eMemory 2Q23 Earnings Call Q&A Transcript (Combined)

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Q&A Transcript

1. **What's your view on operating margin for H2?**
   >> It will be a few percentages higher than the first half of the year.

2. **How will the post-quantum encryption algorithm affect the company?**
   >> Encryption uses crypto algorithms to protect sensitive information, including secure websites or even emails. The widely used public-key encryption system relies on algorithms difficult for even the fastest conventional computers to solve in limited time. However, quantum computers will threaten existing public-key encryption within a decade, The National Institute of Standards and Technology (NIST) is expected to announce new algorithms for encryption in 2024. The main problem with the potential post-quantum encryption algorithm is that the key size is very long, which may be thousands of times longer than current RSA and ECC keys.

   The strength of eMemory's PUF-based Root of Trust lies in its flexible and high-speed key generation, which is currently the world's easiest, fastest, and safest method. It will be necessary for customers to adopt PUF-based Hardware Root of Trust to face post-quantum crypto algorithm. The last large-scale replacement of the encryption algorithm was around 2000. At that time, the United States decided to adopt the AES algorithm. It took ten years for major related companies to switch to the new encryption methods, so we expect that changing to a new encryption algorithm will also take around ten years. This is very positive for speeding up customers' adoption of our solution.

3. **The PMIC market is quite sluggish, coupled with TI's price competition, is TI a customer of the company? If not, will TI's price competition grab orders from existing PMIC company customers, affecting the company's future royalty income?**
   >> While TI is not currently our customer, we have many PMIC customers. Still, the main royalty contribution comes from Dialog and non-traditional PMIC companies, mainly from processors or system companies. This type of customer's annual wafer production volume is 700,000 to 800,000 pieces. They have replaced some of the chips of the traditional IDM (like TI). TI's pricing competition will not affect such companies because they are all top-tier customers of foundries with the lowest foundry cost, even when foundry raise wafer price in past years, it did not affect theirs. Their PMIC products are mainly used in-house or bundled sales with processors. Their royalty was affected primarily by end-market demand and inventory adjustments, and each customer's situation differs. The first customer to adjust inventory had already started placing wafer orders. The rest will gradually return to normal production levels next year.

   We believe that PMIC's royalties will grow strongly next year. In addition to the lower year-over-year base comparison, new customer gains (i.e. Korean smartphone), penetrating into EV cars, data center , wearable through key customers, as well as ASP enhancement through customers

migrating into more leading process node (our US customers' PMIC migrating from 8 inch to 12 inch 55 nm) will all make PMIC royalty growth strongly next year.

4. **Do you have any AI processor customers?**
   \>> The definition of AI is very broad. I think what most people care about now is the large-scale language training models made by NVDA and AMD, both of which have made contact with us in the past. NVDA started reaching out in 2020, and we have been discussing how to implement our OTP and PUF into their security architecture. The reason for not being adopted was that our 4/5 nm did not complete the qualification at that time.

   For the key storage of Hardware Root of Trust (HRoT), they currently use eFuse. As I mentioned earlier, eFuse is not safe for key storage. OTP or PUF+OTP must be used to provide keys secure storage.

   For key generation of Hardware Root of Trust (HRoT), they currently use the conventional True Random Number Generator (TRNG) without PUF so the entropy and speed of key generation is inferior to what we provide in PUF-based True Random Number Generator (TRNG). In fact, our randomness is about 100 times theirs, they also consume about 100 times the power of ours.

   Especially in the future, the length of the key required by post-quantum algorithm will be greatly increased, which will also increase the calculation time. Having high-speed key generation such as ours is very advantageous. We are very confident that with the progress of our 3nm and more production records, we have great opportunities in the future.

   In addition to these two major chip suppliers, we also have cloud customers doing in-house AI processor in China and US this year. Furthermore, if AI, in a broad sense, also covers edge computing, then we already have many customers. Our solution is only a small area and can generate basic security functions in a simple way, which is very competitive in edge computing.

5. **Which AI-server-related applications have adopted the company's IP? Does this include CPU and GPU?**
   \>> Currently, the applications inside the AI server adopting our IPs with tape-outs or in production are: SSD controllers, CXL memory controllers, Retimers, PMIC and SPD for DDR 5 DIMM card. The CPU and GPU have not yet adopted our IP, but we have a good chance when we complete 3nm verification, especially for those which adopt ARM solution.

6. **You mentioned that AI-related applications are among the few early adopters of PUF. Why are they the first to adopt PUF?**
   \>> Advanced AI models are typically stored in conventional commodity flash memory, and this standard storage device has no security function, so it can be stolen or modified. Our PUF-based hardware security Root of Trust IP (PUFrt) and Crypto Coprocessor (PUFcc) can encrypt and authenticate these AI models to protect them from being stolen or modified, which is why customers need PUFsecurity and eMemory solutions.

In addition, all processors have SRAM, one type of volatile memory, just like DRAM. When SRAM is manufactured, it will have bad bits that need OTP for memory repair. In the past, eFuse was used to do SRAM repair functions. However, the SRAM density in AI chips is much bigger, which eFuse cannot fulfil due to density limitations. Our OTP offers 500 to 1000 times bigger density than eFuse. Therefore, for AI with large-density/SRAM, our IP become a necessity. Based on SRAM repair and security requirements, most AI chips will convert from eFuse to our OTP.

