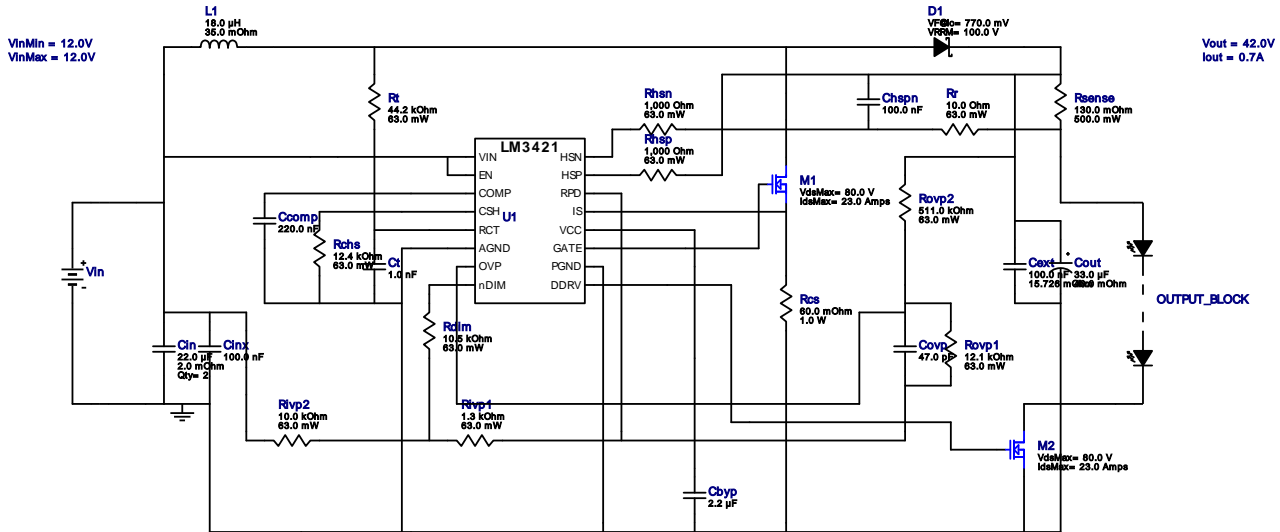


WEBENCH® Design Report

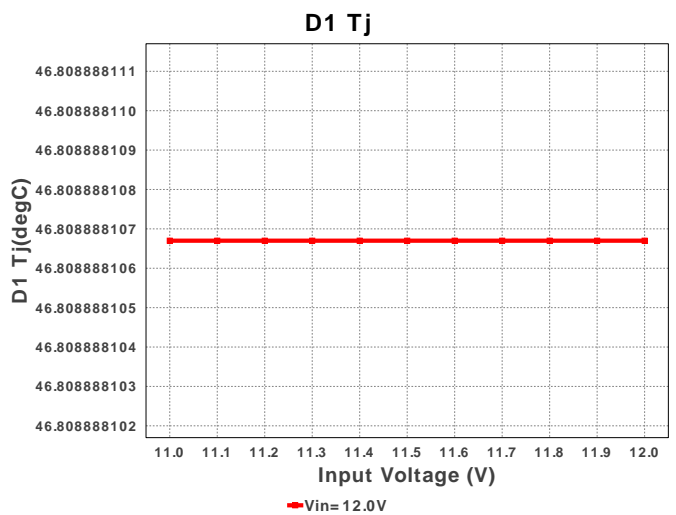
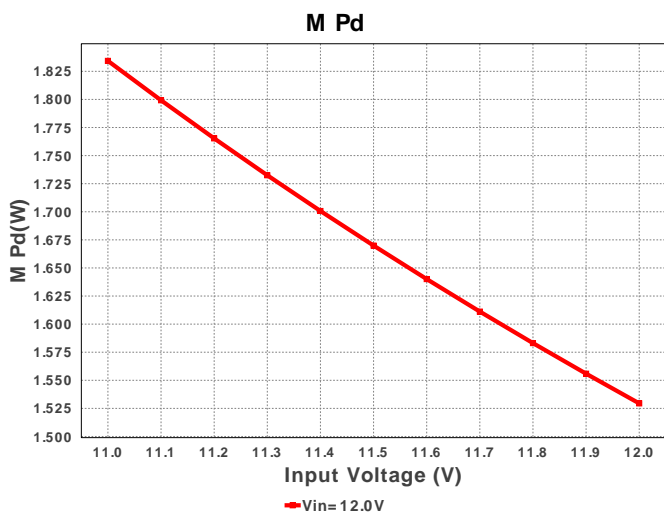
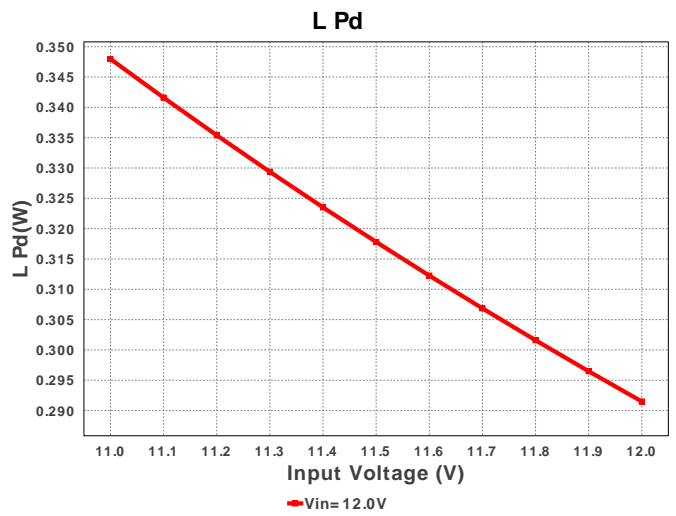
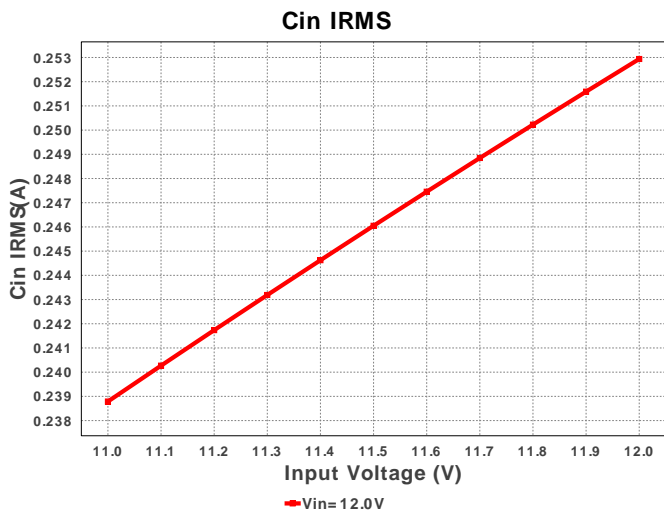
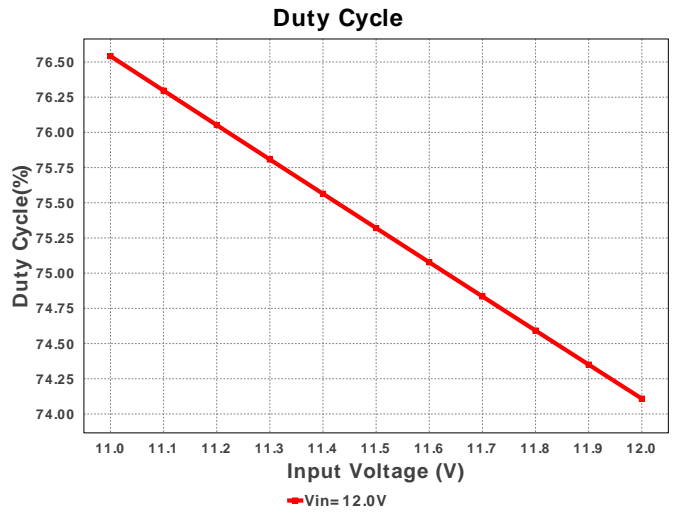
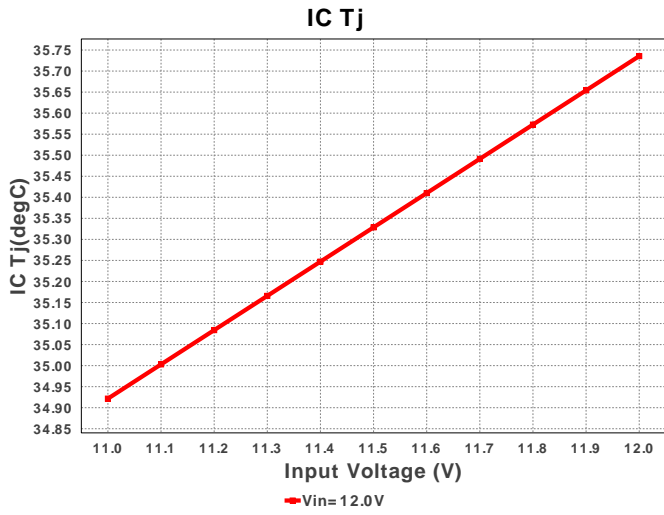
 Design : 3469099/166 LM3421MHX/NOPB
 LM3421MHX/NOPB 12.0V-12.0V to 42.0V @ 0.727657493796526A


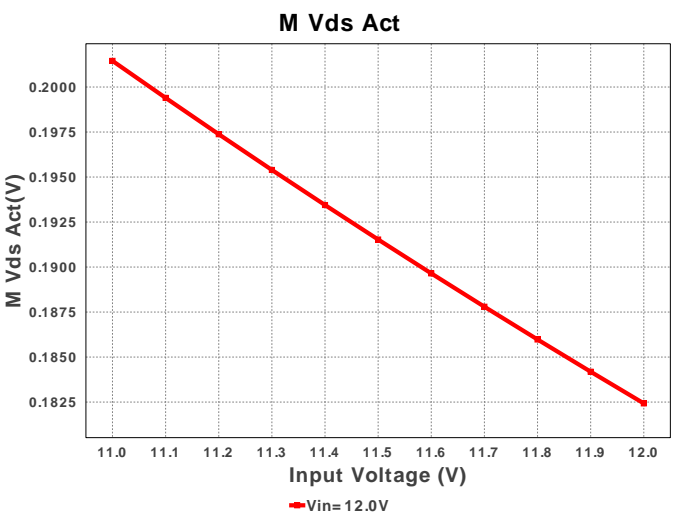
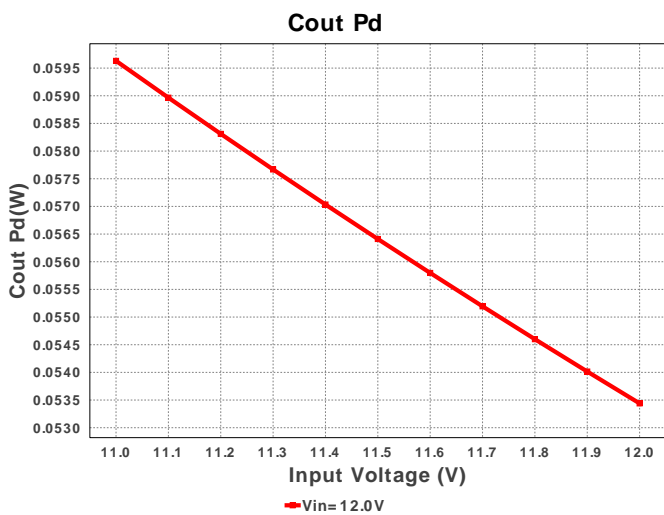
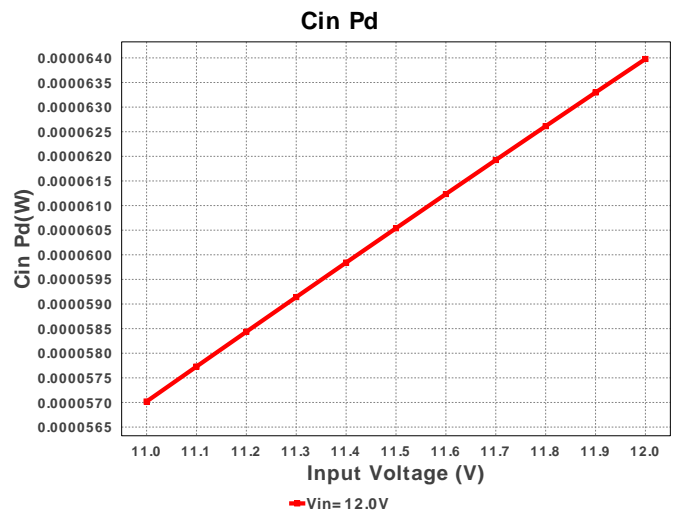
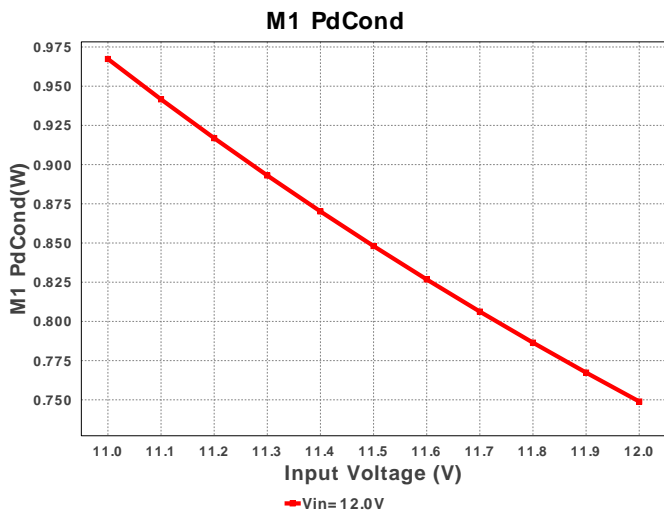
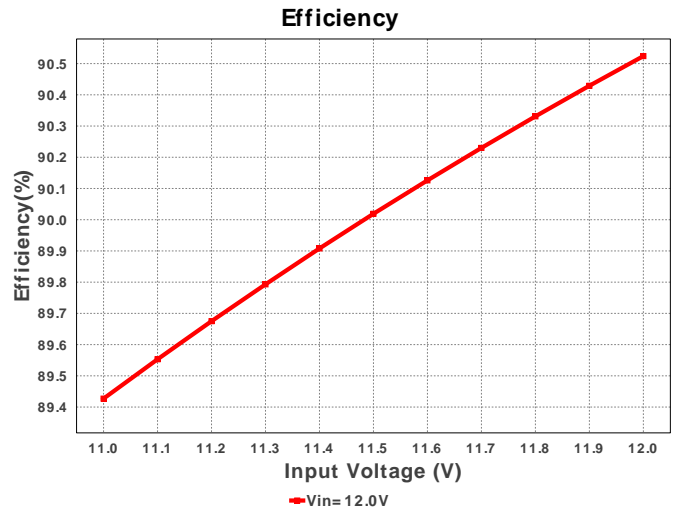
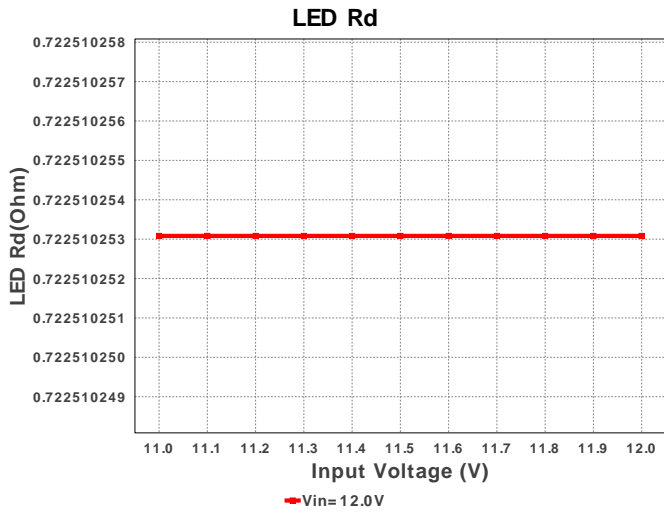
1. This regulator device is qualified for Automotive applications. All passives and other components selected in this design may not be qualified for Automotive applications. The user is required to verify that all components in the design meet the qualification and safety requirements for their specific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

