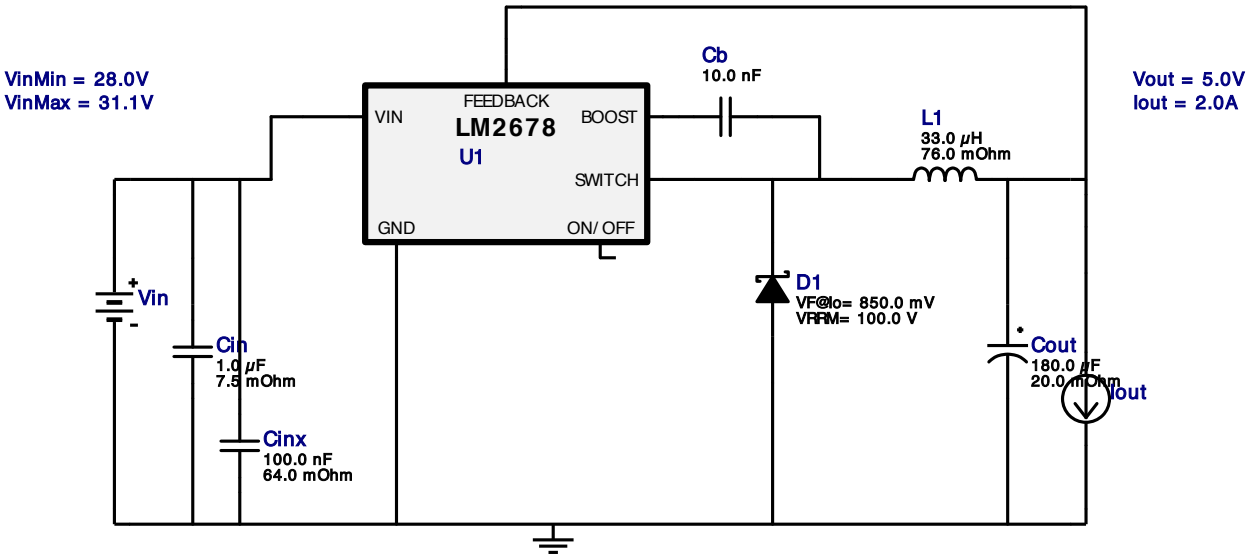
WEBENCH® Design Report

VinMax = 31.1V
Vout = 5.0V
Iout = 2.0A

Topology = Buck
Created = 3/8/15 4:03:33 PM
BOM Cost = $3.09
Footprint = 590.0 mm²
BOM Count = 7
Total Pd = 2.1W

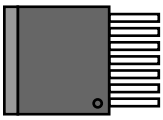
Design : 1217044/8 LM2678SX-5.0/NOPB
LM2678SX-5.0/NOPB 28.0V-31.1V to 5.00V @ 2.0A

