

Product Presentation

XDP™ Digital Power Controller
XDPP1188, XDPP114x, XDPP1100

March 2026

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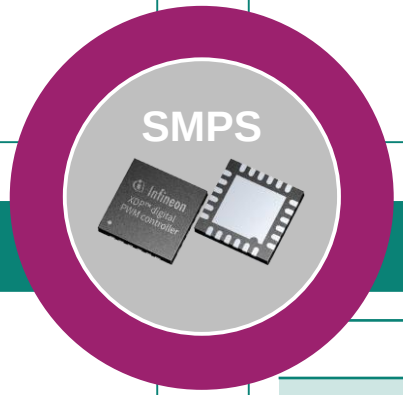
Overview of XDP™ Digital Power Controllers for DC-DC applications

Key features

- Best-in-class analog front-end performance
- Pre-programmed hardware peripherals with digital control loop
- Integrated Arm® Cortex®-M0 provides ability to differentiate with customized firmware for increased competitiveness
- Highly flexible, suitable for isolated and non-isolated topologies
- Industry's smallest digital power controller 4x4 mm

Topologies

- Full-bridge
- Half-bridge
- Active clamp forward
- LLC
- Non-isolated Buck, Boost
- Inverting Buck-boost
- Interleaved DC-DC



Typical Application

- AI server & data center intermediate bus converters (IBC)
- Telecommunication infrastructure
- Power modules bricks
- DC-DC SMPS
- HV DC

Products

P/N	Package
XDPP1100-Q024	4x4 mm 24-pin
XDPP1100-Q040	6x6 mm 40-pin
XDPP1140-100B/C	4x4 mm 24-pin
XDPP1148-100B/C	4x4 mm 24-pin
XDPP1188-200C	5x5 mm 40-pin

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XDP™ Digital Power Controller XDPP11xx

Portfolio comparison (1/2)

Differences highlighted

Feature	XDPP1100-Q040	XDPP1100-Q024	XDPP1140-100B/C	XDPP1148-100B/C	XDPP1188-200C
ARM M0 core processor	100 MHz	100 MHz	100 MHz	100 MHz	100 MHz
High resolution DPWM outputs (78.125ps resolution)	12	6	6	6	8
Number of high-speed independent feedback rails	2	1	1	1	1
Number of voltage sense ADC	3	2	2	1	2
Number of current sense ADC	2	1	1	2	2
General purpose ADC channels	6 (9-bit, 1 MHz)	4 (9-bit, 1 MHz)	4 (10-bit, 1 MHz)	4 (10-bit, 1 MHz)	4 (10-bit, 1 MHz)
OTP	64 kB	64 kB	64 kB	64 kB	64 kB
RAM	32 kB	32 kB	32 kB	32 kB	32 kB
ROM	80 kB	80 kB	80 kB	80 kB	80 kB
DPWM switching frequency	Up to 2 MHz	Up to 2 MHz	Up to 2 MHz	Up to 2 MHz	Up to 2 MHz
Secondary serial bus (I2C M/S)	Yes	No	No	No	No
SPI serial bus	No	No	Yes	Yes	Yes
UART	Yes	Yes	Yes	Yes	Yes
PMBus	Yes	Yes	Yes	Yes	Yes
Watchdog	Yes	Yes	Yes	Yes	Yes
On-chip oscillator	Yes	Yes	Yes	Yes	Yes
Sync in and sync out functions	Yes	Yes	Yes	Yes	Yes
Temperature sense inputs	2	1	1	1	1
Enable inputs	2	1	1	1	1
Power good outputs	2	1	1	1	1
Total GPIO (General purpose I/O pins)	16	11	11	11	13
Package offering	VQFN-40 (6x6 mm^2)	VQFN-24 (4x4 mm^2)	VQFN-24 (4x4 mm^2)	VQFN-24 (4x4 mm^2)	VQFN-40 (5x5 mm^2)

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XDP™ Digital Power Controller XDPP11xx

Portfolio comparison (2/2)

Differences highlighted

Feature	XDPP1100-Q040	XDPP1100-Q024	XDPP1140-100B/C	XDPP1148-100B/C	XDPP1188-200C
Number of ramps	2	2	2+1	2+1	2+1
Topology:					
HB/CT; HB/FB	✓	✓	✓	✓	✓
FB/CT; FB/FB (VMC with Flux balance)	✓	✓	✓		✓
FB/CT; FB/FB (PCMC)	✓			✓	✓
ACF	✓	✓	✓	✓	✓
PSM-FB/CT; PSM-FB/FB	✓	✓	✓	✓	✓
LLC-HB; LLC-FB; LLC-PSFB; secondary CT or FB			✓	✓	✓
Buck	✓	✓	✓	✓	✓
Buck-Boost	✓	✓	✓	✓	✓
Boost	✓	✓	✓	✓	✓
Interleaved Buck	✓			✓	✓
Interleaved Buck-Boost	✓			✓	✓
Interleaved Boost	✓			✓	✓
Interleaved PSM-FB/CT; PSM-FB/FB	✓				
Interleaved FB/FB; HB/CT; HB/FB; FB/CT	✓				✓
Interleaved ACF	✓				✓
Dual loop (single phase of each loop)	✓				
Interleaved Buck + open loop converter	✓			✓	✓
Interleaved 3-level Buck + open loop converter				✓	✓

