TRK-S12ZVL
Quick Start Guide

MagniV Mixed-signal MCUs
for LIN Applications

Introduction

The TRK-S12ZVL features the S12ZVL, an automotive 16-bit MCU family. This integrates on the same die a S12Z CPU, a LINPHY interface, a 5 volts internal LDO (with an option to control an external ballast transistor) which operates at vehicle battery level and a high voltage input pin. The S12ZVL family includes error correction code (ECC) on program flash, EEPROM as well as SRAM memory, a fast 10 bits ATD converter and a frequency modulated phase locked loop (PLL) that improves the EMC performance.

This MCU family is targeted for smart sensor slave LIN node applications as well as applications requiring to drive RGB LEDs. This device fulfils ISO26262 ASIL A requirements.

This guide will show how to quickly connect the board to a host PC and execute a demonstration application preloaded in to the flash memory. Default jumper positions of the TRK-S12ZVL board.

S12ZVL Overview

The MC9S12ZVL-Family is an automotive 16-bit microcontroller family using the 180nm NVM + UHV technology that offers the capability to integrate 40V analog components. This family reuses many features from the existing S12 portfolio. The particular differentiating features of this family are the enhanced S12Z core and the integration of "high-voltage" analog modules, including the voltage regulator (VREG) and a Local Interconnect Network (LIN) physical layer.

The MC9S12ZVL-Family includes error correction code (ECC) on RAM, FLASH and EEPROM for diagnostic or data storage, a fast analog-to-digital converter (ADC) and a frequency modulated phase locked loop (IPLL) that improves the EMC performance. The MC9S12ZVL-Family delivers an optimized solution with the integration of several key system components into a single device, optimizing system architecture and achieving significant space savings. The MC9S12ZVL-Family delivers all the advantages and efficiencies of a 16-bit MCU while retaining the low cost, power consumption, EMC, and code-size efficiency advantages currently enjoyed by users of existing S12 families. The MC9S12ZVL-Family is available in 48-pin, 32-pin LQFP and 32-pin QFN-EP. In addition to the I/O ports available in each module, further I/O ports are available with interrupt capability allowing wake-up from stop or wait modes.

S12ZVL Family

LIN-PHY	Pierce Oscillator	Temp. Sense	10-bit ADC
SCI 0	RCosc. +/-1.3%	PLL	16-bit Timer, 6-ch. + 2-ch.
SCI 1	S12Z Core		PWM 8-ch., 8-bit (or 4-ch., 16-bit)
1 SPI	32 KB Flash (ECC)		BDM/BDC
1 I²C	128 Byte EEPROM (ECC)	1 KB RAM (ECC)	VREG for Total Supply • 70 mA • 170 mA with Ext. Ballast
GPIO / 1# E-Vdd / 1-3# NGPIO	HVI	V-SUP SENSE	

■ Core and Memories   ■ Digital Peripherals   ■ HV Analog   ■ 5 V Analog

The MC9S12ZVL-Family is targeted at generic automotive applications requiring LIN connectivity. Typical examples of these applications include switches, actuators (e.g., window lift and door lock modules); body control electronics for occupant comfort (e.g., door, steering wheel, seat and mirror modules); and motors and sensors (e.g., in climate control, lighting, rain sensors, smart wipers, intelligent alternators and switch panels).
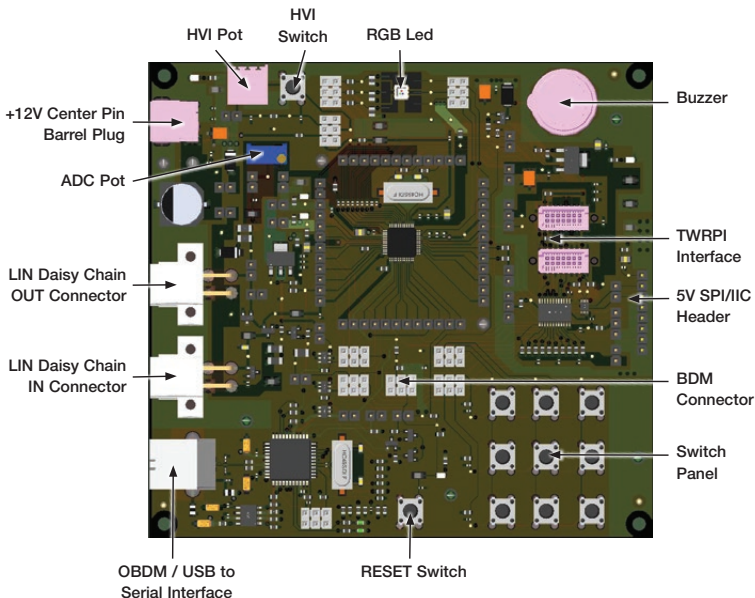
Get To Know The TRK-S12ZVL

