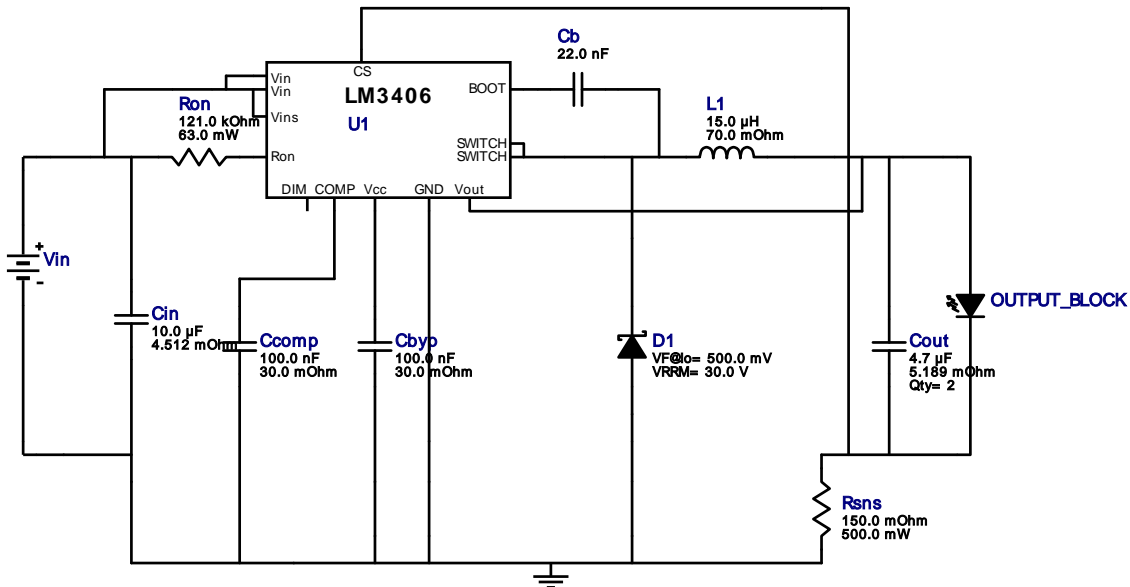


WEBENCH® Design Report





 Design : 3851011/27 LM3406MHX/NOPB
 LM3406MHX/NOPB 9.0V-15.0V to 5.80V @ 1.4A

Vout = 5.6V
Iout = 1.4A

My Comments

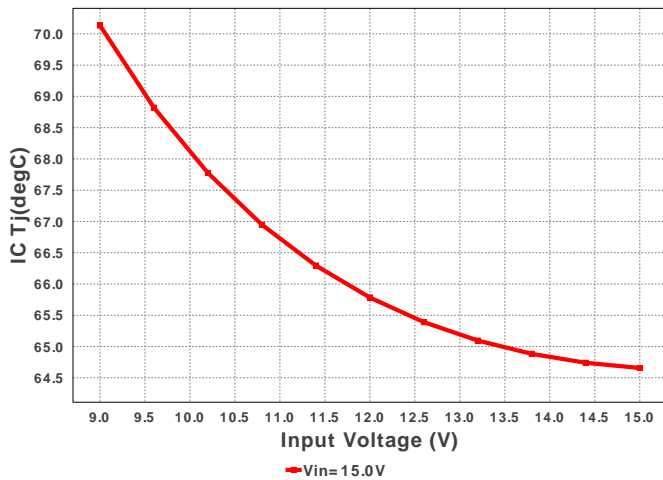
LM3406 based constant current source

Electrical BOM

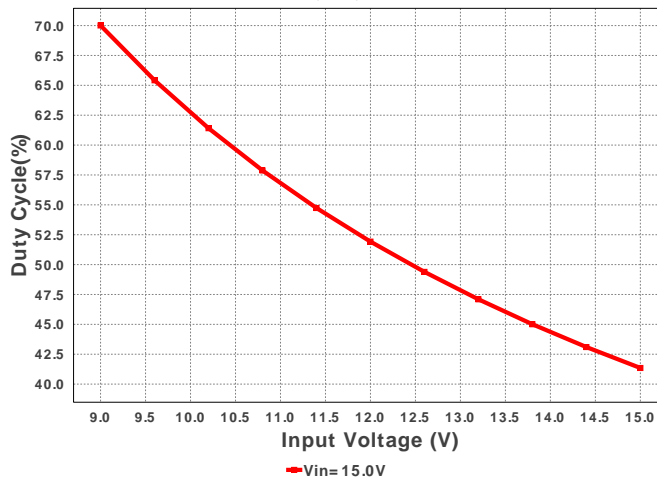
#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
1.	Cb	MuRata	GRM155R71E223KA61D Series= X7R	Cap= 22.0 nF VDC= 25.0 V IRMS= 0.0 A	1	\$0.01	0402 3 mm ²
2.	Cbyp	MuRata	GRM188R71E104KA01D Series= X7R	Cap= 100.0 nF ESR= 30.0 mOhm VDC= 25.0 V IRMS= 1.51 A	1	\$0.01	0603 5 mm ²
3.	Ccomp	MuRata	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	GRM31CR61E106KA12L Series= X5R	Cap= 10.0 uF ESR= 4.512 mOhm VDC= 25.0 V IRMS= 2.447 A	1	\$0.06	1206_190 11 mm ²
5.	Cout	MuRata	GRM21BR61E475KA12L Series= X5R	Cap= 4.7 uF ESR= 5.189 mOhm VDC= 25.0 V IRMS= 2.03531 A	2	\$0.03	0805 7 mm ²
6.	D1	Diodes Inc.	B230A-13-F	VF@Io= 500.0 mV VRRM= 30.0 V	1	\$0.09	SMA 37 mm ²
7.	D_LED	Philips Lumileds	LMZ7-RW57	LED	1	NA	luxeon_mz 25 mm ²

#	Name	Manufacturer	Part Number	Properties	Qty	Price	Footprint
8.	L1	Bourns	SRN8040-150M	L= 15.0 μ H DCR= 70.0 mOhm	1	\$0.22	 SRN8040 100 mm ²
9.	Ron	Vishay-Dale	CRCW0402121KFKED Series= CRCW..e3	Res= 121.0 kOhm Power= 63.0 mW Tolerance= 1.0%	1	\$0.01	 0402 3 mm ²
10.	Rsns	Rohm	MCR25JZHFLR150 Series= MCR25	Res= 150.0 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

