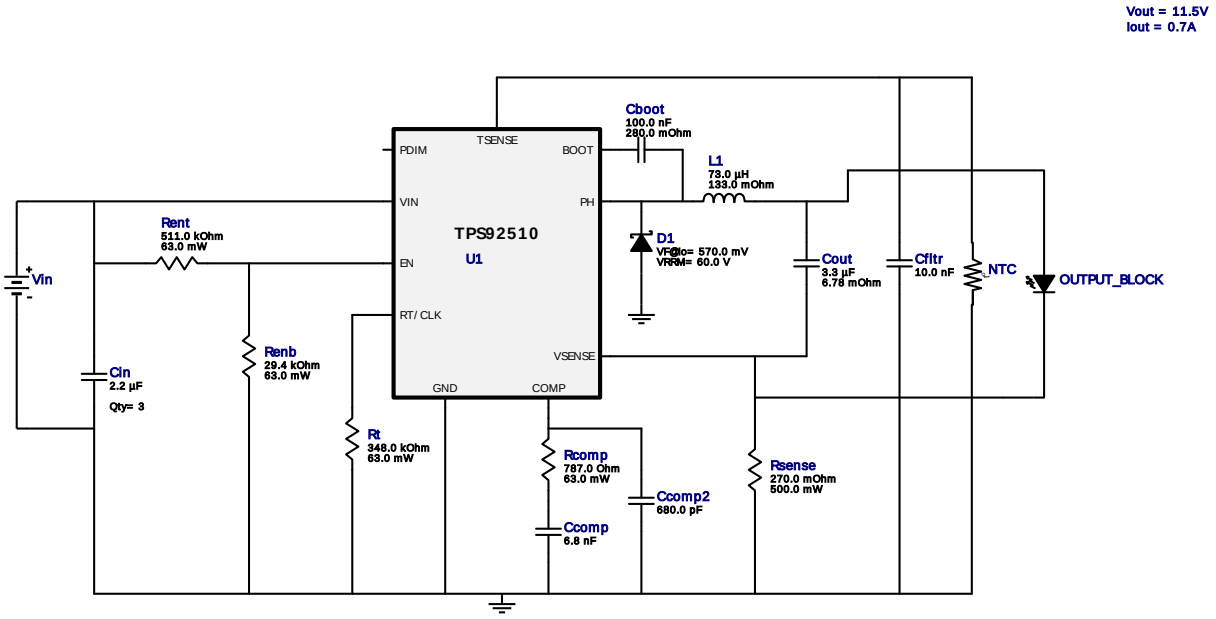
WEBENCH® Design Report

VinMin = 24.0V
VinMax = 32.0V
Vout = 11.5V
Iout = 0.7A

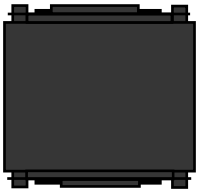
Device = TPS92510DGQR
Topology = Buck
Created = 7/13/16 11:53:09 PM
BOM Cost = $0.00
BOM Count = 18
Total Pd = 0.66W

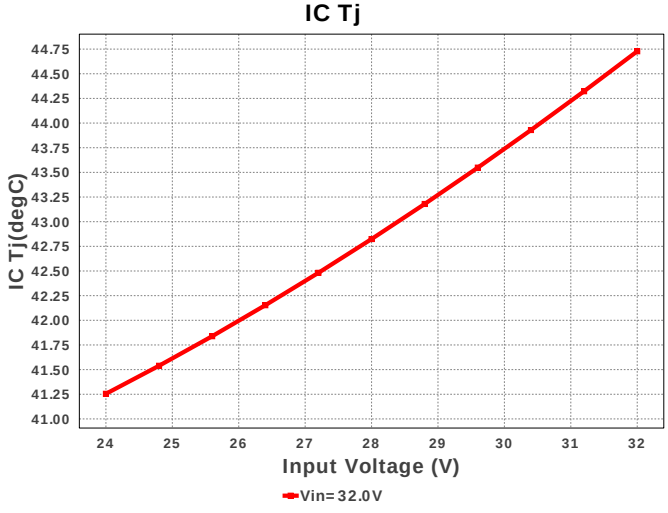
Design : 4077713/6 TPS92510DGQR
TPS92510DGQR 24.0V-32.0V to 11.50V @ 0.7A

