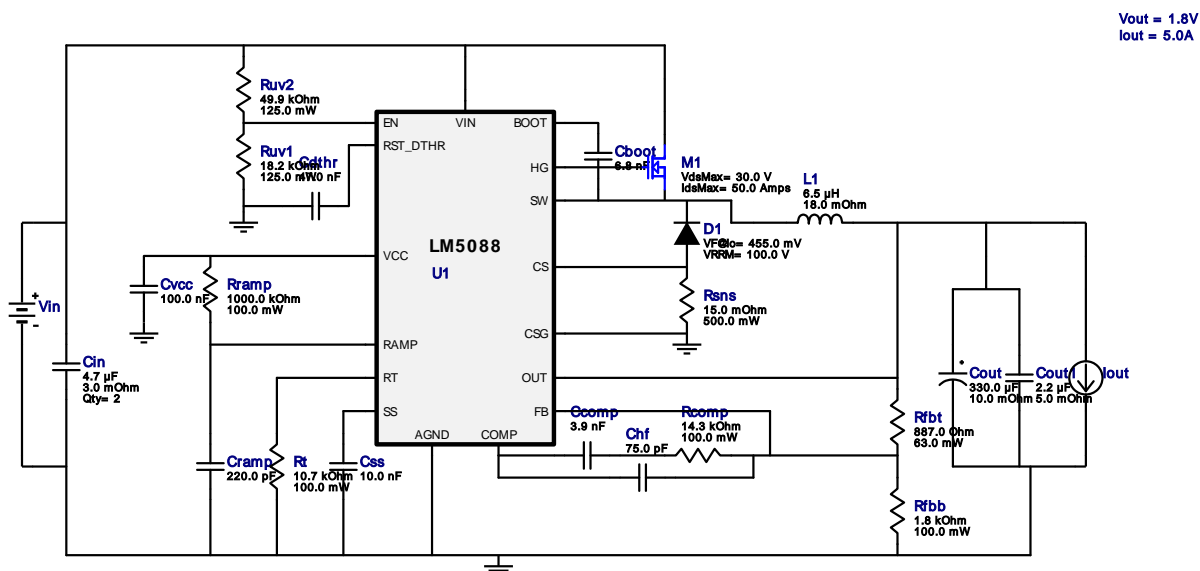





## WEBENCH® Design Report

Design : 4466246/69 LM5088MH-1/NOPB  
LM5088MH-1/NOPB 5.0V-24.0V to 1.80V @ 5.0A

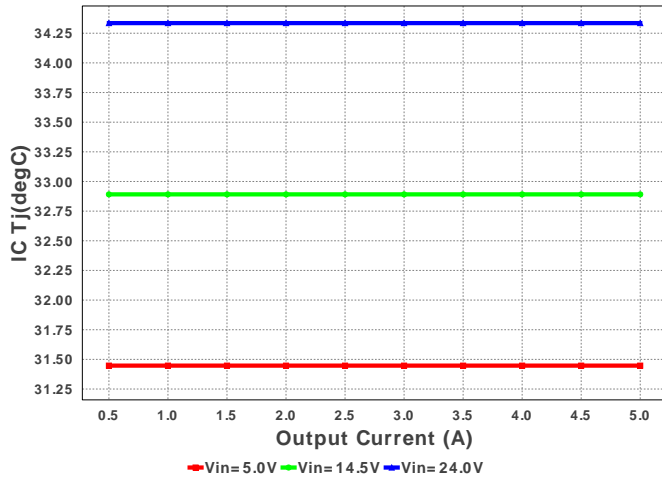


## Electrical BOM

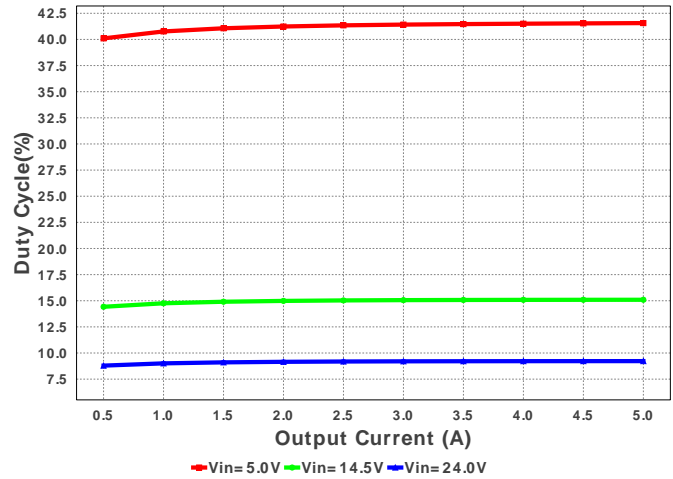
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Kemet	C0603C682K5RACTU Series= X7R	Cap= 6.8 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0603 5 mm <sup>2</sup>
2.	Ccomp	MuRata	GRM188R71E392KA01D Series= X7R	Cap= 3.9 nF VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0603 5 mm <sup>2</sup>
3.	Cdthr	MuRata	GRM188R71C473KA01D Series= X7R	Cap= 47.0 nF VDC= 16.0 V IRMS= 0.0 A	1	\$0.01	0603 5 mm <sup>2</sup>
4.	Chf	Samsung Electro-Mechanics	CL10C750JB8NNNC Series= C0G/NP0	Cap= 75.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0603 5 mm <sup>2</sup>
5.	Cin	MuRata	GRM31CR71H475KA12L Series= X7R	Cap= 4.7 uF ESR= 3.0 mOhm VDC= 50.0 V IRMS= 4.98 A	2	\$0.07	1206 11 mm <sup>2</sup>
6.	Cout	Panasonic	2R5SVPE330MY Series= SVPE	Cap= 330.0 uF ESR= 10.0 mOhm VDC= 2.5 V IRMS= 3.86 A	1	\$0.22	CAPSMT_62_E61 53 mm <sup>2</sup>
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 <sup>2</sup>
8.	Cramp	AVX	06033A220JAT2A Series= C0G/NP0	Cap= 220.0 pF VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0603 5 mm <sup>2</sup>
9.	Css	Kemet	C0603C103J5RACTU Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0603 5 mm <sup>2</sup>

