Ultimate Power – Perfect Control

Vehicle Safety, Body and Powertrain Applications

www.infineon.com/automotivepower

For a comprehensive and reliable portfolio of products for automotive and other applications, look no further than the product range from Infineon. We have used our 40 years of experience of developing and producing products to meet the demands of the automotive market, and our innovative technologies to design and produce a large number of power products that meet all requirements of the automotive industry and also the transportation, lighting and motor-drive industries.

Our commitment to quality is demonstrated through our focus on Automotive Excellence, the most rigorous zero defect program in the industry.

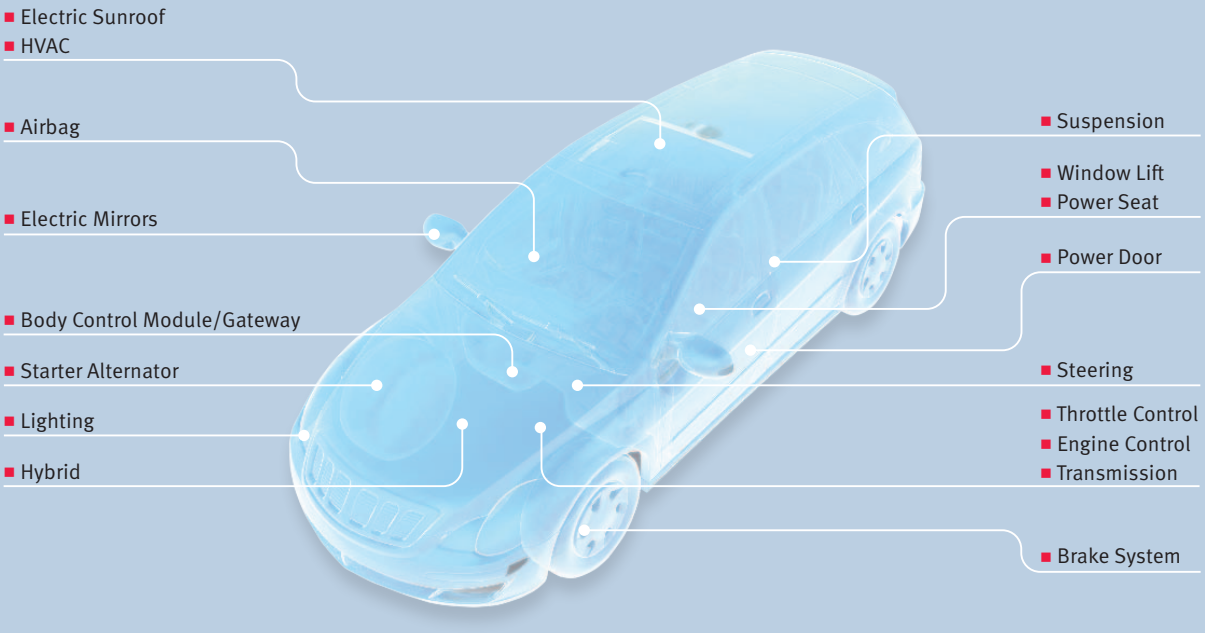
This Selection Guide provides an overview of our ICs and their packages, which are automotive qualified and available for your current and future electronic system designs.

The ultimate power to control your applications including automotive, transportation, industrial, lighting and motor control.

Symbols

I_D	DC Drain Current
$I_{GS(TH)}$	Gate Source Threshold Voltage
I_{IS}	Current Sense Output Current
$I_{L(lim)}$	Load Current Limit
$I_{L(NOM)}$	Load Current (T_a = 85°C, specified PCB)
$I_{L(sat)}$	Saturation Load Current
I_q	Quiescent Current in OFF-State
I_Q	Output Current
Q_G	Total Gate Charge
R_{IS}	Current Sense Resistor
$R_{DS(on)}$	Typical Drain Source Resistance in ON-State @ 25°C (multiply by 2 for Max @ 150°C)
$R_{DS(on)}$ path	Typical Drain Source Resistance in ON-State @ 25°C of both High-Side and Low-Side
R_{thJC}	Thermal Resistance Junction to Case
V_{CE}	Collector Emitter Voltage
$V_{CE(sat)}$	Saturation Collector Emitter Voltage
V_{DS}	Drain Source Voltage
$V_{DS(AZ)}$	Drain Source Voltage (Active Zener)
$V_{GS(th)}$	Gate Threshold Voltage
V_Q	Output Voltage
V_S	Supply Voltage
$V_{S(AZ)}$	Supply Voltage (Active Zener)
$V_{S(op.)}$	Operation Supply Voltage
Inverse	Normal V_S Polarity and Inverse Load Current
PWM	Pulse Width Modulation
Reverse	Reverse V_S Polarity and Reverse Load Current

Automotive Applications



Automotive Power Components Used in Other Applications

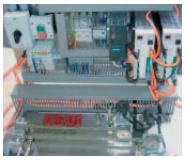
Agriculture

Transportation/Navigation

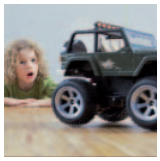
2–4 Wheeler

Lighting

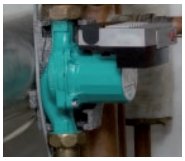
Automation/Industrial



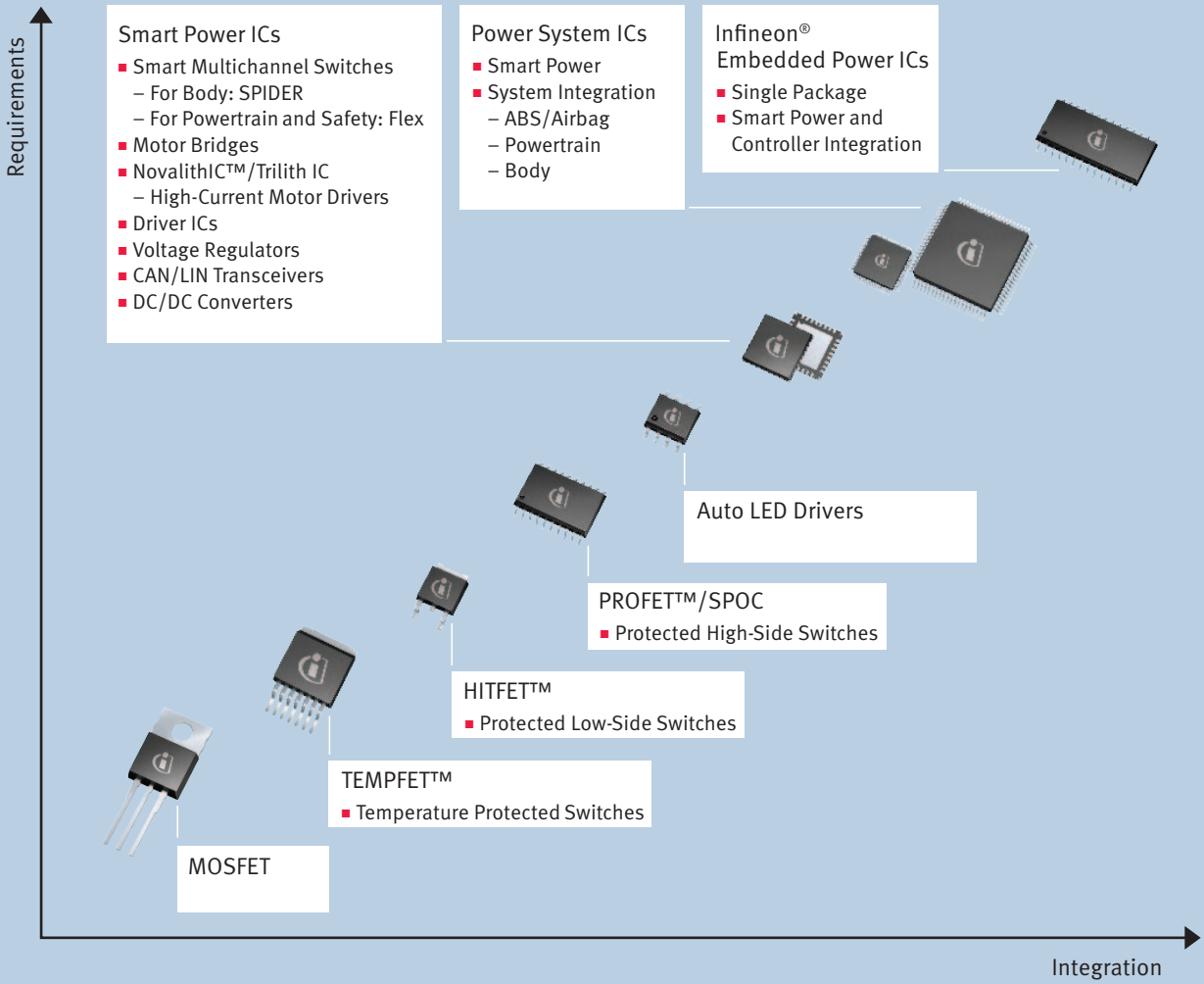
Toys/Games



Electric Tools/Home Appliance/Heating Pump



We meet all requirements for cost-effective application solutions



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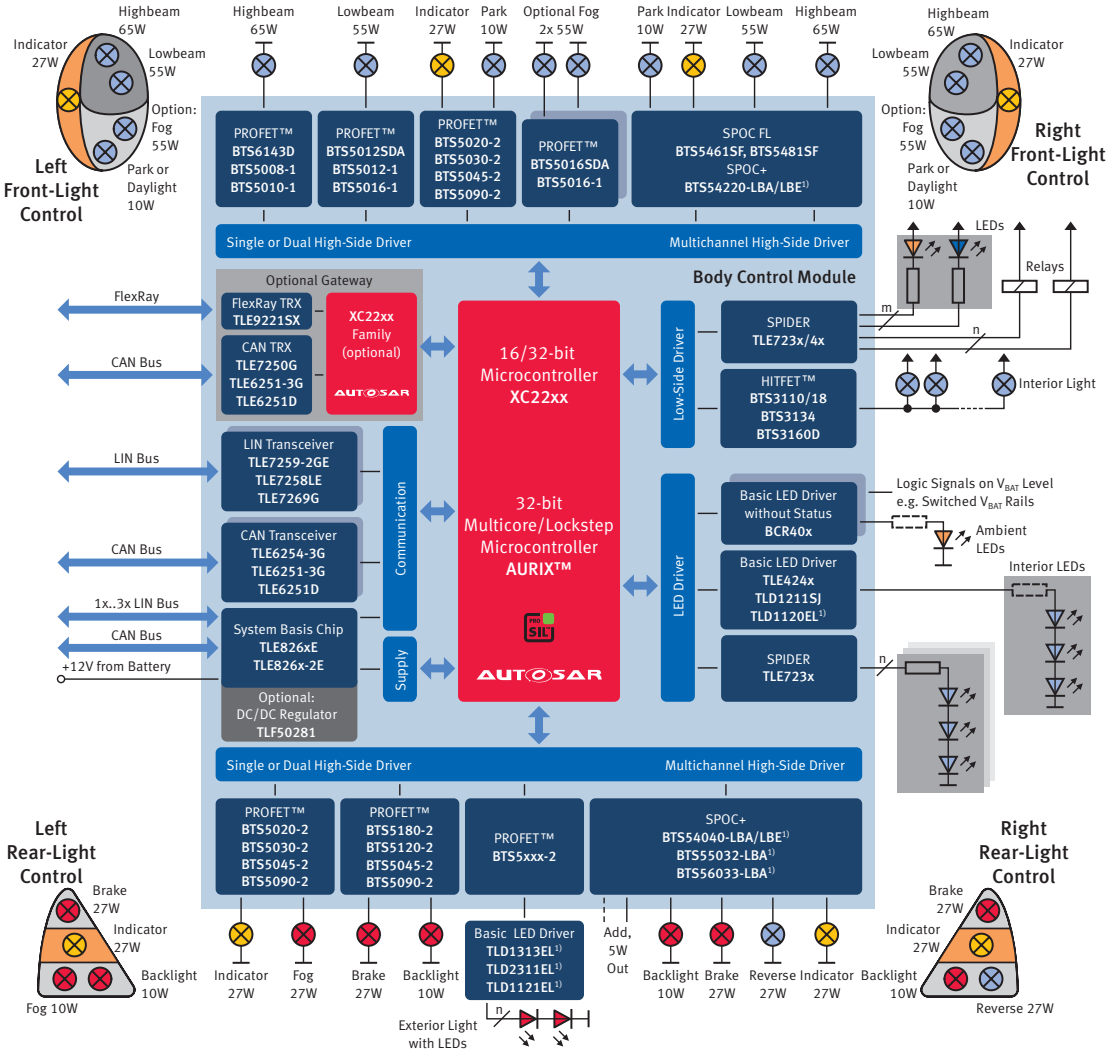
Body Applications

Body Control Module

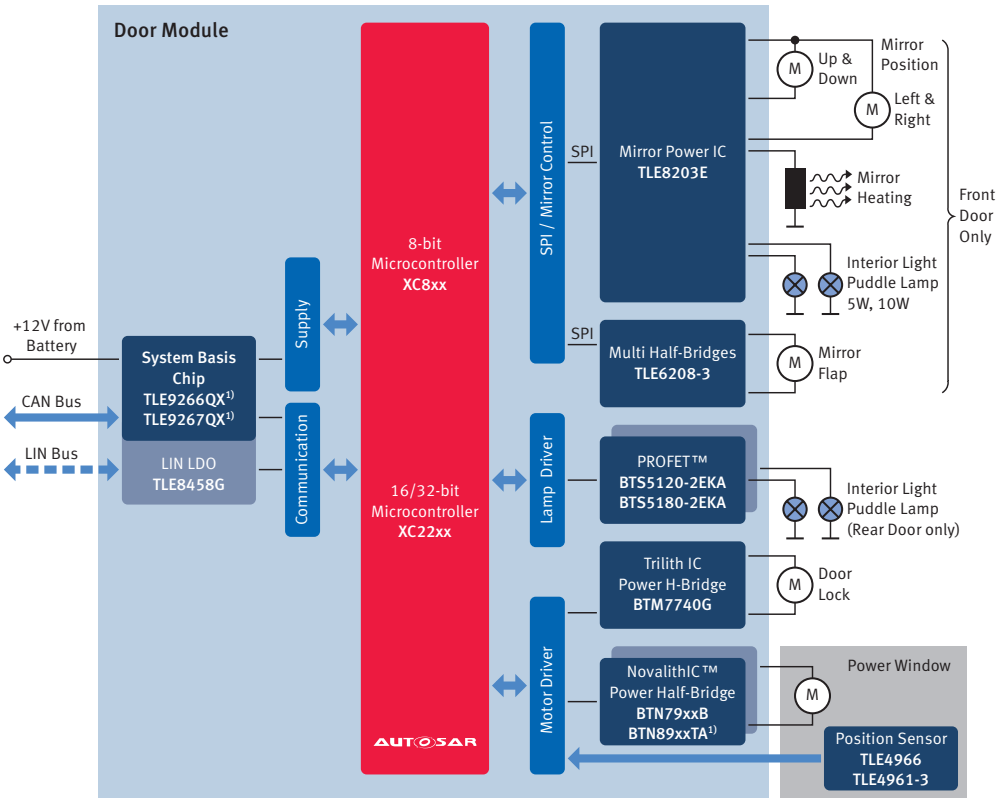


System Benefits

- Reduced board space due to integrated functionality
- Protected load control with sophisticated diagnostic features
- Supports the “Limp Home” functional safety concept
- High scalability and benchmark short-circuit robustness of power semiconductors (PROFET™)
- Supports a smooth transition to LEDs for interior and exterior lighting

1) In development, samples available
2) In development

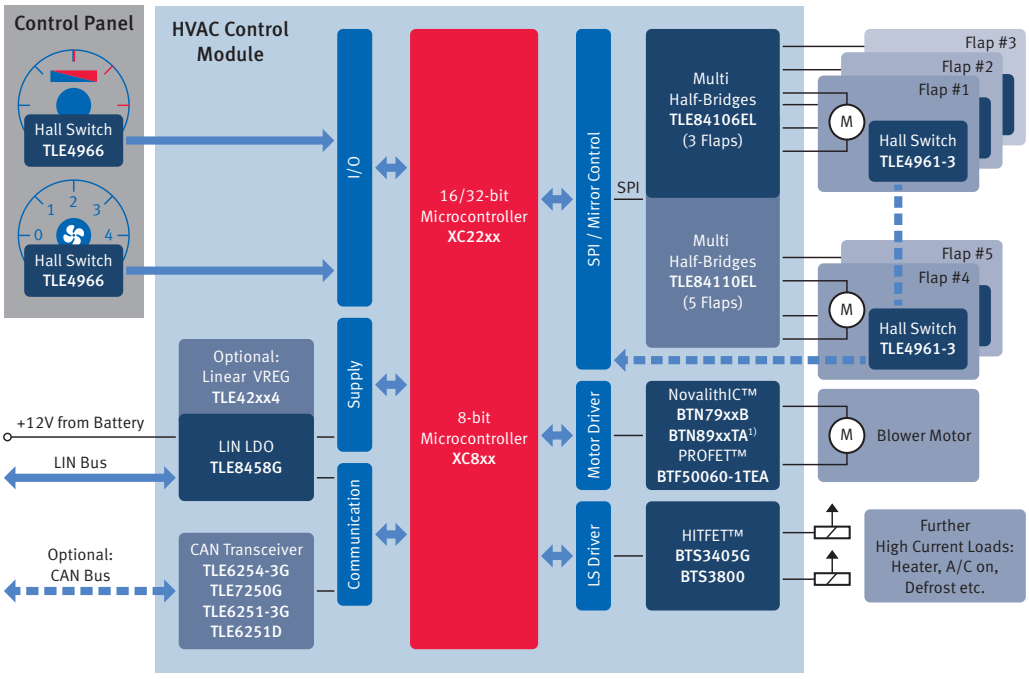
Full Featured Door Module including Door Lock and Mirror Control



System Benefits

- Energy-saving mode with second power domain for cyclic wake-up
- Motor drive modules CCU6
- Highly flexible serial interfaces (USIC), suitable as LIN, SPI, IIC, UART, IIS
- Fully scalable over package and memory
- High-performance CPU for ripple count algorithm
- High-speed ADC: 650ns conversion cycle

HVAC Control Module Low to Mid-End/Manual + Semi-Automatic



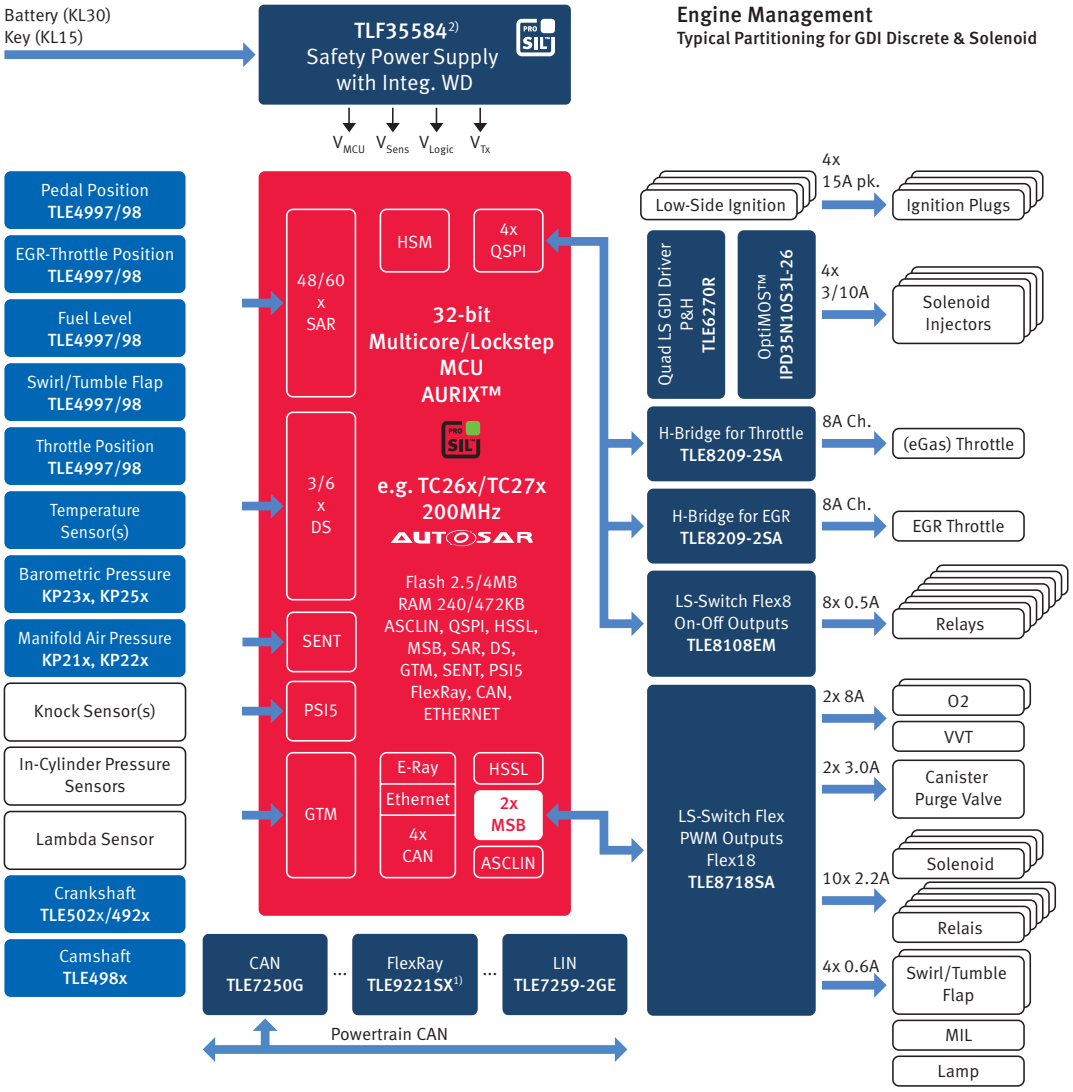
System Benefits

- High-performance, scalable microcontroller family for various classes of HVAC control algorithms
- Dedicated multi half-bridge devices for flap motor control with potentiometer feedback
- Powerful half-bridge devices (NovalithIC™) with high-frequency PWM capability for the blower control

1) In development, samples available

Powertrain Applications

Gasoline Engine Management

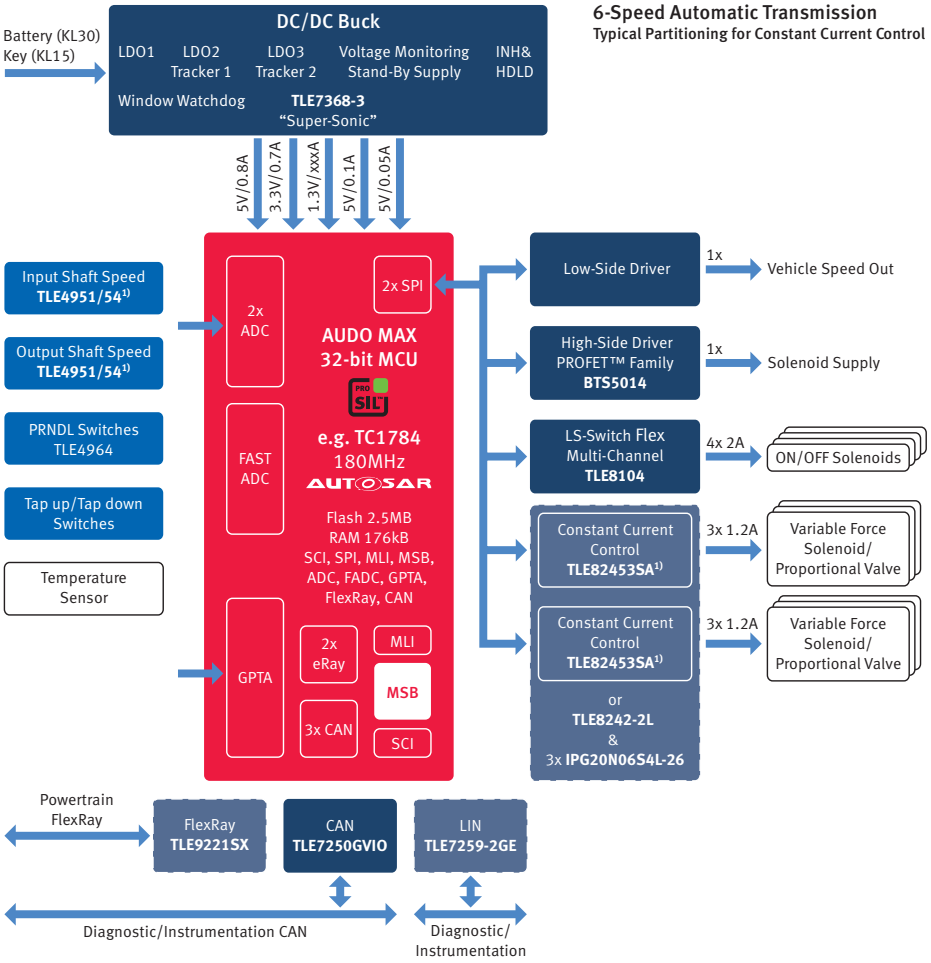


System Benefits

- Flexible and scalable product portfolio tailored to the performance and real-time needs of the premium and value segment
- Conforming with the latest emission legislation at the highest possible fuel efficiency and maximum driving pleasure (e.g. reduces fuel consumption by 20% from 160g to 128g CO_2/km)
- Benchmark-setting real-time performance facilitates down-sizing, direct injection, turbo charging and highly-efficient after-treatment
- New sensor families provide enhanced measurement precision (e.g. ignition control, misfire detection)

1) In development

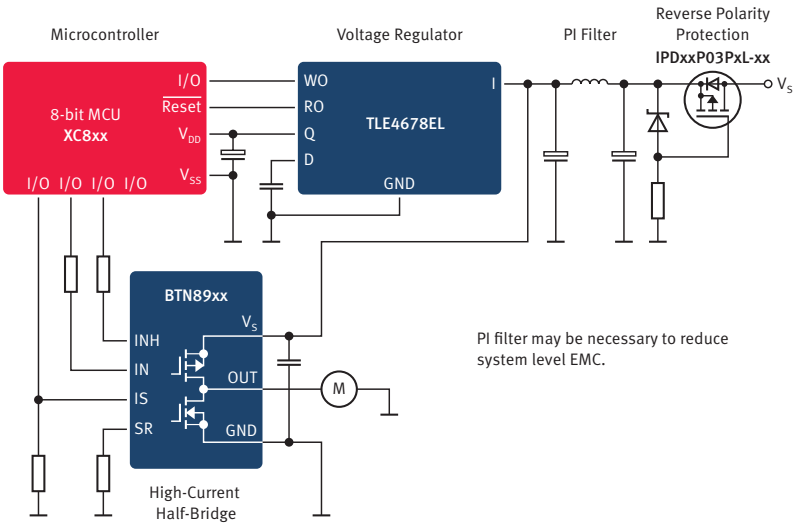
Automatic Transmission – Hydraulic Control



System Benefits

- Full range of products ranging from voltage regulators, transceivers, sensors, microcontrollers and smart power drivers
- Valve actuator ICs supporting highest precision current control
- Optimized sensors providing enhanced disturbance immunity (e.g. vibration) and direction detection
- High-temperature bare die IC supporting integrated transmission control up to the highest torque rates
- Reduces fuel consumption compared to manual transmission (e.g. by 2% from 160g to 156.8g CO_2/km)

Fuel Pump



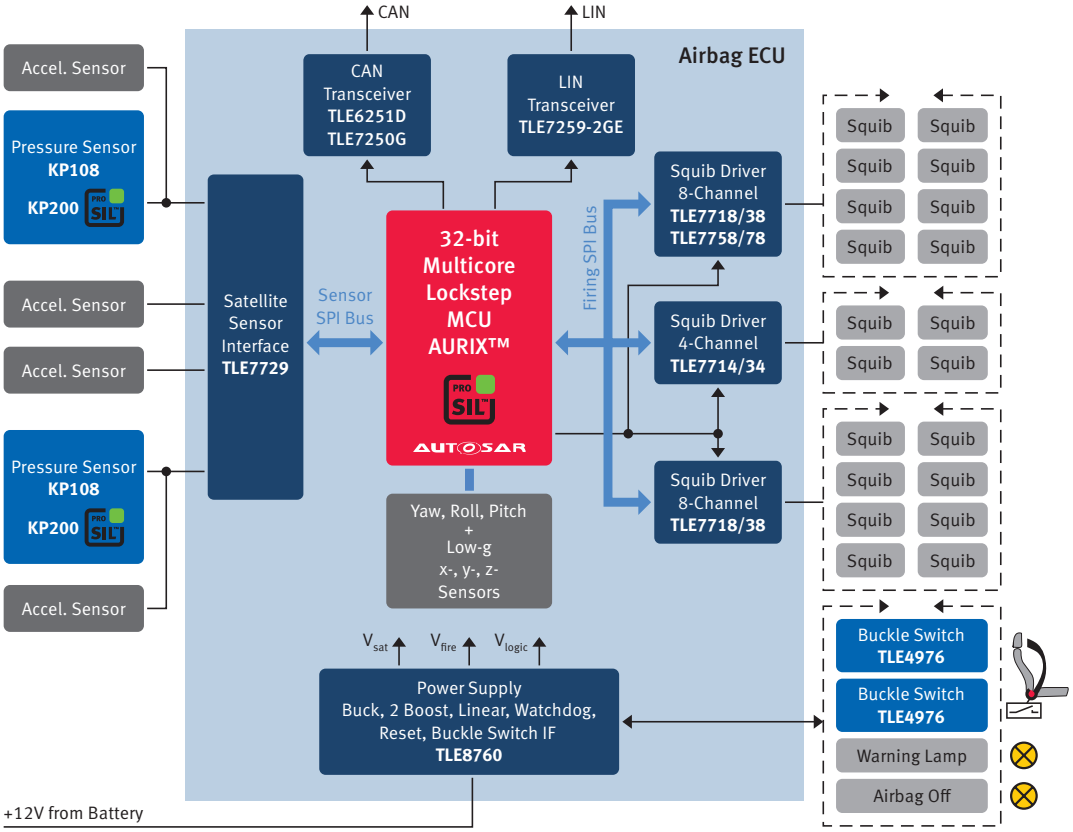
System Benefits

- Runs at full speed only when necessary
- Power consumption reduced by 40% on average
- Lower hydrocarbon emissions
- Increased lifetime

1) In development, samples available

Safety Applications

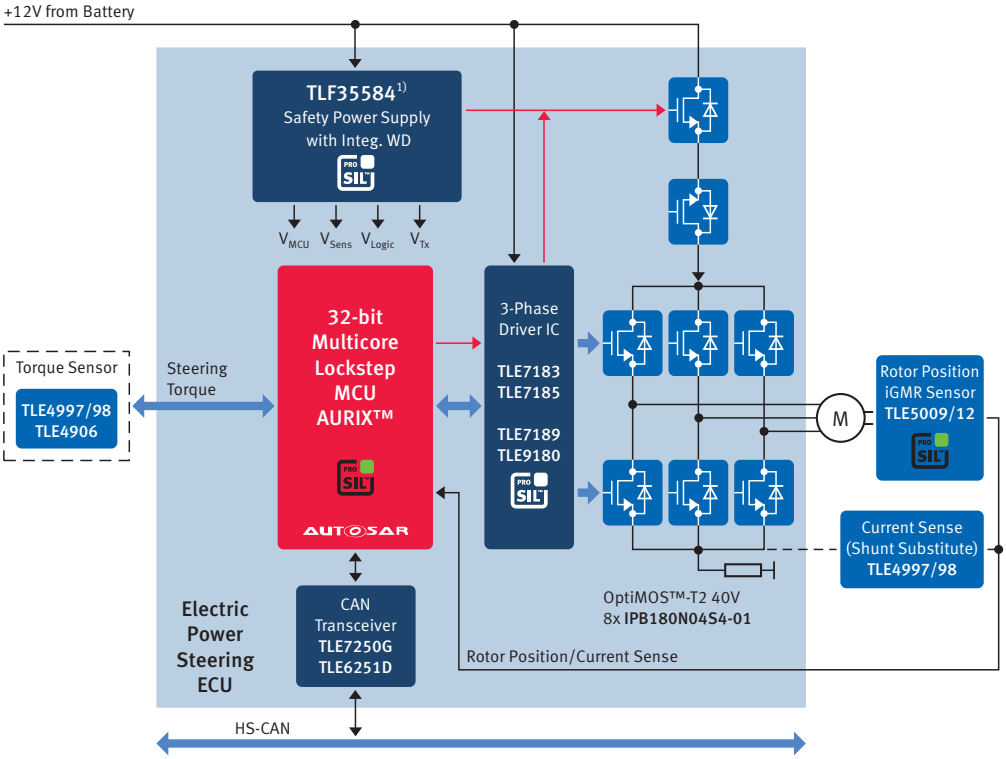
Airbag System (Advanced)



System Benefits

- Infineon's broad product spectrum supports scalability and flexibility for building systems with 4 up to more than 20 firing loops
- Full range of airbag ASSPs ranging from pressure sensors for side crash detection to driver and transceiver ICs
- 16/32-bit microcontrollers with dedicated safety functions
- The parts are optimized in terms of system interoperability as well as best price/performance in this extremely price-sensitive application

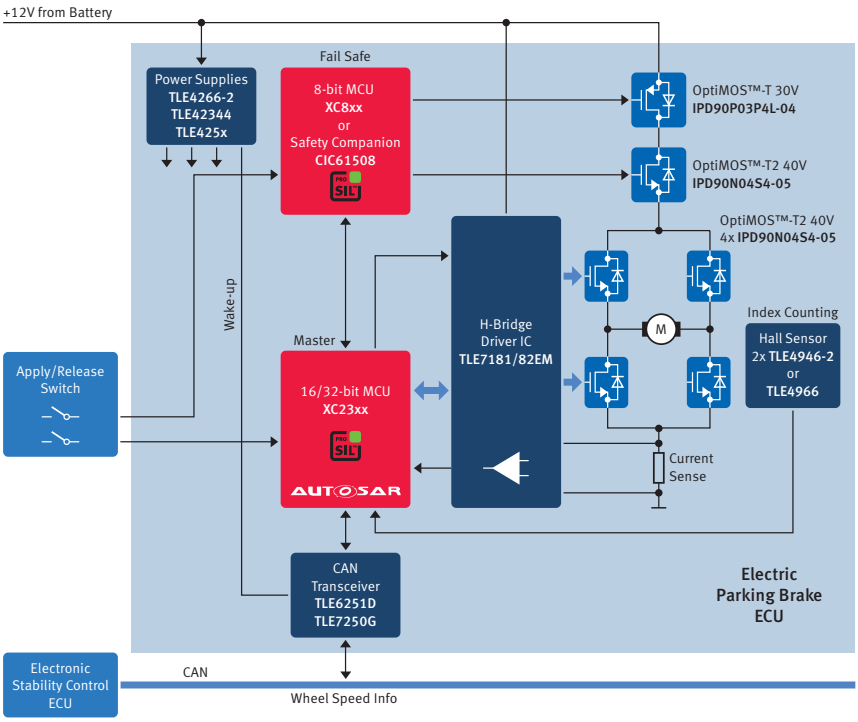
Electric Power Steering (EPS)



System Benefits

- EPS increases fuel efficiency by approximately 3% while improving car handling and the driving experience
- These EPS systems combine a compact design and reduced mounting costs with the ability to be adapted by software to suit diverse car models as well as dedicated driving modes
- EPS is the steering technology needed to enable advanced driver assist systems such as side-wind compensation, lane assist/ keeping and parking aid assist systems
- Infineon has over ten years of experience in this exciting application and provides the full range of ICs, from sensor to microcontroller, from bridge driver to world-class MOSFETs

Electric Parking Brake



System Benefits

- The electric parking brake provides many more comfort and convenience features to drivers than the standard mechanical system
- Hill hold, launch control, roll-away prevention
- These convenience features are also safety-relevant, so they must be implemented using safety-capable hardware (according ISO26262)
- With its CIC61508 safety watchdog IC, Infineon offers a broad range of SIL-supporting functions to enable system designs that have to meet the new SIL and ASIL challenges

1) In development

Automotive MOSFETs

Infineon OptiMOS™ – Benchmark for Automotive MOSFETs

OptiMOS™ Products are Best in Class

OptiMOS™ superior performance is based on Infineon's leading MOSFET technology combined with the unsurpassed quality of robust package:

- Best in class $R_{DS(on)}$ performance for increased system efficiency
- Lowest switching and conduction power losses for increased thermal system reliability
- Robust green package for easy process handling

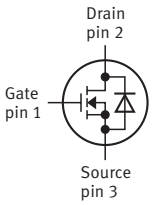
OptiMOS™-T2 Product Family

OptiMOS™-T2 trench technology is the benchmark for applications in energy efficiency, CO_2 reduction, electric drives, etc.. The OptiMOS™-T2 product family extends the existing families of OptiMOS™-T and OptiMOS™.

