



PANJIT International Inc.

Investor Relations Presentation



Chief Strategy Officer

Jasper Lee

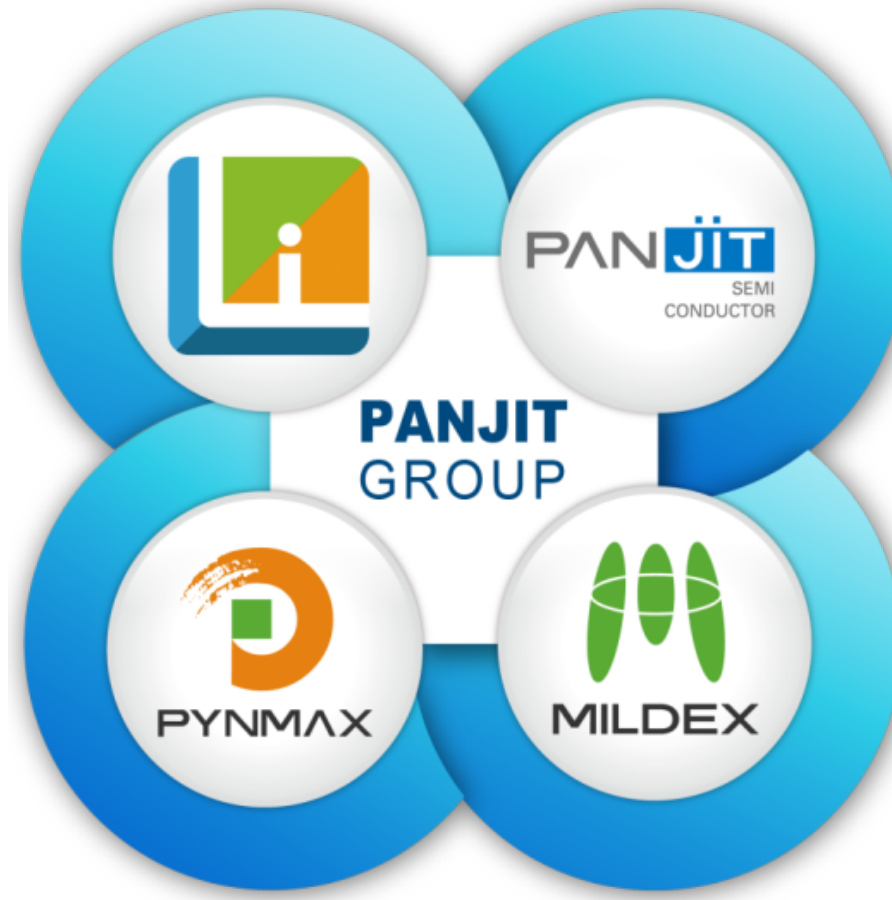
AUG 2018

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



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

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



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

熒茂光學股份有限公司
MILDEX
Est. May 2005
Product: Touch Screen
(Industry/Military)



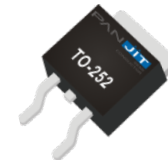
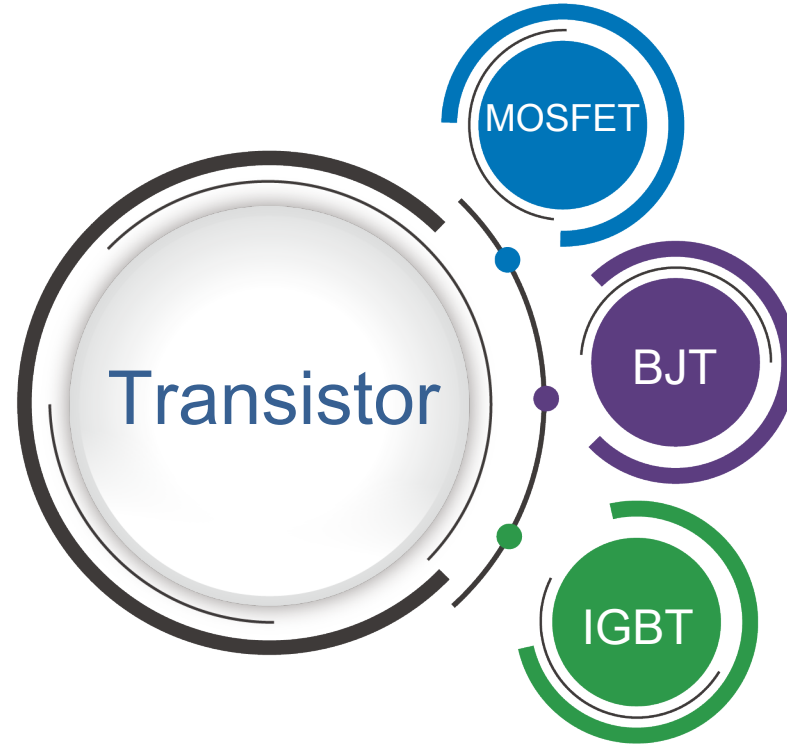
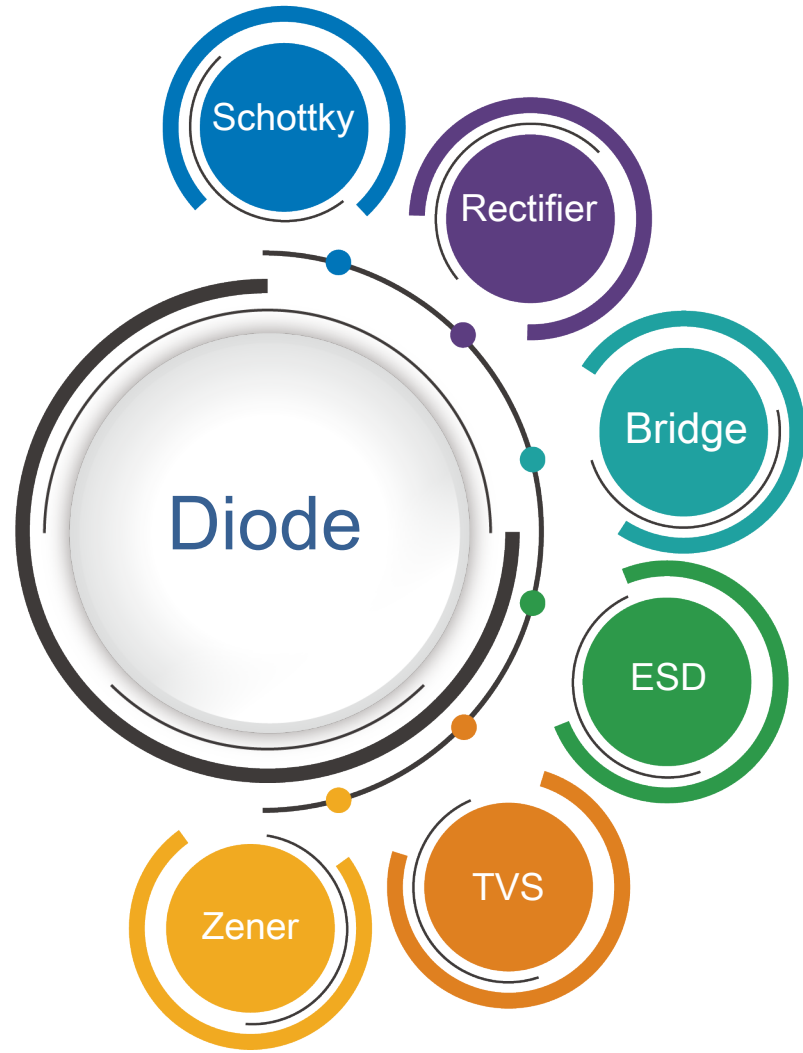
 總部 Headquarters  業務據點 Sales Office



