

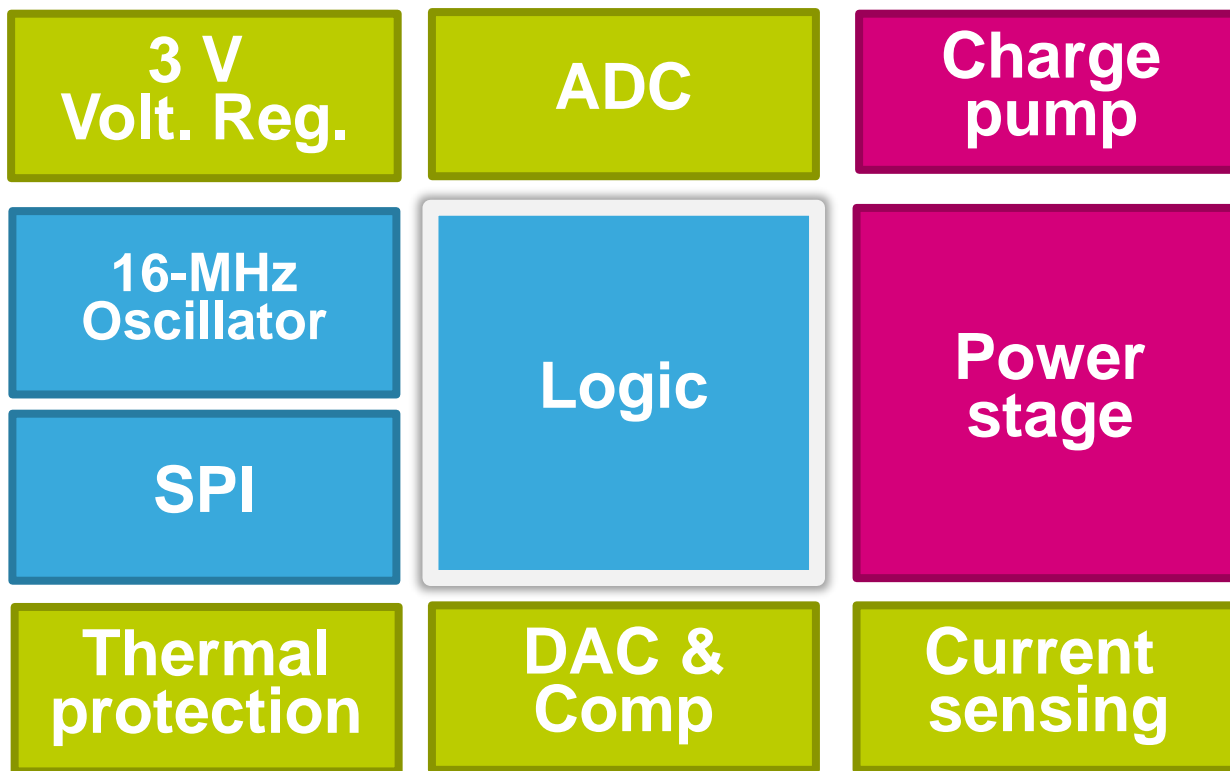


# STSPIN L6474

ST motor drivers are moving the future

# Digital. Accurate. Versatile.

The device integrates **analog circuitry** and a **dual full-bridge power stage** making it a stand-alone solution for stepper motor driving applications.



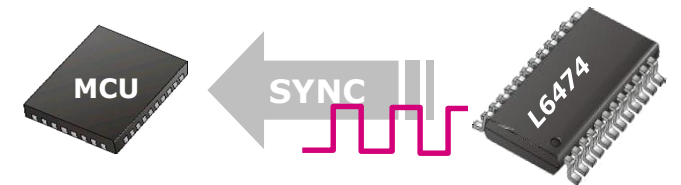
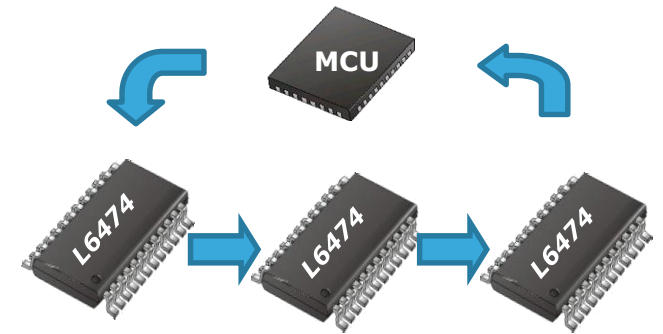
# L6474 characteristics

