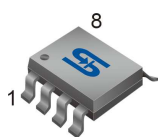


### SOP-8EP



### Pin Definition:

|         |        |
|---------|--------|
| 1. GND  | 8. OUT |
| 2. GND  | 7. OUT |
| 3. VDD  | 6. NC  |
| 4. ISET | 5. OE  |

### General Description

The TS19603 is a high voltage, low dropout current regulator of maximum output current up to 400mA. The output current is decided by an external resistor, and the output sink current could be disabled via OE pin. TS19603 internally also build-in thermal protection to prevent the chip over heat damage.

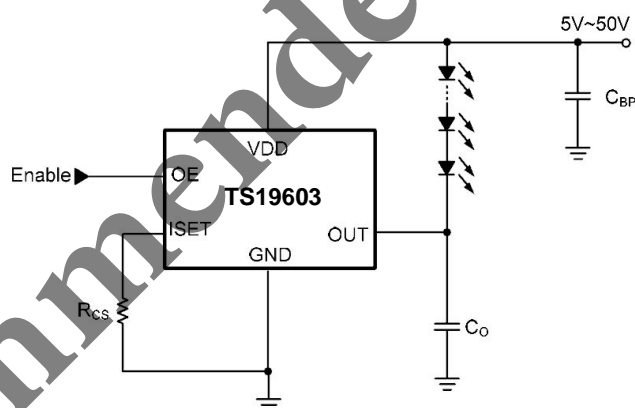
### Features

- 0.28V  $V_{\text{DROP}}$  @ 400mA
- 400mA Maximum Output Current
- Output Current Controlled by External Resistor
- 3 $\mu$ s Fast Response Output Stage Enable Control
- Wide Supply Voltage Range: 5~50V

### Applications

- High Power LED Driver
- RGB Full Color Power LED Driver
- LCD Monitor/TV LED Backlight Driver

### Typical Application Circuit



### Ordering Information

| Part No.      | Package | Packing            |
|---------------|---------|--------------------|
| TS19603CS RLG | SOP-8EP | 2.5Kpcs / 13" Reel |

Note: "G" denotes Halogen Free Product.

### Absolute Maximum Rating

| Parameter   | Symbol               | Value      | Unit                        |
|---|----------------------|------------|-----------------------------|
| Input Voltage   | $V_{\text{IN}}$      | 55         | V                           |
| Output Sink Current   | $I_{\text{OUT}}$     | 450        | mA                          |
| Output Enable Voltage   | $V_{\text{EN}}$      | 13.2       | V                           |
| Operating Junction Temperature Range  | $T_{\text{OPR}}$     | -40 ~ +150 | $^{\circ}\text{C}$          |
| Storage Temperature Range   | $T_{\text{STG}}$     | -65 ~ +150 | $^{\circ}\text{C}$          |
| Thermal Resistance Junction to Air  | $\theta_{\text{JA}}$ | 80         | $^{\circ}\text{C}/\text{W}$ |
| Power Dissipation $P_{\text{D}}$ @ $T_{\text{A}}=25^{\circ}\text{C}$ (Note 2) | $P_{\text{D}}$       | 1          | W                           |
| Thermal Resistance - Junction to Ambient                                      | $\theta_{\text{JA}}$ | 36         | $^{\circ}\text{C}/\text{W}$ |
| Thermal Resistance - Junction to Case   | $\theta_{\text{JC}}$ | 5.5        | $^{\circ}\text{C}/\text{W}$ |
| ESD Rating (Human Body Model) (Note 4)  | ESD                  | 2          | kV                          |

### Recommend Operating Conditions

| Parameter                            | Symbol           | Min | Typ | Max  | Unit               |
|--------------------------------------|------------------|-----|-----|------|--------------------|
| Input Voltage                        | $V_{\text{IN}}$  | 5   | --  | 50   | V                  |
| Output Enable Voltage                | $V_{\text{EN}}$  | 0   | --  | 12   | V                  |
| Output Sink Current                  | $I_{\text{OUT}}$ | 200 | --  | 400  | mA                 |
| Operating Junction Temperature Range | $T_{\text{OPR}}$ | -20 | --  | +125 | $^{\circ}\text{C}$ |
| Operating Free-Air Temperature Range | $T_{\text{A}}$   | -20 | --  | +85  | $^{\circ}\text{C}$ |

