

**80V 1A High Efficiency Buck PFM LED Constant Current Driver****JTMX8912****Features**

- Operation Voltage DC 12V~80V.
- 0.1V current sense voltage reference.
- Directly drive 1~18 Series 1W/3W LED.
- Excellent line and load regulation.
- Internal Optimize Power HV-MOSFET.
- Built in Thermal Shutdown Function.
- Built in Current Limiting Function.
- Built in Soft-Start Circuit.
- Available in TO263-5L package.
- Up to 98% efficiency.

**General Description**

The JTMX8912 is a monolithic high voltage switching regulator with PFM that is specifically designed to operate from a 12V~80V DC power supply.

The JTMX8912 is a high efficiency LED driver switching regulator. The LED string is driven at DC constant current rather than constant voltage, thus providing constant light output and enhanced reliability.

**Applications**

- LED Lighting & LED LAMP
- General purpose LED lighting

**TO263-5L**

Figure1. Package Type of JTMX8912

#### Pin Configurations

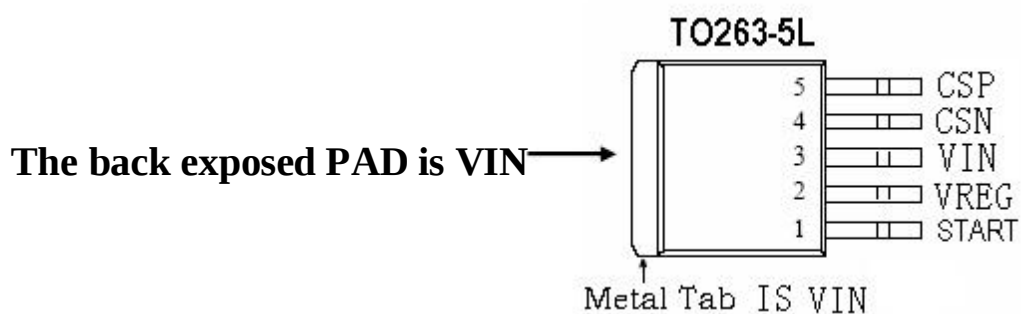


Figure2. Pin Configuration of JTMX8912 (Top View)

Table 1 Pin Description

| Pin Number | Pin Name | Description                                                     |
|------------|----------|-----------------------------------------------------------------|
| 1          | START    | Internal soft start Pin.                                        |
| 2          | VREG     | Internal Voltage Regulation Pin. (The VREG is about 8V)         |
| 3          | VIN      | Input high voltage Pin. (Operation voltage 12V~80V)             |
| 4          | CSN      | Current Sense Negative Pin.                                     |
| 5          | CSP      | Current Sense Positive Pin. (The current sense voltage is 0.1V) |

