# Design 10 - LM3404MA

## Introduction

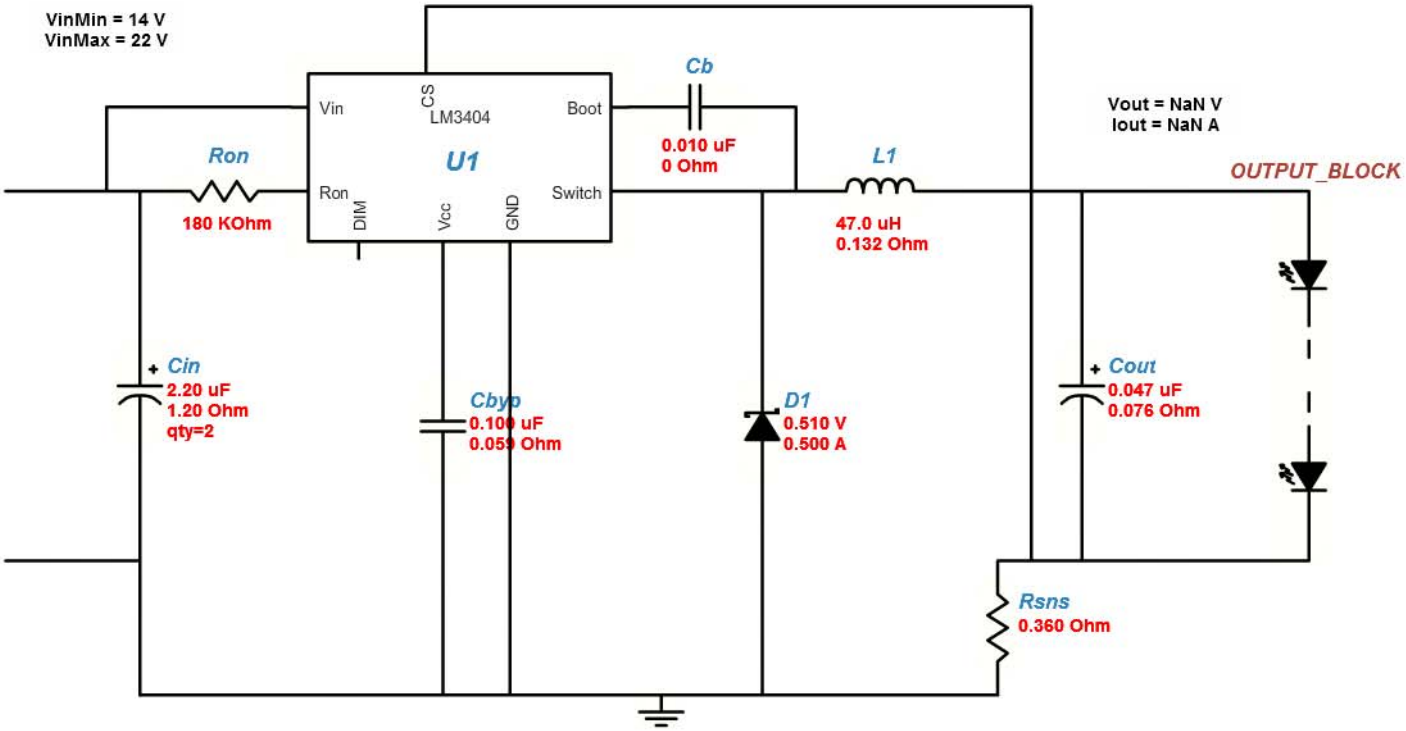
## Design Specifications

| | |
|---|---|
| IC | LM3404 |
| VinMin | 24 V |
| VinMax | 24 V |
| Vout | 14.75 V |
| Iout | 0.6 A |
| ta | 30 |

| | |
|---|---|
| Optimization Factor | 3 |
| application | LED_DRIVER |
| ledpartnumber | custom |
| ledseries | 5 |
| ledparallel | 1 |
| ledrd | 5 |

| | |
|---|---|
| SoftStart Time | 0 mili second |
| userfsw | 676.165 KHertz |
| usecustomfsw | N |
| fsw | 676.165 K |
| NoOutputCap_Confi | N |
| Ipp | 0 |

