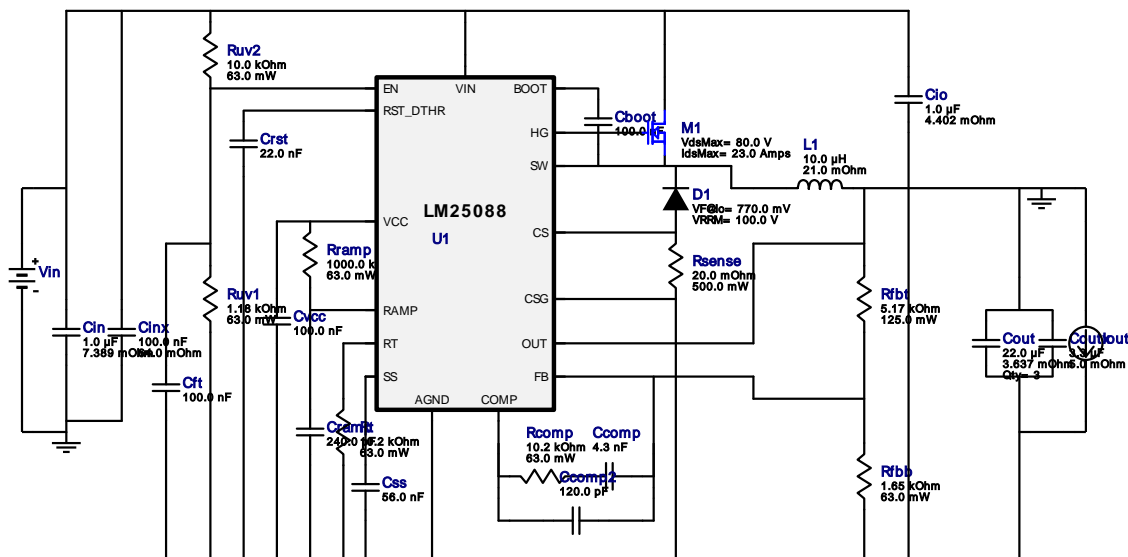


## WEBENCH® Design Report

Design : 4554839/3 LM25088MH-2/NOPB  
LM25088MH-2/NOPB 14.0V-30.0V to -5.00V @ 2.0A

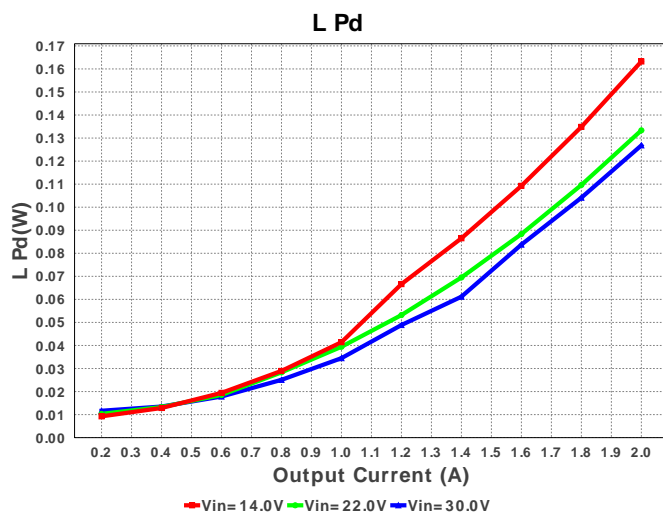
