



PANJIT International Inc.

Investor Relations Presentation



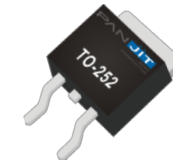
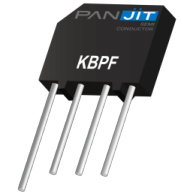
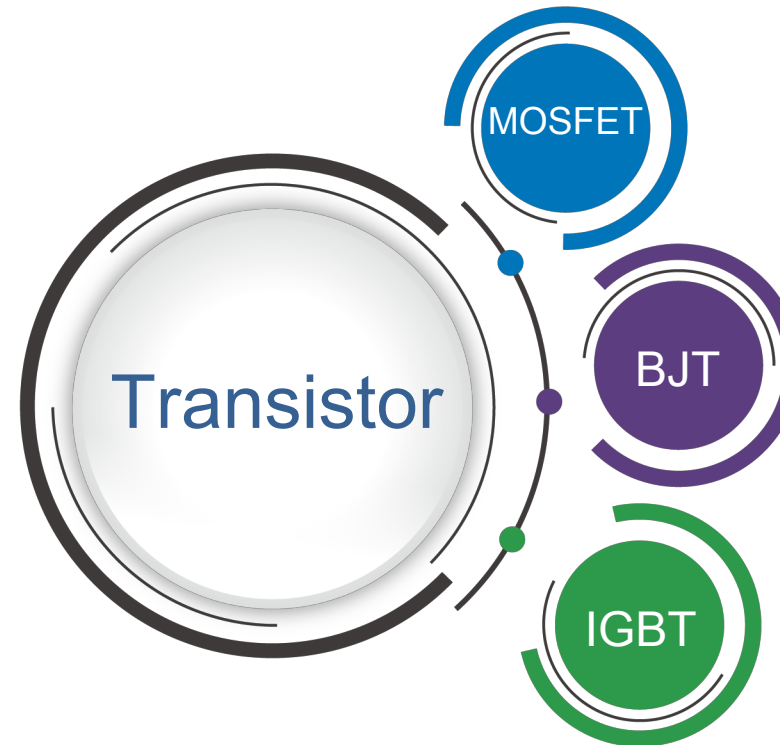
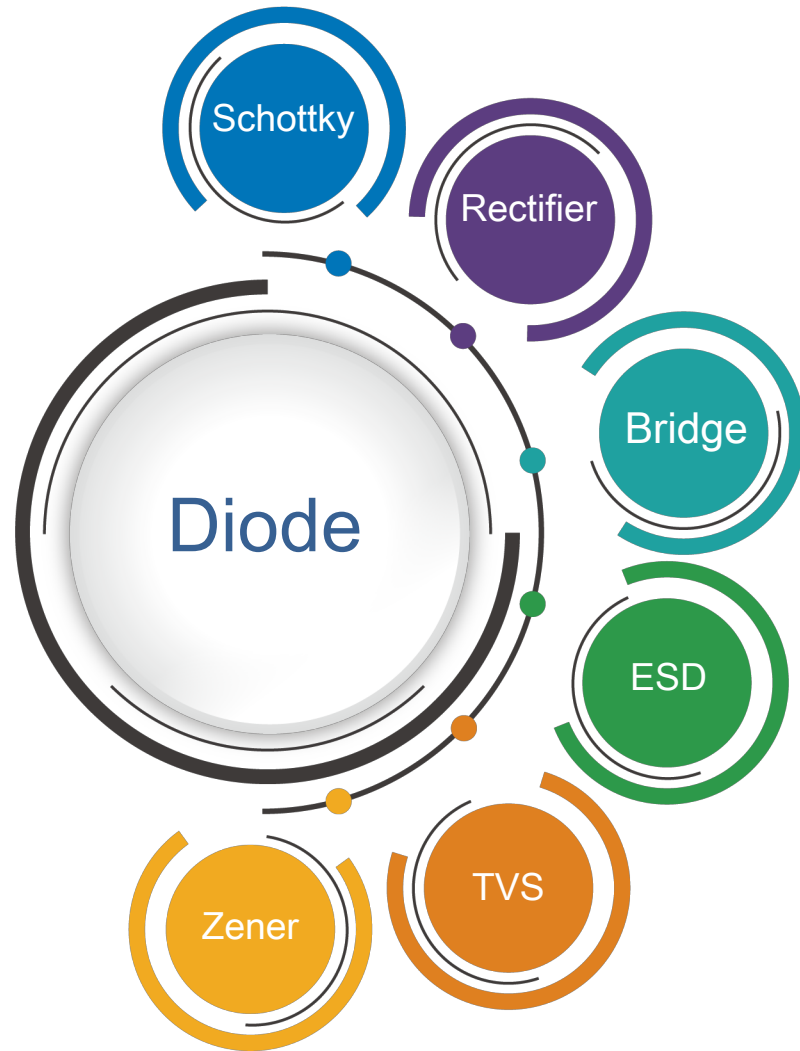
Chief Strategy Officer

Jasper Lee

Dec 2018

- About PANJIT
- Worldwide Discrete Market
- Consumer Electronic
- Industrial Electronic
- Communication Electronic
- Automotive Electronic
- IGBT

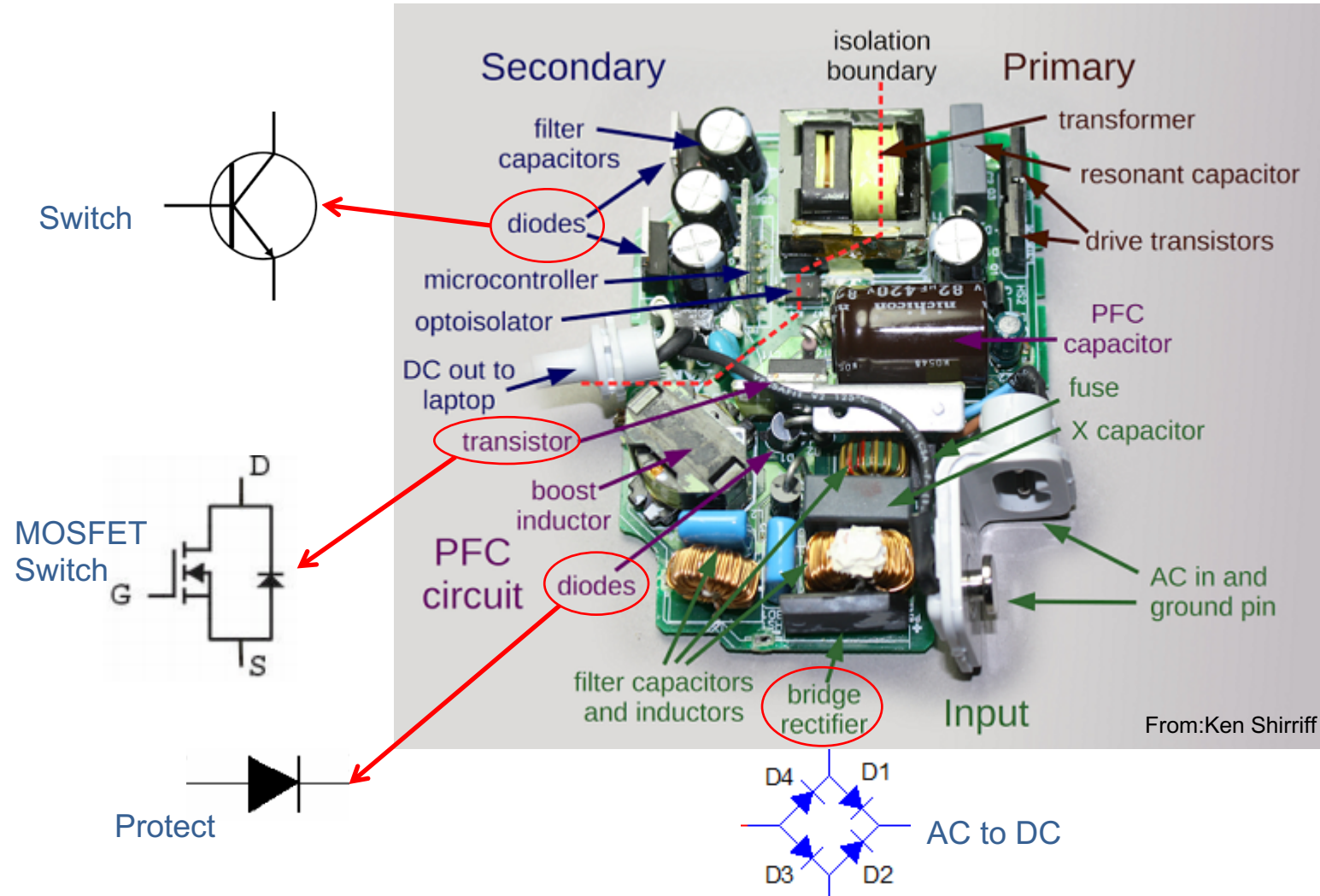




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Where are Discrete?



