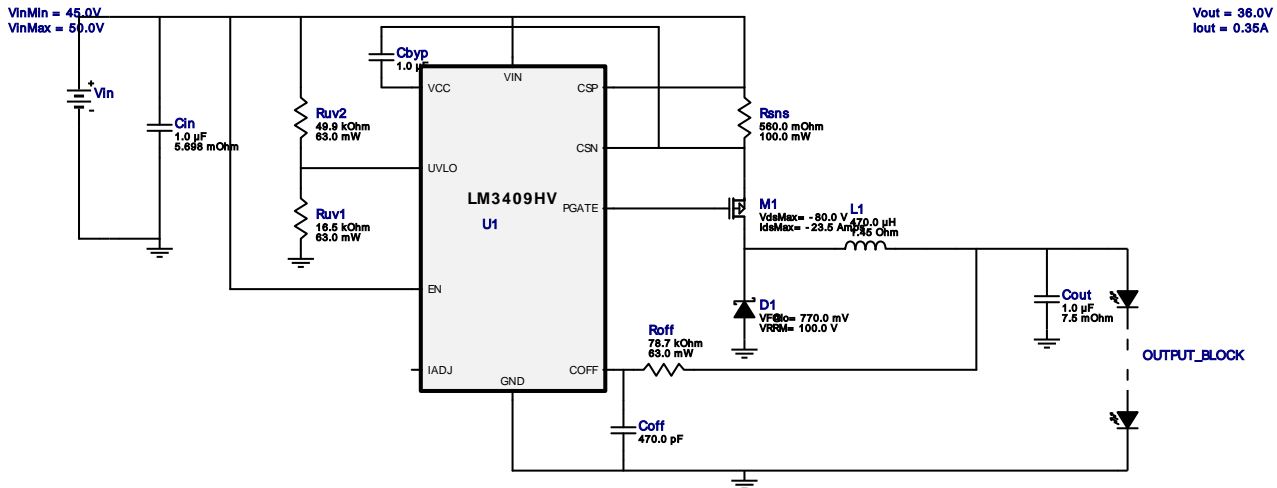



## WEBENCH<sup>®</sup> Design Report

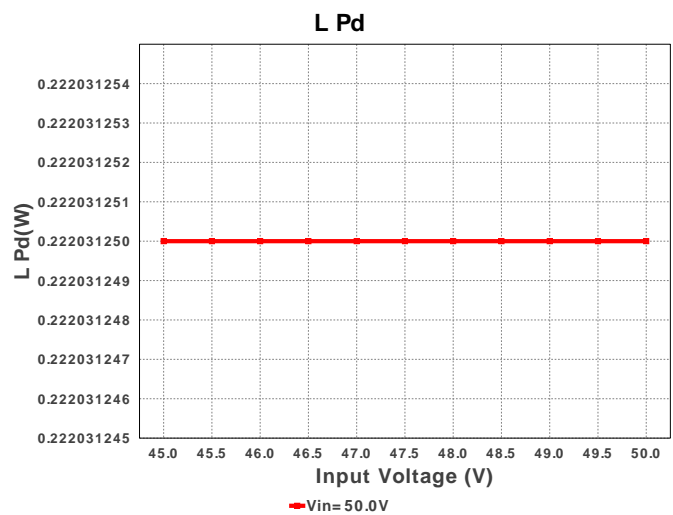
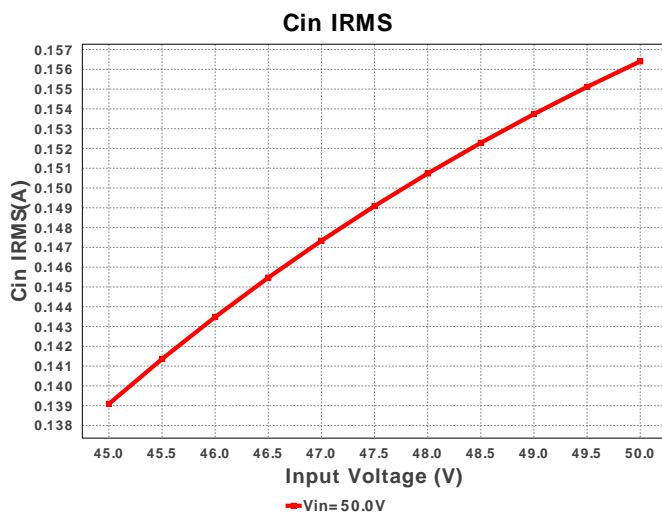
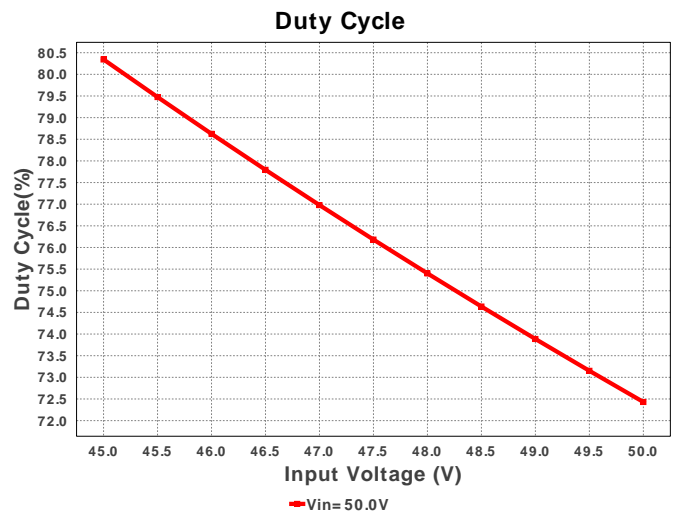
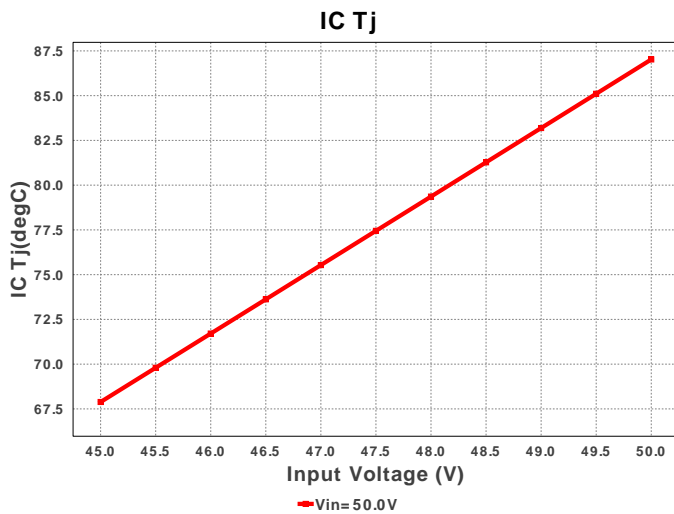
 Design : 1231471/4424 LM3409HVMY/NOPB  
