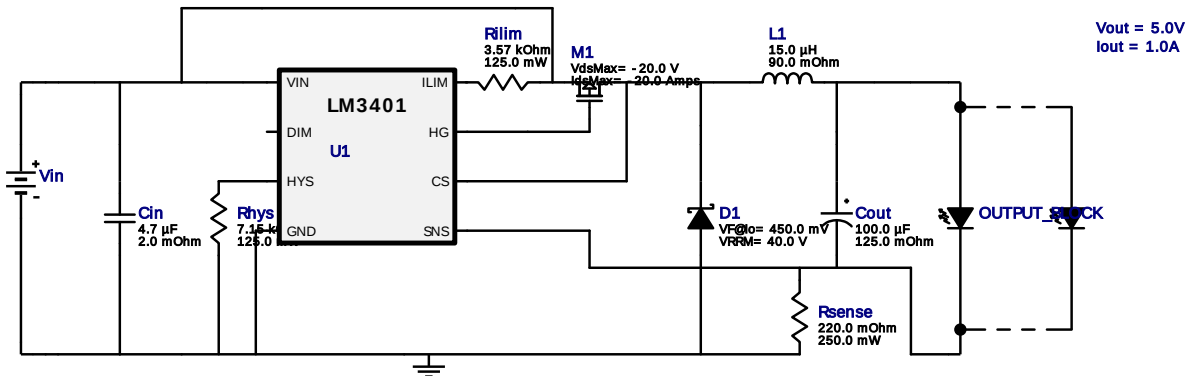


WEBENCH® Design Report

Design : 4148234/162 LM3401MMX/NOPB
LM3401MMX/NOPB 8.0V-16.0V to 5.20V @ 1.0A



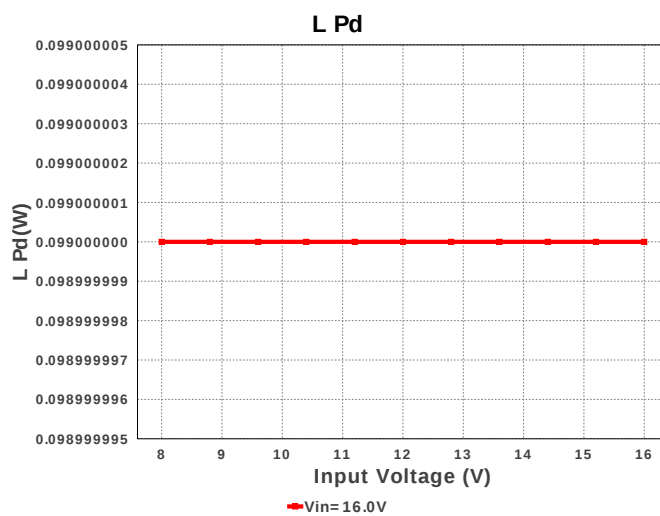
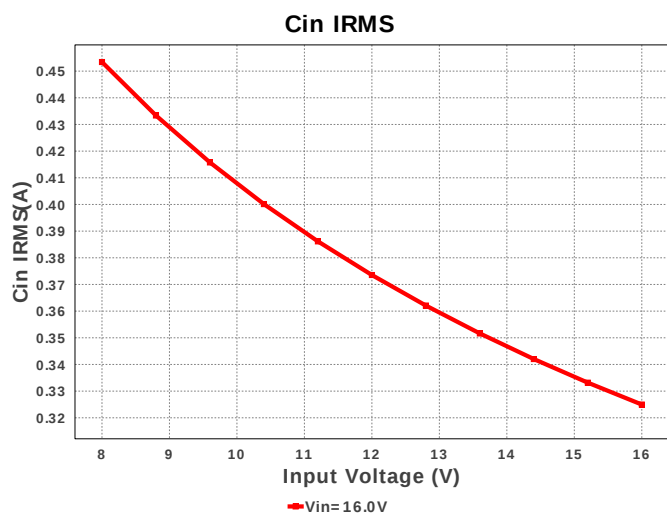
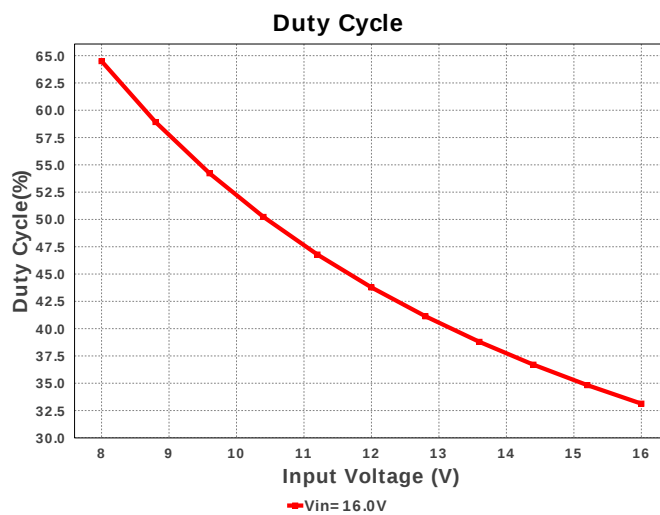
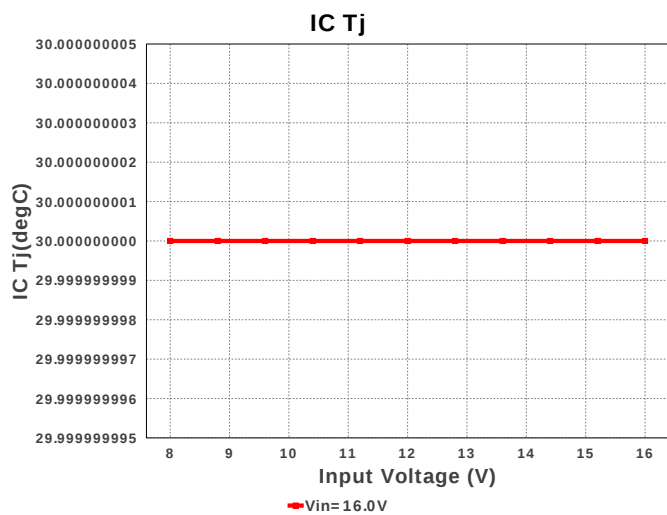
My Comments

