

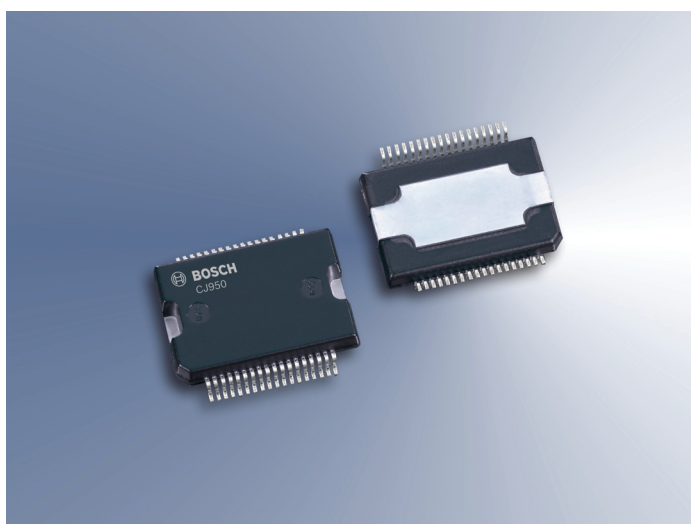
Automotive Electronics

Product Information

CJ950 – 18fold Low Side Power Switch



BOSCH
Invented for life



Customer benefits:

- ▶ Cost and space saving design
- ▶ Enhanced thermal management allows small SO36 package
- ▶ Multi bus capability including parallel port feature
- ▶ Enhanced diagnosis concept
- ▶ Long-term availability of manufacturing processes and products

Features

- ▶ Micro Second Channel
- ▶ SPI interface
- ▶ Fault diagnostic functions of all power stages
- ▶ Parallel input ports
- ▶ Withstand voltage of 36V
- ▶ Enhanced self protection
- ▶ Parallel connection of power stages
- ▶ Two power stages with extended current capability and digital load current monitoring
- ▶ VDD Monitoring
- ▶ Power SO36 package

Diagnostic Features

All PS have fault diagnostic functions:

- ▶ Short circuit to battery (SCB) can be detected if stages are turned on.
- ▶ Short circuit to ground (SCG) can be detected if stages are turned off.
- ▶ Open load (OL) can be detected if stages are turned off.
- ▶ Overtemperature warning (OTW) can be detected if stages are on or forced off by OTSD.

