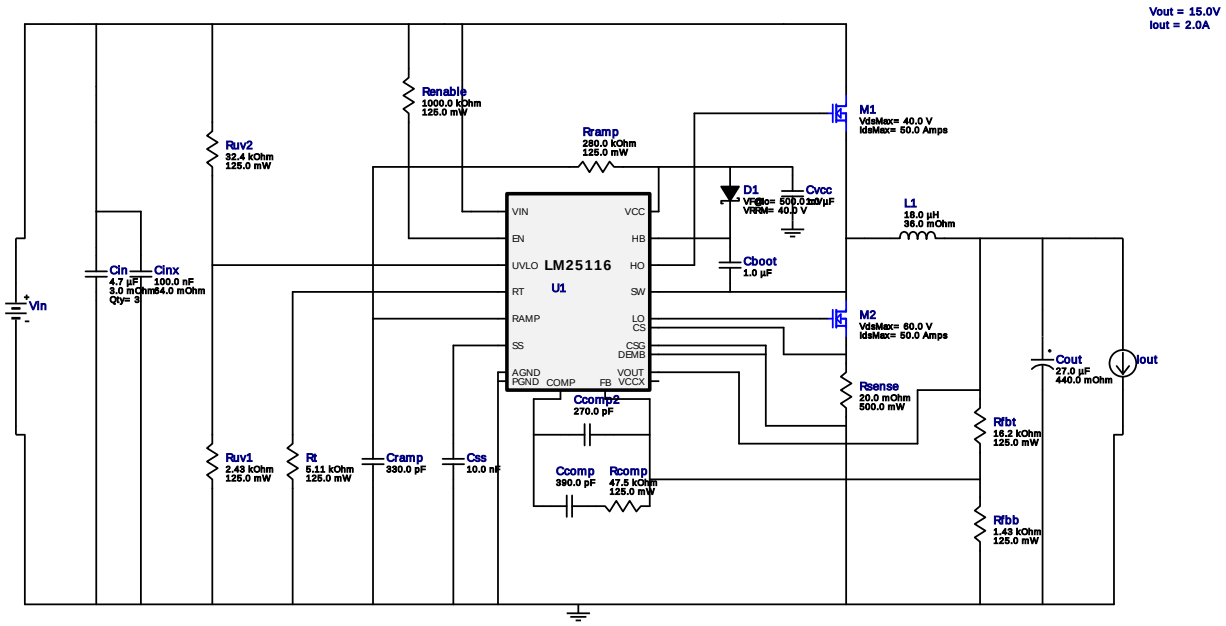
WEBENCH® Design Report

VinMin = 22.0V
VinMax = 30.0V
Vout = 15.0V
Iout = 2.0A

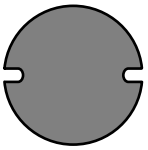
Device = LM25116MHX/NOPB
Topology = Buck
Created = 7/17/16 8:23:07 AM
BOM Cost = $3.74
BOM Count = 25
Total Pd = 1.28W

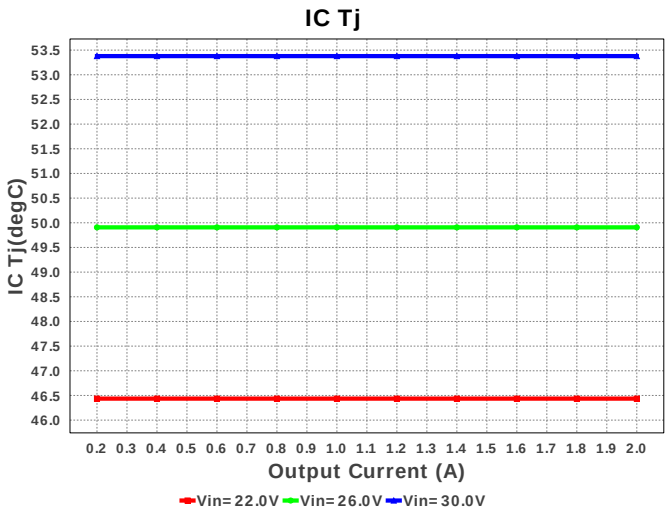
Design : 4352199/44 LM25116MHX/NOPB
LM25116MHX/NOPB 22.0V-30.0V to 15.00V @ 2.0A

