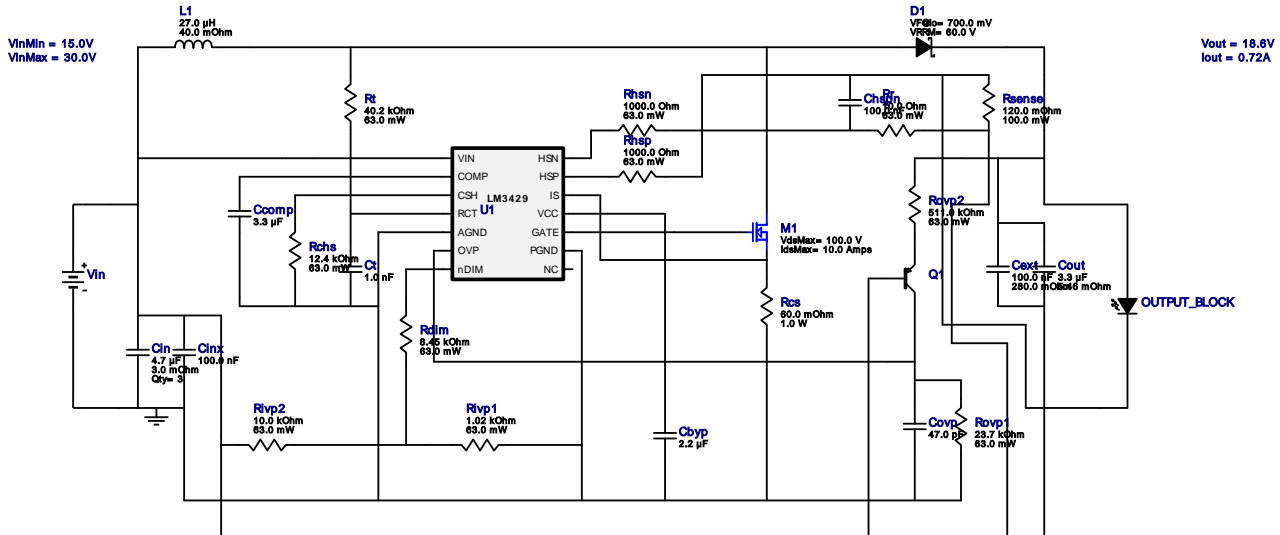


## WEBENCH® Design Report

Design : 4388007/3 LM3429MH/NOPB  
LM3429MH/NOPB 15.0V-30.0V to 10.41V @ 0.7882964516129033A

VinMin = 15.0V  
VinMax = 30.0V  
Vout = 18.6V  
Iout = 0.72A

Device = LM3429MH/NOPB  
Topology = Buck\_Boost  
Created = 6/10/15 1:01:49 AM  
BOM Cost = \$0.00  
Footprint = 1,068.0 mm<sup>2</sup>  
BOM Count = 29  
Total Pd = 1.28W




1. This regulator device is qualified for Automotive applications. All passives and other components selected in this design may not be qualified for Automotive applications. The user is required to verify that all components in the design meet the qualification and safety requirements for their specific application. View WEBENCH(R) Disclaimer.

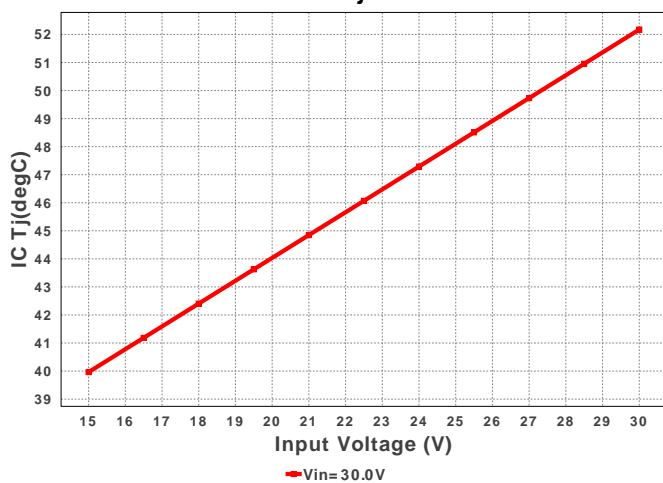
### Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbyp	Taiyo Yuden	EMK212B7225KG-T Series= X7R	Cap= 2.2 uF VDC= 16.0 V IRMS= 0.0 A	1	\$0.03	0805 7 mm <sup>2</sup>
2.	Ccomp	MuRata	GRM21BR71E335KA73L Series= X7R	Cap= 3.3 uF VDC= 25.0 V IRMS= 0.0 A	1	\$0.04	0805 7 mm <sup>2</sup>
3.	Cext	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>
4.	Chspn	MuRata	GRM21BR71E104KA01L Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm <sup>2</sup>
5.	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 mm <sup>2</sup>
6.	Cinx	MuRata	GRM188R72A104KA35D Series= X7R	Cap= 100.0 nF VDC= 100.0 V IRMS= 0.0 A	1	\$0.03	0603 5 mm <sup>2</sup>
7.	Cout	TDK	C3225X7S2A335K200AB Series= 479	Cap= 3.3 uF ESR= 5.46 mOhm VDC= 100.0 V IRMS= 7.0356 A	1	\$0.24	1210 15 mm <sup>2</sup>
8.	Covp	Kemet	C0805C470K5GACTU Series= C0G/NP0	Cap= 47.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm <sup>2</sup>
9.	Ct	Yageo America	CC0805JRNPO9BN102 Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm <sup>2</sup>

