



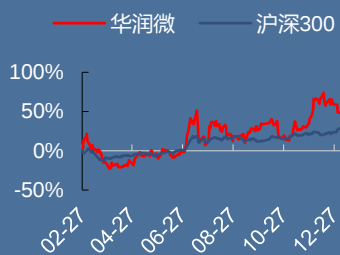
Research and
Development Center

国内功率 IDM 龙头，国产替代稳步前行

466174,QF

0. 0/ / 4

|

[illegible]



	2018	2019	2020E	2021E	2022E
	6,270.80	5,742.78	6,930.34	8,526.82	10,099.92
(%)	6.73%	-8.42%	20.68%	23.04%	18.45%
	429.44	400.76	967.38	1,339.22	1,566.08
(%)	511.02%	-6.68%	141.39%	38.44%	16.94%
(%)	25.20%	22.84%	28.58%	29.50%	28.84%
ROE(%)	10.76%	8.37%	12.06%	9.81%	9.01%
EPS	0.52	0.48	0.80	0.99	1.16
P/E	124.97	218.05	81.30	65.25	55.80
P/S	13.94	15.22	12.61	10.25	8.65



		.....	6
	+	IDM	.....
			7
1			7
2			8
3			9
4			10
			12
1			12
2	MOSFET	IGBT	13
3			15
4	MEMS	MCU	19
			21
1	IDM		21
2		MOSFET	22
3			26
4	BCD		27
5		12	30
			31
1			31
2			31

/		.....	5
0		.....	/6
1	0. /6	.....	0/
2		0. /6	00
3			02
4	KMQDCR		03
5	GA		03
6	0. /7		04
7			05
/.			06
//			07
/0			07
/1			1.
/2			1/
/3			10

/		.....	5
0	3		6
1			6
2			6
3			7
4			7
5			7
6			/.
7			/.
/.	0. 0.	/F	//
//		0. 0.	/F
/0			/0
/1			/0
/2			/0
/3			/1
/4			/1
/5			/1
/6			/1
/7			/2

0.	.....	/2
0/ KMQDCR	.....	/2
00 KMQDCR @R	.....	/2
01	.....	/3
02	.....	/3
03 0. /7	.....	/3
04 0. /7 @	.....	/3
05 0. /7 D @	.....	/4
06	.....	/4
07 K_rc2. 44U	.....	/4
1.	.....	/5
1/	.....	/5
10	.....	/5
11	.....	/6
12 QgA	.....	/6
13 0. 03 E_L 5	.....	/6
14 KCKQ	.....	/7
15 KCKQ	.....	/7
16 KCKQ	.....	/7
17 0. /7 KCKQ	.....	/7
2. 0. /7 KCKQ	.....	.0.
2/ KAS	.....	.0.
20	.....	.0/
21 0. /7	.....	.00
22	.....	.00
23	.....	.01
24	.....	.01
25	.....	.01
26 KMQDCR	.....	.03
27 KMQDCR 0. /7	.....	.03
3.	.....	.04
3/	.....	.05
30	.....	.05
31 @AB	.....	.07

1IDM0.0.

6

0.0/

ⓑK

KMQDCR

ⓑK

14064

025-6/77/11-40/0470./6

6

20./5

06,/0010.0.0./4/2,270.0.6/020/2,.3

IDM

0. 0.

1



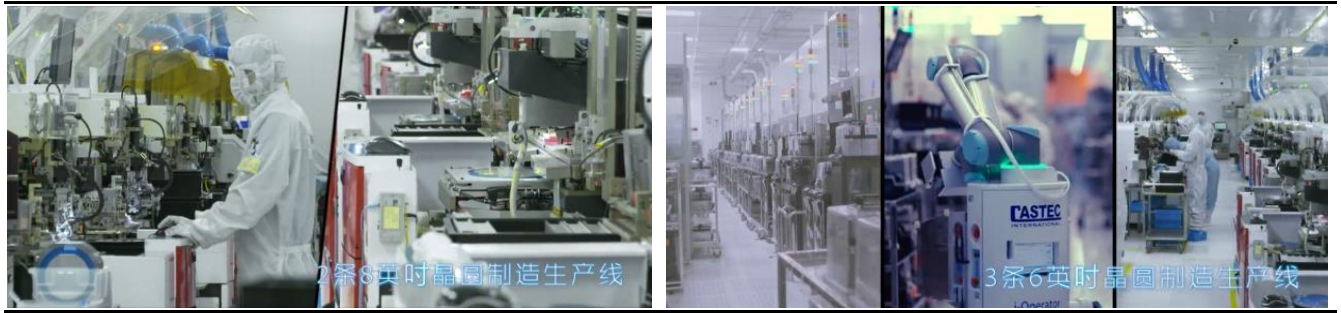
1

功

8

2

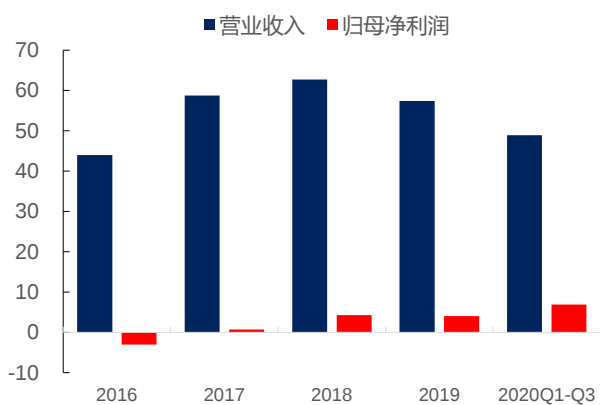
5



2

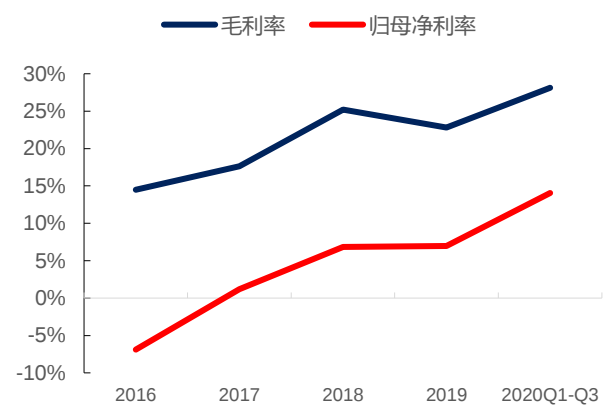
		2016	2018		43.97
62.71		2017		2019	
	57.43	2020		48.89	18.32%
			2017		
	2018	4.29	2019		
4.01	2020				
				2019	1.5
6.87					
		2016	2020		2016 14.49%
2020	28.12%				
2017	2018	6.84%	2019	6.98%	2020
	14.05%				

