

# DAVE™

March 2016



[www.infineon.com/xmc](http://www.infineon.com/xmc)  
[www.infineon.com/dave](http://www.infineon.com/dave)



# XMC™ microcontroller and DAVE™ software development platform



## Our Expertise



Motor control



Power conversion



Lighting



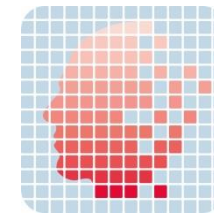
Communication

## Our Excellence



Scalable **ARM®**  
**Cortex™-M MCU**  
**portfolio** offering  
leading-edge, smart,  
and fast peripherals

## Our Enablement



**DAVE™**

Digital  
Application  
Virtual  
Engineer

Innovative and  
free of charge code  
development platform  
goes **hand-in-hand**  
**with a wide ARM®**  
**ecosystem**

# XMC™ Microcontroller

- Software development platform



## DAVE™

Digital  
Application  
Virtual  
Engineer

Free Eclipse based code development platform/IDE offering code repository, graphical system design methods, and automatic code generator to guide **XMC™ microcontroller** user along the entire process – from evaluation to production (E2P).

XMC™ Lib and DAVE™ generated code is tested and released for use with 3<sup>rd</sup> party tool.

[www.infineon.com/dave](http://www.infineon.com/dave)

# XMC™ Microcontroller

## – Software development made easy

### 3<sup>rd</sup> PARTIES

XMC™ Lib and DAVE™ APPs are tested with GCC, ARM®, TASKING, IAR compilers;  
Can be used with Altium, ARM®/KEIL, Atollic, IAR Systems, Rowley, and DAVE™ compiler IDEs

### DAVE™

Free Eclipse-based Integrated Development Environment (IDE) including  
GNU C-compiler, debugger and code generation plug-in

### EXAMPLES

XMC™ Lib and DAVE™ APPs composed to create applications

### DAVE™ SDK

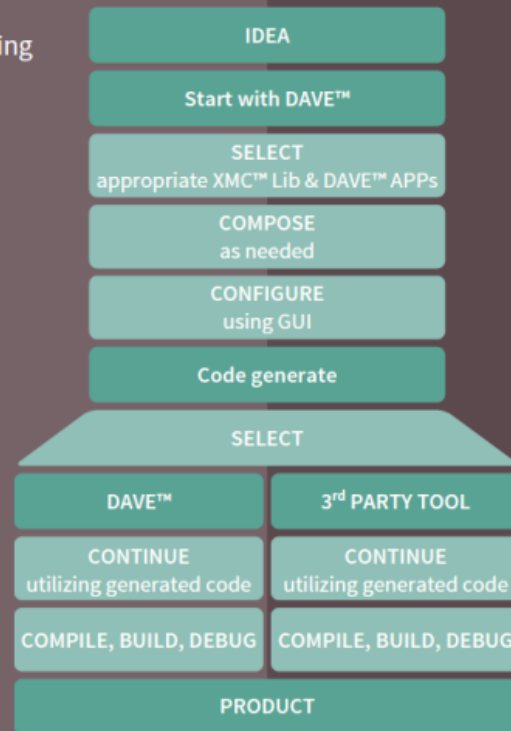
Software development kit to modify,  
enhance, and develop new DAVE™ APPs

### DAVE™ APPs

GUI-configurable application-oriented  
software components using XMC™ Lib;  
arranged in a library (APIs)

### XMC™ Lib

CMSIS / MISRA 2004-compliant low  
level driver library for peripherals (APIs)



Professional code  
development  
platform/IDE  
for all XMC™  
microcontrollers.

