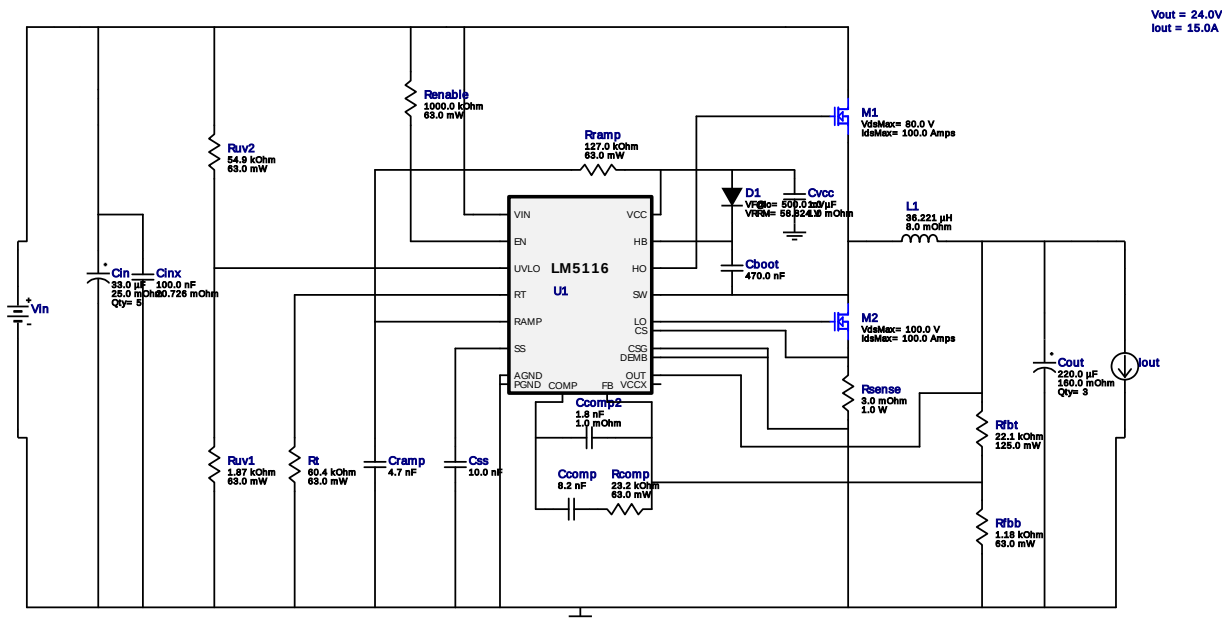


WEBENCH® Design Report

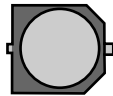
Design : LM5116MHX/NOPB
LM5116MHX/NOPB 46.0V-50.0V to 24.00V @ 15.0A



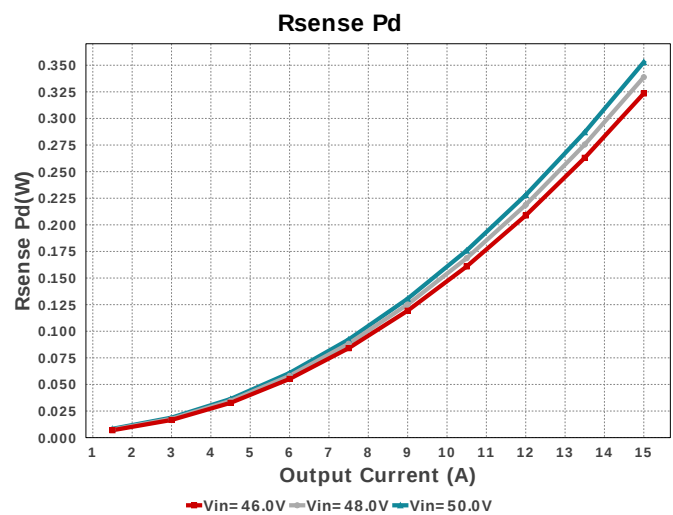
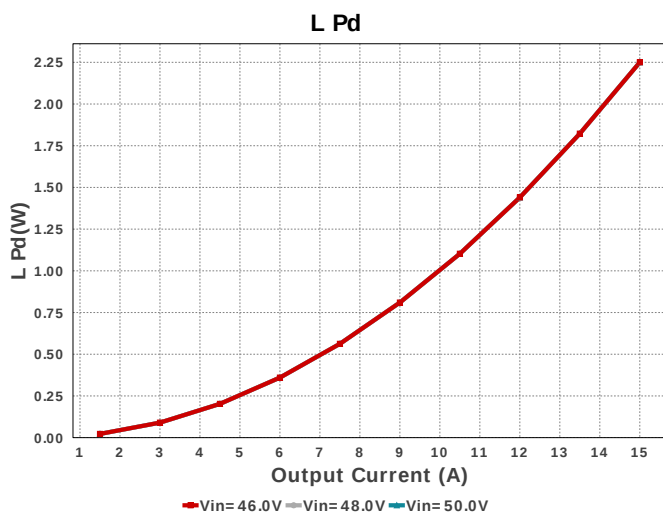
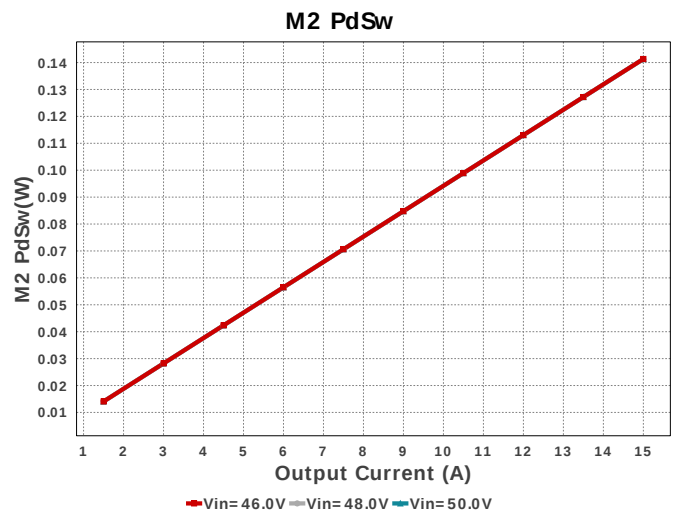
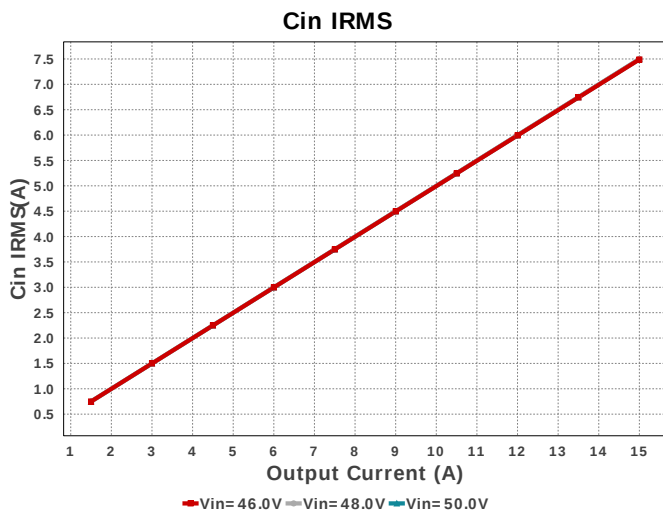
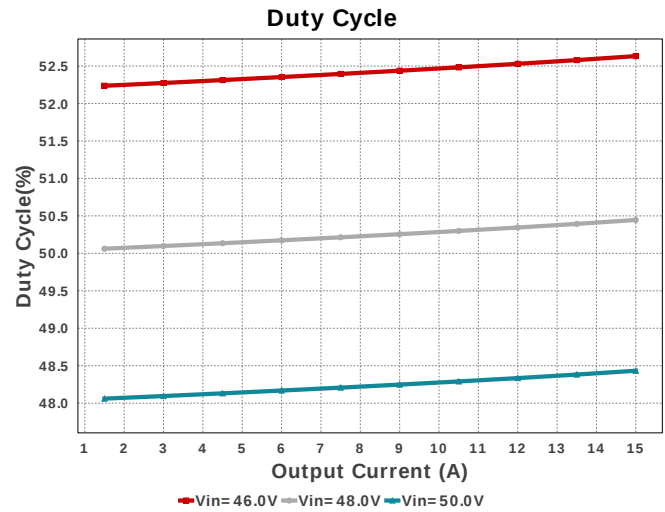
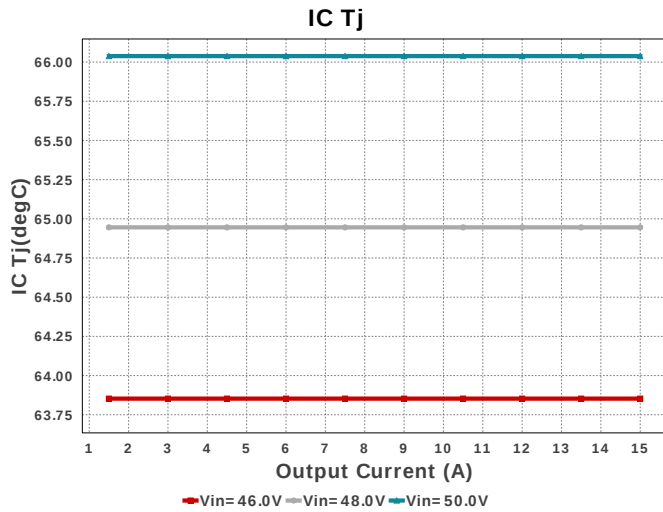
My Comments

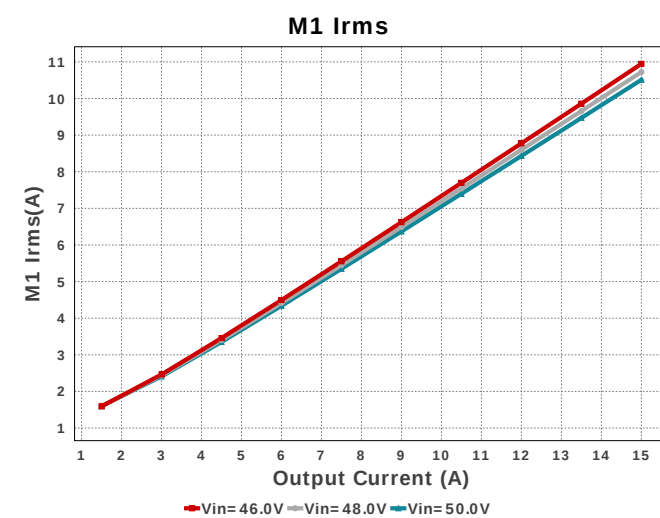
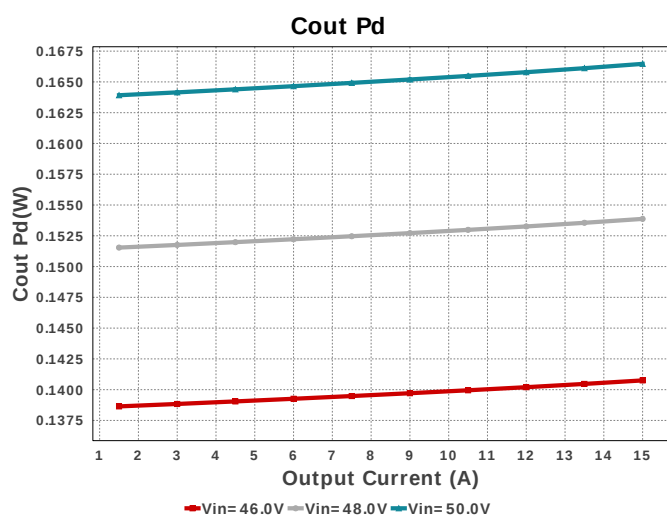
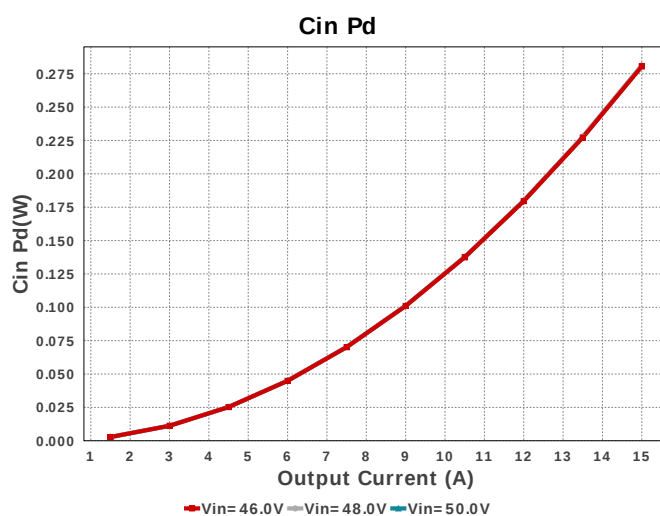
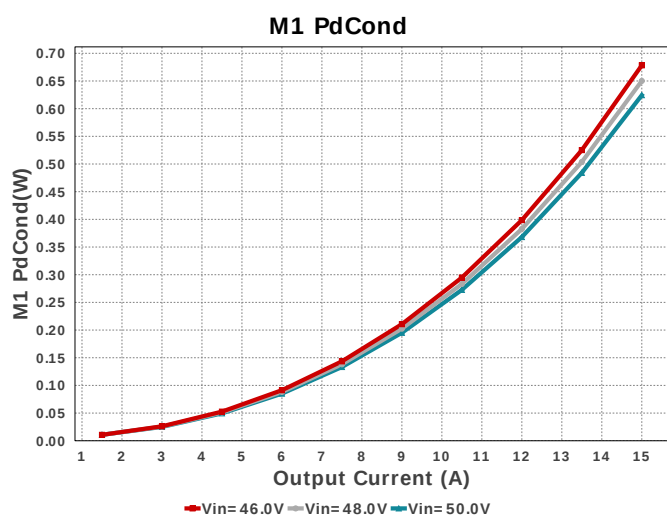
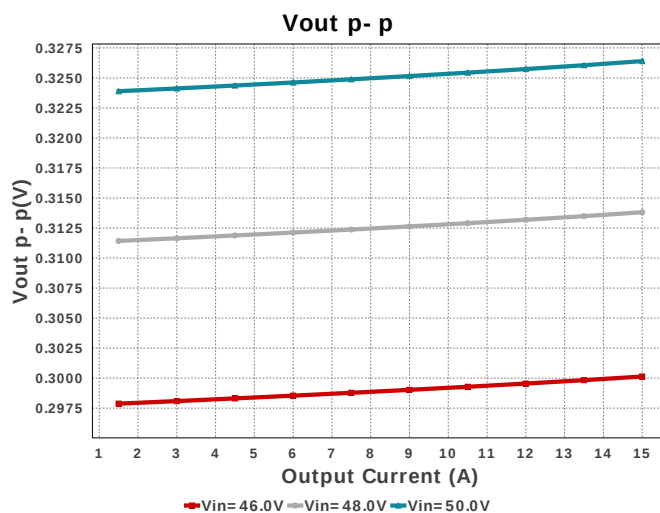
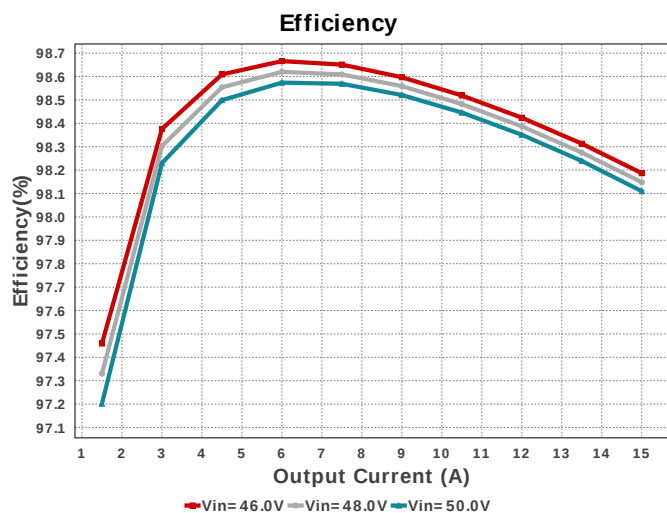
LM5116 - Ta 40DegC

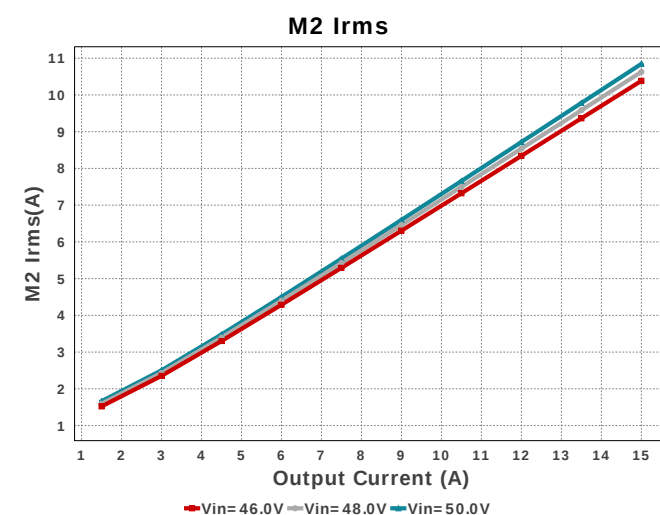
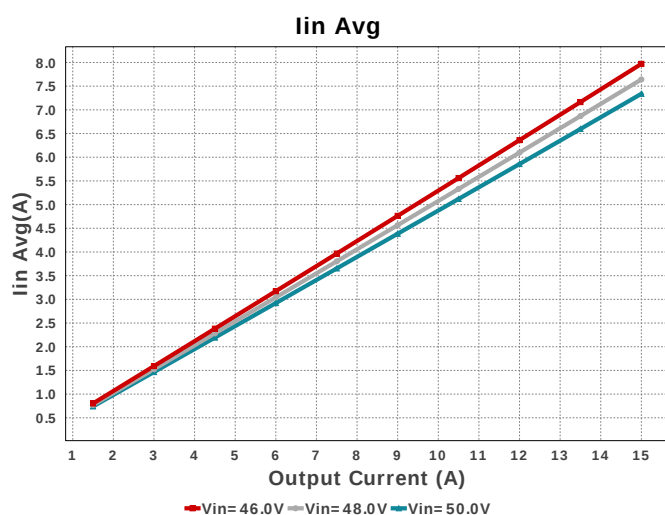
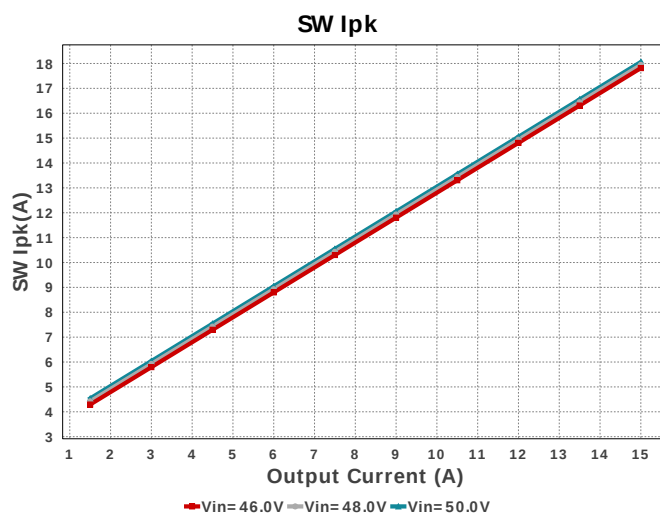
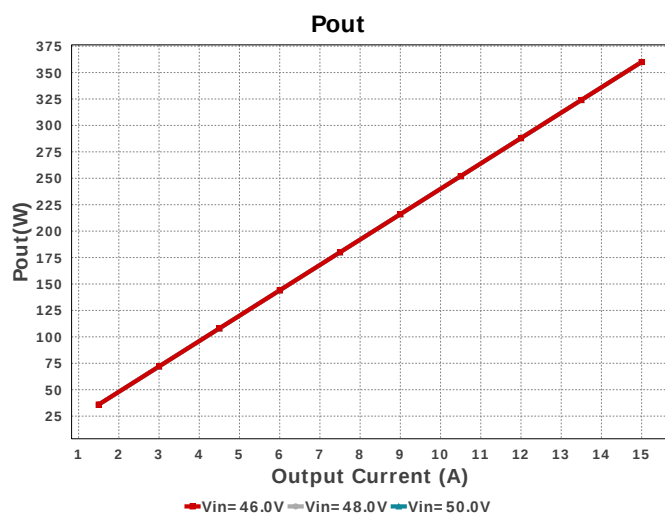
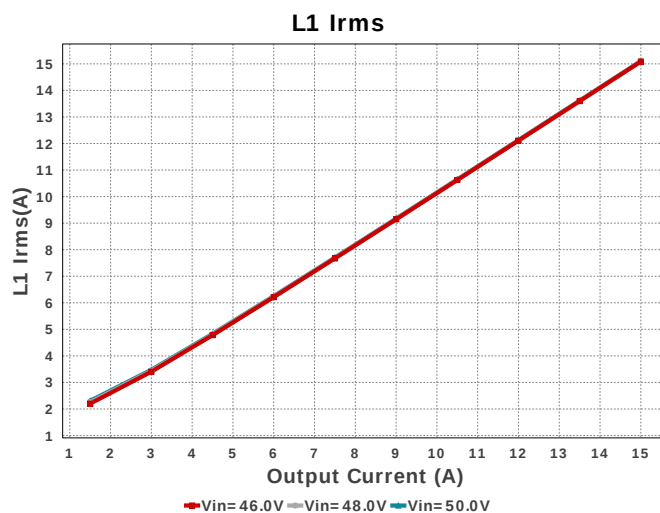
