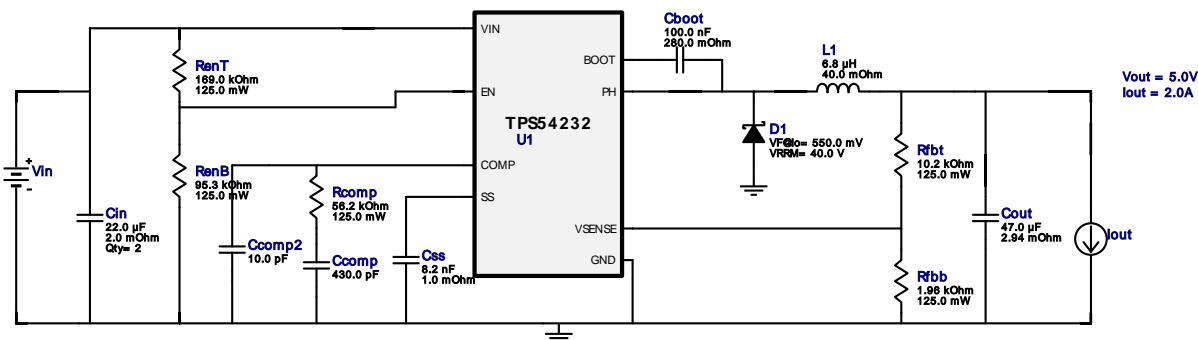


## WEBENCH® Design Report

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



### My Comments

No comments

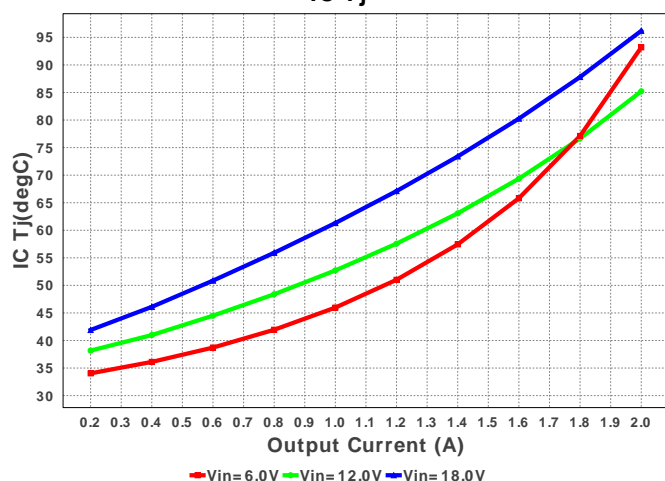
### Electrical BOM

#	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 <sup>2</sup>
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 <sup>2</sup>
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 <sup>2</sup>
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 <sup>2</sup>
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 <sup>2</sup>
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 <sup>2</sup>
7.	D1	Fairchild Semiconductor	SS24FL	VF@Io= 550.0 mV VRRM= 40.0 V	1	\$0.07	SOD-123F 12 mm <sup>2</sup>
8.	L1	Bourns	SDR0805-6R8ML	L= 6.8 uH DCR= 40.0 mOhm	1	\$0.23	SDR0805 96 mm <sup>2</sup>
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 <sup>2</sup>
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 <sup>2</sup>

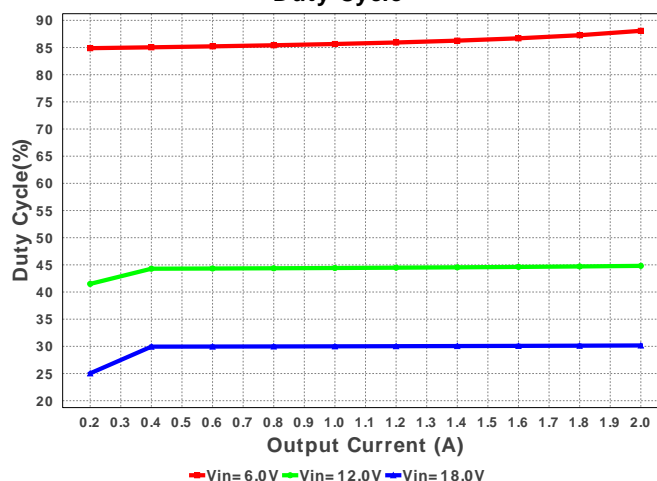
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	RenT	Panasonic	ERJ-6ENF1693V Series= ERJ-6E	Res= 169.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	0805 7 mm <sup>2</sup>
12.	Rfbb	Panasonic	ERJ-6ENF1961V Series= ERJ-6E	Res= 1.96 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	0805 7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

