

Semiconductor Market Update Russia – Nov 2012

Russia to invest \$ 16b into the Electronic industry

Russian government is funding \$16.0b in into the Electronic Industry and Angstrom signed an agreement with IBM for 90nm technology transfer. The WTO accession will have a positive impact on easing up high-tech trade. SEMI advocates for fast and simple implementation of the new rules.

The Russian government has approved a program to develop further the electronic industry up to 2025 spending up to 517 billion rubles(16.0 US\$) rubles for the coming years). According to the Russia CNews, Minister of Industry, Denis Manturov, has received approval for the program that is planned to allocate 180 billion rubles, including 19 billion rubles (\$605 million) in 2013. According to the Minister, the main focuses of the program are special electronics designed for the production of electrical components for the automotive industry, energy, microelectronic components and defense.

In October 2012, IBM and the Scientific and Production Association (SPA) “Angstrom” signed two agreements to spur technology innovation. In the first agreement, IBM has licensed Angstrom integrated circuit technology for 90nm production for use at the newly built fab in Zelenograd. In addition to the 90nm technology license, Angstrom will receive design rules from....read more on next page.



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...IBM required for contract manufacturing organizations so that the company will be able to offer "Smart Foundry" services to Russian and foreign customers. The second agreement outlines areas of potential mutual cooperation in the field of research and development activities with the use of advanced microelectronic technology.

SEMI strongly supports the industry development in Russia. SEMI is involved in industry advocacy, trade missions and public policy, working with high-ranking government officials. The annual SEMICON Russia exhibition and technical conferences are offered to support the industry. To support Russian development, SEMI also has a Russian Advisory Committee with 15 members from Russia and Western Europe, as well as partnerships with High-Tech Clusters, Special Economic Zones, the Russian PV Industry Association, the Russian LED Industry Association, and the Renewable Energy Association of Ukraine.

"With Russia's accession to the WTO set to go into effect by June of 2012, trade barriers will ease creating significant opportunities for SEMI member companies," said Heinz Kundert, president of SEMI Europe. "SEMICON Russia is timed perfectly to capitalize on these developments. Russian leaders from the semiconductor, PV, LED and other industries will be attendance, exploring partnership, technology solutions, and sourcing options."

Last year over 2,200 buyers, engineers, scientists and business executives attended SEMICON Russia to learn about the latest industry developments and explore solutions with the 93 exhibiting companies. SEMICON Russia 2013, to be held next year at the ExpoCenter Moscow on June 5-6, will focus on these favorable trends and help facilitate buyer-seller and partnership opportunities. For more information on SEMICON Russia, visit www.semiconrussia.org

Update on Russian Microelectronic Projects and Activities

Russia plans to build up a strong ecosystem for the Electronic Industry to foster technology and manufacturing of Advanced Electronic Components. The ecosystem is built around larger companies and includes clusters technology parks and Free Trade Economic Zones all over the country.

Sitronics / Mikron

SITRONICS Microelectronics began supplying the first memory chips designed for 90 nm design rules. First customers were "The Institute of Electronic Control Computers named after I.S.Bruk" (INEUM), Ostec Enterprise Ltd, "Scientific research institute "Submicron" and "Zelenograd innovation and technology centre" (ZITC). In addition to microcontroller memory, SITRONICS Microelectronics plans to produce SIM-cards with digital signature (EDS) and telecom chipsets on the 90nm line.

The grand opening of the line for the production of chips with 90 nanometer design rules was held on February 17 at the Zelenograd Fab Mikron. Rather than the traditional cutting of red tape, Deputy Prime Minister Dmitry Rogozin opened the new area at the facility with a smart card. The start of the new line will not only double the production capacity (up to 36,000 of 200mm wafers per year), but also develop new types of products.

Commercial production was scheduled to begin in April-May, said Gennady Krasnikov, Head of SITRONICS Microelectronics and chairman of the Board of Directors of JSC "Mikron" in an interview with Zelenograd.ru. According to his forecast, the full line will be loaded by the end of 2013 or the beginning of 2014.

