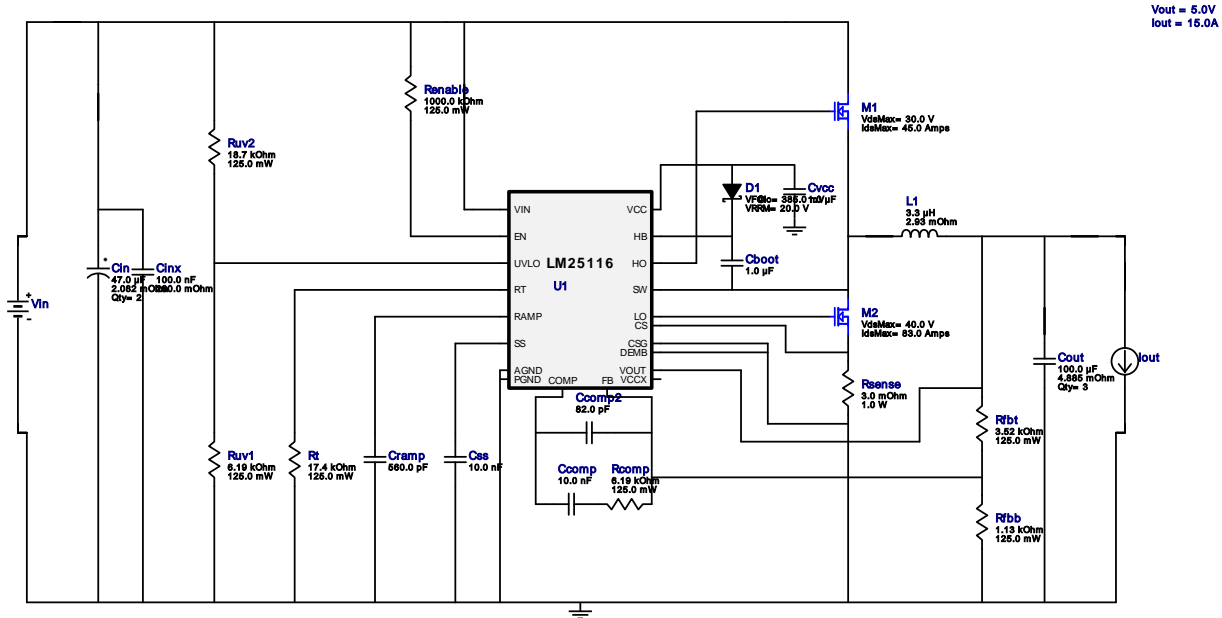


## WEBENCH® Design Report

Design : 4875907/6 LM25116MHX/NOPB  
LM25116MHX/NOPB 6.0V-17.0V to 5.00V @ 15.0A



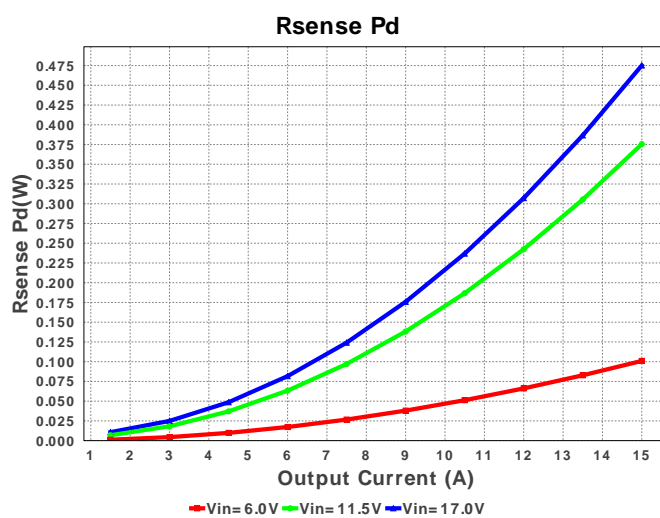