D0008A 57 mm<sup>2</sup>

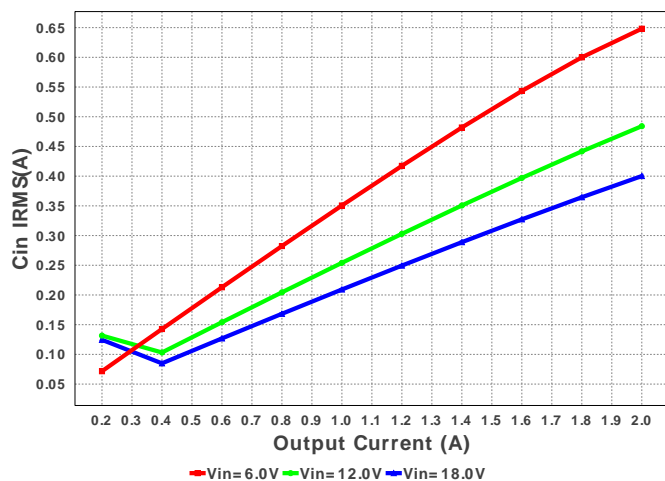
IC Tj



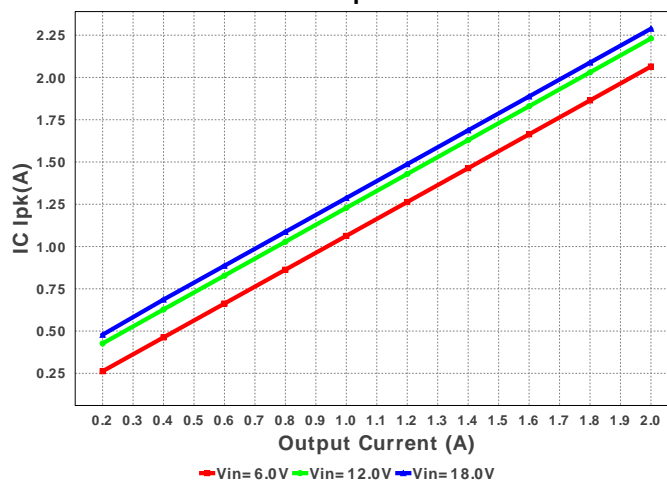
Duty Cycle

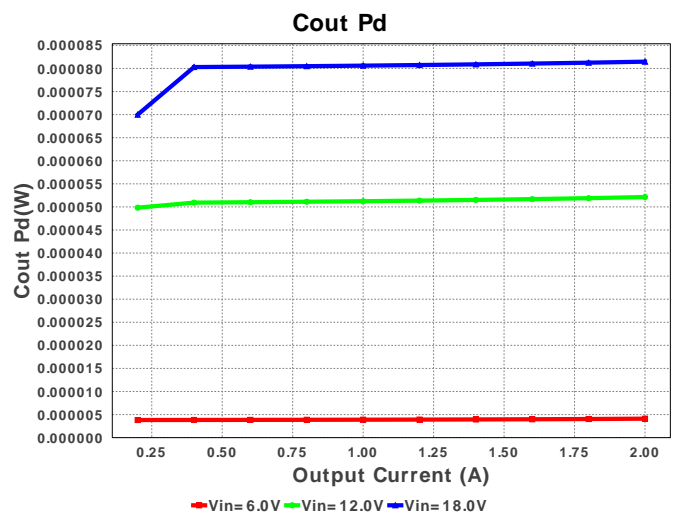
