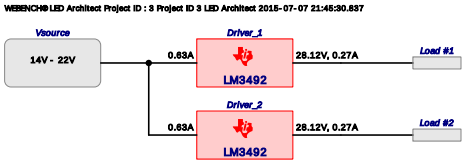
WEBENCH® LED Architect



Project Report

Project : 4420283/3 : Project ID 3
Created : 2015-07-07 21:45:30.837
LED Architect with light output=1000.0

Launch WEBENCH LED Architect.

Project Summary

Total BOM Cost : $297.90
Total Footprint : 285,953 mm^2
Total BOM Count : 35
Total Efficiency : 28.98%
Total Efficacy : 57.6 lumens / Watt
Total Power Dissipation (loss) : 2.16 Watts

Design Inputs :

1.	VinMax	22.0	Maximum input voltage
2.	VinMin	14.0	Minimum input voltage
3.	color	cool white	LED Color
4.	source	DC	Input Source Type
5.	lightOutput	1000.0	Light Output in Lumen
6.	maxHeatSinkLength	200.0	Max Heat Sink Length
7.	maxHeatSinkWidth	50.0	Max Heat Sink Width
8.	maxJunctionTemp	150.0	Max LED Junction Temperature
9.	maxLEDStringVout	60.0	Max LED String Voltage
10.	optfactor	3	Optimization factor to tune up the design
11.	priceFactor	0	Price factor to tune up the design cost
12.	Ta	30.0	Ambient temperature

Regulators

Main Driver NSID : LM3492MHX/NOPB Two-Channel COT Boost LED Driver; Driver Efficiency = 87.83%

Drivers Electrical BOM

Manufacturer	Part Number	Quantity	Budgetary Price	Footprint (mm^2)
Wurth Elektronik	74408943150	2	$3.40	67
TDK	C3216X7R2A105M160AA	2	$0.22	22
TDK	C5750X7S2A106M	4	$1.68	108
Vishay-Dale	CRCW040216K2FKED	2	$0.02	6
Vishay-Dale	CRCW0402226KFKED	2	$0.02	6
Vishay-Dale	CRCW0402402KFKED	2	$0.02	6
Vishay-Dale	CRCW040252K3FKED	2	$0.02	6
Vishay-Dale	CRCW04029K09FKED	2	$0.02	6
Taiyo Yuden	EMK212B7105KG-T	2	$0.04	14
MuRata	GRM155R60J394KE19D	2	$0.04	6
MuRata	GRM1885C2A100JA01D	2	$0.02	9
SHARP Electronics	GW5BNF15L10	6	$30.82	800
Texas Instruments	LM3492MHX/NOPB	2	$2.00	143
Micro Commercial Components	SK310A-TP	2	$0.20	75
Total		34	$38.52	1,273

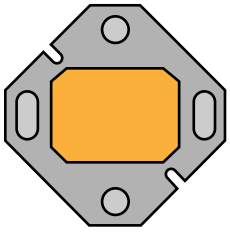
LED Array Solution BOM = LEDs + Heatsink

Manufacturer	Part Number	Quantity	Cost	Footprint (cm^2)
SHARP Electronics	GW5BNF15L10	6	$92.46	-
Aavid	62335	1	$196.06	2,853
Total			$288.52	2,853

LED Array Solution

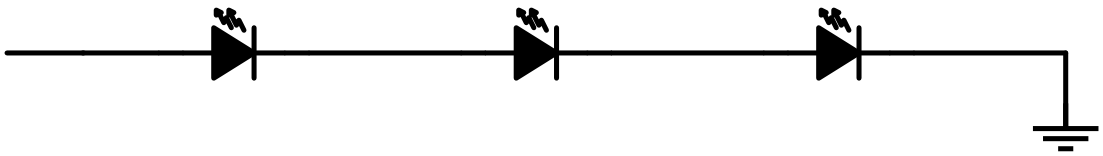
LED Array
Light Output : 1000 lumens
Color : cool white
LED quantity : 6Series = 3Parallel = 2
Total Vout : 28.1 Volts
Total Iload : 0.3 Amps
Total Light Output : 1000 lumens
Flux : 167 lumens
ThetaSA : 0.31 C / Watt
Junction Temp : 47 degrees
Operating Vf : 9.373 Volts
Operating Io : 0.27 Amps
Efficiency : 33%
Efficacy : 109.6 lumens / Watt
Total Footprint : 285371.1 mm^2
Total LED Cost : $288.52
Max LED Vout : 60.0 Volts

Selected LED



Manufacturer : SHARP Electronics
Part Number : GW5BNF15L10
Vf : 10.5 V
Io : 0.64 A
Angle : 120.0 degree
PhiV : 350.0
Color Temperature : 6500.0 K
Color : cool white
Tj : 90.0 deg C
IfMin : 0.0 Amps
IfMax : 0.7 Amps
RJC : 4.5 deg C/Ohm
Isat : 0.0 Amps
Package mount : SMT
Footprint : 400.0 mm2

