

Artificial Intelligence System Edge AI SOC + SPI NAND

MCP Features

- Low power consumption SoC + AI accelerator
- AI SoC + SPI NAND in 153-ball FBGA compact package
- Built-in high-performance TTS and KWS functions
- Software ecosystem support, compatible with TensorFlow Lite (TFL) framework
- SLC NAND reliability with strong on-die ECC engine
- 2–8 Gb NAND Flash densities, configurable boot modes
- Extended temperature and stable supply
- Total Edge AI solution at an affordable price

SPI SLC NAND Flash Features

- **Density**
 - 2/4/8 Gb
- **Architecture**
- Page size:
 - 2 Gb / 4 Gb / 8 Gb: (2048 + 128) bytes; 128-byte spare area
- Block size: 64 Pages
 - 2 Gb / 4 Gb / 8 Gb: 128 KB + 8 KB
- Plane size
 - 2 Gb: 1024 blocks per plane or (128 MB + 8 MB)
 - 4 Gb: 2048 blocks per plane or (256 MB + 16 MB)
- Device Size
 - 2 Gb: 2 planes per device or 256 Mbyte
 - 4 Gb: 2 planes per device or 512 Mbyte

Artificial Intelligence System GW2120 Features

- ARM® Cortex M4F 32-bit RISC Core
 - 256 KB program memory
 - 512 KB data memory
- AI Inference Accelerator
 - 128 16-bit floating point MAC
 - 2,048 KB SRAM shared with RISC Core
 - Vector processing acceleration
 - Convolution
 - Data Alignment
 - Add, Multiply, Sum, Square Sum
 - ReLu, Leaky ReLu, tanh
- Two 133 MHz QSPI for NAND or NOR flash access
- Digital Sensor Interface
 - 2x SPI
 - 4x I²C
 - 8x UART
 - 12 channel PWM
 - 12 channel Pulse Density Modulator (PDM) for microphone input
 - Inter-IC Sound (I²S) for digital audio input/output
- Digital DAC for direct analog audio output
- 8 channels 12-bit SAR ADC for analog input
- Two LDOs for 1.2 V supply
- Internal 8 MHz Oscillator, 32 kHz Real Time Clock Oscillator or Crystal Clock 12 ~ 48 MHz
- Phase Lock Loop (PLL) with Spread Spectrum

Physical Characteristics

- Operating voltages
 - External supply voltage: 3.3 V
 - Analog/Digital Core: 1.2 V
- Operating temperature:
 - Industrial: –40°C to +85°C
 - Industrial Extended: –40°C to +105°C

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Description

GW2120 AI System

The GW2120 is an artificial intelligence system on a chip (AI-SoC), with 32-bit RISC core, AI Inference Accelerator, and peripherals. The GW2120 integrates ARM® Cortex-M4F and 128 16-bit floating point (FP16) Multiply-Accumulate (MAC) logic which can operate up to 180 MHz, and vector processing manipulator for efficient neural network operations. Two high speed Quad Serial Peripheral Interface (QSPI) for serial NAND or NOR flash memory which enables access of large number of neural network coefficients in efficient way. 2,048 KB shared SRAM exists between the AI Inference Accelerator and the RISC core.

The GW2120 support digital interfaces for various sensors like SPI/I²C/I²S/UART/PWM/PDM. A 12-bit SAR ADC allows analog sensor signal input and Digital DAC allows analog audio output.

Two internal oscillators, Phase Lock Loop (PLL) circuit, and two LDOs minimize required external components for system implementation.

Typical Applications

- Text-to-Speech, Speech-to-Text,
- Keyword Spotting
- Sensor Data Processing
- Smart home automation
- Voice-controlled IoT devices
- Healthcare, medical, and industrial devices
- Environmental monitoring
- Retail, hospitality, and education
- Automotive and accessibility solutions
- Robotics and automation

SPI NAND

SkyHigh Memory SPI NAND devices are offered with a 3.3-V VCC power supply, and with industry standard Serial Peripheral Interface (SPI). Its NAND cell provides the most cost-effective solution for the solidstate mass storage market with low pin count and a modified SPI-NOR command set to address NAND specific functions and features.

The memory is divided into blocks that can be erased independently so it is possible to preserve valid data while old data is erased. The page size is (2048 + 128 spare) bytes. SkyHigh SPI NAND family is designed with powerful internal ECC engine.

