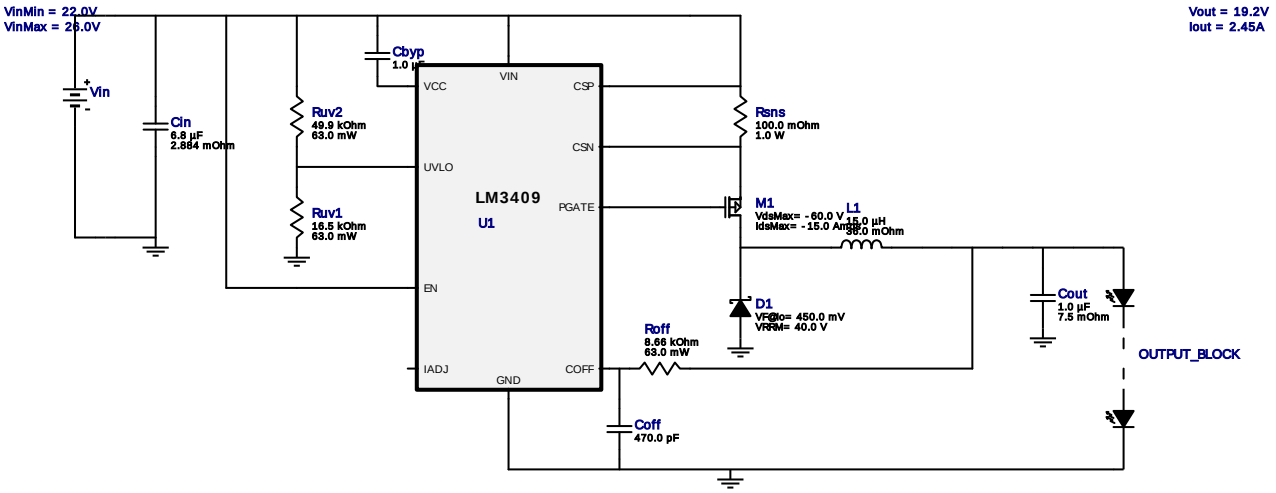
WEBENCH® Design Report

VinMin = 22.0V
VinMax = 26.0V
Vout = 19.2V
Iout = 2.45A

Device = LM3409MY/NOPB
Topology = Buck
Created = 8/7/14 5:00:06 AM
BOM Cost = $0.00
Footprint = 454.0mm2
BOM Count = 18
Total Pd = 2.85W

Design : 1227976/92 LM3409MY/NOPB
LM3409MY/NOPB 22.0V-26.0V to 19.2V @ 2.45A

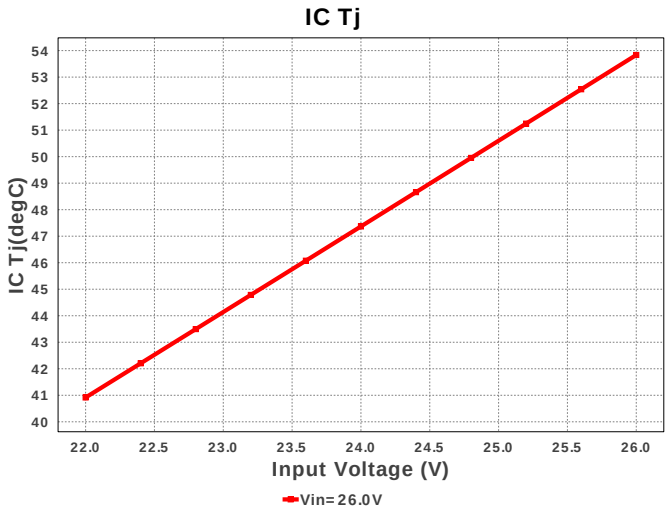


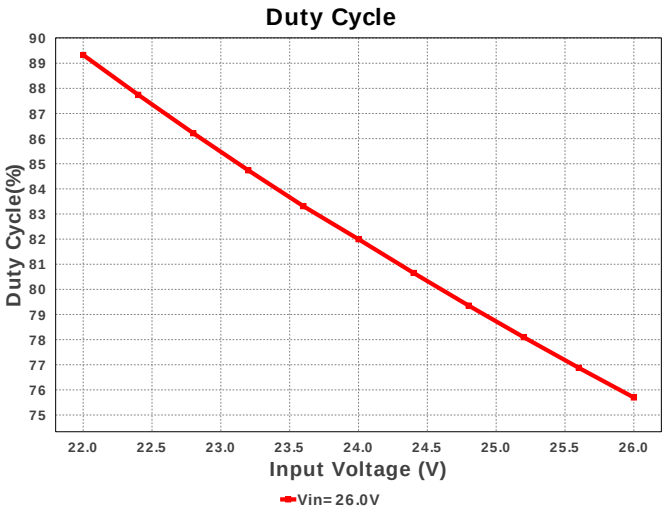
1. Bypass Capacitor Connection : WEBENCH schematic configured for the selected PFET's total gate charge (Qg). If the Qg value is > 30 nC, the Bypass Capacitor(Cbyp or CF) is connected from the VCC pin to CSN pin instead of the typically connected from VCC to Vin when Qg < 30nC.