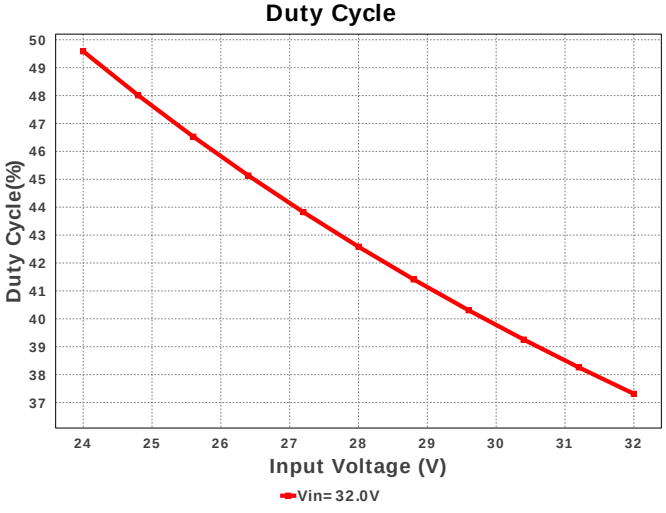


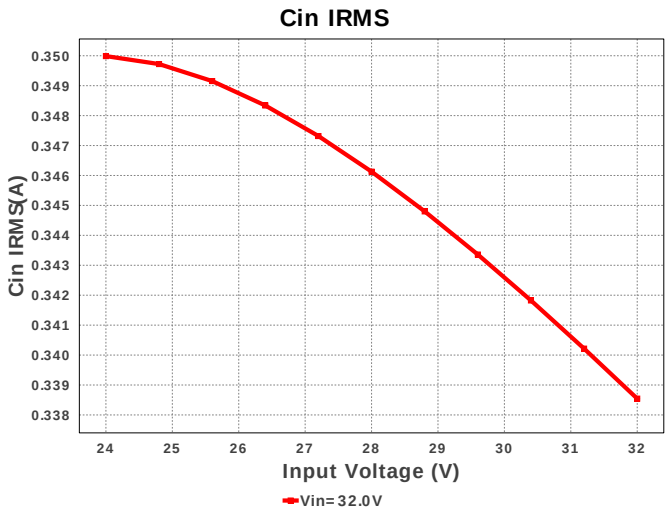
Electrical BOM

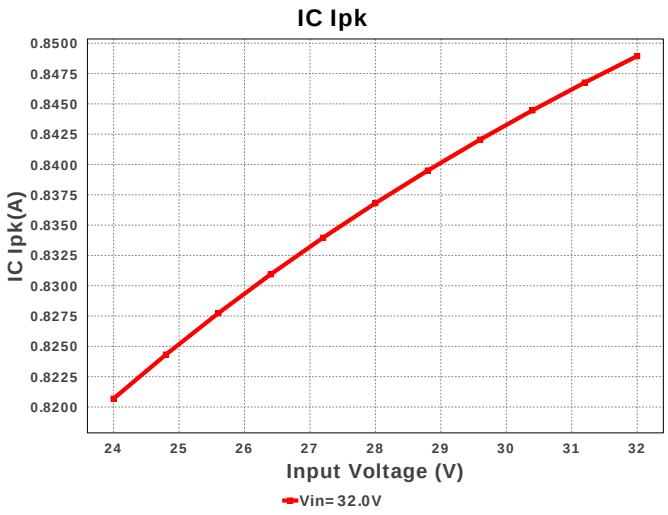
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
2.	Ccomp	Yageo America	CC0805KRX7R9BB682 Series= X7R	Cap= 6.8 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
3.	Ccomp2	Yageo America	CC0805KRX7R9BB681 Series= X7R	Cap= 680.0 pF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
4.	Cfltr	MuRata	GRM033R61A103KA01D Series= X5R	Cap= 10.0 nF VDC= 10.0 V IRMS= 0.0 A	1	$0.01	0201 2 mm²
5.	Cin	Taiyo Yuden	HMK325B7225KN-T Series= X7R	Cap= 2.2 uF VDC= 100.0 V IRMS= 0.0 A	3	$0.13	1210 15 mm²
6.	Cout	MuRata	GRM21BR71E335KA73L Series= X7R	Cap= 3.3 uF ESR= 6.78 mOhm VDC= 25.0 V IRMS= 1.4 A	1	$0.06	0805 7 mm²
7.	D1	NXP Semiconductor	PMEG6010CEH,115	VF@Io= 570.0 mV VRRM= 60.0 V	1	$0.04	SOD-123F 12 mm²
8.	D_LED	Cree	XHP50A-00-0000-0D0BJ20DV	LED	1	$4.23	xlampxhp 0 mm²

