

Product brief

PROFET™ +2 12V Grade 1

High-side switches for energy efficiency and miniaturization

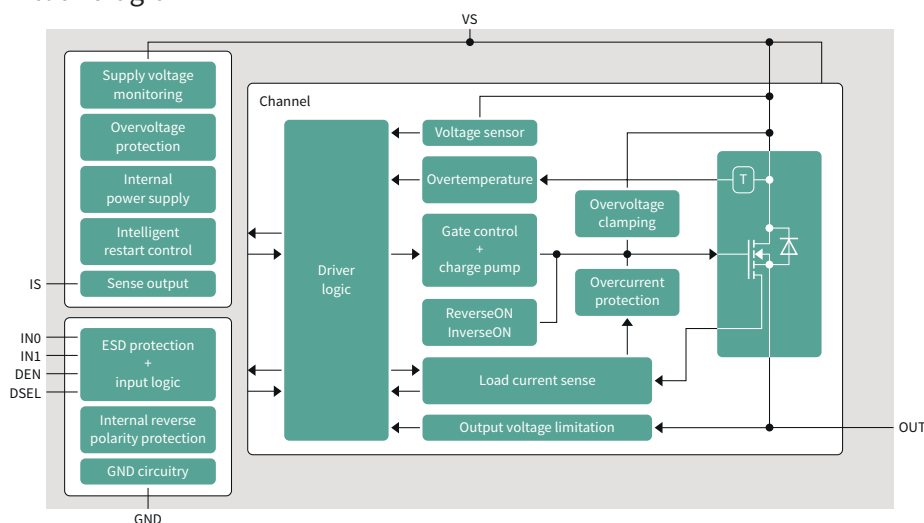
The PROFET™ +2 12V family of protected high-side power switches (1.2 mΩ to 200 mΩ) provides state of the art diagnostics and protection features. The whole family is equipped with ReverseON functionality on a monolithic chip. The family offers outstanding energy efficiency with reduced current consumption, state of the art current sense accuracy (k_{ILIS}), benchmark low cranking voltage capability and faster switching/slew rate with no impact on EMC.

The PROFET™ +2 12V products are offered in TSDSO-14 (2.0 mΩ to 200 mΩ) and TSDSO-24 (1.2 mΩ to 2.0 mΩ) exposed pad package with a pin pitch of 0.65 mm. Thanks to pin to pin compatibility between the packages, high design-in flexibility is granted. Moreover, the TSDSO-24 products have a Capacitive Load Switching mode implemented.

Key applications

- > Automotive 12 V
 - Lighting loads e.g. bulbs, LED
 - Capacitive loads e.g. LED-/BCM -modules, capacitors
 - Resistive loads e.g. seat heater, mirror defroster
 - Inductive loads e.g. motors, solenoids

