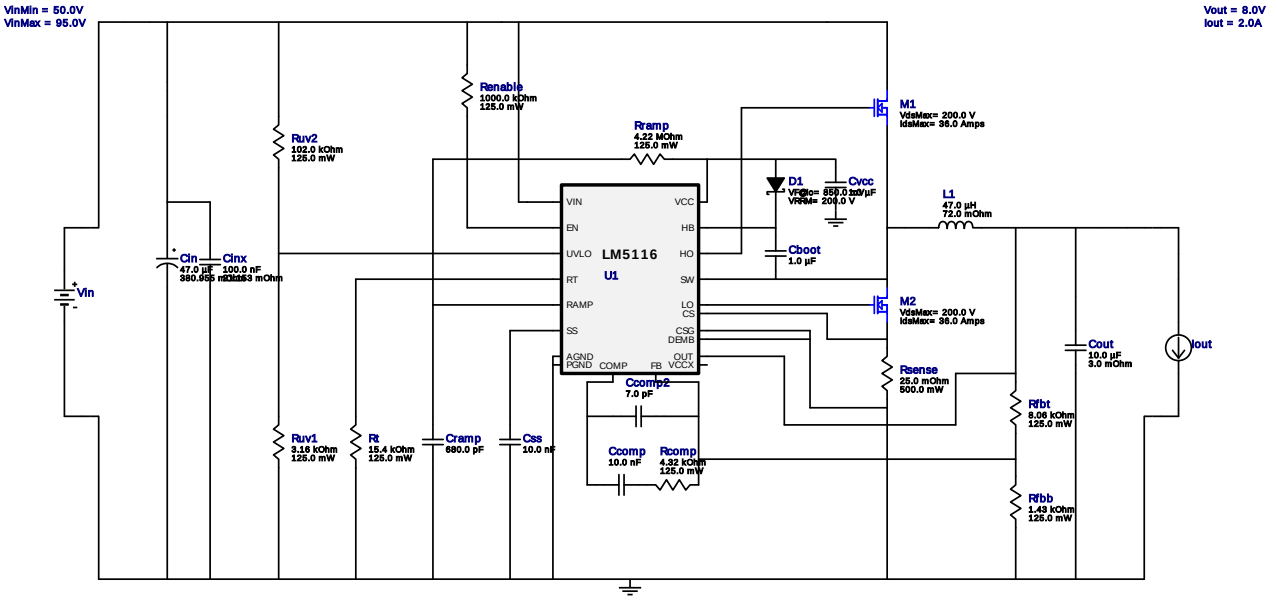
TEXAS INSTRUMENTS

WEBENCH® Design Report

VinMin = 50.0V
VinMax = 95.0V
Vout = 8.0V
Iout = 2.0A

Device = LM5116MHX/NOPB
Topology = Buck
Created = 6/16/14 6:45:00 PM
BOM Cost = $6.49
Footprint = 720.0mm2
BOM Count = 23
Total Pd = 3.14W

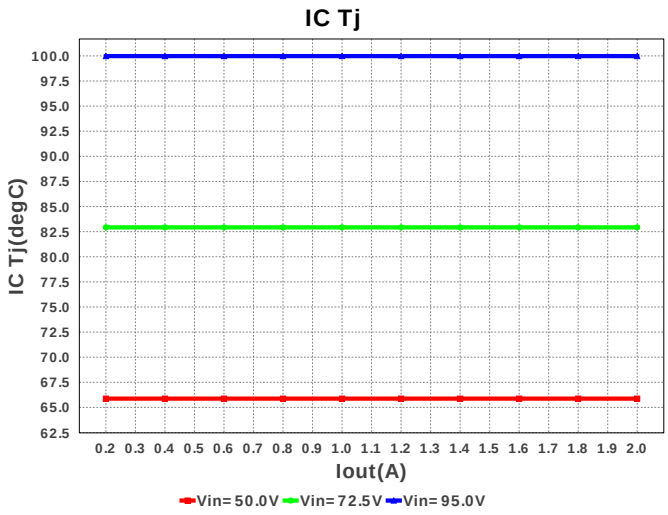
Design : 3816206/167 LM5116MHX/NOPB
LM5116MHX/NOPB 50.0V-95.0V to 8.0V @ 2.0A

