

· 1 3 İ k 3

N √ (688396)

/ p İ 1 φ +
/ p İ B " ' A E √ 2003
1 8.79 İ u " ' 12.16
f F u + E r √
İ p Ä π c' κ φ CRH f Micro E i √
100% 8
2 16 3 2
1 3 İ φ ' Y 1 φ
k j k İ + ' Y r r ' 3
Ü IDM İ s æ k İ l A
φ 1 φ 3 ' İ f + Ü
U İ IDM U ' Y B ψ İ r 2
Ü 3 İ

+
Y MOSFET 4 İ İ 6 ψ
İ 6 ψ E n H T İ
MOSFET ı IGBT II 6 φ l İ n | 2019 ~ II
35% 3 X İ φ l 3 r ' 1
1 φ 3 t, k İ 3 Ü 2
İ æ φ ' Y 4 İ 6
ψ İ İ ' t 4 İ İ r IHS
Markit İ II 3 İ " ' X MOSFET X O
P İ : 2 İ f æ j k İ X
MOSFET 4 İ r

IGBT 3 İ B ψ
" ' IGBT t m + H 1 l
İ 3 r H 600V-6500V Y 1 ~ IGBT
t m İ 3 3 ~ Ü 3 İ π
X l T B ψ r " IGBT t l
k + Ü l İ n , Ü 2 ψ
İ l 1 r

SiC f GaN π ~ İ ' İ 1 r Q B ψ
SiC ~ II + 1 l ' t t MOSFET ı IGBT ı
SBD İ 2 k r Yole İ
2017-2023 SiC ' 3 t U φ 31% İ
L 2023 15 3 İ ~ U " ı 3
l " ı Q 3 l r n İ
f SiC f n GaN φ r Yole 3 İ
2022 GaN φ 4.5 3 r " ' 3 ε
/ p φ p. D İ P ψ U 1
φ İ " 2 İ f İ P
ψ 1 φ İ π Y GaN ' t l' m

Ü 3 H

E 4 ĩ
p E
ME

ψ E 688396
52 %... M / u M E
w ()
w ()
(b) 237.14

3 E
E sunyf@hx168.com.cn
SAC NO E S1120519080005

3 E
E wanghw1@hx168.com.cn
SAC NO E S1120519090003

İ 4. p

İ



æ 2019~2021 " ' 57.45 , 69.60 ,
 83.52 , ĩ n -8.39% 21.15% 20%Ж
 4.01 , 6.35 , 8.16 , æ w
 ĩ æ 'Y' 2021 PE æ
 40 P Í ■ ĩ 100 P II p æ w Ćİ 7 " MOSFET
 Q r ũ ĩ æ G' æ w M ĩ
 N ü ĩ n r

	2017A	2018A	2019E	2020E	2021E
$R_{\tilde{f}}(\tilde{f} \rightarrow b \tilde{\psi})$	5875.59	6270.80	5745.00	6960.00	8352.00
YoY	33.63%	6.73%	-8.38%	21.15%	20.00%
$R_{\tilde{r}}(\tilde{r} \rightarrow b \tilde{\psi})$	70.28	429.44	400.75	651.91	833.59
YoY	123.22%	511.02%	-6.68%	62.67%	27.87%
r	17.62%	25.20%	23.50%	27.00%	28.00%
$\tilde{f} \rightarrow \tilde{\psi} E$	0.06	0.37	0.34	0.56	0.71
ROE	1.83%	10.35%	4.38%	6.65%	7.84%
	0.00	0.00	0.00	0.00	0.00

7 4

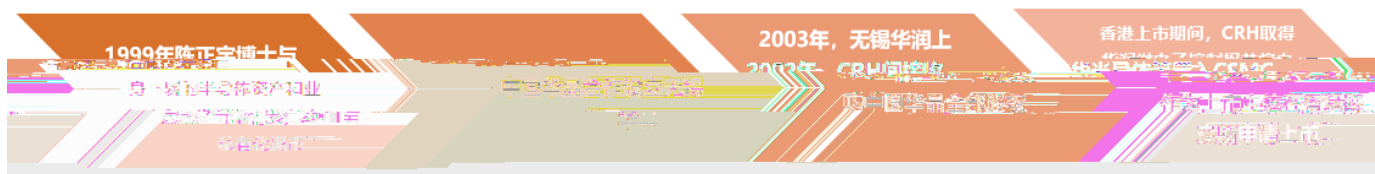


1. " ' ϕ İ IDM&Ψ Ů " "