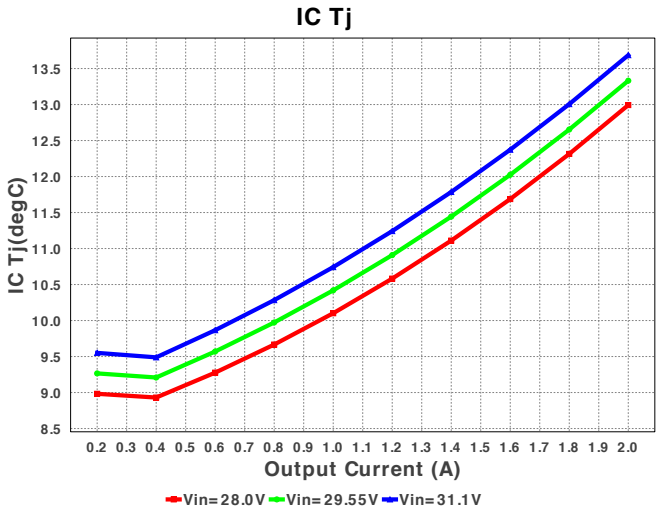


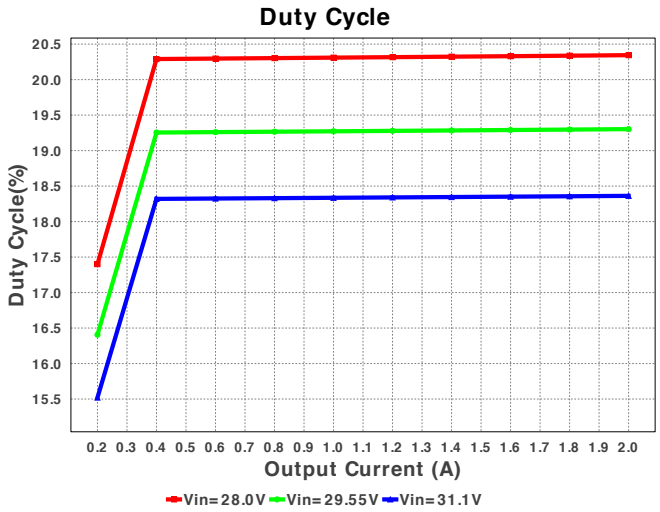
Electrical BOM

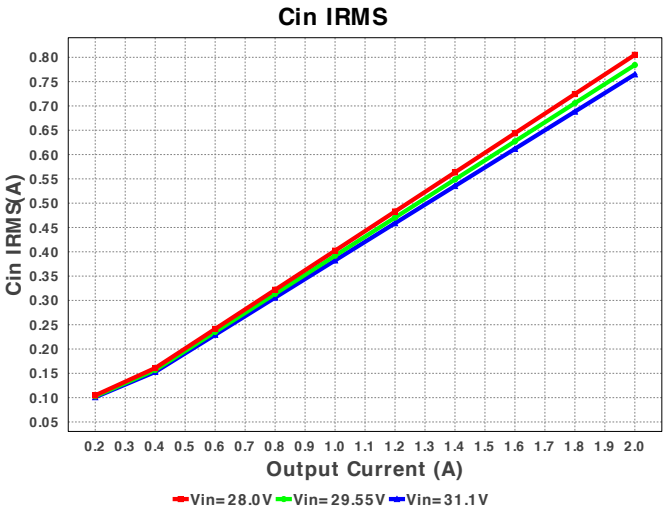
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cb	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
2.	Cin	TDK	C3216X7R2A105M160AA Series= X7R	Cap= 1.0 uF ESR= 7.5 mOhm VDC= 100.0 V IRMS= 5.9235 A	1	$0.11	1206 11 mm²
3.	Cinx	Kemet	C0805C104K5RACTU 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= 261	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	Micro Commercial Components	SK310A-TP	VF@Io= 850.0 mV VRRM= 100.0 V	1	$0.10	SMA 37 mm²
6.	L1	Bourns	SRR1208-330YL	L= 33.0 µH DCR= 76.0 mOhm	1	$0.37	SRR1208 216 mm²

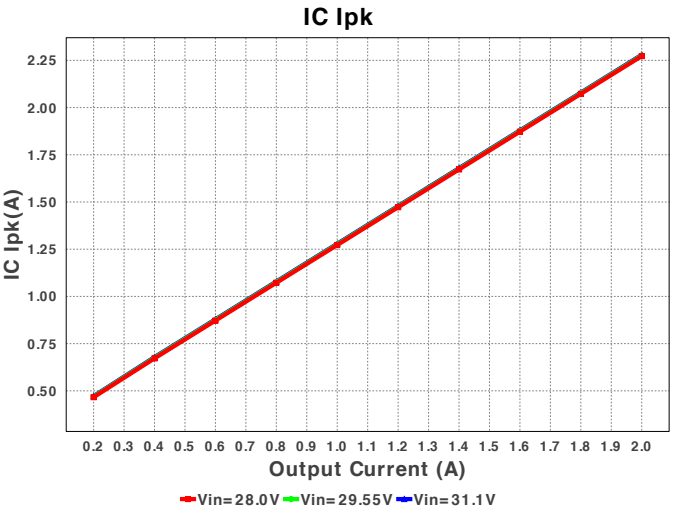
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
7.	U1	Texas Instruments	LM2678SX-5.0/NOPB	Switcher	1	$2.20	TS7B 199 mm^2

