LAUTERBACH
DEVELOPMENT TOOLS

TRACE32®

# DEBUG & TRACE

## TriCore™ AURIX™

TriCore™

# TriCore™ AURIX™ at a glance

For more than 20 years Lauterbach has been supporting the latest TriCore™ AUDO™ and AURIX™ microcontrollers. Our tool-chain offers:

- Debugging of all TriCore CPUs and auxiliary cores.
- Tracing of TriCore CPUs and some auxiliary cores via on-chip trace, high-speed serial trace or DAP streaming.
- Code Coverage according to ISO 26262 (Tool Qualification Support Kit)
- AUTOSAR-aware debugging & profiling

TriCore™ AURIX™

## TriCore™ AURIX™ Debug Solutions

Single debug solution for all cores

| target system | core type | core state |
|---|---|---|
| 1: Chip | | |
| 1: SMP Sub System | TriCore | |
| 0: TriCore0 | TriCore | stopped |
| 1: TriCore1 | TriCore | stopped |
| 2: TriCore2 | TriCore | stopped |
| 3: TriCore3 | TriCore | stopped |
| 4: TriCore4 | TriCore | stopped |
| 5: TriCore5 | TriCore | stopped |
| 2: Core | HSM\ARM | stopped |
| 3: SMP Sub System | GTM | |
| 0: Core | GTM | stopped |
| 1: Core | GTM | stopped |
| 2: Core | GTM | stopped |
| 3: Core | GTM | stopped |
| 4: Core | GTM | stopped |
| 5: Core | GTM | stopped |
| 6: Core | GTM | stopped |
| 7: Core | GTM | stopped |
| 4: TC3X_SCR | i8051 | running |

TRACE32® enables concurrent debugging of all TriCore™ CPUs as well as all auxiliary cores of an AURIX™ SoC.

This allows to examine their interaction in depth.

The above includes:

- TC4xx: up to 6 TriCore™ CPUs, CSRM (TriCore™), SCR (XC800), PPU (ARC), GTM
- TC2xx/3xx: up to 6 TriCore™ CPUs, HSM (Cortex®-M), SCR (XC800), GTM

Besides standard features like Step/Go/Break and flash programming TRACE32® offers:

- AUTOSAR-aware debugging
- Debugging of multi-OS configurations
- Hypervisor-aware debugging for Memory Protection Unit (MPU) hypervisors

## TriCore™ AURIX™ Trace Solutions

- Records information, generated by the MCDS module, about instruction execution and data accesses of multiple TriCores™ CPUs, GTM and PPU as wells as transfers on the on-chip buses and peripheral states transitions.
- Provides triggers and filters to limit recorded data and to use trace buffers effectively.
- Enables long-term recoding by streaming trace data to the host (TRACE32® trace streaming).

