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S0880517010002	S0880118090094

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4y

6 SiC

SiC GaN

2020.11.09

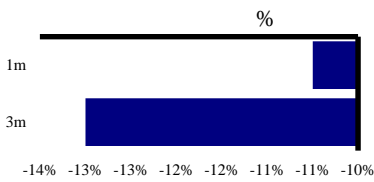
(688396)

**87.41**

81.07

**50.20**

www.crmicro.com



52

32.38-63.51

61,039

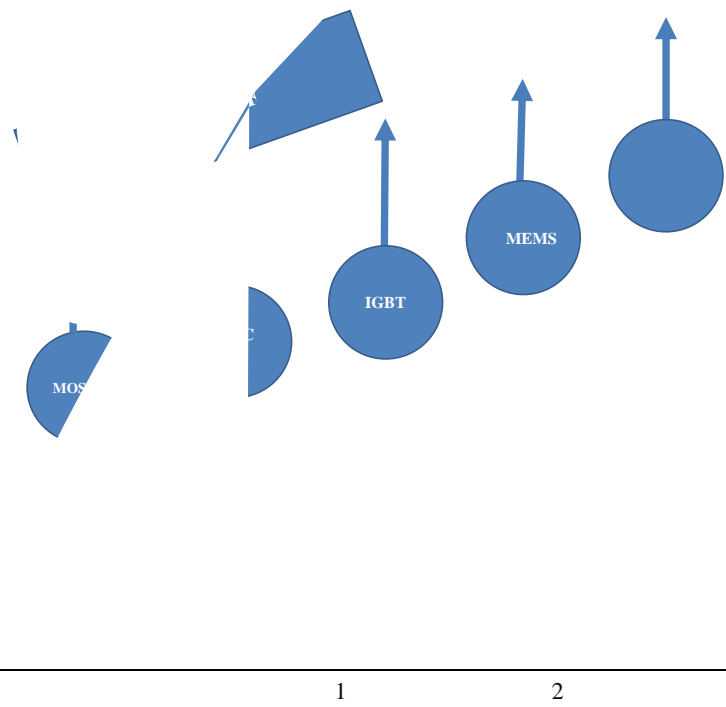
	2018A	2019A	2020E	2021E	2022E
	<b>6,271</b>	<b>5,743</b>	<b>6,719</b>	<b>8,197</b>	<b>10,083</b>
	4,690	4,431	4,752	5,574	6,639
	85	66	77	94	116
	126	112	131	172	219
	374	377	336	410	504
<b>EBIT</b>	<b>546</b>	<b>274</b>	<b>926</b>	<b>1,209</b>	<b>1,646</b>
	0	0	0	0	0
	11	0	0	0	0
	0	31	47	-52	-78
	<b>586</b>	<b>478</b>	<b>1,120</b>	<b>1,564</b>	<b>2,106</b>
	53	-6	116	160	215
	108	112	104	144	193
	<b>429</b>	<b>401</b>	<b>940</b>	<b>1,299</b>	<b>1,738</b>
于	1,538	2,438	7,500	8,639	10,176
于	27	44	44	44	44
于可	0	82	82	82	82
于可	3,898	3,816	3,806	3,796	3,746
于可	571	557	557	557	557
于可	<b>9,992</b>	<b>10,095</b>	<b>15,600</b>	<b>17,446</b>	<b>19,834</b>
	4,654	1,979	2,127	2,480	2,936
	318	1,726	1,726	1,726	1,726
未	5,020	6,391	11,748	13,241	15,173
(IC)	<b>7,471</b>	<b>7,897</b>	<b>13,254</b>	<b>14,747</b>	<b>16,679</b>
NOPLAT	497	277	833	1,088	1,482
承	953	709	510	410	350
	133	-1,192	105	115	144
	-533	-611	-658	-607	-557
	<b>1,050</b>	<b>-816</b>	<b>791</b>	<b>1,006</b>	<b>1,419</b>
	1,482	576	1,497	1,802	2,200
	-575	-41	-658	-607	-557
	-627	-180	4,223	-56	-105
	<b>281</b>	<b>356</b>	<b>5,062</b>	<b>1,139</b>	<b>1,538</b>
	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%
于 (ROE)	10.4%	7.4%	8.8%	10.8%	12.6%
于 (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
	35.0	51.8	51.8	51.8	51.8
于	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%
于	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.				.....	4
2.					.5
2.1.		SiC	GaN		..5
2.2.	SiC			.....	8
2.3.	GaN			.....	12
3.		6	SiC		
				.....	15
3.1.	6	SiC	GaN	.....	15
3.2.			SiC	.....	17
4.				.....	19
5.				.....	19
6.				.....	20

1.

