eMemory Q2 2020 Results – Earnings Call Transcript

August 12th, 2020 16:00-17:00

Chairman's opening remarks:

Good afternoon, everyone. I hope you're all healthy and doing well. In Q2 2020, we delivered record high revenue. As mentioned in previous conference calls, we are poised to enter a multiyear growth cycle with a strong set of tape outs in 'the 'pipe line. Besides the continuous strength of 12-inch royalty, 8-inch royalty has gained momentum as 2 to 3 times PMIC content increase in 5G smart phones as well as medical, online working and entertainment-related demand. In addition, we are experiencing strong interest in particular for our security PUF-based technology due to security requirements for 5G, AI, automotive and IoT. We are actively engaging with leading companies for design in our NeoPUF into their security architectures and expect more design win for the rest of the year.

Next, I would like to invite our President, Rick, to report our operating results of Q2 and the future outlook of our business. Afterward, I will elaborate more on our NeoPUF unique quantum tunneling mechanisms and why we believe we will be the winner of security silicon IP provider.

President's presentation on operating results and future outlook:

Good afternoon.

Thank you for attending eMemory's 2020 second quarter investor conference webcast. In today's presentation, I would like to report our operating results of 2020 Q2, followed by the status update of our technologies and future outlook.

To begin with, I would like to report our 2020 Q2 results.

1) Q2 revenue was four hundred and twenty-three million NT dollars (NT$ 423 mil), an increase of 1.9% sequentially and 33.7% year-over-year. In terms of US dollars, Q2 revenue was fourteen million US dollars (US$ 14 mil), a growth of 2% sequentially and 38.1% year-over-year.

2) The operating expenses of Q2 was two hundred and twenty-seven million NT dollars (NT$ 227 mil), up 2.7% sequentially, and 21% year-over-year.

3) Q2 operating income increased 1% sequentially, and 52.3% year-over-year. The operating margin was 46.3%, a decrease of 0.4 percentage point sequentially, but increased 5.7 percentage points year-over-year.

4) EPS of Q2 is 2.28 NT Dollars (NT$ 2.28) and ROE at 41.9%.

5) For the first half of 2020, the revenue was eight hundred and thirty-nine million NT dollars (NT$ 839 mil), up 17.9% year-over-year. The operating expenses increased 15.4%, and the operating margin was 46.5%, with an increase of 1.2 percentage points. EPS up 18.3% to NT$ 4.66, and ROE gained 5.9 percentage points to 42.8%.

In the following section, I will break down the revenue contribution by licensing and royalty.

1) Licensing from Q2 is one hundred and eighteen million NT dollars (NT$ 118 mil), accounted for 27.9% of the revenue, up 10.9% sequentially, and 12.6% year-over-year. In terms of US dollars, licensing revenue is 4 million US dollars (US$ 4 mil), up 11.6% sequentially, and 17.2% year-over-year.

2) Royalty contributed to 72.1% of the total revenue, is three hundred and five million NT dollars (NT$ 305 mil), decreased 1.2% sequentially, but increased 44.1% year-over-year. In terms of US dollars, the royalty is ten million US dollars (US$ 10mil), down 1.4% sequentially, but up 48.4% year-over-year.

3) In the first half of 2020, the total revenue grew by 17.9% as compared to the previous year. Licensing and royalty each has a growth of 6.6% and 22.6%

respectively. In terms of US dollars, licensing and royalty grew by 10% and 26.2% respectively.

If we breakdown revenue by technologies, the results are as follows:

1) <u>NeoBit</u> accounted for 17.2% of the total licensing revenue of the second quarter, decreased 15.6% compared to the previous quarter, and 26.7% year-over-year. Its royalty accounted for 65.6% of total royalty, increased 0.5% sequentially, and 31% year-over-year. This was due to contribution from PMIC, DDI and TDDI.

2) <u>NeoFuse</u> accounted for 71% of total licensing revenue of the second quarter, up 12.3% sequentially, and 27.6% year-over-year. Its royalty decreased 2.3% sequentially, but increased 100.4% year-over-year because of increasing contributions from 40/28nm OLED DDI, DTV and Networking applications. The royalty of NeoFuse contributed 31.5% of total royalty.