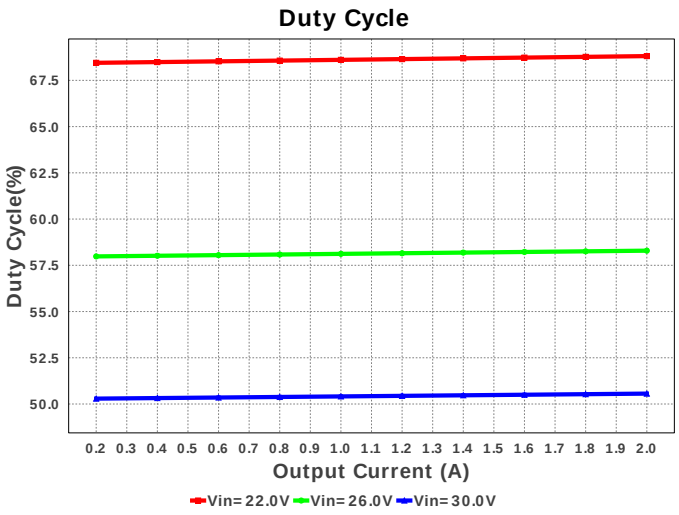


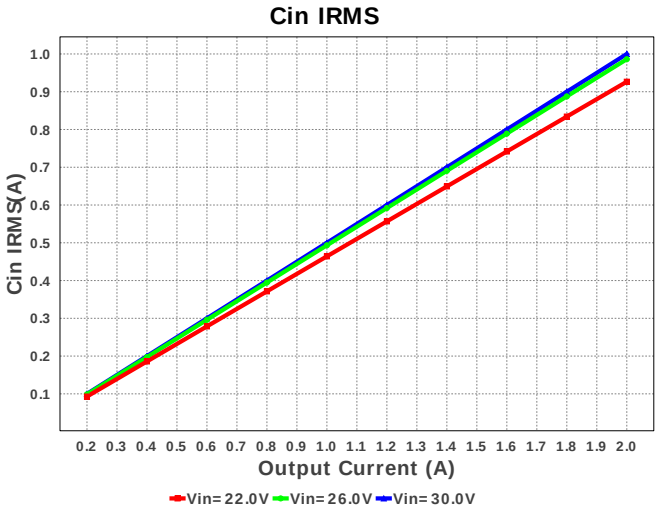
Electrical BOM

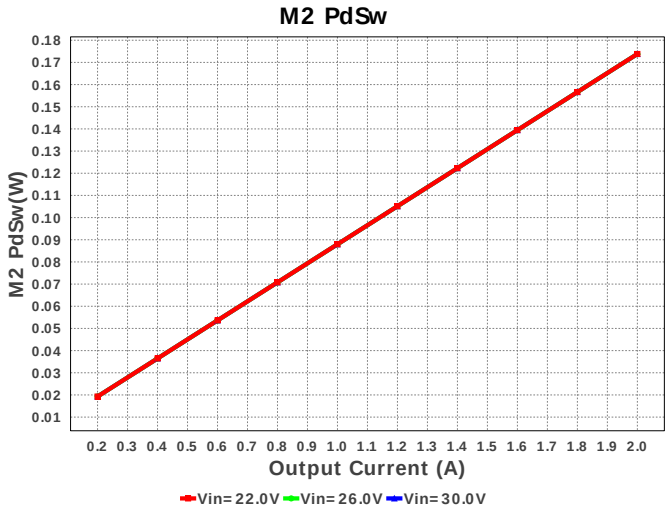
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Taiyo Yuden	EMK212B7105KG-T Series= X7R	Cap= 1.0 uF VDC= 16.0 V IRMS= 0.0 A	1	$0.02	0805 7 mm²
2.	Ccomp	Yageo America	CC0805KRX7R9BB391 Series= X7R	Cap= 390.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
3.	Ccomp2	Yageo America	CC0805KRX7R9BB271 Series= X7R	Cap= 270.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
4.	Cin	MuRata	GRM31CR71H475KA12L Series= X7R	Cap= 4.7 uF ESR= 3.0 mOhm VDC= 50.0 V IRMS= 4.98 A	3	$0.07	1206 11 mm²
5.	Cinx	Kemet	C0805C104K5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	0805 7 mm²
6.	Cout	Nichicon	UUD1E270MCL1GS Series= uD	Cap= 27.0 uF ESR= 440.0 mOhm VDC= 25.0 V IRMS= 230.0 mA	1	$0.11	SM_RADIAL_6.3AMM 80 mm²
7.	Cramp	Samsung Electro-Mechanics	CL21C331JBANFNC Series= C0G/NP0	Cap= 330.0 pF 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

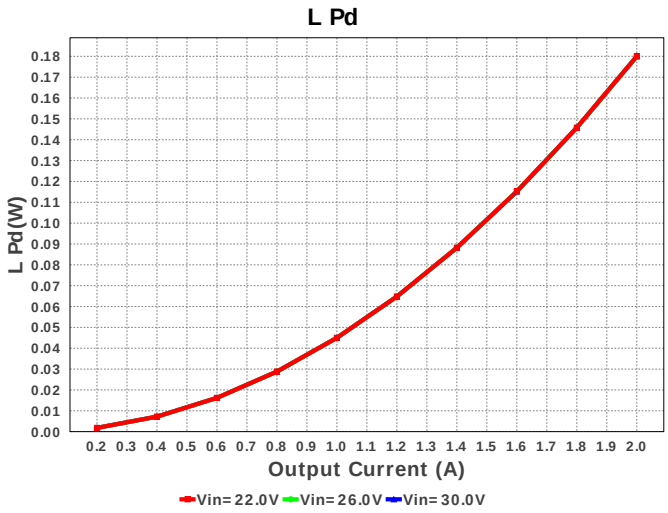
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	Cvcc	Taiyo Yuden	EMK212B7105KG-T Series= X7R	Cap= 1.0 uF VDC= 16.0 V IRMS= 0.0 A	1	$0.02	 0805 7 mm²
10.	D1	Vishay-Semiconductor	SS14-E3/61T	VF@Io= 500.0 mV VRRM= 40.0 V	1	$0.08	 SMA 37 mm²
11.	L1	Bourns	SDR1307-180ML	L= 18.0 µH DCR= 36.0 mOhm	1	$0.35	 SDR1307 227 mm²
12.	M1	Texas Instruments	CSD18504Q5A	VdsMax= 40.0 V IdsMax= 50.0 Amps	1	$0.56	 TRANS_NexFET_Q5A 55 mm²
13.	M2	Texas Instruments	CSD18537NQ5A	VdsMax= 60.0 V IdsMax= 50.0 Amps	1	$0.46	 TRANS_NexFET_Q5A 55 mm²
14.	Rcomp	Panasonic	ERJ-6ENF4752V Series= ERJ-6E	Res= 47.5 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-6ENF1431V Series= ERJ-6E	Res= 1.43 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
17.	Rfbt	Panasonic	ERJ-6ENF1622V Series= ERJ-6E	Res= 16.2 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
18.	Rramp	Panasonic	ERJ-6ENF2803V Series= ERJ-6E	Res= 280.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
19.	Rsense	Stackpole Electronics Inc	CSR1206FK20L0 Series= ?	Res= 20.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	$0.10	 1206 11 mm²
20.	Rt	Panasonic	ERJ-6ENF5111V Series= ERJ-6E	Res= 5.11 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
21.	Ruv1	Panasonic	ERJ-6ENF2431V Series= ERJ-6E	Res= 2.43 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
22.	Ruv2	Panasonic	ERJ-6ENF3242V Series= ERJ-6E	Res= 32.4 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	 0805 7 mm²
23.	U1	Texas Instruments	LM25116MHX/NOPB	Switcher	1	$1.70	 MXA20A 71 mm²

