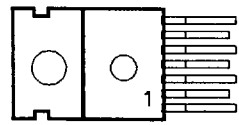
TWO CHANNEL PROFET®

- Two independent high-side switches
- Overtemperature protection for each channel
- Overload protection for each channel
- Short circuit protection by overtemperature protection [2]
- Overvoltage protection
- Input protection
- Clamp of negative output voltage with inductive loads
- Open load detection in OFF-state
- Maximum current internally limited
- Protection against loss of ground
- Undervoltage shutdown with reset and hysteresis
- Overvoltage shutdown with reset and hysteresis
- Open drain status feedback
- Electrostatic discharge (ESD) protection

Description PROFET® an intelligent power switch with integrated protection against self-destruction

Application Power switch for all kinds of loads.

Case Plastic package, similar to TO 220 Pin 4 is shorted to the mounting flange



(OUT2)	Output 2	(7)
(IN2)	Input 2	(6)
(ST)	Status	(5)
(V_{bb})	Operating voltage	(4)
(IN1)	Input1	(3)
(GND)	Ground	(2)
(OUT1)	Output1	(1)

pin configuration

TO220 / 7

Type	Ordering code
BTS 612	C67078-S5505-A2

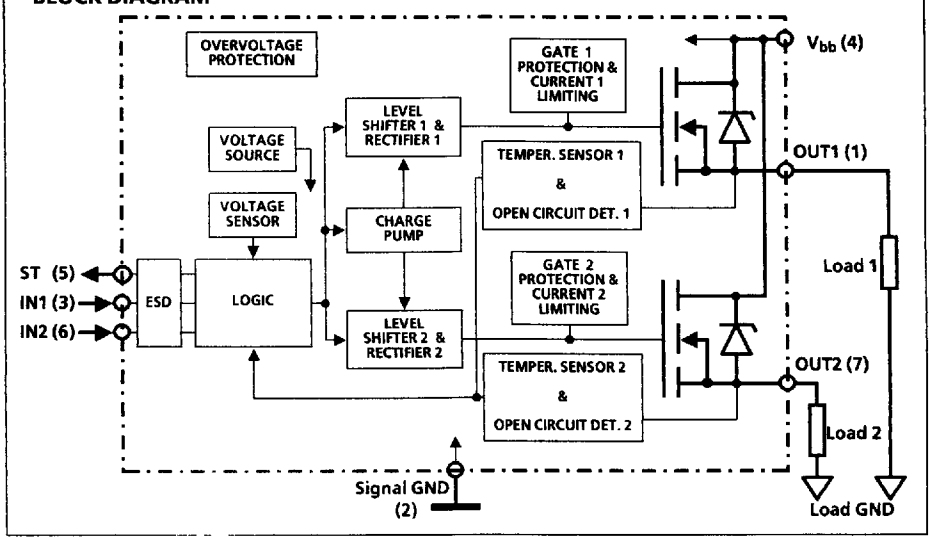
MAXIMUM RATINGS

DESCRIPTION	SYMBOL	RATINGS	UNIT	CONDITIONS
Breakdown voltage	$V_{bb(AZ)}$ [1]	>40	V	T_j =-40. +150 °C , I_{bb} = 1mA
Short circuit current	I_{SC}	self-limited		
Max. power dissipation	P_D	50	W	T_C = 25 °C
Operating temperature range	T_j	-40 +150	°C	
Storage temperature range	T_{stg}	-55 +150	°C	
Status-pin current	I_{ST}	5	mA	
Thermal resistance				
Chip - case	$R_{th\,JC}$	2 5	K / W	for both channels
Chip - case	$R_{th\,JC}$	ca 5	K / W	for each channel
Chip - ambient	$R_{th\,JA}$	75	K / W	

[1] Internal active clamp

[2] Valid for 12 V applications only. For 24 V application available from middle of 1994 onwards