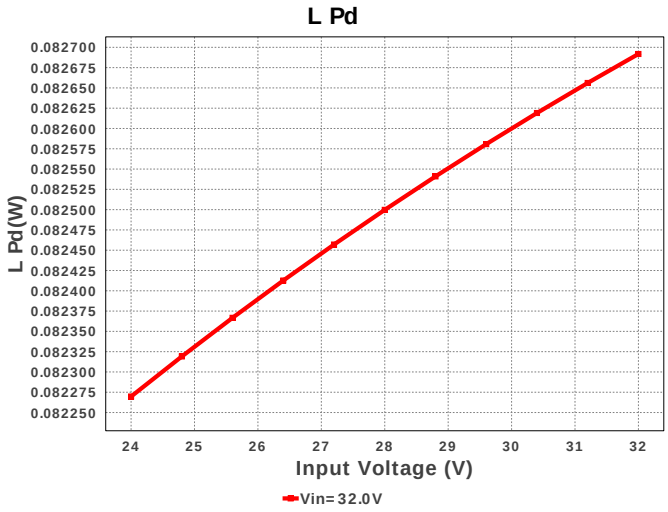
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
9.	L1	Coilcraft	SPT50L-733MLB	L= 73.0 µH DCR= 133.0 mOhm	1	NA	 KMSM050 376 mm²
10.	Rcomp	Vishay-Dale	CRCW0402787RFKED Series= CRCW..e3	Res= 787.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
11.	Renb	Vishay-Dale	CRCW040229K4FKED Series= CRCW..e3	Res= 29.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
12.	Rent	Vishay-Dale	CRCW0402511KFKED Series= CRCW..e3	Res= 511.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
13.	Rsense	Rohm	MCR25JZHFLR270 Series= MCR25	Res= 270.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	$0.03	 1210 15 mm²
14.	Rt	Vishay-Dale	CRCW0402348KFKED Series= CRCW..e3	Res= 348.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	 0402 3 mm²
15.	U1	Texas Instruments	TPS92510DGQR	Switcher	1	$1.05	 S-PDSO-G10 24 mm²

