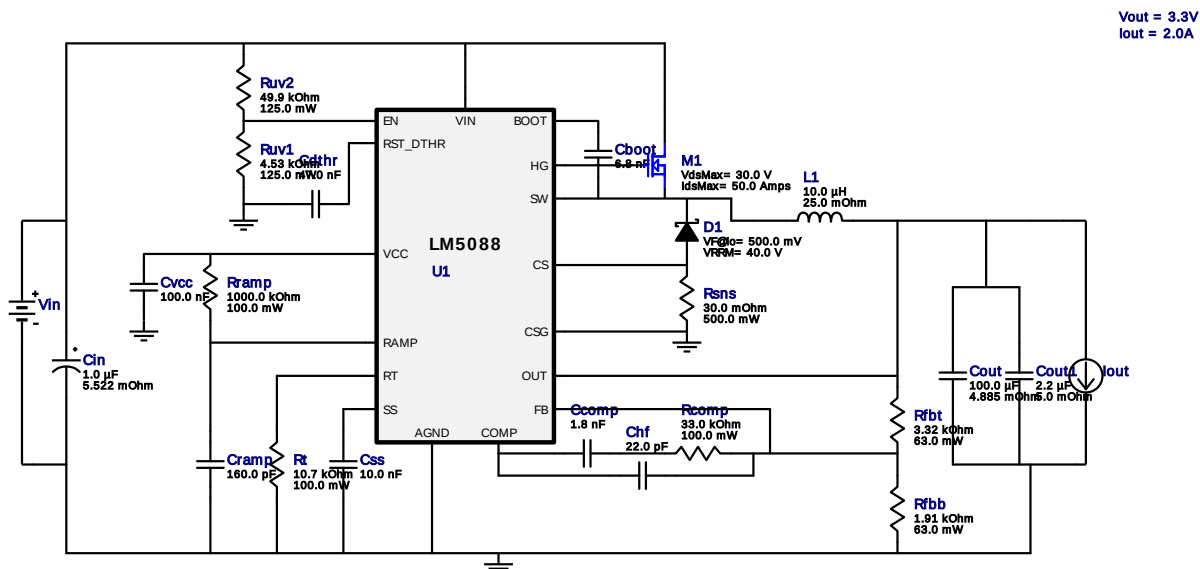


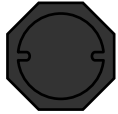
WEBENCH® Design Report

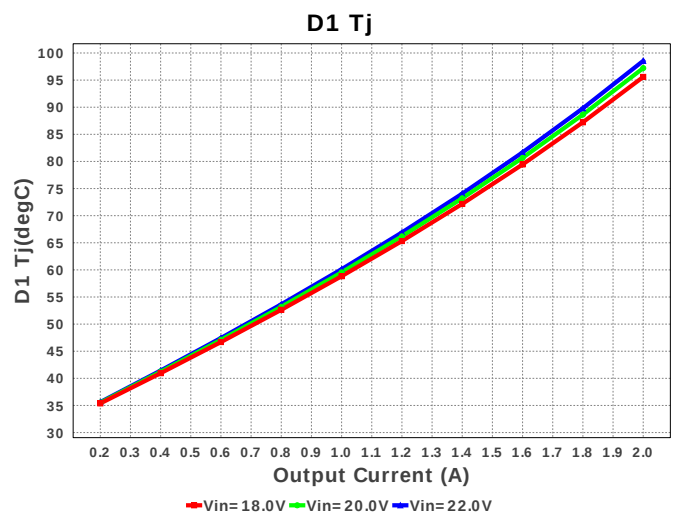
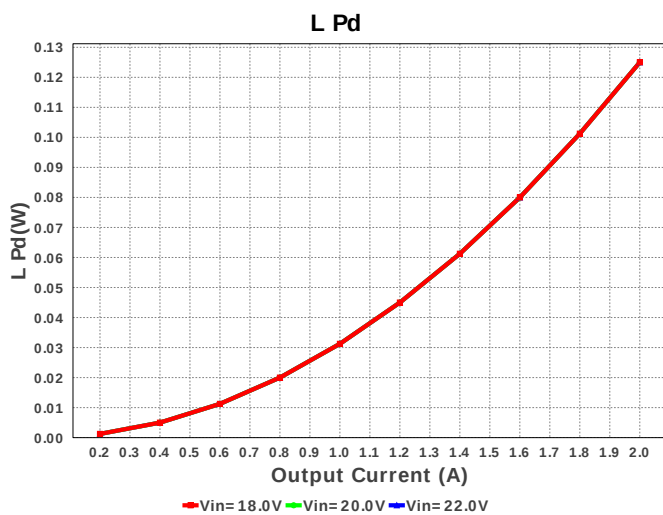
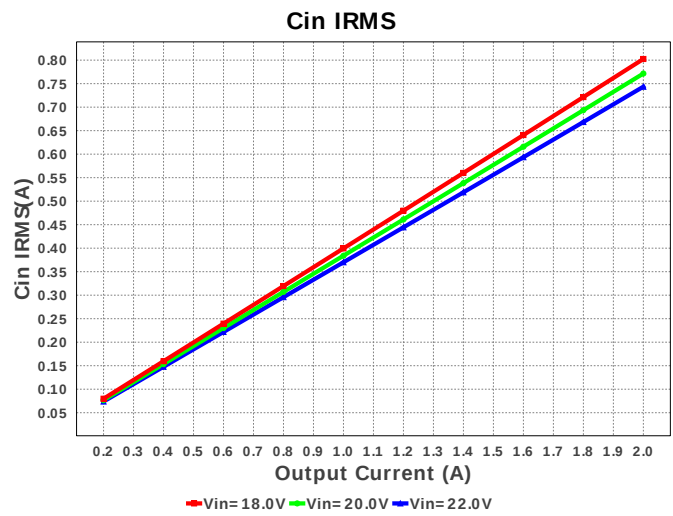
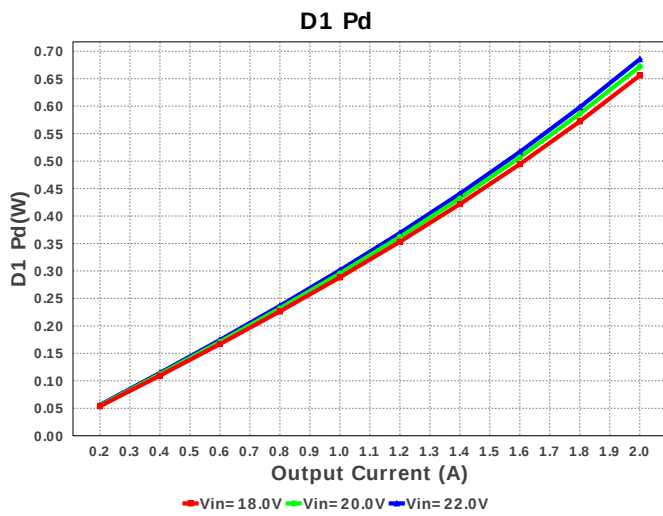
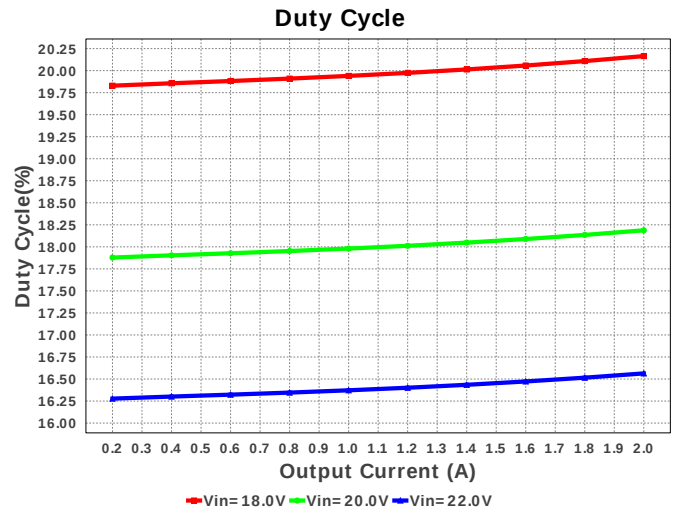
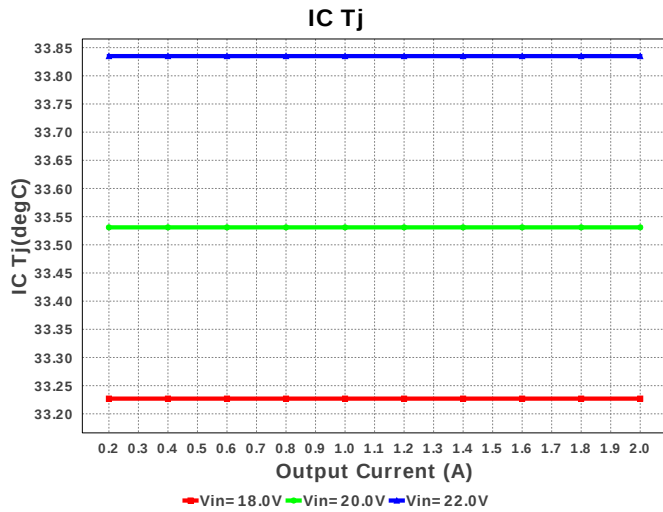
Design : 4748772/3 LM5088MH-1/NOPB
LM5088MH-1/NOPB 18.0V-22.0V to 3.30V @ 2.0A

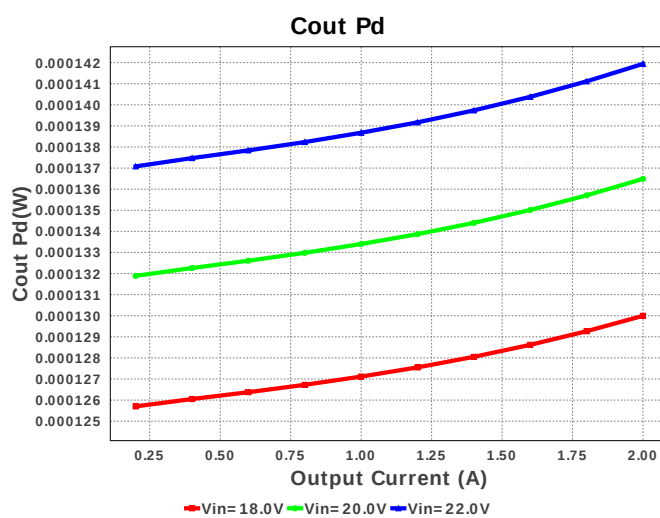
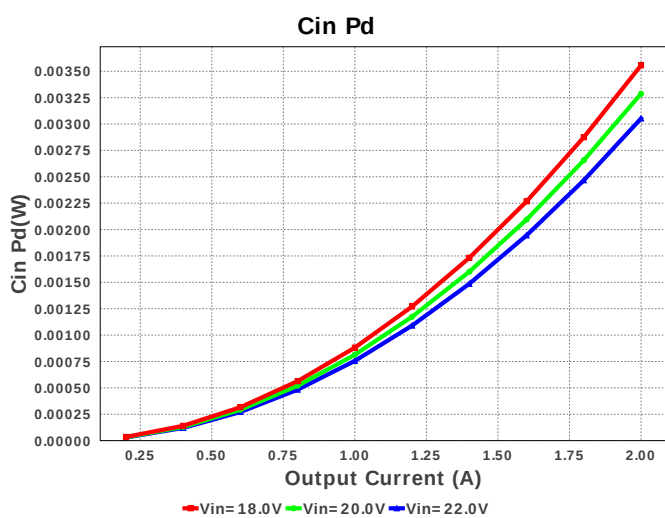
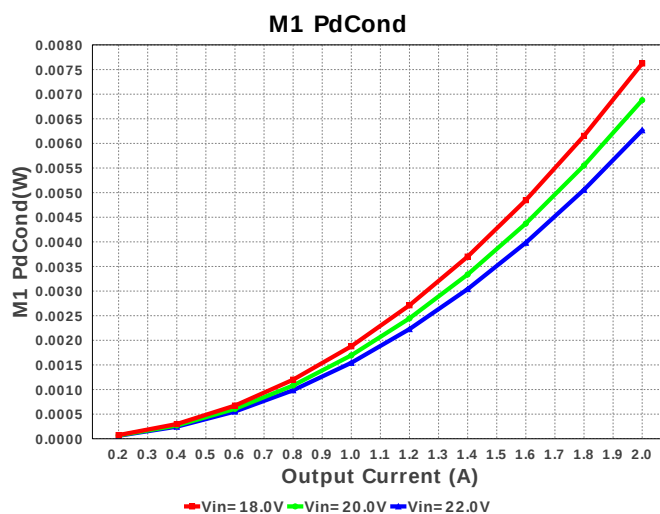
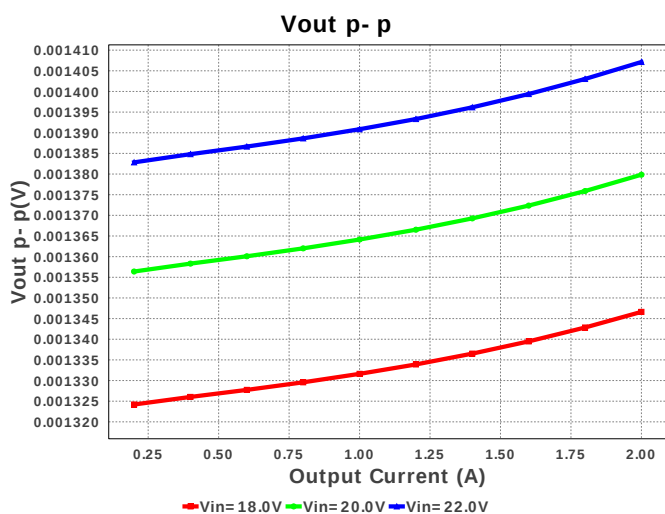
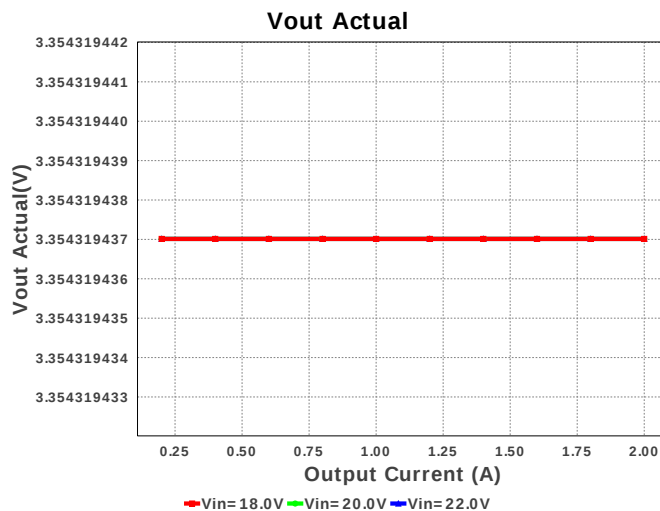
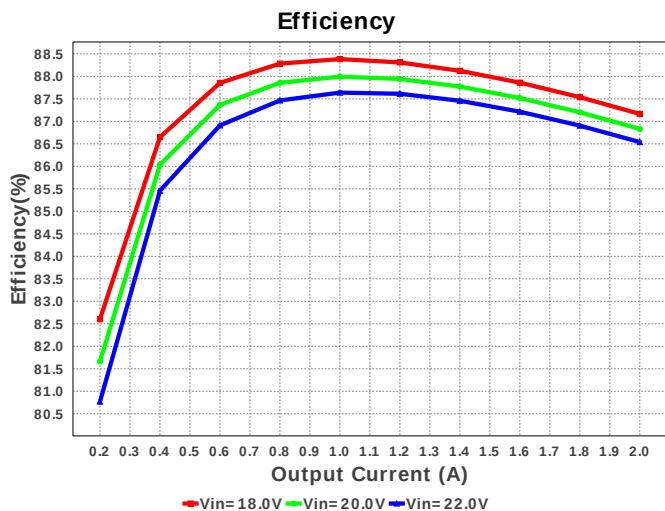


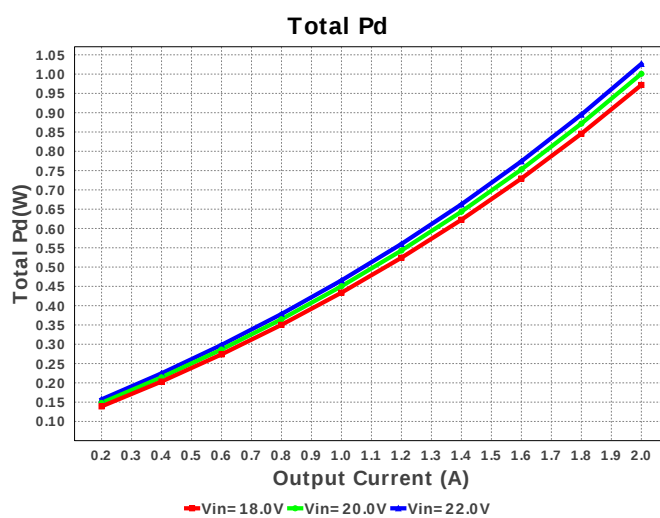
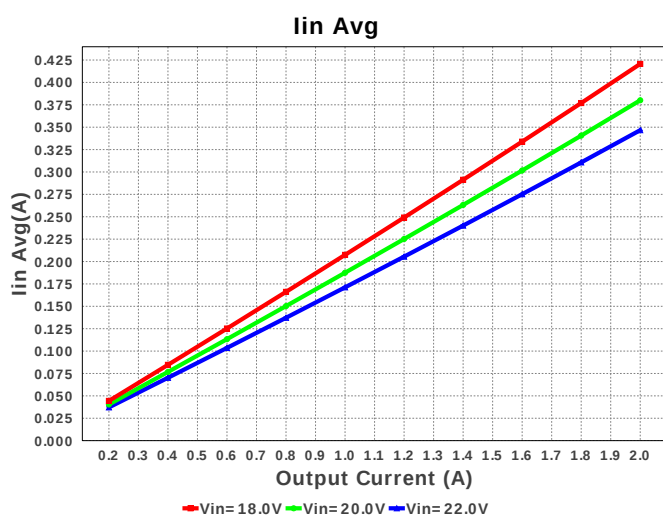
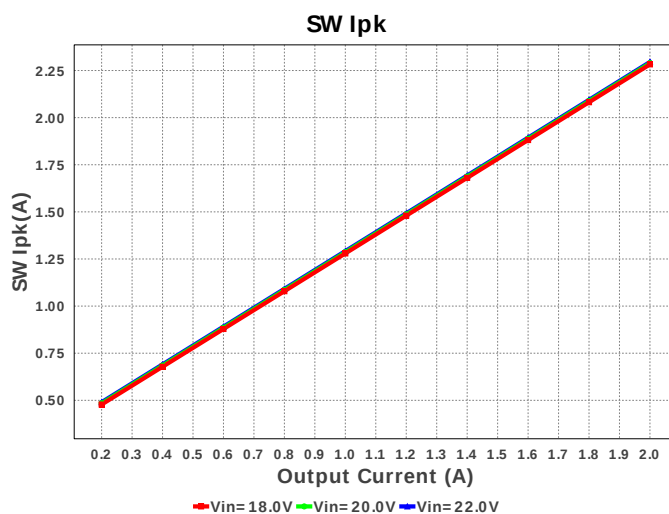
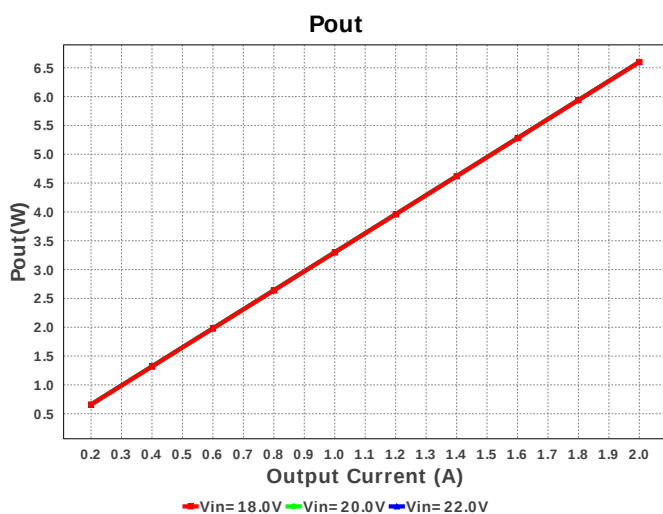
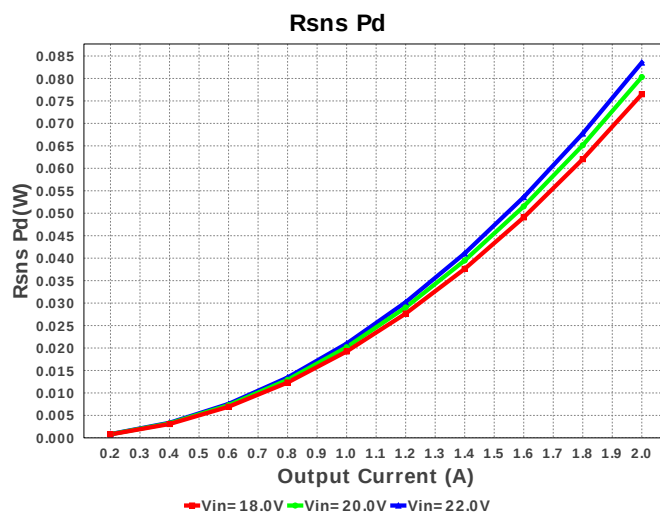
