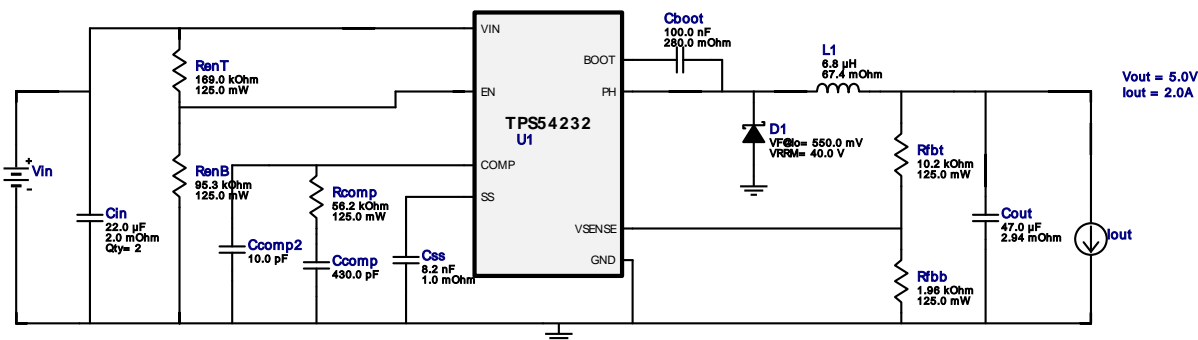


WEBENCH® Design Report

Design : 4530725/56 TPS54232DR
Leawood R2 TPS54232DR 6.0V-18.0V to 5.00V @ 2.0A



My Comments

No comments

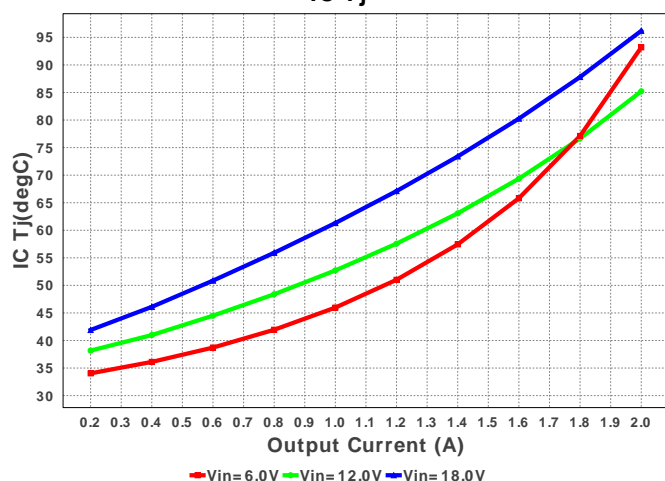
Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
2.	Ccomp	Samsung Electro-Mechanics	CL21C431JBANNNC Series= C0G/NP0	Cap= 430.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.03	0805 7 mm ²
3.	Ccomp2	Kemet	C0805C100K5GACTU Series= C0G/NP0	Cap= 10.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
4.	Cin	MuRata	GRM32ER61E226KE15L Series= X5R	Cap= 22.0 uF ESR= 2.0 mOhm VDC= 25.0 V IRMS= 3.67 A	2	\$0.18	1210 15 mm ²
5.	Cout	TDK	C2012X5R1A476M125AC Series= X5R	Cap= 47.0 uF ESR= 2.94 mOhm VDC= 10.0 V IRMS= 3.80451 A	1	\$0.29	0805 7 mm ²
6.	Css	MuRata	GRM188R71E822KA01D Series= X7R	Cap= 8.2 nF ESR= 1.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.02	0603 5 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	Coilcraft	XAL4030-682MEB	L= 6.8 uH DCR= 67.4 mOhm	1	\$0.72	XAL4030 25 mm ²
9.	Rcomp	Panasonic	ERJ-6ENF5622V Series= ERJ-6E	Res= 56.2 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	0805 7 mm ²
10.	RenB	Panasonic	ERJ-6ENF9532V Series= ERJ-6E	Res= 95.3 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	0805 7 mm ²