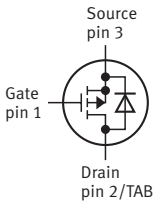
OptiMOS™ Robust Green Package

OptiMOS™ robust package is the benchmark for quality and reliability. Robust package sustains 260°C GREEN reflow processes at MSL1 combined with automotive qualification. No special handling or dry-pack is needed. All green packages are in compliance with RoHS/WEEE guidelines.

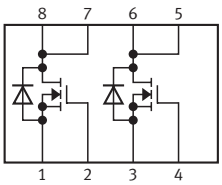
N-Channel



P-Channel



Dual Channel



	Voltage Class [V]	OptiMOS™-T2 (Trench)	OptiMOS™-T (Trench)	OptiMOS™ (Planar)
Single MOSFET				
N-Channel	30	●		●
N-Channel	40	●	●	●
N-Channel	55			●
N-Channel	60	●		
N-Channel	75			●
N-Channel	100		●	
P-Channel	30	●		
P-Channel	40	●		
Dual MOSFET				
NEW! Dual N-Channel	2 x 40	●		
Dual N-Channel	2 x 55			●
NEW! Dual N-Channel	2 x 60	●		
NEW! Dual N-Channel	2 x 100	●		

Naming System

I	P	B	180	N	03	S4	L	–	01

Company:
- I for Green Products
- S for Non-Green Products

Device:
- P for Power-MOSFET

Package Type:
- G for Dual SuperSO8
- P for TO220
- B for D²PAK (TO263)
- D for DPAK (TO252)
- I for I²PAK (TO262)

Continuous Drain Current/$I_{D(max.)}$

- P for P-Channel
- N for N-Channel

Breakdown Voltage Divided by 10

- S for SIPMOS™ Planar N-Channel
- S2 for OptiMOS™ Planar N-Channel
- S3 for OptiMOS™-T Trench N-Channel
- S4 for OptiMOS™-T2 Trench N-Channel
- P4 for OptiMOS™-T2 Trench P-Channel

- L for Logic Level

$R_{DS(on)}$ in mΩ

Automotive N-Channel MOSFETs

OptiMOS™ 30V (Planar)

Product Type	$R_{DS(on)}$ [mΩ]	I_D [A]	R_{thJC} (max) [K/W]	$V_{GS(th)}$ (min-max) [V]	Q_G(typ) [nC]	Package[1)]
IPD50N03S2L-06	6.4	50	1.1	1.2 ... 2.0	50	㉜
IPD30N03S2L-07	6.7	30	1.1	1.2 ... 2.0	51	㉜
IPD50N03S2-07	7.3	50	1.1	2.1 ... 4.0	52	㉜
IPD30N03S2L-10	10.0	30	1.5	1.2 ... 2.0	31	㉜
IPD30N03S2L-20	20.0	30	2.5	1.2 ... 2.0	14	㉜

OptiMOS™ 40V (Planar)

Product Type	$R_{DS(on)}$ [mΩ]	I_D [A]	R_{thJC} (max) [K/W]	$V_{GS(th)}$ (min-max) [V]	Q_G(typ) [nC]	Package[1)]
IPB160N04S2L-03	2.7	160	0.5	1.2 ... 2.0	230	㊳
IPB160N04S2-03	2.9	160	0.5	2.1 ... 4.0	123	㊳
IPB100N04S2L-03	3.0	100	0.5	1.2 ... 2.0	170	㉞
IPB100N04S2-04	3.3	100	0.5	2.1 ... 4.0	172	㉞
IPB80N04S2L-03	3.4	80	0.5	1.2 ... 2.0	170	㉞
IPB80N04S2-04	3.4	80	0.5	2.1 ... 4.0	127	㉞
IPB80N04S2-H4	3.7	80	0.5	2.1 ... 4.0	103	㉞
IPI80N04S2-04	3.7	80	0.5	2.1 ... 4.0	170	㊽
IPI80N04S2-H4	4.0	80	0.5	2.1 ... 4.0	148	㊽
IPP100N04S2L-03	3.3	100	0.5	1.2 ... 2.0	163	㊿
IPP80N04S2L-03	3.4	80	0.5	1.2 ... 2.0	163	㊿
IPP100N04S2-04	3.6	100	0.5	2.1 ... 4.0	172	㊿
IPP80N04S2-04	3.7	80	0.5	2.1 ... 4.0	127	㊿
IPP80N04S2-H4	4.0	80	0.5	2.1 ... 4.0	103	㊿

OptiMOS™ 55V (Planar)

Product Type	$R_{DS(on)}$ [mΩ]	I_D [A]	R_{thJC} (max) [K/W]	$V_{GS(th)}$ (min-max) [V]	Q_G(typ) [nC]	Package[1)]
IPD50N06S2L-13	12.7	50	1.1	1.2 ... 2.0	52	㉜
IPD30N06S2L-13	13.0	30	1.1	1.2 ... 2.0	52	㉜
IPD50N06S2-14	14.4	50	1.1	2.1 ... 4.0	39	㉜
IPD30N06S2-15	14.7	30	1.1	1.2 ... 2.0	39	㉜
IPD30N06S2L-23	23.0	30	1.5	1.2 ... 2.0	33	㉜
IPD30N06S2-23	23.0	30	1.5	2.1 ... 4.0	25	㉜
IPD26N06S2L-35	35.0	30	2.2	1.2 ... 2.0	10	㉜
IPD25N06S2-40	40.0	29	2.2	2.1 ... 4.0	14	㉜
IPD15N06S2L-64	64.0	19	3.2	1.2 ... 2.0	11	㉜
IPD14N06S2-80	80.0	17	3.2	2.1 ... 4.0	8	㉜
IPB100N06S2L-05	4.4	100	0.5	1.2 ... 2.0	170	㉞
IPB80N06S2L-05	4.5	80	0.5	1.2 ... 2.0	170	㉞
IPB100N06S2-05	4.7	100	0.5	2.1 ... 4.0	130	㉞
IPB80N06S2L-H5	4.7	80	0.5	1.2 ... 2.0	145	㉞
IPB80N06S2-05	4.8	80	0.5	2.1 ... 4.0	130	㉞
IPB80N06S2-H5	5.2	80	0.5	2.1 ... 4.0	116	㉞

1) See packages on page 96

OptiMOS™ 55V (Planar) (cont'd)

Product Type	$R_{DS(on)}$ [mΩ]	I_D [A]	R_{thJC} (max) [K/W]	$V_{GS(th)}$ (min-max) [V]	Q_G(typ) [nC]	Package[1]
IPB80N06S2L-06	6.0	80	0.6	1.2 ... 2.0	114	㉞
IPB80N06S2-07	6.3	80	0.6	2.1 ... 4.0	86	㉞
IPB80N06S2L-07	6.7	80	0.7	1.2 ... 2.0	95	㉞
IPB80N06S2-08	7.7	80	0.7	2.1 ... 4.0	72	㉞
IPB80N06S2L-09	8.2	80	0.8	1.2 ... 2.0	82	㉞
IPB80N06S2-09	8.8	80	0.8	2.1 ... 4.0	60	㉞
IPB80N06S2L-11	10.7	80	0.95	1.2 ... 2.0	62	㉞
IPB77N06S2-12	11.7	77	0.95	2.1 ... 4.0	45	㉞
IPI80N06S2L-05	4.8	80	0.5	1.2 ... 2.0	170	㊽
IPI80N06S2-07	6.6	80	0.6	2.1 ... 4.0	86	㊽
IPI80N06S2-08	8.0	80	0.7	2.1 ... 4.0	72	㊽
IPI80N06S2L-11	11.0	80	0.95	1.2 ... 2.0	62	㊽
BSP603S2L	33.0	5.2	20.0	1.2 ... 2.0	31	㉓
IPP100N06S2L-05	4.7	100	0.5	1.2 ... 2.0	170	㊿
IPP80N06S2L-05	4.8	80	0.5	1.2 ... 2.0	170	㊿
IPP100N06S2-05	5.0	100	0.5	2.1 ... 4.0	130	㊿
IPP80N06S2L-H5	5.0	80	0.5	1.2 ... 2.0	145	㊿
IPP80N06S2-05	5.1	80	0.5	2.1 ... 4.0	130	㊿
IPP80N06S2-H5	5.5	80	0.5	2.1 ... 4.0	116	㊿
IPP80N06S2L-06	6.3	80	0.6	1.2 ... 2.0	114	㊿
IPP80N06S2-07	6.6	80	0.6	2.1 ... 4.0	86	㊿
IPP80N06S2L-07	7.0	80	0.7	1.2 ... 2.0	95	㊿
IPP80N06S2-08	8.0	80	0.7	2.1 ... 4.0	72	㊿
IPP80N06S2L-09	8.5	80	0.8	1.2 ... 2.0	82	㊿
IPP80N06S2-09	9.1	80	0.8	2.1 ... 4.0	60	㊿
IPP80N06S2L-11	11.0	80	0.95	1.2 ... 2.0	62	㊿
IPP77N06S2-12	12.0	77	0.95	2.1 ... 4.0	45	㊿

OptiMOS™ 75V (Planar)

Product Type	$R_{DS(on)}$ [mΩ]	I_D [A]	R_{thJC} (max) [K/W]	$V_{GS(th)}$ (min-max) [V]	Q_G(typ) [nC]	Package[1]
IPD30N08S2L-21	20.5	30	1.1	2.1 ... 4.0	43	㉜
IPD30N08S2-22	21.5	30	1.1	2.1 ... 4.0	44	㉜
IPD22N08S2L-50	50.0	22	2.0	1.2 ... 2.0	21	㉜
IPB100N08S2L-07	6.5	100	0.5	1.2 ... 2.0	185	㉞
IPB100N08S2-07	6.8	100	0.5	2.1 ... 4.0	153	㉞
IPB80N08S2L-07	6.8	80	0.5	1.2 ... 2.0	186	㉞
IPB80N08S2-07	7.1	80	0.5	2.1 ... 4.0	182	㉞
IPI100N08S2-07	7.1	100	0.5	2.1 ... 4.0	144	㊽
IPI80N08S2-07	7.4	80	0.5	2.1 ... 4.0	144	㊽
IPP100N08S2L-07	6.8	100	0.5	1.2 ... 2.0	182	㊿
IPP100N08S2-07	7.1	100	0.5	2.1 ... 4.0	144	㊽
IPP80N08S2L-07	7.1	80	0.5	1.2 ... 2.0	183	㊿
IPP80N08S2-07	7.4	80	0.5	2.1 ... 4.0	144	㊽

1) See packages on page 96

Automotive N-Channel MOSFETs

OptiMOS™-T 100V (Trench)

Product Type	$R_{DS(on)}$ [mΩ]	I_D [A]	R_{thJC} (max) [K/W]	$V_{GS(th)}$ (min-max) [V]	Q_G(typ) [nC]	Package[1]
IPB100N10S3-05	4.8	100	0.5	2.0 ... 4.0	135	㉞
IPB70N10S3-12	11.3	70	1.2	2.0 ... 4.0	51	㉞
IPB70N10S3L-12	11.8	70	1.2	1.2 ... 2.4	60	㉞
IPB50N10S3L-16	15.4	70	1.5	1.2 ... 2.4	49	㉞
IPD70N10S3-12	11.1	70	1.2	2.0 ... 4.0	51	㉜
IPD70N10S3L-12	11.5	70	1.2	1.2 ... 2.4	60	㉜
IPD50N10S3L-16	15.0	50	1.5	1.2 ... 2.4	49	㉜
IPD35N10S3L-26	24.0	35	2.1	1.2 ... 2.4	39	㉜
IPD30N10S3L-34	31.0	30	2.6	1.2 ... 2.4	24	㉜
IPI100N10S3-05	5.1	100	0.5	2.0 ... 4.0	135	㊽
IPI70N10S3-12	11.6	70	1.2	2.0 ... 4.0	51	㊽
IPI70N10S3L-12	12.1	70	1.2	1.2 ... 2.4	60	㊽
IPI50N10S3L-16	15.7	50	1.5	1.2 ... 2.4	49	㊽
IPP100N10S3-05	5.1	100	0.5	2.0 ... 4.0	135	㊿
IPP70N10S3-12	12.1	70	1.2	2.0 ... 4.0	51	㊿
IPP70N10S3L-12	12.1	70	1.2	1.2 ... 2.4	60	㊿
IPP50N10S3L-16	15.7	50	1.5	1.2 ... 2.4	49	㊿

OptiMOS™-T2 30V (Trench)

Product Type	$R_{DS(on)}$ [mΩ]	I_D [A]	R_{thJC} (max) [K/W]	$V_{GS(th)}$ (min-max) [V]	Q_G(typ) [nC]	Package[1]
IPD90N03S4L-02	2.2	90	1.1	1.0 ... 2.2	110	㉜
IPD90N03S4L-03	3.3	90	1.6	1.0 ... 2.2	60	㉜
IPD70N03S4L-04	4.3	70	2.2	1.0 ... 2.2	37	㉜
IPD50N03S4L-06	5.5	50	2.7	1.0 ... 2.2	24	㉜
IPD40N03S4L-08	8.0	40	3.6	1.0 ... 2.2	15	㉜
IPD30N03S4L-09	9.0	30	3.6	1.0 ... 2.2	15	㉜
IPD30N03S4L-14	13.6	30	4.9	1.0 ... 2.2	11	㉜
IPB180N03S4L-H0	0.95	180	0.6	1.0 ... 2.2	230	㊳
IPB180N03S4L-01	1.05	180	0.8	1.0 ... 2.2	187	㊳
IPB80N03S4L-02	2.4	80	1.1	1.0 ... 2.2	110	㉞
IPB80N03S4L-03	3.4	80	1.6	1.0 ... 2.2	60	㉞
IPB22N03S4L-15	14.6	22	4.9	1.0 ... 2.2	11	㉞
IPI80N03S4L-03	2.7	80	1.1	1.0 ... 2.2	110	㊽
IPI80N03S4L-04	3.6	80	1.6	1.0 ... 2.2	60	㊽
IPI22N03S4L-15	14.9	22	4.9	1.0 ... 2.2	11	㊽
IPP80N03S4L-03	2.7	80	1.1	1.0 ... 2.2	110	㊿
IPP80N03S4L-04	3.7	80	1.6	1.0 ... 2.2	60	㊿
IPP22N03S4L-15	14.9	22	4.9	1.0 ... 2.2	11	㊿

1) See packages on page 96

OptiMOS™-T2 40V (Trench)

Product Type	$R_{DS(on)}$ [mΩ]	I_D [A]	R_{thJC} (max) [K/W]	$V_{GS(th)}$ (min-max) [V]	Q_G(typ) [nC]	Package[1]
IPD100N04S4-02	2.0	100	1.0	2.0 ... 4.0	91.0	㉜
IPD90N04S4-02	2.4	90	1.0	2.0 ... 4.0	91.0	㉜
IPD90N04S4-03	3.2	90	1.6	2.0 ... 4.0	51.0	㉜
IPD90N04S4L-04	3.8	90	2.1	1.2 ... 2.0	46.0	㉜
IPD90N04S4-04	4.1	90	2.1	2.0 ... 4.0	33.0	㉜
IPD90N04S4-05	5.2	90	2.3	2.0 ... 4.0	33.0	㉜
IPD75N04S4-06	5.9	75	2.6	2.0 ... 4.0	24.5	㉜
IPD50N04S4L-08	7.3	50	3.3	1.2 ... 2.0	23.0	㉜
IPD50N04S4-08	7.9	50	3.3	2.0 ... 4.0	17.2	㉜
IPD50N04S4-10	9.3	50	3.7	2.0 ... 4.0	14.0	㉜
IPB180N04S4-00	0.98	180	0.5	2.0 ... 4.0	220.0	㊳
IPB180N04S4-H0	1.1	180	0.6	2.0 ... 4.0	173.0	㊳
IPB180N04S4-01	1.3	180	0.8	2.0 ... 4.0	135.0	㊳
IPB120N04S4-01	1.5	120	0.8	2.0 ... 4.0	135.0	㉞
IPB160N04S4-H1	1.6	160	0.9	2.0 ... 4.0	105.0	㊳
IPB120N04S4-02	1.8	120	0.95	2.0 ... 4.0	103.0	㉞
IPB90N04S4-02	2.1	90	1.0	2.0 ... 4.0	91.0	㉞
IPB100N04S4-H2	2.4	100	1.3	2.0 ... 4.0	70.0	㉞
IPB80N04S4-03	3.3	80	1.6	2.0 ... 4.0	51.0	㉞
IPB80N04S4L-04	4.0	80	2.1	1.2 ... 2.0	46.0	㉞
IPB80N04S4-04	4.2	80	2.1	2.0 ... 4.0	33.0	㉞
IPB70N04S4-06	6.2	70	2.6	2.0 ... 4.0	24.5	㉞
IPB45N04S4L-08	7.6	45	3.3	1.2 ... 2.0	23.0	㉞
IPI120N04S4-01	1.9	120	0.8	2.0 ... 4.0	135.0	㊽
IPI120N04S4-02	2.1	120	0.95	2.0 ... 4.0	103.0	㊽
IPI90N04S4-02	2.5	90	1.0	2.0 ... 4.0	91.0	㊽
IPI100N04S4-H2	2.7	100	1.3	2.0 ... 4.0	70.0	㊽
IPI80N04S4-03	3.7	80	1.6	2.0 ... 4.0	51.0	㊽
IPI80N04S4L-04	4.3	80	2.1	1.2 ... 2.0	46.0	㊽
IPI80N04S4-04	4.6	80	2.1	2.0 ... 4.0	33.0	㊽
IPI70N04S4-06	6.5	70	2.6	2.0 ... 4.0	24.5	㊽
IPP120N04S4-01	1.9	120	0.8	2.0 ... 4.0	135.0	㊿
IPP120N04S4-02	2.1	120	0.95	2.0 ... 4.0	103.0	㊿
IPP90N04S4-02	2.5	90	1.0	2.0 ... 4.0	91.0	㊿
IPP100N04S4-H2	2.7	100	1.3	2.0 ... 4.0	70.0	㊿
IPP80N04S4-03	3.7	80	1.6	2.0 ... 4.0	51.0	㊿
IPP80N04S4L-04	4.3	80	2.1	1.2 ... 2.0	46.0	㊿
IPP80N04S4-04	4.6	80	2.1	2.0 ... 4.0	33.0	㊿
IPP70N04S4-06	6.5	70	2.6	2.0 ... 4.0	24.5	㊿

1) See packages on page 96

Automotive N-Channel MOSFETs

OptiMOS™-T2 60V (Trench)

Product Type	$R_{DS(on)}$ [mΩ]	I_D [A]	R_{thJC} (max) [K/W]	$V_{GS(th)}$ (min-max) [V]	Q_G(typ) [nC]	Package[1]
IPD100N06S4-03	3.5	100	1.0	2.0 ... 4.0	99.0	㉜
IPD90N06S4L-03	3.5	90	1.0	1.2 ... 2.0	133.0	㉜
IPD90N06S4-04	3.8	90	1.0	2.0 ... 4.0	99.0	㉜
IPD90N06S4L-05	4.6	90	1.4	1.2 ... 2.0	83.0	㉜
IPD90N06S4-05	5.1	90	1.4	2.0 ... 4.0	62.0	㉜
IPD90N06S4L-06	6.3	90	1.9	1.2 ... 2.0	58.0	㉜
IPD90N06S4-07	6.9	90	1.9	2.0 ... 4.0	43.0	㉜
IPD50N06S4L-08	7.8	50	2.1	1.2 ... 2.0	49.0	㉜
IPD50N06S4-09	9.0	50	2.1	2.0 ... 4.0	36.0	㉜
IPD50N06S4L-12	12.0	50	3.0	1.2 ... 2.0	30.0	㉜
IPD30N06S4L-23	23.0	30	4.2	1.2 ... 2.0	16.1	㉜
IPD25N06S4L-30	30.0	25	5.1	1.2 ... 2.0	12.5	㉜
IPB180N06S4-H1	1.7	180	0.6	2.0 ... 4.0	208	㊳
IPB120N06S4-H1	2.0	120	0.6	2.0 ... 4.0	208	㉞
IPB120N06S4-02	2.4	120	0.8	2.0 ... 4.0	150	㉞
IPB120N06S4-03	2.8	120	0.9	2.0 ... 4.0	125	㉞
IPB90N06S4L-04	3.4	90	1.0	1.2 ... 2.0	133	㉞
IPB90N06S4-04	3.7	90	1.0	2.0 ... 4.0	99	㉞
IPB80N06S4L-05	4.8	80	1.4	1.2 ... 2.0	83	㉞
IPB80N06S4-05	5.4	80	1.4	2.0 ... 4.0	62	㉞
IPB80N06S4-07	5.4	80	1.4	2.0 ... 4.0	62	㉞
IPB80N06S4L-07	6.4	80	1.9	1.2 ... 2.0	58	㉞
IPB45N06S4L-08	7.9	45	2.1	1.2 ... 2.0	49	㉞
IPB45N06S4-09	9.1	45	2.1	2.0 ... 4.0	36	㉞
IPI120N06S4-H1	2.4	120	0.6	2.0 ... 4.0	208	㊽
IPI120N06S4-02	2.8	120	0.8	2.0 ... 4.0	150	㊽
IPI120N06S4-03	3.2	120	0.9	2.0 ... 4.0	125	㊽
IPI90N06S4L-04	3.4	90	1.0	1.2 ... 2.0	133	㊽
IPI90N06S4-04	4.0	90	1.0	2.0 ... 4.0	99	㊽
IPI80N06S4L-05	4.8	80	1.4	1.2 ... 2.0	83	㊽
IPI80N06S4-05	5.4	80	1.4	2.0 ... 4.0	62	㊽
IPI80N06S4L-07	6.4	80	1.9	1.2 ... 2.0	58	㊽
IPI80N06S4-07	7.1	80	1.9	2.0 ... 4.0	43	㊽
IPI45N06S4L-08	8.2	45	2.1	1.2 ... 2.0	49	㊽
IPI45N06S4-09	9.1	45	2.1	2.0 ... 4.0	36	㊽
IPP120N06S4-H1	2.4	120	0.6	2.0 ... 4.0	208	㊿
IPP120N06S4-02	2.8	120	0.8	2.0 ... 4.0	150	㊿
IPP120N06S4-03	3.2	120	0.9	2.0 ... 4.0	125	㊿
IPP90N06S4L-04	3.4	90	1.0	1.2 ... 2.0	133	㊿
IPP90N06S4-04	3.7	90	1.0	2.0 ... 4.0	99	㊿
IPP80N06S4L-05	4.8	80	1.4	1.2 ... 2.0	83	㊿
IPP80N06S4-05	5.4	80	1.4	2.0 ... 4.0	62	㊿
IPP80N06S4L-07	6.4	80	1.9	1.2 ... 2.0	58	㊿
IPP80N06S4-07	7.1	80	1.9	2.0 ... 4.0	43	㊿
IPP45N06S4L-08	8.2	45	2.1	1.2 ... 2.0	49	㊿
IPP45N06S4-09	9.1	45	2.1	2.0 ... 4.0	36	㊿

1) See packages on page 96

OptiMOS™-T2 100V (Trench)

Product Type	$R_{DS(on)}$ [mΩ]	I_D [A]	R_{thJC} (max) [K/W]	$V_{GS(th)}$ (min-max) [V]	Q_G(typ) [nC]	Package[1]
IPD90N10S4L-06	6.6	90	1.1	1.1 ... 2.1	75	㉜
IPD60N10S4L-12	12.0	60	1.6	1.1 ... 2.1	38	㉜

Automotive P-Channel MOSFETs

OptiMOS™-T2 30V P-Channel (Trench)

Product Type	$R_{DS(on)}$ [mΩ]	I_D [A]	R_{thJC} (max) [K/W]	$V_{GS(th)}$ (min-max) [V]	Q_G(typ) [nC]	Package[1]
IPD90P03P4L-04	4.5	-90	1.1	-2.0 ... -1.0	100	㉜
IPD90P03P4-04	4.5	-90	1.1	-4.0 ... -2.0	100	㉜
IPD80P03P4L-07	6.8	-80	1.7	-2.0 ... -1.0	80	㉜
IPD50P03P4L-11	10.5	-50	2.6	-2.0 ... -1.0	42	㉜
IPB80P03P4L-04	4.1	-80	1.1	-2.0 ... -1.0	125	㉞
IPB80P03P4-05	4.7	-80	1.1	-4.0 ... -2.0	100	㉞
IPB80P03P4L-07	6.9	-80	1.7	-2.0 ... -1.0	63	㉞
IPB45P03P4L-11	10.8	-45	2.6	-2.0 ... -1.0	42	㉞
IPI80P03P4L-04	4.4	-80	1.1	-2.0 ... -1.0	125	㊽
IPI80P03P4L-07	7.2	-80	1.7	-2.0 ... -1.0	63	㊽
IPI45P03P4L-11	11.1	-45	2.6	-2.0 ... -1.0	42	㊽
IPP80P03P4L-04	4.4	-80	1.1	-2.0 ... -1.0	125	㊿
IPP80P03P4L-07	7.2	-80	1.7	-2.0 ... -1.0	63	㊿
IPP45P03P4L-11	11.1	-45	2.6	-2.0 ... -1.0	42	㊿

1) See packages on page 96

Automotive P-Channel MOSFETs

OptiMOS™-P2 40V P-Channel (Trench)

Product Type	$R_{DS(on)}$ [mΩ]	I_D [A]	R_{thJC} (max) [K/W]	$V_{GS(th)}$ (min-max) [V]	Q_G(typ) [nC]	Package[1)]
IPB180P04P4L-02	2.4	-100	1.0	-2.2 ... -1.7	220	㊳
IPB180P04P4-03	2.8	-100	1.0	-4.0 ... -2.0	190	㉞
IPB120P04P4L-03	3.0	-120	1.1	-2.2 ... -1.7	180	㉞
IPB120P04P4-04	3.6	-120	1.1	-4.0 ... -2.0	158	㉞
IPB80P04P4L-04	4.2	-90	1.2	-2.2 ... -1.7	135	㉞
IPB80P04P4-05	4.9	-80	1.2	-4.0 ... -2.0	118	㉞
IPB80P04P4L-06	6.4	-80	1.7	-2.2 ... -1.7	71	㉞
IPB80P04P4-07	7.3	-80	1.7	-4.0 ... -2.0	71	㉞
IPB70P04P4L-08	7.5	-70	2.0	-2.2 ... -1.7	63	㉞
IPB70P04P4-09	9.3	-70	2.0	-4.0 ... -2.0	54	㉞
IPD90P04P4L-04	4.3	-90	1.2	-2.2 ... -1.7	135	㉜
IPD90P04P4-05	4.7	-90	1.2	-4.0 ... -2.0	118	㉜
IPD85P04P4L-06	6.4	-85	1.7	-2.2 ... -1.7	80	㉜
IPD85P04P4-07	7.3	-85	1.7	-4.0 ... -2.0	69	㉜
IPD70P04P4L-08	7.8	-70	2.0	-2.2 ... -1.7	63	㉜
IPD70P04P4-09	8.9	-70	2.0	-4.0 ... -2.0	54	㉜
IPD50P04P4L-11	10.6	-50	2.6	-2.2 ... -1.7	45	㉜
IPD50P04P4-13	12.7	-50	2.6	-4.0 ... -2.0	39	㉜
IPP120P04P4L-03	3.4	-120	1.1	-2.2 ... -1.7	180	㊿
IPP120P04P4-04	3.9	-120	1.1	-4.0 ... -2.0	158	㊿
IPP80P04P4L-04	4.7	-80	1.2	-2.2 ... -1.7	16	㊿
IPP80P04P4-05	5.2	-80	1.2	-4.0 ... -2.0	14	㊿
IPP80P04P4L-06	6.7	-80	1.7	-2.2 ... -1.7	71	㊿
IPP80P04P4-07	7.6	-80	1.7	-4.0 ... -2.0	71	㊿
IPP70P04P4L-08	8.2	-70	2.0	-2.2 ... -1.7	63	㊿
IPP70P04P4-09	9.4	-70	2.0	-4.0 ... -2.0	54	㊿
IPI120P04P4L-03	3.4	-120	1.1	-2.2 ... -1.7	180	㊽
IPI120P04P4-04	3.9	-120	1.1	-4.0 ... -2.0	135	㊽
IPI80P04P4L-04	4.7	-80	1.2	-2.2 ... -1.7	16	㊽
IPI80P04P4-05	5.2	-80	1.2	-4.0 ... -2.0	14	㊽
IPI80P04P4L-06	6.7	-80	1.7	-2.2 ... -1.7	71	㊽
IPI80P04P4-07	7.6	-80	1.7	-4.0 ... -2.0	71	㊽
IPI70P04P4L-08	8.2	-70	2.0	-2.2 ... -1.7	63	㊽
IPI70P04P4-09	9.4	-70	2.0	-4.0 ... -2.0	54	㊽