XMC™ 32-bit industrial microcontrollers portfolio



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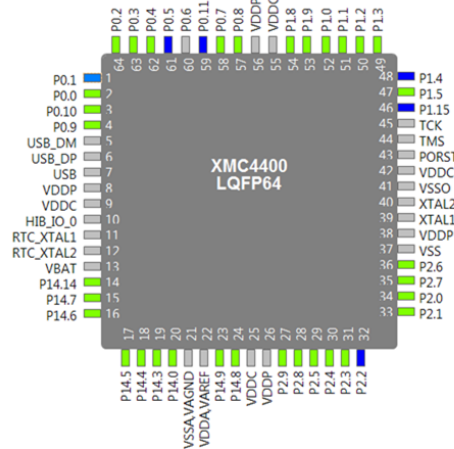
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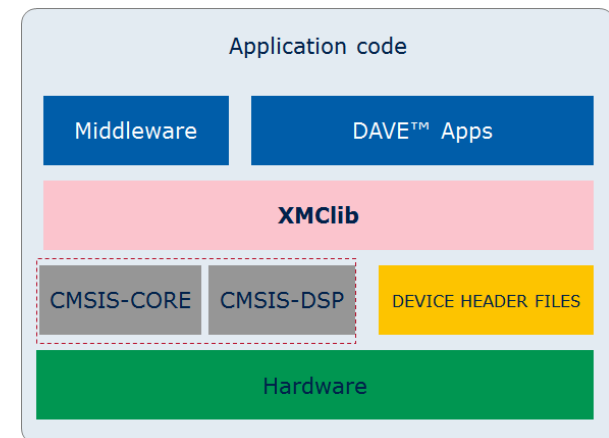
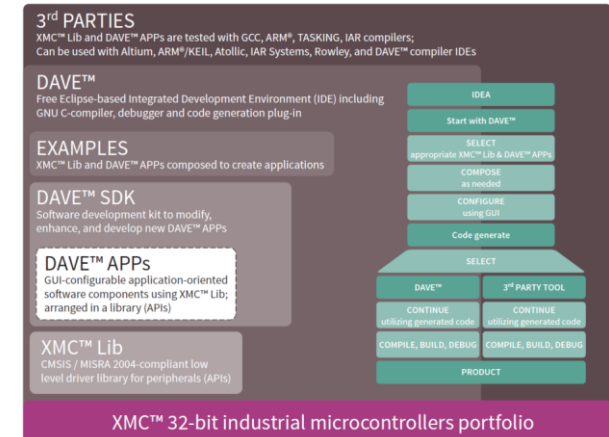
**XMC™ Lib**  
CMSIS / MISRA 2004-compliant low  
level driver library for peripherals (APIs)

**Development Process Flowchart:**

  - IDEA
  - Start with DAVE™
  - SELECT  
appropriate XMC™ Lib & DAVE™ APPs
  - COMPOSE  
as needed
  - CONFIGURE  
using GUI
  - Code generate
  - SELECT
  - DAVE™
    - CONTINUE  
utilizing generated code
  - 3<sup>rd</sup> PARTY TOOL
    - CONTINUE  
utilizing generated code
  - COMPILE, BUILD, DEBUG
  - COMPILE, BUILD, DEBUG
  - PRODUCT



- › Low level driver (APIs)
- › Code library for peripherals
- › Transparency of code
- › CMSIS and MISRA 2004 complaint
- › Routines and data structures for all peripheral functions
  - Initialization / Configuration
  - Cross peripheral connectivity
  - Event handling
  - I/O handling
  - Runtime peripheral operation



