1998

250 nm processes announced

NOR revenues exceed $2 B

1999

SD card introduced by **SanDisk, Toshiba** and **Matsushita**

Micron announces NOR products

Over 1 billion flash chips ship

Dov Moran of **M-Systems** applies for patent on a USB-based flash drive

NOR revenues exceed $4 B

2000

Samsung enters Flash Memory market

M-Systems (working with **IBM**) and **Trek Technology** introduce USB flash drives

Intel ships its one billionth flash unit

160 nm processes announced

Flash (NOR and NAND) revenues exceed $10 B

2001

Toshiba and **SanDisk** announce 1Gbit MLC NAND

SanDisk introduces NAND product (through joint venture with **Toshiba**)

Hitachi Flash Division (now merged with **Renesas**) AG-AND

NAND revenues exceed $1B

NEC introduces multichip packages

2002

Olympus and **FujiFilm** introduce xD-Picture Card

MMCmobile card introduced by the **MMCA** (MultiMediaCard Association)

Sony expands available storage to create the Memory Stick Pro

Sony introduces the half-size Memory Stick Duo

Spansion introduces MirrorBit

130 nm processes announced

Hitachi and **Mitsubishi** semiconductor divisions form Renesas

2003

SanDisk introduces miniSD card

Sony introduces the Memory Stick Micro

NAND revenues exceed $5B

AMD and **Fujitsu** form **Spansion**

2004

U3 software system for USB flash drives introduced by **SanDisk** and **M-Systems**

NAND prices drop below DRAM prices

SanDisk and **Motorola** introduce the TransFlash card

Samsung announces 1-gigabit OneNAND flash for mobile phones

Datalight introduces multi-threaded "FlashFX Pro" management software to support multi-media NAND devices

Spansion announces MirrorBit Quad

90 nm processes announced

Hynix and **ST Micro** form flash joint venture

Samsung NAND product introduced

Hynix NAND product introduced

Infineon NAND product introduced

Panasonic and **Sanyo** introduce first flash-based camcorders

Over 2 billion flash chips ship

Flash (NOR and NAND) revenues exceed $15B

2005

Apple introduces iPod shuffle

Apple introduces iPod nano

Microsoft introduces Hybrid Hard Disk Drive concept

MMCmicro card introduced by the **MMCA**

Intel and **Micron** enter NAND market with IMFT joint venture

70 nm processes announced

Micron NAND product introduced

Intel NAND product introduced

Intel and **Micron** form IMFT NAND flash joint venture

Over 3 billion flash chips ship

NAND GB shipments overtake those of DRAM

NAND revenues exceed $10B

2006

Intel introduces Robson Cache Memory (now called Turbo Memory)

Microsoft introduces ReadyBoost

SanDisk announces 3-bit MLC technology

M-Systems announces 4-bit MLC technology

SanDisk announces the microSDHC card

SanDisk acquires **M-Systems**

Samsung shows first Hybrid Hard Disk Drive

56 nm processes announced

300 mm wafers begin production

Flash (NOR and NAND) revenues exceed $20 B

2007

SanDisk introduces USB TV

Toshiba introduces eMMC NAND

Apple introduces the iPhone

SanDisk demonstrates Vaulter PCIe SSD as dual drive for laptops

Fusion-io announces 640 GB ioDrive NAND-based PCIe x4 board

BiTMICRO launches 3.5" SSD with a capacity of 1.6 TB (military applications)

Several laptop MLC SSDs introduced with up to 128 GB storage

Dell introduces SSD option for several laptop models

Sub-$200 laptop computers introduced with flash memory storage

Microsoft introduces flash-based Zune Player

NAND revenues exceed $14.5 B

Flash (NOR and NAND) revenues exceed $22 B

2008

34 nm processes announced by **Intel** and **Micron**

Intel and **STMicro** spin off **Numonyx**

EMC announces use of flash-based SSDs for enterprise applications

Apple introduces MacBook Air with SSD option

Samsung and **Sun** announce high-endurance flash memory for server SSD applications

Samsung announces 150 GB (MLC-based) 2.5" SSD with SATA II interface

Ultra Mobile PCs make a come-back using flash memory

Several companies announce MLC flash SSDs with up to 256 GB for notebook applications

Apple iPhone 3G using flash memory sold 1 million units in 3 days

Flash Memory SUMMIT

Compiled by Tom Coughlin and Jim Handy