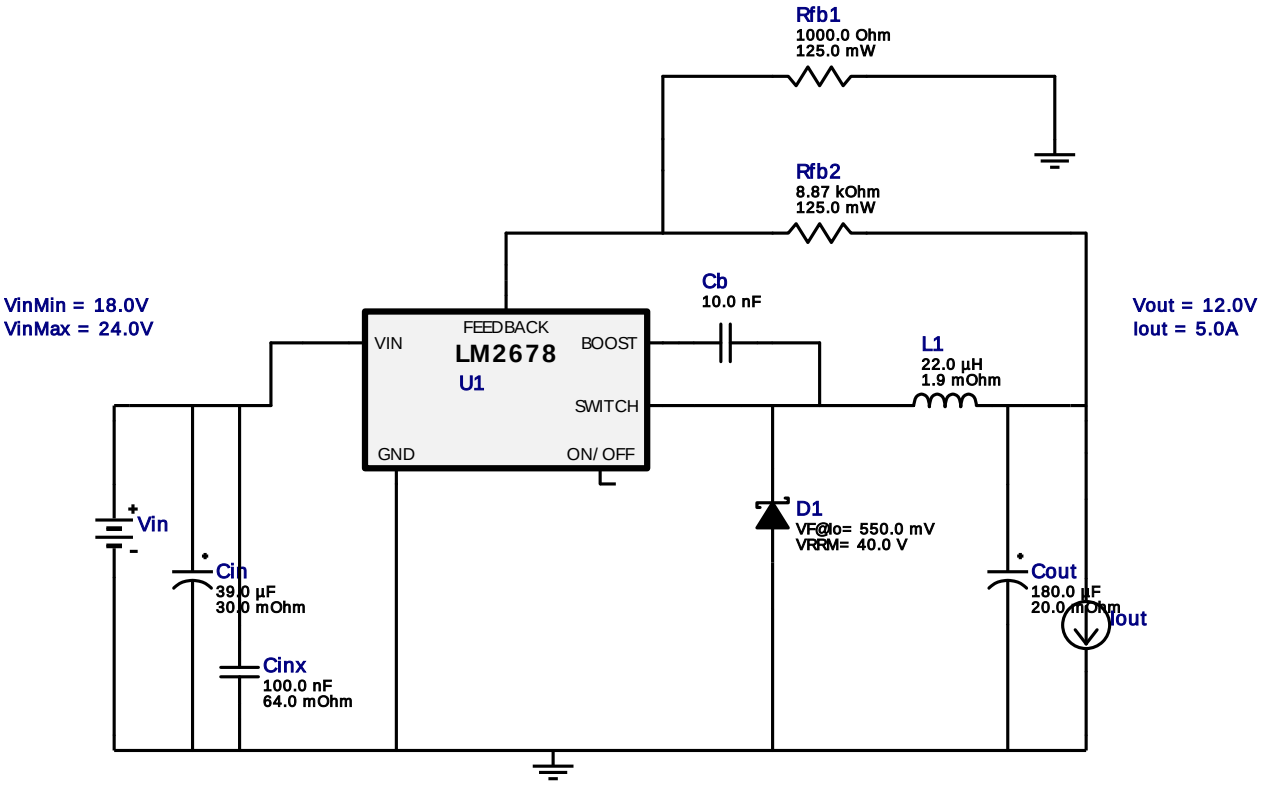
WEBENCH® Design Report

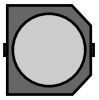
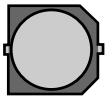
VinMin = 18.0V
VinMax = 24.0V
Vout = 12.0V
Iout = 5.0A

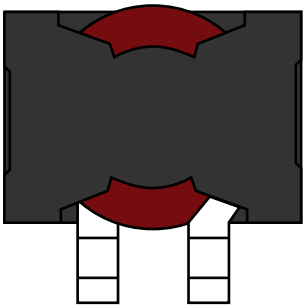
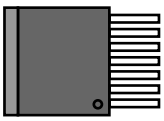
Device = LM2678SX-ADJ/NOPB
Topology = Buck
Created = 9/18/15 10:37:45 AM
BOM Cost = $5.37
Footprint = 1,180.0 mm²
BOM Count = 9
Total Pd = 5.07W

