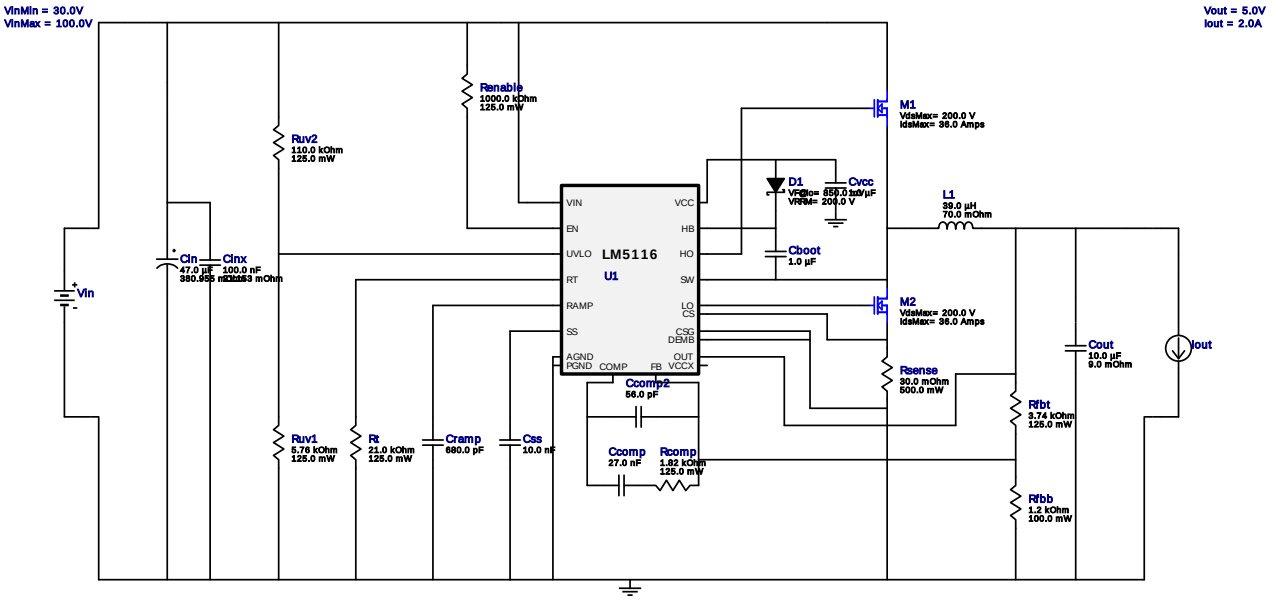
WEBENCH® Design Report

VinMin = 30.0V
VinMax = 100.0V
Vout = 5.0V
Iout = 2.0A

Device = LM5116MHX/NOPB
Topology = Buck
Created = 6/16/14 12:18:46 AM
BOM Cost = $6.44
Footprint = 723.0mm2
BOM Count = 22
Total Pd = 2.8W

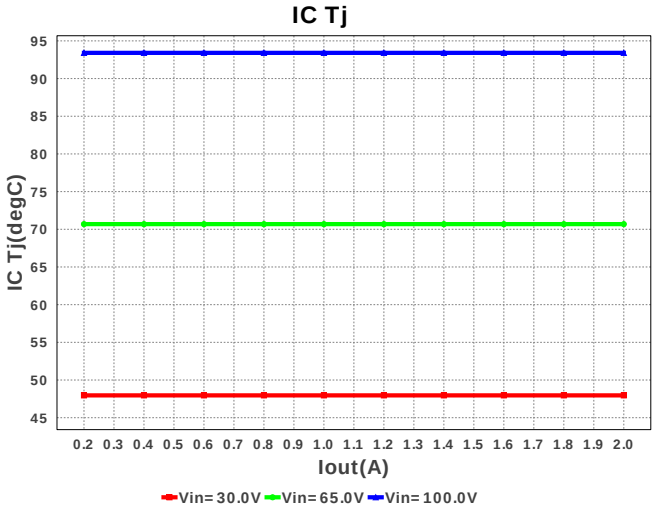
Design : 3816206/164 LM5116MHX/NOPB
LM5116MHX/NOPB 30.0V-100.0V to 5.0V @ 2.0A