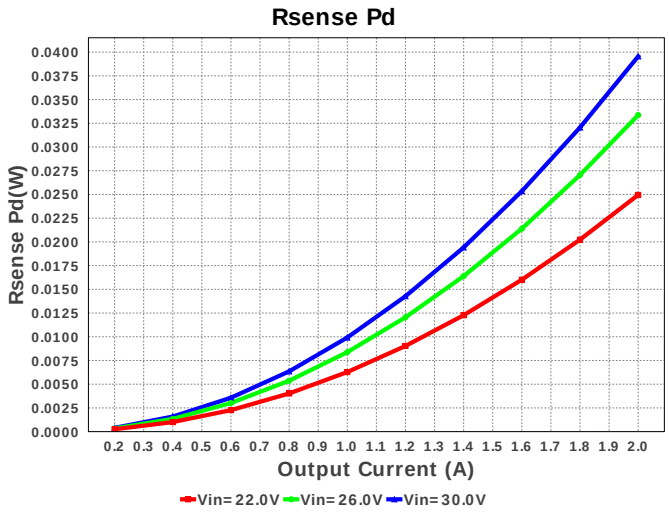


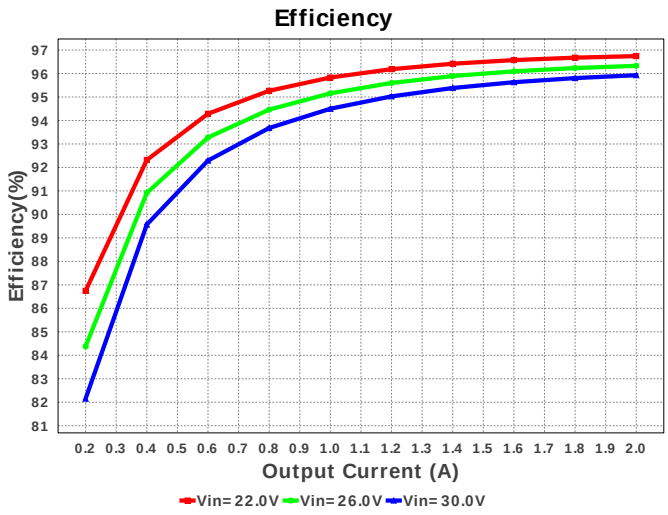


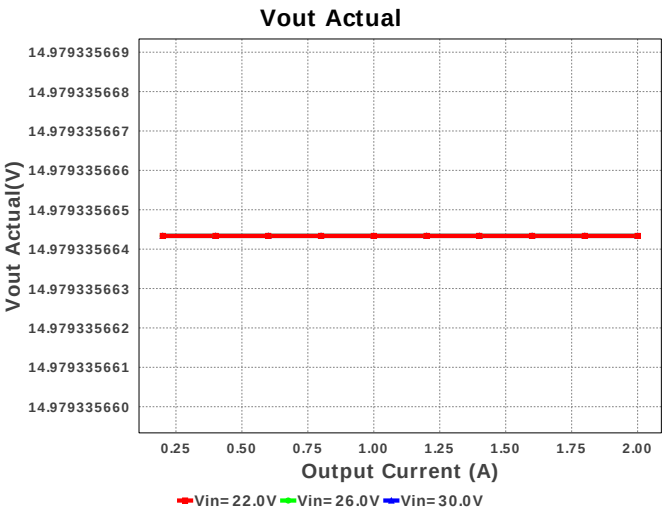


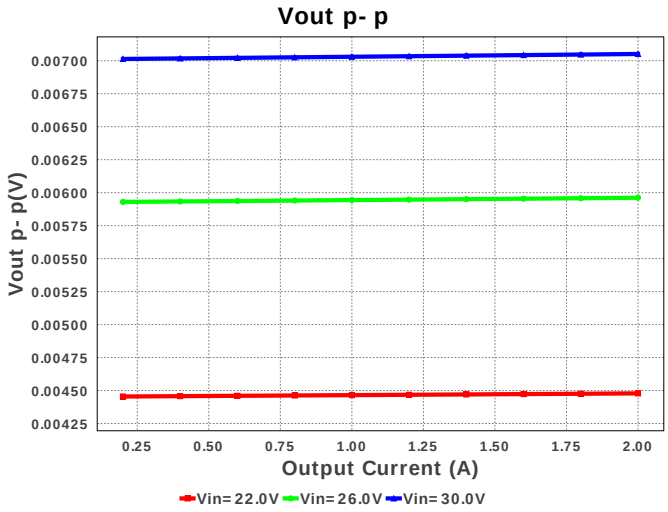


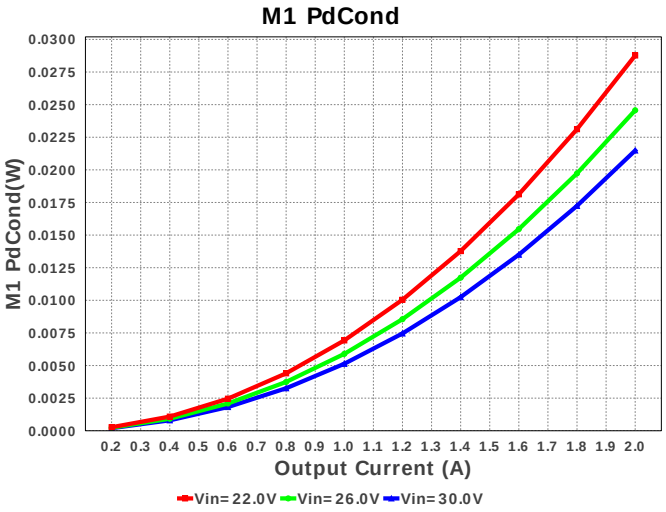


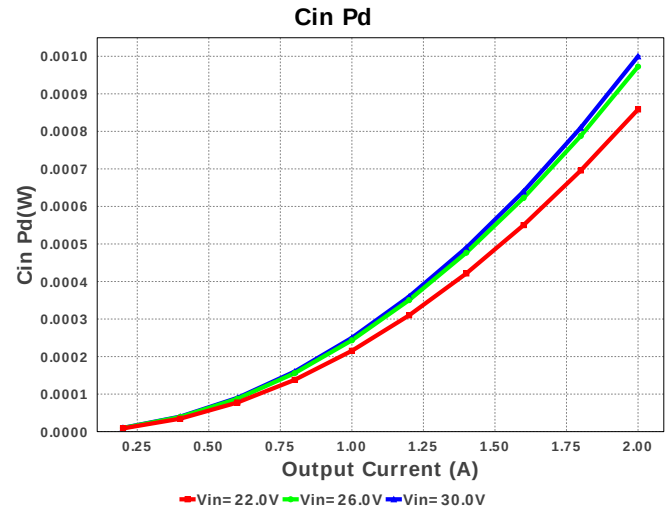


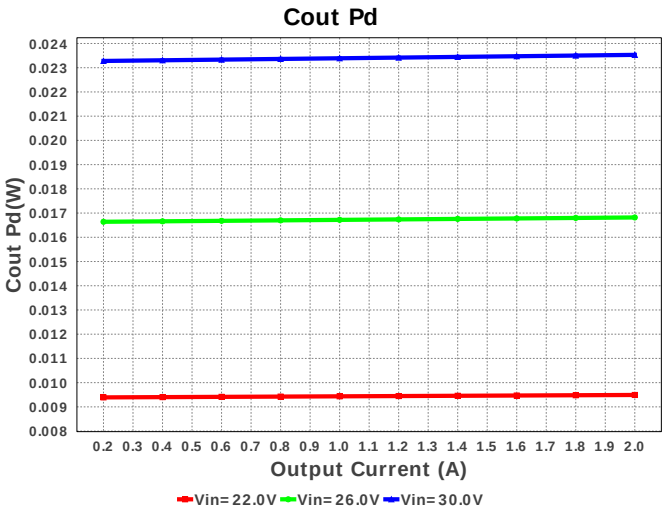


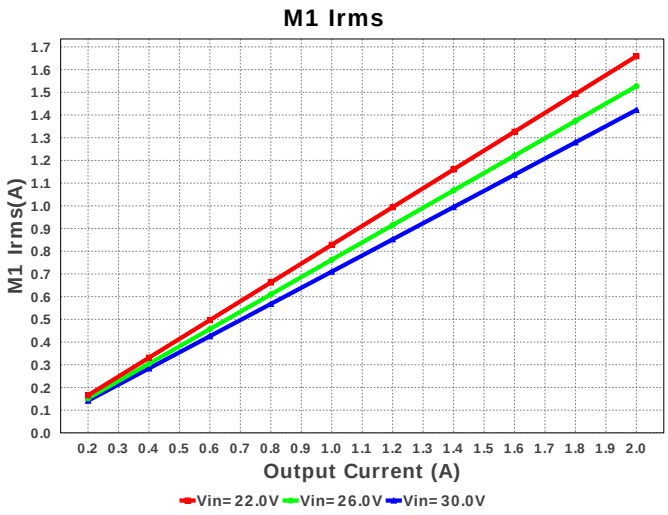


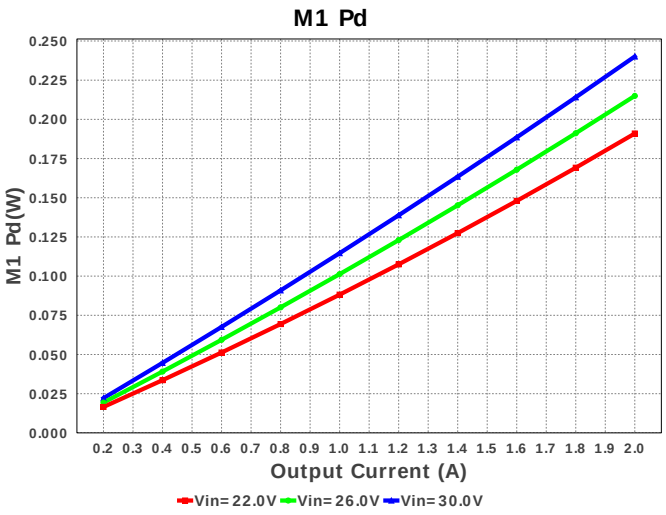


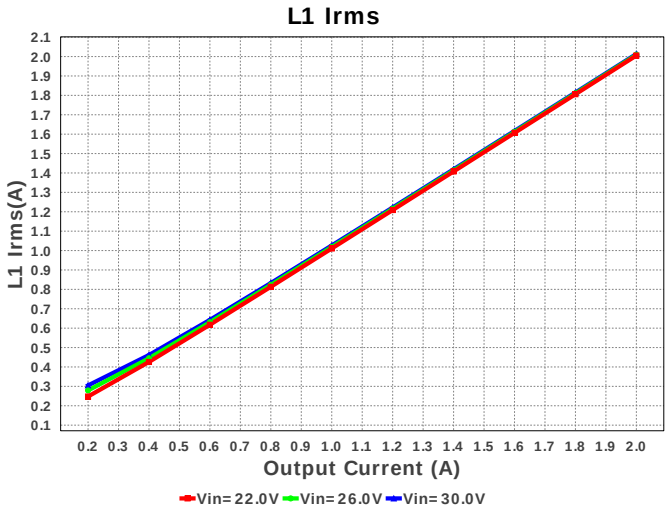


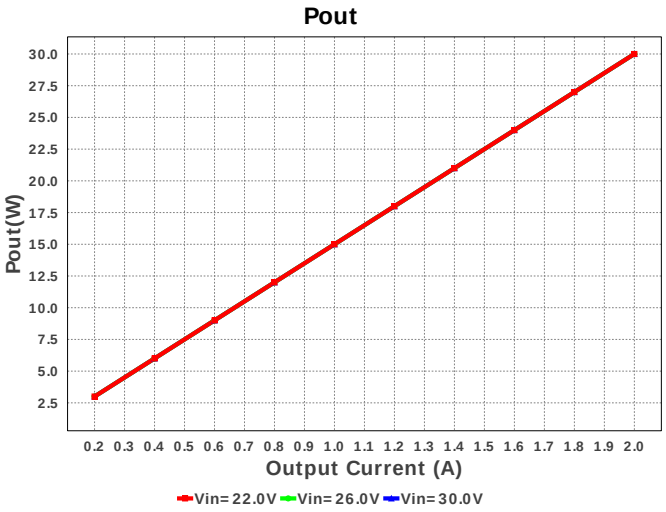


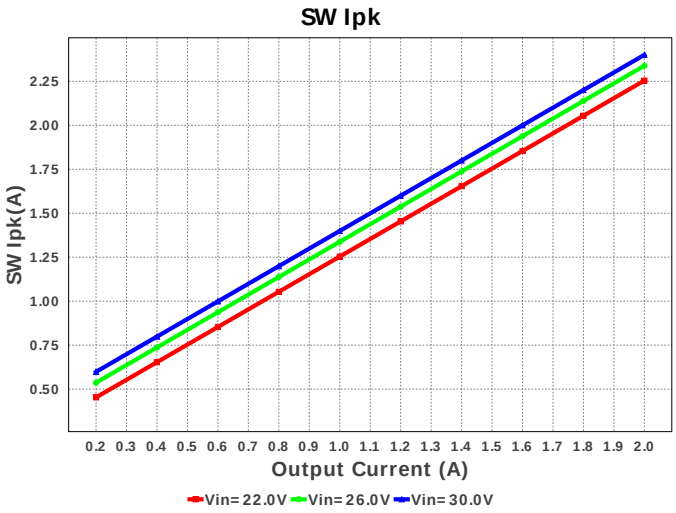


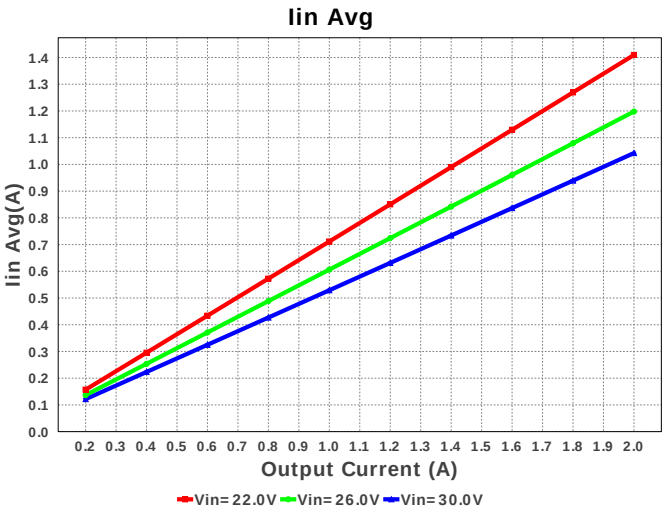


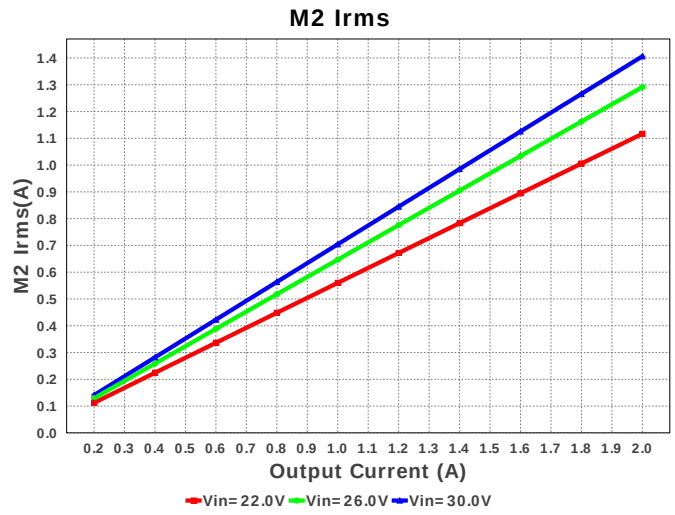


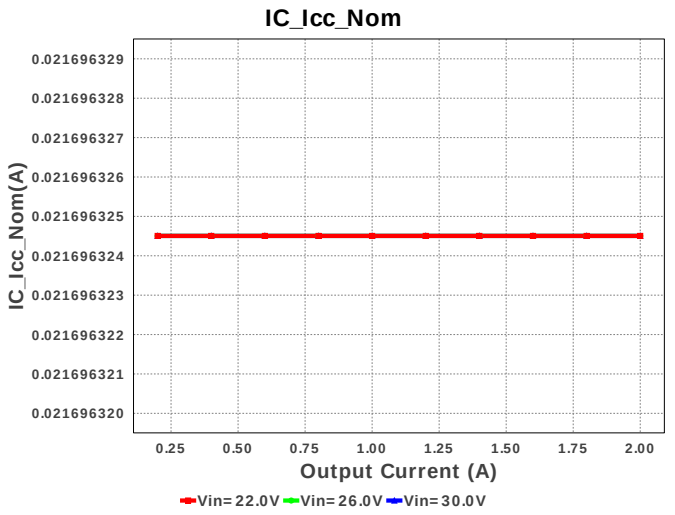