 LM3409HVMY/NOPB 45.0V-50.0V to 36.00V @ 0.35A


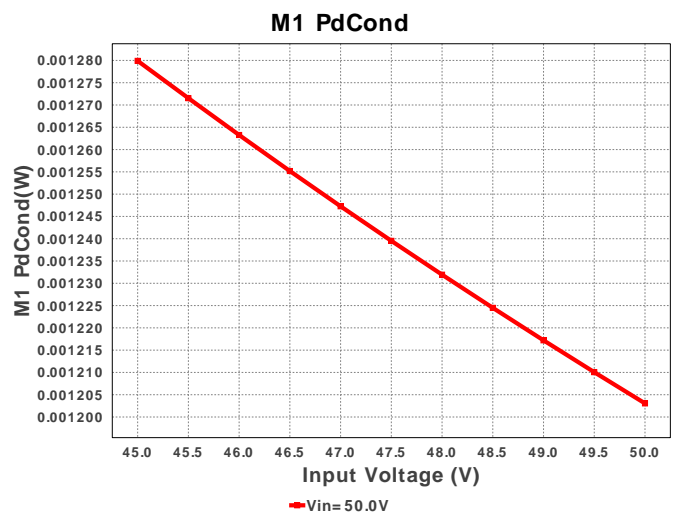
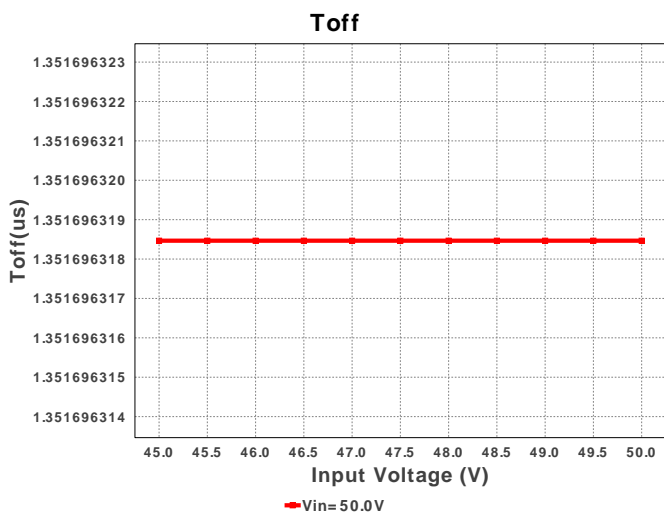
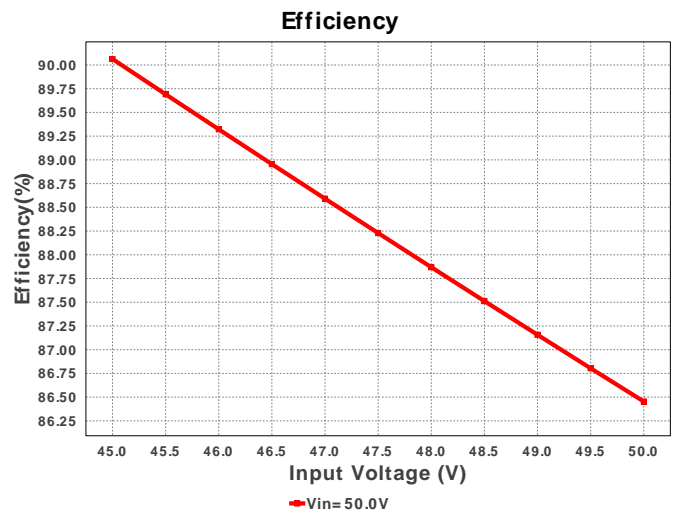
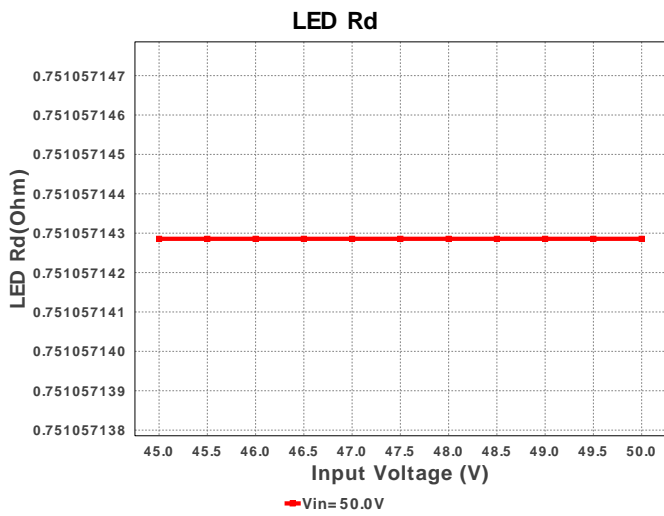
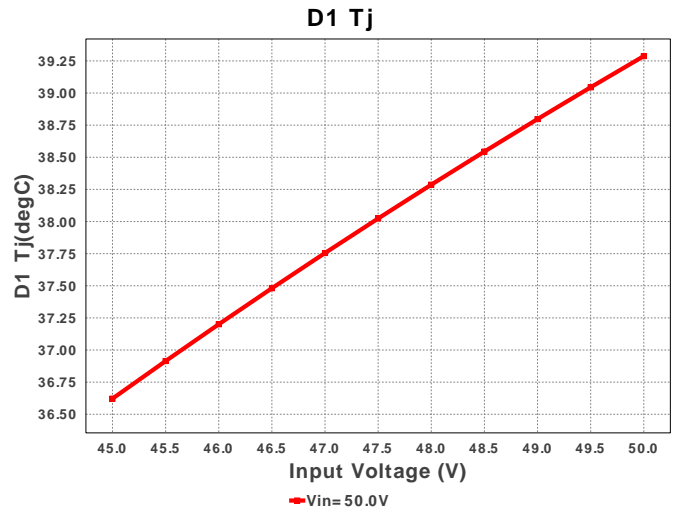
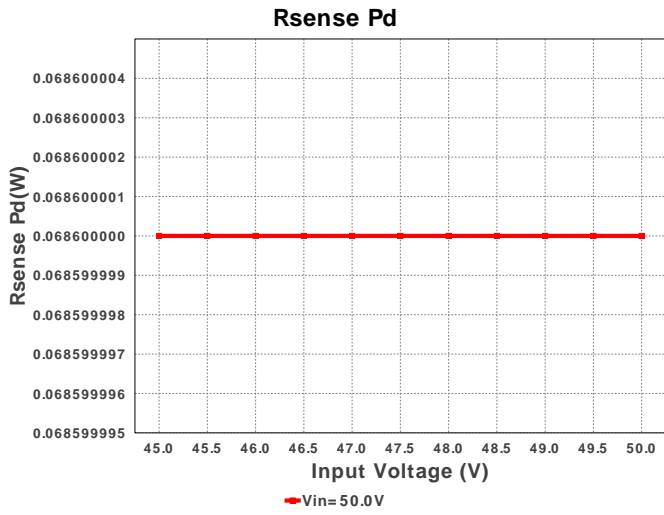
1. Bypass Capacitor Connection : WEBENCH schematic configured for the selected PFET's total gate charge (Qg). If the Qg value is > 30nC, the Bypass Capacitor(Cbyp or CF) is connected from the VCC pin to CSN pin instead of the typically connected from VCC to Vin when Qg < 30nC.

