



Data sheet

## **ESD clamps for 180nm**

On-chip ESD protection clamps for  
TSMC 180nm CMOS technology

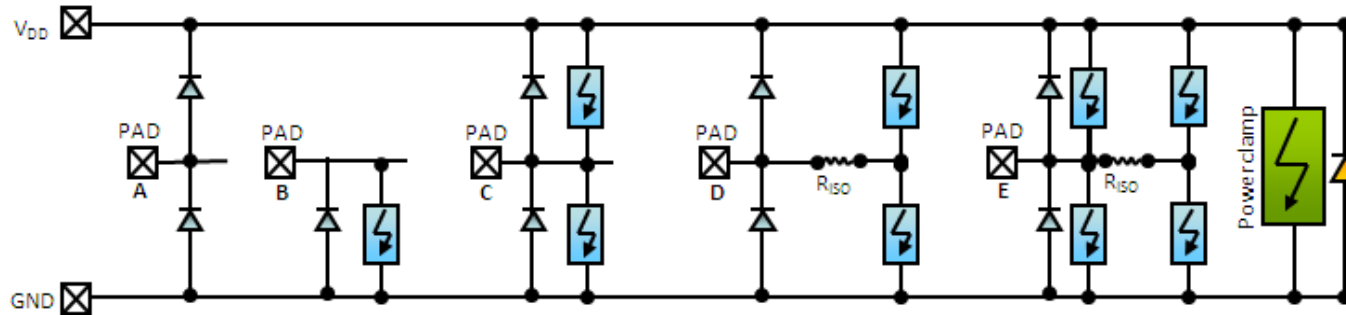
Sofics has verified its TakeCharge ESD protection clamps on technology nodes between 0.25um CMOS down to 28nm across various fabs and foundries. The ESD clamps are silicon and product proven in more than 1500 mass produced IC-products. The cells provide competitive advantage through improved yield, reduced silicon footprint and enable advanced multimedia and wireless interfaces like HDMI, USB 3.0, SATA, WIFI, GPS and Bluetooth.

The devices described in this document can be used for the protection of various voltage domains and interfaces in TSMC 180nm CMOS technology.

## ESD protection clamps for TSMC 180nm CMOS technology

The following tables provide an overview of the Sofics ESD clamps verified on silicon. The cells can be easily adapted for other ESD protection levels and can be further customized to ensure compatibility with specific metal schemes and IO pitch. Cells for other voltage domains can be provided as well. In many cases devices verified in one foundry can be ported to another foundry. Please discuss your specific requirement with our sales person at [bd@sofics.com](mailto:bd@sofics.com).

The Sofics ESD cells cover all types of protection concepts and approaches as detailed in the figure below.



Different pad types available in the solution set from Sofics. For each power domain a power clamp is available. For the IO's several pad-types exist.

Process	Voltage domain	Clamp type Datasheet name	footprint	Leakage	Junction capacitance	ESD performance	Vt1	Info
TSMC 180nmG	1.8V	power clamp DS-TS180G-PC1V8	<3000um <sup>2</sup>	<200pA	0	5.5 kV HBM 200 V MM	2.75	
TSMC 180nmG	1.8V	A clamp DS-TS180G-A1V8	<1000um <sup>2</sup>	<200pA	159	5.5 kV HBM 200 V MM	Depends on power clamp	Dual diode protection
TSMC 180nmG	1.8V	B clamp DS-TS180G-B1V8I	<1800um <sup>2</sup>	<200pA	295.58	5.5 kV HBM 200 V MM	6.3	Overshoot tolerant
TSMC 180nmG	1.8V	C clamp DS-TS180G-C1V8I	<3600um <sup>2</sup>	<200pA	295.58	5.5 kV HBM 200 V MM	6.3	Full local protection
TSMC 180nmG	1.8V	B clamp DS-TS180G-B1V8-RC	<2200um <sup>2</sup>	<200pA	266	5.5 kV HBM 200 V MM	2	Overshoot tolerant