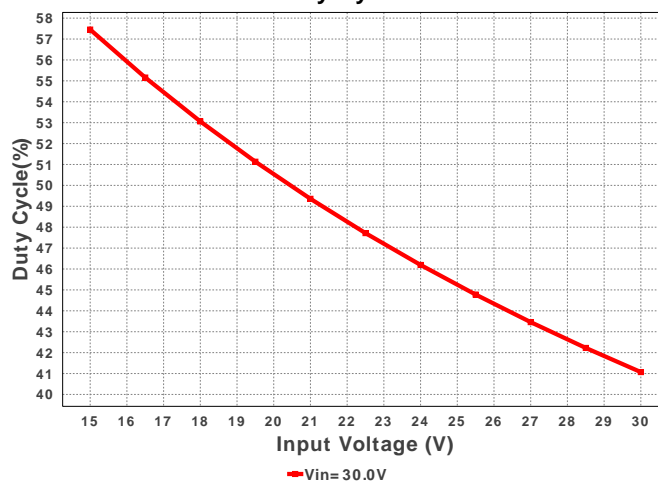
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	D1	Diodes Inc.	B560C-13-F	VF@Io= 700.0 mV VRRM= 60.0 V	1	\$0.19	 SMC 83 mm <sup>2</sup>
11.	D_LED	Citizen Electronics	CL-L233-C13N1-C	LED	1	NA	 CIT_LED_5 501 mm <sup>2</sup>
12.	L1	Bourns	SRR1210-270M	L= 27.0 µH DCR= 40.0 mOhm	1	\$0.44	 SRR1210 196 mm <sup>2</sup>
13.	M1	Texas Instruments	CSD19534Q5A	VdsMax= 100.0 V IdsMax= 10.0 Amps	1	\$0.68	 TRANS_NexFET_Q5A 55 mm <sup>2</sup>
14.	Q1	Diodes Inc.	MMBT3906-7-F	Bipolar Transistor	1	\$0.02	 SOT-23 14 mm <sup>2</sup>
15.	Rchs	Vishay-Dale	CRCW040212K4FKED Series= CRCW..e3	Res= 12.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
16.	Rcs	Stackpole Electronics Inc	CSRN2010FK60L0 Series= ?	Res= 60.0 mOhm Power= 1.0 W Tolerance= 1.0%	1	\$0.14	 2010 32 mm <sup>2</sup>
17.	Rdim	Vishay-Dale	CRCW04028K45FKED Series= CRCW..e3	Res= 8.45 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
18.	Rhsn	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1000.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
19.	Rhsp	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1000.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
20.	Rivp1	Vishay-Dale	CRCW04021K02FKED Series= CRCW..e3	Res= 1.02 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
21.	Rivp2	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
22.	Rovp1	Vishay-Dale	CRCW040223K7FKED Series= CRCW..e3	Res= 23.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
23.	Rovp2	Vishay-Dale	CRCW0402511KFKED Series= CRCW..e3	Res= 511.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
24.	Rr	Vishay-Dale	CRCW040210R0FKED Series= CRCW..e3	Res= 10.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>
25.	Rsense	Panasonic	ERJ-3RSFR12V Series= 227	Res= 120.0 mOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.03	 0603 5 mm <sup>2</sup>
26.	Rt	Vishay-Dale	CRCW040240K2FKED Series= CRCW..e3	Res= 40.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm <sup>2</sup>

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
27.	U1	Texas Instruments	LM3429MH/NOPB	Switcher	1	\$1.20	 MXA14A 59 mm <sup>2</sup>