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PANJIT GROUP



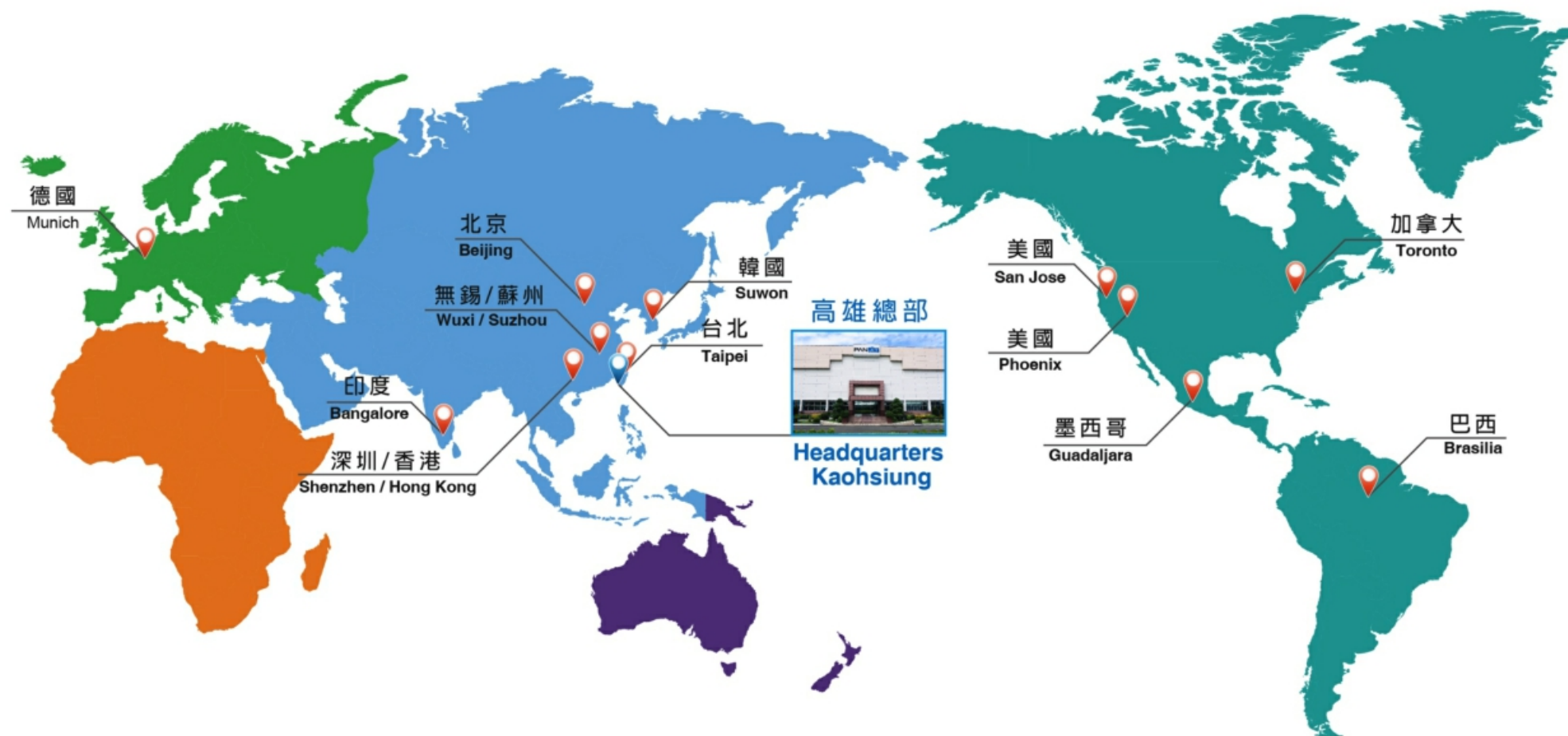
強茂股份有限公司
PANJIT
Est. May 1986
Product: Discrete
Packaging & Testing



璟茂科技股份有限公司
PYNMAX
Est. Mar 2000
Product: Wafer Foundry



無錫至極動能科技有限公司
Sumnergy
Est. Jun 2017
Product: BMS, Battery Pack



📍 總部 Headquarters 📍 業務據點 Sales Office

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前端晶圓



後端封測

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Global Diode Ranking

No.	2016		2017	
1	Vishay	10%	Vishay	11%
2	Rohm	9%	Rohm	10%
3	ON Semiconductor	7%	ON Semiconductor	8%
4	Microsemi	7%	Infineon Technologies	7%
5	Infineon Technologies	7%	Microsemi	7%
6	NXP	6%	Diodes	6%
7	STMicroelectronics	6%	PANJIT	5%
8	Diodes	6%	STMicroelectronics	5%
9	PANJIT	5%	Nexperia	4%
10	Semtech	4%	Good-ark	4%
	Others	33%	Others	33%

- Global Diode Sales Ranking: #7

* Diodes above 0.5 amps.
Excluding RF diode

Global Discrete Ranking

No.	2016		2017	
1	Infineon Technologies	13%	Infineon Technologies	14%
2	ON Semiconductor	8%	ON Semiconductor	10%
3	NXP	8%	Mitsubishi	6%
4	Mitsubishi	6%	Nexperia	6%
5	STMicroelectronics	6%	Rohm	6%
6	Vishay	5%	Toshiba	5%
7	Toshiba	5%	Vishay	5%
8	Rohm	5%	STMicroelectronics	5%
9	Renesas Electronics	4%	Renesas Electronics	4%
10	Fuji Electric	3%	Fuji Electric	3%
11	Diodes	3%	Diodes	3%
12	Fairchild Semiconductor	2%	Microsemi	2%
13	Microsemi	2%	AOS	2%
14	Toyota	2%	PANJIT	2%
15	PANJIT	2%	Shindengen Electric	2%
16	Shindengen Electric	2%	Toyota	2%
17	Denso	1%	Denso	1%
18	IXYS	1%	IXYS	1%
	Others	22%	Others	21%

- Global Discrete Sales Ranking: #14 (includes of Diode, MOSFET, IGBT, and etc.)

Excluding RF diode

Worldwide Discrete Market

Worldwide Discrete Market - Application

Automotive



- ADAS
- Body
- Infotainment
- Lighting
- Motor
- Powertrain
- Sensor
- xEV

Industrial



- Solar Junction Box
- LED Lighting
- Robotic
- Medical Equipment
- Motor

Green Power



- EV Charging station
- Quick charger
- Battery module
- UPS

Consumer



- UHD TV
- Set Top Boxes
- Camera
- Home Appliance

Communication



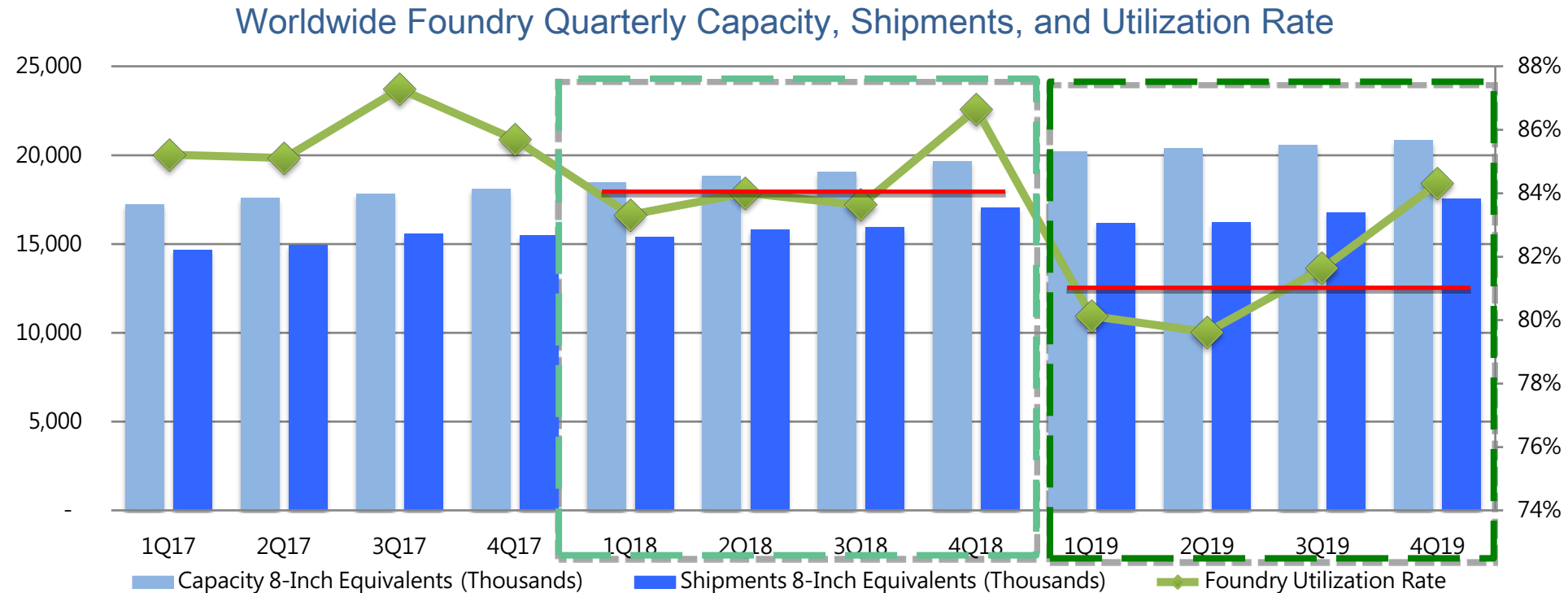
- Networking
- PoE
- VOIP
- Infrastructure

