點序科技股份有限公司
ASolid Technology Co., Ltd.

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Datasheet: SSD SATA 6Gbps Controller AS2258

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1. Foreword

This document has been produced by ASolid Technology Co., Ltd., should the company modifies the contents of this specification, it will be re-released with an identifying change of release date and an increase in revision number as follows:

Revision mn.xy, where:

- mn   the first two digit are incremented for major changes of substance, e.g., functional changes.
- xy   the second two digits are incremented when minor changes have been incorporated into the specification, i.e., enhancements, corrections, updates, etc.

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2. Statement of Scope

This Data Book describes the main features and the applications of SSD SATA 6Gbps Controller AS2258. For more details, please contact service.asolid@asolid-tek.com directly.

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3. General Description

AS2258 SSD SATA 6Gbps Controller is produced to build Solid-State Drive (SSD) related NAND flash storage devices. All ASolid's flash modules – for both commercial and industrial use, designed with the AS2258, are vibration-free and consume as little power as possible due to its lack of mechanical moving parts. Integrating SDRAM and SMART into the AS2258 completely minimizes the effort to migrate from R&D to mass production, resulting in reduced design-to-market cycles and greater business profits.

The embedded 32-bit microcontroller can provide a high performance of wear-levering and buffer management, and also act as a search engine for its neighboring flash unit. More importantly, ASolid optimal algorithm for wear-leveling can effectively increase the lifespan of a flash chip, especially for MLC and TLC flash. Moreover, the AS2258 contains Low Density Parity Check (LDPC) of Error Correction Code (ECC) circuitry, which is for increasing data reliability while reading raw data inside a flash chip.

The AS2258 has 16 hardware pins for general input/output control. These 16 pins can be programmed individually for input or output application. Furthermore, the default level of these pins is used for default function settings of the controller, including the frequency of DRAM, the type of flash, and the SATA speed setting. The AS2258 also supports Toggle NAND and ONFi NAND, and it can support high speed NAND flash requirement as NAND flash increasing capacity.

3.1. Feature

- Host interface:
    - AC coupling for transmitter and receiver
    - Compliant with SATA Revision 3.2
    - Compatible with SATA 1.5Gbps, 3Gbps and 6Gbps interface
    - Embedded BIST function for SATA PHY for low cost mass production
    - Self-calibrated and embedded termination resistor at transmitter
    - Support power management
    - Support expanded register for SATA protocol 48 bits addressing mode
- Flash interface support:
    - Built-in 2-channel NAND flash interface controller
    - Support both 1.2V and 1.8V flash (CE version supports 1.2V Flash)

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- UP to 16 flash chip selection and 8-bit flash IO access
- NAND flash support:
    - Support Low Density Parity Check (LDPC) code
    - Support RAID protection
    - Support 2D and 3D SLC/MLC/TLC NAND type flash
    - Support flash with 8KB/16KB page architecture
    - Support four-plane operation
    - Support Toggle Mode flash
    - Support ONFi3.0/ONFi2.3/ONFi2.2/ONFi2.1/ONFi2.0 flash
    - Support ONFi4.0 interface
        - SDR up to mode 5
        - NV-DDR up to mode 5
        - NV-DDR2 up to mode 7
        - NV-DDR3 up to mode 8
- Architecture
    - Built-in 32-bit microcontroller
    - Built-in voltage detector
    - Built-in UART function
    - Support JTAG interface
    - Support GPIO
    - Support I2C interface
    - Enhanced ESD design
- Power save implementation
    - Partial mode
    - Slumber mode
    - DevSleep mode
- Operating temperature
    - Commercial grade: 0℃ ~ 70℃
    - Industrial grade: -40℃ ~ +80℃
- Package
    - Support LFBGA (9 x 9 mm) 169-ball package
    - Lead-free and RoHS compliant