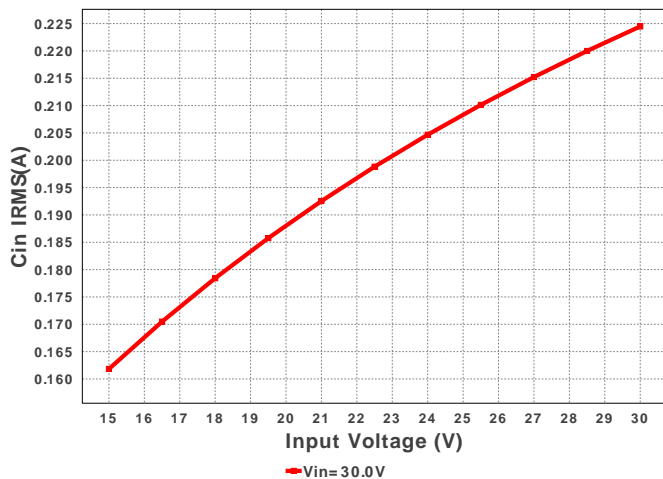
IC Tj



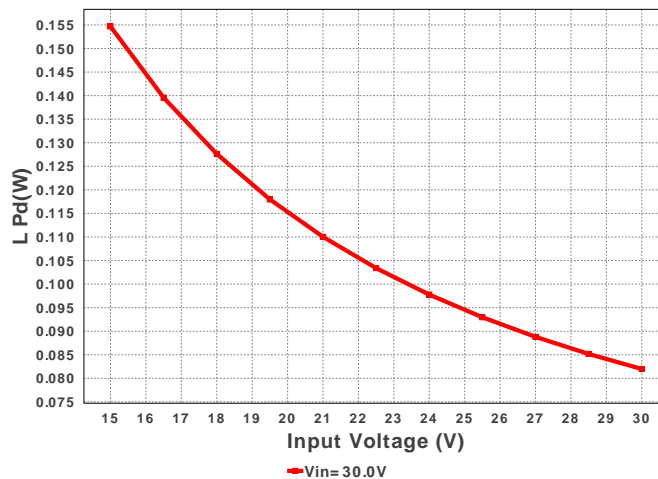
Duty Cycle



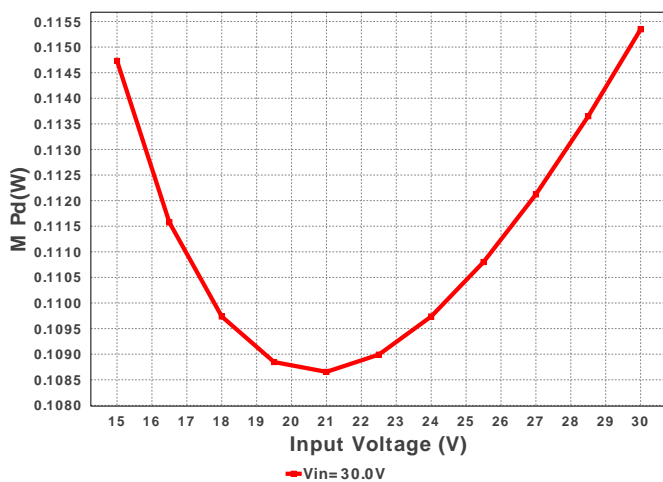
Cin IRMS



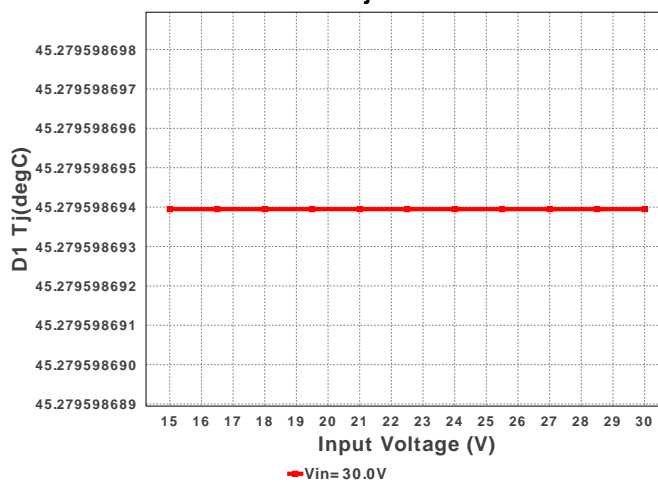
L Pd



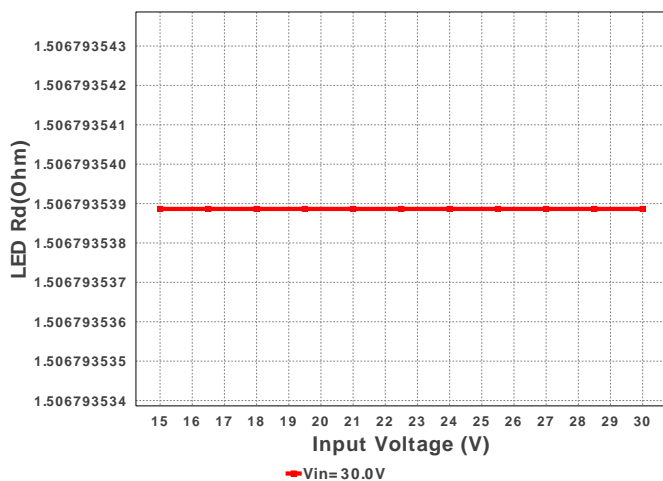
M Pd