### 80V 1A High Efficiency Buck PFM LED Constant Current Driver

JTMX8912

#### Function Block

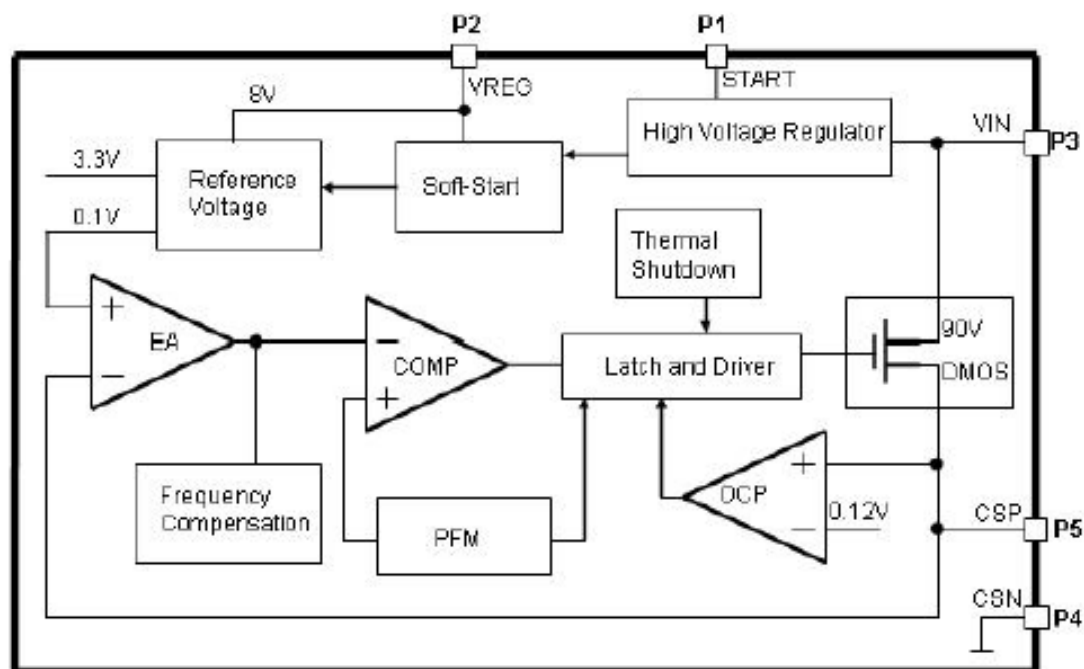


Figure3. Function Block Diagram of JTMX8912

#### Typical Application Circuit

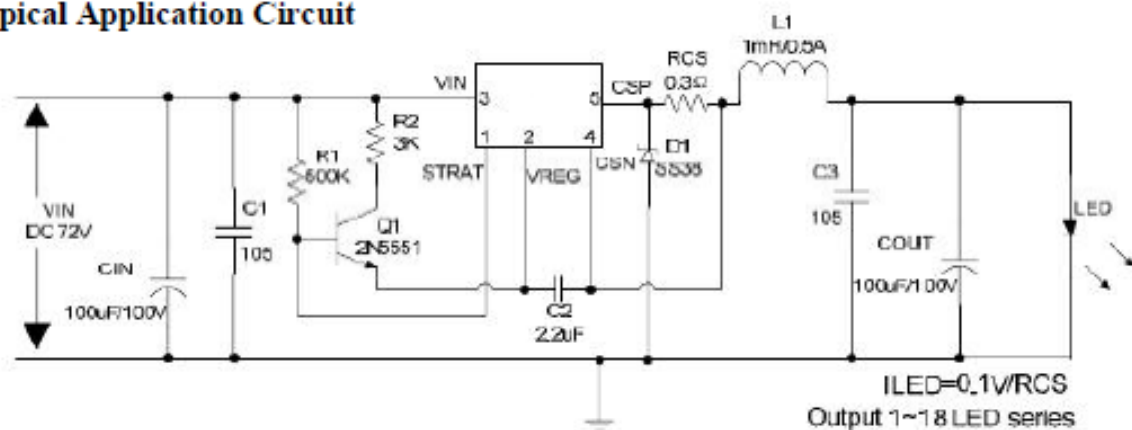


Figure4. JTMX8912 Typical Application

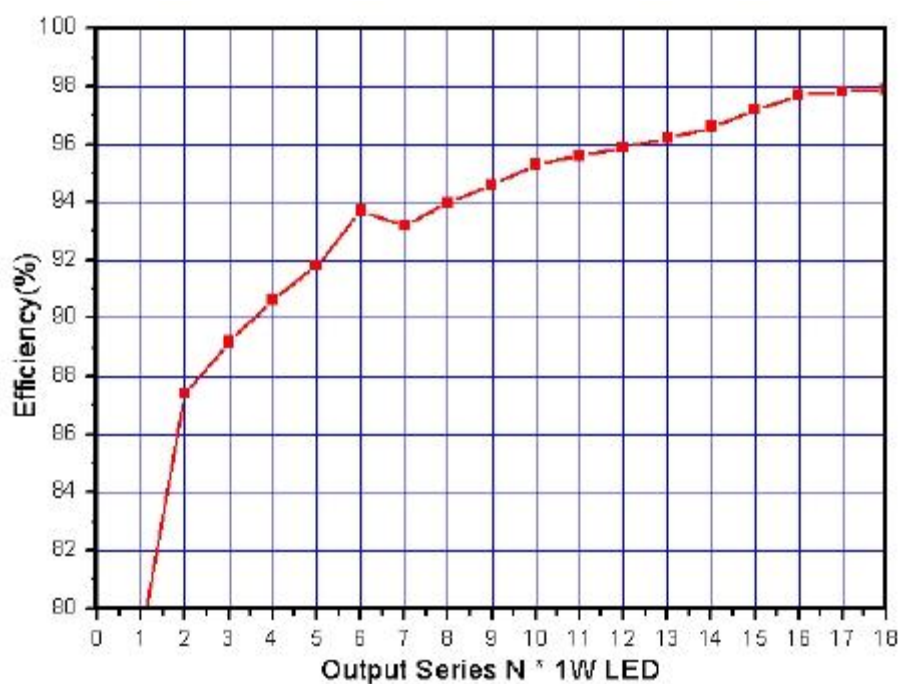


Figure5. Efficiency VS Output N\*1W LED

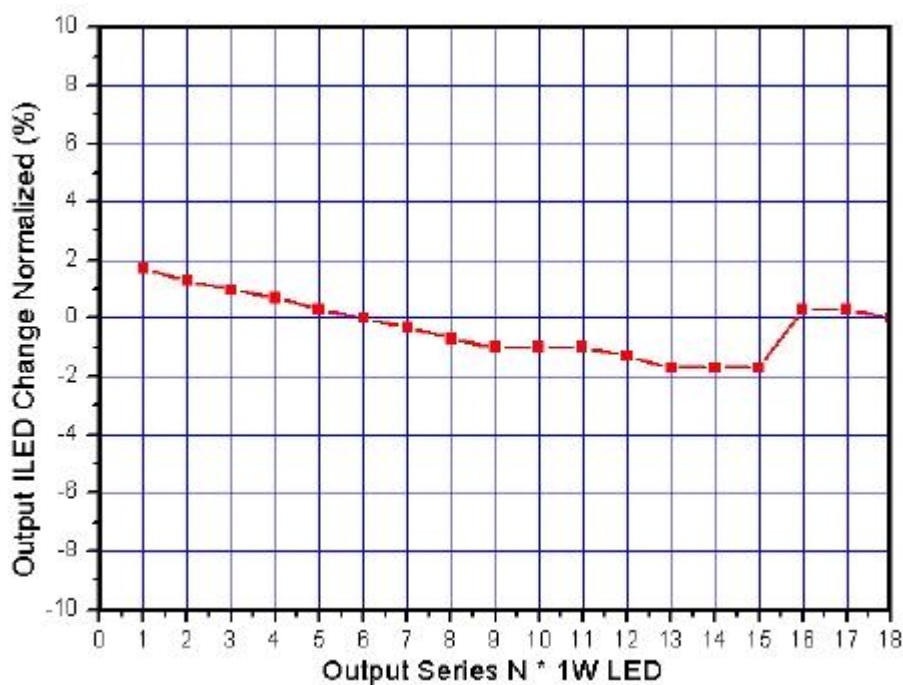


Figure6. Output ILED Load Regulation VS Output N\*1W LED

### 80V 1A High Efficiency Buck PFM LED Constant Current Driver

**JTMX8912**

#### Ordering Information

| Order Information | Marking ID | Package Type | Packing Type Supplied As |
|-------------------|------------|--------------|--------------------------|
| JTMX8912E1        | JTMX8912E1 | TO263-5L     | 800 Units on Tape & Reel |

JIATAIMU Pb-free products, as designated with “E1” suffix in the par number, are RoHS compliant.

#### Absolute Maximum Ratings (Note1)

| Parameter                                                                     | Symbol            | Value              | Unit |
|-------------------------------------------------------------------------------|-------------------|--------------------|------|
| Input Voltage                                                                 | V <sub>in</sub>   | -0.3 to 90         | V    |
| Power Dissipation                                                             | P <sub>D</sub>    | Internally limited | mW   |
| Thermal Resistance (TO263-5L)<br>(Junction to Ambient, No Heatsink, Free Air) | R <sub>JA</sub>   | 30                 | ℃/W  |
| Operating Junction Temperature                                                | T <sub>J</sub>    | -40 to 125         | ℃    |
| Storage Temperature                                                           | T <sub>STG</sub>  | -65 to 150         | ℃    |
| Lead Temperature (Soldering, 10 sec)                                          | T <sub>LEAD</sub> | 260                | ℃    |
| ESD (HBM)                                                                     |                   | >3000              | V    |