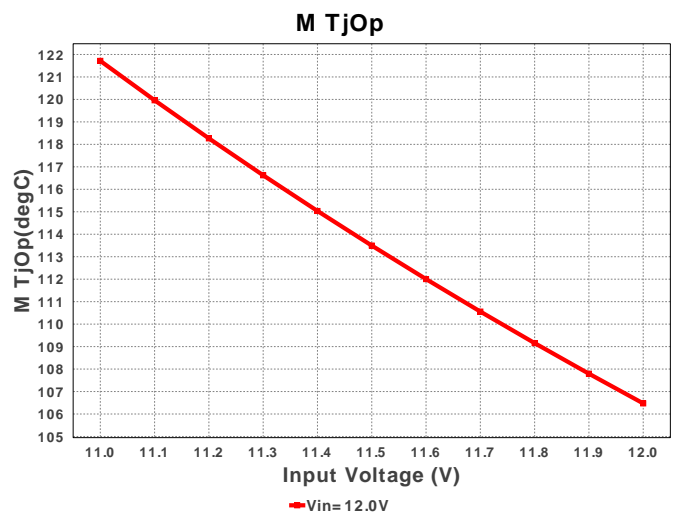
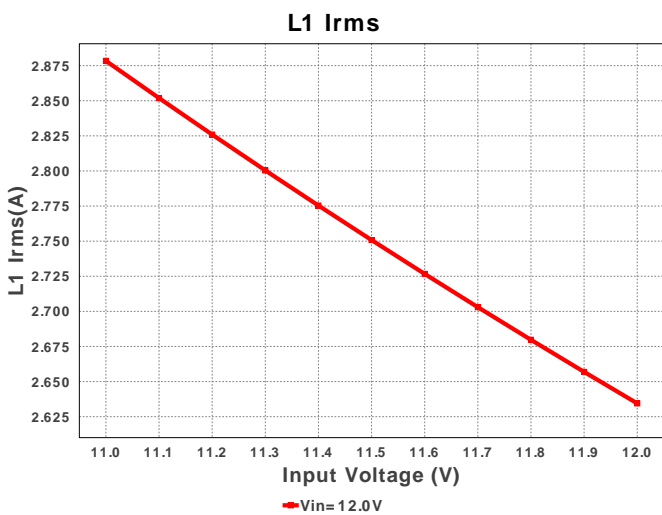
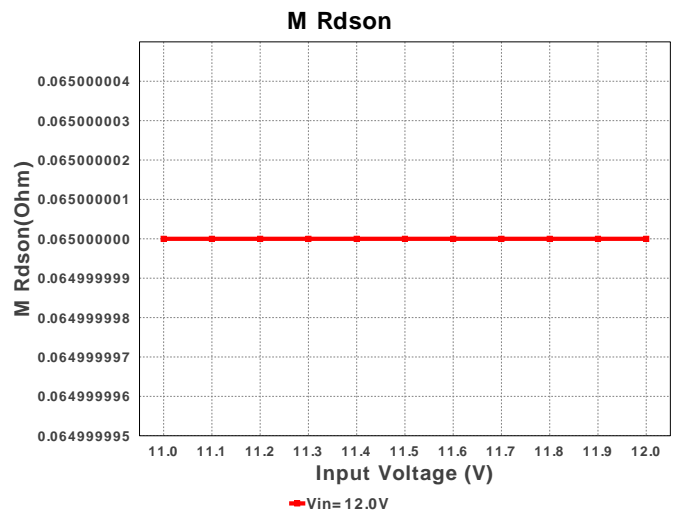
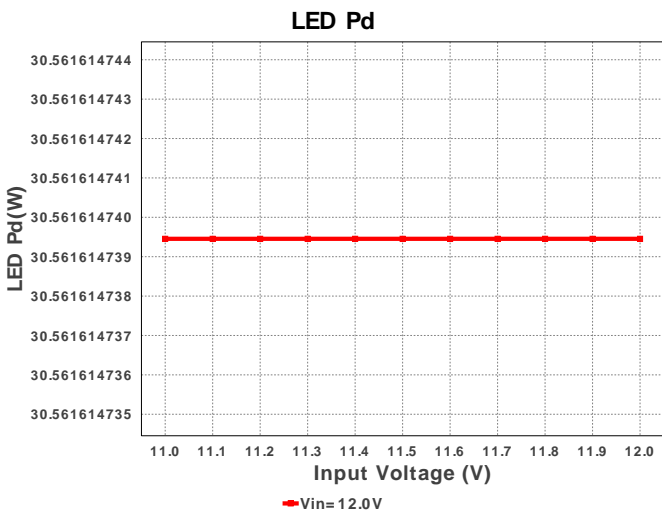
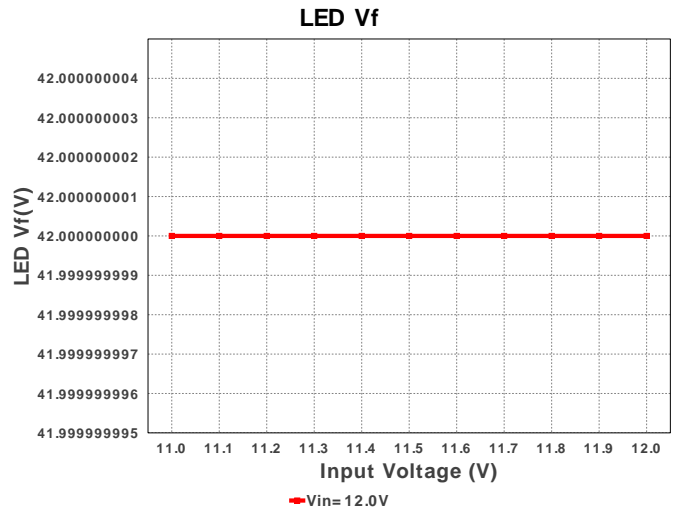
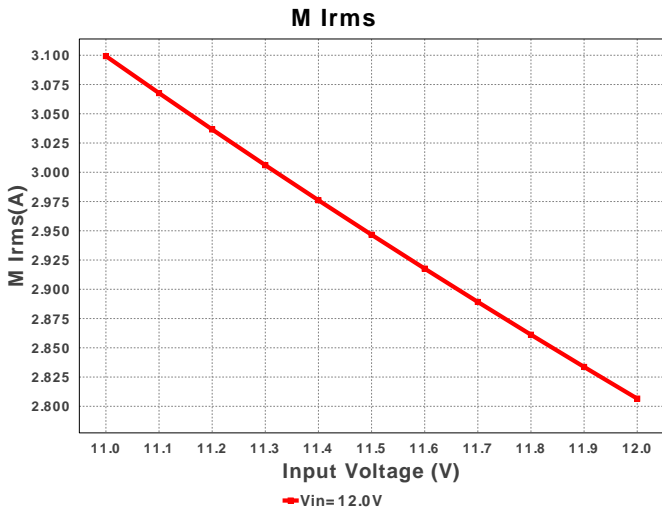
Electrical BOM

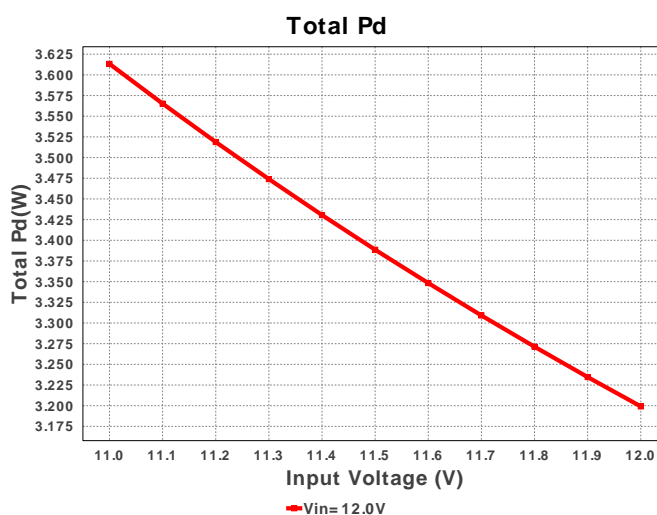
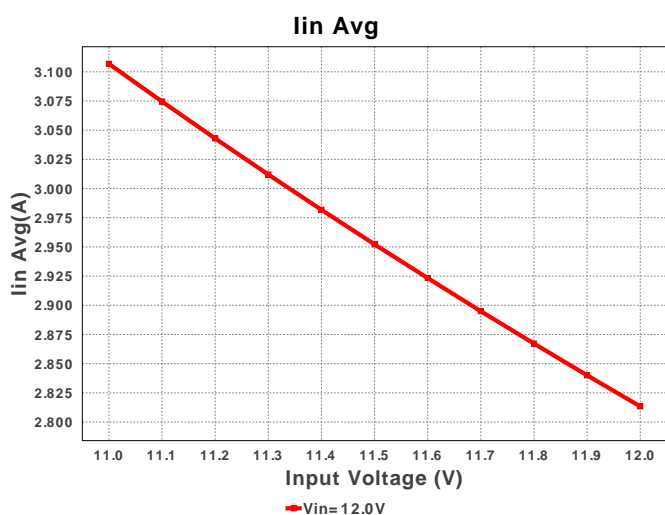
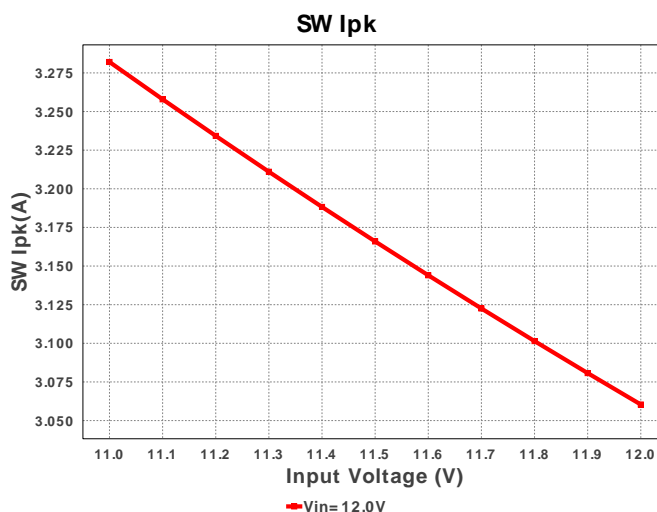
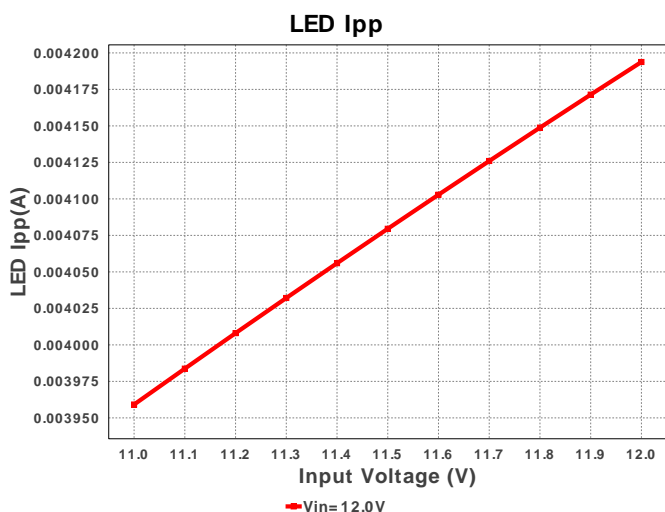
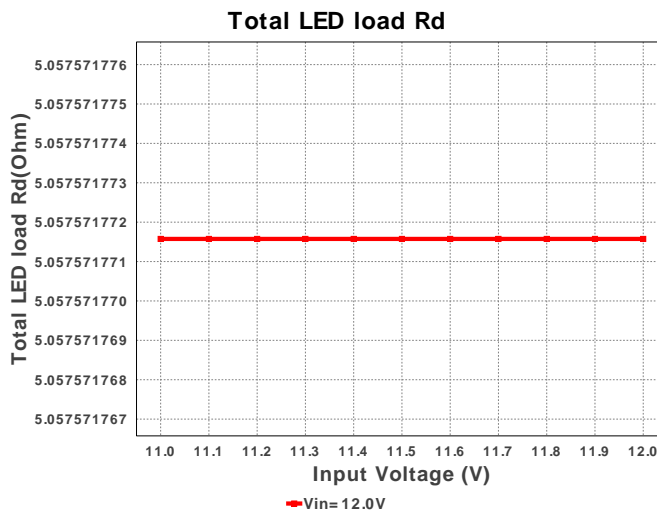
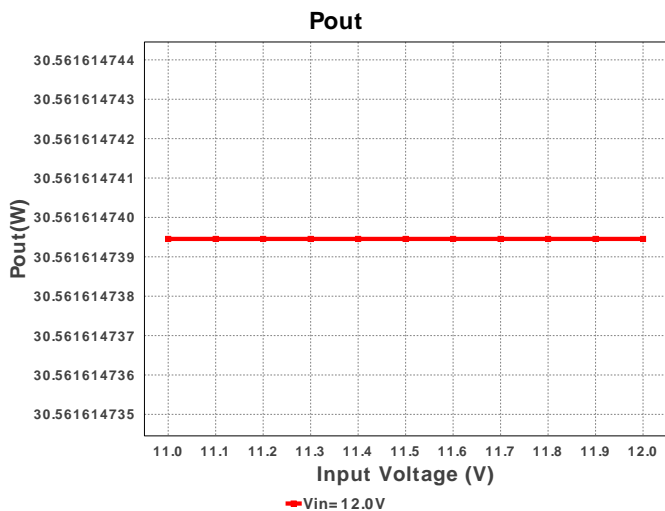
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbyp	Taiyo Yuden	EMK212B7225KG-T Series= X7R	Cap= 2.2 µF VDC= 16.0 V IRMS= 0.0 A	1	\$0.03	 0805 7mm2
2.	Ccomp	MuRata	GRM155C80G224KE01D Series= 379	Cap= 220.0 nF VDC= 4.0 V IRMS= 0.0 A	1	\$0.01	 0402 3mm2
3.	Cext	TDK	C2012X7R2A104K Series= 285	Cap= 100.0 nF ESR= 15.726 mOhm VDC= 100.0 V IRMS= 0.0 A	1	\$0.03	 0805 7mm2
4.	Chspn	Yageo America	CC0805KRX7R9BB104 Series= X7R	Cap= 100.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7mm2
