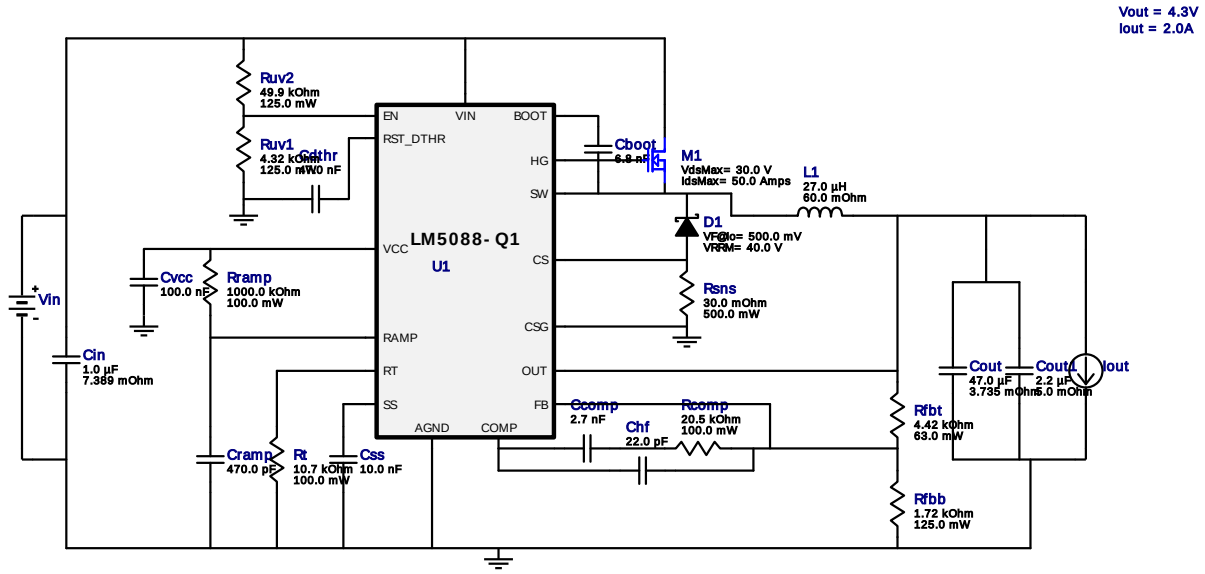
VinMin = 19.0V
VinMax = 22.0V
Vout = 4.3V
Iout = 2.0A

Device = LM5088QMHX-1/NOPB
Topology = Buck
Created = 9/9/16 1:52:30 AM
BOM Cost = $2.82
BOM Count = 22
Total Pd = 1.14W

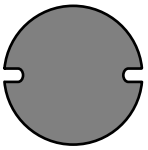
WEBENCH® Design Report

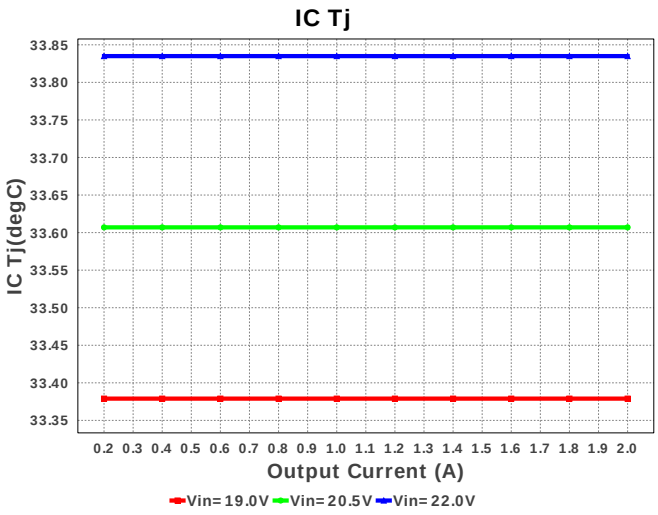
Design : 4789503/3 LM5088QMHX-1/NOPB
LM5088QMHX-1/NOPB 19.0V-22.0V to 4.30V @ 2.0A

