Automotive Electronics

# Product Information

## CY335 – Direct Injection Driver

BOSCH
Invented for life

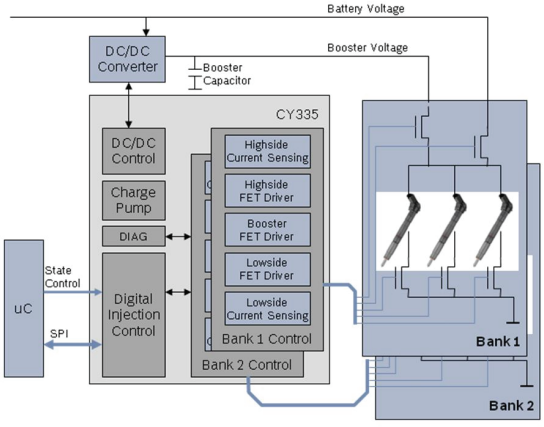

**Customer benefits:**

- Injection driver for up to 6 solenoid DI valves
- Support of overlapping fuel injections
- Several successive fuel injections without recharge cycle
- Flexible configuration
- Compact TQFP64 package

### Features

- 2-bank structure with 2*3 outputs, both output stage banks can be activated simultaneously
- Output stage concept with constant booster voltage
- External NMOS power stages
- External shunt and voltage feedback resistors
- Operation sequence determined by microcode
- Current levels and boost voltage configurable by SPI
- Integrated DC/DC control for booster voltage
- Short circuit protection for power stages
- Integrated charge pump and driver for highside/boost switches

### Block Diagram




### Product Brief

CY335 has been designed to cover all aspects of controlling direct injection valves.

Up to six injectors are supported, the two-bank concept allows for two independent injections at a time.

Multiple configuration and programming options guarantee high flexibility.

External power components (switches and shunts) provide a high degree of freedom to the ECU designer.

A CY335-based system can be adapted to any direct injection valve in the market.

CY335 contains a digital control part, a driver for the DC/DC converter and two identical output stage banks, each of which can drive up to three injectors. Optionally, bank 1 can control up to four injections if bank 2 is not used.

Both banks can operate with independent timing, allowing for two simultaneous injections. All switches and shunts are outside the CY335, allowing to adapt the circuit to almost any current and voltage range. Fine tuning of the parameters is done in SPI registers.

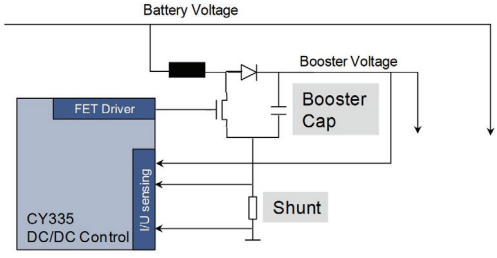
## Maximum ratings

| | Values | | |
|---|---|---|---|
| | **min** | **max** | **unit** |
| Booster FET Driver voltage | | 65 | V |
| Operating junction temperature | -40 | 150 | °C |
| ESD HBM | -2 | 2 | kV |

CY335 can drive booster FET voltages of up to 65V. For booster voltages above 65V, use external high-side drivers for the booster FETs.

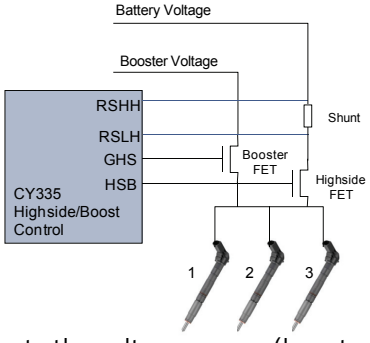
## Functional description

### DC/DC Converter



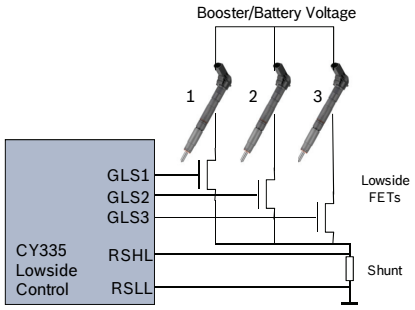

- Buck Converter to generate booster voltage
- Current Mode Control
- Currents and voltages set by software

### Highside/Boost Control




- Selects the voltage source (booster or battery voltage)
- FETs control the current level
- Connected to highside of injectors
- Dual implementation (once per bank)

### Lowside Control

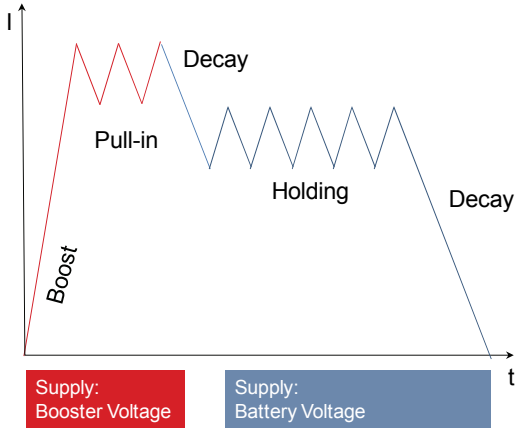



- Selects the injector
- Measures the injector current for highside control
- Connected to lowside of injectors
- Dual implementation (once per bank)

### Injection Example

The CY335 injection sequence can be freely configured via SPI, using a total of 23 different instructions.

The example below depicts a typical injection current profile:




During opening phase of the injector, the current is supplied from the booster voltage. To keep the injector open, the CY335 switches from the booster FET to the highside FET and reduces the current through the injector. At the end of the injection, the current decays back to zero.

**Regional sales contacts**
Europe/Japan bosch.semiconductors@de.bosch.com
USA/Canada bosch.semiconductors@us.bosch.com
China bosch.semiconductors@cn.bosch.com
Korea bosch.semiconductors@kr.bosch.com

**www.bosch-semiconductors.com**
**www.bosch-sensors.com**

**Robert Bosch GmbH**
AE/MKC
Postfach 13 42
72703 Reutlingen
Germany

**www.bosch.de**