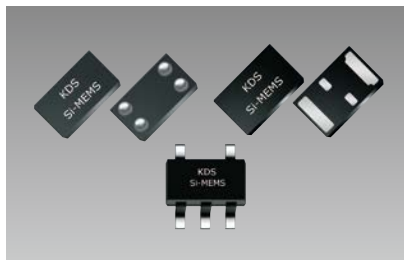


32 kHz MEMS Oscillators / 32 kHz TC-MO - μ Power

MO1532/MO1552/MO1630/MO1566/MO1568



■ Features

- Fixed 32.768 kHz
- Ultra-low power
- Internal filtering eliminates external Vdd bypass cap

■ Applications

- Mobile Phones, Tablets
- Health and wellness monitors, Fitness Watches
- Pulse-per-second timekeeping, RTC reference clock
- Battery Management Timekeeping



Model	Output Frequency (kHz)	Frequency Tolerance ($\times 10^{-6}$)	Supply Voltage (V)	Current Consumption (μ A Typ.)	Size (mm)	Output
MO1532	32.768	± 10 room; 75, 100 over temp.	+1.2 to +3.63	+0.90	1.5 \times 0.8 \times 0.6 (CSP)	NanoDrive™ LVCMOS
MO1552 TC-MO		$\pm 5, \pm 10, \pm 20$ over temp.	+1.5 to +3.63	+0.99		
MO1566 Super TC-MO		$\pm 3, 5$ all inclusive	+1.8	+4.5	1.5 \times 0.8 \times 0.6 (CSP)	LVCMOS
MO1568 Super TC-MO		± 5 all inclusive After Overmold/Underfill				
MO1630 -40 to +105°C	16.384, 32.768	± 20 room; $\pm 75, 100, 150$ over temp.	+1.5 to +3.63	+1.00	2.0 \times 1.2 \times 0.6 (QFN) 2.9 \times 2.8 \times 1.3 (SOT23-5)	LVCMOS

■ Standard Specification (MO1532)

Item	Legend	Min.	Typ.	Max.	Unit	Condition
Output Frequency Range	F _{out}	32.768			kHz	
Supply Voltage	V _{dd}	+1.2	-	+3.63	V	T _A = -10°C to +70°C
		+1.5	-	+3.63		T _A = -40°C to +85°C
Operating Temperature Range	T _{use}	-10 to +70 / -40 to +85			°C	
Frequency Stability [1]	F _{stab}	-	-	+75	$\times 10^{-6}$	T _A = -10°C to +70°C, V _{dd} : +1.5V to +3.63V
		-	-	+100		T _A = -40°C to +85°C, V _{dd} : +1.5V to +3.63V
		-	-	+250		T _A = -10°C to +70°C, V _{dd} : +1.2V to +1.5V
Frequency Tolerance [2]	F _{tol}	-	-	+10	$\times 10^{-6}$	T _A = +25° C, post reflow, V _{dd} : +1.5V to +3.63V
		-	-	+20		T _A = +25° C, post reflow with board-level underfill, V _{dd} : +1.5V to +3.63V
First Year Aging	F _{aging1}	-1.0	-	+1.0	$\times 10^{-6}$	T _A = +25°C
Core Operating Current [3]	I _{dd}	-	+0.9	-	μ A	T _A = +25°C, V _{dd} : +1.8V. No load
		-	-	+1.3		T _A = -10°C to +70°C, V _{dd} max: +3.63V. No load
		-	-	+1.4		T _A = -40°C to +85°C, V _{dd} max: +3.63V. No load
Start-up Time [4]	T _{start}	-	180	300	ms	T _A = -40°C \leq T _A \leq +50°C, valid output
		-	-	450		T _A = +50°C < T _A \leq +85°C, valid output
LVCMOS Output Option, T _A = -40°C to +85°C, typical values are at T _A = +25°C						
Duty Cycle	DC	48	-	52	%	
Output Low Voltage	V _{OL}	-	-	V _{dd} \times 0.1	V	V _{dd} : +1.5V to +3.63V, I _{OL} = +10 μ A, 15 pF
Output High Voltage	V _{OH}	V _{dd} \times 0.9	-	-	V	V _{dd} : +1.5V to +3.63V, I _{OH} = -10 μ A, 15 pF
Rise and Fall Time	Tr, Tf	-	100	200	ns	10 to 90% (V _{dd}), 15 pF load, V _{dd} = +1.5V to +3.63V
		-	-	50		10 to 90% (V _{dd}), 5 pF load, V _{dd} \geq +1.62V
Packing Unit	1000pcs./reel (ϕ 180) or 3000pcs./reel (ϕ 180)					

[1]. Measured peak-to-peak. Inclusive of Initial Tolerance at +25° C, and variations over operating temperature, rated power supply voltage and load. Stability is specified for two operating voltage ranges. Stability progressively degrades with supply voltage below +1.5V.

[2]. Measured peak-to-peak. Tested with Keysight 53132A frequency counter. Due to the low operating frequency, the gate time must be \geq 100 ms to ensure an accurate frequency measurement.

[3]. Core operating current does not include output driver operating current or load current. To derive total operating current (no load), add core operating current + (+0.065 μ A/V) \times (output voltage swing).

[4]. Measured from the time V_{dd} reaches +1.5V.