XDPE1A2G5C 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
- PMBus compliant with rev 1.4 with AVSBus serial interface
  - Output voltage control
  - Query voltage, current, temperature faults
  - Fault Response
  - Maximum supported bus speed 1 MHz
  - Supports 1.8/3.3 V operation
- AVSBus
  - Supports 1.2V/1.8V operation
  - Supports clock frequencies up to 50MHz
- Output voltage regulation range
  - 0.05 V to 3.1 V (1 mV/step)
- 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
- 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
- Internal non-volatile memory (NVM) to store multiple custom configurations
- RoHS compliant and Halogen free 56-lead QFN plastic package

Potential applications

- CORE power regulator for AI based Microprocessors
  - Telecom applications
  - ASIC POWER

Product validation

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

Description

The XDPE1A2G5C digital dual loop 16 phase controller provides power for AI servers, workstation, and telecom applications that use AVSBUS. 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. Typical configurations of 16+0, 15+1, and up to 8+8 are supported.

Command and monitoring functions are controlled through the PMBus and AVS interfaces which supports dynamic voltage identification with 1 mV/step, output range up to 3.1 V, offset and trim resolution of 625 uV and accuracy better than 0.5%.

The XDPE1A2G5C 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 XDPE1A2G5C 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.

In addition to supporting power stage fault protection features, the XDPE1A2G5C 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
XDPE1A2G5C	56-lead 7 mm x 7 mm QFN PG-VQFN-56

Table of contents

1 Ordering information

Table 2 Ordering information

Base Part Number	Package Type	Standard Pack Form and Quantity		Orderable Part Number
XDPE1A2G5C-0000	QFN 7 mm x 7 mm	Tape and Reel	3000	XDPE1A2G5C0000XUMA1 Note **1**
				XDPE1A2G5CxyzzXUMA1 Note **2**

Note:

1. *Standard part number with default configuration*
2. *Customer Specific Configuration File, where x = Firmware ID and yzz = Custom Configuration File ID (Codes assigned by Product Marketing).*

Sample Programming

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 non-configured samples. The generic part numbering format is shown below:

