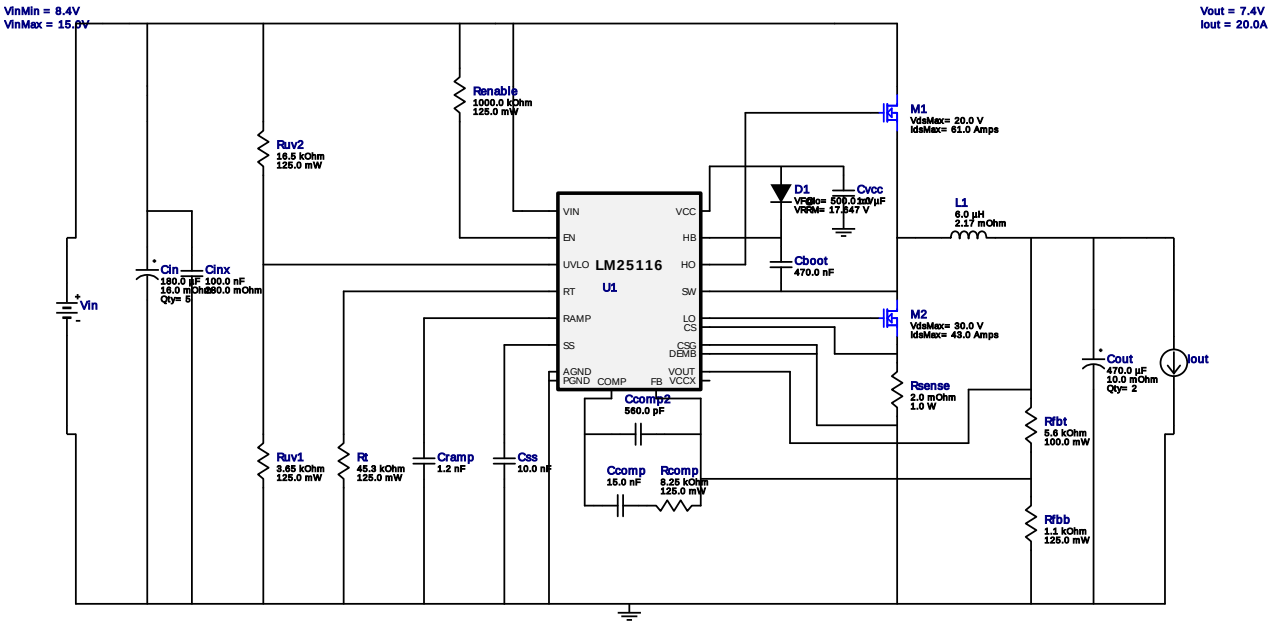
TEXAS INSTRUMENTS

WEBENCH® Design Report

VinMin = 8.4V
VinMax = 15.0V
Vout = 7.4V
Iout = 20.0A

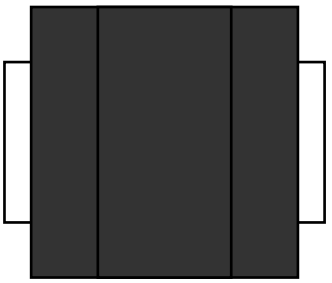
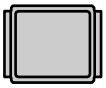
Device = LM25116MHX/NOPB
Topology = Buck
Created = 11/2/15 7:34:59 PM
BOM Cost = $0.00
BOM Count = 27
Total Pd = 3.84W

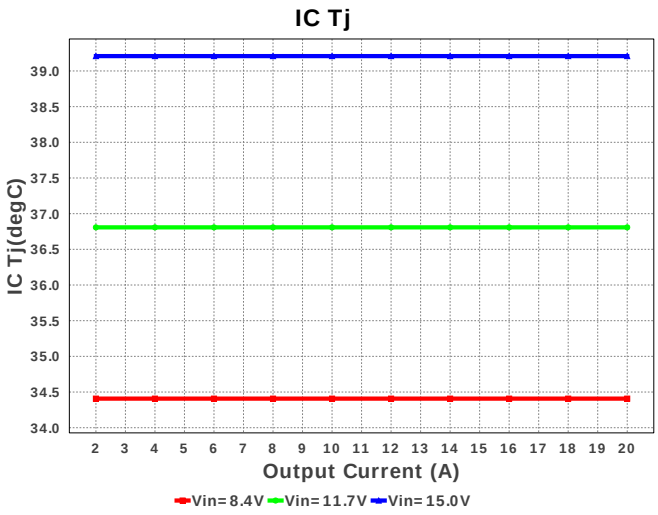
Design : 4455668/36 LM25116MHX/NOPB
LM25116MHX/NOPB 8.4V-15.0V to 7.40V @ 20.0A

