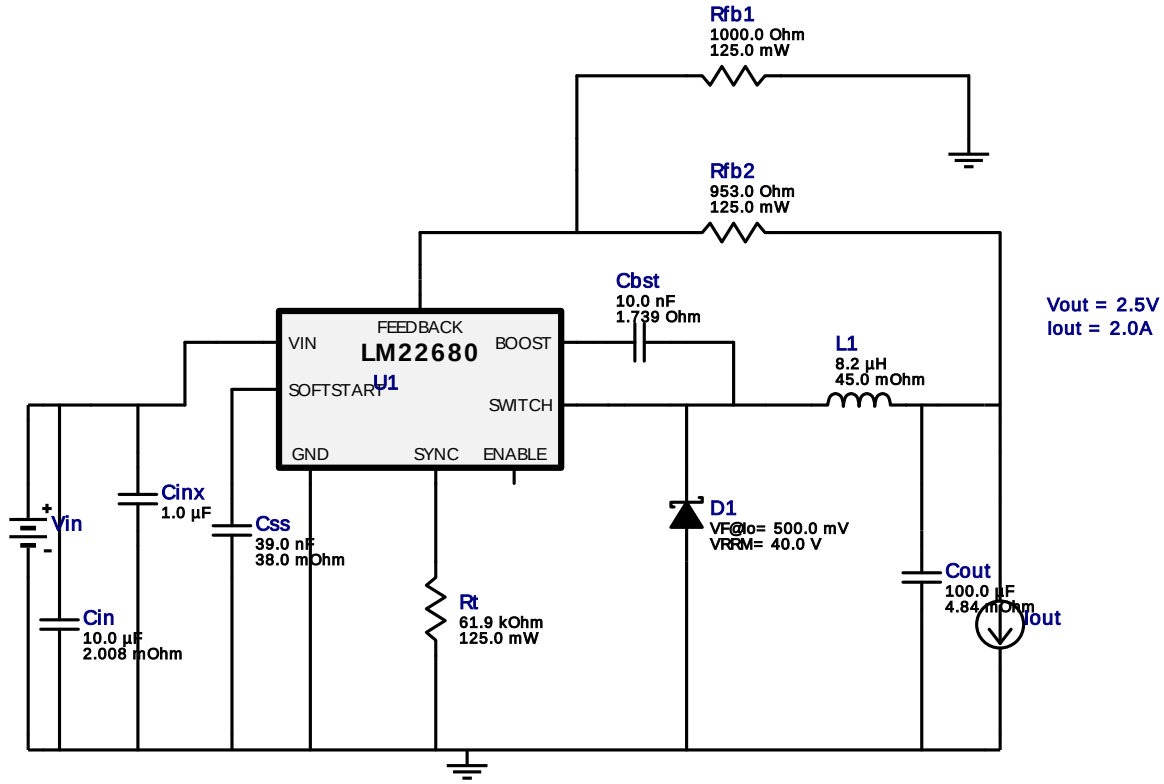
TEXAS INSTRUMENTS

WEBENCH® Design Report

VinMin = 21.0V
VinMax = 25.0V
Vout = 2.5V
Iout = 2.0A

Device = LM22680MRE-ADJ/NOPB
Topology = Buck
Created = 7/21/16 12:30:05 AM
BOM Cost = $2.76
BOM Count = 11
Total Pd = 1.69W