1.1. / ρ İ' ϕ A

/ ρ İ B " ' A E √ √ 2003 1 √ İ İ
 √ 8.79, İ İ u " ' √ 12.16, Í F u +
 √ E r √ İ ρ Ä π √ κ √ CRH Í Micro E İ √
 100% √ İ İ +. √ X √ r
 Í 1E " ' ω İ Í I ϕ ' Y İ ' II ρ
 √ k Ж
 Í 2E √ √ √ k İ √ " ' " ' İ √ " ' Ж
 Í 3E √ " ' √ √ II √ √ √ İ " ' İ
 √ 1.00 √ İ A ' √ II √ √ √ İ A " ' Ж
 Í 4E || H √ İ " ' √ ' H N η + / IPO √ k İ
 A √ ρ İ : √ √ k √ Q + √ Y İ
 X √ H " İ Ń N + η İ + U m √ u
 √ İ H √ r

1 " ' İ √



E Ů İ √ ||

2 2004~2013 " ' İ Ε Ł



E " ' İ √ ||

3 2014~2020 " ' İ Ε Ł



E " ' İ √ ||



2	Մ	Վ	Փ 2018	ձ	Օ	
Օ		Ն	Կ	2018	ձ	Դ, ֆԵ
1		Ն			21.7	
2					18.5	
3		Ն			17.1	
4					8.1	
5		æ			7.7	
6					7.2	
7			Վ	Փ	6.9	
8		Կ			6	
9					5.4	
10			Կ		4.9	
Ե		Թ	Ի	Ն		



4 | " "

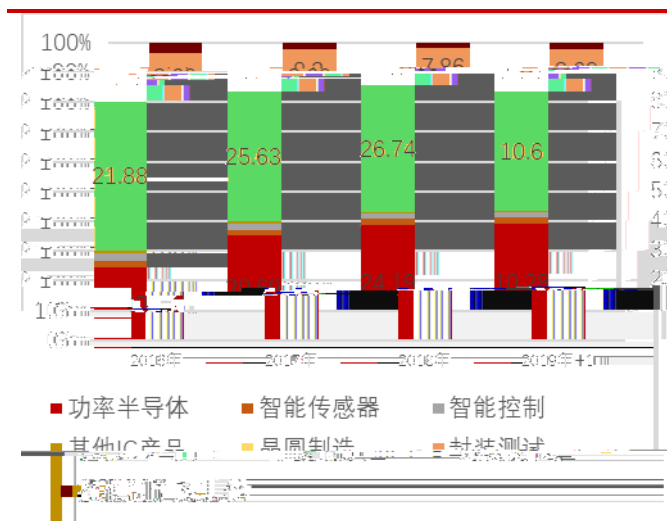
4

4 " "		E, 3 Ü		I	
MOSFET	MOS 1	φ I, 3	MOS 1	MOS I 1	1 k + 1
			-100V-1500V		
IGBT		Ü	φ I, 3	1	1 k + 1
			600V-1200V		
SBD	SBD	ε I, 3	SBD 1	45V-150V I	1
			200mA-		
FRD		ε I 1		200V-6500V	1 1
E		ö I 1			