1) See packages on page 96

Automotive Dual MOSFETs

OptiMOS™ Dual N-Channel 55V
Automotive MOSFETs in Dual SuperS08

Product Type	$R_{DS(on)}$ (max) @ 10V [mΩ]/channel	I_D [A]/channel	R_{thJC} (max) [K/W]	$V_{GS(th)}$ (min-max) [V]	Q_G (typ) [nC]	Package[1]
IPG20N06S2L-35	2 x 35.0	20	2.3	1.2 ... 2.2	18.0	㉛
IPG20N06S2L-50	2 x 50.0	20	2.9	1.2 ... 2.2	12.4	㉛
IPG20N06S2L-65	2 x 65.0	20	3.5	1.2 ... 2.2	10.0	㉛

OptiMOS™-T2 Dual N-Channel 40V
Automotive MOSFETs in Dual SuperS08

Product Type	$R_{DS(on)}$ (max) @ 10V [mΩ]/channel	I_D [A]/channel	R_{thJC} (max) [K/W]	$V_{GS(th)}$ (min-max) [V]	Q_G (typ) [nC]	Package[1]
IPG20N04S4-08	2 x 7.5	20	2.3	2.0 ... 4.0	28.0	㉛
IPG20N04S4-09	2 x 8.6	20	2.8	2.0 ... 4.0	21.7	㉛
IPG20N04S4-12	2 x 12.2	20	3.7	2.0 ... 4.0	14.0	㉛
IPG20N04S4L-07	2 x 7.2	20	2.3	1.2 ... 2.2	39.0	㉛
IPG20N04S4L-08	2 x 8.1	20	2.8	1.2 ... 2.2	30.0	㉛
IPG20N04S4L-11	2 x 11.6	20	3.7	1.2 ... 2.2	20.0	㉛

OptiMOS™-T2 Dual N-Channel 60V
Automotive MOSFETs in Dual SuperS08

Product Type	$R_{DS(on)}$ (max) @ 10V [mΩ]/channel	I_D [A]/channel	R_{thJC} (max) [K/W]	$V_{GS(th)}$ (min-max) [V]	Q_G (typ) [nC]	Package[1]
IPG20N06S4-15	2 x 15.5	20	3.0	2.0 ... 4.0	22	㉛
IPG20N06S4L-11	2 x 11.1	20	2.3	1.2 ... 2.2	41	㉛
IPG20N06S4L-14	2 x 13.7	20	3.0	1.2 ... 2.2	30	㉛
IPG20N06S4L-26	2 x 26.0	20	4.5	1.2 ... 2.2	20	㉛

OptiMOS™-T2 Dual N-Channel 100V
Automotive MOSFETs in Dual SuperS08

Product Type	$R_{DS(on)}$ (max) @ 10V [mΩ]/channel	I_D [A]/channel	R_{thJC} (max) [K/W]	$V_{GS(th)}$ (min-max) [V]	Q_G (typ) [nC]	Package[1]
IPG20N10S4L-22	2 x 22.0	20	2.5	1.1 ... 2.1	21.0	㉛
IPG20N10S4L-35	2 x 35.0	20	3.5	1.1 ... 2.1	13.4	㉛
IPG16N10S4-61	2 x 61.0	16	5.2	2.0 ... 3.5	5.4	㉛

1) See packages on page 96

Small Signal MOSFETs

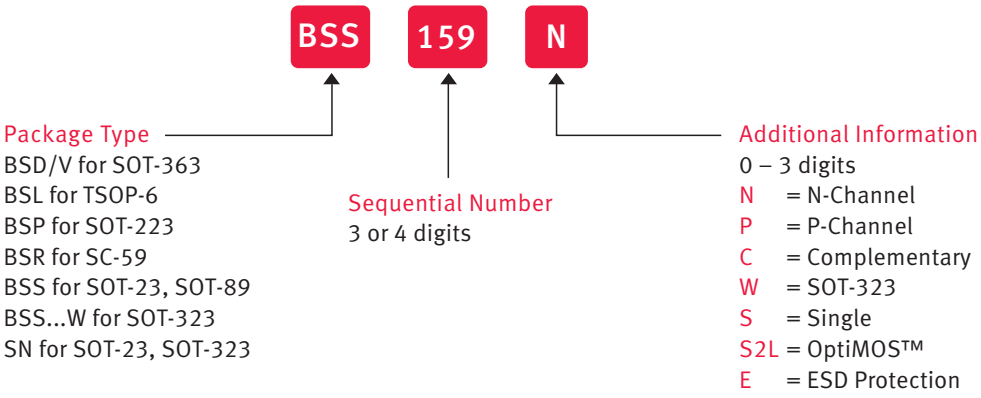
Infineon offers a full range of Small Signal MOSFETs qualified according AEC Q101.

The portfolio includes:

- Polarity: N-Channel enhancement, N-Channel depletion and P-Channel MOSFETs
- Voltage classes: -250 ... 800V
- V_{GS} rating: 10V(Normal Level), 4.5V (Logic Level), 2.5V (Super Logic Level), 1.8V (Ultra Logic Level)
- Packages: SOT-223, SOT-89, TSOP-6 (single and dual), SC-59, SOT-23, SOT-323, SOT-363 (single and dual)
- Configuration: single, dual, complementary (n+p pairs)
- Additional features: the products with names ending by “E” have an integrated ESD protection

SC-59 is and enhanced version of the SOT-23: it’s footprint compatible with SOT-23, but allows a bigger chip inside, therefore a lower $R_{DS(on)}$.

Naming System



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www.infineon.com/pchannel
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N-Channel MOSFETs

Voltage	Product Type	$R_{DS(on)}$ (max) [mΩ]	I_D [A]	$V_{GS(th)}$ (min-max) [V]	Q_G (typ) [nC]	Technology	Package[1]
20V	BSL802SN	–	7.5	0.3 ... 0.75	4.7	OptiMOS™2	㊹
	BSL202SN	–	7.5	0.7 ... 1.2	5.8	OptiMOS™2	㊹
	BSL205N	–	2.5	0.7 ... 1.2	2.1	OptiMOS™2	㊹ (dual)
	BSL214N	–	1.5	0.7 ... 1.2	0.8	OptiMOS™2	㊹ (dual)
	BSL207N	–	2.1	0.7 ... 1.2	2.1	OptiMOS™2	㊹ (dual)
	BSL806N	–	2.3	0.3 ... 0.75	1.7	OptiMOS™2	㊹ (dual)
	BSR202N	–	3.8	0.7 ... 1.2	5.8	OptiMOS™2	⑰
	BSR802N	–	3.7	0.3 ... 0.75	4.7	OptiMOS™2	⑰
	BSS205N	–	2.5	0.7 ... 1.2	2.1	OptiMOS™2	⑳
	BSS214N	–	1.5	0.7 ... 1.2	0.8	OptiMOS™2	⑳
	BSS806N	–	2.3	0.3 ... 0.75	1.7	OptiMOS™2	⑳
	BSS816NW	–	1.4	0.3 ... 0.75	0.6	OptiMOS™2	㉔
	BSS214NW	–	1.5	0.7 ... 1.2	0.8	OptiMOS™2	㉔
	BSD214NW	–	1.5	0.7 ... 1.2	0.8	OptiMOS™2	㉖
	BSD816SN	–	1.4	0.3 ... 0.75	0.6	OptiMOS™2	㉖
	BSD235N	–	0.95	0.7 ... 1.2	0.32	OptiMOS™2	㉖ (dual)
	BSD840N	–	0.88	0.3 ... 0.75	0.26	OptiMOS™2	㉖ (dual)
30V	BSR302N	23	3.7	1.2 ... 2.0	4.4	OptiMOS™2	⑰
	BSL302SN	25	7.1	1.2 ... 2.0	4.4	OptiMOS™2	㊹
	BSL306N	57	2.3	1.2 ... 2.0	1.6	OptiMOS™2	㊹ (dual)
	BSS306	57	2.3	1.2 ... 2.0	1.5	OptiMOS™2	⑳
	BSS316N	160	1.4	1.2 ... 2.0	0.6	OptiMOS™2	⑳
	BSD316SN	160	1.4	1.2 ... 2.0	0.6	OptiMOS™2	㉖
55V	BSS670S2L	650	0.54	1.2 ... 2.0	1.7	OptiMOS™	⑳
60V	BSS606N	60	3.2	1.3 ... 2.3	6.1	OptiMOS™3[2]	㉑
	BSL606SN	60	4.5	1.3 ... 2.3	6.1	OptiMOS™3[2]	㊹
	BSR606N	60	2.4	1.3 ... 2.3	6.1	OptiMOS™3[2]	⑰
	BSP318S	90	2.6	1.2 ... 2.0	14.0	SIPMOS™	㉓
	BSP320S	120	2.9	2.1 ... 4.0	9.7	SIPMOS™	㉓
	BSP295	300	1.8	0.8 ... 1.8	14.0	SIPMOS™	㉓
	2N7002DW	3,000	0.3	1.5 ... 2.5	0.4	OptiMOS™	㉖ (dual)
	BSS138N	3,500	0.23	0.6 ... 1.4	1.0	SIPMOS™	⑳
	BSS138W	3,500	0.28	0.6 ... 1.4	1.0	SIPMOS™	㉓
	SN7002N	5,000	0.2	0.8 ... 1.8	1.0	SIPMOS™	⑳
	BSS7728N	5,000	0.2	1.3 ... 2.3	1.0	SIPMOS™	⑳
	SN7002W	5,000	0.23	0.8 ... 1.8	1.0	SIPMOS™	㉔
100V	BSL372SN[4]	220	2.0	4.5	9.5	SIPMOS™	㊹
	BSP372N[4]	230	1.8	0.8 ... 2.0	9.5	SIPMOS™	㉓
	BSL373SN[4]	230	2.0	10.0	6.2	SIPMOS™	㊹
	BSP373N[4]	240	1.8	2.1 ... 4.0	6.2	SIPMOS™	㉓
	BSL296SN[4]	460	1.4	4.5	4.5	SIPMOS™	㊹
	BSP296N[3]	600	1.2	0.8 ... 1.8	4.5	SIPMOS™	㉓
	BSP123	6,000	0.37	0.8 ... 1.8	1.60	SIPMOS™	㉓
	BSS123N	6,000	0.19	0.8 ... 1.8	0.6	SIPMOS™	⑳
	BSS119N	6,000	0.19	1.8 ... 2.3	0.6	SIPMOS™	⑳
200V	BSP297	1,800	0.66	0.8 ... 1.8	12.9	SIPMOS™	㉓

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1) See packages on page 96
2) Coming Q4/2012
3) Coming soon
4) Coming Q1/2013

Small Signal MOSFETs

N-Channel MOSFETs (cont'd)

Voltage	Product Type	$R_{DS(on)}$ (max) [mΩ]	I_D [A]	$V_{GS(th)}$ (min-max) [V]	Q_G (typ) [nC]	Technology	Package[1]
240V	BSP89	6,000	0.35	0.8 ... 1.8	4.3	SIPMOS™	㉓
	BSP88	6,000	0.35	0.6 ... 1.4	4.5	SIPMOS™	㉓
	BSS87	6,000	0.26	0.8 ... 1.8	3.7	SIPMOS™	㉑
	BSS131	14,000	0.11	0.8 ... 1.8	2.1	SIPMOS™	⑳
400V	BSP298	3,000	0.5	2.1 ... 4.0	–	SIPMOS™	㉓
	BSP324	25,000	0.17	1.3 ... 2.3	4.5	SIPMOS™	㉓
500V	BSP299	4,000	0.4	2.1 ... 4.0	–	SIPMOS™	㉓
600V	BSP125	45,000	0.12	1.3 ... 2.3	4.4	SIPMOS™	㉓
	BSS225	45,000	0.09	1.3 ... 2.3	3.9	SIPMOS™	㉑
	BSS127	500,000	0.023	1.4 ... 2.6	1.4	SIPMOS™	⑳
800V	BSP300	20	0.19	2.1 ... 4.0	–	SIPMOS™	㉓

P-Channel MOSFETs

Voltage	Product Type	$R_{DS(on)}$ (max) @ V_{GS} = -10V [mΩ]	I_D [A]	$V_{GS(th)}$ (min-max) [V]	Q_G (typ) [nC]	Technology	Package[1]
-20V	BSL207SP	–	-6.0	-1.2 ... -0.6	-13.3	OptiMOS™2 P	㊹
	BSL211SP	–	-4.7	-1.2 ... -0.6	-8.3	OptiMOS™2 P	㊹
	BSL215P	–	-1.5	-1.2 ... -0.6	-3.55	OptiMOS™2 P	㊹ (dual)
	BSS215P	–	-1.5	-1.2 ... -0.5	-3.6	OptiMOS™2 P	⑳
	BSS209PW	–	-0.58	-1.2 ... -0.6	-0.92	OptiMOS™2 P	㉔
	BSS223PW	–	-0.39	-1.2 ... -0.6	-0.5	OptiMOS™2 P	㉔
	BSV236SP	–	-1.5	-1.2 ... -0.6	-3.8	OptiMOS™ P	㉖
	BSD223P	–	-0.39	-1.2 ... -0.6	-0.5	OptiMOS™2 P	㉖ (dual)
-30V	BSL307SP	43	-5.5	-2.0 ... -1.0	-23.4	OptiMOS™2 P	㊹
	BSL308PE	80	-2.1	-2.0 ... -1.0	-2.9	OptiMOS™3 P + integrated ESD diode	㊹ (dual)
	BSL314PE	140	-1.5	-2.0 ... -1.0	-2.3	OptiMOS™3 P + integrated ESD diode	㊹ (dual)
	BSL315P	150	-1.5	-2.0 ... -1.0	-2.3	OptiMOS™2 P	㊹ (dual)
	BSS308PE	80	-2.1	-2.0 ... -1.0	-5.2	OptiMOS™3 P + integrated ESD diode	⑳
	BSS314PE	140	-1.5	-2.0 ... -1.0	-2.9	OptiMOS™3 P + integrated ESD diode	⑳
	BSS315P	150	-1.5	-2.0 ... -1.0	-2.3	OptiMOS™2 P	⑳
	BSD314SPE	140	-1.5	-2.0 ... -1.0	-2.9	OptiMOS™3 P + integrated ESD diode	㉖
	BSL303SPE[2]	30	-6.6	4.5	–	OptiMOS™ P + integrated ESD diode	㊹
	BSL305SAE[2]	50	-5.3	4.5	–		㊹
	BSS356PWE[2]	560	-0.73	4.5	–		㉔
	BSD356PE[2]	560	-0.73	4.5	–		㉖
-60V	BSP613P	130	-2.9	-4.0 ... -2.1	-22.0	SIPMOS™	㉓
	BSP170P	300	-1.9	-4.0 ... -2.1	-10.0	SIPMOS™	㉓

1) See packages on page 96
2) Coming in 2013

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P-Channel MOSFETs (cont'd)

Voltage	Product Type	$R_{DS(on)}$ (max) @ V_{GS} = -10V [mΩ]	I_D [A]	$V_{GS(th)}$ (min-max) [V]	Q_G (typ) [nC]	Technology	Package[1]
-60V	BSP171P	300	-1.9	-2.0 ... -1.0	-13.0	SIPMOS™	㉓
	BSP315P	800	-1.17	-2.0 ... -1.0	-5.2	SIPMOS™	㉓
	BSR315P	800	-0.62	-2.0 ... -1.0	-4.0	SIPMOS™	⑰
	BSS83P	2,000	-0.33	-2.0 ... -1.0	-2.38	SIPMOS™	⑳
	BSS84P	8,000	-0.17	-2.0 ... -1.0	-1.0	SIPMOS™	⑳
	BSS84PW	8,000	-0.15	-2.0 ... -1.0	-1.0	SIPMOS™	㉔
-100V	BSP322P	800	-1.0	-2.0 ... -1.0	-12.4	SIPMOS™	㉓
	BSP321P	900	-0.98	-4.0 ... -2.1	-9.0	SIPMOS™	㉓
	BSP316P	1,800	-0.68	-2.0 ... -1.0	-5.1	SIPMOS™	㉓
	BSR316P	1,800	-0.36	-2.0 ... -1.0	-3.0	SIPMOS™	⑰
-250V	BSP317P	4,000	-0.43	-2.0 ... -1.0	-11.6	SIPMOS™	㉓
	BSP92P	12,000	-0.26	-2.0 ... -1.0	-4.3	SIPMOS™	㉓
	BSS192P	12,000	-0.19	-2.0 ... -1.0	-4.9	SIPMOS™	㉑
	BSR92P	11,000	-0.14	-2.0 ... -1.0	-3.6	SIPMOS™	⑰

Complementary MOSFETs

Voltage	Product Type	$R_{DS(on)}$ (max) @ V_{GS} = -10V [mΩ]	I_D [A]	$V_{GS(th)}$ (min-max) [V]	Q_G (typ) [nC]	Technology	Package[1]
20V	BSL215C/n-ch	–	1.5	0.7 ... 1.2	0.73	OptiMOS™2	㊹ (dual)
-20V	BSL215C/p-ch	–	-1.5	-1.2 ... -0.6	-3.0	OptiMOS™2 P	㊹ (dual)
20V	BSD235C/n-ch	–	0.95	-1.2 ... -0.6	0.34	OptiMOS™2	㉖ (dual)
-20V	BSD235C/p-ch	–	-0.53	0.7 ... 1.2	-0.4	OptiMOS™2 P	㉖ (dual)
30V	BSL316C/n-ch	160	1.4	-2.0 ... -1.0	0.6	OptiMOS™2	㊹ (dual)
-30V	BSL316C/p-ch	150	-1.5	1.2 ... 2.0	-2.4	OptiMOS™2 P	㊹ (dual)
30V	BSL308C/n-ch	57	2.3	1.2 ... 2.0	1.5	OptiMOS™2	㊹ (dual)
-30V	BSL308C/p-ch	80	-2.1	-2.0 ... -1.0	-2.9	OptiMOS™3 P	㊹ (dual)
30V	BSD356C/n-ch[2]	350	0.95	4.5	–	OptiMOS™2	㉖ (dual)
-30V	BSD356C/p-ch[2]	560	-0.73	4.5	–	OptiMOS™2 P	㉖ (dual)

Depletion MOSFETs

Voltage	Product Type	$R_{DS(on)}$ (max) @ V_{GS} = 0V [mΩ]	I_D [A]	Q_G (typ) [nC]	Technology	Package[1]
60V	BSS159N	8.0	0.13	2.2	SIPMOS™	⑳
100V	BSS169	12.0	0.09	2.1	SIPMOS™	⑳
200V	BSP149	3.5	0.14	11.0	SIPMOS™	㉓
240V	BSP129	20.0	0.05	3.8	SIPMOS™	㉓
250V	BSS139	30.0	0.03	2.3	SIPMOS™	⑳
600V	BSP135	60.0	0.02	3.7	SIPMOS™	㉓
	BSS126	700.0	0.007	1.4	SIPMOS™	⑳

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1) See packages on page 96
2) Coming Q1/2013

AEC Qualified

RoHS

650V CoolMOS™ CFDA

With the new 650V CoolMOS™ CFDA, Infineon launches its second generation of market leading Automotive qualified high voltage CoolMOS™ MOSFET. In addition to the well-known attributes of high quality and reliability required by the automotive industry, the new CoolMOS™ CFDA series provides now also an integrated Fast Body Diode.

This Fast Body Diode is the key for addressing resonant switching topologies resulting in lower switching losses due to the low gate charge. The softer commutation behavior and consequent reduced EMI appearance gives the CoolMOS™ CFDA series a clear advantage in comparison with competitor parts. Furthermore, limited voltage overshoot during hard commutation of the body diode enables easier implementation of layout and design.

The broad 650V CoolMOS™ CFDA portfolio provides all benefits of fast switching Superjunction MOSFET fulfilling the enhanced reliability requirements for automotive applications realized with special screening measures in Front End and Back End as well as the qualification compliant to AEC Q101.

Therefore, the new 650V CoolMOS™ CFDA technology is the best choice for switching topologies in Automotive applications.

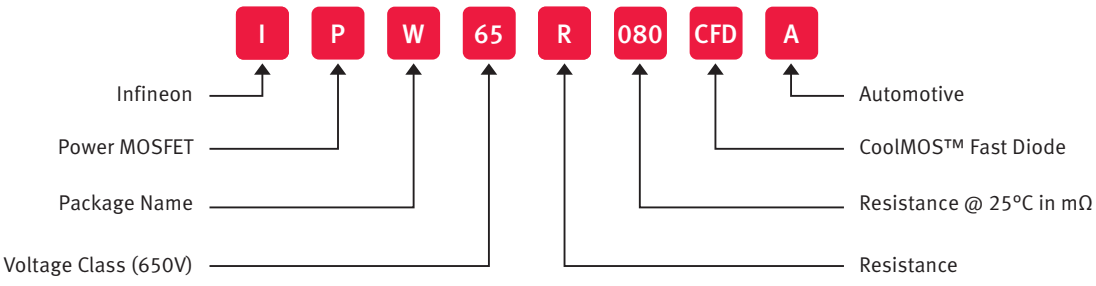
Key Features

- First 650V automotive qualified technology with integrated fast body diode on the market
- Limited voltage overshoot during hard commutation – self limiting di/dt and dv/dt
- Low gate charge value Q_g
- Low Q_{rr} at repetitive commutation on body diode & low Q_{oss}
- Reduced turn on and turn off delay times
- Compliant to AEC Q101 standard

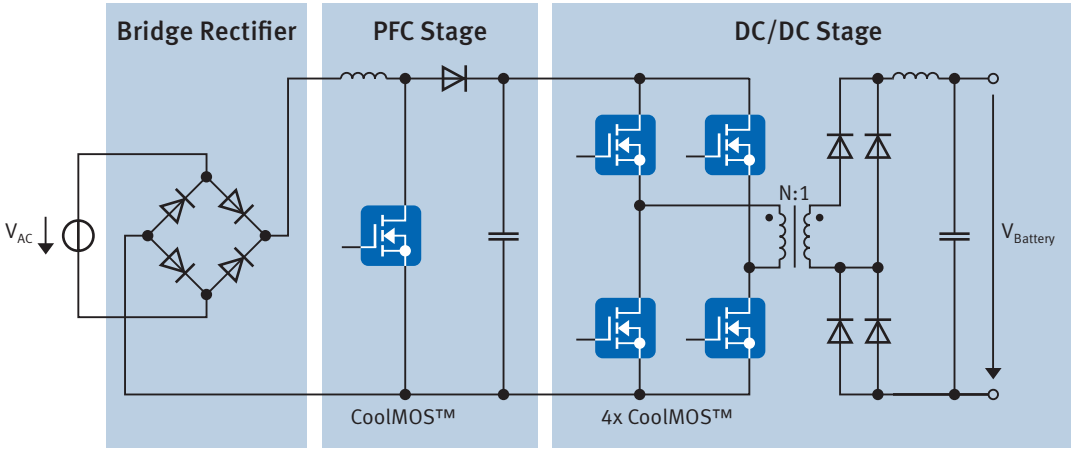
Applications

- Unidirectional and bidirectional DC/DC converter
- Battery charge
- HID lighting

Naming System



Example for Automotive Topology using CoolMOS™ CFDA



On-board battery charger with ZVS phase shifted topology

650V CoolMOS™ CFDA Product Portfolio

Product Type	$R_{DS(on)}$ @ T_j = 25°C V_{GS} = 10V [mΩ]	I_D (max) @ T_j = 25°C [A]	I_{Dpuls} (max) [A]	$V_{GS(th)}$ (min-max) [V]	Q_G (typ) [nC]	R_{thJC} (max) [K/W]	Package[1)]
IPD65R420CFDA	420	8.7	27.0	3.5 ... 4.5	32	1.5	32
IPD65R660CFDA	660	6.0	17.0	3.5 ... 4.5	20	2.0	32
IPB65R110CFDA	110	31.2	99.6	3.5 ... 4.5	118	0.45	34
IPB65R150CFDA	150	22.4	72.0	3.5 ... 4.5	86	0.64	34
IPB65R190CFDA	190	17.5	57.2	3.5 ... 4.5	68	0.83	34
IPB65R310CFDA	310	11.4	34.4	3.5 ... 4.5	41	1.2	34
IPB65R660CFDA	660	6.0	17.0	3.5 ... 4.5	20	2.0	34
IPP65R110CFDA	110	31.2	99.6	3.5 ... 4.5	118	0.45	50
IPP65R150CFDA	150	22.4	72.0	3.5 ... 4.5	86	0.64	50
IPP65R190CFDA	190	17.5	57.2	3.5 ... 4.5	68	0.83	50
IPP65R310CFDA	310	11.4	34.4	3.5 ... 4.5	41	1.2	50
IPP65R660CFDA	660	6.0	17.0	3.5 ... 4.5	20	2.0	50
IPW65R048CFDA	48	63.3	228.0	3.5 ... 4.5	270	0.25	57
IPW65R080CFDA	80	43.3	127.0	3.5 ... 4.5	161	0.32	57
IPW65R110CFDA	110	31.2	99.6	3.5 ... 4.5	118	0.45	57
IPW65R150CFDA	150	22.4	72.0	3.5 ... 4.5	86	0.64	57
IPW65R190CFDA	190	17.5	57.2	3.5 ... 4.5	68	0.83	57

1) See packages on page 96

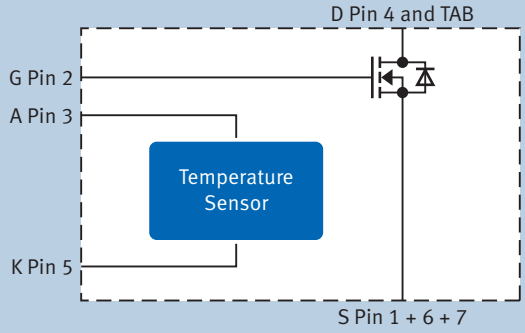
TEMPFET™: Temperature Protected Switches

TEMPFET™ provides the first level of temperature and current protection via its temperature sensor (available on external pins). Additionally, it enables direct gate access and flexible temperature response control.

Features

- Logic level input
- Analog driving capability
- Potential-free temperature sensor
- High-speed switching (100kHz)
- Overload protection and thermal shutdown with external circuit
- Avalanche rated

Block Diagram



Product Table TEMPFET™: Temperature Protected Switches

Product Type	V_{DS} [V]	$R_{DS(on)}$ [mΩ]	I_D [A]	$V_{GS(th)}$ (min-max) [V]	Q_G(typ) [nC]	Package[1]
BTS282Z	49	6.5	80	1.2 ... 2.0	155	(39) (54)
BTS244Z	55	12.0	35	1.2 ... 2.0	85	(37) (51) (52)
BTS247Z	55	18.0	33	1.2 ... 2.0	60	(37) (51) (52)

1) See packages on page 96

HITFET™: Low-Side Protected Switches

HITFET™ provides a high level of protection for overtemperature, short-circuit, overcurrent, overvoltage, open-load and ESD-sensitive circuits. HITFET™ combines all these protection features in one easy-to-use device. Infineon has recently expanded its HITFET™ portfolio into low range $R_{DS(on)}$ (BTS3160D and BTS3256D) and into 24V parts (BTS3xxxSDx).

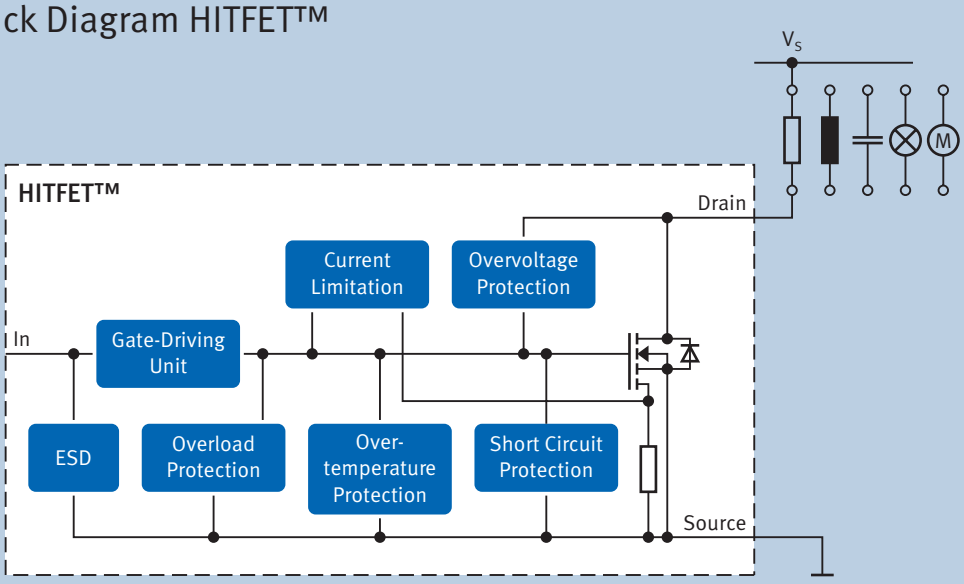
Features

- Overtemperature protection
- Overload protection
- Current limitation
- Short-circuit protection
- Open-load detection
- Thermal shutdown with auto-restart or latch behavior
- Overvoltage protection
- Logic level input
- Electrostatic Discharge (ESD) protection
- Linear drive capability
- Status feedback
  - Digital flag or with external resistor
  - Analogous with external resistor at input

Automotive and Industrial Applications

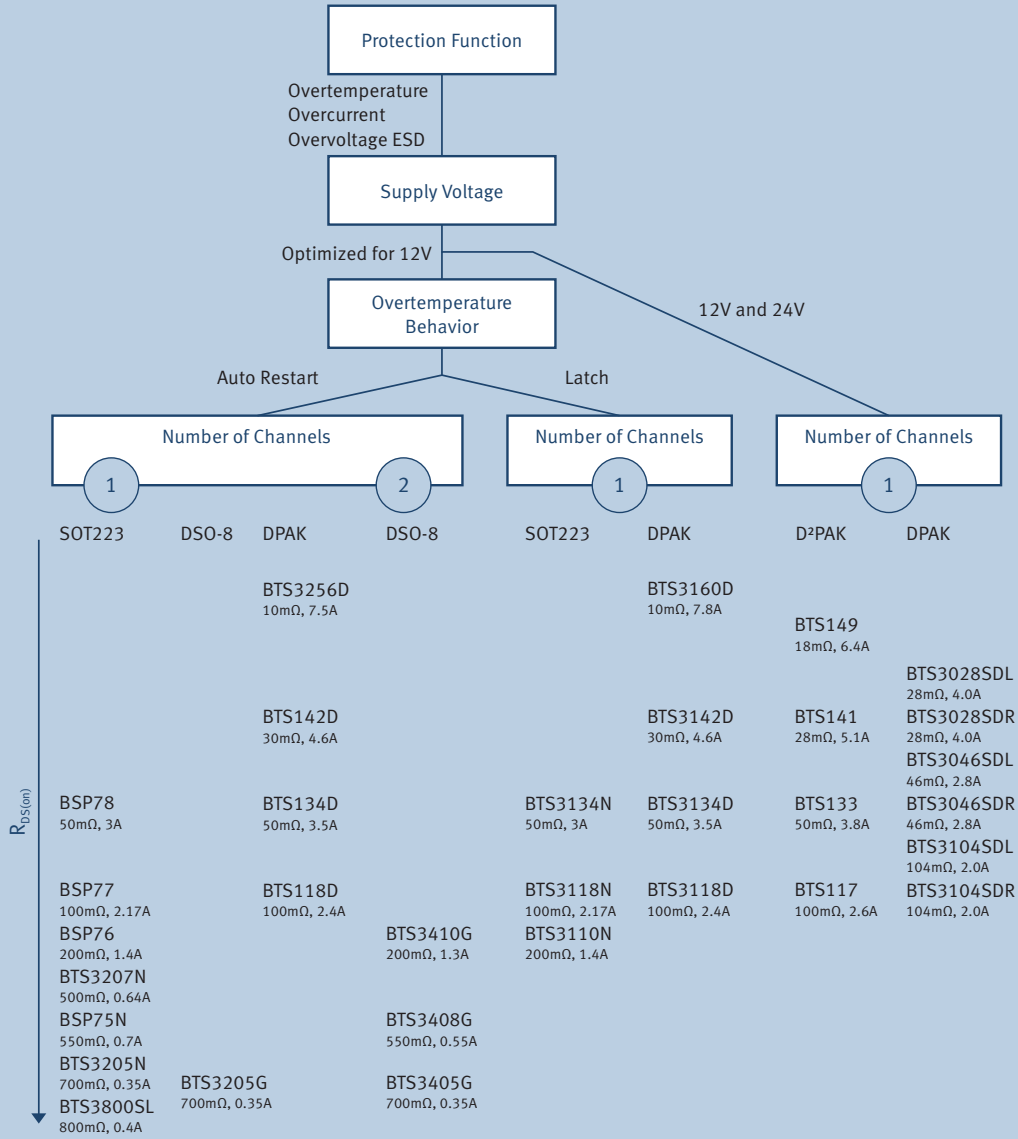
- Relays
- Fans and pumps
- Solenoids
- Valves
- Heating element
- Bulbs and LEDs
- Fuses
- Line drivers and supply switches

Block Diagram HITFET™



HITFET™: Low-Side Protected Switches

Selection Tree HITFET™



Product Table HITFET™: Low-Side Protected Switches

Product Type	$R_{DS(on)}$ [mΩ]	Channels	$V_{DS(AZ)}$ [V]	$I_{L(nom)}$ [A]	$I_{L(lim)}$ [A]	PWM [kHz]	Diagnostic	Package[2]
BTS3160D	10	1	40	7.8	70.0	1	digital	㉝
BTS3256D	10	1	40	7.5	42.0	10	digital	㉝
BTS3142D	28	1	42	4.6	30.0	1	through input pin	㉜
BTS142D	28	1	42	4.6	30.0	1	through input pin	㉜
BTS3134N	50	1	42	3.0	18.0	1	through input pin	㉓
BTS3134D	50	1	42	3.5	18.0	1	through input pin	㉜
BSP78	50	1	42	3.0	18.0	1	through input pin	㉓
BTS134D	50	1	42	3.5	18.0	1	through input pin	㊿
BTS3118D	100	1	42	2.4	10.0	1	through input pin	㉜
BTS3118N	100	1	42	2.2	10.0	1	through input pin	㉓
BSP77	100	1	42	2.2	10.0	1	through input pin	㉓
BTS118D	100	1	42	2.4	10.0	1	through input pin	㉜
BSP76	200	1	42	1.4	5.0	1	through input pin	㉓
BTS3410G	200	2	42	1.3	5.0	1	through input pin	①
BTS3110N	200	1	42	1.4	5.0	1	through input pin	㉓
BTS3207N	500	1	42	0.7	5.0	1	through input pin	㉓
BTS3205G	700	1	42	0.35	0.6	1	through input pin	①
BTS3405G	700	2	42	0.35	0.6	1	through input pin	①
BTS3205N	700	1	42	0.35	0.6	1	through input pin	㉓
BTS3800SL	800	1	42	0.35	0.6	10		⑲
BTS149[1]	20	1	60	6.4	30.0	1	through input pin	㊿
BTS141TC	30	1	60	5.1	25.0	1	through input pin	㉞
BTS3028SDL	30	1	60	5.0	18.0	1	through input pin	㉜
BTS3028SDR	30	1	60	5.0	18.0	1	through input pin	㉜
BTS123TC	50	1	60	3.8	21.0	1	through input pin	㉞
BTS3046SDL	50	1	60	3.6	10.0	1	through input pin	㉜
BTS3046SDR	50	1	60	3.6	10.0	1	through input pin	㉜
BTS117TC	100	1	60	3.5	7.0	1	through input pin	㉞
BTS3104SDL	104	1	60	2.0	6.0	1	through input pin	㉜
BTS3104SDR	104	1	60	2.0	6.0	1	through input pin	㉜
BSP75N	550	1	60	0.7	1.0	5	through input pin	㉓
BTS3408G	550	2	60	0.55	1.0	1	through input pin	①

1) Non green
2) See packages on page 96

Smart Multichannel Switches for Body: SPIDER – SPI Driver for Enhanced Relay Control

SPIDER stands for SPI Driver for Enhanced Relay control. SPIDER products are the smallest relay drivers in the market with innovative features and packages.