Design : 4742013/201 LM22680MRE-ADJ/NOPB
LM22680MRE-ADJ/NOPB 21.0V-25.0V to 2.50V @ 2.0A



Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbst	Kemet	C0805C103K5RACTU Series= X7R	Cap= 10.0 nF ESR= 1.739 Ohm VDC= 50.0 V IRMS= 411.0 mA	1	$0.01	0805 7 mm²
2.	Cin	MuRata	GRM32ER7YA106KA12L Series= X7R	Cap= 10.0 uF ESR= 2.008 mOhm VDC= 35.0 V IRMS= 4.6772 A	1	$0.22	1210_280 15 mm²
3.	Cinx	Taiyo Yuden	GMK212B7105KG-T Series= X7R	Cap= 1.0 uF VDC= 35.0 V IRMS= 0.0 A	1	$0.05	0805 7 mm²
4.	Cout	MuRata	GRM31CD80G107ME39L Series= X6T	Cap= 100.0 uF ESR= 4.84 mOhm VDC= 4.0 V IRMS= 4.3381 A	1	$0.14	1206_190 11 mm²
5.	Css	AVX	08055C393KAT2A Series= X7R	Cap= 39.0 nF ESR= 38.0 mOhm VDC= 50.0 V IRMS= 0.0 A	1	$0.02	0805 7 mm²
6.	D1	Diodes Inc.	B340A-13-F	VF@Io= 500.0 mV VRRM= 40.0 V	1	$0.11	SMA 37 mm²

