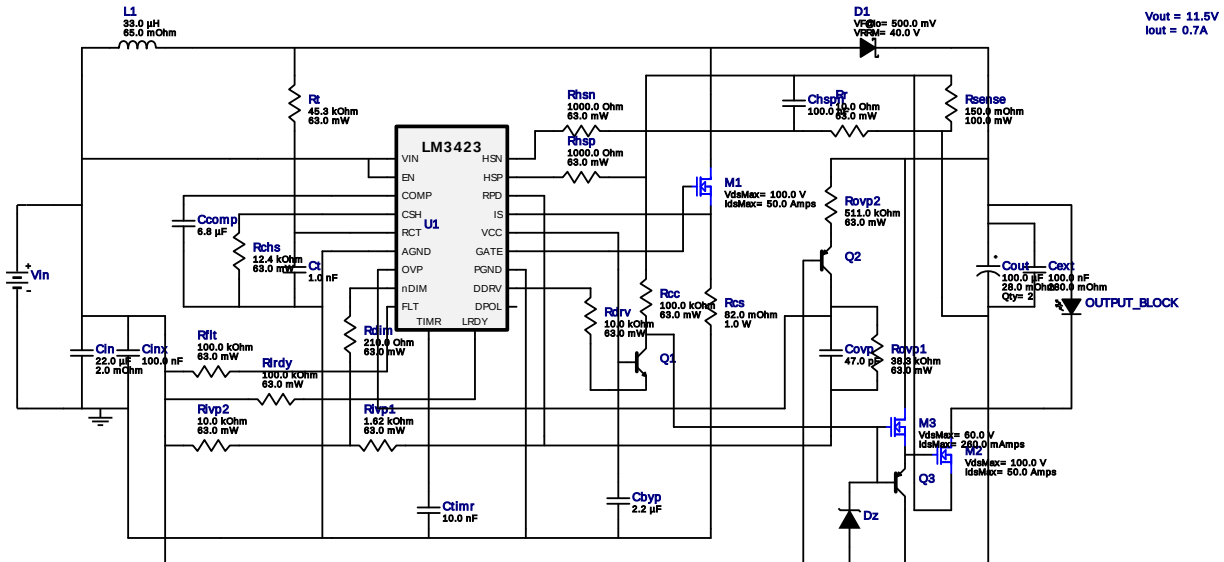


WEBENCH® Design Report

Design : 4193871/8 LM3423MHX/NOPB
LM3423MHX/NOPB 10.0V-14.0V to 18.86V @ 0.6639684946236559A



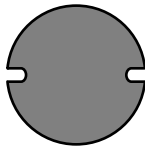
1. This regulator device is qualified for Automotive applications. All passives and other components selected in this design may not be qualified for Automotive applications. The user is required to verify that all components in the design meet the qualification and safety requirements for their specific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

My Comments

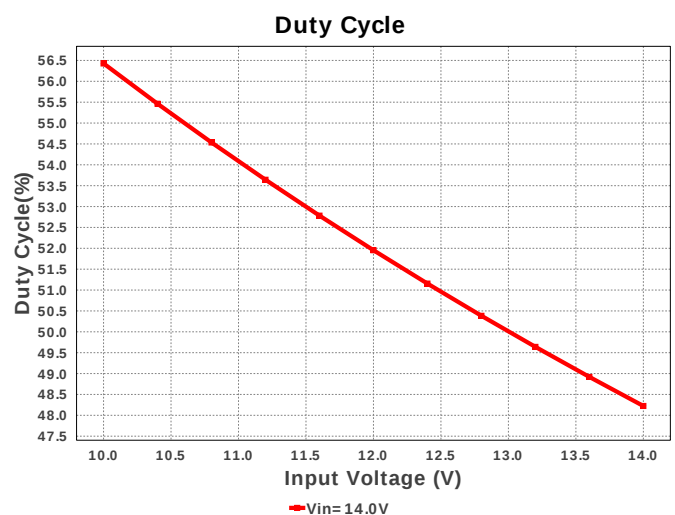
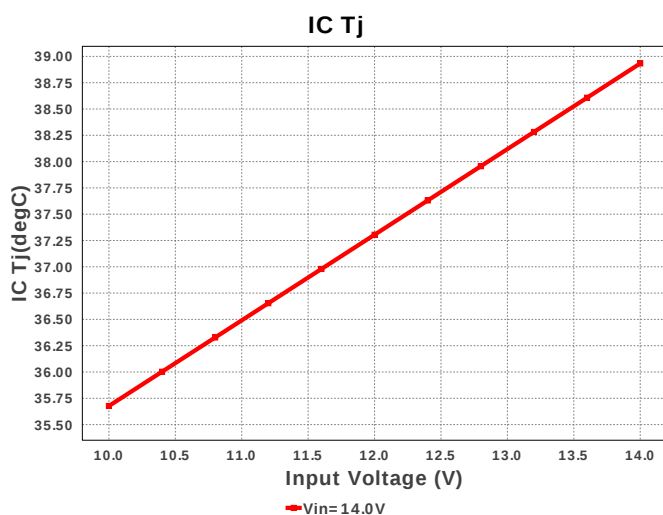
No comments