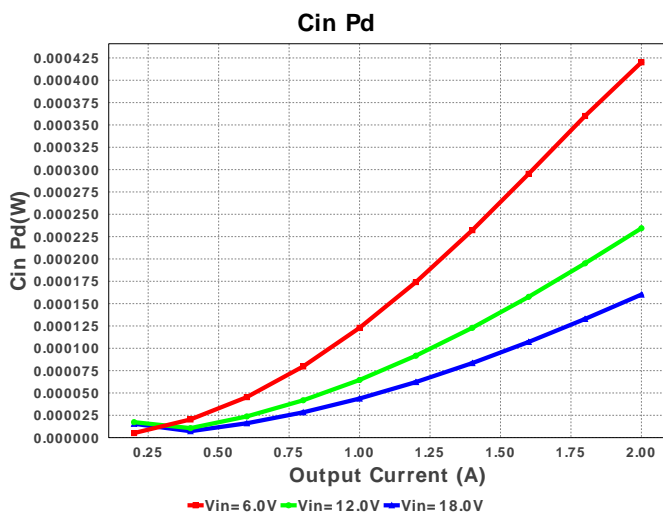
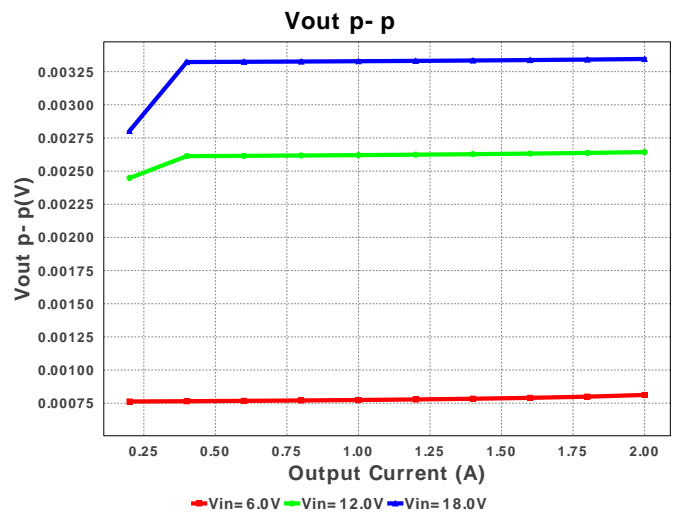
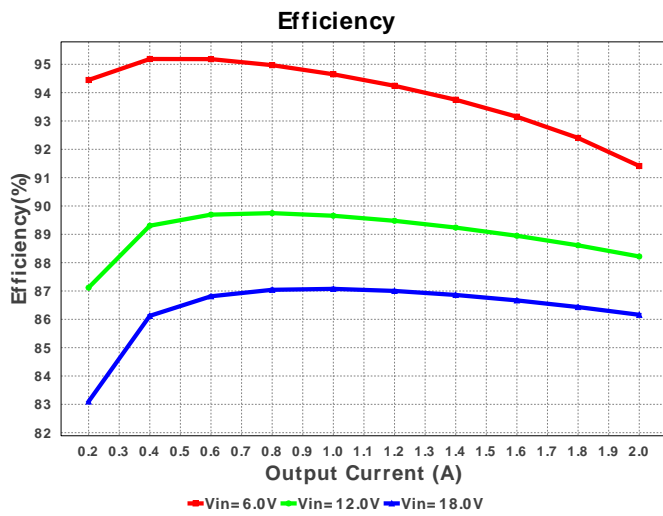
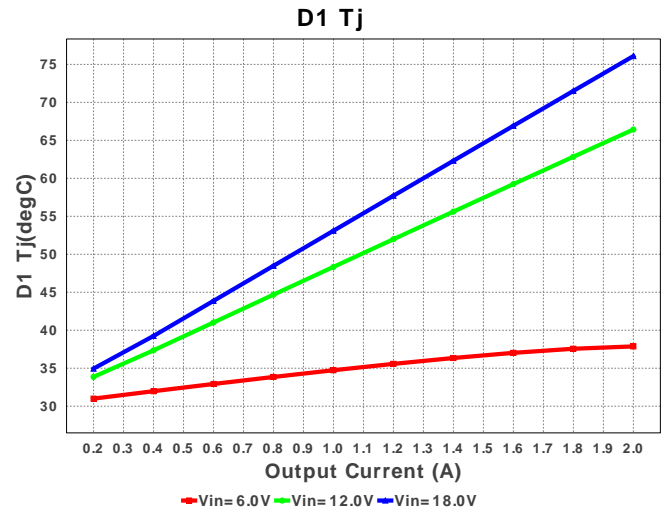
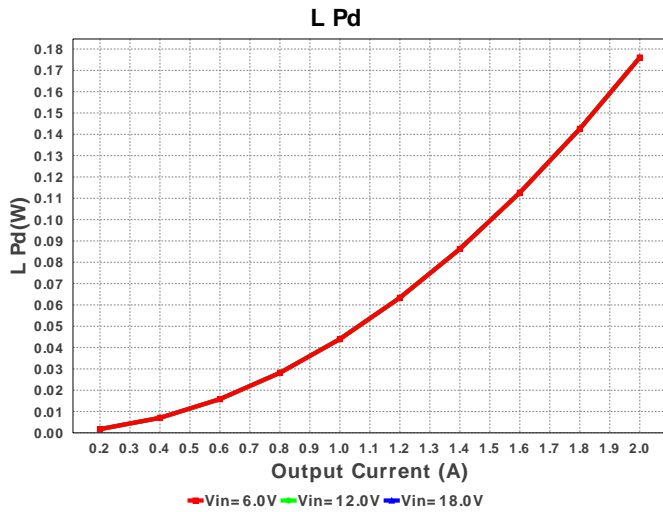


