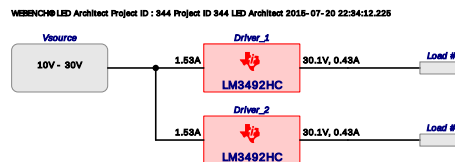


WEBENCH® LED Architect



Project Report

Project : 906020/344 : Project ID 344

Created : 2015-07-20 22:34:12.225

LED Architect with light output=2000.0

Launch WEBENCH LED Architect.

Project Summary

Total BOM Cost : \$32.42

Total Footprint : 13,300 mm²

Total BOM Count : 49

Total Efficiency : 25.02%

Total Efficacy : 66.6 lumens / Watt

Total Power Dissipation (loss) : 4.21 Watts

Design Input Specifications :

1. VinMax	30.0	Maximum input voltage
2. VinMin	10.0	Minimum input voltage
3. color	cool white	LED Color
4. inputSource	DC	Input Source Type
5. lightOutput	2000.0	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 : LM3492HCMHX/NOPB Two-Channel COT Boost LED Driver; Driver Efficiency = 86.28%

Drivers Electrical BOM

Manufacturer	Part Number	Quantity	Budgetary Price	Footprint (mm ²)
TDK	C3225X7R2A225K230AB	2	\$0.38	29
TDK	C5750X7S2A106M	4	\$1.68	108
Comchip Technology	CDBC5100-G	2	\$0.52	167
Vishay-Dale	CRCW040216K2FKED	2	\$0.02	6
Vishay-Dale	CRCW0402309KFKED	2	\$0.02	6
Vishay-Dale	CRCW040252K3FKED	2	\$0.02	6
Vishay-Dale	CRCW04025K76FKED	2	\$0.02	6
Vishay-Dale	CRCW0402825KFKED	2	\$0.02	6
MuRata	GRM155R60J394KE19D	2	\$0.04	6
MuRata	GRM1885C2A100JA01D	2	\$0.02	9
MuRata	GRM21BR61C105KA01L	2	\$0.02	14
Texas Instruments	LM3492HCMHX/NOPB	2	\$2.60	143
Coilcraft	XAL4030-682MEB	2	\$1.44	50
Cree	XPEWHT-L1-R250-00C01	20	\$2.04	40
Total		48	\$8.84	595

LED Array Solution BOM = LEDs + Heatsink

Manufacturer	Part Number	Quantity	Cost	Footprint (cm ²)
Cree	XPEWHT-L1-R250-00C01	20	\$20.40	-
Aavid	60585	1	\$3.54	126
Total			\$23.94	126

LED Array Solution

LED Array

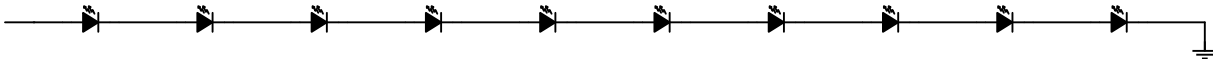
Light Output : 2000 lumens
 Color : cool white
 LED quantity : 20 Series = 10 Parallel = 2
 Total Vout : 30.1 Volts
 Total Iload : 0.4 Amps
 Total Light Output : 2000 lumens
 Flux : 100 lumens
 ThetaSA : 2.04 C / Watt
 Junction Temp : 87 degrees
 Operating Vf : 3.01 Volts
 Operating Io : 0.429 Amps
 Efficiency : 29%
 Efficacy : 98.1 lumens / Watt
 Total Footprint : 12635.9 mm²
 Total LED Cost : \$23.94
 Max LED Vout : 60.0 Volts

Selected LED



Manufacturer : Cree
 Part Number : XPEWHT-L1-R250-00C01
 Vf : 3.24 V
 Io : 0.35 A
 Angle : 115.0 degree
 PhiV : 100.0
 Color Temperature : 7500.0 K
 Color : cool white
 Tj : 150.0 deg C
 IfMin : 0.1 Amps
 IfMax : 1.0 Amps
 RJC : 9.0 deg C/Ohm
 Isat : 0.0 Amps
 Package mount : SMT
 Footprint : 19.8 mm²

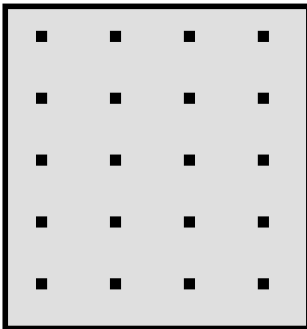
LED Load Array : For each Driver : series = 10, parallel = 1, LED Quantity = 10
 Total Driver Quantity = 2 Total LED Quantity = 20



