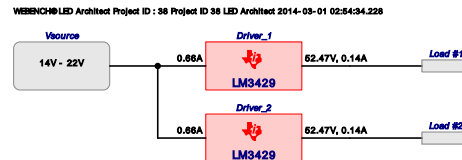


WEBENCH® LED Architect



Project Report

Project : 1382630/38 : Project ID 38
 Created : 2014-03-01 02:54:34.228
 LED Architect with light output=1000.0

Launch WEBENCH LED Architect.

Project Summary

Total BOM Cost : \$23.39
 Total Footprint : 11,109 mm²
 Total BOM Count : 85
 Total Efficiency : 16.19%
 Total Efficacy : 53.1 lumens / Watt
 Total Power Dissipation (loss) : 3.71 Watts

Design Input Specifications :

1. VinMax	22.0	Maximum input voltage
2. VinMin	14.0	Minimum input voltage
3. color	cool white	LED Color
4. inputSource	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 : LM3429MH/NOPB Boost Controller for LED; Driver Efficiency = 80.96%

Drivers Electrical BOM

Manufacturer	Part Number	Quantity	Budgetary Price	Footprint (mm ²)
Infineon Technologies	BSZ160N10NS3 G	2	\$1.26	39
Vishay-Semiconductor	BYS12-90-E3/TR	2	\$0.15	75
Kemet	C0603C104K5RACTU	2	\$0.02	9
Kemet	C0603C225K9PACTU	2	\$0.04	9
TDK	C2012X7R2A104K	2	\$0.06	14
TDK	C3216X7R2A105M	2	\$0.22	22
Yageo America	CC0805JRNPO9BN470	2	\$0.02	14
Yageo America	CC0805KRX7R9BB102	2	\$0.02	14
Vishay-Dale	CRCW040210K0FKED	2	\$0.02	6
Vishay-Dale	CRCW040210R0FKED	2	\$0.02	6
Vishay-Dale	CRCW040212K4FKED	2	\$0.02	6
Vishay-Dale	CRCW04021K00FKED	4	\$0.04	12
Vishay-Dale	CRCW04021K10FKED	2	\$0.02	6
Vishay-Dale	CRCW040244K2FKED	2	\$0.02	6
Vishay-Dale	CRCW0402511KFKED	2	\$0.02	6
Vishay-Dale	CRCW04028K66FKED	2	\$0.02	6
Vishay-Dale	CRCW04029K09FKED	2	\$0.02	6
Panasonic	EEE-FK1V100UR	2	\$0.18	94
Panasonic	ERJ-3RQFR27V	2	\$0.04	9
Panasonic	ERJ-3RQFR68V	2	\$0.04	9
MuRata	GRM155R61A184KE19D	2	\$0.02	6
MuRata	GRM21BR71H104KA01L	2	\$0.02	14
Texas Instruments	LM3429MH/NOPB	2	\$2.00	118
Bourns	SRN8040-101M	2	\$0.42	200
Total		50	\$4.71	705

LED Array Solution BOM = LEDs + Heatsink

Manufacturer	Part Number	Quantity	Cost	Footprint (cm ²)
OSRAM	LUW G5GPGXHY5C8E	34	\$16.66	-
Aavid	61585	1	\$2.01	104
Total			\$18.67	104

LED Array Solution

LED Array

Light Output : 1000 lumens
 Color : cool white
 LED quantity : 34 Series = 17 Parallel = 2
 Total Vout : 52.5 Volts
 Total Iload : 0.1 Amps
 Total Light Output : 1000 lumens
 Flux : 29 lumens
 ThetaSA : 3.55 C / Watt
 Junction Temp : 90 degrees
 Operating Vf : 3.087 Volts
 Operating Io : 0.144 Amps
 Efficiency : 20%
 Efficacy : 66.3 lumens / Watt
 Total Footprint : 10403.5 mm²
 Total LED Cost : \$18.67
 Max LED Vout : 60.0 Volts

Selected LED



Manufacturer : OSRAM
 Part Number : LUW G5GPGXHY5C8E
 Vf : 3.2 V
 Io : 0.1 A
 Angle : 135.0 degree
 PhiV : 26.0
 Color Temperature : 6500.0 K
 Color : cool white
 Tj : 125.0 deg C
 IfMin : 0.03 Amps
 IfMax : 0.2 Amps
 RJC : 40.0 deg C/Ohm
 Isat : 0.0 Amps
 Package mount : SMT
 Footprint : 42.6 mm²

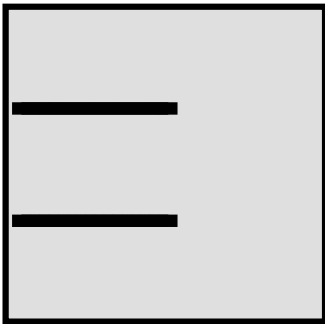
LED Load Array : Per each Driver : series = 17, parallel = 1, LED Quantity = 17
 Total Driver Quantity = 2 Total LED Quantity = 34



Heatsink

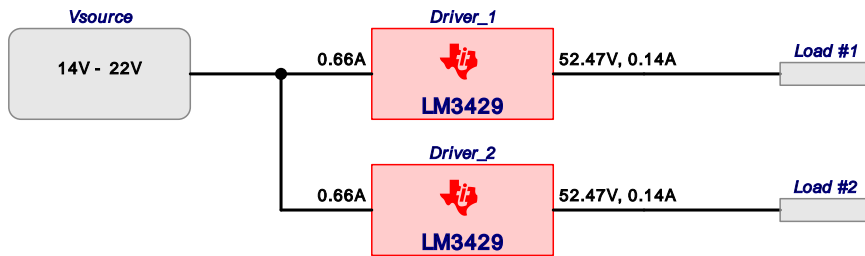
Length : 102.4 mm
 Width : 101.6 mm
 Height : 7.62 mm
 Total Heatsink Footprint : 10403 mm²
 Total Heatsink Cost : \$2.01

Manufacturer : Aavid
 Part Number : 61585
 ThetaSA : 3.55 C/W



Project Diagram

WEBENCH® LED Architect Project ID : 38 Project ID 38 LED Architect 2014-03-01 02:54:34.228



