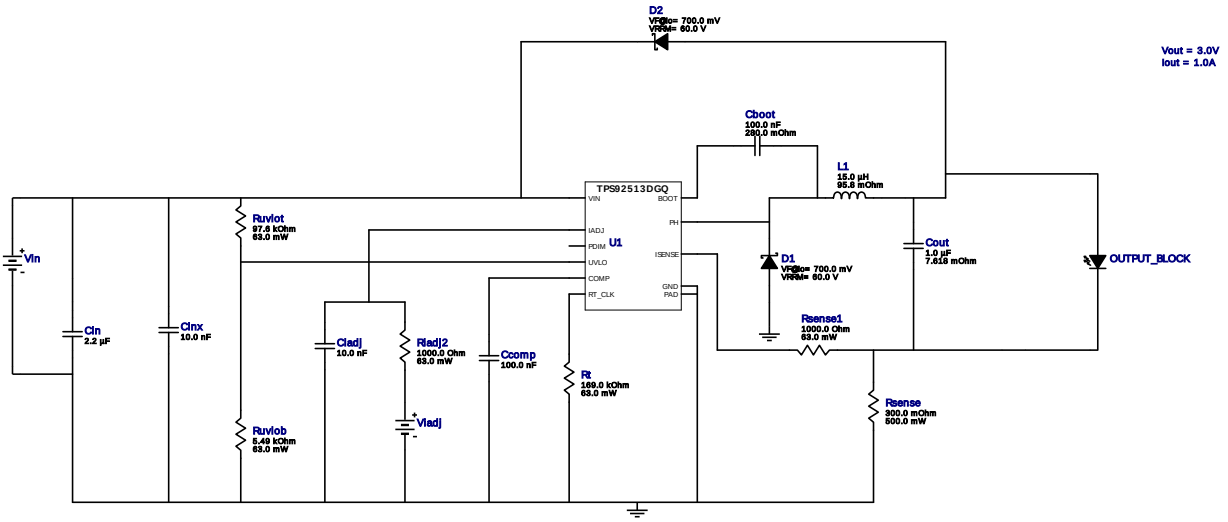
TEXAS INSTRUMENTS

WEBENCH® Design Report

VinMin = 24.0V
VinMax = 32.0V
Vout = 3.0V
Iout = 1.0A

Device = TPS92513DGQR
Topology = Buck
Created = 7/19/16 1:15:29 AM
BOM Cost = $2.28
BOM Count = 17
Total Pd = 1.13W

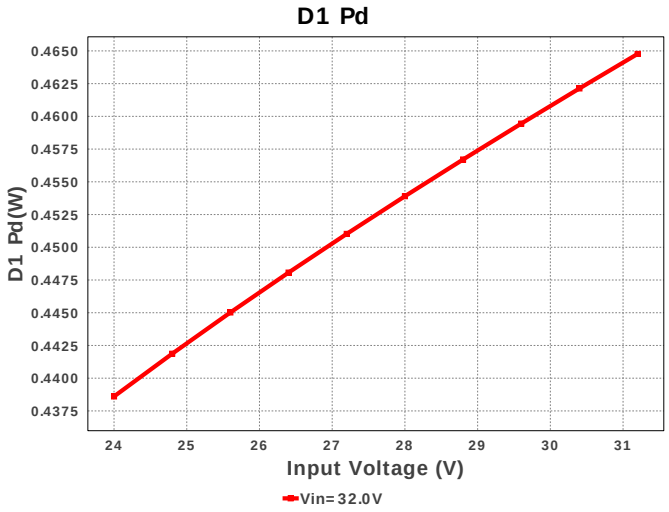
Design : 3496425/36 TPS92513DGQR
TPS92513DGQR 24.0V-32.0V to 3.00V @ 1.0A