- Supply voltage from **8 to 45 V**
- Power stage
  - **3 A<sub>RMS</sub>**
  - **R<sub>DS(ON)</sub> = 0.28 Ω**
- **Integrated current sensing**  
(no external shunt)
- Up to **16 microsteps**
- **Advanced current control**
- **8-bit 5 MHz SPI interface**  
(Daisy-chain compatible)
- Integrated 16 MHz oscillator
- Integrated 5-bit ADC
- Integrated 3 V voltage regulator
- **Overcurrent, overtemperature and undervoltage protections**
- **HTSSOP and POWERSO** packages

# A full-digital interface to MCU

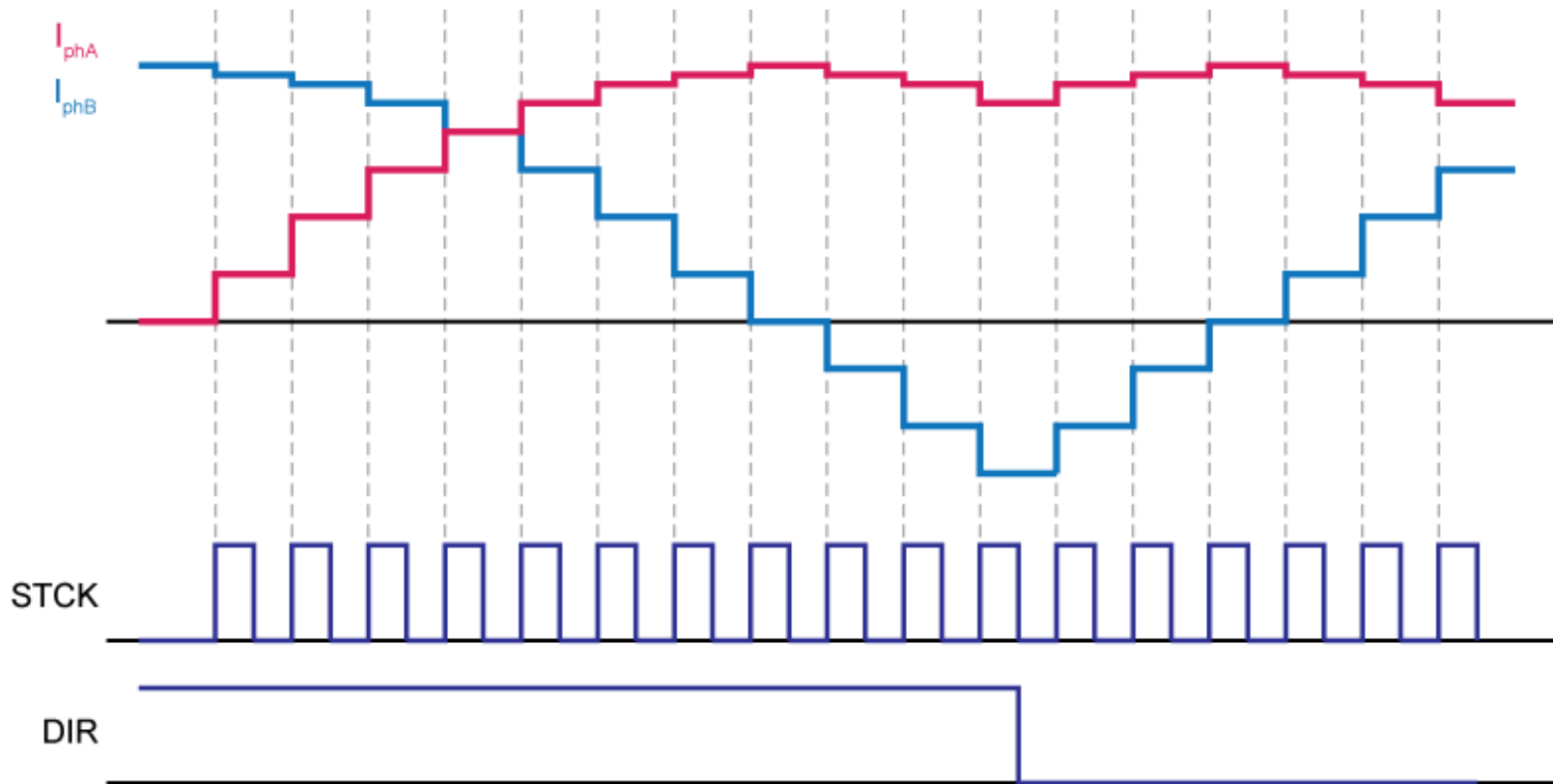
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- The fast SPI interface with **daisy-chain** capability allows a single MCU to manage multiple devices
- Programmable alarm **FLAG** open-drain output for interrupt-based FW  
In daisy-chain configuration, **FLAG** pins of different devices can be OR-wired to save host controller GPIOs
- **STCK** and **DIR** inputs allow full control of the motion of the motor by the MCU
- **SYNC** signal gives feedback of the step-clock to the MCU  
(programmable # of microsteps)