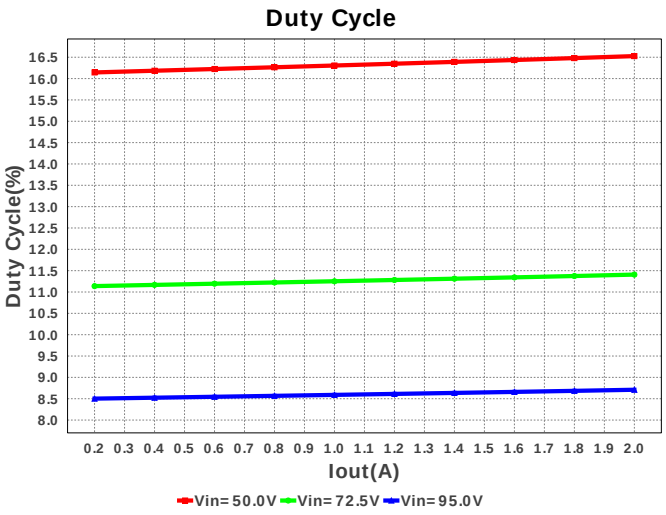


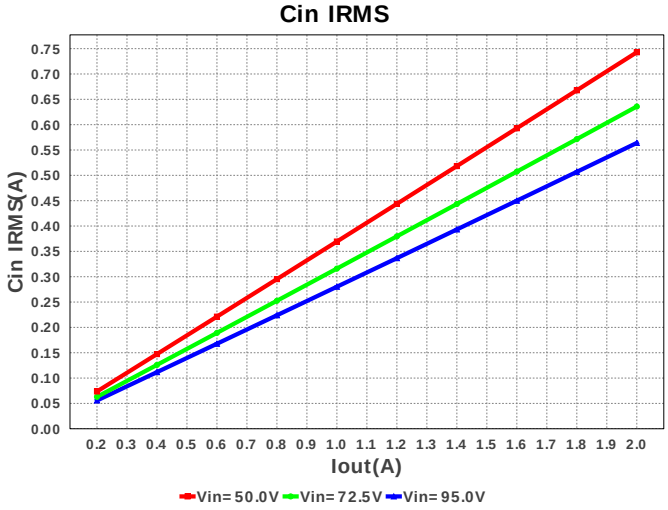
Electrical BOM

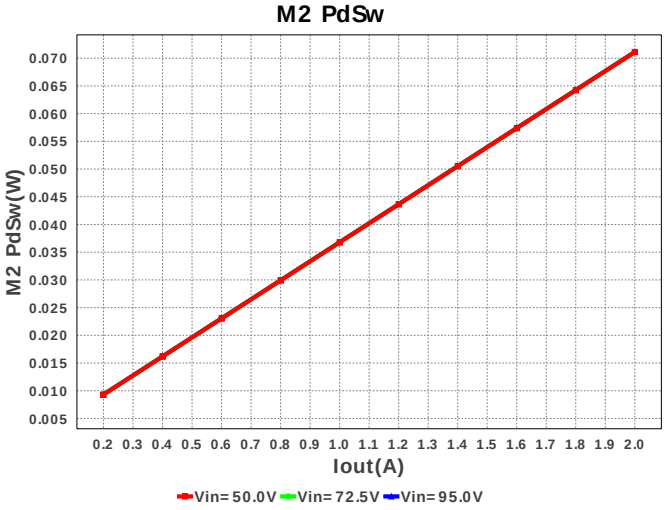
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Kemet	C0603C105K8PACTU Series= X5R	Cap= 1.0 µF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0603 5mm2
2.	Ccomp	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7mm2
3.	Ccomp2	Yageo America	CC0805DRNP09BN7R0 Series= C0G/NP0	Cap= 7.0 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	Kemet	C0805C106K8PACTU Series= X5R	Cap= 10.0 µF ESR= 3.0 mOhm VDC= 10.0 V IRMS= 11.43 A	1	$0.04	0805 7mm2
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

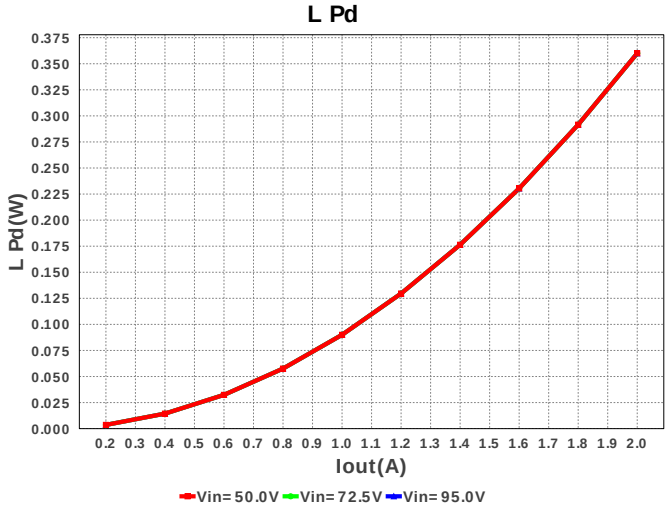
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	D1	Diodes Inc.	DFLS1200-7	VF@Io= 850.0 mV VRRM= 200.0 V	1	$0.21	 PowerDI123 13mm2
11.	L1	Bourns	SRR1210-470M	L= 47.0 µH DCR= 72.0 mOhm	1	$0.44	 SRR1210 196mm2
12.	M1	Infineon Technologies	BSC320N20NS3 G	VdsMax= 200.0 V IdsMax= 36.0 Amps	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-6ENF4321V Series= 225	Res= 4.32 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	Panasonic	ERJ-6ENF1431V Series= 225	Res= 1.43 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7mm2
17.	Rfbt	Panasonic	ERJ-6ENF8061V Series= 225	Res= 8.06 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7mm2
18.	Rramp	Vishay-Dale	CRCW08054M22FKEA Series= CRCW..e3	Res= 4.22 MOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7mm2
19.	Rsense	Stackpole Electronics Inc	CSR1206FK25L0 Series= ?	Res= 25.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	$0.10	 1206 11mm2
20.	Rt	Panasonic	ERJ-6ENF1542V Series= 225	Res= 15.4 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7mm2
21.	Ruv1	Panasonic	ERJ-6ENF3161V Series= 225	Res= 3.16 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7mm2
22.	Ruv2	Panasonic	ERJ-6ENF1023V Series= 225	Res= 102.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7mm2
23.	U1	Texas Instruments	LM5116MHX/NOPB	Switcher	1	$2.42	 MXA20A 71mm2

