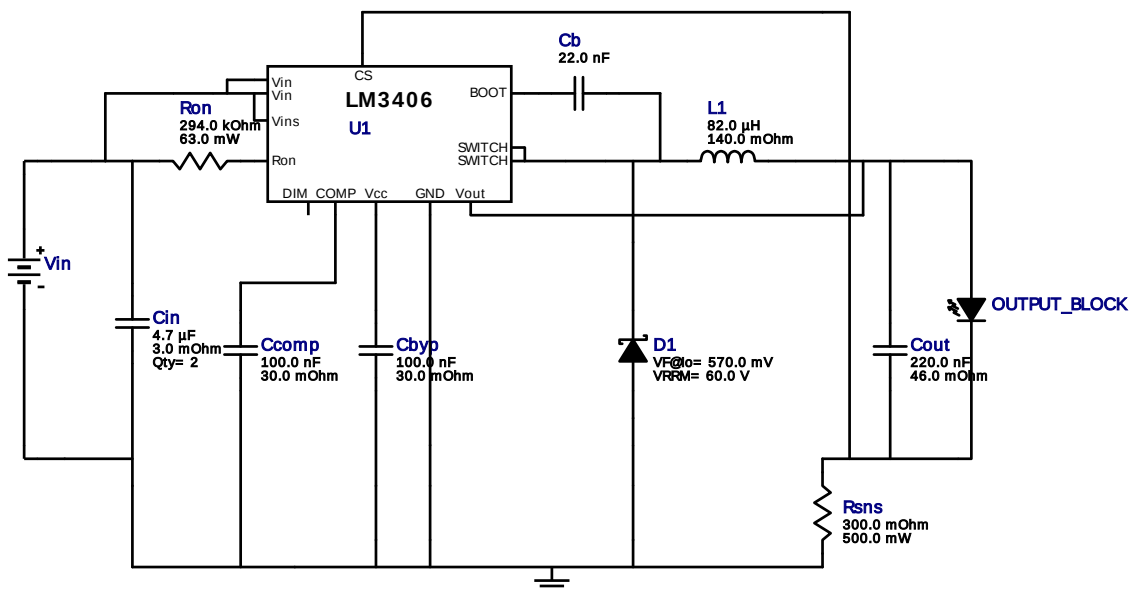


WEBENCH® Design Report

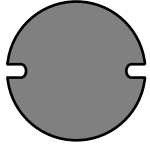
Design : 4077713/4 LM3406MHX/NOPB
LM3406MHX/NOPB 14.0V-22.0V to 11.70V @ 0.7A