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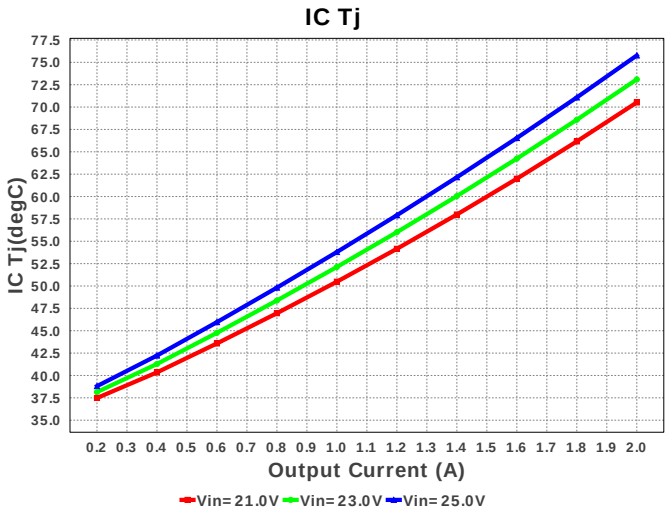
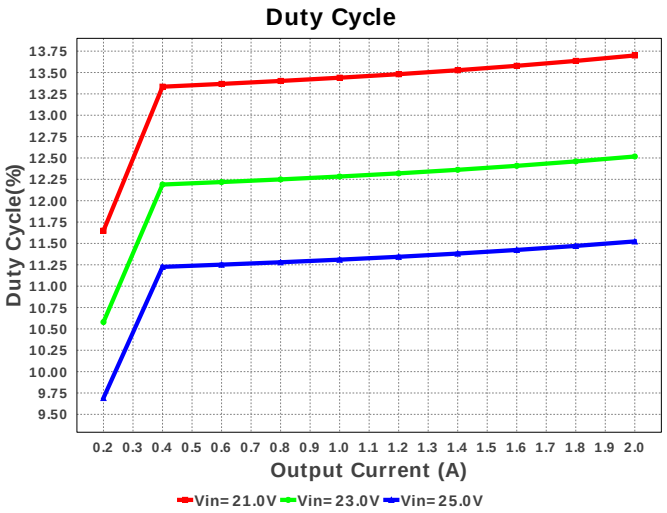
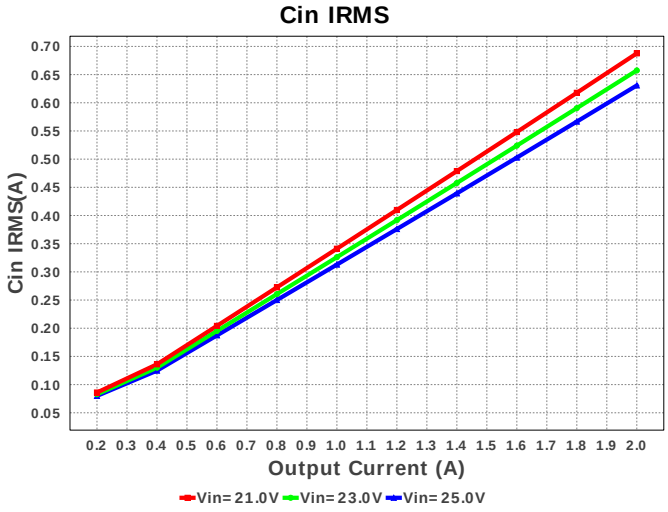
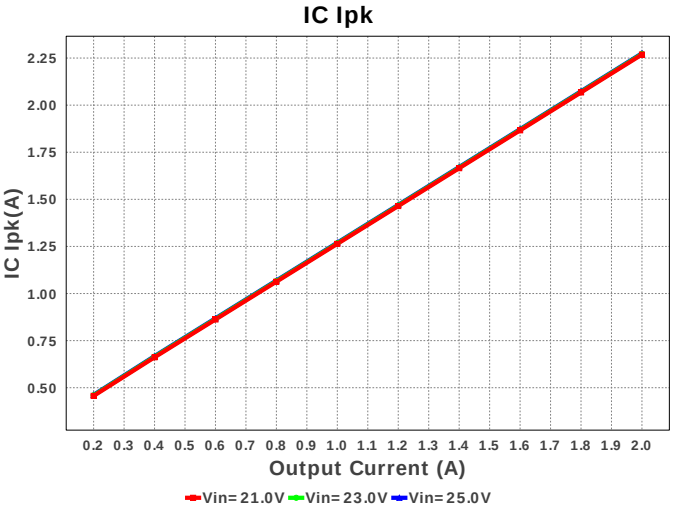
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
7.	L1	Bourns	SRN8040-8R2Y	L= 8.2 µH DCR= 45.0 mOhm	1	$0.22	 SRN8040 100 mm²
8.	Rfb1	Panasonic	ERJ-6ENF1001V Series= ERJ-6E	Res= 1000.0 Ohm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
9.	Rfb2	Panasonic	ERJ-6ENF9530V Series= ERJ-6E	Res= 953.0 Ohm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
10.	Rt	Panasonic	ERJ-6ENF6192V Series= ERJ-6E	Res= 61.9 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
11.	U1	Texas Instruments	LM22680MRE-ADJ/NOPB	Switcher	1	$1.96	 MRA08B 56 mm²









