

## Features

- AEC Q200 Qualified
- IATF-16949 QMS
- Stabilities to  $\pm 25$  PPM
- Temperature Ranges as wide as  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$
- Supply Voltages: 1.8V, 2.5V, 3.3V; 1.6V ~ 3.63V

1.8V ELECTRICAL CHARACTERISTICS	
PARAMETERS	MAX (Unless otherwise noted)
Frequency Range ( $F_o$ )	1.250 ~ 60.000 MHz
Temperature Range	
Storage ( $T_{STG}$ )	$-55^{\circ}\text{C} \sim +125^{\circ}\text{C}$
Supply Voltage ( $V_{DD}$ )	$1.8\text{V} \pm 5\%$
Input Current ( $I_{DD}$ )	
1.250 ~ <10.000MHz	3 mA
10.000 ~ <32.000 MHz	5 mA
32.000 ~ 60.000 MHz	10 mA
Standby Current	
$T_{OPR} = -40 \sim +85^{\circ}\text{C}$	10 $\mu\text{A}$
$T_{OPR} = -40 \sim +105^{\circ}\text{C} / -40 \sim +125^{\circ}\text{C}$	20 $\mu\text{A}$
Output Symmetry (50% $V_{DD}$ )	45 % ~ 55 %
Rise Time (10%~90% $V_{DD}$ )	5 nS
Fall Time (90%~10% $V_{DD}$ )	5 nS
Output Voltage ( $V_{OL}$ )	10 % $V_{DD}$
( $V_{OH}$ )	90 % $V_{DD}$ Min
Output Load (HCMOS)	15 pF
Start-up Time ( $T_S$ )	10 mS
Output Disable Time <sup>1</sup>	200 $\mu\text{S}$
Output Enable Time <sup>1</sup>	10 mS
Aging (per year @ 25C)	$\pm 5$ PPM

ENABLE / DISABLE FUNCTION	
Pin1	Output (pin 3)
OPEN <sup>1</sup>	Active
'1' Level $V_{IH} \geq 70\%V_{DD}$	Active
'0' Level $V_{IL} \leq 30\%V_{DD}$	High Z

Available Options by Stability & Operating Temp for 1.8V <sup>2</sup>		
Frequency Stability	Operating Temperature ( $^{\circ}\text{C}$ )	Frequency Range (MHz)
$\pm 100$ PPM	$-40 \sim +85$	1.250 ~ 60.000
$\pm 100$ PPM	$-40 \sim +105$	1.250 ~ 60.000
$\pm 100$ PPM	$-40 \sim +125$	1.250 ~ 60.000
$\pm 50$ PPM	$-40 \sim +85$	1.250 ~ 60.000
$\pm 50$ PPM	$-40 \sim +105$	1.250 ~ 60.000
$\pm 50$ PPM	$-40 \sim +125$	1.250 ~ 60.000
$\pm 25$ PPM	$-40 \sim +80$	1.250 ~ 60.000

<sup>1</sup> An internal pull-up resistor from pin 1 to pin 4 allows active output if pin 1 is left open

<sup>2</sup> Inclusive of  $25^{\circ}\text{C}$  tolerance and operating temperature range.

2.5V ELECTRICAL CHARACTERISTICS	
PARAMETERS	MAX (Unless otherwise noted)
Frequency Range (F <sub>0</sub> )	1.250 ~ 60.000 MHz
Temperature Range	
Storage (T <sub>STG</sub> )	-55°C ~ +150°C
Supply Voltage (V <sub>DD</sub> )	2.5V±5%
Input Current (I <sub>DD</sub> )	
1.250 ~ <10.000 MHz	6 mA
10.000 ~ <32.000 MHz	8 mA
32.000 ~ 60.000 MHz	20 mA
Standby Current	
T <sub>OPR</sub> = -40 ~ +85°C	10µA
T <sub>OPR</sub> = -40 ~ +105°C / -40 ~ +125°C	20µA
Output Symmetry (50% V <sub>DD</sub> )	45 % ~ 55 %
RiseTime (10%~90% V <sub>DD</sub> )	5 nS
Fall Time (90%~10% V <sub>DD</sub> )	5 nS
Output Voltage (V <sub>OL</sub> )	10 % V <sub>DD</sub>
(V <sub>OH</sub> )	90 % V <sub>DD</sub> Min
Output Load (HCMOS)	15 pF
Start-up Time (T <sub>S</sub> )	10 mS
Output Disable Time <sup>1</sup>	200 µS
Output Enable Time <sup>1</sup>	10 mS
Aging (per year @ 25°C)	±5 PPM

