Motor Control

Power & Analog program

European

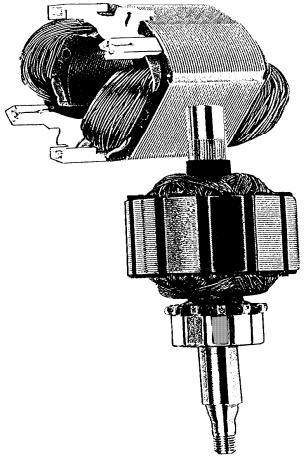
Multi System Market Competence Center

MOTION CONTROL / THE POWER

- Motors overview
- Standard chip solution
  - Controllers
  - Integrated power stages
- Power spin
- ST Gate drivers
  - High voltage gate drivers L638x
  - TD35x Family: Advanced IGBT/Mosfet Driver for 1200V Applications
- Evaluation boards

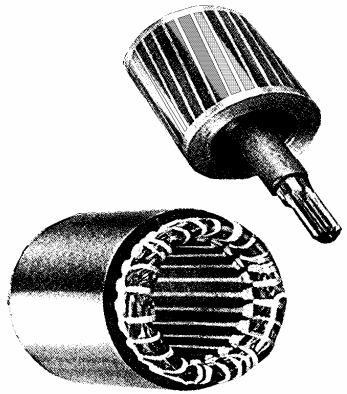
Types of motors

WITH BRUSHES



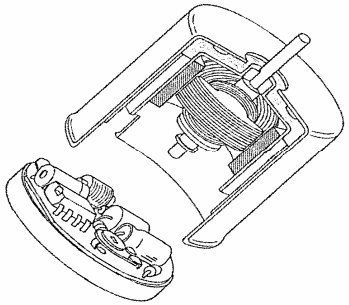
UNIVERSAL

BRUSHLESS



1 & 3 phase induction
Asynchronous

ELECTRONICALLY COMMUTATED



BLDC + SR
Synchronous

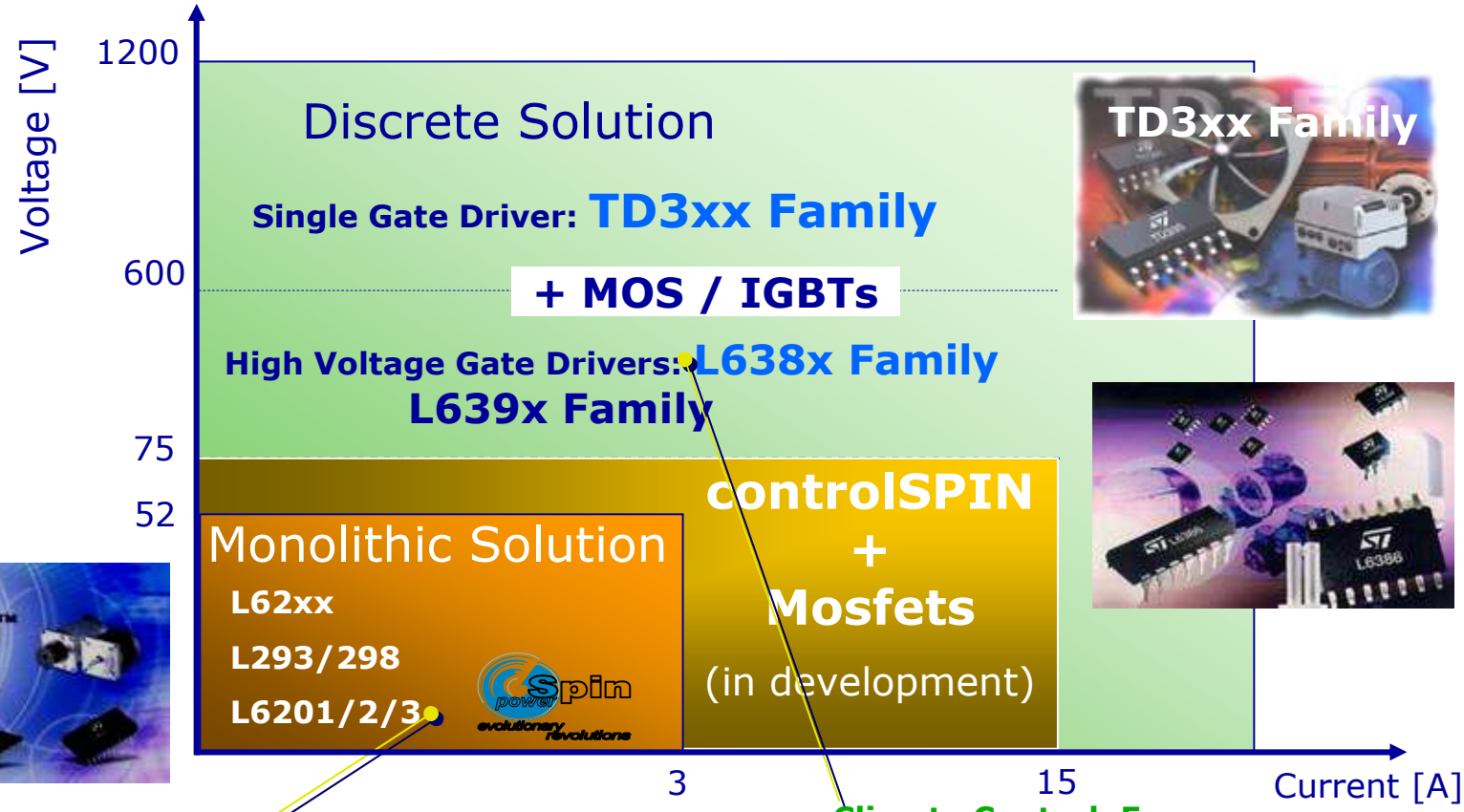
Standard MCU – ACS/Triac Control

Dedicated MCU – 3 phase Inverter Control

Main motors and driving methods

Motor Type & Suitable MCU	Supply	Speed controlled by	Typical Power Controller	Main Advantage	Main Weakness	Typical Application
Universal **(single phase)** ST72F32x & ST7FLite	**AC or DC**	**RMS Voltage**	**Triac (phase angle) IGBT + Free Wheeling Diode (PWM)**	**Easy speed control, high torque at start-up**	**Lower life time, noisy sparks, poor efficiency**	Washing-machine in Europe, vaccum-cleaner, power tools, food processor
Induction **(single phase)** ST72F32x & ST7FLite	**AC**	**Freq.**	**Triac (on/off)**	**Robust, silent, efficient**	**Fixed speed**	Fridge compressor, aircon compressor, washing-machine in A/P & US
Induction **(3 phases)** ST7FMC STR91x STM32x	**AC**	**Freq.**	**Inverter (electronic control)**	**Robust, silent, efficient, variable speed**	**Cost until volume effect appears**	Aircon compressor and fans, industrial control, washing-machine, UPS, pumps High-end industrial control (vector ctrl)
PM BLDC **& Switched Reluctance (3 phases)** ST7FMC STR91x STM32x	**AC DC**	**Phase commutation speed**	**Inverter (electronic control**	**Silent, very efficient, variable speed**	**Cost until volume effect appears**	Automotive, fridge, compressor, aircon compressor, vaccum-cleaner, fans, pumps (sensorless)
PMAC **(2&3 phases)** STR91x STM32x	**AC**	**Freq.**	**Inverter (electronic control)**	**Silent, very efficient, variable speed**	**Cost until volume effect appears**	Pumps (sensorless)

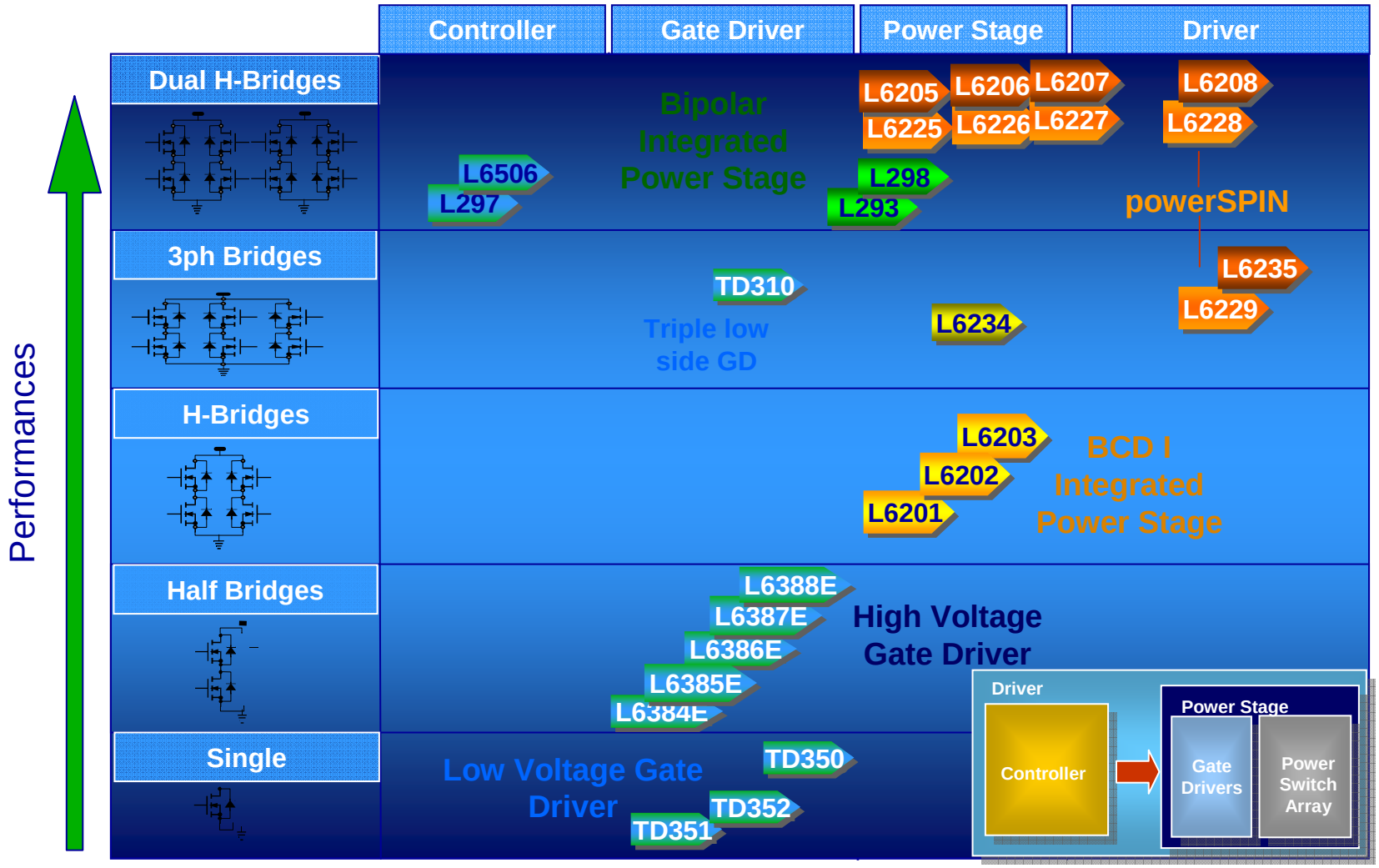
Motor control: flexible platform



Factory automation, Home Automation
Office Automation: Printers, LBP
Industrial: Vending Machine, Money dispenser, POS
Toys, Consumer Applications, Medical

Climate Control, Fans
White goods
Vacuum cleaner, food processor
Pumps
Industrial Applications

Motor control product matrix



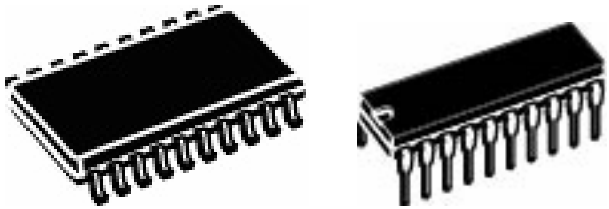
L297– Bipolar Stepper Motor Controller

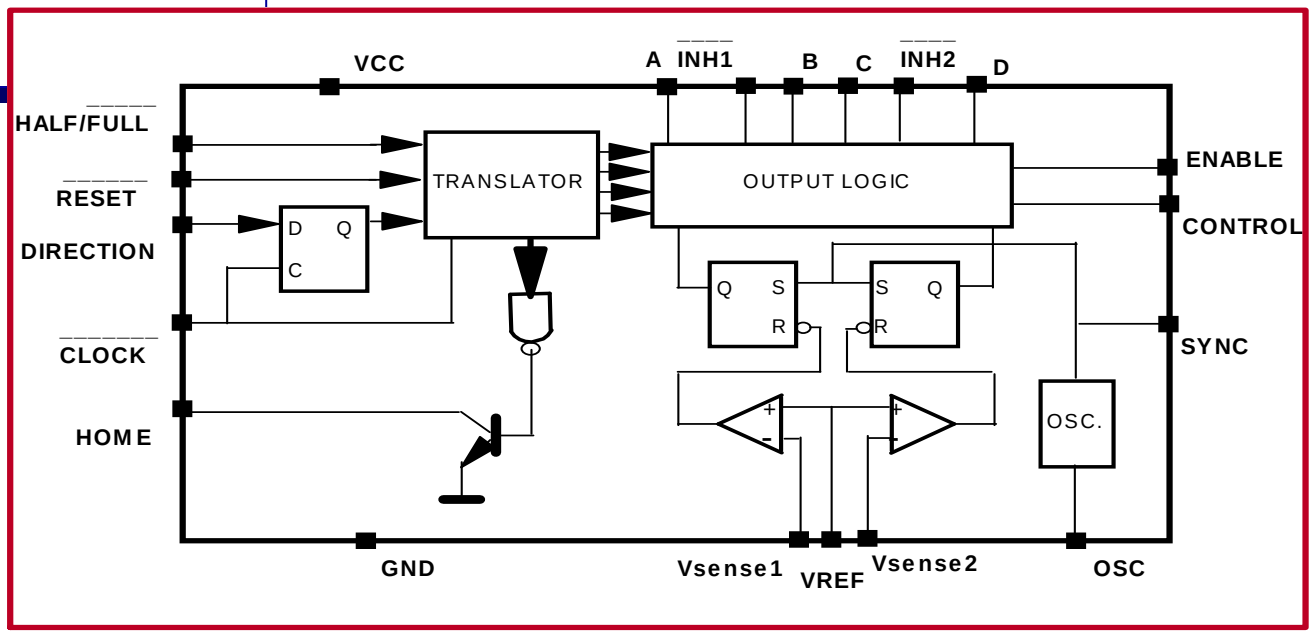
L297 Main Features

- Supply Voltage from 4.75 to 7V
- Typ. Quiescent Supply Current 50mA
- Constant Frequency PWM Control
- Sync. Function
- Phase Sequence Generator
  - Half Step Mode
  - Full Step Mode
- Reset Input & Home Output
- Enable Input
- Direction Setting

Packages

- DIP20 (L297)
- SO20 (L297D)





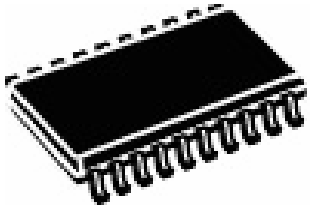
L6506– Bipolar PWM Current Controller

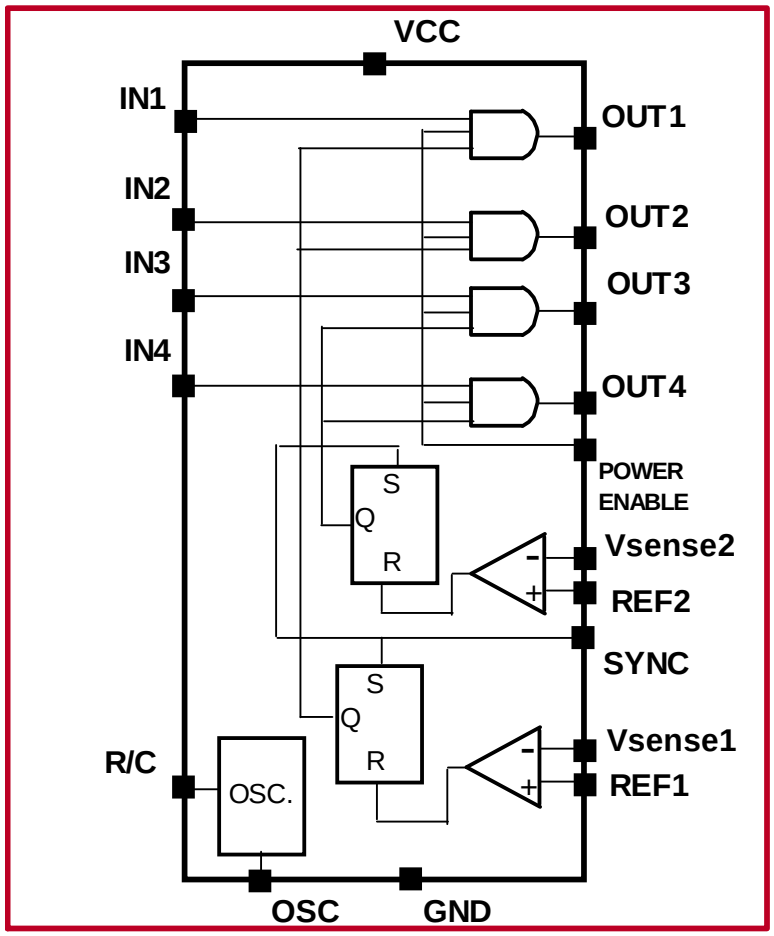
L6506 Main Features

- Supply Voltage from 4.5 to 7V
- Max. Quiescent Supply Current 25mA
- Constant Frequency PWM Current Control
- Sync. Function

Packages

- DIP18 (L6506)
- SO20 (L6506D)

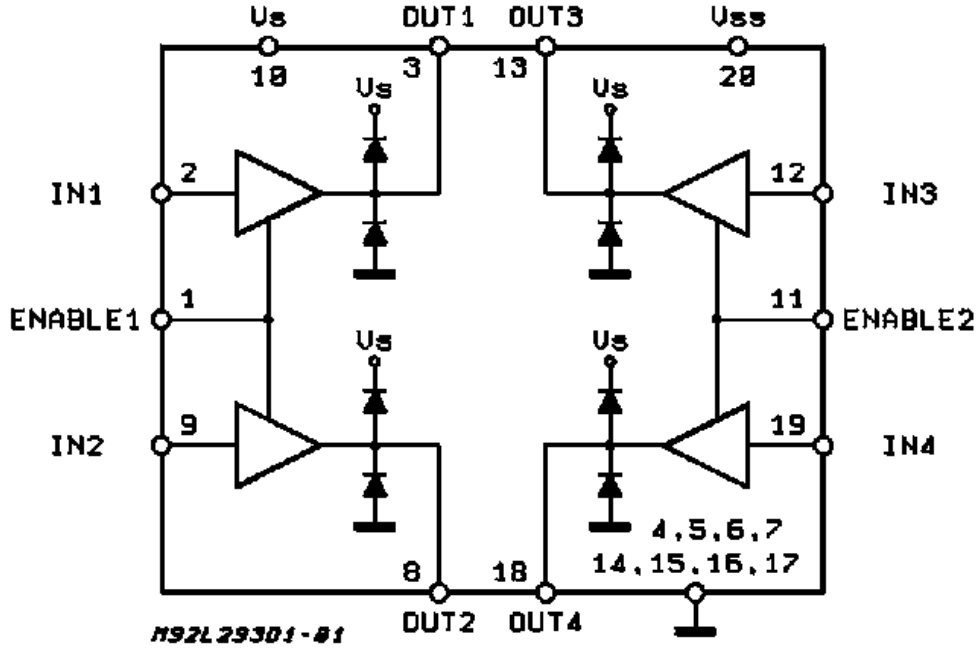




L293D/L293DD – Bipolar Dual Full Bridge

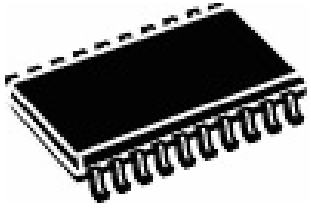
L293D/L293DD Main Features

- Supply Voltage up to 36V
- Output Peak Current 1.2A (0.6A DC)
- Vcesat = 1.8Vmax @0.6A
- Operating Frequency up to 5KHz
- Thermal Shut Down
- TTL Compatible Inputs
- Internal Clamp Diodes



Packages

- SO20 (L293DD)
- PowerDIP20 (L293D)
- QFN 5x5x1 – 32 L



L2293Q – Bipolar Dual Full Bridge

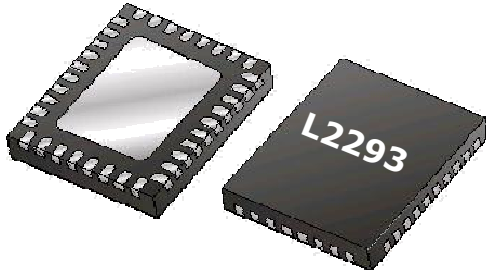
L2293Q – Low Voltage Bipolar Dual Full Bridge for PORTABLE applications

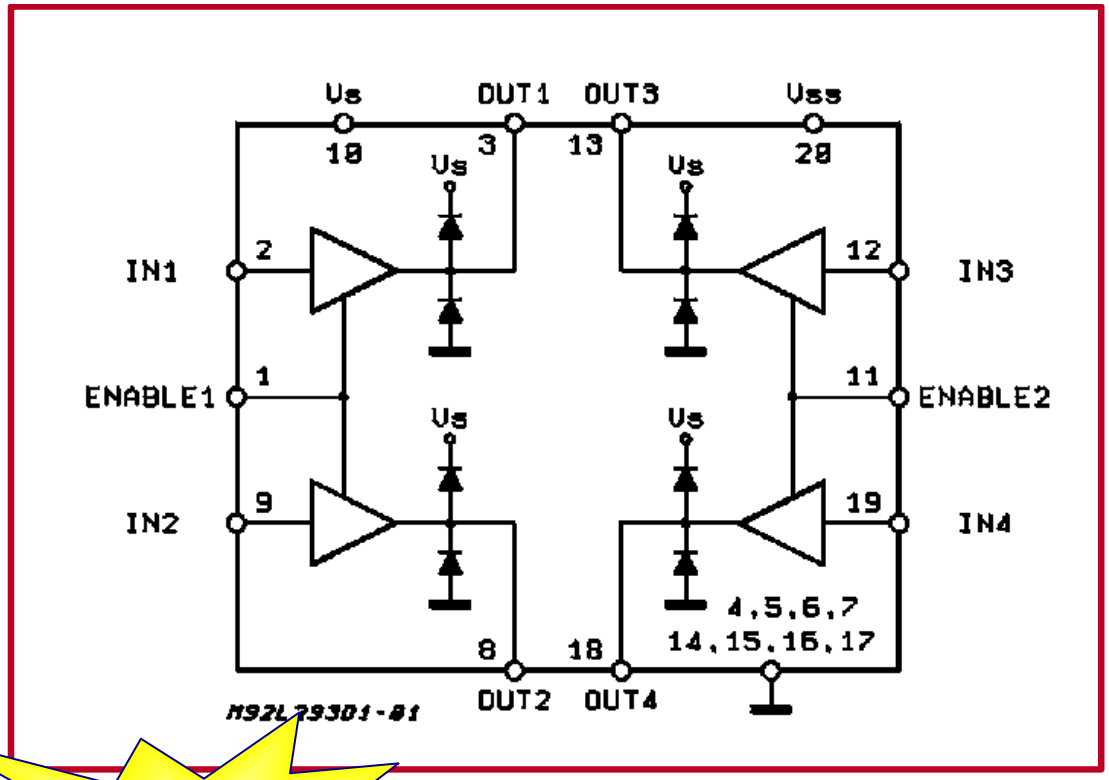
L2293Q Main Features

- Supply Voltage rating 2.8V - 36V
- Output Peak Current 1.2A (0.6A DC)
- Vcesat = 1.8Vmax @0.6A
- Operating Frequency up to 50KHz
- Thermal Shut Down
- TTL Compatible Inputs
- Internal Clamp Diodes

Packages

- QFN 5x5x1 – 32 L





NEW !!!