#	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 <sup>2</sup>
11.	D1	STMicroelectronics	STPS20M100SG-TR	VF@Io= 455.0 mV VRRM= 100.0 V	1	\$1.33	 DDPAK 210 mm <sup>2</sup>
12.	L1	Bourns	SRR1208-6R5ML	L= 6.5 µH DCR= 18.0 mOhm	1	\$0.37	 SRR1208 216 mm <sup>2</sup>
13.	M1	Texas Instruments	CSD17308Q3	VdsMax= 30.0 V IdsMax= 50.0 Amps	1	\$0.34	 TRANS_NexFET_Q3 18 mm <sup>2</sup>
14.	Rcomp	Vishay-Dale	CRCW060314K3FKEA Series= CRCW..e3	Res= 14.3 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm <sup>2</sup>
15.	Rfbb	Yageo America	RC0603FR-071K8L Series= ?	Res= 1.8 kOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.01	 0603 5 mm <sup>2</sup>
16.	Rfbt	Vishay-Dale	CRCW0402887RFKED Series= CRCW..e3	Res= 887.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
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 <sup>2</sup>
18.	Rsns	Stackpole Electronics Inc	CSR1206FK15L0 Series= ?	Res= 15.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	\$0.11	 1206 11 mm <sup>2</sup>
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 <sup>2</sup>
20.	Ruv1	Panasonic	ERJ-6ENF1822V Series= ERJ-6E	Res= 18.2 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm <sup>2</sup>
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 <sup>2</sup>
22.	U1	Texas Instruments	LM5088MH-1/NOPB	Switcher	1	\$1.76	 MXA16A 59 mm <sup>2</sup>

