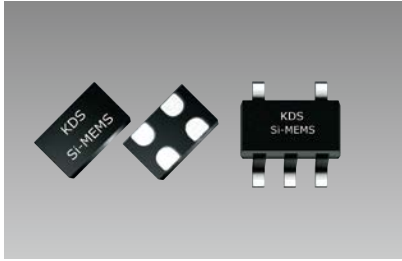# High Temperature MEMS Oscillators

MO8918/MO8919/MO2018/MO2019/MO8920/MO8921/MO2020/MO2021

■Features
- Low power consumption of +3.5 mA typical (20 MHz, +1.8 V)
- Excellent total frequency tolerance as low as $\pm 20 \times 10^{-6}$

■ Applications
- High temp industrial equipment such as industrial control systems and industrial sensors
- Servo motor, PLC & High-temp networking gears
- Outdoor systems (medical and health monitoring)
- Asset tracking systems

Pb-Free

RoHS Compliant

Model	Output Frequency (MHz)	Frequency Tolerance ($\times 10^{-6}$)	Supply Voltage (V)	Current Consumption (mA Typ.)	Size (mm)	Output
MO8918	1 to 110	$\pm 20, \pm 25, \pm 30, \pm 50$ (-40 to $+125°C$)	+1.62 to +1.98, +2.25 to +3.63	+3.6 to +5.4 (+1.0 μA stby)	2.0×1.6×0.8, 2.5×2.0×0.8, 3.2×2.5×0.8, 5.0×3.2×0.8, 7.0×5.0×1.0 (QFN)	LVCMOS
MO8919	115 to 137					
MO2018	1 to 110				2.9×2.8×1.3 (SOT23-5)	
MO2019	115 to 137					
MO8920	1 to 110	$\pm 20, \pm 25, \pm 30, \pm 50$ (-55 to $+125°C$)			2.0×1.6×0.8, 2.5×2.0×0.8, 3.2×2.5×0.8, 5.0×3.2×0.8, 7.0×5.0×1.0 (QFN)	LVCMOS
MO8921	119 to 137					
MO2020	1 to 110				2.9×2.8×1.3 (SOT23-5)	
MO2021	119 to 137					

■ Standard Specification (MO8918)

Item	Legend	Min.	Typ.	Max.	Unit	Condition
Output Frequency Range	f	1		110	MHz	Refer to datasheet for exact list of supported frequencies
Supply Voltage	Vdd	+1.62	+1.8	+1.98	V	
		+2.25	+2.5	+2.75		
		+2.52	+2.8	+3.08		
		+2.7	+3.0	+3.3		
		+2.97	+3.3	+3.63		
		+2.25	–	+3.63		
Operating Temperature Range	T_use	−40	–	+105	℃	Extended Industrial
		−40	–	+125		Automotive
Frequency Tolerance	F_stab	−20	–	+20	$\times 10^{-6}$	Inclusive of Initial tolerance at +25°C, 1st year aging at +25°C, and variations over operating temperature, rated power supply voltage and load (15 pF ± 10%).
		−25	–	+25		
		−30	–	+30		
		−50	–	+50		
Current Consumption	Idd	–	+3.8	+4.7	mA	No load condition, f = 20 MHz, Vdd = +2.8V, +3.0V or +3.3V
		–	+3.6	+4.5		No load condition, f = 20 MHz, Vdd = +2.5V
		–	+3.5	+4.5		No load condition, f = 20 MHz, Vdd = +1.8V
OE Disable Current	I_od	–	–	+4.5	mA	Vdd = +2.5V to +3.3V, OE = Low, Output in high Z state
		–	–	+4.3		Vdd = +1.8V, OE = Low, Output in high Z state
Standby Current	I_std	–	+2.6	+8.5	μA	Vdd = +2.8V to +3.3V, $\overline{ST}$ = Low, Output is weakly pulled down
		–	+1.4	+5.5		Vdd = +2.5V, $\overline{ST}$ = Low, Output is weakly pulled down
		–	+0.6	+4.0		Vdd = +1.8V, $\overline{ST}$ = Low, Output is weakly pulled down
Duty Cycle	DC	45	–	55	%	All Vdds
Output Low Voltage	V_{OL}	–	–	Vdd×0.1	V	I_{OL} = +4.0 mA (Vdd = +3.0V or +3.3V) I_{OL} = +3.0 mA (Vdd = +2.8V or +2.5V) I_{OL} = +2.0 mA (Vdd = +1.8V)
Output High Voltage	V_{OH}	Vdd×0.9	–	–	V	I_{OH} = −4.0 mA (Vdd = +3.0V or +3.3V) I_{OH} = −3.0 mA (Vdd = +2.8V or +2.5V) I_{OH} = −2.0 mA (Vdd = +1.8V)
Rise and Fall Time	Tr, Tf	–	1.0	2.0	ns	Vdd = +2.5V, +2.8V, +3.0V or +3.3V, 20% to 80%
		–	1.3	2.5		Vdd = +1.8V, 20% to 80%
		–	1.0	3.0		Vdd = +2.25V to +3.63V, 20% to 80%
Input Low Voltage	V_{IL}	–	–	Vdd×0.3	V	Pin 1, OE or $\overline{ST}$
Input High Voltage	V_{IH}	Vdd×0.7	–	–	V	Pin 1, OE or $\overline{ST}$
Start-up Time	T_start	–	–	5.0	ms	Measured from the time Vdd reaches its rated minimum value.
Enable and Disable Time	T_oe	–	–	130	ns	f = 110 MHz. For other frequencies, T_oe = 100 ns + 3×cycles
Resume Time	T_resume	–	–	5.0	ms	Measured from the time $\overline{ST}$ pin crosses 50% threshold
RMS Period Jitter	T_jitt	–	1.6	2.5	ps	f = 75 MHz, Vdd = +2.5V, +2.8V, +3.0V or +3.3V
		–	1.9	3.0		f = 75 MHz, Vdd = +1.8V
Peak-to-peak Period Jitter	T_pk	–	12	20	ps	f = 75 MHz, Vdd = +2.5V, +2.8V, +3.0V or +3.3V
		–	14	25		f = 75 MHz, Vdd = +1.8V
RMS Phase Jitter (random)	T_phj	–	0.5	0.8	ps	f = 75 MHz, Integration bandwidth = 900 kHz to 7.5 MHz
		–	1.3	2.0		f = 75 MHz, Integration bandwidth = 12 kHz to 20 MHz
Packing Unit		1000pcs./reel (φ180) or 3000pcs./reel (φ180: 2016, 2520, 3225 package)				