# UNISONIC TECHNOLOGIES CO., LTD

ADAPTIVE CONDUCTION LINEAR DRIVER

■ **DESCRIPTION**

UTC **UL75** 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 ±10% variations.

UTC **UL75** is an ideal solution for LED Lamps (e.g. E27, GU10), General Illumination, LED Strings (e.g. T-8 Tube) and Constant Current Sink.

HSOP-8
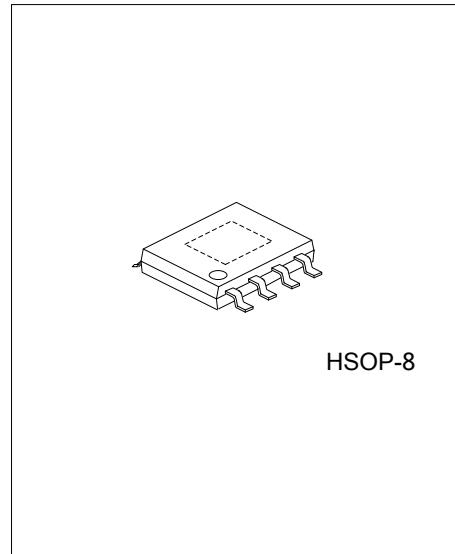
■ **FEATURES**
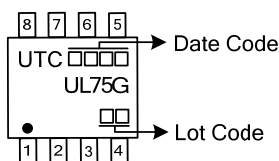
* Adaptive Conduction.
* Wide Range, Programmable LED Voltage
* Output LED Current available from 50mA to 100mA
* Can be Paralleled for Higher Current
* 5V to 500V Supply Voltage Range
* High Efficiency
* Stable LED Brightness
* Over Temperature Protection
* Patent Pending Drive Architecture
* Low THD

■ **ORDERING INFORMATION**

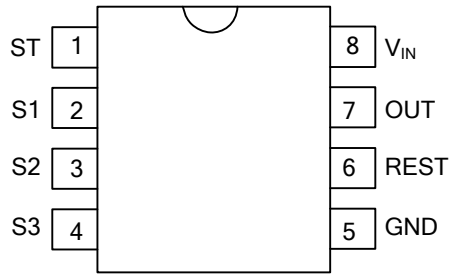| Ordering Number	Package	Packing
UL75G-SH2-R	HSOP-8	Tape Reel

UL75G-SH2-R	
(1)Packing Type	(1) R: Tape Reel
(2)Package Type	(2) SH2: HSOP-8
(3)Green Package	(3) G: Halogen Free and Lead Free

■ **MARKING**

UTC ☐☐☐☐ → Date Code
UL75G
☐☐ → Lot Code

8 7 6 5
1 2 3 4

QW-R125-051.b

■ PIN CONFIGURATION

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          ┌──────────⌣──────────┐
   ST  │1 │                  │8 │ V_IN
          │  │                  │  │
   S1  │2 │                  │7 │ OUT
          │  │                  │  │
   S2  │3 │                  │6 │ REST
          │  │                  │  │
   S3  │4 │                  │5 │ GND
          └─────────────────────┘
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■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	ST	Adjust the output power and the soft start function
2	S1	The first LED string constant current output
3	S2	The second LED string constant current output
4	S3	The third LED string constant current output
5	GND	Ground
6	RSET	Set constant current
7	OUT	Power supply
8	V_{IN}	Input AC voltage

