



PANJIT
SEMI
CONDUCTOR

PANJIT International Inc.

Nov. 2019

- About PANJIT 關於強茂
- Application and Market Trend 應用和市場趨勢
- New Team 新團隊
- Automotive 汽車應用
- New Technologies Focus 新技術發展
- Financial Info 財務信息



About PANJIT

PANJIT Overview

TWSE : 2481 (2001 IPO)

Founded in 1986

Corporate Headquarters: Kaohsiung, Taiwan

Capital: \$111 Million USD

2018 Consolidated revenue: \$379 Million USD

2019 YTD (Sep) Consolidated revenue : \$226 Million USD

Approximately 3,000 employees worldwide

1 front-end fabrication sites 2 back-end manufacturing sites

ISO9001: 2015 Certified / IATF16949: 2016 / IECQ QC080000: 2012



PANJIT GROUP



PANJIT
Est. May 1986
Product: Discrete
Packaging & Testing



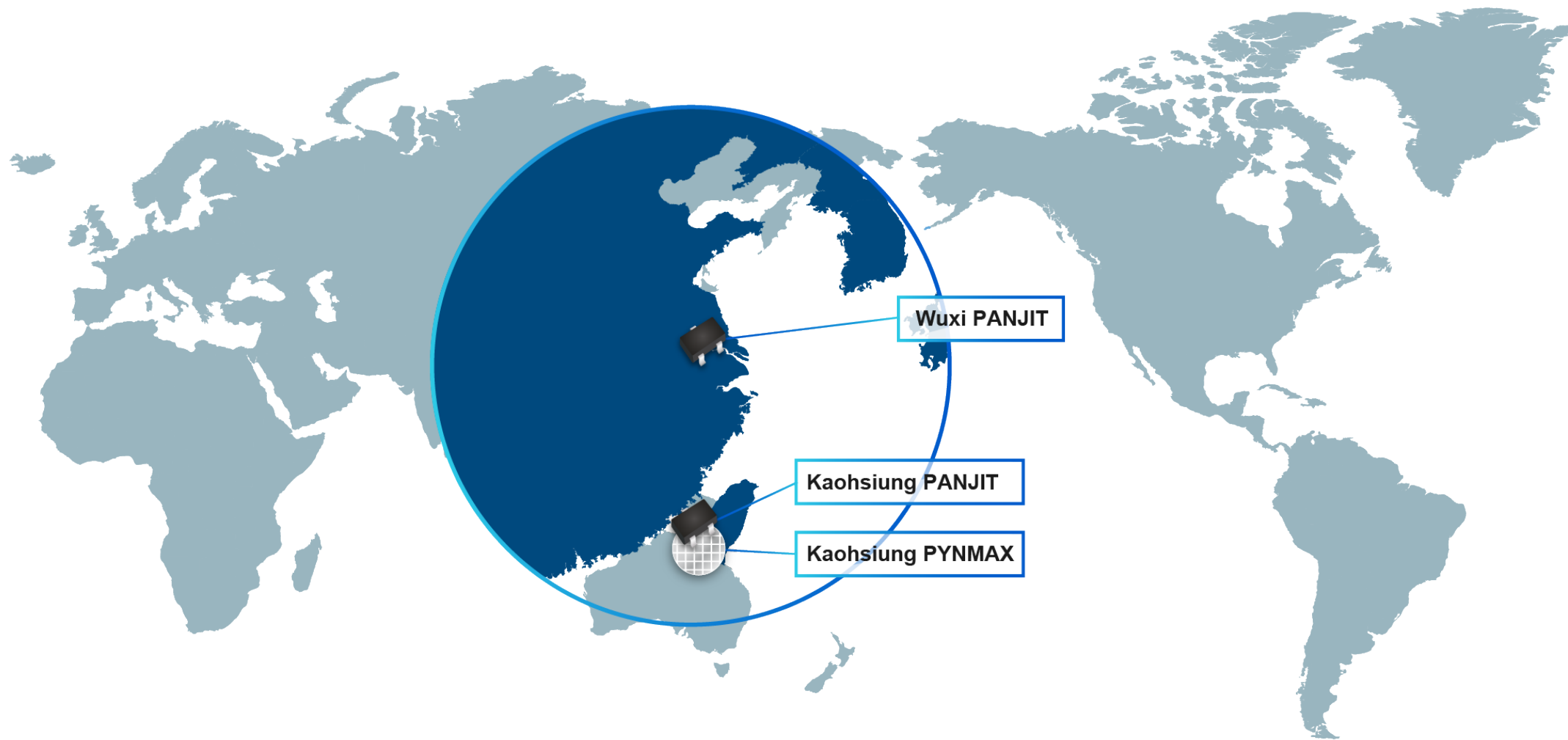
PYNMAX
Est. Mar 2000
Product: Wafer Foundry



SUMNERGY
Est. Jun 2017
Product: BMS, Battery Pack



強茂 前段晶圓廠&後段封裝廠



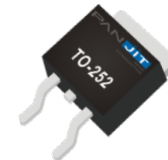
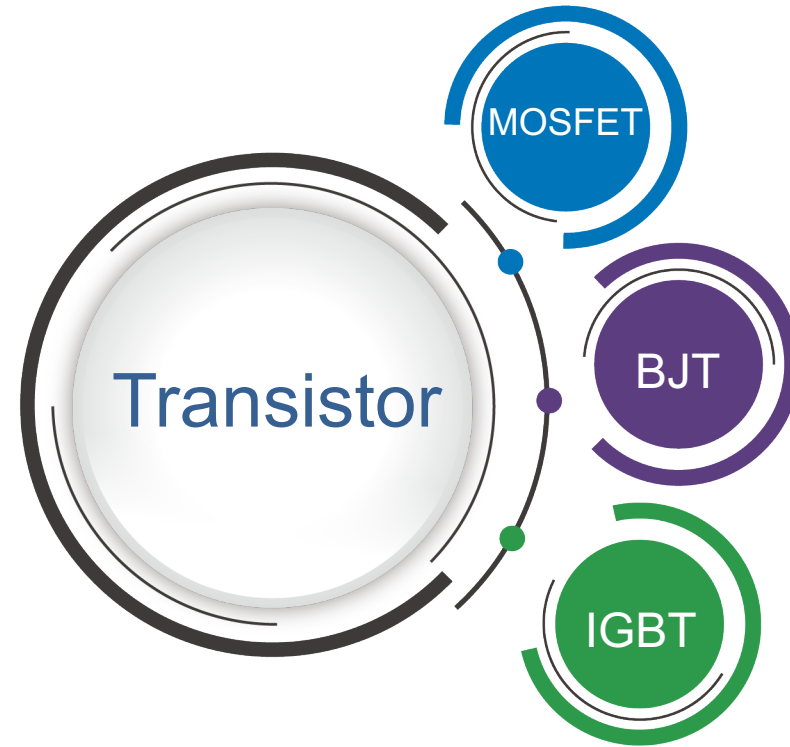
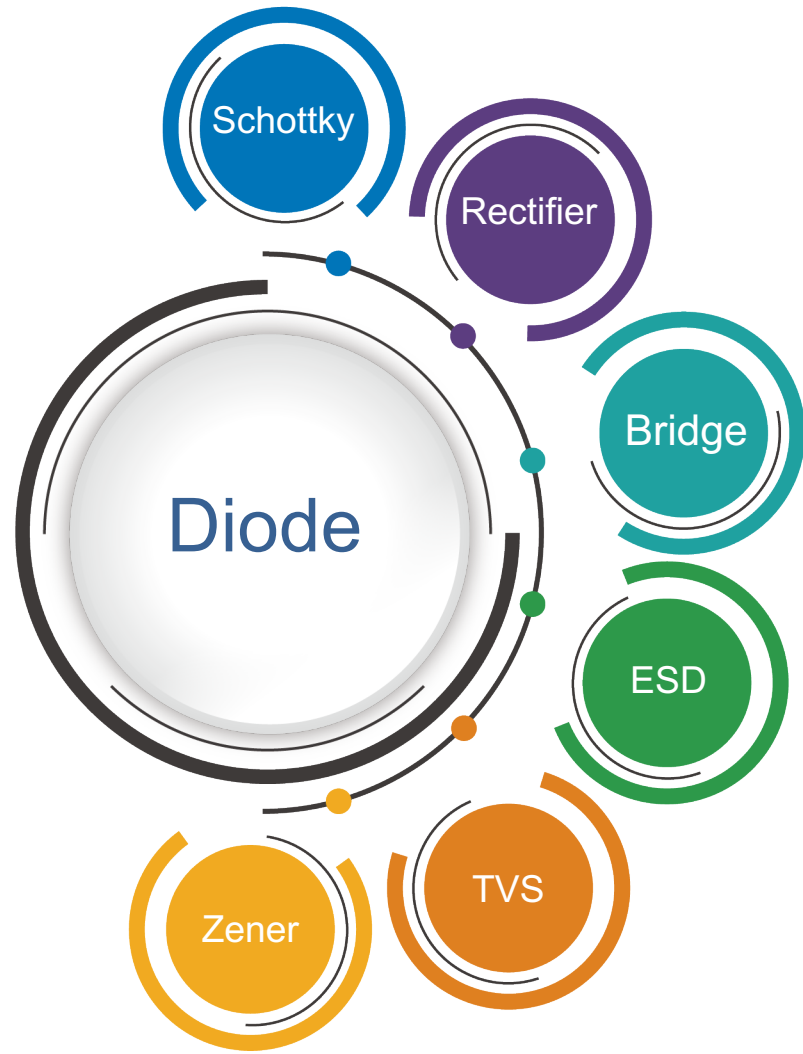
Front-End



