

Multi-Channel Smart Half-Bridge Gate Drivers

GENERAL DESCRIPTION

The SiLM92108-AQ is a Multi-MOSFET driver IC dedicated to control up to sixteen N-channel MOSFETs. It includes eight half-bridges for DC motor control applications such as automotive power seat control or other applications.

A 24-bit Serial Peripheral Interface (SPI) is used to configure the SiLM92108-AQ and to control the half-bridges. It also allows to read out the status registers for diagnostic purpose.

The SiLM92108-AQ offers a wide range of diagnostic features such as the monitoring of the supply voltage, the charge pump voltage, temperature warning and over-temperature shutdown. Each gate driver monitors independently its external MOSFET drain-source voltage for fault conditions.

The SiLM92108-AQ is available in a QFN7X7-48 WS package with exposed pad supporting lead tip inspection. The package provides a good thermal performance and minimizes the required PCB space.

APPLICATIONS

- Seat control and extended functions (steering column adjustment, gas pedal adjustment)
- Power lift gate
- Central door lock
- Body control module (cargo cover, washer pump, window lift, rear wiper ...)

FEATURES

- AEC-Q100 qualified for automotive applications:
 - Temperature grade 1: -40°C to $+125^{\circ}\text{C}$, T_A
- Eight half-bridge gate drivers for external N-channel MOSFETs
- Control of reverse battery protection MOSFET
- Adaptive MOSFET gate control
 - Improved electromagnetic emission
 - Reduced switching losses in PWM mode
- 24-bit Serial Peripheral Interface
- Two current sense amplifiers with configurable gain
 - High-side and low-side capable for protection and diagnosis
- Drain-source monitoring for short circuit detection
- Overtemperature warning and shutdown
- Timeout watchdog
- Detailed off-state diagnostic (open load, short circuit to battery or short circuit to GND) via SPI
- Four PWM inputs
 - High-side and low-side PWM capable
 - Active/Passive free-wheeling settings
 - Up to 25 kHz PWM frequency
- Low current consumption in sleep mode
- Configurable low-side 1-4 brake with short circuit detection in sleep mode and normal mode
- Configurable VS overvoltage detection in sleep mode
- Leadless power package with support of optical lead tip inspection

FAMILY OVERVIEW

DEVICE	CSA1	CSA2	PWM/nFault	Passive mode	PIN32	Exposed PAD
SiLM92108-131EW-AQ	Y	N	3*PWM	Fixed	GND	Thermal Pad
SiLM92108-132EW-AQ	Y	N	3*PWM	Configurable	GND	Thermal Pad
SiLM92108-231EW-AQ	Y	Y	3*PWM	Fixed	GND	Thermal Pad
SiLM92108-232EW-AQ	Y	Y	3*PWM	Configurable	GND	Thermal Pad
SiLM92108-242EW-AQ	Y	Y	4*PWM (Reuse PWM4/EN)	Configurable	GND	Thermal Pad
SiLM92108-252EW-AQ	Y	Y	4*PWM+nFault (Reuse PWM4/EN)	Configurable	nFault	GND
SiLM92108-262EW-AQ	Y	Y	4*PWM	Configurable	PWM4	GND

ORDERING INFORMATION

Order Part No.	Package	QTY
SiLM92108-131EW-AQ	QFN7X7-48 WS	2500/Reel
SiLM92108-132EW-AQ	QFN7X7-48 WS	2500/Reel
SiLM92108-231EW-AQ	QFN7X7-48 WS	2500/Reel
SiLM92108-232EW-AQ	QFN7X7-48 WS	2500/Reel
SiLM92108-242EW-AQ	QFN7X7-48 WS	2500/Reel
SiLM92108-252EW-AQ	QFN7X7-48 WS	2500/Reel
SiLM92108-262EW-AQ	QFN7X7-48 WS	2500/Reel