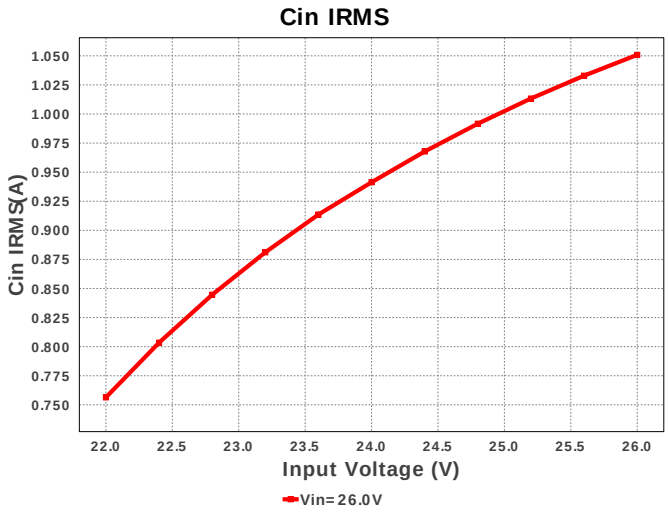
Electrical BOM

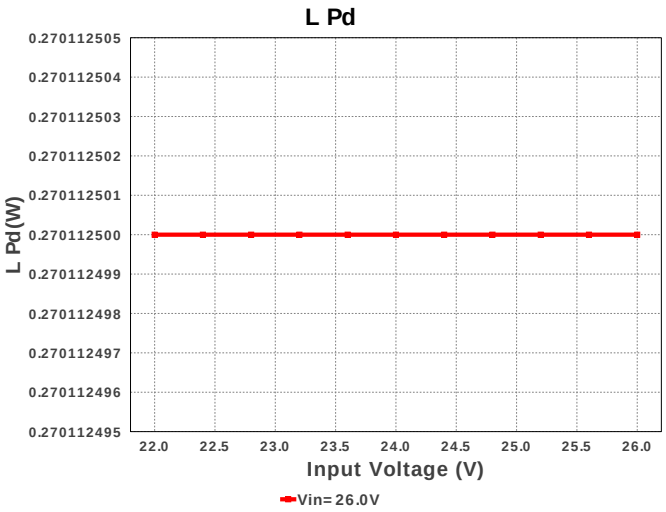
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbyp	MuRata	GRM155R61A105KE15D Series= X5R	Cap= 1.0 µF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0402 3mm2
2.	Cin	TDK	C4532JB1H685M Series= 285	Cap= 6.8 µF ESR= 2.884 mOhm VDC= 50.0 V IRMS= 0.0 A	1	$0.41	1812 27mm2
3.	Coff	Yageo America	CC0805KRX7R9BB471 Series= X7R	Cap= 470.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7mm2
4.	Cout	TDK	C3216X7R2A105M160AA Series= X7R	Cap= 1.0 µF ESR= 7.5 mOhm VDC= 100.0 V IRMS= 5.923 A	1	$0.11	1206 11mm2
5.	D1	Diodes Inc.	1N5819HW-7-F	VF@Io= 450.0 mV VRRM= 40.0 V	1	$0.08	SOD-123 13mm2
6.	D_LED	CUSTOM	CUSTOM	LED	6	NA	CUSTOM 0mm2
7.	L1	Bourns	SRR1208-150ML	L= 15.0 µH DCR= 36.0 mOhm	1	$0.37	SRR1208 216mm2
8.	M1	Fairchild Semiconductor	FDD5614P	VdsMax= -60.0 V IdsMax= -15.0 Amps	1	$0.24	DPAK 102mm2