BLOCK DIAGRAM



Description	Symbol	Characteristics			Unit	Conditions
		min.	typ.	max.		
Drain-source on-state resistance (Pin 4 to 7/1)	$R_{DS(on)}$	-	-	200	mΩ	V_{bb} = 12 V, I_L = 2 A
Operating voltage (Pin 4 to 2)	V_{bb}	5.8	-	34	V	T_j = -40...+150 °C
Nominal current, calculated value (Pin 7/1 to GND)	I_L-ISO	1.8	-	-	A	ISO-proposal: V_{bb} - V_{out} ≤ 0.5V, T_C = 85 °C
Load current, theoretical value (Pin 7/1 to GND)	I_L-MOS	-	-	14	A	MOS-standard: T_C = 25 °C, T_j = 150 °C
Load current limit (Pin 7/1 to GND)	I_{LLim}	-	11	-	A	onset of active regulation when: V_{bb} - V_{out} > 1 V
Standby current (Pin 4)	I_R	-	80	120	µA	V_{bb} = 12 V
Voltage threshold for open load detection in OFF - state	V_{OC}	2	3	4	V	
Input voltage (Pin 6/3 to 2)	$V_{in(off)}$ $V_{in(on)}$	-0.5 3.5	- -	1.5 20	V	V_{bb} = 12 V
Input current (Pin 6/3)	$I_{in(off)}$ $I_{in(on)}$	1 20	- 50	50 80	µA	$V_{in(off)}$ = 0.4 V $V_{in(on)}$ = 2.5 V
Trip temperature	T_t	150	-	-	°C	automatic shutdown
Slew rate	di/dt_{on} di/dt_{off}	0.01 0.01	- -	0.1 0.1	A/µs	V_{bb} = 12 V Resistive Load I_L = 2 A
Status (Open drain)	$V_{St(high)}$ $V_{St(low)}$	5 -	- -	7 0.8	V	I_{St} = 50 µA I_{St} = 1,6mA, T_j = -40 ...+150° C
negative inductive clamp voltage	V_{ind}	-	33	-	V	V_{bb} = 12 V V_{ind} = $V_{bb(AZ)}$ - V_{bb} $V_{bb(AZ)}$ = 45 V_{typ}
Reverse polarity (Pin 2 to 4) *	-V_{bb}	-	-	32	V	

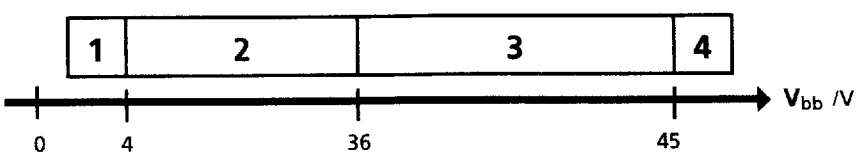
*) Requires 150Ω resistor in GND connection. Reverse load current (through intrinsic drain-source diode) is normally limited by the connected load. Input and Status currents have to to be limited. It is recommend that 15kΩ resistors be inserted in series with IN and ST.

Truth table (priority given to activated (V_{in} = high) channel in the event of status conflict)

		IN1	IN2	OUT1	OUT2	ST
Normal operation		L	L	L	L	H
		H	H	H	H	H
		L	H	L	H	H
		H	L	H	L	H
Undervoltage / Overvoltage		X	X	L	L	H
Overtemperature	Channel 1	H	X	L	X	L
	Channel 2	X	H	X	L	L
	Ch.1 / Ch.2	L	L	L	L	H
Open Load	Channel 1	H	X	H	X	H
		L	L	H	L	L
		L	H	H	H	H
	Channel 2	X	H	X	H	H
		L	L	L	H	L
		H	L	H	H	H

L = "Low" level X = "Don't care"
H = "High" level Z = Potential defined by external impedance
Status timing : see applications