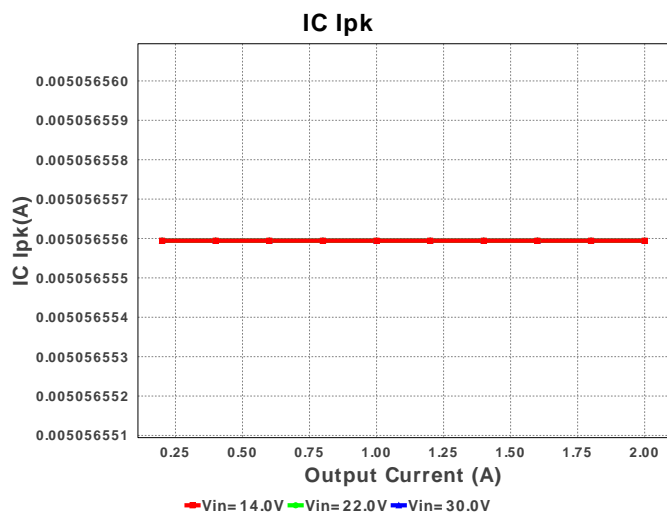
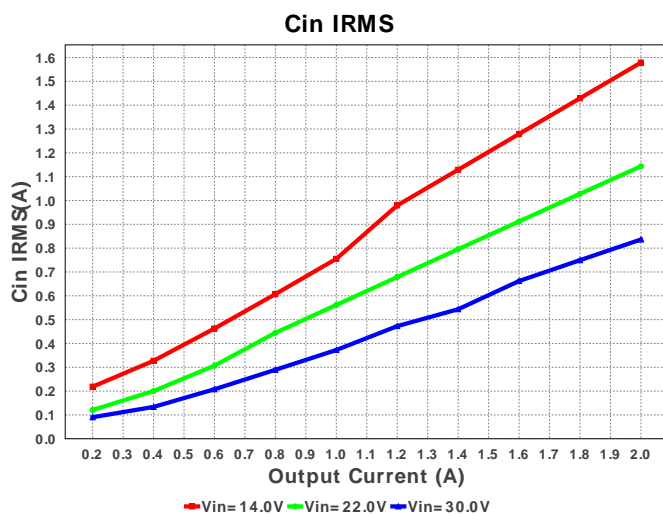
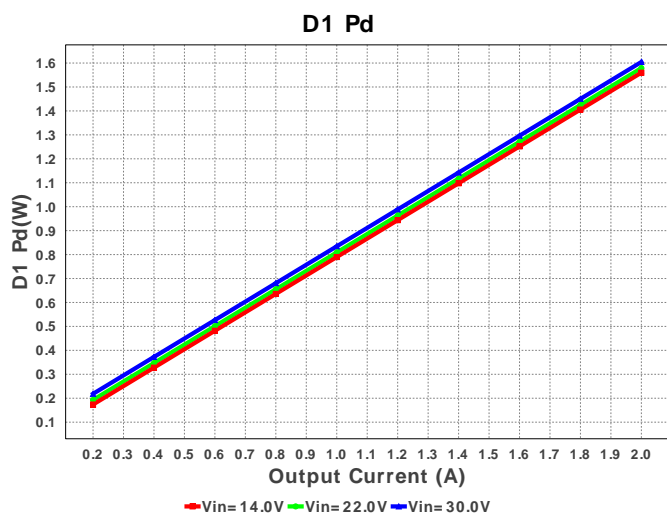
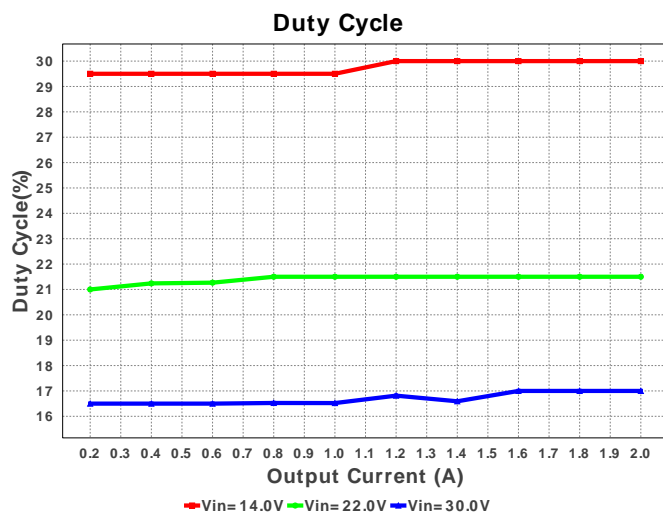
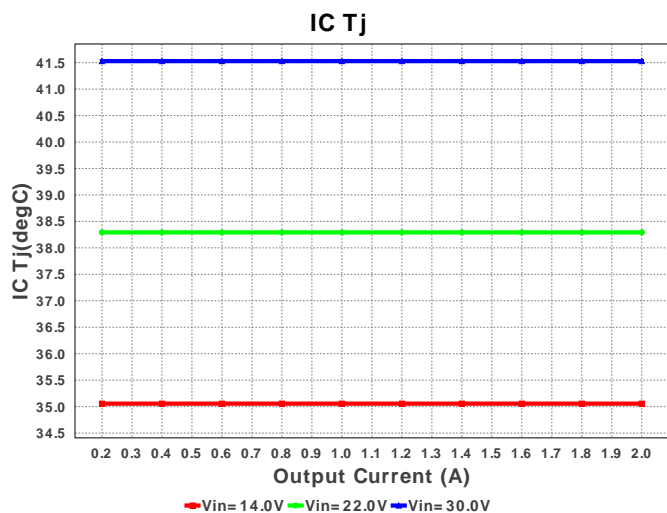
Vout = -5.0V  
Iout = 2.0A