## Schematic



# Bill of Materials

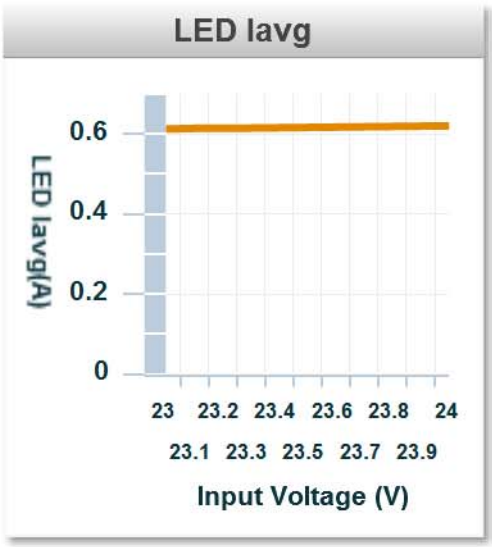
| Part | Manufacturer | Part Number | Quan | Price | Attributes | Top View |
|---|---|---|---|---|---|---|
| Cb | Vishay-Vitramon | VJ1206Y103KBBAT4X | 1 | 0.3 | Cap=10nF, ESR=0Ohm, VDC=100V | |
| Cbyp | Kemet | C1206C104J5RACTU | 1 | 0.06 | Cap=100nF, ESR=0.059Ohm, VDC=50V | |
| Cin | AVX | TPSD225K050R1200 | 2 | 5.32 | Cap=2.2uF, ESR=1.2Ohm, | |
| Cout | Kemet | C1206C473K5RACTU | 1 | 0.03 | Cap=47nF, ESR=0.076Ohm, VDC=50V | |
| D1 | ON Semiconductor | MBR0540T1G | 1 | 0.07 | VFatIo=0.51V, Io=0.5A, VRRM=40V | |
| L1 | Wurth Elektronik eiSos | 744066470 | 1 | 1.8 | L=47uH, DCR=0.132Ohm, IDC=1.75A | |
| Ron | Yageo America | RC1206FR-07180KL | 1 | 0.02 | Resistance=180KOhm, Tolerance=1%, Power=0.25W | |
| Rsns | Rohm | MCR25JZHFLR360 | 1 | 0.1 | Resistance=0.36Ohm, Tolerance=1%, Power=0.5W | |
| U1 | National Semiconductor Inc. | LM3404MA | 1 | 1.35 | | |
| D_LED | CUSTOM | CUSTOM | 5 | 0 | Color=, Io=0.6A | |

