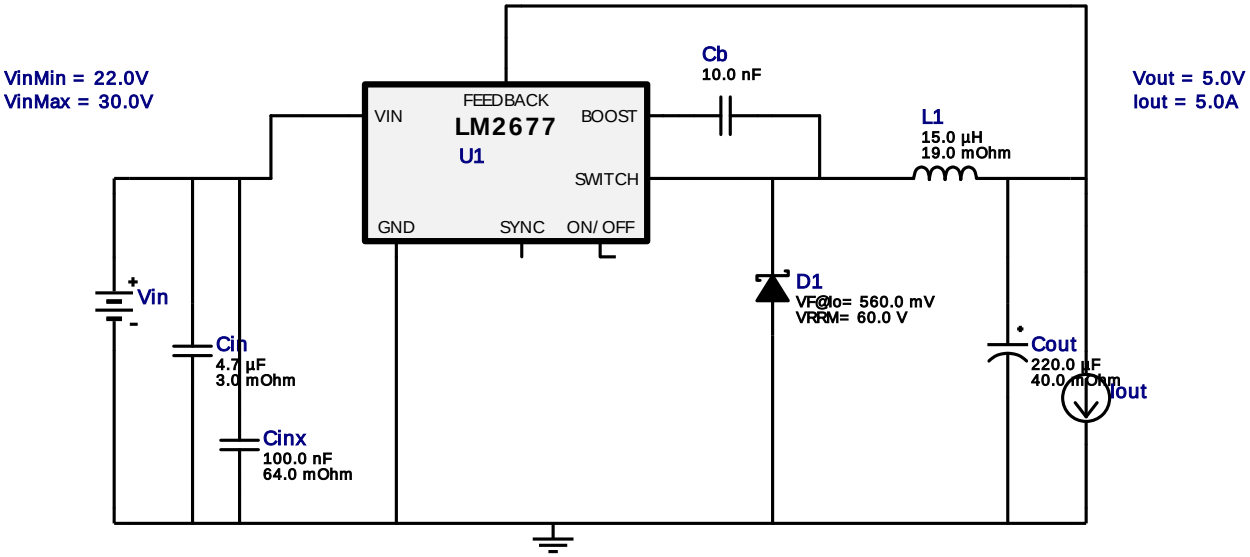
WEBENCH® Design Report

VinMin = 22.0V
VinMax = 30.0V
Vout = 5.0V
Iout = 5.0A

Device = LM2677SX-5.0/NOPB
Topology = Buck
Created = 2/4/15 4:50:43 AM
BOM Cost = $4.55
Footprint = 536.0 mm²
BOM Count = 7
Total Pd = 4.0W

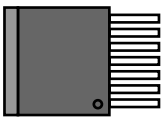
Design : 4270138/2 LM2677SX-5.0/NOPB
LM2677SX-5.0/NOPB 22.0V-30.0V to 5.00V @ 5.0A