Chips made in accordance with 90nm technology will be used in computer and automation systems, passport and visa documents, smart cards and universal e-cards. Much of the production will be exported. "We now have a range of integrated circuits, including RFID, and supply them for export, especially to Southeast Asia, where this technology is evolving rapidly and the demand is very high," said Krasnikov. By 2015, the volume of sales for this line is expected to reach €300 million a year.

Continuing development to minimize the topological sizes down to 65-45nm and further at the existing facility is no longer possible. Chips at 65-45nm should be produced on 300mm wafers; so a new factory should be built. The construction project with the public-private partnership with the Zelenograd Special Economic Zone has not yet developed. According to Gennady Krasnikov, the State has not refused to finance the project, but is actively working on this project which is scheduled to start in about six months.

At present the 90nm scanner installation is in full progress. Meanwhile, they entered the agreement with Mapper and will develop 65-45-32nm at Molecular Electronics Research Institute (MERI), which is now separate from Mikron and still managed by Gennady Krasnikov. Currently, the 65/45 nm fab project is on hold. The most profitable part of Sitronics (telecom) has been merged with a telecom solution provider.

ANGSTREM: Angstrom-T Project

Angstrom-T project now financed. Backed by Vladimir Putin, the decision was made to open a financing line to the ANGSTREM-T project based on equipment purchased from AMD. The construction of Angstrom-T chip fab resumed in May, and is now moving forward.

As a result of the tender, a Russian general contractor named Ramos (Comnews.ru) was selected to build a plant for the production of microchips at 130-110nm technology level. The reconstruction involves the main production area of the future fab, located in the South industrial zone of Zelenograd, as well as building additional engineering facilities and infrastructure including power facility energy station up to 40 MW.

The total area of buildings is estimated to more than 48,000 square meters, with the building area at 19,000 square meters. The industrial and production complex will consist of several 1-4-story facilities. The construction period will be two years, with all construction is expected to be completed in the first year with the installation of special technological equipment to follow.

Four Russian companies participated in the tender for selection of contractor for construction of basic facilities for "Angstrom-T" project. Another tender — for the construction of clean rooms for the new plant — will be announced after the completion of the basic premises construction of the plant, said Alexei Dianov, the head of Corporate Communications of Angstrom Group. The decision will be made on the basis of M+W Group recommendations, which has been involved in the implementation of the project since 2006-2007. According to Alexei Dianov, it is most likely that it will be a foreign company who will build clean rooms for Angstrom-T because local companies don't have the right resources.

It will be also necessary to deliver and install process equipment which was purchased from AMD in 2008 for about 300 million euros.

In a presentation at the SEMI Industry Strategy Symposium 2012 in February in Munich, Angstrom-T reported about investments of US\$ 1 billion in a fab that will produce 15,000 wafers per month with a diameter of 200mm at 110 nm technology level on AMD equipment. In the future, Angstrom-T is planning to create a "microelectronics boutique" to provide a "range of scientific,

engineering and manufacturing services," and then will introduce the line for the production of microchips at 90-65 nm technology level.

According to Alexei Dianov, microchips 130-110nm, which will be produced by Angstrom-T, will be applied in "system-on-chip" class of products: processors, smart cards, in fixed and mobile communication devices. According to Angstrom's plans (previously published in Zelenograd.ru), the plant will produce chips for multimedia and telecommunication devices, navigation system, GLONASS, electronic passport and visa documents, etc. In addition, the fab will provide services to small and medium businesses in device manufacturing,

Infrastructure construction is in progress. Equipment "move in" should begin in Q4 2013. The risk production start is planned for Q2 2014, first commercial silicon out in Q3 2014, though as Phase 1 (1/3 of total projected capacity). G2 information is that they are working seriously with logistics and customs on the equipment imports and rigging issues.