Block diagram



Key features

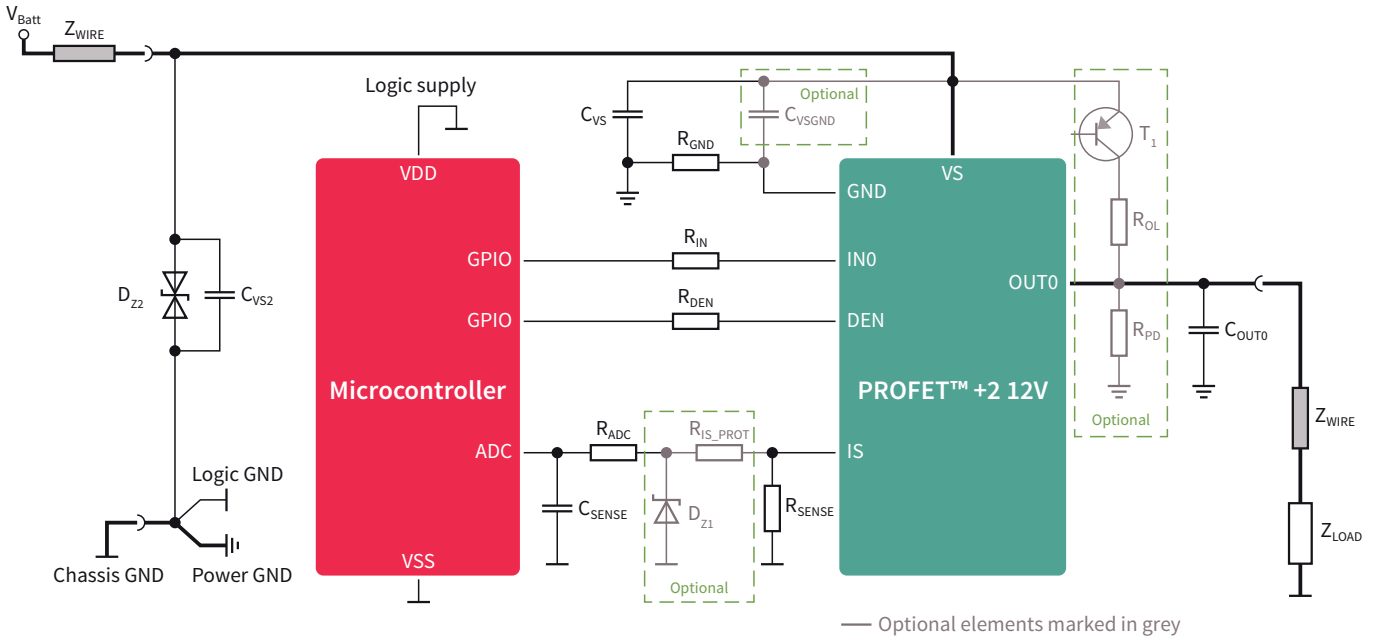
- > Operating voltage range 2.7–28 V with 3.3 V and 5 V compatible logic input
- > **Protection:** current tripping, over-temperature, overvoltage, load dump, reverse polarity, short-circuit
- > **Diagnosis:** load current sense output
- > **Capacitive Load Switching Mode:** charges capacitive loads and reduces current peaks during switch-ON of capacitors

Key benefits

- > 50% reduced internal operating current consumption
- > Simplified & cost-efficient ground network
- > Outstanding current sense accuracy (k_{ILIS}) down to 5% @ nominal load current
- > Benchmark cranking voltage capability able to work down to 2.7 V
- > Small package size for area savings
- > Optimized for design flexibility across the family by pin to pin compatibility
- > Very low output leakage current ($\leq 0.5 \mu\text{A}$ up to 85°C) reduces current peaks during switch-ON of capacitors



