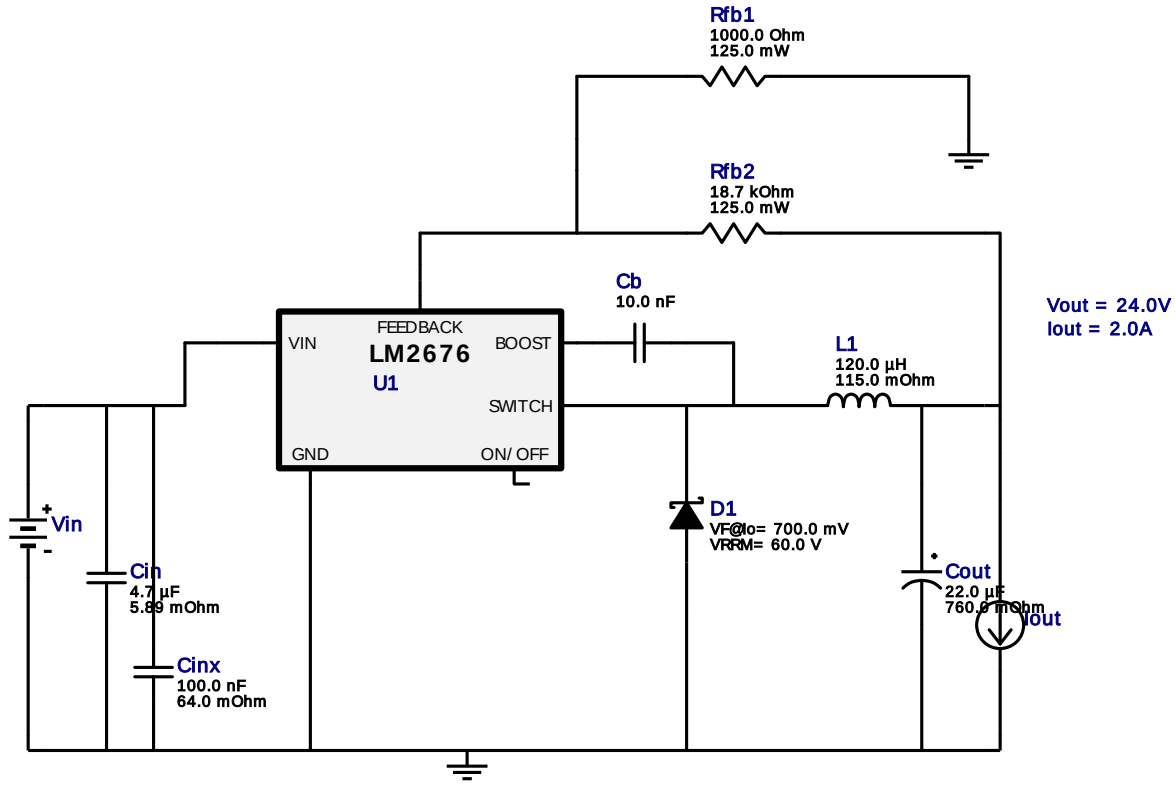
TEXAS INSTRUMENTS

WEBENCH® Design Report

VinMin = 33.0V
VinMax = 38.0V
Vout = 24.0V
Iout = 2.0A

Device = LM2676SX-ADJ/NOPB
Topology = Buck
Created = 9/23/16 1:45:52 AM
BOM Cost = $3.22
BOM Count = 9
Total Pd = 2.03W