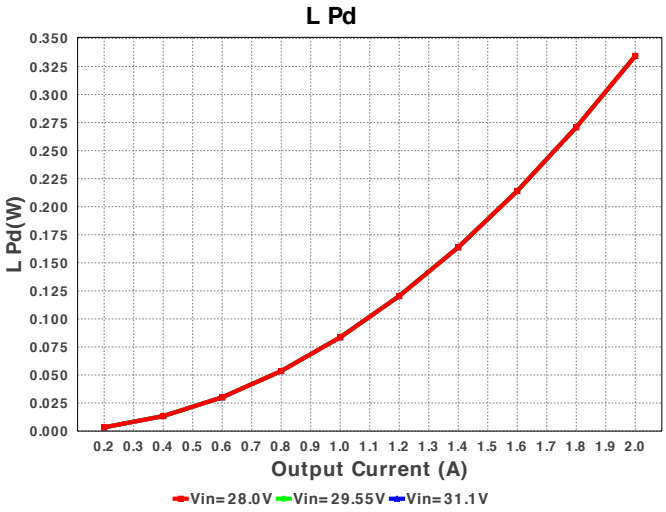


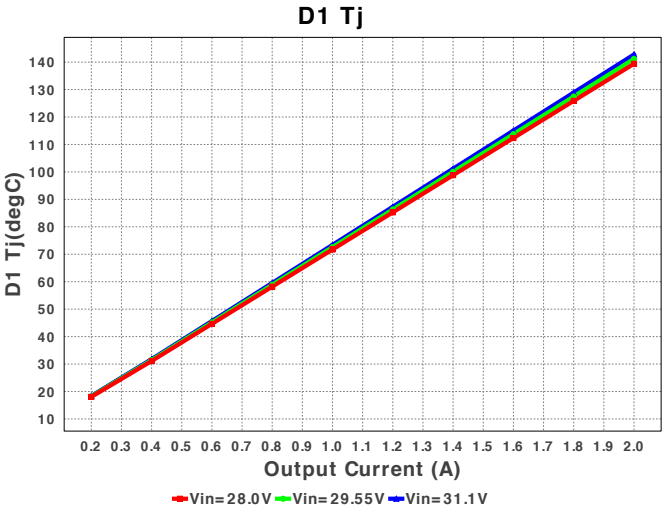


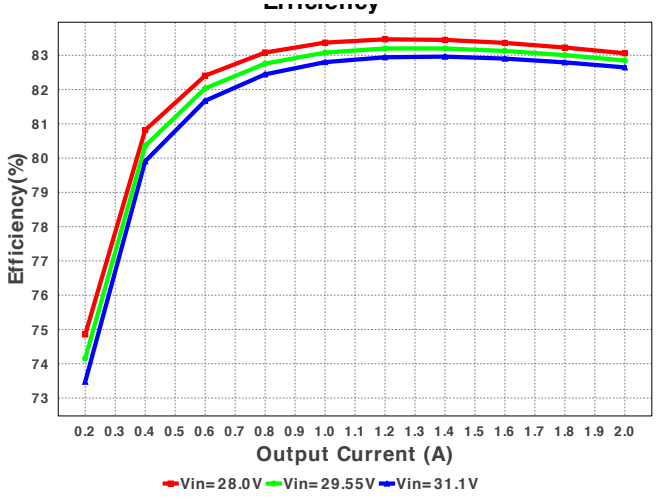


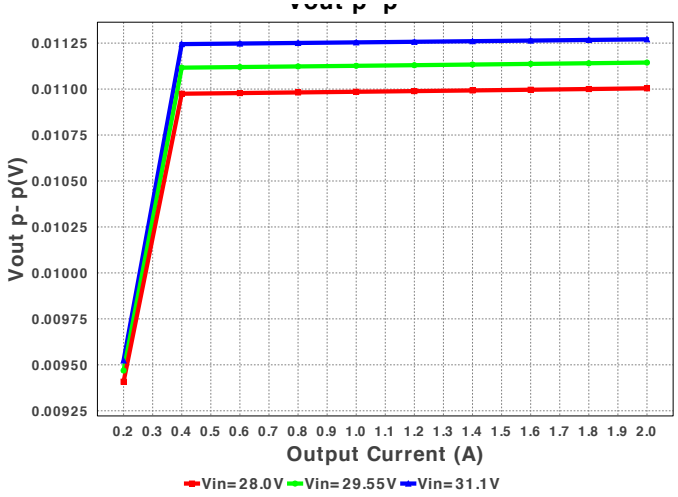


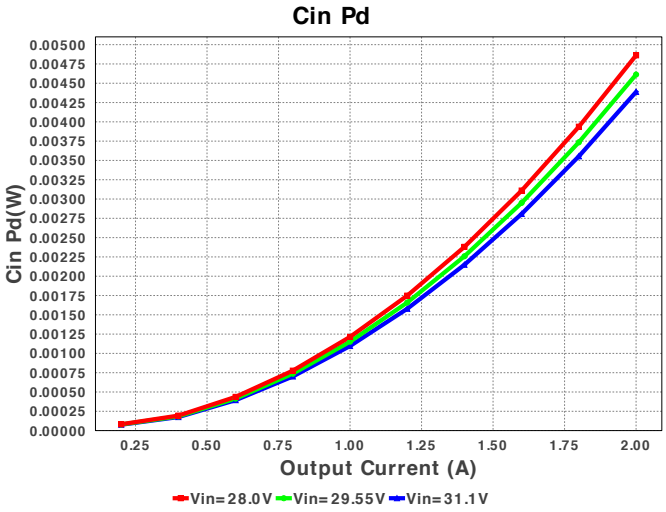


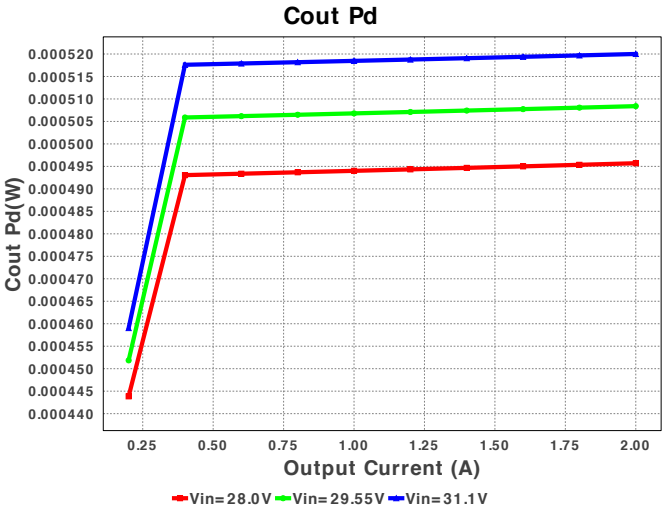


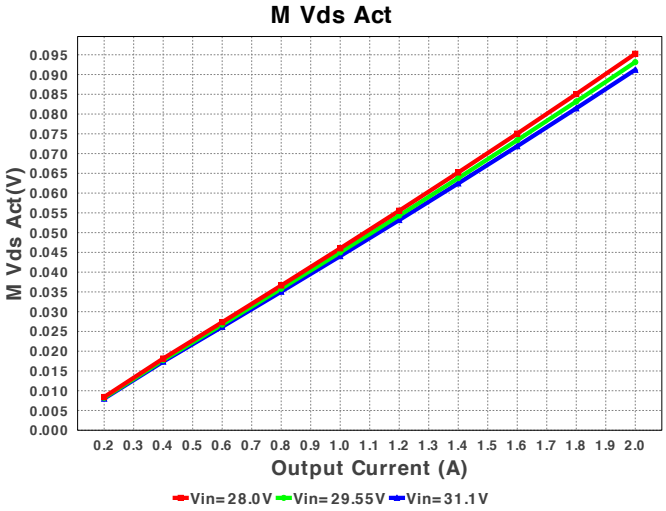


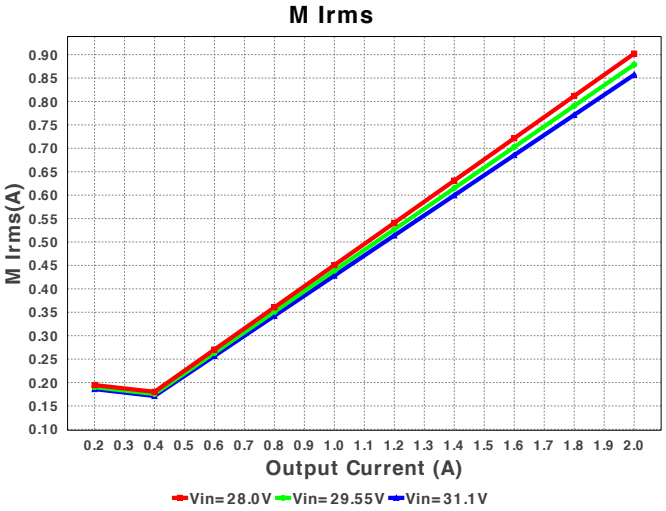

Efficiency(%)
Output Current (A)
Vin=28.0V
Vin=29.55V
Vin=31.1V

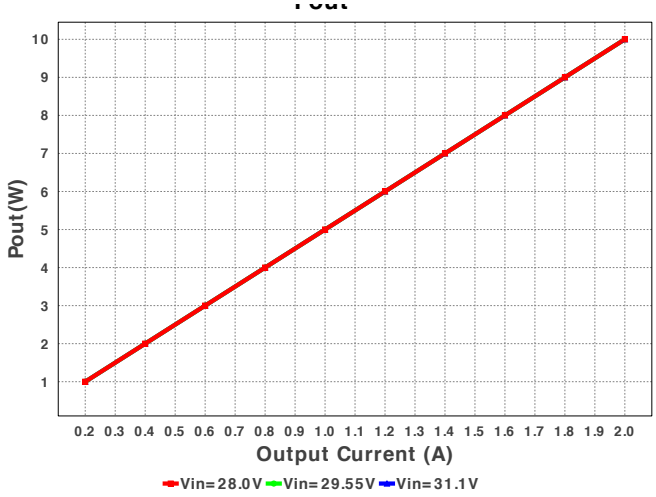

Vout p-p(V)
Output Current (A)
Vin=28.0V
Vin=29.55V
Vin=31.1V

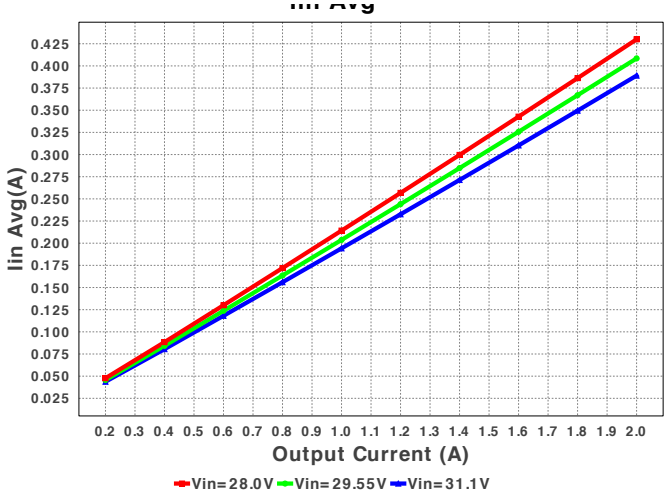

Cin Pd
Cin Pd(W)
Output Current (A)
Vin=28.0V
Vin=29.55V
Vin=31.1V


Cout Pd
Cout Pd(W)
