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Table Captions

Chapter 1

Table 1 Summary of 2003 Roadmap. node, gate length, EOT of high power (CPU) and low standby power devices (mobile), gate oxide material and gate electrode material. Earliest introduction of high K would be late in 45 nm node.



Figure Captions

Chapter 1

Fig. 1-1: The scaling of feature size, gate length and oxide thickness according to the 2003 semiconductor Roadmap.

Fig. 1-2: Leakage current versus voltage for various thicknesses of SiO₂ layers.

Fig. 1-3: Schematic of direct tunnelling through a SiO₂ layer and the more difficult tunneling through a thicker layer of high K oxide.

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Chapter 2

Fig. 2-1: The process flow of the binary high-k SONOS-type nanocrystal memory.

Fig. 2-2: Device structure of hafnium silicate nanocrystal memory.

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Chapter 3

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Fig. 3-10 : The data retention of the nanocrystal memory.

Fig. 3-11 : Endurance of the hafnium silicates and zirconium silicates co-existed nanocrystal memory.

Fig. 3-12: TEM image of hafnium silicate and zirconium silicate nanocrystal.

Fig. 3-13(a): XPS curve of hafnium silicate.

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