

IG5638 Product Brief

Accelerating Next-Gen Applications



InnoGrit® IG5638 implemented in advanced 12nm FinFET CMOS process, is an industry-leading **PCIe Gen4 x4, NVMe 1.4** SSD controller supporting capacity size up to 16TB.

Stable and Outstanding Performance

- Speed up sequential Read/Write to 7.4/7.0 GB/s and random Read/Write to 1.7M/0.9M IOPs.
- Support DDR3L, DDR4, LPDDR3, and LPDDR4, with DDR rates up to 3200 MT/s.
- Support SLC, MLC, TLC, and QLC NAND with ONFI 5.0 or Toggle 2.0/3.0/4.0/5.0 interfaces, at data rates up to 1600 MT/s (IG5638CAA(I)) or 2400 MT/s (IG5638CAAH(I)).

Data Security and Integrity

- Provide multiple data encryption and protection schemes, including AES, SHA, RSA, SM2/3/4 of SCA, General-Purpose Cipher Engine, ECC, CRC, RAID, and End-to-End data protection.
- Leverage proprietary 4K LDPC ECC technology of the second generation, to improve reliability, endurance, and performance.

Other Advanced Functions

- Smart Cache
- Support Conventional SSD mode, Open Channel SSD mode, and ZNS
- Thermal throttling protection
- 32 Namespaces
- Support SR-IOV
- Two temperature grade options
- Intelligent PMU with multi-level power management
- Various peripheral interfaces: SPI, SMBus/I2C, UART, JTAG, and GPIO

Please visit the website for more information:

www.innogritcorp.com

For feedback or suggestions on documents:

Tech-Writer@innogritcorp.com

NOTE: Product diagram is only for reference. Real product might have slight differences in appearance.

Key Features and Specifications

Full Part Number	IG5638CAA	IG5638CAAI	IG5638CAAH	IG5638CAAHI
Typical Application	Data Centers and Enterprise Applications		Data Centers and Enterprise Applications	
Max Capacity	16TB	16TB	16TB	16TB
Total Number of Balls	575	575	575	575
Package	FCCSP	FCCSP	FCCSP	FCCSP
Dimension (mm)	15 × 15	15 × 15	15 × 15	15 × 15
Max. NAND Interface Data Rate (MT/s)	1600	1600	2400	2400
Operating Temperature (°F)	32 ~ 158	-40 ~ 185	32 ~ 158	-40 ~ 185
Operating Temperature (°C)	0 ~ 70	-40 ~ 85	0 ~ 70	-40 ~ 85
CPU	Four ARM Cortex R5 CPU cores			
Max. Read/Write Performance	Sequential Read: 7.4 GB/s Sequential Write: 7.0 GB/s Random Read: 1.7M IOPs Random Write: 0.9M IOPs			
Power Consumption	Peak: 4 W			
Energy Efficiency Ratio	425 KIOPs/W			
Reliability	UBER $\leq 10^{-17}$ MTBF: 300 million hours			
Interface	PCIe Gen4 ×4 interface NAND flash interface, 8CH × 8CE DDR interface 1 × UART, 1 × SPI Master, 1 × JTAG 2 × SMBus/I2C Master/Slave, support NVMe-MI 16 GPIOs + 4 SPI pins which can be multiplexed with GPIO function			
Data Security	TCG Opal 2.01 AES-128/256 SHA3-256/384/512, SHA256 RSA1024/2048/3072/4096 SM2/3/4 published by the State Cryptography Administration of China General-Purpose Cipher Engine			
Data Integrity Protection	Programmable RAID operation End-to-End data protection CRC protection Advanced LDPC ECC engine, supporting ECC protection for TCM, Cache, SRAM, and DDR			

InnoGrit, a fabless IC design company, is focused on advancing storage technology to solve the data storage and data transport problems in AI and big data applications. Our innovation in system performance, efficiency, reliability and security is the foundation that supports our mission to unleash the potential limited by traditional data processing architectures and enable a new class of products to consumers, data centers, and enterprises.

For more product and technology information, please visit: www.innogritcorp.com.