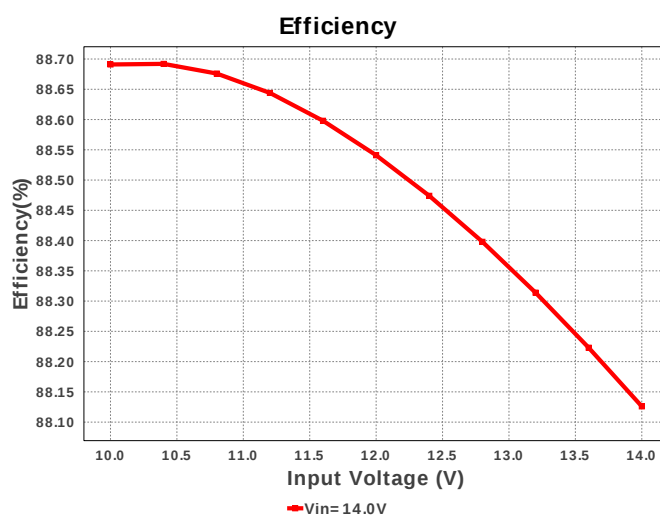
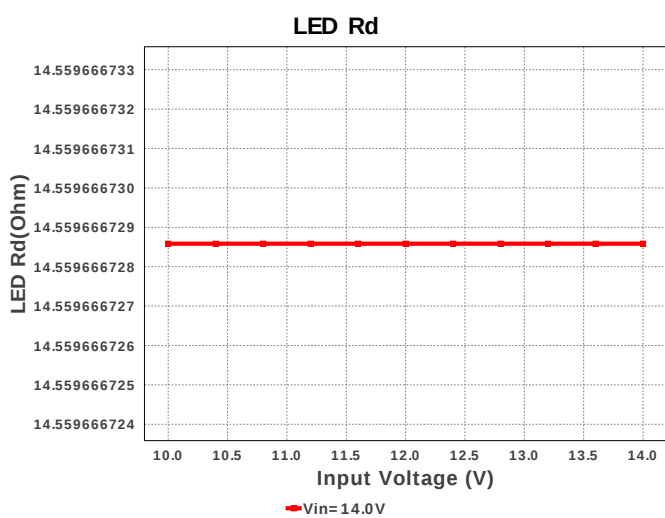
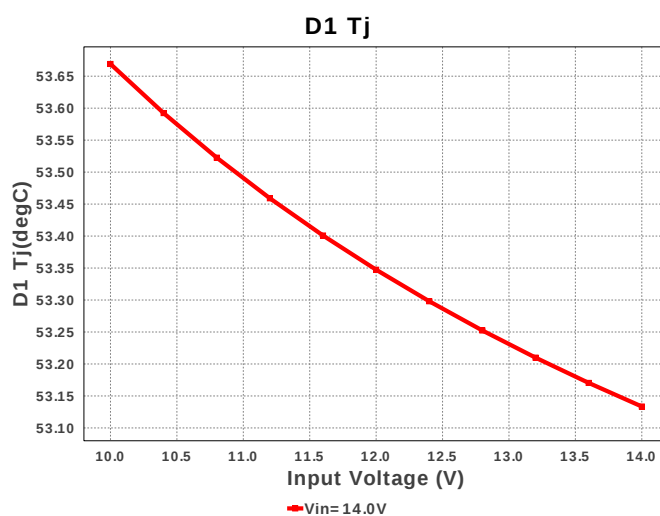
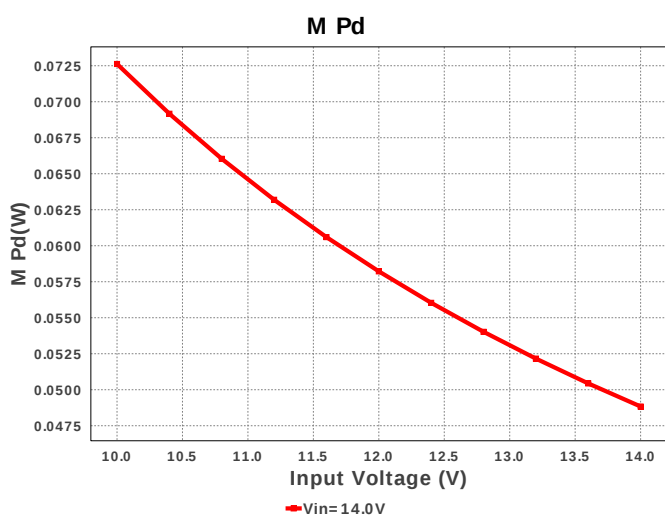
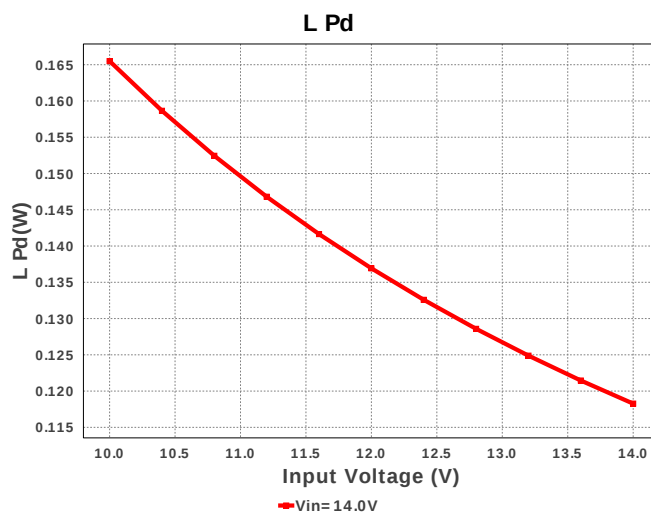
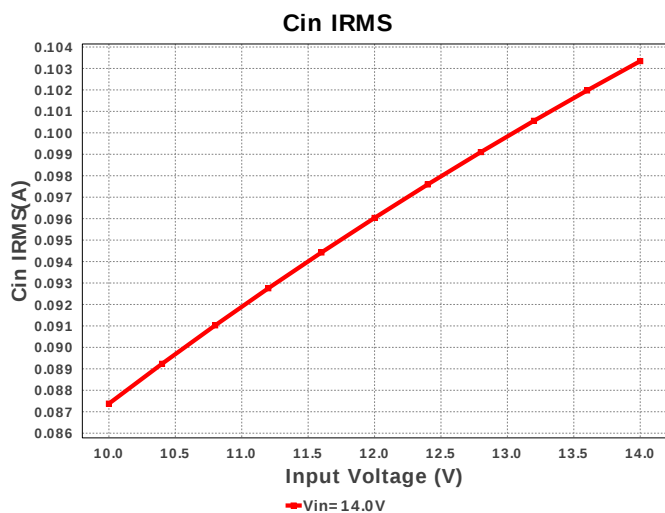
Electrical BOM