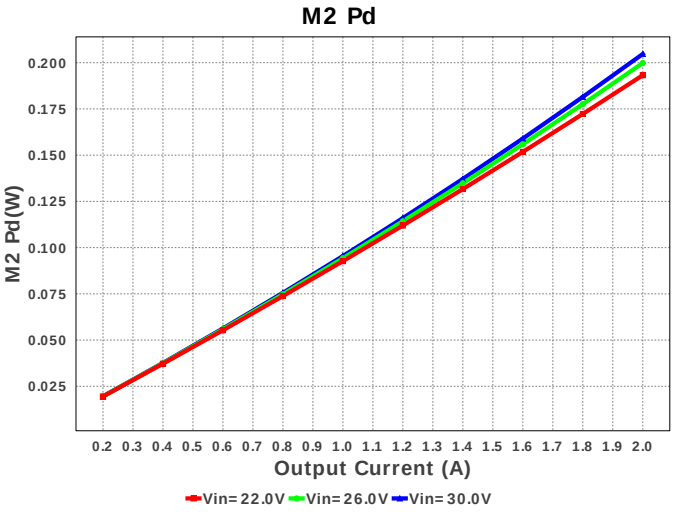


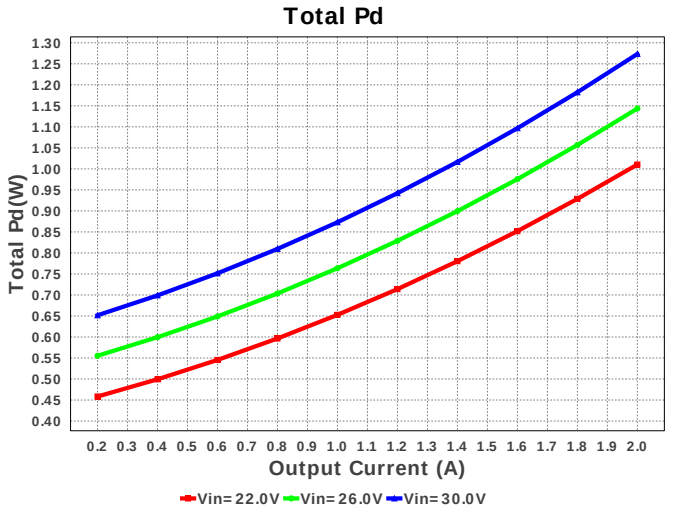


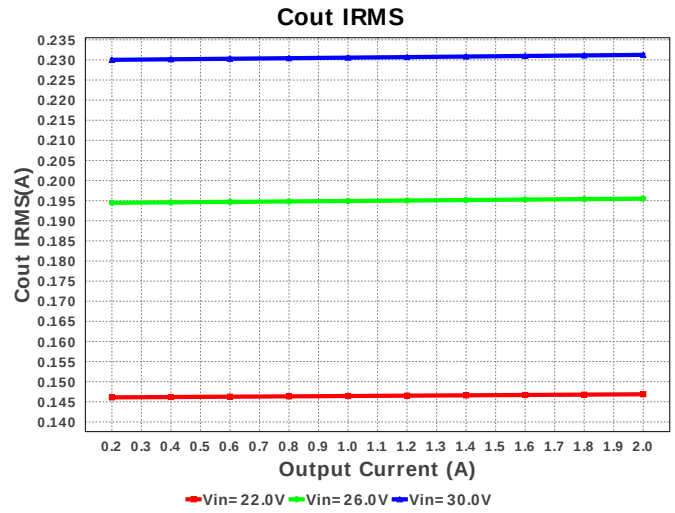


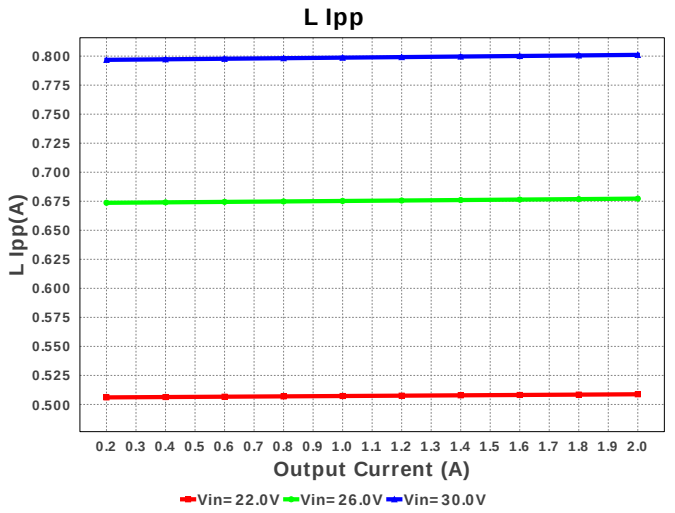


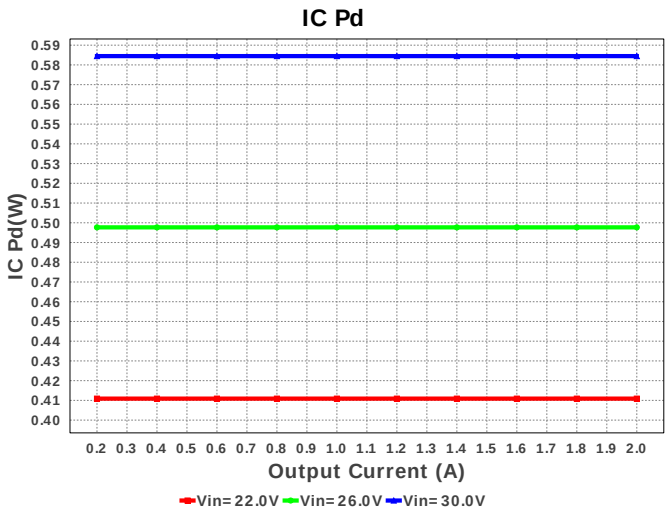


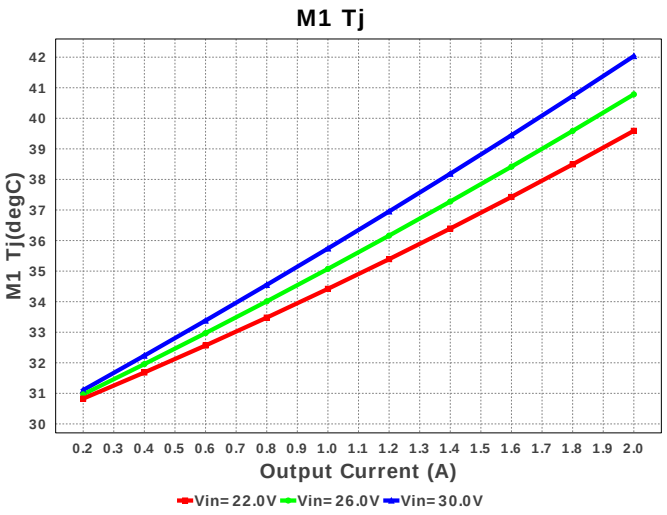


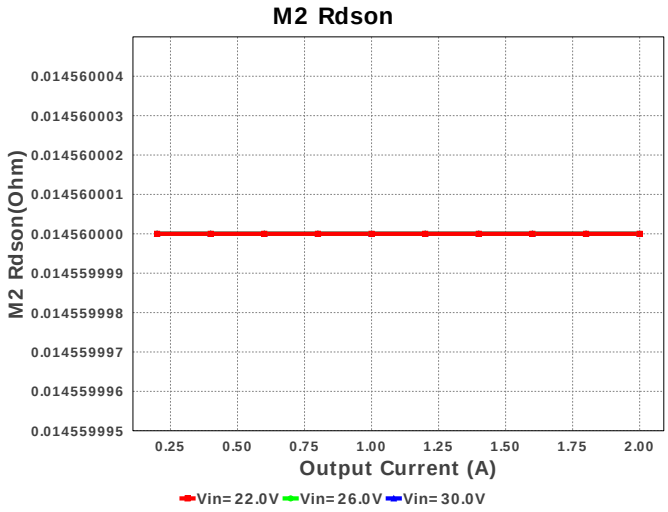


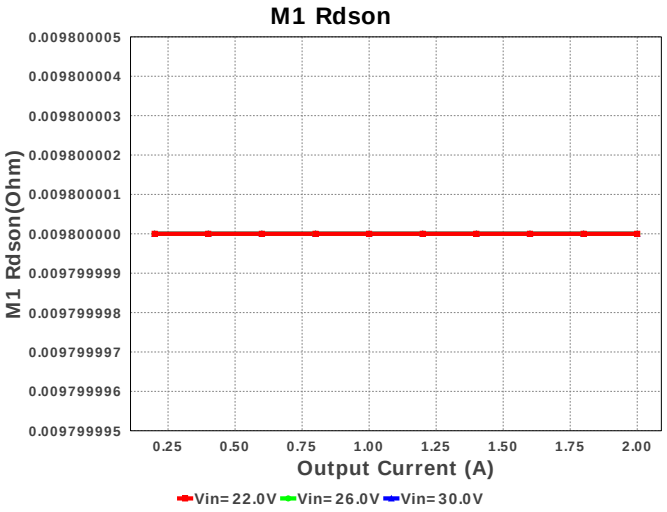


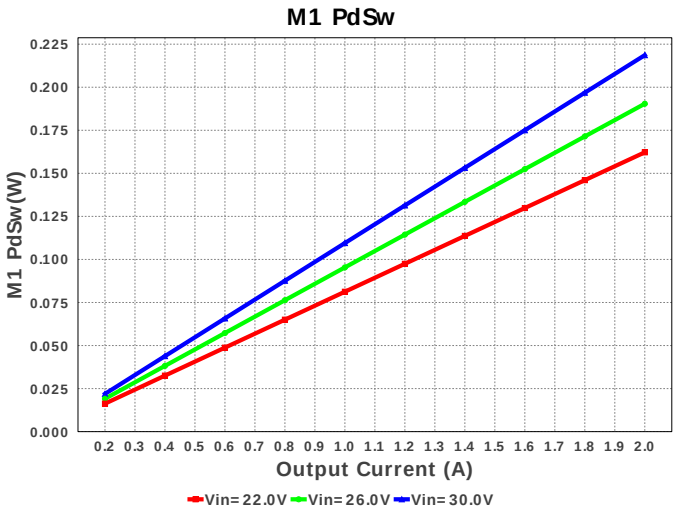


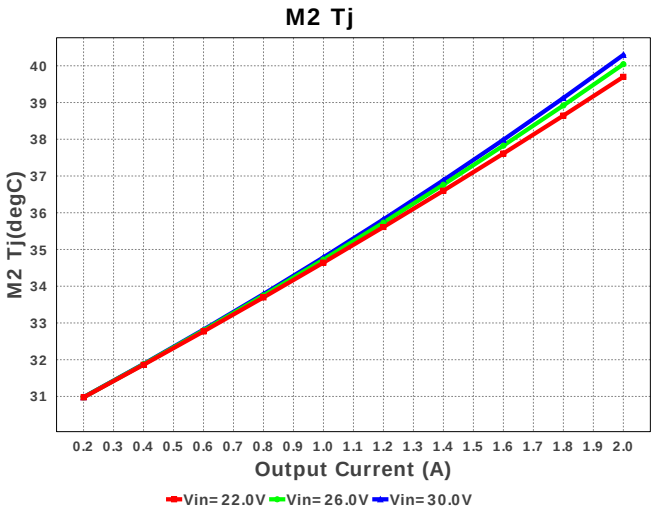


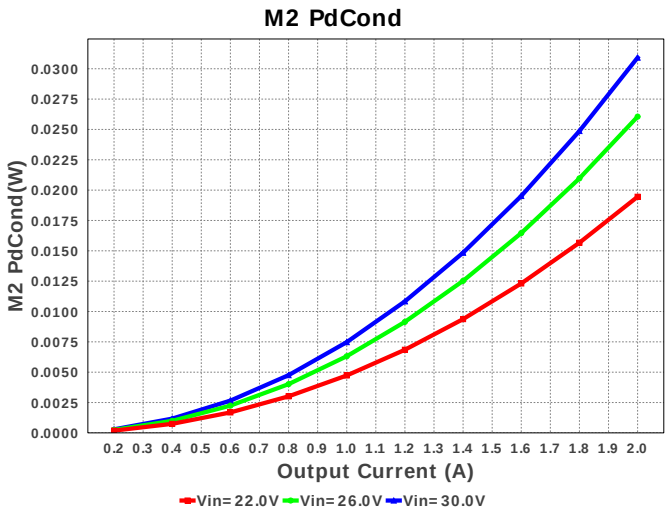












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	999.937 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	231.253 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	1.043 A	Current	Average input current
