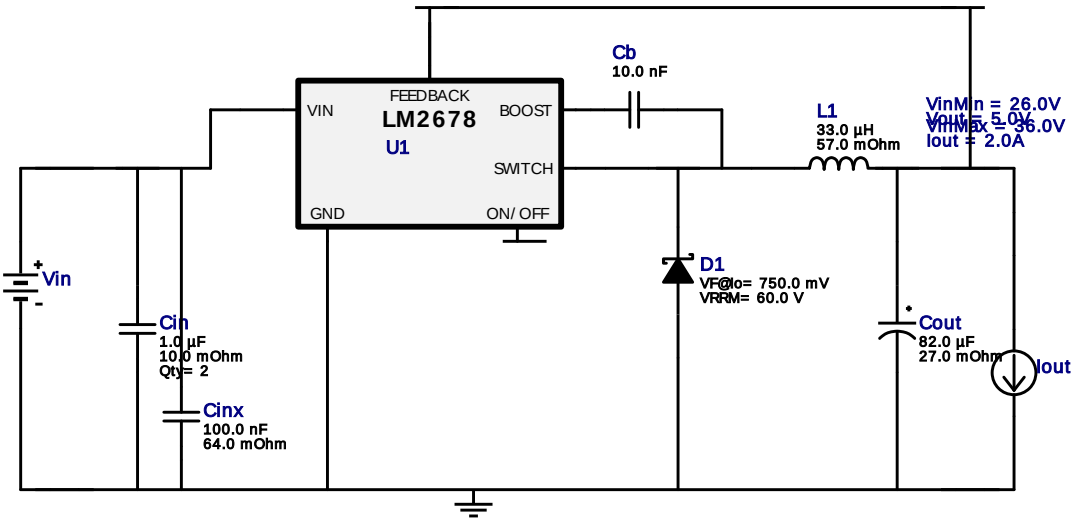
WEBENCH® Design Report

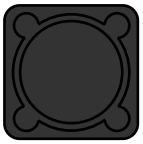
VinMin = 26.0V
VinMax = 36.0V
Vout = 5.0V
Iout = 2.0A

Device = LM2678S-5.0/NOPB
Topology = Buck
Created = 12/18/13 3:05:40 PM
BOM Cost = $3.32
Total Pd = 1.96W
Footprint = 581.0mm2
BOM Count = 8

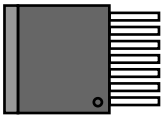
Design : 1217044/7 LM2678S-5.0/NOPB
LM2678S-5.0/NOPB 26.0V-36.0V to 5.0V @ 2.0A

