

強茂 集團

Investor Relations Presentation

PAN JIT
SEMI
CONDUCTOR

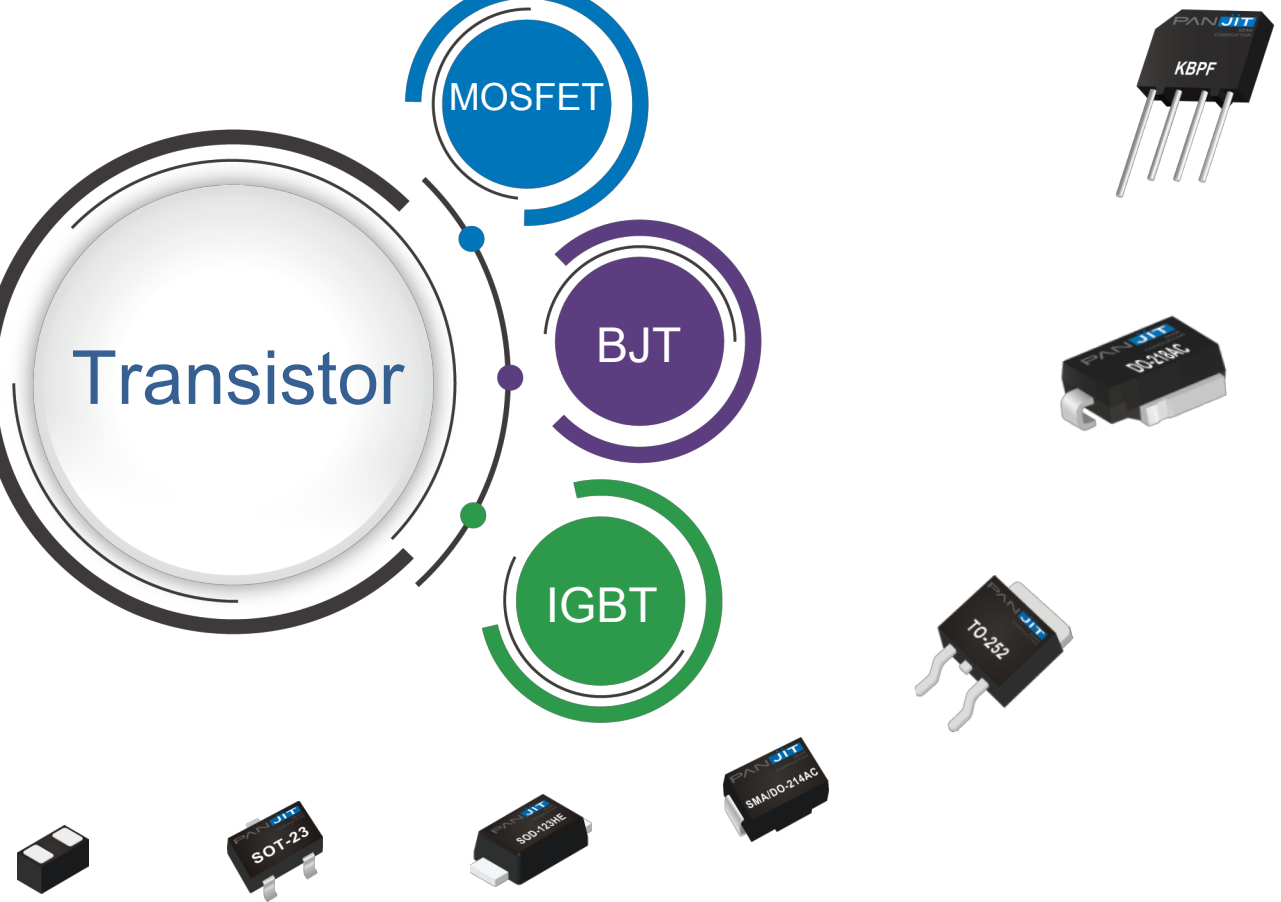
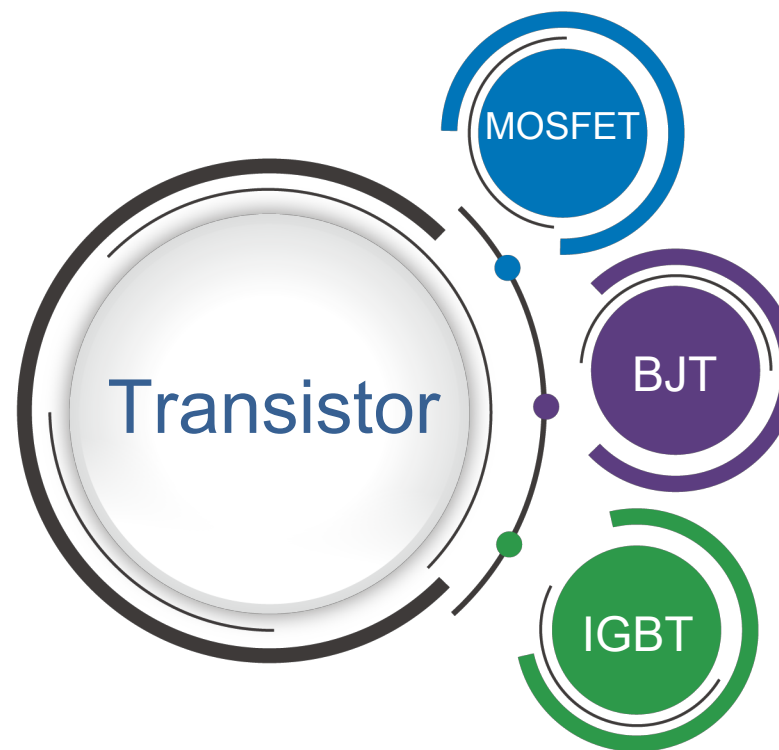
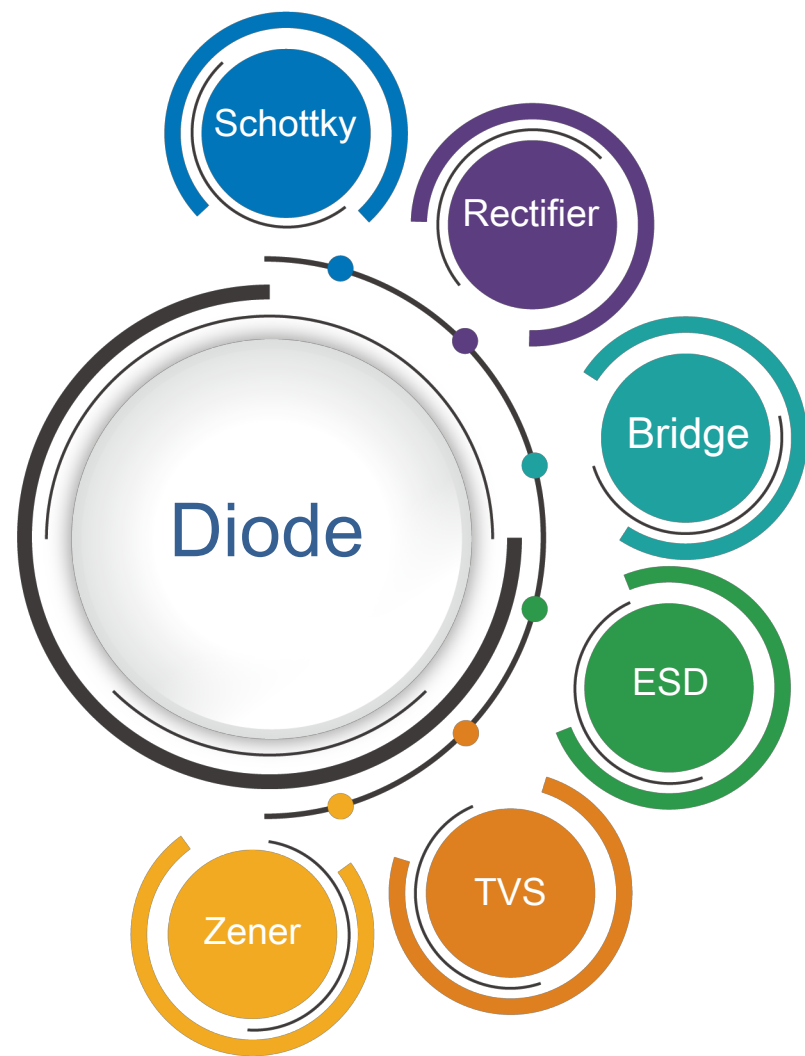
Chief Strategy Officer

