(688396)

(**)**	**(** **)**
021-38676820	021-38677388
wangcong@gtjas.com	zhangtianwen@gtjas.com
S0880517010002	S0880118090094

6 **SiC**

SiC **GaN**

NSumm

2020.11.09

(688396)

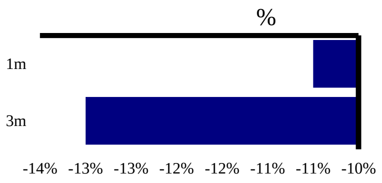
87.41

81.07

50.20

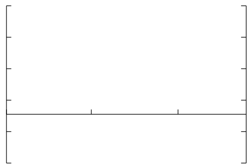
www.crmicro.com

%



52 32.38-63.51

61,039

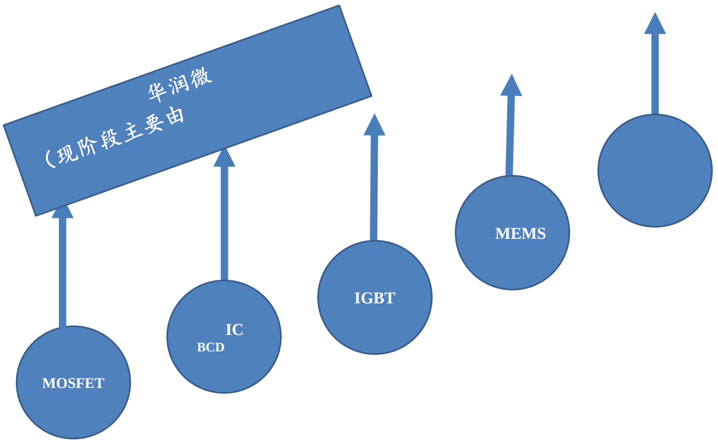


	2018A	2019A	2020E	2021E	2022E
	6,271	**5,743**	**6,719**	**8,197**	**10,083**
	4,690	4,431	4,752	5,574	6,639
	85	66	77	94	116
	126	112	131	172	219
	374	377	336	410	504
EBIT	**546**	**274**	**926**	**1,209**	**1,646**
他	0	0	0	0	0
	11	0	0	0	0
	0	31	47	-52	-78
	586	**478**	**1,120**	**1,564**	**2,106**
	53	-6	116	160	215
	108	112	104	144	193
	429	**401**	**940**	**1,299**	**1,738**
了					
了	1,538	2,438	7,500	8,639	10,176
了	27	44	44	44	44
	0	82	82	82	82
了	3,898	3,816	3,806	3,796	3,746
了	571	557	557	557	557
了	**9,992**	**10,095**	**15,600**	**17,446**	**19,834**
	4,654	1,979	2,127	2,480	2,936
	318	1,726	1,726	1,726	1,726
	5,020	6,391	11,748	13,241	15,173
(IC)	**7,471**	**7,897**	**13,254**	**14,747**	**16,679**
NOPLAT	497	277	833	1,088	1,482
	953	709	510	410	350
	133	-1,192	105	115	144
	-533	-611	-658	-607	-557
	1,050	**-816**	**791**	**1,006**	**1,419**
	1,482	576	1,497	1,802	2,200
	-575	-41	-658	-607	-557
	-627	-180	4,223	-56	-105
	281	**356**	**5,062**	**1,139**	**1,538**
	6.7%	-8.4%	17.0%	22.0%	23.0%
EBIT	8150.3%	-49.9%	238.0%	30.6%	36.2%
	511.0%	-6.7%	134.5%	38.3%	33.8%
	25.2%	22.8%	29.3%	32.0%	34.2%
EBIT	8.7%	4.8%	13.8%	14.7%	16.3%
	6.8%	7.0%	14.0%	15.9%	17.2%
了 (ROE)	10.4%	7.4%	8.8%	10.8%	12.6%
了 (ROA)	5.4%	5.1%	6.7%	8.3%	9.7%
(ROIC)	6.7%	3.5%	6.3%	7.4%	8.9%
	91.9	86.9	86.9	86.9	86.9
平	35.0	51.8	51.8	51.8	51.8
了	581.6	641.6	847.5	776.8	718.0
	3.5	1.4	1.6	1.4	1.3
/	8.5%	10.6%	9.8%	7.4%	5.5%
了	49.8%	36.7%	24.7%	24.1%	23.5%
	99.1%	58.0%	32.8%	31.8%	30.7%
PE	142.14	152.31	64.95	46.97	35.11
PB	11.69	8.44	5.72	5.08	4.44
EV/EBITDA	0.61		36.97	33.61	26.49
P/S	6.64	7.25	8.72	7.45	6.05
	0.0%	0.1%	0.3%	0.4%	0.6%