### Electrical Specification ( $V_{IN}=24V$ , $T_A=25^{\circ}C$ , unless otherwise specified.)

| Parameter                  | Conditions   | Min | Typ  | Max     | Unit    |
|----------------------------|--|-----|------|---------|---------|
| Output Current             | $V_{OUT}=0.5V$ , $R_{SET}=3k\Omega$                              | --  | 200  | --      | mA      |
|                            | $V_{OUT}=0.5V$ , $R_{SET}=1.5k\Omega$                            | --  | 400  | --      |         |
| Output Current Deviation   | $V_{OUT}=0.5V$ , $I_{OUT}=200mA\sim 400mA$                       | --  | --   | $\pm 5$ | %       |
| SET Current Range          |  | 200 | --   | 900     | $\mu A$ |
| Minimum Output Current     | $I_{SET}=200\mu A$   | --  | 100  | --      | mA      |
| Maximum Output Current     | $I_{SET}=900\mu A$   | --  | 450  | --      | mA      |
| Output Dropout Voltage     | $I_{SET}=800\mu A$ (Note 1)                                      | --  | 0.28 | --      | V       |
| Load Regulation            | $V_{OUT}=0.5V$ to $3V$ , $I_{OUT}=200mA$                         | --  | --   | 3       | mA/V    |
| Line Regulation            | $V_{OUT}=0.5V$ , $I_{OUT}=350mA$ , $V_{IN}=5\sim 50V$            | --  | 0.08 | 0.15    | %/V     |
| Enable Low Input Voltage   |  | 0   | --   | 0.8     | V       |
| Enable High Input Voltage  | Should lower than $V_{IN}$                                       | 2   | --   | 12      | V       |
| Enable Low Input Current   |  | -20 | --   | +20     | $\mu A$ |
| Enable High Input Current  |  | -5  | --   | +5      | $\mu A$ |
| Output Enable Delay Time   | EN from low to high. $V_{OUT}=0.5V$ , $I_{OUT}=350mA$ , Duty 50% | --  | 3    | --      | $\mu S$ |
| Output Disable Delay Time  | EN from high to low. $V_{OUT}=0.5V$ , $I_{OUT}=350mA$ , Duty 50% | --  | 3    | --      | $\mu S$ |
| Supply Current Consumption |  | --  | --   | 5       | mA      |

**Note 1:** Output Dropout Voltage: Duty 90% x  $I_{OUT}$  @  $V_{OUT}=0.5V$

**Note 2:** Stresses listed as the above "Absolute Maximum Ratings" may cause permanent damage to the device. These are for stress ratings. Functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may remain possibility to affect device reliability.

**Note 3:** Thermal Resistance is specified with the component mounted on a low effective thermal conductivity test board in free air at  $T_A=25^{\circ}C$ .

**Note 4:** 2 square inch of FR-4, double sided, 1 oz. minimum copper weight.

**Note 5:** Devices are ESD sensitive. Handling precaution recommended.

### Pin Function Description

| Pin Name | Pin Function  |
|----------|---|
| VIN      | Power Supply Pin  |
| OUT      | Output pin. Sink current is decided by the current on $R_{SET}$ connected to $I_{SET}$ pin.<br>$I_{SET}=1.2V \times 500/R_{CS}$           |
| GND      | Ground Pin  |
| OE       | Output Stage Enable Control pin. High enable the output pin. It can be left floating for normally on.                                     |
| ISET     | Output Current Setting pin. Connect a resistor from ISET to GND to set the LED bias current<br>$I_{SET}=0.002 \times I_{OUT}=1.2V/R_{CS}$ |