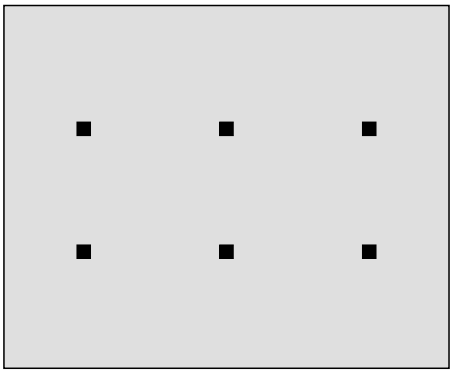
LED Load Array : For each Driver : series = 3, parallel = 1. LED Quantity = 3
Total Driver Quantity = 2 Total LED Quantity = 6



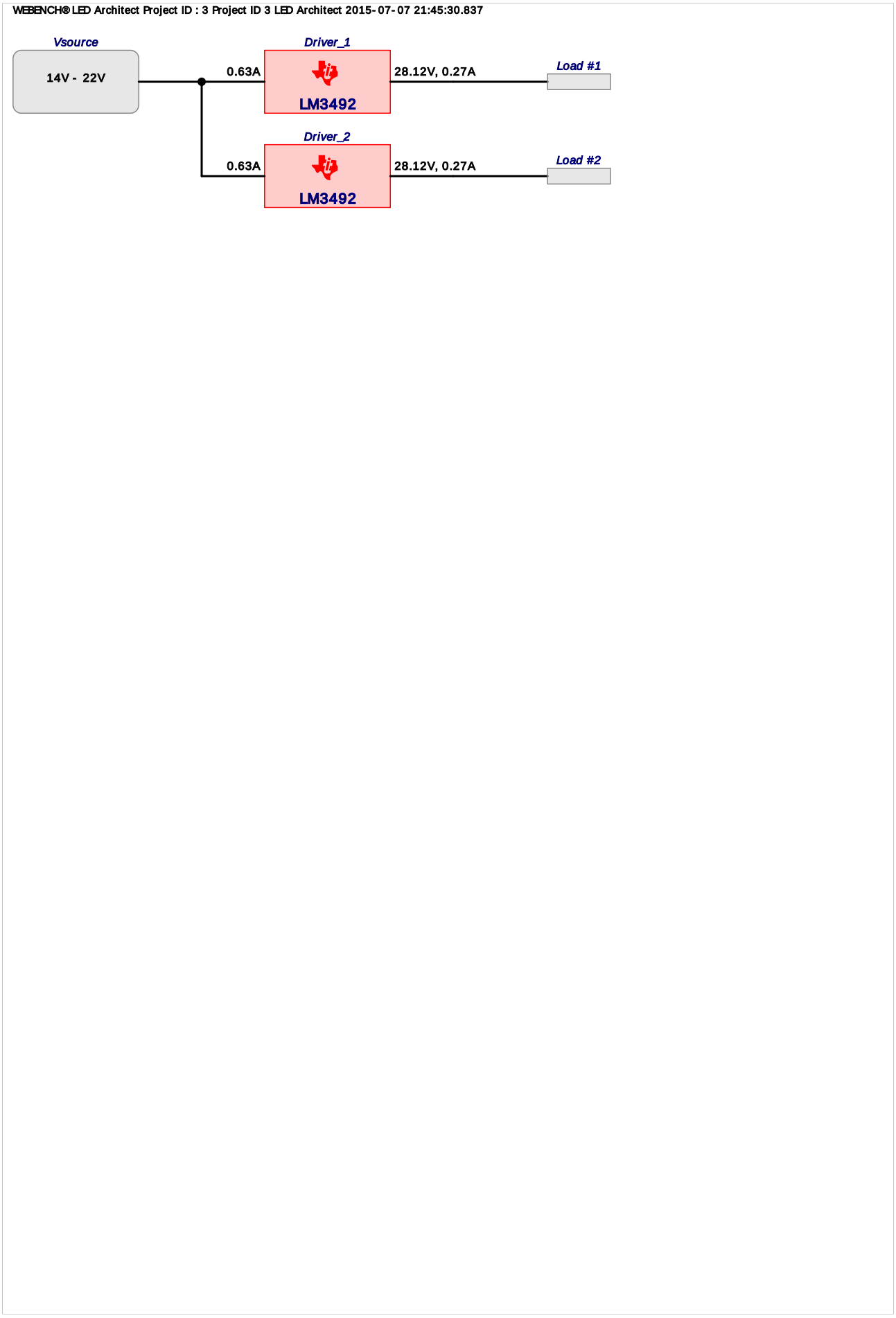
Heatsink

Length : 591.32 mm
Width : 482.6 mm
Height : 33.32 mm
Total Heatsink Footprint : 285371 mm^2
Total Heatsink Cost : $196.06