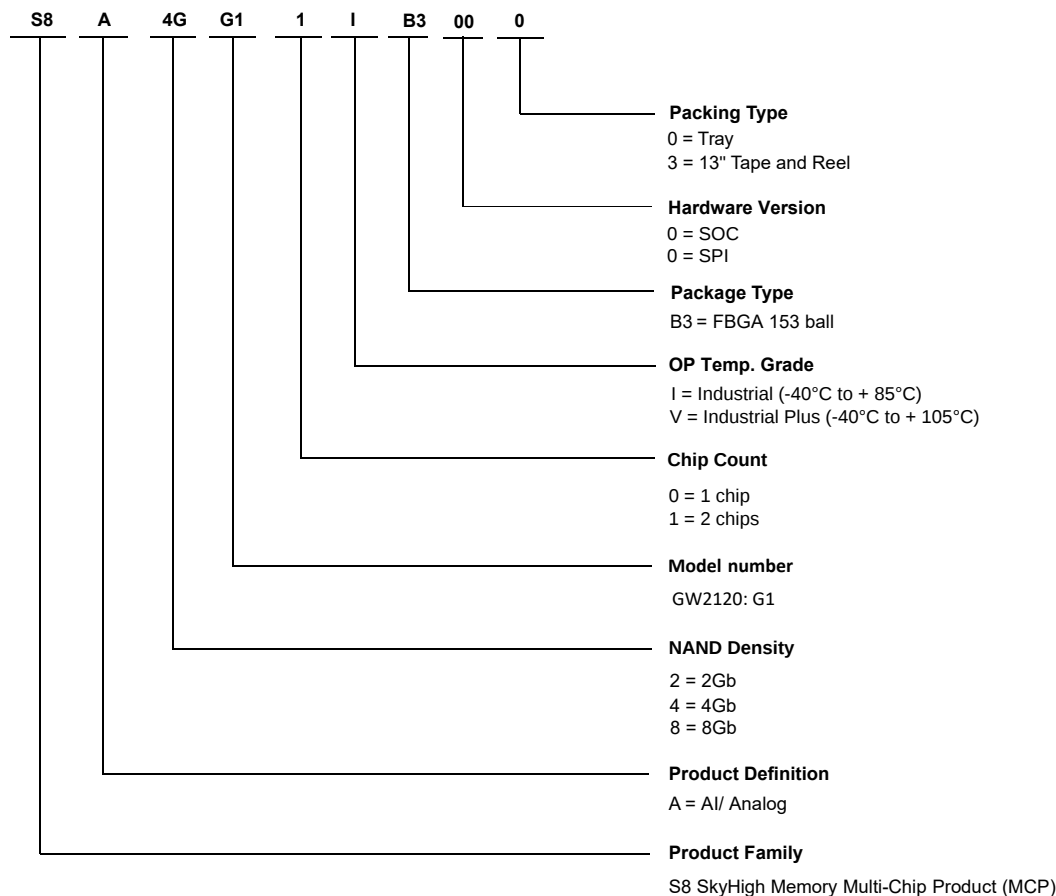
SkyHigh Memory SPI NAND Devices come with the following security features:

- OTP (one time programmable) area, which is a restricted access area where sensitive data/code can be stored permanently.
- Volatile and Permanent Block Protection.

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1. Ordering Information

The order number (Valid Combination) is formed by the following:



1.1 Valid Combinations

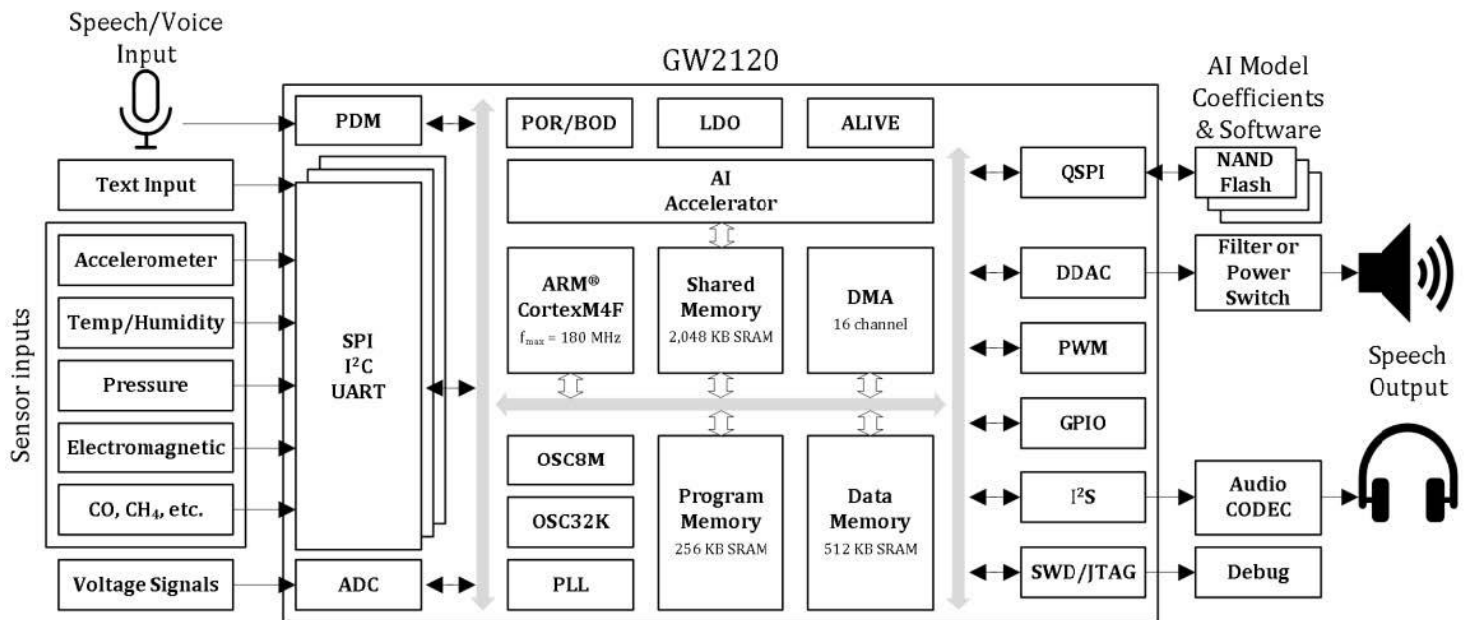
Valid Combinations list configurations planned to be supported in volume for this device. Consult your local sales office to confirm availability of specific valid combinations and to check on newly released combinations.

Product Family	Product Definition	NAND Density	Model number	Package	Temp grade	HW version	Packing Type
S8	A	2G, 4G, 8G	G1	B3	I, V	00	0, 3

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2. Product Block Diagram

Figure 2.1 Block Diagram



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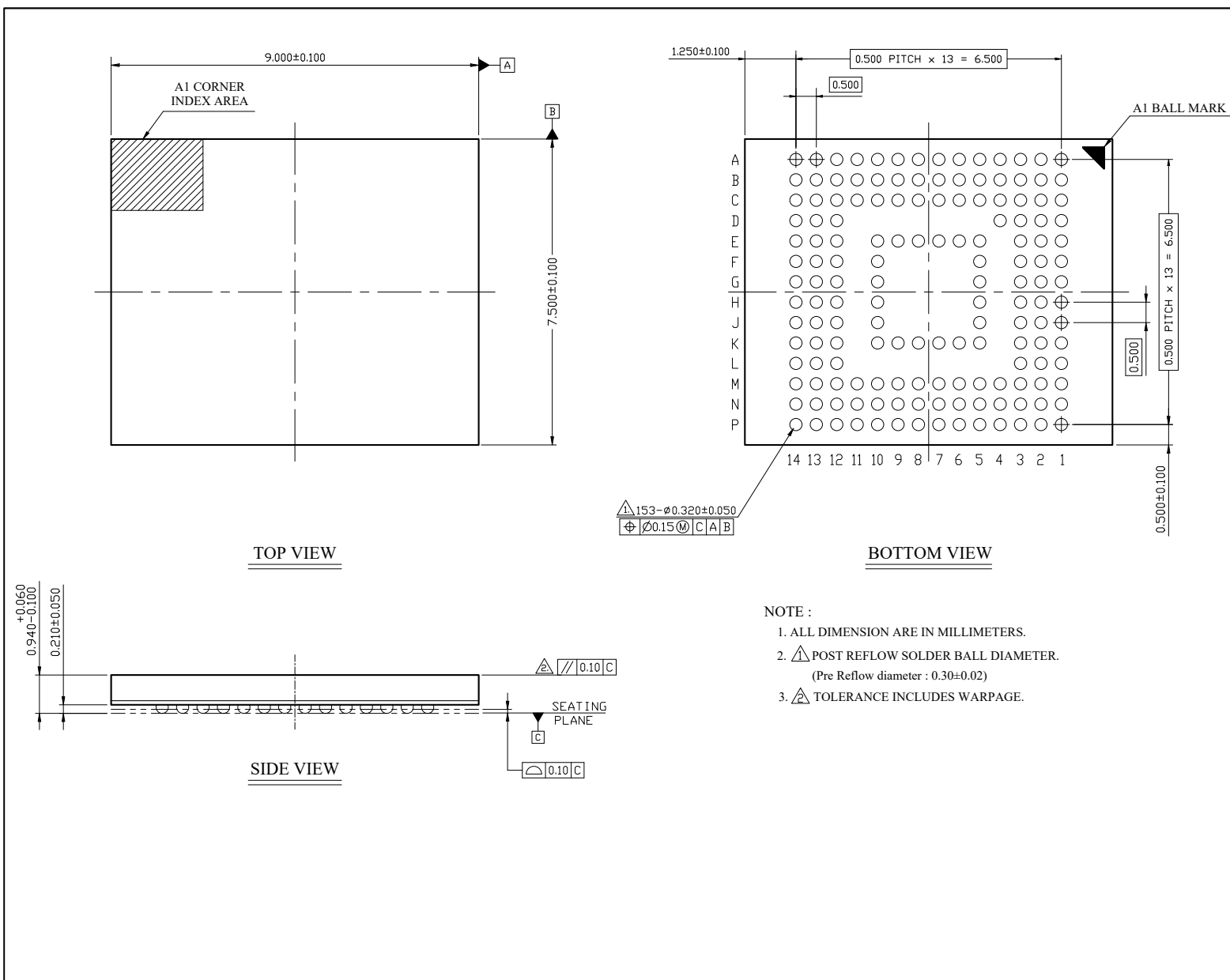
3. Connections Diagrams