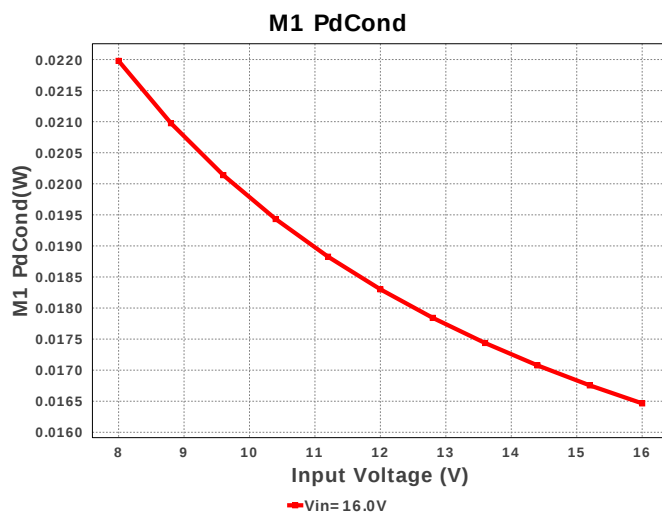
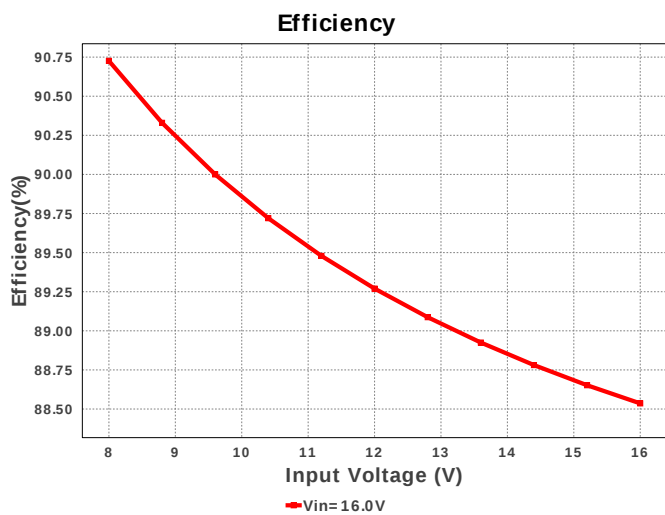
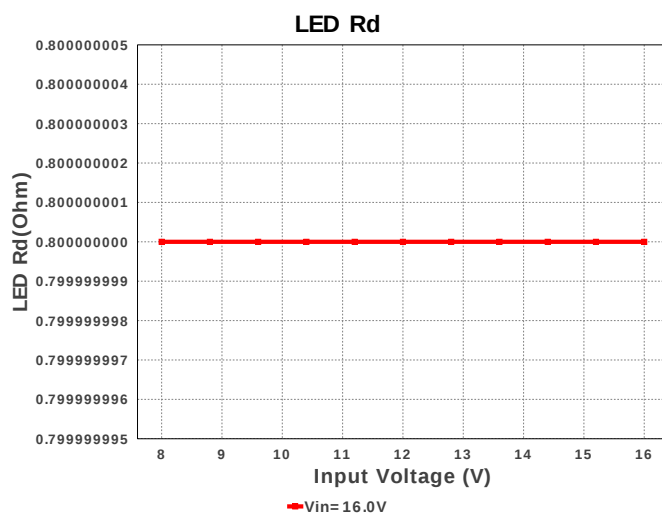
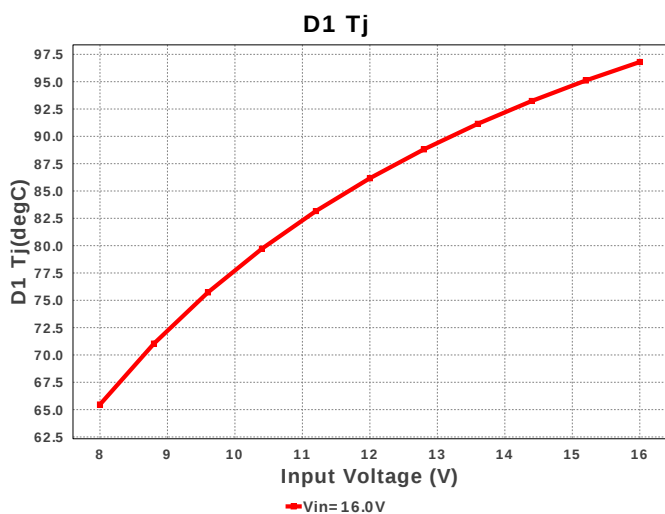
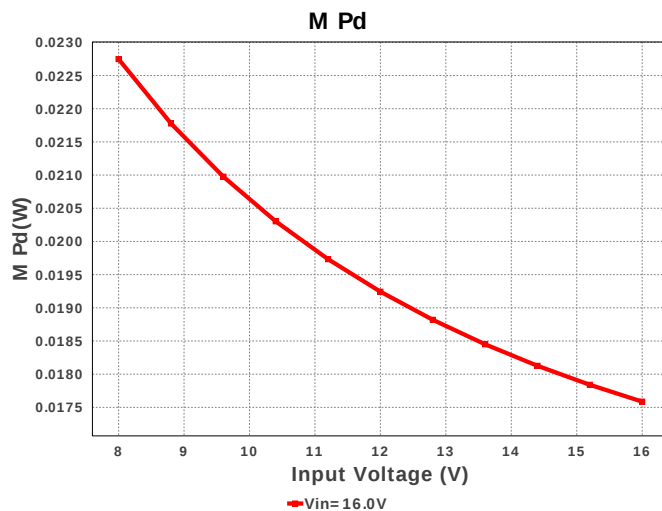
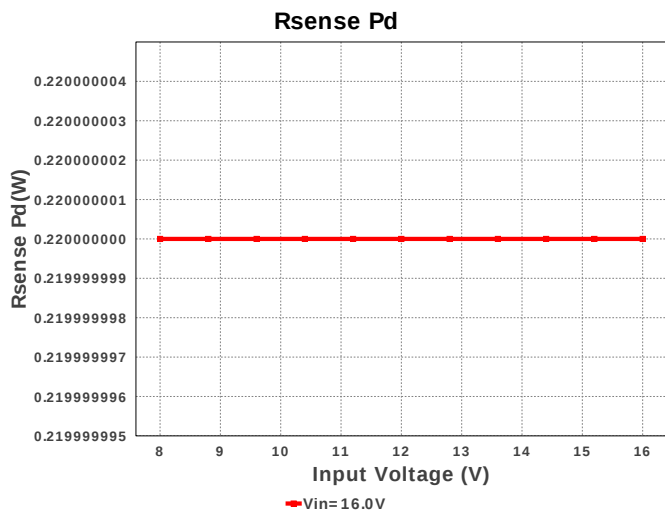
No comments