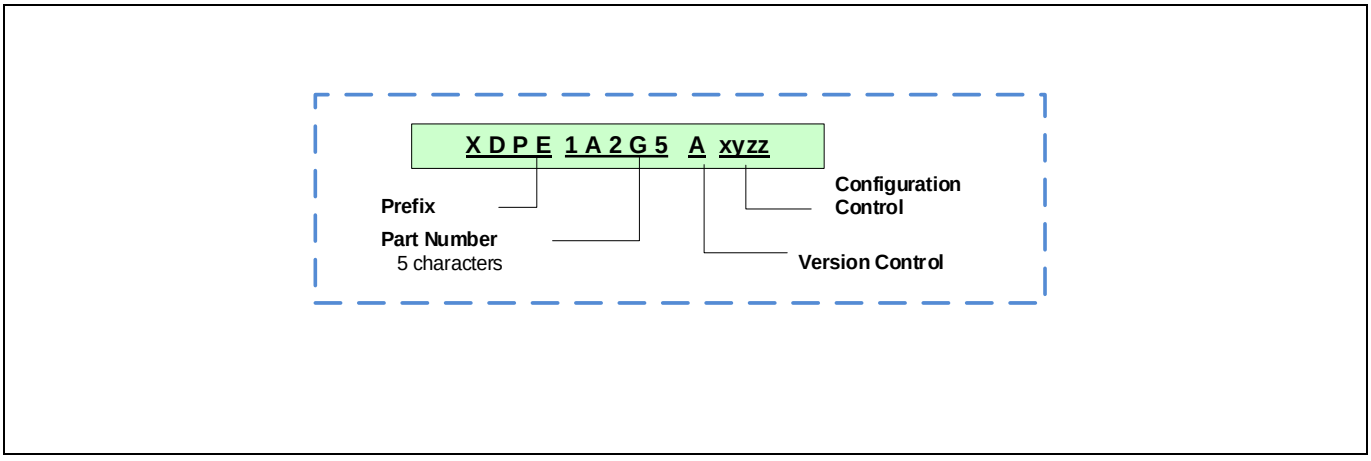

Figure 1 Part number decoding

2 Package

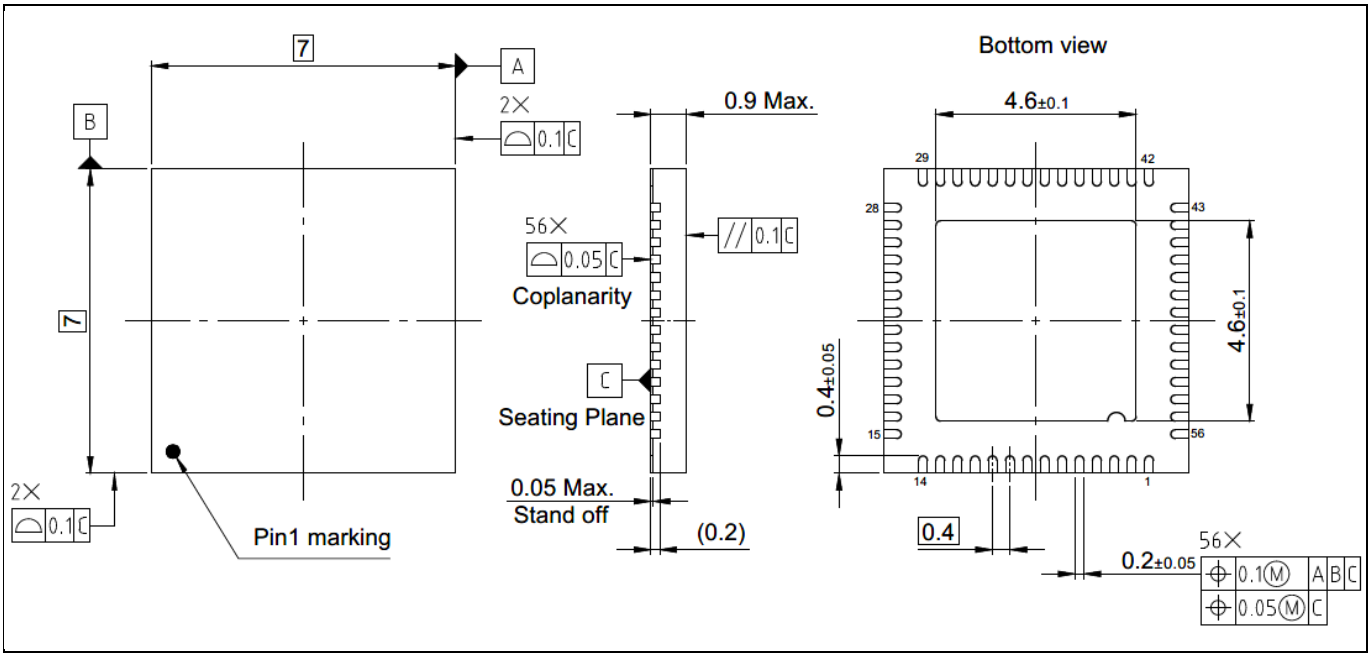

Figure 2 Package

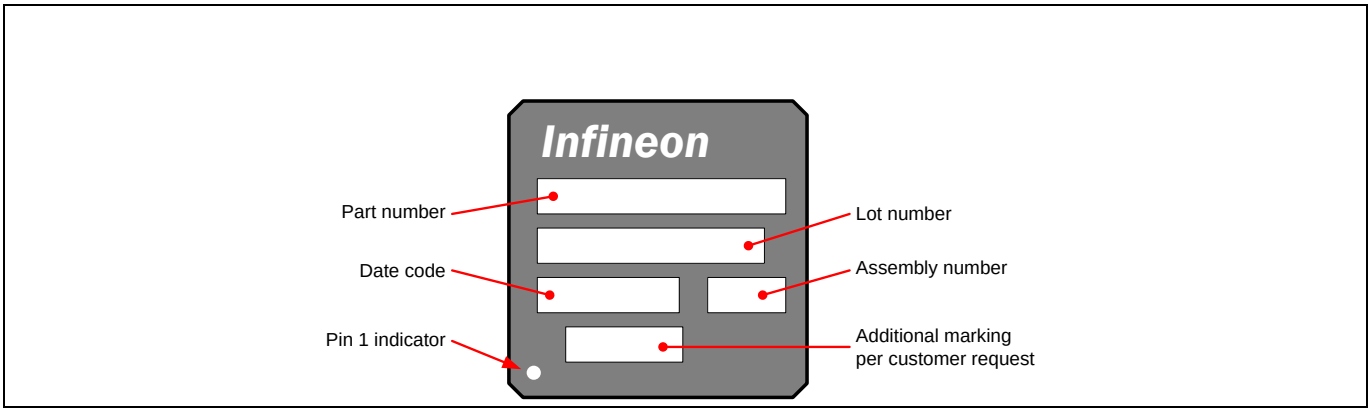

Figure 3 Package marking

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

XDPE1A2G5C-short

Revision 2026-03-09, Rev. 1.1

Previous revisions

Revision	Date	Subjects (major changes since last revision)
1.0	2026-02-26	Release of final version
1.1	2026-03-09	Remove 'Restricted' marking

Trademarks
All referenced product or service names and trademarks are the property of their respective owners.

Published by Infineon Technologies AG, Am Campeon 1-15, 85579 Neubiberg, Germany

Important notice
Products which may also include samples and may be comprised of hardware or software or both ("Product(s)") are sold or provided and delivered by Infineon Technologies AG and its affiliates ("Infineon") subject to the terms and conditions of the frame supply contract or other written agreement(s) executed by a customer and Infineon or, in the absence of the foregoing, the applicable Sales Conditions of Infineon. General terms and conditions of a customer or deviations from applicable Sales Conditions of Infineon shall only be binding for Infineon if and to the extent Infineon has given its express written consent.

For the avoidance of doubt, Infineon disclaims all warranties of non-infringement of third-party rights and implied warranties such as warranties of fitness for a specific use/purpose or merchantability.

Infineon shall not be responsible for any information with respect to samples, the application or customer's specific use of any Product or for any examples or typical values given in this document.

The data contained in this document is exclusively intended for technically qualified and skilled customer representatives. It is the responsibility of the customer to evaluate the suitability of the Product for the intended application and the customer's specific use and to verify all relevant technical data contained in this document in the intended application and the customer's specific use. The customer is responsible for properly designing, programming, and testing the functionality and safety of the intended application, as well as complying with any legal requirements related to its use.