With the SPIDER family Infineon offers a wide choice of integrated Multichannel switches specially designed for the control of small loads like relays, LEDs and small motors.

The new modular family is scaled by $R_{DS(on)}$, packages and add-on features. They come in 4- and 8-channel low-side configurations (SPIDER Low-Side), as well as configurable 8-channel high-/low-side configurations (SPIDER High-/Low-Side).

It offers not only the scalability through the number of channels and the current density, but also flexibility regarding enhanced features like parallel inputs for PWM, limp home and low-voltage cranking.

A variety of packages is available in order to serve different applications.

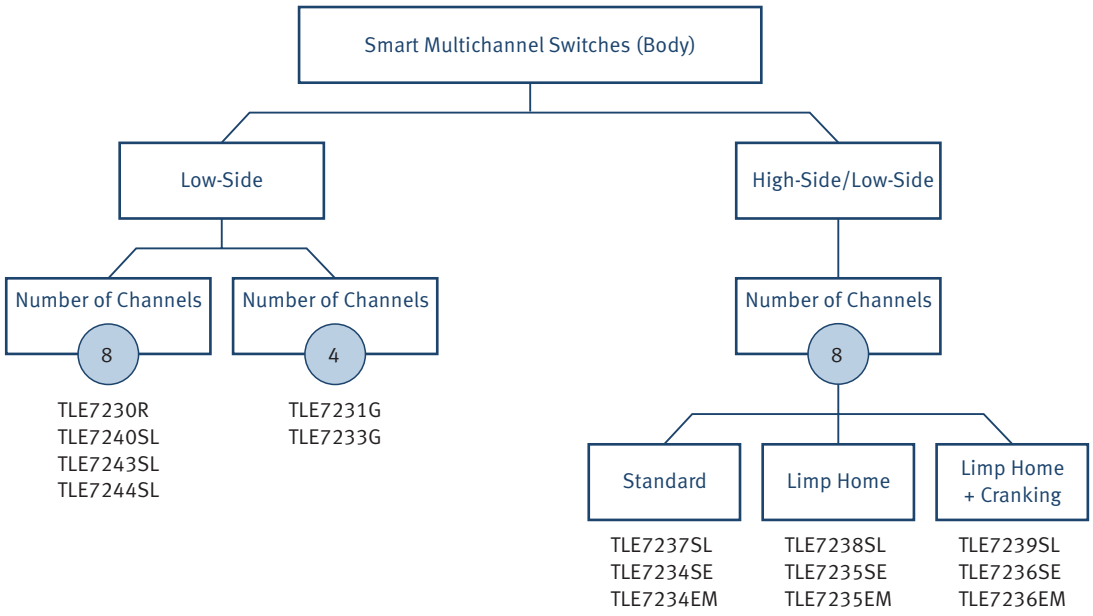
Applications

- Relays
- Small LEDs
- Valves
- Solenoids
- DC and stepper motors

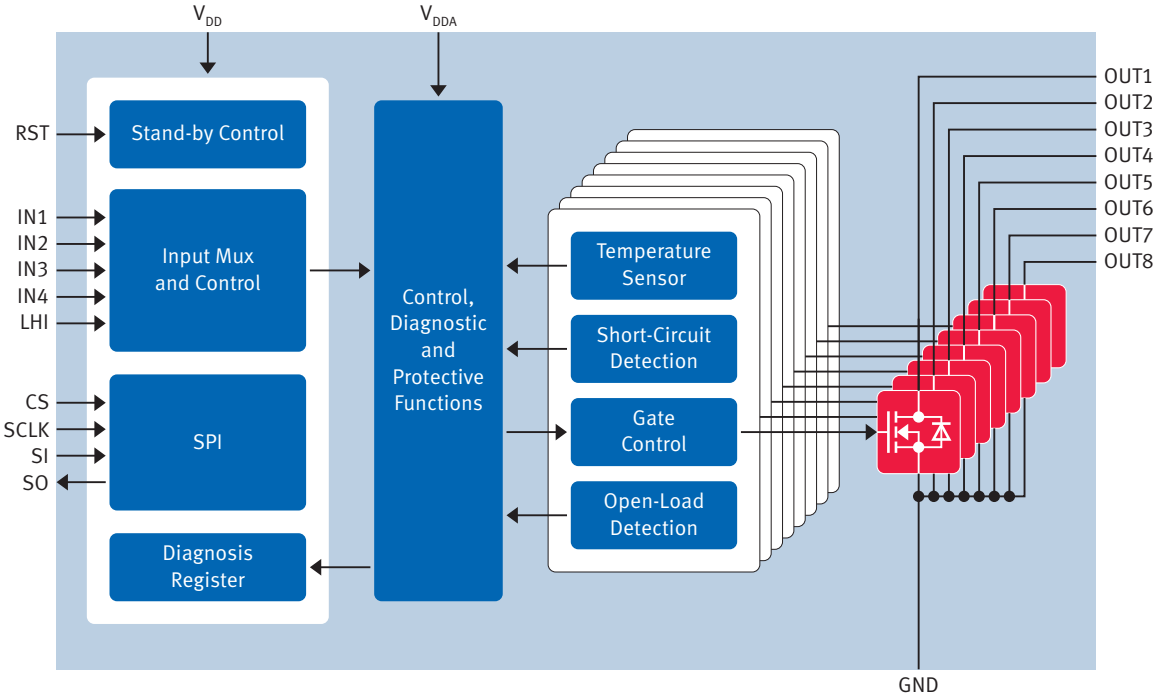
Features

- SPI (Serial Peripheral Interface)
- Daisy-chain and detailed diagnostics via SPI
- Small package
- Four different packages
- Short-circuit, overload protection configurable behavior (limitation or shutdown), thermal shutdown configurable behavior (latch or restart)
- Fail safe mode (limp home)
- Low battery voltage operation (cranking)
- AEC-qualified green robust product (RoHS-compliant)
- Undervoltage shutdown
- Overload shutdown
- Short to GND detection
- Open-load detection
- Stand-by mode
- Daisy-chain capability

Selection Tree SPIDER



Block Diagram TLE7244SL



Smart Multichannel Switches for Body: SPIDER – SPI Driver for Enhanced Relay Control

SPIDER Product Table

	Product Type	High-Side	Small High-Side	Low-Side	Configurable
SPIDER LS	TLE7230R	–	–	8	–
	TLE7240SL	–	–	8	–
	TLE7243SL	–	–	8	–
	TLE7244SL	–	–	8	–
	TLE7231G	–	–	4	–
	TLE7233G	–	–	4	–
SPIDER HS/LS	TLE7237SL	2	2	2	2
	TLE7238SL	2	2	2	2
	TLE7239SL	2	2	2	2
	TLE7234SE	2	2	2	2
	TLE7235SE	2	2	2	2
	TLE7236SE	2	2	2	2
	TLE7234EM	2	2	2	2
	TLE7235EM	2	2	2	2
	TLE7236EM	2	2	2	2

1) See packages on page 96

$R_{DS(on)}$ (typ) @25°C [Ω]	Cranking Mode [V]	$V_{DS(AZ)}$ [V]	Limp Home	$I_{L(nom)}$ [mA]	Number of Direct Inputs	Package [1]
0.8	–	48		500	4	⑬
1.5	–	41	●	210	4	㉙
1.2	–	41	●	260	4	㉙
0.8	–	41	●	290	4	㉙
1.0	–	41		320	1	④
1.0	–	41	●	390	4	㉙
6 x 0.9; 2 x 1.6	–	41		6 x 260; 2 x 120	3	㉙
6 x 0.9; 2 x 1.6	–	41	●	6 x 260; 2 x 120	2	㉙
6 x 0.9; 2 x 1.6	4	41	●	6 x 260; 2 x 120	2	㉙
6 x 0.85; 2 x 1.6	–	41		6 x 280; 2 x 140	3	⑦
6 x 0.85; 2 x 1.6	–	41	●	6 x 280; 2 x 140	2	⑦
6 x 0.85; 2 x 1.6	4	41	●	6 x 280; 2 x 140	2	⑦
6 x 0.9; 2 x 1.6	–	41		6 x 350; 2 x 175	3	㉚
6 x 0.9; 2 x 1.6	–	41	●	6 x 350; 2 x 175	2	㉚
6 x 0.9; 2 x 1.6	4	41	●	6 x 350; 2 x 175	2	㉚

Smart Multichannel Switches for Powertrain and Safety: Flex

The Flex Multichannel Low-Side Switches family for powertrain, safety and industrial applications is specially designed to drive a various range of loads from relays, injector valves, oxygen probe heaters and general purpose solenoids, through to unipolar stepper motors. We offer a complete family concept with full scalability from 2 to 18 channels and leading edge technology.
All Flex Multichannel Switches have full certification and are equipped with embedded protection functions and enhanced diagnosis which are used in numerous industry platforms.

Application

- Engine management systems
- Diesel direct injection
- Gasoline direct injection
- Multi port injection
- Industrial applications

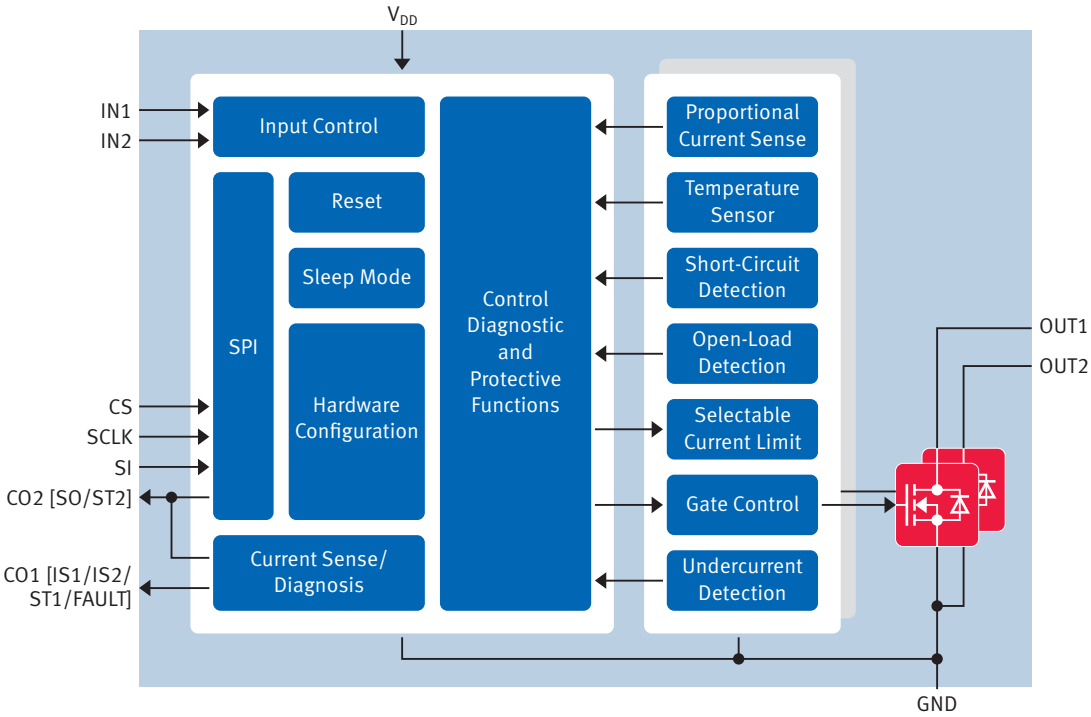
Features

- Overvoltage protection
  - Active clamping for inductive loads
- Undervoltage protection
  - Power-on reset
  - Undervoltage shutdown
- Overcurrent protection
  - Current limitation
  - Overcurrent switch-off
- Overtemperature protection
  - Thermal shutdown
- Electrostatic Discharge (ESD) protection
- Direct input control (for PWM)
- Communication interface (control/diagnosis)
  - Serial Peripheral Interface (SPI)
  - Micro Second Channel (MSC)
- 5V and 3.3V µC compatibility
- Status flag
- 2-bit diagnosis feedback for:
  - Short-to-GND
  - Open-load
  - Short-to-battery
  - Normal operation

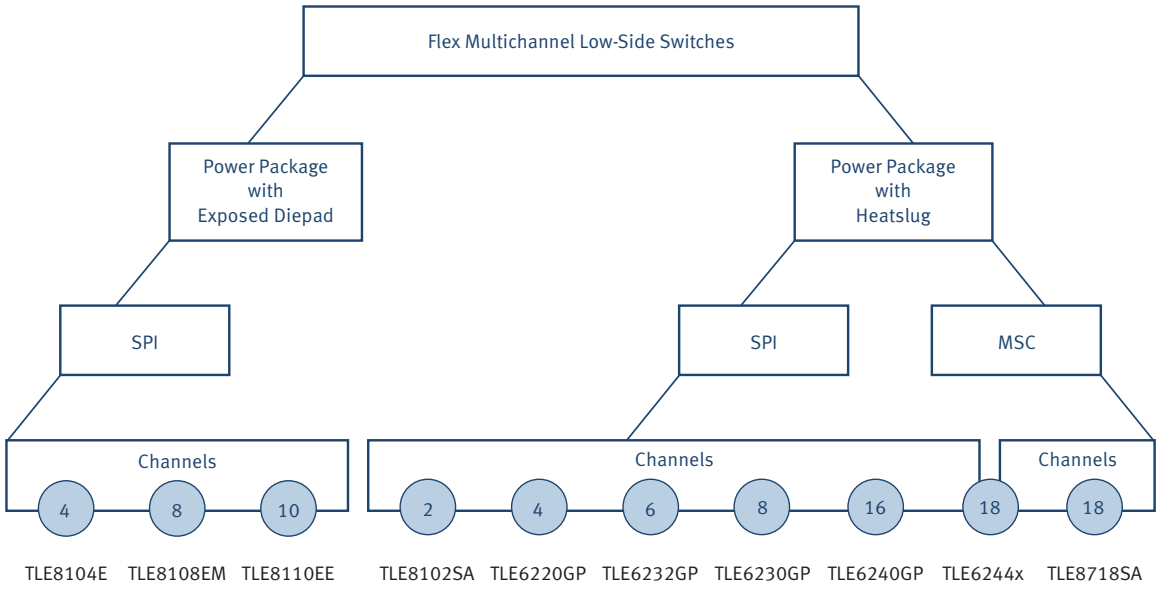
Benefits

- One family concept
- Designed for dedicated applications, but also available for off-the-shelf use as standard products
- Integrated self-protection and diagnosis
- Enhanced error detection for improved system reliability
- Control via standard SPI Bus or MicroSecond Channel (TLE6244X, TLE8718SA) or direct inputs
- Suitable for daisy-chain configuration to save I/O ports
- Support of safety-critical applications by overvoltage protection on all pins (TLE6244X, TLE8718SA)
- High quality ensured with automotive excellence program on Zero Defect strategy

Block Diagram Flex (TLE8102SG)



Selection Tree Flex Multichannel Low-Side Switches



Smart Multichannel Switches for Powertrain and Safety: Flex

Product Table

	Target Loads[2]	Channels	Electrical Specification			
			#	R_{DS} (max) @ 25°C [mΩ]	$I_{L(lim)}$ (max) [A]	V_{CL} (typ) [V]
TLE8102SG	High-Current-Solenoids, O2-Heater	2	2x	0.18	5.0 (9.0)	54
TLE6217G	High-Current-solenoids	4	2x 2x	0.20 0.35	5.0 3.0	53
TLE6220GP	Injectors, High-Current-Solenoids, Stepper-Motor	4	4x	0.32	3.0	53
TLE8104E	Injectors, High-Current-Solenoids, Stepper-Motor	4	4x	0.32	3.0	53
TLE6232GP	High-Current-Relays, Injectors, High-Current-Solenoids	6	4x 2x	0.25 0.45	3.0 1.5	53
TLE6230GP	Relays, High-Current-Relays	8	8x	0.80	1.0	43
TLE8108EM	LEDs, Relays	8	8x	0.80	0.5	45
TLE8110EE	LEDs, High-Current-Relays, Injectors, High-Current-Solenoinds, Stepper-Motor	10	4x 2x 4x	0.30 0.25 0.60	2.6 3.7 1.7	55
TLE6240GP	High-Current-Relays, Injectors, High-Current-Solenoids	16	8x 4x 4x	1.00 0.35 0.30	1.0 3.0 3.0	50 53 53
TLE8718SA	LEDs, Relays, Injectors, High-Current-Solenoids, O2-Heater	18	2x 2x 8x 2x 2x 2x	0.15 0.26 0.53 0.35 1.78 0.96	8.0 3.0 2.2 2.2 0.6 0.6	55
TLE6244X	High-Current-Relays, Injectors, High-Current-*Solenoids	18	6x 6x 2x 4x	0.32 0.30 0.22 0.62	2.2 2.2 3.0 1.1	70 45 45 45

1) See packages on page 96
2) Indication only. Devices can drive any kind of inductive/resistive load according to spec
3) Refer to Application Note: TLE8110 – SPI and daisy-chain
4) 1st generation MSC, High-speed down-stream + SPI up-stream

Interface				Overcurrent Protection		Status Flag	Package[1]
Direct Input Pins	SPI	MSC	Daisy-Chain	I-limit	Switch-Off		
2	8-bit		●	●	●	●	③
4					●	●	⑧
4	8-bit		●	●		●	⑧
4	8-bit		●	●		●	⑦
6	16-bit			●		●	⑬
4	16-bit			●		●	⑬
4	16-bit		●		●		㉚
10	16-bit		● [3]		●		⑫
8	16-bit		●	●		●	⑬
		LVDS + LVTTL		●	●		⑬
16	16-bit	● [4]		●	●		⑯

PROFET™: Smart High-Side Switches

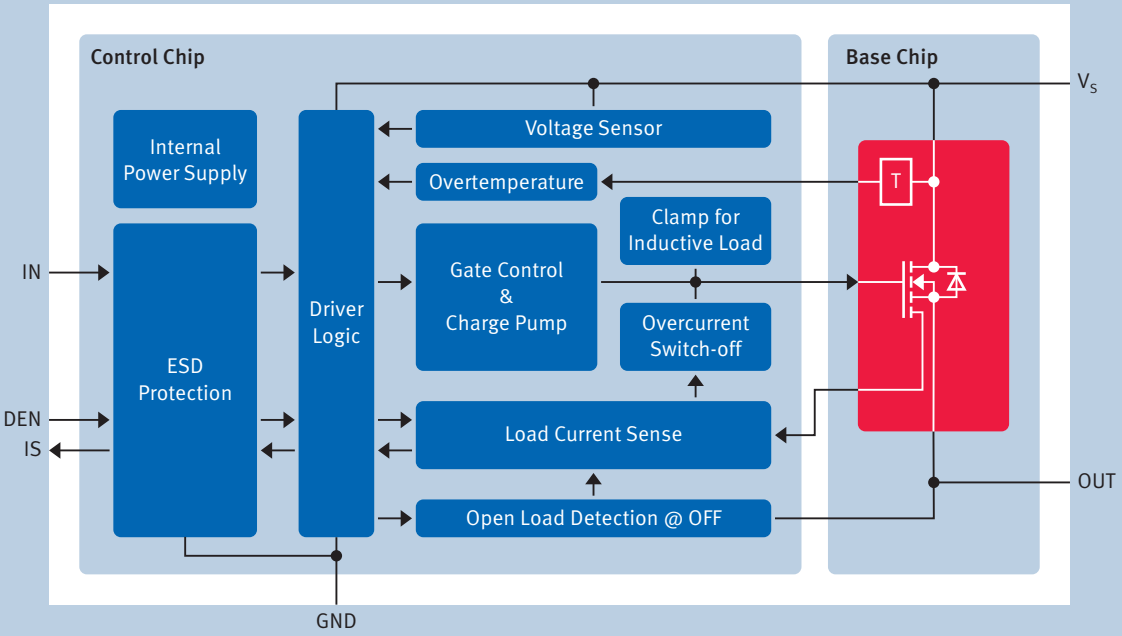
The highly integrated PROFET™ family (PROtected FET) incorporates a broad range of smart features, like diagnosis and protection. PROFET™ intelligent power switches consist of DMOS power transistor and CMOS logic circuitry for complete built-in protection.

The PROFET™ family offers protection against overload, overvoltage, short-circuit, excessive temperature, ground loss, power supply loss and Electrostatic Discharge (ESD). The PROFET™ family products are also capable of protecting against dynamic overvoltage such as load dump and inductive load turn-off. For the benefits and the functionality of the protection features, please refer to www.infineon.com/profet.

The PROFET™ diagnostics offer the choice of either status or current sense features, or a combination of both. In the event of a malfunction, the status feature is able to diagnose overtemperature or open-load. The PROFET™ diagnostic features also provide the user with precise information about switch and load. Diagnostic feedback and load current sensing minimize risks by eliminating the need for additional discrete circuitry and assembly.

This vast range of smart features makes the PROFET™ ideal for a variety of automotive (12V), trucks & agriculture (24V) and industrial applications.

Block Diagram BTS500x0-1EGA



Application Examples
- Lighting
- Heating
- Power distribution
- Motor control

Application Ranges
- Automotive (12V)
- Transportation (24V)
- Industrial

Load
- Capacitive like lamps and glow plugs
- Resistive like PTC
- Inductive like solenoids
- Electronic like ECU

Basic Features
- High-side switches (0.5 ... 45A load current)
- RoHS compliant & AEC qualified
- Very low stand-by current
- ESD protection, optimized EMC
- PWM capability
- Very low power DMOS leakage current in OFF
- 3.3V and 5V compatible logic inputs

Protection Features
- Load dump
- Current limitation
- Thermal shutdown with restart
- Loss of ground/battery protection
- Stable behavior at undervoltage
- Overvoltage protection (ext. components)
- Voltage dependent current limitation
- Reverse polarity compliant (ext. components)

Diagnostic Features
- Proportional load current sense
- Open-load in ON- and OFF-State
- Short-circuit to battery and ground
- Overtemperature sense

PROFET™: Smart High-Side Switches

No Diagnosis

Basic Features
- 12V or 24V capable

Protection Features
- Current limitation
- Thermal shutdown
- Restart
- Loss of inductive load

Product Type	$R_{DS(on)}$ @ T_j = 25°C [mΩ]	Load Current (min) [A]	Load Current (typ) [A]	$I_{L(SC)}$ (typ) [A]
BTS4140N	1,000	0.2	0.55	0.9
BSP742T	260	0.8	1.1	4.0
BTS4141N	150	0.7	1.1	1.4
BTS4142N	150	1.4	2.2	3.0
BTS452T	150	1.8	2.2	6.5
BSP452	160	0.7	1.2	1.5
BSP752T	150	1.3	1.7	6.5
BSP762T	70	2.0	2.4	10.0
BTS462T	70	3.5	4.4	14.0
BTS730	70	3.0	–	20.0
BSP772T	50	2.6	3.1	17.0
BTS441T	15	17.0	21.0	65.0

Digital Diagnosis

Basic Features
- 12V or 24V capable

Protection Features
- Current limitation
- Thermal shutdown
- Restart
- Loss of inductive load

Diagnosis Features
- Open drain status feedback
- Overtemperature

Product Type	$R_{DS(on)}$ (typ) @ T_j = 25°C [mΩ]	Nominal Current (typ)	Load Current (typ) [A]	$I_{L(SC)}$ (typ) [A]	E_{AS} [mJ]	Recommended Operating Voltage Range [V]
BSP742R	250	0.4	0.8	1.2	800 @ 300mA	5.0 ... 34.0
BSP742RI[2]	250	0.4	0.8	1.2	800 @ 300mA	5.0 ... 34.0
BTS4300SGA	300	0.4	0.8	1.2	800 @ 300mA	5.0 ... 34.0
BTS452R	150	1.8	2.2	6.5	150 @ 1.0A	6.0 ... 52.0
BSP752R	150	1.3	1.7	6.5	125 @ 1.0A	6.0 ... 52.0
BTS712N1	200	1.7	1.9	7.5	150 @ 1.9A	5.0 ... 34.0
BTS711L1	200	1.7	1.9	7.5	150 @ 1.9A	5.0 ... 35.0
BTS4880R	150	0.3	0.4	1.4	10,000 @ 0.625mA	11.0 ... 45.0
BTS4175SGA	175	1.3	1.7	6.5	125 @ 1.0A	6.0 ... 52.0
BTS4160DGA	160	1.7	–	9.0	65 @ 2.9A	5.5 ... 20.0
BTS5210G	140	1.8	2.4	9	65 @ 2.9A	5.5 ... 40.0
BTS5210L	140	1.8	2.4	9	65 @ 2.9A	5.5 ... 40.0
BTS716G	140	2.3	2.6	9	76 @ 2.3A	5.5 ... 40.0
BTS716GB	140	2.3	2.6	9	76 @ 2.3A	5.5 ... 40.0
BTS4130QGA	130	2.1	–	9	76 @ 2.3A	5.5 ... 20.0

1) See packages on page 96
2) Inversed logic for diagnosis

E_{AS} [mJ]	Recommended Operating Voltage Range [V]	Channels No.	24V capable	Package[1)]
1,000 @ 0.15A	4.9 ... 60.0	1	•	㉓
100 @ 0.5A	5.0 ... 34.0	1		①
700 @ 0.5A	12.0 ... 45.0	1	•	㉓
160 @ 1A	12.0 ... 45.0	1	•	㉓
150 @ 1A	6.0 ... 52.0	1	•	㉝
500 @ 0.5A	5.0 ... 34.0	1		㉓
125 @ 1A	6.0 ... 52.0	1	•	①
870 @ 1A	5.0 ... 34.0	1		①
4,400 @ 1A	5.0 ... 34.0	1		㉝
–	5.9 ... 16.9	1		⑦
900 @ 1.5A	5.0 ... 34.0	1		①
700 @ 21A	4.75 ... 41.0	1		㊱ ㊹ ㊻

Number of Channels	24V Capable	Overvoltage Shutdown	Short-circuit Diagnosis		Open-load Diagnosis			Package[1)]
			To GND	To battery	In OFF-State with test current	In OFF-State with external pull-up	In ON-State	
1			•	•	•			①
1			•	•	•			①
1			•	•	•			①
1	•		•	•		•		㉝
1	•		•	•		•		①
4		•		•		•		⑦
4		•					•	⑦
8	•							⑬
1	•		•			•		①
2				•		•		④
2				•		•		④
2				•		•		③
4				•		•		⑦
4				•		•		⑦
4				•		•		⑦

PROFET™: Smart High-Side Switches

Digital Diagnosis (cont'd)

Product Type	$R_{DS(on)}$ (typ) @ T_j = 25°C [mΩ]	Nominal Current (min)	Load Current (typ) [A]	$I_{L(SC)}$ (typ) [A]	E_{AS} [mJ]	Recommended Operating Voltage Range [V]
BTS723GW	105	2.5	2.9	9	123 @ 2.5A	7.0 ... 58.0
BTS721L1	100	2.5	2.9	14	300 @ 2.9A	5.0 ... 34.0
BTS5215L	90	3.7	4.7	15	178 @ 3.5A	5.5 ... 40.0
BTS724G	90	3.0	3.3	15	120 @ 3.3A	5.5 ... 40.0
BTS428L2	60	5.8	7.0	22	190 @ 7.0A	4.75 ... 41.0
BTS432E2	38	9.0	11.0	44	1,700 @ 11.0A	4.5 ... 42.0
BTS441RG	15	17.0	21.0	55	700 @ 21.0A	4.75 ... 41.0
BTS442E2	18	17.0	21.0	95	2,100 @ 21.0A	4.5 ... 42.0

Current Sense, Current Input

Basic Features
- 12V or 24V capable
- Single channel

Protection Features
- Current limitation
- Loss of inductive load with additional external diode
- Thermal shutdown
- ReverSave™

Diagnosis Features
- Analog signal proportional to load current
- Overtemperature
- Short-circuit to GND

Product Type	$R_{DS(on)}$ (typ) [mΩ]	$R_{DS(on)}$ (max) @ T_j = 150°C [mΩ]	Load Current (typ) [A]	E_{AS} @ 20A [mJ]	Recommended Operating Voltage Range [V]	$I_{L(SC)}$ (typ) [A]
BTS6163D	20	40	6.5	250	5.5 ... 62.0	70
BTS443P	16	32	6.5	150	5.0 ... 36.0	65
BTS5016SDA	16	32	6.5	120	5.5 ... 20.0	75
BTS5014SDA	14	28	7.0	150	5.5 ... 20.0	90
BTS6142D	12	24	8.0	250	5.5 ... 24.0	100
BTS5012SDA	12	24	8.0	200	5.5 ... 20.0	90
BTS6143D	10	20	10.0	300	5.5 ... 38.0	105
BTS6133D	10	20	10.0	300	5.5 ... 38.0	105
BTS50085-1TMB	9	17	11.0	1200	5.0 ... 58.0	90
BTS50085-1TMA	9	17	11.0	1200	5.5 ... 58.0	90
BTS50080-1TMB	8	16	12.0	400	5.5 ... 38.0	130
BTS50080-1TMA	8	16	12.0	400	5.5 ... 38.0	130
BTS50080-1TEB	8	16	12.0	300	5.5 ... 30.0	75
BTS50080-1TEA	8	16	12.0	300	5.5 ... 30.0	75
BTS50070-1TMA	7	14	14.0	400	5.5 ... 30.0	95
BTS50070-1TMB	7	14	14.0	400	5.5 ... 30.0	95
BTS50055-1TMC	6	11	17.0	1,500	5.5 ... 34.0	95
BTS50055-1TMB	6	11	17.0	1,500	5.0 ... 34.0	130
BTS50055-1TMA	6	11	17.0	1,500	5.0 ... 34.0	130
BTS550P E3146	3.5	7	35.0	3,000	5.0 ... 34.0	220
BTS555 E3146	2.5	5	45.0	3,000	5.0 ... 34.0	400