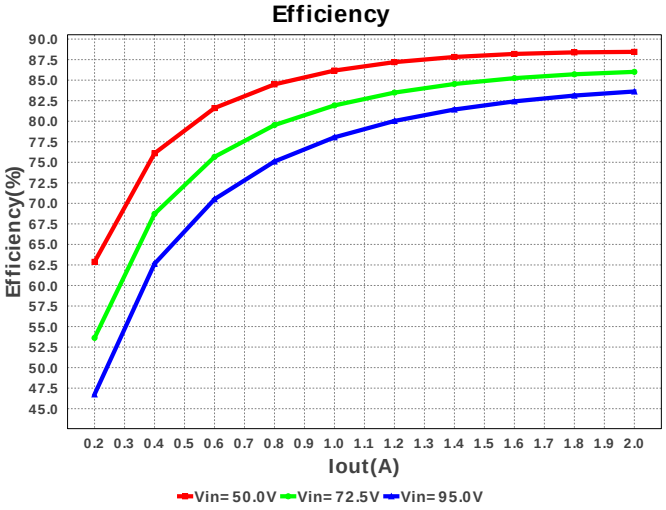


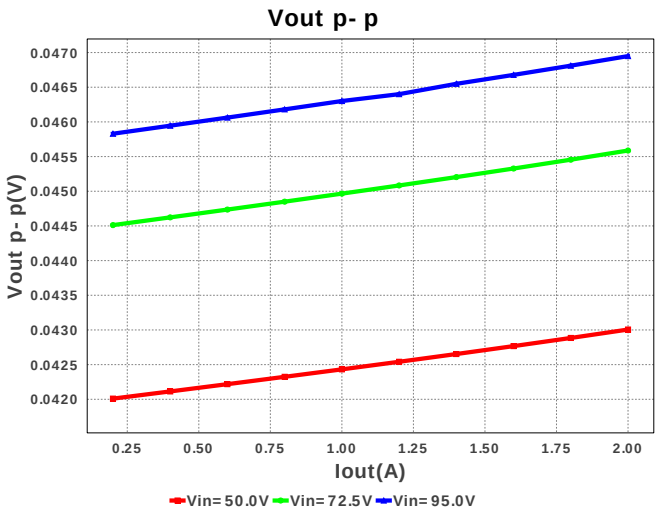


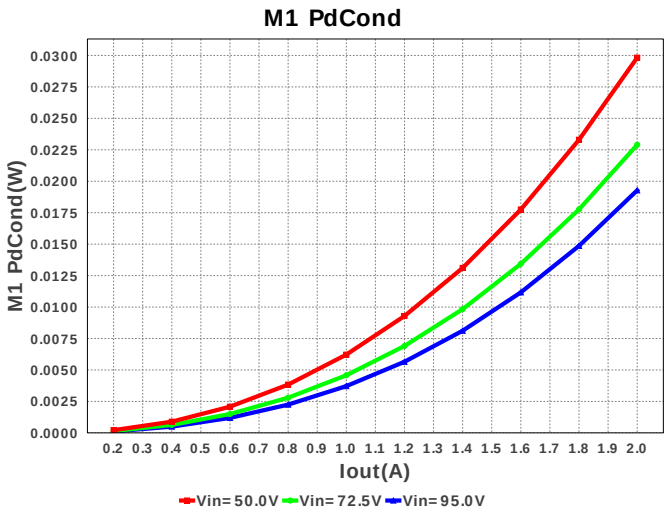


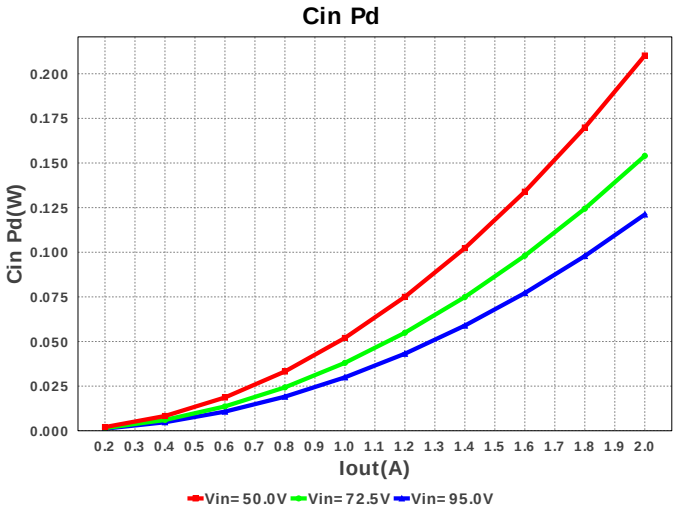


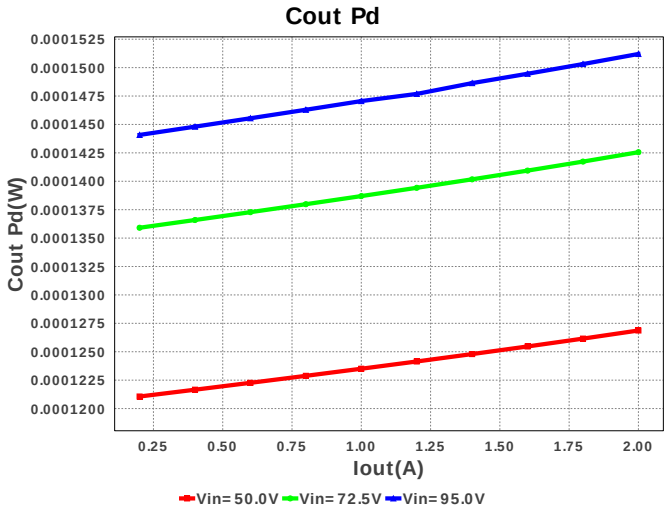


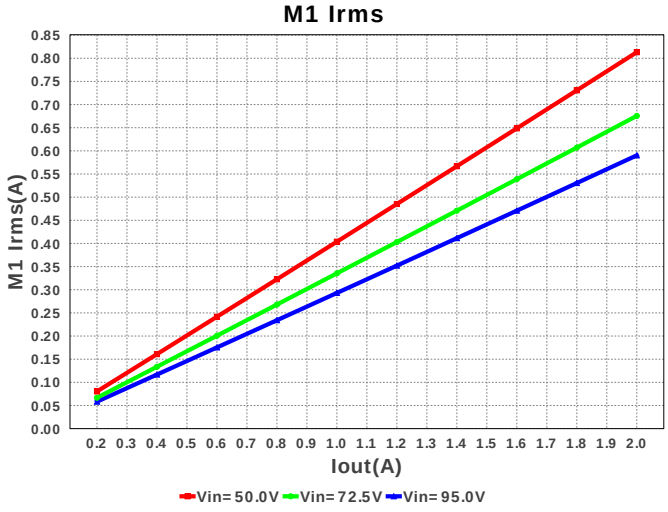


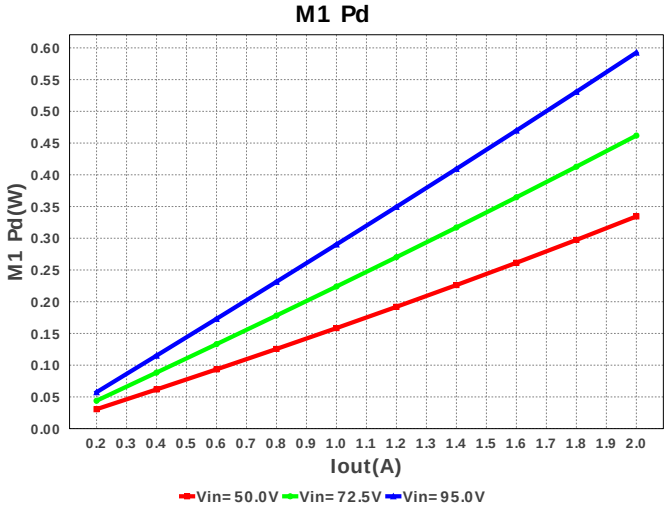


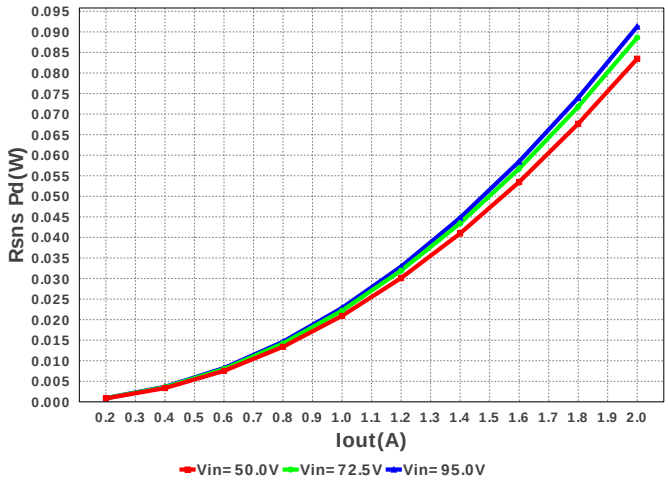


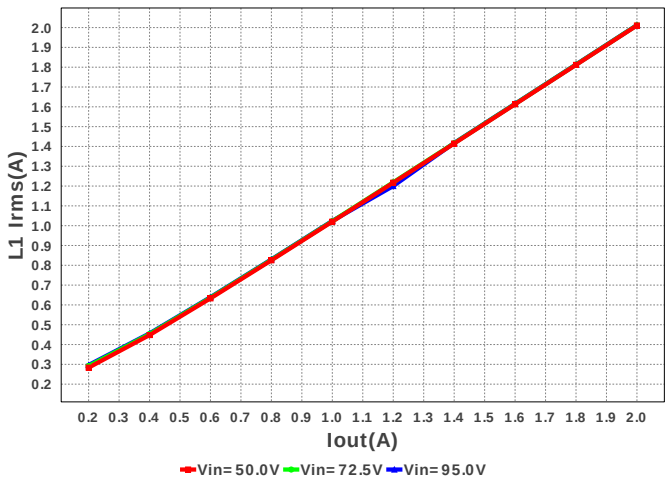


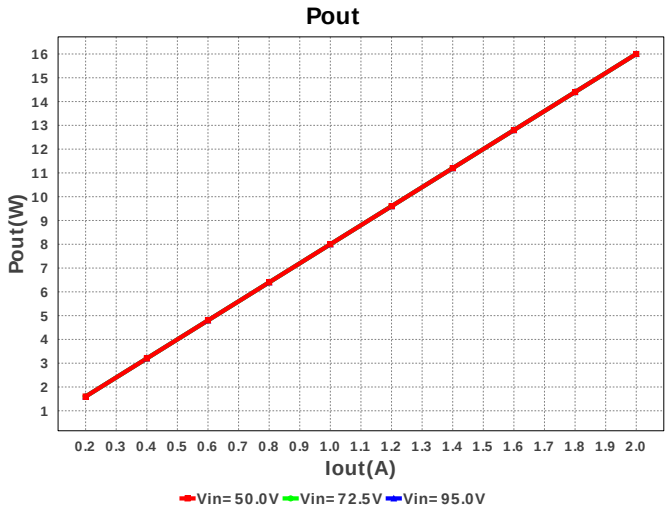


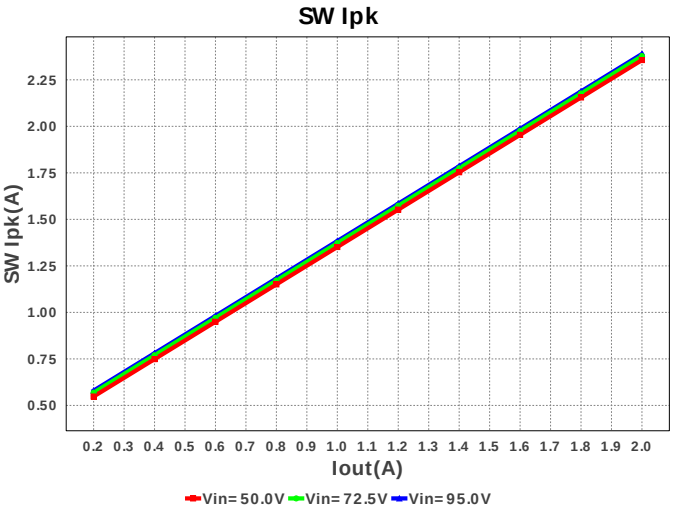


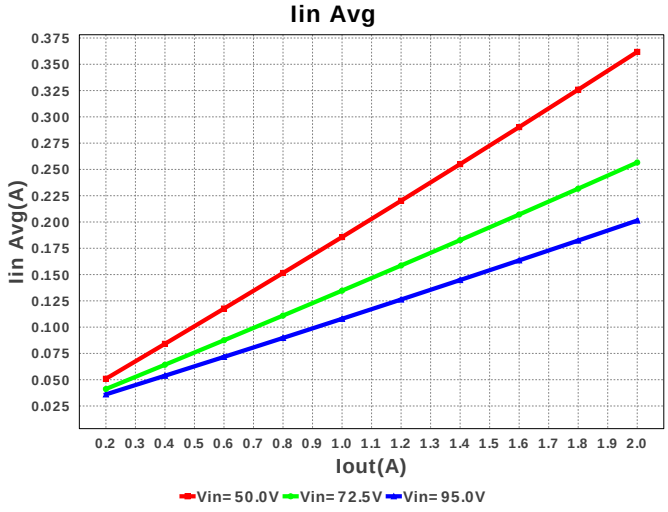


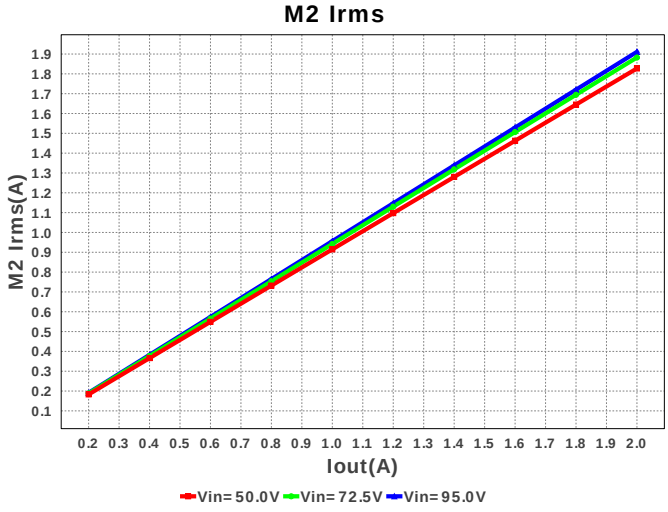


