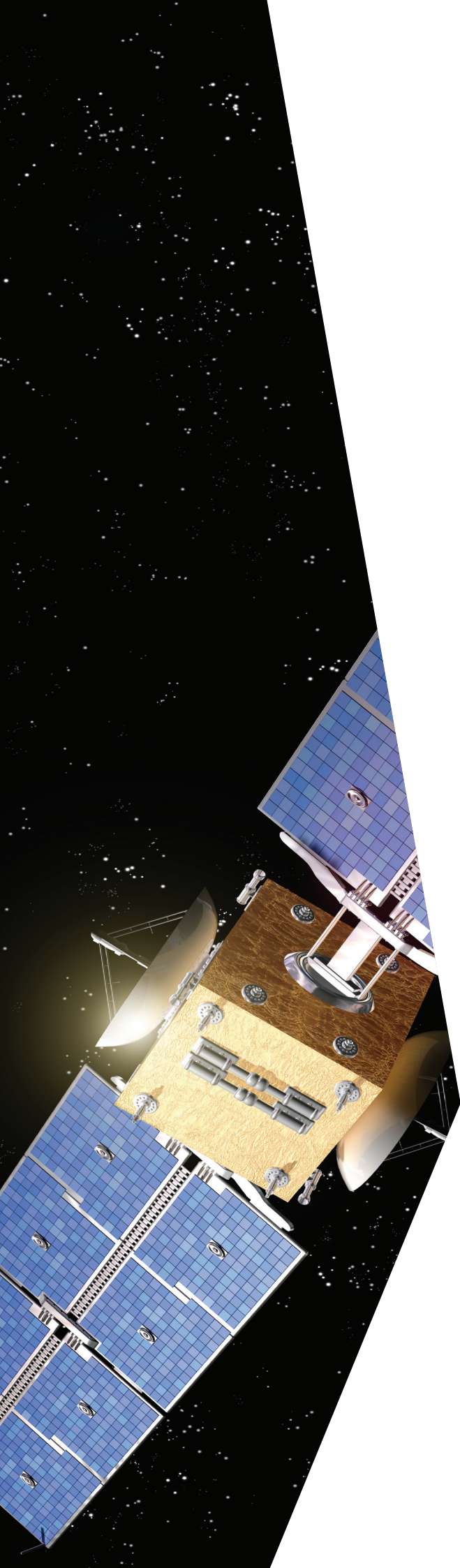




Infineon rad hard memory solutions for space applications

www.infineon.com/memory





SPACE APPLICATIONS

Radiation hardened memories

Space platforms require reliable, secure, and robust memory solutions capable of enduring harsh operating environments. These compute intensive applications put increasing demands on memory performance and density to handle the large amounts of data sourced from multiple sensors and processor nodes. Infineon's rad hard space memories are QML-V and QML-P certified, meeting space applications' reliability, performance, and life cycle demands. Our space memory solutions enhance overall system computing limits while providing Size, Weight, and Power (SWaP) benefits and greater design flexibility.

Our portfolio includes:

Volatile memories

- Quad Data Rate (QDR)[®] II+ Synchronous SRAMs
- Asynchronous SRAMs

Non-volatile memories

- Serial NOR Flash
- Serial and Parallel F-RAMs

Our HiRel space memories are used throughout satellite subsystems. Whether you're designing satellite payloads, buses, communications, or other spacecraft systems, our memories provide the highest reliability, highest performance, and superior radiation and single event effects (SEE) performance on the market.



Space

Table of contents

Product resouces summary	4
Infineon space memory portfolio	5
QDR® II+ SRAM	5
Fast async SRAM	6
F-RAM	7
RadTol NOR Flash	7
Rad hard NOR Flash	7
Where to Buy	8

SPACE APPLICATIONS

Rad hard product resources summary

Launching your space systems to new heights

Glossary

Radiation effects

- **Total Ionizing Dose (TID) Radiation:** Resistance to permanent device damage caused by exposure to ionizing radiation (gamma rays) over life of the device. A trapped positive charge can result in field device turn-on.
- **Single Event Effects (SEE):** Loss of data and possible physical device damage caused by the impact of radiation particle (heavy ions, protons, or neutrons) which may result in device latch-up where a high current state is observed.
- **Prompt Dose (PD):** Resistance to minimum 20 ns X-ray pulse that can cause data corruption as well as device latch-up.

QML-V/P and QML-Q screening

DLAM QML certification is the highest standard of reliability issued by the United States government for microcircuit devices. This certification indicates that the device can be relied upon to function properly while being subjected to the harshest of conditions.

