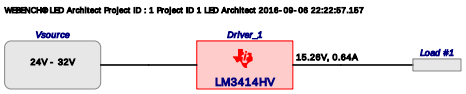


WEBENCH® LED Architect

Project Report

Project : 3876120/1 : Project ID 1
Created : 2016-09-06 22:22:57.157
LED Architect with light output=1000.0

Launch WEBENCH LED Architect.

Project Summary

Total BOM Cost : $0.00
Total Footprint : 2,216 mm^2
Total BOM Count : 13
Total Efficiency : 26.56%
Total Efficacy : 90.6 lumens / Watt
Total Power Dissipation (loss) : 1.27 Watts

Design Inputs :

1.	VinMax	32.0	Maximum input voltage
2.	VinMin	24.0	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 : LM3414HVMR/NOPB Common Anode Capable Constant Current; Driver Efficiency = 88.53%

Drivers Electrical BOM

Manufacturer	Part Number	Quantity	Budgetary Price	Footprint (mm^2)
AVX	08055C105KAT2A	1	$0.45	7
Vishay-Dale	CRCW04024K87FKED	1	$0.01	3
Panasonic	ERJ-6ENF3242V	1	$0.01	7
MuRata	GRM31CR71H225KA88L	1	$0.05	11
Texas Instruments	LM3414HVMR/NOPB	1	$0.96	56
NXP Semiconductor	PMEG6010CEH,115	1	$0.04	12
Bourns	SRN6045-470M	1	$0.16	64
Total		7	$1.68	159

LED Array Solution BOM = LEDs + Heatsink

Manufacturer	Part Number	Quantity	Cost	Footprint (cm^2)
Cree	XPGWHT-L1-0000-00H51	5	$8.00	-
Aavid	66365	1	$1.42	22
Total			$9.42	22

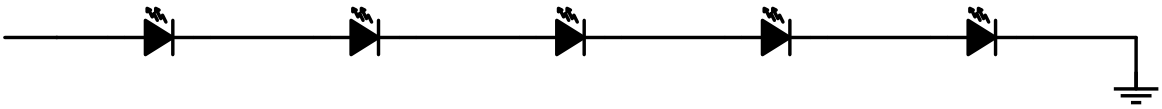
LED Array Solution

LED Array
Light Output : 1000 lumens
Color : cool white
LED quantity : 5Series = 5Parallel = 1
Total Vout : 15.3 Volts
Total Iload : 0.6 Amps
Total Light Output : 1000 lumens
Flux : 200 lumens
ThetaSA : 7.46 C / Watt
Junction Temp : 101 degrees
Operating Vf : 3.052 Volts
Operating Io : 0.64 Amps
Efficiency : 30%
Efficacy : 102.4 lumens / Watt
Total Footprint : 2215.8 mm^2
Total LED Cost : $9.42
Max LED Vout : 60.0 Volts

Selected LED

Manufacturer : Cree
Part Number : XPGWHT-L1-0000-00H51
Vf : 3.0 V
Io : 0.35 A
Angle : 125.0 degree
PhiV : 139.0
Color Temperature : 6650.0 K
Color : cool white
Tj : 150.0 deg C
IfMin : 0.1 Amps
IfMax : 1.5 Amps
RJC : 6.0 deg C/Ohm
Isat : 0.0 Amps
Package mount : SMT
Footprint : 19.8 mm2

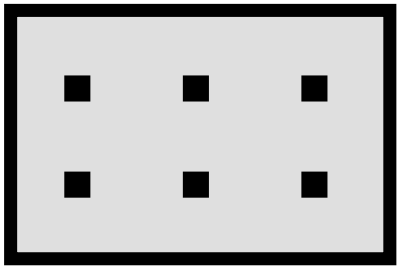
LED Load Array : For each Driver : series = 5, parallel = 1. LED Quantity = 5
Total Driver Quantity = 1 Total LED Quantity = 5



Heatsink

Length : 58.16 mm
Width : 38.1 mm
Height : 16.0 mm
Total Heatsink Footprint : 2216 mm^2
Total Heatsink Cost : $1.42