Computing



- Desktop PC
- Notebook PC
- Tablet
- Graphic Cards

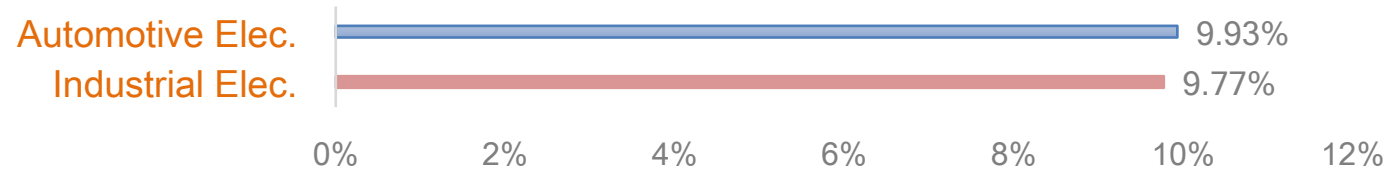
WW Foundry Quarterly Capacity, Shipments and Utilization Rate



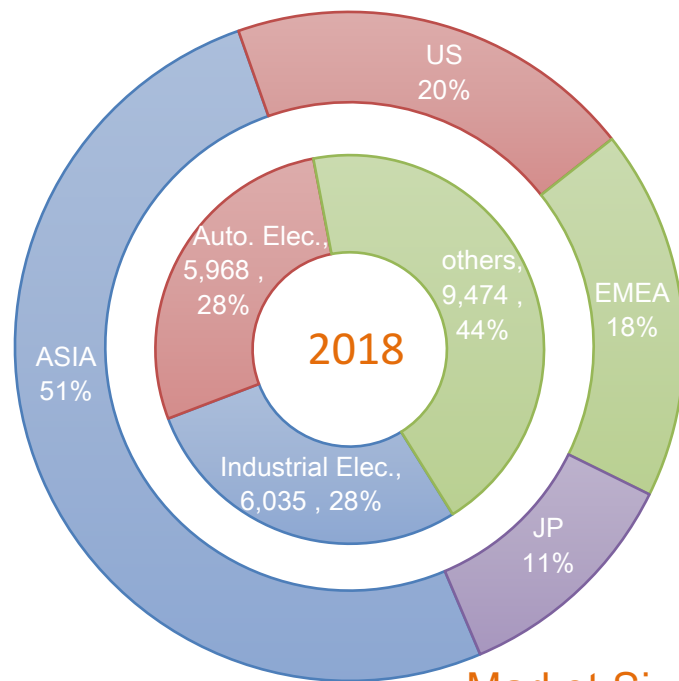
In 2019, the Worldwide Foundry 8-Inch capacity will be 82 million pcs (2019 YoY : 8%).

WW Discrete Semiconductor Forecast

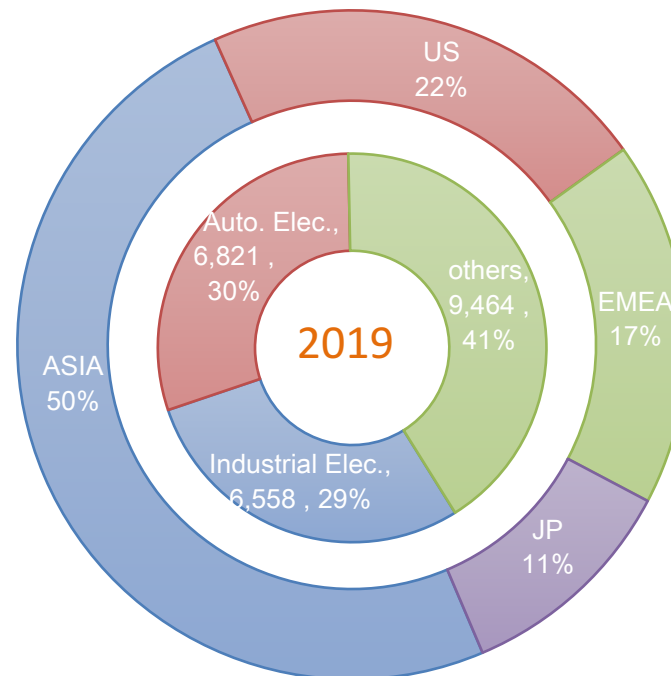
2017-2022 CAGRS



Unit: M' USD



Market Size : 21,477



Market Size:22,838

- The major demand side of the discrete semiconductor will still be the Asia-Pacific region, Its market size account for nearly 50%

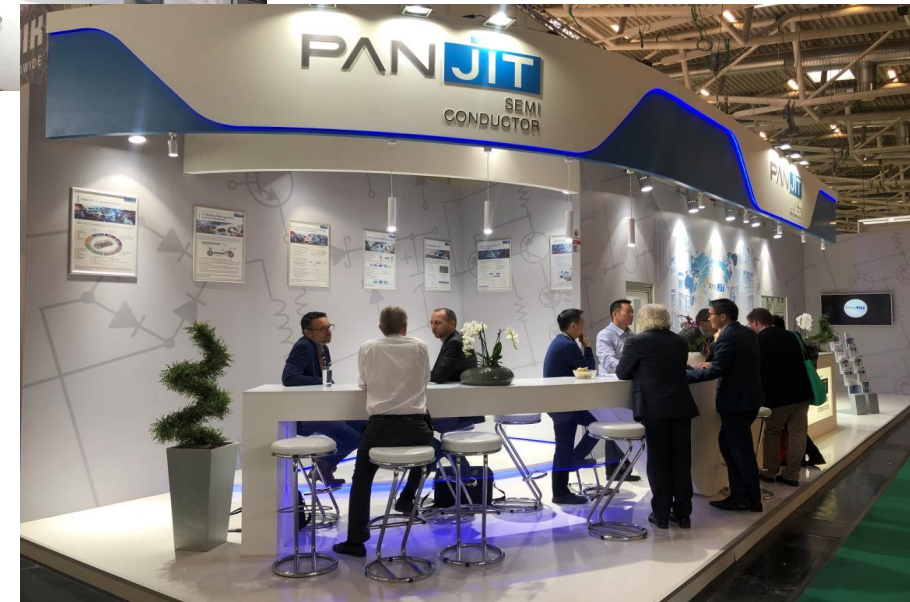
- By application review, the demand of discrete will be focus on Automotive and Industrial electronic market. In future five years, the CAGR will around 10% in these two markets.

electronica 2018 in numbers

- 4 days
- 17 halls
- 182,000 square meters of exhibition space
- 3,100 exhibitors from over 50 countries
- 80,000 visitors from over 80 countries

Location : New Munich fair Center, Germany
Munich Electronica founded 1964,
the largest electronic component exhibition biennial

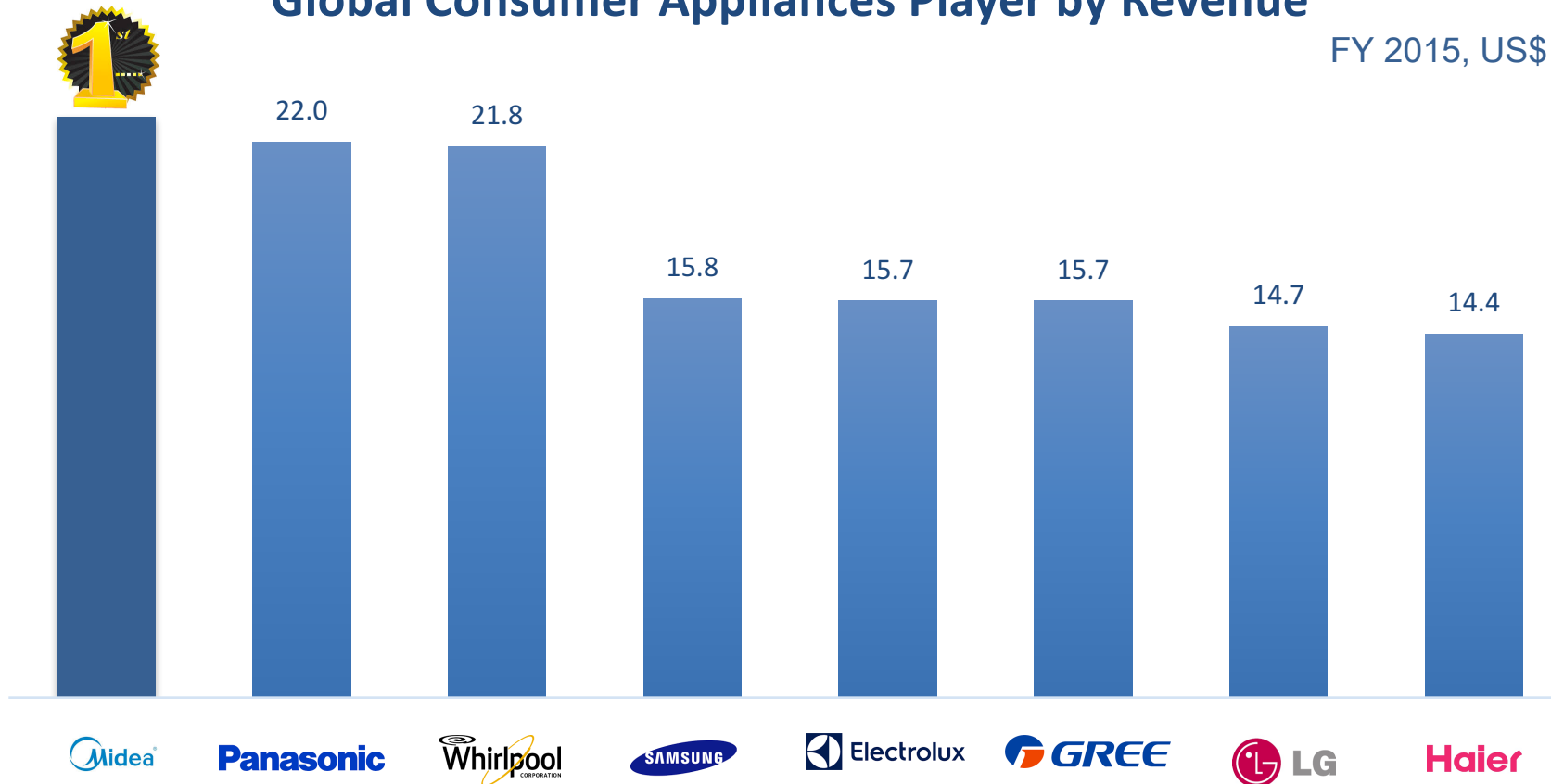
In the Exhibition, it was easily can find the Au customer
come to ask and discuss about our MOS plan in the future