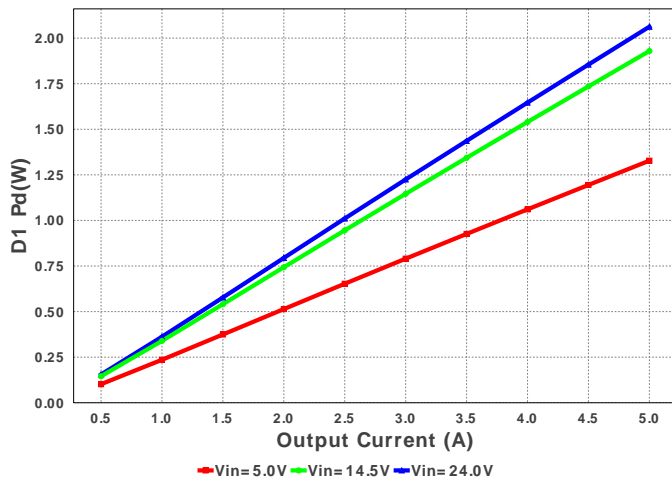
IC Tj



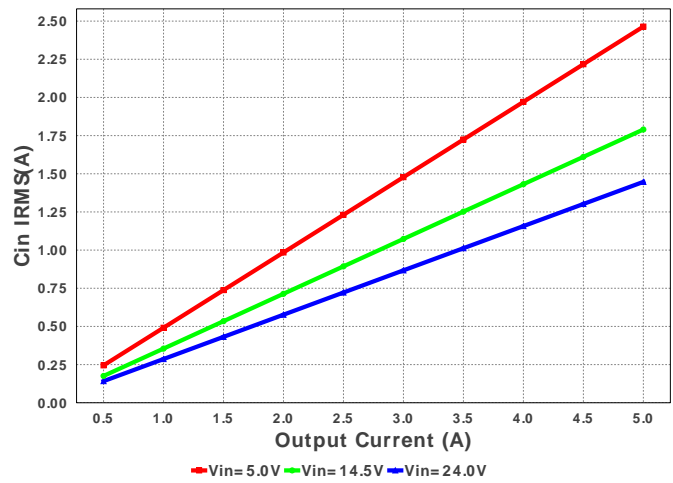
Duty Cycle



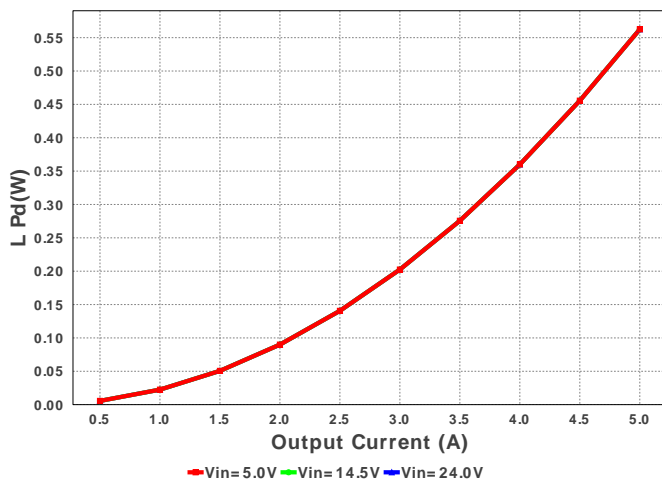
D1 Pd



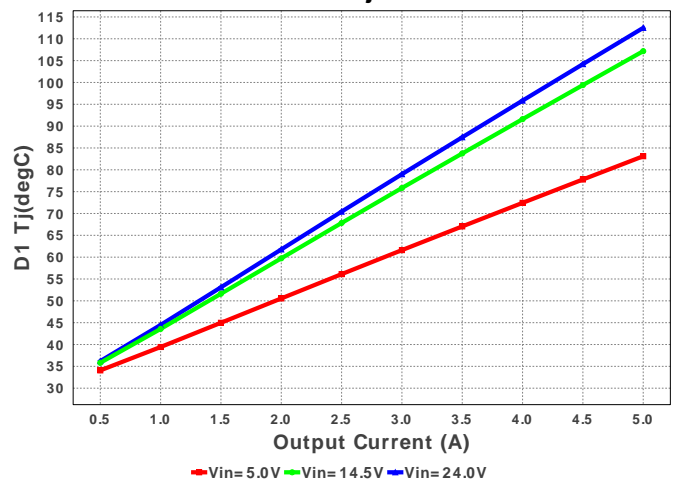
Cin IRMS

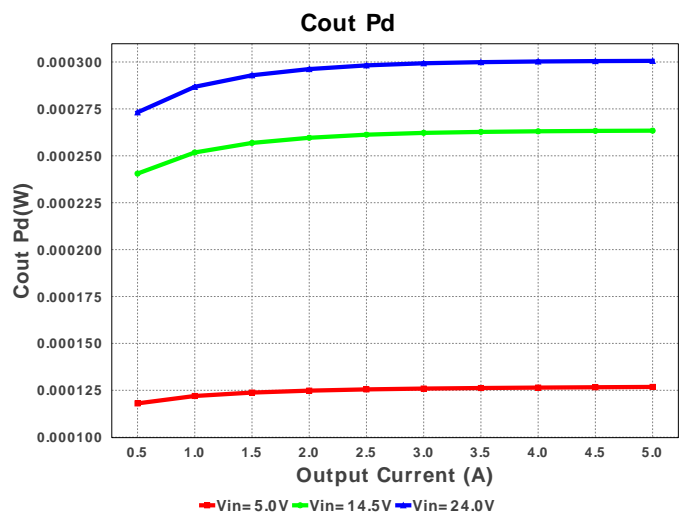