Vout = 11.5V
Iout = 0.7A

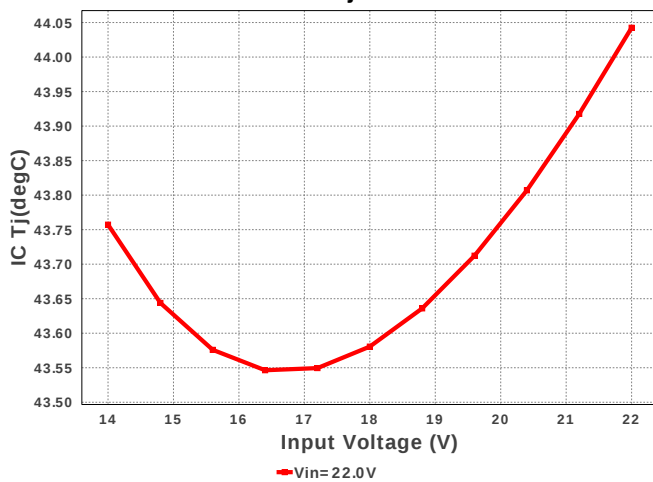


Electrical BOM

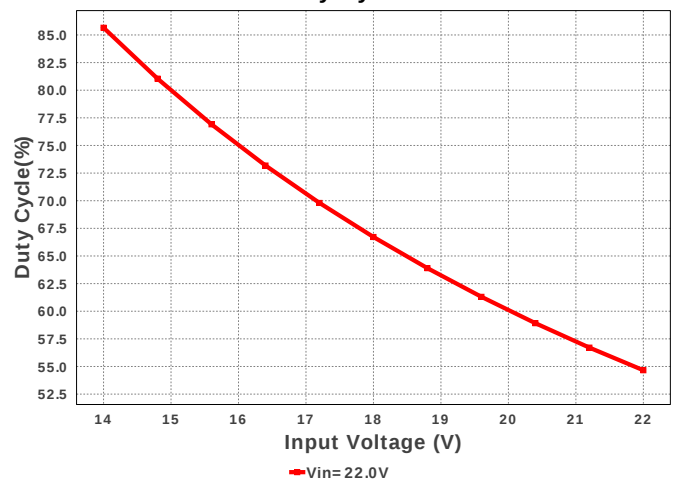
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cb	MuRata	GRM155R71E223KA61D Series= X7R	Cap= 22.0 nF VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	 0402 3 mm ²
2.	Cbyp	MuRata	GRM188R71E104KA01D Series= X7R	Cap= 100.0 nF ESR= 30.0 mOhm VDC= 25.0 V IRMS= 1.51 A	1	\$0.01	 0603 5 mm ²
3.	Ccomp	MuRata	GRM188R71E104KA01D Series= X7R	Cap= 100.0 nF ESR= 30.0 mOhm VDC= 25.0 V IRMS= 1.51 A	1	\$0.01	 0603 5 mm ²
4.	Cin	MuRata	GRM31CR71H475KA12L Series= X7R	Cap= 4.7 uF ESR= 3.0 mOhm VDC= 50.0 V IRMS= 4.98 A	2	\$0.07	 1206 11 mm ²
5.	Cout	Kemet	C0805C224K5RACTU Series= X7R	Cap= 220.0 nF ESR= 46.0 mOhm VDC= 50.0 V IRMS= 2.65 A	1	\$0.02	 0805 7 mm ²
6.	D1	NXP Semiconductor	PMEG6010CEH,115	Vf@Io= 570.0 mV VRRM= 60.0 V	1	\$0.04	 SOD-123F 12 mm ²
7.	D_LED	Cree	XHP50A-00-0000-0D00J40CB	LED	1	\$5.02	 xlampxhp 0 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
8.	L1	Bourns	SDR1307-820KL	L= 82.0 μ H DCR= 140.0 mOhm	1	\$0.35	 SDR1307 227 mm ²
9.	Ron	Vishay-Dale	CRCW0402294KFKED Series= CRCW..e3	Res= 294.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
10.	Rsns	Rohm	MCR25JZHFLR300 Series= MCR25	Res= 300.0 mOhm Power= 500.0 mW Tolerance= 1.0%	1	\$0.03	 1210 15 mm ²
11.	U1	Texas Instruments	LM3406MHX/NOPB	Switcher	1	\$0.95	 MXA14A 59 mm ²