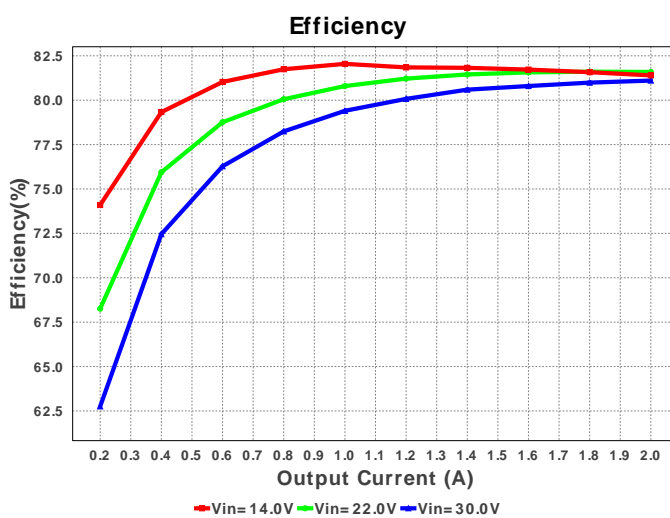
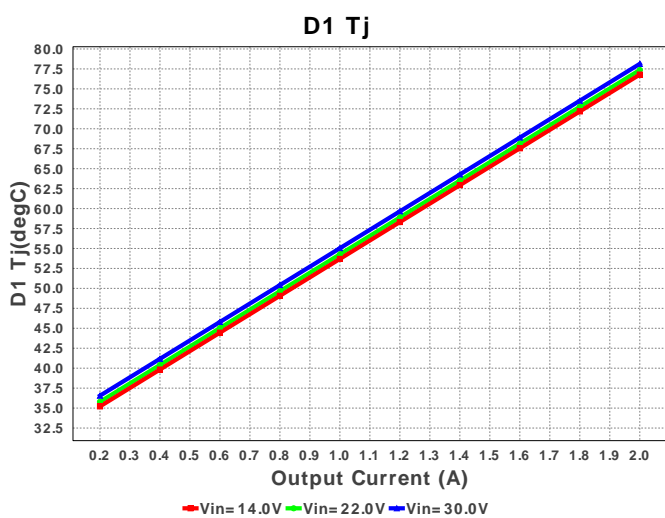
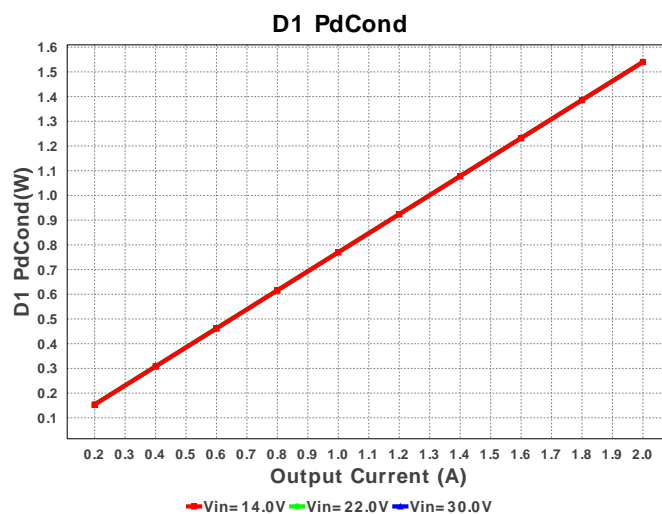
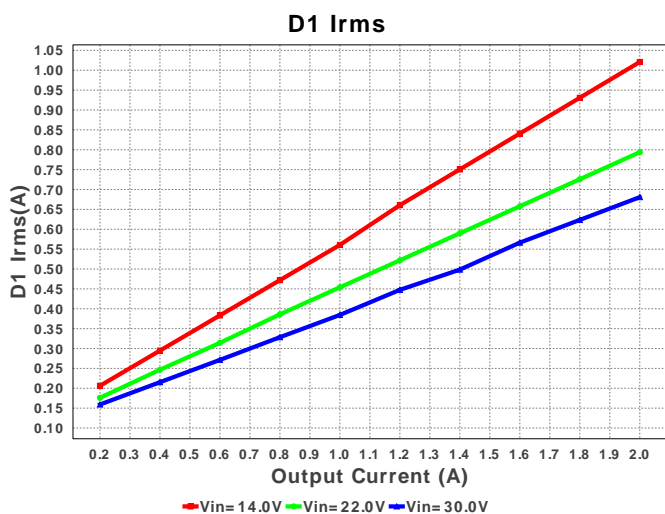
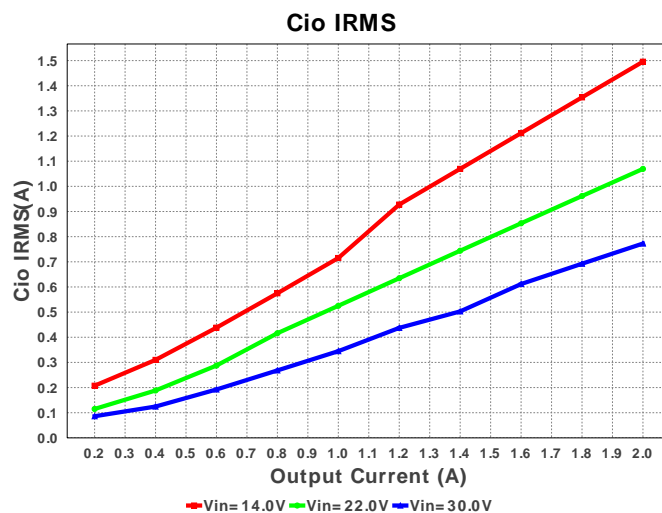
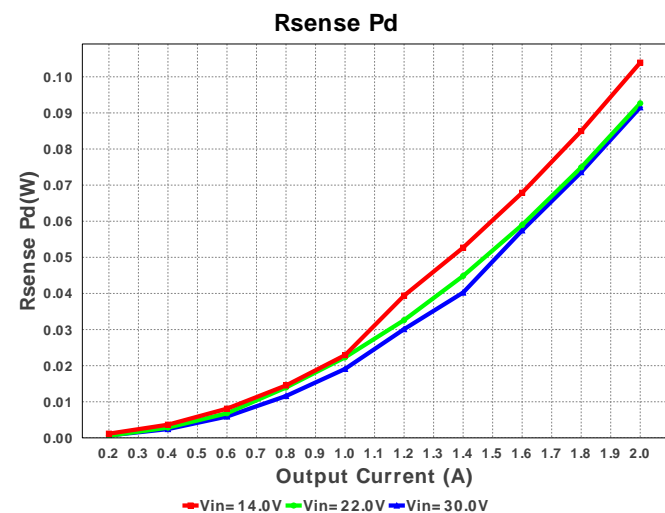