Multicore Trace

Setup... | Config... | Goto... | Find... | Chart | Profile | MIPS | More | Less

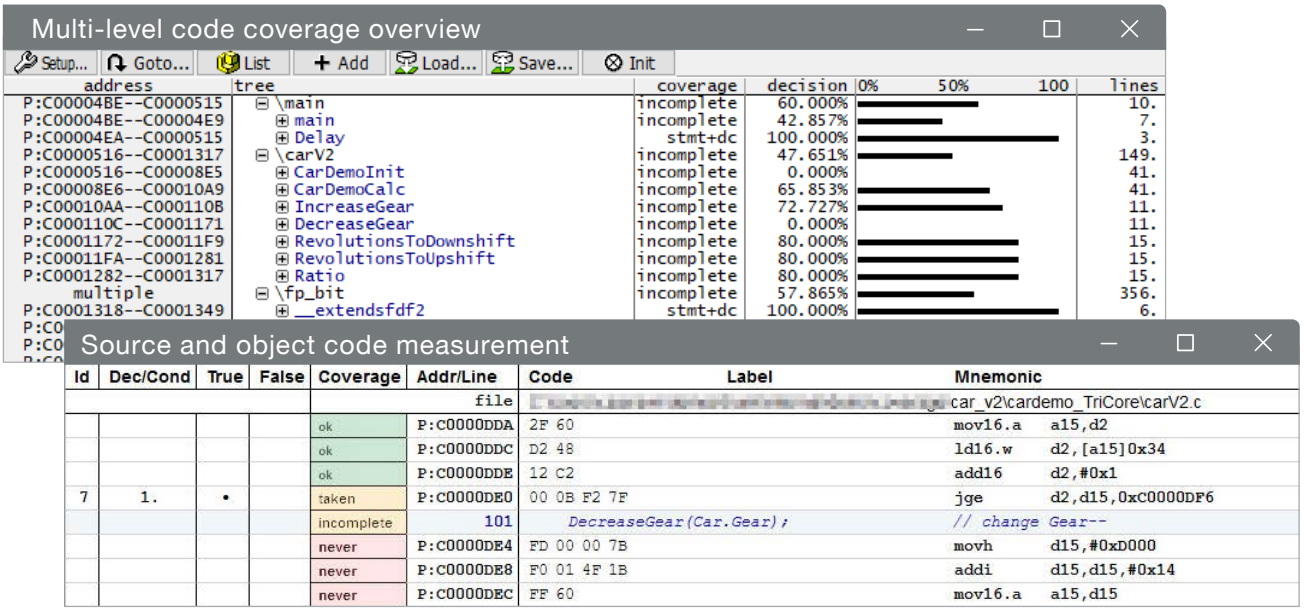
| record | run | address | cycle | data | symbol | ti.back | busmaster |
|---|---|---|---|---|---|---|---|
| | 0 | /* Enabling core3 : tc3.. */ | | | | | |
| | 0 | void TC0_StartCore3() | | | | | |
| | 0 | { | | | | | |
| | 0 | extern void __noinline__ __noreturn__ __jump__ _start_tc3(void); | | | | | |
| 50 | 0 | CPU3_PC.U = (unsigned int)_start_tc3; | | | | | |
| | 0 | movh.a a15,#0xF888 | | | | | |
| | 0 | st.w [a15]-0x1F8,d15 | | | | | |
| +00004136 | 0 | D:F887FE08 wr-data | | 70101348 | | 0.080us | |
| +00004148 | 1 | P:70100EA6 ptrace | | | ..._intmem\cstart_tc1_start+0x86 | 2.080us | |
| | 1 | isync | | | | | |
| | 1 | st16.w [a15],d15 | | | | | |
| +00004154 | 1 | D:F0036258 wr-data | | FFFC00F3 | | 0.000us | |
| | 1 | ld16.w d15,[a15] | | | | | |
| +00004166 | | D:F00362A8 rd-spb | | FFFC000F | | | CPU0 DMI |
| +00004175 | 1 | D:F0036258 rd-data | | FFFC000F | | 0.000us | |
| | 1 | movh.a a15,#0x0 | | | | | |

(feature availability depdends on used device)