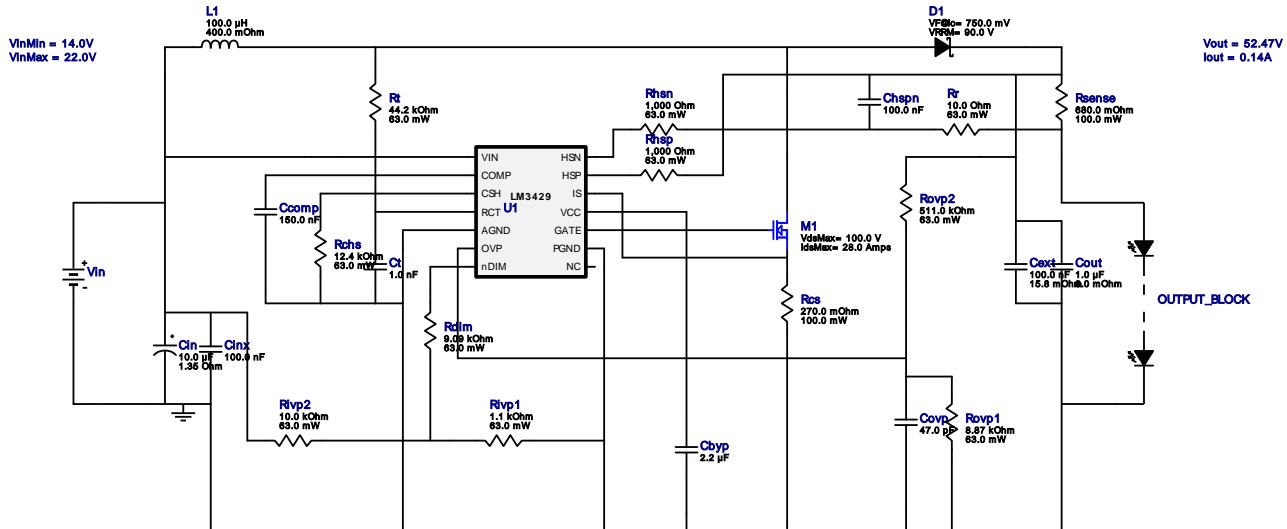


WEBENCH® Design Report

Design : 1382630/427 LM3429MH/NOPB
LM3429MH/NOPB 14.0V-22.0V to 52.471V @ 0.13910290322580643A

VinMin = 14.0V
VinMax = 22.0V
Vout = 52.47V
Iout = 0.14A

Device = LM3429MH/NOPB
Topology = Boost
Created = 3/1/14 2:54:33 AM
BOM Cost = \$2.36
Total Pd = 1.72W
Footprint = 353.0mm2
BOM Count = 42

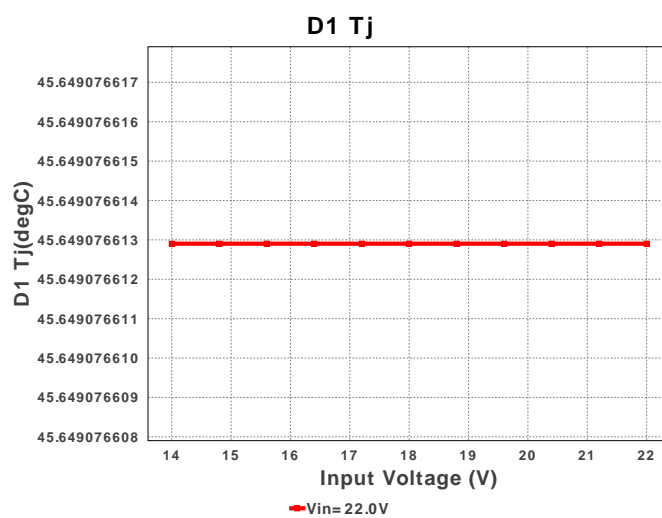
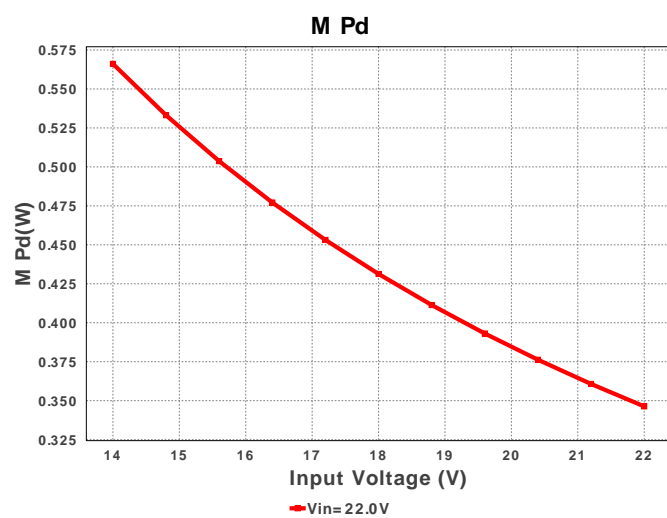
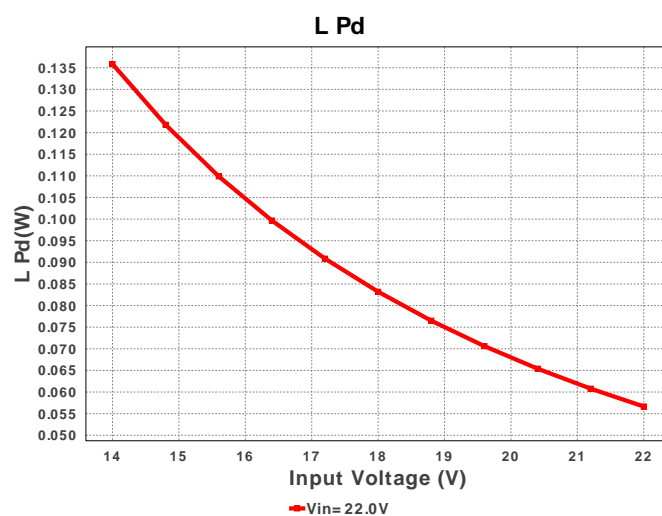
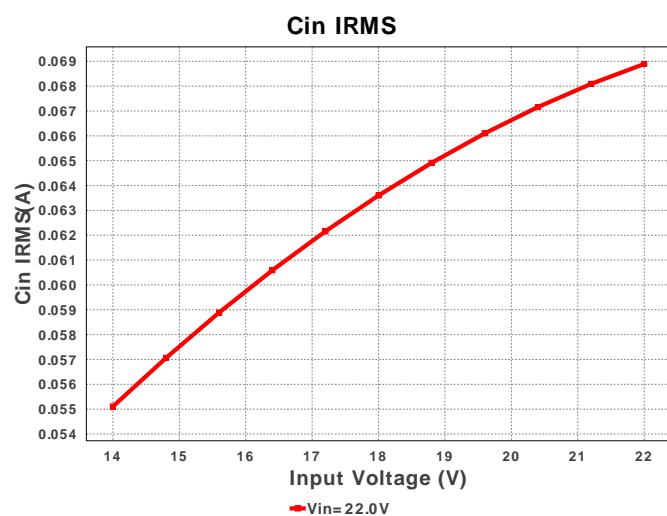
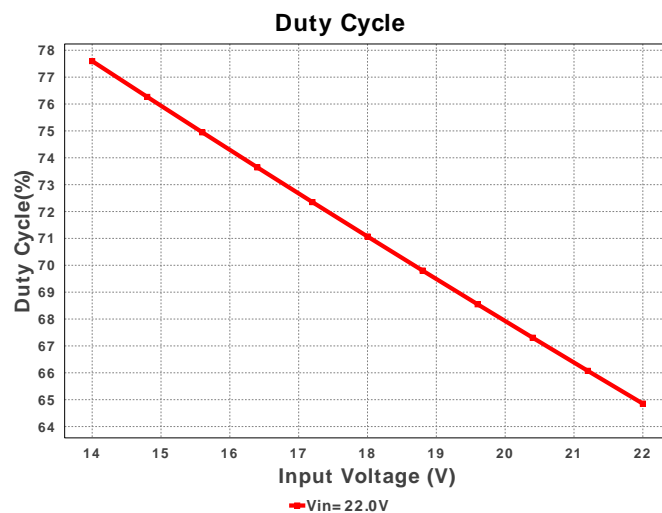
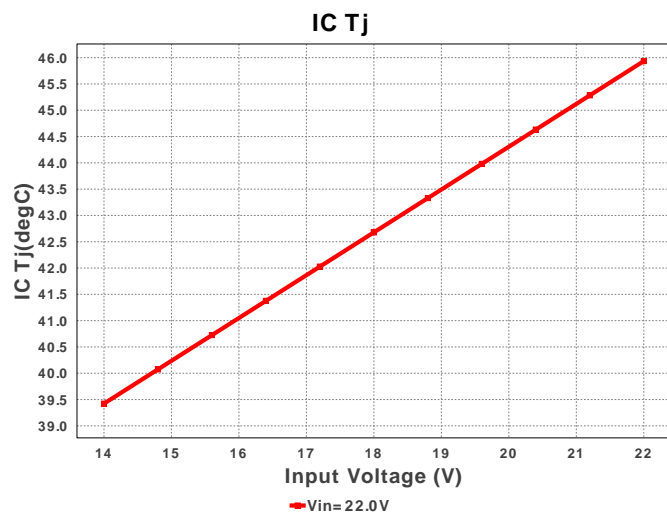


