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STM is the market share leader in ESD and EMI protection devices, says Petrov Group

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The market for electro-static discharge (ESD) and electromagnetic interference (EMI) protection devices is nearly invisible. However, it is a large (US$6 billion and 16+ billion unit per year) and growing market, according to the Petrov Group.

This often overlooked and "hidden" market is also many times larger than reported by WSTS statistics, in part because of the variety of technologies and approaches used. Moreover, there are profound changes in the semiconductor ESD and EMI protection market, specifically its accelerating transformation and migration, from discretes into ICs, said Boris Petrov, managing partner of the Petrov Group.

The IC-based integration trend in ESD and EMI protection solutions will significantly increase the total market within a relatively short period, driven primarily by high-speed interfaces and mobile applications. This emerging IC-based ESD and EMI protection market creates numerous high margin and high ASP business opportunities since IC-based protection devices are very application-specific.

One of the many reasons for the low visibility of this large market is that ESD and EMI protection devices have evolved from pure discrete components toward integrated ICs. This evolution has blurred the traditional boundary between discrete and IC devices. As a result, emerging classes of state-of-the-art protection devices found at the discrete-IC boundary are unaccounted for by traditional market statistics.

These unaccounted-for market data considerably exceed those presented by traditional market statistics. In addition, protection devices are on the very edge of the analog periphery domain. Their average unit price in 100 thousand unit quantities is about US$0.10 in cell phones, although with ten of them in cell phones their value per phone is about US$1.

Emerging semiconductor and packaging technologies have created new classes of products that are blurring the boundary between single-function discrete and integrated multi-function devices. These integrated products combine single-function discrete and passive devices as well as analog perimeter functions on a single chip. A meaningful assessment of the actual market size, opportunities, and trends requires a methodology that links the target end-market with the protection devices applications in a specific end-equipment type, the End-Market to Bill of Materials (BOM) methodology, says Boris Petrov.

Protection devices are highly application-specific. Here, the term general-purpose is not synonymous with universal use, but rather it applies to a limited range of applications. For example, general-purpose ESD and EMI devices are primarily targeted at high-speed data interfaces or audio applications. Protection devices are typically application specific not only to a specific end-equipment type (such as a handset), but also to a specific application within that end-equipment type (such as LCD display).

A market analysis based on select higher volume end-equipment types and applications confirms a greater than US$6 billion market size for protection devices (about 16 billion units per year). Included in this market analysis are only clamping type (diode based) ESD and EMI products and data (signal) line applications.

Prices for ESD and EMI protection devices vary widely from US$0.10 to US$1.50 (for 10 thousand volume pricing), even for the same end-equipment type and depending on the target applications. In order to meaningfully asses a business opportunity in the protection devices market it is mandatory to analyze each target end-equipment type at the application level. Major pricing determinants include (1) number of protected lines, (2) line capacitance, (3) working voltage, (4) functional integration, (5) surge power capability, and (6) package type.

End-equipment types and applications range from very high volume handsets to less volume intensive telecom equipment. Protection device unit prices vary depending on unit volume and application type and protection performance requirements. Two pure play vendors, Semtech and CMD (acquired by ON Semi), illustrate the financial and risk implications in opposite approaches to the ESD protection business.

Some vendors, for example Semtech, cover the entire range of end-markets. Others, for example CMD, are mainly confined to handsets where ultra high unit volume manufacturing is essential to achieve a higher gross margin. At a US$0.10 ASP, a US$0.01 benefit from manufacturing volume leverage increases the gross margin by 10%.

In general, applications requiring higher protection device performance attributes tend to add the most value and command higher ASPs. These typically include video and audio applications. Some vendors (such as Texas Instruments) address only these applications. In the case of TI, this also enables the company to use the so-called "attach" strategy by leveraging its IC business in the mobile device end-market.

In 2009 CMD introduced its LuxGuard ESD protection technology for high-brightness (HB) LEDs; it represents an integration approach targeted at custom business for LED manufacturers. Hence, it has a licensing potential as LED vendors follow the IC vendors in incorporating ESD protection into LED device structures.

Mapping of protection devices applications reveals that in the case of the market leader, STM, the device prices range from US$0.10 to US$0.56 (10 thousand unit quantity, distribution). Hence, there is a relatively large spread in ASPs. Higher end, feature rich phones provide more opportunities for higher ASP protection devices. CMD seems to be deprived of such opportunities in its business focused on the Asia market.

The highly diverse protection devices market presents an opportunity to generate a revenue stream derived from both vertical (volume) and horizontal (value) applications, a key attribute of highly profitable and high market valuation analog vendors.

Transient voltage suppression (TVS) is another name for ESD devices. TVS products are typically application-specific because they must feature operating transparency to the target application. Hence, they must be tightly matched in performance and form factor with target application requirements. Sub-5V applications typically require specialized semiconductor technologies in order to meet target application requirements.

Packaging technologies play a critical role in TVS performance and form factor requirements, especially in high speed data applications such as HDMI interfaces. TVS market segmentation is strongly driven by the end-equipment type and application environment, all subject to international and local protection standards.

There is a large number of competing technologies; vendors of primarily semiconductor-based devices include STMicro (market share leader), Semtech, OnSemi/CMD, Microsemi, ProTek, Texas Instruments, NXP, Panjit, Diodes, Semitel, Bourns, Murata, Littelfuse, BrightKing, Amazing, AEM, Shocking Technology, and numerous others.

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