Heatsink

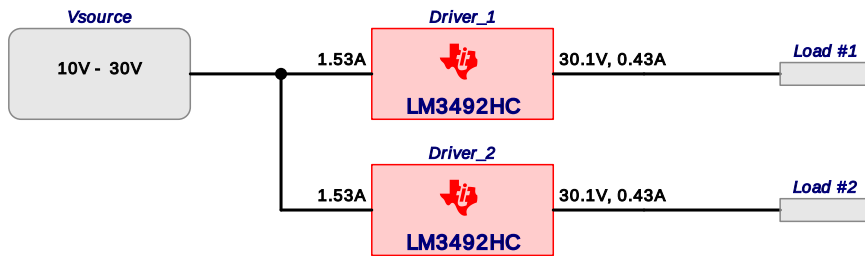
Length : 109.05 mm
 Width : 115.87 mm
 Height : 19.05 mm
 Total Heatsink Footprint : 12636 mm²
 Total Heatsink Cost : \$3.54

Manufacturer : Aavid
 Part Number : 60585
 ThetaSA : 2.04 C/W



Project Diagram

WEBENCH® LED Architect Project ID : 344 Project ID 344 LED Architect 2015-07-20 22:34:12.225





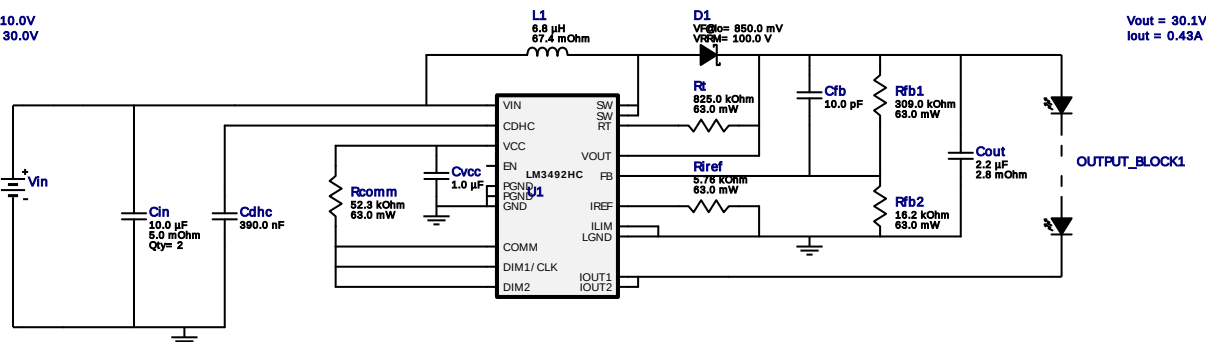
VinMin = 10.0V
 VinMax = 30.0V
 Vout = 30.1V
 Iout = 0.43A

Device = LM3492HCMHX/NOPB
 Topology = Boost
 Created = 7/20/15 10:34:11 PM
 BOM Cost = \$4.24
 Footprint = 332.0 mm²
 BOM Count = 24
 Total Pd = 2.11W

WEBENCH® Design Report

Design : 906020/2113 LM3492HCMHX/NOPB
 LM3492HCMHX/NOPB 10.0V-30.0V to 30.85V @ 0.429A

