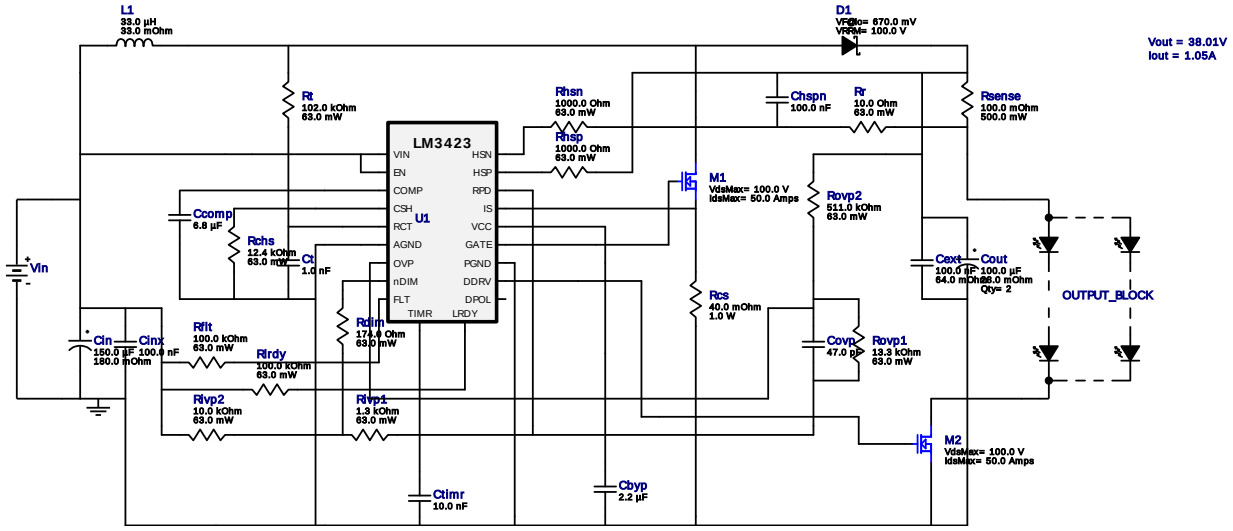
TEXAS INSTRUMENTS

WEBENCH® Design Report

VinMin = 12.0V
VinMax = 32.0V
Vout = 38.01V
Iout = 1.05A

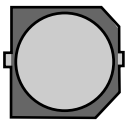
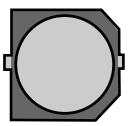
Device = LM3423MHX/NOPB
Topology = Boost
Created = 8/30/16 9:26:19 AM
BOM Cost = $9.05
BOM Count = 39
Total Pd = 3.78W

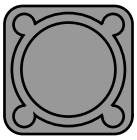
Design : 4009018/142 LM3423MHX/NOPB
LM3423MHX/NOPB 12.0V-32.0V to 36.49V @ 0.9959577419354838A



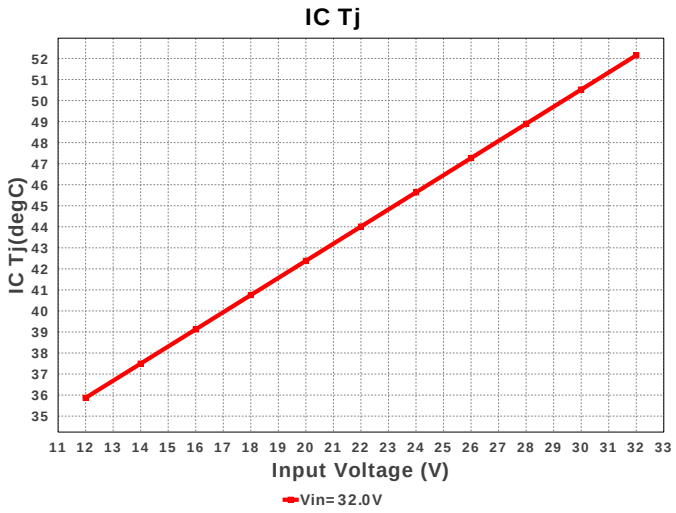
1. This regulator device is qualified for Automotive applications. All passives and other components selected in this design may not be qualified for Automotive applications. The user is required to verify that all components in the design meet the qualification and safety requirements for their specific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