3) <u>Our PUF-Based Security IP</u> contributed to 2.4% of licensing revenue in the second quarter. Although this technology has not contributed royalty yet, engagement with industrial leaders are still actively ongoing.

4) <u>As for MTP technology</u>, licensing revenue increased 56.3% sequentially and 3.3% year-over-year. Royalty from MTP decreased 22.2% sequentially, and 18.3% year-over-year. Our MTP team is working with partners on developing MRAM, ReRAM and AI memory.

In the first half of 2020:

1) <u>For NeoBit</u>, the licensing revenue decreased 6.9% year-over-year, but royalty increased 1.2%, accounting for 52.9% of the total revenue.

2) <u>For NeoFuse</u>, the licensing and royalty revenue grew 21.4% and 136.8% year-over-year, contributing to around 42.1% of the total revenue.

3) <u>For PUF-Based Security IP</u>, licensing revenue increased 443.2% year-over-year, about 0.4% of total revenue.

4) <u>For MTP technology</u>, the licensing and royalty revenue declined 42.6% and 15.2% year-over-year, accounting for 4.6% of the total revenue.

If we breakdown royalty by 8-inch and 12-inch wafers:

1) 8-inch wafers, which accounted for 64.1% of royalty, decreased 1.2% sequentially, but increased 22.7% year-over-year.

2) Royalty for 12-inch wafers contributed 35.9% of royalty, decreased 1.2% sequentially, but increased 109.4% year-over-year.

115 product tape-outs were completed in Q2, up 10.6% from the previous year. This shows the persistent design activities of our customers with our IPs. We will provide more information in the management report that will be released later today.

In the next section, I would like to address our future outlook.

We expect the growth of revenue to continue in the second half and beyond.

1) For licensing revenue, the main contributors to our revenue are still NeoBit and NeoFuse. Due to increasing advanced technology platforms and more comprehensive PUF-based security IPs, we anticipate that licensing from NeoFuse and NeoPUF will continue to grow.

2) For royalty revenues, we expect 8-inch wafer royalty to regain momentum due to the 2 to 3 times PMIC content increase in 5G smartphones. In addition, we have developed various automobile-grade processes, and expect the EV automotive sector to drive further growth momentum for 8-inch application royalty. 12-inch royalty will continue to grow as more than 300 tape outs forvarious applications in the pipe line ready for production, which include TDDI, OLED, T-con, ISP, Bluetooth, WiFi, TWS, switch, set top box, video processor, SSD controller, IoT security processor, digital power, DRAM and others.

For new application development:

1) Our new applications are centered around the development of PUF-based technology. As mentioned before, PUFrt was adopted by customers in IoT platform, AI training modules, Blockchain, FPGA, and industrial automation applications to ensure data security and increase attack-resistance ability. Apart from PUFrt, our PUFiot is also well-developed and engagement with customers are on-going.

2) Aside from our development efforts, our collaboration with ARM to embed our NeoFuse in its security platform, which already has customer adoption, and has entered the product verification stage is going well.

Contribution from the developments mentioned above will be seen this year.

For new technology developments:

1) In addition to the 5nm technology platform, MRAM, ReRAM, and ARM security IP platform which we mentioned in the previous quarter, we are developing 6nm and 5nm plus (N5P) technology with our leading foundry partner, and have already demonstrated 6nm silicon results successfully, while 7nm has been adopted into automotive application.

2) Second, we are developing new security IPs. After the completion of PUFtrng (PUF-base true random number generator) and PUFrt (PUF-based root of trust), our PUF-based IoT security solutions, security elements, and hardware security module IPs are also under development.

3) Lastly, we are in the process of creating an open platform. This open platform focuses on PUF-based hardware security by integrating OTP, PUF, security-function IPs, and cryptographic algorithm IPs to provide total security solutions for AIoT and 5G applications.

Despite the global pandemic, the need for increased performance, yield and security continue to create strong and sustained demand for our IPs. I would like to thank all

our employees for their effort in continued success in penetrating new markets and maintaining our position in existing market. With that, I will conclude my presentation on our operating results and future outlook. Thank you.

Chairman's NeoPUF Quantum tunneling mechanisms & PUFrt introduction:

In page 23, I will explain the mechanism of our NeoFuse. We invented the NeoFuse transistor. The programing mechanism is to apply voltage just high enough generate a tunneling current path in the gate oxide. We call this current path quantum tunneling.