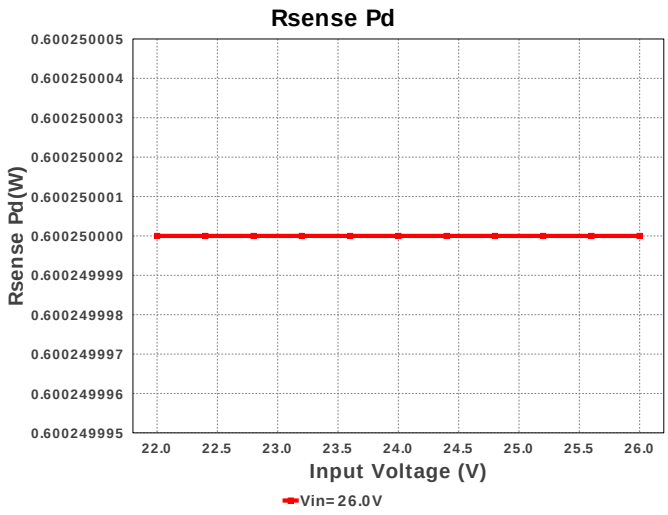
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	Roff	Vishay-Dale	CRCW04028K66FKED Series= CRCW..e3	Res= 8.66 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3mm2
10.	Rsns	Stackpole Electronics Inc	CSRN2010FKR100 Series= ?	Res= 100.0 mOhm Power= 1.0 W Tolerance= 1.0%	1	$0.11	2010 32mm2
11.	Ruv1	Vishay-Dale	CRCW040216K5FKED Series= CRCW..e3	Res= 16.5 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3mm2
12.	Ruv2	Vishay-Dale	CRCW040249K9FKED Series= CRCW..e3	Res= 49.9 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3mm2
13.	U1	Texas Instruments	LM3409MY/NOPB	Switcher	1	$0.70	MUC10A 24mm2

