SUPPLEMENT

Am29F100 Known Good Die

1 Megabit (128 K x 8-Bit/64 K x 16-Bit)
CMOS 5.0 Volt-only, Boot Sector Flash Memory—Die Revision 1

DISTINCTIVE CHARACTERISTICS

- **Single power supply operation**
  - — 5.0 V ± 10% for read, erase, and program operations
  - — Simplifies system-level power requirements
- **High performance**
  - — 120 ns maximum access time
- **Low power consumption**
  - — 20 mA typical active read current for byte mode
  - — 28 mA typical active read current for word mode
  - — 30 mA typical program/erase current
  - — 25 µA typical standby current
- **Flexible sector architecture**
  - — One 16 Kbyte, two 8 Kbyte, one 32 Kbyte, and one 64 Kbyte sectors (byte mode)
  - — One 8 Kword, two 4 Kword, one 16 Kword, and one 32 Kword sectors (word mode)
  - — Any combination of sectors can be erased
  - — Supports full chip erase
- **Top or bottom boot block configurations available**
- **Sector protection**
  - — Hardware-based feature that disables/re-enables program and erase operations in any combination of sectors
  - — Sector protection/unprotection can be implemented using standard PROM programming equipment
  - — Temporary Sector Unprotect feature allows in-system code changes in protected sectors
- **Embedded Algorithms**
  - — Embedded Erase algorithm automatically pre-programs and erases the chip or any combination of designated sector
  - — Embedded Program algorithm automatically programs and verifies data at specified address
- **Minimum 100,000 program/erase cycles guaranteed**
- **Compatible with JEDEC standards**
  - — Pinout and software compatible with single-power-supply flash
  - — Superior inadvertent write protection
- **Data Polling and Toggle Bits**
  - — Provides a software method of detecting program or erase cycle completion
- **Ready/Busy pin (RY/BY#)**
  - — Provides a hardware method for detecting program or erase cycle completion
- **Erase Suspend/Erase Resume**
  - — Suspends an erase operation to read data from, or program data to, a sector that is not being erased, then resumes the erase operation
- **Hardware RESET# pin**
  - — Hardware method of resetting the device to reading array data
- **Tested to datasheet specifications at temperature**
- **Quality and reliability levels equivalent to standard packaged components**

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GENERAL DESCRIPTION

The Am29F100 in Known Good Die (KGD) form is a 1 Mbit, 5.0 Volt-only Flash memory. AMD defines KGD as standard product in die form, tested for functionality and speed. AMD KGD products have the same reliability and quality as AMD products in packaged form.

Am29F100 Features

The Am29F100 is a 1 Mbit, 5.0 Volt-only Flash memory organized as 131,072 bytes or 65,536 words. Word-wide data appears on DQ0-DQ15; byte-wide data on DQ0-DQ7. The device is designed to be programmed in-system with the standard system 5.0 Volt V_{CC} supply. A 12.0 volt V_{PP} is not required for program or erase operations. The device can also be programmed or erased in standard EPROM programmers.

To eliminate bus contention the device has separate chip enable (CE#), write enable (WE#) and output enable (OE#) controls.

The device requires only a **single 5.0 volt power supply** for both read and write functions. Internally generated and regulated voltages are provided for the program and erase operations.

The device is entirely command set compatible with the **JEDEC single-power-supply Flash standard**. Commands are written to the command register using standard microprocessor write timings. Register contents serve as input to an internal state machine that controls the erase and programming circuitry. Write cycles also internally latch addresses and data needed for the programming and erase operations. Reading data out of the device is similar to reading from other Flash or EPROM devices.

Device programming occurs by executing the program command sequence. This invokes the **Embedded Program** algorithm—an internal algorithm that automatically times the program pulse widths and verifies proper cell margin.

Device erasure occurs by executing the erase command sequence. This invokes the **Embedded Erase** algorithm—an internal algorithm that automatically preprograms the array (if it is not already programmed) before executing the erase operation. During erase, the device automatically times the erase pulse widths and verifies proper cell margin.

