SUPPLEMENT

Am29LV200B Known Good Die

2 Megabit (256 K x 8-Bit/128 K x 16-Bit)
CMOS 3.0 Volt-only, Boot Sector Flash Memory, Die Revison 1

DISTINCTIVE CHARACTERISTICS

- **Single power supply operation**
  - — 2.7 to 3.6 volt read and write operations for battery-powered applications
- **Manufactured on 0.32 µm process technology**
- **High performance**
  - — 60R, 70, 90, 120 ns access time
- **Low power consumption (typical values at 5 MHz)**
  - — 200 nA Automatic Sleep mode current
  - — 200 nA standby mode current
  - — 7 mA read current
  - — 15 mA program/erase current
- **Flexible sector architecture**
  - — One 16 Kbyte, two 8 Kbyte, one 32 Kbyte, and seven 64 Kbyte sectors (byte mode)
  - — One 8 Kword, two 4 Kword, one 16 Kword, and seven 32 Kword sectors (word mode)
  - — Supports full chip erase
  - — Sector Protection features:

    A hardware method of locking a sector to prevent any program or erase operations within that sector

    Sectors can be locked in-system or via programming equipment

    Temporary Sector Unprotect feature allows code changes in previously locked sectors
- **Unlock Bypass Program Command**
  - — Reduces overall programming time when issuing multiple program command sequences
- **Top or Bottom boot block configuration**
- **Embedded Algorithms**
  - — Embedded Erase algorithm automatically preprograms and erases the entire chip or any combination of designated sectors
  - — Embedded Program algorithm automatically writes and verifies data at specified addresses
- **Minimum 1,000,000 write cycle guarantee per sector**
- **Compatibility 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 operation completion
- **Ready/Busy# pin (RY/BY#)**
  - — Provides a hardware method of 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 (RESET#)**
  - — Hardware method to reset the device to reading array data
- **20-year data retention at 125°C**
- **Tested to datasheet specifications at temperature**
- **Quality and reliability levels equivalent to standard packaged components**
- **500 µm or 280 µm die thickness shipping options**

Publication# **26014** Rev: **A** Amendment/**+2**
Issue Date: **November 18, 2003**

GENERAL DESCRIPTION

The Am29LV200B in Known Good Die (KGD) form is a 2 Mbit, 3.0 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.

Am29LV200B Features

The Am29LV200B is an 2 Mbit, 3 volt-only Flash memory organized as 262,144 bytes or 131,072 words. The word-wide data (x16) appears on DQ15–DQ0; the byte-wide (x8) data appears on DQ7–DQ0. 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 3 volt power supply** for both read and write functions. Internally generated and regulated voltages are provided for the program and erase operations. No V_{PP} is required for program or erase operations. The device can also be programmed in standard EPROM programmers.

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 initiates the **Embedded Program** algorithm—an internal algorithm that automatically times the program pulse widths and verifies proper cell margin. The **Unlock Bypass** mode facilitates faster programming times by requiring only two write cycles to program data instead of four.

Device erasure occurs by executing the erase command sequence. This initiates 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 **sector erase architecture** allows memory sectors to be erased and reprogrammed without affecting the data contents of other sectors. The device is fully erased when shipped from the factory.

Hardware data protection measures include a low V_{CC} detector that 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. This can be achieved in-system or via programming equipment.

The **Erase Suspend** feature enables the user to put erase on hold for any period of time to read data from, or program data to, any sector that is not selected for erasure. True background erase can thus be achieved.

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 device offers two power-saving features. When addresses have been stable for a specified amount of time, the device enters the **automatic sleep mode**. The system can also place the device into the **standby mode**. Power consumption is greatly reduced in both these modes.

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 data is programmed using hot electron injection.

