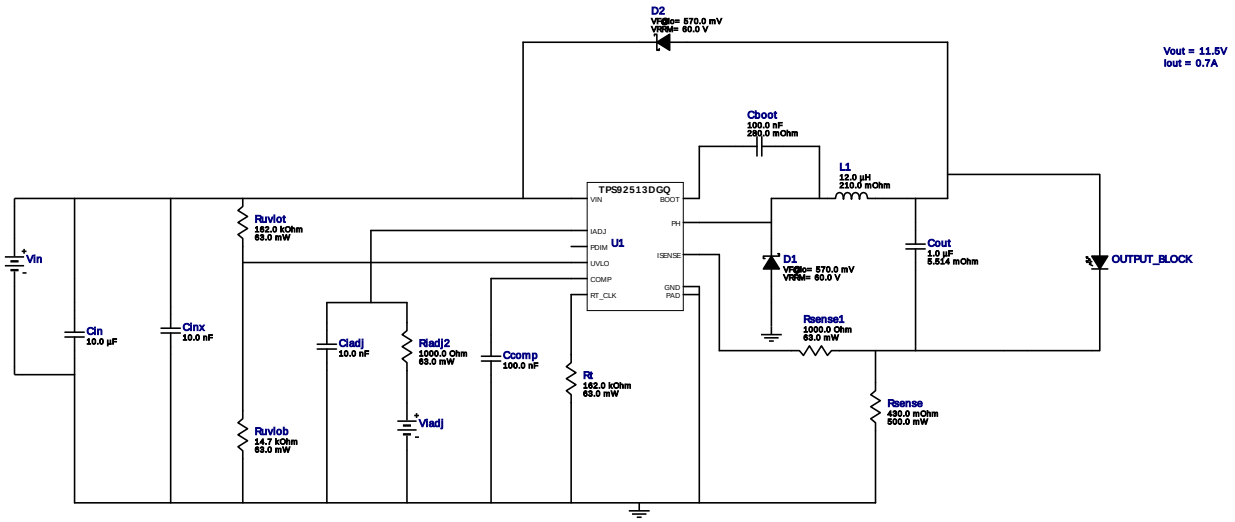
WEBENCH® Design Report

VinMin = 14.0V
VinMax = 22.0V
Vout = 11.5V
Iout = 0.7A

Device = TPS92513DGQR
Topology = Buck
Created = 8/4/16 1:47:50 AM
BOM Cost = $5.93
BOM Count = 17
Total Pd = 0.71W

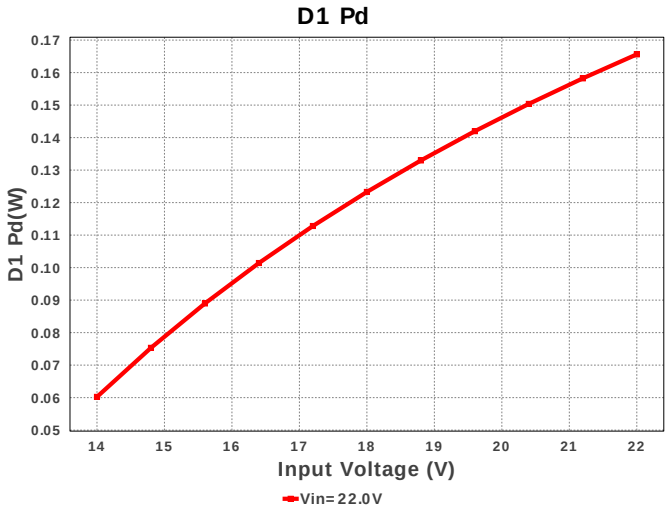
Design : 4749722/2 TPS92513DGQR
TPS92513DGQR 14.0V-22.0V to 11.50V @ 0.7A