前端晶圓 後端封測



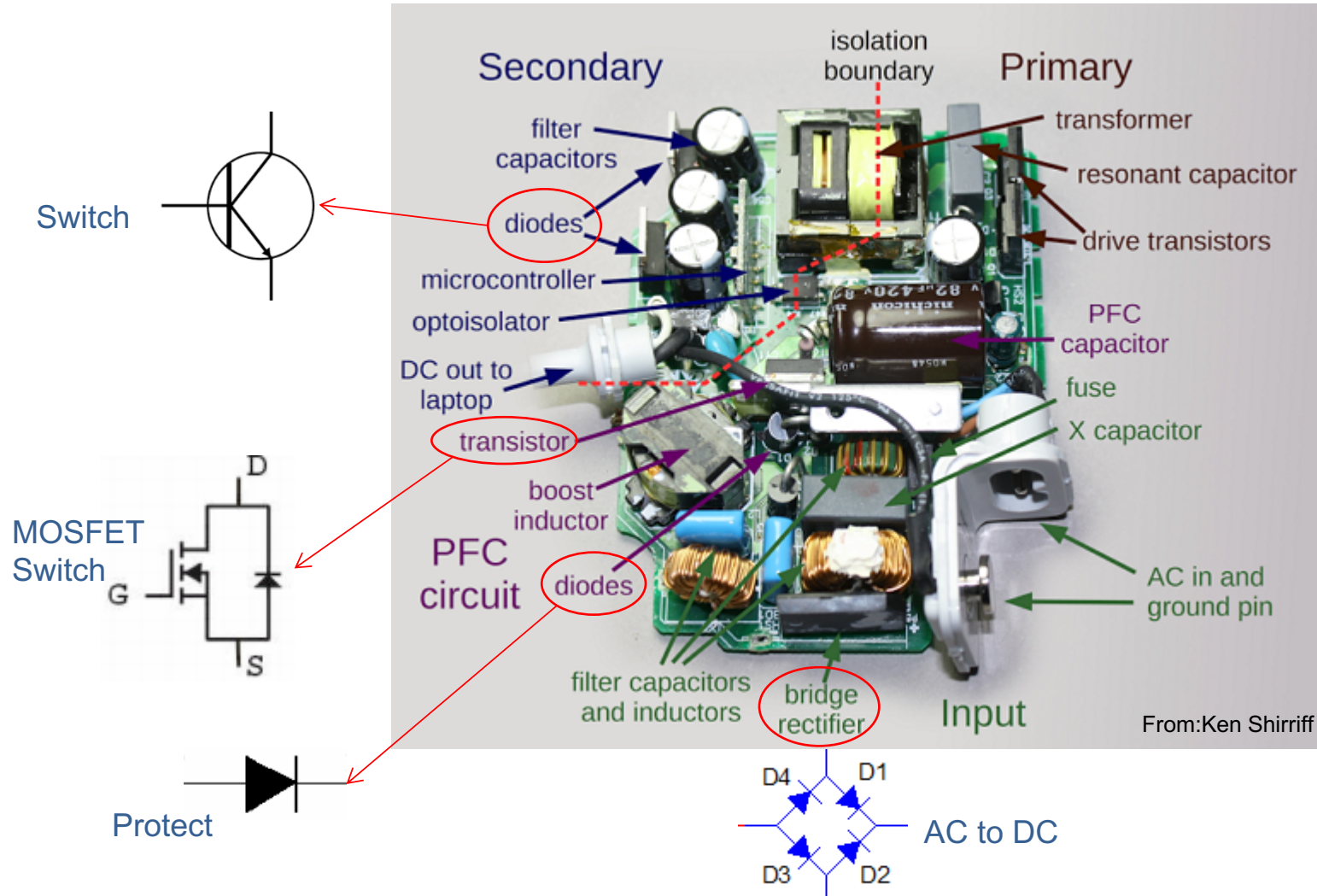
Your Component Our Profession



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Where are Discrete?

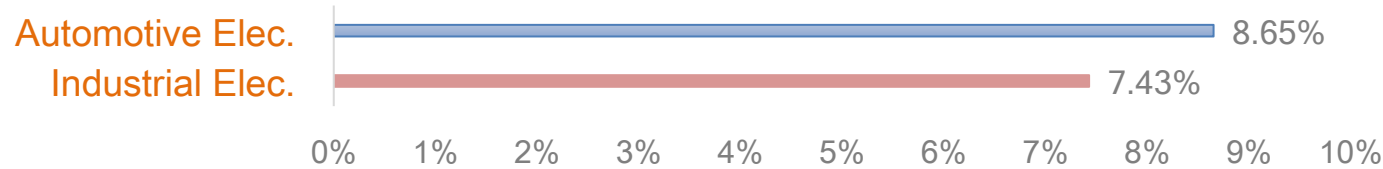


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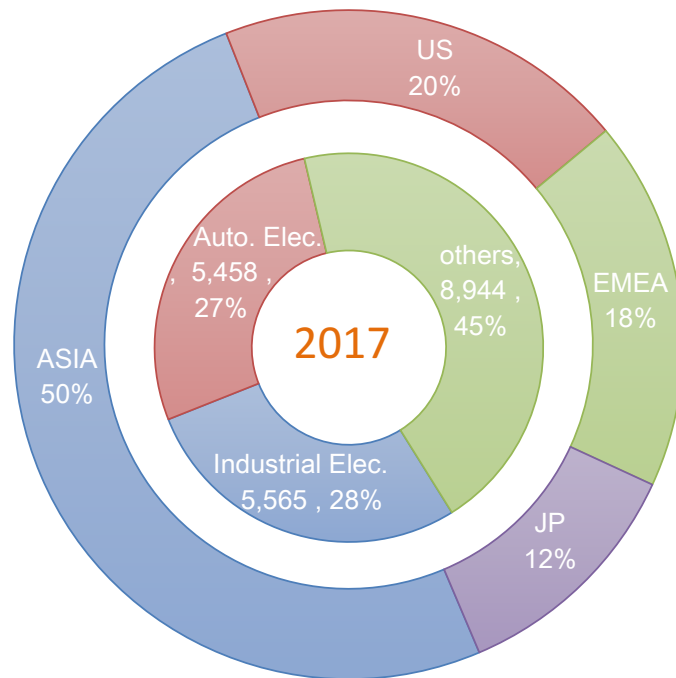
Worldwide Discrete Market

WW Discrete Semiconductor Forecast

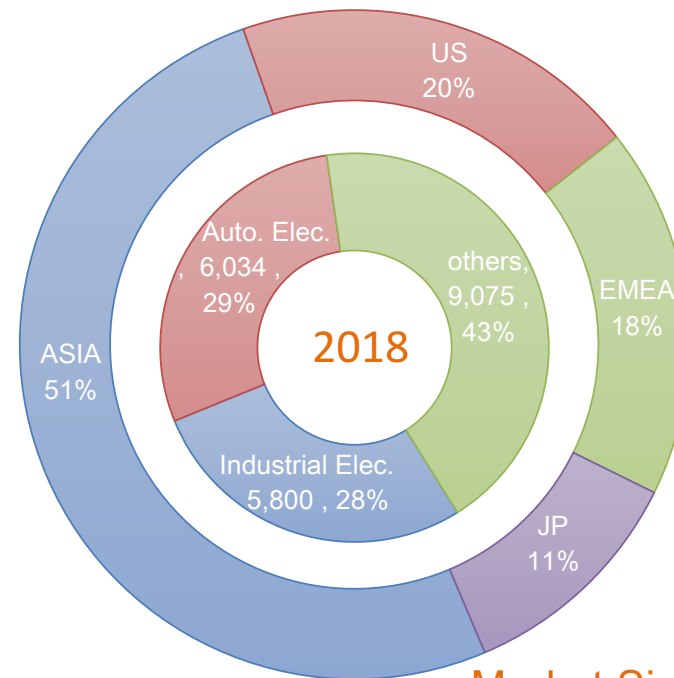
2017-2022 CAGRS



Unit: M' USD



Market Size: 19,029



Market Size : 19,973

- The major demand side of the discrete semiconductor will still be the Asia-Pacific region, Its market size account for nearly **50%**
- Automotive and Industrial are the major demand for discrete from 2018

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

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%

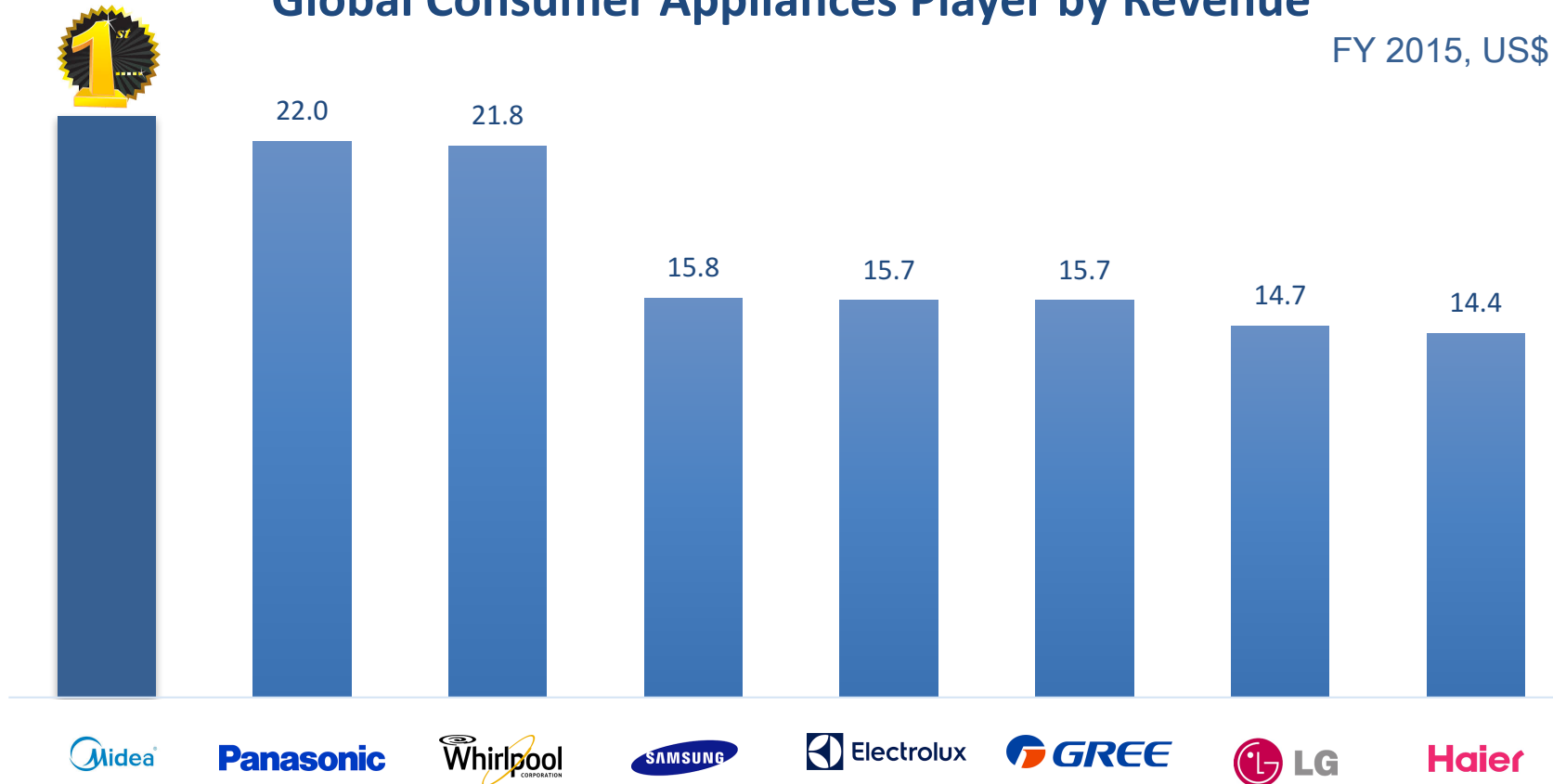
- Global Discrete Sales Ranking: #14 (includes of Diode, MOSFET, IGBT, and etc.)