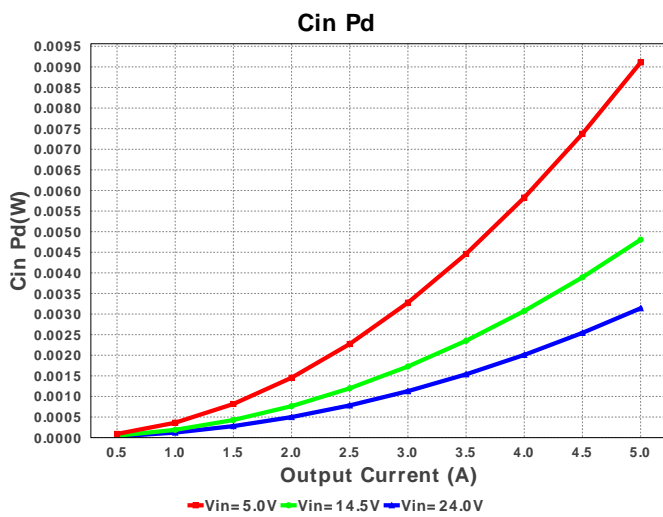
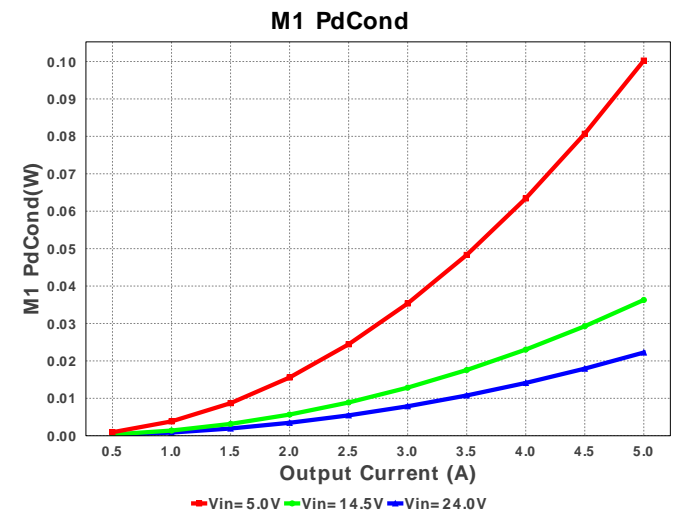
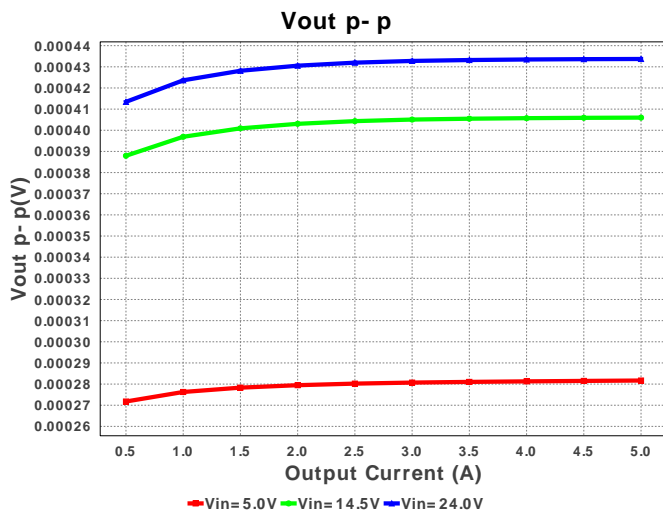
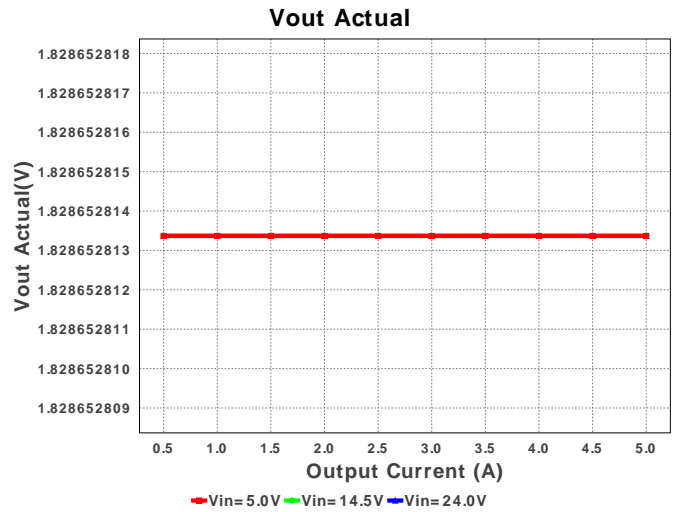
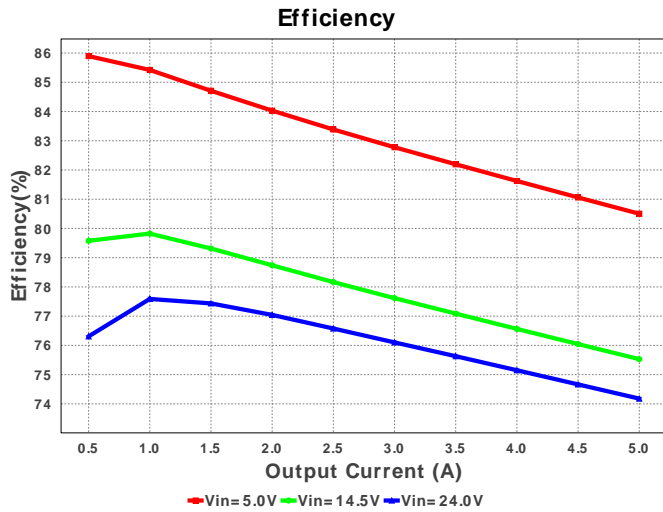