MOSFET IGBT

1



9 25

(688396)

MOSFET IGBT 4

IGBT IGBT

GaN SiC SiC MOSFET

**2.**

SiC GaN  
 SiC 2030  
 500  
 SiC 5G  
 GaN

**2.1. SiC GaN**

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

(Ge) (Si) (Se) (B)

50

60

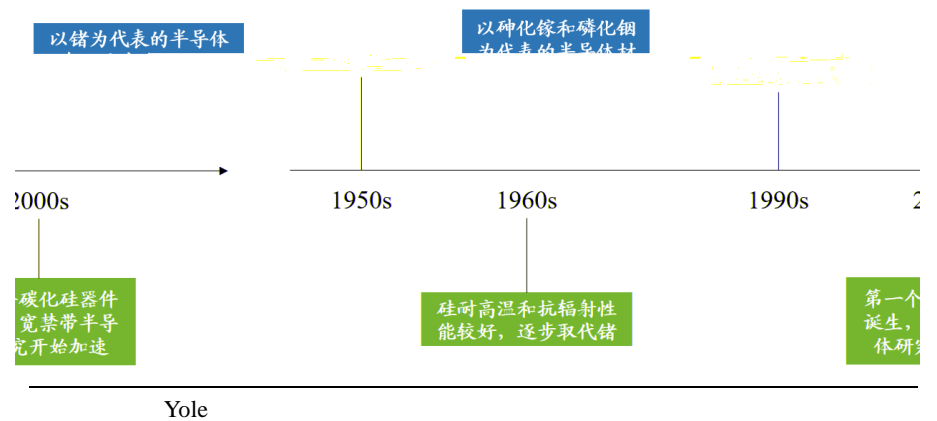
(InSb)      (GaN)      (SiC)      (GaAs)      (InP)  
(Cds)      20      90  
(GaAs)      (InP)

1

2

(LED)      (LD)

2



(Eg)      SiC      GaN      (eV)  
2.3

3

SiC      GaN

(SiC)      (GaN)

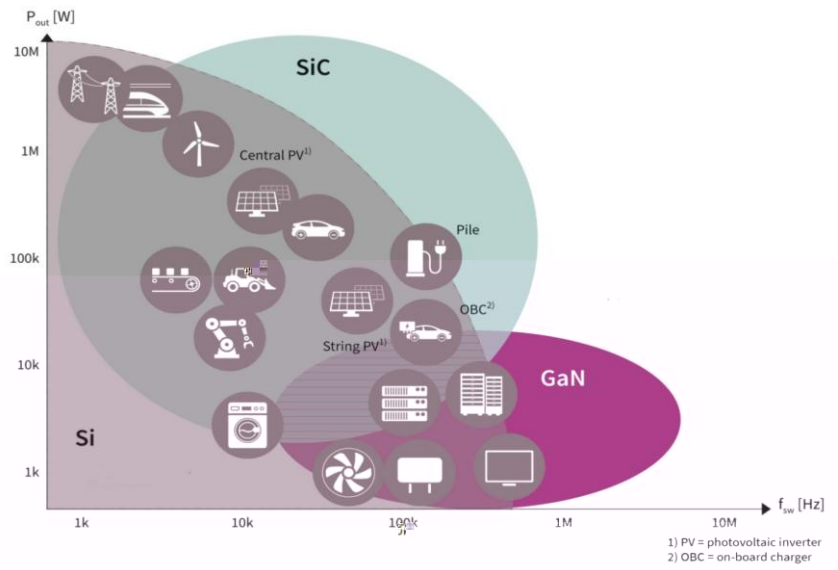
1:

	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 <sup>2</sup> /V s	1350	8500	900

/



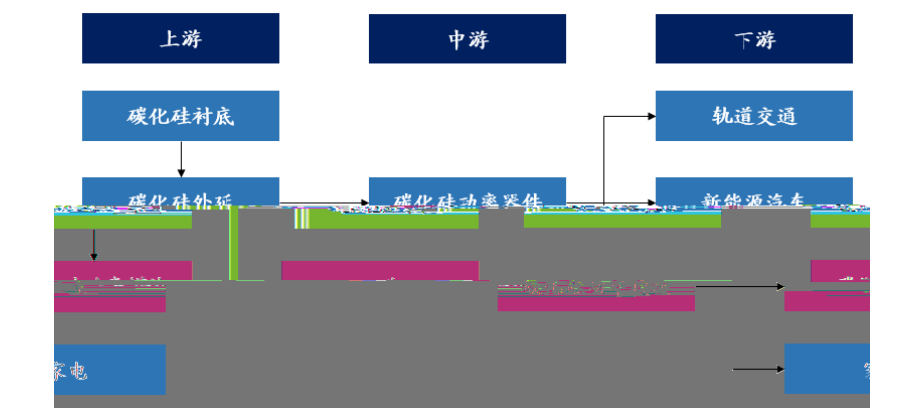
4



## 2.2. SiC

4H SiC(4H-SiC)

## 5 SiC



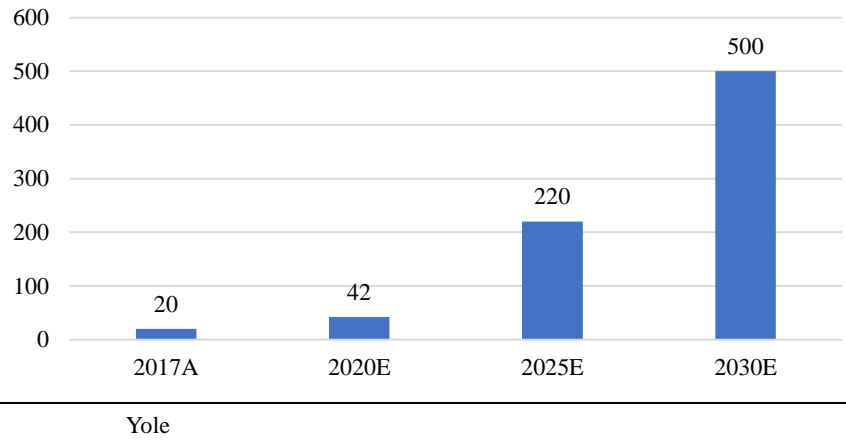
1 /

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[2i826 0 0 Tm EMC /P /MCID 84/Lang(en-US)BDC