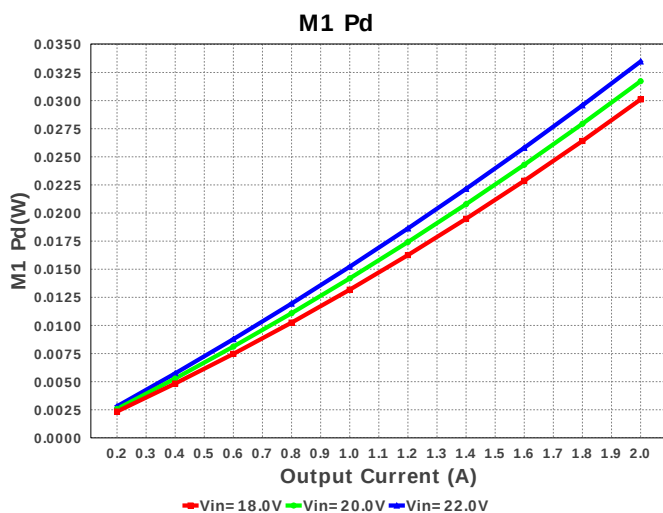
Electrical BOM

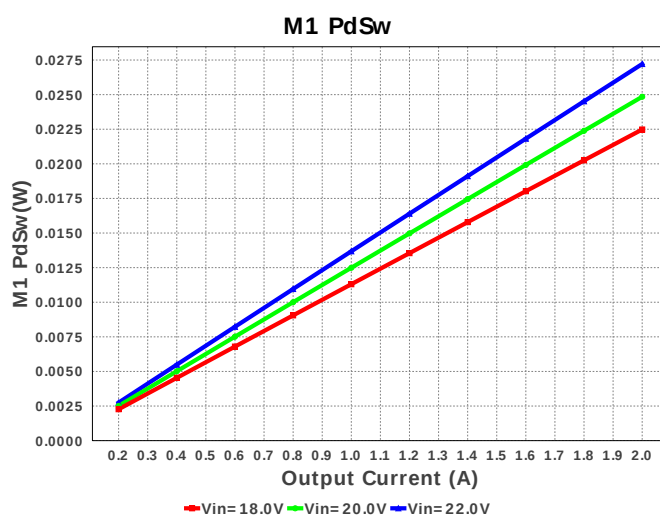
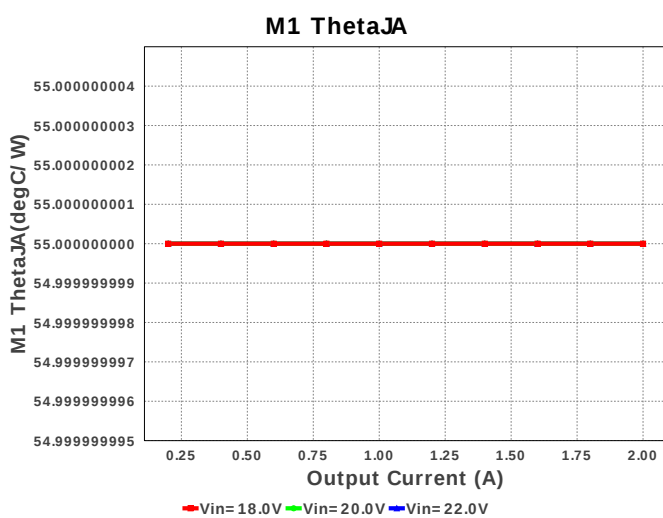
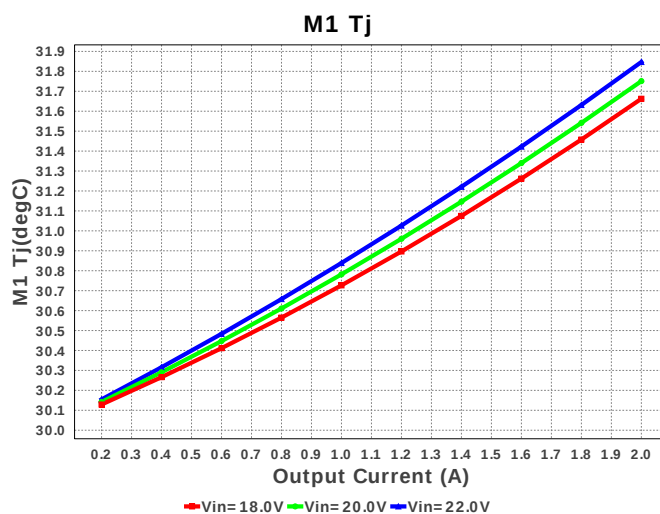
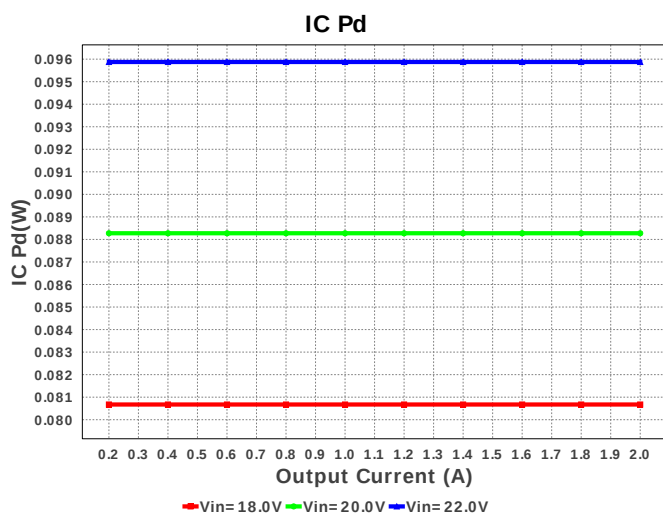
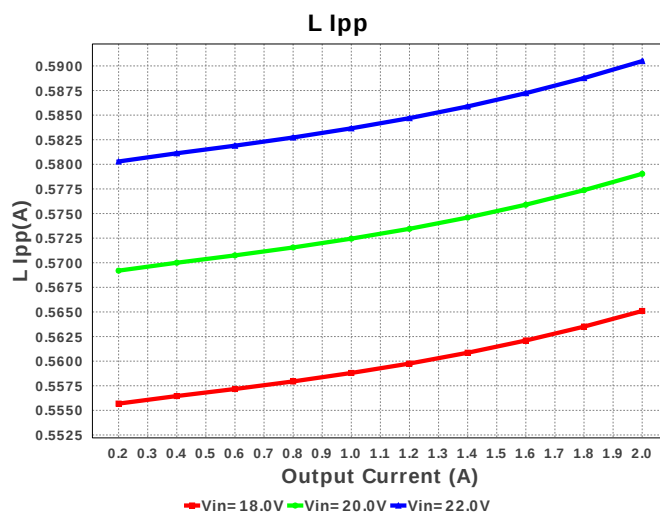
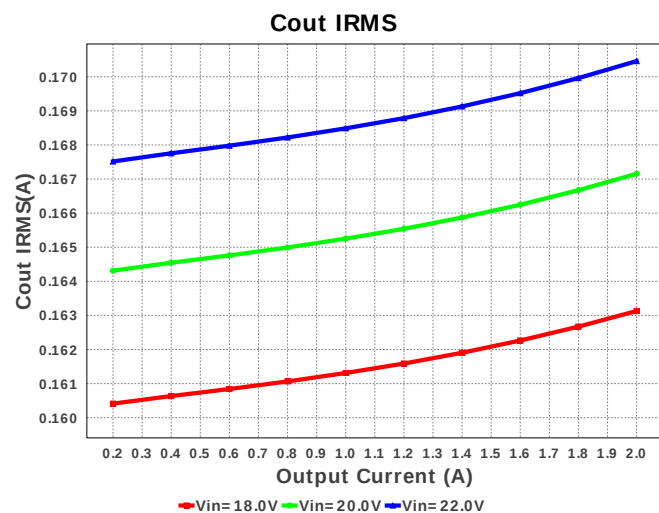
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Kemet	C0603C682K5RACTU Series= X7R	Cap= 6.8 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0603 5 mm ²
2.	Ccomp	MuRata	GRM1885C1H182JA01J Series= C0G/NP0	Cap= 1.8 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0603 5 mm ²
3.	Cdthr	MuRata	GRM188R71C473KA01D Series= X7R	Cap= 47.0 nF VDC= 16.0 V IRMS= 0.0 A	1	\$0.01	0603 5 mm ²
4.	Chf	Kemet	C0603C220K3GACTU Series= C0G/NP0	Cap= 22.0 pF VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0603 5 mm ²
5.	Cin	TDK	C1608X7R1V105K080AC Series= X7R	Cap= 1.0 uF ESR= 5.522 mOhm VDC= 35.0 V IRMS= 2.2162 A	1	\$0.05	0603 5 mm ²