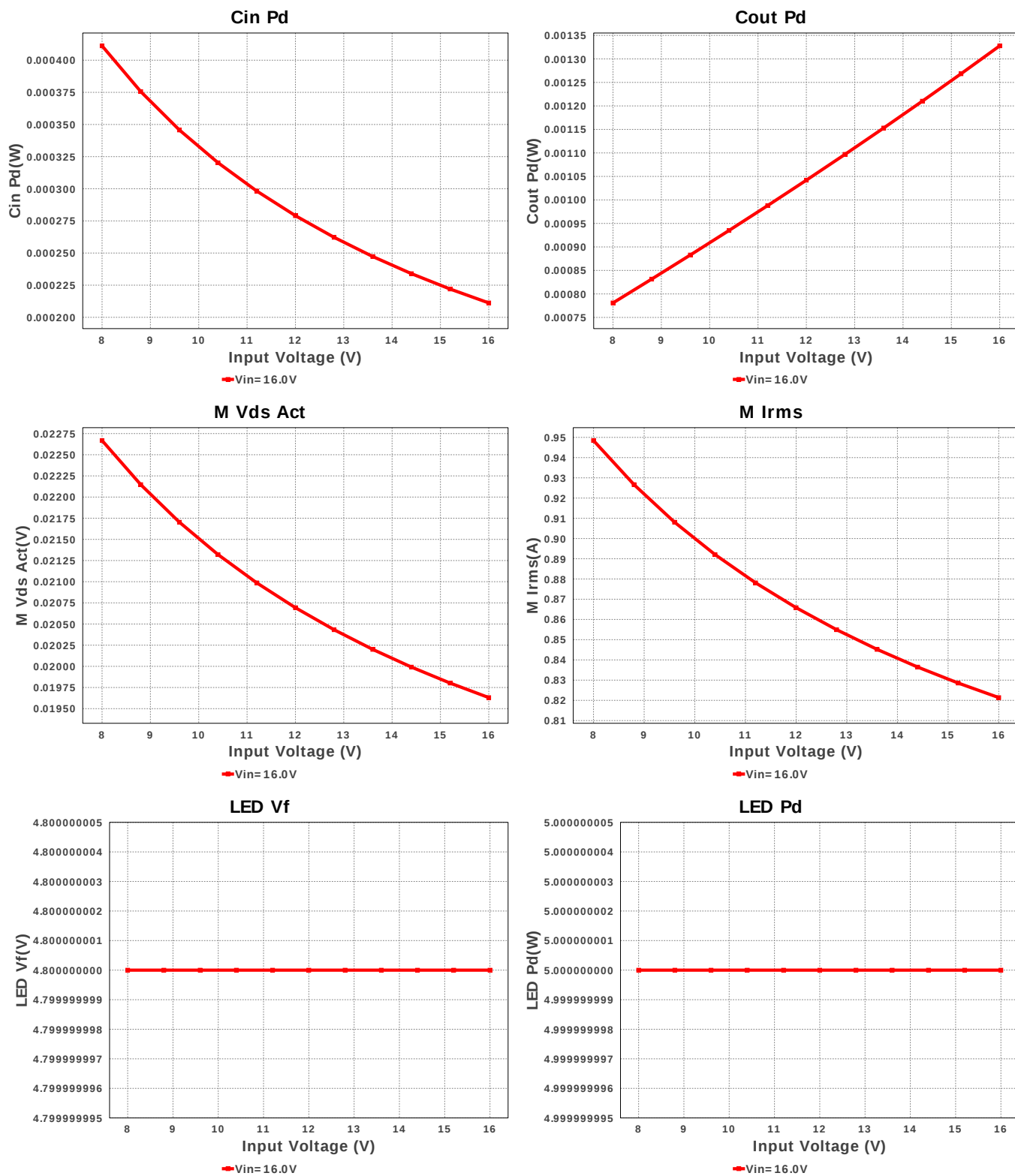
Electrical BOM

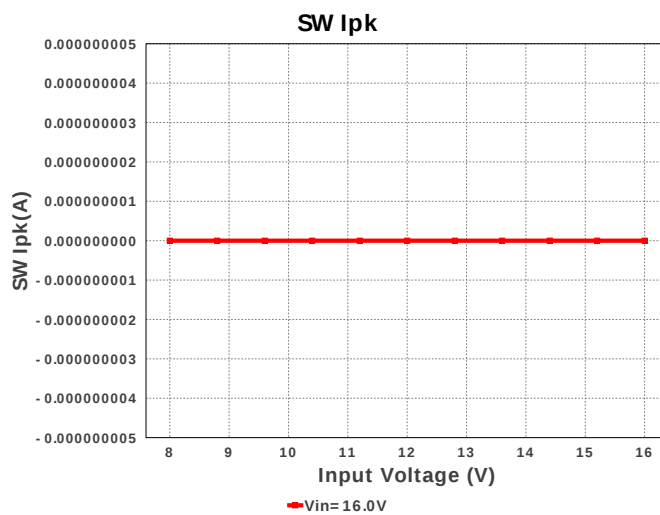
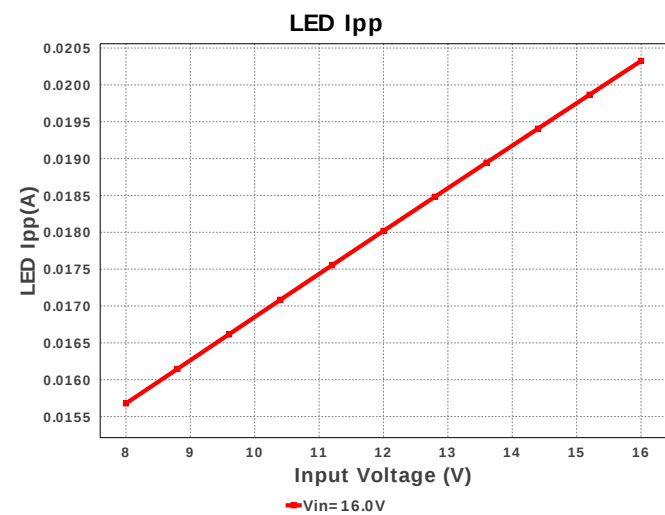
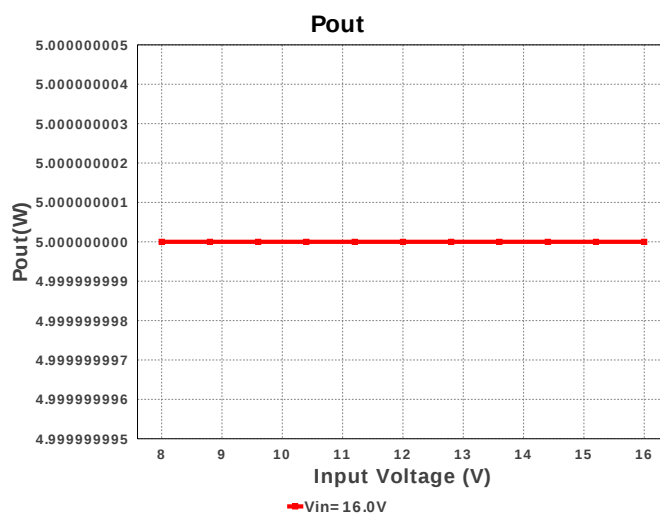
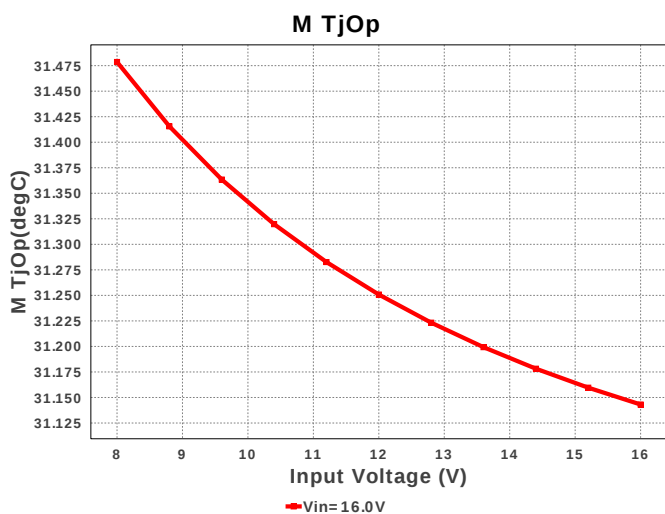
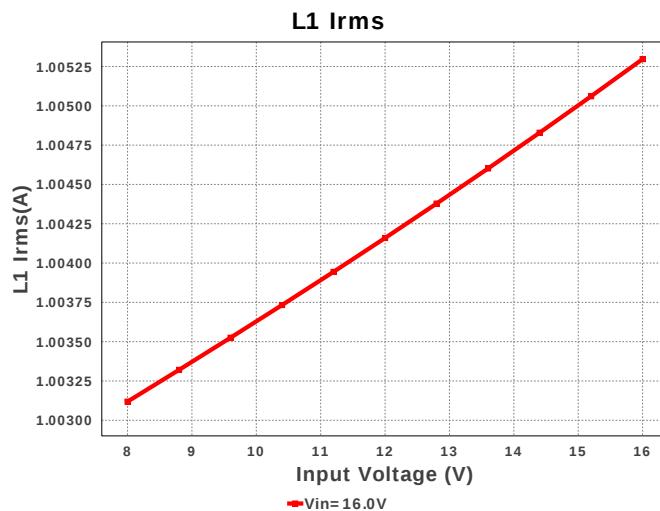
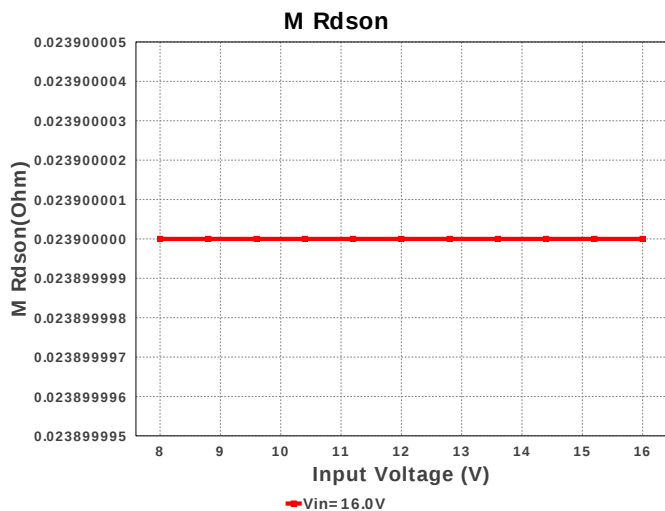
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cin	MuRata	GRM21BR61E475MA12L Series= X5R	Cap= 4.7 uF ESR= 2.0 mOhm VDC= 25.0 V IRMS= 7.29 A	1	\$0.02	 0805 7 mm ²