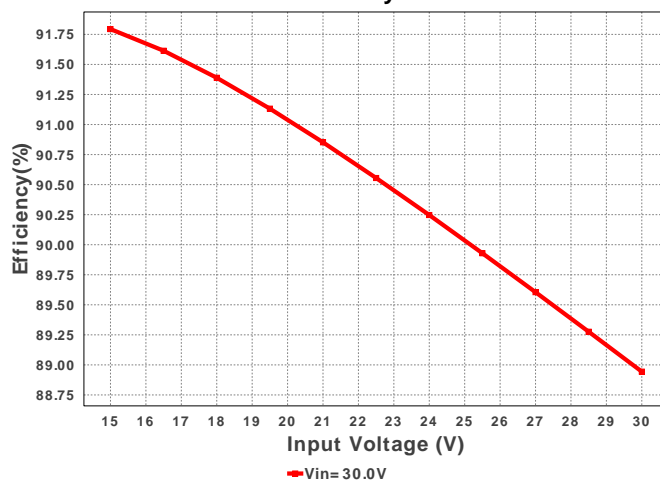
D1 Tj



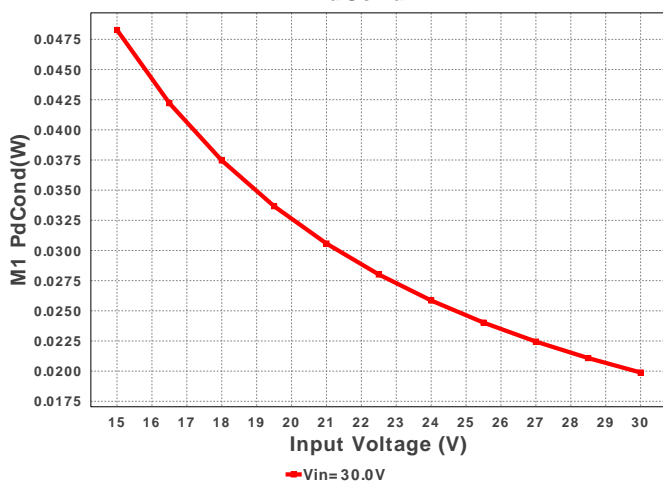
LED Rd



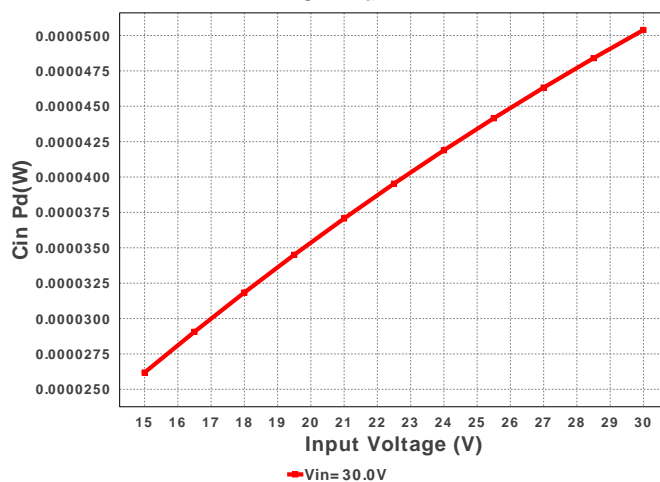
Efficiency



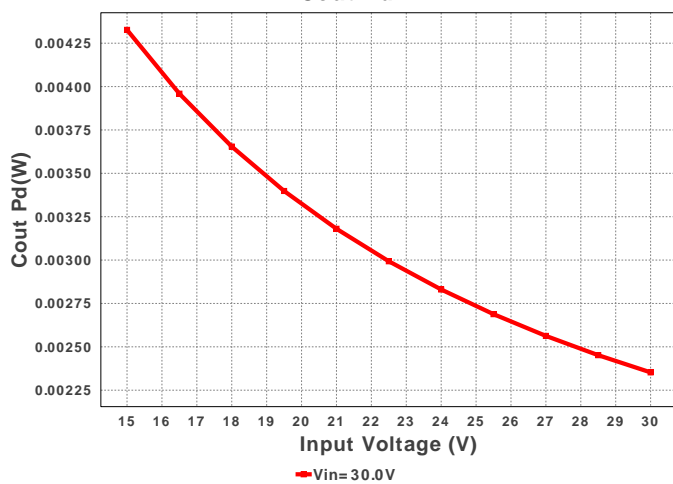
M1 PdCond



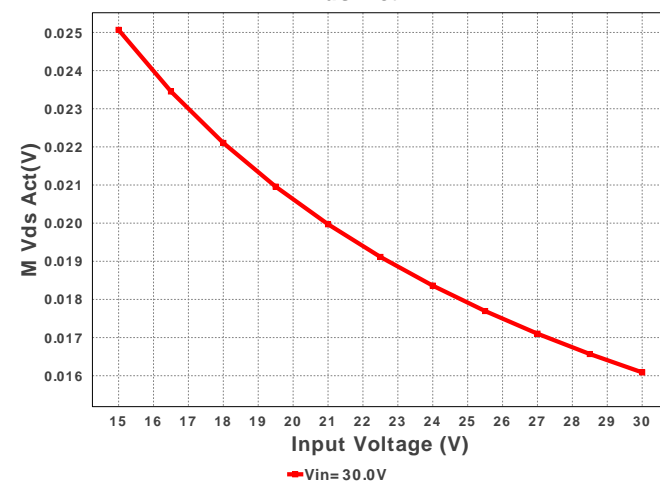
