

Libraries

Name	Process	Form Factor
RGO_GF40_25V5_LP_20C_FT	LP	Staggered CUP
RGO_GF40_25V5_LP_40C_FT	LP	Inline CUP

Summary

The 5V GPIO FT library provides general purpose bidirectional I/O cells that are fault tolerant. These programmable, multi-voltage I/O's give the system designer the flexibility to design to a wide range of performance targets. The library also contains a fault tolerant VREF cell required for proper operation of the 5V fault tolerant cells.

This 40nm library is available in both staggered CUP and inline CUP wire bond implementations with a staggered flip chip option.

To design an operational I/O power domain with these cells, an additional library is required – 5V GPIO. That library contains a full complement of cells to support the assembly of a functional pad ring by abutment. That set includes an input-only buffer, isolated analog I/O, and power / ground cells along with corner and spacer cells. An included 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)
 - 200V ESD Machine Model (MM)
 - 500V ESD Charge Device Model (CDM)

Latch-up Immunity:

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

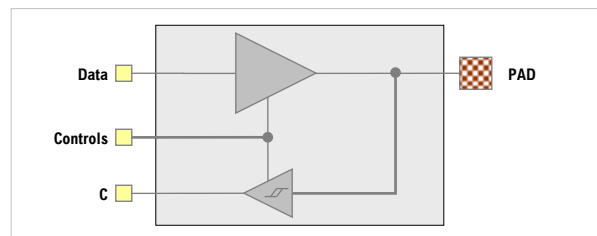
Cell Size & Form Factor

- Staggered (pad-limited) – $45\mu\text{m} \times 200\mu\text{m}$
- Inline (core-limited) – $65\mu\text{m} \times 140\mu\text{m}$

Recommended operating conditions

Description	Min	Nom	Max	Units
V_{VDD} Core supply voltage	0.90	1.0	1.10	V
	0.99	1.1	1.21	V
V_{DVDD} I/O supply voltage	1.08	1.2	1.26	V
	4.5	5.0	5.5	V
T_{J} Junction temperature	-40	25	175	$^\circ\text{C}$
V_{PAD} Voltage at PAD	$V_{\text{DVSS}} - 0.3$	-	$V_{\text{DVDD}} + 0.3$	V

FRx_BI_SDS_5V_STB



Bidirectional GPIO Driver Features

- Fault tolerant - no current flow when $DVDD = 0\text{V}$ at $V_{\text{PAD}} \leq 5.5\text{V}$
- 5V operation
- LVCMOS / LVTTTL input with selectable hysteresis
- Programmable drive strength (rated 2mA to 12mA)
- Selectable output slew rate
- Optimized for EMC with SSO factor of 8
- Open-drain output mode
- Programmable input options (hi-Z/pull-up/pull-down/repeater)
- Power sequencing independent design with Power-On Control

In full-drive mode, this driver can operate to frequencies in excess of 100MHz with 15pF external load and 125 MHz with 10pF load. Actual frequency limits are load and system dependent. A maximum of 200 MHz can be achieved under small capacitive loads.

Characterization Corners

Nominal VDD	Model	VDD	DVDD = 5V	Temperature
1.2	FF	+5%	+10%	-40 $^\circ\text{C}$
	FFF	+5%	+10%	125 $^\circ\text{C}$
	FFF	+5%	+10%	150 $^\circ\text{C}$
	FFF	+5%	+10%	175 $^\circ\text{C}$
	TT	nominal	nominal	25 $^\circ\text{C}$
	SS	-10%	-10%	-40 $^\circ\text{C}$
	SS	-10%	-10%	125 $^\circ\text{C}$
	SS	-10%	-10%	150 $^\circ\text{C}$
	SS	-10%	-10%	175 $^\circ\text{C}$
	1.1 / 1.0	FF	+10%	+10%
FFF		+10%	+10%	125 $^\circ\text{C}$
FFF		+10%	+10%	150 $^\circ\text{C}$
FFF		+10%	+10%	175 $^\circ\text{C}$
TT		nominal	nominal	25 $^\circ\text{C}$
SS		-10%	-10%	-40 $^\circ\text{C}$
SS		-10%	-10%	125 $^\circ\text{C}$
SS		-10%	-10%	150 $^\circ\text{C}$
SS		-10%	-10%	175 $^\circ\text{C}$

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