1.

MOSFET IGBT

1



1 2

9 25 (688396)

MOSFET IGBT 4

IGBT
IGBT

SiC **SiC MOSFET**
GaN

2.

SiC GaN
SiC 2030
500 5G
SiC GaN

2.1. SiC GaN

/
/

(GaAs) (InP) (GaN) (SiC)

/ **(Ge)** **(Si)** **(Se)** **(B)**
50

60

(GaAs) **(InP)**

(InSb) **(GaN)** **(SiC)** **(CdS)** 20 90

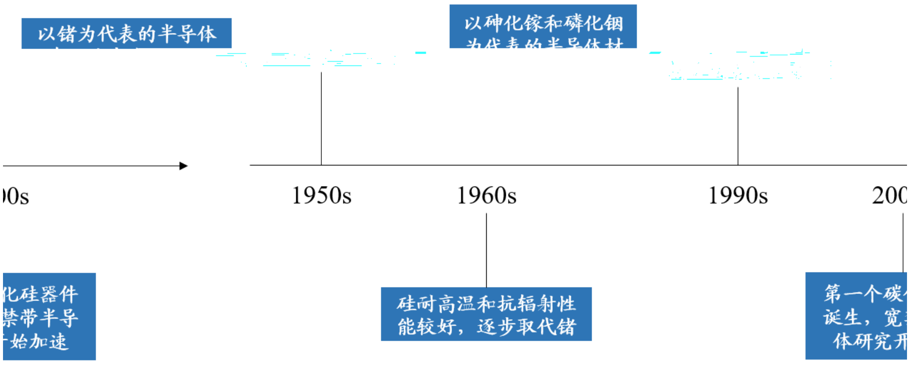
(GaAs) (InP)

1

2

(LED) (LD)

2



Yole

SiC GaN

(Eg) 2.3 (eV)

3 **SiC** **GaN**

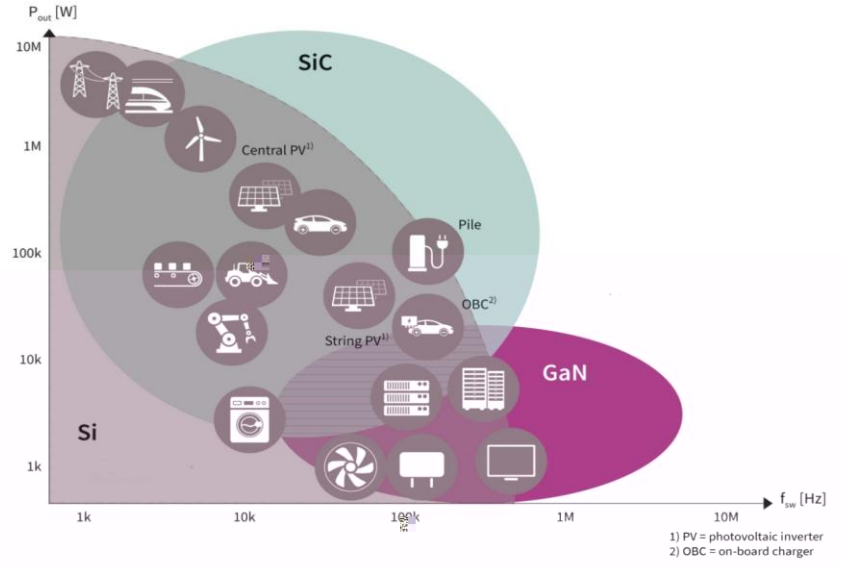
(SiC) **(GaN)**

1:

	Si	**GaAs**	**GaN**
eV	1.1	1.4	3.4
10^{-7}cm/s	1.0	2.1	2.7
W/c K	1.3	0.6	2.0
M/cm	0.3	0.4	5.0
cm^2/ V s	1350	8500	900

/

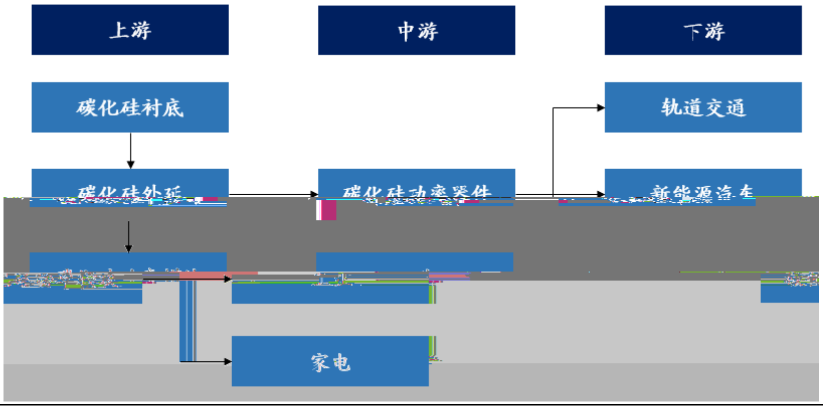
4



2.2. SiC

4H SiC(4H-SiC)

5 SiC



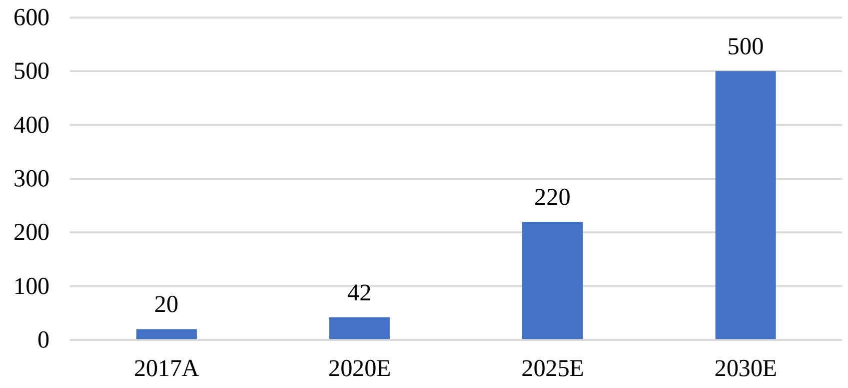
1 /

2010 Cree 6
2015 2015 Cree II-VI
8

6 **2030** **6** **SiC**
40 Yole 2017 4
10 6 1.5 2020 4
10 6
8 2020 TD[2i82.r 1 0 0⁄MCI ⁄MCID 74/LaD 84/L 0 0 1 2/P ⁄MCI

SiC	SBD
	PiN PiN
	JBS
	PiN MPS
SiC	MOSFET
	BJT
	JFET
	IGBT

21 **SiC** **JBS** **(** **)** **MOSFET** 2001 (Infineon) Cree



Yole

1

2

3

4

99 %

50 %

5

2001 600 V

SiC MOSFET JBS

SiC MOSFET

SiC JBS

7 4 SiC

SiC

5G 2020 5G

SiC

SiC

10 SiC

11 SiC

行业	新基建投资金额
5G✓	2020年投资规模近3000亿元
特高压	2020年投资规模超600亿元
轨道交通	2020年投资规模在5000亿元左右
充电桩✓	2020年投资规模约100亿元
数据中心✓	2020年投资规模约1000亿元
人工智能	2020年投资规模约350亿元