Excluding RF diode

Consumer Electronic

Global Consumer Appliances Player by Revenue

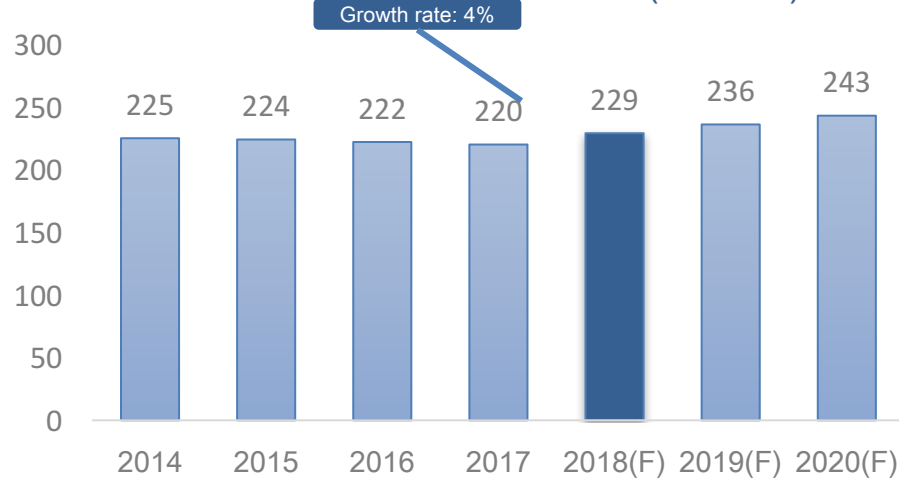
FY 2015, US\$ Bn



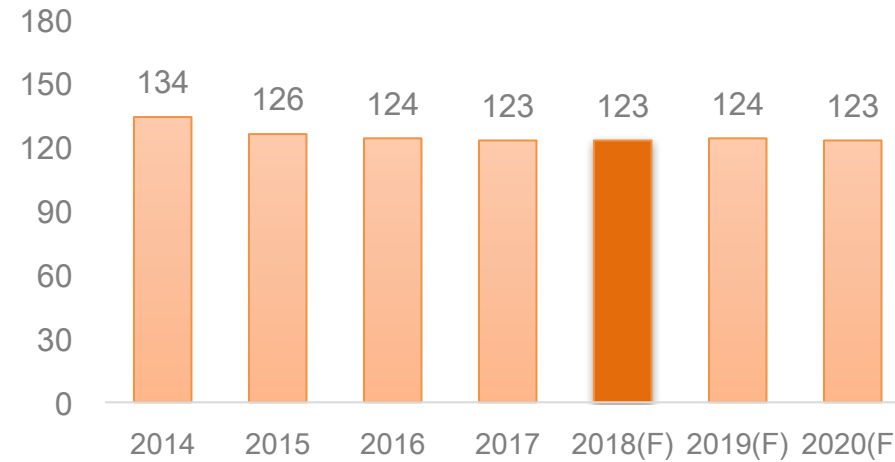
- The market for major household appliances is expected to reach \$28.1 billion by 2021. (Home Improvement Research Institute)

Panel - 4% Growth in 2018

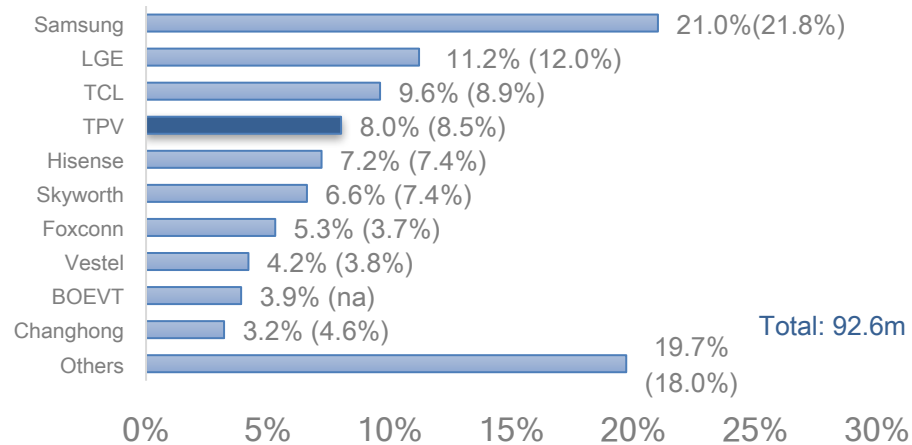
TV Global Shipment Forecast (Units M)



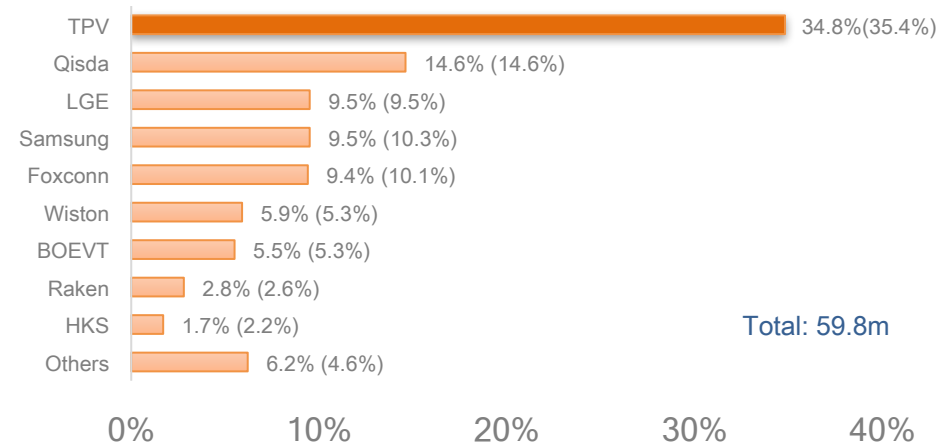
Monitor Global Shipment Forecast (Units M)



Worldwide LCD TV Manufacturer Share



Worldwide Monitor Manufacturer Share

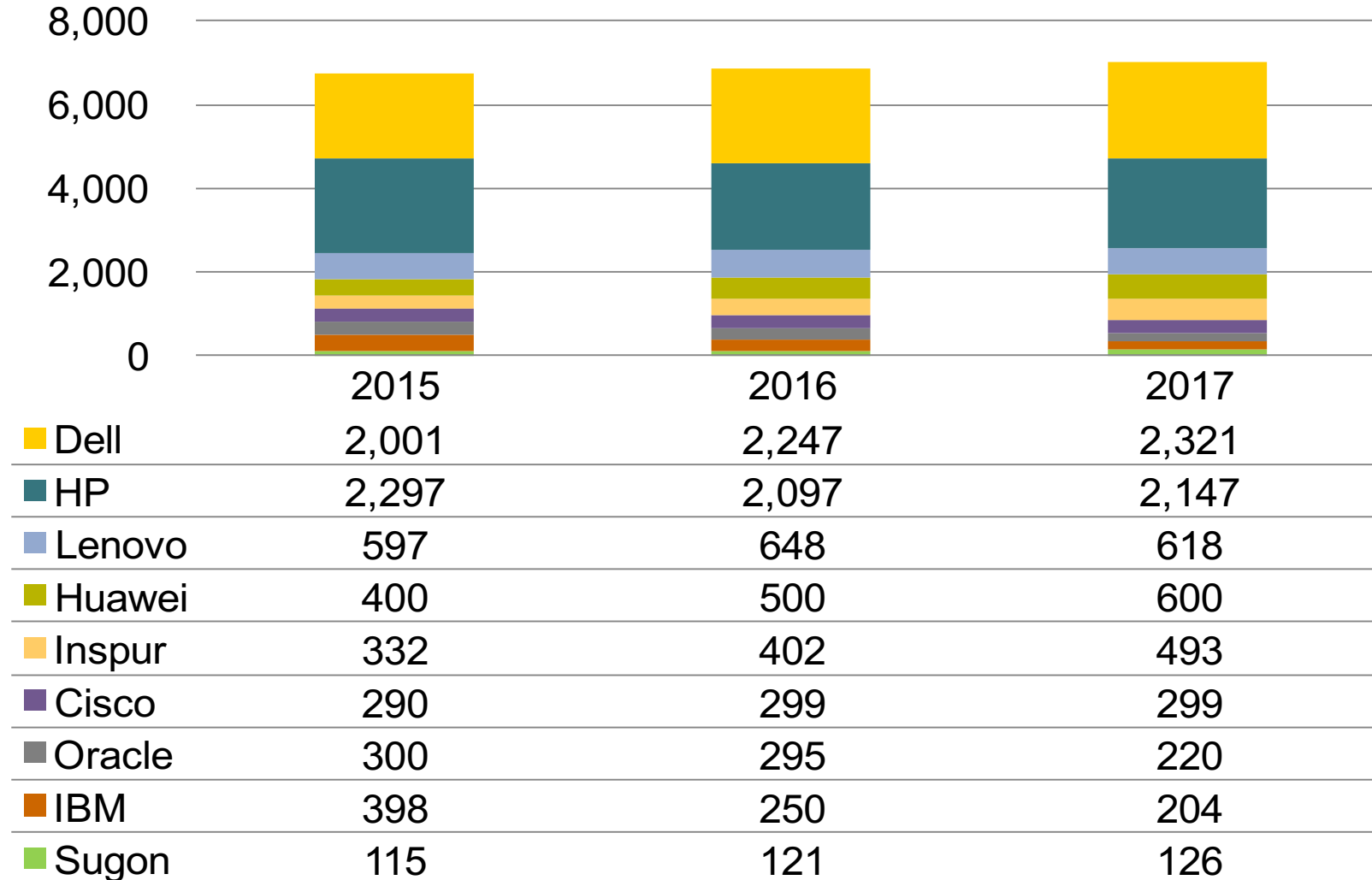


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Server Major Player

Unit : K

WW server shipment (OEM)

