

# 9 Debug and trace

The debug and trace system is a flexible and powerful mechanism for non-intrusive debugging.

The main features of the debug and trace system are the following:

- Access port connection for Arm Cortex-M33
  - Eight breakpoints
  - Four watchpoint comparators
  - Instrumentation trace macrocell (ITM)
  - Embedded trace macrocell (ETM)
  - Access protection through APPROTECT, SECUREAPPROTECT, and ERASEPROTECT
- Serial wire debug (SWD) interface, protocol version 2
- Control-access port (CTRL-AP) that enables device control when other debug access ports (DAP) have been disabled by the access port protection
- Trace port interface unit (TPIU)
  - 4-bit parallel trace of ITM and ETM trace data
  - Serial wire output (SWO) trace of ITM data

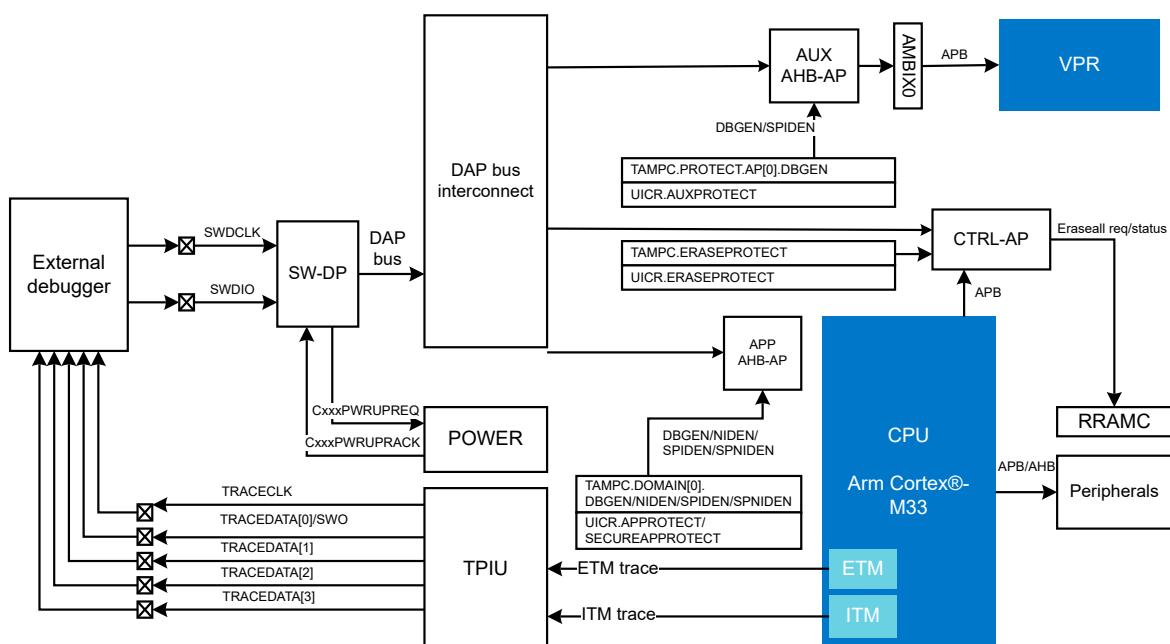


Figure 164: Debug and trace overview

## 9.1 Debug access port

An external debugger can access the device through the debug access port (DAP).

The DAP implements a standard serial wire debug (SWD) Arm CoreSight protocol with a two-pin serial interface (**SWDCLK** and **SWDIO**).

The **SWDIO** pin has an internal pull-up resistor. The **SWDCLK** pin has an internal pull-down resistor.

There are several access ports for connecting to different parts of the system, as shown in the following table.