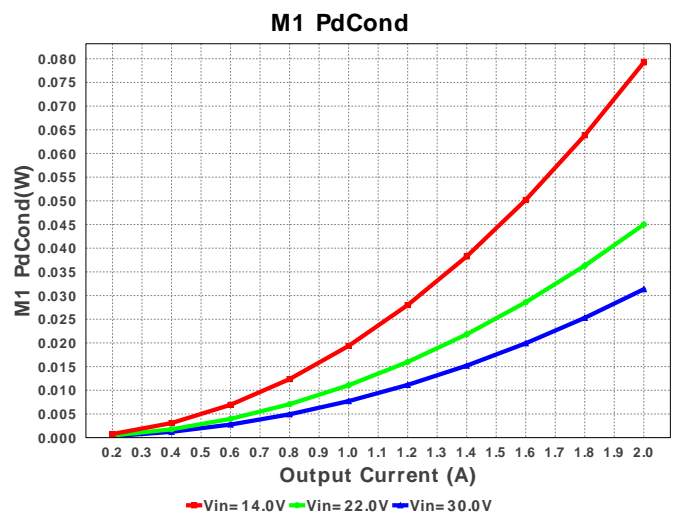
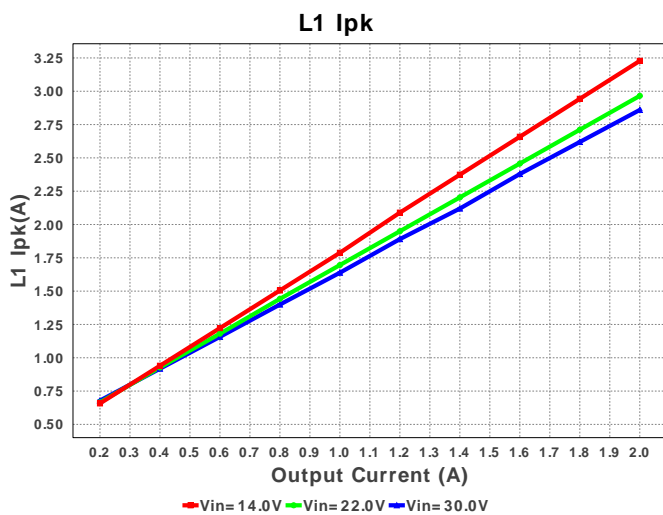
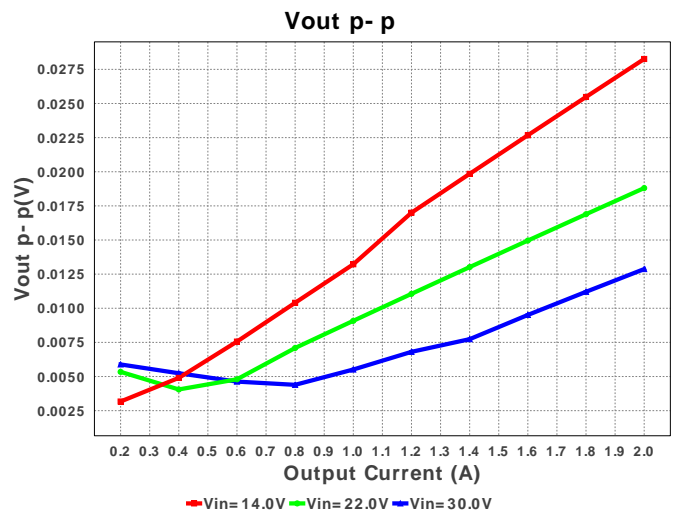
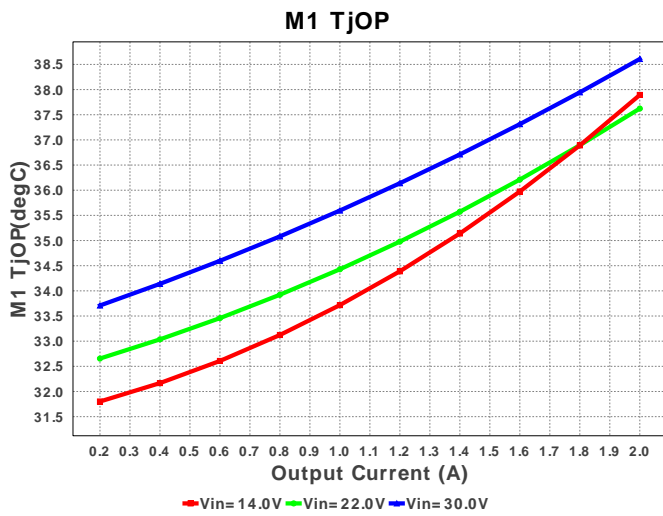
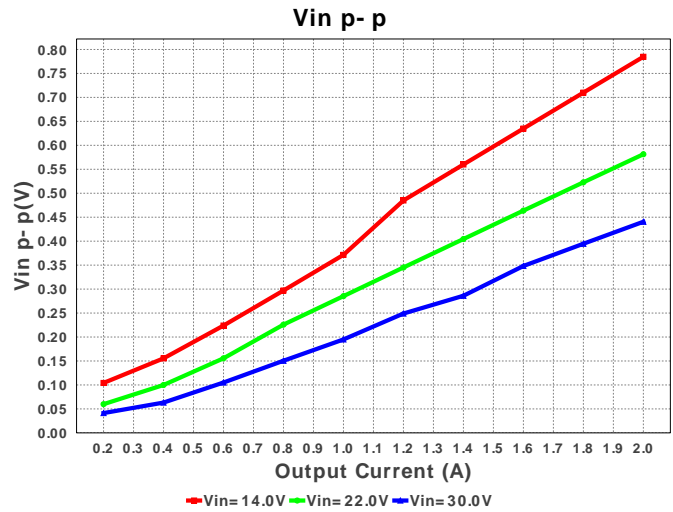
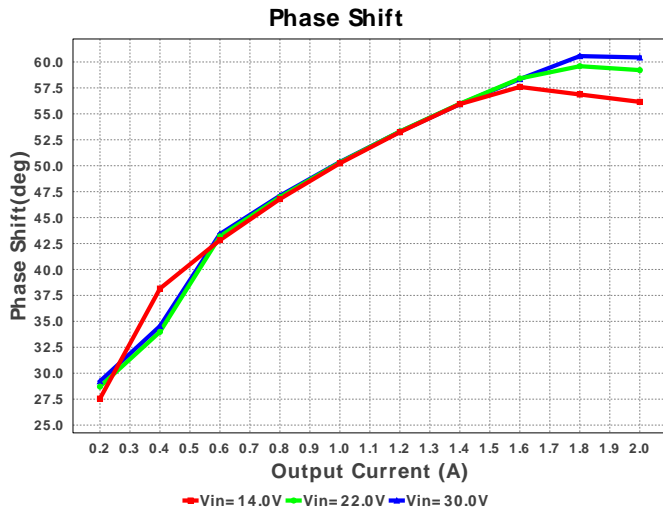
## Electrical BOM

