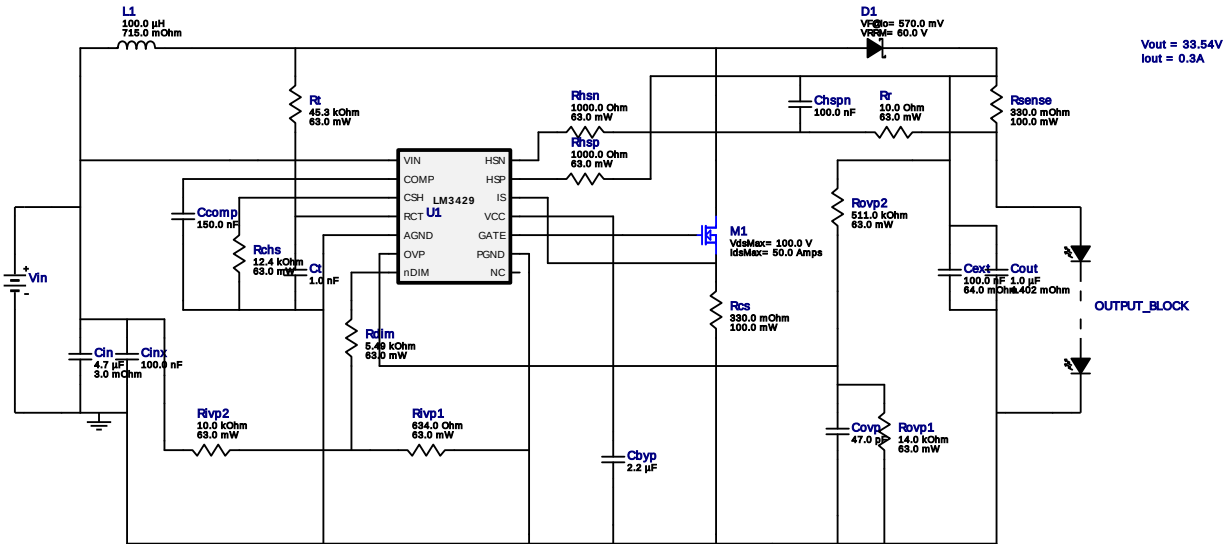
WEBENCH® Design Report

VinMin = 23.5V
VinMax = 24.8V
Vout = 33.54V
Iout = 0.3A

Device = LM3429MH/NOPB
Topology = Boost
Created = 7/18/16 7:25:17 PM
BOM Cost = $17.73
BOM Count = 28
Total Pd = 1.58W

Design : 3496425/17 LM3429MH/NOPB
LM3429MH/NOPB 23.5V-24.8V to 33.72V @ 0.30179840664711627A

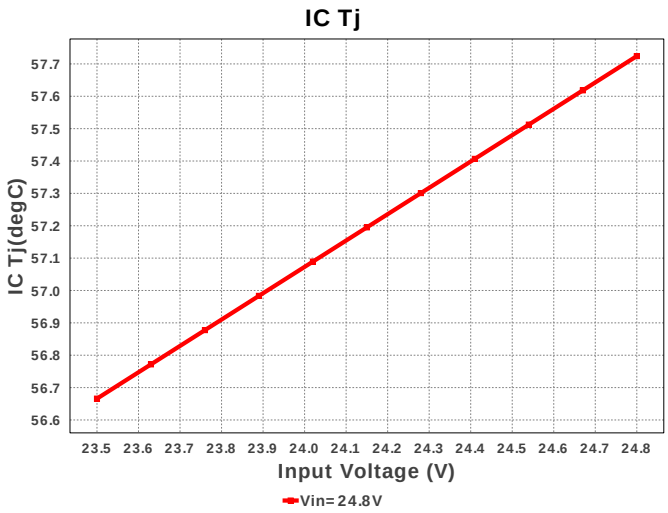


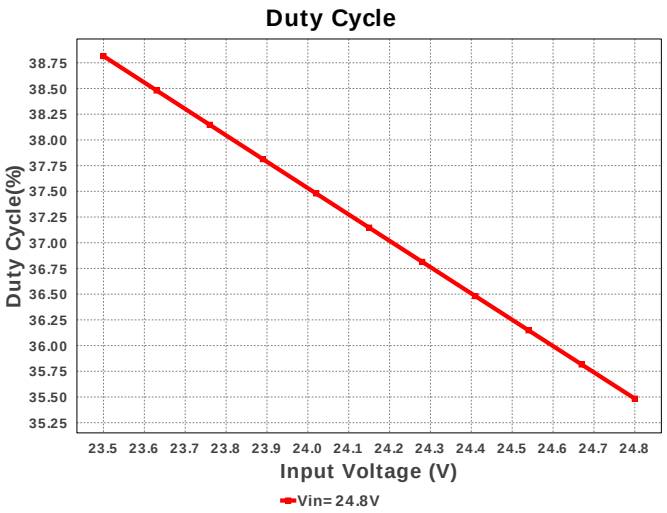
1. This regulator device is qualified for Automotive applications. All passives and other components selected in this design may not be qualified for Automotive applications. The user is required to verify that all components in the design meet the qualification and safety requirements for their specific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