VinMin = 10.0V
 VinMax = 30.0V

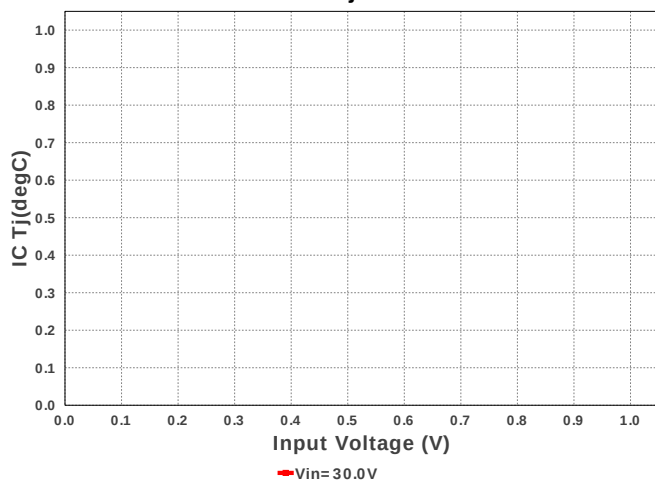


Electrical BOM

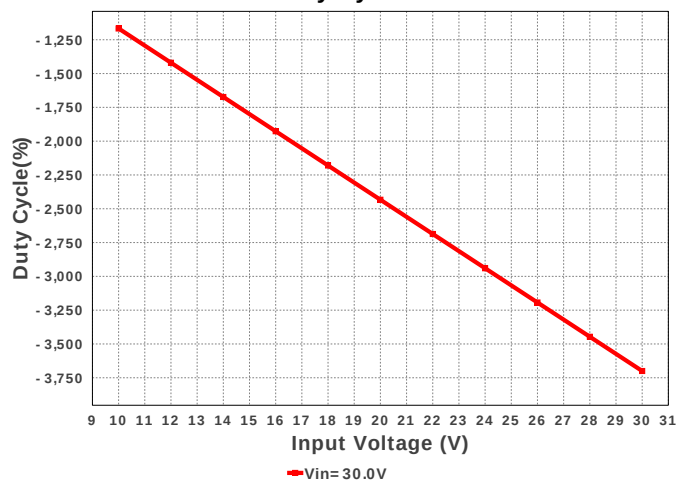
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cdhc	MuRata	GRM155R60J394KE19D Series= X5R	Cap= 390.0 nF VDC= 6.3 V IRMS= 0.0 A	1	\$0.02	0402 3 mm ²
2.	Cfb	MuRata	GRM1885C2A100JA01D Series= C0G/NP0	Cap= 10.0 pF VDC= 100.0 V IRMS= 0.0 A	1	\$0.01	0603 5 mm ²
3.	Cin	TDK	C5750X7S2A106M Series= X7S	Cap= 10.0 uF ESR= 5.0 mOhm VDC= 100.0 V IRMS= 6.45 A	2	\$0.84	2220 54 mm ²
4.	Cout	TDK	C3225X7R2A225K230AB Series= X7R	Cap= 2.2 uF ESR= 2.8 mOhm VDC= 100.0 V IRMS= 9.8247 A	1	\$0.19	1210 15 mm ²
5.	Cvcc	MuRata	GRM21BR61C105KA01L Series= X5R	Cap= 1.0 uF VDC= 16.0 V IRMS= 0.0 A	1	\$0.01	0805 7 mm ²
6.	D1	Comchip Technology	CDBC5100-G	VF@Io= 850.0 mV VRRM= 100.0 V	1	\$0.26	SMC 83 mm ²
7.	D_LED1	Cree	XPEWHT-L1-R250-00C01	LED	10	\$1.02	xlampxpe 20 mm ²
8.	L1	Coilcraft	XAL4030-682MEB	L= 6.8 uH DCR= 67.4 mOhm	1	\$0.72	XAL4030 25 mm ²
9.	Rcomm	Vishay-Dale	CRCW040252K3FKED Series= CRCW..e3	Res= 52.3 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
10.	Rfb1	Vishay-Dale	CRCW0402309KFKED Series= CRCW..e3	Res= 309.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	0402 3 mm ²
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

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
12.	Riref	Vishay-Dale	CRCW04025K76FKED Series= CRCW..e3	Res= 5.76 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
13.	Rt	Vishay-Dale	CRCW0402825KFKED Series= CRCW..e3	Res= 825.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm²
14.	U1	Texas Instruments	LM3492HCMHX/NOPB	Switcher	1	\$1.30	 MXA20A 71 mm²