# Step-clock and direction driving

**Step-clock and direction control** allows performing any motion profile with no limitations



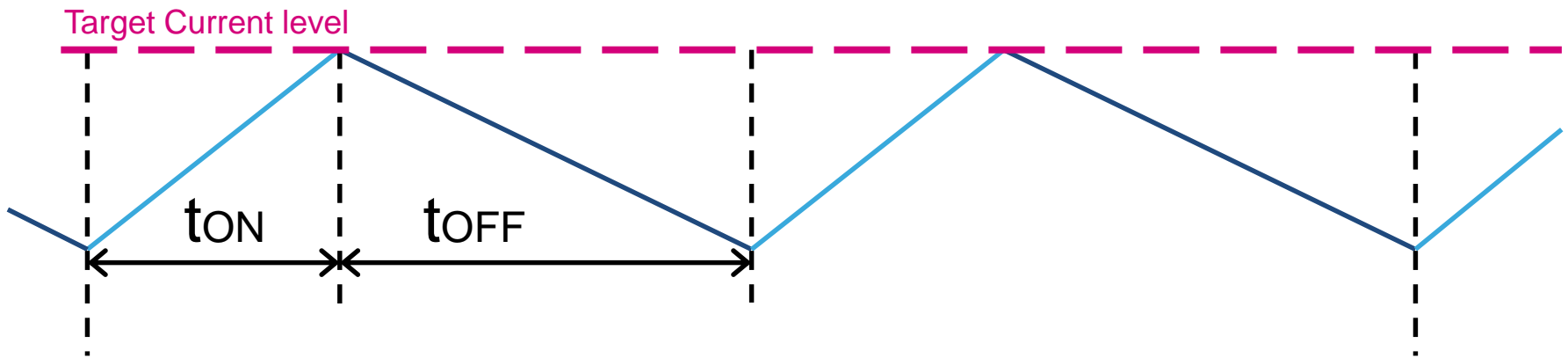
# Enable and disable the power stage

The power stage can be **enabled and disabled** through two specific **SPI commands**:

- **Enable:** turns on the power stage and starts the current control according to the current EL\_POS value.  
If a failure condition is present (overtemperature, overcurrent, etc.), the power stage is kept disabled.
- **Disable:** immediately turns off the power stage.

- **Automatic selection of the decay mode**  
Stable current control in microstepping
- **Slow decay and fast decay balancing**  
Reduced current ripple

# Challenges to perform the right decay

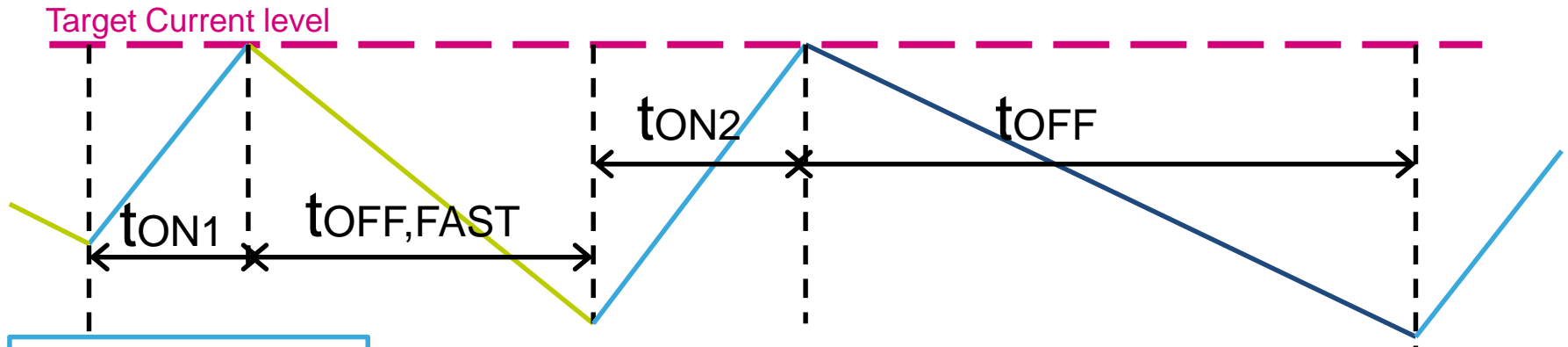


During the OFF state, both slow and fast decay must be used for a better control:

**L6474** performs an  
**AUTO-ADJUSTED DECAY**



# Auto-adjusted decay



tON1 < TON\_MIN

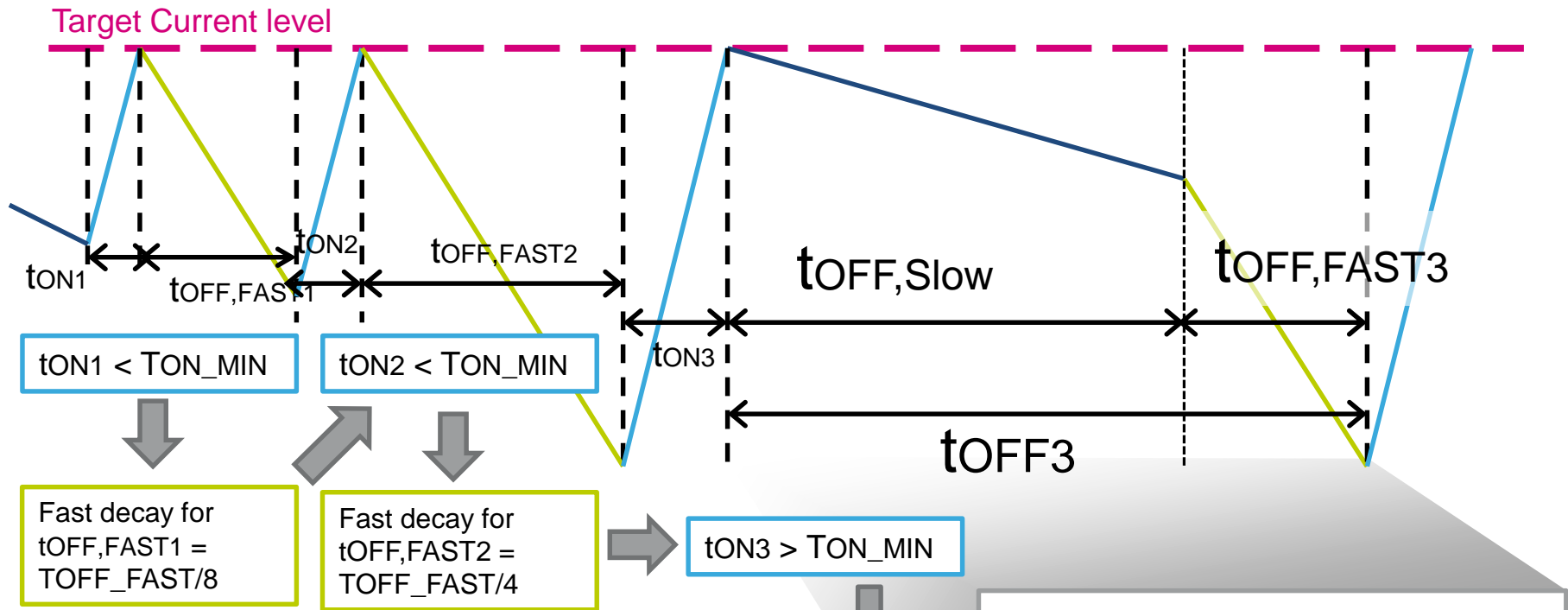
tON2 > TON\_MIN

Fast decay for  
 $t_{OFF,FAST} = T_{OFF\_FAST}/8$   
in order to remove more energy than a slow decay

Slow decay for  $t_{OFF} = T_{OFF}$

Parameter	Function
TON_MIN	Target minimum ON time
TOFF_FAST	Maximum fast decay duration
TOFF	Fixed OFF time

# Auto-adjusted decay



Parameter	Function
TON_MIN	Target minimum ON time
TOFF_FAST	Maximum fast decay duration
TOFF	Fixed OFF time