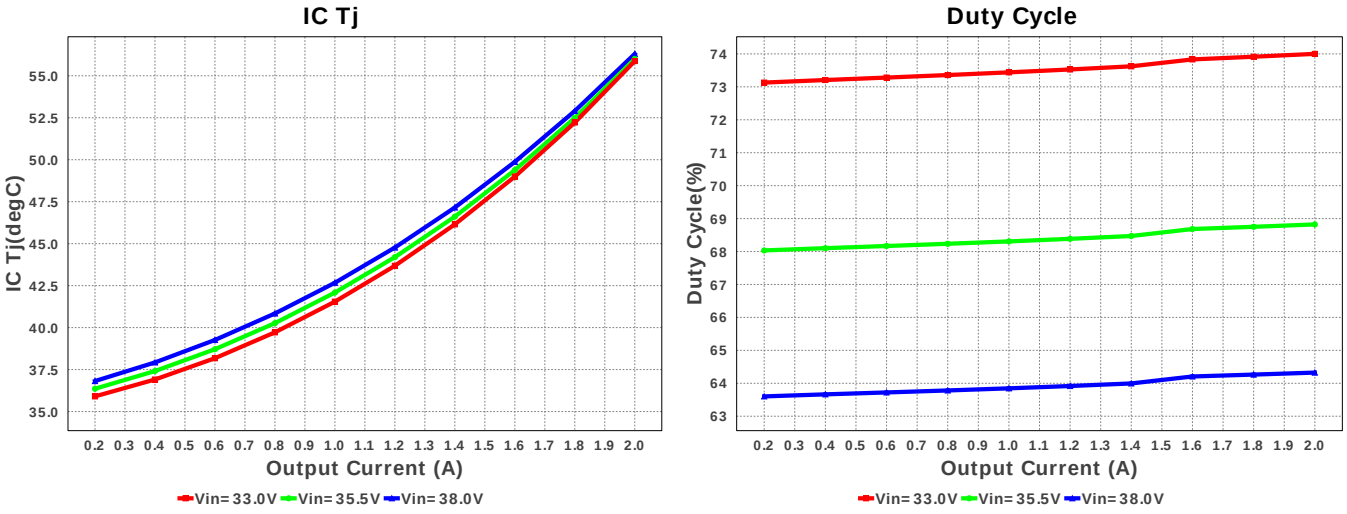
Design : 4800957/12 LM2676SX-ADJ/NOPB
LM2676SX-ADJ/NOPB 33.0V-38.0V to 24.00V @ 2.0A

