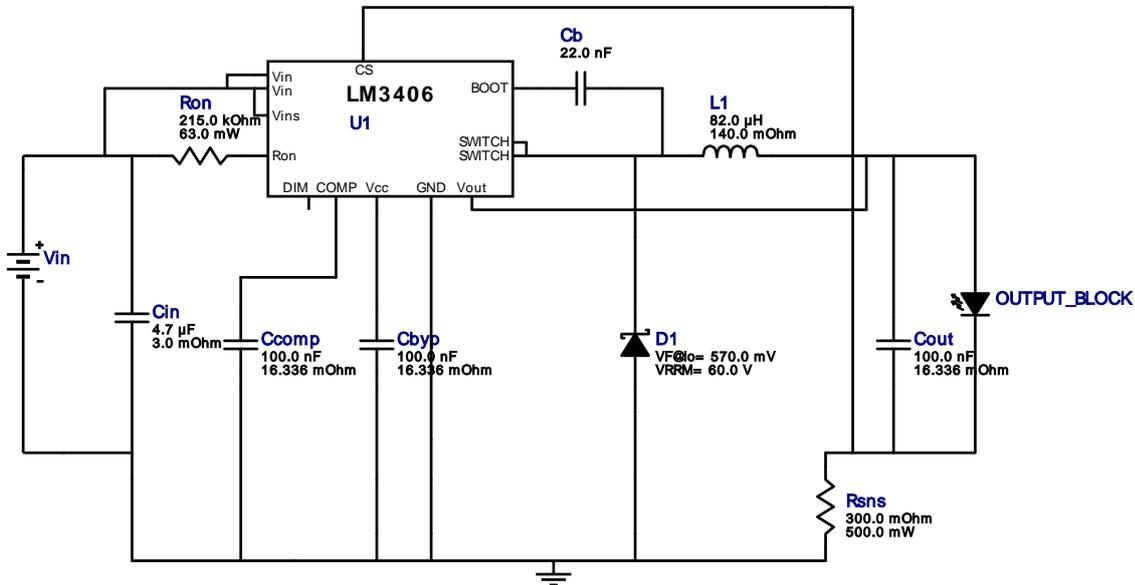


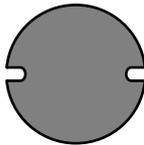
WEBENCH[®] Design Report

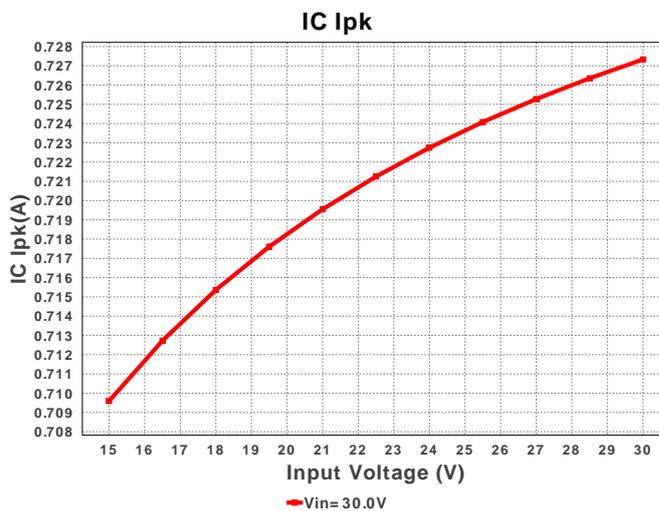
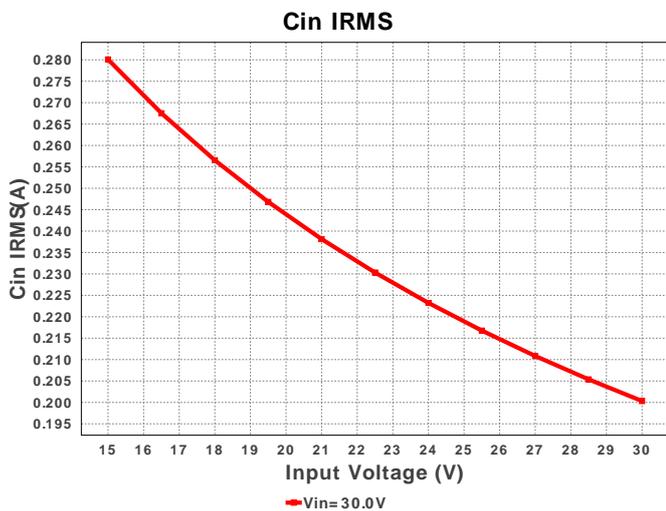
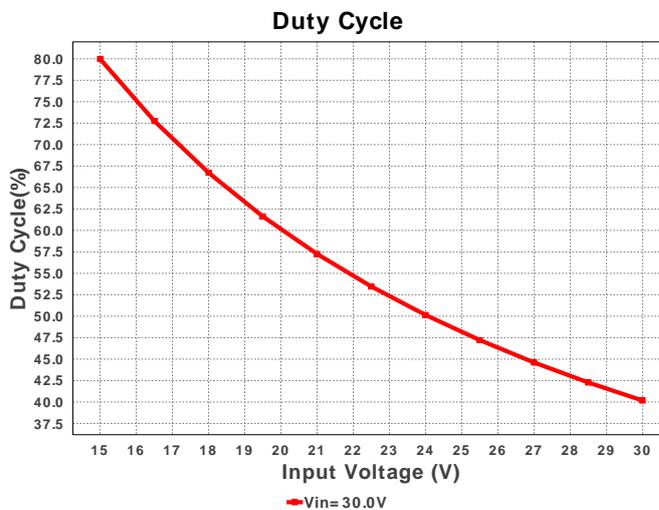
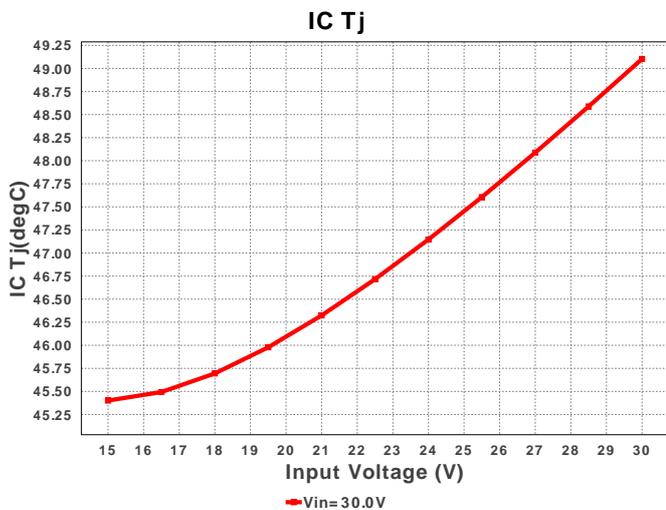
 Design : 4398736/3 LM3406MHX/NOPB
 LM3406MHX/NOPB 15.0V-30.0V to 11.70V @ 0.7A

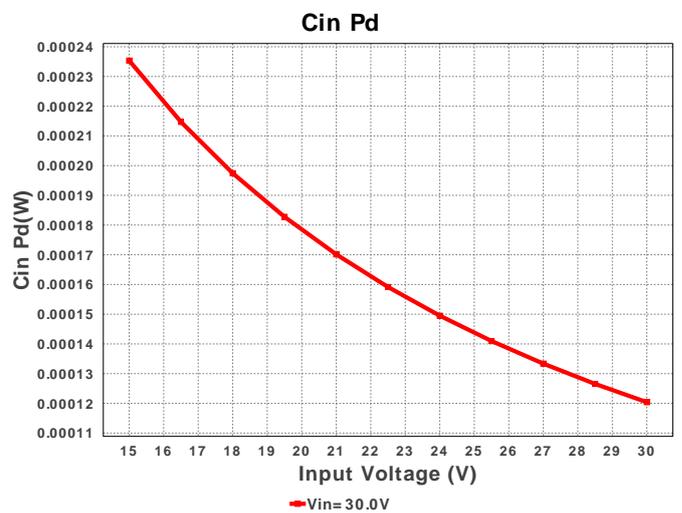
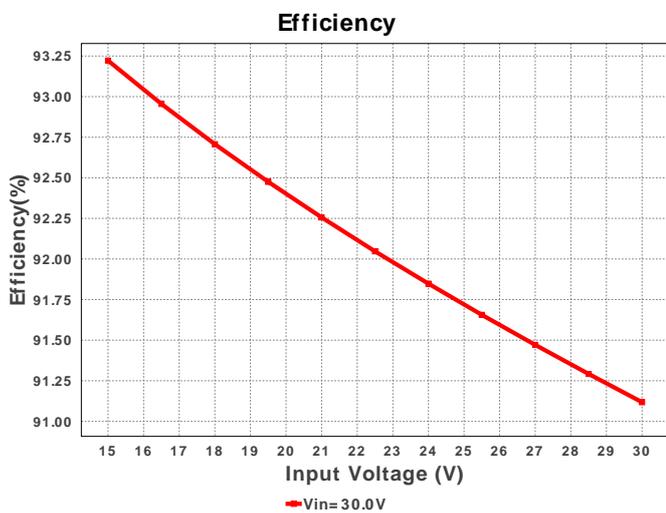
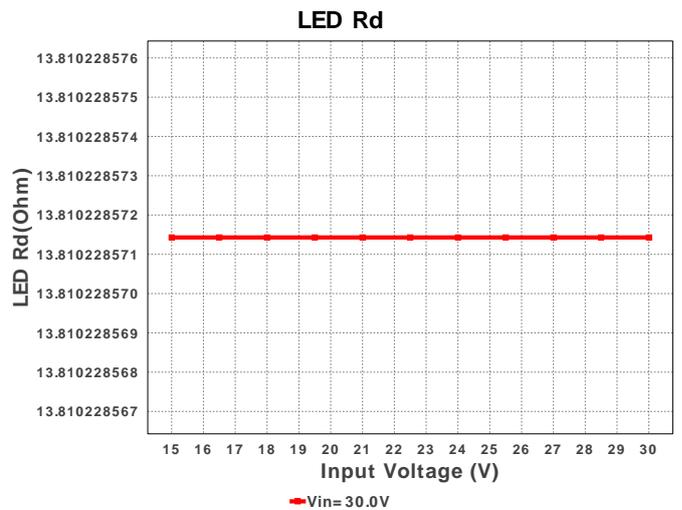
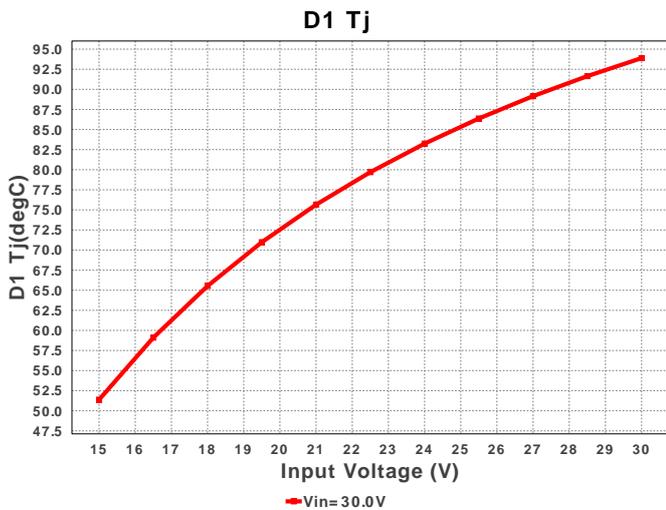
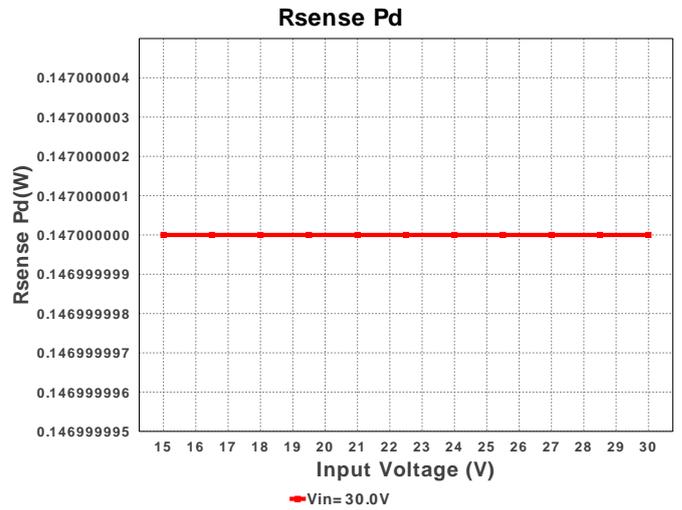
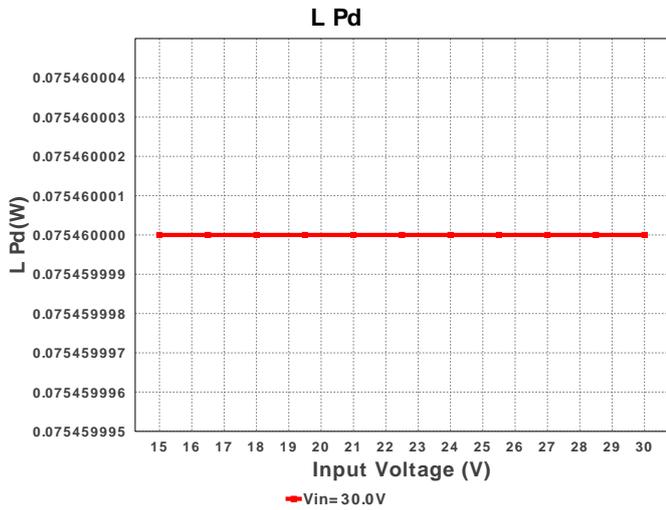
 VinMin = 15.0V
 VinMax = 30.0V

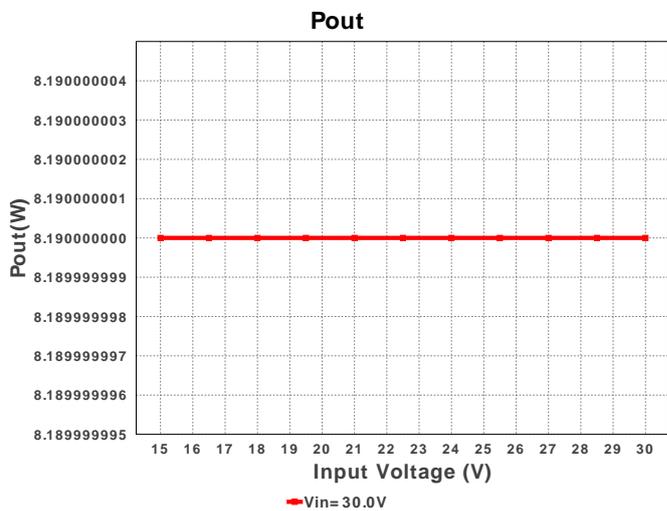