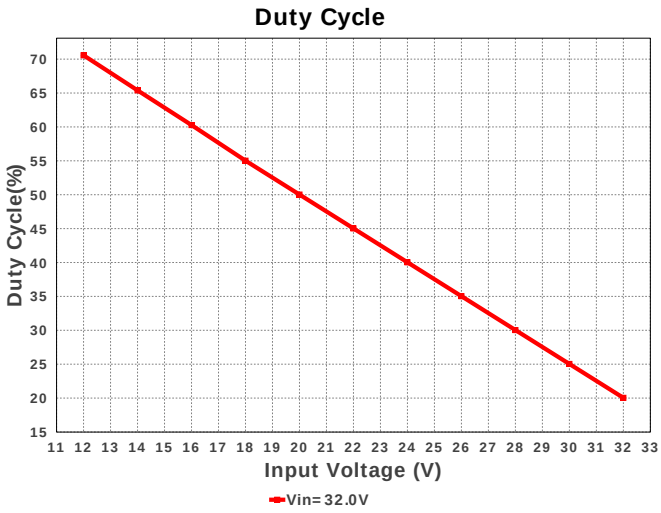
Electrical BOM

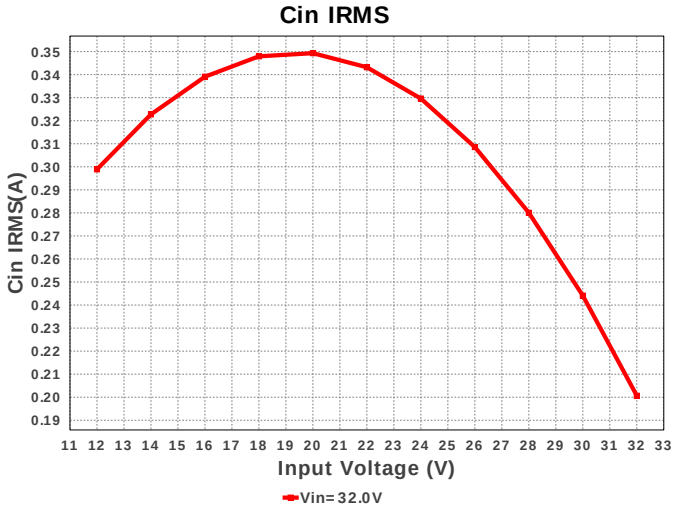
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbyp	Taiyo Yuden	EMK212B7225KG-T Series= X7R	Cap= 2.2 uF VDC= 16.0 V IRMS= 0.0 A	1	$0.03	0805 7 mm²
2.	Ccomp	MuRata	GRM32NR61E685KA12L Series= X5R	Cap= 6.8 uF VDC= 25.0 V IRMS= 0.0 A	1	$0.27	1210 15 mm²
3.	Cext	Kemet	C0805C104K5RACTU Series= 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	Nichicon	UUD1H151MNL1GS Series= uD	Cap= 150.0 uF ESR= 180.0 mOhm VDC= 50.0 V IRMS= 670.0 mA	1	$0.26	 SM_RADIAL_10BMM 160 mm²
6.	Cinx	MuRata	GRM188R72A104KA35D Series= X7R	Cap= 100.0 nF VDC= 100.0 V IRMS= 0.0 A	1	$0.03	0603 5 mm²
7.	Cout	Panasonic	EEHZA1H101P Series= ?	Cap= 100.0 uF ESR= 28.0 mOhm VDC= 50.0 V IRMS= 2.0 A	2	$2.54	 SM_RADIAL_10BMM 160 mm²

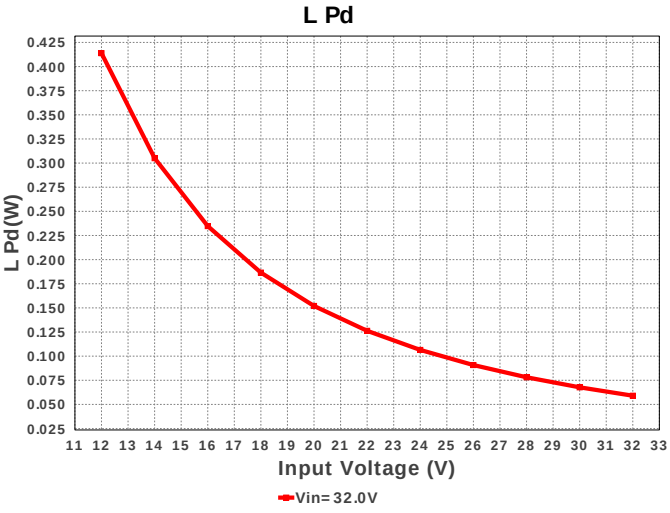
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
8.	Covp	Kemet	C0805C470K5GACTU Series= C0G/NP0	Cap= 47.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	 0805 7 mm²
9.	Ct	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	 0805 7 mm²
10.	Ctimr	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	 0805 7 mm²
11.	D1	Fairchild Semiconductor	FSV8100V	VF@Io= 670.0 mV VRRM= 100.0 V	1	$0.21	 TO-277A 56 mm²
12.	D_LED	Cree	XHP50A-00-0000-0D0BJ40DT	LED	9	$5.42	 xlampxhp 0 mm²
13.	L1	Coilcraft	MSS1210-333MEB	L= 33.0 µH DCR= 33.0 mOhm	1	$0.81	 MSS1210 204 mm²
14.	M1	Texas Instruments	CSD19534Q5A	VdsMax= 100.0 V IdsMax= 50.0 Amps	1	$0.38	 TRANS_NexFET_Q5A 55 mm²
15.	M2	Texas Instruments	CSD19534Q5A	VdsMax= 100.0 V IdsMax= 50.0 Amps	1	$0.38	 TRANS_NexFET_Q5A 55 mm²
16.	Rchs	Vishay-Dale	CRCW040212K4FKED Series= CRCW..e3	Res= 12.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
17.	Rcs	Stackpole Electronics Inc	CSRN2010FK40L0 Series= ?	Res= 40.0 mOhm Power= 1.0 W Tolerance= 1.0%	1	$0.15	 2010 32 mm²
18.	Rdim	Vishay-Dale	CRCW0402174RFKED Series= CRCW..e3	Res= 174.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
19.	Rflt	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
20.	Rhsn	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1000.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
21.	Rhsp	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1000.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
22.	Rivp1	Vishay-Dale	CRCW04021K30FKED Series= CRCW..e3	Res= 1.3 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
23.	Rivp2	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
24.	Rlrdy	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
25.	Rovp1	Vishay-Dale	CRCW040213K3FKED Series= CRCW..e3	Res= 13.3 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²