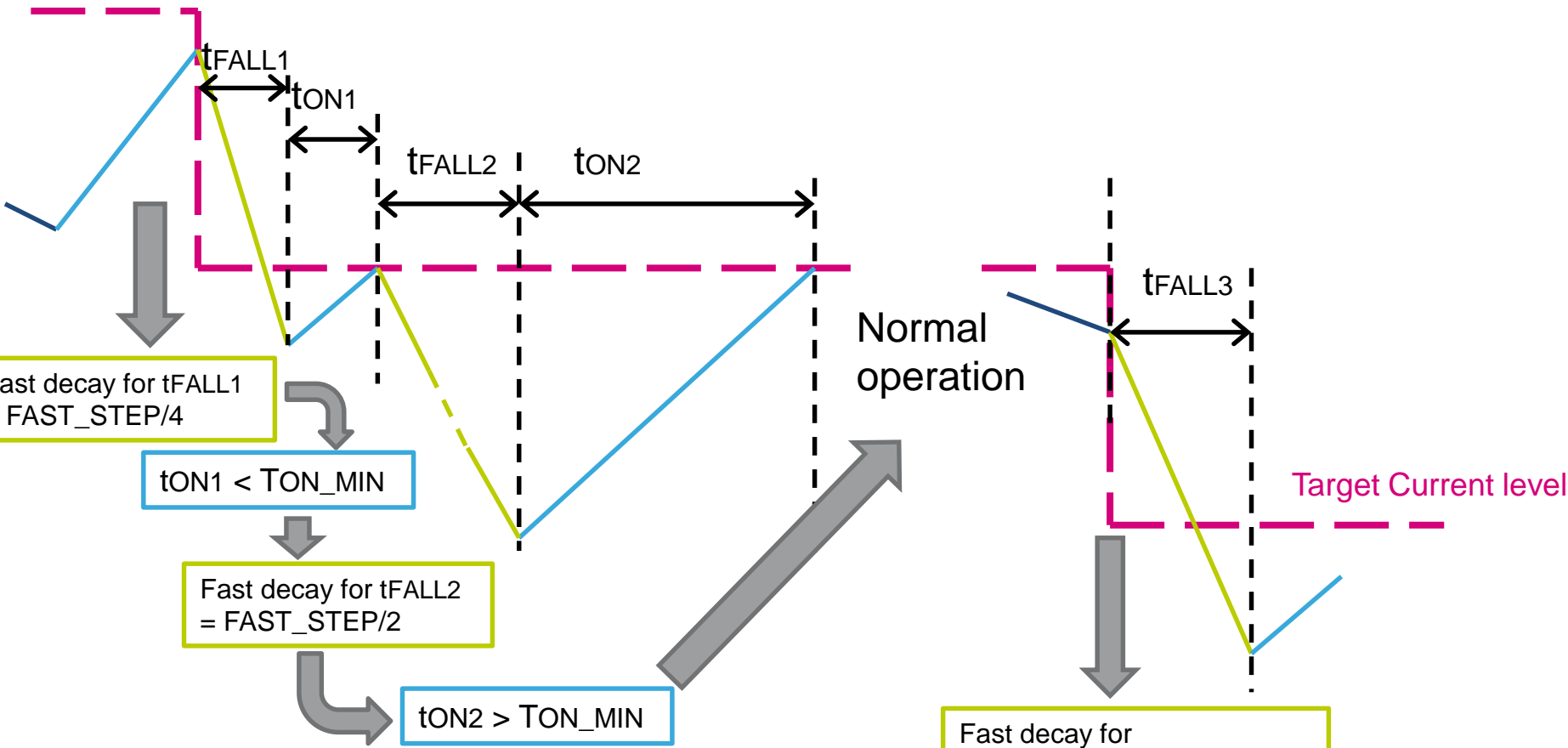
**Mixed decay :**

$t_{OFF3} = TOFF$

$t_{OFF,FAST3} = t_{OFF,FAST2} = TOFF\_FAST/4$

$t_{OFF,Slow} = t_{OFF3} - t_{OFF,FAST3}$

# Falling step control



Parameter	Function
TON_MIN	Target minimum ON time
FAST_STEP	Maximum fast decay duration during falling steps

# Programmable overcurrent protection

**Each MOSFET** of the power stage is protected by an overcurrent protection system.

The overcurrent threshold can be programmed **from 375 mA to 6 A**.

When the current in one of the MOSFET exceeds the threshold, the whole power stage is **immediately turned OFF**.