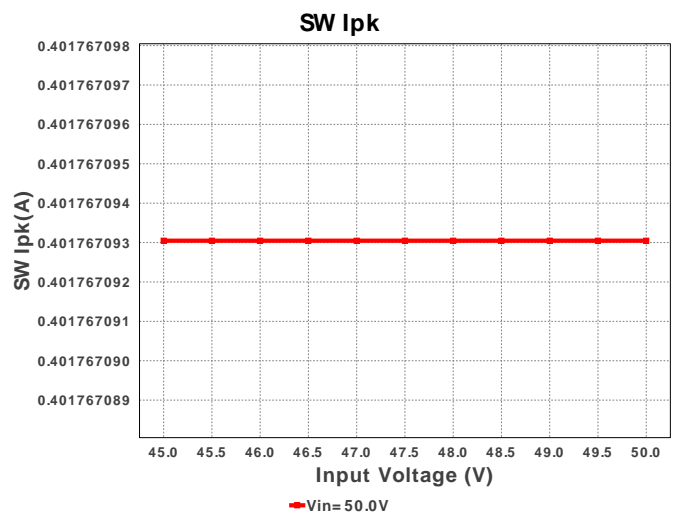
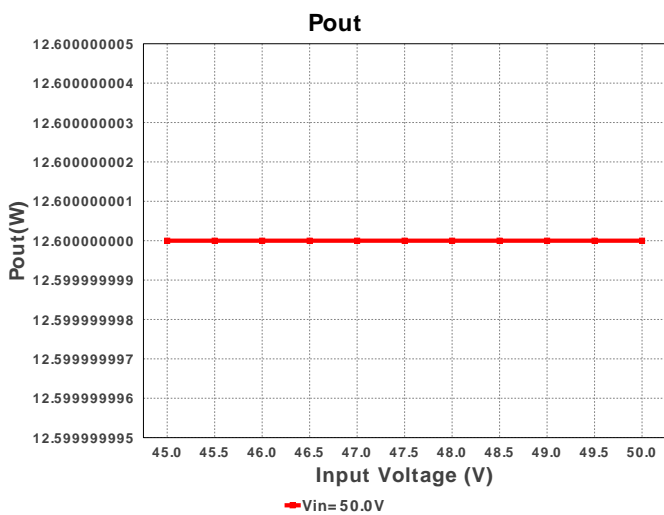
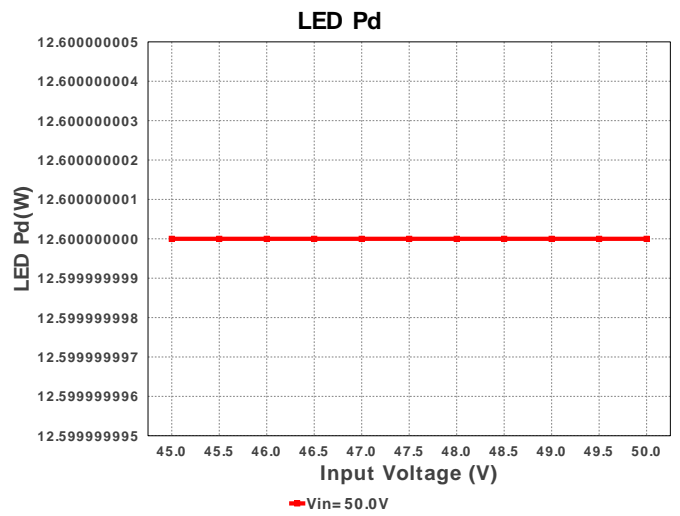
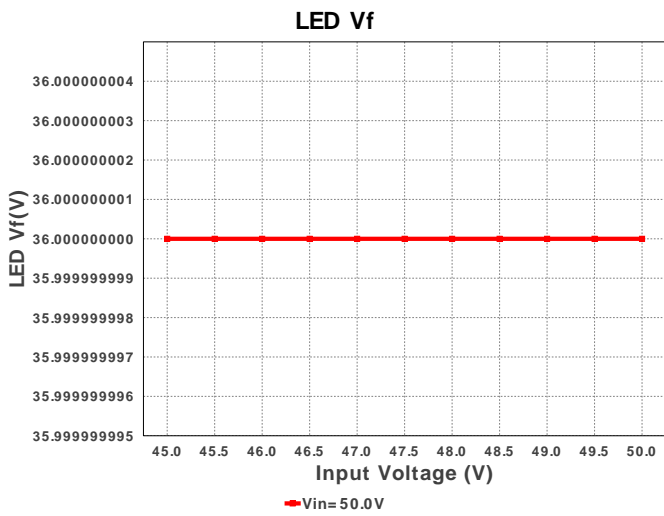
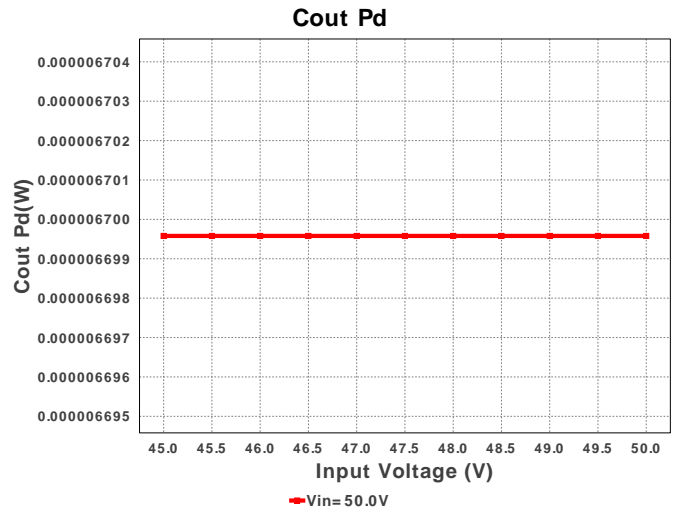
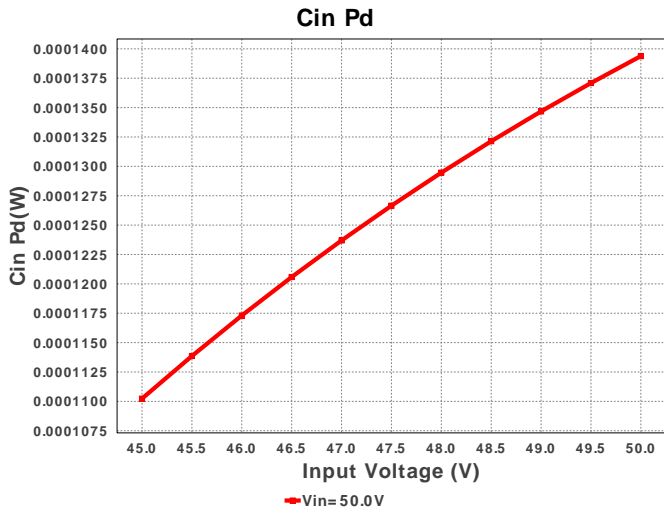
### Electrical BOM

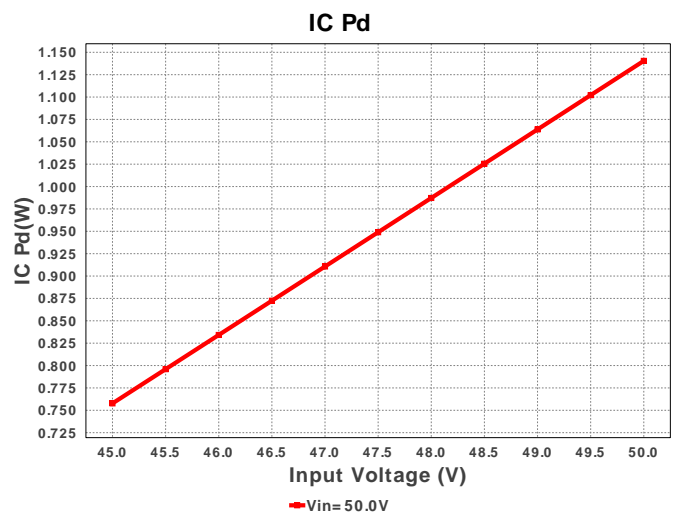
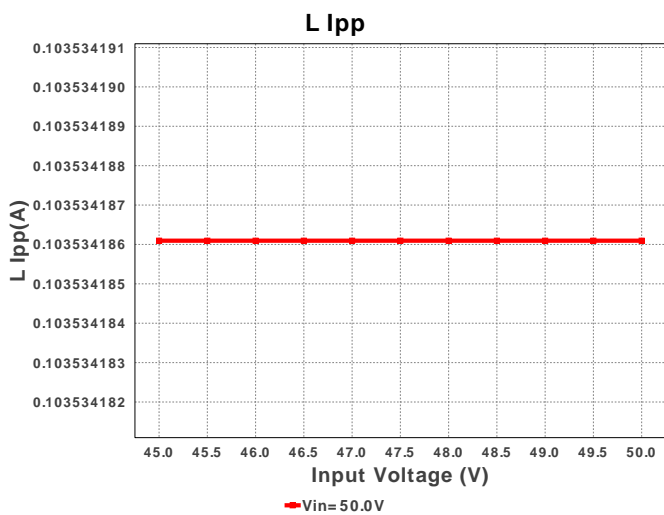
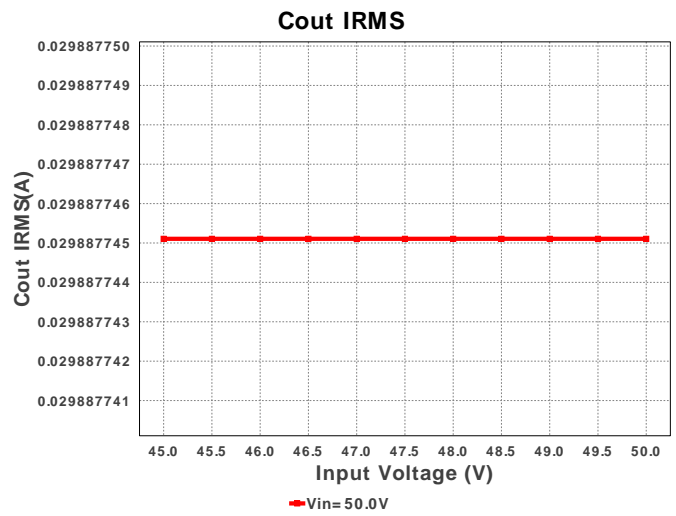
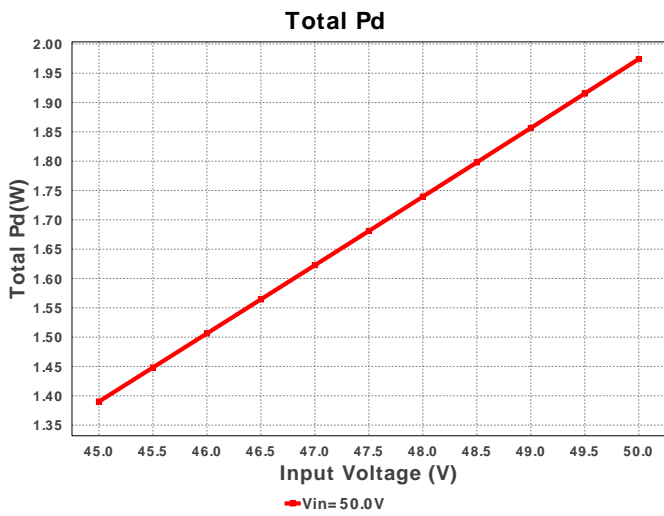
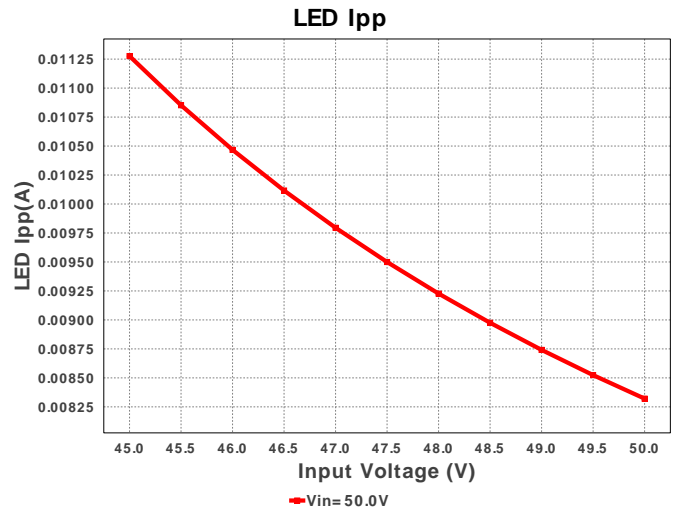
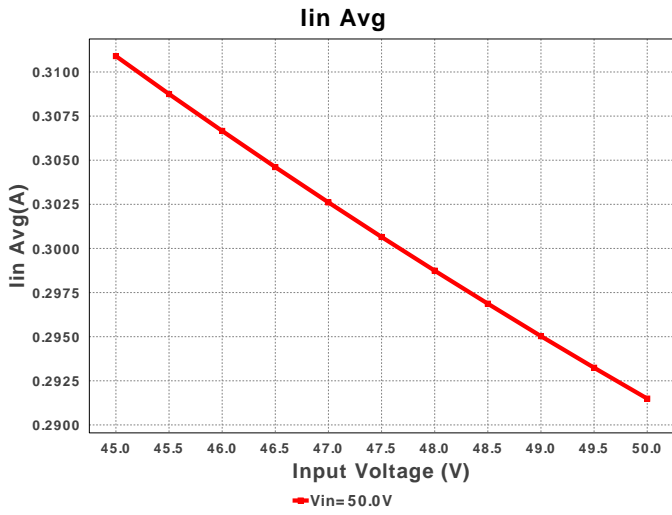
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbyp	MuRata	GRM155R61A105KE15D Series= X5R	Cap= 1.0 uF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	 0402 3 mm <sup>2</sup>
2.	Cin	TDK	C3216JB2A105K Series= 285	Cap= 1.0 uF ESR= 5.698 mOhm VDC= 100.0 V IRMS= 0.0 A	1	\$0.11	 1206 11 mm <sup>2</sup>
3.	Coff	Yageo America	CC0805KRX7R9BB471 Series= X7R	Cap= 470.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm <sup>2</sup>
4.	Cout	TDK	C3216X7R2A105M160AA Series= X7R	Cap= 1.0 uF ESR= 7.5 mOhm VDC= 100.0 V IRMS= 5.9235 A	1	\$0.11	 1206 11 mm <sup>2</sup>