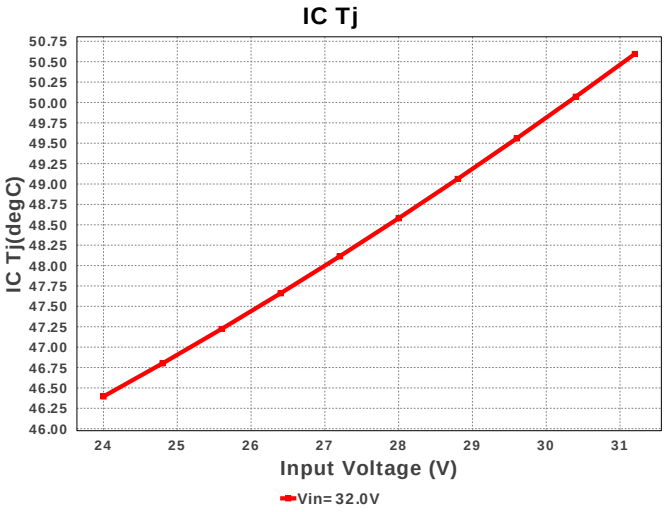


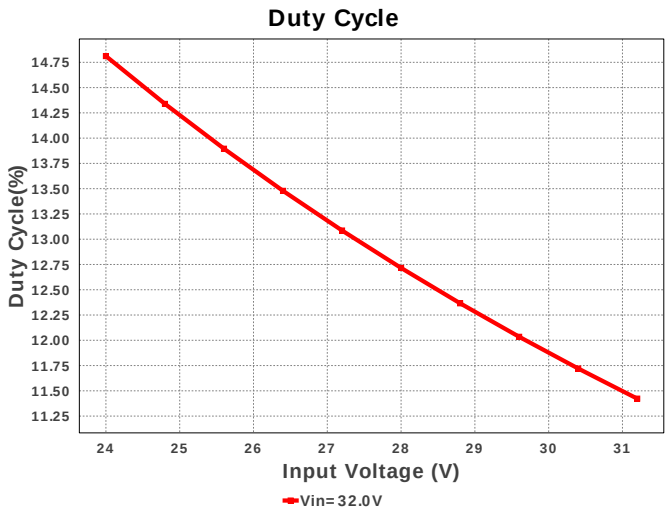
Electrical BOM

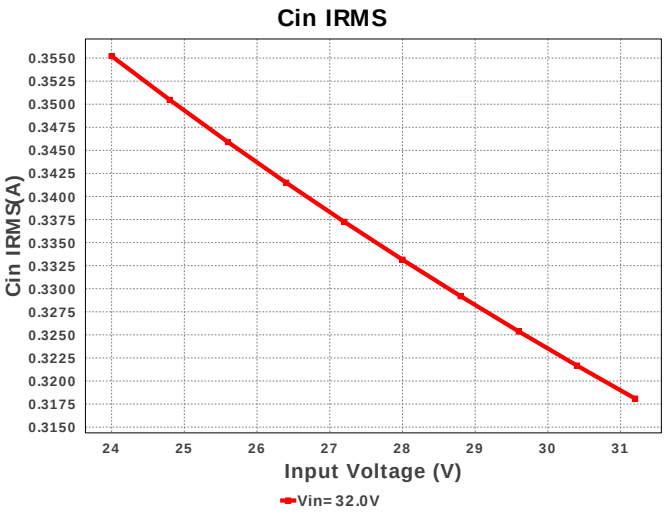
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
2.	Ccomp	MuRata	GRM21BR71E104KA01L Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
3.	Ciadj	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
4.	Cin	Taiyo Yuden	HMK325B7225KN-T Series= X7R	Cap= 2.2 uF VDC= 100.0 V IRMS= 0.0 A	1	$0.13	1210 15 mm²
5.	Cinx	MuRata	GRM188R72A103KA01D Series= X7R	Cap= 10.0 nF VDC= 100.0 V IRMS= 0.0 A	1	$0.01	0603 5 mm²
6.	Cout	TDK	C1005X5R0J105M Series= X5R	Cap= 1.0 uF ESR= 7.618 mOhm VDC= 6.3 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
7.	D1	Diodes Inc.	B260A-13-F	VF@Io= 700.0 mV VRRM= 60.0 V	1	$0.09	SMA 37 mm²
8.	D2	Diodes Inc.	B160-13-F	VF@Io= 700.0 mV VRRM= 60.0 V	1	$0.06	SMA 37 mm²
9.	D_LED	Philips Lumileds	LXML-PWC2	LED	1	$1.26	luxeon_rebel 23 mm²
10.	L1	Bourns	SRN6045-150M	L= 15.0 µH DCR= 95.8 mOhm	1	$0.16	SRN6045 64 mm²

