ATLAS project	Electrical schematics of the Cu/Polyimide barrel hybrid version 4		
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Project breakdown name			
Electrical schematics of the Cu/Polyimide barrel hybrid version 4			
abstract			
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History of Changes			
Rev. No.	Date	Pages	Description of changes
А	12/07/00	All	First version

# 1 Introduction

The Cu/Polyimide barrel hybrid version 3 was critically reviewed in the Barrel Hybrid Design Review held on 22nd June, 2000. The summary of review [1] has recommended several features to be implemented in the next round of fabrication for the module-0. In response, the schematics has been updated for the version 4.

# 2 Electrical schematics

The updated schematics is shown in the figures (2 pages), "Circuit Diagram of Barrel Cu/Polyimide Hybrid for ABCD3T chips".

## **3** Changes implemented

## 3.1 Connector pin assignment

The recommendation is

"keep the current 36-pin connector and minimize the number of changes to the current pin assignment. Remove unused pins, and

pin14 to AGND (to allow up to 4 AGND connections)

pin13 to VCC

pin7 to remain unallocated as a potential temperature return line".

Changes are made to

pin14 to AGND

pin13 to VCC

pin7 to tempret (see below).

### 3.2 Temperature sensing and DGND-sensing

Concerns are expressed in several paragraphs on the temperature sensing and DGND sensing. The arguments are a bit complicated:

- The temperature reading and the DGND potential, when they are sensed at the mating connector, have uncertainty due to the voltage drops generated by the ASIC currents between the hybrid and the point of sensing. Both uncertainties are calculated to be acceptable, <0.5 K in the temperature reading and <40 mV in the DGND potential [2]. Although acceptably small, an introduction of a line can service for reducing both uncertainties.</li>
- 2. There is an express of concern on the introduction of noise from the temperature sensing circuitry into DGND when the temperature return and the DGND are connected. A separate temperature return may evade the noise issue.
- 3. Introduction of lines must be minimized since it is an "real-estate" trade-off. The first and the second arguments are incompatible with the connection of the line to DGND.

Careful examination allows to introduce one line into the hybrid without compromising the realestate. Thus, the change is A separate line for "temperature return" of Temp1 and Temp2 sensors, connected to the pin7 (tempret), and an optional wire-bonding pad between the tempret line and DGND near the middle of the 12 chips hybrid.

If no-connection of the tempret and DGND minimizes the noise from the temperature circuitry, no wire-bonding at the "optional tempret-DGND" is made and the pin7 line should go to the temperature circuitry without connecting to DGND-sense in the dogleg and after. If there is no difference in the noise, there is a choice to sense the DGND at the middle of the hybrids or at the connector in the dogleg.

#### 3.3 Option for connecting ID4 to either SELECT or VDD

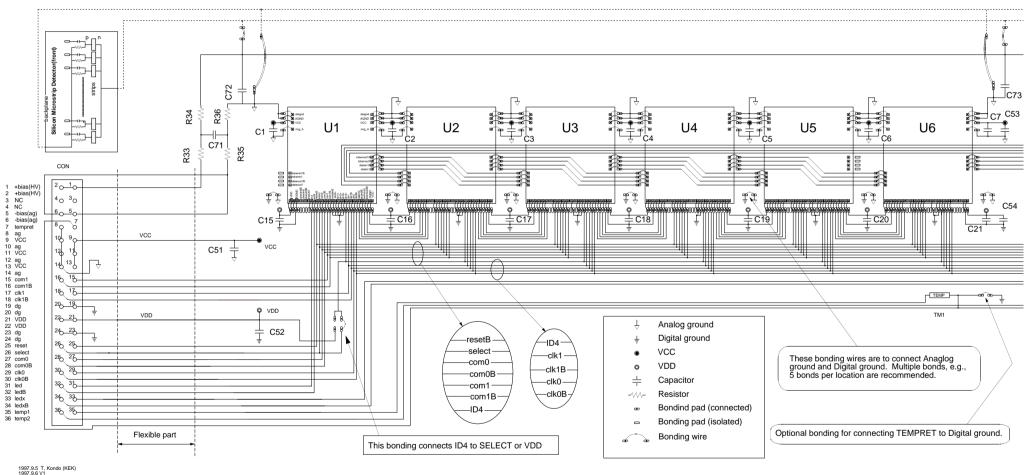
ID4 has a pull-down resistor inside the ABCD chip and the module is served by primary fibre. In case the module is required to be served by an adjacent fibre, the ID4 is set by SELECT-high. An option is requested to set the ID4 high without SELECT-high connection.

Change is

A VDD wire-bonding pad is provided next to the SELECT line pad.

#### References

- [1] M. Tyndel, et al., "Internal Design Review of the SCT Barrel Hybrids", reference id, 5 July, 2000
- [2] Y. Unno, et al., "Temperature readout errors in thermistors due to voltage ambiguities", 29 June, 2000, http://atlas.kek.jp/~unno/si\_hybrid/SMDparts/Temperrors.fm55.pdf



1997.9.5 T. Kondo (KEK) 1997.9.6 V1 1997.9.6 V1 1998.1.2 V3 1998.4.1 2V5 1998.4.1 2V5 1998.5.8 V6 <- Melbourune 1998.5.19 V7 <- Melbourune 1998.5.29 V8 1999.1.2 28 V8c 2000.1.15.V8d 2000.2.4 V8e 2000.2.5 V8b 1999.5.1 mistakes corrected 2000.7.12 new version for ABCDET

Circuit Diagram of Barrel Cu/Polyimide Hybrid for ABCD3T chips (ATLAS/K4ABCD3/2K09)