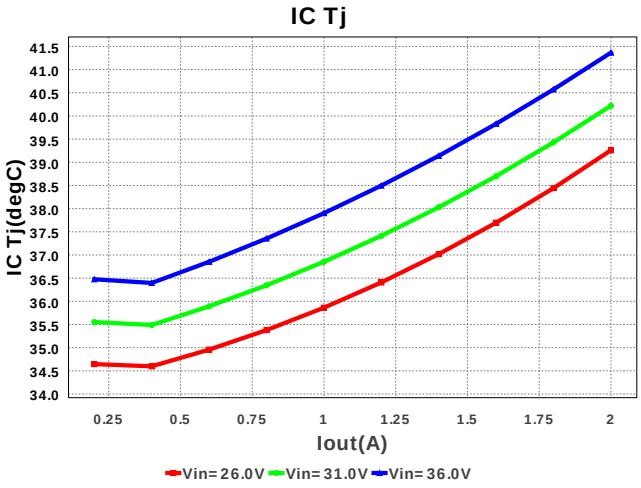


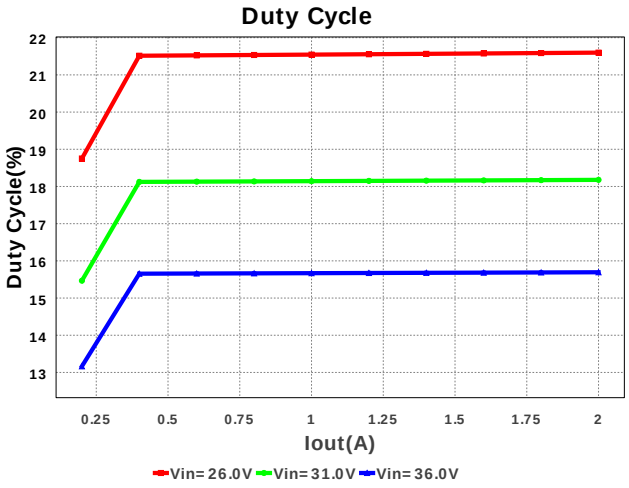
Electrical BOM

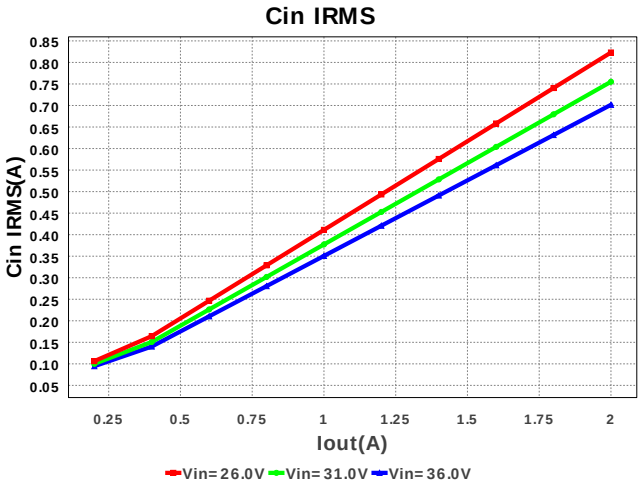
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cb	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	 0805 7mm2
2.	Cin	TDK	C3216X7R1H105K Series= X7R	Cap= 1.0 µF ESR= 10.0 mOhm VDC= 50.0 V IRMS= 3.2 A	2	$0.04	 1206 11mm2
3.	Cinx	Kemet	C0805C104K5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	 0805 7mm2
4.	Cout	Sanyo	16SVPF82M Series= 1273	Cap= 82.0 µF ESR= 27.0 mOhm VDC= 16.0 V IRMS= 3.0 A	1	$0.35	 CAPSMT_62_E61 53mm2
5.	D1	Vishay-Semiconductor	SS36-E3/57T	VF@Io= 750.0 mV VRRM= 60.0 V	1	$0.18	 SMC 83mm2
6.	L1	Bourns	SRR1280-330M	L= 33.0 µH DCR= 57.0 mOhm	1	$0.49	 SRR1280 210mm2

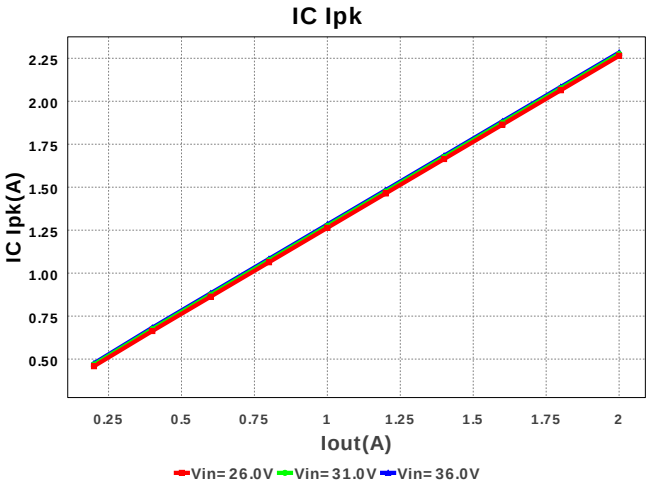
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
7.	U1	Texas Instruments	LM2678S-5.0/NOPB	Switcher	1	$2.20	TS7B 199mm2