5.	D1	Diodes Inc.	DFLS1100-7	VF@Io= 770.0 mV VRRM= 100.0 V	1	\$0.19	 PowerD1123 13 mm <sup>2</sup>
6.	D_LED	Cree	XPGWHT-L1-0000-00H51	LED	12	\$2.59	 xlampxpg 20 mm <sup>2</sup>
7.	L1	TDK	CLF10040T-471M	L= 470.0 µH DCR= 1.45 Ohm	1	\$0.46	 CLF10040 148 mm <sup>2</sup>
8.	M1	Vishay-Siliconix	SUM110P08-11L	VdsMax= -80.0 V IdsMax= -23.5 Amps	1	\$2.27	 DDPAK 210 mm <sup>2</sup>

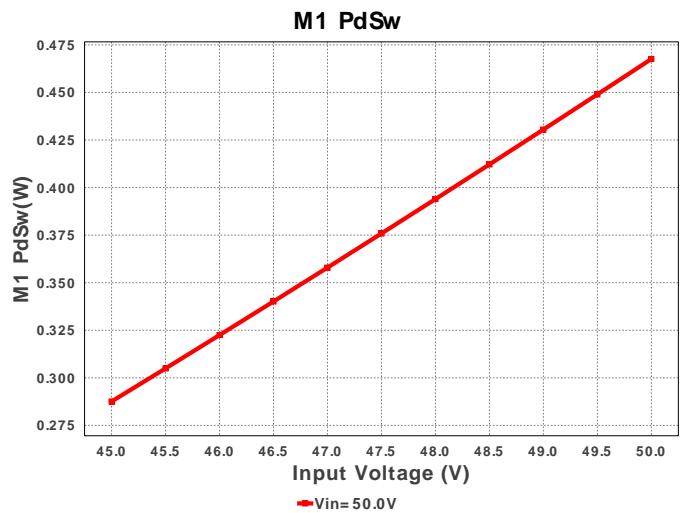
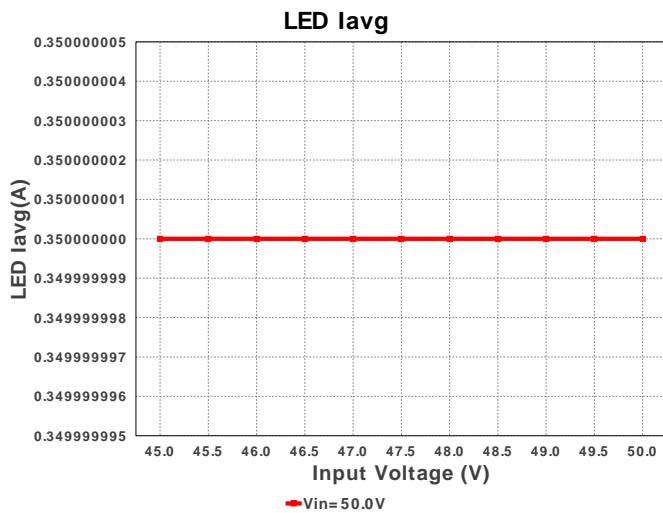
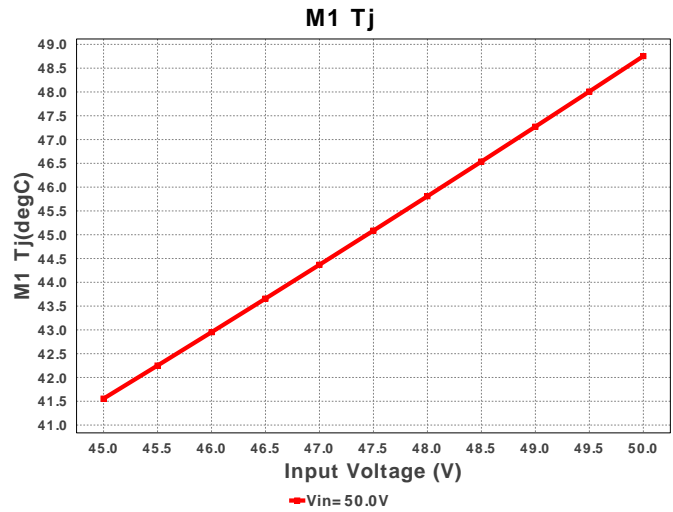
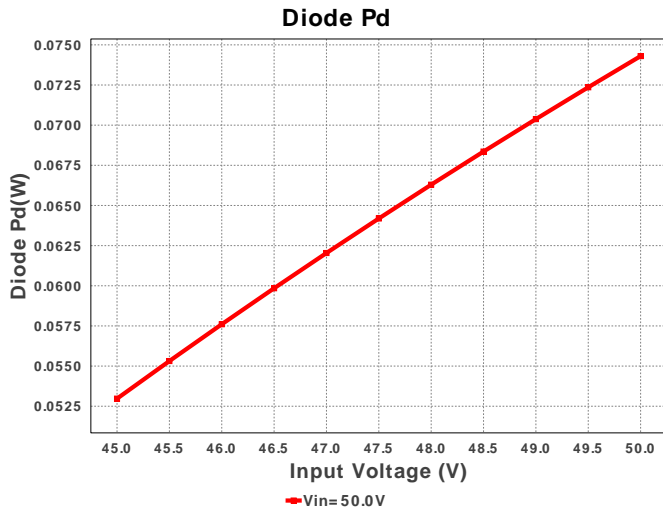
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	Roff	Vishay-Dale	CRCW040278K7FKED Series= CRCW..e3	Res= 78.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm <sup>2</sup>
10.	Rsns	Panasonic	ERJ-3RQFR56V Series= 227	Res= 560.0 mOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.02	0603 5 mm <sup>2</sup>
11.	Ruv1	Vishay-Dale	CRCW040216K5FKED Series= CRCW..e3	Res= 16.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm <sup>2</sup>
12.	Ruv2	Vishay-Dale	CRCW040249K9FKED Series= CRCW..e3	Res= 49.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm <sup>2</sup>
