

688396.SH

IDM

247 2 8 133 3 6 1 12

5G

1 5G
UPS

2 IGBT MOSFET

3 IGBT 132
yole 2023 CAGR 4.05% IGBT&MOSFET 8

MOSFET

12

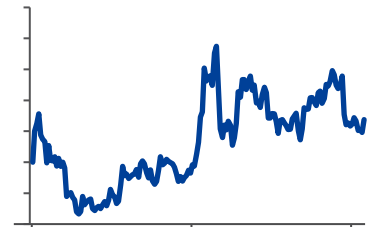
12 6 SiC

12
MOSFET

2020~2022

9.53/13.33/14.90

	49.88
()	60,650.35
()	1,215.93
(%)	20.48
30 ()	8.29



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	2018A	2019A	2020E	2021E	2022E
yoy %	6.7	-8.4	19.2	23.0	6.9
yoy %	429	401	953	1,333	1,490
EPS /	511.0	-6.7	137.8	39.9	11.8
%	0.35	0.33	0.78	1.10	1.23
P/E	10.7	8.0	14.3	16.7	15.8
P/B	136.0	145.8	61.3	43.8	39.2
	14.1	10.8	9.2	7.6	6.4



	2018A	2019A	2020E	2021E	2022E			2018A	2019A	2020E	2021E	2022E
	5106	5092	7280	8465	9950			6271	5743	6843	8418	8998
	1538	1931	1864	3806	3982			4690	4431	4790	5893	6299
	1108	1006	1514	1586	1727			85	66	86	101	110
	1184	13	1413	341	1534			126	112	136	118	90
	68	52	91	85	103			374	377	411	505	513
	1181	1055	1362	1611	1567			450	483	493	547	567
	27	1036	1036	1036	1036			0	31	13	-24	-77
	4886	5003	4553	4997	4635			-72	-37	7	8	9
	0	82	163	245	326			91	239	165	202	183
	3898	3816	3329	3656	3268			0	0	0	0	0
	294	275	295	320	315			11	-0	5	3	4
	693	830	765	776	726			9	2	6	4	5
	9992	10095	11833	13462	14586			586	478	1085	1478	1680
	4654	1979	2600	3047	2886			11	33	22	27	25
	0	0	0	0	0			6	4	5	5	5
	800	848	934	1258	1085			591	506	1101	1500	1699
	3854	1130	1666	1789	1801			53	-6	42	19	44
	318	1726	1425	1145	804			538	512	1059	1481	1656
	0	1506	1205	925	585			108	112	106	148	166
	318	220	220	220	220			429	401	953	1333	1490
	4972	3704	4025	4192	3690	EBITDA		1498	1257	1726	2181	2451
	872	968	1074	1222	1387	EPS /		0.35	0.33	0.78	1.10	1.23
	830	830	1216	1216	1216							
	6021	5450	5450	5450	5450							
	-3049	-1225	-203	1203	2787							
	4148	5423	6735	8048	9508							
	9992	10095	11833	13462	14586							

——	IDM	.....	5
1.1		.....	5
1.2	MOSFET	.....	6
1.3		.....	9
1.4		.....	10
		.....	12
2.1 5G		.....	13
2.1.1		.....	13
2.1.2 5G		.....	17
2.2	IBGT MOS	.....	18
2.3		.....	23
		.....	25
3.1		.....	25
3.2 MOSFET		.....	28
		.....	29
4.1 IDM		.....	29
4.2		.....	30
		.....	31
12			

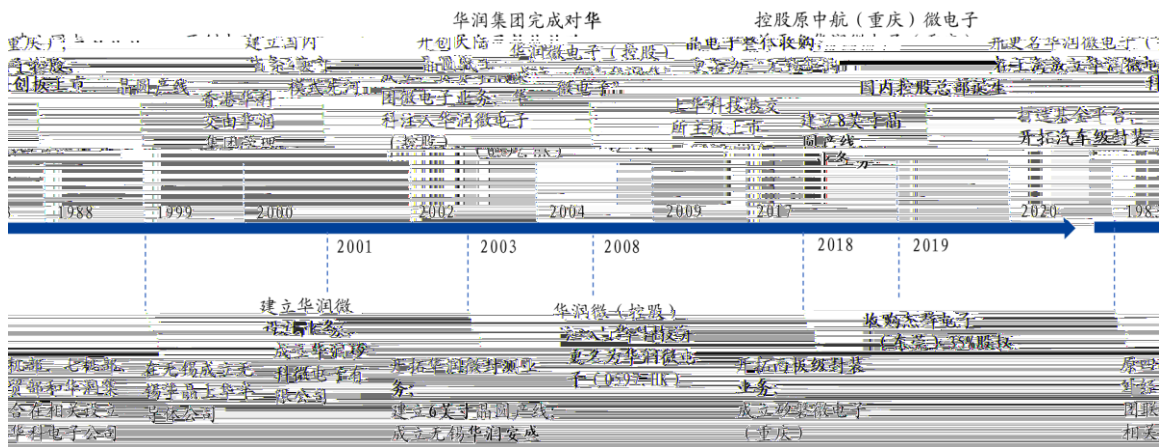
23				14
24	X86			15
25	X86			15
26	UPS			15
27	2018-2024			16
28	5G	1GHz=1000MHz		17
29				17
30	5G			17
31				18
32	%			18
33				18
34				19
35				19
36				19
37				20
38				20
39				20
40				20
41	EV/HEV			21
42	2018 IGBT			21
43	IGBT			21
44				22
45	IGBT			22
46				22
47	2025 IGBT			22
48	MOSFET			23
49				23
50				23
51				24
52				24
53	IGBT			24
54	IGBT			24
55				25
56	IGBT			25
57	12	8		26
58	12			27
59	12			27
60	12			27
61	200nm			28
62	2018 200nm			28
63	8			28
64	2018 MOSFET			29
65	2018 MOSFET			29
66	" + "			30
67	IPO			30
68				31
69	2020/10/28			32

IDM

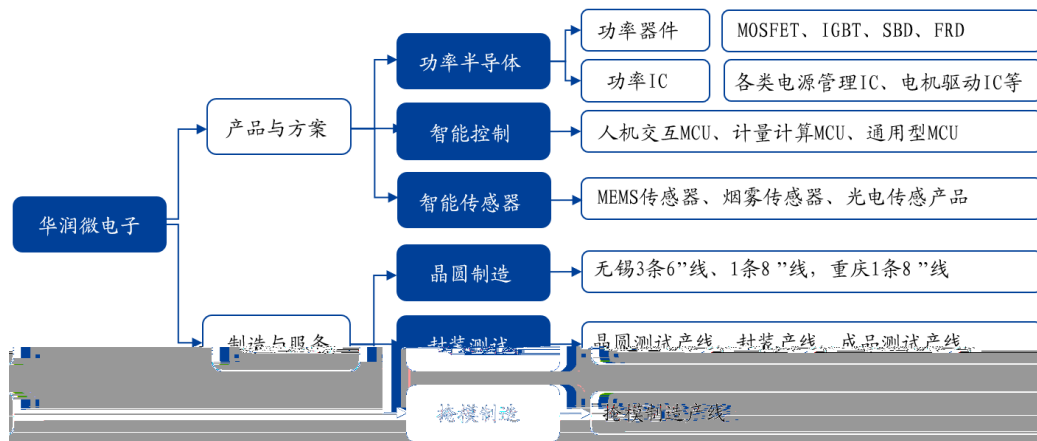
1.1

1983
4 6
2018
IDM
2018 2019
90%

1



2



1.2

MOSFET

MOSFET IGBT SBD FRD IC IC MOSFET MOSFET

3

MOSFET	-100V-1500V	MOS	MOS
IGBT	600V-1200V	MOS	MOS
SBD	45V-150V	SBD	SBD
FRD	200mA-30A		
	200V-6500V		

4 2019 MOSFET

2019	MOS
58	27.4%
39	18.4%
16	7.5%
12	5.7%
11	5.2%
10	4.7%
66	31.1%
212	100.0%

Omdia 2019

IC

AC-DC
LED

IC BMS IC
WPC QI

AC-DC	AC-DC				
LED	IC	LED			
BMS IC					
	IC		78 1117		100mA-1A
	IC			100W	
	IC				

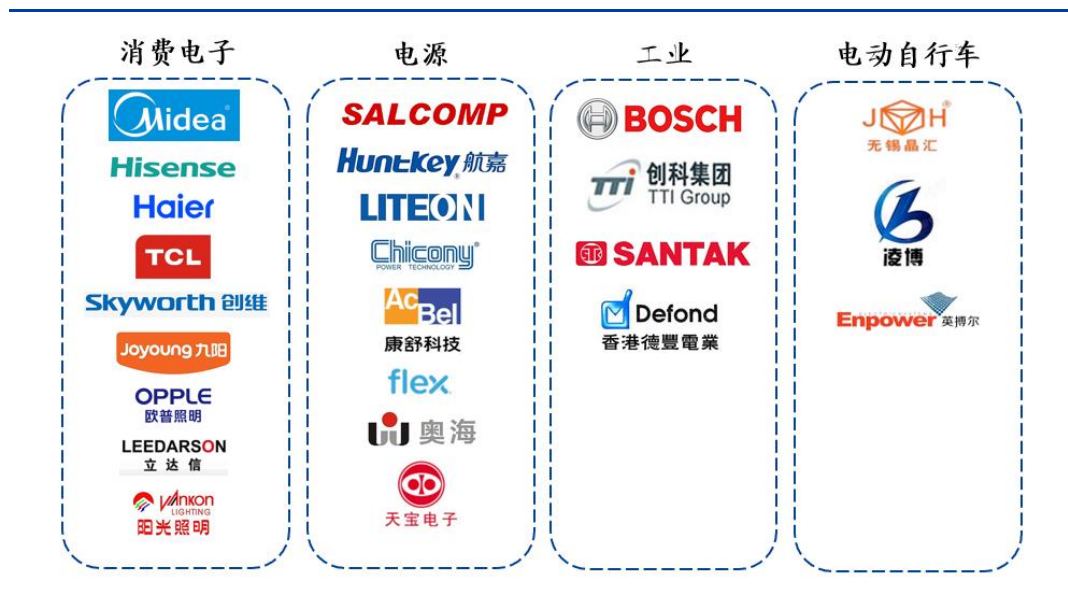
	SOI	BCD	MEMS			BCD		MEMS
2)	8							MOS
	SBD		MOS IC	MOS	IGBT	GaN		
							62	
					Pep Innovation			
							2.4 2018	
			27%					