Cin Pd

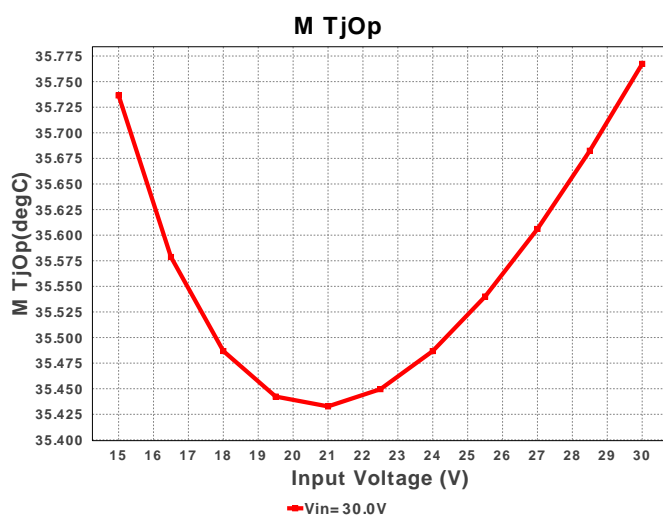
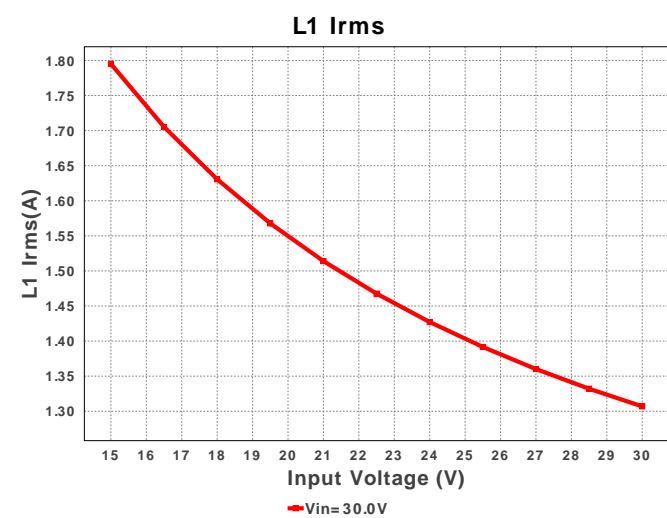
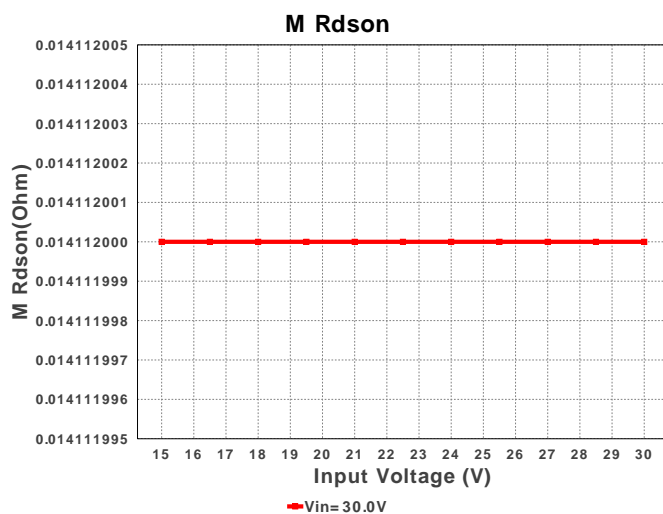
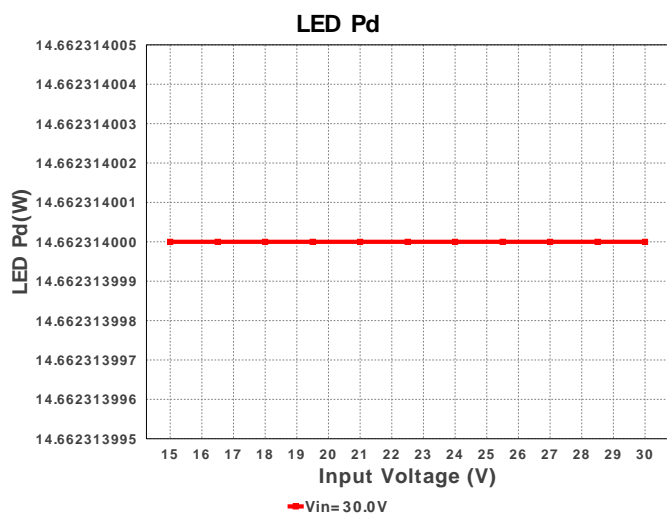
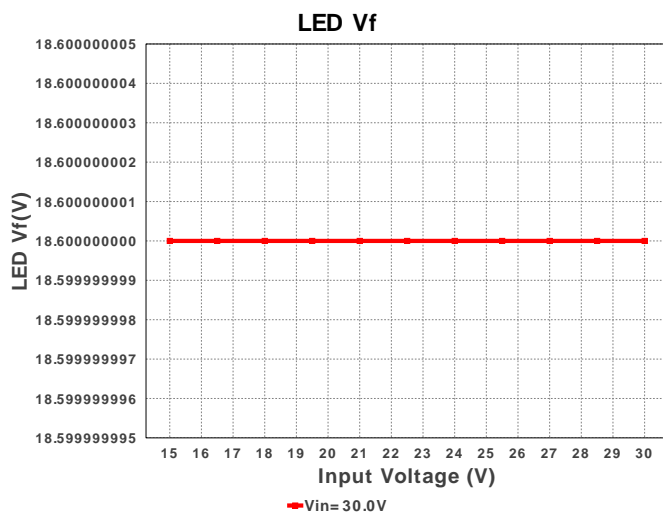
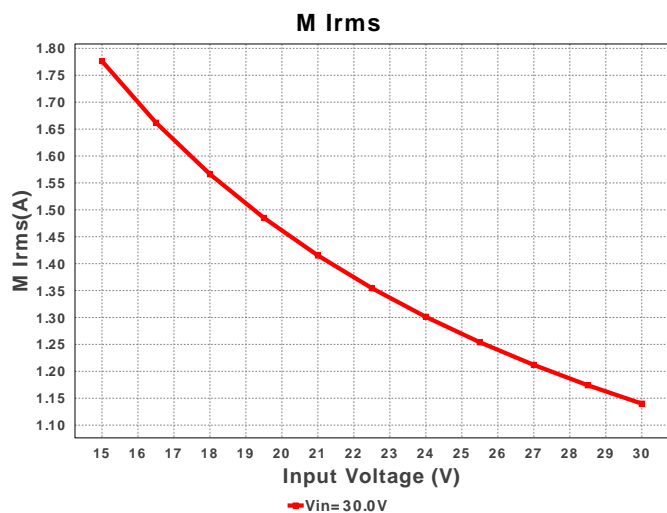


