

Proposal for changing the module naming for the FPIX Phase 1 Upgrade

The naming convention used so far for the sensors and the modules for the FPIX Phase 1 Upgrade is described in [DocDB document 12227](#) written by Gino Bolla, Kirk Arndt, and Mayur Bubna. A production module (both at the level of bare module and at the level of fully assembled module) will have a name like M_123_**, where 123 is a 3 digit sequence between 001 and 200 that indicates the serial number of the sensor wafer and ** is a two character sequence that indicates the position of the 2*8 sensor on the wafer (this two character sequence will be one of TT, FL, LL, CL, CR, RR, FT, and BB, and the mapping between the sensor position on wafer and the two character sequence is indicated in Figure 1 below). During the discussions on the HDI production we were informed by Compunetics about the possibility of adding a serial number on the HDI (this was added for revision C of the HDI) and one of the authors of the naming convention (Kirk Arndt) suggested that we should be using the HDI serial number to identify the assembled modules. The advantage of this approach is that the serial number of the HDI will continue to be visible throughout the lifetime of the module whereas a name like M_123_** will only appear on labels that are attached to the module carriers (we have checked that the silkscreen used to put the serial number of the HDI is still intact after a Co⁶⁰ irradiation to 180 MRad). In any approach the database will contain the mapping between the bare module and the sensor, between the bare module and the HDI, between the bare module and the ROCs, between the HDI and the TBM. Our proposal consists simply in using the HDI serial number for identifying the module after its assembly instead of using the M_123_** type string. We propose to add a label on the module carriers that contains a copy of the HDI serial number to make that number readable without accessing the module itself. Once the module is removed from the module carrier and installed on the half disk mechanical support the HDI serial number will be again visible. The procedure that we are proposing is essentially identical to the one followed up to now, except that so far the M_123_** type string has been used as a label on the module carriers.

The full HDI serial number is something like YHC69-1015-2-15 (see Figure 2 below) where the first five characters represent the work order. The second set of characters (1015 in this case) represent a date, the third is the panel number (2) and the fourth set represent the position of the HDI in a panel (50). We expect that 2 digits will be needed for the panel number. Based on communications with Compunetics we know that future deliveries of HDIs will have different work orders and should have different time stamps. The panel number will be reset at the beginning of each work order. Based on this the proposal for the unique identifier for a module will be something like M-*-x-yy for production modules and P-*-x-yy for preproduction or prototype modules. In this coding * is a single character that represents the string of work order and date (starting with A for YHC69-1015), A is a single digit panel number (between 1 and 8) and BB is a two digit number that indicates the position of the HDI in the panel (between 01 and 50). We propose to keep the correspondence between the string representing the work order and

date and the single character inside this document (see Table 1 below), which will be updated every time we receive a new batch of HDIs

The change we propose can be summarized as follows:

1. All the relationships between sensor wafers, ROCs, bare modules, HDI, TBM, will continue to be maintained in the database as we are doing now.
2. We propose to use a name derived from the HDI serial number instead of using the name of the bare module to identify the fully assembled module. This name should have a clear mapping to the HDI serial number and it should be printed, instead of the bare module name on the label attached to the module carriers.
3. No changes in the database will be made for modules that were built with revision C HDIs and earlier versions

We hope that this procedure does not require major changes to the Purdue database and to the module assembly practices at Nebraska and Purdue.

Table 1: Correspondence between HDI serial number and module names (x and yy are single and two digit numbers, respectively). We expect that no preproduction modules will be built using HDIs from the batches that will be delivered in April 2015 or later dates. The starting work weeks for HDI batches 2-4 are not yet known as of April 16. Batch number 5 will be needed depending on the number of HDIs in previous batches that do not pass quality acceptance criteria. The work order for this batch is not yet known.

HDI Rev D batch	HDI Serial Number	Production Modules	Preproduction Modules
Preproduction	YHC69-1015	No production modules	P-A-x-yy
Batch 1	YHD19-1815	M-B-x-yy	P-B-x-yy
Batch 2	YHD27-1015	M-C-x-yy	P-C-x-yy
Batch 3	YHD23-2015	No production modules	No preproduction modules
Batch 4	YFC67-2915	No production modules	No preproduction modules
Batch 5	YFC73-3415	M-F-x-yy	No preproduction modules
Batch 6	YFC89-3815	M-G-x-yy	No preproduction modules
Batch 7	Week of Oct 19		

Figure 1: Correspondence between the ** label in the M_123_** type string and the position of the 2*8 sensor on a FPIX production wafer.