In late October of 2012, IBM and the Scientific and Production Association (SPA) "Angstrom" signed two agreements to spur technology innovation. In the first agreement, IBM has licensed Angstrom integrated circuit technology for 90nm production for use at the newly built fab in Zelenograd. In addition to the 90nm technology license, Angstrom will receive design rules from IBM required for contract manufacturing organizations so that the company will be able to offer "Smart Foundry" services to Russian and foreign customers. The second agreement outlines areas of potential mutual cooperation in the field of research and development activities with the use of advanced technology.

CROCUS TECHNOLOGIES: Invests US\$ 300 Million, 65nm MRAM

Crocus Technologies announced that they have closed an agreement with RUSNANO to create a MRAM manufacturing company, with an initial investment of \$300 million to build an advanced MRAM facility in Russia, capable of manufacturing medium to high-density MRAM products based on Crocus' Thermally Assisted Switching™ (TAS) MRAM technology at 90nm and 65nm lithography. They have received special benefits from the Moscow Administration, construction at Moskwitch Technopark is at full pace, with the equipment move in scheduled for Q2 2013 and first wafers processed Q1 2014.

The Russia-based CNE (Crocus Nano Electronics) facility will utilize Crocus technology to create the first dedicated magnetic memory wafer fab in the world capable of high-volume manufacturing of MRAM devices on 300mm wafers with 90nm and 65nm feature sizes. The factory will be designed to add MRAM specific processing layers to standard CMOS foundry wafers. The production facility is scheduled to be in operation within two years and will be capable of producing up to 500 wafers per week. Expanded capacity of up to 1,000 wafers per week is anticipated under a second phase of investment. In addition, CNE and Crocus plan to create a Learning Center and a Development Ecosystem for advanced memory design and production in the Russian Federation. Crocus will invest over \$5 million initially into Russian research organizations to develop advanced manufacturing solutions. This research investment will expand over time to include system-on-chip (SOC) capabilities for secure memory, network processing, and advanced computing.

CNE's 90nm and 65nm manufacturing capability will enable Crocus to offer much higher-density MRAM devices than currently available. Products manufactured by CNE will be marketed and sold worldwide by Crocus, excluding Russia and other former CIS states, while CNE will market directly within the former CIS. Crocus products sourced by CNE will address key markets such as storage, mobile communications, networking and cloud computing. In addition to general purpose memory applications, Crocus' TAS MRAM technology will serve specific uses in smartcards, network

processing, biometric authentication, near-field communications (NFC), and secure memory. The unlimited endurance, non-volatility, and fast read/write performance of Crocus' MRAM technology are extremely valuable for many of these applications. Crocus' technology will be available for use in both standalone and embedded applications, addressing a total market opportunity of more than \$40 billion per year.

The production is planned to be launched by the end of 2013 in Moscow in the new Technopark "Moskvich" where clean rooms with total area of 300,000 sq. meters can be built. The Technopark belongs to the Moscow city government. Currently the government's intention is to set up proper infrastructure including customs and other benefits to the Technopark participants including foreign companies.

RUSNANO

RUSNANO continues to invest into advanced technology. It made a co-investment in a project to expand production of ESTO-Vacuum automated vacuum units (ESTO-Vacuum is located in Zelenograd). RUSNANO co-invested in the development of electronic components for MEMS (for use in sensors), computing and telecommunications equipment with participation of SiTime. In addition, RUSNANO finalized investment in Plastic Logic: \$700 million total investment project will include building world's largest commercial Plastic Electronics factory in Zelenograd

RUSNANO is also entering a project to expand the production of sapphire and sapphire wafers for LED. It is also investing in Monocrystal Ltd. to increase the industrial production of single-crystal sapphire and sapphire substrates for LEDs and high-frequency integrated circuits, as well as silver and aluminum composite pastes for the metallization of silicon solar cells.

