

Thintri, Inc. announces the release of the 2010 edition of **Terahertz Systems: Technology and Emerging Markets**, an updated study that explores the current state of terahertz technology and market opportunities for systems operating in the terahertz range. This in-depth investigation discusses terahertz technologies already creating markets, emerging technologies that are set to create new market opportunities, the technical hurdles that must be overcome for wider commercial acceptance of terahertz systems, and overall market development. The report surveys today's terahertz technology, separates hype and skepticism from reality and assesses the applications where terahertz technology will open up significant new markets, and those where it won't, including bracketed five- and ten-year market forecasts.



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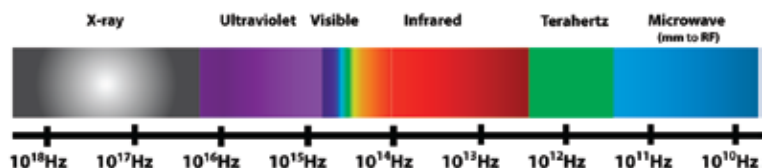
Thintri Inc.

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- ◆ Semiconductors
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- ◆ Telecommunications
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The Terahertz Band



Background on Terahertz Systems & Their Markets

Terahertz radiation, which can penetrate to some degree most materials, has long been established as a research tool, e.g., helping astronomers detect antimatter in space. The transparency of most materials to terahertz waves has made it difficult to work with, and confined applications to those where users are tolerant of, for example, having to detect very low power levels of radiation, or the need to cool systems to liquid helium temperatures.

Now, ongoing developments in technologies associated with terahertz radiation have brought about the possibility of opening up an extraordinary range of new markets in this decade.

The tremendous versatility of terahertz technology allows it to be used in both imaging and spectroscopic modalities, or both at once. Thus, a terahertz system could not only identify a concealed weapon on an airline passenger, it could also identify a material carried by that same passenger and distinguish between an explosive and a harmless cosmetic.

Just a few of the applications that are envisioned in this one technology arena:

- Airport screening of passengers for weapons, explosives, drugs or other contraband
- Secure wireless communications
- Cancer detection, wound inspection and other medical imaging
- Biochip analysis of DNA, proteins and other biological materials
- Detection of chemical and biological warfare agents
- Detection of land mines and buried explosive devices
- Monitoring manufacturing processes
- Measuring the water content of food to detect spoilage
- Inspecting finished products through packaging
- Determining the thickness of a layer of paint while it is still wet
- Quality control of insulated wires during manufacture
- Inspecting semiconductor wafers for defects
- Inspecting (and reading) unopened mail

When the first version of this study was published in 2007, the industry faced daunting challenges in technology development that had to be addressed before signifi-

cant markets could emerge. Sources were weak, detectors were insensitive and many needed cryogenic cooling, and systems were bulky, not robust and most importantly, very expensive. Any significant penetration of commercial markets rested on a series of significant technological developments which at the time were uncertain.

Since 2007, the situation has changed dramatically. Robust, relatively inexpensive and even portable terahertz systems are available commercially, suitable for a number of the high profile applications discussed in the report. Industry players are preparing to enter astonishingly varied markets, from security to medicine to manufacturing process control to wireless communications and others. Early stage terahertz cameras have also been developed, overcoming a significant hurdle on the way to commercial terahertz imaging systems.

However, the development and user communities have become much more polarized since 2007. Some users, having invested perhaps too early in the technology, grew frustrated with the expense and limited capabilities of the technology of the time. Even some participants in terahertz technology have withdrawn at least partially, discouraged by perceived lack of market readiness and lack of customer interest. On the other side, developers have come up with components and systems that have overcome significant technical hurdles. While technology development remains an ongoing need, commercially available systems are available to address some of the most promising, high profile markets.

Terahertz technology is poised to move into substantial markets in the next few years. Already, commercial systems are in use for security screening, to inspect pharmaceutical and other products for defects while already packaged, to monitor manufacturing processes or to check materials (like the insulating foam on the Space Shuttle) for flaws. Clinical trials for detection of cancer with terahertz technology are underway. Commercially available terahertz systems are available that are so portable and robust, they can be delivered by mail. Terahertz spectrometers can detect materials of interest in parts per trillion levels. Potential customers are becoming increasingly aware of the promise of terahertz technology and players in food processing, pharmaceuticals and manufacturing are making inquiries and conducting trials and evaluations of the systems.

Market opportunities within the decade are promising. A number of markets within medi-

cine, security and manufacturing are likely to reach the tens or hundreds of millions of dollars per year by 2020, leading to overall markets possibly in the billions.

The Thintri market study, *Terahertz Systems: Technology and Emerging Markets*, relies on extensive, in-depth interviews with industry executives, market development managers and government and academic researchers. The report provides a survey of the current state of the art in terahertz technology, an assessment of potential applications in terms of their viability and requirements in technology development, discussion of market development and bracketed forecasts for individual markets in 2015 and 2020.

Understand the Markets

How many of these applications will actually lead to growth markets is uncertain; chances are, not all will. However, given the extraordinary breadth and potential volumes of these markets, and the unique ability of terahertz technology to address fundamental issues in these markets, a conservative bet is that at least several of these markets will take off. The question is, which ones? Ultimately the answer will depend on a combination of factors that include application and market development, customer awareness and education, and evolution of technology. What is clear is that the terahertz industry as a whole is on the verge of significant growth. This market study reflects the input of a number of industry experts on the most likely course of development in terahertz systems and the consequent viability of individual emerging markets.



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