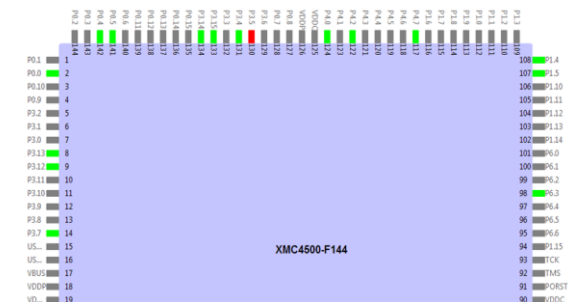
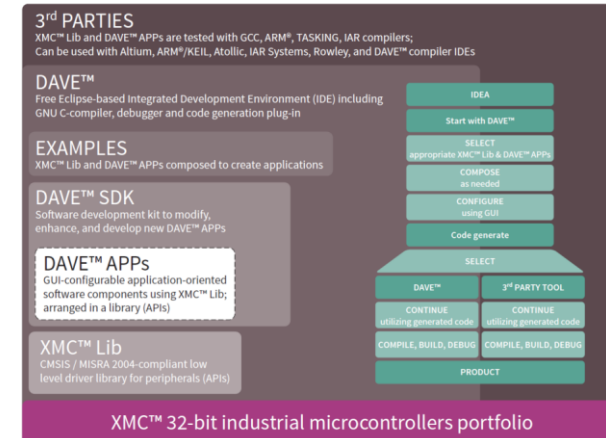
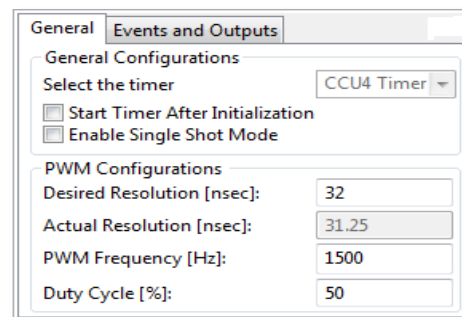
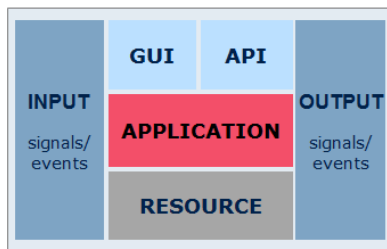
**DAVE™ APPs**  
are build on top of XMC™ Lib

# DAVE™ APPs

– Simple, fast, and well structured



- › Library of configurable (GUI) **application** oriented software components using XMC™ Lib
- › Growing repository of APPs for
  - System Control
  - General Purpose
  - Communication
  - Power Conversion
  - Motor Control
  - HMI, Lighting



# DAVE™ APPs (2)

– A wide range of applications is covered

## Motor Control



- › Asynchronous Motors (FOC, Frequency Control)
- › PMSM, BLDC (FOC, Scalar, Hall Sensor)
- › PWM Generation
  - Space Vector
  - Block Commutation
- › Position Detection (Hall, Encoder, Resolver)
- › Drive Automation

## Power Conversion



- › Buck Converter
  - Peak Current Control
  - Voltage Control
- › PWM Generation using HRPWM