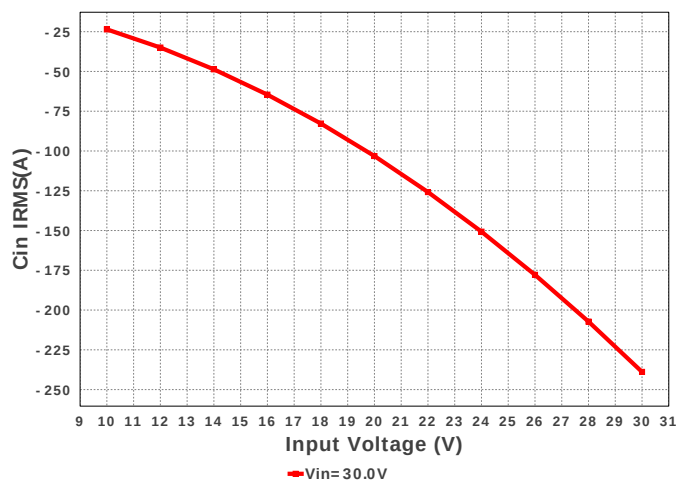
IC Tj



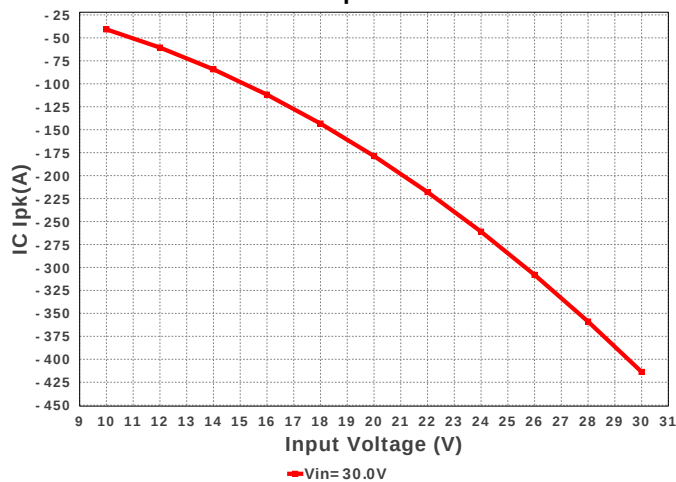
Duty Cycle



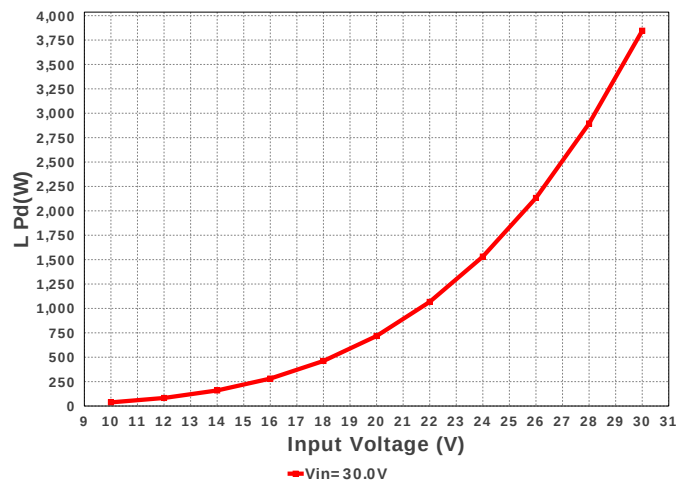