1. This regulator device is qualified for Automotive applications. All passives and other components selected in this design may not be qualified for Automotive applications. The user is required to verify that all components in the design meet the qualification and safety requirements for their specific application. View WEBENCH(R) Disclaimer.

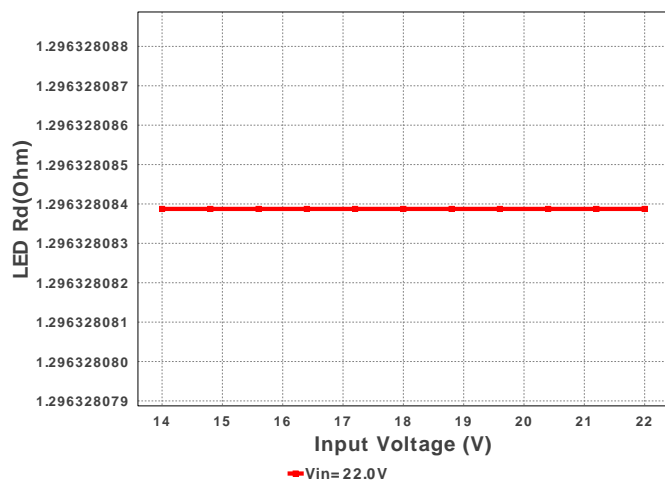
Electrical BOM

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cbyp	Kemet	C0603C225K9PACTU Series= X5R	Cap= 2.2 µF VDC= 6.3 V IRMS= 0.0 A	1	\$0.02	0603 5mm2
2.	Ccomp	MuRata	GRM155R61A154KE19D Series= X5R	Cap= 150.0 nF VDC= 10.0 V IRMS= 0.0 A	1	\$0.01	0402 3mm2
3.	Cext	TDK	C2012X7R2A104K Series= X7R	Cap= 100.0 nF ESR= 15.8 mOhm VDC= 100.0 V IRMS= 0.0 A	1	\$0.03	0805 7mm2
4.	Chspn	MuRata	GRM21BR71H104KA01L Series= X7R	Cap= 100.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7mm2
5.	Cin	Panasonic	EEE-FK1V100UR Series= FK	Cap= 10.0 µF ESR= 1.35 Ohm VDC= 35.0 V IRMS= 90.0 mA	1	\$0.09	SM_RADIAL_B 47mm2
6.	Cinx	Kemet	C0603C104K5RACTU Series= X7R	Cap= 100.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0603 5mm2
7.	Cout	TDK	C3216X7R2A105M Series= 285	Cap= 1.0 µF ESR= 6.0 mOhm VDC= 100.0 V IRMS= 4.5 A	1	\$0.11	1206 11mm2
8.	Covp	Yageo America	CC0805JRNP09BN470 Series= C0G/NP0	Cap= 47.0 pF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7mm2
9.	Ct	Yageo America	CC0805KRX7R9BB102 Series= X7R	Cap= 1.0 nF VDC= 50.0 V IRMS= 0.0 A	1	\$0.01	0805 7mm2