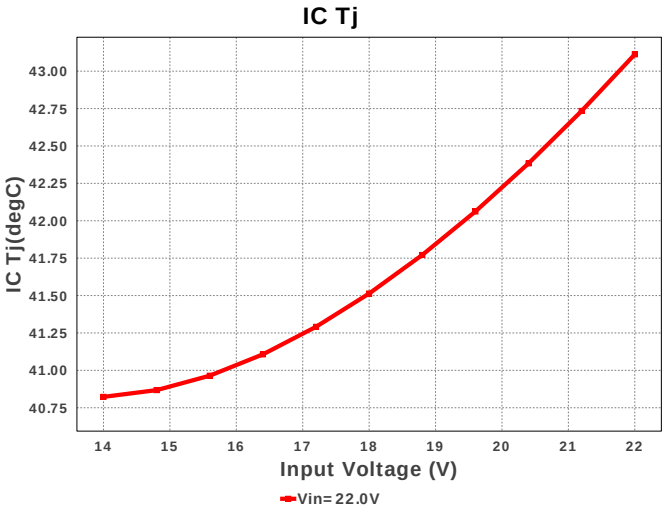


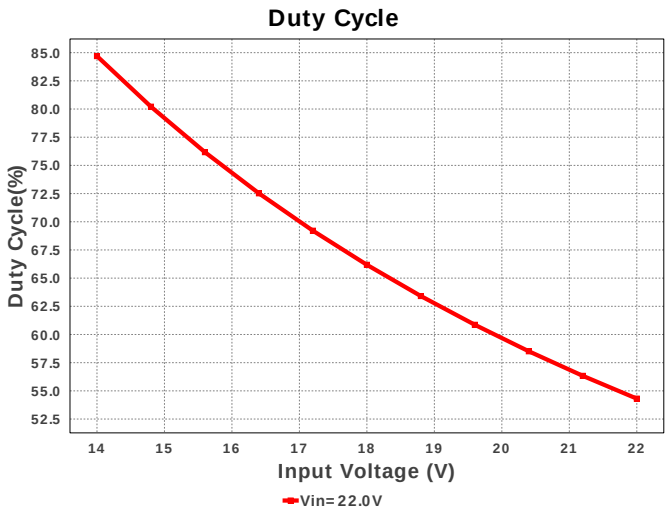
Electrical BOM

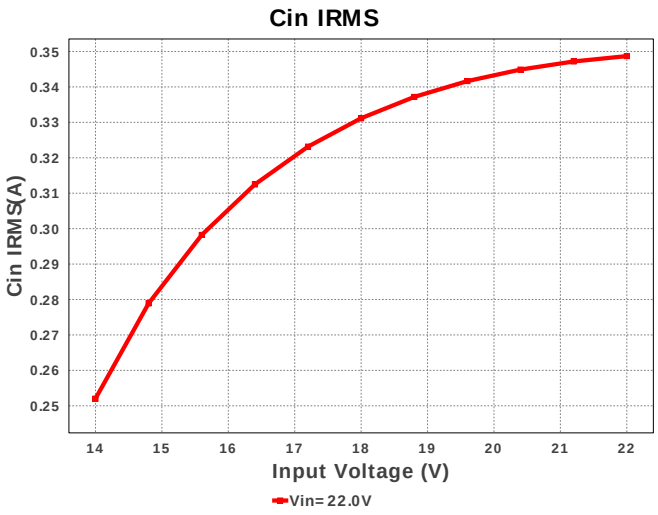
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cboot	AVX	08053C104KAT2A Series= X7R	Cap= 100.0 nF ESR= 280.0 mOhm VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
2.	Ccomp	MuRata	GRM21BR71E104KA01L Series= X7R	Cap= 100.0 nF VDC= 25.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
3.	Ciadj	MuRata	GRM216R71H103KA01D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0805 7 mm²
4.	Cin	MuRata	GRM32ER71J106KA12L Series= X7R	Cap= 10.0 uF VDC= 63.0 V IRMS= 0.0 A	1	$0.27	1210_280 15 mm²
5.	Cinx	MuRata	GRM155R71H103KA88D Series= X7R	Cap= 10.0 nF VDC= 50.0 V IRMS= 0.0 A	1	$0.01	0402 3 mm²
6.	Cout	MuRata	GRM21BR71E105KA99L Series= X7R	Cap= 1.0 uF ESR= 5.514 mOhm VDC= 25.0 V IRMS= 1.47583 A	1	$0.02	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.	D2	NXP Semiconductor	PMEG6010CEH,115	VF@Io= 570.0 mV VRRM= 60.0 V	1	$0.04	SOD-123F 12 mm²
9.	D_LED	Cree	XHP50A-00-0000-0D00J40E1	LED	1	$4.81	xlampxhp 0 mm²
10.	L1	Bourns	SDR0403-120ML	L= 12.0 µH DCR= 210.0 mOhm	1	$0.18	SDR0403 28 mm²