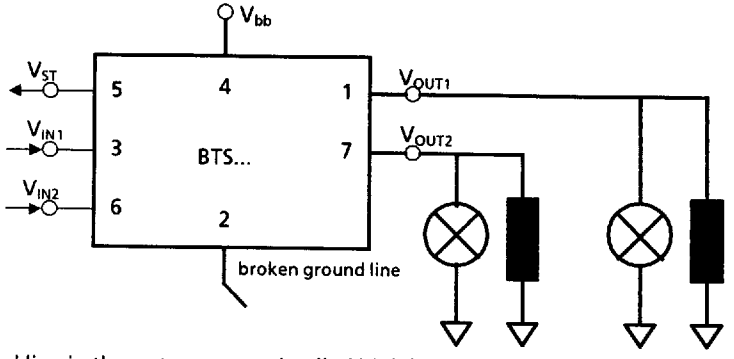
Operating range (typ. at T_j = 25 °C)



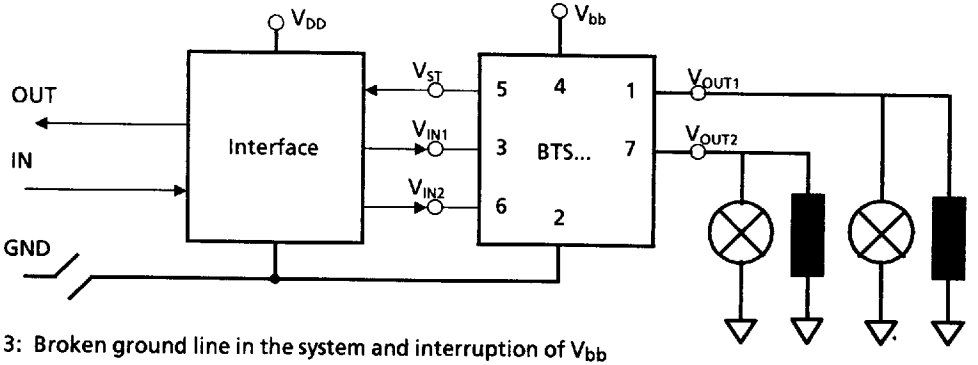
1: Undervoltage sensor causes the device to switch off
2: Normal operation
3: Overvoltage sensor causes the device to switch off
4: Increase of current between pin 4 and 2 from Zener diode to protect the circuit against overvoltage spikes

This power switch is fully protected against loss of ground (see below).
By definition: no load current flows in the load despite loss of ground

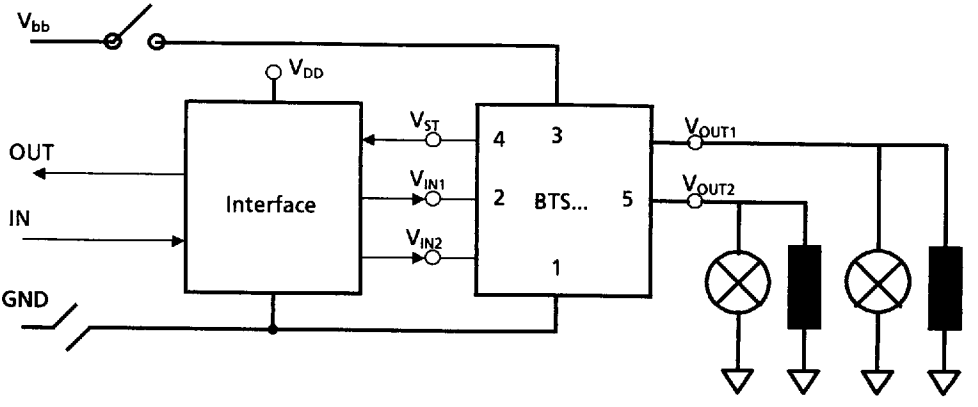
1: Broken ground line at the BTS...



