

Efficient Lighting

Intelligent solutions for LED drivers and lamp ballast control





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Efficient Lighting

Intelligent solutions for LED drivers and lamp ballast control

INFINEON DELIVERS INNOVATIVE, high-performance solutions with best-in-class technologies that can be used in a broad portfolio of applications ranging from room lighting to automotive, the activation of light sources, energy-saving lamps, and light management systems. Our product portfolio consists of lamp ballast controllers as well as LED and lamp driver solutions characterized by high efficiency and cost effectiveness which meet the evolving and expanding requirements of lighting applications.

- Smart ballast controller for fluorescent lamps
- CoolSET™ ICs for efficient off-line LED power supplies
- Low-cost BCR 4xx series LED drivers designed for industrial and automotive applications
- High-performance driver ICs with integrated diagnostic functions that are designed to supply constant current to white or color LEDs up to 500mA
- PROFET™ switches for advanced high-side applications

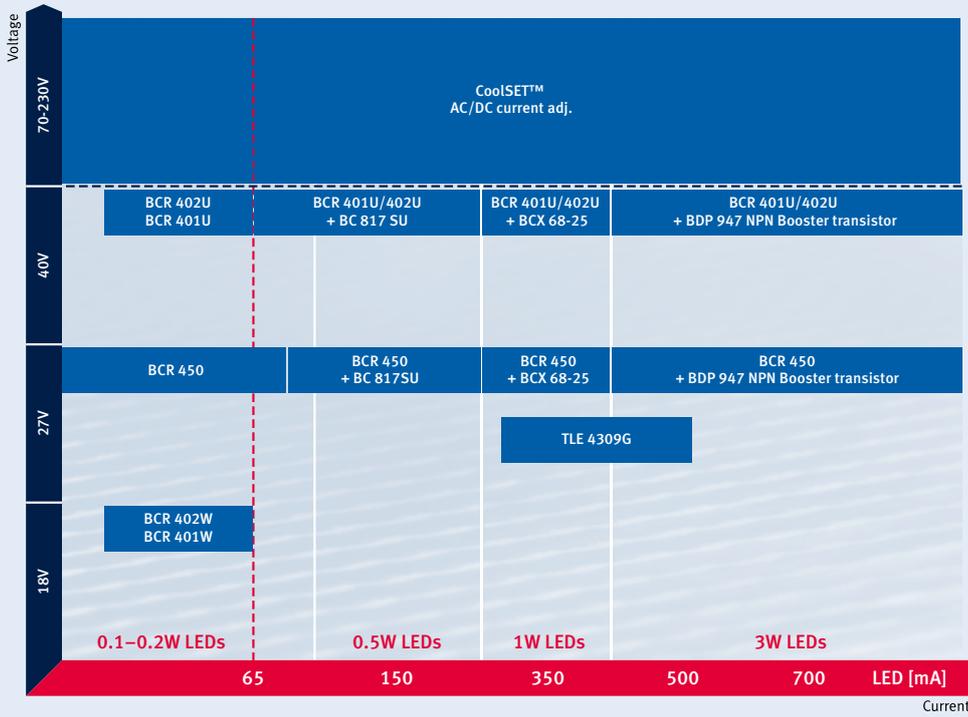
DUE TO OUR HIGHEST level of quality, service and technology, Infineon is an OSRAM “LED Light for you” certified partner who supports costumers with outstanding and forward-looking solutions for Solid State Lighting (SSL).



Smart ballast control

| | | Device | | |
|---|--|--------------------|-----------|-----------|
| | | ICB1FL02G | ICB2FL01G | ICB2FL02G |
| Technical Features | $\eta > 90\%$ @ low line Input Voltage | ✓ | ✓ | ✓ |
| | PF close to 1 | ✓ | ✓ | ✓ |
| | THD | < 10% | < 5% | < 5% |
| | Improved THD in DCM | - | ✓ | ✓ |
| | Integrated High and Low Side | ✓ | ✓ | ✓ |
| | Integrated PFC | ✓ | ✓ | ✓ |
| | Supports Multilamp Design 1 - 4 Lamps | ✓ | ✓ | ✓ |
| | Universal Input Voltage Range Design | ✓ | ✓ | ✓ |
| | Application Specific Features | EOL1 & 2 Detection | ✓ | adj. |
| CapLoad 1 & 2 Detection | | ✓ | 1 | ✓ |
| Filament Detection | | ✓ | ✓ | ✓ |
| Dead Time: adjustable and self adapting | | fix | ✓ | ✓ |
| Emergency Lighting | | - | ✓ | ✓ |
| Supports Customer IN Circuit Test Mode | | - | ✓ | ✓ |
| Supports Choke Saturation during Ignition | | - | ✓ | ✓ |
| Supports low EMI Topologies | | ✓ | ✓ | ✓ |
| Supports Dimming | | - | ✓ | ✓ |

LED drivers for general lighting and industrial applications



LED and lamp drivers for automotive applications



Industrial

Outdoor



- BCR 40x / BCR 450
- TLE 4309
- TLD 5085
- TLD 5095
- TLE 6389-2
- CoolSET™

Architectural lighting



- BCR 40x / BCR 450
- TLE 424x
- TLE 4309
- TLD 5085
- TLD 5095
- TLE 6389-2
- CoolSET™
- Smart ballast IC

Advertising and channel letters



- BCR 40x / BCR 450
- TLE 4309
- TLD 5085
- TLD 5095
- TLE 6389-2
- CoolSET™

Emergency lighting



- BCR 40x / BCR 450
- TLE 424x
- TLE 4309
- CoolSET™

Traffic lighting



- TLE 424x
- TLE 4309
- TLD 5085
- TLD 5095
- TLE 6389-2
- CoolSET™

Residential lighting



- BCR 40x / BCR 450
- TLE 424x
- TLE 4309
- TLD 5085
- TLD 5095
- TLE 6389-2
- CoolSET™

Retail display lighting



- BCR 40x / BCR 450
- TLE 4309
- TLD 5085
- TLD 5095
- CoolSET™
- Smart Ballast IC

Medical and transportation



- BCR 40x / BCR 450
- TLE 4309
- TLE 424x
- TLE 5085EJ
- TLE 6389-2



Automotive

Backlighting

Dashboard

Navigation system



- BCR 40x
- TLE 424x
- SPIDER

- BCR 40x
- SPIDER
- TLD 5095

Interior

Interior illumination

Interior indication



- TLE 424x
- TLD 5085
- TLE 6389-2
- SPIDER

- BCR 40x
- TLE 424x
- TLD 5085
- TLE 6389-2

Exterior

Front lighting / daytime running light

Rear/signal lighting



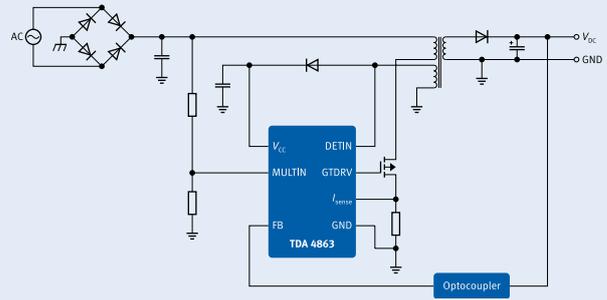
- TLE 424x
- Boost converter
- SPI Power Controller (SPOC)
- PROFET™
- TLD 5095

- BCR 40x
- TLE 424x
- TLD 5085 / TLD 5095
- TLE 6389-2
- SPI Power Controller (SPOC)
- PROFET™

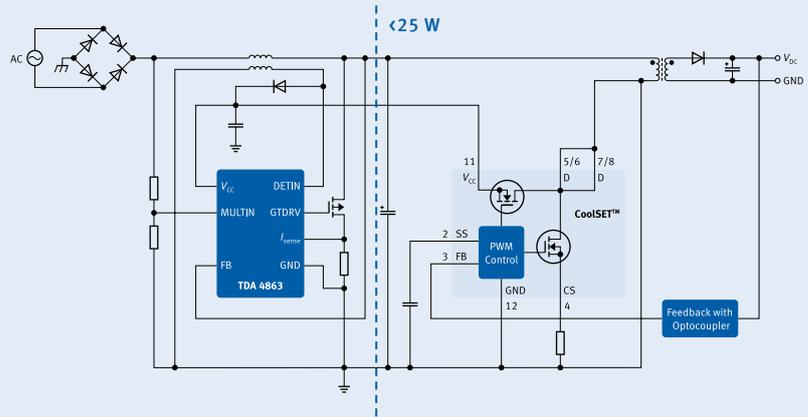
General Lighting and Industrial Applications

Single Stage Isolated Topology with PFC >25W

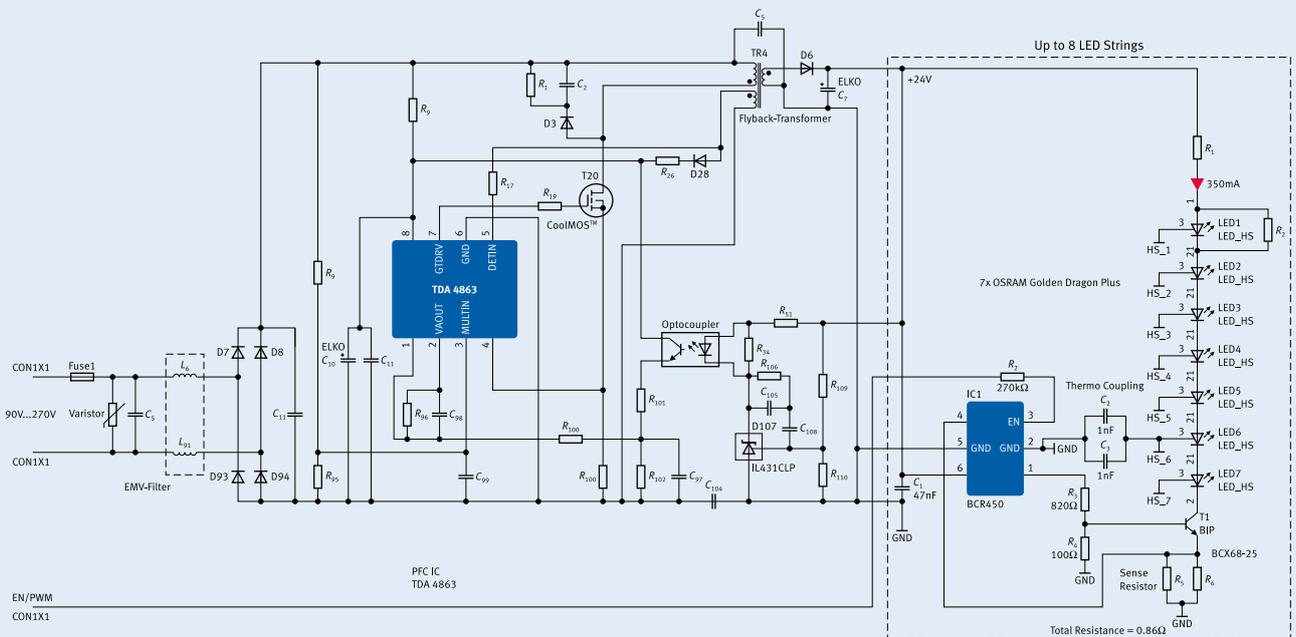
- TDA 4863
- High power factor >0.9
- PWM dimming
- High efficiency up to 90%
- Low EMI
- Optimized system cost
- Small footprint



- TDA 4863, CoolSET™
- Universal input 80-270V AC
- Variable, stable output (10V-50V)
- Very high power factor >0.98
- PWM dimming down to <1%
- Efficiency >85%
- Flexible design
- For single string no linear regulator on secondary side necessary

