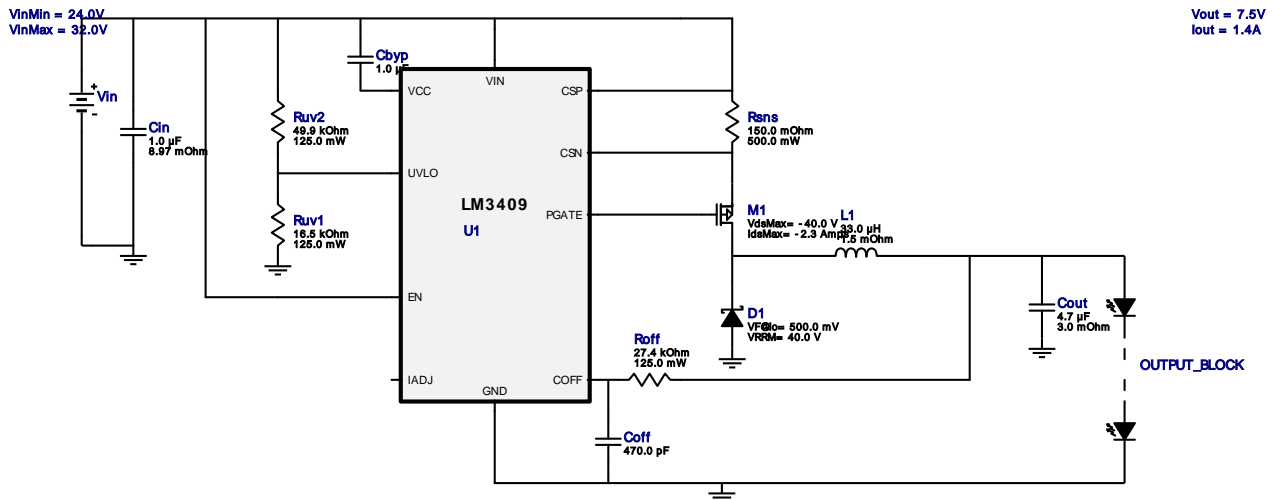








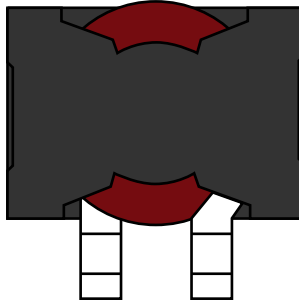





## WEBENCH<sup>®</sup> Design Report

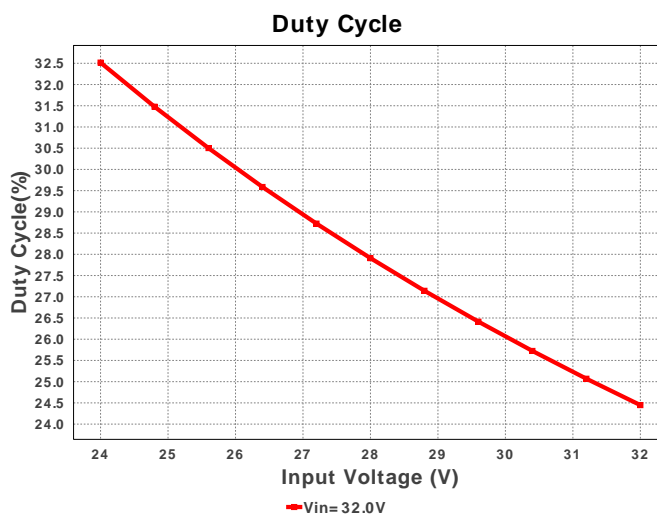
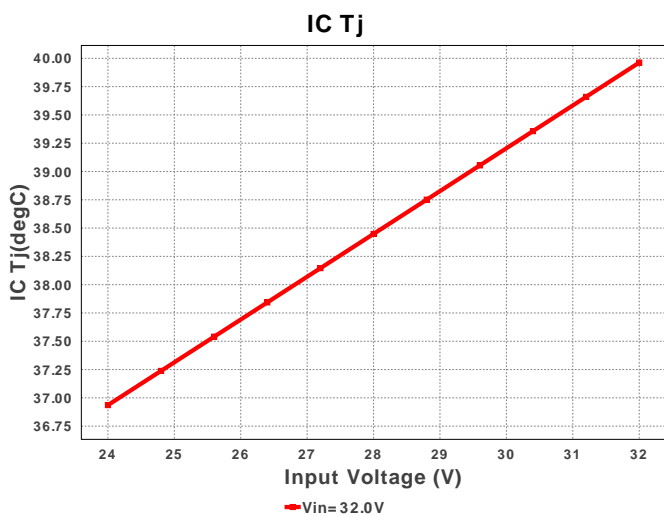
 Design : 1836019/3 LM3409MY/NOPB  
 LM3409MY/NOPB 24.0V-32.0V to 7.50V @ 1.4A


