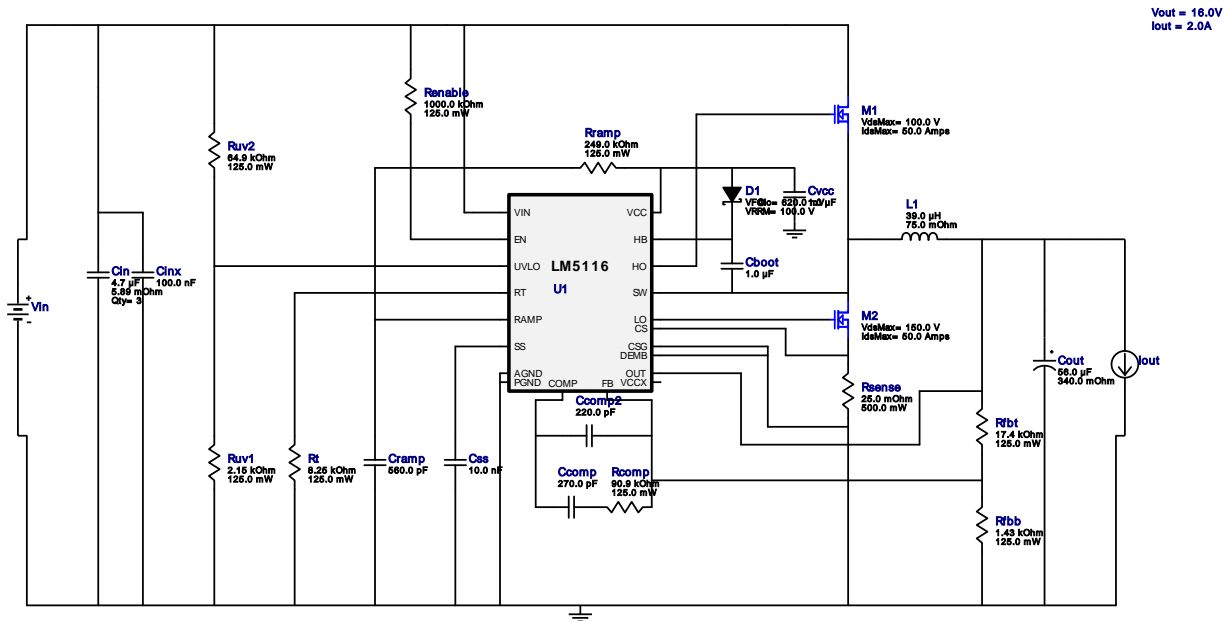











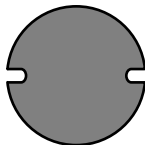












WEBENCH® Design Report

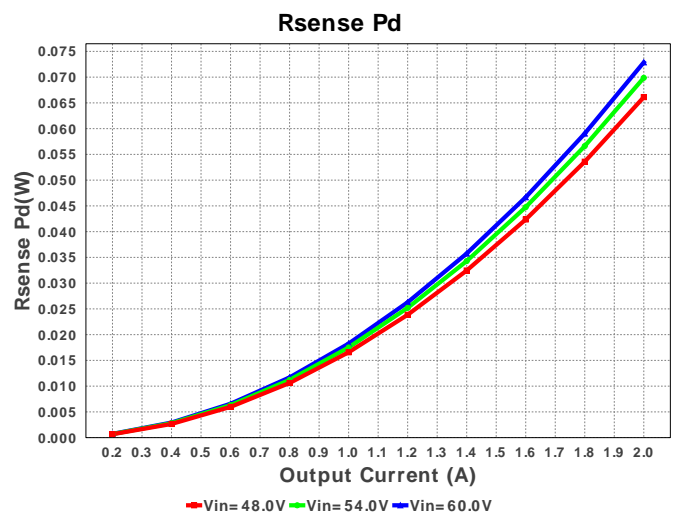
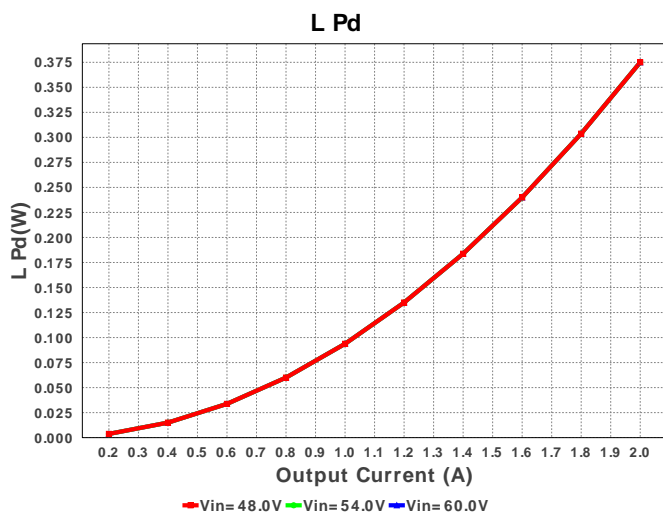