Connector Optics launched a plant in St. Petersburg to produce EPI wafers for high-speed optical components. RUSNANO and URALSIB are investors in this project. The production technology was developed by the Loffe Institute team together with VI Systems GmbH and doesn't have any equivalent in the world. Total investments are equal to 1,1B rubles (\$ 34m) including RUSNANO co-investment of 770m rubles. It is expected that that by 2015 the Connector Optics production volume will be close to 5 percent of the world market while the revenue will be 2,4B rubles (\$75m).

The production list includes emitting lasers and photodiodes on the basis of EPI wafers and will be used in optical interconnections of the next generation — USB, TV or HDMI, interface for Display Port, active optical cables for computer systems of Infiniband standard; and devices for Fiber Channel standard.

In addition, Israeli Technology ALOX™ was assigned to the city of Vladimir LED Substrate Production Project. Co-investors in the project are RUSNANO and a venture fund established with the participation of Russian Venture Company and Israeli company Micro Components Ltd., the developer of the technology.

OPTOGAN: Optogan Creates the First Company for OLED

In January 2012, Optogan LTD announced Optogan Organic Lighting Solutions, the first Russian company to develop lighting based on OLEDs. The company Optogan OLED, a subsidiary of JSC Optogan, will develop a new direction — the production of solid-state lighting based on (OLED) and the development of intelligent lighting control systems OLED. The company initially will focus on improving the performance of OLED manufacturing to reduce the cost of products based on them. Optogan Organic Lighting Solutions is a resident of the innovation center in Skolkovo, which is creating a research center on LED technology. Research will be conducted jointly by researchers

of the company Optogan, STRC Nanotech-Dubna, Ioffe Institute and the Fraunhofer Institute for Photonic Microsystems (Germany).

AIR LIQUIDE: Zelenograd Plant “LOGIKA” and Air Liquide

The French Air Liquide Group and Russian Electronics (Roselectronica) Holding announced the creation of a technological partnership on the basis of a LOGIC plant in Zelenograd. In accordance with the terms of the deal, Air Liquide acquired 75 percent minus 1 share of the plant; while Russian Electronics has remained a minority shareholder (25 percent shares plus 1 share). Based on the press release information, Air Liquide is investing over 1,6B rubles (€40M) in the plant. The plant will be modernized and equipped with a new air separation unit for the production of liquid oxygen and nitrogen, as well as with a new automated system for filling cylinders. The announced aim of the Air Liquide partnership with the Russian State Corporation “Rustechologies,” for which Roselectronica is a daughter company, is providing all the plants of the State Corporation with the best products and services of Air Liquide, especially in electronic and automobile industries. The recent agreement is the first step on this way.

The vice president of Air Liquide, who supervises Northern and Central Europe, said that the new partnership is consistent with the company strategy, reinforcing their position in Russia and expanding the geography of their presence. “Based on the company strategy of our development in Russia the company investment volume in Russia will reach €1B by 2015”.

Status of the other Projects

NIIS - Institute of Measuring Systems in Nizhny Novograd, 150mm

Equipment was moved in the cleanroom in 2010, with physical installation of track and stepper done. Meanwhile, there are three new projects at the early phase in the same shell, mask production, MEMS and microwave, FAITH now completing the mask production site, the other two in the very early ages. The latter two projects are scheduled for the next year, but the mask production project is in full steam, with reportedly KLA and Vistec tools in the SCAN warehouse at the moment) and more minor purchases will be made via SCAN later this year.

Istok in Fryazino with Small 150mm Fab

It now appears that the Istok Nikon Body 9s will never occur in real volume production and that Istok will take over Pulsar as the leading company in the government microwave project and take over the ASML /100). They have applied for the additional government support, and if approved, will receive money by the end of 2012. It appears that they may come out with modernization plan _shortly.

Micran in Tomsk with Small 150mm fab

Micran has a new building in Tomsk, Siberia, a project funded by RUSNANO. Construction began in July 2011 with plans to begin equipping in September 2012. Risk productions are scheduled for December 2012 with volume production expected in March 2013.

