Test 0.7.3 Verify function of Ge:Ga detectors, CREs and detector heaters

Objectives

Check the availability and basic functionalities of the Ge:Ga detectors, CREs and detector heaters. Detectors must generate HK data with nominal values.

Reflected requirements (see also PACS-IM-PS-001):

- stability of output signal;
- linearity;
- readout modes;
- operating temperature;
- temperature sensors;

Related features to check:

- DMC accepts and executes DMC_WRT_x_SPEC_PAR command, the full parameter space is configurable;
- DMC can regulate blue detector temperature (heater);
- DMC can read-out detector (housing) temperature values;
- DMC can generate detector HK;
- DMC can generate detector diagnostic HK at readout frequency;

Priority

A (on ground)

When performed / frequency

PFM-ILT

Inputs, prerequisites

Interconnections

A. Fulfilled By

B. Fulfilling

OGSE Setup, astr. sources, OBSW Compr./Red.

Use PACS internal Calibration Sources for the illumination of the blue and the red detector array. Use the default temperatures for both CSs. Thus, when this test will be performed the CSs have to be stable on the desired temperature plateaux. We will use the loss-less compression mode with 14 randomly selected pixels.

Test Implementation Procedure (TIP)

Since all possible detector settings cannot be checked within the time frame of a functional test, only a relevant subset of the full parameter space is scanned over.

Step #	Test Implementation Procedure	OGSE Setup	Products Online Analysis	Pass/Fail & Remarks
	FM ILT TIP for req. 0.7.3 CRE, Ge:Ga detector and heater functional test			
	Setup the instrument for this PTD			
0.01	`Switch on PACS` (if not already done).			
0.02	`Setup spectroscopy mode` (if not already done).			
0.03	`Setup blue detector temperature` set blue detector temperature to 2.1 K with command DMC_SET_B_SPEC_HEATER_C			

0.04	`Set diagnostics HK for detectors at readout frequency:` (synchronize on blue spectrometer readout)
	`281 DMC_DECB_HEAT_C Blue DEC Heater Current`
	`349 DMC_DECR_HEAT_C`
	`290 DMC_DECB_RO_RA_3 Number of readouts per ramp (blue-group 3)`
	`291 DMC_DECB_CR_ST_3 CRE group 3 status`
	`298 DMC_DECB_RA_CO_3 ramp counter, increments until reset (blue-group 3)`
	`324 DMC_DECB_RO_RA_4 Number of readouts per ramp (blue-group 4)`
	`325 DMC_DECB_CR_ST_4 CRE group 4 status`
	`332 DMC_DECB_RA_CO_4 ramp counter, increments until reset (blue-group 4)`
	`358 DMC_DECR_RO_RA_1 Number of readouts per ramp (red-group 1)`
	`359 DMC_DECR_CR_ST_1 CRE group 1 status`
	`366 DMC_DECR_RA_CO_1 ramp counter, increments until reset (red-group 1)`
	`392 DMC_DECR_RO_RA_2 Number of readouts per ramp (red-group 2)`
	`393 DMC_DECR_CR_ST_2 CRE group 2 status`
	`399 DMC_DECR_RO_CO_2 ramp counter, increments until reset (red-group 2)`			

0.05	`Setup the SPU` compression / reduction: Spectroscopy Loss-less compression mode having raw data for 14 pixels.			
0.06	`Select detector selection table` select appropriate detector selection table (DXS7602) for the loss-less compression mode with 14 pixels in blue and red array having raw data.			
	Step 1: Verify functionalities (with raw pixels - loss-less compression)			

1.01	Set blue spec heater current to 2.5 K (default value) SET_B_SPEC_HEAT_C Wait for 60 s			
1.02	Loop over all integration capacities Loop over reset intervals (1/32s, 1/8s, 1/4s, 2s) Perform T_obs = 16s measurement End loop selected reset intervals End loop integration capacities		only start when CSs are stabilized; check signal on QLA; check all relevant detector HK values;	
	Step 2: Verify functionalities (default mode)			
2.01	Switch to SPU default compression mode Use smallest capacity Loop over reset intervals (1/4s, 2s) Perform T_obs = 16s measurement End loop selected reset intervals			
	Step 3: End of Test			

2.01	Set PACS in default starting mode. stop diagnostic housekeeping set PACS back to its default starting mode		

Estimated time needed

16 measurements $\times$ (16 sec integration + XX sec overhead) + 60sec wait time temperature change of blue array = few minutes.

Success criteria, required accuracy

Detector HK values and ramps as expected.

Test Analysis Procedure (TAP)

Science data has to be de-compressed and checked if ramps are within specifications. Therefore, the signals of the blue and red detector arrays should be plotted versus time for all different settings.

Output, products

Coding Strategy

Version number

$Revision$: 1.2