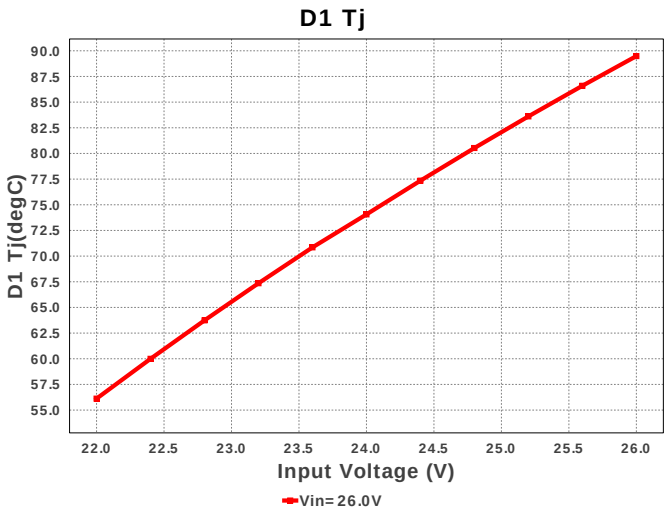


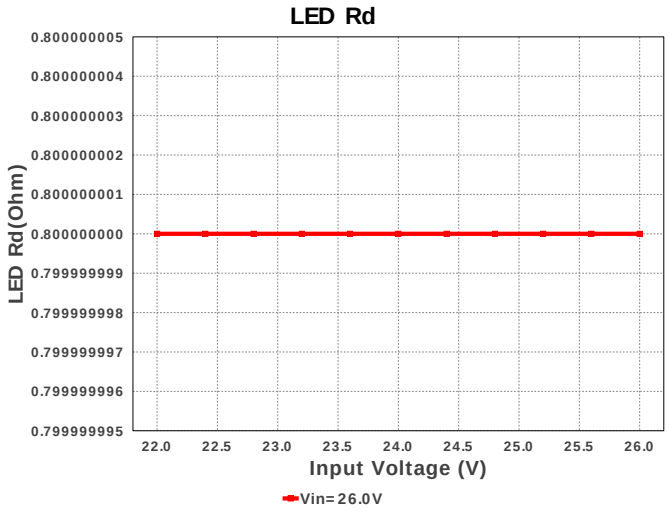


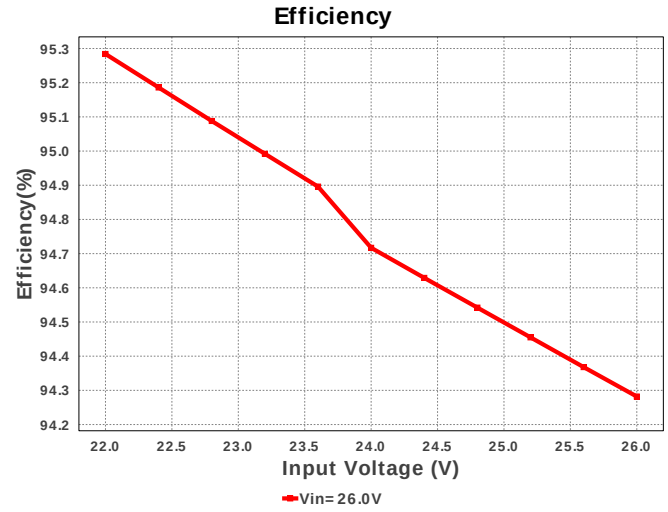


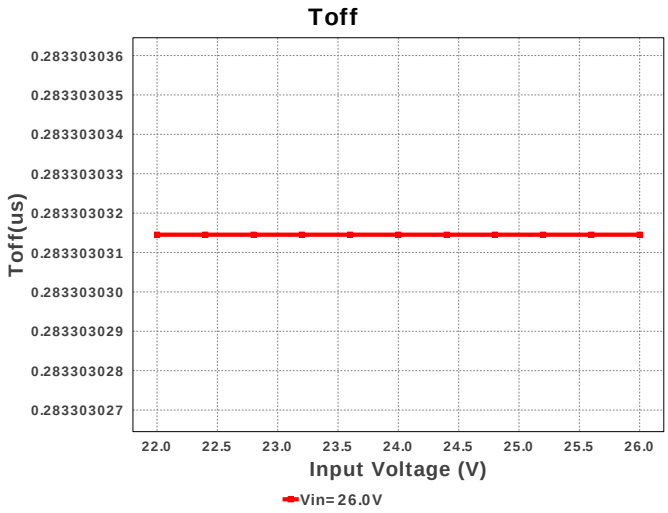


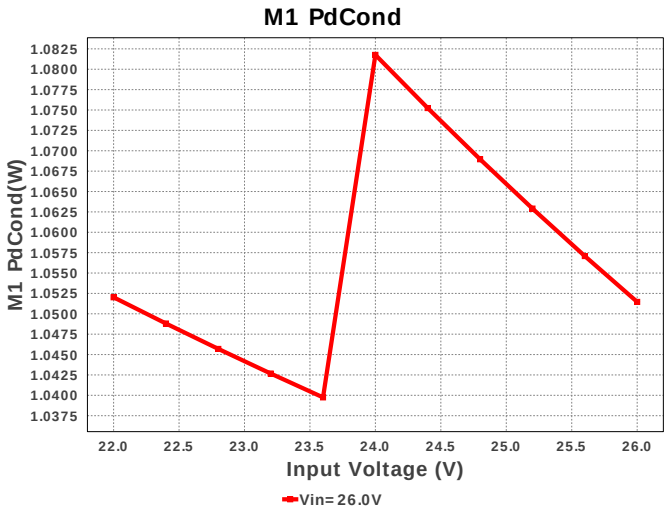


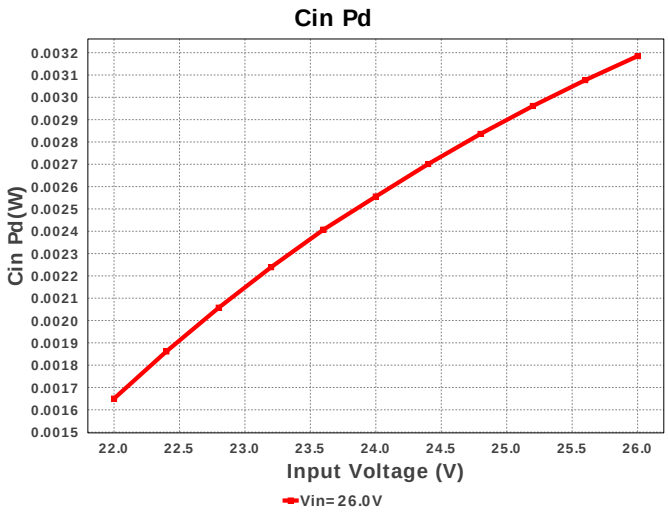


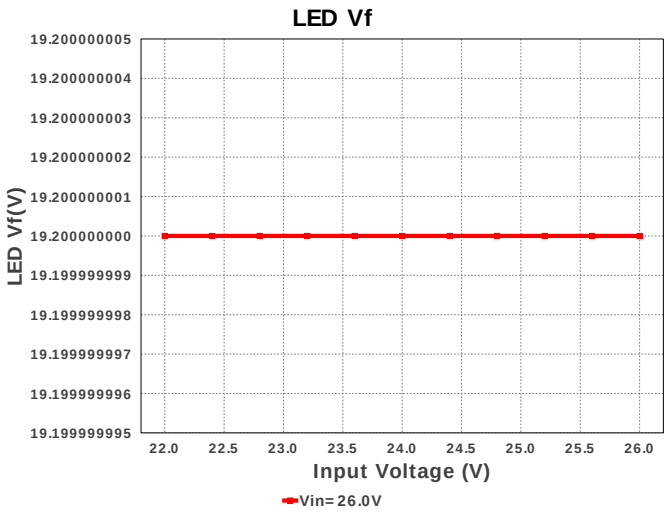


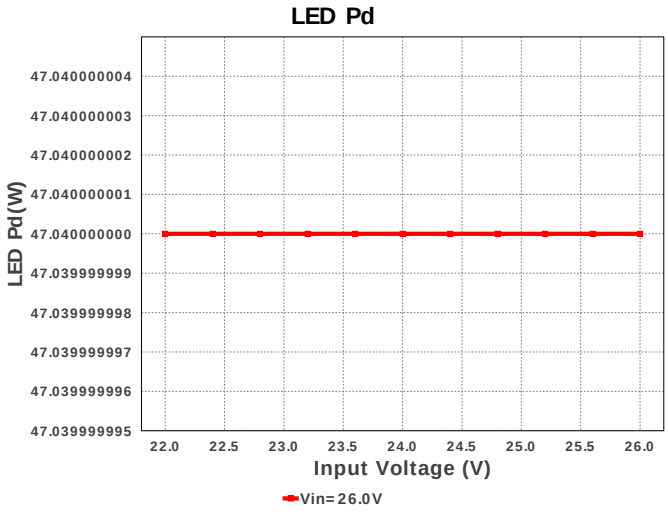


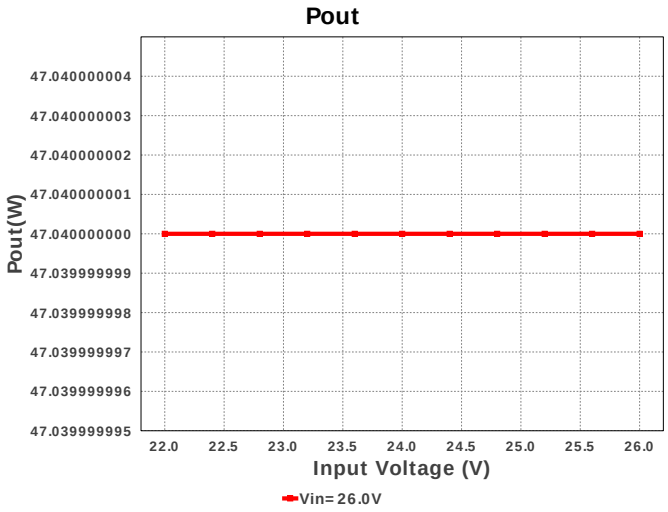


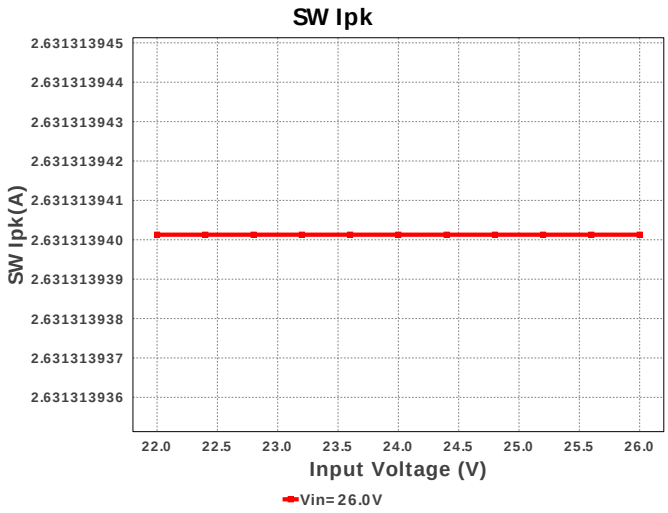


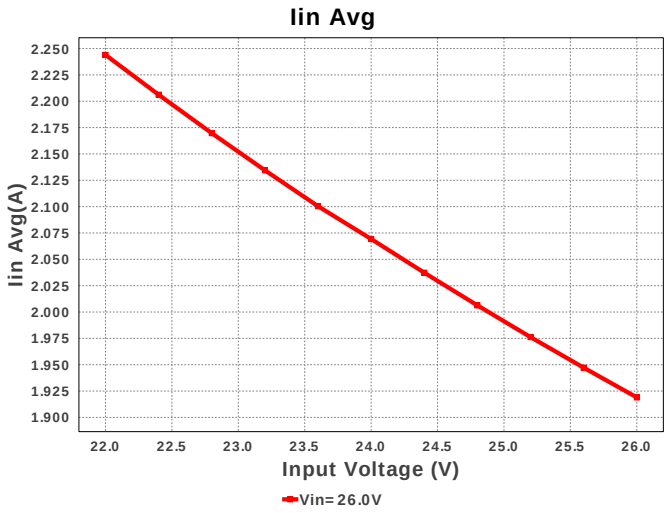


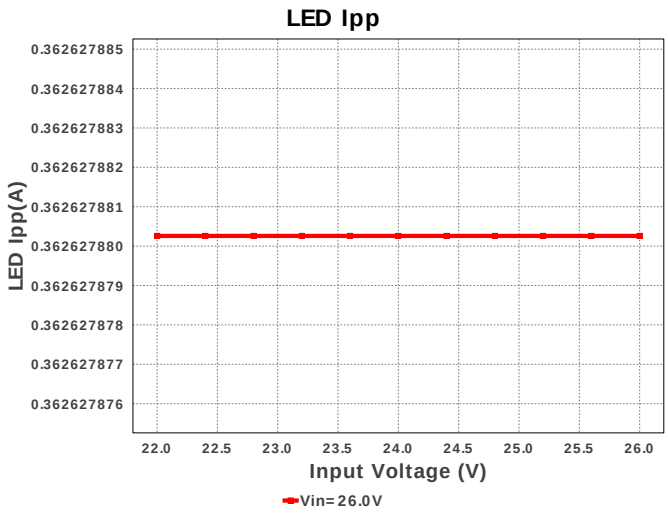


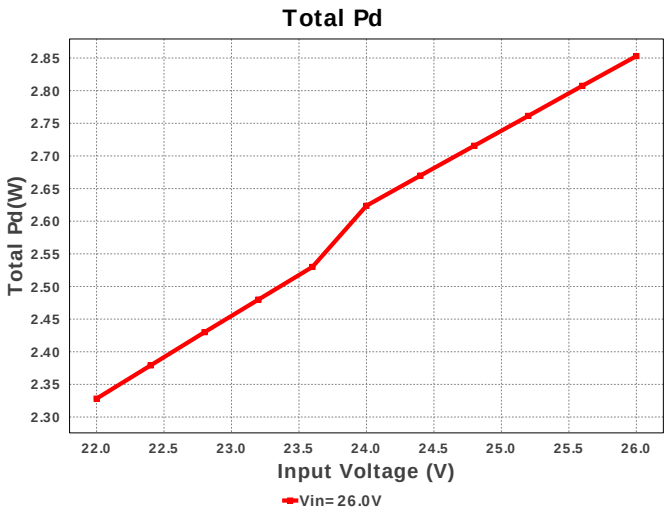


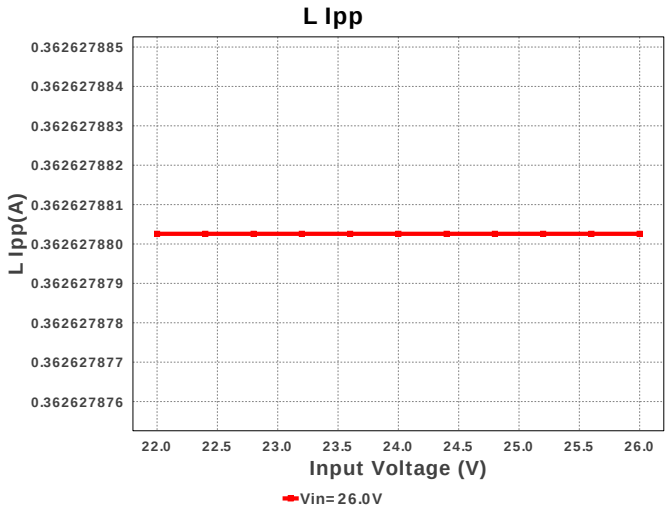