Consumer Electronic

Global Consumer Appliances Player by Revenue

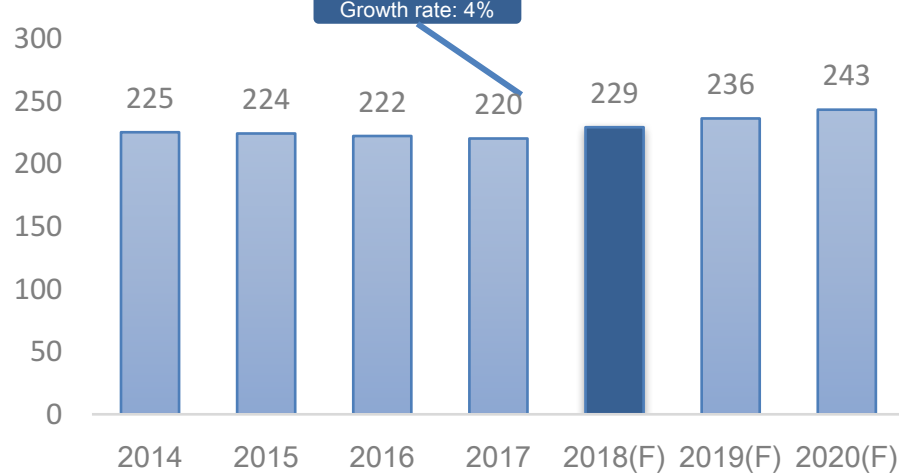
FY 2015, US\$ Bn



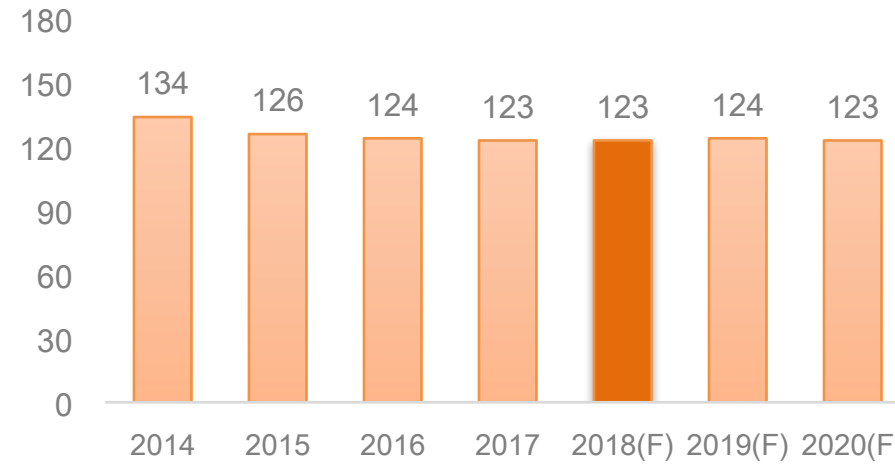
- The market for major household appliances is expected to reach \$28.1 billion by 2021. (Home Improvement Research Institute)

Panel - 4% Growth in 2018

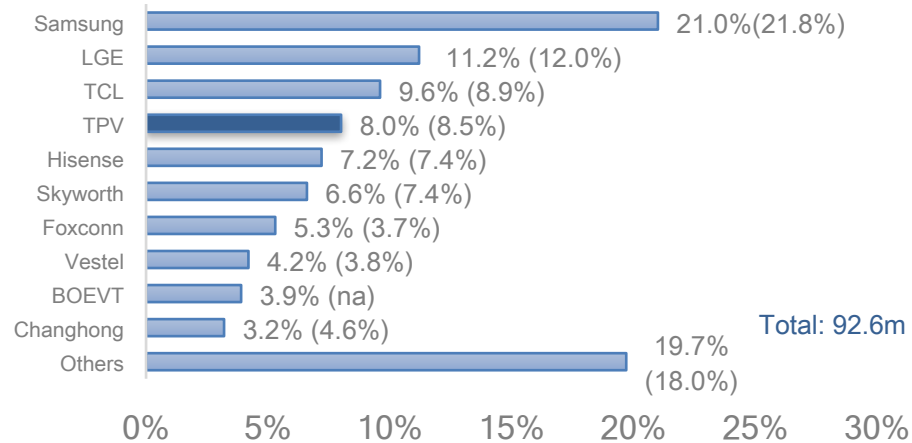
TV Global Shipment Forecast (Units M)



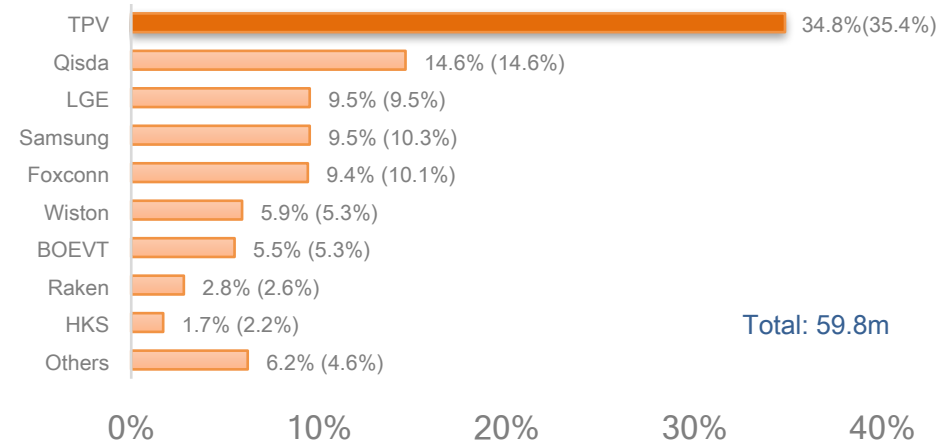
Monitor Global Shipment Forecast (Units M)



