

(Hiroshima University)							
3 2							
(1) (2) (3) (4) (5)							
31 2 13							
	4	120	-	480	()	49	
	4	40	-	160	()	30 4	
	4	130 3	10	540	()		
	4	157	-	628	()	12	
	4	82	-	328			
	4	73	-	292			
	4	81	-	324			
	4	52	-	208	() ()		
	4	140 3	10	580	()		
	4	30 3	10	140	()		
	4	150 3	5	610	()		
	4	45 3	5	190	()		
	4	47	3 10	188	()	24	
	4	66		264		29	
	4	59		236		24	
	4	34		136		5	

	4	24		96		4																																		
	6	118 105		656 630		2 4 1		13 3																																
	4	120	-	480	() ()	4		720																																
	6	53	-	318	()	40		<table border="1"> <tr><td></td><td>118</td><td>0</td><td>718</td></tr> <tr><td></td><td>118</td><td>0</td><td>716</td></tr> <tr><td></td><td>105</td><td>0</td><td>701</td></tr> <tr><td></td><td>105</td><td>0</td><td>686</td></tr> <tr><td></td><td>105</td><td>0</td><td>671</td></tr> <tr><td></td><td>105</td><td>0</td><td>656</td></tr> <tr><td></td><td>105</td><td>0</td><td>643</td></tr> <tr><td></td><td>105</td><td>0</td><td>630</td></tr> </table>		118	0	718		118	0	716		105	0	701		105	0	686		105	0	671		105	0	656		105	0	643		105	0	630
	118	0	718																																					
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	105	0	656																																					
	105	0	643																																					
	105	0	630																																					
	4	40	-	160	()	21																																		
	6	38	-	228	()	18																																		
	4	22	-	88	()																																			
	4	150	5	610	()	30 4	4																																	
	4	90	3	366		1																																		
	4	115	4	468		2 4																																		
	4	90	3	366		3																																		
	4	90	3	380	()	54	4 4																																	
	4	80	3	330	()	30 4	4																																	
		2,336 (2,323)	3 80	9,870 (9,844)		1 2 4 3																																		
		<p style="text-align: center;">2 4</p> <p style="text-align: center;">M60 DI7</p> <p style="text-align: center;">2 4</p> <p style="text-align: center;">M64 D32</p> <p style="text-align: center;">2 4</p> <p style="text-align: center;">P20 M20 M80</p> <p style="text-align: center;">M4 M4 M9</p> <p style="text-align: center;">M5 D49</p> <p style="text-align: center;">2 4</p> <p style="text-align: center;">M24 D5 M28 D9</p> <p style="text-align: center;">M28 D14</p> <p style="text-align: center;">2 4</p> <p style="text-align: center;">M22 D11 M80 D13</p> <p style="text-align: center;">M23 D11 M0 D5</p> <p style="text-align: center;">2 4</p> <p style="text-align: center;">M25 D12 M5 D7</p> <p style="text-align: center;">2 4</p> <p style="text-align: center;">M28 D9 M80 D10</p> <p style="text-align: center;">M24 D8 M84 D11 M26 D9 M87 D13</p> <p style="text-align: center;">M20 D7 M80 D7</p> <p style="text-align: center;">M21 D7</p>																																						

2 4

M43 D22 M28 D14

P20 2 4

6

M257 D85 M63 D50

P30 (P20)