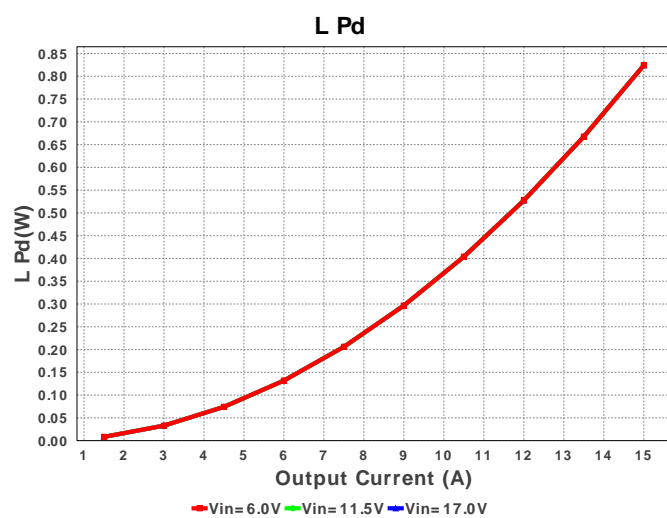
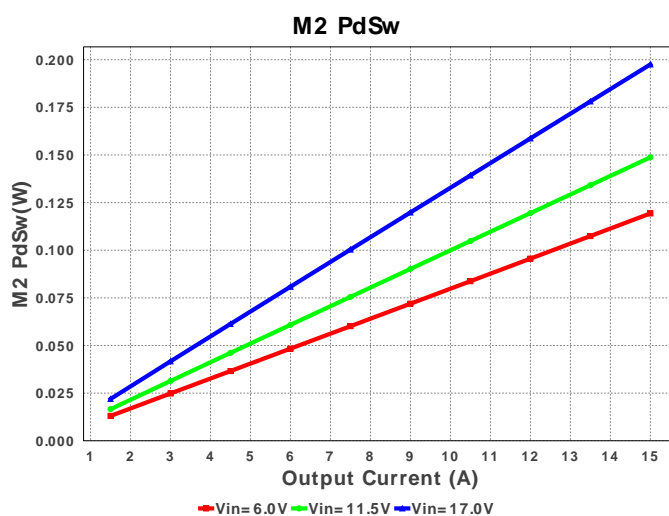
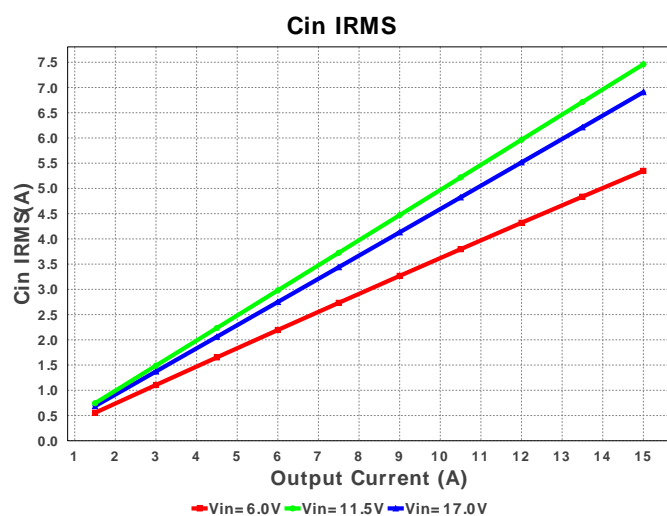
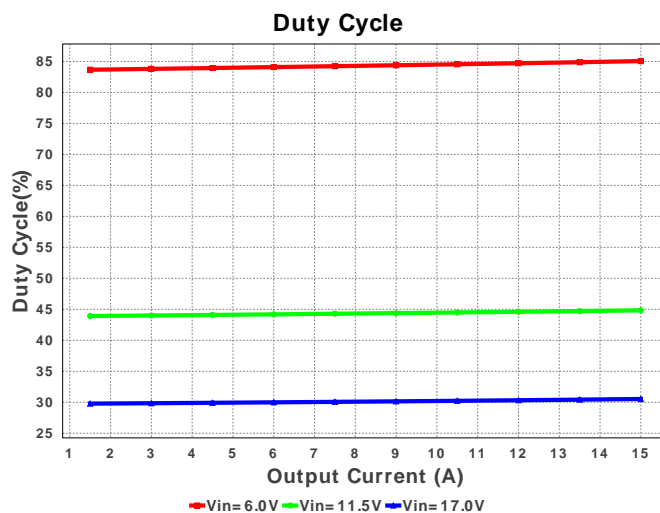
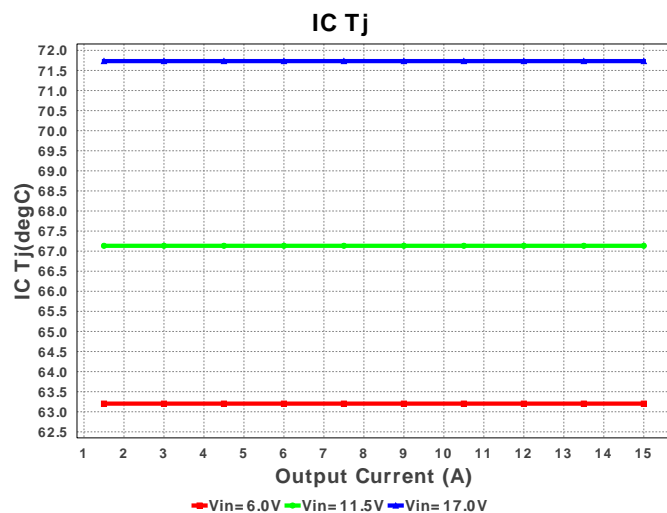
### My Comments