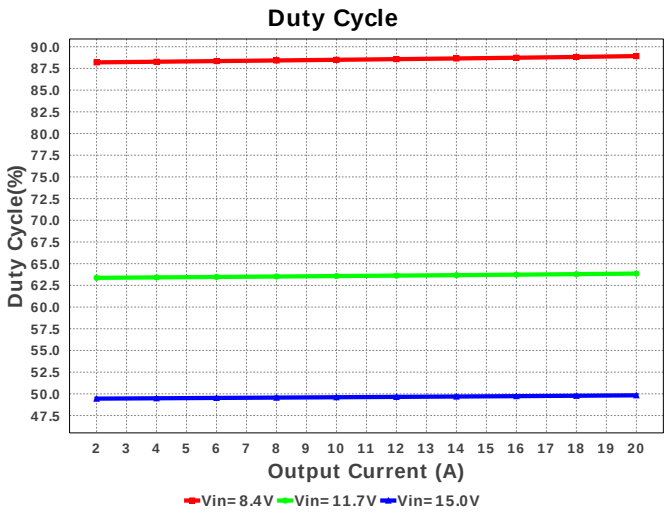


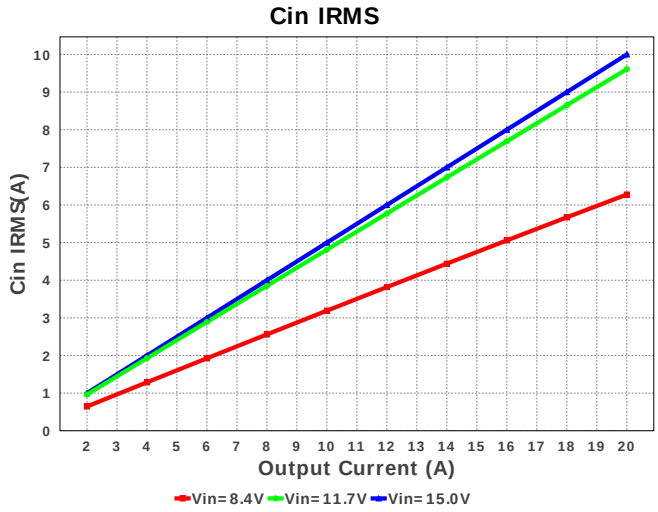
Electrical BOM

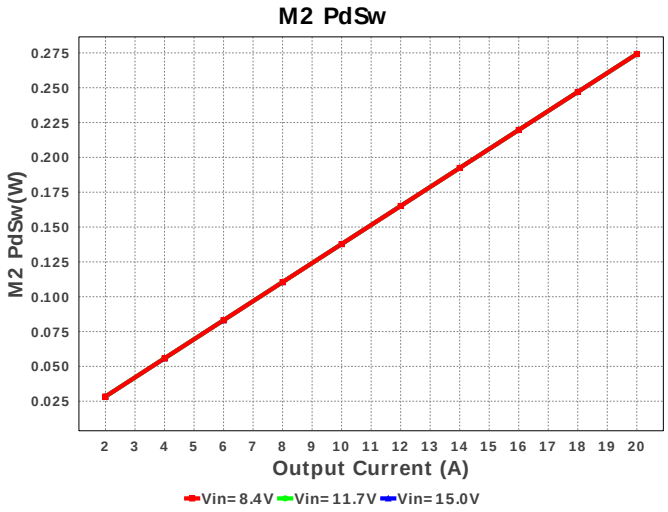
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Taiyo Yuden	EMK212B7474KD-T Series= X7R	Cap= 470.0 nF VDC= 16.0 V IRMS= 0.0 A	1	$0.02	0805 7 mm²
2.	Ccomp	Yageo America	CC0805KRX7R9BB153 Series= X7R	Cap= 15.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
3.	Ccomp2	Samsung Electro-Mechanics	CL21C561JBANFNC Series= C0G/NP0	Cap= 560.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
4.	Cin	Panasonic	25SVPF180M Series= SVPF	Cap= 180.0 uF ESR= 16.0 mOhm VDC= 25.0 V IRMS= 4.65 A	5	$0.61	CAPSMT_62_E12 106 mm²
5.	Cinx	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
6.	Cout	Panasonic	16SVPE470M Series= SVPE	Cap= 470.0 uF ESR= 10.0 mOhm VDC= 16.0 V IRMS= 6.1 A	2	$0.88	CAPSMT_62_JC0 156 mm²
7.	Cramp	Samsung Electro-Mechanics	CL21C122JBFNNNE Series= C0G/NP0	Cap= 1.2 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
8.	Css	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²

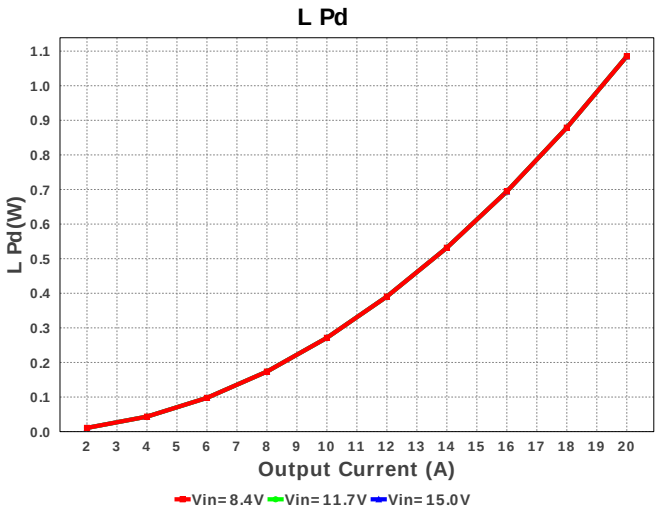
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	Cvcc	CUSTOM	CUSTOM Series= ?	Cap= 1.0 uF VDC= 0.0 V IRMS= 0.0 A	1	NA	CUSTOM 0 mm²
10.	D1	CUSTOM	CUSTOM	VF@Io= 500.0 mV VRRM= 17.647 V	1	NA	CUSTOM 0 mm²
11.	L1	Coiltronics	HC3-6R0-R	L= 6.0 µH DCR= 2.17 mOhm	1	$4.51	 HC3 874 mm²
12.	M1	International Rectifier	IRF6718L2TRPBF	VdsMax= 20.0 V IdsMax= 61.0 Amps	1	$2.21	 DirectFET_L6 100 mm²
13.	M2	Texas Instruments	CSD17573Q5B	VdsMax= 30.0 V IdsMax= 43.0 Amps	1	$0.75	 TRANS_NexFET_Q5B 58 mm²
14.	Rcomp	Panasonic	ERJ-6ENF8251V Series= ERJ-6E	Res= 8.25 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	Yageo America	RC0603FR-075K6L Series= ?	Res= 5.6 kOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.01	 0603 5 mm²
18.	Rsense	Stackpole Electronics Inc	CSNL1206FT2L00 Series= CSNL	Res= 2.0 mOhm Power= 1.0 W Tolerance= 1.0%	1	$0.19	 1206 11 mm²
19.	Rt	Panasonic	ERJ-6ENF4532V Series= ERJ-6E	Res= 45.3 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
20.	Ruv1	Panasonic	ERJ-6ENF3651V Series= ERJ-6E	Res= 3.65 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
21.	Ruv2	Panasonic	ERJ-6ENF1652V Series= ERJ-6E	Res= 16.5 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
22.	U1	Texas Instruments	LM25116MHX/NOPB	Switcher	1	$1.70	 MXA20A 71 mm²