Unless otherwise explicitly approved by Infineon, Products may not be used in any application where a failure of the Products or any consequences of the use thereof can reasonably be expected to result in personal injury. However, the foregoing shall not prevent the customer from using any Product in such fields of use that Infineon has explicitly designed and sold it for, provided that the overall responsibility for the application lies with the customer.

Infineon expressly reserves the right to use its content for commercial text and data mining (TDM) according to applicable laws, e.g. Section 44b of the German Copyright Act (UrhG).

If the Product includes security features: Because no computing device can be absolutely secure, and despite security measures implemented in the Product, Infineon does not guarantee that the Product will be free from intrusion, data theft or loss, or other breaches ("Security Breaches"), and Infineon shall have no liability arising out of any Security Breaches.

If this document includes or references software:
The software is owned by Infineon under the intellectual property laws and treaties of the United States, Germany, and other countries worldwide. All rights reserved. Therefore, you may use the software only as provided in the software license agreement accompanying the software. If no software license agreement applies, Infineon hereby grants you a personal, non-exclusive, non-transferable license (without the right to sublicense) under its intellectual property rights in the software (a) for software provided in source code form, to modify and reproduce the software solely for use with Infineon hardware products, only internally within your organization, and (b) to distribute the software in binary code form externally to end users, solely for use on Infineon hardware products. Any other use, reproduction, modification, translation, or compilation of the software is prohibited.

For further information on the Product, technology, delivery terms and conditions, and prices, please contact your nearest Infineon office or visit https://www.infineon.com.