

**QUALIFICATION
CERTIFICATE**

NanoUtil MSP FPP

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1. Introduction

1.1 Purpose

This document describes the environmental qualification tests carried out on the following product:

- 200281 - NanoUtil MSP FPP

In the following sections, the tests and the corresponding test results are described.

1.2 References Standards

Table 1 presents the tests included in the Qualification Program with reference to ECSS documentation.

Table 1: Reference Standards

Test		ECSS/ESCC Reference
Structural and Mechanical	Random Vibration	ECSS-E-ST-10-03C
	Sinusoidal Vibration	ECSS-E-ST-10-03C
	Mechanical Shock	ECSS-E-ST-10-03C
	Quasi static	ECSS-E-ST-10-03C
Thermal	Thermal Ambient	ECSS-E-ST-10-03C
	Thermal Vacuum	ECSS-E-ST-10-03C

2. Qualification tests

It is hereby certified that the product mentioned above has been subjected to the tests executed in relation to the standards mentions in section 1.2

2.1 Structural and Mechanical tests

Sinusoidal Vibration		
	Frequency [Hz]	Level [g]
Sine Sweep Vibration	5-8	20mm peak-peak
	8-100	4,5
Sweep rate: 2 Octaves per minute		

Random Vibration		
	Frequency [Hz]	ASD Level [g^2/Hz]
Sine Sweep Vibration	20	0,026
	50	0,16
	800	0,16
	2000	0,026
	Overall	14,1g RMS
Duration: 120 Seconds on each axis		

Mechanical shock			
Mechanical shock	Type	Duration [ms]	Level[g]
		Half sine	2
No. of pulses:1			

Mechanical Quasi-Static			
Sine Burst	Frequency [Hz]	Cycles	Level[g]
		15	19
No. of burst: 8 ($\approx 10sec$)			

Remarks: None

2.2 Thermal Vacuum Test

Thermal Vacuum Qualification levels		
Temperature range: -5°C to +50°C		
Pressure level: < 1.0 x 10 ⁻⁵ mbar		
Number of Cycles: 12		
Thermal Vacuum Test	CFT	Temperature [°C]
	1	10
	2	50
	3	-5
	4	50
	5	15
	6	-5
	7	35
	8	-5
	9	50
	10	-5
	11	8
12	22	
Test duration: 146min		

Thermal Vacuum Qualification levels		
Temperature range: -20°C to +35°C		
Pressure level: < 1.0 x 10 ⁻⁵ mbar		
Number of Cycles: 11		
Thermal Vacuum Test	CFT	Temperature [°C]
	1	20
	2	35
	3	-20
	4	35
	5	-20
	6	35
	7	-20
	8	35
	9	-20
	10	35
11	-20	

Remarks: None

2.3 Flight Heritage

The NanoUtil MSP FPP is TRL 9 and has extensive flight heritage including GomSpace missions like GOMX4 as well as many customer missions.

3. Conclusion

The NanoUtil MSP FPP is tested according to the above-mentioned conditions and is fully functional and have the expected performance.

This certificate ensures that performance, test condition and test equipment are according to GomSpace quality.