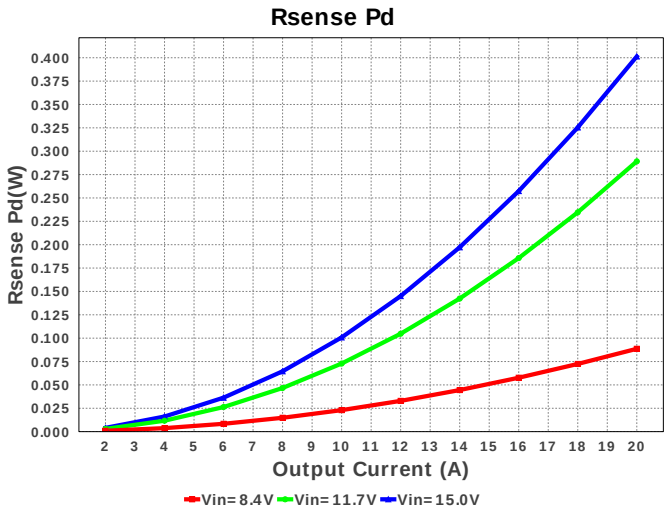


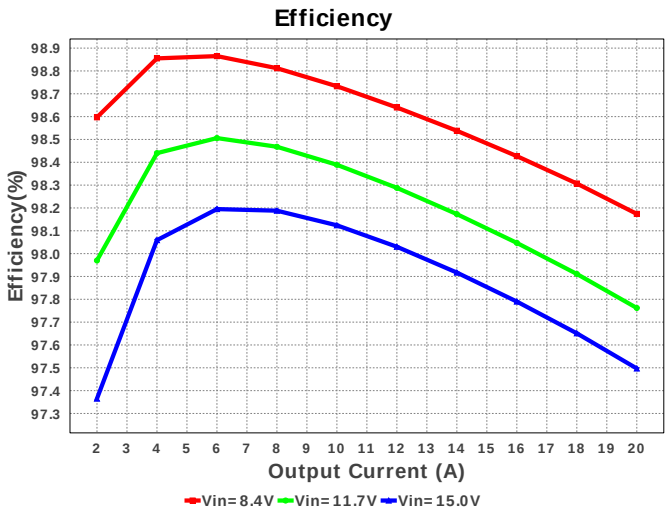


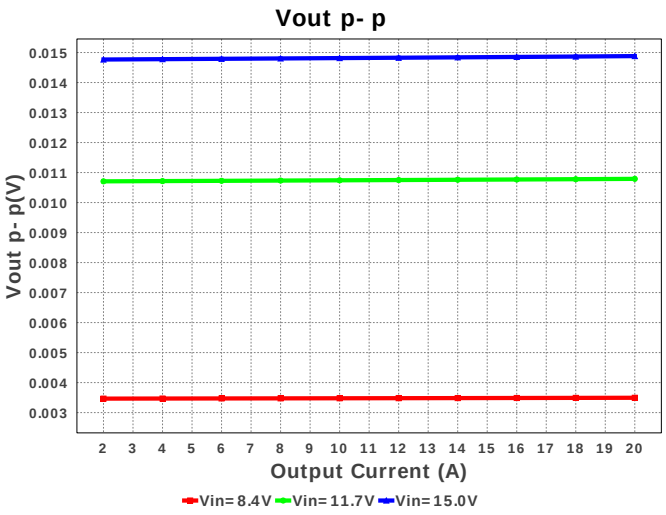


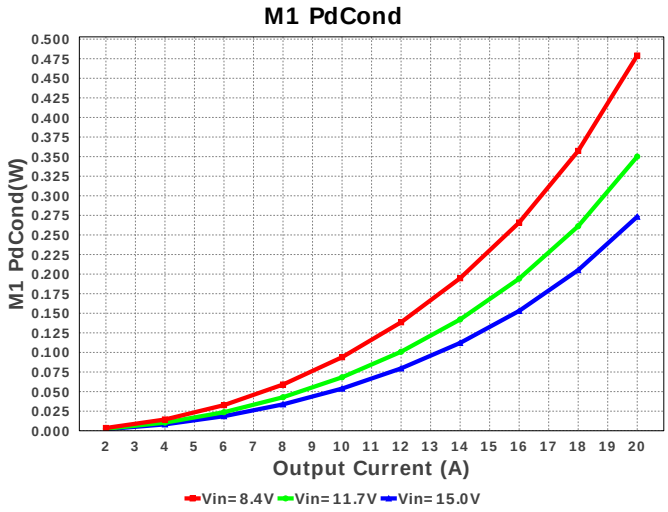


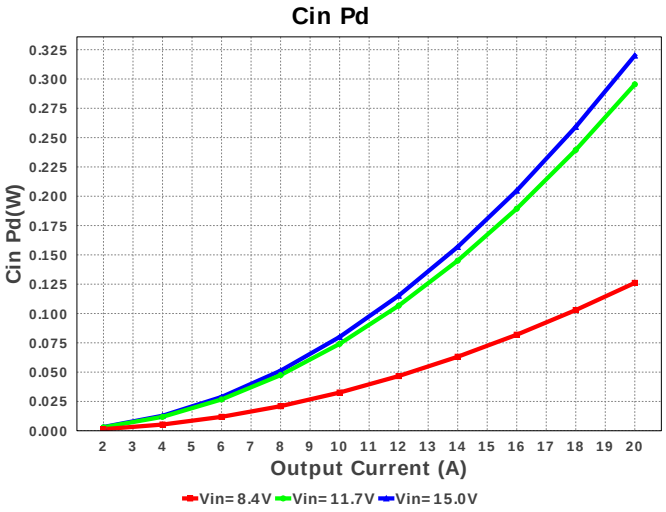


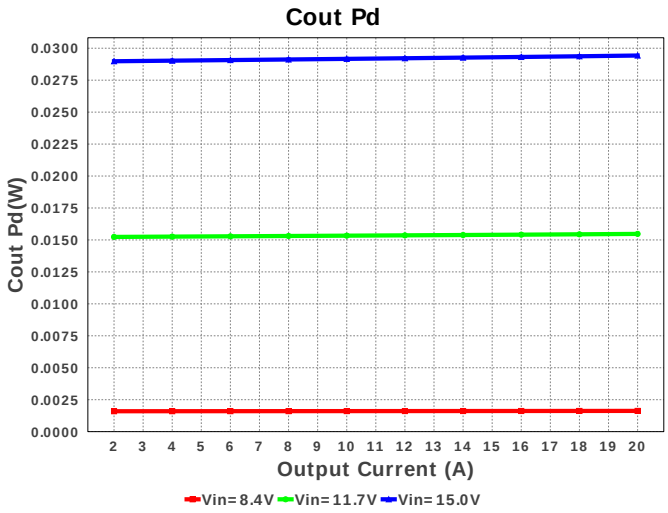


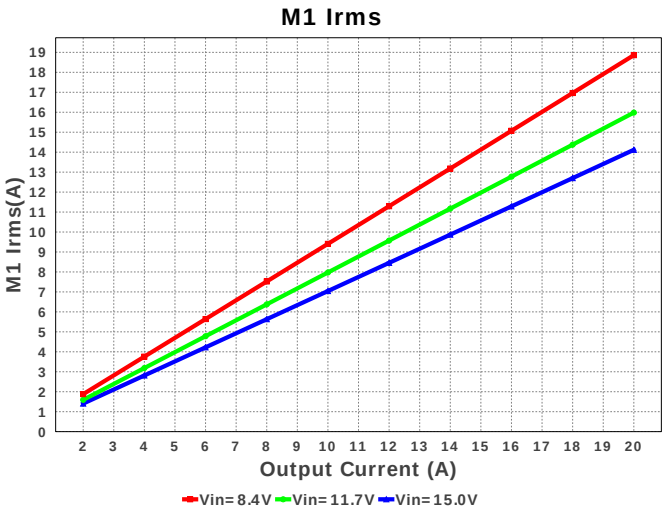


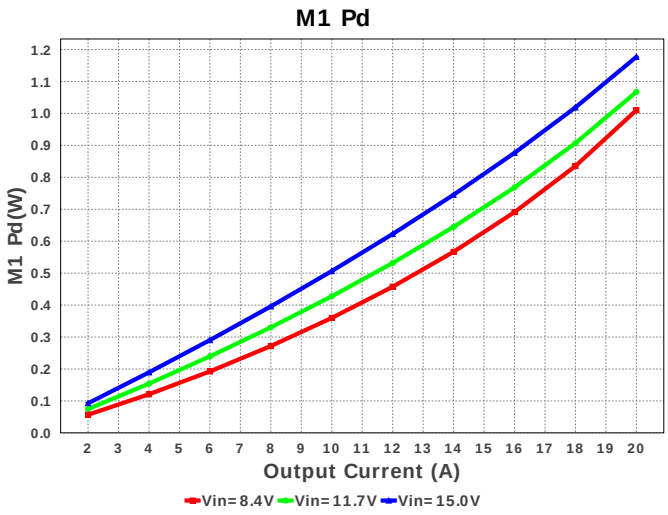


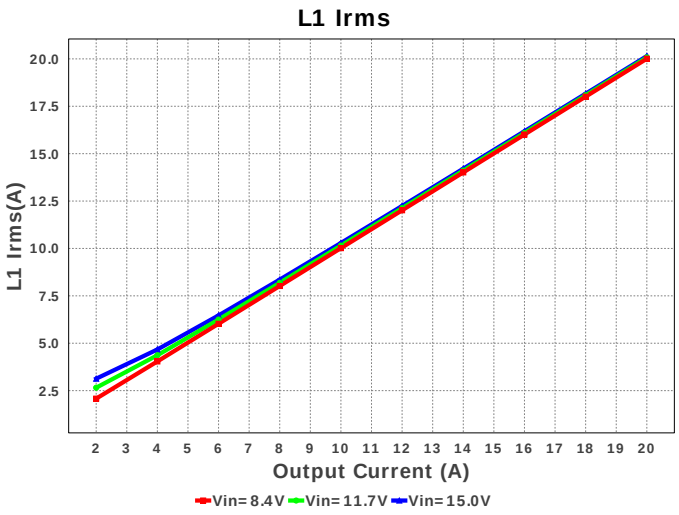


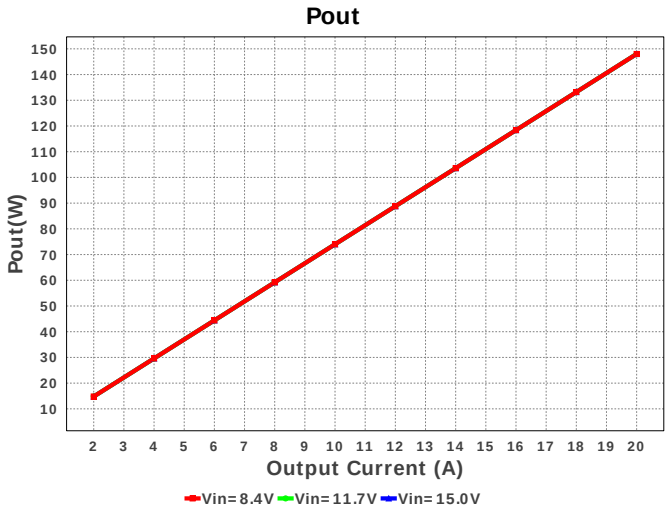


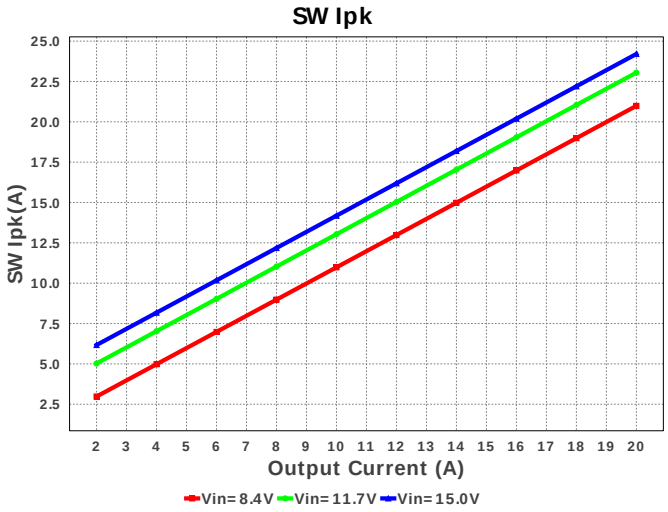


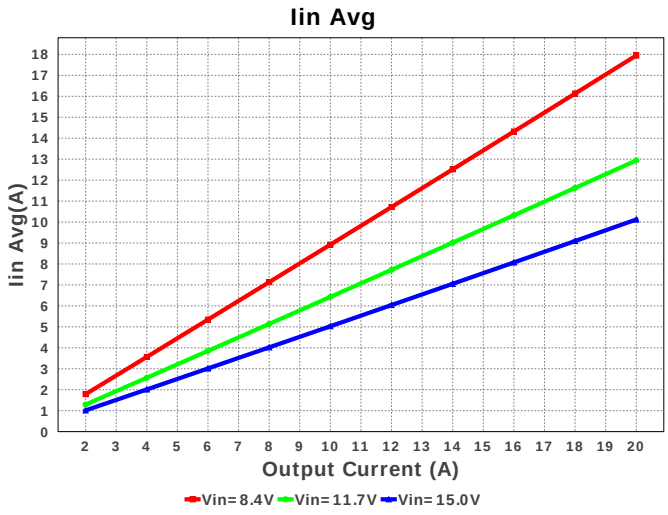


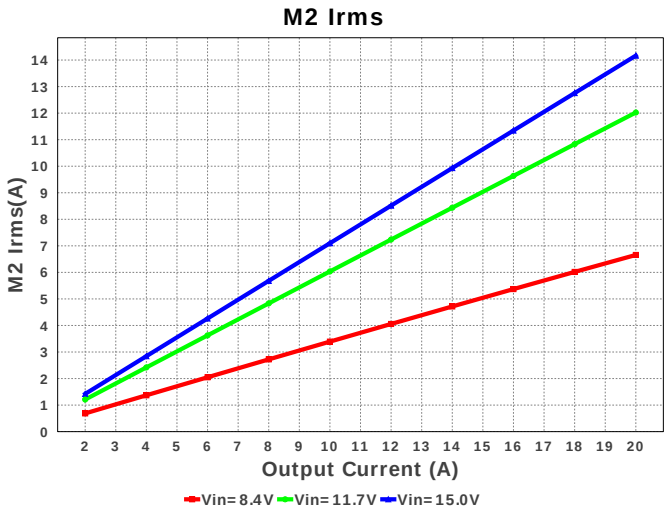


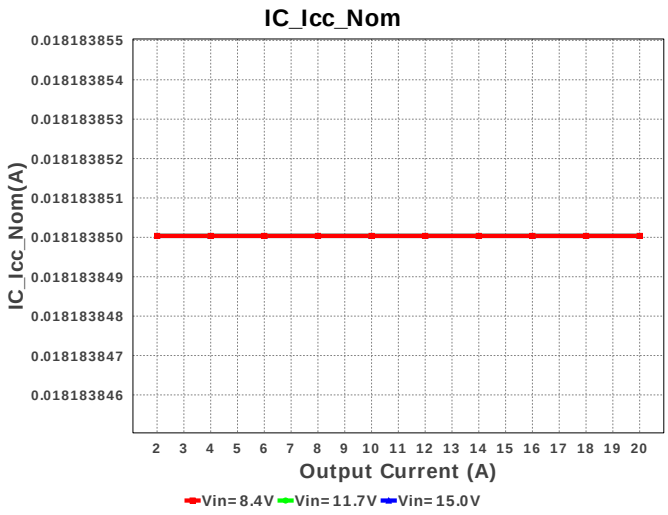


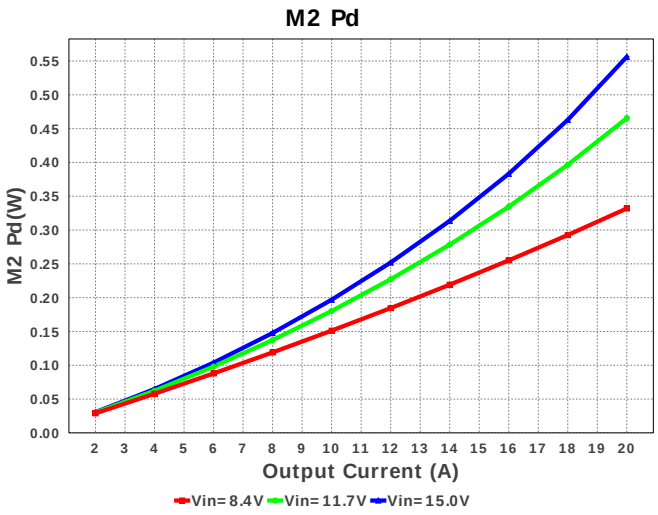