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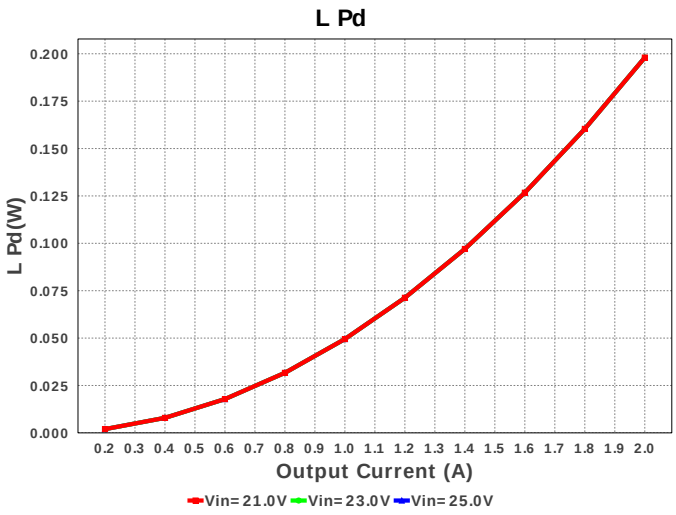

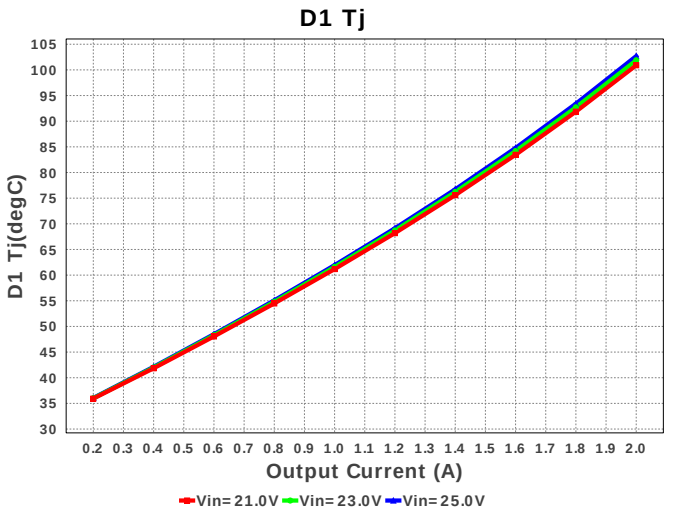

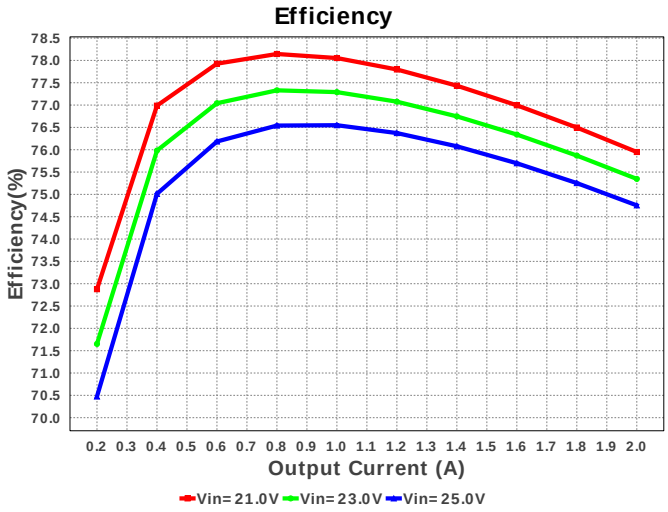