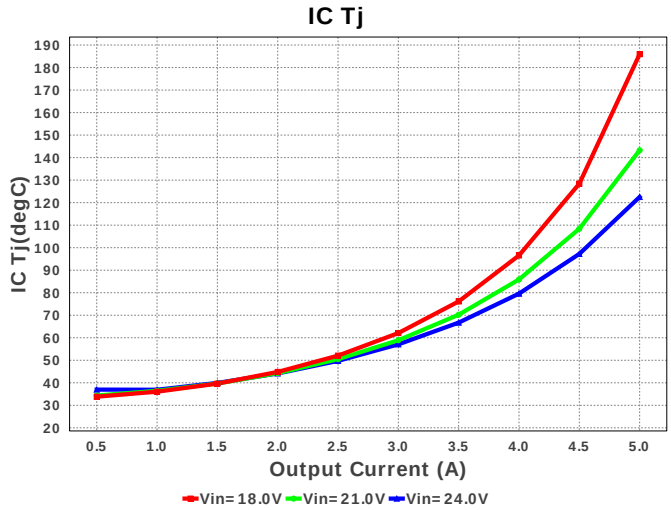
Design : 760425/6899 LM2678SX-ADJ/NOPB
LM2678SX-ADJ/NOPB 18.0V-24.0V to 12.00V @ 5.0A

