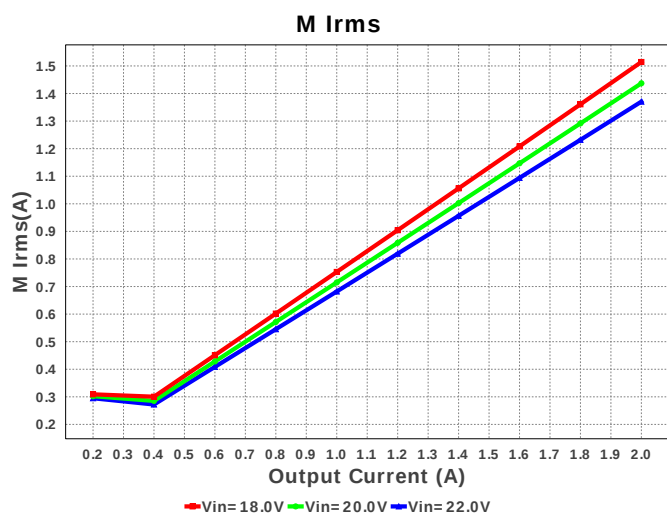
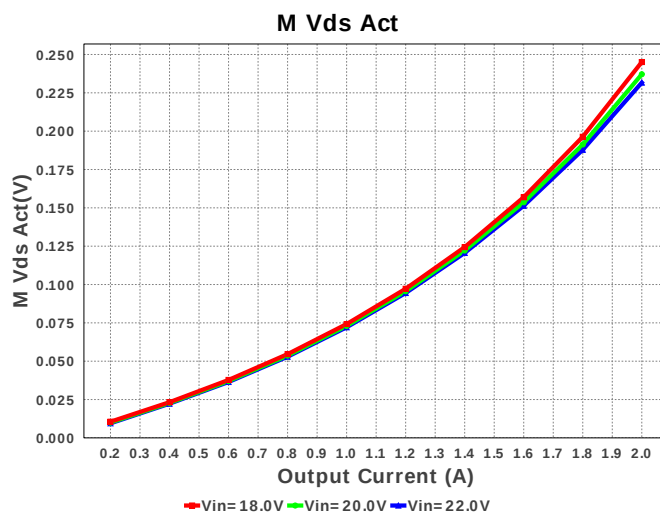
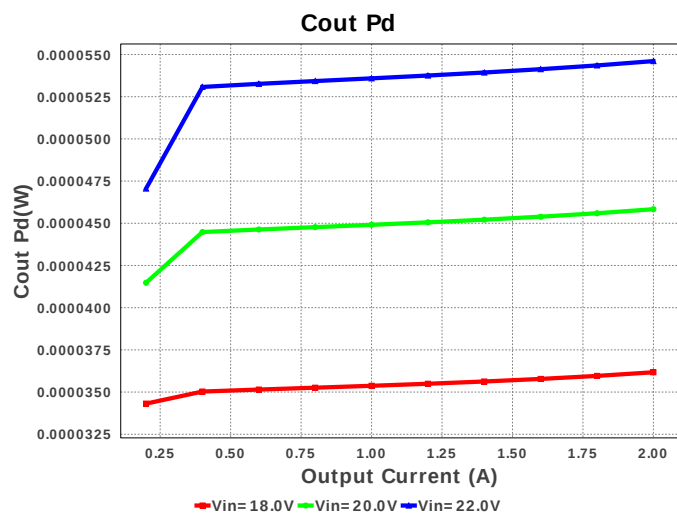
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
12.	Rfbb	Vishay-Dale	CRCW0402887RFKED Series= CRCW..e3	Res= 887.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
13.	Rfbt	Vishay-Dale	CRCW040210K2FKED Series= CRCW..e3	Res= 10.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
14.	U1	Texas Instruments	TPS54232DR	Switcher	1	\$0.55	