6.	Cout	MuRata	GRM31CR60J107ME39L Series= X5R	Cap= 100.0 uF ESR= 4.885 mOhm VDC= 6.3 V IRMS= 4.4118 A	1	\$0.14	1206_190 11 mm ²
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 mm ²
8.	Cramp	Samsung Electro-Mechanics	CL10C161JB8NNNC Series= C0G/NP0	Cap= 160.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0603 5 mm ²
9.	Css	Kemet	C0603C103J5RACTU Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0603 5 mm ²

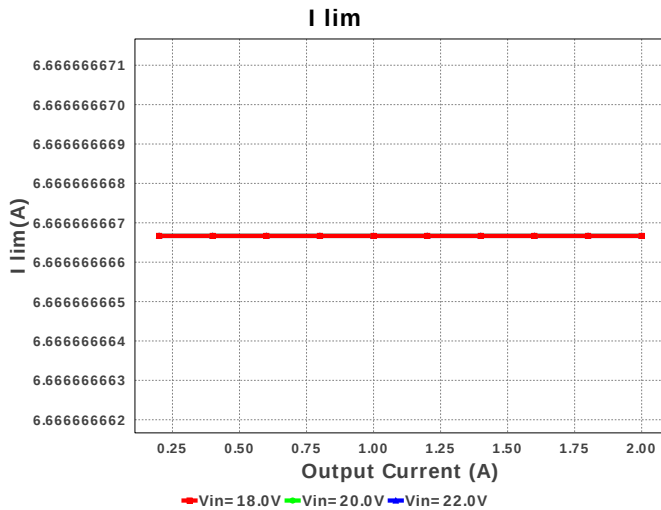
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	Cvcc	Kemet	C0603C104K3RACTU Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	 0603 5 mm ²
11.	D1	Diodes Inc.	B340A-13-F	VF@Io= 500.0 mV VRRM= 40.0 V	1	\$0.11	 SMA 37 mm ²
12.	L1	Bourns	SRU1038-100Y	L= 10.0 µH DCR= 25.0 mOhm	1	\$0.33	 SRU1038 144 mm ²
13.	M1	Texas Instruments	CSD17308Q3	VdsMax= 30.0 V IdsMax= 50.0 Amps	1	\$0.34	 TRANS_NexFET_Q3 18 mm ²