1) See packages on page 96

Number of Channels	24V Capable	Overvoltage Shutdown	Short-circuit Diagnosis		Open-load Diagnosis			Package[1]
			To GND	To battery	In OFF-State with test current	In OFF-State with external pull-up	In ON-State	
2	•		•	•	•			④
4		•		•		•		⑦
2				•		•		③
4	•			•		•		⑦
1							•	㉝
1	•	•	•				•	㉝
1				•		•		㊱ ㊸
1	•	•	•				•	㊱ ㊶

24V Capable	Short-circuit to GND protection		Overtemperature protection		Inverse current operation capability	Open-load in ON detection	Packages[1]
	latch	restart	latch	restart			
•	•			•			㉝
	•			•	•		㉝
	•			•			㉝
	•			•			㉝
	•			•			㉝
	•			•		•	㉝
	•			•		•	㉝
	•			•	•		㉝
•	•			•			㊹
•	•			•		•	㊴
	•			•			㊻
	•			•			㊴
	•			•		•	㉝
	•			•	•		㉝
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	•			•	•		㊹
				•			㊴
	•			•	•		㊾
	•		•		•		㊾

PROFET™: Smart High-Side Switches

Current Sense, Voltage Input

Basic Features
- 12V or 24V capable

Protection Features
- Current limitation
- Thermal shutdown
- Restart or latch
- Loss of inductive load

Diagnosis Features
- Analog signal proportional to load current
- Overtemperature
- Short-circuit to GND
- Short-circuit to battery
- Open-load in OFF

Product Type	$R_{DS(on)}$ (typ) [mΩ]	$R_{DS(on)}$ (max) @ T_j = 150°C [mΩ]	Load Current (typ) [A]	E_{AS} [mJ]	Recommended Operating Voltage Range [V]	$I_{L(SC)}$ (typ) [A]
Automotive Grade						
BTS5180-2EKA	180	360.0	1.0	30	4.1 ... 28.0	11
BTS5120-2EKA	120	240.0	2.0	15	4.1 ... 28.0	12
BTS5090-2EKA	90	180.0	2.5	42	4.1 ... 28.0	30
BTS5090-1EJA	90	180.0	2.5	42	5.0 ... 28.0	32
BTT6050-2EKA	50	100.0	3.0	55	5.0 ... 36.0	38
BTS5045-2EKA	45	90.0	3.0	35	4.1 ... 28.0	32
BTS5045-1EJA	45	90.0	3.0	35	5.0 ... 28.0	32
BTS740S2	30	60.0	4.0	370	5.0 ... 34.0	50
BTS640S2G	30	60.0	4.5	410 @ 12.6A	5.0 ... 34.0	50
BTS5030-2EKA	30	60.0	4.0	50	4.1 ... 28.0	47
BTS5030-1EJA	30	60.0	4.0	50	5.0 ... 28.0	47
BTS5020-2EKA	20	40.0	5.0	75	4.1 ... 28.0	65
BTS5020-1EKA	20	40.0	5.0	75	5.0 ... 28.0	65
BTS5016-1EKB	16	32.0	6.0	95	5.0 ... 28.0	65
BTS5012-1EKB	12	24.0	7.0	110	5.0 ... 28.0	65
BTS5010-1EKB	10	20.0	8.0	155	5.0 ... 28.0	65
BTS50080-1EGA	8	16.0	13.0	125 @ 50A	6.0 ... 28.0	150
BTS50070-1EGA	7	14.0	14.0	145 @ 50A	6.0 ... 28.0	150
BTF50060-1TEA[2]	6	12.0	13.5	280 @ 20A	4.7 ... 28.0	75
BTS50060-1TEA	6	12.0	13.5	280 @ 20A	4.7 ... 28.0	75
BTS50060-1EGA	6	12.0	15.0	170 @ 50A	6.0 ... 28.0	150
BTS50050-1EGA	5	10.0	16.0	200 @ 50A	6.0 ... 28.0	150
BTS50040-2SFA	4	8.2	11.0	411 @ 20A	6.0 ... 28.0	160

1) See packages on page 96
2) Speed PROFET™, capable for PWM up to 25kHz

Number of channels	Load current		Overvoltage shutdown	Sense enable	Latch	24V	Reversave	Packages[1]
	limit	trip						
2	•			•				⑤
2	•			•				⑤
2	•			•				⑤
1	•			•				②
2	•			•	•	•		⑤
2	•			•				⑤
1	•			•				②
2	•		•					⑦
1	•		•					㊱
2	•			•				⑤
1	•			•				②
2	•			•				⑤
1	•			•				⑤
1	•			•				⑤
1	•			•				⑤
1	•			•				⑤
1		•		•	•		•	③
1		•		•	•		•	③
1		•			•			㉝
1		•			•			㉝
1		•		•	•		•	③
1		•		•	•		•	③
2		•		•	•		•	⑪

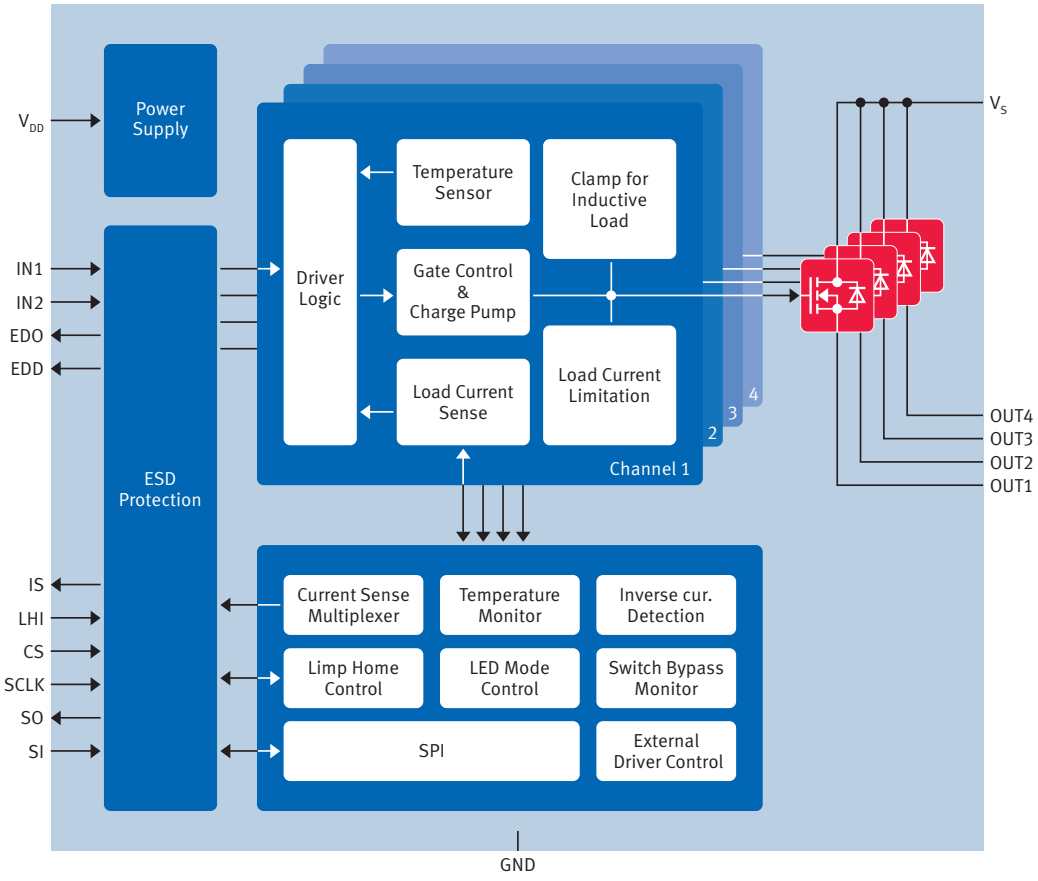
SPI Power Controller (SPOC)

SPOC devices are high-side smart power Multichannel switches providing embedded protective functions and diagnosis. They are specially designed for standard exterior lighting and LED equivalent loads in automotive applications, but can be used for further automotive and industrial applications such as heating, motor driving or power distribution.

The unique selling point of the SPOC is the pin, function and package compatibility within a SPOC family and the ability to drive a bulb or LED with the same device (except SPOC-DUO family), enabling customers to develop a modular and scalable platform with only one PCB.

Configuration and diagnosis are carried out via SPI. Additionally, there is a current sense signal available for each channel that is routed via a multiplexer to one diagnostic pin.

Block Diagram (SPOC+ Example)



Basic Features

- Serial Peripheral Interface (SPI) (daisy-chain capable) for control and diagnosis
- CMOS-compatible parallel input pins provide straightforward PWM operation and FailSafe
- Very low stand-by current
- Optimized electromagnetic compatibility
- Suitable for bulbs as well as LEDs

Protective Functions

- Reverse battery protection
- Short-circuit and overload protection
- Multistep current or tripping (SPOC FL)
- Selectable current tripping (SPOC DUO)
- Thermal shutdown with latch
- Overvoltage protection
- Reverse polarity protection (SPOC DUO and SPOC FL)
- Loss of ground protection

Diagnosis Functions

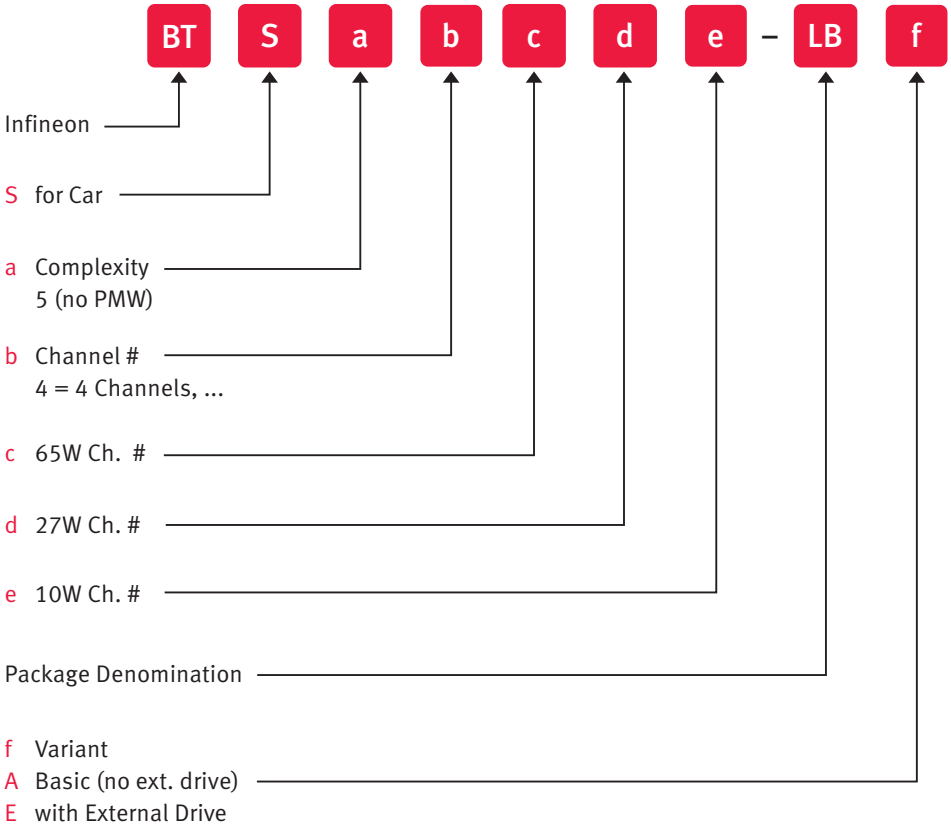
- Multiplexed proportional load current sense signals
- High accuracy of current sense signal at wide load current range
- Latching feedback on overtemperature and overload via SPI
- Diagnosis PWM with small duty cycle possible
- LED mode (not for SPOC DUO)
- Fail-safe activation via LHI pin and configuration via input pins

Options

- **LED mode (SPOC+, SPOC FL):** Load type configuration between bulbs and LEDs for products featuring the LED mode option (current sense ratio configurable, very fast diagnosis in LED mode)
- **Adjustable slew rate (SPOC DUO):** allows customers to optimize switching losses and electromagnetic compatibility performance for the design
- **PWM engine (SPOC FL):** autonomous PWM generator to reduce micro controller loading
- **External drive capability (SPOC+, SPOC FL):** ability to control one or two smart power drivers to reduce the I/O usage of the micro controller

SPI Power Controller (SPOC) for Advanced Light Control

SPOC+ Family Naming System



Product Table

Product Type	Channel mix [mΩ]			LED mode (27W channels)	Adjustable slew rate	PWM engine integrated	External drive capability	Package[1]
	65W	27W	10W					
SPOC-DUO								Standard
BTS5264SF	2 x 4.5	–	–					⑪
BTS5274SF	2 x 4.5	–	–		•			⑪
BTS5266SF	2 x 6.0	–	–					⑪
BTS5276SF	2 x 6.0	–	–		•			⑪
BTS5268SF	2 x 8.0	–	–					⑪
BTS5278SF	2 x 8.0	–	–		•			⑪
SPOC FL (Front Light)								
BTS5461SF	2 x 4.5	2 x 14	–	•				⑪
BTS5481SF	2 x 4.5	2 x 14	–	•			•	⑪
BTS6480SF	2 x 4.5	2 x 14	–	•		•	•	⑪
SPOC+								
BTS54220-LBA	2 x 9.0	2 x 27	–	•				㊸
BTS54220-LBE	2 x 9.0	2 x 27	–	•			•	㊸
BTS54040-LBA	–	4 x 39	–	•				㊸
BTS54040-LBE	–	4 x 39	–	•			•	㊸
BTS55032-LBA	–	3 x 39	2 x 110	•				㊸
BTS56033-LBA	–	3 x 39	3 x 110	•				㊸

1) See packages on page 96

Infineon® Auto LED Drivers

Infineon® Auto LED Drivers are the best solutions to benefit from the advantages of LEDs providing full protection to your lighting application in automotive. A constant current regulation is the enabler for stable brightness over the whole automotive temperature and voltage range.

The driver will protect itself against overstress and the LED is as well protected against overstress caused by e.g. voltage spikes or overtemperature. Additionally derivatives out of the Infineon Auto LED Driver Family provide diagnostic functionality of open and shorted LED as well.

All these features are required to drive LEDs inside a car with harsh automotive conditions.

Features

- Constant output current, therefore constant brightness and extended LED lifetime
- Wide input voltage range
- Low drop voltage
- Open-load detection
- Overtemperature protection
- Short-circuit proof
- Reverse polarity proof
- Wide temperature range
- Very small SMD packages

Infineon® Auto LED drivers are divided in four sub-families

Linear LED driver of BCR400 series

- The most cost effective solutions to drive low power LED

Infineon® Basic LED Driver

- Linear current sources for low to medium power applications

Infineon® Power LED Driver

- DC/DC converter & controller for high power applications

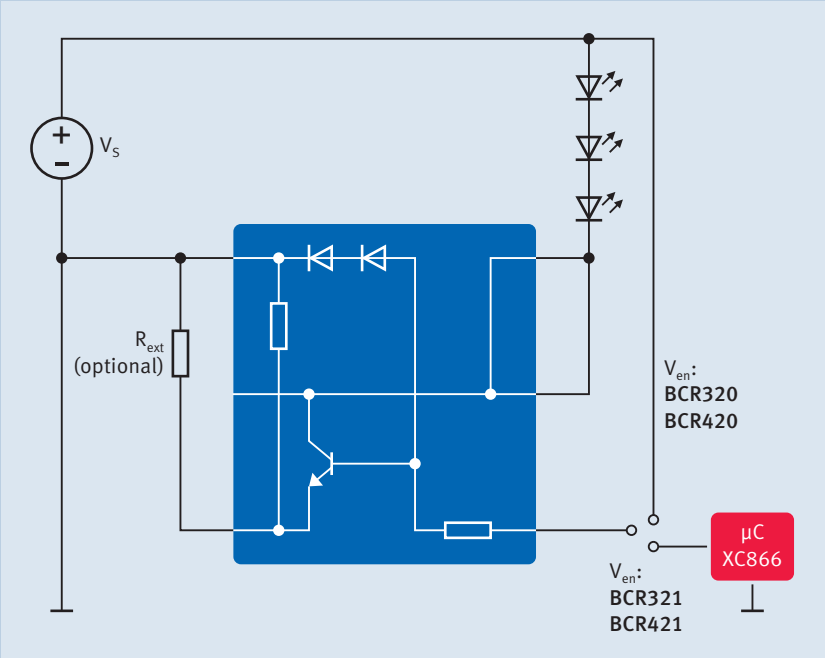
Infineon® LIN LED Driver

- LIN controlled LED driver for multicolor ambient lighting

Linear LED Driver of BCR400 Series

The most cost effective solution to drive small LEDs with accurate current source.

Block Diagram BCR42x-U



Product Table

Product Type	Output Current (max) [mA]	Adjustable Output Current	Supply Voltage (max) [V]	Inhibit	PWM enable	P_{tot} [mW]	Package[1]
BCR401U	65	•	40			750	⑱
BCR401W	65	•	18			500	㉕
BCR402U	65	•	40			750	⑱
BCR402W	65	•	18			500	㉕
BCR405U	65	•	40			750	⑱
BCR320U	250	•	27			1,000	⑱
BCR321U	250	•	27	•	•	1,000	⑱
BCR420U	150	•	40			1,000	⑱
BCR421U	150	•	40	•	•	1,000	⑱

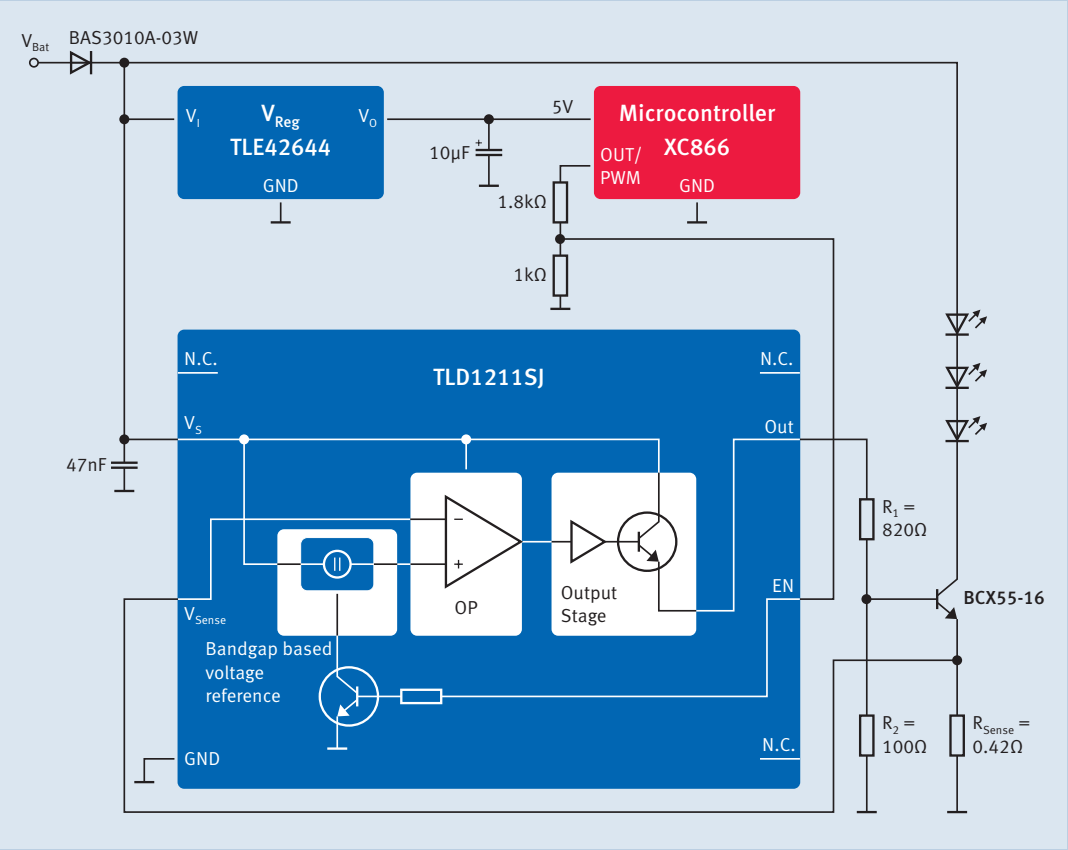
1) See packages on page 96

Infineon® Basic LED Driver

Linear Current Sources for Low to Medium Power Applications

LED drivers designed to supply constant current up to 500mA, which enables constant LED brightness and ensures extended LED lifetime, independently from supply voltage or LED forward voltage class.

Block Diagram TLD1211SJ



Product Table

Product Type	Output Current (typ) [mA]	Adjustable	Driver for External Transistor	Open-load detection	PWM/Enable input	High-Low Current Switch	Package[1)]
TLD1211SJ	85	•	•		•		①
TLE4240-2M	58						⑲
TLE4240-3M	58			•			⑲
TLE4241GM	60	•		•	•	•	①
TLE4242G	450	•		•	•		㊴

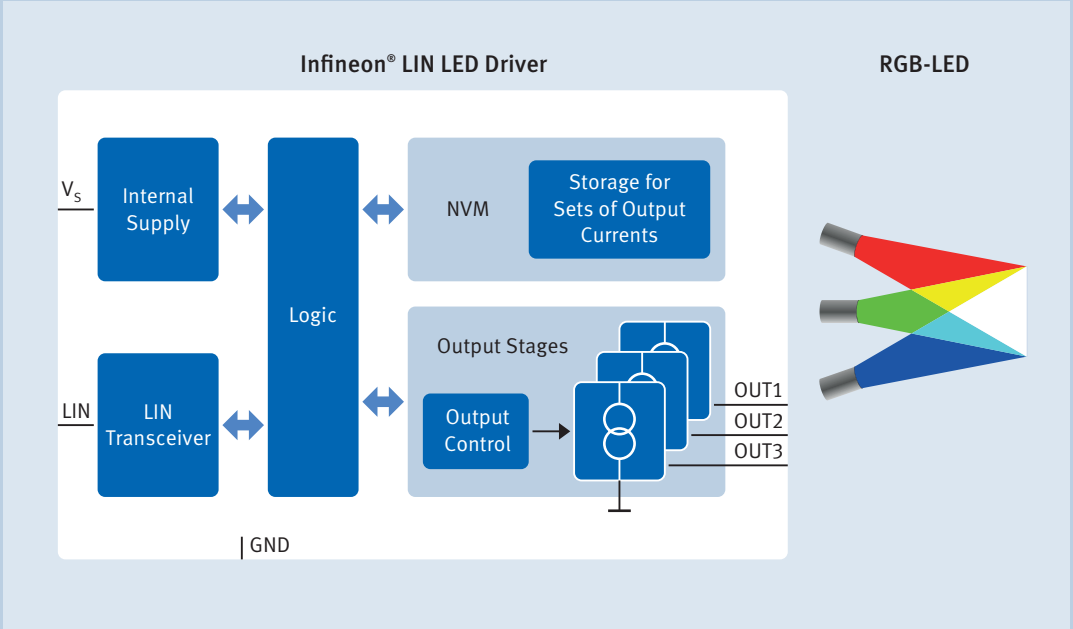
1) See packages on page 96

Infineon® LIN LED Driver

LIN Controlled LED Driver for Multicolor Ambient Lighting

The Infineon® LIN LED Driver family is the enabler for multicolor and especially for the challenging RGB (Red-Green-Blue) Ambient Lighting. The device family members combine logic, memory, LIN interface and a three channel linear current source in one device. By using the integrated memory to store calibration points of the used LED a stable color point can be achieved. The integrated memory is big enough to store up to 16 color points. Additionally a smart color theater dimming and color transitioning is already integrated in the device to allow smooth color changes and up- and down dimming.

Block Diagram TLD7306EK



Product Table

Product Type	LIN Interface	Output Current (max) Capability	External Driver Capability	Package[1)]
TLD7305EK	SAE-J2602	48mA		Ⓢ
TLD7306EK	LIN 2.1	48mA		Ⓢ
TLD7395EK	SAE-J2602	dependend on external Bipolar Transistor	•	Ⓢ
TLD7396EK	LIN 2.1		•	Ⓢ

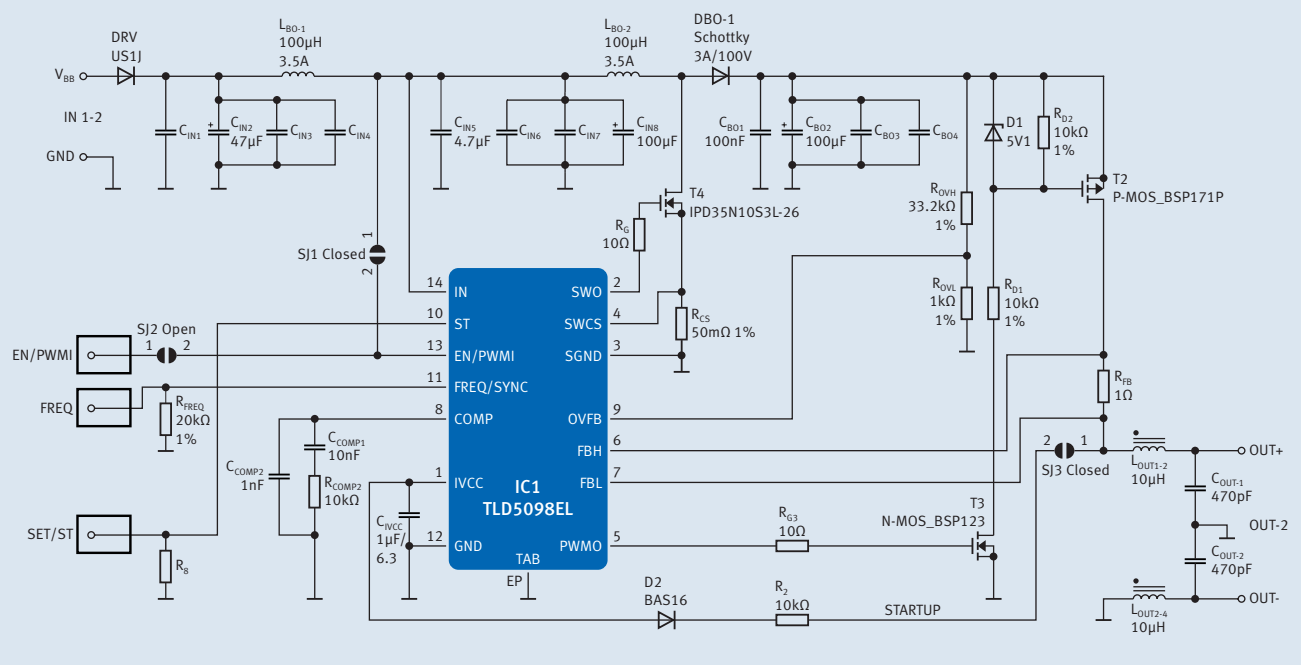
1) See packages on page 96

Infineon® Power LED Driver

DC/DC Converter & Controller for High Power Applications

Increasingly, LED lighting solutions are used in the front area of the car, especially in the Premium segment. LED Frontlight solutions are usually implemented using several discrete LEDs in one chain which leads to a string voltage of up to 60V or using less LEDs with high forward current up to 1.5A. Both implementations are requiring DC/DC solutions either boost, buck or buck-boost architectures are needed. The Infineon® Power LED Driver Family consists of DC/DC devices which are perfectly fulfilling these requirements.

Application Diagram TLD5098EL in Boost Mode with Short to Ground Protection



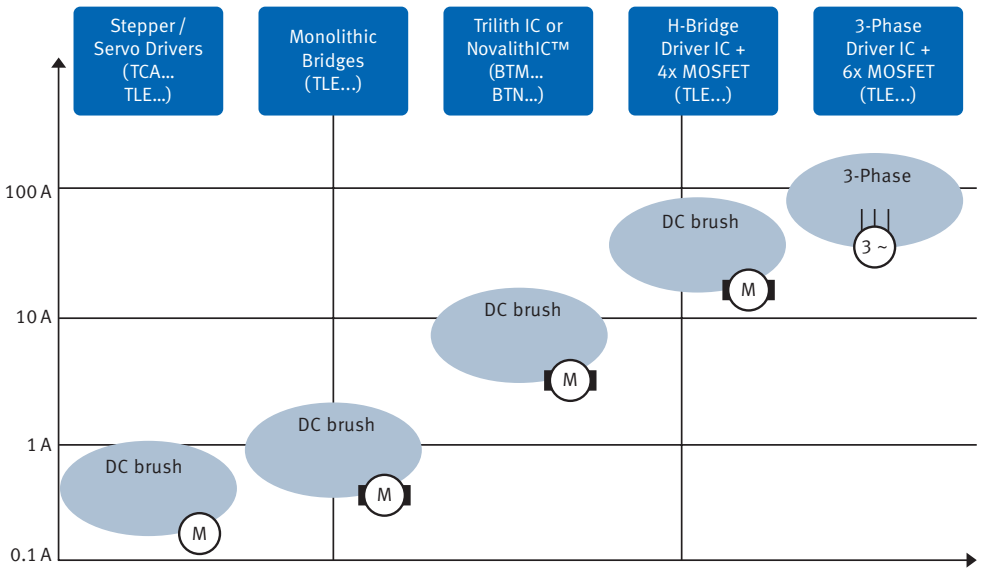
Product Table

Product Type	Topology	Power Stage	Current (max) [A]	Switching Frequency [kHz]	Analogue Dimming	Package[1)]
TLD5045EJ	Buck Converter	Internal	0.7	Flexible 50 ... 300	Yes	②
TLD5085EJ	Buck Converter	Internal	1.8	370	No	②
TLD5095EL	Multitopology Controller IC Buck, Boost, Buck-Boost, SEPIC, Flyback	External	dependent on External MOSFET	Flexible 100 ... 500	No	㉗
TLD5098EL	Multitopology Controller IC Buck, Boost, Buck-Boost, SEPIC, Flyback	External	dependent on External MOSFET	Flexible 100 ... 500	Yes	㉗

1) See packages on page 96

Motor Drivers
The Right Driver for Every Motor

The search for a solution to drive applications powered by low-voltage motors ends with Infineon. From 0.1 to 100A, and from steppers to 3-Phase drivers, we offer the right solution for every current range and application requirement.



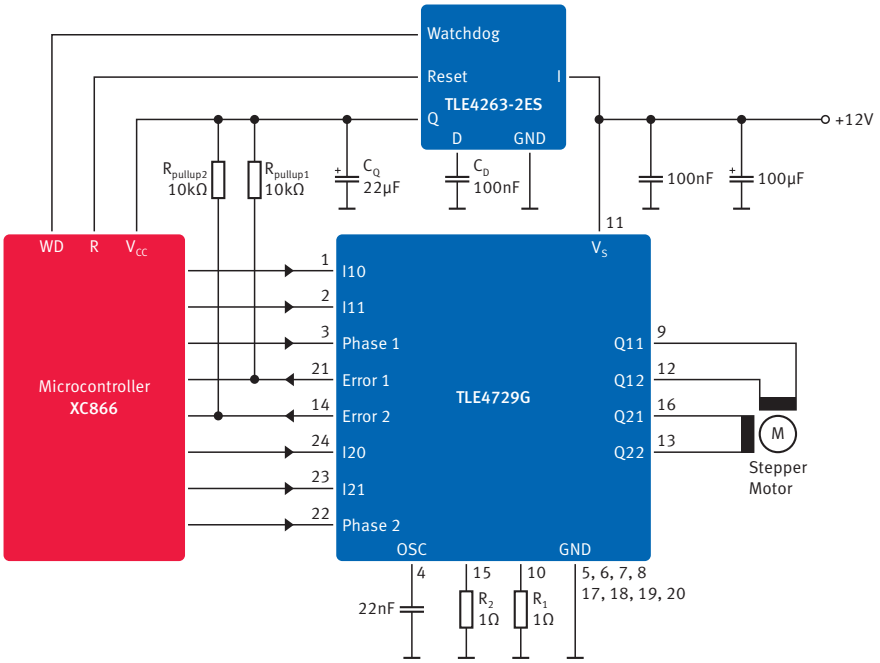
Integrated Smart Power Motor Drivers

The Infineon low-current DC motor bridge family consists of a broad variety of bridges for stepper and DC brush motors including servo motors. They are designed for use in automotive and industrial applications. Typical applications are light leveling, HVAC flap control, and mirror adjustment.