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■ **BLOCK DIAGRAM**
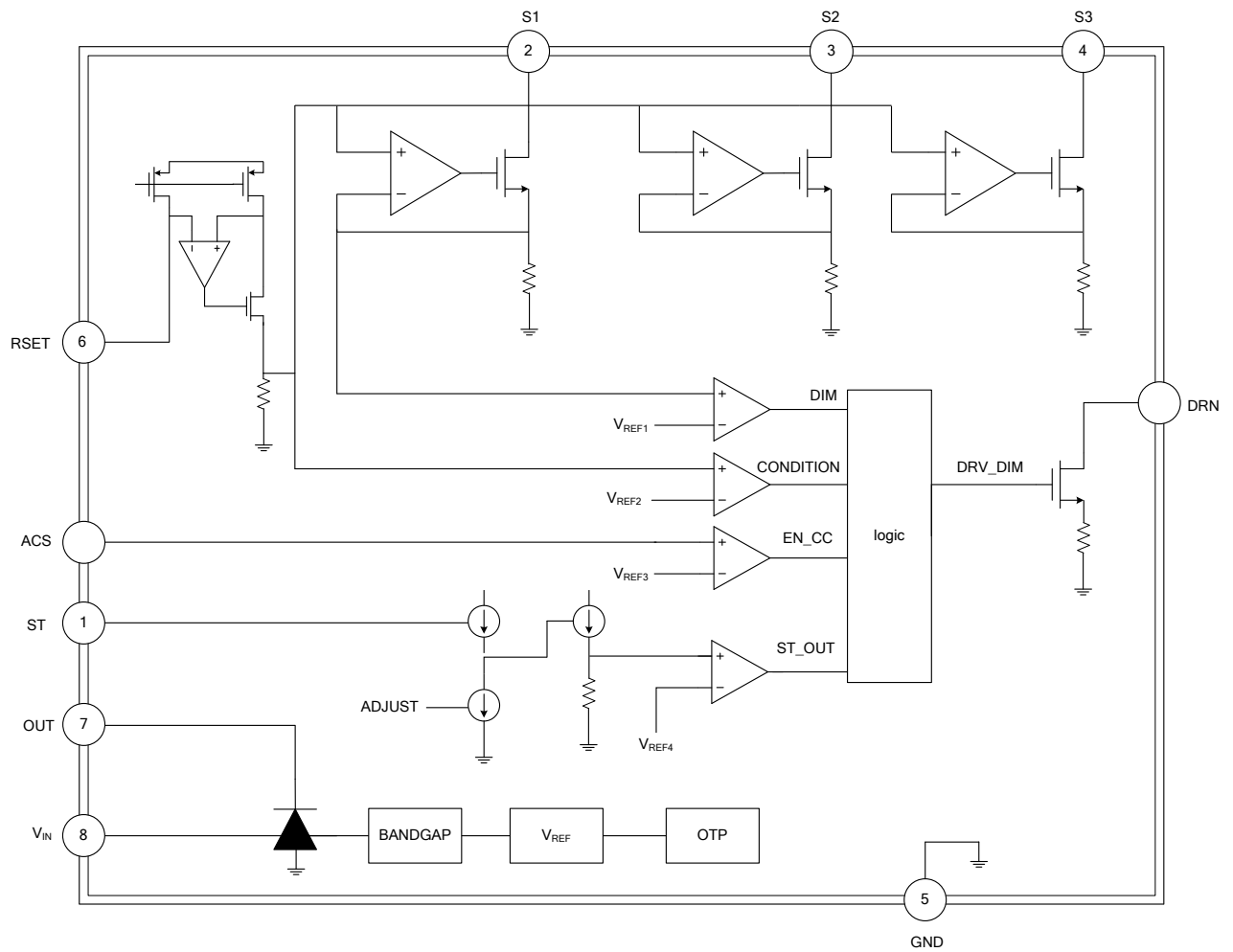
■ **ABSOLUTE MAXIMUM RATING**

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V_{IN}	-0.3 ~ 550	V
Supply Voltage	V_{OUT}	-0.3 ~ 10	V
Output Current, Source Or Sink	I_{CC}	0 ~ 200	mA
ST Input Voltage	V_{ST}	-0.3 ~ 15	V
Power Dissipation (T_A=70 °C)	P_D	3000	mW
Junction Temperature	T_J	-55 ~ +125	°C
Storage Temperature	T_{STG}	-55 ~ +150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ **RECOMMENDED OPERATING CONDITIONS (Note)**

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V_{IN}	140 ~ 375	V
Supply Voltage	V_{OUT}	5.5 ~ 6.5	V
Sink/Source Load Current (steady state)	I_{STEAD}	0 ~ 100	mA
Sink/Source Load Current (peak)	I_{PEAK}	0 ~ 200	mA
Reference Load Current	I_{LOAD}	0 ~ 100	mA
ST Input Voltage	V_{ST}	0 ~ 7	V
Operating Ambient Temperature	T_{ORP}	0 ~ +70	°C

Note: Range over which the device is functional and parameter limits are guaranteed.

■ **THERMAL DATA**

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Case	θ_{JC}	50	°C/W

Note: Thermal resistance junction-alumina with the device soldered on the middle of an alumina supporting substrate measuring 15×20mm; 0.65mm thickness with infinite heat sink.

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■ **ELECTRICAL CHARACTERISTICS** (TEMPER=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
POWER SECTION						
Input Voltage	V_{IN}		0	220	500	V
Output Led Current	I_{LED}	V_{IN}=110AC, 220AC	0	50	130	mA
Supply Voltage	V_{DD}		5.5	6	6.5	V
Power Efficiency	η	I_{LED}=100mA	0.7	0.8	0.9	
Power Factor	P_F	I_{LED}=100mA	0.7	0.9	0.96	
CC SECTION						
The Precision Of Constant Current	CC	I_{LED}=50mA~100mA		±5		%
RSET Pin Voltage	V_{SET}		0.594	0.6	0.606	V
Standby Power Consumption				15	25	mW
PROTECTION SECTION						
Short Circuit Protection Current	$I_{LED\ st}$	V_{IN}=220AC	120	130	140	mA
Input Voltage Protection	V_{IN_OV}	RST=20.5MΩ	245	265	285	V
LED Limit Current Protection	I_{LED_LIM}	V_{IN}=220AC	120	130	140	mA
LDMOS SECTION						
LDMOS Withstand Voltage	BV		500	550	600	V
LDMOS Current	I_{ON_S1}			71		mA
	I_{ON_S2}			85		mA
	I_{ON_S3}			100		mA
TEMPER SETION						
Over Temper Protection	T_{OTP}			145		°C
Over Temper Hysteresis	T_{HYS}			20		°C

Note: The parameters are not 100% tested in production.

