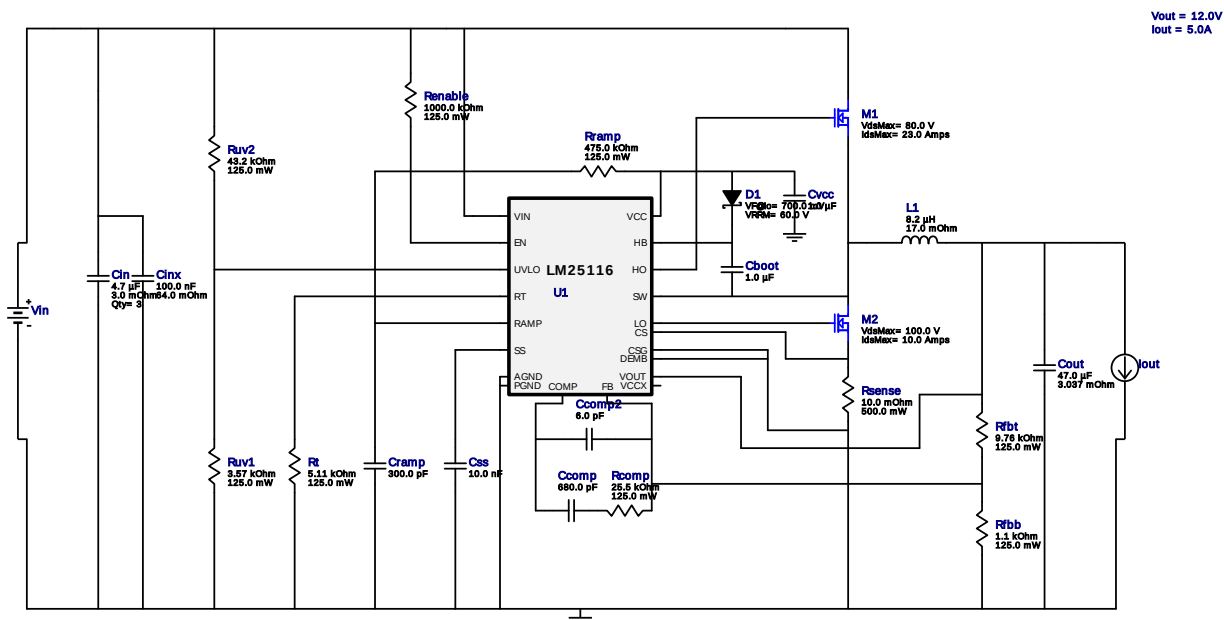


WEBENCH® Design Report

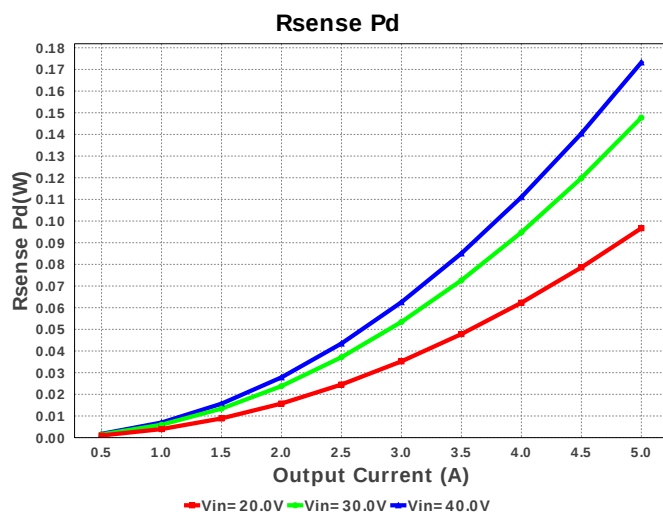
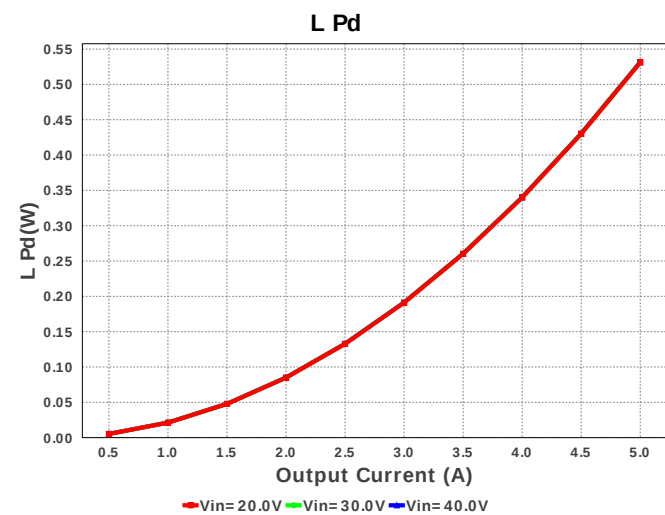
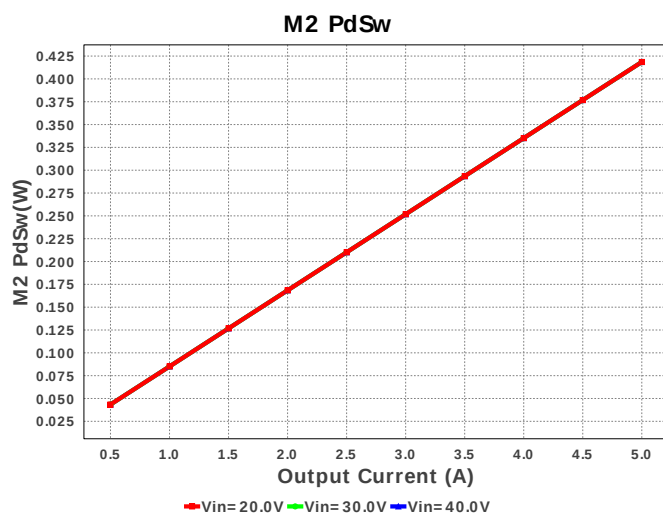