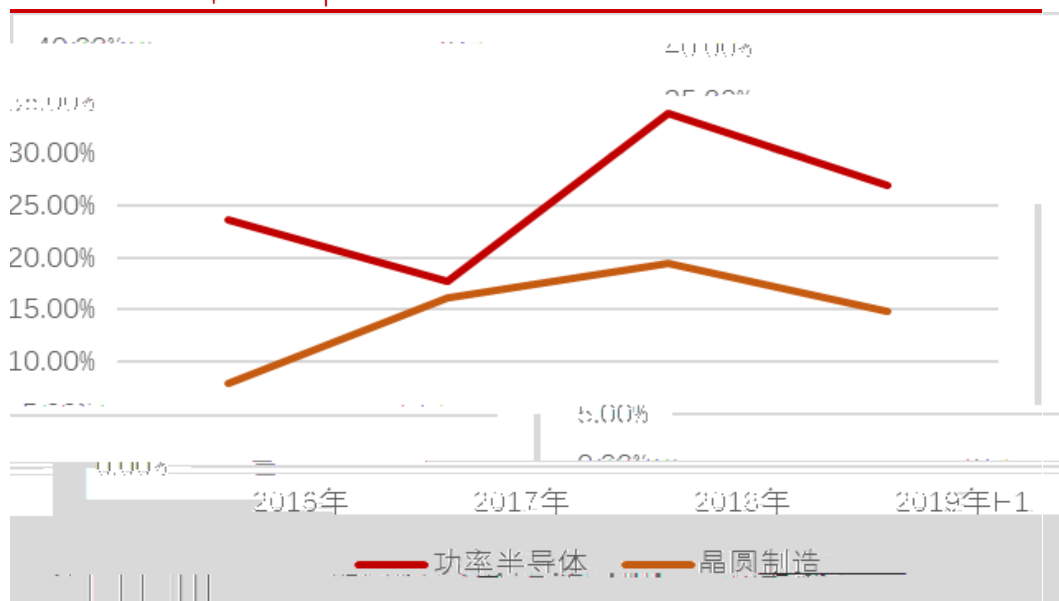
5 " "		IC I		IC E, 3 Ü	
				I	
AC-DC	AC-DC	Δ, 3 I ~	+ 1 n	1 k +	
		+ 1	ω 1		
LED	LED	π I, 3 ~	π f	1	1
		Ω π		k +	
BMS IEMC/31D76					



7 2016~2019H1



EWind i v

$$8^{-1} \quad \gamma \quad \varphi \quad \ddot{U} \quad + \quad \Gamma \quad \Gamma \% \in$$


Ө İ √

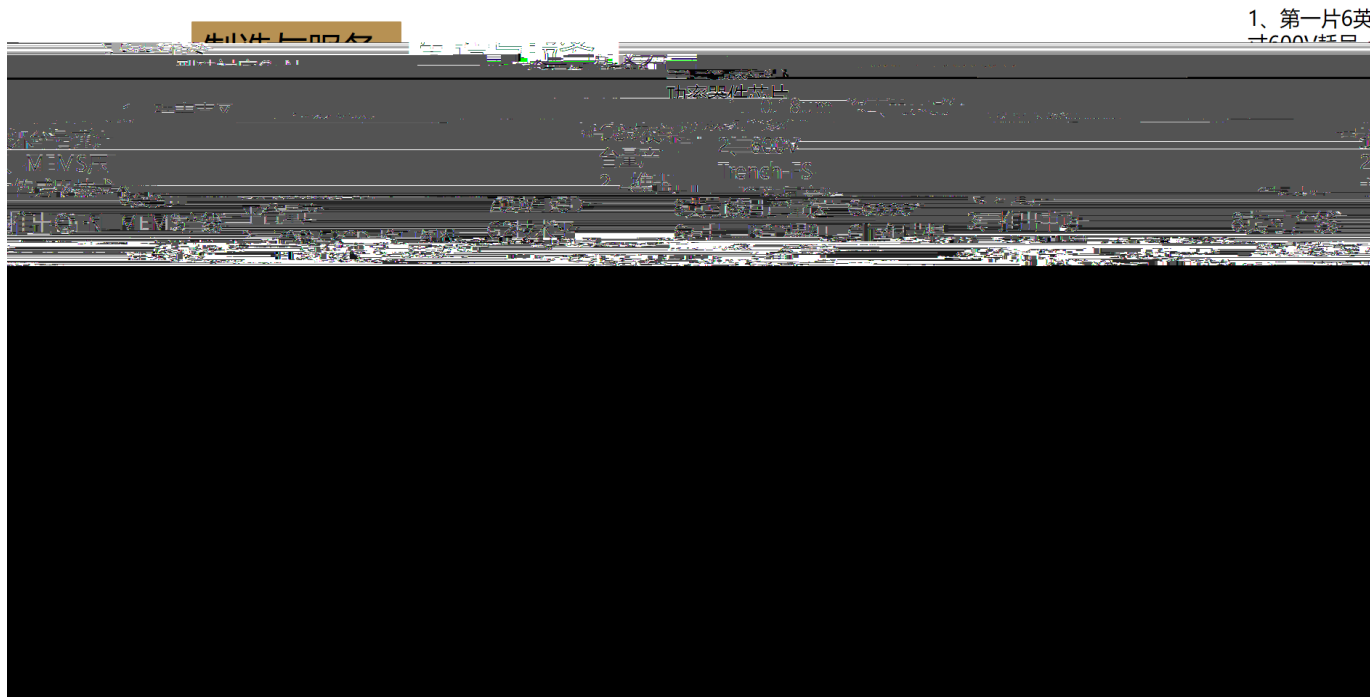
1.3.

