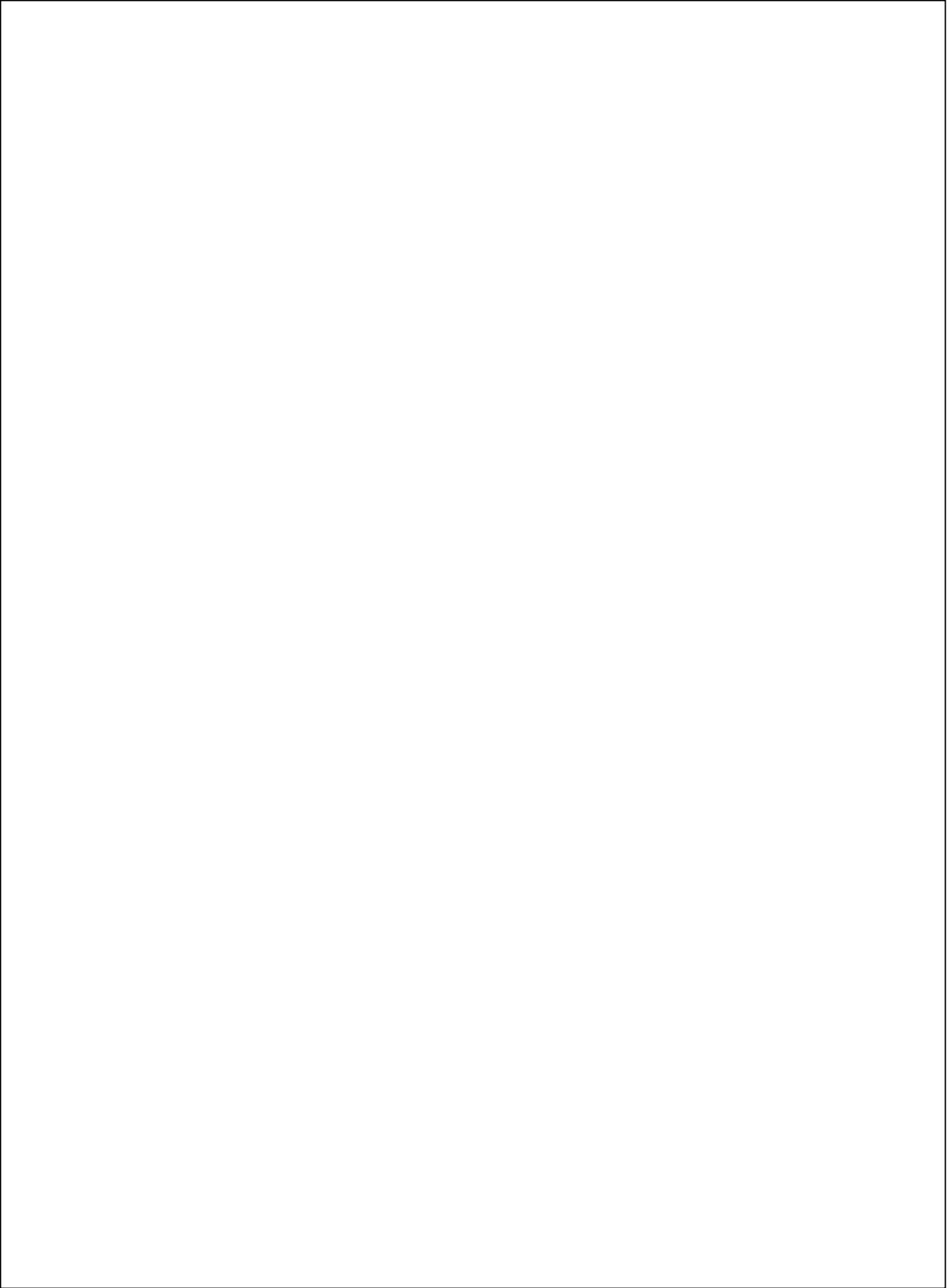




Part No.	LT5280	Page	
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High performance Asynchronies Boost Controller for LED Driver

General Description

The LT5280 is a High performance step-up DC/DC controller specifically designed for LCD TV and LCD application with a constant current.

The LT5280 uses current mode, fixed frequency of approximately 120 kHz architecture to regulate the output constant current through an external current sense resistor. The low feedback voltage of 400 mV can minimize the system power dissipation.

The LT5280 allows a PWM signal to reduce this regulation voltage by changing the PWM duty cycle to achieve LED brightness dimming control.