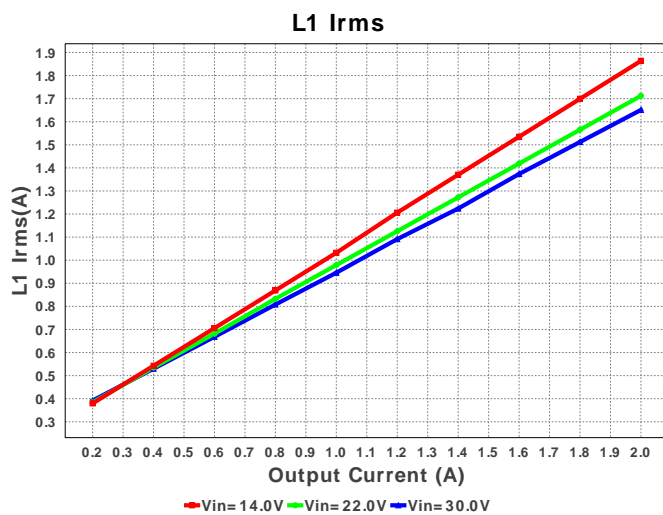
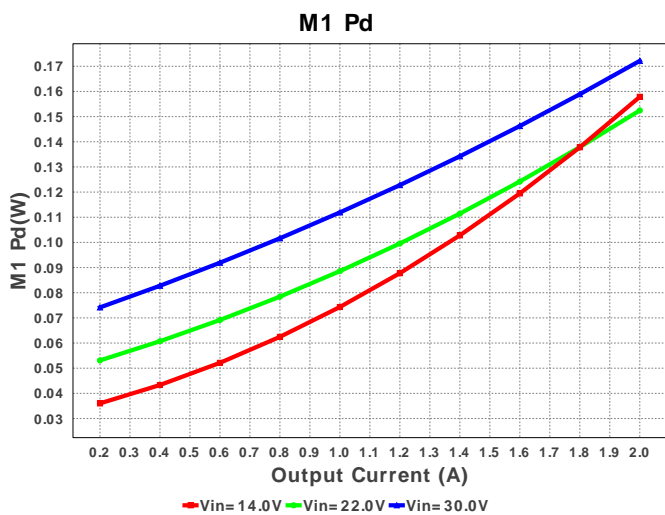
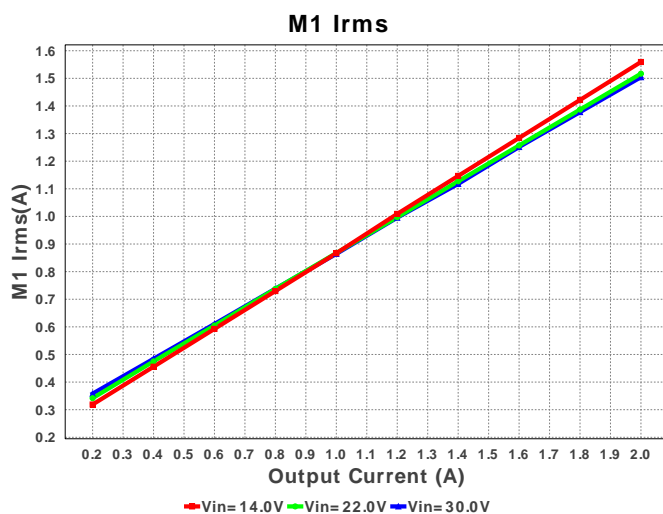
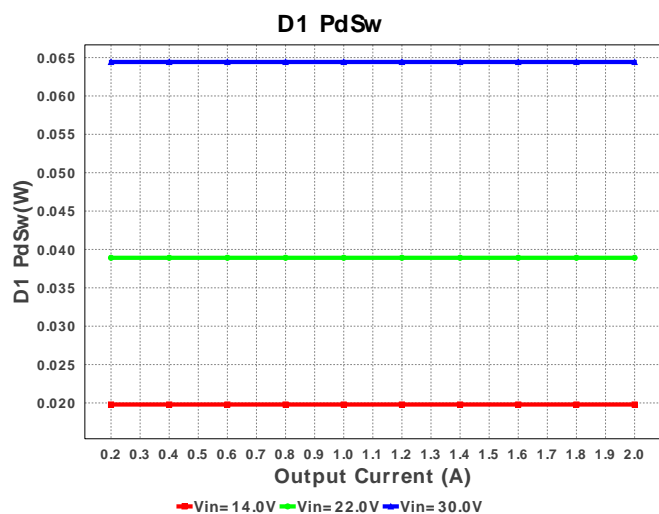
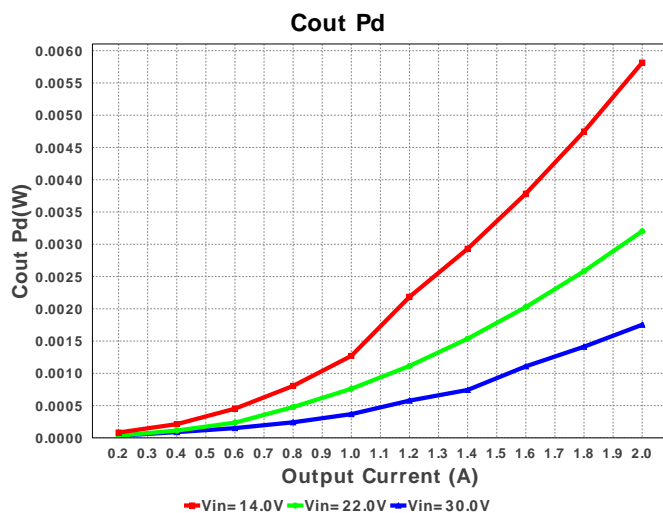
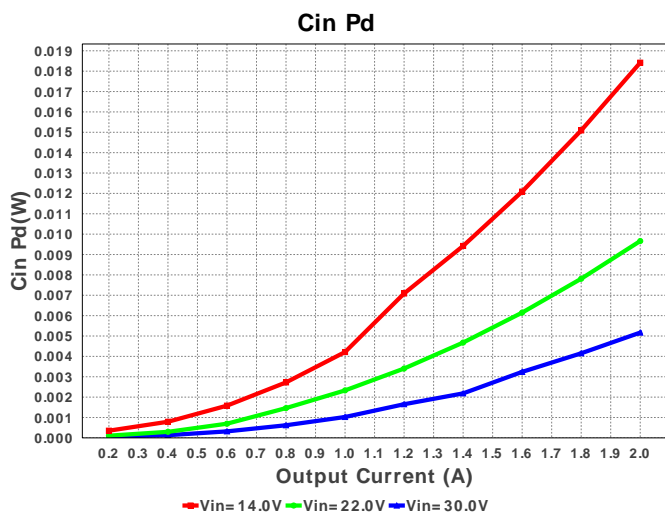
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Kemet	C0603C104K5RACTU Series= X7R	Cap= 100.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0603 5 mm <sup>2</sup>
2.	Ccomp	MuRata	GRM2165C1H432JA01D Series= C0G/NP0	Cap= 4.3 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.04	0805 7 mm <sup>2</sup>
3.	Ccomp2	Samsung Electro-Mechanics	CL21C121JB61PNC Series= C0G/NP0	Cap= 120.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm <sup>2</sup>
4.	Cft	MuRata	GRM155R61A104KA01D Series= X5R	Cap= 100.0 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm <sup>2</sup>
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 mm <sup>2</sup>
6.	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 mm <sup>2</sup>
7.	Cio	MuRata	GRM21BR71H105KA12L Series= X7R	Cap= 1.0 uF ESR= 4.402 mOhm VDC= 50.0 V IRMS= 1.677 A	1	\$0.05	0805 7 mm <sup>2</sup>
8.	Cout	MuRata	GRM31CR61A226KE19L Series= X5R	Cap= 22.0 uF ESR= 3.637 mOhm VDC= 10.0 V IRMS= 3.56456 A	3	\$0.07	1206_190 11 mm <sup>2</sup>