**Note1:** Stresses greater than those listed under Maximum Ratings may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the operation is not implied. Exposure to absolute maximum rating conditions for extended periods may affect reliability.

### 80V 1A High Efficiency Buck PFM LED Constant Current Driver

**JTMX8912**

#### JTMX8912 Electrical Characteristics

T<sub>a</sub> = 25℃; unless otherwise specified. Reference test circuit figure4

| Symbol     | Parameter   | Test Condition                             | Min. | Typ. | Max. | Unit |
|------------|-------------|--------------------------------------------|------|------|------|------|
| VCSP       | CSP Voltage | VIN=72V; Iled=300mA;<br>Series 1~18 1W LED | 96   | 100  | 104  | mV   |
| Efficiency | η           | VIN=72V; Iled=300mA;<br>Pout=16W           | -    | 98   | -    | %    |

#### Electrical Characteristics (DC Parameters)

| Parameters                           | Symbol              | Test Condition                                 | Min. | Typ. | Max. | Unit |
|--------------------------------------|---------------------|------------------------------------------------|------|------|------|------|
| Input operation voltage              | VIN                 |                                                | 12   |      | 80   | V    |
| Switching Frequency                  | FOSC                | Figure4 (12*1W)<br>VIN=72V                     | 102  | 127  | 152  | KHz  |
| Max. Duty Cycle                      | D <sub>MAX</sub>    |                                                |      | 85   |      | %    |
| VDMOS Drain-Source Breakdown Voltage | V <sub>BRDS</sub>   | V <sub>GS</sub> =0V,<br>I <sub>DS</sub> =250uA | 90   |      |      | V    |
| VDMOS Drain-Source on resistor       | R <sub>DS(on)</sub> | I <sub>DS</sub> =1A, V <sub>GS</sub> =8V       |      | 100  | 120  | mOhm |
| Thermal Shutdown                     | OTP                 | T <sub>j</sub>                                 |      | 160  |      | °C   |
| Thermal Shutdown Window              |                     |                                                |      | 20   |      | °C   |