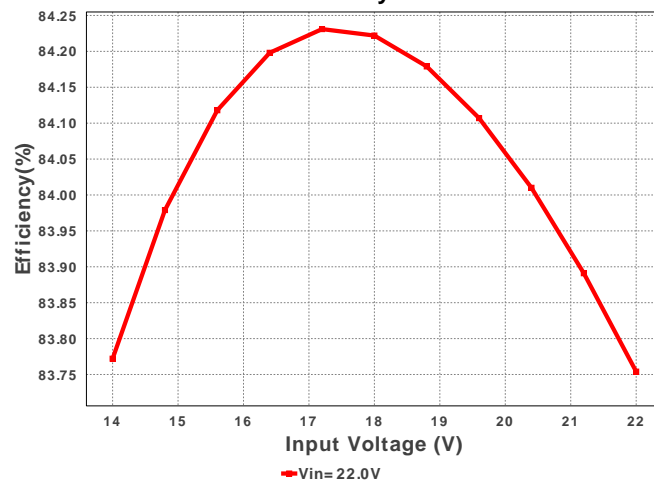
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
10.	D1	Vishay-Semiconductor	BYS12-90-E3/TR	VF@Io= 750.0 mV VRRM= 90.0 V	1	\$0.08	 SMA 37mm2
11.	D_LED	OSRAM	LUW G5GPGXHY5C8E	LED	17	\$0.49	 advancedpower topledplus 43mm2
12.	L1	Bourns	SRN8040-101M	L= 100.0 µH DCR= 400.0 mOhm	1	\$0.21	 SRN8040 100mm2
13.	M1	Infineon Technologies	BSZ160N10NS3 G	VdsMax= 100.0 V IdsMax= 28.0 Amps	1	\$0.63	 PG-TSDSON-8 19mm2
14.	Rchs	Vishay-Dale	CRCW040212K4FKED Series= CRCW..e3	Res= 12.4 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
15.	Rcs	Panasonic	ERJ-3RQFR27V Series= 227	Res= 270.0 mOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.02	 0603 5mm2
16.	Rdim	Vishay-Dale	CRCW04029K09FKED Series= CRCW..e3	Res= 9.09 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
17.	Rhsn	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1,000 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
18.	Rhsp	Vishay-Dale	CRCW04021K00FKED Series= CRCW..e3	Res= 1,000 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
19.	Rivp1	Vishay-Dale	CRCW04021K10FKED Series= CRCW..e3	Res= 1.1 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
20.	Rivp2	Vishay-Dale	CRCW040210K0FKED Series= CRCW..e3	Res= 10.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
21.	Rovp1	Vishay-Dale	CRCW04028K87FKED Series= CRCW..e3	Res= 8.87 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
22.	Rovp2	Vishay-Dale	CRCW0402511KFKED Series= CRCW..e3	Res= 511.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
23.	Rr	Vishay-Dale	CRCW040210R0FKED Series= CRCW..e3	Res= 10.0 Ohm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
24.	Rsense	Panasonic	ERJ-3RQFR68V Series= 227	Res= 680.0 mOhm Power= 100.0 mW Tolerance= 1.0%	1	\$0.02	 0603 5mm2
25.	Rt	Vishay-Dale	CRCW040244K2FKED Series= CRCW..e3	Res= 44.2 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3mm2
26.	U1	Texas Instruments	LM3429MH/NOPB	Switcher	1	\$1.00	 MXA14A 59mm2