4.	L Ipp	801.08 mA	Current	Peak-to-peak inductor ripple current
5.	L1 Irms	2.013 A	Current	Inductor ripple current
6.	M1 Irms	1.422 A	Current	MOSFET RMS ripple current
7.	M2 Irms	1.406 A	Current	MOSFET RMS ripple current
8.	SW Ipk	2.401 A	Current	Peak switch current
9.	BOM Count	25	General	Total Design BOM count
10.	FootPrint	671.0 mm^2	General	Total Foot Print Area of BOM components
11.	Frequency	525.973 kHz	General	Switching frequency
12.	IC Tolerance	16.0 mV	General	IC Feedback Tolerance
13.	M1 Rdson	9.8 mOhm	General	Drain-Source On-resistance
14.	M2 Rdson	14.56 mOhm	General	Drain-Source On-resistance
15.	Pout	30.0 W	General	Total output power
16.	Total BOM	$3.74	General	Total BOM Cost
17.	Low Freq Gain	110.385 dB	Op_Point	Gain at 10Hz
18.	Vout Actual	14.979 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
19.	Cross Freq	78.014 kHz	Op_point	Bode plot crossover frequency
20.	Duty Cycle	50.562 %	Op_point	Duty cycle
21.	Efficiency	95.91 %	Op_point	Steady state efficiency
22.	Gain Marg	-6.217 dB	Op_point	Bode Plot Gain Margin
23.	IC Tj	53.379 degC	Op_point	IC junction temperature
24.	IOUT_OP	2.0 A	Op_point	Iout operating point
25.	M1 Tj	42.525 degC	Op_point	M1 MOSFET junction temperature
26.	M2 Tj	40.116 degC	Op_point	M2 MOSFET junction temperature