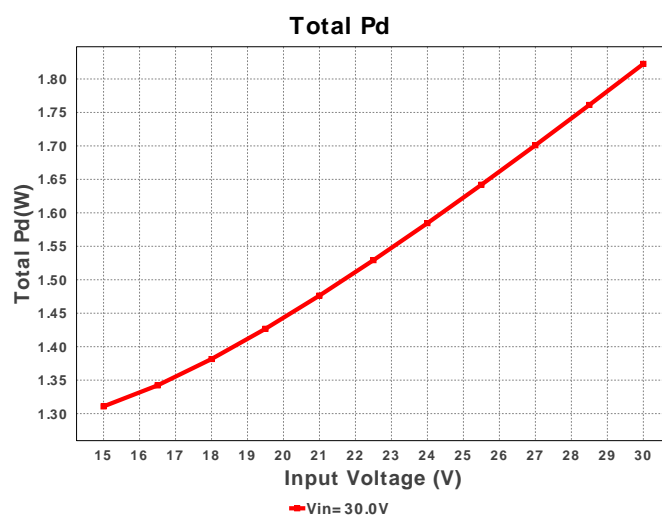
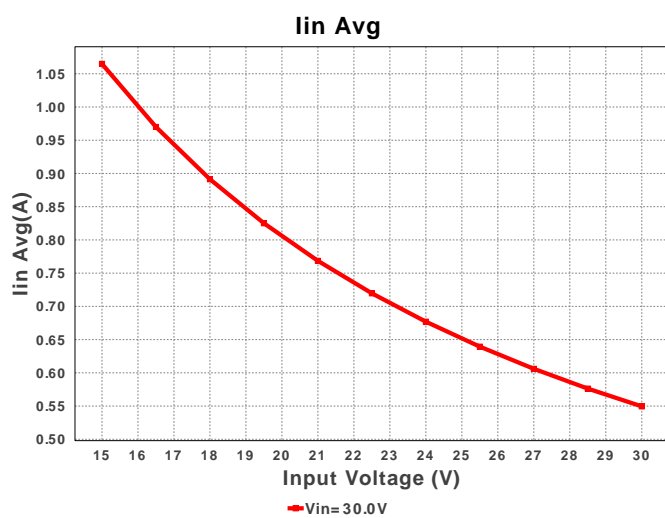
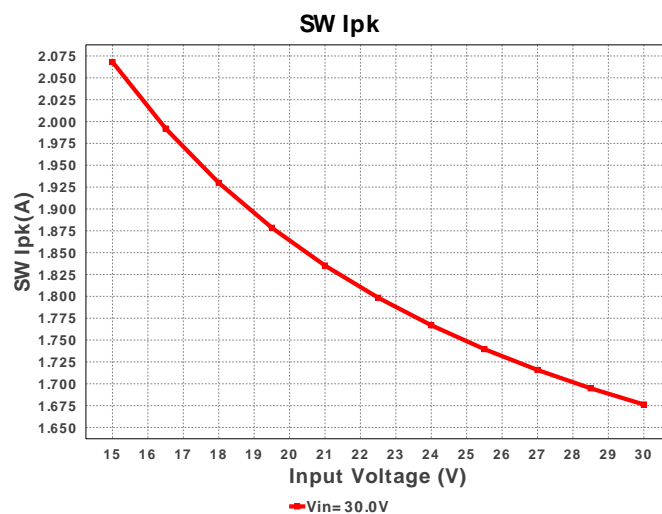
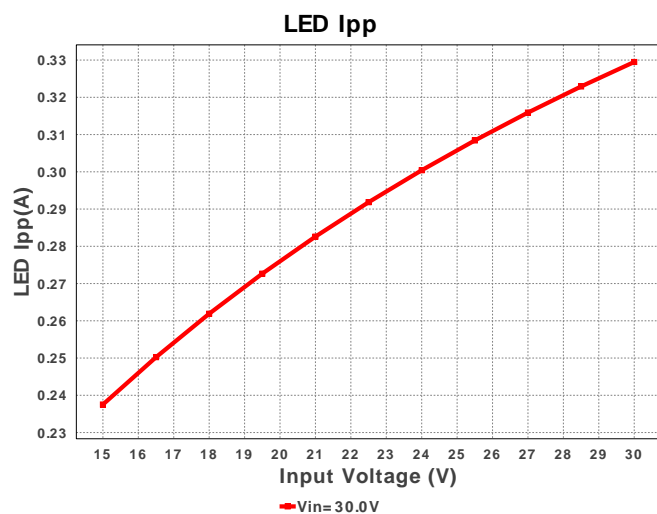
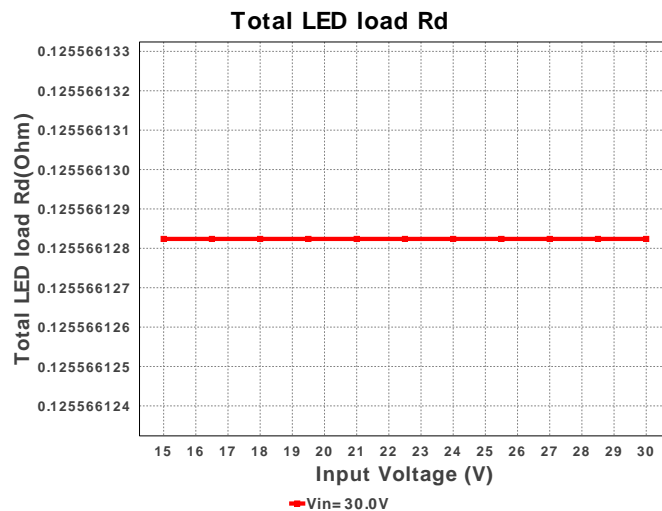
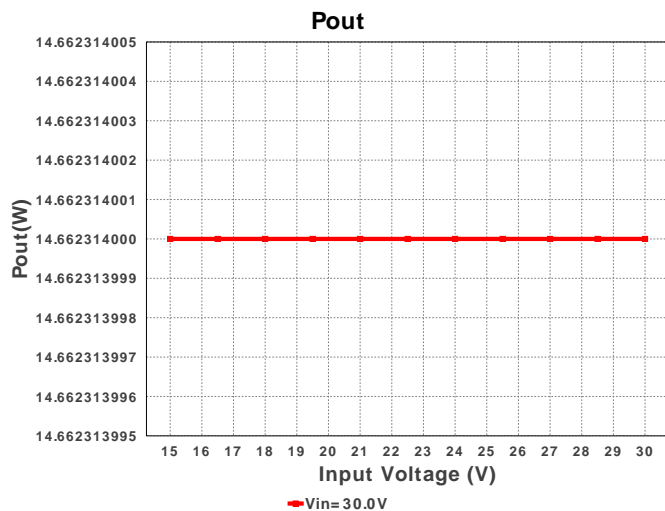
Cout Pd