Worldwide LCD TV Manufacturer Share



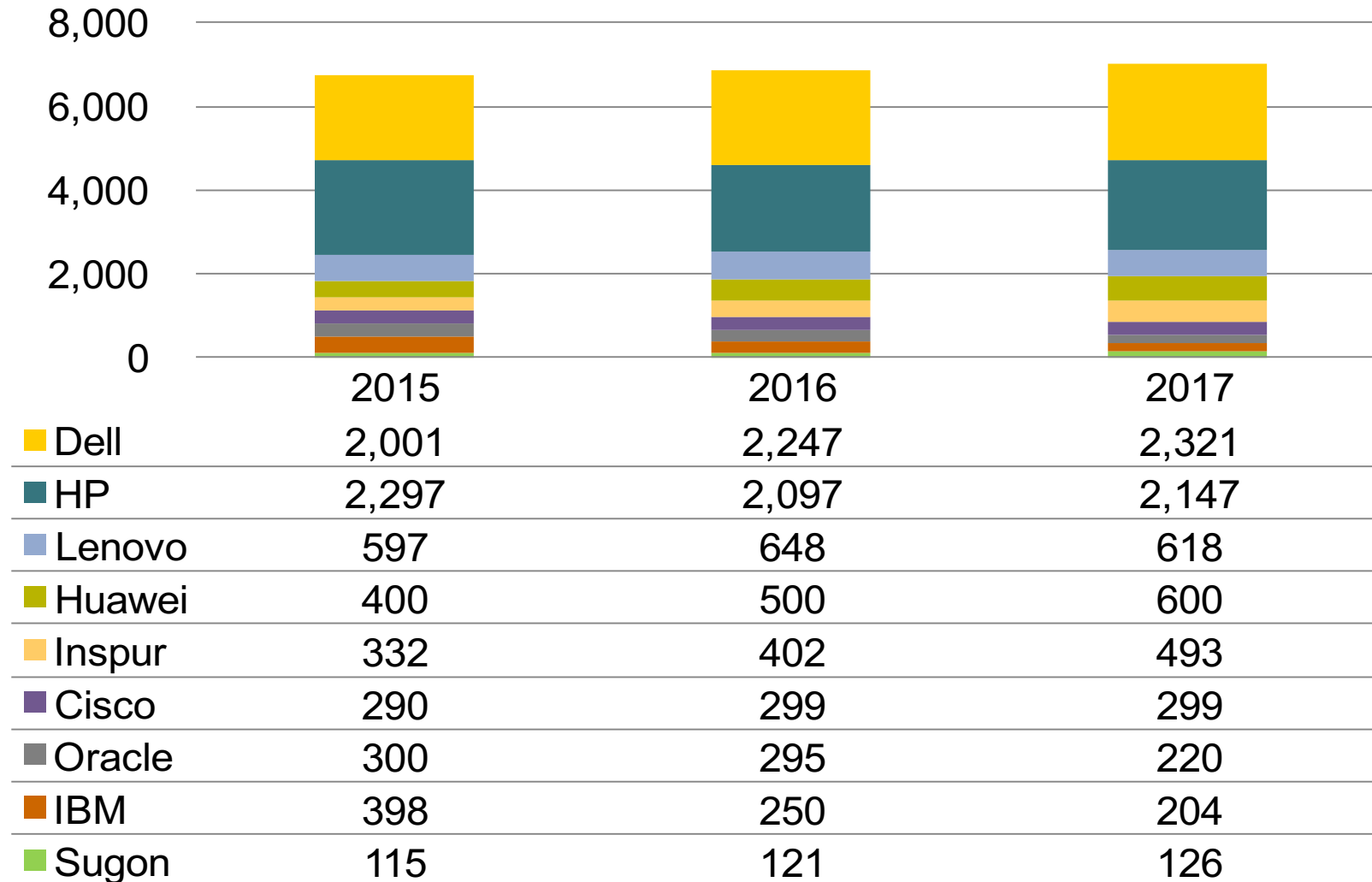
Worldwide Monitor Manufacturer Share



Server Major Player

Unit : K

WW server shipment (OEM)



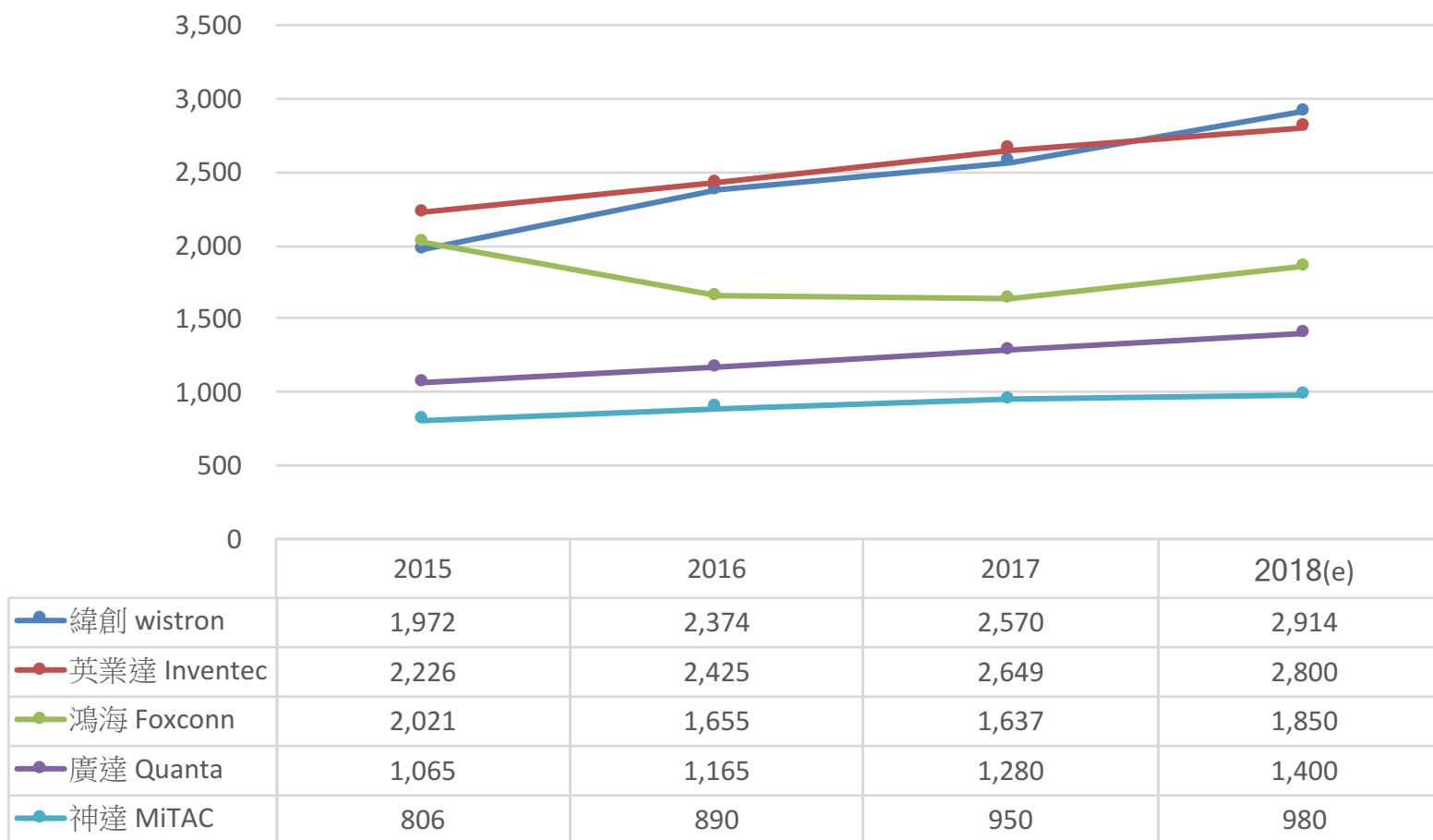
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Server MB TW Major Players v.s. PJ Customers

Unit : K

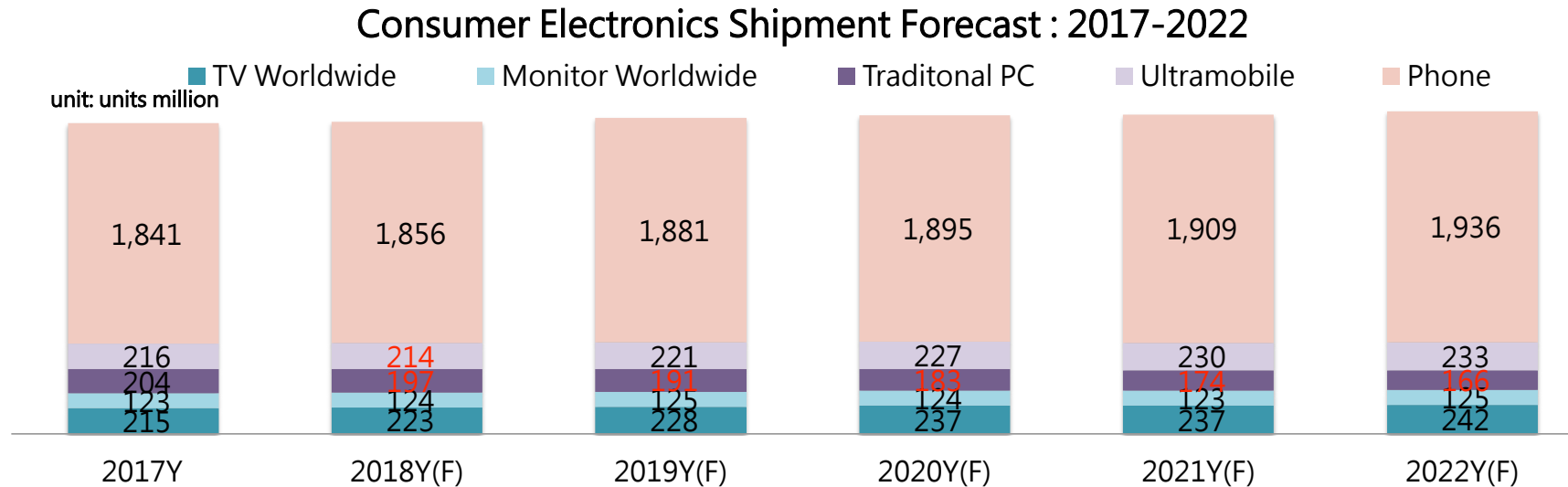
Server MB shipment (EMS)



