Infineon

Never stop thinking

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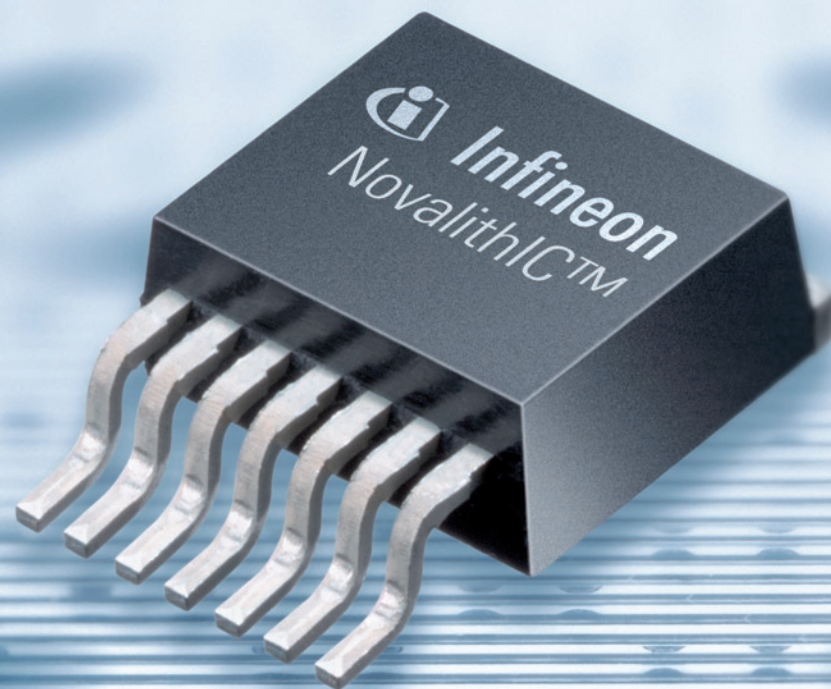☎ (+1) 9 08-23 6 56-21

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* and representative offices

Integrated High Current Motor Drivers
NovalithIC™
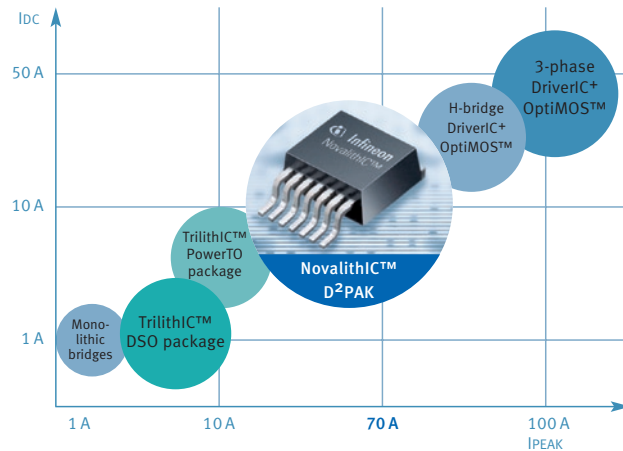
[www.infineon.com]

NovalithIC™

N O V A L I T H I C ™ – A NovalithIC™ provides a complete low-ohmic-protected half-bridge in a single package. It can be combined with additional NovalithIC™ to create an H-bridge or 3-phase bridge as well.
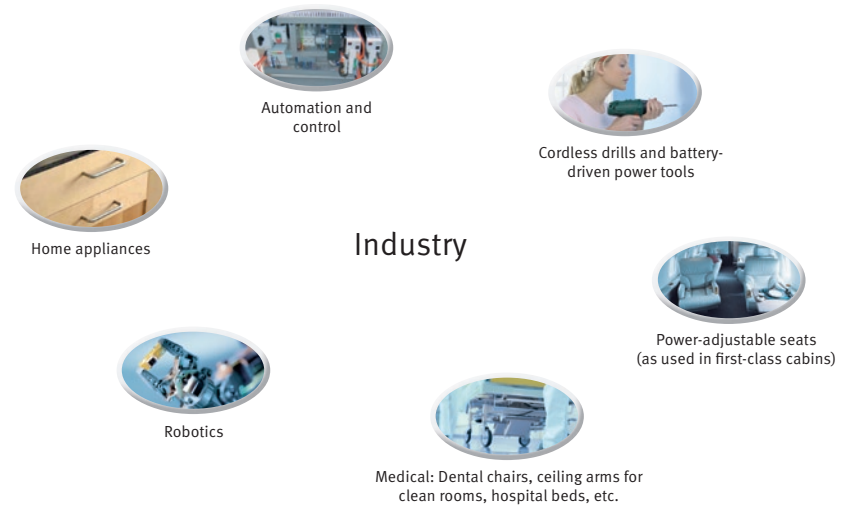
T H E   N O V A L I T H I C ™   F A M I L Y has the capability to switch to up to 25kHz while providing overcurrent, overvoltage and overtemperature protection. Current sense is optionally available to monitor load current.