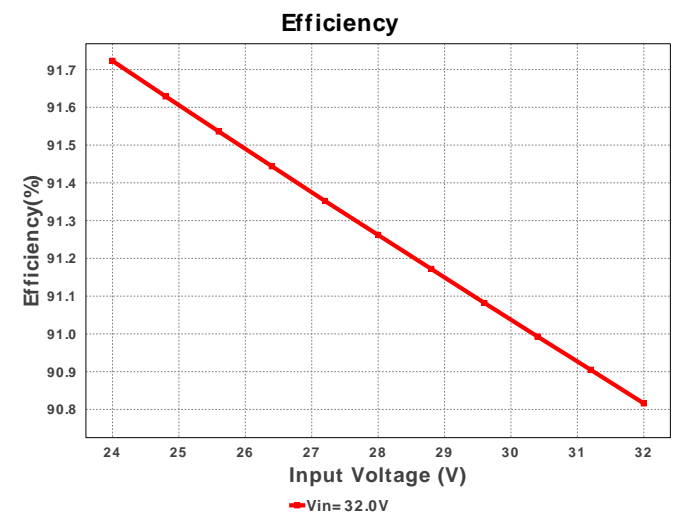
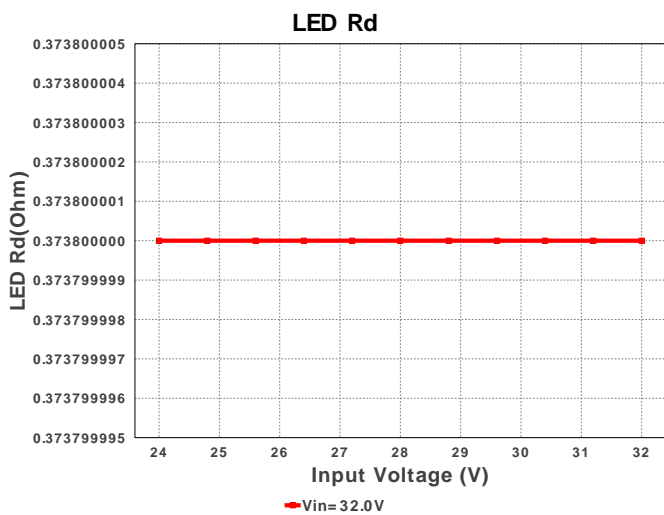
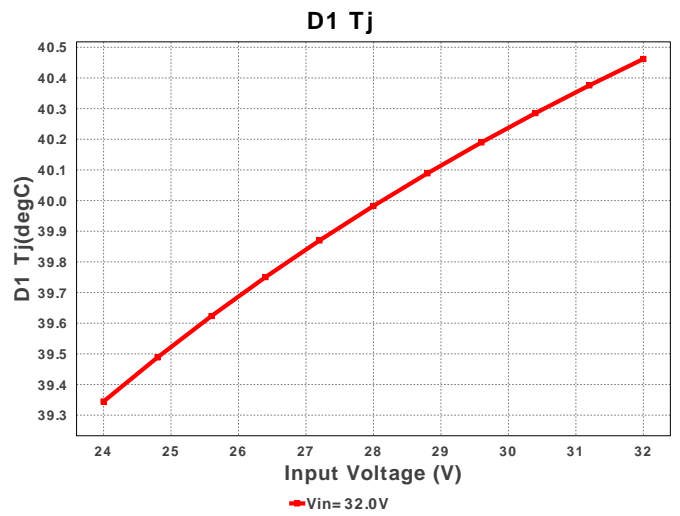
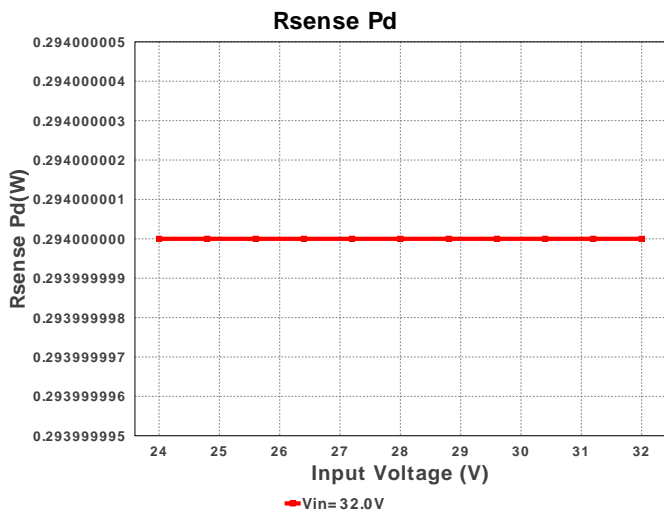
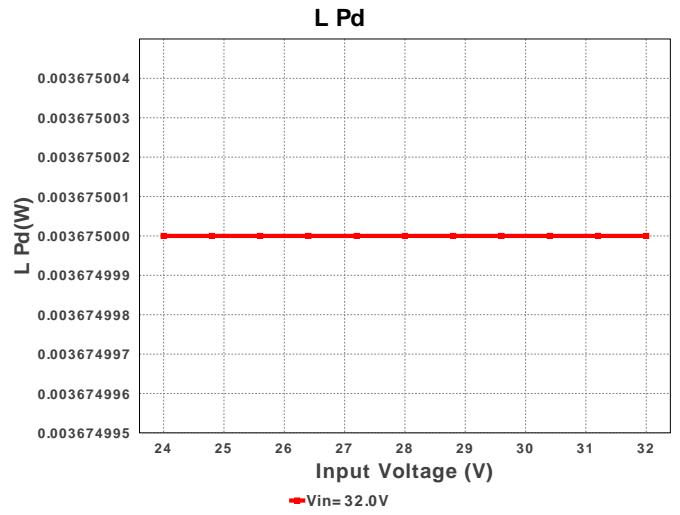
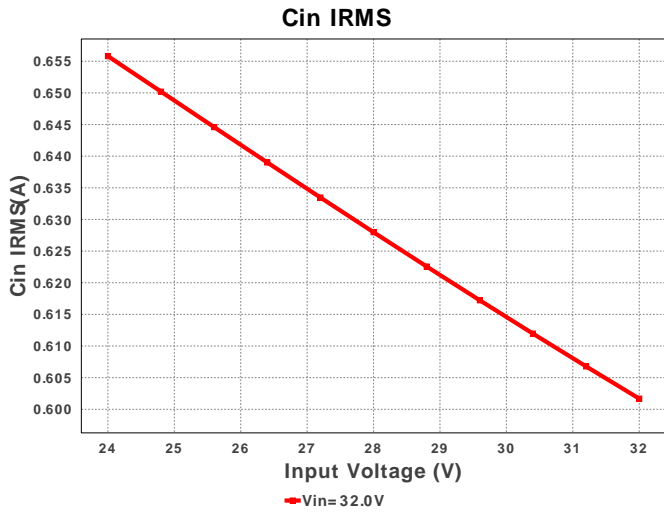
1. Bypass Capacitor Connection : WEBENCH schematic configured for the selected PFET's total gate charge (Qg). If the Qg value is > 30 nC, the Bypass Capacitor(Cbyp or CF) is connected from the VCC pin to CSN pin instead of the typically connected from VCC to Vin when Qg < 30nC.