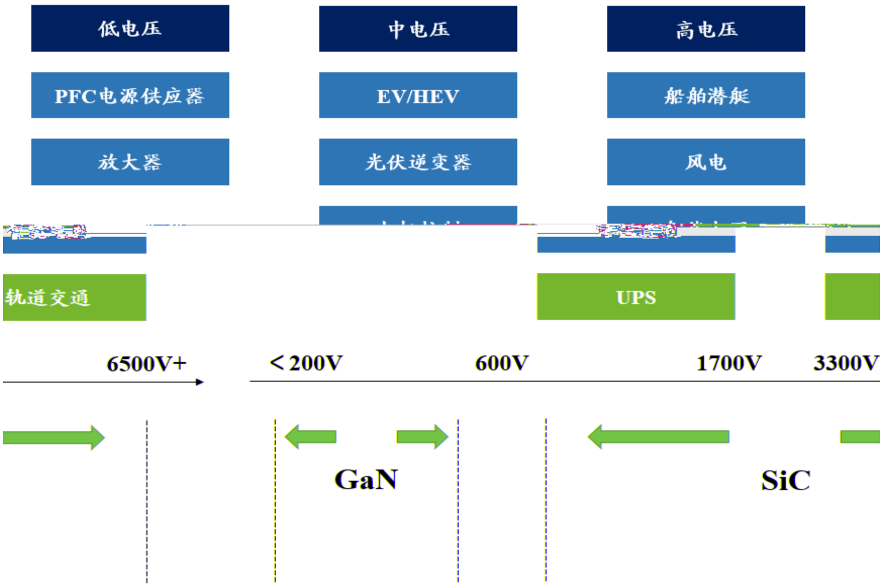
规模或达百亿级别 工业互联网 2020年投资

SiC

2.3. GaN

GaN **600V** GaN 1700 GaN GaN 0~300V Si 600V SiC 300V~600V GaN

12 GaN 600V



SiC **GaN**

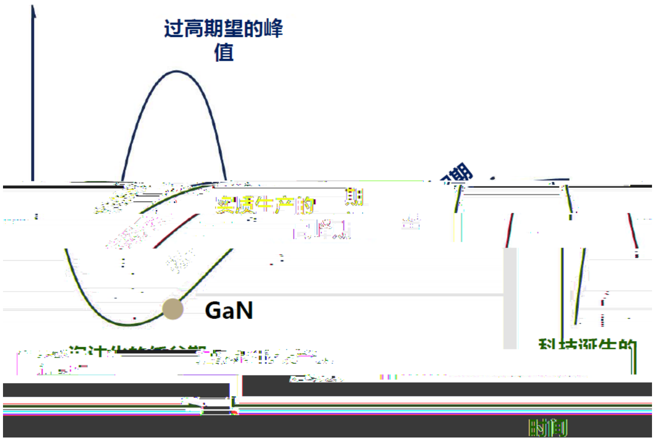
GaN GaN Si SiC GaN-on-Si GaN-on-SiC GaN-on-SiC GaN SiC GaN SiC GaN