Jasper Lee

Dec 2018

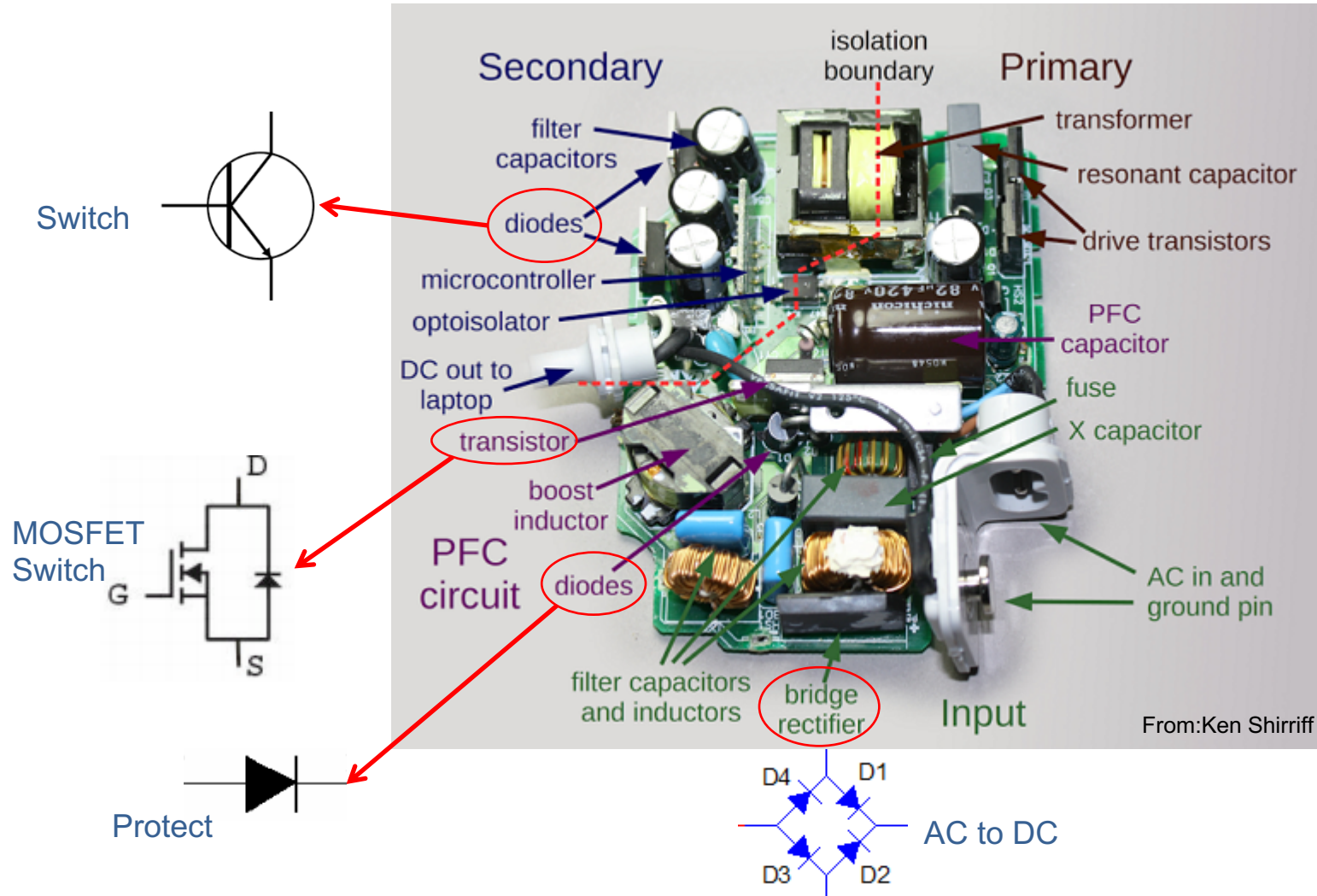
- 關於強茂
- 全球分離器件
- 消費性應用
- 工業應用
- 通訊應用
- 汽車應用
- IGBT





Your Component Our Profession

分離器件在哪？



Your Component Our Profession



Your Component Our Profession

PANJIT GROUP



強茂股份有限公司
PANJIT
成立：1986.5
營業項目：
功率式元件、封裝測試



環茂科技股份有限公司
PYNMAX
成立：2000.3
營業項目：
晶圓製造



無錫至極動能科技有限公司
Sumnergy
成立：2017.6
營業項目：
電池管理系統，電池組



📍 總部 Headquarters 📍 業務據點 Sales Office

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 前端晶圓  後端封測

Your Component Our Profession

全球二極體排名

No.	2016		2017	
	1	Vishay	10%	Vishay
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

全球分離式器件排名

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

全球分離器件

汽車應用



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

工業應用



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

新能源



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

消費性電子



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

通訊



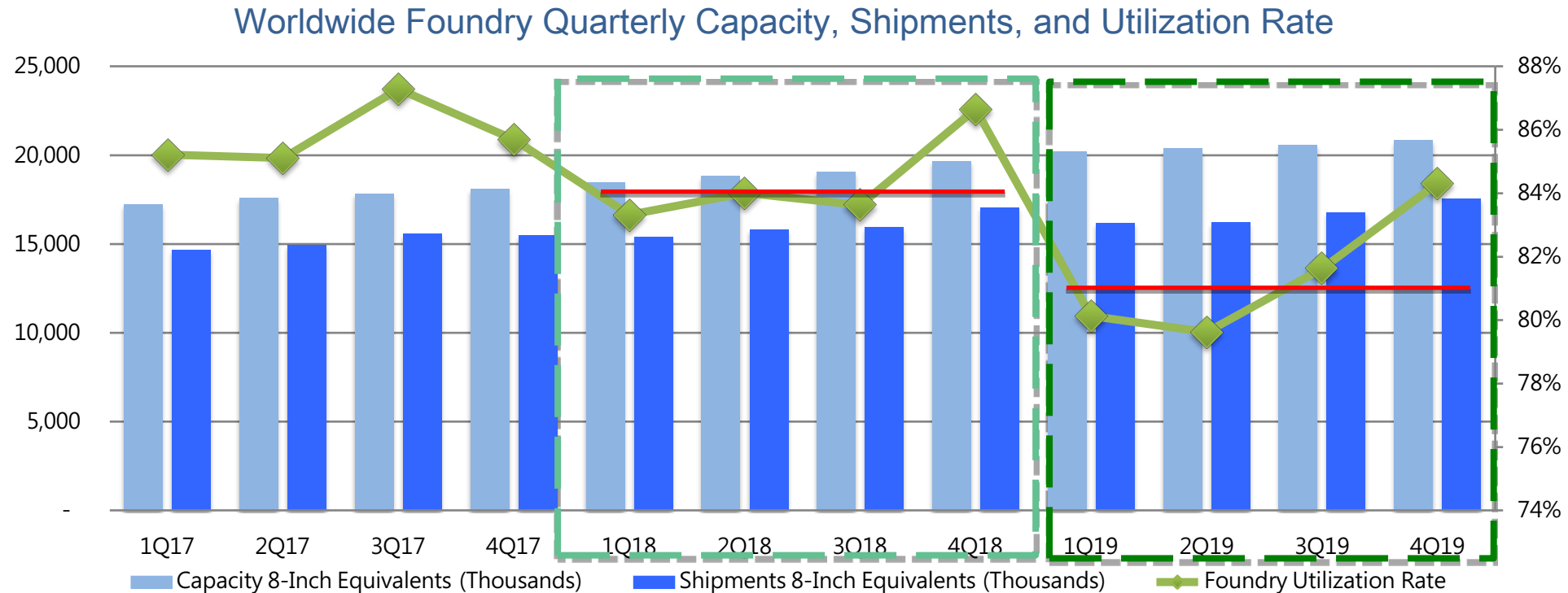
- Networking
- PoE
- VOIP
- Infrastructure

電腦



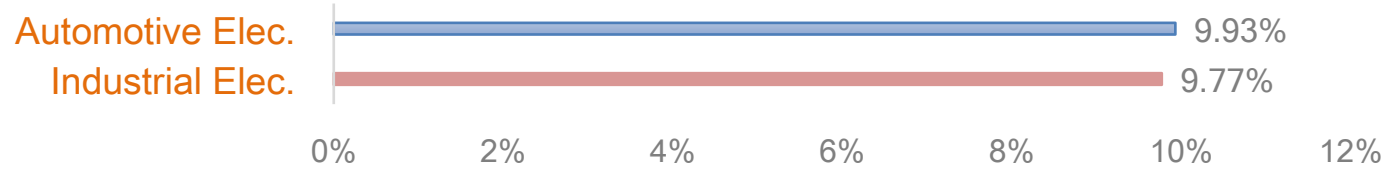
- Desktop PC
- Notebook PC
- Tablet
- Graphic Cards

WW Foundry Quarterly Capacity, Shipments and Utilization Rate

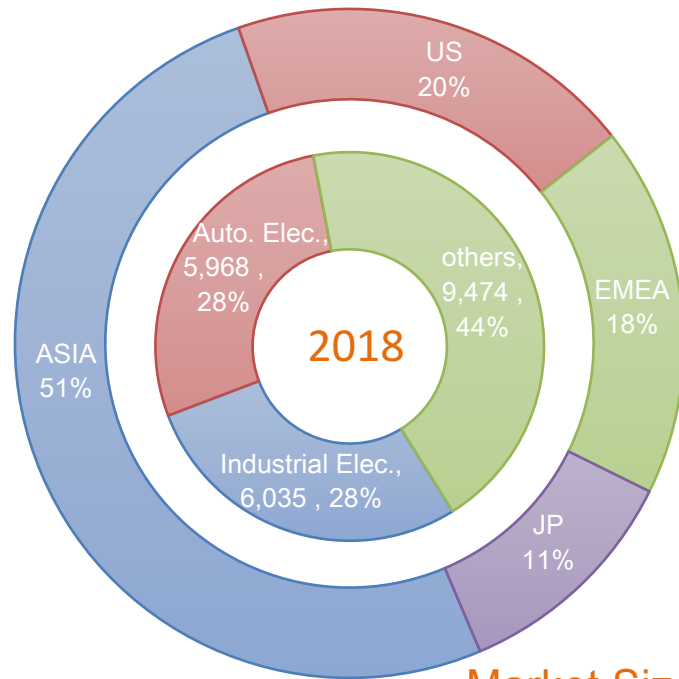


In 2019, the Worldwide Foundry 8-Inch capacity will be 82 million pcs (2019 YoY : 8%).