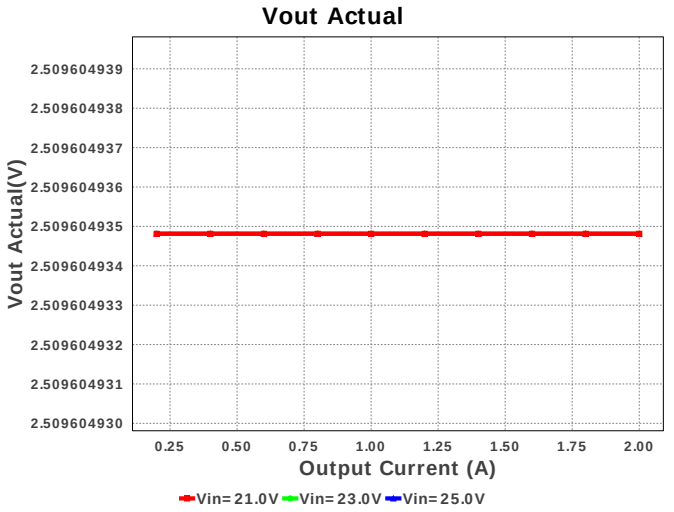

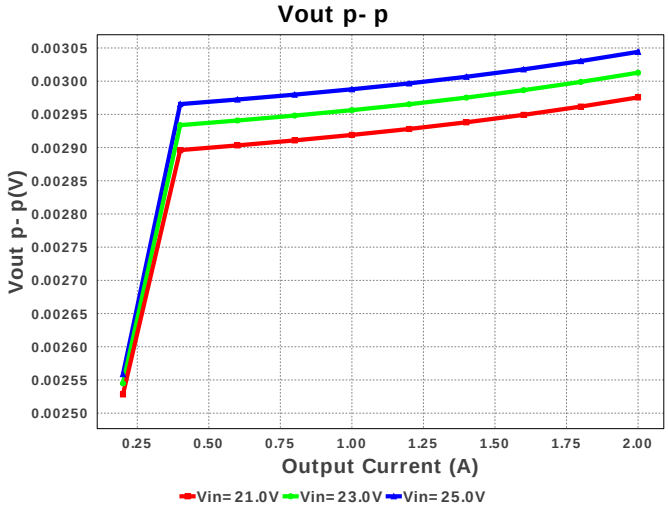

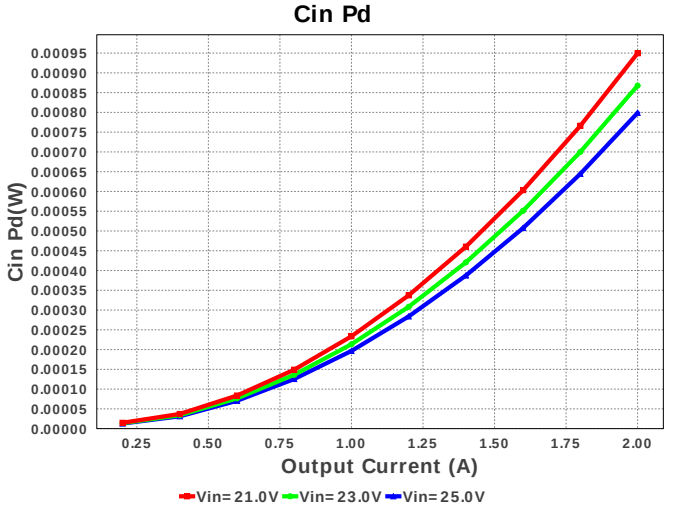

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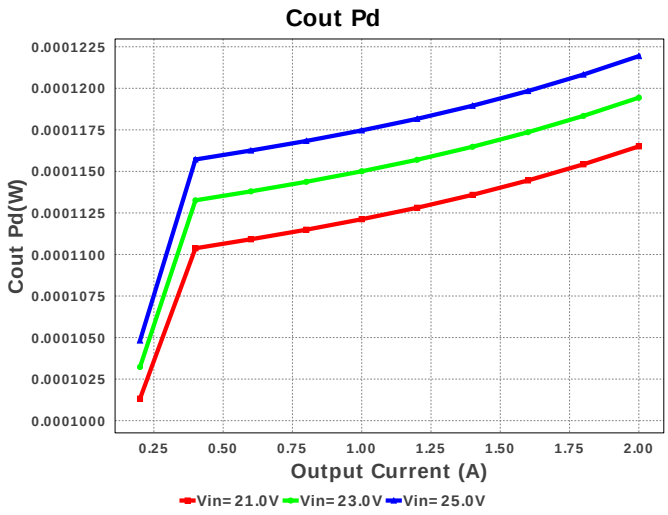