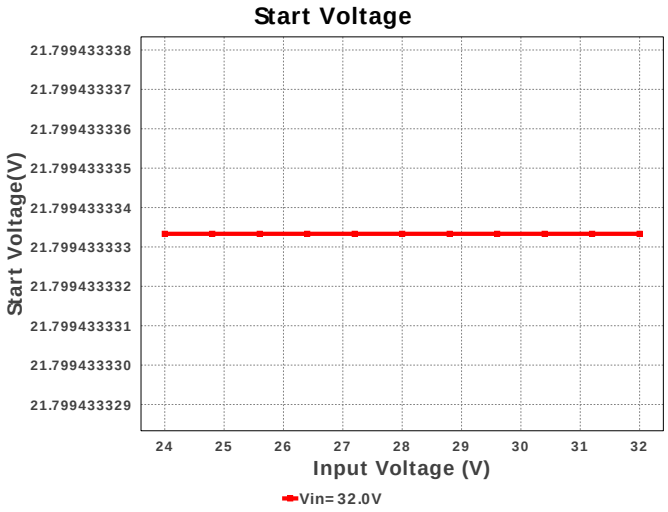


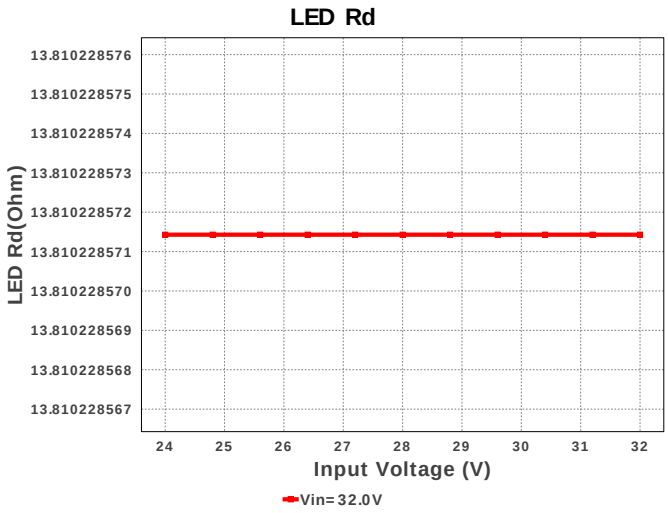


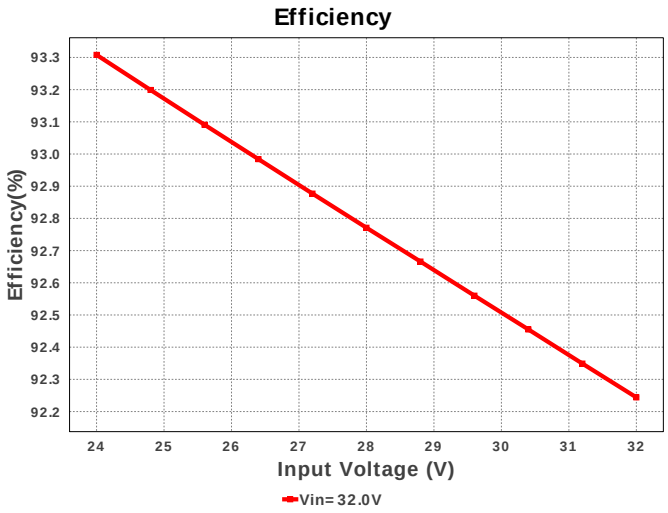


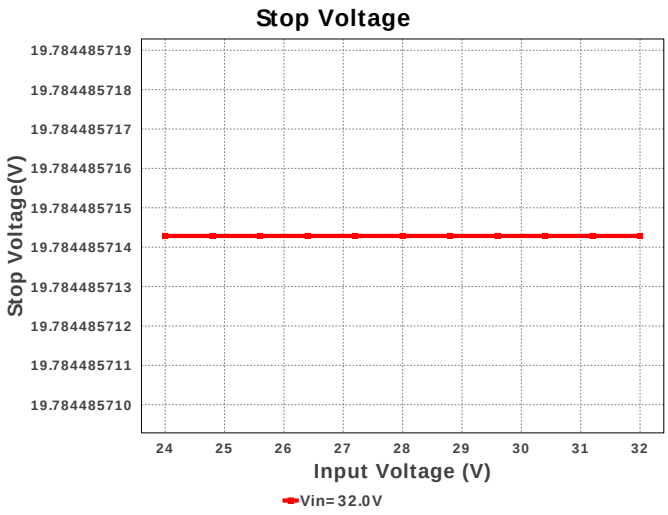


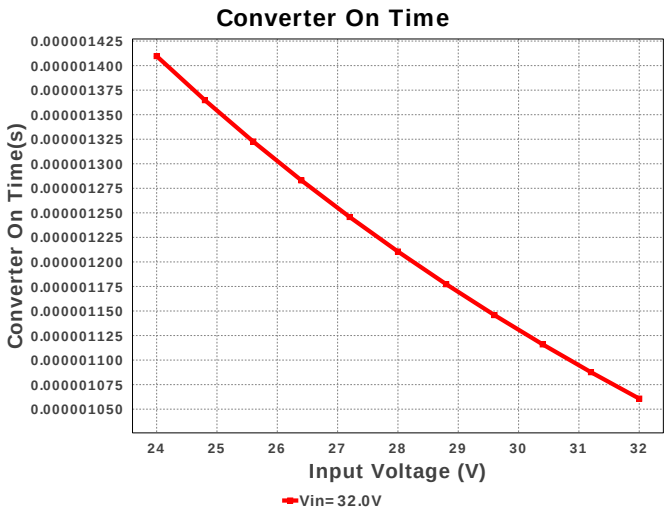


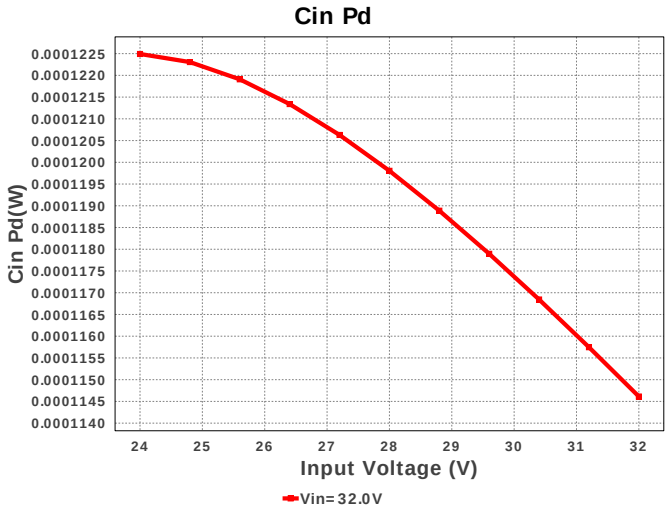


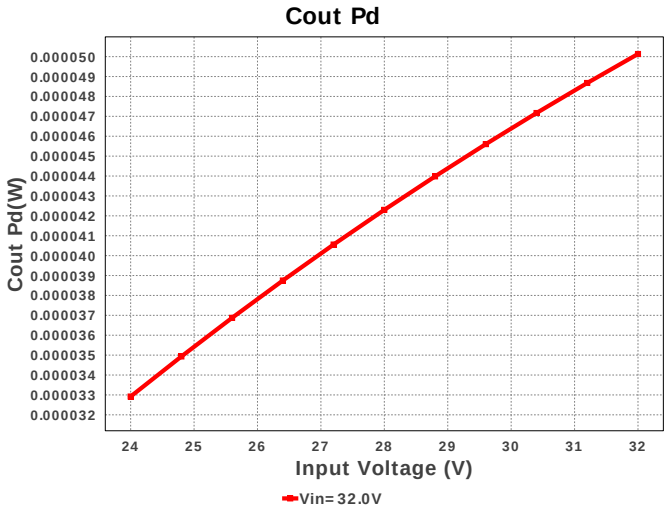


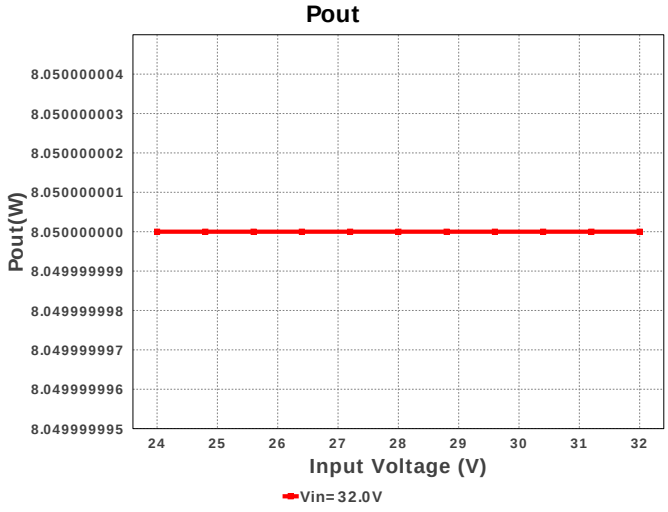


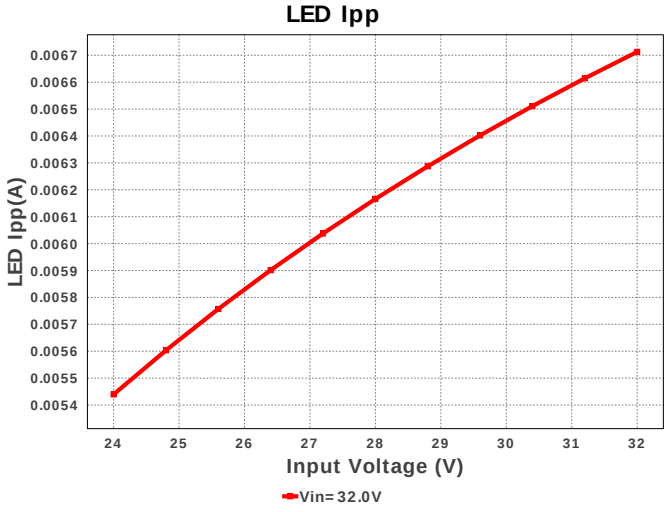


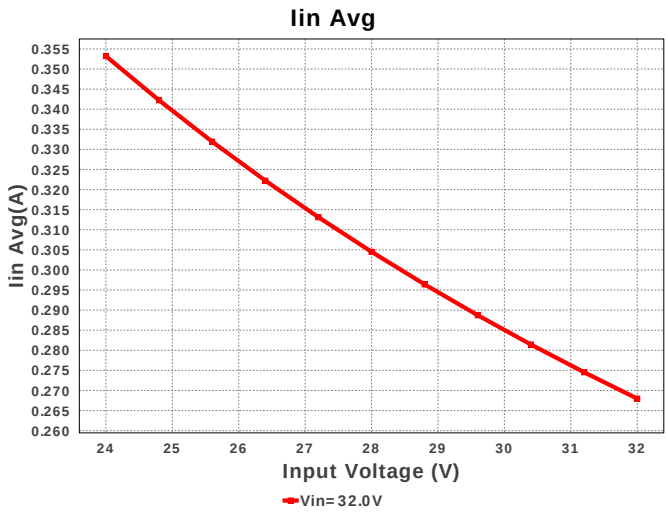


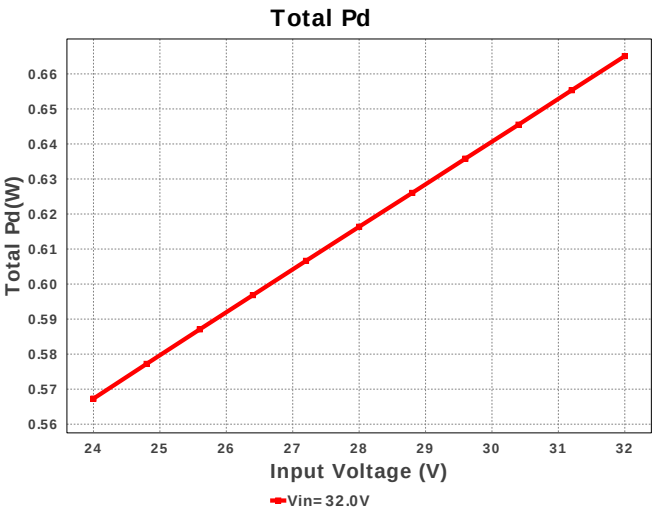


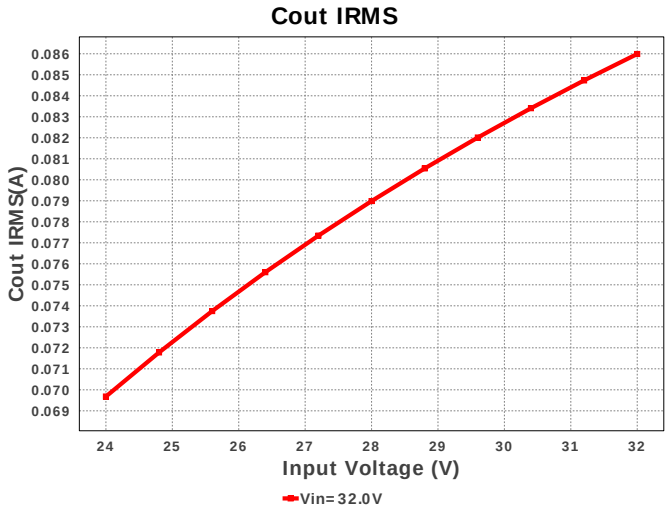


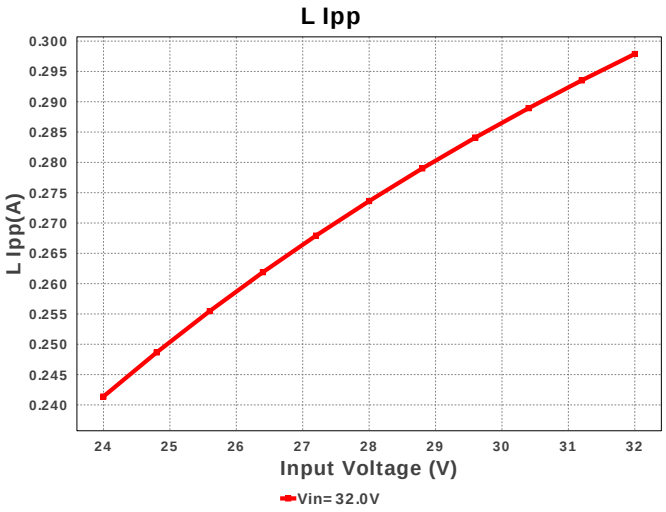


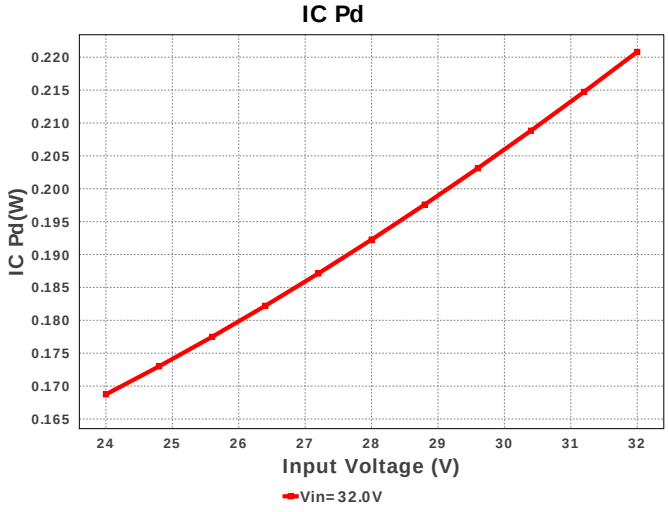


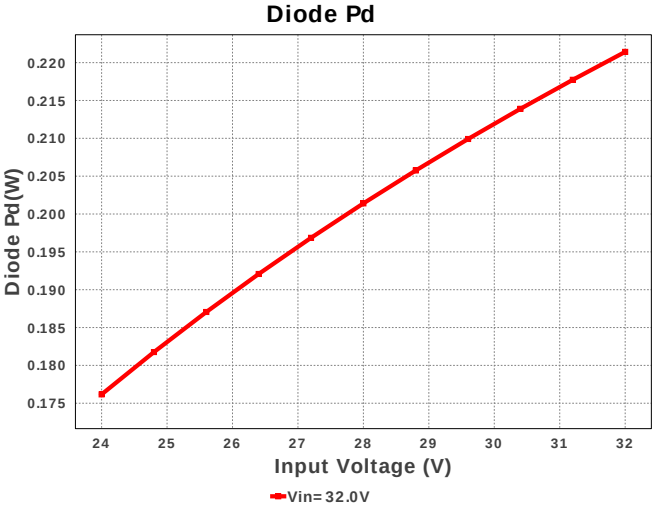


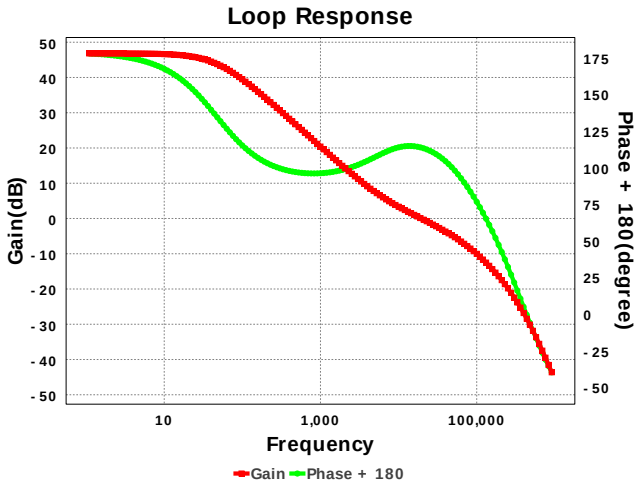












