



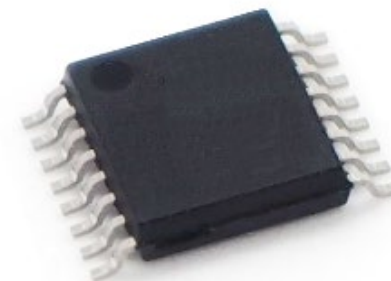
Working Together for a Greener Society

Future of Power Electronics and the Earth



1 Converter System High Power Factor LED Driver ICs

LC5581AS/LS



■ Description

The LC5581AS and LC5581LS are quasi-resonant LED driver ICs. The ICs can also operate in PWM mode. The ICs provide the systems that can comply with the harmonics standard (IEC61000-3-2 Class C) in all conditions, including a light load condition. These systems, moreover, can be achieved by 1 converter system that requires no input electrolytic capacitor. The ICs employ the average current and quasi-resonant controls: the average current control realizes high power factors, whereas the quasi-resonant control contributes to high efficiency and low noise.

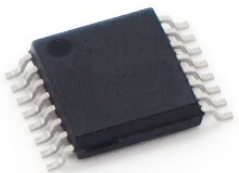
The ICs have a high voltage (800 V) startup circuit that can use power MOSFETs up to 800 V, achieving a safe power supply that is hard to be broken even in an area with unstable input voltages. The ICs also have an analog dimming function that offers dimming by applying external voltages and a standby function.

The ICs can be used for flyback isolated and non-isolated circuits, and non-isolated buck converter circuits, configuring the optimal circuit according to your application.

We offer two different types of products: the LC5581AS of the auto-restart type and the LC5581LS of the latch type.

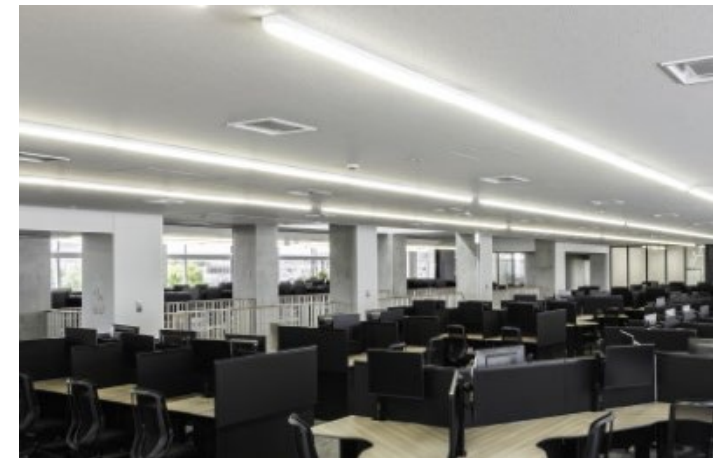
■ Package

VSOP16



■ Application

- LED Lighting Equipment
such as Base Lighting and Downlight



■ Description

- Built-in 800 V High Voltage Startup Circuit
- High Power Factor Achieved by Average Current Control
- Analog Dimming Function
- Bias Assist Function that Includes Two Types that are Activated at Different Voltage Levels (Smaller capacitor of VCC pin)
- Standby Function
- COMP Pin Fast Charging Function (Shorter Time from Startup to LED Lighting)