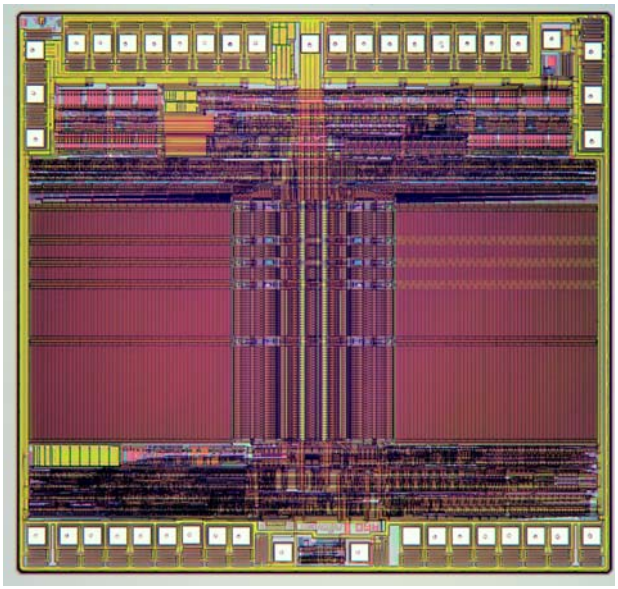
Electrical Specifications

Refer to the Am29LV200B data sheet, for full electrical specifications on the Am29LV200B in KGD form.

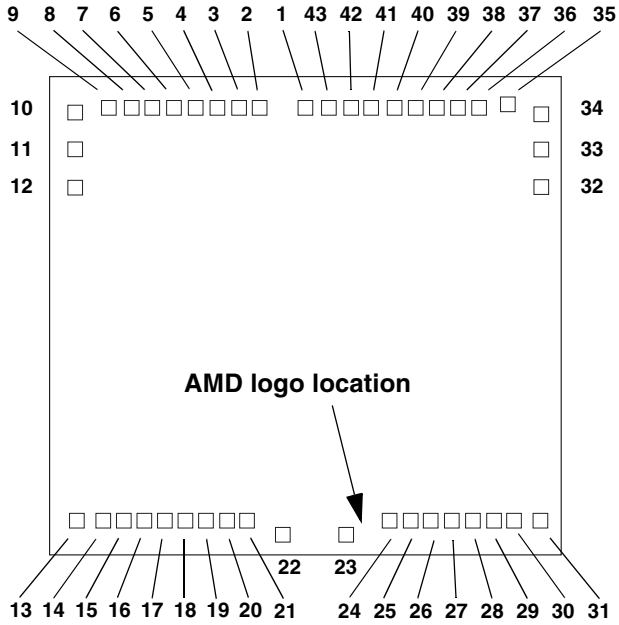
PRODUCT SELECTOR GUIDE

Family Part Number		Am29LV200B				
Speed Options	Regulated Voltage Range: V_{CC} = 3.0–3.6 V	**60R**	**70R**			
	Full Voltage Range: V_{CC} = 2.7–3.6 V			**70**	**90**	**120**
Max access time, ns (t_{ACC})		60	70	70	90	120
Max CE# access time, ns (t_{CE})		60	70	70	90	120
Max OE# access time, ns (t_{OE})		30	30	30	35	50

DIE PHOTOGRAPH



DIE PAD LOCATIONS



PAD DESCRIPTION (RELATIVE TO DIE CENTER)

Pad	Signal	Pad Center (mils)		Pad Center (millimeters)	
		X	Y	X	Y
1	V_{CC}	–0.90	57.70	–0.02	1.47
2	DQ4	–13.00	57.70	–0.33	1.47
3	DQ12	–18.90	57.70	–0.48	1.47
4	DQ5	–24.80	57.70	–0.63	1.47
5	DQ13	–30.70	57.70	–0.78	1.47
6	DQ6	–36.50	57.70	–0.93	1.47
7	DQ14	–42.40	57.70	–1.08	1.47
8	DQ7	–48.30	57.70	–1.23	1.47
9	DQ15/A–1	–54.20	57.70	–1.38	1.47
10	V_{SS}	–63.60	56.20	–1.62	1.43
11	BYTE#	–63.60	46.10	–1.62	1.17
12	A16	–63.60	36.00	–1.62	0.91
13	A15	–63.30	–54.80	–1.61	–1.39
14	A14	–55.90	–54.80	–1.42	–1.39
15	A13	–50.50	–54.80	–1.28	–1.39
16	A12	–44.70	–54.80	–1.14	–1.39
17	A11	–39.30	–54.80	–1.00	–1.39
18	A10	–33.40	–54.80	–0.85	–1.39
19	A9	–28.00	–54.60	–0.71	–1.39
20	A8	–22.10	–54.80	–0.56	–1.39
21	WE#	–16.60	–54.80	–0.42	–1.39
22	RESET#	–7.10	–58.60	–0.18	–1.49
23	RY/BY#	10.20	–58.60	0.26	–1.49
24	Not Connected	N/A	N/A	N/A	N/A
25	A7	28.00	–54.80	0.71	–1.39
26	A6	33.40	–54.80	0.85	–1.39
27	A5	39.30	–54.80	1.00	–1.39
28	A4	44.70	–54.80	1.14	–1.39
29	A3	50.50	–54.80	1.28	–1.39
30	A2	55.90	–54.80	1.42	–1.39
31	A1	63.30	–54.80	1.61	–1.39
32	A0	63.60	35.80	1.62	0.91
33	CE#	63.60	45.90	1.62	1.17
34	V_{SS}	63.60	56.00	1.62	1.42
35	OE#	54.20	58.60	1.38	1.49
36	DQ0	46.60	57.70	1.18	1.47
37	DQ8	40.70	57.70	1.03	1.47
38	DQ1	34.90	57.70	0.89	1.47
39	DQ9	28.90	57.70	0.73	1.47
40	DQ2	23.10	57.70	0.59	1.47
41	DQ10	17.20	57.70	0.44	1.47
42	DQ3	11.40	57.70	0.29	1.47
43	DQ11	5.40	57.70	0.14	1.47