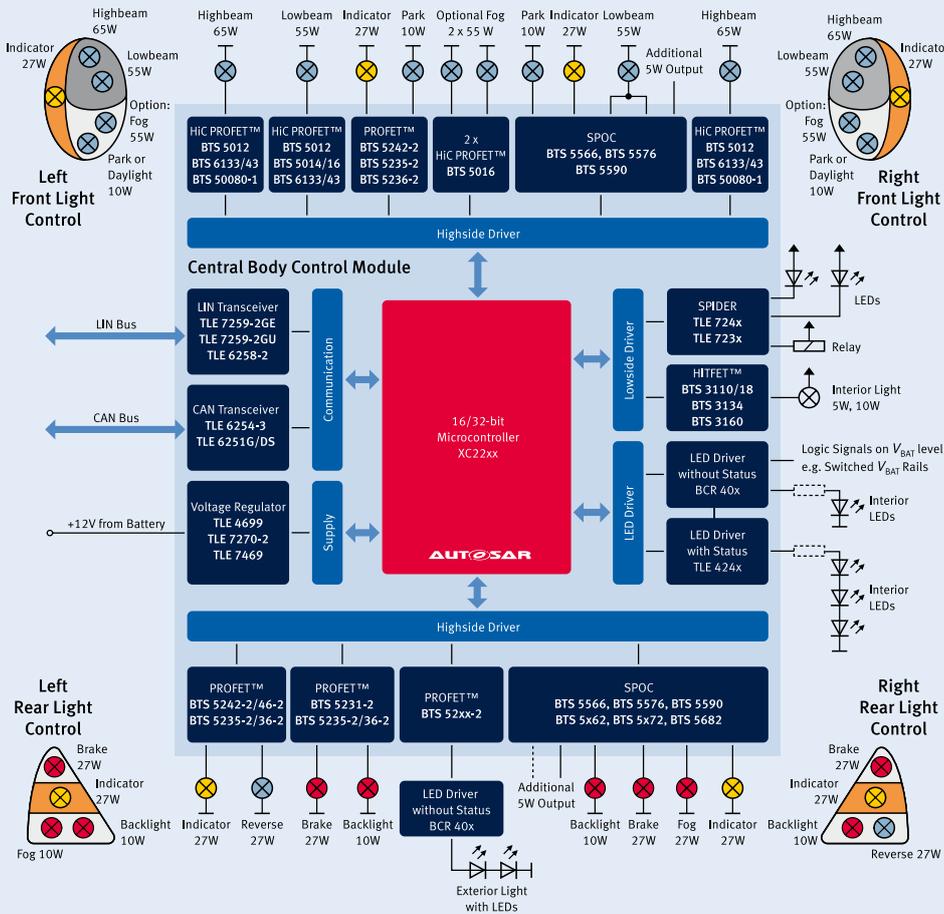


AC/DC LED driving solution with PFC for up to 50W



- PFC-DCM control IC as SMPS for conversion from 90 – 270V AC to 24V DC
- One linear LED driver BCR450 per string in combination with a booster transistor control the LEDs

Automotive Applications



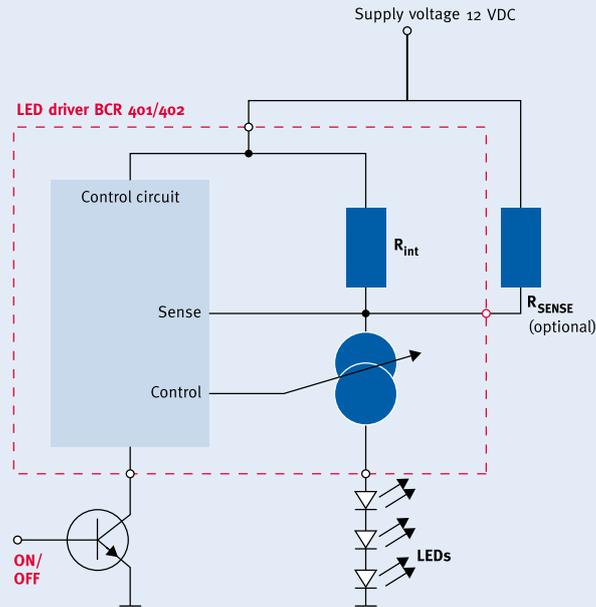
INFINEON OFFERS A WIDE variety of automotive qualified products dedicated for LED driving in the interior and exterior area, e.g. protected single and multi-channel power switches for bulbs and LEDs, protected linear LED drivers with diagnostic functionality, switched DC/DC buck and boost high-current LED driver, LEDs in front lights.

THE EXEMPLARY DIAGRAM shows a typical central body control module consisting of a microcontroller, lighting elements, power switches as well as supply ICs and network transceivers.

BCR 401W/402W | BCR 401U/402U

Low-cost LED drivers for general lighting applications

Application example



Key features

- Output current from 10-65mA adjustable by external resistor
- Output current can be increased to > 1A by using an external booster transistor
- V_s up to 40V
- Self-protection due to negative temperature coefficient
- Enable pin can be used for PWM and ON/OFF

WITH THE BCR 401/ BCR 402 driver family, Infineon targets low-current LED lighting applications. The output current range from 10mA to 65mA can be adjusted with an external resistor. For 0,5W LEDs, three LED drivers can be used in parallel operation to avoid hotspots and therefore enable the customer to take low cost FR 4 boards. Due to the negative temperature coefficient of these drivers, this can be realized without emitter ballasting.

The advantages versus resistor biasing are:

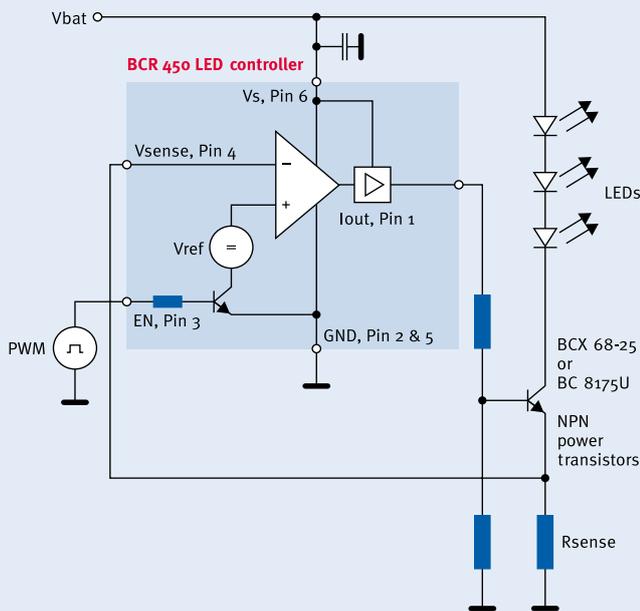
- In case of different forward voltages of LEDs, the BCR401/ 402 ensure homogenous light output → customer can avoid higher purchasing costs for special binned LEDs
- Constant current supply of LED driver avoids thermal overstress and therefore increases lifetime of LEDs

Benefits

- Lowest cost LED driver in the industry
- Higher output current precision, less voltage drop and less complexity than resistor or discrete solution
- PWM dimming possible with external digital transistor
- Constant current ensures homogenous light output, because current is directly proportional to light output

BCR 450

High-precision controller for high-power LEDs



Application example

- Using BCR450 and external NPN booster transistor:
 - For 0.5W LEDs: BC817SU in SC74
 - For 1W LEDs: BCX68-25 in SOT89
 - For 3W LEDs: BDP947 in SOT223
- Reverse polarity protection with:
 - BAS3007A-RPP in SOT143
 - BAS3010A-03W in SOD323

THE BCR 450, with features like overcurrent, overvoltage and thermal protection, is designed for high current general lighting applications. The 85mA current in stand-alone mode can be extended to up to 2.0A with an external booster transistor. This circuit for high current applications is described in 'Application Note AN105' (page 39).

With the ability to drive high-power LEDs in combination with additional protection features and a price-performance ratio that is benchmark in the industry, the BCR 450 offers a unique yet cost-effective way to drive high-power LEDs.

Benefits

- Thermal shutdown protects the LEDs from permanent damage
- Linear concept eliminates EMI problems
- External power stage allows improved heat dissipation in comparison to monolithic drivers
- Higher count of LEDs possible in a string due to very low overhead voltage
- Less space needed on PCB as no coils, inductors or external digital transistor required for PWM
- Excellent price-performance ratio due to separation of power stage from higher cost IC technology

Key features

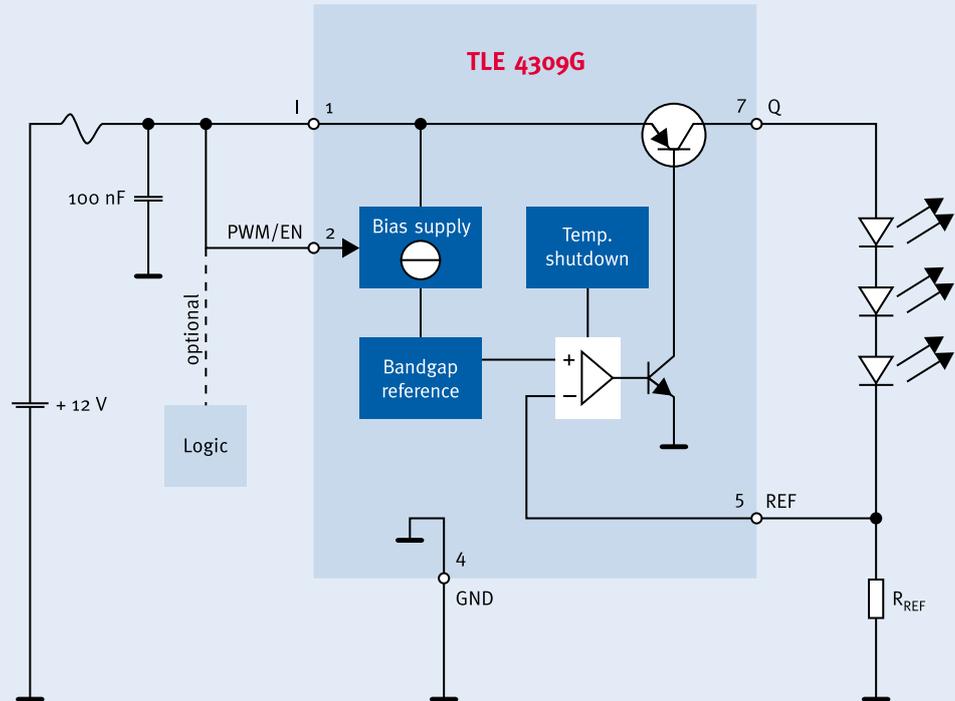
- High output current precision of +/- 1.5% at 25°C
- Current range:
 - Stand-alone mode: up to 85mA
 - Booster circuit: 85mA – 2000mA
- Maximum operating voltage: 27V
- Overvoltage and over-current protection
- Thermal shutdown
- Low voltage overhead in boost mode of only 0.5V (0.15V at sense resistor + 0.35V at booster transistor)
- Direct PWM possible due to logic-level enable input
- Automotive version TLD 1211MA (available Q4 2009)



TLE 4309G

500mA adjustable linear LED driver

Application example



Key features

- Adjustable constant current up to 500mA
- PWM / enable input
- $1\mu\text{A}$ quiescent current when disabled
- Overtemperature protection
- Short-circuit proof
- Reverse polarity protection
- TO-263 package

THE TLE 4309G is an integrated adjustable constant current source for driving loads up to 500mA. The output current level can be adjusted with an external shunt resistor. Supplying high-power LEDs with the TLE 4309G ensures constant brightness independent from supply voltage or LED forward voltage spread. Therefore, LED lifetime is extended by protecting from overcurrent and overtemperature. The PWM/EN input permits LED brightness regulation by pulse width modulation. Setting the pin to “low” switches off the IC entirely. Due to the high impedance of the PWM/EN input, the TLE 4309G can be used as a protected high-side switch. Protection circuits prevent damage to the IC in case of overload, short circuit, and reverse polarity. A chip temperature monitoring circuit shuts off the power stage and prevents the IC from destruction under fault conditions. The LEDs are also protected against reverse supply. Input voltage peaks up to 45V are absorbed by the IC, preventing the LEDs from overcurrent. The TLE 4309G is provided in the surface mounted PG-TO-263.