Output Current (A)
Vin=28.0V
Vin=29.55V
Vin=31.1V

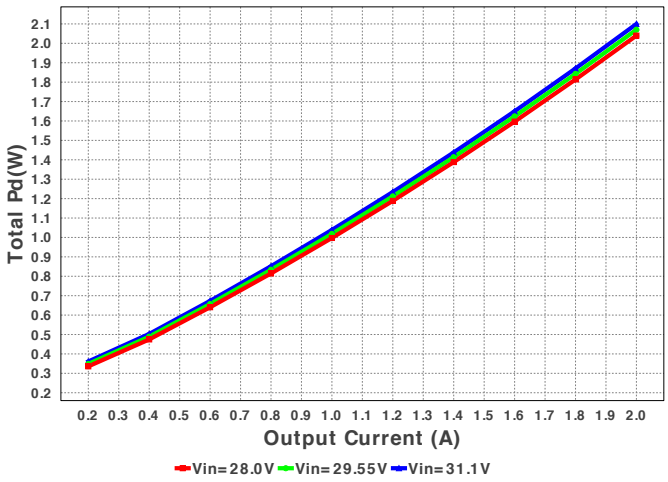

M Vds Act
M Vds Act(V)
Output Current (A)
Vin=28.0V
Vin=29.55V
Vin=31.1V


M Irms
M Irms(A)
Output Current (A)
Vin=28.0V
Vin=29.55V
Vin=31.1V

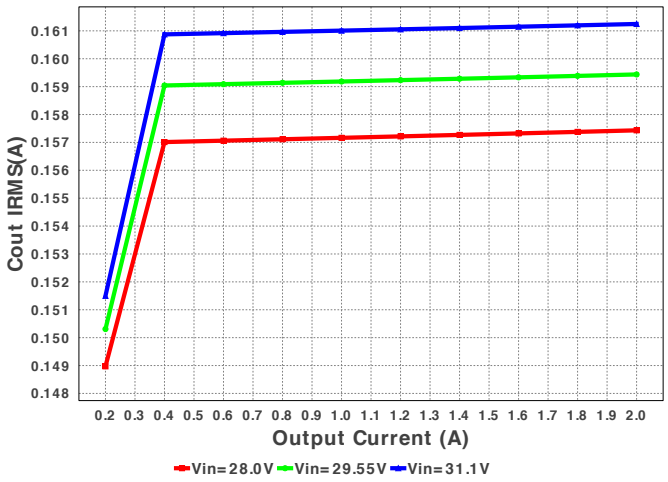




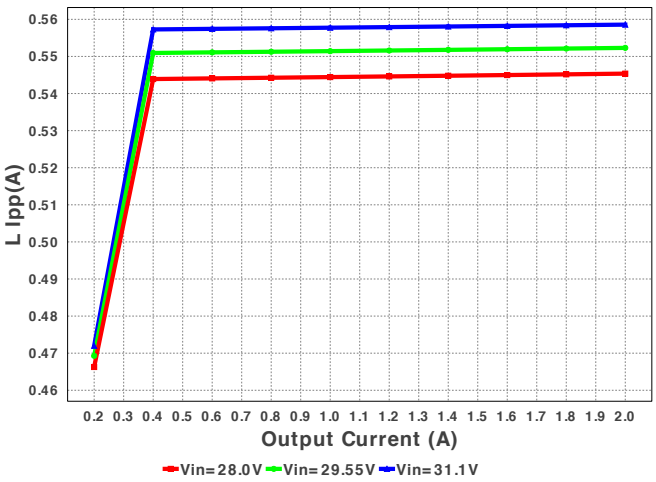
Total Pd



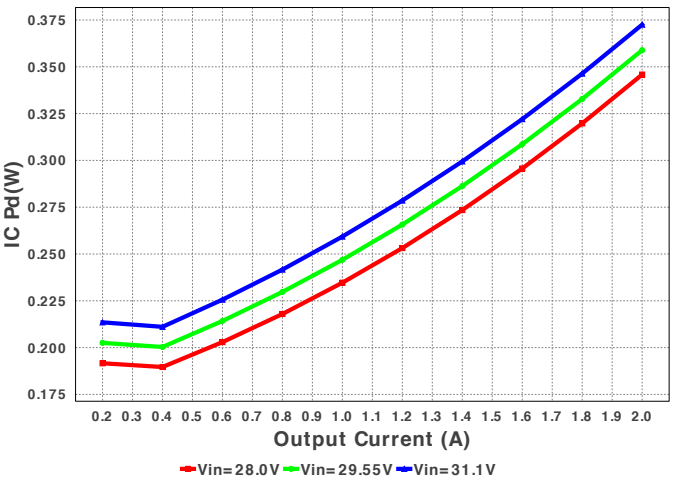
Cout IRMS

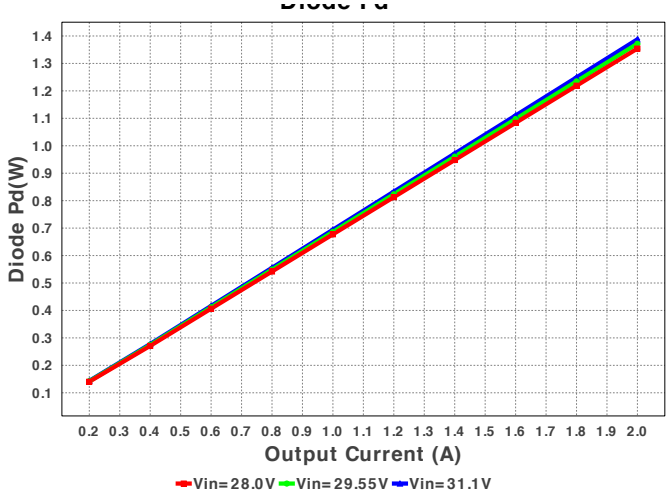


L Ipp



IC Pd





Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	764.908 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	161.246 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.279 A	Current	Peak switch current in IC