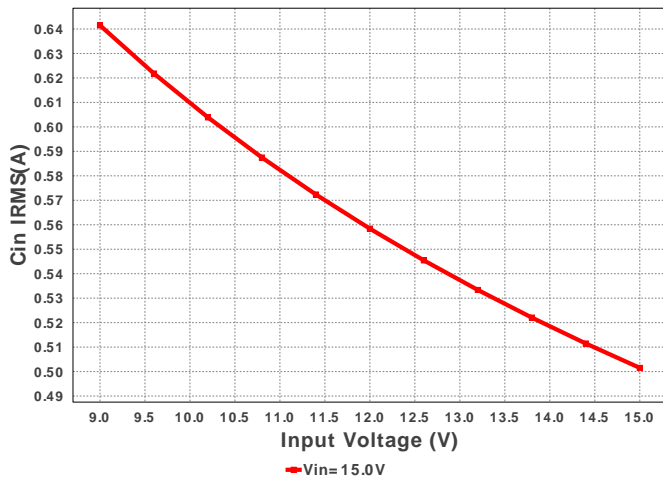
IC Tj



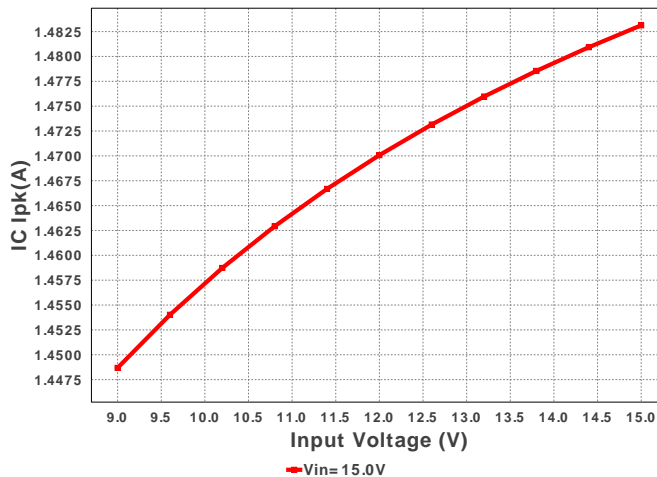
Duty Cycle

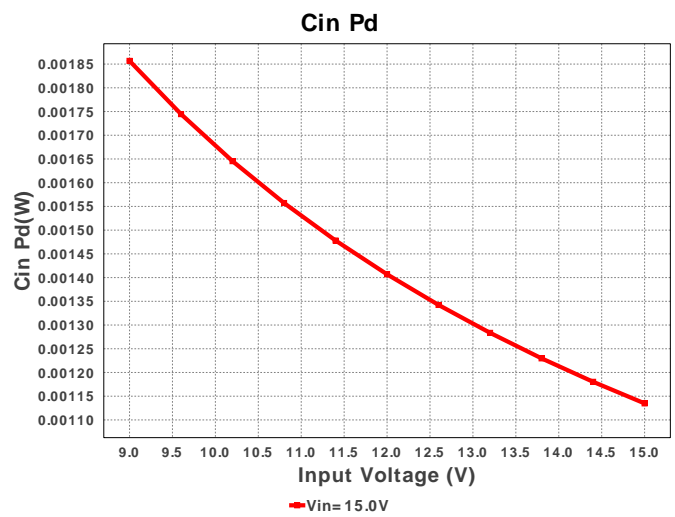
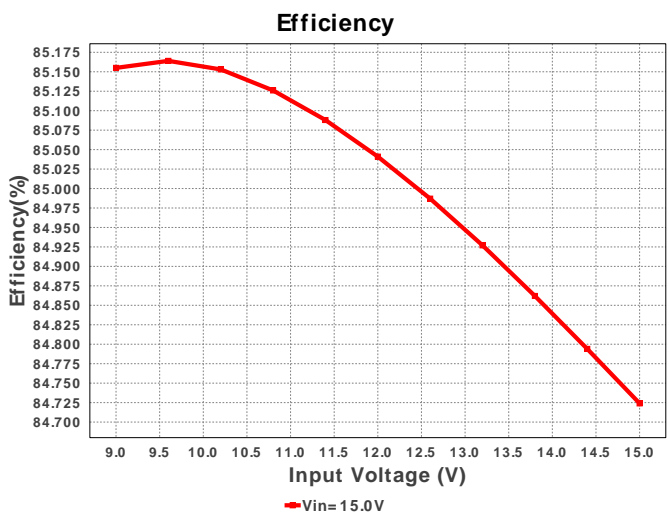