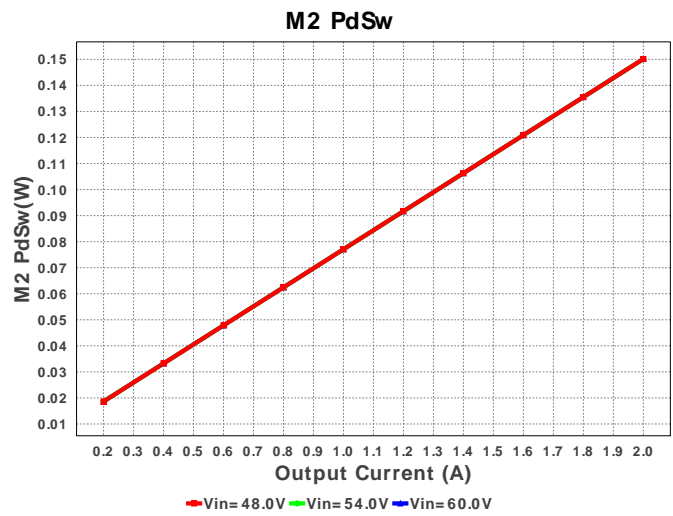
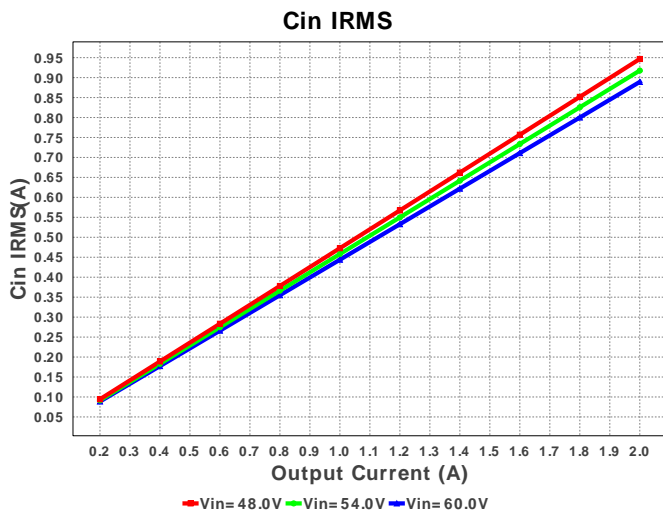
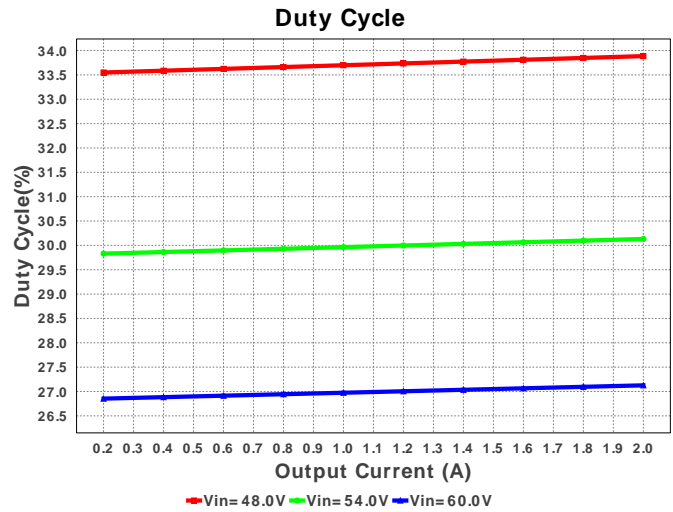
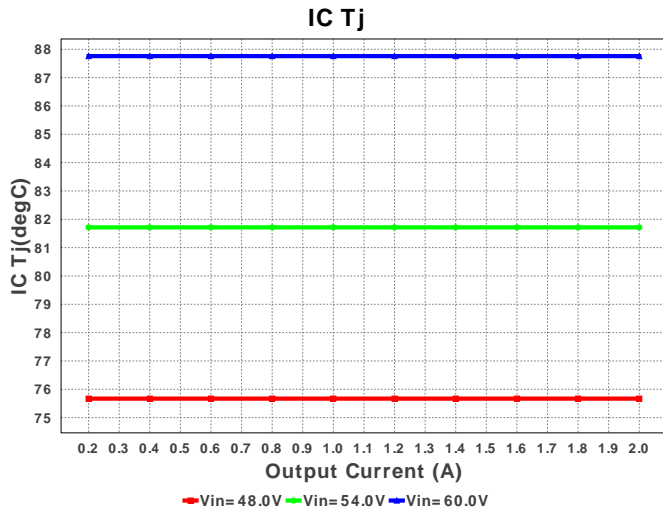
Design : 4466246/58 LM5116MHX/NOPB
LM5116MHX/NOPB 48.0V-60.0V to 16.00V @ 2.0A