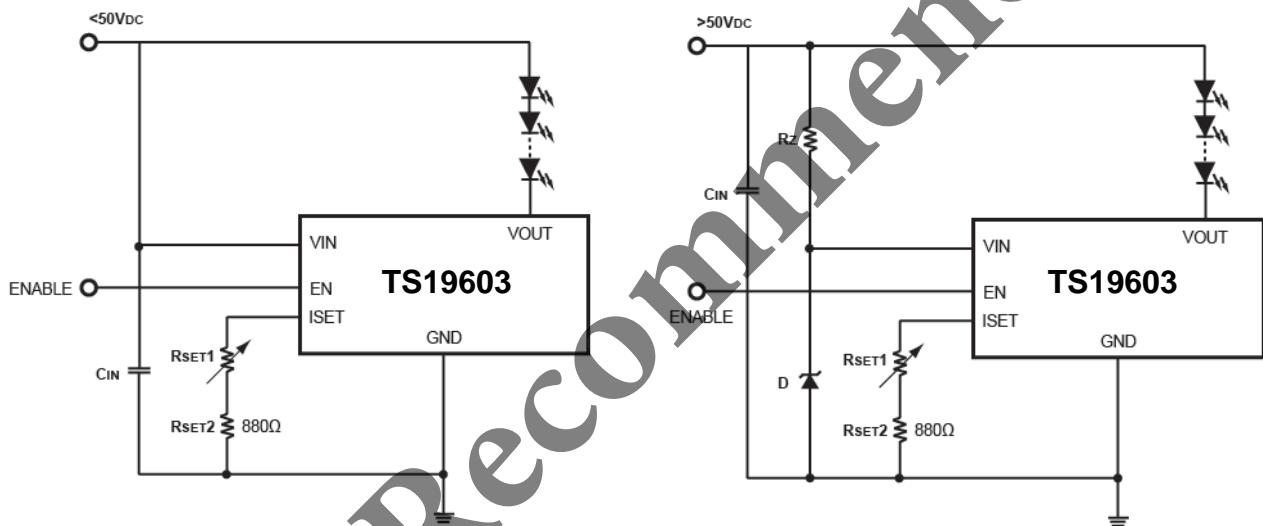
**Application Information**

TS19603 is a high voltage, low dropout current regulator for maximum output current up to 400mA with OE pin control. The current could be linearly adjusted through variable resistor connected to ISET pin, or by PWM control via OE pin. Although the absolute maximum rating of OUT pin 75V, the dropout voltage between OUT pin and GND pin should not be too large when current is sinking because of the thermal dissipation capability of the package.

Here are some of the typical application examples:

**DC Voltage Input**

Any DC voltage level between 5V to 50V could be adopted as power source VDD for typical application of TS19603 as long as VDD is larger than the total forward voltage drop of the LED string (at expecting current) by 0.35V. If 50V ~ 60V voltage level is adopted as power source to positive end of the LED string, one Zener shunt regulator could be used to provide appropriate voltage to VDD pin.