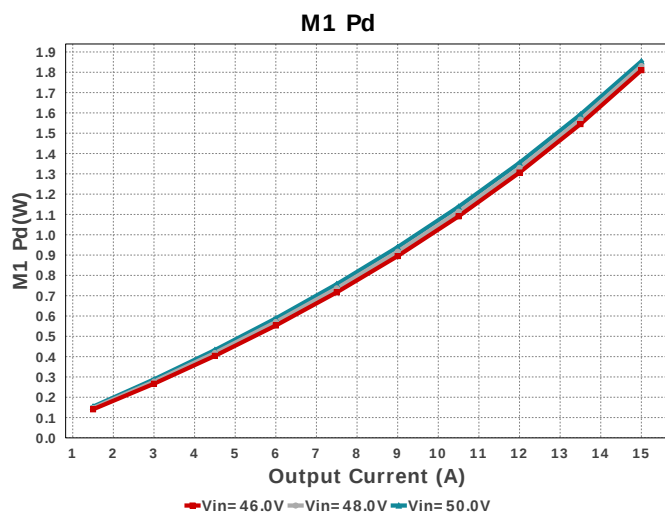
Electrical BOM

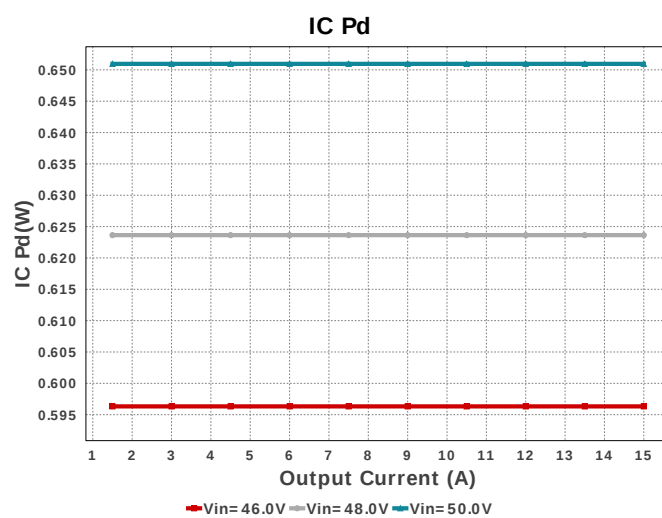
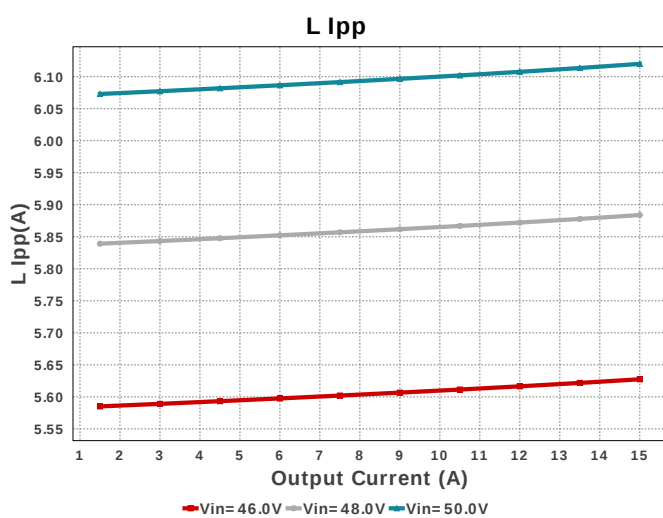
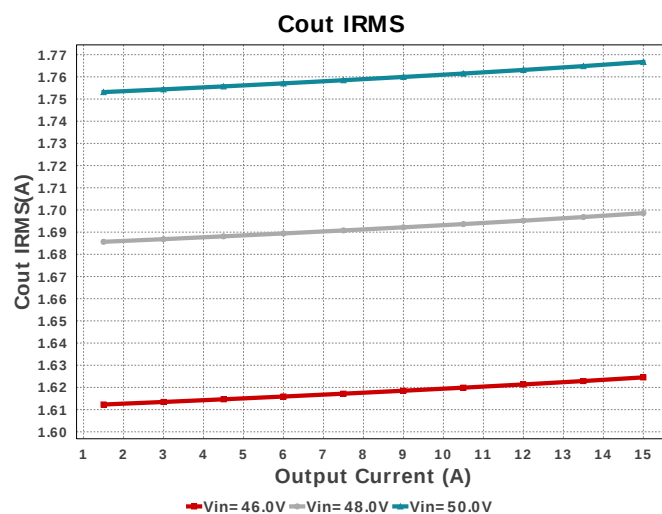
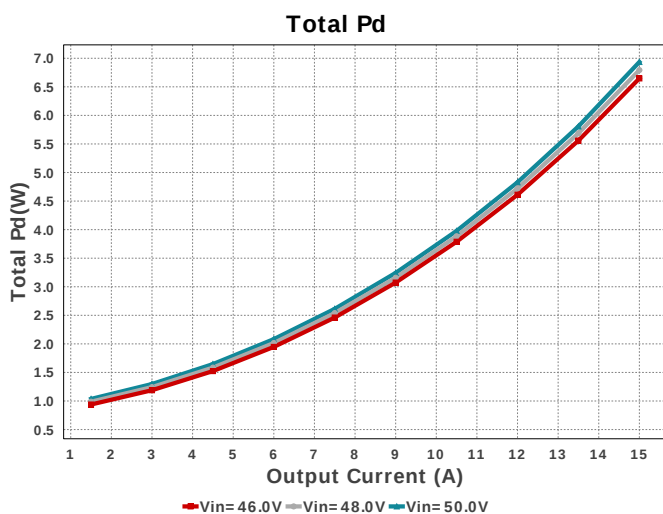
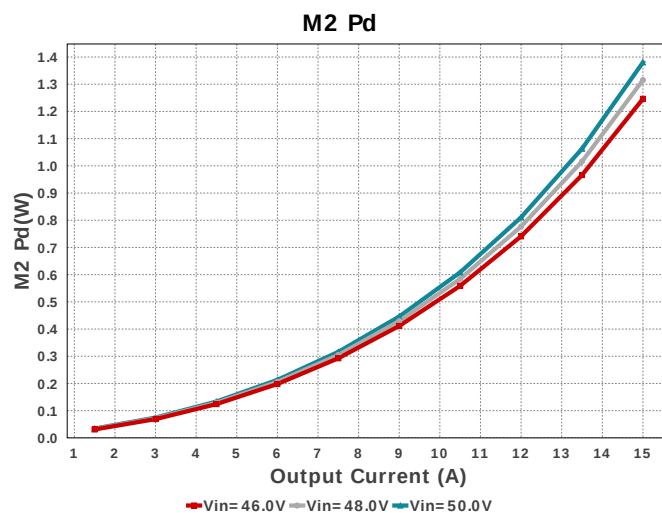
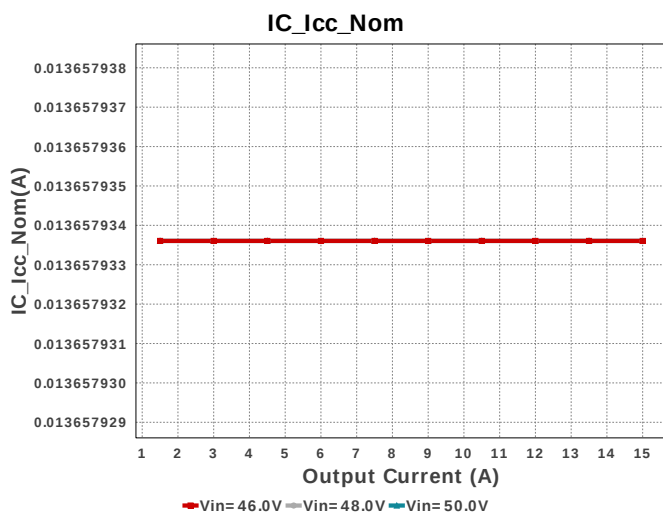
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1.	Cboot	Panasonic	ECPU1C474MA5 Series= ECPU(A)	Cap= 470.0 nF VDC= 16.0 V IRMS= 0.0 A	1	\$0.20	 1206 11 mm ²
2.	Ccomp	Samsung Electro-Mechanics	CL21C822JBFNNE Series= C0G/NP0	Cap= 8.2 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.02	 0805 7 mm ²
3.	Ccomp2	MuRata	GRM216R71E182KA01D Series= X7R	Cap= 1.8 nF ESR= 1.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.02	 0805 7 mm ²
4.	Cin	Panasonic	63SXV33M Series= SXV	Cap= 33.0 uF ESR= 25.0 mOhm VDC= 63.0 V IRMS= 2.95 A	5	\$1.24	 CAPSMT_62_E12 106 mm ²
