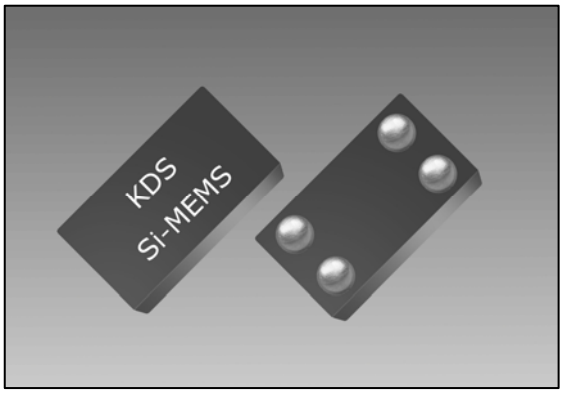
kHz Band Temperature Compensated MEMS Oscillator

MO1566

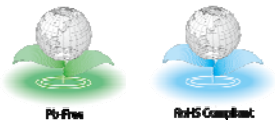


■Features

- ●32.768 kHz ±5 x 10^{-6} all-inclusive frequency stability
- ●Smallest TCXO Footprint: 1.2mm^2
  - ・1.5 x 0.8 mm CSP / ・No external bypass cap required
- ●Ultra-low power: +4.5 µA
- ●Improved stability reduces system power with fewer network timekeeping updates

■Applications

- ●Smart watches, Health and wellness monitors
- ●Smart utility meters
- ●Internet of Things (IoT)
- ●Ultra-accurate RTC reference clock



■Standard Specification

Conditions: Min/Max limits are over temperature, Vdd = +1.8V±10%, unless otherwise stated. Typicals are at +25°C and Vdd = +1.8V.

Item	symbol	Min.	Typ.	Max.	Unit	Condition
Output Frequency	Fout		32.768		kHz	
Operating Supply Voltage	Vdd	+1.62	+1.8	+1.98	V	
Operating Temperature Range	T_use		-20~+70 / -40~+85		°C	
Total Frequency Stability[1]	F_stab	-5.0	-	+5.0	x 10^{-6}	All inclusive, without overmold.
Allan Deviation	AD	-	1e-8	4e-8	-	1 second averaging time
First Year Frequency Aging	F_aging	-	±1.0	-	x 10^{-6}	T_A =+25°C, Vdd = +1.8V
Supply Current	Idd	-	+4.5	+5.3	µA	No load
Start-up Time at Power-up	t_start	-	-	300	ms	Measured when supply reaches 90% of final Vdd to the first output pulse.
Output Clock Duty Cycle	DC	45	-	55	%	
Output Voltage Low	V_{OL}	-	-	Vdd x 0.1	V	I_{OL} = +1.0 µA
Output Voltage High	V_{OH}	Vdd x 0.9	-	-		I_{OH} = -1.0 µA
Output Rise/Fall Time	tr,tf	-	9.0	20	ns	10-90% (Vdd), 15 pF Load
Integrated Phase Jitter	IPJ	-	1.8	2.5	ns_{RMS}	Integration bandwidth = 100 Hz to 16.384 kHz. Inclusive of +50mV peak-to-peaks inusoidal noise on Vdd. Noise frequency 100 Hz to 20 MHz.
RMS Period Jitter	PJ_{RMS}	-	2.5	4	ns_{RMS}	10,000 samples, per JEDEC standard 65B
Peak-to-Peak Period Jitter	PJ_{p-p}	-	20	35	ns_{p-p}	
Dynamic Temperature Frequency Response	-	-0.5	-	+0.5	10^{-6}/sec	Under temp ramp up to +1.5°C/sec

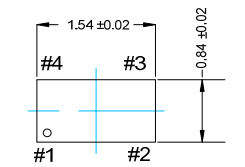
[1]. Relative to 32.768 kHz, includes initial tolerance, over temp stability, Vdd, load variation, hysteresis, board-level underfill, 3x reflow. Tested with Keysight 53132A frequency counter. Measured with 100 ms gate time for accurate frequency measurement.

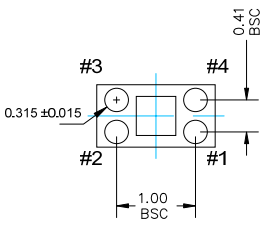
Consult our sales representative for other specifications.

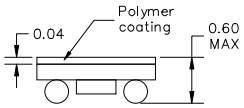
■Dimensions and Patterns

Package Size – Dimensions (Unit: mm)	Recommended Land Pattern (Unit: mm)

1.55 x 0.85 mm CSP

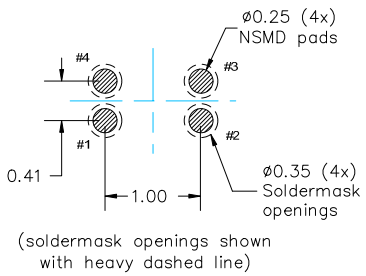






Pin Connections

Pin No.	Connection
#1	GND
#2	CLK Output
#3	Vdd
#4	GND



Recommend 4-mil (0.1mm) stencil thickness