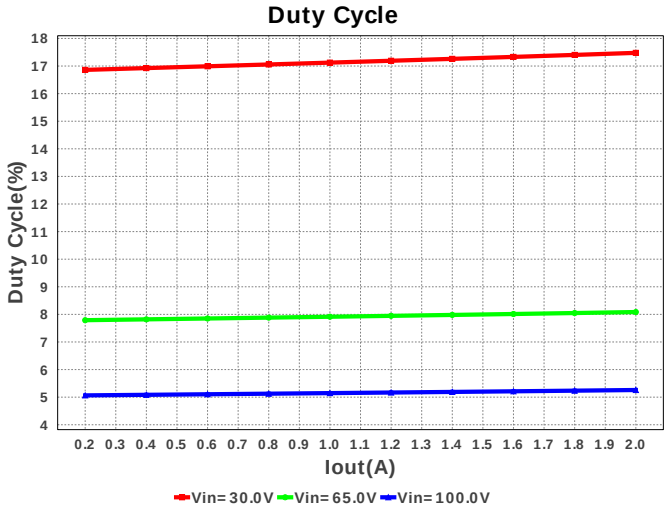


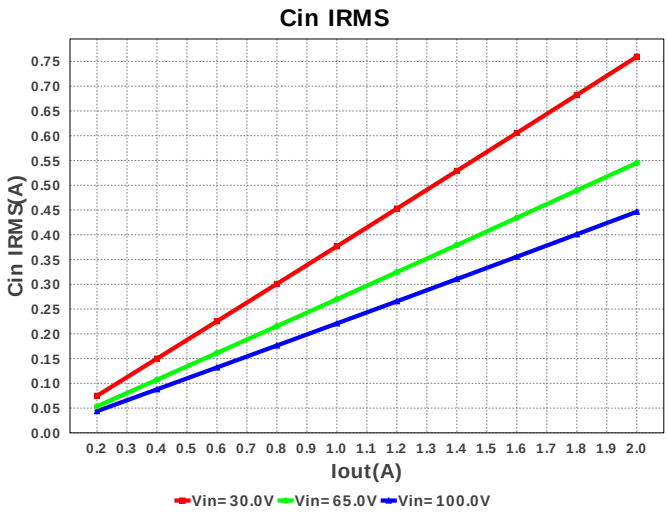
Electrical BOM

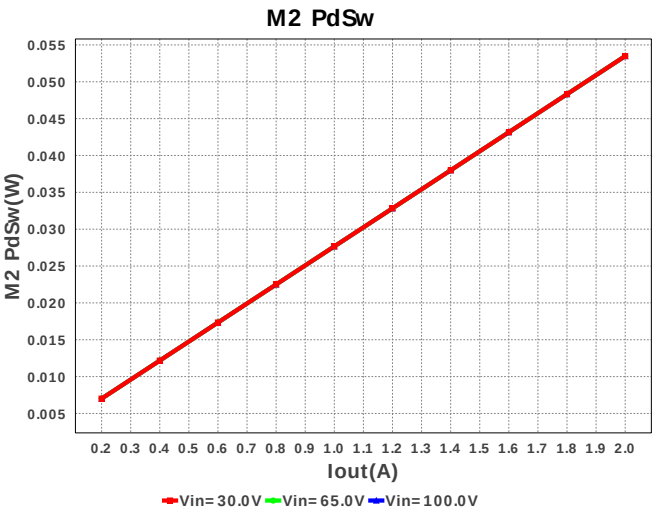
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Kemet	C0603C105K8PACTU Series= X5R	Cap= 1.0 µF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0603 5mm2
2.	Ccomp	Yageo America	CC0805KRX7R9BB273 Series= X7R	Cap= 27.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7mm2
3.	Ccomp2	Yageo America	CC0805JRNP09BN560 Series= C0G/NP0	Cap= 56.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7mm2
4.	Cin	Panasonic	EEUED2D470 Series= 286	Cap= 47.0 µF ESR= 380.955 mOhm VDC= 200.0 V IRMS= 790.0 mA	1	$0.29	CAPPR5-12.5X20 210mm2
5.	Cinx	TDK	C3216X7R2E104K Series= 285	Cap= 100.0 nF ESR= 21.153 mOhm VDC= 250.0 V IRMS= 0.0 A	1	$0.07	1206 11mm2
6.	Cout	MuRata	GRM188R60J106ME47D Series= X5R	Cap= 10.0 µF ESR= 9.0 mOhm VDC= 6.3 V IRMS= 2.74 A	1	$0.03	0603 5mm2
7.	Cramp	Yageo America	CC0805KRX7R9BB681 Series= X7R	Cap= 680.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7mm2
8.	Css	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7mm2
9.	Cvcc	Kemet	C0603C105K8PACTU Series= X5R	Cap= 1.0 µF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0603 5mm2

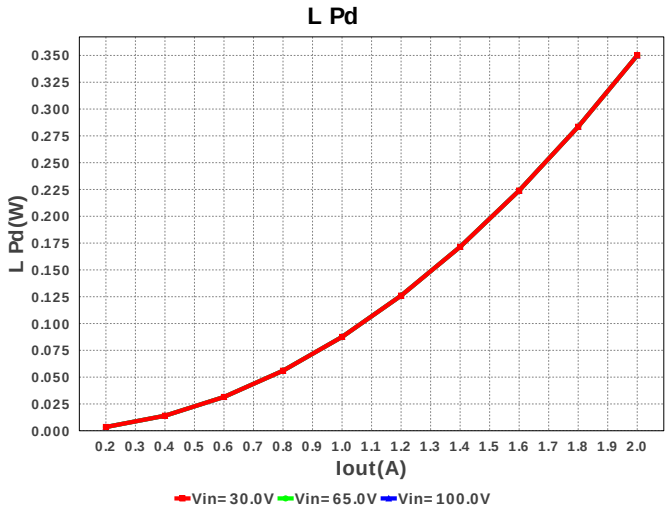
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	D1	Diodes Inc.	DFLS1200-7	VF@Io= 850.0 mV VRRM= 200.0 V	1	$0.21	PowerDI123 13mm2
11.	L1	Bourns	SRR1260-390M	L= 39.0 µH DCR= 70.0 mOhm	1	$0.41	SRR1260 210mm2
12.	M1	Infineon Technologies	BSC320N20NS3 G	VdsMax= 200.0 V IdsMax= 36.0 Amps	1	$1.39	PG-TDSON-8 55mm2
13.	M2	Infineon Technologies	BSC320N20NS3 G	VdsMax= 200.0 V IdsMax= 36.0 Amps	1	$1.39	PG-TDSON-8 55mm2
14.	Rcomp	Panasonic	ERJ-6ENF1821V Series= 225	Res= 1.82 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7mm2
15.	Renable	Panasonic	ERJ-6ENF1004V Series= 225	Res= 1000.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7mm2
16.	Rfbb	Yageo America	RC0603FR-071K2L Series= 233	Res= 1.2 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	0603 5mm2
17.	Rfbt	Panasonic	ERJ-6ENF3741V Series= 225	Res= 3.74 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7mm2
18.	Rsense	Stackpole Electronics Inc	CSR1206FK30L0 Series= ?	Res= 30.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	$0.10	1206 11mm2
19.	Rt	Panasonic	ERJ-6ENF2102V Series= 225	Res= 21.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7mm2
20.	Ruv1	Panasonic	ERJ-6ENF5761V Series= 225	Res= 5.76 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7mm2
21.	Ruv2	Panasonic	ERJ-6ENF1103V Series= 225	Res= 110.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7mm2
22.	U1	Texas Instruments	LM5116MHX/NOPB	Switcher	1	$2.42	MXA20A 71mm2