Benefits

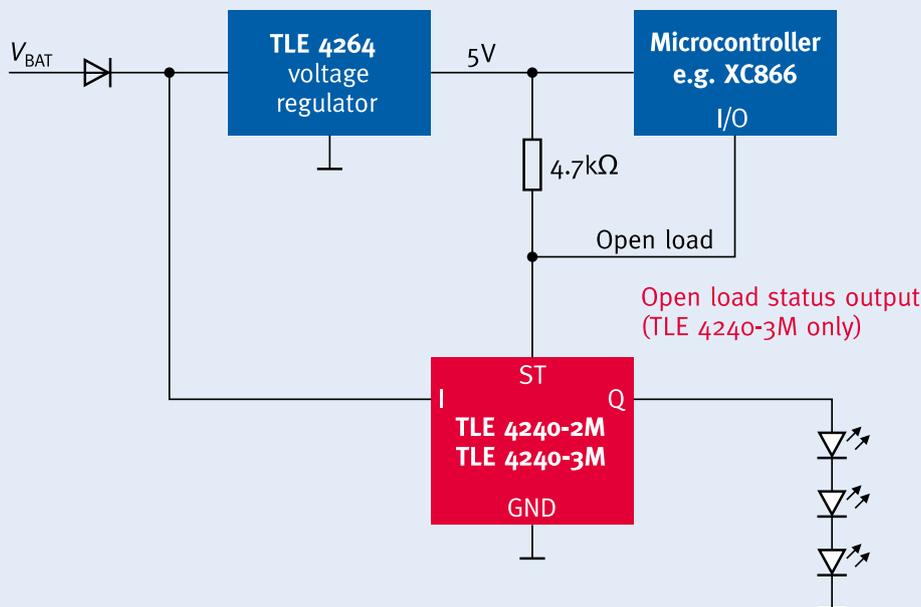
- Supports all LEDs with currents up to 500mA
- Exact brightness setting
- Complete protection
- Allows extended LED lifetime

TLE 4240-2M/-3M

60mA linear LED driver



Application example



THE TLE 4240 -2M/-3M is a monolithic integrated, low dropout linear constant current source. It is designed to supply white or color LEDs in order to achieve constant brightness and extended LED lifetime, independent from supply voltage or LED forward voltage class. Protection circuits prevent damage to the device in case of overload, short circuit, reverse polarity and overheating. The LEDs connected are protected against reverse polarity transients as well as against voltages up to 45V. The safe operation area (SOA) monitoring function limits the output current in case of a very high drop voltage across the regulator. The TLE 4240-3M version is equipped with a status output indicating an open-load failure condition. The TLE 4240-2M/-3M is supplied in a space-saving PG-SCT5 95-5 package offering minimal thermal resistance.

Benefits

- Constant LED brightness
- Extended LED lifetime
- Protection of LED devices in automotive applications
- Diagnostic capability
- Small footprint

Key features

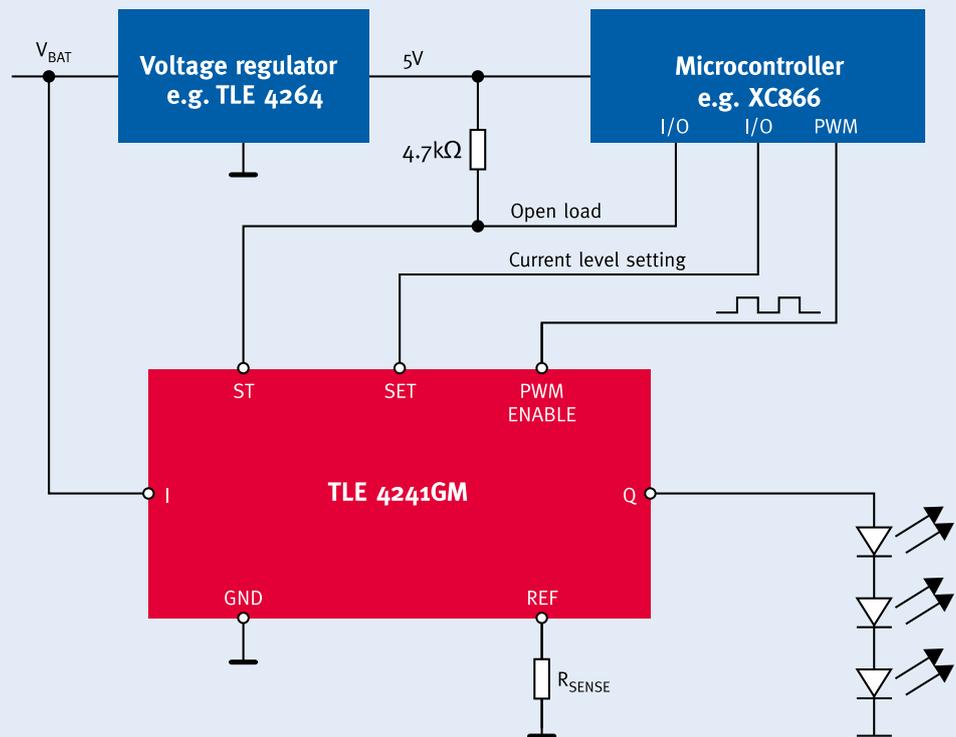
- Constant output current of typ. 60mA
- Low dropout voltage
- Open load diagnosis output (version TLE 4240-3M)
- Safe operation area circuit monitoring drop voltage
- Short-circuit protection to GND and VBAT (up to 45V)
- Reverse polarity protected
- PG-SCT5 95-5 package



TLE 4241GM

70mA adjustable linear LED driver

Application example



Key features

- Adjustable constant output current up to 70mA
- Low dropout voltage
- Dual mode for tail and stop light (high/low current SET)
- PWM input (e.g. for individual dimming) up to 1kHz
- Open load diagnosis output
- Input voltage range up to 45V
- Reverse polarity protected
- Short-circuit protection to GND and VBAT
- PG-DSO-8 package

THE TLE 4241GM is an integrated adjustable constant current source, providing an output current adjustable via different means (SET, PWM, reference resistor). The output is kept independent from load and supply voltage changes. The IC is designed to supply LEDs under the severe conditions of automotive applications resulting in constant brightness and extended LED lifetime. It is provided in the very small PG-DSO-8-16 package. Protection circuits prevent damage to the device in case of overload, short circuit, reverse polarity and overtemperature. The connected LEDs are protected against reverse polarity as well as excess voltages up to 45V. A status output allows handling of open load and short circuit at the main output. A PWM input offers the possibility to adjust the LED brightness by pulse width modulation. With an implemented high/low current switch, the output current level can be reduced, e.g. for brake/tail light applications.

Benefits

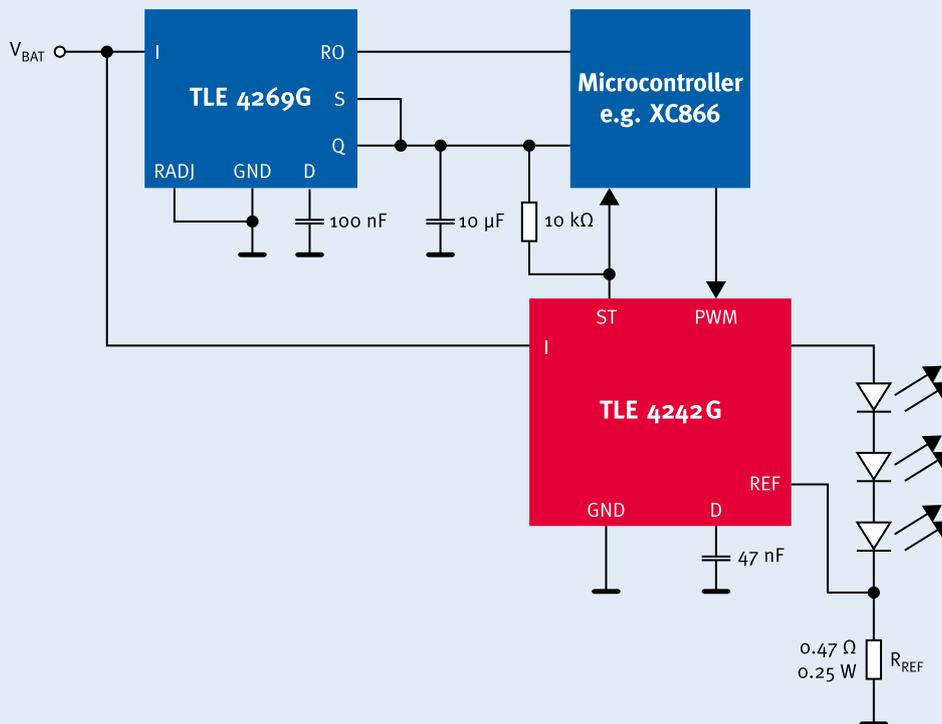
- Supports the full spectrum up to 70mA
- Exact brightness adjustment
- High/low brightness switch without PWM
- Displays malfunctions
- Complete protection

TLE 4242G

500mA adjustable linear LED driver



Application example



THE TLE 4242G is an integrated adjustable constant current source driving loads up to 500mA. The output current level can be adjusted via an external resistor. The IC is designed to supply high-power LEDs (e.g. Osram Dragon LA W57B) under the severe conditions of automotive applications resulting in constant brightness and extended LED lifetime. Protection circuits prevent damage to the device in case of overload, short circuit, reverse polarity and overheating. The connected LEDs are protected against reverse polarity as well as excess voltages up to 45V.

The integrated PWM input of the TLE 4242G permits LED brightness regulation by pulse width modulation. Due to the high input impedance of the PWM input the LED driver can be operated as a protected high-side switch.

Benefits

- Support for all currents up to 500mA
- Exact brightness setting
- Malfunctions are displayed
- Complete protection

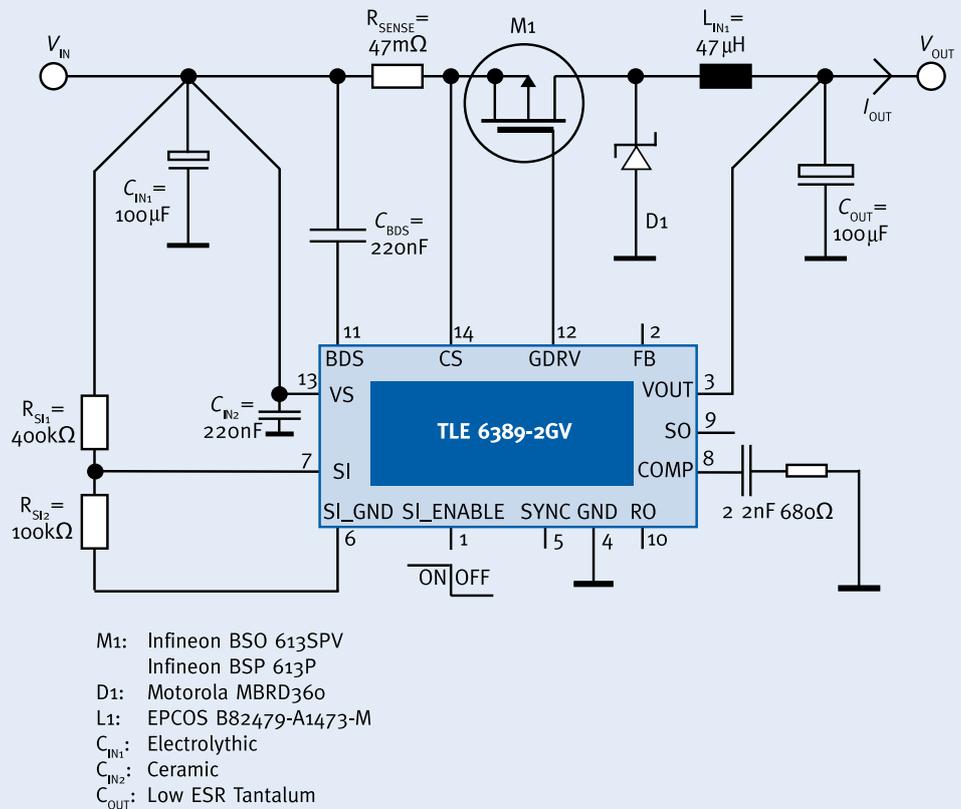
Key features

- Adjustable output current up to 500mA
- Low dropout voltage
- PWM input (dimming, switching between brake and tail light, etc.)
- Diagnosis output
- Overtemperature protection
- Short-circuit protection to GND and VBAT
- Reverse polarity protected
- Input voltage range up to 45V
- TO-263 package