PAD DESCRIPTION (RELATIVE TO V_{CC})

Pad	Signal	Pad Center (mils)		Pad Center (millimeters)	
		X	Y	X	Y
1	V_{CC}	0.00	0.00	0.00	0.00
2	DQ4	–12.10	0.00	–0.31	0.00
3	DQ12	–18.00	0.00	–0.46	0.00
4	DQ5	–23.90	0.00	–0.61	0.00
5	DQ13	–29.80	0.00	–0.76	0.00
6	DQ6	–35.60	0.00	–0.90	0.00
7	DQ14	–41.50	0.00	–1.05	0.00
8	DQ7	–47.40	0.00	–1.20	0.00
9	DQ15/A–1	–53.30	0.00	–1.35	0.00
10	V_{SS}	–62.70	–1.50	–1.59	–0.04
11	BYTE#	–62.70	–11.60	–1.59	–0.29
12	A16	–62.70	–21.70	–1.59	–0.55
13	A15	–62.40	–112.50	–1.58	–2.86
14	A14	–55.00	–112.50	–1.40	–2.86
15	A13	–49.60	–112.50	–1.26	–2.86
16	A12	–43.80	–112.50	–1.11	–2.86
17	A11	–38.40	–112.50	–0.98	–2.86
18	A10	–32.50	–112.50	–0.83	–2.86
19	A9	–27.10	–112.30	–0.69	–2.85
20	A8	–21.20	–112.50	–0.54	–2.86
21	WE#	–15.70	–112.50	–0.40	–2.86
22	RESET#	–6.20	–116.30	–0.16	–2.95
23	RY/BY#	11.10	–116.30	0.28	–2.95
24	Not Connected	N/A	N/A	N/A	N/A
25	A7	28.90	–112.50	0.73	–2.86
26	A6	34.30	–112.50	0.87	–2.86
27	A5	40.20	–112.50	1.02	–2.86
28	A4	45.60	–112.50	1.16	–2.86
29	A3	51.40	–112.50	1.31	–2.86
30	A2	56.80	–112.50	1.44	–2.86
31	A1	64.20	–112.50	1.63	–2.86
32	A0	64.50	–21.90	1.64	–0.56
33	CE#	64.50	–11.80	1.64	–0.30
34	V_{SS}	64.50	–1.70	1.64	–0.04
35	OE#	55.10	0.90	1.40	0.02
36	DQ0	47.50	0.00	1.21	0.00
37	DQ8	41.60	0.00	1.06	0.00
38	DQ1	35.80	0.00	0.91	0.00
39	DQ9	29.80	0.00	0.76	0.00
40	DQ2	24.00	0.00	0.61	0.00
41	DQ10	18.10	0.00	0.46	0.00
42	DQ3	12.30	0.00	0.31	0.00
43	DQ11	6.30	0.00	0.16	0.00

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:

Am29LV200B T -60 DP C 1

DIE REVISION
This number refers to the specific AMD manufacturing process and product technology reflected in this document. It is entered in the revision field of AMD standard product nomenclature.