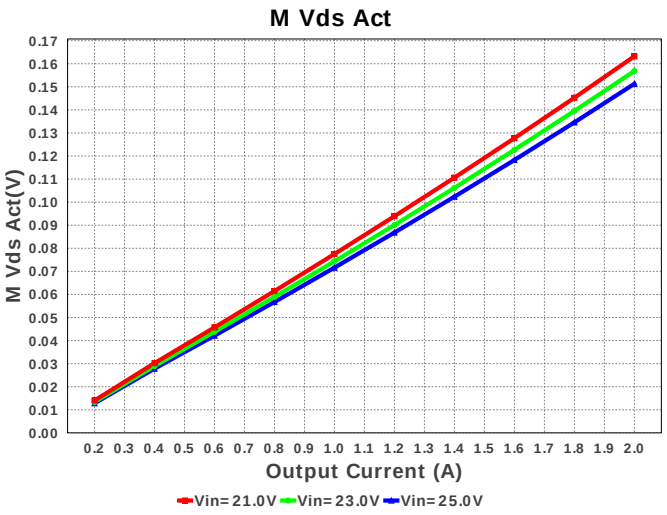

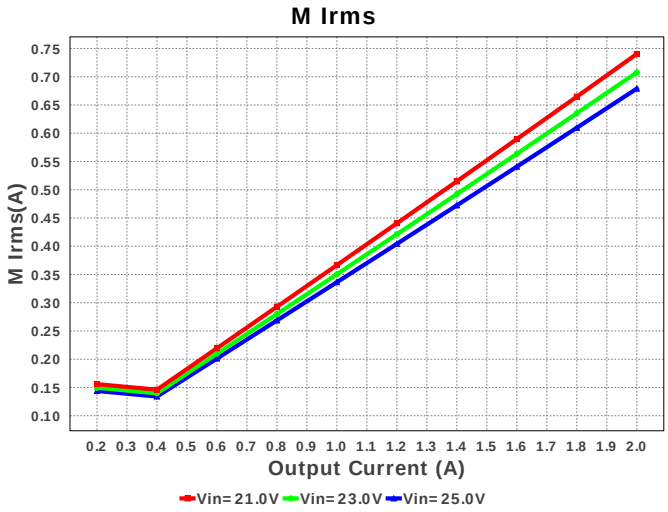

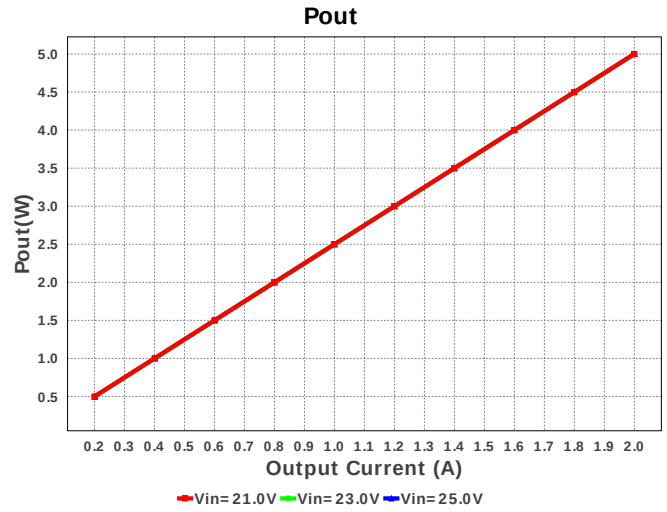

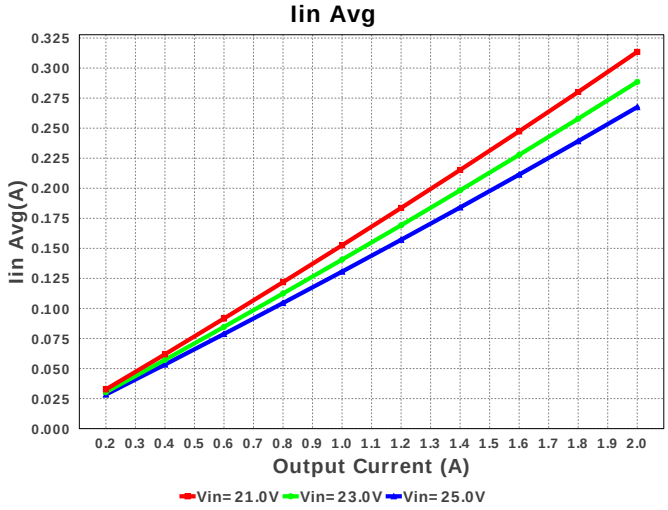

