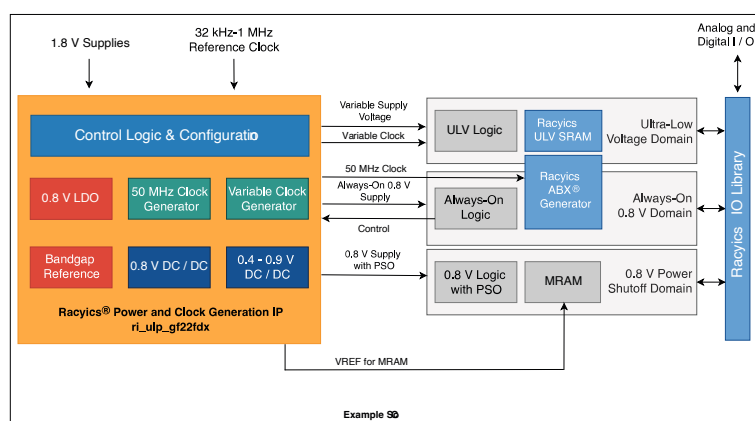


### DESCRIPTION

Tightly integrated power management platform with a soft-IP wrapper around Analog / Mixed-Signal hard macros which generate all supply voltages and clock signals needed to run highly efficient SoCs in GlobalFoundries 22FDX. Running from only one supply voltage and reference clock, the IP generates its own internal supplies and references, and those needed to run the **Racyics ABX® Generator**. With a simple digital interface, and a comprehensive register file for configuration, the IP simplifies chip power management and can be customized to a wide range of applications.

### INTEGRATION EXAMPLE



### KEY FACTS

#### Supply and Reference Voltages

- ▶ 0.8 V supplies for always-on logic and a power-shutoff domain
- ▶ Seamless switching between LDO and DC / DC converter for fast startup and high efficiency
- ▶ Variable 0.4 to 0.9 V supply for additional power domains supporting up to 250 mA load current
- ▶ 0.6 V voltage reference for MRAM

#### Clock Generation

- ▶ Ultra-low power 50 MHz clock generator
- ▶ Variable-frequency PLL clock generator with a wide frequency range reaching up to 500 MHz

#### Control Logic

- ▶ Simple handshake protocol for selecting IP operation modes with different power and clock generation settings
- ▶ APB interface and explicit inputs for detailed configuration of each sub-block
- ▶ Reference clock failure detection and handling for safe shutdown of high-current circuits

### DESIGN VIEWS

- ▶ APL views for EMIR analysis
- ▶ Datasheet with integration guidelines
- ▶ GDSII layout
- ▶ LEF abstract
- ▶ .lib / .db timing
- ▶ LVS netlist
- ▶ Verilog simulation models
- ▶ Synthesizable controller RTL with implementation constraints

### IP SPECIFICATION

IP	Description	Power typ. 25 °C / max. 125 °C	Area
ri_bgr_gf22fdx_ulp	Voltage reference with buffered 0.6 V reference for MRAM and 0.4 V and 0.6 V references for power and clock generation	30 / 43 µW without buffer 59 / 84 µW with buffer enabled	165 x 95 µm <sup>2</sup>
ri_ldo_gf22fdx	LDO regulator for generating 0.8 V from 1.8 V for fast start-up	10 nW / 1 µW disabled 38 / 62 µW enabled	50 x 60 µm <sup>2</sup>
ri_dcdc_gf22fdx_buck	DC / DC converter for generating 0.4-0.9 V from 1.8 V	up to 95 % conversion efficiency < 3 µW / < 30 µW disabled 36 µW / 85 µW enabled	180 x 80 µm <sup>2</sup>
ri_clkgen_gf22fdx_50m	Ultra-low power 50 MHz FLL clock generator	1 / 20 µW disabled 10 / 30 µW enabled	50 x 40 µm <sup>2</sup>
ri_adpll_gf22fdx_500m	200 to 500 MHz PLL clock generator	75 / 170 µW at 200 MHz running from 10 MHz 125 / 240 µW at 500 MHz running from 10 MHz	60 x 70 µm <sup>2</sup>
ri_ulp_gf22fdx	Digital soft-IP wrapper for IP control and configuration with APB interface and register file		10 000 NAND gate equivalents



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