



## Classic PROFET™ and Mini PROFET™

Leading the Way in Energy Robustness

[ [www.infineon.com/profet](http://www.infineon.com/profet) ]



## Introduction

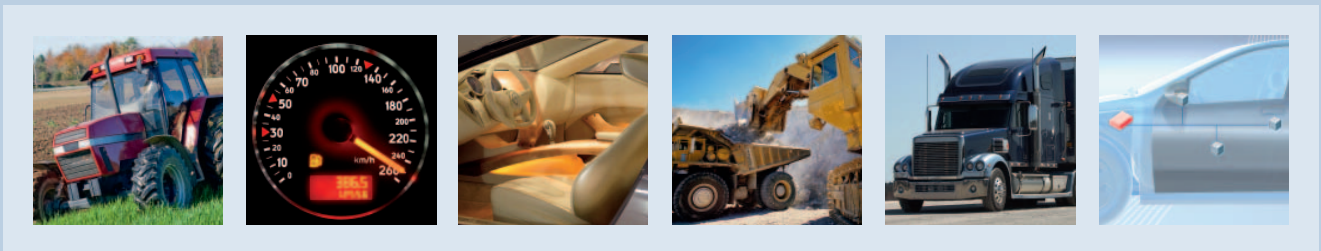
The well-established high-side switch families Classic PROFET™ and Mini PROFET™ were designed for targeting a variety of automotive & industrial applications which include all types of resistive, inductive and capacitive loads. Due to their outstanding energy robustness, they are perfectly suitable for switching even higher inductive loads. Their main application areas include high-voltage applications ( $V_{BAT}$  up to 58V), high-speed PWM applications (up to 1kHz) and they are most notably capable of switching higher inductances smoothly.

The Classic PROFET™ and Mini PROFET™ device concept includes protection against short circuit, overvoltage and overload. The implemented diagnostic features offer the choice of either status or current sense features for screening the load status and detecting a potential failure mode.



## Applications Overview

- Qualified for automotive applications, such as body control modules (Truck BCM), heating, energy/power distribution, door module applications
- Microcontroller-compatible power switch for 12V/24V and 42V DC applications
- High-speed PWM applications
- Qualified for 12V and 24V applications
- Resistive loads, such as heating systems
- Inductive loads, such as electromagnetic valves, relays
- Replacement of electromechanical relays, fuses and discrete circuits
- Especially suitable for 28V-Powernet, such as within heavy truck applications





# Benefits and Key Features

## Benefits

- Benchmark energy robustness
- Especially suitable for switching inductive loads
- High voltage capability (up to 58V)
- Fast switching capability (up to 1kHz)
- Low current consumption

## Basic Features

- CMOS-compatible input
- Improved electromagnetic compatibility (EMC)
- Fast demagnetization of inductive loads
- Stable behavior at undervoltage
- Wider operating voltage range
- Logic ground independent from load ground
- Optimized inverse current capability
- Green products (RoHS compliant)
- Qualified acc. to AEC Q100

## Protection Features


- Load dump: 42V/60V
- Short-circuit protection
- Overload protection
- Over-temperature protection
- Current limitation
- Thermal shutdown
- Reverse battery protection with external resistor
- Loss of ground and loss of  $V_{BAT}$  protection
- Electrostatic discharge protection (ESD)
- Very low stand-by current


## Diagnostic Features


- Diagnostic feedback with open drain output and integrated pull-up resistor
- Open load detection in ON/OFF state
- Short-circuit detection
- Feedback of thermal shutdown in ON/OFF state
- Proportional load current sense