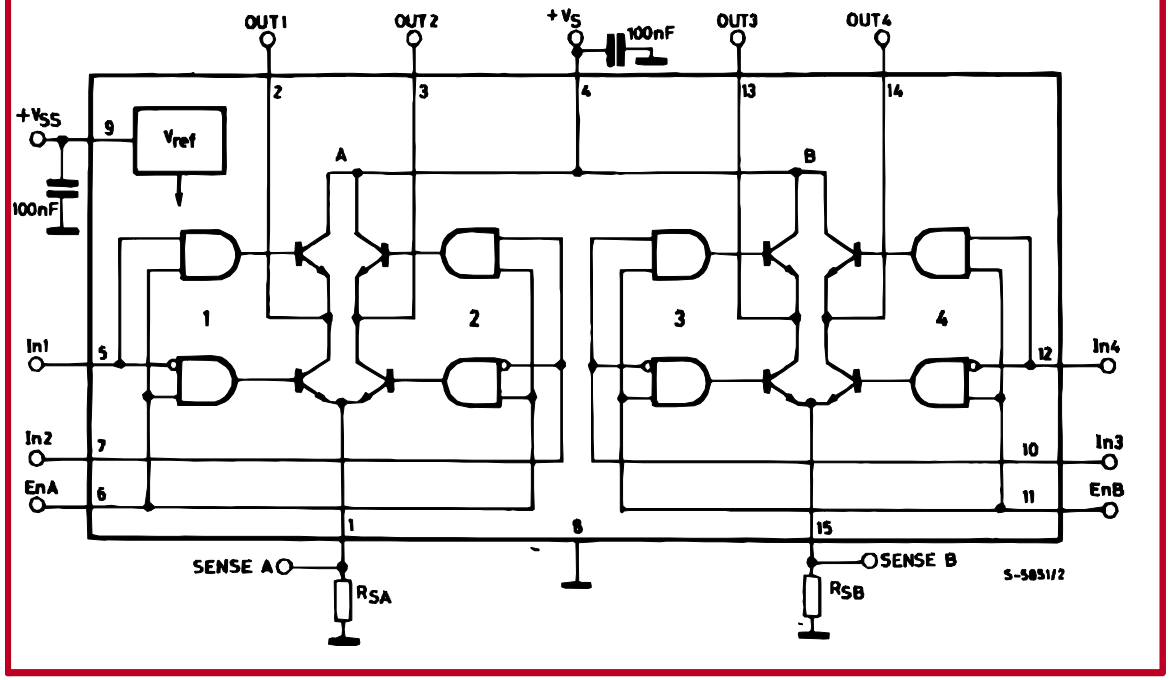
L298 – Bipolar Dual Full Bridge

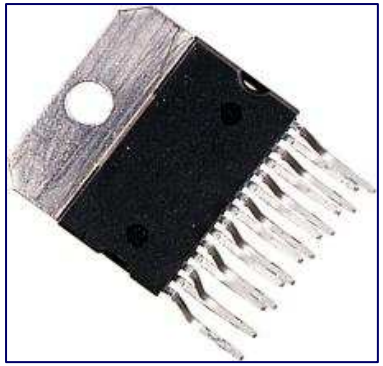
L298 Main Features

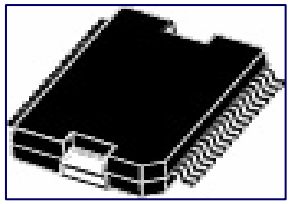
- Supply Voltage up to 46V
- Output Peak Current 3A (2A DC)
- Vcesat = 3.7Vmax @2A/25°C
- Cross Conduction Protection
- Thermal Shut Down
- TTL Compatible Inputs

Packages

- MultiWatt15 Vert. (L298N)
- MultiWatt15 Horiz. (L298HN)
- PowerSO20 (L298P)



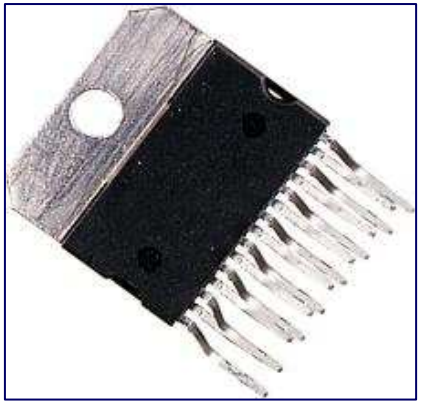


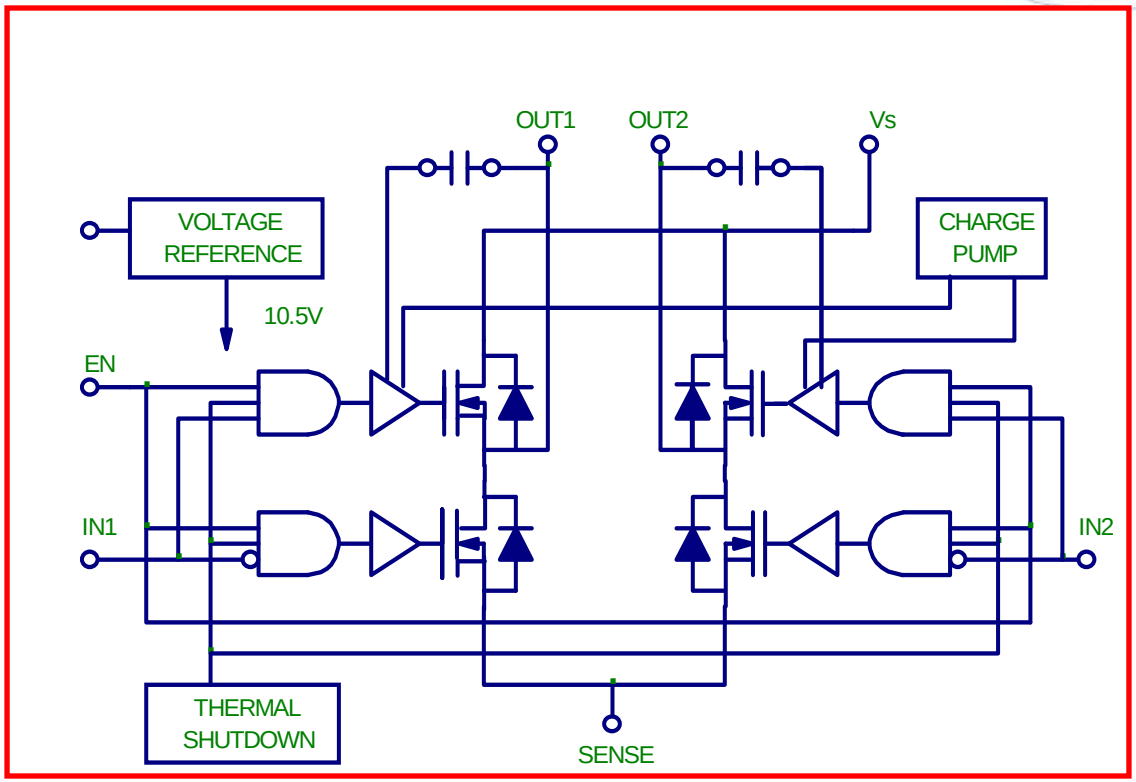


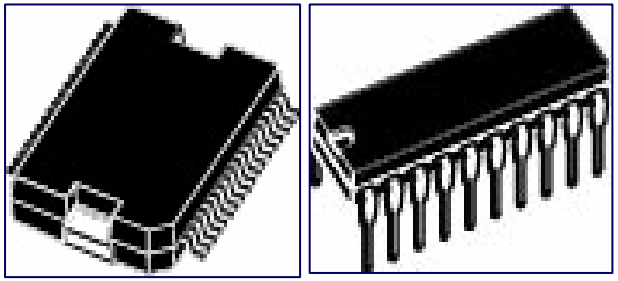
L6201/L6202/L6203 DMOS Full Bridge

Key Features

- Up to 46 V supply
- 5A Peak current
- R_{DSON} 0.3Ω
- Cross conduction protection
- Thermal shutdown
- Internal charge pump





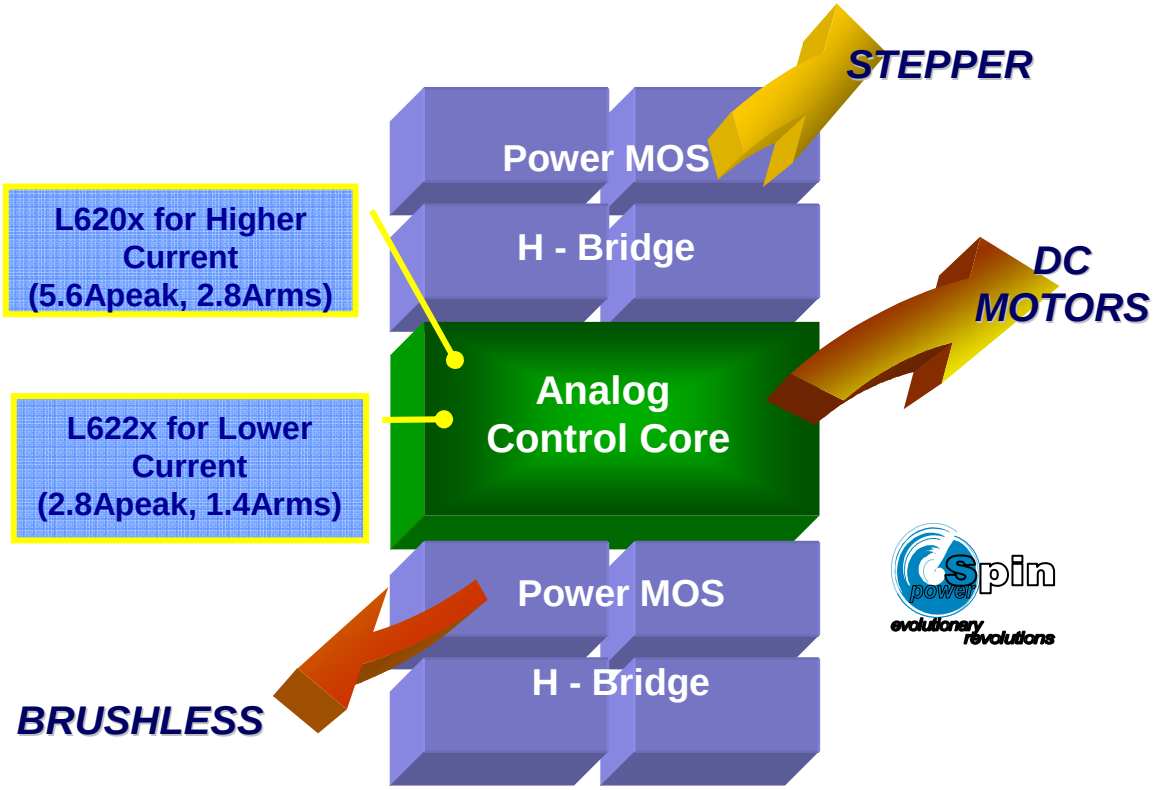


2x L6201/02/03 are needed to drive a Bipolar Stepper motor

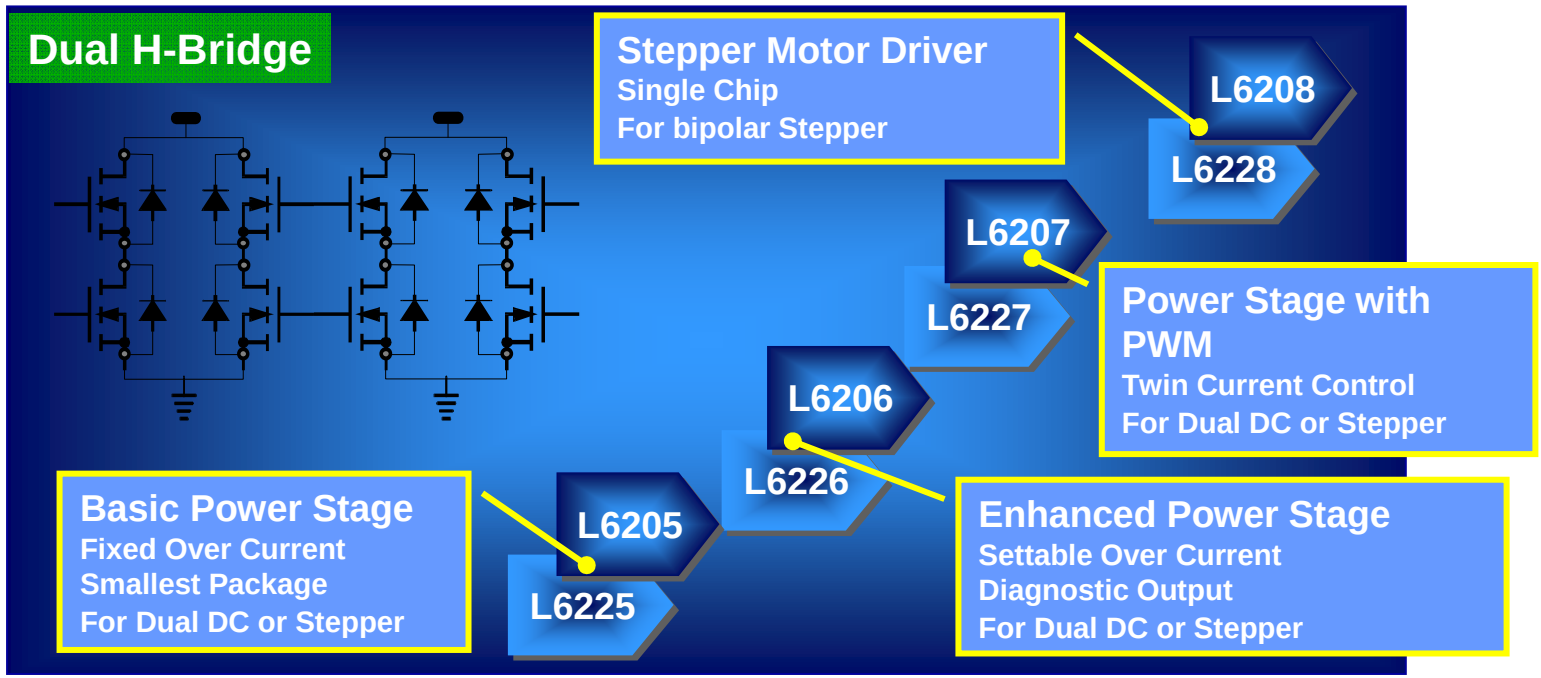
Power SPIN

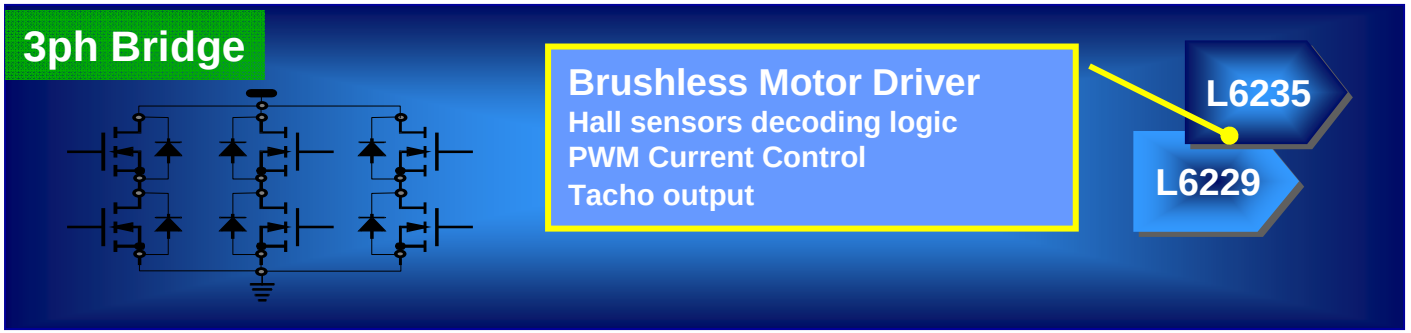
- Operating Supply Voltage from *8 to 52V*
- PowerMOS output stage**:**
  - $R_{ds(on)}$ = 0.3Ω or 0.73Ω
  - *Intrinsic Fast Free Wheeling Diodes* L622X: 2.8Apk and 1.4Arms
- Two product classes covering different current ratings**:**
  - L620X and L6235: 5.6Apk and 2.8Arms
  - L622X: 2.8Apk and 1.4 A rms
  - *Paralleled Operation doubles peak and rms ratings!*
- Extensive Protection Schemes
  - Non-Dissipative High Side Current Sensing for *Over Current Protection*
  - Cross Conduction Protection
  - *Thermal Protection*
  - Under Voltage Lock Out
- CMOS/TTL Inputs
- Operating Frequency up to 100KHz

a motor driver platform ready for mass customization



Power SPIN family portrait





Power Spin selection table

Function	P/N 1.4Arms	P/N 2.8Arms	Description	Packages
Three phase brushless motor driver	L6229	L6235	Hall sensor decoding logic, PWM current loop, diagnostic output, fixed overcurrent detection	PowerSO36 SO24 - DIP24
Bipolar Stepper Motor Driver	L6228	L6208	Stepping sequence generation logic, twin PWM current loop, diagnostic output, fixed overcurrent detection	PowerSO36 SO24 - DIP24 QFN32
Dual H Bridge with twin PWM control	L6227	L6207	Twin PWM current loop, diagnostic output, fixed overcurrent detection	PowerSO36 SO24 - DIP24 QFN32
Dual H Bridge with adjustable overcurrent detection	L6226	L6206	Diagnostic output, adjustable overcurrent detection	PowerSO36 SO24 - DIP24 QFN32
Dual H Bridge with fixed overcurrent detection	L6225	L6205	Fixed overcurrent detection	PowerSO20 SO20 - DIP20

Common Features:

- BCDIIIs, 1um, 60 V Mixed signal power technology
- Operating Supply Voltage from 8 to 52V
- PowerMOS output stage:
  - **typical Rds(on) = 0.3ohm or 0.73ohm @ Tj = 25 ℃**
  - **Intrinsic Fast Free Wheeling Diodes**

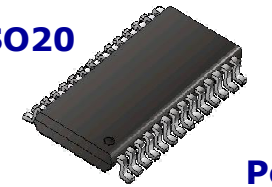
Fully protected Dual H-Bridge: L6205/6225

Main Features:

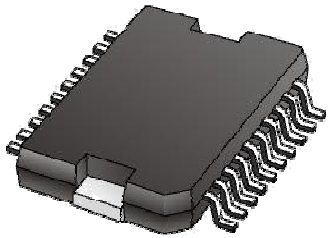
- Operative Voltage: 7V - 52V
- Output Peak Current 5.6A / 2.8A*
- Operating Frequency up to 100KHz
- Cross conduction protection
- Fixed (5.6A/2.8A*) Over Current trip point
- Thermal Shut down

