

## ■ FEATURES

- Flexible Voltage Detect.
- Wide Range, Programmable LED Voltage.
- LED Thermal Regulation.
- Fixed Current Operation: 20mA, 25mA and 30mA.
- Can be Paralleled for Higher Current
- 50V to 500V Supply Voltage Range.
- Low Quiescent Current.
- High Efficiency.
- LED Brightness Stable.
- No Need External Component.
- SOP-8 Exposed pad (Heat Sink) Package.
- Patent Pending Drive Architecture.

## DESCRIPTION

The AIC6602 is off-line linear LED driver. The application of high bright LED is widely used for general illumination.

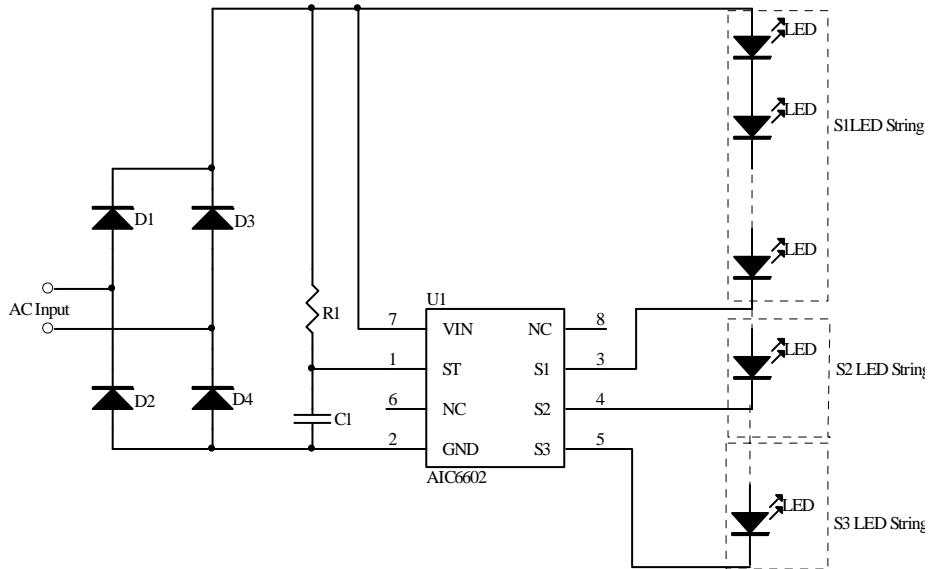
The AIC6602 can drive a plurality of LED strings. When the voltage detecting circuit detects the different voltage level of input voltage, it can control the LED strings. If the input voltage is lower that it will bypass some LED strings. And turn on all LED strings when the input voltage is higher. The number of LEDs in LED array is dependent on the voltage level of the AC power source, that includes of  $\pm 10\%$  variations. A typical application for the AIC6602 is to drive LEDs with a constant current of 20mA, 25mA and 30mA. Multiple AIC6602 can also be used in parallel to provide higher currents.

The AIC6602 is available in a SOP-8 Exposed Pad (Heat Sink) package.

## ■ APPLICATIONS

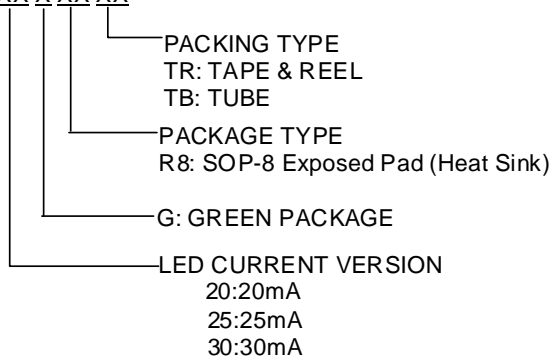
- LED Lamps (e.g. E27, GU10)
- General Illumination
- LED Strings (e.g. T-8 Tube)
- Constant Current Source
- Constant Current Sink

## ■ TYPICAL APPLICATION CIRCUIT

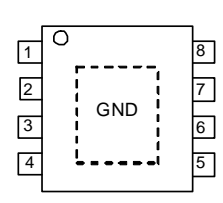


## ■ ORDERING INFORMATION

AIC6602-XX X XX XX



PACKAGE TYPE	PIN CONFIGURATION
R8 (SOP-8)	SOP-8 Exposed Pad (Heat Sink) TOP VIEW 1: ST 2: GND 3: S1 4: S2 5: S3 6: NC 7: VIN 8: NC



Example: AIC6602-20GR8TR

→ 20mA Version, in SOP-8 Expose Pad(Heat Sink)  
Green Package and TAPE & REEL Packing Type.