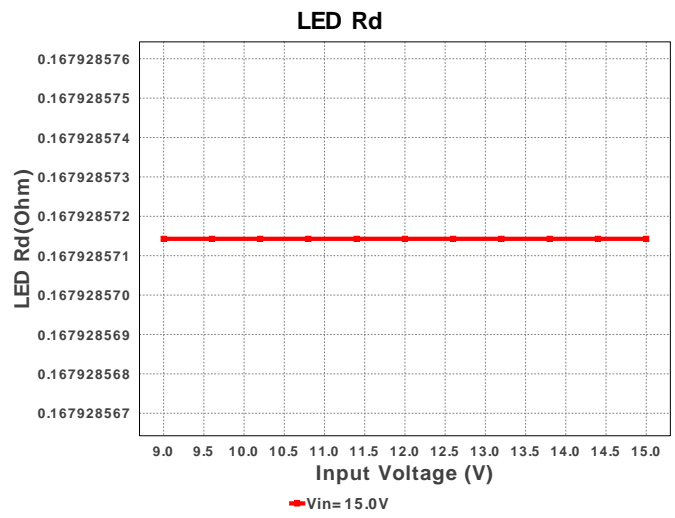
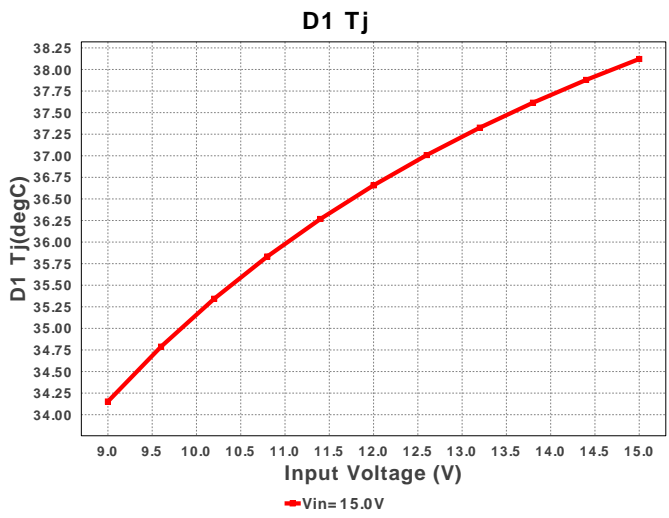
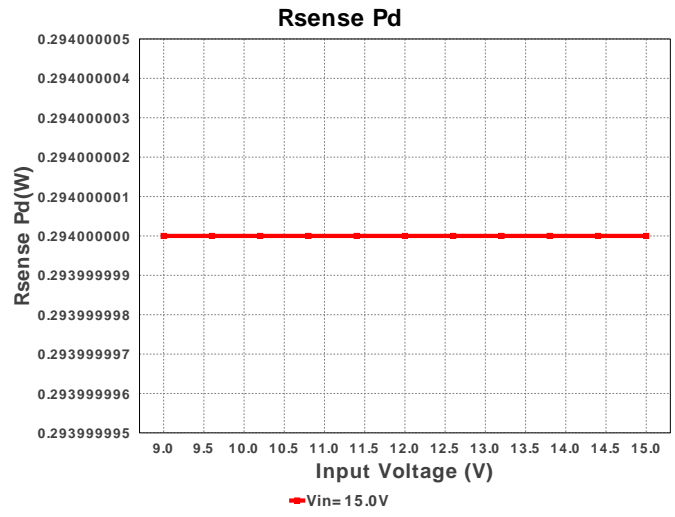
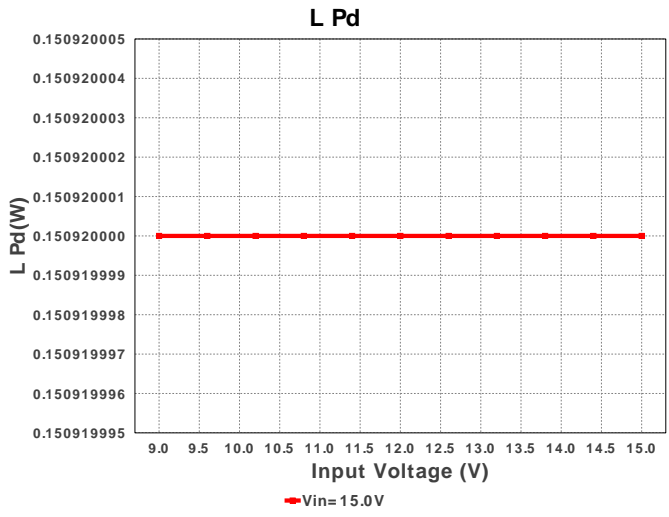


