

11.9 OSCILLATORS Electrical specification

11.9.1 32 MHz crystal oscillator (HFXO)

Symbol	Description	Min.	Typ.	Max.	Units
f_{HFXO}	External crystal frequency	32			MHz
$f_{\text{TOL_HFXO}}$	Frequency tolerance requirement for 2.4 GHz proprietary radio applications		± 60		ppm
$f_{\text{TOL_HFXO_BLE}}$	Frequency tolerance requirement, Bluetooth Low Energy applications		± 40		ppm
$C_{\text{L_HFXO}}$	Load capacitance	6		9	pF
$P_{\text{D_HFXO}}$	Drive level			100	μW
$I_{\text{STBY_X32M_X2}}$	Core standby current for a given 2.0x1.6 mm crystal: CL_HFXO=8 pF CO_HFXO=0.74 pF LM_HFXO=9.4 mH RS_HFXO=35 Ω		34		μA
$I_{\text{START_X32M_X2}}$	Average startup current during first 1ms for a given 2.0x1.6 mm crystal	0.36			mA
$t_{\text{POWERUP_X32M_X2}}$	Power-up time for a given 2.0x1.6 mm crystal, generating XOSTARTED event	200			μs
$t_{\text{POWERUP_X32M_TUNED_X2}}$	Power-up time for a given 2.0x1.6 mm crystal, generating XOTUNED event	300			μs
$I_{\text{STBY_X32M_X3}}$	Core standby current for a given 1.2x1.0 mm crystal: CL_HFXO=8 pF CO_HFXO=0.42 pF LM_HFXO=22.7 mH RS_HFXO=100 Ω		63		μA
$I_{\text{START_X32M_X3}}$	Average startup current during first 1ms for a given 1.2x1.0 mm crystal	0.38			mA
$t_{\text{POWERUP_X32M_X3}}$	Power-up time for a given 1.2x1.0 mm crystal, generating XOSTARTED event	415			μs
$t_{\text{POWERUP_X32M_TUNED_X3}}$	Power-up time for a given 1.2x1.0 mm crystal, generating XOTUNED event	700			μs

11.9.2 32.768 kHz crystal oscillator (LFXO)

Symbol	Description	Min.	Typ.	Max.	Units
f_{LFXO}	External crystal frequency	32.768			kHz
$f_{\text{TOL_LFXO_BLE}}$	Frequency tolerance requirement, Bluetooth Low Energy applications		± 500		ppm
$f_{\text{TOL_LFXO_ANT}}$	Frequency tolerance requirement for ANT applications		± 50		ppm
$C_{\text{L_LFXO}}$	Load capacitance	6		9	pF
$C_{\text{O_LFXO}}$	Shunt capacitance		1.0	2.0	pF
$R_{\text{S_LFXO}}$	Equivalent series resistance	60		100	k Ω
$P_{\text{D_LFXO}}$	Drive level			0.5	μW
C_{pin}	Input capacitance on XL1 and XL2 pads with internal capacitor is disabled (INTCAP=0)		3		pF
$V_{\text{AMP,IN,XO,LOW}}$	Peak-to-peak amplitude for external low swing clock. Input signal must not swing outside supply rails.	100		500	mV