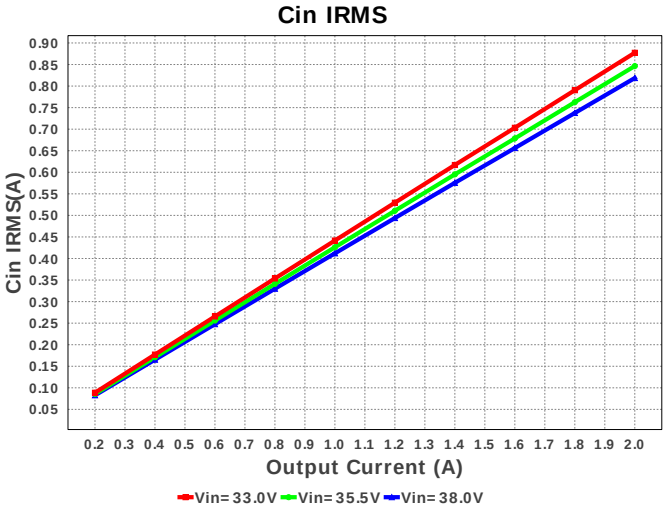


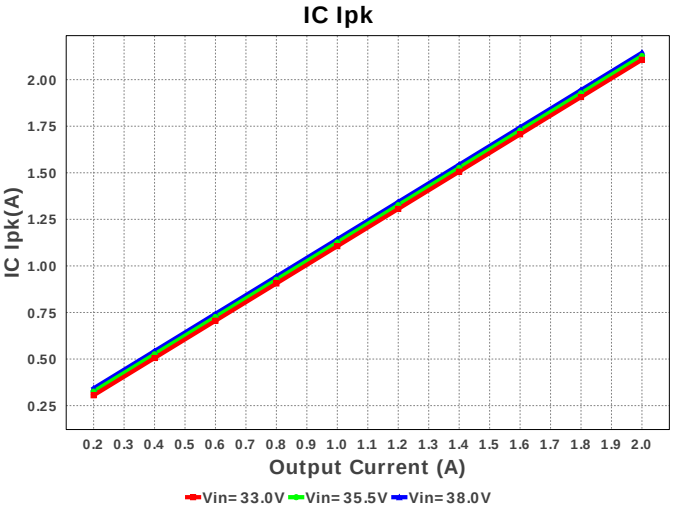
Electrical BOM

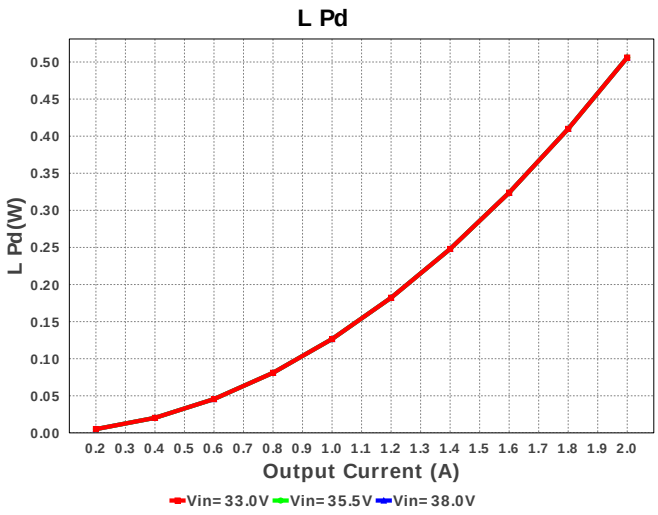
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cb	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
2.	Cin	TDK	C3225X7S2A475M200AB Series= X7S	Cap= 4.7 uF ESR= 5.89 mOhm VDC= 100.0 V IRMS= 6.7739 A	1	$0.42	1210 15 mm²
3.	Cinx	Kemet	C0805C104K5RACTU 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	Nichicon	UUD1V220MCL1GS Series= uD	Cap= 22.0 uF ESR= 760.0 mOhm VDC= 35.0 V IRMS= 150.0 mA	1	$0.10	SM_RADIAL_5MM 58 mm²
5.	D1	Diodes Inc.	B160-13-F	VF@Io= 700.0 mV VRRM= 60.0 V	1	$0.05	SMA 37 mm²
6.	L1	Coilcraft	MSS1210-124KEB	L= 120.0 µH DCR= 115.0 mOhm	1	$0.81	MSS1210 204 mm²

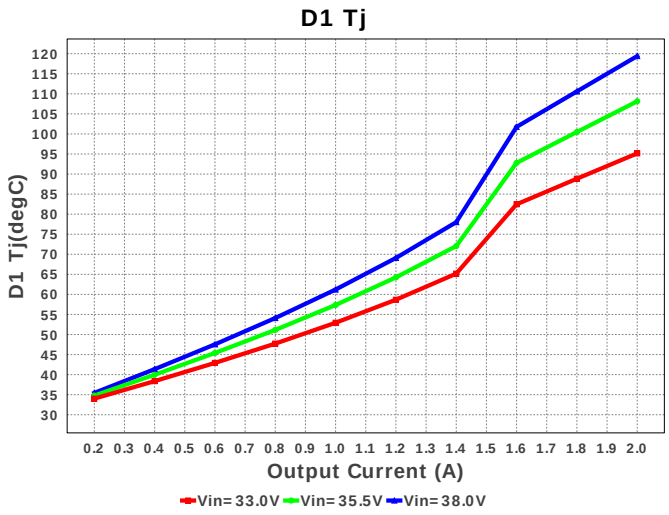
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
7.	Rfb1	Panasonic	ERJ-6ENF1001V Series= ERJ-6E	Res= 1000.0 Ohm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm²
8.	Rfb2	Panasonic	ERJ-6ENF1872V Series= ERJ-6E	Res= 18.7 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm²
9.	U1	Texas Instruments	LM2676SX-ADJ/NOPB	Switcher	1	$1.80	TS7B 199 mm²

