# XMC™ in LED Lighting Applications

XMC™ Microcontrollers

January 2016

# Agenda

1. Why XMC™ for LED Lighting?
2. Key Microcontroller Features
3. Kits and Reference Designs
4. Development Tool and Software

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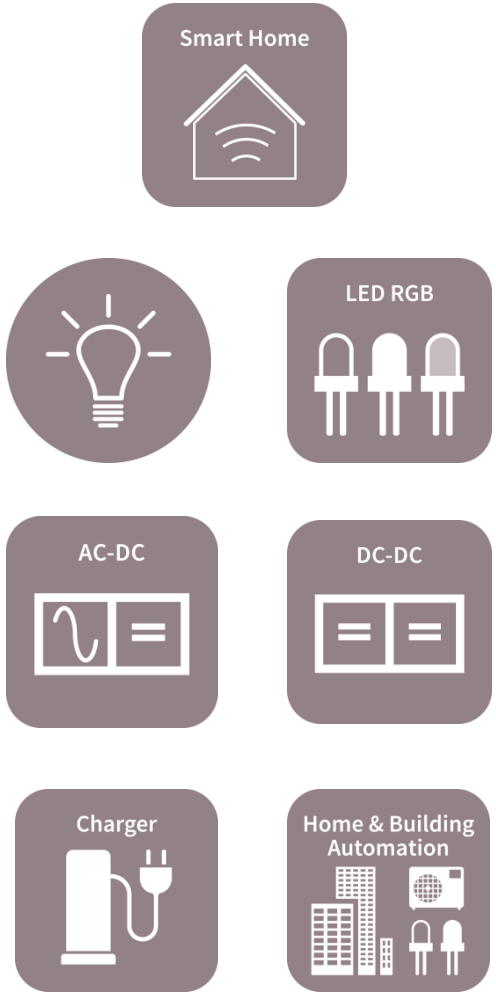
# Why XMC™ for LED Lighting?

- Dedicated peripheral for smooth, flicker-free dimming and color mixing
- On-chip comparators, fast 12-bit ADC and PWM modules for fast and accurate LED current control
- Ideal for dimmable multi-channel DCDC LED driver solutions
- High-current pins for fast switching: up to 50 mA
- Integrated solution for lighting control, power conversion and communications.
- Up to 200 K Flash
- 16 to 64-pin packages
- 32-bit ARM® Cortex®-M0 core



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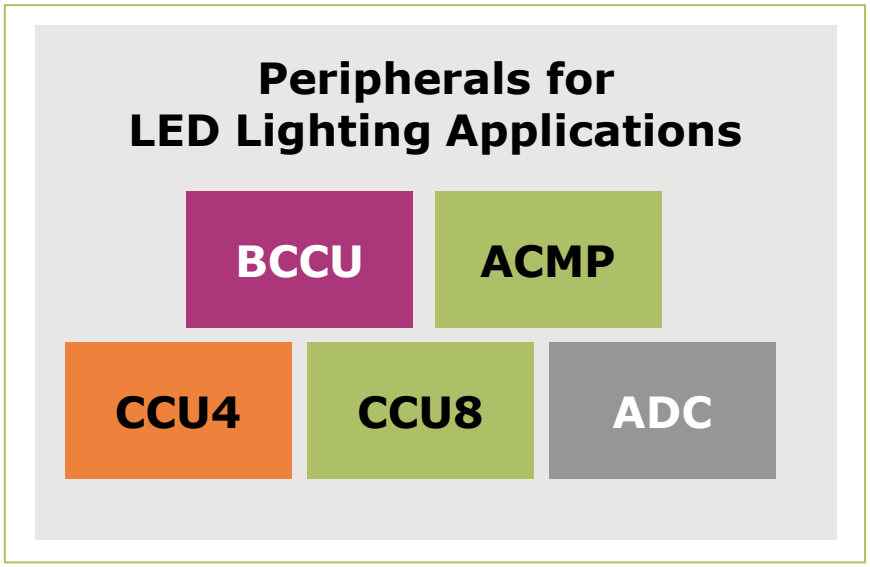
# Key Microcontroller Features




## Highlights

BCCU dedicated for modulation dimming and color mixing enables users to develop high quality lighting solutions with little user code.

Tightly interconnected analog and PWM peripherals enable fast SMPS control for high efficiency.