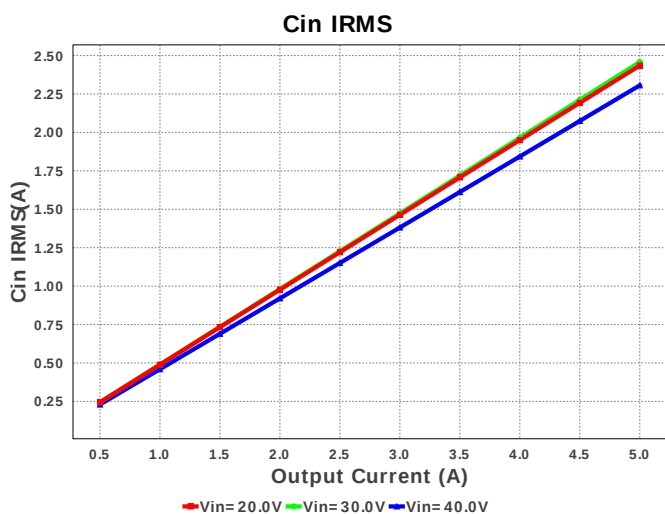
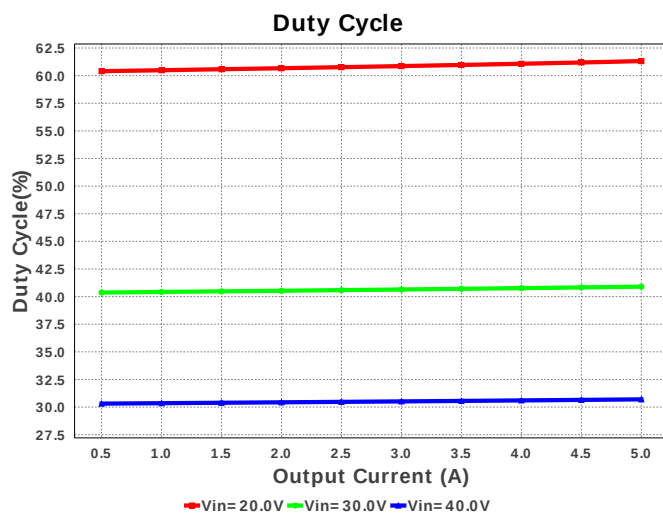
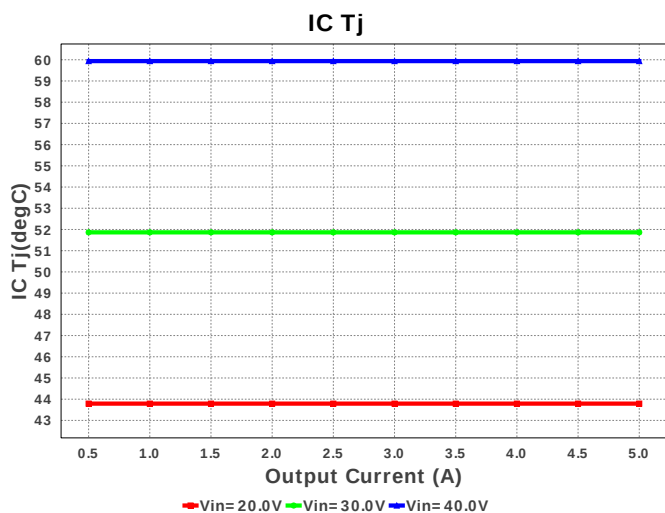
Design : 4161985/19 LM25116MHX/NOPB
LM25116MHX/NOPB 20.0V-40.0V to 12.00V @ 5.0A