TEMPERATURE RANGE
C = Commercial (0°C to +70°C)
I = Industrial (–40°C to +85°C)
E = Extended (–55°C to +125°C)

PACKAGE TYPE AND MINIMUM ORDER QUANTITY
DP = Waffle Pack, 500 µm thick die
245 die per 5 tray stack
DT = Surftape™ (Tape and Reel), 500 µm thick die
2500 per 7-inch reel
DW = Gel-Pak® Wafer Tray (sawn wafer on frame)
500 µm thick die
Call AMD sales office for minimum order quantity
DR = Surftape™ (Tape and Reel), 280 µm thick die
2500 per 7-inch reel
DF = Waffle Pack, 280 µm thick die
245 die per 5 tray stack

SPEED OPTION
See Product Selector Guide and Valid Combinations

BOOT CODE SECTOR ARCHITECTURE
T = Top sector
B = Bottom sector

DEVICE NUMBER/DESCRIPTION
Am29LV200B Known Good Die
2 Megabit (256 K x 8-Bit/128 K x 16-Bit) CMOS Flash Memory
3.0 Volt-only Program and Erase

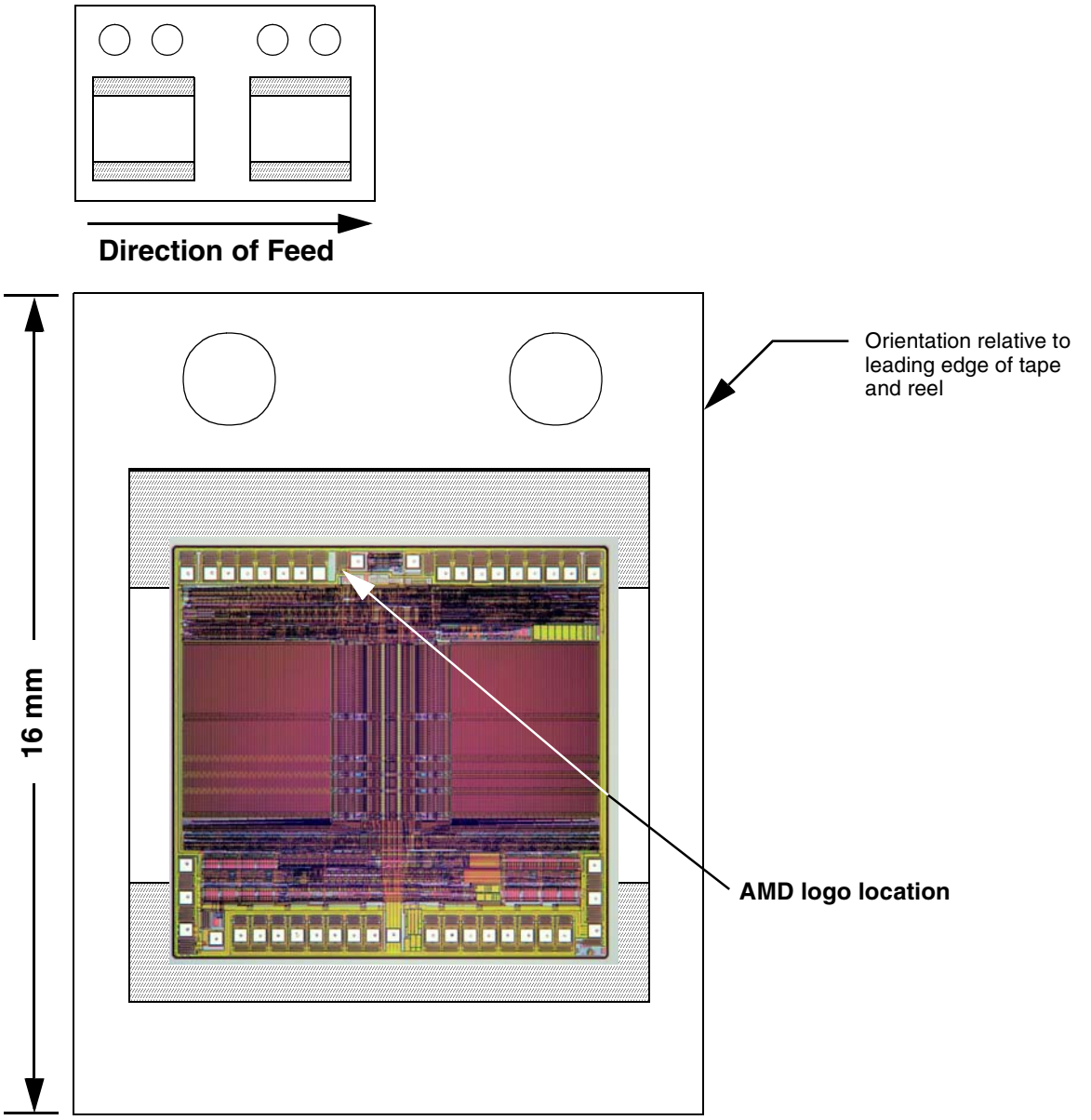
Valid Combinations	
AM29LV200BT-60R AM29LV200BB-60R	DRC, DRI, DFC, DFI DPC, DPI, DTC, DTI, DWC, DWI
AM29LV200BT-70, AM29LV200BB-70	
AM29LV200BT-90, AM29LV200BB-90	
AM29LV200BT-120, AM29LV200BB-120	
AM29LV200BT-70R AM29LV200BB-70R	DFE, DRE, DPE, DTE

