

NKF7 VERTICAL PROBE CARD WITH NEW NEEDLE FAMILY

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NKF7 VERTICAL PROBING STATUS RECAP

- Original family needles experienced difficulties in achieving reliable electrical contacts on test chips
- New needles, EVS_80_P, probe card received 06/06/25 at CERN and retested



- Repeated NKF7 electrical tests for a few chipsets with new needles family type and successfully achieved "good and reliable" contact and reproduced 10.24 Gbps
- Prepared APTS chipset to redo FIB measurements
- Testing probe card contact reliability



TEST1: FIND BEST CONTACT OVERDRIVE

- TEST description: Find the initial position in which a mark starts appearing and slowly increase the over drive to see when the best signal appears
- Currently statistics for 8 dies have been taken
 - Mind that most of these dies are in the top part of the wafer
 - More samples to be measured to increase the reliability of the results
- Company data for reference
 - 100 OD corresponds 4.5 g of force
 - 75 OD corresponds to 3.4 g of force

		-2,-1	1,-1	0,-1	1,-1	2,-1	з,	1		
			1	#1	# 2	# 3	\$4			
			\$0 V	-2.68547	6-4.10401	-6.47388	5-6.	37808	4	
	-3,0	-2,0	-170-	0,00	1,0	2,0	3,0		a. U	
		\$11 0 404560	\$10 00 620604	#9 7 0 44206	#8 611 62015	#7 E 2 02496	* 6	50150	#5 E E E E 104	0
	-8.1	-2.1	-1.1	0.1	1.1	2.1	3]	2	4.1	3
	#12	≢13	±14	£15	±16	±17	±15		#19	
	6.045685	-0.01003	6455198264	1.257826	0.812377	90.869968	2-4	16069	-3.52052	
-4,2	-3,2	-2,2	-1,2	0,2	1,2	2,2	3,2		4,2	5,2
	#21					#20				
	5.471969					0.227669	3			
-4 3	-3,3	-2,3	-1,3	0,3	1,3	2,3	3,3	_	4,3	5,3
	-3.4	-2 4	-1 4	0.4	1 4	2 4	3 4		4 4	5.4
- <u></u>	/ -	2/1	-/.	0/1	-/-	2/1			-/-	
4,5	-3,5	-2,5	-1,5	0,5	1,5	2,5	3,5		4,5	5,5 🔎
										5
-4,6	-3,6	-2,6	-1,6	0,6	1,6	2,6	3,6		4,6	5,6
-47	-37	-27	-17	0.7	1 7	27	3 7		4 7	57
	422	2,7	1,7	0,7	-,,	422	5,1		1,7	3,7
	13.18063					₽23 5.96306				
-4,8	-3,8	-2,8	-1,8	0,8	1,8	2,8	3,8		4,8	5,8
	\$31	\$30	\$29	\$28	\$27	\$26	\$25		\$24	
	15.80432	11.16403	11.46491	8.705829	7.869519	5.456659	3.5	45111	-0.02706	5/9
-4,9	-3,9	-2,9	-1,9	0,9	1,9	2,9	3,9		4,9	5,9
		\$32	\$33	\$34	\$35	\$36	\$37		\$38	
	-3.10	-2 10	-1 10	9.341292	8.115105	5.091998	2.8	14669	-0.62079	52
	0,10	2,10	440	442	441	*40	400	×		
			12.88822	10.39859	10,21153	7.606981	4.7	51529		
	-3,11	-2,11	-1,11	0,11	1,11	2,11	3,2	1	4,11	
		-2,12	-1,12	0,12	1,12	2,12	3,1	2		



TEST1: FIND BEST CONTACT OVERDRIVE

NKF7 #7		
Table2 🗸 🛛		
OD 🗸	Contact height 🗸 🗸	Current,mA 🗸
0	14931.4	-
20	14951.4	-
40	15032.4	2.4
60	15051.4	2.4
65	15056.4	18.2
70	15061.4	21.7
80	15071.4	21.1
85	16976.4	27.2
90	15081.4	29.4
95	15086.4	27.1
100	15091.4	28.7

