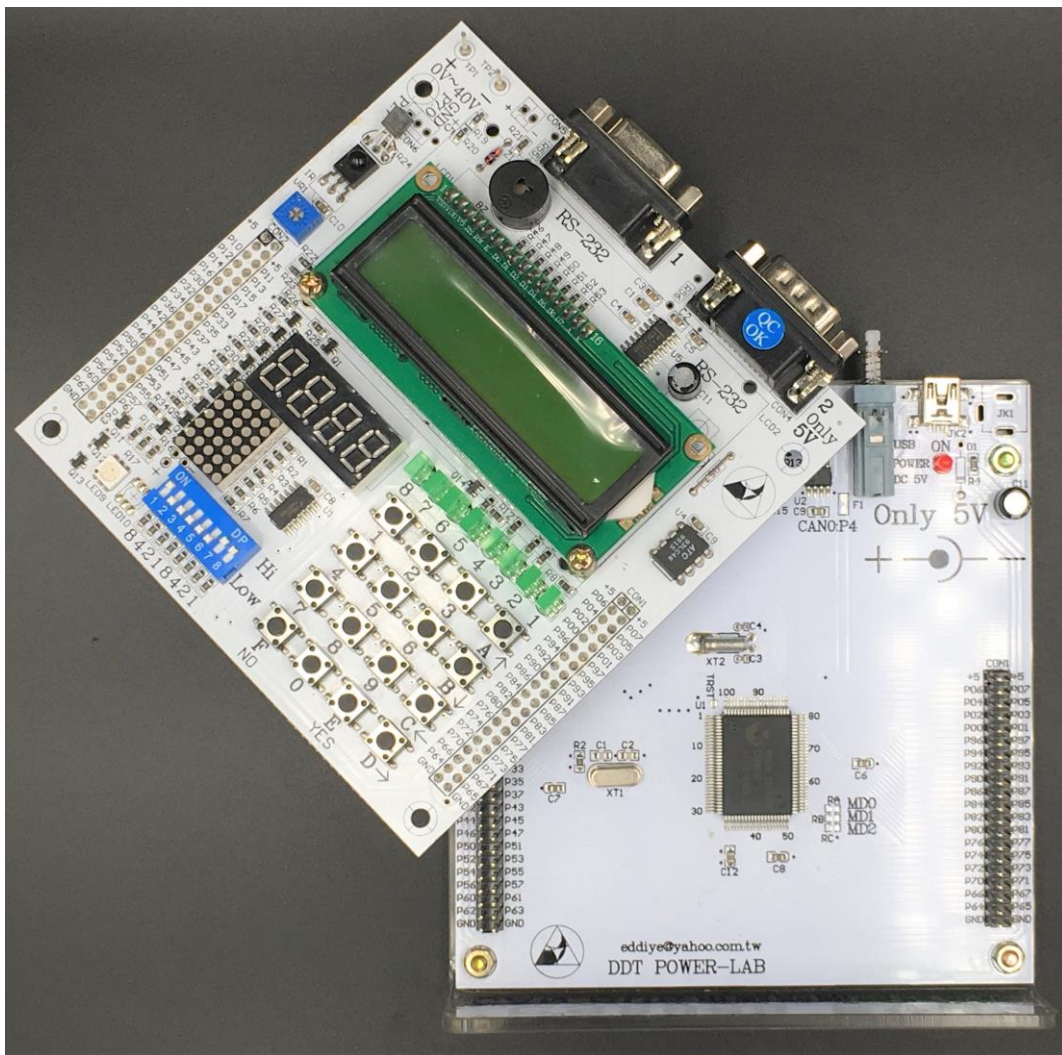# CS8959 EVB

(SWI-CAN-CS-8959-202006)

User Manual v1.0

2020/06

SwiSys Co., Ltd.
Tainan, Taiwan.

Noted

- **This document is intended for the** **「CS8959 EVB User Manual」****. Some of the information, such as the engineering specification or BOM or firmware source codes, described in this document should not appear in any of the** **「EVB User Manual」****.**
- **This copyright of this document belongs to the SwiSys. Any persons who view/edit this document should be liable to the loyalty to the team group members.**

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1. Introduction

The CS8959 EVB is a single-chip structure Including automotive CAN 2.0 Bus technology, specifically designed for automotive electronic applications, is an in-vehicle serial communication network controller that can effectively support distributed control and real-time monitoring. The CS8959 contains two CANs that can be used in automotive body control and gateway control units.