T H E   N O V A L I T H I C ™   F A M I L Y offers cost-optimized solutions for protected high-current PWM motor drives with very low board-space consumption – scaled to your needs.
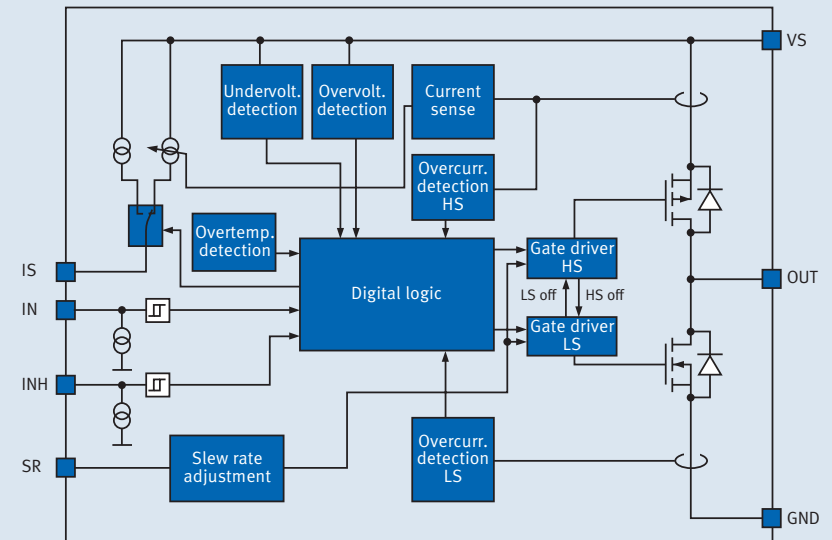
The NovalithIC™ family covers a current range of 10A to 70A.

NovalithIC™ applications

Automotive

Seat Belt
Wipers
Fuel Pump
Gearbox
Lift up tailgate
Sliding Door
HVAC fans
Door locks / Soft close
Engine cooling fans
Sunroofs
Power windows

Industry

Automation and control
Cordless drills and battery-driven power tools
Home appliances
Power-adjustable seats (as used in first-class cabins)
Robotics
Medical: Dental chairs, ceiling arms for clean rooms, hospital beds, etc.

3-phase DriverIC+ OptiMOS™
H-bridge DriverIC+ OptiMOS™
TrilithIC™ PowerTO package
NovalithIC™ D²PAK
Monolithic bridges
TrilithIC™ DSO package

I_{DC}

50 A

10 A
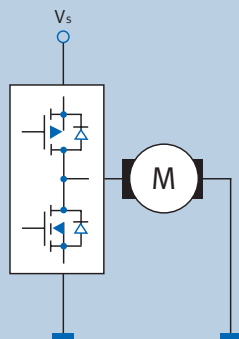
1 A

1 A   10 A   **70 A**   100 A
I_{PEAK}

A look at the inventive design of NovalithIC™

THE NOVALITHIC™ PAIRS a p-channel high-side switch and a n-channel low-side switch to create a half-bridge, adding an integrated circuit to protect the device. The IC also features microprocessor-compatible logic level inputs, diagnosis with current sense, slew rate adjustment and dead-time generation. Overtemperature, overvoltage, undervoltage, overcurrent and short-circuit protection is part of the package. Two hallmark features set this multichip, half-bridge configuration apart – it generates neither charge pump emissions nor cross-current. The half-bridge combines with others to form H-bridge and three-phase drive configurations.
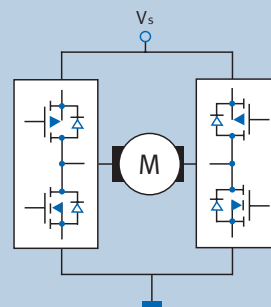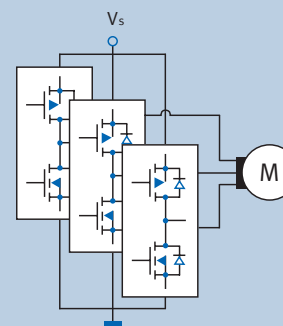
NovalithIC™ applications
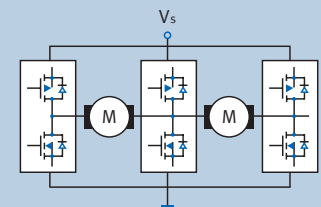

