



ENVIRONMENTAL TEST AUTHORIZATION AND SUMMARY (ETAS)

AUTHORIZATION SECTION

PROJECT Herschel		LOG NO. HS0TCA01	
JBSYSTEM/ASSEMBLY TITLE SPIRE THERMAL CONTROL, SN001			DATE ISSUED 10/13/2004
REFERENCE DESIGNATION NUMBER	PART NO. (IF MULTIPLE, ATTACH LIST) 10219660-1	REV	SERIAL NO. 001
HARDWARE TYPE <input checked="" type="checkbox"/> EM QUAL <input type="checkbox"/> FLIGHT <input type="checkbox"/> FLIGHT SPARE <input type="checkbox"/> OTHER		PRE-ENVIRONMENTAL INSPECTION REPORT NUMBER (ATTACH IR)	
WIRING HARNESS <input type="checkbox"/> EM QUAL <input type="checkbox"/> FLIGHT <input type="checkbox"/> EM <input type="checkbox"/> SE		PART NO.	SERIAL NO.
TEST DESCRIPTION (CHECK ALL APPLICABLE) <input type="checkbox"/> SINE VIBRATION <input type="checkbox"/> PYROSHOCK <input type="checkbox"/> ACOUSTIC <input type="checkbox"/> EMC <input type="checkbox"/> OTHER _____ <input checked="" type="checkbox"/> RANDOM VIBRATION <input checked="" type="checkbox"/> THERMAL VAC. <input type="checkbox"/> THERMAL ATMOSPHERE		TYPE OF TEST <input checked="" type="checkbox"/> QUALIFICATION <input type="checkbox"/> FLIGHT ACCEPTANCE <input type="checkbox"/> PROTO FLIGHT <input type="checkbox"/> RETEST	
WILL ALL TESTS/LEVELS/DURATIONS REQUIRED BY THE PROJECT DOCUMENTS BE PERFORMED ON THIS UNIT? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO (IF NO, ATTACH EXCEPTIONS LIST) ENTER PROJ. DOC. NO. AND REV. D-19155, Rev B, HP ERD			
HAS THE UNIT PASSED ALL PRE-ENVIRONMENTAL FUNCTIONAL TESTS? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO (IF NO, ATTACH EXCEPTIONS LIST) BRIEF EXPLANATION			
HAVE ALL DESIGN ANALYSES BEEN COMPLETED AND REQUIRED CHANGES BEEN IMPLEMENTED? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO (IF NO, ATTACH EXCEPTIONS LIST) BRIEF EXPLANATION			
IS THE TEST ARTICLE IDENTICAL TO OTHER FLIGHT UNITS? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO (IF NO, ATTACH EXCEPTIONS LIST) BRIEF EXPLANATION NA (This is the first unit produced, other units are expected to be identical)			
ARE ALL PFRs AGAINST THIS UNIT CLOSED? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO (IF NO, ATTACH EXCEPTIONS LIST) BRIEF EXPLANATION			
HAVE ALL WAIVERS AND ECRs BEEN APPROVED AND ARE THEY INCORPORATED? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO (IF NO, ATTACH EXCEPTIONS LIST) BRIEF EXPLANATION			

TEST AUTHORIZED BY

COGNIZANT ENGINEER Mark Weiert	DATE 10-20-04	TECHNICAL MGR./INSTR MRG./PI PREP REP Monty R	DATE 10/18/04	ENVIRONMENTAL REQUIREMENTS ENG. D. J. Newell	DATE 10-15-2004
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SUMMARY SECTION

TEST AGENCY (IF MULTIPLE, ATTACH SUMMARY AND TEST DATES) JPL Building 144	TEST INITIATION DATE 10/14/04	ACCUMULATED OPERATING HOURS PRIOR TO FIRST ENVIRONMENTAL TEST
SERIAL NUMBERS ACTUALLY TESTED 001	TEST TERMINATION DATE 12-1-04	OPERATING HOURS DURING ENVIRONMENTAL EXPOSURE

TEST DESCRIPTION

VIBRATION AXES: X Y Z SINE VIBRATION <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> RANDOM VIBRATION <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	ACOUSTIC <input type="checkbox"/>	PYROSHOCK SHOCK AXES: X Y Z <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> SHOCKS/AXIS:	<input type="checkbox"/> THERMAL VACUUM PRESSURE: <1E-5 mbar, 290K to 7K 12R 15-16-04 NO OF CYCLES: 27 total, 6 pre-vibe, 21 post-vibe	<input type="checkbox"/> TEMPERATURE ATMOSPHERE	<input type="checkbox"/> OTHER
EMC <input type="checkbox"/> ESD	<input type="checkbox"/> COND. SUSC. <input type="checkbox"/> RAD. SUSC.	<input type="checkbox"/> COND. EMIS. <input type="checkbox"/> RAD. EMIS.	<input type="checkbox"/> ISOLATION <input type="checkbox"/> MAGNETICS	TEMP. LEVEL (°C) AND ACCUMULATED DURATION (HRS) HOT: _____ °C, _____ h COLD: _____ °C, _____ h HOT: _____ °C, _____ h COLD: _____ °C, _____ h	