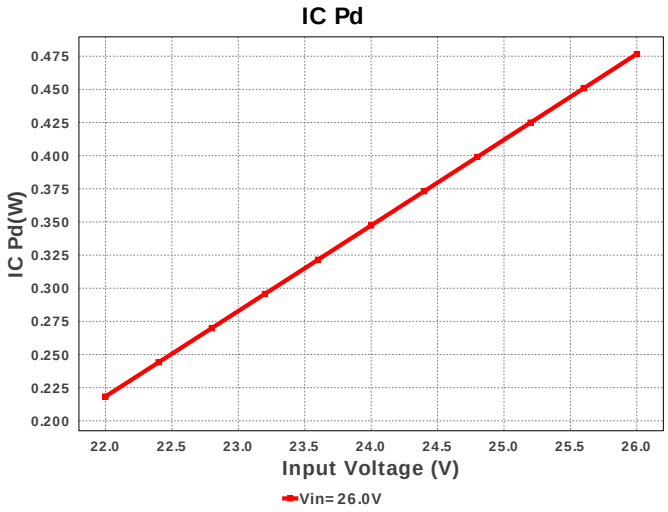


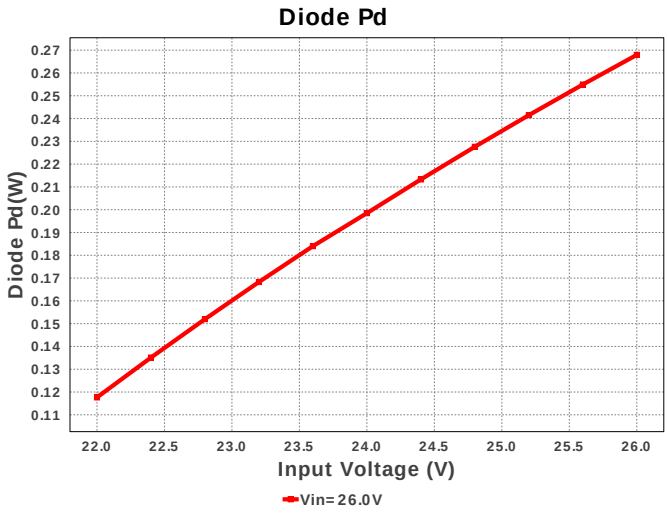


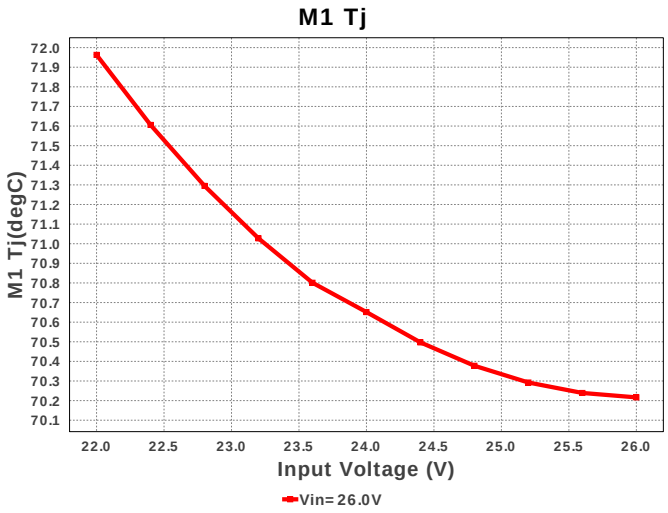


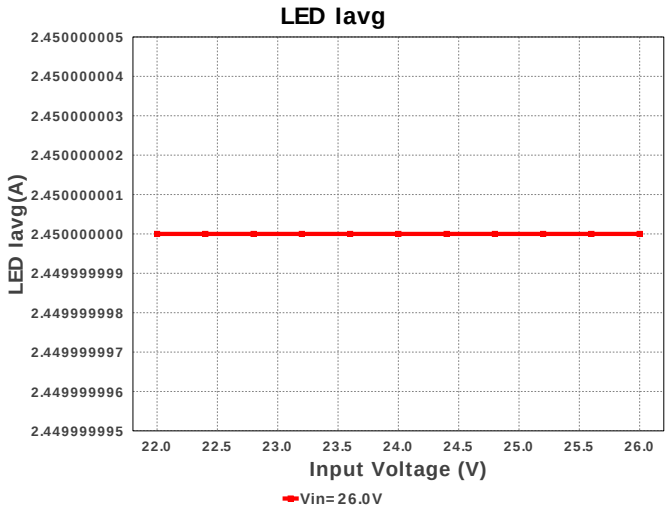


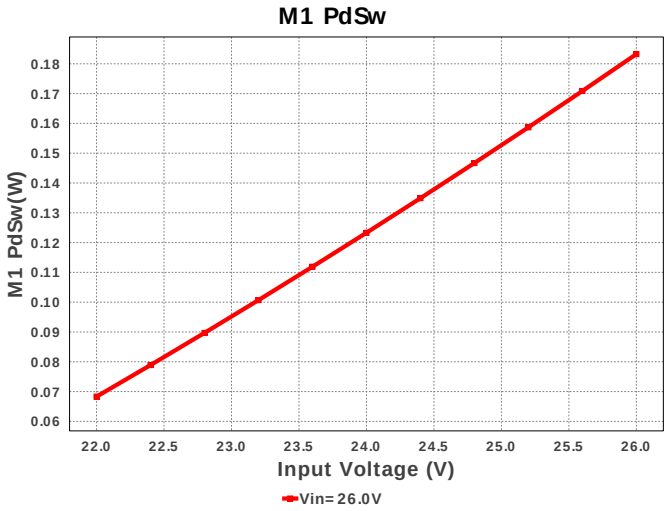


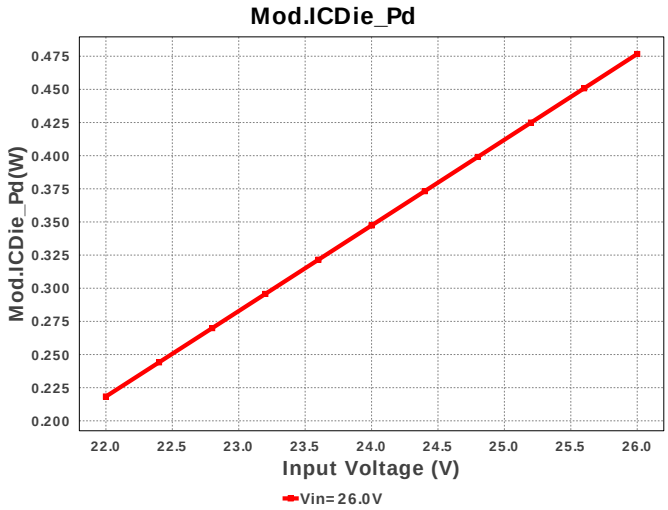












Operating Values

#	Name	Value	Category	Description
1.	BOM Count	18		Total Design BOM count
2.	Total BOM	$0.0		Total BOM Cost
3.	Cin IRMS	1.051 A	Current	Input capacitor RMS ripple current
4.	Iin Avg	1.919 A	Current	Average input current
5.	L Ipp	362.628 mA	Current	Peak-to-peak inductor ripple current
6.	LED Iavg	2.45 A	Current	LED Average Current
7.	LED Ipp	362.628 mA	Current	LED Ripple Current