Page 24 tells how quantum tunneling works. On the left side of the figure, it is the physical structure of the oxide with many defects (upper) and without defects (lower) respectively. The figure on the right is the corresponding energy band diagram. From semiconductor physics, we know that the defect in the oxide is a trap, and in the corresponding band diagram is the quantum well. So, if you have many quantum wells in the oxide, it will facilitate the electron to tunnel from one well to another such that the electron can tunnel from the substrate to the gate and contribute to the tunneling current. For the lower figure, in the oxide without defects, it is very difficult for the electron to tunnel from the substrate to the gate and consequently generate very little tunneling current. And once the defect is generated, it is very difficult to recover. From the literature, it shows that the broken bond (Si-O) needs at least more than 600 degree Celsius to recover. Therefore, the program numbers created by this mechanism is very stable. It is resilient to voltage variation, temperature variation, noise, and aging effects

As shown in page 25, our NeoFuse is known for its reliability (data retention much more than 10 years), and for being invisible and untraceable, perfect for secure storage. This is in contrast to eFuse, the most commonly used process that uses fuse

burn-out to establish "1" or "0" in the circuit, and is highly vulnerable to reverse engineering and data leakage.

In page 26, based on our NeoFuse, we design a pair of NeoFuse transistors and apply the voltage on their gate in parallel. When the voltage is high enough, we will see the oxide with more defects generated begins to have higher tunneling current; whereas the oxide with fewer defects generated has less. Thus, every time when we choose a pair of NeoFuse transistor to compare the tunneling current during high voltage stress, we will always see one of them, either the left one or the right one, having high tunneling current. Like tossing a coin, you never know which side will turn up. By doing this repeatedly, we will generate a group of random numbers which are dependent on the variation of the gate oxides. As shown in the second figure of page 26, the probability of high tunneling current occurring first on the right or left is 50%. When high tunneling current happens on the left hand side, we will define it as "1" and as "0" when it happens on the right hand side. As our NeoPUF was based on the nature randomness of oxide quality, we amplify the variation of gate oxide and transform them into digital signals, which become unique fingerprint for chip itself.

In summary, our NeoPUF is built on the foundations of our NeoFuse technology and shares the same qualities of reliability, invisibility and non-traceablility. Since we have many NeoFuse platforms, so there are also many NeoPUF platforms that are available and ready to be used. NeoPUF is the one and only one produced using Quantum tunneling mechanism. This is something no other competitors or new comers can do and catch up with. I think our NeoPUF technology will dominate the world's PUF technology.

In page 27 and 28, I will explain what hardware root of trust is and how our NeoPUF and NeoFuse work as a root of trust. A root of trust must ensure that the secret key is stored in a manner that cannot be detected and is not susceptible to reverse

engineering, guaranteeing the safety of the data. The root of trust is therefore the key component that protects the storage of system data and maintains its integrity.

Our PUFrt solution leverages our NeoPUF and NeoFuse technologies to establish a robust root of trust. First, our NeoPUF allows us to extract a unique ID (UID) for the chip, essentially a digital fingerprint. This UID is then stored within our NeoFuse, where it remains securely, free from detection and the threat of reverse engineering.

Key generation, which is crucial for coding and decoding sensitive data, can be executed through the combination of the unique ID and true random number generator. And the keys are securely protected from physical tampering in the embedded secure NeoFuse OTP. This helps solve the major security problems that chip designers face.

The root of trust based on NeoFuse and NeoPUF has many outstanding features: in particular, ease of use, high speed, low power utilization, and low cost. Before the availability of our root of trust solution, customers need to incorporate at least three IP vendors' IP (OTP, PUF, and TRNG) into their designs or use very expensive external hardware random number generator. Consequently, we have strong conviction that our PUFrt will become the future market leader due to its overwhelming competitive advantages.

<u>Chairman's closing remarks:</u>

With 20 years of innovations, eMemory continues to develop the foundational semiconductor technology which help our customers to speed up their technology development and improve their chip performance. We hope to use our innovation to ensure all online activities are secure, and this is our company's vision - embedded

everywhere and secure everywhere! Once again, thank you for your patience and support for eMemory.