Exhibit 19

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DRAM   FLASH   MOBILE MEMORY   APPLICATION PROCESSOR   IMAGING SOLUTIONS

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Overview

Drawing file download :

An application processor, or SoC (System on a Chip), is a microprocessor with a specialized architecture for deployment in embedded systems, such as digital still/video cameras, digital/smart TVs and set-top boxes, and automotive systems, among others. This document describes the specific packaging technology needed for application processors to enable them to achieve the required performance at low power consumption levels with limited board space.

Packaging Technology for Application Processors

An application processor is a highly specialized and complex device operating at frequencies of several hundred MHz, to a few GHz, and hence, careful attention must be paid to the design of its packaging. Leading-edge, high-performance application processors, such as Samsung's Exynos 4210, are packaged using the Package on Package (PoP) technology, resulting in significant savings in board space in the final design.
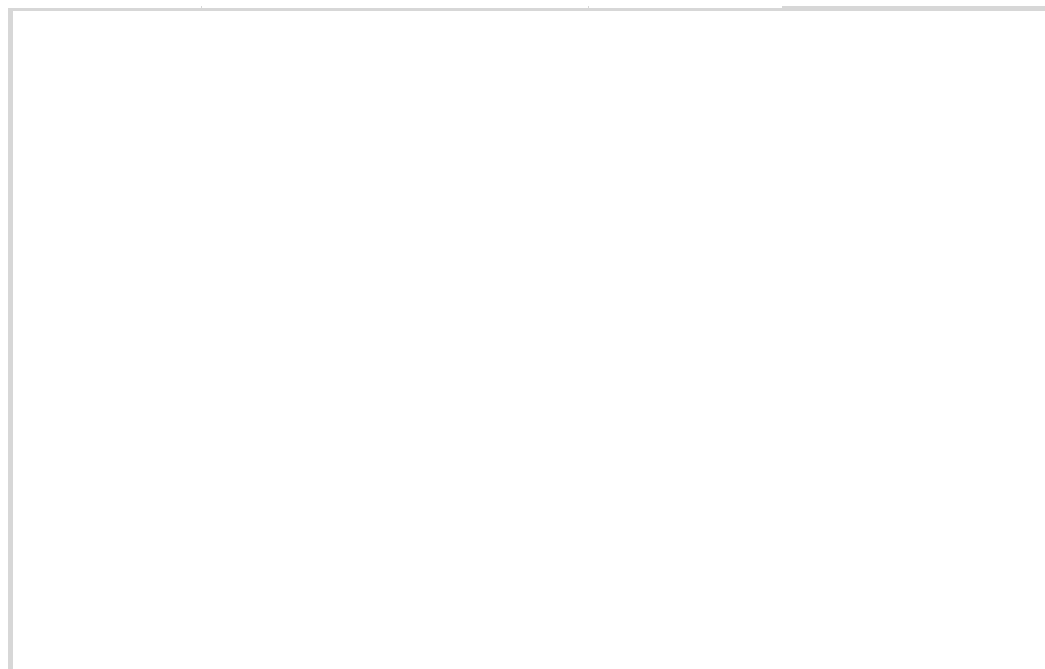
Figure 1 below illustrates a DRAM memory package stacked on top of an application processor, used in a typical PoP design. The figure also shows extended details for the package, such as the interconnecting wires, metal bumps, and the stacking balls that connect the separated packages.

FCFBGAH   PoP 2chipstack   TSVSiP DDP   TSVSiP QDP

Samsung SMART MEMORY
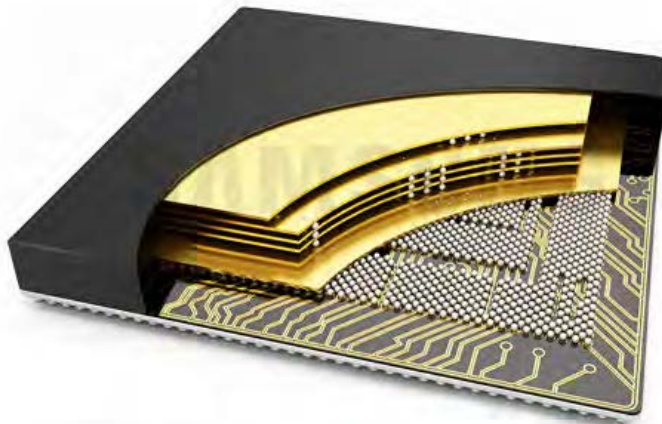More Mobility.
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TSVSiP QDP

*The above image is an artist rendering and may differ from the actual product.

Samsung's advanced processing and packaging technology ensure that PoP devices, such as application processors, as well as high-density memory chips, are optimized for the highest levels of performance, and the lowest power consumption. The PoP technique offers significant benefits, particularly for packaging application processors, since the logic layer at the bottom and the memory layer at the top can be selected, assembled, and tested independently.

Application processors packaged using Samsung's advanced PoP technologies have ultra-low physical footprints (as low as 12 mm x 12 mm, to 14 mm x 14 mm), and result in devices with the thinnest profiles, making them ideal for deployment in space-constrained applications, such as mobile handsets and portable media players.

Key Features and Benefits of Samsung's Packaging Technology for Application Processors

Samsung's advanced processing and packaging technology ensures that the application processors have some of the most distinct features, as listed below:

Ultra-low footprints and thinnest profiles :

process also ensures that the package profile (or height) is kept to as low a value as possible, making it easier to use the processor in compact, space-constrained applications such as digital still/video cameras and mobile handsets.

High-speed device compliant :
High-end embedded computing devices, such as network processors, usually contain more than 1 computing core per device (typically 3 to 4 cores per processor). Samsung's packaging technology is well suited for such high-speed, multi-core application processors, which involve extensive on-chip interconnection between the cores.

High-density I/O capable :
Application processors usually contain a large number of I/O lines, resulting in the pin counts for the device reaching significantly high numbers (as high as 1,000 in certain cases). Using industry-standard alternative versions of the BGA package, such as FPBGA (Fine-Pitch Ball Grid Array), Samsung's refined processing techniques ensure reliability for all I/O lines on the chip.

Excellent thermal stability and operational reliability :
Samsung's packaging technology provides high heat-dissipation capabilities for the device, eliminating the necessity for additional heat-dissipation mechanisms, such as heat sinks for the devices. Additionally, the techniques provide significant

Areas that can Benefit from Samsung's Packaging Technology for Application Processors

Samsung's technology for packaging application processors are used in a wide variety of computing, communication, and embedded devices. Some of these include:

Mobile computing devices :
Application processors are used in all mobile computers, such as tablets, PDAs, and ebook readers. Samsung's advanced processing and packaging technology for application processors can be used to improve and enhance the capabilities and performance of such applications.

Mobile communications devices :
Mobile phones, smartphones, and VoIP phones also use application processors designed specifically for the networking segment. These devices stand to benefit significantly by using Samsung's refined packaging technology for application processors.

Entertainment/gaming devices :
Today's high-end gaming devices require significant computing power, and most commonly use multi-core processors. Such applications stand to gain considerably by using Samsung's packaging technology for their multi-core application processors.

Consumer products :
Product-specific application processors are used in a wide range of consumer electronic products, such as digital TVs and set-top boxes, DVD/Blu-ray players, and automobile navigation systems. The performance of such devices can be improved manifold by adopting Samsung's industry-leading packaging technology for application processors.

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