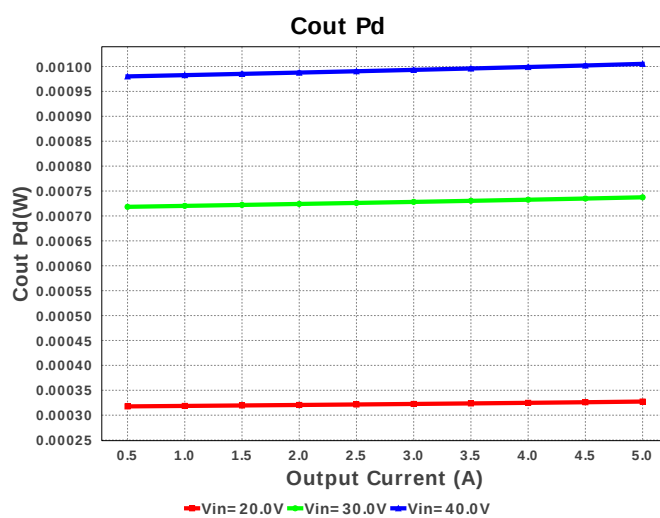
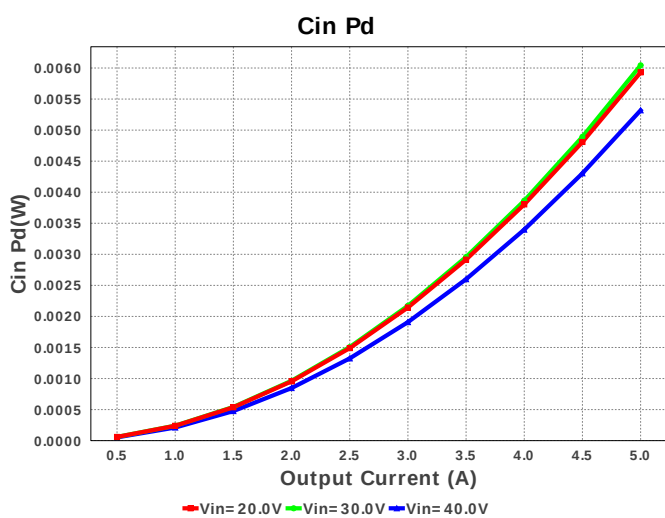
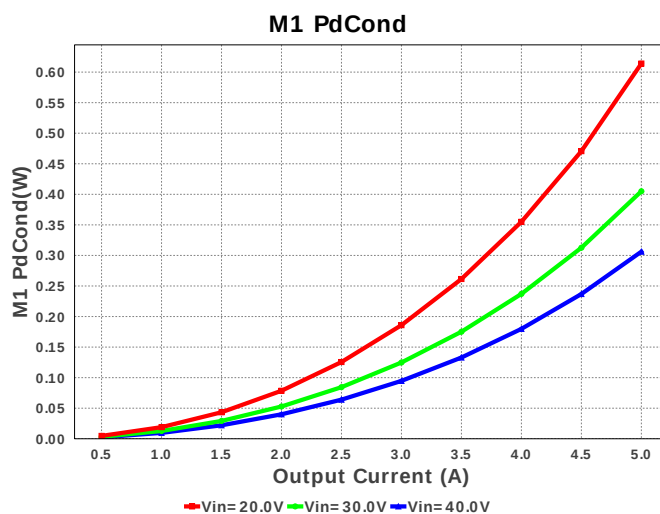
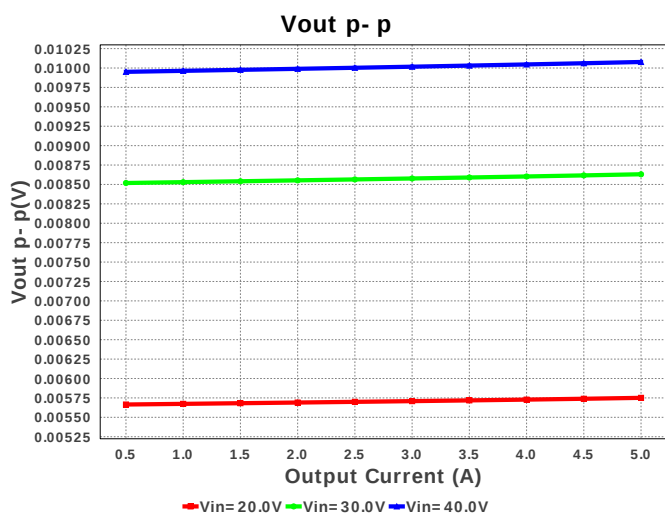
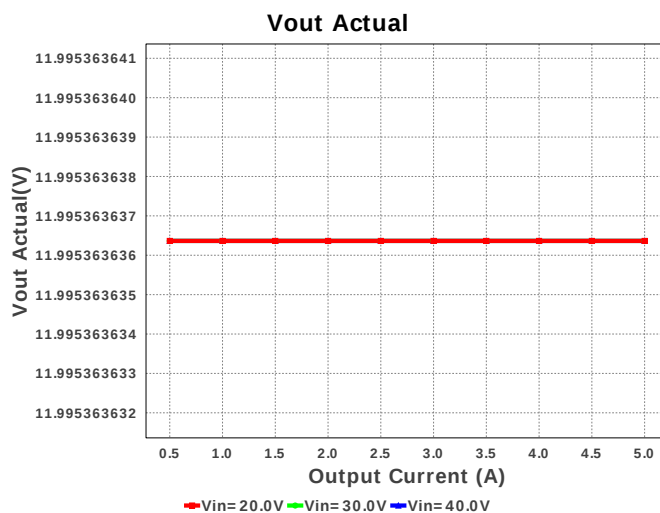
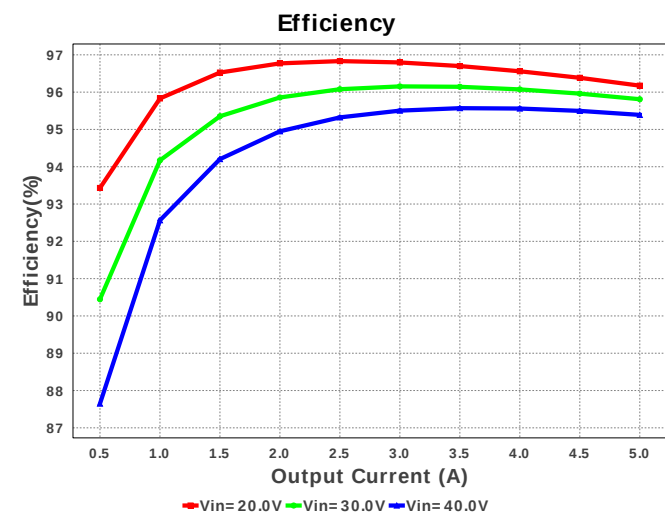