M449 D128

8

M2

M2

51	50	2	18	121	0	30
(51)	(50)	(2)	(18)	(121)	(0)	(30)
9	10	2	0	21	0	83
(9)	(10)	(2)	(0)	(21)	(0)	(83)
33	20	0	7	60	0	27
(33)	(20)	(0)	(7)	(60)	(0)	(27)
18	17	5	1	41	0	55
(18)	(17)	(5)	(1)	(41)	(0)	(55)
16	14	3	1	34	0	45
(16)	(14)	(3)	(1)	(34)	(0)	(45)
16	8	1	1	26	0	31
(16)	(8)	(1)	(1)	(26)	(0)	(31)
15	12	0	3	30	0	49
(15)	(12)	(0)	(3)	(30)	(0)	(49)
17	12	1	5	35	0	55
(17)	(12)	(1)	(5)	(35)	(0)	(55)
17	9	1	2	29	0	23
(17)	(9)	(1)	(2)	(29)	(0)	(23)
20	15	1	4	40	0	9
(20)	(15)	(1)	(4)	(40)	(0)	(9)
11	11	2	5	29	0	9
(11)	(11)	(2)	(5)	(29)	(0)	(9)
16	17	0	13	46	0	2
(16)	(17)	(0)	(13)	(46)	(0)	(2)
14	9	1	15	39	0	4
(14)	(9)	(1)	(15)	(39)	(0)	(4)
12	11	3	17	43	0	2
(12)	(11)	(3)	(17)	(43)	(0)	(2)
6	5	0	4	15	0	3
(6)	(5)	(0)	(4)	(15)	(0)	(3)
52	44	55	71	222	0	191
(52)	(44)	(55)	(71)	(222)	(0)	(191)
21	5	9	21	56	0	86
(21)	(5)	(9)	(21)	(56)	(0)	(86)
19	9	13	59	100	0	123
(19)	(9)	(13)	(59)	(100)	(0)	(123)
6	2	5	4	17	0	111
(6)	(2)	(5)	(4)	(17)	(0)	(111)
9	6	0	11	26	0	27
(9)	(6)	(0)	(11)	(26)	(0)	(27)
4	3	0	4	11	0	37
(4)	(3)	(0)	(4)	(11)	(0)	(37)
21	20	0	13	54	0	11
(21)	(20)	(0)	(13)	(54)	(0)	(11)
16	17	2	15	50	0	26
(16)	(17)	(2)	(15)	(50)	(0)	(26)
21	19	1	23	64	0	38
(21)	(19)	(1)	(23)	(64)	(0)	(38)
11	13	0	11	35	0	37
(11)	(13)	(0)	(11)	(35)	(0)	(37)

	514,567	0	0	514,567
	514,567	0	0	514,567
203	365	1,393	15	8
			20	18
			1,468	

3 494 421	1 315 991	61,208	25,362	5,769	5,762	5,637	12,757	133
(3 494 421	1 315 991)	(61,208	25,362)	(5,769	5,762)	(5,637)	12,757	133
3 494 421	1 315 991	61,208	25,362	(5,769 5,762)				

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1 1 2 4 5 6

	4	150	3	5	615	()	1.07 1.07			30 (5)
	4	45	3	5	220	()	1.06			30 (15)
	4	47	} 3 10		192	()	1.06	24		
	4	66			268	()	1.03	10		
	4	59			240	()	1.07	24		
	4	34			140	()	1.06			
	4	24			100	()	1.06			
	6	120		720	()	1.00 1.03 1.00	28			6 4
	4	120								
	4	60		240	()	1.03				
	4	30		120	()	1.02				
	4	30		120	()	1.02				
	6	53		318	()	1.00 1.05 1.00	40			6 4
	4	20		160	()					
	4	20		80	()	1.05	21			
	4	20		80	()	1.06	21			
	6	38		228	()	1.03 1.07 1.03	18			6 4
	4	22		88	()	1.07	18			
	4					1.03	13			30
	4					()	13			30
()	4					()	13			30
()	4	150	3	5	300	()	1.04	30		
()	4	90	3	3	180	()	1.04	30		
()	4	115	3	4	465	()	1.02	13		30 (4)
()	4	90	3	3	180	()	1.06	30		
	4	90	3	10	380	()	1.13 1.13	54		
	4	80	3	5	160	()	1.06 1.06	30		
	2	50		110	()	0.98	18			2 31 (10)
	3	17		57	()	0.81	18			31 (3)