3



Wind

4



Wind

2020		10.53		2016	25%	2020
1H	34%		2020		10.95	
		2016	50%	2020	1H	36%
MCU						

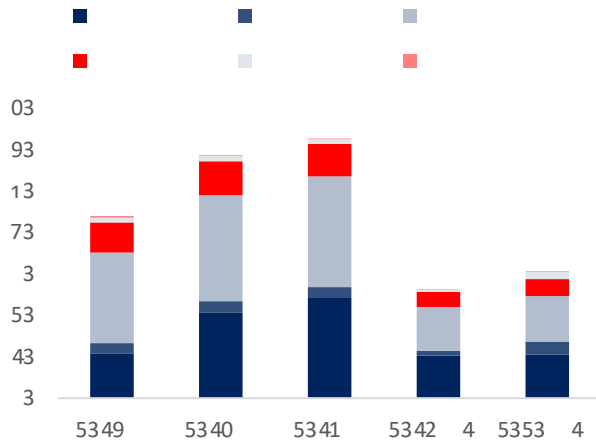
功

2016 23.61%
2019 14.90%

2019 1H 26.94%
2020

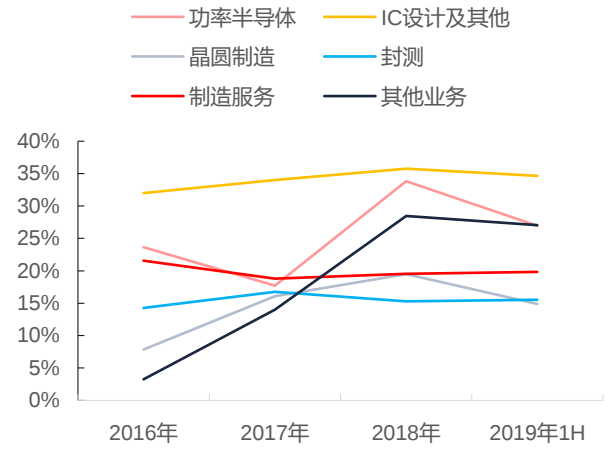
2016 7.85%
28.12%

5



Wind

6



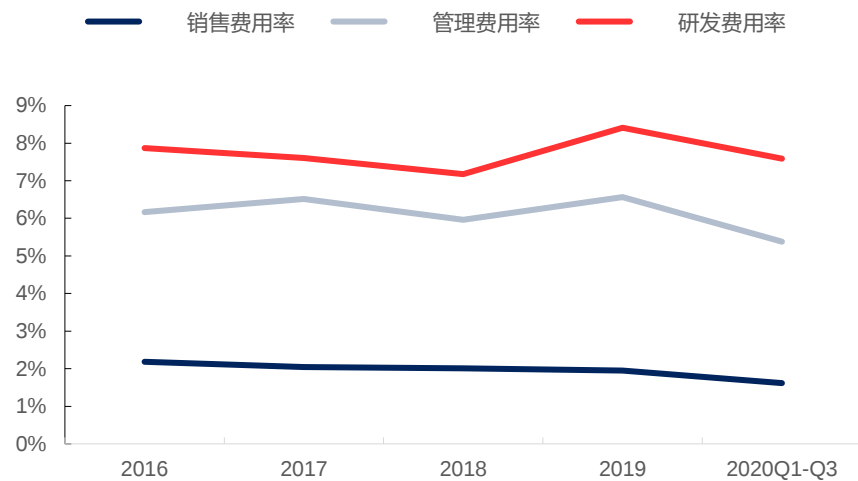
Wind

0. / 4 0. 0.
4, / 4 4, 30 3, 74 4, 34 3, 16

5, 65 5, 4 / 5, / 6 6, 2 / 5, 37
0, / 6 0, . 2 0, . /

/, 73 /, 40

7



wind

3

72.29%

0. 0.

/ . .
50, 07

APF / . .