Electrical BOM

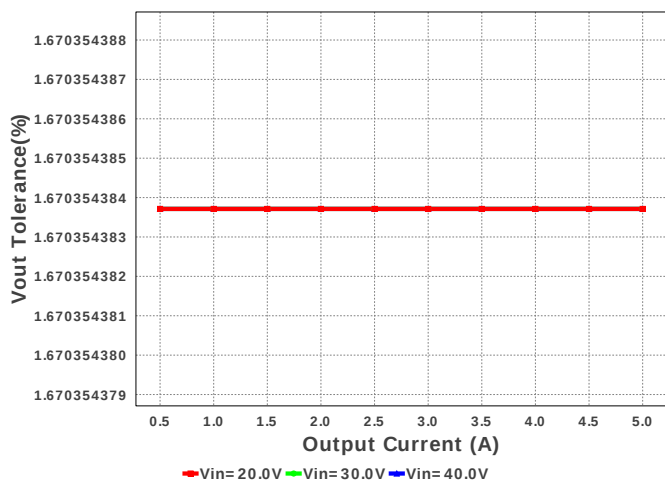
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Taiyo Yuden	EMK212B7105KG-T Series= X7R	Cap= 1.0 uF VDC= 16.0 V IRMS= 0.0 A	1	\$0.02	0805 7 mm ²
2.	Ccomp	Yageo America	CC0805KRX7R9BB681 Series= X7R	Cap= 680.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
3.	Ccomp2	Yageo America	CC0805DRNP09BN6R0 Series= C0G/NP0	Cap= 6.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.03	0805 7 mm ²
4.	Cin	MuRata	GRM31CR71H475KA12L Series= X7R	Cap= 4.7 uF ESR= 3.0 mOhm VDC= 50.0 V IRMS= 4.98 A	3	\$0.07	1206 11 mm ²
5.	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 ²
6.	Cout	MuRata	GRM32ER61C476ME15L Series= X5R	Cap= 47.0 uF ESR= 3.037 mOhm VDC= 16.0 V IRMS= 4.59346 A	1	\$0.24	1210_280 15 mm ²
7.	Cramp	Samsung Electro-Mechanics	CL10C301JB8NNNC Series= C0G/NP0	Cap= 300.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0603 5 mm ²
8.	Css	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	Cvcc	Taiyo Yuden	EMK212B7105KG-T Series= X7R	Cap= 1.0 uF VDC= 16.0 V IRMS= 0.0 A	1	\$0.02	 0805 7 mm²
10.	D1	Diodes Inc.	B260A-13-F	VF@Io= 700.0 mV VRRM= 60.0 V	1	\$0.09	 SMA 37 mm²
11.	L1	Bourns	SRR1210-8R2Y	L= 8.2 uH DCR= 17.0 mOhm	1	\$0.44	 SRR1210 196 mm²
12.	M1	Infineon Technologies	BSC340N08NS3 G	VdsMax= 80.0 V IdsMax= 23.0 Amps	1	\$0.23	 PG-TDSON-8 55 mm²
13.	M2	Texas Instruments	CSD19534Q5A	VdsMax= 100.0 V IdsMax= 10.0 Amps	1	\$0.68	 TRANS_NexFET_Q5A 55 mm²
14.	Rcomp	Panasonic	ERJ-6ENF2552V Series= ERJ-6E	Res= 25.5 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm²
15.	Renable	Panasonic	ERJ-6ENF1004V Series= ERJ-6E	Res= 1000.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm²
16.	Rfbb	Panasonic	ERJ-6ENF1101V Series= ERJ-6E	Res= 1.1 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm²
17.	Rfbt	Panasonic	ERJ-6ENF9761V Series= ERJ-6E	Res= 9.76 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm²
18.	Rramp	Panasonic	ERJ-6ENF4753V Series= ERJ-6E	Res= 475.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm²
19.	Rsense	Stackpole Electronics Inc	CSR1206FK10L0 Series= ?	Res= 10.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	\$0.11	 1206 11 mm²
20.	Rt	Panasonic	ERJ-6ENF5111V Series= ERJ-6E	Res= 5.11 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm²
21.	Ruv1	Panasonic	ERJ-6ENF3571V Series= ERJ-6E	Res= 3.57 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm²
22.	Ruv2	Panasonic	ERJ-6ENF4322V Series= ERJ-6E	Res= 43.2 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm²
23.	U1	Texas Instruments	LM25116MHX/NOPB	Switcher	1	\$1.70	 MXA20A 71 mm²