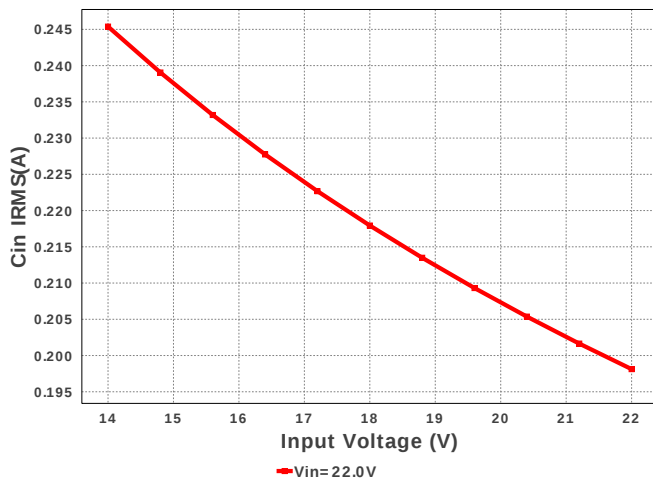
IC Tj



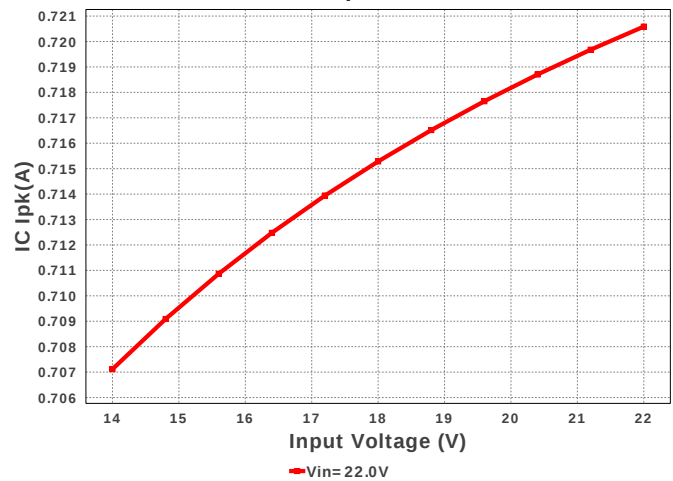
Duty Cycle

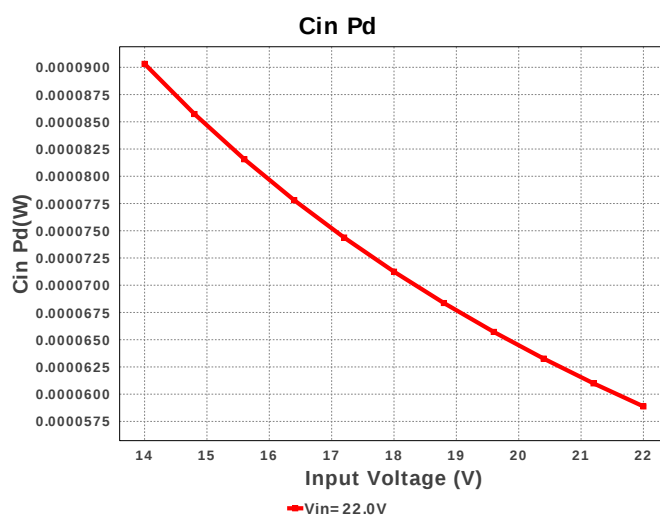
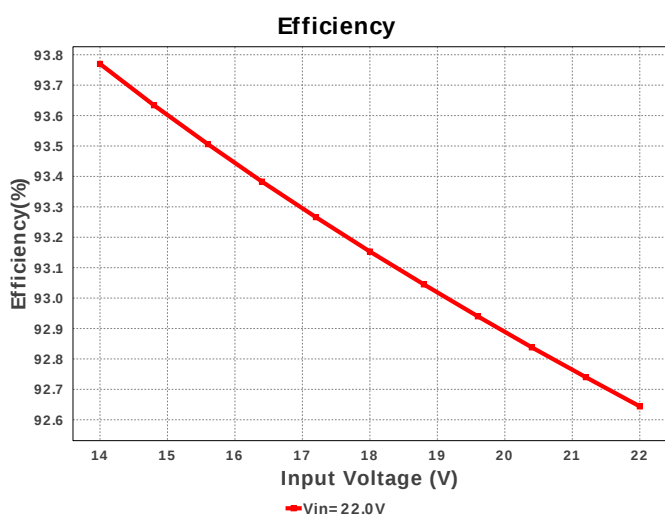