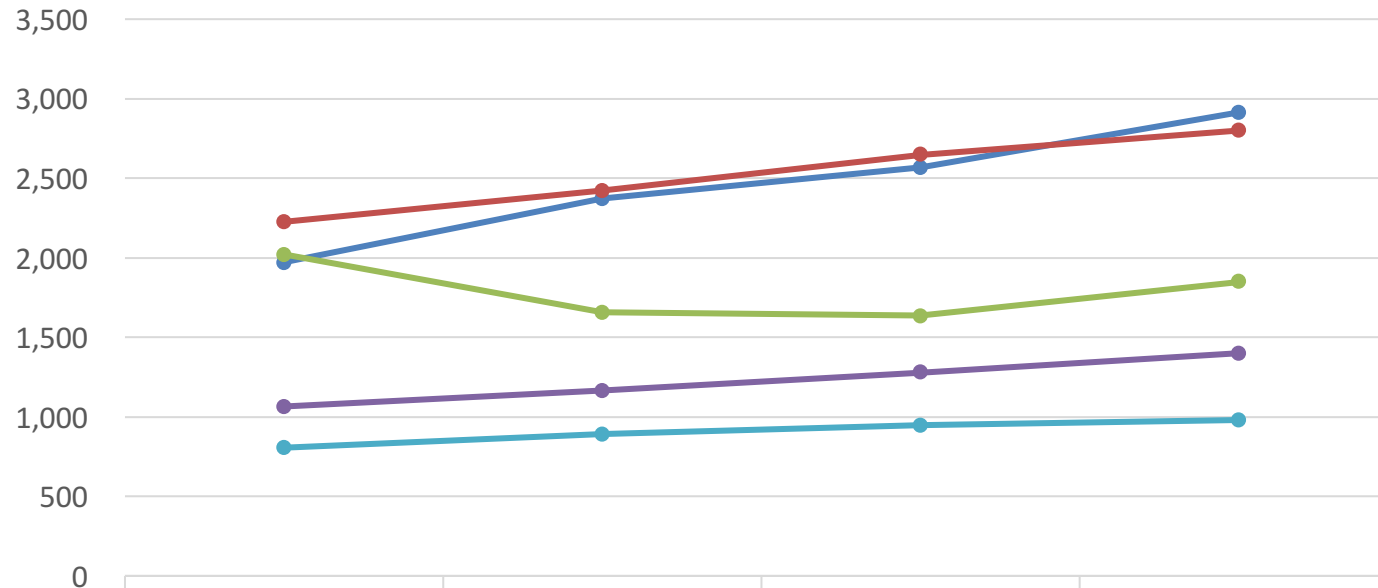


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Server MB TW Major Players v.s. PJ Customers

Unit : K

Server MB shipment (EMS)



	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

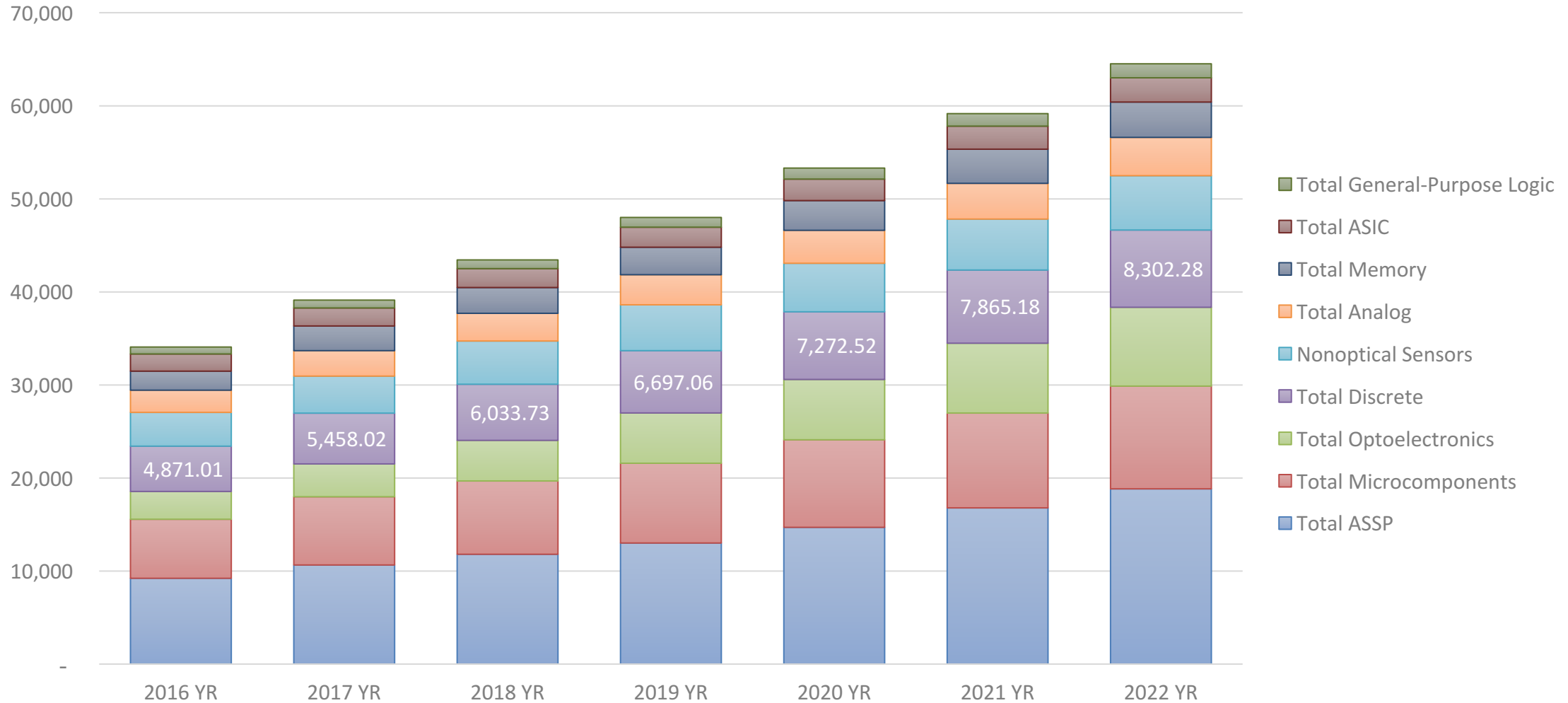
- The Taiwanese EMSs produce 90% of the server MB

