

1 General

The GZ16-STK is a starter kit for the new Motorola micro controller 68HC908GZ16.

This micro controller features the 8 bit CPU08 core, a CAN interface, 16KB of in-system programmable flash memory, 1KB of RAM and more.

To build a complete system, the starter kit is equipped with

- system basis chip (SBC, Motorola MC33989) for voltage regulation, CAN physical interface and watchdog circuit
- H-Bridge (Motorola MC33886) for control of DC motors
- Circuits for testing, evaluation and debugging (2 LEDs, 1 push-button, MON08-Interface, pin header to give access to all 'GZ16 pins and the special function pins of SBC
- Easy connection of power, CAN bus and H-bridge via screw terminals
- All parts to start a working application are included



2 Packing List

Position	Article
1	Evaluation board EB08 GZSBC
2	Programming / debugging adaptor MONIF08-LC
3	Mains adapter / Power supply approx. 9 to 12 V 0.5 Amps (primary side 230V/50Hz only), european plug type
4	10pin ribbon cable 25cm
5	Starterkit Software CD (Demo application software, documentation, data sheets, Flash programming software HC08_ISP)
6	Metrowerks Codewarrior CD
7	small screwdriver, 2mm blade
8	2 jumpers
9	Small DC Motor with 50 cm cable
10	Cable for serial interface 9 pin D-Sub 1:1 (m/f) 1.8m

Package will be plain cardboard box, approx. dimensions 95 x 250 x 180 mm, weight approx. 1.2 Kg
 For over sea shipment to USA, air freight without power supply: approx. dimensions 50 x 240 x 160 mm, weight approx. 0.5 Kg. Dimensions of box not yet fixed, subject to change.

3 Evaluation Board EB08 GZSBC

3.1 Connectors and Pin Out

3.1.1 X9 Screw Terminal

Pin #	1	2	3	4	5	6
Connect to	Supply plus 9..12V	Supply GND	CAN H	CAN L	H-Bridge +	H-Bridge -
Label	+ Bat	- Bat	CAN H	CAN L	HBR A	HBR B

Power Supply Friwo FE 4120 090D060: white wire is plus, brown wire is minus

3.2 Setup and Configuration

3.2.1 Function of Push Button

Solder Jumper SJ1	Connection 1-2	Push Button resets the 'GZ16 if pressed
Solder Jumper SJ1	Connection 2-3	Push Button pulls port PTA2 low if pressed

3.2.2 Baudrate in Monitormode

Solder Jumper SJ2	Open	PTB4 is at high level, standard baud rate
Solder Jumper SJ2	Closed	PTB4 is at low level, high (double) baud rate

3.2.3 Connect SBC Watchdog out with SBC Reset out

Solder Jumper SJ3	Open	SBCs Reset and WatchDog out are separate functions
Solder Jumper SJ3	Closed	SBCs Reset and WatchDog out are connected (wired OR)

3.2.4 CAN Termination

To set the CAN termination connect X2 Pin 5 and Pin 6 with a jumper. CAN is to be terminated only at the ends of the bus line.

3.2.5 Connection of Reset GZ16 with SBC Reset Out

A jumper on X2 – pin 31 to 32 to connect the SBC reset out to 'GZ16 reset. For flash programming or debugging this connection may be opened.

3.3 System Basis Chip

3.3.1 Features

The MC33989 is a monolithic integrated circuit combining many functions frequently used by automotive ECUs. It incorporates:

- Two voltage regulators.
- Four high voltage inputs.
- 1Mbaud CAN physical interface.

- Vdd1: Low drop voltage regulator, current limitation, over temperature detection, monitoring and reset function
- Vdd1: Total current capability 200mA.
- V2: Tracking function of Vdd1 regulator. Control circuitry for external bipolar ballast transistor for high flexibility in choice of peripheral voltage and current supply.
- Four operational modes (normal, stand-by, stop and sleep mode)
- Low stand-by current consumption in stop and sleep modes
- High speed 1Mbaud CAN physical interface.
- Four external high voltage wake-up inputs, associated with HS1 Vbat switch
- 150mA output current capability for HS1 Vbat switch allowing drive of external switches pull up resistors or relays
- Vsup failure detection
- Nominal DC operating voltage from 5.5 to 27V, extended range down to 4.5V.
- 40V maximum transient voltage
- Programmable software time out and window watchdog
- Safe mode with separate outputs for Watchdog time out and Reset
- Wake up capabilities (four wake up inputs, programmable cyclic sense, forced wake up, CAN interface, SPI and stop mode over current)
- Interface with MCU through SPI

3.3.2 Programming

The SBC is programmed using the SPI.

A simple command sequence sets the SBC into debug mode:

```
SPIsendByte(0xb3); // WD trigger and configure non Window
SPIsendByte(0x10); // enter debug mode
SPIsendByte(0x15); // enter debug normal mode
```

This commands (or others, that configure the SBC e.g. for normal mode) must be sent within approx. 300ms after power on. If not, the SBC will reset the 'GZ16 again.

In debug mode the voltage regulators and the CAN interface are activated. The Watchdog is deactivated, so debugging and programming can be done without caring for the watchdog.