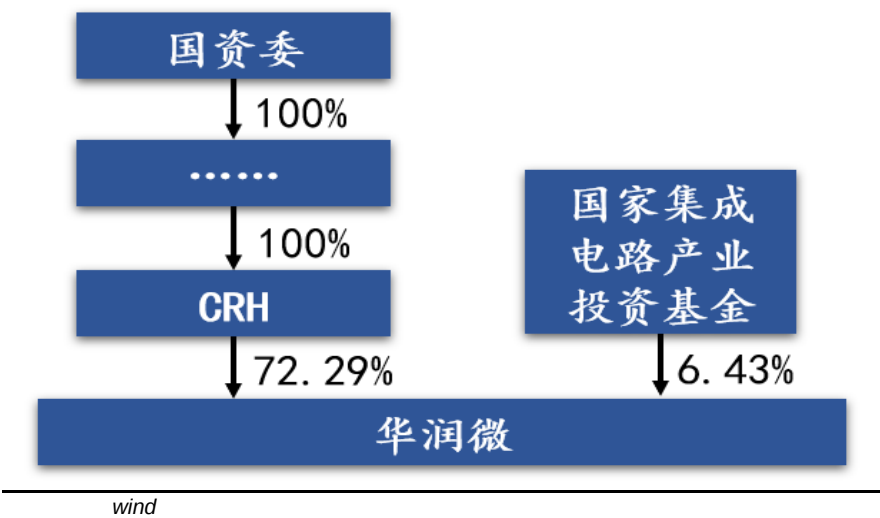
APF
6.43%

功

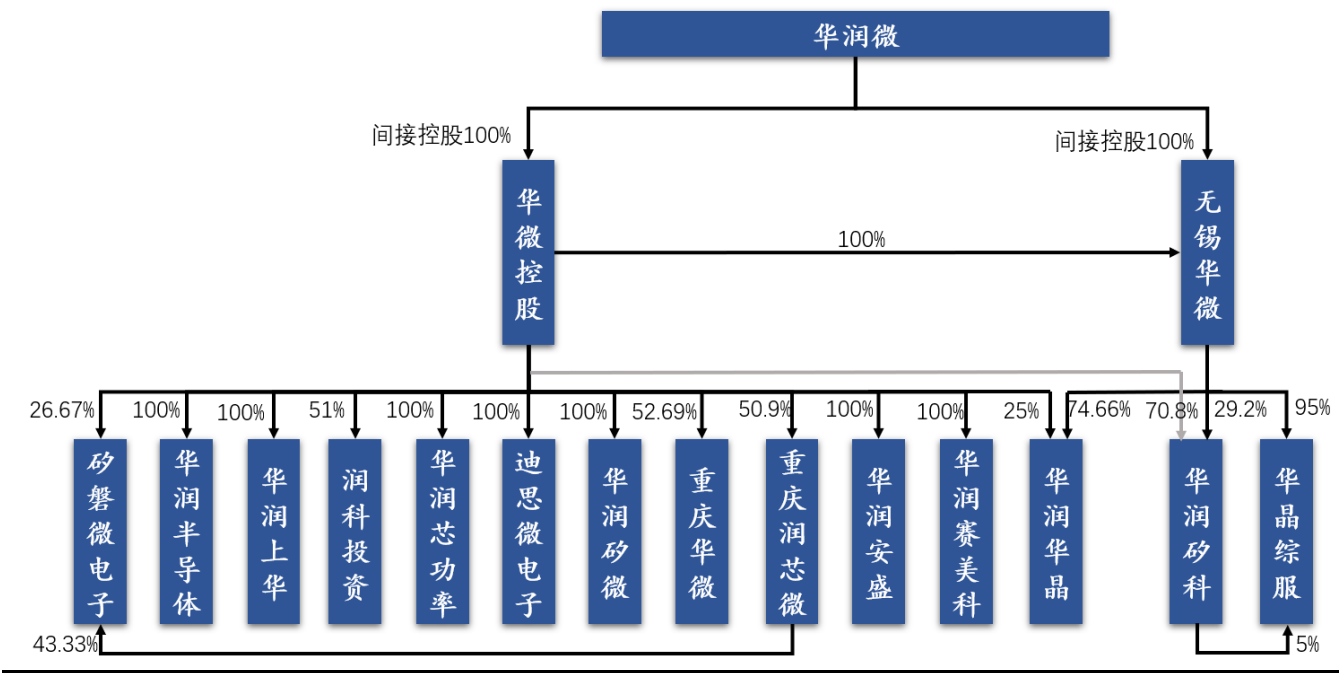
Qck gam@G APK

FI /4

8



9



4

0. 0. 4 1. 5 763

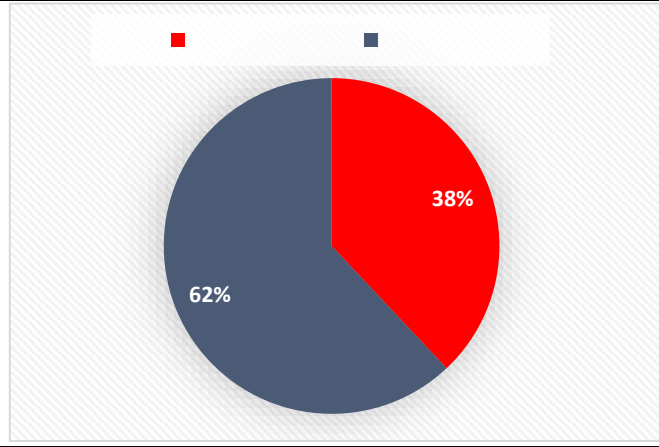
1 . 11 37.98%

684 86%

31%

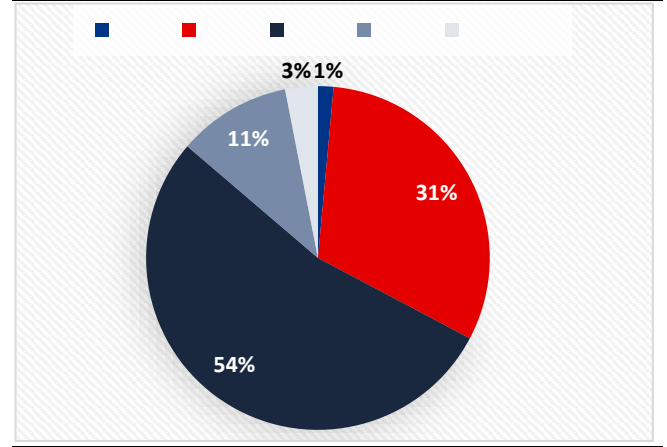
10

2020 1H



11

2020 1H



1

2019

WSTS

2019

2019

3303.5

656.7

541.5

239.6

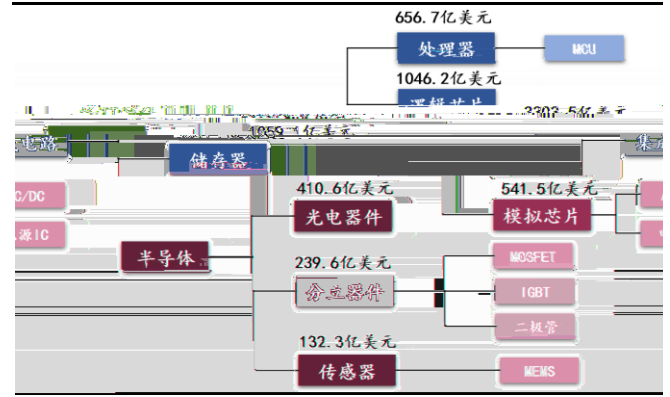
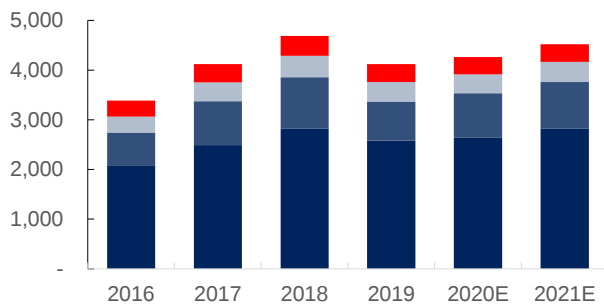
MOSFET IGBT

