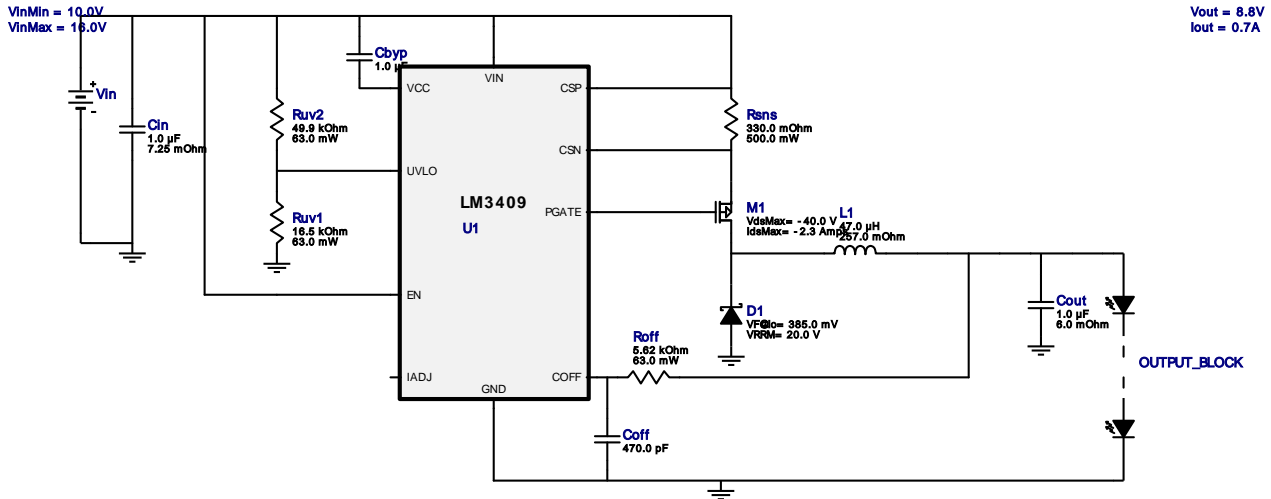














WEBENCH® Design Report

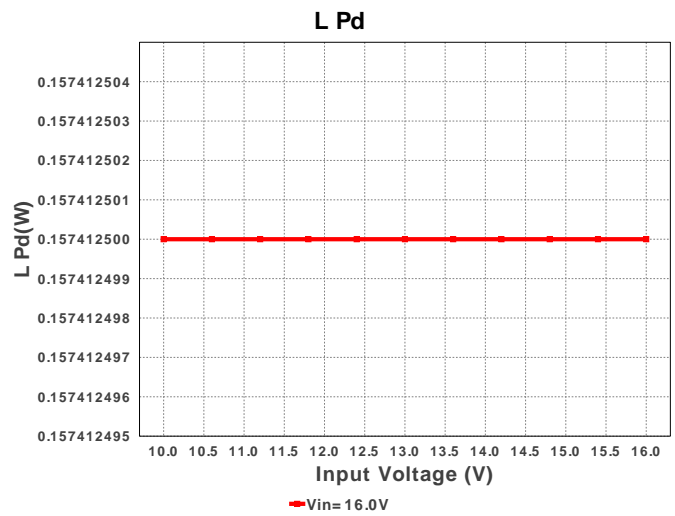
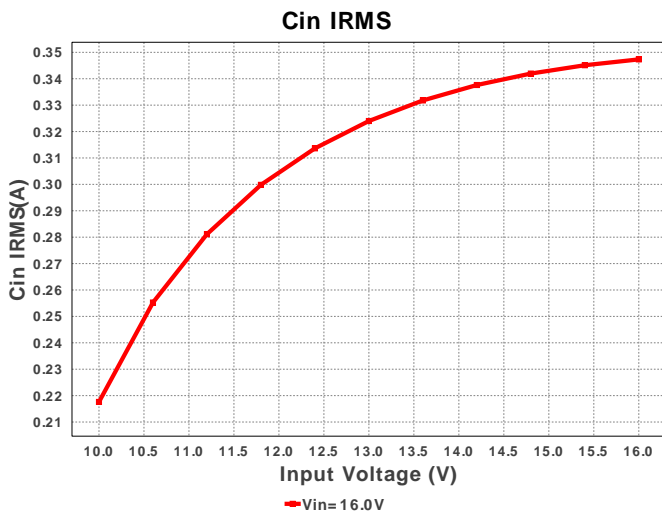
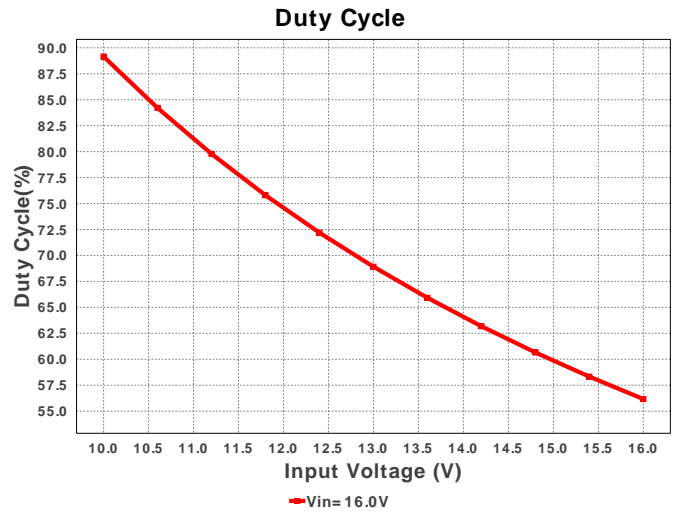
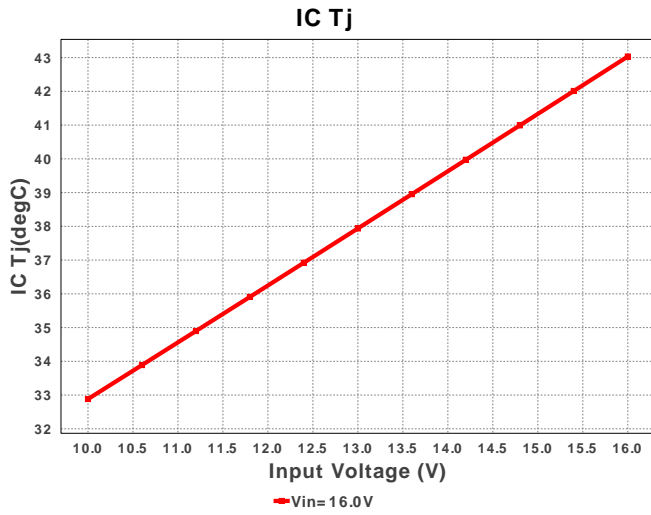
 Design : 1961187/52 LM3409MY/NOPB