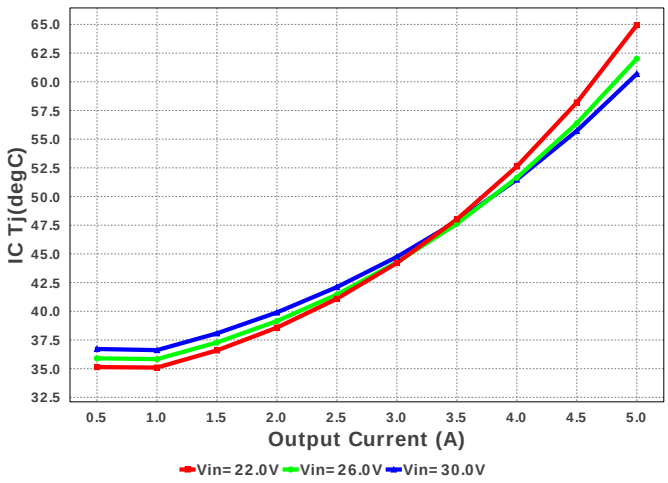
Electrical BOM

#	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	MuRata	GRM31CR71H475KA12L Series= X7R	Cap= 4.7 uF ESR= 3.0 mOhm VDC= 50.0 V IRMS= 4.98 A	1	$0.22	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	10TPB220ML Series= ?	Cap= 220.0 uF ESR= 40.0 mOhm VDC= 10.0 V IRMS= 2.0 A	1	$0.65	7343-31 59 mm²
5.	D1	Diodes Inc.	PDS760-13	VF@Io= 560.0 mV VRRM= 60.0 V	1	$0.60	PowerDI5 50 mm²
6.	L1	Coilcraft	MSS1210-153MEB	L= 15.0 µH DCR= 19.0 mOhm	1	$0.81	MSS1210 204 mm²

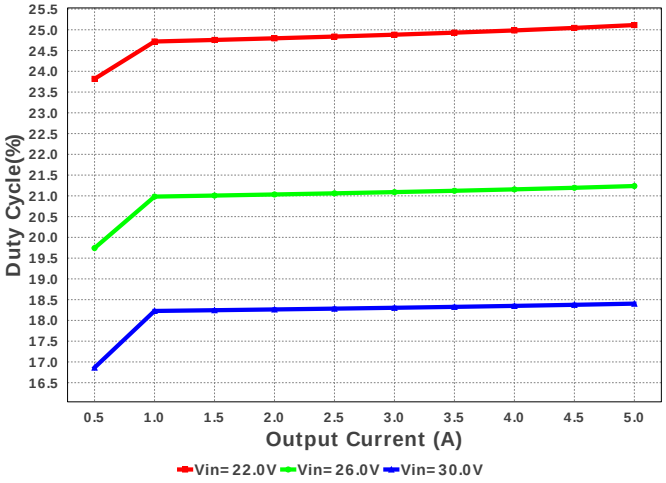
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
7.	U1	Texas Instruments	LM2677SX-5.0/NOPB	Switcher	1	$2.25	TS7B 199 mm²