20 к 50 ш İ √ л к м т r 60-70 ш İ ll ч р 80 ш İ MOSFET IGBT r ε ï л
т ï Ĩ φ λ ı ı 6500 Ж80 ш Ĩ MOSFET ж
L ѿ ĩ n ч т ѱ ш r IGBT ж н ч
ı ч . ĩ 6500V ∈ f . ĩ 10-100kHz ∈ r ε γ' қ π u ĩ ч т ф
X n' y X Ĩ' т а т' л r



Y Q I 1 " ' U T F E " ' I K⁺ H
 Δ 1 I ' I F e Y Q I 1 X SBD
 ũ 1 Q U P J Δ P + ũ BCD Q I
 " ' u 20 o I J " ' 3 I ' H " '
 k Y Q r l

9 2008~2018 “ ’ ĩ , ŧ f ĩ ”



E ð ï √ ||

[illegible]



E " ' 1 2

E ð ï √ ||



90nm-0.13um

MCU 4

MCU 4

4

DSP 4 FPGA



9 2016~2019H1 " ' , ũ ĩ 1 " ĩ, ÷ €


$$11 \quad Y \quad \quad \quad t \quad \tilde{Y}_t$$
[illegible]

2.2.MOSFET ʻY ʻQ İ IDM ʻ ʻ

	IHS Markit	İ 2018	MOŞBİFP8p	₺ 27.92	₺ İ 2016
-2018	U	₺ 15.03%	İ	İ	İ



" ' Y k ñ l F Q MOSFET ¼ ð r Pts\$ IDM B W M
 ì F Ì " ' e , ð Δ Ì , ð f ' Y Q r " ' π
 'Y e -100V 1500V 'Y u l X l ¼ H Δ MOSFET , ð j k Ì Ï
 π 'Y 'H MOSFET l l ì m + F l j k Ì , l ~
 MOS l VDMOS ð MOS Ì ~ l F n m F n r "
 MOSFET , ð f 'Y n k ~ " ' " l E