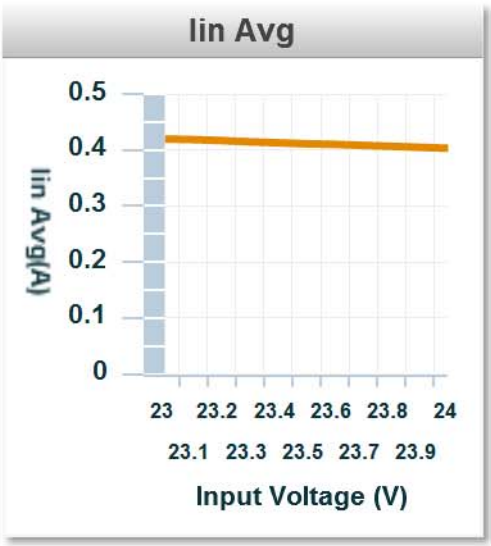
## Operating Values

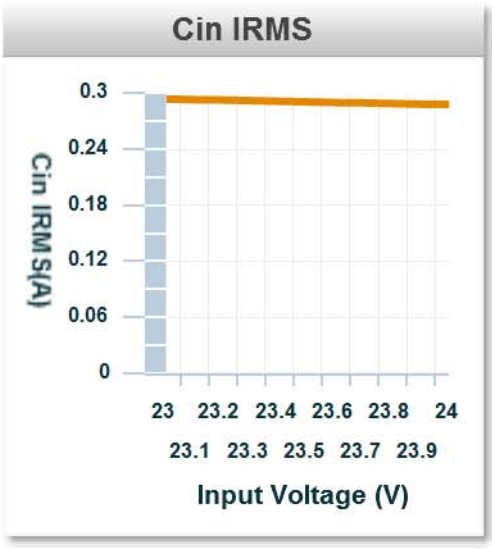
| Name | Value | Category | Description |
|---|---|---|---|
| LED Iavg | 0.62A | Current | LED Average Current |
| Iin Avg | 0.40A | Current | Average input current |
| Cin IRMS | 0.28A | Current | Input capacitor RMS ripple current |
| IC Ipk | 0.63A | Current | Peak switch current in IC |
| Cout IRMS | 0.05A | Current | Output capacitor RMS ripple current |
| LED Ipp | 0.03A | Current | LED Ripple Current |
| L Ipp | 0.19A | Current | Peak-to-peak inductor ripple current |
| Frequency | 638KHz | General | Switching frequency |
| Mode | CCM | General | Conduction Mode |
| FootPrint | 393mm2 | General | Total Foot Print Area of BOM components |
| Pout | 8.97W | General | Total output power |
| Duty Cycle | 64.1% | Op_point | Duty cycle |
| Efficiency | 92.7% | Op_point | Steady state efficiency |
| ICThetaJA | 155degC/W | Op_point | IC junction-to-ambient thermal resistance |
| VIN_OP | 24V | Op_point | Vin operating point |
| IC Tj | 87.1degC | Op_point | IC junction temperature |
| IOUT_OP | 0.6A | Op_point | Iout operating point |
| LED Vf | 14.8V | Op_point | Total LED Forward Calculated Voltage |
| LED Rd | 5Ohm | Op_point | LED DynamicResistance |
| M_Vds_Act | 0.39V | Op_point | |
| M_Irms_Act | 0.48A | Op_point | Q Iavg |
| Cout Pd | 251uW | Power | Output capacitor power dissipation |
| L Pd | 0.05W | Power | Inductor power dissipation |
| Cin Pd | 0.05W | Power | Input capacitor power dissipation |
| LED Pd | 8.85W | Power | LED Power Dissicipation |
| Rsense Pd | 0.13W | Power | LED Power Dissicipation |
| IC Pd | 0.36W | Power | IC power dissipation |
| Diode Pd | 0.11W | Power | Diode power dissipation |