Back-End

強茂PANJIT & 璟茂PYNMAX

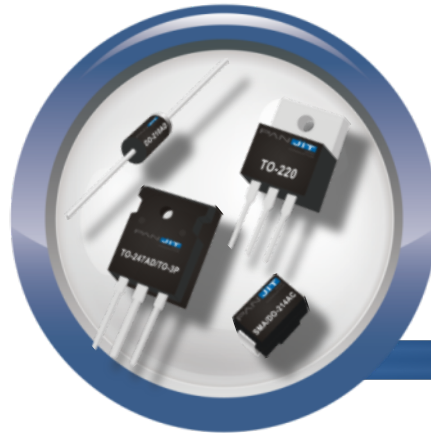
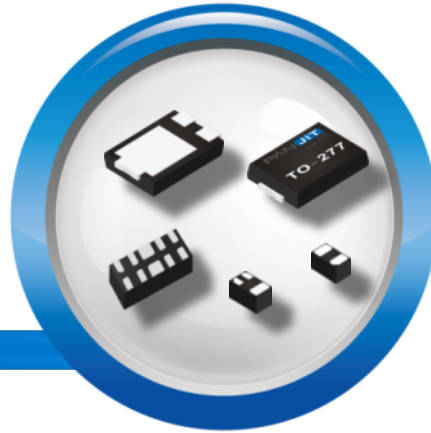




Gangshan

Package: Small Signal Devices

Capacity: 1,400 KK /month

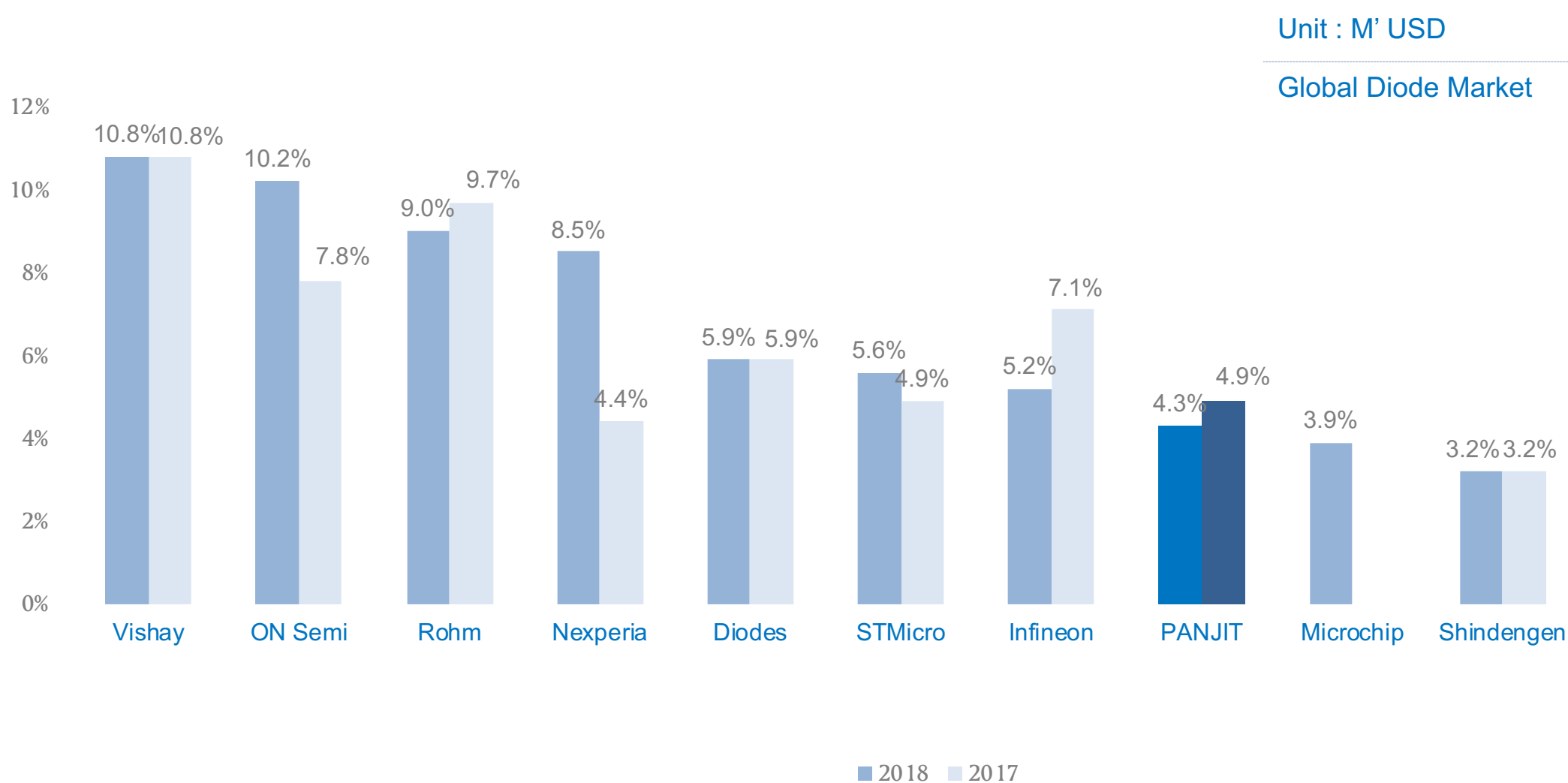


Wuxi

Package: Power Package Devices

Capacity: 550 KK /month

全球二極體排行 & 市場占比

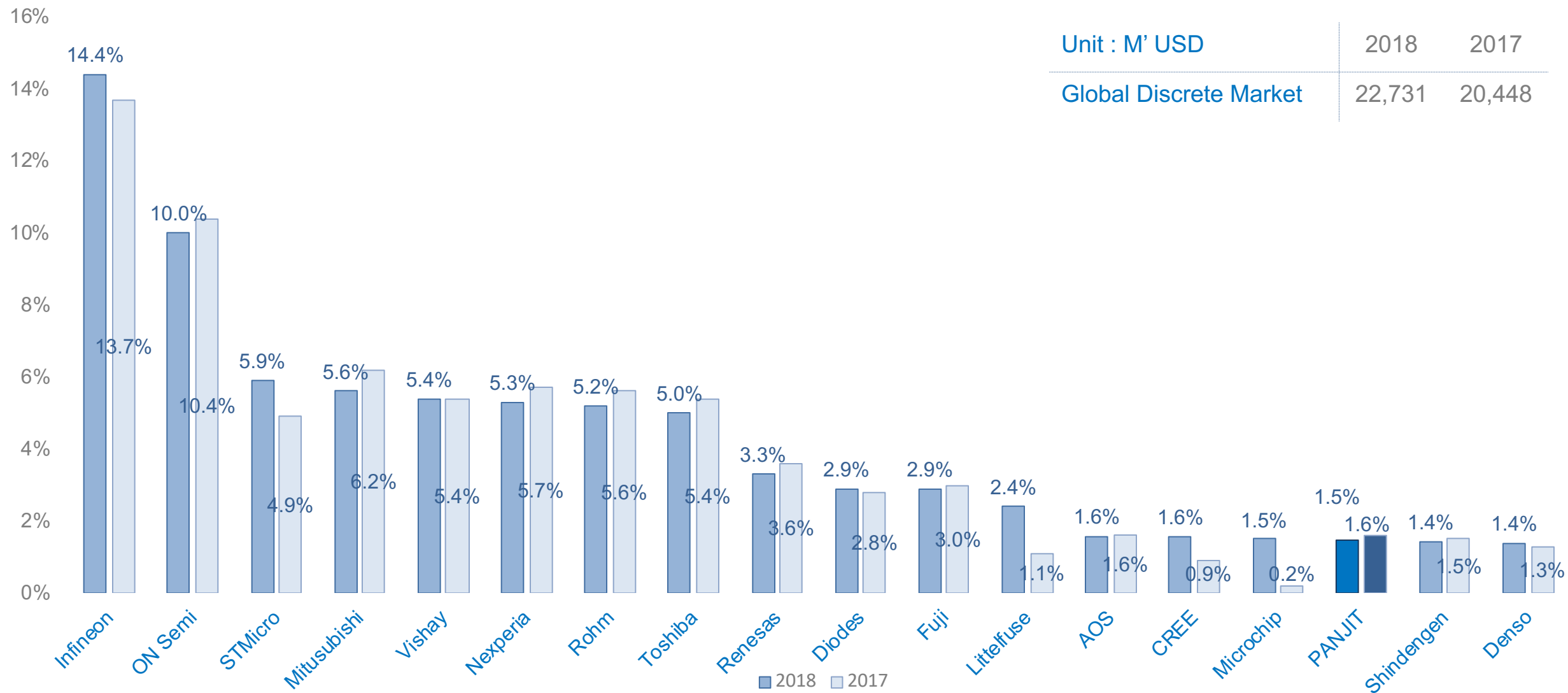


Unit : M' USD

Global Diode Market

2018	2017
6,393	5,903

全球分離式器件 排行 & 市場占比



Unit : M' USD

Global Discrete Market

	2018	2017
Global Discrete Market	22,731	20,448

New

Set up New Global RD center from Tier one DISCRETE wafer supplier

R&D Centre : US San Jose, KR Incheon, TW Zuibe

Tier one Automotive customer increased significantly

Technologies

Front-side fab foundry outsource(8")

New Technologies development, MV Shielded Gate Trench MOS, HV SuperJunction MOS, Field-Stop Planar/Trench IGBT

In-house IGBT & MOSFET (BGBM) & SuperJunction Multi epi process
key toolset set-up for new tech development & mass production (8")