5.	Cin	MuRata	GRM32ER61E226KE15L Series= X5R	Cap= 22.0 µF ESR= 2.0 mOhm VDC= 25.0 V IRMS= 3.67 A	2	\$0.28	 1210 15mm2
6.	Cinx	Kemet	C0603C104K3RACTU Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	 0603 5mm2
7.	Cout	Panasonic	EEHZA1J330P Series= ?	Cap= 33.0 µF ESR= 40.0 mOhm VDC= 63.0 V IRMS= 1.7 A	1	\$0.97	 SM_RADIAL_8MM 113mm2
8.	Covp	Yageo America	CC0805JRNP09BN470 Series= C0G/NP0	Cap= 47.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7mm2
9.	Ct	Yageo America	CC0805KRX7R9BB102 Series= X7R	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7mm2

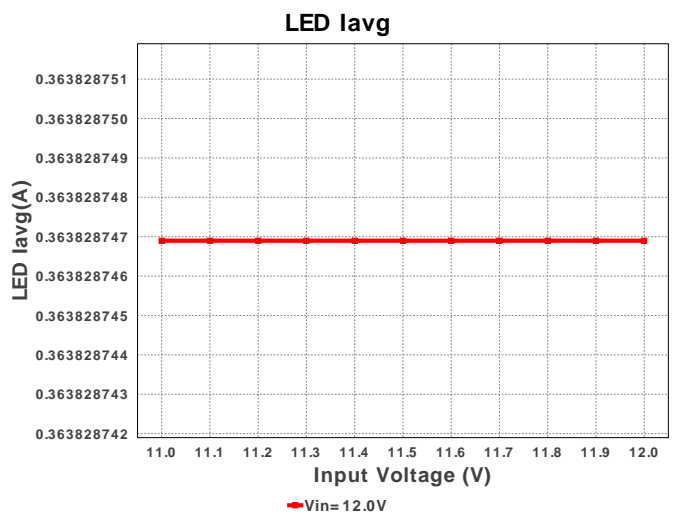
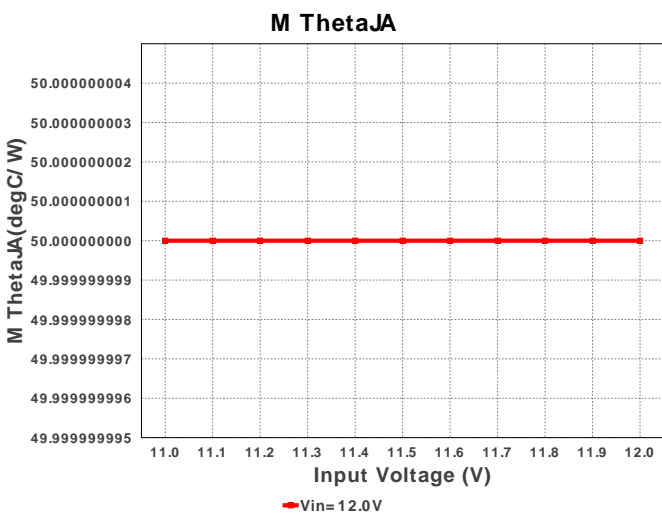
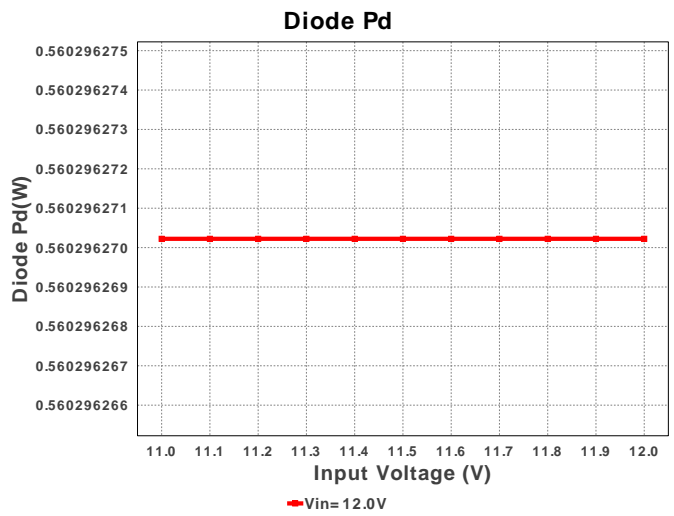
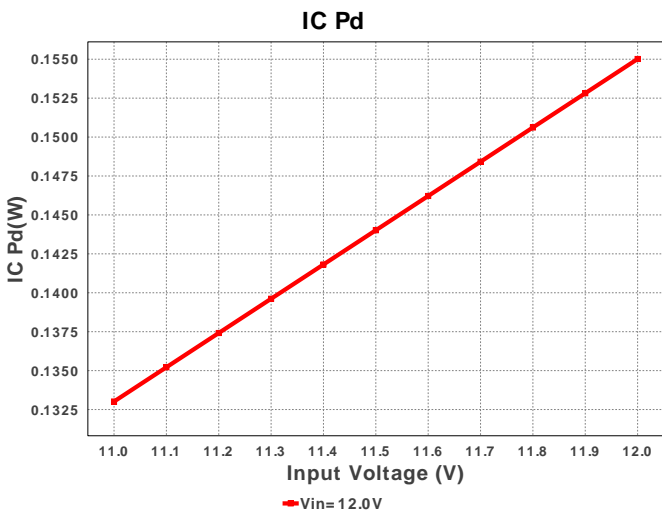
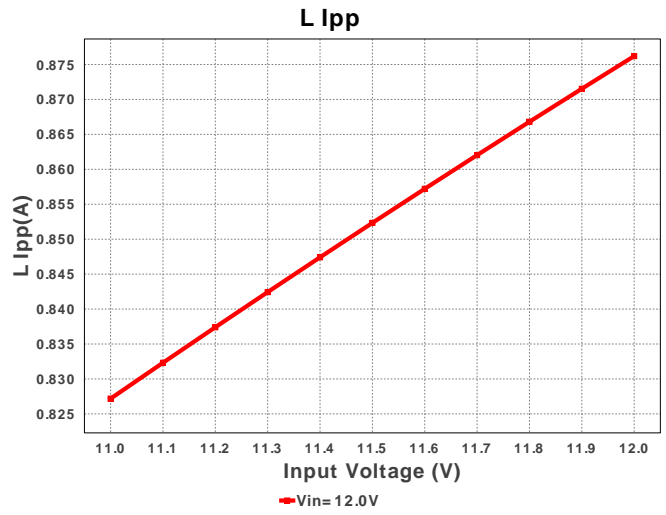
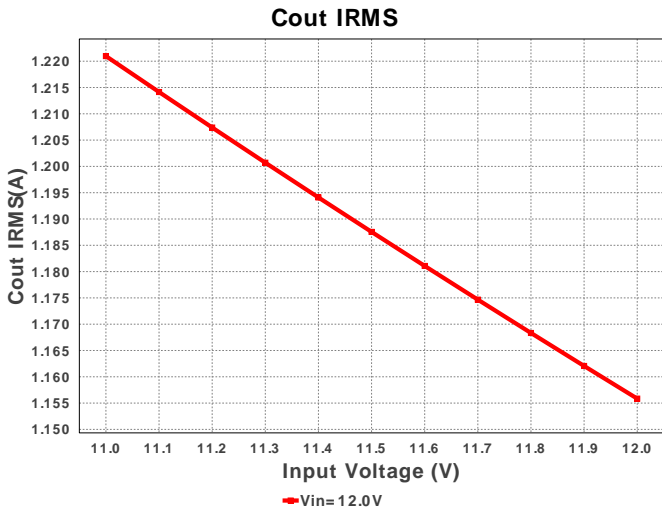
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	D1	Vishay-Semiconductor	50WQ10FNPBF	VF@Io= 770.0 mV VRRM= 100.0 V	1	\$0.41	 DPAK 102mm2