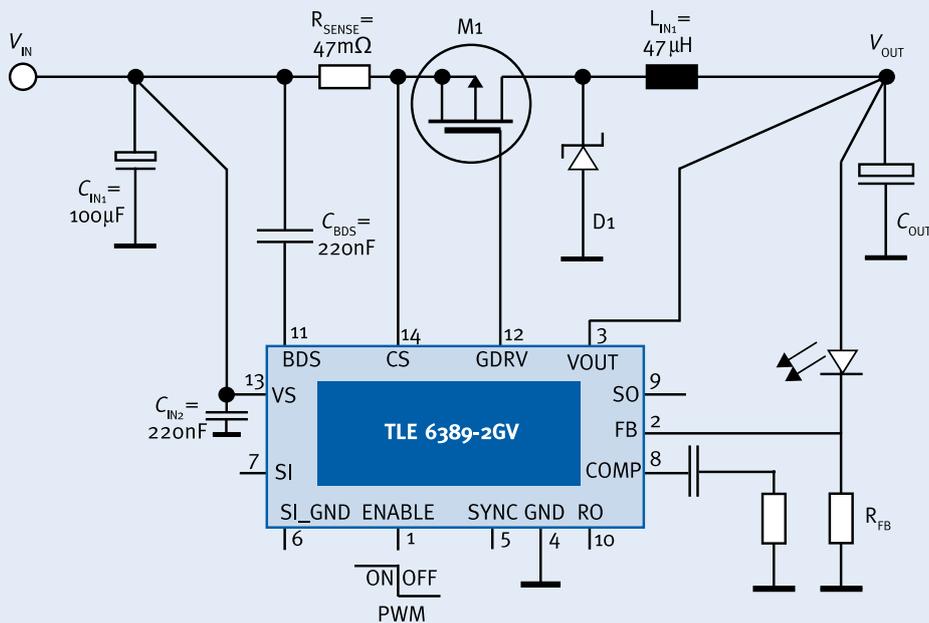
TLE 6389-2GV

Step-down/buck converter with wide input voltage range

TLE 6389-2GV constant-voltage application example



THE TLE 6389-2GV STEP-DOWN DC/DC switching controller provides a high efficiency for loads up to 2.3A, suitable to drive several high current LEDs. Input voltages up to 60V are possible, enabling the use of this device for 24V/48V power networks (e.g. trucks, industrial applications). A unique PWM/PFM control scheme eliminates minimum load requirements and reduces the supply current under light loads down to 120µA, depending on dimensioning of external components. The TLE 6389-2GV can be shut down via the enable input, reducing the input current down to <2µA. Via the enable pin, it is also possible to apply PWM signals for LED brightness dimming. The TLE 6389-2GV step-down controller drives an external p-channel MOSFET, allowing design flexibility. Output capacitor requirements are also reduced, minimizing PC board area and system cost. Depending on the load requirements, the output can be configured for CV, constant voltage or constant current operation. A fixed 5V output voltage controller is also available (TLE 6389-2GV50).



TLE 6389-2GV constant-current/LED driving example

Benefits

- High output current of up to 2.3A
- Wide input voltage range up to 60V
- Integrated supply supervisory
- Diagnostic capability
- PWM input

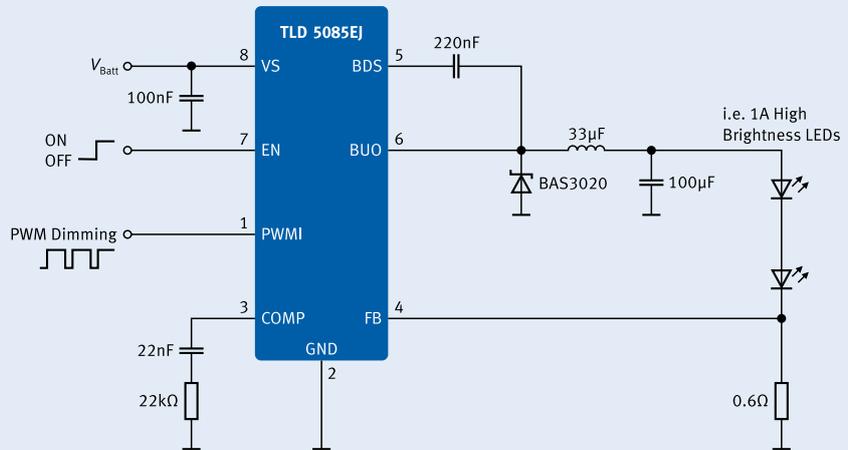
Key features

- Input voltage range from <5V up to 60V
- Output voltage: 5V fixed or adjustable
- Output voltage accuracy: 3%
- Output current up to 2.3A
- 100% maximum duty cycle
- Less than 120µA quiescent current at low loads
- Max. 2µA quiescent current in shutdown mode
- Fixed 360kHz switching frequency
- Frequency synchronization input for external clocks
- Current mode control scheme
- Automotive temperature range -40°C to 150°C

TLD 5085EJ

DC/DC constant current LED driver

Application example



Key features

- Adjustable up to 1.8A constant current
- Typical output voltage: $V_{bat} - 1V$ difference
- Integrated power stage
- Input voltage range from 4.75V to 45V
- 370kHz switching frequency
- PWM input for LED dimming and enable input pin
- Automotive temperature range $-40^{\circ}C$ to $150^{\circ}C$
- PG-SO8 package with exposed heatslug

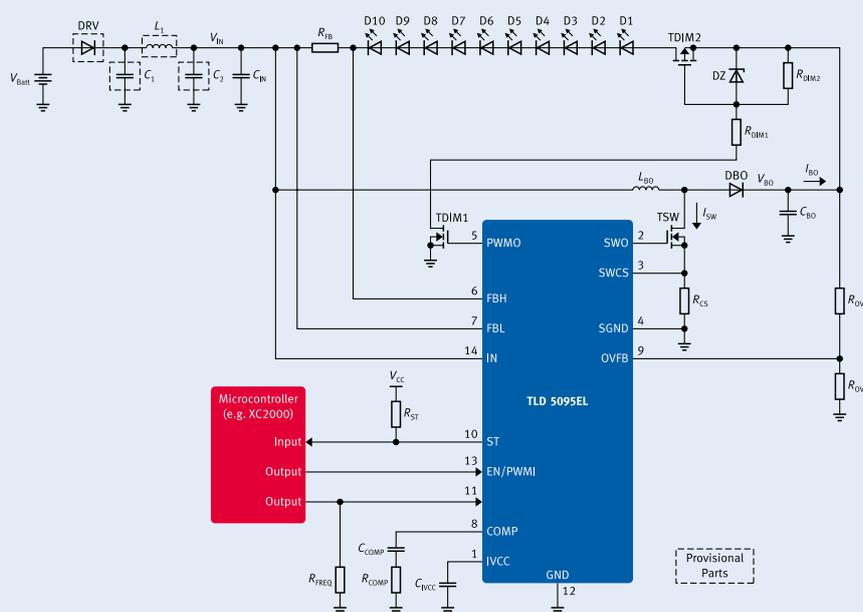
THE TLD 5085EJ is a monolithic integrated high-brightness LED driver circuit that provides all active functions for a constant current switching regulator, capable of delivering up to 1.8A load current with excellent line and load regulation. This device is suited for use under the harsh automotive electronics environmental conditions, featuring protection functions such as short-circuit and over-temperature protection. The switching frequency of 370kHz allows the use of small and inexpensive passive components. The TLD 5085EJ features an enable/PWM input, reducing the shut-down current consumption to $<2\mu A$. The voltage mode regulation scheme of this device provides a stable regulation loop maintained by small external compensation components.

Benefits

- Very small, thermally enhanced package (DSO 8 size)
- PWM capability for LED dimming
- Few external components because of high integration (power stage)

TLD 5095EL

For advanced high-side applications



Application example

THE TLD 5095EL IS A smart LED boost controller with built in protection and diagnostic features. The main function of this device is to step-up (boost) the output voltage and regulate a constant LED current. The constant current regulation is especially beneficial for LED color accuracy and longer lifetime. The TLD 5095EL also has a PWM output for dimming an LED load. The diagnostics are communicated on a status output (pin ST) to indicate a fault condition such as an LED open circuit. The switching frequency is adjustable in the range from 100-500kHz and can be synchronized to an external clock source. The current mode regulation scheme of this device provides a stable regulation loop maintained by small external compensation components. The integrated soft-start feature limits the current peak as well as voltage overshoot at start-up.

Benefits

- Well-suited for head lamp and DRL applications
- Very small, thermally enhanced package (DSO8 size fine pitch)
- High flexibility in terms of LED chain length, two configurations possible: return to ground and return to battery
- Dedicated feature set specified for LED application in automotive

Key features

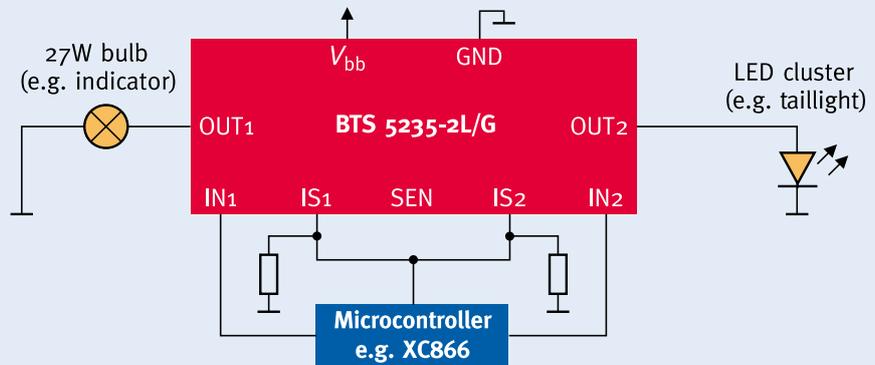
- Wide input voltage range from 4.75V to 45V
- Constant current or constant voltage regulation
- Very low shutdown current: $I_{Q} < 10\mu\text{A}$
- Flexible switching frequency, 100 kHz to 500 kHz
- Synchronization with external clock source
- PWM dimming
- Output overvoltage protection
- Internal soft start
- Overtemperature shutdown
- Available in a small, thermally enhanced PG-SSOP-14-3 package
- ES samples will be available in Q3 2009



Green PROFET™ Switches

For advanced high-side applications

Application example



Product portfolio

- BTS 5231-2GS
- BTS 5235-2G
- BTS 5235-2L
- BTS 5236-2GS
- BTS 5242-2L
- BTS 5246-2L

Key features

- 2-channel high-side power driver (140-19mΩ)
- CMOS- and TTL-compatible input
- Open-load detection in OFF and ON state
- Proportional load-current sense
- Differentiation between OL and SC in ON state
- Short-circuit protection
- Thermal shutdown
- Overvoltage protection (incl. load dump)
- Under- and overvoltage shutdown
- Loss of ground and loss ofVbb protection
- SOP-20 / SOP-14 / SOP-12 exposed pad package

INFINEON'S NEW PROFET™ "-2" FAMILY is a set of 2-channel high-side power drivers ranging from 19 to 140mΩ. They offer complete protection against the harsh automotive environment. Their state-of-the-art diagnostic features cover all possible failures that the application may encounter.

