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Combining a low $R_{DS(on)}$ with a wide safe operating area (SOA)

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A revolution in the IGBT world - highest robustness for (H)EV switching applications

BTS50020-1TAD & BTS50025-1TAD
New ultra low ohmic power switches of the smart high-side Power PROFET™ family

12V Protected Switch Shield with BTS50010-1TAD

TLT807B0EPV
Linear voltage regulator for 24V applications. Low dropout adjustable stand-by linear voltage regulator with overvoltage protection
OptiMOS™ Linear FET
Combining a low $R_{DS(on)}$ with a wide safe operating area (SOA)

OptiMOS™ Linear FET is a revolutionary approach to avoid the trade-off between $R_{DS(on)}$ and linear mode capability – operation in the saturation region of an enhanced mode MOSFET. It offers the state-of-the-art $R_{DS(on)}$ of a trench MOSFET together with the wide safe operating area of a classic planar MOSFET.

**Features**
- Combination of low $R_{DS(on)}$ and wide safe operating area (SOA)
- High max. pulse current
- High continuous pulse current

**Benefits**
- Rugged linear mode operation
- Low conduction losses
- Higher in-rush current enabled for faster start-up and shorter down time

**Target applications**
- Telecom
- Battery management

**Target applications – examples**
- Hot swap circuits
- Power distribution unit
- Battery management/protection circuit
- Soft start/lightning surge protection

**Product collaterals / online support**
- Product family page
- Product landing pages (will go live 25th of July)
- Product datasheet pages

**Product overview**

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600 V CoolMOS™ P7 power MOSFETs (portfolio extension)
The CoolMOS™ 7th generation platform is a revolutionary technology for high voltage power MOSFETs, designed according to the superjunction (SJ) principle.

Infineon extends the large portfolio of the 600 V CoolMOS™ P7, offering a granular R_{D(on)} selection of high voltage power MOSFETs. CoolMOS™ P7 is Infineon's best balanced technology, with optimized balance of ease-of-use and highest energy efficiency.

**Features**
- Outstanding commutation ruggedness
- Optimized balance between efficiency and ease-of-use
- Significant reduction of switching and conduction losses
- Excellent ESD robustness >2 kV (HBM) for all products
- Better R_{D(on)}/x A (below 1 Ω x mm²)
- Large portfolio with granular R_{D(on)} selection qualified for a variety of industrial and consumer grade applications

**Benefits**
- Suitable for hard and soft switching (PFC and LLC)
- Ease-of-use and fast design-in through low ringing tendency and usage across PFC and PWM stages
- Simplified thermal management due to low switching and conduction losses
- Higher manufacturing quality due to >2 kV ESD protection
- Increased power density solutions enabled by using products with smaller footprint
- Suitable for a wide variety of applications and power ranges

**Target applications**
- Server, telecom, PC power, solar, EV charging, lighting and TV

**Completing products (P2S)**
- 1EDN EiceDRIVER™, 2EDN EiceDRIVER™

**Product collaterals / online support**
- Product family page
- Getting introduced to CoolMOS™ P7 series – on-demand webinar
- 600 V CoolMOS™ P7 – Infineon’s most well balanced High Voltage MOSFET technology – video
- 600 V CoolMOS™ P7 power MOSFET – product brief

**Block diagram**

**Product overview incl. data sheets links**

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800 V CoolMOS™ P7 series (portfolio extension)
A new benchmark in efficiency and thermal performance

The latest 800 V CoolMOS™ P7 series sets a new benchmark in 800 V superjunction technologies and combines best-in-class performance with state-of-the-art ease-of-use, resulting from Infineon’s more than 18 years pioneering superjunction technology innovation.

Features
- Best-in-class FOM $R_{\text{DS(on)}}, E_{\text{loss}}$, reduced $Q_g, C_{iss}$, and $C_{oss}$
- Better DPAK $R_{\text{DS(on)}}$ of 280 mΩ, 360 mΩ, and 450 mΩ with 280 mΩ as best-in-class
- Best-in-class $V_{\text{GE(th)}}$ of 3.0 V and smallest $V_{\text{GE(th)}}$ variation of ±0.5 V
- Integrated Zener Diode ESD protection up to Class 2 (HBM)
- Best-in-class quality and reliability
- Product portfolio breadth