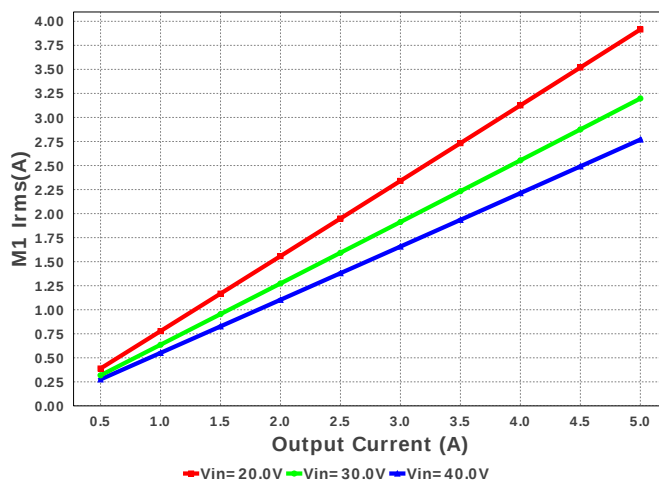




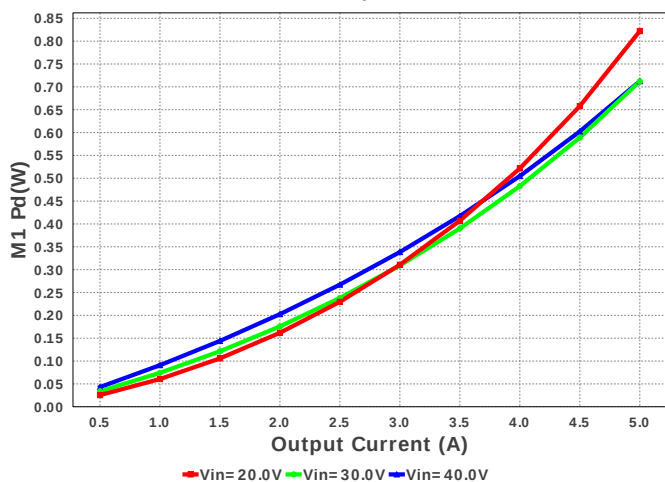
Vout Tolerance



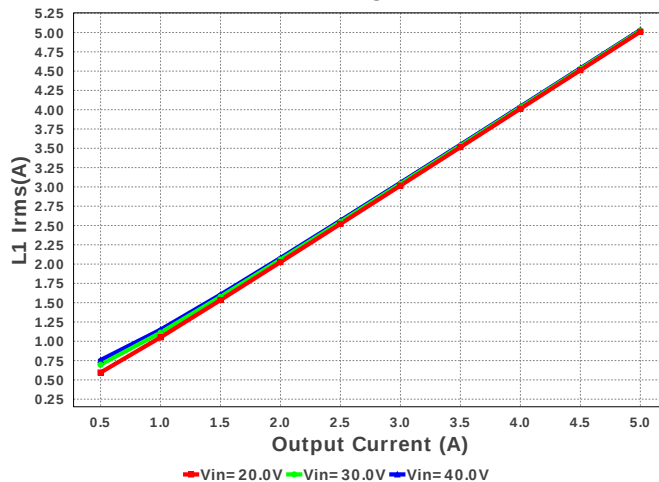
M1 Irms



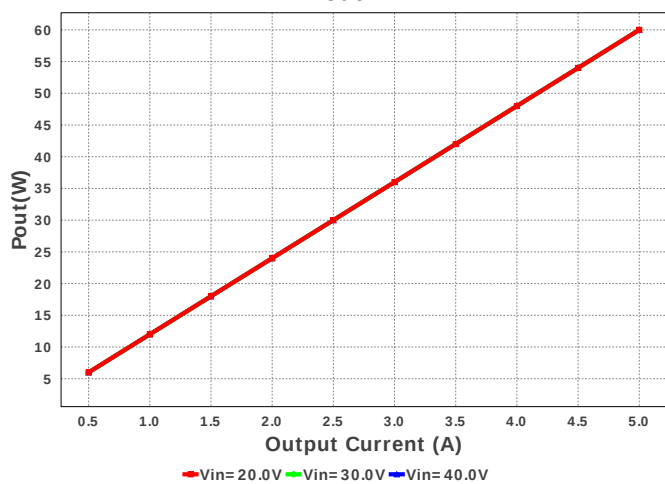
M1 Pd



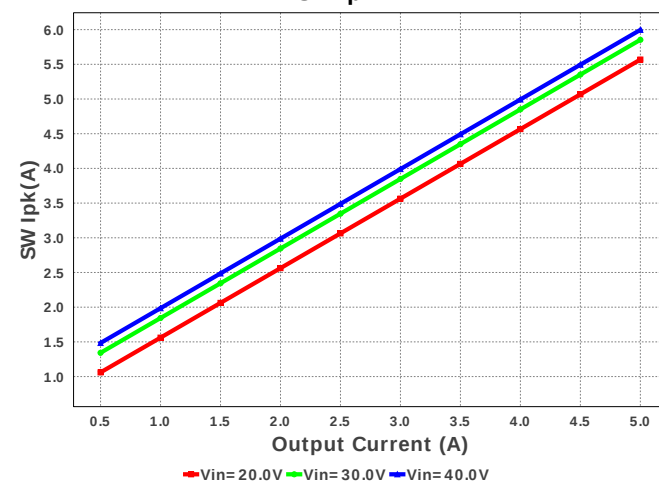
L1 Irms