4.	Iin Avg	389.06 mA	Current	Average input current
5.	L Ipp	558.57 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	857.025 mA	Current	Q Iavg
7.	BOM Count	7	General	Total Design BOM count
8.	FootPrint	590.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	260.0 kHz	General	Switching frequency
10.	IC Tolerance	100.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	91.207 mV	General	Voltage drop across the MosFET
12.	Pout	10.0 W	General	Total output power
13.	Total BOM	$3.09	General	Total BOM Cost
14.	D1 Tj	142.784 degC	Op_Point	D1 junction temperature
15.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
16.	Cross Freq	17.028 kHz	Op_point	Bode plot crossover frequency
17.	Duty Cycle	18.362 %	Op_point	Duty cycle
18.	Efficiency	82.647 %	Op_point	Steady state efficiency
19.	IC Tj	13.686 degC	Op_point	IC junction temperature
20.	ICThetaJA	26.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
21.	IOUT_OP	2.0 A	Op_point	Iout operating point
22.	Phase Marg	65.118 deg	Op_point	Bode Plot Phase Margin
23.	VIN_OP	31.1 V	Op_point	Vin operating point
24.	Vout p-p	11.271 mV	Op_point	Peak-to-peak output ripple voltage
25.	Cin Pd	4.388 mW	Power	Input capacitor power dissipation
26.	Cout Pd	520.006 μW	Power	Output capacitor power dissipation
27.	Diode Pd	1.388 W	Power	Diode power dissipation
28.	IC Pd	372.527 mW	Power	IC power dissipation
29.	L Pd	334.4 mW	Power	Inductor power dissipation
30.	Total Pd	2.1 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	2.0	Maximum Output Current
2.	Iout1	2.0	Output Current #1
3.	VinMax	31.1	Maximum input voltage
4.	VinMin	28.0	Minimum input voltage
5.	Vout	5.0	Output Voltage
6.	Vout1	5.0	Output Voltage #1
7.	base_pn	LM2678	Base Product Number
8.	source	DC	Input Source Type
9.	Ta	4.0	Ambient temperature

Design Assistance

1. **LM2678** Product Folder : http://www.ti.com/product/lm2678 : contains the data sheet and other resources.