132.3

12

13

■ 亚洲太平洋 ■ 美国 ■ 欧洲 ■ 日本



WSTS

WSTS

PC

BCG Analysis

15%

30%

40%

10%

IC Insights

2019

1250

15.60%

2024

2000

20%

14

20世纪80年代之前

20世纪80年代

20世纪90年代

21世纪之后

美国

日本

韩国、中国台湾

中国大陆

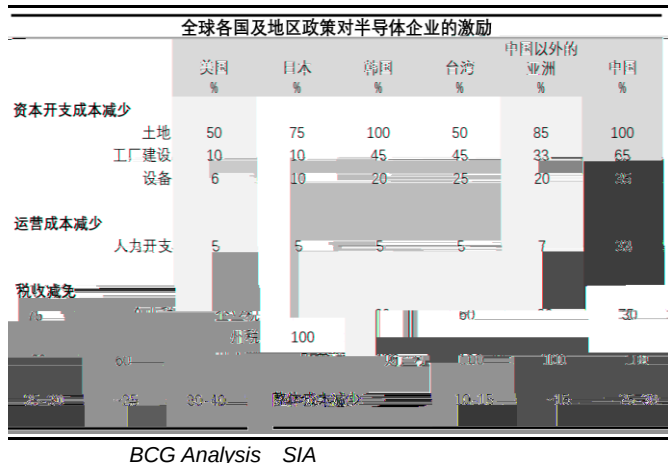
美国一直霸占全球半导体产业第一名的地位。

日本凭借存储器产业的成功，于1986年成为全球最大的半导体生产国。

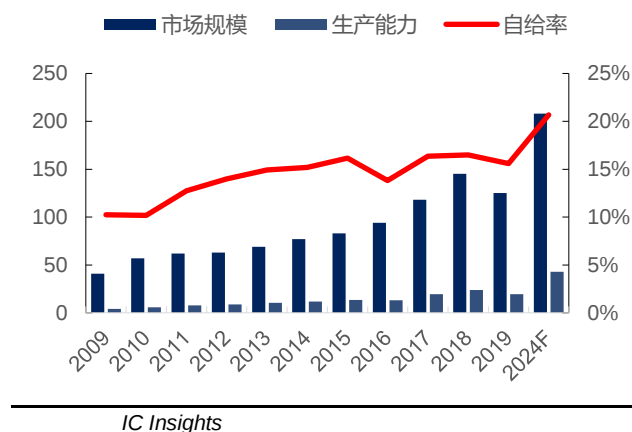
韩国在存储器产业超越日本。中国台湾凭借创新的代工模式跻身全球领先地位。

受益于PC和智能手机及，中国大陆成为全子制造中心，大陆半导体产业开始加速发展。体产业向大陆转移的加强。

15



16



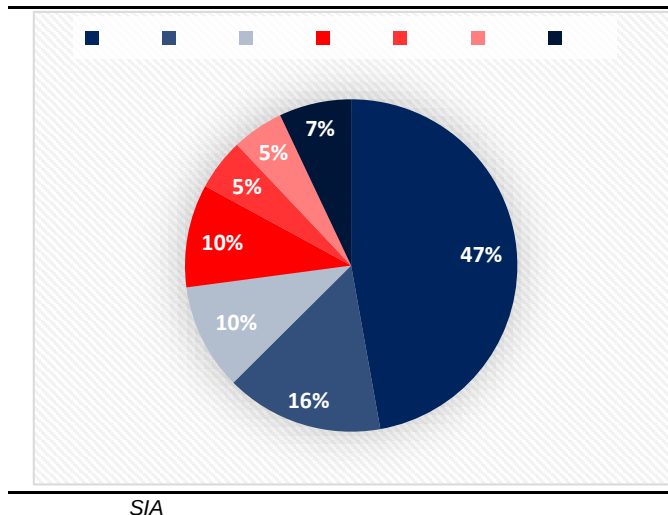
SIA

47%

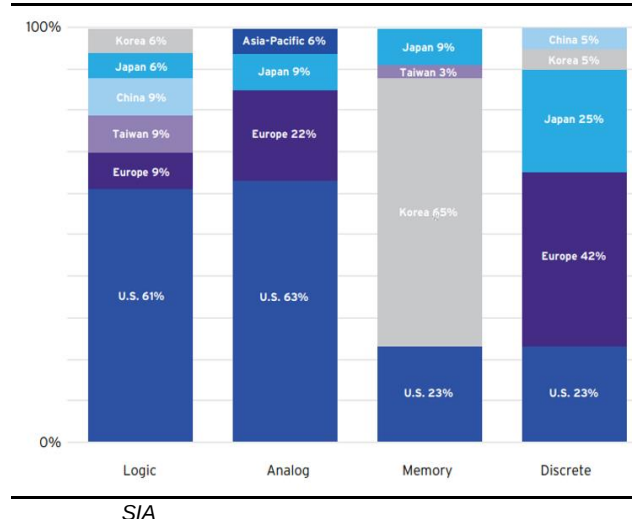
5%

60%

17



18



2 K MQDCR 6 @R

MOSFET IGBT

45% IGBT 21% WMJC

MOSFET 6 @qfrq

K MQDCR

6 @R

2019

2020

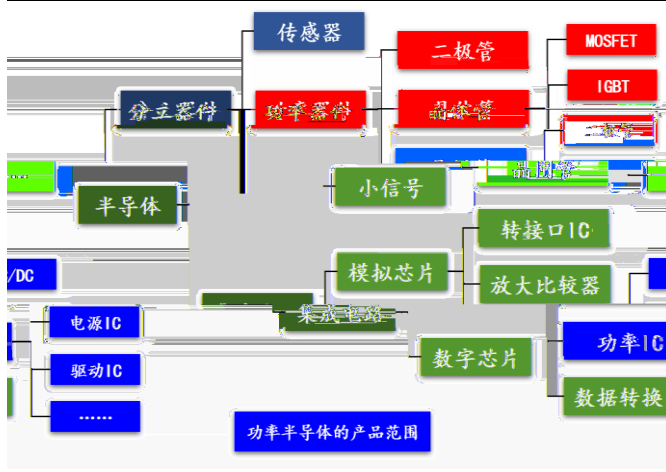
2019-2024

MOSFET IGBT

2%

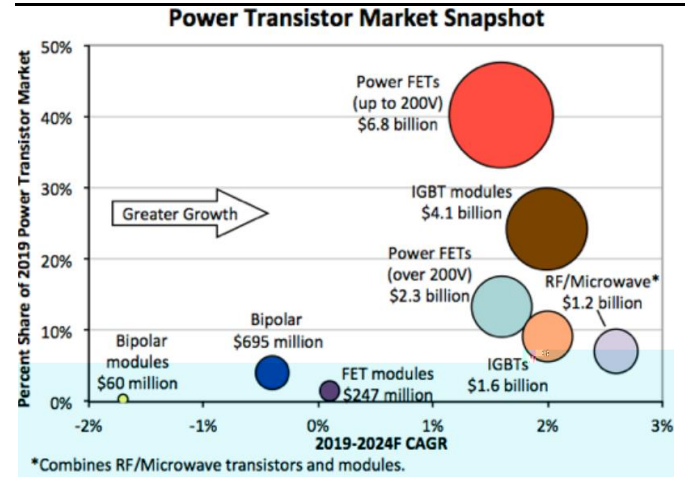
功

19



MOSFET IGBT
K MQDCR

20



IC Insights

GEOR

K MQDCR

0. T /... T

GEOR

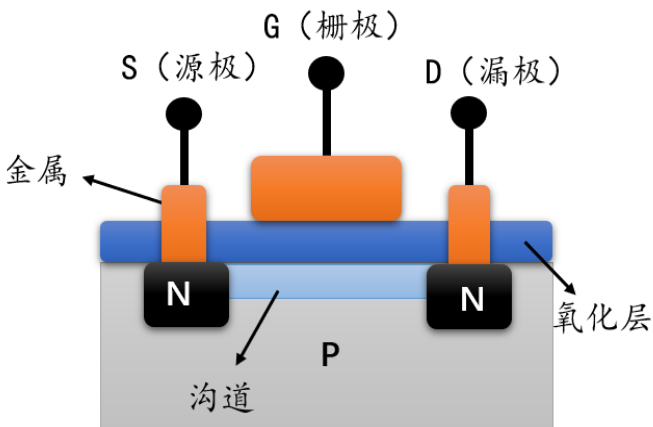
/... T

K MQDCR

K MQDCR

GEOR

21 MOSFET



22 MOSFET IGBT

IPC territory	IGBT modules	6,500 V	IGBTs (discrete, modules)
		4,500 V	
		3,300 V	
		1,700 V	
	discrete IGBTs	1,200 V	
PSS territory	high-voltage MOSFETs (CoolMOS™)	900 V	MOSFETs
		600 V	
		400 V	
	mid-voltage MOSFETs (OptiMOS™)	150 V	
		100 V	
		80 V	
	low-voltage MOSFETs (OptiMOS™)	40 V	
		20 V	

1018.10 20201

0. /7

0632,5.

0. 0.

0. 0.

0,4 056. ,3.

T

2020

2023

CAGR

4.29%

0. /7

/... /6, /.

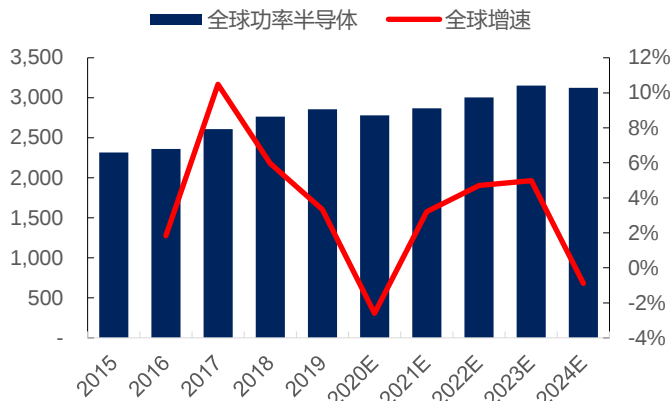
0. 0.