## Lighting



- › LED Lamp Control
- › DALI
- › DMX512

## HMI



- › SEGGER GUI Library
- › Display
- › Touch

## Communication



- › USIC
  - UART
  - SPI
  - I2C
- › USB
- › Ethernet

## General Purpose



- › Timer/PWM (Capture, Compare)
- › ADC
- › DAC
- › GPIO

## System

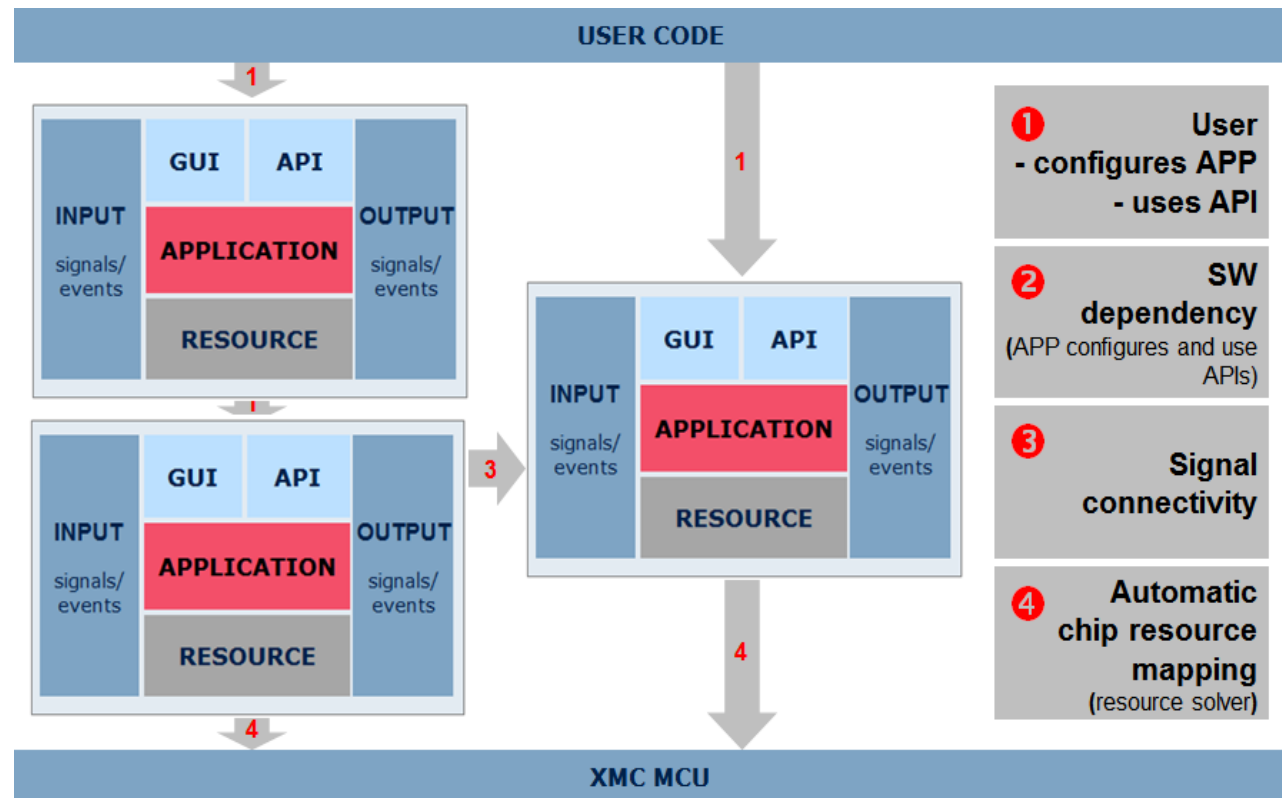


- › Interrupt
- › DMA
- › AES
- › CRC
- › RTOS
- › File System
- › Emulated EEPROM

# DAVE™ APPs (3)

## – Efficient object oriented programming

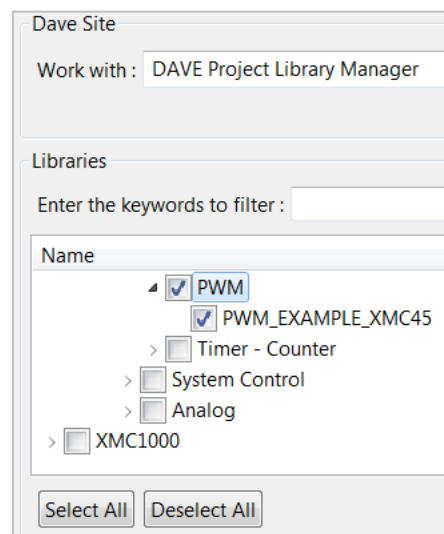
- › Flexibility of combination
- › Validate user input/configuration
- › Support user with connectivity options