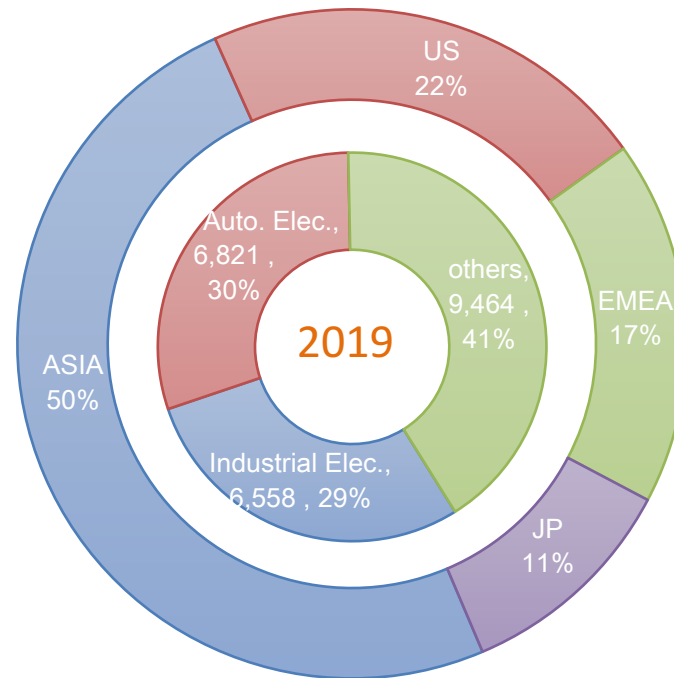
2017-2022 CAGRS



Unit: M' USD



Market Size : 21,477



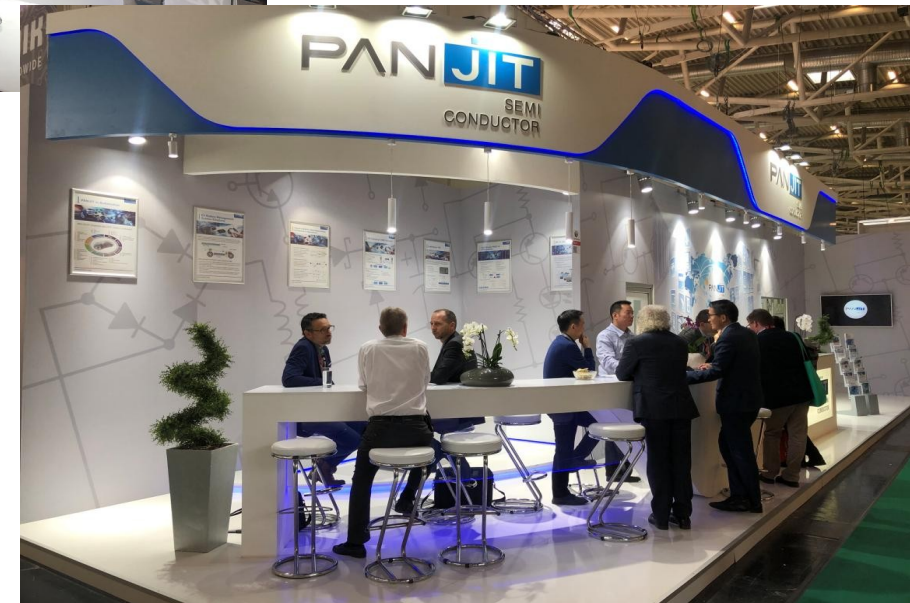
Market Size:22,838

- 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



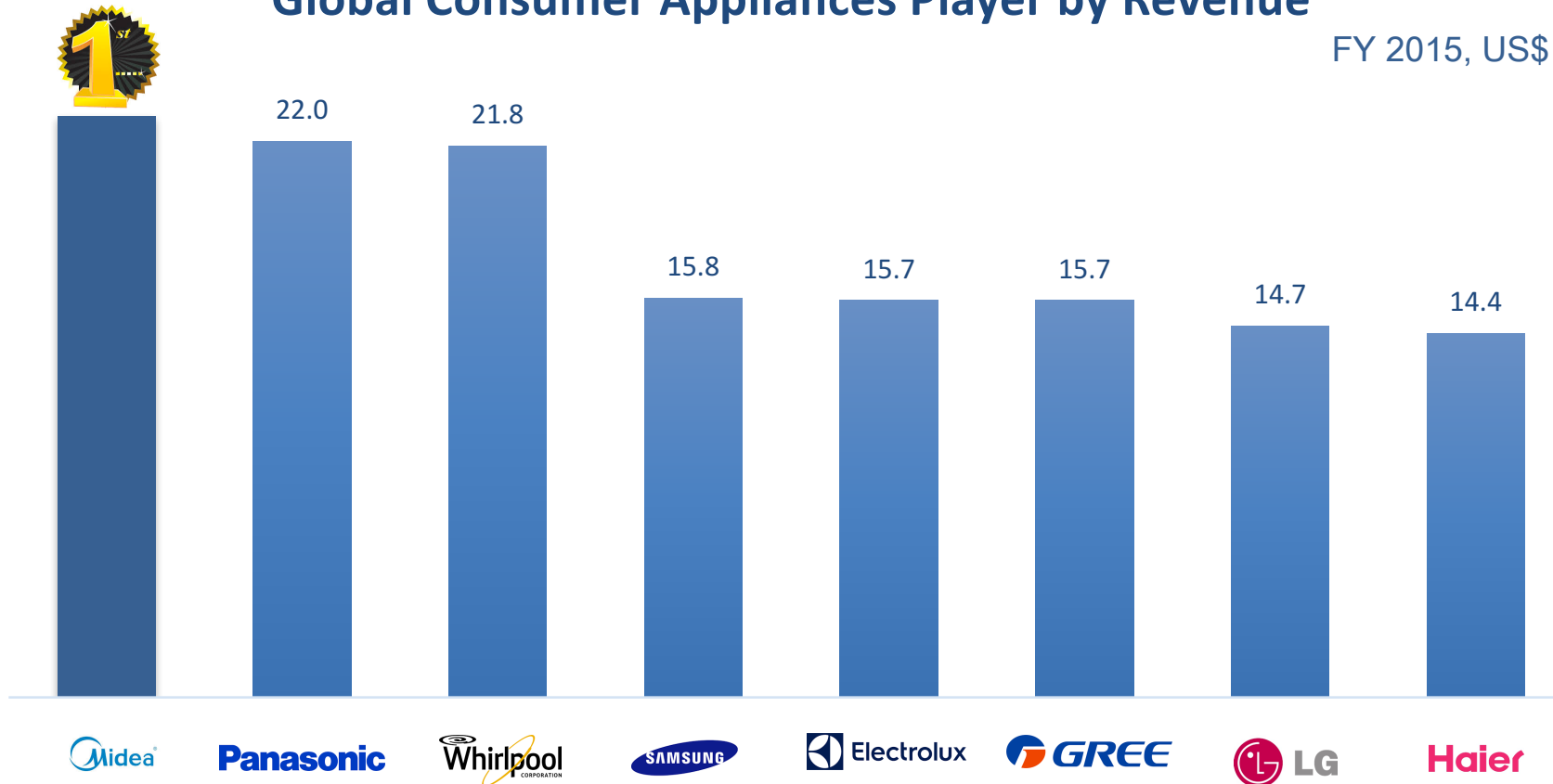
Location : New Munich fair Center, Germany
Munich Electronica founded 1964,
the largest electronic component exhibition biennial