 LM3409MY/NOPB 10.0V-16.0V to 8.80V @ 0.7A


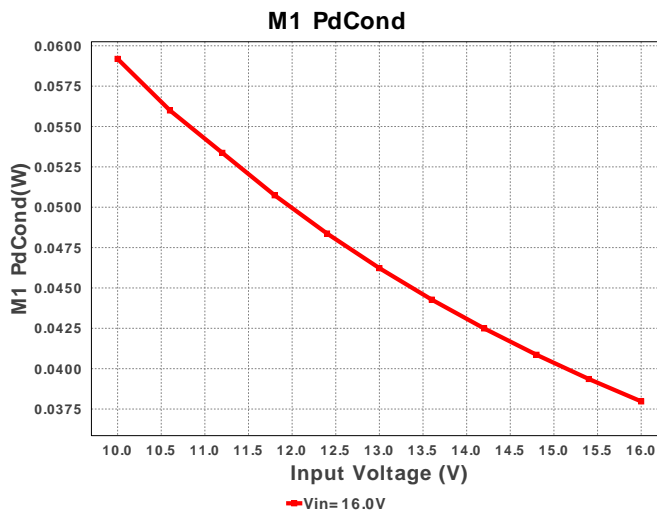
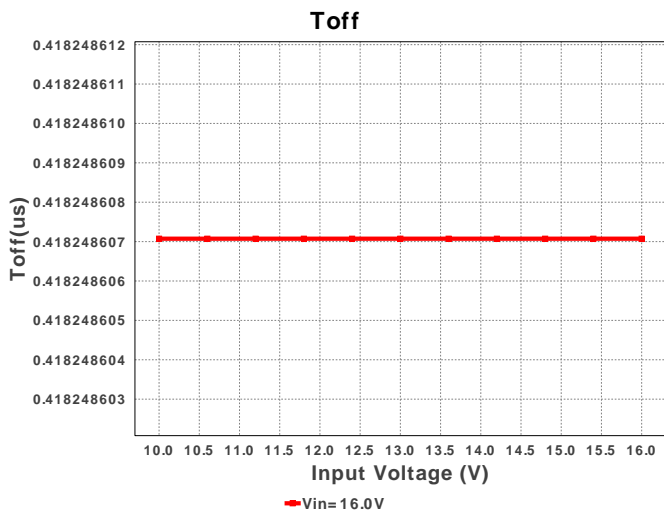
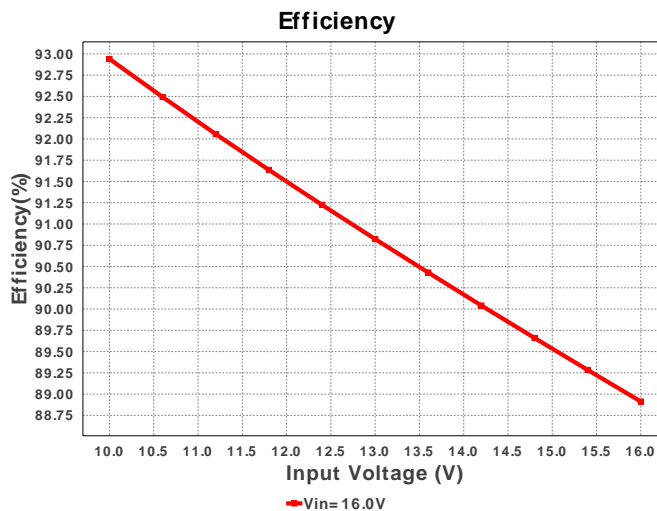
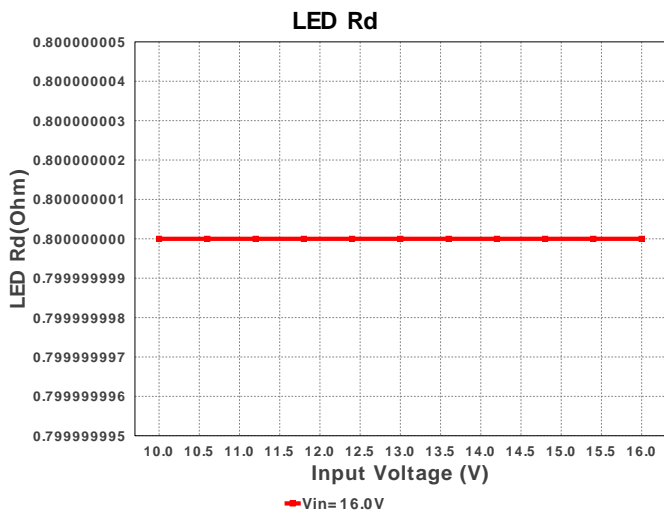
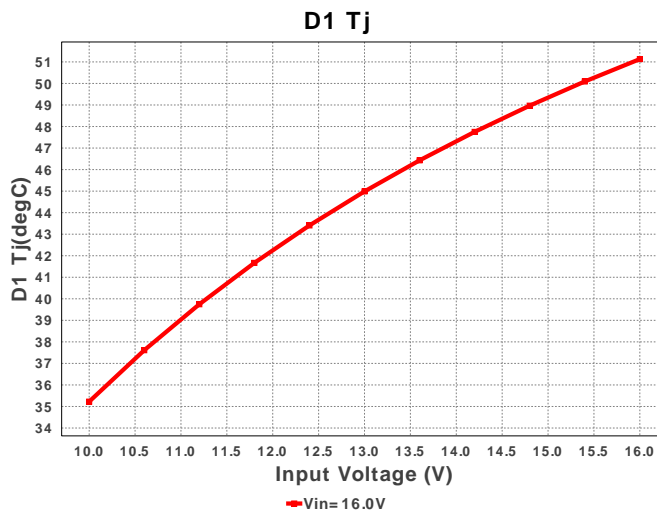
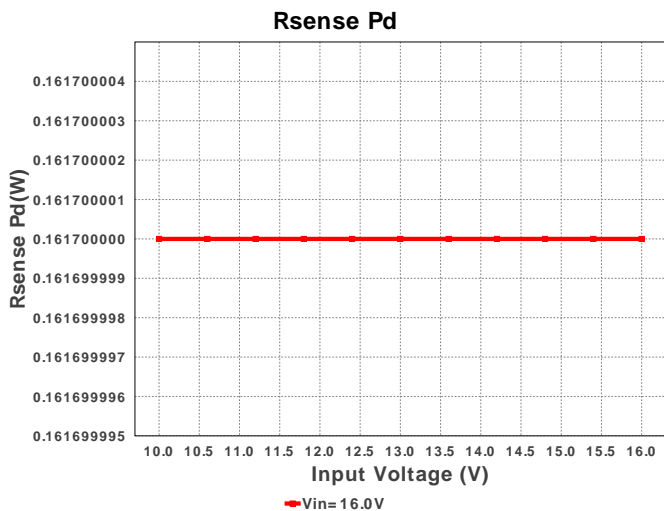
1. Bypass Capacitor Connection : WEBENCH schematic configured for the selected PFET's total gate charge (Qg). If the Qg value is > 30 nC, the Bypass Capacitor(Cbyp or CF) is connected from the VCC pin to CSN pin instead of the typically connected from VCC to Vin when Qg < 30nC.

