



2.5x2.0mm Auto Grade Oscillator

O2HA

(Former FA200 Series)

DATASHEET

- AEC Q200 Qualified
- IATF-16949 QMS
- Stabilities to ± 25 PPM
- Temperature Ranges as wide as -40°C to $+125^{\circ}\text{C}$
- Supply Voltages: 1.8V; 2.5V; 3.3V; 1.7V~3.63V

1.8V ELECTRICAL CHARACTERISTICS

PARAMETERS	MAX (unless otherwise noted)
Frequency Range (F_o)	1.250 ~ 60.000 MHz
Storage Temperature Range (T_{STG})	$-55 \sim +150^{\circ}\text{C}$
Supply Voltage (V_{DD})	$1.8V \pm 5\%$
Input Current (I_{DD})	
1.250 ~ <10.000 MHz	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 μA
$T_{OPR} = -40 \sim +105^{\circ}\text{C} / -40 \sim +125^{\circ}\text{C}$	20 μA
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 ¹	200 nS
Output Enable Time ¹	10 mS
Aging (per year @ 25C)	± 5 PPM

ENABLE / DISABLE FUNCTION

Pin1	Output (pin 3)
OPEN ¹	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 1.8V²

Frequency Stability	Operating Temperature ($^{\circ}\text{C}$)	Frequency Range (MHz)
$\pm 100\text{PPM}^2$	$-40 \sim +85$	1.250 ~ 60.000
$\pm 100\text{PPM}^2$	$-40 \sim +105$	1.250 ~ 60.000
$\pm 100\text{PPM}^2$	$-40 \sim +125$	1.250 ~ 60.000
$\pm 50\text{PPM}^2$	$-40 \sim +85$	1.250 ~ 60.000
$\pm 50\text{PPM}^2$	$-40 \sim +105$	1.250 ~ 60.000
$\pm 50\text{PPM}^3$	$-40 \sim +125$	1.250 ~ 60.000
$\pm 25\text{PPM}^3$	$-40 \sim +85$	1.250 ~ 60.000

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

² Inclusive of 25°C tolerance and operating temperature range.





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2.5V ELECTRICAL CHARACTERISTICS

PARAMETERS	MAX (unless otherwise noted)
Frequency Range (F_o)	1.250 ~ 60.000 MHz
Storage Temperature Range (T_{STG})	-55 ~ +150°C
Supply Voltage (V_{DD})	2.5V±5%
Input Current (I_{DD})	
1.250 ~ <10.000 MHz	6 mA
10.000 ~ <32.000 MHz	8 mA
32.000 ~ 60.000 MHz	20 mA
Standby Current	
$T_{OPR} = -40 \sim +85^\circ\text{C}$	10 μA
$T_{OPR} = -40 \sim +105^\circ\text{C} / -40 \sim +125^\circ\text{C}$	20 μA
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 ¹	200 nS
Output Enable Time ¹	10 mS
Aging (per year @ 25C)	±5 PPM

ENABLE / DISABLE FUNCTION

Pin1	Output (pin 3)
OPEN ¹	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 2.5V²

Frequency Stability	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

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

² Inclusive of 25°C tolerance and operating temperature range.





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3.3V ELECTRICAL CHARACTERISTICS