- 
- The figure illustrates the DAVE™ APP Management and Code Generation process. It is divided into two main parts: a flowchart on the left and a screenshot of the DAVE™ APP Management interface on the right.
- Flowchart:**
- CODE ENGINE (eclipse plug-in):** This central component manages the application development process. It includes:
    - DAVE™ APP management
    - Graphical User Interface
    - Resource management
      - Assign USIC channel 2
    - Code generator
      - Using code templates
  - DEVICE DESCRIPTION:** This input provides the XMC MCU resource and connection model. It specifies:
    - Require one USIC channel
    - Provide six USIC channels
  - GENERATED APPLICATION LIBRARY:** The output of the code generation process, represented by a stack of red documents.
- DAVE™ APP Management Interface Screenshot:**
- General Configurations:**
    - Select the timer: CCU4 Timer
    - Start Timer After Initialization: ☐
    - Enable Single Shot Mode: ☐
  - PWM Configurations:**
    - Desired Resolution [nsec]: 32
    - Actual Resolution [nsec]: 31.25
    - PWM Frequency [Hz]: 1500
    - Duty Cycle [%]: 50
  - Code Generation:** The interface shows the generation of code for the CCU4 timer, including the generation of the CCU4 timer driver code and the generation of the CCU4 timer peripheral driver code.

- Base upon it ...

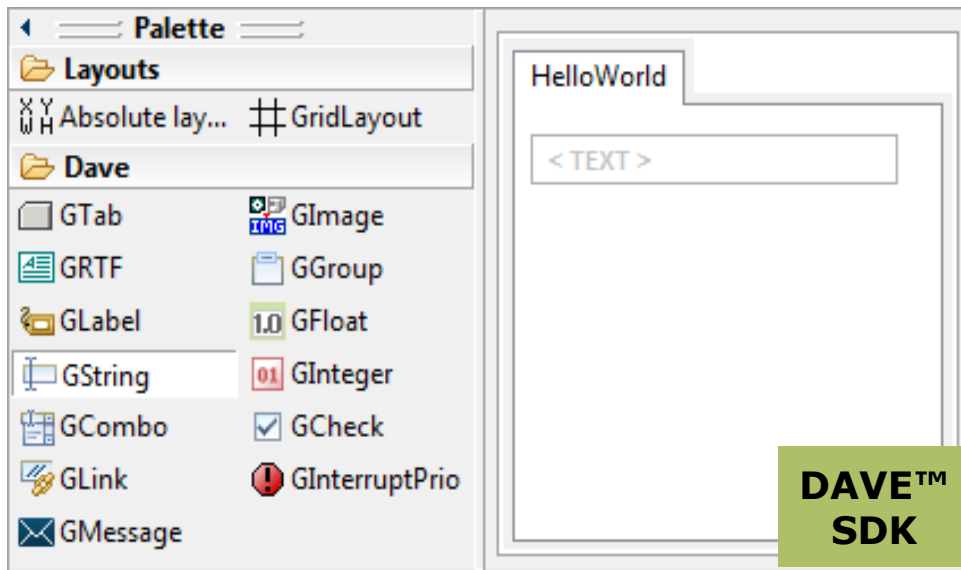
- › A set of examples projects as references for complete applications
  - Motor Control
  - Power Conversion
  - Lighting and HMI
  - And many more ...
- › XMC™ Lib and DAVE™ APPs composed to applications examples



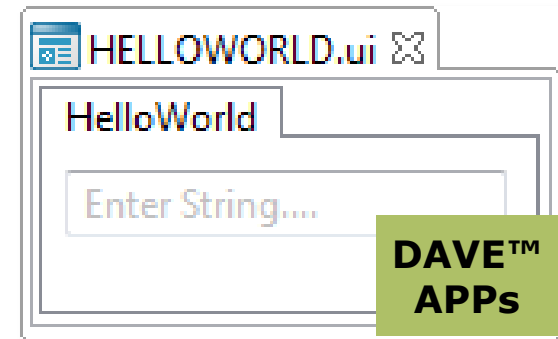
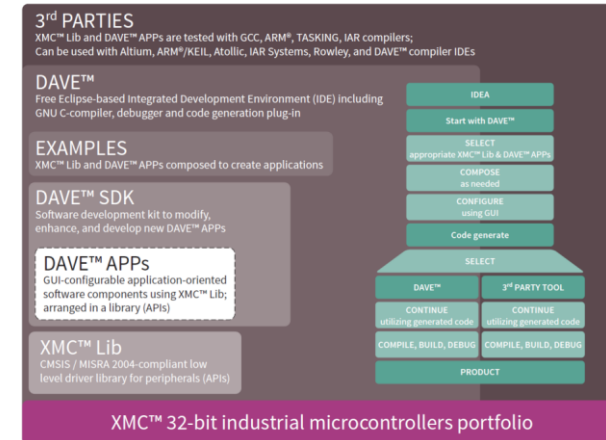
# DAVE™ SDK