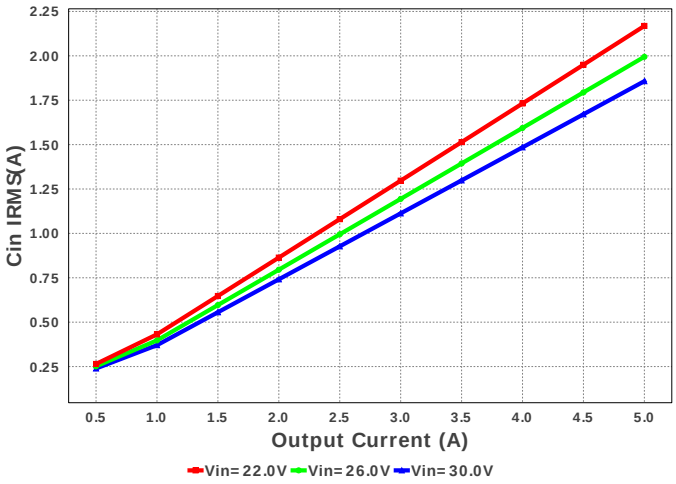
IC Tj



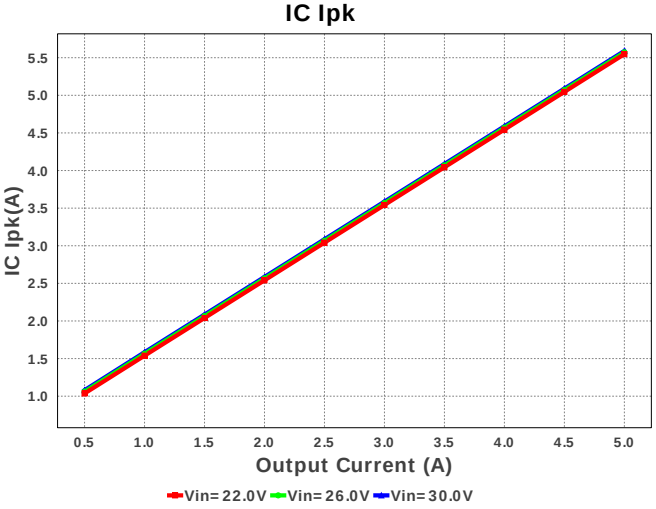
Duty Cycle



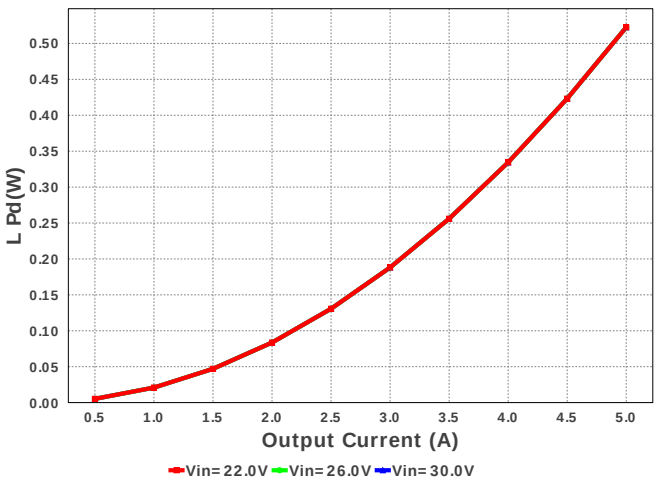
Cin IRMS



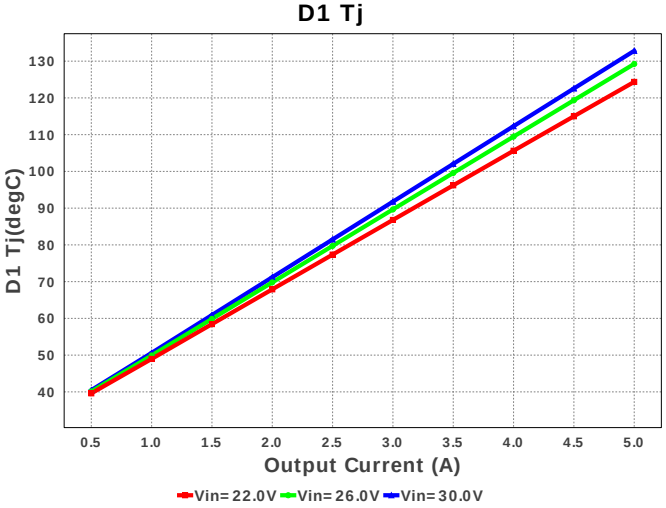
IC Ipk

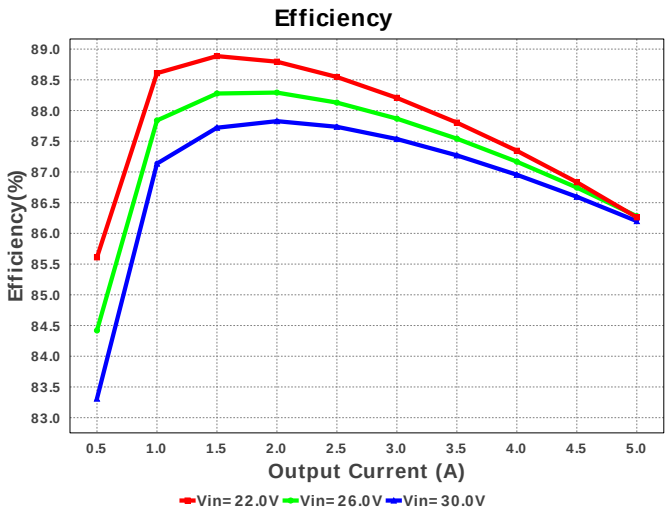


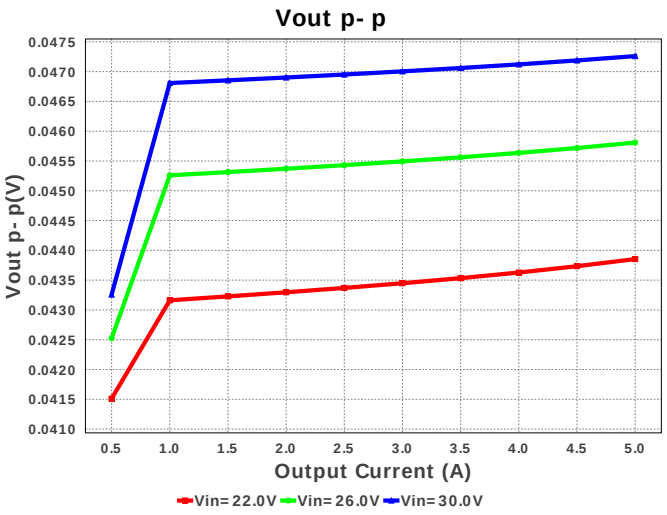
L Pd

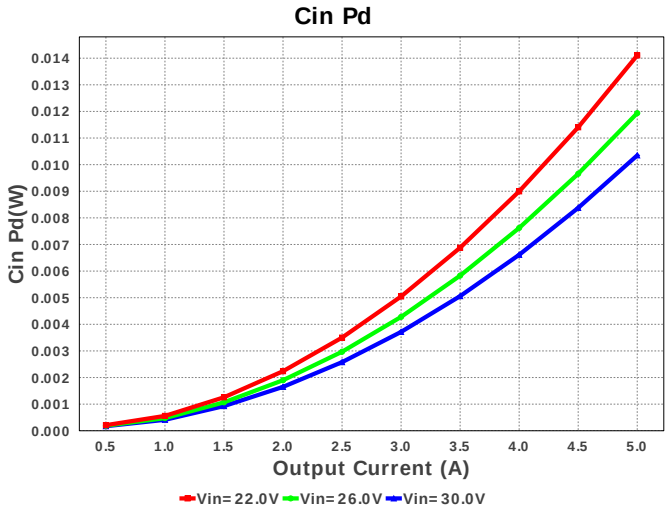


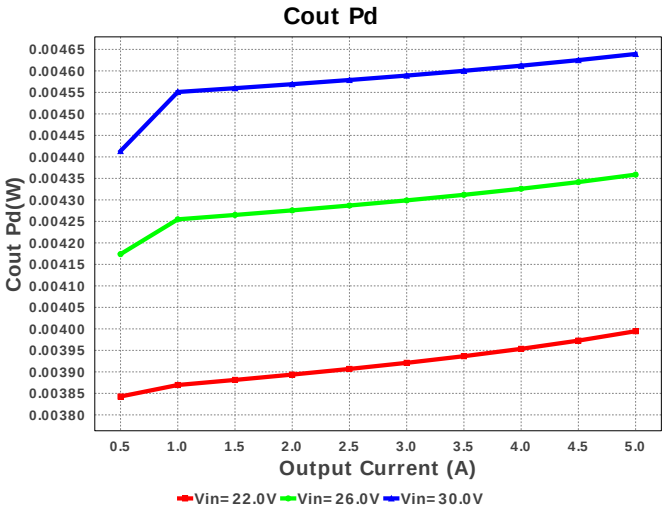
D1 Tj

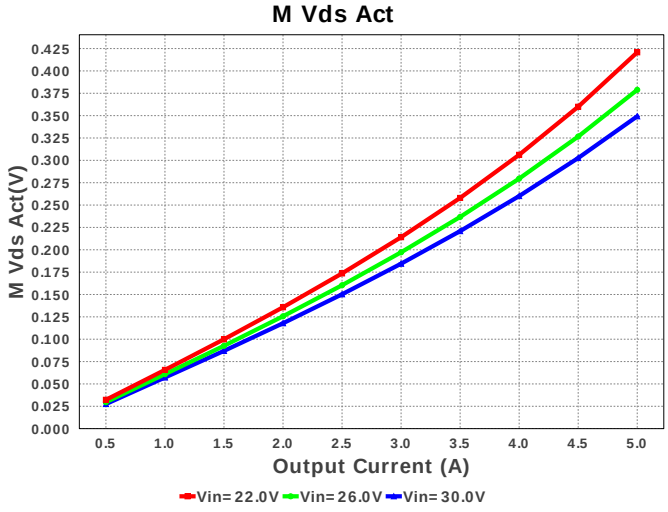


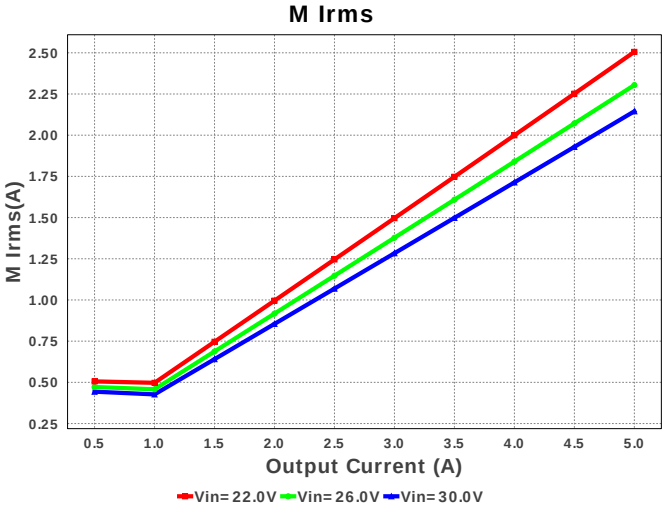


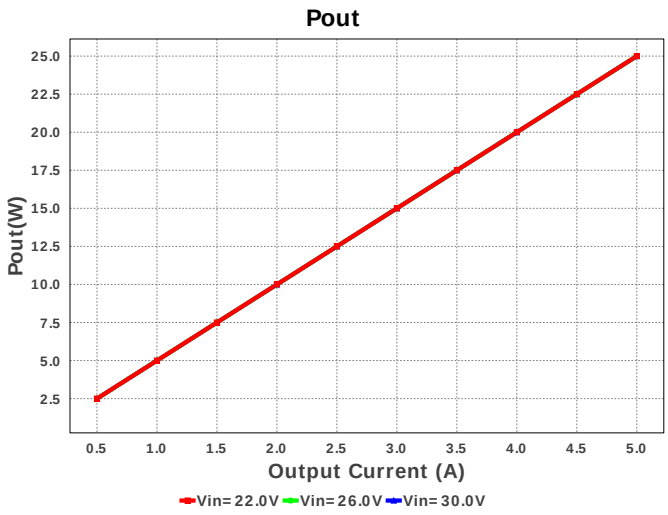