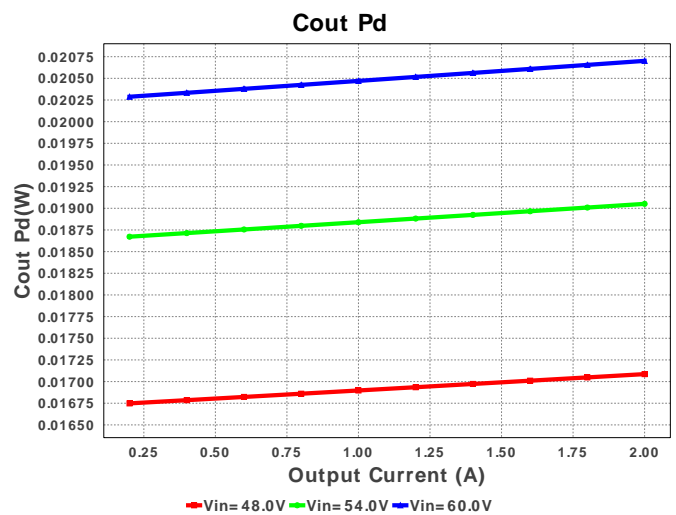
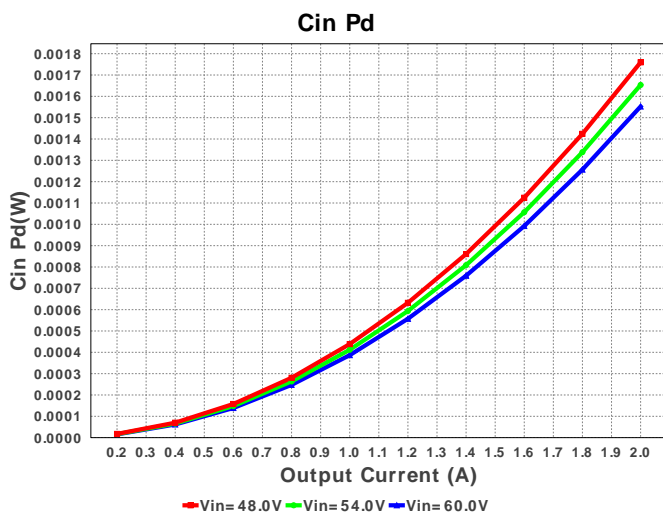
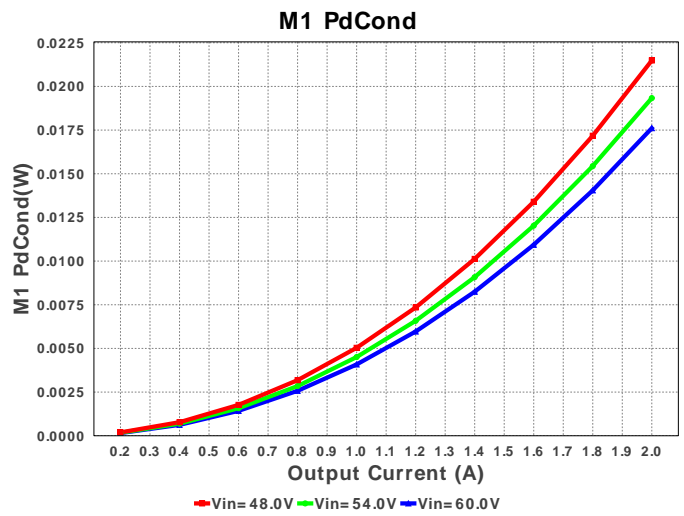
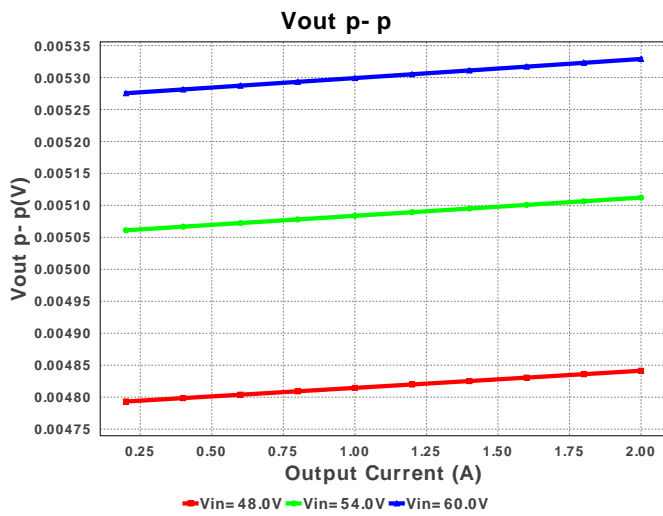
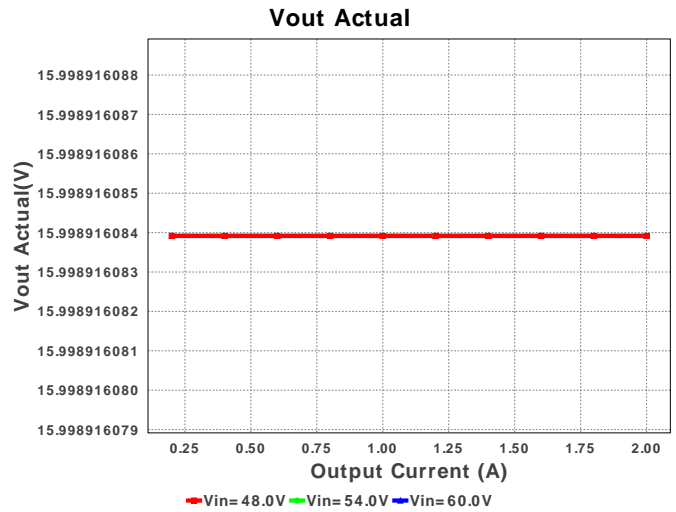
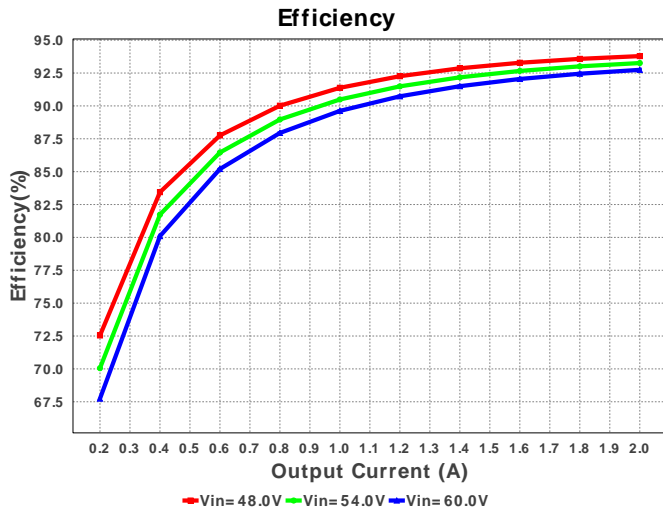