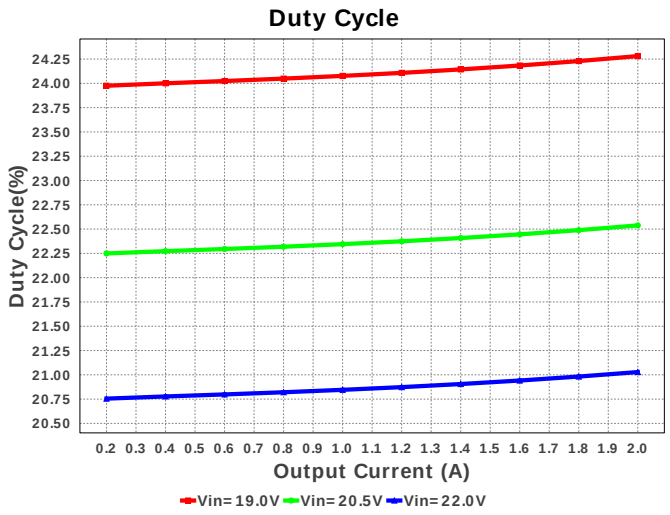


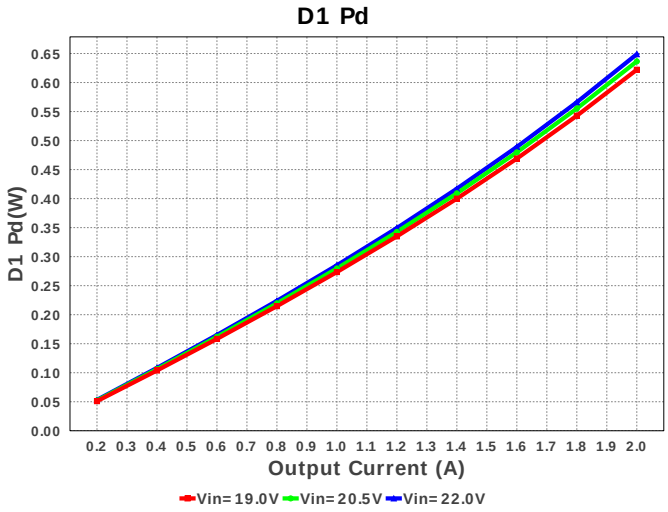
Electrical BOM

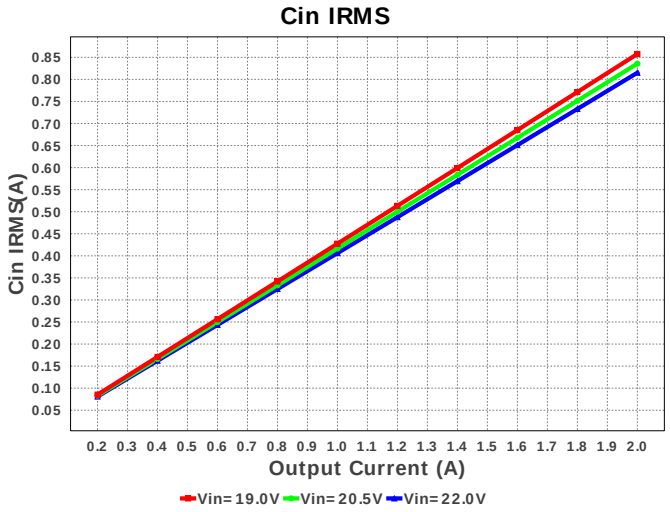
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Kemet	C0603C682K5RACTU Series= X7R	Cap= 6.8 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0603 5 mm²
2.	Ccomp	MuRata	GRM1885C1H272JA01J Series= C0G/NP0	Cap= 2.7 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0603 5 mm²
3.	Cdthr	MuRata	GRM188R71C473KA01D Series= X7R	Cap= 47.0 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.01	0603 5 mm²
4.	Chf	Kemet	C0603C220K3GACTU Series= C0G/NP0	Cap= 22.0 pF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0603 5 mm²
5.	Cin	MuRata	GRM31MR71H105KA88L Series= X7R	Cap= 1.0 uF ESR= 7.389 mOhm VDC= 50.0 V IRMS= 979.22 mA	1	$0.03	1206 11 mm²
6.	Cout	MuRata	GRM31CC80J476KE18L Series= X6S	Cap= 47.0 uF ESR= 3.735 mOhm VDC= 6.3 V IRMS= 4.0522 A	1	$0.10	1206_190 11 mm²
7.	Cout1	MuRata	GRM155R60J225ME15D Series= X5R	Cap= 2.2 uF ESR= 5.0 mOhm VDC= 6.3 V IRMS= 3.67 A	1	$0.02	0402 3 mm²
8.	Cramp	AVX	06035A470KAT2A Series= C0G/NP0	Cap= 470.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0603 5 mm²
9.	Css	Kemet	C0603C103J5RACTU Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0603 5 mm²