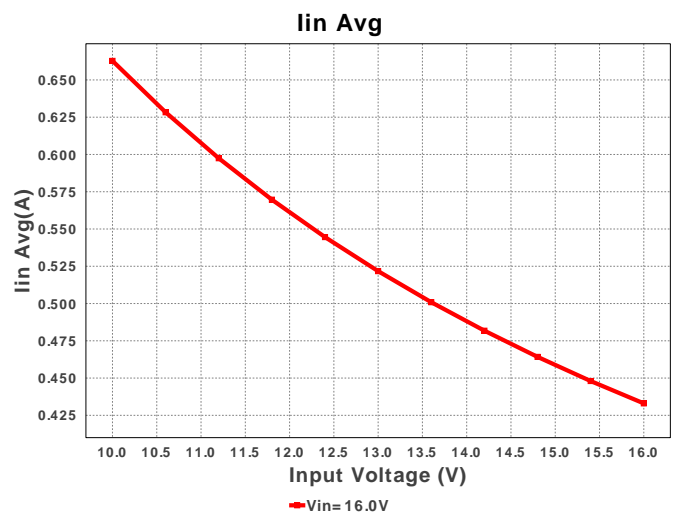
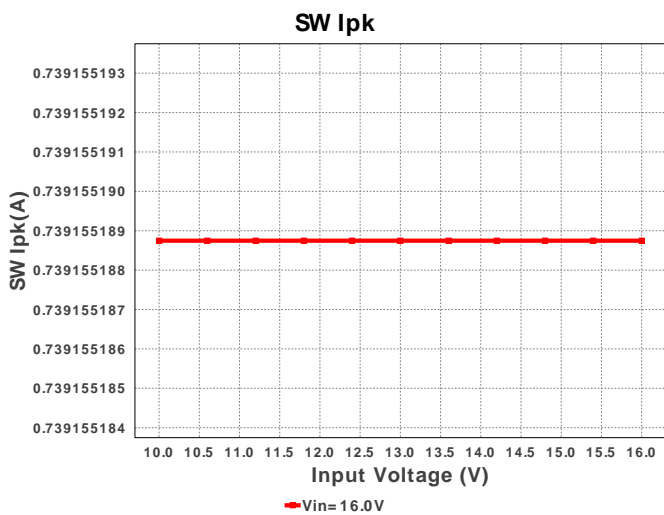
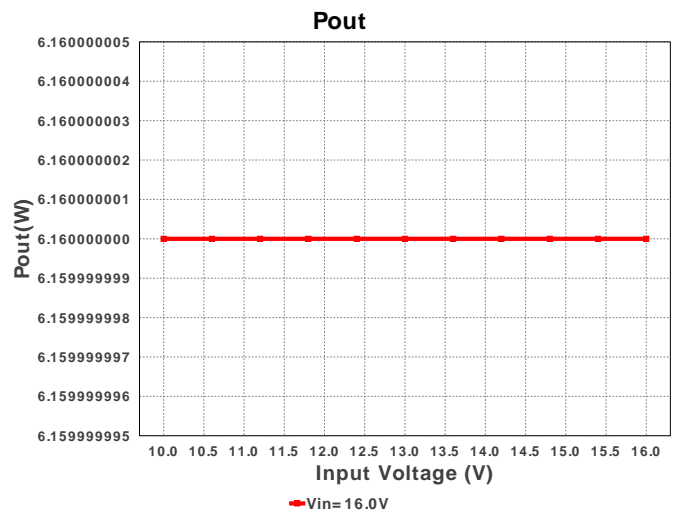
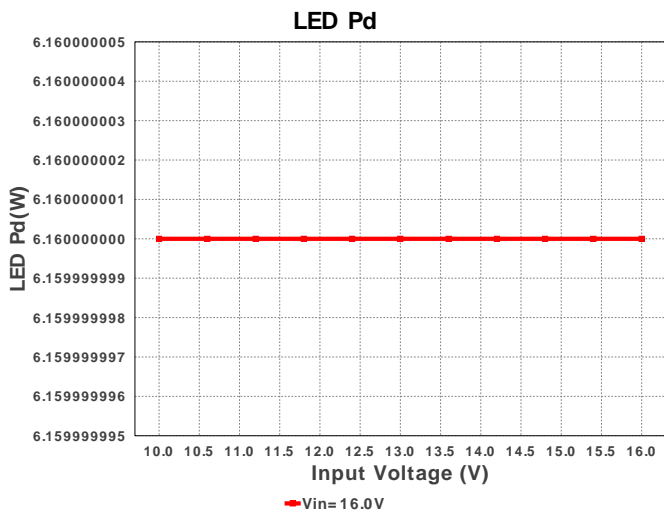
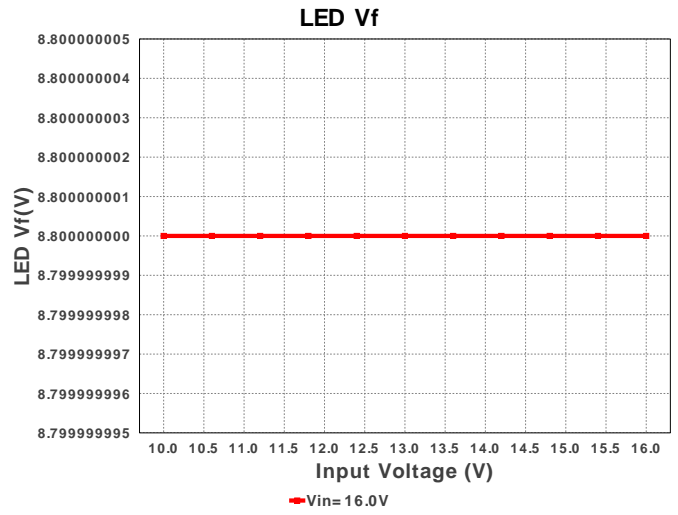
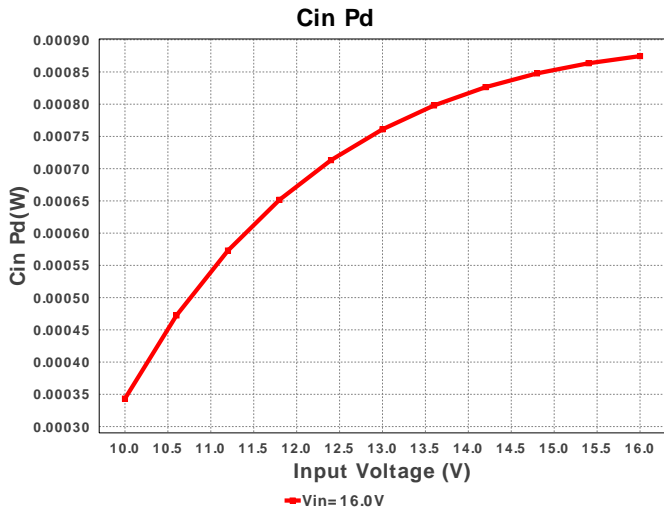
Electrical BOM

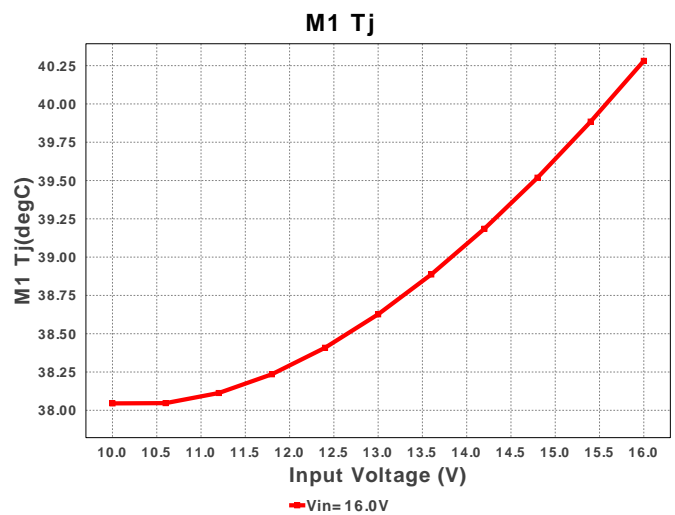
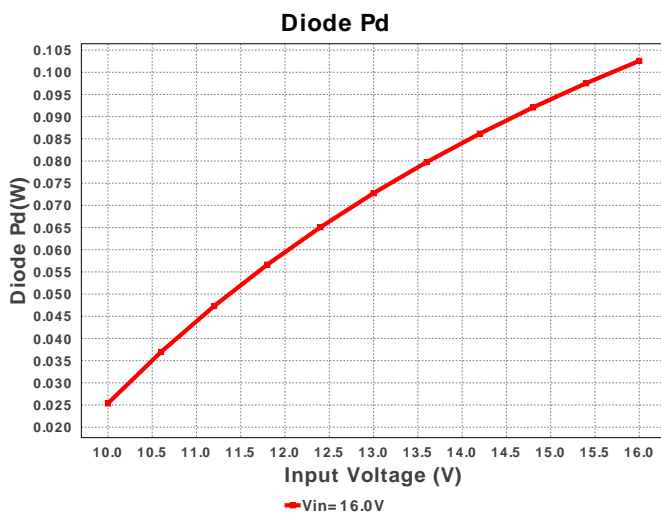
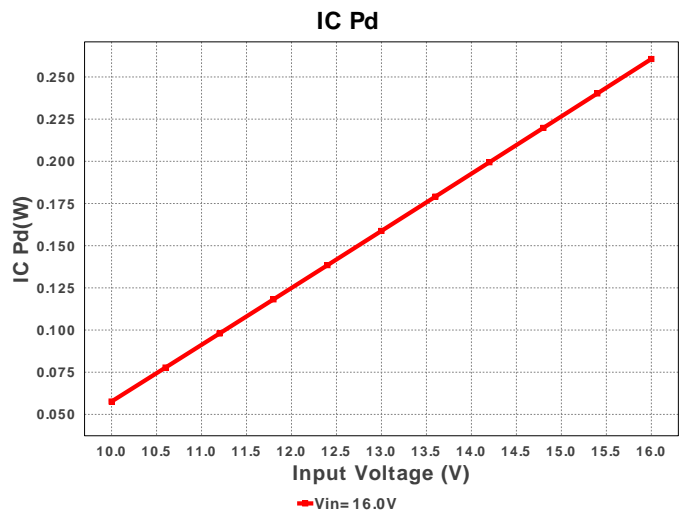
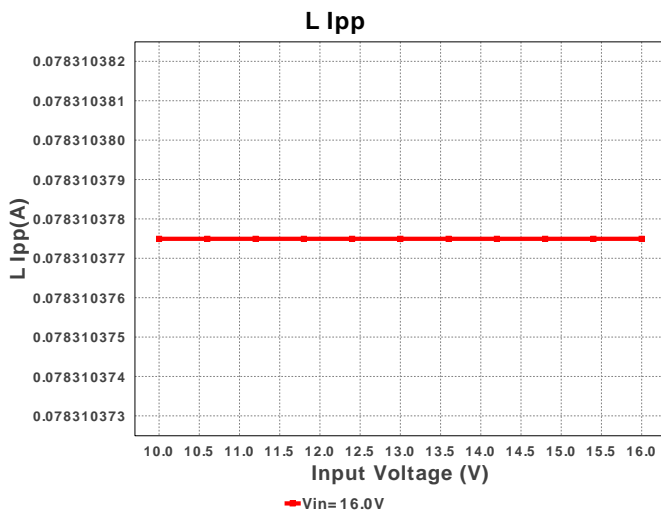
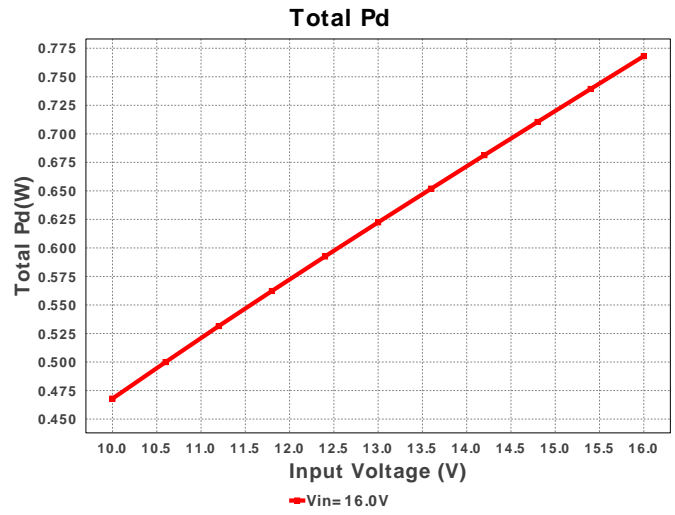
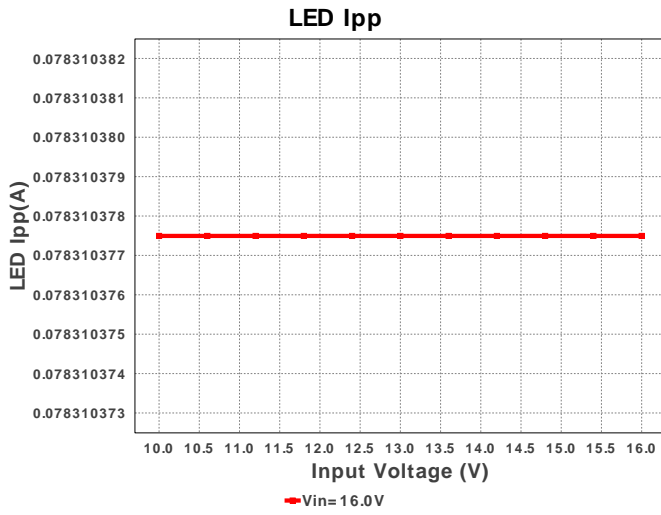
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbyp	Taiyo Yuden	EMK212B7105KG-T Series= X7R	Cap= 1.0 uF VDC= 16.0 V IRMS= 0.0 A	1	\$0.02	 0805 7 mm ²
2.	Cin	TDK	C2012X5R1E105K Series= X5R	Cap= 1.0 uF ESR= 7.25 mOhm VDC= 25.0 V IRMS= 0.0 A	1	\$0.03	 0805 7 mm ²
3.	Coff	Yageo America	CC0805KRX7R9BB471 Series= X7R	Cap= 470.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	 0805 7 mm ²