Electrical BOM

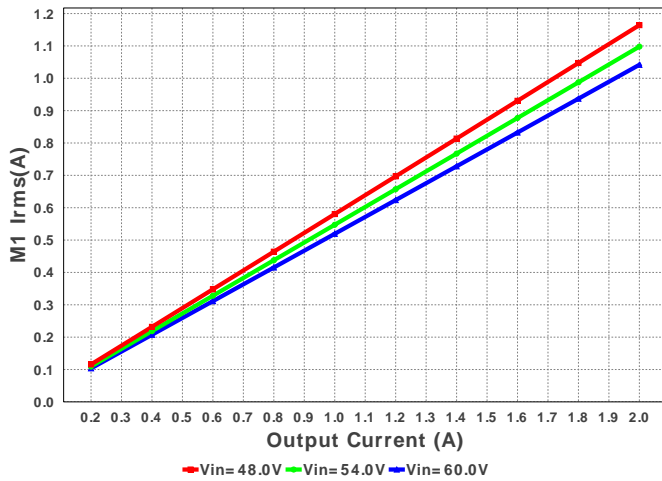
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Taiyo Yuden	EMK212B7105KG-T Series= X7R	Cap= 1.0 uF VDC= 16.0 V IRMS= 0.0 A	1	\$0.02	 0805 7 mm ²
2.	Ccomp	Yageo America	CC0805KRX7R9BB271 Series= X7R	Cap= 270.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²
3.	Ccomp2	Yageo America	CC0805JRNPO9BN221 Series= C0G/NP0	Cap= 220.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²
4.	Cin	TDK	C3225X7S2A475M200AB Series= X7S	Cap= 4.7 uF ESR= 5.89 mOhm VDC= 100.0 V IRMS= 6.7739 A	3	\$0.42	 1210 15 mm ²
5.	Cinx	Taiyo Yuden	HMK212B7104KG-T Series= X7R	Cap= 100.0 nF VDC= 100.0 V IRMS= 0.0 A	1	\$0.03	 0805 7 mm ²
6.	Cout	Nichicon	UUD1V560MCL1GS Series= uD	Cap= 56.0 uF ESR= 340.0 mOhm VDC= 35.0 V IRMS= 280.0 mA	1	\$0.11	 SM_RADIAL_6.3BMM 80 mm ²
7.	Cramp	Yageo America	CC0805KRX7R9BB561 Series= X7R	Cap= 560.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 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 mm ²
10.	D1	Vishay-Semiconductor	SS2PH10-M3	VF@Io= 620.0 mV VRRM= 100.0 V	1	\$0.14	DO-220AA 14 mm ²
11.	L1	Bourns	SDR1307-390KL	L= 39.0 uH DCR= 75.0 mOhm	1	\$0.35	 SDR1307 227 mm ²
12.	M1	Texas Instruments	CSD19534Q5A	VdsMax= 100.0 V IdsMax= 50.0 Amps	1	\$0.68	 TRANS_NexFET_Q5A 55 mm ²
13.	M2	Infineon Technologies	BSC190N15NS3 G	VdsMax= 150.0 V IdsMax= 50.0 Amps	1	\$1.18	 PG-TDSON-8 55 mm ²
14.	Rcomp	Panasonic	ERJ-6ENF9092V Series= ERJ-6E	Res= 90.9 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm ²
15.	Renable	Panasonic	ERJ-6ENF1004V Series= ERJ-6E	Res= 1000.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm ²
16.	Rfbb	Panasonic	ERJ-6ENF1431V Series= ERJ-6E	Res= 1.43 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm ²
17.	Rfbt	Panasonic	ERJ-6ENF1742V Series= ERJ-6E	Res= 17.4 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm ²
18.	Rramp	Panasonic	ERJ-6ENF2493V Series= ERJ-6E	Res= 249.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm ²
19.	Rsense	Stackpole Electronics Inc	CSR1206FK25L0 Series= ?	Res= 25.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	\$0.10	 1206 11 mm ²
20.	Rt	Panasonic	ERJ-6ENF8251V Series= ERJ-6E	Res= 8.25 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm ²
21.	Ruv1	Panasonic	ERJ-6ENF2151V Series= ERJ-6E	Res= 2.15 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm ²
22.	Ruv2	Panasonic	ERJ-6ENF6492V Series= ERJ-6E	Res= 64.9 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm ²
23.	U1	Texas Instruments	LM5116MHX/NOPB	Switcher	1	\$2.42	 MXA20A 71 mm ²

