



Product Brief

BTT6020-1EKA, BTT6030-1EKA, BTT6050-1EKA (Truck devices)

New Smart High-Side Switches for 24V Applications

Infineon's new pin-compatible Single Channel 24V High-Side Switches of the PROFET™+ 24V family in DSO-14 EP package provide embedded diagnostic and protective functions. The power transistor is built by a N-channel vertical power MOSFET with charge pump. The device are especially designed to drive lamps as well as LEDs in the harsh automotive environment.

The high current sense accuracy (k_{ILIS}) is able to diagnose even the smallest loads, such as LEDs. The high short-circuit robustness sets the market benchmark. Infineon is the first company to specify the short-circuit robustness of a device in the datasheet: Min. 100k SC cycles for family members of PROFET™+ 24V.

Applications

- 24V grounded high-side loads,
- μ C compatible with diagnostic feedback
- Suitable for automotive and industrial applications
- All types of resistive, inductive and capacitive loads
- Suitable for loads with high inrush currents, such as lamps
- Suitable for loads with low currents such as LEDs
- Replaces electromechanical relays, fuses and discrete circuits

Diagnostic Functions

- Proportional load current sense
- Open load in ON and OFF
- Short circuit to battery and ground
- Overtemperature sense
- Current sense matching between channels
- Stable diagnostic signal during short circuit
- Enhanced k_{ILIS} accuracy with calibration

Basic Functions

- RoHS compliant & AEC qualified
- Op. Voltage range (5 – 36V)
- Low stand-by current ($< 0.5\mu$ A)
- ESD protection, optimized EMC
- PWM capability up to 500Hz
- Very low leakage current in OFF
- 3.3V and 5V – compatible logic inputs
- Improved heat dissipation of DSO – package

Protection Functions

- Load Dump (Min.): 65V
- Current limitation
- Thermal shutdown: Latch
- Enhanced short circuit operation
- Loss of ground/battery protection
- Stable behavior at under voltage
- Overvoltage protection
- Voltage dependent current limitation

The diagram illustrates the internal architecture of a power MOSFET driver. It features several key functional blocks:

- Internal Power Supply:** Provides power to the driver logic and other components.
- ESD Protection:** Protects the driver from electrostatic discharge.
- Driver Logic:** The central control unit that manages the MOSFET's operation.
- Voltage Sensor:** Monitors the supply voltage (V_S).
- Overtemperature:** Monitors the temperature of the MOSFET (indicated by a 'T' symbol).
- Gate Control & Charge Pump:** Generates the gate drive voltage for the MOSFET.
- Clamp for Inductive Load:** Protects the MOSFET from voltage spikes during inductive load switching.
- Overcurrent Switch Limit:** Monitors the current through the MOSFET to prevent overcurrent.
- Load Current Sense and Open Load Detection:** Detects the load current and identifies open load conditions.
- Forward Voltage Drop Detection:** Monitors the voltage drop across the MOSFET to detect faults.

The system is connected to an input (IN), a driver enable (DEN), and a sense input (IS). The output (OUT) is connected to the MOSFET's drain, which is also connected to the supply voltage (V_S) and ground (GND).

Type	Description	Packsge
BTt6020-1EKA for target load: 4x 21W lighting load	1x 20mΩ	PG-DSO-14-40 EP

Parameter	Symbol	Value
Operating voltage range	$V_{S(OP)}$	5 – 36V
Maximum supply voltage	$V_{S(LD)}$	65V
Maximum ON state resistance at $T_j = 150^{\circ}\text{C}$ per channel	$R_{DS(on)}$	42m Ω
Nominal load current (one channel active)	$I_{L(NOM)}$	7A
Typical current sense ratio	k_{ILIS}	3000
Minimum current limitation	$I_{LS(SC)}$	70A
Maximum standby current with load at $T_j = 25^{\circ}\text{C}$	$I_{S(OFF)}$	500nA
Load 4x 21W (24V) / Load 4x 27W (12V)	12V	BTS5008-1EKB (PROFET™+ 12V)
	24V	BTT6020-1EKA (PROFET™+ 24V)

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