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	Coutx	Kemet	C0805C335K8PACTU Series= X5R	Cap= 3.3 uF ESR= 5.0 mOhm VDC= 10.0 V IRMS= 8.13 A	1	\$0.05	 0805 7 mm <sup>2</sup>
10.	Cramp	MuRata	GRM1555C1H241JA01D Series= C0G/NP0	Cap= 240.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0402 3 mm <sup>2</sup>
11.	Crst	MuRata	GRM033C80J223KE01D Series= X6S	Cap= 22.0 nF VDC= 6.3 V IRMS= 0.0 A	1	\$0.01	 0201 2 mm <sup>2</sup>
12.	Css	MuRata	GRM155R61A563KA01D Series= X5R	Cap= 56.0 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	 0402 3 mm <sup>2</sup>
13.	Cvcc	MuRata	GRM155R61A104KA01D Series= X5R	Cap= 100.0 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	 0402 3 mm <sup>2</sup>
14.	D1	Vishay-Semiconductor	50WQ10FNPBF	VF@Io= 770.0 mV VRRM= 100.0 V	1	\$0.74	 DPAK 102 mm <sup>2</sup>
15.	L1	Bourns	SDR1307-100ML	L= 10.0 uH DCR= 21.0 mOhm	1	\$0.35	 SDR1307 227 mm <sup>2</sup>
16.	M1	Infineon Technologies	BSC340N08NS3 G	VdsMax= 80.0 V IdsMax= 23.0 Amps	1	\$0.19	 PG-TDSON-8 55 mm <sup>2</sup>
17.	Rcomp	Vishay-Dale	CRCW040210K2FKED Series= CRCW..e3	Res= 10.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
18.	Rfbb	Vishay-Dale	CRCW04021K65FKED Series= CRCW..e3	Res= 1.65 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
19.	Rfbt	Yageo America	RT0805BRD075K17L Series= RT0805	Res= 5.17 kOhm Power= 125.0 mW Tolerance= 0.1%	1	\$0.05	 0805 7 mm <sup>2</sup>
20.	Rramp	Vishay-Dale	CRCW04021M00FKED Series= CRCW..e3	Res= 1000.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
21.	Rsense	Stackpole Electronics Inc	CSR1206FK20L0 Series= ?	Res= 20.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	\$0.10	 1206 11 mm <sup>2</sup>
22.	Rt	Vishay-Dale	CRCW040210K2FKED Series= CRCW..e3	Res= 10.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
23.	Ruv1	Vishay-Dale	CRCW04021K18FKED Series= CRCW..e3	Res= 1.18 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
24.	Ruv2	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
25.	U1	Texas Instruments	LM25088MH-2/NOPB	Switcher	1	\$1.50	 MXA16A 59 mm <sup>2</sup>