1

2

3

4

99 %

50 %

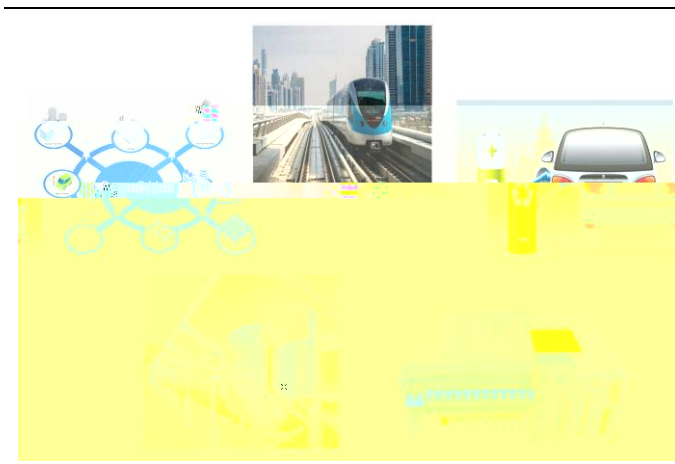
5  
2001 600 V

SiC MOSFET JBS  
SiC MOSFET  
SiC JBS

SiC 7 4 SiC  
5G 2020 5G  
SiC  
SiC

10 SiC

11 SiC

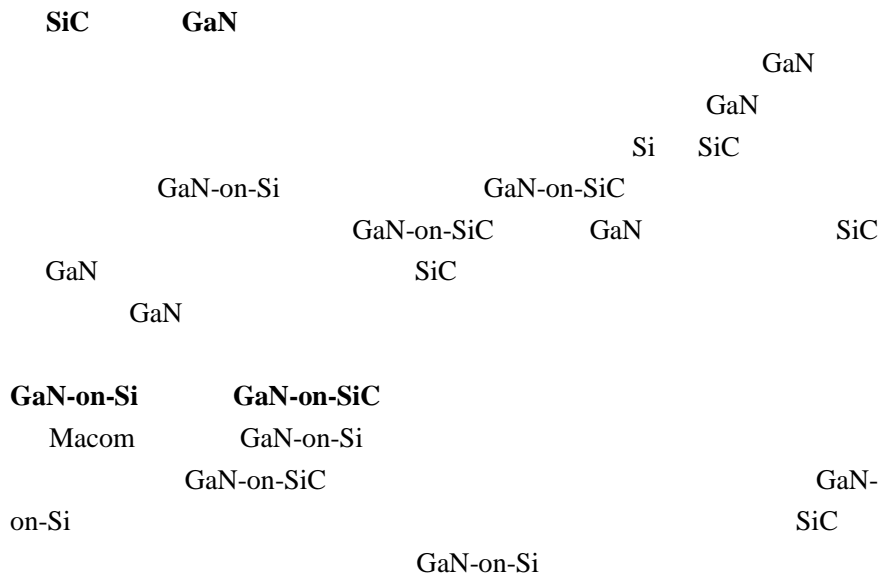
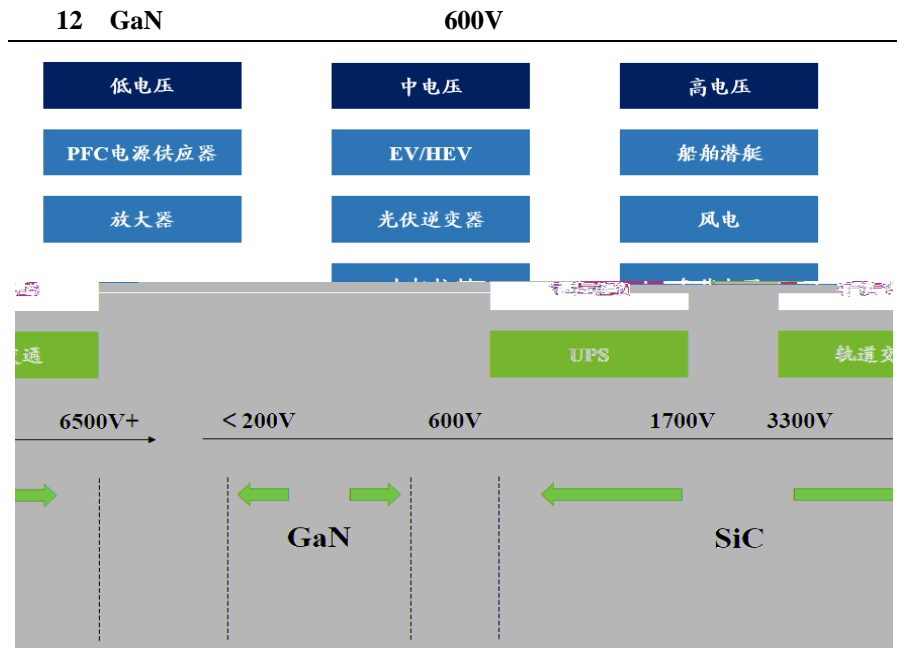


行业	新基建投资金额
5G ✓	2020年投资规模近3000亿元
特高压	2020年投资规模超600亿元
轨道交通	2020年投资规模在5000亿元左右
充电桩 ✓	2020年投资规模约100亿元
数据中心 ✓	2020年投资规模约1000亿元
人工智能	2020年投资规模约350亿元
投资规模或达百亿级别	工业互联网 2020年

