

1.8V/3.3V SWITCHABLE GPIO WITH 3.3V I2C OPEN DRAIN & ANALOG IN TSMC 22nm TECHNOLOGY



A TSMC 22nm Wirebond / Flip-Chip IO library with dynamically switchable 1.8V/3.3V GPIO, 3.3V I2C open-drain, 3.3V analog cell and associated ESD.

SUMMARY

A key attribute of this library is its ability to detect and dynamically adjust to a VDDIO supply of 1.8V or 3.3V during system operation. The GPIO cell set can be configured as input, output, open-source, or open-drain with an optional internal 60K ohm pull-up or pull-down resistor. Cells for IO & core power & ground with built-in ESD circuitry are included. Digital cells for 25MHz, 75MHz, and 150MHz allow optimization across SSO currents & power. A 3.3V I2C open-drain (fail-safe) and a 3.3V analog cell with ESD protection are included. The library is enriched with feed-through, filler, transition and domain-break cells to allow for flexible pad ring construction while maintaining ESD robustness. ESD targets are 2KV HBM / 500V CDM with 2KV IEC 61000-4-2 system stress capability.

OPERATING CONDITIONS

Parameter	Value
VDDIO	1.8 / 3.3V selectable
VREF	1.8V
Core VDD	0.9V
Tj	-40°C to 125°C
Max_Load ¹	50pF (10pF at speed)

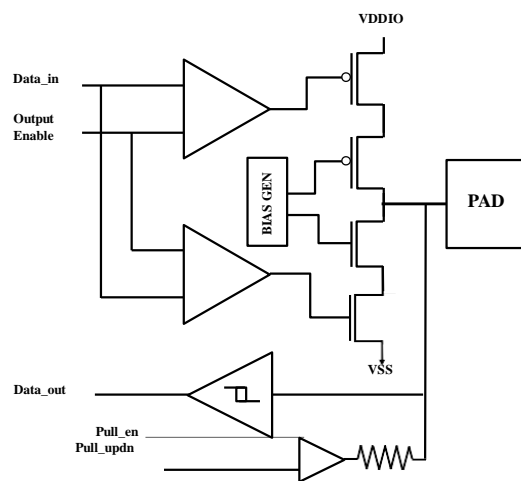
CELL SIZE & METAL STACK

Cell size	Metal Stack	Wirebond Pitch
55x81um	8M_5x2r	55um single

LIBRARY CELL SUMMARY

Cell Type	Feature
Supply / ESD	1.8/3.3V; 1.8V; 0.9V; GND
GPIO ¹	25, 75, 150 MHz, fail safe
I2C open-drain ²	3.3V, fail-safe
Analog	3.3V
Break cells	VDDIO, VDD, VSS
Filler cells	1um, 5um
Transition	Bridge to TSMC IOs

GPIO BLOCK DIAGRAM



GPIO FEATURES

- Multi-voltage 1.8V / 3.3V switchable operation
- 25MHz, 75MHz, & 150MHz GPIO¹ speed options
- Full-speed output enable
- Independent power sequencing
- Shorted output protection
- Schmitt trigger receiver
- 60KΩ selectable pull-up or pull-down resistor
- ESD: 2KV HBM, 500V CDM³, 2KV IEC 61000-4-2⁴

Certus also supports IO libraries in the following TSMC nodes: 180nm, 130nm, 110nm, 65nm, 55nm, 45/40nm, 28nm, and 16/12nm. Additional Certus libraries are available across technologies supported by Global Foundries & Samsung. Certus is particularly suited at providing custom variants in a cost-efficient framework. Feel free to inquire for supplementary physical or electrical features to suit your needs.

1. GPIO speeds are load dependent (faster for lighter loads, slower for heavier). Speeds shown are at 10pF.
2. Open drain cell is I2C, SMBus, DDC, CEC, & HPD compliant.
3. CDM rating is a function of package size. Rating shown is for nominal packages.
4. Please contact a Certus representative for IEC 62100-4-2 protection levels achievable with your design.