Application diagram



Product table

| | Product name | $R_{DS(on)}$ (typ) [mΩ] | $R_{DS(on)}$ (max) @ $T_j = 150^\circ\text{C}$ [mΩ] | Nominal load current [A] | E_{AS} [mJ] | Operating voltage range [V] | $I_{L(SC)}$ [A] | Number of channels | Load current trip | Sense enable | Open-load in OFF | Latch | ReverseON | Package |
|-----|---------------|-------------------------|---|--------------------------|---------------|-----------------------------|--------------------|--------------------|-------------------|--------------|------------------|-------|-----------|----------|
| NEW | BTS70012-1ESP | 1.4 | 2.47 | 31.3 | 525 @ 62.6 A | 3.1 ... 28.0 ¹⁾ | 209 ²⁾ | 1 | ● | ● | ● | ● | ● | TSDSO-24 |
| NEW | BTS70015-1ESP | 1.7 | 3.17 | 27.6 | 420 @ 55.2 A | 3.1 ... 28.0 ¹⁾ | 171 ²⁾ | 1 | ● | ● | ● | ● | ● | TSDSO-24 |
| NEW | BTS70020-1ESP | 2.3 | 4.16 | 23.2 | 325 @ 46.4 A | 3.1 ... 28.0 ¹⁾ | 141 ²⁾ | 1 | ● | ● | ● | ● | ● | TSDSO-24 |
| | BTS7200-4EPA | 66.5 | 120.0 | < 3 | 13.5 @ 2.4 A | 3.1 ... 28.0 | 10 ³⁾ | 4 | ● | ● | ● | | | TSDSO-14 |
| | BTS7200-2EPA | 66.5 | 120.0 | < 3 | 13.5 @ 2.4 A | 3.1 ... 28.0 | 10 ³⁾ | 2 | ● | ● | ● | | | TSDSO-14 |
| | BTS7200-2EPC | 66.5 | 120.0 | < 3 | 13.5 @ 2.4 A | 2.7 ... 28.0 | 10 ³⁾ | 2 | ● | ● | ● | | | TSDSO-14 |
| | BTS7120-2EPA | 61.0 | 110.0 | < 3 | 13.5 @ 4.0 A | 3.1 ... 28.0 | 18.2 ³⁾ | 2 | ● | ● | ● | | | TSDSO-14 |
| | BTS7080-2EPA | 20.9 | 39.6 | 3–5 | 36 @ 6 A | 3.1 ... 28.0 | 36 ³⁾ | 2 | ● | ● | ● | | ● | TSDSO-14 |
| | BTS7040-2EPA | 19.0 | 36.0 | 3–5 | 36 @ 7 A | 3.1 ... 28.0 | 46 ³⁾ | 2 | ● | ● | ● | | ● | TSDSO-14 |
| | BTS7040-1EPA | 19.0 | 36.0 | 3–5 | 30 @ 9 A | 3.1 ... 28.0 | 46 ³⁾ | 1 | ● | ● | ● | | ● | TSDSO-14 |
| | BTS7030-2EPA | 13.5 | 25.0 | 3–5 | 38 @ 9 A | 3.1 ... 28.0 | 60 ³⁾ | 2 | ● | ● | ● | | ● | TSDSO-14 |
| | BTS7020-2EPA | 12.7 | 23.7 | 5–10 | 42 @ 10 A | 3.1 ... 28.0 | 71 ³⁾ | 2 | ● | ● | ● | | ● | TSDSO-14 |
| | BTS7012-2EPA | 11.5 | 21.5 | 5–10 | 42 @ 12 A | 3.1 ... 28.0 | 73 ³⁾ | 2 | ● | ● | ● | | ● | TSDSO-14 |
| | BTS7012-1EPA | 11.5 | 21.5 | 5–10 | 50 @ 17 A | 3.1 ... 28.0 | 73 ³⁾ | 1 | ● | ● | ● | | ● | TSDSO-14 |
| | BTS7010-2EPA | 9.5 | 19.5 | 5–10 | 55 @ 13 A | 3.1 ... 28.0 | 77 ³⁾ | 2 | ● | ● | ● | | ● | TSDSO-14 |
| | BTS7010-1EPA | 9.5 | 19.5 | 5–10 | 55 @ 18 A | 3.1 ... 28.0 | 77 ³⁾ | 1 | ● | ● | ● | | ● | TSDSO-14 |
| | BTS7008-2EPA | 9.0 | 16.0 | 5–10 | 75 @ 15 A | 3.1 ... 28.0 | 88 ³⁾ | 2 | ● | ● | ● | | ● | TSDSO-14 |
| | BTS7008-1EPA | 9.0 | 16.4 | 10–15 | 65 @ 20 A | 3.1 ... 28.0 | 88 ³⁾ | 1 | ● | ● | ● | | ● | TSDSO-14 |
| | BTS7008-1EPP | 8.8 | 16.0 | 10–15 | 70 @ 22 A | 3.1 ... 28.0 | 77.5 ³⁾ | 1 | ● | ● | ● | ● | ● | TSDSO-14 |
| | BTS7006-1EPP | 6.6 | 12.0 | 10–15 | 95 @ 25 A | 3.1 ... 28.0 | 89.5 ³⁾ | 1 | ● | ● | ● | ● | ● | TSDSO-14 |
| | BTS7004-1EPP | 4.4 | 8.0 | 10–15 | 150 @ 30 A | 3.1 ... 28.0 | 113 ³⁾ | 1 | ● | ● | ● | ● | ● | TSDSO-14 |
| | BTS7002-1EPP | 2.6 | 4.8 | > 15 | 315 @ 42 A | 3.1 ... 28.0 | 133 ³⁾ | 1 | ● | ● | ● | ● | ● | TSDSO-14 |

1) Recommended operating voltage

2) I_L Short Circuit current

3) I_L Short Circuit typical

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