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

消費性應用

Global Consumer Appliances Player by Revenue

FY 2015, US\$ Bn

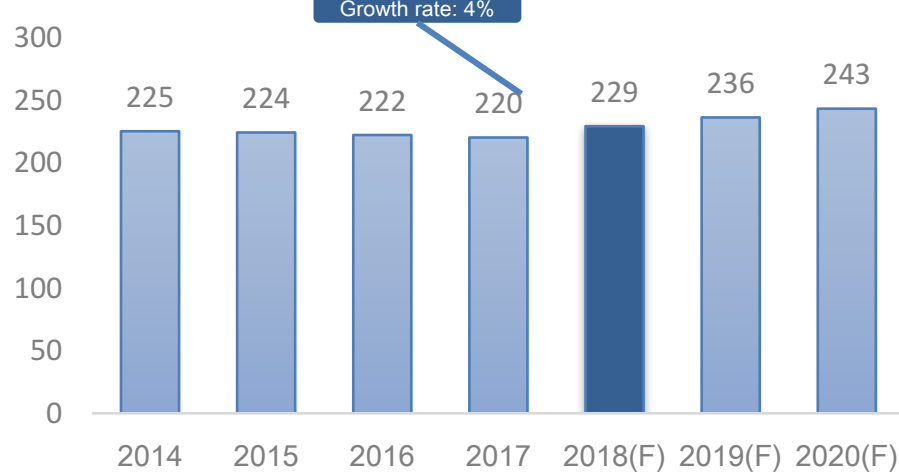


- The market for major household appliances is expected to reach \$28.1 billion by 2021. (Home Improvement Research Institute)

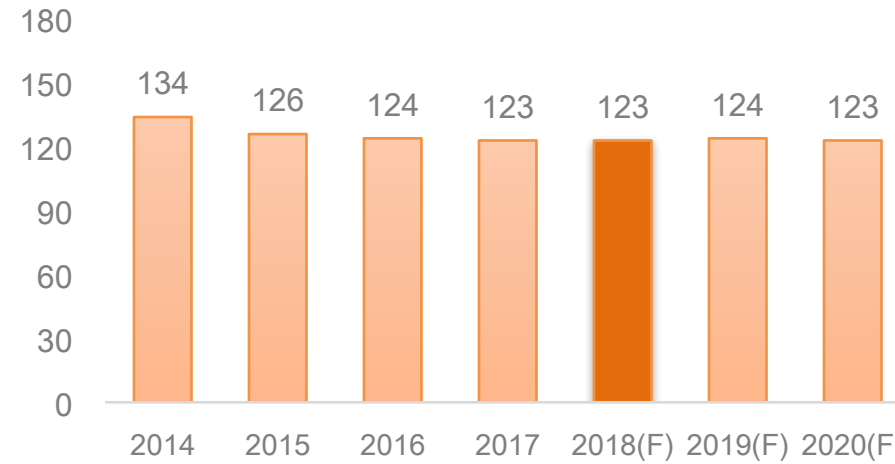
面板在2018的成長

Panel - 4% Growth in 2018

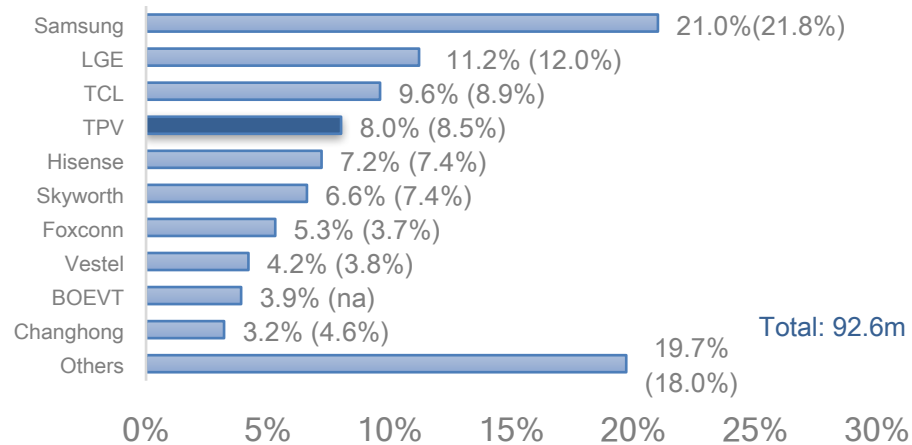
TV Global Shipment Forecast (Units M)



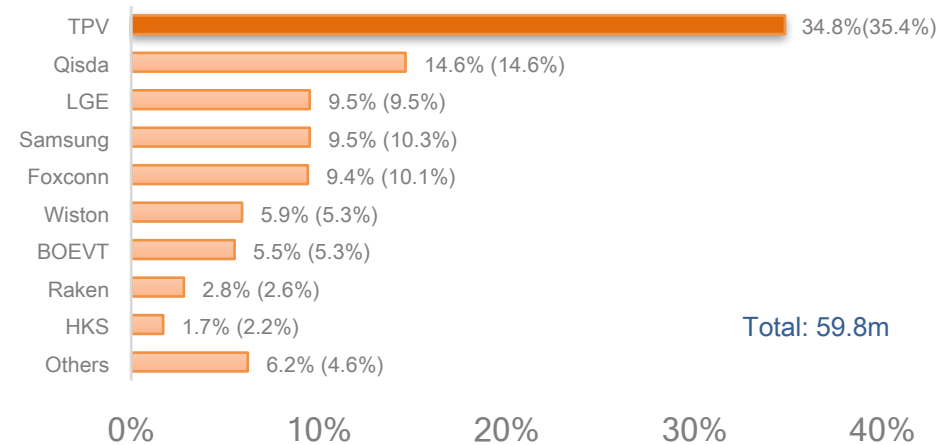
Monitor Global Shipment Forecast (Units M)



