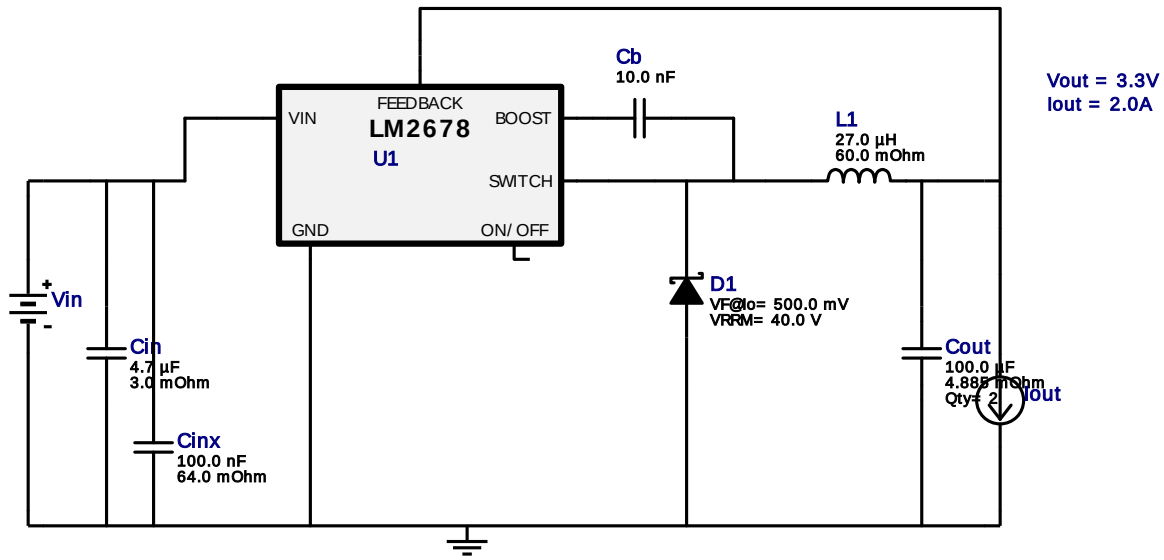
TEXAS INSTRUMENTS

WEBENCH® Design Report

VinMin = 14.0V
VinMax = 22.0V
Vout = 3.3V
Iout = 2.0A

Device = LM2678SX-3.3/NOPB
Topology = Buck
Created = 7/12/16 2:03:05 AM
BOM Cost = $3.03
BOM Count = 8
Total Pd = 1.22W

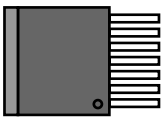
Design : 4737567/71 LM2678SX-3.3/NOPB
LM2678SX-3.3/NOPB 14.0V-22.0V to 3.30V @ 2.0A