2.	Cout	Vishay-Sprague	593D107X9016D2TE3 Series= 593D	Cap= 100.0 uF ESR= 125.0 mOhm VDC= 16.0 V IRMS= 1.1 A	1	\$0.34	 7343-31 59 mm ²
3.	D1	Diodes Inc.	1N5819HW-7-F	VF@Io= 450.0 mV VRRM= 40.0 V	1	\$0.08	 SOD-123 13 mm ²
4.	D_LED	CUSTOM	CUSTOM	LED	10	NA	CUSTOM 0 mm ²
5.	L1	NIC Components	NPI75C150MTRF	L= 15.0 µH DCR= 90.0 mOhm	1	\$0.11	 IND_NPI75C 94 mm ²
6.	M1	Texas Instruments	CSD25310Q2	VdsMax= -20.0 V IdsMax= -20.0 Amps	1	\$0.17	 TRANS_NexFET_Q2 9 mm ²
7.	Rhys	Panasonic	ERJ-6ENF7151V Series= ERJ-6E	Res= 7.15 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm ²
8.	Rilim	Panasonic	ERJ-6ENF3571V Series= ERJ-6E	Res= 3.57 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm ²
9.	Rsense	Panasonic	ERJ-8RQFR22V Series= ERJ-8R	Res= 220.0 mOhm Power= 250.0 mW Tolerance= 1.0%	1	\$0.04	 1206 11 mm ²