Worldwide LCD TV Manufacturer Share

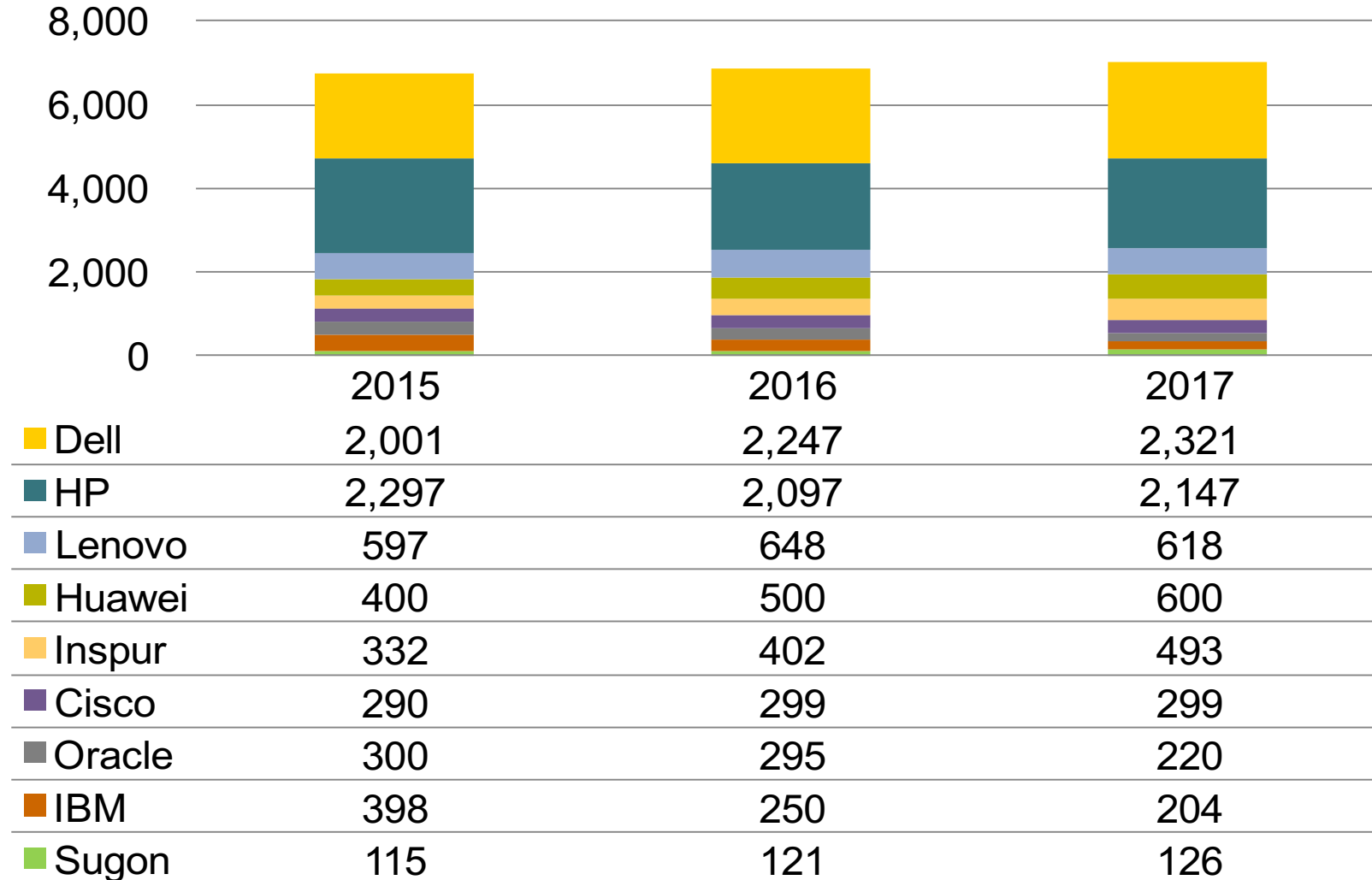


Worldwide Monitor Manufacturer Share



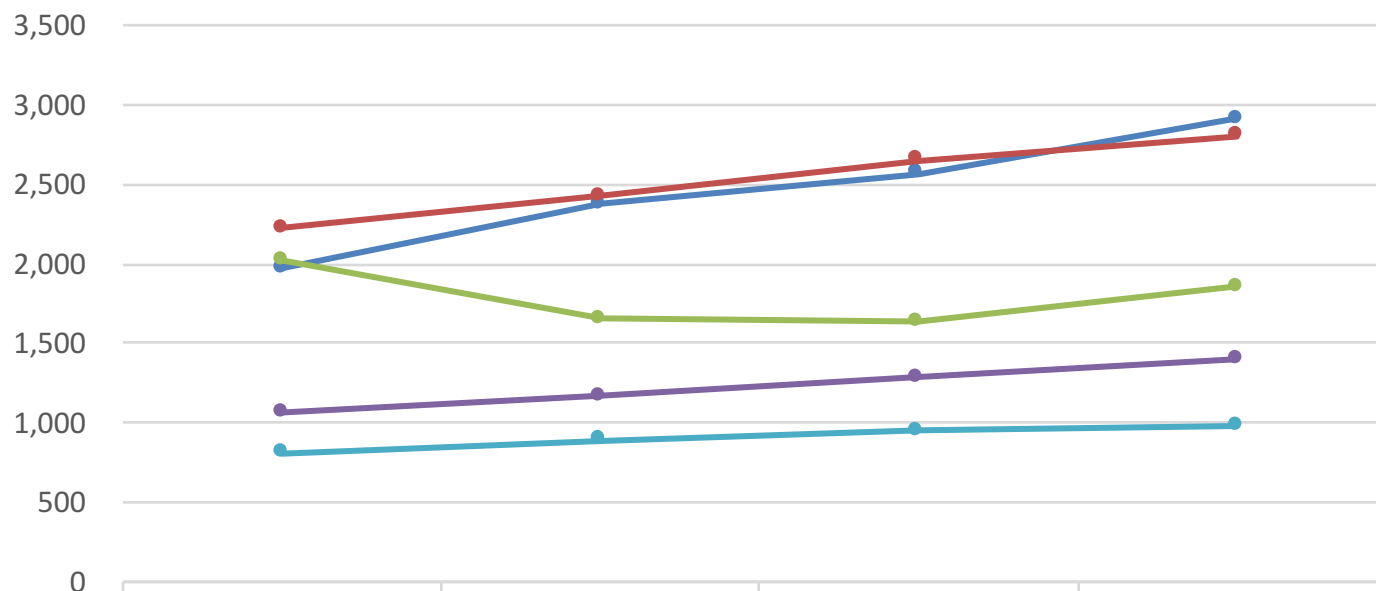
Unit : K

WW server shipment (OEM)



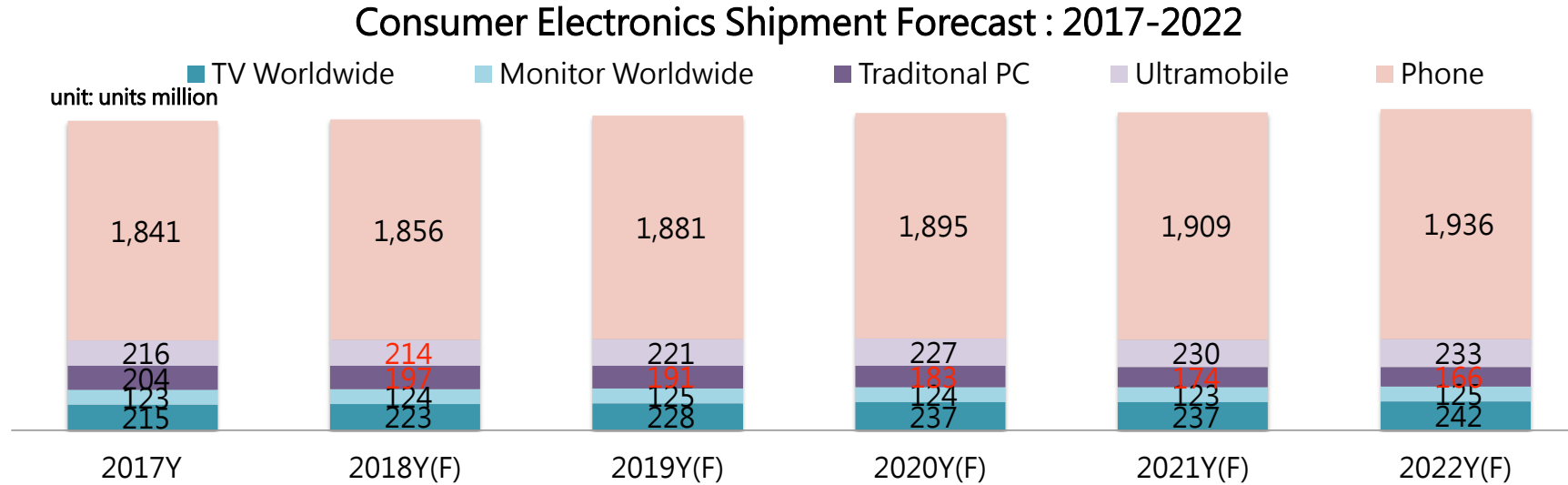
Unit : K

Server MB shipment (EMS)



	2015	2016	2017	2018(e)
緯創 wistron	1,972	2,374	2,570	2,914
英業達 Inventec	2,226	2,425	2,649	2,800
鴻海 Foxconn	2,021	1,655	1,637	1,850
廣達 Quanta	1,065	1,165	1,280	1,400
神達 MiTAC	806	890	950	980

- The Taiwanese EMSs produce 90% of the server MB

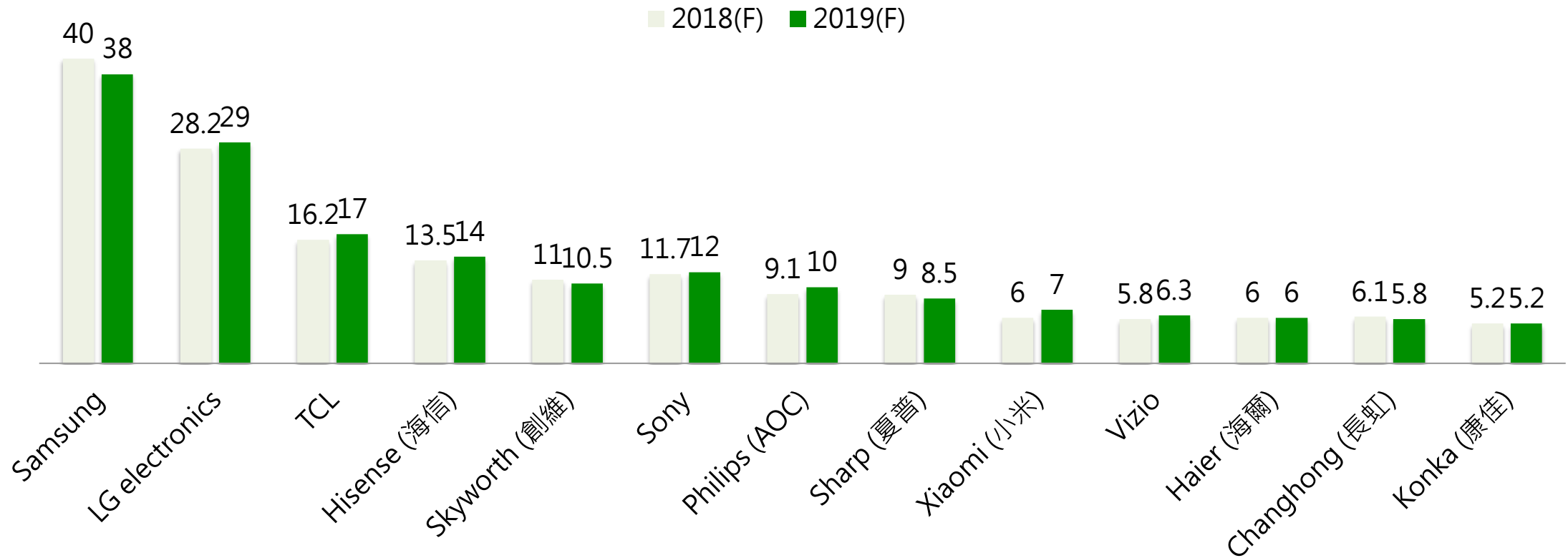


- Macro Trends in Consumer Electronics Market

- 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.

