Rad hard 65nm CMOS technology platform for space applications

**Features**

**Process**
- STMicroelectronics C65SPACE (65nm CMOS)
- 3.3V IO gate oxide GO2 (5nm)
- 1.2V core gate oxide GO1 (1.8nm), triple VT transistors
- 7 copper metallization, 5 thin and 2 thick
- Low-K inter-metallic dielectrics for thin metal layers
- High density SRAMs
- Compatible with flip-chip and wire bonding packaging

**Radiations**
- SEL-free up to LET = 60MeV/mg/cm² at 125°C Tj and Vdd max
- SEE hardened library
- Tested up to a total dose of 300 krad (Si)

**Reliability**
- Library cells models with 20 years aging
- Transistor models including aging alteration
- ESD better than:
  - 2kV in HBM (Class 2 / MIL-STD-883H)
  - 150V in MM
  - 250V in CDM

**Library offer**
- Comprehensive library of standard logic with PVT and aging corners models
- IO pad libraries provide interfaces at 3.3V +/- 0.30V, 2.5V/-0.25V and 1.8V +/-0.15V
- High speed IO Pad LVDS supplied at 2.5V +/- 0.25V up to 650Mbps
- Cold sparing IOs with single/double row support
- Memories generation: single port SRAM, ROM, Dual port SRAMs, BIST library, EDAC library
- Wide-range PLLs 1.2GHz with multi-phase outputs
- 6.25Gbit/s high speed serial links (HSSL)

**Design flow**
- An ST customized design flow (RTL to GDS) invoking commercial solutions (Synopsys, Cadence, Mentor…) is available for partners and certified design houses:
  - Front-End kit from RTL to gates based
  - SiPKit for IO ring generation
  - FFKit for place and route
  - SignOffKit for final verification before tape-out
- For customer owned tools (COT) flow, ST provides the C65SPACE design platform along with the DRM and sign-off kit.

**Description**
The C65SPACE is fabricated on a proprietary 65nm, 7 metal layers CMOS process intended for use with a core voltage of 1.2V ±0.10V. The ST standard-cells, memories and PLL have been designed and characterized to be compatible with each other.
1 Model conditions

The different model conditions are defined as described in Table 1.

<table>
<thead>
<tr>
<th>Process</th>
<th>Voltage</th>
<th>Tj</th>
<th>Aging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal</td>
<td>1.2V</td>
<td>25°C</td>
<td>Fresh</td>
</tr>
<tr>
<td>Slow</td>
<td>1.1V</td>
<td>-40°C</td>
<td>Fresh</td>
</tr>
<tr>
<td></td>
<td></td>
<td>125°C</td>
<td>Fresh</td>
</tr>
<tr>
<td>Fast</td>
<td>1.3V</td>
<td>125°C</td>
<td>Fresh</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-40°C</td>
<td>Fresh</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>20 years</td>
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2 Revision history

<table>
<thead>
<tr>
<th>Date</th>
<th>Revision</th>
<th>Changes</th>
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</thead>
<tbody>
<tr>
<td>02-Feb-2015</td>
<td>1</td>
<td>Initial release.</td>
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