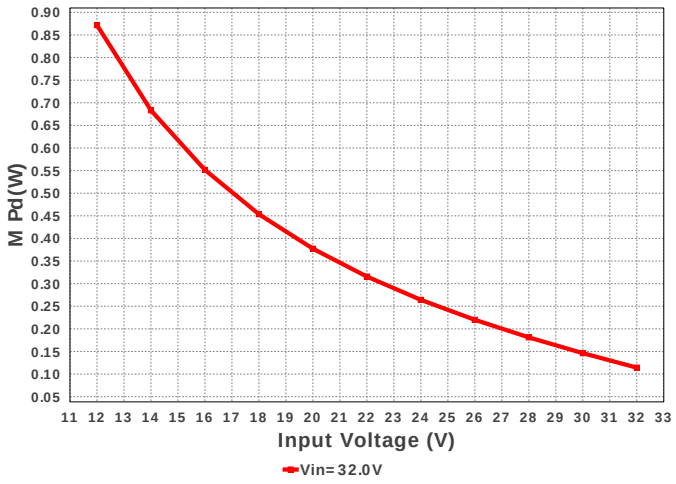
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
26.	Rovp2	Vishay-Dale	CRCW0402511KFKED Series= CRCW..e3	Res= 511.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
27.	Rr	Vishay-Dale	CRCW040210R0FKED Series= CRCW..e3	Res= 10.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
28.	Rsense	Rohm	MCR25JZHFLR100 Series= MCR25	Res= 100.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	$0.03	1210 15 mm^2
29.	Rt	Vishay-Dale	CRCW0402102KFKED Series= CRCW..e3	Res= 102.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
30.	U1	Texas Instruments	LM3423MHX/NOPB	Switcher	1	$1.25	MXA20A 71 mm^2