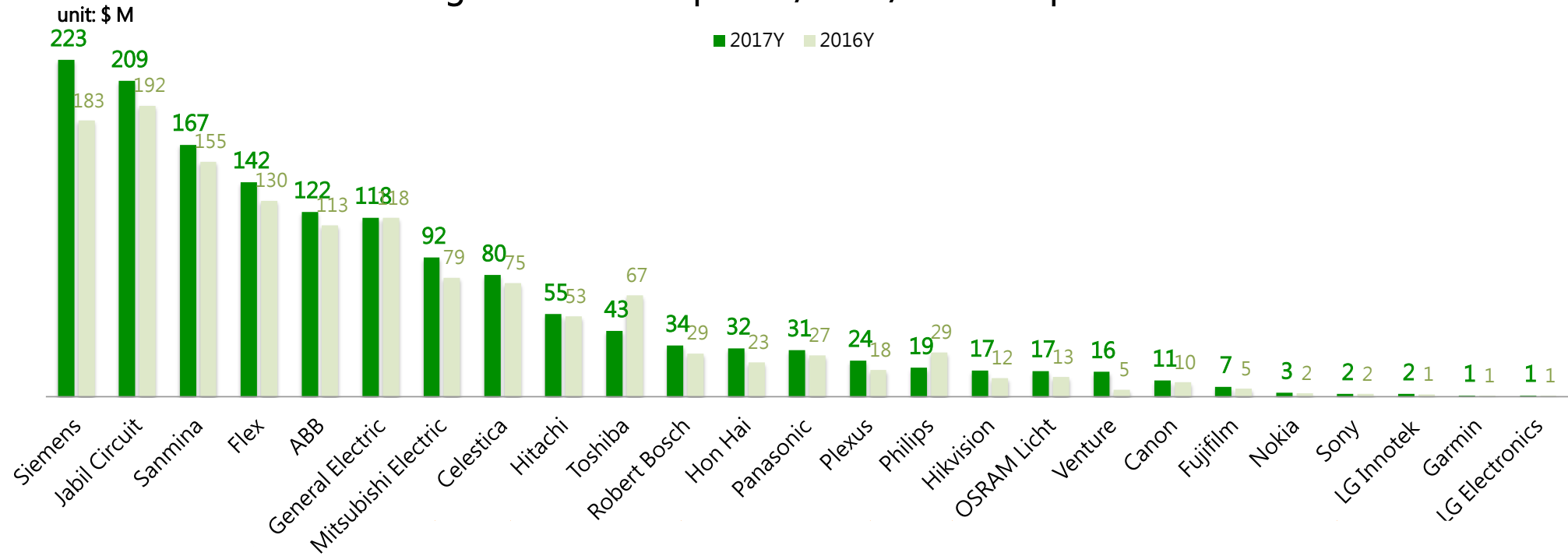
電視出貨量預測: 2018 v.s. 2019 (F)

Unit: Million units

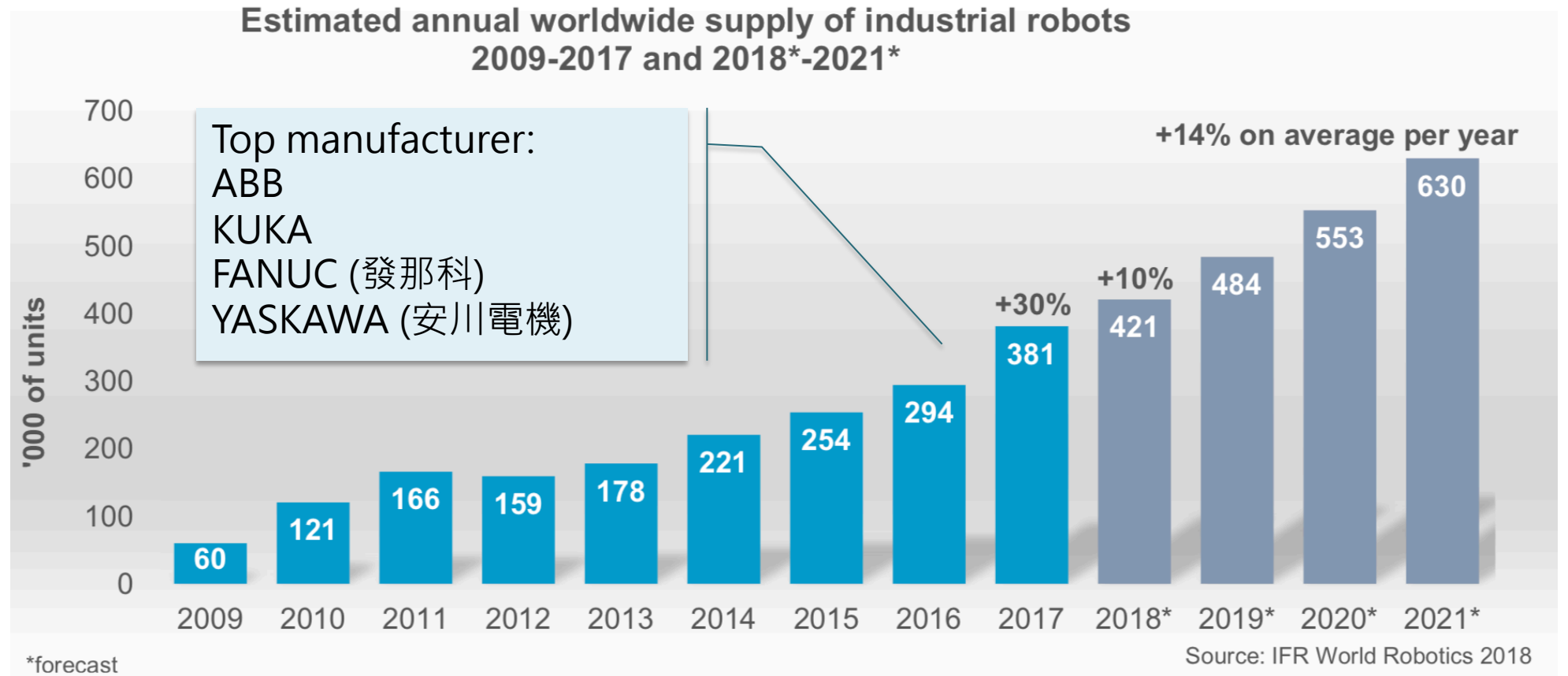


工業應用

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



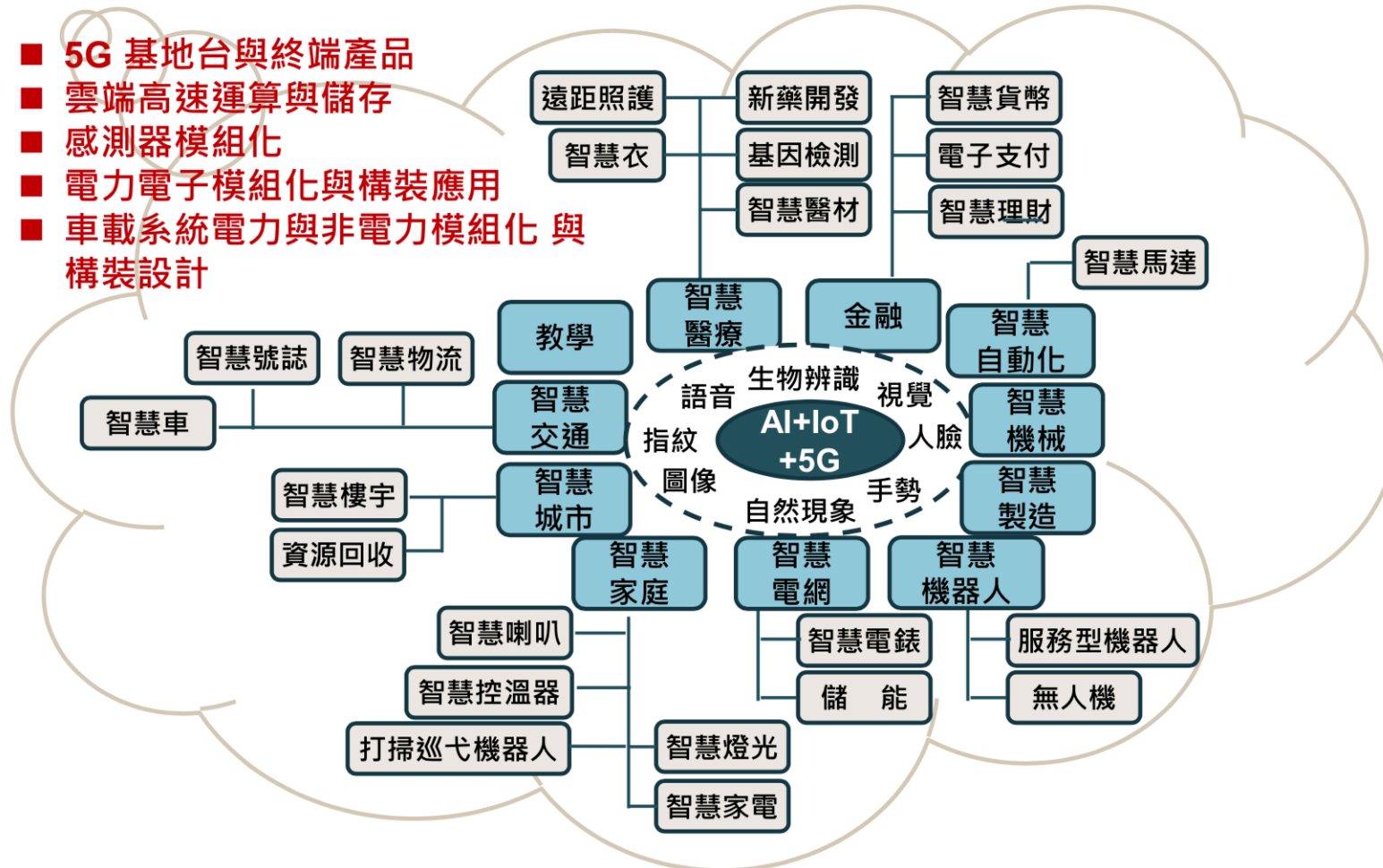
- Review the past two years, PANJIT's existing customers purchased discrete device applied on industrial do be increasing