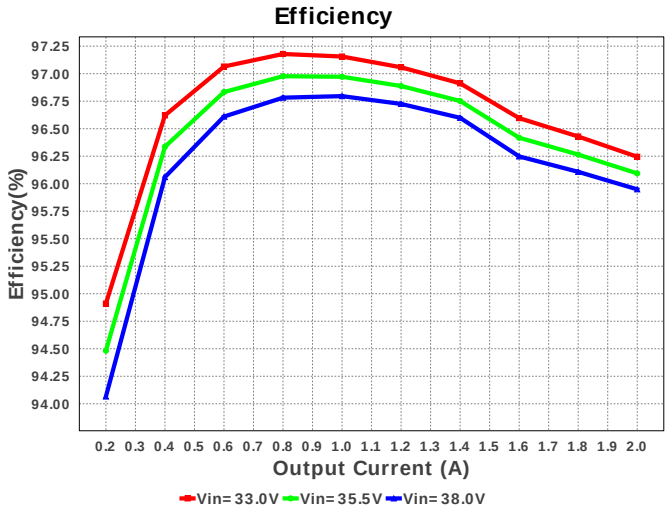


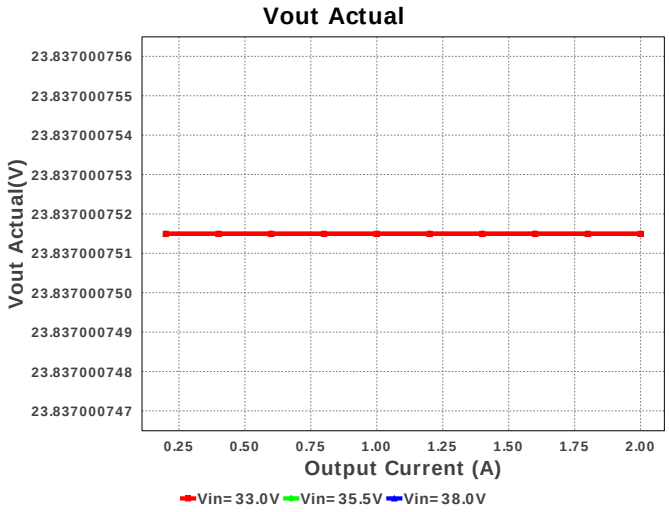


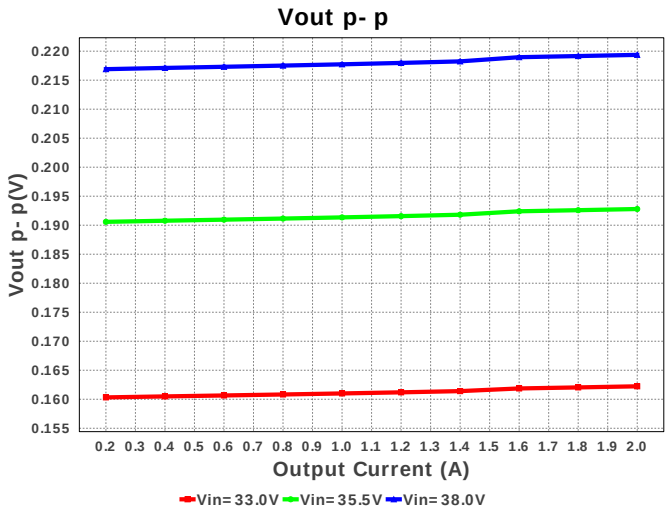


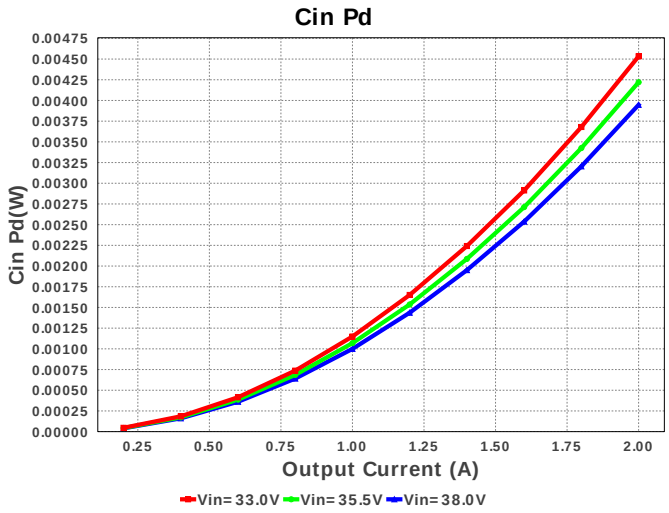


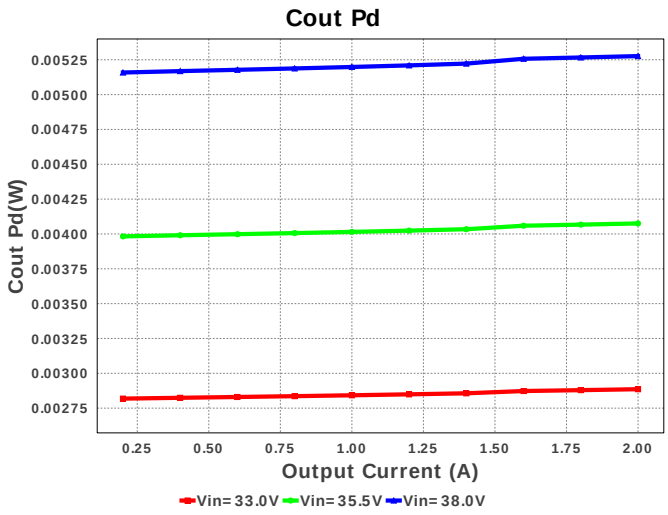


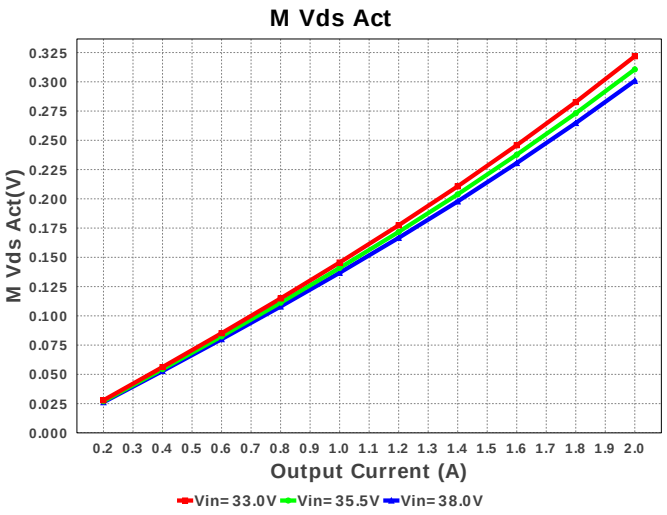


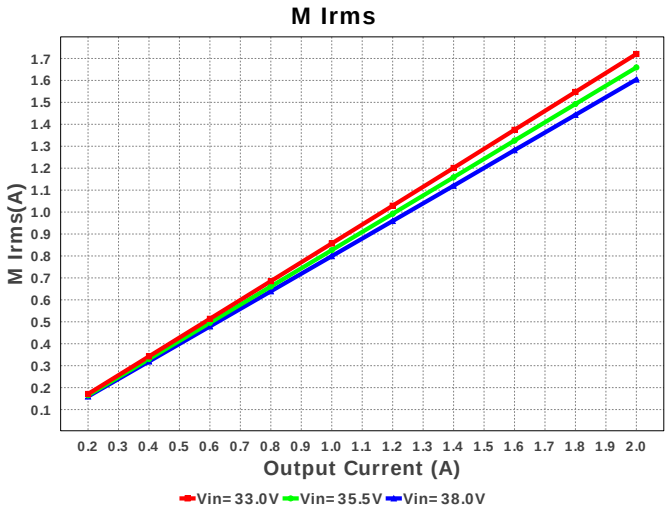


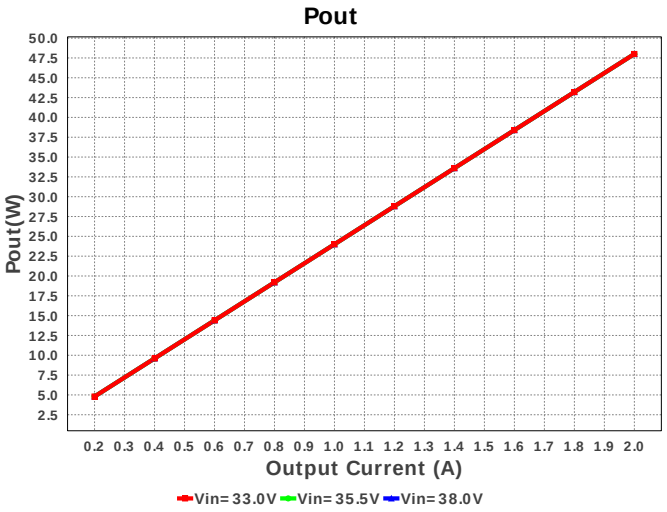


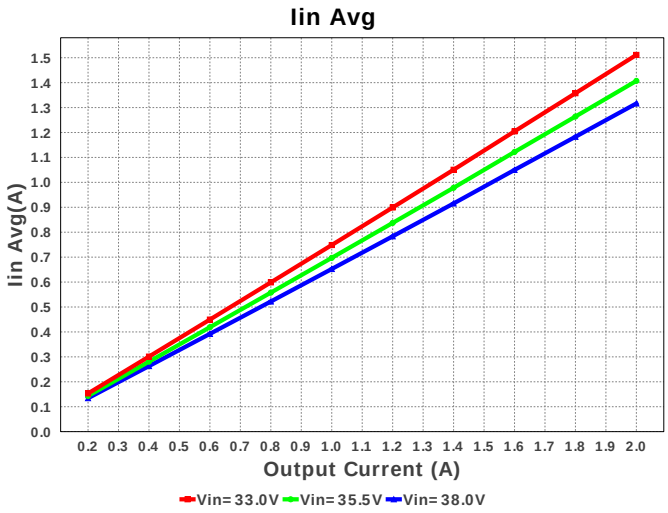


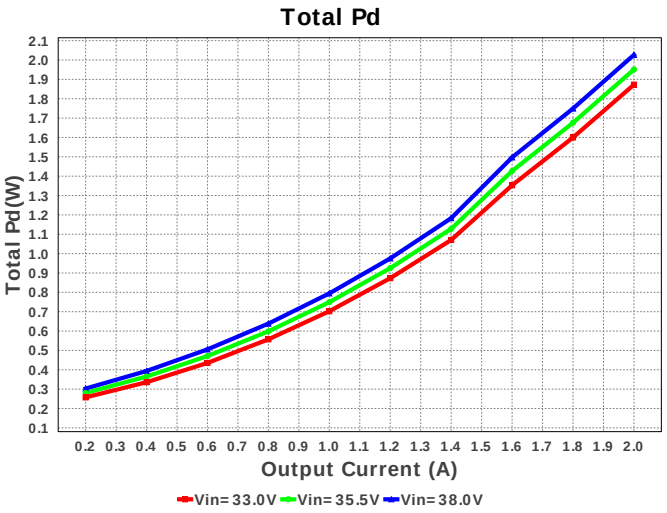


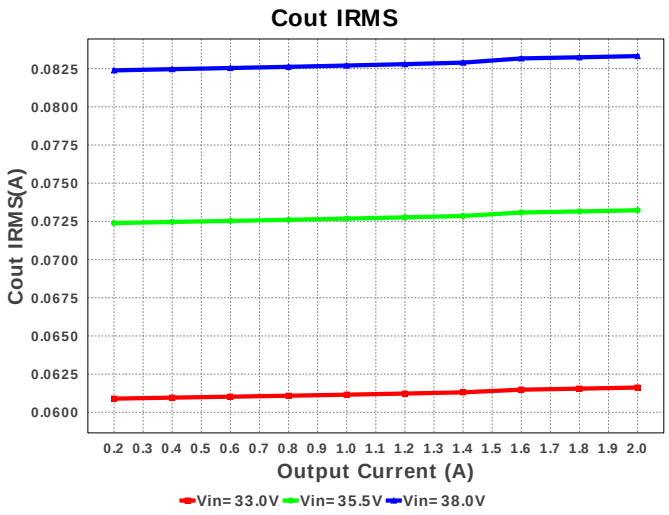


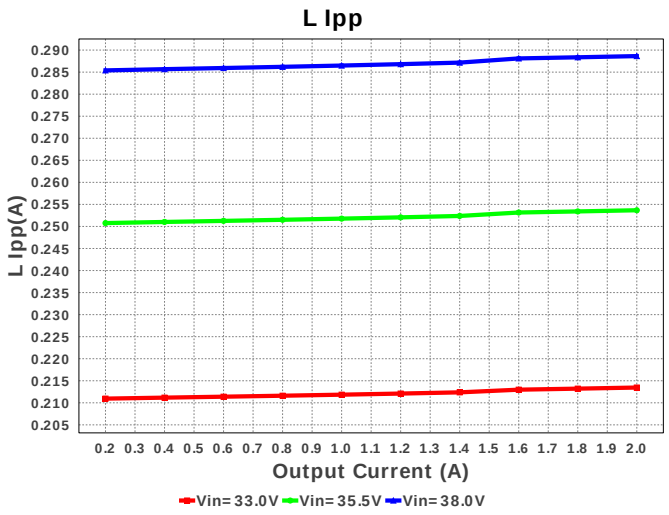


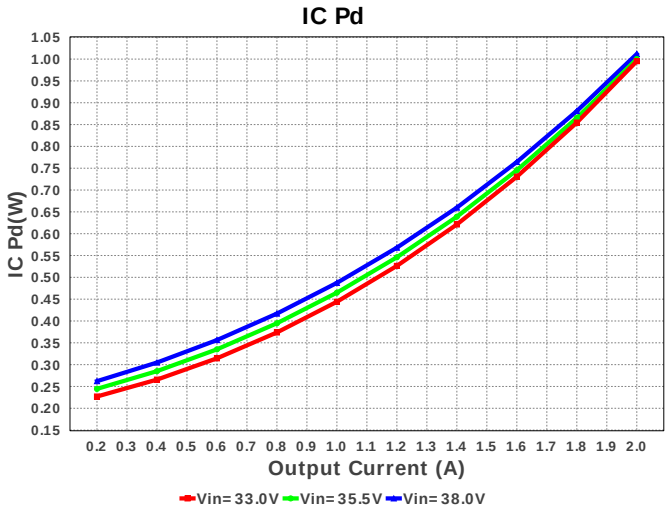


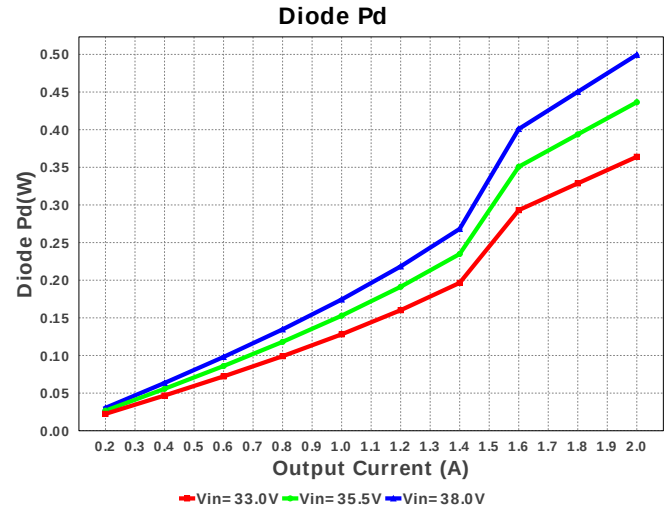