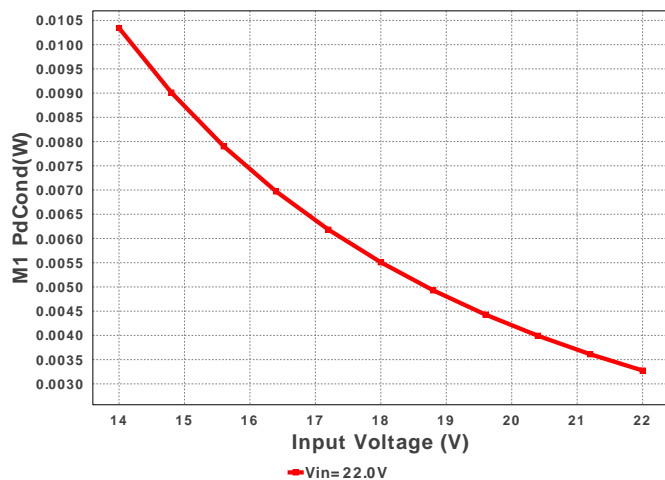
LED Rd



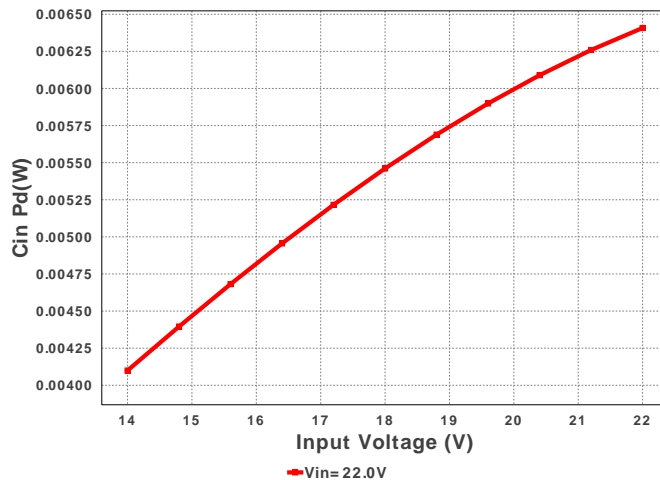
Efficiency



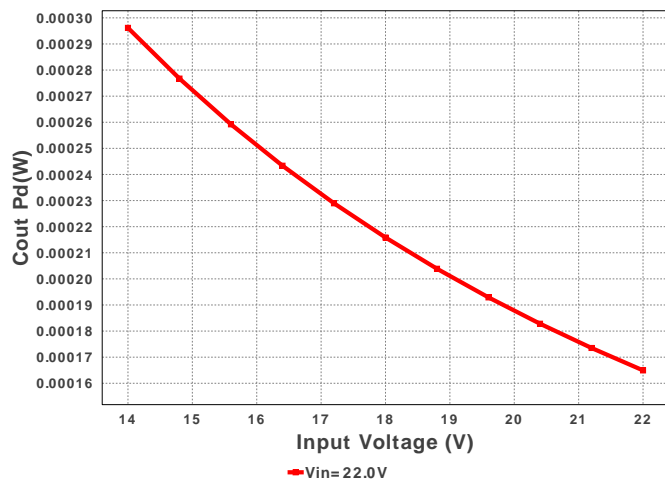
M1 PdCond



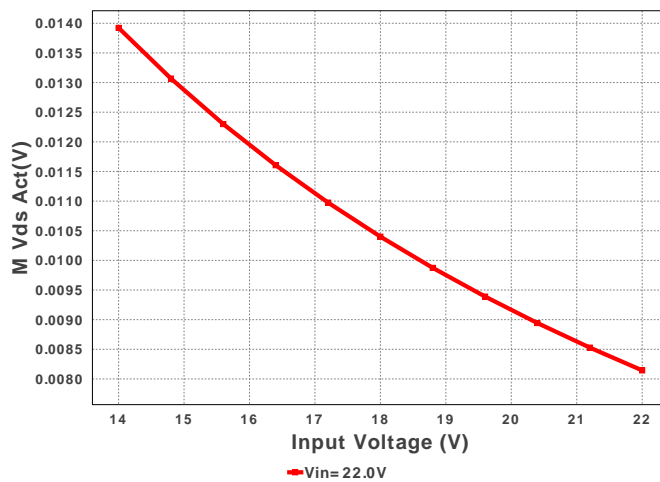
Cin Pd



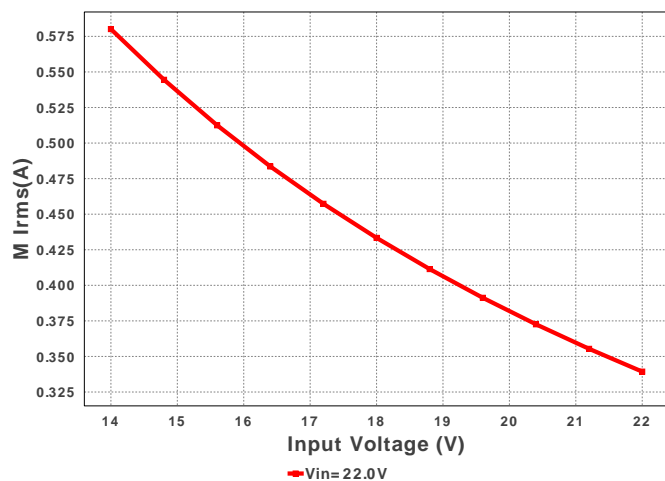
Cout Pd



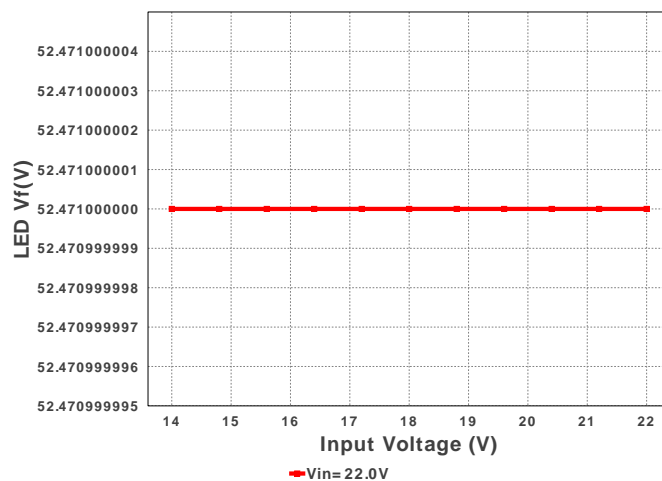
M Vds Act



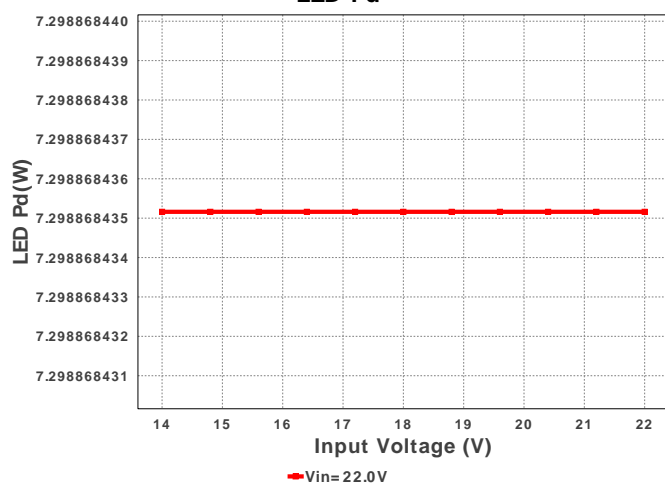
M Irms



