



## TRINAMIC: Key Facts

- Silicon Vendor (fabless) for Motion Control ICs
- Trinamic develops and markets ASSPs:  
Application Specific Standard Products
- Trinamic focuses on the market of fractional horse power motion control  
(Stepper & BLDC motors of 28mm up to 86mm)



## TRINAMIC: Product Range

- Integrated Circuits
  - Controller
  - Driver
  - MOSFETs
- Off-the shelf motion control solutions (Modules)
- Mechatronic solutions (PANdrives)
- Bus interface converters

# POWER DRIVER FOR STEPPER MOTORS



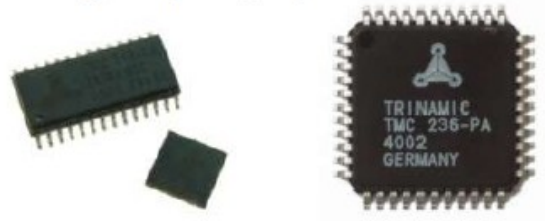
| TYPE   | DESCRIPTION            | stallGuard™ | MOSFETs    |
|--------|------------------------|-------------|------------|
| TMC236 | Microstep driver, 1.5A |             | integrated |
| TMC246 | Microstep driver, 1.5A | ✓           | integrated |
| TMC239 | Microstep driver, 4A   |             | external   |
| TMC249 | Microstep driver, 4A   | ✓           | external   |

## TMC 236/239: Stepper Motor Driver



### Common Features:

- 2-phase bipolar stepper motor driver
- SPI and Analog Interface
- Up to 16 times micro stepping w/ integrated 4 Bit DACs via SPI, 64 micro steps via analog control
- Low temperature operation
- 3.3V to 5V for digital part; up to 34V motor supply voltage



# TMC 236: Stepper Motor Driver



## Features:

- TRINAMIC USPs:  
Advanced technology - lowest power dissipation on the market
- No heatsink needed
- Up to 1.5A (peak) phase current

