TOP-LEVEL PERSPECTIVE ON CHINA MARKET

- China is evolving to becoming high technology in number of areas
  - 50% of smartphones provided globally in 2015 will come from Chinese companies, eg, Huawei Technologies, Xiaomi, and others
  - China is projected to be global leader in 5G
  - 250M 4G subscribers out of 1.3M handsets in China as of July 2015
- $20B is available for setting up wafer foundry, NAND Flash, and DRAM manufacturing
- Acquisition of OmniVision Technologies, Integrated Silicon Solution, STATS ChipPAC, and NXP Semiconductors’ RF Power business was made to gain access to products and IP

Many more acquisitions will be made in order to strengthen competitiveness of Chinese semiconductor industry
TOP-LEVEL PERSPECTIVE ON CHINA MARKET (CONTINUED)

- Increased emphasis on big data in China in order to improve efficiencies in many areas
  Supercomputers designed and manufactured in China are competitive in many big data applications
- Entering HD video age
  - Samsung plans to manufacture 11K panels in high volume in 2018
  - China will likely manufacture 11K panels in 2020
  - BOE Technology Group is becoming increasingly competitive
  - Medical, industrial, and other applications can benefit from HD video
  - HD content will need high performance semiconductors

CHINA IS CHANGING, AND SEMICONDUCTORS ARE KEY PART OF STRENGTHENING COMPETITIVENESS IN TECHNOLOGY
STRATEGIC ISSUES IN CHINA

- GDP growth has slowed in China
  Key reason is slowdown of exports because consumption in many countries has slowed
  Exports represent large component of China’s GDP, and this is expected to continue

- China will continue to have large manufacturing base
  Manufacturing provides employment and supports exports, with increased use of robots in China
  Supply chains for manufacturing are very strong in China
  Countries that do not place high levels of importance on manufacturing are making strategic errors
STRATEGIC ISSUES IN CHINA (CONTINUED)

- Many government agencies are active in supporting growth of electronics and semiconductor industries in China.
  These agencies include Chinese Academy of Sciences, Ministry of Industry and Information Technology, and China Development Bank as well as SOEs such as CEC and E-Town Capital.

- China is very effective at managing big projects, e.g., high speed rail system, Three Gorges Dam, and other areas.
  Semiconductors and electronics can be considered as big projects in China.

CHINA IS EVOLVING FROM LOW TECHNOLOGY TO HIGH TECHNOLOGY
IMPLICATIONS OF CHINA’S ACTIVITIES FOR EUROPE

- GDP growth of China has slowed
  However, there continues to be investments in high technology
  Increased emphasis on exports as well as local consumption in order to have relatively high economic growth

  Provides structure for investments and priorities for technology development and supply chains

- Increased concerns regarding ability to compete in China without partnership relationships because of strong emphasis on local supply
  Best option for European companies is to establish joint ventures in China
China’s leadership in 5G will represent challenges and opportunities for European governments, system companies, and semiconductor companies. Having multiple standards for 5G protocol will be highly inefficient. It may be appropriate to collaborate to have a global standard.

IoT market in China has very large potential but will be highly fragmented. Sensors will be important IP, with leadership in many areas in Europe. Many opportunities to collaborate with Chinese companies on IoT ecosystem.

High power semiconductors will have large market opportunities in China. Europe is strong in many areas of technology. China can be a good location to build a manufacturing ecosystem for power semiconductor products, e.g., inverter motor control facility in Hefei (China).

MANY OPPORTUNITIES IN CHINA FOR COLLABORATION, BUT NEEDS INNOVATIVE BUSINESS MODELS.
TOP-LEVEL METRICS FOR CHINA

CHINA’S ELECTRONICS INDUSTRY PRODUCTION

BROADBAND WIRELESS CONNECTIVITY

SMARTPHONE SUPPLY

UHD TELEVISION SUPPLY

RATE OF PROGRESS IS ACCELERATING
GLOBAL SEMICONDUCTOR MARKET

TOTAL GLOBAL MARKET WILL BE $590B IN 2025
CHINA’S SEMICONDUCTOR MARKET

CHINA MARKET WILL BE $336B, REPRESENTING 57% OF GLOBAL MARKET IN 2025
SEMICONDUCTOR CONSUMPTION PATTERN IN CHINA

IN 2010, CHINESE COMPANIES CONSUMED 15.8% OF TOTAL SEMICONDUCTORS IN CHINA BUT WILL BE 53.8% IN 2025
FOREIGN COMPANIES DOMINATE SUPPLY OF SEMICONDUCTORS IN CHINA IN 2015, BUT CHANGES ARE EMERGING
GLOBAL FOUNDRY MARKET

WAFFER FOUNDRY SUPPLY IS KEY TARGET IN CHINA
CHINA’S FOUNDRY MARKET

China was 7.8% of total global foundry market in 2010 and will be 26.4% in 2025.
DESIGN STARTS BY GEOGRAPHIC REGION

HIGH GROWTH FOR DESIGN STARTS IN CHINA
REVENUE LEVELS TO SUPPORT MAINSTREAM DESIGNS

REVENUES PER DESIGN NEED TO BE 10X DESIGN COSTS

NEED NEW DESIGN METHODOLOGIES

IBS
IN 2025, CHINA WILL BE 50% OR MORE OF IOT MARKET
AUTOMOTIVE MANUFACTURING BY COUNTRIES

CHINA IS LARGEST PRODUCER OF AUTOMOBILES BUT MUST CHANGE FROM INTERNAL CONSUMPTION TO BEING BASED ON EXPORTS
CONCLUSION

- Market for semiconductors in China is large and growing rapidly
  Level of technology is increasing
  Initial designs are in 10/7nm
  Products need to be developed specifically for China market
- Chinese government agencies will spend up to $100B to build globally competitive electronics and semiconductor industries over next 10 years
  Key targets include 3D NAND, DRAM, application processors, modems, Wi-Fi, and many other products
  Full LED lighting supply chain is being built
  $10B+ were spent on flat panel displays by BOE and others
  Willingness to make large expenditures building up manufacturing capacity
  Manufacturing facilities must operate at high levels of capacity utilization
CONCLUSION (CONTINUED)

- Goal of China is to be leader in 5G
  This will be disruptive from global competitiveness perspective
  5G will support many different industries, including automotive, medical, security, and smartphones
  IoT will be synergistic with 5G

- Acquisitions will continue to be made but have risks because key people will likely leave
  Joint ventures can be better option but need close management

- Important to build close relationships with key decision makers in China and to have long-term strategies for China
  Even though there can be volatility, China will be economically successful in longer term
  China has many problems, but indications are that China is managing its problems more effectively than most other countries

CHINA IS MAJOR OPPORTUNITY, AND COLLABORATION IS CRITICAL