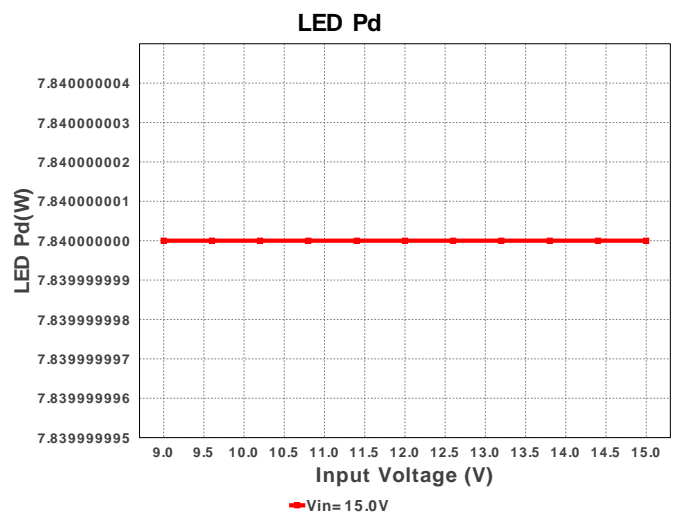
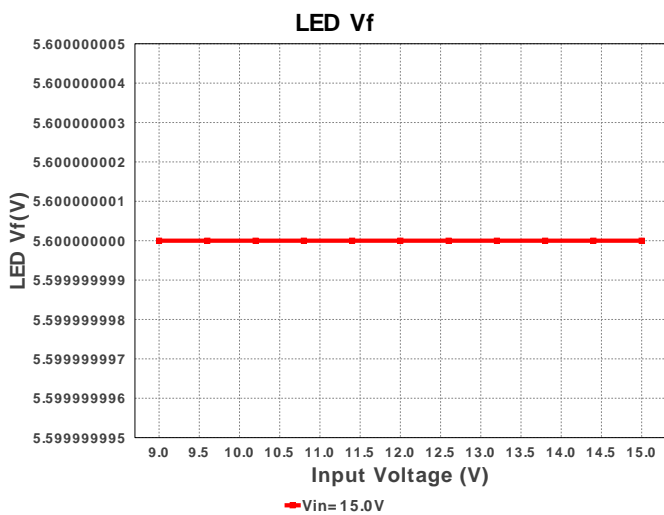
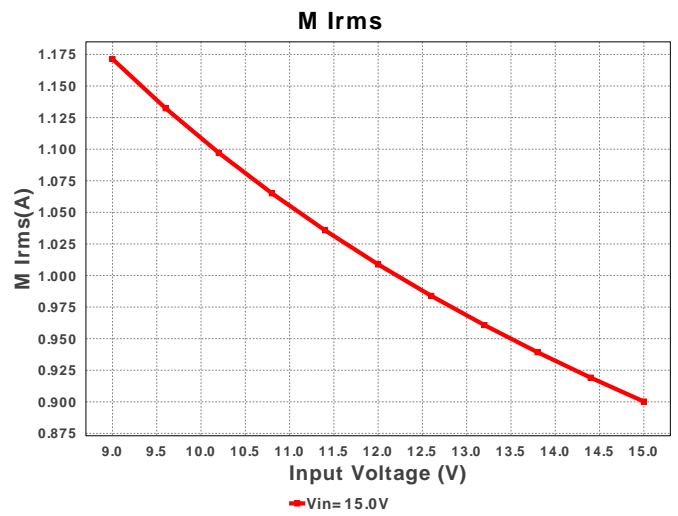