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Automotive

Discrete in Semi Automotive- CAGR 8.75%

Discrete in Semiconductor Automotive CAGR 2017-2022 8.75%

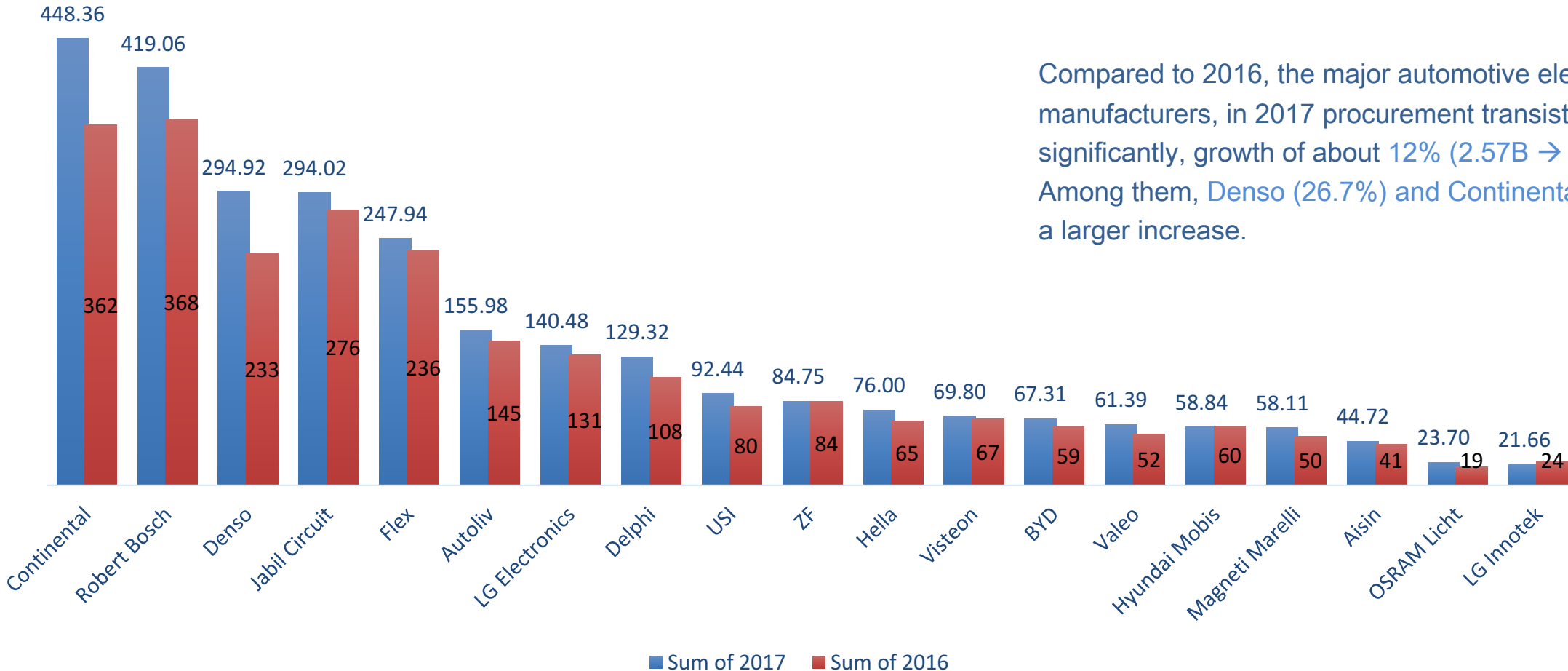


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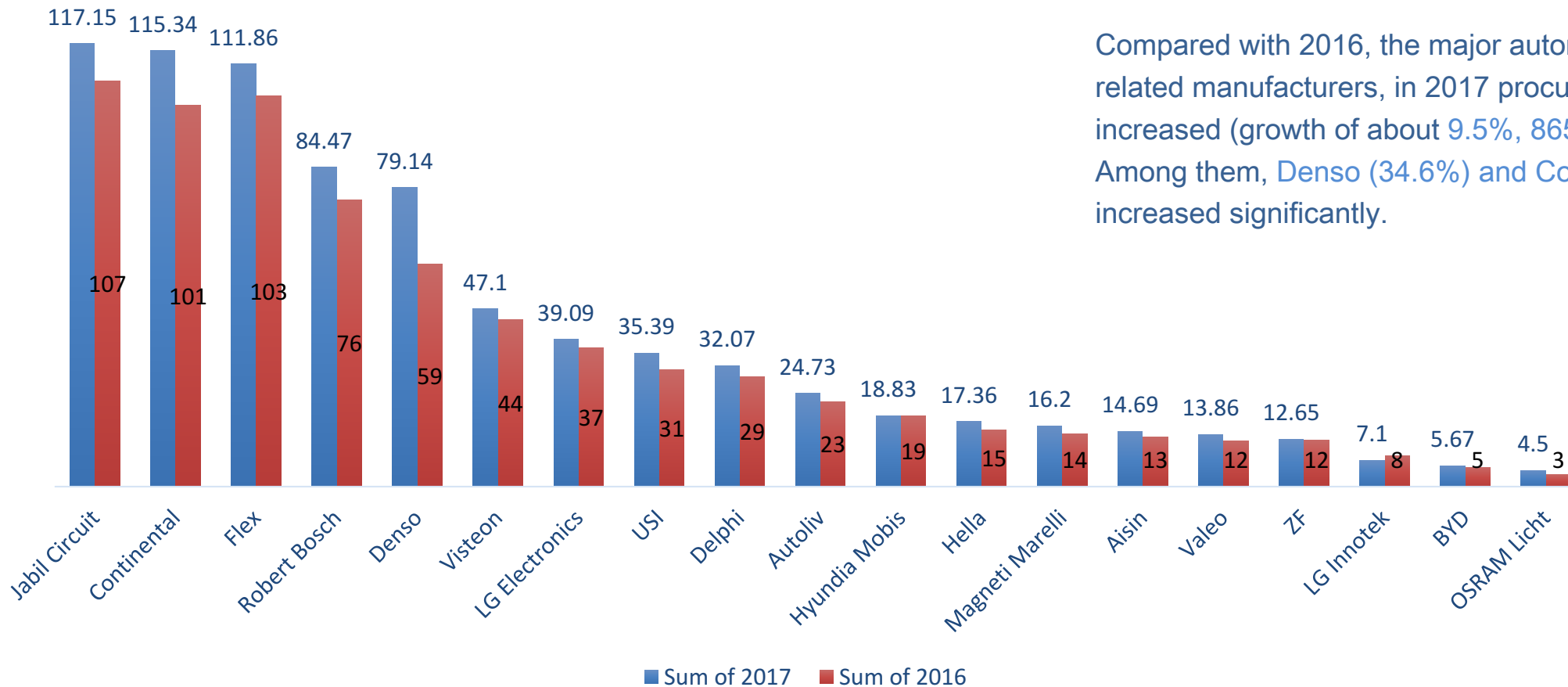
2017 Transistors Growth 12%

Purchasing TAM - Transistors (M\$)

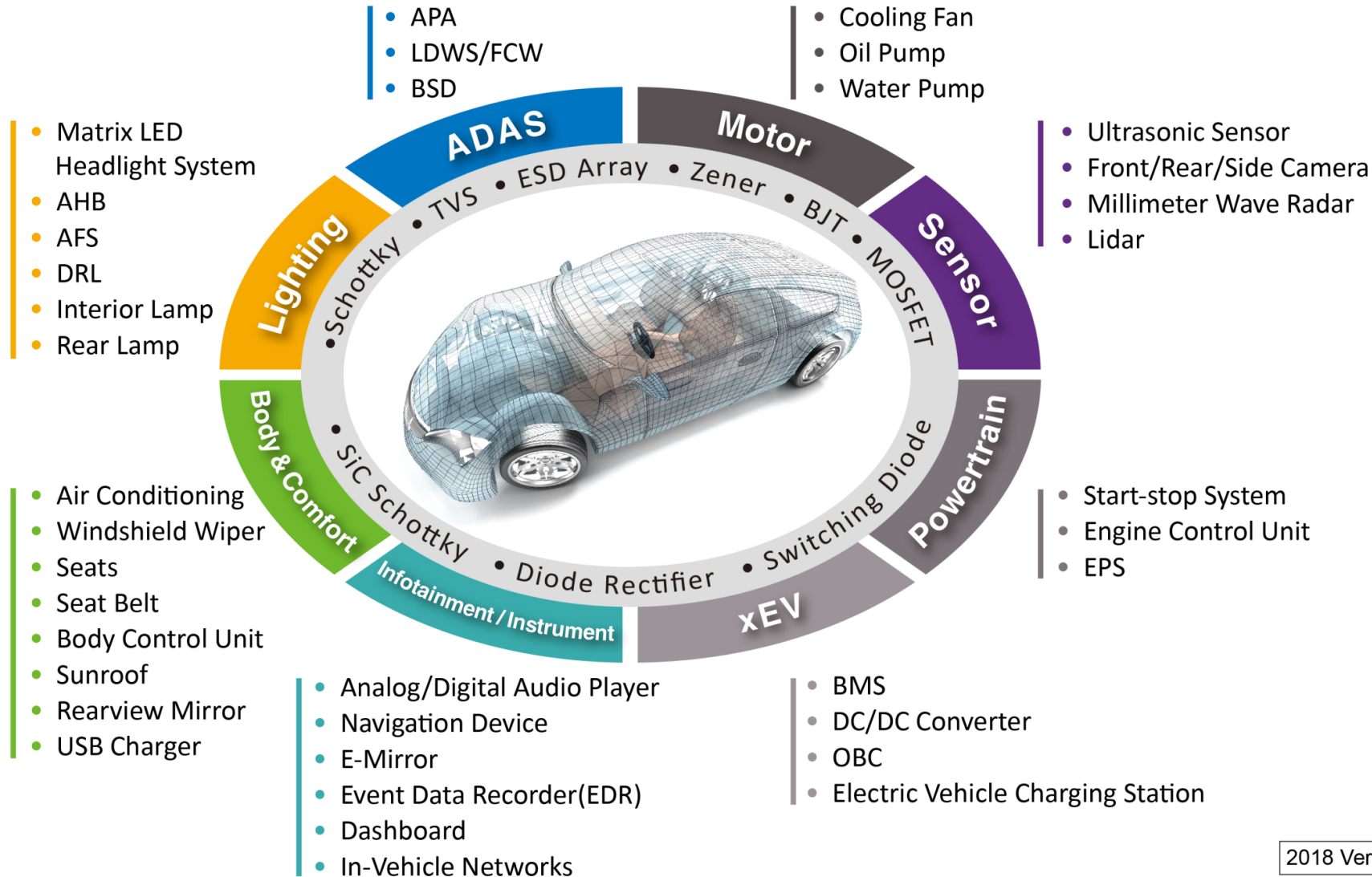
Compared to 2016, the major automotive electronics related manufacturers, in 2017 procurement transistors increase significantly, growth of about 12% (2.57B → 2.89B\$). Among them, Denso (26.7%) and Continental (23.9%) recorded a larger increase.



Purchasing TAM – Diodes (M\$)