The LT5280 supports the LED open loop protection, the LED cathode short to GND protection, the Diode short circuit protection and the Inductor short circuit protection.

Other features include current limit protection, thermal shutdown protection, under-voltage lockout (UVLO), and over-voltage function.

The LT5280 is available in SOP8 package.

Applications

- LCD TV Backlight
- LCD Monitor Backlight
- LapLa L09(c)iducp onti LR

Absolute Maximum Ratings⁽¹⁾

VDD, GATE, OVP.....	-0.3 V ~ 38 V	Min. Operating T _J	-40 °C
CS, FB, CMP, PWM.....	-0.3 V ~ 7 V	Max. Operating T _J	Internally Limited
ESD Rating (Human Body Model).....	>±2 kV ⁽²⁾	Storage Temperature.....	-55 °C ~ 150 °C
Package Thermal Resistance		Lead Temperature (Soldering 10 sec.).....	260 °C
JA ⁽³⁾	40 °C/W		

- (1). All voltages refer to ground unless otherwise noted; Stresses exceed those ratings may damage the device.
(2). Tested and classified as ESDA/JEDEC JDS-001-2014.
(3). Soldered to 100 mm2, 1 oz copper clad.

Electrical Characteristics⁽¹⁾

(V_{IN} = 12 V, V_{PWM} = 5 V, T_A = 25 °C, unless otherwise noted.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Input Supply Voltage						
Input Voltage	V _{IN}		9		35	V
Input UVLO						
Input UVLO Threshold	V _{UVLO}	V _{IN} Rising	7.8	8.3	8.8	V
Input UVLO Hysteresis						

reW*1367.8s 21 gs 221. 0 d 1367.87 523.87 41.904 14.ime1465 580011 0.20 scn 0.2YS0 d 1367.87 52

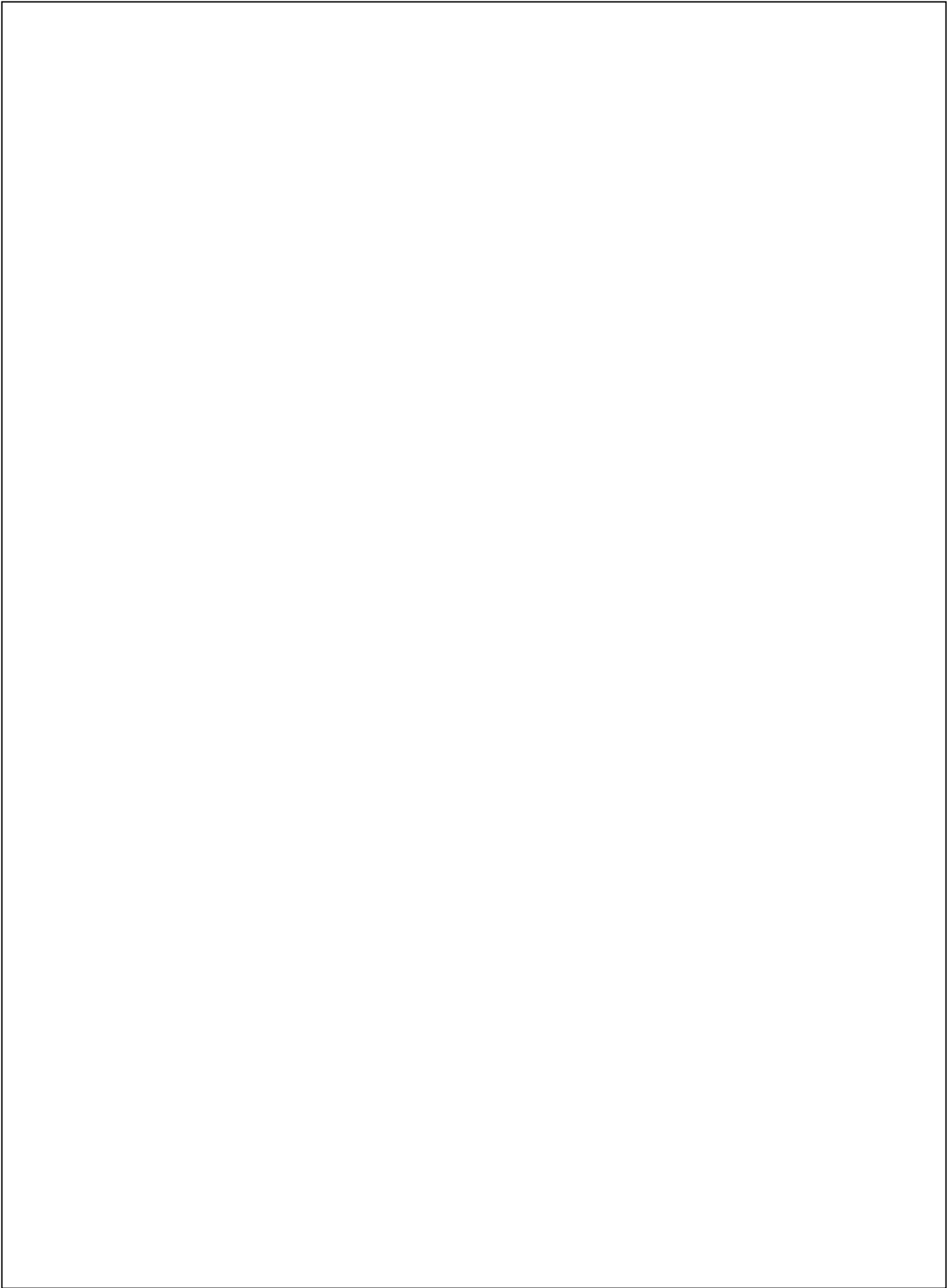
Electrical Characteristics⁽¹⁾ (continued)