	2	64		128	()	0.95	13		2
	3	32		96	()	0.67	13		
	3				()		12		28
	3				()		12		28
	3				()		12		28
	2	20		40	()	1.00	28		2
	2	20		40	()	1.72	28		2
	2	80		160	()	1.23	28		2
	2	14		28	()	1.21	28		2
	2	14		28	()	1.21	12		2
	2	19		38	()	1.12	12		2
	2	5		10	()	0.80	28		2
	3	49		147	()	1.36	28		2
	2	24		48	()	1.02	16		2
	3	5		15	()	0.53	16		
	2	28		56	()	1.28	16		
	3	8		24	()	0.41	16		
	2	28		56	()	0.67	12		
	3	14		42	()	0.45	12		
	2	22		44	()	0.67	28		2
	3	11		33	()	0.48	28		
	2	30		60	()	1.08	28		2
	3	13		39	()	0.63	28		
	2	23		46	()	1.56	28		2
	3	11		33	()	0.75	28		
	2				()		28		31
	3				()		28		
	2	10		20	()	1.05	28		2
	3	5		15	()	0.53	28		
	2				()		11		31
	3				()		11		

	2	25		50	() () ()	1.26	10		2
	3	12		36	() () ()	0.30	10		
	2				() () ()		10		31
	3				() () ()		10		
	2	15		30	() () ()	1.33	16		2
	3	7		21	() () ()	0.23	16		
	4				() () () ()		24		31
()	2				()		24		
	3				()		24		
	2				()		24		
	3				()		24		
	2				()		24		
	3				()		24		
	2				() () ()		24		
	2				() () ()		14		24
	3				() () ()		14		
	2	28		56	()	1.23	22		2
	3	9		27	()	0.70	22		
	2	30		60	()	1.61	22		
	3	10		30	()	0.96	22		
	2	34		68	() ()	1.58	22		
	3	11		33	() ()	0.78	22		
	2	37		74	() ()	1.40	22		
	3	13		39	() ()	0.43	22		
	2	24		48	()	1.47	22		
	3	8		24	()	0.74	22		
	2	26		52	()	1.32	22		
	3	9		27	()	0.29	22		
	2	20		40	()	1.42	22		
	3	7		21	()	0.80	22		
	2	20		40	()	1.32	22		
	3	7		21	()	0.66	22		

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3

					()				
					()				
					()				
					()				
					()				
					()				
		3	20		60	()	0.66	16	
									2

1 2 3
36 4
(144,700) 7,971

1 2 3
31 4
(144,700) 122,552

1 2 2
24 5
(2,492,191) 29,584

1 2 3
55 4
(144,700) 298

7 4
53 10
2,675 840

1 1 1
41 4
(2,492,191) 44,097

1 1 1
63 4
(2,492,191) 44,097

1 1 1
7 4
(2,492,191) 44,097

1 1 1
14 4
(2,492,191) 44,097

5
(18,470) 3,163

1 3 1
19 4
(2,492,191) 34,461

2965 5 8 1
15 4
(2,492,191 4,268) 1,353

2445
24 5
21,197 1,590

1156-2
49 4
102,076 578

1 4 3
52 4
(2,492,191) 794

1 2 3
18 6
(144,700) 84,633

1 2 3
21 4
(144,700) 120

1 1 89
17 4
(18,470) 53

1 2 3
42 6
(144,700) 7,971

2 313
8 5
(2,492,191) 3,881

47 4 570
111,469 1,022

8 5 1 4 2
(2,492,191) 4,153

12 4 1 2 2
(2,492,191) 1,207

13 4 1 4 2
(2,492,191) 2,507

15 4 1 4 2
(2,492,191) 13,074

9 4 1 5 1
(2,492,191) 306

44 4 1 7 1
(2,492,191) 1,146

50 7 1 1 89
(18,470) 386

1 5 3
 17 3
 (2,492,191) 2,374

- (1)
- (2)
- (3)

1 1 1
 18 4
 (2,492,191) 443

83

14 10
 (243)

1 3 1
 16 4
 (2,492,191) 478

1 7 1
 16 4
 (2,492,191) 1,195

1 1 1
 16 4
 (2,492,191) 783

1 1 1
 17 4
 (2,492,191) 26

HSIM

HSIM(Hrosi na university STARC
 IGFET Model) CMC(Compact Modeling Council)
 ()
 3 CMC

1 3 1
17 7
(2,492,191) 87

1 1 1
22 4
(2,492,191) 60

1 3 2
28 4
(2,492,191)