### [1] Typical System Application (VIN=60V~80V)

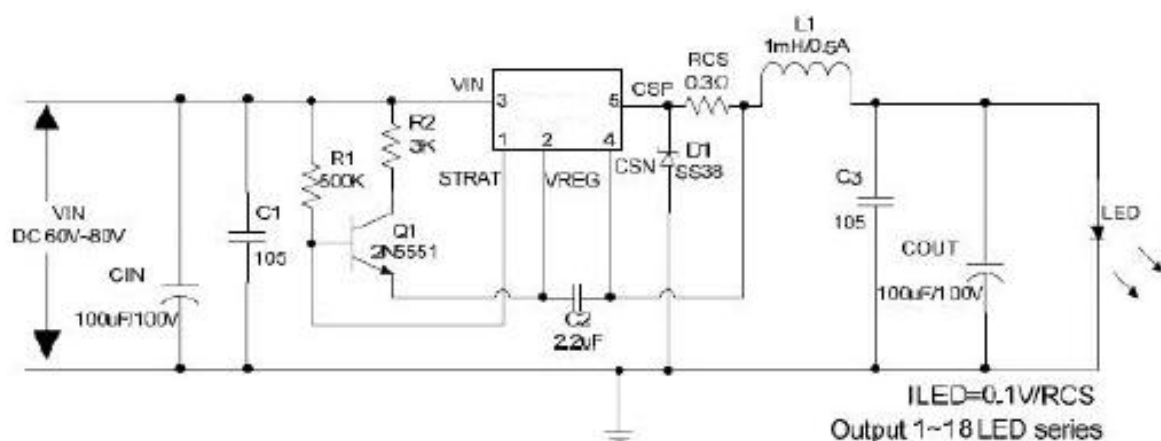


Figure7. JTMX8912 System Application at VIN=60V~80V Schematic

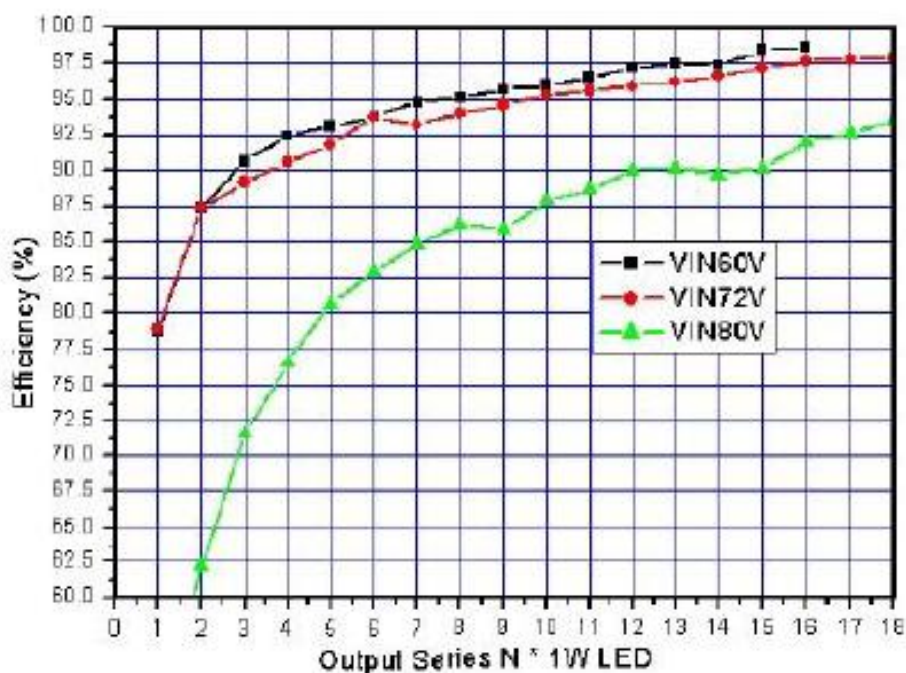


Figure8. JTMX8912 System Application at VIN=60V~80V Efficiency Curve

# 80V 1A High Efficiency Buck PFM LED Constant Current Driver

JTMX8912

Table1: Figure7 Input VIN=60V/72V/80V system parameters table:

| LED String<br>1W*N | VIN=60V |        |            | VIN=72V |        |            | VIN=80V |        |            |
|--------------------|---------|--------|------------|---------|--------|------------|---------|--------|------------|
|                    | FOSC    | Pout   | Efficiency | FOSC    | Pout   | Efficiency | FOSC    | Pout   | Efficiency |
| 1                  | 27.54K  | 1.04W  | 78.7%      | 25.41K  | 0.97W  | 78.9%      | 28.84K  | 1.14W  | 50.8%      |
| 2                  | 45.90K  | 1.99W  | 87.4%      | 45.76K  | 2.02W  | 87.4%      | 46.98K  | 2.09W  | 62.2%      |
| 3                  | 61.79K  | 2.94W  | 90.7%      | 61.10K  | 2.89W  | 89.2%      | 63.69K  | 3.04W  | 71.6%      |
| 4                  | 74.70K  | 3.83W  | 92.4%      | 75.13K  | 3.79W  | 90.6%      | 78.04K  | 3.92W  | 76.6%      |
| 5                  | 85.92K  | 4.75W  | 93.1%      | 87.70K  | 4.70W  | 91.8%      | 91.51K  | 4.85W  | 80.7%      |
| 6                  | 94.64K  | 5.63W  | 93.8%      | 98.50K  | 5.61W  | 93.7%      | 103.35K | 5.78W  | 82.9%      |
| 7                  | 101.06K | 6.48W  | 94.8%      | 107.44K | 6.45W  | 93.2%      | 113.48K | 6.66W  | 84.9%      |
| 8                  | 105.65K | 7.36W  | 95.1%      | 114.66K | 7.37W  | 94.0%      | 121.91K | 7.52W  | 86.2%      |
| 9                  | 108.26K | 8.21W  | 95.7%      | 120.15K | 8.24W  | 94.6%      | 129.09K | 8.39W  | 85.9%      |
| 10                 | 109.06K | 9.10W  | 96.0%      | 124.10K | 9.13W  | 95.3%      | 134.73K | 9.29W  | 87.9%      |
| 11                 | 107.72K | 10.01W | 96.5%      | 126.54K | 10.12W | 95.6%      | 138.71K | 10.16W | 88.7%      |
| 12                 | 104.57K | 10.91W | 97.2%      | 126.90K | 10.97W | 95.9%      | 141.32K | 11.03W | 90.0%      |
| 13                 | 98.61K  | 11.92W | 97.5%      | 125.62K | 11.92W | 96.2%      | 142.28K | 12.00W | 90.2%      |
| 14                 | 88.21K  | 12.92W | 97.4%      | 122.06K | 12.94W | 96.6%      | 141.32K | 13.02W | 89.8%      |
| 15                 | 74.63K  | 13.87W | 98.4%      | 116.52K | 13.94W | 97.2%      | 137.62K | 13.95W | 90.2%      |
| 16                 | 46.44K  | 15.62W | 98.6%      | 99.20K  | 15.77W | 97.7%      | 121.04K | 15.84W | 92.0%      |
| 17                 |         |        |            | 89.37K  | 16.69W | 97.8%      | 113.56K | 16.37W | 92.6%      |
| 18                 |         |        |            | 75.17K  | 17.64W | 97.9%      | 103.65K | 17.36W | 93.5%      |