13.	U1	Texas Instruments	LM3409HVMY/NOPB	Switcher	1	\$0.75	 MUC10A 24 mm <sup>2</sup>











## Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	156.402 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	29.888 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	291.48 mA	Current	Average input current
4.	L Ipp	103.534 mA	Current	Peak-to-peak inductor ripple current
5.	LED Iavg	350.0 mA	Current	LED Average Current
6.	LED Ipp	8.322 mA	Current	LED Ripple Current
7.	SW Ipk	401.767 mA	Current	Peak switch current
8.	BOM Count	24	General	Total Design BOM count
9.	FootPrint	677.0 mm <sup>2</sup>	General	Total Foot Print Area of BOM components
10.	Frequency	203.974 kHz	General	Switching frequency
11.	IC Tolerance	54.0 mV	General	IC Feedback Tolerance
12.	Pout	12.6 W	General	Total output power
13.	Total BOM	\$35.04	General	Total BOM Cost
14.	D1 Tj	39.288 degC	Op_Point	D1 junction temperature
15.	Vout OP	36.0 V	Op_Point	Operational Output Voltage
16.	Duty Cycle	72.43 %	Op_point	Duty cycle
17.	Efficiency	86.454 %	Op_point	Steady state efficiency
18.	IC Tj	87.013 degC	Op_point	IC junction temperature
19.	ICThetaJA	50.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