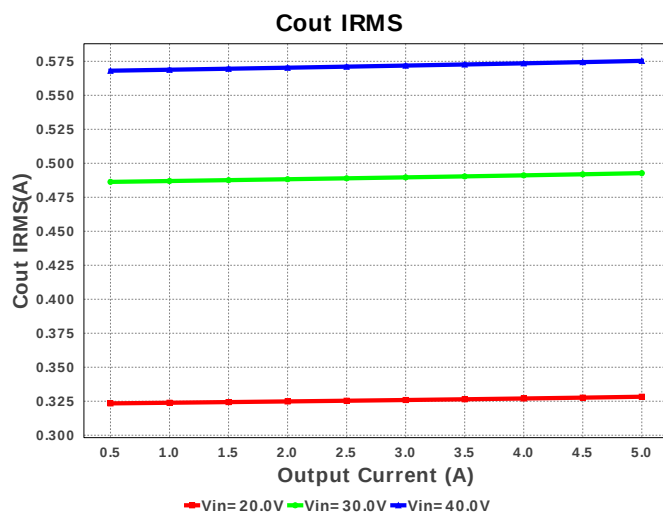
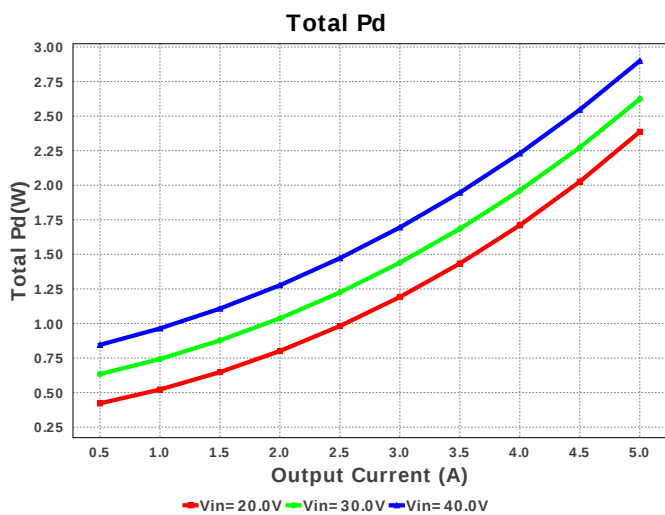
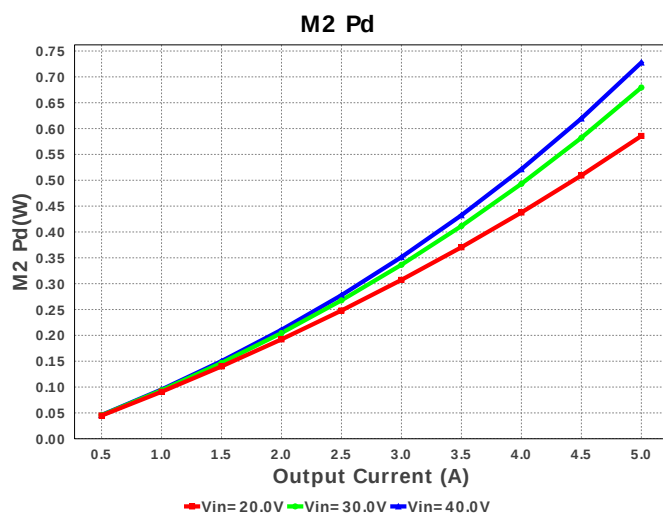
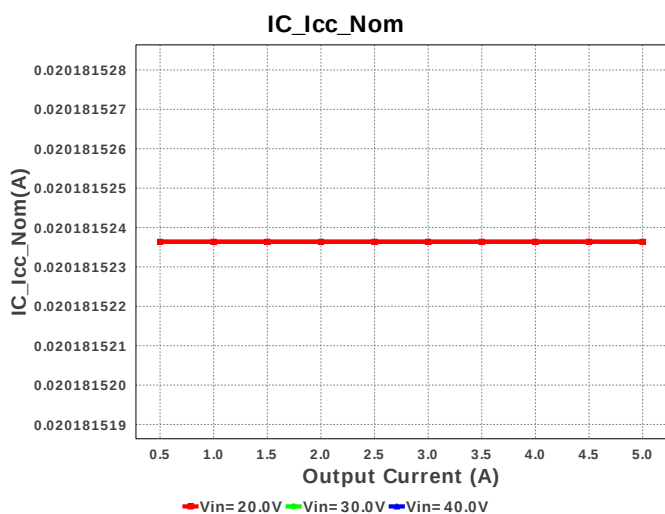
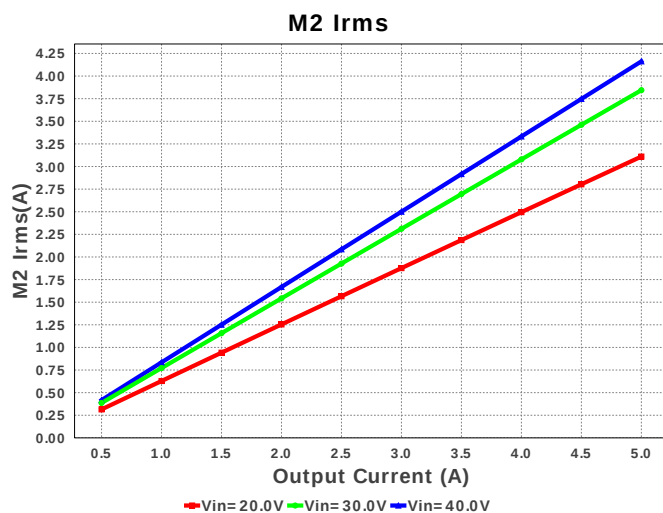
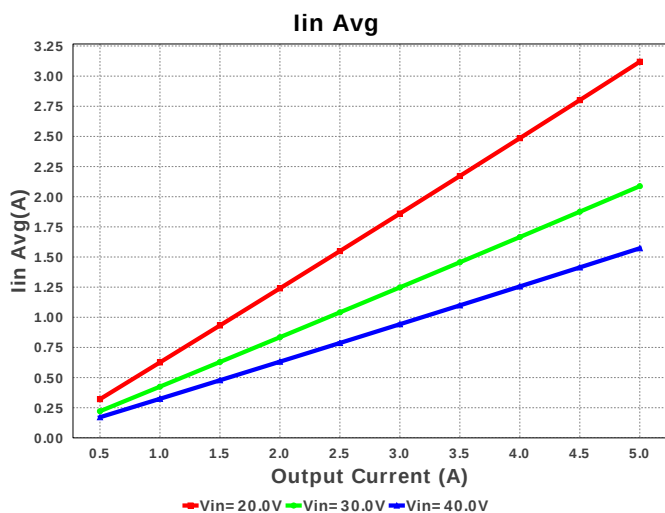