4.	Cout	MuRata	GRM219R71E105KA88D Series= X7R	Cap= 1.0 uF ESR= 6.0 mOhm VDC= 25.0 V IRMS= 3.87 A	1	\$0.04	 0805 7 mm ²
5.	D1	ON Semiconductor	MBR0520LT1G	Vf@Io= 385.0 mV VRRM= 20.0 V	1	\$0.06	 SOD-123 13 mm ²
6.	D_LED	CUSTOM	CUSTOM	LED	4	NA	CUSTOM 0 mm ²
7.	L1	Bourns	SRN6045-470M	L= 47.0 uH DCR= 257.0 mOhm	1	\$0.16	 SRN6045 64 mm ²
8.	M1	Vishay-Siliconix	SI2319DS-T1-E3	VdsMax= -40.0 V IdsMax= -2.3 Amps	1	\$0.28	 SOT-23 14 mm ²
9.	Roff	Vishay-Dale	CRCW04025K62FKED Series= CRCW..e3	Res= 5.62 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²

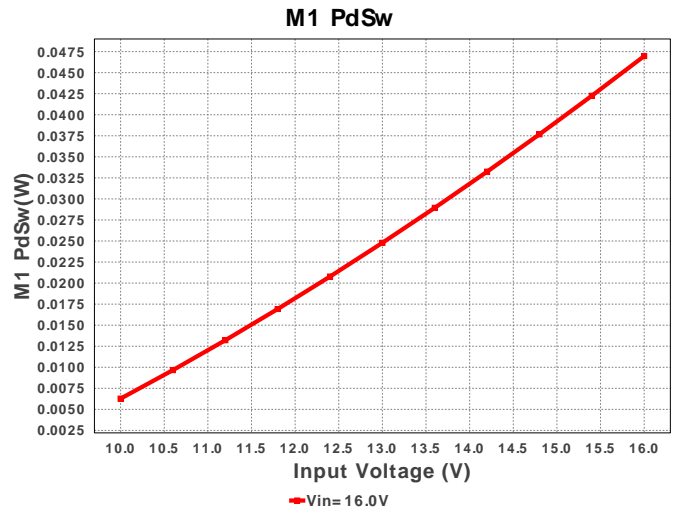
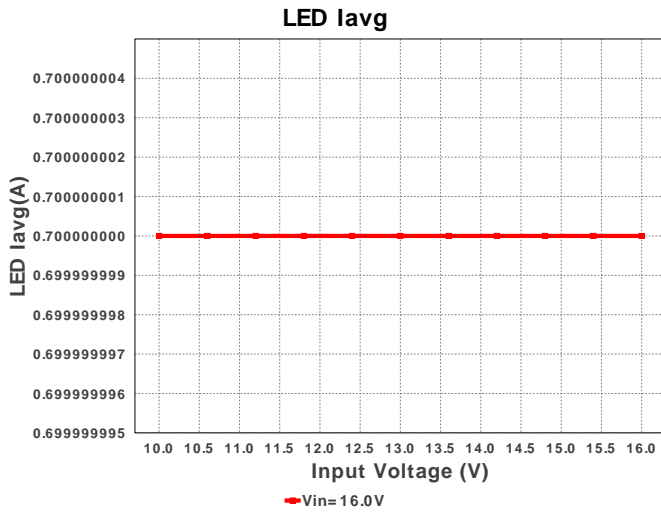
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	Rsns	Rohm	MCR25JZHFLR330 Series= 298	Res= 330.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	\$0.03	 1210 15 mm ²
11.	Ruv1	Vishay-Dale	CRCW040216K5FKED Series= CRCW..e3	Res= 16.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
