

Radiation Tolerant Technologies

Flexible solutions for Aerospace, Military and Medical applications

With the wealth of more than 20 years serving the High Reliability markets, MHS is committed to building long-term relationships with its customers. MHS offers mature technologies (in a production status for more than 8 years and initially developed with the expert support of the CNES - French National Space Center).

Their performance and reliability are time-proven, as numerous products have been produced for different customers and applications in the High Reliability markets.

MHS's SCMOS3RT is a radiation-tolerant 0.5 μm mixed-signal CMOS technology with different process options, including analog devices, and two levels of radiation tolerance (60 krad or 300 krad @VCC=5.5V, total dose tolerance is higher for lower supply voltages).

The mixed-signal process offers the UNIQUE opportunity for designing full-custom complex ICs, with the support of a complete CADENCE Design Kit.

The technology processes are based on thin-epitaxial layer silicon substrates, and include specific steps for radiation tolerance enhancement. The 60 krad option is fully topological rules compatible with non-RT technology, with the same component integration. The 300 krad option offers a specific NMOS transistor with a small impact in terms of integration.

Products based on MHS's SCMOS3RT processes have shown SEL tolerance higher than 70 MeV/mg/cm².

SCMOS3RT Devices Key Parameters

LOW VOLTAGE CMOS TRANSISTORS

DEVICE	PARAMETER	UNIT	TYPICAL
CMOS	VCC	V	3 or 5
NMOS 60 krad option, Lmin	VT	V	0.67
NMOS 60 krad option, Lmin	IDSAT	$\mu\text{A}/\mu\text{m}$ @5V	580
NMOS 300 krad option, Lmin	VT	V	0.67
NMOS 300 krad option, Lmin	IDSAT	$\mu\text{A}/\mu\text{m}$ @5V	620
PMOS (both options), Lmin	VT	V	-0.65
PMOS (both options), Lmin	IDSAT	$\mu\text{A}/\mu\text{m}$ @5V	350



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PASSIVE DEVICES

DEVICE	PARAMETER	UNIT	TYPICAL
Interpoly capacitor	Capacitance	fF/μm ²	1.25
Nwell resistor	Resistance	Ohms/square	560
Poly1 Unsalicided resistor 60K 300K	Resistance	Ohms/square	250 130
High Value Resistor 1K	Resistance	Ohms/square	1 000

Full Custom Mixed-Signal Design Kit

A CADENCE® professional Design Kit environment is available consisting of:

- Physical Design Kit (PDK) including P-Cells of all the devices
- DIVA™ DRC, LVS verification files, Mentor CALIBRE™ DRC verification files
- Typical and worst cases models, including total dose radiation effects BSIM3V3 and EKV Model parameter sets for MOS transistors and Gummel Pool SPICE™ for bipolar transistors
- Models are available for ELDO™ and SPECTRE™
- Design Rules (Topological, Electrical) and comparison between measurements and simulations
- Standard Cell Libraries (Option 60 krad, Option 300 krad) characterized for VCC = 3 and 5V, and temperature = -55, 25, and 125 °C
- Pad Libraries, including ESD protection structures
- Application notes and tutorials

Special attention has been paid by the MHS Characterization team to enhance the model's quality and contents. This modeling effort includes matching, 1/f noise, voltage and temperature behavior as well as corner cases and Monte-Carlo parameters.