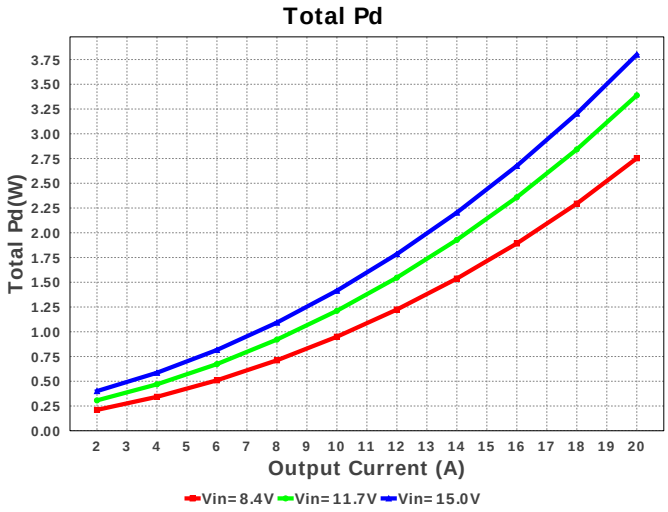


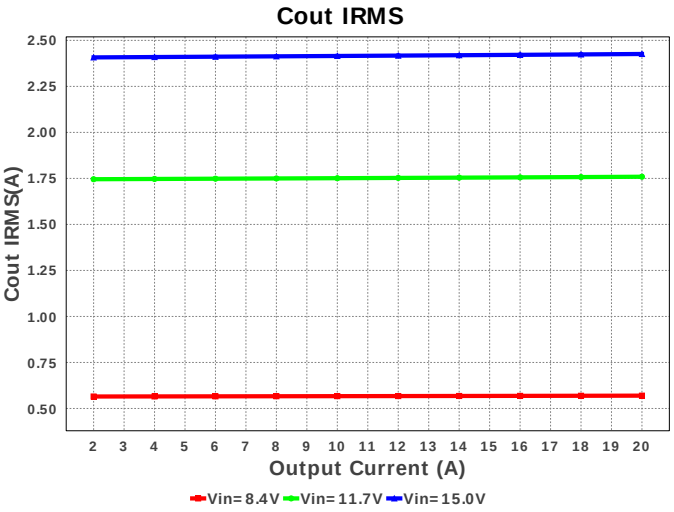


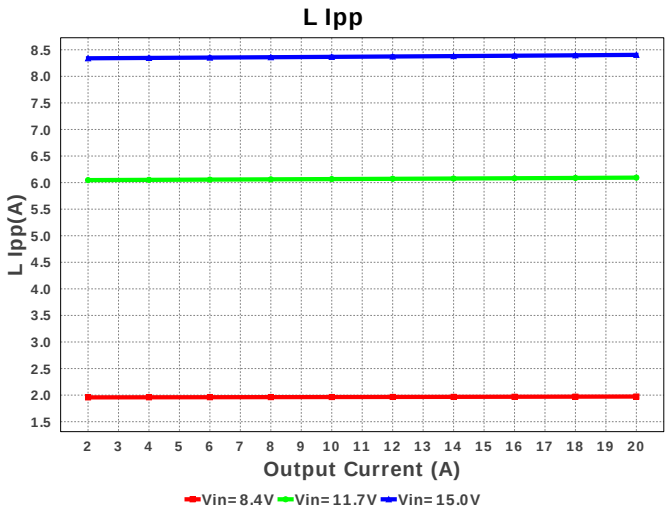


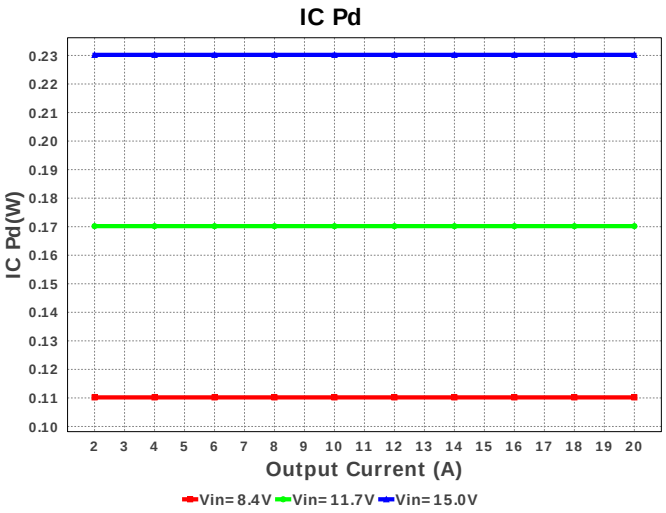


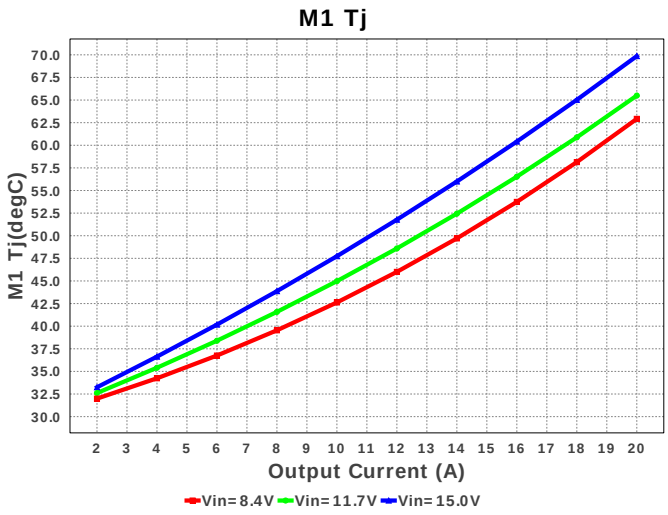


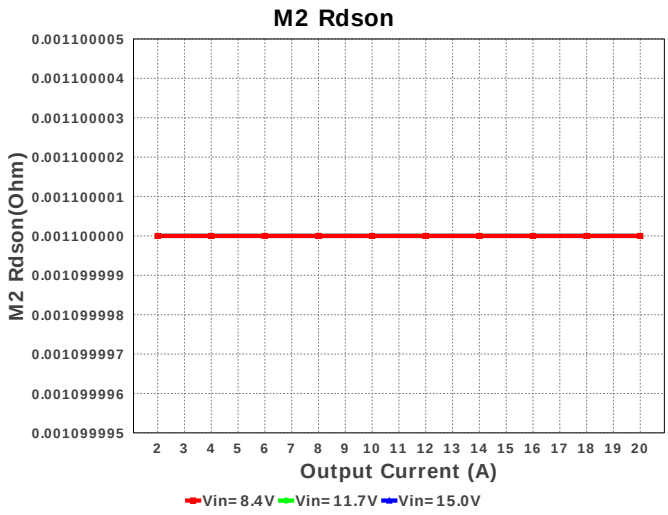


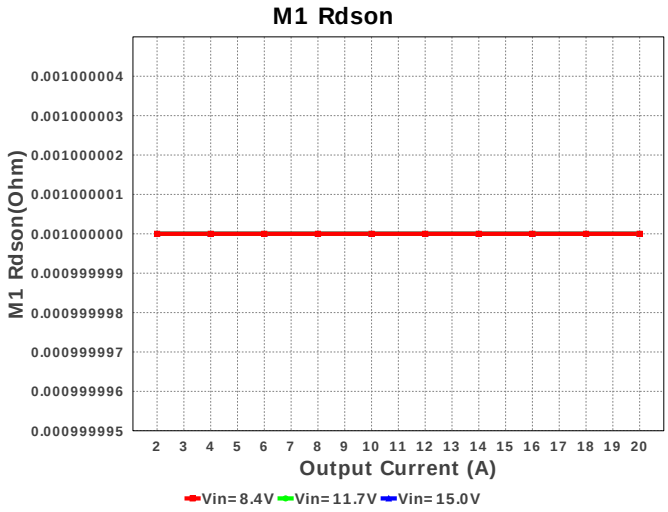


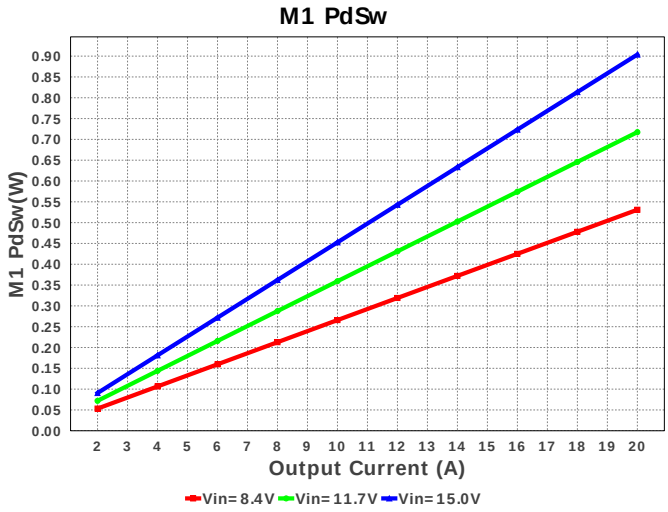


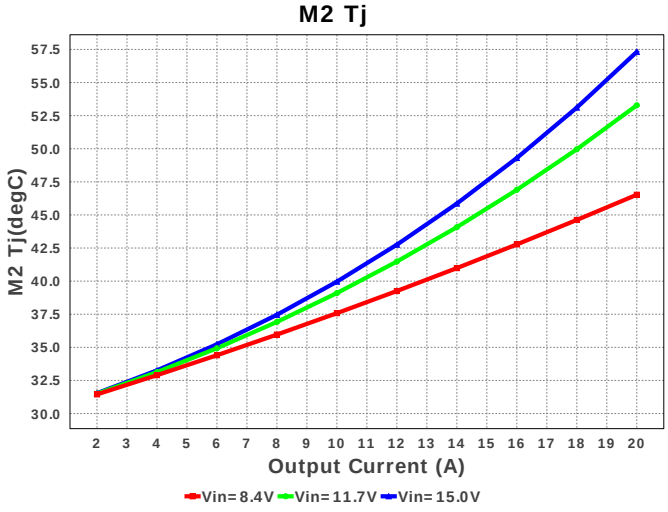


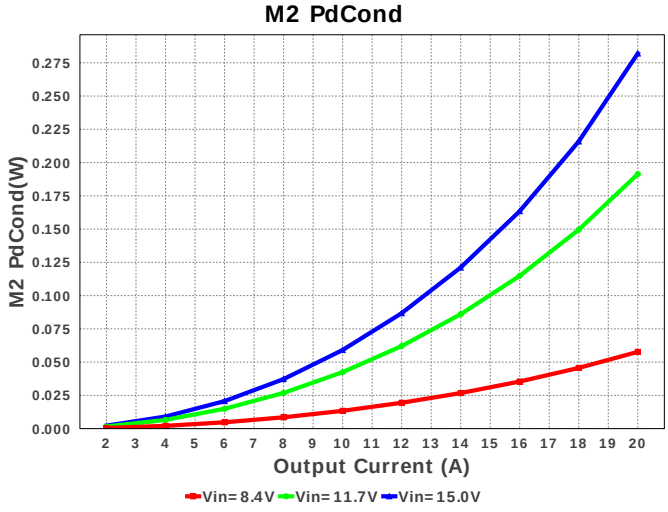












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	10.0 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	2.426 A	Current	Output capacitor RMS ripple current
3.	Iin Avg	10.122 A	Current	Average input current