**■ ABSOLUTE MAXIMUM RATINGS**

VIN Pin Voltage .....	550V
S1, S2 & S3 Pin Voltage .....	350V
Operating Ambient Temperature Range $T_A$ .....	-40°C~85°C
Operating Maximum Junction Temperature $T_J$ .....	150°C
Storage Temperature Range $T_{STG}$ .....	-65°C~150°C
Lead Temperature (Soldering 10 Sec.).....	260°C
Thermal Resistance Junction to Case    SOP-8 Exposed Pad* .....	15°C /W
Thermal Resistance Junction to Ambient   SOP-8 Exposed Pad*.....	60°C /W

(Assume no Ambient Airflow, no Heatsink)

**Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.**

\*The package is place on a two layers PCB with 2 ounces copper and 2 square inch, connected by 8 vias.

**■ ELECTRICAL CHARACTERISTICS**
**(T<sub>J</sub>=25°C, unless otherwise specified) (Note 1)**

PARAMETER	TEST CONDITIONS	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>Supply Voltage Section</b>						
VIN Operation Voltage			50		500	V
Quiescent Current	VIN=310V	I <sub>VIN</sub>		300		μA
<b>LED Current</b>						
LED Current Tolerance	$\frac{(I_{S2} + I_{S3}) - 2 \times I_{REG}}{2 \times I_{REG}} \times 100\%$		-10		+10	%
<b>Fault Protection</b>						
Thermal Regulation				140		°C

Note 1: Specifications are production tested at T<sub>A</sub>=25°C. Specifications over the -40°C to 85°C operating temperature range are assured by design, characterization and correlation with Statistical Quality Controls (SQC).

**TYPICAL PERFORMANCE CHARACTERISTICS**

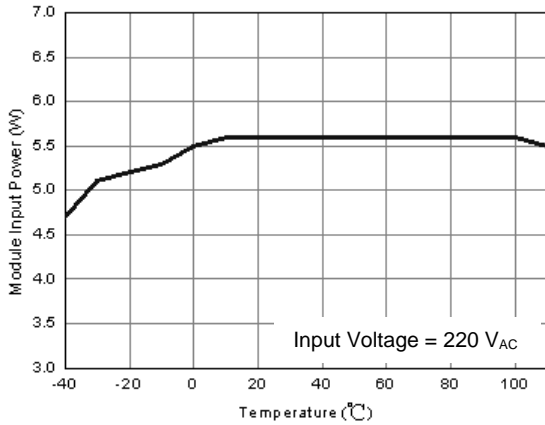


Fig. 1 Input Power vs. Temperature

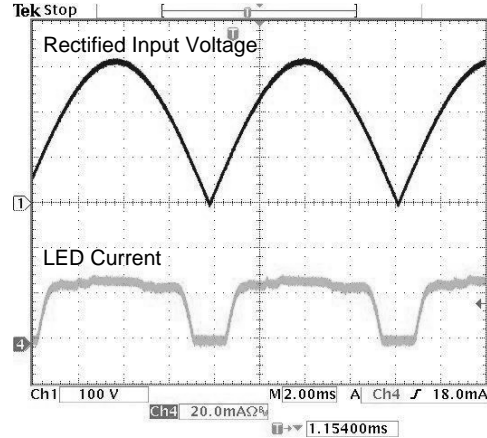
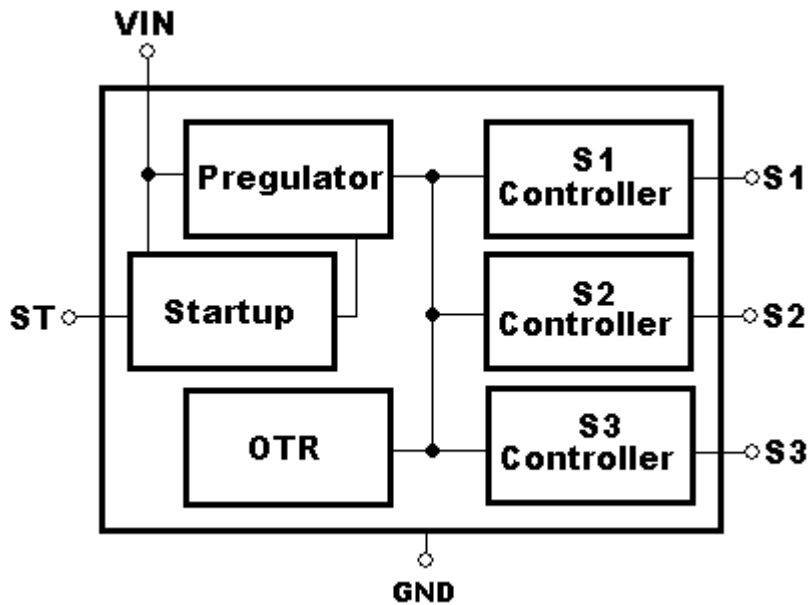