Benefits
- 0.1% to 0.6% efficiency gain and 2°C to 8°C lower MOSFET temperature as compared to market offers
- Enabling higher power density designs, BOM savings and lower assembly cost
- Easy to drive and to design-in
- Better production yield by reducing ESD related failures
- Less production issues and reduced field returns
- Easy to select right parts for fine tuning of designs

Target applications
- LED driver
- Adapter
- Audio power supply
- Industrial SMPS
- AUX power supply
- HV startup circuitry

Evaluation board
- EVAL_45W_19V_FLYB_P7 / SP001619668
- SA001620142
- Price per unit in EUR: 188
Board page incl. interactive 3D model

Block diagram
- Dual stage flyback P7
- Single stage flyback P7

Product collaterals / online support
- Product family page
- Getting introduced to CoolMOS™ P7 series – on-demand webinar
- 800V CoolMOS™ P7 - a new benchmark in efficiency and thermal performance- video
- 800 V CoolMOS™ P7 series – product brief
- 45 W adapter demo board – application note

Product overview incl. data sheets links

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TO-247-4pin S5 TRENCHSTOP™ 5
Best efficiency, lowest switching losses for medium speed frequencies 15-40kHz

Highest efficiency for medium frequency speed form 15kHz to 40kHz with S5 TRENCHSTOP™ 5 IGBTs in TO-247-4pin Kelvin Emitter package.

Features
- Extremely low control inductance loop
- Emitter pin for driver feedback
- Same creepage distance of collector emitter as standard TO-247 package

Benefits
- 20% reduction in total switching losses compared to TO-247 package using same technology
- System efficiency improvement compared to standard TO-247
- IGBTs operates under lower junction temperature
- Much less power dissipation under overcurrent conditions

Target applications
- UPS, Solar

Completing products
- Every switch needs a driver: 1ED EiceDriver™ Compact, eg. 1EDI20I12

Block diagram

Product collaterals / online support
- Product family page
- Product landing pages
  - IKZ50N65ES5
  - IKZ75N65ES5
- Product datasheet pages
  - IKZ50N65ES5
  - IKZ75N65ES5
- TO-247-4pin S5 TRENCHSTOP™ 5 evaluation board – application note
- TRENCHSTOP™ 5 in TO-247 4pin Package - video

Evaluation board
- EVAL-IGBT-650V-TO247-4
  OPN: EVALIGBT650VTO2474TOBO1

Product overview

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600V/680V TRENCHSTOP™ AUTO IGBTs
A revolution in the IGBT world - highest robustness for (H)EV switching applications

Infineon’s TRENCHSTOP™ IGBT technology offers a significant improvement of static as well as dynamic performance of the device. The combination of trench top-cell and field stop leads to optimal specification parameters for automotive switching applications. A further minimization of the turn-on losses can be achieved in combination with soft recovery emitter controlled-3 diodes.

Features
- Automotive AEC-Q101 qualified
- 600V or 680V break-through voltages
- Positive temperature coefficient in VCE(sat)
- Low switching losses
- Co-packed with soft fast recovery EMCON3 diode technology
- Short-circuit capable of up to 6µs

Benefits
- Capable for rugged designs through short-circuit rating
- Reliable supply at natural disasters through dual fab supply chain
- Easy design by low EMI due to minimized turn-on losses
- Dynamic Testing for optimal test coverage

Target applications
- Main Inverter
- Oil/Water Pump
- AirCon Compressor
- PTC Heater
- Air Blower

Product collaterals / online support
- Product family page

Application overview

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BTS50020-1TAD & BTS50025-1TAD
New ultra low ohmic power switches of the smart high-side Power PROFET™ family

With a 2.0mΩ / 2.5mΩ (R<sub>GS(OH)</sub>) single channel, the new Power PROFET™ BTS50020-1TAD and BTS50025-1TAD offer the benchmark current and energy capabilities to drive applications up to 29A / 25A DC (I<sub>ON</sub>). The products provide protection functions and diagnosis.