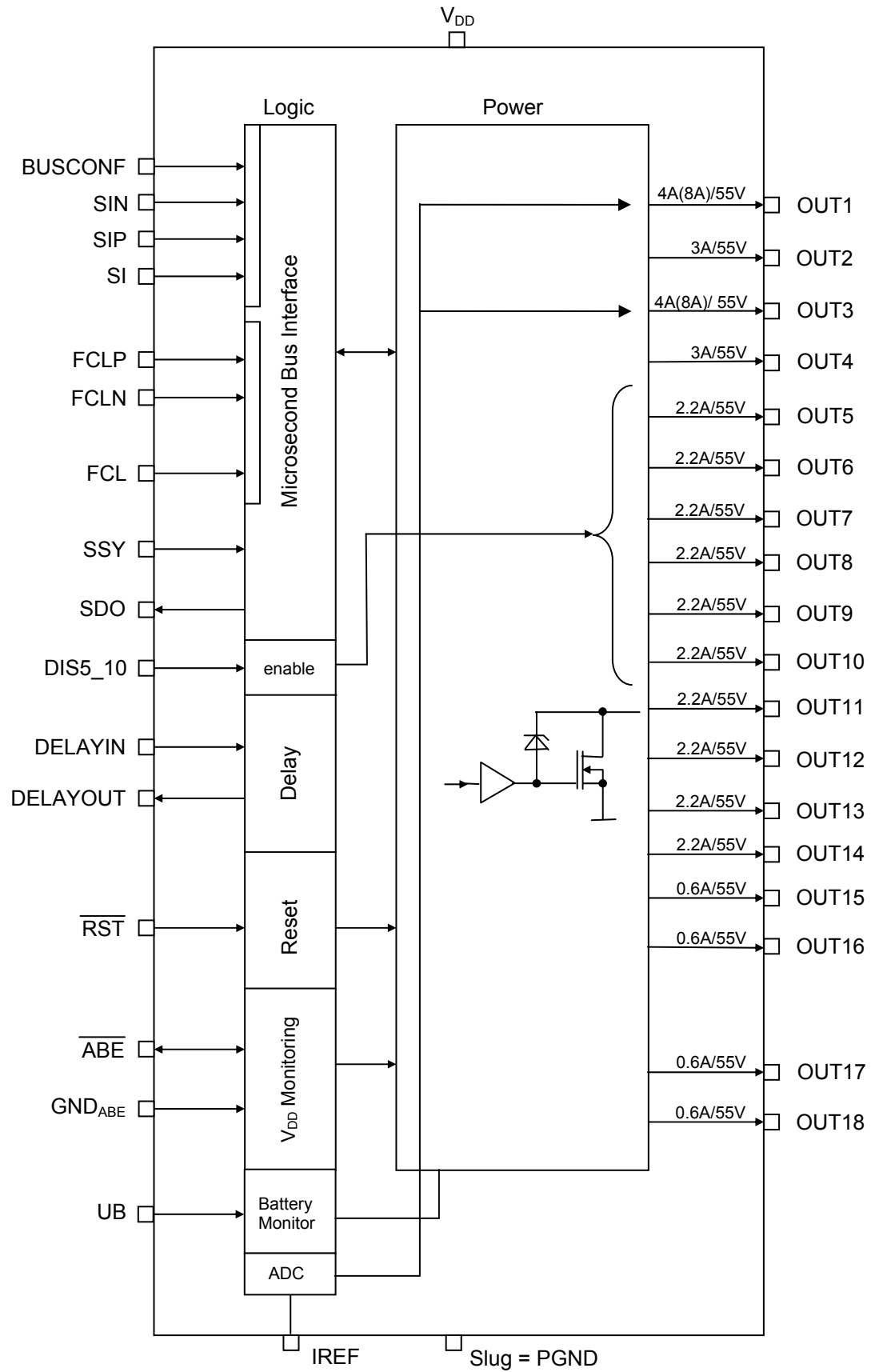
Functional Description

Output	Stage Type	Nominal Load current	R _{ON_typ} (T _J = 25°C)
OUT1, OUT3	PS	4.0A / 8.0A	150mΩ
OUT2, OUT4	PS	3.0A	260mΩ
OUT5...OUT10	PS	2.2A	500mΩ
OUT11...OUT14	PS	2.2A	500mΩ
OUT15, OUT16	PS	0.6A	1800mΩ
OUT17, OUT18	PS	0.6A	1800mΩ

Electrical Maximum Ratings

Parameter Condition/Comment	Symbol	Values		
		min	max	unit
Supply Voltage Range pin VDD, static	V _{DD_MR}	-0.3	36	V
Battery Voltage stages output pins via load	V _{BAT_MR}	-1.0	40	V
Total Ground Current total current over heat slug	I _{GND_MR}	-38		A
Output Stages static voltage OUTn (n=1...18)	V _{OUTn_MR}		50	V

Block Diagram



Name	Number	Description
OUT01	2	Power stages.
OUT03	17	Short circuit proof, individually protected against overtemperature, diagnostic functions, control via MSC. Limitation of the output voltage by clamping diodes. Current monitoring up to 4A.
OUT02	36	Power stages.
OUT04	19	Short circuit proof, individually protected against overtemperature, diagnostic functions, control via MSC. Limitation of the output voltage by clamping diodes.
OUT05	3	
OUT06	35	
OUT07	16	
OUT08	20	
OUT09	4	
OUT10	34	
OUT11	15	
OUT12	21	
OUT13	5	
OUT14	33	
OUT15	14	
OUT16	22	
OUT17	6	
OUT18	32	
DIS5_10	9	Disable pin for OUT5...OUT10 (low level on this pin disables OUT5...OUT10 after filtering time (t_{DIS5_10}) has expired).
DELAYIN	7	Switch on and off pin DELAYOUT with programmable delay time.
DELAYOUT	8	Open drain output generating active low level if disabling input DELAYIN is low level, input ABE disables stages or V_{DD} monitoring has detected a supply voltage failure.
ABE	11	Bidirectional reset pin (active low) output. Shut down all stages.
GND _{ABE}	12	Reference ground for V_{DD} monitoring only.
V_{DD}	13	Supply voltage 5V.
SDO	24	MSC or SPI interface. Upstream data, open drain output.
SSY	25	MSC or SPI interface. Chip select and synchronisation strobe.

Name	Number	Description
SIP	26	MSC interface. Downstream data positive for differential interface.
SIN	27	MSC interface. Downstream data negative for differential interface.
SI	28	MSC or SPI interface. Optional downstream data input for single ended interface.
FCLP	29	MSC interface. Clock positive for differential interface.
FCLN	30	MSC interface. Clock negative for differential interface.
FCL	31	MSC or SPI interface. Optional clock input for single ended interface.
RST	23	Reset input (active low). Shuts down all stages regardless of their input signals.
BUSCONF	1	Bus configuration pin. GND=>us-Bus; 3.3V=>3.3V SPI; 5V=>5V SPI.
IREF	18	Output reference current for current monitor ADC.
UB	10	Battery voltage.

