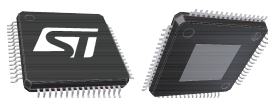


Automotive Front Door device with LIN and HS-CAN, providing Dual H-bridge driving



LQFP-64

GAPG2607151543CET

Features



- AEC-Q100 qualified
- 2 configurable half bridges for 7.5 A load ($R_{ON} = 150\text{ m}\Omega$) or 3 A load ($R_{ON} = 300\text{ m}\Omega$)
- 2 half bridges for 0.5 A load ($R_{ON} = 2000\text{ m}\Omega$)
- 1 configurable high-side driver for up to 1.5 A ($R_{ON} = 500\text{ m}\Omega$) or 0.35 A ($R_{ON} = 1600\text{ m}\Omega$) load
- 1 configurable high-side driver for 0.7 A ($R_{ON} = 800\text{ m}\Omega$) or 0.35 A ($R_{ON} = 1600\text{ m}\Omega$) load
- 3 configurable high-side drivers for 0.15 A/0.35 A ($R_{ON} = 2\text{ }\Omega$)
- 1 configurable high-side driver for 0.25 A/0.5 A ($R_{ON} = 2\text{ }\Omega$) to supply EC Glass MOSFET
- 1 configurable P-channel high-side drivers for 0.15 A/0.25 A ($R_{ON} = 5\text{ }\Omega$)
- Internal 10bit PWM timer for each stand-alone high-side driver
- Buffered supply for voltage regulators and 1 high-side driver (OUT15 P-channel) to supply e.g. external contacts
- Programmable soft-start function to drive loads with higher inrush currents as current limitation value for OUT1-6 (i.e. motors) and OUT7, OUT8 (i.e. bulbs) with thermal expiration feature
- Flexible HS drivers (OUT7, OUT8 and OUT9) suitable to drive external LED modules with huge input capacitance
- All the embedded outputs come with protection and supervision features:
 - Current Monitor (high-side only)
 - Open-load
 - Overcurrent
 - Thermal warning
 - Thermal shutdown
- 2 fully protected drivers for external MOSFETs in H-bridge configuration, dual Half bridge configuration and combined configuration to drive 3 motors
- Fully protected driver for external high-side MOSFET
- Control block for electro-chromic element
- One 5 V voltage regulators for microcontroller supply
- One 5 V voltage tracker for peripheral supply
- Programmable reset generator for power-on and under voltage
- Configurable window watchdog
- LIN 2.2a compliant (SAEJ2602 compatible) transceiver
- Advanced high speed CAN transceiver (ISO 11898-2:2003 /-5:2007 and SAE J2284 compliant) with local failure and bus failure
- Separated (Isolated) fail-safe block with 2 LS ($R_{ON} = 1\text{ }\Omega$) to pull down the gates of the external HS MOSFETs
- Thermal clusters
- A/D conversion of supply voltages and internal temperature sensors
- Embedded and programmable VS duty cycle adjustment for LED driver outputs

Product status link

[L99DZ200](#)

Product summary

Order code	L99DZ200
Package	LQFP-64
Packing	Tray
Order code	L99DZ200TR
Package	LQFP-64
Packing	Tape and reel

Application

Door zone applications.

Description

The L99DZ200 is a door zone systems IC providing electronic control modules with enhanced power management power supply functionality, including various standby modes, as well as LIN and HS CAN physical communication layers.

The two low-drop voltage regulators of the devices supply the system microcontroller and external peripheral loads such as sensors and provide enhanced system standby functionality with programmable local and remote wake-up capability. In addition 5 high-side drivers to supply LEDs, 2 high-side drivers to supply bulbs increase the system integration level. Three High Side drivers can be configured to support the so-called Constant Current mode conceived to supply external LED modules with huge decoupling capacitors

Up to 3 DC motors and 8 external MOS transistors (4 for each of the 2 H-bridges) in H-bridge configuration can be driven. An additional gate drive can control an external MOSFET in high-side configuration to supply a resistive load connected to GND (e.g. mirror heater).

An electro-chromic mirror glass can be controlled using the integrated SPI-driven module in conjunction with an external MOS transistor. All outputs are SC protected and implement an open-load diagnosis.

The ST standard SPI interface (4.0) allows control and diagnosis of the device and enables generic software development.