■ APPLICATION INFORMATION

Application information

UTC **UL75** is a linear constant current driver IC for LED lighting, which is applied to the non isolated LED driver power supply.

The 500V power transistor is integrated with the constant current drive architecture and control method, which only needs a few external components to achieve excellent constant current characteristics. Piecewise constant current control mode to achieve higher PF value and efficiency,

Built in soft start mechanism and the line network monitor adjust system output power.

LED open circuit protection、LED short circuit protection、sampling resistance short circuit protection、over temperature regulation and other protective functions to improve the reliability of the system.

Start

After the system is powered up, the input voltage is charged on the OUT pin through the depleted MOS, and when the OUT voltage reaches the threshold value, the chip's internal reference circuit begins to work. When the chip is working normally, the required operating current is still through the supply of internal consumption.

Constant current control

The chip is detected the peak current, and the RSET resistance is connected to the input terminal of the peak comparator, which is compared with the threshold voltage 1V. When the RSET voltage reaches the threshold, the LED current is adjusted, and realized the constant current control.

The formula for calculating the LED constant current is $I_{LED}=3150/RSET$

Among them, RSET is set to LED peak current resistance

Peak current comparator also includes a peak over current protection function. The threshold is about 200mA.

Protection function

UTC **UL75** built in a variety of protection functions, including LED short-circuit protection, LED open circuit protection, sampling circuit short-circuit protection, temperature regulation and protection, etc.

Over temperature adjustment function

UTC **UL75** has the function of over temperature adjustment, the output current is gradually reduced when the driving power is over, so that the output power and temperature rise is controlled, the power supply is maintained at the set value,

In order to improve the reliability of the system, the chip is internally set to adjust the temperature of the 145°C.

PCB design

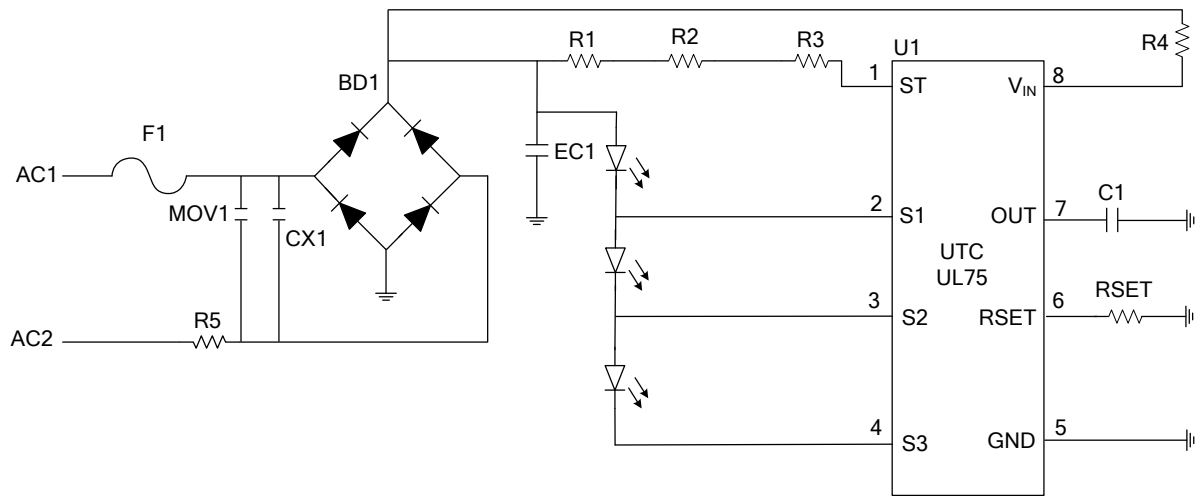In the design of PCB, you need to follow the following guidelines:

OUT bypass capacitor is required to close the OUT pin of the chip.

RSET resistor requires close to the RSET pin of the chip

Between RSET and OUT bypass capacitor resistor connected to the copper foil as short as possible

RSET pin increases in the area of copper clad to improve chip cooling.

■ **TYPICAL APPLICATION CIRCUIT**