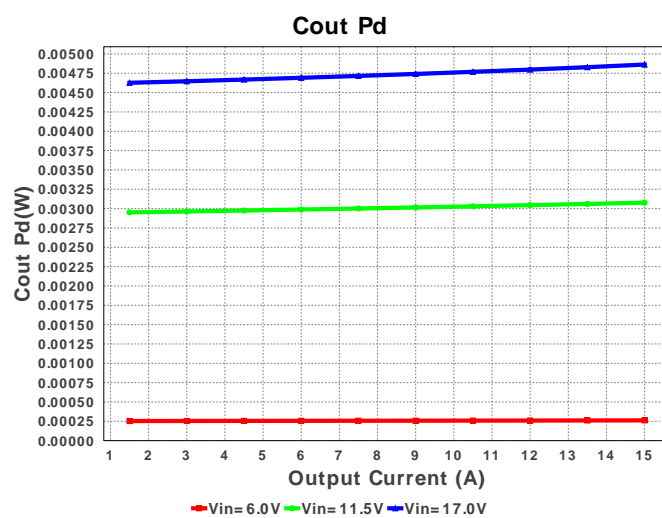
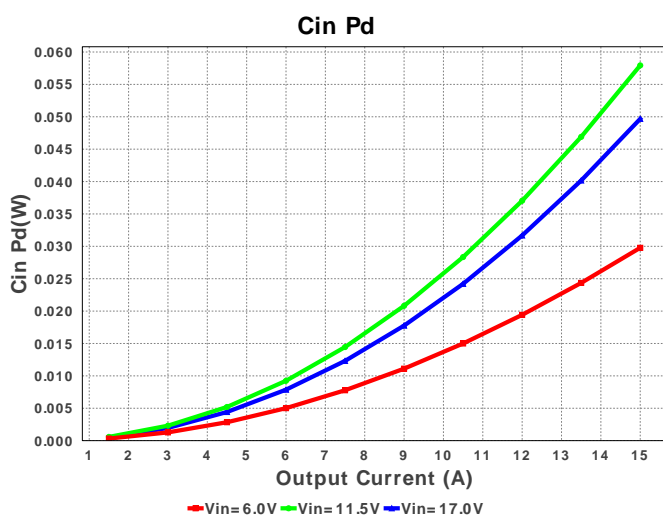
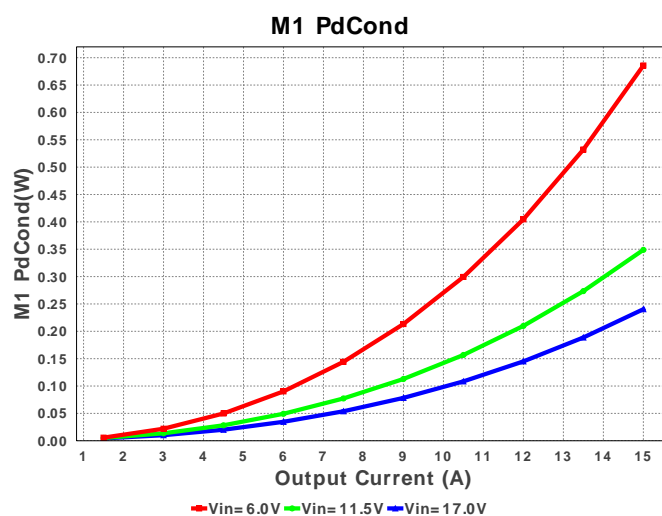
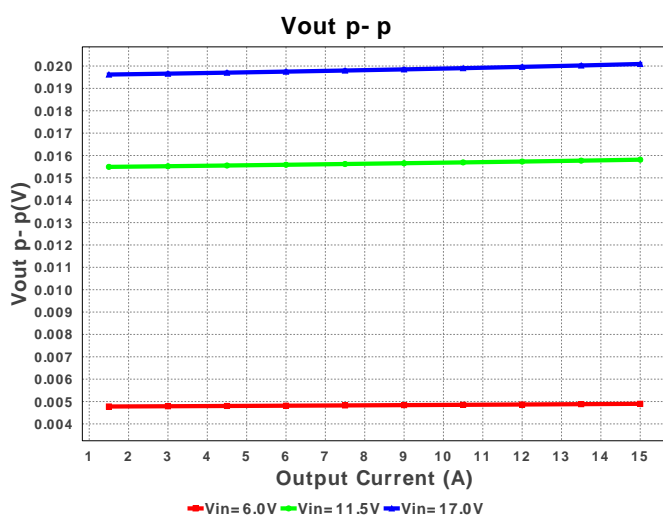
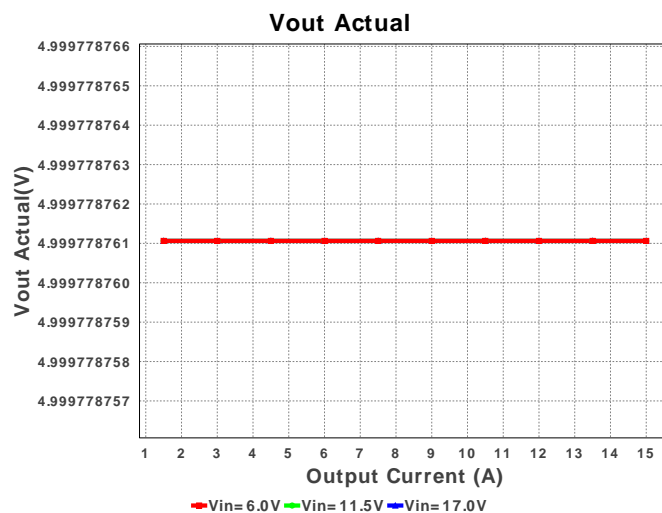
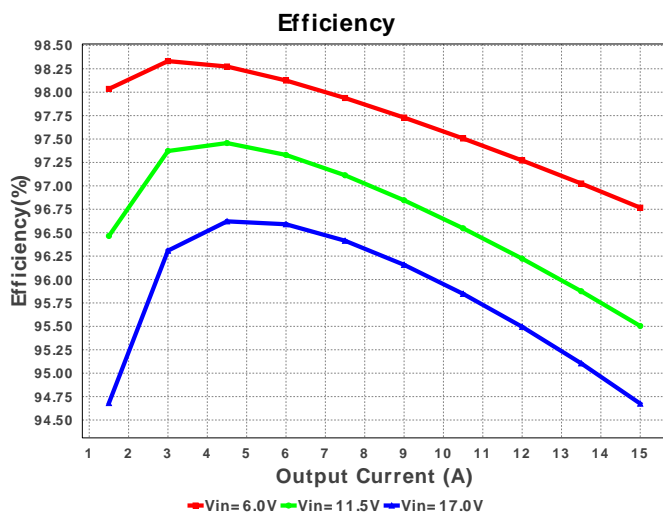
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### Electrical BOM