The products are offered with protection features as well as diagnosis. Depending on the product type the protection ranges from basic protection against overtemperature to a full set of protection against open-load, overvoltage, undervoltage, overtemperature and short-circuit. The diagnosis capabilities range from a simple status flag to communication via a 16-bit SPI.

Stepper Motor Drivers

The TCA3727 and TLE4726 et seqq. cover a broad range of applications from automotive to industry. The TLE4726 can be used in 24V applications. All types are produced in DOPL, Infineon's robust bipolar technology.



Product Type	$I_{L(NOM)}$	$I_{L(lim)}$	I_q [µA]	$V_{S(op)}$	Step Operations	Protection	Diagnostic interface	Highlights	Package[1)]
Current controlled									
TCA3727G	2 x 0.75	2 x 1.5	200	5–50	Full to mini step	OT	–	High operating voltage, low quiescent current with inhibit	⑨
TLE4726G	2 x 0.75	2 x 1.5	200	5–50	Full to mini step	OT	–		⑨
TLE4729G	2 x 0.7	2 x 1.5	50	6–16	Full to mini step	OL, OT, SC	Status flag	Very low quiescent current with inhibit	⑨
Voltage controlled									
TLE4208G	4 x 0.8	4 x 1.5	20	8–18	Full to half-step	SC, OT, OV, UV	Status flag	Dual Full Bridge	⑩
TLE8444SL	4 x 0.5	4 x 0.9	1	8–18	Full to half-step	SC, OT, OV, UV, OL	Status flag	Open-load detection in ON-State	㉙

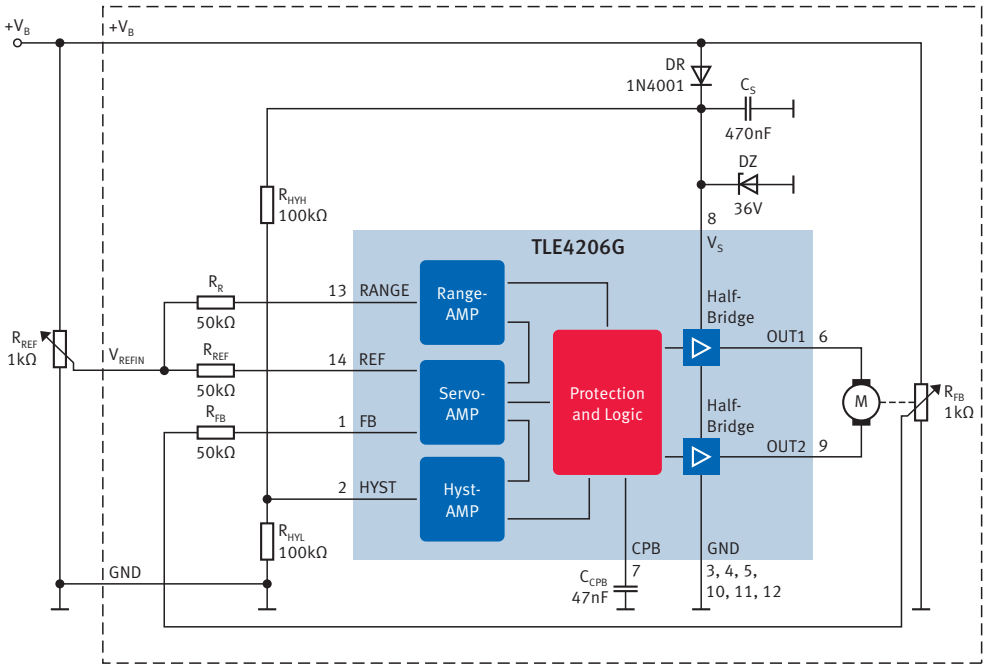
1) See packages on page 96

LO = Lockout
OL = Open-Load
OV = Overvoltage
UV = Undervoltage
OT = Overtemperature
SC = Short-Circuit

Integrated Smart Power Motor Drivers

Servo Drivers

The TLE4205, TLE4206 and TLE4209 are protected H-Bridge drivers for automotive applications like headlight beam control and industrial servo control applications. The part is built using DOPL, Infineon's robust bipolar technology.



Product Type	$I_{L(NOM)}$	$I_{L(lim)}$	I_q [µA]	$V_{S(op)}$	Protection	Inhibit	Highlights	$V_{sat\ path}$	Package[1]
TLE4205G[3]	0.6	1.0	0.01	6 ... 32	SC	•	Dual power comparator for higher voltage	2.1V at 0.6A[2] supply voltage	Ⓟ-DSO-14
TLE4206G	0.8	1.5	12	8 ... 18	OT, OV, UV, LO, SC		Servo driver with current peak blanking	1.2V at 0.4A[2]	Ⓟ-DSO-36
TLE4206-2G	0.8	1.5	12	8 ... 18			Switching hysteresis on range input	1.2V at 0.4A[2]	Ⓟ-DSO-36
TLE4206-4G	0.9	1.6	12	8 ... 19			Adapted range input	1.2V at 0.4A[2]	Ⓟ-DSO-36
TLE4209A	0.8	1.5	12	8 ... 18			Servo driver	1.2V at 0.4A[2]	Ⓟ-DSO-47
TLE4209G	0.8	1.5	12	8 ... 18			Servo driver	1.2V at 0.3A[2]	Ⓟ-DSO-36

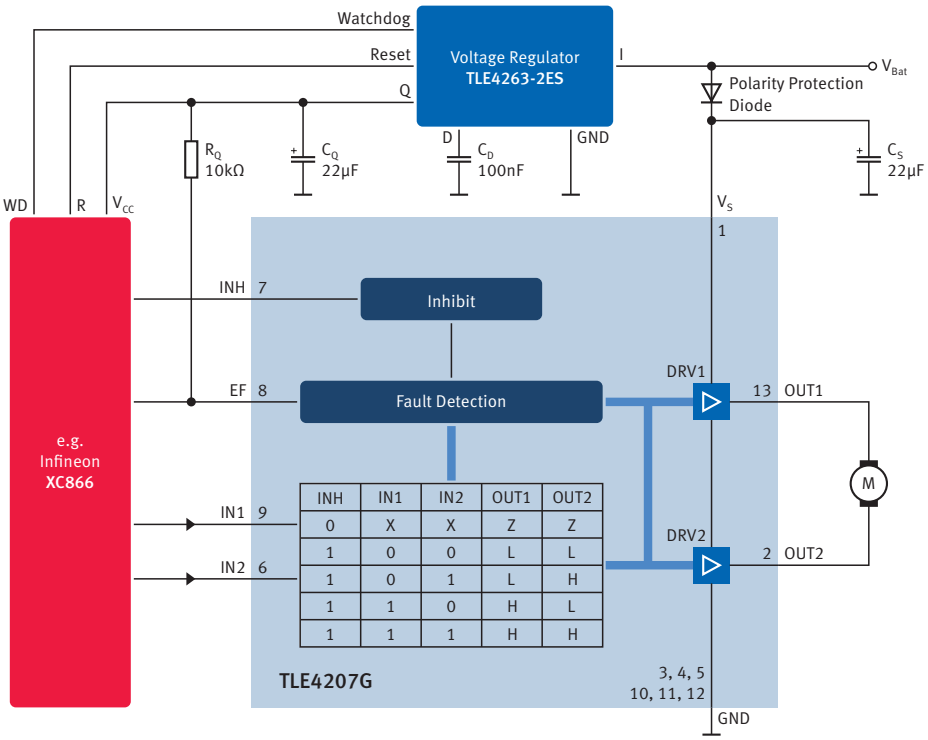
1) See packages on page 96
2) Total drop saturation voltage typ. value @ 25°C
3) Not green

LO = Lockout
OL = Open-Load
OV = Overvoltage

UV = Undervoltage
OT = Overtemperature
SC = Short-Circuit

Motor Control ICs

The TLE4207, TLE4208, TLE6208-3/-6 are multipurpose bridges designed to drive DC brush motors with nominal load currents < 1A for automotive and industrial applications. The TLE4207 and TLE4208 parts are built using Infineon's robust bipolar technology DOPL. TLE6208-3/-6 and TLE84xxx use SPT, a technology combining bipolar, CMOS and DMOS cells.



Basic Features

- OV = Overvoltage
- UV = Undervoltage
- OT = Overtemperature
- SC = Short-Circuit

Product Type	Config.	$I_{L(NOM)}$	$I_{L(LIM)}$	I_q	$V_{S(op)}$	Protection	Diagnostic Interface	Highlights	$V_{CE(sat)}$ / $R_{DS(on)}$	Package[1]
TLE4207G	2x Half-bridge	2 x 0.8	2 x 1.5	20	8 ... 18	LO	Status flag	Error det.	1.2V[2]	④
TLE4208G	4x Half-bridge	4 x 0.8	4 x 1.5	20	8 ... 18	LO	Status flag	Error det.	1.2V[2]	⑩
TLE8444SL	4x Half-bridge	4 x 0.5	4 x 0.9	1	8 ... 18	OL	Status flag	Open-load detection in ON-State	600mΩ/ switch	㉙
TLE6208-3G	3x Half-bridge	3 x 0.8	3 x 1.0	10	8 ... 40	LO	16-bit SPI	Detailed diagnosis via SPI	800mΩ[3]/ switch	④
TLE6208-6G	6x Half-bridge	6 x 0.8	6 x 1.0	12	8 ... 40	LO	16-bit SPI	Single switch usage possible	800mΩ[3]/ switch	⑩
TLE84106EL	6x Half-bridge	6 x 0.3	6 x 0.5	2	7 ... 18	OL	16-bit SPI	Pin compatible to TLE84110EL	800mΩ[3]/ switch	㉚
TLE84110EL	10x Half-bridge	10 x 0.3	10 x 0.5	2	7 ... 18	OL	16-bit SPI	Pin compatible to TLE84106EL	800mΩ[3]/ switch	㉚

1) See packages on page 96
2) Total drop saturation voltage typ. value @ 25°C and 0.4A
3) $R_{DS(on)}$ is typical and specified @ T_j = 25°C

LO = Lockout
OL = Open-Load

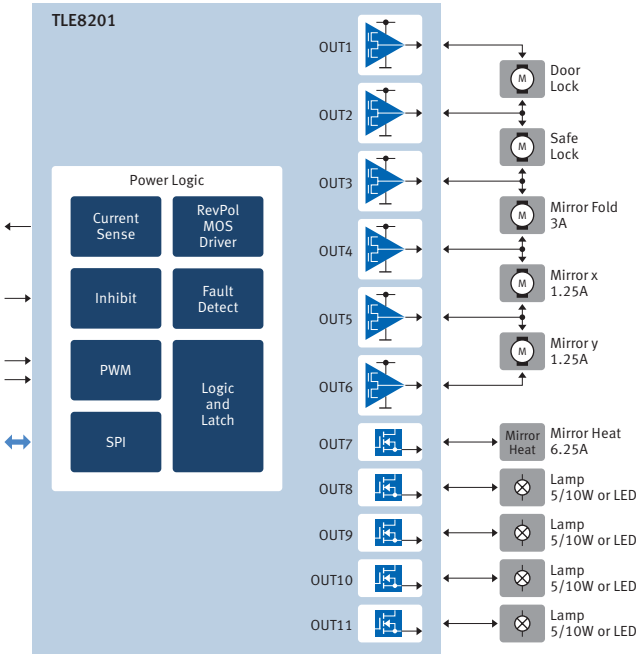
Integrated Smart Power Motor Drivers

Door Module ICs

The TLE8201R is an ASSP for door-module applications. It includes those power stages necessary to drive the following loads in a typical front door: Central lock, mirror fold, mirror position, mirror defrost plus 5 and 10W lamps. It is designed as a monolithic circuit in a SPT technology which combines bipolar and CMOS control circuit with DMOS power devices.
The TLE8203E is a derivative of the TLE8201R for automotive mirror control applications. The following output stages are included in this monolithic device, mirror position, mirror defrost and one lamp driver for 5 or 10W.

Standard Features

- SPI Interface
- I_Q = 3µA
- Operating Range: 8–20VS



Product Type	Outputs	$I_{L(lim)}$	$R_{DS(on)}$	Driver Stage	Operating Range [VS]	Protect	Diagnosis	Target Load	Package[1]
TLE8201R	1, 2	8.0	120	Half-bridge	8–20	OC, OT, OV, UV	CS	Central lock	⑬
	3, 4	3.0	350	Half-bridge			CS	Mirror folding	
	5, 6	1.25	650	Half-bridge			OC, OT	Mirror X-Y	
	7	6.25	85	High-side switch (mirror defrost)			CS	Mirror defrost	
	8–11	1.8	400	Lamp driver			OC, OT	Repeater	
TLE8203E	4	3.0	350	Half-bridge	8–20	OC, OT, OV, UV	CS	Mirror folding	⑫
	5, 6	1.25	650	Half-bridge			OC, OT	Mirror X-Y	
	7	6.25	85	High-side switch (mirror defrost)			CS	Mirror defrost	
	8, 10	1.8	400	Lamp driver			OC, OT	Repeater	

1) See packages on page 96

LO = Lockout
OL = Open-Load
OV = Overvoltage
OC = Overcurrent
UV = Undervoltage
OT = Overtemperature
SC = Short-Circuit

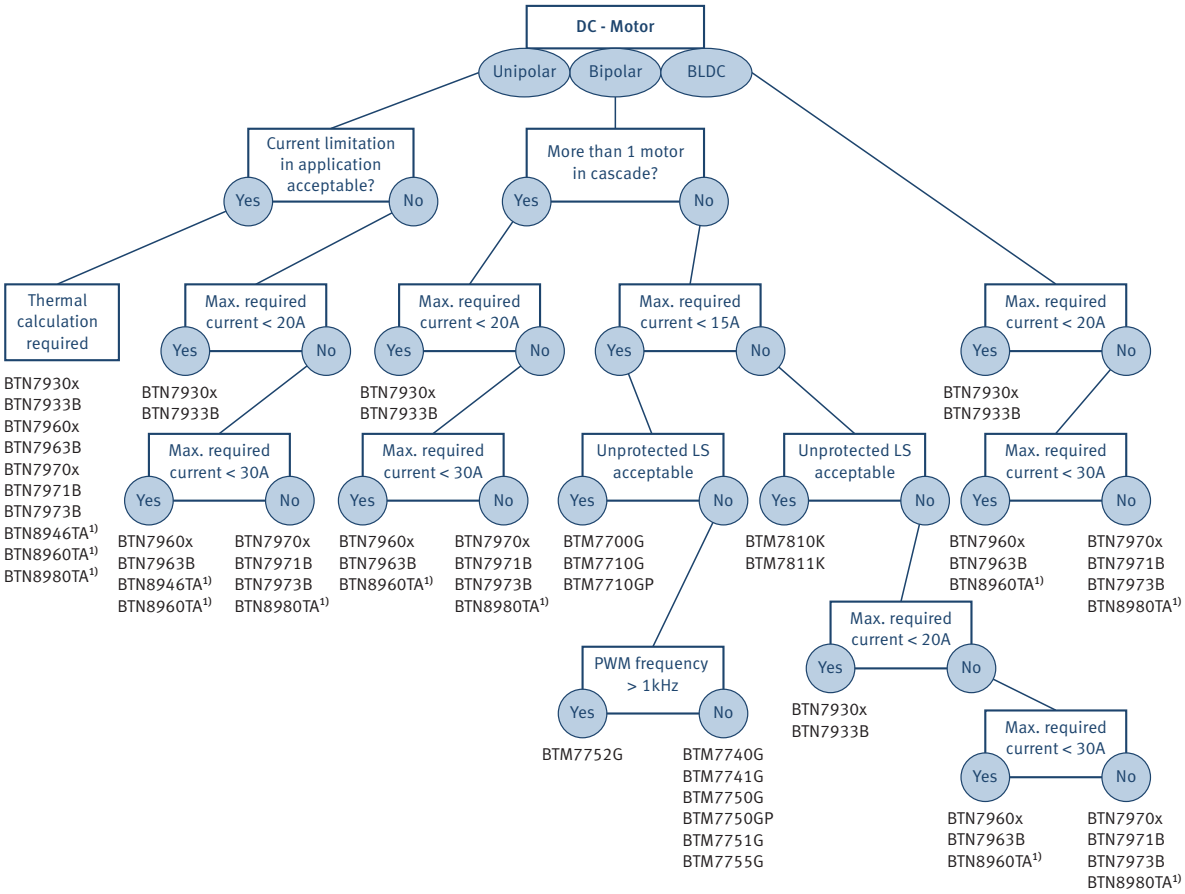
Integrated High-Current Motor Drivers

NovalithIC™/Trilith IC

A NovalithIC™ provides a complete low-ohmic-protected half-bridge in a single package. It can be combined with an additional NovalithIC™ to create an H-bridge or 3-phase bridge as well. The NovalithIC™ family 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. The NovalithIC™ family offers cost-optimized solutions for protected high-current PWM motor drives with very low board-space consumption–scaled to your needs.

The Trilith IC family members combine two high-side and two low-side switches in one package. They are geared to driving high-current DC motors in an H-bridge configuration but can also be used as single independent switches. All Trilith ICs include overcurrent and overtemperature protection for the high-side switches. For the low-side switches the user can choose between unprotected switches as well as protected switches.

Selection Tree NovalithIC™ (BTNxxxx)/Trilith IC (BTMxxxx)



1) In development

www.infineon.com/trilithic
www.infineon.com/novalithic

Integrated High-Current Motor Drivers

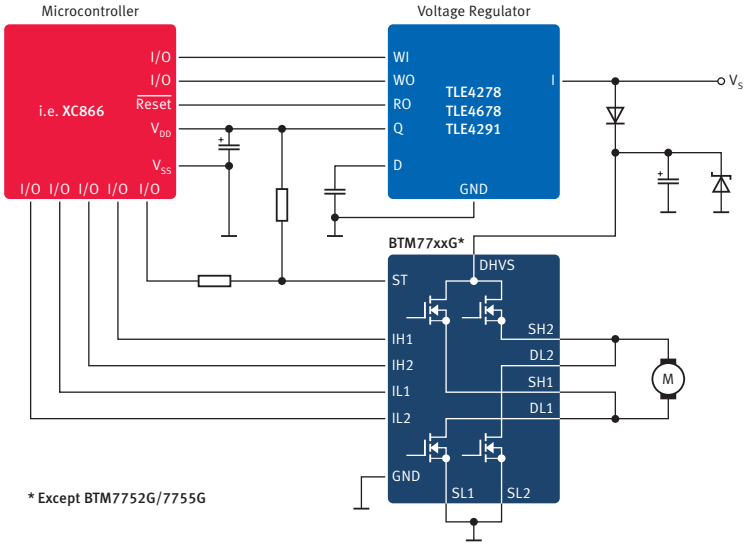
Trilith IC – Integrated H-Bridge

Basic Features
- Low quiescent current
- Capable for high PWM frequency

Diagnostic Features
- Overvoltage
- Overtemperature
- Short-circuit/overcurrent
- Current sense/status
- Open-load

Protection Features
- Overvoltage
- Undervoltage
- Overtemperature
- Short-circuit/overcurrent

Application Example Trilith IC



* Except BTM7752G/7755G

Trilith IC Product Overview

Product Type	Operating Range [V]	$R_{DS(on)}$ path (typ) @25°C [mΩ]	$I_{D(lim)}$ (typ) [A]	I_q (typ) [µA]	Switch freq. (typ) [kHz]	Diagnosis	Protect	Package[1]
BTM7740G	4.8 ... 42.0	210	8.0	5	1	OT	OT, SC	⑩
BTM7741G	4.8 ... 42.0	210	8.0	5	1	OT, OL	OT, SC	⑩
BTM7700G	4.8 ... 42.0	190	9.5	5	1	OT	OT, SC	⑩
BTM7750G	4.8 ... 42.0	115	12.0	5	1	OT	OT, SC	⑩
BTM7750GP[2]	4.8 ... 42.0	115	12.0	5	1	OT	OT, SC	㊵
BTM7751G	4.8 ... 42.0	115	14.0	5	1	OT, OL	OT, SC	⑩
BTM7710GP[2]	4.8 ... 42.0	110	15.0	5	1	OT	OT, SC	㊵
BTM7710G	4.8 ... 42.0	110	15.0	5	1	OT	OT, SC	⑩
BTM7810K[2]	5.0 ... 42.0	40	42.0	4	1	OT, OL	OT, SC	㊵
BTM7811K[2]	5.0 ... 42.0	40	42.0	4	20	OT, OL	OT, SC	㊵
BTM7752G	5.5 ... 28.0	150	12.0	5	25	OV, OT, SC/OC, CS	OV, UV, OT, SC/OC	⑪
BTM7755G	5.5 ... 28.0	150	12.0	5	1	OV, OT, SC/OC	OV, UV, OT, SC/OC	⑪

1) See packages on page 96
2) AEC std. grade 3, T_j(max) = 110°C

CS = Current Sense
OL = Open-Load
OV = Overvoltage

UV = Undervoltage
OT = Overtemperature
SC = Short-Circuit
OC = Overcurrent

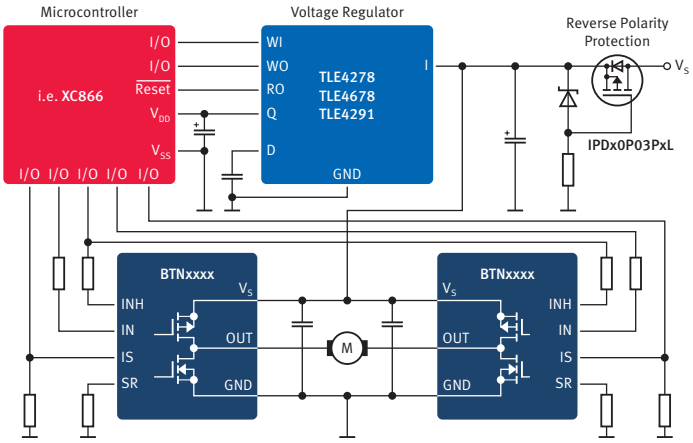
NovalithIC™ – Integrated Half Bridge

Basic Features
- Low quiescent current
- Capable for high PWM frequency (e.g. 25kHz)
- Logic level input
- Adjustable slew rate
- Cross current protection

Diagnostic Features
- Overtemperature
- Overvoltage
- Overcurrent
- Current sense and status

Protection Features
- Overtemperature shutdown
- Overvoltage (lockout or smart clamp)
- Undervoltage
- Overcurrent

Application Example NovalithIC™



NovalithIC™ Product Overview

Product Type	Operating Range [V]	$R_{DS(on)}$ path (typ) [mΩ]	$I_{D(lim)}$ (typ) [A]	I_q(typ) [µA]	Switch time (typ) [µs]	Diagnosis	Protect	Package[1]
BTN7930B	5.5 ... 28.0	28.0	32	7	1.0	OV, OT, OC, CS	OV, UV, OT, OC	⑲
BTN7930P	5.5 ... 28.0	29.6	32	7	1.0	OV, OT, OC, CS	OV, UV, OT, OC	⑭
BTN7930S	5.5 ... 28.0	28.2	32	7	1.0	OV, OT, OC, CS	OV, UV, OT, OC	⑭
BTN7960B	5.5 ... 28.0	16.0	47	7	1.0	OV, OT, OC, CS	OV, UV, OT, OC	⑲
BTN7960P	5.5 ... 28.0	17.6	47	7	1.0	OV, OT, OC, CS	OV, UV, OT, OC	⑭
BTN7960S	5.5 ... 28.0	16.2	47	7	1.0	OV, OT, OC, CS	OV, UV, OT, OC	⑭
BTN7970B	5.5 ... 28.0	16.0	70	7	1.0	OV, OT, OC, CS	OV, UV, OT, OC	⑲
BTN7970P	5.5 ... 28.0	17.6	70	7	1.0	OV, OT, OC, CS	OV, UV, OT, OC	⑭
BTN7970S	5.5 ... 28.0	16.2	70	7	1.0	OV, OT, OC, CS	OV, UV, OT, OC	⑯
BTN7971B	4.5 ... 28.0	16.0	70	7	0.5	OV, OT, OC, CS	OV, UV, OT, OC	⑲
BTN7933B	4.5 ... 28.0	28.0	32	7	0.5	OV, OT, OC, CS	OV(SCL), UV, OT, OC	⑲
BTN7963B	4.5 ... 28.0	16.0	47	7	0.5	OV, OT, OC, CS	OV(SCL), UV, OT, OC	⑲
BTN7973B	4.5 ... 28.0	16.0	70	7	0.5	OV, OT, OC, CS	OV(SCL), UV, OT, OC	⑲
BTN8946TA[2]	4.5 ... 40.0	5.3[4]	42	7	0.5[3]	OT, OC, CS	UV, OT, OC	⑲
BTN8960TA[2]	4.5 ... 40.0	13.5	42	7	0.5[3]	OT, OC, CS	UV, OT, OC	⑲
BTN8980TA[2]	4.5 ... 40.0	9.0	70	7	0.5[3]	OT, OC, CS	UV, OT, OC	⑲

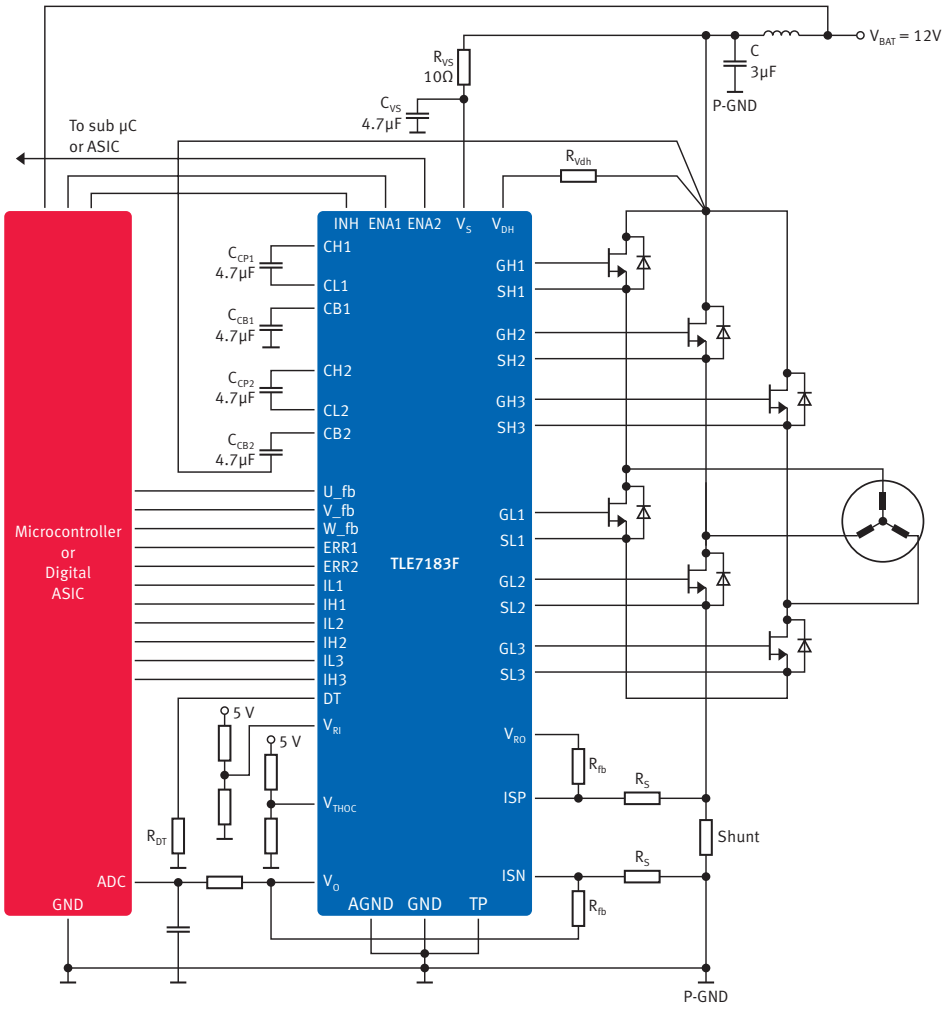
1) See packages on page 96
2) Product in development, electrical values specified must be considered as target values
3) Target values calculated
4) Target value for the HS switch only

OV = Overvoltage
OC = Overcurrent
CS = Current Sense

UV = Undervoltage
OT = Overtemperature
SCL= Short Clamping

Gate Driver ICs for External MOSFETs

The trend towards greater efficiency in automotive applications also applies to electric motors. Applications such as power steering, HVAC compressors and engine cooling fans will be controlled by electronic motors in the future. Infineon's family of configurable, H-bridge and 3-phase gate driver ICs can be combined with MOSFETs to provide the power and efficiency these systems demand.