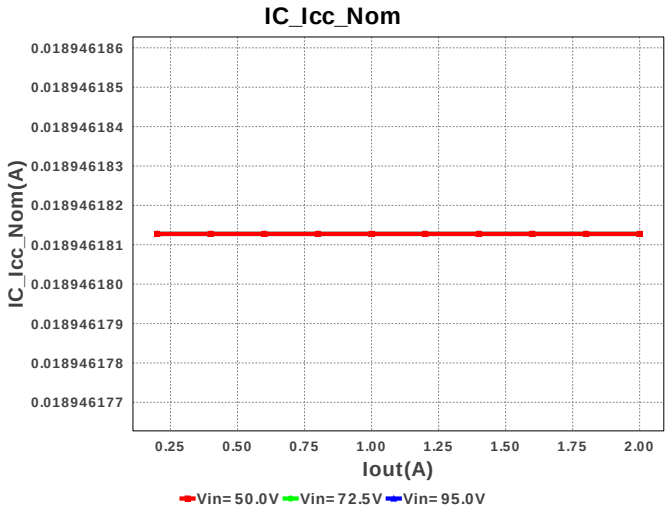


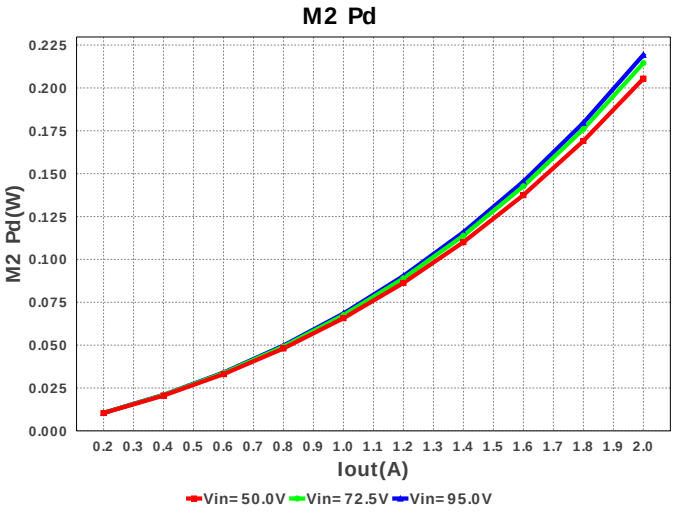


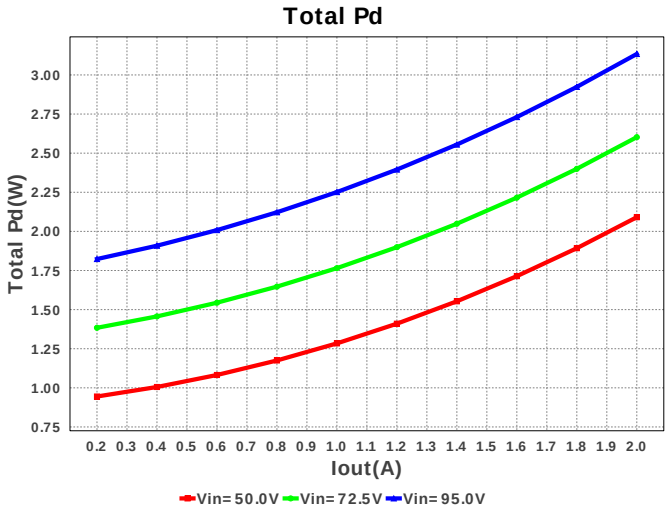


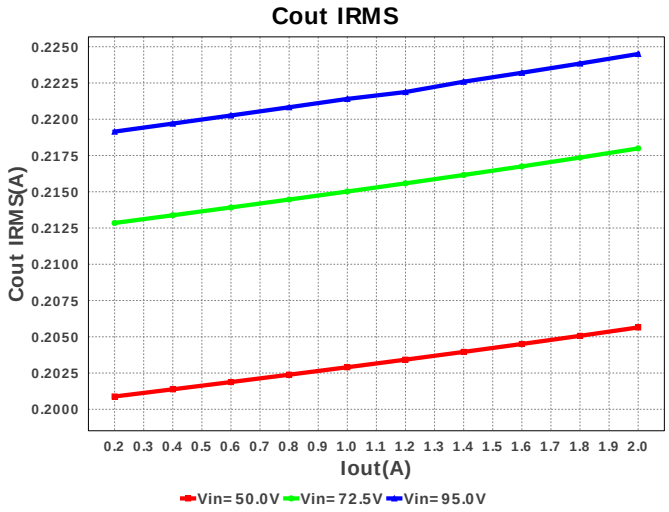


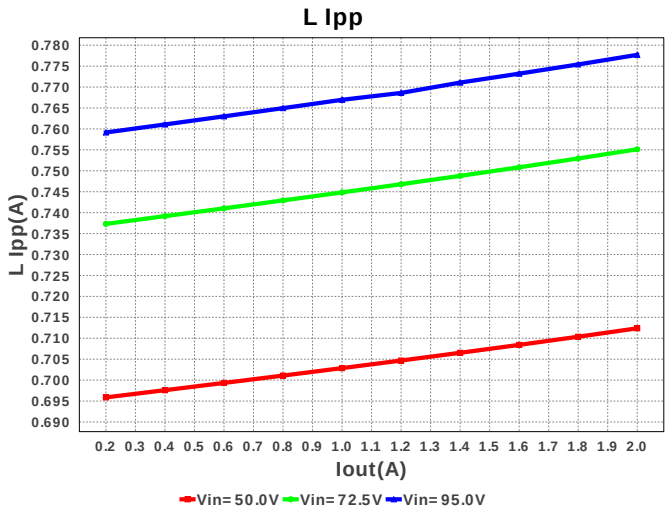


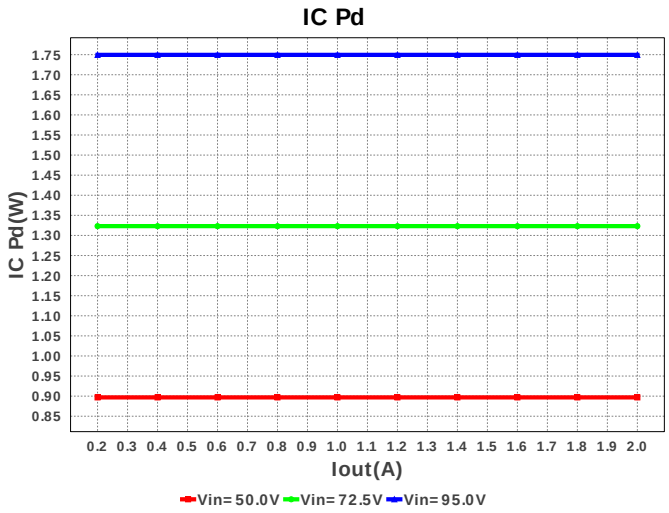


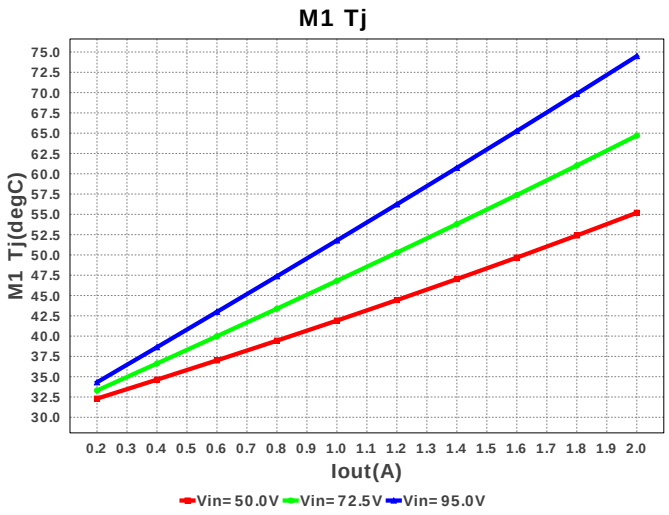


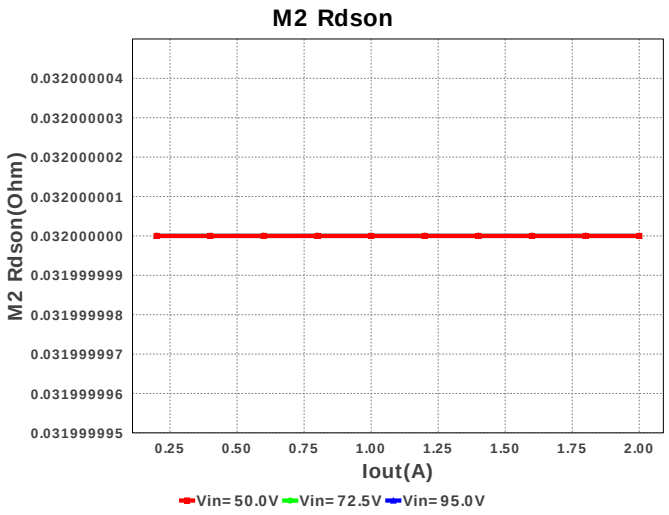


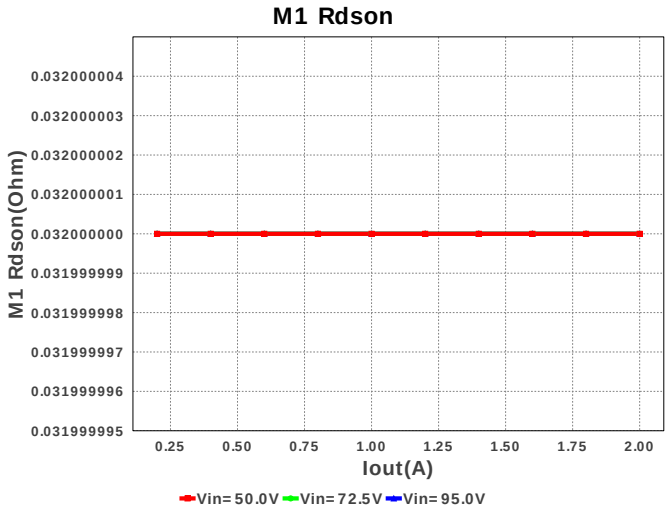


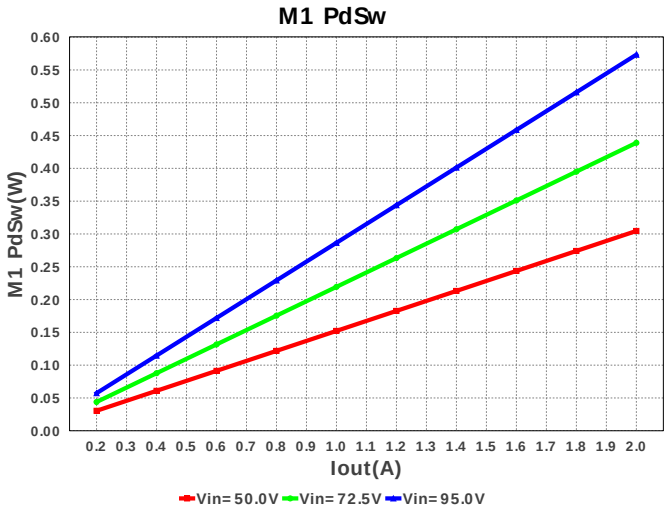


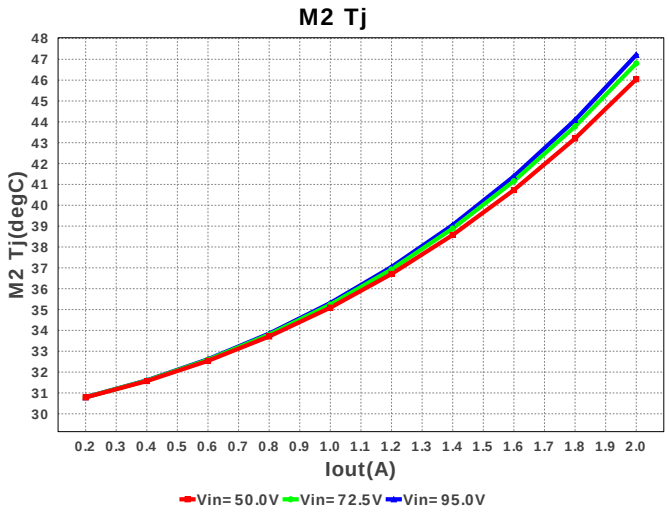


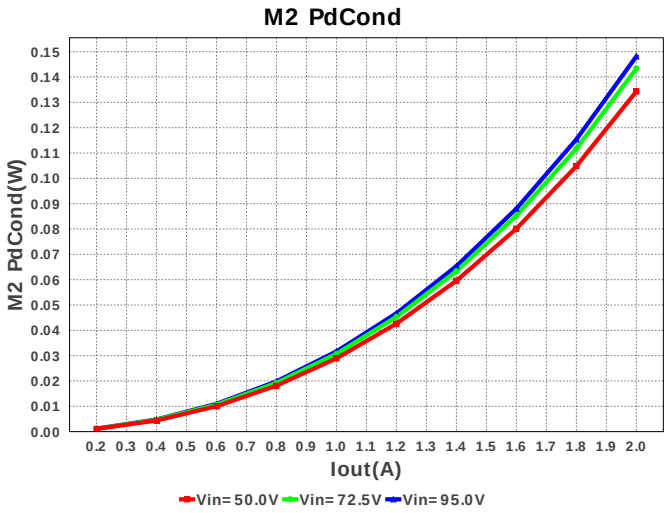