WERE THERE ANY PFRs GENERATED DURING ENVIRONMENTAL TESTS? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO (IF NO, ATTACH EXCEPTIONS LIST)	LIST PFR NOS. / BRIEF EXPLANATION
ARE THE POST ENVIRONMENTAL DAMAGE INSPECTIONS COMPLETE? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO (IF YES, ATTACH A COPY OF THE INSPECTION REPORTS. IF NO, ATTACH EXPLANATION)	LIST PFR NOS. / BRIEF EXPLANATION
WERE ALL PLANNED TESTS/LEVELS/DURATIONS ACHIEVED? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO (IF NO, ATTACH EXCEPTIONS LIST)	LIST PFR NOS. / BRIEF EXPLANATION

TESTS HAVE NOT BEEN SUCCESSFULLY COMPLETED. SEE THE ATTACHED SUMMARY FOR ACTIONS THAT NEED TO BE TAKEN.

COGNIZANT ENGINEER	DATE	TECHNICAL MGR./INSTR MRG./PI PREP REP	DATE	ENVIRONMENTAL REQUIREMENTS ENG.	DATE
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HARDWARE HAS SUCCESSFULLY COMPLETED THE ENVIRONMENTAL TESTS LISTED ON THIS FORM OR REMAINING ACTIONS HAVE BEEN TAKEN, INCLUDING RETEST.

COGNIZANT ENGINEER Mark Weiert	DATE 12-16-04	TECHNICAL MGR./INSTR MRG./PI PREP REP Monty R	DATE 12/13/04	ENVIRONMENTAL REQUIREMENTS ENG. D. J. Newell	DATE 12-16-04
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This ETAS is for qualification testing of the Qual Model of the SPIRE thermal control assembly (TCA). The test consists of 27 total cryogenic thermal cycles (including DC electrical continuity tests) and a 3-axis cold shake test.

The thermal cycle test will be done with the TCA unit mounted inside the SPIRE cold alignment facility, which has previously been used for thermal cycle tests on the SPIRE BDA's. This test is a set of 6 cycles before vibration, which will be followed later by an additional 21 cycles after vibration (for a total of 27 cycles) to complete the qualification. The unit contains only passive electrical components (heaters and resistance thermometers), which will be DC continuity tested warm and cold during a subset of the thermal cycles.

The 3-axis cold vibration test will be performed with the hardware at <100 K. TCA unit mounted inside the SPIRE cold vibration facility. The hardware has such a low mass (<50 grams) and will be vibrated cold, so no accelerometers or force transducers will be used during the primary tests. Low-level warm tests with a small accelerometer mounted to the TCA will be performed to characterize the system. The vibration levels will be as specified in the Herschel-Plank Environmental Requirements document, applied for 2 minutes in each axis.



**ENVIRONMENTAL TEST CORRELATION AND SUMMARY (ETAS)
ENVIRONMENTAL TEST SUMMARY**

HARDWARE	S/N	ETAS	TEST ENVIRONMENT LEVELS & DURATION	DATE TEST PERFORMED	TEST AGENCY	PASS/ FAIL	COMMENTS
SPIRE Thermal Control Assembly (10217660-1)	001	HSOTCA01	<p>Thermal Cycle: 6 Thermal cycles from 290K to <math>\leq 7K</math>, at a pressure of <math>\leq 1E-5</math> mbar.</p> <p>Vibration: LATERAL (2 axes), T~100K 2 minute Random Vibe 20 Hz 0.007 g²/Hz 100 Hz 0.2 g²/Hz 100-110 Hz +43.8dB/Oct 110 - 200 Hz 0.4 g²/Hz 200 - 210 Hz -42.8 dB/Oct 210-400 Hz 0.2 g²/Hz 400-2000 Hz -12 dB/Oct 2000 Hz 0.003 g²/Hz 0.003 g²/Hz Grms 10.45</p> <p>LONGITUDINAL Same-as-lateral Z-axis static performed 2 min + 2dB dynamic levels Thermal Cycle: 21 Thermal cycles from 290K to 7K</p>				