# Product Portfolio Overview

$R_{DS(on)}$ /Packages	SOT-223	DSO	DPAK	TO220	Channels
1 × 1000mΩ	BTS4140N				1 Channel
1 × 350mΩ		BSP742R/T <sup>1)</sup>			
1 × 300mΩ		BTS4300SGA			
1 × 200–250mΩ	BSP452 BTS4141N BTS4142N	BSP752R/T <sup>1)</sup>	BTS452R/T <sup>1)</sup>	BTS307	
1 × 175mΩ		BTS4175SGA			
1 × 100mΩ		BSP762T	BTS462T		
1 × 70mΩ		BTS730			
1 × 60mΩ		BSP772T			
1 × 20mΩ				BTS441R/T <sup>1)</sup>	
2 × 100mΩ		BTS723GW			
2 × 30mΩ		BTS740S2 BTS840S2			
4 × 130–140mΩ		BTS716GB BTS4130QGA			4 Channels
4 × 90mΩ		BTS724G			
8 × 200mΩ		BTS4880R			8 Channels

 Suitable for Truck and 24V Applications

 Long Light Chain Applications (e.g. 3 × 21W + 2 × 5W)

 Cranking Capability

 Only Designed for Dimmer and Dome Lighting

All named products are suitable for driving resistive, inductive and capacitive loads for any kind of applications

In addition to the high-energy robust Classic PROFET™ and Mini PROFET™, Infineon also offers: Door module switches, such as BTS5242-2L and BTS5246-2L with adjustable current limitation.

Diagnostic feedback

1) R = Included, T = Without

# Product Table

## No Diagnosis (1 Channel)

Device	$R_{DS(on)}$ (typ.) [mΩ]	$R_{DS(on)}$ (max.) @ $T_j = 150^\circ\text{C}$ [mΩ]	Typical Load Current [A]	EAS [m]
<b>Automotive Grade</b>				
BTS4140N <sup>1)</sup>	1000	3000	0.2	1000 @ 0.15A
BSP742T	350	700	0.8	100 @ 0.5A
BSP452	200	400	0.7	500 @ 0.5A
BTS452T	200	380	1.3	150 @ 1.0A
BSP752T	200	380	1.3	125 @ 1.0A
BTS4141N	200	320	0.7	700 @ 0.5A
BTS4142N	200	320	1.4	160 @ 1.0A
BSP762T	100	200	2.4	870 @ 1.0A
BTS462T	100	200	4.4	4400 @ 1.0A
BTS730	70	140	3.0	N/A
BSP772T	60	120	3.1	900 @ 1.5A
BTS441TG	20	37	21.0	700 @ 21.0A
<b>Industrial</b>				
ITS4140N	1000	3000	0.2	1000 @ 0.15A
ISP452	200	400	0.7	500 @ 0.5A
ISP752T	200	380	1.3	125 @ 1.0A
ITS4141D	200	320	0.7	12000 @ 0.5A
ITS4141N	200	320	0.7	700 @ 0.5A
ITS4142N	200	320	1.4	160 @ 1.0A
ISP762T	100	200	2.4	870 @ 1.0A
ISP772T	60	120	3.1	900 @ 1.5A

### Basic Features

- Single channel

### Protection Features

- Restart
- Loss of inductive load

## Current Sense, Voltage Input

Product Type	$R_{DS(on)}$ (typ.) [mΩ]	$R_{DS(on)}$ (max.) @ $T_j = 25^\circ\text{C}$ [mΩ]	Typical Load Current [A]	EAS [m]
<b>Automotive Grade</b>				
BTS740S2	30	30	4.0	370 @ 5.5A
BTS840S2	30	30	4.0	1130 @ 4.0A
<b>Industrial</b>				
ITS640S2	30	60	4.5	410 @ 12.6A

### Basic Features

- 12V capable

### Protection Features

- Restart
- Loss of inductive load

### Diagnostic Features

- Analog signal proportional to load current
- Over-temperature
- Short circuit to GND
- Short circuit to battery
- Open load in OFF