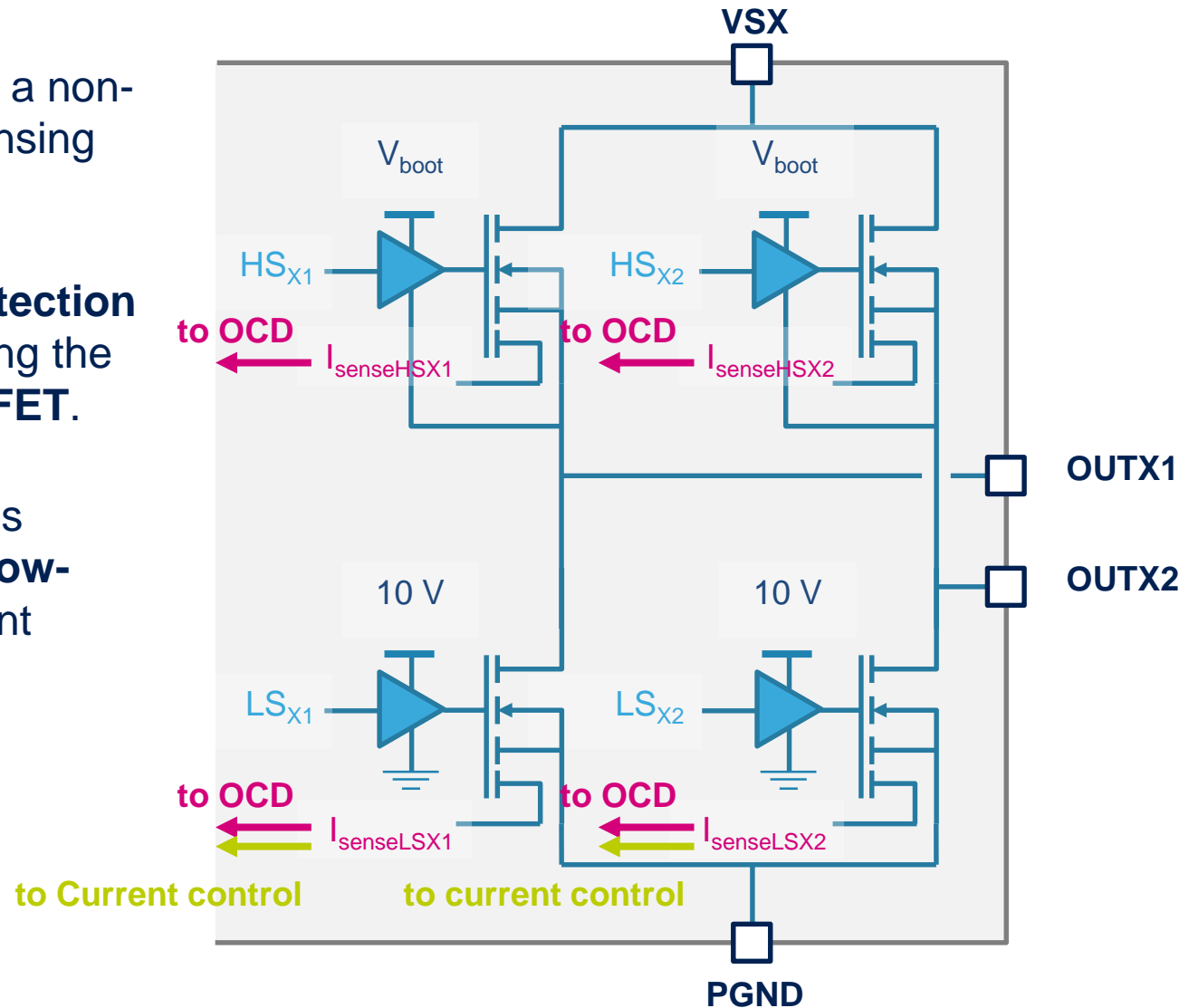
The power stage **cannot be enabled until a GetStatus command releases the failure condition**.