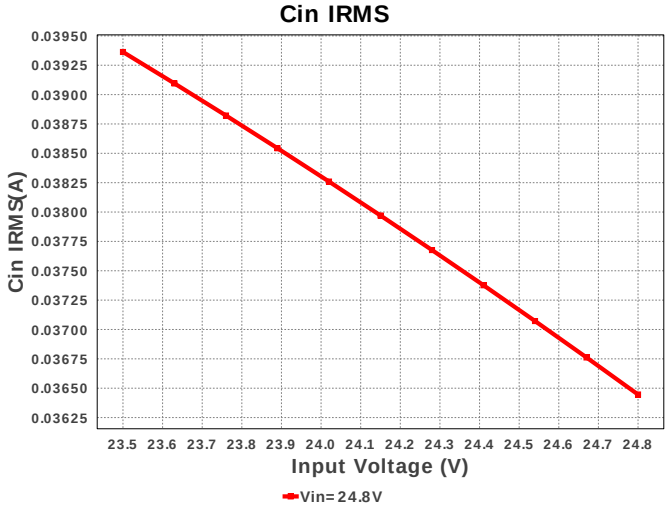
Electrical BOM

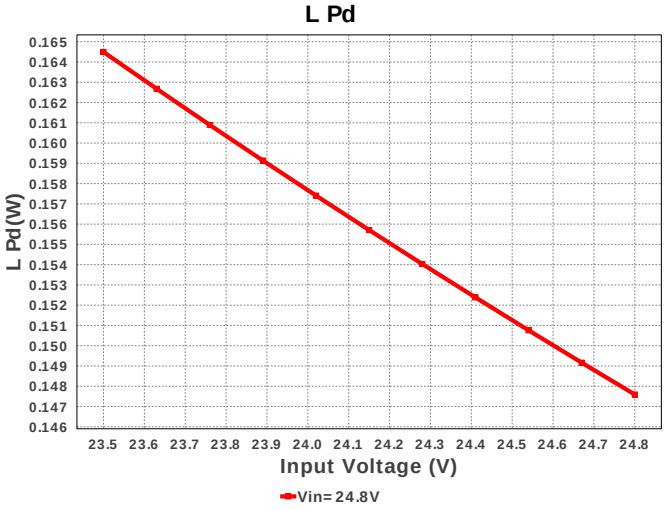
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbyp	Taiyo Yuden	EMK212B7225KG-T Series= X7R	Cap= 2.2 uF VDC= 16.0 V IRMS= 0.0 A	1	$0.03	0805 7 mm²
2.	Ccomp	MuRata	GRM155R60J154KE01D Series= X5R	Cap= 150.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
3.	Cext	Kemet	C0805C104K5RACTU Series= X7R	Cap= 100.0 nF ESR= 64.0 mOhm VDC= 50.0 V IRMS= 1.64 A	1	$0.01	0805 7 mm²
4.	Chspn	MuRata	GRM21BR71E104KA01L Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
5.	Cin	MuRata	GRM31CR71H475KA12L Series= X7R	Cap= 4.7 uF ESR= 3.0 mOhm VDC= 50.0 V IRMS= 4.98 A	1	$0.07	1206 11 mm²
6.	Cinx	Kemet	C0603C104K5RACTU Series= X7R	Cap= 100.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0603 5 mm²
7.	Cout	MuRata	GRM21BR71H105KA12L Series= X7R	Cap= 1.0 uF ESR= 4.402 mOhm VDC= 50.0 V IRMS= 1.677 A	1	$0.05	0805 7 mm²
8.	Covp	Kemet	C0805C470K5GACTU Series= C0G/NP0	Cap= 47.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
9.	Ct	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²

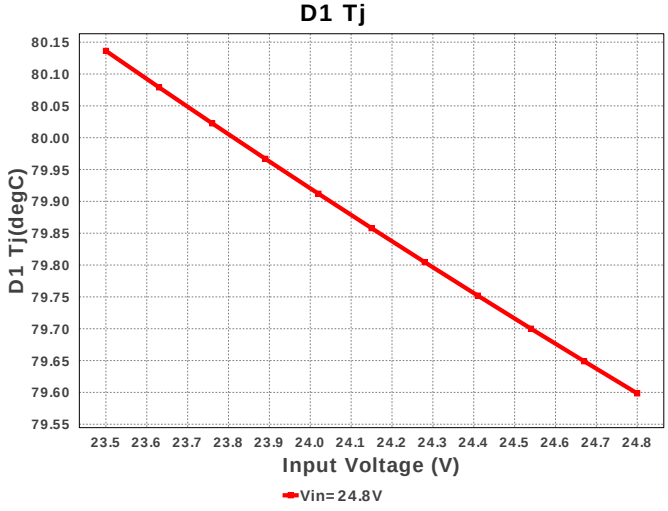
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	D1	NXP Semiconductor	PMEG6010CEH,115	VF@Io= 570.0 mV VRRM= 60.0 V	1	$0.04	 SOD-123F 12 mm^2
11.	D_LED	Cree	XHP50A-00-0000-0D00J40CB	LED	3	$5.02	 xlampxhp 0 mm^2
12.	L1	Bourns	SRF0703-101M	L= 100.0 µH DCR= 715.0 mOhm	1	$0.33	 SRF0703 92 mm^2
13.	M1	Texas Instruments	CSD19537Q3	VdsMax= 100.0 V IdsMax= 50.0 Amps	1	$0.75	 TRANS_NexFET_Q3 18 mm^2
14.	Rchs	Vishay-Dale	CRCW040212K4FKED Series= CRCW..e3	Res= 12.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
15.	Rcs	Panasonic	ERJ-3RQFR33V Series= ERJ-3R	Res= 330.0 mOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.02	 0603 5 mm^2
16.	Rdim	Vishay-Dale	CRCW04025K49FKED Series= CRCW..e3	Res= 5.49 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
17.	Rhsn	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1000.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
18.	Rhsp	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1000.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
19.	Rivp1	Vishay-Dale	CRCW0402634RFKED Series= CRCW..e3	Res= 634.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
20.	Rivp2	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
21.	Rovp1	Vishay-Dale	CRCW040214K0FKED Series= CRCW..e3	Res= 14.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
22.	Rovp2	Vishay-Dale	CRCW0402511KFKED Series= CRCW..e3	Res= 511.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
23.	Rr	Vishay-Dale	CRCW040210R0FKED Series= CRCW..e3	Res= 10.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
24.	Rsense	Panasonic	ERJ-3RQFR33V Series= ERJ-3R	Res= 330.0 mOhm Power= 100.0 mW Tolerance= 1.0%	1	$0.02	 0603 5 mm^2
25.	Rt	Vishay-Dale	CRCW040245K3FKED Series= CRCW..e3	Res= 45.3 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm^2
26.	U1	Texas Instruments	LM3429MH/NOPB	Switcher	1	$1.20	 MXA14A 59 mm^2