Manufacturer : Aavid
Part Number : 66365
ThetaSA : 8.16 C/W



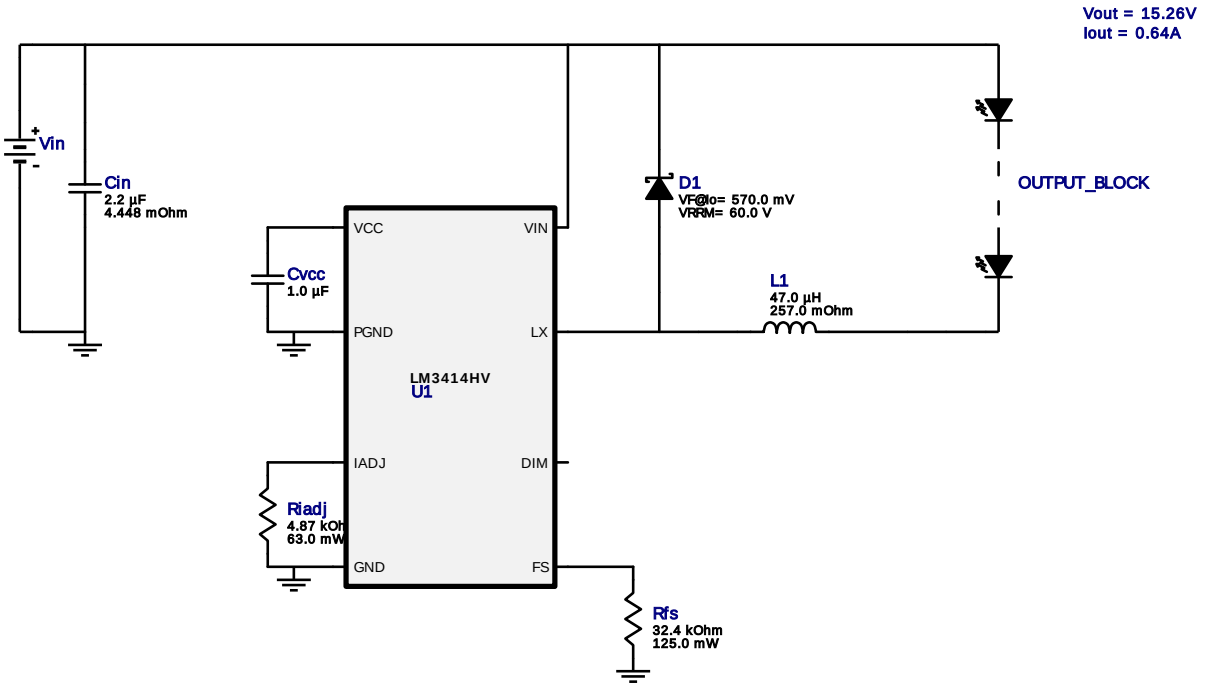
Project Diagram

WEBENCH® Design Report

Vout = 15.26V
Iout = 0.64A

Device = LM3414HVMR/NOPB
Topology = Buck
Created = 9/6/16 10:22:56 PM
BOM Cost = $0.00
BOM Count = 12
Total Pd = 1.27W

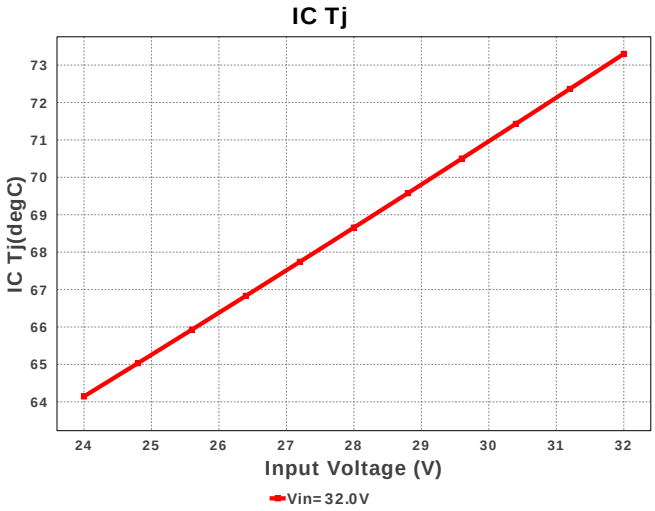
Design : 3876120/6 LM3414HVMR/NOPB
LM3414HVMR/NOPB 24.0V-32.0V to 15.26V @ 0.64A

