



Digital Answering Device

**Memory Product &
Technology Division**

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Digital Answering Device Application

■ Digital Answering Machine

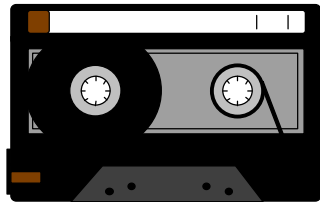
- . Stores code, pre-recorded date/ time stamps, and messages in single chip.
- . Eliminates **Battery and Voice Font ROM**.

■ Hand-Held Solid State Recorder

- . One system design to meet all demands with 4M,8M,16M,32M,64M chips to store from **12 Mins to 192 Mins** of high quality speech

Conventional Solutions

Magnetic Tape

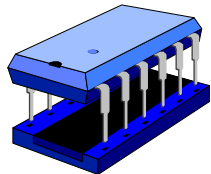


Issues



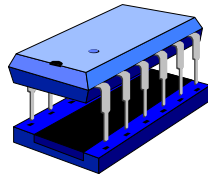
Features, Performance, Power, Ruggedness, Size, Reliability

ROM/EPROM



+

ARAM



+

Battery



Power, Updatability, Size Environment-unfriendly

code/voice font storage

message storage

required for power failure

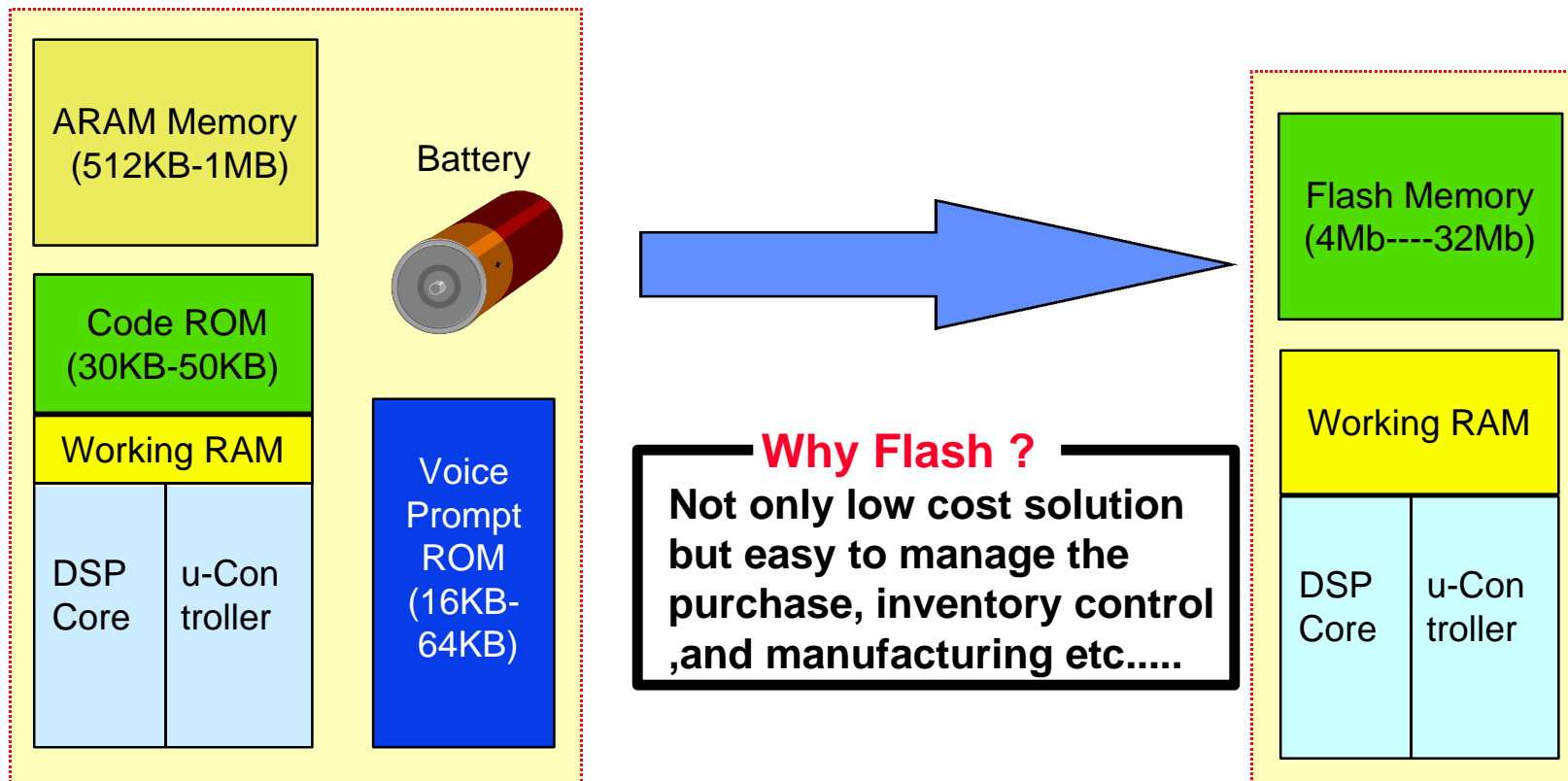


Audio Flash offers the **best price/ performance** solution

Flash Solution for Digital Answering Device

- Achieves lower total system cost with Samsung NAND Flash

- : No embedded ROM required in DSP to store the execution codes
- : No external ROM required to store the voice prompt
- : No battery back-up required

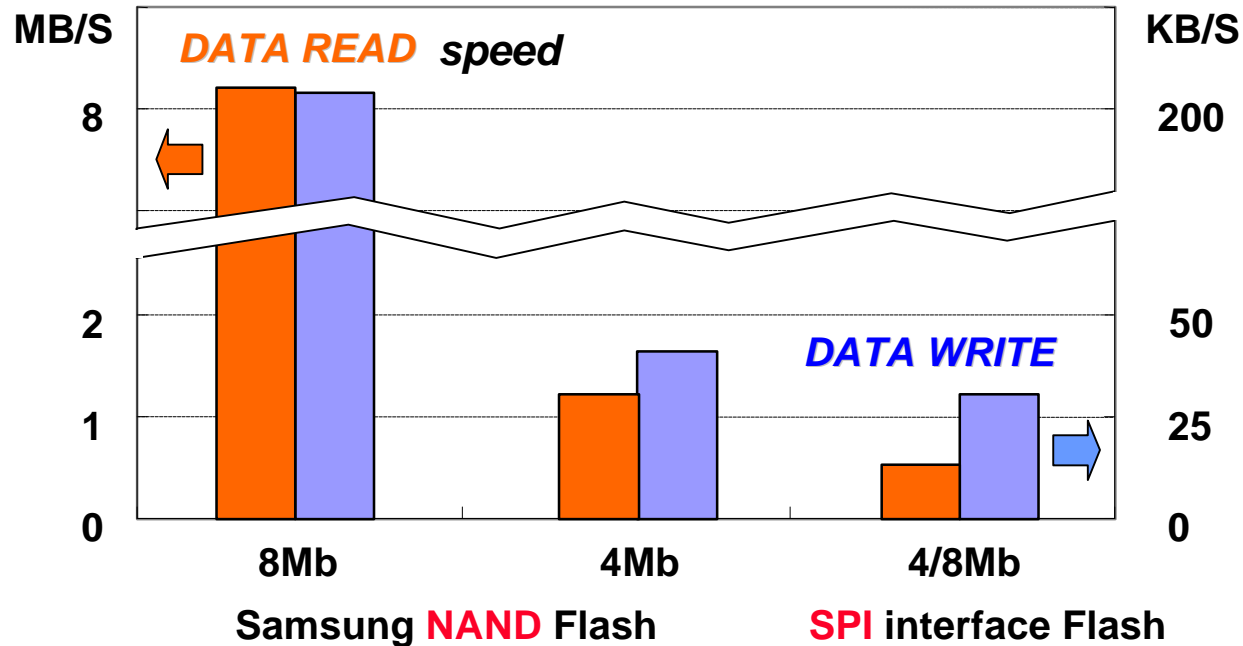


Specification Comparison (4Mb vs. 8Mb)

- **8Mb** can provide low cost and high performance compared to **two 4Mb**

Key Parameter		KM29W4000T	KM29W800T
Organization	Page Size	32 Byte(Frame Size)	(256 + 8) Byte
	Block Size	4K Byte	(4K + 128) Byte
	Number of Page Block Size	32 Pages	16 Pages
Operating Voltage		3.0V~5.5V	2.7V~5.5V
Main Characteristics	Program time	250us (typ.)	250us(typ.)
	Erase time	6.0ms (typ.)	2.0ms (typ.)
	Max. tR(us)	15	10
	Min. Cycle Time	120ns	80ns