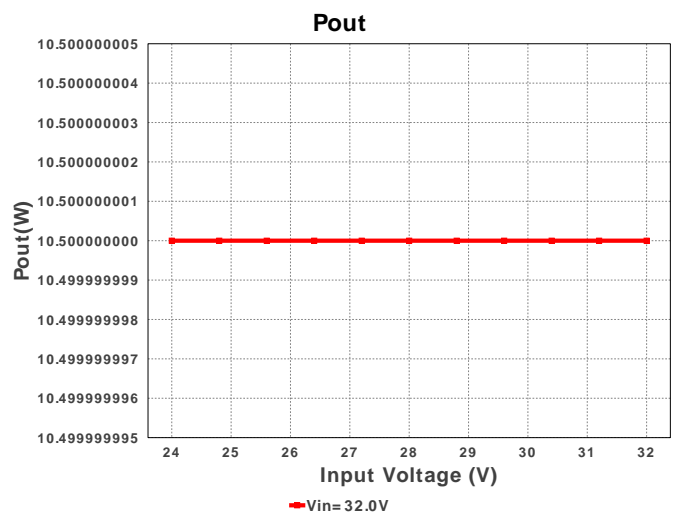
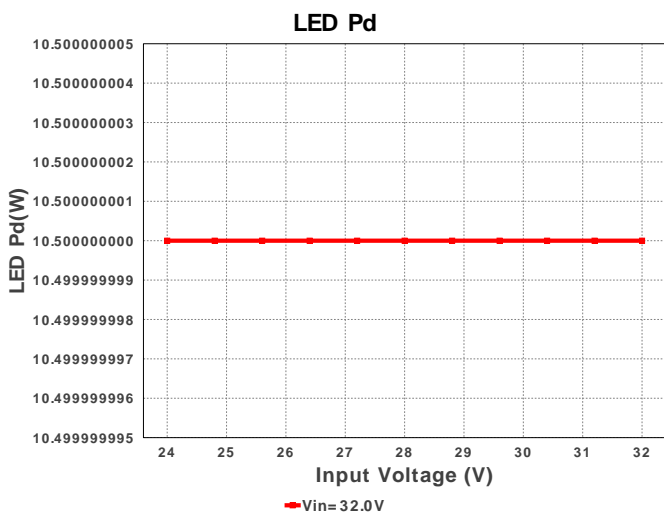
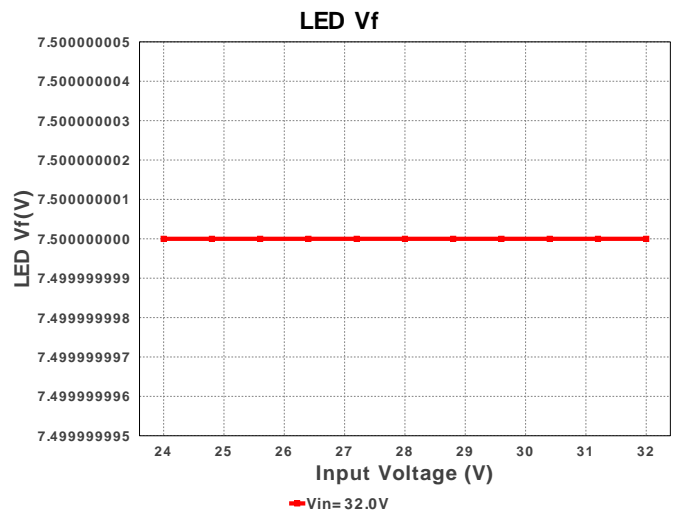
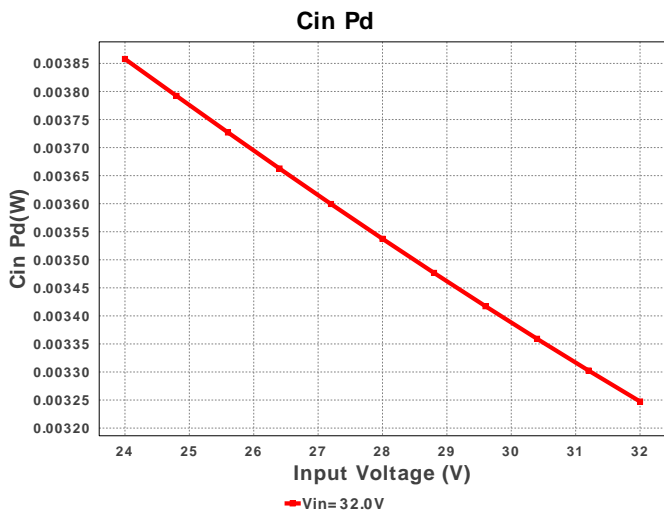
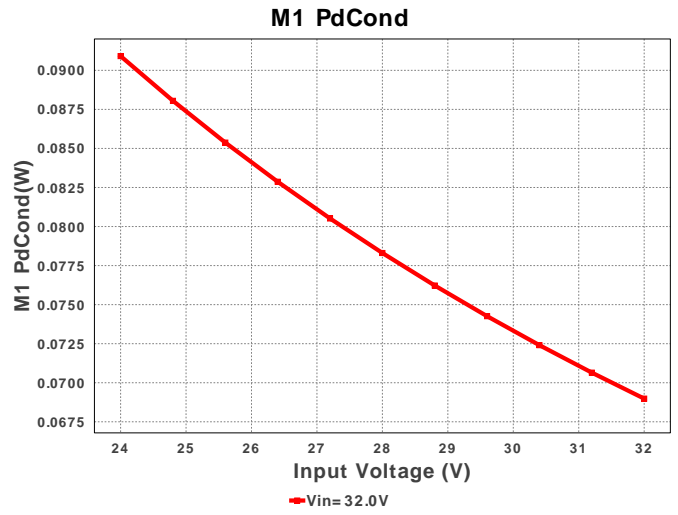
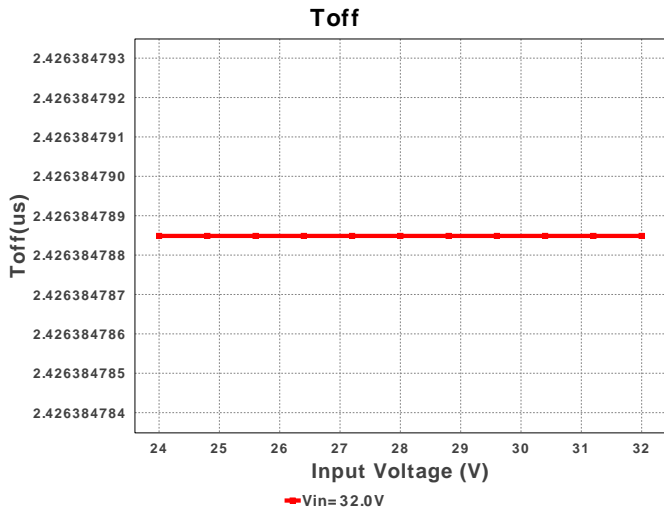
### Electrical BOM

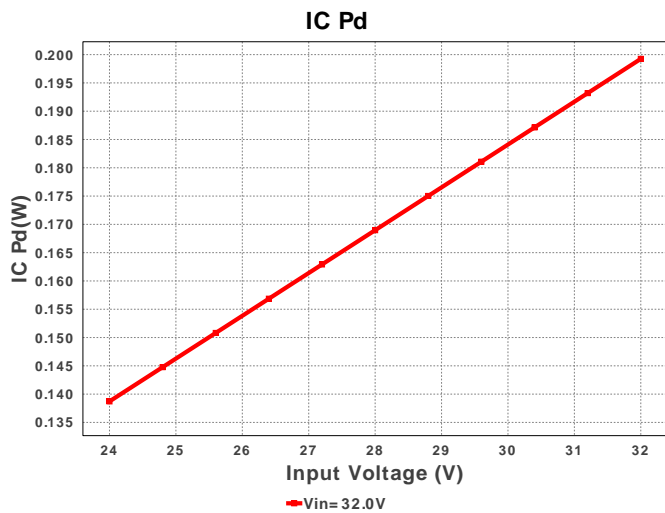
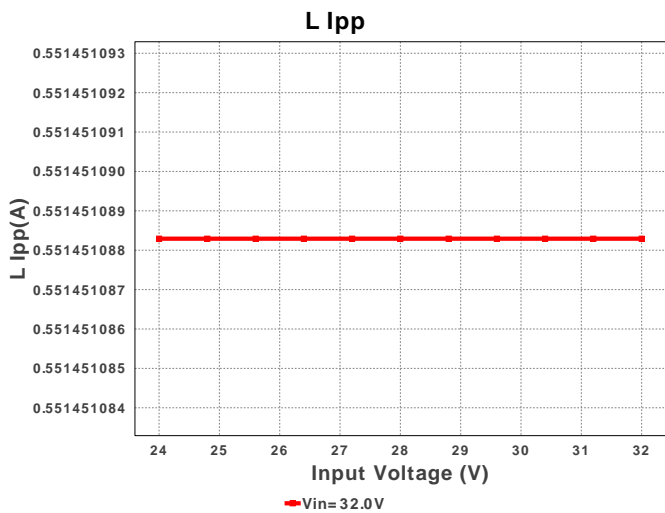
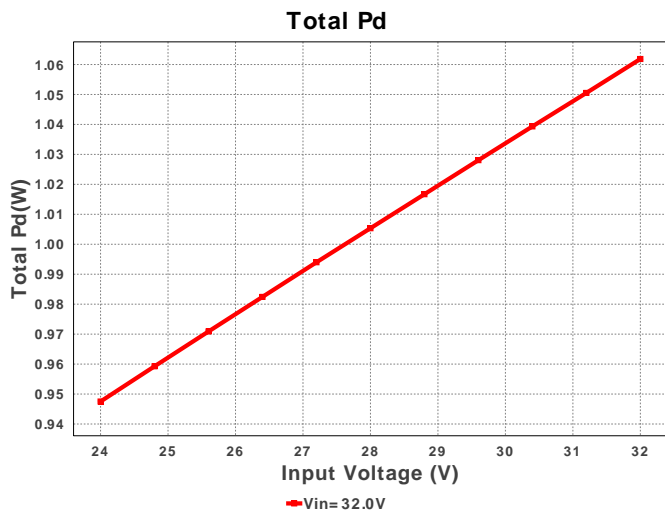
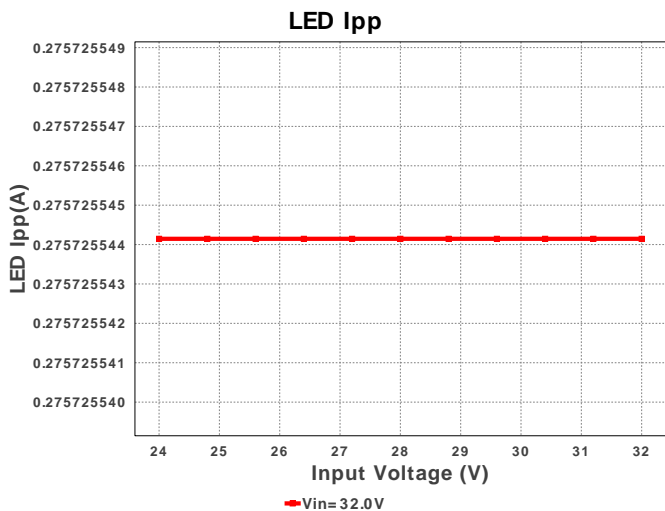
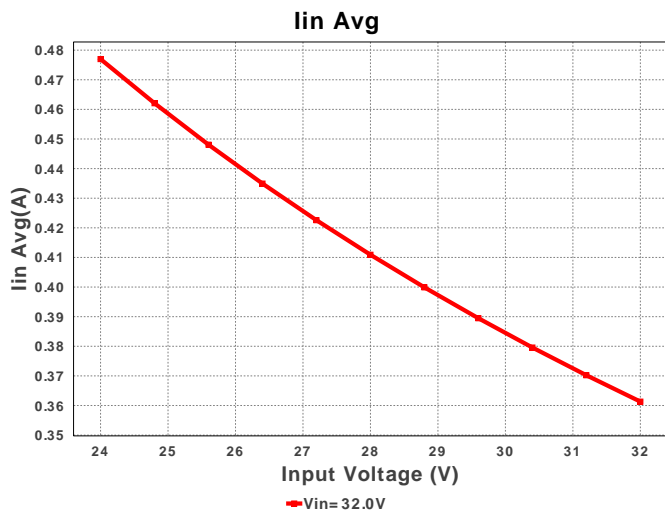
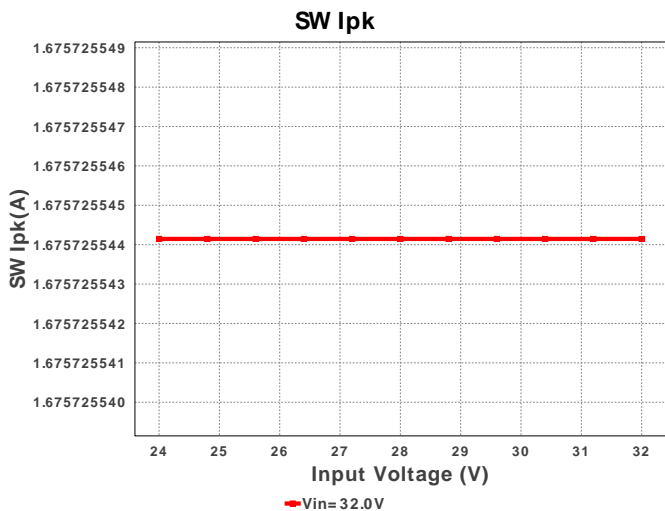
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbyp	Taiyo Yuden	EMK212B7105KG-T Series= X7R	Cap= 1.0 uF VDC= 16.0 V IRMS= 0.0 A	1	\$0.02	 0805 7 mm <sup>2</sup>
2.	Cin	TDK	C3216X5R1H105K Series= X5R	Cap= 1.0 uF ESR= 8.97 mOhm VDC= 50.0 V IRMS= 0.0 A	1	\$0.04	 1206 11 mm <sup>2</sup>
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	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 mm <sup>2</sup>