Application and market Trend

應用領域

Automotive



- Body
- xEV
- ADAS
- Infotainment
- Motor

Industrial



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

Power



- Quick charger
- Battery module
- UPS

Consumer



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

Communication



- Networking
- PoE
- VOIP
- Infrastructure

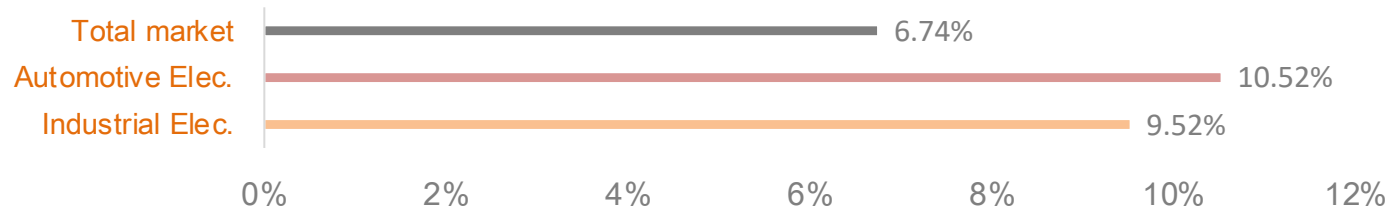
Computing



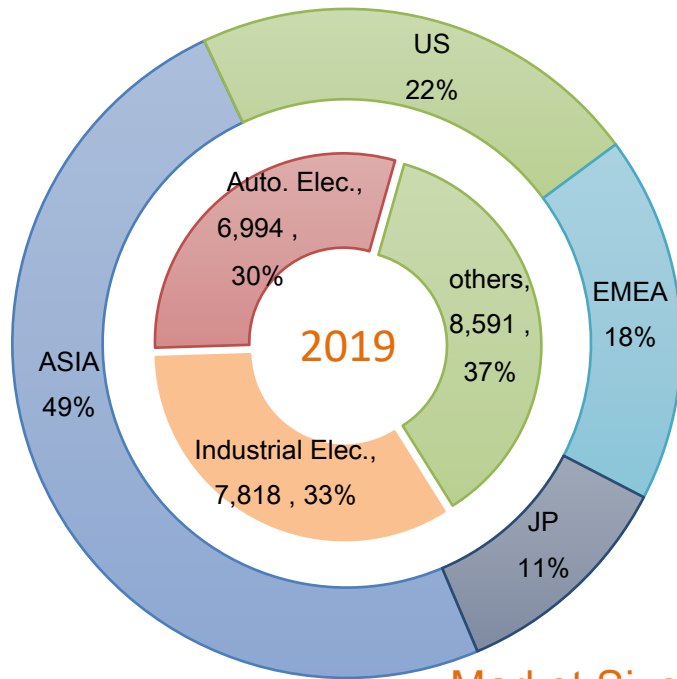
- Desktop PC
- Notebook PC
- Tablet
- Graphic Cards

功率半導體分離式器件市場趨勢

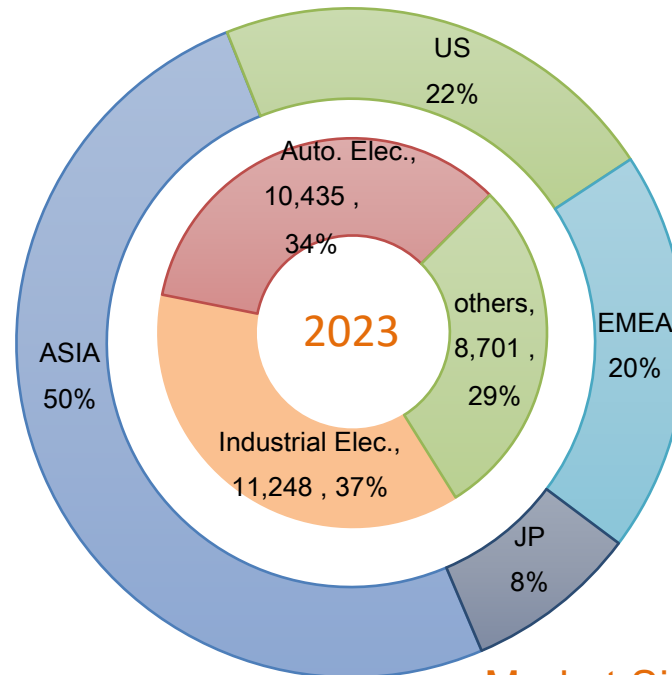
2019-2023 CAGRS



Unit: M' USD



Market Size : 22,731



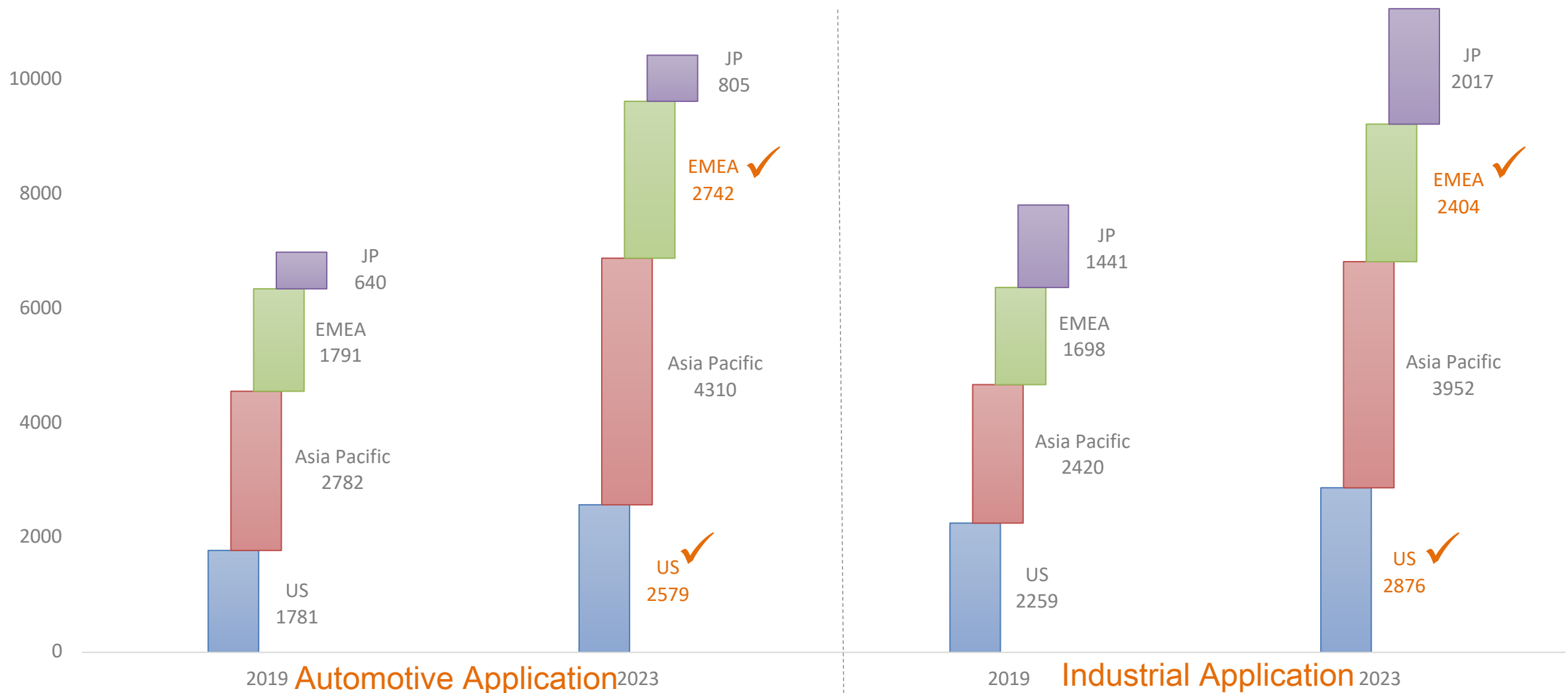
Market Size: 30,385

- The major demand side of the discrete semiconductor will still be the Asia-Pacific region with 50% market size, also the US & EU region with 40% market size
- By application review, the demand of discrete will be focus on **Automotive and Industrial electronic market**. In future four years, the **CAGR will around 10%** in these two markets.

PanJit growth driver : except for GC area, PanJit will also focus on EU & US market in Automotive application and Industrial application