The family is suitable to drive LED lamps, bulb lamps, as well as inductive loads such as motors for various automotive and industrial applications. Because of high current limitation values, devices in the family can turn high capacitive loads on without overheating.

All ICs in the family have current sense, and their diagnostics signal can differentiate between open loads and short circuits in the ON state. The complete family is PWM-capable in order to improve bulb lifetime.

Benefits

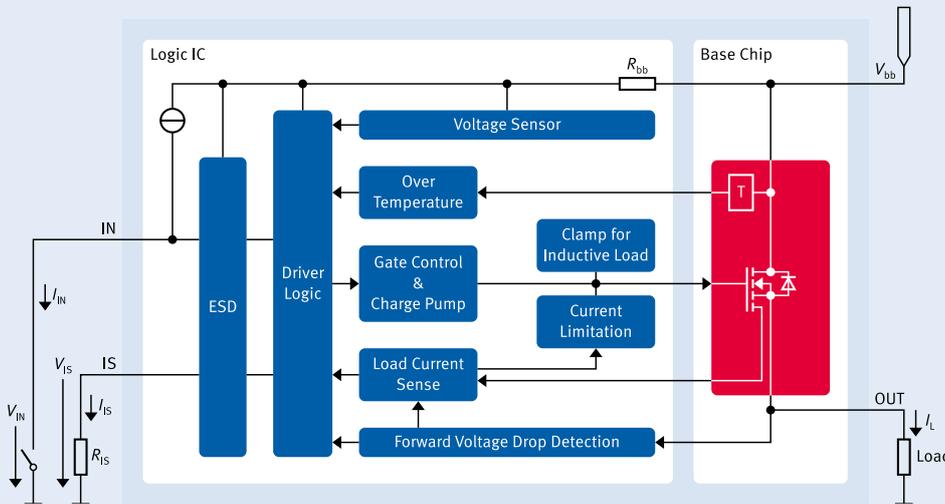
- State-of-the-art diagnostics and protection feature set for high-side applications
- High current limitation values
- Life span improvement for light bulbs due to PWM capability
- Improved short-circuit robustness (especially BTS 5231-2GS, BTS 5236-2GS)

High-Current PROFET™ in Green DPAK

Power and flexibility



Block diagram



Product portfolio

- BTS 6143D
- BTS 6133D
- BTS 5012SDA
- BTS 5014SDA
- BTS 5016SDA
- BTS 50080-1TEA
- BTS 50080-1TEB

INFINEON'S HIGH CURRENT PROFET™ in Green DPAK package are a family of single channel high-side drivers (with $R_{DS(ON)}$ ranging from 8 to 16mΩ). The devices have the same functionality and are pin-to-pin compatible; thus, they enable scalability by $R_{DS(ON)}$ and related parameters; they all have current sense, and provide an embedded set of protection and diagnostic features, also including ReverSave™.

The family is suitable to drive all types of resistive (bulbs, heaters), inductive (solenoids, motors) and capacitive loads, and are particularly suitable for loads with high inrush current, such as high-beam/low-beam conventional and HID, fog lights, trailer nodes, etc.

The inverse load current capability, available only on BTS 6133D and BTS 50080-1TEB, makes these devices optimized for driving HID lamps.

Benefits

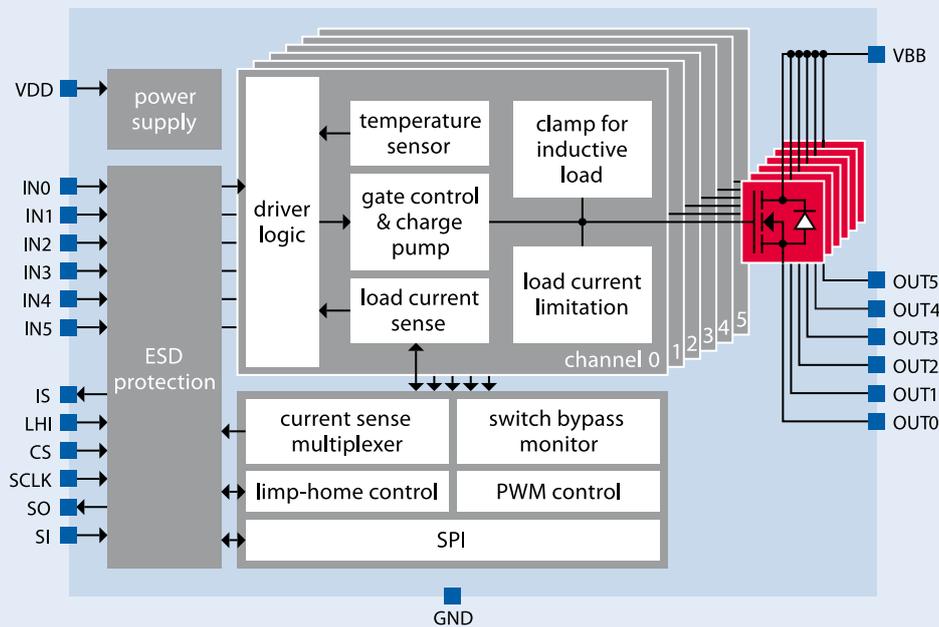
- Scalability, allowing complex load combination partitioning and optimized board design and layout
- ReverSave™ function; switching the power transistor on, in case of reverse battery, reduces power dissipation
- Protection of both the load and the device, with failure diagnostic capability
- Load current monitoring from 500mA to several amperes and high current-limitation values

Key features

- Overload, short circuit, overtemperature and overvoltage protection
- Loss of ground and loss of V_{bb} protection
- Open-load detection
- Multi-step current limitation
- Current sense with fault signal generation
- Very low stand-by current
- Optimized Electro-magnetic Compatibility (EMC)
- PWM capability

SPI Power Controller (SPOC II)

Second-generation integrated multichannel switch family for body lighting



Block diagram of the 6-channel BTS 5672E, with LED mode and cranking options

SPOC II CONSISTS OF a family of 5- or 6-channel integrated high-side switches suitable for driving rear and central lighting loads into a Body Control Module (BCM). The complexity and density of BCMs is constantly increasing with more loads and features inside the module, and car manufacturers are looking for modular BCM concepts which allow them to use the same platform with various options: for example, for multiple car models, with or without LED option. The SPOC II family, scaled by number of channels and features (basic, LED mode, cranking), addresses this trend and integrates multiple channels inside one package to reduce board space. SPOC II devices feature a Serial Peripheral Interface (SPI), enabling customers to save I/Os in the microcontroller and reduce the amount of external components required for a discrete implementation. The LED mode in BTS 5672E and BTS 5682E is programmable via SPI.

Benefits

- Scalability by feature (basic, LED mode, cranking) and number of channels (5 or 6)
- I/O savings with SPI daisy-chain configuration, particularly for BCMs with higher complexity/load density
- Less routing effort and reduced PCB space
- Fewer external components required in the BCM
- PWM via SPI possible

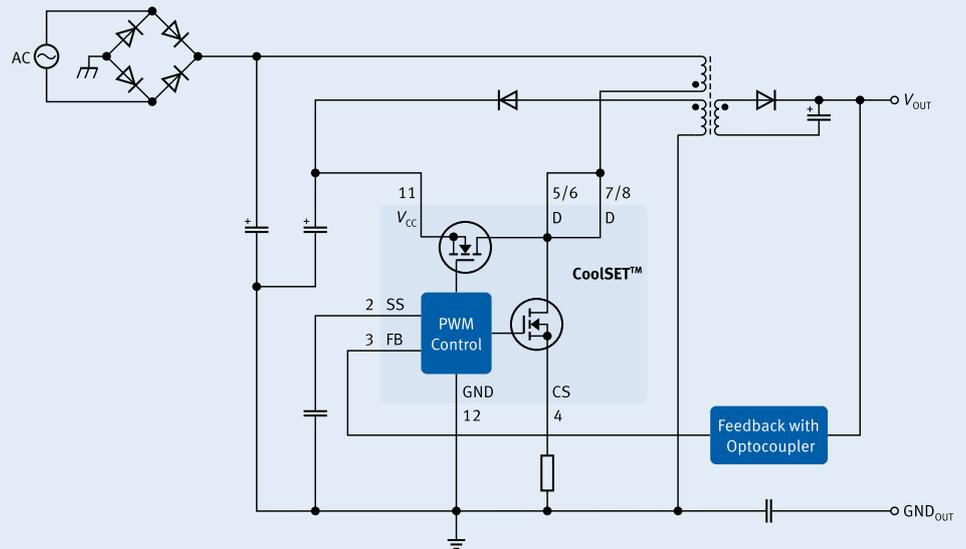
Key features

- Load type configuration via SPI (bulbs or LEDs) for load optimization
- Integration of five or six channels inside one device
- 8-bit SPI for control and diagnostic
- Selectable AND/OR combination for parallel inputs (PWM control)
- Multiplexed proportional load-current sense signals

CoolSET™

Off-line LED SMPS solution for higher power LEDs

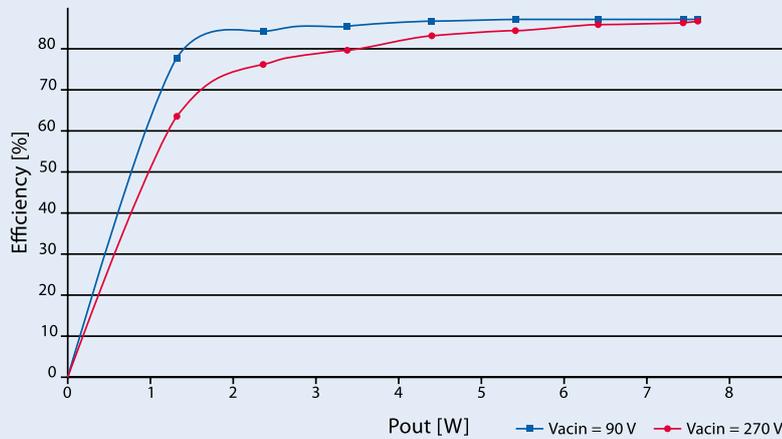
Application example



FOR HIGHER POWER LEDs, Infineon Technologies provides a compact and flexible off-line LED SMPS solution, which was designed to give maximum safety, reliability and improved EMI performance while protecting the LEDs during load transients. The compact design is suitable for use worldwide and ensures highly efficient driving of up to 10 series LEDs at up to 350mA. The circuit also features a highly accurate output current control and a very low standby power rating during no load condition.