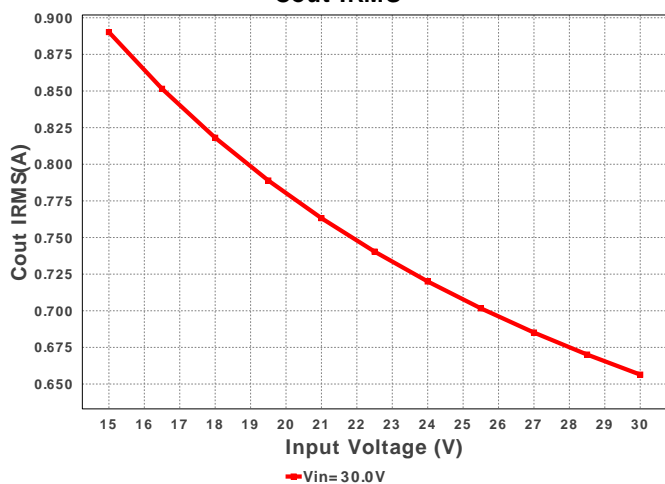
M Vds Act



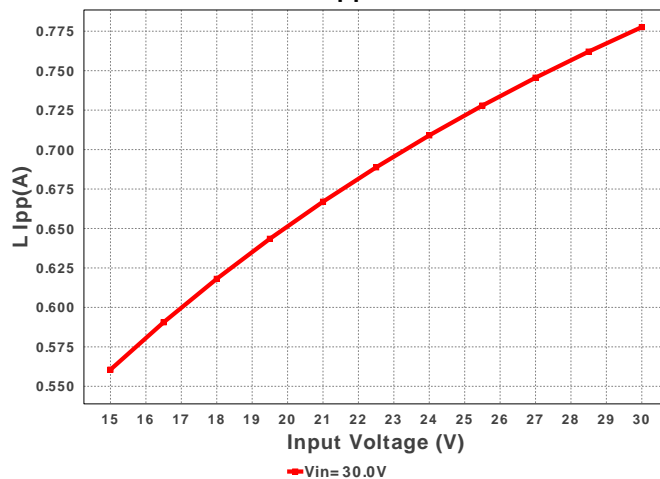




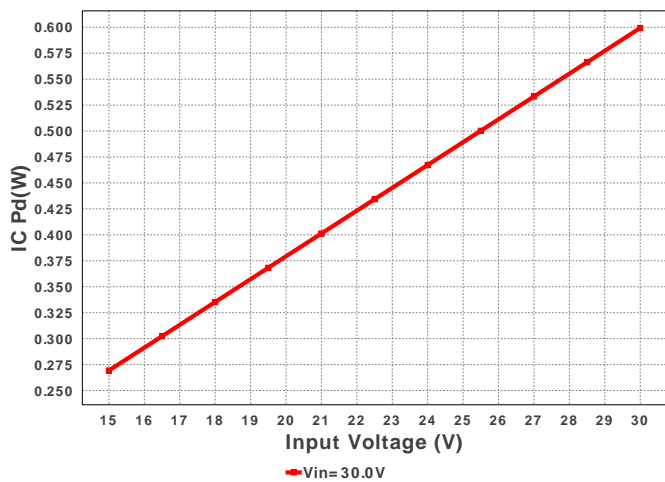
Cout IRMS



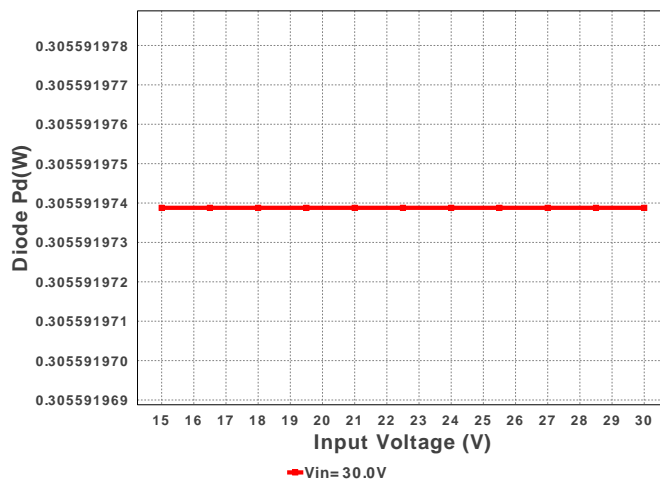
L Ipp



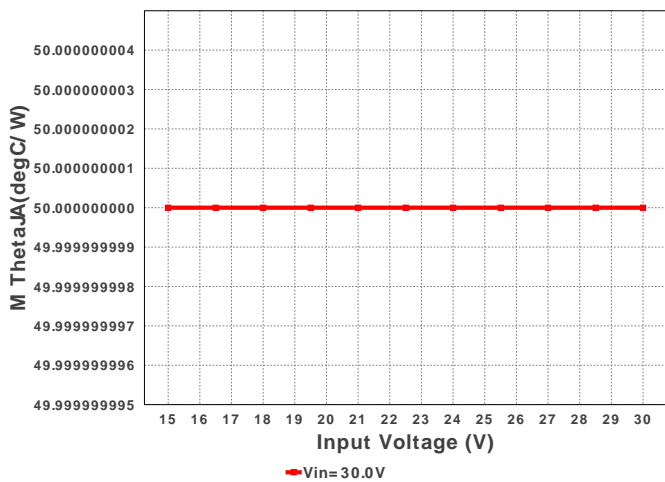
IC Pd



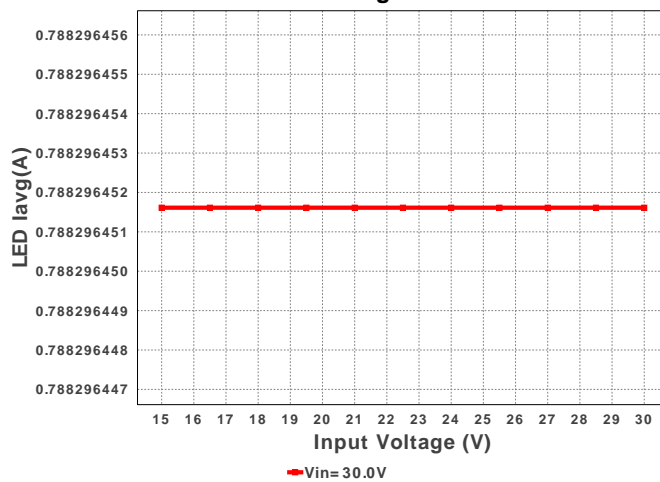
Diode Pd



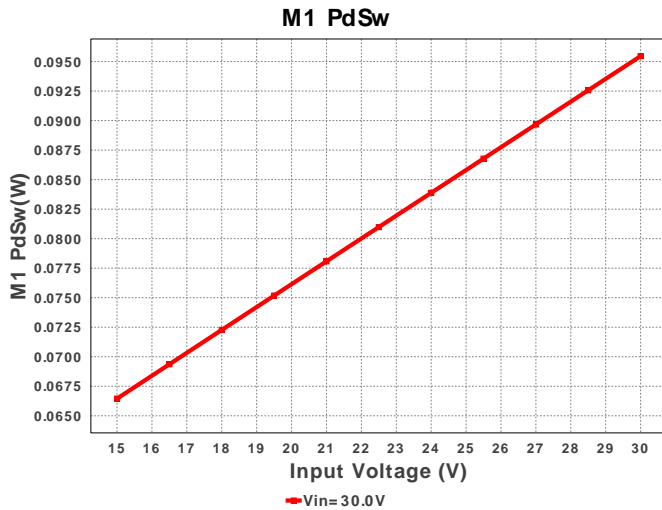
M ThetaJA



LED Iavg







## Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	122.076 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	682.413 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	632.46 mA	Current	Average input current
4.	L Ipp	422.88 mA	Current	Peak-to-peak inductor ripple current
5.	L1 Irms	1.366 A	Current	Inductor ripple current
6.	LED Iavg	788.296 mA	Current	LED Average Current
7.	LED Ipp	179.183 mA	Current	LED Ripple Current
8.	M Irms	1.215 A	Current	MOSFET RMS ripple current
9.	SW Ipk	1.572 A	Current	Peak switch current
10.	BOM Count	29	General	Total Design BOM count
11.	FootPrint	1.068 k mm <sup>2</sup>	General	Total Foot Print Area of BOM components
12.	Frequency	555.224 kHz	General	Switching frequency
13.	IC Tolerance	25.0 mV	General	IC Feedback Tolerance
14.	M Rdson	6.8 mOhm	General	Drain-Source On-resistance
15.	M Vds Act	8.259 mV	General	M Vds
16.	Pout	8.205 W	General	Total output power
17.	Total BOM	\$0.0	General	Total BOM Cost
18.	D1 Tj	48.972 degC	Op_Point	D1 junction temperature
19.	Vout OP	10.409 V	Op_Point	Operational Output Voltage
20.	Duty Cycle	44.498 %	Op_point	Duty cycle
21.	Efficiency	86.49 %	Op_point	Steady state efficiency
22.	IC Tj	41.172 degC	Op_point	IC junction temperature
23.	ICThetaJA	37.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
24.	IOUT_OP	788.296 mA	Op_point	Iout operating point
