



VEMAC

FACTSHEET

# VERA 4.0 COMPACT

Multi-function ECU with advanced  
automotive network connection.

- Model-based toolchain
- Compact design with integrated actuator outputs
- Multi-Core processor
- 4xCAN + 2xCAN FD
- Prepared for Automotive Ethernet

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## PRODUCT DESCRIPTION

VERA 4.0 compact is the continued development of the VeRa 3.0 compact and starts the new generation of VeRa products: Three-core processor with attached system base chip. A total of 6 CAN buses, including 2 CAN FD, prepared for Automotive Ethernet/BroadR-Reach, all inputs and outputs fully diagnosable. The VERA 4.0 compact retains the familiar form factor and housing and thus continues to represent the compact and cost-optimized version of our product portfolio. The standardized and rugged enclosure without any compromises in calculation power makes VERA 4.0 compact best choice for many applications.

## MARKETS AND GOALS

Today's markets are characterized by shorter development cycles and increasing competition. In order to succeed in this environment, the limits of possibility have to be kept in sight. Based on our widely used and highly configurable VeRa system we developed VeRa 4.0 compact for cost sensitive powertrain and body applications. Additionally, to prototype and A-sample use it is designed for small series and to bridge the gap between prototype and series.

The consequent use of model-based development methods makes the VeRa family with its comfortable tool-chain VeRa TC a highly cost effective platform, because the developer can concentrate on the function itself, while the interfaces to all automotive sensors and actuators are available and integrated for easy use.

## AUTOMOTIVE REQUIREMENTS FOR 2022+

Advanced powertrain components like new sensors and actuators in body and powertrain systems lead to more comfort, safety and environmental functions. And all these functions have to be integrated in the highly distributed E/E-architecture of modern passenger cars, heavy duty vehicles and agricultural and construction machines as well.

Hence the requirements for flexible fleet test and small series ECUs are the combination of many and various network interfaces as CAN, LIN or SENT with on-board actuator power-stages and dedicated sensor inputs.

The full diagnostic capability for all inputs and outputs is a natural demand and the control units have to be robust against any environmental influences. Our systems are both splash and dust proof according to IP6K9K (DIN 40 050). The temperature range fulfils industry standards and allows operation from -40°C to +85°C, and optionally up to 105 °C.

## INPUTS

<b>Analog Inputs</b>	Input Range	10x 0...10 V input voltage Pull-Up or Pull-down configuration Passive input filter
	Sampling	2 ADC Multiplex-Chains with 2 ADCs Processor internal max. sample rate per ADC 1 MSPS FPGA internal 8 simultaneous ADCs with 3 MSPS
	Resolution	12 bit
	Redundance	All analog inputs are read into the FPGA via redundant ADCs for applications where increased safety is required.
<b>Digital Inputs</b>	Input Range	8x 5V/12V/24V logic levels Schmitt-Trigger inputs TTL-level compatible Pull-up or Pull-down configuration
	Configuration	Standard DI (fast/slow) Frequency measurement PWM (Pulse Width Modulation) measurement
	Analog use	All digital inputs can be used as simple analog inputs (w/o redundance)

## OUTPUTS

<b>Analog Outputs</b>	Configuration	0...5V output voltage 51Ω 10mA Max. 1 MSPS
	Number of channels	4x analog output channels 12 bit resolution
<b>Digital Outputs Multi-Purpose</b>	Configuration	8x multi-purpose output channels on two banks - up to 4 H-bridges to be realized - alternatively, each half bridge can be configured individually as push/pull. lowside or highside output
	Specifications	10A maximum output short circuit current Operation voltage bankwise selectable by software switch: - VeRa operation voltage (6...34V) - two software configurable DAC voltages
<b>Digital Outputs Low Side</b>	Configuration	6x Open-Drain Outputs Control as digital or PWM outputs Current: 25 A (continuous), 30A (peak current) Load voltage: max 60 V 0 ... 100 kHz, 0 ... 100 % duty cycle Output current-feedback (1MSPS)

## COM

## SPECIFICATION

<b>Communication</b>	CAN	4x CAN standard Max. 1 MBit/s 2x CAN FD calibration access over XCP on CAN A
	LIN	2x LIN Bus
	SENT	2x SENT input (with Pull-Up-resistor) SENT outputs realizable via multi-purpose digital outputs
	BroadR-Reach (upcoming)	(automotive Ethernet) Ready on hardware level. No software support yet
<b>Sensors</b>		
	Temperature	2x ECU onboard temperature 16 bit resolution, +/-0.5% accuracy
	Acceleration (optional)	Triaxial 12bit acceleration sensor Triaxial 16bit, +/-2000°/s gyroscope

## DEVICE

## SPECIFICATION

<b>Mechanical</b>	Main Connector	Cinch Modice LE60pol.
	Housing	Chinch Modice LE
	Temperature	-40...85°C
<b>Power Supply</b>	Input voltage range	6...34V according to ISO 7637 reverse polarity protection and Overvoltage protection
	Output voltage	2x5V 300mA, independently stabilized for sensor supply Protected battery output Overcurrent protected Output voltage and current read in by MPC for diagnostics
	Current consumption	ca. 250 mA (@12 V / CPU working) turned off ISTBY < 200 µA
	Diagnostics	State-of-the-art automotive drivers with full diagnosability via SPI. Where necessary for further diagnostics, voltages/currents are read back via analog MPC inputs.
<b>General</b>	EEPROM	256 bit / 1M Erase/Write cycles (page mode @25°C)
	Safety	Main processor MPC5777C (up to ASIL-D) three dual issue, 32-bit CPU core complexes (e200z7), two of which run in lockstep. System Basis Chip supported (optionally equipable)
	Security	Tamper Detection Module (TDM) On-Chip encryption (CSE/TDM) PASS module to support security features

## SOFTWARE

### Software

- VeRa TC 3.0
- Project management
- Configuration and generating of Simulink libraries
- Compiler call and code generation for configuration components
- Flashing on hardware
- Generation of A2L and HEX files for calibration software
- Support of MATLAB SIMULINK © and dSPACE TargetLink ©

### Compiler

Support of CLANG compiler (free – no additional costs) alternatively:  
state-of-the-art WindRiver C-Compiler (formerly DIAB), suited for developments according to ISO 26262

## System Overview