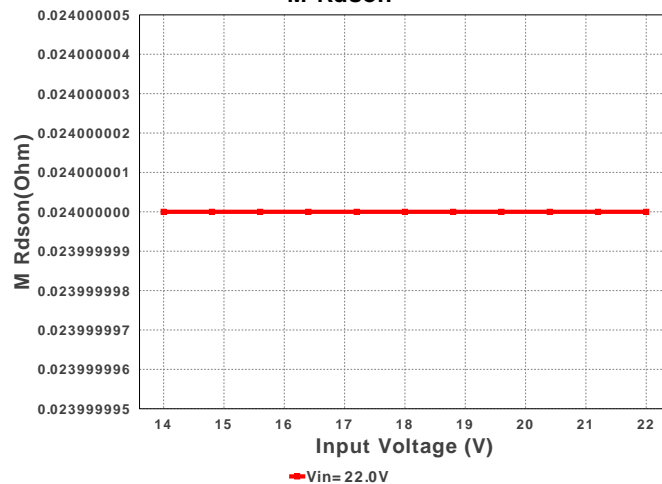
LED Vf



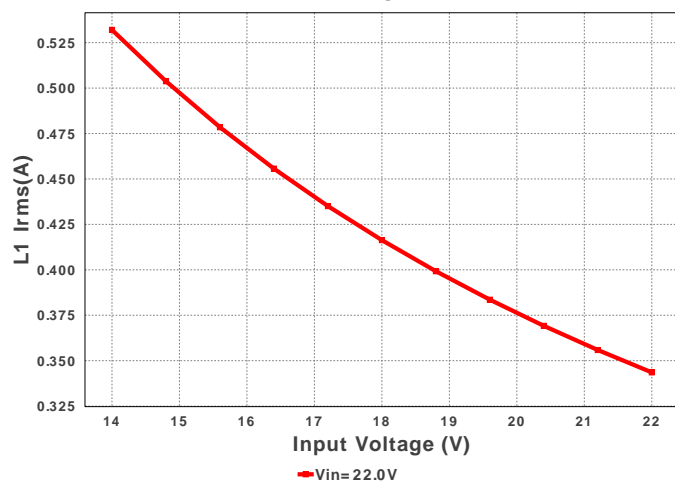
LED Pd



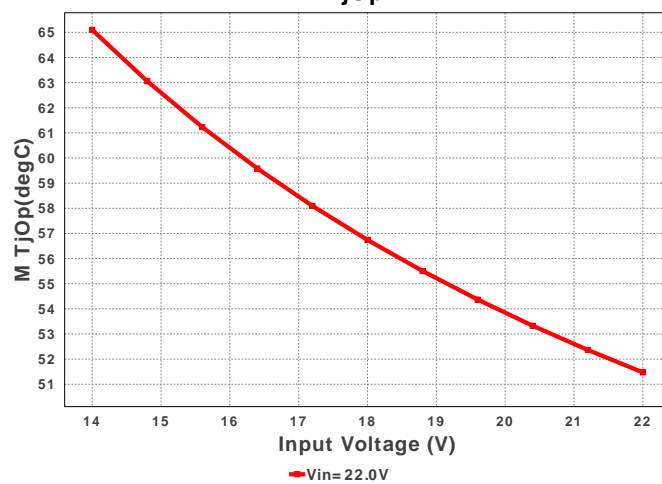
M Rdson

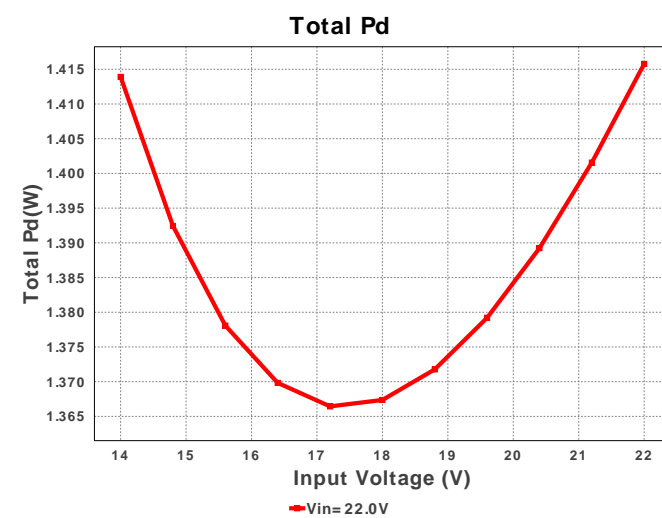
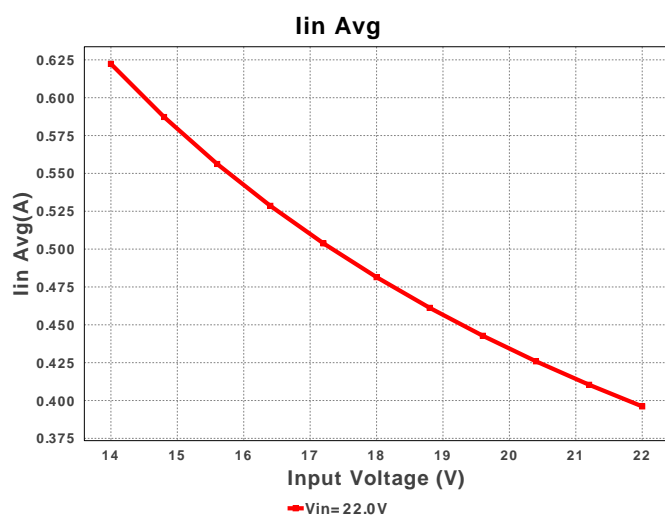
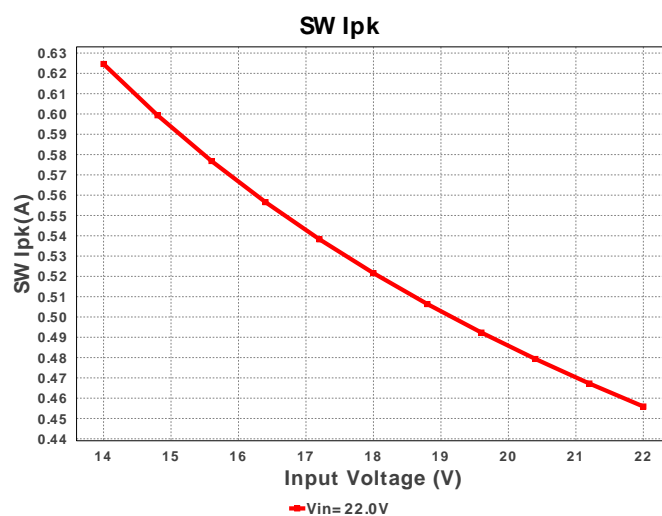
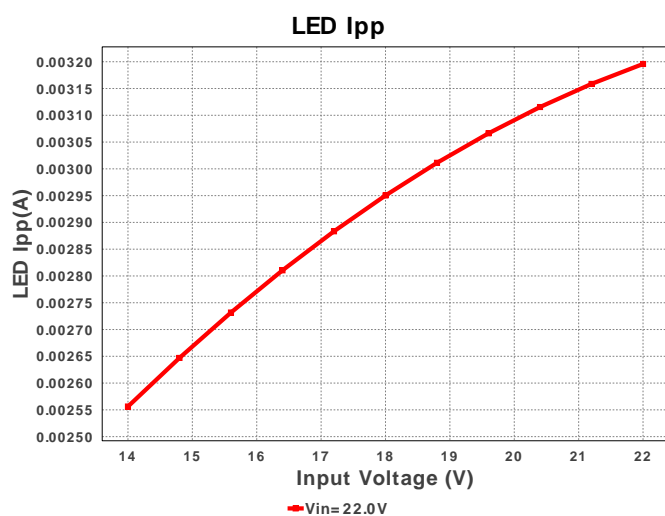
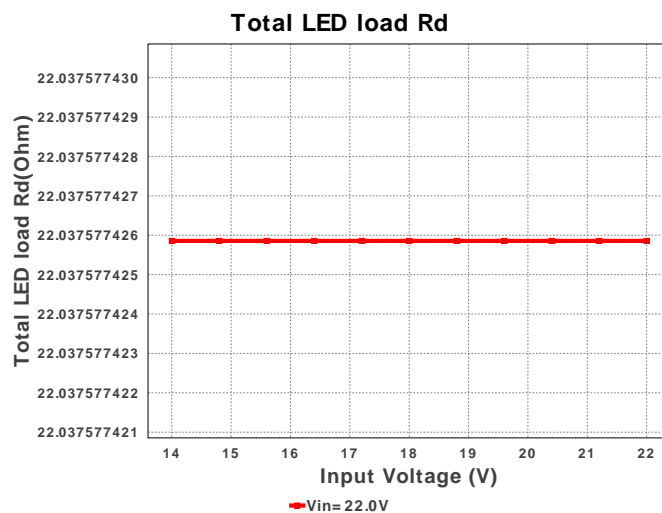
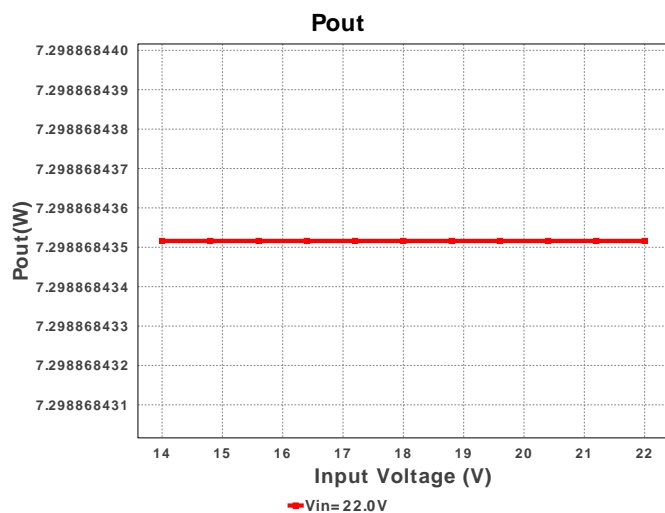