5.	Cinx	TDK	C2012X5R2A104K125AA Series= X5R	Cap= 100.0 nF ESR= 20.726 mOhm VDC= 100.0 V IRMS= 1.456 A	1	\$0.04	 0805 7 mm ²
6.	Cout	Panasonic	EEE-FK1V221P Series= FK	Cap= 220.0 uF ESR= 160.0 mOhm VDC= 35.0 V IRMS= 600.0 mA	3	\$0.22	 SM_RADIAL_F 124 mm ²
7.	Cramp	TDK	C2012C0G1H472K060AA Series= C0G/NP0	Cap= 4.7 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.04	 0805 7 mm ²

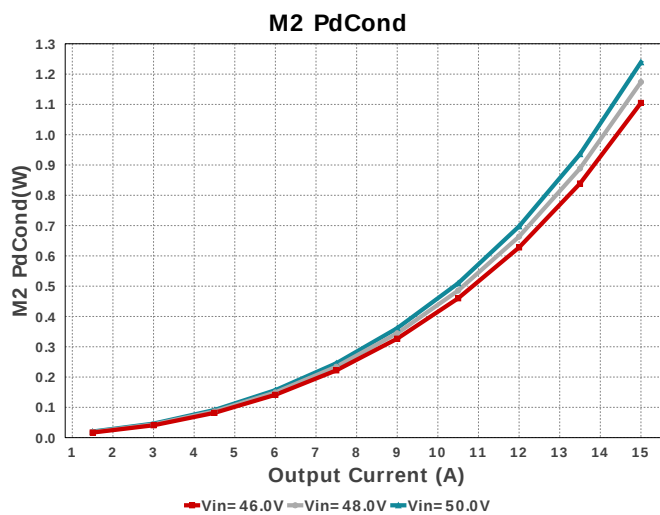
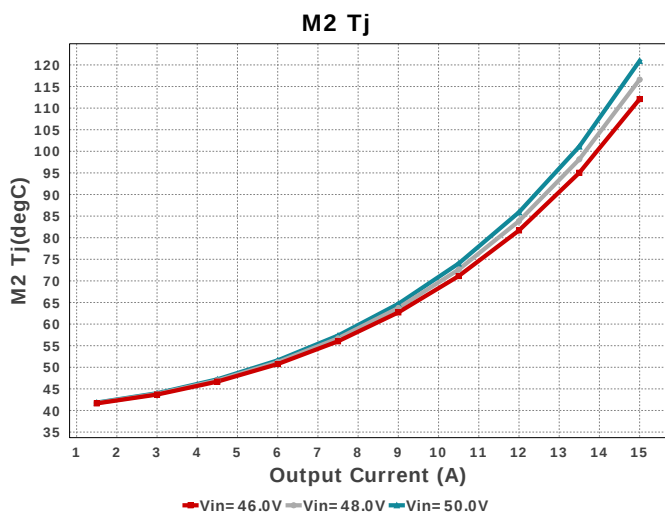
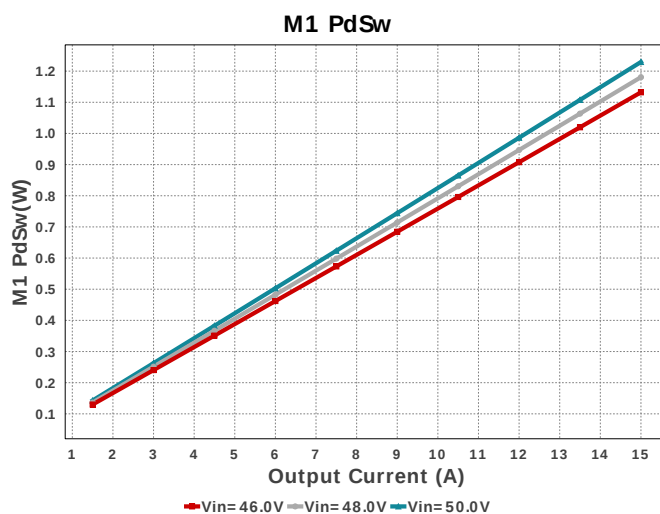
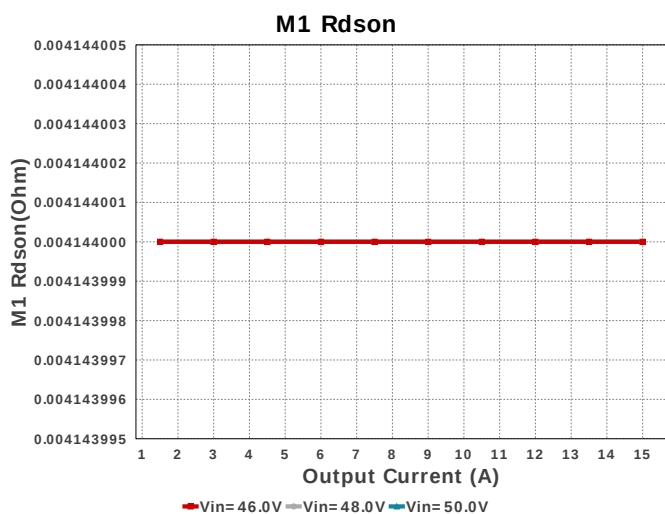
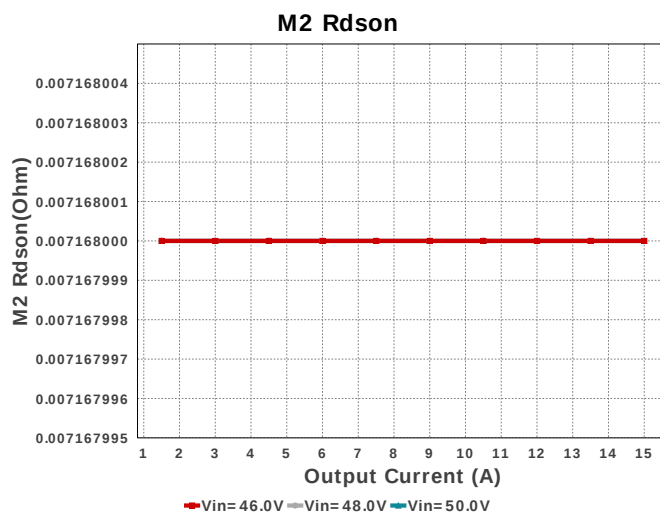
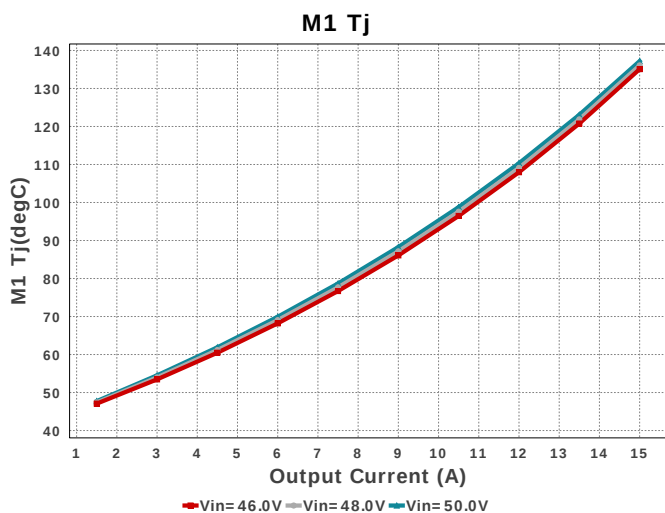
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
8.	Css	TDK	CGA4C2C0G1H103J060AA Series= C0G/NP0	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.07	 0805 7 mm ²
9.	Cvcc	Taiyo Yuden	TMK212BJ105KG-T Series= X5R	Cap= 1.0 uF ESR= 1.0 mOhm VDC= 20.0 V IRMS= 0.0 A	1	\$0.03	 0805 7 mm ²