# Current sensing

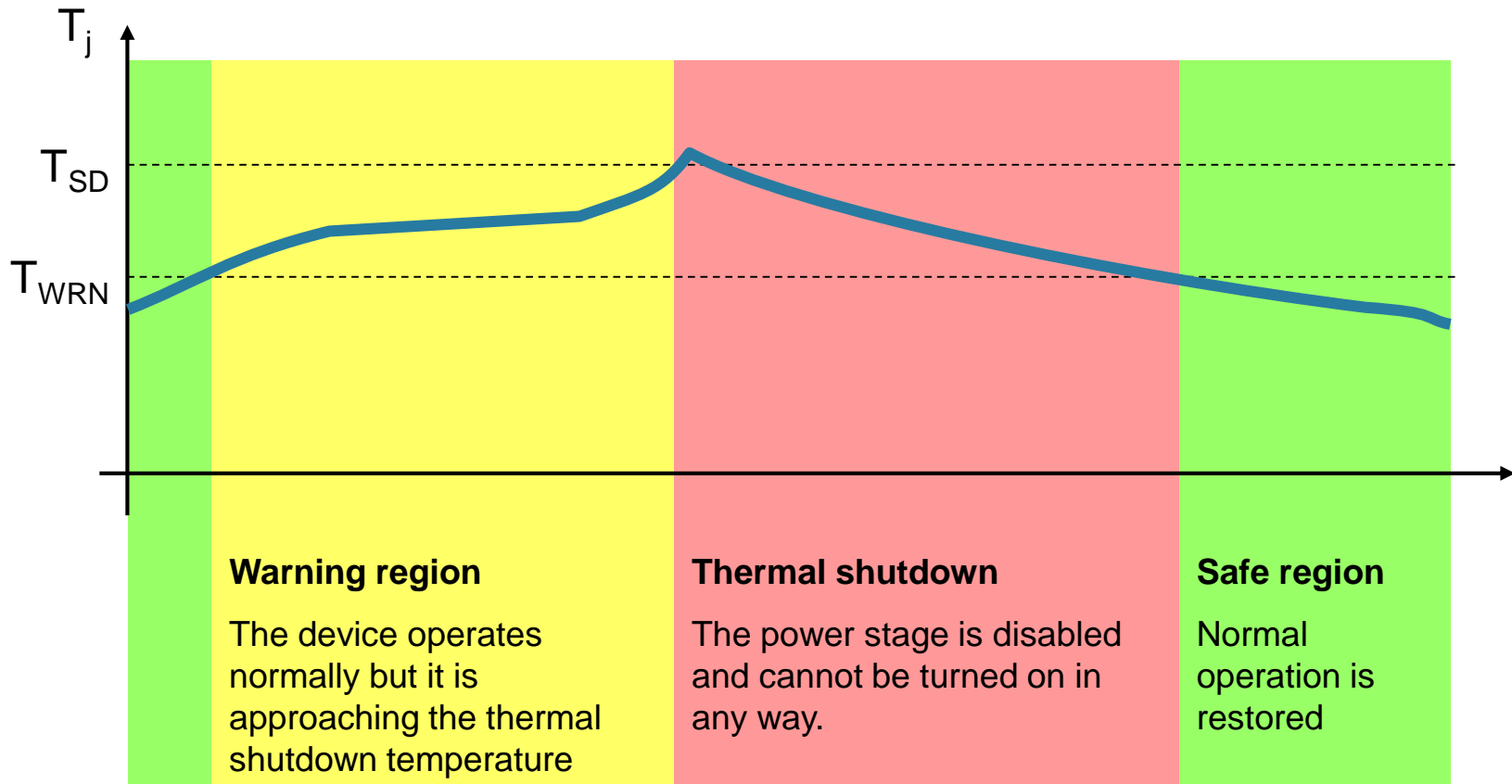
The device integrates a non-dissipative current sensing on each MOSFET.

The **overcurrent protection** is performed measuring the current in **each MOSFET**.

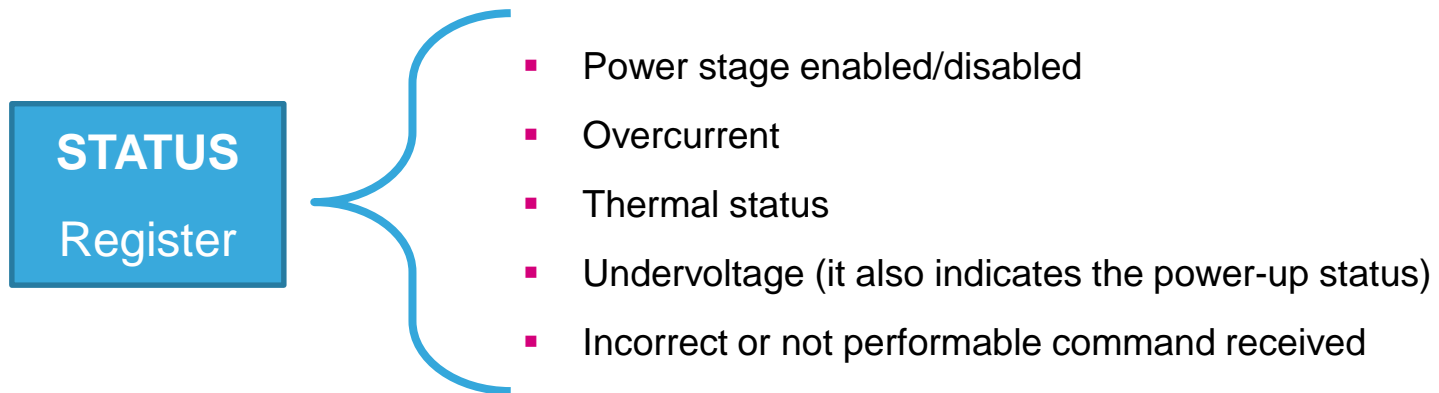
The **current control** is performed using the **low-side MOSFETs** current value.