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	818.631 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	83.322 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.144 A	Current	Peak switch current in IC
4.	Iin Avg	1.316 A	Current	Average input current
5.	L Ipp	288.63 mA	Current	Peak-to-peak inductor ripple current
6.	M1 Irms	1.604 A	Current	Q Iavg
7.	BOM Count	9	General	Total Design BOM count
8.	FootPrint	541.0 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	300.864 mV	General	Voltage drop across the MosFET
12.	Mode	CCM	General	Conduction Mode
13.	Pout	48.0 W	General	Total output power
14.	Total BOM	$3.22	General	Total BOM Cost
15.	D1 Tj	119.403 degC	Op_Point	D1 junction temperature
16.	Vout Actual	23.837 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
17.	Vout OP	24.0 V	Op_Point	Operational Output Voltage
18.	Cross Freq	14.639 kHz	Op_point	Bode plot crossover frequency
19.	Duty Cycle	64.324 %	Op_point	Duty cycle
20.	Efficiency	95.949 %	Op_point	Steady state efficiency
21.	IC Tj	56.305 degC	Op_point	IC junction temperature
22.	ICThetaJA	26.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
23.	IOUT_OP	2.0 A	Op_point	Iout operating point
24.	Phase Marg	104.07 deg	Op_point	Bode Plot Phase Margin
25.	VIN_OP	38.0 V	Op_point	Vin operating point
26.	Vout p-p	219.363 mV	Op_point	Peak-to-peak output ripple voltage
27.	Cin Pd	3.947 mW	Power	Input capacitor power dissipation
28.	Cout Pd	5.276 mW	Power	Output capacitor power dissipation
29.	Diode Pd	499.459 mW	Power	Diode power dissipation
30.	IC Pd	1.012 W	Power	IC power dissipation
31.	L Pd	506.0 mW	Power	Inductor power dissipation

#	Name	Value	Category	Description
32.	Total Pd	2.027 W	Power	Total Power Dissipation
33.	Vout Tolerance	3.939 %		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	38.0	Maximum input voltage
3.	VinMin	33.0	Minimum input voltage
4.	Vout	24.0	Output Voltage
5.	base_pn	LM2676	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **LM2676** Product Folder : http://www.ti.com/product/LM2676 : contains the data sheet and other resources.