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XDP™ Digital Power Controller

Key differentiations vs. generic MCU/DSPs



XDPP11xx

1

Unique State-machine based digital architecture

- Fast loop compensation with no dependence on processor speed/bandwidth
- Excellent dynamic transient performance via state-machine hardware
- Low cost and low complexity compared to dedicated MCU cores

2

Pre-configured DCDC control features

- Very little firmware efforts compared to generic MCUs
- Supports varies common power supply topologies with no need of coding
- Configurable power supply features and parameters
- Easy to reuse and flexible customization, shorter Time-to-Market

3

Smaller packages & low power consumption

- Available in 4x4 / 5x5 / 6x6 mm small QFN packages
- High performance integrated peripherals reduce BOM size & cost
- <30 mA typical operation current consumption

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XDP™ XDPP11xx Digital Controller
Features, Benefits & Value Proposition

Key features	Key benefits	Value
High performance AFE	– Enhanced control and excellent dynamic transient performance – Sophisticated system level fault handling – Ease of use firmware-based system configuration with GUI support – User-specific customization and software-based design changes – System housekeeping – Suitable for high power-density modules	Reduce system BOM and solution size
State-machine-based digital control loop		Enhanced system performance and efficiency
Arm® Cortex®-M0 processor		Flexible configuration and housekeeping
Industry's smallest VQFN package		Multiple topology support with minimum design change efforts

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XDPP11xx architecture benefits

Application optimized digital control

Pre-programmed advanced digital control (e.g., startup into pre-bias, mode control, loop control, protection features, feed-forward, flux balancing, active transient support, etc.)

Less firmware development efforts

Dedicated hardware peripherals

Optimized for DC-DC converter topologies and Brick applications and brings superior performance

Supports different topologies, e.g., FB, HB, interleaving, LLC, ZSC, HSC, RHSC, SHSC, DRHSC
High efficiency and high density

Highest sampling rate ADCs

The fastest response 50 ns. No external comparator is required
System level BOM and board space savings

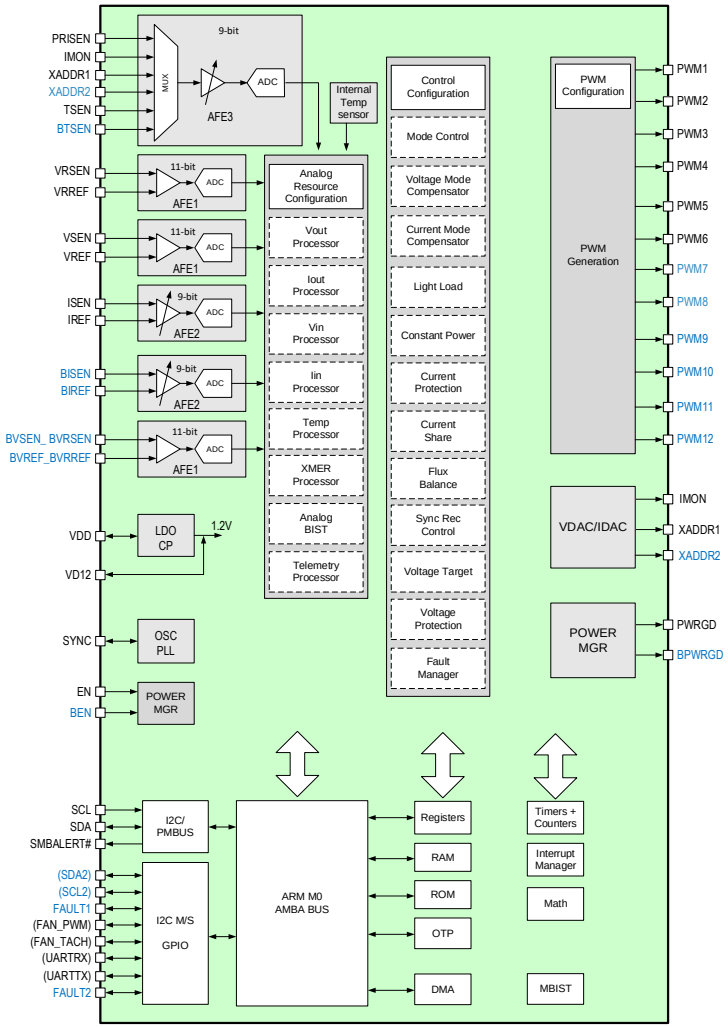
Allows direct current sensing without external amplifier
System level BOM and board space savings

Cycle-by-cycle peak current limiting within 100ns
Highest system robustness

Small footprint

Smallest package 4 mm x 4 mm, 56% footprint reduction

PCB board savings



Blue pins: pins that are available in XDPP1100-Q040

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NEW

XDPP1188 8-PWM digital controller

XDP™ Digital Controller XDPP1188
8-PWM supports interleaved FB-FB or similar topologies