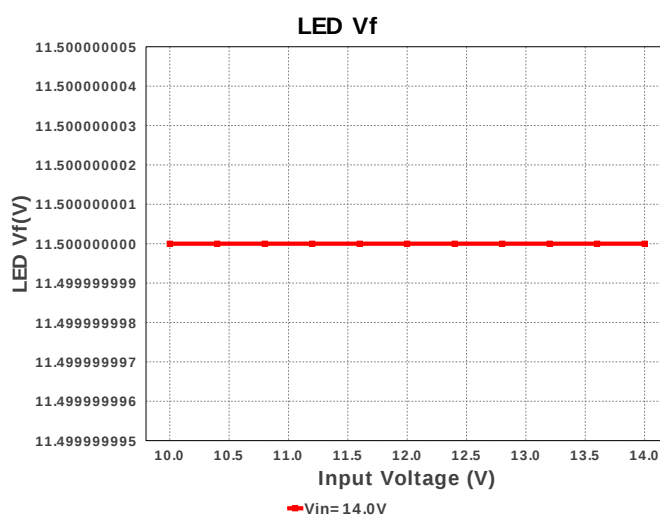
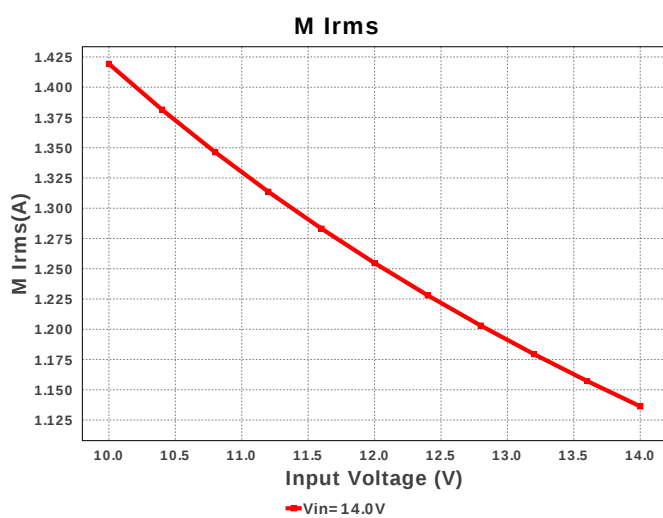
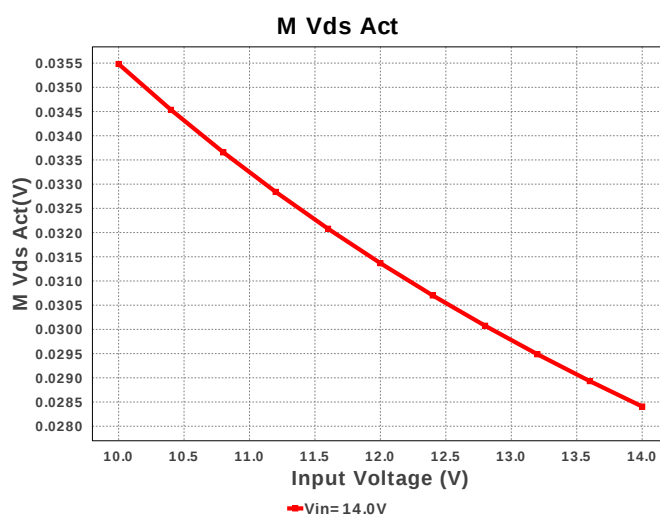
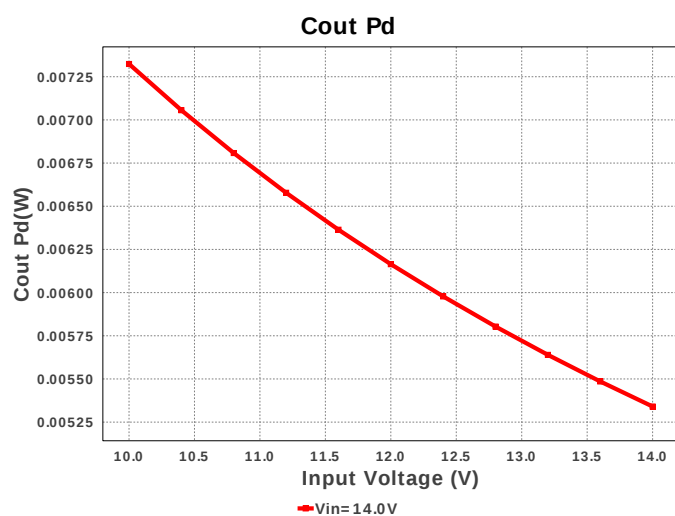
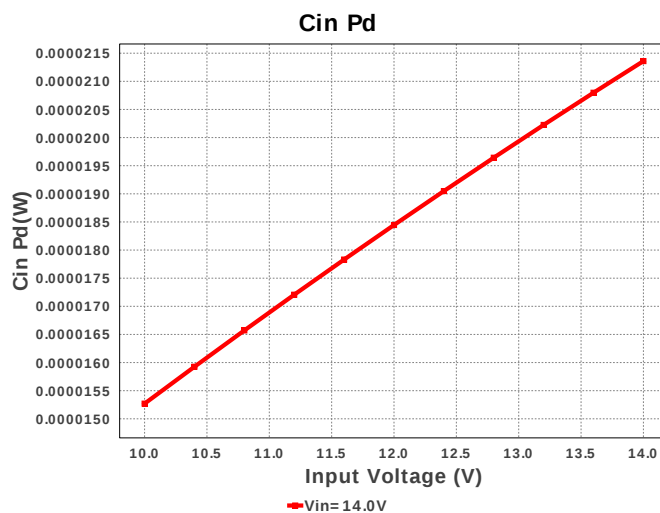
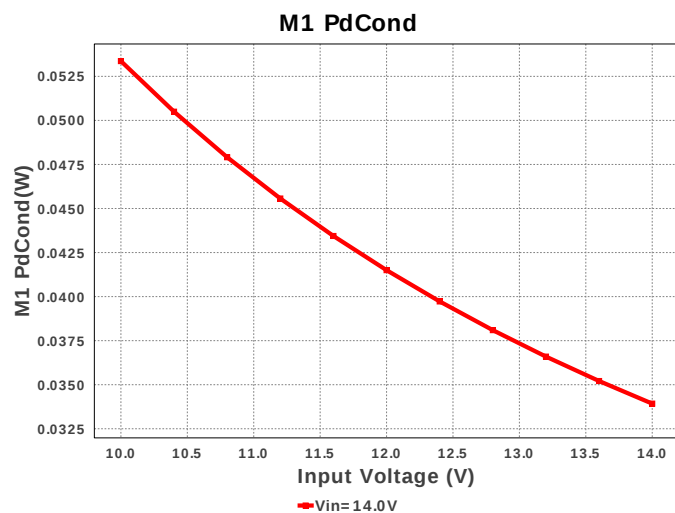
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1.	Cbyp	Taiyo Yuden	EMK212B7225KG-T Series= X7R	Cap= 2.2 uF VDC= 16.0 V IRMS= 0.0 A	1	\$0.03	0805 7 mm ²
2.	Ccomp	MuRata	GRM32NR61E685KA12L Series= X5R	Cap= 6.8 uF VDC= 25.0 V IRMS= 0.0 A	1	\$0.27	1210 15 mm ²
3.	Cext	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
4.	Chspn	MuRata	GRM21BR71E104KA01L Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
5.	Cin	MuRata	GRM32ER61E226KE15L Series= X5R	Cap= 22.0 uF ESR= 2.0 mOhm VDC= 25.0 V IRMS= 3.67 A	1	\$0.16	1210 15 mm ²
6.	Cinx	Kemet	C0603C104K5RACTU Series= X7R	Cap= 100.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0603 5 mm ²
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 mm ²