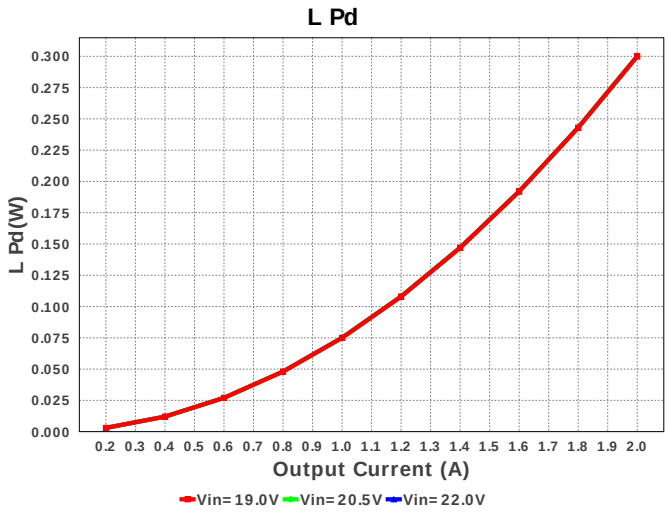
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	Cvcc	Kemet	C0603C104K3RACTU Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	 0603 5 mm²
11.	D1	Diodes Inc.	B340A-13-F	VF@Io= 500.0 mV VRRM= 40.0 V	1	$0.11	 SMA 37 mm²
12.	L1	Bourns	SDR1307-270ML	L= 27.0 µH DCR= 60.0 mOhm	1	$0.35	 SDR1307 227 mm²
13.	M1	Texas Instruments	CSD17308Q3	VdsMax= 30.0 V IdsMax= 50.0 Amps	1	$0.28	 DQG0008A 18 mm²
14.	Rcomp	Vishay-Dale	CRCW060320K5FKEA Series= CRCW..e3	Res= 20.5 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	 0603 5 mm²
15.	Rfbb	Yageo America	RT0805BRD071K72L Series= RT0805	Res= 1.72 kOhm Power= 125.0 mW Tolerance= 0.1%	1	$0.05	 0805 7 mm²
16.	Rfbt	Vishay-Dale	CRCW04024K42FKED Series= CRCW..e3	Res= 4.42 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
17.	Rramp	Vishay-Dale	CRCW06031M00FKEA Series= CRCW..e3	Res= 1000.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	 0603 5 mm²
18.	Rsns	Stackpole Electronics Inc	CSR1206FK30L0 Series= ?	Res= 30.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	$0.10	 1206 11 mm²
19.	Rt	Vishay-Dale	CRCW060310K7FKEA Series= CRCW..e3	Res= 10.7 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	 0603 5 mm²
20.	Ruv1	Panasonic	ERJ-6ENF4321V Series= ERJ-6E	Res= 4.32 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
21.	Ruv2	Panasonic	ERJ-6ENF4992V Series= ERJ-6E	Res= 49.9 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
22.	U1	Texas Instruments	LM5088QMHX-1/NOPB	Switcher	1	$1.65	 MXA16A 59 mm²