- Aimed at dual DC / Bipolar Stepper

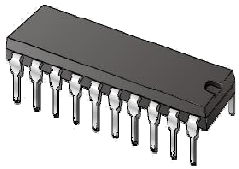
SO20

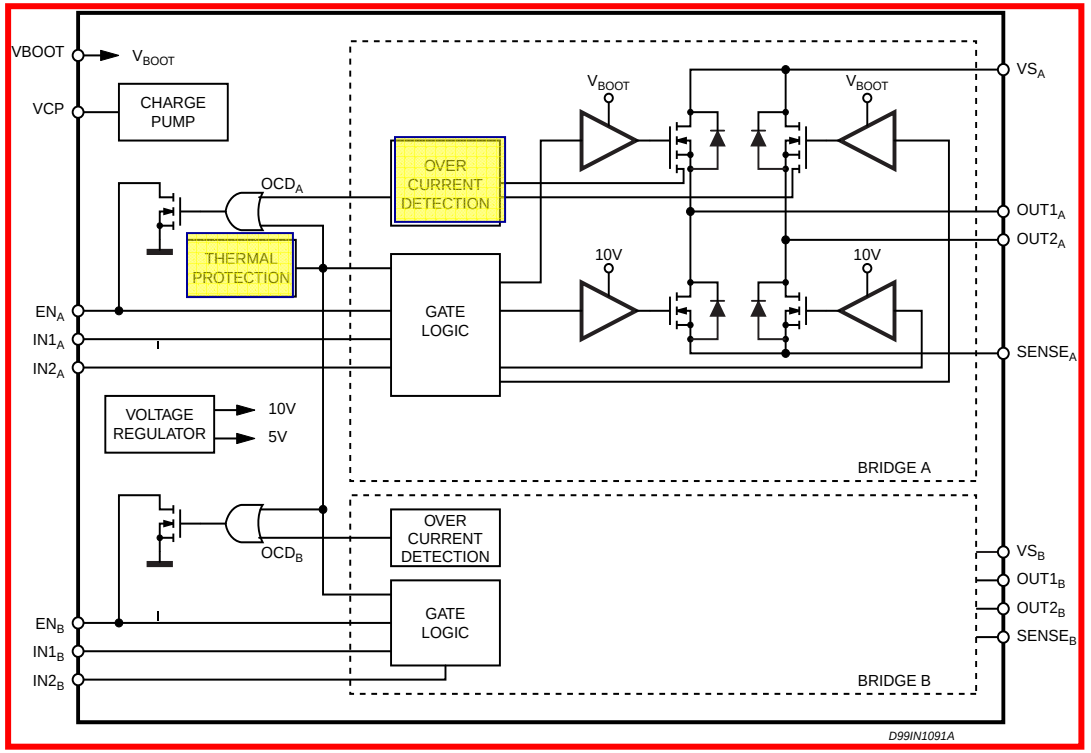


PowerSO20

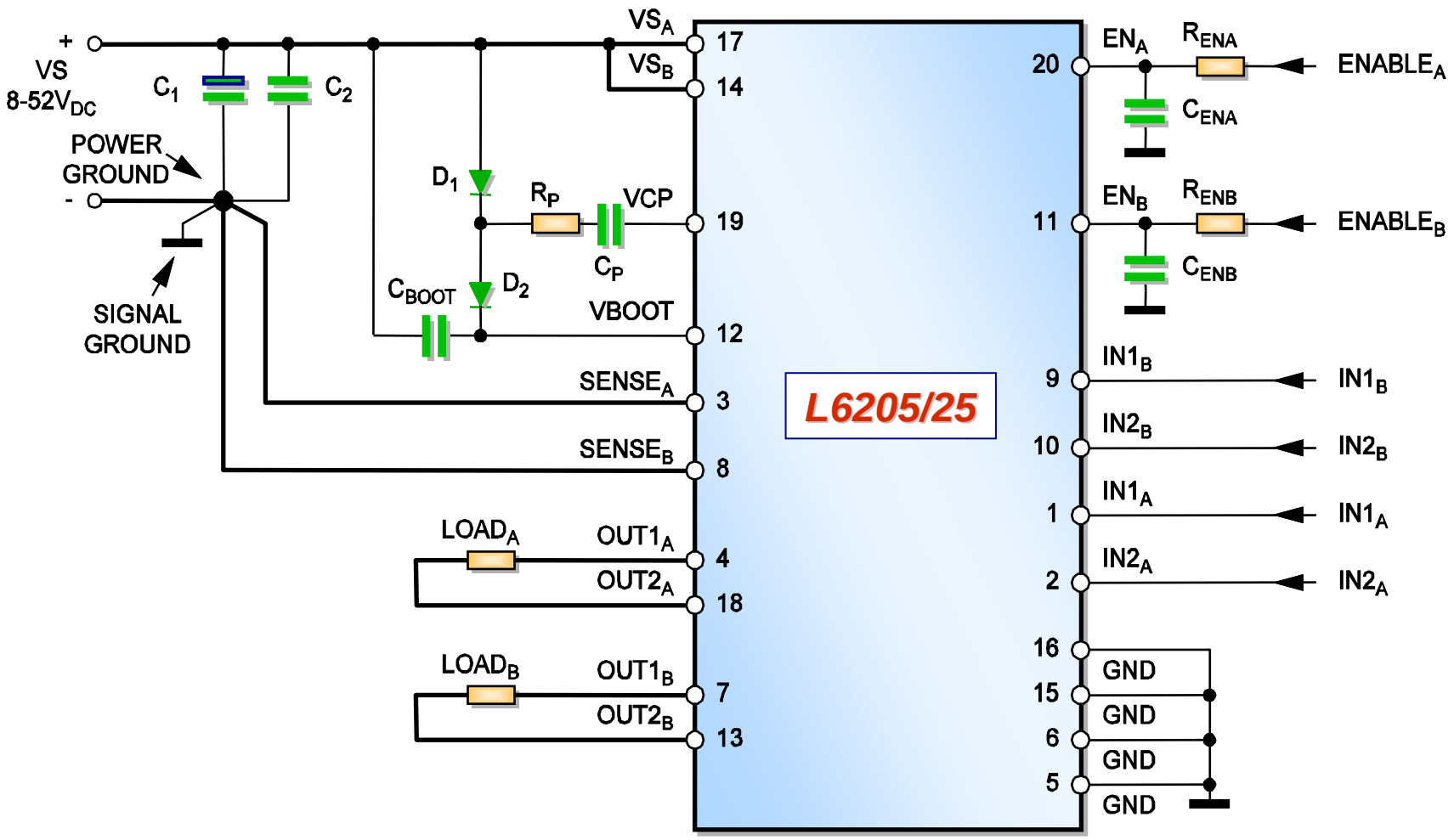


DIP20





Fully protected dual H-bridge: L6205/25



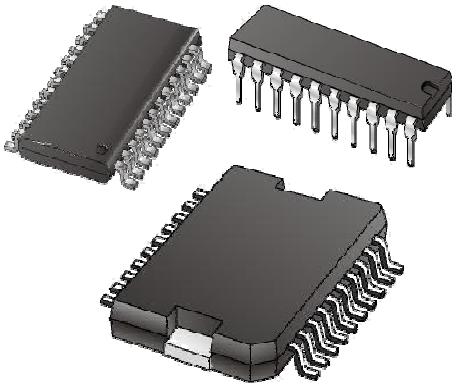
…with an external OCD setting, here's L6206 and L6226

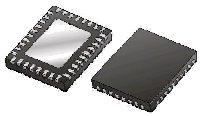
Main Features:

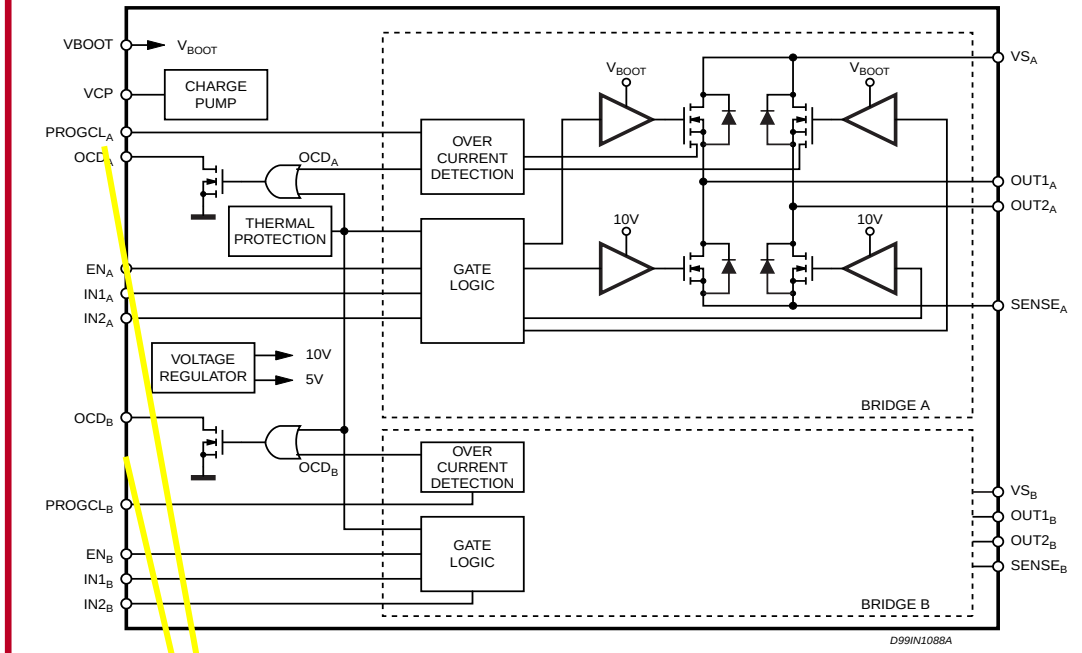
- Supply Voltage rating 7V - 52V
- Output Peak Current 5.6A (2.8A)*
- Rdson = 0.3Ω (0.73Ω)* typ
- Operating Frequency up to 100KHz
- Cross conduction protection
- Settable Over Current Threshold
- Thermal Shut down

Application

- Dual or quad DC Motors
- Bipolar Stepper Motors
- High Current DC Motor





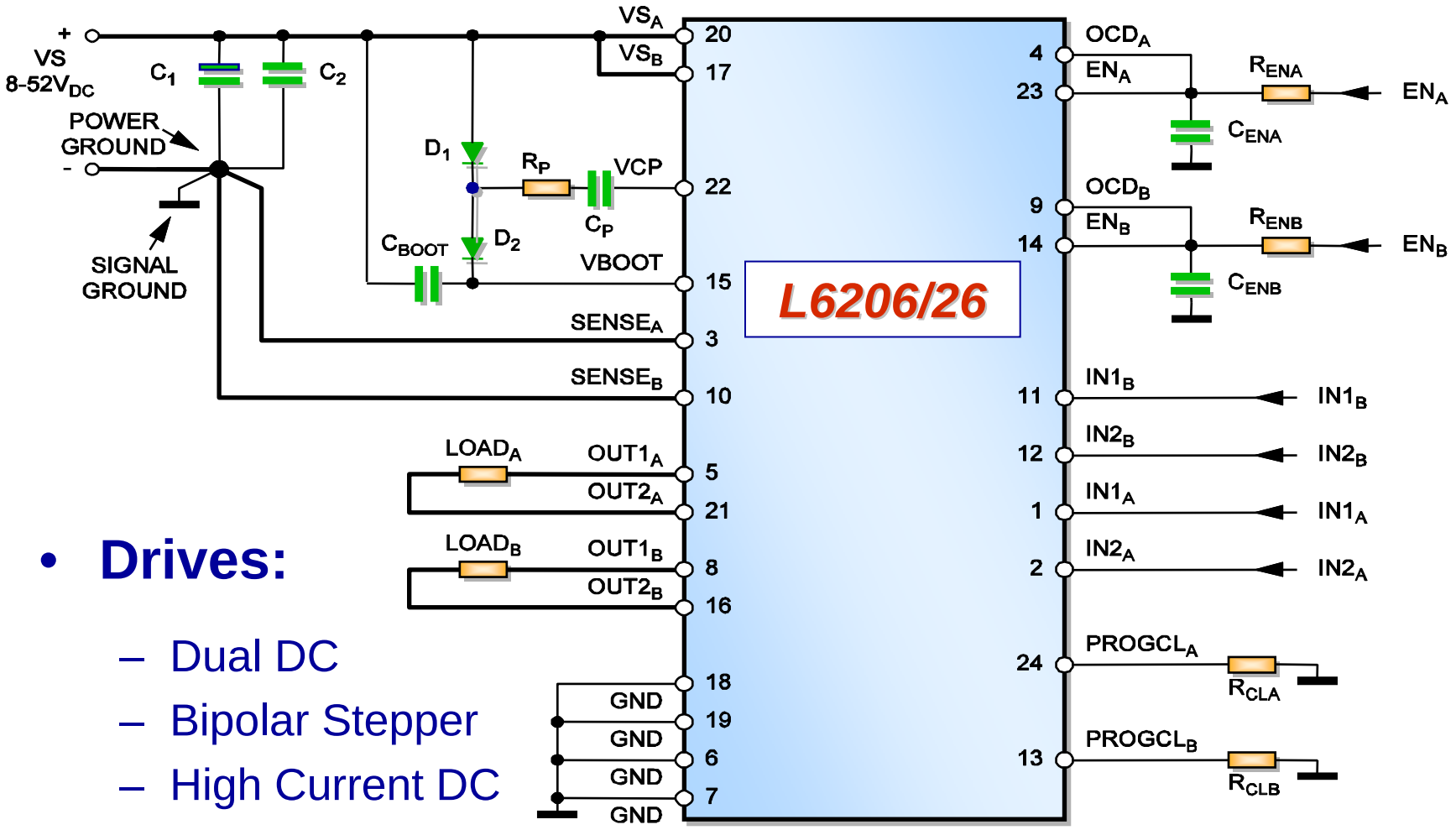


Externally Adjustable Over Current trip point

Diagnostic Output

New *L6226Q* !!!

Typical application with L6206/26

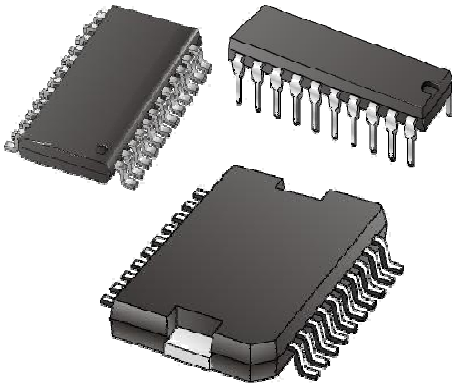


- **Drives:**
  - Dual DC
  - Bipolar Stepper
  - High Current DC

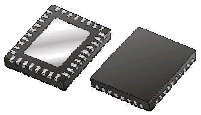
...then add a twin PWM control to get L6207 and L6227*

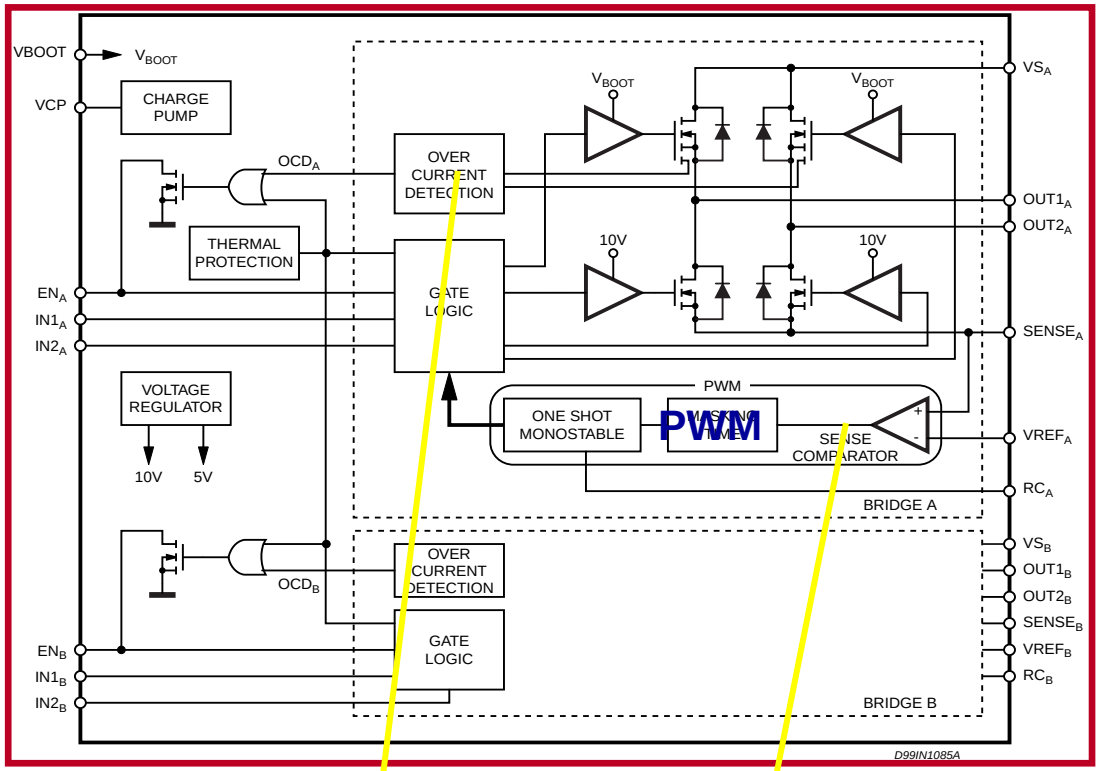
Main Features

- Supply Voltage rating 7V - 52V
- Output Peak Current 5.6A (2.8A)*
- Rdson = 0.3Ω (0.73Ω)* typ
- Operating Frequency up to 100KHz
- Twin integrated PWM for chopping regulation
- Cross conduction protection
- Thermal Shut down



New *L6227Q* !!!

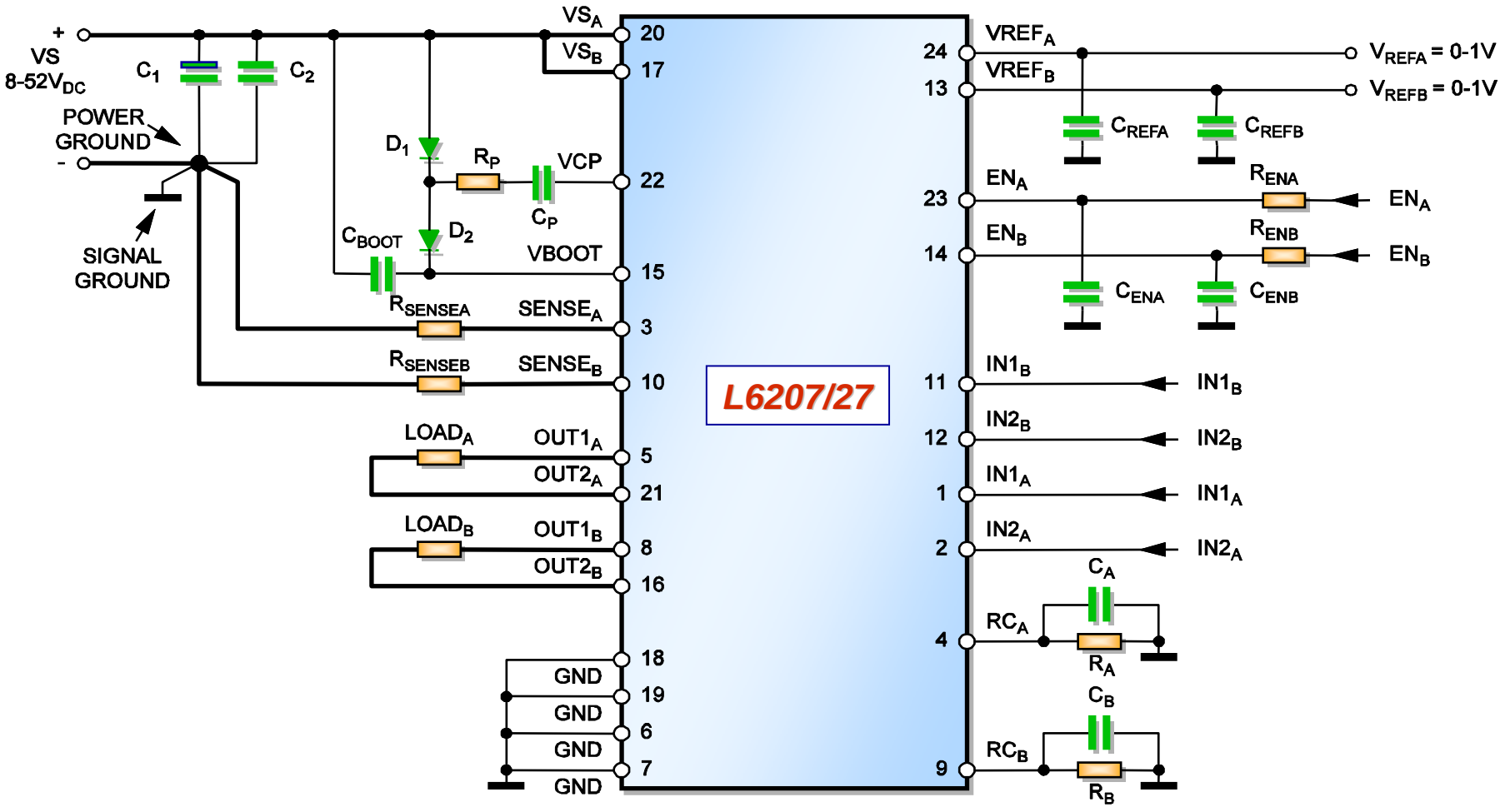




Fixed Over Current

Twin integrated PWM current controller

…twin PWM control: L6207 and L6227



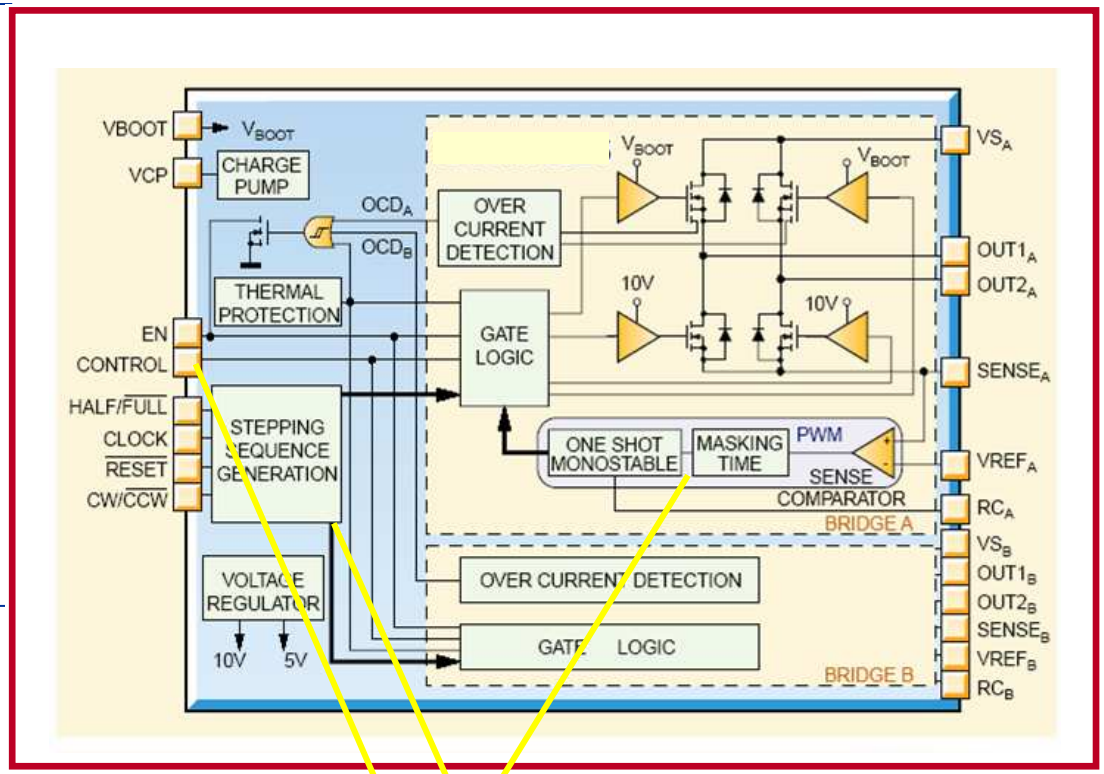
L6208 & L6228* – DMOS stepper motor driver!!!

L6228Q Main Features

- Supply Voltage rating 7V - 52V
- Output Peak Current 5.6A (2.8A)*
- Rdson = 0.3Ω (0.73Ω)* typ
- Operating Frequency up to 100KHz
- Internal PWM current control
- Cross conduction protection
- Thermal Shut down
- Non dissipativeOver Current protection
- Traslator integrated
- Digital setting of decay mode

Packages

- SO24, DIP24, powerSO36
- QFN 5x5x1 – 32 L



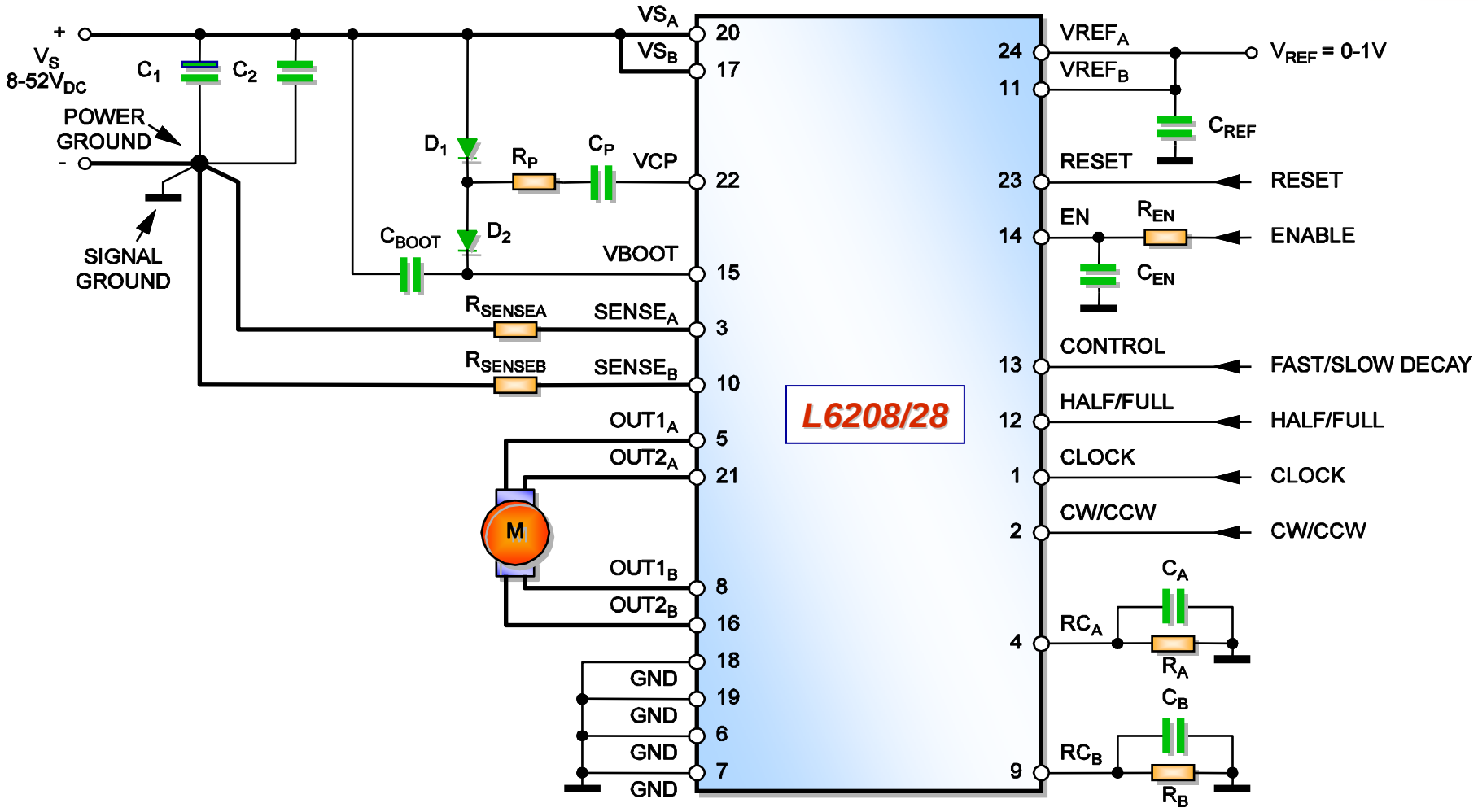
Twin integrated PWM current controller

Integrated Translator

Digital decay mode setting

New *L6228Q* !!!