11.	D_LED	Cree	XPGWHT-L1-0000-00H51	LED	28	\$2.59	 xlampxpg 20mm2
12.	L1	Bourns	SRR1280-180M	L= 18.0 µH DCR= 35.0 mOhm	1	\$0.41	 SRR1280 210mm2
13.	M1	Infineon Technologies	BSC340N08NS3 G	VdsMax= 80.0 V IdsMax= 23.0 Amps	1	\$0.30	 PG-TDSON-8 55mm2
14.	M2	Infineon Technologies	BSC340N08NS3 G	VdsMax= 80.0 V IdsMax= 23.0 Amps	1	\$0.30	 PG-TDSON-8 55mm2
15.	Rchs	Vishay-Dale	CRCW040212K4FKED Series= CRCW..e3	Res= 12.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
16.	Rcs	Stackpole Electronics Inc	CSRN2010FK60L0 Series= ?	Res= 60.0 mOhm Power= 1.0 W Tolerance= 1.0%	1	\$0.14	 2010 32mm2
17.	Rdim	Vishay-Dale	CRCW040210K5FKED Series= CRCW..e3	Res= 10.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
18.	Rhsn	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1,000 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
19.	Rhsp	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1,000 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
20.	Rivp1	Vishay-Dale	CRCW04021K30FKED Series= CRCW..e3	Res= 1.3 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
21.	Rivp2	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
22.	Rovp1	Vishay-Dale	CRCW040212K1FKED Series= CRCW..e3	Res= 12.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
23.	Rovp2	Vishay-Dale	CRCW0402511KFKED Series= CRCW..e3	Res= 511.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
24.	Rr	Vishay-Dale	CRCW040210R0FKED Series= CRCW..e3	Res= 10.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
25.	Rsense	Rohm	MCR25JZHFLR130 Series= 298	Res= 130.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	\$0.03	 1210 15mm2
26.	Rt	Vishay-Dale	CRCW040244K2FKED Series= CRCW..e3	Res= 44.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
27.	U1	Texas Instruments	LM3421MHX/NOPB	Switcher	1	\$1.15	 MXA16A 59mm2

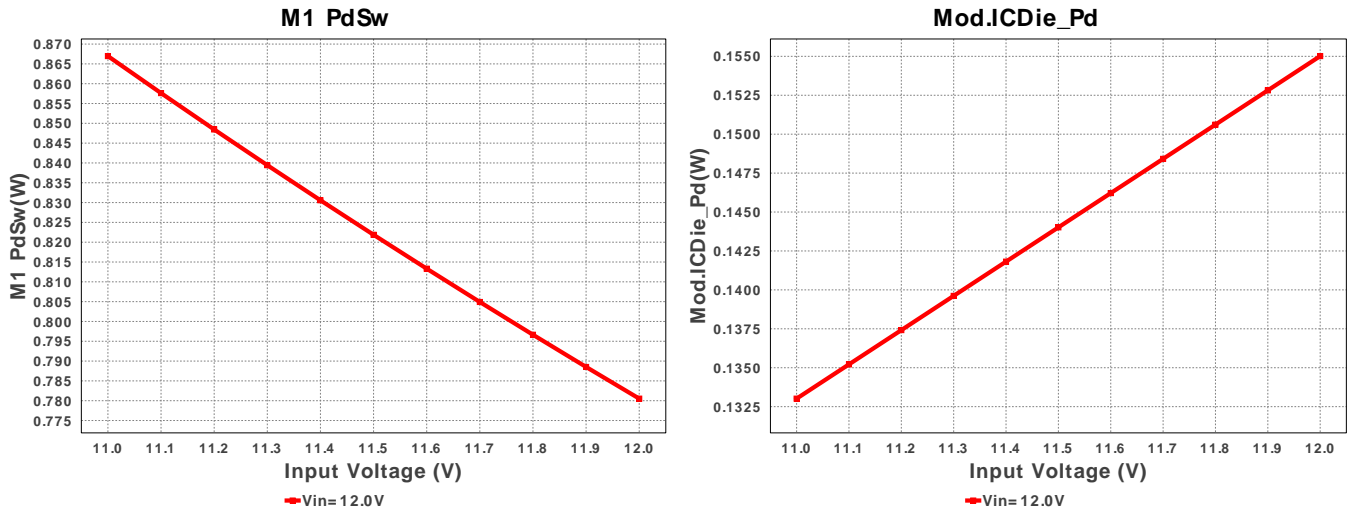