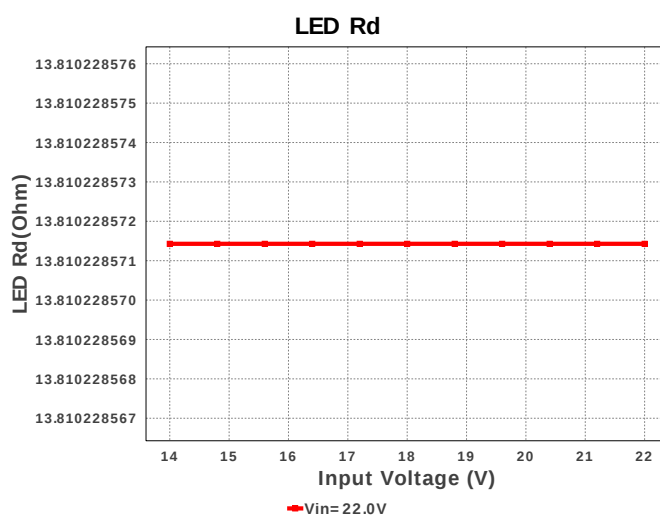
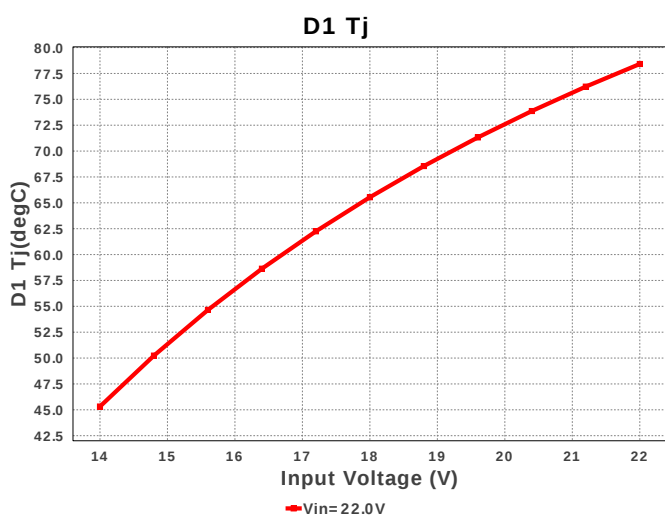
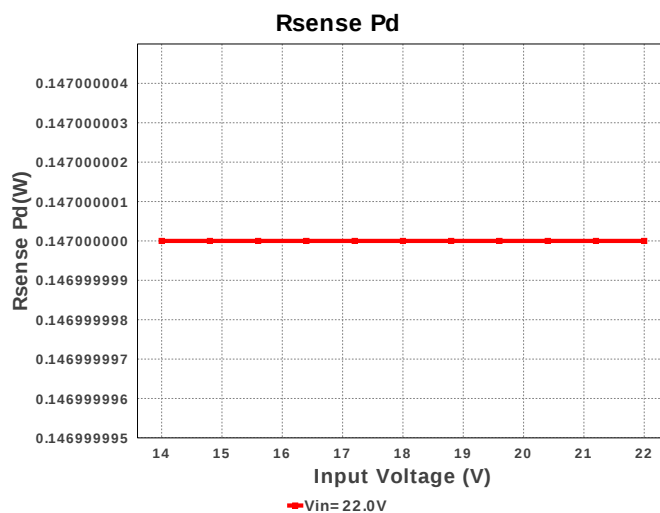
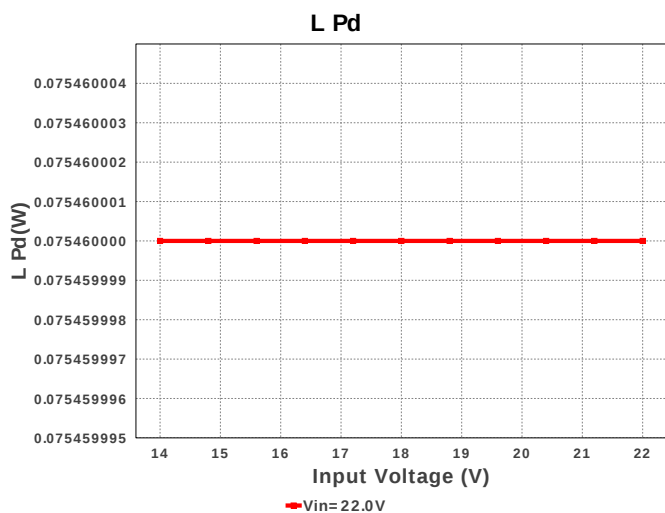