GaN-on-Si **GaN-on-SiC**

Macom GaN-on-Si GaN-on-SiC GaN-on-Si SiC GaN-on-Si

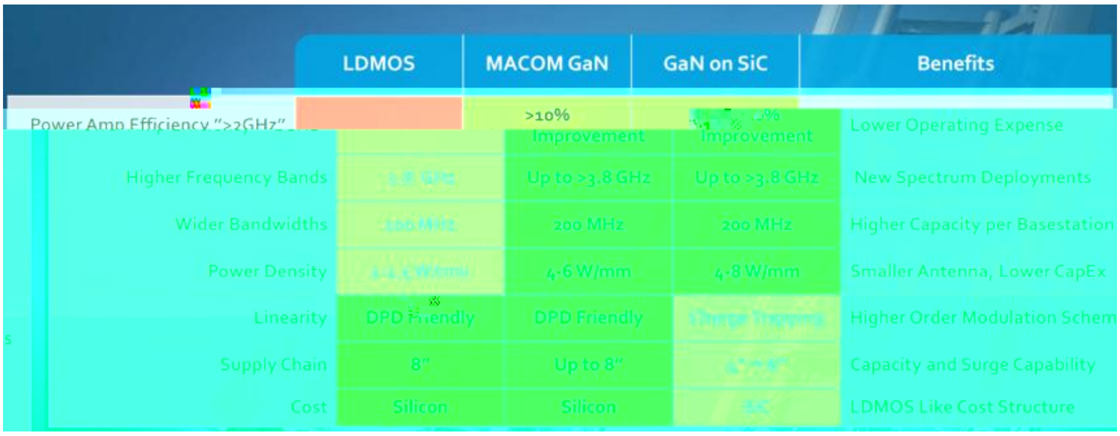
13 CoolGaN

14 GaN



Gartner

15　GaN-on-Si



	LDMOS	MACOM GaN	GaN on SiC	Benefits
Power Amp Efficiency ">2GHz"		>10% Improvement	>10% Improvement	Lower Operating Expense
Higher Frequency Bands	3.8 GHz	Up to >3.8 GHz	Up to >3.8 GHz	New Spectrum Deployments
Wider Bandwidths	100 MHz	200 MHz	200 MHz	Higher Capacity per Basestation
Power Density	[illegible]	4-6 W/mm	4-8 W/mm	Smaller Antenna, Lower CapEx
Linearity	DPD Friendly	DPD Friendly	Charge Trapping	Higher Order Modulation Schem
Supply Chain	8"	Up to 8"	4"-6"	Capacity and Surge Capability
Cost	Silicon	Silicon	SiC	LDMOS Like Cost Structure

GaN

GaN (SBD) (FET)
GaN
(PA) (LNA) **GaN**
GaN
2018 GaN
2020 CES GaN 66
18W 30W 65W 100W
2020 2 13 10
65W

Yole 2017 GaN
1000 2023 4.3 2017-
2023 CAGR 87%

16　10　65W

3. 6 SiC

SiC 2020 7 SiC
6 SiC
SiC JBS GaN
SiC

3.1. 6 SiC GaN

2020

1 2020 2

2020 2

IDM
650V GaN SiC JBS
SiC MOSFET

2 2020 7
7 SiC 6 SiC
2020 7
4 SiC
1200V 650V SiC
6 SiC GaN

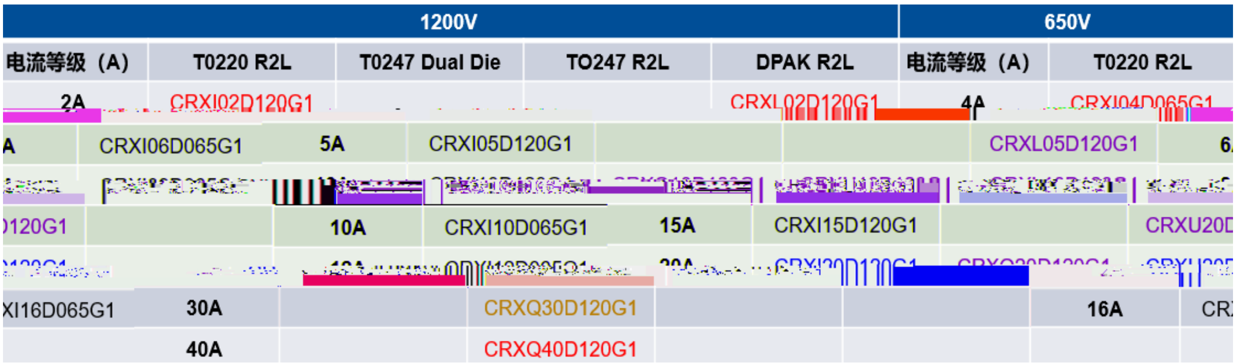
3 2020 8
SiC JBS GaN
2020 6 650V 1200V SiC JBS
SiC JBS
650V
MOCVD

4 2020 9
6 SiC

2020 8 2020 9
6 SiC 1000

SiC

18 SiC SiC



1200V | 650V

电流等级（A） | T0220 R2L | T0247 Dual Die | TO247 R2L | DPAK R2L | 电流等级（A） | T0220 R2L