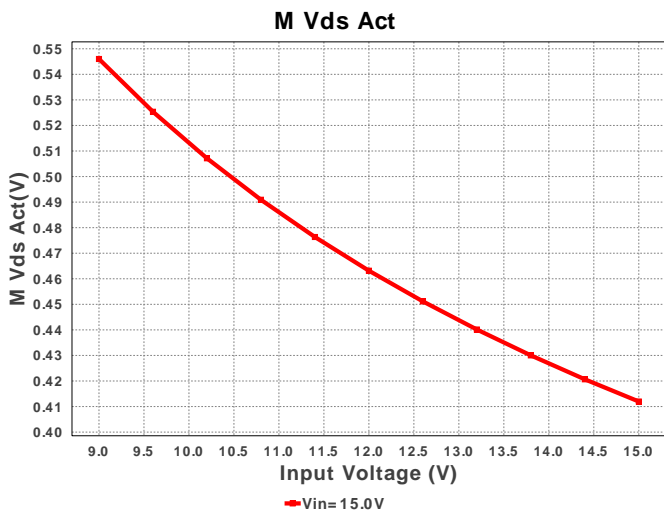
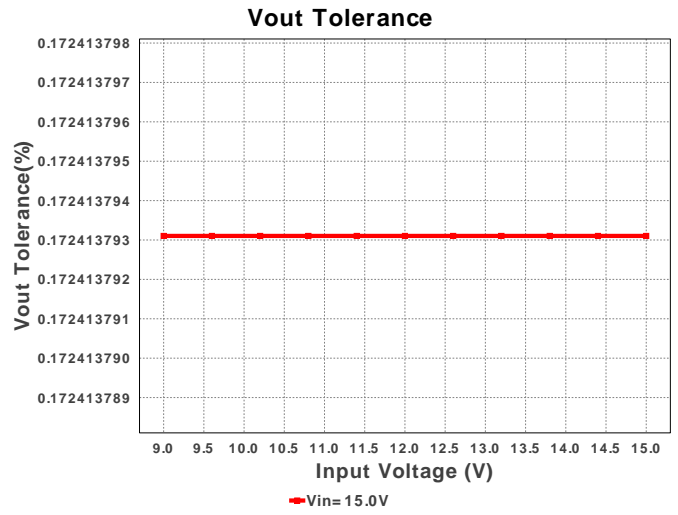
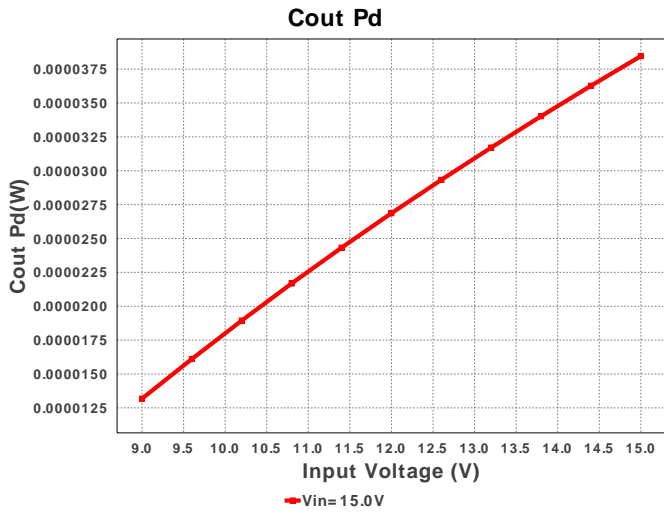
Cin IRMS