14.	Rcomp	Yageo America	RC0603FR-0733KL Series= ?	Res= 33.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm ²
15.	Rfbb	Vishay-Dale	CRCW04021K91FKED Series= CRCW..e3	Res= 1.91 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
16.	Rfbt	Vishay-Dale	CRCW04023K32FKED Series= CRCW..e3	Res= 3.32 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
17.	Rramp	Vishay-Dale	CRCW06031M00FKEA Series= CRCW..e3	Res= 1000.0 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm ²
18.	Rsns	Stackpole Electronics Inc	CSR1206FK30L0 Series= ?	Res= 30.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	\$0.10	 1206 11 mm ²
19.	Rt	Vishay-Dale	CRCW060310K7FKEA Series= CRCW..e3	Res= 10.7 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm ²
20.	Ruv1	Panasonic	ERJ-6ENF4531V Series= ERJ-6E	Res= 4.53 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm ²
21.	Ruv2	Panasonic	ERJ-6ENF4992V Series= ERJ-6E	Res= 49.9 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm ²
22.	U1	Texas Instruments	LM5088MH-1/NOPB	Switcher	1	\$1.76	 MXA16A 59 mm ²











Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	743.508 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	170.313 mA	Current	Output capacitor RMS ripple current
3.	I lim	6.667 A	Current	Current limit threshold
4.	Iin Avg	346.66 mA	Current	Average input current
5.	L Ipp	589.98 mA	Current	Peak-to-peak inductor ripple current
6.	SW Ipk	2.295 A	Current	Peak switch current
7.	BOM Count	22	General	Total Design BOM count
8.	FootPrint	354.0 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.	Pout	6.6 W	General	Total output power
13.	Total BOM	\$2.99	General	Total BOM Cost
14.	D1 Tj	98.547 degC	Op_Point	D1 junction temperature
15.	Vout Actual	3.3 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