Performance Comparison (4Mb vs. 8Mb)

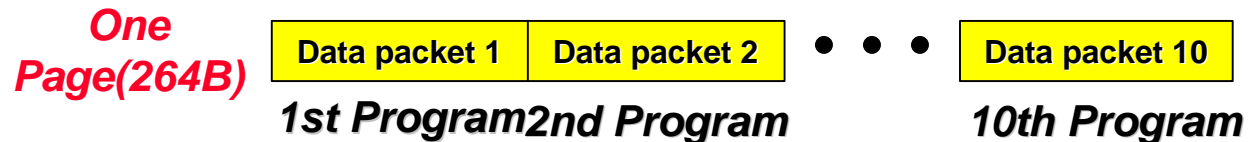
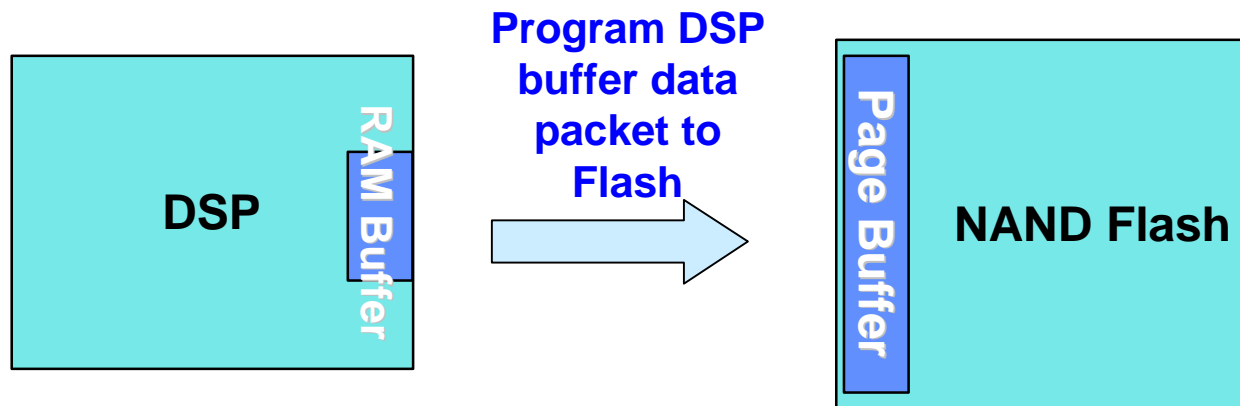


Example) In case of recording **300 sec's** voice message.
(Using **2.8K BPS** compression rate)

- Memory size = **105KB** (=2.8Kb x 300 sec / 8)
- Recording Time
 - ▶ NAND : 105KB / 211KB = **0.5 sec**
 - ▶ SPI : 105KB / 12.5KB = **8.4 sec**

Easy Interface to DSP

- **Partial page program feature** supports DSP with smaller sized RAM buffer than the Flash page buffer.



- A page or frame of NAND Flash may be fragmented and programmed multiple times without **Erasing**.

3rd Party Support

- **DSP** Support for NAND Flash

	DSPG	Zilog	Lucent	TI	Siemens
Part Name	D6587A	Z89175	FTAD LM30	MSP58C80	PSB4860
Compression Rate	2.8Kbps	10Kbps 6.8Kbps	6.8Kbps/ 5.4Kbps	5.4Kbps	10.3Kbps/ 3.3Kbps
Rec. Time(4M)	25min	6/10min	10/15min	15min	6/20min
Component*	3chip	1chip	3chip	3chip	3chip
NAND Flash	4/8/16M	4M	4M/8M/16M	4M	4/8/16M
Mass Prod.	Now	Now	Now	Now	Now

*: DSP+MPU+CODEC

* Major DSP players support NAND flash memory.

Summary

- ➔ **Suitable Architecture** for voice application
- ➔ Accomplished **Low Cost** and **High Performance**
- ➔ **Easy Upgrading** path to high density flash
- ➔ **3rd party support**