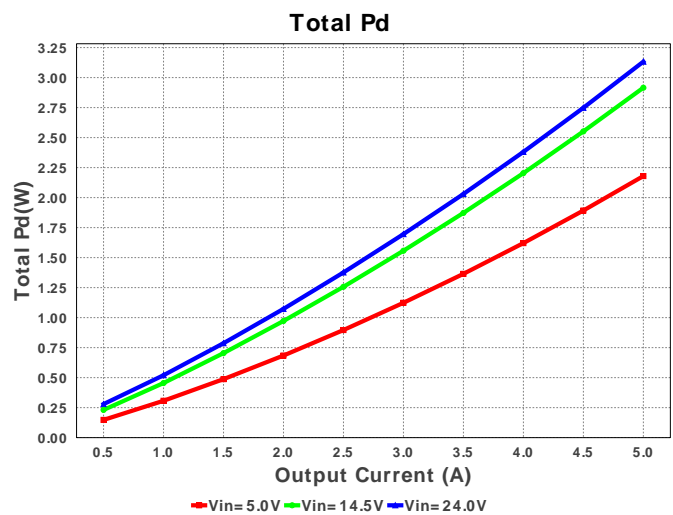
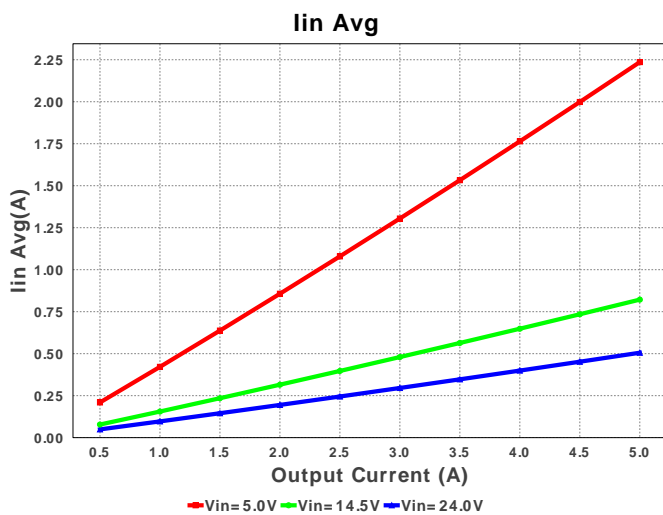
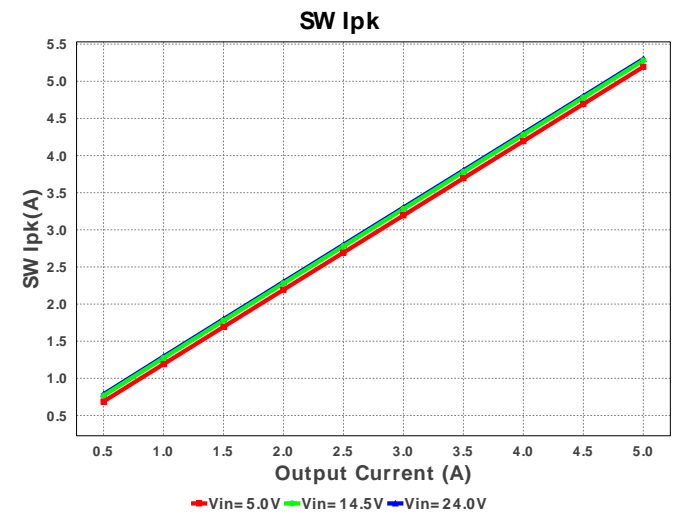