Stepper Motor Driver Complete Solution: L6208/L62



Current Ratings vs Package and configuration

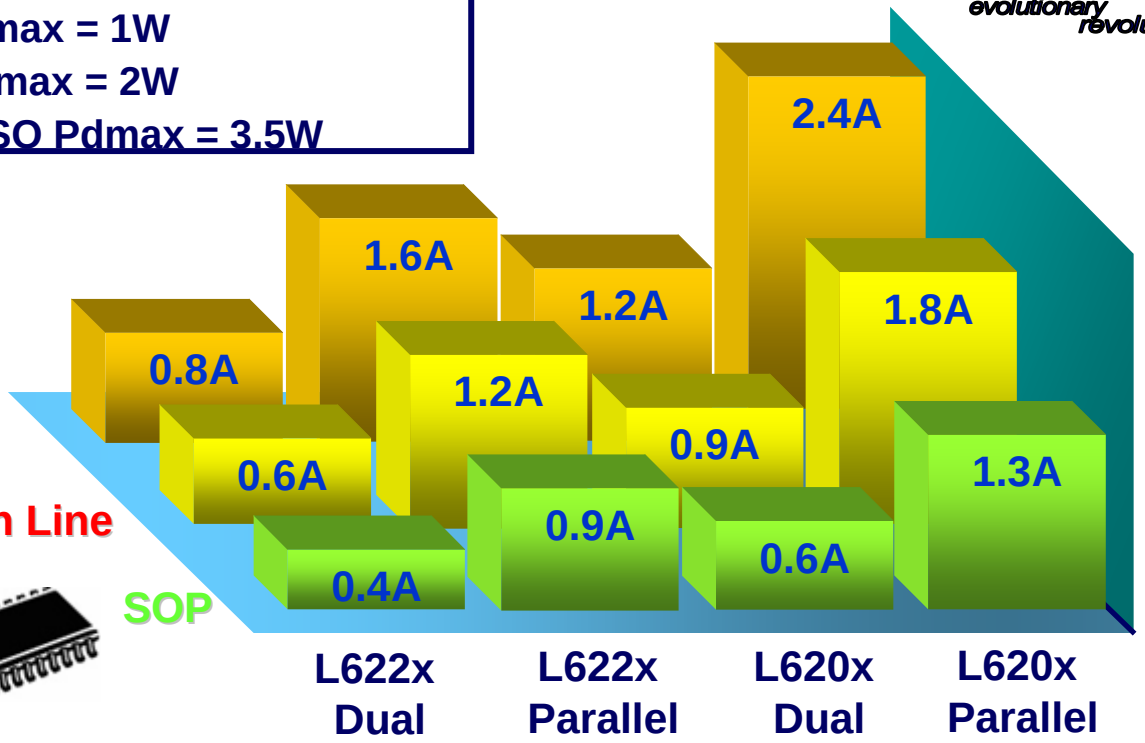
Assumptions

- Tj = 125C
- Vs = 24V
- Synchronous Rectification
- SO Pdmax = 1W
- DIP Pdmax = 2W
- PowerSO Pdmax = 3.5W

PowerSO

Dual In Line

SOP

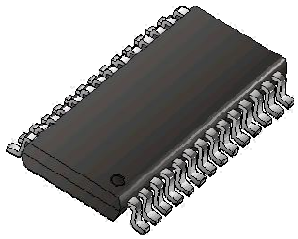


L622xQ: more (power) with less (space)

MINIATURIZATION / THERMAL PERFORMANCES

L622xD → **L622xQ**

SO24

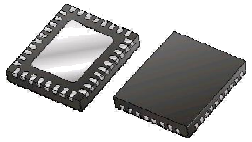


Footprint:

10.3 mm x 15.4mm

+ 50% Thermal Performance

QFN 5x5x1 – 32L



- 85% Footprint Area

VFQFP-N PACKAGE THERMAL COMPARISON

PACKAGE TYPE (pitch : 0.5mm)	Theta J-A
VFQFPN 32 (5x5)	**27.3°C/W**
powerDIP24	**36°C/W**
SO24	**60°C/W**
powerSO36	**18°C/W**

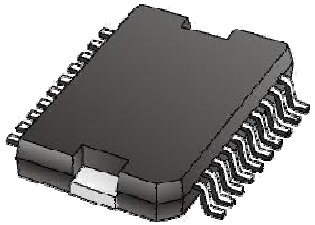
General DMOS Three-Phase Bridge: L6234

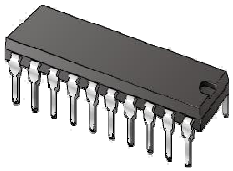
L6234 Main Features

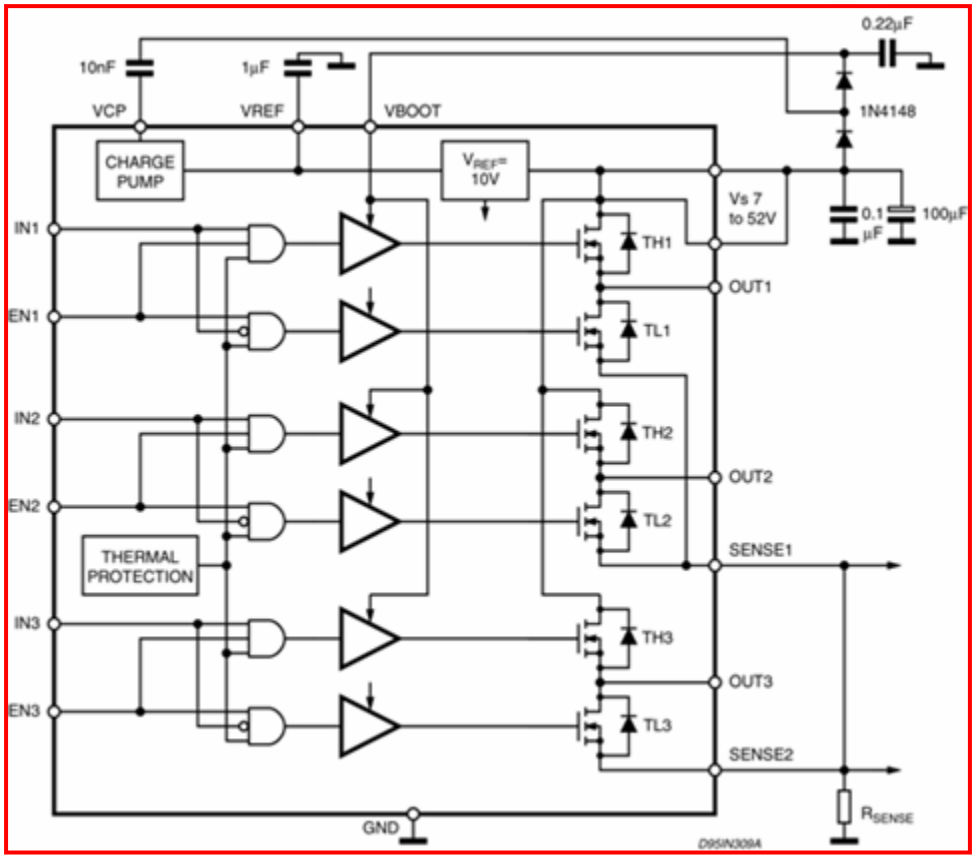
- Supply Voltage from 7 to 52V
- Output Peak Current 5A (2.8A DC)
- PowerMOS Typical
  $R_{DS(ON)}$=0.3Ω@T_J=25℃
- Operating Frequency up to 50KHz
- Cross Conduction Protection
- Thermal Shut Down
- CMOS/TTL Inputs
- Intrinsic Fast Free Wheeling Diodes
- Internal Logic Supply

Applications:

• BLDC 3 phases sensorless





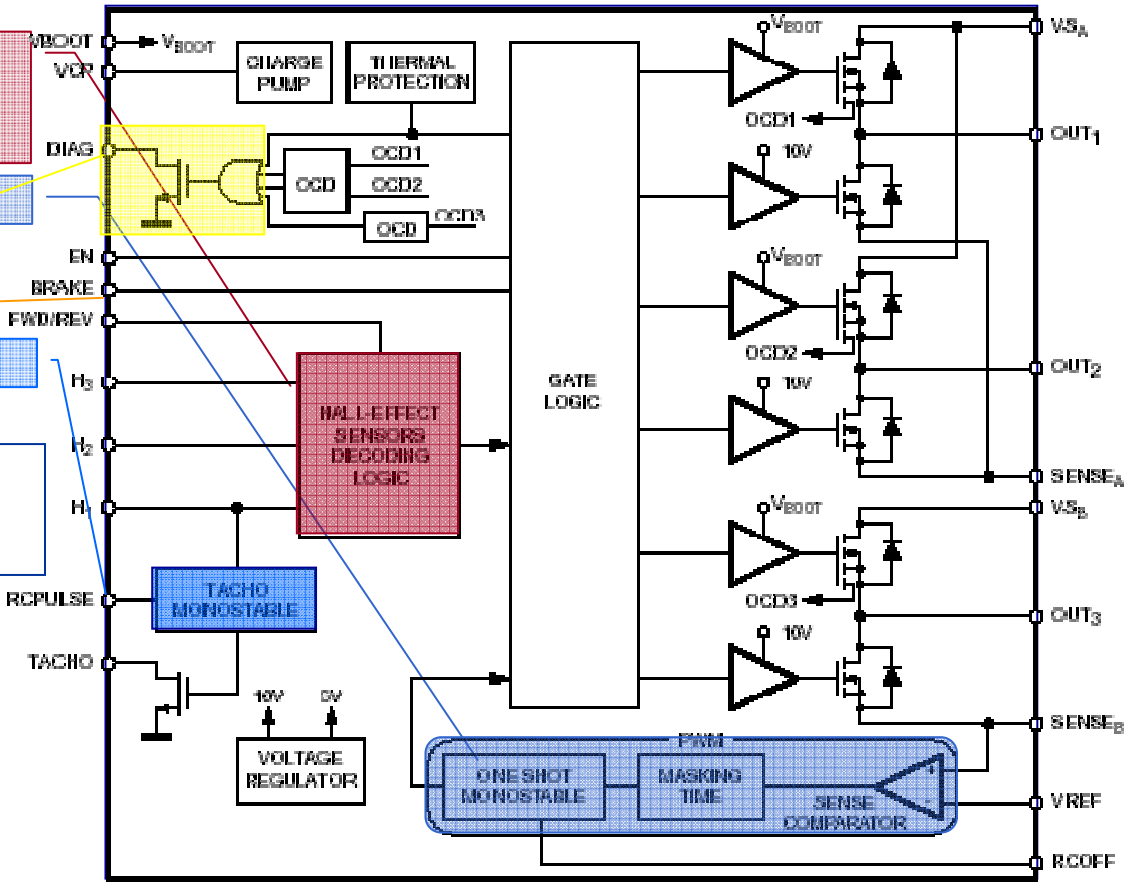


Complete BLDC Motor Driver Solutions: Fully Protected L6235 and L6229 Driver

- Integrated hall sensor decoding logic
  - 60 or 120 degrees
- Integrated PWM current control
- Diagnostic Output
- Simple Interface to host
- Tacho Output for Speed control

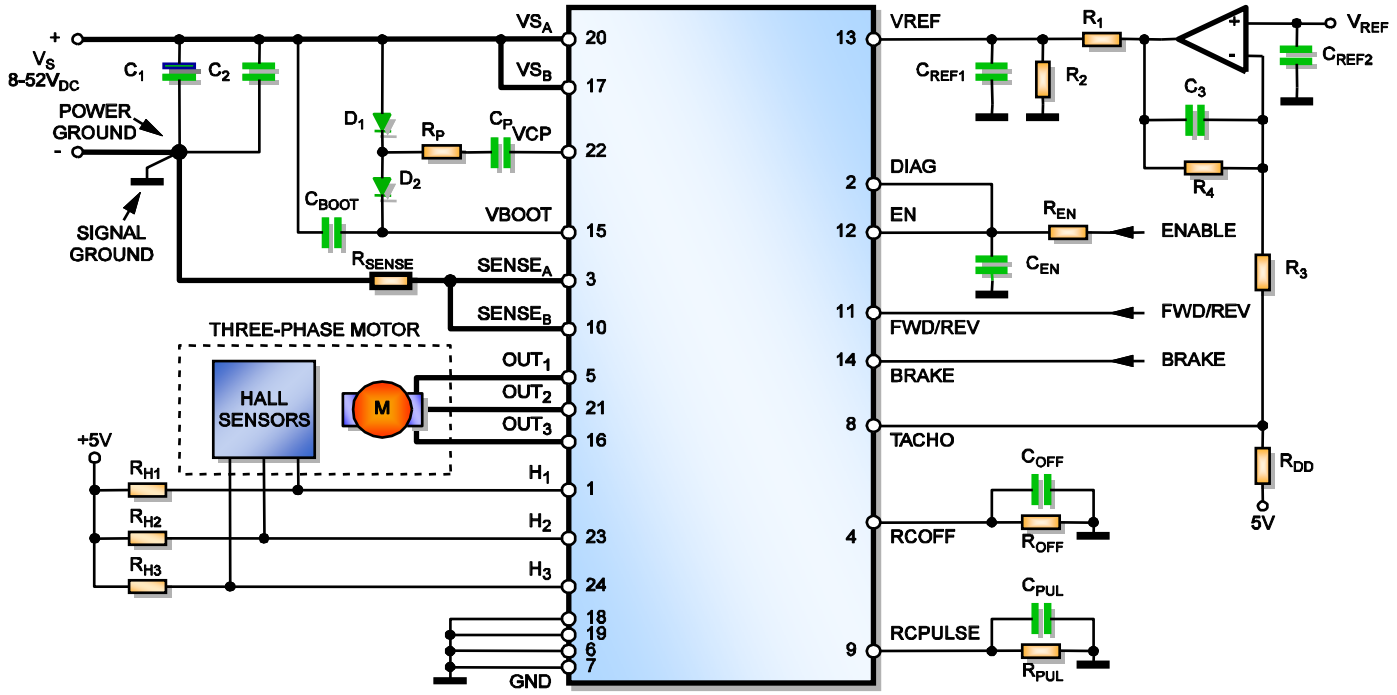
Applications:

- BLDC 3 phases with hall sensors



Typical Applications - L6235/29

- L6235/L6229 common main features
  - Internal PWM current Control
  - Thermal Protection
  - Overcurrent Protection
  - Power On Reset Circuit
  - Translator integrated
  - Slow Decay
  - Simple Interface to Host



L6235/29: current rating vs. package options

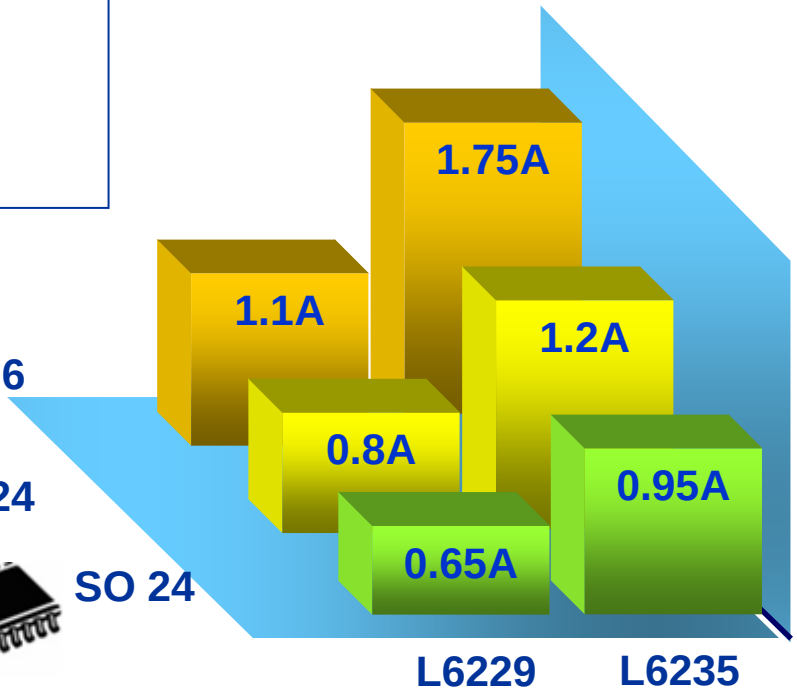
Assumptions

- **Tj = 125C**
- **Vs = 24V**
- **Switching Frequency Fs =20Khz**
- **SO Pdmax = 1.3 W**
- **DIP Pdmax = 1.9 W**
- **PowerSO Pdmax = 3.6 W**

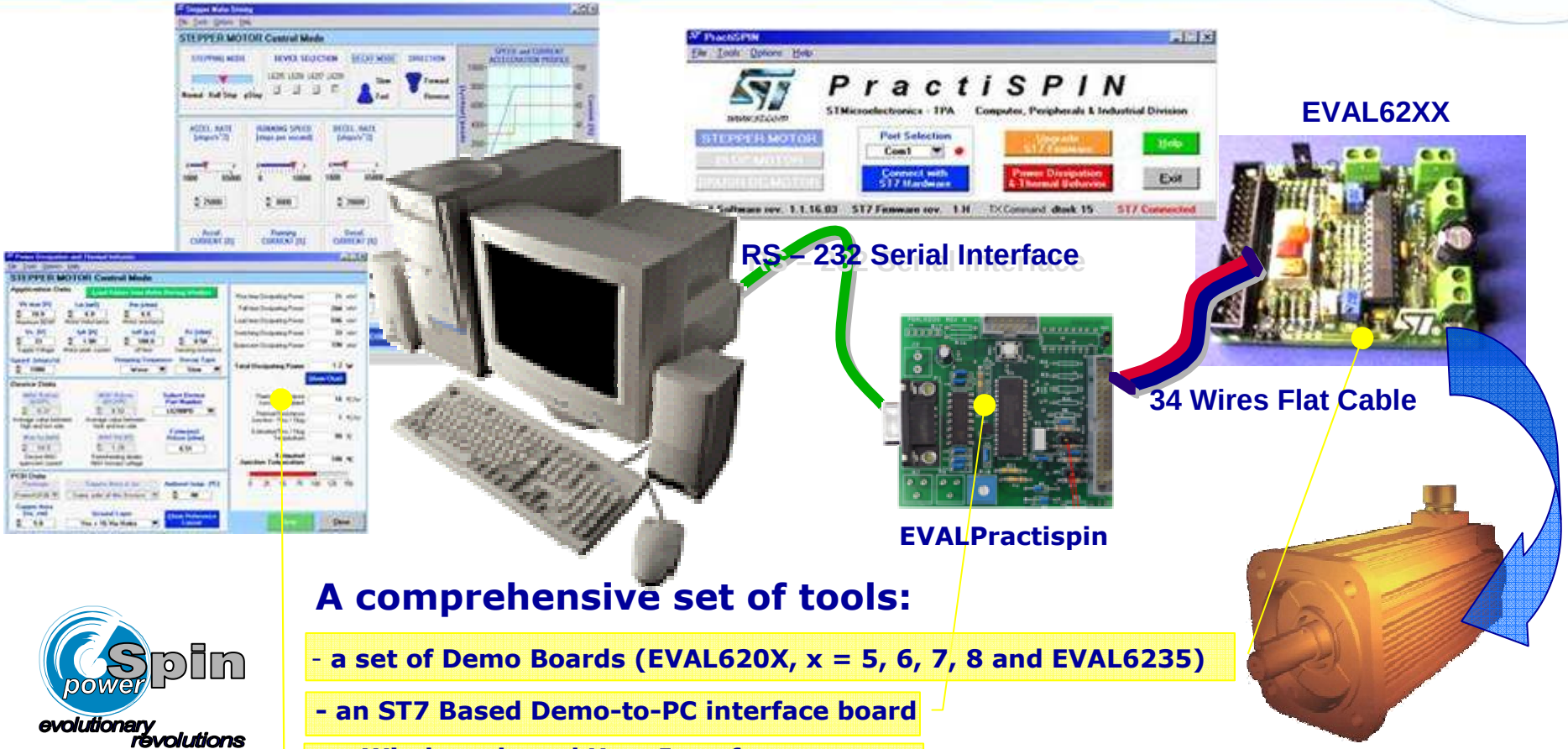
PowerSO36

DIP 24

SO 24



PractiSPIN: PowerSpin demotools architecture



A comprehensive set of tools:

- a set of Demo Boards (EVAL620X, x = 5, 6, 7, 8 and EVAL6235)
- an ST7 Based Demo-to-PC interface board
- a Windows based User Interface

Enabling user to:

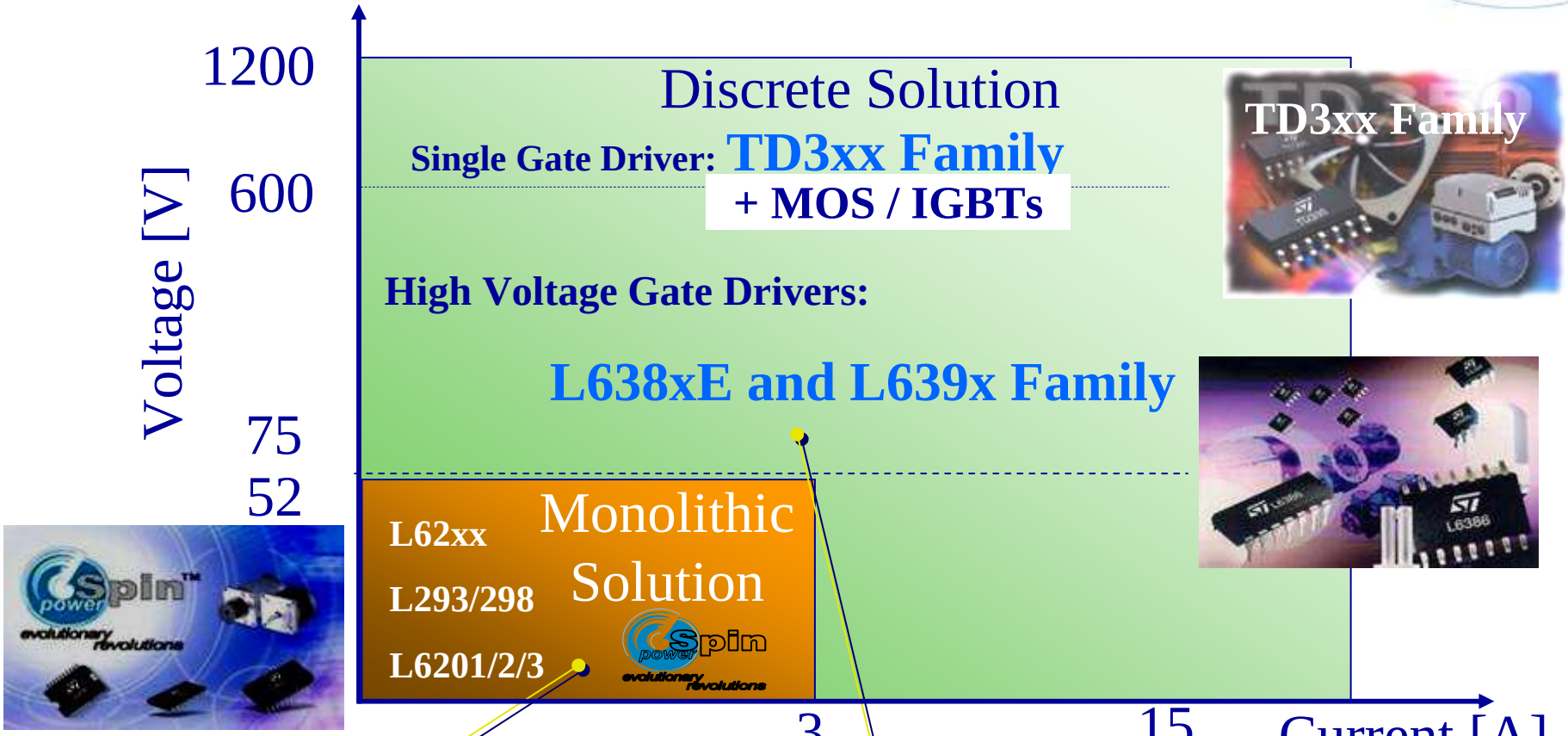
- establish plug –and –play connection to the motor for a rapid product evaluation
- first cut thermal analysis

High-Voltage Motor Control : Gate Drivers

MOTION CONTROL / THE POWER

- Motors overview
- Standard chip solution
  - Controllers
  - Integrated power stages
- Power spin
- **ST Gate drivers**
  - High voltage gate drivers L638x
  - TD35x Family: Advanced IGBT/Mosfet Driver for 1200V Applications
- Evaluation boards

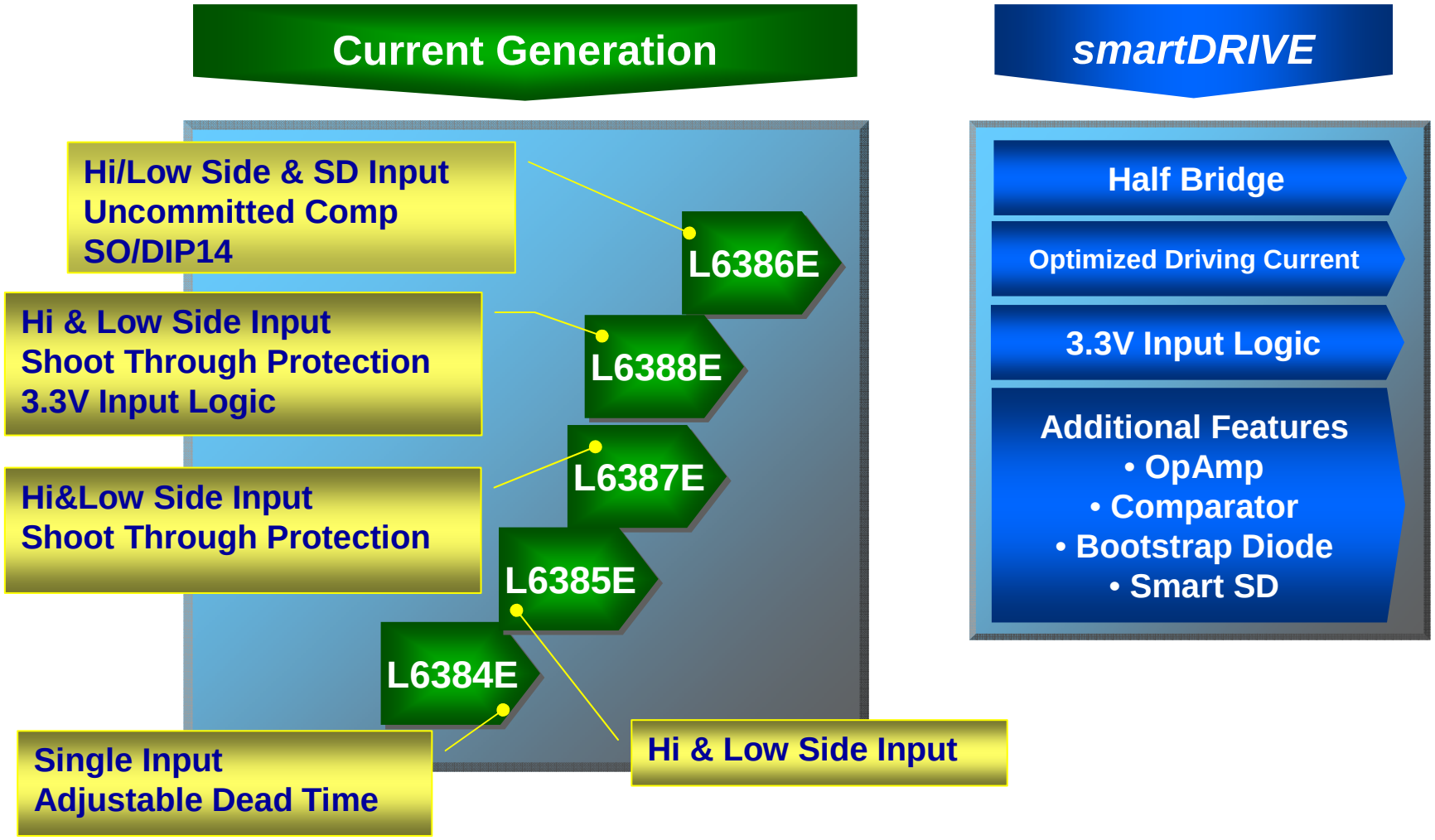
Monolithic and Discrete Approach



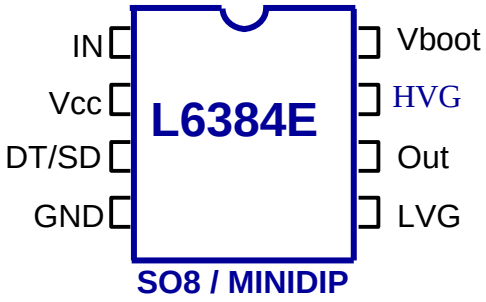
Factory automation, Home Automation
Office Automation: Printers, LBP
Industrial: Vending Machine, Money dispenser, POS
Toys, Consumer Applications, Medical

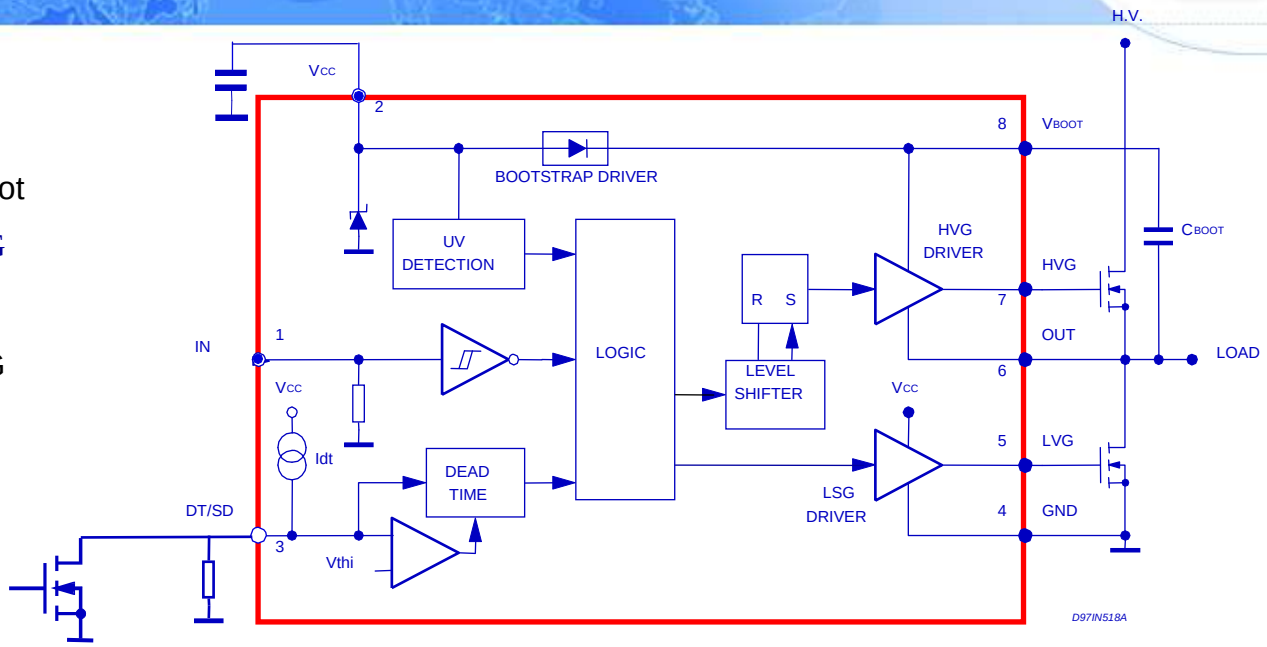
Climate Control, Fans
White goods
Vacuum cleaner, food processor
Pumps
Industrial Applications

High Voltage Gate Drivers Family



L6384E





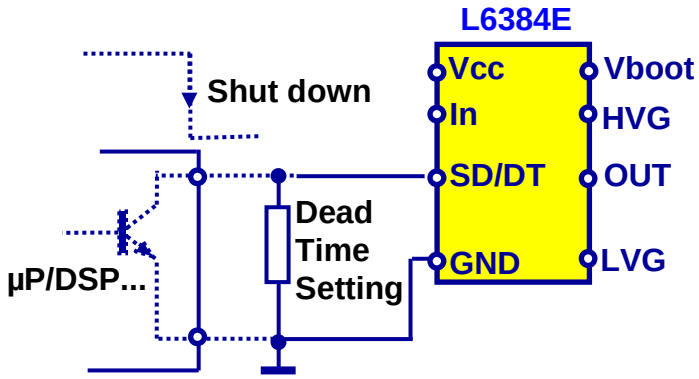
KEY FEATURES

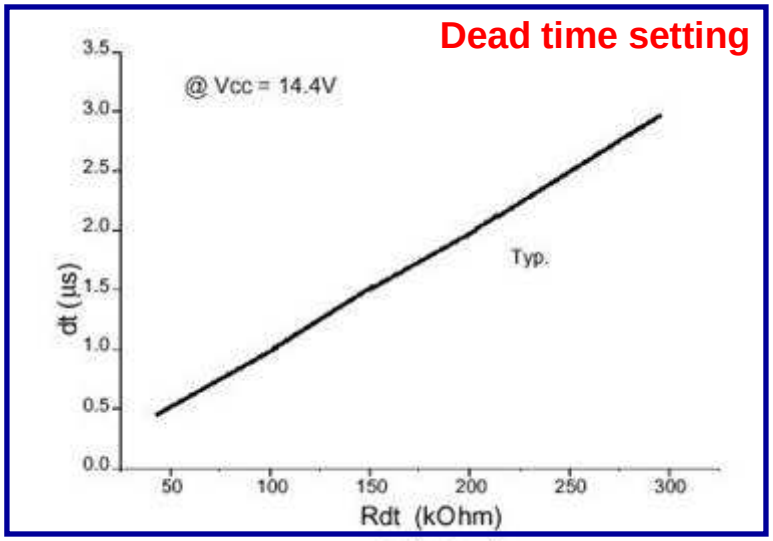
- **1 Logic input → 2 Outputs**
- **Input in phase with HVG, out of phase with LVG**
- **Adjustable Dead-Time / Shut Down input**
- **Inputs compatible to Vcc**
- **Vcc Under-voltage lock out (Turn-On@12V, Turn-Off@10V)**
- **Internal clamp on Vcc at 15.6V (typ)**

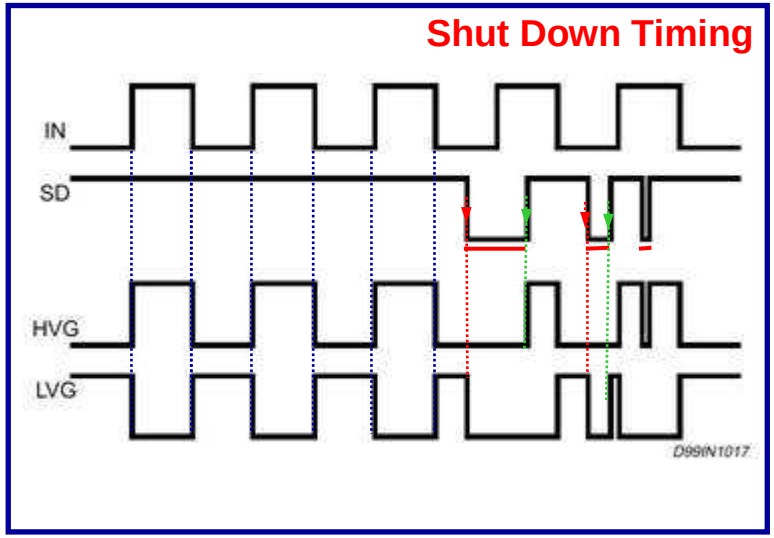
L6384E: Shut Down Functionality

- The L6384 SD/DT pin has a double function:
  1. dead time setting from 0.4 to 3.1 µs (resistor);
  2. Shut down functionality (SD/DT below 0.5V Typ.);

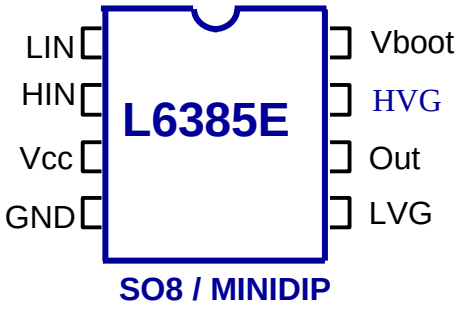
  The Shut Down propagation delay is 280ns max.;

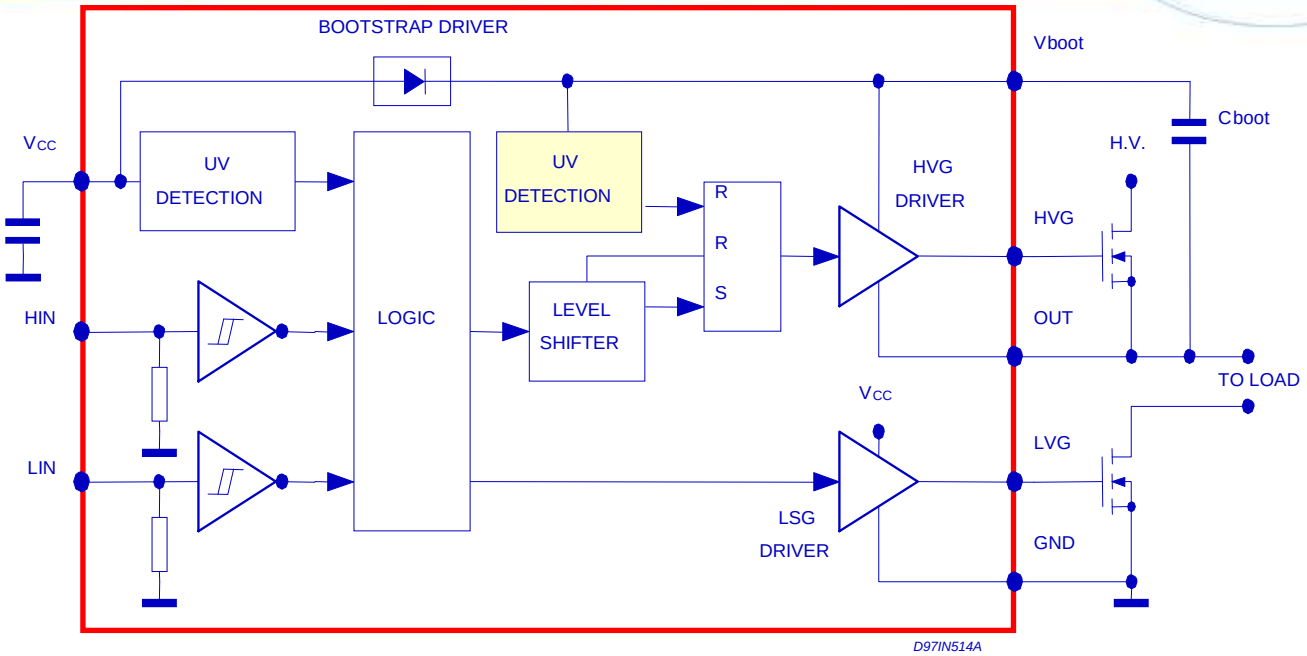






L6385E

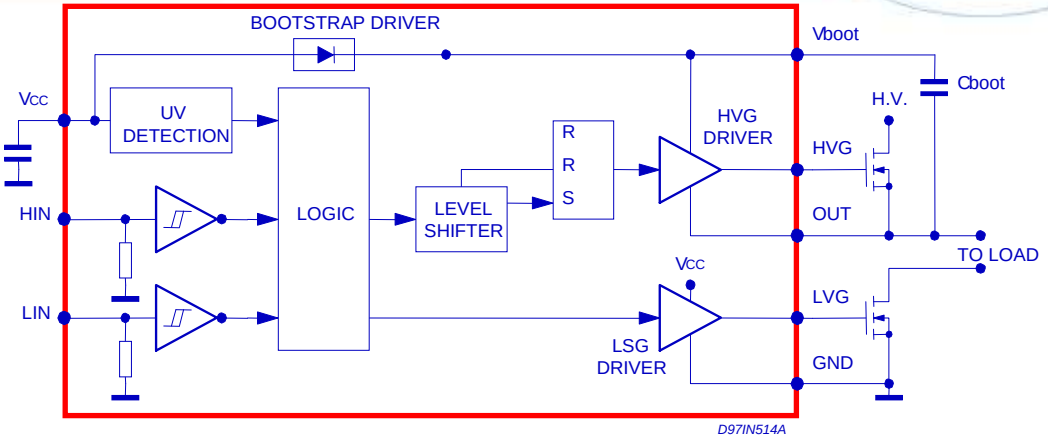




KEY FEATURES

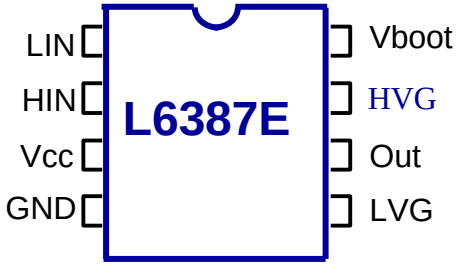
- **2 Logic input → 2 Outputs**
- **Logic Inputs in phase with the Outputs**
- **Under-voltage Lock-out on lower and Upper driving section**
- **Supply Voltage up to 17 V (Typ.)**

L6387E



- KEY FEATURES
- **2 Logic input → 2 Outputs**
- **Logic Inputs in phase with the Outputs**
- Cross-conduction prevention logic

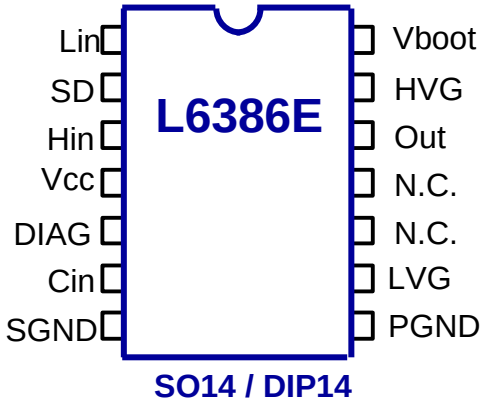
INPUT	**HIN**	0	0	1	1
	LIN	0	1	0	1
OUTPUT	**HVG**	0	0	1	0
	LVG	0	1	0	0



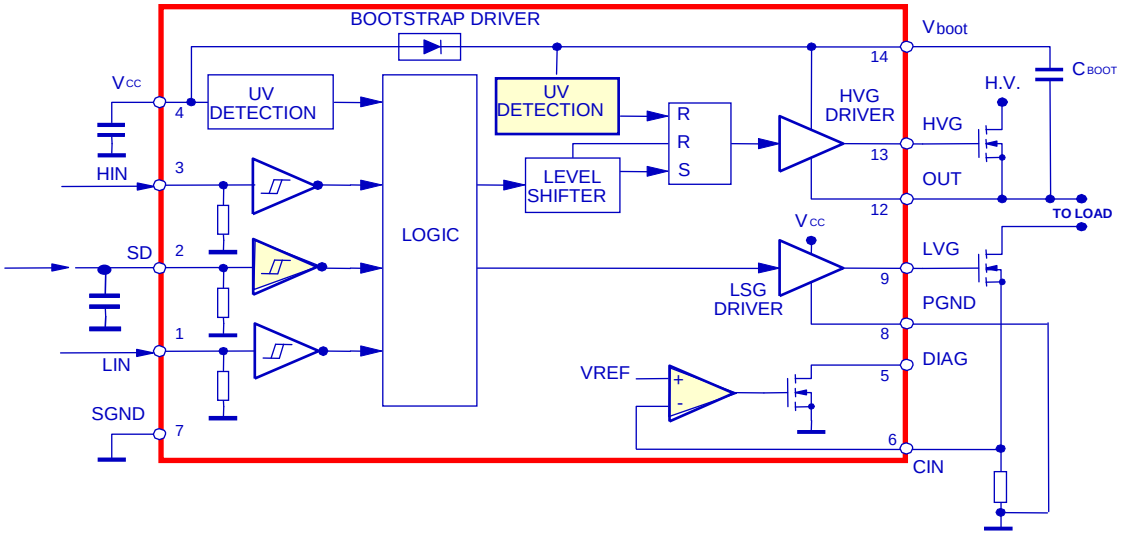
SO8 / MINIDIP

- **Supply voltage up to 17 V (typ.)**
- **Vcc Under-voltage lock-out (Turn-On@6V, Turn-Off@5.5V)**

L6386E



SO14 / DIP14



KEY FEATURES

- **2 Logic input → 2 Outputs**
- **Logic Inputs in phase with the Outputs**
- **Shut-Down input**
- **Built-in comparator**
- **Signal and Power Ground**
- **Under-voltage Lock-out on**
- **Lower and Upper driving section**
- **Supply voltage up to 17 V (typ.)**

L6386E :SD Feature/DIAG pin

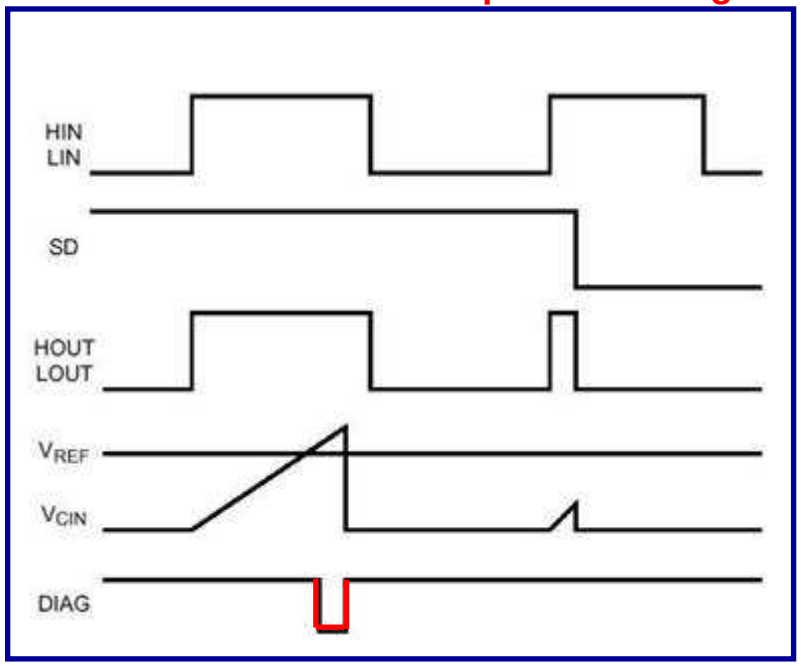
The L6386 has a **fast Shut Down logic input**

(propagation delay **150ns** max.)