## [2] Typical System Application (VIN=36V~60V)

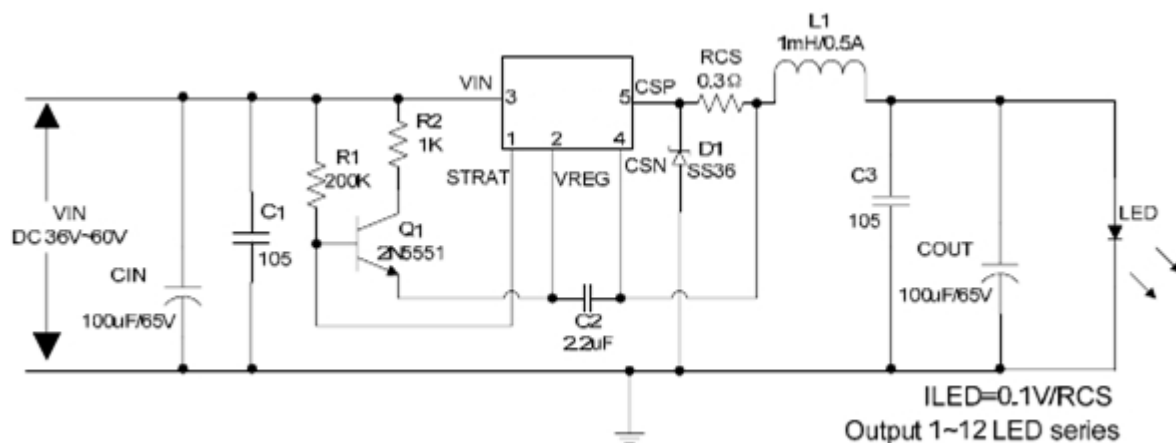


Figure9. JTMX8912 System Application at VIN=36V~60V Schematic

### 80V 1A High Efficiency Buck PFM LED Constant Current Driver

JTMX8912

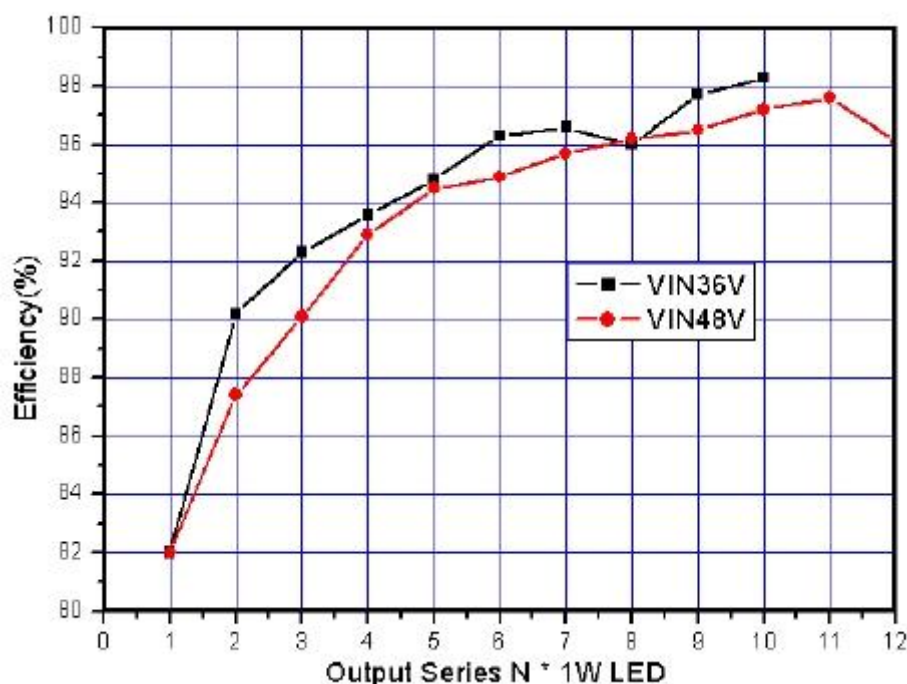


Figure10. JTMX8912 System Application at VIN=36V~60V Efficiency Curve

Table2: Figure9 Input VIN=36V/48V system parameters table:

| LED String<br>1W*N | VIN=36V |       |            | VIN=48V |        |            |
|--------------------|---------|-------|------------|---------|--------|------------|
|                    | FOSC    | Pout  | Efficiency | FOSC    | Pout   | Efficiency |
| 1                  | 28.83K  | 1.09W | 82.0%      | 29.18K  | 1.10W  | 82.0%      |
| 2                  | 45.06K  | 2.05W | 90.2%      | 46.81K  | 2.06W  | 87.4%      |
| 3                  | 56.98K  | 2.99W | 92.3%      | 61.45K  | 2.98W  | 90.1%      |
| 4                  | 64.58K  | 3.88W | 93.6%      | 72.05K  | 3.88W  | 92.9%      |
| 5                  | 68.53K  | 4.77W | 94.8%      | 80.32K  | 4.76W  | 94.5%      |
| 6                  | 68.66K  | 5.68W | 96.3%      | 85.95K  | 5.65W  | 94.9%      |
| 7                  | 65.21K  | 6.57W | 96.6%      | 88.95K  | 6.52W  | 95.7%      |
| 8                  | 58.26K  | 7.36W | 96.0%      | 89.37K  | 7.38W  | 96.2%      |
| 9                  | 48.75K  | 8.33W | 97.7%      | 87.31K  | 8.24W  | 96.5%      |
| 10                 | 34.20K  | 9.29W | 98.3%      | 82.56K  | 9.14W  | 97.2%      |
| 11                 |         |       |            | 74.92K  | 10.06W | 97.6%      |
| 12                 |         |       |            | 62.77K  | 10.92W | 96.1%      |

#### [3] Typical System Application (VIN=12V~36V)

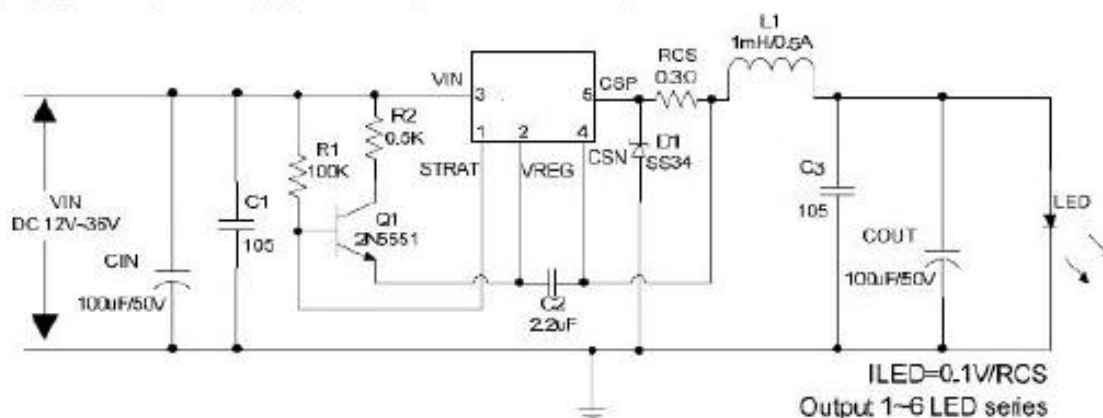


Figure11. JTMX8912 System Application at VIN=12V~36V Schematic

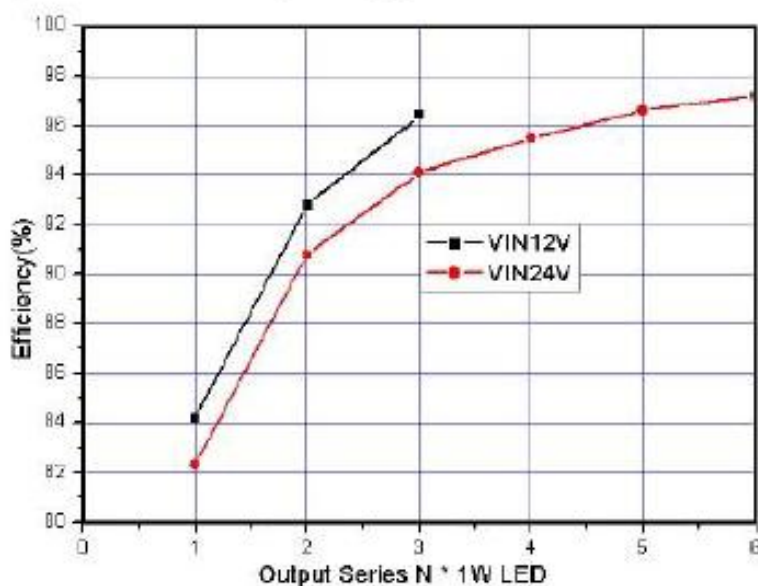


Figure12. JTMX8912 System Application at VIN=12V~36V Efficiency Curve

Table3: Figure11 Input VIN=12V/24V system parameters table:

| LED String<br>1W*N | VIN=12V |       |            | VIN=24V |       |            |
|--------------------|---------|-------|------------|---------|-------|------------|
|                    | FOSC    | Pout  | Efficiency | FOSC    | Pout  | Efficiency |
| 1                  | 22.75K  | 1.06W | 84.2%      | 26.42K  | 1.01W | 82.3%      |
| 2                  | 24.18K  | 2.02W | 92.8%      | 39.74K  | 1.96W | 90.8%      |
| 3                  | 10.37K  | 3.10W | 96.4%      | 46.63K  | 2.91W | 94.1%      |
| 4                  |         |       |            | 47.25K  | 3.80W | 95.5%      |
| 5                  |         |       |            | 42.17K  | 4.70W | 96.6%      |
| 6                  |         |       |            | 31.13K  | 5.61W | 97.2%      |

#### [4] Typical System Application (VIN=60V~80V, Output Series 3W LED)

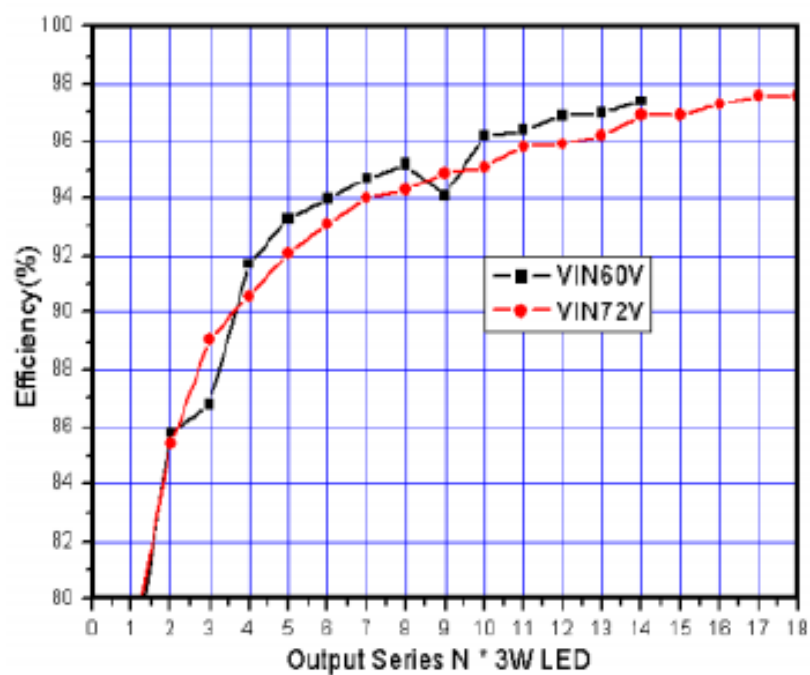
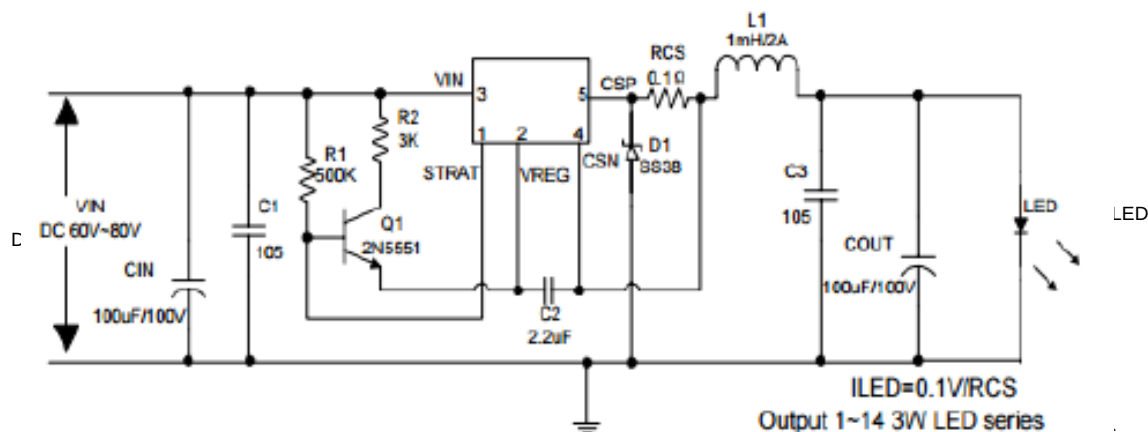


Figure14. JTMX8912 System Application at VIN=60V~80V Efficiency Curve

### 80V 1A High Efficiency Buck PFM LED Constant Current Driver

JTMX8912

Table4: Figure13 Input VIN=60V/72V system parameters table:

| LED String<br>3W*N | VIN=60V |        |            | VIN=72V |        |            |
|--------------------|---------|--------|------------|---------|--------|------------|
|                    | FOSC    | Pout   | Efficiency | FOSC    | Pout   | Efficiency |
| 1                  | 29.69K  | 3.09W  | 76.8%      | 30.19K  | 3.31W  | 77.9%      |
| 2                  | 49.15K  | 6.04W  | 85.8%      | 49.44K  | 6.28W  | 85.4%      |
| 3                  | 67.05K  | 8.92W  | 86.8%      | 66.47K  | 9.19W  | 89.1%      |
| 4                  | 79.4K   | 11.68W | 91.7%      | 80.02K  | 11.76W | 90.6%      |
| 5                  | 90.69K  | 14.40W | 93.3%      | 92.67K  | 14.47W | 92.1%      |
| 6                  | 99.29K  | 16.99W | 94.0%      | 103.38K | 17.11W | 93.1%      |
| 7                  | 105.99K | 19.68W | 94.7%      | 112.28K | 19.72W | 94.0%      |
| 8                  | 110.14K | 22.24W | 95.2%      | 119.03K | 22.30W | 94.3%      |
| 9                  | 112.33K | 24.62W | 94.1%      | 124.22K | 24.90W | 94.9%      |
| 10                 | 112.21K | 27.43W | 96.2%      | 127.71K | 27.42W | 95.1%      |
| 11                 | 110.21K | 29.95W | 96.4%      | 129.3K  | 30.02W | 95.8%      |
| 12                 | 106.33K | 32.32W | 96.9%      | 129.88K | 32.44W | 95.9%      |
| 13                 | 100.82K | 34.72W | 97.0%      | 125.21K | 35.28W | 96.2%      |
| 14                 | 92.68K  | 37.37W | 97.4%      | 122.24K | 37.92W | 96.9%      |
| 15                 |         |        |            | 119.06K | 40.50W | 96.9%      |
| 16                 |         |        |            | 112.73K | 42.86W | 97.3%      |
| 17                 |         |        |            | 103.35K | 45.47W | 97.6%      |
| 18                 |         |        |            | 93.18K  | 47.89W | 97.6%      |

### Schottky Diode Selection Table

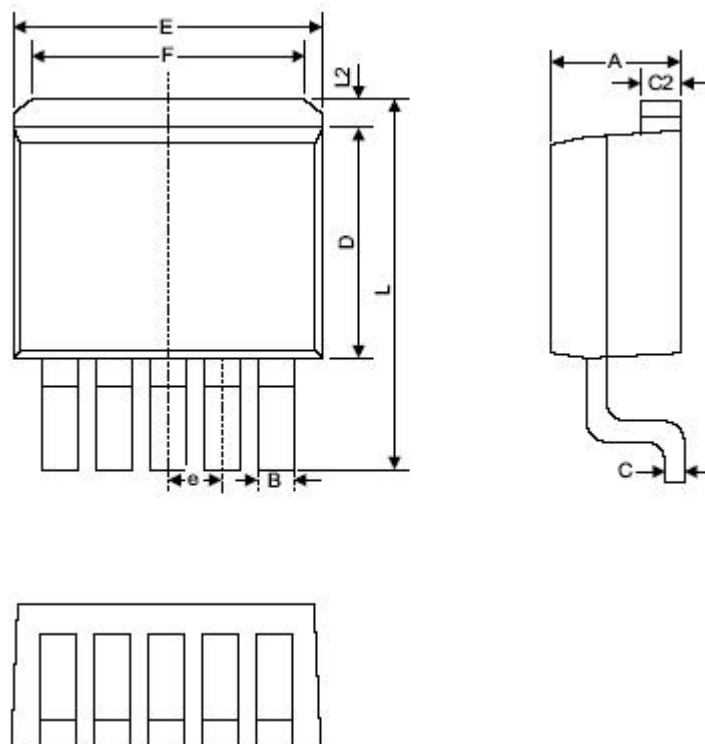
| VR   | 1A     | 3A    |      |        |        |       |
|------|--------|-------|------|--------|--------|-------|
| 20V  | 1N5817 | SS32  | SK32 | 1N5820 | MBR320 | SR302 |
| 30V  | 1N5818 | SS33  | SK33 | 1N5821 | MBR330 | SR303 |
| 40V  | 1N5819 | SS34  | SK34 | 1N5822 | MBR340 | SR304 |
| 50V  |        | SS35  | SK35 |        | MBR350 | SR305 |
| 60V  |        | SS36  | SK36 |        | MBR360 | SR306 |
| 70V  |        | SS37  | SK37 |        |        | SR307 |
| 80V  |        | SS38  | SK38 |        |        | SR308 |
| 90V  |        | SS39  | SK39 |        |        | SR309 |
| 100V |        | SS310 | S310 |        |        | SR310 |

### 80V 1A High Efficiency Buck PFM LED Constant Current Driver

JTMX8912

#### Package Information

TO263-5L



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min.                      | Max.  | Min.                 | Max.  |
| A      | 4.06                      | 4.83  | 0.160                | 0.190 |
| B      | 0.76                      | 1.02  | 0.030                | 0.040 |
| C      | 0.36                      | 0.64  | 0.014                | 0.025 |
| C2     | 1.14                      | 1.40  | 0.045                | 0.055 |
| D      | 8.64                      | 9.65  | 0.340                | 0.380 |
| E      | 9.78                      | 10.54 | 0.385                | 0.415 |
| e      | 1.57                      | 1.85  | 0.062                | 0.073 |
| F      | 6.60                      | 7.11  | 0.260                | 0.280 |
| L      | 15.11                     | 15.37 | 0.595                | 0.605 |
| L2     | -                         | 1.40  | -                    | 0.055 |