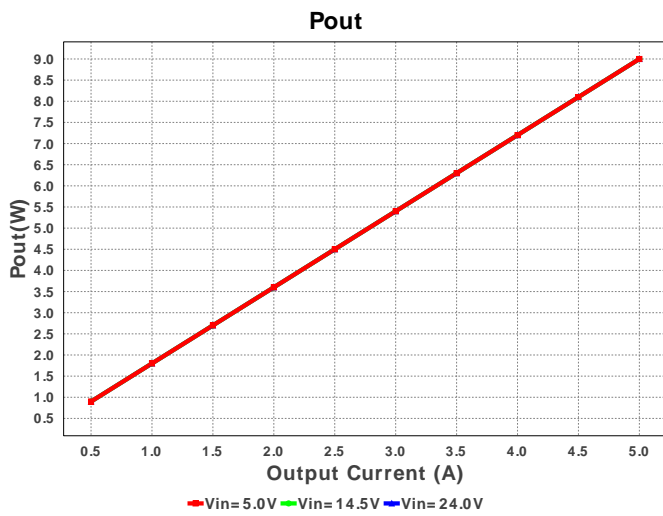
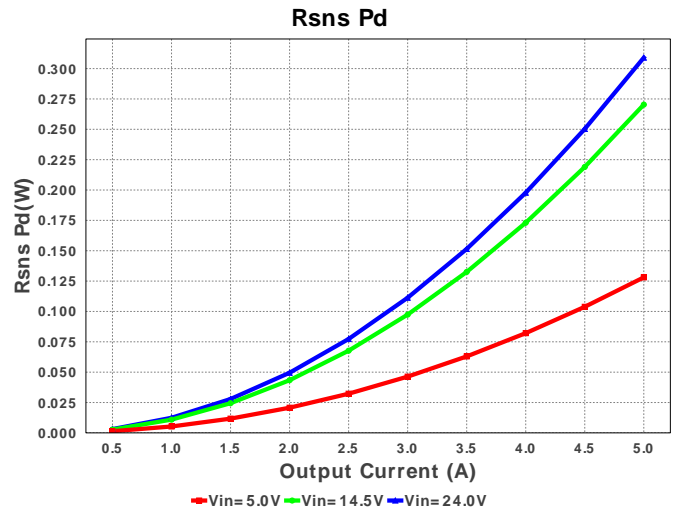
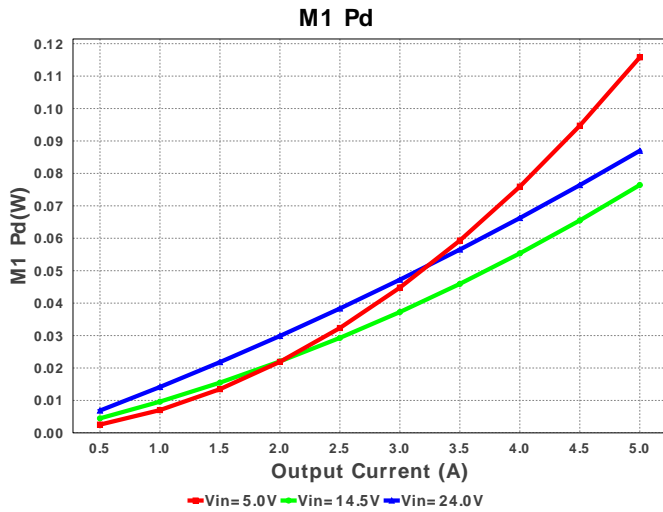
L Pd