7

2018

	3	6"	Analog	BCD	MEMS	DMOS	Power Discrete				247
	1	8"	Advance	BCD	Analog	DMOS					73
	1	8"	MOS			MOS	MOS	SBD			60
											199
	QFP			QFN	PQFN	FC-QFN	TSSOP	SSOP	MSOP	IPM	62
											69
											2.4

8



1.3

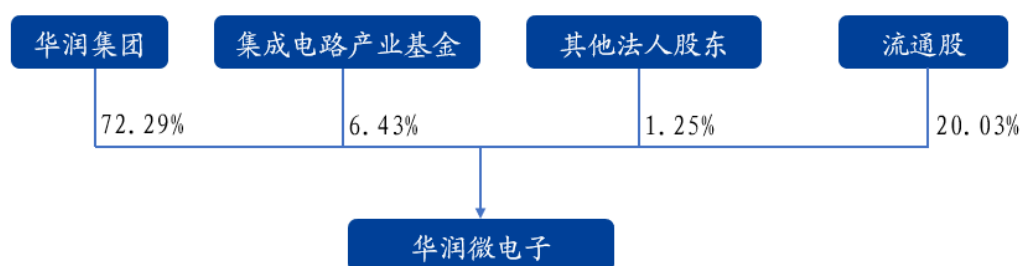
72.29%
100%

100%
6.43%

20

9

2020.10.26



Wind

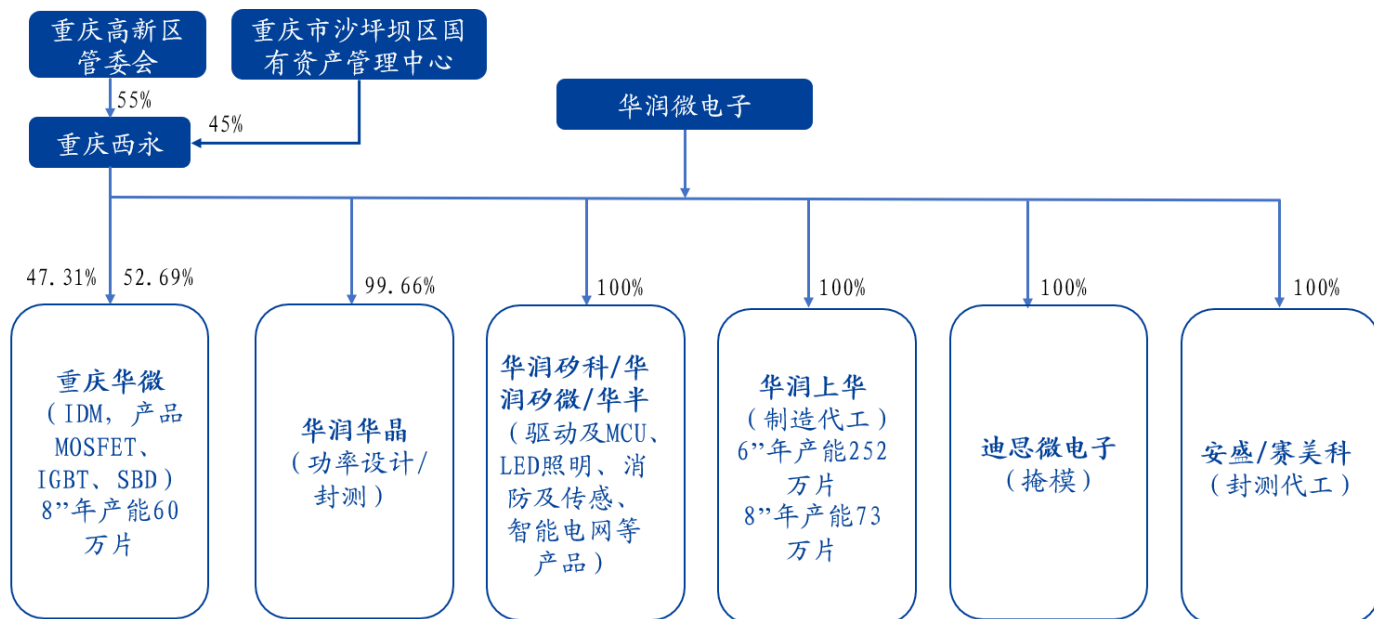
6

8

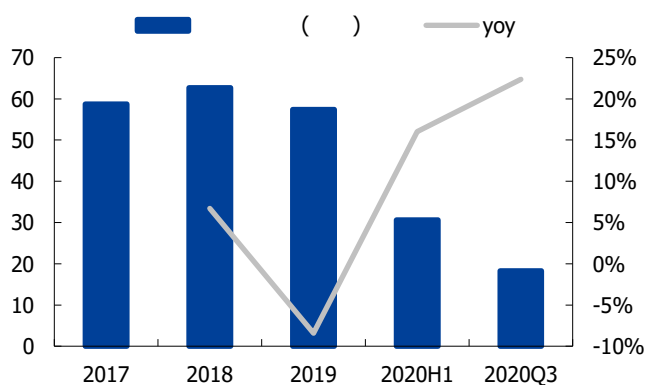
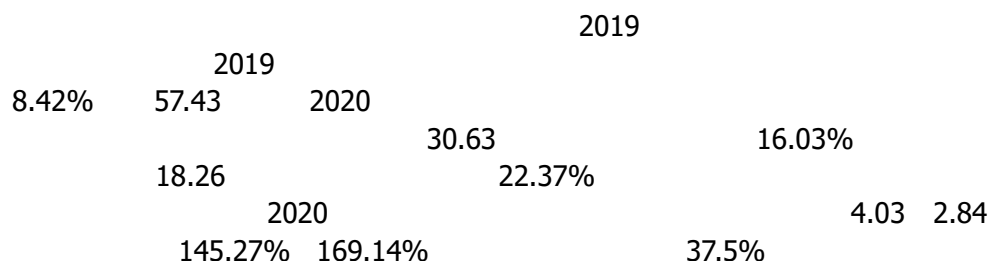
IDM

8

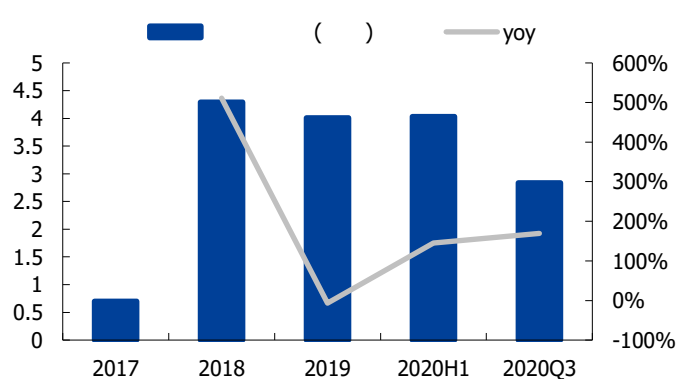
IC



1.4



Wind



Wind

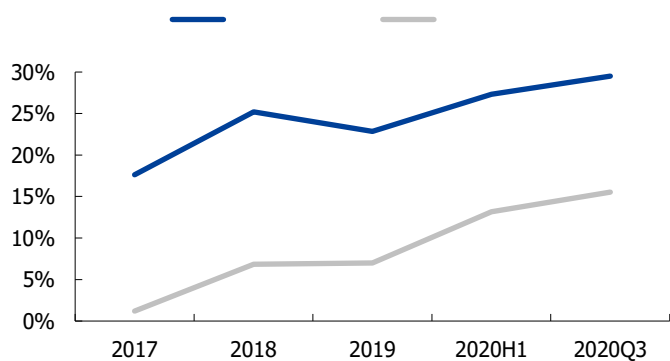
30% 44% 2019 2016 2019 2020
IGBT

13

	2019	2018	2017	2019	2018	2017	2019	2018	2017
	25.2	26.8	23.4	44.1%	42.9%	39.9%	29.5%	34.0%	19.6%
	22.7	24.2	20.7	39.8%	38.7%	35.3%	28.5%	33.8%	17.7%
	1.4	1.4	1.0	2.4%	2.2%	1.7%	43.4%	40.4%	39.2%
	0.9	1.0	1.3	1.6%	1.6%	2.2%	30.2%	30.7%	31.4%
IC	0.2	0.3	0.5	0.3%	0.4%	0.8%	47.6%	30.9%	30.3%
	31.8	35.7	35.2	55.9%	57.1%	60.1%	17.8%	18.6%	16.3%
		26.7	25.6		42.8%	43.8%		19.5%	16.1%
	8.1	7.9	8.2	14.2%	12.6%	14.0%		15.3%	16.8%
		1.1	1.4		1.8%	2.3%		19.5%	18.8%
	57.0	62.6	58.6	100.0%	100.0%	100.0%	22.9%	25.2%	17.6%

