CONDENSED

AmC0XXDFLKA

4, 8, or 20 Megabyte 5.0 Volt-only Flash Memory PC Card

Advanced Micro Devices

DISTINCTIVE CHARACTERISTICS

- **High performance**
  - — 200/150 ns maximum access time
- **Single supply operation**
  - — Write and erase voltage, 5.0 V ±5%
  - — Read voltage, 5.0 V ±5%
- **CMOS low power consumption**
  - — 45 mA maximum active read current (x8 mode)
  - — 65 mA maximum active erase/write current (x8 mode)
- **High write endurance**
  - — Minimum 100,000 erase/write cycles per sector
- **PCMCIA/JEIDA 68-pin standard**
  - — Selectable byte-/or word-wide configuration
- **Write protect switch**
  - — Prevents accidental data loss
- **Zero data retention power**
  - — Batteries not required for data storage
- **Enhanced power management for standby mode**
  - — <1 µA typical standby current
  - — Standard access time from standby mode
- **Separate attribute memory**
- **Automated write and erase operations increase system write performance**
  - — 64K byte memory sectors for faster automated erase speed
  - — Typically 1 second per single memory sector erase
  - — Random address writes to previously erased bytes (8 µs typical per byte)
- **Total system integration solution**
  - — Support from independent software and hardware vendors
- **Low insertion and removal force**
  - — State-of-the-art connector allows for minimum card insertion and removal effort
- **Erase Suspend/Resume**
  - — Supports **reading or programming** data to a sector not being erased within the same device
- **Support for RDY/$\overline{\text{BSY}}$ and RESET signals**

GENERAL DESCRIPTION

AMD's 5.0 Volt-only Flash Memory PC Card provides the highest system level performance for data and file storage solutions to the portable PC market segment and a wide range of embedded applications. Manufactured with AMD's Negative Gate Erase, 5.0 Volt-only technology, the AMD 5.0 Volt-only Flash Memory Cards are the most cost-effective and reliable approach to single-supply Flash memory cards. Data files and application programs can be stored on the "D" series cards. This allows OEM manufacturers of portable systems to eliminate the weight, high-power consumption and reliability issues associated with electro-mechanical disk-based systems. The "D" series cards also allow today's bulky and heavy battery packs to be reduced in weight and size. AMD's Flash Memory PC Cards provide the most efficient method to transfer useful work between different hardware platforms. The enabling technology of the "D" series cards enhances the productivity of mobile workers.

Widespread acceptance of the "D" series cards is assured due to their compatibility with the 68-pin PCMCIA/JEIDA international standard. AMD's Flash Memory Cards can be read in either a byte-wide or word-wide mode which allows for flexible integration into various system platforms. Compatibility is assured at the hardware interface and software interchange specification. The Card Information Structure (CIS) or Metaformat, can be written by the OEM into the memory card's attribute memory address space beginning at address 00000H by using a format utility. The CIS appears at the beginning of the Card's attribute memory space and defines the low-level organization of data on the PC Card. The "D" series cards contains a separate EEPROM memory for the cards' attribute memory space. This allows all of the Flash memory to be used for the common memory space.

Third party software solutions such as Microsoft's and SystemSoft's Flash File System (FFS2), SCM's SCM-FTL, and Datalight's Cardtrick enable AMD's Flash Memory PC Card to replicate the function of traditional disk-based memory systems.