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	563.958 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	224.497 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	201.44 mA	Current	Average input current
4.	L Ipp	777.682 mA	Current	Peak-to-peak inductor ripple current
5.	L1 Irms	2.013 A	Current	Inductor ripple current
6.	M1 Irms	590.248 mA	Current	MOSFET RMS ripple current
7.	M2 Irms	1.911 A	Current	MOSFET RMS ripple current
8.	SW Ipk	2.389 A	Current	Peak switch current
9.	BOM Count	23	General	Total Design BOM count
10.	FootPrint	720.0 mm2	General	Total Foot Print Area of BOM components
11.	Frequency	207.314 kHz	General	Switching frequency

#	Name	Value	Category	Description
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	16.0 W	General	Total output power
16.	Total BOM	$6.49	General	Total BOM Cost
17.	Cross Freq	24.249 kHz	Op_point	Bode plot crossover frequency
18.	Duty Cycle	8.71 %	Op_point	Duty cycle
19.	Efficiency	83.607 %	Op_point	Steady state efficiency
20.	IC Tj	99.978 degC	Op_point	IC junction temperature
21.	IOUT_OP	2.0 A	Op_point	Iout operating point
22.	M1 Tj	75.025 degC	Op_point	M1 MOSFET junction temperature
23.	M2 Tj	46.916 degC	Op_point	M2 MOSFET junction temperature