Product page

Key features

- Arm® Cortex®-M0 core
- Supports PWM and PFM control loop
- Hardware based PID compensator with 3 poles and 2 zeros
- Up to **8** DPWM outputs with 78.125 ps resolution and 2 MHz max frequency
- Up to **13** GPIO pins
- 1 MHz I²C/PMBus and SPI interface
- 100 MHz 11-bit VADC with 3-bit modulation
- 1.25 mV LSB, 156 µV Vout sense resolution
- 0 to 2.1 V differential voltage range
- 200 MHz edge detection comparator
- Low-latency protection comparators
- 100 MHz 9-bit IADC with current estimator
- 1.2V common mode voltage with 1mV LSB
- 3 levels over current protection
- Supports temperature compensation
- 10-bit 4-ch telemetry ADC

Key firmware benefits

- Configurable with GUI Support
- **Allows FW based customization**
- Accurate V/I/Temp monitoring
- **Pre-programmed control providing fast time-to-market**

Key hardware benefits

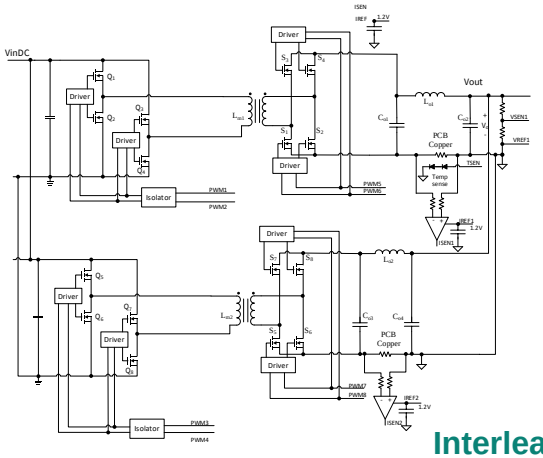
- Precise SR timing control improves LLC efficiency
- **Excellent feed-forward performance**
- Enables volt-second flux balance
- **Pre-bias startup** with SR or DE mode
- **Fast transient response by non-linear PID**
- **Active current sharing** and current balance
- Sophisticated system level fault handling
- Fast GPI input for external fault or SR control
- **Low power consumption in sleep mode**
- Light load management
  - Burst, diode emulation, **phase shedding**
  - **Phase shift for full-bridge LLC**

XDPP1188

8x PWM
2x VADC
2 x IADC
4-ch TS ADC
2 fast input
13x GPIO
VQFN – 40
5x5 mm²
0.4 mm pitch



VQFN 5x5 40-pin 0.4mm pitch



Interleaved FB-FB

Topologies:

- **Interleaved bridge topologies**
- Full Bridge
- Half Bridge
- Active Clamp Forward
- Non-Isolated Buck, Boost
- Inverting Buck-boost
- Interleaved
- ZSC, HSC, SHSC, DRHSC
- Close loop LLC
- HVDC, 400 V input

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XDP™ Digital Controller XDPP1188

Features

Enhanced EADC with hardware dithering:

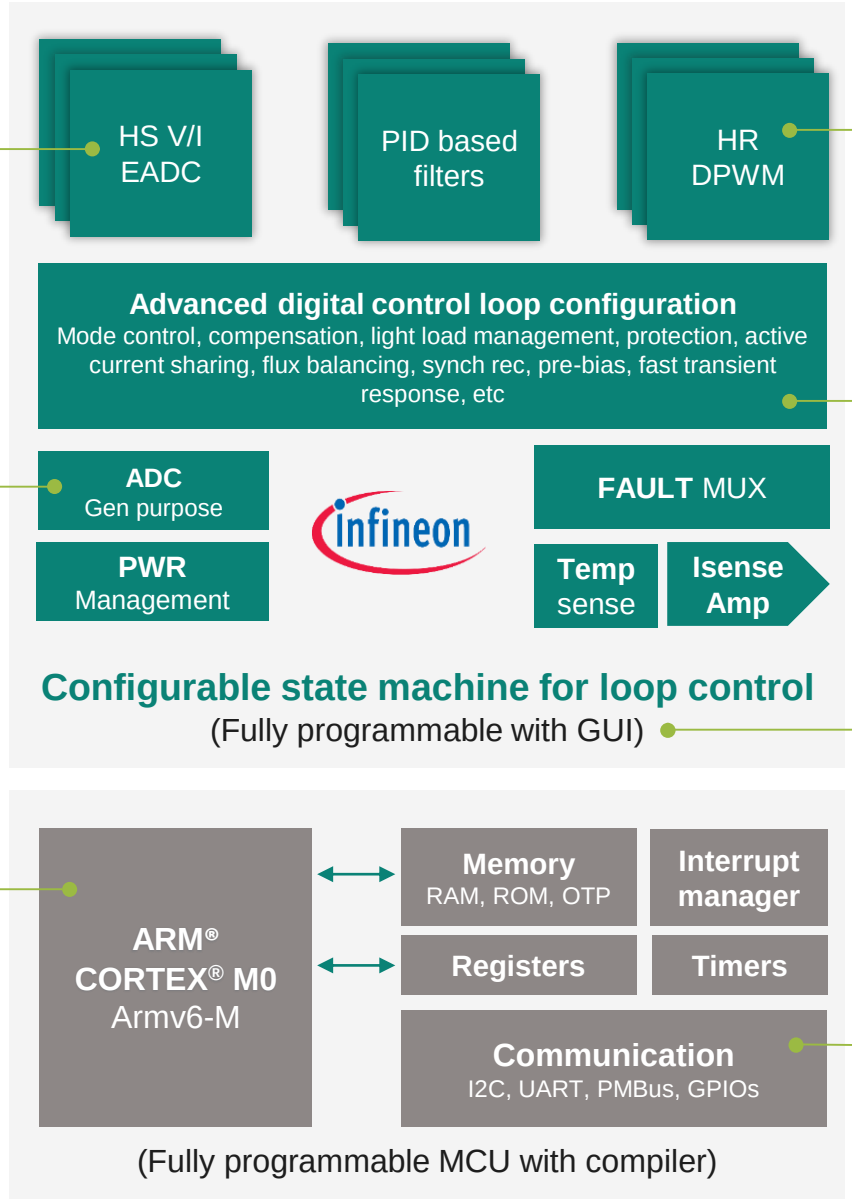
- **2x Isen ADCs:**
  100 MHz, 9-bit with 1 mV/LSB
  input differential voltage range -256 mV~ +256 mV with common voltage 1.2 V
- **2x VADCs:**
  100 MHz 11-bit ADC, input differential voltage range 0.25 V~2.1 V.