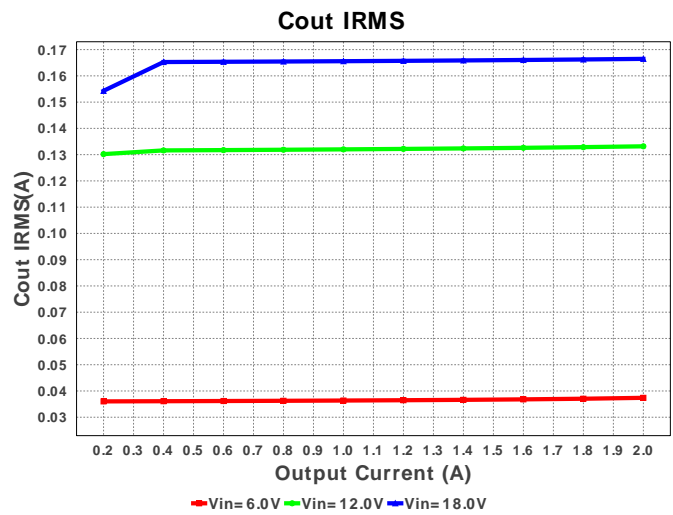
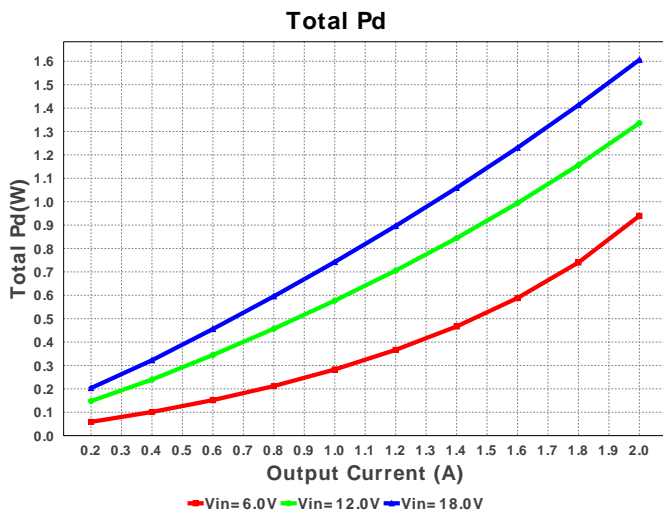
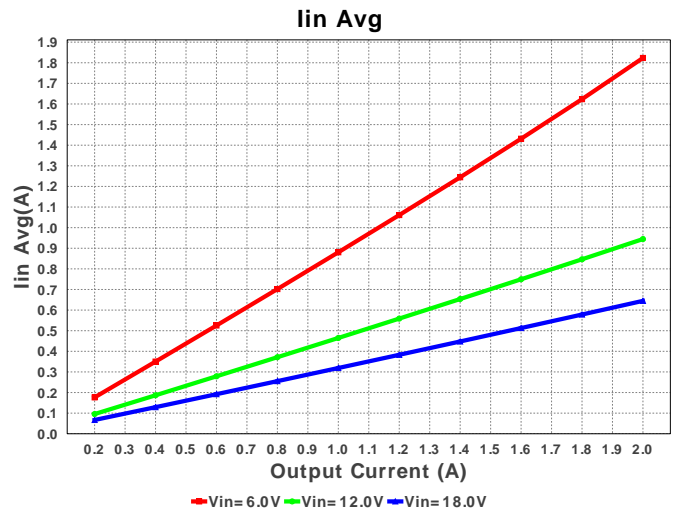
