Characterization of test batch of GaAs:Cr sector sensors (March 2020)

Table1. Quantity and data sheet of HR GaAs wafers

#	HR GaAs wafer	Mean ρ[1], Gohm×cm	Thickness, um	J[2] @100V, uA/cm^2	$(\mu\times\tau)^3_n$, cm^2/V×s
1	H3295#63	1.7	505	~0.8	~$1.6\cdot10^{-4}$
2	H3295#66	1.63	506	~1.2	~$1.7\cdot10^{-4}$
3	H3295#70	1.67	509	~1.1	~$1.8\cdot10^{-4}$
4	H3295#72	1.62	513	~0.9	~$1.7\cdot10^{-4}$

[1] – Mean value of resistivity (ρ_i) distribution measured by means of contactless technique;
[2] – Density of leakage current (J) at 100 V bias calculated from IV curves of pad HR GaAs samples for similar annealing conditions and for other wafers of the same ingot;
[3] – Product of mobility and life time for electrons calculated from charge collection dependence (CCE) of pad HR GaAs samples for similar annealing conditions and for other wafers of the same ingot;

1. Results of HR GaAs measurements

The results of resistivity measurement are demonstrated in figure 1. The resistivity measurements were made by means of contactless technique.

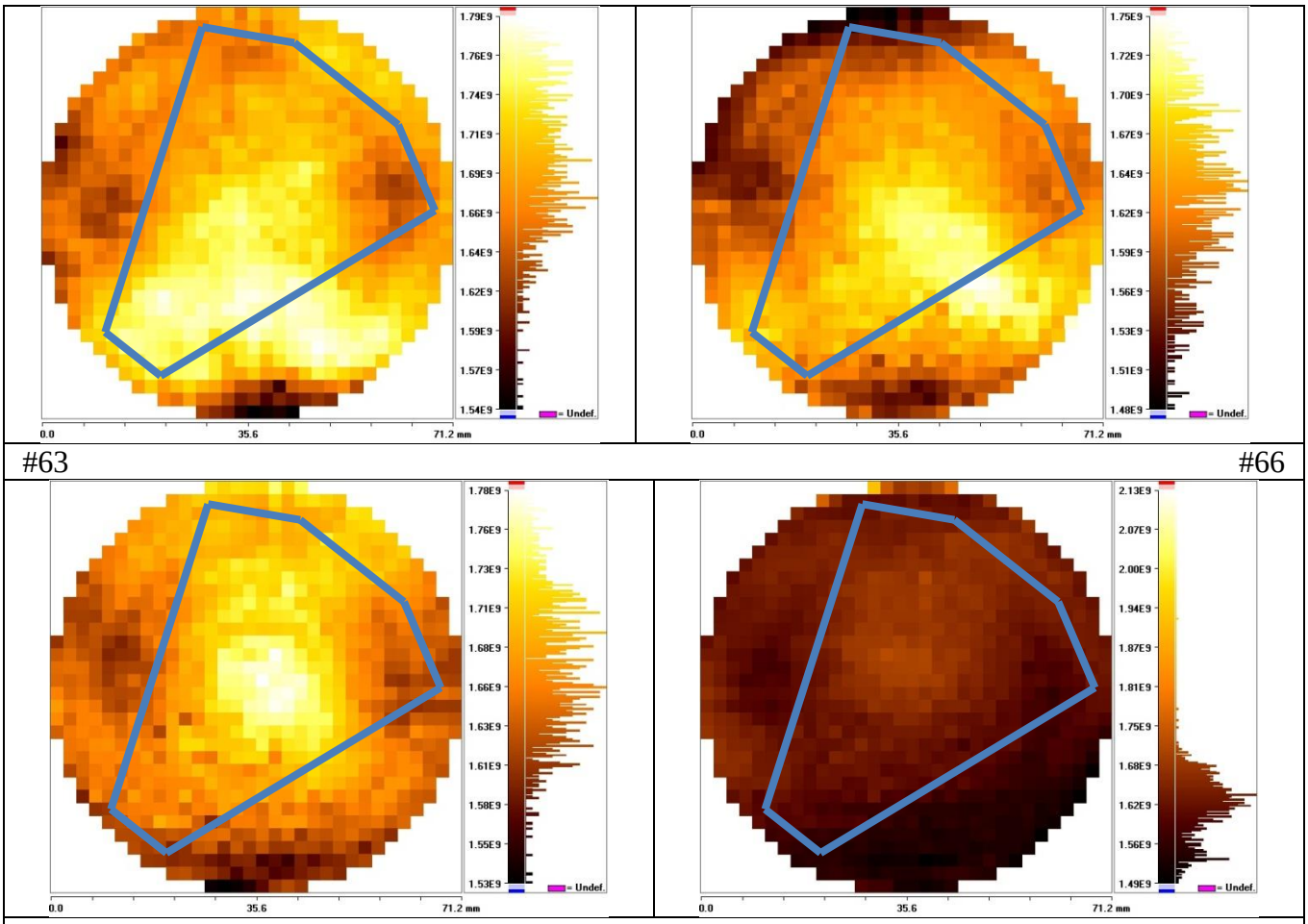


Figure 1 - Results of resistivity mapping of wafers in accordance to their number

2 Results of CCE and IV measurements

There are results of CCE and IV measurements of wafers H3295#63, 66, 70 and 72 (Figure 2 –5).

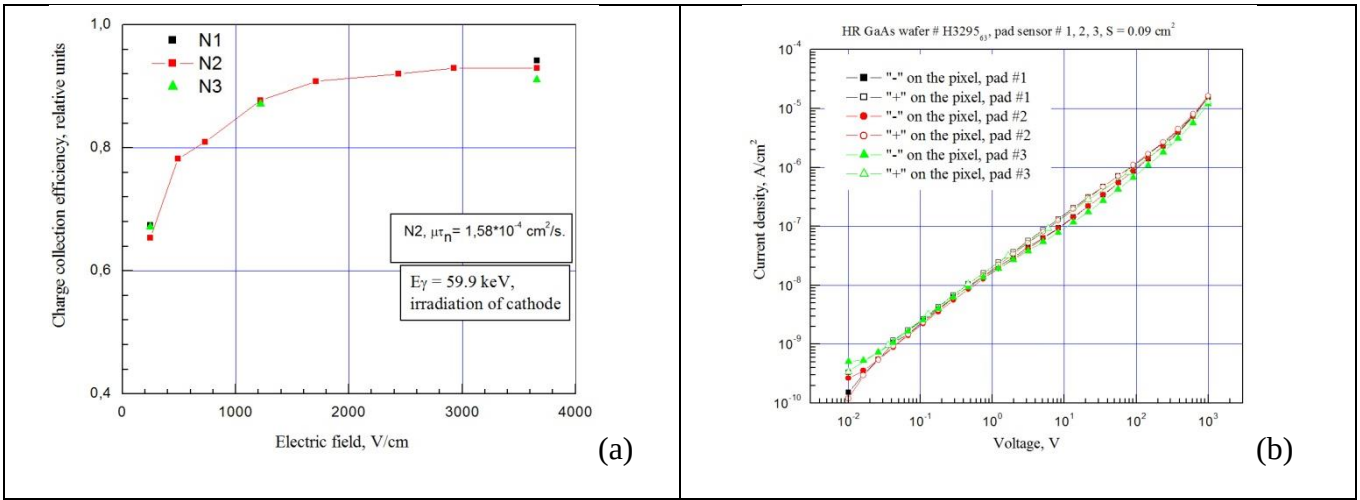
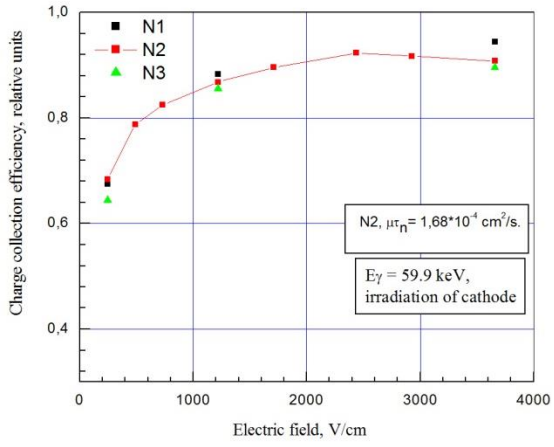
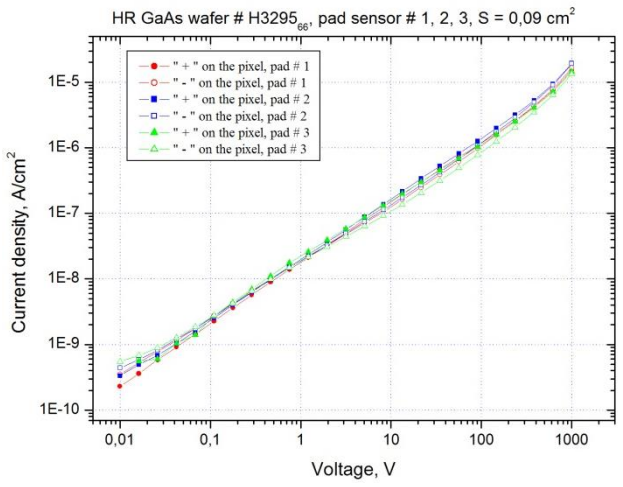