7. **Many mature processes are located in China. In the past, even Arm faced the problem of collecting royalties from Chinese customers. If customers all move their mature products to Chinese foundries, will eMemory face trouble receiving royalties?**
>> We have 9 foundries customers and over 900 chip customers in China, accounting for about 10-15% of our total revenue. There have been no problems with collecting royalties and other payments. This is related to the nature of IPs. ARM offers soft IP, providing customers RTL (similar to software for chip design). They collect licenses and royalties from chip companies. They must audit their customers if customers use the same RTL to other chips without being licensed.

We license the fundamental transistor to the foundries. The foundry pays royalties based on the royalty rate and wafer volume, while the chip companies pay design licensing fees only . Since there are only 9 foundries but more than 900 chip customers in China, it is much easier to collect and audit the accounts of foundries than chip companies. In addition, we have continuously licensed our technologies to foundries for new process nodes and new applications and continuing tape-outs through end customers' adoption. The contract will be breached if the foundry fails to pay the royalties. As a result, all customers' tape- outs in the pipeline cannot go for production. The loss to the foundry will be much bigger than not paying royalties, not to mention the infringement of lawsuits penalty. The risk of embedded NVM is that there is a problem with memory reading after production, the entire chip or even the system will shut down, and the resulting penalty for damage will be much bigger, so customers don't want to risk illegally obtaining IPs.

8. **Why has MTP's license fee increased in Q2? What applications have adopted your MTP?**
>> Since the utilization rate of foundries is very low, there are incentives for foundries to develop specialty technologies, especially embedded NVMs, to increase wafer value. With the requirement for high speed, low power and small form factors, replacing external memory with embedded memory is accelerating. Our MTP technology is compatible with the logic process, so the foundry can easily expand the existing logic process for embedded NVM without investing in additional equipment.
With fabs' low utilization rate, foundries are allocating more resources to speed up technology development. We believe our MTP-related technologies have started to enter a multi-year growth cycle and will have significant royalty growth next year.

9. **I heard that Synposys, your competitor, bundled OTP, PUF, and EDA together and even offered it as a free IP. Will this affect eMemory?**
>> Synopsys has acquired our previous main competitors, Sidense and Kilopass, for over five years. In the past, we often heard clients say that they bundle EDA tools to sell together, and the OTP price was very low or even free to get our customers to switch. However, no customers have ever switched because of this, and we have not changed our pricing strategy either. Accurately, more and more customers using Synopsys have switched to our IP. The latest news is that Synopsys raised their price because the previous price-killing strategy was ineffective. PUF is even more fundamentally different.

Synopsys uses SRAM PUF, and the performance is incomparable to our NeoPUF IP. Synopsys' security department is composed mainly of many companies acquired through M&A. Their strategy focuses on the security aspect of system integration, which differs from our focus on offering the best root of trust in the world.

10. **When will you start seeing contributions from your collaboration with Arm?**
    >> Our cooperation with Arm has been ongoing. Some customers have already taped out our security solution through ARM's platform and contributed license fee already.

11. **Does eMemory do 12nm ISP? In addition, if the OTP of the ISP rises from 2K to 16K, will the output value of royalty be multiplied?**
    >> Some customers have adopted our IP in 12nm ISPs with small volume production. Since the price of 12nm wafer is 40% higher than that of 22/28nm, if existing 22/28nm customers switch to 12nm, chip size remains the same, then royalty difference will be the increase of wafer pricing, which has nothing to do with how much density is used.

12. **Under the CXL framework, what role do eMemory IPs play?**
    >> CXL is the protocol to enhance the memory capacity sharing between CPU and other devices, such as GPU. Our CXL Memory eXpander Controller customers adopt our Root of Trust to protect the security of data confidentiality and integrity during data transfer.

13. **Other than PMIC, do other parts of DDR5 also need to use your IPs? Ex: RCD(register clock driver), DB(Data Buffer), SPD Hub, etc...**
    >> RCD and DB currently do not use. But SPD Hub has adopted NeoEE for 100K endurance. So, inside DDR5 DIMM card, there are two chips SPD hub and PMIC with our MTP solution.

14. **eFuse cannot shrink below 28nm. However, in terms of the advanced manufacturing process, if the customer's eFuse is accidentally blown out, what kind of solution will be adopted if the eMemory solution has not yet been adopted?**
    >> If the customer uses eFuse and it blows out accidentally, they will usually increase the eFuse area, however, this will take up too much space and would be very expensive for advanced process chips. In addition, eFuse cannot accommodate circuit design that needs to burn a large current. However, since eFuse is provided by the foundry, if there is a problem, the foundry will be responsible, so eFuse is still dominating in advanced manufacturing processes. Another type of technology is anti-fuse, mainly our NeoFuse and competitor's solution. However, the IP of competitors has experienced problems in advanced manufacturing processes. At present, not heard any customer adopt their solution in leading processes. But it also affects customers' confidence and slows down the adoption of this technology. With more production record and successfully moving into 5nm and 3nm, we are confident to replacing eFuse is only a matter of time.

15. **Why is your royalty ratio of revenue much higher than other IP companies, and why has it been like this for such a long time?**

    >> The majority of IP companies mainly collect licensing fees but with no or little royalty. Our strategy is to charge less on licensing in the early stage but insist on collecting royalties.