The host system can detect whether a program or erase operation is complete by observing the RY/BY# pin, or by reading the DQ7 (Data# Polling) and DQ6 (toggle) **status bits**. After a program or erase cycle has been completed, the device is ready to read array data or accept another command.

The **Erase Suspend** feature enables the system to put erase on hold for any period of time to read data from, or program data to, a sector that is not being erased.

The **sector erase architecture** allows memory sectors to be erased and reprogrammed without affecting the data contents of other sectors. The device is erased when shipped from the factory.

The **hardware data protection** measures include a low V_{CC} detector automatically inhibits write operations during power transitions. The **hardware sector protection** feature disables both program and erase operations in any combination of the sectors of memory, and is implemented using standard EPROM programmers. The **temporary sector unprotect** feature allows in-system changes to protected sectors.

The **hardware RESET# pin** terminates any operation in progress and resets the internal state machine to reading array data. The RESET# pin may be tied to the system reset circuitry. A system reset would thus also reset the device, enabling the system microprocessor to read the boot-up firmware from the Flash memory.

The system can place the device into the **standby mode**. Power consumption is greatly reduced in this mode.

AMD's Flash technology combines years of Flash memory manufacturing experience to produce the highest levels of quality, reliability, and cost effectiveness. The device electrically erases all bits within a sector simultaneously via Fowler-Nordheim tunneling. The bytes are programmed one byte at a time using the EPROM programming mechanism of hot electron injection.

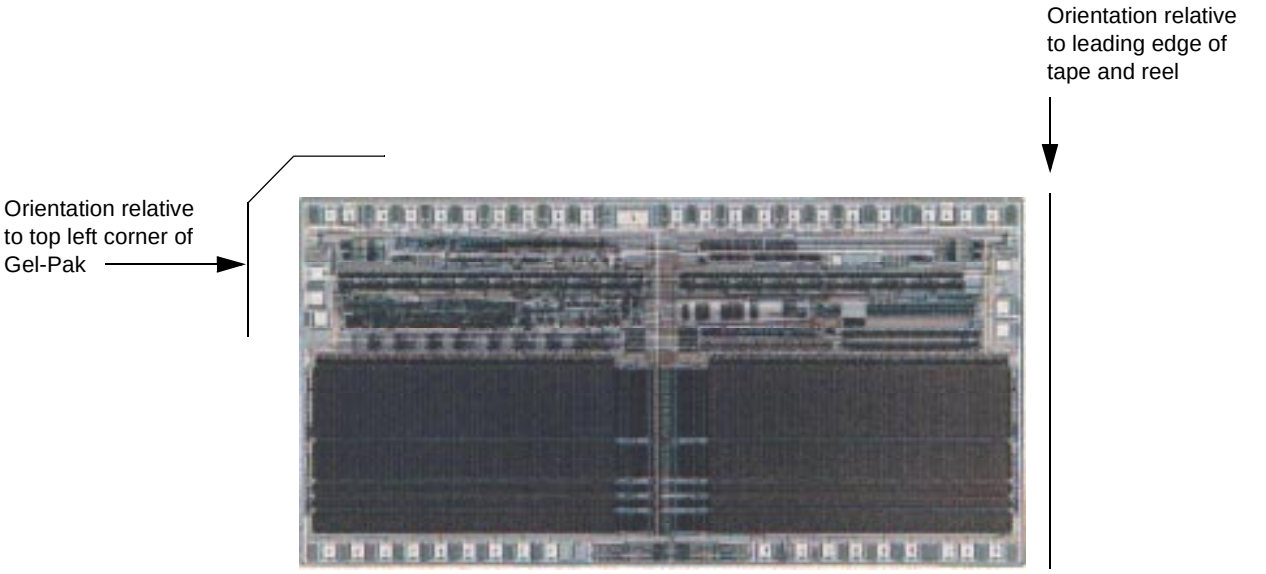
ELECTRICAL SPECIFICATIONS

Refer to the Am29F100 data sheet, document number 18926, for full electrical specifications on the Am29F100.