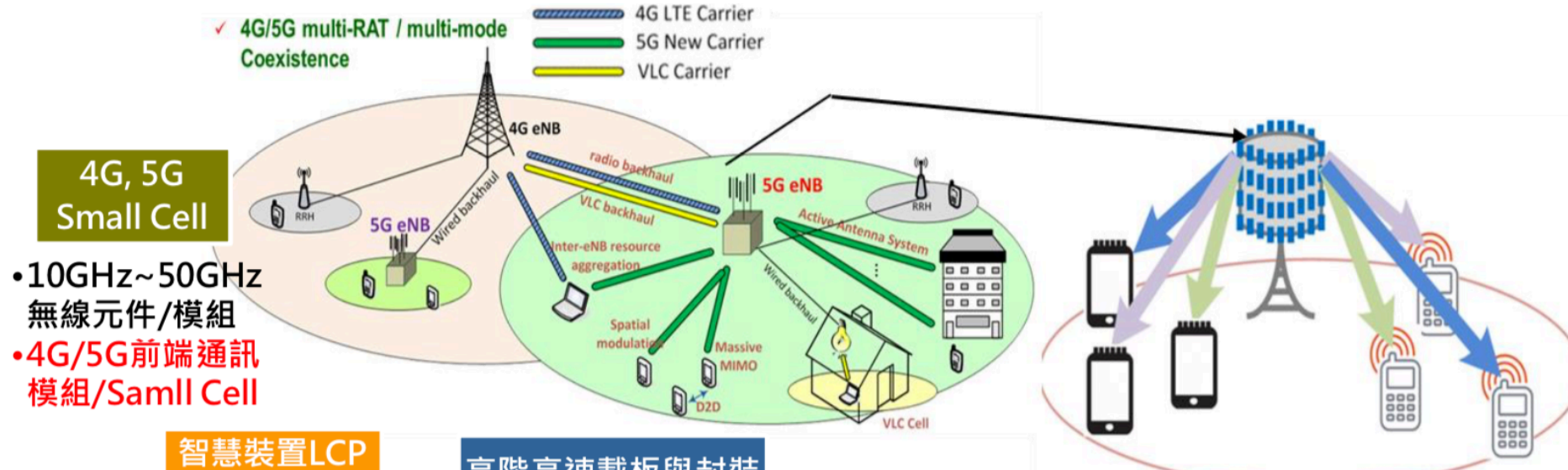
- Industrial Robots will be forecast growth rate more than 14% on average per year.
 - Main drivers of the growth 2017: automotive, electronics, metal

通訊應用

- 5G 基地台與終端產品
- 雲端高速運算與儲存
- 感測器模組化
- 電力電子模組化與構裝應用
- 車載系統電力與非電力模組化 與 構裝設計



- Through IoT, there are more and more the application field of AI connect 5G



**4G, 5G
Small Cell**

- 10GHz~50GHz 無線元件/模組
- 4G/5G前端通訊 模組/Small Cell

**智慧裝置LCP
天線/傳輸板**

- LCP超低損耗 基板材料/基板
- 智慧行動裝置 天線與傳輸線

高階高速載板與封裝

- 28Gbps/32Gbps載板
- 雲端運算主機及高速通訊基板應用為主

基礎材料

- PA, Si 晶圓
- 高頻基板材料

**77GHz汽車
防撞雷達**

- 77GHz汽車防撞雷達基板
- 汽車安全防撞雷達產品

**802.11ad
WiGig
WLAN**

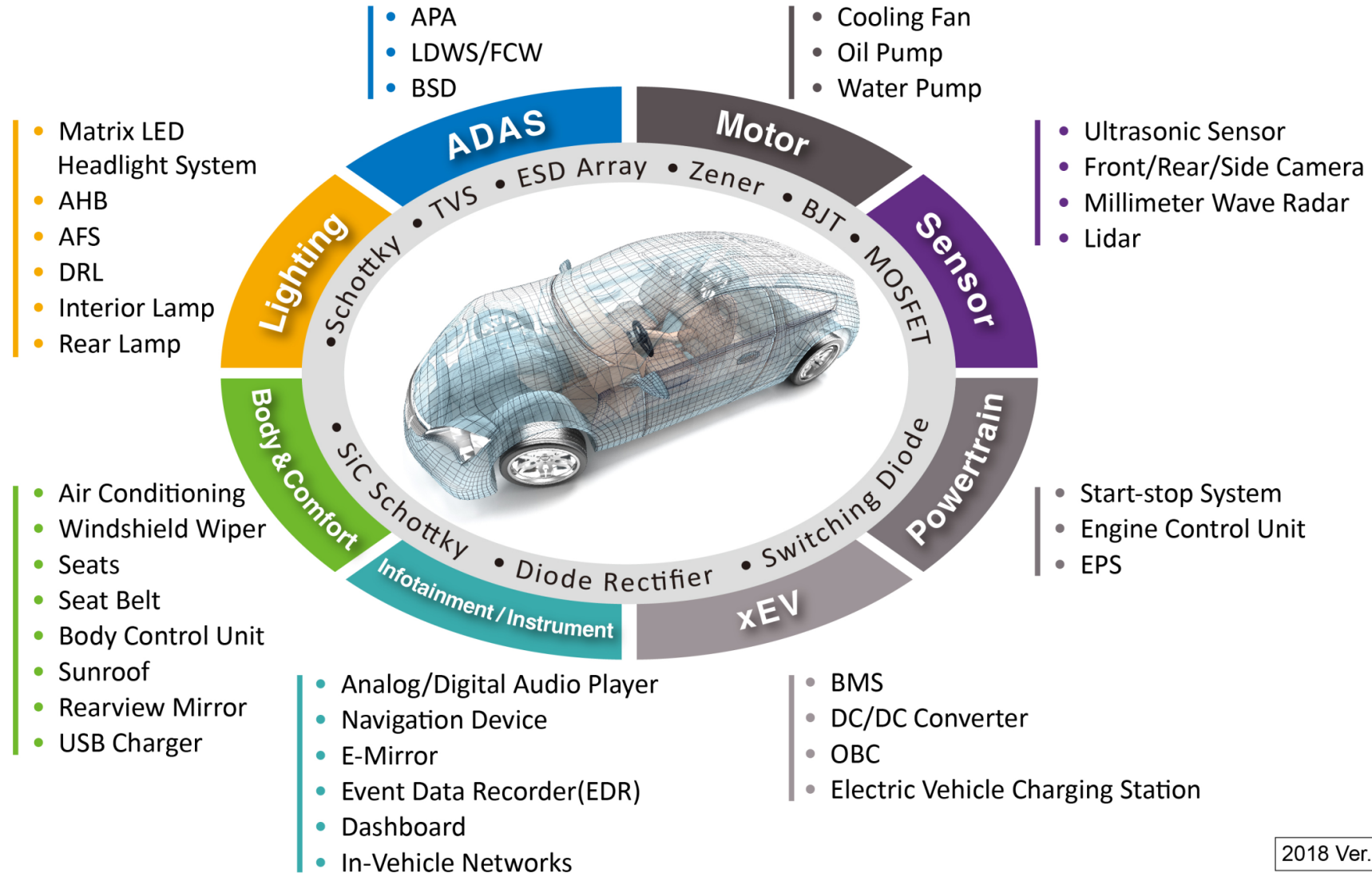
- 60GHz頻帶, 7Gbps無線模組
- 4G/5G接軌無線區域網路模組

**mmWave 高頻
通訊及影像**

- ≥ 94 GHz影像雷達/生醫影像
- ≥ 110 GHz 下世代無線寬頻資料傳輸 802.15.3

- 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

汽車應用



2018 Ver.2

2015

Analog Cluster



From analog meter to all-digital cluster

AM/FM Radio



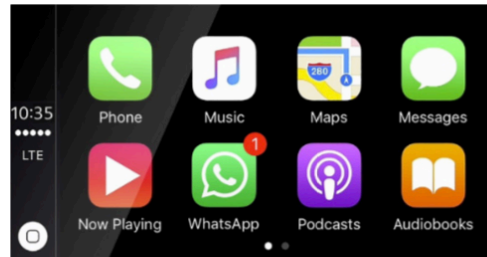
From AM/FM radio to connected infotainment

