

## Libraries

Name	Process	Form Factor
RGO_TSMC07_18V33_7FF_UN_ESD	7FF	Core-placeable

## Summary

The ESD Protection library provides ESD protection components. In addition to core-placeable ESD protection cells, discrete components (RF diodes and SCR's) are provided to enable construction of a custom ESD protection solution.

This library is compatible with all 7nm library offerings.

### ESD Protection:

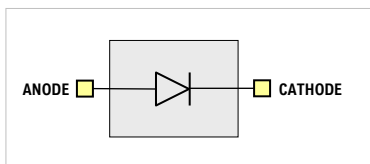
- JEDEC compliant
  - 2KV ESD Human Body Model (HBM)
  - 500 V ESD Charge Device Model (CDM)

### Latch-up Immunity:

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

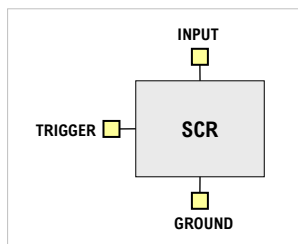
## RF Diodes

A set of PPLUS\_NWELL\_DIODE RF diodes provide minimum capacitance for RF applications and high current handling capability for good ESD protection.

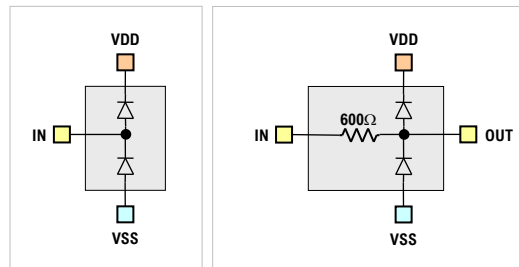


## Silicon-Controlled Rectifiers (SCR)

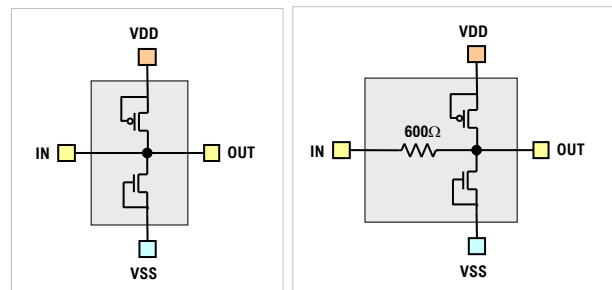
A set of P+ to Nwell SCR discrete components provide the lowest capacitance with the highest ESD protection. These components have been used in I/O pads to demonstrate over 6KV ESD protection.



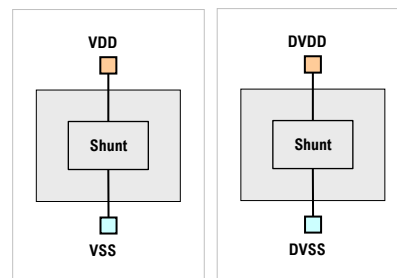
## Diode-Based Protection



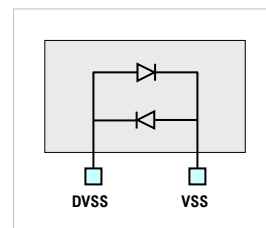
## FET-Based Protection



## RC Shunts – Core & I/O Domain



## Back-To-Back Diodes - Ground



# TSMC 07: ESD Protection



## Recommended operating conditions

Description	Min	Nom	Max	Units
V <sub>VDD</sub> Core supply voltage	0.675	0.75	0.825	V
	0.765	0.85	0.935	V
	2.97	3.3	3.63	V
V <sub>DVDD</sub> I/O supply voltage	2.25	2.5	2.75	V
	1.62	1.8	1.98	V
	1.08	1.2	1.32	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> +0.3	V

## Characterization Corners \*

Model	LPE Type	VDD [1]	DVDD [2]	Temp
FF	Cbest_CCbest	+10%	+10%	-40°C
FF	Cbest_CCbest	+10%	+10%	125°C
TT	Ctypical	nominal	nominal	25°C
TT	Ctypical	nominal	nominal	85°C
SS	Cworst_CCworst	-10%	-10%	-40°C
SS	Cworst_CCworst	-10%	-10%	125°C

[1] VDD = 0.75V & 0.85V

[2] DVDD = 1.2V, 1.8V, 2.5V & 3.3V

\* PRELIMINARY

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Published by:

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Printed in the United States of America