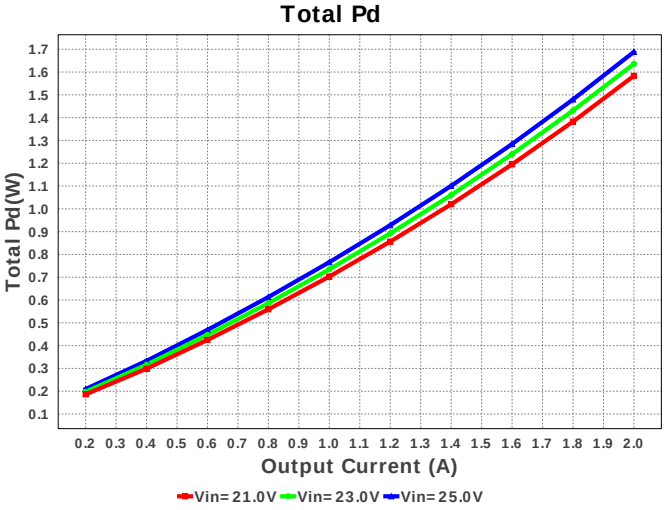

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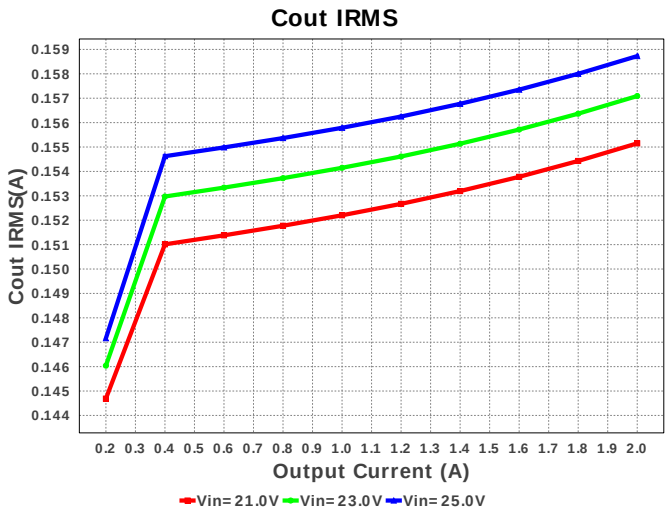