PARAMETERS	MAX (unless otherwise noted)
Frequency Range (F_o)	1.250 ~ 160.000 MHz
Storage Temperature Range (T_{STG})	-55 ~ +150°C
Supply Voltage (V_{DD})	3.3V±10%
Input Current (I_{DD})	
1.25 ~ <20.000 MHz	7 mA
20.000 ~ <32.000 MHz	12 mA
32.000 ~ 50.000 MHz	20 mA
>50.000 ~ 60.000 MHz	25 mA
>60.000 ~ 160.000 MHz	35 mA
Standby Current	
$T_{OPR} = -40 \sim +85^\circ\text{C}$	10 μA
$T_{OPR} = -40 \sim +105^\circ\text{C} / -40 \sim +125^\circ\text{C}$	
1.25 ~ <135.000 MHz	20 μA
135.000 ~ 160.000 MHz	100 μA
Output Symmetry (50% V_{DD})	45% ~ 55%
Rise Time (10%~90% V_{DD})	
1.250 ~ <20.000 MHz	6 nS
20.000 ~ 160.000 MHz	5 nS
Fall Time (90%~10% V_{DD})	
1.250 ~ <20.000 MHz	6 nS
20.000 ~ 160.000 MHz	5 nS
Output Voltage (V_{OL})	10% V_{DD}
(V_{OH})	90% V_{DD} Min
Output Current (I_{OL})	2 mA Min
(I_{OH})	-2 mA Min
Output Load (HCMOS)	15 pF
Start-up Time (T_s)	10 mS
Output Disable Time ¹	200 nS
Output Enable Time ¹	10 mS
Aging (per year @ 25C)	±5 PPM

ENABLE / DISABLE FUNCTION

Pin1	Output (pin 3)
OPEN ¹	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 3.3V²

Frequency Stability	Operating Temperature (°C)	Frequency Range (MHz)
±100PPM	-40 ~ +85	1.250 ~ 160.000
±100PPM	-40 ~ +105	1.250 ~ 160.000
±100PPM	-40 ~ +125	1.250 ~ 133.333
±50PPM	-40 ~ +85	1.250 ~ 160.000
±50PPM	-40 ~ +105	1.250 ~ 160.000
±50PPM	-40 ~ +125	1.250 ~ 133.333
±25PPM	-40 ~ +85	1.250 ~ 60.000

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

² Inclusive of 25°C tolerance and operating temperature range.





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VARIABLE VOLTAGE ELECTRICAL CHARACTERISTICS

PARAMETERS	MAX (unless otherwise noted)
Frequency Range (F_o)	1.25 ~ 135 MHz
Storage Temperature Range (T_{STG})	-55 ~ +125°C
Supply Voltage (V_{DD})	1.7V ~ 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 ~ 70MHz	15 mA
>70.0 ~ 135.0MHz	30 mA
Standby Current	
$T_{OPR} = -40 \sim +85^\circ\text{C}$	10 μA
$T_{OPR} = -40 \sim +105^\circ\text{C} / -40 \sim +125^\circ\text{C}$	20 μA
Output Symmetry (50% V_{DD})	
1.25 ~ 70MHz	45% ~ 55%
>70.0 ~ 135MHz	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 ¹	200 nS
Output Enable Time ¹	5 mS
Aging (per year @ 25C)	±5 PPM

ENABLE / DISABLE FUNCTION

Pin1	Output (pin 3)
OPEN ¹	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 Temp²

Frequency Stability	Operating Temperature (°C)	Frequency Range (MHz)
±100PPM	-40 ~ +85	1.250 ~ 135.000
±100PPM	-40 ~ +105	1.250 ~ 135.000
±100PPM	-40 ~ +125	1.250 ~ 135.000
±50PPM	-40 ~ +85	1.250 ~ 135.000
±50PPM	-40 ~ +105	1.250 ~ 135.000
±50PPM	-40 ~ +125	1.250 ~ 135.000
±25PPM	-40 ~ +85	1.250 ~ 135.000

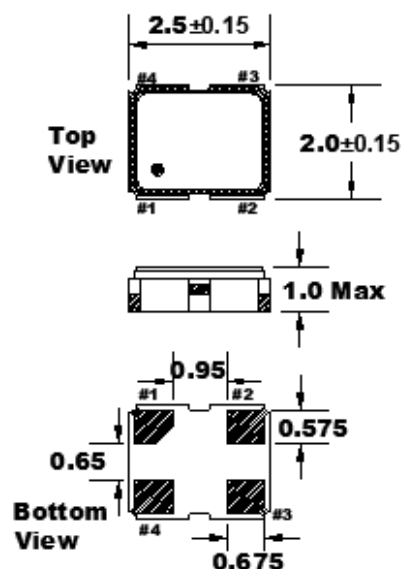
¹ An internal pull-up resistor from pin 1 to pin 4 allows active output if pin 1 is left open

² Inclusive of 25°C tolerance and operating temperature range.