Valid Combinations

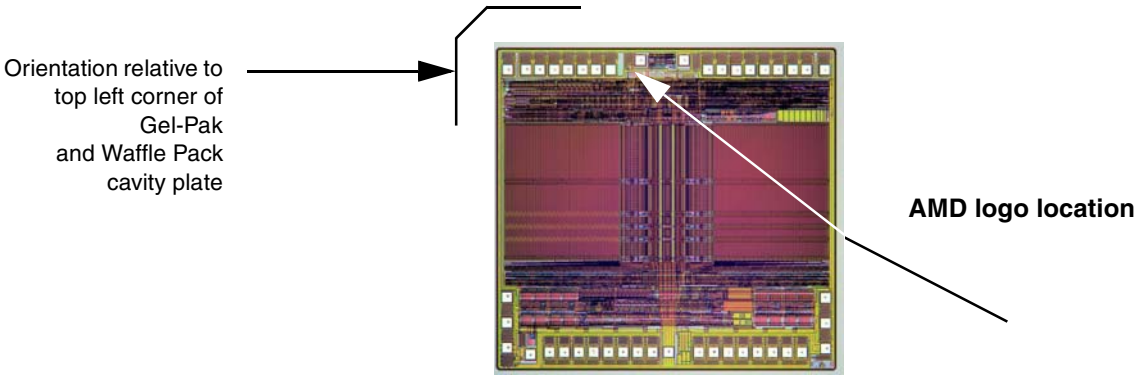
Valid Combinations list configurations planned to be supported in volume for this device. Consult the local AMD sales office to confirm availability of specific valid combinations and to check on newly released combinations.

PACKAGING INFORMATION

Surftape Packaging



Gel-Pak and Waffle Pack Packaging



PRODUCT TEST FLOW

Figure 1 provides an overview of AMD's Known Good Die test flow. For more detailed information, refer to the Am29LV200B product qualification database. AMD implements quality assurance procedures throughout the product test flow. These QA procedures also allow AMD to produce KGD products without requiring or implementing burn-in. In addition, an off-line qualification maintenance program (QMP) further guarantees AMD quality standards are met on Known Good Die products.