($V_{IN} = 12\text{ V}$, $V_{PWM} = 5\text{ V}$, $T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Gate Driver						
Gate rise time	t_{RISE}	1nF loading		40		ns
Gate fall time	t_{FALL}	1nF loading		20		ns
Thermal Shutdown						
Thermal Shutdown Threshold ⁽²⁾	T_{SDN}			150		$^{\circ}\text{C}$

(1). Specifications over temperature range are guaranteed by design and characterization.

(2). Guaranteed by design and characterization only.



Functional Description

1. Operation

The LT5280 is a high performance asynchronous boost controller with accurately constant current output in a wide input range from 9 V to 35 V. This constant current can be programmed through the FB pin connecting a sensing resistor or set by the external PWM dimming duty cycle.

With the slope compensated current mode PWM control, the LT5280 provides stable switching and cycle-by-cycle current limit for protection of the external MOSFET.

2. Additional External Slope Compensation

To improve control loop stability when the operation switch duty cycles greater than 50%, LT5280 has a build-in slope compensation circuit. **Figure 11** shows the basic slope compensation principle.

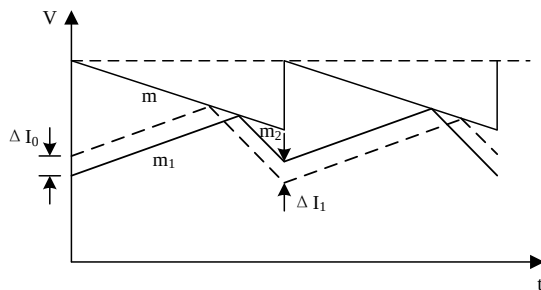


Figure 11 the Slope Compensation Principle

There is an **Equation 1** for slope compensation as below:

$$\text{---} \text{---} \text{---} \quad (1)$$

Where

- k is the factor of the Slope Compensation.
- ΔI_0 is the difference of inductor current between the original inductor current and the perturbed current.
- ΔI_1 is the difference of inductor current between the two currents after slope compensation one operational period.
- m is the slope of the compensation ramp.
- m_1 is the slope of the inductor rising current.
- m_2 is the slope of the inductor falling current.

The condition of a good compensation is that ensure the factor k is less than 1. Can calculate the **Equation 1** with the following equations:

$$(2)$$

$$\text{---} \quad (3)$$

$$\text{---} \quad (4)$$

Where

- f_{sw} is the Operating Frequency.
- R_S is the sensing resistor of the external MOSFET.
- V_{OUT} is the output voltage.
- V_{IN} is the input voltage.
- L is the value of the inductor.

The built-in slope compensation may be inadequate to stable the control loop under some conditions, the LT5280 supports an additional external Slope Compensation as **Figure 12**:

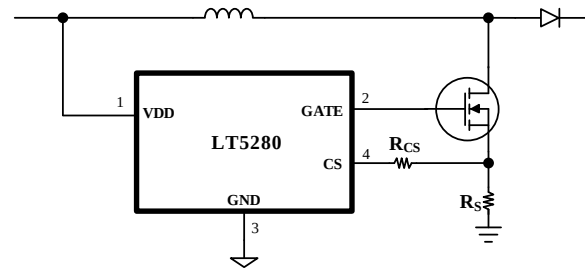


Figure 12 the Additional External Slope Compensation

The slope of the compensation ramp m is changed to **Equation 5** by the additional external Slope Compensation as below:

$$(5)$$

Where

- R_{CS} is the resistor between CS pin and external MOSFET.