ENABLE / DISABLE FUNCTION	
Pin1	Output (pin 3)
OPEN <sup>1</sup>	Active
'1' Level V <sub>IH</sub> ≥ 70%V <sub>DD</sub>	Active
'0' Level V <sub>IL</sub> ≤ 30%V <sub>DD</sub>	High Z

Available Options by Stability & Operating Temp for 2.5V <sup>2</sup>		
Frequency Stability <sup>2</sup>	Operating Temperature (°C)	Frequency Range (MHz)
±100PPM	-40 ~ +85	1.250 ~ 60.000
±100PPM	-40 ~ +105	1.250 ~ 60.000
±100PPM	-40 ~ +125	1.250 ~ 60.000
±50PPM	-40 ~ +85	1.250 ~ 60.000
±50PPM	-40 ~ +105	1.250 ~ 60.000
±50PPM	-40 ~ +125	1.250 ~ 60.000
±25PPM	-40 ~ +85	1.250 ~ 60.000

<sup>1</sup> An internal pull-up resistor from pin 1 to pin 4 allows active output if pin 1 is left open

<sup>2</sup> Inclusive of 25°C tolerance and operating temperature range.

3.3V ELECTRICAL CHARACTERISTICS	
PARAMETERS	MAX (Unless otherwise noted)
Frequency Range (Fo)	1.250 ~ 60.000MHz
Temperature Range	
Storage (T <sub>STG</sub> )	-55°C ~ +125°C
Supply Voltage (V <sub>DD</sub> )	3.3V±5%
Input Current (I <sub>DD</sub> )	
1.250 ~ <20.000MHz	7 mA
20.000 ~ <32.000 MHz	12 mA
32.000 ~ 50.000 MHz	20 mA
>50.000 ~ 60.000 MHz	25 mA
Standby Current	
T <sub>OPR</sub> = -40 ~ +85°C	10µA
T <sub>OPR</sub> = -40 ~ +105°C / -40 ~ +125°C	20µA
Output Symmetry (50% V <sub>DD</sub> )	45 % ~ 55 %
RiseTime (10%/90% V <sub>DD</sub> )	5 nS
Fall Time (90%/10% V <sub>DD</sub> )	5 nS
Output Voltage (V <sub>OL</sub> )	10 % V <sub>DD</sub>
(V <sub>OH</sub> )	90 % V <sub>DD</sub> Min
Output Load (HCMOS)	15 pF
Start-up Time (T <sub>S</sub> )	10 mS
Output Disable Time <sup>1</sup>	200 nS
Output Enable Time <sup>1</sup>	10 mS
Aging (per year @ 25°C)	±5 PPM

ENABLE / DISABLE FUNCTION	
Pin1	Output (pin 3)
OPEN <sup>1</sup>	Active
'1' Level V <sub>IH</sub> ≥ 70%V <sub>DD</sub>	Active
'0' Level V <sub>IL</sub> ≤ 30%V <sub>DD</sub>	High Z

Available Options by Stability & Operating Temp for 3.3V <sup>2</sup>		
Frequency Stability <sup>2</sup>	Operating Temperature (°C)	Frequency Range (MHz)
±100PPM	-40 ~ +85	1.250 ~ 60.000
±100PPM	-40 ~ +105	1.250 ~ 60.000
±100PPM	-40 ~ +125	1.250 ~ 60.000
±50PPM	-40 ~ +85	1.250 ~ 60.000
±50PPM	-40 ~ +105	1.250 ~ 60.000
±50PPM	-40 ~ +125	1.250 ~ 60.000
±25PPM	-40 ~ +85	1.250 ~ 60.000

<sup>1</sup> An internal pull-up resistor from pin 1 to pin 4 allows active output if pin 1 is left open

<sup>2</sup> Inclusive of 25°C tolerance and operating temperature range.

