

QUALIFICATION CERTIFICATE

NanoSense M315

Reference: 1028519
Revision: 1.2
Date: 11-02-2022

Document Title:	Gs-Qtct-NanoSense M315		
Reference:	1028519	Document Class	Qtct
Revision number:	1.2	Date:	11-02-2022

Release Table:

Action	Name	Function	Signature	Date
Prepared / Owned by:	Sebastian Andersen	Junior Engineer	SEAN	29-09-2020
Verified / Reviewed by:	Morten Bisgaard	Head of Spacecraft and Solutions	MBD	24-09-2021
Approved by:	Lars Vestergaard	Technology Manager	LAV	24-09-2021

Document Change Log

Revision	Date	Name	Description
1.0	06-11-2020	SEAN	Initial release
1.1	24-09-2021	LAV	Updated with thermal shock result
1.2	11-02-2022	LAV	Random vibration typo corrected

1. Introduction

1.1 Purpose

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

- 200279 - NanoSense M315

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
Radiation TID		ESCC 22900
Thermal Stress		ECSS-Q-ST-70-38C

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

Test condition: Tested as part of integrated spacecraft. All tests executed on all three axes.

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

Random Vibration	
Frequency [Hz]	ASD Level [g^2/Hz]
20	0,026
20-50	+6dB/Oct
50-800	0,16
800-2000	-6dB/Oct
2000	0,026
Overall	14.1G RMS
Duration: 120 Seconds on each axis	

Mechanical shock		
Mechanical shock	Frequency [Hz]	Level [g]
	2000 Hz	1500G
2 shocks on each axis		

Mechanical Quasi-Static			
Sine Burst	Frequency [Hz]	Cycles	Level[g]
	15	19	11,2G

Remarks: None

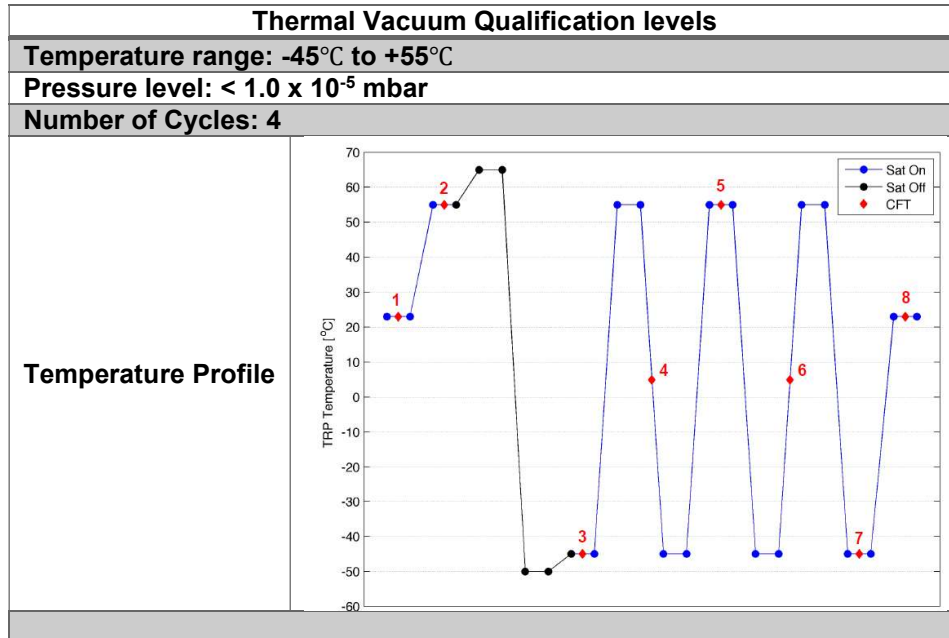
2.2 Thermal Stress Test

Thermal Stress		
Temperature Range:		
Action	Temperature [°C]	Duration [Minutes]
Heat	100	(10°C/min)
Dwell	100	15
Cool	-55	(10°C/min)
Dwell	-55	15
Repeat	-	-
Repeats: 500 cycles		

Remarks: None

2.3 Thermal Vacuum Test

Test condition: Test as part of fully integrated 3U spacecraft.



Remarks: None

2.4 Radiation TID Tests

Test condition: Radiation tested at PCBA level without additional shielding.

Total Ionizing Dose		
Dose Rate:	14,09kRad/h	
Dose	85,1min	18 kRad (SI)
Annealing	>24 hours	25 degC
Aging	168 hours	85 degC

Remarks: None

2.5 Flight Heritage

The NanoSense M315 is TRL 9 and has extensive flight heritage including GomSpace missions like GOMX3 and GOMX4 as well as many customer missions.

3. Conclusion

The NanoSense M315 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.