For real applications, the watchdog should not be deactivated. In this case, it has to be triggered periodically via SPI.

3.4 H-Bridge

3.4.1 Features

The 33886 is a monolithic H-Bridge ideal for fractional horsepower DC-motor and bi-directional thrust solenoid control. The IC incorporates internal control logic, charge pump, gate drive, and low RDS(ON) MOSFET output circuitry. The 33886 is able to control continuous inductive DC load currents to 5.2 A. Output loads can be Pulse Width Modulation (PWM) controlled at frequencies to 10 kHz.

A Fault Status output reports undervoltage, overcurrent, and overtemperature conditions. Two independent inputs control the two half-

bridge totem-pole outputs. Two disable inputs force the outputs to tristate (exhibit high impedance).

The 33886 is parametrically specified over a temperature range of $-40^{\circ}\text{C} = \text{TA} = 125^{\circ}\text{C}$, $5.0 \text{ V} = \text{VPWR} = 28 \text{ V}$, and is available in an economical surface mount package.

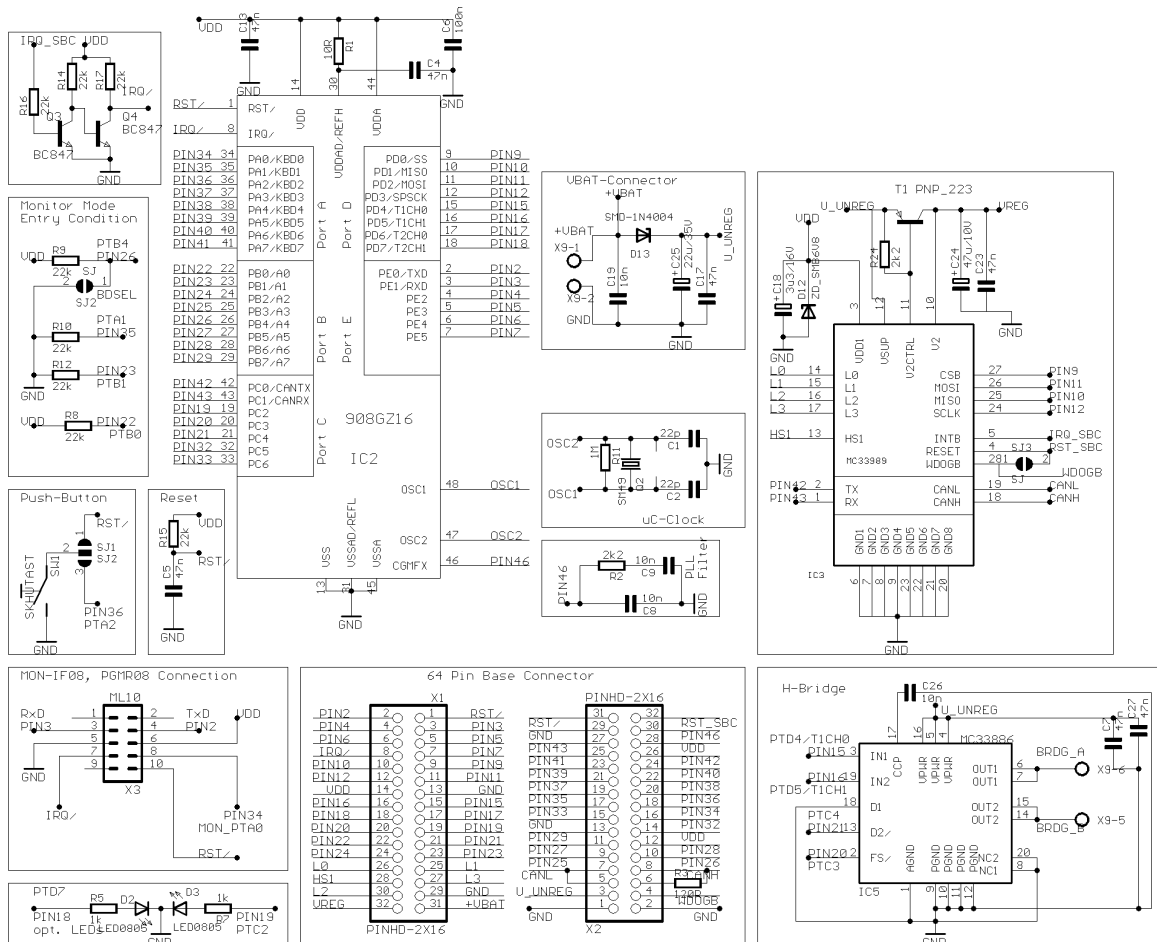
- 5.0 V to 30 V Operation
- 120 m RDS(ON) H-Bridge Switches
- TTL/CMOS Compatible Inputs
- PWM Frequencies to 10 kHz
- Automatic PWM Overcurrent Limiting
- Output Short Circuit Protection
- Overtemperature Output Current Reduction with Shutdown
- Undervoltage Shutdown
- Fault Status Reporting