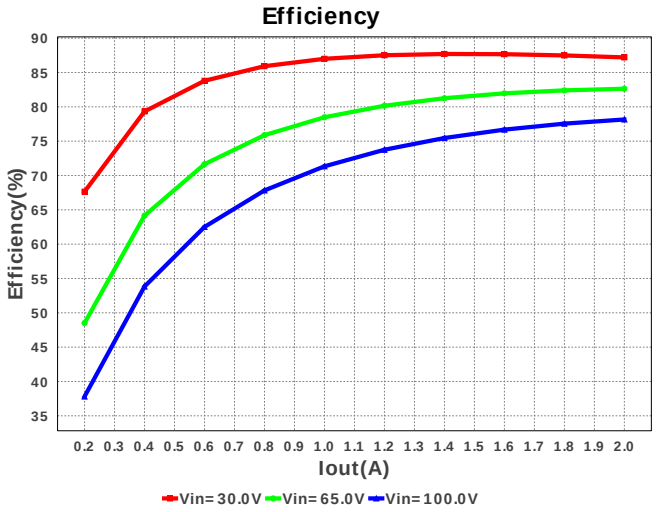


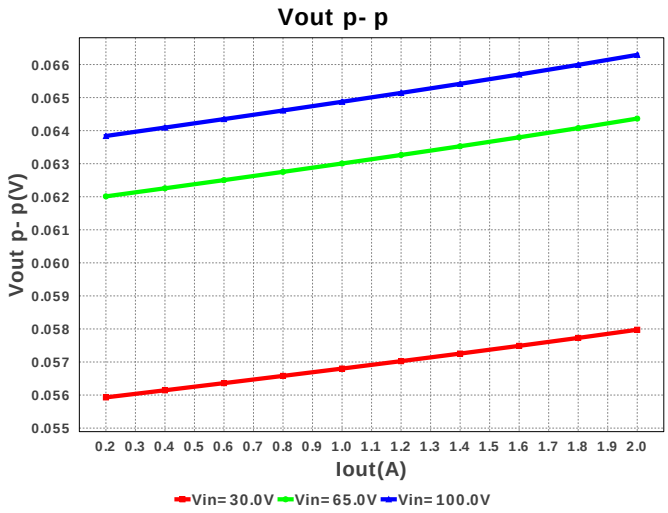


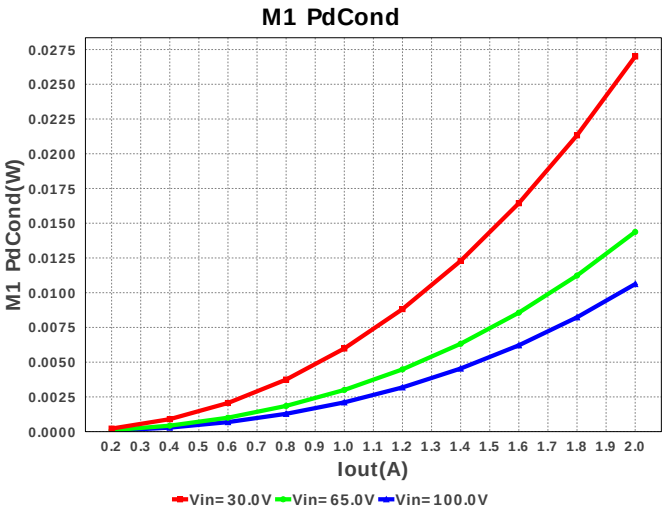




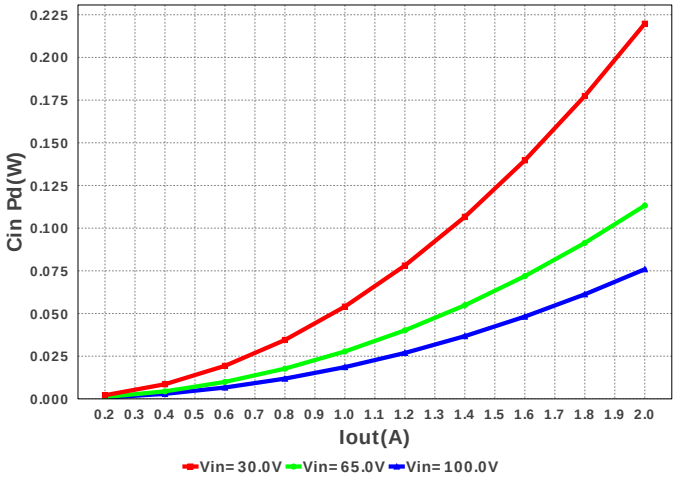




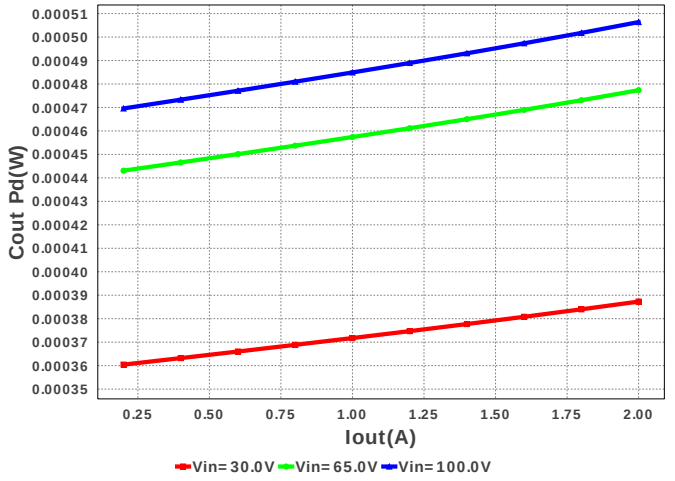




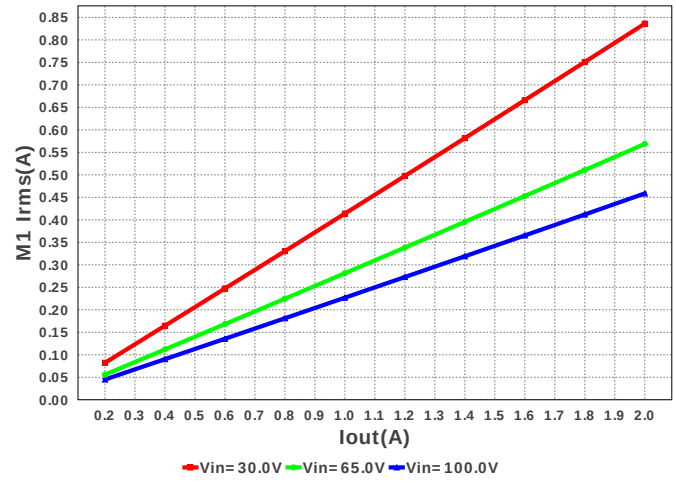
Cin Pd



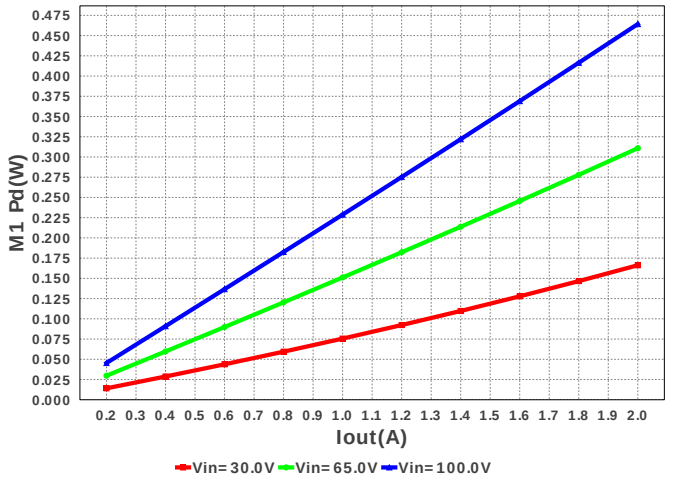
Cout Pd



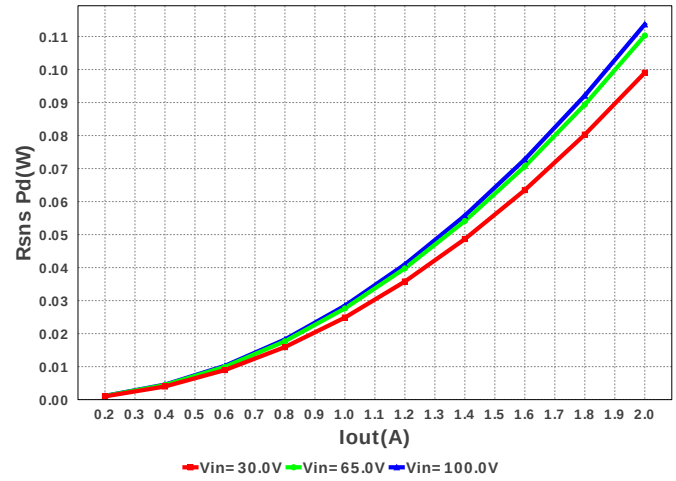
M1 Irms



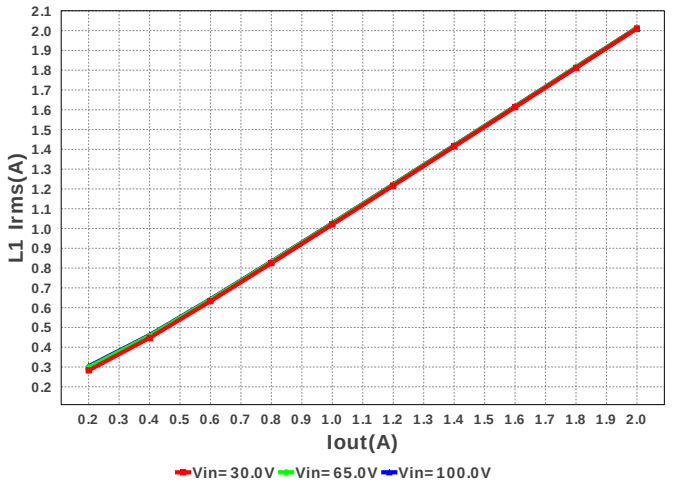
M1 Pd

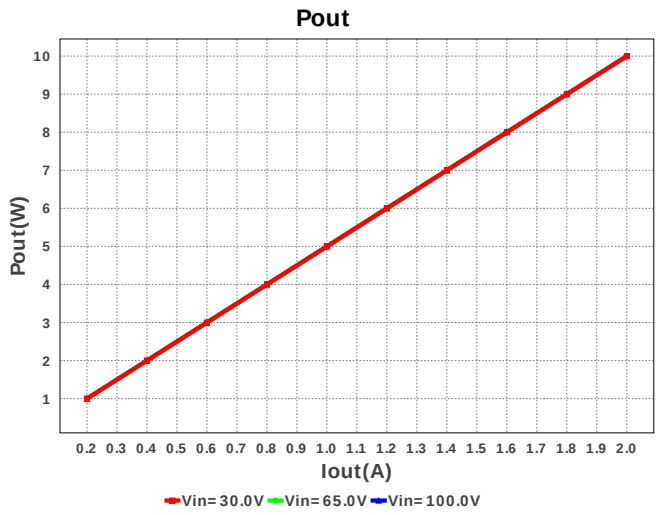


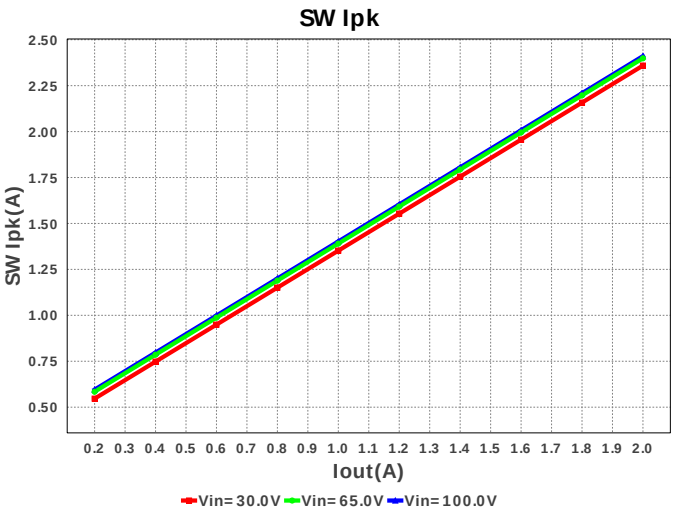
Rsns Pd

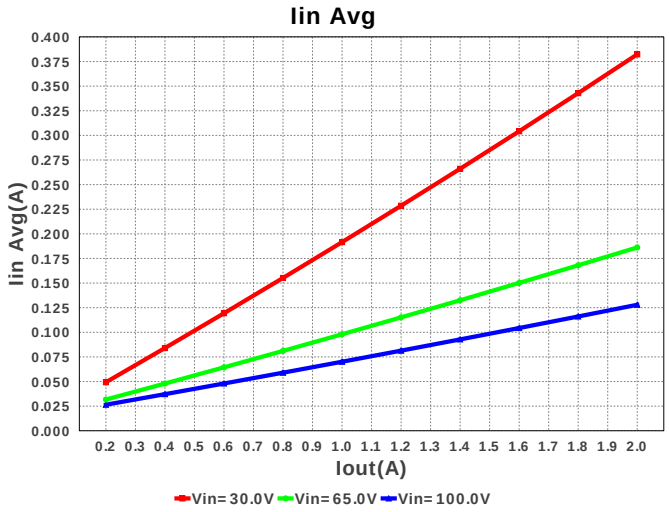


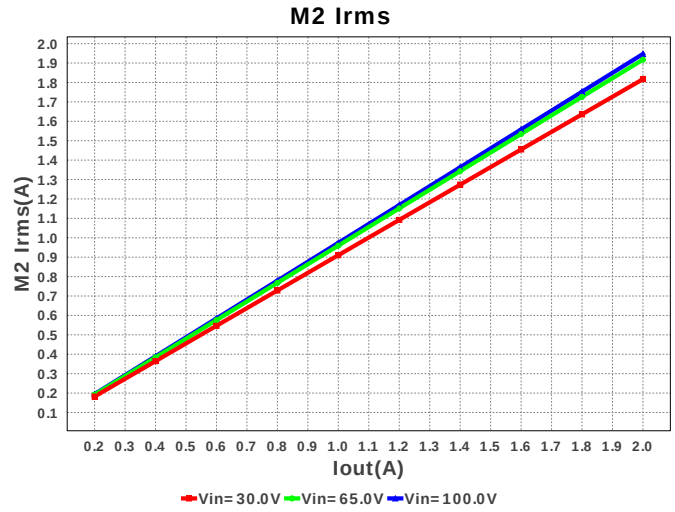
L1 Irms

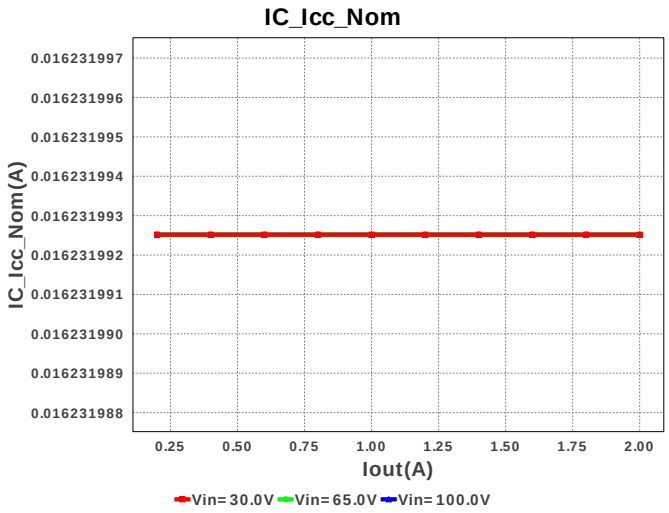