# Warning temperature and thermal shutdown

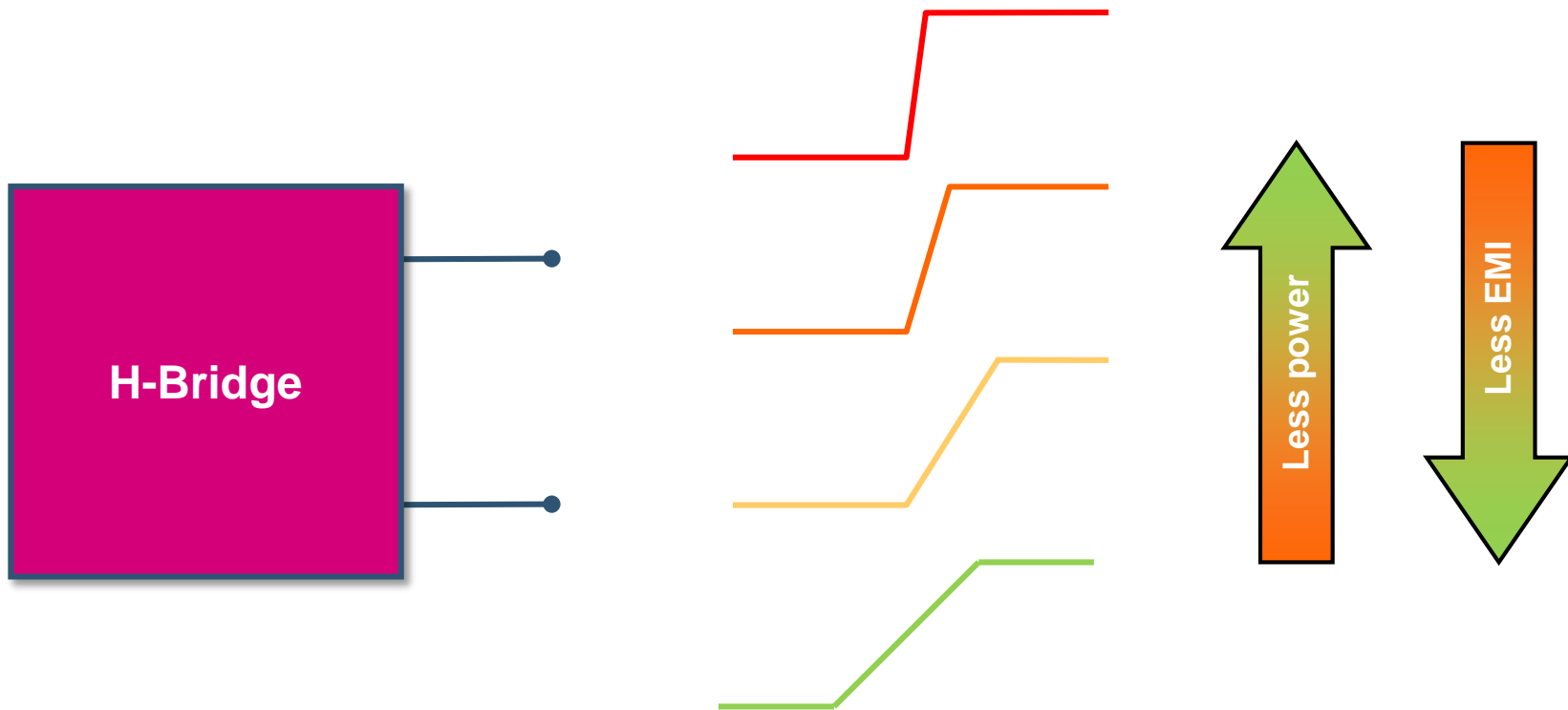


The device integrates a diagnostic register collecting the information about the status of the system:



# Programmable output slew-rate

Four output slew-rate values can be selected via SPI in order to fit the application EMI / Power dissipation tradeoff.







# Competitive advantages

- High level of integration
- Integrated current sensing
- Advanced diagnostics

Further information and full design support can be found at [www.st.com/stspin](http://www.st.com/stspin)