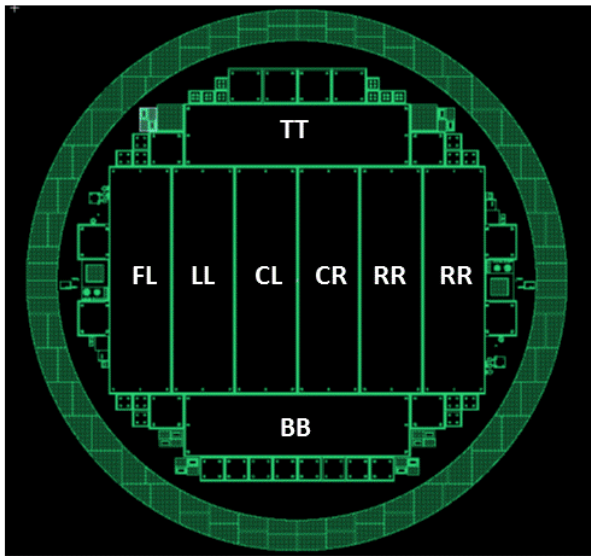
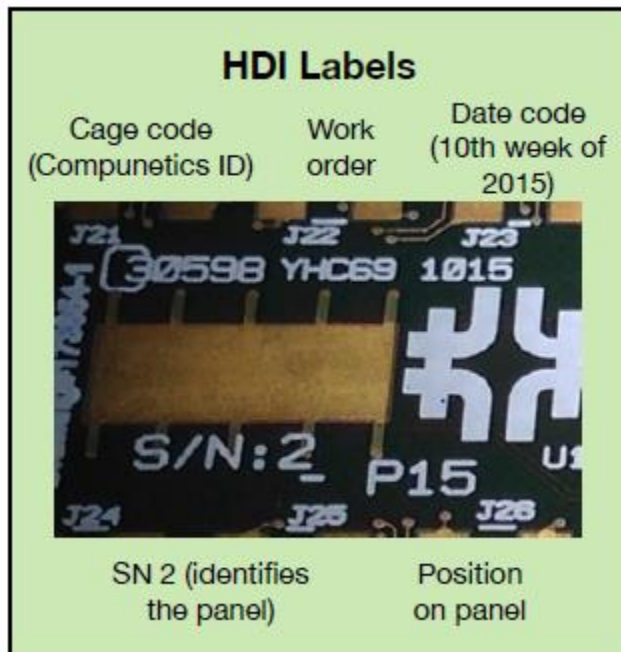


Figure 2: Example of an HDI serial number (the full serial number in this case is YHC69-1015-SN2-P15 and we are hoping that only the panel number [2] and the position index [15] will be sufficient to uniquely identify all the production HDIs).



Addendum – Yield of HDIs for each batch

- 1) Batch YHC69-1015 (information updated on 1 September 2015)
 - a. 73 HDIs pass electrical tests at Compunetics and delivered to Nebraska (2 HDIs kept at Nebraska for wire bonding tests, 71 HDIs delivered to Fermilab)
 - i. 33 HDIs fail Fermilab inspection and tests (not yet returned to Compunetics, some were declared bad after installation of SMT components) ***** REQUIRES ACTION *****
 - ii. 38 HDIs used for preproduction at Fermilab (modules P-A-x-yy)
 - b. Charge for 40 HDIs (2+38)
 - c. 21 additional mechanical grade HDIs delivered from Compunetics (zero cost)
- 2) Batch YHD19-1015
 - a. 293 HDIs delivered from Compunetics to Nebraska and then sent to Fermilab (10 of these should have been declared to be mechanical grade by Compunetics)
 - i. 268 HDIs fail Fermilab inspection and tests, returned to Compunetics on 8/24/2015 (MMR0016324)
 - ii. 25 HDIs can be used for module assembly
 - b. Charge for 25 HDIs
- 3) Batch YHD27-2015
 - a. 101 HDIs delivered from Compunetics to Nebraska and then sent to Fermilab
 - i. 99 HDIs fail Fermilab inspection and tests, returned to Compunetics on 8/24/2015 (MMR0016324)
 - ii. 1 HDI can be used for module assembly, 1 HDI needs further testing ***** REQUIRES ACTION *****
 - b. Charge for 1 or 2 HDIs
- 4) Batch YHD23-2015
 - a. 123 HDIs delivered from Compunetics to Nebraska and then sent to Fermilab
 - i. 105 HDIs fail Fermilab inspection and tests, returned to Compunetics on 8/24/2015 (MMR 0016324)
 - ii. 18 HDIs kept as mechanical (do we have the agreement of Compunetics) ***** REQUIRES ACTION *****
 - b. Charge for 18 or 0 HDIs
- 5) Batch YFC67-2915
 - a. 99 HDIs delivered from Compunetics to Nebraska and then sent to Fermilab
 - i. 99 HDIs fail Fermilab inspections and tests (not yet returned to Compunetics) ***** REQUIRES ACTION *****
 - b. Charge for 99 or 0 HDIs
- 6) Batch