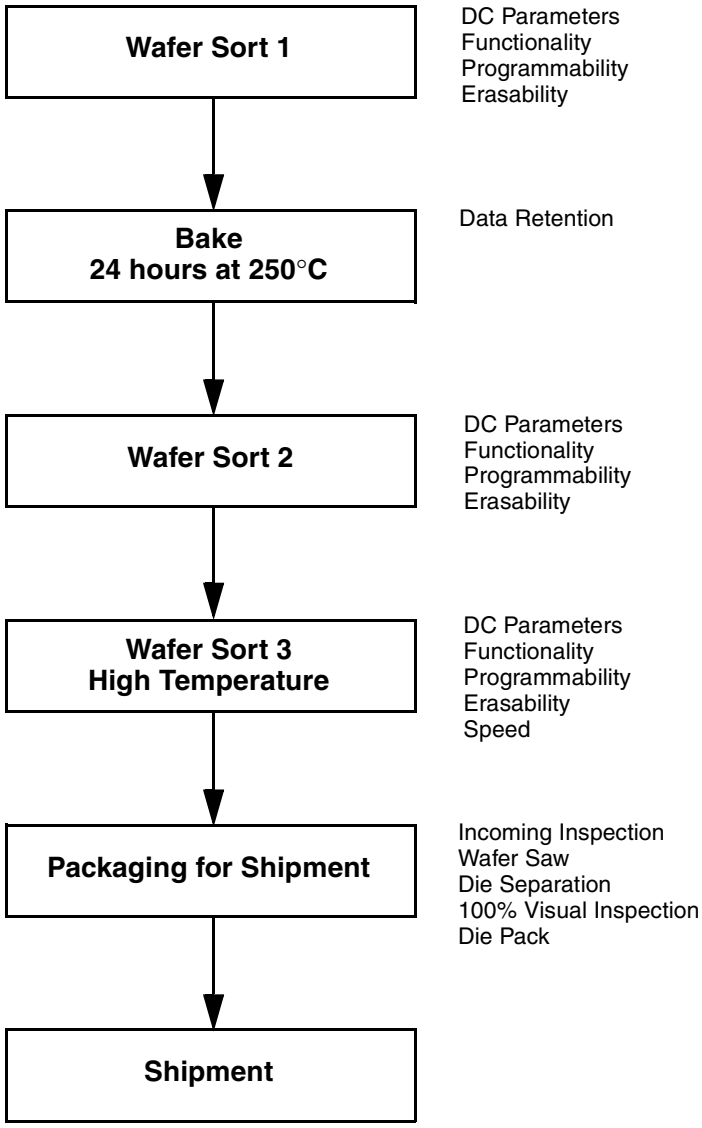


Figure 1. AMD KGD Product Test Flow

PHYSICAL SPECIFICATIONS

Active Die dimensions . x = 3462.6 µm; y = 3277.8 µm
. . . . . x = 136.3 mils; y = 129.0 mils

Scribe width . . . . . x = 87.4 µm; y = 232.2 µm
. . . . . x = 3.44 mils; y = 9.03 mils

Step dimensions . . . . . x = 3.56 mm; y = 3.51 mm
. . . . . x = 139.76 mils; y = 138.19 mils

Die Thickness. . . . . .500 µm = 483 +/–51 µm
. . . . . 280 µm = 280 +/–15 µm

Bond Pad Size . . . . . .115.9 µm x 115.9 µm
. . . . . 4.69 mils x 4.69 mils

Minimum pad pitch. . . . . 137.8 µm
. . . . . 5.43 mils

Pad Area Free of Passivation . . . . . 13.99 $mils^2$

Pads Per Die 43

Bond Pad Metalization . . . . . Al/Cu
. . . . . .Minimum thickness: 10500 Å

Die Backside . . . . . No metal,
may be grounded with Back-grind type finish (optional)

Passivation. . . . . Nitride/SOG/Nitride
. . . . . .Minimum thickness: 14700 Å

Ink dot height . . . . . .0.8 mils max
. . . . . 20.3 µm max

Ink dot diameter . . . . . .15 mils min
. . . . . 381 µm min

DC OPERATING CONDITIONS

V_{CC} (Supply Voltage) . . . . . 2.7 V to 3.6 V

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

MANUFACTURING INFORMATION

Manufacturing . . . . . .FASL

Test . . . . . Penang, Malaysia

Manufacturing ID (Top Boot) 98488AK
(Bottom Boot) 98488ABK

Preparation for Shipment . . . . . Penang, Malaysia

Fabrication Process CS39S

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

TERMS AND CONDITIONS OF SALE FOR AMD NON-VOLATILE MEMORY DIE

All transactions relating to unpackaged die under this agreement shall be subject to AMD's standard terms and conditions of sale, or any revisions thereof, which revisions AMD reserves the right to make at any time and from time to time. In the event of conflict between the provisions of AMD's standard terms and conditions of sale and this agreement, the terms of this agreement shall be controlling.

AMD warrants unpackaged die of its manufacture ("Known Good Die" or "Die") against defective materials or workmanship for a period of one (1) year from date of shipment. This warranty does not extend beyond the first purchaser of said Die. Buyer assumes full responsibility to ensure compliance with the appropriate handling, assembly and processing of Known Good Die (including but not limited to proper Die preparation, Die attach, wire bonding and related assembly and test activities), and compliance with all guidelines set forth in AMD's specifications for Known Good Die, and AMD assumes no responsibility for environmental effects on Known Good Die or for any activity of Buyer or a third party that damages the Die due to improper use, abuse, negligence, improper installation, accident, loss, damage in transit, or unauthorized repair or alteration by a person or entity other than AMD ("Warranty Exclusions").