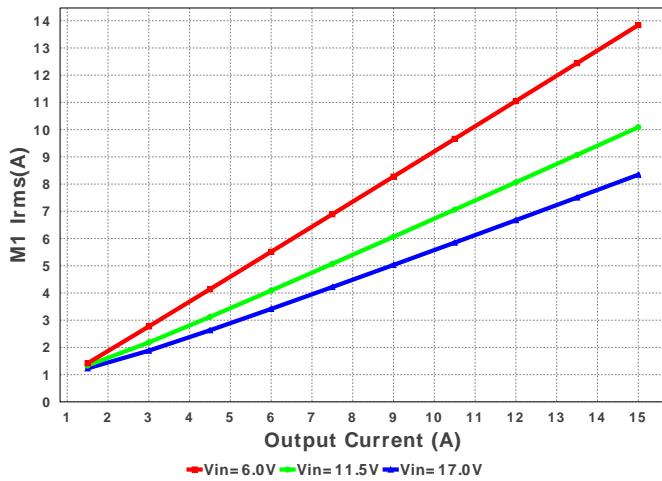
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	Taiyo Yuden	EMK212B7105KG-T Series= X7R	Cap= 1.0 uF VDC= 16.0 V IRMS= 0.0 A	1	\$0.02	0805 7 mm <sup>2</sup>
2.	Ccomp	Yageo America	CC0805KRX7R9BB103 Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm <sup>2</sup>
3.	Ccomp2	Yageo America	CC0805JRNPO9BN820 Series= C0G/NP0	Cap= 82.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm <sup>2</sup>
4.	Cin	TDK	C3216X5R1E476M160AC Series= X5R	Cap= 47.0 uF ESR= 2.082 mOhm VDC= 25.0 V IRMS= 5.0279 A	2	\$0.35	1206 11 mm <sup>2</sup>
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 mm <sup>2</sup>
6.	Cout	MuRata	GRM31CR60J107ME39L Series= X5R	Cap= 100.0 uF ESR= 4.885 mOhm VDC= 6.3 V IRMS= 4.4118 A	3	\$0.14	1206_190 11 mm <sup>2</sup>
7.	Cramp	Samsung Electro-Mechanics	CL21C561JBANFNC Series= C0G/NP0	Cap= 560.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm <sup>2</sup>
8.	Css	Yageo America	CC0805KRX7R9BB103 Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm <sup>2</sup>

#	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 mm <sup>2</sup>
10.	D1	Comchip Technology	CDBK0520L	VF@Io= 385.0 mV VRRM= 20.0 V	1	\$0.07	 SOD-123F 12 mm <sup>2</sup>
11.	L1	Vishay-Dale	IHLP6767DZER3R3M11	L= 3.3 uH DCR= 2.93 mOhm	1	\$2.54	 IHLP-6767DZ 369 mm <sup>2</sup>
12.	M1	Renesas	RJK0330DPB	VdsMax= 30.0 V IdsMax= 45.0 Amps	1	NA	 LFPAK 56 mm <sup>2</sup>
13.	M2	NXP Semiconductor	PSMN4R0-40YS	VdsMax= 40.0 V IdsMax= 83.0 Amps	1	\$0.39	 LFPAK 56 mm <sup>2</sup>
14.	Rcomp	Panasonic	ERJ-6ENF6191V Series= ERJ-6E	Res= 6.19 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm <sup>2</sup>
15.	Renable	Panasonic	ERJ-6ENF1004V Series= ERJ-6E	Res= 1000.0 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm <sup>2</sup>
16.	Rfbb	Panasonic	ERJ-6ENF1131V Series= ERJ-6E	Res= 1.13 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm <sup>2</sup>
17.	Rfbt	Yageo America	RT0805BRD073K52L Series= RT0805	Res= 3.52 kOhm Power= 125.0 mW Tolerance= 0.1%	1	\$0.05	 0805 7 mm <sup>2</sup>
18.	Rsense	Stackpole Electronics Inc	CSNL1206FT3L00 Series= CSNL	Res= 3.0 mOhm Power= 1.0 W Tolerance= 1.0%	1	\$0.19	 1206 11 mm <sup>2</sup>
19.	Rt	Panasonic	ERJ-6ENF1742V Series= ERJ-6E	Res= 17.4 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm <sup>2</sup>
20.	Ruv1	Panasonic	ERJ-6ENF6191V Series= ERJ-6E	Res= 6.19 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm <sup>2</sup>
21.	Ruv2	Panasonic	ERJ-6ENF1872V Series= ERJ-6E	Res= 18.7 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm <sup>2</sup>
22.	U1	Texas Instruments	LM25116MHX/NOPB	Switcher	1	\$1.70	 MXA20A 71 mm <sup>2</sup>