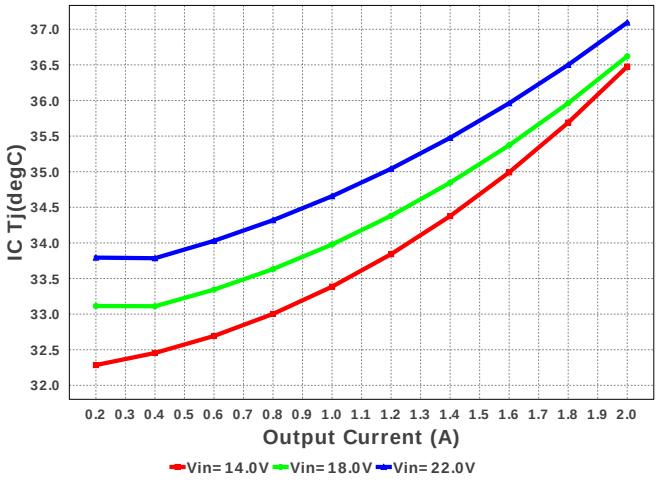
Electrical BOM

#	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	MuRata	GRM31CR71H475KA12L Series= X7R	Cap= 4.7 uF ESR= 3.0 mOhm VDC= 50.0 V IRMS= 4.98 A	1	$0.07	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	MuRata	GRM31CR60J107ME39L Series= X5R	Cap= 100.0 uF ESR= 4.885 mOhm VDC= 6.3 V IRMS= 4.4118 A	2	$0.14	1206_190 11 mm²
5.	D1	Diodes Inc.	B340A-13-F	VF@Io= 500.0 mV VRRM= 40.0 V	1	$0.11	SMA 37 mm²
6.	L1	Bourns	SDR1307-270ML	L= 27.0 µH DCR= 60.0 mOhm	1	$0.35	SDR1307 227 mm²

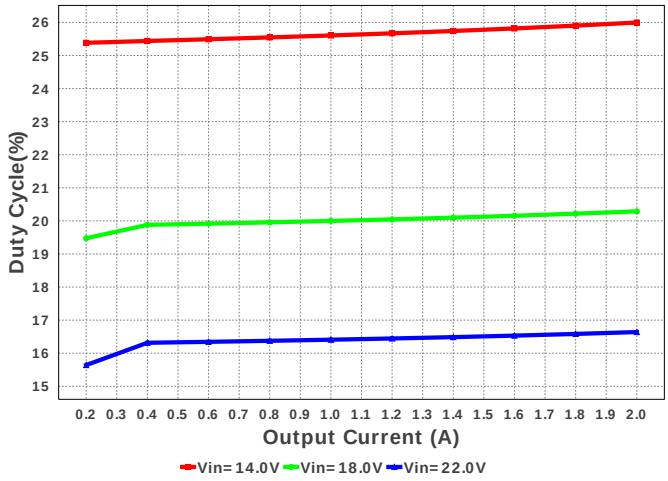
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
7.	U1	Texas Instruments	LM2678SX-3.3/NOPB	Switcher	1	$2.20	TS7B 199 mm^2