Cin IRMS



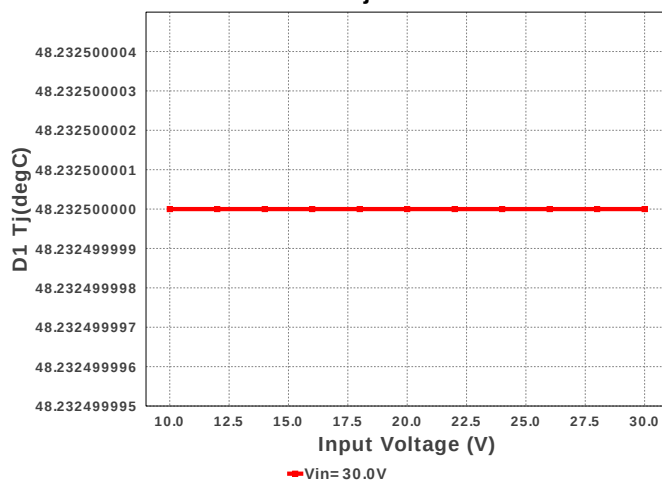
IC Ipk

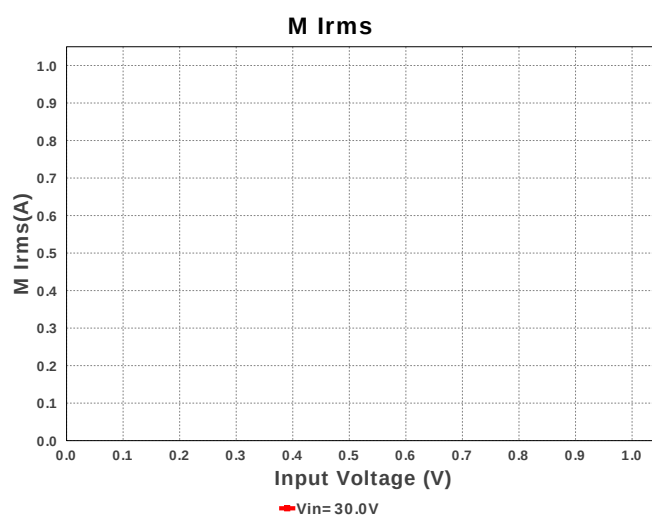
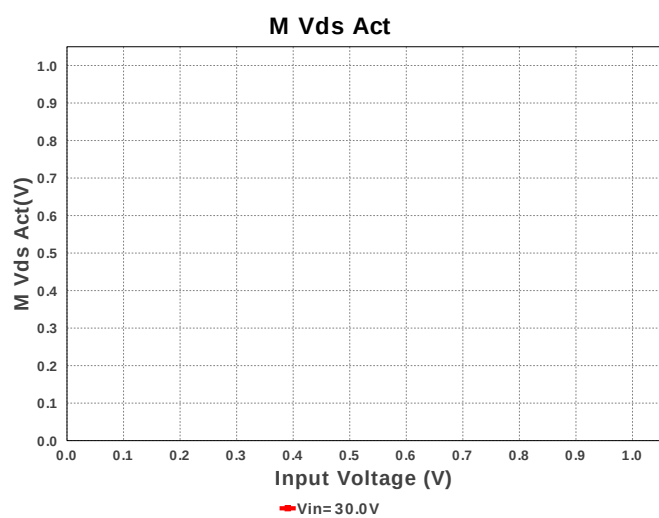