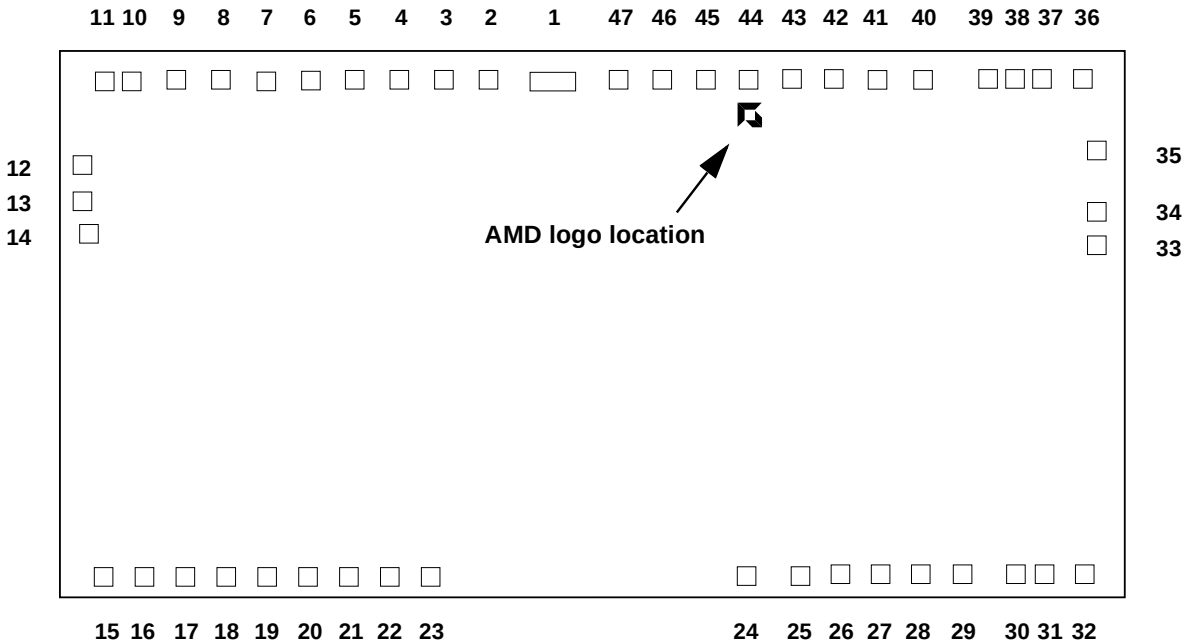
PRODUCT SELECTOR GUIDE

Family Part Number	**Am29F100 KGD**
Speed Option (V_{CC} = 5.0 V ± 10%)	**-120**
Max Access Time, t_{ACC} (ns)	120
Max CE# Access, t_{CE} (ns)	120
Max OE# Access, t_{OE} (ns)	50