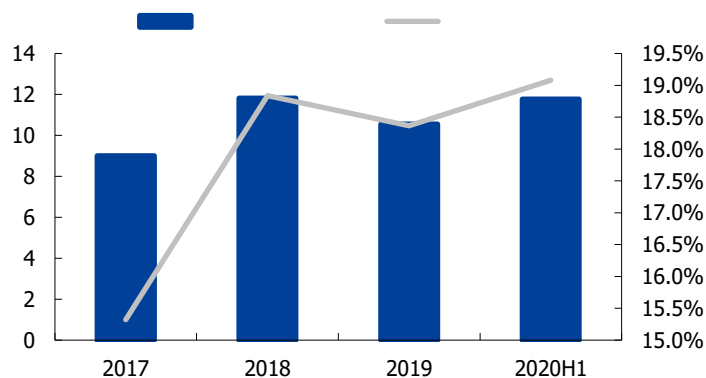
2016 2019
2020Q3 29.5%

14



Wind

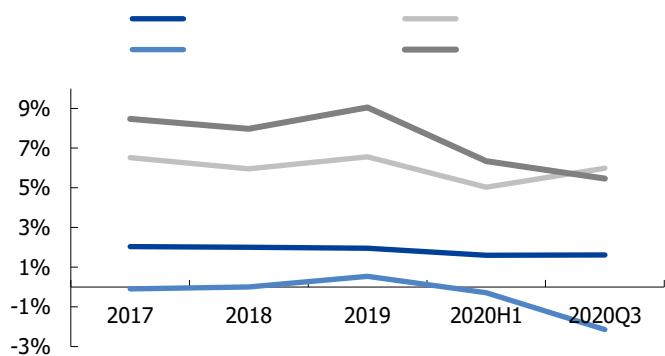
15



Wind

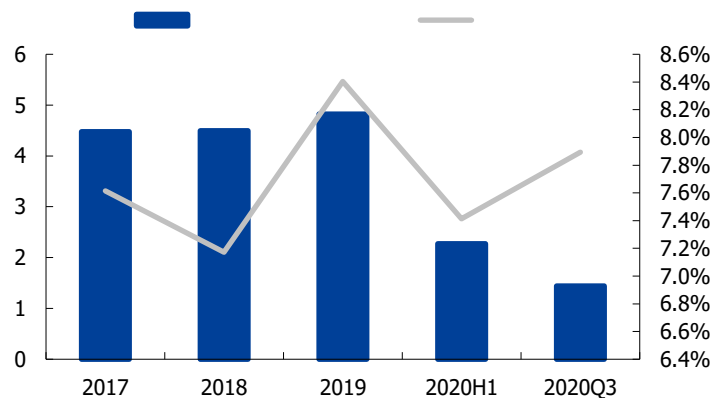
2020

16



Wind

17



Wind

2020 2.27 13.8

7%

BCD SBD

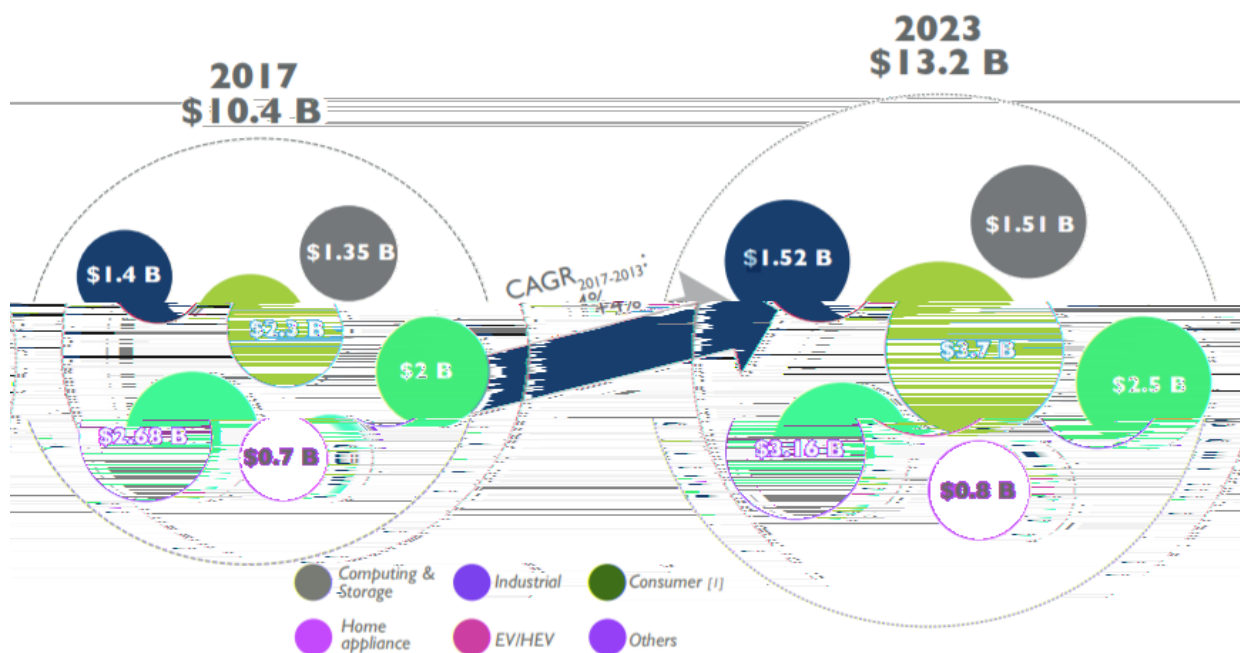
LED

Yole 2017 26.8 IGBT&MOSFET 104

2023 / 132 23

MOSFET IGBT 63% 5G EV/HEVs 37

5 2017-2023 8.3%



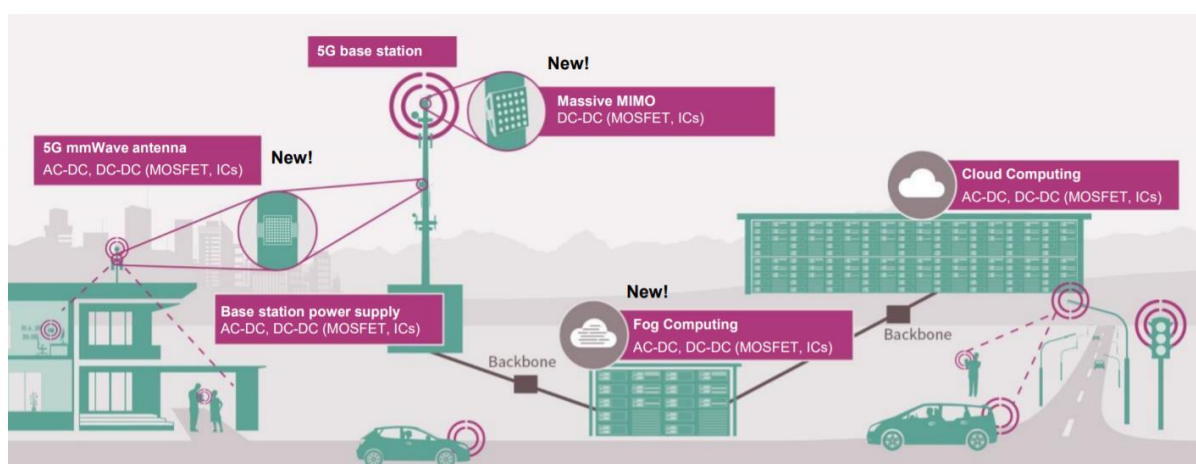
Yole 2018

2.1 5G

5G

- 1) 5G
- 2) 5G
- 3)
- 4)