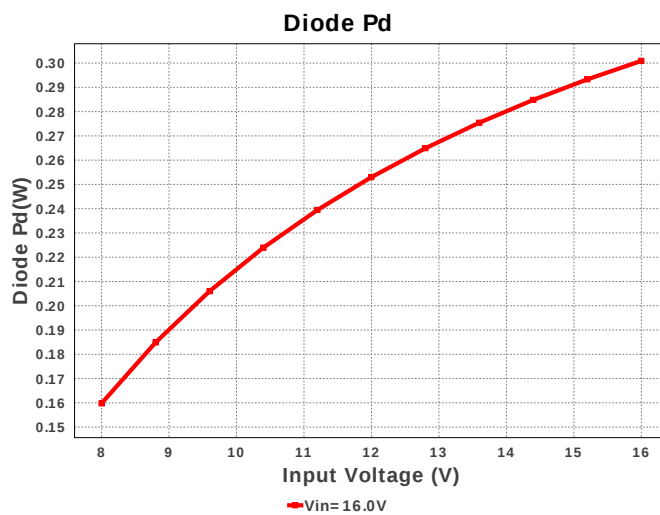
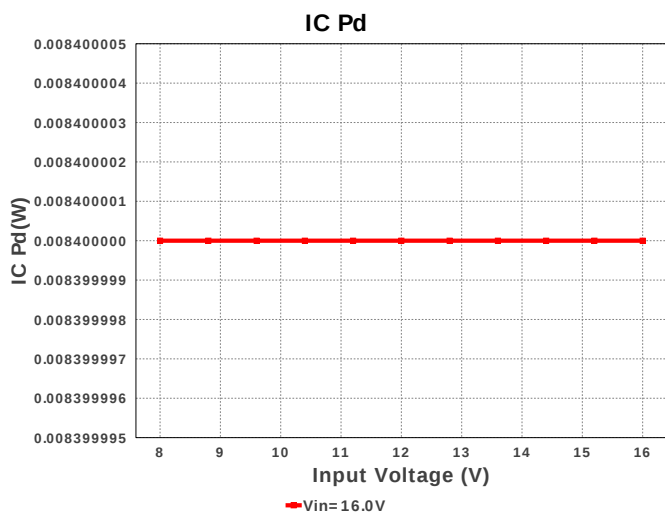
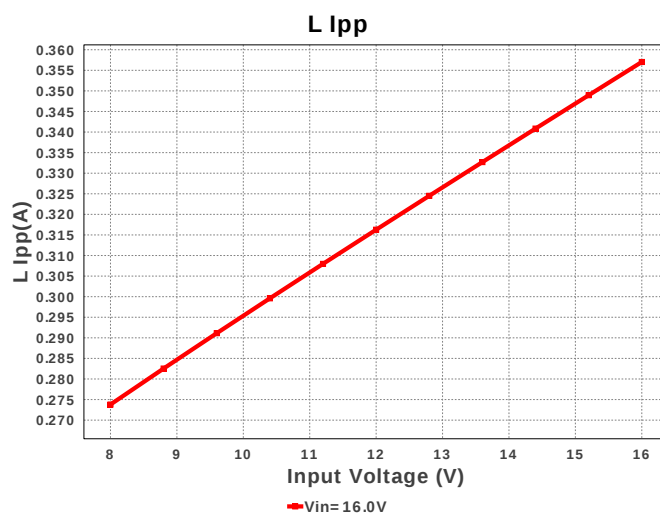
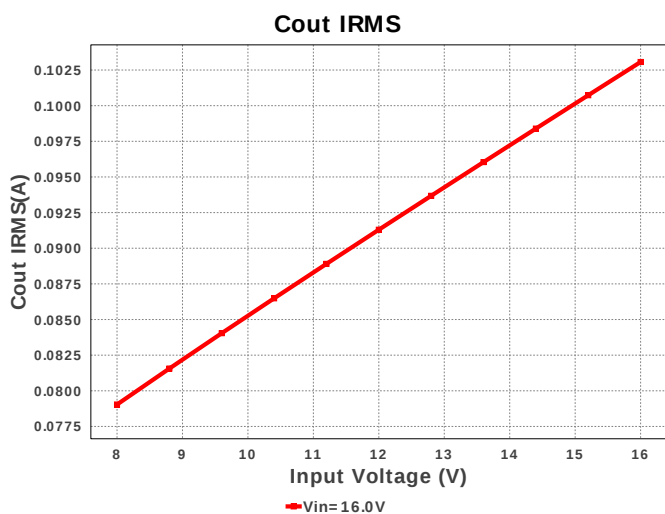
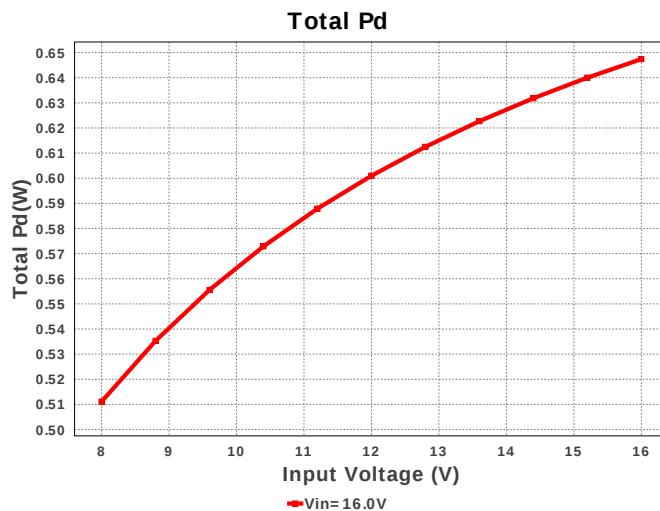
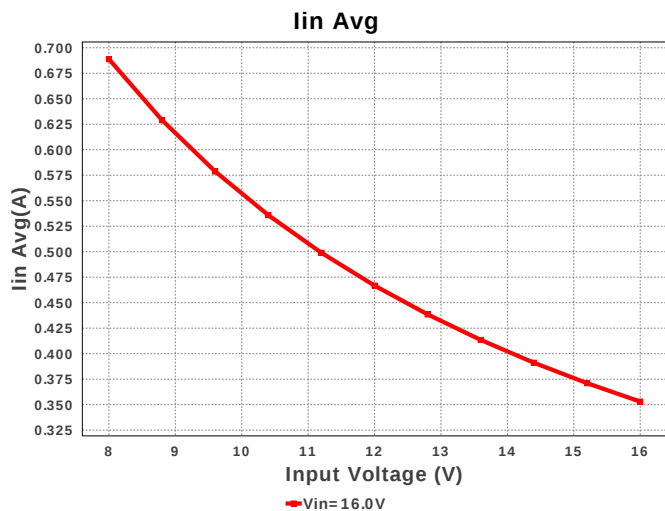
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	U1	Texas Instruments	LM3401MMX/NOPB	Switcher	1	\$0.60	 MUA08A 24 mm ²