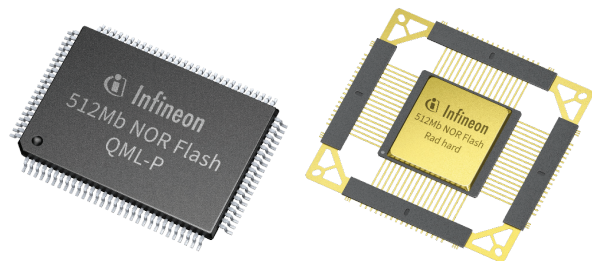
Datapack

Infineon offers the option of purchasing a datapack with all QML-certified products. This datapack tabulates data gathered during the part certification process including radiation data, read and record electrical data, and tri-temperature test data. The datapack is offered in both hard and soft copy

formats and is matched to individual part serial numbers.

Memory controller

Memory controllers are available free of charge for Xilinx Virtex V5, Kintex US as well as for Microchip RTG4 and RTPolarFire FPGA's for the RadHard 72M and 144M QDRII+ SRAM devices. The QDR-II+ SRAM controllers manage the intricate timing details of a DDR-based source synchronous timing architecture and ensure reliable data traffic between the FPGA and the QDRII+ SRAM memory. Controller embedded ECC (SECDEC) is also available as an RTL option if a higher level of radiation immunity is required to mitigate single event upsets. Please contact hirel-memory@infineon.com for a copy of the RTL code and test bench.



Infineon's 512 Mbit and 1 Gbit rad hard NOR Flash memory (pictured above) features QML certification for plastic packaging (QML-P; pictured left) and ceramic packaging (QML-V; pictured right).

Infineon space memory portfolio

QDR® II+ SRAM

The QDR synchronous SRAMs are true, high-speed cache memories that provide low latency and random memory access capability needed for high-performance applications such as on-board image processing, radar imaging payload applications, and satellite communications.