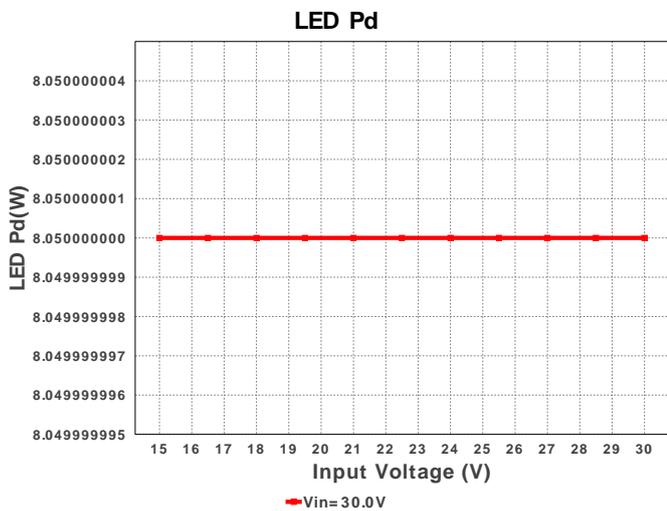
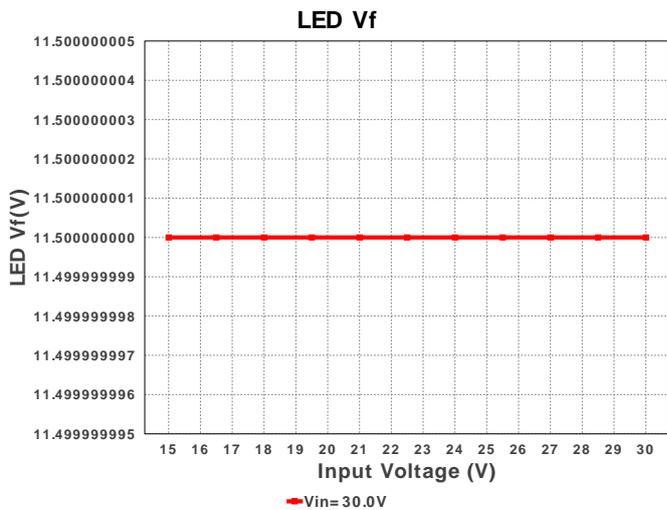
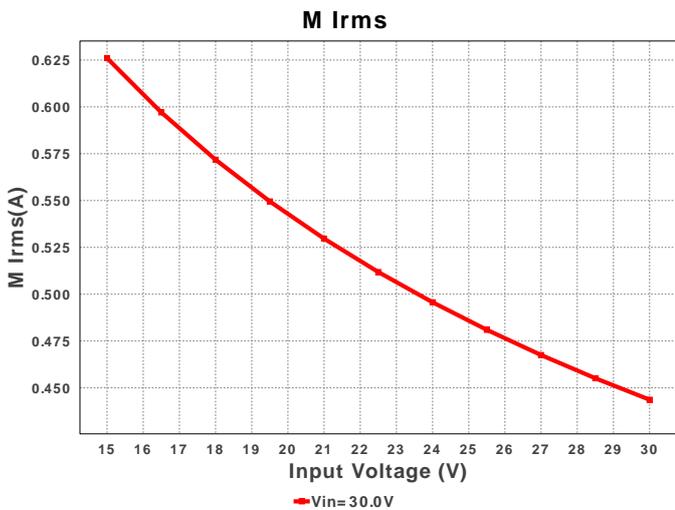
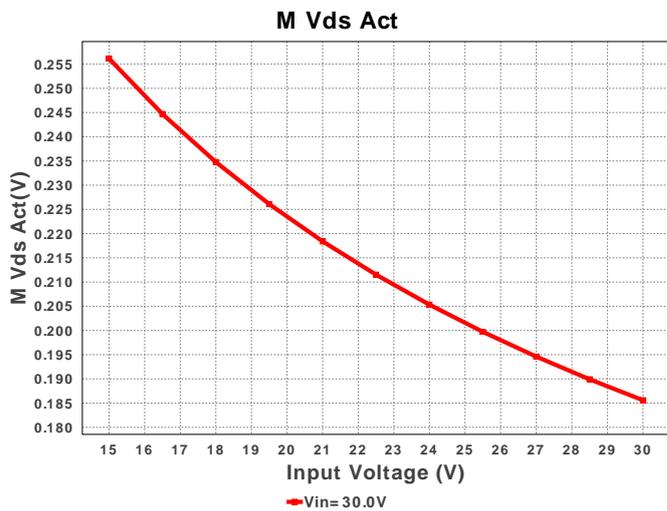
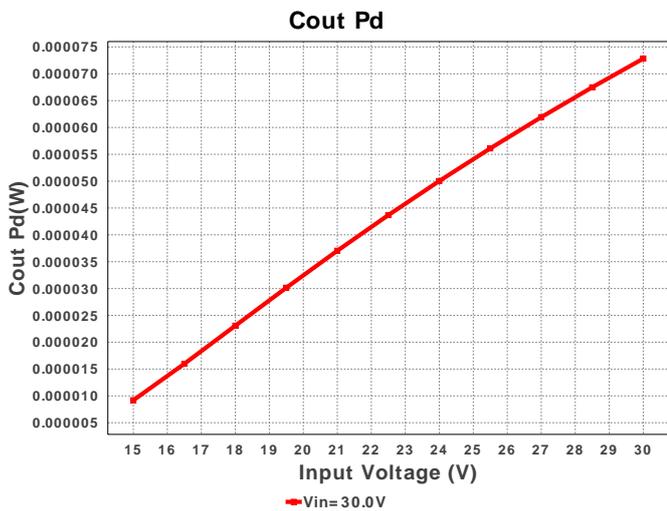
 Vout = 11.5V
 Iout = 0.7A

Electrical BOM

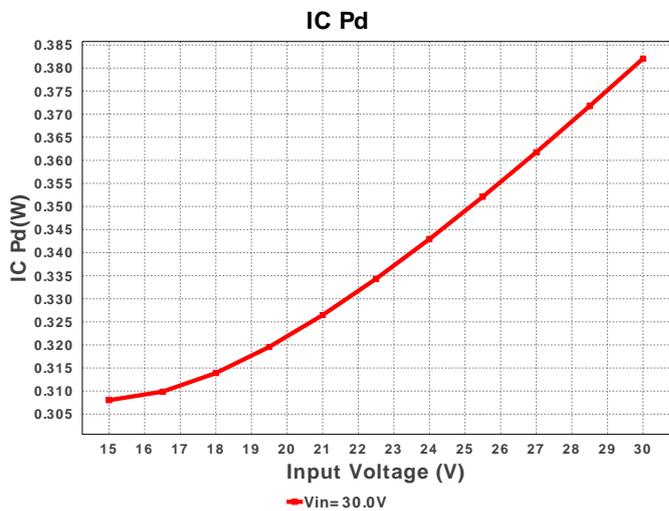
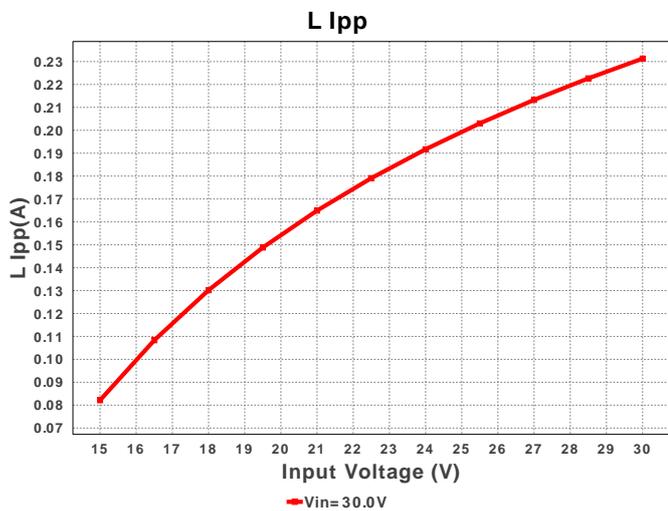
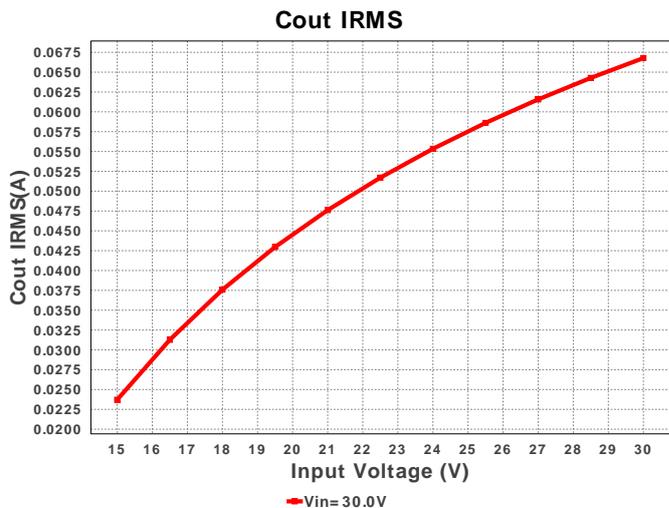
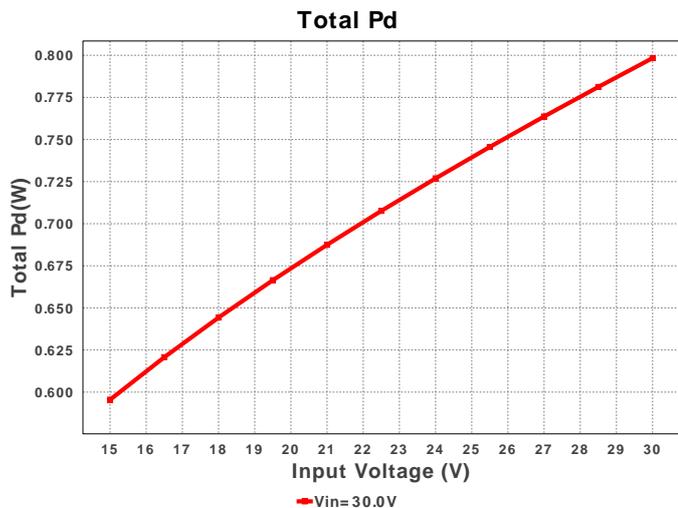
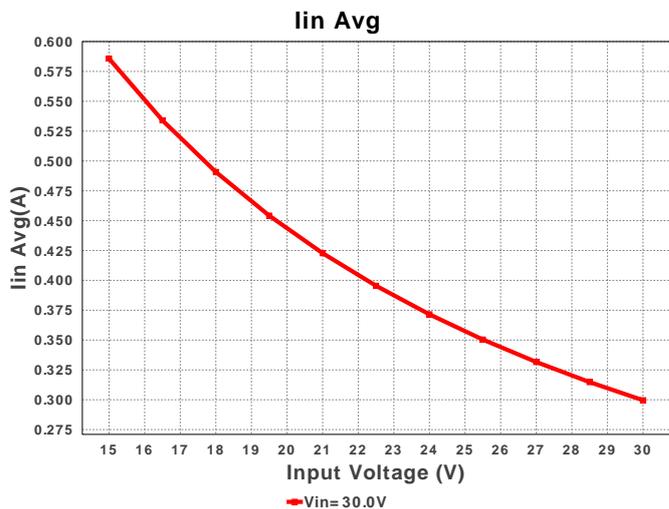
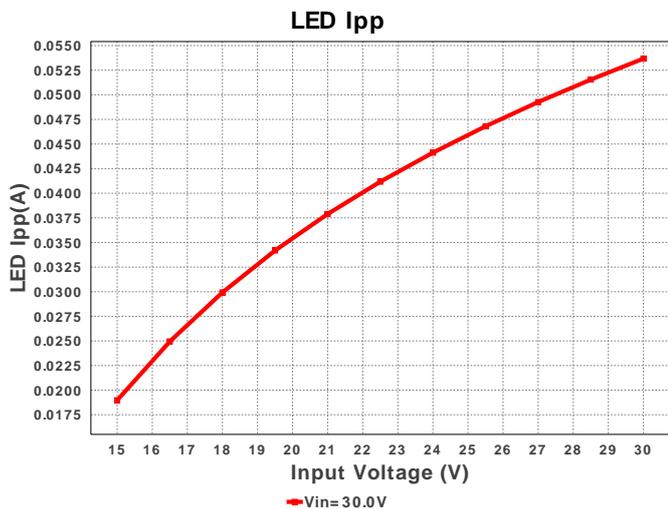
| # | Name | Manufacturer | Part Number | Properties | Qty | Price | Footprint |
|----|-------|-------------------|-----------------------------------|---|-----|--------|--|