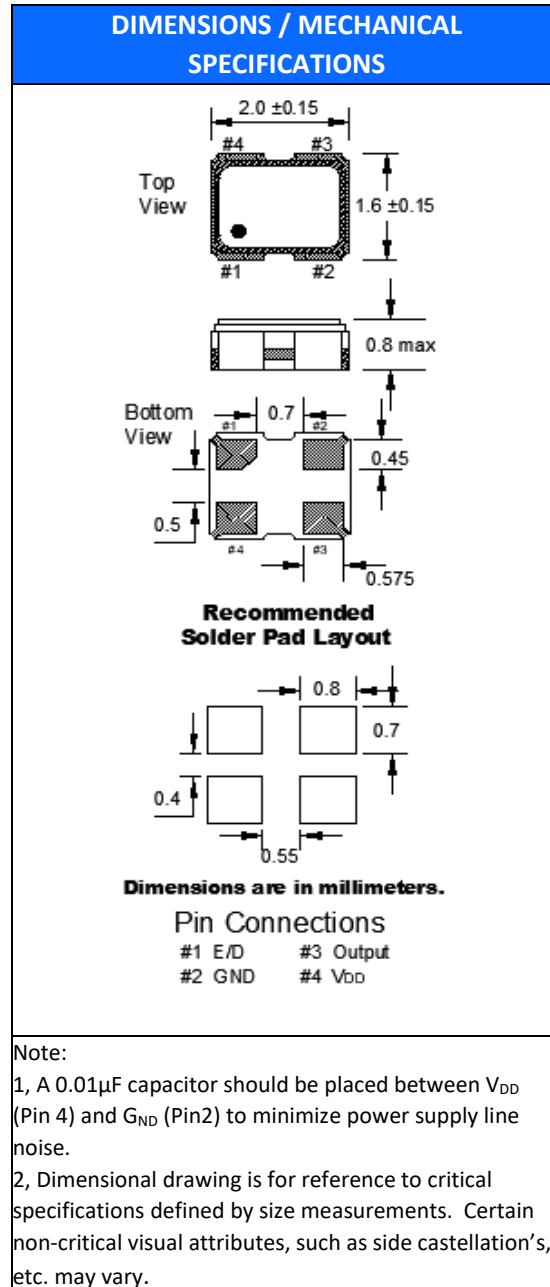
VARIABLE VOLTAGE ELECTRICAL CHARACTERISTICS	
PARAMETERS	MAX (Unless otherwise noted)
Frequency Range ( $F_0$ )	1.25 ~ 135 MHz
Temperature Range	
Storage ( $T_{STG}$ )	-55°C ~ +125°C
Supply Voltage ( $V_{DD}$ )	1.6V ~ 3.63V
Input Current ( $I_{DD}$ )	
1.25 ~ 19.999MHz	4 mA
20.0 ~ 39.999MHz	6 mA
40.0 ~ 59.999MHz	10 mA
60.0 ~ 80MHz	15 mA
>80.0 ~ 135.0MHz	30 mA
Standby Current	
$T_{OPR} = -40 \sim +85^\circ\text{C}$	10 $\mu\text{A}$
$T_{OPR} = -40 \sim +105^\circ\text{C} / -40 \sim +125^\circ\text{C}$	20 $\mu\text{A}$
Output Symmetry (50% $V_{DD}$ )	
0.75 ~ 80MHz	45 % ~ 55 %
80.0 ~ 135 MHz	40 % ~ 60 %
Rise/Fall Time (10%/90% $V_{DD}$ Levels) ( $T_R/T_F$ )	6 nS
Output Voltage ( $V_{OL}$ )	10 % $V_{DD}$
( $V_{OH}$ )	90 % $V_{DD}$ Min
Output Load (HCMOS)	15 pF
Start-up Time ( $T_S$ )	5 mS
Output Disable Time <sup>1</sup>	200nS
Output Enable Time <sup>1</sup>	5 mS
Aging (per year @ 25°C)	$\pm 5$ PPM

ENABLE / DISABLE FUNCTION	
Pin1	Output (pin 3)
OPEN <sup>1</sup>	Active
'1' Level $V_{IH} \geq 70\%V_{DD}$	Active
'0' Level $V_{IL} \leq 30\%V_{DD}$	High Z