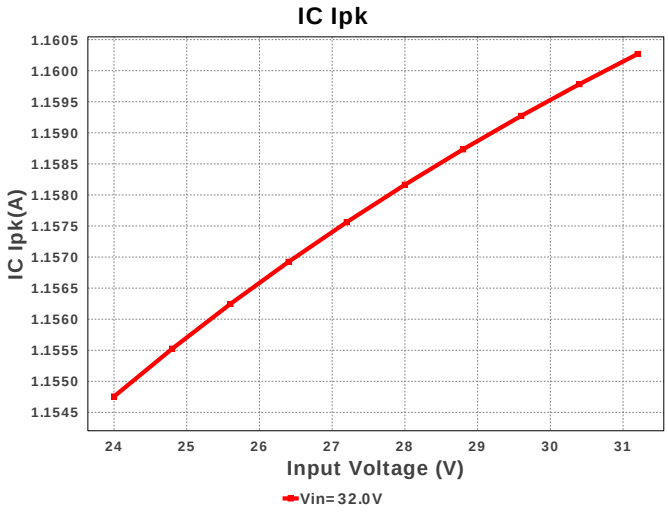
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	Riadj2	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1000.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
12.	Rsense	Rohm	MCR25JZHFLR300 Series= MCR25	Res= 300.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	$0.03	1210 15 mm^2
13.	Rsense1	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1000.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
14.	Rt	Vishay-Dale	CRCW0402169KFKED Series= CRCW..e3	Res= 169.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
15.	Ruvlob	Vishay-Dale	CRCW04025K49FKED Series= CRCW..e3	Res= 5.49 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
16.	Ruvlot	Vishay-Dale	CRCW040297K6FKED Series= CRCW..e3	Res= 97.6 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
17.	U1	Texas Instruments	TPS92513DGQR	Switcher	1	$0.45	DGQ0010D_NV_N 24 mm^2