BLOCK DIAGRAM

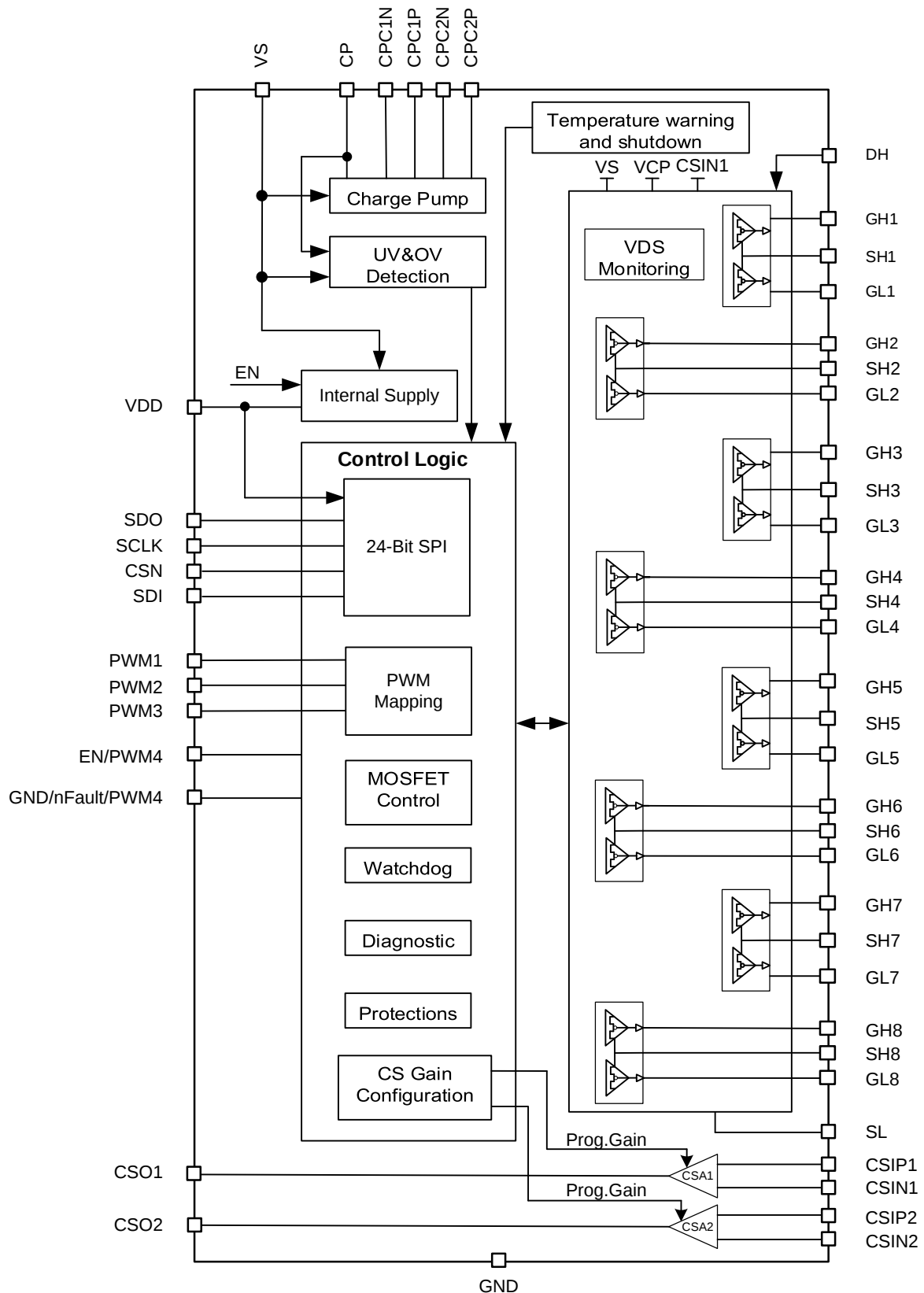


Figure 1. Block diagram

PIN CONFIGURATION