3. Input Under-voltage Lockout (UVLO)

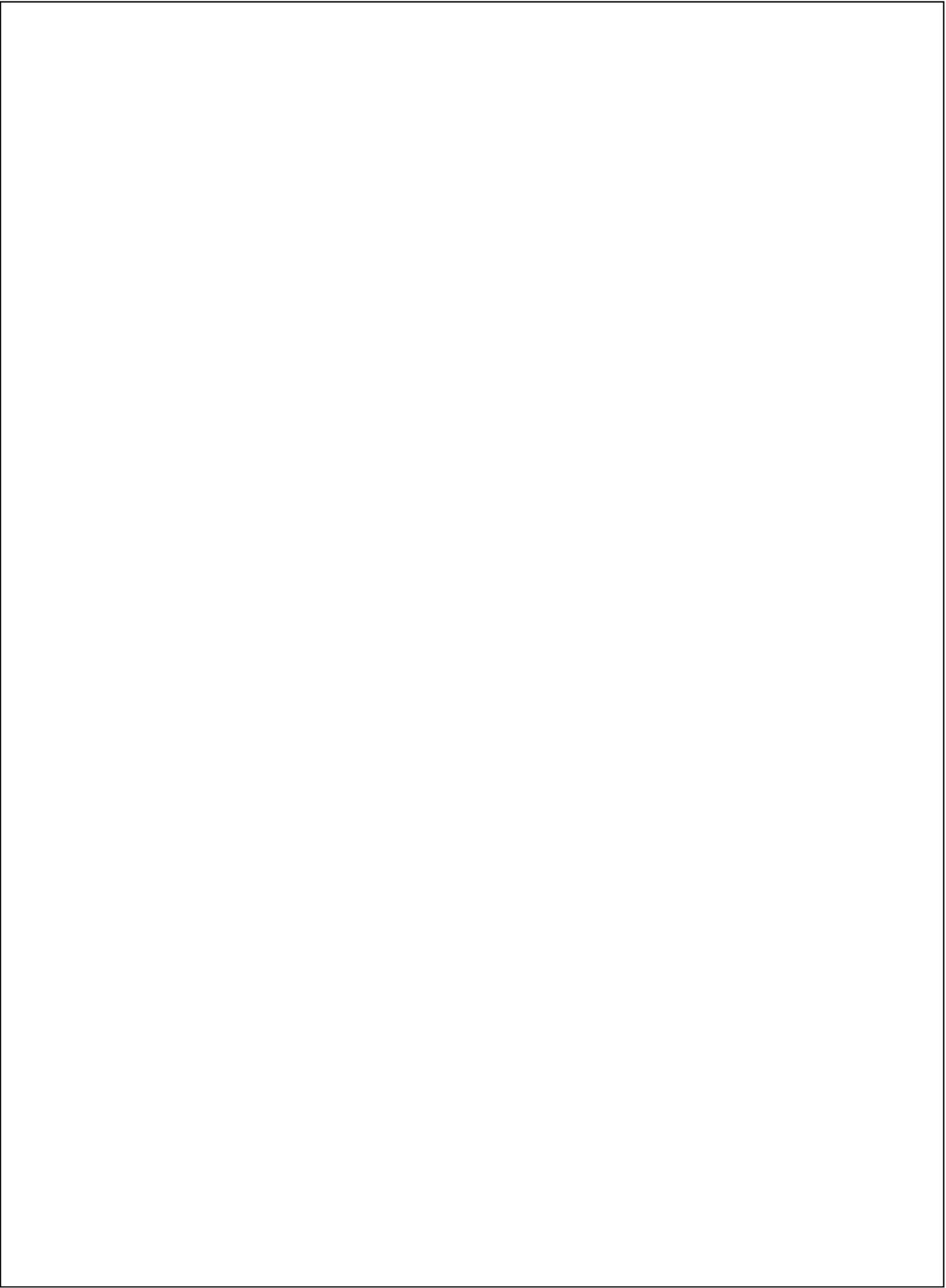
An input UVLO circuit prevents the converter from starting the operation until the input voltage rises above the typical UVLO threshold of 8.3 V. And when input decrease to a hysteresis voltage of 600 mV, The LT5280 will be lockout until to input reaching 8.3 V again.