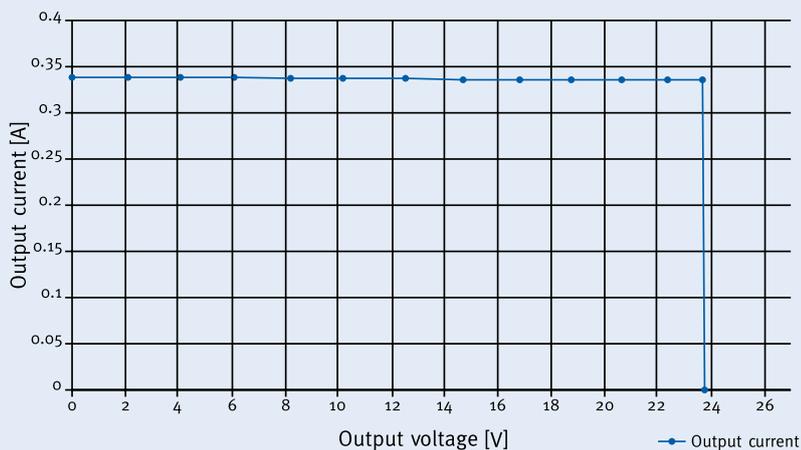
Benefits

- CoolSET™ simplifies LED drive implementation with a minimum requirement of external components



Efficiency and regulation

■ Efficiency >85%



■ High accurate current/
voltage regulation
using TLE 4305G and
CoolSET™ ICE B0365JG

Key features

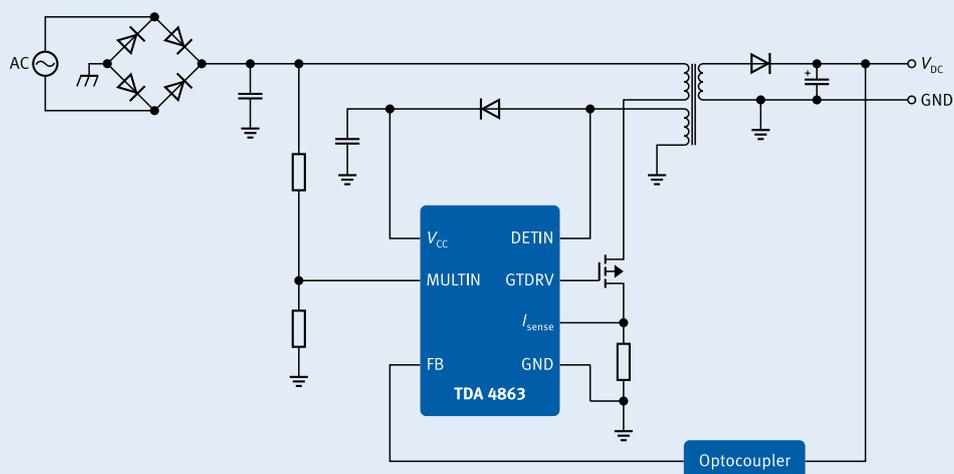
- Integration of sophisticated control IC and leading-edge CoolMOS™ FET technology
- 650V or 800V rated for universal input compatibility
- Start-up cell for reduced component count
- Low standby power
- Frequency jitter for good EMC performance
- Overvoltage protection
- Overcurrent protection
- Overtemperature protection
- Auto restart



TDA 4863

PFC-DCM (discontinuous conduction mode) control IC for SMPS

Application example



Key features

- IC for sinusoidal line-current consumption
- Power factor achieves nearly 1
- Controls boost converter as active harmonic filter for low THD
- Start-up with low current consumption
- Zero current detector for discontinuous operation mode
- Output overvoltage protection
- Output undervoltage lockout
- Internal start-up timer with low current consumption
- Totem pole output with active shutdown
- Internal leading-edge blanking LEB

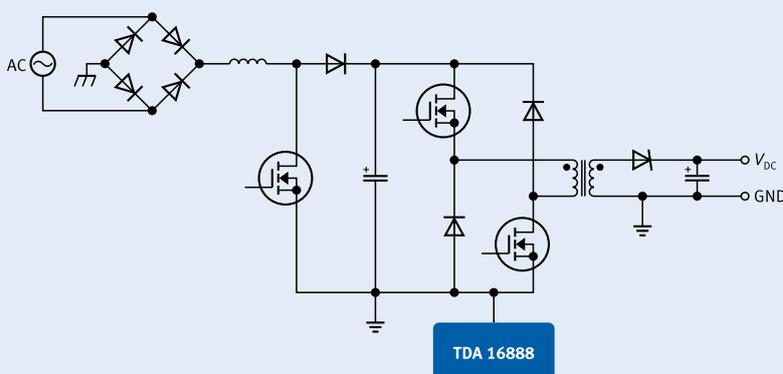
THE TDA 4863 IC CONTROLS a boost converter in a way that sinusoidal current is taken from the single phase line supply and stabilized DC voltage is available at the output. This active harmonic filter limits the harmonic currents resulting from the capacitor pulse charge currents during rectification. The power factor which describes the ratio between active and apparent power is close to one. Line voltage fluctuations can be compensated for very efficiently.

Benefits

- Discontinuous Conduction Mode (DCM) Power Factor Correction (PFC) controller
- High-power factor, low THD
- Internal start-up with low current consumption
- UVLO with hysteresis
- Output overvoltage protection
- Excellent light-load behaviour
- Totem pole output with active shutdown

TDA 16888

PWM (FF) and PFC (CCM) combi IC



THE TDA 16888 COMPRISES the complete control for power factor controlled switched-mode power supplies. With its PFC and PWM section being internally synchronized, it applies for off-line converters with input voltages ranging from 90V to 270V.

While the preferred topologies of the PFC preconverter are boost or flyback, the PWM section can be designed as forward or flyback converter. In order to achieve minimal line current gaps, the maximum duty cycle of the PFC is about 94%. The maximum duty cycle of the PWM, however, is limited to 50% to prevent transformer saturation.

PFC section

- IEC 1000-3 compliant
- Additional operation mode as auxiliary power supply
- Fast, soft-switching totem pole gate drive (1A)
- Dual-loop control (average current and voltage sensing)
- Leading-edge triggered, pulse width modulation
- Peak current limitation
- Topologies of PFC preconverter are boost or flyback
- Continuous/discontinuous mode possible
- 94% maximum duty cycle

PWM section

- Improved current mode control
- Fast, soft-switching totem pole gate drive (1A)
- Soft-start management
- Trailing edge triggered pulse width modulation
- Topologies of PWM converter are feed forward or flyback
- 50% maximum duty cycle to prevent transformer saturation
- fPWM = fPFC

Key features

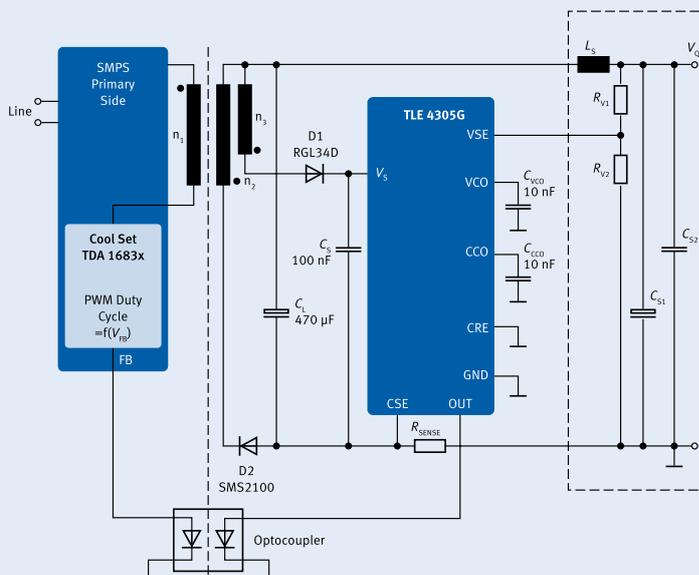
- High-power factor
- Typical 50µA start-up supply current
- Low quiescent current (15mA)
- Undervoltage lockout with internal stand-by operation
- Internally synchronized fixed operating frequency ranging from 15kHz to 200kHz
- External synchronization possible
- Shutdown of both outputs externally triggerable
- Peak current limitation
- Overvoltage protection
- Average current sensing through noise filtering



TLE 4305G

Current and voltage controller

Application example



Key features

- Wide supply voltage operation range
- Wide ambient temperature operation range
- Minimized external circuitry
- High voltage regulation accuracy
- High current-limit regulation accuracy
- Low temperature drift
- Internal fixed amplification
- Independent voltage and current-loop compensation
- SO-8 Package

THE TLE 4305G IS specifically designed to control the output voltage and the output current of a switch mode power supply. Independent compensation networks for the voltage- and for the current-loop can be realized with external circuitry.

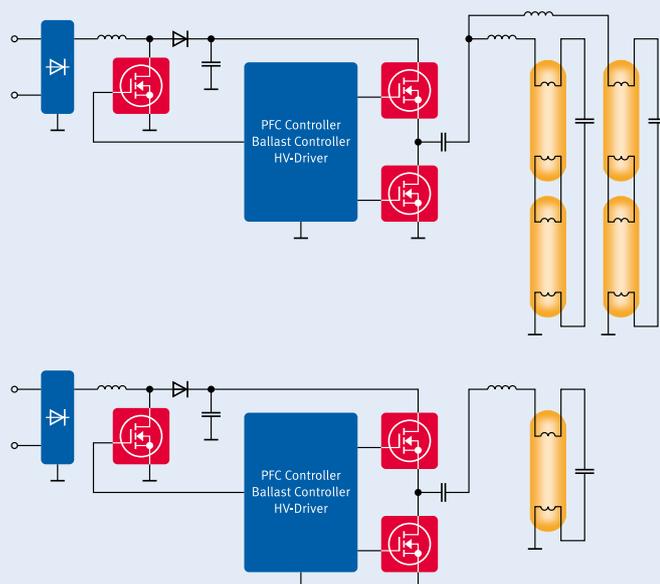
The device contains a high accuracy bandgap reference voltage, two Operational Transconductance Amplifiers (OTA), an optocoupler driver output stage and a high-voltage bias circuit. The device is based on the Infineon double-isolated power line technology DOPL, which allows to produce high precision bipolar-voltage regulators with breakdown voltages of up to 45V.

Benefits

- Minimized Bill-Of-Material (BOM)
- Integrated temperature compensated current and voltage OTA (Operational Transconductance Amplifier)
- Driver for optocoupler implemented

ICB2FL01G / ICB2FL02G / ICB1FL02G

Smart ballast controller



Application examples

SMART BALLAST CONTROL ICs from Infineon integrate all of the lamp start, run and protection features required by current and future fluorescent lamp ballasts. Digital mixed signal power control is employed enabling speedy, cost-effective and stable ballast designs with the minimum of external components. Reliable and robust high-voltage isolation is achieved using Infineon's proprietary Coreless Transformer Technology (CLT).

Our smart ballast controllers are designed to control a fluorescent lamp ballast including

- Discontinuous conduction mode Power Factor Correction (PFC)
- Lamp inverter control
- High voltage level-shift, half-bridge driver with coreless transformer technology in one package

Key features ICB2FL01G / ICB2FL02G

- Critical conduction mode PFC with overcurrent and overvoltage protection and internal loop compensation
- Adjustable end-of-life detection in multi-lamp topologies and detection of capacitive mode operation
- Improved reliability and minimized spread due to digital and optimized analog control functions
- Meets emergency lighting standards
- Suitable for dimming
- Improved ignition control for an operation close to the magnetic saturation
- Improved THD and harmonic distortion for low-power applications in DCM

Key features ICB1FL02G

- Critical conduction mode PFC with over-current and overvoltage protection and internal loop compensation
- End-of-life detection in multi-lamp topologies and detection of capacitive mode operation in TS designs
- Improved reliability and minimized spread due to digital and optimized analog control functions
- Due to a minimum number of required external components, system costs can be brought down significantly

Topologies

| | Industrial | Automotive |
|----------|------------|------------|
| Linear | ✓ | ✓ |
| DC/DC | ✓ | ✓ |
| Switches | ✓ | ✓ |
| AC/DC | ✓ | |

Product Portfolio

Linear constant current source

General lighting

LED driver for low-current general lighting applications

| Product | Package | V _{cc, max} [V] | Current range** | | V _{Overhead*} [V] | P _{tot} [mW] | Thermal protection | Overcurrent/Overvoltage protection | R _{thjS} [K/W] |
|-------------|---------|--------------------------|--------------------------|--------------------------|----------------------------|-----------------------|--------------------|------------------------------------|-------------------------|
| | | | I _{d, typ} [mA] | I _{d, max} [mA] | | | | | |
| BCR 401W | SOT343 | 18 | 10 | 60 | 1,4 | 500 | no | no | 110 |
| BCR 402W | SOT343 | 18 | 20 | 60 | 1,4 | 500 | no | no | 110 |
| BCR 401U | SC74 | 40 | 10 | 65 | 1,4 | 500 | no | no | 50 |
| BCR 402U | SC74 | 40 | 20 | 65 | 1,4 | 500 | no | no | 50 |
| BCR 405U | SC74 | 40 | 50 | 65 | 1,4 | 500 | no | no | 50 |
| TLE 4240-3M | SCT595 | 45 | 60 | 90 | 0,7 | - | yes | no | 180 |
| BCR 450 | SC74 | 27 | 0 | 85 | 1,4 | 500 | yes | yes | 75 |