24.	Phase Marg	60.075 deg	Op_point	Bode Plot Phase Margin
25.	VIN_OP	95.0 V	Op_point	Vin operating point
26.	Vout p-p	46.948 mV	Op_point	Peak-to-peak output ripple voltage
27.	Cin Pd	121.162 mW	Power	Input capacitor power dissipation
28.	Cout Pd	151.197 µW	Power	Output capacitor power dissipation
29.	IC Pd	1.749 W	Power	IC power dissipation
30.	L Pd	360.0 mW	Power	Inductor power dissipation
31.	M1 Pd	599.452 mW	Power	M1 MOSFET total power dissipation
32.	M1 PdCond	19.189 mW	Power	M1 MOSFET conduction losses
33.	M1 PdSw	580.263 mW	Power	M1 MOSFET switching losses
34.	M2 Pd	215.752 mW	Power	M2 MOSFET total power dissipation
35.	M2 PdCond	148.035 mW	Power	M2 MOSFET conduction losses
36.	M2 PdSw	67.717 mW	Power	M2 MOSFET switching losses
37.	Rsns Pd	91.29 mW	Power	Current Limit Sense Resistor Power Dissipation
38.	Total Pd	3.137 W	Power	Total Power Dissipation
39.	IC_Icc_Nom	18.946 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	95.0 V	Maximum input voltage
4.	VinMin	50.0 V	Minimum input voltage
5.	Vout	8.0 V	Output Voltage
6.	Vout1	8.0 Volt	Output Voltage #1
7.	base_pn	LM5116	Texas Instruments Base Part 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.