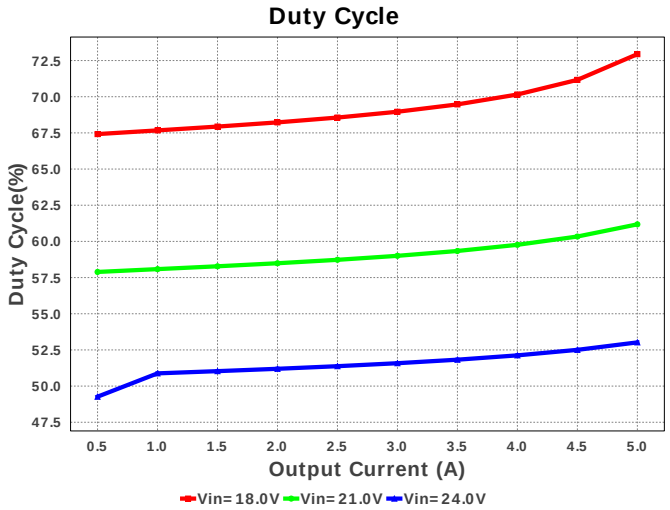


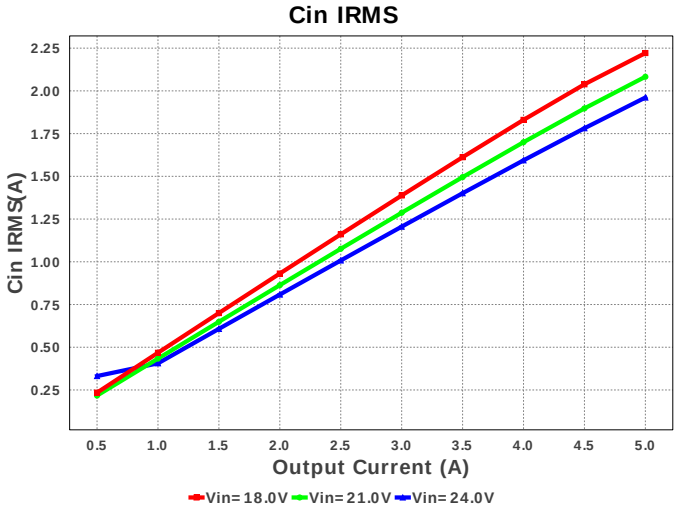
Electrical BOM

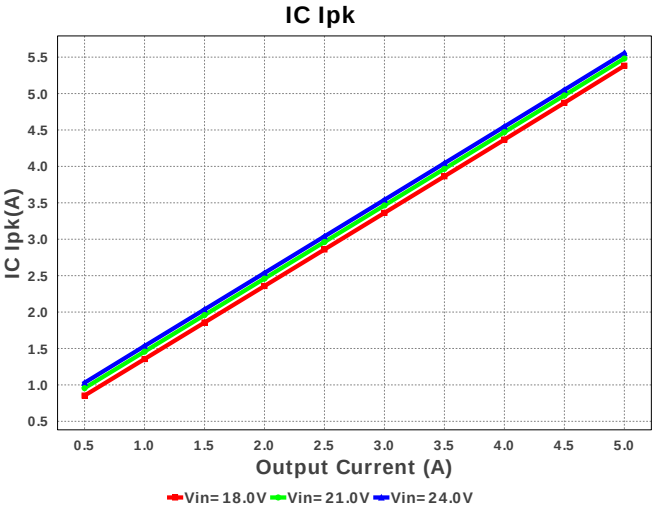
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cb	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	 0805 7 mm²
2.	Cin	Panasonic	35SVPF39M Series= SVPF	Cap= 39.0 uF ESR= 30.0 mOhm VDC= 35.0 V IRMS= 2.8 A	1	$0.50	 CAPSMT_62_E7 106 mm²
3.	Cinx	Kemet	C0805C104K5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	 0805 7 mm²
4.	Cout	Panasonic	16SVP180M Series= SVP	Cap= 180.0 uF ESR= 20.0 mOhm VDC= 16.0 V IRMS= 3.64 A	1	$0.29	 SM_RADIAL_8MM 113 mm²
5.	D1	Diodes Inc.	B540C-13-F	VF@Io= 550.0 mV VRRM= 40.0 V	1	$0.17	 SMC 83 mm²

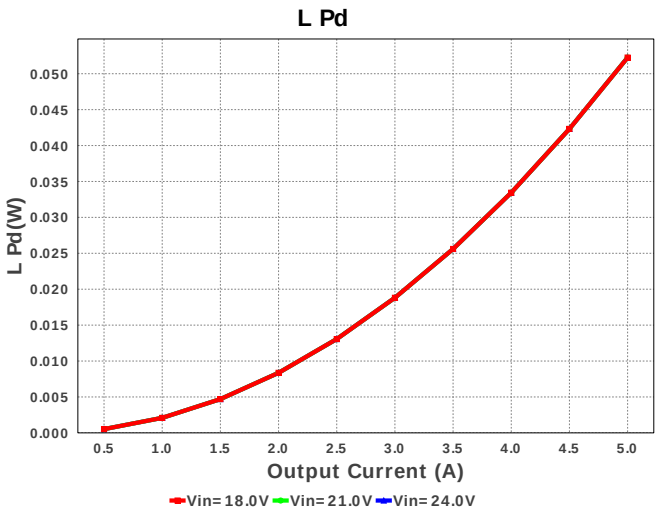
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
6.	L1	Coilcraft	SER2915H-223KL	L= 22.0 µH DCR= 1.9 mOhm	1	$2.17	 SER2915H 652 mm²
7.	Rfb1	Panasonic	ERJ-6ENF1001V Series= ERJ-6E	Res= 1000.0 Ohm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
8.	Rfb2	Panasonic	ERJ-6ENF8871V Series= ERJ-6E	Res= 8.87 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
9.	U1	Texas Instruments	LM2678SX-ADJ/NOPB	Switcher	1	$2.20	 TS7B 199 mm²