MIMO



2.1.1

5G

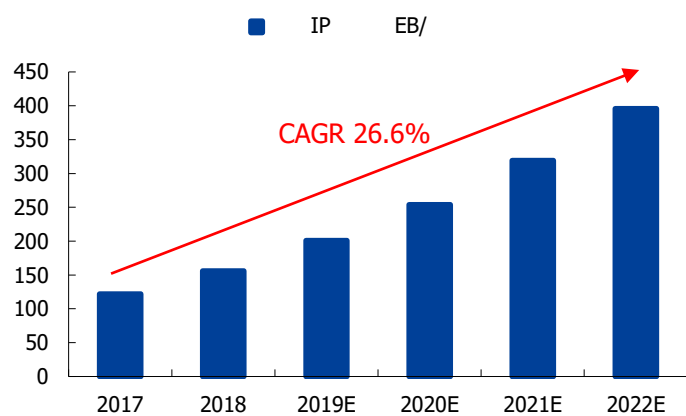
AI

Cisco 2022
Gartner
26.6%

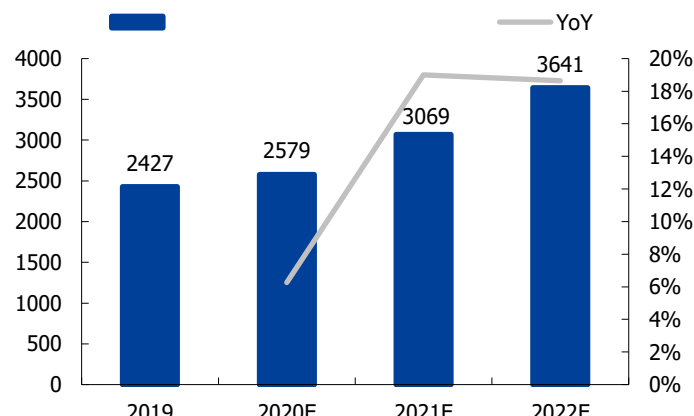
IP 2019 2022
2017~2022 CAGR
3641

20 IP

21



Cisco



Gartner

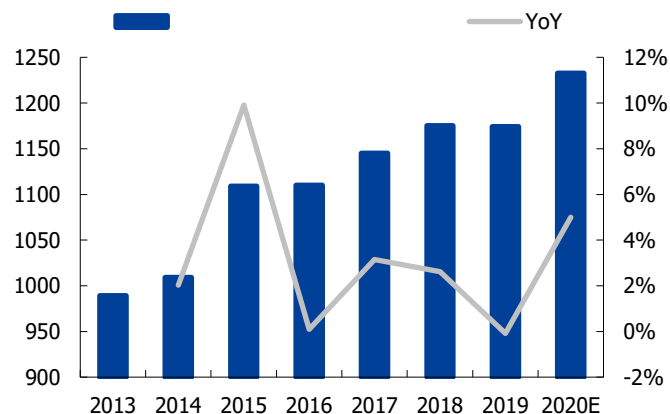
TrendForce 2020
19.8% 5%

2015 2018
IDC
0.2%

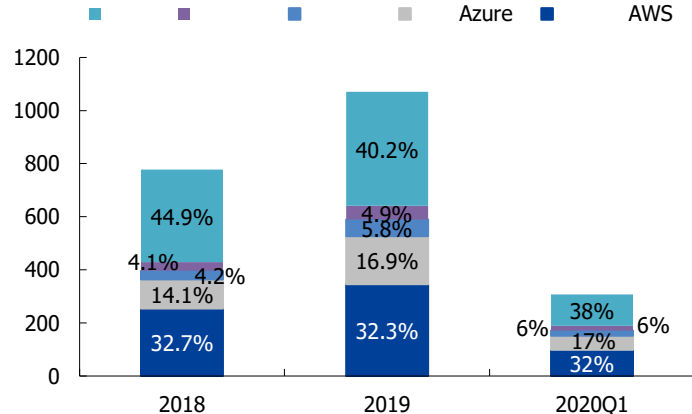
5G
2021

22

23



IDC TrendForce



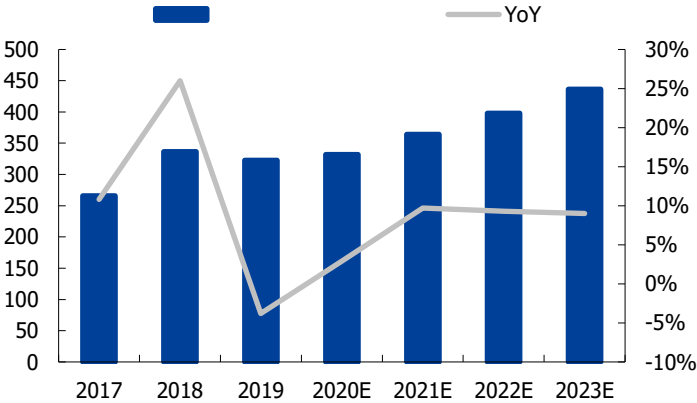
Canalys

5 5000

5 5G

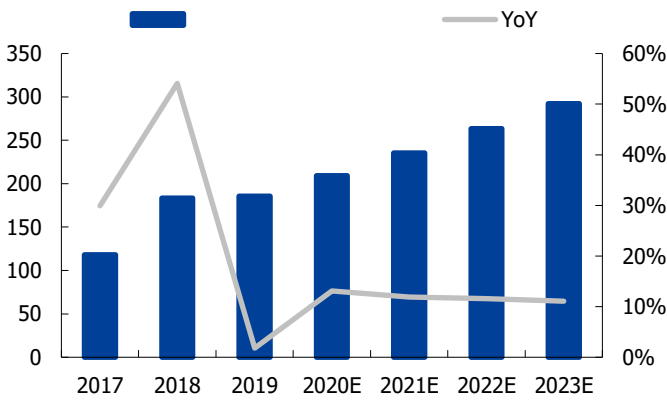
2019

24 X86



IDC

25 X86



IDC

UPS

70%

UPS

85%-89%

10% 20%

93% 95%

IT

500kW

(EER) 3:1

UPS

UPS

UPS

26 UPS

		UPS	93%	UPS	96%
UPS	kWh	329,677		182,500	
UPS	kWh	109,892		60,833	
		439,569		243,333	

UPS

UPS

119

3KVA

UPS

IGBT

2018-2024

CAGR 5.6%

UPS

IGBT

Yole UPS

IGBT

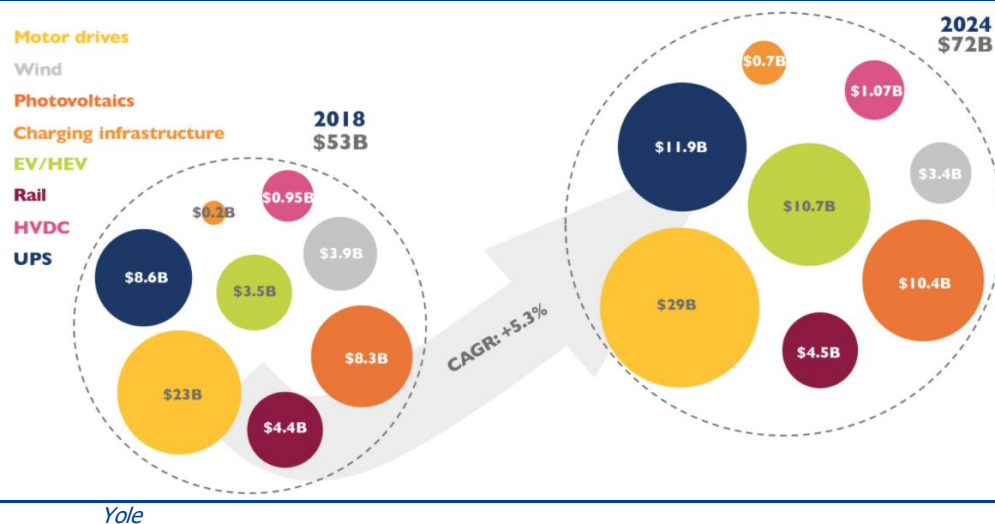
MOSFET

IGBT

DC/AC

2024

27 2018-2024



650V IGBT T Vienna 98% SiC 1200V SiC 1200V SiC MOSFET UPS

MOSFET

MOSFET

SiC

2.1.2 5G

5G

4.4GHz~5.0GHz R 3.5GHz 4.9GHz 5G 5G 3.3GHz~4.2GHz 2.3GHz 4G 0.66R 0.47R
1.5~2 5G

28

5G

1GHz=1000MHz

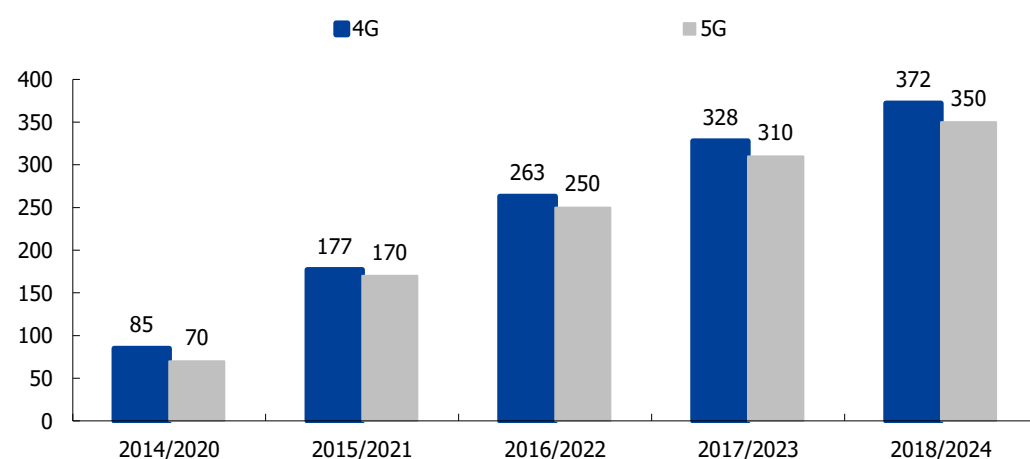
5G	5G
2515MHz~2675MHz	160MHz n41
4800MHz~4900MHz	100MHz n79
3400MHz~3500MHz	100MHz n78
3500MHz~3600MHz	100MHz n78