8.	SW Ipk	2.631 A	Current	Peak switch current
9.	FootPrint	454.0 mm2	General	Total Foot Print Area of BOM components
10.	Frequency	907.469 kHz	General	Switching frequency
11.	IC Tolerance	54.0 mV	General	IC Feedback Tolerance
12.	Pout	47.04 W	General	Total output power
13.	D1 Tj	89.483 degC	Op_Point	D1 junction temperature
14.	Vout OP	19.2 V	Op_Point	Operational Output Voltage
15.	Duty Cycle	75.697 %	Op_point	Duty cycle
16.	Efficiency	94.282 %	Op_point	Steady state efficiency
17.	IC Tj	53.835 degC	Op_point	IC junction temperature
18.	ICThetaJA	50.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
19.	IOUT_OP	2.45 A	Op_point	Iout operating point
20.	LED Rd	800.0 mOhm	Op_point	LED DynamicResistance
21.	LED Vf	19.2 V	Op_point	Total LED Forward Calculated Voltage
22.	M1 Tj	70.216 degC	Op_point	MOSFET junction temperature
23.	VIN_OP	26.0 V	Op_point	Vin operating point
24.	Cin Pd	3.185 mW	Power	Input capacitor power dissipation
25.	Diode Pd	267.94 mW	Power	Diode power dissipation
26.	IC Pd	476.696 mW	Power	IC power dissipation
27.	L Pd	270.112 mW	Power	Inductor power dissipation
28.	LED Pd	47.04 W	Power	LED Power Dissipation
29.	M1 PdCond	1.051 W	Power	M1 MOSFET conduction losses
30.	M1 PdSw	183.253 mW	Power	M1 MOSFET switching losses
31.	Rsense Pd	600.25 mW	Power	LED Power Dissipation
32.	Total Pd	2.853 W	Power	Total Power Dissipation

#	Name	Value	Category	Description
33.	Toff	283.303 mus	Unknown	Fixed Off Time

Design Inputs

#	Name	Value	Description
1.	Iout	2.45 A	Maximum Output Current
2.	Iout1	2.45 Amps	Output Current #1
3.	VinMax	26.0 V	Maximum input voltage
4.	VinMin	22.0 V	Minimum input voltage
5.	Vout	19.2 V	Output Voltage
6.	Vout1	19.2 Volt	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	6.0	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(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.