## Key Feature

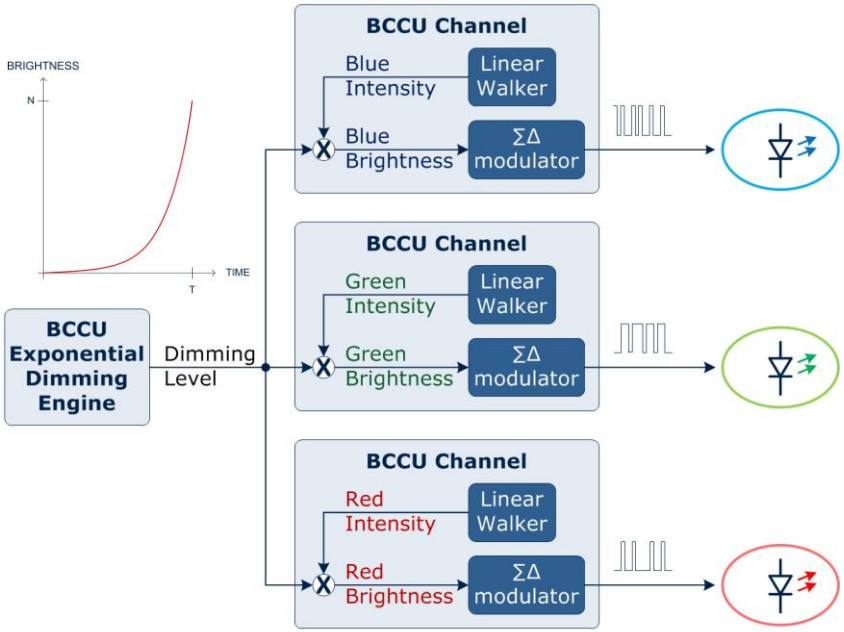
- Dedicated Brightness and Color Control Unit
- Interconnected analog and PWM peripherals
- In-built comparators and high-current pads

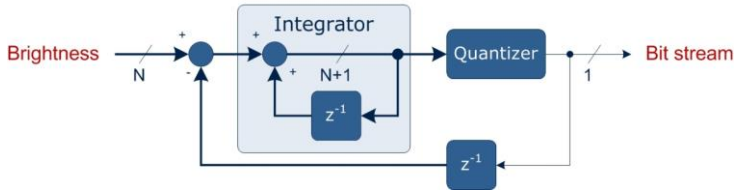
## Customer Benefits

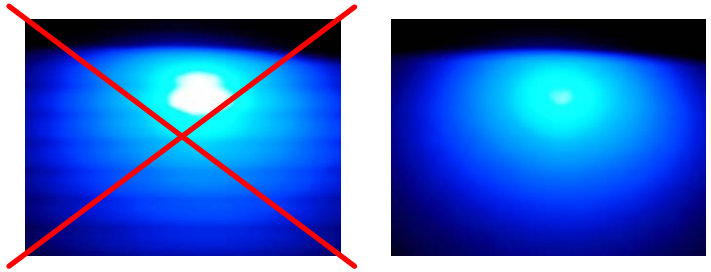
- Automatic pulse-density modulated dimming and color control
- Control fast SMPSs with high power density and high dimmability
- Low BOM cost

# Dedicated Brightness and Color Control Unit

- Designed to automatically control the dimming level and color of multi-channel LED lights
  - Automatic configurable high frequency brightness modulation (PDM)
  - Automatic exponential dimming and linear intensity change

