Compliance sheet — star-mat3

Everything a supplier qualification, a legal review or an export check usually asks about star-mat3 0.1.0, in one document.

1. Identity

Document	STAR-PKG-STAR-MAT3-EN · v2.3 · 2026-11-14
Package	star-mat3
Version	0.1.0
Capability	star.geometry.mat3
Maturity	Released & Verified (RELEASED)
Python	>=3.9
Source commit	dc09f61d
Source	https://github.com/Andrea07072000/S.T.A.R.-/tree/main/packages/star_mat3

2. Licence and obligations

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3. What it needs at run time

Nothing beyond the Python standard library: it works offline.

4. Integrity

SHA-256 fingerprints of the files published on this website. Check a downloaded file with:

```
python -c "import
hashlib,sys;print(hashlib.sha256(open(sys.argv[1],'rb').read()).hexdigest())" star_mat3-0.1.0-
py3-none-any.whl
```

FILE	SHA-256
star_mat3-0.1.0-py3-none-any.whl	a43dbc5fa62c9d9b1aa023375a145d98369a5931eb96cf09e8cef87dce772acd
star_mat3.py	40456aa4d4da89cd6b1aaeca81e93b57e971b8cf672d9b34c005a5eb5b5ee343
star_mat3-0.1.0-source.zip	9fc3da18de452e73ae8d0600fdee4ee7fc071bf66a6b125cfd9f26ed6d5ff3d9

5. What it does, and its limits

Transpose, exact determinant and inverse, products and a proper-rotation test for 3x3 matrices; determinant and inverse identical to exact rational arithmetic on 575 matrices including condition numbers up to 1e8 (where SPICE's inverse is off by 6e-6 and NumPy's by 9e-10); singular matrices refused.

3×3 only; no eigenvalues, no decompositions, no orthonormalisation of a drifting rotation. The exact arithmetic makes `inverse` slower than a floating-point one (tens of microseconds): it is for correctness, not for inner loops. "Exact" means the exact inverse of the floats given: if those floats are themselves rounded measurements of an ill-conditioned matrix, the inverse amplifies their error by the condition number, and nothing here can prevent that. The products are compensated sums of rounded products, accurate to a few units in the last place, not exact.

- `determinant` and `inverse` in exact rational arithmetic (a float is an exact fraction), rounded once: correct to the last digit whatever the conditioning. `inverse` refuses singular and nearly singular matrices, with a test that does not depend on the scale of the entries.
- `transpose`, `matmul`, `matvec`, `identity`; `is_rotation(m, tol)` is True only for an orthonormal matrix with determinant +1 within the tolerance.
- Measured on 575 matrices (300 general, 150 rotations, 125 with condition numbers up to 1e8) against EXACT arithmetic (SymPy): determinant and inverse identical to the exact value rounded; products within 4e-15. On the ill-conditioned matrices SPICE's inverse differs from the exact one by up to 6e-6 of its largest entry and NumPy's by 9e-10. `is_rotation` agrees with SPICE on every matrix.

- Every function returns floats (or a bool) or raises `ValueError`: wrong shape or type, an entry that is not a finite real number within ±1e60 (booleans refused), a singular or nearly singular matrix, an inverse that overflows, a tolerance outside (0, 1].

6. Export, use and certification

The package is published and freely available. That usually takes software out of export-control lists, but not every use of it: read the page on space activities and export control before using it in a controlled programme. It is not certified or qualified for flight; the evidence describes what was tested and how.

7. Citation and bill of materials

```
@software{cavazzini_star_mat3_0_1_0,
  author  = {Cavazzini, Andrea},
  title   = {{star-mat3}: The 3×3 matrix operations of frame and attitude code},
  version = {0.1.0},
  year    = {2026},
  url     = {https://andrea07072000.github.io/S.T.A.R.-/software/star_mat3/},
  note    = {Apache-2.0. Source: https://github.com/Andrea07072000/S.T.A.R.-, commit dc09f61d}
}
```

CITATION.cff · BibTeX · SBOM CycloneDX 1.5 · SBOM SPDX 2.3

8. Warranty and liability

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