

Product Overview

DARE22G I/O library provides a comprehensive set of radiation-hardened I/O cells for the implementation of 1.8 V and 3.3 V mixed-signal I/O rings in the commercial GF 22 nm FDSOI CMOS technology.

Radiation Hardening

DARE22G I/O cells exploit the intrinsic SEL immunity of the FDSOI process in combination with various radiation-hardening-by-design (RHBD) techniques to mitigate TID and single-event effects.

Library Cells

DARE22G I/O library combines 1.8 V and 3.3 V domain cells. Special adapter breaker cells enable the integration of 1.8 V and 3.3 V interface domains in a single I/O ring.

Cold-Spare 1.8 V I/O Cells

- Analog I/O cells
- Programmable digital I/O cells
- Back-gate biasing supply cells
- Power-on control cells
- Core and I/O supply cells
- Isolated core and I/O supply cells
- Full and partial domain breaker cells
- Corner and filler cells

3.3 V I/O Cells

- Programmable digital I/O cells
- Power-on control cells
- Full domain breaker cells
- 1.8 V domain adapter cells
- Corner and filler cells

Operating Conditions

Performance and reliability are not guaranteed outside these recommended operating boundaries.

Parameter	Name	Minimum	Typical	Maximum	Unit
Core supply voltage	V _{DD0V8}	0.72	0.8	0.88	V
I/O supply voltage					
- 1.8 V I/O domain	V _{DD1V8}	1.62	1.8	1.98	V
- 3.3 V I/O domain	V _{DD3V3}	2.97	3.3	3.63	V
I/O voltage	V _{I/O}				
- 1.8 V I/O domain		-0.3		1.98	V
- 3.3 V I/O domain		-0.3		3.63	V
Operating temperature	T _j	-40	25	125	°C
ESD rating (HBM)	V _{HBM}	2			kV
TID threshold	TID _{th}	100			krad (SiO ₂)
LET threshold (SET)	LET _{th_SET}	60			MeV.cm ² /mg
LET threshold (SEL)	LET _{th_SEL}	70			MeV.cm ² /mg

Features

Main features include:

- Pad-limited fixed-height narrow layout
- 1.8 & 3.3 V I/O supply voltage
- CMOS/LVTTL compatibility
- Multi-domain enablement
- Programmable digital I/O cells
- Cold-spare functionality (1.8 V cells only)
- Horizontal and vertical placement support
- Inline and staggered pad arrangement support
- Distributed power-on control
- 2 kV ESD protection (HBM)
- TID immunity over 100 krad (SiO₂)
- SET immunity over 60 MeV.cm²/mg
- SEL immunity over 70 MeV.cm²/mg

Physical Dimensions

DARE22G I/O cells are implemented in a pad-limited fixed-height narrow layout construction that can accommodate high pin counts with inline or staggered pad arrangements.

Parameter	Value
Pad arrangement	inline/staggered
Cell height	89 µm
Cell width	0.5 ~ 60 µm
Cell placement grid	0.5 µm

Contact

For further information, please contact us at dare@imec.be