| 1. | Cb | MuRata | GRM155R71E223KA61D Series= X7R | Cap= 22.0 nF VDC= 25.0 V IRMS= 0.0 A | 1 | \$0.01 |  0402 3 mm ² |
| 2. | Cbyp | TDK | C1608X7R1E104K Series= X7R | Cap= 100.0 nF ESR= 16.336 mOhm VDC= 25.0 V IRMS= 0.0 A | 1 | \$0.01 |  0603 5 mm ² |
| 3. | Ccomp | TDK | C1608X7R1E104K Series= X7R | Cap= 100.0 nF ESR= 16.336 mOhm VDC= 25.0 V IRMS= 0.0 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 | 1 | \$0.07 |  1206 11 mm ² |
| 5. | Cout | TDK | C1608X7R1H104K Series= X7R | Cap= 100.0 nF ESR= 16.336 mOhm VDC= 50.0 V IRMS= 0.0 A | 1 | \$0.01 |  0603 5 mm ² |
| 6. | D1 | NXP Semiconductor | PMEG6010CEH,115 | VF@Io= 570.0 mV VRRM= 60.0 V | 1 | \$0.11 |  SOD-123F 12 mm ² |
| 7. | D_LED | Cree | XHP50A-00-0000-0D00J40E1ED | | 1 | \$6.54 |  xlampxhp 0 mm ² |

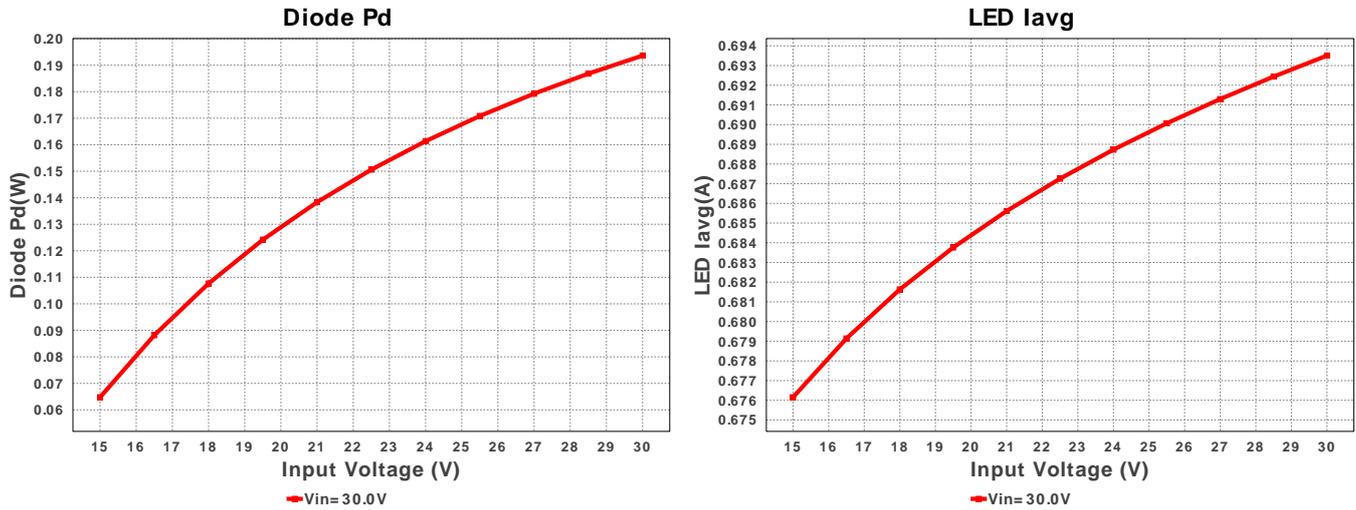
| # | Name | Manufacturer | Part Number | Properties | Qty | Price | Footprint |
|-----|------|-------------------|-------------------------------------|---|-----|--------|--|
| 8. | L1 | Bourns | SDR1307-820KL | L= 82.0 μ H DCR= 140.0 mOhm | 1 | \$0.35 |  SDR1307 227 mm ² |
| 9. | Ron | Vishay-Dale | CRCW0402215KFKED Series= CRCW.e3 | Res= 215.0 kOhm Power= 63.0 mW Tolerance= 1.0% | 1 | \$0.01 |  0402 3 mm ² |
| 10. | Rsns | Rohm | MCR25JZHFLR300 Series= 298 | 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 |











Operating Values

| # | Name | Value | Category | Description |