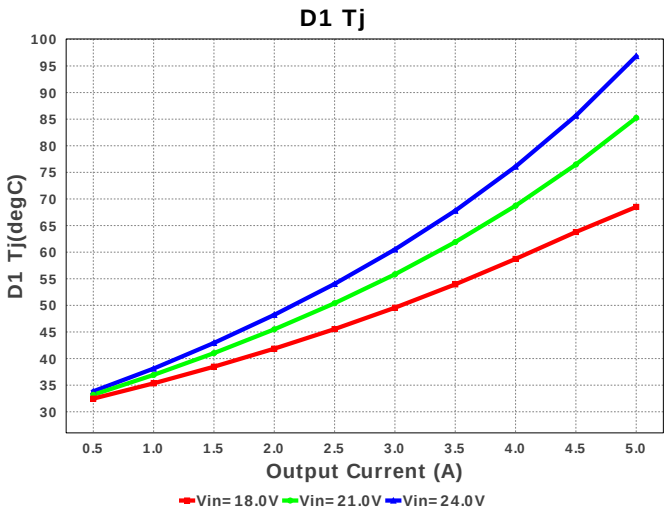


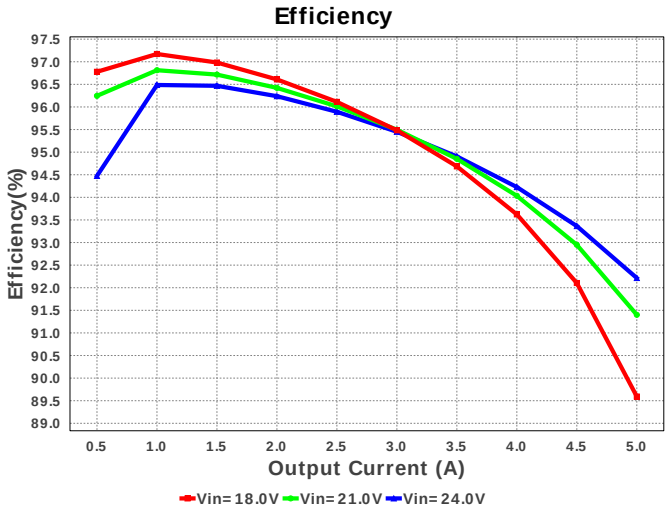


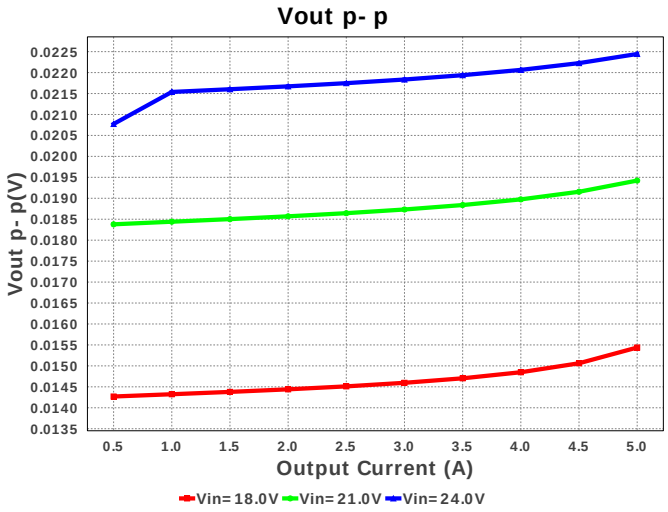


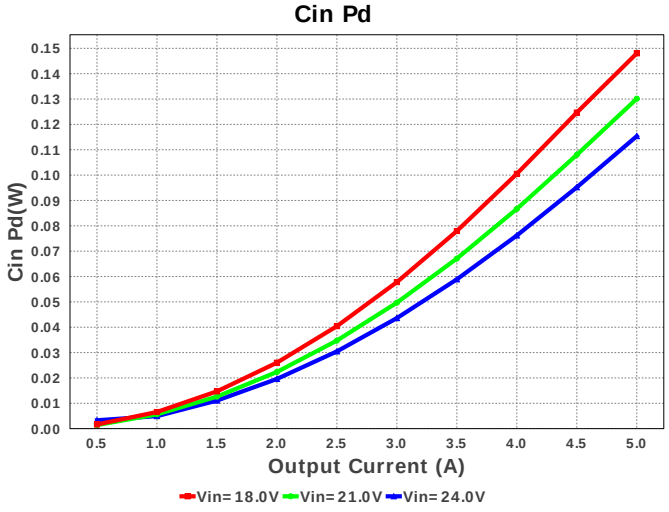


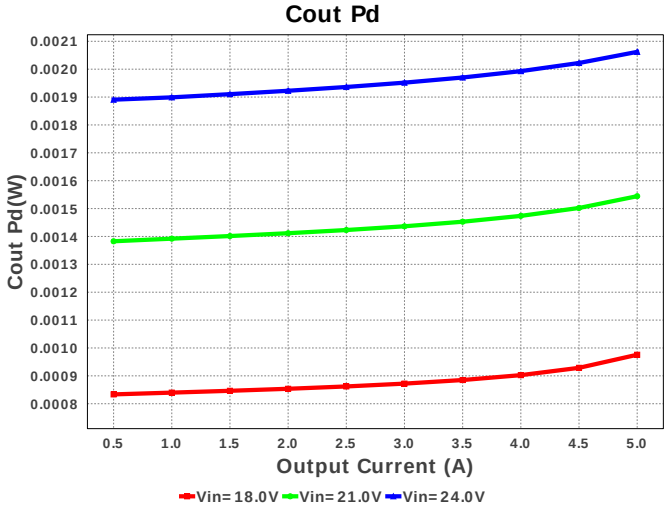


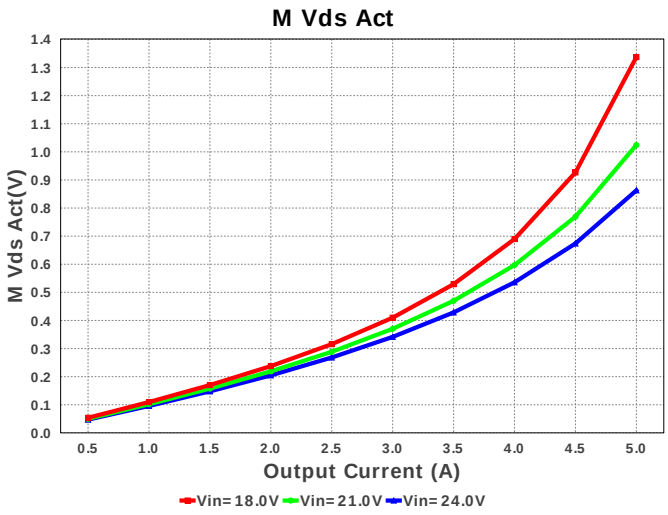


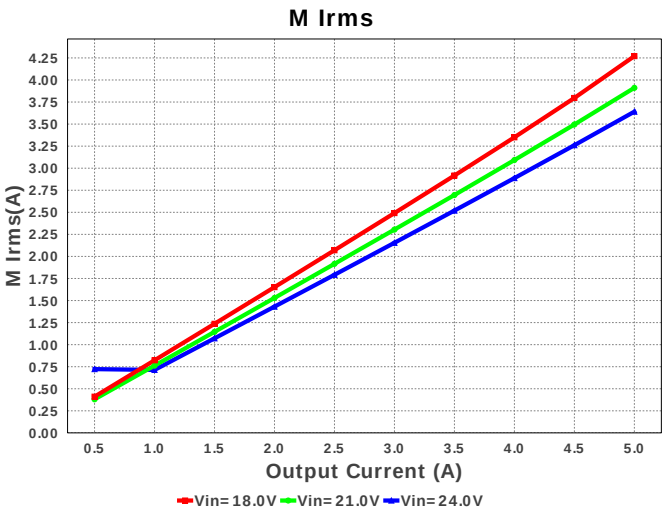


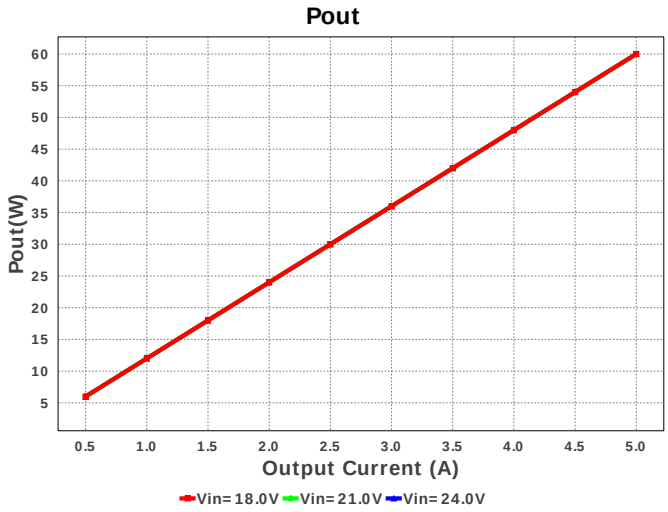


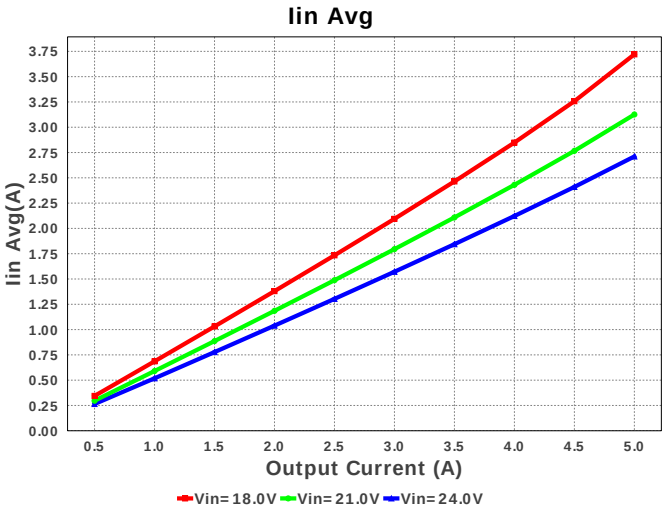


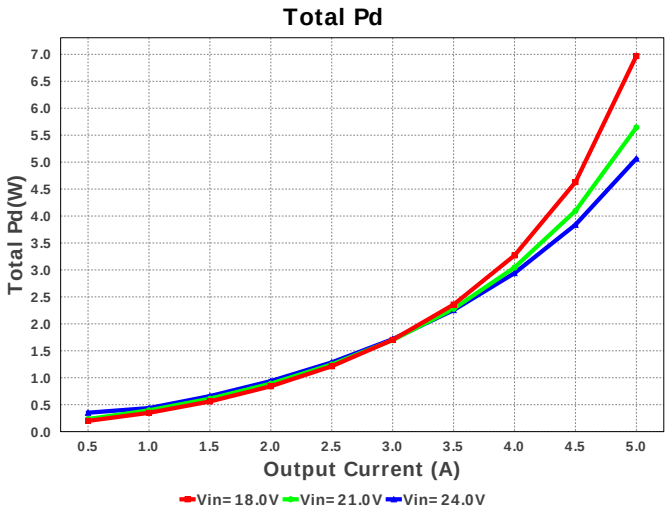


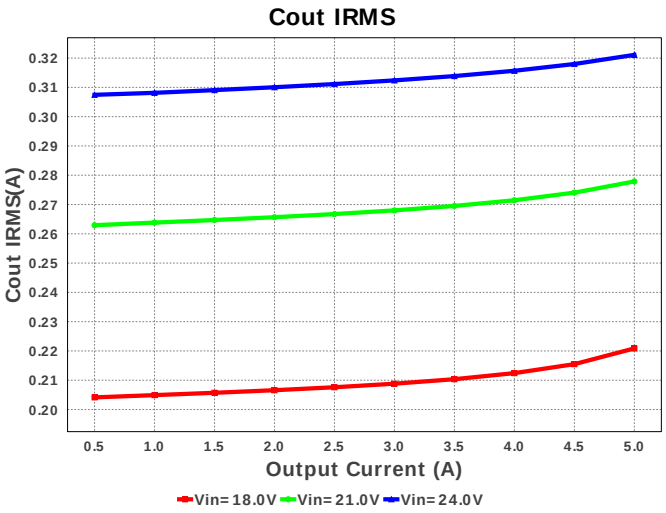


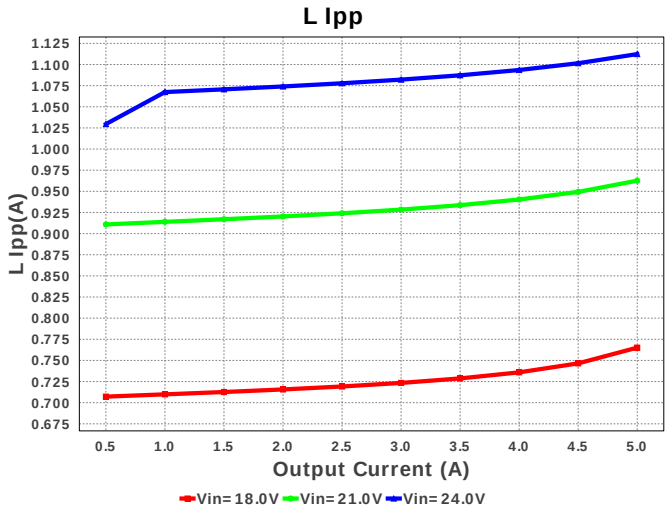


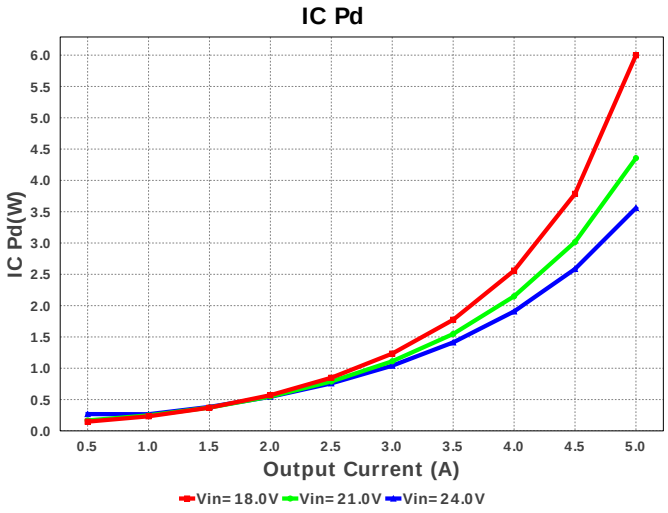


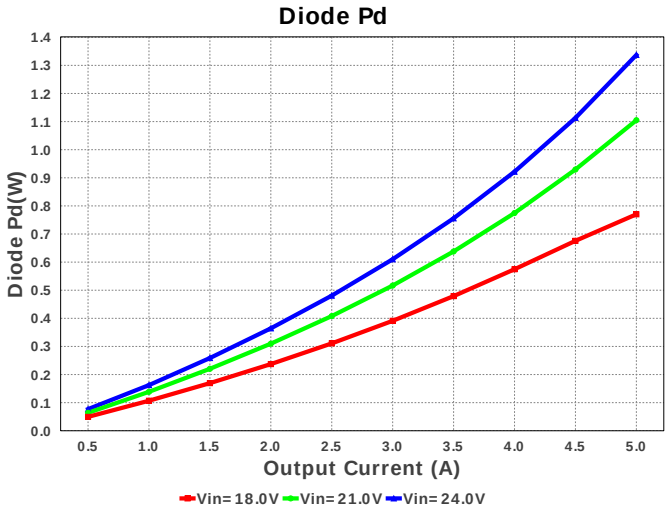