2021

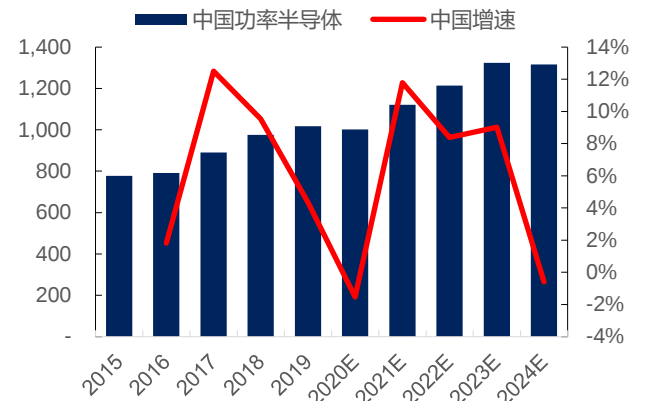
8% 12%

功

23



24

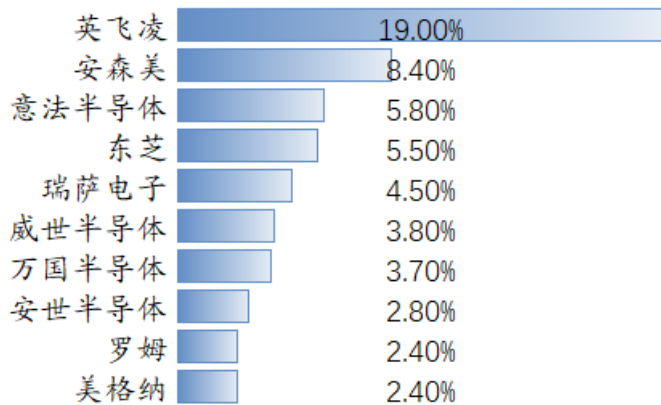


25

/7 6

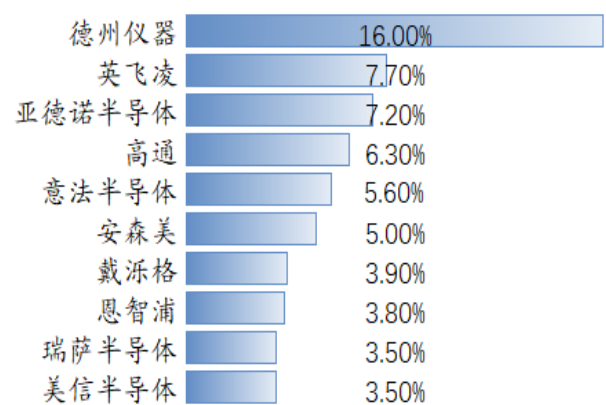
/4 6

25 2019



26 2019

IC



3

8

/0

26

/0

/0

26

6

6

6

12

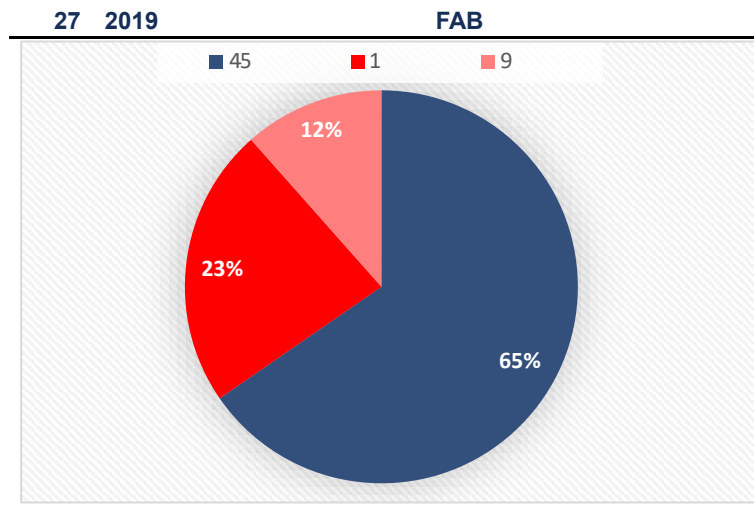
2019

7

8

23%

6



8
/0

IC
6

8

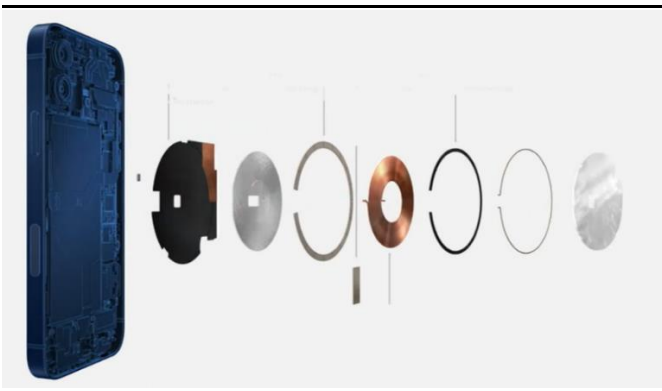
6

6

8

2021

28



iPhone12

29

Mate40 66W



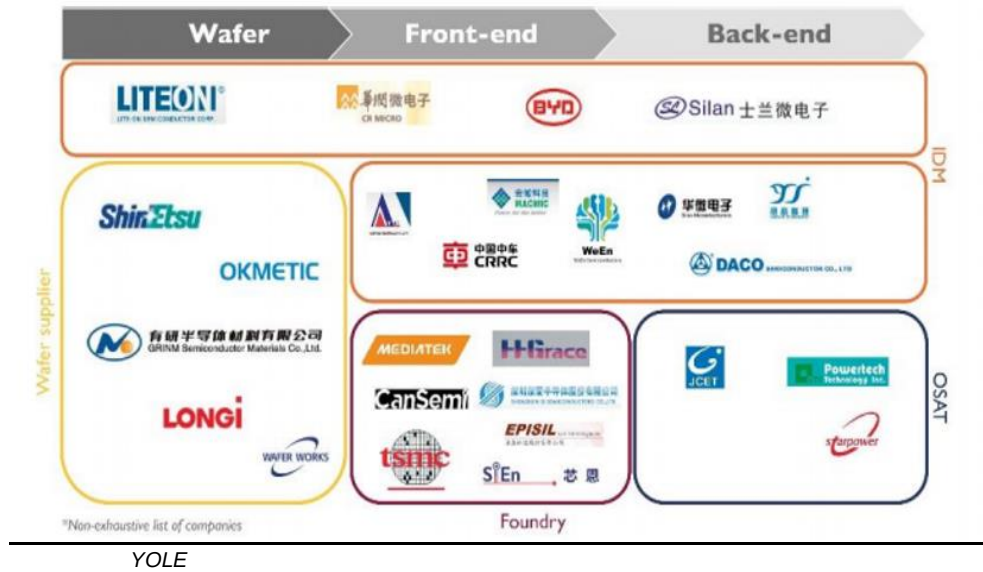
Mate 40

6

30

Components supply chain in Greater China*

(Source: Status of the Power Electronics Industry 2020 report, Yole Développement, 2020)



21.65%

VMJC

0. / 6

//,76

0.02

7, 7

0.02

/7, /.

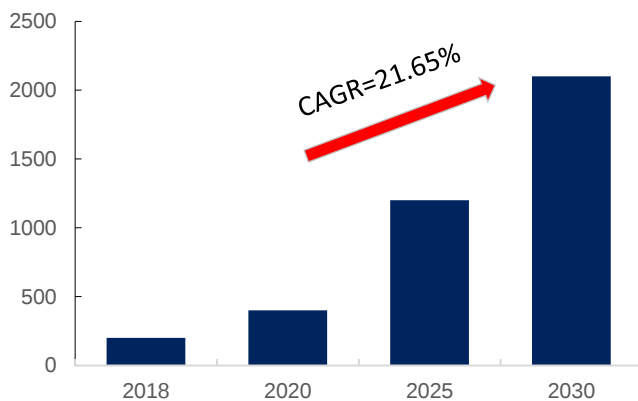
13.17%

SiC

0.91

9.41

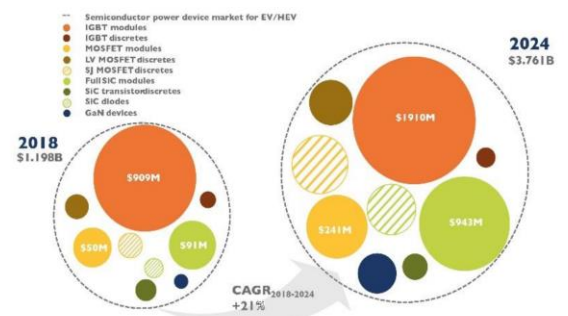
31



32

2018 – 2024 power electronics device market for EV/HEV

(Source: Power Electronics for Electric & Hybrid Electric Vehicles 2020 report, Yole Développement, 2020)



