

TSMC 16/12: 1.8V 32kHz Oscillators



Libraries

Name	Process	Form Factor
RGO_TSMC16_18V18_FFC_20C_OSC_032	FFC	Staggered CUP
RGO_TSMC12_18V18_FFC_LL_20C_OSC_032	FFC_LL	Staggered CUP

Summary

The 1.8V 32kHz Oscillators library includes a real time clock oscillator macro I/O cell.

- 32 kHz RTC oscillator

These libraries are offered at both 16nm and a 12nm shrink. They are available in a staggered CUP wire bond implementation with a flip chip option.

To utilize these cells in the pad ring, an additional library is required – 1.8V Support: Power. That library contains the DVDD/DVSS power cells necessary for ESD protection, the POC cell, and a rail splitter to isolate the oscillator in its own power domain as recommended. It also contains an input-only buffer, isolated analog I/O, and a full complement of power cells along with corner and spacer cells to assemble a complete pad ring by abutment. The 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:

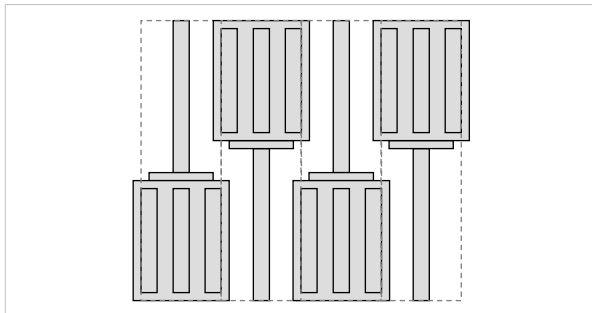
- JEDEC compliant
 - 2KV ESD Human Body Model (HBM)
 - 500 V ESD Charge Device Model (CDM)

Latch-up Immunity:

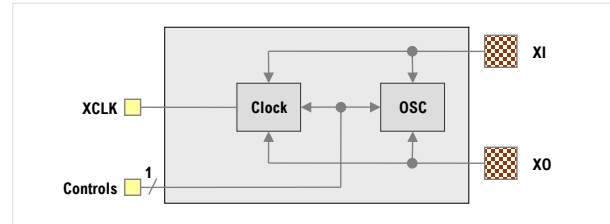
- JEDEC compliant
 - Tested to I-Test criteria of $\pm 100\text{mA}$ @ 125°C

Cell Size & Form Factor

Staggered (pad-limited) – $126\mu\text{m} \times 165.024\mu\text{m}$



OSP_BI_032_18V



32 KHz RTC Oscillator Features

- Designed to use a 32.786 kHz external crystal for Real Time Clock applications.
- Optimized for low power, stability and minimum jitter
- Characterized with crystal loading capacitors ranging from 4 pF to 35 pF.
- Speed-up circuitry for fast startup
- Power-down mode
- Operates on core power only (VDD/VSS cells embedded)

Vertical-only (_V) and horizontal-only (_H) variants provided.

Recommended operating conditions

Description	Min	Nom	Max	Units
V _{VDD}	0.72	0.80	0.88	V
V _{DVDD}	1.62	1.8	1.98	V
T _J	-40	25	125	°C
V _{PAD}	0	-	V _{VDD}	V

[1] XI can be driven by an external clock for bypass operation. XO should never be driven or loaded by anything other than the oscillator crystal.

Characterization Corners (16nm)

Model	LPE Type	VDD=0.8V	DVDD=1.8V	Temp
FFGNP	Cbest_CCbest_T	+10%	+10%	-40°C
FFGNP	Cbest_CCbest_T	+10%	+10%	0°C
FFGNP	Cbest_CCbest_T	+10%	+10%	125°C
FFG	Ctypical	+10%	+10%	125°C
TT	Ctypical	nominal	nominal	25°C
TT	Ctypical	nominal	nominal	85°C
SSGNP	Cworst_CCworst_T	-10%	-10%	-40°C
SSGNP	Cworst_CCworst_T	-10%	-10%	0°C
SSGNP	Cworst_CCworst_T	-10%	-10%	125°C

Characterization Corners (12nm)

Model	LPE Type	VDD=0.8V	DVDD=1.8V	Temp
FF	Cbest_CCbest	+10%	+10%	-40°C
FF	Cbest_CCbest	+10%	+10%	0°C
FF	Cbest_CCbest	+10%	+10%	125°C
FFG	Ctypical	+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%	0°C
SS	Cworst_CCworst	-10%	-10%	125°C

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