2. Product Description

- The CS8959 micro-controller is an embedded device with a single-cycle 8051CPU.
- It includes an internal Flash ROM system of 171Kbytes, an internal RAM of 256 bytes, and an auxiliary RAM of 4 K Bytes.
- It also includes some specialized peripherals, such as 2-channel CAN ports, 9 channels of general PWM output terminals and a Real Time Clock (RTC) module.
- The characteristic Boot- Code-Free ISP (In System Programming) allows users to easily update the programming codes via JTAG ports or a UART port.
- Additionally, users can debug the system via the JTAG interface in real time.
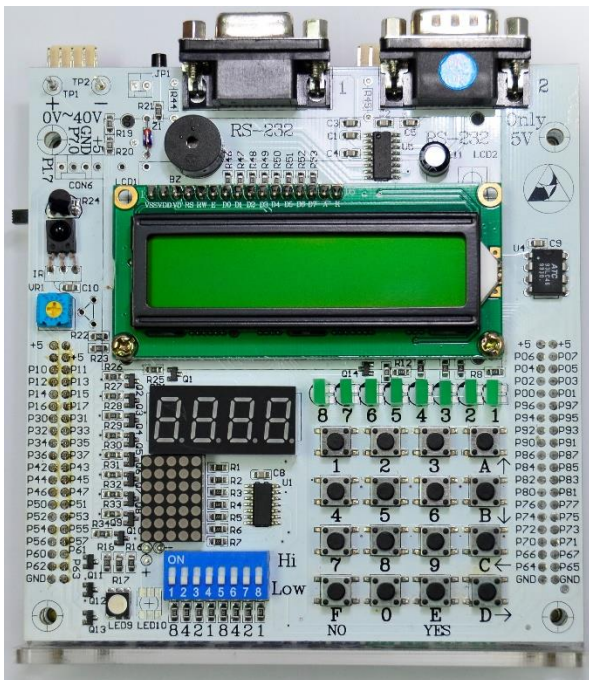
3. CS8959 Evaluation Board

Slave Board (Top View)   **Master Board (Bottom View)**
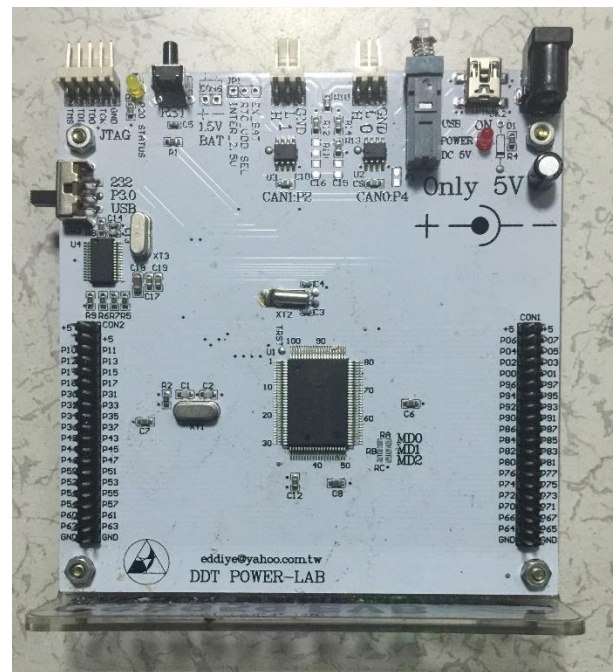

Figure 1: CS8959 Slave Board

Figure 2: CS8959 Master Board
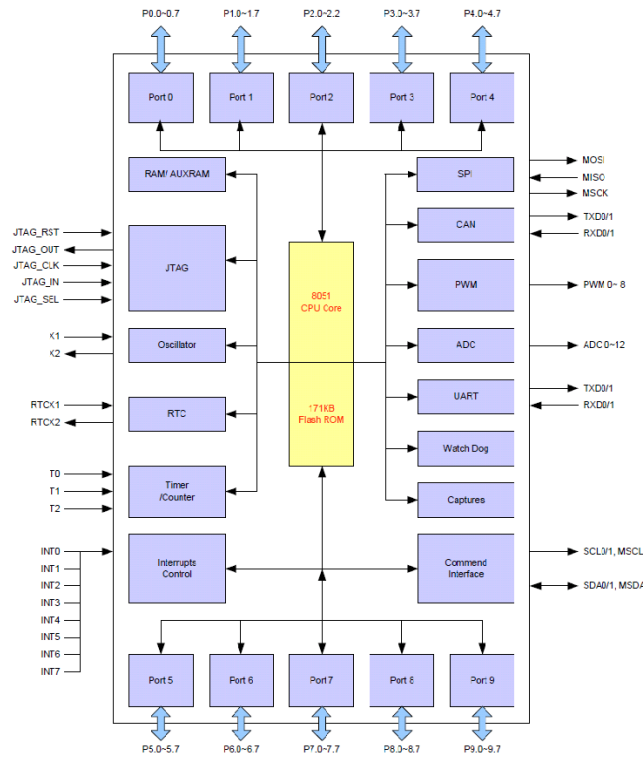
4. CS8959 Block Diagram