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	253.022 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	1.11 A	Current	Output capacitor RMS ripple current
3.	Iin Avg	2.826 A	Current	Average input current
4.	L Ipp	876.494 mA	Current	Peak-to-peak inductor ripple current
5.	L1 Irms	2.534 A	Current	Inductor ripple current
6.	LED Iavg	363.829 mA	Current	LED Average Current
7.	LED Ipp	4.195 mA	Current	LED Ripple Current
8.	M Irms	2.694 A	Current	MOSFET RMS ripple current
9.	SW Ipk	2.96 A	Current	Peak switch current
10.	BOM Count	55	General	Total Design BOM count
11.	FootPrint	1.297 kmm2	General	Total Foot Print Area of BOM components
12.	Frequency	542.986 kHz	General	Switching frequency
13.	IC Tolerance	25.0 mV	General	IC Feedback Tolerance
14.	M Rdsn	65.0 mOhm	General	Drain-Source On-resistance
15.	M Vds Act	175.13 mV	General	M Vds
16.	Pout	30.562 W	General	Total output power
17.	Total BOM	\$77.0	General	Total BOM Cost
18.	D1 Tj	46.809 degC	Op_Point	D1 junction temperature
19.	Vout OP	42.0 V	Op_Point	Operational Output Voltage
20.	Duty Cycle	74.226 %	Op_point	Duty cycle
21.	Efficiency	90.106 %	Op_point	Steady state efficiency
22.	IC Tj	35.736 degC	Op_point	IC junction temperature
23.	ICThetaJA	37.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
24.	IOUT_OP	727.657 mA	Op_point	Iout operating point
25.	LED Rd	722.51 mOhm	Op_point	LED DynamicResistance
26.	LED Vf	42.0 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	115.408 degC	Op_point	MOSFET junction temperature
29.	VIN_OP	12.0 V	Op_point	Vin operating point
30.	Cin Pd	64.02 μW	Power	Input capacitor power dissipation
31.	Cout Pd	49.314 mW	Power	Output capacitor power dissipation
32.	Diode Pd	560.296 mW	Power	Diode power dissipation
33.	IC Pd	155.015 mW	Power	IC power dissipation
34.	L Pd	269.723 mW	Power	Inductor power dissipation
35.	LED Pd	30.562 W	Power	LED Power Dissipation
36.	M Pd	1.708 W	Power	MOSFET power dissipation
37.	M1 PdCond	714.158 mW	Power	M1 MOSFET conduction losses
38.	M1 PdSw	994.006 mW	Power	M1 MOSFET switching losses
39.	Total Pd	3.356 W	Power	Total Power Dissipation
40.	Total LED load Rd	5.058 Ohm	Unknown	Total LED Load DynamicResistance

Design Inputs

#	Name	Value	Description
1.	Iout	700.0 mA	Maximum Output Current
2.	Iout1	700.0 mAmps	Output Current #1
3.	VinMax	12.0 V	Maximum input voltage
4.	VinMin	12.0 V	Minimum input voltage
5.	Vout	42.0 V	Output Voltage
6.	Vout1	42.0 Volt	Output Voltage #1
7.	application	LED_DRIVER	LED Application
8.	base_pn	LM3421	Base Product Number

#	Name	Value	Description
9.	LED_Architect	N	LED Architect Project
10.	ledparallel	2.0	Number of LED in parallel
11.	ledpartnumber	XPGWHT- L1-0000-00H51	LED Part number
12.	ledseries	14.0	Number of LED in series
13.	line_fsw	60.0	AC Line Frequency
14.	source	DC	Input Source Type
15.	Ta	30.0 degC	Ambient temperature

Design Assistance

1. **LM3421** Product Folder : <http://www.ti.com/product/lm3421> : contains the data sheet and other resources.

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