1 Block diagram and pins description

Figure 1. Functional block diagram

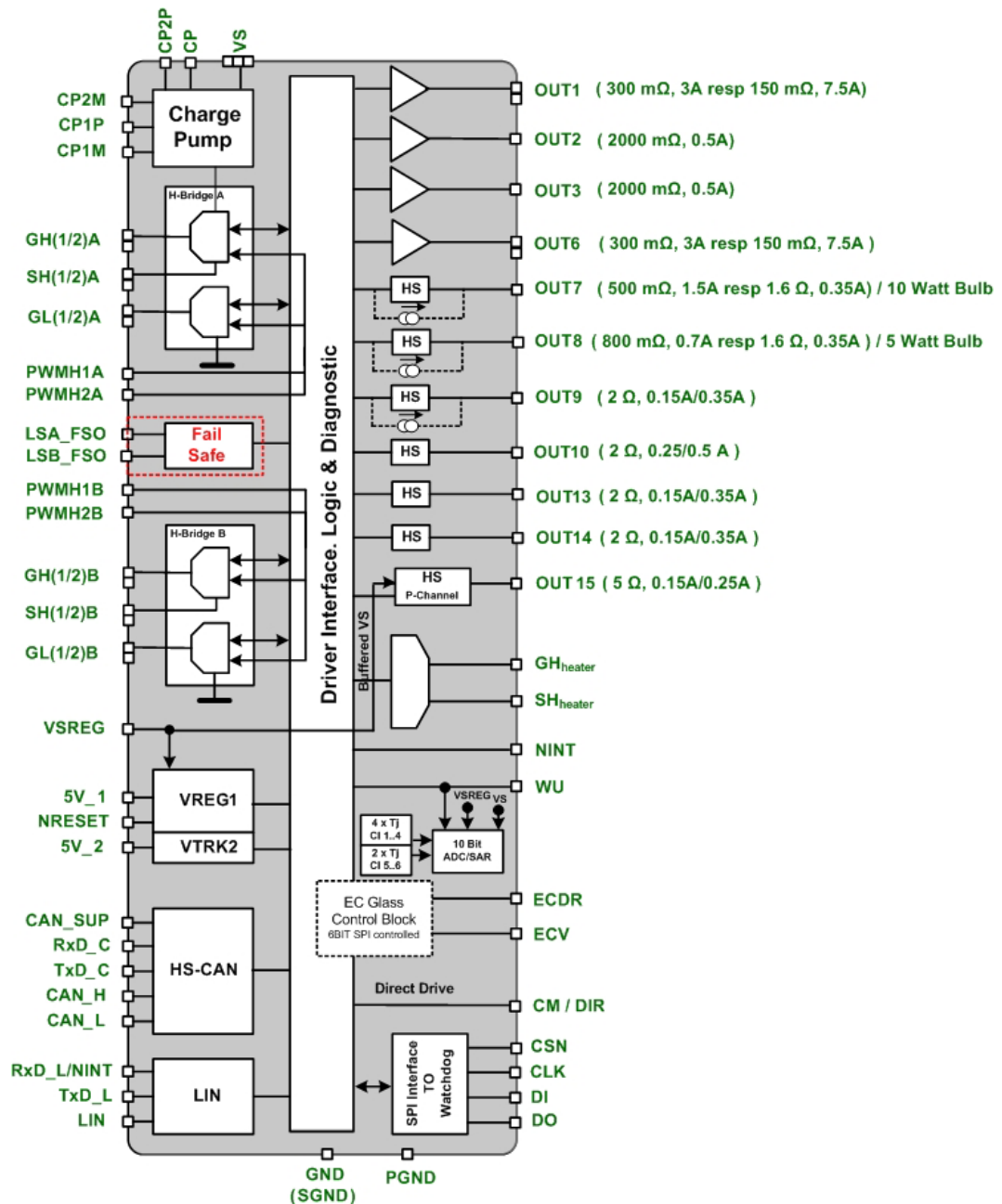
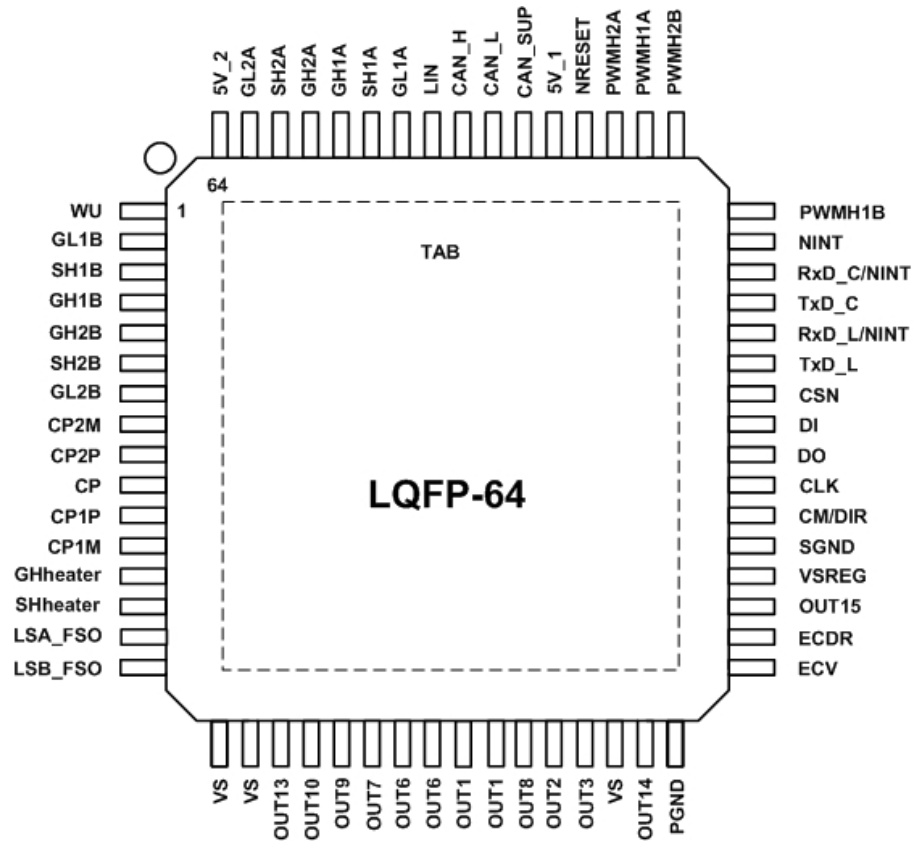