4.	L Ipp	8.404 A	Current	Peak-to-peak inductor ripple current
5.	L1 Irms	20.146 A	Current	Inductor ripple current
6.	M1 Irms	14.118 A	Current	MOSFET RMS ripple current
7.	M2 Irms	14.166 A	Current	MOSFET RMS ripple current
8.	SW Ipk	24.202 A	Current	Peak switch current
9.	BOM Count	27	General	Total Design BOM count
10.	FootPrint	2.147 k mm^2	General	Total Foot Print Area of BOM components
11.	Frequency	75.102 kHz	General	Switching frequency

#	Name	Value	Category	Description
12.	IC Tolerance	16.0 mV	General	IC Feedback Tolerance
13.	M1 Rdson	1.0 mOhm	General	Drain-Source On-resistance
14.	M2 Rdson	1.1 mOhm	General	Drain-Source On-resistance
15.	Pout	148.0 W	General	Total output power
16.	Total BOM	$0.0	General	Total BOM Cost
17.	Low Freq Gain	84.376 dB	Op_Point	Gain at 10Hz
18.	Cross Freq	11.495 kHz	Op_point	Bode plot crossover frequency
19.	Duty Cycle	49.829 %	Op_point	Duty cycle
20.	Efficiency	97.473 %	Op_point	Steady state efficiency
21.	Gain Marg	-14.64 dB	Op_point	Bode Plot Gain Margin
22.	IC Tj	39.208 degC	Op_point	IC junction temperature
23.	IOUT_OP	20.0 A	Op_point	Iout operating point
24.	M1 Tj	71.404 degC	Op_point	M1 MOSFET junction temperature
25.	M2 Tj	57.053 degC	Op_point	M2 MOSFET junction temperature
26.	Phase Marg	58.452 deg	Op_point	Bode Plot Phase Margin