|-----|--------------|-----------------------|----------|---|
| 1. | Cin IRMS | 200.384 mA | Current | Input capacitor RMS ripple current |
| 2. | Cout IRMS | 66.653 mA | Current | Output capacitor RMS ripple current |
| 3. | IC Ipk | 826.493 mA | Current | Peak switch current in IC |
| 4. | Iin Avg | 299.12 mA | Current | Average input current |
| 5. | L Ipp | 230.89 mA | Current | Peak-to-peak inductor ripple current |
| 6. | LED Iavg | 693.207 mA | Current | LED Average Current |
| 7. | LED Ipp | 53.08 mA | Current | LED Ripple Current |
| 8. | M Irms | 443.275 mA | Current | MOSFET RMS current |
| 9. | BOM Count | 11 | General | Total Design BOM count |
| 10. | FootPrint | 343.0 mm ² | General | Total Foot Print Area of BOM components |
| 11. | Frequency | 387.592 kHz | General | Switching frequency |
| 12. | IC Tolerance | 10.0 mV | General | IC Feedback Tolerance |
| 13. | M Vds Act | 185.277 mV | General | Voltage drop across the MosFET |
| 14. | Pout | 8.19 W | General | Total output power |
| 15. | Total BOM | \$8.1 | General | Total BOM Cost |
| 16. | D1 Tj | 89.105 degC | Op_Point | D1 junction temperature |
| 17. | Vout OP | 11.7 V | Op_Point | Operational Output Voltage |
| 18. | Duty Cycle | 40.101 % | Op_point | Duty cycle |
| 19. | Efficiency | 91.267 % | Op_point | Steady state efficiency |