Fig. 2 LED Current Waveform at 220 V<sub>AC</sub> Input

**BLOCK DIAGRAM**



**PIN DESCRIPTION**

- ST PIN - Provide the Startup Current for the Controller.
- VIN PIN - Power Supply Input.
- S1PIN - LED S1 Cathode Connection.
- S2PIN - LED S2 Cathode Connection.
- S3 PIN - LED S3 Cathode Connection.
- GND PIN - Ground.

## APPLICATION INFORMATION

The AIC6602 is off-line constant current LED driver. It can drive a plurality of LED strings. The AIC6602 can flexibly control the LED strings according to the variance of input voltage. If the input voltage is lower, it will bypass some LED strings. When the input voltage is higher than the total forward voltage of all LED strings, all LED strings will be turned on. The number of LEDs in LED array is dependent on the voltage level of the AC power source. Multiple AIC6602 can also be used in parallel to provide higher LED current.

### THERMAL REGULATION

The AIC6602 includes the thermal-regulation circuit, which are designed to protect the device from excessive temperature. The internal thermal-regulation circuit reduces the LED current if the junction temperature rises above the preset value of about 140°C.

### POWER DISSIPATION

The maximum power dissipation of AIC6602 depends on the thermal resistance of its case and circuit board, the temperature difference between the die junction and ambient air, and the rate of airflow. The rate of temperature rise is greatly affected by the mounting pad configuration on the PCB, the board material, and the ambient temperature. When the IC mounting with good thermal conductivity is used, the junction temperature will be low even when large power dissipation applies.

As a general rule, the lower temperature is, the better reliability of the device is. So the PCB mounting pad should provide maximum thermal conductivity to maintain low device temperature.