HVI Pot

HVI Switch

RGB Led

+12V Center Pin Barrel Plug

ADC Pot

LIN Daisy Chain OUT Connector

LIN Daisy Chain IN Connector

OBDM / USB to Serial Interface

RESET Switch

Buzzer

TWRPI Interface

5V SPI/IIC Header

BDM Connector

Switch Panel

Figure 1: Front side of TRK-S12ZVL

Peripheral List

Peripheral	ID	MCU Port	Description
Button	SW1 – SW9	PT1 to PT9	Matrix Switch Panel 3x3
	SW10	PL0	HVI Switch connected to HVI
	SW12	RESET	RESET Switch
Potentiometer	R11	PL0	Potentiometer connected to HVI
	R40	AN0	Potentiometer connected to ADC port
LED	D8	PP3	RGB LED - Green
		PP1	RGB LED - Red
		PP5	RGB LED - Blue
	D10	-	OSBDM PWR LED, ON when OSBDM is successfully enumerated as USB device.
	D11	-	OSBDM STATUS LED. ON when OSBDM is successfully transmitting as USB device.
	D5	VSUP	Power LED indicator, ON when +12V is connected to the board
	D4	VDDX	MCU Power LED Indicator. On when VDDX is regulating to +5V
	D17	VDDA	MCU Power LED Indicator. On when VDDA is connected to VDDX
Buzzer	LS1	PP0	Buzzer to 2048Hz

Software Tools Installation

1 ## Download Software and Tools
Install Code Warrior Development Studio for Microcontrollers 10.5 (Eclipse). Download it from **www.freescale.com/codewarrior**.

2 No service pack is needed since CW 10.5 already supports the S12ZVL.

3 Install PE Micro OSBDM V11 drivers from:

**http://www.pemicro.com/support/download_processor.cfm?type=3.**
Look for: P&E Hardware Interface Drivers, Version 11 (Win XP/Vista/7/8).

These drivers allow using the OSBDM firmware 31.21 (already flashed in the JM60) as a USB to serial bridge. (Instead of virtual serial port use the COM serial port for the OSBDM)