Figure 3.1 153-Ball Ball Grid Array MCP

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
A	AIN1	AIN0	AIN4	PB26	PB25	PB24	PA17	DVDD	DVDD	IOVDD	IOVDD	PA16	PB28	PB29	A
B	AIN2	AVDD33	NF_CSB1	NF_CS0	NF_MISO	IOVDD	IOVDD	IOVDD	GNDQ	GND	NF_HOLD	NF_SCK	NF_MOSI	PB30	B
C	AIN3	AVDD33	NC	NF_CS0	NF_MISO	IOVDD	IOVDD	IOVDD	GNDQ	GND	NF_HOLD	NF_SCK	NF_MOSI	PB31	C
D	AVDD33	AVDD33	NF_WPB	NF_WPB								GNDQ	IOVDD	PB07	D
E	VLD012A	VLD012A	GND		GND	GND	GND	GND	GNDQ	GND		IOVDD	IOVDD	PB06	E
F	VLD012D	VLD012D	VLD012D		GND					GND		DVDD	DVDD	SWV	F
G	VLD012D	VLD012D	VLD012D		GND					GND		GND	GND	SWCLK	G
H	DVDD	DVDD	VDD33AL		GND					GND		GND	DVDD	SWDIO	H
J	WAKE_UP	DVDD	DVDD		GND					GND		DVDD	DVDD	PB23	J
K	PWR_ON	GND	GND		GND	GND	GND	GND	GND	GND		GND	GND	PB22	K
L	RESETB	IOVDD	IOVDD									IOVDD	IOVDD	PB21	L
M	PA18	IOVDD	IOVDD	DVDD	DVDD	IOVDD	GND	IOVDD	GND	GND	DVDD	DVDD	IOVDD	PB20	M
N	XTI0	AVDD12	FSOURCE	DVDD	NC	NC	GND	IOVDD	IOVDD	TESTMODE	DVDD	DVDD	IOVDD	PB19	N
P	XTI	AVDD12	PB14	PB15	PB08	PB09	PB10	PB11	PB12	PB13	PA21	PB16	PB17	PB18	P
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	

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4.1. 153 BGA 7.5 x 9.0 x 1.0 mm



5. Revision History

Document History Page

Document Title: Artificial Intelligence System - Edge AI SOC + SPI NAND Document Number: 003-00010B				
Rev.	ECN No.	Orig. of Change	Submission Date	Description of Change
**	—	MNADA	11/13/2025	Initial release

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