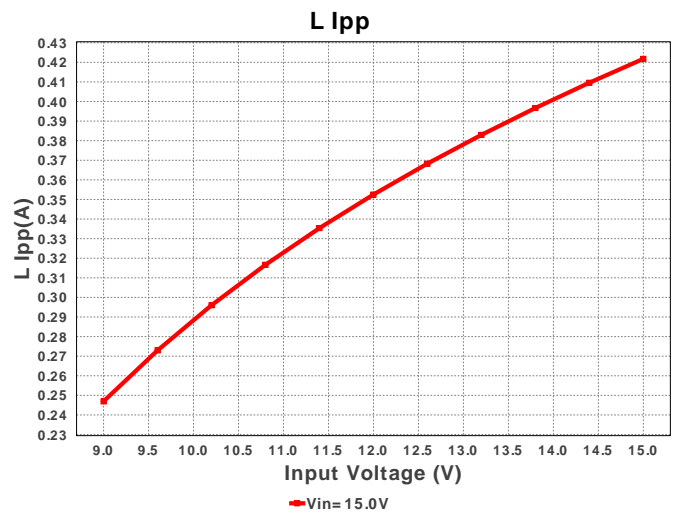
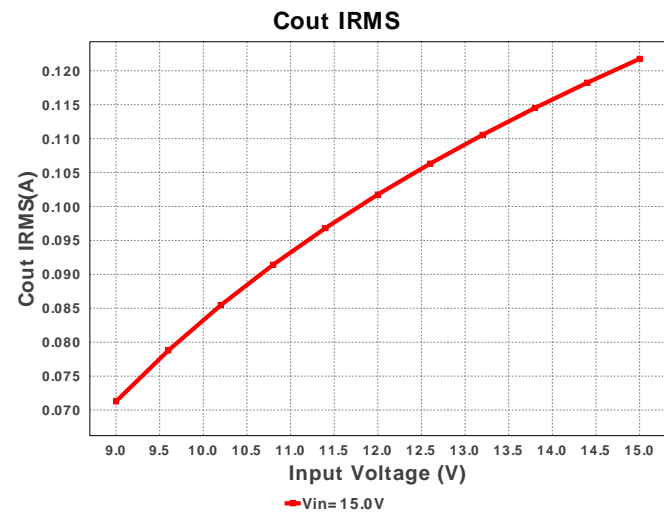
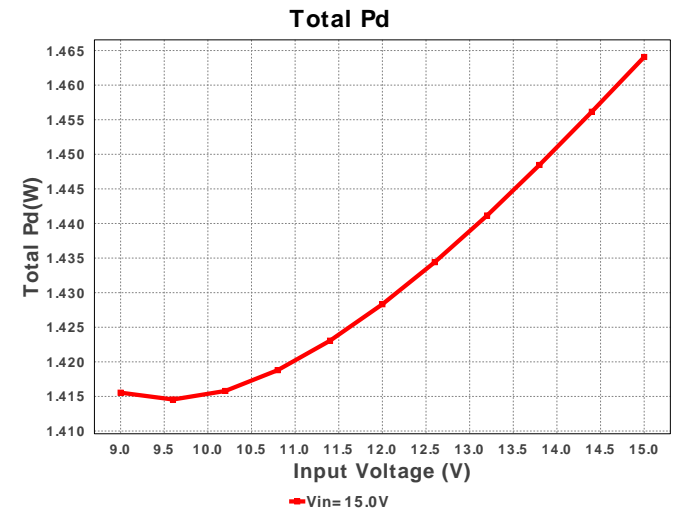
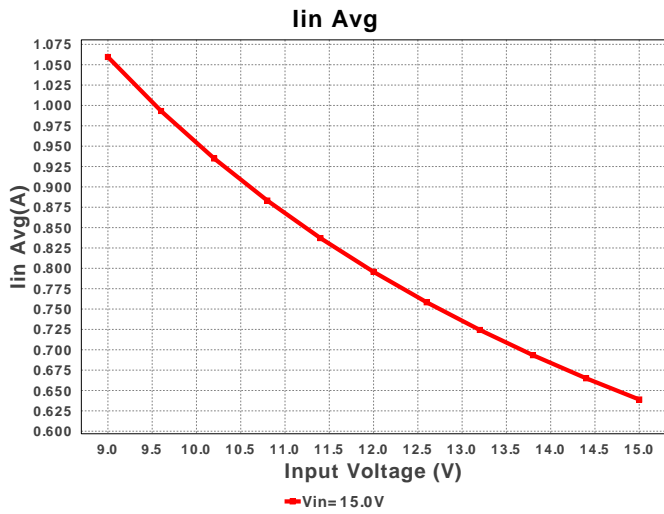
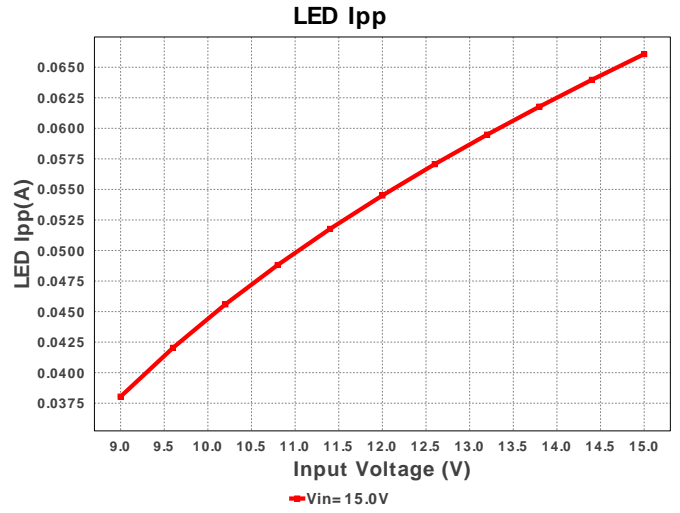
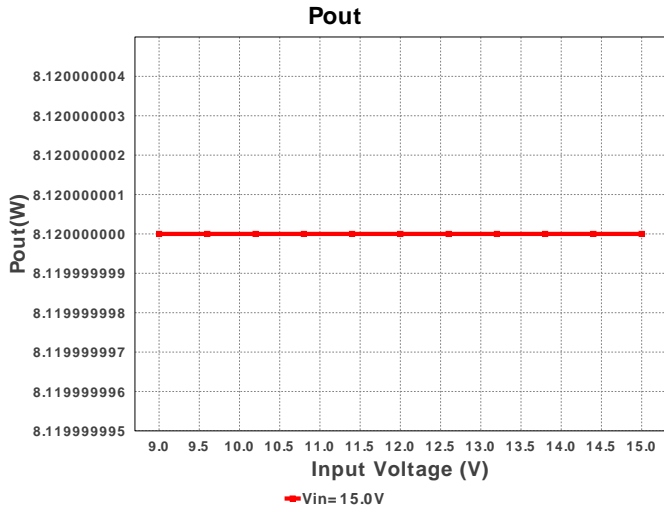