General purpose ADC

1 MHz 10-bit, 4 channels, input differential voltage range 0 V~2.4 V
IMON: active current sharing
PRISEN: primary V-sensing
TSEN: temp sensing
XADDR1: address offset

ARM® Cortex® - M0 processor

- 100 MHz clock
- 32-bit resolution
- 64 kB OTP, 80 kB ROM, 32 kB RAM



8 high-resolution Digital Modulated PWM outputs:

- 78.125 ps PW resolution
- 50 kHz~2 MHz frequency
- Frequency resolution 5 ns
- Dead-time res 1.25 ns

Configurable feedback control

- PWM, phase shift modulation, PFM for LLC
- Voltage, peak current mode

High efficiency at light load

- Burst mode, diode emulation, phase dropping /adding, sleep mode

FTR, flux balancing, voltage feed-forward

Copper trace current sensing

- 100 MHz 9-bit ADC with temp compensated
- Cycle-by-cycle peak current limiting and short circuit protection within 100 ns

- 13x configurable GPIOs
- 1 MHz I2C/PMBUS
- SPI
- UART

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XDPP114x 6-PWM digital controller

XDP™ Digital Power Controller XDPP1140 & XDPP1148

6-PWM for 1-2 phase DC-DC applications in 4x4 package

Product page

Key Features

- Fully programmable ARM®-Cortex™ M0 core
- Supports PWM and PFM control loop
- Hardware based PID compensator with 3 poles and 2 zeros
- Up to 6 DPWM outputs with 78.125 ps resolution and 2 MHz max frequency
- Up to 11 GPIO pins
- 10-bit 4-ch telemetry general purpose ADC
- 1 MHz I²C/PMBus®, SPI and UART interface
- **High-speed voltage sense:**
  - 100 MHz 11-bit VADC with 3-bit modulation
  - 1.25 mV LSB, 156 µV Vout sense resolution
  - 0 to 2.1 V differential voltage range
  - 200 MHz edge detection comparator
  - Low-latency protection comparators
- **High-speed current sense:**
  - 100 MHz 9-bit IADC with current estimator
  - 1.2V common mode voltage with 1mV LSB
  - 3 levels over current protection
  - Supports temperature compensation

Key Firmware Benefits

- Configurable with GUI Support
- **Allows FW based customization**
- Accurate V/I/Temp monitoring
- **Pre-programmed control providing fast time-to-market**

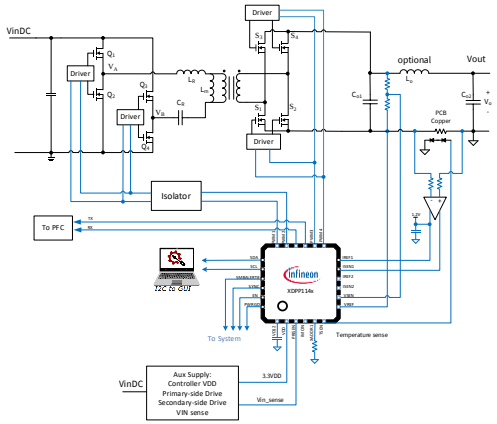
Key Hardware Benefits

- Precise SR timing control improves LLC efficiency
- **Excellent feed-forward performance**
- Enables volt-second flux balance
- **Pre-bias startup** with SR or DE mode
- **Fast transient response by non-linear PID**
- **Active current sharing** and current balance
- Sophisticated system level fault handling
- Fast GPI input for external fault or SR control
- **Low power consumption in sleep mode**
- Light load management
  - Burst, diode emulation, **phase shedding**
  - **Phase shift for full-bridge LLC**

