



HCMOS 2.5x2.0mm SMD Oscillator

O2HS

(former F210, F230, F240 Series)

DATASHEET

- HCMOS Output
- Stabilities to ± 20 PPM
- Temperature Ranges as wide as -40°C to $+85^{\circ}\text{C}$
- Supply Voltages: 1.0V, 1.8V, 2.5V, 3.3V, Variable (1.7 ~ 3.63V)

1.0V ELECTRICAL CHARACTERISTICS

PARAMETERS	MAX (unless otherwise noted)
Frequency Range (F_0)	1.8 ~ 50.0 MHz
Storage Temperature Range (T_{STG})	$-55 \sim +125^{\circ}\text{C}$
Supply Voltage (V_{DD})	$1.0\text{V} \pm 5\%$
Input Current (I_{DD})	
1.8 ~ 32.1 MHz	2.5 mA
$>32.1 \sim 50.0$ MHz	3.5 mA
Standby Current	5 μA
Output Symmetry (50% V_{DD})	40 % ~ 60 %
Rise/Fall Time (20%/80% V_{DD} Levels) (T_R/T_F)	
1.8 ~ 32.1 MHz	5 nS
$>32.1 \sim 50.0$ MHz	3.5 nS
Output Voltage (V_{OL})	20 % V_{DD}
(V_{OH})	80 % V_{DD} Min
Output Load (HCMOS)	15 pF
Start-up Time (T_S)	5 mS
Output Disable Time ¹	250 nS
Output Enable Time ¹	5 mS

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 1.0V

Frequency Stability ²	Operating Temperature (°C)	Frequency Range (MHz)
$\pm 100\text{PPM}$	$-10 \sim +70$	1.8 ~ 50.0
$\pm 100\text{PPM}$	$-40 \sim +85$	1.8 ~ 50.0
$\pm 50\text{PPM}$	$-10 \sim +70$	1.8 ~ 50.0
$\pm 50\text{PPM}$	$-40 \sim +85$	1.8 ~ 50.0
$\pm 25\text{PPM}$	$-10 \sim +70$	1.8 ~ 50.0
$\pm 25\text{PPM}$	$-40 \sim +85$	1.8 ~ 50.0
$\pm 20\text{PPM}^*$	$-10 \sim +70$	1.8 ~ 50.0

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, operating temperature range, input voltage change, load change, reflow, and one year aging. *Excludes Shock/Vibration.





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1.8V ELECTRICAL CHARACTERISTICS

PARAMETERS	MAX (unless otherwise noted)
Frequency Range (F_0)	1.25 ~ 133.0 MHz
Storage Temperature Range (T_{STG})	$-55 \sim +100^{\circ}\text{C}$
Supply Voltage (V_{DD})	$1.8 \pm 5\%$
Input Current (I_{DD})	
1.25 ~ 10.0 MHz	2.5 mA
>10.0 ~ 20.0 MHz	3.5 mA
>20.0 ~ 30.0 MHz	4.0 mA
>30.0 ~ 40.0 MHz	4.5 mA
>40.0 ~ 60.0 MHz	6.0 mA
>60.0 ~ 100.0 MHz	10.0 mA
>100.0 ~ 133.0 MHz	20.0 mA
Standby Current	10 μA
Output Symmetry (50% V_{DD})	
1.25 ~ 50.0 MHz	45 % ~ 55 %
>50.0 MHz	40 % ~ 60 %
Rise/Fall Time (10%/90% V_{DD} Levels) (T_R/T_F)	10 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	10 μS
Output Enable Time ¹	10 mS

ENABLE / DISABLE FUNCTION²

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 1.8V

Frequency Stability ²	Operating Temperature ($^{\circ}\text{C}$)	Frequency Range (MHz)
$\pm 100\text{PPM}$	$-10 \sim +70$	1.25 ~ 133.0
$\pm 100\text{PPM}$	$-40 \sim +85$	1.25 ~ 133.0
$\pm 50\text{PPM}$	$-10 \sim +70$	1.25 ~ 133.0
$\pm 50\text{PPM}$	$-40 \sim +85$	1.25 ~ 133.0
$\pm 25\text{PPM}$	$-10 \sim +70$	1.25 ~ 133.0
$\pm 25\text{PPM}$	$-40 \sim +85$	1.25 ~ 133.0

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

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2.5V ELECTRICAL CHARACTERISTICS

PARAMETERS	MAX (unless otherwise noted)
Frequency Range (F_0)	1.25 ~ 170.0 MHz
Storage Temperature Range (T_{STG})	$-55 \sim +100^{\circ}\text{C}$
Supply Voltage (V_{DD})	$2.5 \pm 5\%$
Input Current (I_{DD})	
1.25 ~ 19.999999 MHz	5 mA
20.0 ~ 39.999999 MHz	9 mA
40.0 ~ 50.0 MHz	11 mA
$>50.0\text{MHz} \sim 170\text{MHz}$	30 mA
Standby Current	10 μA
Output Symmetry (50% V_{DD})	
1.25 ~ 50.0 MHz	45 % ~ 55 %
$>50.0\text{ MHz}$	40 % ~ 60 %
Rise/Fall Time (10%/90% V_{DD} Levels) (T_R/T_F)	10 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