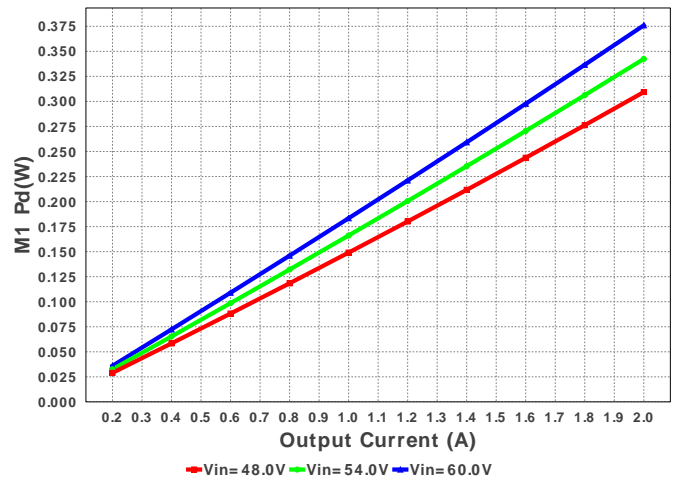




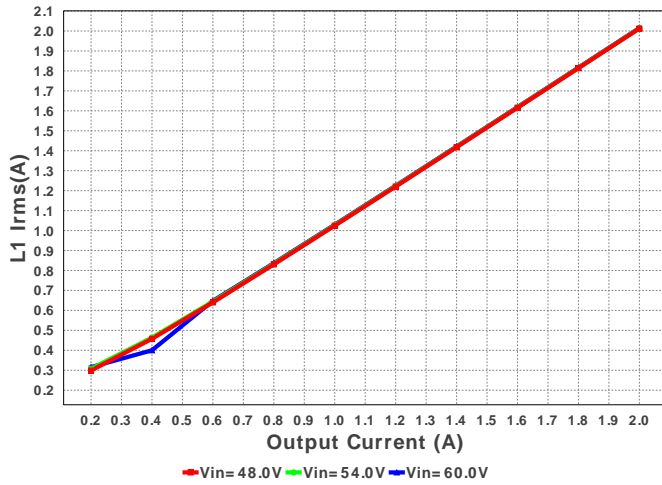
M1 Irms



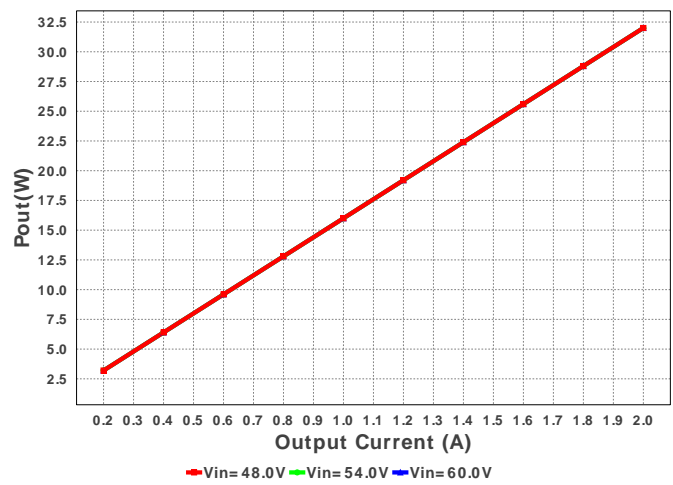
M1 Pd



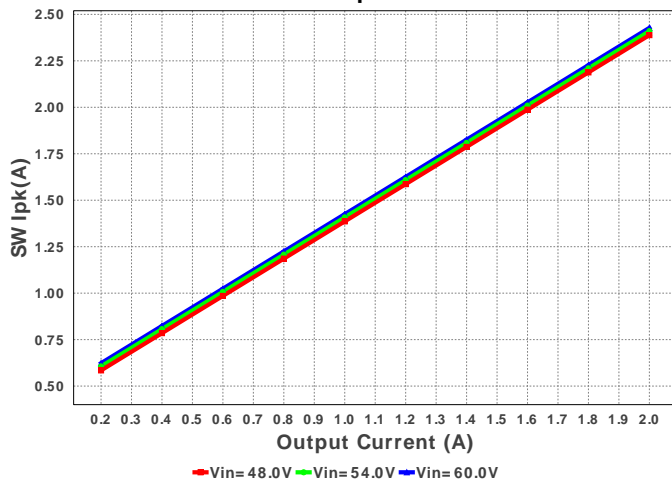
L1 Irms



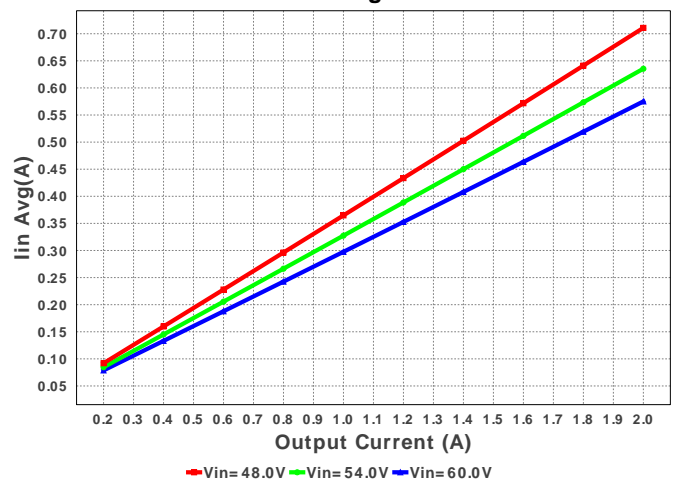
Pout



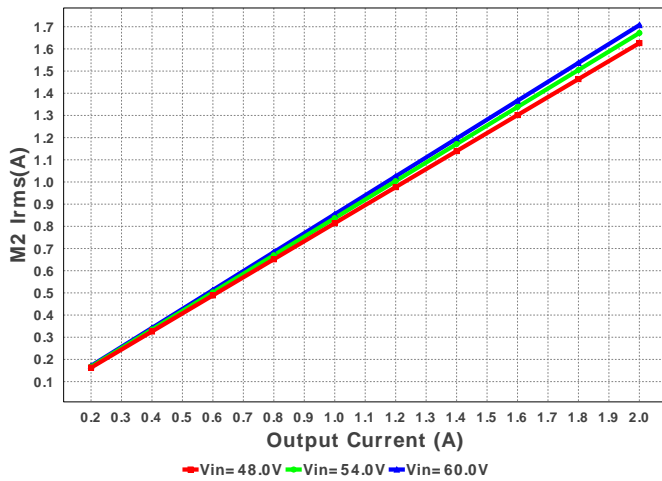