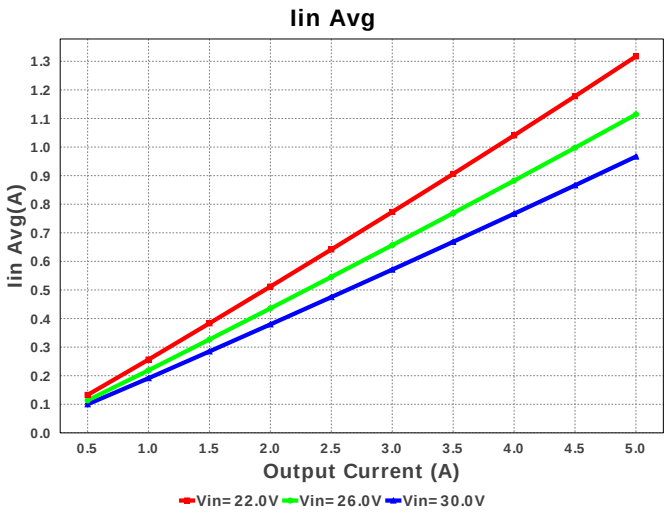


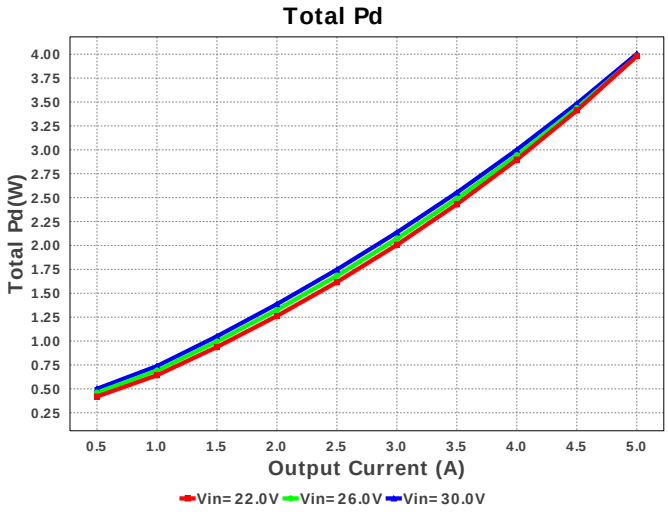


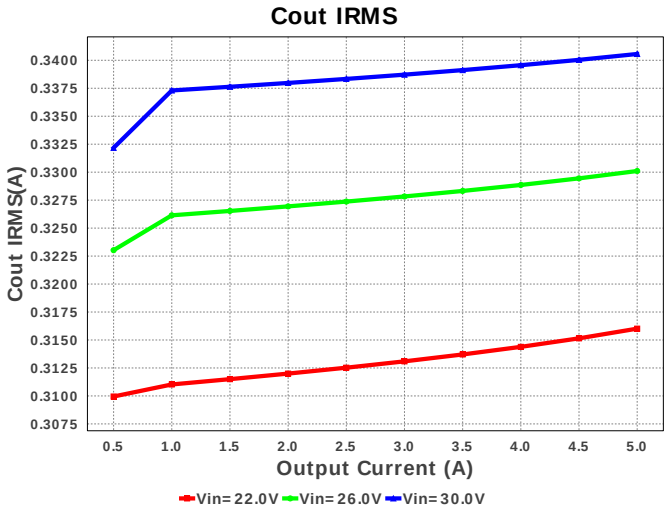


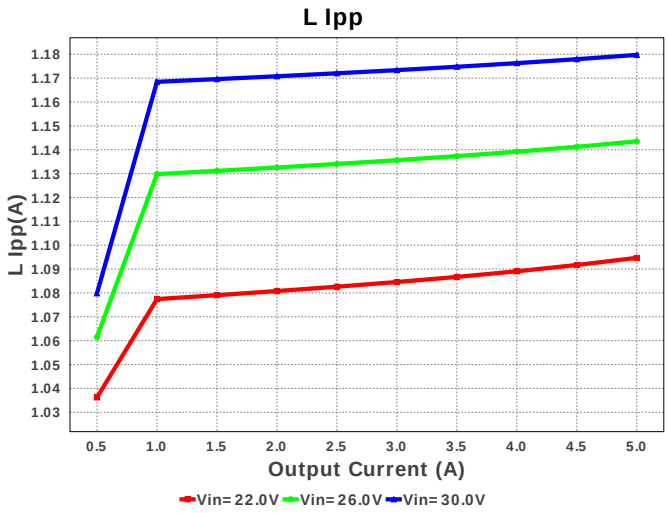


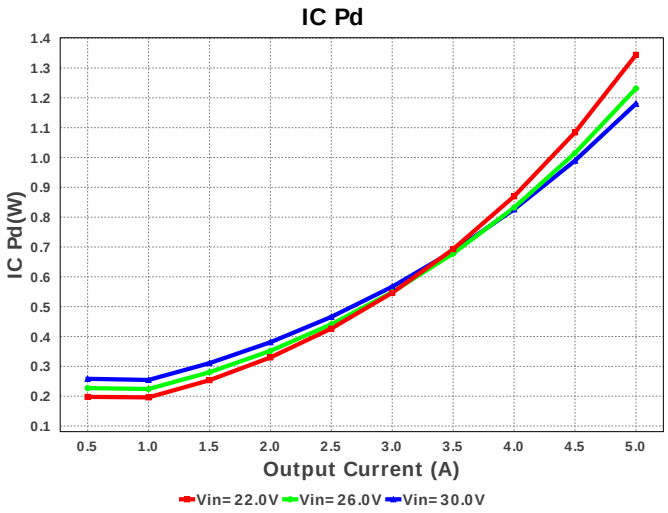


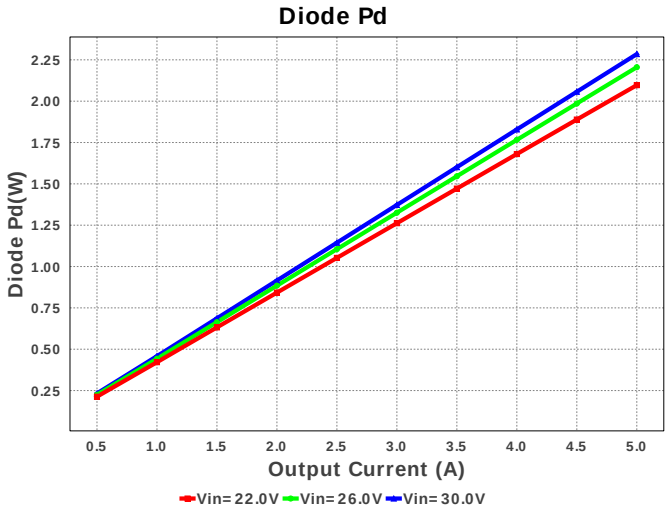












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	1.857 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	340.563 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	5.59 A	Current	Peak switch current in IC
4.	Iin Avg	966.74 mA	Current	Average input current
