Comparison of Apps Processors for Apple Handheld Products

iPod Touch, iPhone and iPad

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Young Choi
iPhone – 1st Generation Apps Processor

App Processor PoP

App Processor PoP Bottom
Die Photo of – 1st Generation Apps Processor
Diffusion Die Photo – 1st Generation Apps Processor
iPhone 3G – 2nd Generation Apps Processor

App Processor PoP

App Processor PoP Bottom
Die Photo – 2\textsuperscript{nd} Generation Apps Processor
Apps processors for iPhone and iPhone 3G
iPhone 3GS – Apps Processor

MCP PoP - Top

App Processor PoP

App Processor PoP Bottom
iPhone 3GS – Apps Processor
Comparison of the Apps Processors of Apple Products
Identification of the 3GS AP

Samsung App Processor for PND (ARM11 Core)

Samsung App Processor for the iPhone 3G S
iPod Touch – 2nd Generation Apps Processor

MCP PoP - Top

App Processor PoP

App Processor PoP Bottom
iPod Touch – 2nd Generation Apps Processor
iPod Touch – 3rd Generation Apps Processor

MCP PoP - Top

App Processor PoP

App Processor PoP Bottom
iPod Touch – 3rd Generation Apps Processor
iPod Touch – 3rd Generation Apps Processor
iPad Apps Processor – A4
A4 Die Photo & Die Marking
Comparison of Apps Processors

- Some similarity between the package markings
- Some similarity between the die markings and surrounding patterns
- Further SEM cross section analyses confirmed that the iPhone 3GS process is manufactured by Samsung
Comparison of the Apps Processors of Apple Products

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Comparison with 45nm Apps Processors

- The Apps Processor for the iPod Touch has been confirmed to be the Samsung 45nm processor.
- The A4 Process appears to have very similar look to that of the iPod Touch Apps Processor.
### Apple Apps Processor Time Line

<table>
<thead>
<tr>
<th>Year</th>
<th>iPhone</th>
<th>iPod Touch</th>
<th>iPhone 3G</th>
<th>iPod Touch</th>
<th>iPhone 3GS</th>
<th>iPod Touch</th>
<th>iPad</th>
</tr>
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<td>2007</td>
<td>Q2 2007</td>
<td>(1st gen)</td>
<td>Q3 2007</td>
<td>(2nd gen)</td>
<td>Q3 2008</td>
<td>(3rd Gen)</td>
<td>Q2 2010</td>
</tr>
<tr>
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**Applications Processors: 8900B series**

- Apple appears to have done processor designs since the iPod Touch 2nd generation released in Q3 2008 (with Samsung)

- Given that the iPod Touch and the iPhone use the same operating systems, Apple must have gained significant experience to prepare the new applications processor line by using it with the 2nd generation iPod Touch prior to launching the iPhone 3GS

- The A4 processor, an Apple designed apps processor for the iPad, has the same part numbering convention as the other apps processors since the 2nd generation iPod Touch (APL series). The iPad is also using the iPhone OS.
Summary

• TechInsights has good coverage of applications processors of all Apple handheld products: iPod Touches and iPhones.

• TechInsights has been able to identify foundry of applications processors of Apple handheld products as “Samsung” through various process analyses and tacking of every generation of Apple handheld products.

• The process technologies for applications processor identified so far includes 90nm eDRAM, 65nm, and 45nm node.

• TechInsights has detailed structure analysis report completed on all three process node parts.

• A detailed analysis on the Apple iPad Apps Processor (A4) has been started. Initial and preliminary results suggest that the A4 could be another processor with Samsung 45nm process technology. More details to follow after SEM cross sections and cross examination with the existing Samsung 45nm analysis results.