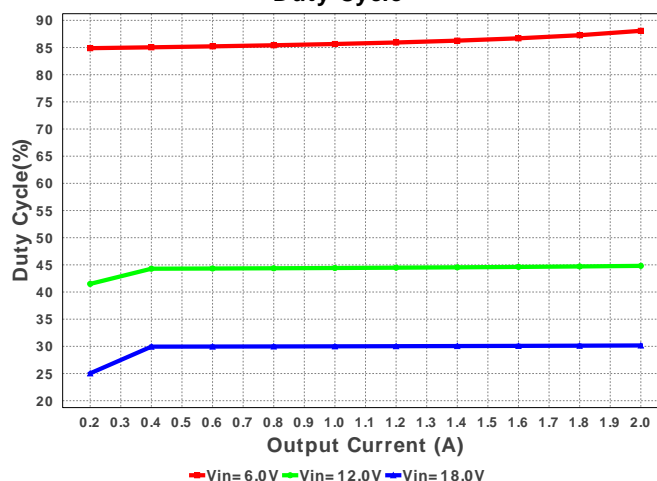
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	RenT	Panasonic	ERJ-6ENF1693V Series= ERJ-6E	Res= 169.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	0805 7 mm ²
12.	Rfbb	Panasonic	ERJ-6ENF1961V Series= ERJ-6E	Res= 1.96 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	0805 7 mm ²
13.	Rfbt	Panasonic	ERJ-6ENF1022V Series= ERJ-6E	Res= 10.2 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	0805 7 mm ²
14.	U1	Texas Instruments	TPS54232DR	Switcher	1	\$0.55	