XDPP1140	XDPP1148
6x PWM	6x PWM
2x VADC	1x VADC
1x IADC	2x IADC
4-ch TS ADC	4-ch TS ADC
2 fast input	2 fast input
11x GPIO	11x GPIO
VQFN -24	VQFN -24
4x4 mm²	4x4 mm²
0.5 mm pitch	0.5 mm pitch



VQFN 4x4 24-pin



Topologies

- Full Bridge
- Half Bridge
- Active Clamp Forward
- Non-Isolated Buck, Boost
- Inverting Buck-boost
- Interleaved
- Close loop LLC
- HVDC, 400 V input

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XDP™ Digital Controller XDPP114x

Features

Enhanced EADC with hardware dithering:

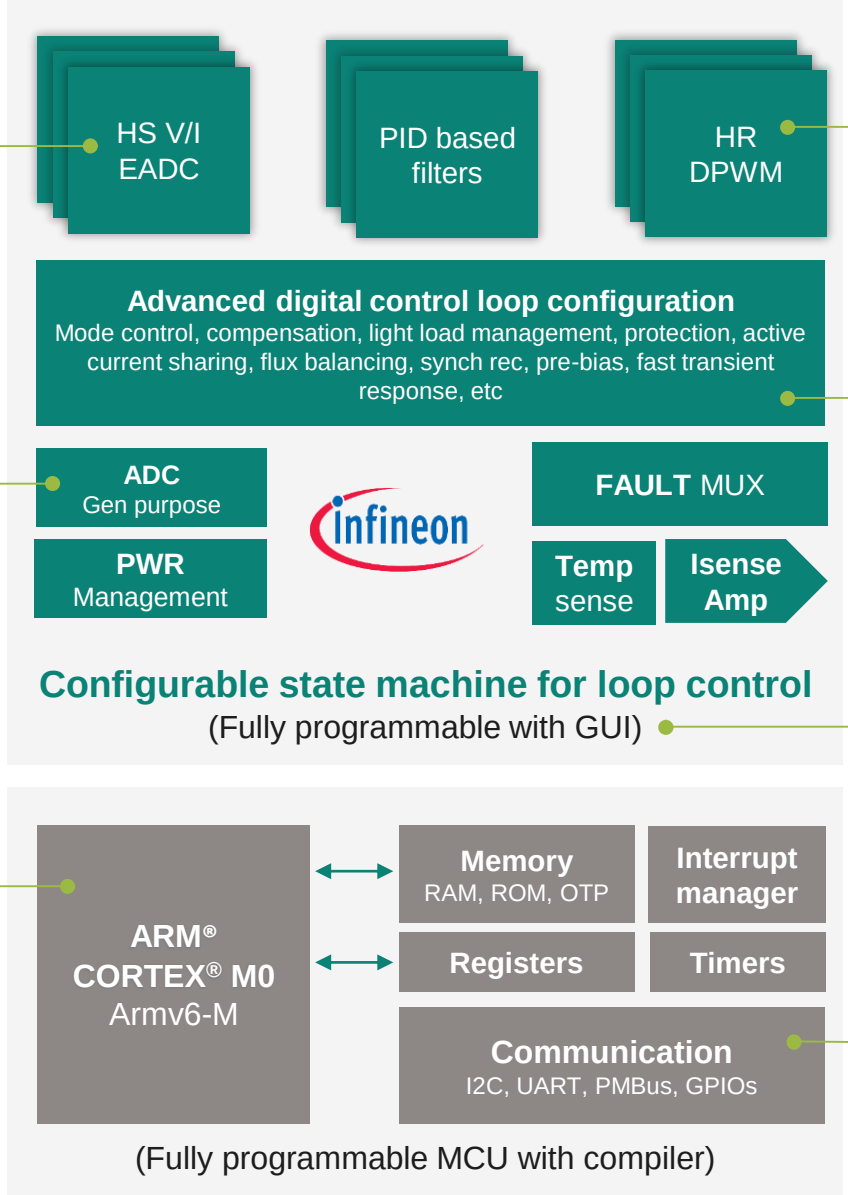
- **1~2x Isen ADCs:** 100 MHz, 9-bit with 1.2 V common mode voltage with 1 mV LSB
- **1~2x VADCs:** 100 MHz 11-bit ADC, input differential voltage range 0 V~2.1 V.