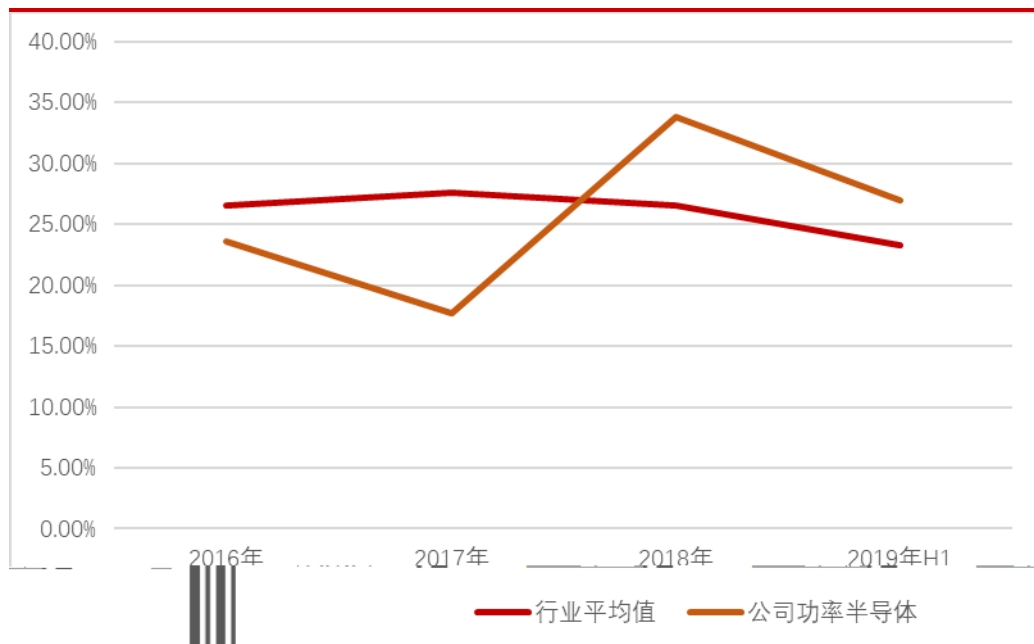
12 'Y MOS e ð ¼ ð l

	ì	¼	¼	¼
¼	30V-900V	40V-900V	-60V-150V	-100V-1500V
	MOS	MOS	MOS	MOS
	MOS	MOS	MOS	MOS
l	MOS		MOS	MOS
	MOS	P	MOS	MOS
	MOS			MOS
				P MOS

E ð Ì ¼ ||

MOSFET , ð T F Ä' l + r " ' ð ð Ì IDM B W Ì
 MOSFET Ì f 3 r l f + U Ì l
 l W r " ' MOSFET l , ð l B , ð ð ð Ì
 f Æ U f Ì ð o ð Ì Ì " ' l
 l r 2018 n k " ' r " ' MOSFET l , ð X
 ð k l Ì l r π Ì MOSFET Ì ð
 Ì , W Ì r " ' MOSFET , ð ð l W Ì l l
 l r IHS Markit Ì l ð Ì " ' X MOSFET X
 o P Ì : l l f e j k Ì X MOSFET ¼ ð r

16 2016~2019H1 'Y' l ¼ l W ð ¼ ' k' r l %E



E ð Ì ¼ ||



2.3.IGBT 3 İ B 5

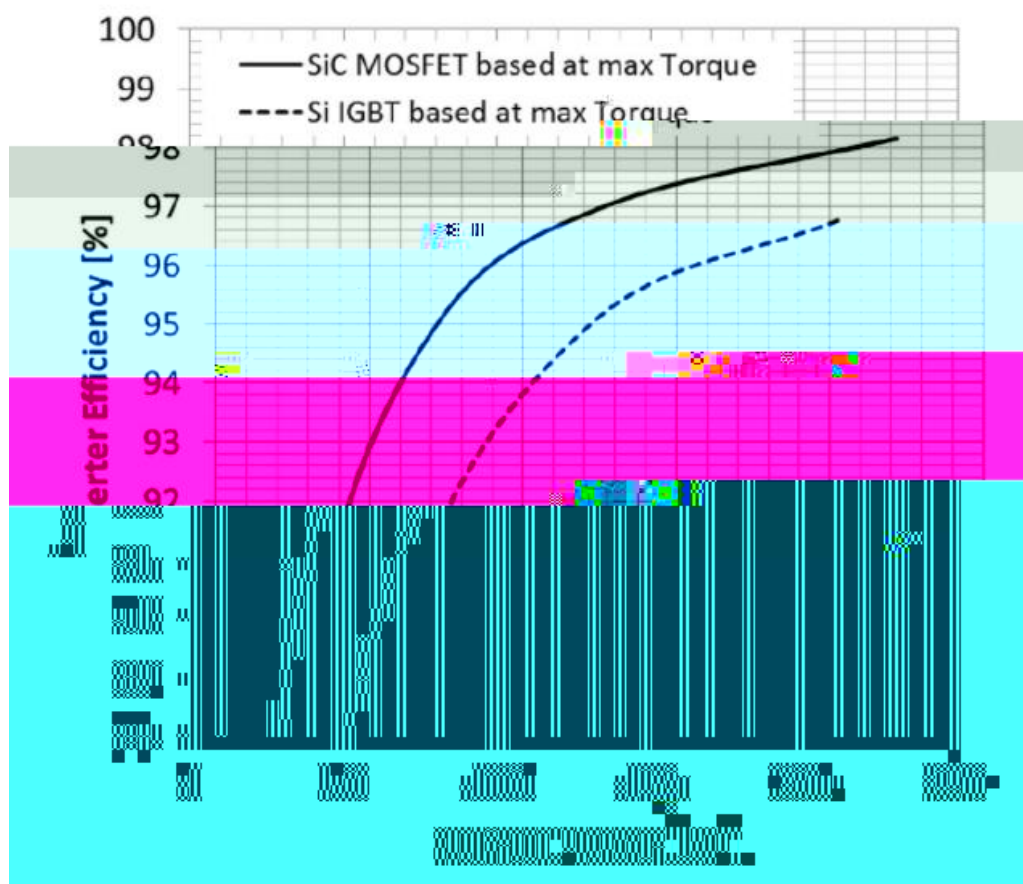
IGBT Insulated Gate Bipolar Transistor
BJT MOSFET
IGBT 20 80
MOSFET GTR
BJT