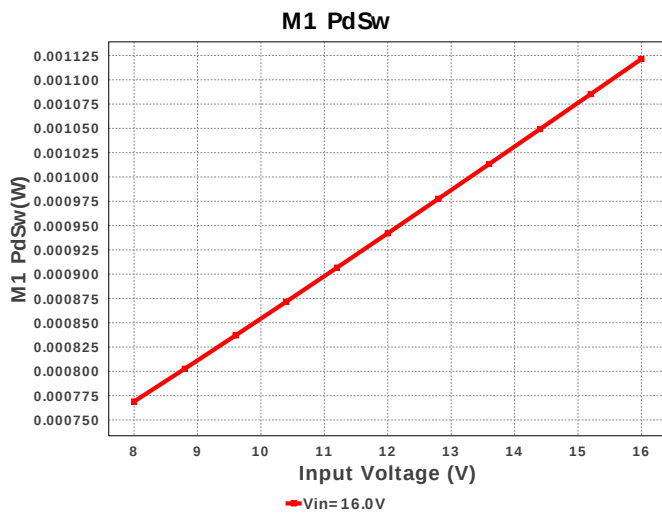
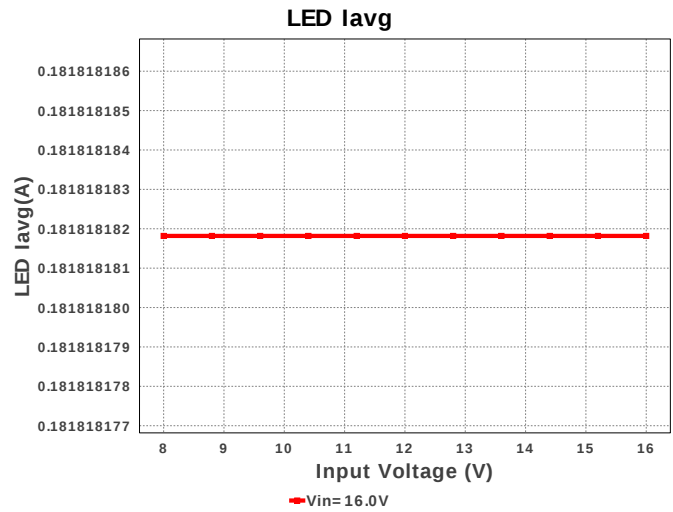
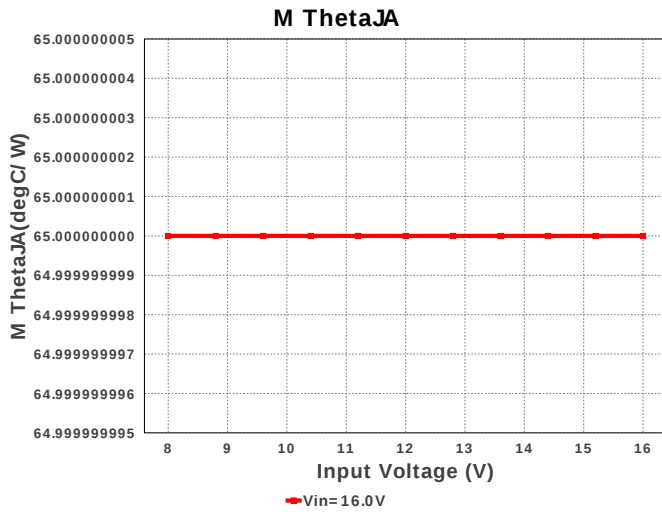