## – Modify/Build your own APP

- › Modify, extend, optimize or develop DAVE™ APPs using DAVE™ SDK (Software Development Kit)



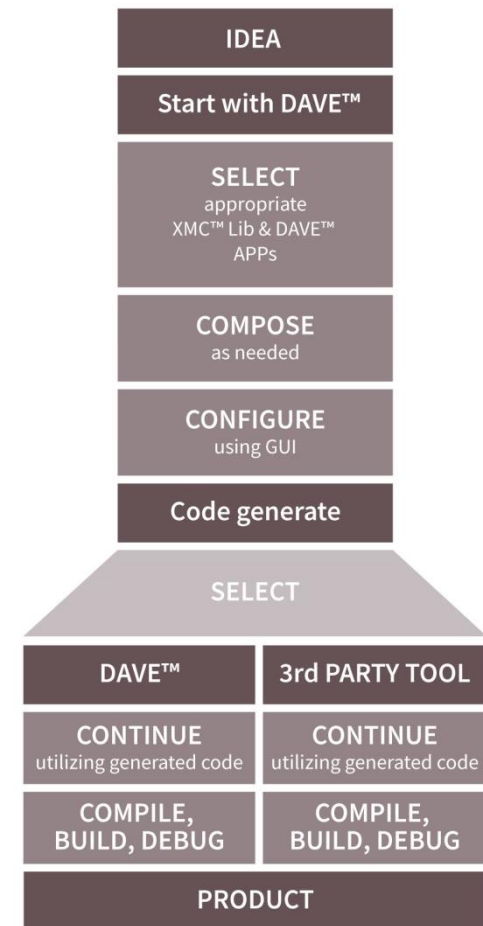
*Based on Eclipse Java IDE extended with GROOVY plug-in*



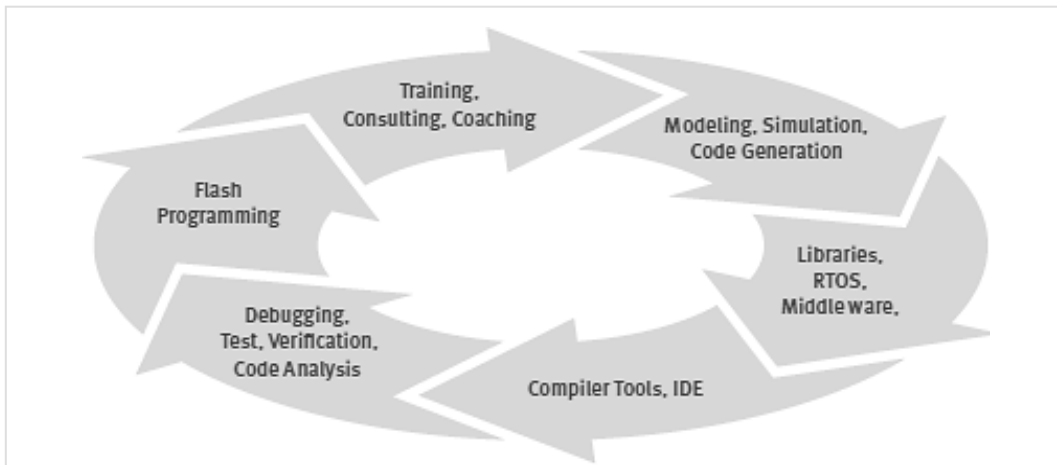
# 3rd PARTIES

## – Hand-in-Hand

- › XMC™ Lib and DAVE™ generated Code are tested with
  - GCC compiler
  - ARM® compiler
  - TASKING compiler
- › And released for Compiler IDEs