12.	Ruv2	Vishay-Dale	CRCW040249K9FKED Series= CRCW..e3	Res= 49.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
13.	U1	Texas Instruments	LM3409MY/NOPB	Switcher	1	\$0.70	 MUC10A 24 mm ²











Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	347.37 mA	Current	Input capacitor RMS ripple current
2.	Iin Avg	432.6 mA	Current	Average input current
3.	L Ipp	78.31 mA	Current	Peak-to-peak inductor ripple current
4.	LED Iavg	700.0 mA	Current	LED Average Current
5.	LED Ipp	3.672 mA	Current	LED Ripple Current
6.	SW Ipk	739.155 mA	Current	Peak switch current
7.	BOM Count	16	General	Total Design BOM count
8.	FootPrint	165.0 mm ²	General	Total Foot Print Area of BOM components
9.	Frequency	1.051 MHz	General	Switching frequency
10.	IC Tolerance	54.0 mV	General	IC Feedback Tolerance
11.	Pout	6.16 W	General	Total output power
12.	Total BOM	\$0.0	General	Total BOM Cost
13.	D1 Tj	49.942 degC	Op_Point	D1 junction temperature
14.	Vout OP	8.8 V	Op_Point	Operational Output Voltage
15.	Duty Cycle	56.118 %	Op_point	Duty cycle
16.	Efficiency	88.998 %	Op_point	Steady state efficiency
17.	IC Tj	43.001 degC	Op_point	IC junction temperature
18.	ICThetaJA	50.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
19.	IOUT_OP	700.0 mA	Op_point	Iout operating point
20.	LED Rd	800.0 mOhm	Op_point	LED DynamicResistance
21.	LED Vf	8.8 V	Op_point	Total LED Forward Calculated Voltage
22.	M1 Tj	40.255 degC	Op_point	MOSFET junction temperature
23.	VIN_OP	16.0 V	Op_point	Vin operating point
24.	Cin Pd	874.829 μW	Power	Input capacitor power dissipation
25.	Diode Pd	96.804 mW	Power	Diode power dissipation
26.	IC Pd	260.03 mW	Power	IC power dissipation
27.	L Pd	157.412 mW	Power	Inductor power dissipation
28.	LED Pd	6.16 W	Power	LED Power Dissipation
29.	M1 PdCond	37.914 mW	Power	M1 MOSFET conduction losses
30.	M1 PdSw	46.79 mW	Power	M1 MOSFET switching losses
31.	Rsense Pd	161.7 mW	Power	LED Power Dissipation
32.	Total Pd	761.514 mW	Power	Total Power Dissipation
33.	Toff	418.249 mus	Unknown	Fixed Off Time

Design Inputs

#	Name	Value	Description
1.	Iout	700.0 m	Maximum Output Current
2.	Iout1	700.0 m	Output Current #1
3.	VinMax	16.0	Maximum input voltage
4.	VinMin	10.0	Minimum input voltage
5.	Vout	8.8	Output Voltage
6.	Vout1	8.8	Output Voltage #1
7.	application	LED_DRIVER	LED Application
8.	base_pn	LM3409	Base Product Number
9.	LED_Architect	N	LED Architect Project
10.	ledparallel	1.0	Number of LED in parallel
11.	ledpartnumber	Custom	LED Part number
12.	ledseries	4.0	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

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 (C_{byp} or CF) is connected from the VCC pin to CSN pin instead of typically connected from VCC to Vin when $Qg < 30$ nC. 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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