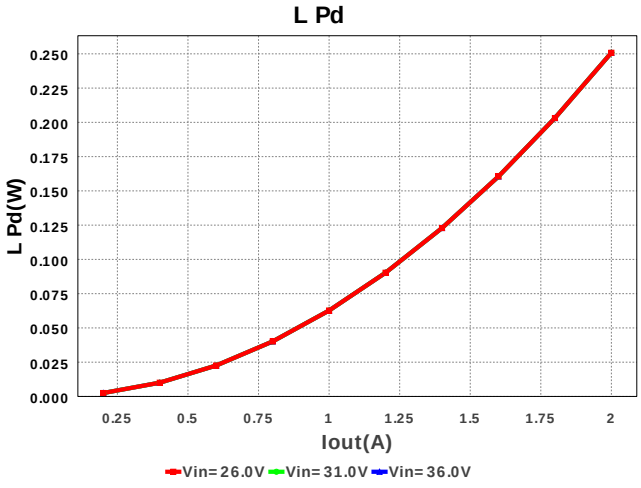


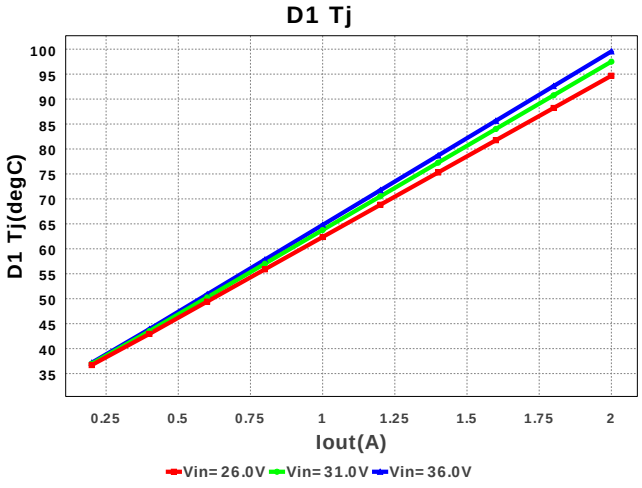




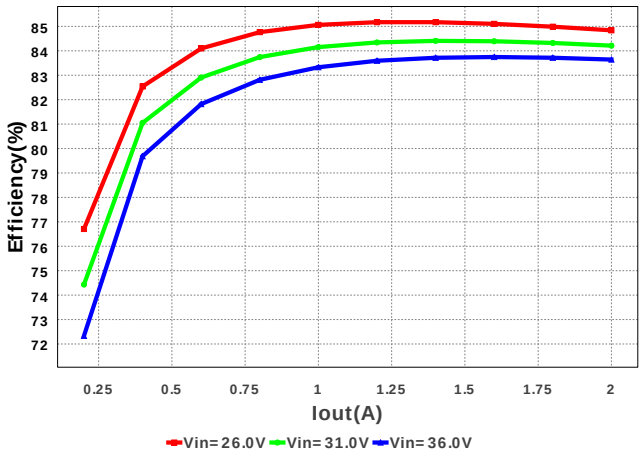




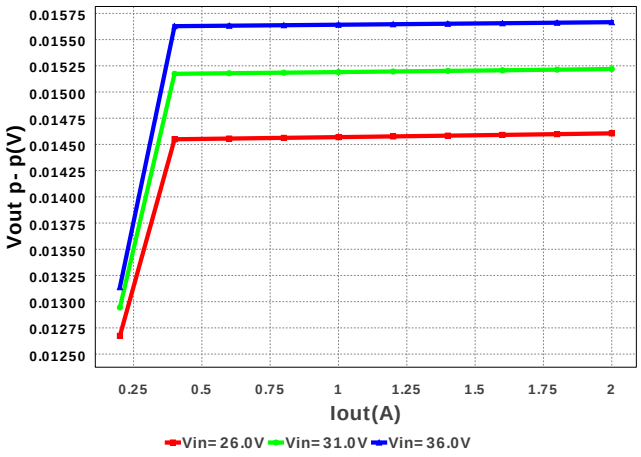




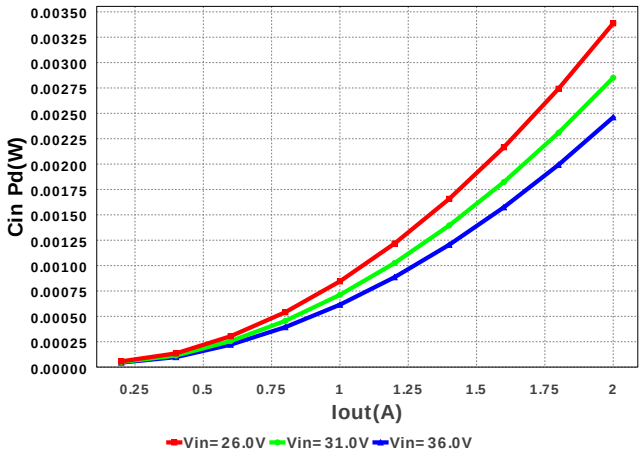
Efficiency



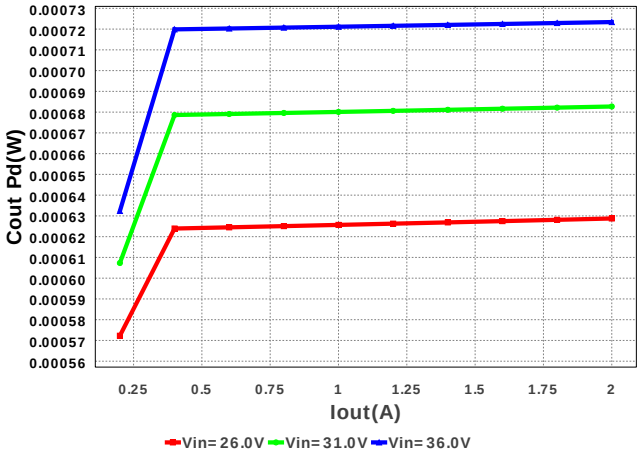
Vout p- p



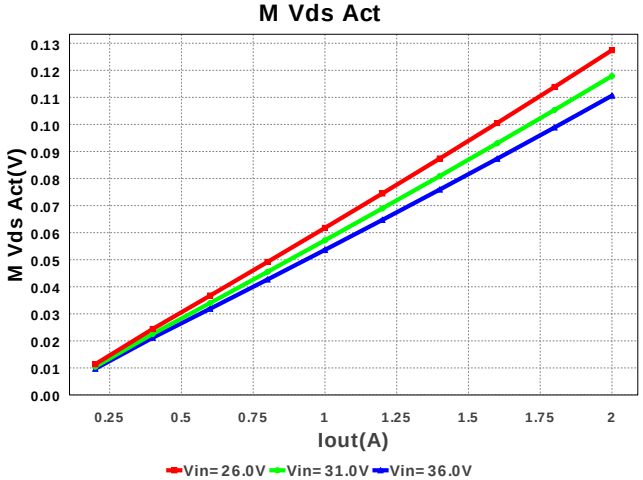
Cin Pd



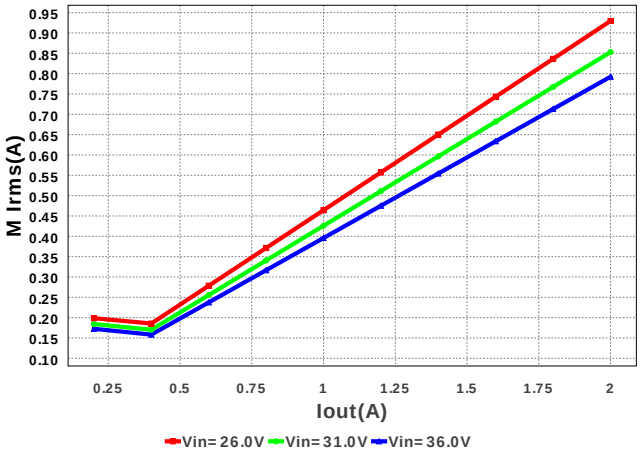
Cout Pd

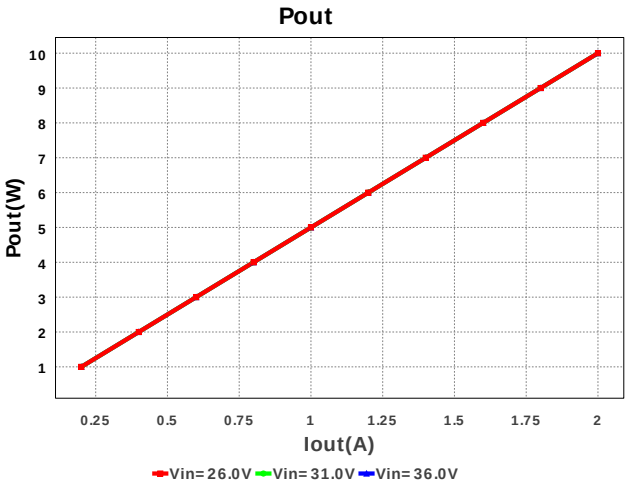


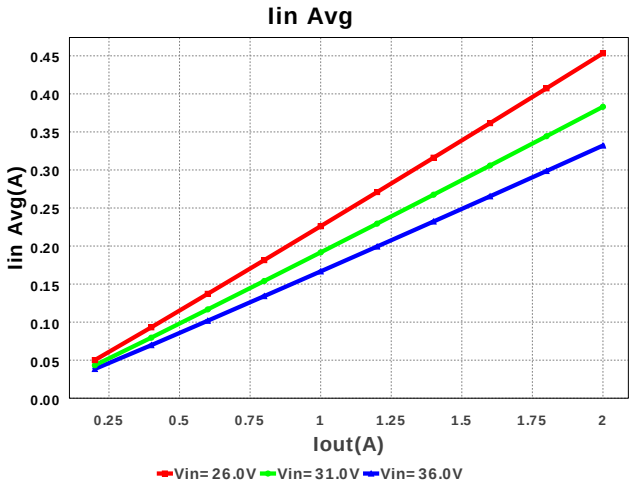
M Vds Act

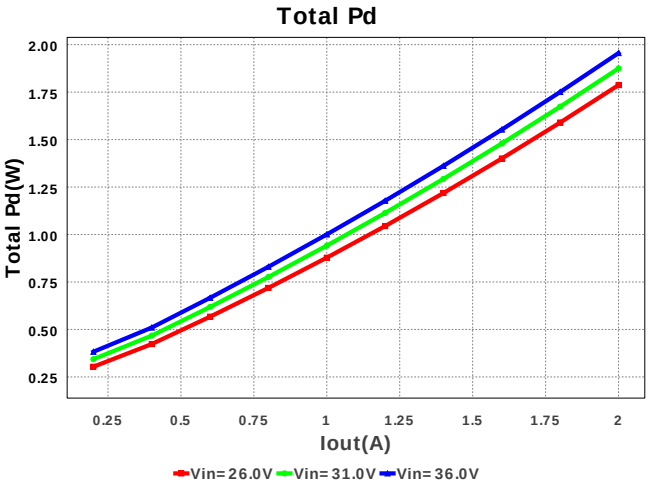


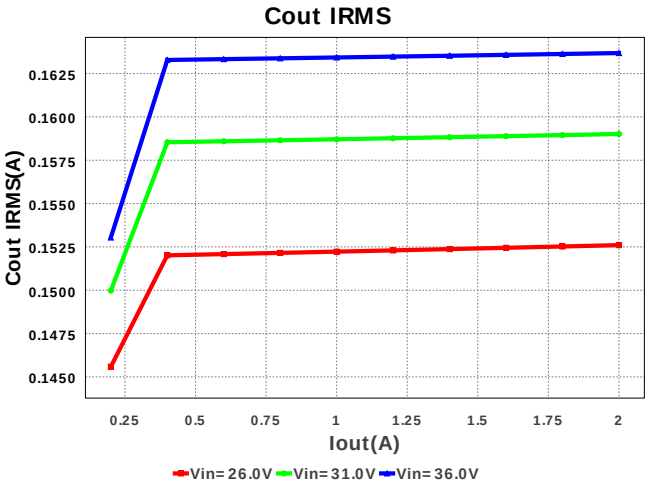
M Irms

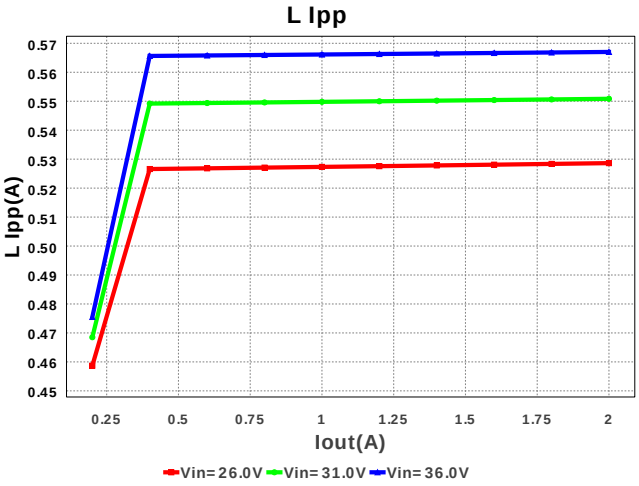


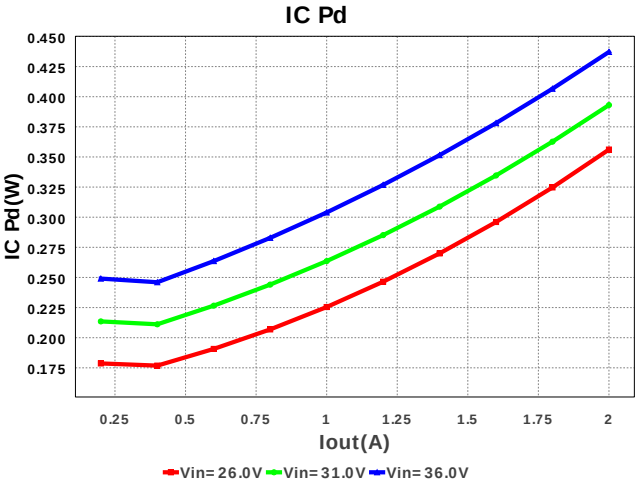