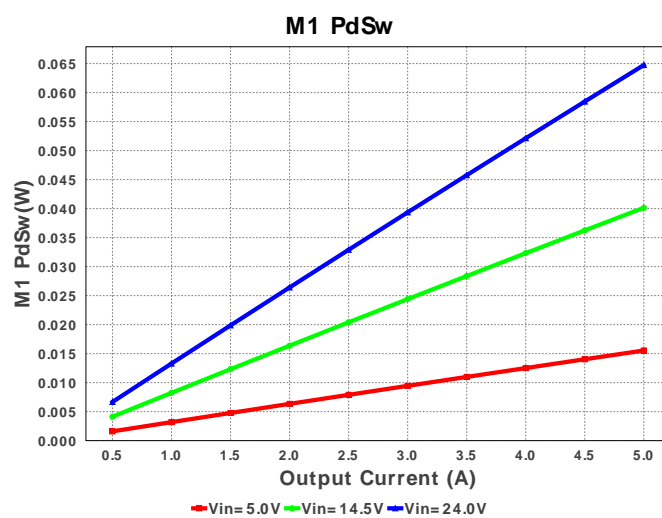
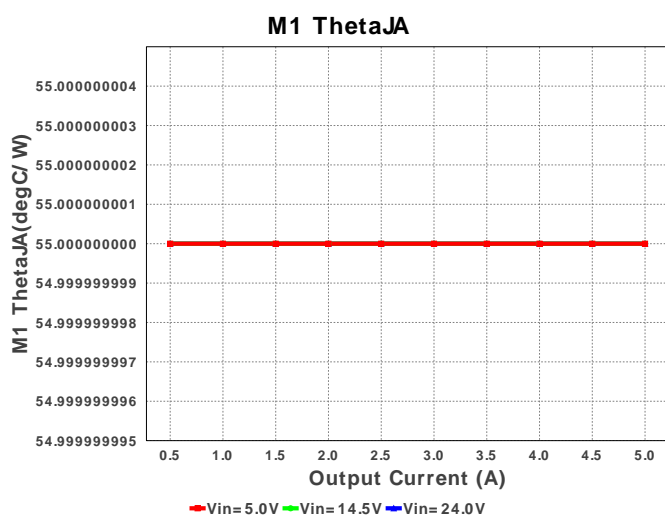
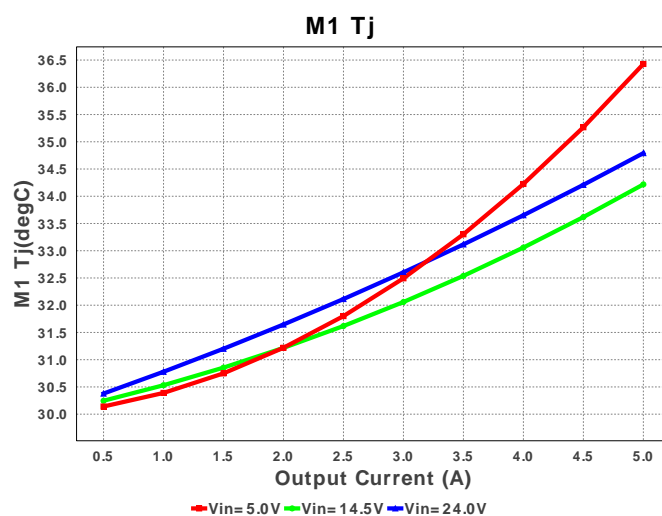
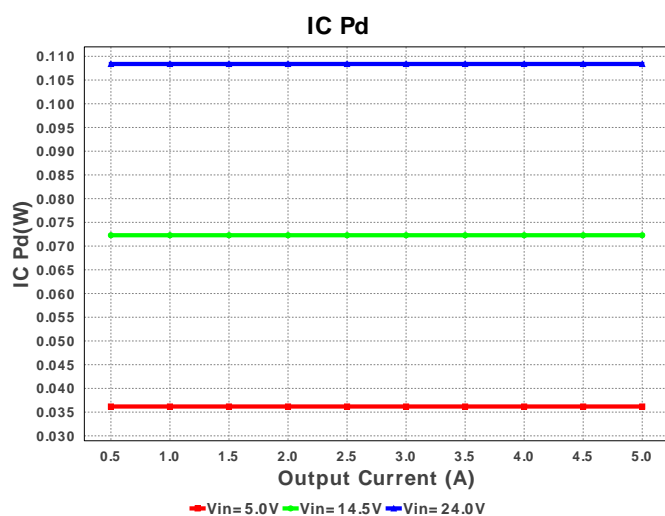
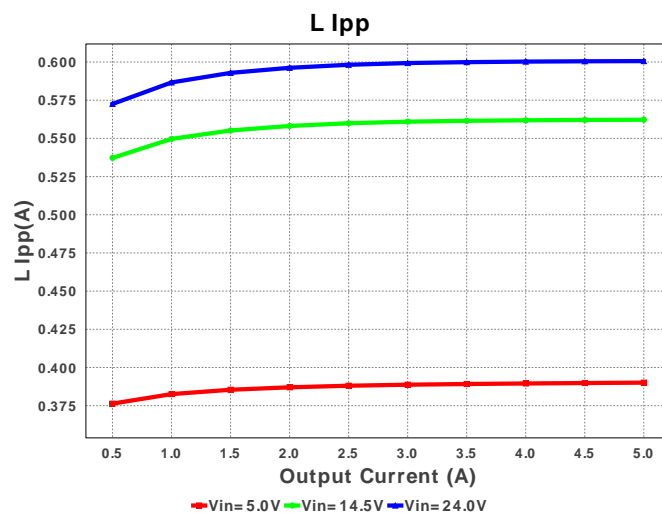
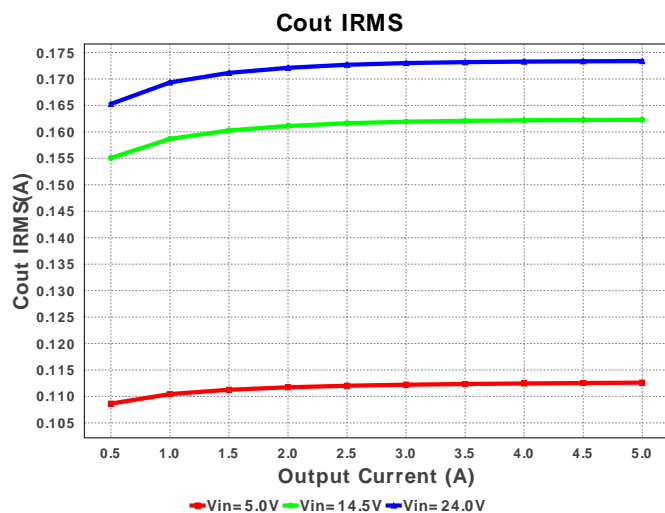