25.	LED Rd	1.507 Ohm	Op_point	LED DynamicResistance
26.	LED Vf	10.409 V	Op_point	Total LED Forward Calculated Voltage
27.	M ThetaJA	50.0 degC/W	Op_point	MOSFET junction-to-ambient thermal resistance
28.	M TjOp	33.889 degC	Op_point	MOSFET junction temperature
29.	VIN_OP	15.0 V	Op_point	Vin operating point
30.	Cin Pd	14.903 μW	Power	Input capacitor power dissipation
31.	Cout Pd	2.543 mW	Power	Output capacitor power dissipation
32.	Diode Pd	379.435 mW	Power	Diode power dissipation
33.	IC Pd	301.933 mW	Power	IC power dissipation
34.	L Pd	89.616 mW	Power	Inductor power dissipation
35.	LED Pd	8.205 W	Power	LED Power Dissipation
36.	M Pd	77.784 mW	Power	MOSFET power dissipation
37.	M1 PdCond	10.388 mW	Power	M1 MOSFET conduction losses
38.	M1 PdSw	67.397 mW	Power	M1 MOSFET switching losses
39.	Total Pd	1.282 W	Power	Total Power Dissipation
40.	Total LED load Rd	125.566 mOhm	Unknown	Total LED Load DynamicResistance

## Design Inputs

#	Name	Value	Description
1.	Iout	720.0 m	Maximum Output Current
2.	Iout1	720.0 m	Output Current #1
3.	VinMax	30.0	Maximum input voltage
4.	VinMin	15.0	Minimum input voltage
5.	Vout	18.6	Output Voltage
6.	Vout1	18.6	Output Voltage #1
7.	application	LED_DRIVER	LED Application
8.	base_pn	LM3429	Texas Instruments Base Part Number



#	Name	Value	Description
9.	isLEDArchitect	N	LED Architect Project
10.	ledparallel	1.0	Number of LED in parallel
11.	ledpartnumber	CL-L233-C13N1-C	LED Part number
12.	ledseries	1.0	Number of LED in series
13.	line_fsw	60.0	AC Line Frequency
14.	source	DC	Input Source Type
15.	ta	30.0	Ambient temperature

## Design Assistance

1. LM3429 Product Folder : <http://www.ti.com/product/LM3429> : 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](#).