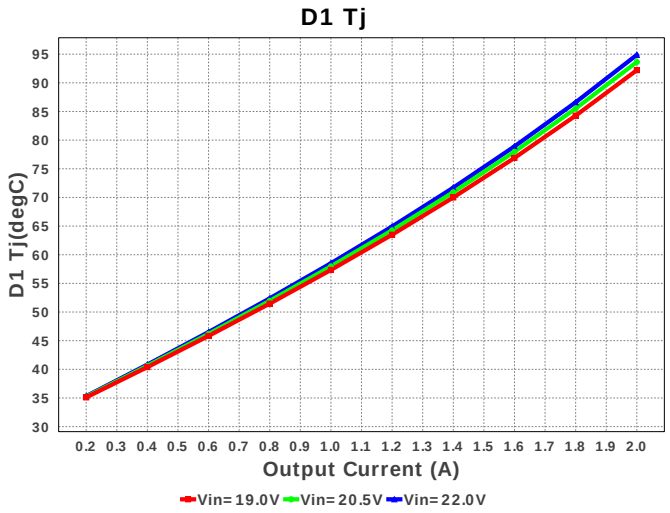


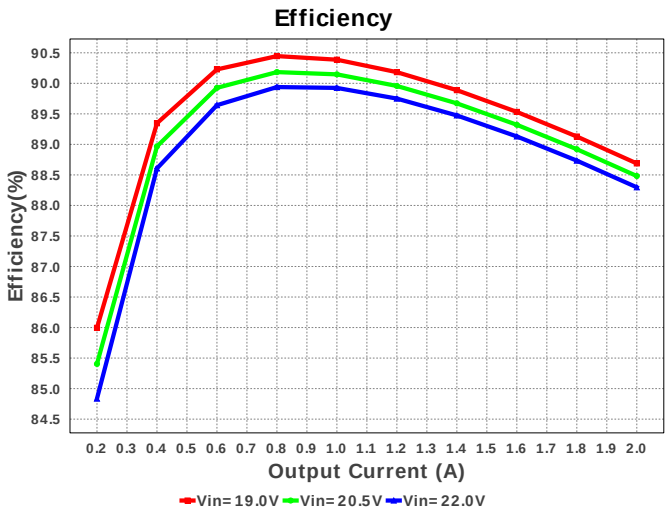


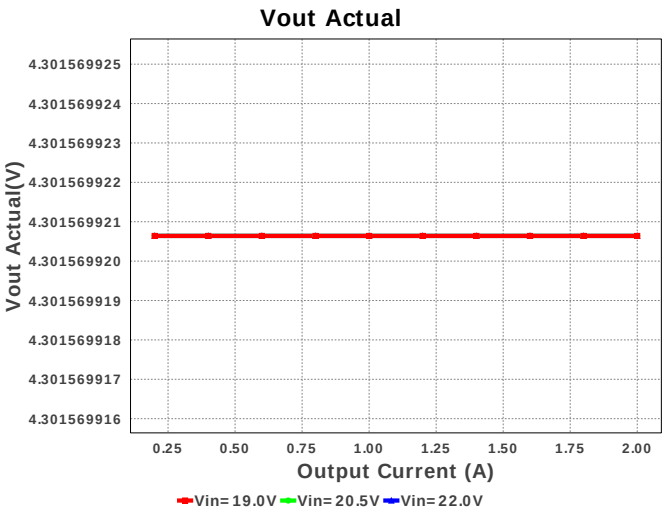


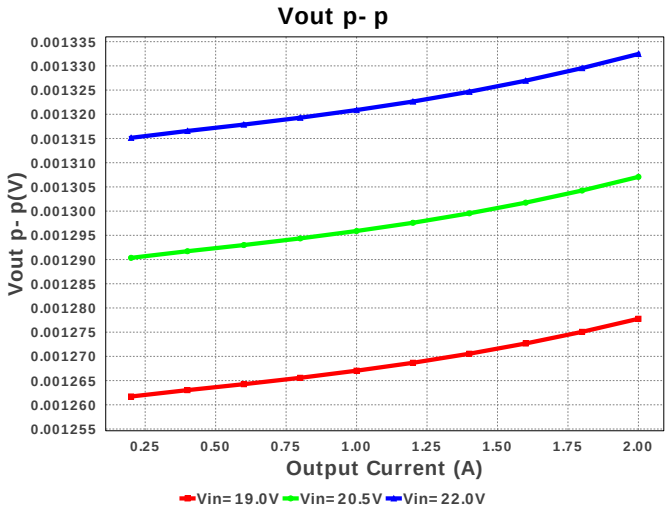


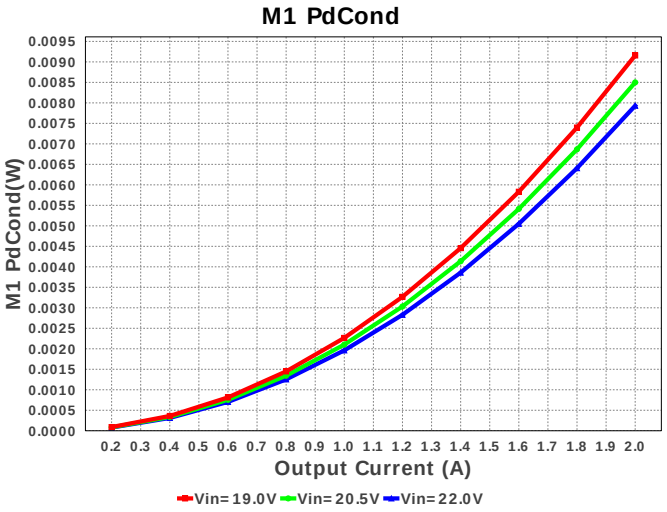


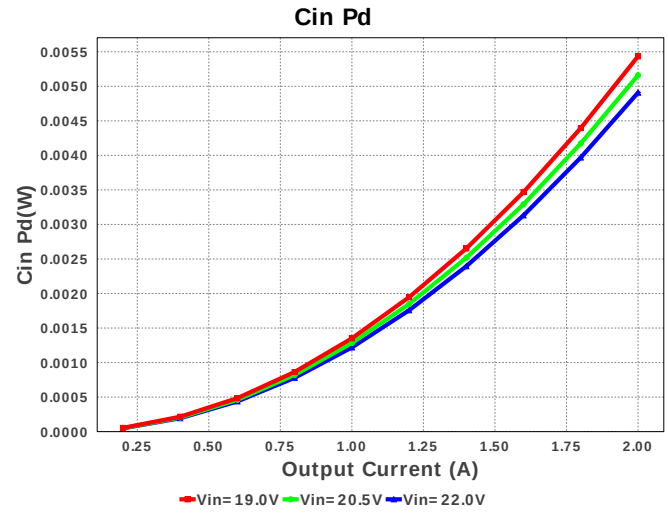


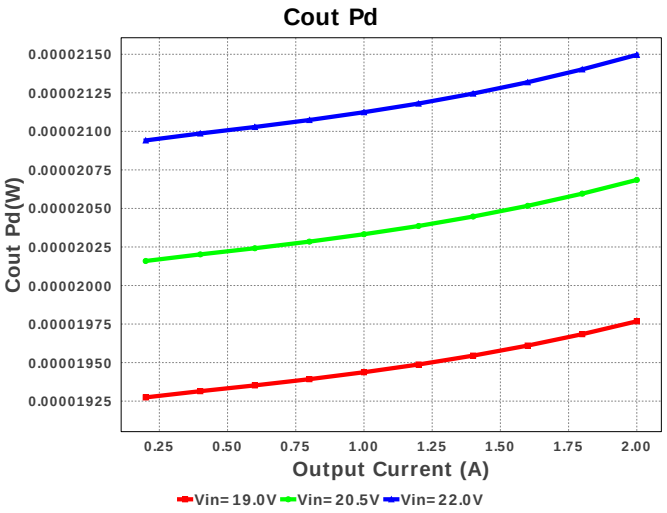


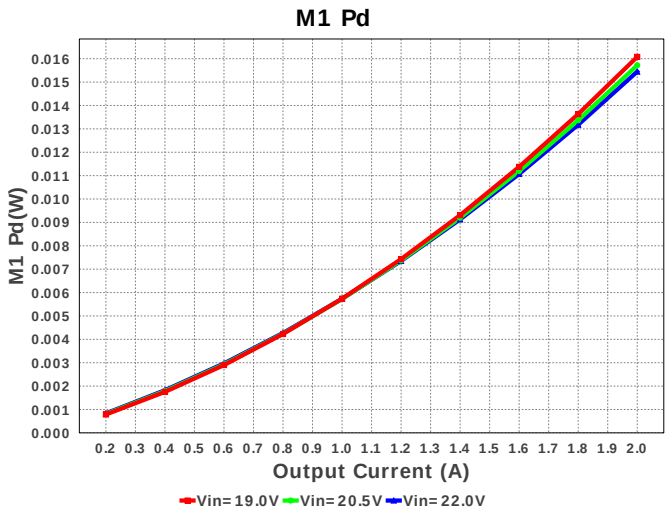


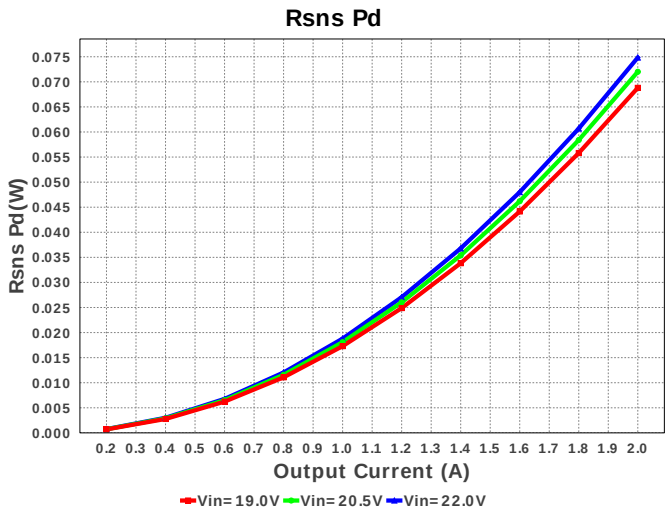


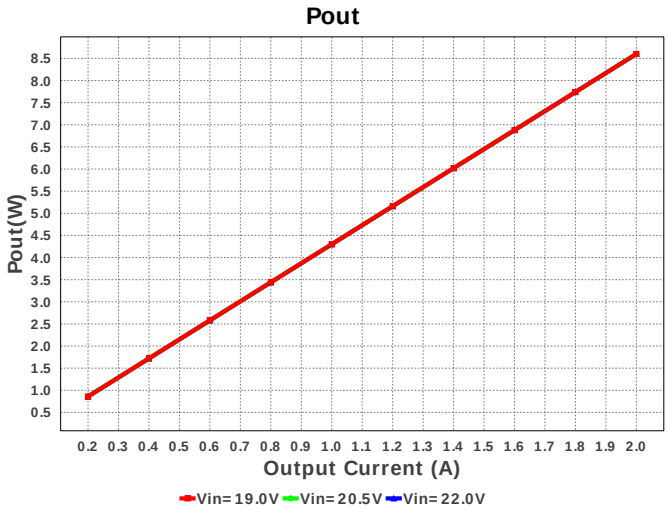


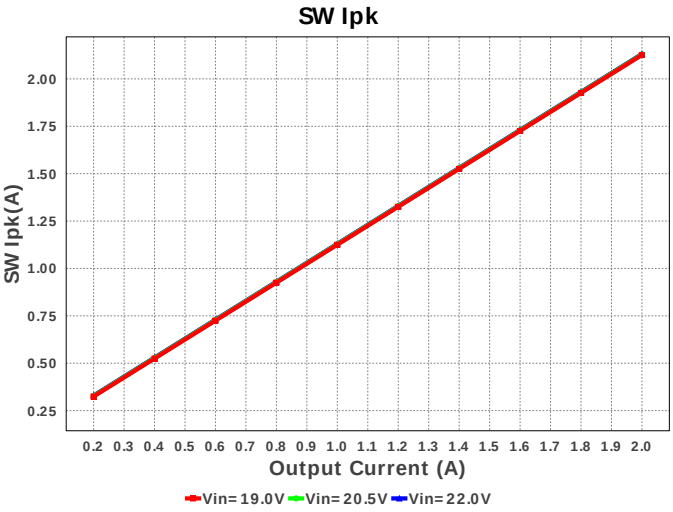


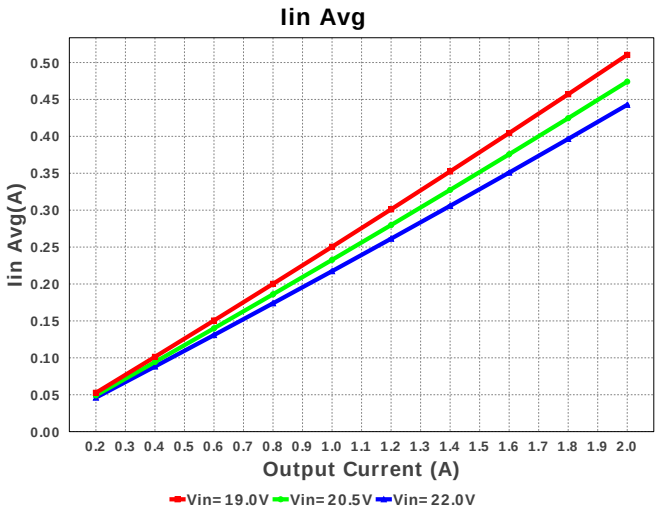


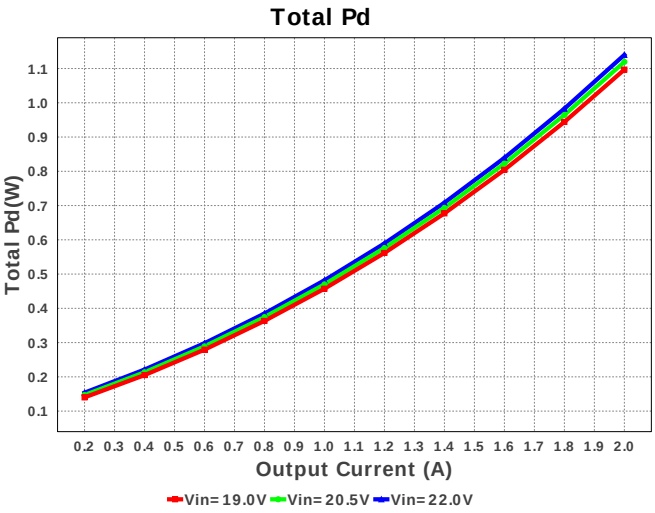


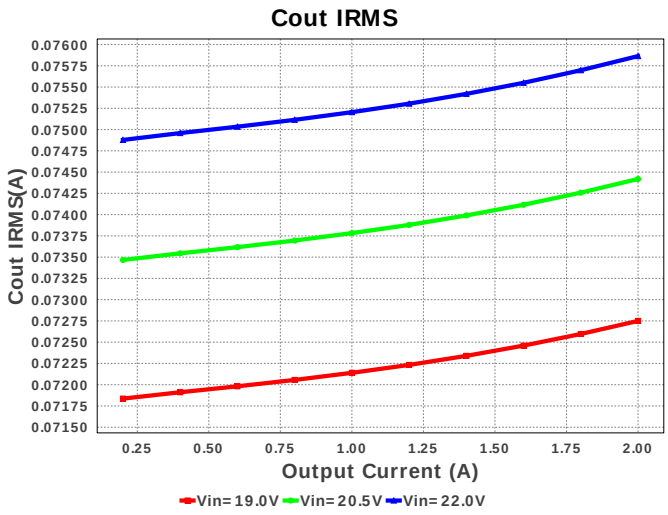


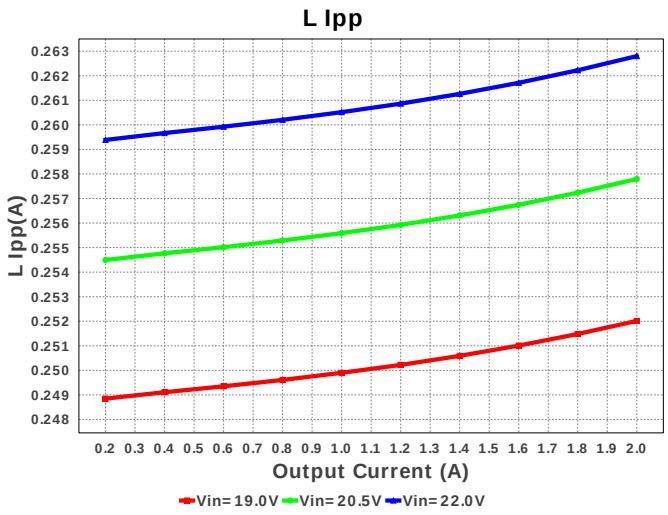