Manufacturer : Aavid
Part Number : 62335
ThetaSA : 0.31 C/W



Project Diagram



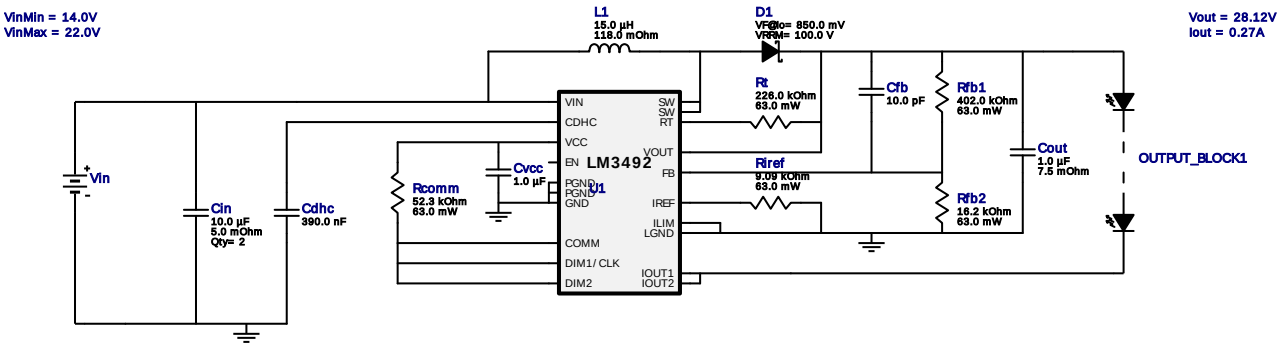
TEXAS INSTRUMENTS

WEBENCH® Design Report

VinMin = 14.0V
VinMax = 22.0V
Vout = 28.12V
Iout = 0.27A

Device = LM3492MHX/NOPB
Topology = Boost
Created = 7/7/15 9:45:30 PM
BOM Cost = $4.69
Footprint = 291.0 mm²
BOM Count = 17
Total Pd = 1.08W

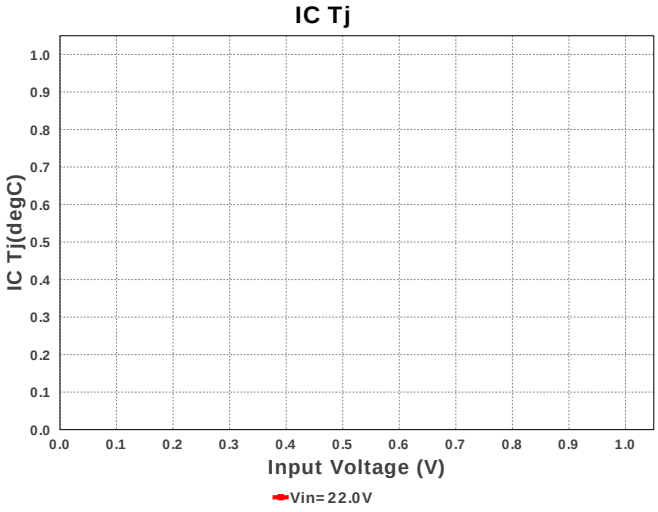
Design : 4420283/7 LM3492MHX/NOPB
LM3492MHX/NOPB 14.0V-22.0V to 28.87V @ 0.27A