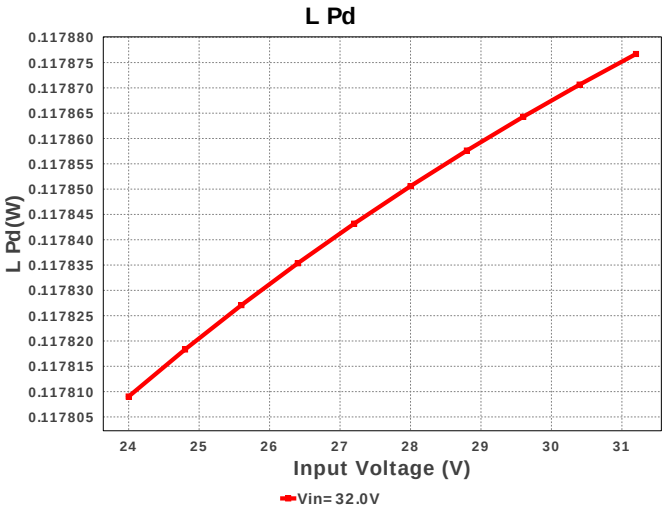


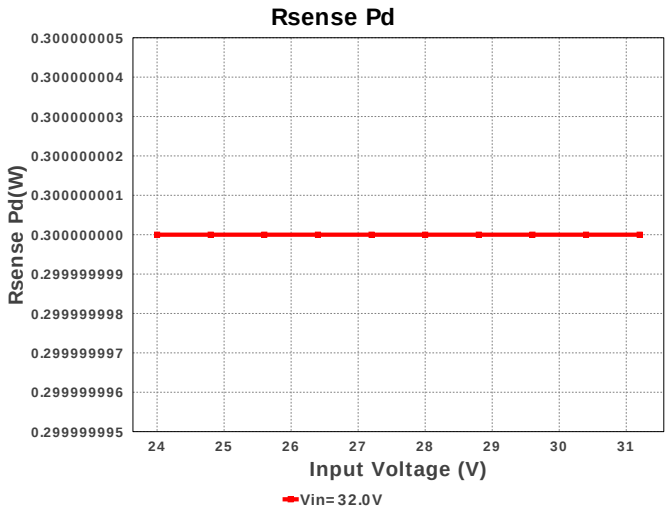


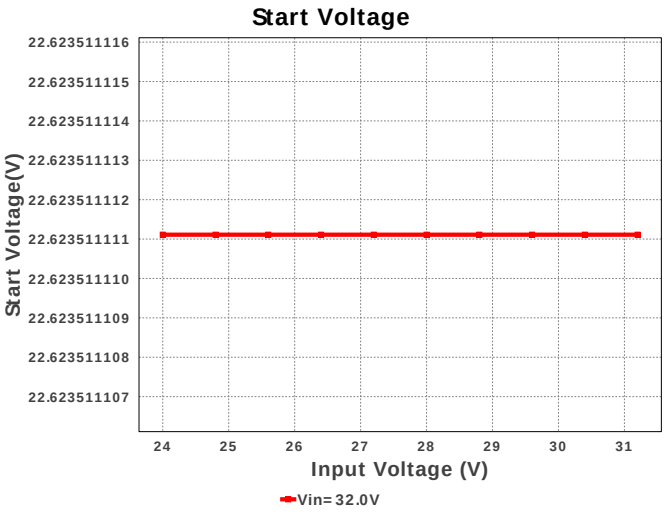


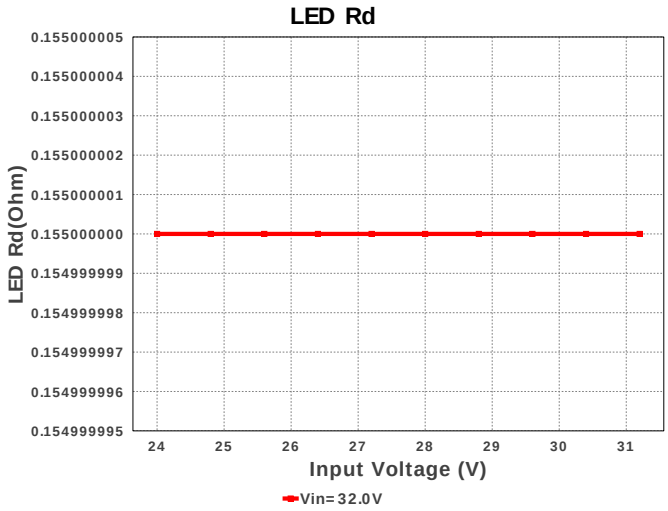


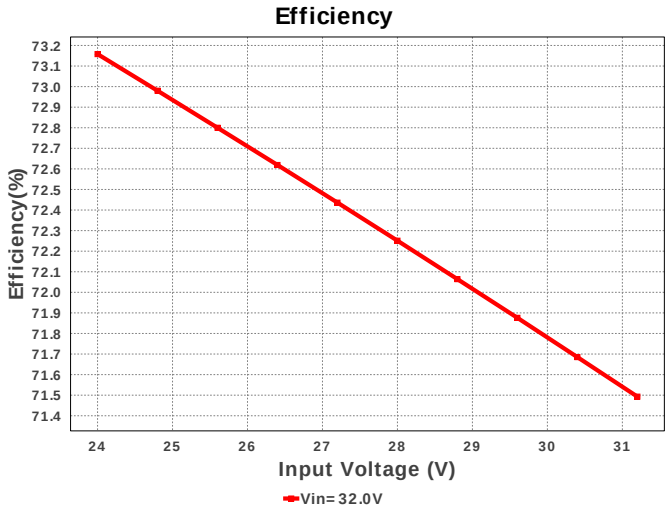


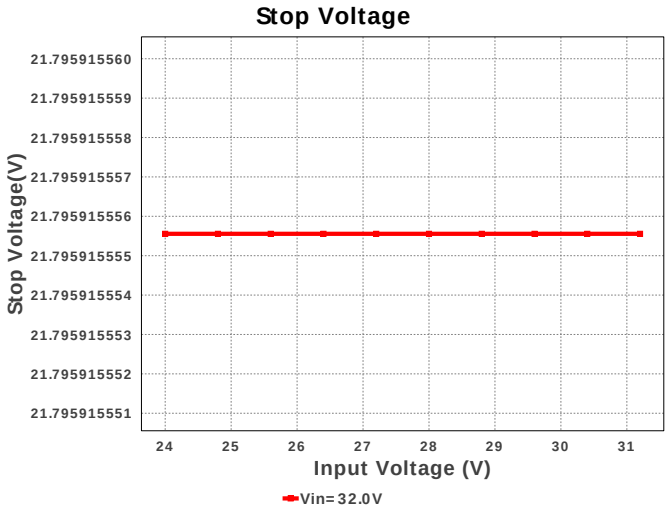


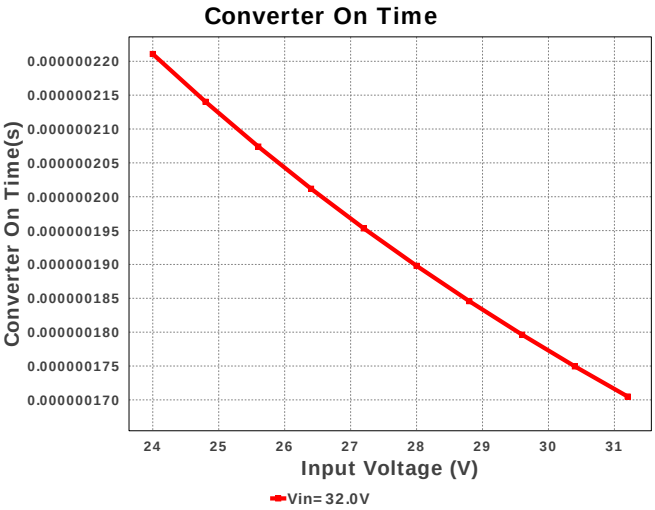


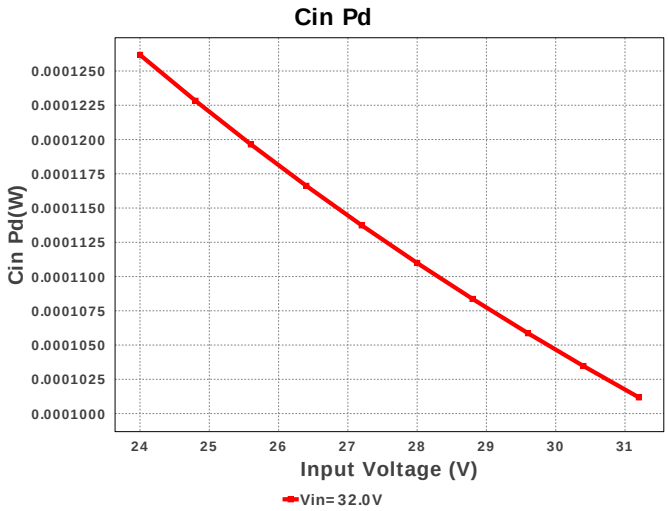


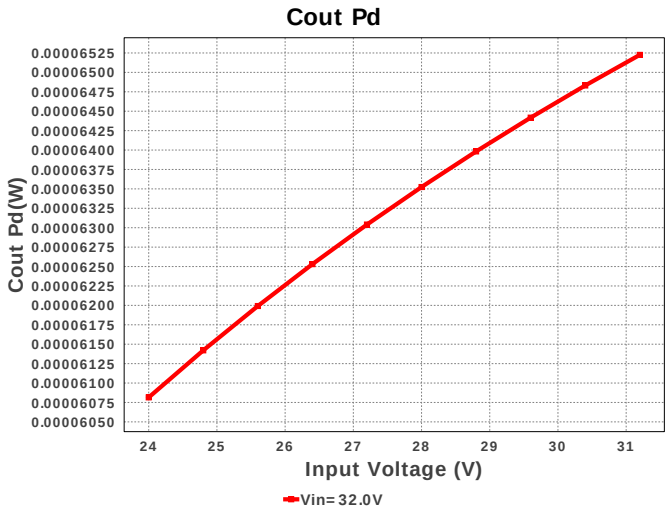


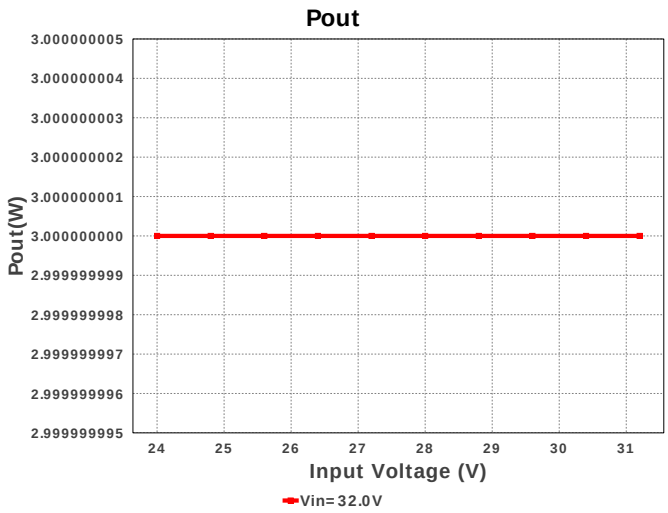


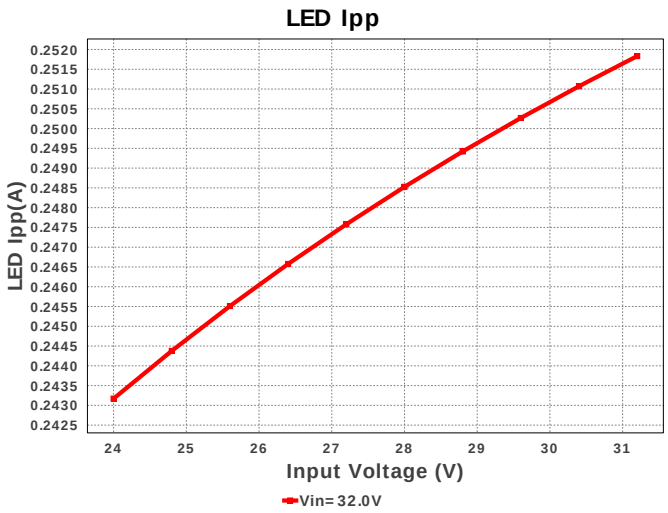


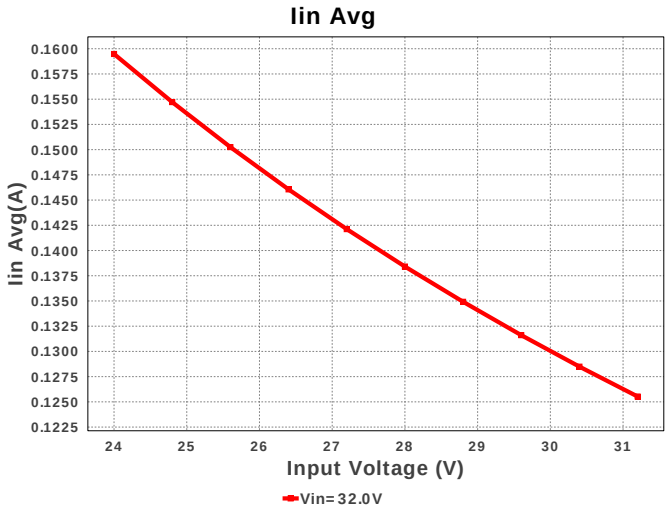


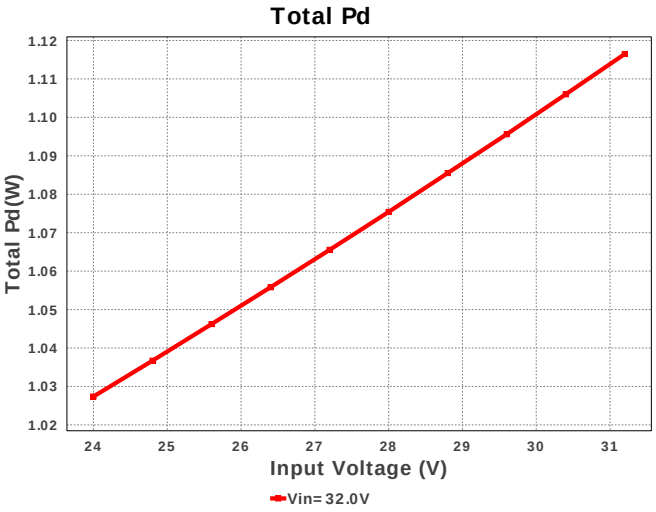


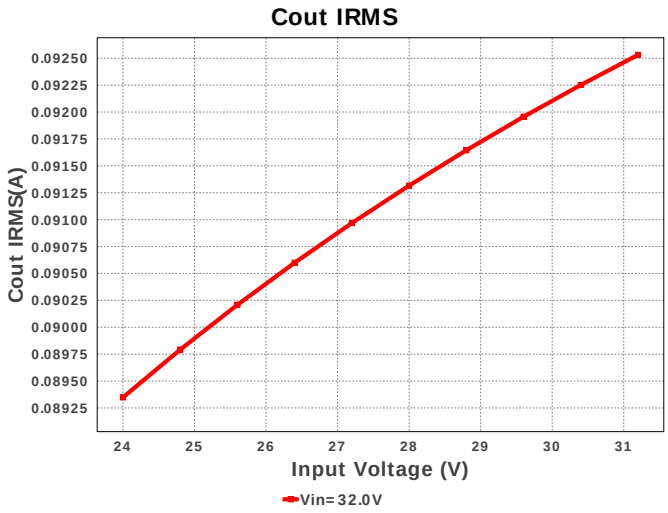


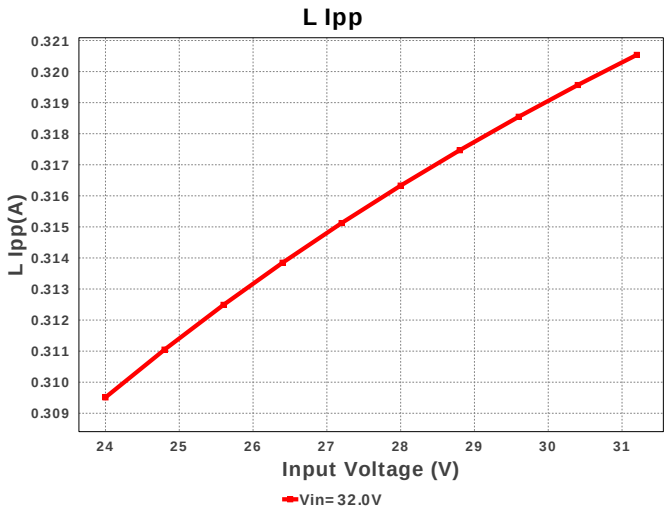