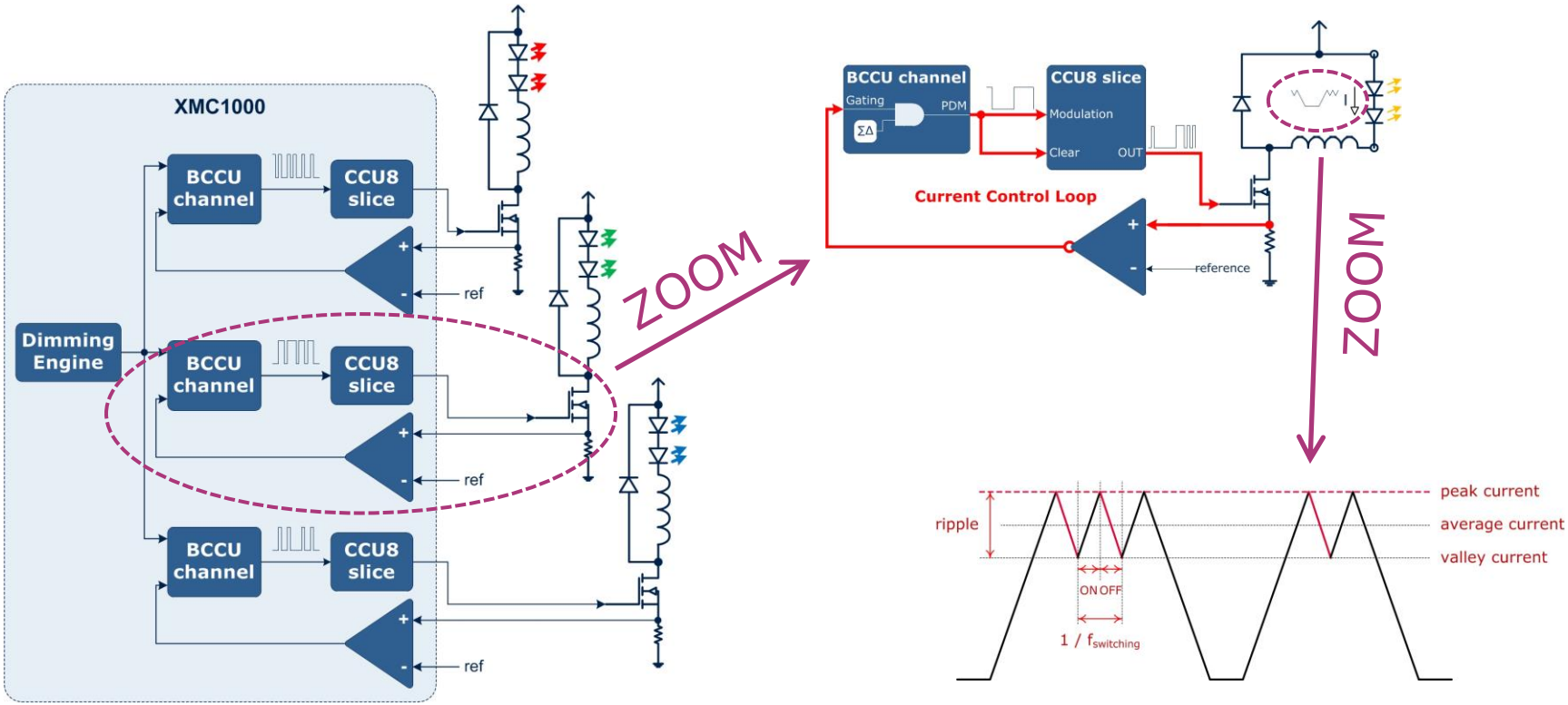


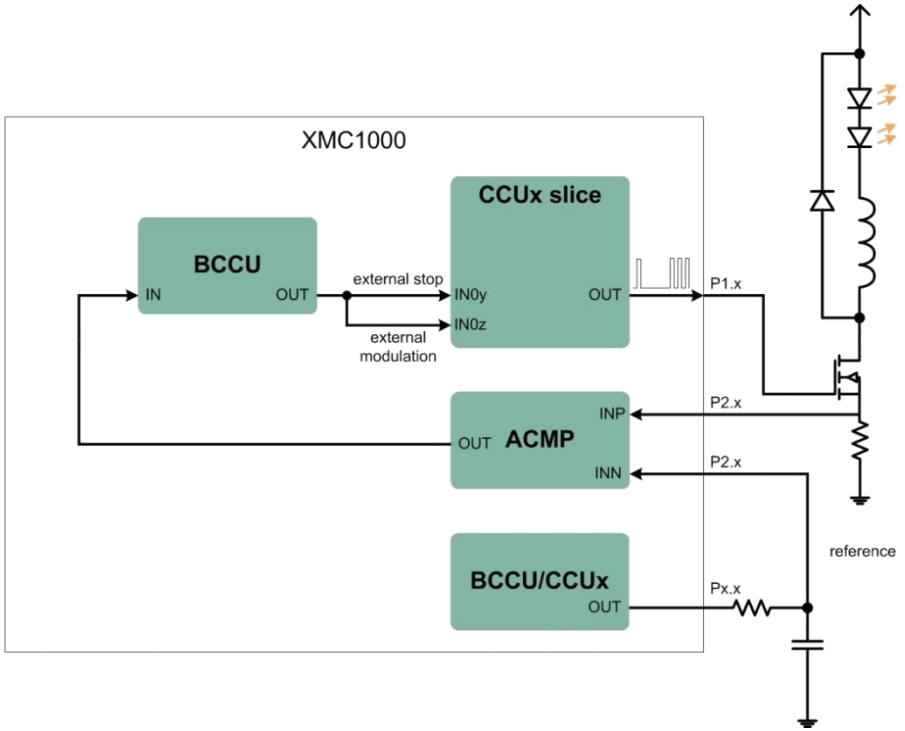
# Interconnected analog and PWM peripherals