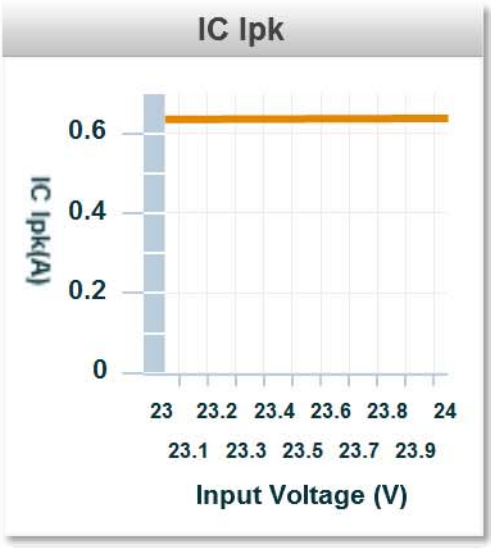
## Charts

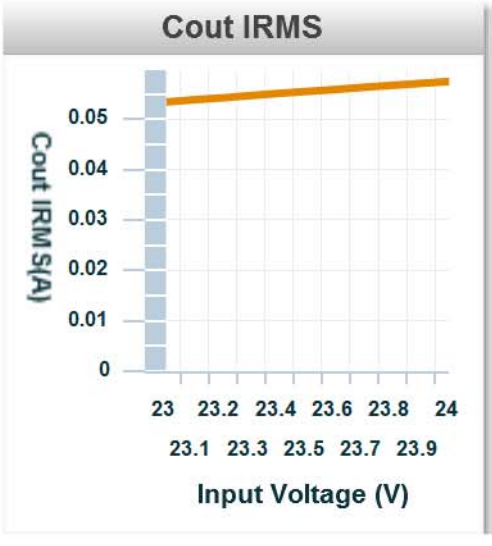
### Current

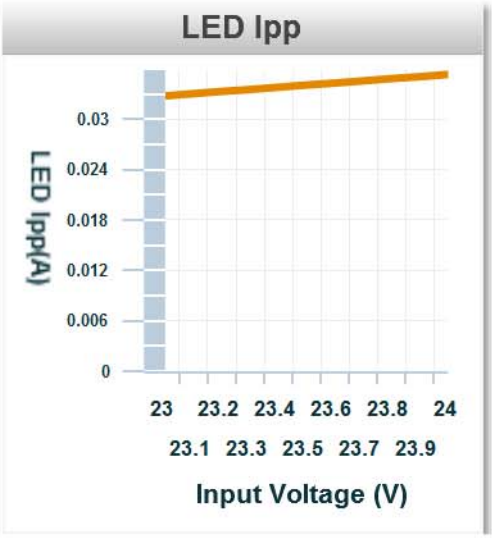


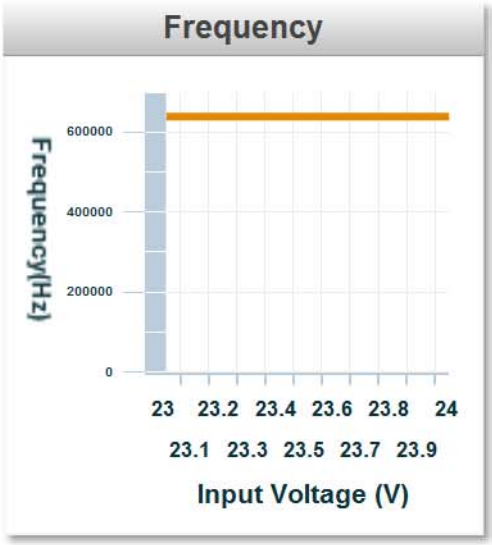



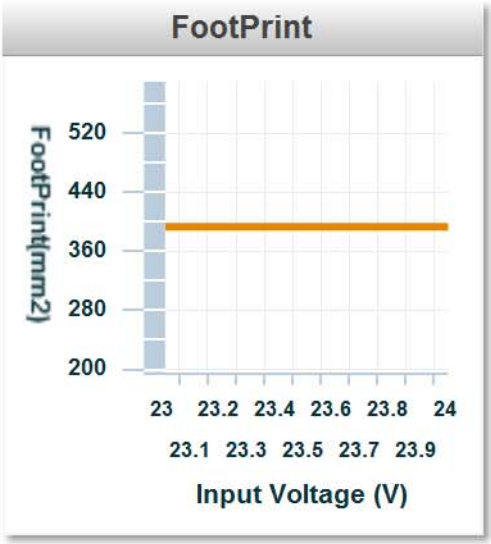