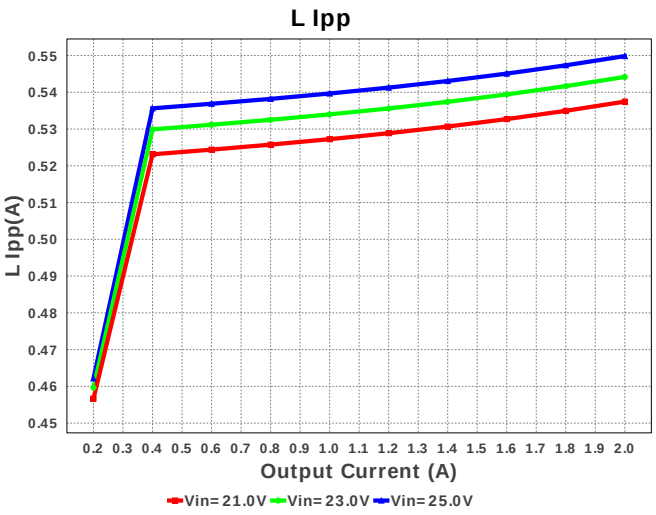

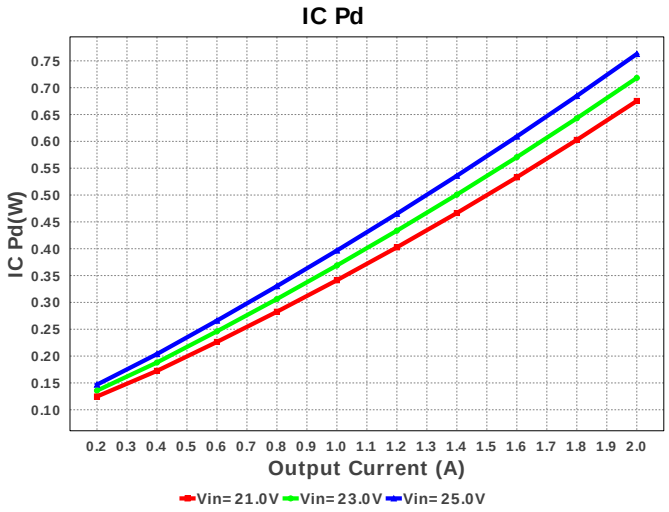

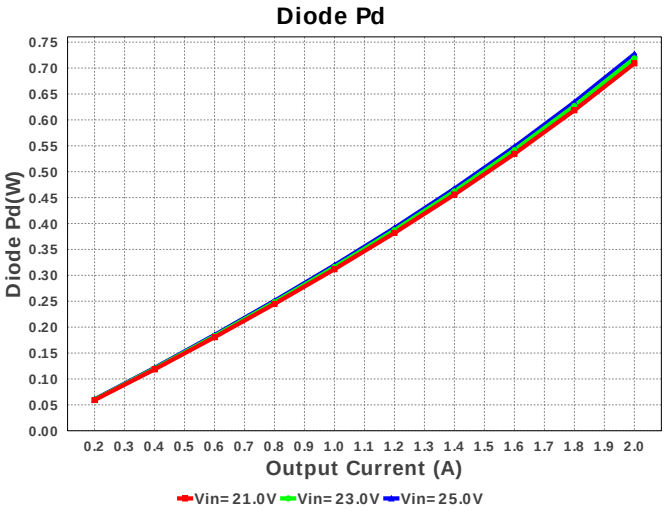

Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	630.737 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	158.726 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	2.275 A	Current	Peak switch current in IC
4.	Iin Avg	267.54 mA	Current	Average input current
5.	L Ipp	549.84 mA	Current	Peak-to-peak inductor ripple current
6.	M Irms	678.926 mA	Current	MOSFET RMS current
7.	BOM Count	11	General	Total Design BOM count
8.	FootPrint	259.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	575.061 kHz	General	Switching frequency
10.	IC Tolerance	19.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	151.295 mV	General	Voltage drop across the MosFET
12.	Pout	5.0 W	General	Total output power
13.	Total BOM	$2.76	General	Total BOM Cost
14.	D1 Tj	102.688 degC	Op_Point	D1 junction temperature
15.	Vout Actual	2.51 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
16.	Vout OP	2.5 V	Op_Point	Operational Output Voltage
17.	Cross Freq	58.504 kHz	Op_point	Bode plot crossover frequency
18.	Duty Cycle	11.523 %	Op_point	Duty cycle
19.	Efficiency	74.754 %	Op_point	Steady state efficiency
20.	IC Tj	75.767 degC	Op_point	IC junction temperature
21.	ICThetaJA	60.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
22.	IOUT_OP	2.0 A	Op_point	Iout operating point
23.	Phase Marg	51.198 deg	Op_point	Bode Plot Phase Margin
24.	VIN_OP	25.0 V	Op_point	Vin operating point
25.	Vout p-p	3.044 mV	Op_point	Peak-to-peak output ripple voltage
26.	Cin Pd	798.842 µW	Power	Input capacitor power dissipation
27.	Cout Pd	121.939 µW	Power	Output capacitor power dissipation
28.	Diode Pd	726.88 mW	Power	Diode power dissipation
29.	IC Pd	762.78 mW	Power	IC power dissipation
30.	L Pd	198.0 mW	Power	Inductor power dissipation
31.	Total Pd	1.689 W	Power	Total Power Dissipation

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#	Name	Value	Category	Description
32.	Vout Tolerance	2.479 %		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	25.0	Maximum input voltage
3.	VinMin	21.0	Minimum input voltage
4.	Vout	2.5	Output Voltage
5.	base_pn	LM22680	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

1. Part Description The LM22680 is a monolithic integrated circuit that provides all of the active functions for a step-down (buck) switching regulator capable of driving up to 2.0A loads with excellent line and load regulation characteristics. High efficiency (>90%) is obtained through the use of a low ON-resistance N-channel MOSFET.

2. LM22680 Product Folder : http://www.ti.com/product/LM22680 : contains the data sheet and other resources.

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