NKF7 #8			
Table4	~		
OD	~	Contact height 🗸 🗸	Current,mA 🗸
	0	14991.1	0.2
	20	15011.1	1.7
	40	15031.1	2.4
	60	15051.1	2.6
	65	15056.1	2.6
	70	15061.1	4.8
	75	15066.1	4.8
	80	15071.1	5.2
	85	15076.1	7.8
	90	15081.1	11.2
	95	15086.1	25.8
	100	15091.1	29

NKF7 #9			
Table5	~ [
OD	~	Contact height 🗸 🗸	Current,mA 🗸
	0	14994.8	0
	20	15014.8	1.2
	40	15034.8	2.3
	60	15054.8	2.3
	65	15059.8	3.1
	70	15064.8	3.4
	75	15069.8	4.3
	80	15074.8	7.7
	85	15079.8	23.4
	90	15084.8	27.6
	95	15089.8	28.2
	100	15094.8	25.2



Current,mA 🗸

0.2

0.2

0.2

0.2

0.2

0.2

0.2

0.2

17.5

23.4

26.1

24.1

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Contact height \checkmark

14986.2

15006.2

15026.2

15046.2

15051.2

15056.2

15061.2

15066.2

15071.2

15076.2

15081.2

15086.2

TEST1: FIND BEST CONTACT OVERDRIVE

NKF7 #10	D					
Table6	~					
OD	~	Co	ntact height	~	Current,mA	~
	0		1499	92.6	0.2	
	20		1501	2.6	3.3	
	40		1503	82.6	4.6	
	60		1505	52.6	8.1	
	65		1505	57.6	8.3	
	70		1506	52.6	2.4	
	75		1506	57.6	10.1	
	80		1507	2.6	11.2	
	85		1507	7.6	24.3	
	90		1508	32.6	24.3	
	95		1508	87.6	22.3	
	100		1509	2.6	25.6	

NKF7 #11			NKF7 #12
Table7 🗸 🛛			Table8 🗸
OD 🗸	Contact height 🗸 🗸	Current,mA 🗸	OD 🗸
0	14984	0.2	0
20	15004	0.2	20
40	15024	0.2	40
60	15044	0.2	60
65	15049	1.3	65
70	15054	2.4	70
75	15059	2.4	75
80	15064	2.4	80
85	15069	23.4	85
90	15074	26.9	90
95	15079	23.4	95
100	15084	27.8	100

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TEST2: TOUCHDOWN PERFORMANCE AT UNIQUE POSITION

- TEST description: Evaluate touchdown performance at a unique position
 - Prepared automatized script that
 - 1. Goes in contact in a specific die in the center of the pad
 - 2. Turns on HAMEG PS
 - 3. Waits for X s in order to get the current stabilized (capacitance ramp-up)
 - 4. Log of time, current, voltage and contact cycle
 - 5. Turns off the HAMEG PS
- Performance metric: Current > 25 mA
- Tested 5 dies:
 - Die 29: Number of touchdowns 100, waiting time for stabilization 5s
 - Die 30: Number of touchdowns 30, waiting time for stabilization 10s
 - Repeated tests day after: Number of touchdowns 10, waiting time for stabilization 15s
 - Die 31: Number of touchdowns 15, waiting time for stabilization 15s
 - Die 24: Number of touchdowns 15, waiting time for stabilization 15s
 - Die 25: Number of touchdowns 15, waiting time for stabilization 15s



























FIB CHIP PREPARATION



OD
0
30
50
60
70
80
90
100
120



CONCLUSIONS

- Number of reliable contacts test show that we can at least do ~10 touch downs in the same position without damaging the chip performance
- Overdrive tests show that 85-100 OD seems to be best performing setting for the current probe card
- FIB chipset prepared and waiting for results