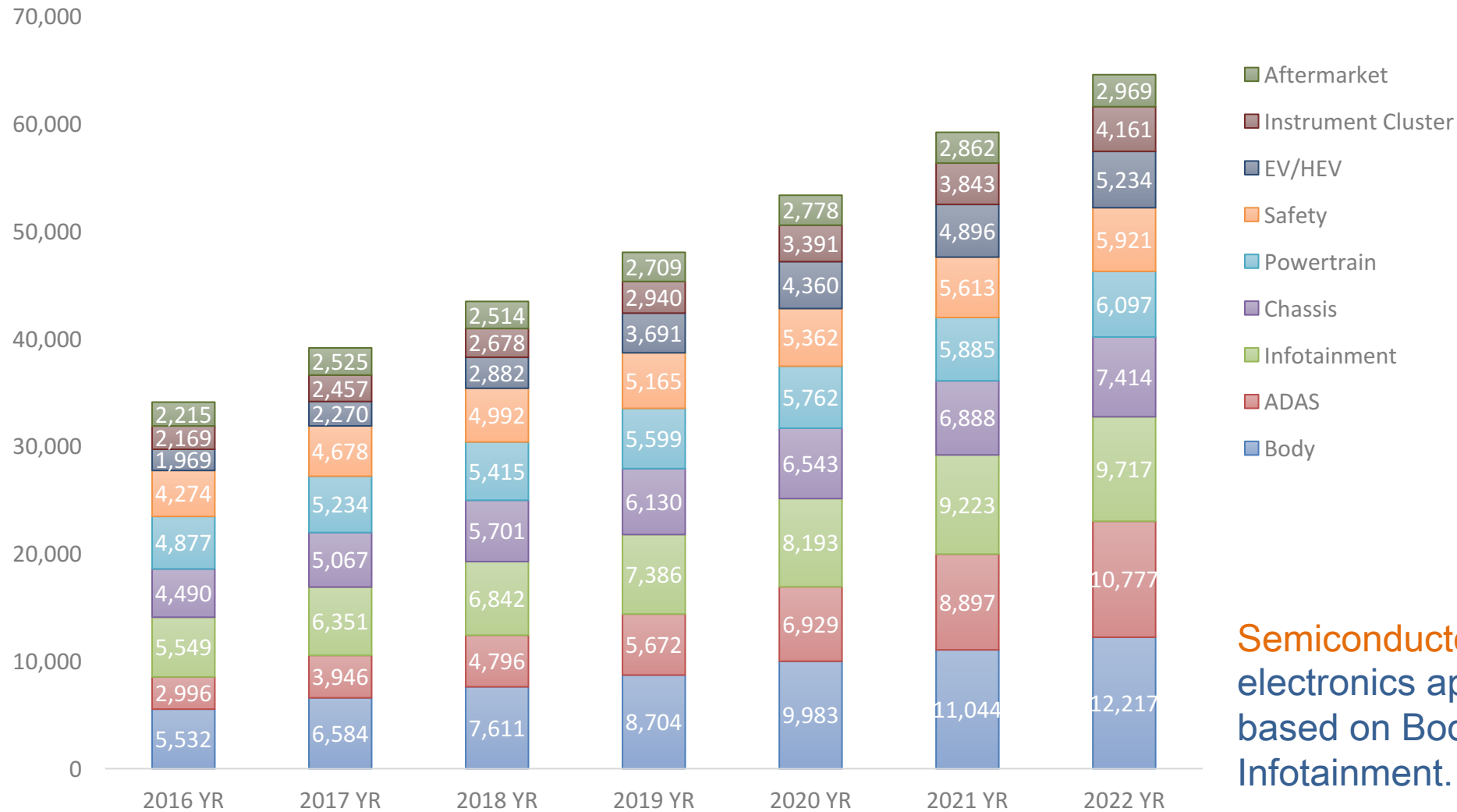


Compared with 2016, the major automotive electronics-related manufacturers, in 2017 procurement diodes have increased (growth of about 9.5%, 865M → 947M). Among them, Denso (34.6%) and Continental (14.4%) increased significantly.



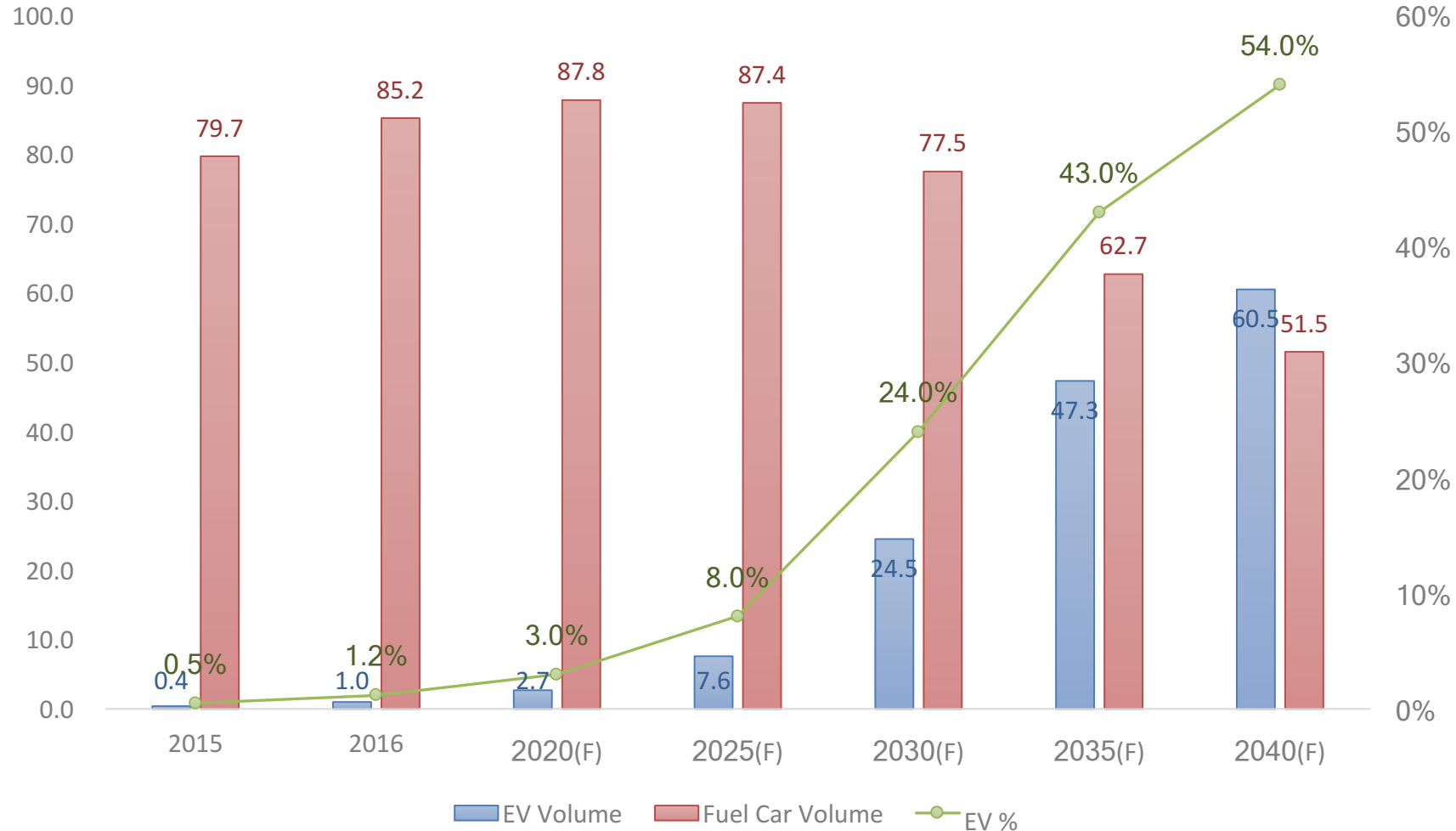
2018 Ver.2

Automotive electronics, 2016-2022



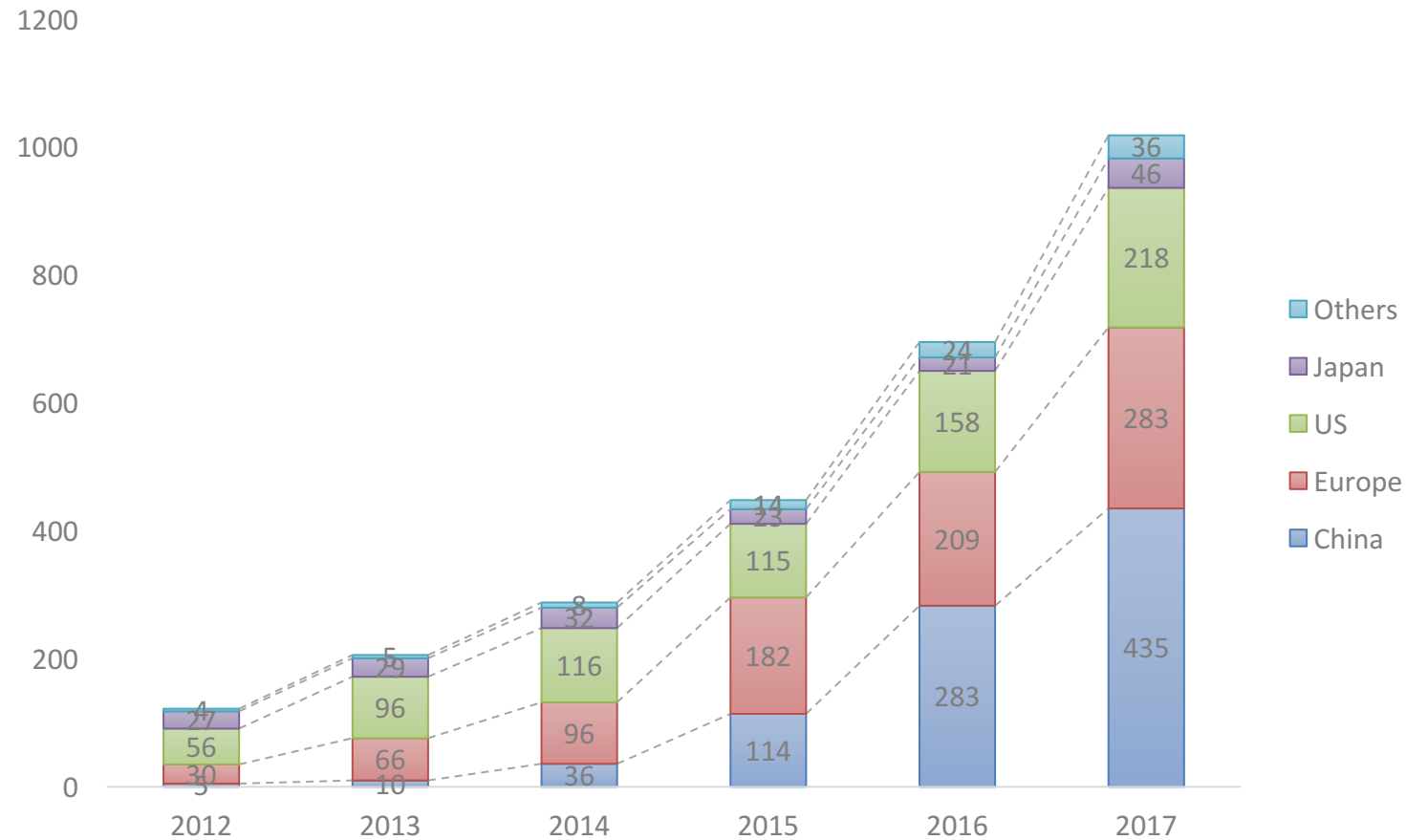
Semiconductors in automotive electronics applications, are mainly based on Body, ADAS and Infotainment.