- High frequency DCDC control possible with peak-current control
  - Dedicated hardware solution with short propagation delay
  - Full hardware control, no CPU load
  - Stable control possible at up to 4 MHz switching frequency



# In-built comparators and high-current pads

- No need for external comparators and gate drivers
  - Save up to USD$0.20 per channel
- High switching frequency
  - Smaller magnetics needed
  - Better dimmability
- 4 pins are enough to control one LED channel



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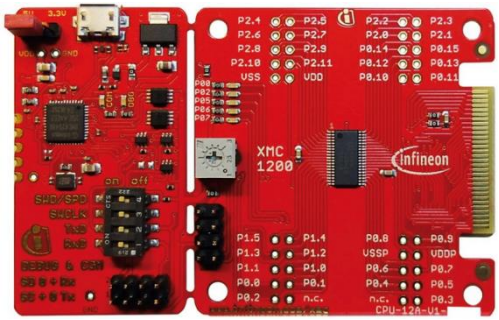
# Kits and Reference Design

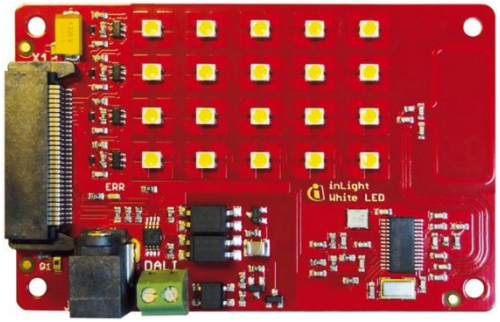
| Development Boards | | Order Number | Kit/Ref Design |
|---|---|---|---|
| LED Lighting Application Kit |  | KIT_XMC1X_AK_LED_001 | Kit |
| RGB LED Lighting Shield |  | KIT_LED_XMC1202_AS_01 | Kit |
| LED Current Control Explorer |  | Coming Up | Kit |

# LED Lighting Application Kit

- Features
  - XMC1200 Microcontroller with 200 KB Flash
  - Detachable SEGGER J-Link
  - Colour LED Card
    - 3 RGB LEDs, 10 mA
    - Connectivity: DALI, DMX512, RF
    - Ambient light sensor
    - Linear LED drivers
  - White LED Card
    - 20 LEDs in 4 strings, 20 mA
    - Connectivity: DALI, RF
    - Ambient light sensor
    - Temperature sensor
    - Linear LED drivers