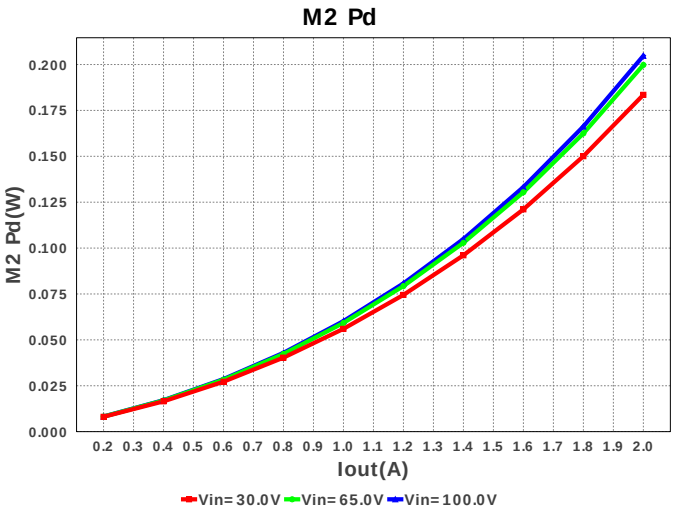


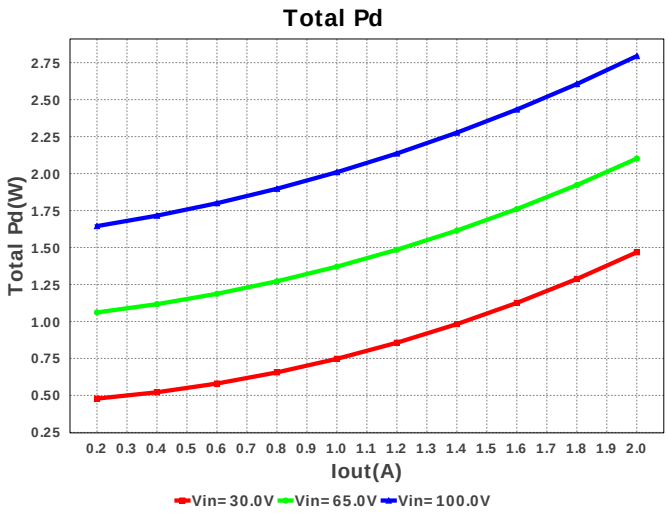


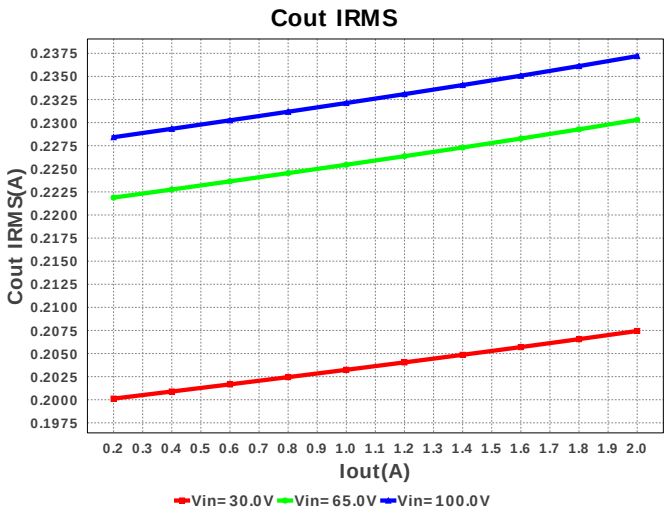


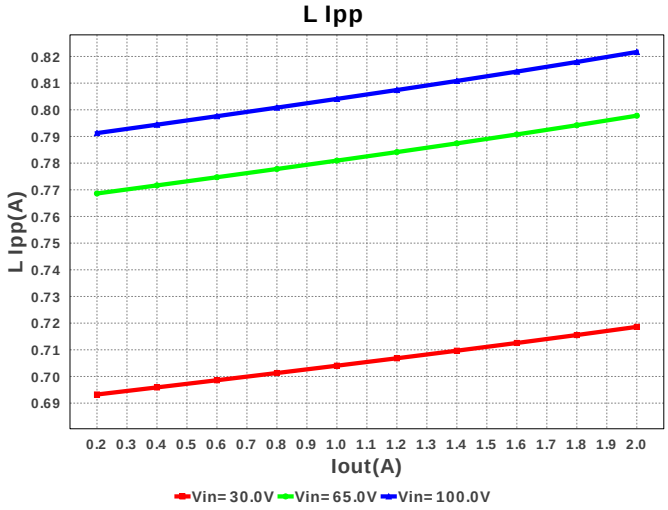


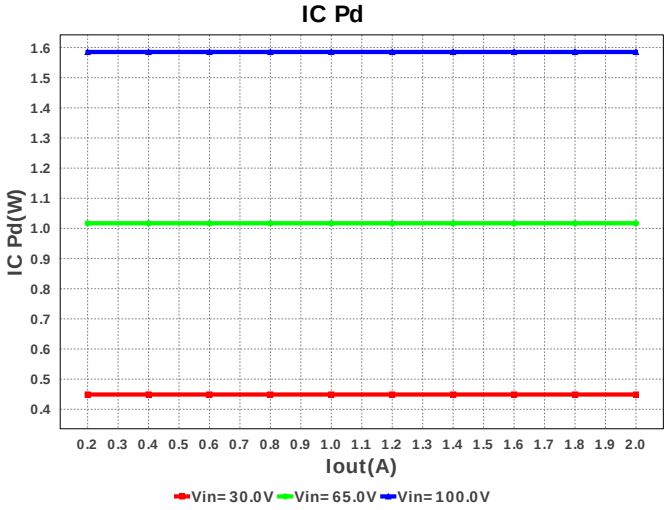


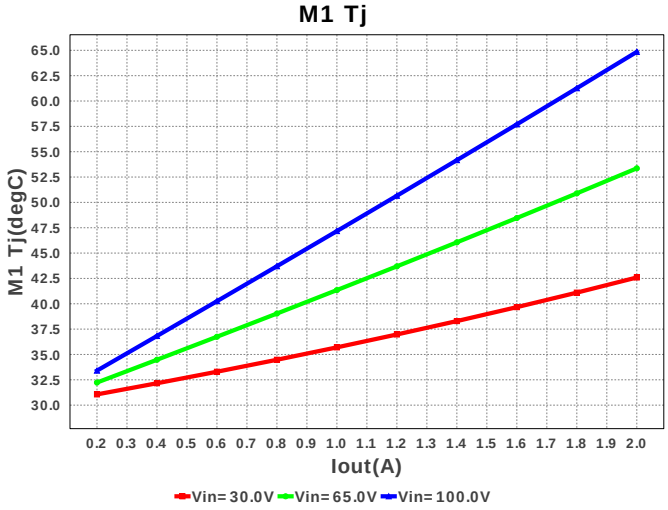


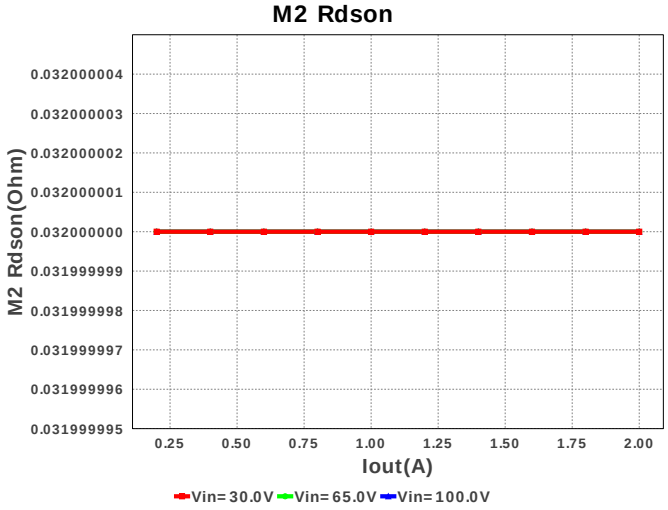


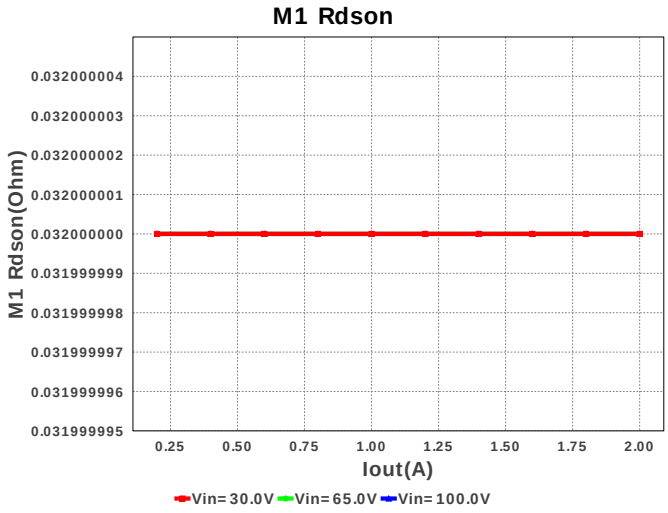


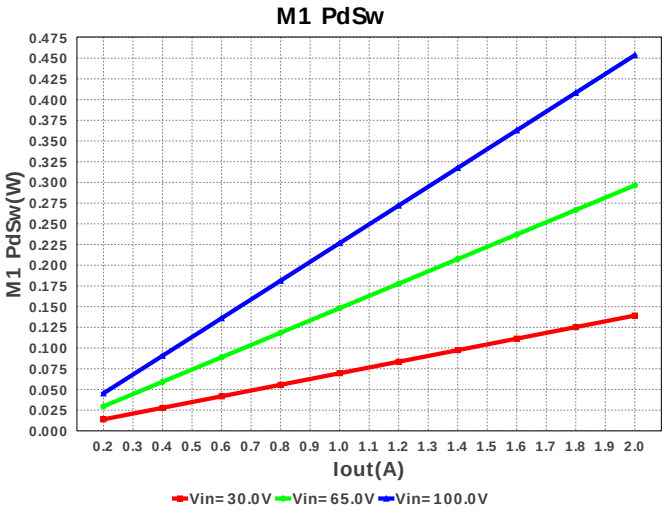


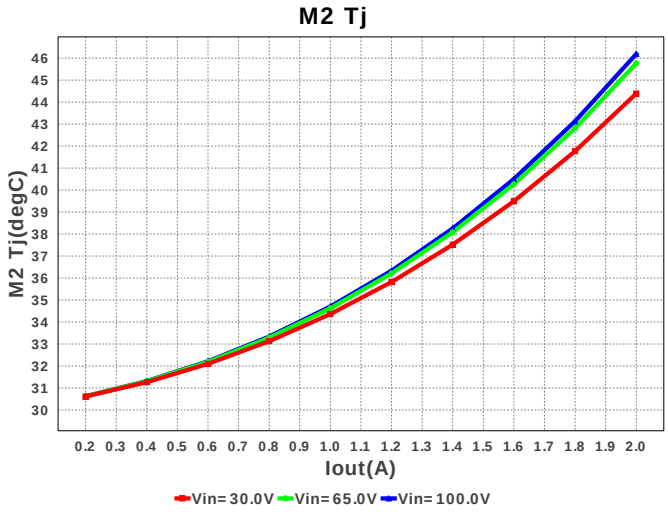


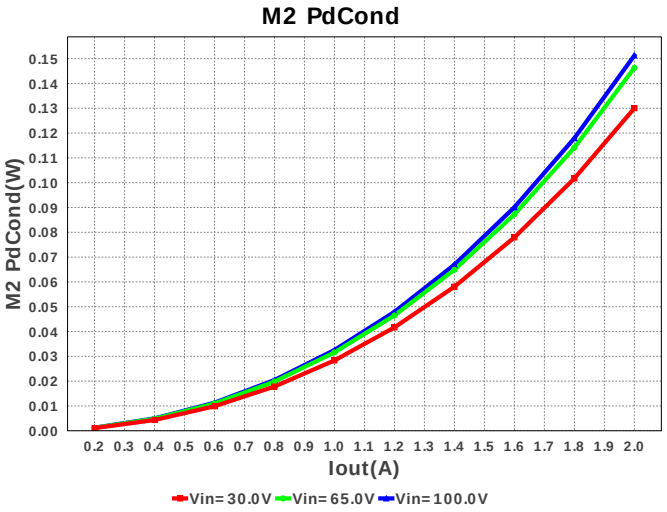












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	446.432 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	237.198 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	127.96 mA	Current	Average input current