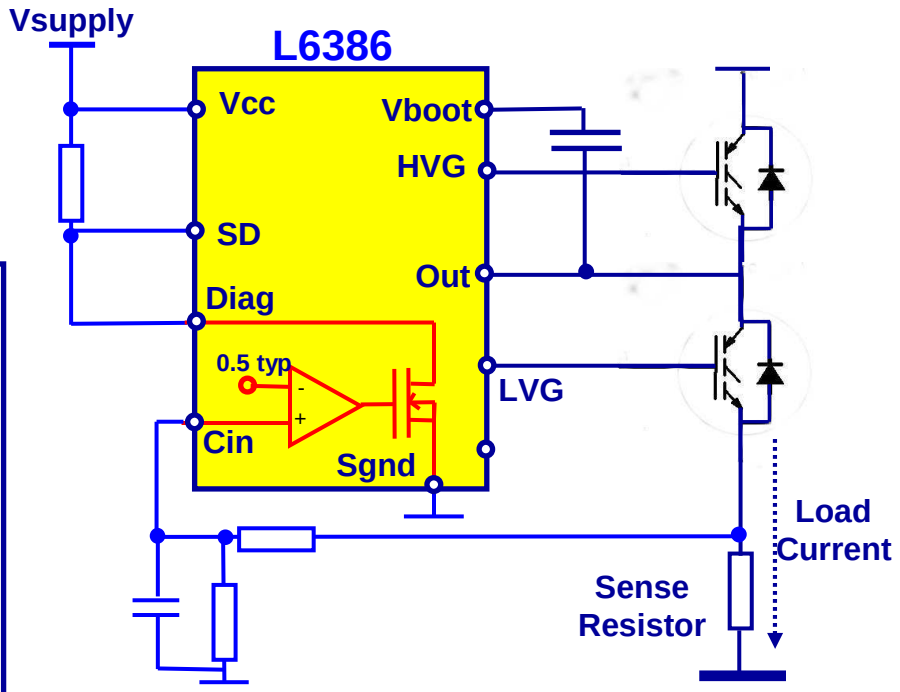
This pin can be used in a double way:

1. Together with the DIAG pin
2. With an external uC/DSP/Logic…

DIAG PIN: Built-in comparator timing



Overcurrent protection using the SD/DIAG pin



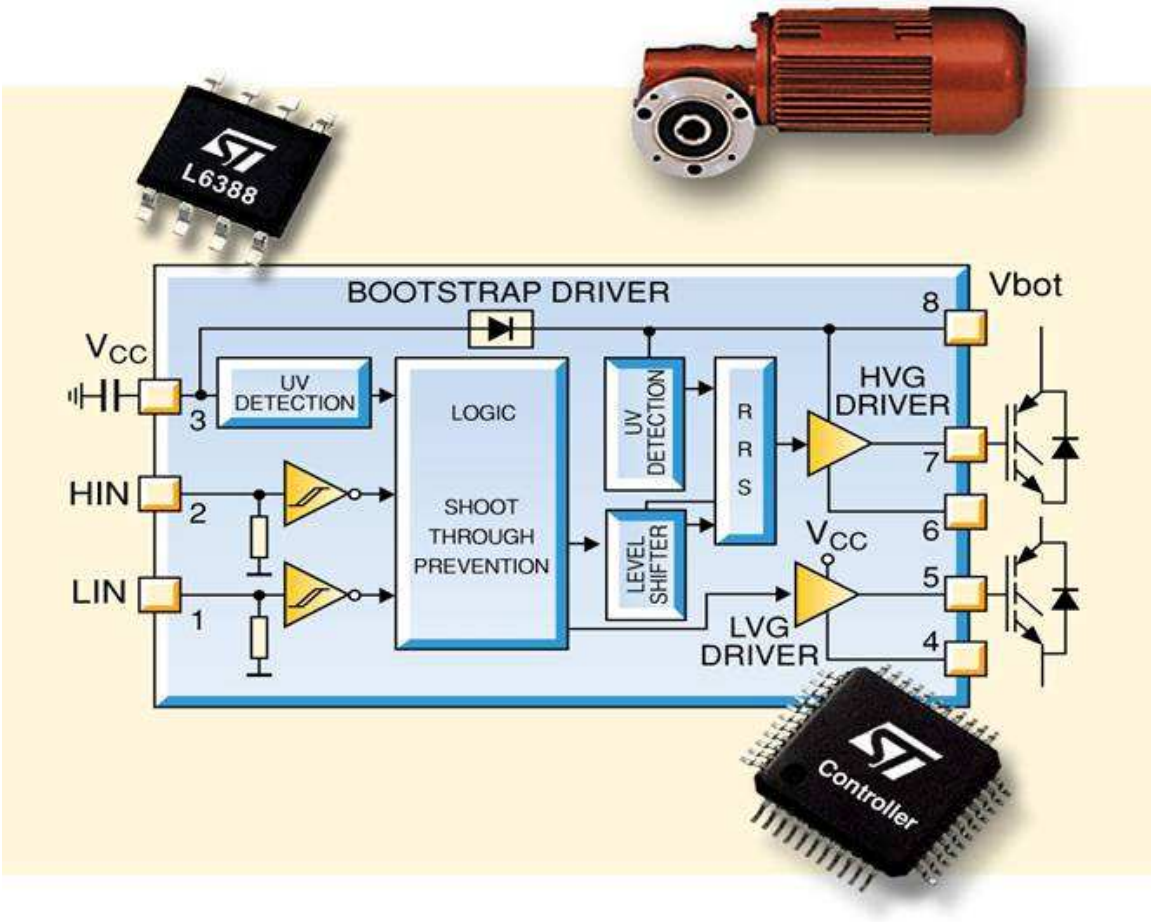
DIAG pin (pin 5) current capability:

DIAG pin is "open collector" and the pull down capability is up to 2.5mA. (Suggested values for the Pull up Resistor are 5kΩ-10kΩ)

L6388E

KEY FEATURES

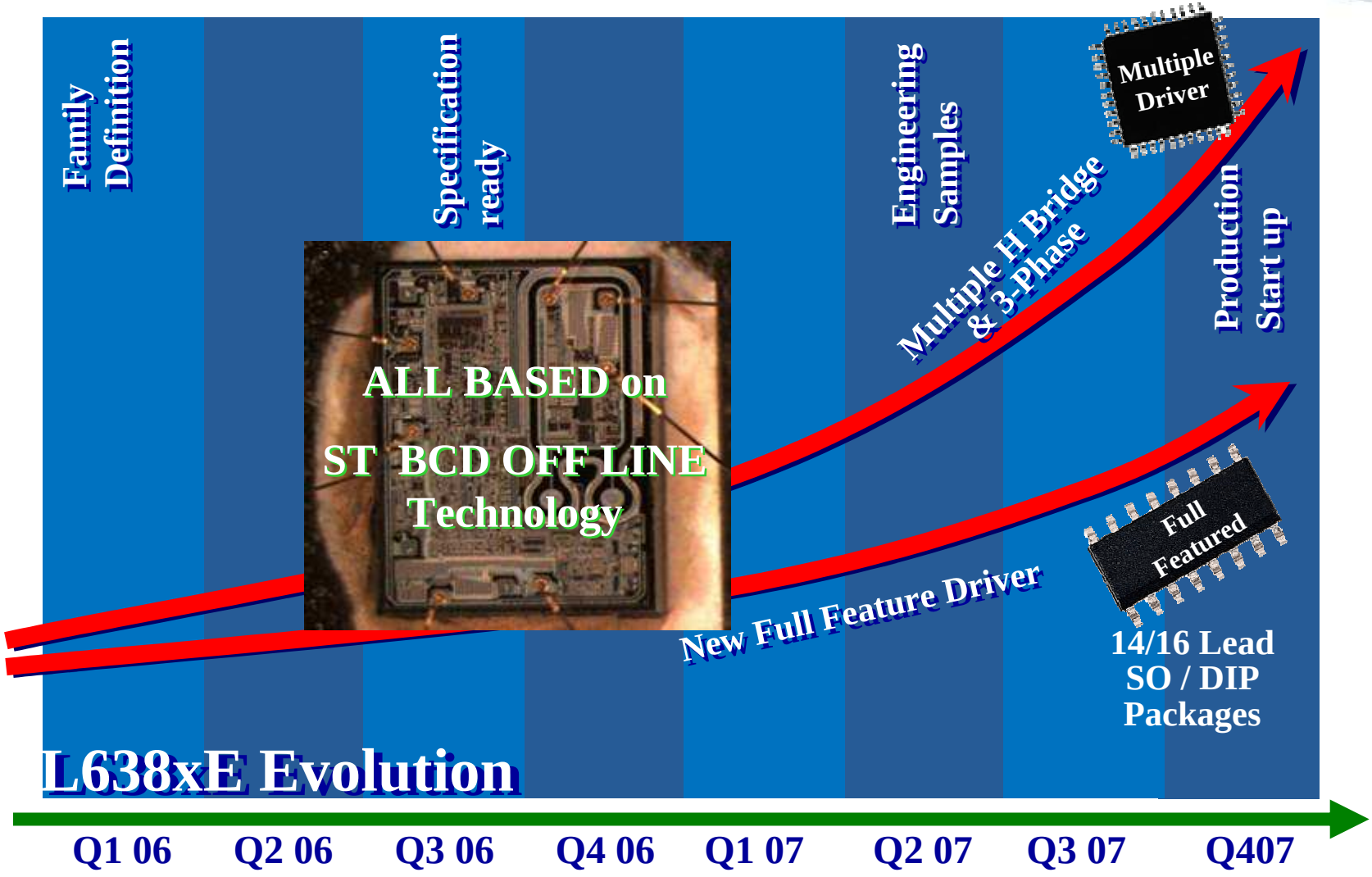
- **2 Logic input → 2 Outputs**
- **3.3V Compatible Inputs**
- Cross-conduction prevention logic
- **Logic Inputs in phase with the Outputs**
- **Under-voltage Lock-out on lower and Upper driving section**
- **Supply Voltage up to 17 V (Typ.)**



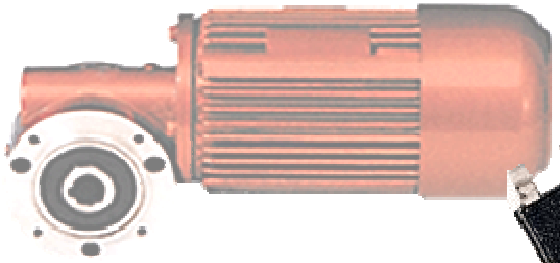
L638XE Short Form

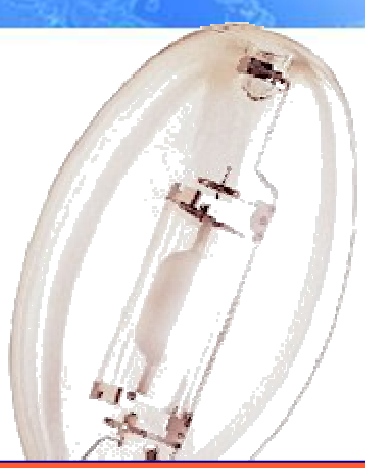
	L6384E	L6385E	L6386E	L6387E	L6388E
Asymm. H.B	No	Yes	Yes	No	No
Symm. H.B	Yes	Yes	Yes	Yes	Yes
Shut Down	Yes	No	Yes	No	No
Built in Comp.	No	No	Yes	No	No
UVLO on Vcc	Yes Turn-On: 12V Turn-Off: 10V	Yes Turn-On: 9.6V Turn-Off: 8.3V	Yes Turn-On: 12V Turn-Off: 10V	Yes Turn-On: 6V Turn-Off: 5.5V	Yes Turn-On: 9.6V Turn-Off: 8.3V
UVLO On Vboot	No	Yes Turn-On: 9.5V Turn-Off: 8.2V	Yes Turn-On: 11.9V Turn-Off: 9.9V	No	Yes Turn-On: 9.5V Turn-Off: 8.2V

smartDRIVE: HV gate driver evolution



L639x: the smartDRIVE





Power Supply

Interface

Control

DIGITAL CONTROL

smartDRIVE

High Voltage GATE DRIVER

PROTECTIONS

FULL FEATURES

FEEDBACK

SENSE

Power Stage

- Power MOSFETs
- IGBT

smartDRIVE L639x
A Flexible Platform for Mass Customization

Wide Block Diagrams Spectrum in the Library

UVLO on HS
3 different Thresholds

Dead Time
Fixed or Adjustable

Shut Down
Fast Shut Down Block

UVLO on LS
3 different Thresholds

High Side Driver
Current Capability:
290/430 Sink/Source

Low Side Driver
Current Capability:
290/430 Sink/Source

Interlocking
for Cross Conduction Prevention

OPAMP
12MHz 3.8V/µs
offset < 6mV

Comparator
> 10 V/µs

Bootstrap Diode

smartDRIVE Platform Features

KEY FEATURES

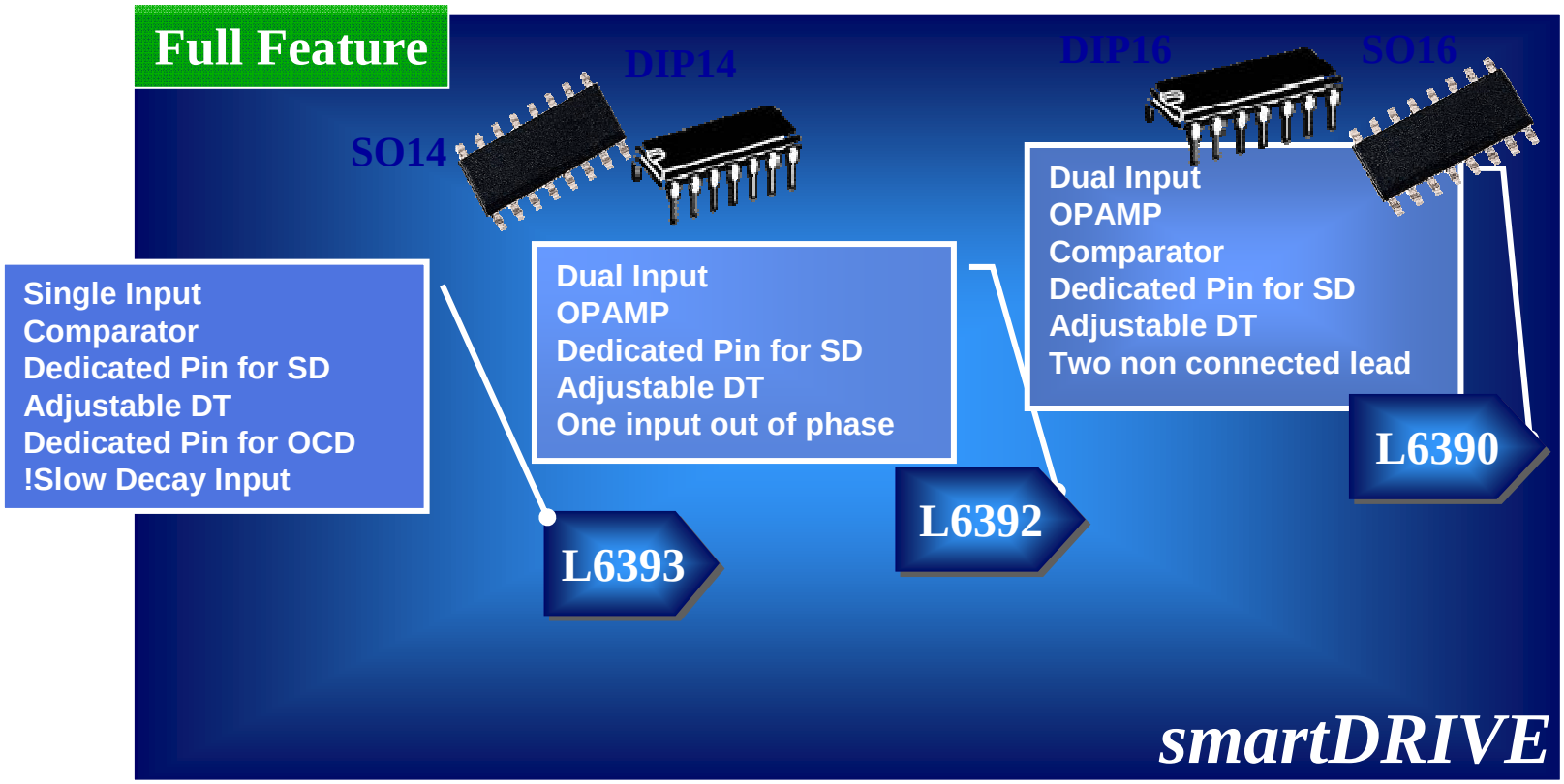
- **Current capability - 290mA source / 430mA sink**
- **Integrated bootstrap diode**
- **TTL/CMOS/ 3.3V, 5V, 15V inputs with hysteresis and pull-down**
- **UVLO on Both Low- and High-Side**
- **SO14/DIP14, SO16/Dip16**
- Operational Amplifier for advanced current sensing
- Comparator **(for protections)**

ST ADVANTAGE

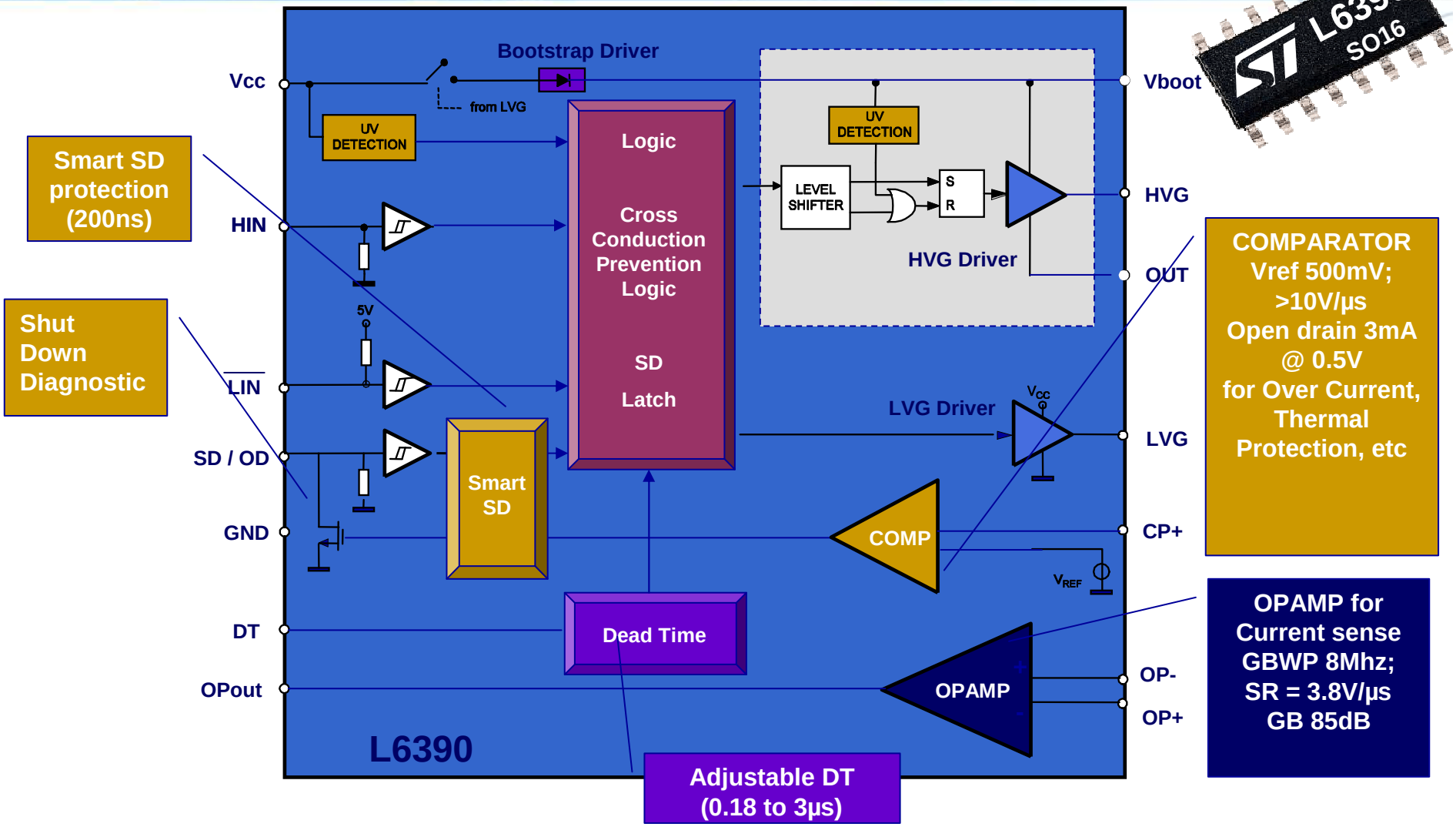
- **Designed to** optimize vector Motor Drive Systems
- Internal bootstrap diode **eliminating the external high voltage diode**
- **Better Performance at** high switching frequencies **(thanks to BCD ST process)**
- **Unique level of integration:** external component reduction
- Simplify board layout, reduction of board dimension