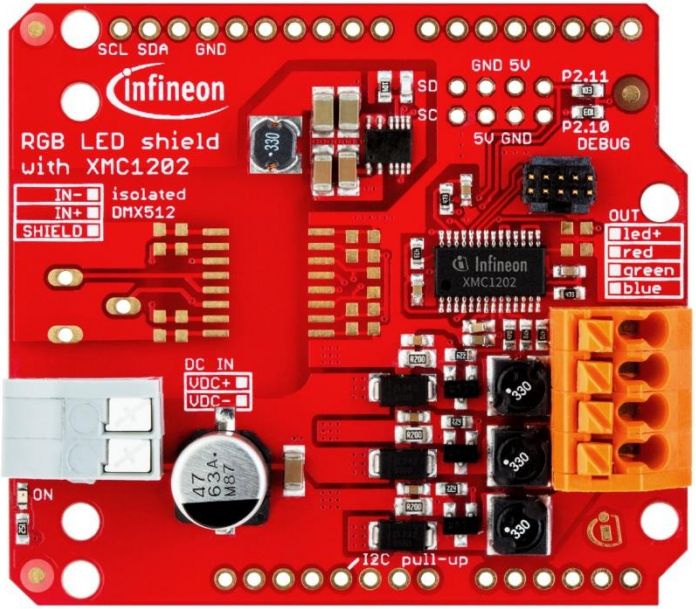






# RGB LED Lighting Shield

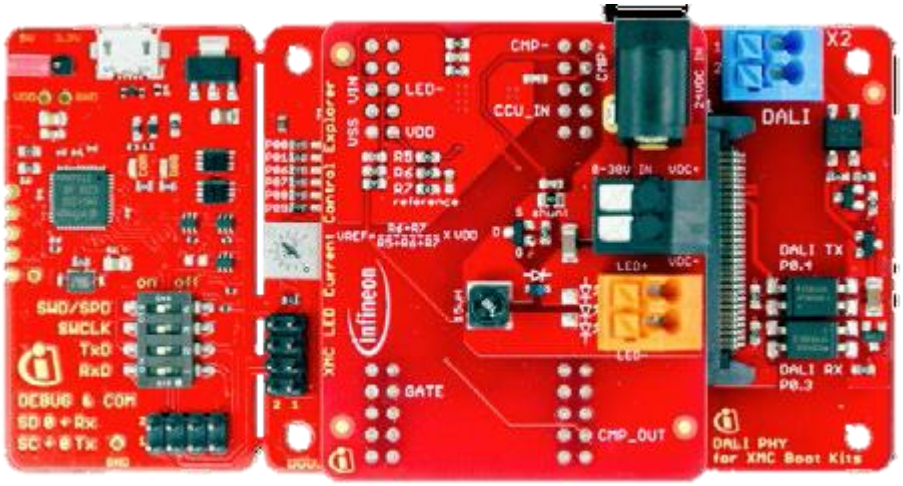
- Features
  - XMC1202 Microcontroller with 16 K Flash
  - 3 independent output channels
  - Up to 48 V DC input
  - Up to 700 mA output on each channel
  - Connectivity: $I^2C$, isolated DMX512 (n.m.)
  - Compatible with Arduino Uno R3 and XMC1100 Boot Kit




- Current control scheme
  - Peak-current control with fixed off-time
  - Pulse density modulation

# XMC™ LED Current Control Explorer

- Features
  - Up to 30 $V_{DC}$ input voltage
  - Up to 700 mA average output current
  - Up to 1 A peak current, programmable ripple
  - High-speed dimmable DC-DC buck




- DALI PHY for XMC™ Boot Kits
  - Isolated DALI interface

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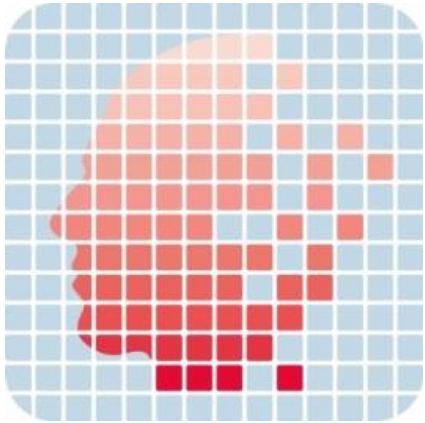
# Development Tool and Software (1/2)

- DAVE™ – Free Development Platform for Code Generation
  - Eclipse IDE
  - Compiler
  - Debugger
  - Application Library and Examples
  - Software can be used with 3rd party tools