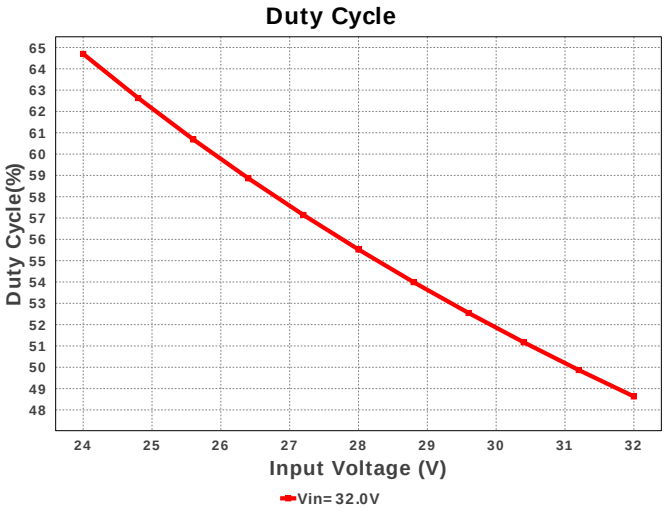


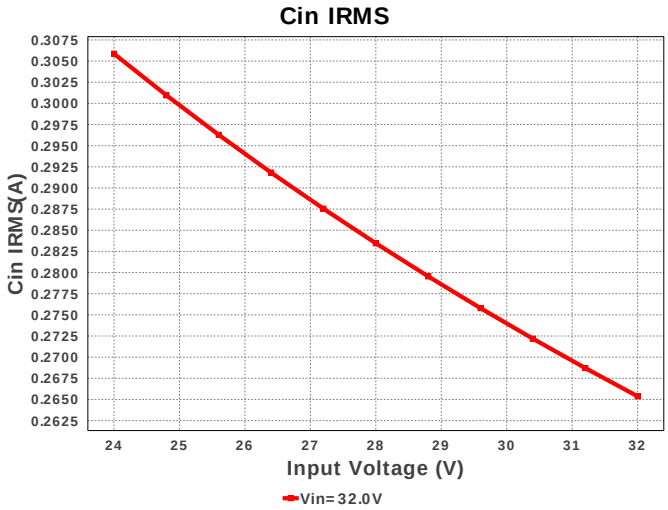
Electrical BOM

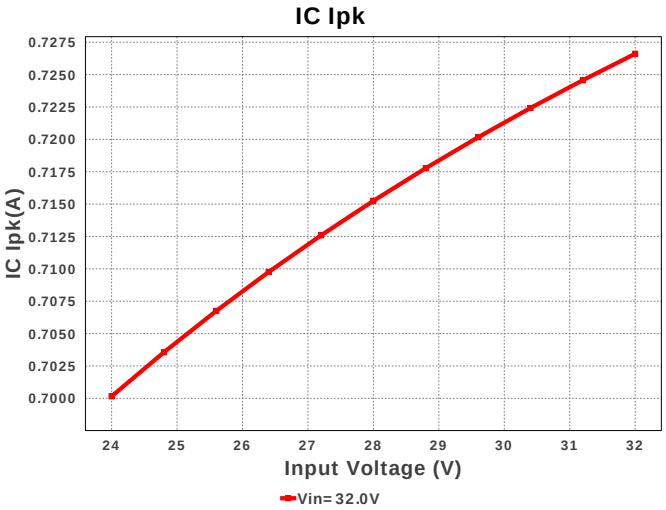
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cin	MuRata	GRM31CR71H225KA88L Series= X7R	Cap= 2.2 uF ESR= 4.448 mOhm VDC= 50.0 V IRMS= 2.2252 A	1	$0.05	1206_190 11 mm²
2.	Cvcc	AVX	08055C105KAT2A Series= X7R	Cap= 1.0 uF VDC= 50.0 V IRMS= 0.0 A	1	$0.45	0805 7 mm²
3.	D1	NXP Semiconductor	PMEG6010CEH,115	VF@Io= 570.0 mV VRRM= 60.0 V	1	$0.04	SOD-123F 12 mm²
4.	D_LED	Cree	XPGWHT-L1-0000-00H51	LED	5	$1.60	xlampxpg 20 mm²
5.	L1	Bourns	SRN6045-470M	L= 47.0 µH DCR= 257.0 mOhm	1	$0.16	SRN6045 64 mm²
6.	Rfs	Panasonic	ERJ-6ENF3242V Series= ERJ-6E	Res= 32.4 kOhm Power= 125.0 mW Tolerance= 1.0%	1	$0.01	0805 7 mm²
7.	Riadj	Vishay-Dale	CRCW04024K87FKED Series= CRCW..e3	Res= 4.87 kOhm Power= 63.0 mW Tolerance= 1.0%	1	$0.01	0402 3 mm²