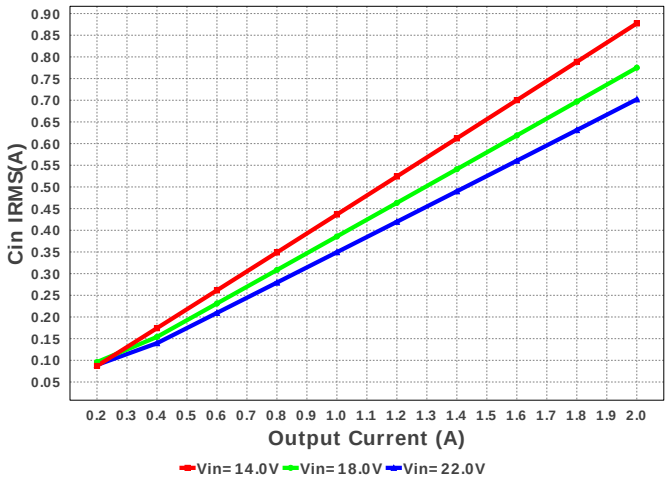
IC Tj



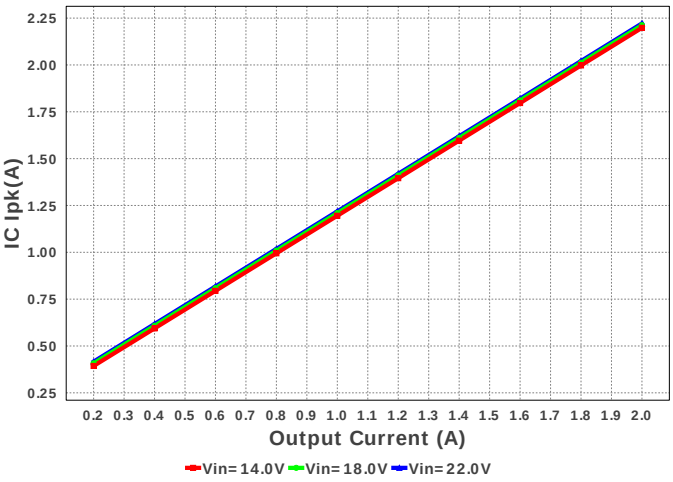
Duty Cycle

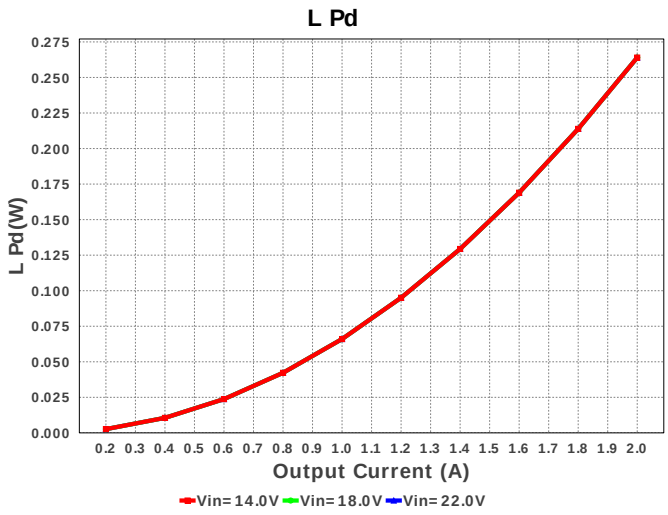


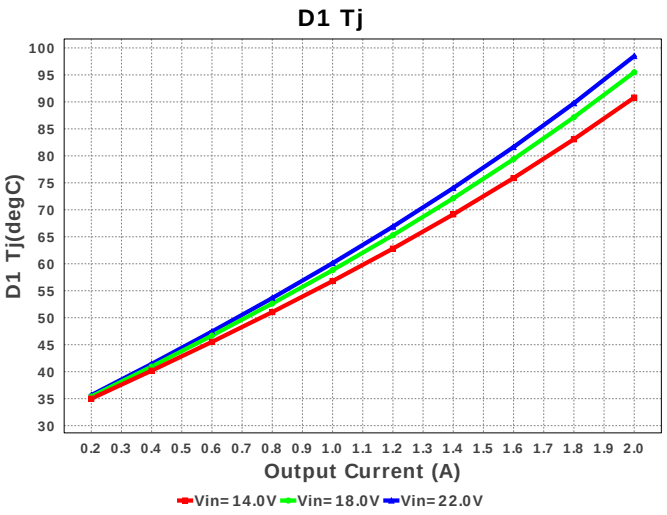
Cin IRMS

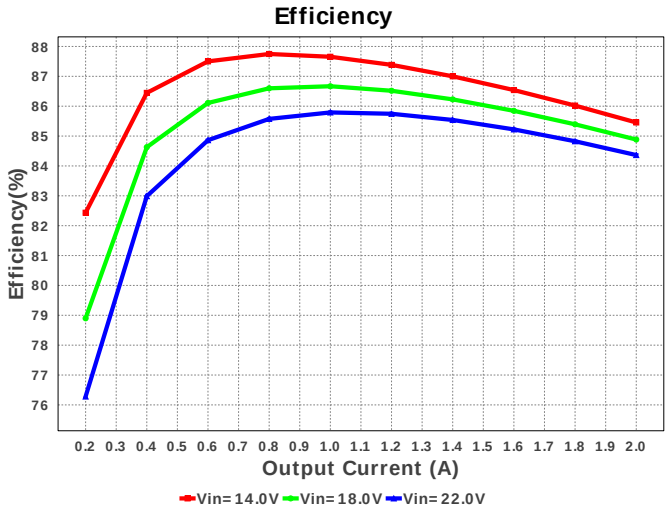


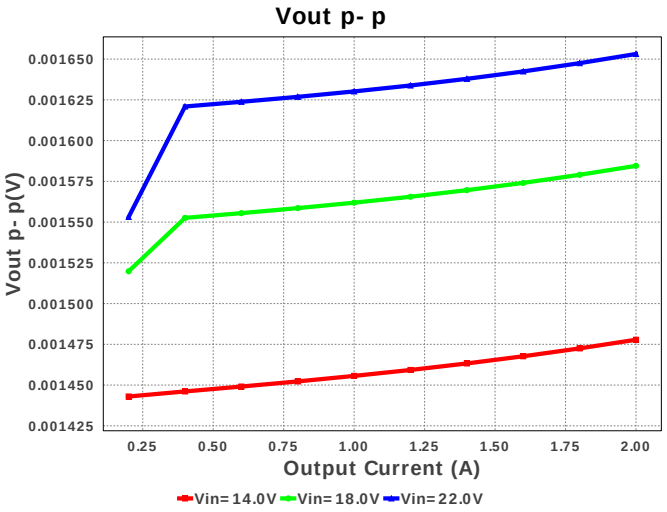
IC Ipk

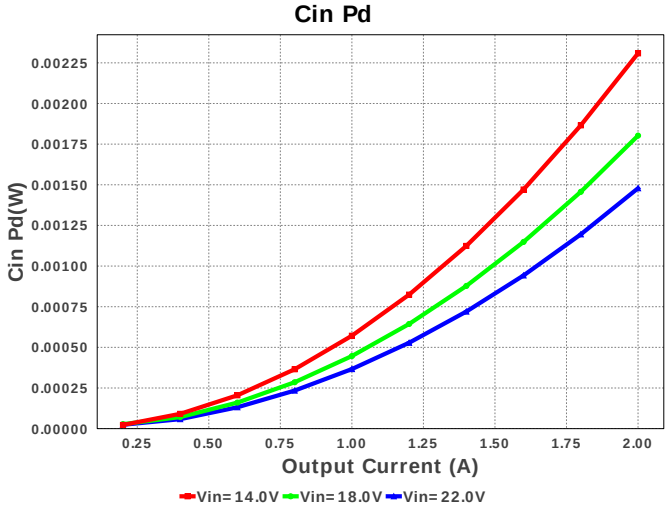


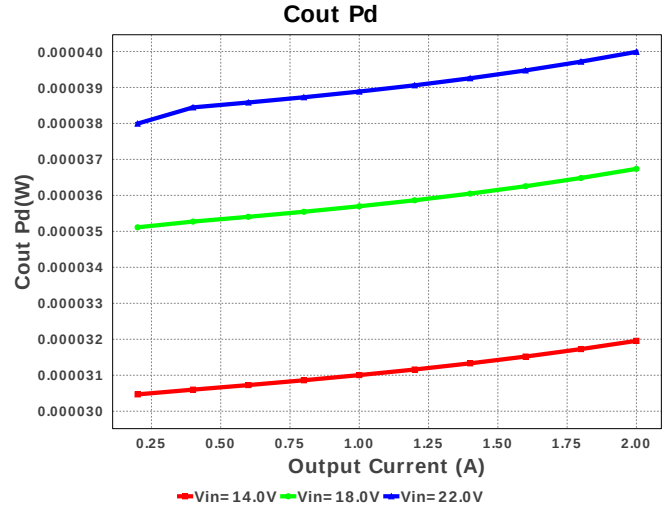


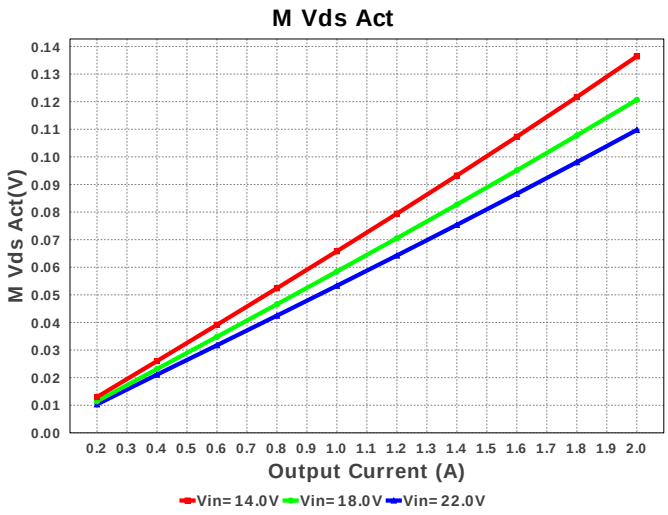


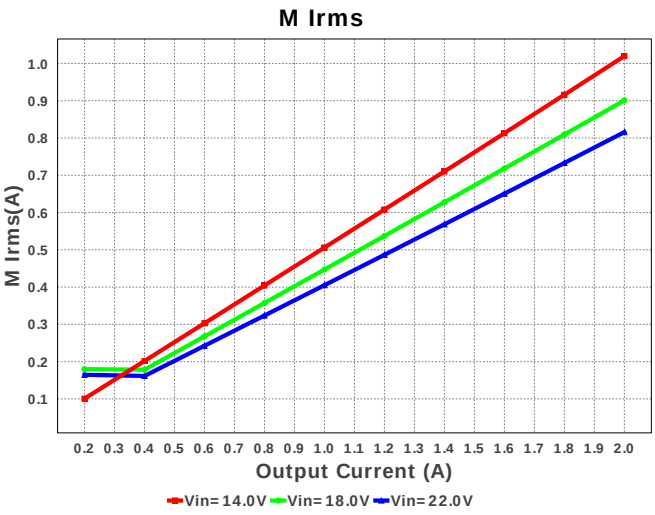


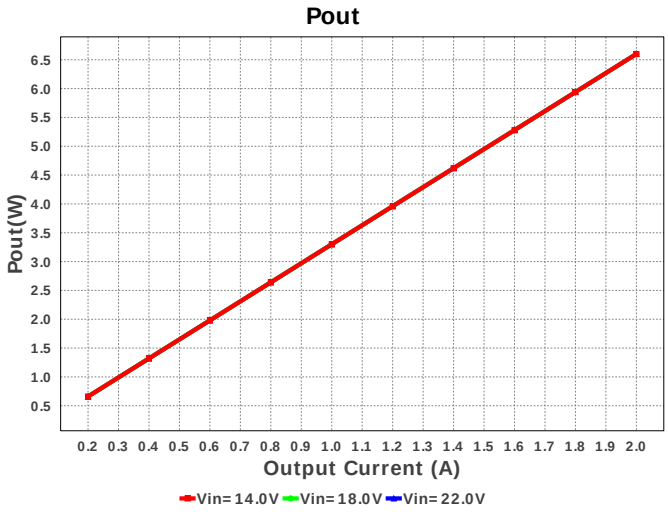


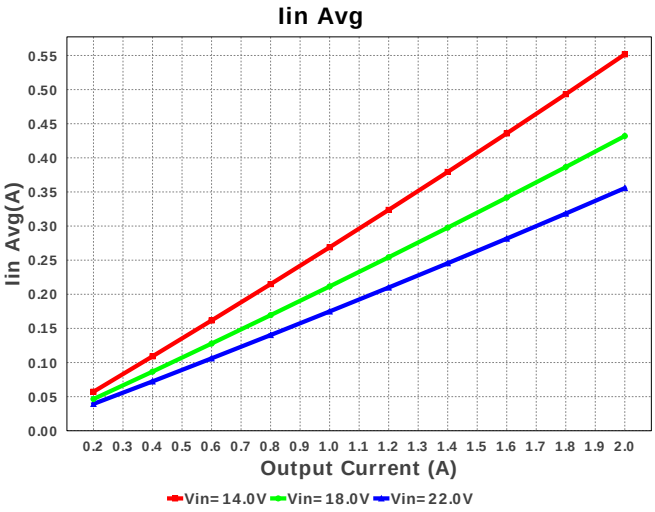