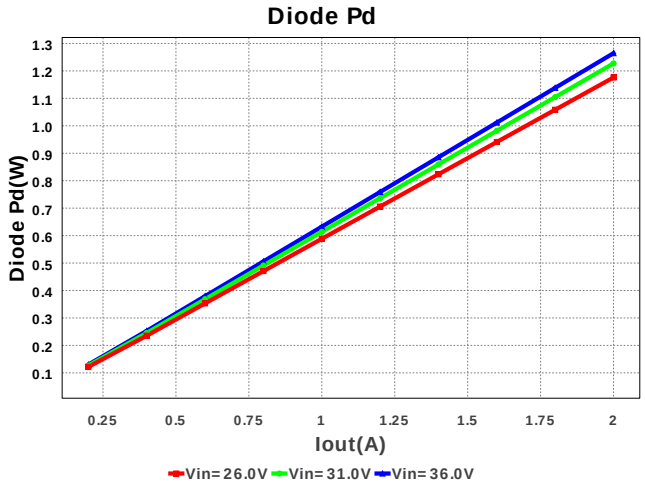












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	701.602 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	163.683 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.284 A	Current	Peak switch current in IC
4.	Iin Avg	332.1 mA	Current	Average input current
5.	L Ipp	567.015 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	792.301 mA	Current	Q Iavg
7.	BOM Count	8	General	Total Design BOM count
8.	FootPrint	581.0 mm2	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	110.636 mV	General	Voltage drop across the MosFET
12.	Pout	10.0 W	General	Total output power