- The Taiwanese EMSs produce 90% of the server MB

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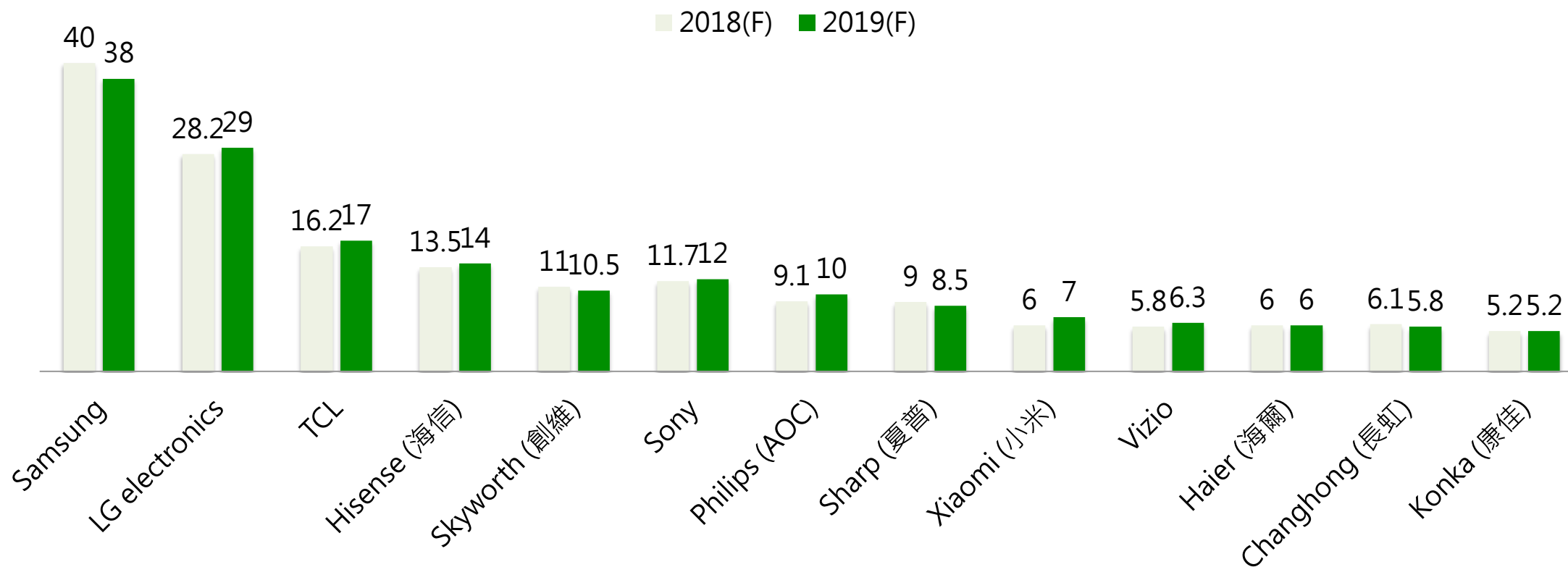
Consumer Electronics Shipment Forecast



- Macro Trends in Consumer Electronics Market
 - Just like as 2018, the shipment of **traditional PC** has be forecasted still decreasing in the future.
 - From 2019 to 2022, the other Consumer Electronics goods, as **TVs NBs and Phone**, which Shipment growth rate just could be one or two percentage.

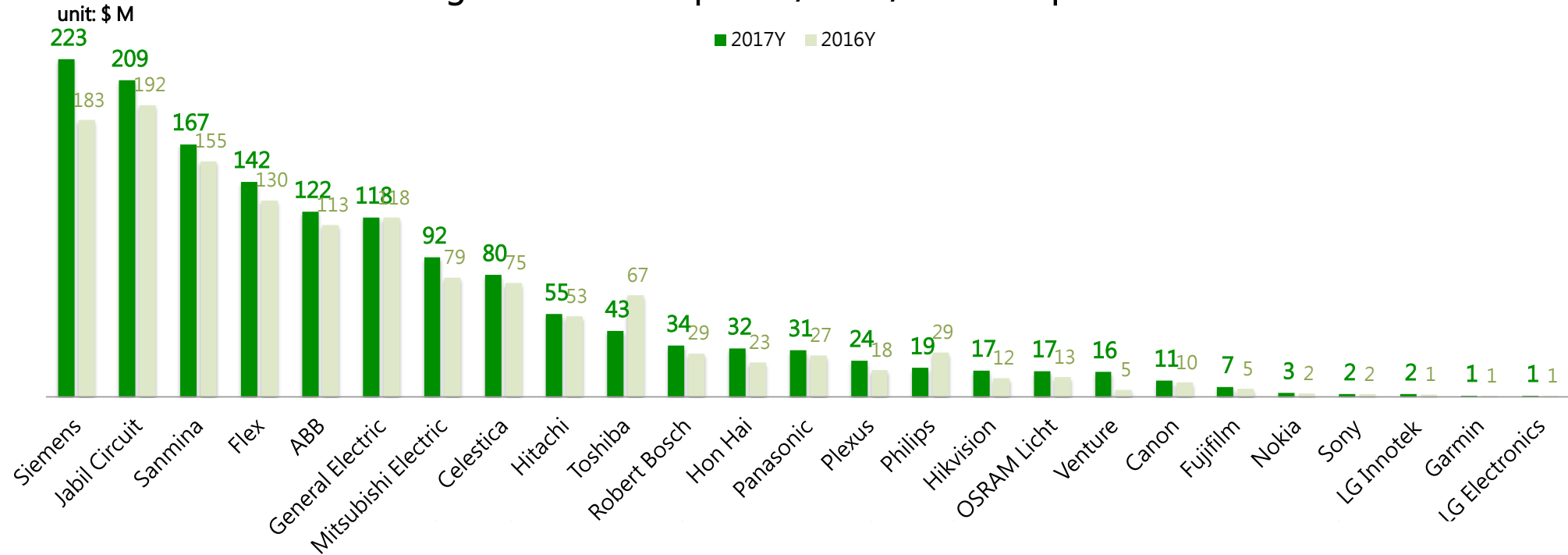
TV shipment forecast by brand: 2018 v.s. 2019 (F)

Unit: Million units

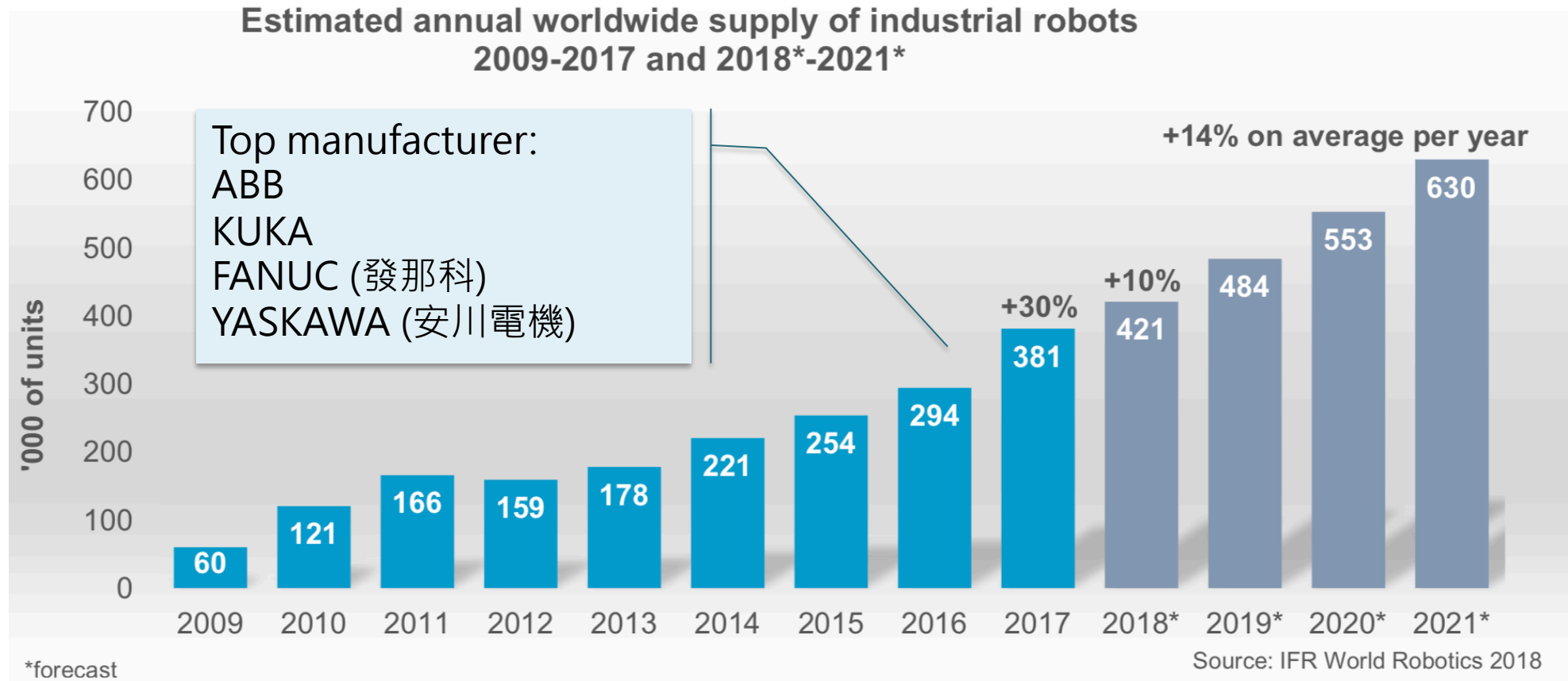


Industrial Electronic

Discrete Purchasing TAM for the Top OEM/ODM/EMS Companies : Industrial Market

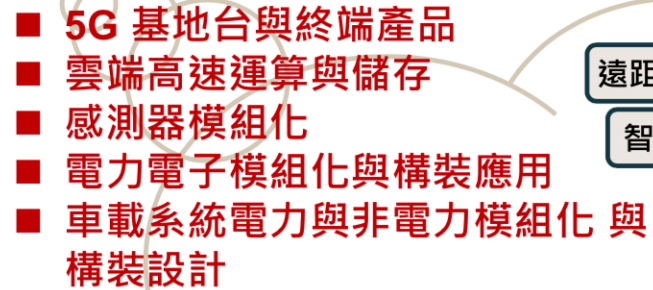


- Review the past two years, PANJIT's existing customers purchased discrete devices applied in industrial do be increasing