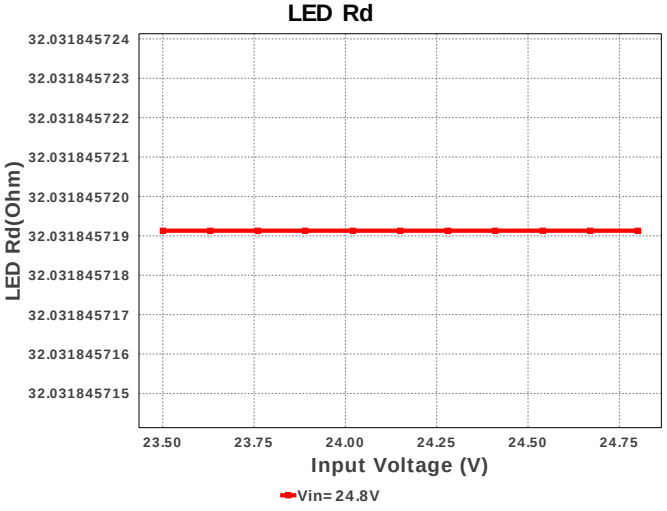


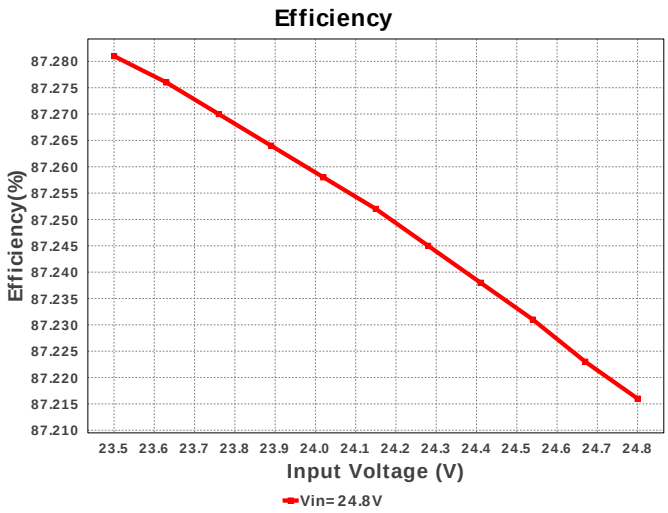


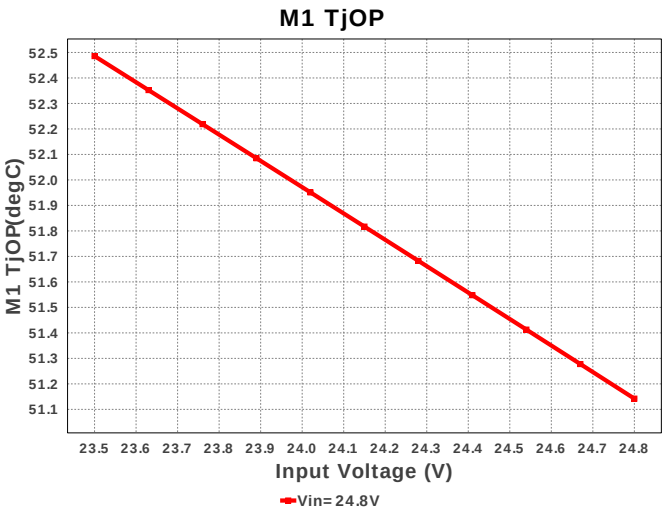


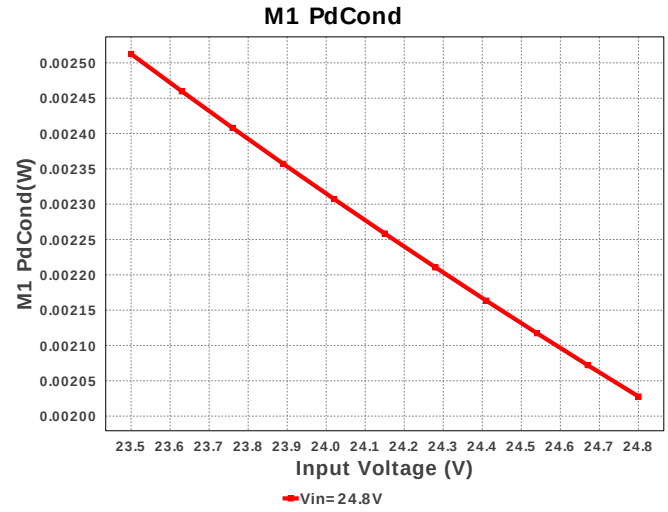


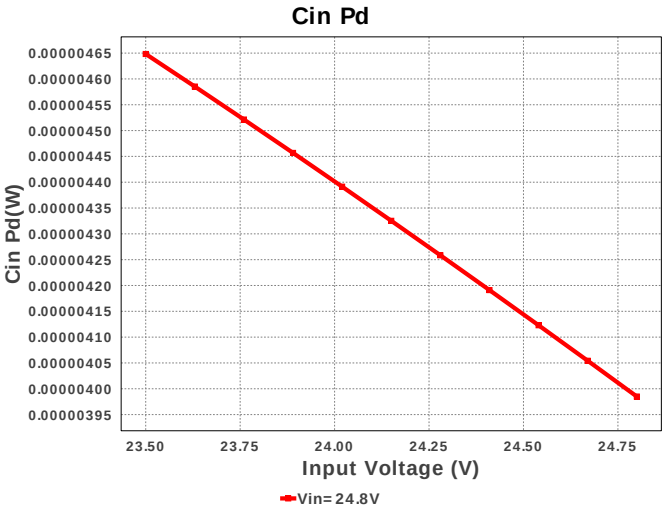


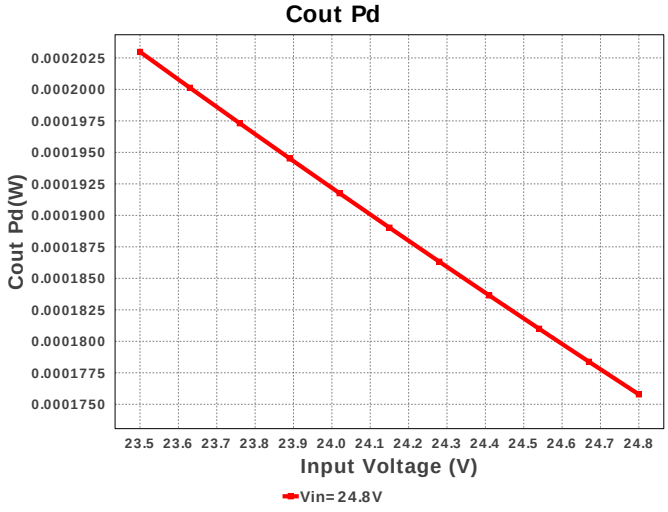


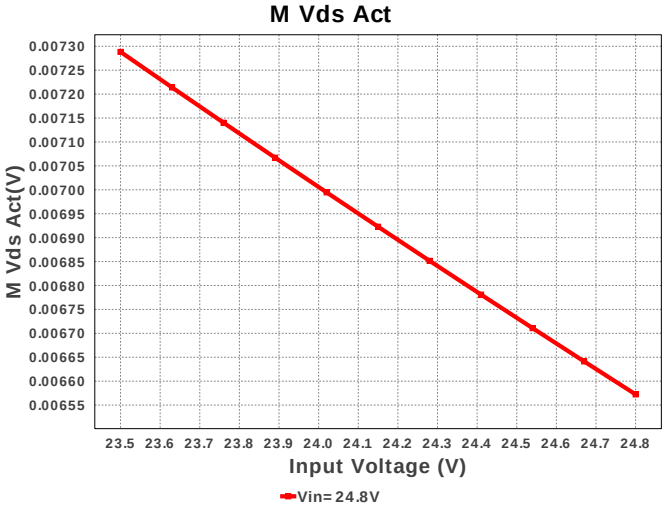


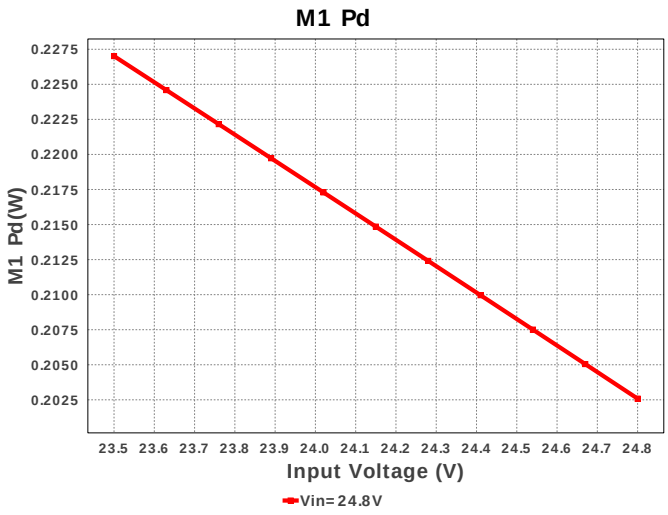


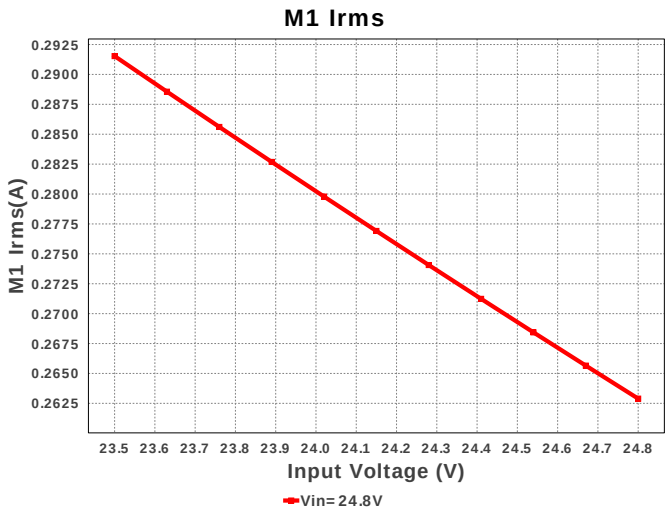


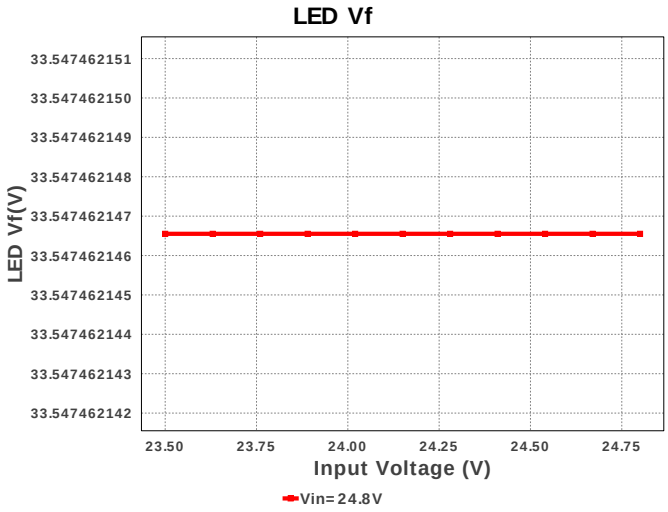


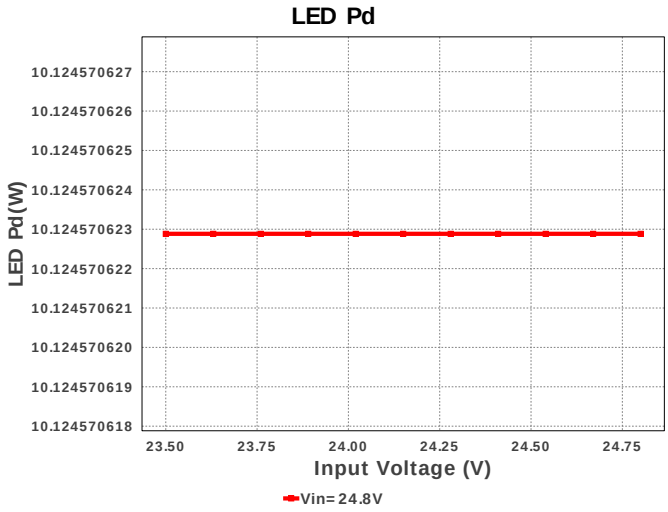


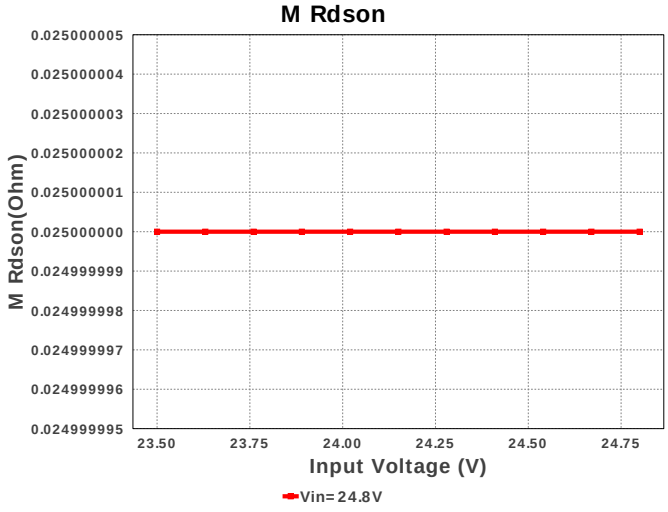


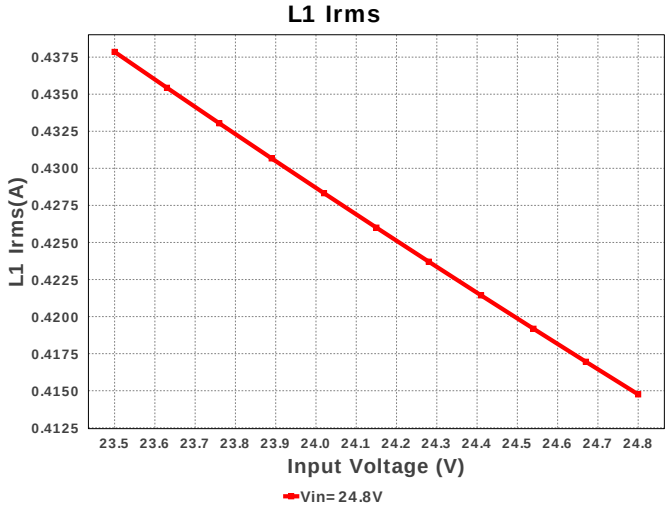


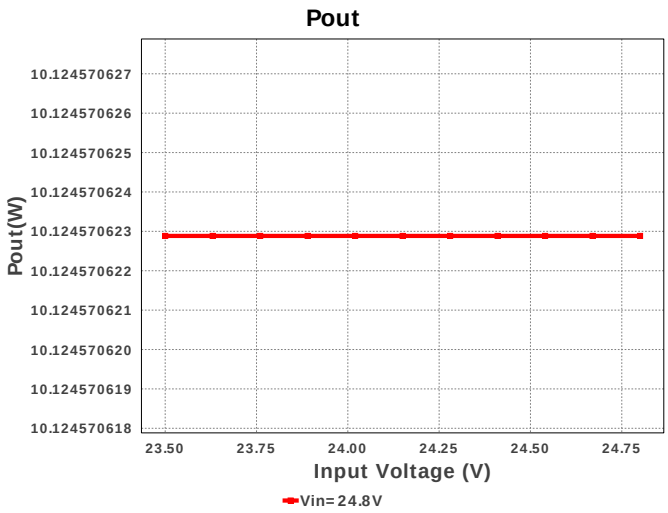


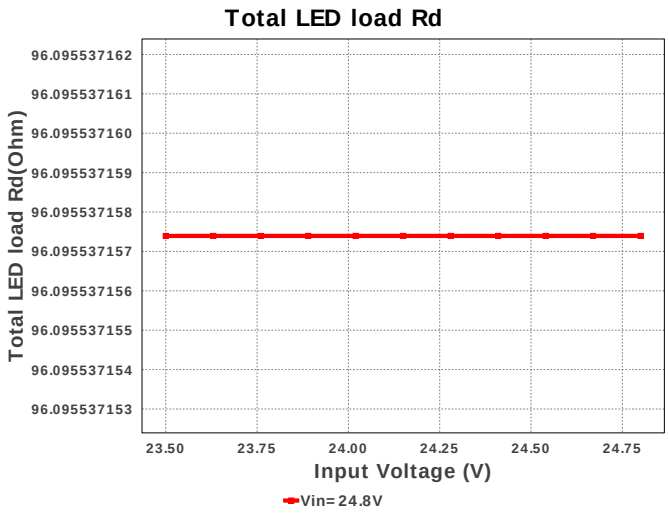


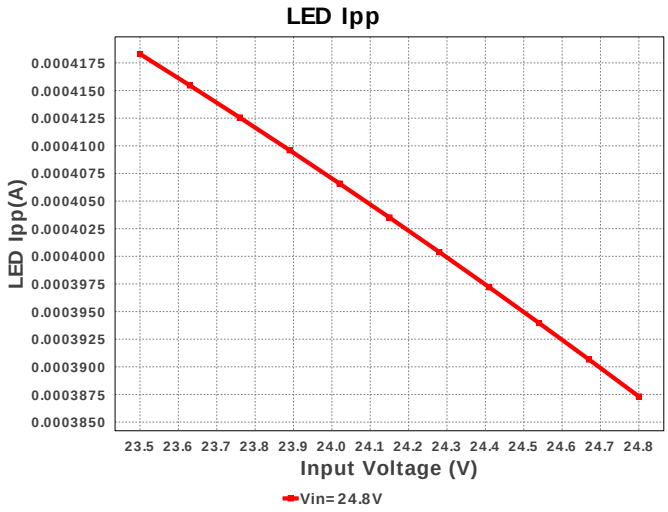