D0008A 57 mm²

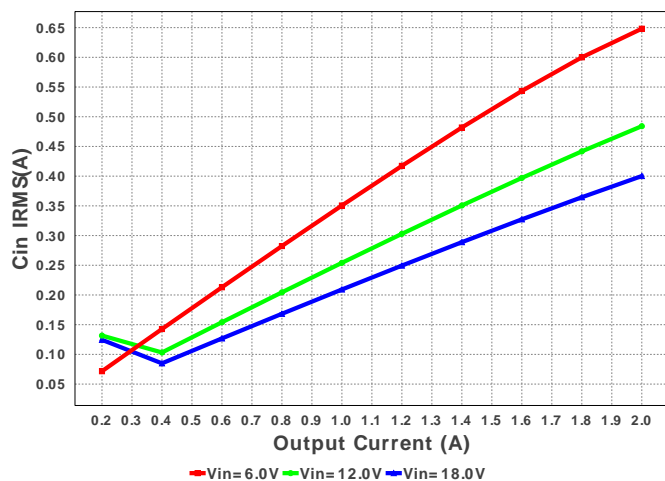
IC Tj



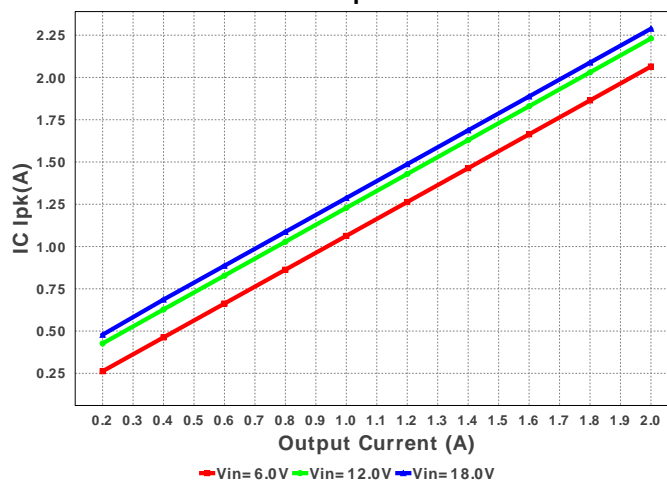
Duty Cycle

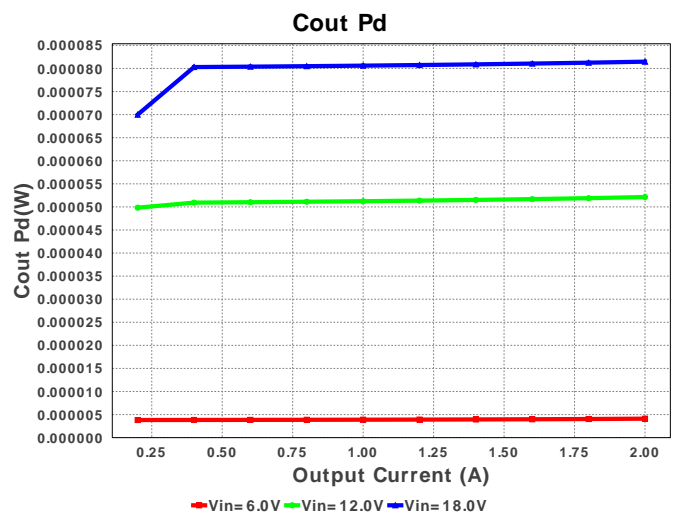
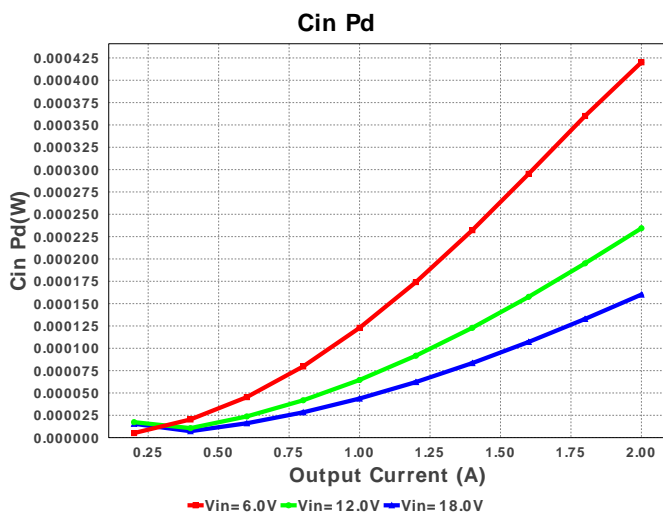