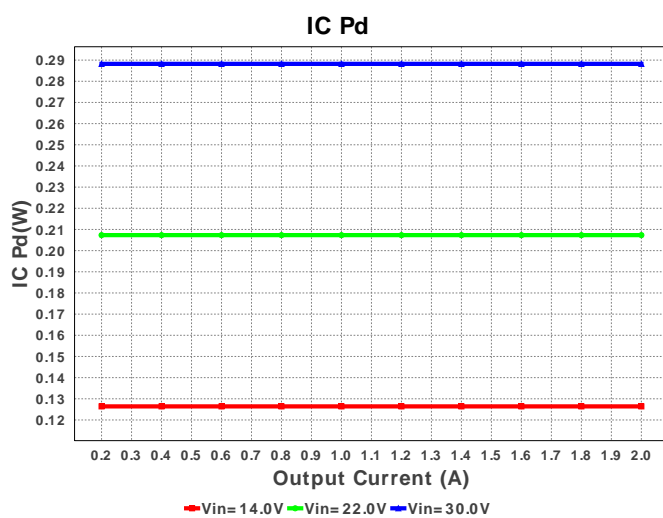
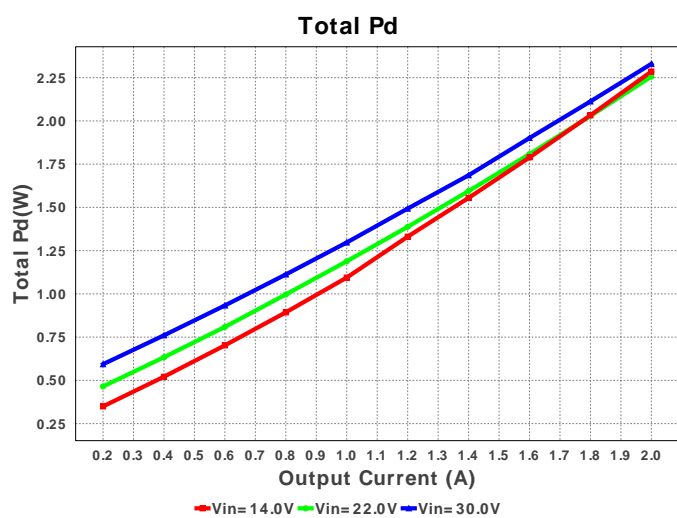
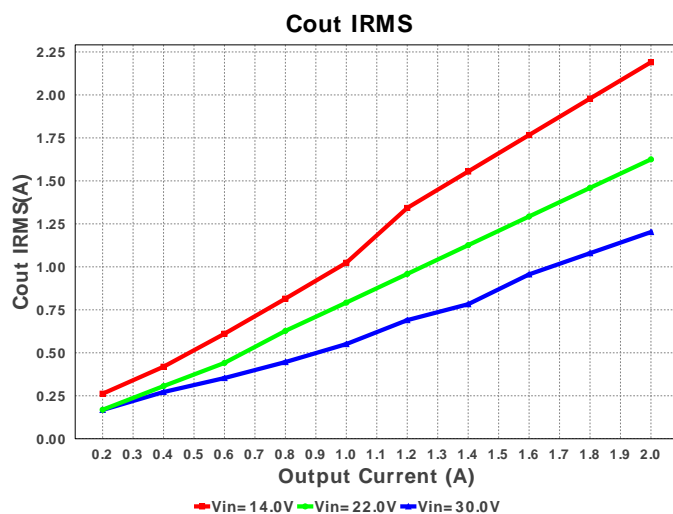
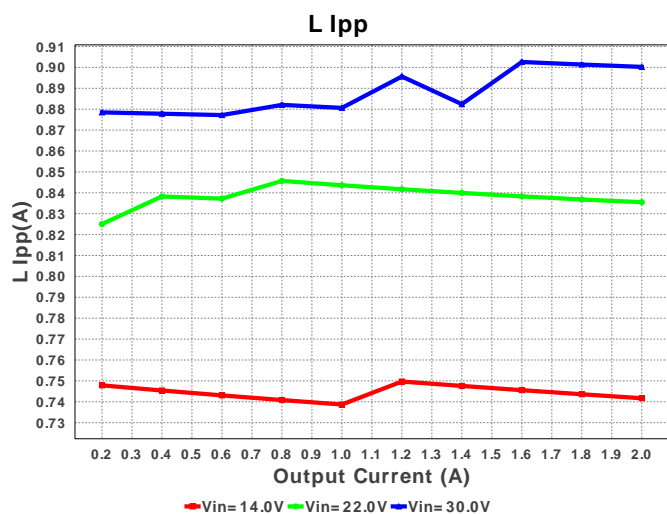
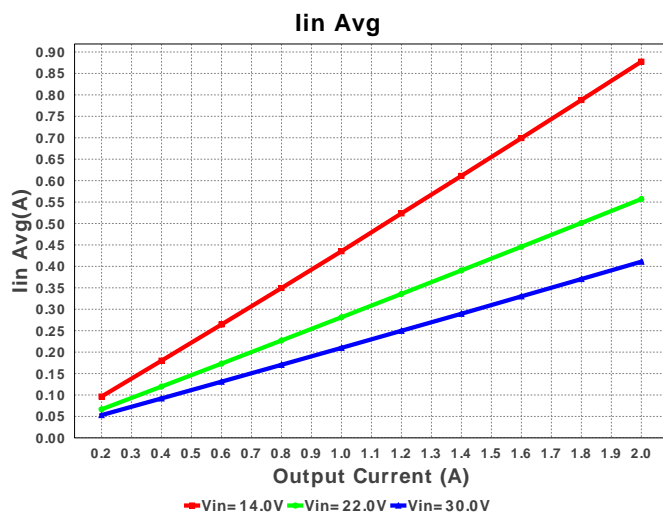
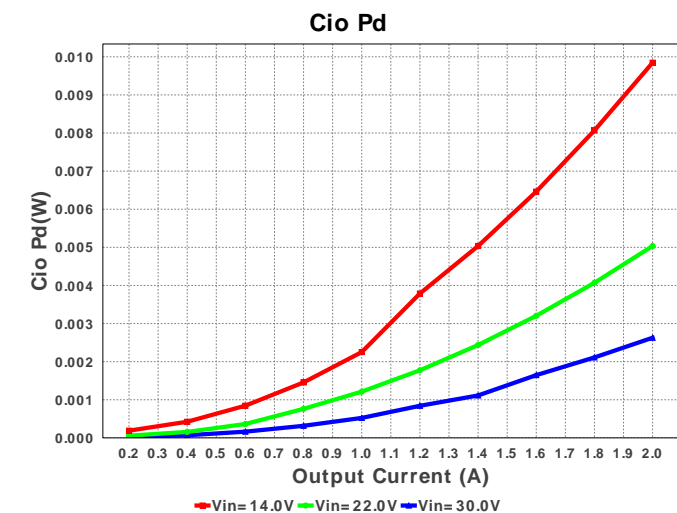