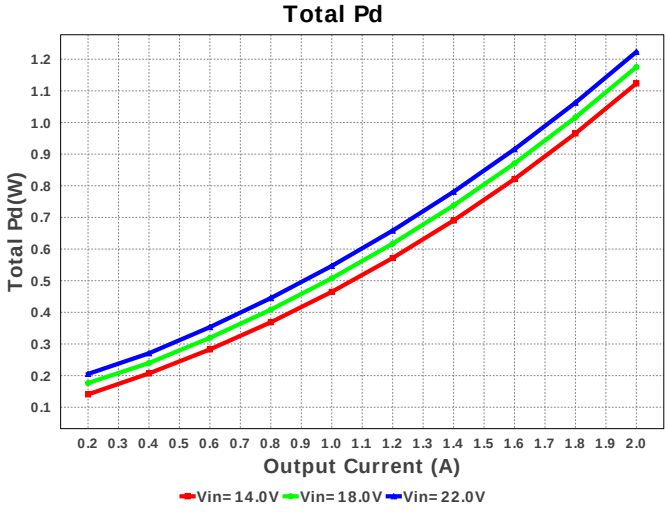


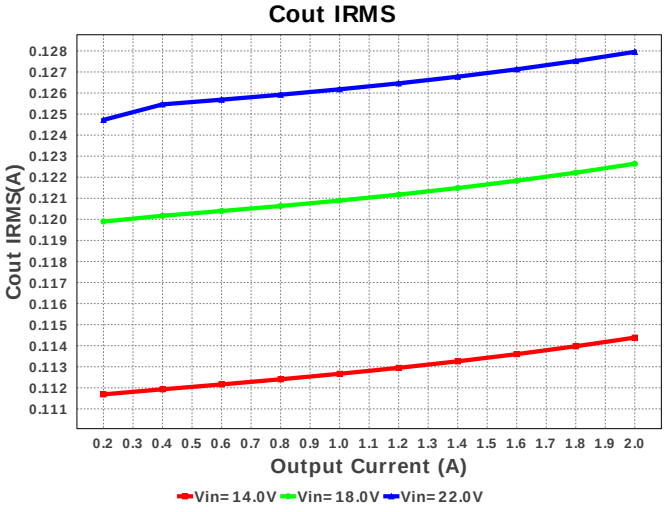


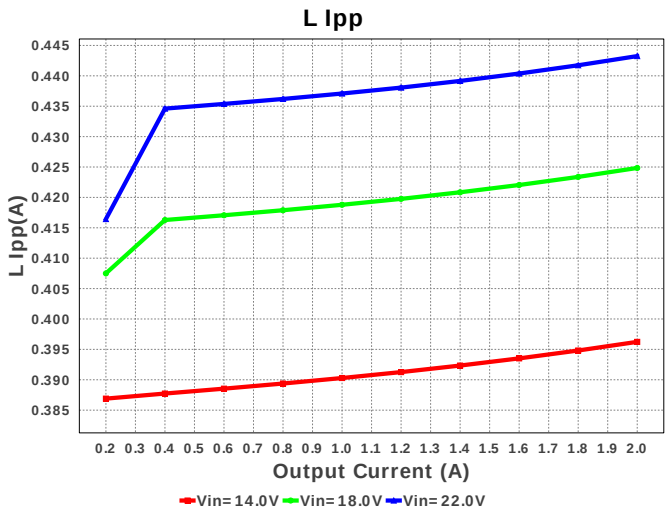


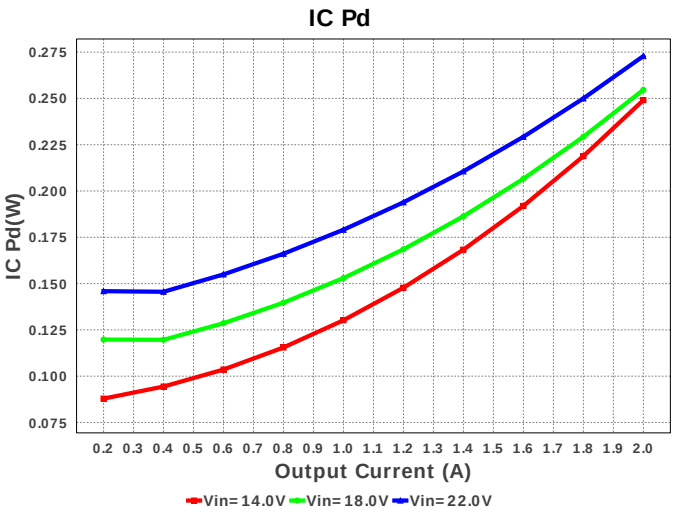


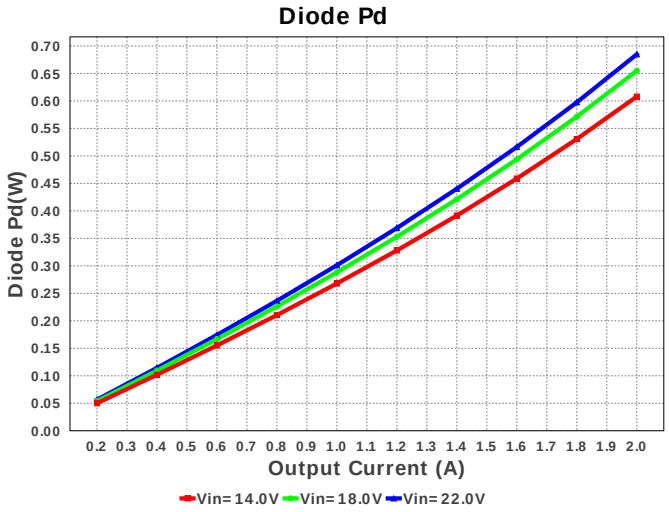












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	702.052 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	127.954 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.222 A	Current	Peak switch current in IC
4.	Iin Avg	355.6 mA	Current	Average input current