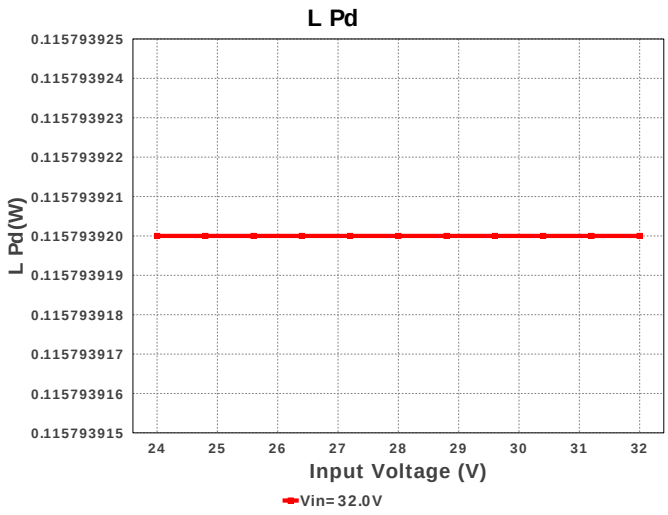
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
8.	U1	Texas Instruments	LM3414HVMR/NOPB	Switcher	1	$0.96	 MRA08A 56 mm^2