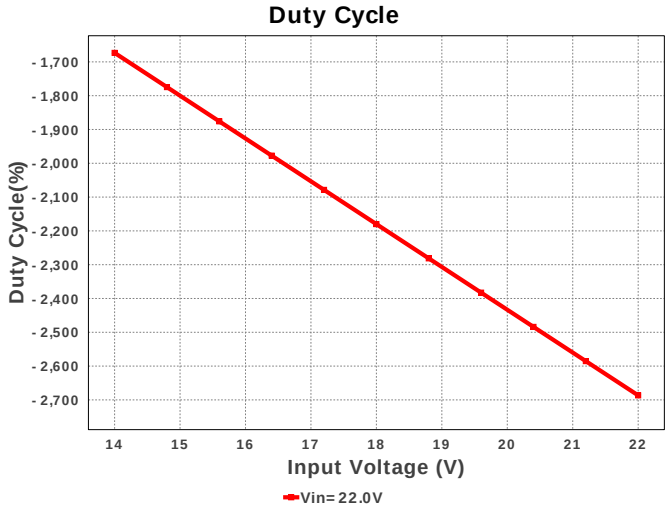


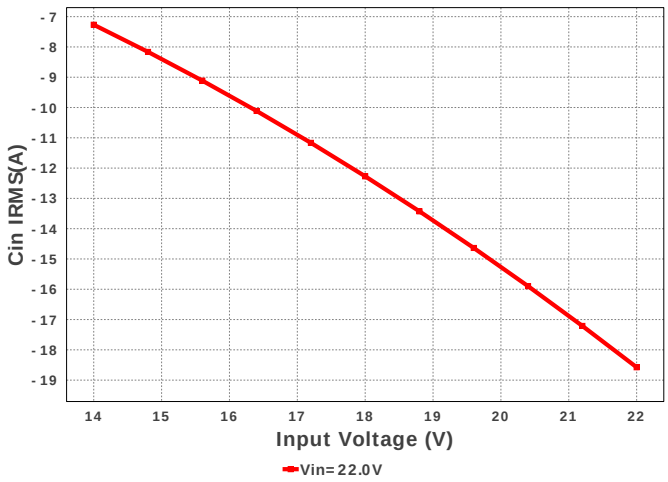
Electrical BOM

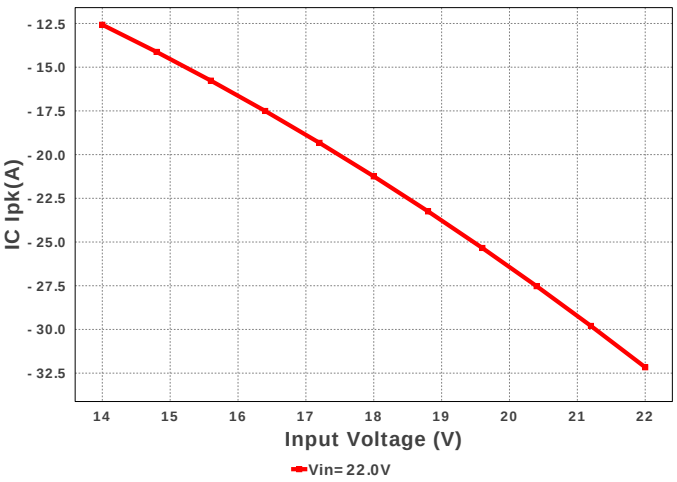
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cdhc	MuRata	GRM155R60J394KE19D Series= X5R	Cap= 390.0 nF VDC= 6.3 V IRMS= 0.0 A	1	$0.02	0402 3 mm²
2.	Cfb	MuRata	GRM1885C2A100JA01D Series= C0G/NP0	Cap= 10.0 pF VDC= 100.0 V IRMS= 0.0 A	1	$0.01	0603 5 mm²
3.	Cin	TDK	C5750X7S2A106M Series= 479	Cap= 10.0 uF ESR= 5.0 mOhm VDC= 100.0 V IRMS= 6.45 A	2	$0.84	2220 54 mm²
4.	Cout	TDK	C3216X7R2A105M160AA Series= X7R	Cap= 1.0 uF ESR= 7.5 mOhm VDC= 100.0 V IRMS= 5.9235 A	1	$0.11	1206 11 mm²
5.	Cvcc	Taiyo Yuden	EMK212B7105KG-T Series= X7R	Cap= 1.0 uF VDC= 16.0 V IRMS= 0.0 A	1	$0.02	0805 7 mm²
6.	D1	Micro Commercial Components	SK310A-TP	VF@Io= 850.0 mV VRRM= 100.0 V	1	$0.10	SMA 37 mm²
7.	D_LED1	SHARP Electronics	GW5BNF15L10	LED	3	$15.41	gw5b 400 mm²
8.	L1	Wurth Elektronik	74408943150	L= 15.0 µH DCR= 118.0 mOhm	1	$1.70	SRR4038 34 mm²
9.	Rcomm	Vishay-Dale	CRCW040252K3FKED Series= CRCW..e3	Res= 52.3 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²
10.	Rfb1	Vishay-Dale	CRCW0402402KFKED Series= CRCW..e3	Res= 402.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

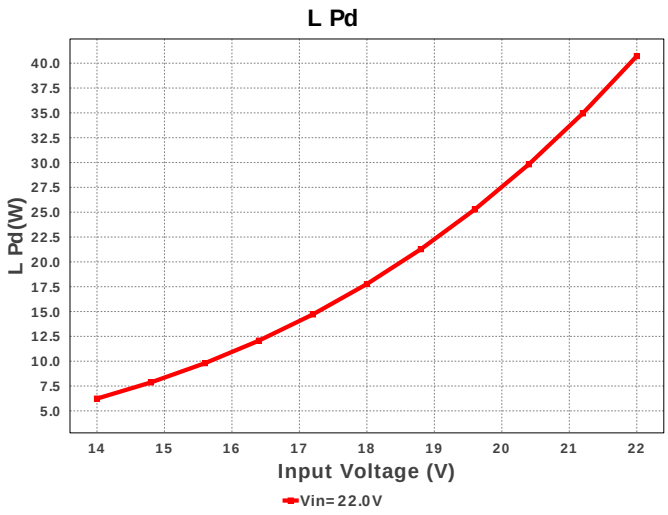
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
11.	Rfb2	Vishay-Dale	CRCW040216K2FKED Series= CRCW..e3	Res= 16.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
12.	Riref	Vishay-Dale	CRCW04029K09FKED Series= CRCW..e3	Res= 9.09 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
13.	Rt	Vishay-Dale	CRCW0402226KFKED Series= CRCW..e3	Res= 226.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm^2
14.	U1	Texas Instruments	LM3492MHX/NOPB	Switcher	1	$1.00	 MXA20A 71 mm^2