Figure 2 – CCE (a) and IV curves (b) dependence on bias voltage of pad samples # 1, 2, 3 made of H3295#63 HR GaAs wafer

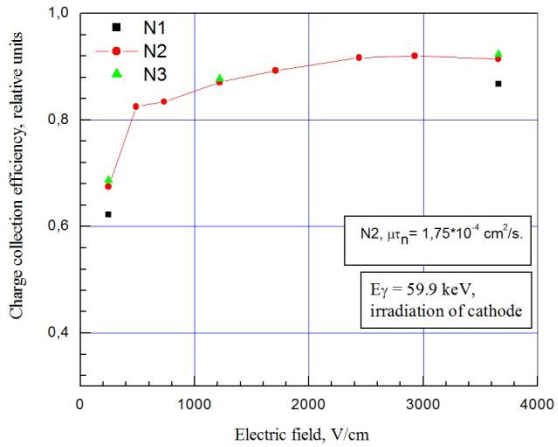


(a)

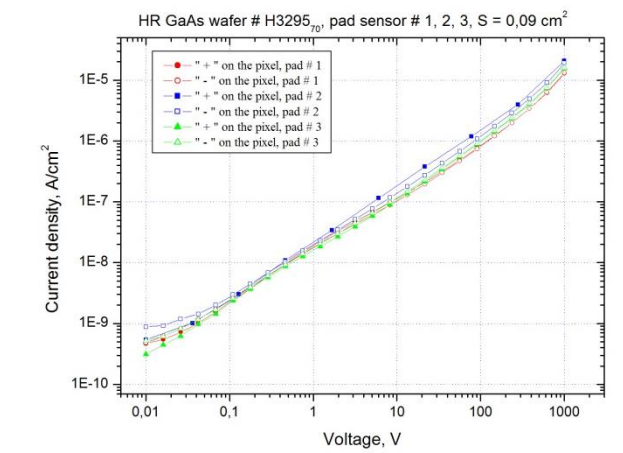


(b)

Figure 3 – CCE (a) and IV curves (b) dependence on bias voltage of pad samples # 1, 2, 3 made of H3295#66 HR GaAs wafer

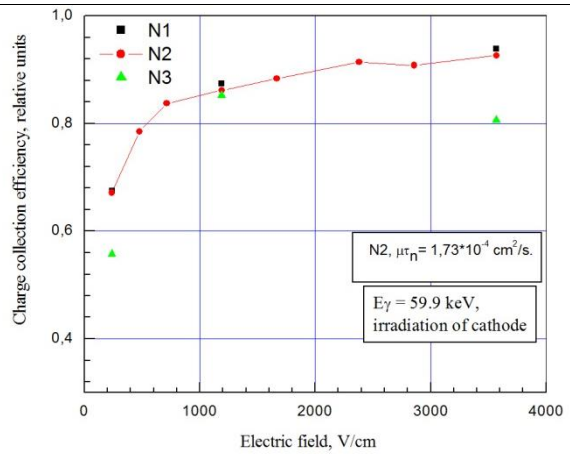


(a)

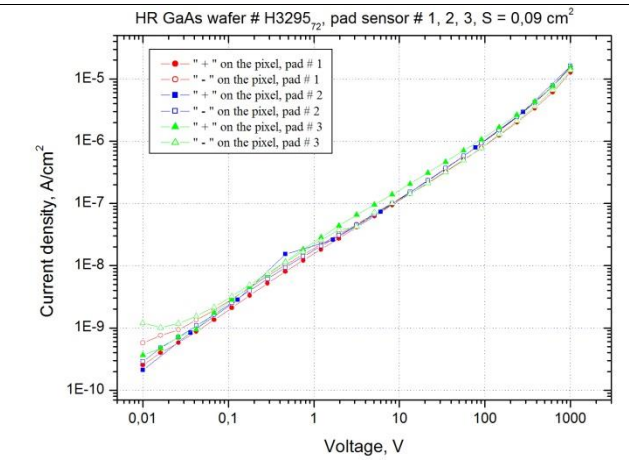


(b)