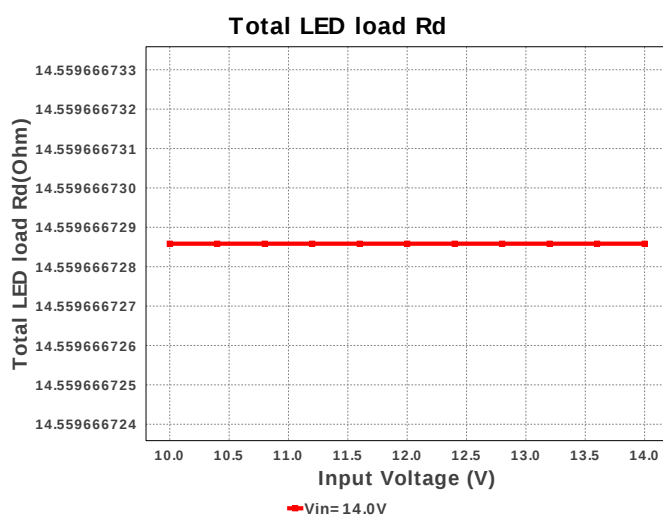
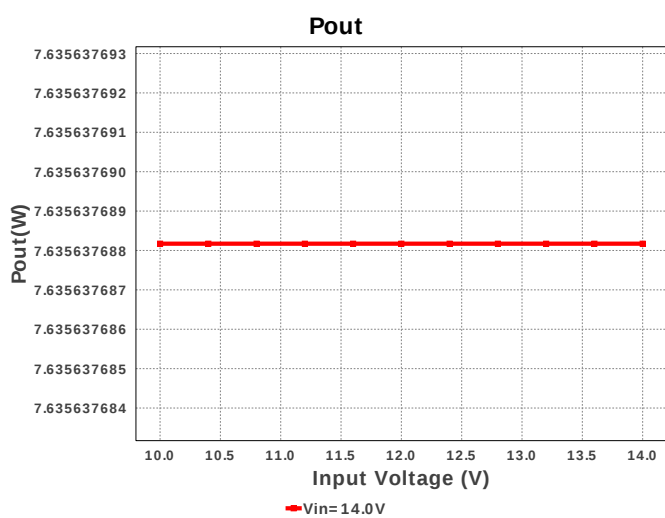
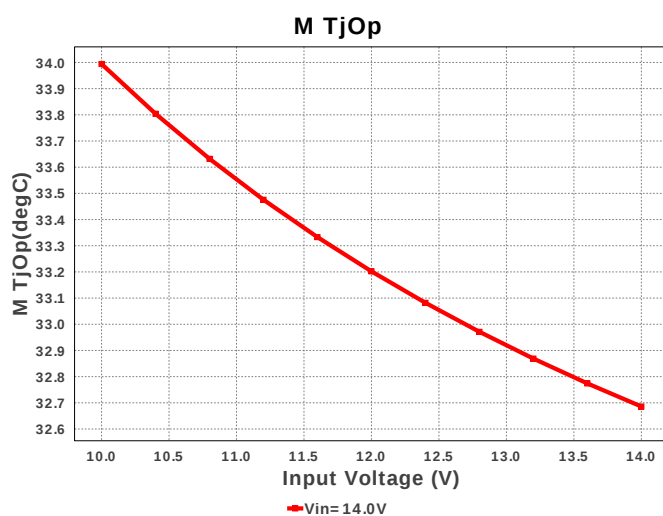
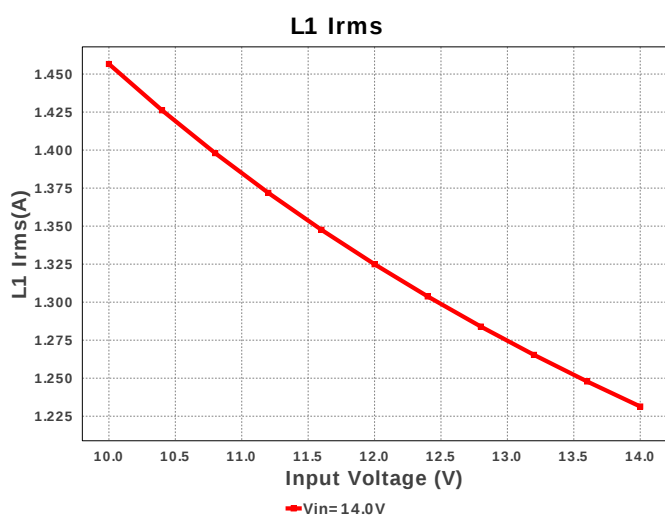
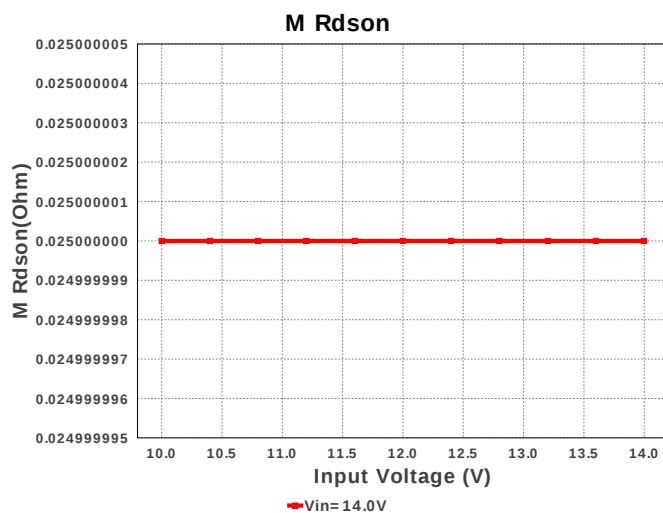
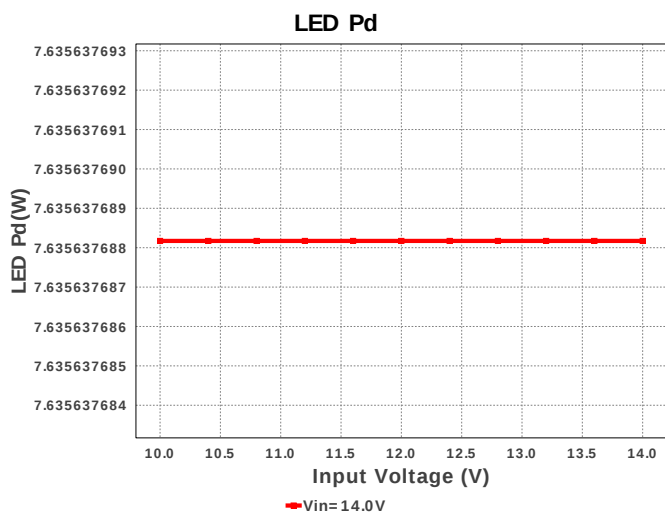
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8.	Covp	Kemet	C0805C470K5GACTU Series= C0G/NP0	Cap= 47.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²
9.	Ct	Samsung Electro-Mechanics	CL21C102JBCNFNC Series= C0G/NP0	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²
10.	Ctimr	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²
11.	D1	Diodes Inc.	B340A-13-F	VF@Io= 500.0 mV VRRM= 40.0 V	1	\$0.11	 SMA 37 mm ²
12.	D_LED	Cree	XHP50A-00-0000-0D00J40CB	LED	1	\$5.02	 xlampxhp 0 mm ²
13.	Dz	ON Semiconductor	BZX84C10LT1G	Zener	1	\$0.02	 SOT-23 14 mm ²
14.	L1	Bourns	SDR1307-330KL	L= 33.0 µH DCR= 65.0 mOhm	1	\$0.35	 SDR1307 227 mm ²
15.	M1	Texas Instruments	CSD19537Q3	VdsMax= 100.0 V IdsMax= 50.0 Amps	1	\$0.50	 DQG0008A 18 mm ²
16.	M2	Texas Instruments	CSD19537Q3	VdsMax= 100.0 V IdsMax= 50.0 Amps	1	\$0.50	 DQG0008A 18 mm ²
17.	M3	ON Semiconductor	2N7002ET1G	VdsMax= 60.0 V IdsMax= 260.0 mAmps	1	\$0.02	 SOT-23 14 mm ²
18.	Q1	Diodes Inc.	MMBT3904-7-F	Bipolar Transistor	1	\$0.02	 SOT-23 14 mm ²
19.	Q2	Diodes Inc.	MMBT3906-7-F	Bipolar Transistor	1	\$0.02	 SOT-23 14 mm ²
20.	Q3	Diodes Inc.	MMBT3906-7-F	Bipolar Transistor	1	\$0.02	 SOT-23 14 mm ²
21.	Rcc	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
22.	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
23.	Rcs	Bourns	CRM2010-FZ-R082ELF Series= ?	Res= 82.0 mOhm Power= 1.0 W Tolerance= 1.0%	1	\$0.19	 2010 32 mm ²
24.	Rdim	Vishay-Dale	CRCW0402210RFKED Series= CRCW..e3	Res= 210.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
25.	Rdrv	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
26.	Rflt	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
27.	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
28.	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
29.	Rivp1	Vishay-Dale	CRCW04021K62FKED Series= CRCW..e3	Res= 1.62 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
30.	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
31.	Rlr dy	Vishay-Dale	CRCW0402100KFKED Series= CRCW..e3	Res= 100.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
32.	Rovp1	Vishay-Dale	CRCW040238K3FKED Series= CRCW..e3	Res= 38.3 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
33.	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
34.	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
35.	Rsense	Panasonic	ERJ-3RSFR15V Series= ERJ-3R	Res= 150.0 mOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.03	 0603 5 mm ²
36.	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
37.	U1	Texas Instruments	LM3423MHX/NOPB	Switcher	1	\$1.25	 MXA20A 71 mm ²