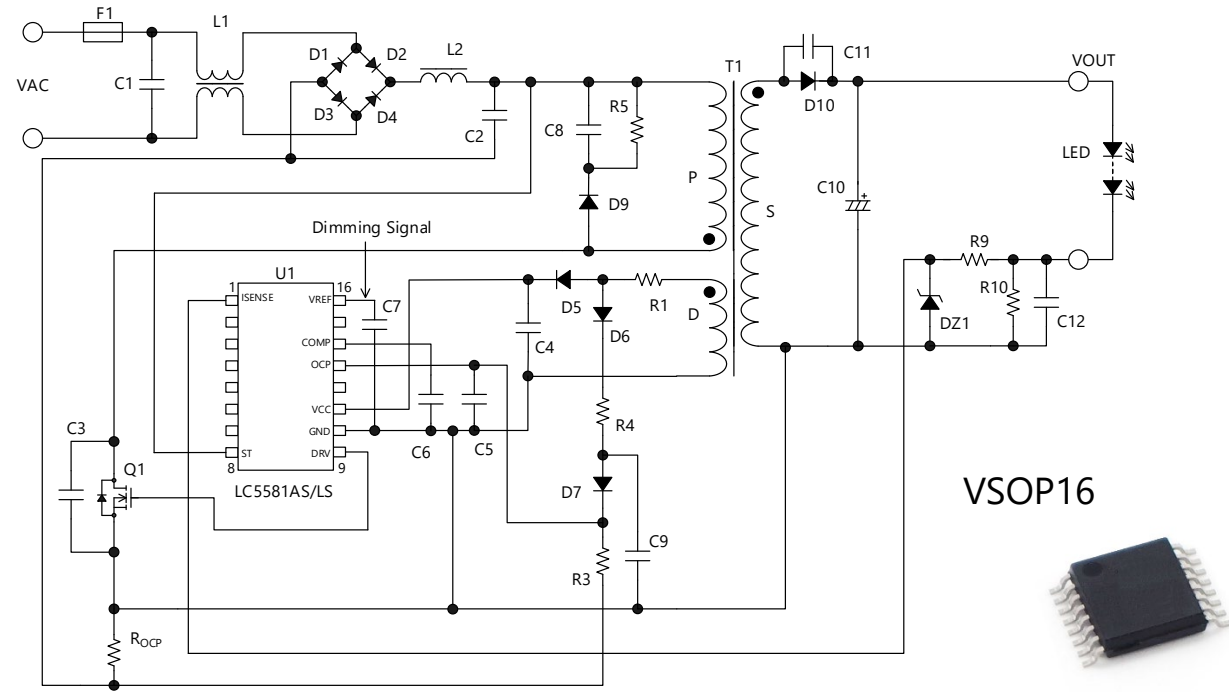
■ Specifications

- Gate Drive Output Voltage, $V_{DRV} = 8.2 \text{ V}$
- DRV Pin Output Impedance, $R_{DRV(SOURCE)} = 45 \Omega$
- DRV Pin Input Impedance, $R_{DRV(SINK)} = 15 \Omega$

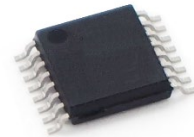
■ Selection Guide

Part Number	Operation Mode	Startup Circuit V_{ST}	Overcurrent Protection (OCP)	Overload Protection (OLP)	Overvoltage Protection (OVP)
LC5581AS	PWM (60 kHz) /Quasi-resonant	800 V	Pulse-by-pulse	Auto-restart	Auto-restart
LC5581LS					Latched

■ Typical Application



VSOP16



Supporting Voltages of up to 800 V

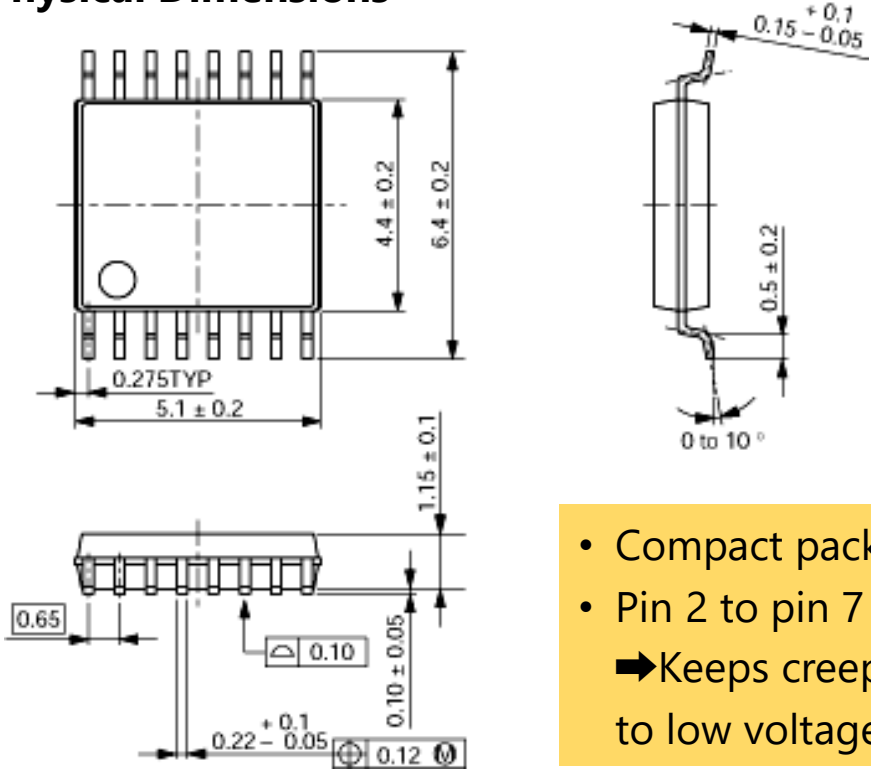
The IC has the startup circuit of 800 V.

The VSOP16 package has a body size equivalent to the SOP8.

In order to support voltages of 800 V in a small package, the IC has NC pins for all the pins between the high-voltage pin (pin 8) and the low-voltage pin (pin 1).