DIE PHOTOGRAPH



DIE PAD LOCATIONS



PAD DESCRIPTION

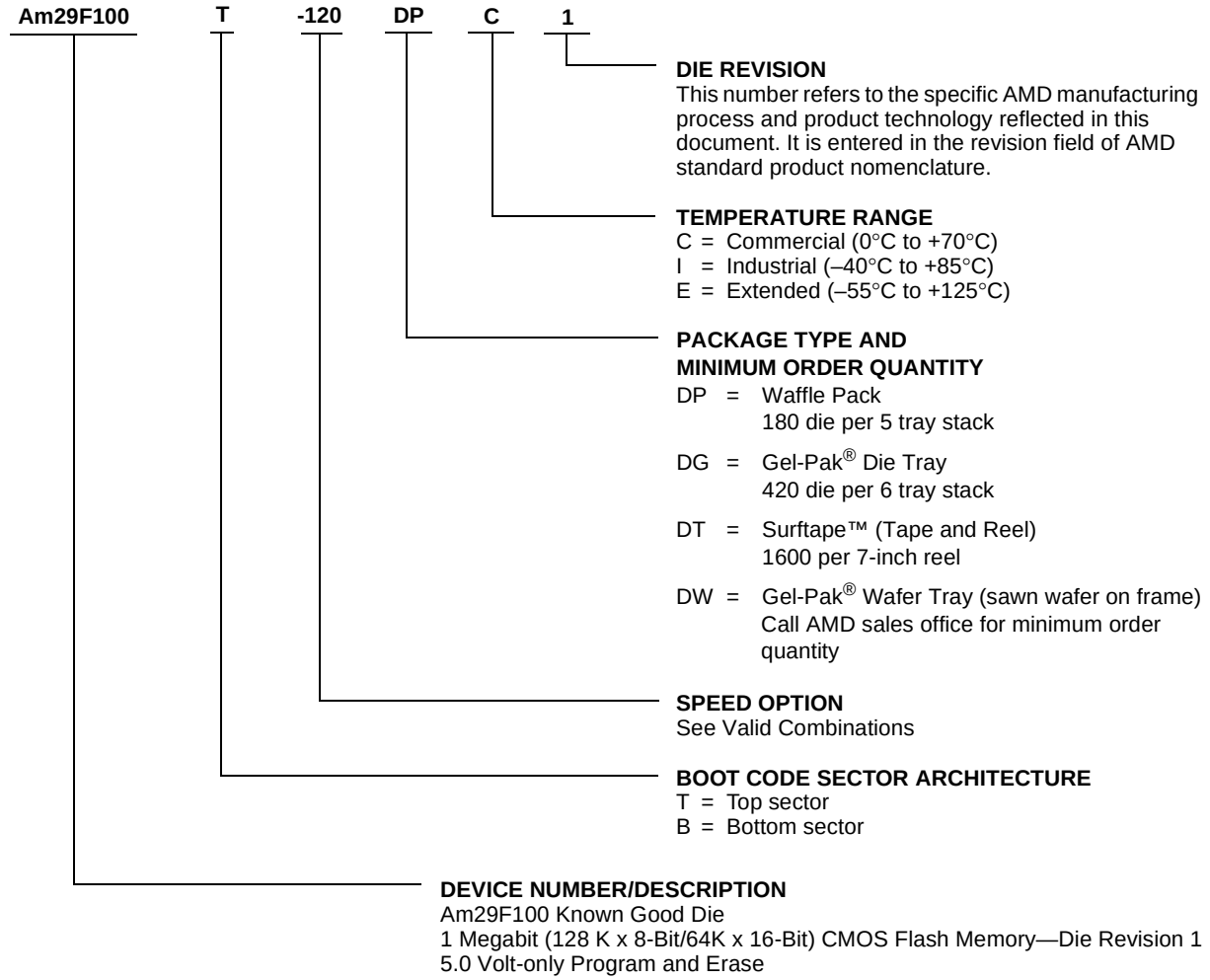
Pad	Signal	Pad Center (mils)		Pad Center (millimeters)	
		X	Y	X	Y
1	V_{CC}	0.0	0.0	0.00	0.00
2	DQ4	–16.5	0.6	–0.42	0.02
3	DQ12	–27.0	0.6	–0.69	0.02
4	DQ5	–37.8	0.6	–0.96	0.02
5	DQ13	–48.4	0.6	–1.23	0.02
6	DQ6	–59.1	0.6	–1.50	0.02
7	DQ14	–69.7	0.6	–1.77	0.02
8	NC	–80.5	0.6	–2.04	0.02
9	DQ7	–91.0	0.6	–2.31	0.02
10	NC	–103	0.6	–2.62	0.02
11	NC	–109.6	0.6	–2.78	0.02
12	DQ15	–114.7	–20.6	–2.91	–0.52
13	V_{SS}	–114.7	–29.5	–2.91	–0.75
14	BYTE#	–113.3	–37.0	–2.88	–0.94
15	A15	–110.2	–121.9	–2.80	–3.10
16	A14	–100.0	–121.9	–2.54	–3.10
17	A13	–90.0	–121.9	–2.29	–3.10
18	A12	–79.9	–121.9	–2.03	–3.10
19	A11	–69.9	–121.9	–1.78	–3.10
20	A10	–59.9	–121.9	–1.52	–3.10