It appears that the project is now on hold. No funding from Rusnano and no support from Sigma since then. However, they were spotted in India together with Peter Kember and were invited to

help modernize India's government fabs. Meanwhile, Mikron opened the new office/production building in the Tomsk Free Economic Zone. Also, they are attacked by companies of Russian Technologies as they are competing in the end-equipment sector, especially in radars.

Territorial Clusters in Russia

Russian Ministry of Economic Development took a decision to provide government support to 13 innovative clusters from which 6 clusters are related to semiconductor industry. This support will include subsidies from the Federal budget to the budgets of the regions of Russian Federation (first group) where those clusters are located.

This is the list of innovative territorial clusters related to semiconductor industry which will be supported by the government.

- Cluster of information and communication technologies located in **Zelenograd**
- Cluster of nuclear-physical technologies, and nanotechnology in **Dubna, Moscow**
- Nuclear, supercomputer and laser technologies in **Nishni Novgorov**
- Cluster of Information and telecommunication technologies. **Siberian Federal Region, Novosibirsk area**
- Technologies and Electronics in **Siberian Federal Region, Tomsk**
- Cluster of Information Technologies in **Siberian Federal Region, Krasnoyarsk**

All the other 12 territorial clusters at the first stage will be supported without subsidies from the Federal Budget.

Zelenograd Innovative Territorial Cluster Format

Business: The core of the cluster consists of about 20 companies including: Mikron with its R&D Institute of Molecular Electronics, Angstrom Group consisting of 4 parts, Zelenograd Innovations Technology Center, Zelenograd Nanotechnologies Center, ELVEES Group (IC Design), "Components Plant Ltd", Plastic Logic, NTC Elins, NTMDT and a few more

Education: Engineering education: MGIEU (the leading Russian University in microelectronics area), 8th place among engineering universities of Russia in the commercializing volume of products developed by the University.

Management Education: MGADA (Moscow State Academy of Business Administration), IMB (Institute of International Business Education)

Science: State Scientific Centre "Technology Center", Scientific Research Institute for Semiconductor Physics, Scientific Research Institute for Materials Science, Scientific Research Institute in Machinery Development for Microelectronics, Institute for Design in Microelectronics of the Russian Academy of Science which is a part of Branch of Informatics, Computer equipment and Automatization of RAS

Infrastructure: SEZ "Zelenograd" Zelenograd Innovation and Technology Centre (ZITT), Zelenograd Nanotechnology Center (ZNTTS), Technopark «Zelenograd», specialized area of small business, a business incubator and the Center for Enterprise Development.

Power: The Moscow City Government (Department of Science, Industrial Policy and Entrepreneurship)

Members: Currently the Zelenograd High Tech cluster consists of 150 members, and it is expected the addition of 50 new Startups who will become members by the beginning of 2013.

Media: City portal "Zelenograd.ru"

SEZ Request - Reset on Tax. SEZ Zelenograd requested that the government reduce the income tax rate (from 13.5 percent to 0 percent) allocated by the residents of Zelenograd special economic zone in Moscow Allowance of income tax is already in place for SEZ residents — 15.5 percent (against 20 percent of baseline). Apparently, this privilege is not sufficient and the last time (in March 2012) Vladimir Putin instructed the Ministry of Finance to extend benefits which should intensify the development of special economic zones.

Key Cluster Data:

- Geographical location: Zelenograd (Moscow Zealand)
- Area: 3720 hectares
- The population: 2 217 000
- Working-age population with higher education: 44%
- Number of participants in the cluster: 150
- Total revenue of the cluster members (2011): 24.7 billion rubles (630M Euro)
- The share of exports of cluster members (2011): 28%
- The share of small and medium-sized companies in the economy of the cluster: 21%
- The share of innovative products and services: 84%
- The cost of research and development (2011): 4.9 billion rubles (125M Euro)
- The volume of investments for the period up to 2017: 153 billion rubles (3.9B Euro)

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