16.	Duty Cycle	16.564 %	Op_point	Duty cycle
17.	Efficiency	86.54 %	Op_point	Steady state efficiency
18.	IC Tj	33.835 degC	Op_point	IC junction temperature
19.	ICThetaJA	40.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
20.	IOUT_OP	2.0 A	Op_point	Iout operating point
21.	M1 Tj	31.847 degC	Op_point	M1 MOSFET junction temperature
22.	VIN_OP	22.0 V	Op_point	Vin operating point
23.	Vout p-p	1.406 mV	Op_point	Peak-to-peak output ripple voltage
24.	Cin Pd	3.053 mW	Power	Input capacitor power dissipation
25.	Cout Pd	141.697 μW	Power	Output capacitor power dissipation
26.	D1 Pd	685.473 mW	Power	Diode1 power dissipation
27.	IC Pd	95.874 mW	Power	IC power dissipation
28.	L Pd	125.0 mW	Power	Inductor power dissipation
29.	M1 Pd	33.48 mW	Power	M1 MOSFET total power dissipation
30.	M1 PdCond	6.267 mW	Power	M1 MOSFET conduction losses
31.	M1 PdSw	27.213 mW	Power	M1 MOSFET switching losses
32.	Rsns Pd	83.539 mW	Power	Current Limit Sense Resistor Power Dissipation
33.	Total Pd	1.027 W	Power	Total Power Dissipation
34.	Vout Tolerance	2.795 %		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	18.0	Minimum input voltage
4.	Vout	3.3	Output Voltage
5.	base_pn	LM5088	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **LM5088** Product Folder : <http://www.ti.com/product/LM5088> : contains the data sheet and other resources.

Texas Instruments' WEBENCH simulation tools attempt to recreate the performance of a substantially equivalent physical implementation of the design. Simulations are created using Texas Instruments' published specifications as well as the published specifications of other device manufacturers. While Texas Instruments does update this information periodically, this information may not be current at the time the simulation is built. Texas Instruments does not warrant the accuracy or completeness of the specifications or any information contained therein. Texas Instruments does not warrant that any designs or recommended parts will meet the specifications you entered, will be suitable for your application or fit for any particular purpose, or will operate as shown in the simulation in a physical implementation. Texas Instruments does not warrant that the designs are production worthy.

You should completely validate and test your design implementation to confirm the system functionality for your application prior to production.

Use of Texas Instruments' WEBENCH simulation tools is subject to [Texas Instruments' Site Terms and Conditions of Use](#). Prototype boards based on WEBENCH created designs are provided AS IS without warranty of any kind for evaluation and testing purposes and are subject to the terms of the [Evaluation License Agreement](#).