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3.2. AS2258 Function Block Diagram
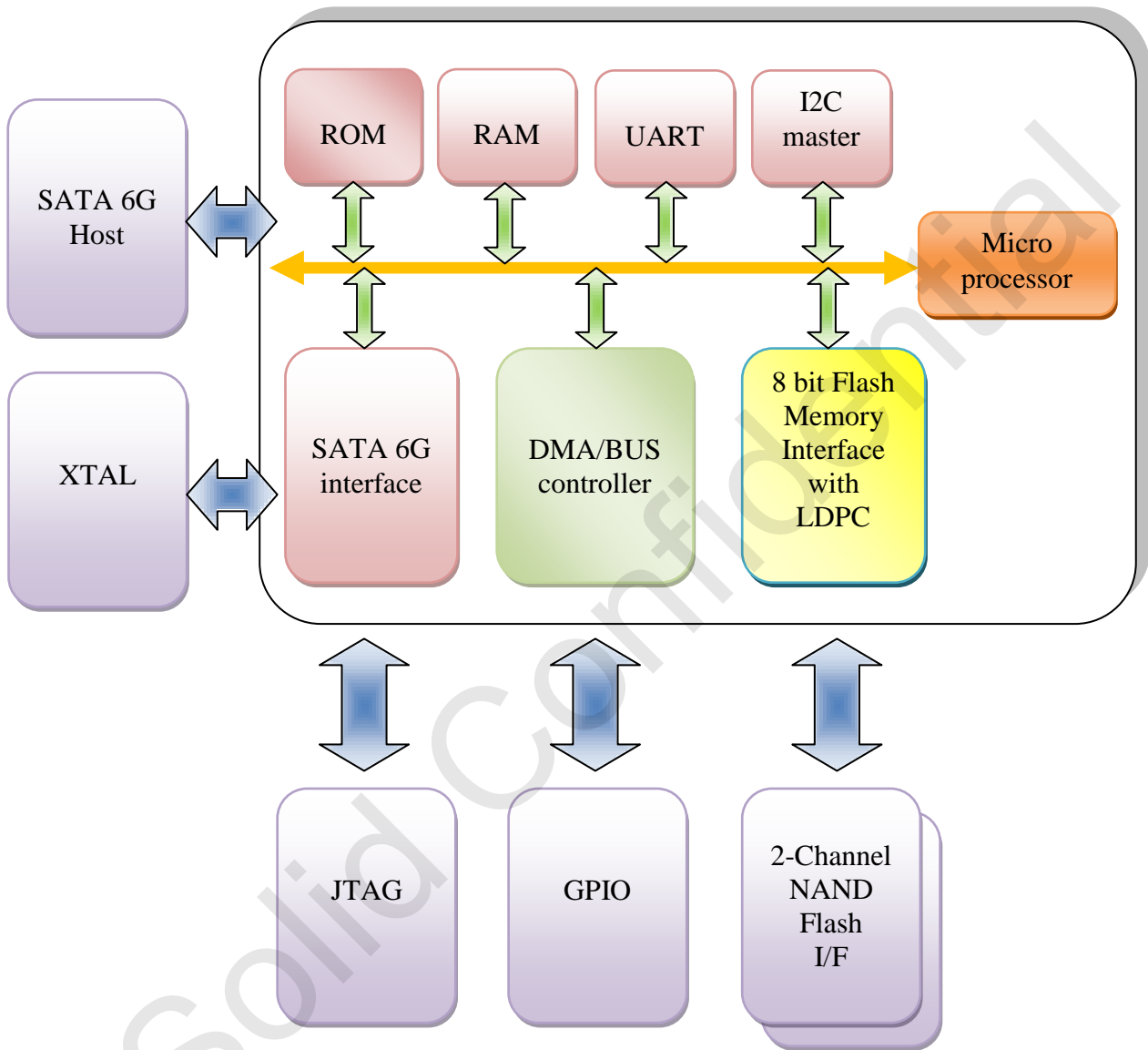
The following diagram is the internal block diagram of AS2258.

Figure 3-1 AS2258 Function Block Diagram