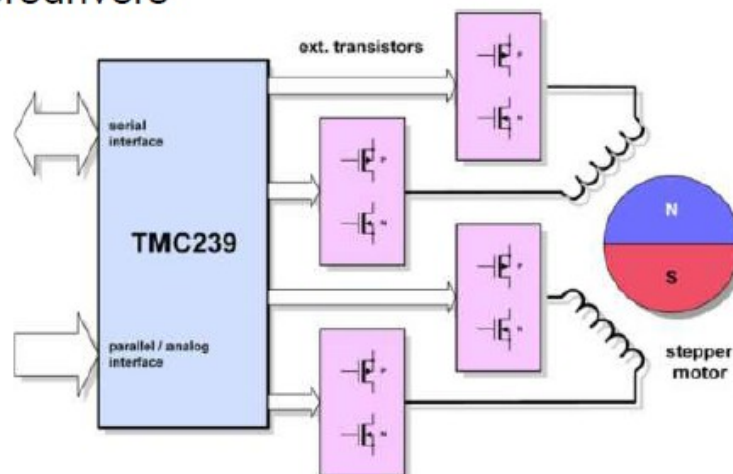


# TMC 239: Stepper Motor Driver



## Features:

- TMC239 up to 6A (peak) with external MOSFETs
- with additional predrivers



# TMC 246/249: Stepper Driver with stallGuard™



## Common features:

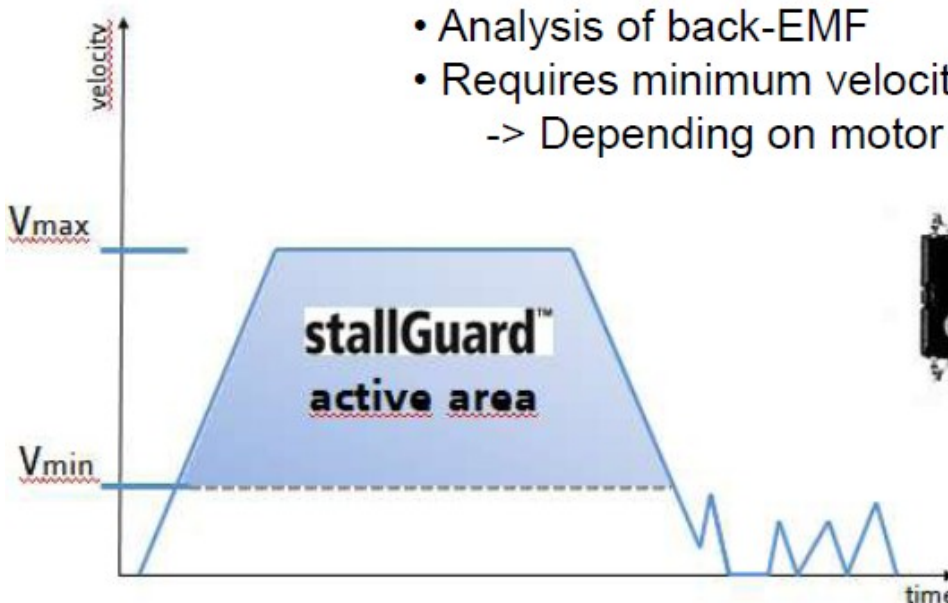
- Compatible to TMC236 and TMC239 with additional **StallGuard™** feature
- Stall Detection Load Angle Measurement
- Reduction of system cost
  - No need of limit-switches and cables
- Higher reliability without additional cost
- Low noise during mechanical reference search



## stallGuard™: Principle of Operation



### STEPPER MOTOR DRIVER



- Analysis of back-EMF
- Requires minimum velocity
  - > Depending on motor characteristics





## TRINAMIC: Services

- Lifecycles of up to 5 years
  - Advantages for our customers:
    - Reduces costs of re-designing, re-qualification and re-certifying
    - Saves valuable resources
    - Reduces time-to-market
- Lead times:
  - quantities of up to 5,000pcs in rather short notice
  - bigger volumes on request
- After sales & Support:
  - user manuals
  - online support forum of TRINAMIC with quick and competent support from TRINAMIC and an active discussion group

## COMPETITION

- Competitors: Allegro, Luminary Micro, Elmos  
TRINAMIC TMC236/246 vs. Allegro A3972

### TRINAMIC

- Size: 12\*12\*1,6 (mm)
- Power dissipation: 1.1 W
- extremely high efficiency
  - operation up to 125°C
- No heat sink
- stallGuard™
- operating voltage: 34V, up to 60V using a few add. components
- No limit switches
- No current measurement
- Increased safety
- Short circuit protected
- dual interface option
- programmable slope control

### Allegro

- Size: 30\*10,9\*8,6 (mm)
- Power dissipation: 3.1 W
- operation up to 85°C
- internal UVLO and thermal shutdown circuitry
- crossover-current protection
- sleep and idle modes
- operating voltage: 50 V

# THE MARKET



- Market drivers:
  - Increasing need for environmental protection
  - Increasing performance in office automation
  - Reduction of power dissipation
  - Electronic motion control replaces mechanics
- How to identify?
  - Trade associations
  - Newsletter
  - Trade magazines
  - Business directories

# APPLICATIONS: Biotech/ Medical



- Microscopy
- Laboratory automation
- Cell technology



analyzer



DNA test material mixer



auto refracto-



microscope



# APPLICATIONS: Consumer Electronics

- Office automation
  - Printer, scanner, copy machines
- Cash vending machines
- Ticket- and POS printer
- Mechanical entertainment
- Sewing machines



ATM machines



Sewing machine



pay machine



gambling machine



printer

# APPLICATIONS: Industrial



- Industrial automation
  - Robotics, wood processing
- Laboratory automation
- Surveillance cameras, rotary antenna
- Regulated gas- and water valves
- Electronic lens adjustment
  - LCD projector, microscope, telescope



Surveillance cameras



textile



projector



dosing pump

# SUCCESS STORIES



|                 |  |
|-----------------|--|
| <b>Industry</b> | <b>Textile machines</b>  |
| Application     | drive system for splicing  |
| Product         | TMC236   |
| Volume          | 280k   |
| Why Trinamic?   | <ul style="list-style-type: none"><li>▪ Lowest power dissipation in class</li><li>▪ Highest reliability</li><li>▪ Best diagnostics</li></ul> |

## Q&A



If you have questions, please don't hesitate to get in contact with TRINAMIC:

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