The liability of AMD under this warranty is limited, at AMD's option, solely to repair the Die, to send replacement Die, or to make an appropriate credit adjustment or refund in an amount not to exceed the original purchase price actually paid for the Die returned to AMD, provided that: (a) AMD is promptly notified by Buyer in writing during the applicable warranty period of any defect or nonconformity in the Known Good Die; (b) Buyer obtains authorization from AMD to return the defective Die; (c) the defective Die is returned to AMD by Buyer in accordance with AMD's shipping instructions set forth below; and (d) Buyer shows to AMD's satisfaction that such alleged defect or nonconformity actually exists and was not caused by any of the above-referenced Warranty Exclusions. Buyer shall ship such defective Die to AMD via AMD's carrier, collect. Risk of loss will transfer to AMD when the defective Die is provided to AMD's carrier. If Buyer fails to adhere to these warranty returns guidelines, Buyer shall assume all risk of loss and shall pay for all freight to AMD's specified location. The aforementioned provisions do not extend the original warranty period of any Known Good Die that has either been repaired or replaced by AMD.

WITHOUT LIMITING THE FOREGOING, EXCEPT TO THE EXTENT THAT AMD EXPRESSLY WARRANTS TO BUYER IN A SEPARATE AGREEMENT SIGNED BY AMD, AMD MAKES NO WARRANTY WITH RESPECT TO THE DIE'S PROCESSING OF DATE DATA, AND SHALL HAVE NO LIABILITY FOR DAMAGES OF ANY KIND, UNDER EQUITY, LAW, OR ANY OTHER THEORY, DUE TO THE FAILURE OF SUCH KNOWN GOOD DIE TO PROCESS ANY PARTICULAR DATA CONTAINING DATES, INCLUDING DATES IN AND AFTER THE YEAR 2000, WHETHER OR NOT AMD RECEIVED NOTICE OF THE POSSIBILITY OF SUCH DAMAGES.

THIS WARRANTY IS EXPRESSED IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING THE IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, THE IMPLIED WARRANTY OF MERCHANTABILITY AND OF ALL OTHER OBLIGATIONS OR LIABILITIES ON AMD's PART, AND IT NEITHER ASSUMES NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR AMD ANY OTHER LIABILITIES. THE FOREGOING CONSTITUTES THE BUYER'S SOLE AND EXCLUSIVE REMEDY FOR THE FURNISHING OF DEFECTIVE OR NON CONFORMING KNOWN GOOD DIE AND AMD SHALL NOT IN ANY EVENT BE LIABLE FOR INCREASED MANUFACTURING COSTS, DOWNTIME COSTS, DAMAGES RELATING TO BUYER'S PROCUREMENT OF SUBSTITUTE DIE (i.e., "COST OF COVER"), LOSS OF PROFITS, REVENUES OR GOODWILL, LOSS OF USE OF OR DAMAGE TO ANY ASSOCIATED EQUIPMENT, OR ANY OTHER INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES BY REASON OF THE FACT THAT SUCH KNOWN GOOD DIE SHALL HAVE BEEN DETERMINED TO BE DEFECTIVE OR NON CONFORMING.

Buyer agrees that it will make no warranty representations to its customers which exceed those given by AMD to Buyer unless and until Buyer shall agree to indemnify AMD in writing for any claims which exceed AMD's warranty.

Known Good Die are not designed or authorized for use as components in life support appliances, devices or systems where malfunction of the Die can reasonably be expected to result in a personal injury. Buyer's use of Known Good Die for use in life support applications is at Buyer's own risk and Buyer agrees to fully indemnify AMD for any damages resulting in such use or sale.

REVISION SUMMARY

Revision A (February 4, 2002)

Initial release.

Revision A+1 (December 9, 2002)

Global

Added the 60R, 70, 90, and 120 speeds.

Valid Combinations

Added package types to table.

Ordering Information

Removed extended temperature range.

Packaging Information

Added gelpack and waffle pack photo to section.

Revision A+2 (November 18, 2003)

Global

Added Extended Temperature and 280 um die thickness shipping option.