Available Options by Stability & Operating Temp <sup>2</sup>		
Frequency Stability <sup>2</sup>	Operating Temperature (°C)	Frequency Range (MHz)
$\pm 100$ PPM	-40 ~ +85	1.250 ~ 135.000
$\pm 100$ PPM	-40 ~ +105	1.250 ~ 135.000
$\pm 100$ PPM	-40 ~ +125	1.250 ~ 135.000
$\pm 50$ PPM	-40 ~ +85	1.250 ~ 135.000
$\pm 50$ PPM	-40 ~ +105	1.250 ~ 135.000
$\pm 50$ PPM	-40 ~ +125	1.250 ~ 135.000
$\pm 25$ PPM	-40 ~ +85	1.250 ~ 135.000

<sup>1</sup> An internal pull-up resistor from pin 1 to pin 4 allows active output if pin 1 is left open

<sup>2</sup> Inclusive of 25°C tolerance and operating temperature range.



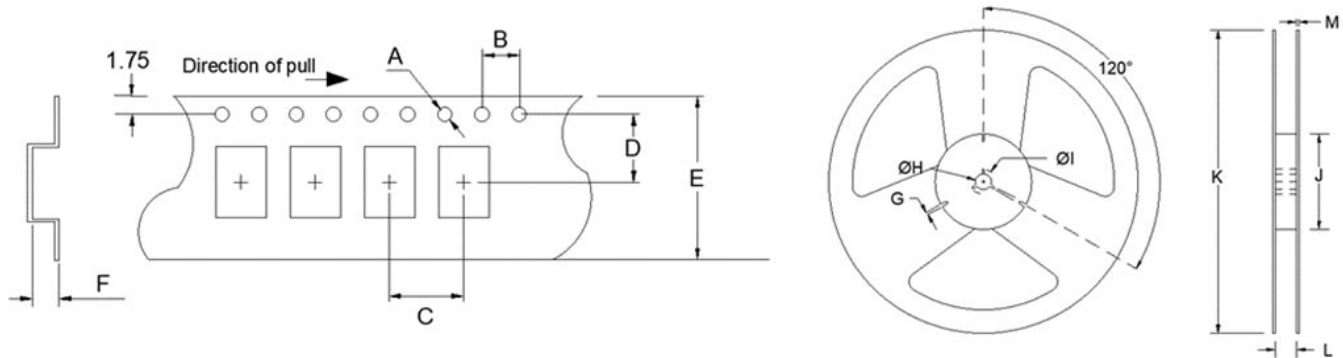
<b>STANDARD SPECIFICATIONS</b>	
PARAMETERS	MAX (Unless otherwise noted)
Maximum Soldering Temp / Time	260°C / 10 Seconds x 2
Moisture Sensitivity Level (MSL)	N/A
Termination Finish	Au (0.3~1μm) over Ni (1.27~8.89μm)
Seal Method	Seam
Lead (Pb) Free	Yes
RoHS Compliant	Yes, no exemptions
REACH Compliant (latest version)	Yes

# FO1HA

2.0mm x 1.6mm  
Auto Grade Oscillator



TAPE SPECIFICATIONS (mm)						REEL SPECIFICATIONS (mm)							
A	B	C	D	E	F	REEL QTY	G	H	I	J	K	L	M
ø1.5	4.0	4.0	3.5	8.0	1.15	-T3 = 3,000 -T2 = 2,000 -T1 = 1,000	2.0	ø13	ø21	ø60	ø180	9.0	1.7



### Available Options & Part Identification\*

Sample PN: **FO1HACBP25.0-T3**

F	O1HA	C	B	P	25.0	-T3
<b>Fox</b>	<b>Model Number</b>	<b>Voltage</b> K = 1.8V±5% H = 2.5V±5% <b>C = 3.3V±10%</b> V = 1.6V ~ 3.63V	<b>Stability</b> A = ±100 PPM <b>B = ±50 PPM</b> D = ±25 PPM	<b>Operating Temperature</b> M = -40 to +85°C <b>P = 40 to +105°C</b> I = -40 to +125°C	<b>Frequency (MHz)</b>	<b>Values Added Options</b> Blank = Bulk T1 = 1,000 pcs T2 = 2,000 pcs <b>T3 = 3,000 pcs</b>

\* Not all frequencies in the frequency range, or every combination of stability, temp range, and voltage available. See stabilities and op temps for each V<sub>DD</sub>.

### Reliability Test Conditions

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