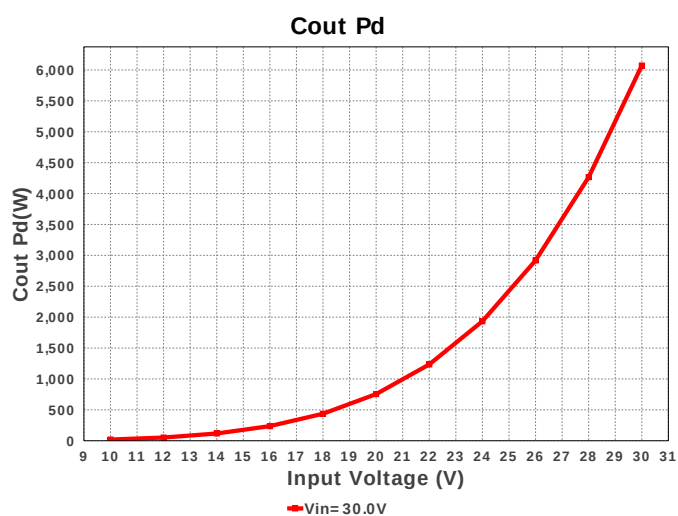
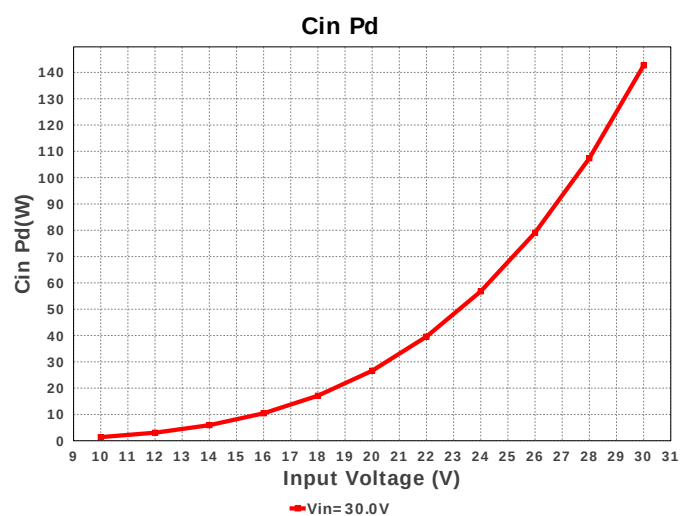
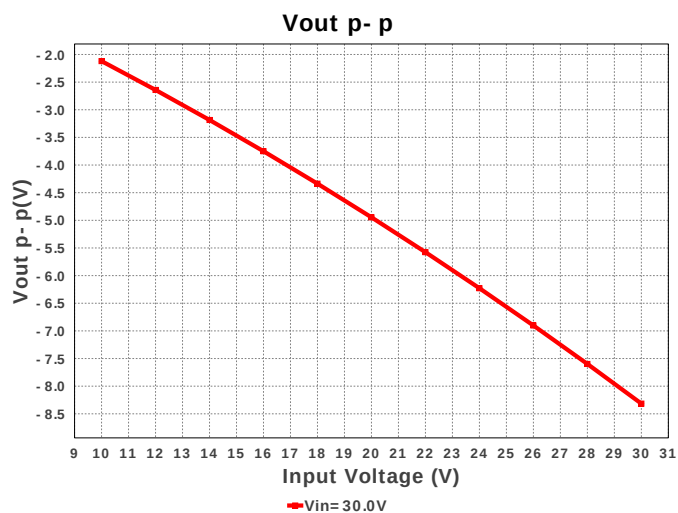
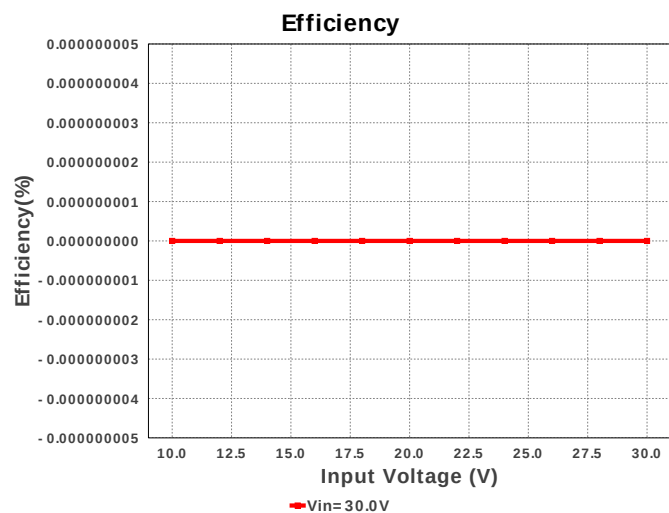