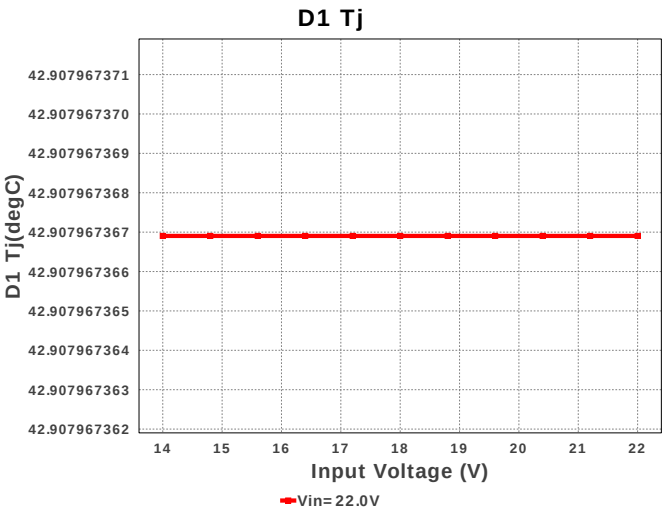


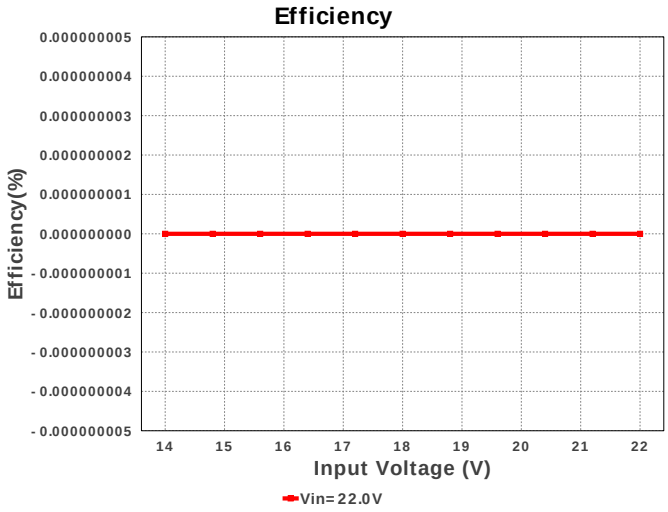


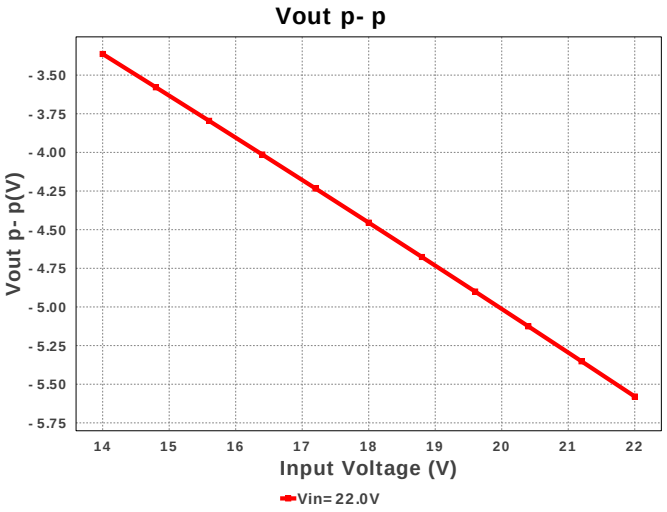


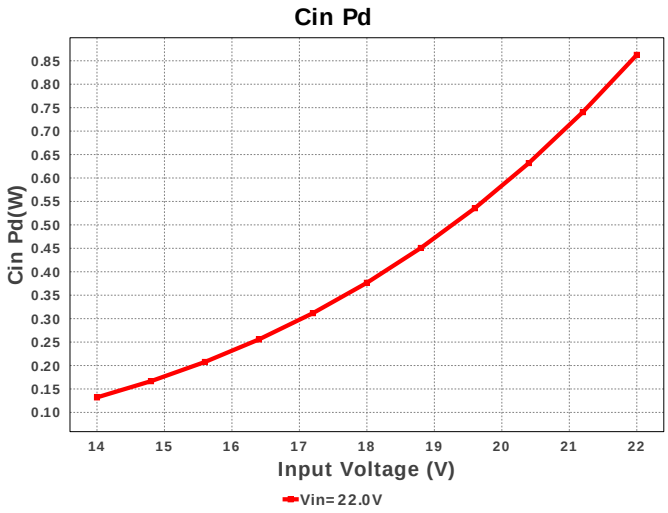


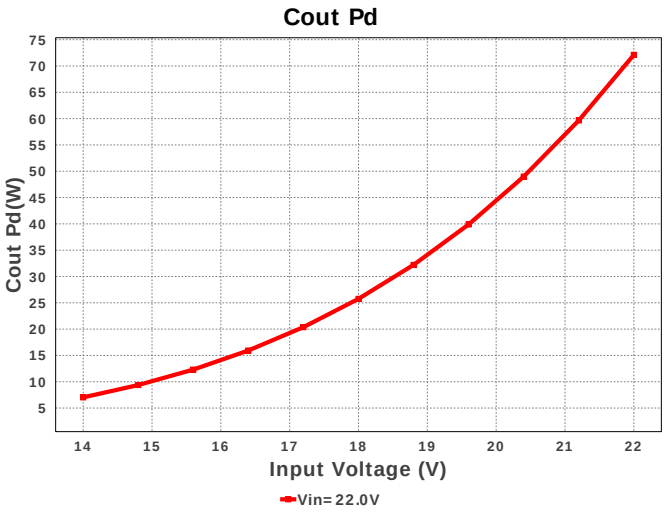


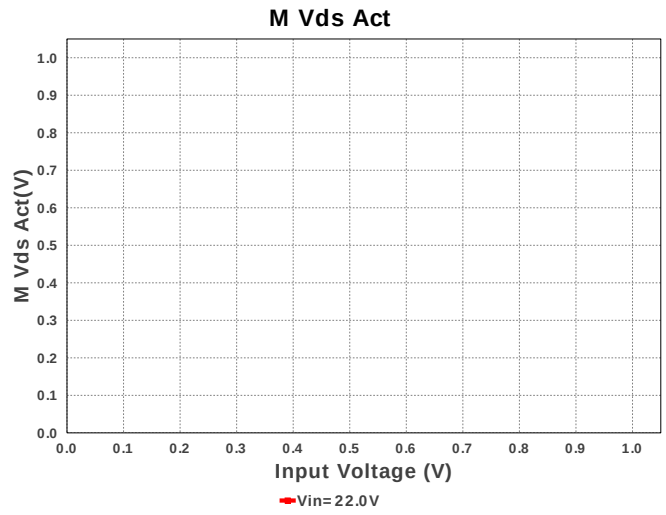


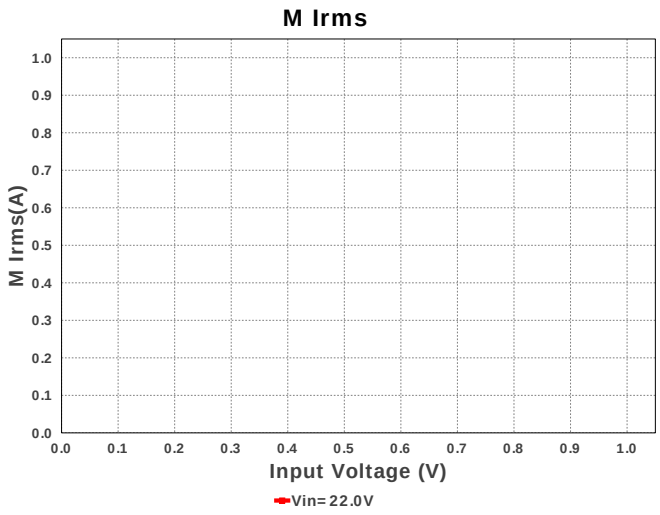


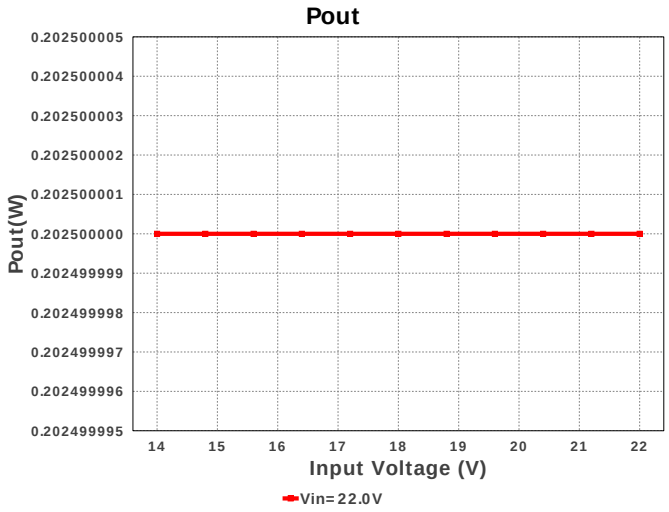


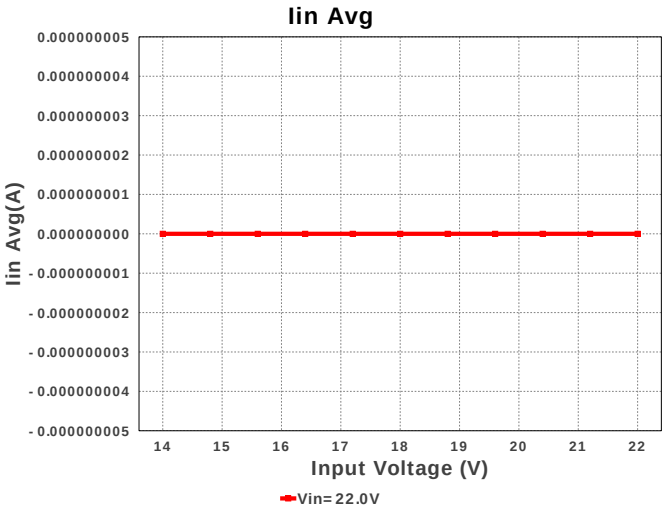


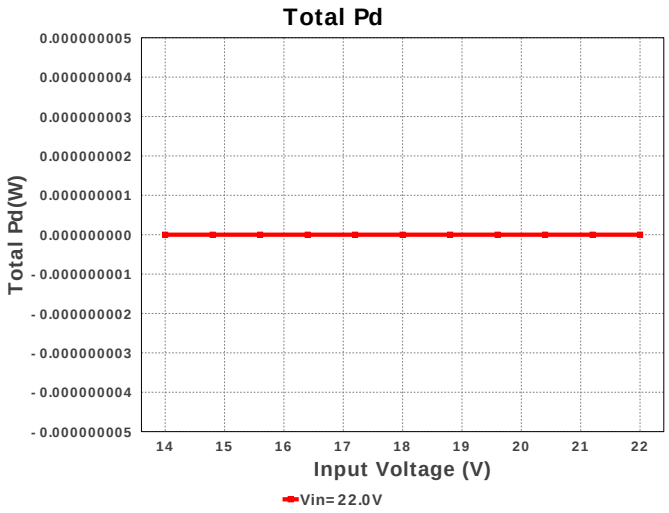


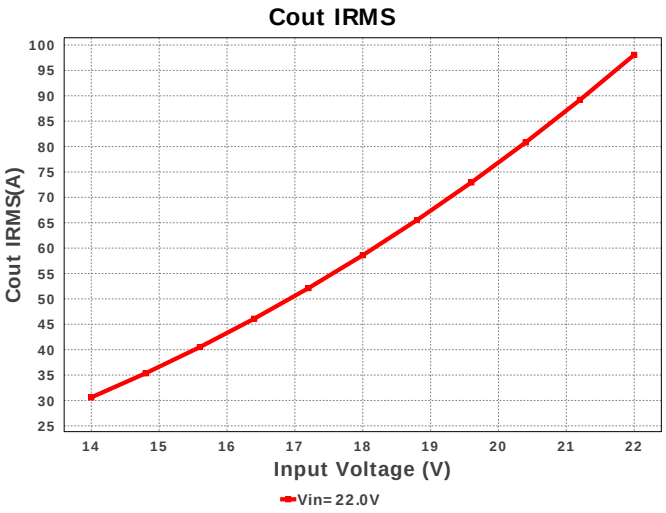


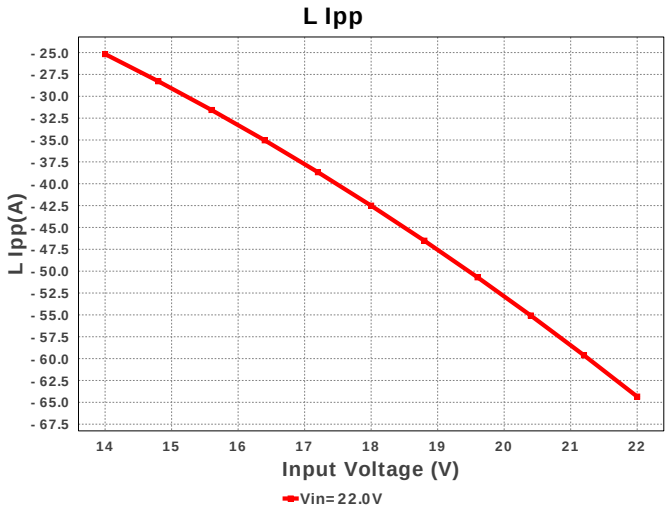


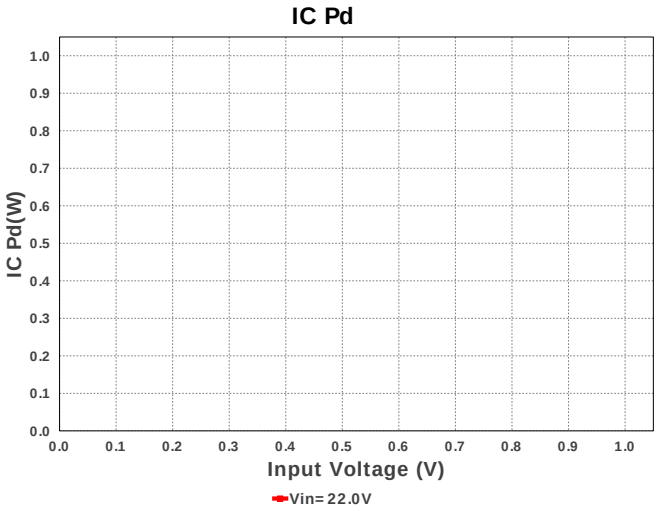


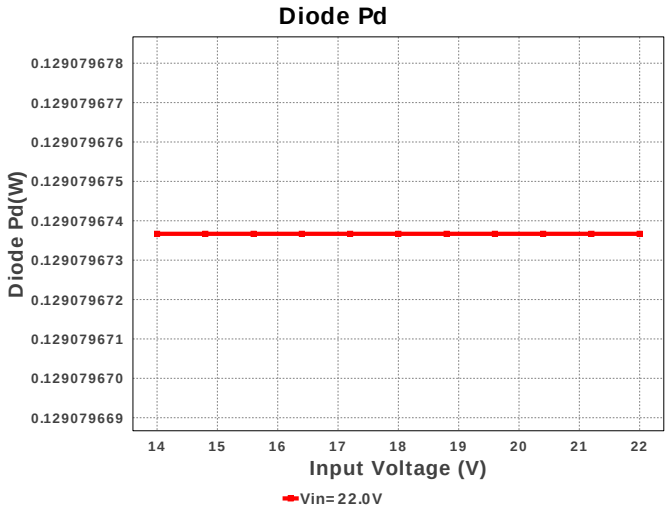












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	211.891 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	341.914 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	998.941 mA	Current	Peak switch current in IC