## APPLICATION CIRCUIT

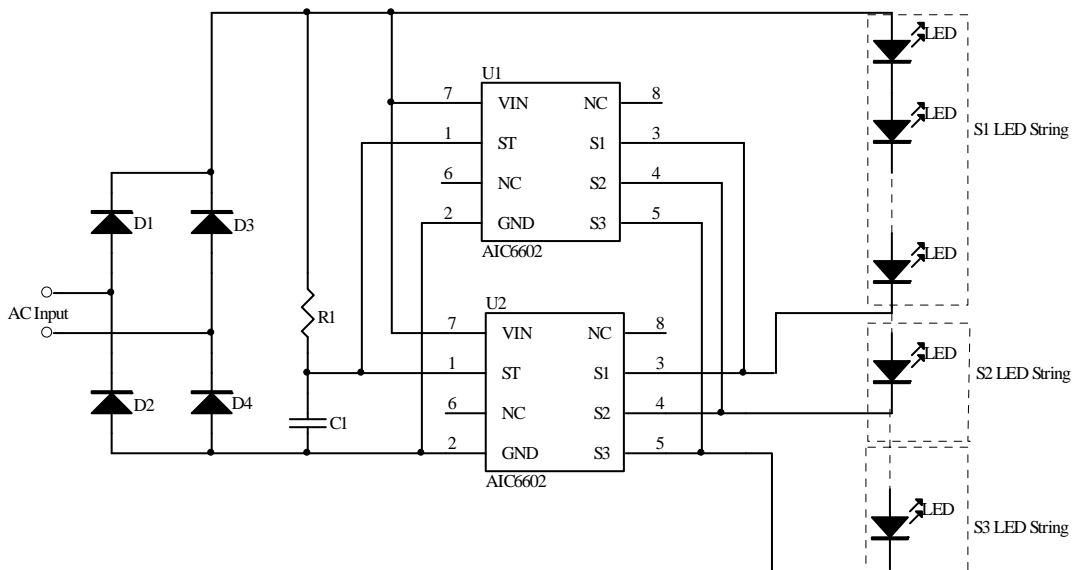
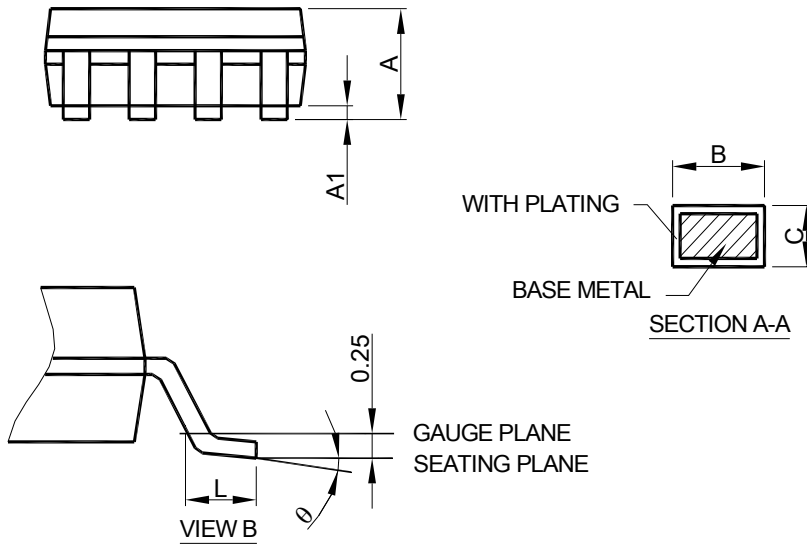
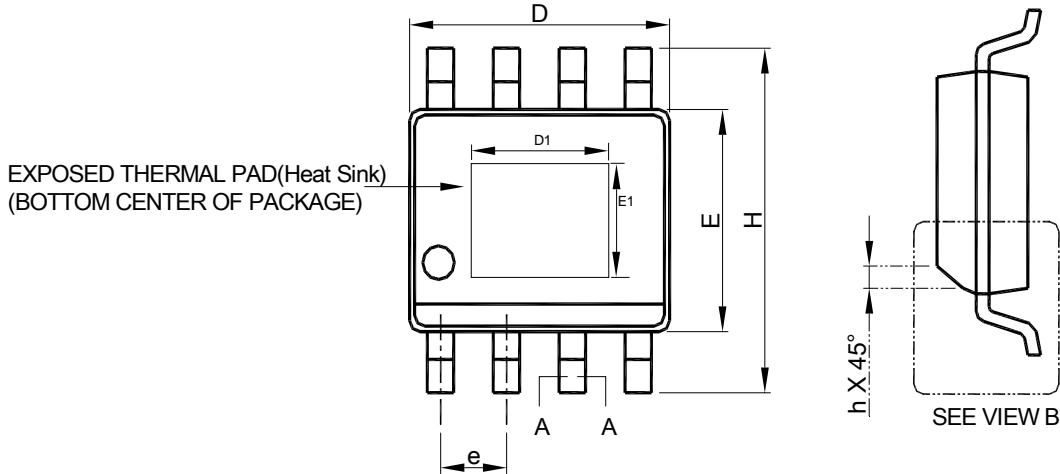


Fig. 3 AIC6602 for Higher LED Current Application

**PHYSICAL DIMENSIONS**

**SOP-8 Exposed Pad (Heat Sink)**



SYMBOL	SOP-8 Exposed Pad(Heat Sink)	
	MILLIMETERS	
	MIN.	MAX.
A	1.35	1.75
A1	0.00	0.15
B	0.31	0.51
C	0.17	0.25
D	4.80	5.00
D1	1.50	3.50
E	3.80	4.00
E1	1.0	2.55
e	1.27 BSC	
H	5.80	6.20
h	0.25	0.50
L	0.40	1.27
θ	0°	8°

- Note :
1. Refer to JEDEC MS-012E.
  2. Dimension "D" does not include mold flash, protrusions or gate burrs. Mold flash, protrusion or gate burrs shall not exceed 6 mil per side .
  3. Dimension "E" does not include inter-lead flash or protrusions.
  4. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

**Note:**

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