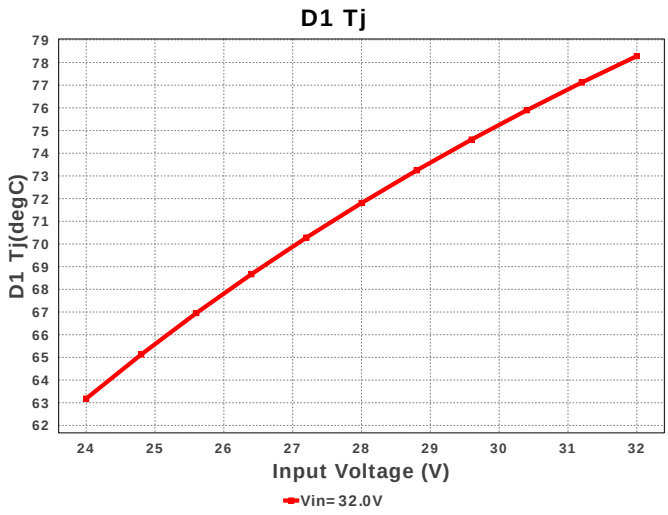


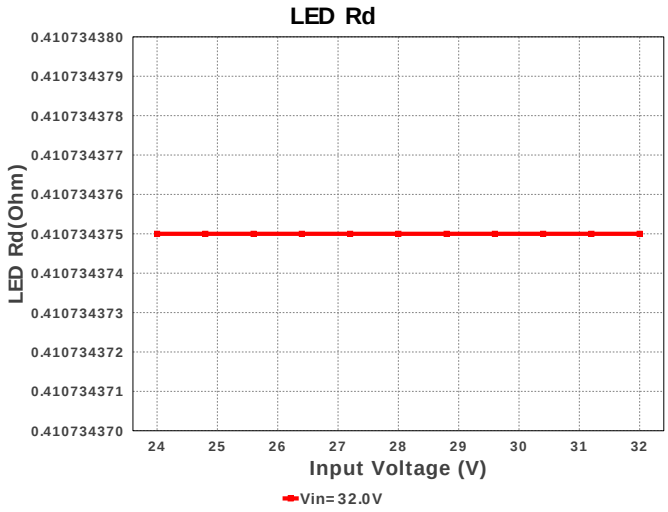


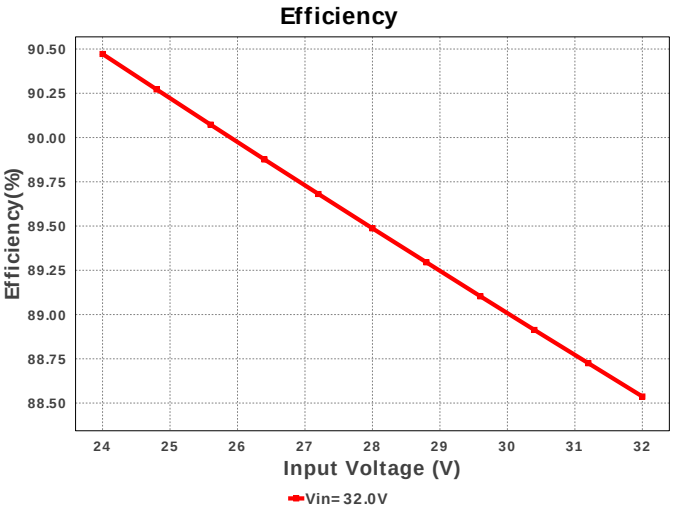


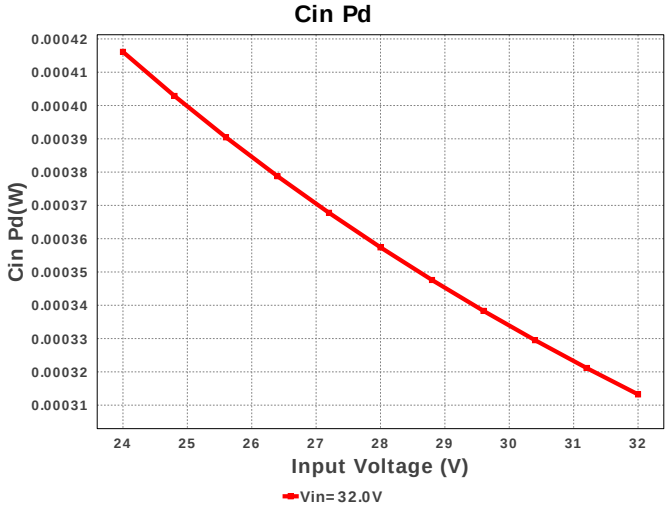


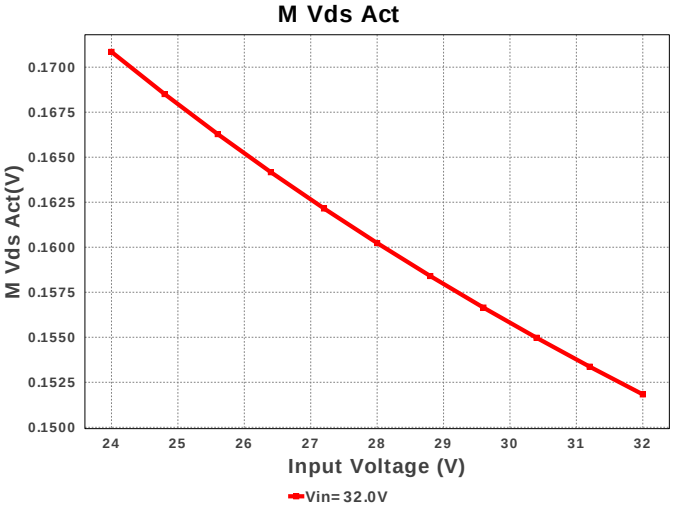


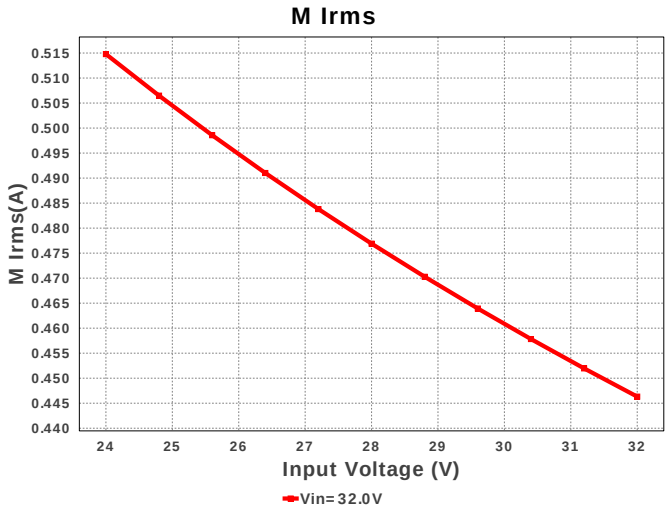


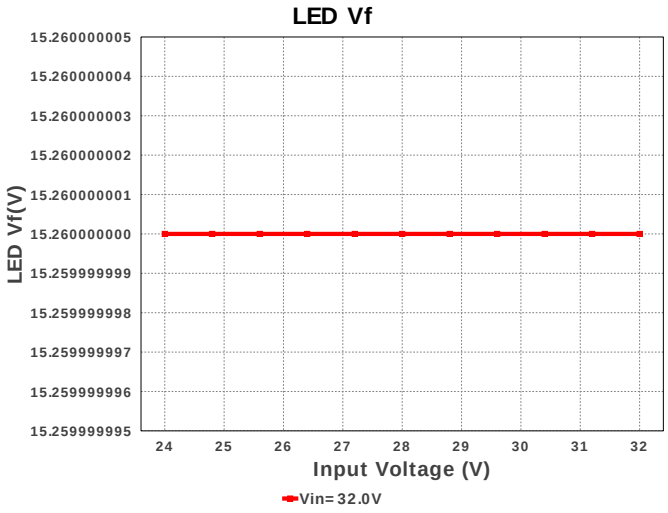


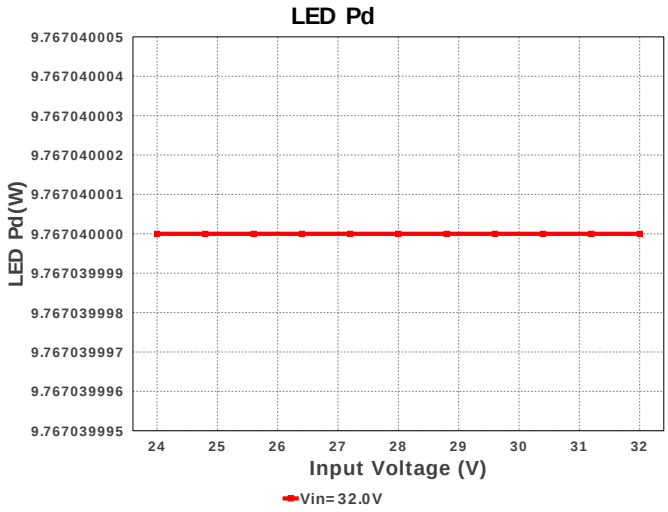


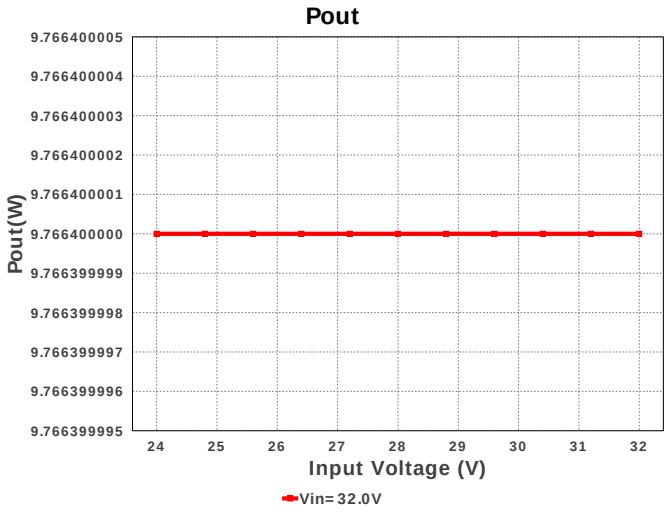


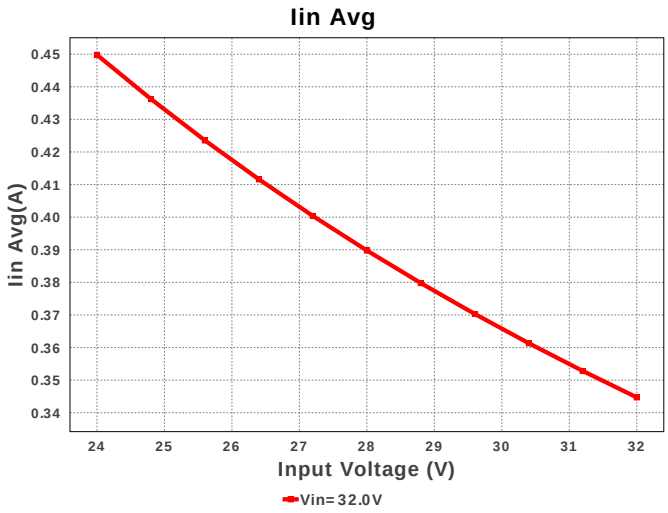


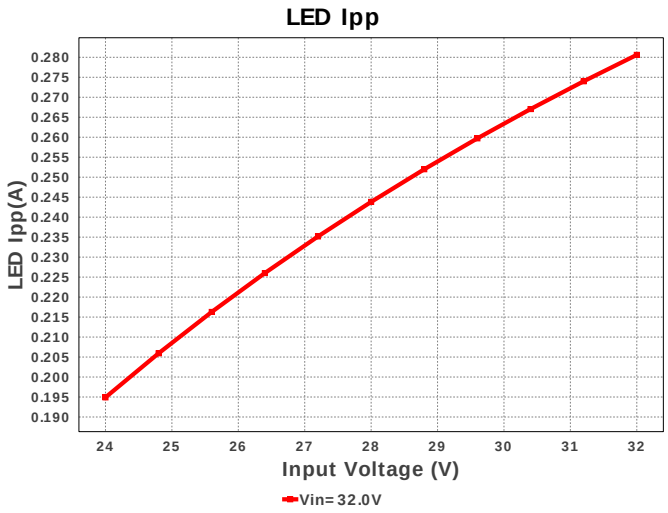


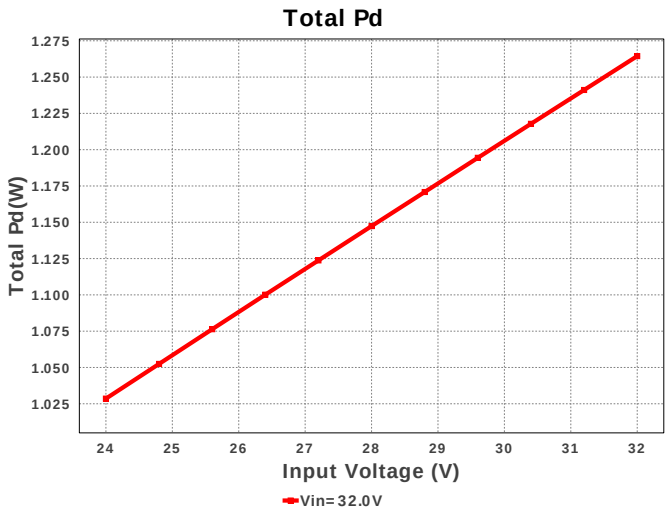


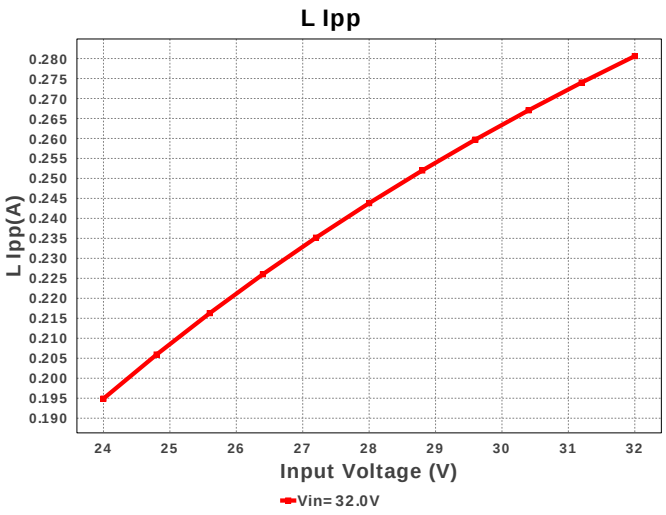


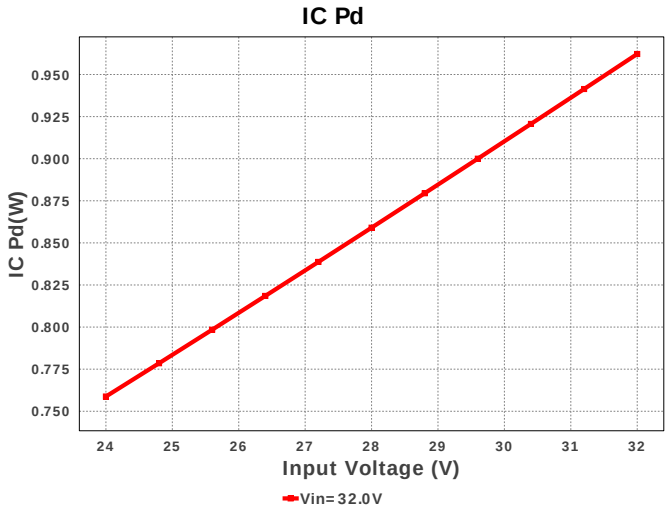


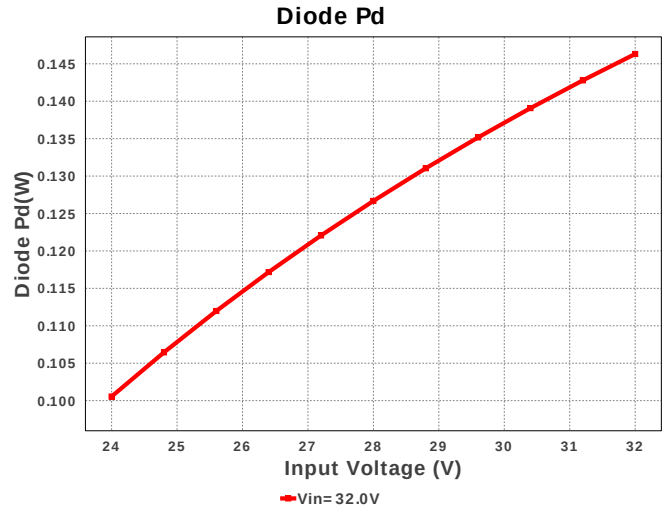


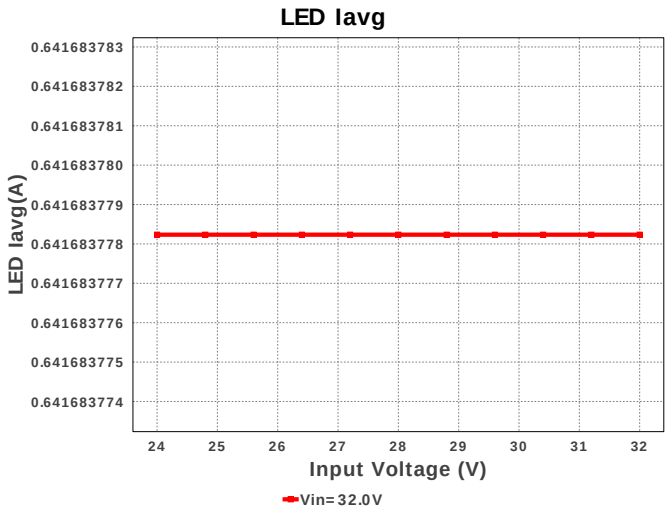












Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	265.35 mA	Current	Input capacitor RMS ripple current
2.	IC Ipk	778.586 mA	Current	Peak switch current in IC
3.	Iin Avg	344.76 mA	Current	Average input current