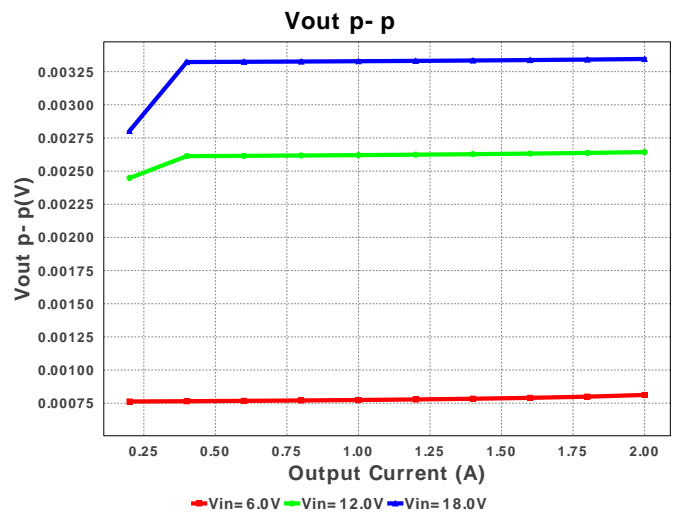
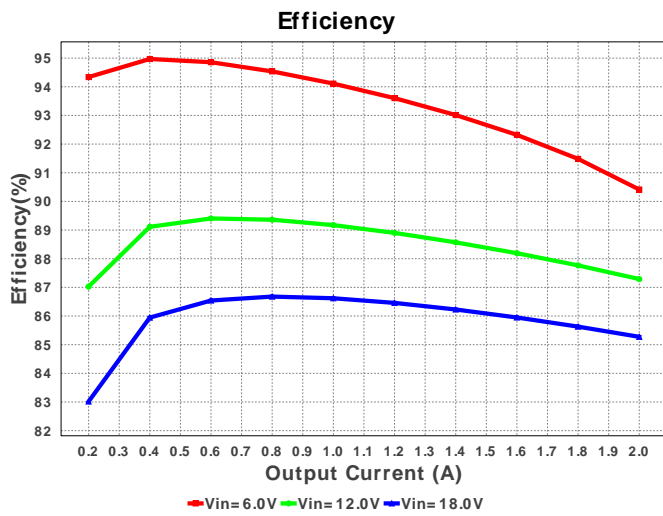
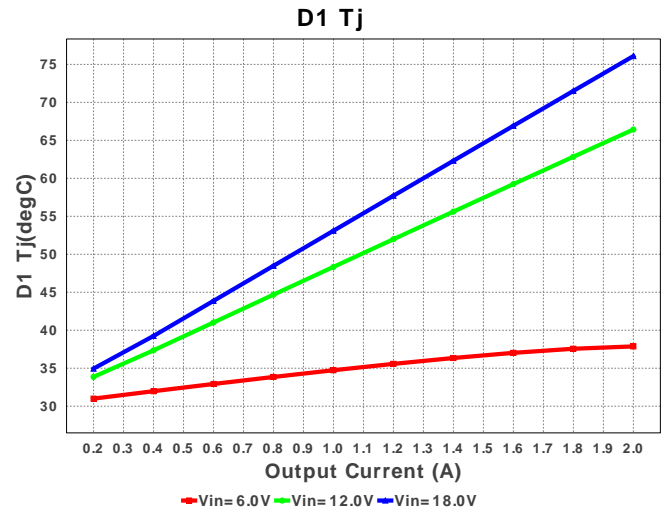
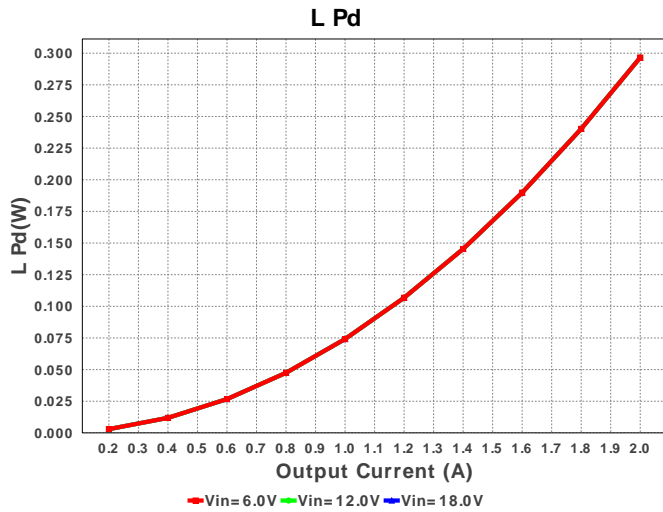