2020

Digital Cluster



Display Audio



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					 中国中车	

- 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 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

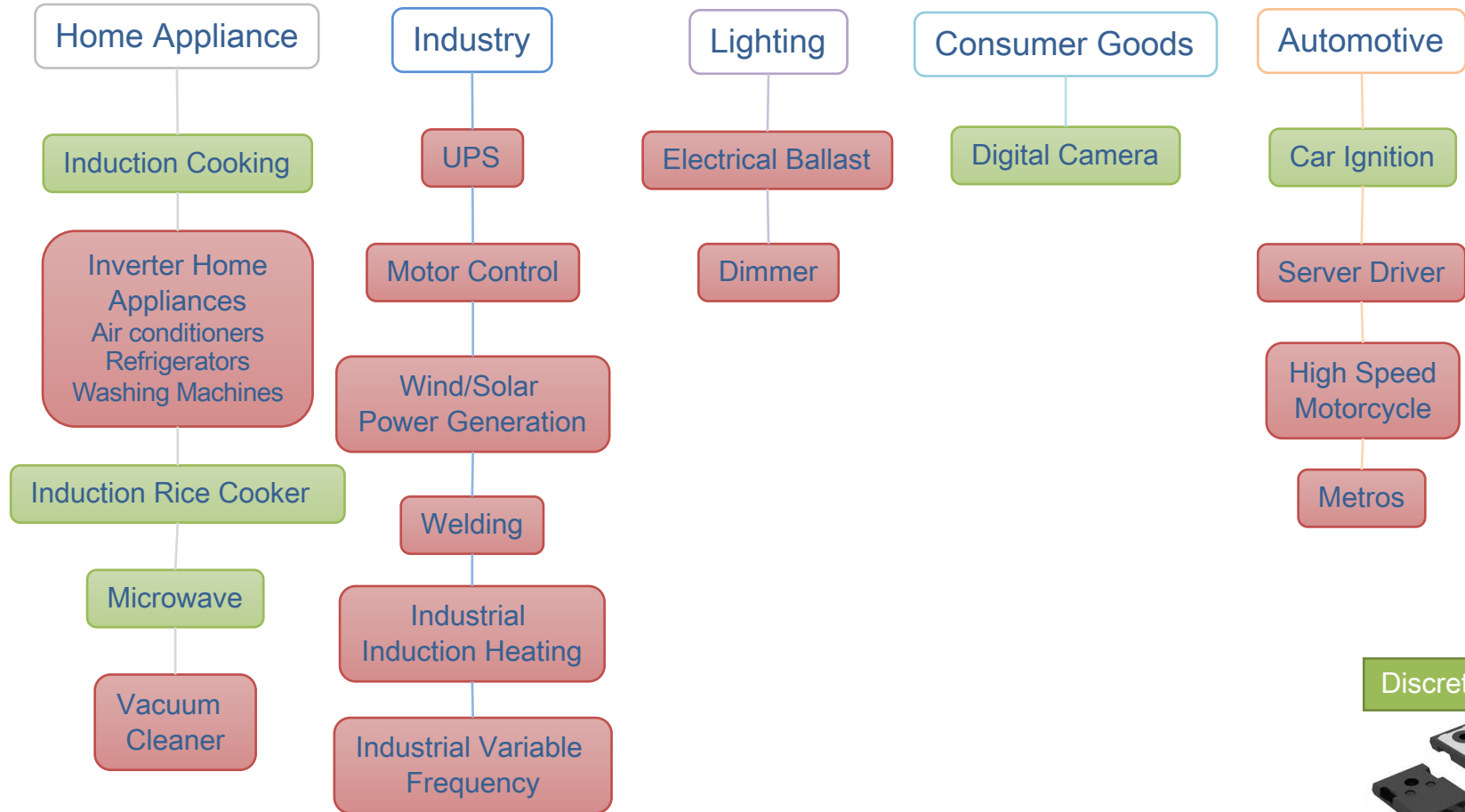
* Infineon Technologies acquired International Rectifier in Jan 2015. Both companies are reported separately in 2014 and combined as Infineon in 2015

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

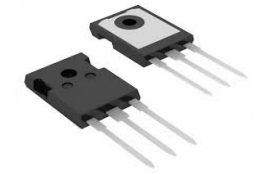
*** Zhuzhou CSR Times Electric Co., Ltd (the owners of Dynes Semiconductor Ltd.) and China CNR Corporation Merged in June 2015 to form Zhuzhou CRRC Times Electric Co., Ltd
r= revised since 2015 edition

Source: IHS

Application Segment

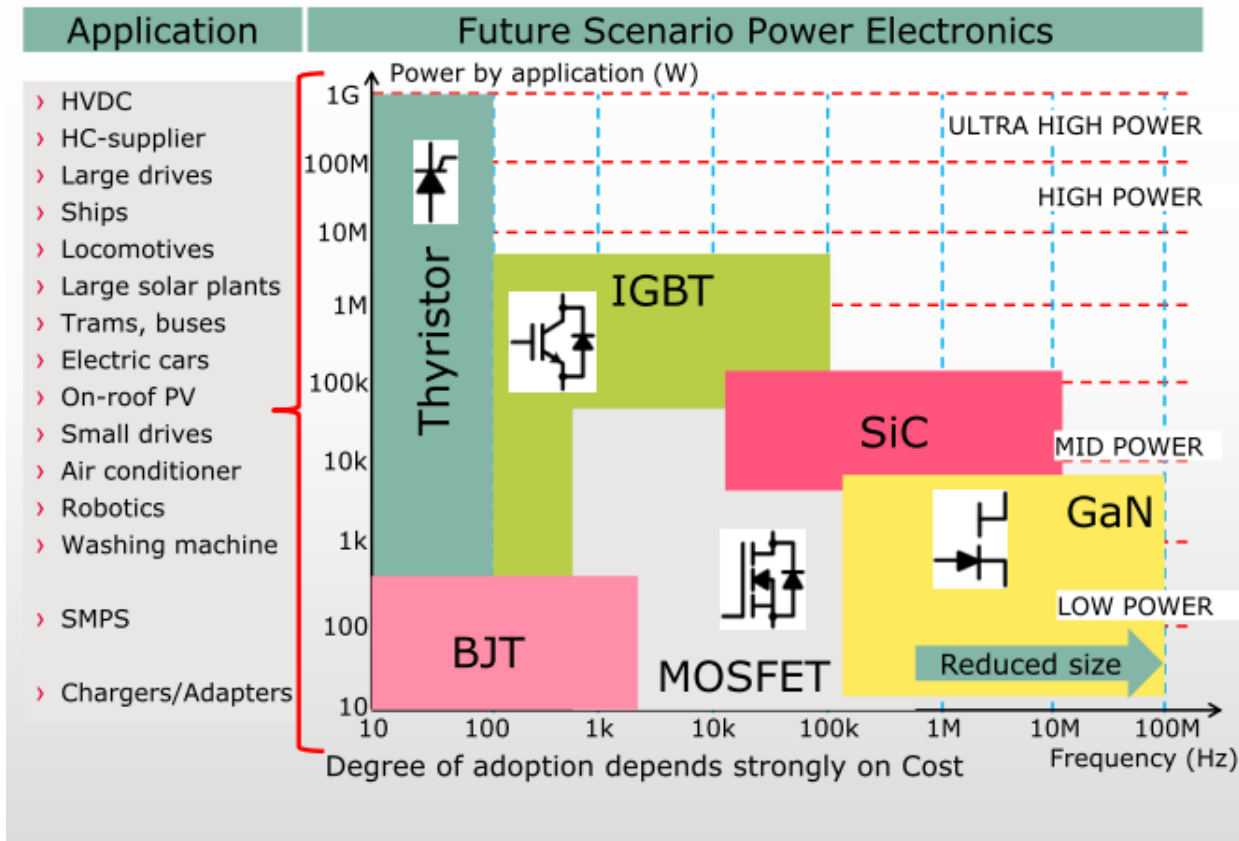


Discrete IGBT



IGBT Module





Report covers

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

Detailed discussion of

- Market Drivers
- Key Metrics
- Trends
- Challenges



Thank you