**Features**

- Ultra-low ohmic smart high-side power switch family with 1.0mΩ/1.5mΩ/2.0mΩ/2.5mΩ devices offering 100% pin compatibility
- High current capability with up to 25/29/33/40A DC (I<sub>ON</sub>) and 100A inrush current
- Benchmark energy handling capability:
  - BTS500010-1TAD: E<sub>A</sub> = 300mJ @ 40A / E<sub>AR</sub> = 460mJ @ 40A
  - BTS50015-1TAD: E<sub>A</sub> = 3000mJ @ 33A / E<sub>AR</sub> = 550mJ @ 33A
  - BTS50020-1TAD: E<sub>A</sub> = 1750mJ @ 29A / E<sub>AR</sub> = 250mJ @ 29A
  - BTS50025-1TAD: E<sub>A</sub> = 1050mJ @ 25A / E<sub>AR</sub> = 120mJ @ 25A
- Outstanding protection performance of more than 1,000,000 short circuit cycles (Grade A according to AEC-Q100)
- Current sense with ±8% δK<sub>IL</sub> variation after calibration and fault digital feedback
- Integrated protection functions and diagnostics
- Operating voltage range from 8V to 18V
- 3.3V to VS compatible logic input.
- Very low leakage current at OUT pin.
- Electrostatic discharge protection (ESD)
- Optimized electromagnetic compatibility (EMC)
- Green product (RoHS compliant)
- AEC qualified

**Benefits**

- Reduce number of components at system level (relay, relay driver, socket, fuses, connectors, free-wheeling diode), significantly decreasing the module size and cost.
- Enable new mounting locations to address the next generation of (decentralized) power distribution architectures, simplifying the wire harness.
- Reduce power losses by up to a factor of 7 compared to relay.
- Increased reliability and lifetime cycle. Resettable device immune to dust, shock and vibrations with no maintenance required.
- Power management through integrated current sensing and pulse width modulation (PWM) up to 100Hz.

**Target applications**

- Replacement of electromechanical relays, fuses and discrete circuits in power distribution and junction boxes.
- Drive resistive, inductive and capacitive loads such as heating resistors, filter capacitors, motor, valves and pumps.
- High current applications such as ECU power feeds, auxiliary power outlets, PTC heaters and rear window heaters.
- Systems with high switching cycles and high energy requirements such as "start-stop" and electric brake vacuum pumps.
- General purpose for power distribution and heating applications in the harsh automotive environment such as HVAC blower, glow plug control unit and trailer node.

**Application examples**

- Infineon 8-, 16- and 32-bit automotive microcontrollers, voltage regulators and transceivers.

**Product collaterals / online support**

- Product family page
- Product datasheet pages BTS50020-1TAD BTS50025-1TAD
- Introduction of the Power PROFET™ family – video
- Getting started with the Shield for Arduino with BTS50015-1TAD - video
- Relay and fuse replacement for high current applications – trends and challenges in automotive – on-demand webinar
- Power PROFET™: A simpler solution with integrated protection for switching high- current applications efficiently & reliably - eBook

**Product overview**

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**Support/Tools/Software:**

- 12V protected switch shield with BTS500010-1TAD or with BTS50015-1TAD. Can be used in stand-alone mode or controlled either by an Arduino board or the ARM® powered Infineon XMC™ microcontroller kits using the Arduino form factor.
- OPN (with BTS50010-1TAD): SHIELDBTS500101TADTOBO1
- OPN (with BTS50015-1TAD): SHIELDBTS500151TADTOBO1
- Software example for the shield (DAVE and Arduino) available.

**Block diagram**

- Main controller
- Power PROFET™
- IN
- OUT
- VIN
- VOUT
- ESD protection
- Driver stage
- Gate driver
- Load current sense
- Load voltage sense
- Full temperature range
- Gate oxide
- Common mode noise immunity
- Smart clamping
- Relay driver
- Socket, fuses, connectors, free-wheeling diode
- Relay
- Vacuum pump
- HVAC blower
- Glow plug control unit and trailer node

**Support/Tools/Software:**

- 12V protected switch shield with BTS500010-1TAD or with BTS50015-1TAD. Can be used in stand-alone mode or controlled either by an Arduino board or the ARM® powered Infineon XMC™ microcontroller kits using the Arduino form factor.
- OPN (with BTS50010-1TAD): SHIELDBTS500101TADTOBO1
- OPN (with BTS50015-1TAD): SHIELDBTS500151TADTOBO1
- Software example for the shield (DAVE and Arduino) available.
12V Protected Switch Shield with BTS50010-1TAD

The 12V Protected Switch Shield for Arduino comes with BTS50010-1TAD (R_{DS(ON)} 1.0mΩ), the lowest ohmic smart high-side power switch available in the market.

Designed for relay and fuse replacement in power distribution and junction boxes, Power PROFET™ can drive resistive, capacitive and inductive loads. The Power PROFET™ family targets high current applications (e.g. ECU power feeds, auxiliary power outlets, PTC heaters, rear windows, heaters) and applications with high switching cycles and high energy requirements (e.g. “start-stop” systems, electric brake vacuum pumps).