SW Ipk



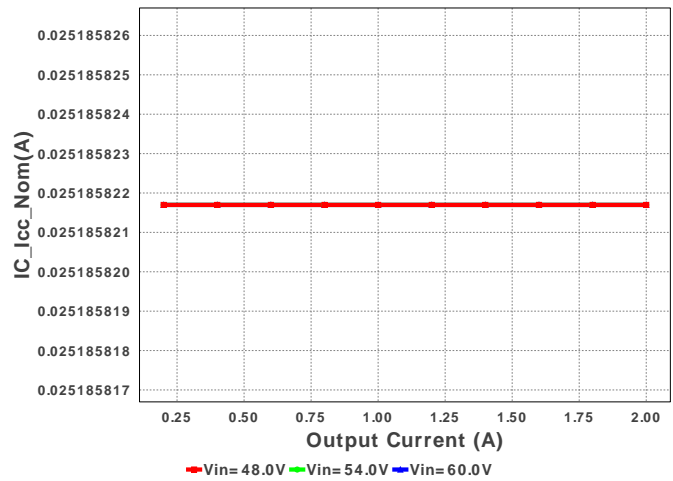
Iin Avg



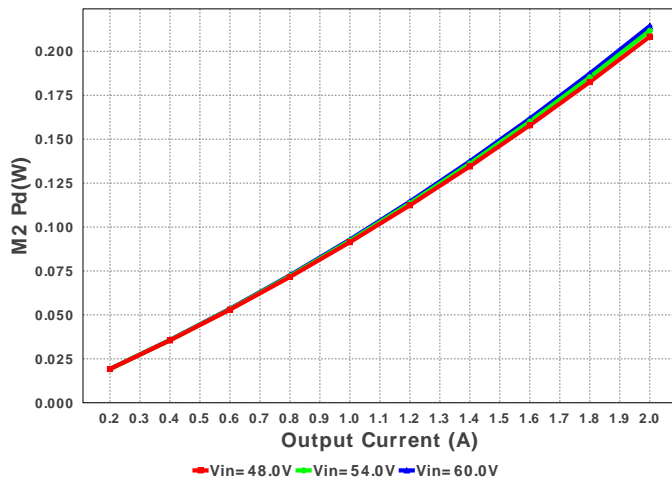
M2 Irms



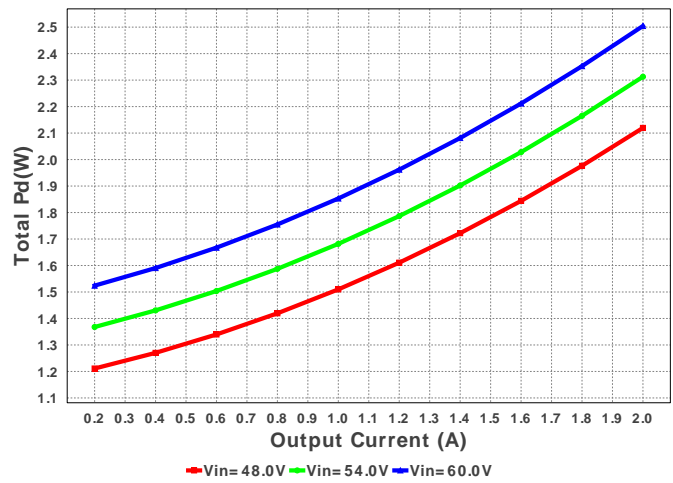
IC_Icc_Nom



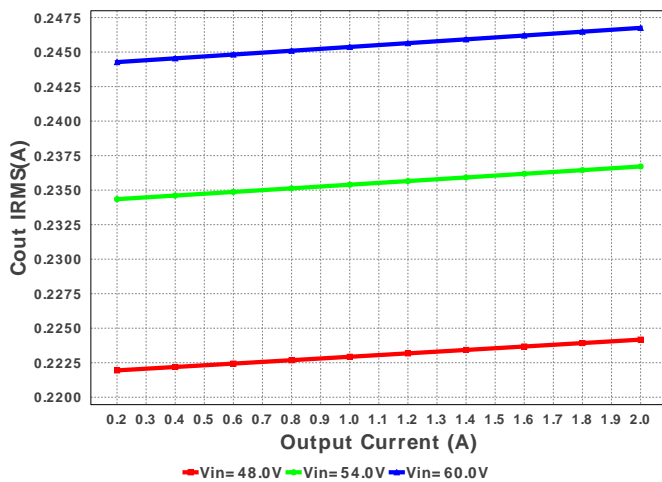
M2 Pd



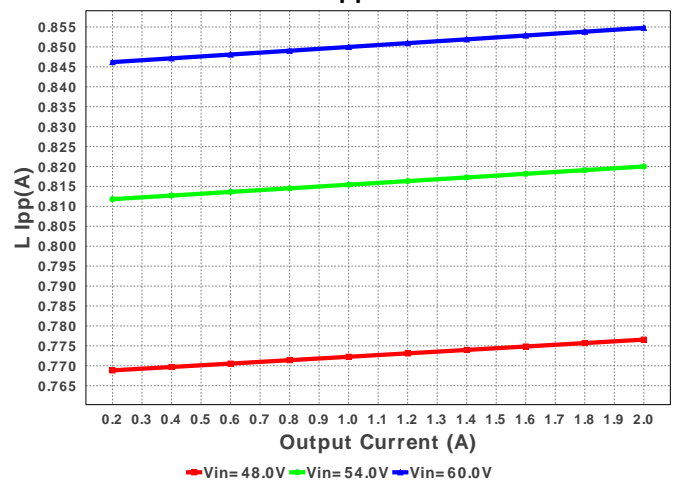