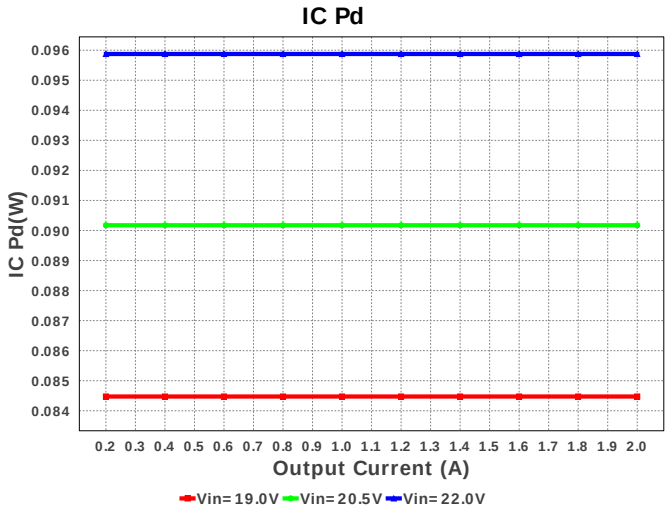


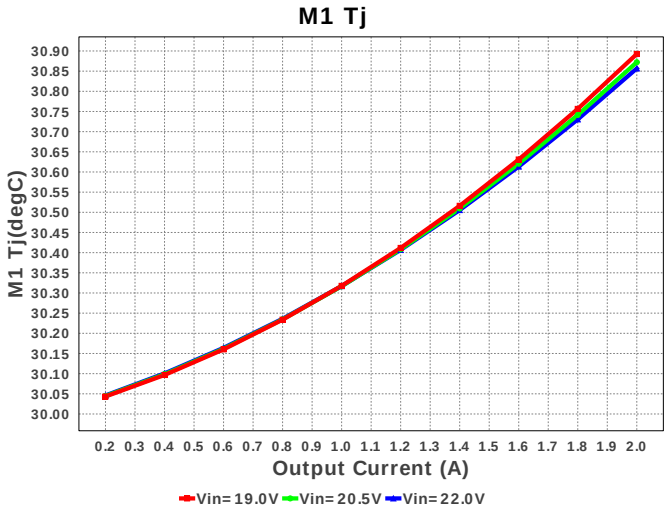


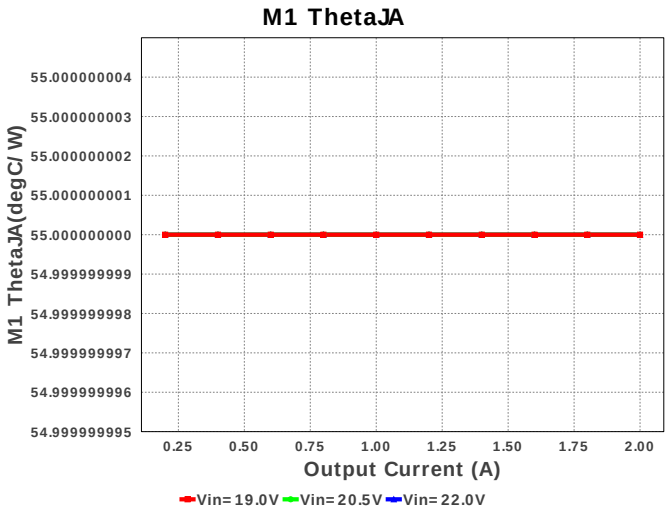


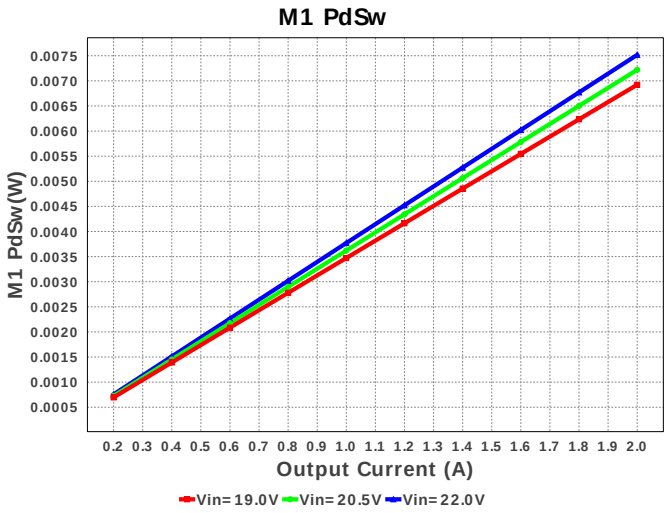


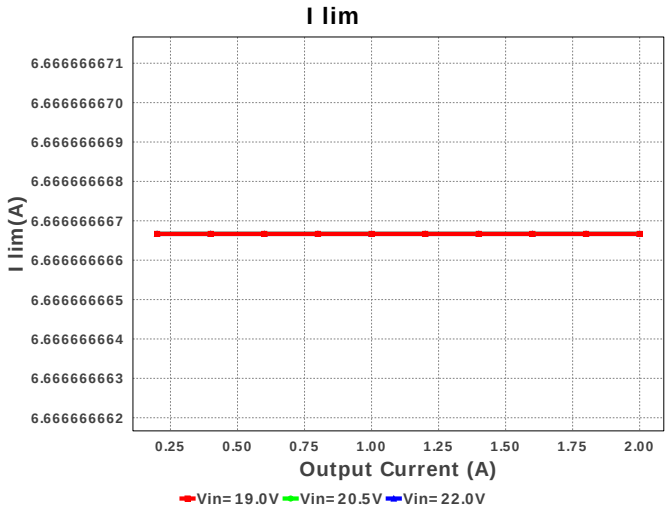












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	815.018 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	75.799 mA	Current	Output capacitor RMS ripple current
3.	I lim	6.667 A	Current	Current limit threshold
4.	Iin Avg	442.72 mA	Current	Average input current
5.	L Ipp	262.57 mA	Current	Peak-to-peak inductor ripple current
6.	SW Ipk	2.131 A	Current	Peak switch current
