

1 Description

- High frequency, low profile DC-DC converters;
- Voltage Regulators for CPUs, GPUs, FPGAs and DDR memory arrays;
- Telecom controlled and uncontrolled

The TDA22590 integrated power-stage contains a low quiescent current synchronous buck gate-driver IC which is embedded along with control and synchronous MOSFETs in a small 4mm x 6mm package. The package is optimized for PCB layout, heat transfer, driver/MOSFET control timing, and minimal switch node ringing when layout guidelines are followed. The paired gate driver and MOSFET combination enables higher efficiency at lower output voltages required by cutting edge CPU, GPU, FPGA and DDR memory designs.

The improved MOSFET current-mirror current-output sensing achieves superior current sense accuracy vs. best-in-class controller based Inductor DCR sense as well as MOSFET $R_{ds(on)}$ current sense methods.

Protection includes IC temperature reporting and over temperature protection feature (OTP with thermal shutdown), cycle-by-cycle over current protection (OCP), control MOSFET short detection (HSS - High side short detection), VDRV and bootstrap under-voltage protection. The TDA22590 also features "refreshing" of bootstrap capacitor to prevent the bootstrap capacitor from over-discharging.

The TDA22590 also supports "advanced fault reporting" which, in a multiphase buck converter, enables the controller to identify a faulty phase as well as type of fault.

Operation of up to 2 MHz switching frequency enables high performance transient response, allowing miniaturization of output inductors, as well as input and output capacitors while maintaining industry leading efficiency.

Features

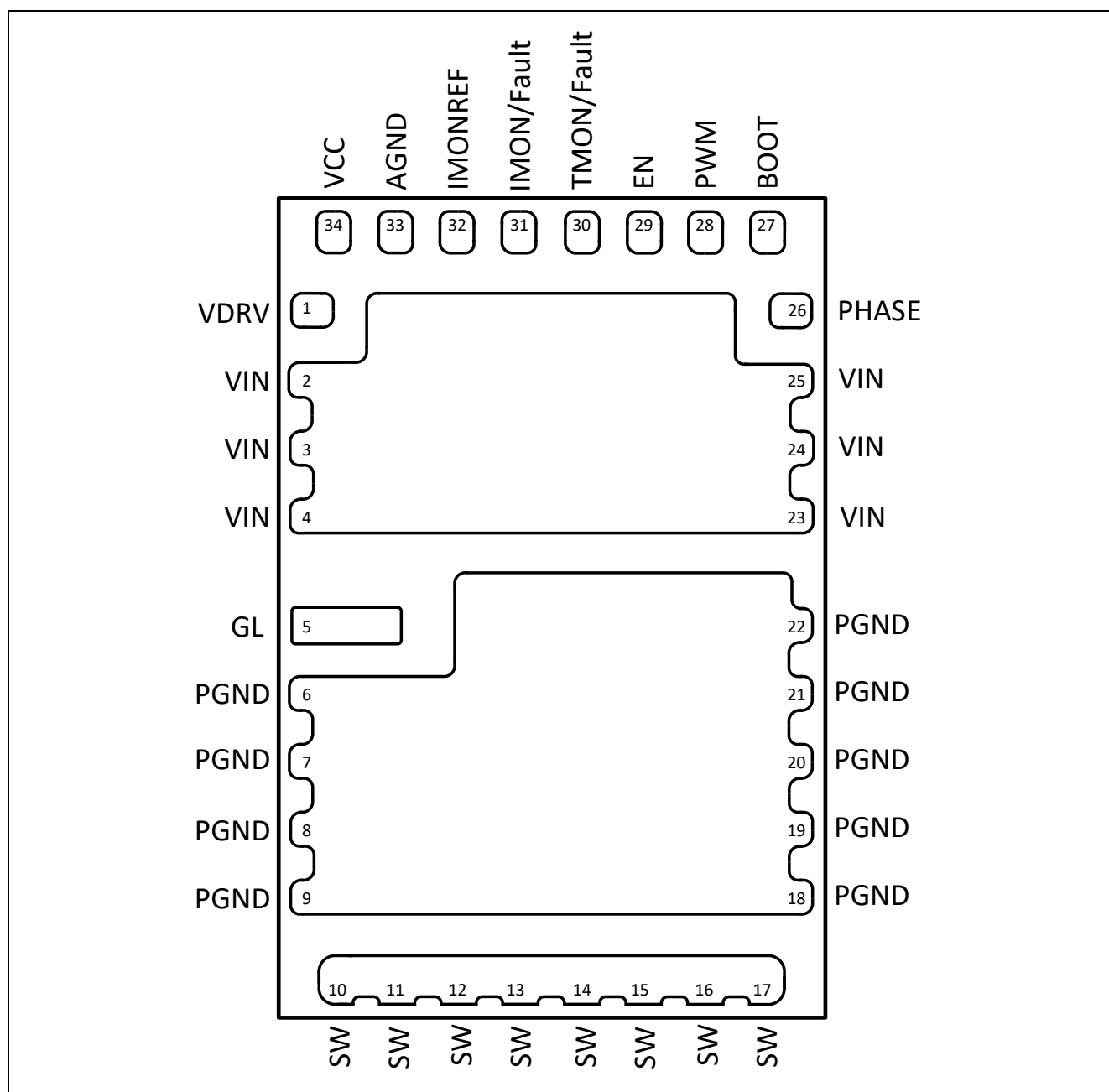
- Integrated driver, Schottky diode, control MOSFET Q1 and synchronous MOSFET Q2
- On-chip MOSFET Current sensing and reporting at 5 $\mu\text{A/A}$.
- Input voltage (V_{IN}) range of 4.25 V to 16 V
- VCC and VDRV supply of 4.5 V to 5.5 V
- Output voltage range from 0.225 V up to 5.5 V at $V_{IN} = 12\text{ V}$
- Output current capability of 90 A
- Operation up to 2 MHz
- VDRV under voltage lockout (UVLO)
- Bootstrap under-voltage protection
- 8mV / $^{\circ}\text{C}$ temperature analog output
- Over temperature protection and thermal shutdown
- Cycle-by-cycle over current Protection (OCP) and flag
- Control MOSFET short (HSS) detection and flag
- Auto-replenishment on bootstrap capacitor
- Compatible with 3.3 V tri-state PWM Input
- Body-Braking™ load transient support
- DEEP SLEEP mode for power saving via EN= low (32 $\mu\text{A typ}$)
- Lead free RoHS compliant package
- Small 4 mm x 6 mm x 0.465 mm CE (Chip Embedded) package

Table 1 Product Identification

Part Number	Temp Range	Package	Marking
TDA22590	-40 to 125°C	CE 4 mm x 6 mm	TDA22590

2 Description

2.1 Pinout

**Figure 1** Pinout, Numbering and Name of Pins (transparent top view)