Market Size 2019-2023

12000 Unit: M' USD

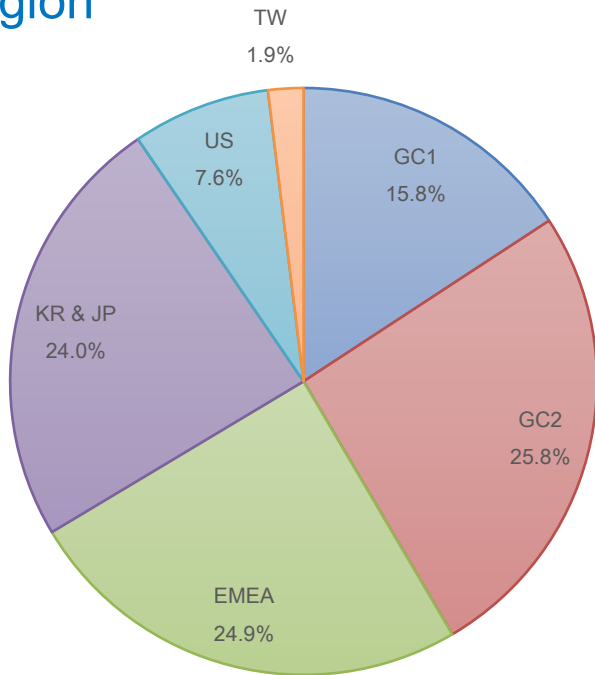


New Team

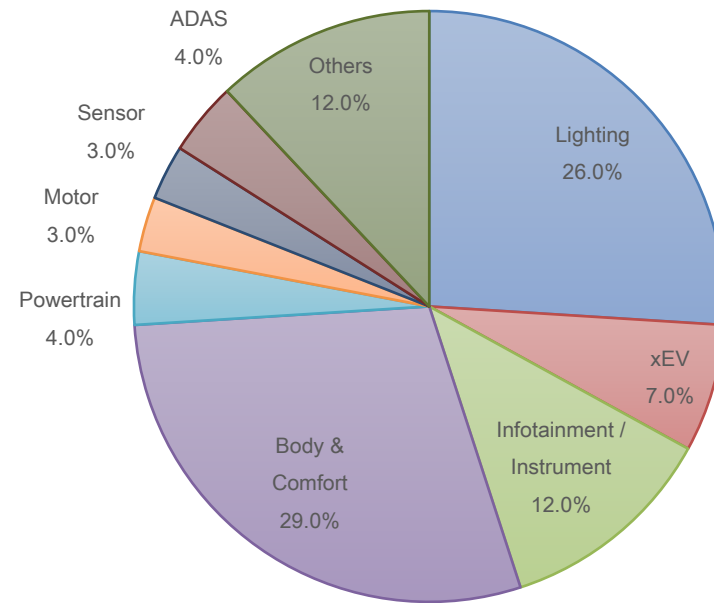
Automotive

PANJIT Automotive 2019 YTD (Sep) Revenue breakdown

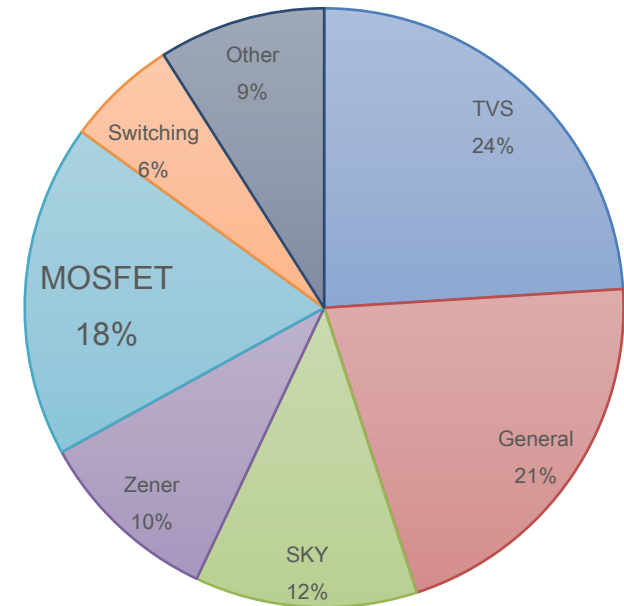
Region



System

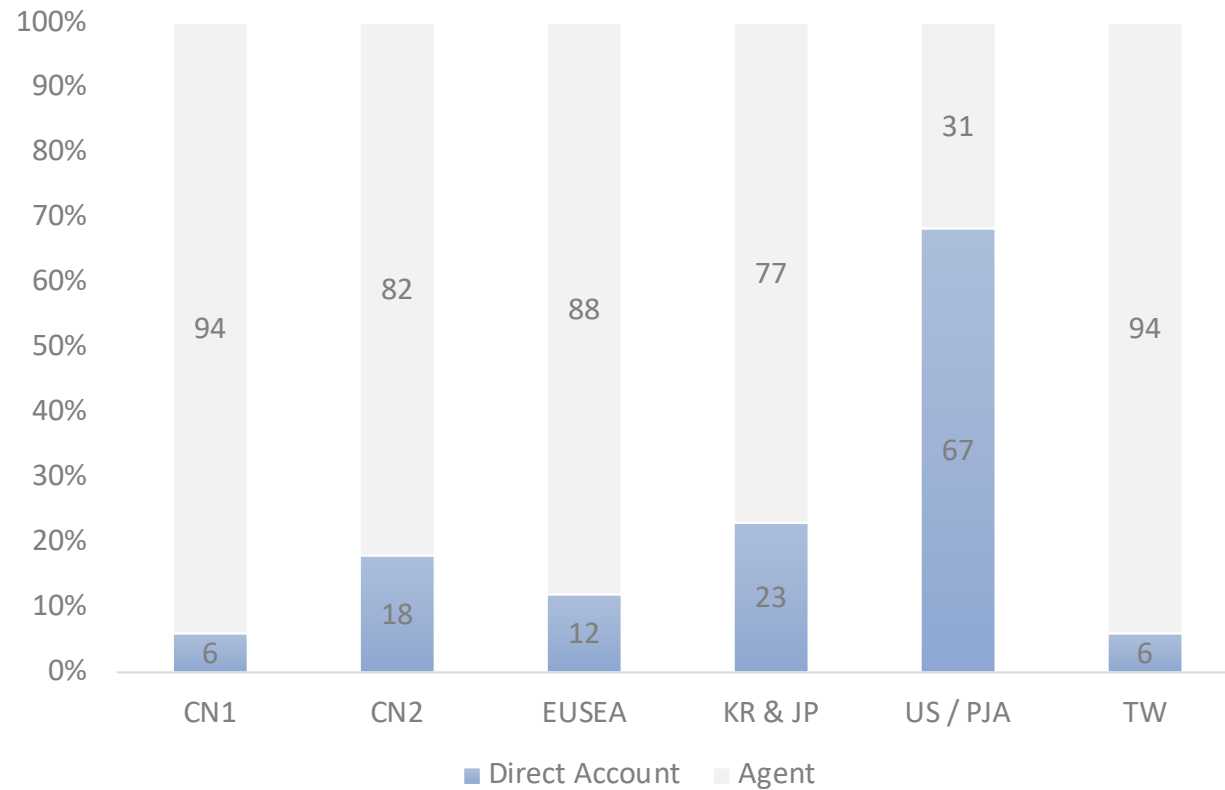


Function

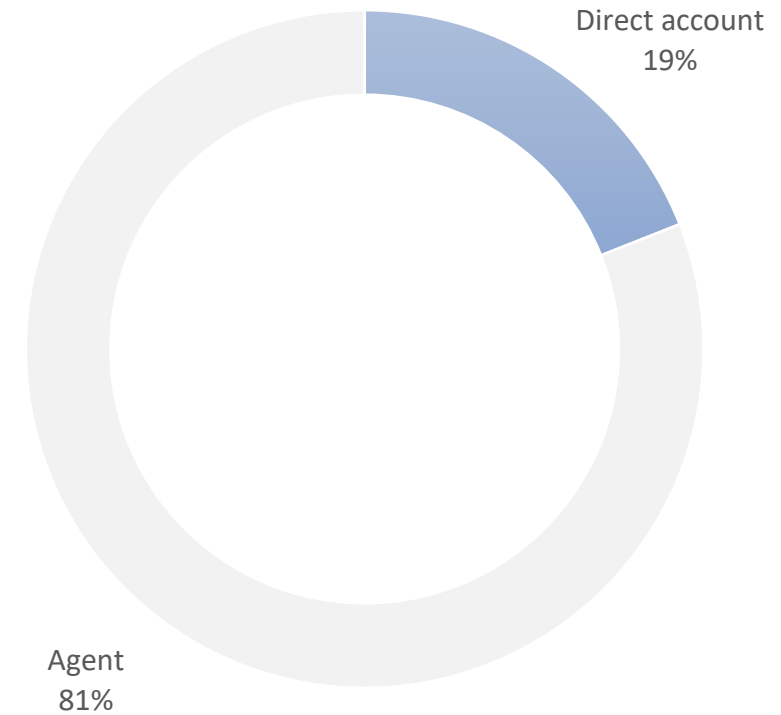


PANJIT Automotive Market Channel – 2019 YTD (Sep)