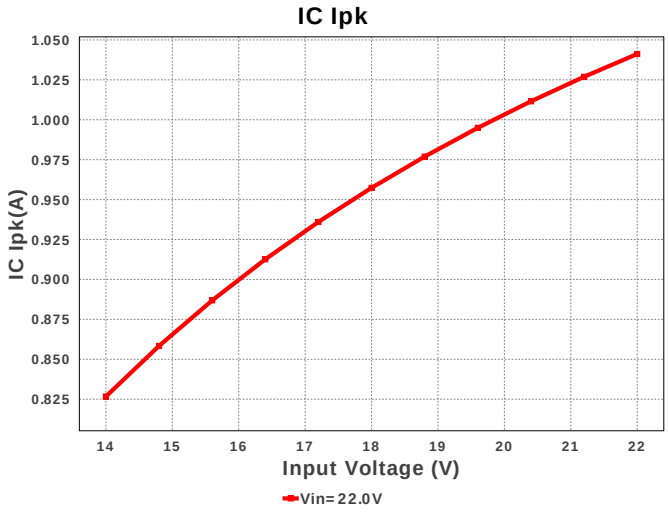
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	Riadj2	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1000.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
12.	Rsense	Rohm	MCR25JZHFLR430 Series= MCR25	Res= 430.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	$0.03	1210 15 mm^2
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	CRCW0402162KFKED Series= CRCW..e3	Res= 162.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
15.	Ruvlob	Vishay-Dale	CRCW040214K7FKED Series= CRCW..e3	Res= 14.7 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
16.	Ruvlot	Vishay-Dale	CRCW0402162KFKED Series= CRCW..e3	Res= 162.0 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