29

2.3GHz	3.5GHz	4.9GHz	26GHz	29GHz
R	0.66R	0.47R	0.09R	0.08R

2020 5G 50 4G 5G 100/80/60/40 5G
2021/2022/2023/2024 2024 350

30 5G



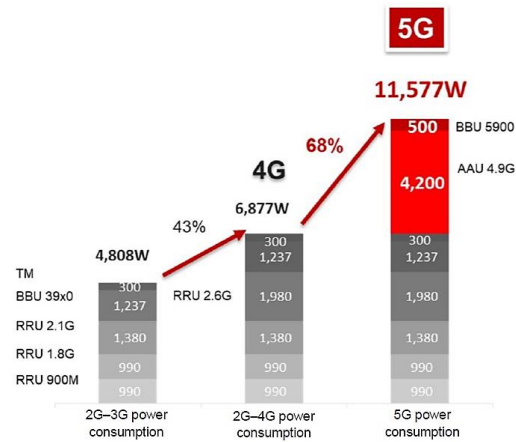
5G AAU 5G Massive MIMO CU 4G 68% DU

5G

MOSFET
GaN

IGBT
SiC MOSFET

31



5G

MOSFET

5G

Massive MIMO
Massive MIMO

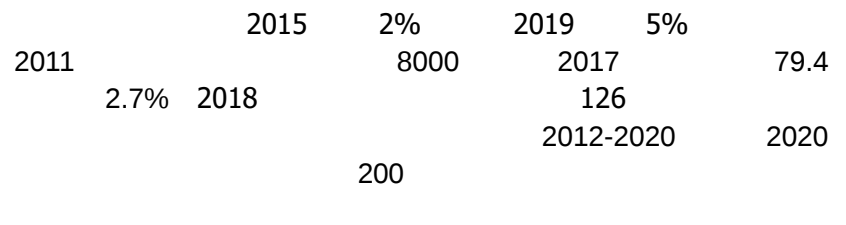
100

4

2.2

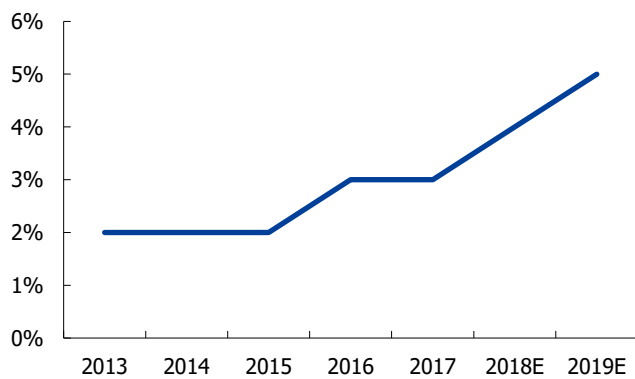
IBGT

MOS

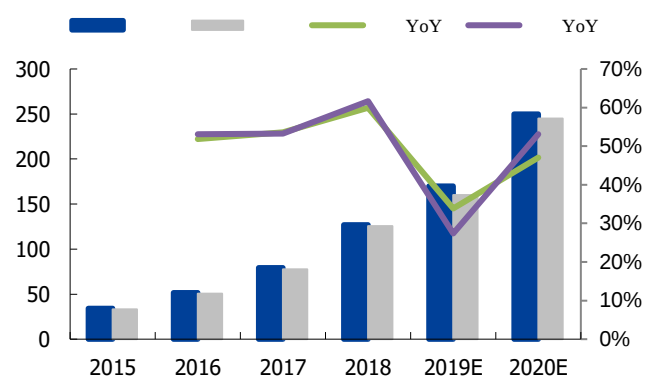


32

%

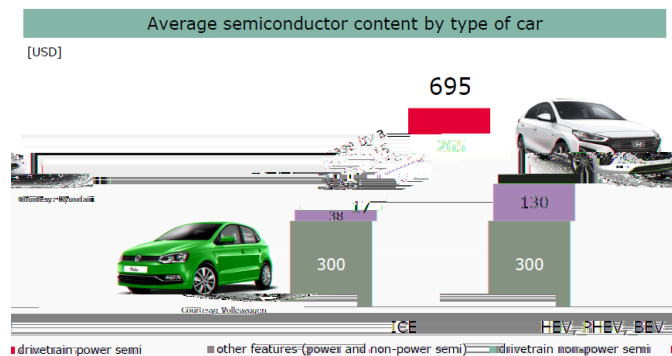


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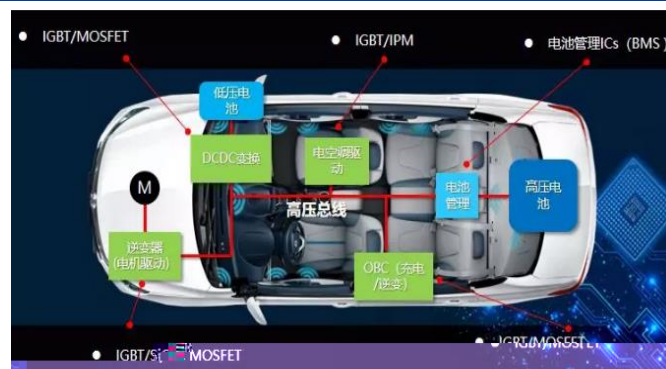


		355	/
695			
	17		/
265	15		

34



35



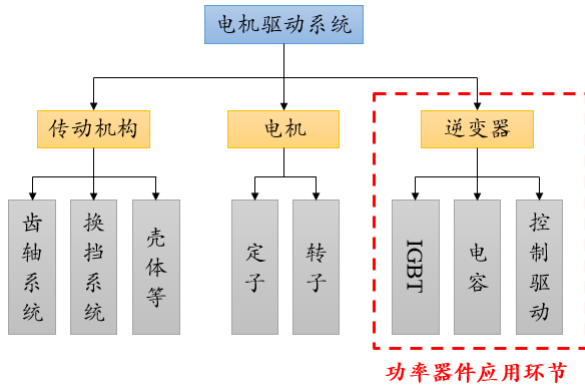
“ ” “ ” “ ”

36

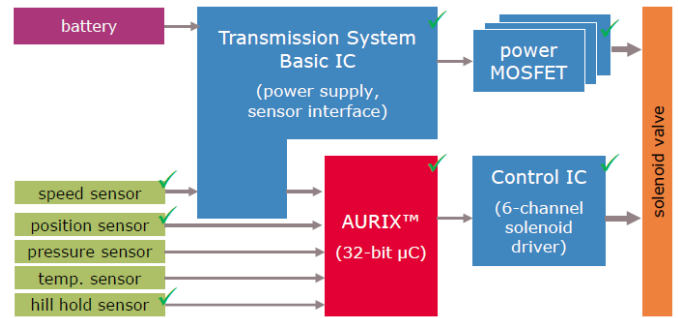
	SSV	Mild HEV	Full HEV	PHEV with EREV	EV BEV/FCV
/	MOSFET 1.5-10kw 3.5kw				
DC/DC			MOSFET 1.5-3kw 2.25kw		
		MOSFET/IGBT 5-20kw 15kw	IGBT 20-150kw	70kw	
			IGBT 20-40kw	30kw	
OBC +				MOSFET 3-6kw	
				IGBT 10-40kw	
NE	3.5kw	17.25kw	52.25kw	56.75-102.5kw	