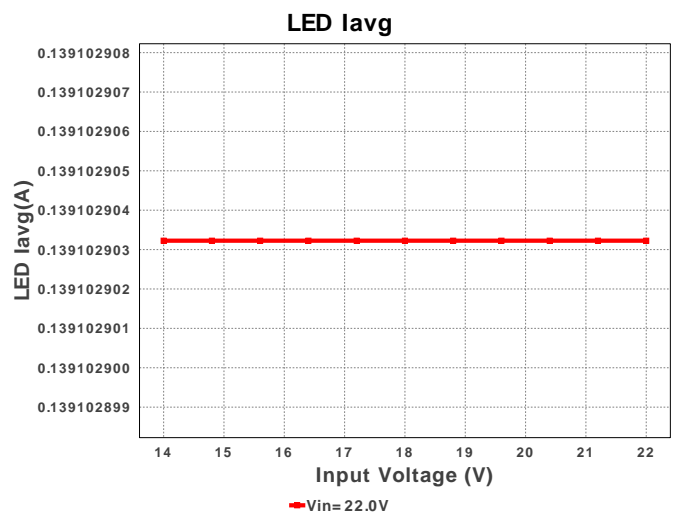
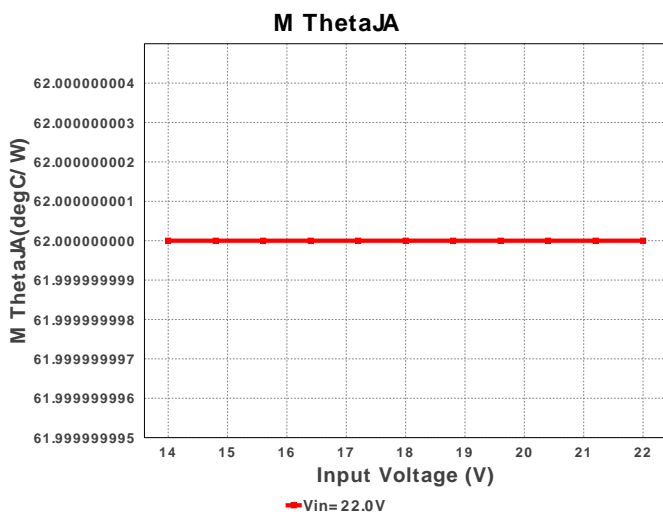
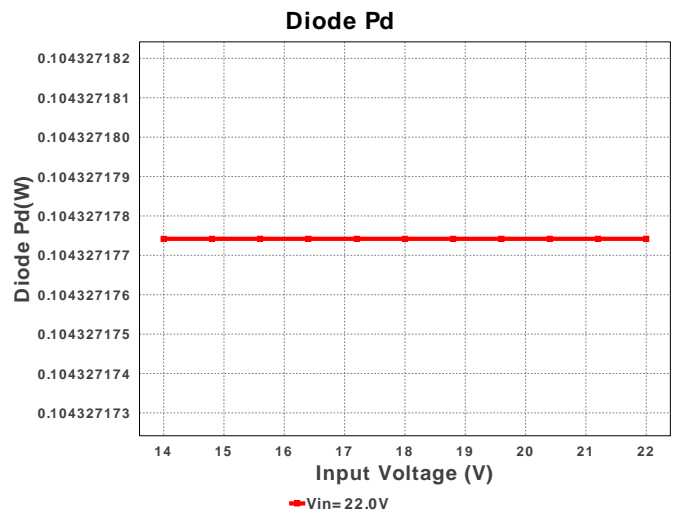
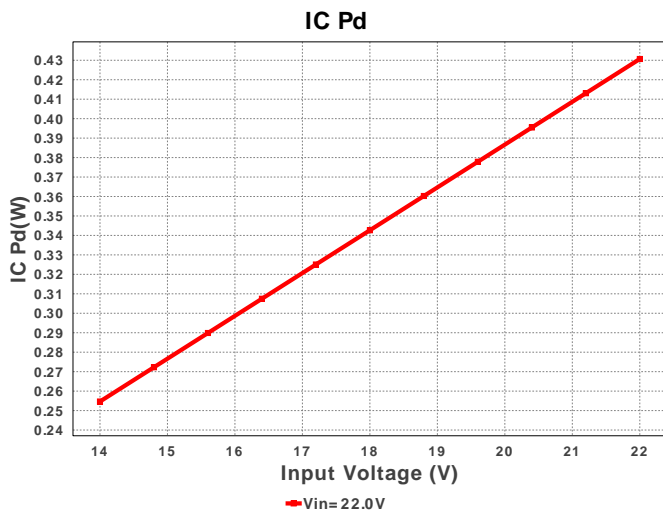
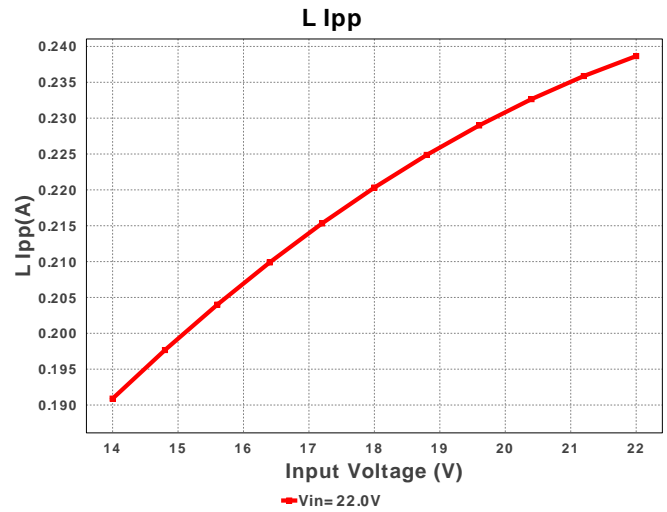
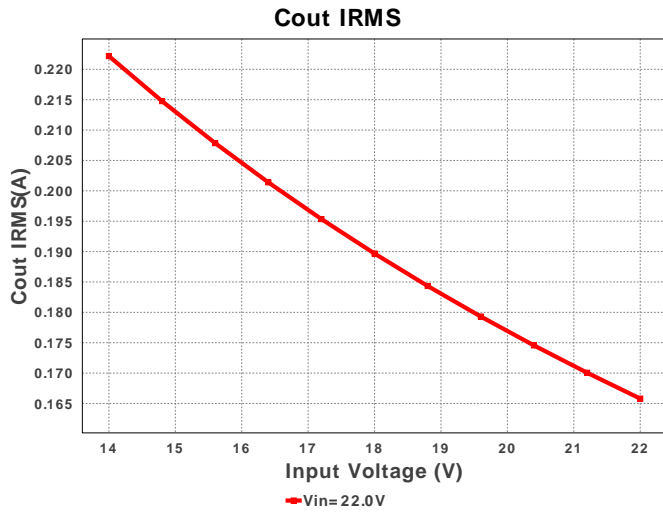
L1 Irms