Micro Second Channel

The MSC is a high speed serial interface that is especially optimized to connect peripheral devices via serial link to the microcontroller.

SPI-Interface

The SPI is a serial interface that is especially optimized to connect peripheral devices via serial link to the microcontroller.

Parallel input ports

In case SPI protocol was chosen, the MSC input pins FLPP, FCLN, SI and SIP serve as parallel input ports for switching the outputs OUT5 to OUT8. on or off.

Withstand voltage

All input pins can handle static overvoltage up to 36V without destruction.

Parallel connection of power stages

In case the application requires a higher load current than a single power stage can deliver, parallel connection of up to four stages is possible.

Enhanced device self protection

All PS are short circuit protected. If critical overtemperature is detected in one stage the stage is switched off.

Operating temperature: $-40^{\circ}\text{C} \dots +150^{\circ}\text{C}$

Storage temperature: $-55^{\circ}\text{C} \dots +150^{\circ}\text{C}$

Two power stages with extended current capability and digital load current monitoring

Especially for lambda sensor heating, two power stages with extended current capability of up to 8A (800h over lifetime) have been implemented. For diagnosis, the heater current can be measured and the current value can be sent via SPI to the μC .

VDD Monitoring

V_{DD} is measured with reference to pin GND_{ABE} .

V_{DD} monitoring detects faulty supply voltage. If V_{DD} is out of limit, all power stages are disabled.

General functions of VDD Monitoring

VDD Undervoltage

If V_{DD} voltage is lower than the supply voltage lower threshold ($V_{\text{DD_THL}}$), all output stages are shut off.

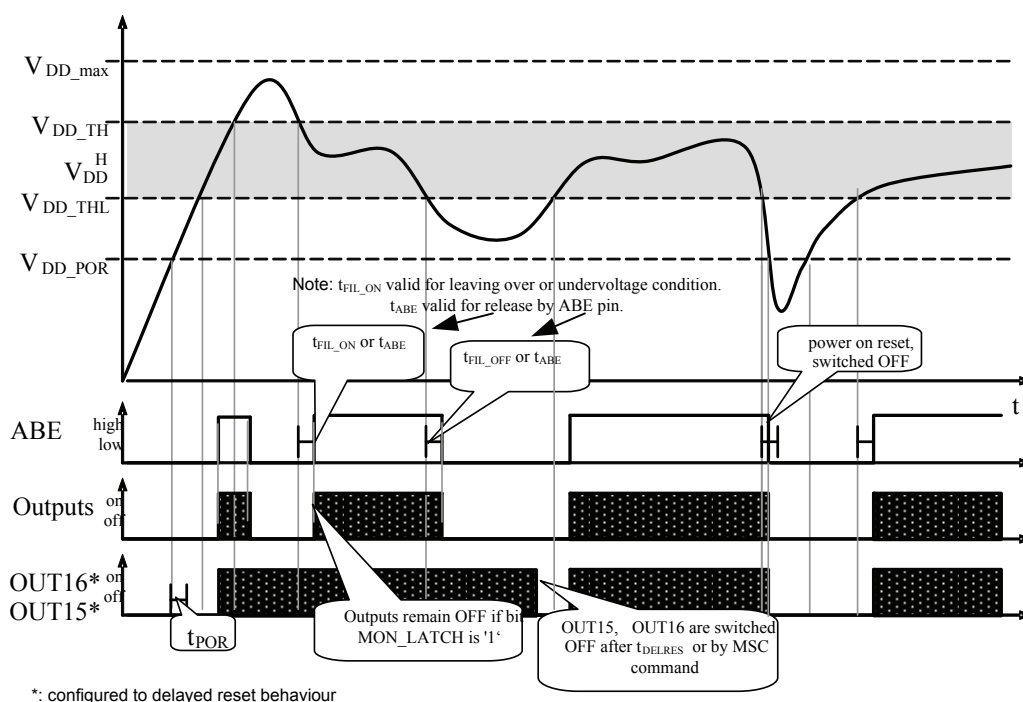
VDD Overvoltage

If the V_{DD} voltage is above the supply voltage upper threshold ($V_{\text{DD_THH}}$), all output stages are shut off.

ESD Capability

The IC pins are protected against electrostatic discharge (ESD) through integrated protection structures.

External Pin-Connections	Pin Combination	Values		
		min	max	unit
Electro Static Discharge Voltage (HBM).	All Pins	-2	2	kV
Electro Static Discharge Voltage (HBM).	OUT1...OUT18 vs. GND	-4	4	kV



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