10.	D1	CUSTOM	CUSTOM	VF@Io= 500.0 mV VRRM= 58.824 V	1	NA	CUSTOM 0 mm ²
11.	L1	CUSTOM	CUSTOM	L= 36.221 uH DCR= 8.0 mOhm	1	NA	CUSTOM 0 mm ²
12.	M1	Infineon Technologies	BSC037N08NS5ATMA1	VdsMax= 80.0 V IdsMax= 100.0 Amps	1	\$1.19	 PG-TDSON-8 55 mm ²
13.	M2	Texas Instruments	CSD19531Q5A	VdsMax= 100.0 V IdsMax= 100.0 Amps	1	\$0.60	 TRANS_NexFET_Q5A 55 mm ²
14.	Rcomp	Vishay-Dale	CRCW040223K2FKED Series= CRCW..e3	Res= 23.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
15.	Renable	Vishay-Dale	CRCW04021M00FKED Series= CRCW..e3	Res= 1000.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
16.	Rfbb	Vishay-Dale	CRCW04021K18FKED Series= CRCW..e3	Res= 1.18 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
17.	Rfbt	Vishay-Dale	CRCW080522K1FKEA Series= CRCW..e3	Res= 22.1 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm ²
18.	Rramp	Vishay-Dale	CRCW0402127KFKED Series= CRCW..e3	Res= 127.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