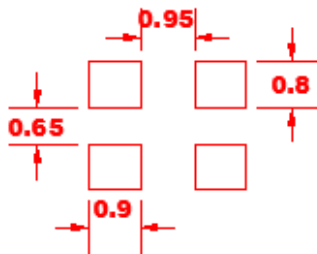




DIMENSIONS / MECHANICAL SPECIFICATIONS



Recommended Solder Pad Layout



All dimensions are in millimeters.

Pin Connections

#1 E/D #3 Output
#2 GND #4 VDD

Maximum Soldering Temp / Time	260°C / 10 Seconds x2
Moisture Sensitivity Level (MSL)	1
Termination Finish	Au over Ni
Seal Method	Seam
Lead (Pb) Free	Yes
ROHS/REACH Compliant	Yes

Notes:

*A 0.01μF capacitor should be placed between V_{DD} (Pin 4) and GND (Pin2) to minimize power supply line noise.

*Dimensional drawing is for reference to critical specifications defined by size measurements.

Certain non-critical visual attributes, such as side castellations, reference pin shape, etc. may vary





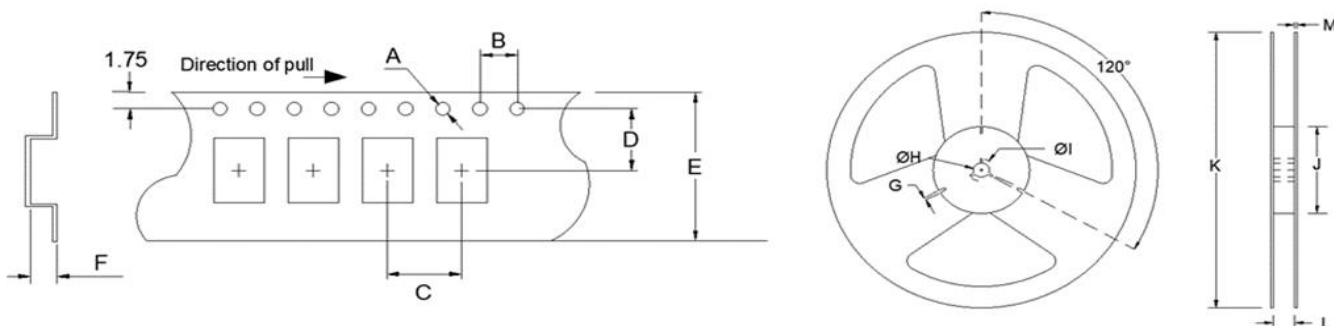
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Tape Specifications (millimeters)							Reel Specifications (millimeters)						
A	B	C	D	E	F	Reel Qty	G	H	I	J	K	L	M
Ø1.5	4.0	4.0	3.5	8.0	1.15	-T3 = 3,000 -T2 = 2,000 -T1 = 1,000	2.0	Ø13	Ø21	Ø60	Ø180	9.0	2.0



Available Options & Part Identification*

Example: **F O2HA C B P 25.0**

F	O2HA	C	B	P	25.0
Fox	Model Number	Voltage	Stability*	Operating Temperature	Frequency (MHz)
		K = 1.8V±5% H = 2.5V±5% C = 3.3V±10% V = 1.7V~3.63V	A = ±100PPM B = ±50PPM D = ±25PPM	M = -40 to +85°C P = -40 to +105°C I = -40 to +125°C	

*Not all frequencies in the frequency range, nor every combination of stability, temp range, and voltage available.

See stabilities and op temps for each V_{DD}.



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Title / Description: O2HA SERIES STANDARD SPECIFICATIONS			
Drawing Number: O2HA-DOC-1		Size: A	
Part Number:		Cage: 61429	
Draftsperson: BEC	Approved: MAJ	Revision Date: 05/06/2020	