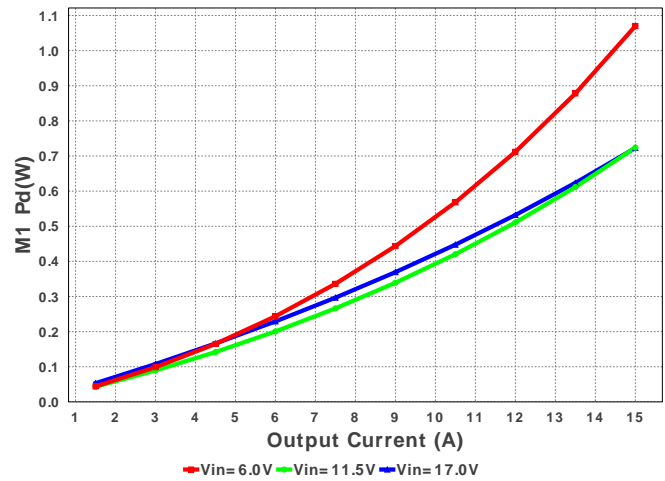




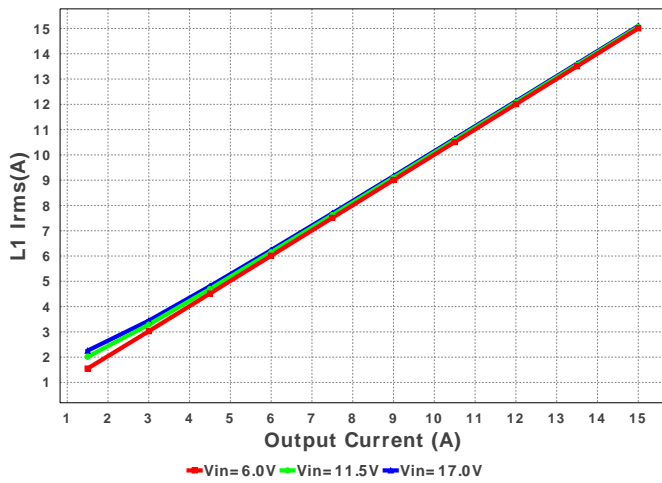
M1 Irms



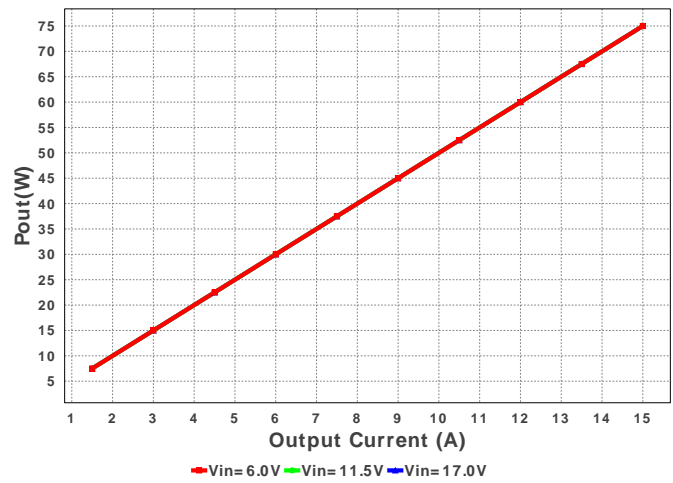
M1 Pd



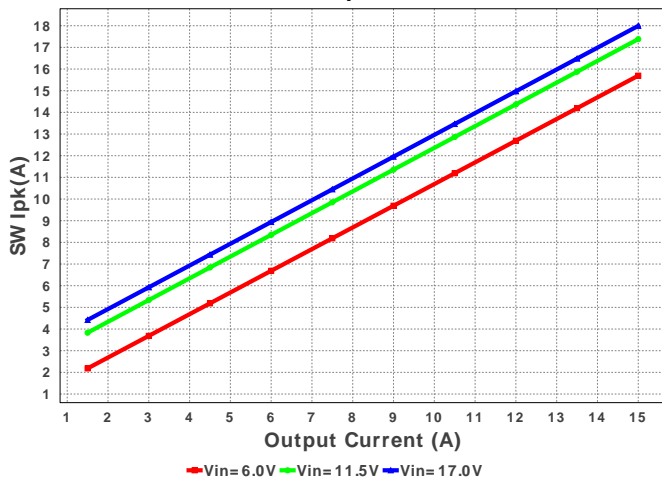
L1 Irms



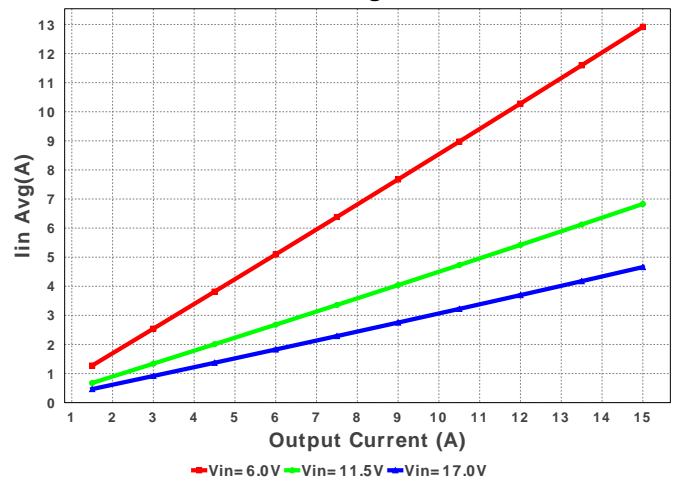