IGBT
SiC MOSFET

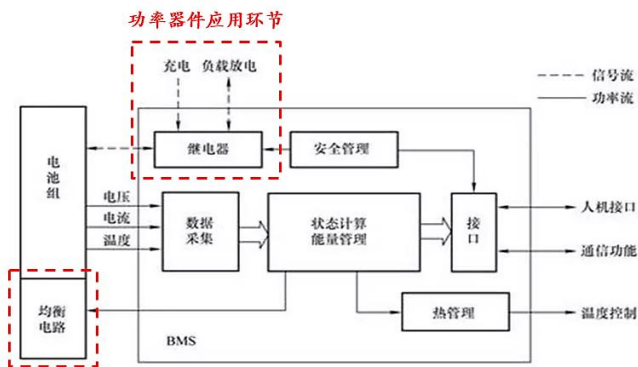
37



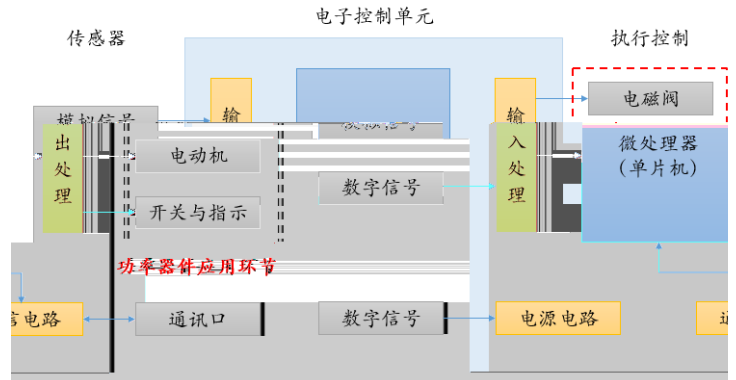
38



39



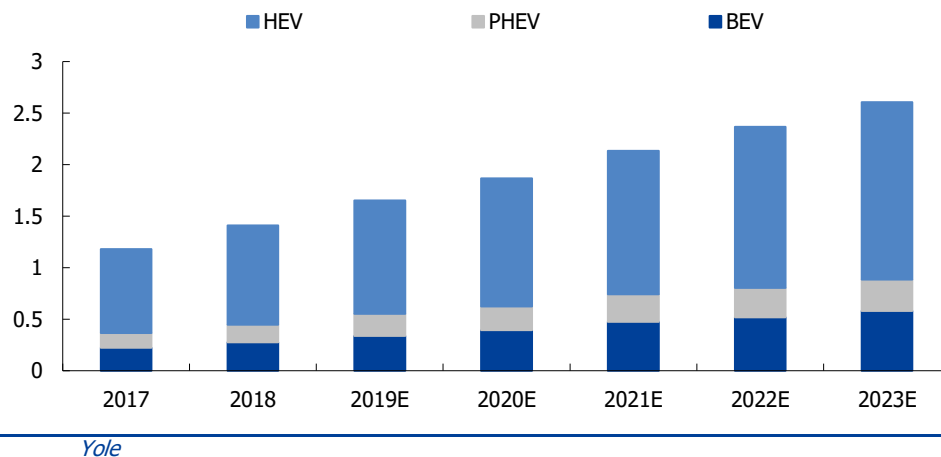
40



“ ” EV/HEV

		EV/HEV			
Yole	2017	BEV	2.2		2023
		22%	5.8		
	2017	8.1	2023	17.2	
			CAGR	43.4%	

41 EV/HEV

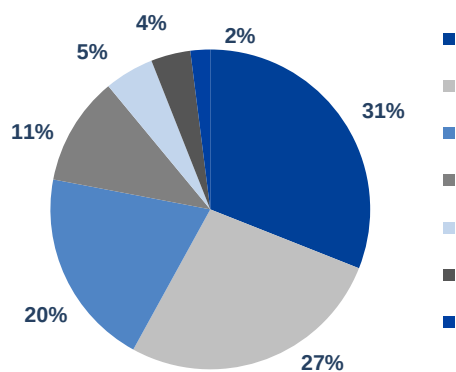


Yole

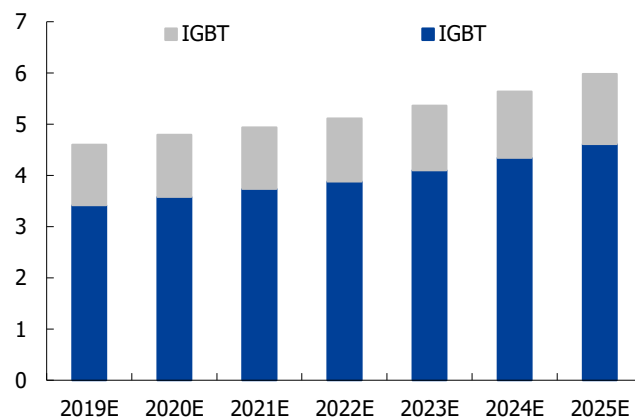
IGBT

IGBT
2018 IGBT
31% HIS Markit 2017 IGBT 47.9 Yole 2019
IGBT 50 IGBT 2020-2025 CAGR 5%

42 2018 IGBT



43 IGBT



Yole

IGBT

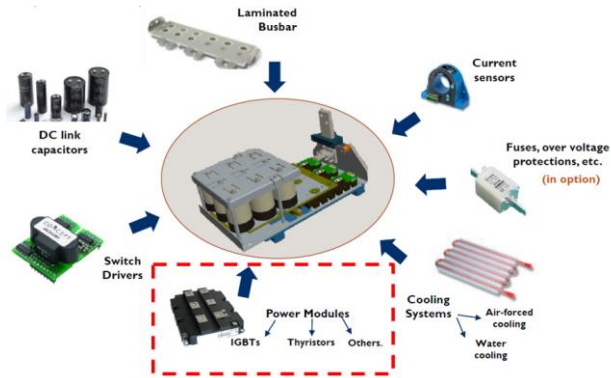
50%

IGBT IGBT

IGBT

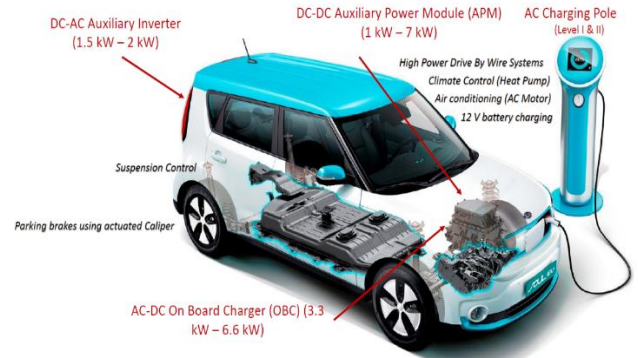
IGBT / (DC/AC)

44



45

IGBT



IGBT

IGBT

36

96

15~20%

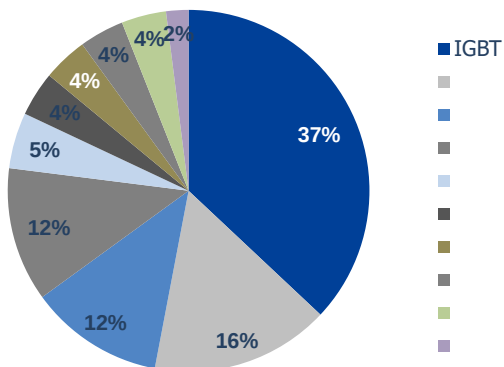
40%

IGBT
Model X
650

20%
132 IGBT

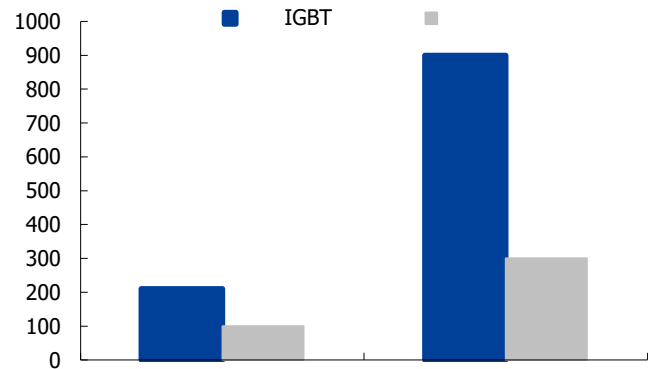
5%

46



47 2025

IGBT



Trendforce

IGBT

Trendforce

IGBT
2018-2025 8
IGBT

2025
100 900 8

IGBT
2025 210
300

MOSFET

IGBT MOSFET

“ ”

IGBT

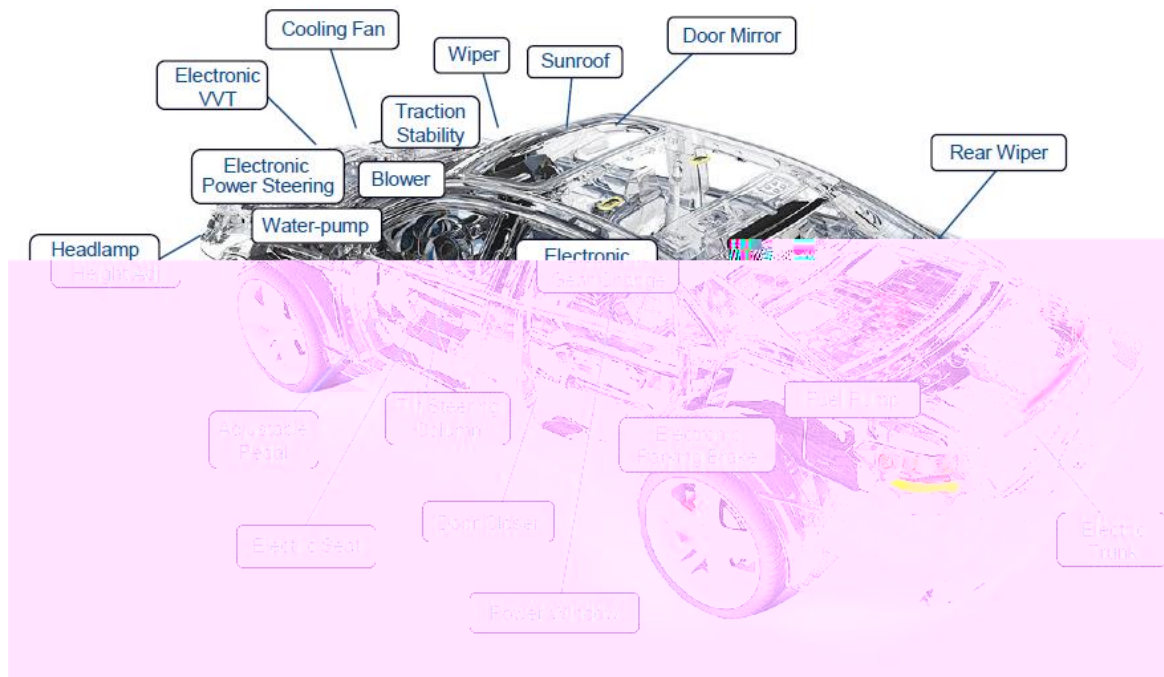
MOSFET

MOSFET

IGBT

1000V

350A



Didodes

2.3

MOSFET

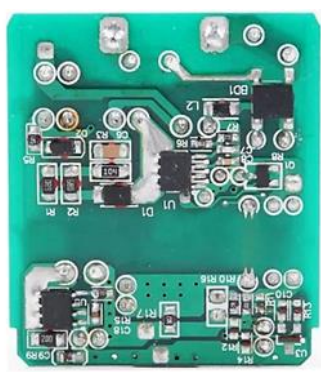
				iPhone 12	
	BCC Research	2017			85.49
20%	2022			27.4	24%
	MOSFET	MOS			
	MOS			MOS	