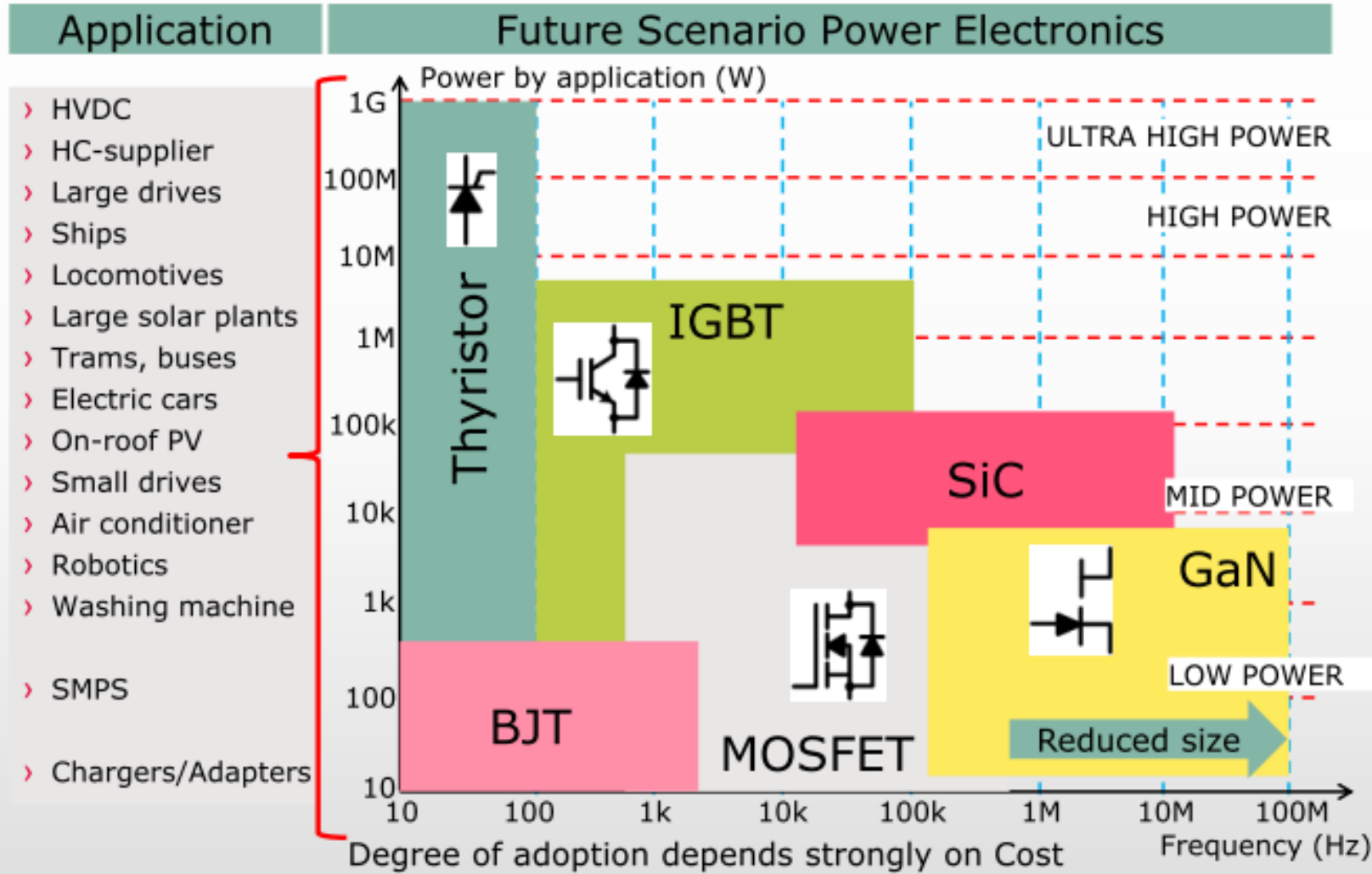
AU 2019 YTD Sales Channel by region



Sales Channel



New Technologies focus



Report covers

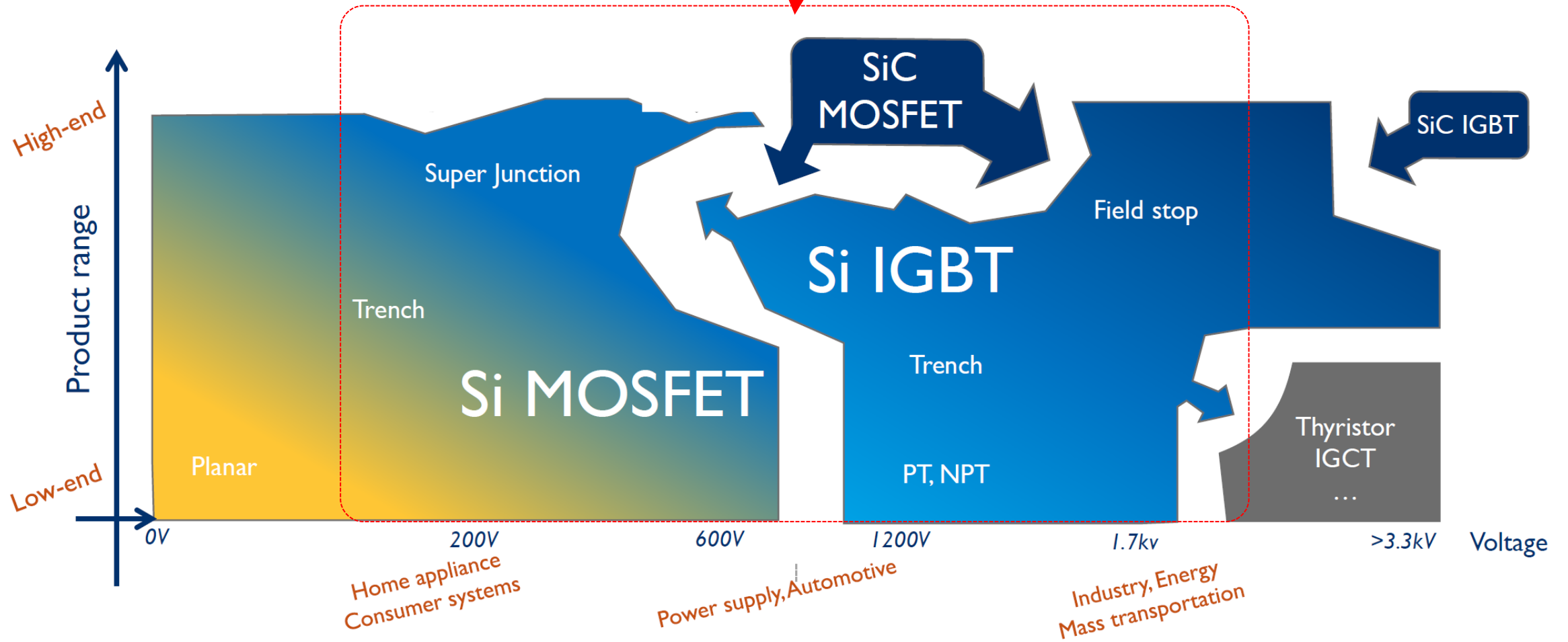
- IGBTs
- MOSFETs
- GaN
- SiC
- Controllers
- Passives

Detailed discussion of

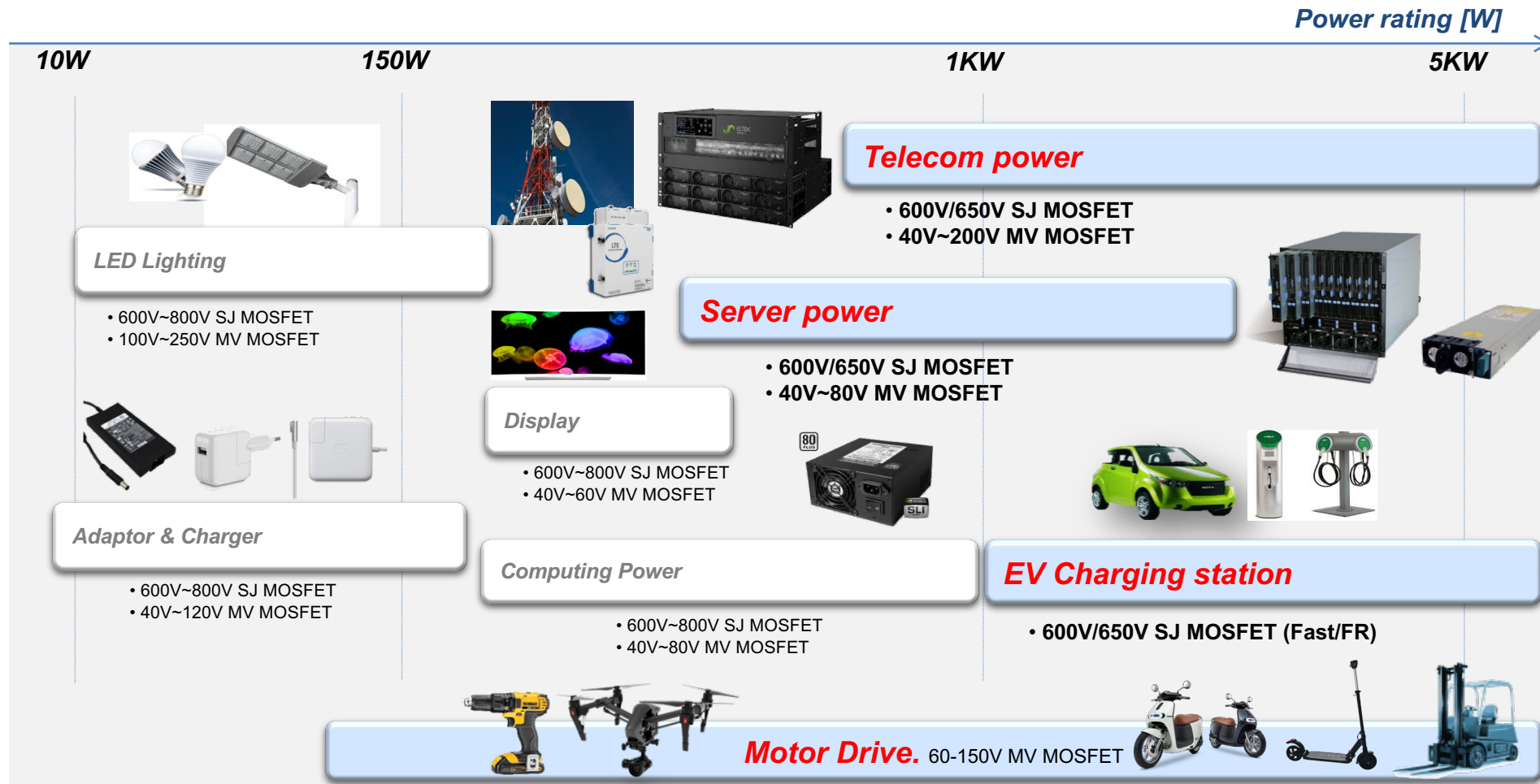
- Market Drivers
- Key Metrics
- Trends
- Challenges