Density	Part number	Description	Operating temp range	Qual level	Product status	TID rating [krad]	SEL [LET]	SEU [err/bit.dy] Geo sync-solar min	SEFI [err/dev.dy] Geo sync-solar min	PD [Rad(Si)/s]
72 Mbit	5962F1120101VXA	72M QDR II+ x18 BURST of 2 DLAM QML V	-55°C to 125°C	QML-V	Production	300	> 120 (125°C)	< 1.34e-7	Immune 120 LET	> 2e9
72 Mbit	CYPT1542AV18-250GCMB	72M QDR II+ x18 BURST of 2 Prototype	-55°C to 125°C	Prototype	Production					
72 Mbit	5962F1120102VXA	72M QDR II+ x18 BURST of 4 DLAM QML V	-55°C to 125°C	QML-V	Production	300	> 120 (125°C)	< 1.34e-7	Immune 120 LET	> 2e9
72 Mbit	CYPT1543AV18-1X24M	72M QDR II+ Prototype Die	-55°C to 125°C	Prototype	Production					
72 Mbit	CYPT1543AV18-250GCMB	72M QDR II+ x18 BURST of 4 Prototype	-55°C to 125°C	Prototype	Production					
72 Mbit	CYRS1543AV18-1X24M	72M QDR II+ QML-V Die	-55°C to 125°C	QML-V	Production	300	> 120 (125°C)	< 1.34e-7	Immune 120 LET	> 2e9
72 Mbit	5962F1120201VXA	72M QDR II+ x36 BURST of 2 DLAM QML V	-55°C to 125°C	QML-V	Production	300	> 120 (125°C)	< 1.34e-7	Immune 120 LET	> 2e9
72 Mbit	CYPT1544AV18-250GCMB	72M QDR II+ x36 BURST of 2 Prototype	-55°C to 125°C	Prototype	Production					
72 Mbit	5962F1120202VXA	72M QDR II+ x36 BURST of 4 DLAM QML V	-55°C to 125°C	QML-V	Production	300	> 120 (125°C)	< 1.34e-7	Immune 120 LET	> 2e9
72 Mbit	CYPT1545AV18-250GCMB	72M QDR II+ x36 BURST of 4 Prototype	-55°C to 125°C	Prototype	Production					
144 Mbit	CYPT2642KV18-250GCMB	144M QDR II+ x18 BURST of 2 Prototype	-55°C to 125°C	Prototype	Production					
144 Mbit	5962R1821401VXF	144M QDR II+ x18 BURST of 2 DLAM QML V	-55°C to 125°C	QML-V	Production	200	> 120 (120°C)	< 3.34e-7	Immune 120 LET	> 1e9
144 Mbit	5962R1821402VXF	144M QDR II+ x18 BURST of 4 DLAM QML V	-55°C to 125°C	QML-V	Production	200	> 120 (120°C)	< 3.34e-7	Immune 120 LET	> 1e9
144 Mbit	CYPT2643KV18-250GCMB	144M QDR II+ x18 BURST of 4 Prototype	-55°C to 125°C	Prototype	Production					
144 Mbit	CYRS2643KV18-1X24M	144M QDR II+ QML-V Die	-55°C to 125°C	QML-V	Production	200	> 120 (120°C)	< 3.34e-7	Immune 120 LET	> 1e9
144 Mbit	CYPT2643KV18-1X24M	144M QDR II+ Prototype Die	-55°C to 125°C	QML-V	Production	200				
144 Mbit	5962R1821501VXF	144M QDR II+ x36 BURST of 2 DLAM QML V	-55°C to 125°C	QML-V	Production	200	> 120 (120°C)	< 3.34e-7	Immune 120 LET	> 1e9
144 Mbit	CYPT2644KV18-250GCMB	144M QDR II+ x36 BURST of 2 Prototype	-55°C to 125°C	Prototype	Production					
144 Mbit	5962R1821502VXF	144M QDR II+ x36 BURST of 4 DLAM QML V	-55°C to 125°C	QML-V	Production	200	>120 (120°C)	< 3.34e-7	Immune 120 LET	> 1e9
144 Mbit	CYPT2645KV18-250GCMB	144M QDR II+ x36 BURST of 4 Prototype	-55°C to 125°C	Prototype	Production					
144 Mbit	CYPT1642KV18-250GCMB	144M QDR II+ x18 BURST of 2 Prototype w/o ODT	-55°C to 125°C	Prototype	Production					
144 Mbit	5962R1821403VXF	144M QDR II+ x18 BURST of 2 DLAM QML V w/o ODT	-55°C to 125°C	QML-V	Production	200	>120 (120°C)	< 3.34e-7	Immune 120 LET	> 1e9
144 Mbit	5962R1821404VXF	144M QDR II+ x18 BURST of 4 DLAM QML V w/o ODT	-55°C to 125°C	QML-V	Production	200	>120 (120°C)	< 3.34e-7	Immune 120 LET	> 1e9
144 Mbit	CYPT1643KV18-250GCMB	144M QDR II+ x18 BURST of 4 Prototype w/o ODT	-55°C to 125°C	Prototype	Production					

QDR® II+ SRAM

Density	Part number	Description	Operating temp range	Qual level	Product status	TID rating [krad]	SEL [LET]	SEU [err/bit.dy] Geo sync-solar min	SEFI [err/dev.dy] Geo sync-solar min	PD [Rad(Si)/s]
144 Mbit	5962R1821503VXF	144M QDR II+ x36 BURST of 2 DLAM QML V w/o ODT	-55°C to 125°C	QML-V	Production	200	> 120 (120°C)	< 3.34e-7	Immune 120 LET	> 1e9
144 Mbit	CYPT1644KV18-250GCMB	144M QDR II+ x36 BURST of 2 Prototype w/o ODT	-55°C to 125°C	Prototype	Production					
144 Mbit	5962R1821504VXF	144M QDR II+ x36 BURST of 4 DLAM QML V w/o ODT	-55°C to 125°C	QML-V	Production	200	> 120 (120°C)	< 3.34e-7	Immune 120 LET	> 1e9
144 Mbit	CYPT1645KV18-250GCMB	144M QDR II+ x36 BURST of 4 Prototype w/o ODT	-55°C to 125°C	Prototype	Production					

Fast async SRAM

Our asynchronous SRAMs provide high-performance buffer support for space FPGA payload processing applications.