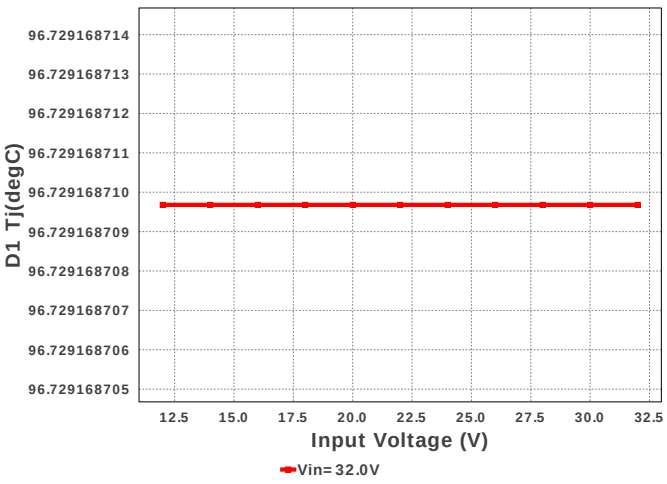


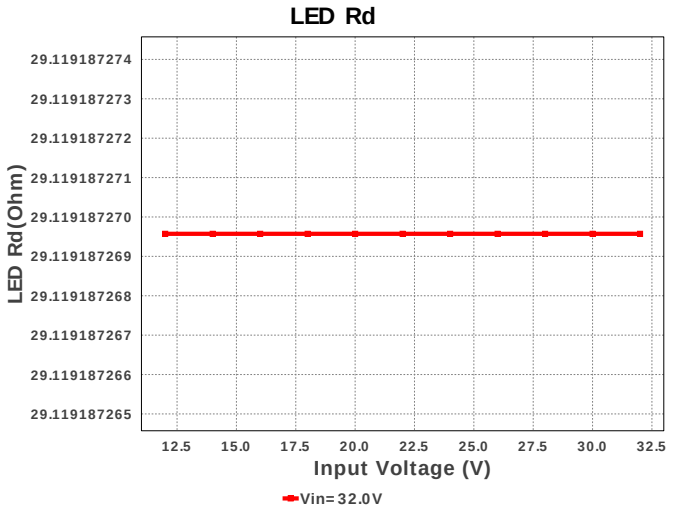


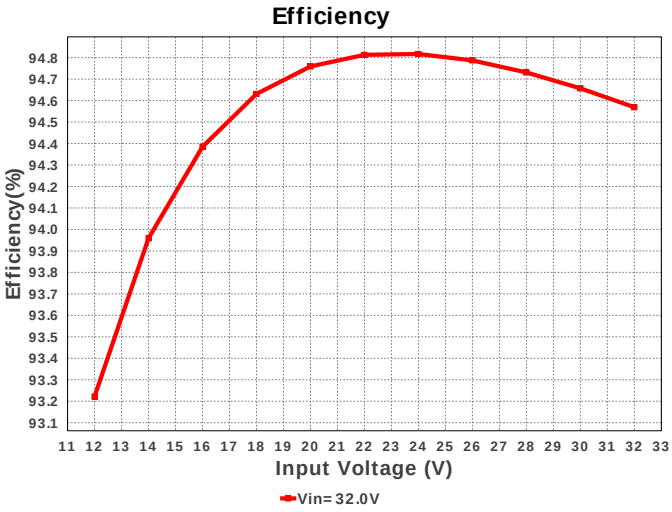


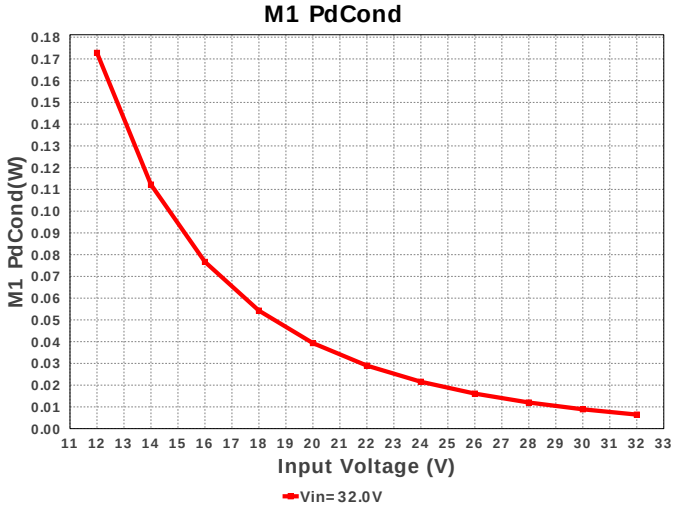


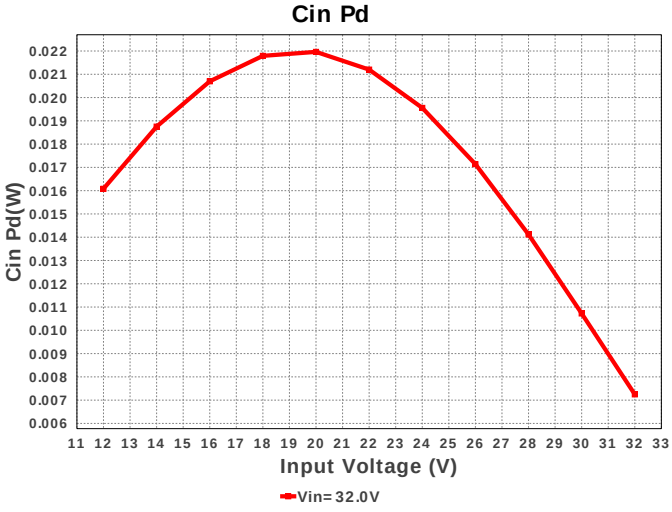


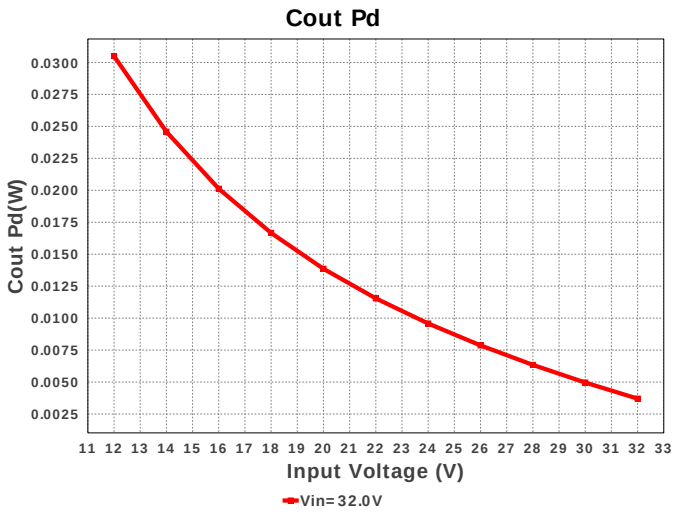


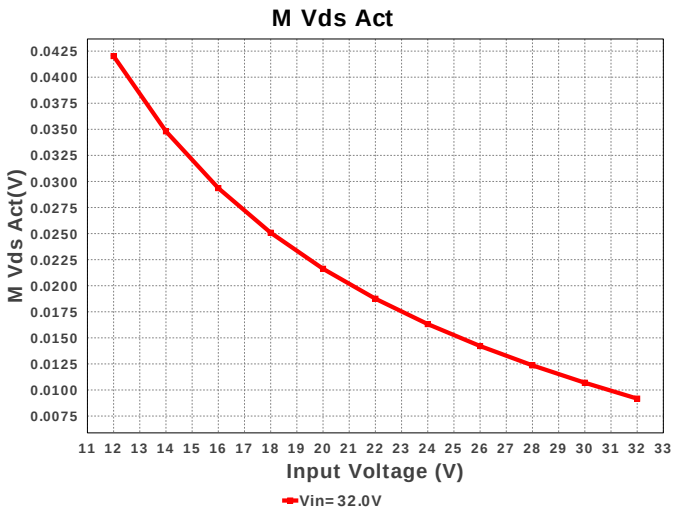


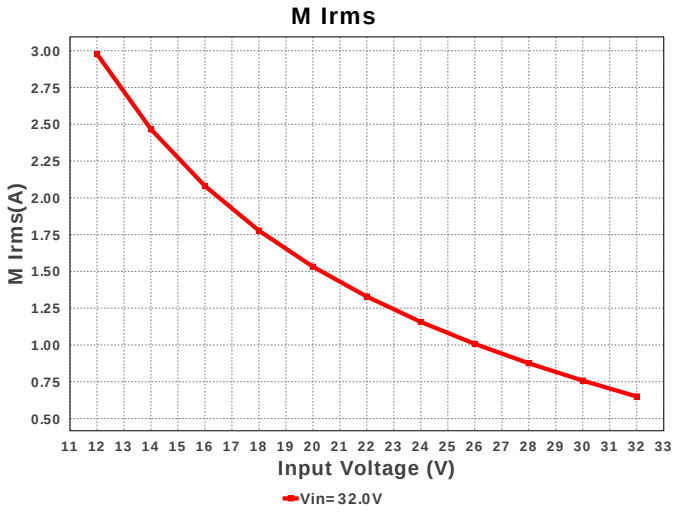


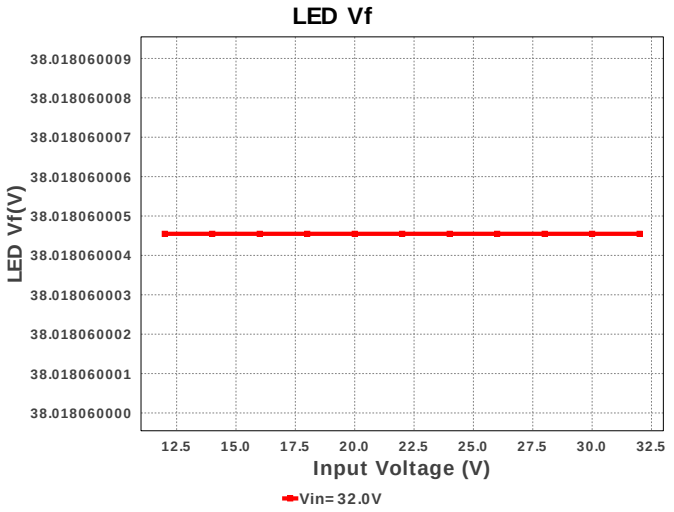


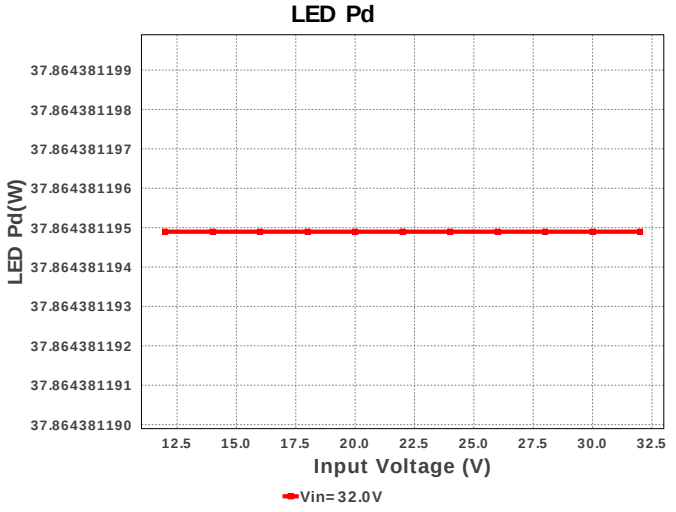


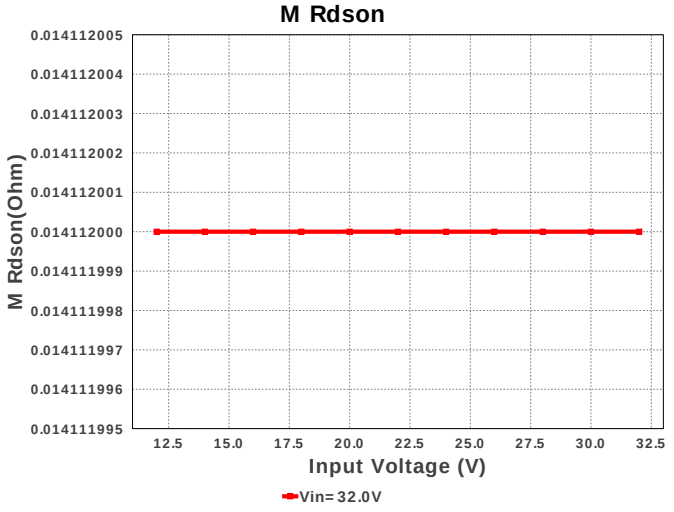


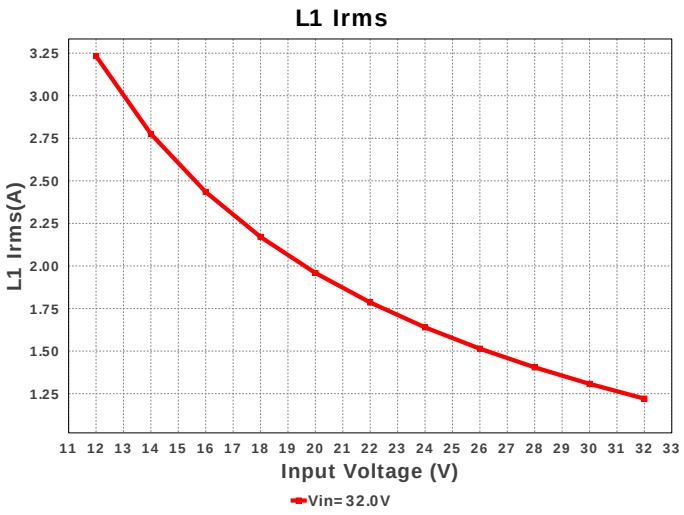


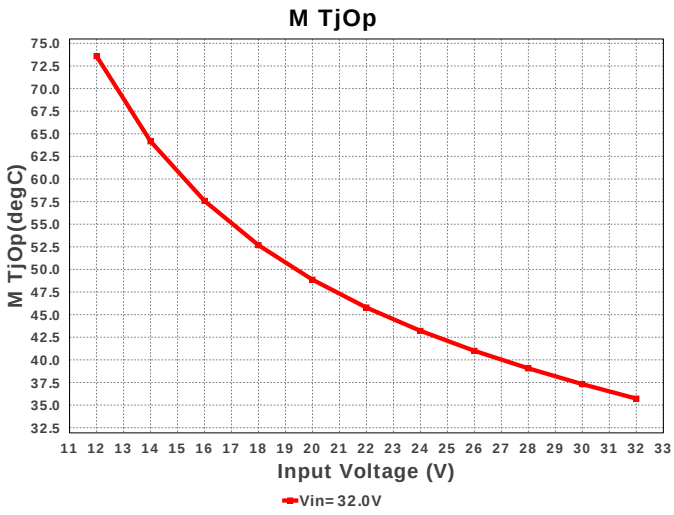


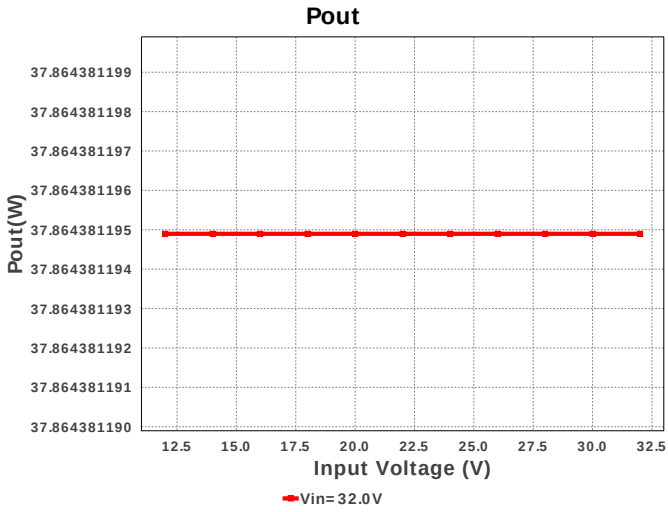


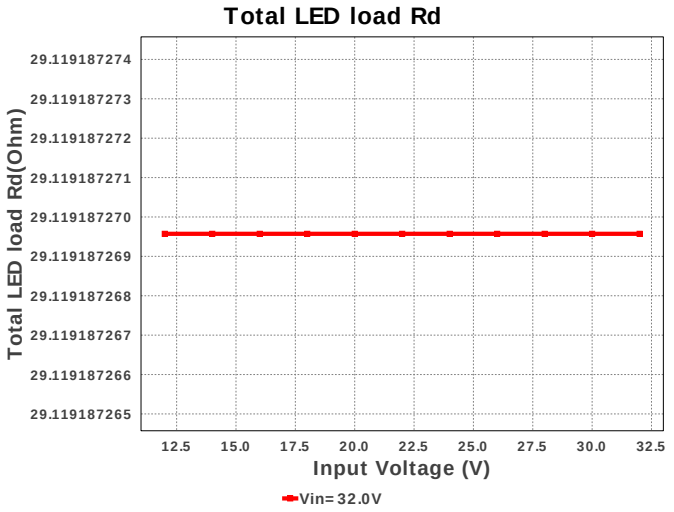


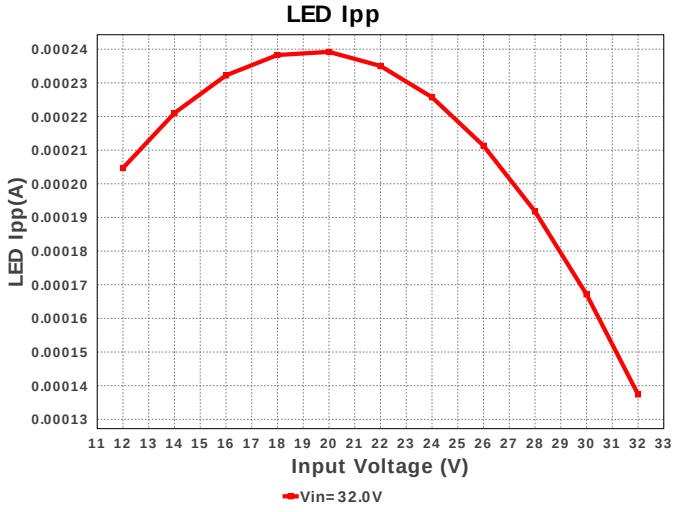


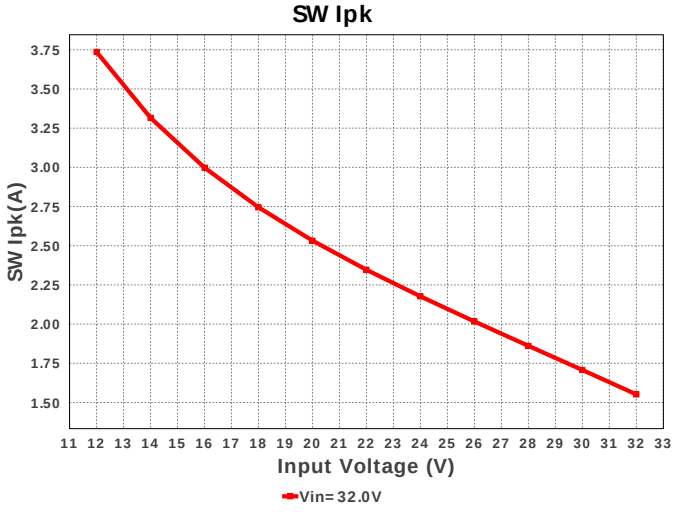


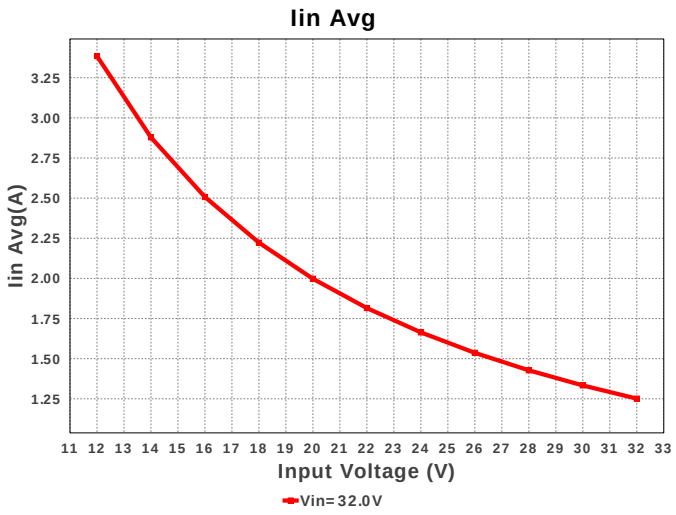


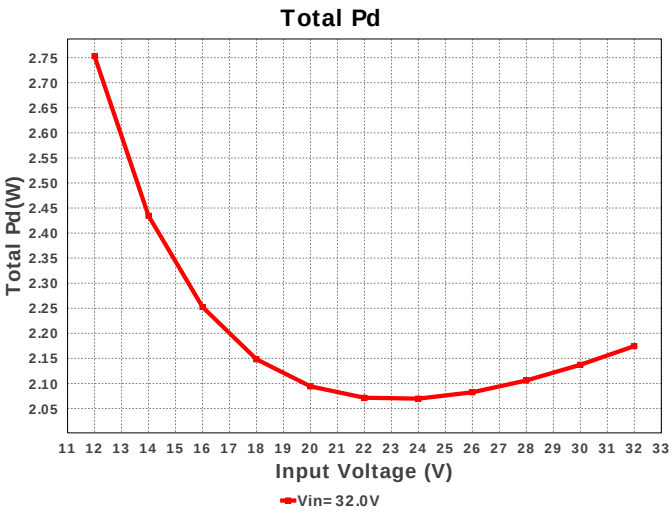