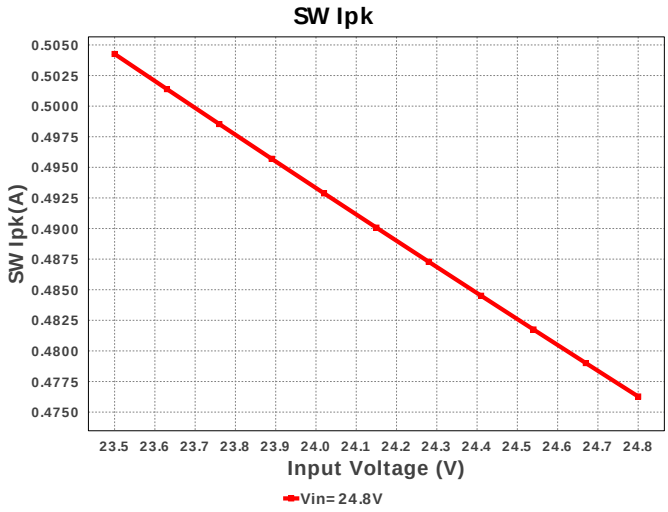


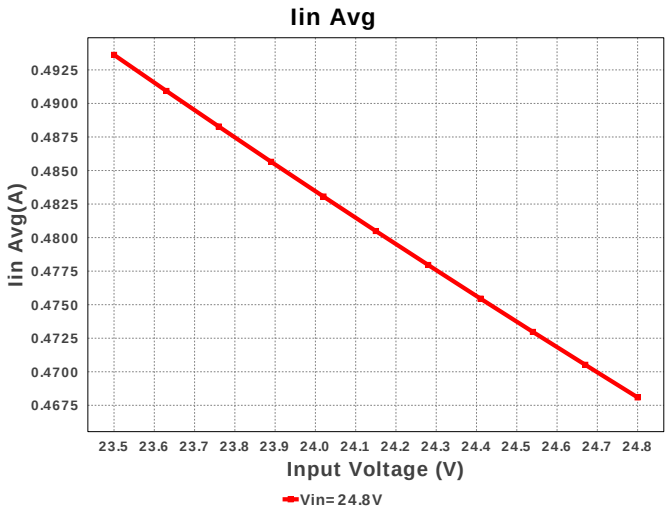


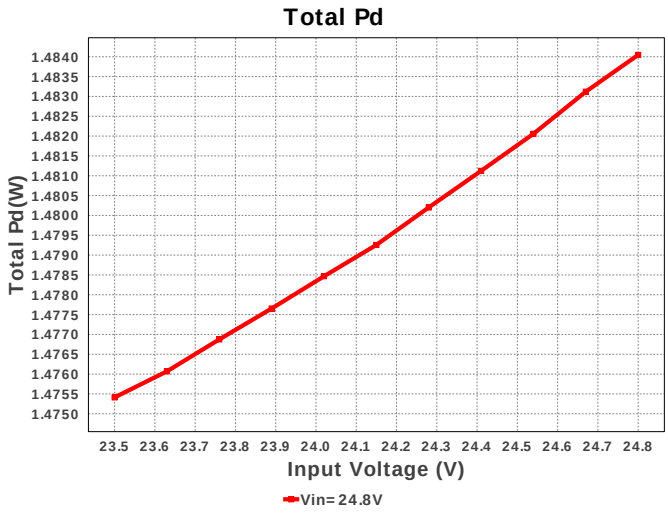


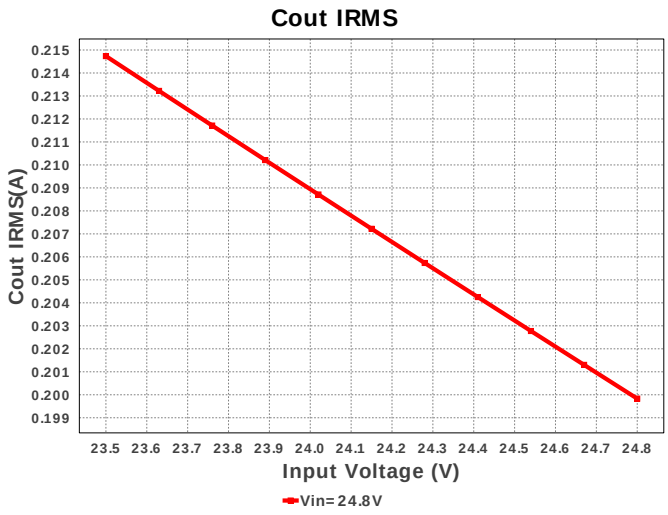


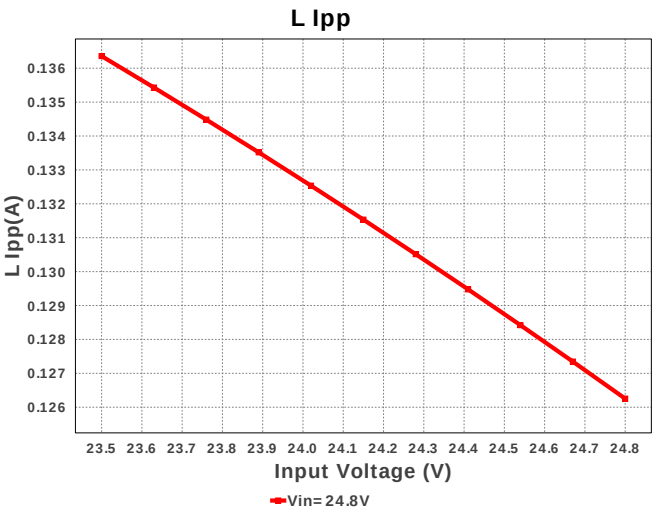


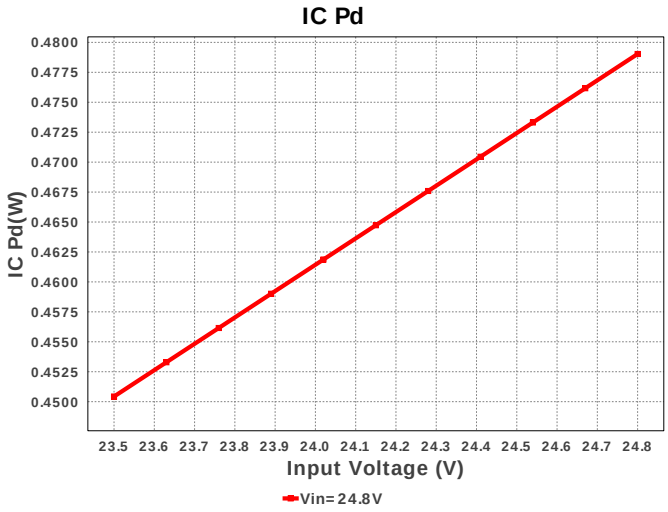


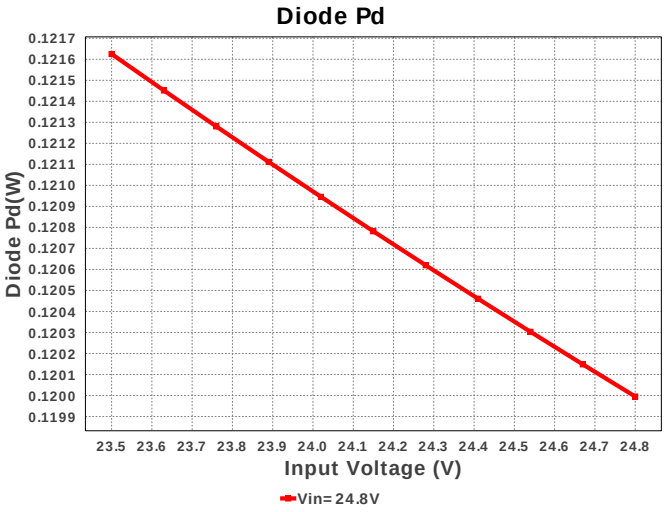


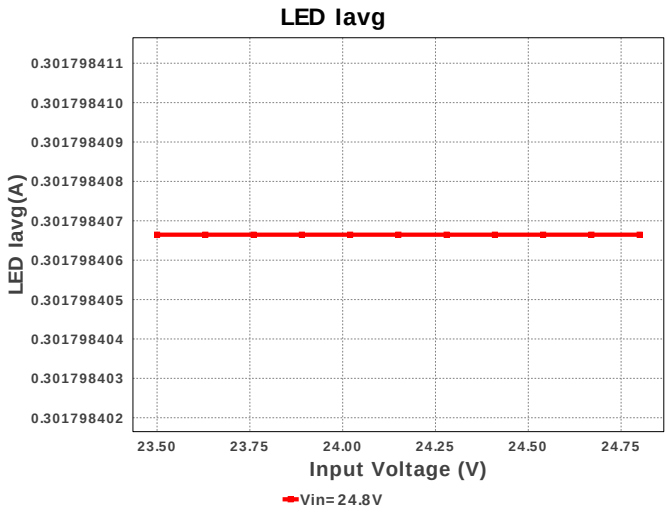


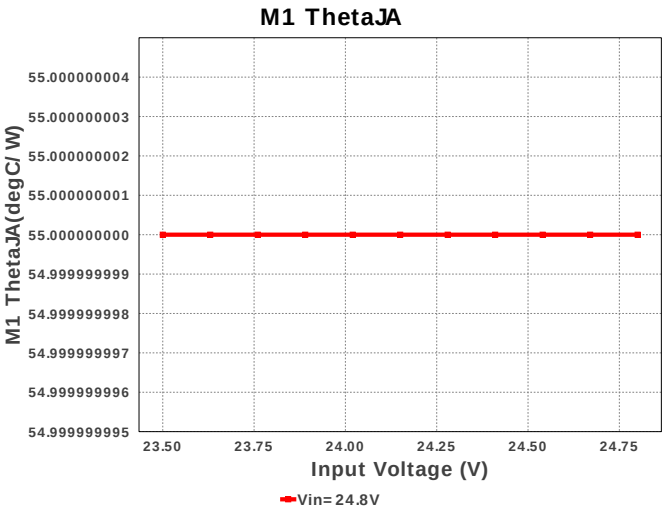


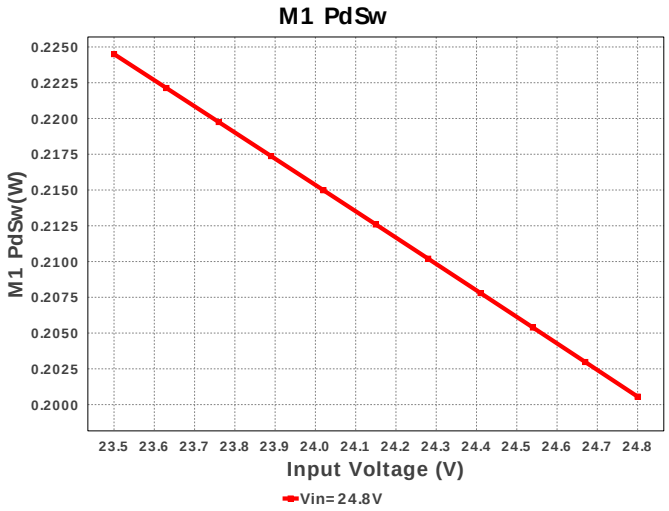












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	39.794 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	216.59 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	500.49 mA	Current	Average input current