L639x family portrait

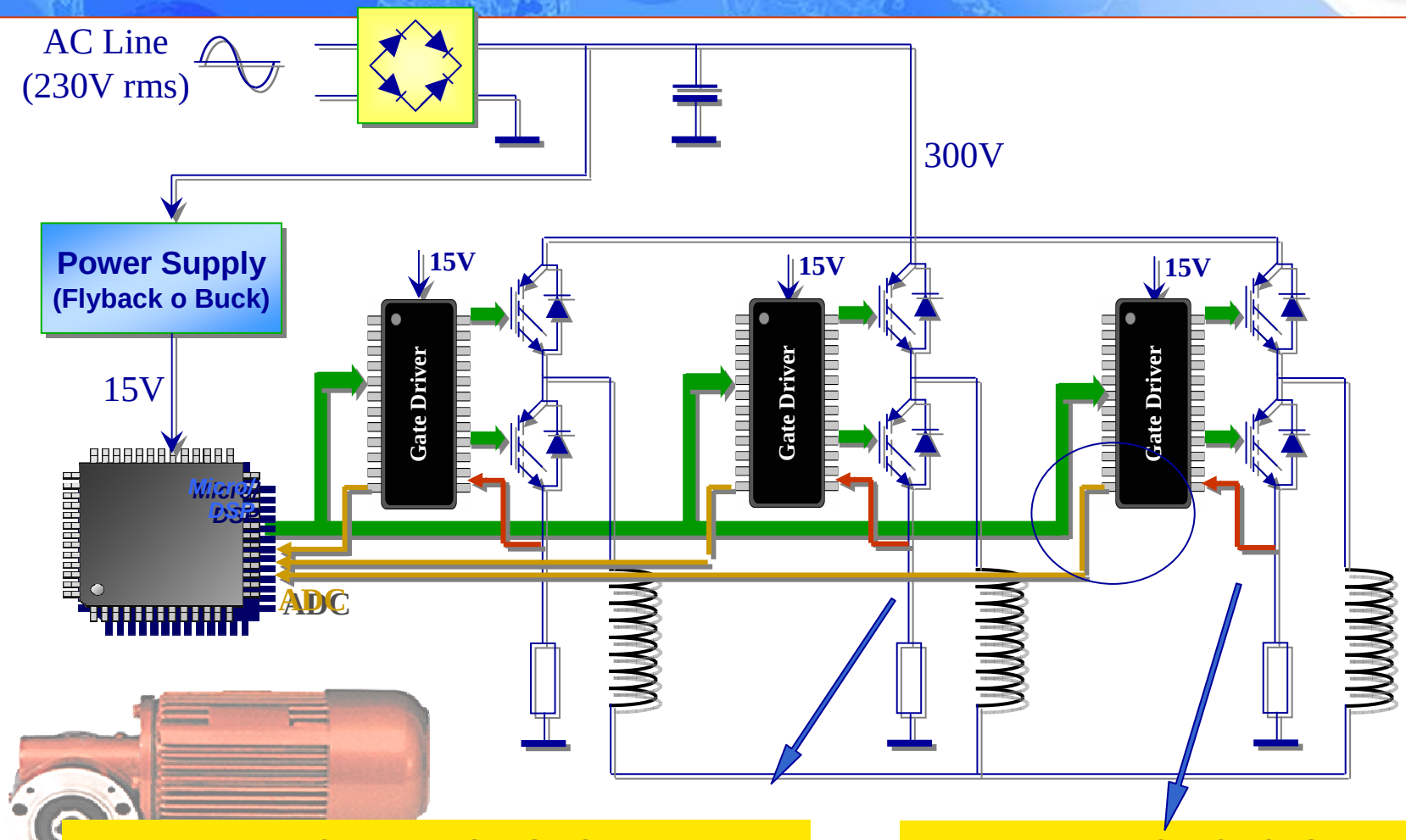
Coming soon!

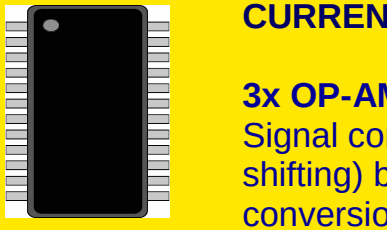


L6390: Full Feature Half Bridge Driver



Motor Drive: Field Oriented Vector Control





CURRENT SENSING

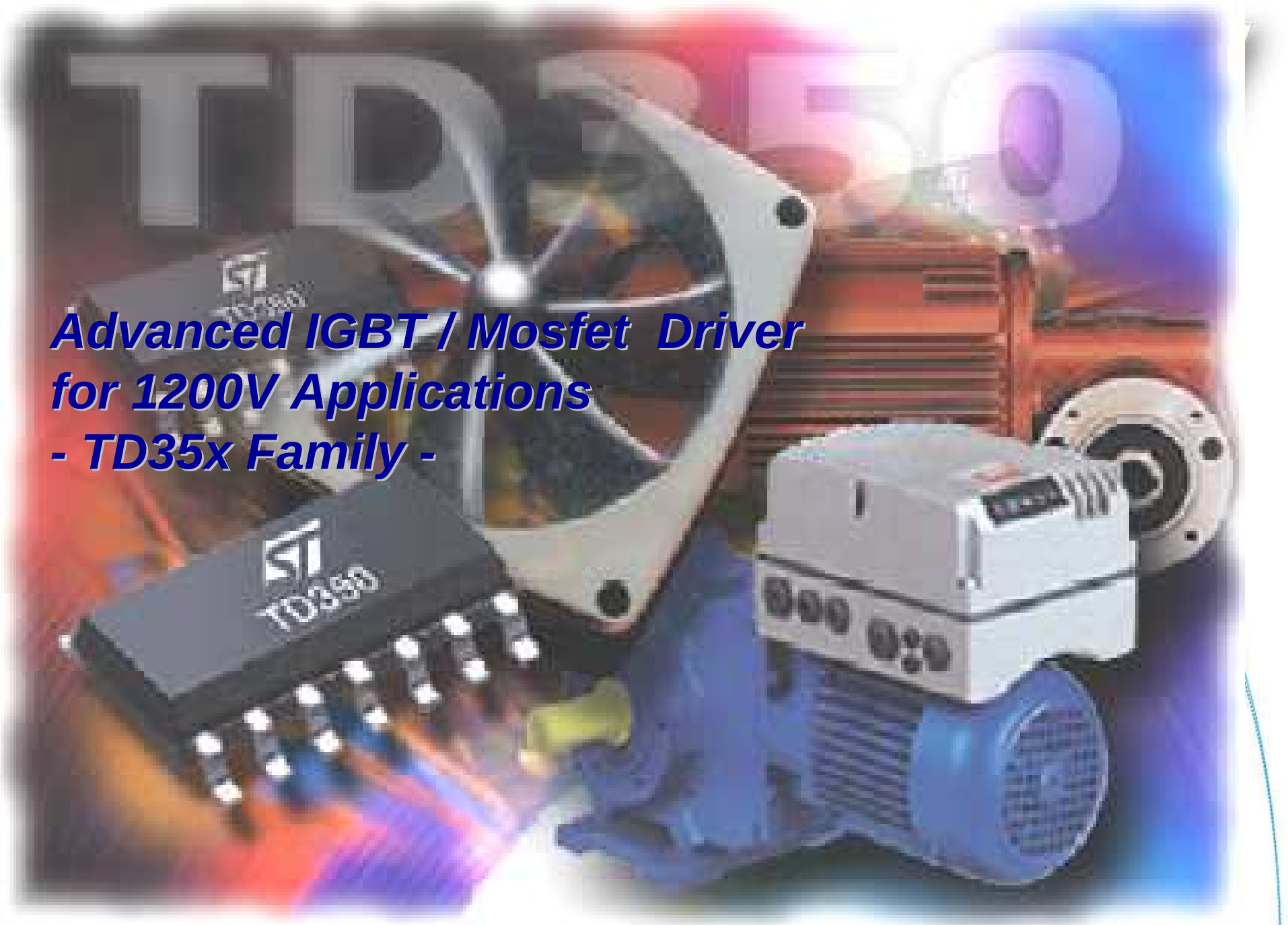
3x OP-AMP in SO14
Signal conditioning (filtering, shifting) before A/D conversion

PROTECTIONS

3x COMPARATOR
For fast overcurrent protection

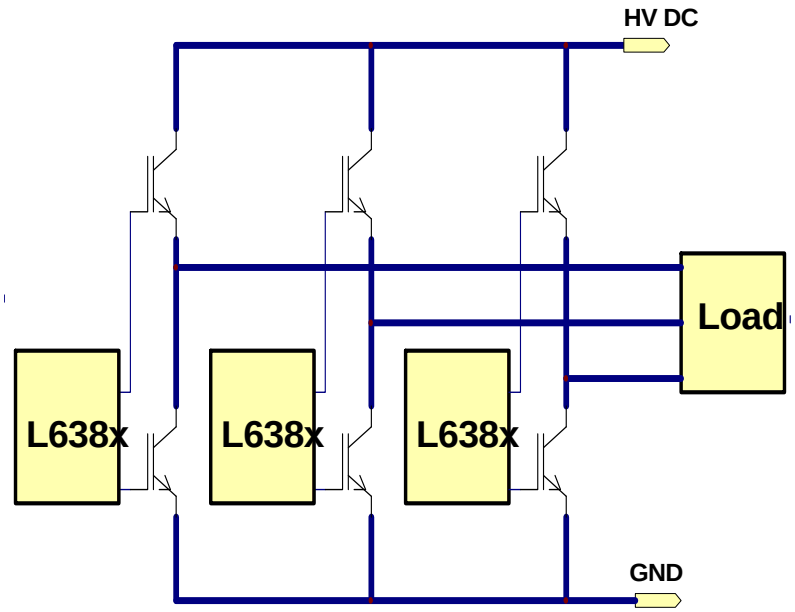
Full Features Half Bridge Driver

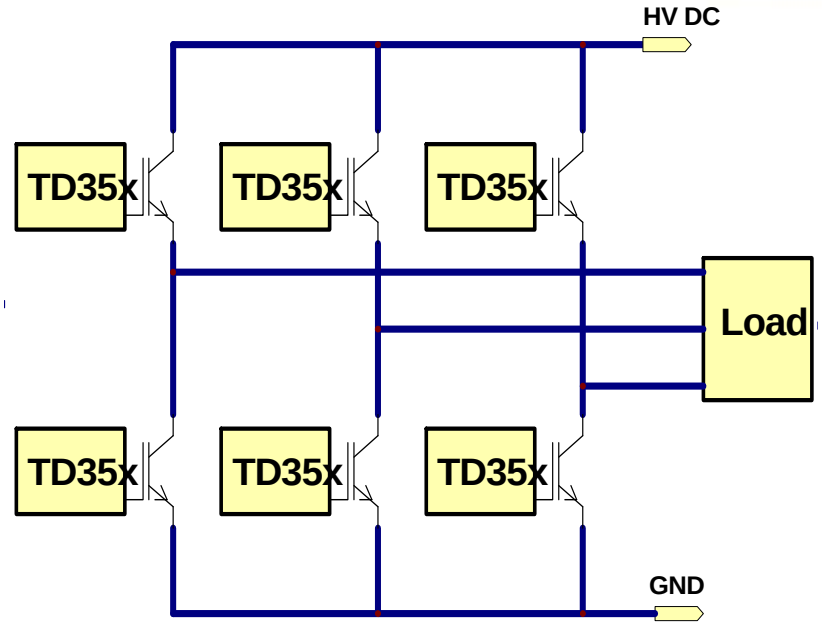
		L6390	L6393	L6392
Current Capability (source/sink)	[mA]	290/430	290/430	290/430
Internal Bootstrap Diode		Y	Y	Y
Input phasing		Out of phase	One input / slow decay input	Out of phase
Input Logic threshold Levels	[V]	3.3, 5 or 15 V	3.3, 5 or 15 V	3.3, 5 or 15 V
UVLO Vcc	[V]	12 – 10.5	12 – 10.5	12 – 10.5
UVLO Vboot	[V]	11.5 – 10	9.1 – 8.1	11.5 – 10
Dead Time		Adjustable (0.18 to 3µs)	Adjustable (0.18 to 3µs)	Adjustable (0.18 to 3µs)
Interlocking		Y	N	Y
Comparator		Y	Y (Uncommitted)	N
OPAMP		Y	N	Y
Package		SO16 / DIP16	SO14 / DIP14	SO14 / DIP14



Advanced IGBT / Mosfet Driver for 1200V Applications - TD35x Family -

TD35x as part of ST Motor Control Solution





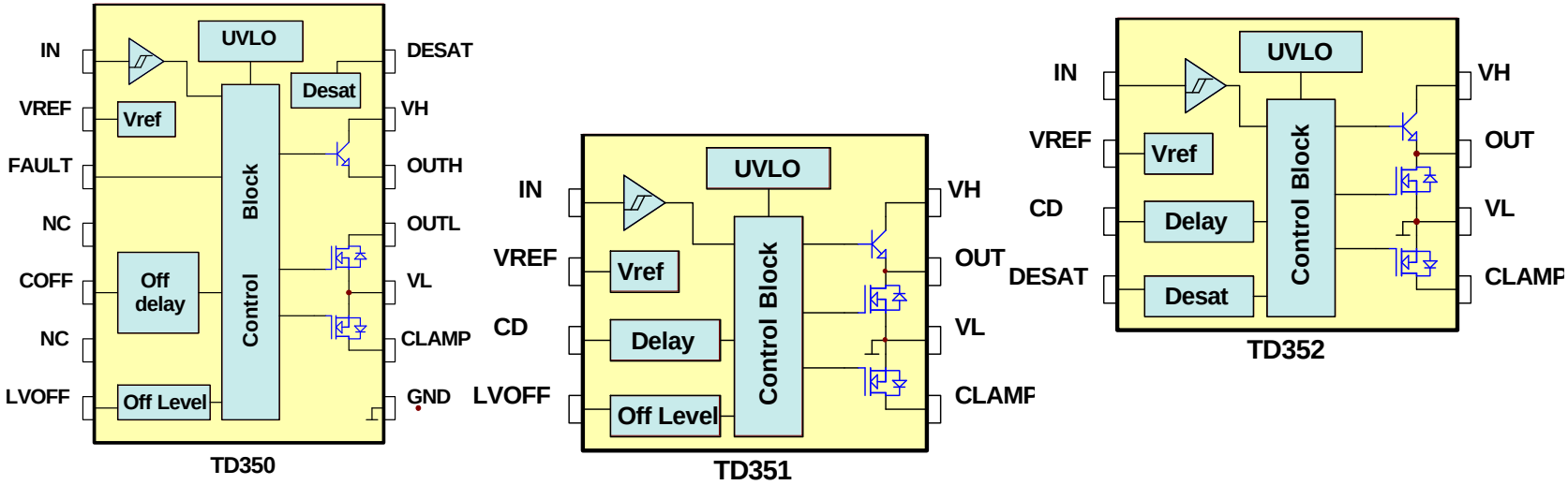
600V Applications:

- Use High Voltage Gate Drivers
- Don't need advanced functions nor galvanic insulation
- Appliance/Industrial applications

1200V Applications:

- Use separate HS & LS Drivers
- Higher power applications need more advanced control functions
- Galvanic insulation mandatory for High Side, also often needed for Low Side
- Industrial only applications

TD35x - Solutions for 1200V IGBT applications



TD350

is a flexible solution for high performance designs with advanced control and protection features

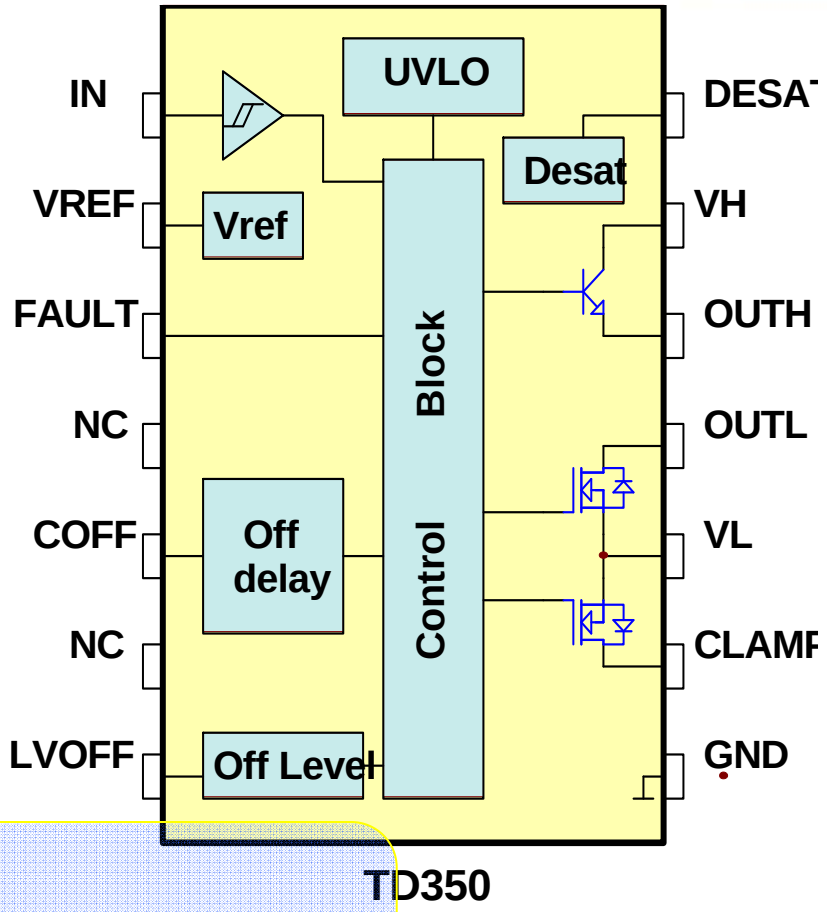
TD351/352

are cost effective solutions with minimum external component count, although providing the most valuable features

TD350 – Single IGBT/MOSFET Driver

Features:

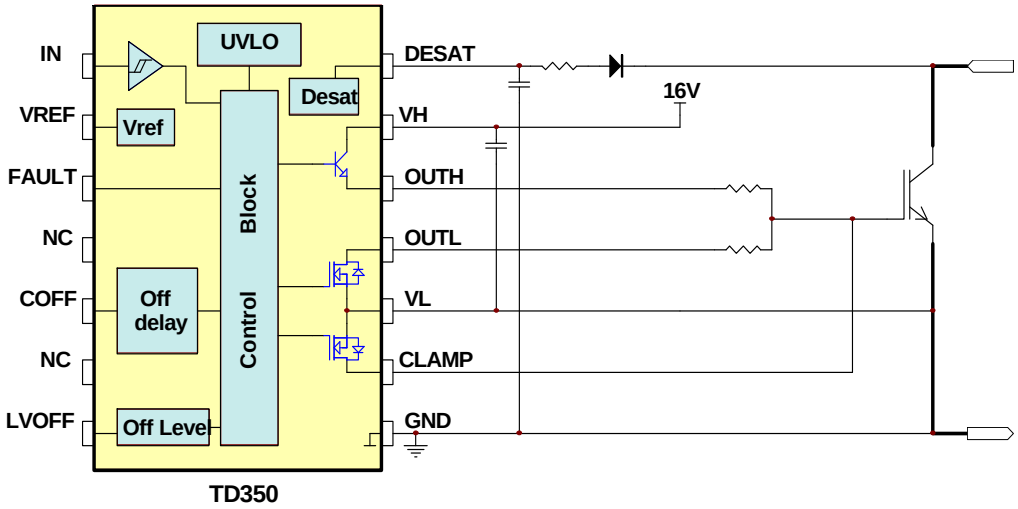
- 0.75A/1.2A min current capability
- Active Miller clamp
- Separate sink & source outputs for easy gate drive
- Desaturation protection (programmable blanking time)
- Optional 2-steps turn-off sequence
- Input compatible with pulse transformer or optocoupler
- Negative gate drive capability
- Fault status output
- UVLO Protection
- SO14 package



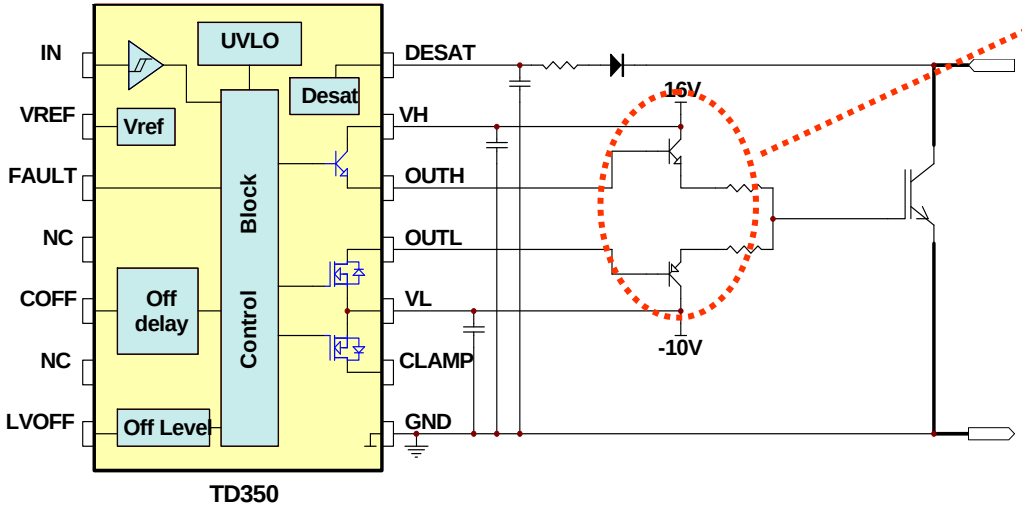
Applications:

- **1200V 3-phase inverter**
- **Industrial motor control**
- **UPS systems**

TD350 – Application Schematics

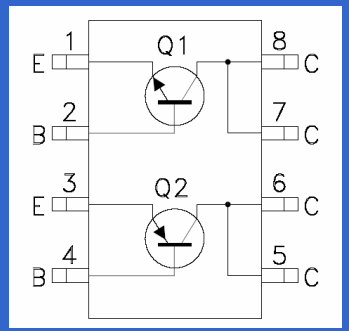


Medium IGBT/Mosfet drive with single supply and active Miller clamp



Large IGBT/Mosfet drive with negative gate drive and external buffers

- DUAL NPN-PNP COMPLEMENTARY BIPOLAR TRANSISTOR
  - STS01DTP06
  - STS05DTP03



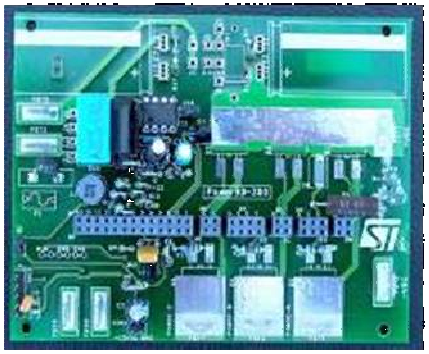
TD35x IGBT/MOSFET Drivers
Solutions for 1200V IGBT applications