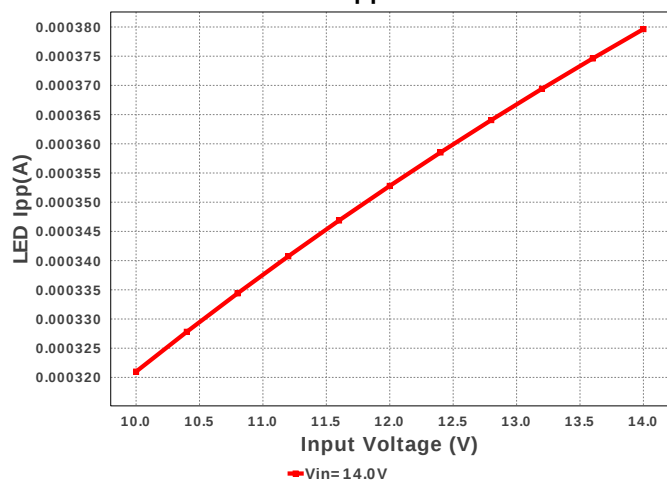




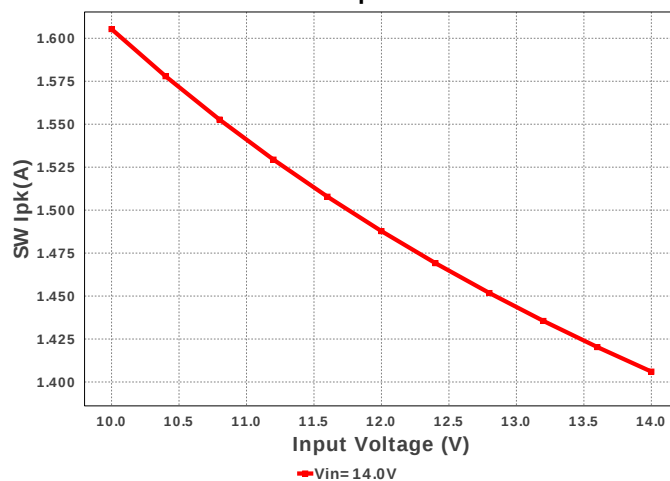




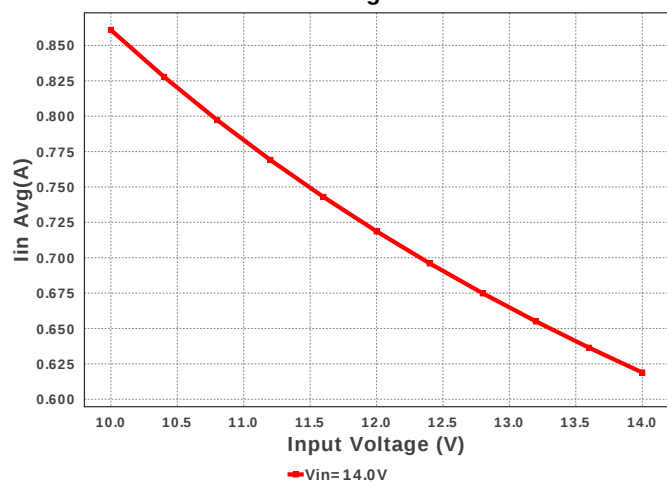
LED Ipp



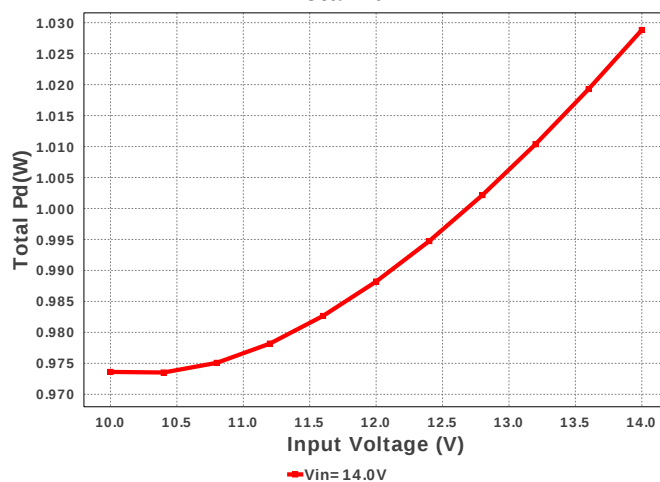
SW Ipk



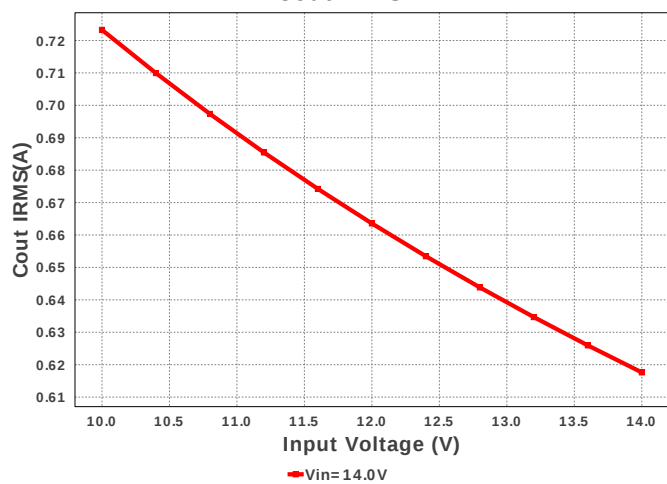
Iin Avg