49

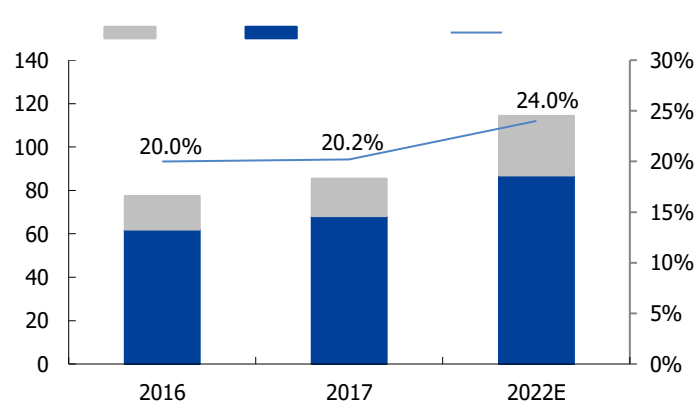
50



传统18W PD快充方案



内置MOS 18W PD快充方案

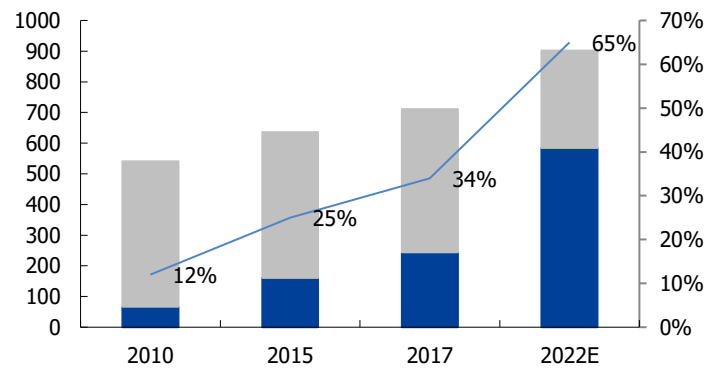
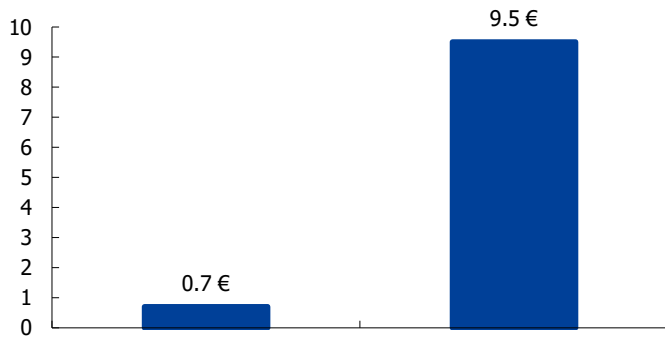