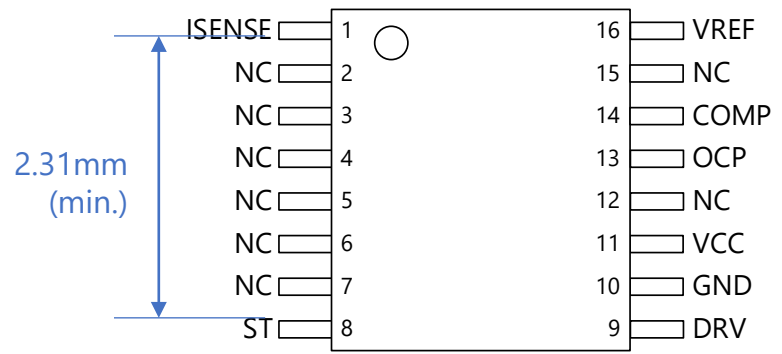
This keeps enough creepage distance of ≥ 2.31 mm.

Physical Dimensions



- Compact package equivalent to SOP8
- Pin 2 to pin 7 are NC pins
 - ➔ Keeps creepage distance between high to low voltage pins of ≥ 2.31 mm

Pin Configuration Definitions



Part Number	Pin Name	Description
1	ISENSE	Feedback current detection
2 to 7	(NC)	No connection
8	ST	Startup current input
9	DRV	Drive output
10	GND	Ground
11	VCC	Power supply voltage input for control part and overvoltage protection signal input
12	(NC)	No connection
13	OCP	Input for overcurrent protection and quasi-resonant signal
14	COMP	Feedback phase compensation
15	(NC)	No connection
16	VREF	Dimming signal input and standby signal input

Shorter Time from Startup to LED Lighting

In general, lighting equipment should light up immediately after power-on. However, general power supply ICs have the soft start function to reduce stresses on components at startup, which causes a delay in lighting the LEDs at power-on.

To solve this problem, the IC has the COMP fast charging function and the bias assist function that includes two types that are activated at different voltage levels. This shortens the LED lighting start time at startup while maintaining the soft start function.

COMP Fast Charging Function

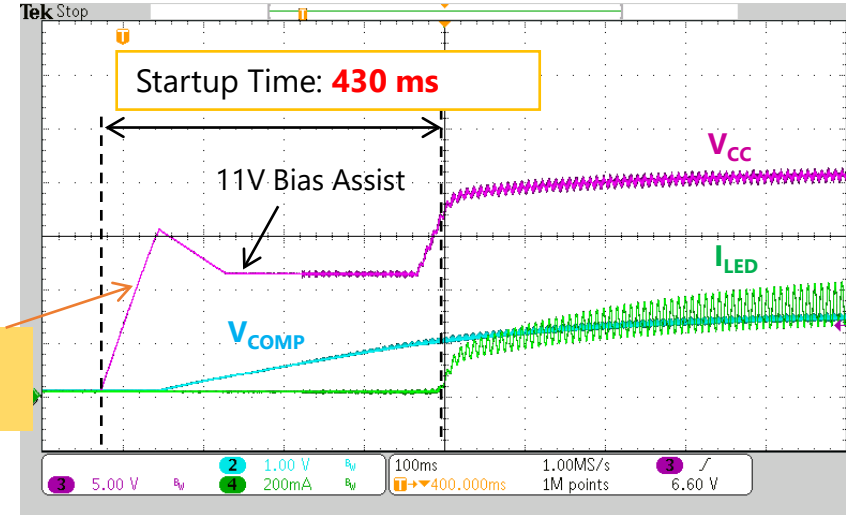
The COMP pin capacitor is rapidly charged at IC startup to allow the voltage to rapidly reach the COMP pin voltage during normal operation.