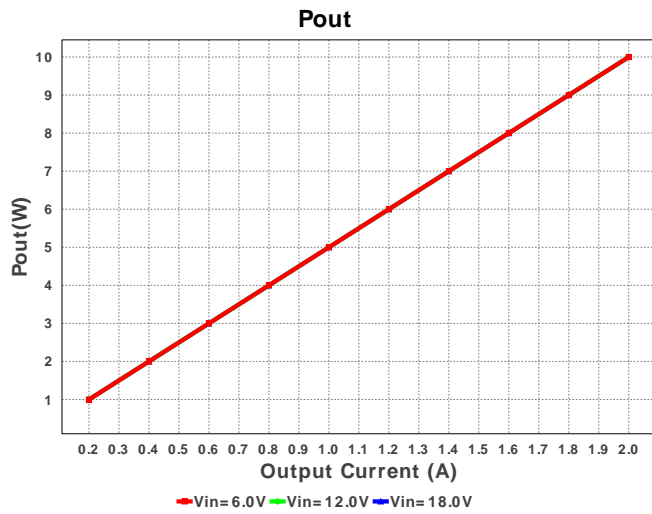
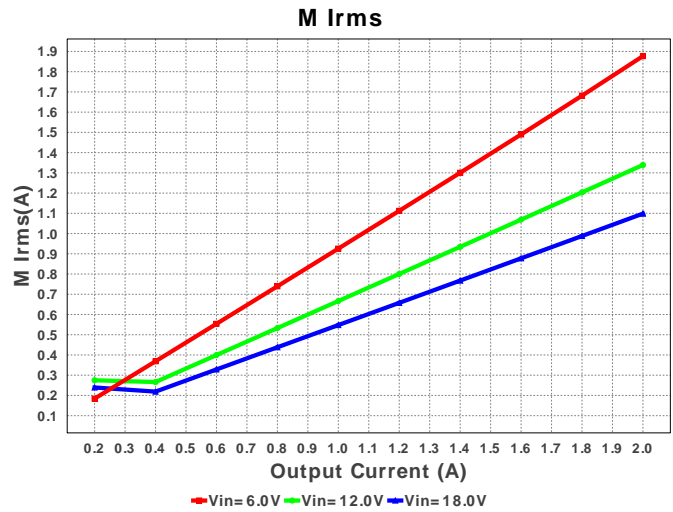
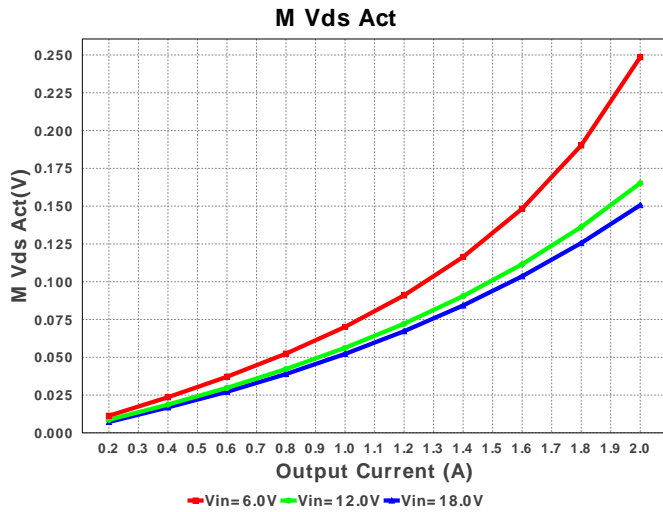
Cin IRMS