20.	IOUT_OP	350.0 mA	Op_point	Iout operating point
21.	LED Rd	751.057 mOhm	Op_point	LED DynamicResistance
22.	LED Vf	36.0 V	Op_point	Total LED Forward Calculated Voltage
23.	M1 Tj	48.758 degC	Op_point	MOSFET junction temperature
24.	VIN_OP	50.0 V	Op_point	Vin operating point
25.	Cin Pd	139.383 μW	Power	Input capacitor power dissipation
26.	Cout Pd	6.7 μW	Power	Output capacitor power dissipation
27.	Diode Pd	74.3 mW	Power	Diode power dissipation
28.	IC Pd	1.14 W	Power	IC power dissipation
29.	L Pd	222.031 mW	Power	Inductor power dissipation
30.	LED Pd	12.6 W	Power	LED Power Dissipation
31.	M1 PdCond	1.201 mW	Power	M1 MOSFET conduction losses

#	Name	Value	Category	Description
32.	M1 PdSw	467.677 mW	Power	M1 MOSFET switching losses
33.	Rsense Pd	68.6 mW	Power	LED Power Dissipation
34.	Total Pd	1.974 W	Power	Total Power Dissipation
35.	Toff	1.352 us	Unknown	Fixed Off Time

## Design Inputs

#	Name	Value	Description
1.	Iout	350.0 mA	Maximum Output Current
2.	Iout1	350.0 mAmps	Output Current #1
3.	VinMax	50.0 V	Maximum input voltage
4.	VinMin	45.0 V	Minimum input voltage
5.	Vout	36.0 V	Output Voltage
6.	Vout1	36.0 Volt	Output Voltage #1
7.	application	LED_DRIVER	LED Application
8.	base_pn	LM3409HV	Base Product Number
9.	LED_Architect	N	LED Architect Project
10.	ledparallel	1.0	Number of LED in parallel
11.	ledpartnumber	XPGWHT-L1-0000-00H51	LED Part number
12.	ledseries	12.0	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. Application Hints Bypass Capacitor Connection WEBENCH schematic configured for the selected PFET's total gate charge (Qg) If the Qg value is > 30 nC, the Bypass Capacitor (Cby or CF) is connected from the VCC pin to CSN pin instead of typically connected from VCC to Vin when Qg < 30nC. Please see the datasheet for further design guidance. <http://www.ti.com/lit/ds/symlink/LM3409HV.pdf>

2. **LM3409HV** Product Folder : <http://www.ti.com/product/lm3409hv> : contains the data sheet and other resources.

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**You should completely validate and test your design implementation to confirm the system functionality for your application prior to production.**

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