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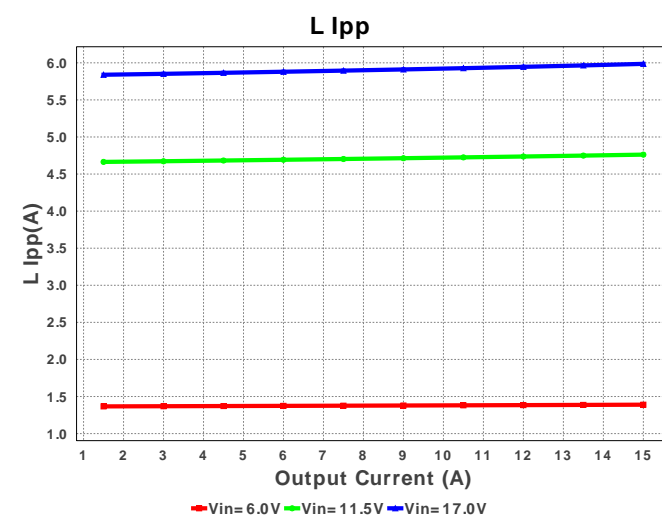
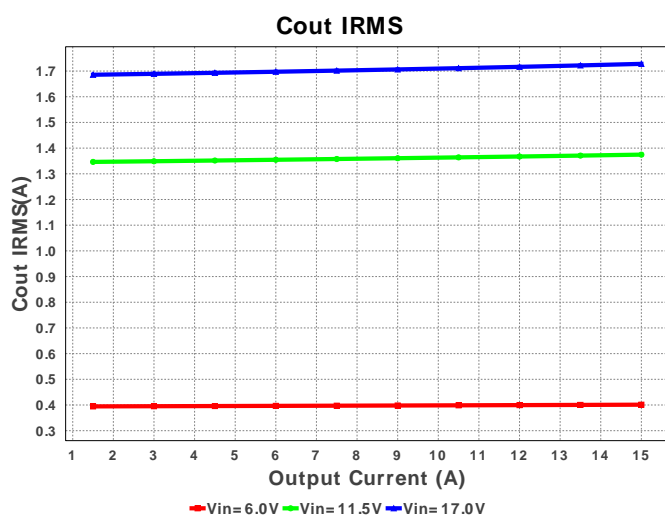
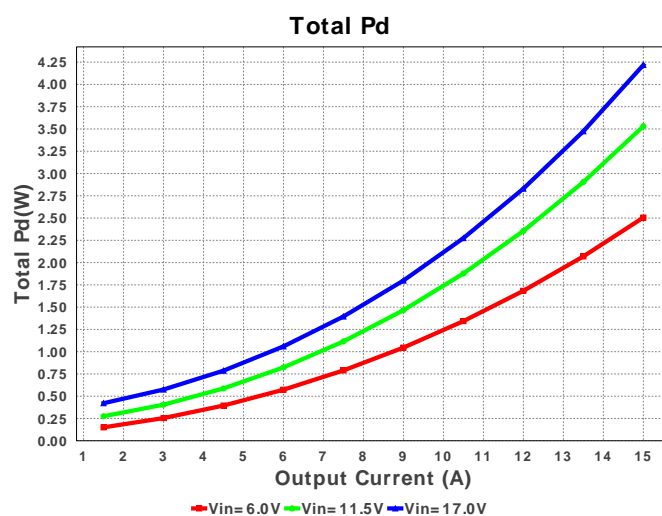
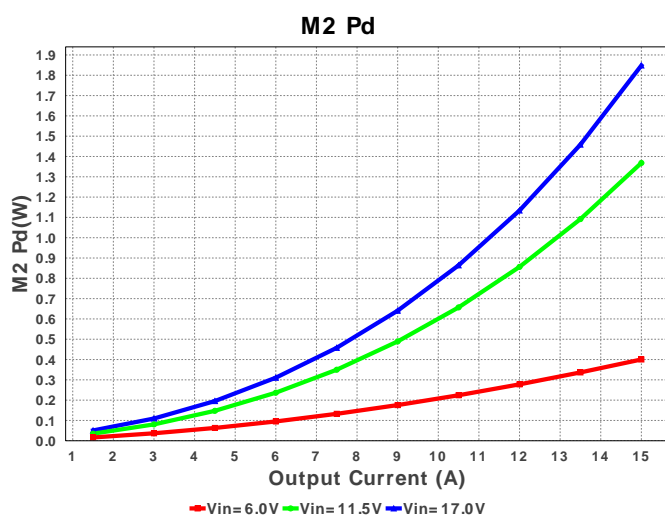
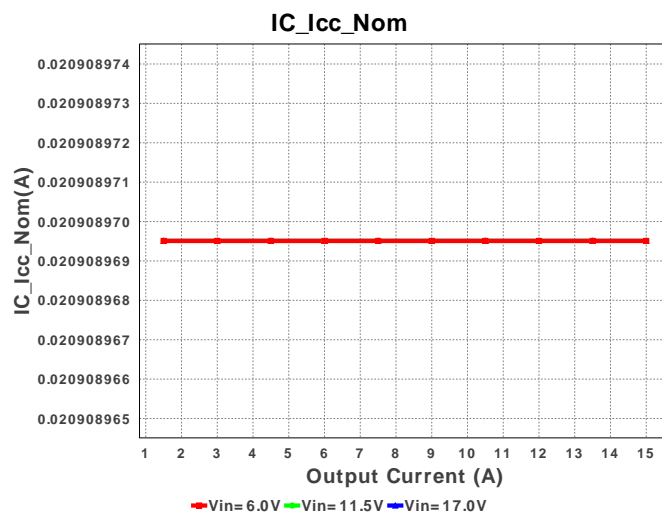
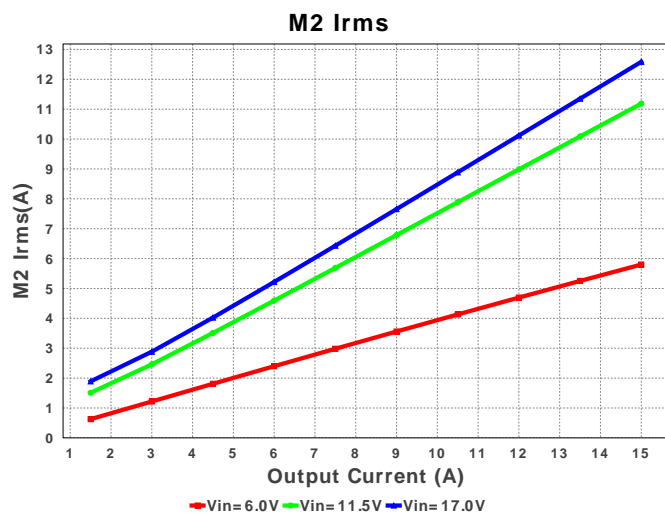