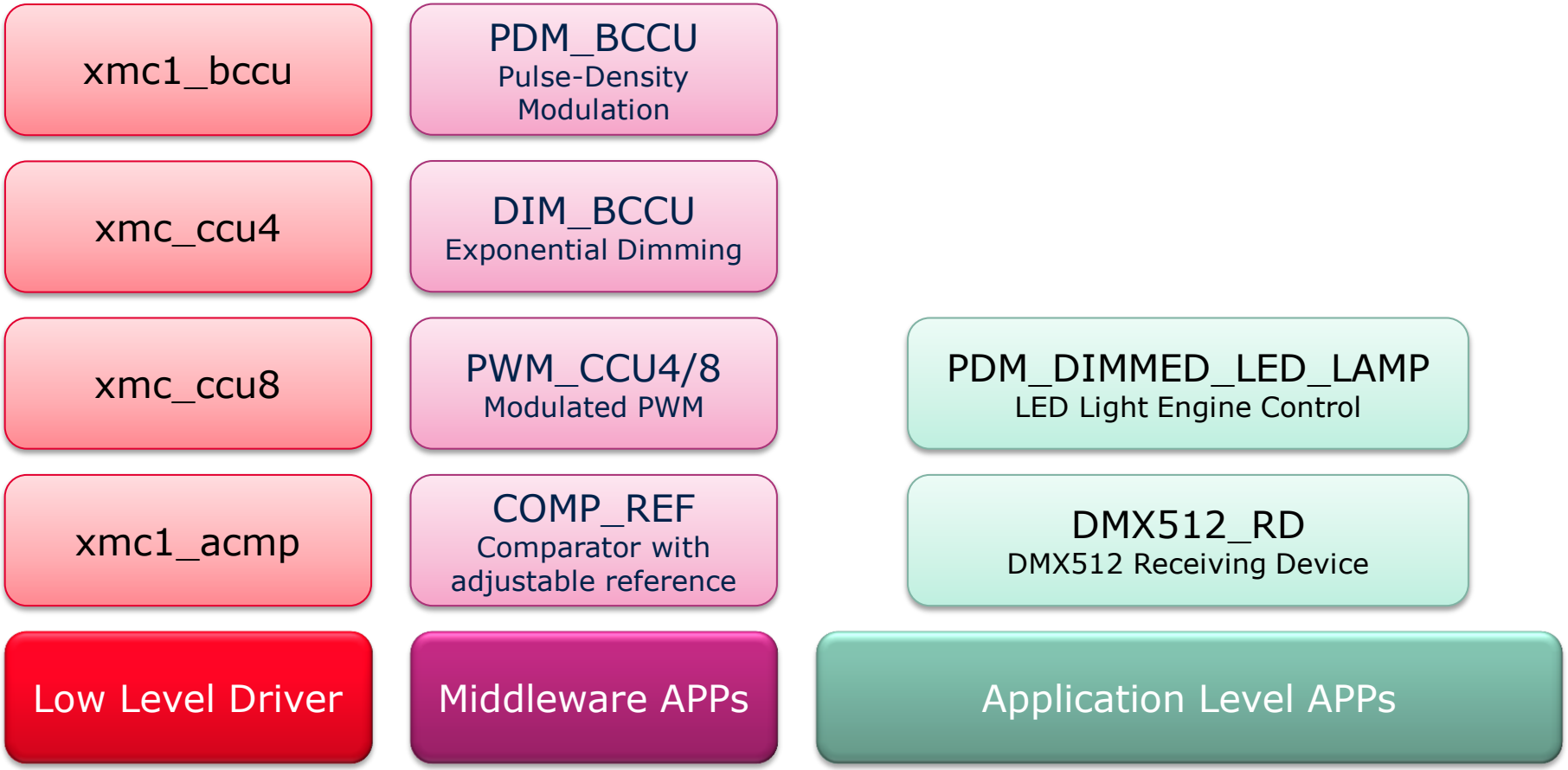


- For download and support:

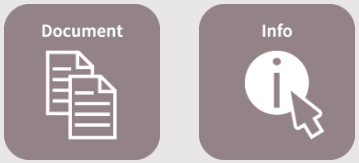
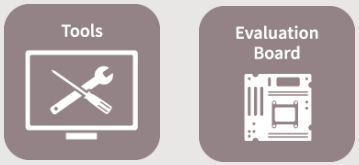
  DAVE™ website

# Development Tool and Software (2/2)

› LED Lighting Software/Apps in DAVE™



# Support material:

| | | |
|---|---|---|
| Collaterals and Brochures   | › Product Briefs<br>› Selection Guides<br>› Application Brochures<br>› Presentations<br>› Press Releases, Ads | › www.infineon.com/XMC |
| Technical Material   | › Application Notes<br>› Technical Articles<br>› Simulation Models<br>› Datasheets, MCDS Files<br>› PCB Design Data | › www.infineon.com/XMC<br>› Kits and Boards<br>› DAVE™<br>› Software and Tool Ecosystem |
| Videos   | › Technical Videos<br>› Product Information Videos | › Infineon Media Center<br>› XMC Mediathek |
| Contact   | › Forums<br>› Product Support | › Infineon Forums<br>› Technical Assistance Center (TAC) |

# Glossary abbreviations

| | |
|---|---|
| ACMP | Analog Comparator |
| ADC | Analog Digital Converter |
| BCCU | Brightness and Color Control Unit |
| CCUx | Capture and Compare Unit x |
| DAC | Digital Analog Converter |
| DALI | Digital Addressable Lighting Interface |
| DAVE™ | Free development IDE for XMC |
| LED | Light Emitting Device |
| PWM | Pulse Width Modulation |
| RGB | Red-Green-Blue |
| RF | Radio Frequency |
| SMPS | Switched Mode Power Supply |

# Disclaimer

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