4.	L Ipp	280.64 mA	Current	Peak-to-peak inductor ripple current
5.	LED Iavg	641.684 mA	Current	LED Average Current
6.	LED Ipp	280.637 mA	Current	LED Ripple Current
7.	M1 Irms	446.341 mA	Current	Q Iavg
8.	BOM Count	12	General	Total Design BOM count
9.	Frequency	617.284 kHz	General	Switching frequency
10.	IC Tolerance	25.0 mV	General	IC Feedback Tolerance
11.	M Vds Act	155.176 mV	General	Voltage drop across the MosFET

#	Name	Value	Category	Description
12.	Mode	CCM	General	Conduction Mode
13.	Pout	9.766 W	General	Total output power
14.	Total BOM	$0.0	General	Total BOM Cost
15.	D1 Tj	78.278 degC	Op_Point	D1 junction temperature
16.	Vout OP	15.26 V	Op_Point	Operational Output Voltage
17.	Duty Cycle	48.638 %	Op_point	Duty cycle
18.	Efficiency	88.525 %	Op_point	Steady state efficiency
19.	IC Tj	82.039 degC	Op_point	IC junction temperature
20.	ICThetaJA	54.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
21.	IOUT_OP	640.0 mA	Op_point	Iout operating point
22.	LED Rd	410.734 mOhm	Op_point	LED DynamicResistance
23.	LED Vf	15.26 V	Op_point	Total LED Forward Calculated Voltage
24.	VIN_OP	32.0 V	Op_point	Vin operating point
25.	Cin Pd	313.187 µW	Power	Input capacitor power dissipation
26.	Diode Pd	146.298 mW	Power	Diode power dissipation
27.	IC Pd	963.681 mW	Power	IC power dissipation
28.	L Pd	115.794 mW	Power	Inductor power dissipation
29.	LED Pd	9.767 W	Power	LED Power Dissipation
30.	Total Pd	1.266 W	Power	Total Power Dissipation
31.	Vout Tolerance	163.83 m%		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	640.0 m	Maximum Output Current
2.	VinMax	32.0	Maximum input voltage
3.	VinMin	24.0	Minimum input voltage
4.	Vout	15.261	Output Voltage
5.	application	LED_DRIVER	LED Application
6.	base_pn	LM3414HV	Base Product Number
7.	LED_Architect	Y	LED Architect Project
8.	ledparallel	1.0	Number of LED in parallel
9.	ledpartnumber	XPGWHT-L1-0000-00H51	LED Part number
10.	ledseries	5.0	Number of LED in series
11.	line_fsw	NaN	AC Line Frequency
12.	source	DC	Input Source Type
13.	Ta	30.0	Ambient temperature

Design Assistance

1. The LM3414 uses a floating buck configuration to supply a constant output current of 350mA to a series of LEDs. This device features: an integrated power N-MOSFET switch, allowing for a simple compact power solution, adjustable switching frequency, via an external resistor, and PWM dimming ability to control the LED brightness. An integrated power N-MOSFET switch allows for a simple compact solution. The switching frequency can be adjusted, via an external resistor. PWM dimming allows the LED brightness to be controlled.

2. **LM3414HV** Product Folder : http://www.ti.com/product/LM3414HV : contains the data sheet and other resources.