SiC

### 2.3. GaN

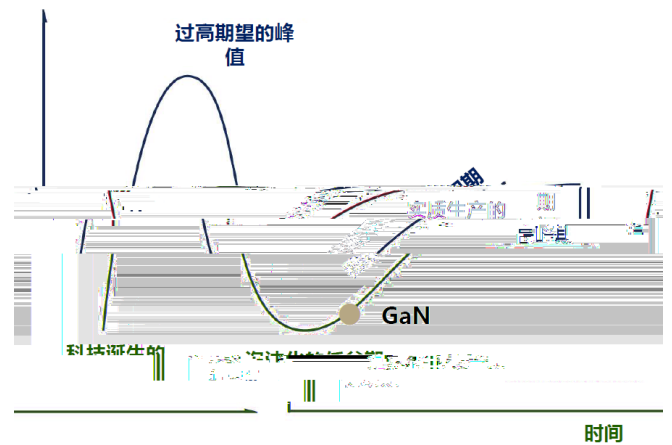
GaN 600V GaN 1700  
GaN GaN  
Si 600V SiC 300V~600V 0~300V GaN



**13 CoolGaN**



**14 GaN**



15 GaN-on-Si

	LDMOS	MACOM GaN	GaN on SiC	Benefits
Power Amp Efficiency ">2GHz"		>10% Improvement	Improvement	Lower Operating Expense
Higher Frequency Bands	1.8 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	1-1.5 W/mm	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		GaN		GaN	
(PA)		(LNA)		(SBD)		(FET)	
2020	18W	2020	30W	2018	65W	2020	65W
2023	100W	2023	100W	2017	65W	2023	65W
CAGR	87%	CAGR	87%	CAGR	87%	CAGR	87%
Yole	1000	Yole	1000	Yole	1000	Yole	1000
2023	1000	2023	1000	2023	1000	2023	1000

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

SiC MOSFET 650V GaN IDM SiC JBS

**2 2020 7**

7 SiC 6 SiC 2020 7

4 SiC  
1200V 650V SiC 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



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			GRXL02D120G1	4A	CRXI04D065G1
	CRXL05D120G1	6A	CRXI06D065G1	5A	CRXI05D120G1	
RXI15D120G1		CRXU20D120G1		10A	CRXI10D065G1	15A
	CRXI16D065G1	30A	CRXQ30D120G1			16A
		40A	CRXQ40D120G1			

SiC

SiC GaN

IDM

3.2.

SiC

3.24%

SiC

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2011  
2014

2012  
6

SiC

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4

SiC

2011

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Aixtron

2012 3 9

3

4

2014 4

6

6

2

32.64%

JIANHUI ZHAO

1988

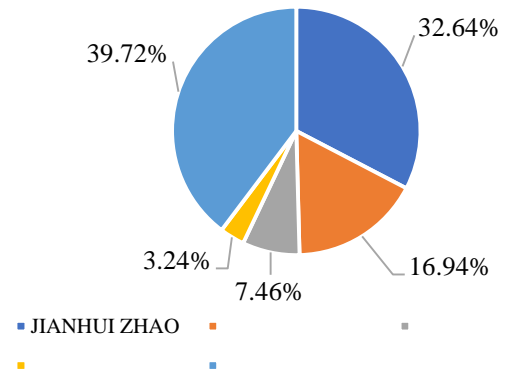
7.46% 16.94%  
5.14%  
3.24%

19



20

3.24%



3

2020 10 10  
41  
2019 12  
2013 9

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.

9.75% 17.31% 10.70% 2020-2022 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%	6.42%	12.42%	17.90%	17.90%	17.90%
	%		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
<b>300623.SZ</b>		41.58	16.86	4.81	5.26	5.83	8.64	7.90	7.13
<b>300373.SZ</b>		41.69	6.23	6.04	6.89	7.93	6.90	6.05	5.26
			11.55	-			7.77	6.98	6.19
<b>688396.SH</b>		49.92	7.45	8.78	9.89	11.32	5.69	5.05	4.41

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