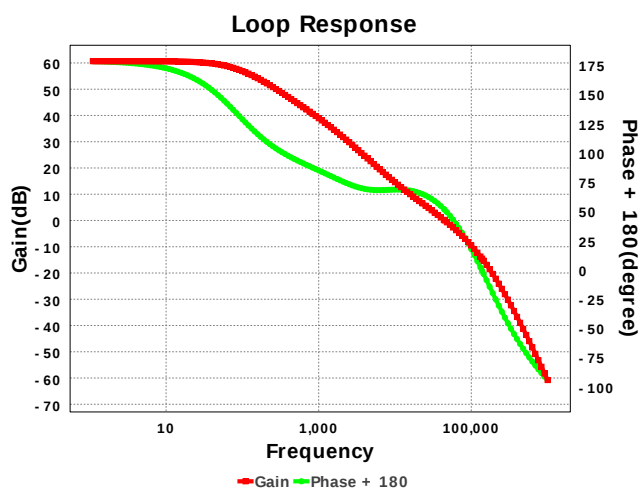
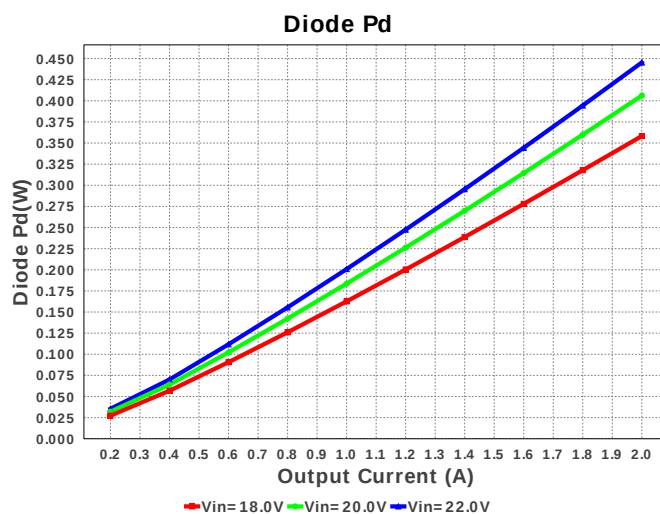
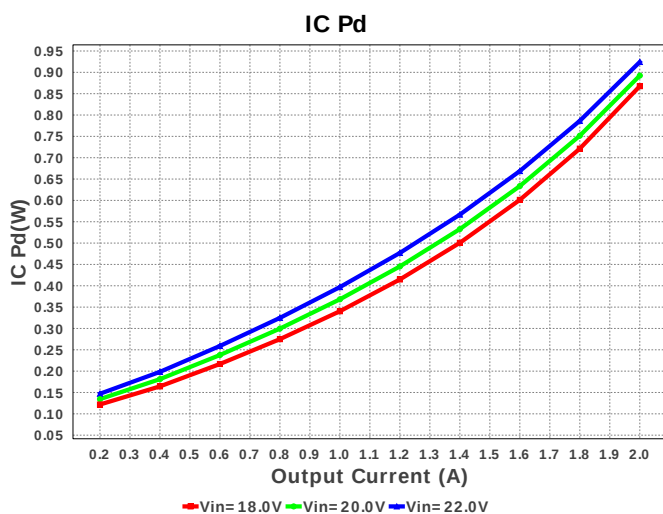
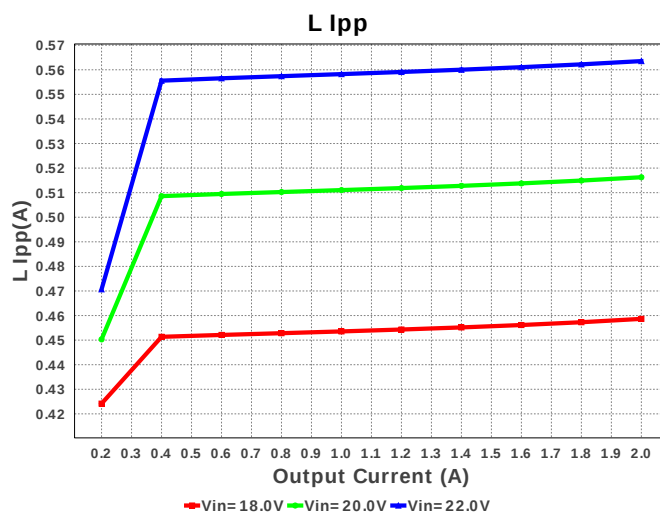
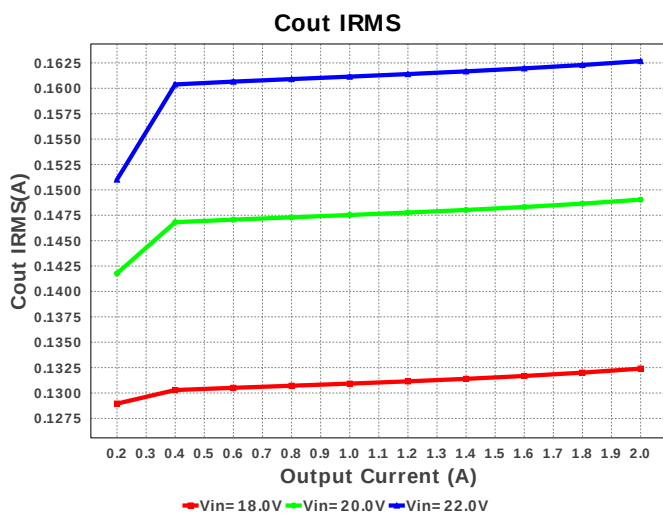