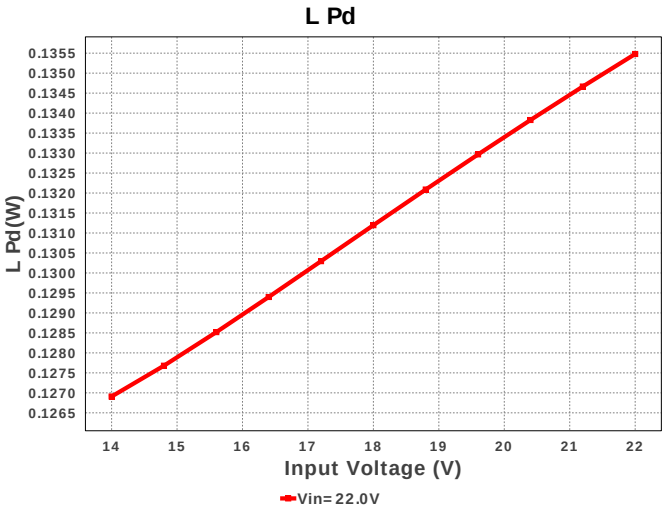


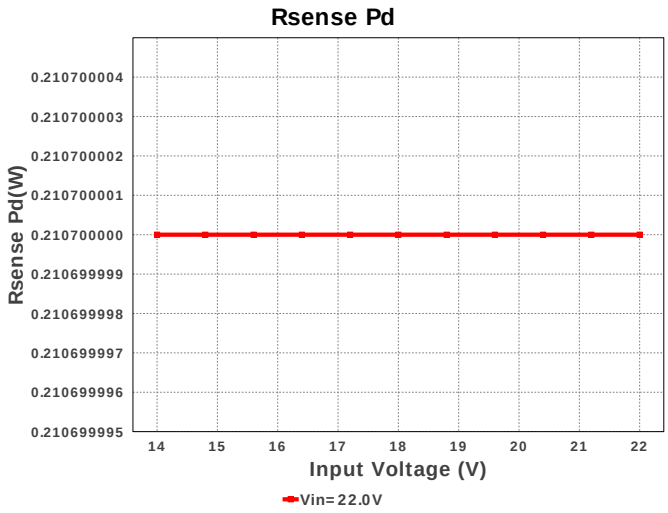


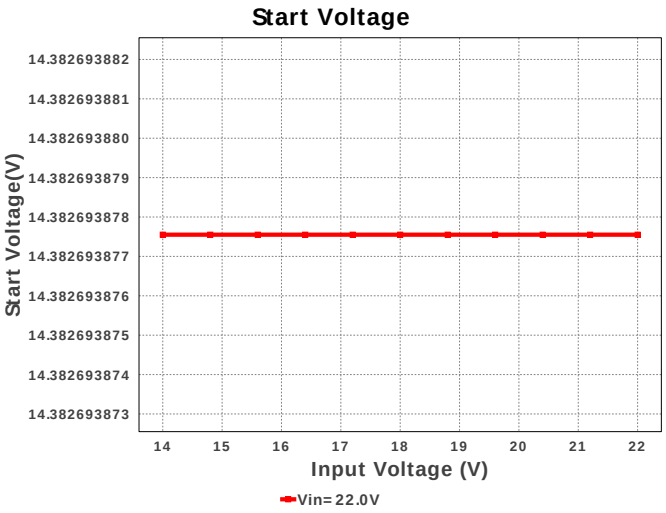


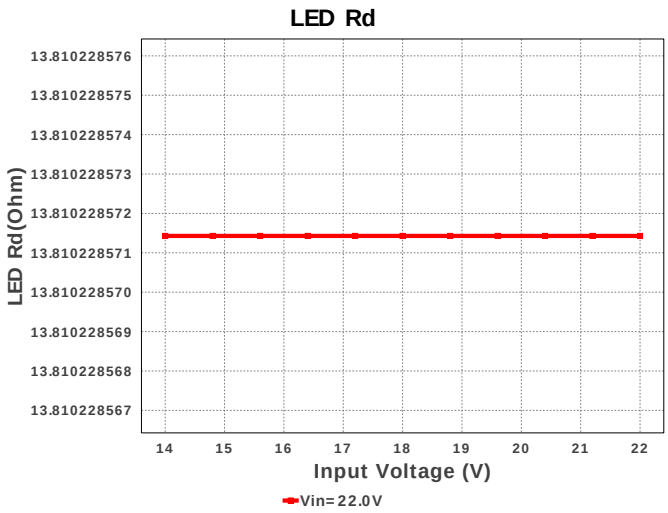


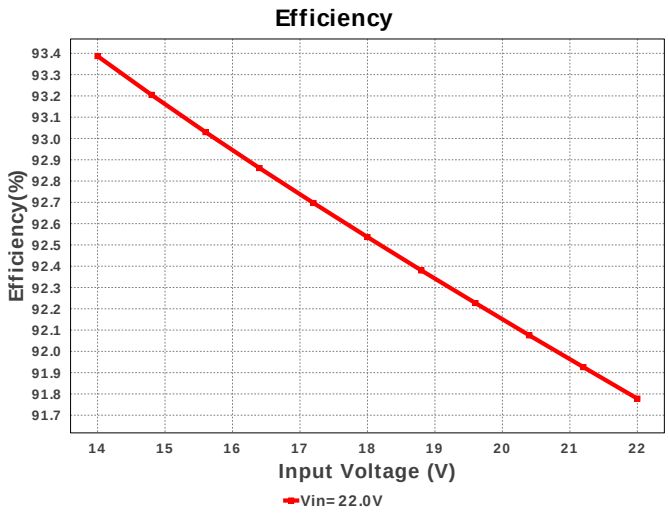


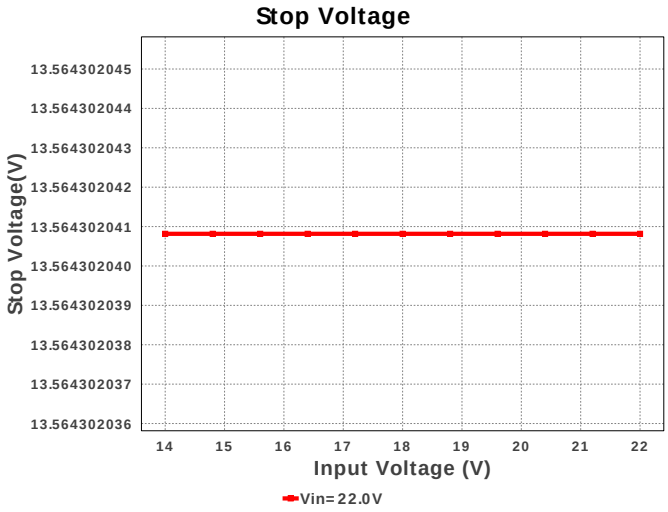


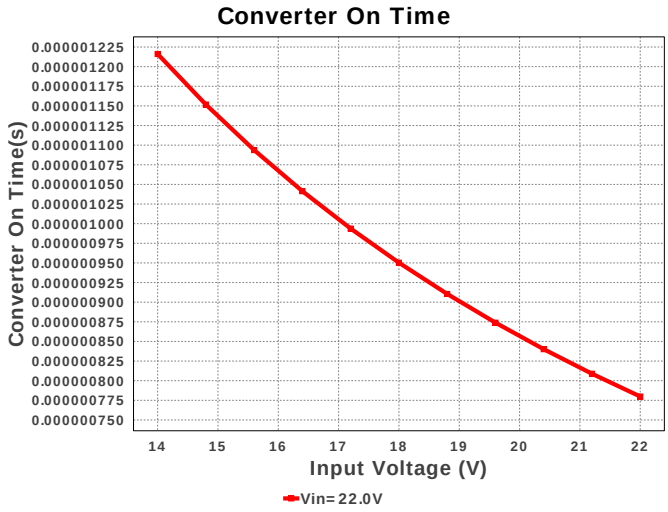


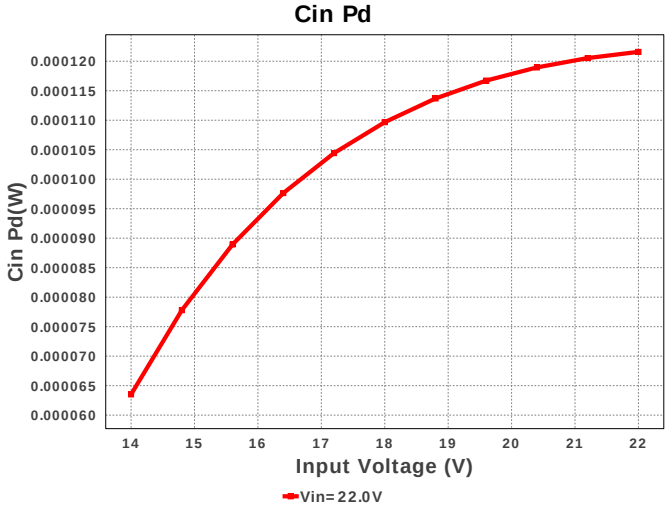


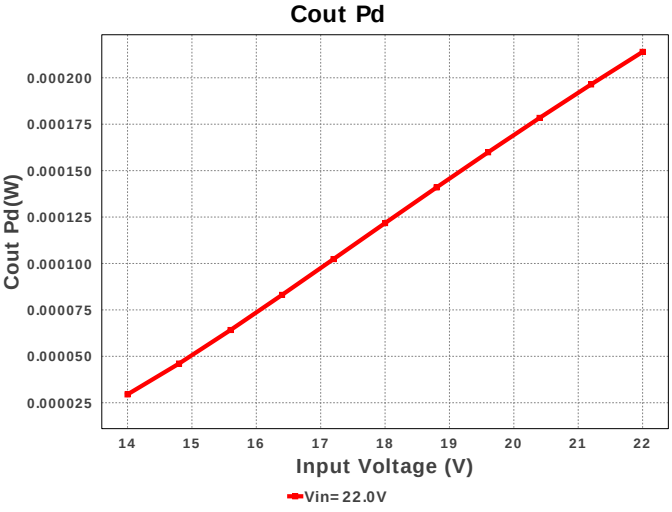


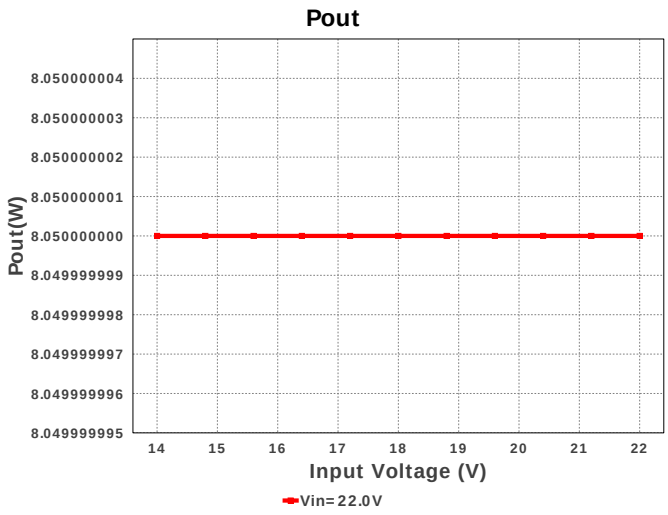


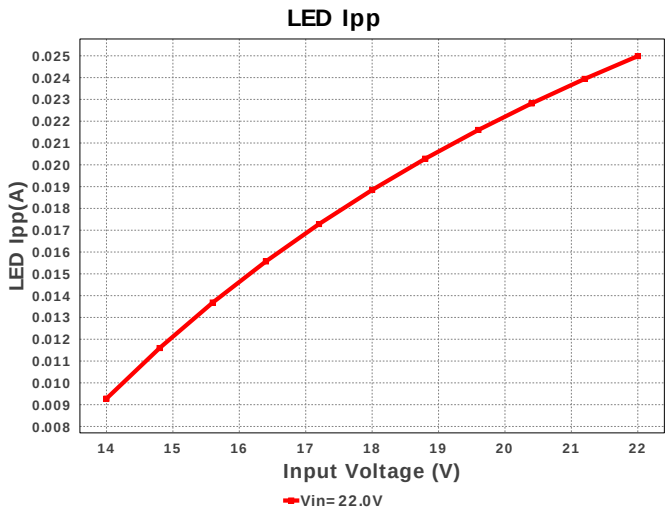


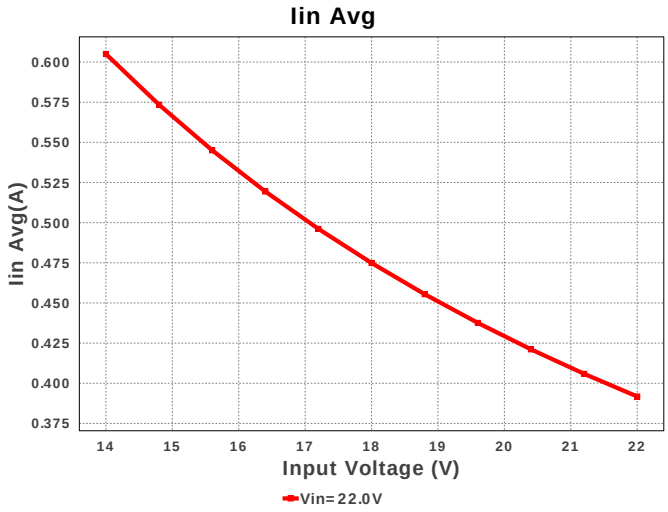


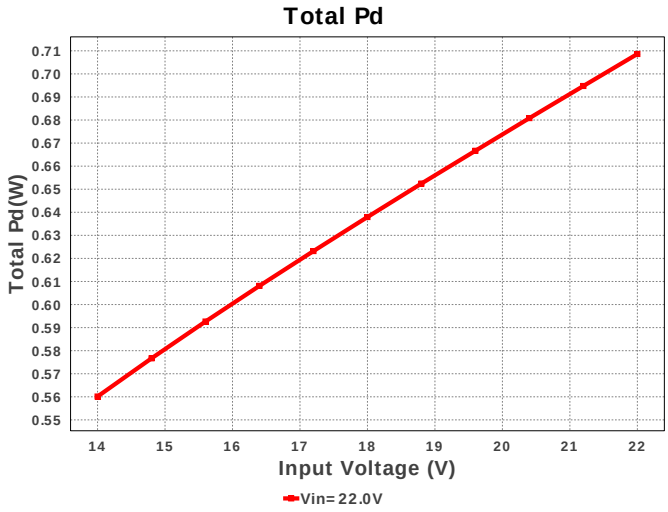


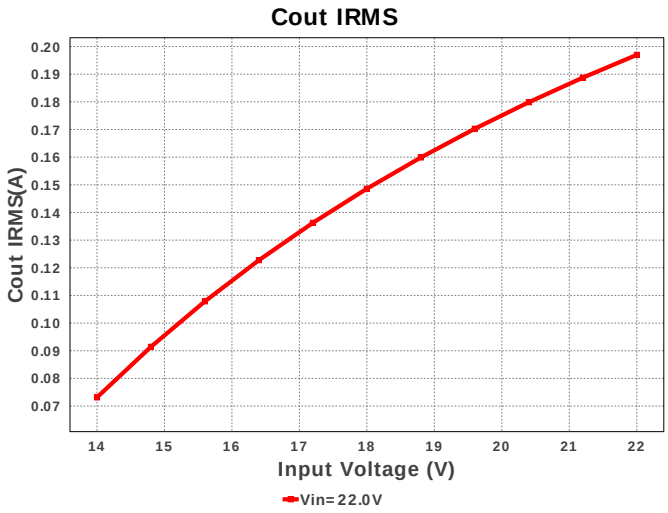