General purpose ADC

1 MHz 10-bit, 4 channels
IMON: active current sharing
PRISEN: primary V-sensing
TSEN: temp sensing

Arm® Cortex®-M0 processor

- 100 MHz clock
- 32-bit resolution
- 64 kB OTP, 80 kB ROM, 32 kB RAM



6 high-resolution Digital Modulated PWM outputs:

- 78.125 ps PW resolution
- 50 kHz~2 MHz frequency
- Frequency resolution 5 ns
- Dead-time res 1.25 ns

Configurable feedback control

- PWM, phase shift modulation, PFM for LLC
- Voltage, peak current mode

High efficiency at light load

- Burst mode, diode emulation, phase dropping /adding, sleep mode

FTR, flux balancing, voltage feed-forward

Copper trace current sensing

- 100 MHz 9-bit ADC with temp compensation
- Cycle-by-cycle peak current limiting within 100 ns

- 11x configurable GPIOs
- 1 MHz I2C/PMBUS
- SPI
- UART

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XDPP1100 6/12-PWM digital controller

XDP™ Digital Power Controller XDPP1100

6/12-PWM available as 24-pin 4x4 (-Q024) or 40-pin 6x6 (-Q040)

Product page

Key Features

- Pre-programmed **digital state machine control loop**:
  - Voltage, Peak Current,
  - Constant Current, Constant Power Modes
- **ARM® Cortex™-M0 processor**
  - 100MHz 32bit, 64kB OTP, 80kB ROM, 64kB RAM
- Up to **16** configurable GPIOs
- Up to **12** high resolution Digital Modulated PWM outputs
- Switching frequency up to **2 MHz**
- Input Voltage Feed-forward control scheme
- **3 High-speed voltage sense ADCs**:
  - 50MHz 11-bit ADC set point accuracy within +/-1% over temp range
- **2 current sense ADCs**:
  - 25 MHz, 9-bit with selectable 100µV and 1.45mV LSB
  - Allows copper trace current sensing
- Communication: **1 MHz** I^2C/PMBus 1.3, UART
- Packages: **40-pin** and **24-pin VQFN**
- Operating temperature: -40˚C to 125˚C



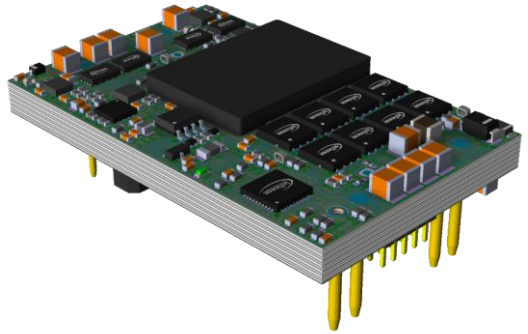
VQFN-40 6x6



VQFN-24 4x4

Benefits

- Dedicated high performance hardware peripherals
- Pre-programmed firmware drivers and power control algorithms
- Supports 2 fully digital voltage control loops
- High efficiency at light load management with:
  - Burst Mode, Diode emulation
- Enhanced dynamic transient performance with Vin feedforward control
- Flux and phase current balancing
- Excellent line/load regulation with non-linear gain
- Firmware based system configuration with GUI
- Available in industries' smallest VQFN package