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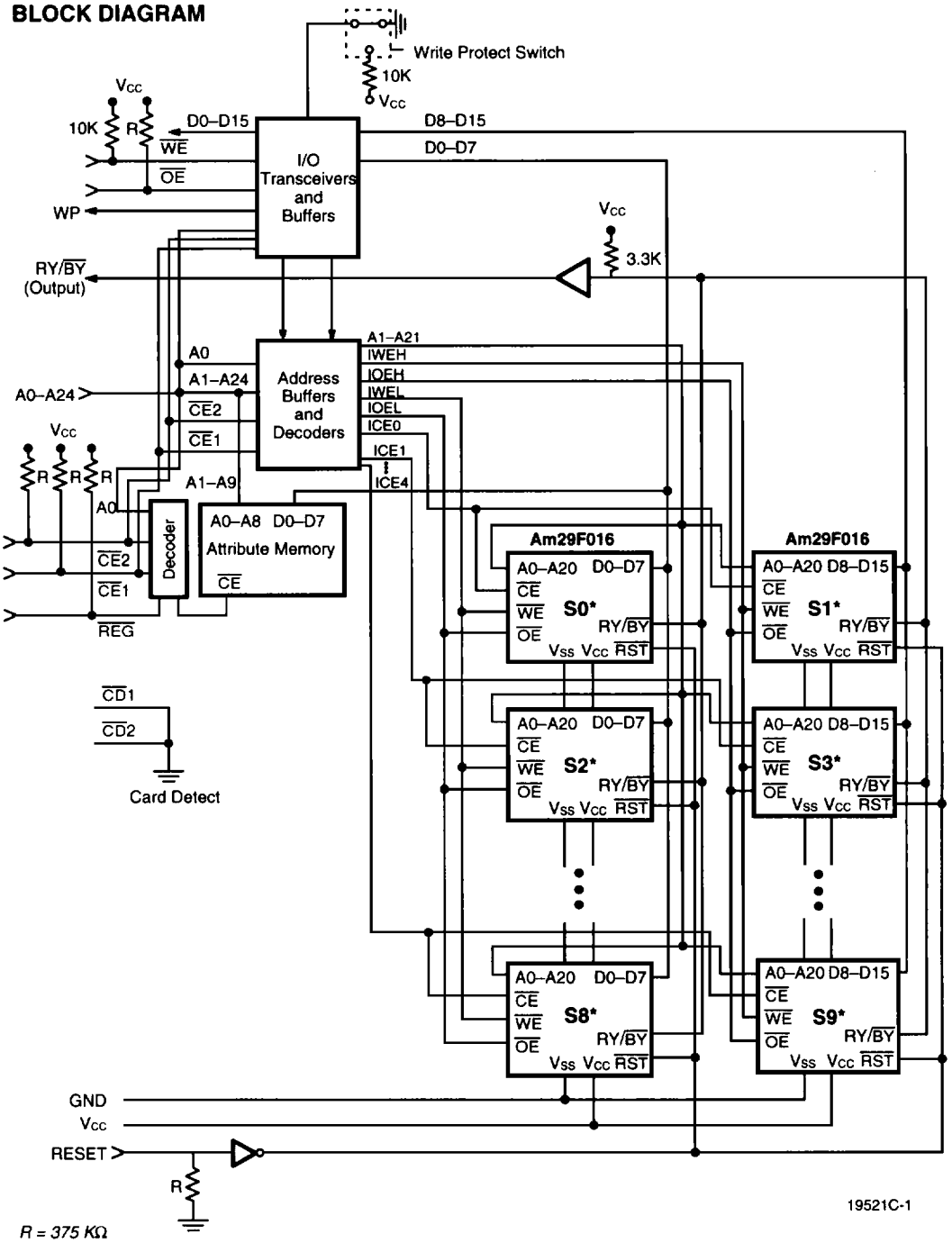
BLOCK DIAGRAM



R = 375 KΩ

**4 Mbyte card = S0 + S1*

**8 Mbyte card = S0....S3*

**20 Mbyte card = S0....S9*

PC CARD PIN ASSIGNMENTS

Pin#	Signal	I/O	Function	Pin#	Signal	I/O	Function
1	GND		Ground	35	GND		Ground
2	D3	I/O	Data Bit 3	36	$\overline{CD1}$	O	Card Detect 1 (Note 3)
3	D4	I/O	Data Bit 4	37	D11	I/O	Data Bit 11
4	D5	I/O	Data Bit 5	38	D12	I/O	Data Bit 12
5	D6	I/O	Data Bit 6	39	D13	I/O	Data Bit 13
6	D7	I/O	Data Bit 7	40	D14	I/O	Data Bit 14
7	$\overline{CE1}$	I	Card Enable 1 (Note 3)	41	D15	I/O	Data Bit 15
8	A10	I	Address Bit 10	42	$\overline{CE2}$	I	Card Enable 2 (Note 3)
9	$\overline{OE}$	I	Output Enable	43	NC		No Connect
10	A11	I	Address Bit 11	44	NC		No Connect
11	A9	I	Address Bit 9	45	NC		No Connect
12	A8	I	Address Bit 8	46	A17	I	Address Bit 17
13	A13	I	Address Bit 13	47	A18	I	Address Bit 18
14	A14	I	Address Bit 14	48	A19	I	Address Bit 19
15	$\overline{WE}$	I	Write Enable	49	A20	I	Address Bit 20
16	RDY/$\overline{BSY}$	O	Ready/Busy	50	A21	I	Address Bit 21 (Note 4)
17	V_{CC1}		Power Supply	51	V_{CC2}		Power Supply
18	NC		No Connect (Note 1)	52	NC		No Connect (Note 1)
19	A16	I	Address Bit 16	53	A22	I	Address Bit 22 (Note 5)
20	A15	I	Address Bit 15	54	A23	I	Address Bit 23 (Note 6)
21	A12	I	Address Bit 12	55	A24	I	Address Bit 24 (Note 7)
22	A7	I	Address Bit 7	56	NC		No Connect
23	A6	I	Address Bit 6	57	NC		No Connect
24	A5	I	Address Bit 5	58	RESET	I	RESET
25	A4	I	Address Bit 4	59	NC		No Connect
26	A3	I	Address Bit 3	60	NC		No Connect
27	A2	I	Address Bit 2	61	$\overline{REG}$	I	Register Select
28	A1	I	Address Bit 1	62	BVD2	O	Battery Vltg Detect 2 (Note 2)
29	A0	I	Address Bit 0	63	BVD1	O	Battery Vltg Detect 1 (Note 2)
30	D0	I/O	Data Bit 0	64	D8	I/O	Data Bit 8
31	D1	I/O	Data Bit 1	65	D9	I/O	Data Bit 9
32	D2	I/O	Data Bit 2	66	D10	I/O	Data Bit 10
33	WP	O	Write Protect (Note 3)	67	$\overline{CD2}$	O	Card Detect 2 (Note 3)
34	GND		Ground	68	GND		Ground