Figure 2. Pins configuration (top view)

Table 1. Pins description

Pin number	Pin name	Function
1	WU	Wake-up Input: Input pin for static or cyclic monitoring of external contacts
2	GL1B	Gate driver for PowerMOS low-side switch in half-bridge 1 (H-bridge b)
3	SH1B	Source of high-side switch in half-bridge 1 (H-bridge b)
4	GH1B	Gate driver for PowerMOS high-side switch in half-bridge 1 (H-bridge b)
5	GH2B	Gate driver for PowerMOS high-side switch in half-bridge 2 (H-bridge b)
6	SH2B	Source of high-side switch in half-bridge 2 (H-bridge b)
7	GL2B	Gate driver for PowerMOS low-side switch in half-bridge 2 (H-bridge b)
8	CP2M	Charge pump pin for capacitor 2, negative side
9	CP2P	Charge pump pin for capacitor 2, positive side
10	CP	Charge pump output
11	CP1P	Charge pump pin for capacitor 1, positive side
12	CP1M	Charge pump pin for capacitor 1, negative side
13	GHheater	Gate driver for external power N-Channel MOSFET in high-side configuration to control the heater
14	SHheater	Source of high-side MOSFET to control the heater
15	LSA_FSO	Fail Safe low-side switch (Active low)
16	LSB_FSO	Fail Safe low-side switch (Active low)

