

## Libraries

| Name                        | Process | Form Factor   |
|-----------------------------|---------|---------------|
| RGO_SMG28_18V33_FDS_20C_I2C | FD-SOI  | Staggered CUP |

## Summary

The I2C library provides open-drain bi-directional I/O cells designed for the I<sup>2</sup>C two-line interface. It is compliant with the I<sup>2</sup>C-bus specification – UMC10204 I<sup>2</sup>C-bus specification and user manual, Rev.4 – 13 February 2012, NXP.

The design supports the Sm, Fm and Hs modes of operation at the I<sup>2</sup>C bus operating voltage (VDDP) of extended range 3.3V.

This 28nm library is available in a staggered CUP wire bond implementation.

The library includes the POC and VREF cells needed to use the I2C cell. An additional library is required – 3.3V Support: Power. That library contains the power cells and a rail splitter to isolate the I2C cells in their own power domain if desired. It also contains an input-only buffer, isolated analog I/O, and a full complement of power cells along with corner and spacer cells to assemble a functional pad ring by abutment. The rail splitter allows multiple power domains to be isolated in the same pad ring while maintaining continuous VDD/VSS for robust ESD protection.

### ESD Protection:

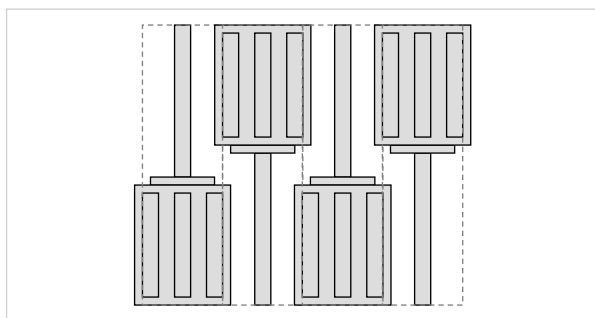
- JEDEC compliant
  - 2KV ESD Human Body Model (HBM)
  - 500 V ESD Charge Device Model (CDM)

### Latch-up Immunity:

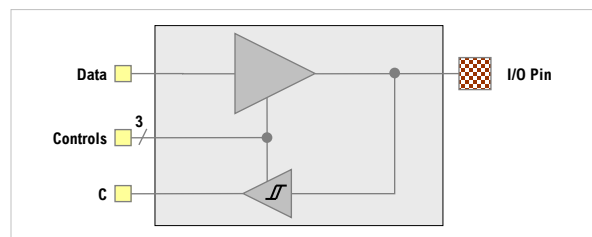
- JEDEC compliant
  - Tested to I-Test criteria of  $\pm 100\text{mA}$  @ 125°C

## Cell Size & Form Factor

Staggered (pad-limited) – 40 $\mu\text{m}$  x 127 $\mu\text{m}$



## I2P\_ON\_003\_33V\_NC



## Product Features

- Supported I2C operating modes:
  - Standard-mode (Sm) – 100 Kbps data rate
  - Fast mode (Fm) – 400 Kbps data rate
  - High speed mode (Hs) – 3.4 Mbps data rate
- Open drain operation only
- Built-in output slew rate control to meet I<sup>2</sup>C T<sub>of</sub> minimum of (20 x VDDP/5.5V) ns
- Output enable
- Receiver enable
- ESD protection is accomplished with an SCR (no diode to the positive power supply)
- Standard LVCMOS compatible inputs with Schmitt trigger (hysteresis) option
- Power-on sequencing independent design with Power-On Control
- I/O power (DVDD) = 2.7V to 3.63V
- Output pull-up power (VDDP) = 2.7V to 3.63V (limited to V<sub>DVDD</sub>)
- The circuit consumes no DC supply current in the static state

An open-drain design, this cell requires an external pull-up resistor to a high voltage power supply. The pull-up power supply (VDDP) can be 3.63V maximum, independent of, but limited to, the I/O cell power supply (DVDD). The sizing of the external resistor is application dependent and can range from 1.1 K $\Omega$  to 40 K $\Omega$ .

## Recommended operating conditions

| Description                                      | Min                     | Nom | Max               | Units |
|--|-------------------------|-----|-------------------|-------|
| V <sub>DVDD</sub> I/O supply voltage             | 2.70                    | 3.3 | 3.63              | V     |
| V <sub>VDDP</sub> External pull-up supply to PAD | 2.70                    |     | V <sub>DVDD</sub> | V     |
| V <sub>VDD</sub> Core supply voltage             | 0.90                    | 1.0 | 1.10              | V     |
|  | 0.99                    | 1.1 | 1.155             | V     |
| T <sub>J</sub> Junction temperature              | -40                     | 25  | 125               | °C    |
| V <sub>PAD</sub> Voltage at PAD                  | V <sub>DVSS</sub> – 0.3 | -   | V <sub>DVDD</sub> | V     |

## Characterization Corners

| Nominal VDD       | Model | VDD     | DVDD <sup>[1]</sup> | Temperature |
|-------------------|-------|---------|---------------------|-------------|
| 1.0V              | FF    | +10%    | +10%                | -40°C       |
|                   | FF    | +10%    | +10%                | 125°C       |
|                   | FF    | +10%    | +10%                | 85°C        |
|                   | FF    | +10%    | +10%                | 0°C         |
|                   | TT    | nominal | nominal             | 25°C        |
|                   | SS    | -10%    | -10%                | 0°C         |
|                   | SS    | -10%    | -10%                | 85°C        |
|                   | SS    | -10%    | -10%                | -40°C       |
|                   | SS    | -10%    | -10%                | 125°C       |
| 1.1V<br>Overdrive | FF    | +5%     | +10%                | -40°C       |
|                   | FF    | +5%     | +10%                | 125°C       |
|                   | FF    | +5%     | +10%                | 85°C        |
|                   | FF    | +5%     | +10%                | 0°C         |
|                   | TT    | nominal | nominal             | 25°C        |
|                   | SS    | -10%    | -10%                | 0°C         |
|                   | SS    | -10%    | -10%                | 85°C        |
|                   | SS    | -10%    | -10%                | -40°C       |
|                   | SS    | -10%    | -10%                | 125°C       |

[1] DVDD = 3.0 & 3.3V

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