



HDRM Nano:

NANOSAT SIZED NANOMORPHODYNAMIC HDRM DEVICES FOR
RELIABLE RELEASE AND DEPLOY OPERATIONS



SUMMARY

The Nano-Morphodynamic muscle strand technology (NMD) is a versatile family of devices for HDRM and **custom geometry actuators that do not use any moving parts** and are only activated via resistive current or heat (stimulus). These devices have extensive flight heritage since 2013 on dozens of CubeSat missions, and have duty cycles regularly into thousands of iterations, actually proven by empirical data. NMD muscle strands have two position settings, customizable upon manufacturing, with custom deploy strength. They have a slow, steady and gradual movement, which drastically reduces wobbling and rotation feedback, while permanently maintaining a tense position once current or heat is no longer applied. Stimulus can be reapplied to reset position should the device be moved out of position.

FEATURES

- Engineered material actuators without mechanical moving parts or springs
- Activated via stimulus of resistive current or direct heating
- Corona dope coating for electrical isolation
- Very extensive flight heritage on dozens of missions for over a decade
- Fully customizable shape, length, width, strength and speed of deployment
- Ultra-slim, yet sturdy and over-engineered design
- Custom configurable choice of mechanical mating, usually soldering or epoxy
- Designed for NanoSat applications, missions and requirements.
- Manufactured according to NASA and ESA space standards and materials.
- Repetitive functional and performance tests provided with documentation.

PERFORMANCE

Activation current: 5W to deploy in 5s. Customizable current-to-deploy-time.



PRODUCT PROPERTIES

As measured from standard components, customized products will vary

- **Weight:** 1 gram
- **Dimensions (L x Dia):** 45mm x 3mm
- **Axis Diameter:** 2mm
- **Activation Temperature:** 65C (customizable)
- **Survival Temperature:** -270C to 1750C

MATERIALS

- Only TML and CVCM < 1% materials used, NASA and ESA approved.
- NMD strand: proprietary alloy
- Wire: 29AWG enamel coated (customizable color, normally bright red)
- Custom electrical mating interface
- Electrical Isolation: Corona Dope

TESTING

All antennas are provided with tests reports regarding:

- Thermal Bake out (10E-5 mbar @ 50C for 72 hours)
- Full vibration test for Falcon 9, Electron, Soyuz, Dnepr and Long March 2D

Test	QT	AT
Functional	✓	✓
Vibration		✓
Thermal Cycling		✓
Thermal Vacuum		✓
Repeatability (100 times)	✓	✓

AVAILABILITY AND LEAD TIME

- **4 to 6 weeks**