Applications

- Power steering
- Fan and pump control
- Starter alternator
- Seat belt pretentioner
- VVT
- Electric park brake
- ECMT

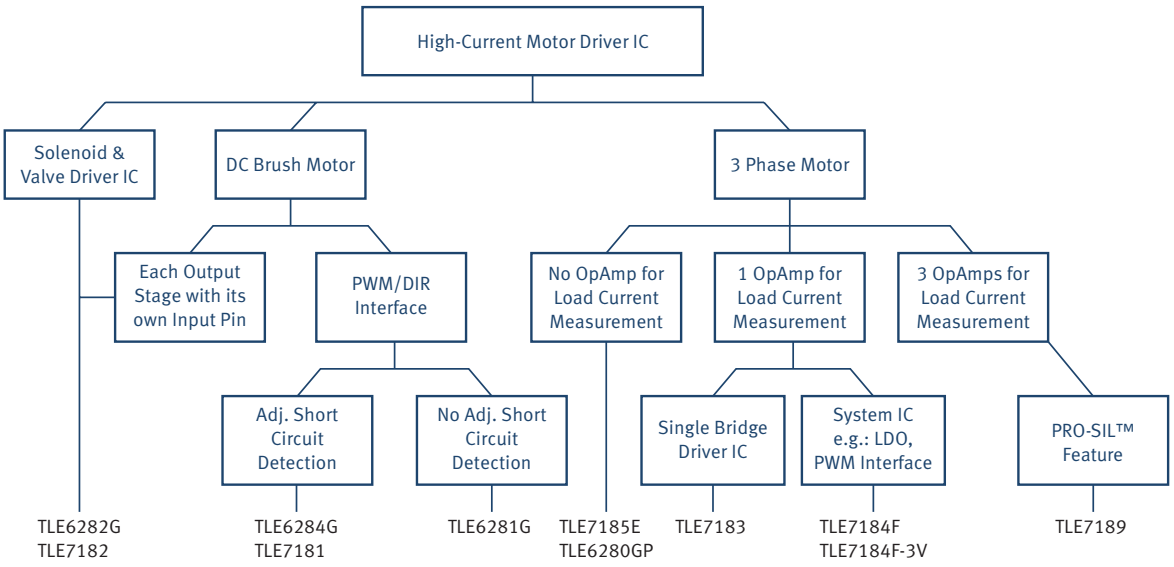
Basic Features

- Strong output stage up to 1.5A
- Precise OpAmp for current shut monitoring
- Operation down to 5.5V
- Duty cycle adjustable up to 100%

Diagnostic Features

- Undervoltage
- Short-circuit
- Overtemperature
- Overvoltage

Selection Tree Gate Drivers



H-Bridge/ Dual Half-Bridge Drivers Family

Product Type	Operating Range [V]	OpAmp	PWM/DIR Input	Reverse Polarity Protection	Diagnostic	Package[1]
TLE6281G	7.5 ... 60.0	0	•		UV, OT, SCD	⑦
TLE6282G	7.5 ... 60.0	0			UV, SCD	⑦
TLE6284G	7.5 ... 60.0	0	•		UV, OT, SCD	⑦
TLE7181EM	7.0 ... 34.0	1	•	•	UV, OV, OC, SCD, OT	㉙
TLE7182EM	7.0 ... 34.0	1		•	UV, OV, OC, SCD, OT	㉙

3-Phase Bridge Driver IC

Product Type	Operating Range [V]	Drives Stage	D.C.-Range @ 20kHz [%]	Numbers of integrated OpAmps for load current measurement	Adjustable dead time	SIL3 features	Diagnosis	Package[1]
TLE6280GP	8.0 ... 36.0	0.9/0.85A	0 ... 95	0	•		UV, SCD, OT	⑬
TLE7183F	5.5 ... 28.0	1.5/1.5A	0 ... 100	1	•		OT, UV, OV, OC, OCD	㊻
TLE7184F TLE7184F-3V[2]	7.0 ... 32.0	12.5/9.0Ω 12.5Ω	0 ... 95	1	•		UV, OV, OC, SCD, OT, VDD supervision	㊻
TLE7185E	5.5 ... 32.0	12.5/9.0Ω	0 ... 95	0	•		UV, OV, SCD, OT	⑫
TLE7188F	5.5 ... 28.0	1.5/1.5A	0 ... 100	3			UV, OV, OC, SCD, OT	㊻
TLE7189F	5.5 ... 28.0	1.5/1.5A	0 ... 100	3		•	UV, OV, SCD, OT, VDD supervision	㊻
TLE7189QK	5.5 ... 28.0	1.5/1.5A	0 ... 100	3		•	UV, OV, SCD, OT, VDD supervision	⑮
TLE7183QU	5.5 ... 28.0	1.5/1.5A	0 ... 100	1	•		OT, UV, OV, OC, SCD	㊶

1) See packages on page 96
2) System IC for fans and pumps with integrated LDO and PWM interface

LO = Lockout
OL = Open-Load
OV = Overvoltage
OC = Overcurrent

UV = Undervoltage
OT = Overtemperature
SCD = Short-Circuit Detection

Power Supply

Linear Voltage Regulators: Voltage Regulators and Trackers and DC/DC Converters

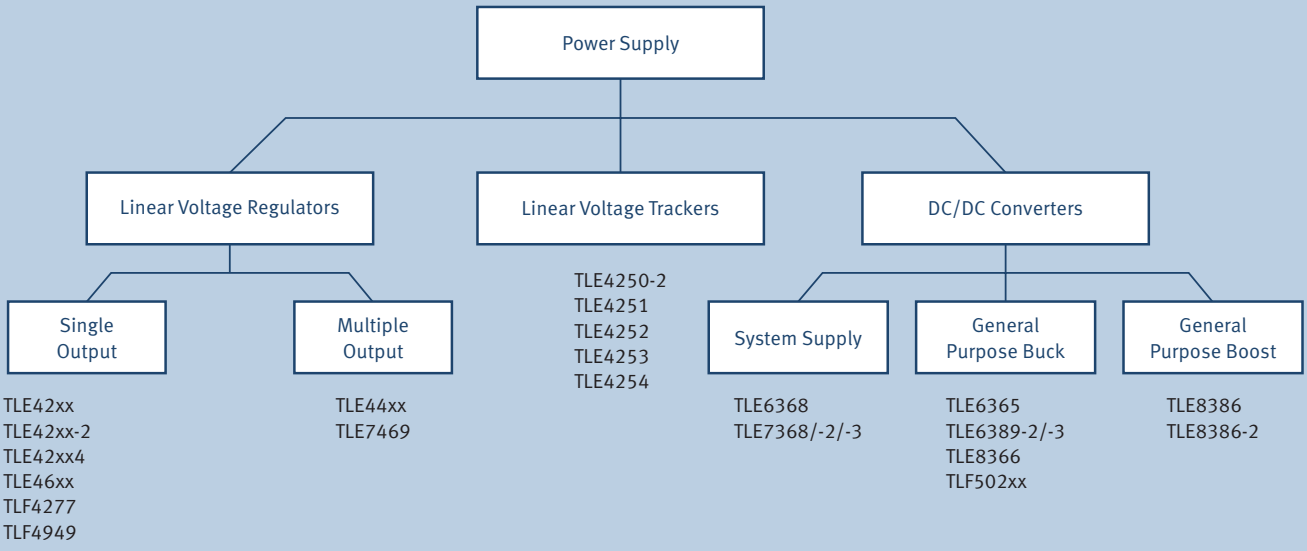
Infineon Technologies offers a comprehensive portfolio of linear voltage regulators and voltage trackers fitting a broad range of automotive applications. We are the global market leader with over 15 years of experience in the automotive regulator segment. We are continuously expanding our portfolio to meet our customers' present and future application requirements.

Our devices are especially designed for use in harsh automotive environments and are offered in the highest quality level. Our robust design approach ensures delamination-free ICs and long-term reliability.

Basic Features

- Wide operation range: Up to 45V
- Very low dropout
- Wide temperature range: -40°C up to +150°C
- Short-circuit protection
- Reverse polarity protection
- Overtemperature protection
- Overload protection

Infineon's Power Supplies Address a Broad Range of Applications



TLE42xx
TLE42xx-2
TLE42xx4
TLE46xx
TLF4277
TLF4949

TLE44xx
TLE7469

TLE4250-2
TLE4251
TLE4252
TLE4253
TLE4254

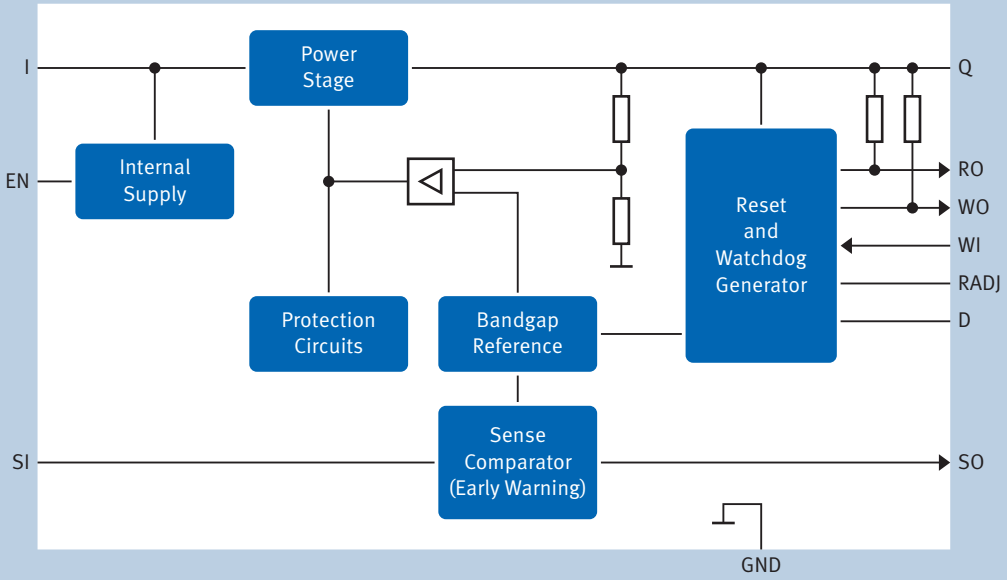
TLE6368
TLE7368/-2/-3

TLE6365
TLE6389-2/-3
TLE8366
TLF502xx

TLE8386
TLE8386-2

Low Quiescent Current
TLE426x-2
TLE426x4
TLE46xx
TLE72xx-2
TLF80511

Block Diagram Single Linear Voltage Regulators



Additional Features

- Low quiescent current consumption in stand-by mode
- Enable function for main output
- Adjustable reset threshold
- Standard and window watchdog
- Power-on reset circuit sensing the stand-by voltage
- Early warning comparator for supply undervoltage

Linear Voltage Regulators: Voltage Regulators and Trackers

Linear Voltage Regulators by Output Current

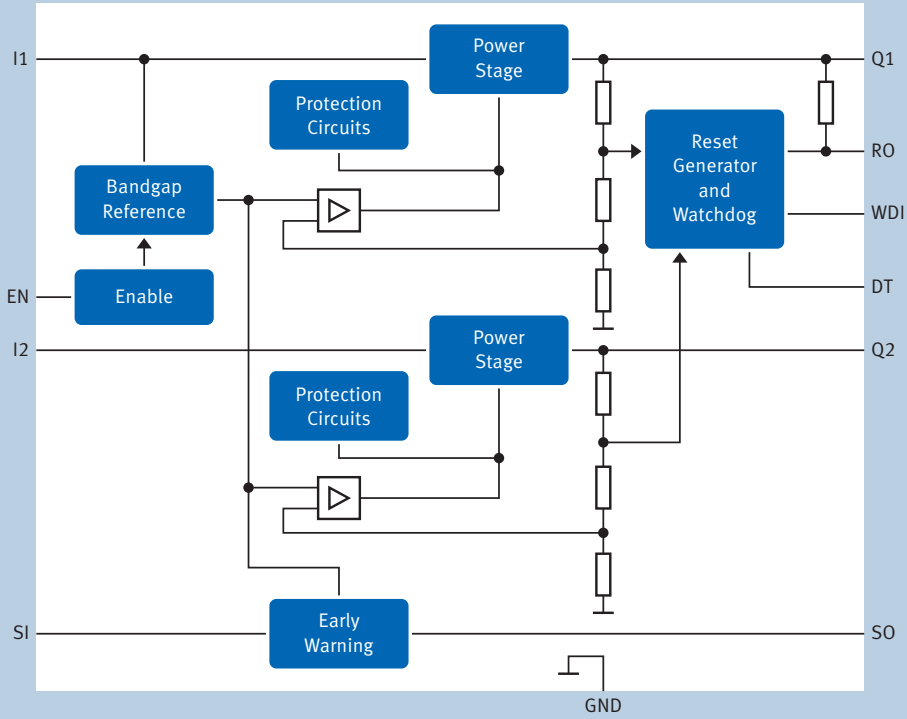
	Product Type	I_Q [mA]	I_q [µA]	V_S Range [V]	V_Q [V]	Drop Voltage [V]	Accuracy (%)
	TLE4285	15	100	6.0–42	5.0	0.8	4
	TLE4286	15	60	6.0–42	5.0	0.8	2
	TLE4294	30	120	5.5–45	5.0	0.25	4
	TLE4295	30	120	3.5–45	2.6; 3.0; 3.3; 5.0	0.25	4
	TLE4296	30	110	4.0–45	3.0; 3.3; 5.0	0.25	4
	TLE4296-2	30	130	4.0–45	3.3; 5.0	0.25	4
NEW!	TLF4949	100	180	3.5–40	5.0	0.3	2
	TLE42344	120	300	5.5–45	5.0	0.25	2
	TLE42364	120	300	5.5–45	5.0; 10.0	0.25	2
	TLE4264-2	150	40	5.5–45	5.0	0.22	2
	TLE42644	150	40	5.5–45	5.0	0.22	2
	TLE4266-2	150	40	6.0–45	3.3; 5.0	0.25	2
	TLE42664	150	40	5.5–45	5.0	0.25	2
	TLE42694	150	210	5.5–45	5.0	0.25	2
NEW!	TLE42694-2	150	210	5.5–45	5.0	0.25	2
	TLE42794	150	150	5.5–45	5.0	0.25	2
	TLE42994	150	65	4.4–45	3.3; 5.0	0.25	2
	TLE4268	180	300	5.5–45	5.0	0.25	2
	TLE7273-2	180	28	4.2–45	2.6; 3.3; 5.0	0.25	2
	TLE7278-2	180	28	4.2–45	5.0	0.25	2
	TLE7279-2	180	28	4.2–45	2.6; 3.3; 5.0	0.25	2
	TLE4262	200	900	6.0–45	5.0	0.35	2
	TLE4263/-2	200	900	5.5–45	5.0	0.35	2
	TLE4278	200	180	5.5–45	5.0	0.25	2
	TLE4678	200	60	3.3–45	5.0	0.25	2
	TLE4699	200	70	3.3–45	5.0	0.16	2
	TLF4277[4)]	200	150	5.0–40	adj.	0.25	2
	TLE4287	250	1,000	7.5–42	5.0	1.8	2
	TLE7270-2	300	20	5.5–42	5.0	0.2	2
	TLE7272-2	300	20	5.5–42	5.0	0.25	2
	TLE7274-2	300	20	5.5–42	5.0	0.25	2
	TLE7276-2	300	20	5.5–42	5.0	0.25	2
	TLE4267	400	1,300	5.5–40(60)	5.0	0.3	2
	TLE42744	400	100	4.7–40	3.3; 5.0	0.25	2
	TLE42754	400	150	5.5–42	3.3; 5.0	0.25	2
	TLE42764	400	100	4.5–40	adj.; 5.0	0.25	2
	TLE4675	400	65	3.3–45	5.0	0.25	2
NEW!	TLF80511	400	38	3.3–40	5.0	0.25	2
	TLE4290	450	200	5.5–42	5.0	0.25	2
NEW!	TLE4291	450	220	3.3–42	5.0	0.25	2
	TLE4270-2	550	1,000	5.5–42(60)	5.0	0.35	2
	TLE4271-2	550	800	6.0–40(60)	5.0	0.35	2
	TLE4284	1,000	1,000	2.9–40	adj.; 1.5; 1.8; 2.6; 3.3; 5.0	1.0	3

1) See packages on page 96
2) Power Good
3) Power Fail
4) LDO with current monitor and status output

Output Capacitance (min) [µF]	Reset	Adjustable Reset Threshold	Enable	Watchdog	Early Warning	Package[1]
1.0	●[3]					⑲
1.0			●			⑲
2.2						⑲
2.2	●[3]					⑲
2.2			●			⑲
3.3			●			⑲
4.7	●				●	① ②
10.0						㉓
10.0			●			㉓
10.0						㉓
10.0						㉓
10.0			●			㉓
10.0			●			㉓
10.0	●	●			●	① ④ ㉗
4.7	●	●				㉗
10.0	●	●			●	① ④ ㉗
22.0	●	●	●		●	① ④ ㉗
22.0	●	●		●		① ⑦
0.5	●		●	●		④ ㉗
0.5	●		●	●		④ ㉗
0.5	●		●		●	④ ㉗
22.0	●	●	●			④ ⑦
22.0	●	●	●	●		① ② ④ ⑦
10.0	●	●		●		④
10.0	●	●		●		④ ㉗
10.0	●	●	●		●	④ ㉗
10.0			●			㉗
0.1	●		●			④
0.5	●					㉗ ㉝ ㊲
0.5	●		●			㉗ ㉝
0.5						㉗ ㉜ ㉟
0.5			●			㉗ ㉝
22.0	●		●			④ ㊴ ㊹ ㊺
22.0						㉓ ㉗ ㉜ ㉟
22.0	●					㉗ ㉝ ㊲
22.0			●			㉝ ㊲
22.0	●					㉝ ㊲
1.0						㉟
22.0					●[2]	㉝ ㊲ ㊶
22.0	●	●	●	●		㉗
22.0	●					㉝ ㊲ ㊶ ㊸
22.0	●		●	●		㊴ ㊹ ㊻
10.0						㉜

Linear Voltage Regulators: Voltage Regulators and Trackers

Block Diagram Multiple Output Regulators



Power Supply Multiple Output Regulators

Product Type	I_Q1 [mA]	I_Q2/3 [mA]	I_q [mA]	V_S Range [V]	V_Q1 [V]	V_Q2/3 [V]	Drop Voltage [V]
TLE4470	350	180	180	5.6–45	5	adj.	0.3
TLE4471	450	100/50	1,100	5.5–40(60)	5	5.0 and 5.0	0.25
TLE4473	300	180	200	5.6–42	5	3.3 or 2.6 or 5.0	0.3
TLE4476	430	350	300	5.7–42(60)	5	3.3	0.3
TLE7469	215	215	55	5.6–45	5	3.3 or 2.6	0.3

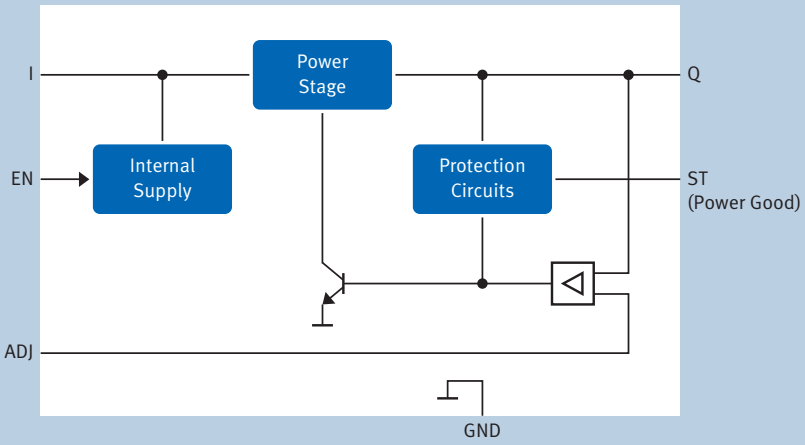
Trackers

Product Type	I_Q [mA]	I_q	V_S Range [V]	V_Q [V]
TLE4250-2	50	140	4.0–40	adj.
TLE4251	400	230	4.0–40	adj.
TLE4252	250	100	3.5–40	adj.
TLE4253	250	100	3.5–40	adj.[2]
TLE4254	70	50	4.0–45	adj.[2]

1) See packages on page 96

2) $V_Q > V_{ref\ possible}$

Block Diagram Trackers



Accuracy (%)	Output Capacitance (min) [µF]	Overvoltage Protection	Reset Output	Adjustable Reset Threshold	Watchdog	Early warning	Package[1]
2	6/10		•	•		•	④ ⑦
2	22/10/10	•	•	•	•		⑧
2	10/22		•		•		③
4	10/10	•					㉝
2	1/1		•		•		③

Drop Voltage [V]	Accuracy (%)	Output Capacitance (min) [µF]	$V_Q > V_{ref}$ Possible	Package[1]
0.1	0.5	1		⑲
0.28	0.2	22		㉝ ㊲
0.28	0.2	10		㉝ ㊲
0.28	0.1	10	•	① ②
0.28	0.1	1	•	① ②

DC/DC Converters

Infineon Technologies offers standard switching converters and several switching converters serving applications with extended requirements like supply for 32-bit microcontrollers and airbag applications. In our portfolio you can find step-up (Boost) and step-down (Buck) converters as well as converters cascaded internally with linear regulators and trackers.

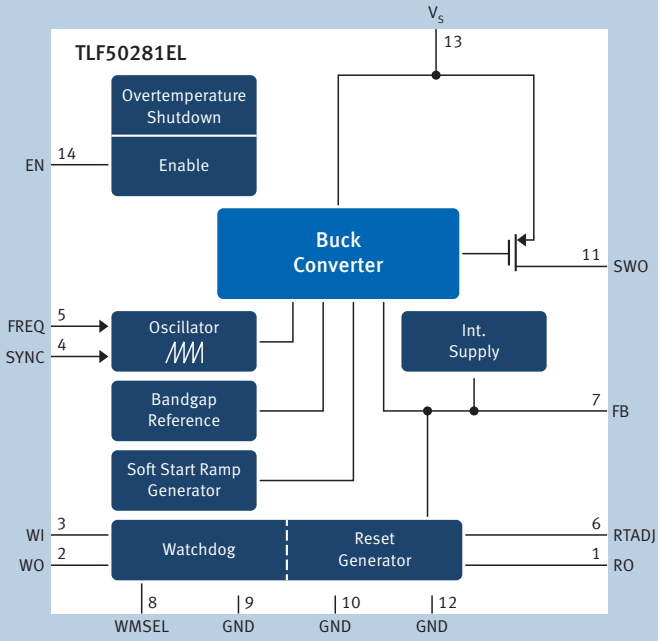
Features

- Step-up and step-down converters
- High-efficiency regulators
- Wide supply voltage operation range
- Very low current consumption operation
- Suitable for standard 12V/24V PowerNets
- Output undervoltage reset with delay
- Overtemperature shutdown
- Wide ambient operation range -40°C up to +125°C
- Short-circuit protection
- Overtemperature protection

Product Type	$V_{S(op)}$ [V]	V_Q [V]	V_Q2 [V]	V_Q3 [V]	V_Q4 [V]	V_Q Additional [V]	Accuracy 1 (%)	Accuracy 2 (%)	Accuracy 3 (%)	Accuracy 4 (%)
Buck										
TLE6365	8.0 ... 40.0	5.0					2			
TLE6389-2GV	5.0 ... 60.0	adj.					3			
TLE6389-2GV50	5.0 ... 60.0	5.0					3			
TLE6389-3GV50	5.0 ... 60.0	5.0					3			
TLE8366	4.75 ... 45.0	adj., 3.3, 5.0					2(4)			
TLF50281	4.75 ... 45.0	5.0					2			
TLF50251	4.75 ... 45.0	5.0					2			
TLF50241	4.75 ... 45.0	5.0					2			
TLF50211	4.75 ... 45.0	5.0					2			
TLF50201	4.75 ... 45.0	5.0					2			
Buck plus linear										
TLE7368	4.5 ... 45.0	5.5	5	2.6 or 3.3	1.5	2 x 5	-2 ... +9	2	2	2
TLE7368-2	4.5 ... 45.0	5.5	5	2.6 or 3.3	1.2	2 x 5	-2 ... +9	2	2	2
TLE7368-3	4.5 ... 45.0	5.5	5	2.6 or 3.3	1.3	2 x 5	-2 ... +9	2	2	2
TLE6368	5.5 ... 60.0	5.5	5	2.6 or 3.3	2.6 or 3.3	6 x 5	10	5	5	5
Boost										
TLE8386[3]	4.75 ... 45.0	adj. (max 9-times of V_S)					4			
TLE8386-2[4]	4.75 ... 45.0	adj (max 9-times of V_S)					4			
Boost plus buck										
TLE6711	4.0 ... 40.0	adj. up to 33	5				10	2		

1) See packages on page 96
2) Different voltage reset hysteresis
3) HS-sense-booster (prefered as current source)
4) LS-sense-booster

Block Diagram TLF50281



Additional Output Accuracy	I_Q [mA]	I_Q2 [mA]	I_Q3 [mA]	I_Q4 [mA]	I_Q Additional [mA]	I_q [mA]	f_{sw} [kHz]	Stand-by Regulator [V–mA]	PFM Operation	Reset	Watchdog	SPI and Add. Logic	Enable/ Disable Possibility	Early Warning	Package[3]
	400					1.5	100			•					①
	2,300					0.120	250 ... 530		•	•			•	•	④
	2,300					0.120	250 ... 530		•	•			•	•	④
	2,300					0.120	250 ... 530		•	•[2]			•	•	④
	1,800					7.0	200 ... 530						•		②
	500					0.045	800 ... 2200		•	•	STD		•		㉗
	500					0.045	800 ... 2200		•	•			•		㉗
	500					0.045	800 ... 2200		•	•					㉗
	500					0.045	800 ... 2200		•				•		㉗
	500					0.045	800 ... 2200		•						㉗
1.5	2,500	800	700	adj.	105 and 50	120	280 ... 425	1.0/2.6–30		•	WWD		•		⑫ ⑬
1.5	2,500	800	700	adj.	105 and 50	120	280 ... 425	1.0/2.6–30		•	WWD		•		⑫
1.5	2,500	800	700	adj.	105 and 50	120	280 ... 425	1.0/2.6–30		•	WWD		•		⑫
1.0	1,500	800	500	350	6 x 17	30	280 ... 425	2.4–1.0		•	WWD	•	•		⑬
	dep. on VQ					7,000	100 ... 500						•		㉗
						7,000	100 ... 500						•		㉗
	1,000	250				1,500				•	•				④ ⑦

Automotive Transceivers

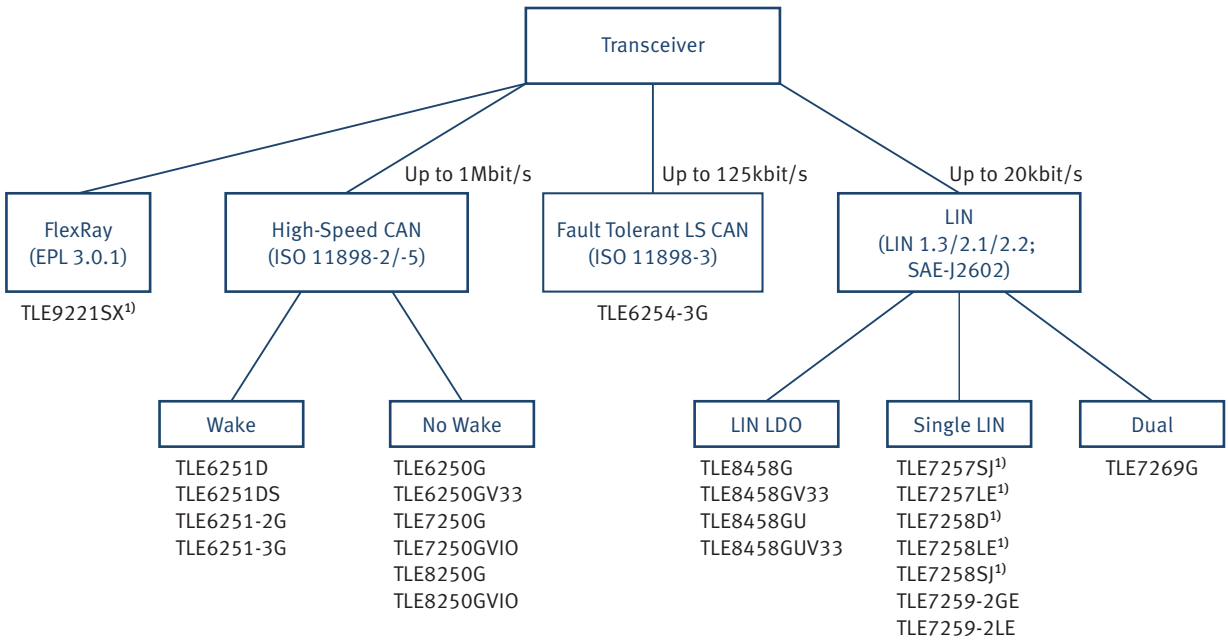
Because of the ever-increasing demand for information exchange in modern vehicles, the automotive industry implemented in vehicle networks (IVN) using the CAN (Controller Area Network), LIN (Local Interconnect Network) and FlexRay protocol-based bus systems.

Transceivers are the link between the protocol unit (the controller) and the physical transmission medium (bus cable). In addition to their driving function (reception/transmission of signals from the bus to ECU) the transceivers also provide a wide range of protective and fault-diagnosis functions.

Features

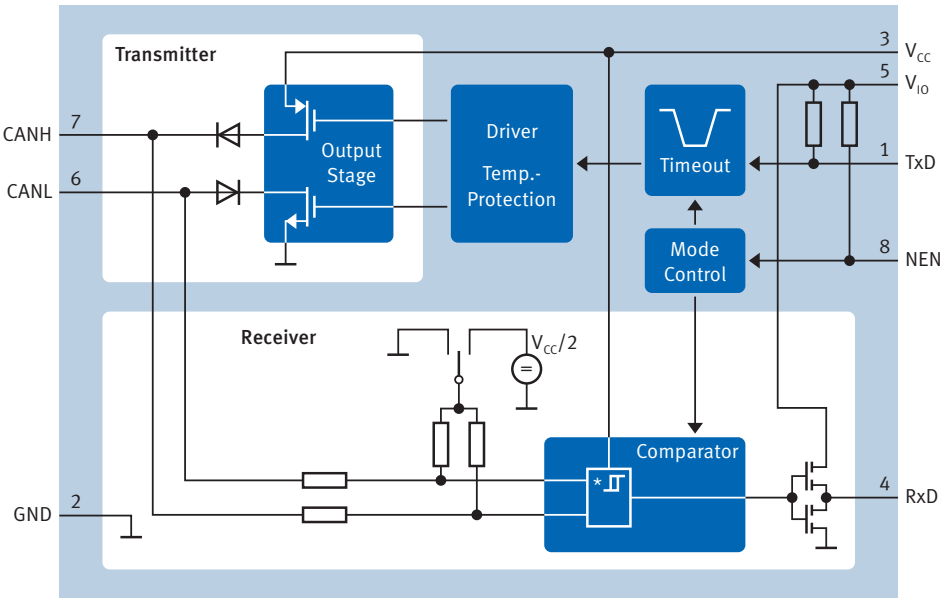
- Excellent EMC
- Outstanding ESD robustness
- Highest quality standard
- Family concept
- Broad product portfolio

Selection Tree Automotive Transceivers

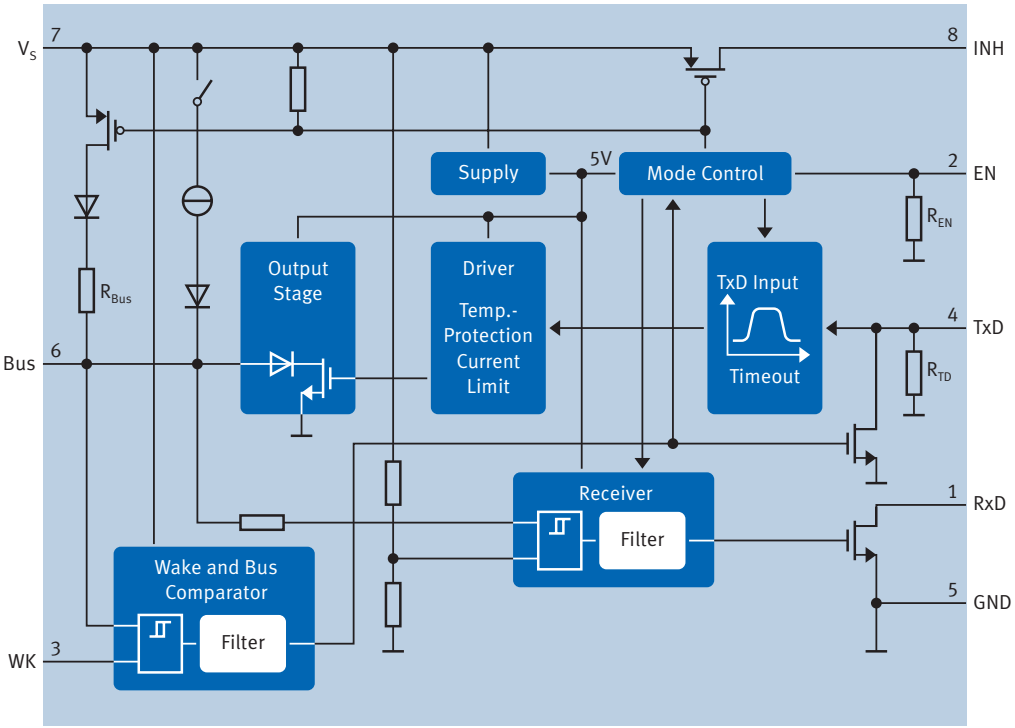


1) In development

Block Diagram Example High-Speed CAN: TLE7250GVIO



Block Diagram Example LIN: TLE7259-2GE



Product Table

	Product Type	Transmission Rate (max)	I_q	Bus Wake-up Capability	Wake-up Inputs	Number of Channel	Bus Failure Management	Package[1)]
	High-speed CAN ISO 11898-2							
	TLE6250G	1Mbit/s	< 10µA @ 5V stand-by			1		①
	TLE6250GV33	1Mbit/s	< 10µA @ 5V stand-by			1		①
NEW!	TLE7250G	1Mbit/s	< 10µA @ 5V stand-by			1		①
NEW!	TLE7250GVIO	1Mbit/s	< 10µA @ 5V stand-by			1		①
	TLE8250G	1Mbit/s	< 10µA @ 5V stand-by			1		①
	TLE8250GVIO	1Mbit/s	< 10µA @ 5V stand-by			1		①
	High-speed CAN ISO 11898-5							
	TLE6251-2G	1Mbit/s	< 30µA sleep mode	•	•	1	•	④
	TLE6251-3G	1Mbit/s	< 30µA sleep mode	•	•	1	•	④
	TLE6251DS	1Mbit/s	< 30µA @ 5V stand-by	•		1		①
NEW!	TLE6251D	1Mbit/s	< 30µA @5V stand-by	•		1		①
	Fault-tolerant CAN ISO 11898-3							
	TLE6254-3G	125kbit/s	< 65µA sleep mode	•	•	1	•	④
	LIN/SAE J2602/k-line							
	TLE6258-2G	20kbit/s	< 40µA stand-by mode			1		①
NEW!	TLE7257SJ TLE7257LE	20kbit/s	< 20µA sleep mode	•		1	•	① ㊷
NEW!	TLE7258SJ TLE7258LE	20kbit/s	< 20µA sleep mode	•		1	•	① ㊷
NEW!	TLE7259-2GE TLE7259-2LE	20kbit/s	< 10µA sleep mode	•	•	1	•	①
	TLE7269G	20kbit/s	< 10µA sleep mode	•	•	2	•	④
	TLE8458	20kbit/s	< 40µA stop mode	•	•	1	•	①
	FLexRay							
NEW!	TLE9221SX	10Mbit/s	< 55µA sleep mode	•	•	1	•	㉘

1) See packages on page 96

System Basis Chips (SBCs)

The latest generations of Infineon System Basis Chips (SBC) are monolithic integrated circuits in an enhanced power package. The TLE826x family provides a pin and software compatible solution with different numbers of LIN transceiver and Limp Home outputs. In addition the TLE7263E provides input monitoring with cyclic sense feature.