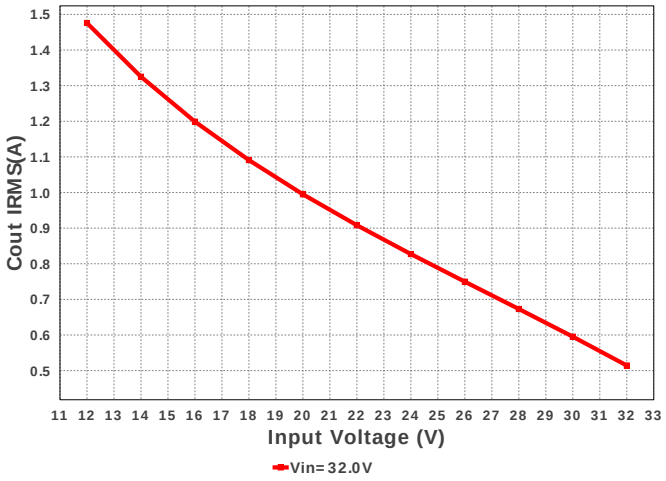


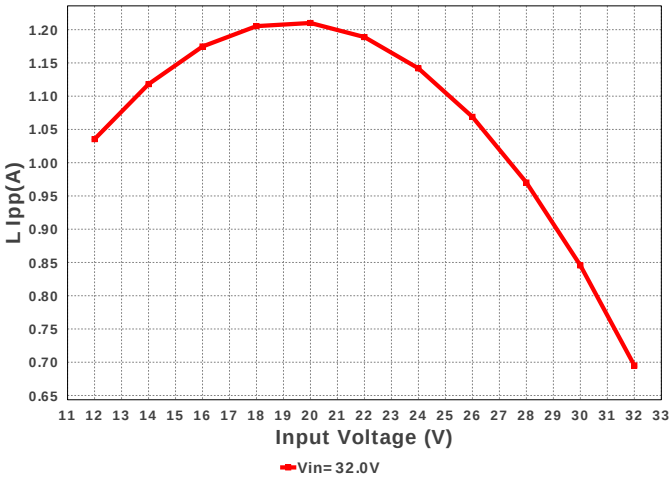


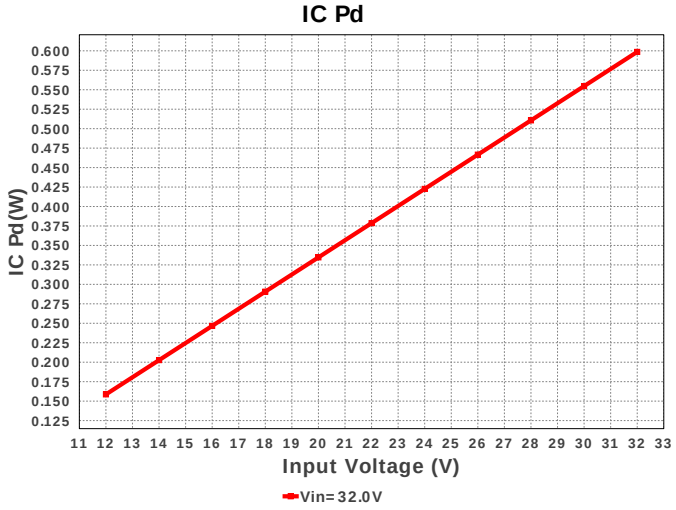


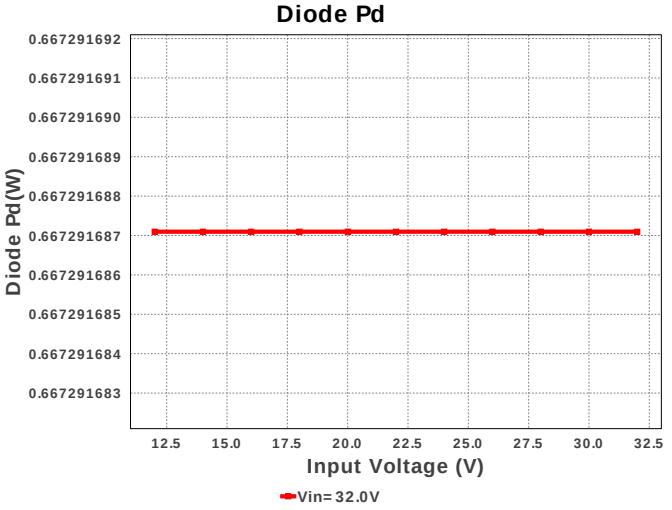


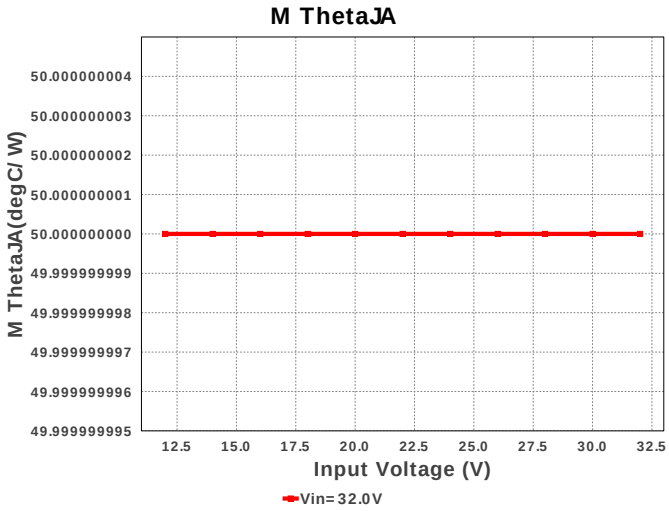


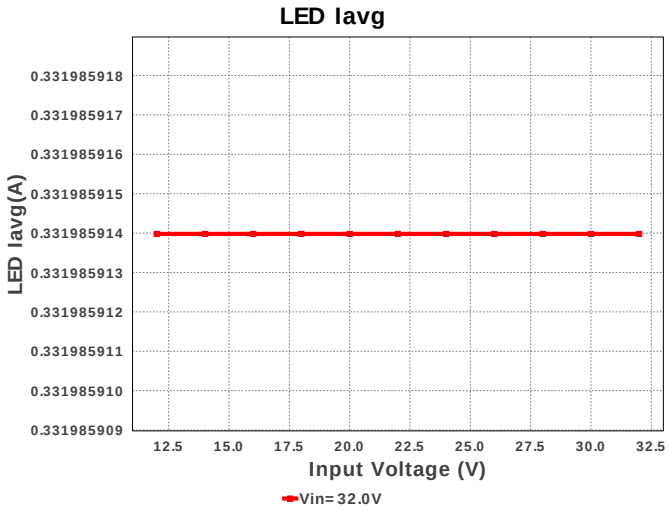


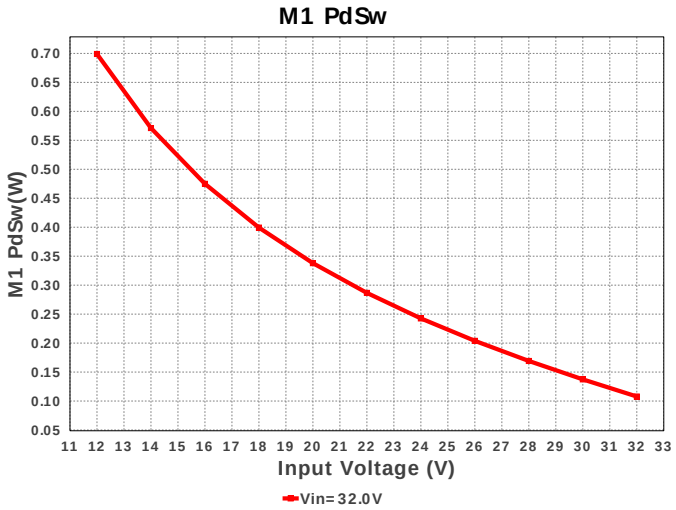












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	293.778 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	1.421 A	Current	Output capacitor RMS ripple current
3.	Iin Avg	3.343 A	Current	Average input current
4.	L Ipp	1.018 A	Current	Peak-to-peak inductor ripple current
5.	L1 Irms	3.101 A	Current	Inductor ripple current
6.	LED Iavg	331.986 mA	Current	LED Average Current
7.	LED Ipp	201.18 µA	Current	LED Ripple Current
8.	M Irms	2.828 A	Current	MOSFET RMS ripple current