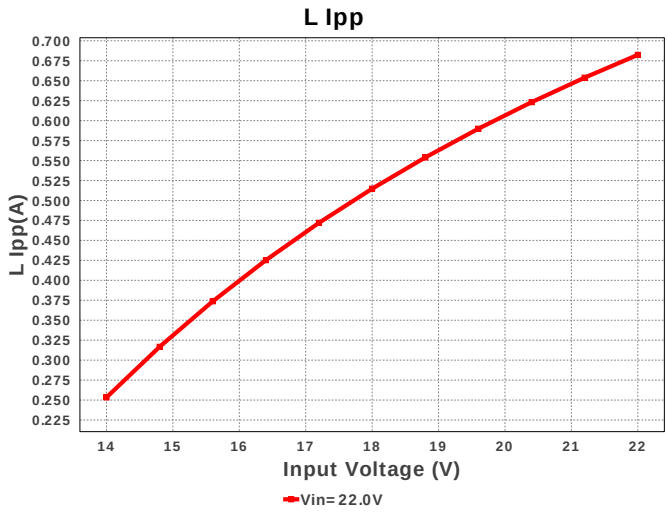


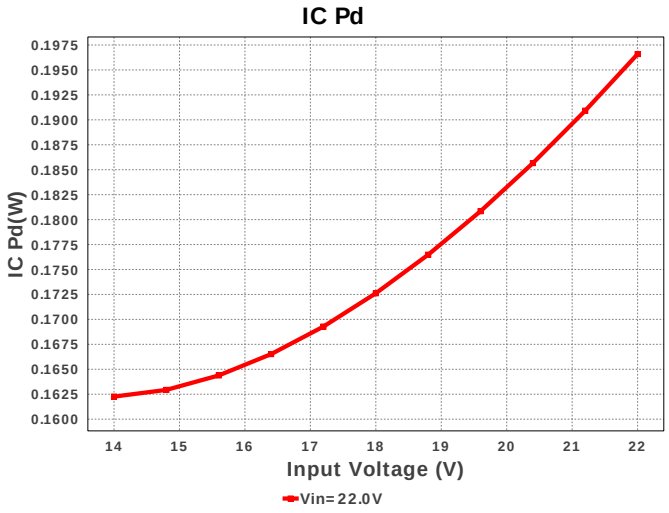


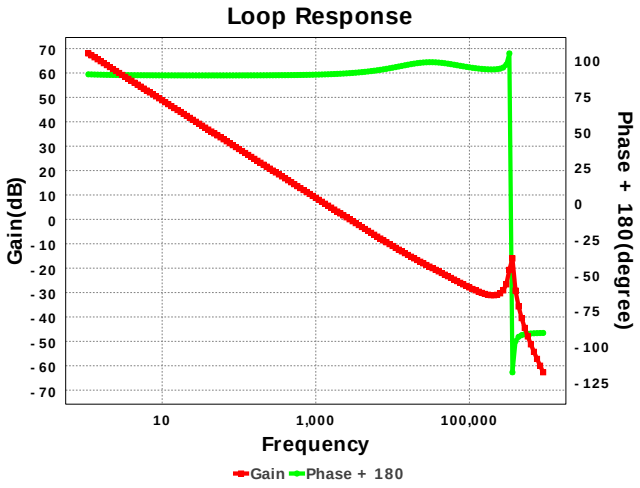












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	348.696 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	195.98 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	1.039 A	Current	Peak switch current in IC
4.	Iin Avg	391.76 mA	Current	Average input current
5.	L Ipp	678.89 mA	Current	Peak-to-peak inductor ripple current
6.	LED Ipp	24.859 mA	Current	LED Ripple Current
7.	BOM Count	17	General	Total Design BOM count