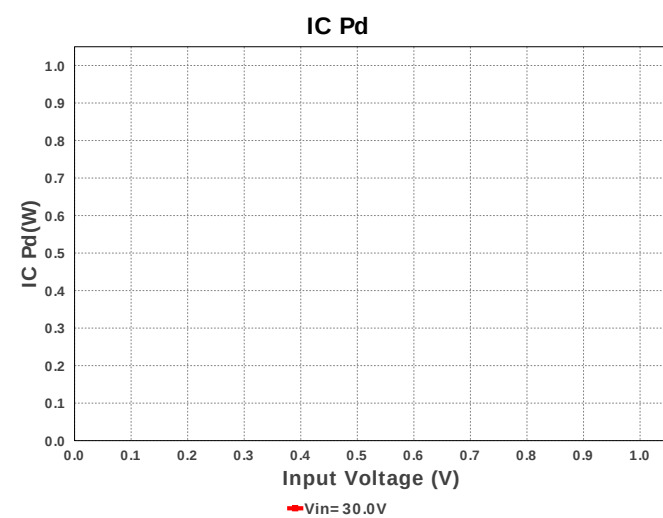
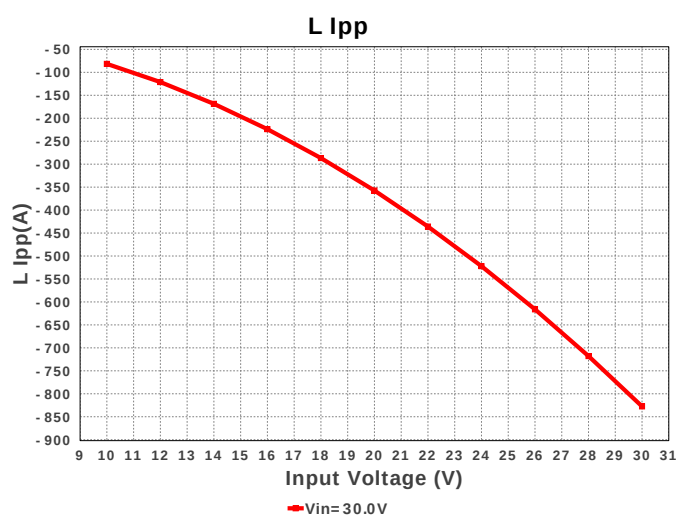
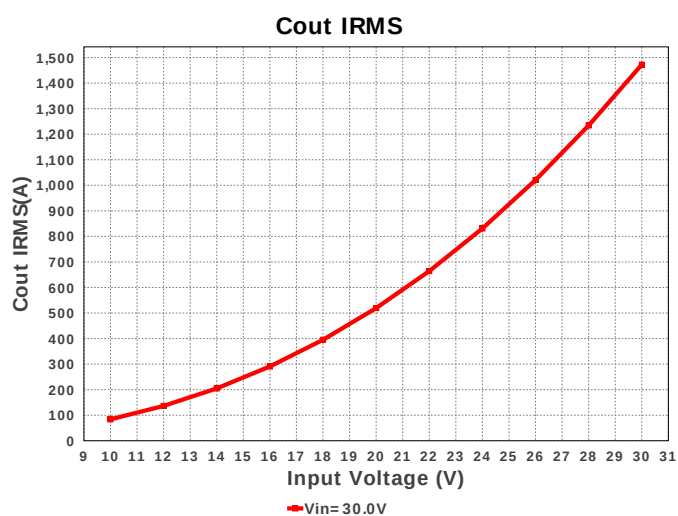
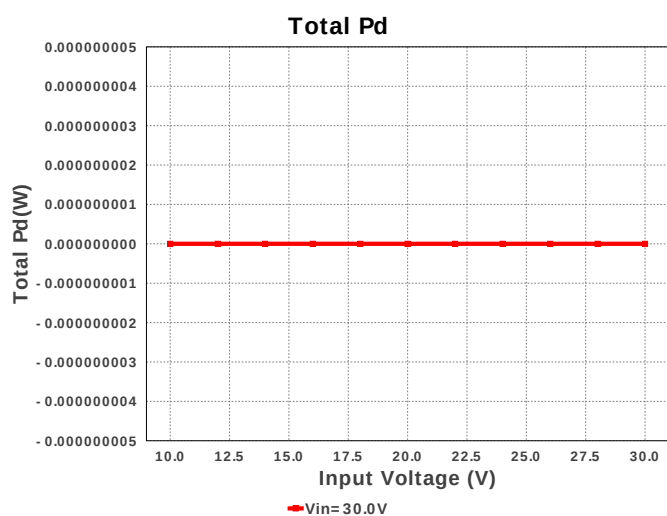
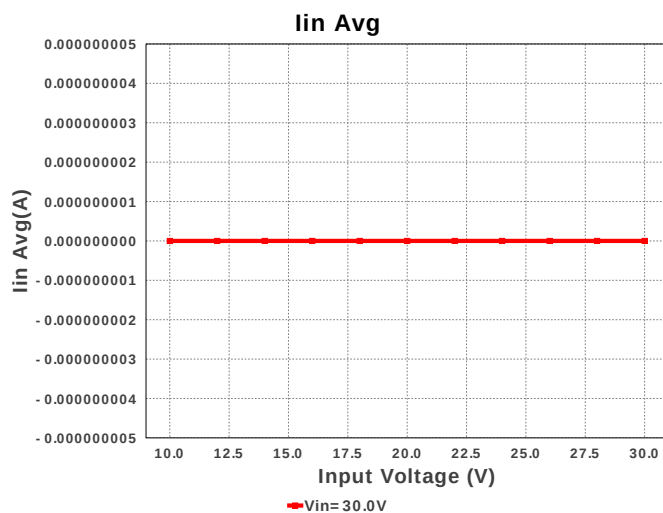
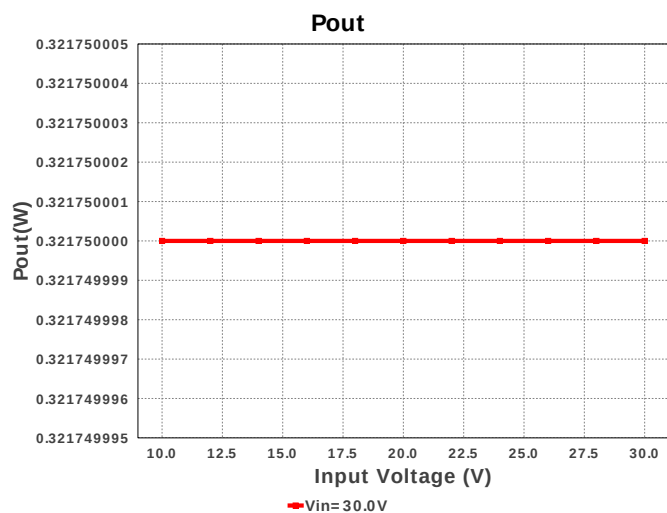
L Pd