4 From Code Warrior 10.5, launch the demo software code.

Jumper Default Configuration

TRK-S12ZVL
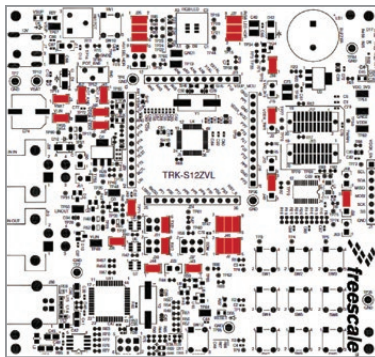
Jumper Default Configuration

Jumper	Setting	Description
J2	1, 2	This link connects the row of SW3, SW6 and SW9 to PT1 port.
	3, 4	This link connects the row of SW2, SW5 and SW8 to PT2 port.
	5, 6	This link connects the row of SW1, SW4 and SW7 to PT3 port.
J3	1, 2	VDDX is routed to VDDX_TWR [TWRPI interface]
J6	5, 6	This link connects SW10 (active to low) to PL0 port [HVI]
J8	1, 2	VBAT is routed to VSUP
J9	1, 2	VBAT is connected to VLIN
J25	1, 2	Connects the AN5 port to the Anode of the GREEN LED [D8]. This is required to read the LED [D8] forward voltage.
	3, 4	Connects the AN4 port to the Anode of the RED LED [D8]. This is required to read the LED [D8] forward voltage.
	5, 6	Connects the AN3 port to the Anode of the BLUE LED [D8]. This is required to read the LED [D8] forward voltage.
J27	1, 2	Connects PP3 to the blue LED in D8. This pin turns the LED on/off.
	3, 4	Connects PP1 to the red LED in D8. This pin turns the LED on/off.
	5, 6	Connects PP5 to the green LED in D8. This pin turns the LED on/off.
J30	5, 6	This jumper selects the SCI0 RXD0 on PS0 as the RXD for the OSBDM serial bridge. After reset PS0 is NOT configured as RXD0.
J31	5, 6	This jumper selects the SCI0 TXD0 on PS1 as the TXD for the OSBDM serial bridge. After reset PS1 is NOT configured as TXD0.

Jumper Default Configuration (Cont.)

Jumper	Setting	Description
J35	1, 2	This link connects PT0 to the control of LIN OUT Interface
J38	1, 2	This link connects PP0 to the gate of the MOSFET that controls the Buzzer. Disconnect this link if PP0 is used in a different application.
J39	2, 3	Voltage Translator of TWRPI interface is disabled
J40	2, 3	Voltage Translator of TWRPI interface is disabled
J41	1-2	ADC potentiometer is supplied to VDDA
J43	1, 2	RESET is routed OSBDM Interface
J44	1, 2	BKGD is routed OSBDM Interface
J45	1, 2	This link connects the column of SW1, SW2 and SW3 to PT4 port.
	3, 4	This link connects the column of SW4, SW5 and SW6 to PT5 port.
	5, 6	This link connects the column of SW7, SW8 and SW9 to PT6 port.
J46	1-2	Output voltage of the External Ballast transistor [+5V] is routed to VDDA
J47	1-2	Output voltage of the External Ballast transistor [+5V] is routed to VDDX
J49	1-2	Output voltage of the External Ballast transistor [+5V] is routed to VDD [OSBDM Interface]
J52	1-2	ADC potentiometer is routed to AN0 port

Headers and Connectors List Description

Jumper	Description
J1	SPI and I2C Header
J3	Header Voltage Selector. VDDX_TWR can be routed to VDDX or PP7 port
J6	Header Load Selector for HVI port
J7	Main power barrel connector (up to 18 V)
J8	VBAT is routed to VSUP
J9	VBAT is routed VLIN
J10	I2C pull-up resistors enable
J11	This jumper connects VSUP voltage to the HVI interface
J12	TWRPI Interface Connector
J13	TWRPI Interface Connector
J15	Power IN of 3.3V Voltage Regulator.
J19	LIN Daisy Chain OUT Connector
J25	The header connects the ADC ports to the Anodes of the RGB LED [D8].
J27	Connects the ports of the MCU to the cathodes of the RGB LED [D8]. These pins controls the on/off of the RGB LED [D8]
J30	This jumper selects the SCI_RX port for the OSBDM serial bridge.
J31	This jumper selects the SCI_TX port for the OSBDM serial bridge.
J35	This link enables the control of the LIN OUT interface
J37	BDM Interface

Headers and Connectors List Description (Cont.)

Jumper	Description
J38	This link connects PP0 port to the Buzzer interface
J39	Voltage Translator of TWRPI interface is disabled
J40	Voltage Translator of TWRPI interface is disabled
J41	This jumper routes VDDA voltage to the ADC Pot
J43	RESET is routed OSBDM Interface
J44	BKGD is routed OSBDM Interface
J36	OSBDM and USB to Serial Interface connector
J46	External Ballast transistor [+5V] is routed to VDDA
J47	External Ballast transistor [+5V] is routed to VDDX
J49	External Ballast transistor [+5V] is routed to VDD [OSBDM Interface]
J52	ADC potentiometer is routed to ADC port
J53	Jumper to enable Pull-up resistors in TWRPI Interface
J28	LIN Daisy Chain IN Connector
J50	LIN Master mode header
J16	GPIO Header
J23	GPIO Header
J24	GPIO Header
J29	GPIO Header