

# HL9554

## GaN Integrated Primary Side PWM Flyback Regulator

### Overview

The HL9554 is a part of the family of GaN integrated flyback current-mode-controlled regulators. It is a flyback PWM controller that operates in a quasi-resonant (QR) and continuous conduction mode (CCM) to significantly enhance system efficiency and power density. The control method is based on the load conditions: for heavy load, the valley switching with fixed blanking time is applied; and for medium load, the valley switching with variable blanking time is applied to optimize efficiency. The device with only 20mW less standby power is optimized for high power density AC/DC power supplies. The built-in numerous protection functions make the devices well suited for a best-in-class reliable system with ultra-low part-count BOM.

The HL9554 offers constant output voltage (CV) regulation through opto-coupler feedback controller with shunt regulator. In addition, it incorporates 700V with 450mΩ GaN power FET to provide high efficiency solution and integrated HV startup. The brown-in voltage is programmed by external DMAG pin resistor.

The HL9554 supports wide VDD operating range to cover variable output applications with USB-PD/PPS and DP/DN protocol communication. The HL9554 provides stable gate voltage to drive GaN device through VREG pin.

The HL9554 has protections, such as VDD over-voltage protection (VDD OVP), VDMAG over-voltage protection (VDMAG OVP), VDMAG under-voltage protection (VDMAG UVP), internal over-temperature protection (OTP), brown-out protection, and externally triggered shut-down (SD) function for safety.

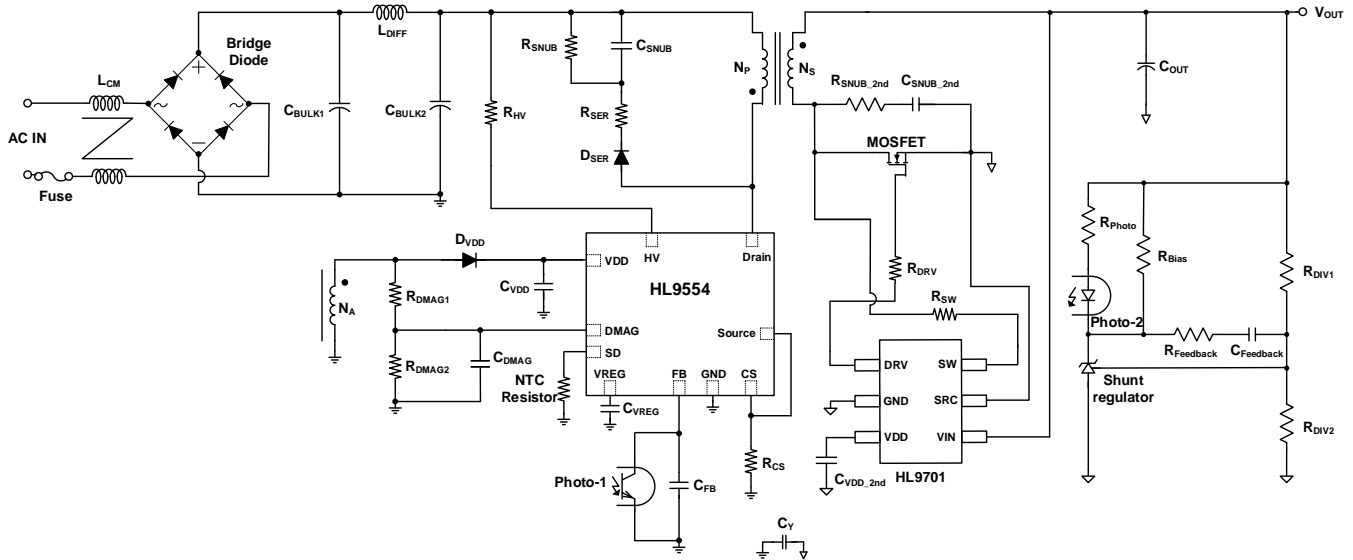
### Features

- Integrated eMode GaN Power FET
- Low 450mΩ  $R_{DS(ON)}$  resistance
- High efficiency across universal input and full load range by hybrid QR and CCM operation
- Wide VDD operating ranges up to 78.5V
- Smart driver and frequency hopping for better EMI performance
- Ultra-low standby power consumption (<20mW)
- Integrated over-voltage protection (OVP), under-voltage protection (UVP), and over-temperature protection (OTP).
- Adjustable thermal shut-down (SD) protection through external NTC thermistor
- Brown-in and brown-out protection
- Integrated high-voltage (HV) startup to reduce external components
- Limit power source (LPS) with power limit and current limit
- Cycle by cycle current limit (VCS\_LIM)
- Current sense short protection (CSSP)
- Secondary side short protection (SSSP)
- Integrated X-cap discharge function
- Accurate protection behavior for auto-restart, latch, and long auto-restart mode

### Applications

- USB PD/QC Battery Charger for Portable Devices
- High-Efficiency AC-DC Power Adapter
- Power Supply with Fixed or Variable Output Voltage

**Simplified Application Diagram**



**Ordering Information**

Part Number	R <sub>DS(ON)</sub>	F <sub>S_BNK_MAX</sub>	Function Descript	Operating Temperature Range	Package	Packing Method
HL9554FN01	450mΩ	129kHz	QR / PL+CC	-40°C to +125°C	QFN 5x6	5K/Tape & Reel
HL9554FN07	450mΩ	129kHz	CCM / PL+CC	-40°C to +125°C	QFN 5x6	5K/Tape & Reel
HL9554FN08	450mΩ	225kHz	QR / PL+CC	-40°C to +125°C	QFN 5x6	5K/Tape & Reel

\*PL: Power Limit, CC: Constant Current (Current Limit)

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