PanJit Focus Power Discrete Technologies

40V – 1.2 kV is PanJit focus

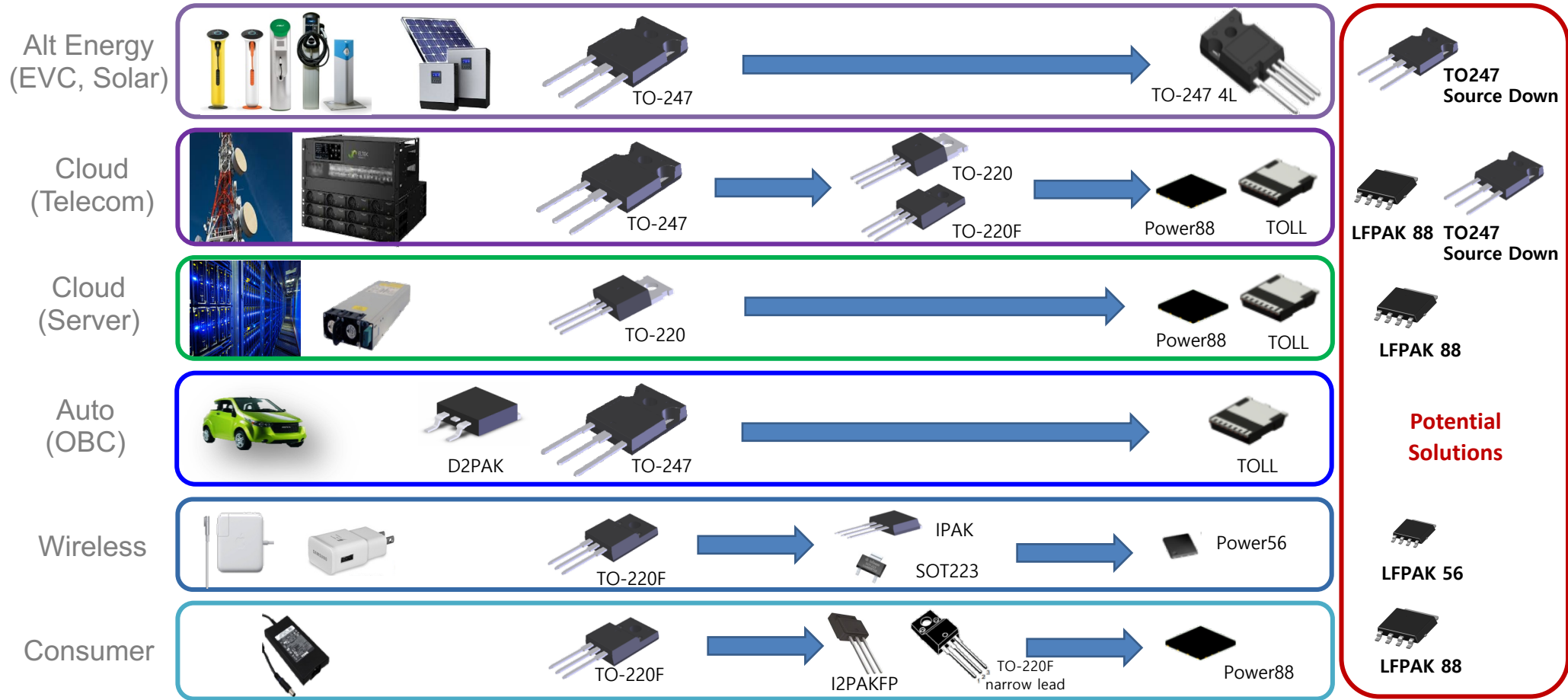


MV/HV MOSFET application



- Telecom power (TO220/F, TO247, D2PAK7L, PQFN56/88, TOLL)
- Server power (TO220/F, TO247, PQFN56/88, TOLL)
- EV Charging station (TO247, TOLL)
- Battery Powered Motor Drive (TO-220, D2-PAK, D2-PAK 7L, PQFN56/88, TOLL)

MOSFET Package Trend



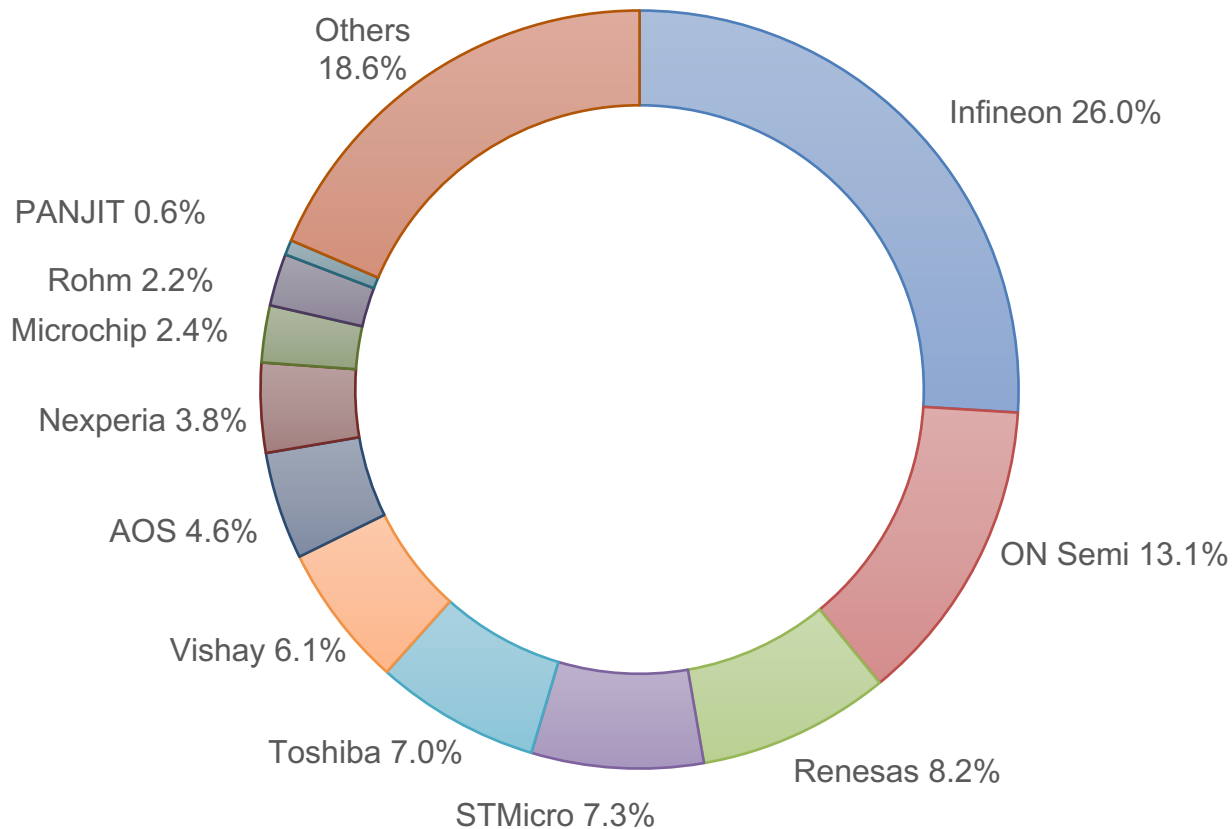
PANJIT Plan: 2021 – 2022

2023 –

☐ Value = Power Density → Surface Mount

MOSFET Market Share (Discrete)

2018 MOSFET Market share



Unit : M' USD

MOSFET Company

Revenue

MOSFET Company	2017	2018
Infineon Technologies	1,753.6	1,938.6
ON Semiconductor	854.5	978.3
Renesas Electronics	609.9	611.7
STMicroelectronics	450.6	547.0
Toshiba	492.6	523.0
Vishay Intertechnology	375.0	456.3
Alpha and Omega	304.0	342.6
Nexperia	243.4	285.0
Microchip	0	181.0
Rohm	143.7	166.2
PANJIT	31.3	47.6
Total Market	6,651.3	7,464.2

IGBT Target Technology to Applications

2012 – 2022

400 V

650 V

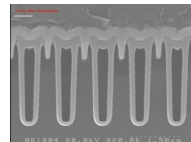
750 V

950 V

1200 V

1700 V

Ultra narrow
mesa based
leading edge
performance



Gen1



Ultrathin devices, < 50um
Rooftop Solar Inverters
New market



Solar, UPS, Motor Control
PIM, IPM, Discretes
High/Med/Low Speed, RC



SCR for Automotive High Power Modules
Dual Side Cooling
EV/HEV, 475V batteries



PIM
Solar Inverters



SCR for EV/HEV, 600V batteries
New market

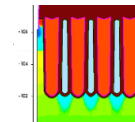


Automotive High Power Modules
EV/HEV, 800V batteries



UltraFS SCR
Bonded

Industrial, Wind power



Novel device architecture,
low capacitance, improved
 $V_{ce,sat}$ – SCWT trade-off,
drift engineering

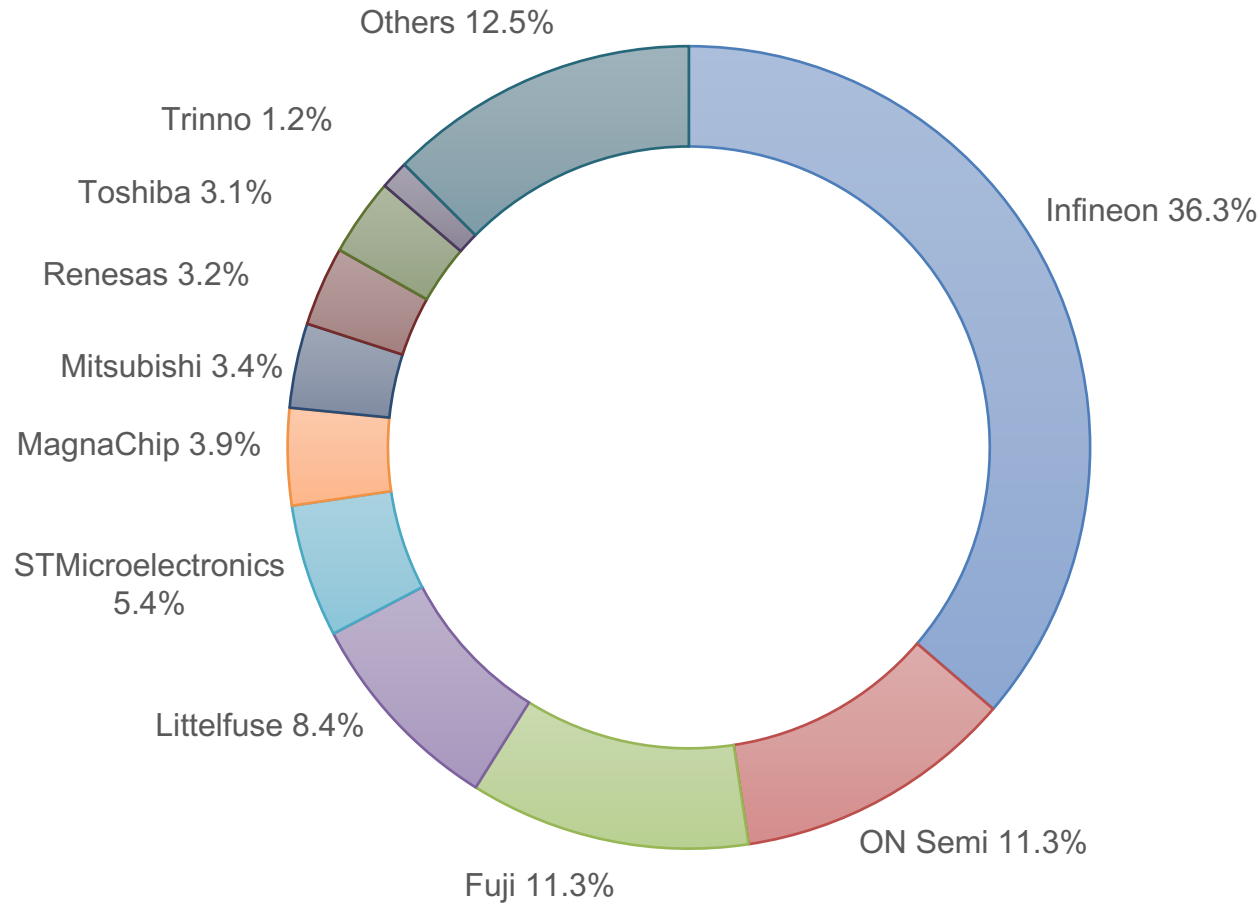
Next Generation
(Application Specific)