Flexibility in design

Half-bridge
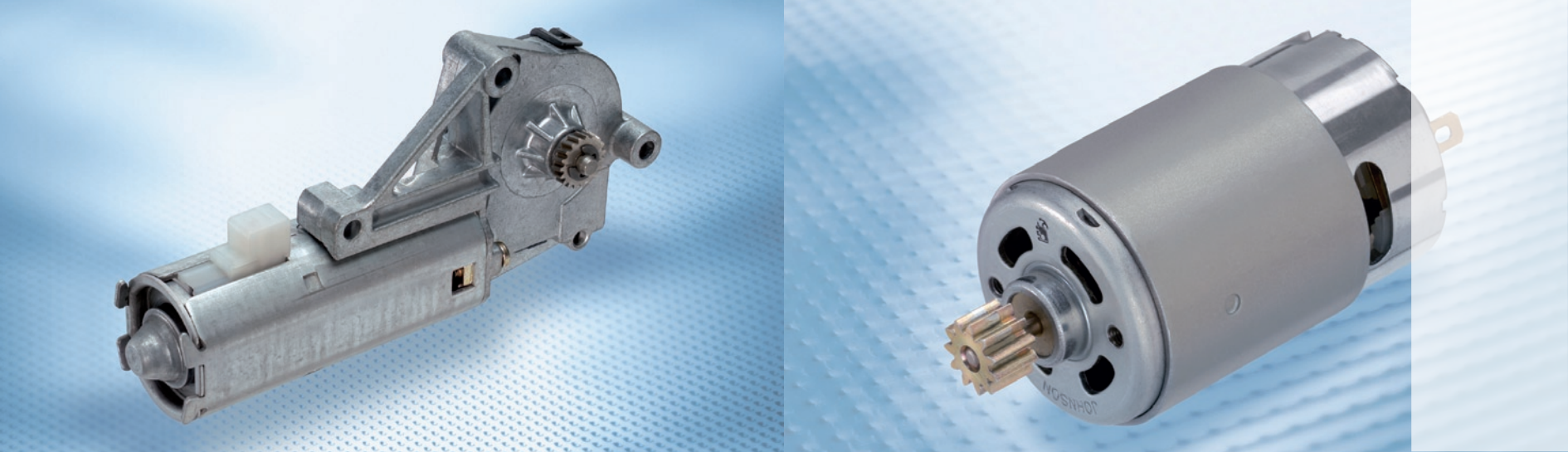DC brush motors
unidirectional

H-bridge
DC brush motors
bidirectional

B6 bridge
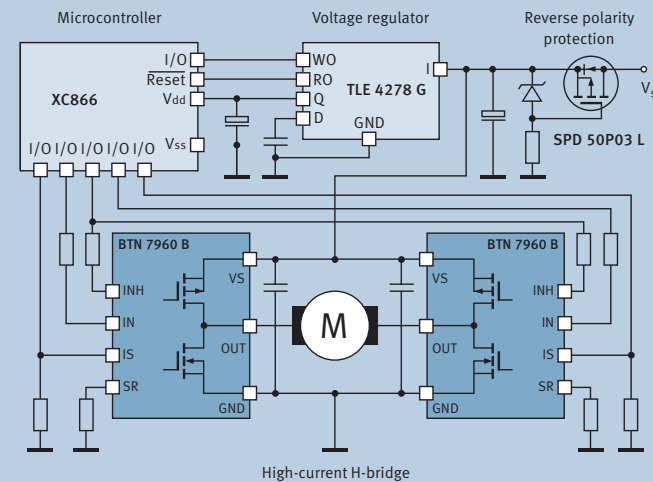Brushless DC
(BLDC) motors

Sharing half-bridges
Driving two bidirectional DC brush
motors with just three half-bridges