# – From evaluation to product (E2P)



Your complete development cycle is covered by DAVE™ which work hand-in-hand with a wide range of 3<sup>rd</sup> party development tools, ready-to-use software stacks, and supporting services to support a efficient design process using the 32-bit XMC™ industrial microcontroller portfolio.

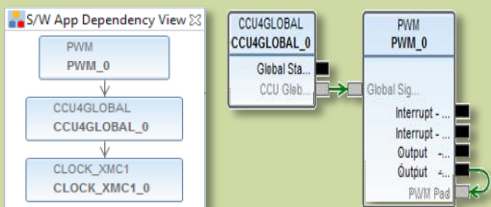


## – Recap of basic facts

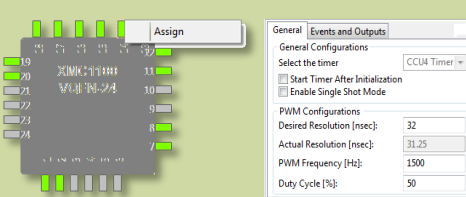


### Digital Application Virtual Engineer

- › **Free** Eclipse CDT based IDE using GNU C-Compiler
- › **Code generation** with **graphical user interface** (GUI)  
*Configurable and reusable code repository consist of **XMC™ Lib** (for all peripherals), **DAVE™ APPs**, and **EXAMPLES***
- › Automatic assignment of chip resources (resolver)
- › Debugger and Flash loader
- › **All XMC™ MCUs** powered by ARM® Cortex®-M supported
- › XMC™ Lib and DAVE™ APPs **tested** with GCC compiler, ARM® compiler, and TASKING compiler **released for** Altium, ARM/KEIL, Atollic, DAVE™, IAR Systems, iSystem, and Rowley



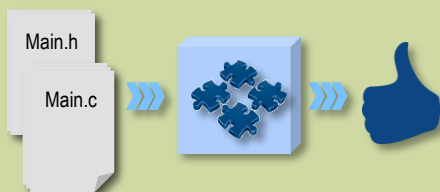
### 1 Component based programming



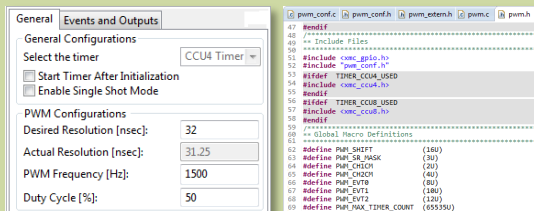
### 2 GUI based configuration



### 3 Reusable code repository



### 4 Hardware resource management



### 5 Easy code generation

Released for

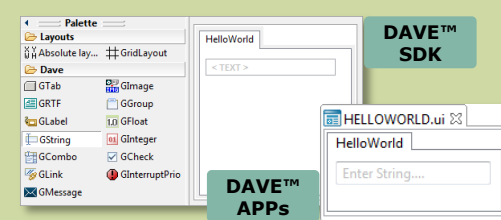
- > Altium Limited
- > Atollic
- > ARM/KEIL
- > DAVE™
- > IAR Systems
- > iSystem
- > Rowley Associates



### 6 Code reuse with 3<sup>rd</sup> party tools

- > FAQ
- > FORUM
- > Knowledge Base
- > Email: [dave@infineon.com](mailto:dave@infineon.com)

### 7 Expert support



### 8 Modify/create DAVE™ APPs with DAVE™ SDK



### 9 Free of charge



Part of your life. Part of tomorrow.