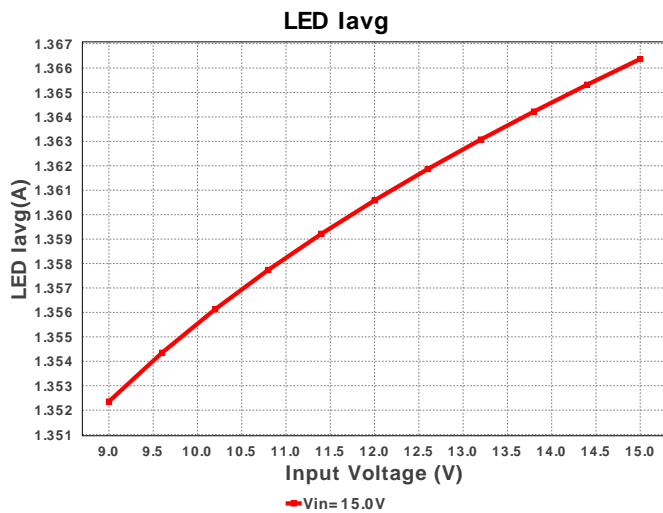
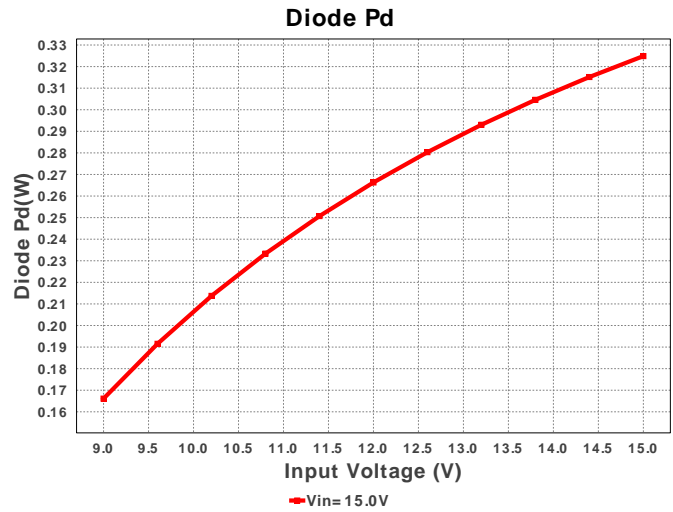
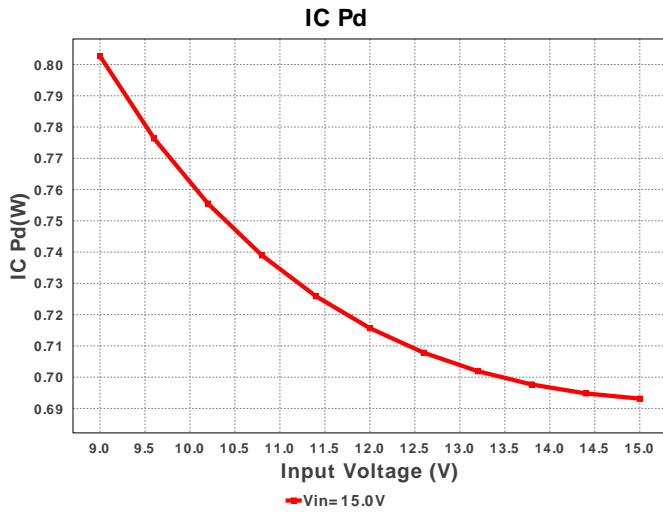
IC Ipk