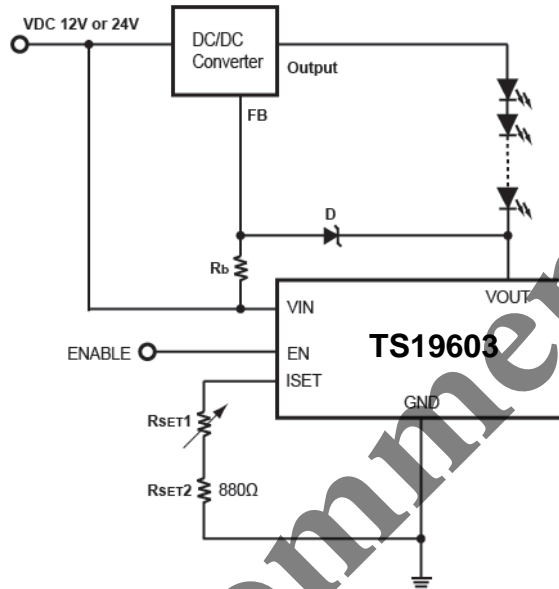


Not Recommended

### Application Information (Continue)

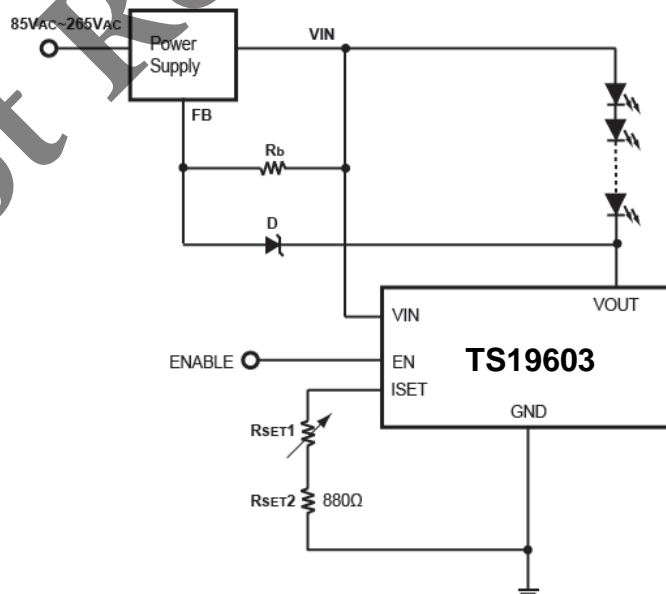
#### LED Backlight Solution

TS19603 could coordinate with any type of DC-to-DC converter through feedback path to realized LED backlight module. The number of LEDs in the string is variable even with certain fixed power source since the output voltage of the DC-to-DC converter could be modulated according to feedback signal.

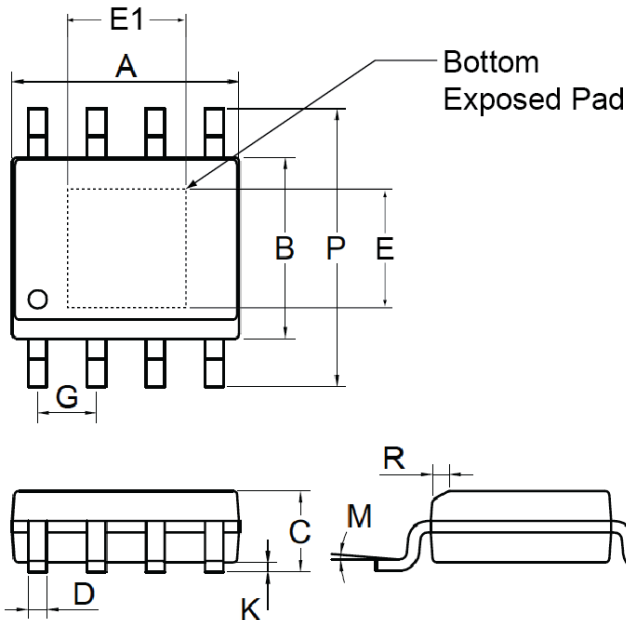


#### AC Voltage Input

TS19603 could work with any kind of well-known or well-developed switch-mode power supply system. Simply cut off the internal feedback path of the power supply system and then feed the signal from TS19603 back to the power supply system instead.

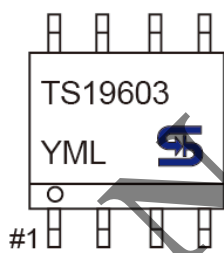


**SOP-8EP Mechanical Drawing**



| DIM | MILLIMETERS |      | INCHES  |       |
|-----|-------------|------|---------|-------|
|     | MIN         | MAX  | MIN     | MAX.  |
| A   | 4.80        | 5.00 | 0.189   | 0.196 |
| B   | 3.80        | 4.00 | 0.150   | 0.157 |
| C   | 1.35        | 1.75 | 0.054   | 0.068 |
| D   | 0.35        | 0.49 | 0.014   | 0.019 |
| E   | 2.05        | 2.41 | 0.081   | 0.095 |
| E1  | 2.82        | 3.30 | 0.111   | 0.130 |
| F   | 0.40        | 1.25 | 0.016   | 0.049 |
| G   | 1.27BSC     |      | 0.05BSC |       |
| K   | 0.10        | 0.25 | 0.004   | 0.009 |
| M   | 0°          | 7°   | 0°      | 7°    |
| P   | 5.80        | 6.20 | 0.229   | 0.244 |
| R   | 0.25        | 0.50 | 0.010   | 0.019 |

**Marking Diagram**



- Y** = Year Code
- M** = Month Code for Halogen Free Product  
(O=Jan, P=Feb, Q=Mar, R=Apl, S=May, T=Jun, U=Jul, V=Aug, W=Sep, X=Oct, Y=Nov, Z=Dec)
- L** = Lot Code

**Not Recommended**

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