1) Current Input

Recommended Operating Voltage Range [V]	$I_{L(SC)}$ (typ.) [A]	Number of Channels	12V Capable	24V Capable	High Current Limit	Low Current Limit	Package
4.9 ... 60.0	0.9	1	•	•		•	SOT-223
5.0 ... 34.0	4.0	1	•		•		DSO-8
5.0 ... 34.0	1.5	1	•			•	SOT-223
6.0 ... 52.0	6.5	1	•	•	•		TO252-5 (DPAK)
6.0 ... 52.0	6.5	1	•	•	•		DSO-8
12.0 ... 45.0	2.1	1		•	•		SOT-223
12.0 ... 45.0	3.0	1		•		•	SOT-223
5.0 ... 34.0	10.0	1	•			•	DSO-8
5.0 ... 34.0	14.0	1	•		•		TO252-5 (DPAK)
5.9 ... 16.9	20.0	1	•		•		DSO-20
5.0 ... 34.0	17.0	1	•		•		DSO-8
4.75 ... 41.0	65.0	1	•	•	•		TO263-5
4.9 ... 60.0	0.9	1	•	•		•	SOT-223
5.0 ... 34.0	1.5	1	•			•	SOT-223
6.0 ... 52.0	6.5	1	•	•	•		DSO-8
12.0 ... 45.0	2.1	1		•	•		TO252-5 (DPAK)
12.0 ... 45.0	3.0	1		•		•	SOT-223
12.0 ... 45.0	3.0	1		•		•	SOT-223
5.0 ... 34.0	10.0	1	•			•	DSO-8
5.0 ... 34.0	17.0	1	•		•		DSO-8

Recommended Operating Voltage Range [V]	$I_{L(SC)}$ (typ.) [A]	Number of Channels	Load current		Overvoltage Shutdown	Sense Enable	Latch	Reversave®	Packages
			Limit	Trip					
5 ... 34	50	2	•		•				DSO-20
5 ... 34	50	2	•		•				DSO-8
5 ... 34	50	1	•		•				TO220-7

# Product Table

## Digital Diagnosis

Device	$R_{DS(on)}$ (typ.) [mΩ]	$R_{DS(on)}$ (max.) @ $T_j = 150^\circ\text{C}$ [mΩ]	Typical Load Current [A]	EAS [m]	Recommended Operating Voltage Range [V]
<b>Automotive Grade</b>					
BSP742R	350	700	0.4	800 @ 300.0mA	5.0 ... 34.0
BSP742RI <sup>1)</sup>	350	700	0.4	800 @ 300.0mA	5.0 ... 34.0
BTS4300SGA	300	600	0.4	800 @ 300.0mA	5.0 ... 34.0
BTS452R	200	380	1.3	150 @ 1.0A	6.0 ... 52.0
BSP752R	200	380	1.3	125 @ 1.0A	6.0 ... 52.0
BTS4880-R	200	400	0.6	10000 @ 0.625mA	11.0 ... 45.0
BTS4175SGA	175	350	1.3	125 @ 1.0A	6.0 ... 52.0
BTS716GB	140	280	1.3	76 @ 2.3A	5.5 ... 40.0
BTS4130QGA	130	260	1.7	76 @ 2.3A	5.5 ... 20.0
BTS723GW	105	210	2.0	123 @ 2.5A	7.0 ... 58.0
BTS724G	90	180	1.6	120 @ 3.3A	5.5 ... 40.0
BTS428L2	60	120	5.8	190 @ 7.0A	4.75 ... 41.0
BTS441RG	20	37	21.0	700 @ 21.0A	4.75 ... 41.0
BTS307	250	500	1.7	N/A	5.8 ... 58.0
<b>Industrial</b>					
ISP742RI <sup>1)</sup>	350	700	0.4	800 @ 300.0mA	5.0 ... 34.0
ITS410E2	220	440	1.8	4500	4.7 ... 42.0
ISP752R	200	380	1.3	125 @ 1.0A	6.0 ... 52.0
ITS724G	90	180	2.0	120 @ 3.3A	5.5 ... 40.0
ITS428L2	60	120	7.0	190 @ 7.0A	4.75 ... 41.0
ITS436L2S	35	72	8.0	330 @ 9.8A	4.75 ... 41.0
ITS612N1	160	400	2.0	290 @ 2.3A	5.0 ... 34.0
ITS621L1	80	200	4.0	395 @ 4.4A	5.0 ... 34.0
ITS5215L	90	180	2.0	178 @ 3.5A	5.5 ... 40.0
ITS711L1	200	400	1.0	150 @ 1.9A	5.0 ... 35.0
ITS716G	140	280	1.0	76 @ 2.3A	5.5 ... 40.0
ITS4880R	200	400	0.4	10000 @ 0.625mA	11.0 ... 45.0