4.	L Ipp	137.85 mA	Current	Peak-to-peak inductor ripple current
5.	L1 Irms	440.039 mA	Current	Inductor ripple current
6.	LED Iavg	301.798 mA	Current	LED Average Current
7.	LED Ipp	422.887 µA	Current	LED Ripple Current
8.	M1 Irms	294.266 mA	Current	M1 MOSFET Irms
9.	SW Ipk	507.161 mA	Current	Peak switch current
10.	BOM Count	28	General	Total Design BOM count
11.	FootPrint	280.0 mm^2	General	Total Foot Print Area of BOM components
12.	Frequency	546.358 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	2.001 mV	General	M Vds
16.	M1 ThetaJA	50.0 degC/W	General	MOSFET junction-to-ambient thermal resistance
17.	Pout	10.177 W	General	Total output power
18.	Total BOM	$17.73	General	Total BOM Cost
19.	D1 Tj	80.139 degC	Op_Point	D1 junction temperature
20.	Vout OP	33.721 V	Op_Point	Operational Output Voltage
21.	Duty Cycle	39.651 %	Op_point	Duty cycle
22.	Efficiency	86.526 %	Op_point	Steady state efficiency
23.	IC Tj	58.024 degC	Op_point	IC junction temperature
24.	ICThetaJA	37.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
25.	IOUT_OP	301.8 mA	Op_point	Iout operating point
26.	LED Rd	32.032 Ohm	Op_point	LED DynamicResistance
27.	LED Vf	33.721 V	Op_point	Total LED Forward Calculated Voltage
28.	M1 TjOP	52.984 degC	Op_point	M1 MOSFET junction temperature
29.	VIN_OP	23.5 V	Op_point	Vin operating point