Global Vehicle Sales Forecast (-2040)



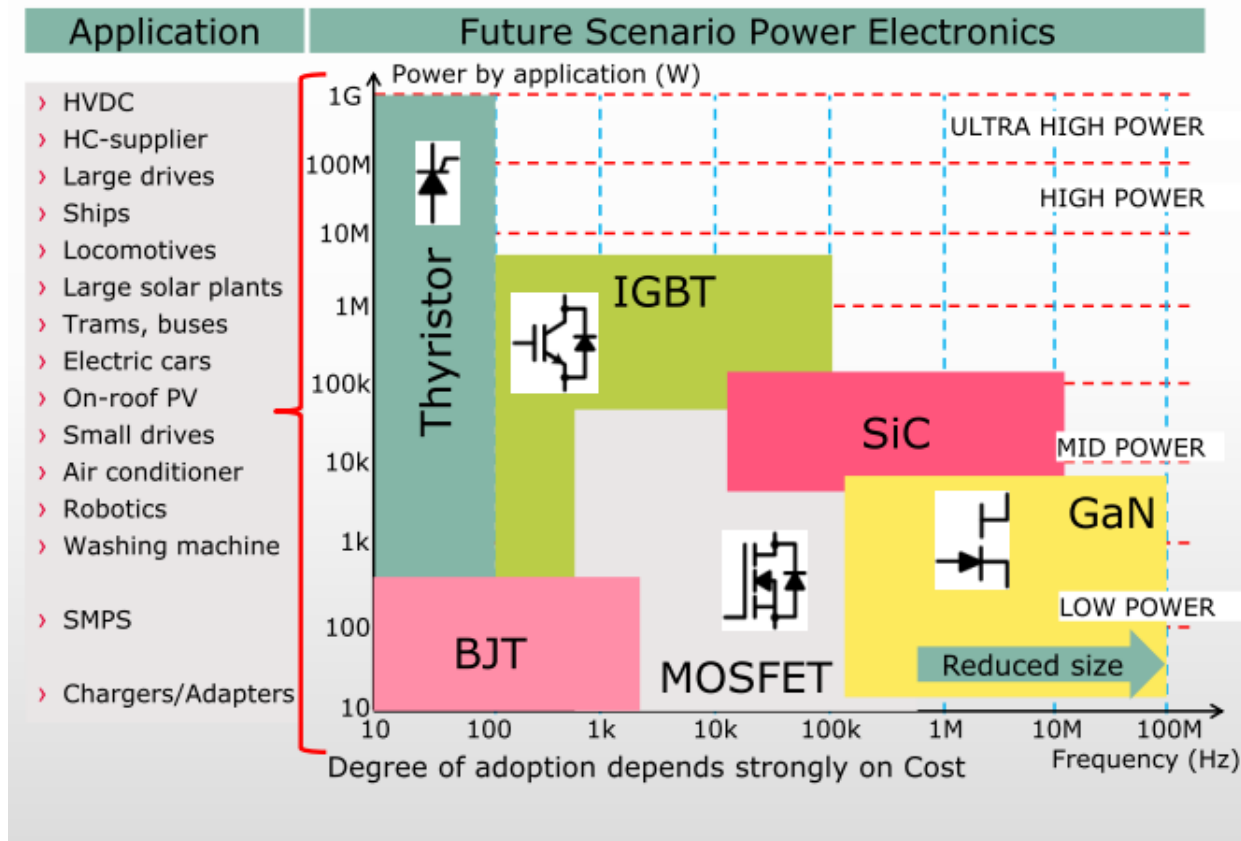
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2012-2017 Global EV Sales by Region



IGBT

Major Product Development Trends & Future Applications



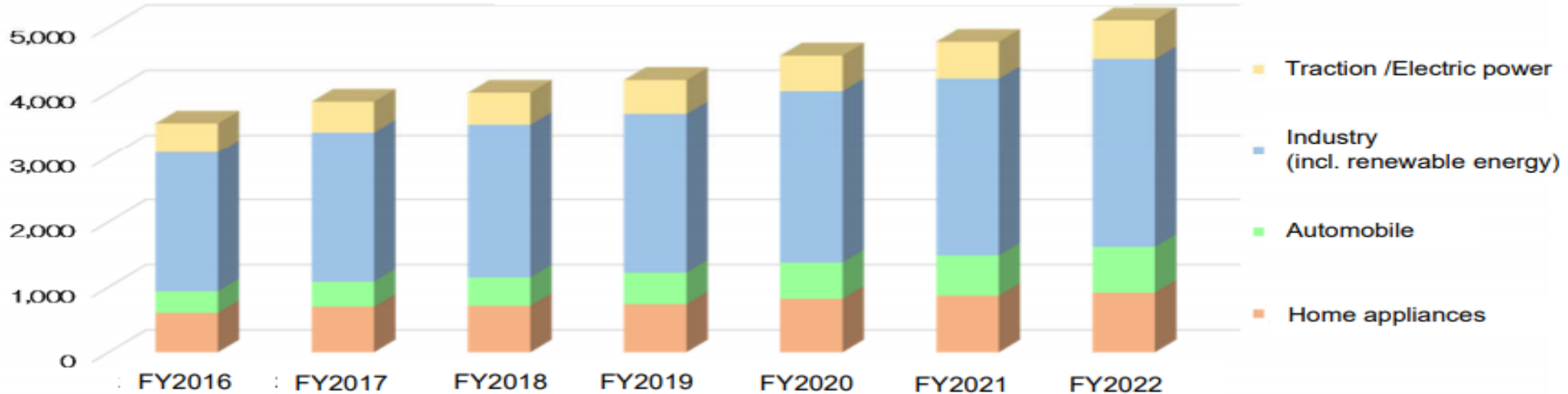
Report covers

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

Detailed discussion of

- Market Drivers
- Key Metrics
- Trends
- Challenges

Global IGBT Annual Growth Rate of 6%



Background of power devices market expansion

Home appliances: Growth due to expansion of market for **white goods** and progress in shift to **DC inverter**.

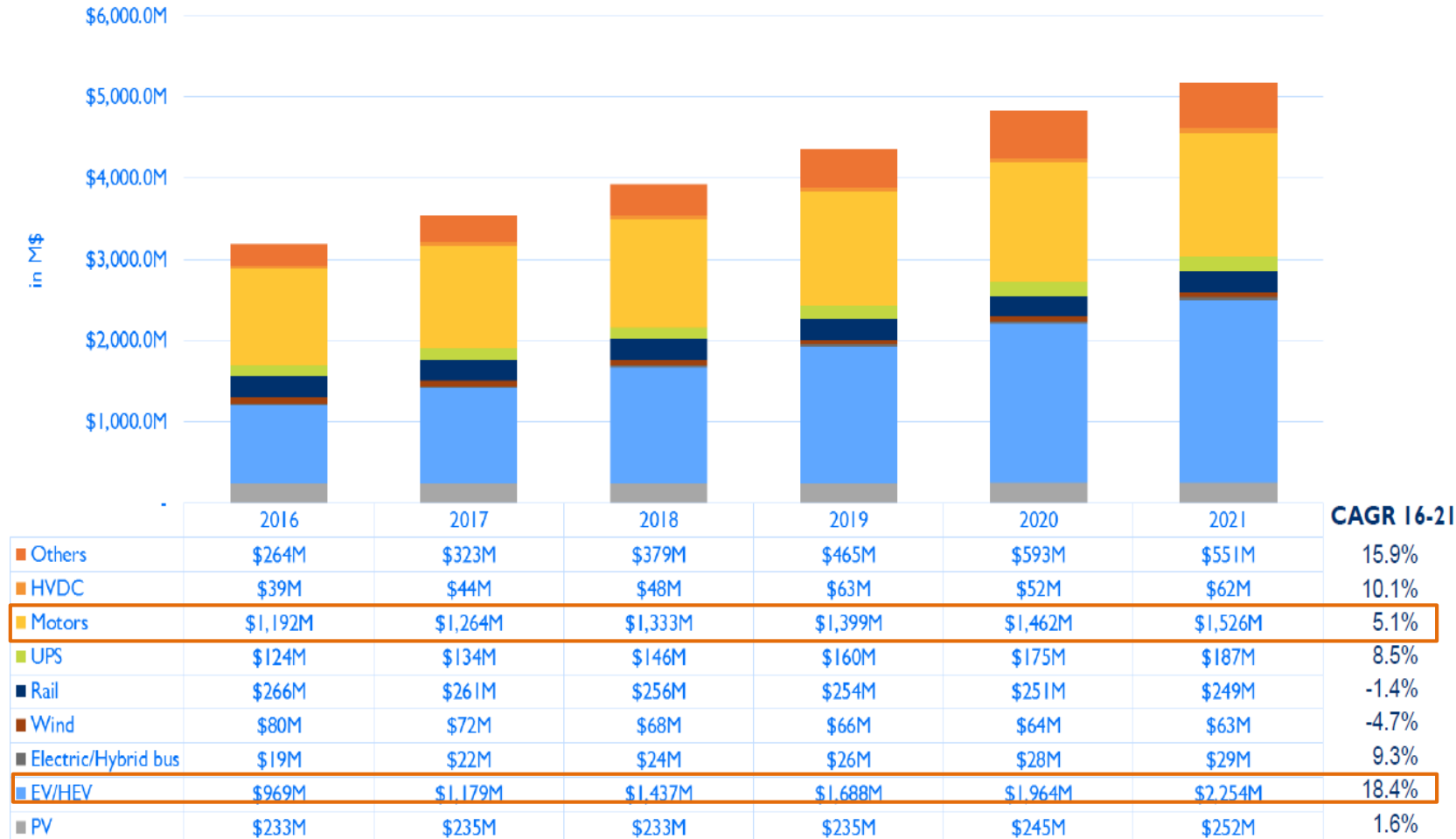
Industry: Smart manufacturing drives **automation equipment** (tools, robots) investment. **Industrial motors** achieve high power efficiency through **high frequency drive**. Growth will accompany expansion of **renewable energy** markets around the world.

