



# - ATLAS12A sensor measurements -

#### Non-irradiated samples

Strip Sensor Meeting – 16th January 2014

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## **ATLAS12A sensors**



#### Non-irradiated samples

Sensors					
W634_EC_LargePitch_C_P19	DC-gang				
W632_EC_LargePitch_E_P20	DC-gang				
W634_EC_smallPitch_E_P18	DC-gang				
W635_EC_smallPitch_C_P17	DC-gang				
W636_EC_LargePitch_E_P10	AC-gang				
W637_EC_LargePitch_C_P9	AC-gang				
W623_EC_smallPitch_E_P18	AC-gang x Al Label:-P10				
W625_EC_smallPitch_C_P7	AC-gang				
W627_EC_skewed_E_P02	x Al Label:C-P01				
W631_EC_skewed_C_P01					
W628_BZ3C_P15					

## **ATLAS12A** → **Frequency Study**



**Skewed Sensors** 20 0.11800 W634 LargePitch C P19 18 **Bulk Capacitance (nF)** W632\_EC\_LargePitch\_E\_P20 0.11700 30kHz 16 W634\_EC\_smallPitch\_E\_P18 0.11600 14 ₩627 EC skewed E P02 W635\_EC\_smallPitch\_C\_P17 0.11500 Bulk Capacitance (nF) W636 EC largePitch E P10 W631\_EC\_skewed\_C\_P01 12 0.11400 W637\_EC\_largePitch\_C\_P9 10 0.11300 W623\_EC\_smallPitch\_E\_P8 8 W625\_EC\_smallPitch\_C\_P7 0.11200 Zoom 、 W627 EC skewed E P02 6 0.11100 W631\_EC\_skewed\_C\_P01 0.11000 4 100 10 1000 Frequency (kHz) 2 0 0.1 10 100 1000 1 0.0320 Frequency (kHz) 0.0270 Zoom Capacitance (nF) 0.0220 30kHz 0.0170 0.0120 10 1 100 1000 Frequency (kHz) W634\_LargePitch\_C\_P19 — W637\_EC\_largePitch\_C\_P9 W634\_EC\_smallPitch\_E\_P18 W635\_EC\_smallPitch\_C\_P17 W625\_EC\_smallPitch\_C\_P7 W623\_EC\_smallPitch\_E\_P8 → W628\_BZ3C\_P15

#### **ATLAS12A** → **IV Curves**





- No breakdown observed up to 600/1000V sensor bias
- ► Tec. Spec. : I @600V <  $2\mu$ A/cm<sup>2</sup> → I @600V < 9nA/cm<sup>2</sup>

#### **ATLAS12A** → **CV Curves**





W634\_EC\_LargePitch\_C\_P19 → W632\_EC\_LargePitch\_E\_P20 → W636\_EC\_largePitch\_E\_P10 → W637\_EC\_largePitch\_C\_P9
 W623\_EC\_smallPitch\_E\_P8 → W625\_EC\_smallPitch\_C\_P7 → W634\_EC\_smallPitch\_E\_P18 → W635\_EC\_smallPitch\_C\_P17
 W627\_EC\_skewed\_E\_P02 → W631\_EC\_skewed\_C\_P01 → W628\_BZ3C\_P15

► Tec. Spec. :  $V_{FD}$  (V) < 300V (resistivity of > 4kΩcm)  $\rightarrow$   $V_{FD}$  (V) = (363.2 ± 12.1) V

## **ATLAS12A → CCE Studies** with Alibava





- Good Agreement with other institutes
- Barrel Mini CCE measurements ongoing to compare



- Complete CCE measurements with barrel mini
- Coupling Capacitance measurement
- Interstrip Capacitance measurement
- Interstrip resistance measurement

- Start studies with irradiated samples
  - from UK, Ljubljana and Cyric



# - Backup slides -



#### Non-irradiated samples

Sensor	I (µA) @200V	I (µA) @600V	V <sub>FD</sub> (V)	C(nF) @400V
W634_LargePitch_C_P19	0,00340	0,00600	$370 \pm 5$	0,027520
W632_EC_LargePitch_E_P20	0,00286	0,00562	$383,9\pm5.1$	0,027240
W636_EC_largePitch_E_P10	0,00240	0,00480	$376,8\pm3.6$	0,024100
W637_EC_largePitch_C_P9	0,00220	0,00440	383,6 ± 3.3	0,024130
W634_EC_smallPitch_E_P18	0,00220	0,00450	$343,8 \pm 3.3$	0,028525
W635_EC_smallPitch_C_P17	0,00260	0,00480	$356 \pm \textbf{1.2}$	0,025300
W623_EC_smallPitch_E_P8	0,00210	0,00400	357,9 ± <b>2.2</b>	0,025485
W625_EC_smallPitch_C_P7	0,00200	0,00390	333,7 ± 6.5	0,021234
W627_skewed_E_P02	0,0055	0,0082	$367.4 \pm 1.3$	0,11554
W631_skewed_C_P01	0,0056	0,0079	$362.8 \pm 1.7$	0,11534
W628_BZ3C_P15	0,0027	0,0054	$359.2\pm \textbf{2.7}$	0,025725

# Pre-irradiated (Normalization)



- Received pre-irradiated measurements from DESY, Freiburg, Liverpool and Valencia
  - Using agreed techniques, DESY, Freiburg and Liverpool measurements agree to 500 e<sup>-</sup> full width
  - Valencia used EC large pitch mini
    - Maximum disagreement 700e<sup>-</sup>
  - Liverpool measured a
    BZ3C and BZ3F from two different wafers
    - Agreed to 0.8%
  - Normalizations will then be used for all future charge collection measurements



Freiburg and Liverpool checked against previous gain normalization using Micron pieces (physical thickness for Micron, capacitance thickness for HPK)

- Freiburg results agree to +0.2%
- Liverpool 2 Micron gain results agree to -3.0% and +1.9%

Looks like ATLAS12 really has 302 µm active thickness