5.	L Ipp	443.25 mA	Current	Peak-to-peak inductor ripple current
6.	M Irms	815.83 mA	Current	MOSFET RMS current
7.	BOM Count	8	General	Total Design BOM count
8.	FootPrint	509.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	260.0 kHz	General	Switching frequency
10.	IC Tolerance	66.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	109.74 mV	General	Voltage drop across the MosFET
12.	Pout	6.6 W	General	Total output power
13.	Total BOM	$3.03	General	Total BOM Cost
14.	D1 Tj	98.485 degC	Op_Point	D1 junction temperature
15.	Vout OP	3.3 V	Op_Point	Operational Output Voltage
16.	Cross Freq	20.475 kHz	Op_point	Bode plot crossover frequency
17.	Duty Cycle	16.639 %	Op_point	Duty cycle
18.	Efficiency	84.364 %	Op_point	Steady state efficiency
19.	IC Tj	37.094 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	42.717 deg	Op_point	Bode Plot Phase Margin
23.	VIN_OP	22.0 V	Op_point	Vin operating point
24.	Vout p-p	1.653 mV	Op_point	Peak-to-peak output ripple voltage
25.	Cin Pd	1.479 mW	Power	Input capacitor power dissipation
26.	Cout Pd	39.989 µW	Power	Output capacitor power dissipation
27.	Diode Pd	684.85 mW	Power	Diode power dissipation
28.	IC Pd	272.861 mW	Power	IC power dissipation
29.	L Pd	264.0 mW	Power	Inductor power dissipation
30.	Total Pd	1.223 W	Power	Total Power Dissipation

#	Name	Value	Category	Description
31.	Vout Tolerance	2.0 %		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	22.0	Maximum input voltage
3.	VinMin	14.0	Minimum input voltage
4.	Vout	3.3	Output Voltage
5.	base_pn	LM2678	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

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