19.	Rsense	Stackpole Electronics Inc	CSNL1206FT3L00 Series= CSNL	Res= 3.0 mOhm Power= 1.0 W Tolerance= 1.0%	1	\$0.20	 1206 11 mm ²
20.	Rt	Vishay-Dale	CRCW040260K4FKED Series= CRCW..e3	Res= 60.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
21.	Ruv1	Vishay-Dale	CRCW04021K87FKED Series= CRCW..e3	Res= 1.87 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
22.	Ruv2	Vishay-Dale	CRCW040254K9FKED Series= CRCW..e3	Res= 54.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
23.	U1	Texas Instruments	LM5116MHX/NOPB	Switcher	1	\$2.42	 MXA20A 71 mm ²

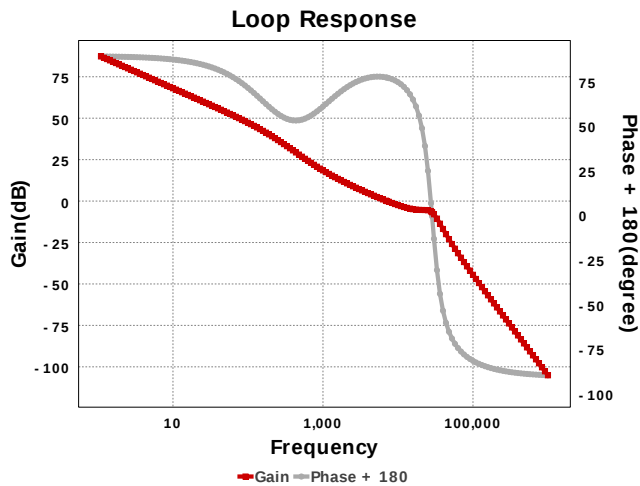












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	7.496 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	1.767 A	Current	Output capacitor RMS ripple current
3.	Iin Avg	7.339 A	Current	Average input current