8.	FootPrint	149.0 mm^2	General	Total Foot Print Area of BOM components
9.	Frequency	696.429 kHz	General	Switching frequency
10.	IC Tolerance	0.0 V	General	IC Feedback Tolerance
11.	Pout	8.05 W	General	Total output power
12.	Total BOM	$5.93	General	Total BOM Cost
13.	Vout OP	11.5 V	Op_Point	Operational Output Voltage
14.	Cross Freq	2.76 kHz	Op_point	Bode plot crossover frequency
15.	Duty Cycle	54.311 %	Op_point	Duty cycle
16.	Efficiency	91.779 %	Op_point	Steady state efficiency
17.	IC Tj	43.112 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	90.76 deg	Op_point	Bode Plot Phase Margin
22.	VIN_OP	22.0 V	Op_point	Vin operating point
23.	Cin Pd	121.589 µW	Power	Input capacitor power dissipation
24.	Cout Pd	211.782 µW	Power	Output capacitor power dissipation
25.	D1 Pd	165.612 mW	Power	Output Diode Power Dissipation
26.	IC Pd	196.587 mW	Power	IC power dissipation
27.	L Pd	135.378 mW	Power	Inductor power dissipation
28.	Rsense Pd	210.7 mW	Power	LED Current Rsns Power Dissipation
29.	Total Pd	708.545 mW	Power	Total Power Dissipation
30.	Start Voltage	14.383 V	UVLO	Start Voltage with External UVLO Resistors
31.	Stop Voltage	13.564 V	UVLO	Stop Voltage with External UVLO Resistors
32.	Converter On Time	775.878 ns		Approximate Converter On Time

Design Inputs

#	Name	Value	Description
1.	Iout	700.0 m	Maximum Output Current
2.	VinMax	22.0	Maximum input voltage
3.	VinMin	14.0	Minimum input voltage
4.	Vout	11.5	Output Voltage
5.	application	LED_DRIVER	LED Application
6.	base_pn	TPS92513	Base Product Number
7.	LED_Architect	N	LED Architect Project
8.	ledparallel	1.0	Number of LED in parallel
9.	ledpartnumber	XHP50A-00-0000-0D00140E1	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. **TPS92513** Product Folder : http://www.ti.com/product/TPS92513 : contains the data sheet and other resources.