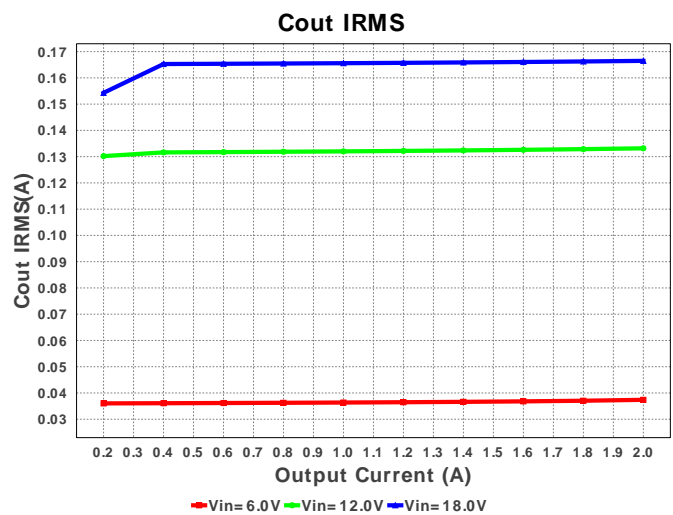
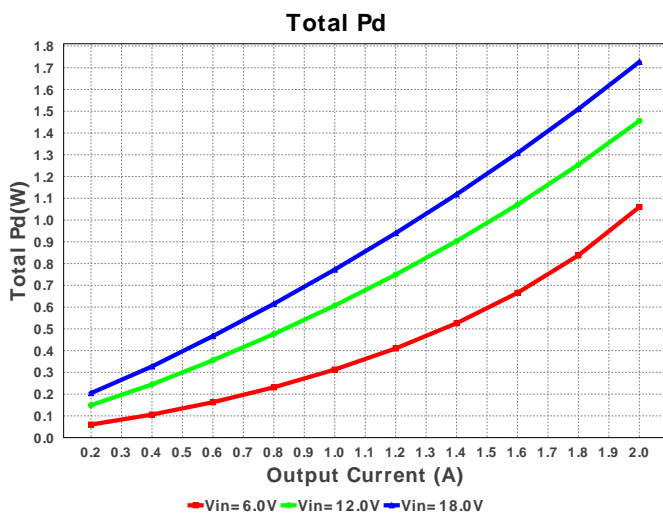
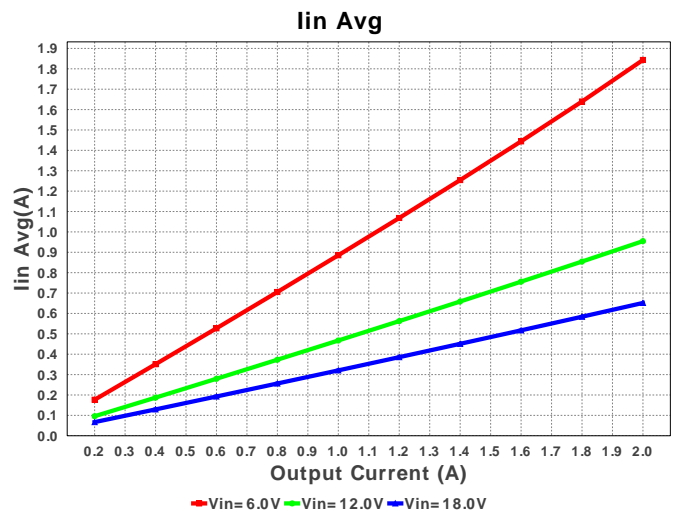