■ Current focus

■ Next Potential Development

IGBT Market Share (Discrete)

2018 IGBT Market Share



Unit : M' USD

Revenue

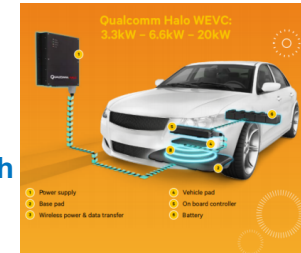
MOSFET Company	2017	2018
Infineon Technologies	424.4	469.2
ON Semiconductor	127.8	146.3
Fuji Electric	132.8	145.9
Littelfuse	28.2	111.8
STMicroelectronics	57.0	69.2
MagnaChip	45.2	50.4
Mitsubishi (inc. Powerex)	39.6	44.1
Renesas Electronics	41.3	41.4
Toshiba	38.0	40.3
TRinno	13.7	14.9
Total Market	1,161.1	1,292.4

SiC Diode Application Specific

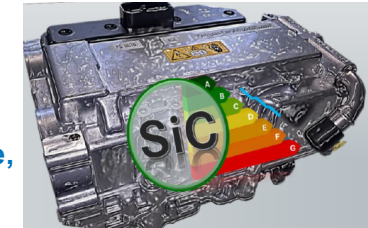


650V SiC Diodes (Fast)
Power supplies/PFC
Market share 2018: **60%**
Key FOM: **Qc x Vf**

1200V SiC Diodes
Battery charger, OBC, Traction drives
Market share 2018: 8%
Key FOM: **Surge capability, SMD package, Low Rth**



1200V SiC Diodes
Industrial Drives, DCDC
Market share 2018: 5%
Key FOM: **Robustness, Price, Excellent thermal package**



Simple part with diverse needs



650V/1200V SiC Diodes
Hybrid inverter/Solar
Market share 2018: **20%**
Key FOM: **Low reverse leakage, Moisture resistance, Module**

1700V-3300V SiC Diodes
Traction drives, HVDC systems
Market share 2018: 5%
Key FOM: **Robustness, Leakage, Max die size/price**



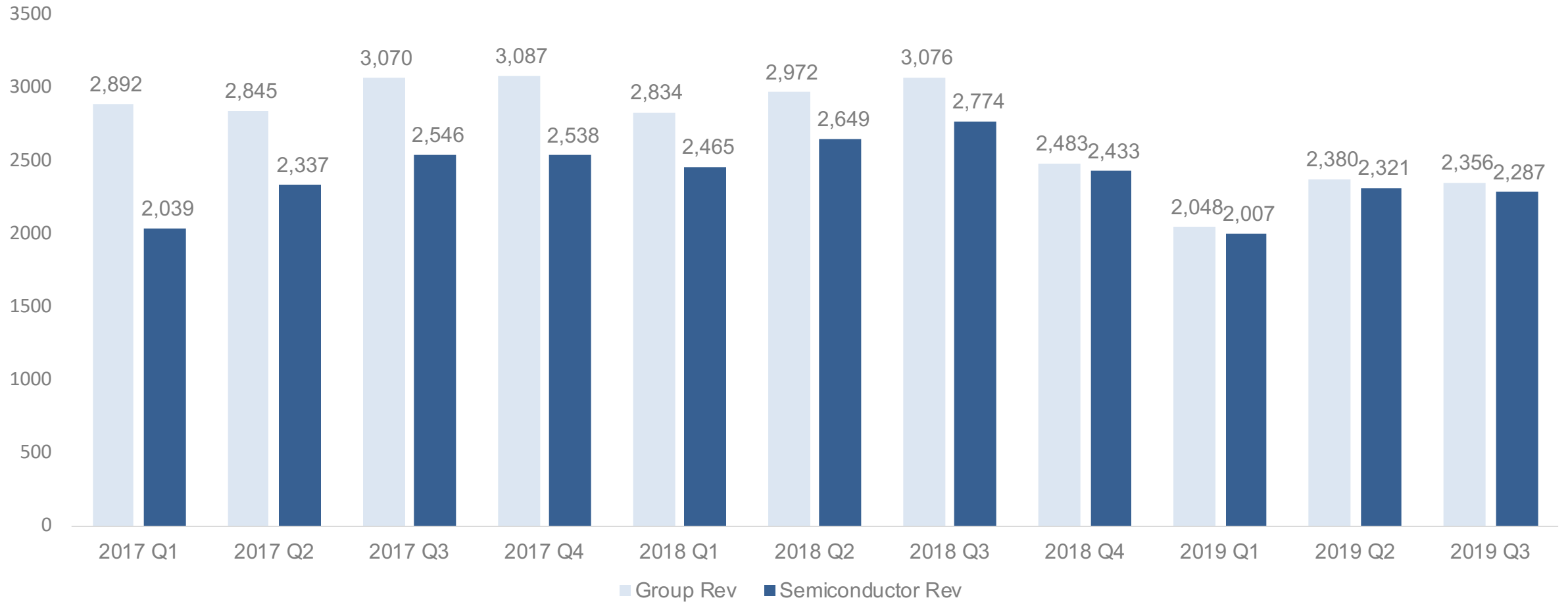
Financial Info

重點彙總 2018 vs 2019 YTD (Q3)

FY 2018	Revenues	Gross Margin	EBITDA & Margin	EPS	Cash Flow from Operating Activities
	NTD 11.4Bn	22.3%	NTD 2,037 Mn 17.9%	NTD 2.41	NTD 1,835 Mn
2019 YTD	Revenues	Gross Margin	EBITDA & Margin	EPS	Cash Flow from Operating Activities
	NTD 6.8Bn	20.9%	NTD 1,148 Mn 16.9%	NTD 1.02	NTD 894 Mn

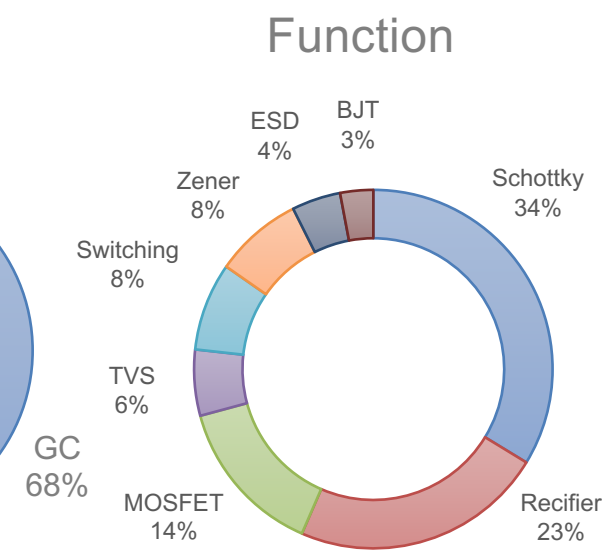
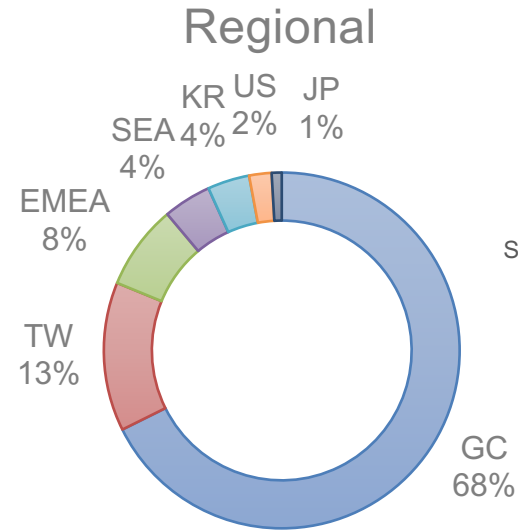
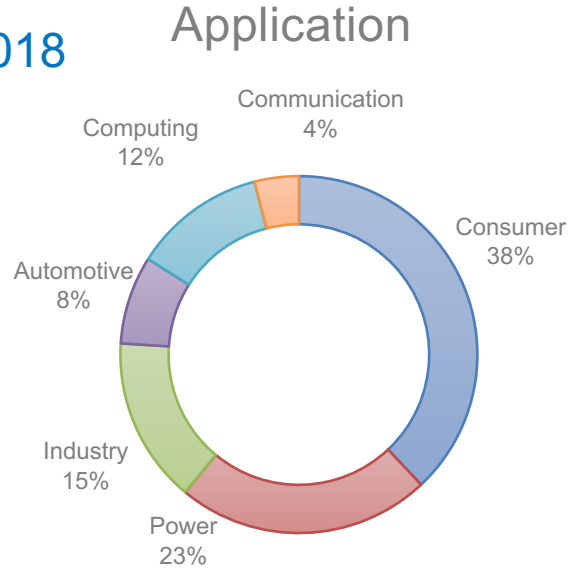
PANJIT Group Rev & Semiconductor BU Rev