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	338.545 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	86.423 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	849.69 mA	Current	Peak switch current in IC
4.	Iin Avg	267.73 mA	Current	Average input current
5.	L Ipp	299.38 mA	Current	Peak-to-peak inductor ripple current
6.	LED Ipp	6.746 mA	Current	LED Ripple Current
7.	BOM Count	18	General	Total Design BOM count
8.	FootPrint	514.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	351.763 kHz	General	Switching frequency
10.	IC Tolerance	10.0 mV	General	IC Feedback Tolerance
11.	Pout	8.05 W	General	Total output power
12.	Total BOM	$0.0	General	Total BOM Cost
13.	Vout OP	11.5 V	Op_Point	Operational Output Voltage
14.	Cross Freq	12.445 kHz	Op_point	Bode plot crossover frequency
15.	Duty Cycle	37.313 %	Op_point	Duty cycle
16.	Efficiency	92.327 %	Op_point	Steady state efficiency
17.	IC Tj	44.728 degC	Op_point	IC junction temperature
18.	ICThetaJA	66.7 degC/W	Op_point	IC junction-to-ambient thermal resistance
19.	IOUT_OP	700.0 mA	Op_point	Iout operating point
20.	LED Rd	13.81 Ohm	Op_point	LED DynamicResistance
21.	Phase Marg	115.057 deg	Op_point	Bode Plot Phase Margin
22.	VIN_OP	32.0 V	Op_point	Vin operating point
23.	Cin Pd	114.613 µW	Power	Input capacitor power dissipation
24.	Cout Pd	50.64 µW	Power	Output capacitor power dissipation
25.	Diode Pd	221.422 mW	Power	Diode power dissipation