4.	L Ipp	6.12 A	Current	Peak-to-peak inductor ripple current
5.	L1 Irms	15.104 A	Current	Inductor ripple current
6.	M1 Irms	10.511 A	Current	MOSFET RMS ripple current
7.	M2 Irms	10.846 A	Current	MOSFET RMS ripple current
8.	SW Ipk	18.06 A	Current	Peak switch current
9.	BOM Count	29	General	Total Design BOM count
10.	FootPrint	2.073 k mm ²	General	Total Foot Print Area of BOM components
11.	Frequency	56.807 kHz	General	Switching frequency
12.	IC Tolerance	16.0 mV	General	IC Feedback Tolerance
13.	M1 Rdson	4.144 mOhm	General	Drain-Source On-resistance
14.	M2 Rdson	7.168 mOhm	General	Drain-Source On-resistance
15.	Mode	CCM	General	Conduction Mode
16.	Pout	360.0 W	General	Total output power
17.	Total BOM	\$0.0	General	Total BOM Cost
18.	Cross Freq	7.158 kHz	Op Point	Bode plot crossover frequency
19.	Duty Cycle	48.434 %	Op Point	Duty cycle
20.	Efficiency	98.107 %	Op Point	Steady state efficiency
21.	Gain Marg	-6.791 dB	Op Point	Bode Plot Gain Margin
22.	IC Tj	66.038 degC	Op Point	IC junction temperature
23.	IOUT_OP	15.0 A	Op Point	Iout operating point
24.	Low Freq Gain	87.255 dB	Op Point	Gain at 1Hz
25.	M1 Tj	137.2 degC	Op Point	M1 MOSFET junction temperature
26.	M2 Tj	120.94 degC	Op Point	M2 MOSFET junction temperature
27.	Phase Marg	77.885 deg	Op Point	Bode Plot Phase Margin
28.	VIN_OP	50.0 V	Op Point	Vin operating point
29.	Vout Actual	23.971 V	Op Point	Vout Actual calculated based on selected voltage divider resistors
30.	Vout Tolerance	3.26 %	Op Point	Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable
31.	Vout p-p	326.408 mV	Op Point	Peak-to-peak output ripple voltage
32.	Cin Pd	280.974 mW	Power	Input capacitor power dissipation
33.	Cout Pd	166.472 mW	Power	Output capacitor power dissipation
34.	IC Pd	650.954 mW	Power	IC power dissipation
35.	L Pd	2.25 W	Power	Inductor power dissipation
36.	M1 Pd	1.843 W	Power	M1 MOSFET total power dissipation
37.	M1 PdCond	613.491 mW	Power	M1 MOSFET conduction losses
38.	M1 PdSw	1.229 W	Power	M1 MOSFET switching losses
39.	M2 Pd	1.402 W	Power	M2 MOSFET total power dissipation
40.	M2 PdCond	1.26 W	Power	M2 MOSFET conduction losses
41.	M2 PdSw	141.317 mW	Power	M2 MOSFET switching losses
42.	Rsense Pd	352.899 mW	Power	LED Current Rsns Power Dissipation
43.	Total Pd	6.946 W	Power	Total Power Dissipation
44.	IC Icc Nom	13.658 mA		IC Icc gate driver current

Design Inputs

#	Name	Value	Description
1.	Iout	15.0	Maximum Output Current
2.	VinMax	50.0	Maximum input voltage
3.	VinMin	46.0	Minimum input voltage

#	Name	Value	Description
4.	Vout	24.0	Output Voltage
5.	base_pn	LM5116	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	40.0	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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