30.	Cin Pd	4.751 µW	Power	Input capacitor power dissipation
31.	Cout Pd	206.504 µW	Power	Output capacitor power dissipation
32.	Diode Pd	121.632 mW	Power	Diode power dissipation
33.	IC Pd	487.146 mW	Power	IC power dissipation
34.	L Pd	166.138 mW	Power	Inductor power dissipation
35.	LED Pd	10.177 W	Power	LED Power Dissipation
36.	M1 Pd	259.681 mW	Power	M1 MOSFET total power dissipation
37.	M1 PdCond	654.742 µW	Power	M1 MOSFET conduction losses
38.	M1 PdSw	259.026 mW	Power	M1 MOSFET switching losses
39.	Total Pd	1.585 W	Power	Total Power Dissipation
40.	Total LED load Rd	96.096 Ohm		Total LED Load DynamicResistance
41.	Vout Tolerance	74.138 m%		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	300.0 m	Maximum Output Current
2.	VinMax	24.8	Maximum input voltage
3.	VinMin	23.5	Minimum input voltage
4.	Vout	33.54	Output Voltage
5.	application	LED_DRIVER	LED Application
6.	base_pn	LM3429	Texas Instruments Base Part Number

#	Name	Value	Description
7.	isLEDArchitect	N	LED Architect Project
8.	ledparallel	1.0	Number of LED in parallel
9.	ledpartnumber	XHP50A-00-0000-0D00L40CB	LED part number
10.	ledseries	3.0	Number of LED in series
11.	line_fsw	60.0	AC Line Frequency
12.	source	DC	Input Source Type
13.	ta	40.0	Ambient temperature

Design Assistance

1. LM3429 Product Folder : http://www.ti.com/product/LM3429 : contains the data sheet and other resources.