Figure 4 – CCE (a) and IV curves (b) dependence on bias voltage of pad samples # 1, 2, 3 made of H3295#70 HR GaAs wafer



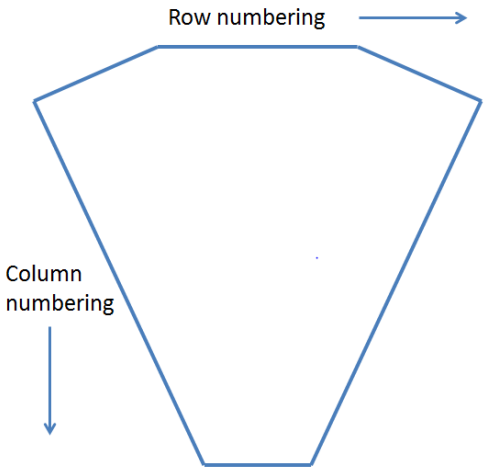
(a)



(b)

Figure 5 – CCE (a) and IV curves (b) dependence on bias voltage of pad samples # 1, 2, 3 made of H3295#72 HR GaAs wafer

3 Leakage current (nA) on sector pads at 100V bias voltage.



3295#63

	1	2	3	4	4	6	7	8
1.	470	500	500	510	530	540	550	520
2.	410	430	430	430	440	440	450	430
3.	330	350	360	350	350	360	360	360
4.	280	290	300	290	280	290	290	280
5.	220	220	230	220	220	220	220	210
6.	190	190	200	200	190	180	180	170
7.	150	150	150	150	150	150	140	140
8.	130	130	120	120	120	120	120	110
9.	110	100	100	100	100	100	100	95
10.	85	90	90	90	85	85	80	80
11.	70	70	70	70	70	70	70	65
12.	55	60	55	55	55	55	55	50
13.	40	45	45	45	45	45	45	40

3295#66

	1	2	3	4	4	6	7	8
1.	500	590	590	590	610	600	540	480
2.	410	420	480	490	500	520	450	400
3.	340	330	330	400	410	420	350	330
4.	290	280	270	300	330	350	330	250
5.	250	240	240	230	270	270	270	250
6.	220	210	190	190	200	210	220	210
7.	180	170	160	160	150	180	170	160
8.	150	150	130	130	130	140	140	130
9.	120	125	110	110	100	110	110	110
10.	100	100	90	90	80	80	90	90
11.	75	80	75	70	65	70	75	75
12.	60	65	60	60	55	60	65	60
13.	50	50	50	50	50	50	50	40

3295#70

	1	2	3	4	4	6	7	8
1.	350	360	360	380	420	430	450	430
2.	290	310	310	310	340	360	360	360
3.	250	210	270	260	280	290	290	280
4.	230	190	160	210	220	230	230	230
5.	200	170	120	160	180	180	180	180
6.	180	140	100	120	140	160	150	150
7.	150	120	130	140	130	130	130	120
8.	120	110	120	120	120	120	110	110
9.	100	110	100	100	100	100	100	100
10.	80	90	80	70	90	90	90	90
11.	60	70	70	60	70	70	80	70
12.	50	60	50	60	60	60	60	60
13.	40	50	50	50	50	50	50	50

3295#72

	1	2	3	4	4	6	7	8
1.	340	370	390	410	440	470	480	450
2.	300	320	330	350	370	380	410	400
3.	250	270	280	300	310	310	330	320
4.	210	230	240	240	250	260	270	260
5.	180	190	200	200	200	210	210	210
6.	150	160	170	170	180	180	180	170
7.	130	140	140	140	140	150	140	140
8.	110	120	120	120	120	120	120	120
9.	90	100	100	100	100	100	100	100
10.	70	80	80	80	80	80	80	80
11.	60	70	70	70	70	70	70	70
12.	50	55	55	55	55	55	55	55
13.	40	45	45	45	45	45	45	45