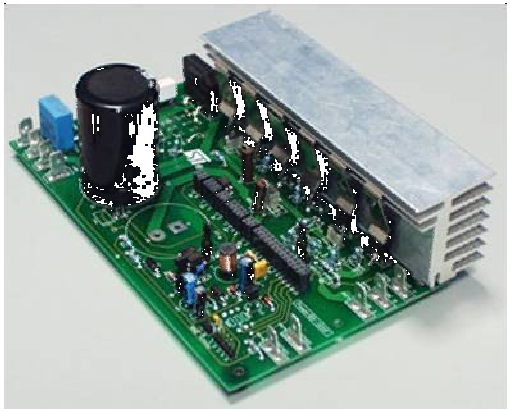
Feature / Part	TD350	TD351	TD352
Peak current +/- (min.)	+0.75A / -1.2A	+0.75A / -1.0A	
Active Miller clamp	yes	yes	yes
Negative gate drive ability	yes	yes	yes
2-level turn-off control	yes	yes	no
Desaturation protection	yes	no	yes
Fault output	yes	no	no
Separate sink/src outputs	yes	no	no
Input - pulse transf. - optocoupler	yes yes	yes yes	no yes
Package	SO14	SO8	

ST Evaluations boards with drivers

Available demo-boards where ST HV drivers are used:

- Motor Control





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STEVAL-IHM001V1

Motor Control

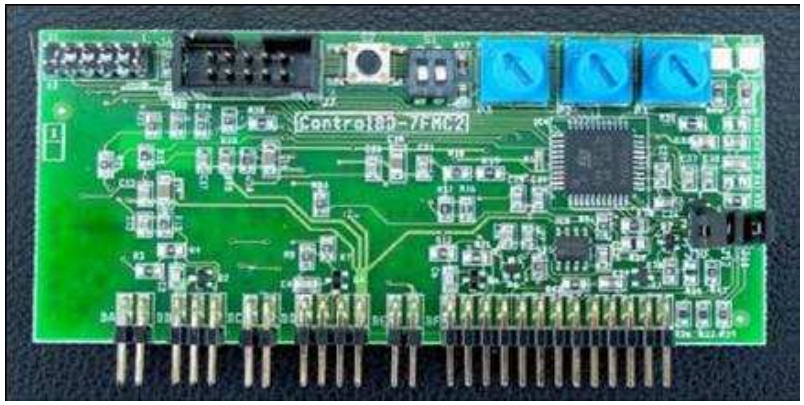
In stock

BLDC & AC Motor Control Control Board

Features:

- Quick to set up, to install and easy to run
- Easy to configure thanks to dedicated Graphic User Interface (RDK-GUI)
- Firmware libraries available for easy customization (RDK-Libraries)
- Design is re-usable (the ORCAD source files are available for free)
- Several kinds of applications with six-step commutation or 6-signal PWM (sine-wave modulated) outputs, including: 3 Phase AC Induction motor control, 3 Phase BLDC/AC PM motor control (6-step sensorless), 3 Phase BLAC PM motor control (sinusoidal driven, with Hall sensors)
- Optimized layout to provide very low level of interference between the Power and the Signal noise
- Modular approach with three different power board module (300W, 1kW, 3kW)

Control board for power stage
MCU: ST7FMC – Driver: L6386D



EVALUATION BOARD
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STEVAL-IHM003V1 + STEVAL-IHM001V1

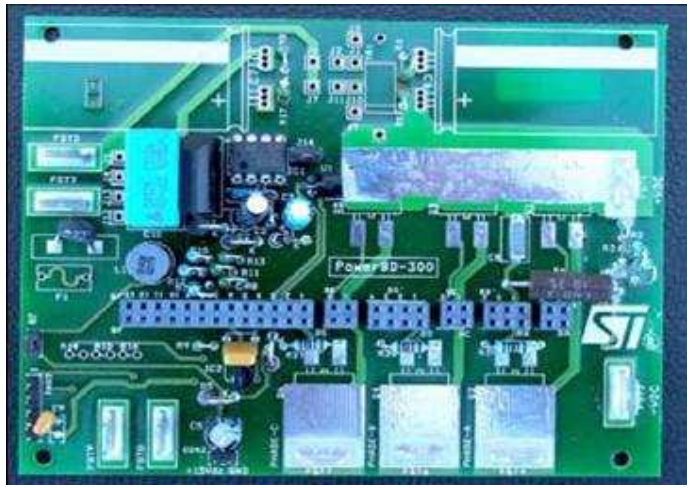
Motor Control

In stock

300W BLDC & AC Motor Control Power Driver Board

Features

- Quick to set up, to install and easy to run
- Inverter stage IGBT short circuit rugged based
- Design is re-usable (the ORCAD source files are available for free)
- Several kinds of applications with six-step commutation or 6-signal PWM (sine wave modulated) outputs, including: 3 Phase AC Induction motor control, 3 Phase BLDC/AC PM motor control (6-step sensorless), 3 Phase BLAC PM motor control (sinusoidal driven, with Hall sensors)
- Optimized layout to provide very low level of interference between the Power and the Signal noise
- Modular approach with three different power board module (300W, 1kW, 3kW)



EVALUATION BOARD

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STEVAL-IHM004V1 + STEVAL-IHM001V1

Motor Control

In stock

1kW BLDC & AC Motor Control Power Driver Board

Features:

- Quick to set up, to install and easy to run
- Inverter stage IGBT short circuit rugged based
- Design is re-usable (the ORCAD source files are available for free)
- Several kinds of applications with six-step commutation or 6-signal PWM (sine-wave modulated) outputs, including: 3 Phase AC Induction motor control, 3 Phase BLDC/AC PM motor control (6-step sensorless), 3 Phase BLAC PM motor control (sinusoidal driven, with Hall sensors)
- Optimized layout to provide very low level of interference between the Power and the Signal noise
- Modular approach with three different power board module (300W, 1kW, 3kW)

EVALUATION BOARD

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STEVAL-IHM005V1 + STEVAL-IHM001V1

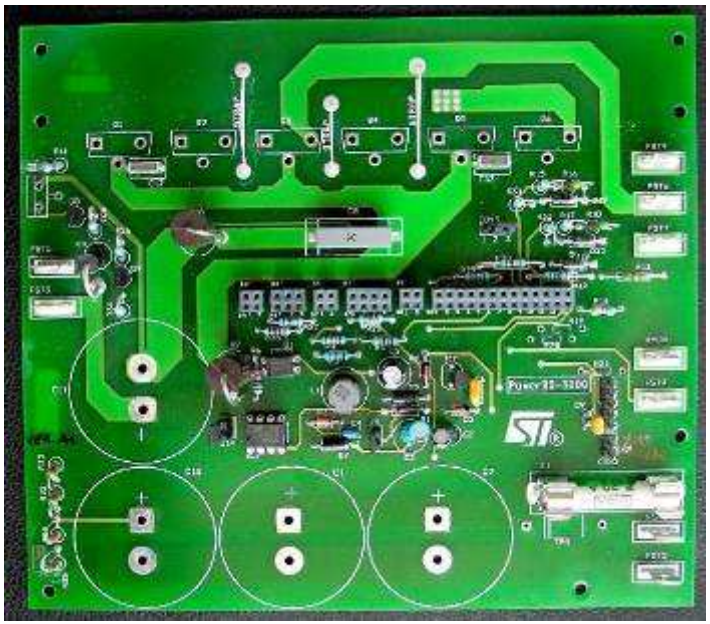
Motor Control

In stock

3kW BLDC & AC Motor Control Power Board

Features:

- Reusable design (the ORCAD source files are available free of charge)
- Supports several applications with six-step commutation or 6-signal PWM (sine-wave modulated) outputs including: 3-phase AC induction motor control, 3-phase BLDC/AC PM motor control (6-step sensorless) and 3-phase BLAC PM motor control (sinusoidal driven, with hall sensors)
- Optimized layout providing a very low level of interference between power and signal noise Inverter stage based on short-circuit rugged IGBTs



STEVAL-IHM008V1 + STEVAL-IHM001V1

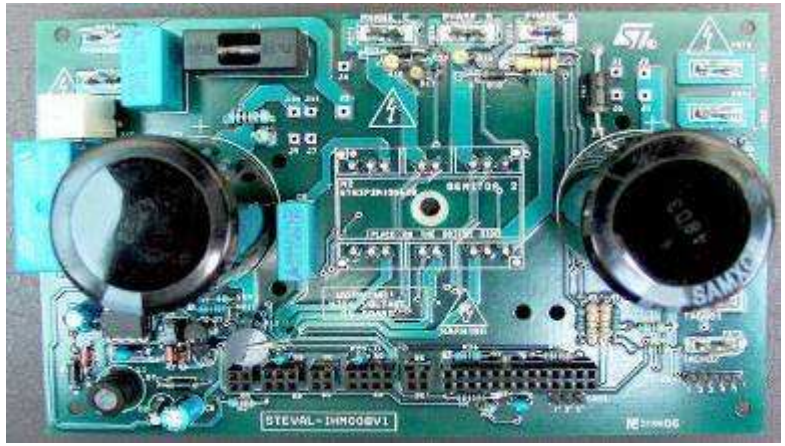
Motor Control

In stock

1kW BLDC & AC Motor Control Power board with SEMITOP®2

Features:

- Quick to set up, to install and easy to run
- Inverter stage IGBT short circuit rugged based
- Design is re-usable (the ORCAD source files are available for free)
- Several kinds of applications with six-step commutation or 6-signal PWM (sine-wave modulated) outputs, including: 3 Phase AC Induction motor control, 3 Phase BLDC/AC PM motor control (6-step sensorless), 3 Phase BLAC PM motor control (sinusoidal driven, with Hall sensors)
- Optimized layout to provide very low level of interference between the Power and the Signal noise
- Designed with ST SEMITOP® 600V / 10A module (STG3P2M10N60B)



STEVAL-IHM009V1 + STEVAL-IHM001V1

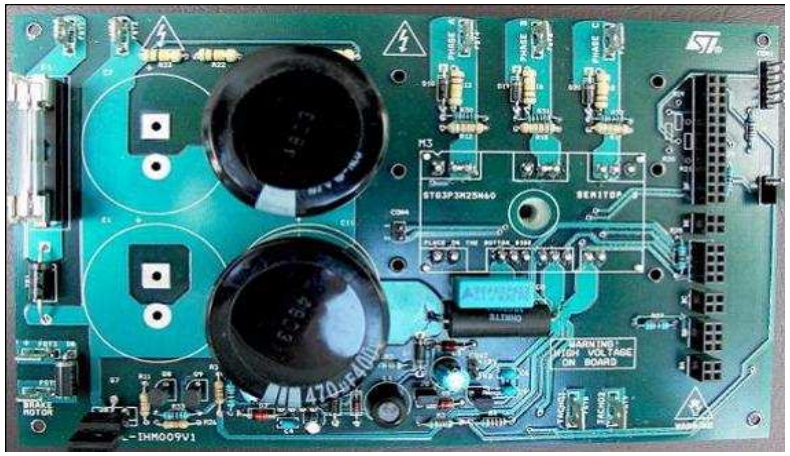
Motor Control

In stock

3kW BLDC & AC Motor Control Power Board with SEMITOP®3

Features:

- Quick to set up, to install and easy to run
- Inverter stage IGBT short circuit rugged based
- Design is re-usable (the ORCAD source files are available for free)
- Several kinds of applications with six-step commutation or 6-signal PWM (sine-wave modulated) outputs, including: 3 Phase AC Induction motor control, 3 Phase BLDC/AC PM motor control (6-step sensorless), 3 Phase BLAC PM motor control (sinusoidal driven, with Hall sensors)
- Optimized layout to provide very low level of interference between the Power and the Signal noise
- Designed with ST SEMITOP® 600V / 25A module (STG3P3M25N60)



EVALUATION BOARD

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STEVAL-IHM010V1

Motor Control

In stock

IGBT power module kit controlled by ST7FMC

Features:

- 5 V power supply connector
- 34-pin dedicated motor-control connector
- Serial communication interface connector
- Programming and debug support via 10-pin ICC connector
- Onboard 2-Kbit (256 byte) serial memory
- 4 potentiometers for runtime settings
- Start / stop button
- Reset button
- Debug pins available

Control board for power stages
MCU: ST7FMC

STEVAL-IHM011V1

Motor Control

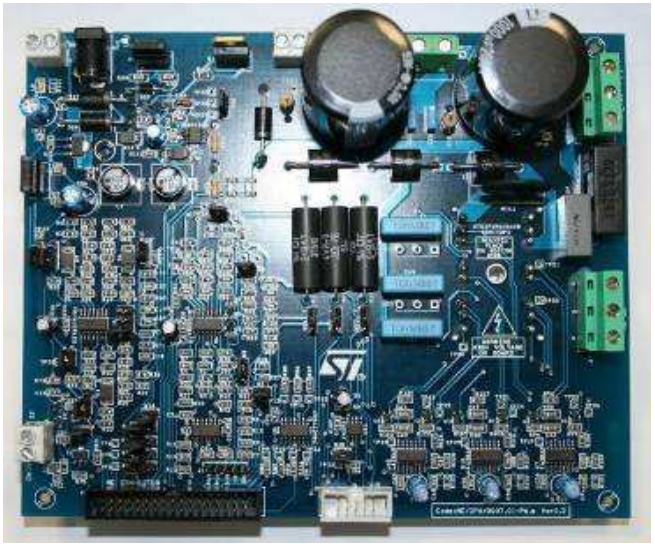
In stock

IGBT power module kit – SEMITOP®2 power board

Features:

- 34-pin dedicated motor-control connector
- 5-pin Hall sensor/encoder input
- Tachometer sensor input
- Support for 5 V or 3.3 V microcontroller
- Three configurations for current detection:
  - 1 shunt resistor
  - 3 shunt resistors or
  - 3 external ICSs (insulated current sensor)
- Current amplification network BEMF detecting network
- Hardware current protection
- Hardware thermal protection (on board temperature sensor)
- Resistive brake network

Driver: L6386D



STEVAL-IHM015V1

Motor Control

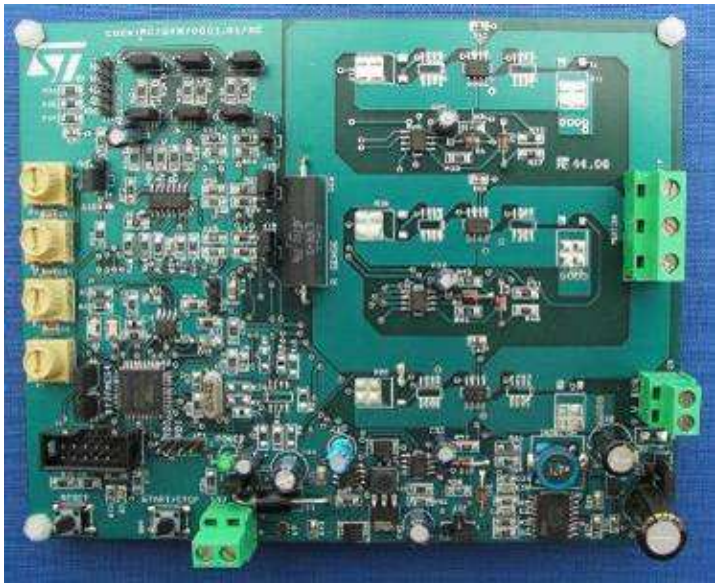
In stock

Low-voltage motor control demo kit based on ST7FMC2S4T6 and STS8DNH3LL

Driver: L6387D

Features:

- Voltage range from 5 V to 48 V Current up to 25 A
- Power MOSFET STS8DNH3LL (dual device) 8 A 30 V included Compatible with power MOSFET in SO-8 and DPAK
- 10 V auxiliary power supply connector Serial communication interface connector Programming and debug support via 10-pin ICC connector
- Onboard 2-Kbit (256 byte) serial memory
- Four potentiometers for runtime settings
- Start/stop button Reset button
- Debug pins available



STEVAL-IHM017V1

Motor Control

In stock

100W 3-phase inverter for BLDC sensor less motor control

Driver: L6386D

Features:

- Minimum input voltage 125VDC or 90VAC
- Wide input voltage range Maximum power up to 100 W
- 4.4 A, 520 V power MOSFET included Compatible with power MOSFETs in IPAK packages
- 15 V auxiliary power supply connector
- Programming and debugging support via 10-pin ICC connector
- Three potentiometers for runtime settings
- Start/stop button
- Reset button

STEVAL-IHM019V1

Motor Control

In stock

Complete inverter for low power 3-phase asynchronous motors demonstration board

Features:

- Voltage Input range 115 VAC to 230 VAC 50/60 Hz
- Total output power 50 W
- High efficiency
- Switching PWM frequency 12 - 22 kHz
- Compliant with EN61000-6-3 and EN61000-6-2
- Possibility to use two motor types:
  - 2-phase motor two sinusoidal voltage waves restored with a phase displacement of 90° between them
  - 3-phase motor three sinusoidal voltages with phase displacement of 120° among them

Driver: L6388D

EVALUATION BOARD

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STEVAL-IHM021V1

Motor Control

In stock

100W 3-phase inverter based on L6390D and STD5NK52ZD for speed FOC of 3-phase PMSM Motor drive

Features:

- 50 Hz or 60 Hz Input voltage wide range (110 VAC and 230 VAC)
- Maximum power-up to 100 W at 230 VAC input voltage
- Power MOSFET STD5NK52ZD-1 (4.4 A 520 V) Compatible with other power MOSFET's in IPAK packages
- +15 V auxiliary power supply connector
- Connector for interface with STM3210B-EVAL board
- Target applications:

- Refrigerators compressors
- Dishwasher pumps

Driver: L6390D

EVALUATION BOARD

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STEVAL-IHM023V1

Motor Control

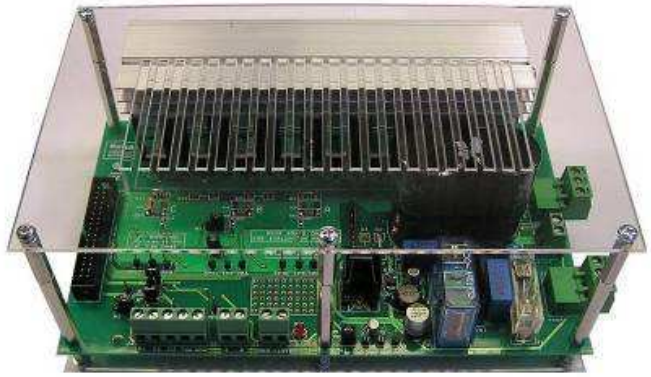
Coming soon

1 kW 3-phase motor control evaluation board featuring L6390 drivers and STGP10NC60KD IGBT

Features:

- Minimum input voltage 125VDC or 90VAC
- Maximum input voltage 375VDC or 270VAC
- Voltage range for low voltage motor control application from 18VDC to 35VDC
- Possibility to use auxiliary +15V supply voltage
- Maximum output power for motor up to 1000W
- Regenerative brake control feature
- Input inrush limitation with bypassing relay
- +15V auxiliary power supply based on buck converter with VIPer16
- Fully populated board conception with testing points and safety isolated plastic cover
- Motor control connector for interface with STM3210B-EVAL board and further ST motor control dedicated kits
- Tacho input
- Hall/encoder inputs
- Possibility to connect BEMF daughter board

Driver: L6390D



3-phase motor control power stage MB459B

Motor Control

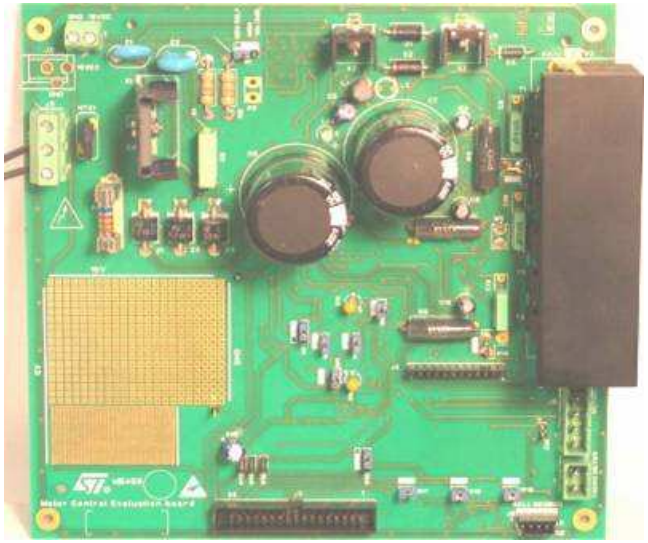
Available on request

STM3210B-MCKIT and STR750-MCKIT
3-phase motor control power stage

Features:

- Voltage Input range 115 VAC to 230 VAC
- An input power stage with voltage rectification and auxiliary power supply,
- A 7A three-phase inverter based on IGBT and level shifter,
- A motor connector for linking with the control board,
- A connector for motors with Hall/encoder and tachometer input.
- The MB459B motor control evaluation board can be supplied in two ways:
  - From a single power supply for motors requiring a voltage greater than 18 V
  - From a dual power supply for motors requiring a voltage less than 18 V

Driver: L6386D



EVALUATION BOARD
www.st.com/evalboards

TD350 Advanced IGBT Driver

Motor Control

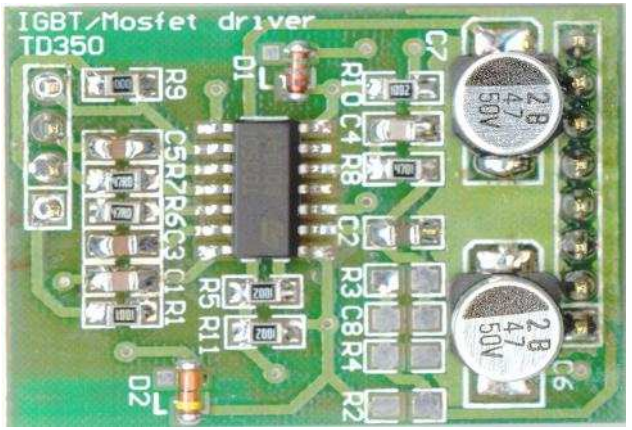
Available on request

TD350 Advanced IGBT/MOSFET Driver

Features:

- 0.75A min gate drive
- Negative gate drive ability
- Input compatible with pulse transformer or optocoupler
- Separate sink and source outputs for easy gate drive
- Two steps turn-off with adjustable level and delay
- Miller clamp feature
- Desaturation protection
- Fault status output
- UVLO protection
- 2kV ESD protection

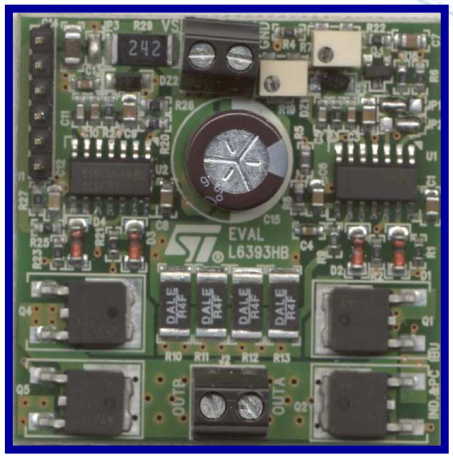
Driver: TD350



EVALUATION BOARD
www.st.com/evalboards

L6393 *Full-Bridge board*

- **Available** L6393 **full-bridge board**:
  - For DC motors and Single-phase BLDC (e.g. FAN)
  - Up to **5A** on output phase
  - All **SMD** components, **no heat-sink**
  - Highly compact and **optimized layout**



reference design