ENABLE / DISABLE FUNCTION ²

Pin1	Output (pin 3)
OPEN ¹	Active
'1' Level $V_{IH} \geq 80\%V_{DD}$	Active
'0' Level $V_{IL} \leq 20\%V_{DD}$	High Z

• Available Options by Stability & Operating Temp for 2.5V

Frequency Stability ²	Operating Temperature ($^{\circ}\text{C}$)	Frequency Range (MHz)
$\pm 100\text{PPM}$	$-20 \sim +70$	1.25 ~ 170.0
$\pm 100\text{PPM}$	$-40 \sim +85$	1.25 ~ 170.0
$\pm 50\text{PPM}$	$-20 \sim +70$	1.25 ~ 170.0
$\pm 50\text{PPM}$	$-40 \sim +85$	1.25 ~ 170.0
$\pm 25\text{PPM}$	$-20 \sim +70$	1.25 ~ 170.0
$\pm 25\text{PPM}$	$-40 \sim +85$	1.25 ~ 170.0

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, operating temperature range, input voltage change, load change, reflow, one year aging, shock and vibration.





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3.3V ELECTRICAL CHARACTERISTICS

PARAMETERS	MAX (unless otherwise noted)
Frequency Range (F_0)	1.25 ~ 170.0 MHz
Storage Temperature Range (T_{STG})	$-55 \sim +100^{\circ}\text{C}$
Supply Voltage (V_{DD})	$3.3\text{V} \pm 5\%$
Input Current (I_{DD})	
1.25 ~ 19.999999 MHz	7 mA
20.0 ~ 39.999999 MHz	13 mA
40.0 ~ 50.0 MHz	19 mA
$>50.0 \sim 170.0$ MHz	40 mA
Standby Current	10 μA
Output Symmetry (50% V_{DD})	
1.25 ~ 50.0 MHz	45 % ~ 55 %
>50.0 MHz	40 % ~ 60 %
Rise/Fall Time (10%/90% V_{DD} Levels) (T_R/T_F)	10 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

ENABLE / DISABLE FUNCTION ²

Pin1	Output (pin 3)
OPEN ¹	Active
'1' Level $V_{IH} \geq 80\%V_{DD}$	Active
'0' Level $V_{IL} \leq 20\%V_{DD}$	High Z

• Available Options by Stability & Operating Temp for 3.3V

Frequency Stability ²	Operating Temperature ($^{\circ}\text{C}$)	Frequency Range (MHz)
$\pm 100\text{PPM}$	$-20 \sim +70$	1.25 ~ 170.0
$\pm 100\text{PPM}$	$-40 \sim +85$	1.25 ~ 170.0
$\pm 50\text{PPM}$	$-20 \sim +70$	1.25 ~ 170.0
$\pm 50\text{PPM}$	$-40 \sim +85$	1.25 ~ 170.0
$\pm 25\text{PPM}$	$-20 \sim +70$	1.25 ~ 170.0
$\pm 25\text{PPM}$	$-40 \sim +85$	1.25 ~ 170.0

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, operating temperature range, input voltage change, load change, reflow, one year aging, shock, and vibration.





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VARIABLE VOLTAGE ELECTRICAL CHARACTERISTICS

PARAMETERS	MAX (unless otherwise noted)
Frequency Range (F_0)	0.75 ~ 156.25 MHz
Storage Temperature Range (T_{STG})	$-55 \sim +125^{\circ}\text{C}$
Supply Voltage (V_{DD}) 0.75 ~ 135.0 MHz >135.0 ~ 156.25 MHz	1.7 ~ 3.63V 2.25 ~ 3.63V
Input Current (I_{DD}) 0.75 ~ 19.999 MHz 20.0 ~ 39.999 MHz 40.0 ~ 59.999 MHz 60.0 ~ 84.999 MHz 85.0 ~ 135.0 MHz >135.0 ~ 156.250 MHz	4 mA 6 mA 10 mA 15 mA 30 mA 40 mA
Standby Current	10 μA
Output Symmetry (50% V_{DD}) 0.75 ~ 84.999 MHz 85.0 ~ 156.25 MHz	45 % ~ 55 % 40 % ~ 60 %
Rise/Fall Time (10%/90% V_{DD} Levels) (T_R/T_F)	6 nS
Output Voltage (V_{OL}) (V_{OH})	10 % V_{DD} 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