5.	L Ipp	1.18 A	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	2.145 A	Current	Q Iavg
7.	BOM Count	7	General	Total Design BOM count
8.	FootPrint	536.0 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	349.245 mV	General	Voltage drop across the MosFET
12.	Pout	25.0 W	General	Total output power
13.	Total BOM	$4.55	General	Total BOM Cost
14.	D1 Tj	132.811 degC	Op_Point	D1 junction temperature
15.	Vout OP	5.0 V	Op_Point	Operational Output Voltage
16.	Cross Freq	50.731 kHz	Op_point	Bode plot crossover frequency
17.	Duty Cycle	18.404 %	Op_point	Duty cycle
18.	Efficiency	86.2 %	Op_point	Steady state efficiency
19.	IC Tj	60.683 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	94.459 deg	Op_point	Bode Plot Phase Margin
23.	VIN_OP	30.0 V	Op_point	Vin operating point
24.	Vout p-p	47.26 mV	Op_point	Peak-to-peak output ripple voltage
25.	Cin Pd	10.348 mW	Power	Input capacitor power dissipation
26.	Cout Pd	4.639 mW	Power	Output capacitor power dissipation
27.	Diode Pd	2.285 W	Power	Diode power dissipation
28.	IC Pd	1.18 W	Power	IC power dissipation
29.	L Pd	522.5 mW	Power	Inductor power dissipation
30.	Total Pd	4.002 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	30.0	Maximum input voltage
4.	VinMin	22.0	Minimum input voltage
5.	Vout	5.0	Output Voltage
6.	Vout1	5.0	Output Voltage #1
7.	base_pn	LM2677	Base Product Number
8.	source	DC	Input Source Type
9.	Ta	30.0	Ambient temperature

Design Assistance

1. **LM2677** Product Folder : http://www.ti.com/product/lm2677 : contains the data sheet and other resources.