Pin number	Pin name	Function
17	VS	Power supply voltage for power stage outputs (external reverse battery protection required), for this input a ceramic capacitor as close as possible to GND is recommended. Important: for the capability of driving, the full current at the outputs all pins of VS mustbe connected externally!
18	VS; 2nd pin	Current capability (pin description see above)
19	OUT13	High-side-driver output to drive LEDs
20	OUT10	High-side-driver-output. Important: beside the bits OUT10_x (CR 5) this output can be switched on setting the ECON bit for electro-chrome control mode with higher priority.
21	OUT9	High-side-driver output to drive LEDs; it can be configured to work in Constant Current Mode.
22	OUT7	High-side-driver output to drive LEDs or a 10 Watt bulb (programmable Rdson); it can be configured to work in Constant Current Mode.
23	OUT6	Half-bridge outputs: the output is built by a high-side and a low-side switch which are internally connected. The output stage of both switches is a power DMOS transistor. Each driver has an internal parasitic reverse diode (bulk-drain-diode: high-side driver from output to VS, low-side driver from GND to output)
24	OUT6; 2nd pin	Current capability (pin description see above)
25	OUT1	Half-bridge outputs: the output is built by a high-side and a low-side switch which are internally connected. The output stage of both switches is a power DMOS transistor. Each driver has an internal parasitic reverse diode (bulk-drain-diode: high-side driver from output to VS, low-side driver from GND to output)
26	OUT1; 2nd pin	Current capability (pin description see above)
27	OUT8	High-side-driver output to drive LEDs or a 5 Watt bulb (programmable Rdson); it can be configured to work in Constant Current Mode.
28	OUT2	Half-bridge outputs: the output is built by a high-side and a low-side switch which are internally connected. The output stage of both switches is a power DMOS transistor. Each driver has an internal parasitic reverse diode (bulk-drain-diode: high-side driver from output to VS, low-side driver from GND to output)
29	OUT3	Half-bridge outputs: the output is built by a high-side and a low-side switch which are internally connected. The output stage of both switches is a power DMOS transistor. Each driver has an internal parasitic reverse diode (bulk-drain-diode: high-side driver from output to VS, low-side driver
30	VS; 3rd pin	Current capability (for the pin description see above)
31	OUT14	High-side-driver output to drive LEDs
32	PGND	Power ground
33	ECV	ECV: using the device in EC control mode this pin is used as voltage monitor input. For fast discharge an additional low-side-switch is implemented
34	ECDR	ECDR: using the device in EC control mode this pin is used to control the gate of an external N-Channel MOSFET
35	OUT15	High-side-driver output to drive LEDs
36	VSREG	Power supply voltage to supply the internal voltage regulator, the internal voltage tracker and OUT15 (external reverse battery protection required/diode) for this input a ceramic capacitor as close as possible to GND and an electrolytic back up capacitor is recommended.
37	SGND	Signal Ground
38	CM / DIR	Current monitor output/DIR input: depending on the selected multiplexer bits CM_SEL_x (CR 7) of the Control Register this output sources an image of the instant current; through the corresponding high-side driver with a fixed ratio. This pin is bidirectional. The Microcontroller can overdrive the current monitor signal to provide the Direct Drive Input.
39	CLK	SPI: serial clock input
40	DO	SPI: serial data output (push pull output stage)
41	DI	SPI: serial data input
42	CSN	SPI: chip select not input

Pin number	Pin name	Function
43	TxD_L	LIN Transmit data input
44	RxD_L/NINT	RxD_L -> LIN receive data output; NINT -> indicates local/remote wake-up events (push pull output stage)
45	TxD_C	CAN transmit data input
46	RxD_C/NINT	CAN receive data output NINT -> indicates local/remote wake-up events (push pull output stage)
47	NINT	Interrupt output (low active; push-pull output stage) to indicate VSREG early warning (Active mode); indicates wake-up events from V1_standby mode
48	PWMH1B	PWMH1 input for H-bridge b: this input signal can be used to control the H-bridge b Gate Drivers.
49	PWMH2B	PWMH2 input for H-bridge b: this input signal can be used to control the H-bridge b Gate Drivers.
50	PWMH1A	PWMH1 input for H-bridge a: this input signal can be used to control the H-bridge b Gate Drivers.
51	PWMH2A	PWMH2 input for H-bridge a: this input signal can be used to control the H-bridge b Gate Drivers.
52	NRESET	NReset output to micro controller; (reset state = LOW) (Low-side switch with drain connected to the output pin and internal pull up resistance to 5V_1)
53	5V_1	Voltage regulator 1 output: 5 V supply e.g. micro controller, CAN transceiver
54	CAN_SUP	CAN supply input; to allow external CAN supply from V1 regulator
55	CAN_L	CAN low level voltage I/O
56	CAN_H	CAN high level voltage I/O
57	LIN	LIN bus line
58	GL1A	Gate driver for PowerMOS low-side switch in half-bridge 1 (H-bridge a)
59	SH1A	Source of high-side switch in half-bridge 1 (H-bridge a)
60	GH1A	Gate driver for PowerMOS high-side switch in half-bridge 1 (H-bridge a)
61	GH2A	Gate driver for PowerMOS high-side switch in half-bridge 2 (H-bridge a)
62	SH2A	Source of high-side switch in half-bridge 2 (H-bridge a)
63	GL2A	Gate driver for PowerMOS low-side switch in half-bridge 2 (H-bridge a)
64	5V_2	Voltage tracker 2 output: 5 V supply for external loads (potentiometer, sensors). 5V_2 pin is protected against short to ground or to battery
TAB		Connect to ground

Revision history

Table 2. Document revision history

Date	Version	Changes
30-May-2017	1	Initial release.
02-Aug-2019	2	Updated Figure 1 , Figure 2 and Table 1 .

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