4.	Iin Avg	634.0 mA	Current	Average input current
5.	L Ipp	734.01 mA	Current	Peak-to-peak inductor ripple current
6.	LED Iavg	270.0 mA	Current	LED Average Current
7.	LED Ipp	59.99 mA	Current	LED Ripple Current
8.	M1 Irms	504.415 mA	Current	Q Iavg
9.	BOM Count	17	General	Total Design BOM count
10.	FootPrint	291.0 mm^2	General	Total Foot Print Area of BOM components
11.	Frequency	600.0 kHz	General	Switching frequency
12.	IC Tolerance	22.5 mV	General	IC Feedback Tolerance
13.	M Vds Act	111.538 mV	General	Voltage drop across the MosFET
14.	Pout	7.795 W	General	Total output power
15.	Total BOM	$4.69	General	Total BOM Cost
16.	D1 Tj	43.987 degC	Op_Point	D1 junction temperature
17.	Vout OP	28.869 V	Op_Point	Operational Output Voltage
18.	Duty Cycle	57.274 %	Op_point	Duty cycle
19.	Efficiency	87.817 %	Op_point	Steady state efficiency
20.	IC Tj	37.968 degC	Op_point	IC junction temperature
21.	ICThetaJA	27.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
22.	IOUT_OP	270.0 mA	Op_point	Iout operating point
23.	LED Rd	3.296 Ohm	Op_point	LED DynamicResistance
24.	LED Vf	26.369 V	Op_point	Total LED Forward Calculated Voltage
25.	VIN_OP	14.0 V	Op_point	Vin operating point
26.	Cin Pd	112.244 µW	Power	Input capacitor power dissipation
27.	Cout Pd	876.791 µW	Power	Output capacitor power dissipation
28.	Diode Pd	139.867 mW	Power	Diode power dissipation
29.	IC Pd	295.104 mW	Power	IC power dissipation
30.	L Pd	52.42 mW	Power	Inductor power dissipation
31.	LED Pd	7.592 W	Power	LED Power Dissipation

#	Name	Value	Category	Description
32.	Total Pd	1.081 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	270.0 m	Maximum Output Current
2.	Iout1	270.0 m	Output Current #1
3.	VinMax	22.0	Maximum input voltage
4.	VinMin	14.0	Minimum input voltage
5.	Vout	28.119	Output Voltage
6.	Vout1	28.119	Output Voltage #1
7.	application	LED_DRIVER	LED Application
8.	base_pn	LM3492	Base Product Number
9.	LED_Architect	Y	LED Architect Project
10.	ledparallel	1.0	Number of LED in parallel
11.	ledpartnumber	GW5BNF15L10	LED Part number
12.	ledseries	3.0	Number of LED in series
13.	line_fsw	NaN	AC Line Frequency
14.	source	DC	Input Source Type
15.	Ta	30.0	Ambient temperature

Design Assistance

1. **LM3492** Product Folder : http://www.ti.com/product/LM3492 : contains the data sheet and other resources.