
Radiation-Tolerant Quad-Core ARM® Cortex®-A72 1.8GHz Microprocessor

1 Introduction

LS1046-Space is a Space Radiation-Tolerant Microprocessor.

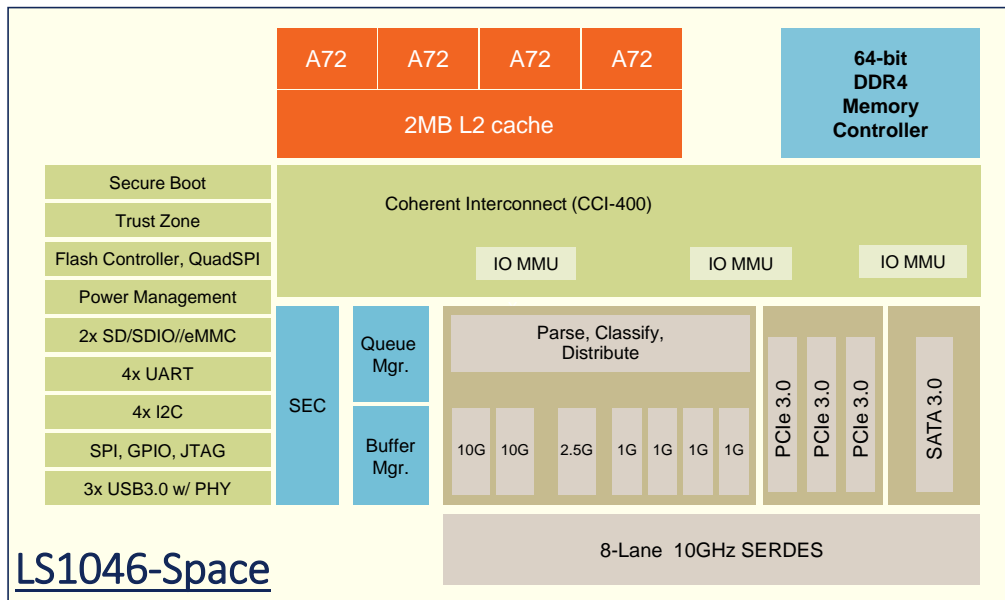
It embeds a Quad-Core ARM® Cortex®-A72 Microprocessor running up to 1.8GHz and bringing 30k DMIPS computing capabilities, with ECC-protected L1 and L2 cache memories for reliable behavior. It features a rich set of peripherals, including integrated packet processing acceleration, high speed serial links supporting 10 Gb Ethernet, PCIe® Gen3, SATA 3.0 and USB, as well as a number of general purpose interfaces such as SPI, I²C, and UART.

It is a Space-qualified, radiation-tolerant version of Teledyne e2v LS1046 standard Hi-Rel component. This document provides the specific features and characteristics of the LS1046-Space. From the functional and computing performance point of view, LS1046-Space is equivalent to the standard version. For the general characteristics, the datasheet and reference manual of the commercial version are applicable.

2 Typical end applications

- Communication Satellites / Constellations – Requiring AI / Security
- Observation Satellites - AI / Security / Automated situation detection & awareness
- High bandwidth Space Observation
- Defense In Space
- Meteorological Satellites
- Data Storage / Servers in the Sky
- Human Mission Exploration & Science Missions

3 Block Diagram



4 Space-Grade Parts Key Features

4.1 Space Qualification

- Up to NASA Level 1 (based on NASA EEE-INST-002 - Section M4 – PEMs)
- Up to Class 1 (ECSS-Q-ST-60-13C)
- Full lot traceability and serializing