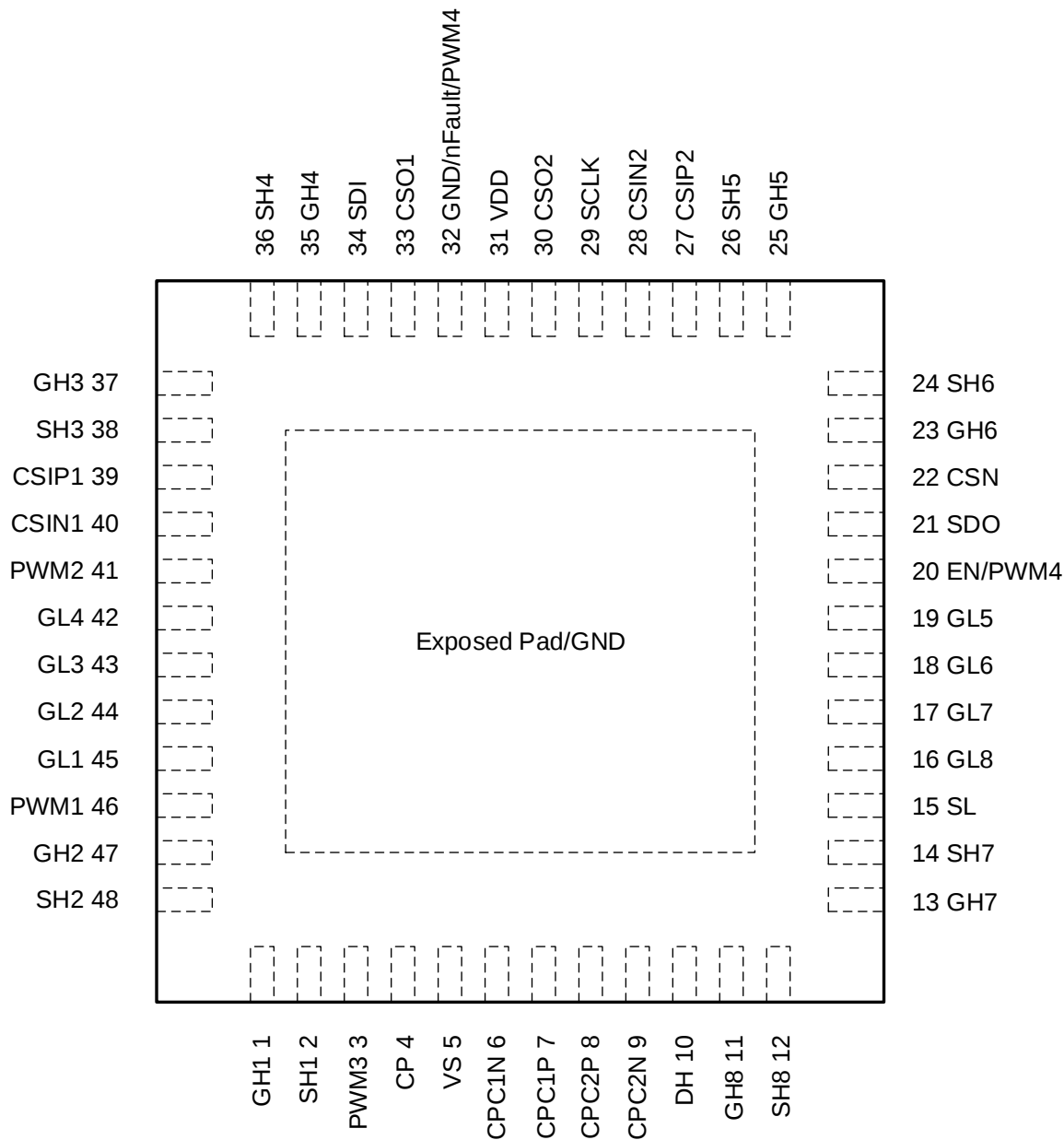


Figure 2. Pin configuration SiLM92108-AQ (Top View)