| 20. | IC Tj | 49.096 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 | 30.0 V | Op_point | Vin operating point |
| 26. | Cin Pd | 120.462 μW | Power | Input capacitor power dissipation |
| 27. | Cout Pd | 72.575 μW | Power | Output capacitor power dissipation |
| 28. | Diode Pd | 179.106 mW | Power | Diode power dissipation |
| 29. | IC Pd | 381.911 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 | 783.664 mW | Power | Total Power Dissipation |

Design Inputs

| # | Name | Value | Description |
|-----|----------------|----------------------|------------------------------------|
| 1. | Iout | 700.0 m | Maximum Output Current |
| 2. | Iout1 | 700.0 m | Output Current #1 |
| 3. | VinMax | 30.0 | Maximum input voltage |
| 4. | VinMin | 15.0 | Minimum input voltage |
| 5. | Vout | 11.5 | Output Voltage |
| 6. | Vout1 | 11.5 | Output Voltage #1 |
| 7. | application | LED_DRIVER | LED Application |
| 8. | base_pn | LM3406 | Texas Instruments Base Part Number |
| 9. | isLEDArchitect | N | LED Architect Project |
| 10. | ledparallel | 1.0 | Number of LED in parallel |
| 11. | ledpartnumber | XHP50A-00-0000-0D001 | LED Part number |
| 12. | ledseries | 1.0 | Number of LED in series |
| 13. | line_fsw | 60.0 | AC Line Frequency |
| 14. | source | DC | Input Source Type |
| 15. | 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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