The Bias Assist Function that Includes Two Types

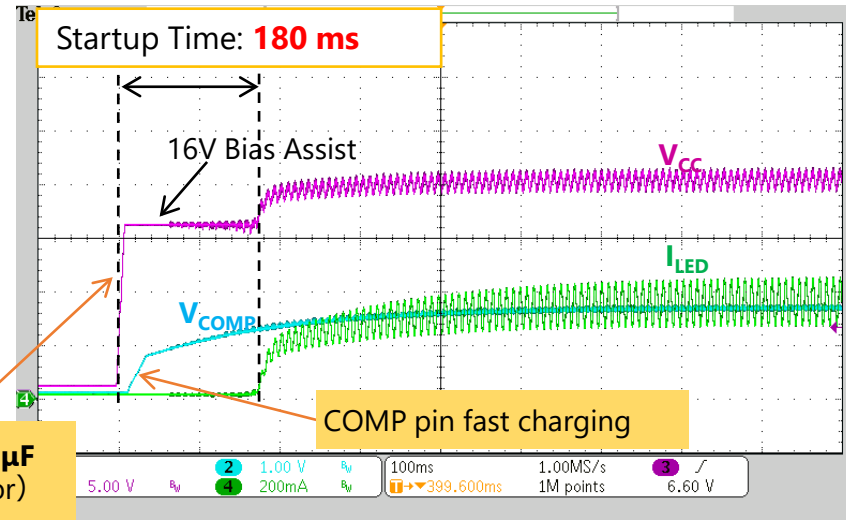
The IC has the bias assist function that includes two types that are activated at startup and normal operation. The threshold value of the bias assist function at startup is set as high as 16 V, which provides a margin for the operation stop voltage, $V_{CC(OFF)} = 9.4$ V. This reduces the capacitance of a capacitor connected to the VCC pin. Though conventional ICs require an electrolytic capacitor of about 22 μ F, a ceramic capacitor of about 4.7 μ F can be used for the IC. This results in a shorter VCC pin charging time.

Startup Operation

<Conventional ICs>



<LC5581AS/LS>



The IC uses the analog dimming function and the standby function by applying an external DC voltage to the VREF pin.

■ Analog Dimming Function

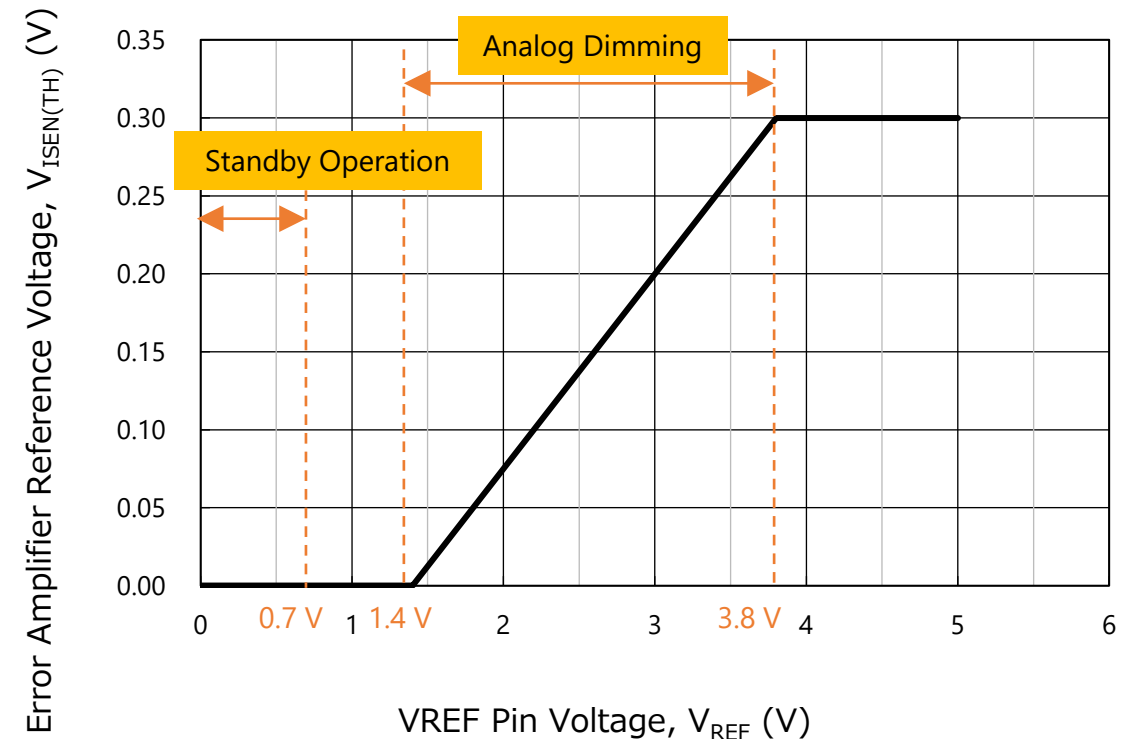
When using the dimming function, change the voltage applied to the VREF pin. The analog dimming voltage ranges from 1.4 V to 3.8 V.

If the dimming function is not used, no voltage is required to be applied to the VREF pin.

■ Standby Function ($V_{REF} \leq 0.7 \text{ V}$)

When the VREF pin voltage is reduced to $\leq 0.7 \text{ V}$, the IC enters standby operation, and then stops oscillating.

When the IC recovers from standby operation, the VREF pin voltage should be set to $\geq 1.4 \text{ V}$. The IC starts oscillating in the soft start mode.



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