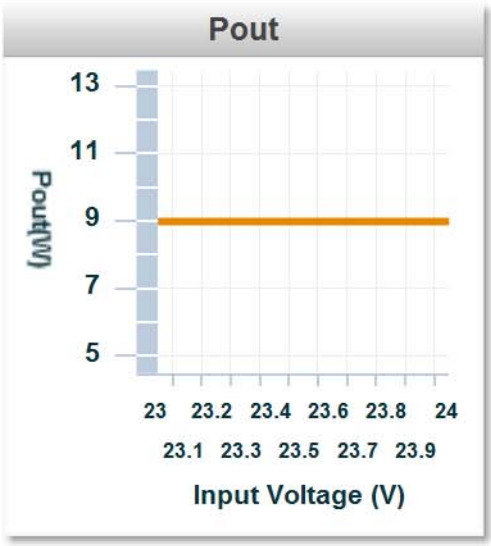



## Charts (Continued)

### General



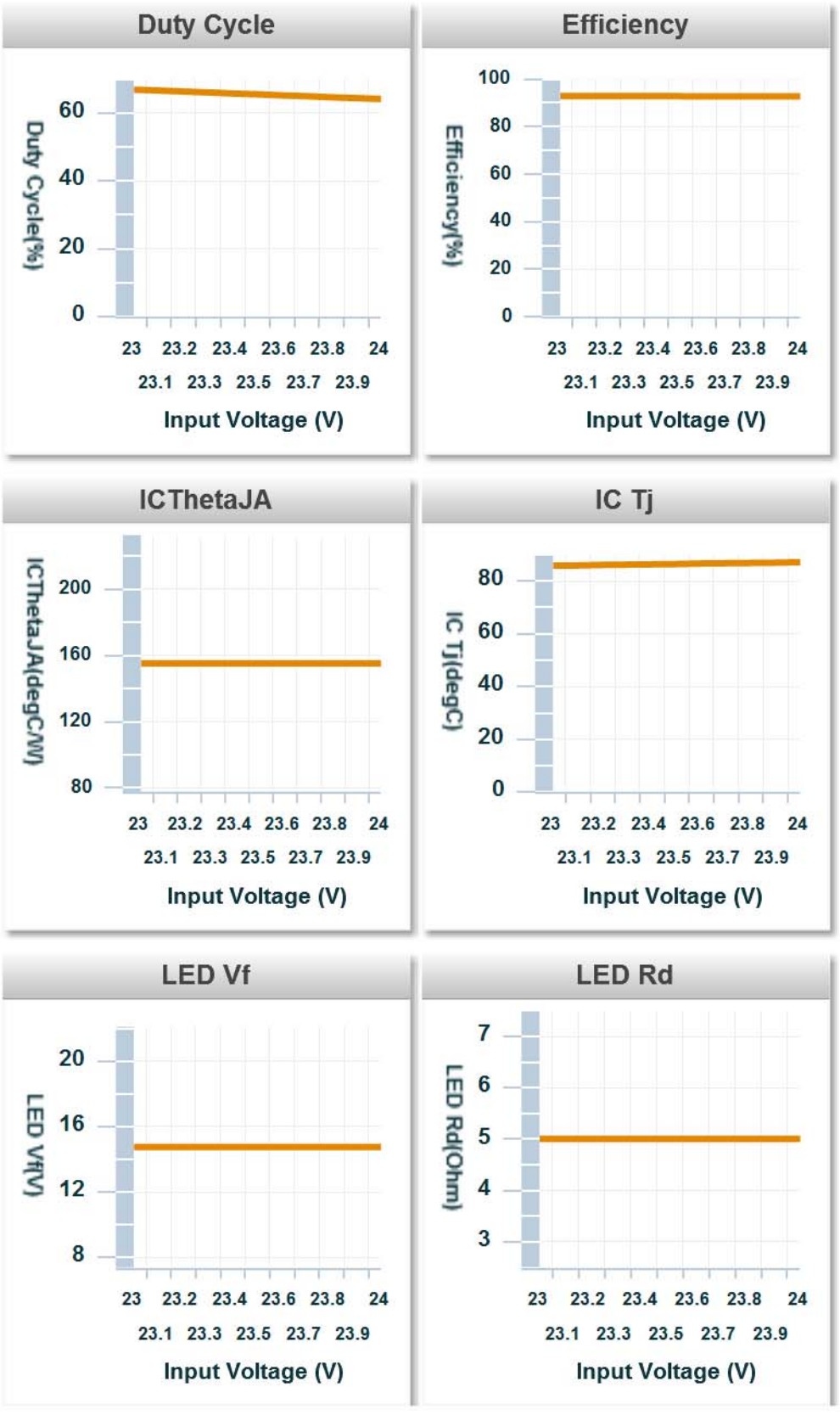



## Charts (Continued)

### Op_point

Vin=24.00V



## Charts (Continued)

### Power