13.	Total BOM	$3.32	General	Total BOM Cost
14.	D1 Tj	99.553 degC	Op_Point	D1 junction temperature
15.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
16.	Cross Freq	30.264 kHz	Op_point	Bode plot crossover frequency
17.	Duty Cycle	15.694 %	Op_point	Duty cycle
18.	Efficiency	83.642 %	Op_point	Steady state efficiency
19.	IC Tj	41.366 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	63.047 deg	Op_point	Bode Plot Phase Margin
23.	VIN_OP	36.0 V	Op_point	Vin operating point
24.	Vout p-p	15.666 mV	Op_point	Peak-to-peak output ripple voltage
25.	Cin Pd	2.461 mW	Power	Input capacitor power dissipation
26.	Cout Pd	723.388 µW	Power	Output capacitor power dissipation
27.	Diode Pd	1.265 W	Power	Diode power dissipation
28.	IC Pd	437.144 mW	Power	IC power dissipation
29.	L Pd	250.8 mW	Power	Inductor power dissipation
30.	Total Pd	1.956 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	2.0 A	Maximum Output Current
2.	Iout1	2.0 Amps	Output Current #1
3.	VinMax	36.0 V	Maximum input voltage
4.	VinMin	26.0 V	Minimum input voltage
5.	Vout	5.0 V	Output Voltage
6.	Vout1	5.0 Volt	Output Voltage #1
7.	base_pn	LM2678	Base Product Number
8.	source	DC	Input Source Type
9.	Ta	30.0 degC	Ambient temperature

Design Assistance

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