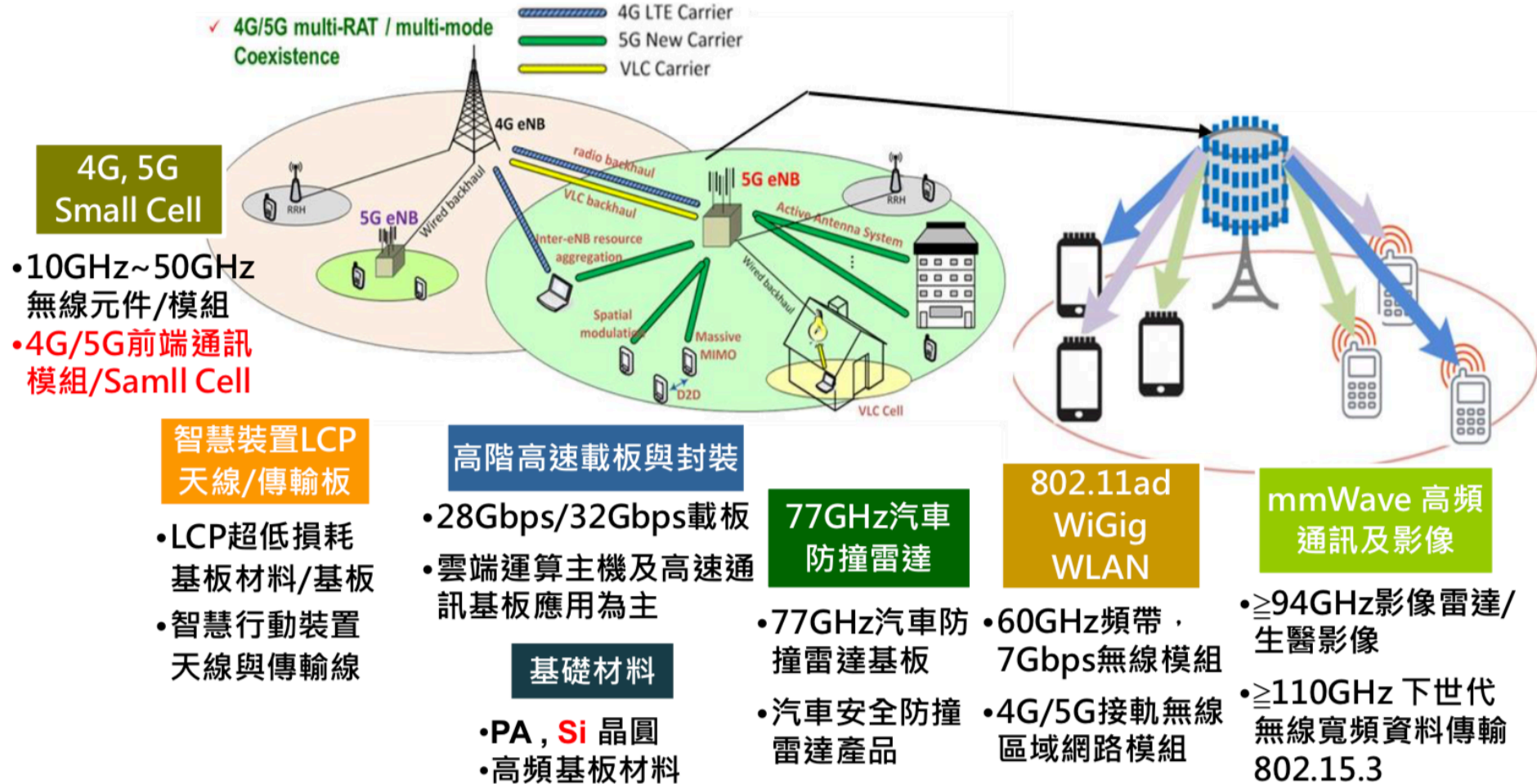


- Industrial Robots will be forecast growth rate more than 14% on average per year.
 - Main drivers of the growth 2017: automotive, electronics, metal

Communication Electronic

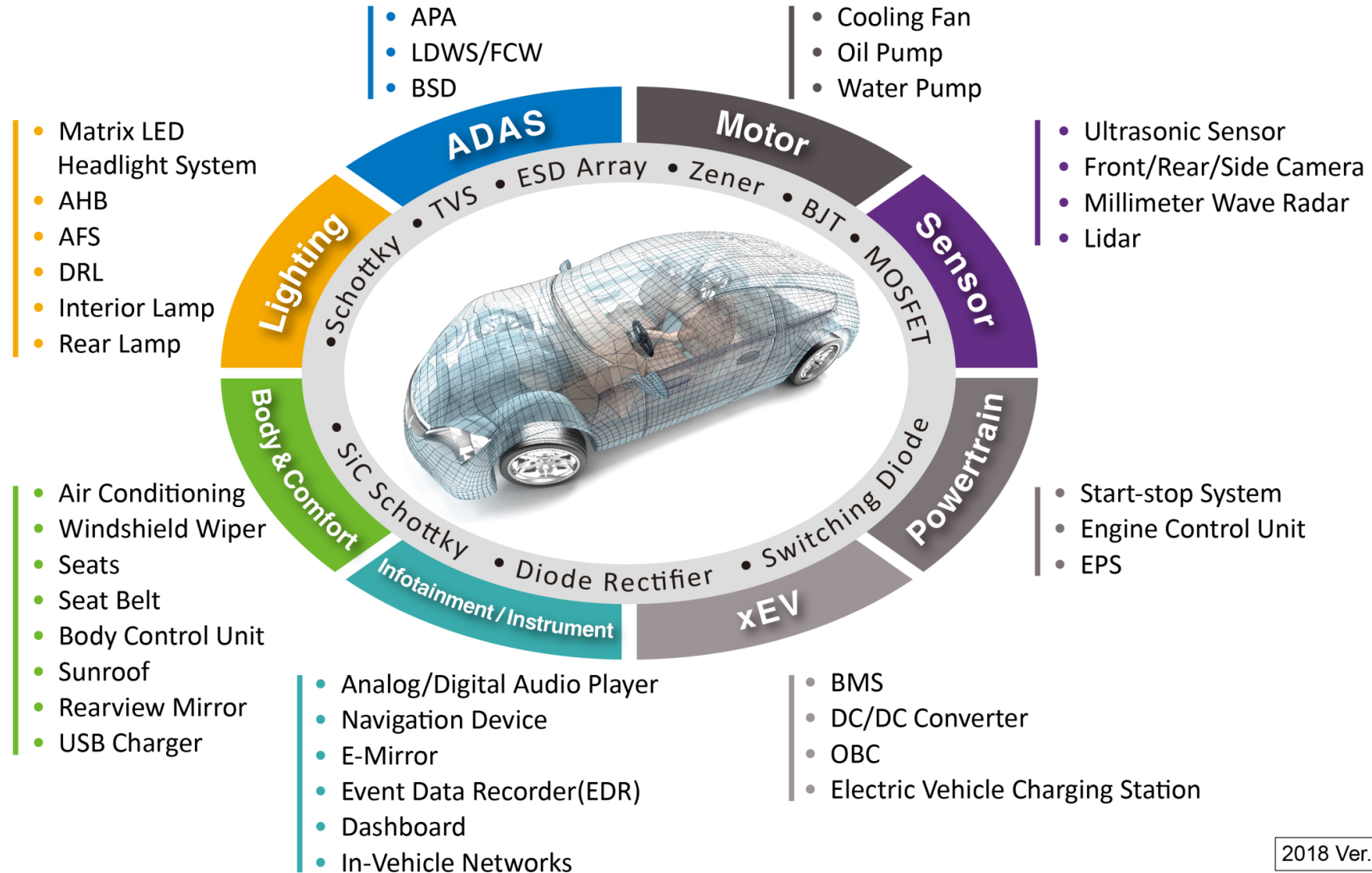


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- As IoT+AI+5G developing, some of the related new design will be more in depend the module, in order to decrease cost and pay layout

Automotive



2018 Ver.2

2015

Analog Cluster



2020

Digital Cluster

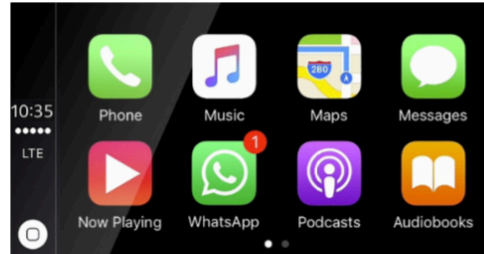


From analog meter to all-digital cluster

AM/FM Radio



Display Audio



From AM/FM radio to connected infotainment

2023

Integrated Digital Cluster and Display Audio



**Integrated cockpit domain controller
powered by single ECU**

- Key Trends in Driver Information
 - **Single integrated ECU** powering all cockpit electronics instead of multiple discrete ECUs

































PANJIT solution:
TVS,
ESD protection
MOSFETs
Schottky

Core Technology Platforms

- Automotive **Infotainment Product** and Technology Strategy
 - All-digital display-based instrument clusters replace traditional analog clusters
 - Software platforms enable broadest product portfolio in automotive electronics

IGBT

IGBT Manufacturers Ranking by Voltage Range

	No.1	No.2	No.3	No.4	No.5	PANJIT
400V and Less			 Leading Innovation >>>	 life.augmented	 SEMICONDUCTOR	
600-650V					 life.augmented	PKB15N60C PKP15N60C PKZ15N60C PKZ160N65F
1200V					 life.augmented	PKZ25N120N PKZ50N120F PKZ25N120C PHZ20N135F
1700V						
2500V-3300V						
4500V and More						

- The IGBT device industry is about to change. With a growing electric vehicle market, the power module is becoming an essentials of the value chain. After 2013, the Chinese market accounts for about one third of the global IGBT market, and the Chinese market is the key target for Panjit's future development.