* Required voltage overhead for LED driver

** Current can be adjusted by usage of external resistor

Driving high-power LEDs in general lighting applications

| | LED driver | V _{cc, max} [V] | Recommended current | max current I _d [mA] | V _{Overhead*} [V] | P _{tot} [mW] | Thermal protection | Overcurrent/Overvoltage protection |
|----------|----------------------|--------------------------|---------------------|---------------------------------|----------------------------|-----------------------|--------------------|------------------------------------|
| 0.5W LED | BCR 450 + BC 817SU | 27* | 200 | 350 | 0.5 | 1 | yes | yes |
| | BCR 402U + BC 817SU | 40 | 200 | 350 | 1.4 | 1 | no | no |
| | BCR 450 + BCX 68-25 | 27* | 350 | 700 | 0.5 | 3 | yes | yes |
| 1W LED | BCR 402U + BCX 68-25 | 40 | 350 | 700 | 1.4 | 3 | no | no |
| | TLE 4309G*** | 45 | 350 | 500 | 0.35** | - | yes | yes |
| 3W LED | BCR 450 + BDP 947 | 27* | 700 | 2000 | 0.5 | 5 | yes | yes |
| | BCR 402U + BD P947 | 40 | 700 | 2000 | 1.4 | 5 | no | no |

*Operating voltage is 27V, maximum rating is 40V

** at 300mA

***Maximum Operating voltage is 24V, absolute maximum rating is 45V

Automotive

| Product | Package | Green | Output current [mA] | Output current [mA] | Operating range [V] | Drop voltage [V] | Accuracy (%) | Inhibit input | PWM |
|-------------|-------------|-------|---------------------|---------------------|---------------------|------------------|--------------|---------------|-----|
| TLE 4240-2M | PG-SCT-595 | ✓ | 60 | fixed | 45 | 0.5 | 10 | | |
| TLE 4240-3M | PG-SCT-595 | ✓ | 60 | fixed | 45 | 0.5 | 10 | x | x |
| TLE 4241GM | PG-DSO-8 | ✓ | 8/65 | adj. | 45 | 0.3 | 20 | x | x |
| TLE 4242G | PG-TO-263-7 | ✓ | 500 | adj. | 45 | 0.35 | 5 | x | x |

DC/DC Converter

Automotive

| | Package | Topology | Max. input voltage [V] | Output voltage [V] | Output current [A] | Accuracy (%) | Short-circuit protection | Overtemperature protection | PWM dimming | Enable pin |
|--------------|--------------|----------|------------------------|--------------------|--------------------|--------------|--------------------------|----------------------------|-------------|------------|
| TLD 5085EJ | PG-DSO-8 | Buck | 40 | adj. <16V | 1.8 | +/-2 | x | x | x | x |
| TLD 5095EL | PG-SSOP-14-3 | Boost | 45 | adj. <45V | ext. MOS | +/-4 | x | x | x | x |
| TLE 6389-2GV | PG-DSO-14 | Buck | 60 | adj. >1.2V | 2.3 | +/-3 | x | x | x | x |

Switches

PROFET™ – BTS 52xx

| Product type | Packages | R_{ON} @ $T_j = 25^\circ\text{C}$ | $R_{ON (max)}$ @ $T_j = 150^\circ\text{C}$ | $V_{BB (max)}$ |
|--------------|-----------|---|--|----------------|
| BTS 5231-2GS | PG-DSO-14 | 140.0mΩ | 260.0mΩ | 28.0V |
| BTS 5235-2G | PG-DSO-20 | 60.0mΩ | 115.0mΩ | 28.0V |
| BTS 5236-2GS | PG-DSO-14 | 50.0mΩ | 100.0mΩ | 28.0V |
| BTS 5235-2L | PG-DSO-12 | 60.0mΩ | 115.0mΩ | 28.0V |
| BTS 5242-2L | PG-DSO-12 | 25.0mΩ | 48.0mΩ | 28.0V |
| BTS 5246-2L | PG-DSO-12 | 19.0mΩ | 38.0mΩ | 28.0V |

High Current PROFET™

| Product type | Packages | R_{ON} @ $T_j = 25^\circ\text{C}$ | $R_{ON (max)}$ @ $T_j = 150^\circ\text{C}$ | $V_{BB (max)}$ |
|----------------|------------|---|--|----------------|
| BTS 5016SDA | PG-TO252-5 | 16.0mΩ | 32.0mΩ | 38.0V |
| BTS 5014SDA | PG-TO252-5 | 14.0mΩ | 28.0mΩ | 38.0V |
| BTS 5012SDA | PG-TO252-5 | 12.0mΩ | 24.0mΩ | 38.0V |
| BTS 6133D | PG-TO252-5 | 10.0mΩ | 18.0mΩ | 38.0V |
| BTS 6143D | PG-TO252-5 | 10.0mΩ | 18.0mΩ | 38.0V |
| BTS 50080-1TEB | PG-TO252-5 | 8.0mΩ | 16.0mΩ | 38.0V |
| BTS 50080-1TEA | PG-TO252-5 | 8.0mΩ | 16.0mΩ | 38.0V |

SPIDER SPI Driver

| Product type | Packages | Family | Channels | $R_{DS(on)}$ (typ) | $V_{DS(CL)}$ | $I_{D nom}$ | PWM inputs | Open load disable function | Limp-home feature | Cranking mode |
|--------------|------------|---------------------------|----------|--------------------|--------------|-------------|------------|----------------------------|-------------------|---------------|
| TLE 7230G | PG-DSO-24 | Spider LS | 8.0 | 0.8Ω | 48.0 - 60.0V | 300.0mA | 1.0 | no | no | no |
| TLE 7232G | PG-DSO-24 | Spider LS | 8.0 | 1.0Ω | 48.0 - 60.0V | 240.0mA | 1.0 | no | no | no |
| TLE 7232GS | PG-SSOP-24 | Spider LS | 8.0 | 1.0Ω | 48.0 - 60.0V | 240.0mA | 1.0 | no | no | no |
| TLE 7230GS | PG-SSOP-24 | Spider LS | 8.0 | 0.8Ω | 48.0 - 60.0V | 300.0mA | 1.0 | no | no | no |
| TLE 7231G | PG-DSO-14 | Spider LS | 4.0 | 1.0Ω | 41.0 - 52.0V | 320.0mA | 1.0 | yes | no | no |
| TLE 7233G | PG-SSOP-24 | Spider LS | 4.0 | 1.0Ω | 41.0 - 52.0V | 390.0mA | 4.0 | yes | yes | no |
| TLE 7240SL | PG-SSOP-24 | Spider LS | 8.0 | 1.5Ω | 41.0 - 52.0V | 200.0mA | 4.0 | yes | yes | no |
| TLE 7234E | PG-SSOP-24 | Spider HS/LS Configurable | 8.0 | 0.9Ω | 41.0 - 52.0V | 350.0mA | 3.0 | yes | no | no |
| TLE 7235G | PG-DSO-20 | Spider HS/LS Configurable | 8.0 | 0.85Ω | 41.0 - 52.0V | 280.0mA | 2.0 | yes | yes | no |
| TLE 7235E | PG-SSOP-24 | Spider HS/LS Configurable | 8.0 | 0.9Ω | 41.0 - 52.0V | 350.0mA | 2.0 | yes | yes | no |
| TLE 7236E | PG-SSOP-24 | Spider HS/LS Configurable | 8.0 | 0.9Ω | 41.0 - 52.0V | 350.0mA | 2.0 | yes | yes | yes |
| TLE 7237GS | PG-SSOP-24 | Spider HS/LS Configurable | 8.0 | 0.9Ω | 41.0 - 52.0V | 250.0mA | 3.0 | yes | no | no |
| TLE 7238GS | PG-SSOP-24 | Spider HS/LS Configurable | 8.0 | 0.9Ω | 41.0 - 52.0V | 250.0mA | 2.0 | yes | yes | no |
| TLE 7239GS | PG-SSOP-24 | Spider HS/LS Configurable | 8.0 | 0.9Ω | 41.0 - 52.0V | 250.0mA | 2.0 | yes | yes | yes |
| TLE 7234G | PG-DSO-20 | Spider HS/LS Configurable | 8.0 | 0.85Ω | 41.0 - 52.0V | 280.0mA | 3.0 | yes | no | no |
| TLE 7236G | PG-DSO-20 | Spider HS/LS Configurable | 8.0 | 0.85Ω | 41.0 - 52.0V | 280.0mA | 2.0 | yes | yes | yes |

SPI Power Controller (SPOC) – BTS55xxG in standard package PG-DSO-36-3

| Parameter | Symbol | Value |
|---|-------------------|---|
| Operating voltage power switch | V_{bb} | 4.5 ... 28V |
| Logic supply voltage | V_{dd} | 3.8 ... 5.5V |
| | $V_{bb(AZ, min)}$ | 41V |
| Nominal loads (bulbs) | | 21 W (27 W) 21 W (27 W) flasher 5W/10W |
| <ul style="list-style-type: none"> ■ Channel 0, 1 ■ Channel 2 ■ Channel 3, 4 | | |
| SPI access frequency | $f_{SCLK(max)}$ | 1MHz (BTS 5590G) 2MHz (BTS 5576G, BTS 5566G) |

| BTS 55xxG | BTS 5590G | BTS 5576G | BTS 5566G |
|---|------------------------|-----------------------|-----------------------|
| Bulb application | yes | yes | yes |
| LED application | yes | yes | no |
| Watchdog functionality | yes | no | no |
| On-state resistances $R_{DS(on) max}$ | | | |
| <ul style="list-style-type: none"> ■ Channel 0, 1 ■ Channel 2 ■ Channel 3, 4 | 50mΩ 800mΩ 200mΩ | 49mΩ 64mΩ 180mΩ | 49mΩ 64mΩ 180mΩ |

| Parameter | Symbol | Value |
|--|-------------------|----------------------------|
| Operating voltage power switch | V_{bb} | 5.5 ... 28V |
| Logic supply voltage | V_{dd} | 3.8 ... 5.5V |
| Oversvoltage protection | $V_{bb(AZ, min)}$ | 40V |
| Nominal loads (bulbs) <ul style="list-style-type: none"> ■ Channel 0, 1 ■ Channel 2 ■ Channel 3, 4 | | 21 W (27 W) 10W (5W) |
| SPI access frequency | $f_{SCLK(max)}$ | 2 MHz |

| BTS 55x2E (5 channels) | BTS 5572E | BTS 5562E |
|---|----------------|----------------|
| Bulb application | yes | yes |
| LED application | yes | no |
| On-state resistances $R_{DS(on) max.}$ <ul style="list-style-type: none"> ■ Channel 0, 1, 2 ■ Channel 3, 4 | 100mΩ 260mΩ | 100mΩ 260mΩ |
| Availability | Q2 2008 | Q2 2008 |

| BTS 56x2E (6 channels) | BTS 5682E | BTS 5672E | BTS 5662E |
|---|-------------------------|-------------------------|-------------------------|
| Bulb application | yes | yes | yes |
| LED application | yes | yes | no |
| Cranking functionality (on channel 5) | yes | no | no |
| On-state resistances $R_{DS(on) max.}$ <ul style="list-style-type: none"> ■ Channel 0, 1 ■ Channel 2 ■ Channel 3, 4 | 100mΩ 260mΩ 460mΩ | 100mΩ 260mΩ 460mΩ | 100mΩ 260mΩ 460mΩ |
| Availability | Q2 2008 | Q2 2008 | Q2 2008 |

AC/DC

CoolSET™

| | Voltage | $R_{ON(max)}$ [mΩ] | Operating mode | Switching frequency [kHz] | Standby mode | Protection features mode | Power rating @ 230Vac ±15 % [W] | Wide range power rating [W] |
|--------------|---------|-----------------------|--------------------|---------------------------|-------------------|--------------------------|---------------------------------|-----------------------------|
| ICE 3B 0365J | 650V | 6.45 | Fixed frequency | 67 | Active burst mode | Autorestart | 17 | 9 |
| ICE 3B 0565J | | 4.70 | PWM with jittering | 67 | | Autorestart | 22 | 11 |
| ICE 3B15 65J | | 1.70 | | 67 | | Autorestart | 38 | 19 |