4.	L Ipp	821.678 mA	Current	Peak-to-peak inductor ripple current
5.	L1 Irms	2.014 A	Current	Inductor ripple current
6.	M1 Irms	458.656 mA	Current	MOSFET RMS ripple current
7.	M2 Irms	1.947 A	Current	MOSFET RMS ripple current
8.	SW Ipk	2.411 A	Current	Peak switch current
9.	BOM Count	22	General	Total Design BOM count
10.	FootPrint	723.0 mm2	General	Total Foot Print Area of BOM components
11.	Frequency	155.909 kHz	General	Switching frequency
12.	IC Tolerance	16.0 mV	General	IC Feedback Tolerance
13.	M1 Rdson	32.0 mOhm	General	Drain-Source On-resistance
14.	M2 Rdson	32.0 mOhm	General	Drain-Source On-resistance
15.	Pout	10.0 W	General	Total output power
16.	Total BOM	$6.44	General	Total BOM Cost
17.	Cross Freq	21.254 kHz	Op_point	Bode plot crossover frequency
18.	Duty Cycle	5.259 %	Op_point	Duty cycle
19.	Efficiency	78.147 %	Op_point	Steady state efficiency
20.	IC Tj	93.411 degC	Op_point	IC junction temperature
21.	IOUT_OP	2.0 A	Op_point	Iout operating point
22.	M1 Tj	65.198 degC	Op_point	M1 MOSFET junction temperature
23.	M2 Tj	45.965 degC	Op_point	M2 MOSFET junction temperature
24.	Phase Marg	75.314 deg	Op_point	Bode Plot Phase Margin
25.	VIN_OP	100.0 V	Op_point	Vin operating point
26.	Vout p-p	66.292 mV	Op_point	Peak-to-peak output ripple voltage