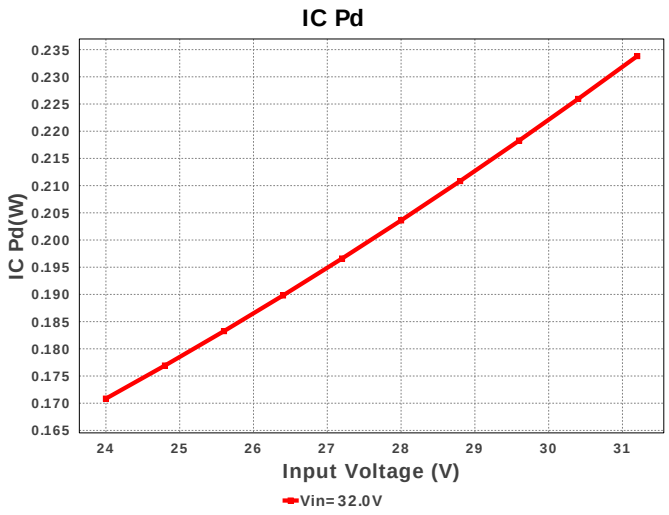


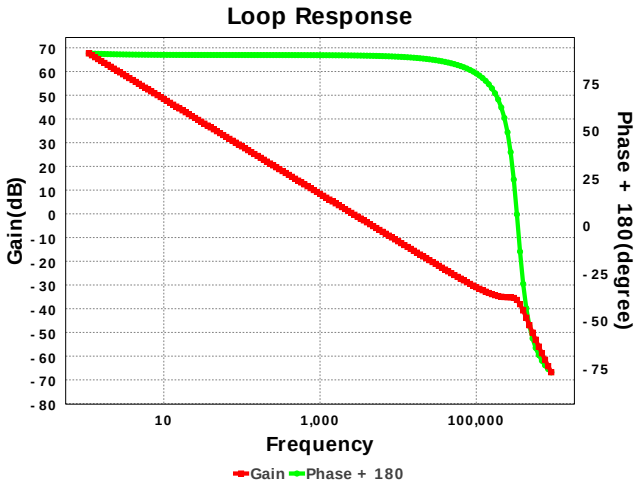












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	314.623 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	94.25 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	1.163 A	Current	Peak switch current in IC
4.	Iin Avg	122.73 mA	Current	Average input current
5.	L Ipp	326.49 mA	Current	Peak-to-peak inductor ripple current
6.	LED Ipp	256.51 mA	Current	LED Ripple Current
7.	BOM Count	17	General	Total Design BOM count
8.	FootPrint	258.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	669.967 kHz	General	Switching frequency