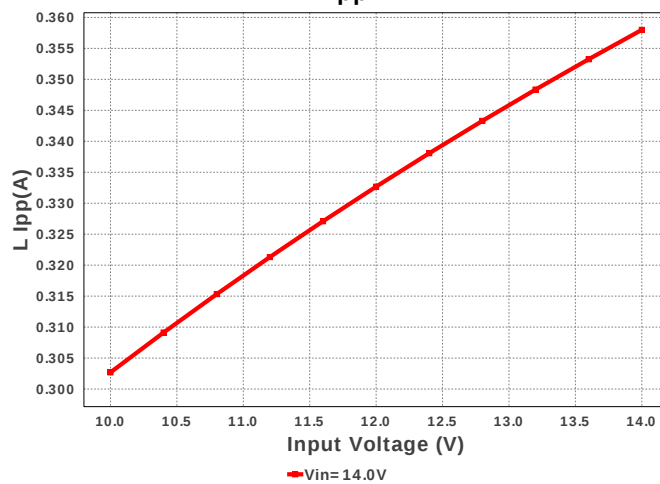
Total Pd

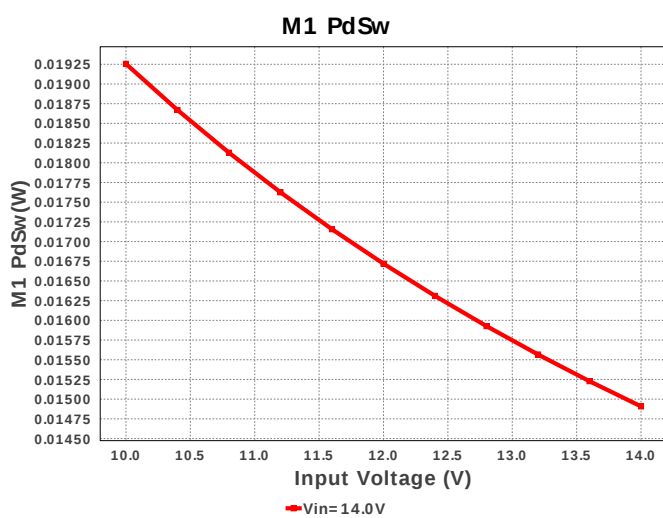
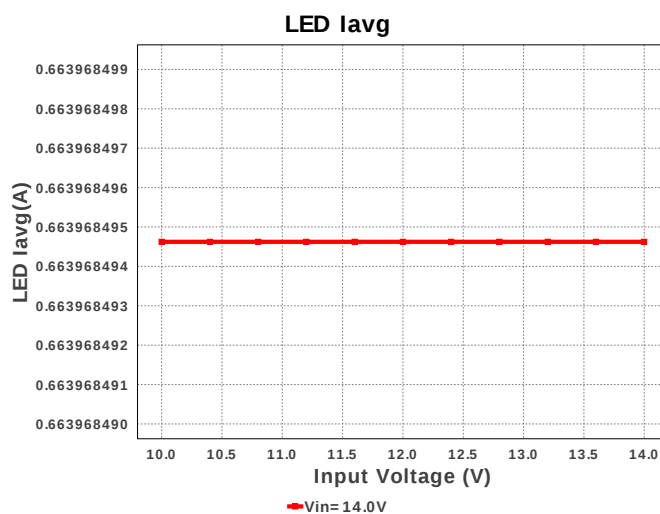
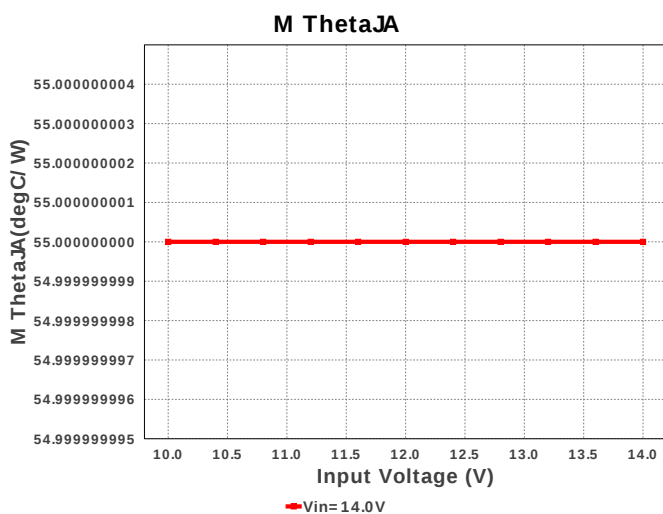
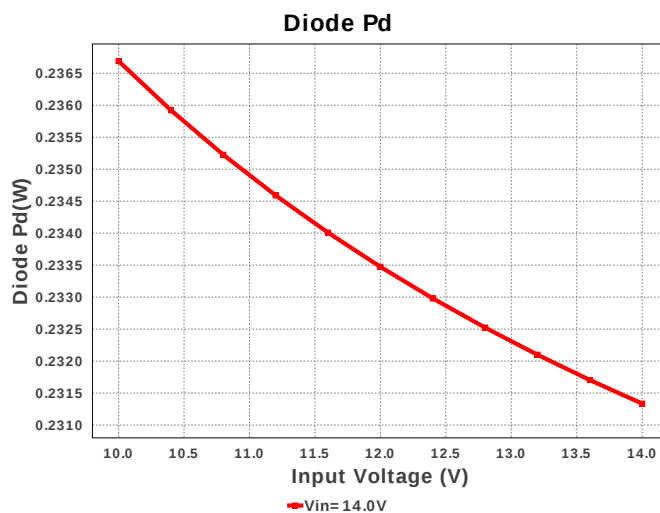
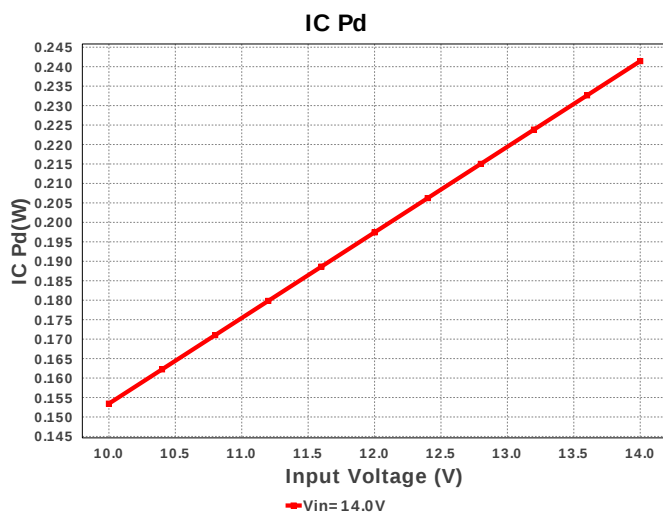