5.	D1	Diodes Inc.	B240A-13-F	VF@Io= 500.0 mV VRRM= 40.0 V	1	\$0.09	 SMA 37 mm <sup>2</sup>
6.	D_LED	OSRAM	LR-W5SN	LED	6	\$1.73	 platinumdragon 108 mm <sup>2</sup>

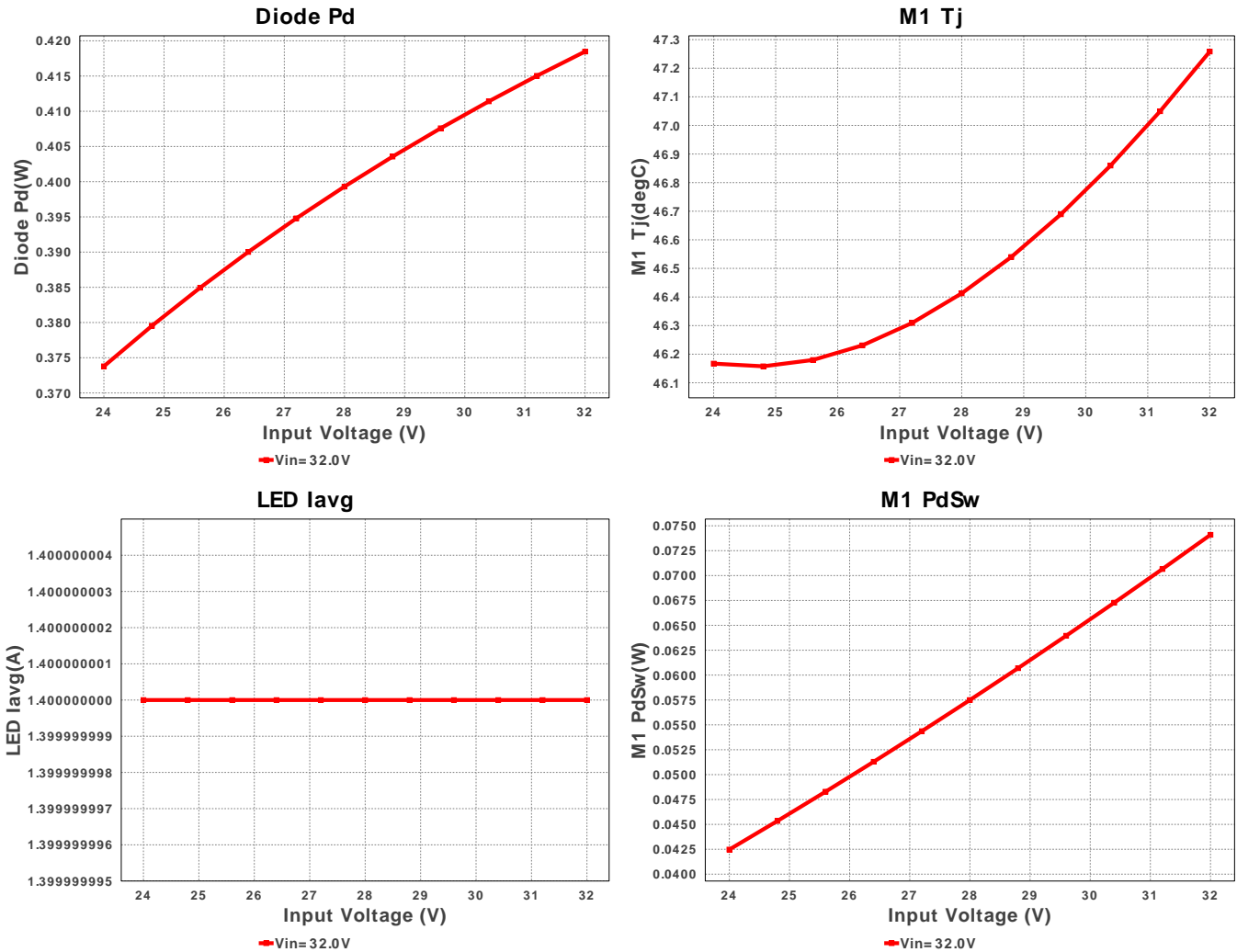
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
7.	L1	Coilcraft	SER2915L-333KL	L= 33.0 $\mu$ H DCR= 1.5 mOhm	1	\$2.05	 SER2915L 652 mm <sup>2</sup>
8.	M1	Vishay-Siliconix	SI2319DS-T1-E3	VdsMax= -40.0 V IdsMax= -2.3 Amps	1	\$0.28	 SOT-23 14 mm <sup>2</sup>
9.	Roff	Panasonic	ERJ-6ENF2742V Series= 225	Res= 27.4 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm <sup>2</sup>
10.	Rsns	Rohm	MCR25JZHFLR150 Series= 298	Res= 150.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	\$0.03	 1210 15 mm <sup>2</sup>
11.	Ruv1	Panasonic	ERJ-6ENF1652V Series= 225	Res= 16.5 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm <sup>2</sup>
12.	Ruv2	Panasonic	ERJ-6ENF4992V Series= 225	Res= 49.9 kOhm Power= 125.0 mW Tolerance= 1.0%	1	\$0.01	 0805 7 mm <sup>2</sup>