Traction/Electric power : Moderate growth in electric railway rolling stock market in line with population growth, urbanization, etc. Low-power **high-voltage direct current (HVDC)** transmission is gradually replacing traditional AC power systems.

Automotive: High growth due to accelerated shift to **EVs** due to more stringent environmental regulations































Application of Automotive and Industry in IGBT

Power modules market, split by application (inM\$)



The rapid growth of the electric vehicle market in mainland China has caused the shortage of goods for industrial/ automotive Si IGBT power modules, which is the opportunity for Taiwanese companies to cut through.

IGBT Manufacturers Ranking by Voltage Range

	No.1	No.2	No.3	No.4	No.5
400V and Less			 Leading Innovation >>>	 life.augmented	 SEMICONDUCTOR
600-650V					 life.augmented
1200V					 life.augmented
1700V					
2500V-3300V					
4500V and More					 中国中车 CRRC

- 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

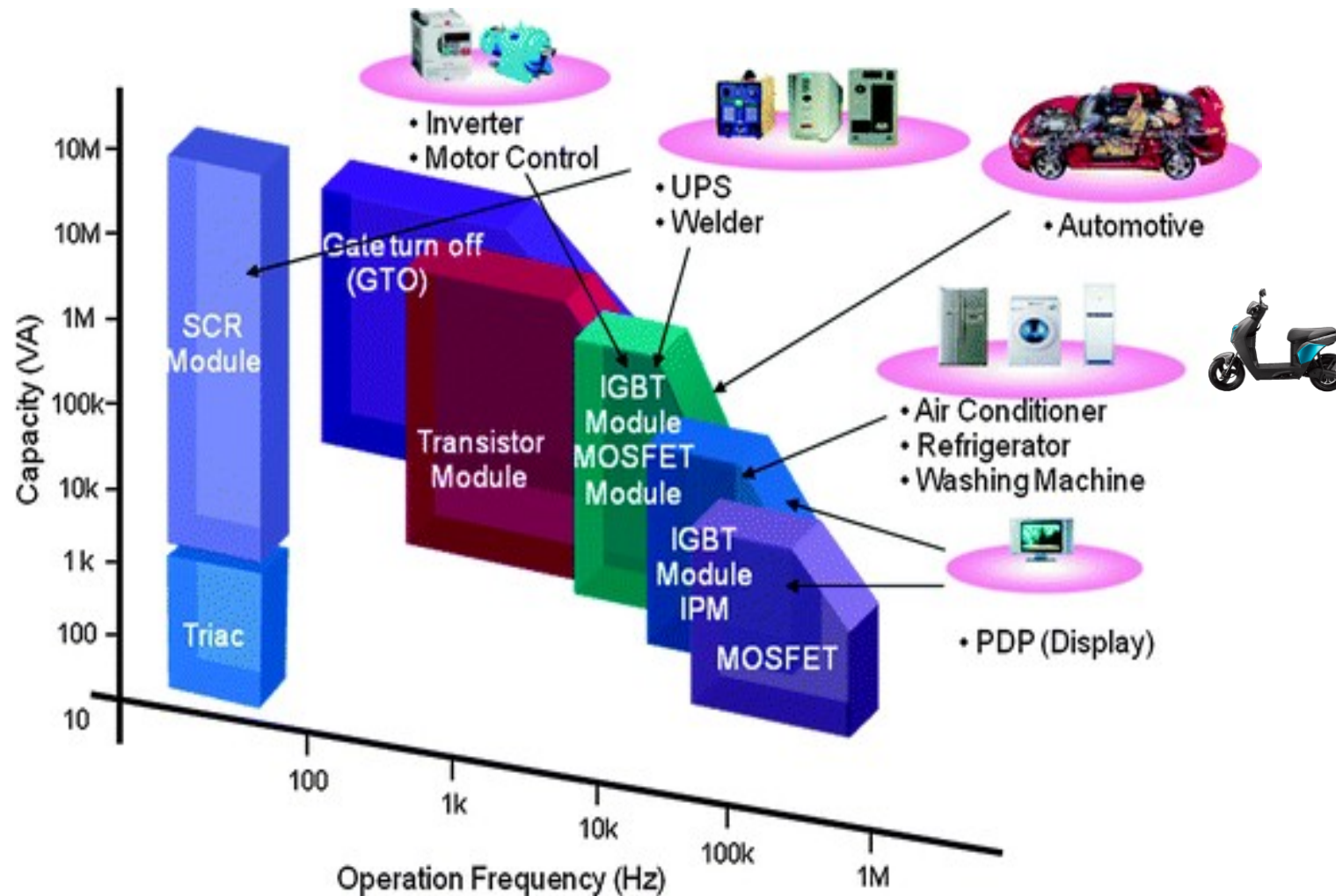
* Infineon Technologies acquired International Rectifier in Jan 2015. Both companies are reported separately in 2014 and combined as Infineon in 2015

** 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

Power Electronics Component / Module Market v.s. Panjit Development Direction

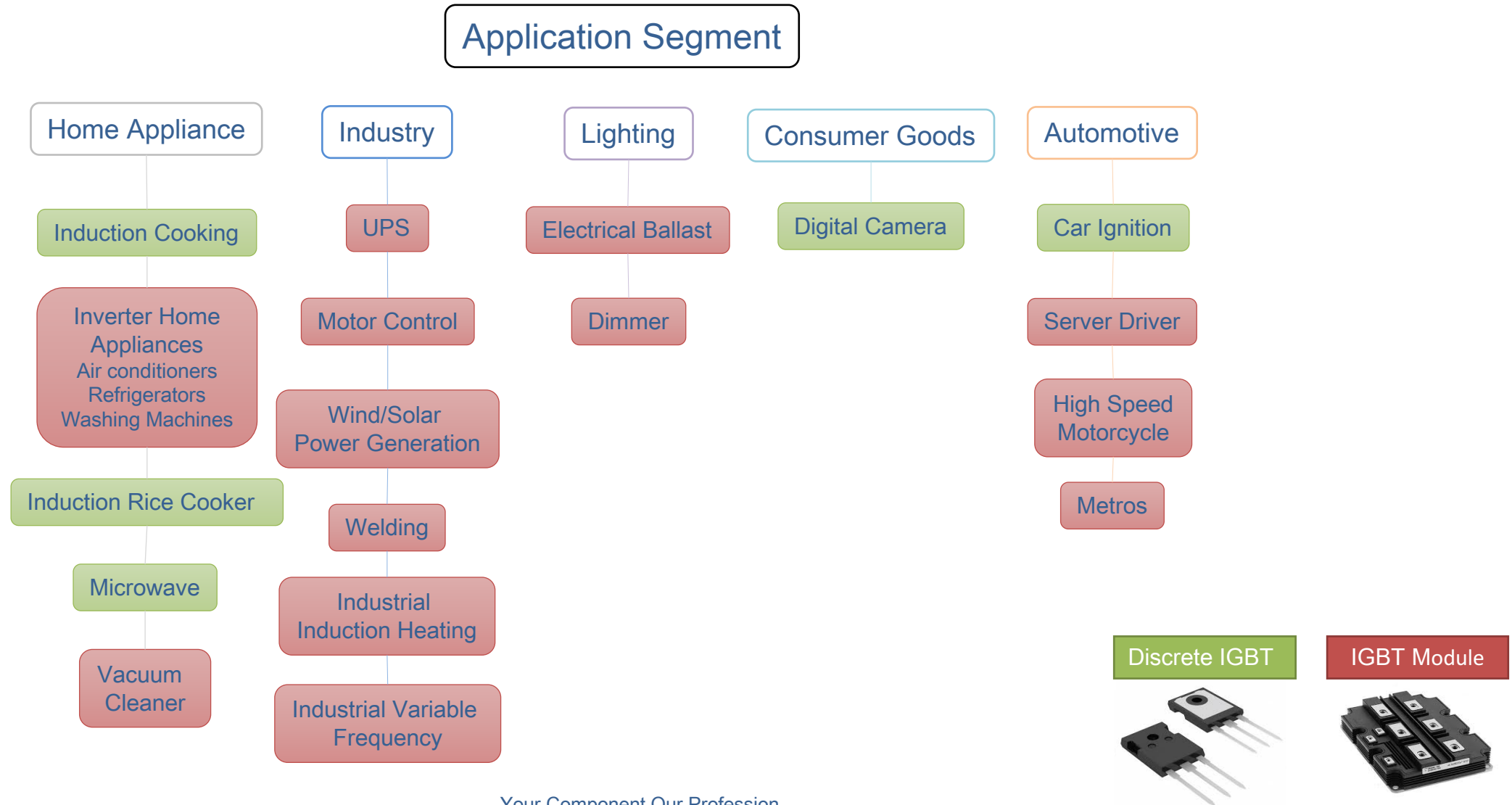


Benefit from the growth in the demand for electric vehicles, the output of IGBT components from international manufacturers is fully loaded, and the China packaging and testing plants have considered to use **Taiwan-made IGBT** components.

There are over 20 million motorcycles in Taiwan, with a mass production scale, the demand for **vehicle MOSFET** power modules has appeared.

China's tier 2 electric vehicle factory and Taiwan invested companies successively established Electric Vehicle factory in China and are actively seeking for good value **vehicle IGBT** module alternative.

The use of MOSFET & IGBT smart power modules has a **high price sensitivity**. The world's largest manufacturing companies have the advantage of manufacturing costs. Taiwan company is not easy to replace, but can try to attack the market with power of 650V/75A.





Thank you