γ φ K γ $\dot{\gamma}$ $\ddot{\gamma}$ $\overline{\gamma}$ $\dot{\gamma}$ H P ψ γ φ $\dot{\gamma}$ ψ γ
 φ I $\dot{\gamma}$ $\ddot{\gamma}$ γ γ $\overline{\gamma}$ K ε ψ γ φ I $\dot{\gamma}$ ψ γ
 φ $\ddot{\gamma}$ $\dot{\gamma}$ K P ψ γ φ γ φ $\dot{\gamma}$ γ X φ
 SiC φ GaN γ

The first part of the text discusses the properties of SiC MOSFETs, including their high switching speed and low on-state resistance. It mentions that SiC MOSFETs are suitable for high-frequency and high-voltage applications. The second part of the text discusses the properties of Si IGBTs, including their high current density and low on-state resistance. It mentions that Si IGBTs are suitable for high-current and high-voltage applications. The third part of the text discusses the properties of SBDs, including their high switching speed and low on-state resistance. It mentions that SBDs are suitable for high-frequency and high-voltage applications.

21 SiC MOSFET f Si IGBT f

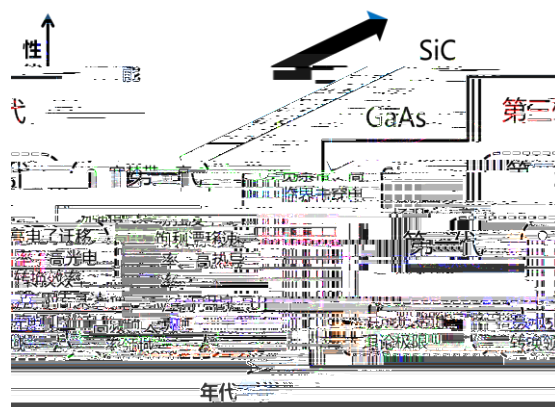


22 功率器件



EY 10 10 10 10 10 10 10

23 功率器件

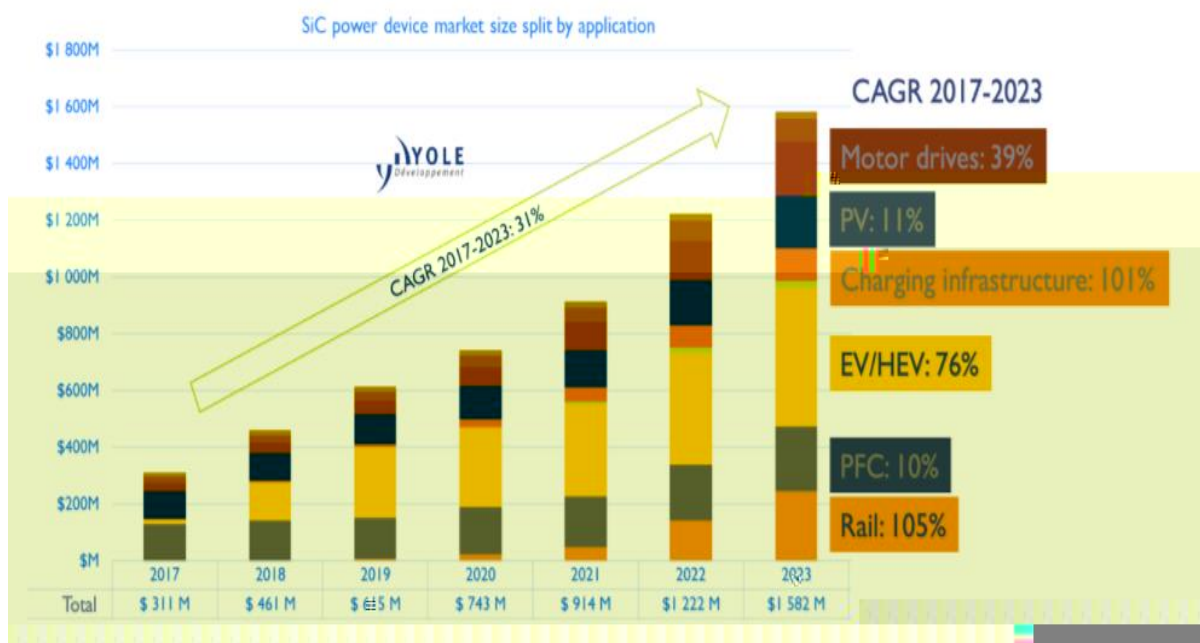


E Google 10 10 10 10 10 10 10

Yole
L 2023
Q 2023
76% I

SiC 10 10 10 10 10 10 10
U 10 10 10 10 10 10 10
CAGR 10 10 10 10 10 10 10

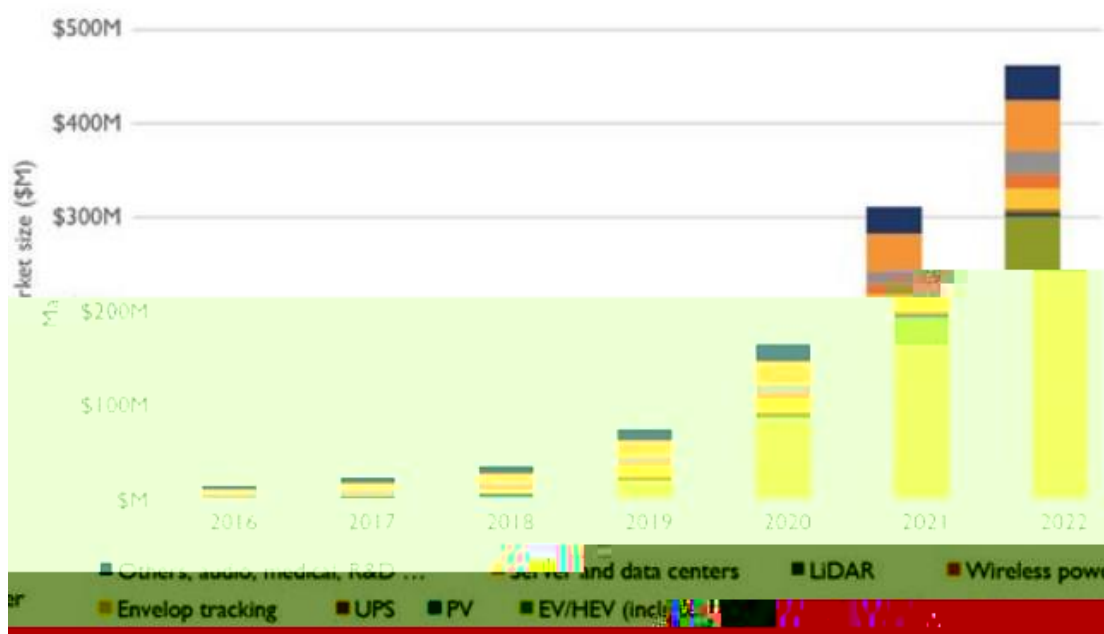
24 2017~2023 SiC 10 10 10 10 10 10 10



EYole 10 10 10 10 10 10 10



25 GaN⁻¹ Ł Ħ Ъ Ѡ €



E V

11

F Q t I GaN l y l p f
 I t r i j 5G H l r I e
 CoolGaN U A r i i ~ u I ~ Å L
 l' i q r n I f SiC F n
 GaN e r Yole e i 2022 GaN e 4.5
 Q r T P v U v φ i " ' Y GaN ' t l' p
 l SiC ' t r n " ' Q d r


$$Q \stackrel{\sim}{=} E' = Q \cup J$$



÷ / ÷

ر	ر ب ق ع	2018A	2019E	2020E	2021E	ر ب ق ع	2018A	2019E	2020E	2021E
ك	ڤ	6270.80	5745.00	6960.00	8352.00	% ر	537.56	512.43	869.21	1111.46
YoY(%)		6.73%	-8.38%	21.15%	20.00%	م	953.19	868.90	908.90	948.90
ك		4690.26	4394.93	5080.80	6013.44	ؤ	-95.14	-39.31	-233.97	-140.00


$$k^+ = \frac{1}{2} \left(1 + \frac{1}{\theta} \right)$$