China IGBT Market Ranking

China Total IGBT - Based Module Supplier Market Share Estimates (US \$ Revenue)				
2015 Rank	Manufacturer	2014 Share	2015 Share	Change
1	Infineon Technologies*	29.2%	23.4%	-5.8%
2	Mitsubishi(inc. Powerex)	19.9%	19.0%	-0.9%
3	Fuji Electric	13.2%	15.5%	2.3%
4	Semikron	9.3%	11.8%	2.5%
5	Starpower Semiconductor	4.5%	4.5%	0.1%
6	On Semiconductor	4.7%	4.4%	-0.3%
7	ABB Semiconductors	2.6%	3.9%	1.4%
8	Vincotech	2.5%	3.9%	1.4%
9	IXYS	1.5%	1.8%	0.3%
10	CRRC Times Electric (inc. Dynex)***	0.4%	1.6%	1.2%
11	Fairchild Semiconductor	1.2%	1.3%	0.1%
12	Hitachi	0.2%	1.1%	0.9%
13	Danfoss	0.7%	1.0%	0.3%
	International Rectifier*	2.2%	N/A	N/A
	LS Power Semitech**	1.1%	N/A	N/A
	Others	7.0%	6.8%	-0.2%
Total Market Size =		\$ 1,082.9 m	\$ 962.5 m	-11.1%

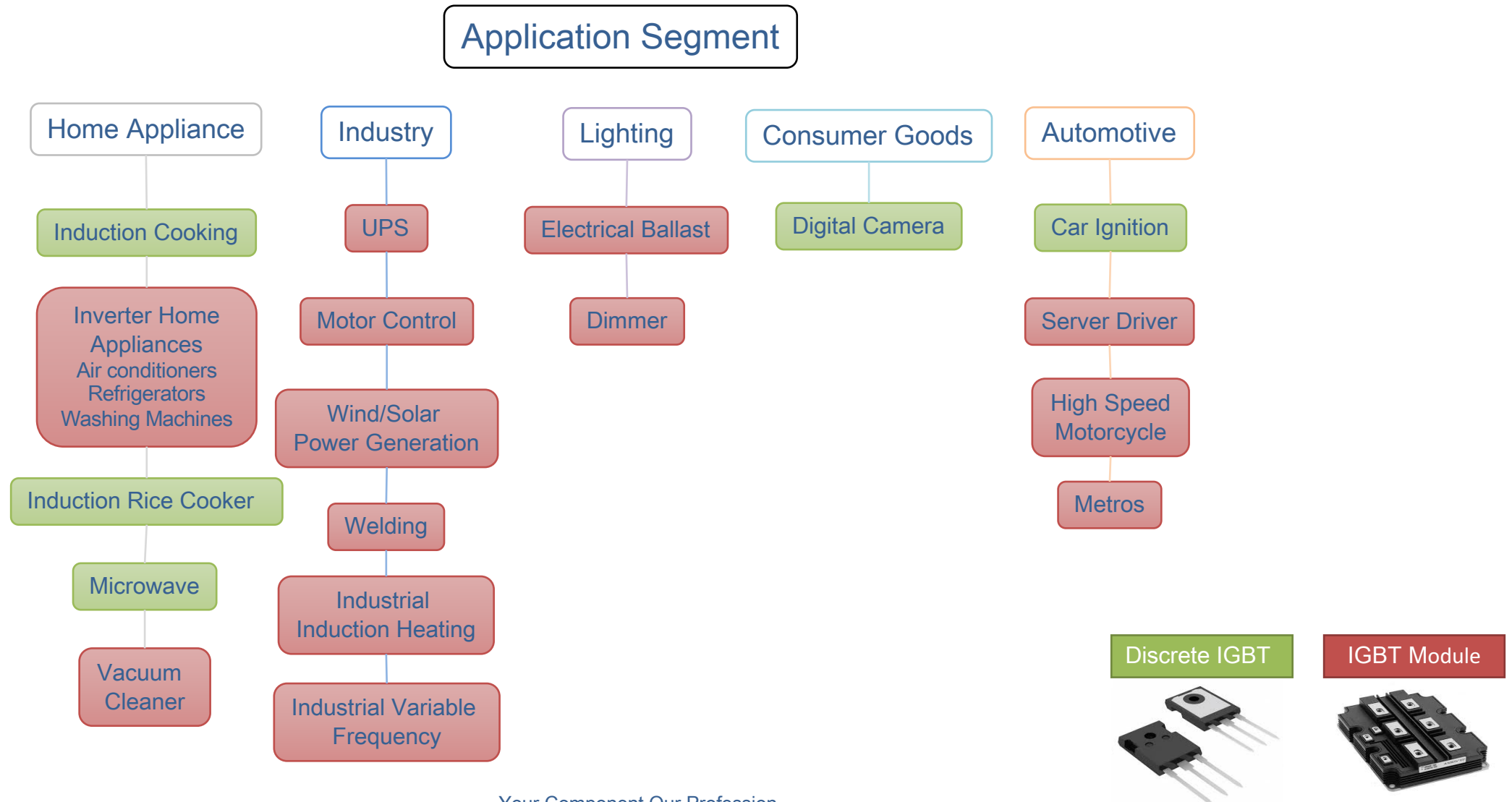
Notes

* Infineon Technologies acquired International Rectifier in Jan 2015. Both companies are reported separately in 2014 and combined as Infineon in 2015

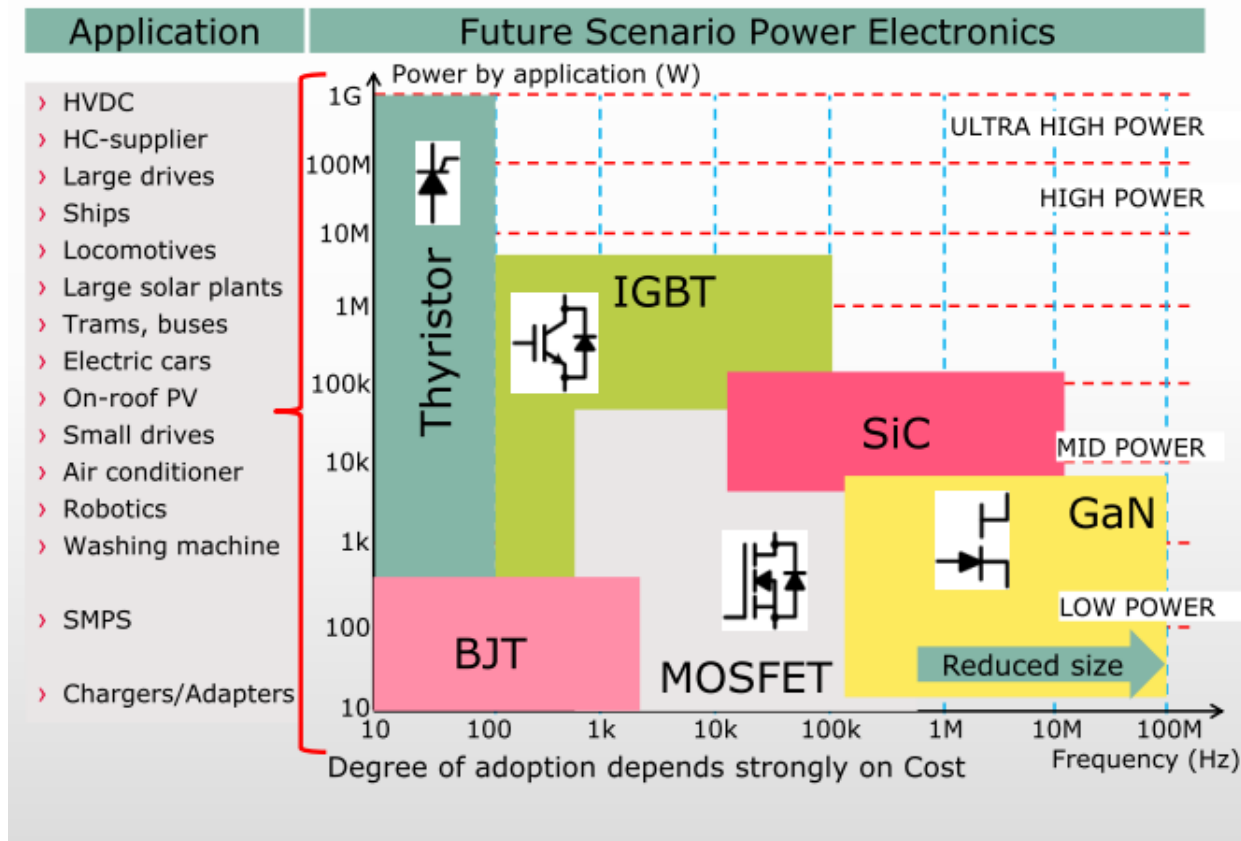
** Infineon also took a controlling interest in former JV company LS Power Semitech part way through 2014

*** Zhuzhou CSR Times Electric Co., Ltd (the owners of Dynes Semiconductor Ltd.) and China CNR Corporation Merged in June 2015 to form Zhuzhou CRRC Times Electric Co., Ltd
r= revised since 2015 edition

Source: IHS



Major Product Development Trends & Future Applications



Report covers

- IGBTs
- MOSFETs
- GaN
- SiC
- Controllers
- Passives

Detailed discussion of

- Market Drivers
- Key Metrics
- Trends
- Challenges



Thank you