21	A9	–49.9	–121.9	–1.27	–3.10
22	A8	–39.9	–121.9	–1.01	–3.10
23	WE#	–29.9	–121.9	–0.76	–3.10
24	RESET#	47.8	–121.9	1.21	–3.10
25	RY/BY#	61.2	–121.9	1.55	–3.10
26	A7	71.1	–121.9	1.81	–3.10
27	A6	81.1	–121.9	2.06	–3.10
28	A5	91.0	–121.9	2.31	–3.10
29	A4	101.1	–121.9	2.57	–3.10
30	A3	114.5	–121.9	2.91	–3.10
31	A2	121.4	–121.9	3.08	–3.10
32	A1	131.4	–121.9	3.34	–3.10
33	A0	134.5	–41.1	3.42	–1.04
34	CE#	134.5	–32.7	3.42	–0.83
35	V_{SS}	134.5	–17.6	3.42	–0.45
36	OE#	130.7	0.6	3.32	0.02
37	NC	120.9	0.6	3.07	0.02
38	NC	114.2	0.6	2.90	0.02
39	NC	107.5	0.6	2.73	0.02
40	DQ0	91.6	0.6	2.33	0.02
41	DQ8	80.2	0.6	2.04	0.02
42	DQ1	69.4	0.6	1.76	0.02
43	DQ9	58.9	0.6	1.50	0.02
44	DQ2	48.1	0.6	1.22	0.02
45	DQ10	37.5	0.6	0.95	0.02
46	DQ3	26.7	0.6	0.68	0.02
47	DQ11	16.2	0.6	0.41	0.02