BCC Research

15%-30%
60
20% 2015
MOSFET
13.6
9.5
25%
2022
57.8
10
2022

51

52



IGBT

IGBT
490

2017-2022

ABI Research
7.1%

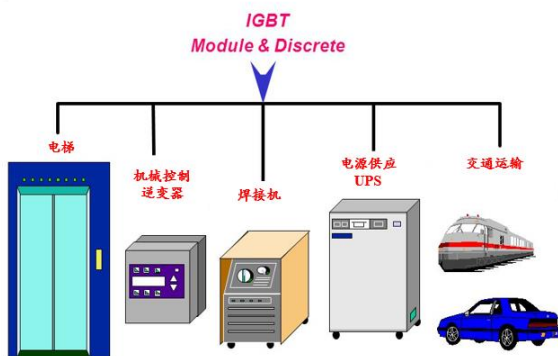
2017

IGBT

53 IGBT

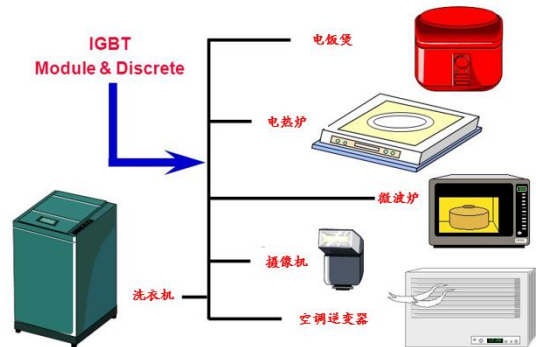
54 IGBT

工业用IGBT



Fairchild

消费类IGBT



Fairchild

IGBT

IGBT
IGBT

55



IGBT



32 IGBT

10

IGBT

10
15

CRH3

IGBT

128

IGBT

3300

IGBT

IGBT

LED IGBT

FACTS
(PET)
IGBT

IGBT

IGBT

3.1

I

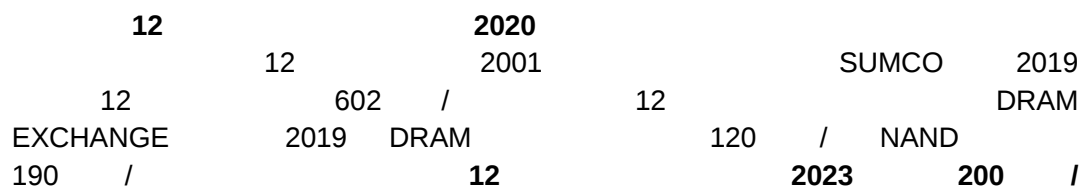
4-6

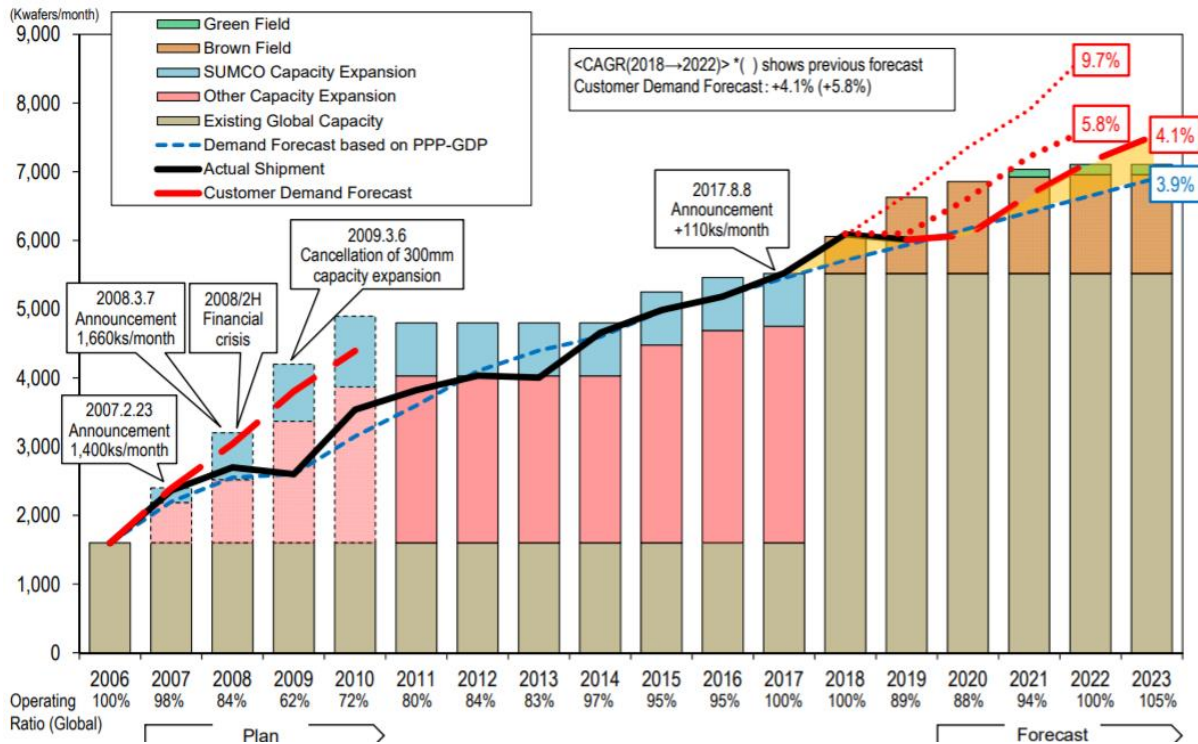
raw wafer

10%

12

8





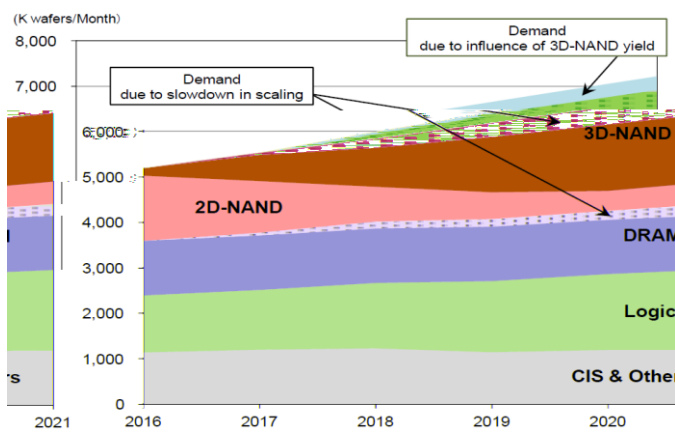
SUMCO

8

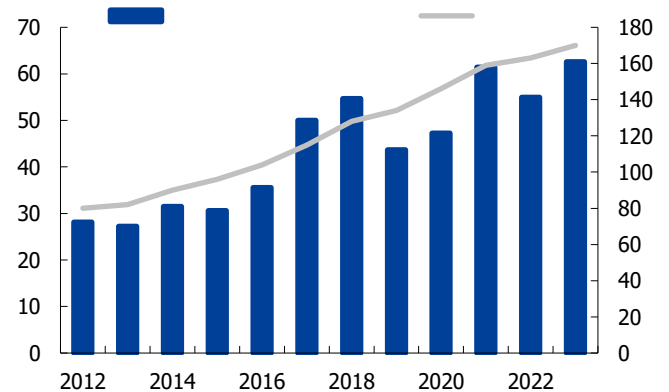
8

CIS PMIC Nor Flash

IC
MEMS



Semico



AnySilicon

8

6 →8 →12
12

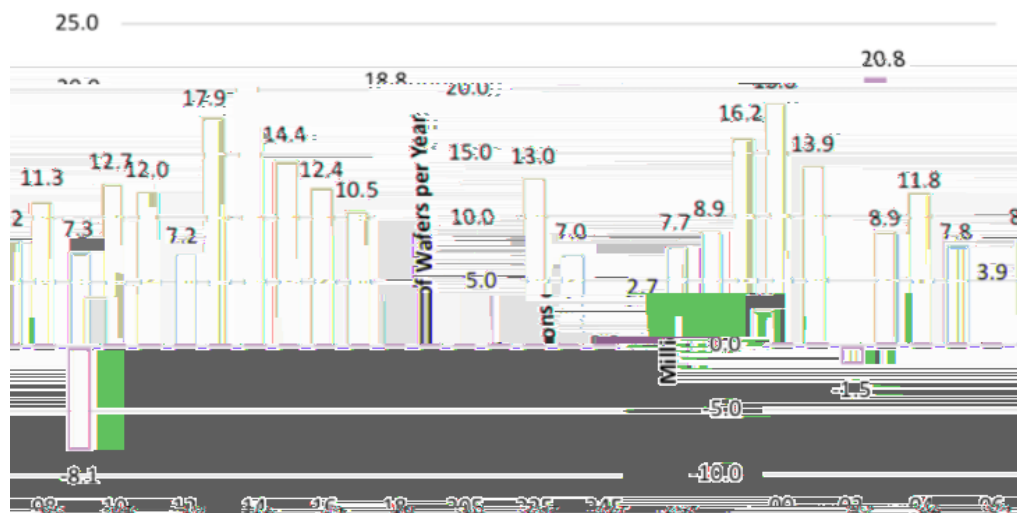
8
MEMS
1990 2007

8

12
201
IC Insights
12
8
2009-2017

[illegible]

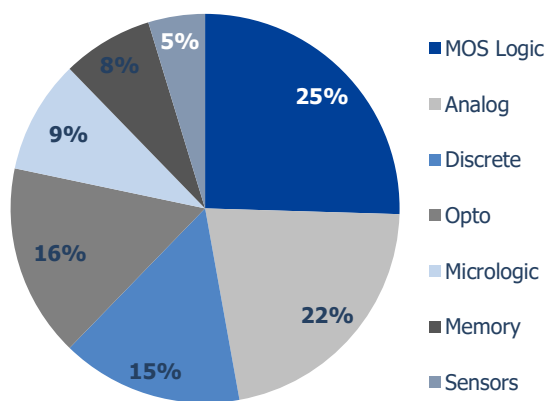
61 200nm



IC Insights

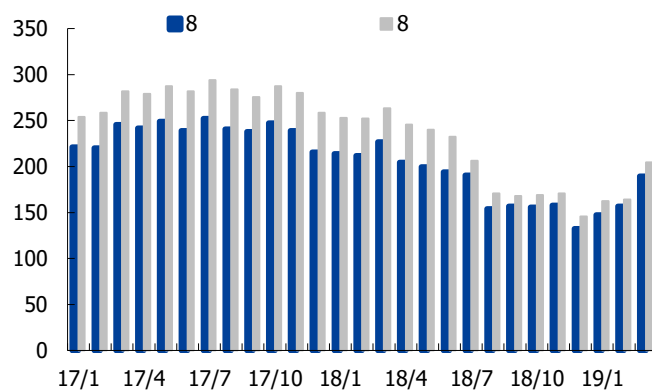
8	2020			IC Insights
2019	720	8	2020	1790
2021			2080	

62 2018 200nm



Semico

63 8



smarkarma

3.2 MOSFET

MOSFET	75.8			IHS Market	2018
MOSFET	75.8	Yole	2024	MOSFET	

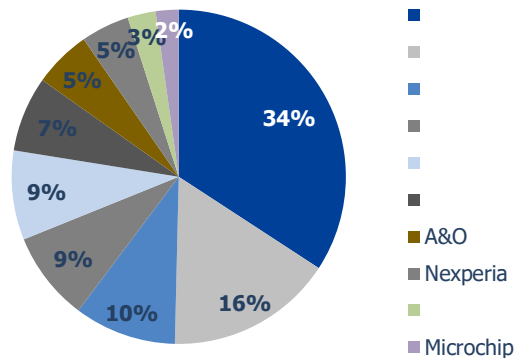
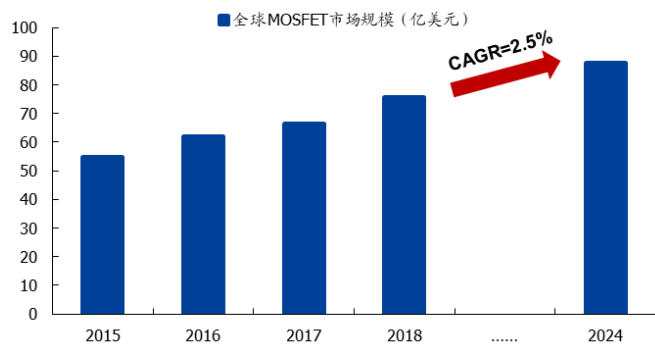
87

CAGR 2.5%
62.8% TOP1

MOSFET
27.7%

64 2018 MOSFET 2024

65 2018 MOSFET



Yole IHS

IHS

PMIC CIS IC Nor Flash

8 MOSFET 8

2017

2017

MOSFET
8-12
MOSFET
16

2019 MOSFET 12
MOSFET 20
2020 MOSFET

4.1 IDM

2018

IDM

IDM

Fabless

IDM

500 IC

1100

MEMS

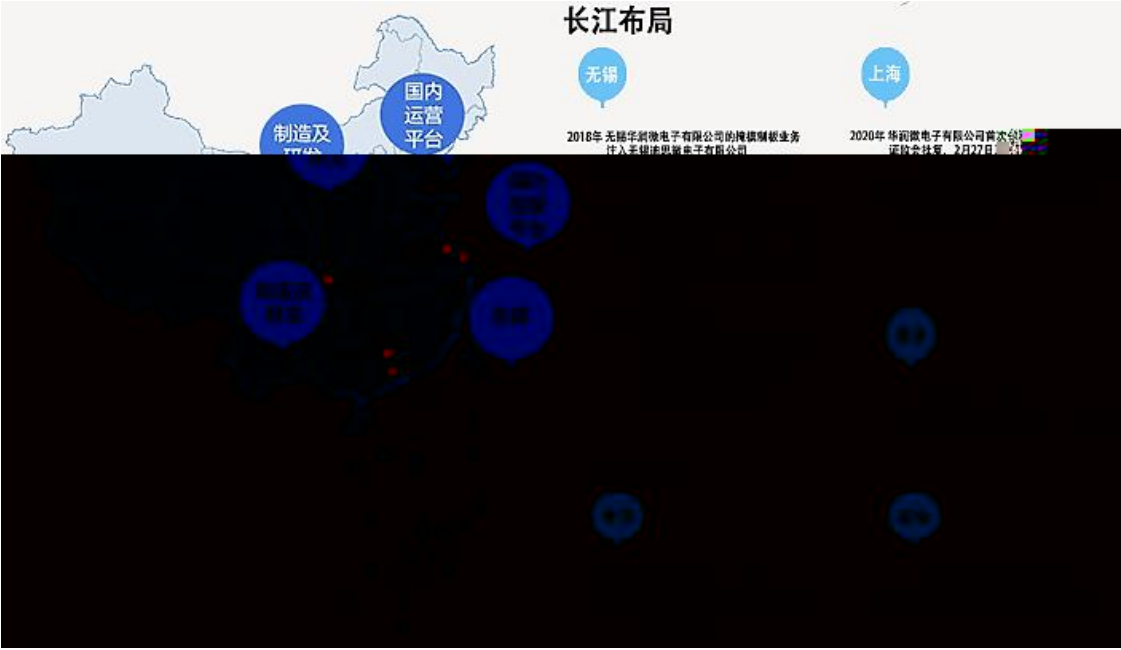
IPM

BCD

4.2

+

66 +



12

90nm

12

MOSFET IGBT

8

50%

8

23.11

8 BCD BCD MEMS

16,000 /

8 MEMS

67 IPO

8	150,000	50%
	60,000	20%
	30,000	10%
	60,000	20%
	300,000	100%

SiC GaN
IC MEMS
GaN 6 SiC JBS SiC MOSFET
1200V 650V SiC

2017 2018
IDM 2019 35%

2020~2022
30%/30%/30% 68.43/84.18/89.98
25.04/25.12/25.20 30.20/40.45/44.57
9.29/14.09/15.00

68

	2016	2017	2018	2019	2020E	2021E	2022E
	1,332	2,339	2,683	2,516	3,371	4,457	4,938
	1,081	2,069	2,419	2,269	3,020	4,045	4,457
	85	97	138	139	161	193	231
	116	128	99	90	150	180	210
IC	49	46	28	18	40	40	40
	3,032	3,520	3,572	3,184	3,433	3,921	4,020
	2,188	2,563	2,674	2,375	2,504	2,512	2,520
	729	820	786	809	929	1,409	1,500
	7	8	8				
	33	17	15	44	40	40	40
	4,396	5,876	6,270	5,744	6,843	8,418	8,998

wind

12

2020~2022 MOSFET
9.53/13.33/14.90

A

69

2020/10/28

		PE-TTM	PB
605111.SH	132	96.9	11.8
688396.SH	604	73.8	5.9
603290.SH	296	195.3	28.0
300623.SZ	185	74.6	7.7
		110	13.3

wind

2019
2020

“ ”

,

“

”

“

”

6 300 A 500			15%
			5%~15%
			-5%~+5%
			5%
			10%
			-10%~+10%
			10%

26 3

868 One56 1 10

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 010-57671718
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 gsresearch@gszq.com

1115

100 24

330038
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518033
 gsresearch@gszq.com