Figure 3: CS8959 Block Diagram

5. Specifications

- Single Cycle 8051 CPU core, maximum operating clock up to 20 MHz
- Power Supply: +5V
- Embedded 171K-byte Flash ROM with ECC (Error Correction Code)
- 4353-byte RAM with ECC:
    - ❖ 256-byte Internal RAM, 4K-byte Auxiliary RAM
- 9 channels general PWM outputs:
    - ❖ 7 channels of 8-bit supporting Programmable PWM output frequency
    - ❖ 2 channels of 8-bit supporting Programmable PWM output frequency with 4-bits flexible time base period
- Maximum 75 I/O pins
- ECC generation with 1-bit correction
- Three 16-bit Counters/Timers
- Built-in one Master and two Slave I²C ports
- Built-in SPI controller
- Hardware ISP (In-System-Programming), no Boot Code required
- Two Full-duplex UARTS
- Two CAN controllers with gateway function. Specification Version 2.0 Part A and B, each one CAN controller provides
    - ❖ Bit rate up to 1Mbit/s

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- ❖ 32 Message Objects
- ❖ Each Message Object has its own Identifier Mask
- ❖ 256 Bytes FIFO
- ❖ Interrupt can be masked
- ❖ Dispatching registers
- ● Peripheral Features
  - ❖ Multi interrupt sources
  - ❖ Programmable Watch Dog Timer
  - ❖ Built-in Real Time Clock (RTC)
  - ❖ Dual Data Pointer (DPTR)
  - ❖ Flash-ROM program code protection
  - ❖ JTAG interface Debug System
  - ❖ Single +5V supply voltage
  - ❖ Industrial operating temperature range (-40°C ~ +85°C)
  - ❖ 100-pin QFP (Quad Flat Package) package with RoHs compliance
- ● CPU Features
  - ❖ Cycle: Single
  - ❖ Architecture: 8051
  - ❖ Maximum operating clock: 20 MHz
- ● RAM & Flash ROM features
  - ❖ Internal RAM size: 256 bytes
  - ❖ Auxiliary RAM size: 4K bytes
  - ❖ Flash-ROM size: 171K bytes (embedded)
  - ❖ Program flash-ROM protect: Support
- ● PINs
  - ❖ Total pins: 100
  - ❖ Maximum I/O pins: 75
  - ❖ Package: 100 pin QFP
- ● PWM features
  - ❖ Total Channels: 9 (7 channel + 2 channels with 4-bits flexible time base period channels)
  - ❖ Support Bit: 8
  - ❖ Programmable: Yes
- ● UART features
  - ❖ Ports: 2
  - ❖ Maximum baud rate: 115200bps
  - ❖ Fully-duplex
- ● ADC features
  - ❖ Channels: up to 13-Channel
  - ❖ A/D converters: 12-bit

- ❖ Conversion time: 12.5 μs
- ❖ Input voltage: 0 ~ +VDD
- ● Timer features
  - ❖ Timers: 3 timers + 1 Programmable Watch Dog Timer
  - ❖ Bit: 16-bit
- ● CAN Bus features
  - ❖ CAN Bus version: CAN 2.0
  - ❖ Support CAN ID: 11 bit or 29 bit
  - ❖ Port: 2-port (port 0 & port 1)
  - ❖ Bit rate: up to 1Mbit/s
  - ❖ FIFO size: 256-bytes
  - ❖ Message Objects: 32 (Each Message Object has its own Identifier Mask) per port
  - ❖ Interrupt can be masked
  - ❖ Dispatching registers

6. Trouble Shooting

The CAN protocol is a modified version of Carrier Sense Multiple Access/Collision Avoidance (CSMA/CA) similar to Ethernet. If two nodes are trying to send at the same time, instead of collision avoidance, the ID field of the message will resolve itself, which allows the higher priority message to continue and lower priority message has been postponed.

If you found out the device is not working as it should the first thing to do is to check all the connections. Check for shorts or open circuits. Set multimeter to ohms measuring or to buzzer mode and check every connection, to make it easier. If everything on a device seems to work fine, try to find what may cause a problem. This is an obvious step, but sometimes taking a day off, it is way easier to find mistakes (like VCC connected to both sides of an LED), To find if there are any errors in CS8972, test your PCB. If there is a microcontroller, write a sketch to test all the functions of your PCB. Check all of them at once or one at a time. If everything works fine in CS8972 don't worry be happy but if something is wrong, keep reading.