26.	IC Pd	220.811 mW	Power	IC power dissipation
27.	L Pd	82.704 mW	Power	Inductor power dissipation
28.	Total Pd	657.374 mW	Power	Total Power Dissipation
29.	Start Voltage	21.799 V	UVLO	Start Voltage with External UVLO Resistors
30.	Stop Voltage	19.784 V	UVLO	Stop Voltage with External UVLO Resistors
31.	Converter On Time	1.066 µs		Approximate Converter On Time
32.	Vout Tolerance	86.957 m%		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	700.0 m	Maximum Output Current
2.	VinMax	32.0	Maximum input voltage
3.	VinMin	24.0	Minimum input voltage
4.	Vout	11.5	Output Voltage
5.	application	LED_DRIVER	LED Application
6.	base_pn	TPS92510	Base Product Number
7.	LED_Architect	N	LED Architect Project
8.	ledparallel	1.0	Number of LED in parallel
9.	ledpartnumber	XHP50A-00-0000-0D0BU240F	LED Part number
10.	ledseries	1.0	Number of LED in series
11.	line_fsw	60.0	AC Line Frequency
12.	source	DC	Input Source Type
13.	Ta	30.0	Ambient temperature

Design Assistance

1. Feature Highlights: 1.5A Constant Current Buck Converter, 3.5V to 60V Input Voltage Range, 200mV Internal Voltage Reference, +/-3% LED Current Accuracy, 100KHz to 2.5MHz Switching Frequency, Dedicated PWM Dimming Input, LED Thermal Foldback, Adjustable UVLO, Overcurrent Protection, Thermal Shutdown

2. **TPS92510** Product Folder : http://www.ti.com/product/TPS92510 : contains the data sheet and other resources.