Density	Part number	Description	Operating temp range	Qual level	Product status	TID rating [krad]	SEL [LET]	SEU [err/bit.dy] Geo sync-solar min	SEFI [err/dev.dy] Geo sync-solar min	PD [Rad(Si)/s]
4 Mbit	5962F1123501VXC	4M Fast Asynchronous SRAM x8 DLAM QML V	-55°C to 125°C	QML-V	Production	300	> 120 (125°C)	< 5.0e-8	Immune 120 LET	> 2e9
4 Mbit	CYPT1049DV33-12FZMB	4M Fast Asynchronous SRAM x8 Prototype	-55°C to 125°C	Prototype	Production					
4 Mbit	CYRS1049DV33-1X18M	4M Fast Asynchronous SRAM DLAM QML V Die	-55°C to 125°C	QML-V	Production	300	> 120 (125°C)	< 5.0e-8	Immune 120 LET	> 2e9
4 Mbit	CYPT1049DV33-1X18M	4M Fast Asynchronous SRAM Prototype Die	-55°C to 125°C	Prototype	Production					
16 Mbit	5962R2020202VYC	16 Fast Asynchronous SRAM x8 DLAM QML V	-55°C to 125°C	QML-V	Production	200	> 60 (95°C)	< 3e-12	> 80 LET	> 1e9
16 Mbit	CYPT1069G30-10FZMB	16 Fast Asynchronous SRAM x8 Prototype	-55°C to 125°C	Prototype	Production					
16 Mbit	5962R2020201VXC	16 Fast Asynchronous SRAM x16 DLAM QML V	-55°C to 125°C	QML-V	Production	200	> 60 (95°C)	< 3e-12	> 80 LET	> 1e9
16 Mbit	CYPT1061G30-10GGMB	16 Fast Asynchronous SRAM x16 Prototype	-55°C to 125°C	Prototype	Production					

F-RAM

Our rad hard F-RAMs are well suited for data logging and calibration data storage for telemetry, command and control and payload applications, and boot code storage for microcontrollers and ASICs.

Density	Part number	Description	Operating temp range	Qual level	Product status	TID rating [krad]	SEL [LET]	SEU [err/bit.dy] Geo sync-solar min	SEFI [err/dev.dy] Geo sync-solar min	PD [Rad(Si)/s]
1 Mbit	CYPT15B101N-GGMB	1M FRAM Parallel Prototype	-55°C to 125°C	Prototype	Production					
1 Mbit	5962R231302VXC	1M FRAM Parallel DLAM QML-V	-55°C to 125°C	QML-V	Production	150	> 96 (115°C)	Immune	< 5.3e-5 (active, standby) Immune (sleep)	> 1e11 (static)
2 Mbit	CYPT15B102N-GGMB	2M FRAM Parallel Prototype	-55°C to 125°C	Prototype	Production					
2 Mbit	5962R231301VXC	2M FRAM Parallel DLAM QML-V	-55°C to 125°C	QML-V	Production	150	> 96 (115°C)	Immune	< 5.3e-5 (active, standby) Immune (sleep)	> 1e11 (static)
2 Mbit	CYPT15B102Q-GGMB	2M FRAM Serial Prototype	-55°C to 125°C	Prototype	Production					
2 Mbit	CYRS15B102Q-1X11I	2M FRAM Serial QML-V Die	Industrial	QML-V	Production	150	> 114 (115°C)	Immune	< 1.34e-4 (active/standby) < 5.88e-8 (sleep)	> 1e11 (static)
2 Mbit	5962R1821601VXC	2M FRAM Serial DLAM QML-V	-55°C to 125°C	QML-V	Production	150	> 114 (115°C)	Immune	< 1.34e-4 (active/standby) < 5.88e-8 (sleep)	> 1e11 (static)

RadTol NOR Flash

Our rad tolerant QSPI NOR Flash family offers reliability, flexibility, and performance well beyond ordinary serial flash devices and are ideal for systems with limited space, signal connections, and power.

Density	Part number	Description	Operating temp range	Qual level	Product status	TID rating [krad]	SEL [LET]	SEU [err/bit.dy] Geo sync-solar min	SEFI [err/dev.dy] Geo sync-solar min	PD [Rad(Si)/s]
256 Mbit	CYRS16B256-133FZMB	256M Serial NOR Flash QSPI	-55°C to 125°C	QML-V Equivalent	Production	30 /125 biased/unbiased	> 60 (85°C)	< 1e-16	Immune 60 LET	TBD
256 Mbit	CYPT16B256-133FZMB	256M Serial NOR Flash QSPI	-55°C to 125°C	Prototype	Production					
512 Mbit	CYRS16B512-133FZMB	512M Serial NOR Flash Dual QSPI	-55°C to 125°C	QML-V Equivalent	Production	30 /125 biased/unbiased	> 60 (85°C)	< 1e-16	Immune 60 LET	TBD
512 Mbit	CYPT16B512-133FZMB	512M Serial NOR Flash Dual QSPI	-55°C to 125°C	Prototype	Production					

Rad hard NOR Flash

Our rad hard QSPI NOR Flash is ideal for space FPGA boot configuration and FPGA data storage for compute-intensive processing where flexibility and high performance have become stringent requirements.