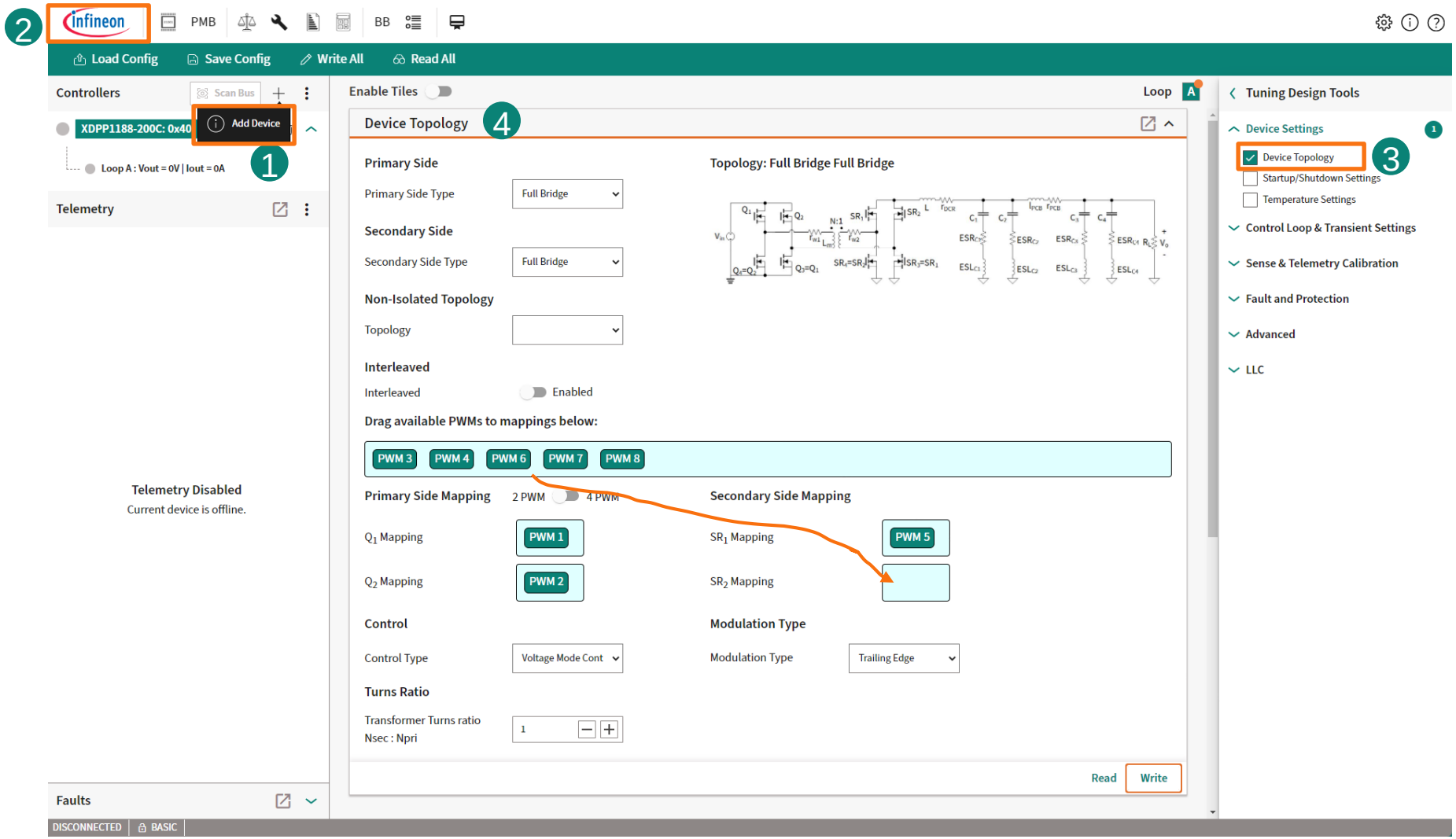
Applications

- Isolated/ non-isolated DC-DC Brick modules
- Intermediate bus converters
- Non-isolated buck boost converters
- Telecom power supplies and PoL applications

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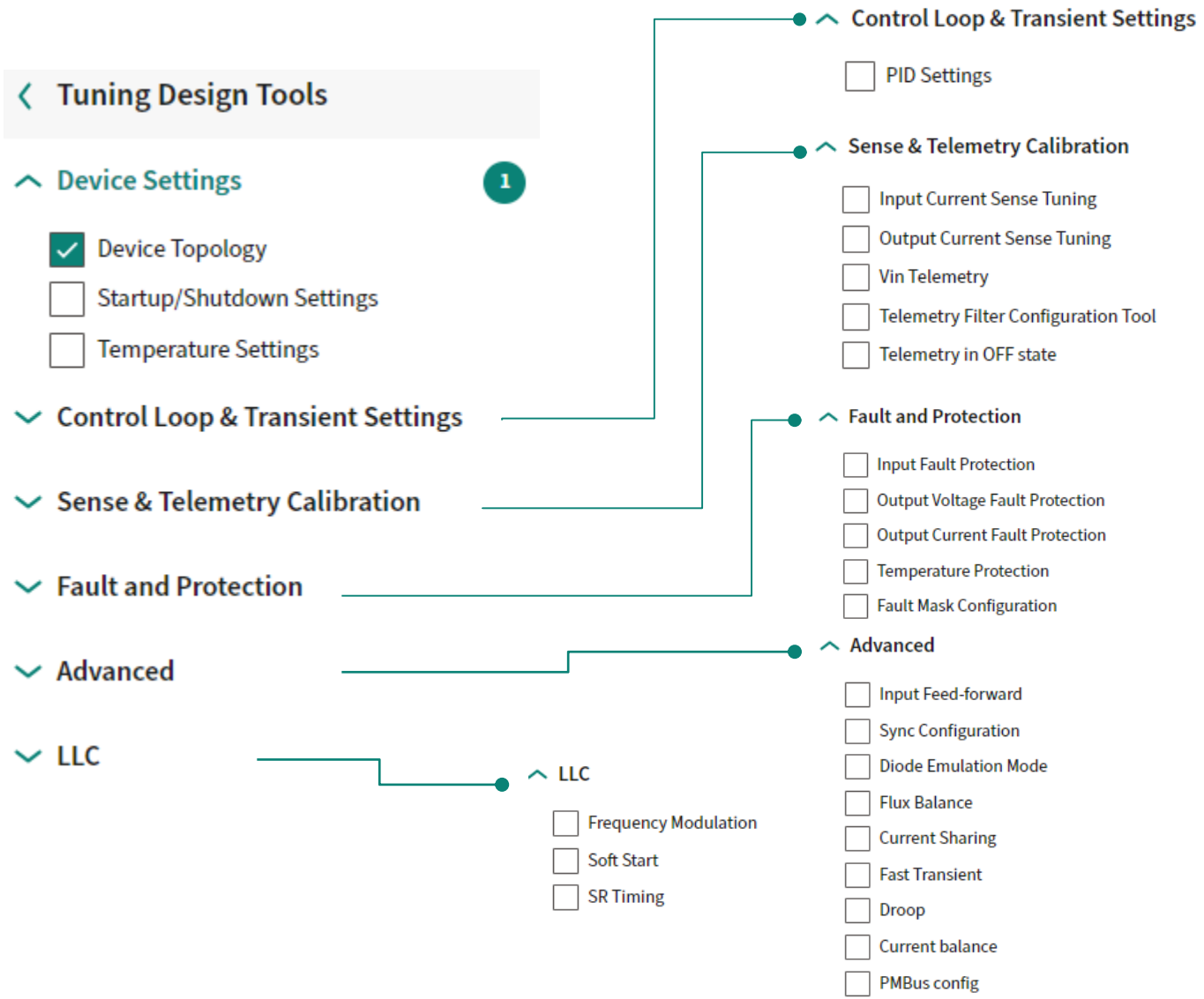
XDP™ Designer GUI