4.2 Radiation Tolerance

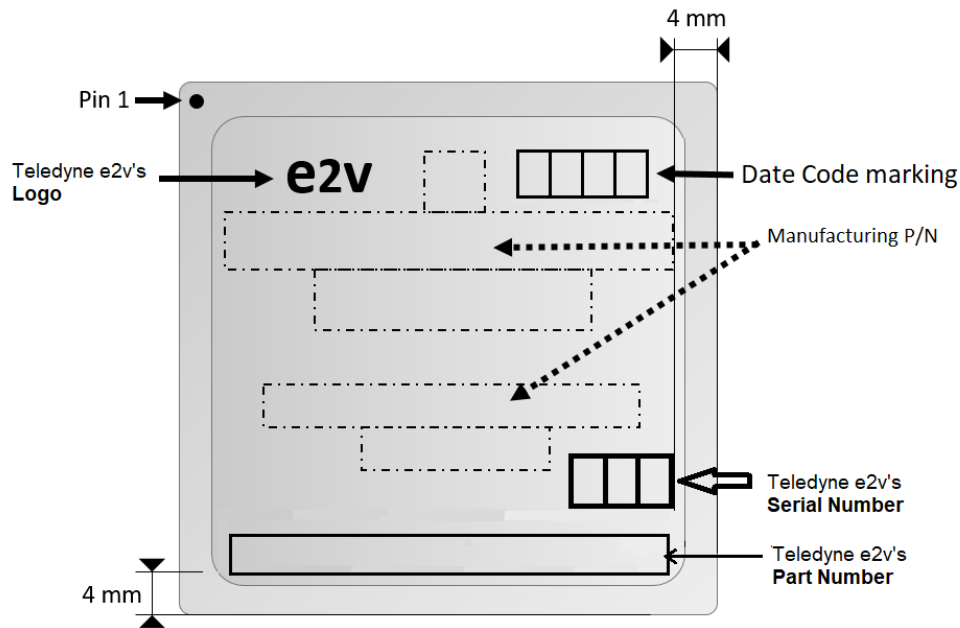
Key figures of the radiation performance of the device are highlighted below:

- SEL LET Threshold > 62.5 MeV.cm²/mg
- SEU LET Threshold 1.8 MeV.cm²/mg Upset cross-section @ 62.5 MeV.cm²/mg = 3.25 E-9 cm²/bit
- SEFI LET Threshold 1.8 MeV.cm²/mg SEFI cross-section @ 62.5 MeV.cm²/mg = 7.23 E-5 cm²/device
- TID 100 krad

Complete radiation reports available for SEE (heavy-ions and protons) and TID testing.

4.3 Package and physical properties

Marking drawing for the LS1046-Space is given below:



e2v		YYMM
LS1046AMN3T1A-N1	NASA LEVEL 1	
LS1046AMN3T1A-N2	NASA LEVEL 2	
LS1046AMN3T1A-N3	NASA LEVEL 3	
LS1046AMN3T1A-E1	ECSS CLASS 1	
LS1046AMN3T1A-E2	ECSS CLASS 2	
LS1046AMN3T1A-E3	ECSS CLASS 3	

Physical properties

- Solder Balls Composition - 63% Sn, 37% Pb
- Mass of the device is 4.06g
- CTE of the package: please contact your Teledyne e2v technical support

General package characteristics are given in the datasheet of the standard version ([Datasheet DS1202](#)).

5 LS1046-Space ordering information

LS	n	nn	n	x	t	e	n	c	t	r	Quality Level
Generation	Performance Level	Number of Virtual cores	Unique ID	Core Type	Temperature Range	Encryption	Package Type	CPU Speed	DDR Data Rate	Die Revision	Grade
LS= Layer scape	1	04 = four cores 02 = two cores	6	A = Arm	M = Military - 55°C – 125°C	E = Encryption N = Non-Encryption	3 = FCPBGA C4 Pb-free/C5 Leaded	P = 1400 MHz Q = 1600 MHz T = 1800 MHz	1 = 2100 MHz	A = Rev 1.0	-N1 = Nasa Level 1 -N2 = Nasa Level 2 -N3 = Nasa Level 3 EM = Engineering Models EQM = Engineering Models -E1 = ECSS Class 1 -E2 = ECSS Class 2 -E3 = ECSS Class 3

6 LS1046 Product Features

Please refer to Teledyne e2v datasheet reference: [Datasheet DS1202](#)

7 Revision history

This table summarizes revisions to this document.

Issue	Date	Comments
A	March 2021	Initial revision

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Mailing Address: Teledyne e2v Semiconductors SAS, Avenue de Rochepleine, 38120 Saint Egrève, France.

Telephone: +33 4 76 58 30 00

e-mail: hotline-std@teledyne.com

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