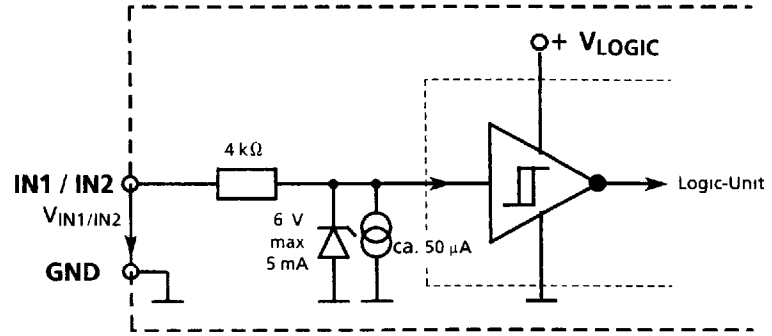
2: Broken ground line in the system, ground pulled high by Interface



3: Broken ground line in the system and interruption of V_{bb}

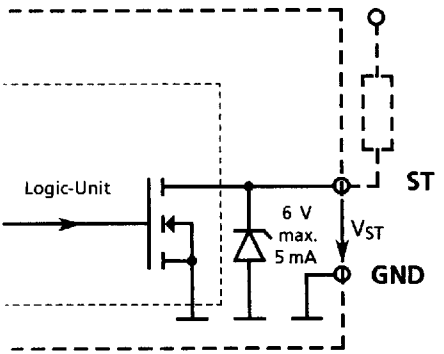


ESD Protected Logic-Inputs: IN1 / IN2 (3/6)



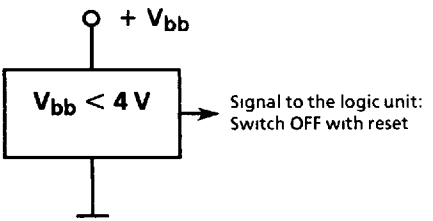
ESD Protected Status-Output: ST (5)

Open drain output with a typical output voltage of 6.0 V

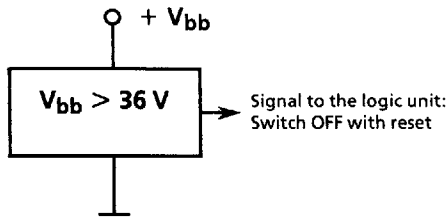


Voltage Sensor (typ. at $T_j = 25$ °C) :