1 3 1
28 10
(2,492,191) 3,886

1 2 3
30 4
(144,700)

1 4 1
30 9
(2,492,191)

1 1 1
30 10
(2,492,191) 1,001

“ ”
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	120		480
	40		160
	³		
	130	10	540
()	157		628
()	82		328
()	73		292
()	81		324
()	52		208
	³		
	140	10	580
	30	10	140
	³		
	150	5	610
	45	5	190
	47		188
	66		264
	59		236
	34		136
	24		96
	³		
		10	20
	105		630
	120		480
	53		318
	40		160
	38		228
	22		88
	³		
()	150	5	610
()	90	3	366
()	115	4	468
()	90	3	366
	³		
	90	10	380
	³		
	80	5	330
<hr/>			
	³		
	2,323	80	9,844



	120		480
	40		160
	³		
	130	10	540
()	157		628
()	82		328
()	73		292
()	81		324
()	52		208
	³		
	140	10	580
	30	10	140
	³		
	150	5	610
	45	5	190
	47		188
	66		264
	59		236
	34		136
	24		96
	³		
		10	20
	118		630
	120		480
	53		318
	40		160
	38		228
	22		88
	³		
()	150	5	610
()	90	3	366
()	115	4	468
()	90	3	366
	³		
	90	10	380
	³		
	80	5	330
<hr/>			
	³		
	<u>2,336</u>	80	<u>9,870</u>

³ (13)

							<u>2 4</u>
50	100			⊗	⊗		
17	51			⊗	⊗		
							<u>2 4</u>
64	128			⊗	⊗		
32	96			⊗	⊗		
							<u>2 4</u>
20	40			⊗	⊗		
20	40			⊗	⊗		
80	160			⊗	⊗		
14	28			⊗	⊗		
14	28			⊗	⊗		
19	38			⊗	⊗		
5	10			⊗	⊗		
49	147			⊗	⊗		
							<u>2 4</u>
24	48			⊗	⊗		
5	15			⊗	⊗		
28	56			⊗	⊗		
8	24			⊗	⊗		
28	56			⊗	⊗		
14	42			⊗	⊗		
							<u>2 4</u>
22	44			⊗	⊗		
11	33			⊗	⊗		
30	60			⊗	⊗		
13	39			⊗	⊗		
23	46			⊗	⊗		
11	33			⊗	⊗		
10	20			⊗	⊗		
5	15			⊗	⊗		
							<u>2 4</u>
25	50			⊗	⊗		
12	36			⊗	⊗		
15	30			⊗	⊗		
7	21			⊗	⊗		
							<u>2 4</u>
28	56			⊗	⊗		
9	27			⊗	⊗		
30	60			⊗	⊗		
10	30			⊗	⊗		
34	68			⊗	⊗		
11	33			⊗	⊗		
37	74			⊗	⊗		
13	39			⊗	⊗		
24	48			⊗	⊗		
8	24			⊗	⊗		
26	52			⊗	⊗		
9	27			⊗	⊗		
20	40			⊗	⊗		
7	21			⊗	⊗		
20	40			⊗	⊗		
7	21			⊗	⊗		
21	42			⊗	⊗		
7	21			⊗	⊗		

43	86
22	66
28	56
14	42
170	340
70	210
97	388
76	152
25	75
20	60
<u>1,561</u>	<u>3,732</u>



2				<u>2 4</u>
		0	0	
		0	0	
		0	0	
		0	0	
				()
		<u>257</u>	<u>514</u>	
		<u>85</u>	<u>255</u>	
		<u>163</u>	<u>326</u>	
		<u>50</u>	<u>150</u>	
		<u>30</u>	<u>60</u>	
		<u>20</u>	<u>60</u>	
		<u>2</u>	<u>4</u>) (
				()
		<u>449</u>	<u>898</u>	
		<u>128</u>	<u>384</u>	
		<u>2</u>	<u>4</u>) (
		170	340	
		70	210	
		97	388	
		76	152	
		25	75	
		0	0	<u>2 4</u>
		<u>1,624</u>	<u>3,820</u>	