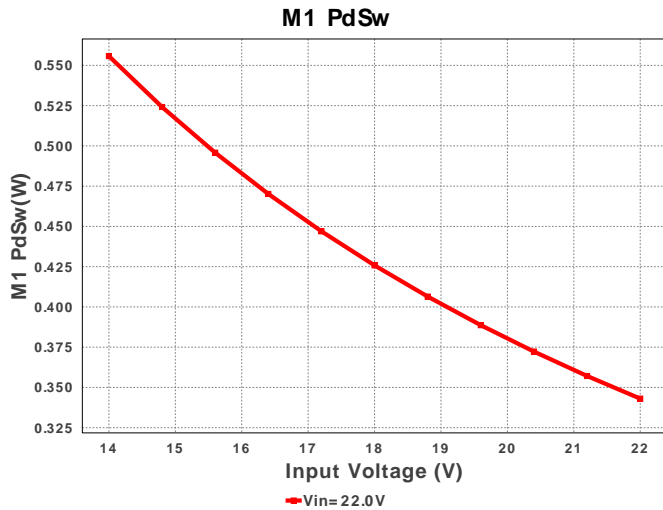


M TjOp









Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	55.116 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	227.685 mA	Current	Output capacitor RMS ripple current
3.	Iin Avg	662.21 mA	Current	Average input current
4.	L Ipp	190.926 mA	Current	Peak-to-peak inductor ripple current
5.	L1 Irms	550.596 mA	Current	Inductor ripple current
6.	LED Iavg	144.0 mA	Current	LED Average Current
7.	LED Ipp	2.645 mA	Current	LED Ripple Current
8.	M Irms	599.307 mA	Current	MOSFET RMS ripple current
9.	SW Ipk	643.294 mA	Current	Peak switch current
10.	BOM Count	42	General	Total Design BOM count
11.	FootPrint	353.0 mm2	General	Total Foot Print Area of BOM components
12.	Frequency	542.986 kHz	General	Switching frequency
13.	IC Tolerance	25.0 mV	General	IC Feedback Tolerance
14.	M Rdson	24.0 mOhm	General	Drain-Source On-resistance
15.	M Vds Act	14.383 mV	General	M Vds
16.	Pout	7.556 W	General	Total output power
17.	Total BOM	\$2.36	General	Total BOM Cost
18.	D1 Tj	46.2 degC	Op_Point	D1 junction temperature
19.	Vout OP	52.471 V	Op_Point	Operational Output Voltage
20.	Duty Cycle	78.191 %	Op_point	Duty cycle
21.	Efficiency	81.5 %	Op_point	Steady state efficiency
22.	IC Tj	39.422 degC	Op_point	IC junction temperature
23.	ICThetaJA	37.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
24.	IOUT_OP	144.0 mA	Op_point	Iout operating point
25.	LED Rd	1.252 Ohm	Op_point	LED DynamicResistance
26.	LED Vf	52.471 V	Op_point	Total LED Forward Calculated Voltage
27.	M ThetaJA	62.0 degC/W	Op_point	MOSFET junction-to-ambient thermal resistance
28.	M TjOp	82.186 degC	Op_point	MOSFET junction temperature
29.	VIN_OP	14.0 V	Op_point	Vin operating point
30.	Cin Pd	4.101 mW	Power	Input capacitor power dissipation
31.	Cout Pd	311.043 µW	Power	Output capacitor power dissipation
32.	Diode Pd	108.0 mW	Power	Diode power dissipation
33.	IC Pd	254.661 mW	Power	IC power dissipation
34.	L Pd	145.515 mW	Power	Inductor power dissipation
35.	LED Pd	7.556 W	Power	LED Power Dissipation
36.	M Pd	841.713 mW	Power	MOSFET power dissipation
37.	M1 PdCond	12.071 mW	Power	M1 MOSFET conduction losses
38.	M1 PdSw	829.642 mW	Power	M1 MOSFET switching losses
39.	Total Pd	1.715 W	Power	Total Power Dissipation
40.	Total LED load Rd	21.288 Ohm	Unknown	Total LED Load DynamicResistance

Design Inputs

#	Name	Value	Description
1.	Iout	144.0 mA	Maximum Output Current
2.	Iout1	144.0 mAmps	Output Current #1
3.	VinMax	22.0 V	Maximum input voltage
4.	VinMin	14.0 V	Minimum input voltage
5.	Vout	52.471 V	Output Voltage
6.	Vout1	52.471 Volt	Output Voltage #1
7.	application	LED_DRIVER	LED Application
8.	base_pn	LM3429	Texas Instruments Base Part Number

#	Name	Value	Description
9.	isLEDArchitect	Y	LED Architect Project
10.	ledparallel	1.0	Number of LED in parallel
11.	ledpartnumber	LUW G5GPGXHY5C8E	LED Part number
12.	ledseries	17.0	Number of LED in series
13.	line_fsw	NaN	AC Line Frequency
14.	source	DC	Input Source Type
15.	ta	30.0 degC	Ambient temperature

Design Assistance

1. LM3429 Product Folder : <http://www.ti.com/product/lm3429> : contains the data sheet and other resources.

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You should completely validate and test your design implementation to confirm the system functionality for your application prior to production.

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