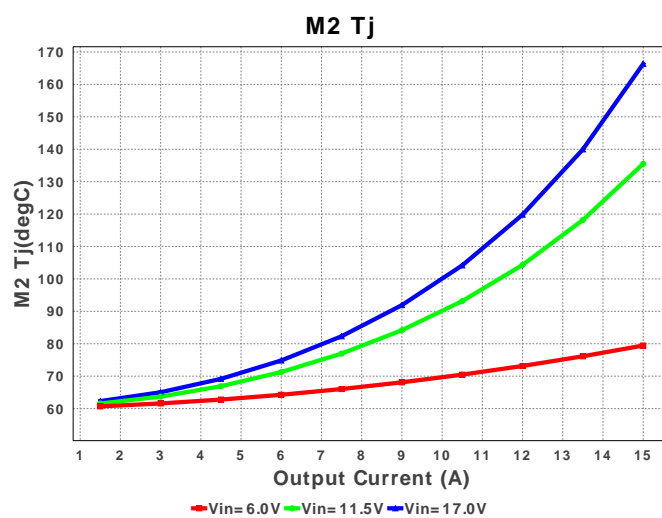
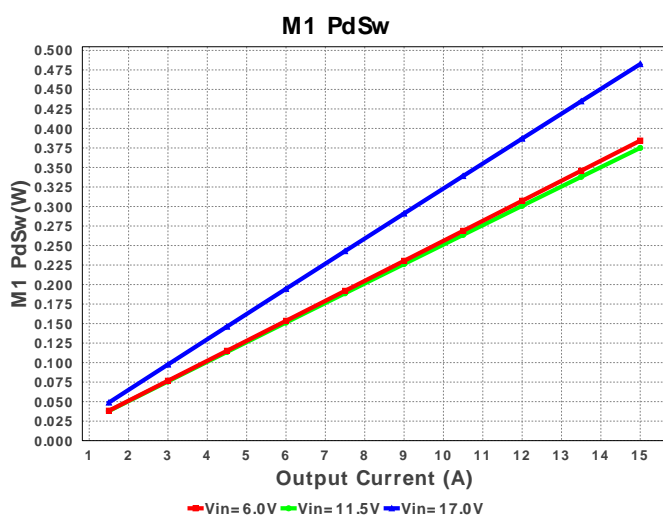
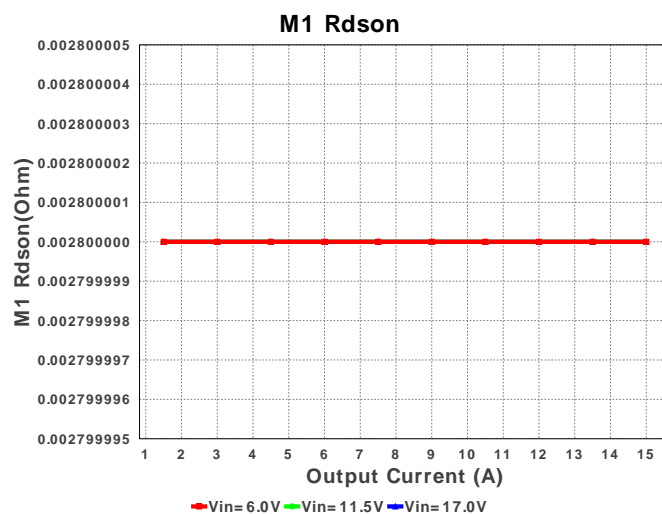
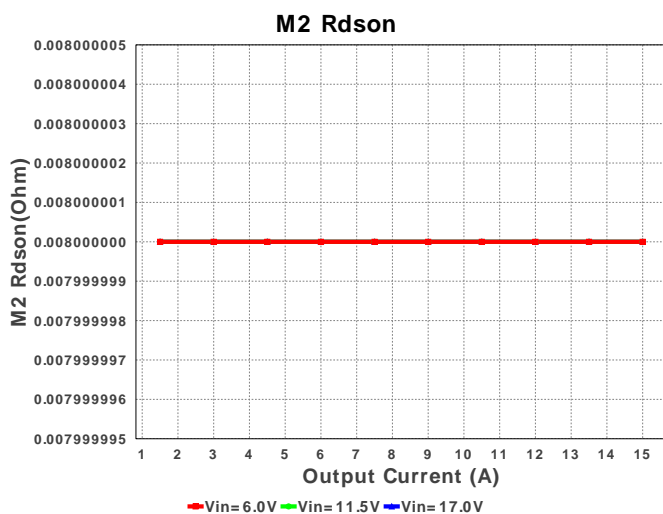
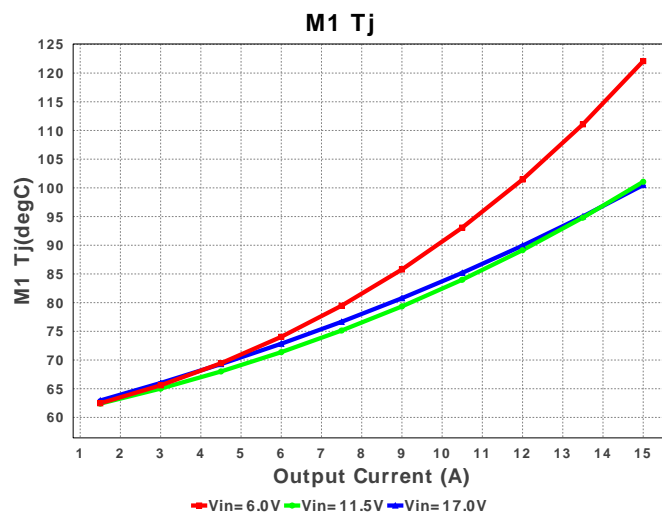
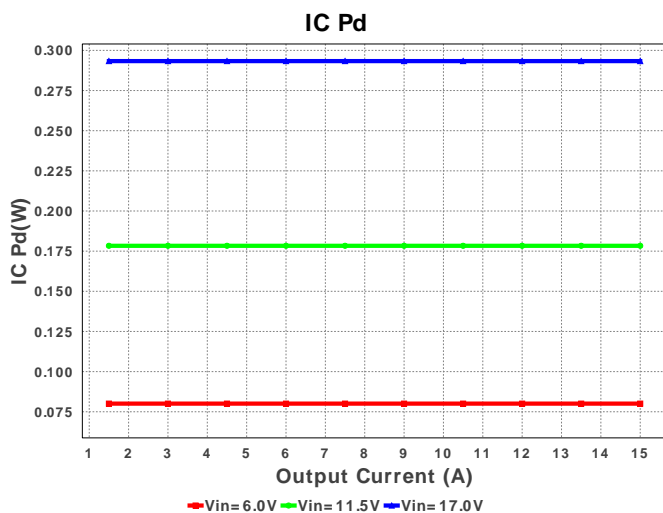
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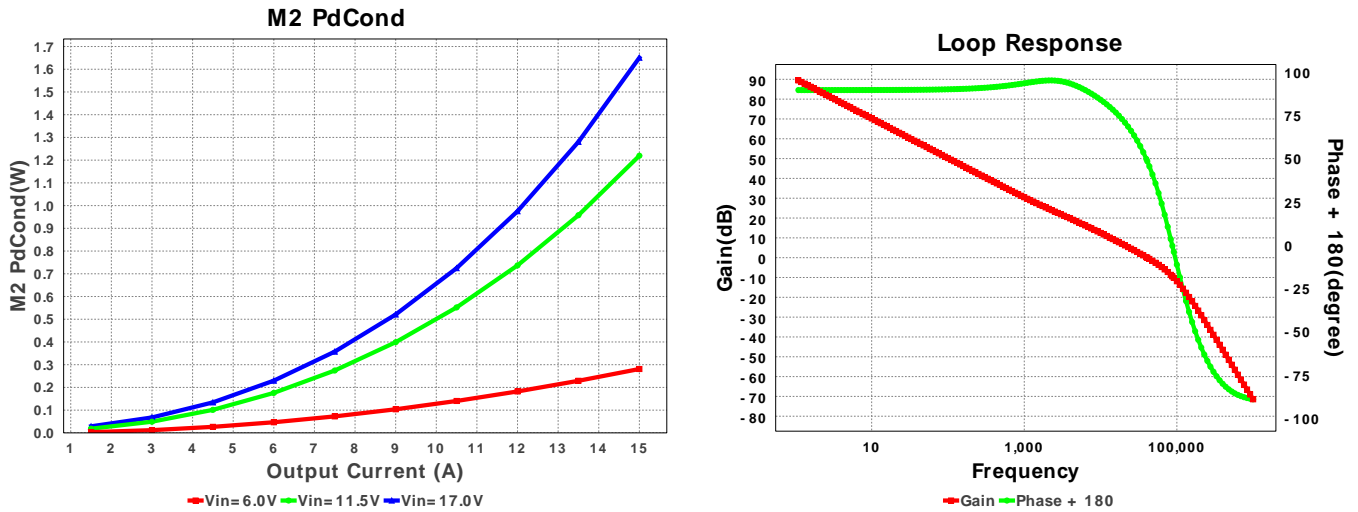
Iin Avg