13.	U1	Texas Instruments	LM3409MY/NOPB	Switcher	1	\$0.70	 MUC10A 24 mm <sup>2</sup>











## Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	601.8 mA	Current	Input capacitor RMS ripple current
2.	Iin Avg	361.49 mA	Current	Average input current
3.	L Ipp	551.45 mA	Current	Peak-to-peak inductor ripple current
4.	LED Iavg	1.4 A	Current	LED Average Current
5.	LED Ipp	45.807 mA	Current	LED Ripple Current
6.	SW Ipk	1.676 A	Current	Peak switch current
7.	BOM Count	18	General	Total Design BOM count
8.	FootPrint	1.446 k mm <sup>2</sup>	General	Total Foot Print Area of BOM components
9.	Frequency	311.5 kHz	General	Switching frequency
10.	IC Tolerance	54.0 mV	General	IC Feedback Tolerance
11.	Pout	10.5 W	General	Total output power
12.	Total BOM	\$13.7	General	Total BOM Cost
13.	D1 Tj	40.612 degC	Op_Point	D1 junction temperature
14.	Vout OP	7.5 V	Op_Point	Operational Output Voltage
15.	Duty Cycle	24.461 %	Op_point	Duty cycle
16.	Efficiency	90.769 %	Op_point	Steady state efficiency