**Data sheet:** Sofics on-chip ESD protection cells for 180nm CMOS

Process	Voltage domain	Clamp type Datasheet name	footprint	Leakage	Junction capacitance	ESD performance	Vt1	Info
TSMC 180nmG	1.8V	C clamp DS-TS180G-C1V8-RC	<4600um <sup>2</sup>	<200pA	266	5.5 kV HBM 200 V MM	2	Full local protection
TSMC 180nmG	1.8V	B clamp DS-TS180G-B1V8-O	<1600um <sup>2</sup>	<200pA	296	5.5 kV HBM 200 V MM	Depends on driver	Overvoltage tolerant
TSMC 180nmG	1.8V	C clamp DS-TS180G-C1V8-O	<2000um <sup>2</sup>	<200pA	296	5.5 kV HBM 200 V MM	Depends on driver	Full local protection
TSMC 180nmG	3.3V	power clamp DS-TS180G-PC3V3	<3200um <sup>2</sup>	<500pA	0	5.5 kV HBM 200 V MM	3.15	
TSMC 180nmG	3.3V	A clamp DS-TS180G-A3V3	<1000um <sup>2</sup>	<200pA	159	5.5 kV HBM 200 V MM	Depends on power clamp	Dual diode protection
TSMC 180nmG	3.3V	B clamp DS-TS180G-B3V3-I	<1800um <sup>2</sup>	<200pA	288	5.5 kV HBM 200 V MM	8.8	Overvoltage tolerant
TSMC 180nmG	3.3V	C clamp DS-TS180G-C3V3-I	<3800um <sup>2</sup>	<200pA	288	5.5 kV HBM 200 V MM	8.8	Full local protection
TSMC 180nmG	3.3V	B clamp DS-TS180G-B3V3-RC	<2200um <sup>2</sup>	<500pA	268	5.5 kV HBM 200 V MM	2	Overvoltage tolerant
TSMC 180nmG	3.3V	C clamp DS-TS180G-C3V3-RC	<4600um <sup>2</sup>	<500pA	268	5.5 kV HBM 200 V MM	2	Full local protection
TSMC 180nmG	3.3V	B clamp DS-TS180G-B3V3-OVT	<2000um <sup>2</sup>	<500pA	260	5.5 kV HBM 200 V MM	9	Overvoltage tolerant
TSMC 180nmG	3.3V	B clamp DS-TS180G-B3V3-O	<1600um <sup>2</sup>	<200pA	301	5.5 kV HBM 200 V MM	Depends on driver	Overvoltage tolerant
TSMC 180nmG	3.3V	C clamp DS-TS180G-C3V3-O	<2000um <sup>2</sup>	<200pA	301	5.5 kV HBM 200 V MM	Depends on driver	Full local protection
TSMC 180nmG	5V	power clamp DS-TS180G-PCB5V	<2000um <sup>2</sup>	<5nA	0	8 kV HBM 350 V MM	10.4	
TSMC 180nmG	5V	B clamp DS-TS180G-B5V	<2000um <sup>2</sup>	<5nA	300	8 kV HBM 350 V MM	10.4	5V tolerant
TSMC 180nmG	7V	power clamp DS-TS180G-PCB7V	<3000 um <sup>2</sup>	<50nA	0	8 kV HBM 350 V MM	8.7	

**Data sheet:** Sofics on-chip ESD protection cells for 180nm CMOS

Process	Voltage domain	Clamp type Datasheet name	footprint	Leakage	Junction capacitance	ESD performance	Vt1	Info
TSMC 180nmG	7V	B clamp DS-TS180G-B7V	<3000 um <sup>2</sup>	<50nA	<200	>2 kV HBM >200 V MM	8.7	7V tolerant

**Data sheet:** Sofics on-chip ESD protection cells for 180nm CMOS

## About Sofics

Sofics ([www.sofics.com](http://www.sofics.com)) is the world leader in on-chip ESD protection. Its patented technology is proven in more than a thousand IC designs across all major foundries and process nodes. IC companies of all sizes rely on Sofics for off-the-shelf or custom-crafted solutions to protect overvoltage I/Os, other non-standard I/Os, and high-voltage ICs, including those that require system-level protection on the chip. Sofics technology produces smaller I/Os than any generic ESD configuration. It also permits twice the IC performance in high-frequency and high-speed applications. Sofics ESD solutions and service begin where the foundry design manual ends.

## Our service and support

Our business models include

- Single-use, multi-use or royalty bearing license for ESD clamps
- Services to customize ESD protection
  - Enable unique requirements for Latch-up, ESD, EOS
  - Layout, metallization and aspect ratio customization
  - Area, capacitance, leakage optimization
- Transfer of individual clamps to another target technology
- Develop custom ESD clamps for foundry or proprietary process
- Debugging and correcting an existing IC or IO
- ESD testing and analysis

## Notes

As is the case with many published ESD design solutions, the techniques and protection solutions described in this data sheet are protected by patents and patents pending and cannot be copied freely. PowerQubic, TakeCharge and Sofics are trademarks of Sofics BVBA.

## Version

August 2012