27.	Cin Pd	75.925 mW	Power	Input capacitor power dissipation
28.	Cout Pd	506.366 µW	Power	Output capacitor power dissipation
29.	IC Pd	1.585 W	Power	IC power dissipation
30.	L Pd	350.0 mW	Power	Inductor power dissipation
31.	M1 Pd	468.842 mW	Power	M1 MOSFET total power dissipation
32.	M1 PdCond	10.599 mW	Power	M1 MOSFET conduction losses

#	Name	Value	Category	Description
33.	M1 PdSw	458.243 mW	Power	M1 MOSFET switching losses
34.	M2 Pd	202.139 mW	Power	M2 MOSFET total power dissipation
35.	M2 PdCond	151.22 mW	Power	M2 MOSFET conduction losses
36.	M2 PdSw	50.918 mW	Power	M2 MOSFET switching losses
37.	Rsns Pd	113.689 mW	Power	Current Limit Sense Resistor Power Dissipation
38.	Total Pd	2.796 W	Power	Total Power Dissipation
39.	IC Icc Nom	16.232 mA	Unknown	IC Icc gate driver current

Design Inputs

#	Name	Value	Description
1.	Iout	2.0 A	Maximum Output Current
2.	Iout1	2.0 Amps	Output Current #1
3.	VinMax	100.0 V	Maximum input voltage
4.	VinMin	30.0 V	Minimum input voltage
5.	Vout	5.0 V	Output Voltage
6.	Vout1	5.0 Volt	Output Voltage #1
7.	base_pn	LM5116	Base Product Number
8.	source	DC	Input Source Type
9.	Ta	30.0 degC	Ambient temperature

Design Assistance

1. **LM5116** Product Folder : http://www.ti.com/product/lm5116 : contains the data sheet and other resources.