17.	IC Tj	39.958 degC	Op_point	IC junction temperature
18.	ICThetaJA	50.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
19.	IOUT_OP	1.4 A	Op_point	Iout operating point
20.	LED Rd	373.8 mOhm	Op_point	LED DynamicResistance
21.	LED Vf	7.5 V	Op_point	Total LED Forward Calculated Voltage
22.	M1 Tj	47.269 degC	Op_point	MOSFET junction temperature
23.	VIN_OP	32.0 V	Op_point	Vin operating point
24.	Cin Pd	3.249 mW	Power	Input capacitor power dissipation
25.	Diode Pd	424.465 mW	Power	Diode power dissipation
26.	IC Pd	199.166 mW	Power	IC power dissipation
27.	L Pd	3.675 mW	Power	Inductor power dissipation
28.	LED Pd	10.5 W	Power	LED Power Dissipation
29.	M1 PdCond	69.053 mW	Power	M1 MOSFET conduction losses
30.	M1 PdSw	74.141 mW	Power	M1 MOSFET switching losses
31.	Rsense Pd	294.0 mW	Power	LED Power Dissipation

#	Name	Value	Category	Description
32.	Total Pd	1.068 W	Power	Total Power Dissipation
33.	Toff	2.426 us	Unknown	Fixed Off Time

## Design Inputs

#	Name	Value	Description
1.	Iout	1.4	Maximum Output Current
2.	Iout1	1.4	Output Current #1
3.	VinMax	32.0	Maximum input voltage
4.	VinMin	24.0	Minimum input voltage
5.	Vout	7.5	Output Voltage
6.	Vout1	7.5	Output Voltage #1
7.	application	LED_DRIVER	LED Application
8.	base_pn	LM3409	Texas Instruments Base Part Number
9.	isLEDArchitect	N	LED Architect Project
10.	ledparallel	2.0	Number of LED in parallel
11.	ledpartnumber	LR-W5SN	LED Part number
12.	ledseries	3.0	Number of LED in series
13.	line_fsw	60.0	AC Line Frequency
14.	source	DC	Input Source Type
15.	ta	30.0	Ambient temperature
16.	userfsw	580.62 k	Customer Selected Frequency

## 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 (Cbyp 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. LM3409 Product Folder : <http://www.ti.com/product/LM3409> : 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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