Cout IRMS



L Ipp





Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	106.008 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	912.388 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	1.388 A	Current	Average input current
4.	L Ipp	367.22 mA	Current	Peak-to-peak inductor ripple current
5.	L1 Irms	1.948 A	Current	Inductor ripple current
6.	LED Iavg	663.968 mA	Current	LED Average Current
7.	LED Ipp	389.428 μ A	Current	LED Ripple Current
8.	M Irms	2.04 A	Current	MOSFET RMS ripple current
9.	SW Ipk	2.129 A	Current	Peak switch current
10.	BOM Count	38	General	Total Design BOM count
11.	FootPrint	915.0 mm ²	General	Total Foot Print Area of BOM components

#	Name	Value	Category	Description
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	13.872 mV	General	M Vds
16.	Mode	CCM	General	Conduction Mode
17.	Pout	12.524 W	General	Total output power
18.	Total BOM	\$8.77	General	Total BOM Cost
19.	D1 Tj	57.199 degC	Op_Point	D1 junction temperature
20.	Vout OP	18.863 V	Op_Point	Operational Output Voltage
21.	Duty Cycle	67.605 %	Op_point	Duty cycle
22.	Efficiency	90.265 %	Op_point	Steady state efficiency
23.	IC Tj	37.035 degC	Op_point	IC junction temperature
24.	ICThetaJA	37.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
25.	IOUT_OP	663.97 mA	Op_point	Iout operating point
26.	LED Rd	14.56 Ohm	Op_point	LED DynamicResistance
27.	LED Vf	18.863 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	34.432 degC	Op_point	MOSFET junction temperature
30.	VIN_OP	10.0 V	Op_point	Vin operating point
31.	Cin Pd	22.475 µW	Power	Input capacitor power dissipation
32.	Cout Pd	11.654 mW	Power	Output capacitor power dissipation
33.	Diode Pd	271.989 mW	Power	Diode power dissipation
34.	IC Pd	190.146 mW	Power	IC power dissipation
35.	L Pd	296.062 mW	Power	Inductor power dissipation
36.	LED Pd	12.524 W	Power	LED Power Dissipation
37.	M Pd	88.641 mW	Power	MOSFET power dissipation
38.	M1 PdCond	29.367 mW	Power	M1 MOSFET conduction losses
39.	M1 PdSw	59.274 mW	Power	M1 MOSFET switching losses
40.	Total Pd	1.351 W	Power	Total Power Dissipation
41.	Total LED load Rd	14.56 Ohm		Total LED Load DynamicResistance
42.	Vout Tolerance	132.54 m%		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	700.0 m	Maximum Output Current
2.	VinMax	14.0	Maximum input voltage
3.	VinMin	10.0	Minimum input voltage
4.	Vout	11.5	Output Voltage
5.	application	LED_DRIVER	LED Application
6.	base_pn	LM3423	Base Product Number
7.	LED_Architect	N	LED Architect Project
8.	ledparallel	1.0	Number of LED in parallel
9.	ledpartnumber	XHP50A-00-0000-0D00140C	LED Part number
10.	ledseries	1.0	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.

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