XDPE1A2G7C-0020 Digital Multi-phase Controller

16-phase Dual Loop Voltage Regulator

Features

- Digital controller assisted with high performance analog front ends with a fully programmable ARM® Cortex™ –M0 Processor
- Compliant with nVIDIA custom PWMVID specification
- Compliant with nVIDIA custom 48V interleave buck requirement
- Compliant with PMBus rev 1.4 (January 2022) serial interface
  - Query voltage, current, temperature faults
  - Fault Response
  - Maximum supported bus speed 1 MHz
  - Support 1.8/3.3 V operation
- Output voltage regulation range
  - Up to 12V with resistor divider
- Digitally controlled phasing for full flexibility in both loop configuration and phase firing order
- Configurable autonomous phase add/drop
- Automatic phase detection at start-up
- Supports start-up into pre-bias voltage
- Integrated power stage current sense
- Differential output voltage sense
- Fast current balancing with current-mode control
- Digitally programmable PID (Proportional, Integral, Differential) loop compensation
- Digitally programmable load line slope and offset
    - 2.5 µΩ resolution
- Digital temperature compensation
- Extensive fault detection and protection capability
  - IUVP, OUVP & OOVP (fixed and tracking)
  - OCP instantaneous & averaged (total current)
  - Multiple OTP thresholds
  - Peak phase current pulse limiting
  - Negative current limit protection
  - Total current limit protection
  - Slow OCP
- Internal non-volatile memory (NVM) to store multiple custom configurations
- RoHS compliant and Halogen free 56-lead QFN plastic package
- NTC temp sensing

Potential applications

- 48V input interleaved buck converter

Product validation

Qualified for industrial applications according to the relevant tests of JEDEC47/20/22

Description

The XDPE1A2G7C-0020 digital dual loop 16 phase controller provides power for nVIDIA AI servers. Voltage on either the first loop or the second loop can be provided by a multi-phase buck converter with up to 16 synchronous-rectified channels on the first loop and up to 8 phases on the second loop. Typical configurations of 16+0, 15+1, and up to 8+8 are supported.

The XDPE1A2G7C-0020 controller utilizes digital technology to implement all control functions, providing the ultimate system solution in terms of flexibility and stability. Advanced control loop features, such as current mode control, variable frequency operation, Active Transient Response (ATR/FATR), fast DVID response, automatic phase shedding and Pulse Frequency Modulation (PFM) enable optimal response to a highly dynamic load with fast di/dt load transients across a wide range of load current.

The XDPE1A2G7C-0020 controller supports multi-vendor pin compatible integrated power stages with trivalent PWM interfaces, fast response, integrated current sense, integrated temperature sense, and advanced fault detection capability, interface and signaling. The XDPE1A2G7C-0020 controller can support upto 3 integrated power stages per PWM pin with no external components required.

In addition to supporting power stage fault protection features, the XDPE1A2G7C-0020 controller also includes a set of sophisticated over-voltage, under-voltage, over-temperature, over-current, and phase fault protections. These attributes provide a complete and advanced protection feature set for microprocessor and power systems.

Infineon strongly recommends pairing Infineon's power stages with our Digital XDP™ family of controllers to ensure correct interoperability. Interoperability when pairing with other vendor power stages/ discrete power components cannot be guaranteed by Infineon and requires thorough evaluation and characterization by the power stage/ discrete power component vendor.