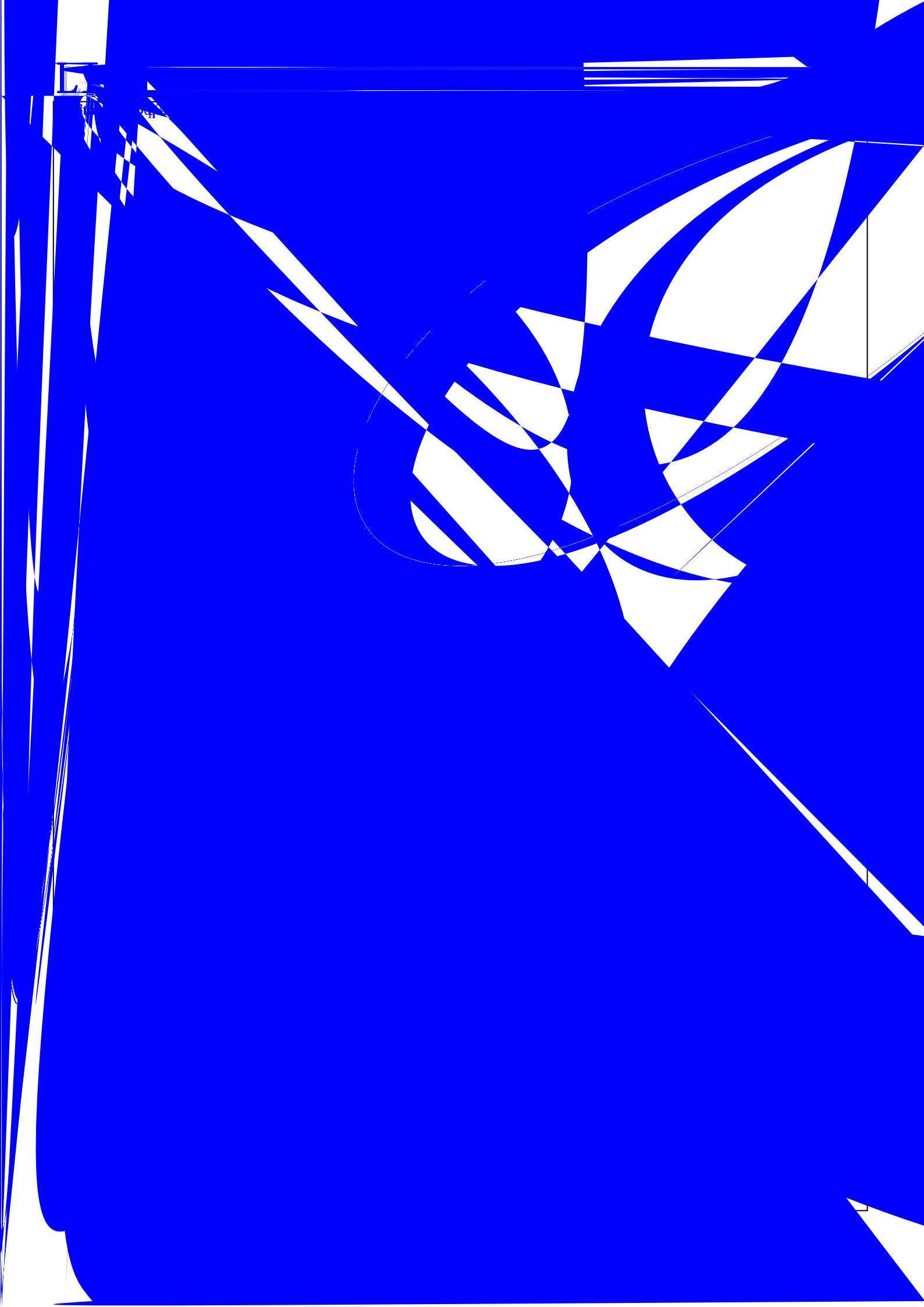
4. Soft-start

The LT5280 implements the soft-start function to reduce the inrush current during startup. The soft-start begins once the input voltage raises above typical UVLO threshold, the soft-start Slope is typically 22 mV/ms.

5. LED Current Setting

The loop of Boost structure will keep the FB pin voltage equal to the reference voltage V_{REF} . Therefore, ing 8TRTJ/FXF23 6 Tf 10.





LIGHT