PIN DEFINITIONS AND FUNCTIONS

No.	Pin Name	Description
1	GH1	Gate high-side 1. Analog I/O pin to turn on/off high-side MOSFET 1. Connect to the gate of high side MOSFET 1
2	SH1	Source high-side 1.
3	PWM3	Half-bridge and H-bridge control input.
4	CP	Charge Pump Output.
5	VS	Supply Voltage.
6	CPC1N	Negative connection to Charge Pump Capacitor 1.
7	CPC1P	Positive connection to Charge Pump Capacitor 1.
8	CPC2P	Positive connection to Charge Pump Capacitor 2.
9	CPC2N	Negative connection to Charge Pump Capacitor 2.
10	DH	Drain input for high-sides.
11	GH8	Gate high-side 8.
12	SH8	Source high-side 8.
13	GH7	Gate high-side 7.
14	SH7	Source high-side 7.
15	SL	Source low-side.
16	GL8	Gate low-side 8.
17	GL7	Gate low-side 7.
18	GL6	Gate low-side 6.
19	GL5	Gate low-side 5.
20 ⁽¹⁾	EN	Enable input with internal pull-down.
	PWM4	Half-bridge and H-bridge control input. Only for SiLM92108-242EW-AQ or SiLM92108-252EW-AQ
21	SDO	Serial Data Output.
22	CSN	Chip Select Not with internal pull-up.
23	GH6	Gate high-side 6.
24	SH6	Source high-side 6.
25	GH5	Gate high-side 5.
26	SH5	Source high-side 5.
27	CSIP2	Non-Inverting input of the Current Sense Amplifier 2.
	N.C	Only for SiLM92108-131EW-AQ or SiLM92108-231EW-AQ
28	CSIN2	Inverting input of the Current Sense Amplifier 2.
	N.C	Only for SiLM92108-131EW-AQ or SiLM92108-231EW-AQ

No.	Pin Name	Description
29	SCLK	Serial Clock Input with internal pull-down.
30	CSO2	Current Sense Amplifier Output 2.
	N.C	Only for SiLM92108-131EW-AQ or SiLM92108-231EW-AQ
31	VDD	Logic supply.
32	GND	Ground connection.
	nFault	Fault indicator output. Pulled logic low during a fault condition and requires an external pull-up resistor. Only for SiLM92108-252EW-AQ
	PWM4	Half-bridge and H-bridge control input. Only for SiLM92108-262EW-AQ
33	CSO1	Current Sense Amplifier Output1.
34	SDI	Serial Data Input with internal pull-down.
35	GH4	Gate high-side 4.
36	SH4	Source high-side 4.
37	GH3	Gate high-side 3.
38	SH3	Source high-side 3.
39	CSIP1	Non-inverting input of the Current Sense Amplifier 1.
40	CSIN1	Inverting input of the Current Sense Amplifier 1.
41	PWM2	PWM input 2.
42	GL4	Gate low-side 4.
43	GL3	Gate low-side 3.
44	GL2	Gate low-side 2.
45	GL1	Gate low-side 1.
46	PWM1	PWM input 1.
47	GH2	Gate high-side 2.
48	SH2	Source high-side 2.
Exposed Pad	Thermal Pad	Exposed pad For cooling purpose only, do not use as electrical GND ⁽²⁾
	GND	Electrical ground connection. Only for SiLM92108-252EW-AQ, SiLM92108-262EW-AQ

(1) This pin can be reused as EN or PWM4 for SiLM92108-242EW-AQ or SiLM92108-252EW-AQ

(2) The exposed pad at the bottom of the package allows better power dissipation from SiLM92108 via the PCB. The exposed pad must be left floating or connected to GND (recommended) for best EMC and thermal performance.