### Basic Features

- 12V capable

### Protection Features

- Restart
- Loss of inductive load

### Diagnostic Features

- Open drain status feedback
- Over-temperature
- Open load

1) Inversed logic for diagnosis



I <sub>L(SO)</sub> (typ.) [A]	Number of Channels	24V Capable	High Current Limit	Low Current Limit	Overvoltage Shutdown	Short-Circuit Diagnosis				Packages
						To GND	To Battery	Open Load in OFF State	Open Load in ON State	
1.2	1			•		•	•	•		DSO-8
1.2	1			•		•	•	•		DSO-8
1.2	1			•		•	•	•		DSO-8
6.5	1	•		•		•	•	•		TO252-5 (DPAK)
6.5	1	•	•			•	•	•		DSO-8
1.4	8	•				•				DSO-36
6.5	1	•	•			•	•	•		DSO-8
9.0	4		•				•	•		DSO-20
9.0	4		•				•	•		DSO-20
9.0	2	•		•		•	•	•		DSO-14
15.0	4		•				•	•		DSO-20
22.0	1		•			•			•	TO252-5 (DPAK)
65.0	1	•	•				•	•		TO263-5
19.0	1	•		•		•				DSO-8
1.2	1			•		•	•	•		DSO-8
12.0	1	•	•		•	•			•	TO220-5
6.5	1	•	•			•	•	•		DSO-8
15.0	4		•				•	•		DSO-20
22.0	1		•			•			•	TO252-5 (DPAK)
51.0	1		•			•			•	TO220-5
7.5	2		•		•	•		•		TO220-7
14.0	1			•	•	•			•	TO220-7
15.0	2		•				•	•		DSO-12
7.5	4		•		•	•			•	DSO-20
9.0	4		•				•	•		DSO-20
1.4	8	•				•		•		DSO-36

## Ask Infineon. Get connected with the answers.

Where you need it. When you need it.

Infineon offers its toll-free 0800/4001 service hotline as one central number, available 24/7 in English, Mandarin and German.

Our global connection service goes way beyond standard switchboard services by offering qualified support on the phone. Call us!

- Germany ..... 0800 951 951 951 (German/English)
- China, mainland ..... 4001 200 951 (Mandarin/English)
- USA ..... 1-866 951 9519 (English/German)
- Other countries ..... 00\* 800 951 951 951 (English/German)
- Direct access ..... +49 89 234-0 (interconnection fee, German/English)

\* Please note: Some countries may require you to dial a code other than "00" to access this international number, please visit [www.infineon.com/service](http://www.infineon.com/service) for your country!

## Where to Buy

### Infineon Distribution Partners and Sales Offices

Please use our location finder to get in contact with your nearest Infineon distributor or sales office.

[www.infineon.com/WhereToBuy](http://www.infineon.com/WhereToBuy)

Infineon Technologies – innovative semiconductor solutions for energy efficiency, mobility and security.



Published by  
Infineon Technologies AG  
85579 Neubiberg, Germany

© 2011 Infineon Technologies AG.  
All Rights Reserved.

Visit us:  
[www.infineon.com](http://www.infineon.com)

Order Number: B124-H9639-X-X-7600  
Date: 10 / 2011

#### ATTENTION PLEASE!

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffungsgarantie"). With respect to any examples or hints given herein, any typical values stated herein and/or any information regarding the application of the device, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

#### INFORMATION

For further information on technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies Office ([www.infineon.com](http://www.infineon.com)).

#### WARNINGS

Due to technical requirements components may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies Office. Infineon Technologies Components may only be used in life-support devices or systems with the express written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support device or system, or to affect the safety or effectiveness of that device or system. Life support devices or systems are intended to be implanted in the human body, or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.