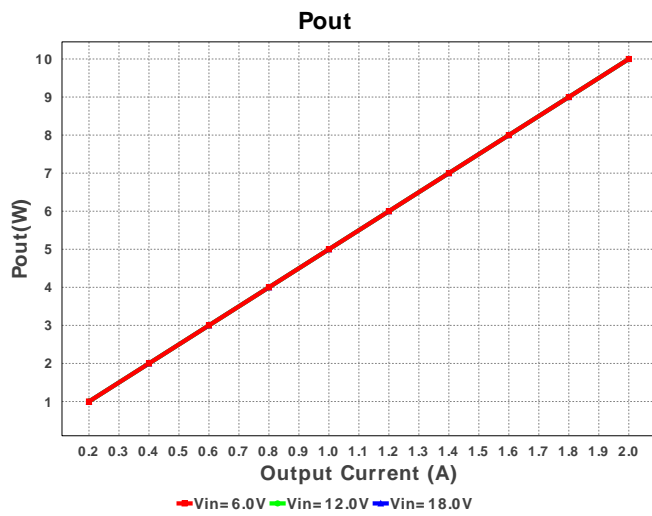
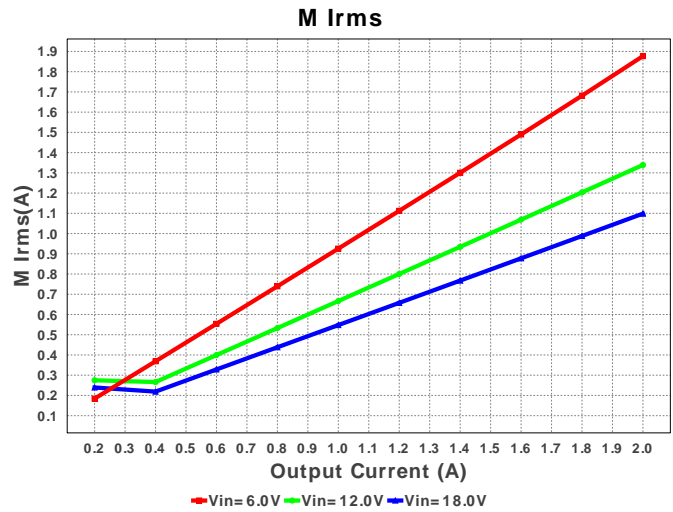
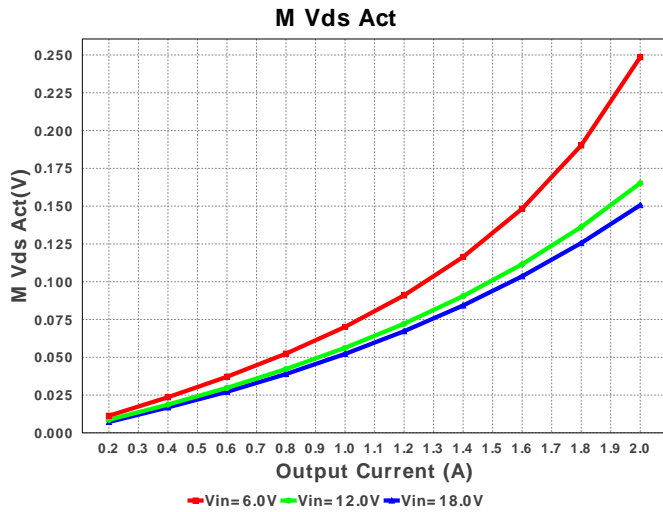
Cin IRMS