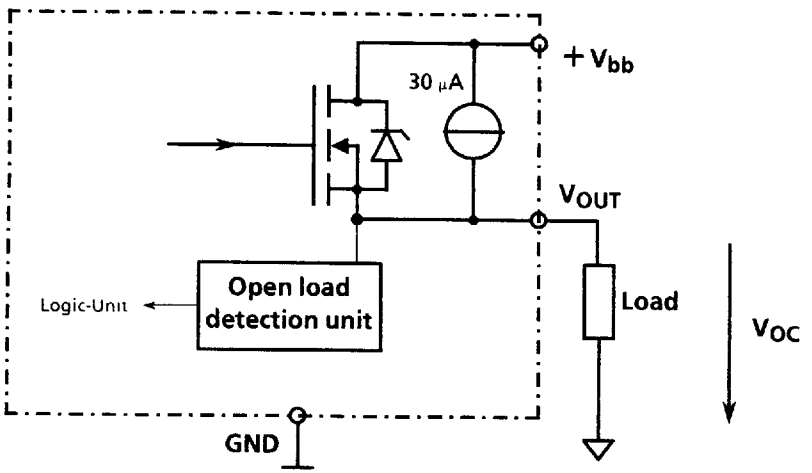
Undervoltage sensor



Overvoltage sensor



Open load detection in OFF-state



The "Open load detection" unit monitors the voltage between OUT and GND

1: Switching lamp loads or inductive loads

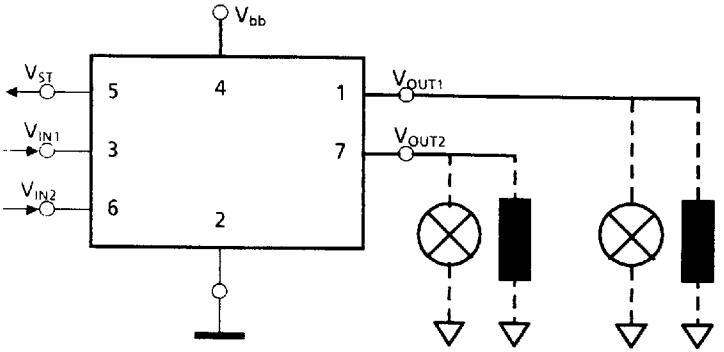
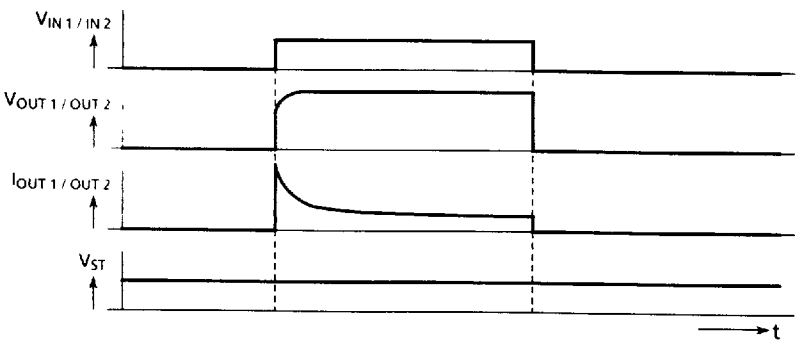
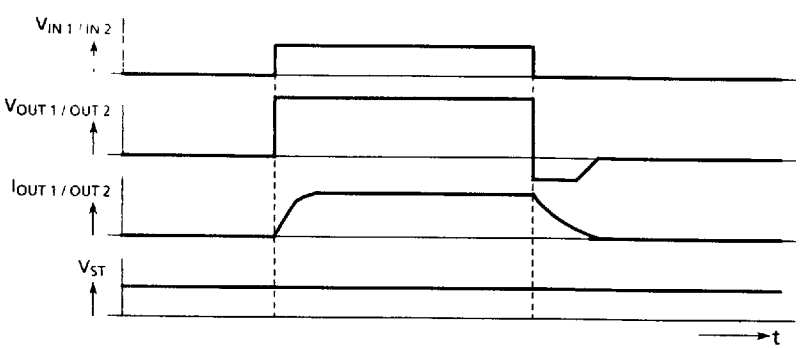


Diagram for each channel

lamp loads



inductive loads



2: Operation with overload / overtemperature

Diagram is representative of each channel.
The channel not shown is in the OFF - state (normal operation)

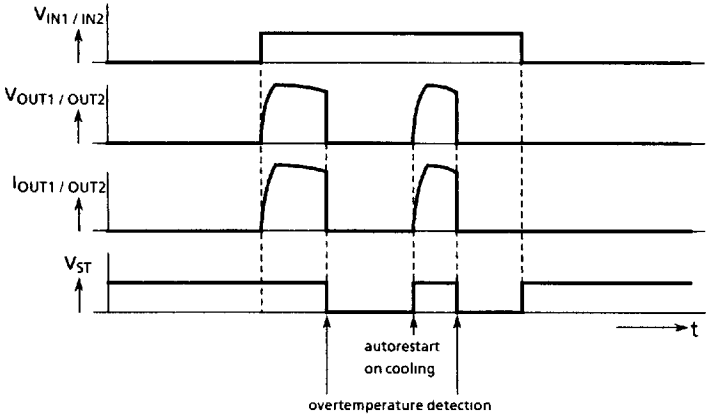
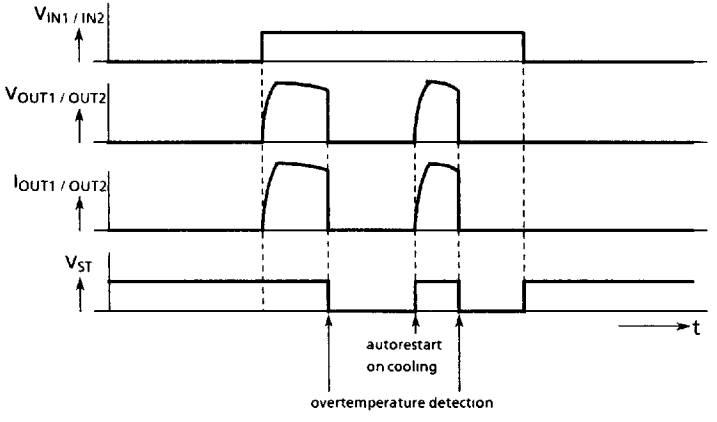