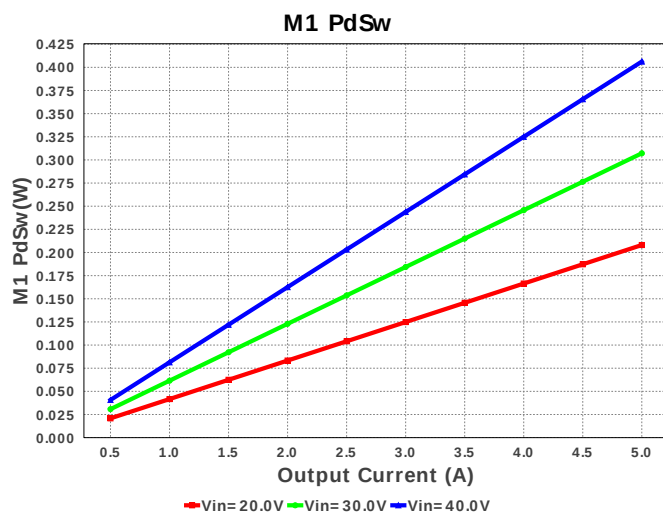
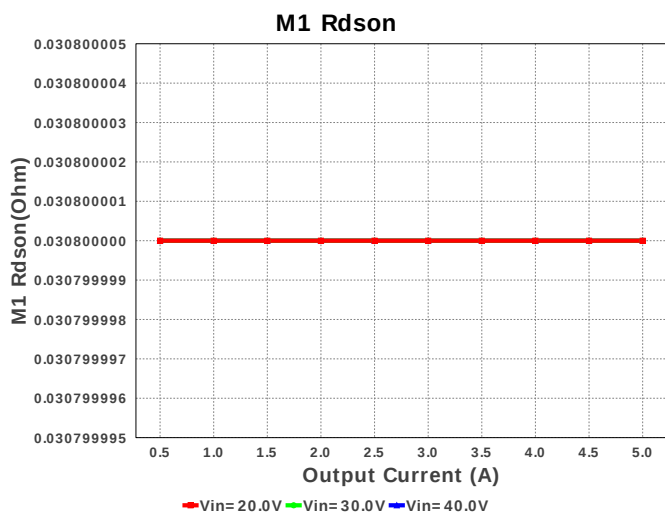
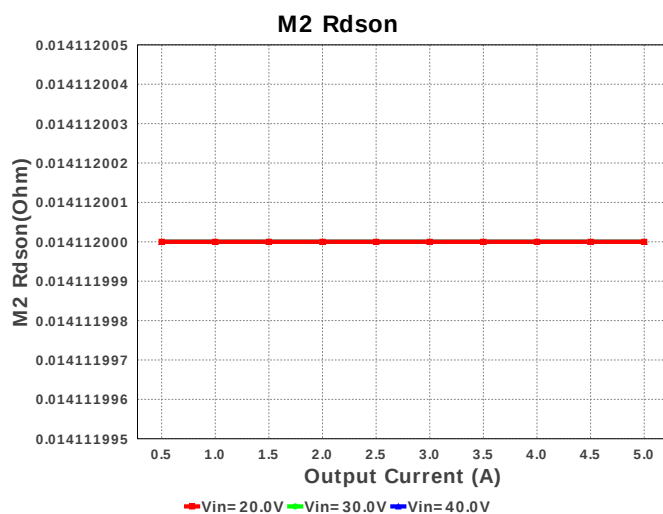
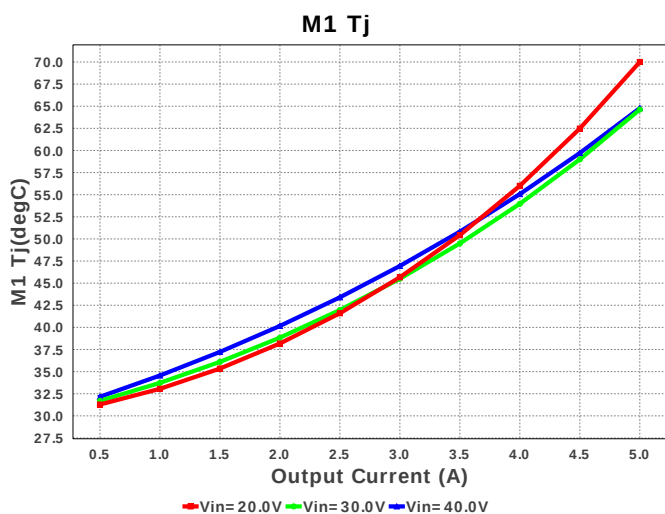
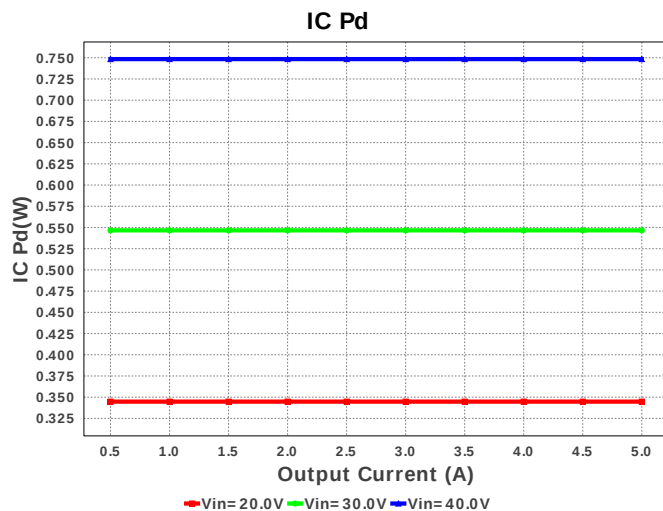
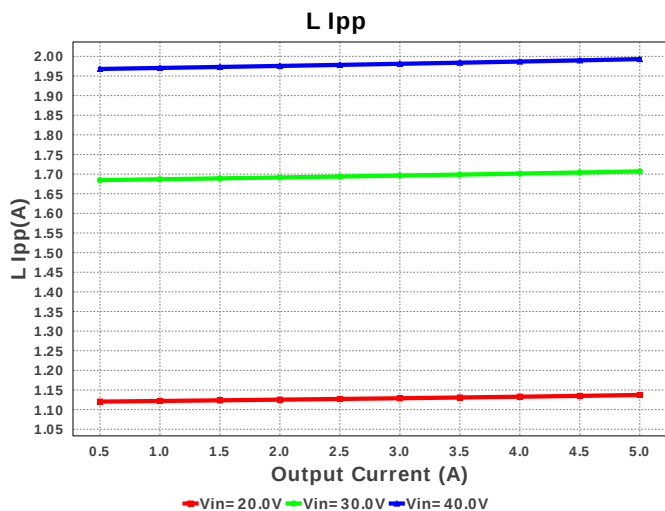
Pout