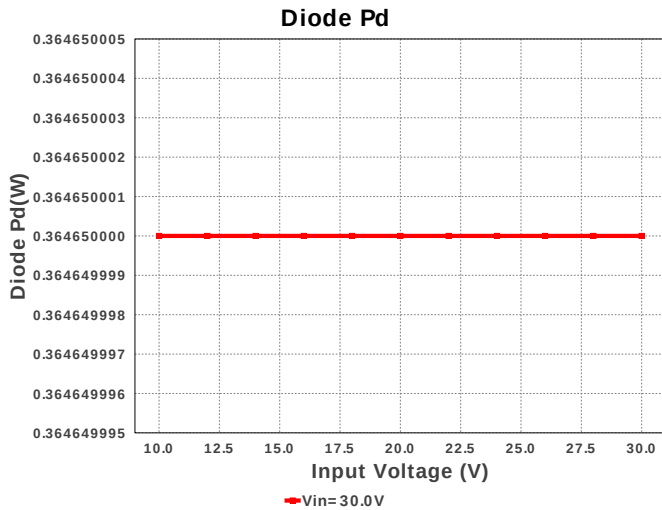


D1 Tj









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	1.232 A	Current	Input capacitor RMS ripple current
2.	Cout IRMS	782.077 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	3.778 A	Current	Peak switch current in IC
4.	Iin Avg	1.534 A	Current	Average input current
5.	L Ipp	3.778 A	Current	Peak-to-peak inductor ripple current
6.	LED Iavg	429.0 mA	Current	LED Average Current
7.	LED Ipp	90.737 mA	Current	LED Ripple Current
8.	M Irms	1.659 A	Current	MOSFET RMS current
9.	BOM Count	24	General	Total Design BOM count
10.	FootPrint	332.0 mm ²	General	Total Foot Print Area of BOM components
11.	Frequency	191.842 kHz	General	Switching frequency
12.	IC Tolerance	22.5 mV	General	IC Feedback Tolerance
13.	M Vds Act	429.506 mV	General	Voltage drop across the MosFET
14.	Pout	13.236 W	General	Total output power
15.	Total BOM	\$4.24	General	Total BOM Cost
16.	D1 Tj	48.232 degC	Op_Point	D1 junction temperature
17.	Vout OP	30.854 V	Op_Point	Operational Output Voltage
18.	Duty Cycle	57.862 %	Op_point	Duty cycle
19.	Efficiency	86.276 %	Op_point	Steady state efficiency
20.	IC Tj	53.688 degC	Op_point	IC junction temperature
21.	ICThetaJA	27.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
22.	IOUT_OP	429.0 mA	Op_point	Iout operating point
23.	LED Rd	548.184 mOhm	Op_point	LED DynamicResistance
24.	LED Vf	28.354 V	Op_point	Total LED Forward Calculated Voltage
25.	VIN_OP	10.0 V	Op_point	Vin operating point
26.	Cin Pd	3.793 mW	Power	Input capacitor power dissipation
27.	Cout Pd	1.713 mW	Power	Output capacitor power dissipation
28.	Diode Pd	364.65 mW	Power	Diode power dissipation
29.	IC Pd	877.33 mW	Power	IC power dissipation
30.	L Pd	258.398 mW	Power	Inductor power dissipation
31.	LED Pd	12.915 W	Power	LED Power Dissipation
32.	Total Pd	2.106 W	Power	Total Power Dissipation

Design Inputs

#	Name	Value	Description
1.	Iout	429.0 m	Maximum Output Current
2.	Iout1	429.0 m	Output Current #1
3.	VinMax	30.0	Maximum input voltage
4.	VinMin	10.0	Minimum input voltage
5.	Vout	30.104	Output Voltage
6.	Vout1	30.104	Output Voltage #1
7.	application	LED_DRIVER	LED Application
8.	base_pn	LM3492HC	Texas Instruments Base Part Number
9.	isLEDArchitect	Y	LED Architect Project
10.	ledparallel	1.0	Number of LED in parallel
11.	ledpartnumber	XPEWHT-L1-R250-00C01	LED Part number
12.	ledseries	10.0	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. LM3492HC Product Folder : <http://www.ti.com/product/LM3492HC> : contains the data sheet and other resources.

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