Density	Part number	Description	Operating temp range	Qual level	Product status	TID rating [krad]	SEL [LET]	SEU [err/bit.dy] Geo sync-solar min	SEFI [err/dev.dy] Geo sync-solar min	PD [Rad(Si)/s]
512 Mbit	CYRS17B512-133UZMB	512M Serial NOR Flash QSPI, 68-pin CQFP	-55°C to 125°C	QML-V	Production	300	> 80 (125°C)	Immune	<2.77e-5	> 6e10 (static)
512 Mbit	5962F2122202VYC	512M Serial NOR Flash QSPI 68-pin CQFP	-55°C to 125°C	QML-V	Production	300	> 80 (125°C)	Immune	<2.77e-5	> 6e10 (static)
512 Mbit	CYPT17B512-133UZMB	512M Serial NOR Flash QSPI, 68-pin CQFP	-55°C to 125°C	PROTOTYPE	Production					
512 Mbit	CYRS17B512-133AZMB	512Mb Serial NOR Flash QSPI, 100-pin TQFP	-55°C to 125°C	QML-V	Production	300	> 80 (125°C)	Immune	<2.77e-5	> 6e10 (static)
512 Mbit	5962F2122201PXE	512Mb Serial NOR Flash QSPI, 100-pin TQFP	-55°C to 125°C	QML-V	Production	300	> 80 (125°C)	Immune	<2.77e-5	> 6e10 (static)
512 Mbit	CYPT17B512-133AZMB	512Mb Serial NOR Flash QSPI, 100-pin TQFP	-55°C to 125°C	PROTOTYPE	Production					
1 Gbit	CYRS17B01G-133UZMB	1Gbit Serial NOR Flash QSPI, 68-pin CQFP	-55°C to 125°C	QML-V	2025	300	> 80 (125°C)	Immune	<2.77e-5	> 6e10 (static)
1 Gbit	CYPT17B01G-133UZMB	1Gbit Serial NOR Flash QSPI, 68-pin CQFP	-55°C to 125°C	PROTOTYPE	2025					
1 Gbit	CYRS17B01G-133AZMB	1Gbit Serial NOR Flash QSPI, 100-pin TQFP	-55°C to 125°C	QML-P	2025	300	> 80 (125°C)	Immune	<2.77e-5	> 6e10 (static)
1 Gbit	CYPT17B01G-133AZMB	1Gbit Serial NOR Flash QSPI, 100-pin TQFP	-55°C to 125°C	PROTOTYPE	2025					

Where to Buy

Infineon distribution partners and sales offices:

www.infineon.com/WhereToBuy

Service Hotline

Infineon offers its toll-free **0800/4001** service hotline as one central number, available 24/7 in English, Mandarin and German.

Germany	0800 951 951 951 (German/English)
India	000 800 4402 951 (English)
USA	1-866 951 9519 (English/German)
Other countries	00* 800 951 951 951 (English/German)
Direct access	+49 89 234-0 (interconnection fee, German/English)

* Please note: Some countries may require you to dial a code other than “00” to access this international number, please visit www.infineon.com/service for your country!



www.infineon.com/hirel

Published by
International Rectifier HiRel Products, Inc.
An Infineon Technologies Company
El Segundo, California 90245 USA

© 2025 Infineon Technologies AG
All rights reserved.

Public
Date: 01/2025

Please note!

This Document is for information purposes only and any information given herein shall in no event be regarded as a warranty, guarantee or description of any functionality, conditions and/or quality of our products or any suitability for a particular purpose. With regard to the technical specifications of our products, we kindly ask you to refer to the relevant product data sheets provided by us. Our customers and their technical departments are required to evaluate the suitability of our products for the intended application.

We reserve the right to change this document and/or the information given herein at any time.

Additional information

For further information on technologies, our products, the application of our products, delivery terms and conditions and/or prices, please contact your nearest Infineon Technologies office (www.infineon.com).

Warnings

Due to technical requirements, our products may contain dangerous substances. For information on the types in question, please contact your nearest Infineon Technologies office.

Infineon Technologies Components may only be used in life-support devices or systems with the expressed written approval of Infineon Technologies, if a failure of such components can reasonably be expected to cause the failure of that life-support device or system, or to affect the safety or effectiveness of that device or system.

Life support devices or systems are intended to be implanted in the human body, or to support and/or maintain and sustain and/or protect human life. If they fail, it is reasonable to assume that the health of the user or other persons may be endangered.