Note: *The coordinates above are relative to the center of pad 1 and can be used to operate wire bonding equipment.*

ORDERING INFORMATION

Standard Products

AMD standard products are available in several packages and operating ranges. The order number (Valid Combination) is formed by a combination of the following:



Valid Combinations	
Am29F100T-120 Am29F100B-120	DPC 1, DPI 1, DPE 1, DGC 1, DGI 1, DGE 1, DTC 1, DTI 1, DTE 1, DWC 1, DWI 1, DWE 1

Valid Combinations

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

PRODUCT TEST FLOW

Figure 1 provides an overview of AMD's Known Good Die test flow. For more detailed information, refer to the Am29F100 product qualification database supplement for KGD. AMD implements quality assurance procedures throughout the product test flow. In addition, an off-line quality monitoring program (QMP) further guarantees AMD quality standards are met on Known Good Die products. These QA procedures also allow AMD to produce KGD products without requiring or implementing burn-in.

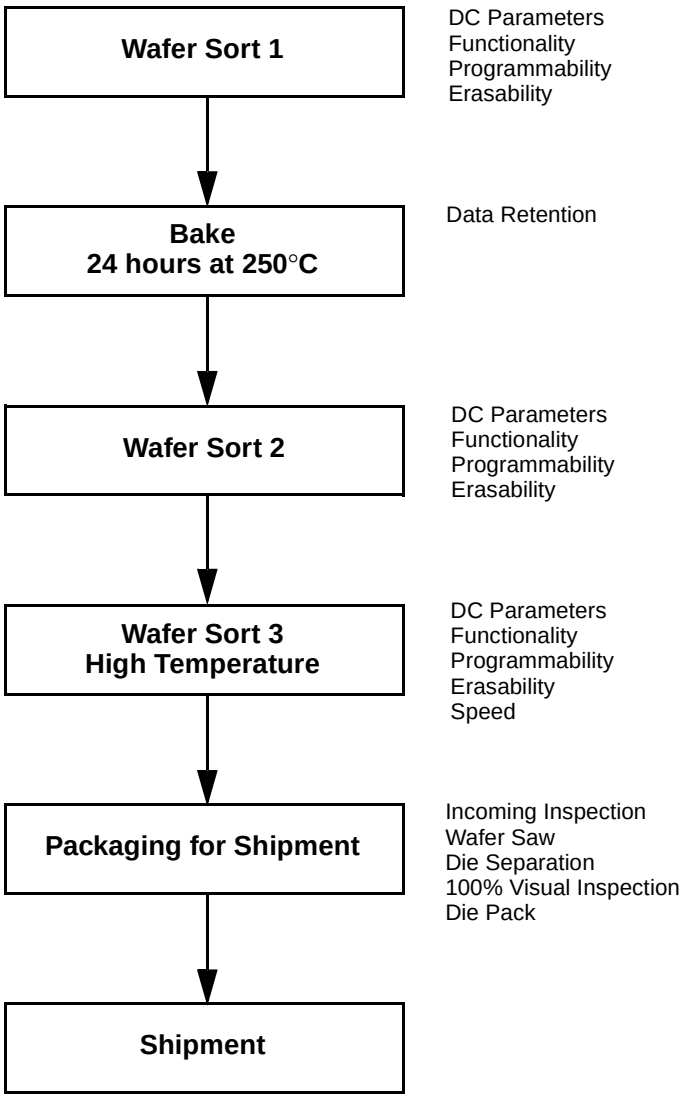


Figure 1. AMD KGD Product Test Flow

PHYSICAL SPECIFICATIONS

Die dimensions . . . . . 266 mils x 142 mils
. . . . . 6.76 mm x 3.61 mm

Die Thickness . . . . . ~20 mils or ~0.51 mm

Bond Pad Size . . . . . 4.64 mils x 4.64 mils
. . . . . 117.8 µm x 117.8 µm

Pad Area Free of Passivation . . . . . 21.53 $mils^2$
. . . . . 13,877 μm^2

Pads Per Die 47

Bond Pad Metalization . . . . . Al/Si/Cu

Die Backside . . . . . No metal,
may be grounded (optional)

Passivation . . . . . Nitride/SOG/Nitride

DC OPERATING CONDITIONS

V_{CC} (Supply Voltage) . . . . . 4.5 V to 5.5 V

Junction Temperature Under Bias . . T_J (max) = 130°C

Operating Temperature
. . . . . Commercial 0°C to +70°C
Industrial . . . . . –40°C to +85°C
Extended . . . . . –55°C to +125°C

MANUFACTURING INFORMATION

Manufacturing and Test. . . . . Fab 14, Austin, TX

Manufacturing ID (Top Boot) 98242AK
(Bottom Boot) 98242ABK

Preparation for Shipment . . . . . Penang, Malaysia

Fabrication Process CS19AFDS

Die Revision 1

SPECIAL HANDLING INSTRUCTIONS

Processing

Do not expose KGD products to ultraviolet light or process them at temperatures greater than 250°C. Failure to adhere to these handling instructions will result in irreparable damage to the devices. For best yield, AMD recommends assembly in a Class 10K clean room with 30% to 60% relative humidity.

Storage

Store at a maximum temperature of 30°C in a nitrogen-purged cabinet or vacuum-sealed bag. Observe all standard ESD handling procedures.

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REVISION SUMMARY FOR AM29F100 KNOWN GOOD DIE

Formatted to match current template. Updated Distinctive Characteristics and General Description sections using the current main data sheet. Changed Surftape quantity to 1600.

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