Total Pd

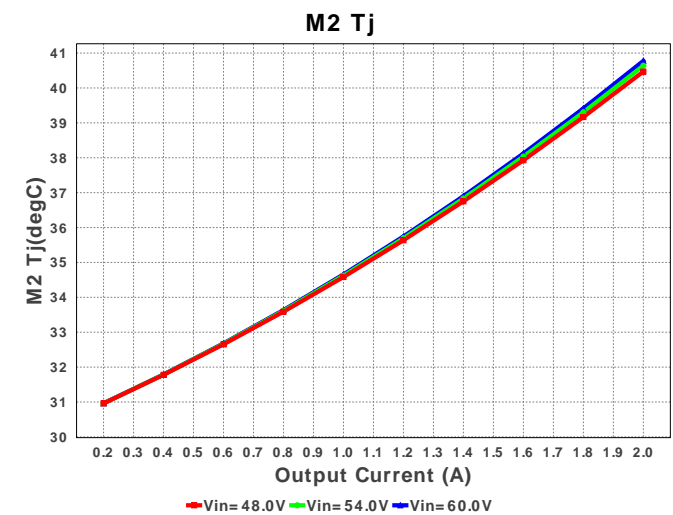
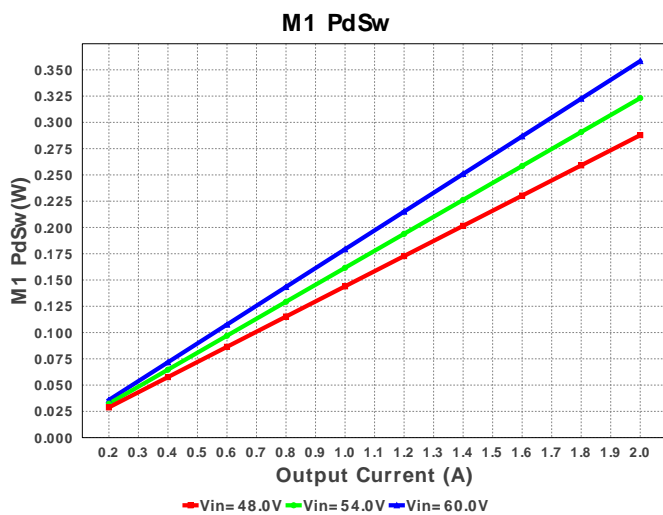
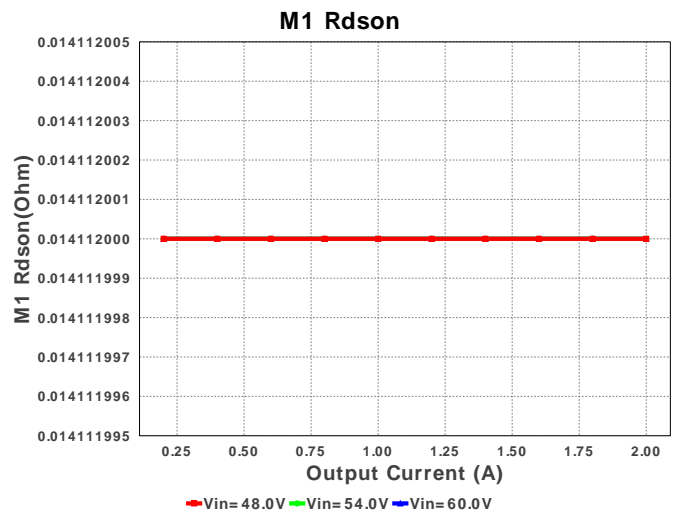
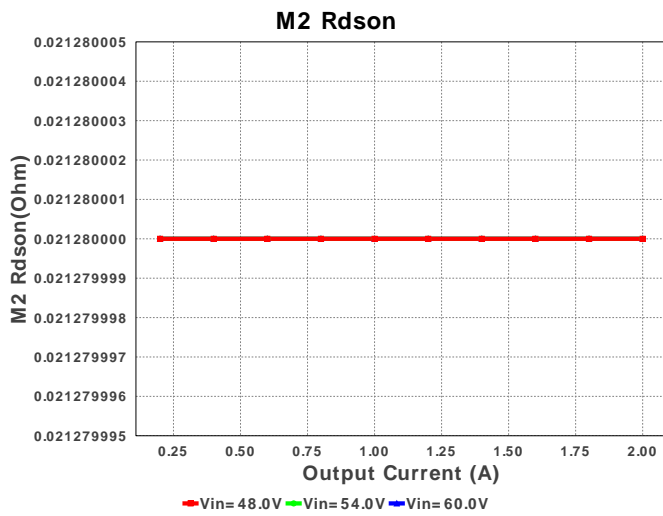
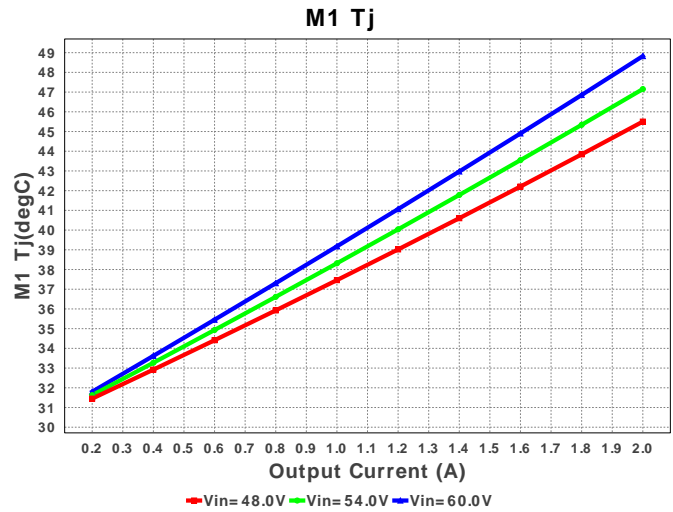
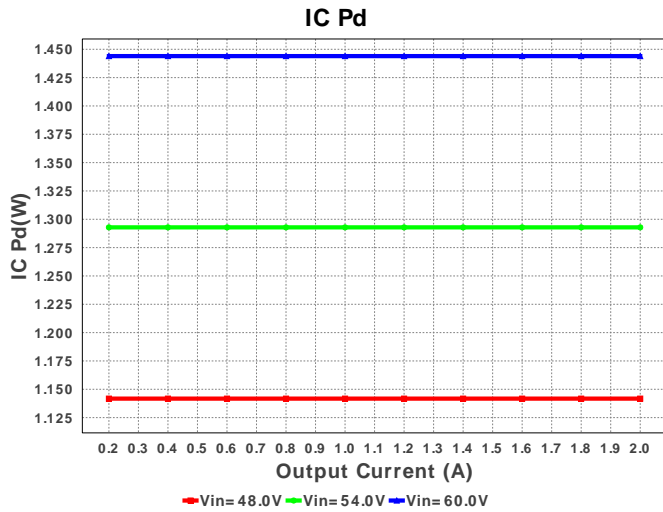