The devices are designed for automotive applications using CAN and LIN communication e.g. body controller, gateway applications, HVAC.

The SBC provide HS-CAN transceiver and LIN transceivers, multiple low dropout voltage regulators (LDO) for 5V supply, and a 16-bit SPI to control and monitor the device. Also implemented are a configurable Watchdog, Limp Home outputs, and configurable undervoltage detections.

The devices offer low power modes in order to support applications that are connected permanently to the battery.

The devices are designed to withstand the severe conditions of automotive applications, especially the ESD and EMC requirements of the OEMs.

Features
- Family concept
- Fully ESD protected
- Excellent EMC performance
- Very low quiescent current
- Supervision/FailSafe management
- “Bus Wake-up capability”

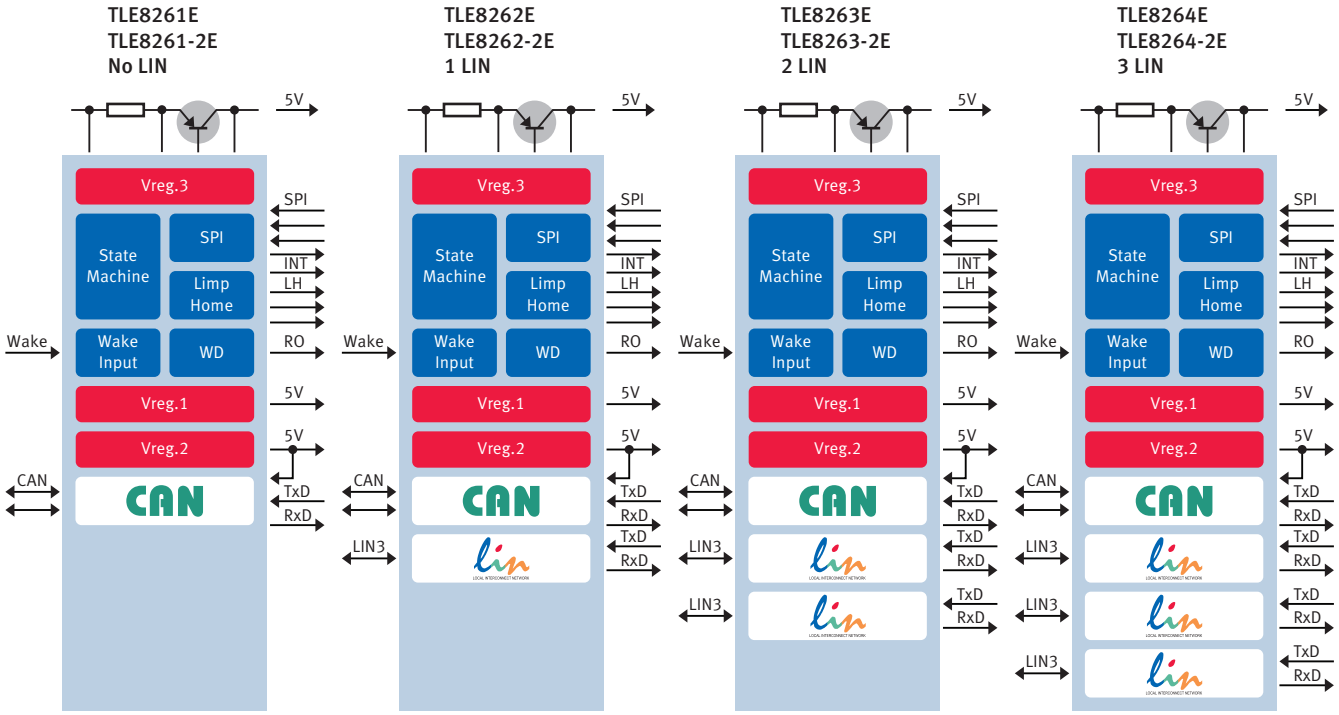
Applications
- HVAC
- BCM/Gateway
- Door module
- Lighting module
- Seat module

Body System ICs – System Basis Chips Product Overview

Product Type	Transmission Rate	I_q	I_Q	V_{reg} 1	V_{reg} 2
Fault-tolerant CAN/ISO 11898-3					
TLE6263-3G	125kbit/s	< 85µA sleep mode	< 500µA, @ 5V stand-by	120mA, @ 5V	
TLE6266G	125kbit/s	–	< 85µA, @ 5V stand-by	45mA, @ 5V	
High-speed CAN/ISO 11898-5/LIN 1.3; 2.0/SAE J2602					
TLE7263E	1Mbit/s (CAN) 20kbit/s 10.4kbit/s (LIN)	49µA (typ) sleep mode 5V Off	68µA (typ) stop mode 5V On	200mA, @ 5V	200mA, @ 5V
TLE826x	1Mbit/s (CAN) 20kbit/s 10.4kbit/s (LIN)	28µA (typ) sleep mode 5V Off	58µA (typ) stop mode 5V On	200mA, @ 5V	200mA, @ 5V
LIN/SAE/J2602/k-line					
TLE6285G	20kbit/s	< 40µA sleep mode	< 140µA, @ 5V stand-by	150mA, @ 5V	
TLE6286G	20kbit/s	< 80µA sleep mode	< 1.3mA, @ 5V stand-by	150mA, @ 5V	
TLE8458	20kbit/s 10.4kbit/s	< 10µA sleep mode	40µA	50mA, @ 5V/3.3V	

1) See packages on page 96

Overview

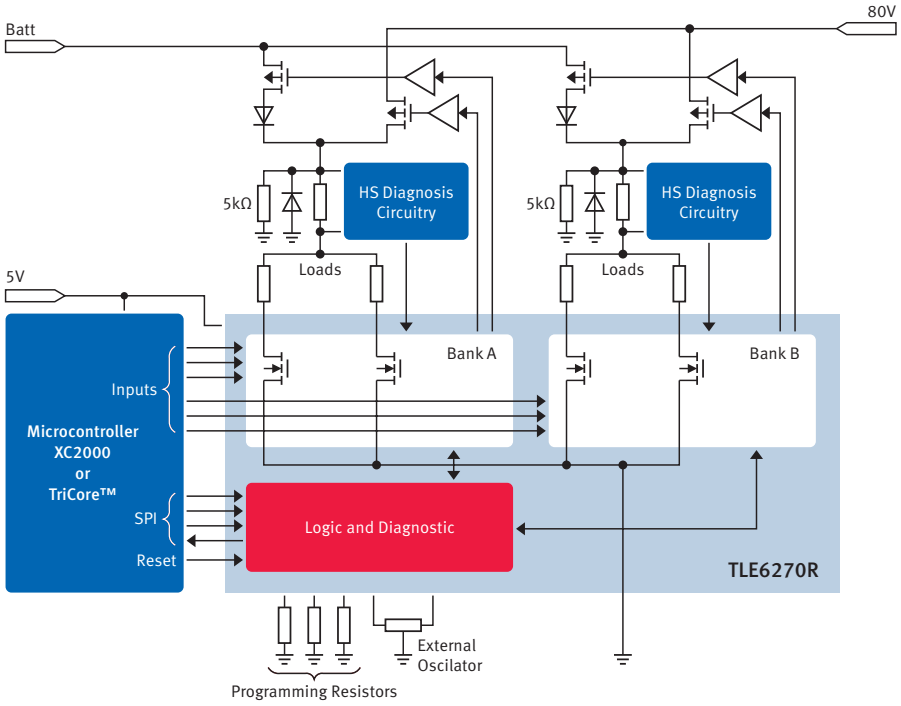


V_{reg} 3	Wake-up inputs	Watchdog	Output Drivers	Package[1)]
	2	•	1 high-side switch 150mA	⑩
	1	•	2 low-side relay drivers 3 high-side drivers	⑩
	4	•	1 high-side switch 150mA	⑫
400mA, @ 5V	1	•		⑫
	1			⑥
	1	•		⑥
	1			①

Gasoline Direct Injection

The TLE6270R is tailored for solenoid based Gasoline Direct Injection (GDI-)systems in automotive applications. The device controls external high-side transistors. The injector voltage can be varied in the range from battery voltage (for pre-charge and hold phases) up to 80V (for peak phase), resulting in fast opening of the injectors. With programmable current levels and peak time, the TLE6270R provides a high flexibility for the adjustment of peak-and-hold current waveforms for four injector channels.

Application Example TLE6270R



Features

- Four integrated low-side switches, control logic and outputs for external high-side switches
- Programmable peak and hold output current control to adapt to application requirements.
- Detailed diagnostic of defective or missing injector connections
- Serial Peripheral Interface (SPI) for diagnostics and control of the device
- Short-circuit, ESD and overtemperature protection
- Undervoltage reset

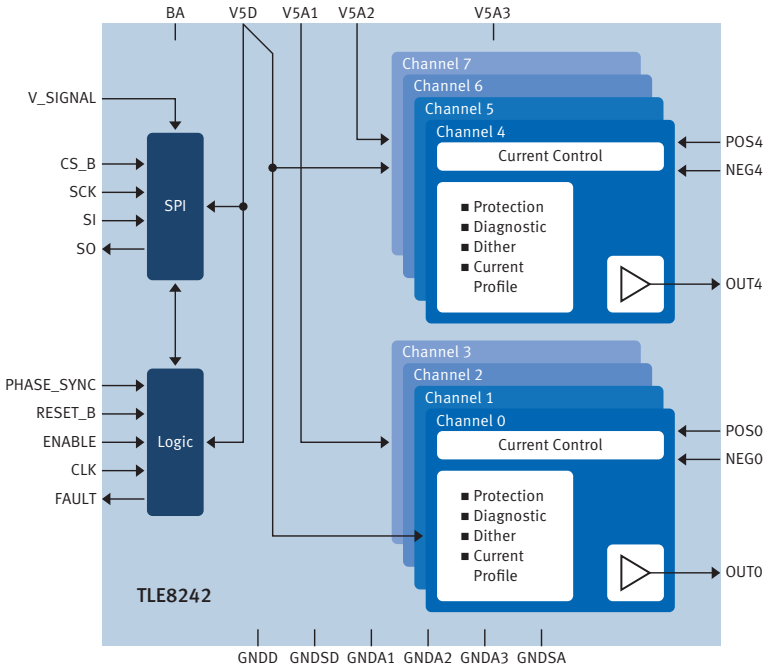
Product Type	Halogen-free	Clam Voltage V_{CLP1} (max) [V]	$R_{DS(on)}$ (max) @150°C [mΩ]	Peak Current Range [A]	Hold Current Range [A]	Quiescent Current (max) [mA]	Package[1)]
TLE6270R	•	94	300	9 ... 13	1.8 ... 3.5	0.1	⑬

1) See packages on page 96

Constant Current Control ICs

Infineon's solution for variable force or constant current controlled solenoids typically used in automatic transmissions, idle speed-/valve-/suspension control or Exhaust Gas Recirculation (EGR) applications

Block Diagram TLE8242L



Features

- Shorted load detection
- Open-load detection in ON-/OFF-State
- Short to ground detection
- Max. output average current approx. 1.2A

Product Type	Number of Channels	Output Current	$R_{DS(on)}$ [mΩ]	Quiescent Current [mA]	Operational Range V_S [V]	SPI	Comment	Package[1]
TLE6288R[2]	6	2	150	0.05	6.0 ... 16.0	16-bit	Smart 6 Channel Peak & Hold Switch	⑬
TLE6288R	6	2	150	0.05	6.0 ... 16.0	16-bit	Smart 6 Channel Peak & Hold Switch	⑬
TLE7241E	2	1.2	240	1.0	9.0 ... 18.0	16-bit	Dual Channel Constant Current Control Solenoid Driver	⑦
TLE7242-2G	4	NA	NA	0.005	5.5 ... 42.0	32-bit	4 Channel Fixed Frequency Constant Current Control IC	⑩
TLE8242L	8	NA	NA	0.005	5.5 ... 42.0	32-bit	8 Channel Fixed Frequency Constant Current Control IC	⑮
TLE82543[3]	3	1.6	250 (max)	0.01	5.5 ... 17.0	32-bit	3 Channel Constant Current Control IC	⑫

1) See packages on page 96
2) Non green
3) In development

Powertrain H-Bridges for Electronic Throttle Controls

Infineon H-bridge portfolio addresses the broad range of DC brush motor applications. Designed and optimized for Electronic Throttle Control (ETC), in addition the H-bridges can be used for Exhaust Gas Recirculation (EGR), valve control, idle control swirl and tumble flaps variable intake, manifold turbo charger waste gate, variable turbo geometry, but also industrial DC-brush motor applications.

Product Type	$I_{L(NOM)}$	$I_{L(LIM)}$	I_q [µA]	$V_{S(op)}$ [V]	$R_{DS(on)}$ [mΩ]	Diagnostic I/F	Package[1]
TLE5205-2	4	5	10	6.0 ... 40.0	220	Status Flag	⑭
TLE5205-2G	4	5	10	6.0 ... 40.0	220	Status Flag	㊳
TLE5205-2GP	4	5	10	6.0 ... 40.0	220	Status Flag	⑧
TLE5205-2S	4	5	10	6.0 ... 40.0	220	Status Flag	⑧
TLE5206-2	4	5	10	6.0 ... 40.0	220	Status Flag	⑭
TLE5206-2G	4	5	10	6.0 ... 40.0	220	Status Flag	㊳
TLE5206-2GP	4	5	10	6.0 ... 40.0	220	Status Flag	⑧
TLE5206-2S	4	5	10	6.0 ... 40.0	220	Status Flag	⑧
TLE6209R	6	7	50	5.0 ... 40.0	150	SPI & Status Flag	⑧
TLE7209-2R	6	7	20	5.0 ... 28.0	150	SPI & Status Flag	⑧
TLE8209-2SA	1.5 ... 8.6	6.5 ... 17.4	20	4.5 ... 28.0	150	SPI & Status Flag	⑧

Flex Multichannel Low-Side Switches (Powertrain & Safety)

Multi channel low-side switches are designed for multi purpose loads (solenoids, relays and resistive loads). The so-called Flex products serve in a flexible way the engine requirements with a different number of low-side drivers.

Please refer to page 38 for the product table.

1) See packages on page 96

Airbag System ICs

Infineon, a world leading supplier of Airbag ICs with more than 15 years experience, offers several complete solutions, enabling cost efficiency over the entire range from basic up to high end airbag systems. With a product portfolio ranging from high content integrated System ICs, over Smart Firing ICs and Power Supplies to Satellite Receiver ICs, Infineon is well positioned to meet the market's requirements for cost efficiency, high quality and flexibility.

Features

- 16-bit Serial Peripheral Interface (SPI)
- Squib diagnosis via resistance measurement

Airbag Firing ICs

Product Type	Channels	Warning Lamp Output Driver	Digital Output for Firing Current Detection	3.3V compatible I/O	Buckle Switch Detection	Number of Analog Output for Signal Monitoring	Firing Loop Enable Inputs	Firing Current (max)	Programmable Deployment Firing Timer	Buck/ Boost	Package[1]
TLE6710[2]	4	2	•			4	0	0	0	•	⑯
TLE6712[2]	2	0	•		•	1	2	2	0		⑨
TLE6714[2]	4	0	•	•	•	1	2	4	0		⑩
TLE7714	4	0				1	1	0	4		⑭
TLE7718	8	0		•		1	1	0	8		⑭
TLE7734	4	0		•		1	1	0	4		⑭
TLE7738	8	0		•		1	1	0	8		⑭

Satellite Receiver IC

Product Type	Channels	Independent Channel	Number of Digital Output	3.3V compatible I/O	Data Rate	Number of Supply	Package[1]
TLE7729	4	4	4	•	125kbit/s	4	㊺

AEC Qualified

RoHS

1) See packages on page 96
2) Non green

Infineon® Embedded Power ICs

The latest generation of Infineon® Embedded Power ICs integrates on a single die all the necessary functions to sense, control and actuate a motor. The TLE983x product family integrates a high performance 8-bit microcontroller derived from the established XC800 microcontroller family with application specific power drivers, control and communication modules in an automotive qualified new Smart-Power Technology.

TLE983x product family improves the microcontroller performance and the product feature set over the existing first generation (TLE78xx) product offering.

The TLE983x product family is offered in a space saving VQFN-48 package, while the first product generation is realized as a Multi-Chip-Module (MCM) in a DSO-28 package.

The devices are designed for LIN based motor control applications such as window lifts, wipers, sun roofs, power seats, fan/blower control.

General Characteristics

- Operating voltage V_{Bat}: 3.0V to 27V, maximum rating 40V
- Stop mode 80µA & sleep mode 25µA
- ESD performance :
  - up to 2kV/handling on all pins 4kV @ HV inputs
  - 6kV @ LIN pin
  - ECU/car handling ruggedness (Gun Model for pins directly connected to ECU plug/socket)
- Overvoltage device clamp (load dump ruggedness): ≥ 40V
- Wide operating temperature range: T_j = -40 ... +150°C

Features of 8-bit Microcontroller, XC8xx

- 8051 compatible, up 40MHz frequency
- 256Byte RAM and 3072Byte XRAM
- 36KB to 64KB Flash memory for code and data
- 10-bit ADC (5V max.), 8 channels including battery and supply supervision
- Five 16-bit timers
- Capture/compare unit for PWM signal generation (CCU6) with 2 x 16-bits timers

TLE983x Product Family Offers

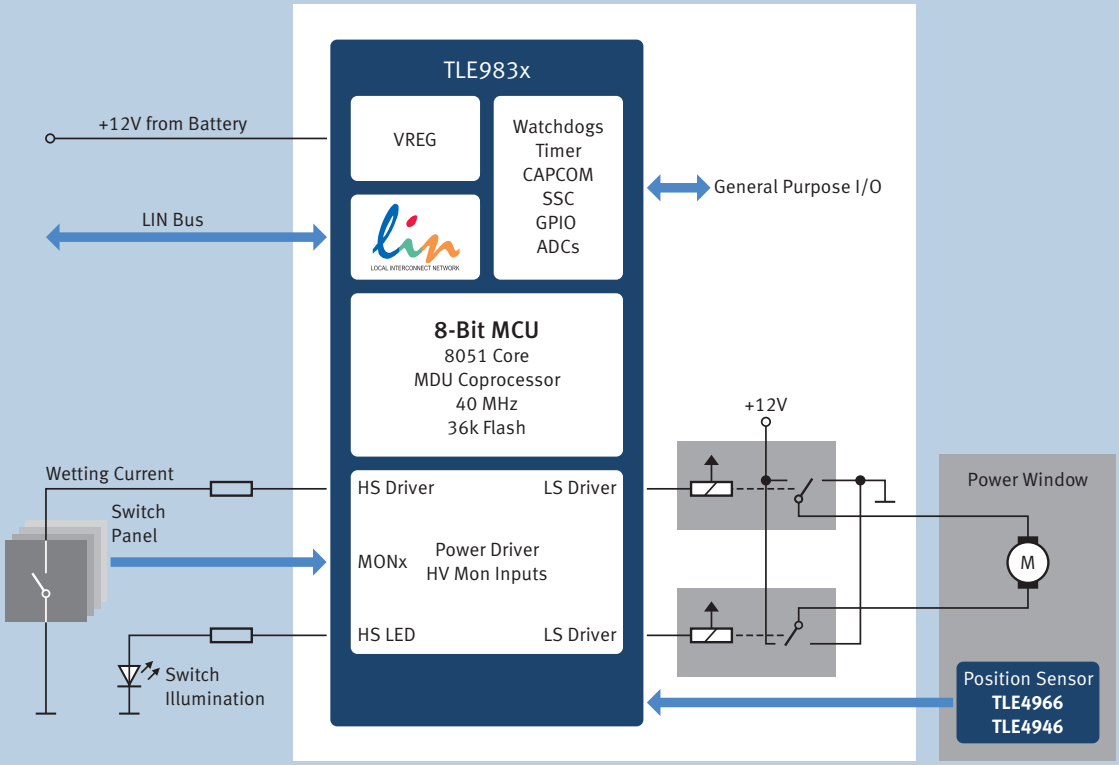
- LIN transceiver (single wire), compliant with LIN Spec. 2.1, 2.0/SAE J2602 and compatible with LIN 1.3
- Two protected low-side drivers (250mA)
- Up to two protected high-side switch drivers (150mA)
- Five high-voltage inputs with wake up functionality
- Two watchdog timers
- Programmable window watchdog
- Measurement unit with 10 channels, 8-bit A/D converter and data post processing
- Voltage regulator with undervoltage reset
- Power saving modes
  - MCU slow-down mode
  - Stop mode
  - Sleep mode
  - Cyclic wake-up and cyclic sense during stop mode and sleep mode

Applications

- Window lift
- Sun roof
- Fan control
- Seat control
- Key pad interface
- Switch panel interface

Product Name	Core	Flash [KB]	Freq [MHz]	High-Side Switch	High Voltage Monitor Input	16-bit Timer	GPIO	OP-AMP	PN MOS Driver	Package[1]
TLE983x Product Family										
TLE9835QX	XC800	64	40	2	5	5	11	Yes	Yes	㊻
TLE9834QX	XC800	64	40	2	5	5	11	No	No	㊻
TLE9833QX	XC800	48	40	2	5	5	11	No	No	㊻
TLE9832-2QX	XC800	36	40	2	5	5	11	No	No	㊻
TLE9832QX	XC800	36	40	1	5	5	11	No	No	㊻
TLE9832QV	XC800	36	40	1	5	5	11	No	No	㊻
TLE78xx Product Family										
TLE7824G	XC885	24	24	1	5	4	8	No	No	⑩
TLE7810G	XC866	16	24	1	5	3	8	No	No	⑩

Smart LIN-based Relay Driver IC & Switch Panel Interface with Integrated 8-bit Microcontroller



1) See packages on page 96

Glossary

Type List	Product Family	Page
2N7002DW	Small Signal OptiMOS™ N-Channel 60V	23
BCR320U	Linear LED Driver of BCR400 Series	53
BCR321U	Linear LED Driver of BCR400 Series	53
BCR401U	Linear LED Driver of BCR400 Series	53
BCR401W	Linear LED Driver of BCR400 Series	53
BCR402U	Linear LED Driver of BCR400 Series	53
BCR402W	Linear LED Driver of BCR400 Series	53
BCR405U	Linear LED Driver of BCR400 Series	53
BCR420U	Linear LED Driver of BCR400 Series	53
BCR421U	Linear LED Driver of BCR400 Series	53
BSD214NW	Small Signal OptiMOS™2 N-Channel 20V	23
BSD223P	Small Signal OptiMOS™2 P-Channel -20V	24
BSD235C/n-ch	Small Signal OPTIMOS™2 N-Channel 20V Complementary MOSFETs	25
BSD235C/p-ch	Small Signal OPTIMOS™2 P-Channel -20V Complementary MOSFETs	25
BSD235N	Small Signal OptiMOS™2 N-Channel 20V	23
BSD314SPE	Small Signal OptiMOS™3 P-Channel -30V + integrated ESD diode	24
BSD316SN	Small Signal OptiMOS™2 N-Channel 30V	23
BSD356C/n-ch	Small Signal OPTIMOS™2 N-Channel 30V Complementary MOSFETs	25
BSD356C/p-ch	Small Signal OPTIMOS™2 P-Channel -30V Complementary MOSFETs	25
BSD356PE	Small Signal OptiMOS™ P-Channel -30V + integrated ESD diode	24
BSD816SN	Small Signal OptiMOS™2 N-Channel 20V	23
BSD840N	Small Signal OptiMOS™2 N-Channel 20V	23
BSL202SN	Small Signal OptiMOS™2 N-Channel 20V	23
BSL205N	Small Signal OptiMOS™2 N-Channel 20V	23
BSL207N	Small Signal OptiMOS™2 N-Channel 20V	23
BSL207SP	Small Signal OptiMOS™2 P-Channel -20V	24
BSL211SP	Small Signal OptiMOS™2 P-Channel -20V	24
BSL214N	Small Signal OptiMOS™2 N-Channel 20V	23
BSL215C/n-ch	Small Signal OPTIMOS™2 N-Channel 20V Complementary MOSFETs	25
BSL215C/p-ch	Small Signal OPTIMOS™2 P-Channel -20V Complementary MOSFETs	25
BSL215P	Small Signal OptiMOS™2 P-Channel -20V	24
BSL296SN	Small Signal SIPMOS™ N-Channel 100V	23
BSL302SN	Small Signal OptiMOS™2 N-Channel 30V	23
BSL303SPE	Small Signal OptiMOS™ P-Channel -30V + integrated ESD diode	24
BSL305SAE	Small Signal OptiMOS™ P-Channel -30V + integrated ESD diode	24
BSL306N	Small Signal OptiMOS™2 N-Channel 30V	23
BSL307SP	Small Signal OptiMOS™2 P-Channel -30V	24
BSL308C/n-ch	Small Signal OPTIMOS™2 N-Channel 30V Complementary MOSFETs	25
BSL308C/p-ch	Small Signal OPTIMOS™3 P-Channel -30V Complementary MOSFETs	25
BSL308PE	Small Signal OptiMOS™3 P-Channel -30V + integrated ESD diode	24
BSL314PE	Small Signal OptiMOS™3 P-Channel -30V + integrated ESD diode	24
BSL315P	Small Signal OptiMOS™2 P-Channel -30V	24
BSL316C/n-ch	Small Signal OPTIMOS™2 N-Channel 30V Complementary MOSFETs	25
BSL316C/p-ch	Small Signal OPTIMOS™2 P-Channel -30V Complementary MOSFETs	25
BSL372SN	Small Signal SIPMOS™ N-Channel 100V	23
BSL373SN	Small Signal SIPMOS™ N-Channel 100V	23
BSL606SN	Small Signal OptiMOS™3 N-Channel 60V	23
BSL802SN	Small Signal OptiMOS™2 N-Channel 20V	23
BSL806N	Small Signal OptiMOS™2 N-Channel 20V	23
BSP123	Small Signal SIPMOS™ N-Channel 100V	23
BSP125	Small Signal SIPMOS™ N-Channel 600V	24
BSP129	Small Signal SIPMOS™ 240V Depletion MOSFETs	25
BSP135	Small Signal SIPMOS™ 600V Depletion MOSFETs	25
BSP149	Small Signal SIPMOS™ 200V Depletion MOSFETs	25
BSP170P	Small Signal SIPMOS™ P-Channel -60V	24
BSP171P	Small Signal SIPMOS™ P-Channel -60V	25
BSP295	Small Signal SIPMOS™ N-Channel 60V	23
BSP296N	Small Signal SIPMOS™ N-Channel 100V	23
BSP297	Small Signal SIPMOS™ N-Channel 200V	23
BSP298	Small Signal SIPMOS™ N-Channel 400V	24
BSP299	Small Signal SIPMOS™ N-Channel 500V	24
BSP300	Small Signal SIPMOS™ N-Channel 800V	24
BSP315P	Small Signal SIPMOS™ P-Channel -60V	25
BSP316P	Small Signal SIPMOS™ P-Channel -100V	25

Type List	Product Family	Page
BSP317P	Small Signal SIPMOS™ P-Channel -250V	25
BSP318S	Small Signal SIPMOS™ N-Channel 60V	23
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Infineon's Next Level of Zero Defect Program – On the Way to Zero Defect Products and Services

The most valuable aspect of cars is the people they carry. Therefore, safety should never be compromised. This is the most important consideration for everybody involved in making automobiles – from the smallest suppliers to the manufacturers themselves. As car components become more and more complex, and as the number of control units in vehicles increases, the likelihood of a product failure becomes greater. Quality performance is a key differentiator for automotive market success.
Our target of Zero Defect means:

- No quality events
- Defect-free product launches
- Automotive product quality of zero failed parts per million
- Low non-conformance costs
- Highest quality image in the market
- More business due to satisfied customers

No compromise when it comes to quality

Infineon established the most comprehensive quality program called "AUTOMOTIVE EXCELLENCE" in the semiconductor industry in 2003. The continuation of the successful "Automotive Excellence" program is "NEXT LEVEL of ZERO DEFECT". The Program is founded on four pillars: people, products, processes and production. Due to our "no compromise" policy in all four pillars our program really works. Our employees truly live the credos of Zero Defect, considering the highest quality requirements and understanding the importance of prevention. They are trained to deeply understand the tools and methods used to avoid deviations and to solve problems by addressing both technical and systemic root causes.

On the way to zero defect products

On the way to zero defect products, some examples:

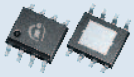
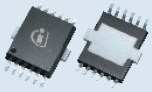
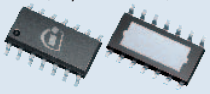
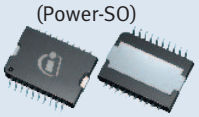
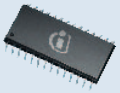
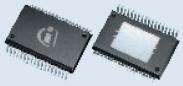
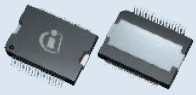
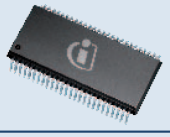
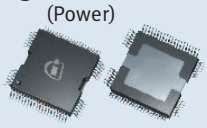
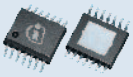
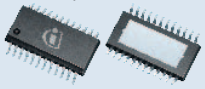
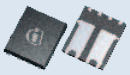
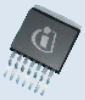
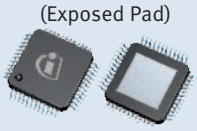
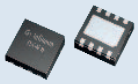
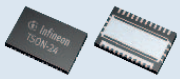
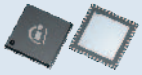
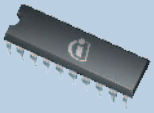
- BEAR (BackEnd Automation Roadmap) project reduces manual handling
- “Top5 Defects Reduction in Backend” deeply addresses technical and systemic root causes
- Quality Firewall: Subproject “Highest outgoing product quality by intelligent outlier screening”
- Extend “Next Level of Zero Defect” into supplier base

“Next Level of Zero Defect” is your competitive advantage

Many of our partners have expressed their satisfaction with the quality of our products and the way we execute “Next Level of Zero Defect”.

- “Honor Quality Award Toyota Hirose” received in 2010 for zero defect quality for last four years. Infineon is the First non- Japanese company that received this honour in this highest level category.
- 7 quality awards in 2004, 2006, 2007, 2008, 2009, 2010 and 2011 from Toyota’s Hirose plant
- “Supplier Performance Award” for the year 2008 and “Automotive Supplier of the Year 2009, 2010 and 2011” from Continental
- “Excellent Supplier Award 2008” from Hitachi Cable Japan

Packages[1)]

① PG-DSO-8	② PG-DSO-8 (Exposed Pad) 	③ PG-DSO-12 	④ PG-DSO-14	⑤ PG-DSO-14 (Exposed Pad) 	⑥ PG-DSO-16
⑦ PG-DSO-20	⑧ PG-DSO-20 (Power-SO) 	⑨ PG-DSO-24	⑩ PG-DSO-28 	⑪ PG-DSO-36	⑫ PG-DSO-36 (Exposed Pad) 
⑬ PG-DSO-36 (Power-SO) 	⑭ PG-DSO-52 	⑮ PG-LQFP-64	⑯ PG-MQFP-64 (Power) 	⑰ SC-59	⑱ SC-74
⑲ SCT-595	⑳ SOT-23	㉑ SOT-89	㉒ SOT-143R	㉓ SOT-223	㉔ SOT-323
㉕ SOT-343	㉖ SOT-363	㉗ PG-SSOP-14EP 	㉘ PG-SSOP-16	㉙ PG-SSOP-24	㉚ PG-SSOP-24 (Exposed Pad) 
㉛ PG-TDSON-8 dual 	㉜ PG-TO252-3 (DPAK)	㉝ PG-TO252-5 (DPAK 5-leg)	㉞ PG-TO263-3 (TO220-3 (SMD))	㉟ PG-TO263-3 (TO220-3 (SMD))	㊱ PG-TO263-5 (TO220-5 (SMD))
㊲ PG-TO263-5 (TO220-5 (SMD))	㊳ PG-TO263-7 (TO220-7 (SMD))	㊴ PG-TO263-7 (TO220-7 (SMD)) 	㊵ PG-TO263-15	㊶ PG-TQFP-48 (Exposed Pad) 	㊷ TSON-8 
㊸ TSON-24 	㊹ TSOP-6/6 dual	㊺ PG-TSSOP-28	㊻ PG-VQFN-48 	㊼ PG-DIP-8	㊽ PG-DIP-20 
㊾ PG-TO218-5	㊿ PG-TO220-3	(51) PG-TO220-5	(52) PG-TO220-5	(53) PG-TO220-5	(54) PG-TO220-7
(55) PG-TO220-7	(56) PG-TO220-7	(57) PG-TO247-3	(58) PG-TO262-3		

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