3.4.2 Programming

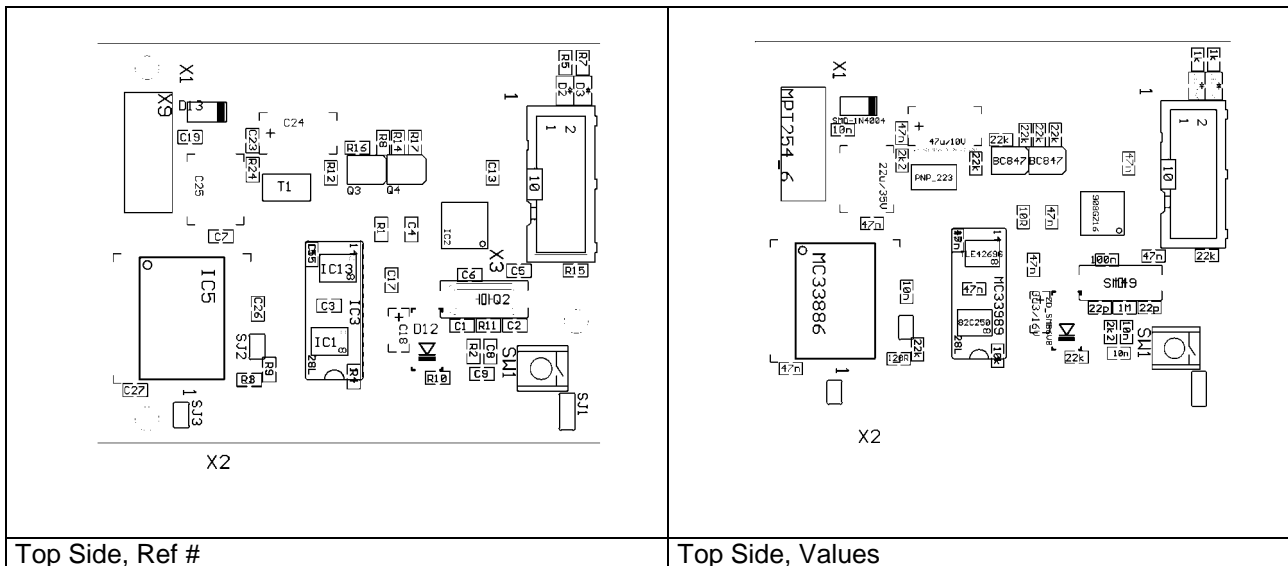
Input one of the H-Bridge is connected to timer 1 channel 0. This output can be programmed with an PWM waveform using the timer module on the 'GZ16 to set the speed of a DC motor connected to the H-bridge outputs.

The input 2 of the H-bridge is used to determine the direction of the motor. If input 2 is pulled high, the PWM waveform duty cycle is reciprocal to the motor speed, if input 2 is low, duty cycle and speed are proportional while direction is reversed.

3.5 Circuit Diagram



3.6 Placement Plan



4 Monitor Mode Interface MONIF08-LC

4.1 General

The monitor mode interface MONIF08-LC is an interface that connects between the PC serial interface and the monitor mode connections of a HC08 micro controller.

The monitor mode of the HC08-family supports in-circuit debugging and in-circuit flash programming.

This interface supports the common debug –features (Break-Interrupt, Reset on DTR-Edge).

It is compatible with common monitor mode debugger software (e.g. the P&E or MON08 debugger integrated into the CodeWarrior IDE or Cosmic ZAP Monitor Mode) and common flash programming tools (e.g. HC08_ISP).

Additionally this interface can be used to connect the micro controllers SCI interface to the COM port of the PC. Via a common terminal program (e.g. Hyperterminal) application generated SCI messages can be monitored. If supported by the application, test data can be sent to the micro controller.

In the CAN test application this feature is used to display the messages on the CAN via SCI and to generate CAN messages on a specific keypress.



Further detailed information is available as separate document on the starterkit disk (MONIF08LC_en.doc) .

5 Starter Kit Software

See GZ16-STK Demo Example Software.pdf in the documentation directory on the starter kit disk.

The demo applications is based on a well documented basic CAN driver are included for reference in the starter kit.

The source code is fully included as basis for customers application design.

The demo applications are programmed in “C” with minor parts in assembly.

6 References

XC33989 SYSTEM BASIS CHIP WITH HIGH SPEED CAN SEMICONDUCTOR TECHNICAL DATA
MC33886/D Rev 2, 12/2002 5.2 A H-BRIDGE
MC68HC908GZ16 Data Sheet Rev 0 2003

See datasheets directory on starter kit disk.

7 Contact

The demo application and this documentation are copyrighted to

Dipl. Ing. J. Freitag Elektronik u. Systeme
Teutoburger Str. 11
33604 Bielefeld – Germany
Tel. +49 (521) 2701093

Fax +49 (521) 2701094
Email: jan.freitag@freitag-elektronik.de
www.freitag-elektronik.de

It can be used freely for evaluation or demonstration purposes. No warranty for the suitability for any purpose or for any errors is given. Use at own risk only.

Questions and remarks via email regarding the demo kit are welcome.

Additional support of your specific CAN application is available, but not free of charge.