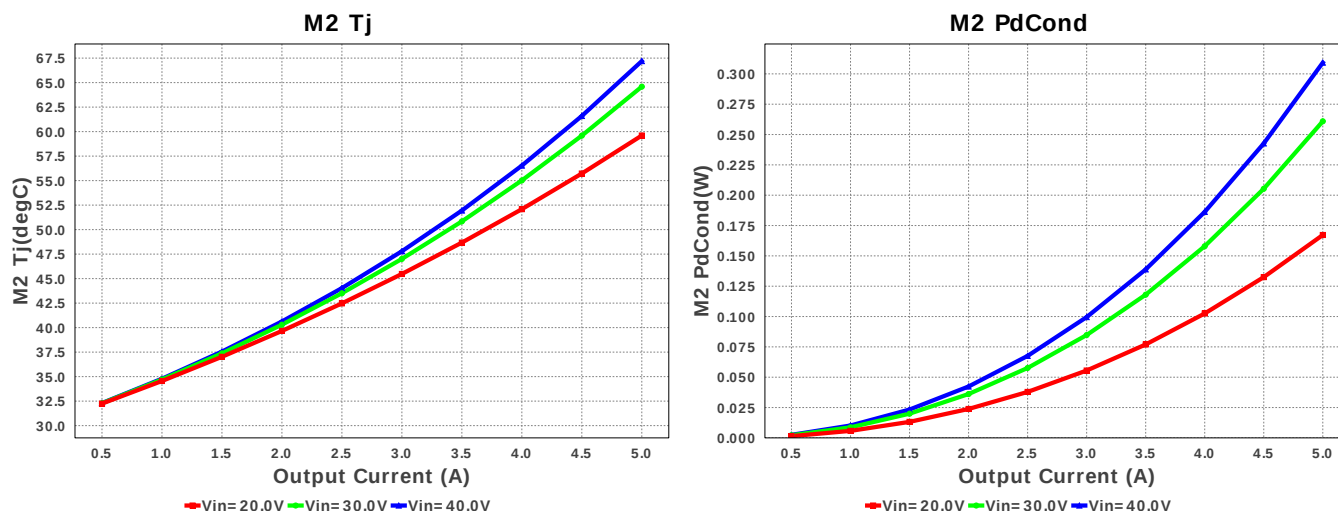


SW Ipk









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	2.306 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	575.333 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	1.572 A	Current	Average input current
4.	L Ipp	1.993 A	Current	Peak-to-peak inductor ripple current
5.	L1 Irms	5.033 A	Current	Inductor ripple current
6.	M1 Irms	2.77 A	Current	MOSFET RMS ripple current
7.	M2 Irms	4.162 A	Current	MOSFET RMS ripple current
8.	SW Ipk	5.997 A	Current	Peak switch current
9.	BOM Count	25	General	Total Design BOM count
10.	FootPrint	573.0 mm ²	General	Total Foot Print Area of BOM components
11.	Frequency	525.973 kHz	General	Switching frequency
12.	IC Tolerance	16.0 mV	General	IC Feedback Tolerance
13.	M1 Rdson	30.8 mOhm	General	Drain-Source On-resistance
14.	M2 Rdson	14.112 mOhm	General	Drain-Source On-resistance
15.	Pout	60.0 W	General	Total output power
16.	Total BOM	\$3.89	General	Total BOM Cost
17.	Low Freq Gain	110.618 dB	Op_Point	Gain at 10Hz
18.	Vout Actual	11.995 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
19.	Cross Freq	87.582 kHz	Op_point	Bode plot crossover frequency
20.	Duty Cycle	30.699 %	Op_point	Duty cycle
21.	Efficiency	95.388 %	Op_point	Steady state efficiency
22.	Gain Marg	-12.165 dB	Op_point	Bode Plot Gain Margin
23.	IC Tj	59.937 degC	Op_point	IC junction temperature
24.	IOUT_OP	5.0 A	Op_point	Iout operating point
25.	M1 Tj	65.109 degC	Op_point	M1 MOSFET junction temperature
26.	M2 Tj	66.951 degC	Op_point	M2 MOSFET junction temperature
27.	Phase Marg	56.858 deg	Op_point	Bode Plot Phase Margin
28.	VIN_OP	40.0 V	Op_point	Vin operating point
29.	Vout p-p	10.078 mV	Op_point	Peak-to-peak output ripple voltage
30.	Cin Pd	5.319 mW	Power	Input capacitor power dissipation
31.	Cout Pd	1.005 mW	Power	Output capacitor power dissipation
32.	IC Pd	748.414 mW	Power	IC power dissipation
33.	L Pd	531.25 mW	Power	Inductor power dissipation
34.	M1 Pd	718.433 mW	Power	M1 MOSFET total power dissipation
35.	M1 PdCond	306.112 mW	Power	M1 MOSFET conduction losses
36.	M1 PdSw	412.321 mW	Power	M1 MOSFET switching losses
37.	M2 Pd	723.272 mW	Power	M2 MOSFET total power dissipation
38.	M2 PdCond	309.164 mW	Power	M2 MOSFET conduction losses
39.	M2 PdSw	414.107 mW	Power	M2 MOSFET switching losses
40.	Rsense Pd	173.252 mW	Power	Rsense Power Dissipation
41.	Total Pd	2.901 W	Power	Total Power Dissipation
42.	IC_licc_Nom	20.182 mA		IC Icc gate driver current
43.	Vout Tolerance	1.67 %		Vout Tolerance based on IC Tolerance and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	5.0	Maximum Output Current
2.	VinMax	40.0	Maximum input voltage
3.	VinMin	20.0	Minimum input voltage
4.	Vout	12.0	Output Voltage

#	Name	Value	Description
5.	base_pn	LM25116	Texas Instruments Base Part Number
6.	source	DC	Input Source Type
7.	ta	30.0	Ambient temperature

Design Assistance

1. LM25116 Product Folder : <http://www.ti.com/product/LM25116> : contains the data sheet and other resources.

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