10.	IC Tolerance	0.0 V	General	IC Feedback Tolerance
11.	Pout	3.0 W	General	Total output power
12.	Total BOM	$2.28	General	Total BOM Cost
13.	Vout OP	3.0 V	Op_Point	Operational Output Voltage
14.	Cross Freq	2.64 kHz	Op_point	Bode plot crossover frequency
15.	Duty Cycle	11.14 %	Op_point	Duty cycle
16.	Efficiency	71.298 %	Op_point	Steady state efficiency
17.	IC Tj	51.133 degC	Op_point	IC junction temperature
18.	ICThetaJA	66.7 degC/W	Op_point	IC junction-to-ambient thermal resistance
19.	IOUT_OP	1.0 A	Op_point	Iout operating point
20.	LED Rd	155.0 mOhm	Op_point	LED DynamicResistance
21.	Phase Marg	89.77 deg	Op_point	Bode Plot Phase Margin
22.	VIN_OP	32.0 V	Op_point	Vin operating point
23.	Cin Pd	98.988 µW	Power	Input capacitor power dissipation
24.	Cout Pd	67.671 µW	Power	Output capacitor power dissipation
25.	D1 Pd	467.362 mW	Power	Output Diode Power Dissipation
26.	IC Pd	241.881 mW	Power	IC power dissipation
27.	L Pd	117.914 mW	Power	Inductor power dissipation
28.	Rsense Pd	300.0 mW	Power	Rsense Power Dissipation
29.	Total Pd	1.127 W	Power	Total Power Dissipation
30.	Start Voltage	22.624 V	UVLO	Start Voltage with External UVLO Resistors
31.	Stop Voltage	21.796 V	UVLO	Stop Voltage with External UVLO Resistors
32.	Converter On Time	168.874 ns		Approximate Converter On Time

Design Inputs

#	Name	Value	Description
1.	Iout	1.0	Maximum Output Current
2.	VinMax	32.0	Maximum input voltage
3.	VinMin	24.0	Minimum input voltage
4.	Vout	3.0	Output Voltage
5.	application	LED_DRIVER	LED Application
6.	base_pn	TPS92513	Texas Instruments Base Part Number
7.	isLEDArchitect	N	LED Architect Project
8.	ledparallel	1.0	Number of LED in parallel
9.	ledpartnumber	LXML-PWC2	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	35.0	Ambient temperature

Design Assistance

1. TPS92513 Product Folder : http://www.ti.com/product/TPS92513 : contains the data sheet and other resources.