27.	Phase Marg	79.672 deg	Op_point	Bode Plot Phase Margin
28.	VIN_OP	30.0 V	Op_point	Vin operating point
29.	Vout p-p	7.051 mV	Op_point	Peak-to-peak output ripple voltage
30.	Cin Pd	999.874 µW	Power	Input capacitor power dissipation
31.	Cout Pd	23.53 mW	Power	Output capacitor power dissipation
32.	IC Pd	584.463 mW	Power	IC power dissipation
33.	L Pd	180.0 mW	Power	Inductor power dissipation
34.	M1 Pd	249.812 mW	Power	M1 MOSFET total power dissipation
35.	M1 PdCond	21.474 mW	Power	M1 MOSFET conduction losses
36.	M1 PdSw	228.338 mW	Power	M1 MOSFET switching losses
37.	M2 Pd	201.126 mW	Power	M2 MOSFET total power dissipation
38.	M2 PdCond	30.903 mW	Power	M2 MOSFET conduction losses
39.	M2 PdSw	170.223 mW	Power	M2 MOSFET switching losses
40.	Rsense Pd	39.551 mW	Power	LED Current Rsns Power Dissipation
41.	Total Pd	1.279 W	Power	Total Power Dissipation
42.	IC Icc Nom	21.696 mA		IC Icc gate driver current
43.	Vout Tolerance	3.198 %		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	30.0	Maximum input voltage
3.	VinMin	22.0	Minimum input voltage
4.	Vout	15.0	Output Voltage

#	Name	Value	Description
5.	base_pn	LM25116	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	30.0	Ambient temperature

Design Assistance

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