GLAST SENSOR SPECIFICATION (updated 3/30 HFWS)

1) Sensor Type: n-bulk, p-strip, single-sided, AC coupled readout

2) Substrate

option A= 4 inch wafer,
option B = 6 inch wafer

type:	n type
resistivity;	4-8 kΩcm
absolute thickness	400 +5, -15 um
uniformity of thickness:	+/- 5 um
local surface flatness:	+/- 1 um

3) Size

There are two options of silicon strip detector (option-A, option-B) to make a tower of 32 cm x 32 cm. A gap of 200 um is assumed between sensors to assemble a tower.

3-1) Outside Dimensions

	width x length x thickness	wafer size	Tray arrangement
Option-A:	64.0 mm x 64.0 mm x 0.4 mm	4 inch	5 x 5 sensors.
Option-B:	64.0 mm x 106.8 mm x 0.4 mm	6 inch	5 x 3 sensors

64.0 x 5+0.2*4(gap) = 320.8, 106.8 x 3 + 0.200 x 2(gap) = 320.8 mm
(a diagonal length of the sensor = 124.5 mm in 6 inch =152.4mm)

3-2) Sensitive area of unit sensor

	width	length	pitch	No.of channels
Option A:	62..274mm	62.430mm	194 um	320
Option B:	62.274 mm	105,230 mm	194 um	320

3-3) Percentage of dead area on one tray
Option A: 5.6 %
Option B: 4.5 %

4) Detailed dimensions

Option-A:	number of strips:	320
	strip pitch:	194 um
	strip width implanted:	50 um
	strip length implanted:	62410 um
	Al readout strip width:	52 um
	length of Al readout strip:	61733 um
	edge dead area: strip end;	785 um
	side edge:	985 um
Option-B:	number of strips	320
	strip pitch;	194 um
	strip width implanted:	50 um
	strip length implanted:	10521 um
	Al readout strip width:	52 um
	length of Al readout strip:	104533 um
	edge dead area: strip end:	785 um
	side edge:	985 um

5) Technology

5-1) positioning accuracy of mask pattern: <+/- 1 um

5-2) Implanted strip
implant-ion density: >1 x 10**14
implant + diffusion depth: 1.0 +/- 0 3 um
any corner of the implant and Al electrode: radius > 10 um

5-3) Biasing resister: Poly-Si, implant-density: > 10**l4

5-4) Guard ring; one extra-guard ring with the extendcd A1 electrode [1] outside of the bias ring, with the gap of 40 um from the bias ring (to improve the breakdown voltage).

5-5) Bias ring: Bias ring consists of Al electrode (extended electrode structure) and an p-implant underneath the Al electrode to collect leakage current from the edges.

5-6) N-side (ohmic contact side) n+ implantation. technology selection is left to the manufacturer to minimize the leakcage current.

6) Electrical properties

6-1) Full depletion voltage:	70V - 125V
6-2) Leakage current (at 125V and 25°C);	< 50 nA/cm**2
dI/dV/cm**2 at 125V:	< 0.2 nA/V/cm**2
6-3) Resistance of biasing resistors:	30 - 80 MOhm
(variation sensor to sensor)	
maximum vanation in one sensor:	< +/- 10 %
6-4) Breakdown voltage of Juncton:	
Catastrophic breakdown at 25° C:	> 200 V
on-set of micro-discharge [2]:	> 165V
6-5) Breakdown voltage of coupling capacitor:	> 100 V
6-6) Capacitance of coupling capacitor:	> 40 pF/cm
6-7) Resistace of Al electrode on the strip:	< 5 Ohm / cm
6-8) Isolation between adjacent strips:	> 30 MOhm

7) Maximum tolerable number of bad strips: <1%

(No. of bad channels =
Shorted capacitors + bad isolation
+ disconnection of Al electrode)

8) Required Tests by the manufacturer and supplied with sensors.

8-1) Total leakage current as a function of bias voltage up to 200 V (5 volt steps) for every sensor delivered.

8-2) leakage current of individual channels at 165V to check micro-discharge

8-3) List of dead channel for each sensor
(isolation check of each channel, capacitor punch through check at 100V)

8-4) Resistance value of every 20th chanel for one sensor in each processing batch.

8-S) Coupling capacitor value of every 20th channel fcr one sensor in each processing batch.

References:

[1] T. Ohsugi et al., NIM A, 383 (1996) 167.
[2] T. Ohsugi et al., NIM A 342 (1996) 22,
T. Ohsugi et al., NIM A, 383 (1996) 116.