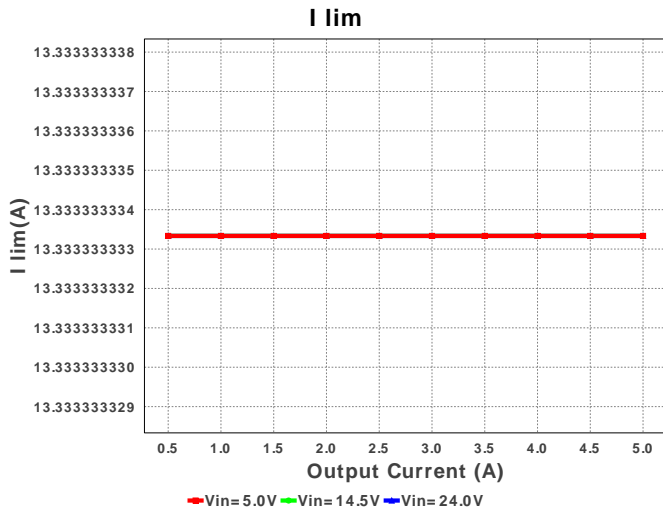
D1 Tj











## Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	1.447 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	173.228 mA	Current	Output capacitor RMS ripple current
3.	I lim	13.333 A	Current	Current limit threshold
4.	Iin Avg	505.53 mA	Current	Average input current
5.	L Ipp	600.08 mA	Current	Peak-to-peak inductor ripple current
6.	SW Ipk	5.3 A	Current	Peak switch current
7.	BOM Count	23	General	Total Design BOM count
8.	FootPrint	660.0 mm <sup>2</sup>	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	9.0 W	General	Total output power
13.	Total BOM	\$4.43	General	Total BOM Cost
14.	D1 Tj	112.499 degC	Op_Point	D1 junction temperature
15.	Vout Actual	1.799 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
16.	Duty Cycle	9.224 %	Op_point	Duty cycle
17.	Efficiency	74.179 %	Op_point	Steady state efficiency
18.	IC Tj	34.335 degC	Op_point	IC junction temperature
19.	ICThetaJA	40.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
20.	IOUT_OP	5.0 A	Op_point	Iout operating point
21.	M1 Tj	34.791 degC	Op_point	M1 MOSFET junction temperature
22.	VIN_OP	24.0 V	Op_point	Vin operating point
23.	Vout p-p	433.331 μV	Op_point	Peak-to-peak output ripple voltage
24.	Cin Pd	3.14 mW	Power	Input capacitor power dissipation
25.	Cout Pd	300.08 μW	Power	Output capacitor power dissipation
26.	D1 Pd	2.062 W	Power	Diode1 power dissipation
27.	IC Pd	108.384 mW	Power	IC power dissipation
28.	L Pd	562.5 mW	Power	Inductor power dissipation
29.	M1 Pd	86.983 mW	Power	M1 MOSFET total power dissipation
30.	M1 PdCond	22.239 mW	Power	M1 MOSFET conduction losses
31.	M1 PdSw	64.744 mW	Power	M1 MOSFET switching losses
32.	Rsns Pd	309.009 mW	Power	Current Limit Sense Resistor Power Dissipation
33.	Total Pd	3.133 W	Power	Total Power Dissipation
34.	Vout Tolerance	2.171 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

## Design Inputs

#	Name	Value	Description
1.	Iout	5.0	Maximum Output Current
2.	VinMax	24.0	Maximum input voltage
3.	VinMin	5.0	Minimum input voltage
4.	Vout	1.8	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](#).