7.	BOM Count	22	General	Total Design BOM count
8.	FootPrint	447.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	524.549 kHz	General	Switching frequency
10.	IC Tolerance	18.0 mV	General	IC Feedback Tolerance
11.	M1 ThetaJA	55.0 degC/W	General	MOSFET junction-to-ambient thermal resistance
12.	Mode	CCM	General	Conduction Mode
13.	Pout	8.6 W	General	Total output power
14.	Total BOM	$2.82	General	Total BOM Cost
15.	D1 Tj	94.879 degC	Op_Point	D1 junction temperature
16.	Vout Actual	4.302 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
17.	Duty Cycle	21.028 %	Op_point	Duty cycle
18.	Efficiency	88.297 %	Op_point	Steady state efficiency
19.	IC Tj	33.835 degC	Op_point	IC junction temperature
20.	ICThetaJA	40.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
21.	IOUT_OP	2.0 A	Op_point	Iout operating point
22.	M1 Tj	30.857 degC	Op_point	M1 MOSFET junction temperature
23.	VIN_OP	22.0 V	Op_point	Vin operating point
24.	Vout p-p	1.331 mV	Op_point	Peak-to-peak output ripple voltage
25.	Cin Pd	4.908 mW	Power	Input capacitor power dissipation
26.	Cout Pd	21.459 µW	Power	Output capacitor power dissipation
27.	D1 Pd	648.794 mW	Power	Diode1 power dissipation
28.	IC Pd	95.874 mW	Power	IC power dissipation
29.	L Pd	300.0 mW	Power	Inductor power dissipation
30.	M1 Pd	15.448 mW	Power	M1 MOSFET total power dissipation
31.	M1 PdCond	7.93 mW	Power	M1 MOSFET conduction losses
32.	M1 PdSw	7.517 mW	Power	M1 MOSFET switching losses
33.	Rsns Pd	74.838 mW	Power	Current Limit Sense Resistor Power Dissipation
34.	Total Pd	1.14 W	Power	Total Power Dissipation
35.	Vout Tolerance	2.298 %		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	19.0	Minimum input voltage
4.	Vout	4.3	Output Voltage
5.	base_pn	LM5088-Q1	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **LM5088-Q1** Product Folder : http://www.ti.com/product/LM5088%2DQ1 : contains the data sheet and other resources.