Diagram is representative of each channel.
The channel not shown is in the ON - state (normal operation)



3: Operation with open load

Diagram is representative of each channel.
The channel not shown is in the OFF - state (normal operation)

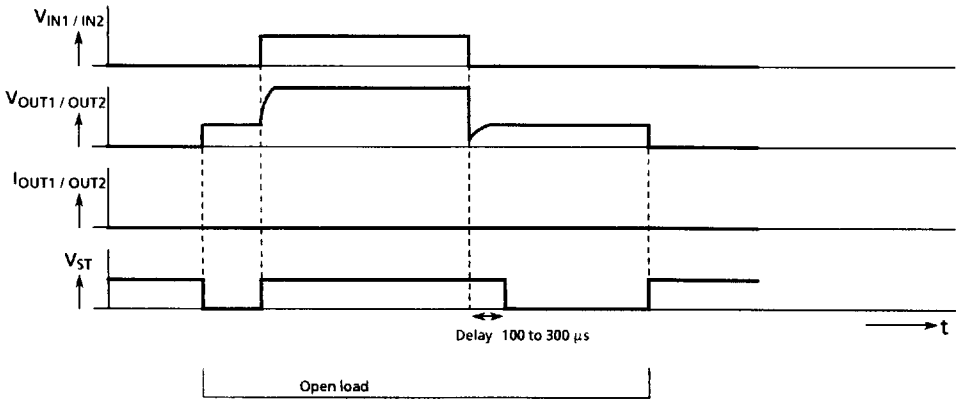
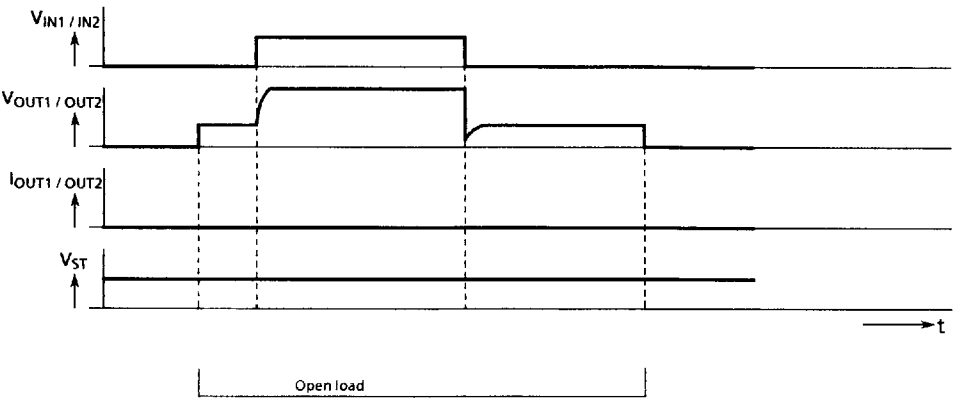


Diagram is representative of each channel.
The channel not shown is in the ON - state (normal operation)



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