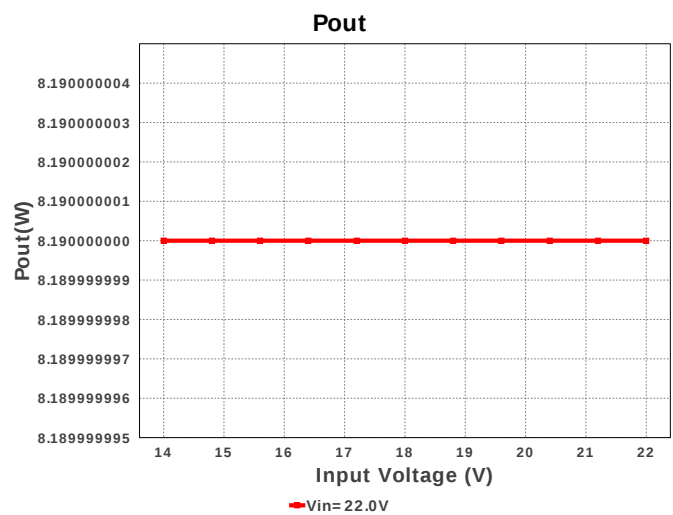
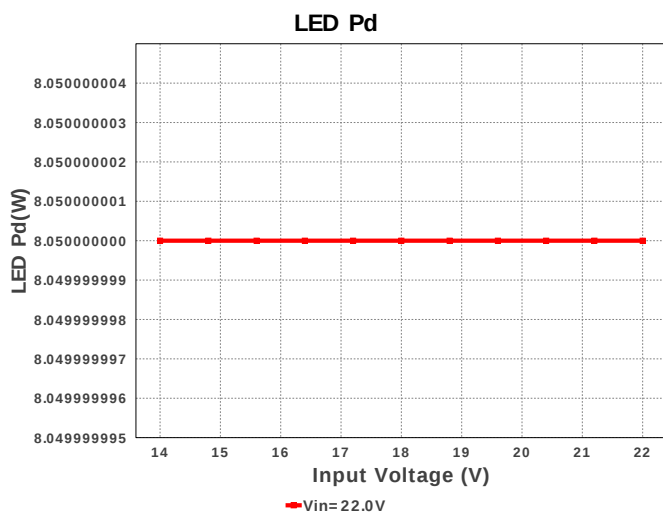
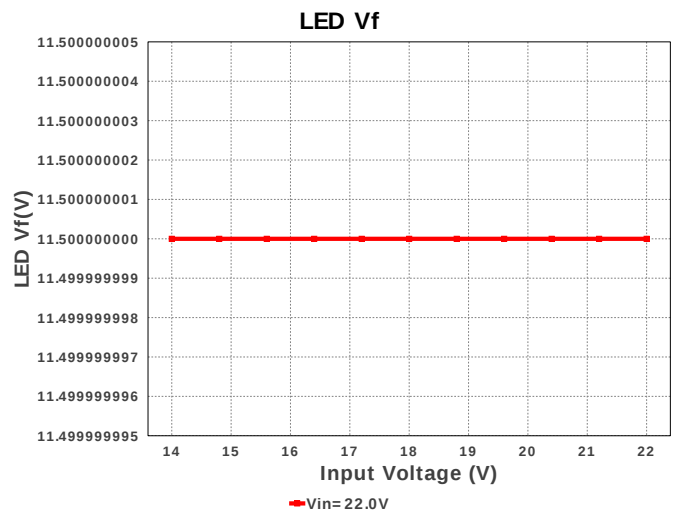
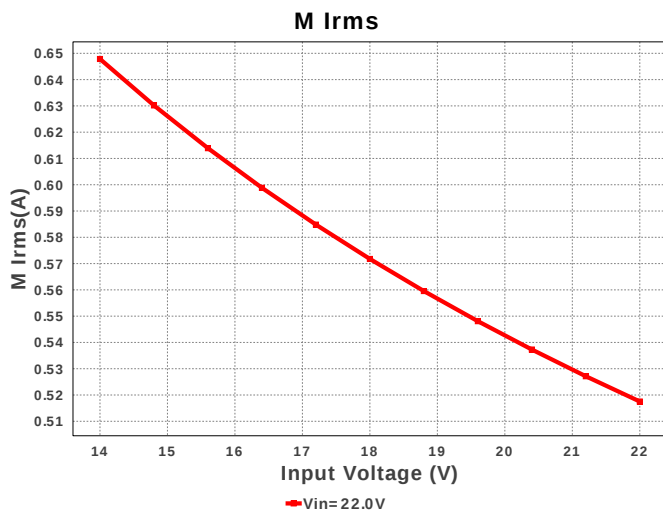
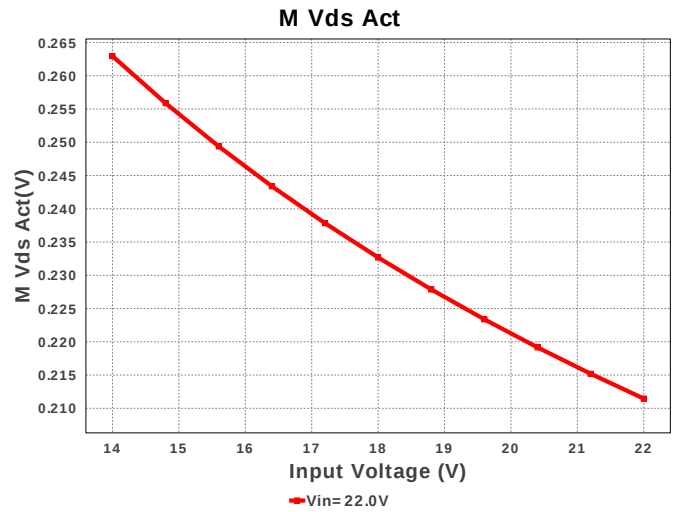
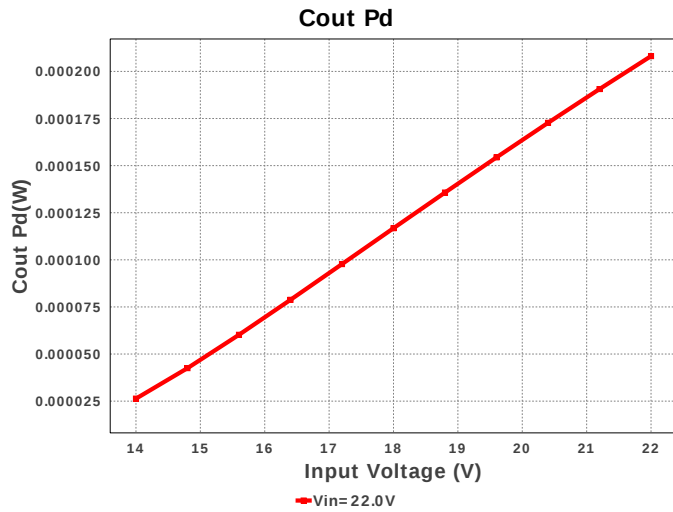
Cin IRMS