27.	VIN_OP	15.0 V	Op_point	Vin operating point
28.	Vout p-p	14.881 mV	Op_point	Peak-to-peak output ripple voltage
29.	Cin Pd	319.996 mW	Power	Input capacitor power dissipation
30.	Cout Pd	29.429 mW	Power	Output capacitor power dissipation
31.	IC Pd	230.205 mW	Power	IC power dissipation
32.	L Pd	1.085 W	Power	Inductor power dissipation
33.	M1 Pd	1.22 W	Power	M1 MOSFET total power dissipation
34.	M1 PdCond	273.264 mW	Power	M1 MOSFET conduction losses
35.	M1 PdSw	946.658 mW	Power	M1 MOSFET switching losses
36.	M2 Pd	551.331 mW	Power	M2 MOSFET total power dissipation
37.	M2 PdCond	281.973 mW	Power	M2 MOSFET conduction losses
38.	M2 PdSw	269.358 mW	Power	M2 MOSFET switching losses
39.	Rsense Pd	401.369 mW	Power	Rsense Power Dissipation
40.	Total Pd	3.837 W	Power	Total Power Dissipation
41.	IC_Icc_Nom	18.184 mA	Unknown	IC Icc gate driver current

Design Inputs

#	Name	Value	Description
1.	Iout	20.0	Maximum Output Current
2.	Iout1	20.0	Output Current #1
3.	VinMax	15.0	Maximum input voltage
4.	VinMin	8.4	Minimum input voltage
5.	Vout	7.4	Output Voltage
6.	Vout1	7.4	Output Voltage #1
7.	base_pn	LM25116	Texas Instruments Base Part Number
8.	source	DC	Input Source Type
9.	ta	30.0	Ambient temperature

Design Assistance

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