¹⁾ Normalized output power; DIP package: $T_a = 75^\circ\text{C}$, $T_j = 125^\circ\text{C}$ and without copper area as heat sink

TDA 4863

| | V _{CCmin} | V _{CCmax} | I _{CCmax} | I _{StartUP} | I _{OUTRise} | f _{Operation} | D _{MAX} | PF | THD | PFC Mode |
|----------|--------------------|--------------------|--------------------|----------------------|----------------------|------------------------|------------------|--------|-------|----------|
| TDA 4363 | 10.0V | 22.0V | 20.0mA | 100µA | 0.5A | up to 200kHz | n.a. | ~ 0.99 | < 10% | DCM |

TDA 16888 / ICE1CS02

| | V _{CCmin} | V _{CCmax} | I _{CCmax} | I _{StartUP} | I _{OUTRise} | f _{Operation} | D _{MAX} | PF | THD | PFC Mode |
|-----------|--------------------|--------------------|--------------------|----------------------|----------------------|------------------------|------------------|--------|-------|-----------|
| TDA 16888 | 11.0V | 19.0V | 50.0mA | 100µA | 1.0A | 15 - 200kHz | 50% | ~ 0.99 | < 10% | DCM / CCM |
| ICE1CS02 | 11.0V | 26.0V | 22.0mA | 1.3mA | 1.5A | 130kHz | 47% / 60% | ~ 0.99 | < 10% | DCM / CCM |

ICB2FL01G

| Short Form Data | min. | typ. | max. |
|---|--------------------|--------|--------|
| Package | SO-19 | | |
| OperatingVoltage Range | 10V | - | 17.5V |
| Turn-on Threshold | - | 14V | |
| Supply Current during UVLO and Fault Mode | - | 110µA | 170µA |
| Operating Frequency of Inverter during RUN Mode | 20kHz | - | 120kHz |
| Operating Frequency of Inverter during Preheating Mode | F _{RFRUN} | - | 150kHz |
| Preheating Time | 0ms | - | 2500ms |
| Adjustable Self-adapting Dead Time max between LS and HS Gate Drive | 2.25µs | 2.50µs | 2.75µs |
| Adjustable Self-adapting Dead Time min between LS and HS Gate Drive | 1.00µs | 1.25µs | 1.50µs |
| OperatingVoltage Range of floating HS Gate Drive | -900V | - | +900V |
| LS Current Limitation Threshold: Ignition/Start up/Soft Start/Pre Run | 1.5V | 1.6V | 1.7V |
| LS Current Protection Threshold during RUN Mode and Preheating | 0.75V | 0.80V | 0.85V |
| End-of-Life Detection Threshold | -40µA | - | +40µA |
| Detection of Non-ZVS Operation CapMode 1 and 2 | - | - | - |
| PFC Preconverter Control with Cirtical and Discontinuous CM | - | - | - |
| Maximum Controlled On-time | 18µs | 22.7µs | 26µs |
| Hysteresis of Zero Current Detector | - | 1.0V | - |
| PFC Current Limitation Threshold | - | 1.0V | - |
| ReferenceVoltage for Control of BusVoltage | 2.47V | 2.5V | 2.53V |
| Overvoltage Detection Threshold | 2.68V | 2.73V | 2.78V |
| Undervoltage Detection Threshold | 1.835V | 1.88V | 1.915V |
| Open Loop Detection | 0.237V | 0.31V | 0.387V |
| Junction Operating Temperature Range | -25°C | - | +125°C |
| Pb-free Lead Plating RoHS Compliant | - | - | - |

ICB2FL02G

The ICB2FL02G is functionally identical to the ICB2FL01G with adjustments to certain timings and parameters to further optimize performance in dimming ballasts.

| Short Form Data | min. | typ. | max. |
|---|-------------|--------|--------|
| Operating Frequency of Inverter during RUN Mode | SO-19 | | |
| Operating Frequency of Inverter during Preheating Mode | 20kHz | – | 160kHz |
| Adjustable Self-adapting Dead Time max between LS and HS Gate Drive | F_{RFRUN} | – | 160kHz |
| Adjustable Self-adapting Dead Time min between LS and HS Gate Drive | 1.75µs | 2.00µs | 2.20µs |
| Operating Frequency of Inverter during RUN Mode | 0.80µs | 1.05µs | 1.30µs |

ICB1FL02G

| Short Form Data | min. | typ. | max. |
|---|-------------|--------|--------|
| Package | SO-18 | | |
| Operating Voltage Range | 10.5V | – | 17V |
| Turn-on Threshold | – | 14V | – |
| Supply Current during UVLO and Fault Mode | – | – | 150µA |
| Operating Frequency of Inverter during Run Mode | 20kHz | – | 100kHz |
| Operating Frequency of Inverter during Preheating Mode | F_{RFRUN} | – | 150kHz |
| Preheating Time | 0ms | – | 2000ms |
| Dead Time between LS and HS Gate drive | – | 1750ns | – |
| Operating Voltage Range of floating HS Gate Drive | -900V | – | +900V |
| LS Current Limitation Threshold during Ignition | – | 0.8V | – |
| LS Current Protection Threshold | – | 1.6V | – |
| End-of-Life Detection Threshold | -230µA | – | +230µA |
| Amplitude Ratio for Detection of Rectifier Effect | 0.85 | – | 1.15 |
| Detection of Non-ZVS Operation CapMode 1 and 2 | – | – | – |
| PFC Preconverter Control with Critical and Discontinuous CM | – | – | – |
| Maximum Controlled On-time | – | 23.5µs | – |
| Hysteresis of Zero Current Detector | – | 1V | – |
| PFC Current Limitation Threshold | – | 1V | – |
| Reference Voltage for Control of Bus Voltage | 2.47V | 2.50V | 2.53V |
| Overvoltage Detection Threshold | – | 2.75V | – |
| Undervoltage Detection Threshold | – | 1.83V | – |
| Open Loop Detection | – | 0.375V | – |
| Junction Operating Temperature Range | -25°C | – | +125°C |
| Pb-free Lead Plating; RoHS compliant | – | – | – |

Support Tools

LED application design tool for general lighting and industrial applications

1. Design requirements

- Enter your application-specific parameters
- Choose a LED driver from the selection list



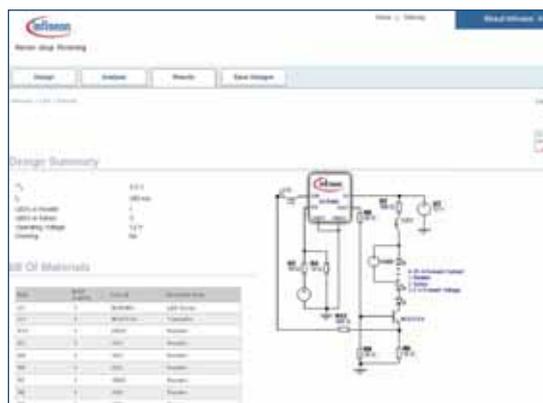
2. Analysis

- Check the generated schematic and modify parameters, if necessary
- Simulate your application schematic



3. Results

- Review your Bill-Of-Materials
- Download an overview of your LED application circuit



4. Save your design for later modification!

For more details and registration: www.infineon.com/lowcostledriver

Evaluation boards

| Board name | Product | Description | Order No. |
|--|---|---|--|
| LED driver demoboard | TLE 4242G TLE 4309G | This board is designed to demonstrate the performance of our linear LED driver TLE 4242G and TLE 4309G with Osram high-brightness LEDs. It is possible to choose between the two drivers. A potentiometer allows to attitud the PWM-frequency for dimming the LEDs. | Demoboard TLE 4242G LED driver/4309 |
| Demoboard TLD 5085 | TLD 5085EJ | This application board shall enable you to test the performance of the TLD 5085EJ, Buck Converter for driving LED. | Demoboard TLD 5085 |
| Buck converter | TLE 6389-2GV | Multipurpose buck controller for external PMOS switch, 5V or adjustable output voltage, maximum of 2 A output current, low quiescent current. | Demoboard TLE 6389-2GV |
| LED driver board with CoolSET™ | ICE 3B0365JG | 24V/350mA low-cost and highly efficient LED PSU for multiple LEDs. | EVALACDC LED-ICE3B0365JG |
| SPOC I demo kit | BTS 5590GX | The universal body control module is intended to be used as a system evaluation board for several automotive power devices. It consists of a control unit and a power unit. The control unit is intended to control the power unit as well as to receive commands from a user interface. The power unit contains BTS 5590GX for system evaluation purpose. | Demoboard BTS 5590GX |
| BTS 5590GX Demoboard | | This board is part of the SPOC demo kit. | |
| BTS 5590GX Demoboard | | This board is part of the SPOC demo kit. | |
| PROFET™ demo kit | BTS 5241L BTS 5234G BTS 5230GS BTS 6143D | Is a versatile tool to demonstrate the functions of the: BTS 5241L, BTS 5234G and BTS 5230GS are 2-channel smart high-side power switches. BTS 6143D is a single-channel high-side power switch. The control board is equipped with a C868BA µC. It is built to be reverse-polarity protected. The powerboards are directly connected to the control board. | Demoboard PROFET™V2.0 |
| PROFET™ demo kit | | This board is part of the PROFET™ demo kit. | |
| PROFET™ demo kit | | This board is part of the PROFET™ demo kit. | |
| HITFET™ protected LS power switch | BTS 3160D | Protected low-side power switch (10 mT at 25°C). This board enables easy startup and connectivity for the new power HITFET™ BTS 3160. Enables easy read out of digital status via LED. | Demoboard BTS 3160D |
| SPIDER (SPI Driver for Enhanced Relay Control) | Demoboard TLE 7234/7237 | SPI Driver for Enhanced Relay Control (SPIDER). This board is designed to interface with the universal body control module system evaluation tool. | SP000598994 |
| | Demoboard TLE 7235/7238 | | SP000598996 |
| | Demoboard TLE 7236/7239 | | SP000598998 |
| Evaluation board ICB2FL01G | ICB 2FL01G | Demoboard for fluorescent lamp ballast with smart ballast controller second-generation ICB 2FL01G. | EVAL BOARD ICB2FL01G |
| Evaluation board ICB2FL02G | ICB 2FL02G | Evaluation board for dimmable fluorescent lamp ballast with smart ballast controller second generation dimmable ICB 2FL02G. | EVAL BOARD ICB2FL02G |
| Evaluation board ICB1FL02G | ICB 1FL02G | Demoboard for fluorescent lamp ballast with smart ballast controller first generation ICB 1FL02G. | EVAL BOARD ICB1FL02G |

Application notes

| Application note | Info number / Internet link |
|---|---|
| BCR 402R – Light Emitting Diode (LED) drive IC provides constant LED current, independent of supply voltage variation | AN066 www.infineon.com/lowcostleddriver |
| Using BCR 402R/BCR 402U at high supply voltages | AN097 www.infineon.com/lowcostleddriver |
| BCR 400 family of constant-current, linear mode LED drivers for lighting applications from 10mA-700mA | AN101 www.infineon.com/lowcostleddriver |
| BCR 450 using OSRAM Platinum Dragon LW_W5SN | AN105 www.infineon.com/lowcostleddriver |
| Low-cost, linear mode, 71% efficiency 380mA LED driver demo using the BCR 401R, BCX 68 and LUXEON Rebel LEDs | AN159 www.infineon.com/lowcostleddriver |
| Sense accuracy of smart power switches to diagnose lamps | www.infineon.com/profet |
| Define PWM duty cycle to stabilize light emission | www.infineon.com/profet |
| Inverse operation behavior of the BTS 6143D and members of this product family | www.infineon.com/profet |
| CoolSET™ – Application solution of AC/DC LED drive | www.infineon.com/coolset |

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