PACKAGE CASE OUTLINES

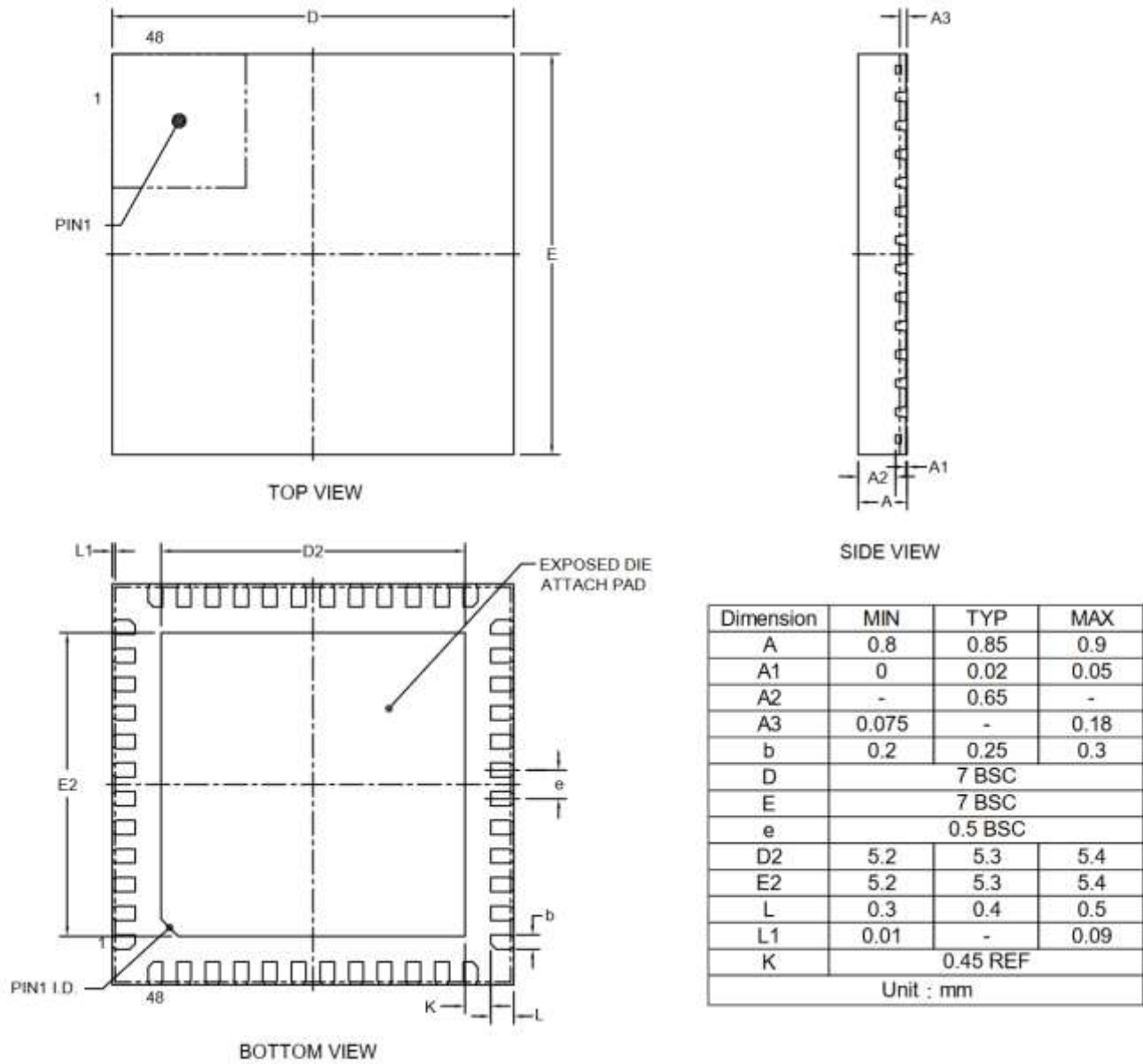


Figure 3. QFN7X7-48 WS Package Outline Dimensions

REVISION HISTORY

Note: page numbers for previous revisions may differ from page numbers in current version

Page or Item	Subjects (major changes since previous revision)
Brief datasheet, Mar 2025	
Whole document	Brief datasheet Release