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	1.961 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	321.099 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	5.556 A	Current	Peak switch current in IC
4.	Iin Avg	2.711 A	Current	Average input current
5.	L Ipp	1.112 A	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	3.641 A	Current	Q Iavg
7.	BOM Count	9	General	Total Design BOM count
8.	FootPrint	1.18 k mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	260.0 kHz	General	Switching frequency
10.	IC Tolerance	24.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	862.921 mV	General	Voltage drop across the MosFET
12.	Pout	60.0 W	General	Total output power
13.	Total BOM	$5.37	General	Total BOM Cost
14.	D1 Tj	96.853 degC	Op_Point	D1 junction temperature
15.	Vout OP	12.0 V	Op_Point	Operational Output Voltage
16.	Cross Freq	17.775 kHz	Op_point	Bode plot crossover frequency
17.	Duty Cycle	53.021 %	Op_point	Duty cycle
18.	Efficiency	92.215 %	Op_point	Steady state efficiency
19.	IC Tj	122.517 degC	Op_point	IC junction temperature
20.	ICThetaJA	26.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
21.	IOUT_OP	5.0 A	Op_point	Iout operating point
22.	Phase Marg	63.515 deg	Op_point	Bode Plot Phase Margin
23.	VIN_OP	24.0 V	Op_point	Vin operating point
24.	Vout p-p	22.444 mV	Op_point	Peak-to-peak output ripple voltage
25.	Cin Pd	115.37 mW	Power	Input capacitor power dissipation
26.	Cout Pd	2.062 mW	Power	Output capacitor power dissipation
27.	Diode Pd	1.337 W	Power	Diode power dissipation
28.	IC Pd	3.558 W	Power	IC power dissipation
29.	L Pd	52.25 mW	Power	Inductor power dissipation
30.	Total Pd	5.065 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	5.0	Maximum Output Current
2.	Iout1	5.0	Output Current #1
3.	VinMax	24.0	Maximum input voltage
4.	VinMin	18.0	Minimum input voltage
5.	Vout	12.0	Output Voltage
6.	Vout1	12.0	Output Voltage #1
7.	base_pn	LM2678	Base Product Number
8.	source	DC	Input Source Type
9.	Ta	30.0	Ambient temperature

Design Assistance

1. **LM2678** Product Folder : http://www.ti.com/product/LM2678 : contains the data sheet and other resources.