XDP™ Designer GUI
Add device and config topology



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XDP™ Designer GUI
Design tools



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Support

XDP™ Digital Power Controller Support

SUPPORT

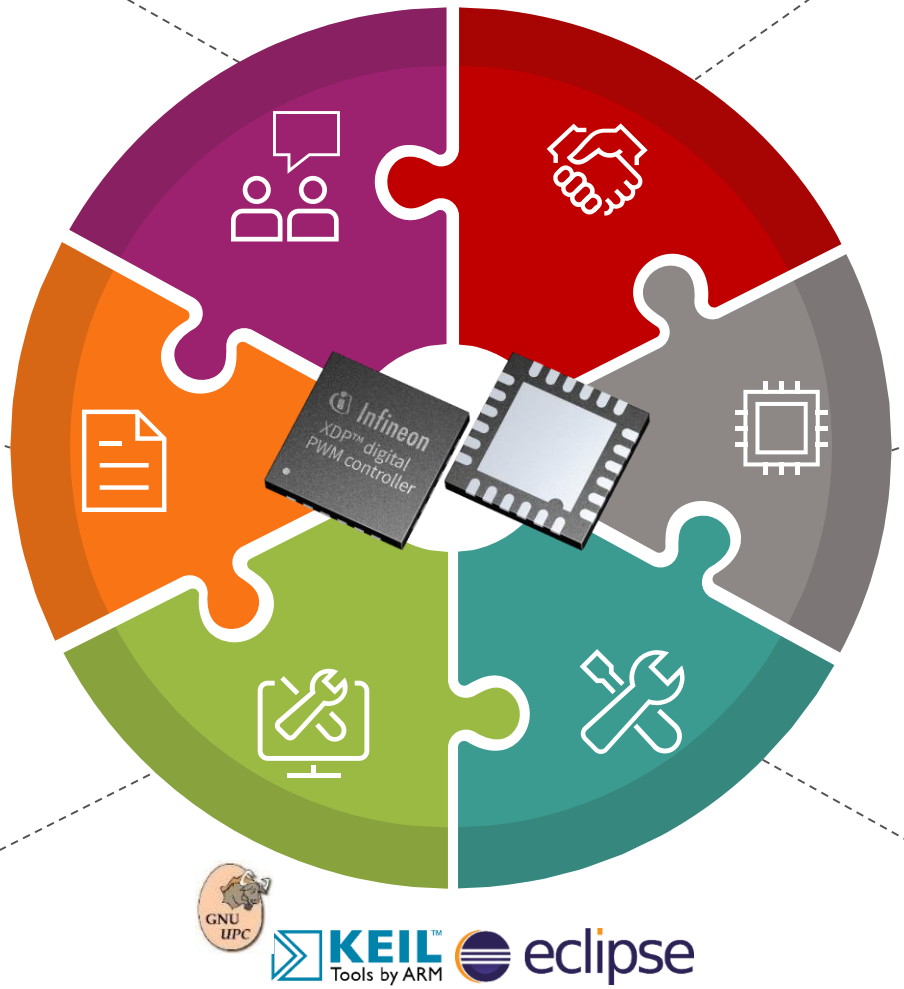
- Power supply experts
- Digital and Analog brick designs
- Firmware patch development support
- Telecom, Server, Datacenter and HVDC application expertise
- Product webpage

TRAINING & COLLATERAL

- XDPP11xx Design manual
- Regional Firmware support
- Reference design library with step-by-step design process
- Training material
- XDPP1100 MyICP link
- XDPP11xx MyICP link

SOFTWARE

- Step-by-step FW development guide
- Example code for various isolated and non-isolated power topologies
- Patch development for customization
- Housekeeping code, fan speed control, sequencing etc.



REFERENCE & DEMO BOARDS

- Digital brick designs for telecom and server
- Non-isolated power designs for IBC
- High voltage LLC
- Documentation, test reports, schematic and layout files to download



EVM DAUGHTER CARDS

- Control card for XDPP11xx available
- Can be plugged into power stage with matching connector



TOOLS

- Complimentary Graphic User Interface (GUI)
- Download from **Infineon Developer Center**
- Compatibility with commonly used IDEs (Keil, Eclipse)
- ARM licensed compilers OR GCC based license free platforms

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