TriCore™

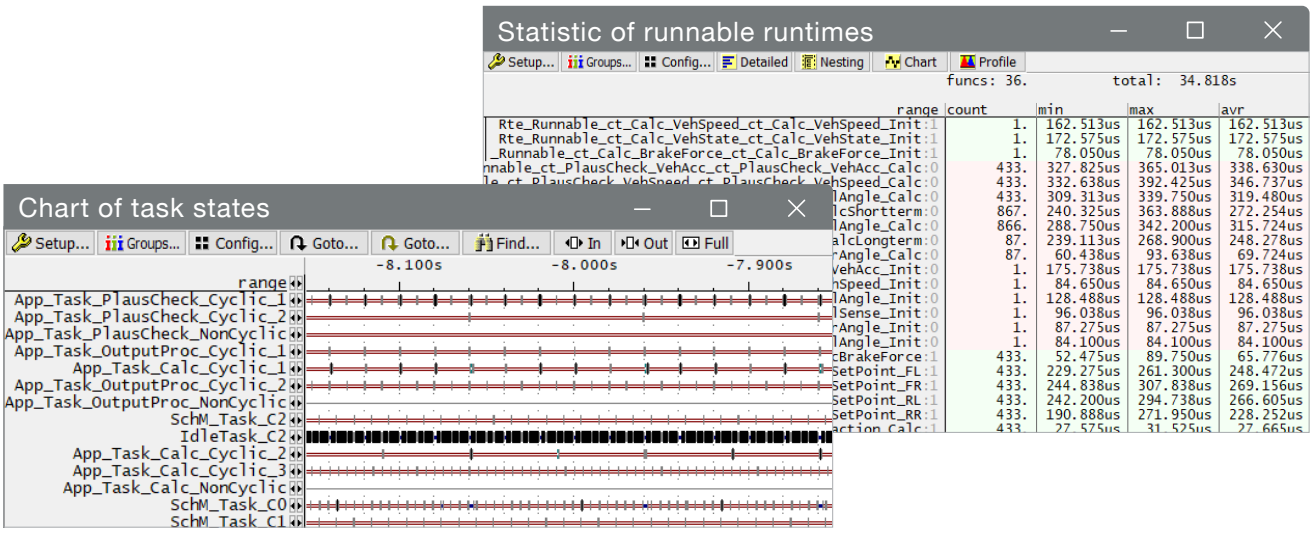
## Code Coverage for Functional Safety

- The code coverage funtionality supports all metrics required for ISO26262 and other safety standards: statement, branch, MC/DC, function and call coverage.
- The TRACE32® Tool Qualification Support-Kit streamlines TRACE32® tool qualification effort and costs for the TRACE32® Instruction Set Simulator and all TriCore™ trace solutions.




## Profiling for AUTOSAR Classic Platform

- The support for the ARTI standard provides profiling of task state changes, runnables, and interrupts including their state changes. An export to the standardized ARTI format allows data exchange with 3rd-party timing tools.
- The support for the ORTI standard provides profiling of running tasks and (interrupt) service routines as well as a proprietary export.
- These use cases are supported by all TRACE32® trace solutions.



# Debugger and Trace for TriCore™ AURIX™

POWER DEBUG

## DEBUGGER VIA JTAG/DAP

Full-featured AUTO26 connector including watchdog control and arbitration lines for third-party tools. Converters for ECU14 and OCDS16 available.

POWER DEBUG ADD-ON

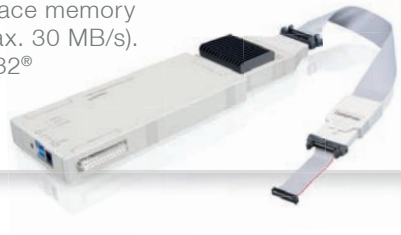
## ON-CHIP TRACE

An additional license enables MCDS trace via on-chip trace memory.


COMBIPROBE 2

## DAP STREAMING

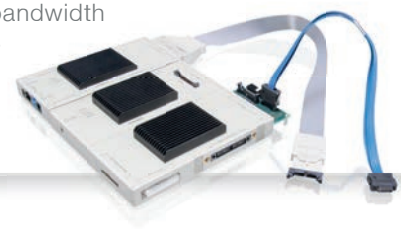
Streaming of on-chip trace via DAP debug port to external trace memory (max. 512 MB, max. 30 MB/s). Supports TRACE32® trace streaming.



POWER TRACE

## AURORA GIGABIT TRACE

Max. 8 GB of external trace memory, max. 12,5 GBit/s bandwidth per lane. Supports TRACE32® trace streaming.



# Software-Only Products

XCP

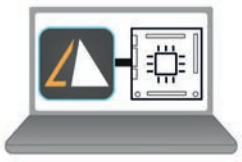
## DEBUG AND TRACE

Debugging via XCP Slave supporting "Software Debugging over XCP" standard (ASAM MCD-1 XCP) or ETAS-specific protocol Trace via Onchip trace.

FRONT-END

## DEBUG AND TRACE OF SYNOPSYS VDK

Debugging and tracing using TRACE32® on software models before a first hardware prototype is available.



FOR MORE INFORMATION VISIT: www.lauterbach.com/1660

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