## Operating Values

#	Name	Value	Category	Description
1.	BOM Count	25		Total Design BOM count
2.	Total BOM	\$0.0		Total BOM Cost
3.	Cin IRMS	6.908 A	Current	Input capacitor RMS ripple current
4.	Cout IRMS	1.728 A	Current	Output capacitor RMS ripple current
5.	Iin Avg	4.66 A	Current	Average input current
6.	L Ipp	5.986 A	Current	Peak-to-peak inductor ripple current
7.	L1 Irms	15.099 A	Current	Inductor ripple current
8.	M1 Irms	8.343 A	Current	MOSFET RMS ripple current
9.	M2 Irms	12.585 A	Current	MOSFET RMS ripple current
10.	SW Ipk	17.993 A	Current	Peak switch current
11.	FootPrint	724.0 mm <sup>2</sup>	General	Total Foot Print Area of BOM components
12.	Frequency	185.474 kHz	General	Switching frequency
13.	IC Tolerance	16.0 mV	General	IC Feedback Tolerance
14.	M1 Rdson	2.8 mOhm	General	Drain-Source On-resistance
15.	M2 Rdson	8.0 mOhm	General	Drain-Source On-resistance
16.	Mode	CCM	General	Conduction Mode
17.	Pout	75.0 W	General	Total output power
18.	Low Freq Gain	89.428 dB	Op_Point	Gain at 10Hz
19.	Vout Actual	5.0 V	Op_Point	Vout Actual calculated based on selected voltage divider resistors
20.	Cross Freq	40.982 kHz	Op_point	Bode plot crossover frequency
21.	Duty Cycle	30.531 %	Op_point	Duty cycle
22.	Efficiency	94.675 %	Op_point	Steady state efficiency
23.	Gain Marg	-9.473 dB	Op_point	Bode Plot Gain Margin
24.	IC Tj	71.733 degC	Op_point	IC junction temperature
25.	IOUT_OP	15.0 A	Op_point	Iout operating point
26.	M1 Tj	100.493 degC	Op_point	M1 MOSFET junction temperature
27.	M2 Tj	166.336 degC	Op_point	M2 MOSFET junction temperature
28.	Phase Marg	48.883 deg	Op_point	Bode Plot Phase Margin
29.	VIN_OP	17.0 V	Op_point	Vin operating point
30.	Vout p-p	20.092 mV	Op_point	Peak-to-peak output ripple voltage
31.	Cin Pd	49.678 mW	Power	Input capacitor power dissipation
32.	Cout Pd	4.862 mW	Power	Output capacitor power dissipation
33.	IC Pd	293.328 mW	Power	IC power dissipation
34.	L Pd	824.062 mW	Power	Inductor power dissipation
35.	M1 Pd	722.852 mW	Power	M1 MOSFET total power dissipation
36.	M1 PdCond	240.375 mW	Power	M1 MOSFET conduction losses
37.	M1 PdSw	482.476 mW	Power	M1 MOSFET switching losses
38.	M2 Pd	1.848 W	Power	M2 MOSFET total power dissipation
39.	M2 PdCond	1.651 W	Power	M2 MOSFET conduction losses
40.	M2 PdSw	197.515 mW	Power	M2 MOSFET switching losses
41.	Rsense Pd	475.137 mW	Power	LED Current Rsns Power Dissipation
42.	Total Pd	4.218 W	Power	Total Power Dissipation
43.	IC Icc Nom	20.909 mA		IC Icc gate driver current
44.	Vout Tolerance	2.169 %		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

## Design Inputs

#	Name	Value	Description
1.	Iout	15.0	Maximum Output Current
2.	VinMax	17.0	Maximum input voltage
3.	VinMin	6.0	Minimum input voltage



#	Name	Value	Description
4.	Vout	5.0	Output Voltage
5.	base_pn	LM25116	Base Product Number
6.	source	DC	Input Source Type
7.	Ta	60.0	Ambient temperature

## Design Assistance

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

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