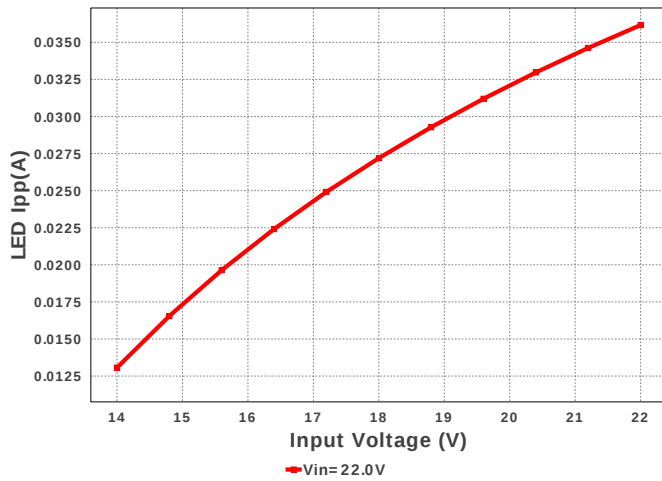
IC Ipk



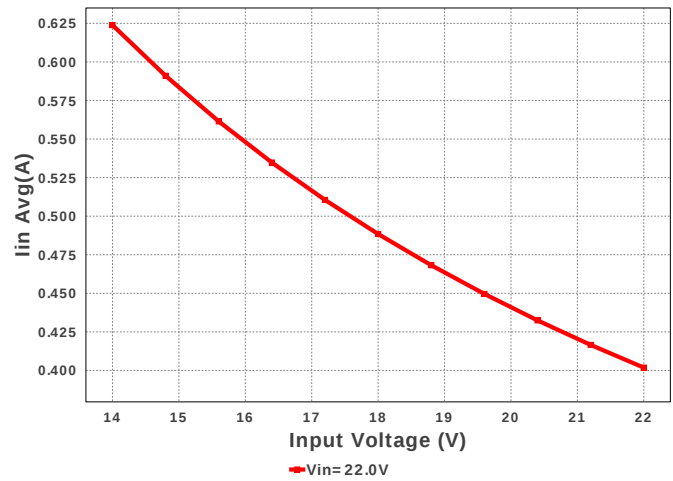




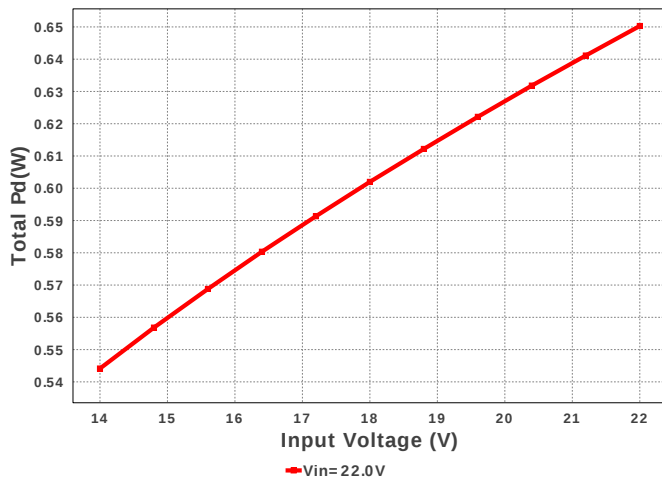
LED Ipp



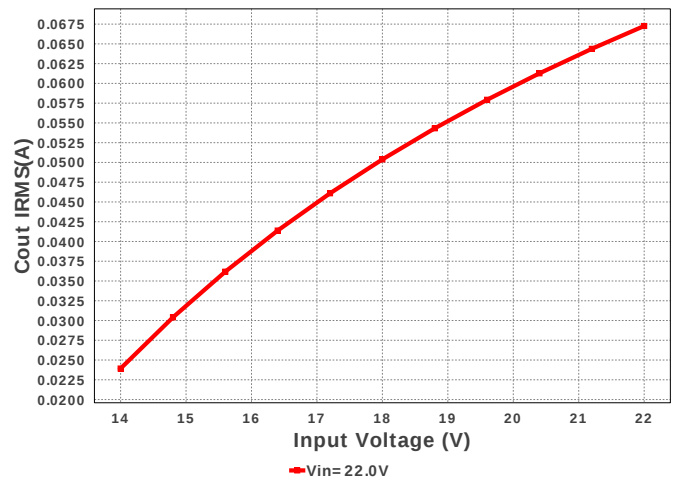
Iin Avg



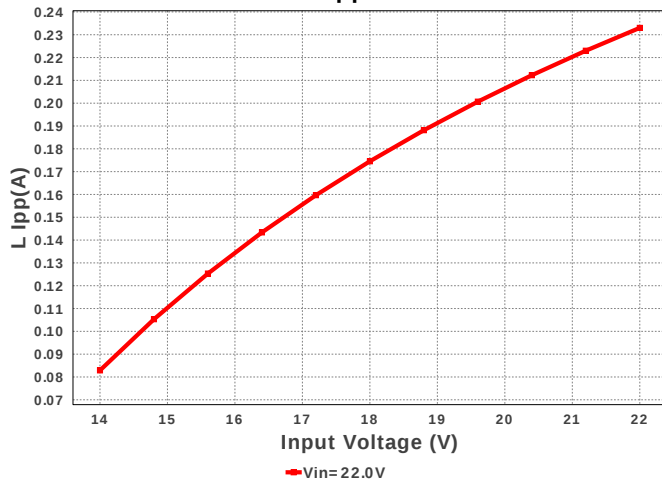
Total Pd



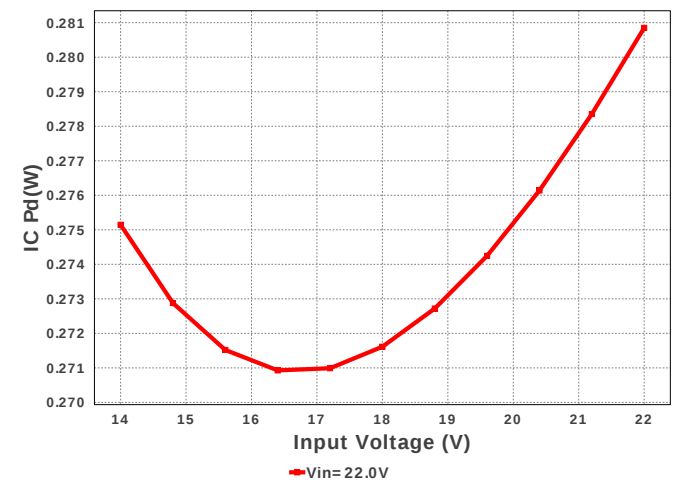
Cout IRMS

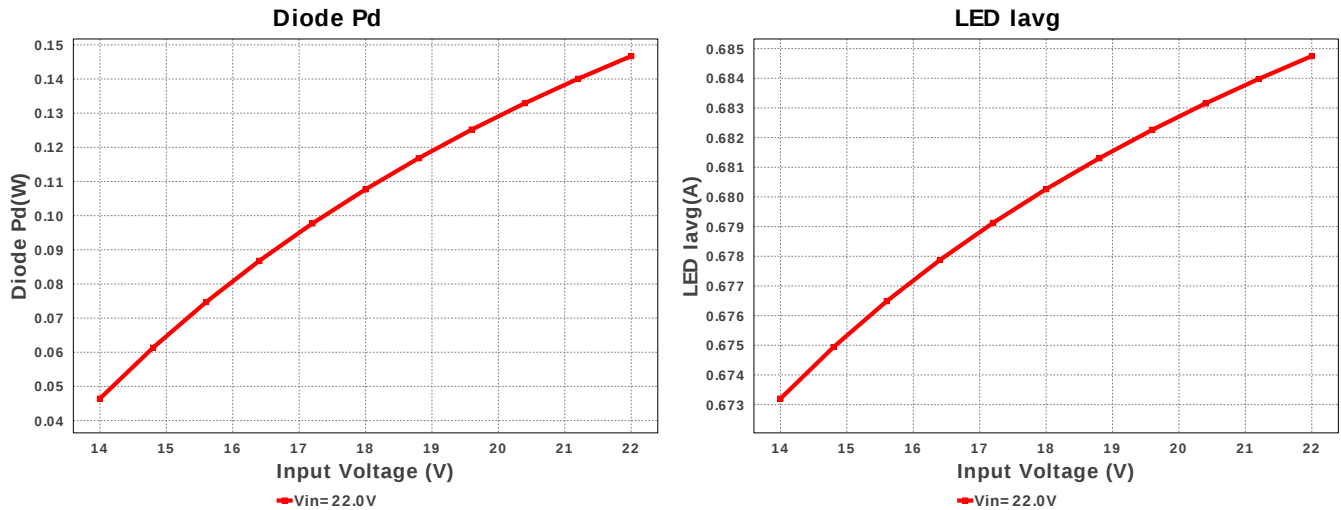


L Ipp



IC Pd





Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	198.123 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	67.264 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	825.755 mA	Current	Peak switch current in IC
4.	Iin Avg	401.83 mA	Current	Average input current
5.	L Ipp	233.01 mA	Current	Peak-to-peak inductor ripple current
6.	LED Iavg	684.531 mA	Current	LED Average Current
7.	LED Ipp	35.729 mA	Current	LED Ripple Current
8.	M1 Irms	517.526 mA	Current	Q Iavg
9.	BOM Count	12	General	Total Design BOM count