YOLE

SiC

29%

QqA

QqA

0. / 6

0.02

0.02

功

17,2

0.03

07

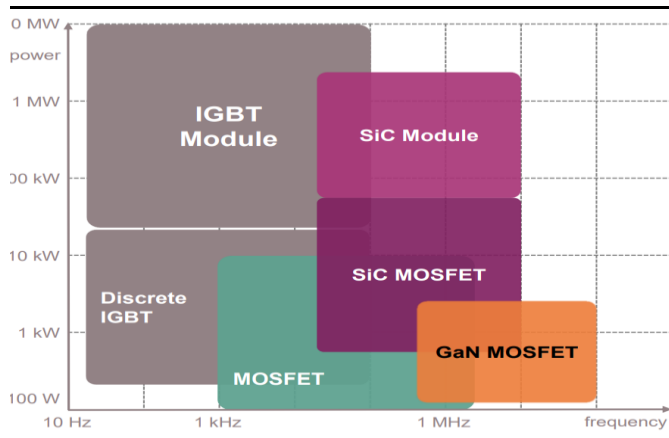
E_L

5

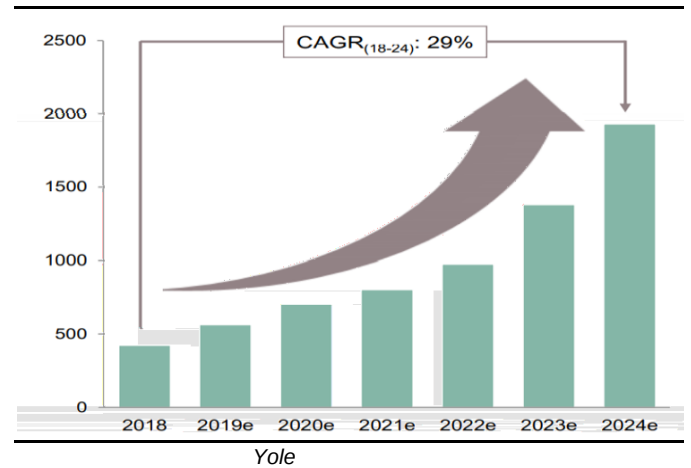
2

eV	
Ge	0.66
Si	1.12
GaAs	1.42
SiC	3.05
GaN	3.44
AlN	6.2
C	5.47
AnO	3.37

33

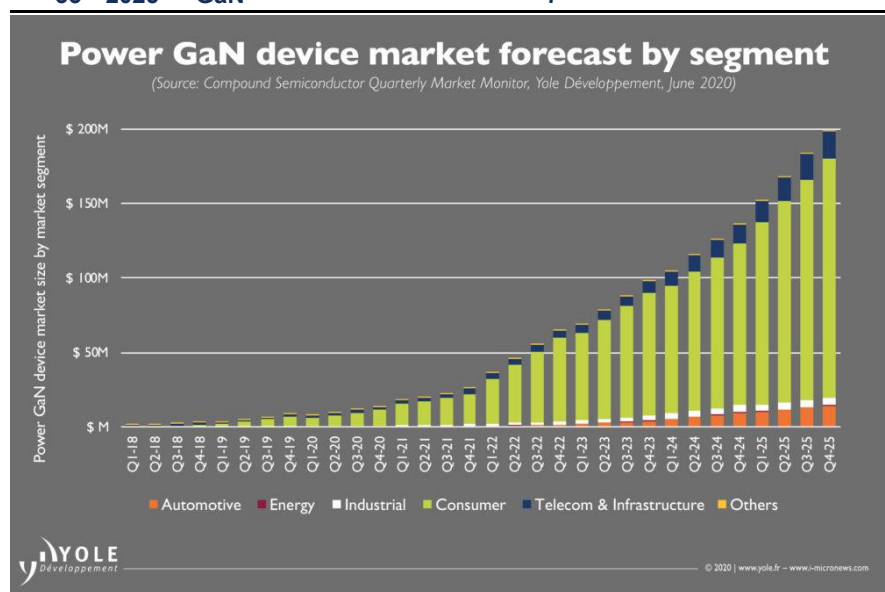


34 SiC



35 2025 GaN

7



YOLE

4 KCKQ

KAS

KCKQ

2019 115.3

2025 177

CAGR 7.4%

KCKQ 0. / 7

46,5

5

MEMS

MEMS
111.4 CAGR 8.4%

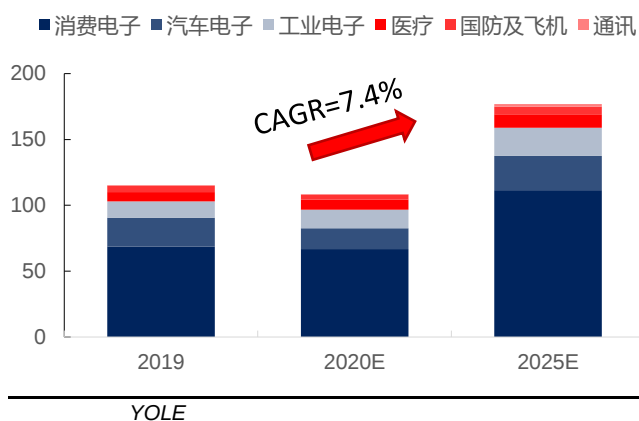
MEMS

KCKQ

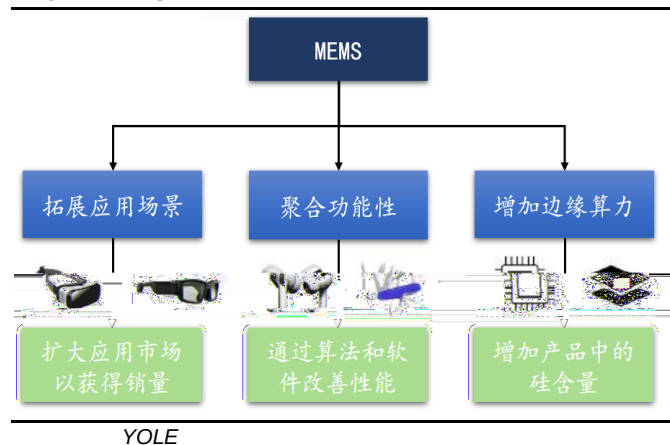
RU Q

TP

36 MEMS



37 MEMS



2019 MEMS

597.8

0. / 7

KCKQ

375,6

0. / 4

141,1

18.06%

1 /

07 / 3

MEMS

58.58%

20%

KCKQ

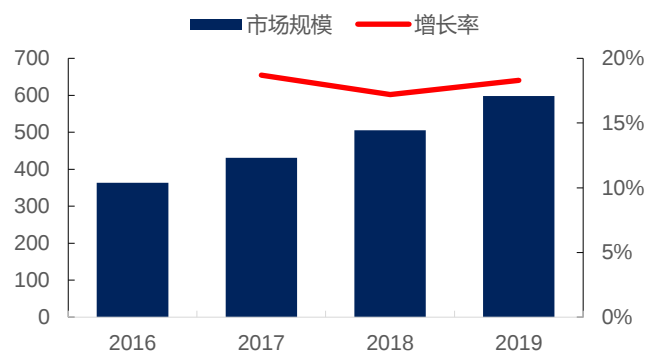
KCKQ

04

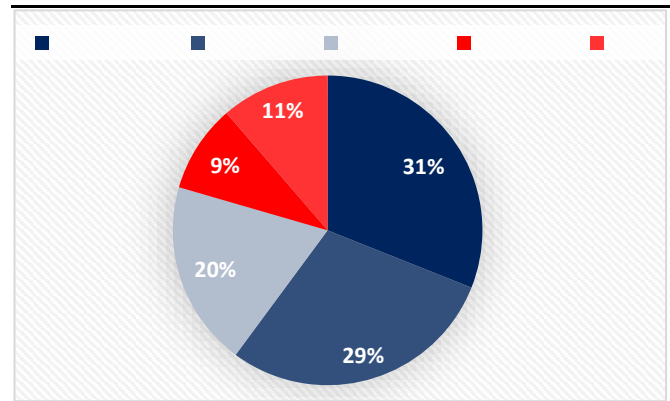
19%

MEMS

38 MEMS



39 2019 MEMS



A pie chart showing the distribution of responses for the question 'How many people do you know who have been vaccinated?'. The chart is divided into five segments with the following percentages: 26% (dark blue), 19% (red), 9% (dark blue), 7% (grey), and 39% (light grey). The segments are arranged in a circle, with the 39% segment being the largest and the 7% segment being the smallest.

Response Category	Percentage
26%	26%
19%	19%
9%	9%
7%	7%
39%	39%

KAS			A Ggfrq	0. /6	KAS
/52,4	0. /7	/40,7	0. 0.		/27,3
2021	MCU	2024	193.4	2020	
2024	6.65%	MCU	2020		
234.5	2021	2024	300	KAS	
		. ,41	. ,42		

Year	Market Size (亿美元)	Output (亿个)	Price (美元/个)
2017	168	258	0.655
2018	178	280	0.625
2019	163	255	0.640
2020E	148	235	0.635
2021E	155	248	0.630
2022E	172	268	0.635
2023E	190	295	0.640
2024E	195	302	0.638