9.	SW Ipk	3.596 A	Current	Peak switch current
10.	BOM Count	39	General	Total Design BOM count
11.	FootPrint	1.064 k mm^2	General	Total Foot Print Area of BOM components
12.	Frequency	242.647 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	19.232 mV	General	M Vds
16.	Mode	CCM	General	Conduction Mode
17.	Pout	36.338 W	General	Total output power
18.	Total BOM	$9.05	General	Total BOM Cost
19.	D1 Tj	141.566 degC	Op_Point	D1 junction temperature
20.	Vout OP	36.486 V	Op_Point	Operational Output Voltage
21.	Duty Cycle	70.182 %	Op_point	Duty cycle
22.	Efficiency	90.586 %	Op_point	Steady state efficiency
23.	IC Tj	36.398 degC	Op_point	IC junction temperature
24.	ICThetaJA	37.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
25.	IOUT_OP	995.96 mA	Op_point	Iout operating point
26.	LED Rd	29.119 Ohm	Op_point	LED DynamicResistance
27.	LED Vf	36.486 V	Op_point	Total LED Forward Calculated Voltage
28.	M ThetaJA	50.0 degC/W	Op_point	MOSFET junction-to-ambient thermal resistance
29.	M TjOp	103.549 degC	Op_point	MOSFET junction temperature
30.	VIN_OP	12.0 V	Op_point	Vin operating point
31.	Cin Pd	15.535 mW	Power	Input capacitor power dissipation

#	Name	Value	Category	Description
32.	Cout Pd	28.289 mW	Power	Output capacitor power dissipation
33.	Diode Pd	1.116 W	Power	Diode power dissipation
34.	IC Pd	172.918 mW	Power	IC power dissipation
35.	L Pd	380.911 mW	Power	Inductor power dissipation
36.	LED Pd	36.338 W	Power	LED Power Dissipation
37.	M Pd	1.471 W	Power	MOSFET power dissipation
38.	M1 PdCond	71.48 mW	Power	M1 MOSFET conduction losses
39.	M1 PdSw	1.4 W	Power	M1 MOSFET switching losses
40.	Total Pd	3.776 W	Power	Total Power Dissipation
41.	Total LED load Rd	29.119 Ohm		Total LED Load DynamicResistance
42.	Vout Tolerance	68.52 m%		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	1.05	Maximum Output Current
2.	VinMax	32.0	Maximum input voltage
3.	VinMin	12.0	Minimum input voltage
4.	Vout	38.01	Output Voltage
5.	application	LED_DRIVER	LED Application
6.	base_pn	LM3423	Texas Instruments Base Part Number
7.	isLEDArchitect	N	LED Architect Project
8.	ledparallel	3.0	Number of LED in parallel
9.	ledpartnumber	XHP50A-00-0000-0D0BU40DF	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	30.0	Ambient temperature

Design Assistance

1. LM3423 Product Folder : http://www.ti.com/product/LM3423 : contains the data sheet and other resources.