



SPIRE Technical Report

Ref: SPIRE-RAL-PRC-002777

Issue: 1.1

Date: 30 Jan 2006

Page: 1 of 4

PFM4 JFET Power and Pixel Diagnostic Test Procedure
Doug Griffin

Change Log

Date	Issue	Change
Thursday 16 November 2006	0	Email summary circulated for comment prior to drafting
Monday, 20 November 2006	1.0	Initial drafting of document
Tuesday, 30 January 2007	1.1	Corrected several typos

1. Scope

This procedure outlines a series of tests to:

- Investigate the cause of some channels on the PFM instrument show anomalous behaviour.
- Measure the dissipation in each of the individual JFET membranes (half modules)

2. General ESD Precautions

1. Personnel carrying out operations on the cryoharness are to be grounded to the laboratory ground via a wrist strap
2. When mating or demating a connector, an air ionizer is to be used to discharge the area around the connector for > 60 sec prior to carrying out the operation
3. Only the two people directly involved in the test are to be in the cryolab when carrying out the mate-demate procedures or a breakout box is mated to the instrument
4. Immediately prior to connecting a DVM or Scope probe to a Breakout Box contact, it is to be shorted to chassis to remove any stray charge

3. JFET Power and Vdd / Vss Measurement

3.1 *I_{ss}* and *I_{dd}* measurement

Note: Normal text is for the measurements on the Photometer, *italics in blue* are the procedure variations for the spectrometer

1. Prepare a 78-Way (*37-way*) breakout box with 20 Ohm inline resistors (*40 Ohm for SLW measurements, 20 Ohm for SSW and PTC*) as indicated in Table 1 (*Table 2*). Note: 20 Ohms gives about 24mV voltage drop for a nominal bias current.
2. Cover exposed contacts on the breakout box not listed in Table 1 (*Table 2*) with static dissipative and electrostatic shielding material (e.g. Lumealloy).
3. Measure and record the resistance of each resistor.
4. Check instrument telemetry that the temperature of the detectors is above 1.7K. Close the evaporator heat switch if necessary.
5. Switch off the DRCU and DPU
6. Check that DCU J30 (*DCU J32*Table 2) is mated with DCU P30 (*DCU P32*Table 2) (it should of course be mated, but it is better to check).



7. Demate DCU P29 ([DCU P31](#)Table 2) from the DCU
8. Place the exposed DCU P29 ([DCU P31](#)Table 2) connector in a dissipative ESD bag.
9. Short the contacts of the plug connector of the breakout box to chassis with conductive foil
10. Mate the 78-way Breakout Box to DCU J29 ([DCU J31](#)Table 2)
11. Remove DCU P29 ([DCU P31](#)Table 2) from the bag and mate to the Breakout Box
12. Secure the Breakout Box in a location where there is no risk of ESD events or the box falling and the resistors coming out of the contacts.
13. Switch on the DPU and DRCU in Prime mode
14. Set up the instrument in Photometer ([Spectrometer](#)Table 2) mode with the nominal Vss settings.
15. Measure the voltage drop across the resistors and record the values in Table 1 ([Table 2](#)).
16. Measure Vdd and Vss at the output of the DCU with respect to chassis and record the values in Table 1 ([Table 2](#)).
17. Switch the instrument off
18. Demate DCU P29 ([DCU P31](#)Table 2) from the breakout box and place the exposed connector in an ESD dissipative bag.
19. Demate the breakout box from DCU J29 ([DCU J31](#)Table 2)
20. Mate DCU P29 to DCU J29 ([DCU P31 to DCU J31](#)).

3.2 Vss and Vdd measurement

21. Remove the inline resistors from the 78-Way ([37-way](#)) breakout box and reinstall the bridges
22. Demate DCU P30 from DCU J30 ([DCU P32 from DCU J32](#)).
23. Place the exposed DCU P30 ([DCU P32](#)Table 2) connector in a dissipative ESD bag.
24. Short the contacts of the plug connector of the breakout box to chassis with conductive foil
25. Mate the 78-way Breakout Box to DCU J30 ([DCU J32](#)Table 2)
26. Remove DCU P30 ([DCU P32](#)Table 2) from the bag and mate to the Breakout Box
27. Secure the Breakout Box in a location where there is no risk of ESD events or the box falling and the resistors coming out of the contacts.
28. Switch on the DPU and DRCU in Prime mode
29. Set up the instrument in Photometer ([Spectrometer](#)Table 2) mode with the nominal Vss settings.
30. Measure Vss and Vdd and record the values in Table 1 ([Table 2](#)).
31. Switch the instrument off
32. Demate DCU P30 ([DCU P32](#)Table 2) from the breakout box and place the exposed connector in an ESD dissipative bag.
33. Demate the breakout box from DCU J30 ([DCU J32](#)Table 2)
34. Mate DCU P30 to DCU J30 ([DCU P32 to DCU J32](#))



SPIRE Technical Report

Ref: SPIRE-RAL-PRC-002777

Issue: 1.1

Date: 30 Jan 2006

Page: 3 of 4

PFM4 JFET Power and Pixel Diagnostic Test Procedure
Doug Griffin

Table 1 – 78-Way Breakout box for photometer Idd/Iss measurement

	(a) Vdd Contact	(b) Measured resistance	(c) dV	(d) Idd	(e) Vdd J29	(f) Vdd J30	(g) Vss Contact	(h) Measured resistance	(i) dV	(j) Iss	(k) Vss J29	(l) Vss J30
PSW_JFET_V1	1						2					
PSW_JFET_V2	3						23					
PSW_JFET_V3	4						5					
PSW_JFET_V4	41						60					
PSW_JFET_V5	61						62					
PSW_JFET_V6	63						44					
PMW_JFET_V1	10						11					
PMW_JFET_V2	12						31					
PMW_JFET_V3	69						70					
PMW_JFET_V4	71						52					
PLW_JFET_V1	36						17					
PLW_JFET_V2	18						19					

Table 2 – 37-Way Breakout box for spectrometer Idd/Iss measurement

	(a) Vdd Contact	(b) Measured resistance	(c) dV	(d) Idd	(e) Vdd J31	(f) Vdd J32	(g) Vss Contact	(h) Measured resistance	(i) dV	(j) Iss	(k) Vss J31	(l) Vss J32
SLW_JFET_V1	25						7					
SLW_JFET_V2	8						27					
SSW_JFET_V1	11						30					
SSW_JFET_V2	33						15					
PTC_JFET_V	21						3					



4. Pixel Check

Similar approach as the JFET power measurement.

1. Detectors at $> 1.7K$
2. Switch the instrument off
3. Put a breakout box inline
4. Switch the instrument on in PDET_STBY (or SDET_STBY)
5. Measure V_s (Sig+ and Sig-) for the suspect channel + at least one good detector on the same connector
 - a. Unmate the harness from the DCU
 - b. Put the exposed connector in a ESD bag
 - c. Mate the breakout box to the DCU (shorting contacts prior to mating so that charge is removed)
 - d. Mate the cryoharness to the Breakout box
 - e. Make the measurements
 - f. Remove the cryoharness from the break out box and put in ESD bag
 - g. Remove the breakout form the DCU
 - h. Mate the cryoharness to the DCU
6. Repeat for any questionable channel on that connector
7. Switch off and repeat for any other suspect channels on different connectors