Unit: M' NTD

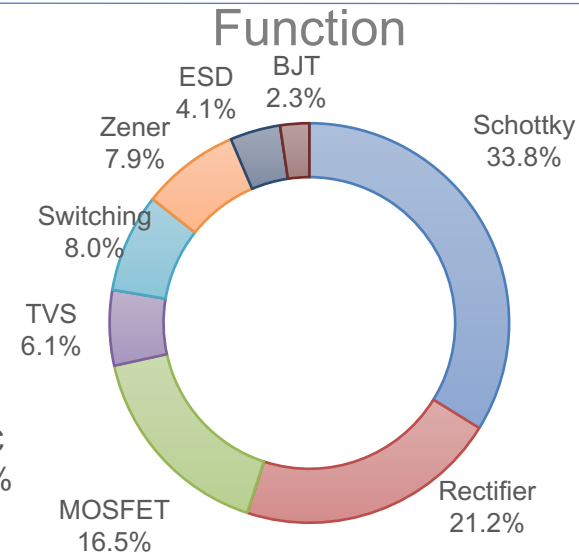
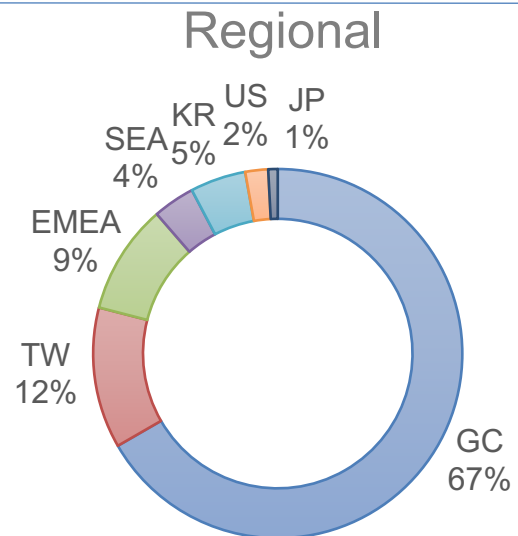
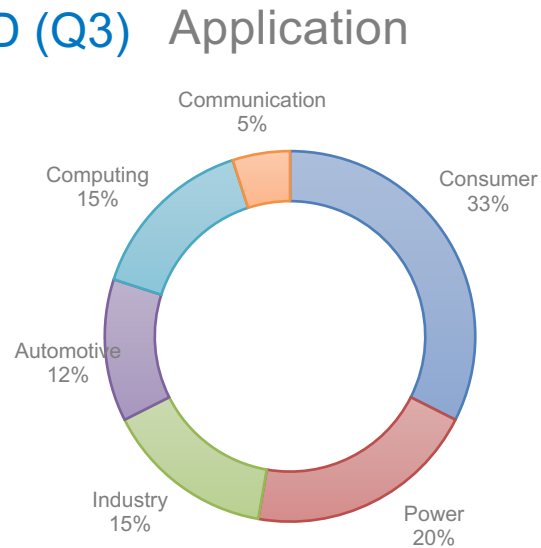


2018 vs 2019 YTD(Q3) Semiconductor revenue breakdown

2018



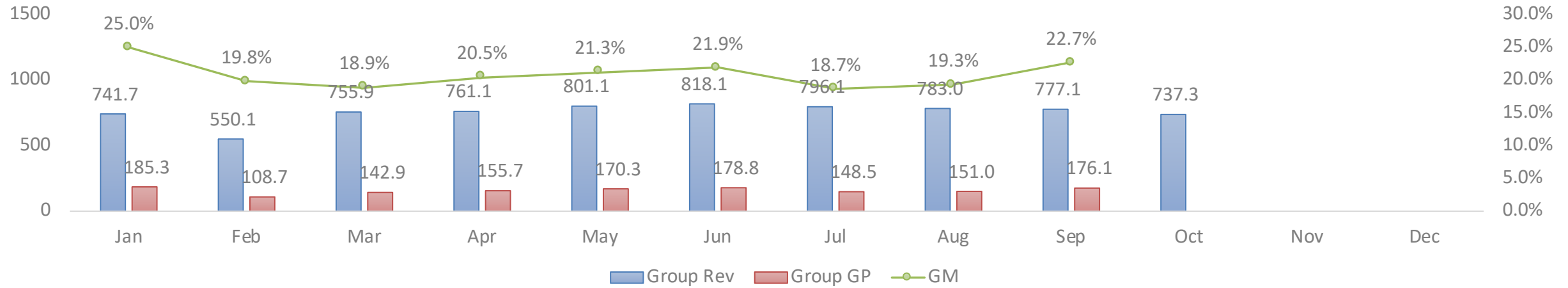
2019 YTD (Q3)



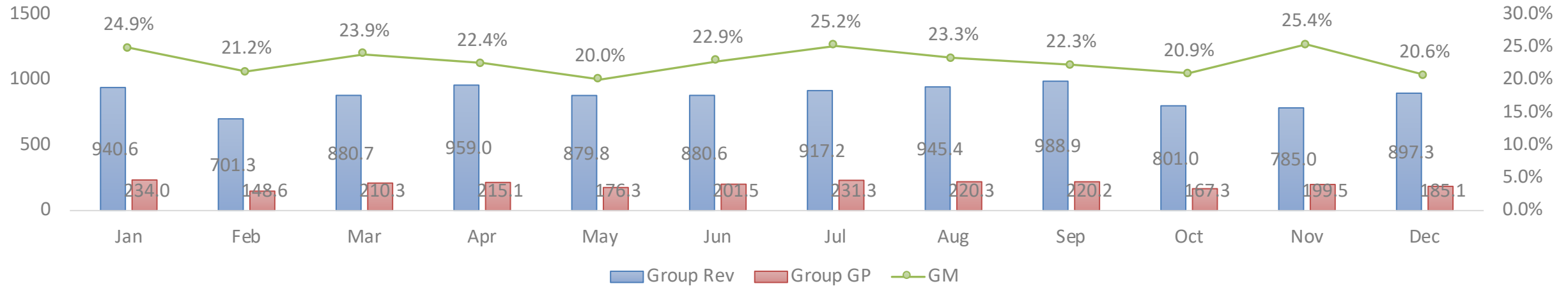
PANJIT Group 2019 YTD & 2018 - Rev & GP

Unit: M' NTD

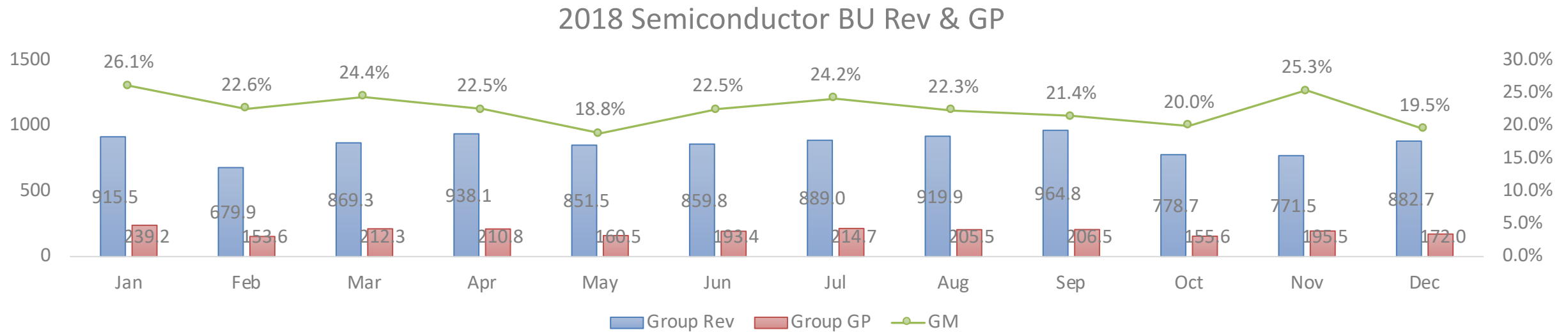
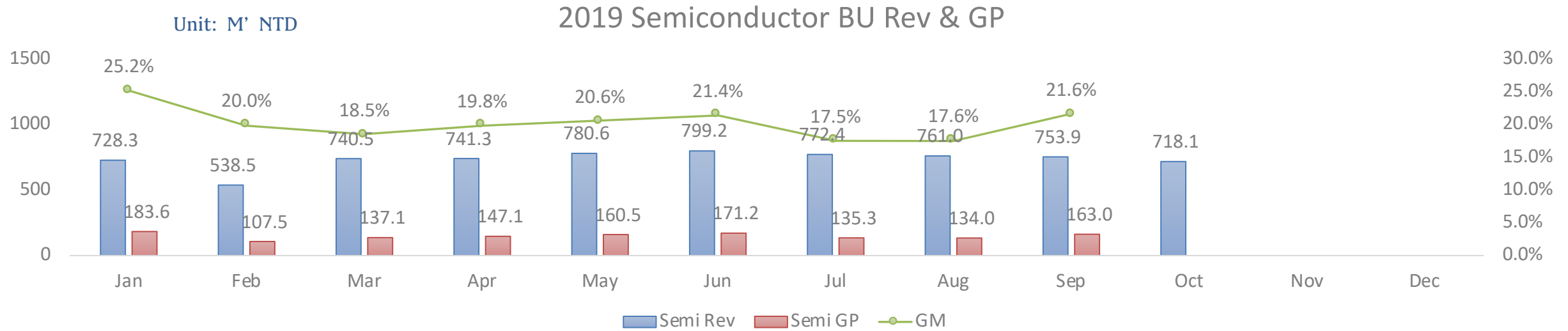
2019 Group Rev & GP



2018 Group (no Mildex) Rev & GP



PANJIT Semiconductor BU 2019 YTD & 2018 - Rev & GP



Thank You