Operating Values

#	Name	Value	Category	Description
1.	Cin IRMS	501.515 mA	Current	Input capacitor RMS ripple current
2.	Cout IRMS	121.754 mA	Current	Output capacitor RMS ripple current
3.	IC Ipk	1.649 A	Current	Peak switch current in IC
4.	Iin Avg	638.94 mA	Current	Average input current
5.	L Ipp	421.77 mA	Current	Peak-to-peak inductor ripple current
6.	LED Iavg	1.366 A	Current	LED Average Current
7.	LED Ipp	65.282 mA	Current	LED Ripple Current
8.	M1 Irms	900.248 mA	Current	Q Iavg
9.	BOM Count	12	General	Total Design BOM count
10.	FootPrint	276.0 mm ²	General	Total Foot Print Area of BOM components
11.	Frequency	601.3 kHz	General	Switching frequency
12.	IC Tolerance	10.0 mV	General	IC Feedback Tolerance
13.	M Vds Act	411.974 mV	General	Voltage drop across the MosFET
14.	Pout	8.12 W	General	Total output power
15.	Total BOM	\$0.0	General	Total BOM Cost
16.	D1 Tj	38.122 degC	Op_Point	D1 junction temperature
17.	Vout OP	5.8 V	Op_Point	Operational Output Voltage
18.	Duty Cycle	41.349 %	Op_point	Duty cycle
19.	Efficiency	84.724 %	Op_point	Steady state efficiency
20.	IC Tj	64.657 degC	Op_point	IC junction temperature
21.	ICThetaJA	50.0 degC/W	Op_point	IC junction-to-ambient thermal resistance
22.	IOUT_OP	1.4 A	Op_point	Iout operating point
23.	LED Rd	167.929 mOhm	Op_point	LED DynamicResistance
24.	LED Vf	5.6 V	Op_point	Total LED Forward Calculated Voltage
25.	VIN_OP	15.0 V	Op_point	Vin operating point
26.	Cin Pd	1.135 mW	Power	Input capacitor power dissipation
27.	Cout Pd	38.461 μW	Power	Output capacitor power dissipation
28.	Diode Pd	324.86 mW	Power	Diode power dissipation
29.	IC Pd	693.143 mW	Power	IC power dissipation
30.	L Pd	150.92 mW	Power	Inductor power dissipation
31.	LED Pd	7.84 W	Power	LED Power Dissipation

#	Name	Value	Category	Description
32.	Rsense Pd	294.0 mW	Power	LED Power Dissipation
33.	Total Pd	1.464 W	Power	Total Power Dissipation
34.	Vout Tolerance	172.414 m%		Vout Tolerance based on IC Tolerance and voltage divider resistors if applicable

Design Inputs

#	Name	Value	Description
1.	Iout	1.4	Maximum Output Current
2.	VinMax	15.0	Maximum input voltage
3.	VinMin	9.0	Minimum input voltage
4.	Vout	5.6	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	LMZ7-RW57	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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