2A | CRXI02D120G1 | CRXL02D120G1 | 4A | CRXI04D065G1

A | CRXI06D065G1 | 5A | CRXI05D120G1 | CRXL05D120G1 | 6

)120G1 | 10A | CRXI10D065G1 | 15A | CRXI15D120G1 | CRXU20D

XI16D065G1 | 30A | CRXQ30D120G1 | 16A | CR

40A | CRXQ40D120G1

SiC

SiC GaN

IDM

3.2. SiC

-

3.24%

SiC

1

2011 2012 3 4 SiC 2014 6 SiC 2011 3

Aixtron

2012 3 9

3 4

2014 4 6

6

2

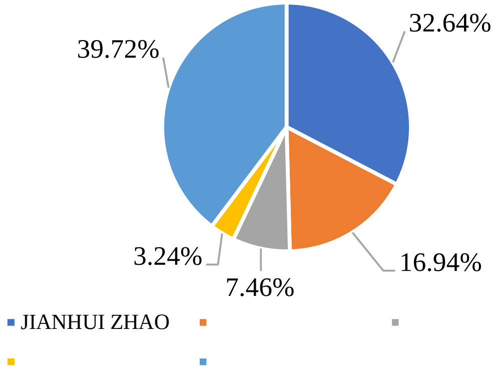
32.64%

JIANHUI ZHAO 1988

16.94%
7.46% 5.14%
3.24%

19

20 3.24%



3

2020 10 10 41 2013 9 2019 12

3: 2020 10 10

	CN201911405142.5	CN111167780A	2019/12/30
	CN201911400025.X	CN111088522A	2019/12/30
T	CN201911400028.3	CN111058091A	2019/12/30
	CN201911400042.3	CN111101196A	2019/12/30
	CN201721375888.2	CN207439989U	2017/10/24
	CN201711000158.9	CN107829135A	2017/10/24
	CN201721078400.X	CN207130366U	2017/08/25
	CN201721073570.9	CN207130365U	2017/08/25
	CN201610377959.6	CN106087039A	2016/05/31
	CN201610351566.8	CN106057694B	2016/05/24

SiC

4.

2020-2022
9.75% 17.31% 10.70% 9.75% 13.46%
9.80% IDM 2020-2022
28.20% 27.08% 35.30% 28.20% 22.92%
34.20%

2020/2021/2022 17%/22%/23%
2020/2021/2022 29.28%/32.00% /34.15%

2020-2022 9.40 12.99 17.38
135% 38% 34% EPS 0.77 1.07 1.43
0.68 0.91 1.23

4

		2017	2018	2019	2020E	2021E	2022E
		3519.76	3571.91	3183.52	3493.91	4098.62	4537.17
	%	59.90%	56.96%	55.44%	52.00%	50.00%	45.00%
	%		1.48%	-10.87%	9.75%	17.31%	10.70%
	%	16.33%	18.57%	17.76%	24.00%	27.00%	27.00%
		2339.06	2683.49	2515.66	3225.15	4098.62	5545.44
	%	39.81%	42.79%	43.80%	48.00%	50.00%	55.00%
	%		14.73%				

IDM

IGBT **15%**

PB 2021 PB 6.98 2021 8.03 PB 87.41

PS 2021 PS 11.55 2021 13.28 PS 89.55

87.41

5 2020 11 5

			P/S				**PB**		
			2021E)	2020E	2021E	2022E	2020E	2021E	2022E
300623.SZ		41.58	16.86	4.81	5.26	5.83	8.64	7.90	7.13
300373.SZ		41.69	6.23	6.04	6.89	7.93	6.90	6.05	5.26
			11.55		-		7.77	6.98	6.19
688396.SH		49.92	7.45	8.78	9.89	11.32	5.69	5.05	4.41

wind wind

6.

受

交 受 受 或 受 受
或 交 交

受
交 受 他 他 平
受 受
受 平 平

刊 或 或
受 受

受 受

受 个 平
受 受
受 了 受
受

平 平

交 受 有 受

受
平 受 个 或
受 受 个 或

个

受 他

受 他

事

取 取 事 取

@ @ @ @