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	317.636 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	101.983 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	366.31 mA	Current	Average input current
4.	L Ipp	353.28 mA	Current	Peak-to-peak inductor ripple current
5.	L1 Irms	1.005 A	Current	Inductor ripple current
6.	LED Iavg	181.818 mA	Current	LED Average Current
7.	LED Ipp	20.105 mA	Current	LED Ripple Current
8.	M Irms	837.647 mA	Current	MOSFET RMS ripple current
9.	SW Ipk	1.422 A	Current	Peak switch current
10.	BOM Count	19	General	Total Design BOM count
11.	FootPrint	229.0 mm ²	General	Total Foot Print Area of BOM components
12.	Frequency	700.0 kHz	General	Switching frequency
13.	IC Tolerance	12.0 mV	General	IC Feedback Tolerance
14.	M Rdson	23.9 mOhm	General	Drain-Source On-resistance
15.	M Vds Act	20.02 mV	General	M Vds
16.	Mode	CCM	General	Conduction Mode
17.	Pout	5.2 W	General	Total output power
18.	Total BOM	\$1.38	General	Total BOM Cost
19.	D1 Tj	95.588 degC	Op_Point	D1 junction temperature
20.	Vout OP	5.2 V	Op_Point	Operational Output Voltage
21.	Duty Cycle	34.347 %	Op_point	Duty cycle
22.	Efficiency	88.724 %	Op_point	Steady state efficiency
23.	IC Tj	38.625 degC	Op_point	IC junction temperature
24.	ICThetaJA	151.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
25.	IOUT_OP	1.0 A	Op_point	Iout operating point
26.	LED Rd	800.0 mOhm	Op_point	LED DynamicResistance
27.	LED Vf	5.0 V	Op_point	Total LED Forward Calculated Voltage
28.	M ThetaJA	65.0 degC/W	Op_point	MOSFET junction-to-ambient thermal resistance
29.	M TjOp	32.376 degC	Op_point	MOSFET junction temperature
30.	VIN_OP	16.0 V	Op_point	Vin operating point
31.	Cin Pd	201.786 μW	Power	Input capacitor power dissipation

#	Name	Value	Category	Description
32.	Cout Pd	1.3 mW	Power	Output capacitor power dissipation
33.	Diode Pd	295.441 mW	Power	Diode power dissipation
34.	IC Pd	57.12 mW	Power	IC power dissipation
35.	L Pd	99.0 mW	Power	Inductor power dissipation
36.	LED Pd	5.0 W	Power	LED Power Dissipation
37.	M Pd	36.548 mW	Power	MOSFET power dissipation
38.	M1 PdCond	17.195 mW	Power	M1 MOSFET conduction losses
39.	M1 PdSw	19.353 mW	Power	M1 MOSFET switching losses
40.	Rsense Pd	220.0 mW	Power	Rsense Power Dissipation
41.	Total Pd	660.882 mW	Power	Total Power Dissipation
42.	Vout Tolerance	230.77 m%		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	1.0	Maximum Output Current
2.	VinMax	16.0	Maximum input voltage
3.	VinMin	8.0	Minimum input voltage
4.	Vout	5.0	Output Voltage
5.	application	LED_DRIVER	LED Application
6.	base_pn	LM3401	Texas Instruments Base Part Number
7.	isLEDArchitect	N	LED Architect Project
8.	ledparallel	5.0	Number of LED in parallel
9.	ledpartnumber	??	LED Part number
10.	ledseries	2.0	Number of LED in series
11.	line_fsw	60.0	AC Line Frequency
12.	source	DC	Input Source Type
13.	ta	30.0	Ambient temperature

Design Assistance

1. LM3401 Product Folder : <http://www.ti.com/product/LM3401> : contains the data sheet and other resources.

Texas Instruments' WEBENCH simulation tools attempt to recreate the performance of a substantially equivalent physical implementation of the design. Simulations are created using Texas Instruments' published specifications as well as the published specifications of other device manufacturers. While Texas Instruments does update this information periodically, this information may not be current at the time the simulation is built. Texas Instruments does not warrant the accuracy or completeness of the specifications or any information contained therein. Texas Instruments does not warrant that any designs or recommended parts will meet the specifications you entered, will be suitable for your application or fit for any particular purpose, or will operate as shown in the simulation in a physical implementation. Texas Instruments does not warrant that the designs are production worthy.

You should completely validate and test your design implementation to confirm the system functionality for your application prior to production.

Use of Texas Instruments' WEBENCH simulation tools is subject to [Texas Instruments' Site Terms and Conditions of Use](#). Prototype boards based on WEBENCH created designs are provided AS IS without warranty of any kind for evaluation and testing purposes and are subject to the terms of the [Evaluation License Agreement](#).