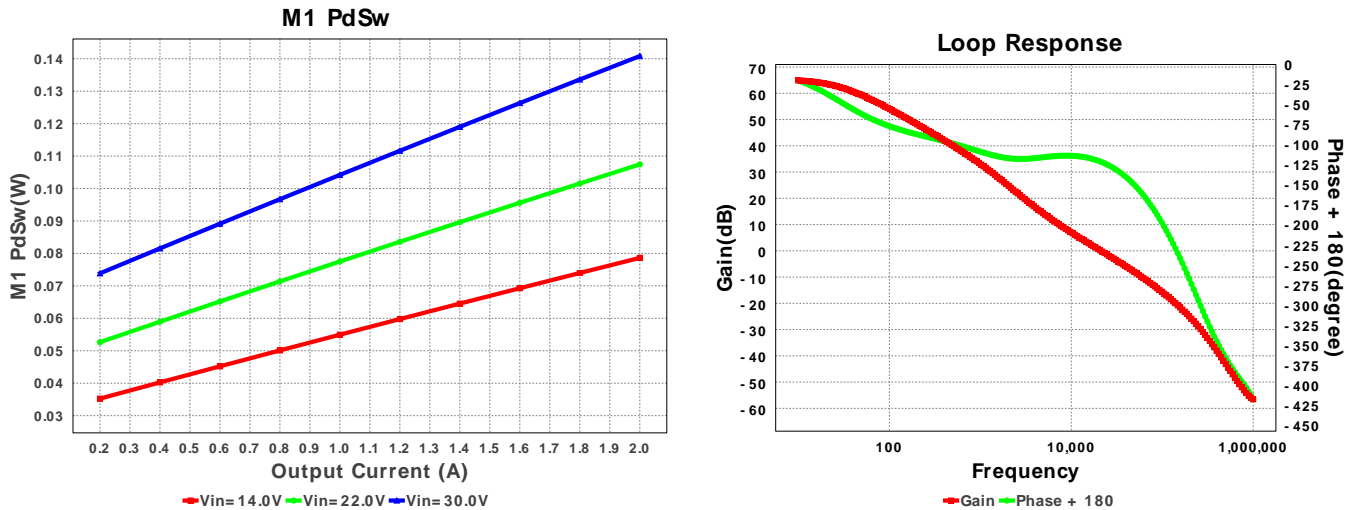












## Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	859.086 mA	Current	Input capacitor RMS ripple current
2.	Cio IRMS	793.553 mA	Current	Input to output capacitor RMS ripple current
3.	Cout IRMS	1.226 A	Current	Output capacitor RMS ripple current
4.	D1 Irms	680.064 mA	Current	D1 Irms
5.	IC Ipk	5.065 mA	Current	Peak switch current in IC
6.	Iin Avg	411.14 mA	Current	Average input current
7.	L Ipp	894.399 mA	Current	Peak-to-peak output inductor ripple current
8.	L1 Ipk	2.857 A	Current	Inductor peak current
9.	L1 Irms	1.649 A	Current	Inductor ripple current
10.	M1 Irms	1.503 A	Current	M1 MOSFET Irms
11.	BOM Count	27	General	Total Design BOM count
12.	FootPrint	574.0 mm <sup>2</sup>	General	Total Foot Print Area of BOM components
13.	Frequency	550.0 kHz	General	Switching frequency
14.	IC Tolerance	18.0 mV	General	IC Feedback Tolerance
15.	Mode	DCM	General	Conduction Mode
16.	Total BOM	\$3.45	General	Total BOM Cost
17.	D1 Tj	78.146 degC	Op_Point	D1 junction temperature
18.	Vin p-p	452.576 mV	Op_Point	Peak-to-peak input voltage
19.	Cross Freq	20.729 kHz	Op_point	Bode plot crossover frequency
20.	Duty Cycle	17.0 %	Op_point	Duty cycle
21.	Efficiency	81.075 %	Op_point	Steady state efficiency
22.	Gain Marg	13.575 db	Op_point	Bode Plot Gain Margin
23.	IC Tj	41.548 degC	Op_point	IC junction temperature
24.	IOUT_OP	2.0 A	Op_point	Iout operating point
25.	M1 TjOP	38.656 degC	Op_point	M1 MOSFET junction temperature
26.	Phase Marg	59.433 deg	Op_point	Bode Plot Phase Margin
27.	Phase Shift	60.474 deg	Op_point	Bode Plot Phase Shift
28.	VIN_OP	30.0 V	Op_point	Vin operating point
29.	Vout p-p	12.98 mV	Op_point	Peak-to-peak output ripple voltage
30.	Cin Pd	5.453 mW	Power	Input capacitor power dissipation
31.	Cio Pd	2.772 mW	Power	Input to output capacitor power dissipation
32.	Cout Pd	1.823 mW	Power	Output capacitor power dissipation
33.	D1 Pd	1.605 W	Power	Diode power dissipation
34.	D1 PdCond	1.54 W	Power	Diode conduction losses
35.	D1 PdSw	64.859 mW	Power	Diode switching losses
36.	IC Pd	288.705 mW	Power	IC power dissipation
37.	L Pd	126.855 mW	Power	Inductor power dissipation
38.	M1 Pd	173.112 mW	Power	M1 MOSFET total power dissipation
39.	M1 PdCond	31.342 mW	Power	M1 MOSFET conduction losses
40.	M1 PdSw	141.77 mW	Power	M1 MOSFET switching losses
41.	Rsense Pd	91.617 mW	Power	Rsense Power Dissipation
42.	Total Pd	2.334 W	Power	Total Power Dissipation

## Design Inputs

#	Name	Value	Description
1.	Iout	2.0	Maximum Output Current
2.	VinMax	30.0	Maximum input voltage
3.	VinMin	14.0	Minimum input voltage
4.	Vout	-5.0	Output Voltage
5.	base_pn	LM25088	Texas Instruments Base Part Number
6.	source	DC	Input Source Type



#	Name	Value	Description
7.	ta	30.0	Ambient temperature

## Design Assistance

1. LM25088 Product Folder : <http://www.ti.com/product/LM25088> : contains the data sheet and other resources.

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