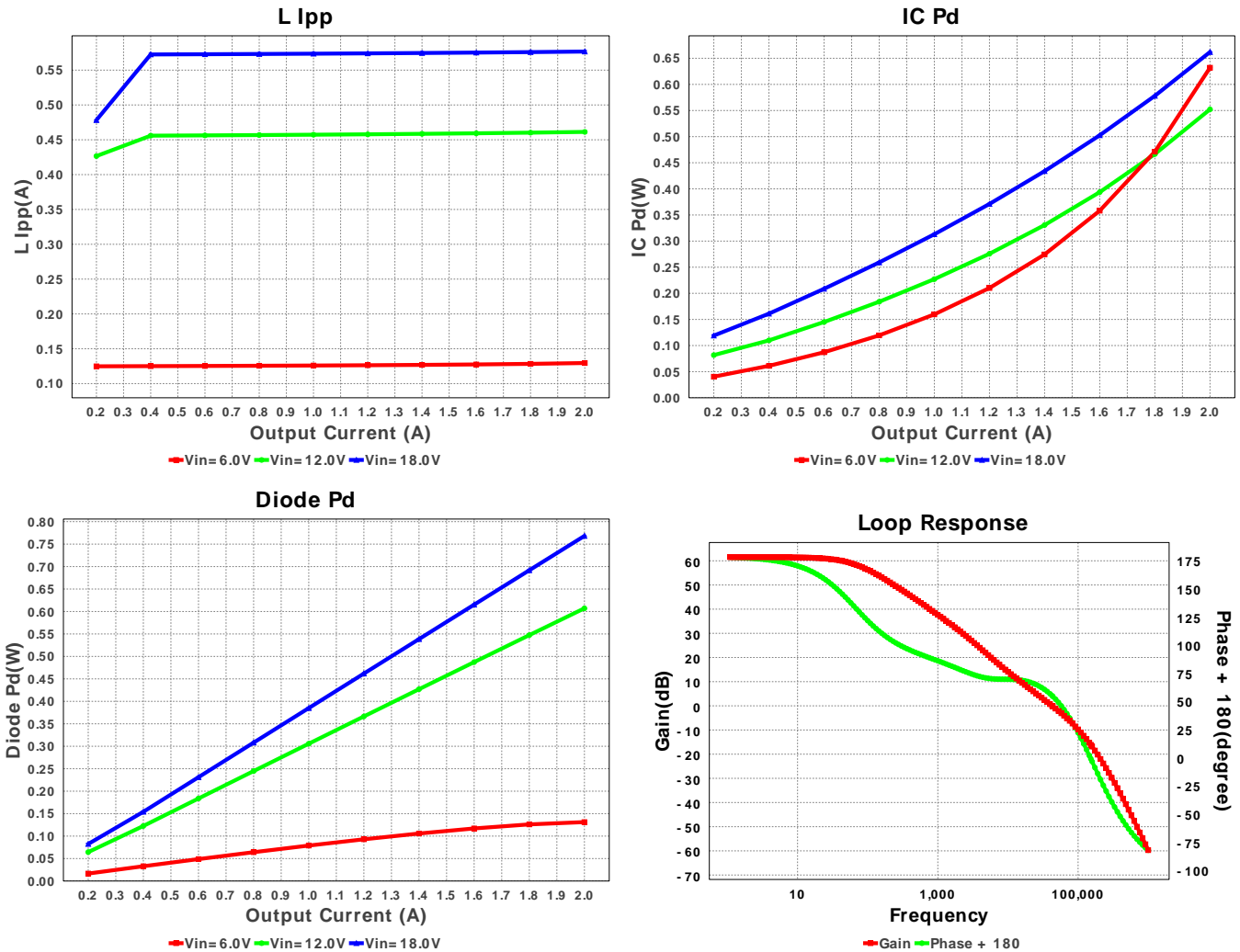


IC Ipk









Operating Values

#	Name	Value	Category	Description
1.	BOM Count	15		Total Design BOM count
2.	Total BOM	\$2.11		Total BOM Cost
3.	Cin IRMS	400.173 mA	Current	Input capacitor RMS ripple current
4.	Cout IRMS	166.469 mA	Current	Output capacitor RMS ripple current
5.	IC Ipk	2.288 A	Current	Peak switch current in IC
6.	Iin Avg	651.5 mA	Current	Average input current
7.	L Ipp	576.667 mA	Current	Peak-to-peak inductor ripple current
8.	M1 Irms	1.098 A	Current	Q Iavg
9.	FootPrint	188.0 mm ²	General	Total Foot Print Area of BOM components
10.	Frequency	1000.0 kHz	General	Switching frequency
11.	M Vds Act	150.661 mV	General	Voltage drop across the MosFET
12.	Mode	CCM	General	Conduction Mode
13.	Pout	10.0 W	General	Total output power
14.	D1 Tj	76.092 degC	Op_Point	D1 junction temperature
15.	Low Freq Gain	61.509 dB	Op_Point	Gain at 1Hz
16.	Vout Actual	4.963 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
17.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
18.	Cross Freq	42.707 kHz	Op_point	Bode plot crossover frequency
19.	Duty Cycle	30.164 %	Op_point	Duty cycle
20.	Efficiency	85.274 %	Op_point	Steady state efficiency
21.	Gain Marg	-16.128 dB	Op_point	Bode Plot Gain Margin
22.	IC Tj	96.193 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	55.931 deg	Op_point	Bode Plot Phase Margin
26.	VIN_OP	18.0 V	Op_point	Vin operating point
27.	Vout p-p	3.345 mV	Op_point	Peak-to-peak output ripple voltage
28.	Cin Pd	160.139 μW	Power	Input capacitor power dissipation
29.	Cout Pd	81.474 μW	Power	Output capacitor power dissipation
30.	Diode Pd	768.195 mW	Power	Diode power dissipation
31.	IC Pd	661.932 mW	Power	IC power dissipation

#	Name	Value	Category	Description
32.	L Pd	296.56 mW	Power	Inductor power dissipation
33.	Total Pd	1.727 W	Power	Total Power Dissipation
34.	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	2.0	Maximum Output Current
2.	VinMax	18.0	Maximum input voltage
3.	VinMin	6.0	Minimum input voltage
4.	Vout	5.0	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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