Notes:

I = Input to card, O = Output from card

I/O = Bi-directional

NC = No connect

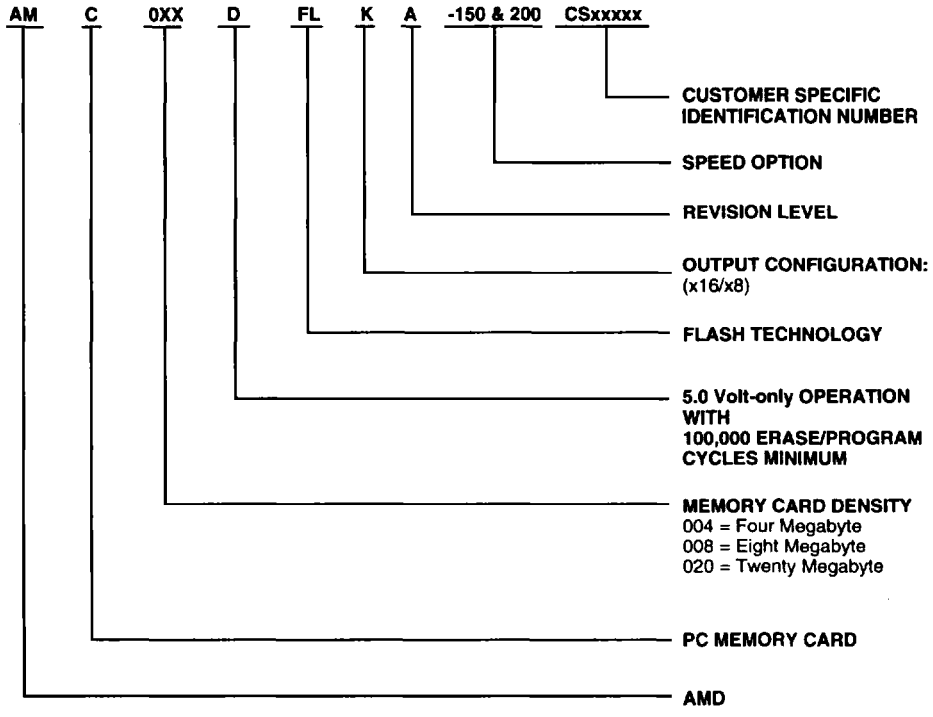
In systems which switch V_{CC} individually to cards, no signal should be directly connected between cards other than ground.

1. *V_{PP} not required for Programming or Reading operations.*
2. *BVD = Internally pulled-up*
3. *Signal must not be connected between cards.*
4. *Highest address bit for 4 Mbyte card.*
5. *Highest address bit for 8 Mbyte card.*
6. *Highest address bit for 12 Mbyte card.*
7. *Highest address bit for 20 Mbyte card.*

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:



Differences Between the "D" and "C" Series Cards

The differences between the "D" Series Card and the earlier "C" Series Cards are as follows:

- The "D" Series Cards are based on AMD's latest 16 MBit 5.0 Volt-only device, the Am29F016. The earlier "C" Series Cards were based on the 4 MBit 5.0 Volt-only device, the Am29F040.
- The "D" Series Cards program faster than the "C" Series Cards. This is due to faster byte write times and an optimized address unlock sequence for write operations.
- The "D" Series Cards are offered in higher densities. The "D" Cards are available in densities of 4 MBytes, 8 MBytes, and 20 MBytes. The earlier "C" Series Cards were available in densities of 1 MByte, 2 MBytes, 4 MBytes and 10 MBytes.

The additional features that are supported in the new "D" Series Cards include:

- The "D" Series Cards support the RESET feature. This allows you to asynchronously RESET the Card into the read state.
- The "D" Cards also provide the RDY/$\overline{BSY}$ functionality. This feature provides a quick way of determining if the Card is busy doing a write or erase operation, or if it is in a position to undertake the next operation.
- Availability of an additional Toggle bit (D2) to determine if the Card is in the Embedded Erase or Erase Suspend mode
- Programming operations can be executed in 8 µs pulses, down from the 16 µs on the "C" Series Cards
- Time out from the rising edge of the $\overline{WE}$ pulse for sector erase command reduced from 100 µs to 50 µs
- The "D" Series Cards offers a low power standby mode with fast recovery time to read. The typical standby current (I_{CCS}) is <1 µA with recovery at standard read access time.