10.	FootPrint	356.0 mm ²	General	Total Foot Print Area of BOM components
11.	Frequency	294.657 kHz	General	Switching frequency
12.	IC Tolerance	10.0 mV	General	IC Feedback Tolerance
13.	M Vds Act	211.457 mV	General	Voltage drop across the MosFET
14.	Pout	8.19 W	General	Total output power
15.	Total BOM	\$6.59	General	Total BOM Cost
16.	D1 Tj	78.415 degC	Op_Point	D1 junction temperature
17.	Vout OP	11.7 V	Op_Point	Operational Output Voltage
18.	Duty Cycle	54.66 %	Op_point	Duty cycle
19.	Efficiency	92.644 %	Op_point	Steady state efficiency
20.	IC Tj	44.042 degC	Op_point	IC junction temperature
21.	ICThetaJA	50.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
22.	IOUT_OP	700.0 mA	Op_point	Iout operating point
23.	LED Rd	13.81 Ohm	Op_point	LED DynamicResistance
24.	LED Vf	11.5 V	Op_point	Total LED Forward Calculated Voltage
25.	VIN_OP	22.0 V	Op_point	Vin operating point
26.	Cin Pd	58.879 μW	Power	Input capacitor power dissipation
27.	Cout Pd	208.126 μW	Power	Output capacitor power dissipation
28.	Diode Pd	146.713 mW	Power	Diode power dissipation
29.	IC Pd	280.85 mW	Power	IC power dissipation
30.	L Pd	75.46 mW	Power	Inductor power dissipation
31.	LED Pd	8.05 W	Power	LED Power Dissipation
32.	Rsense Pd	147.0 mW	Power	LED Power Dissipation
33.	Total Pd	650.29 mW	Power	Total Power Dissipation
34.	Vout Tolerance	85.47 m%		Vout Tolerance based on IC Tolerance (no load) and voltage divider resistors if applicable

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	LM3406	Base Product Number
7.	LED_Architect	N	LED Architect Project
8.	ledparallel	1.0	Number of LED in parallel
9.	ledpartnumber	XHP50A-00-0000-0D00140C	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. **LM3406** Product Folder : <http://www.ti.com/product/LM3406> : contains the data sheet and other resources.

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