NovalithIC™ – features and benefits

Features	Benefits
■ Low path resistance down to 16 mOhm and high-current capability up to 70A typ	➜ High-current motor drive in a small package
■ Low quiescent current of 7 µA	➜ Extended battery life
■ PWM capability up to 25 kHz + active freewheeling	➜ Significantly lower power dissipation
■ Switched mode current limitation	➜ Reduced power dissipation in overcurrent condition
■ Logic level inputs	➜ Connects directly to the micro-controller
■ Integrated over-/undervoltage, overtemperature and overcurrent protection	➜ Fewer external components required
■ Status flag diagnosis	➜ Error detection with direct feedback to the microcontroller
■ Analog current sense	➜ No shunt required for block detection and current control
■ Adjustable slew rate	➜ Flexible design options for EMC and switching loss
■ Fast switching speed, rise and fall times of 500ns	➜ Minimize switching losses in high power applications

Application diagram

High-current H-bridge

Special acquirements for your requirements

Current capability

WE ENGINEERED NovalithICs to handle high currents, a case in point being the BTN7970B with a typical rating of 70A@25ºC. This capability is what makes these ICs so well suited to so many applications. And with features to reduce power dissipation in the device, the NovalithIC™ is the perfect solution for your high-current motor drives.

Current sense with digital failure signal

IN NORMAL OPERATING MODE (current sense), a current source connects to the status pin, which delivers a current proportional to the forward load current flowing through the active high-side switch. This lets you assess the load current, thereby adding value and cutting system costs.

Diagnostics and protection

NOVALITHICS COME WITH A SET of diagnostics and protective features to safeguard devices against overtemperature, overvoltage, undervoltage, overcurrent and short circuit. In failure mode, the status pin delivers a predefined current.

Electromagnetic Emission (EME)

WITHOUT A CHARGE PUMP, control circuit emissions are very low. And with a variable slew rate, edge timing is easily adjusted to strike a balance between emissions and switching loss.

Thermal performance

NOVALITHIC™ IS A HALF-BRIDGE. In contrast to H-bridges, its power dissipation spreads over two packages, reducing the device's thermal integrated load. A half-bridge device is also remarkably flexible, allowing you to improve your layout's thermal performance.

ACTIVE FREEWHEELING: NovalithICs actively open the appropriate FET when freewheeling. Rather than using the body diode for freewheeling, the NovalithIC™ line employs the FET's channel. This also reduces power dissipation in the device.

SWITCH MODE CURRENT LIMITATION: Rather than limiting the current to a certain value in current limitation mode, NovalithICs disables the FET that detects overcurrent, and enables the other FET. Inhibiting the FET's function in the linear range significantly reduces power dissipation in current limitation mode. Unlike in most other devices, current limitation is a standard operating mode in NovalithICs. As long as temperatures remain below the shutdown threshold, this mode remains enabled.

The NovalithIC™ line – the latest in a series of evolutionary advances

WITH THE NOVALITHIC™ family, Infineon Technologies has come full circle with its range of IC products, closing the gap to serve almost all motor driver applications.

NovalithIC™ product overview

Type	Peak current typ. [A]	Quiesc. current [µA]	Operat. range [V]	Path $R_{DS(on)}$ typ. [mΩ]	Switching frequency ƒ max. [kHz]	Short-circuit protection	Load current sense	Self-protection	Error flag	Switching time (typ) [µs]	Package
BTN 7930B	32	7	5.5 – 28	28	25	load + GND + battery	analog current sense + overload det.	OT, OC, OV	OT, OC, OV	1	1, 2, 3
BTN 7935B*	32	7	5.5 – 28	28	2	load + GND + battery	overload det.	OT, OC, OV	OT, OC, OV	1	1
BTN 7960B	47	7	5.5 – 28	16	25	load + GND + battery	analog current sense + overload det.	OT, OC, OV	OT, OC, OV	1	1, 2, 3
BTN 7965B*	47	7	5.5 – 28	16	2	load + GND + battery	overload det.	OT, OC, OV	OT, OC, OV	1	1
BTN 7970B	70	7	5.5 – 28	16	25	load + GND + battery	analog current sense + overload det.	OT, OC, OV	OT, OC, OV	1	1, 2, 3
BTN 7975B*	70	7	5.5 – 28	16	25	load + GND + battery	overload det.	OT, OC, OV	OT, OC, OV	1	1
BTN 7971B	70	7	4.5 – 28	16	25	load + GND + battery	analog sense + overload det.	OT, OC, OV	OT, OC, OV	0.5	1, 2, 3

* in concept

The NovalithIC™ high-current half-bridge family

Scaled to suit your needs

BTN 7930B
28 mΩ
32A

BTN 7960B
16 mΩ
47A

BTN 7970B/-71
16 mΩ
70A

1

TO263-7
(TO220-7 (SMD))

BTN 79xxB

2

TO220-7

BTN 79xxP

3

TO220-7

BTN 79xxS