IC Insights

1 BK

IDM

IDM

8

IDM

IDM

2017

2017

IDM

2017

3.62

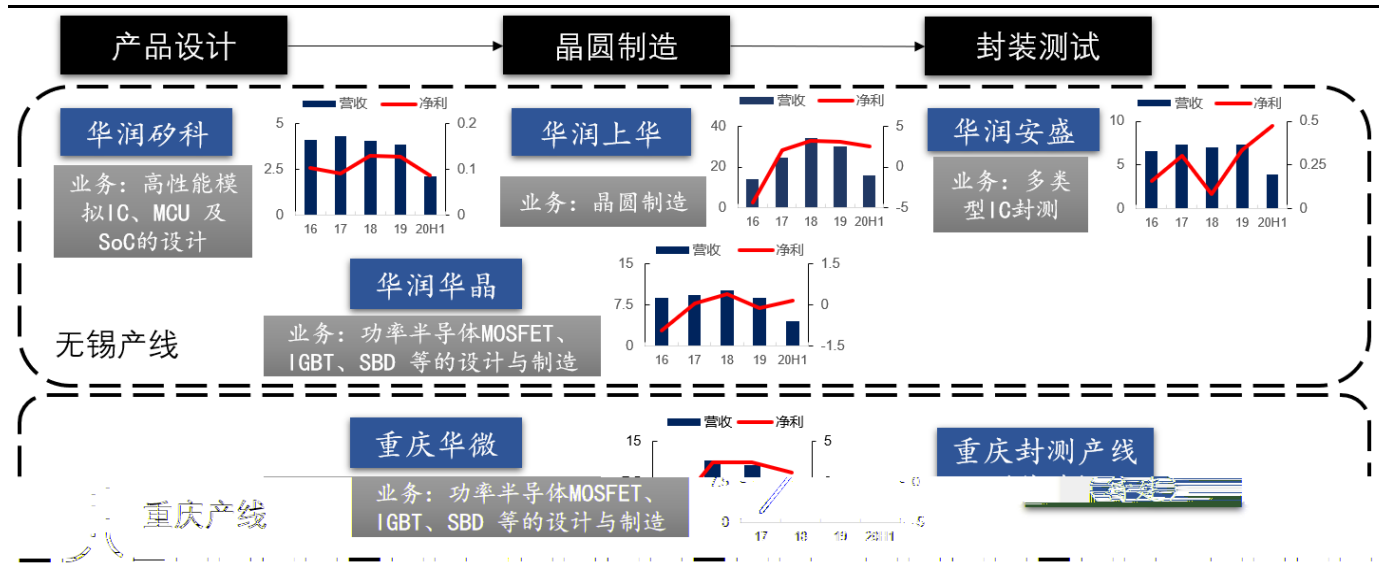
2018

2.41

2019

2.45

42



2017

IDM

2018

IDM

IDM

IDM

IDM

IDM

3 2018

1	509	1	Samsung Electronics	759	IDM
2	248	2	Intel	659	IDM
3	239	3	SK hynix SK	364	IDM
4	225	4	Micron Technology	306	IDM

功

5		111	5	Broadcom	165
6	()	107	6	Qualcomm	154
7		92	7	Texas Instruments	148
8		66	8	Western Digital	93
9		65	9	ST Microelectronics	93
10		63	10	NXP	90

IDM

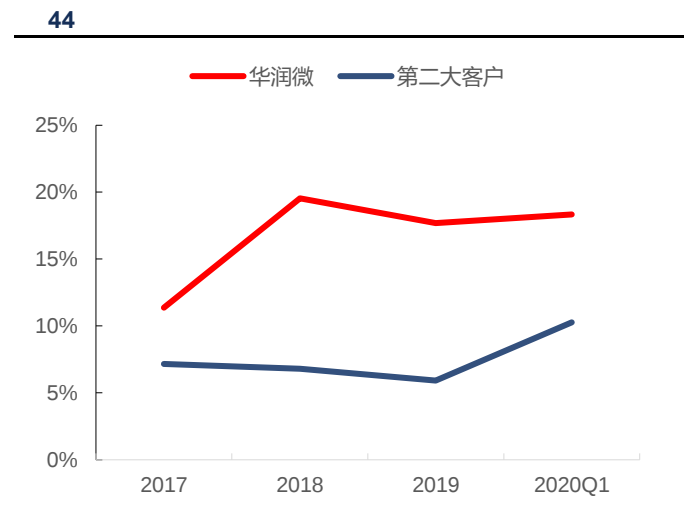
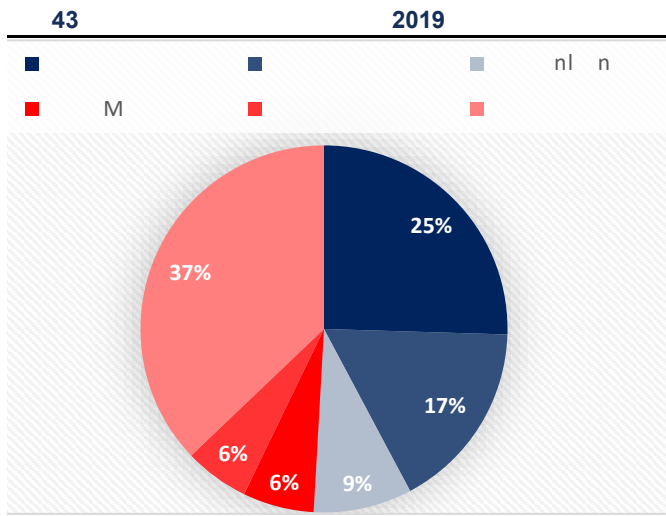
Ⓐ

ⒷK

0. / 7

40,66

25% 17% 37%



2

KMQDCR

0. / 6

0/,5

4	2018
	2018
/	0/,5

功

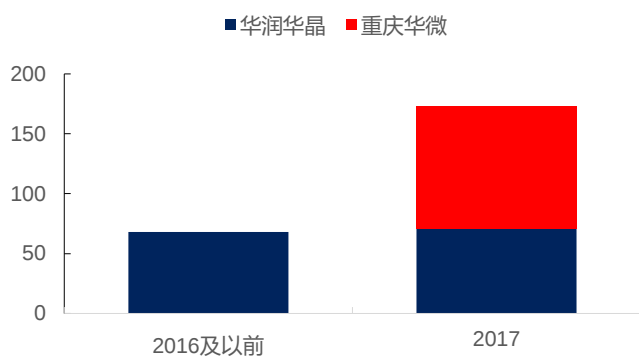
0	/6,3
1	/5,/
2	6,/
3	5,5
4	5,0
5	4,7
6	4
7	3,2
/.	2,7

2019 6 68 102 50

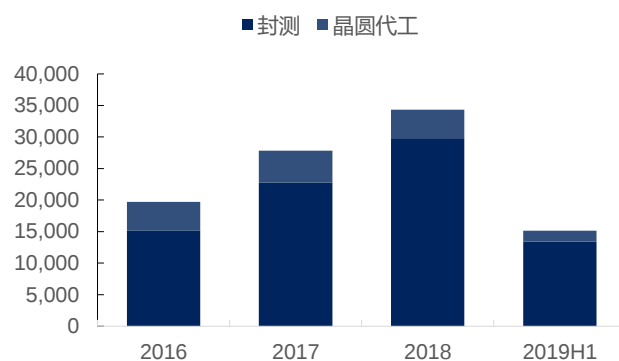
K MQDCR 0.76 0.76

2017 3

45



46



47



/ / . 3 . A

GM/2. . / GM-RQ/4727 GM7. . /
 EN PMQF

5

ISO/TS16949 ISO9001
 ISO14001 GP 1,100 500 IC
 ROHS

IATF16949 ISO14001 OHSAS18000
 ERP MES SPC EAP RMS
 2020 3 31 58

ISO9001 IPM IDM

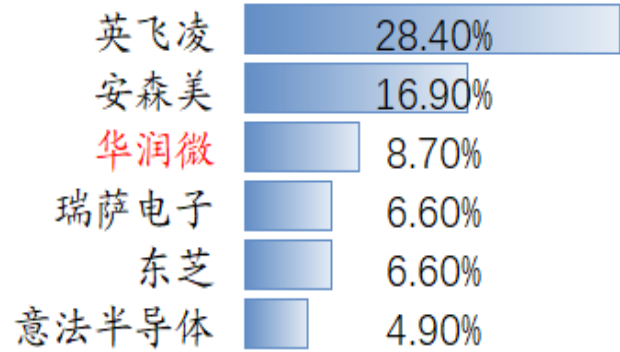
ISO/TS16949 ISO9001
 ISO14001 GP ROHS MOSFET MOSFET IGBT IGBT
 ECO PIM 2019
 416