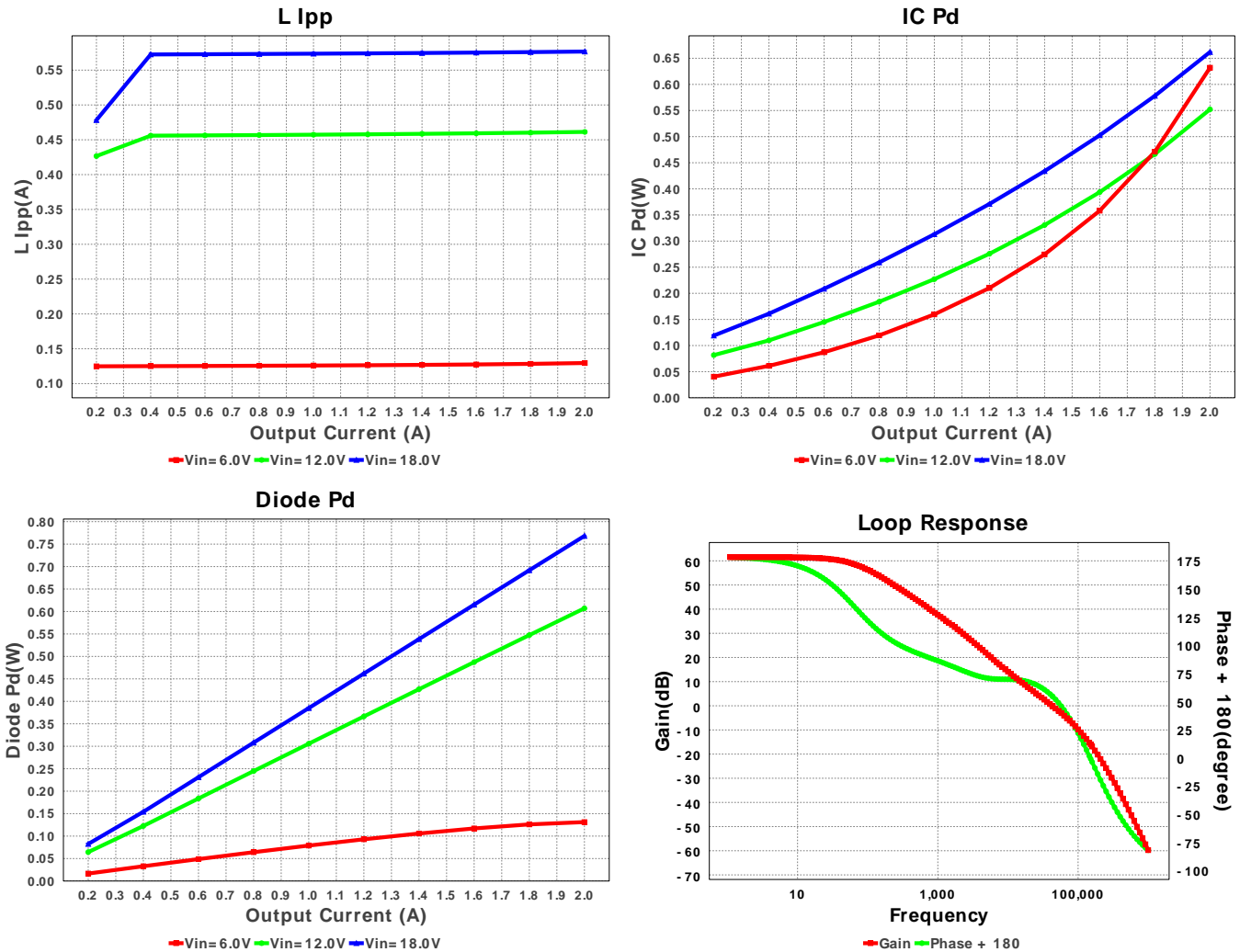


IC Ipk









## Operating Values

#	Name	Value	Category	Description
1.	BOM Count	15		Total Design BOM count
2.	Total BOM	\$1.62		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	644.8 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	259.0 mm <sup>2</sup>	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	61.521 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	42.84 kHz	Op_point	Bode plot crossover frequency
19.	Duty Cycle	30.164 %	Op_point	Duty cycle
20.	Efficiency	86.16 %	Op_point	Steady state efficiency
21.	Gain Marg	-16.048 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	55.699 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 $\mu$ W	Power	Input capacitor power dissipation
29.	Cout Pd	81.474 $\mu$ W	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	176.0 mW	Power	Inductor power dissipation
33.	Total Pd	1.606 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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