D0008A 57 mm²









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	895.714 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	162.678 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.282 A	Current	Peak switch current in IC
4.	Iin Avg	981.38 mA	Current	Average input current
5.	L Ipp	563.53 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	1.371 A	Current	Q lavg
7.	BOM Count	16	General	Total Design BOM count
8.	FootPrint	267.0 mm ²	General	Total Foot Print Area of BOM components
9.	Frequency	1000.0 kHz	General	Switching frequency
10.	M Vds Act	231.657 mV	General	Voltage drop across the MosFET
11.	Mode	CCM	General	Conduction Mode

#	Name	Value	Category	Description
12.	Pout	20.0 W	General	Total output power
13.	Total BOM	\$1.39	General	Total BOM Cost
14.	D1 Tj	41.133 degC	Op_Point	D1 junction temperature
15.	Low Freq Gain	60.666 dB	Op_Point	Gain at 10Hz
16.	Vout Actual	10.0 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
17.	Vout OP	10.0 V	Op_Point	Operational Output Voltage
18.	Cross Freq	44.782 kHz	Op_point	Bode plot crossover frequency
19.	Duty Cycle	46.961 %	Op_point	Duty cycle
20.	Efficiency	92.634 %	Op_point	Steady state efficiency
21.	Gain Marg	-14.518 dB	Op_point	Bode Plot Gain Margin
22.	IC Tj	122.426 degC	Op_point	IC junction temperature
23.	ICThetaJA	100.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
24.	IOUT_OP	2.0 A	Op_point	Iout operating point
25.	Phase Marg	52.108 deg	Op_point	Bode Plot Phase Margin
26.	VIN_OP	22.0 V	Op_point	Vin operating point
27.	Vout p-p	4.508 mV	Op_point	Peak-to-peak output ripple voltage
28.	Cin Pd	802.303 μW	Power	Input capacitor power dissipation
29.	Cout Pd	54.609 μW	Power	Output capacitor power dissipation
30.	Diode Pd	445.322 mW	Power	Diode power dissipation
31.	IC Pd	924.261 mW	Power	IC power dissipation
32.	L Pd	220.0 mW	Power	Inductor power dissipation
33.	Total Pd	1.59 W	Power	Total Power Dissipation
34.	Vout Tolerance	5.424 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	2.0	Maximum Output Current
2.	VinMax	22.0	Maximum input voltage
3.	VinMin	18.0	Minimum input voltage
4.	Vout	10.0	Output Voltage
5.	base_pn	TPS54232	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **TPS54232** Product Folder : <http://www.ti.com/product/TPS54232> : contains the data sheet and other resources.

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