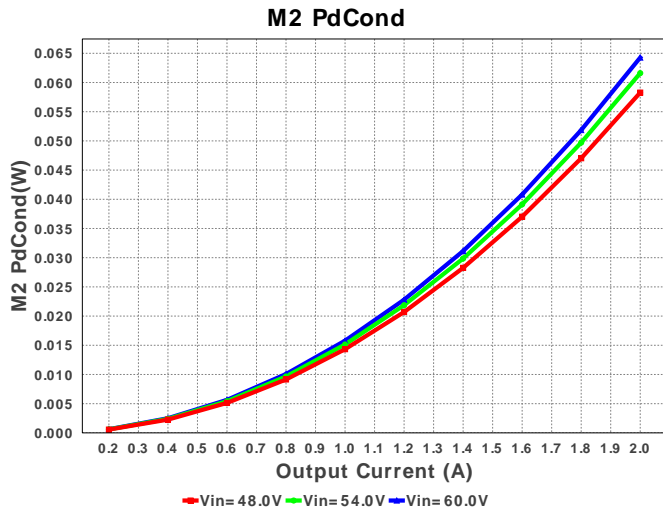
Cout IRMS



L Ipp







Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	889.226 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	246.754 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	575.12 mA	Current	Average input current
4.	L Ipp	854.78 mA	Current	Peak-to-peak inductor ripple current
5.	L1 Irms	2.015 A	Current	Inductor ripple current
6.	M1 Irms	1.042 A	Current	MOSFET RMS ripple current
7.	M2 Irms	1.707 A	Current	MOSFET RMS ripple current
8.	SW Ipk	2.427 A	Current	Peak switch current
9.	BOM Count	25	General	Total Design BOM count
10.	FootPrint	659.0 mm ²	General	Total Foot Print Area of BOM components
11.	Frequency	358.038 kHz	General	Switching frequency
12.	IC Tolerance	16.0 mV	General	IC Feedback Tolerance
13.	M1 Rdson	14.112 mOhm	General	Drain-Source On-resistance
14.	M2 Rdson	21.28 mOhm	General	Drain-Source On-resistance
15.	Pout	32.0 W	General	Total output power
16.	Total BOM	\$6.43	General	Total BOM Cost
17.	Low Freq Gain	110.723 dB	Op_Point	Gain at 10Hz
18.	Vout Actual	15.999 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
19.	Cross Freq	50.803 kHz	Op_point	Bode plot crossover frequency
20.	Duty Cycle	27.127 %	Op_point	Duty cycle
21.	Efficiency	92.734 %	Op_point	Steady state efficiency
22.	Gain Marg	-14.883 dB	Op_point	Bode Plot Gain Margin
23.	IC Tj	87.759 degC	Op_point	IC junction temperature
24.	IOUT_OP	2.0 A	Op_point	Iout operating point
25.	M1 Tj	49.258 degC	Op_point	M1 MOSFET junction temperature
26.	M2 Tj	40.484 degC	Op_point	M2 MOSFET junction temperature
27.	Phase Marg	63.587 deg	Op_point	Bode Plot Phase Margin
28.	VIN_OP	60.0 V	Op_point	Vin operating point
29.	Vout p-p	5.329 mV	Op_point	Peak-to-peak output ripple voltage
30.	Cin Pd	1.552 mW	Power	Input capacitor power dissipation
31.	Cout Pd	20.702 mW	Power	Output capacitor power dissipation
32.	IC Pd	1.444 W	Power	IC power dissipation
33.	L Pd	375.0 mW	Power	Inductor power dissipation
34.	M1 Pd	384.564 mW	Power	M1 MOSFET total power dissipation
35.	M1 PdCond	17.622 mW	Power	M1 MOSFET conduction losses
36.	M1 PdSw	366.942 mW	Power	M1 MOSFET switching losses
37.	M2 Pd	208.629 mW	Power	M2 MOSFET total power dissipation
38.	M2 PdCond	64.278 mW	Power	M2 MOSFET conduction losses
39.	M2 PdSw	144.351 mW	Power	M2 MOSFET switching losses
40.	Rsense Pd	72.873 mW	Power	LED Current Rsns Power Dissipation
41.	Total Pd	2.507 W	Power	Total Power Dissipation
42.	IC Icc Nom	25.186 mA		IC Icc gate driver current
43.	Vout Tolerance	3.208 %		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	60.0	Maximum input voltage
3.	VinMin	48.0	Minimum input voltage
4.	Vout	16.0	Output Voltage

#	Name	Value	Description
5.	base_pn	LM5116	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

1. **LM5116** Product Folder : <http://www.ti.com/product/LM5116> : contains the data sheet and other resources.

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