The shield can be used in stand-alone mode or controlled either by an Arduino board or the ARM® powered Infineon XMC™ microcontroller kits using the Arduino form factor.

**BTS50010-1TAD Arduino shield features**

- Stand alone and microcontroller mode
- Can be controlled with Arduino compatible microcontroller boards such as the XMC™ microcontroller kits from Infineon
- Easy to use “plug and play”
- Fully configurable for different kind of loads

**Benefits**

- Enables quick evaluation of Power PROFET™ for switching loads (BTS50010-1TAD: \(I_{\text{NOM}} = 40A\)). Fast prototyping for switching applications.

**Product collaterals / online support**

- Protected Switch Shield with BTS50010-1TAD for Arduino [product page](#)
- BTS50010-1TAD product [data sheet page](#)
- Infineon Shields for Arduino

**BTS50010-1TAD features**

- One channel device
- Low Stand-by current
- 3.3V to VS level capable input pin
- Electrostatic discharge protection (ESD)
- Optimized Electromagnetic Compatibility (EMC)
- Logic ground independent from load ground
- Very low leakage current at OUT pin
- Compatible to cranking pulse requirement (test pulse 4 of ISO 7637 and cold start pulse in LV124)
- Embedded diagnostic functions
- Embedded protection functions
- Green product (RoHS compliant)
- AEC qualified

**Target applications**

- Replacement of electromechanical relays, fuses and discrete circuits in power distribution and junction boxes.
- Drive resistive, inductive and capacitive loads such as heating resistors, filter capacitors, motor, valves and pumps.
- High current applications such as ECU power feeds, auxiliary power outlets, PTC heaters and rear window heaters.
- Systems with high switching cycles and high energy requirements such as “start-stop” and electric brake vacuum pumps.
- General purpose for power distribution and heating applications in the harsh automotive environment such as HVAC blower, glow plug control unit and trailer node.

**Application examples**

**Block diagram**

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**Product overview**

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**TLT807B0EPV**
Linear voltage regulator for 24V applications. Low dropout adjustable stand-by linear voltage regulator with overvoltage protection.

Trucks as well as commercial, construction and agricultural vehicles have 24V battery operated systems instead of the usual 12V battery in cars. The different voltage requirements lead to a load dump voltage for the latter which is typically higher and could go up to 58V. In addition to higher load dump voltages another important requirement to consider is the lifetime requirements of trucks and commercial agricultural vehicles. A car on average has a lifetime of about 300k km where as heavy duty trucks can have lifetimes of 800k km up to 1000k km. This makes the ‘lifetime’ requirements for these vehicles three times as much as those for cars.

The new TLT807B0EPV not only takes the load dump voltage requirements into consideration but also makes sure that the lifetime requirements are fulfilled by performing extended qualifications. A choice of a robust package in addition to the above mentioned criteria make the TLT807 the first linear voltage regulator specifically designed for trucks and commercial agricultural vehicles!

**Features**

- Enable
- Adjustable output voltage
- Output voltage accuracy: 2 percent
- Output current: 70 mA
- Current consumption: 36 μA
- Overvoltage protection up to 58 V
- Available in TSDSO-14 package
- Wide operating temperature range: -40°C ≤ Tj ≤ 150°C

**Benefits**

- Load dump voltage up to 58 V → Requirement for 24 V battery powered applications
- Robust TSDSO-14 package → Longer lifetime requirements for trucks, commercial and agricultural vehicles
- Low dropout voltage and quiescent current → Suitable as a stand-by supply
- Extended qualification strategy for longer lifetime requirements

### Application examples

- TLT807 Stand-by 5 V, up to 0.07 A
- TLT807 Stand-by 5 V, up to 2.3 A
- Adjustable, up to 0.8 A
- Adjustable, up to 0.5 A
- Adjustable, up to 0.15 A

### Target applications

- Stand-by linear voltage regulator for
  - 24 V applications
  - Trucks, commercial vehicles, construction vehicles, agricultural vehicles

### Product collaterals / online support

- Product page
- Product datasheet
- Evaluation board page

### Completing products

- Post regulators (TLS20x products), 60V DCDC (TLE6389)

### Evaluation board for 24V stand-by supply TLT807B0

- TLT807B0EPVBOARDTOBO1, SP001704180, 5000EUR/100pcs

### Product overview

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