ISO9001 ISO14001 SiCJBS MOSFET WB
 Clip
 7 2019
 4

ISO/TS-16949 ISO-9001 ISO-14001 OHSAS-
 18001

MOSFET
 / . . T / 3 . . T
 KMQDCR KMQ
 TBKMQ KMQ
 2018 MOSFET 16 QK_p g
 MOSFET
 MOSFET 0. / 6 6,52

48 MOSFET

49
MOSFET
2019

6 MOSFET

30V-900V	40V-900V	-60V-150V	-100V-1500V
MOS			MOS
MOS			MOS
MOS	MOS	MOS	MOS
MOS	MOS	MOS	MOS
MOS		MOS	MOS
			P MOS

IGBT SBD FRD

 R_{DS(on)} af DQ

2019
IGBT
45%
2020
IGBT

4. . T 43. . T 6 @R

49.90%
Q@B

6

 R_{DS(on)} af

DPB

IC
IC
IC
7 IC

AC-DC	AC-DC
LED IC	LED
BMS IC	
IC	78 1117 100mA-1A
IC	100W
IC	
IC	AB D 5mW-50W

TCL

功



3

025 - 6 0. /6 4
/11 -

8 2019	
1	
2	
3	
4	SK
5	
6	
7	
8	
9	
10	

/ 6 1 4 8
73 6 247 4
/, . ,// k
QMG @AB AKMQ AKMQ @m_l_p @AKMQ
@ KCKQ E_L Qq
BCD MEMS

1 8

60

KMQ

Q@B

KMQ

KMQ E@R E_L

A

199

62

69

3. k / 0

DA

Z

NCNGLMT R@L

9

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

0,2

51

Laser

Laser writer
激光制版工艺

- 扫描距离：0.65mm
- 扫描方式：Raster
- 精度：5nm

52

E-Beam writer
电子束制版工艺

- 扫描距离：取决于束斑
- 扫描方式：Raster & Vector
- 精度：取决于束斑 (~25nm)

4

@AB

KMQDCR

E@R

KMQDCR

46

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E@R

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54 60

MOSFET 2020

SGT MOSFET

3 21

KMQ

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KMQ

10

MOSFET	MOS	1				FOM	2		
	VDMOS	1		3		FOM	2		
	MOS	1		UIS	3	EMI			
IGBT	IGBT	1		FOM	3				
	IGBT	1		Trench-FS	3		2		
	SBD	1	8	Trench	2		45V-150V	3	
IC	FRD	1							
		2			3				
	IC	1					2		
MEMS	MEMS	1		UL					
	MEMS	2		Delta-Sigma ADC					
	MEMS	1							
IC	IC	1				WPC	QI	2	
	IC					EMI	3		
	IC	2-7		5-8		10			
LED	LED	1		700V	2		3		
	IC	1			2		3		
		1			2				
SiC	SiC	1			2				
	SiC	3							
	SiC	1							
SiC	SiC	6							
	SiC	3							
	SiC	2							

BCD

@AB

AKMQ BKM

BKM

AKMQ

@AB

@AB

2019

11

BCD	BCD		1	1.0-0.18μm	2				
	BCD		5V-700V 3		4	200-600V SOI			
	SOI	BCD	BCD						
MEMS	MEMS		1	MEMS				2	
	MEMS						3		
	MEMS						MEMS		
	IPM				IMS		IPM		
	PQFN/PDFN		1	2					
			3						
					CopperClipBond		FC		
				1				2	
							3		
300um									

IC		, BMS AC-DC	44
			5

13

2018	10	IGBT	iPOWER Semiconductor	5
2017	11			5
2016	10			3
2016	5			5
2015	10			5

5

/0

SiC

0. 0. 5 2

/0. . T 43. T QgA

4 QgA

/... - QgA

QgA K MQDCR

0. 0/ QgA

E_L E_L 0. 0/

12

/0 /0

/0

A BK

1

Q

1

6
BK

KMQDCR

3E

2 IC

KCKQ

KAS

KCKQ

RU Q

TP

KAS

0.

KAS

6

KAS

3

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1 4

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6

4

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63,05

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7,45

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/3,44

CNQ. ,6. . ,77

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14

	2018A	2019A	2020E	2021E	2022E
	6,270.80	5,742.78	6,930.34	8,526.82	10,099.92
WVW	6.73%	-8.42%	20.68%	23.04%	18.45%
	429.44	400.76	967.38	1,339.22	1,566.08
WVW	511.02%	-6.68%	141.39%	38.44%	16.94%
	25.20%	22.84%	28.58%	29.50%	28.84%
PMC	10.76%	8.37%	12.06%	9.81%	9.01%
CNQ	0.52	0.48	0.80	0.99	1.16

Wind

2

IDM

			PS			PE			PB MRQ
			20E	21E	22E	20E	21E	22E	
300373.SZ	48.54	229.17	9.09	7.32	5.93	62.93	49.21	39.62	8.22
300623.SZ	49.57	243.39	26.42	20.21	16.02	92.58	73.67	59.64	10.17
605111.SH	210.20	212.72	22.35	16.68	12.78	141.59	96.53	71.79	18.97
603290.SH	267.50	428.00	43.82	33.23	25.38	228.50	165.34	123.10	38.48
			25.42	19.36	15.03	131.40	96.19	73.54	18.96
688396.SH	64.68	786.46	12.61	10.25	8.65	81.30	65.25	55.80	7.69

Wind

2021.01.05

PE PS

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6/,1. -43,03-33,6.

KMQDCR E @ A

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2018A	2019A	2020E	2021E	2022E	2018A	2019A	2020E	2021E	2022E
5,106.31	5,092.50	10,599.44	17,100.35	18,973.98	6,270.80	5,742.78	6,930.34	8,526.82	10,099.92
1,537.64	1,930.67	6,499.83	12,094.31	13,359.50	4,690.26	4,431.29	4,949.38	6,011.08	7,186.93
506.85	190.96	483.02	522.34	552.82	84.55	66.16	79.85	98.24	116.36
601.61	815.01	816.36	1,270.47	1,504.92	126.13	112.02	107.74	136.43	161.60
68.18	51.89	67.52	79.93	92.59	373.62	376.84	379.39	466.78	552.90
1,181.25	1,054.76	1,130.17	1,320.46	1,537.43	449.76	482.62	526.24	630.98	747.39
1,210.77	1,049.21	1,602.53	1,812.85	1,926.72	0.24	30.99	-65.05	-178.62	-301.74
4,885.74	5,002.79	5,004.09	5,076.20	5,134.70	71.74	-5.69	-23.44	-33.32	-46.68
0.00	81.71	81.71	81.71	81.71	10.59	-0.03	29.11	20.37	14.26
3,898.40	3,815.75	3,790.44	3,772.01	3,798.27	100.52	229.25	77.79	85.44	57.71
293.96	274.94	297.60	317.84	286.68	585.61	477.76	1,083.14		

3

GA

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1 96-/7 0-1 96-/7 1-0

0. /6 0. 0.

0. 0.

0. 0.

13911026534	hanqiuyue@cindasc.com
13520816991	bianshuang@cindasc.com
13816799047	liuchenxu@cindasc.com
18618460223	gushijia@cindasc. com
18340820155	weichong@cindasc.com
18506960410	quejiacheng@cindasc.com
13051504933	qiliyuan@cindasc.com
18121125183	wangliben@cindasc.com
18516562656	sunsiya@cindasc.com
15800476582	wuguo@cindasc.com
13023188237	zhangqiongyu@cindasc.com
15618358383	guopengcheng@cindasc.com
13122616887	liruolin@cindasc.com
13530830620	wangliuyang@cindasc.com
15986679987	chenchen3@cindasc.com
17727821880	wangyufei@cindasc.com
18927445300	jiangkaiwen@cindasc.com
13229465369	yanna@cindasc.com
13032111629	jiaoyang@cindasc.com