Table 1 Part number and package summary

Part Number	Package
XDPE1A2G7C-0020	56-lead 7 mm x 7 mm QFN PG-VQFN-56

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1 Ordering information

Table 2 Ordering information

Base Part Number	Package Type	Standard Pack Form and Quantity		Orderable Part Number
XDPE1A2G7C-0020	QFN 7 mm x 7 mm	Tape and Reel	3000	XDPE1A2G7C0020XUMA1

Prototype Samples

The customer can program the parts to their specific system requirements using software/hardware available from Infineon or through other controller programming facilities (contact Infineon for recommendations). Infineon Field Application Engineers are available to assist with system and configuration file optimization and programming of the controllers. Alternatively, samples can be ordered with a customer specific custom configuration pre-programmed at the factory, but lead times for these types of samples are significantly longer than for the default configured samples. The part numbering format is shown below:

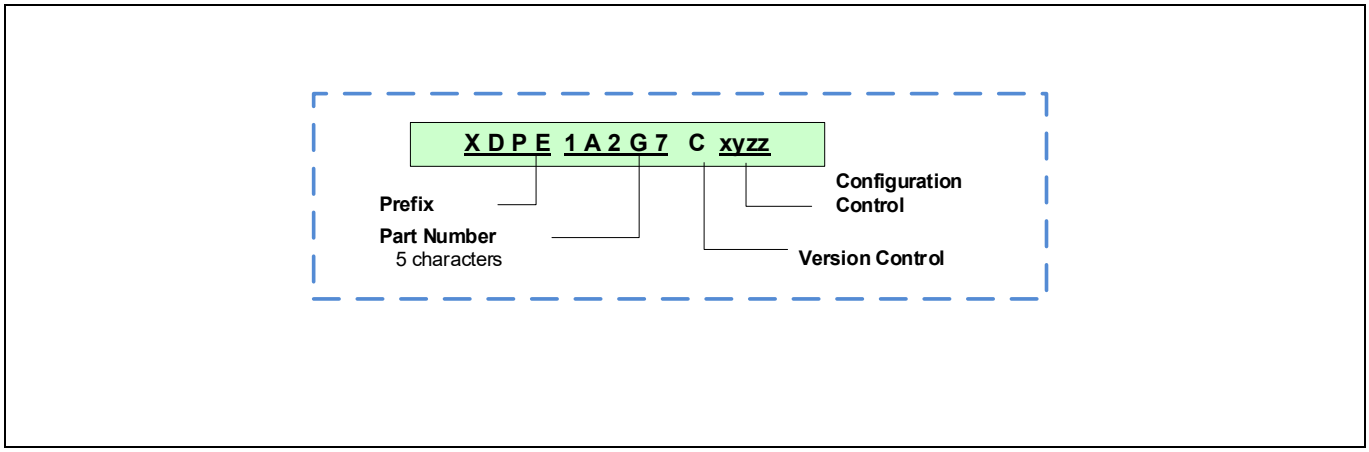


Figure 1 Part number decoding

2 Package marking

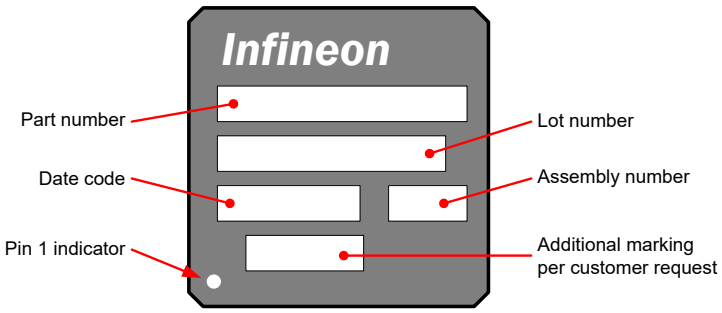


Figure 2 Package marking

3 Environmental qualifications

Table 3

Qualification Level		Industrial	
Moisture Sensitivity		QFN Package	MSL3
ESD	Human Body Model	JS-001, Class 2	
	Charged Device Model	JS-002, Class C3	
	Latch-up	JESD78, Class 2	
RoHS Compliant		Yes	

Revision history

XDPE1A2G7C-O020 Short

Revision 2026-08-20, Rev. 1.0

Previous revisions

Revision	Date	Subjects (major changes since last revision)
1.0	2026-08-20	Release of final version

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