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 Variable Voltage

Frequency Stability	Operating Temperature ($^{\circ}\text{C}$)	Frequency Range (MHz)
$\pm 100\text{PPM}$ ²	$-20 \sim +70$	0.75 ~ 156.25
$\pm 100\text{PPM}$ ²	$-40 \sim +85$	0.75 ~ 156.25
$\pm 50\text{PPM}$ ²	$-20 \sim +70$	0.75 ~ 156.25
$\pm 50\text{PPM}$ ²	$-40 \sim +85$	0.75 ~ 156.25
$\pm 25\text{PPM}$ ²	$-20 \sim +70$	0.75 ~ 156.25
$\pm 25\text{PPM}$ ²	$-40 \sim +85$	0.75 ~ 156.25
$\pm 20\text{PPM}$ ³	$-20 \sim +70$	0.75 ~ 156.25

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, operating temperature range, input voltage change, load change, reflow, one year aging, shock, and vibration.

³ Inclusive of 25°C tolerance, operating temperature range, input voltage change, load change, reflow, and one year aging.





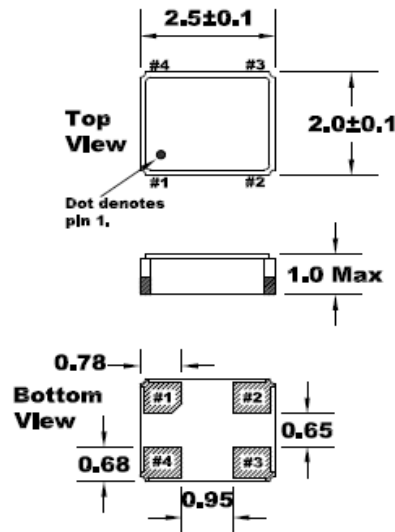
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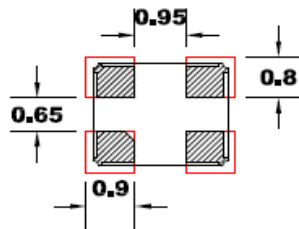
(former F210, F230, F240 Series)

DATASHEET

DIMENSIONS / MECHANICAL SPECIFICATIONS



Recommended Solder Pad Layout



All dimensions are in millimeters.

Pin Connections

#1 E/D #3 Output
#2 GND #4 V_{DD}

Maximum Soldering Temp / Time	260°C / 10 Seconds
Moisture Sensitivity Level (MSL)	1
Termination Finish	Au over Ni
Seal Method	Seam Seal
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



Title / Description: O2HS SERIES STANDARD SPECIFICATIONS	
Drawing Number:	Size: A
Part Number:	Cage: 61429
Draftsperson: MAJ	Approved: BEC
Revision Date: 03/05/2019	



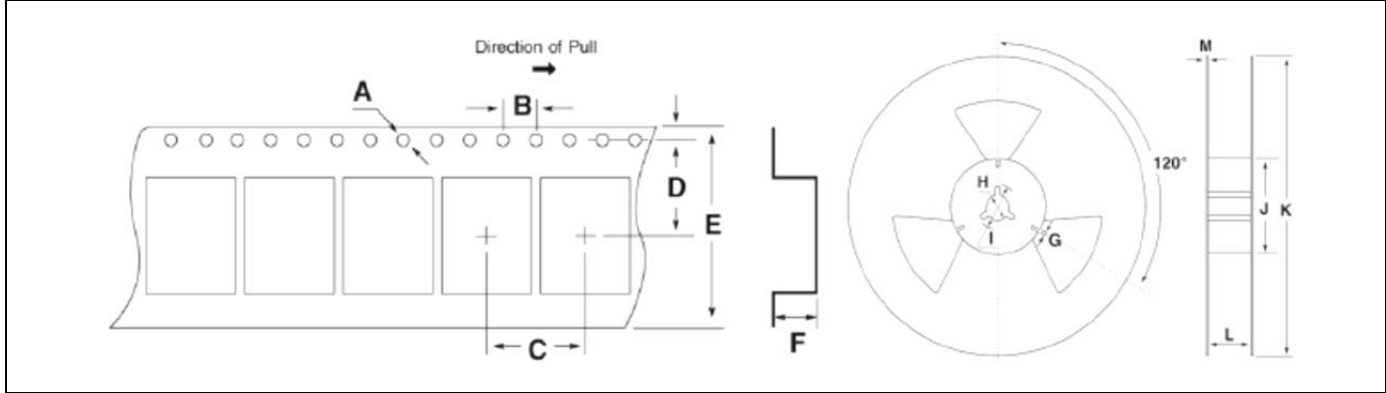
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Tape Specifications (millimeters)							Reel Specifications (millimeters)						
A	B	C	D	E	F	Reel Qty Options	G	H	I	J	K	L	M
Φ1.5	4.0	4.0	3.5	8.0	1.15	-T3 = 3,000 (default) -T1 = 1,000 -T2 = 2,000	2.0	Φ13	Φ21	Φ60	Φ180	9.0	2.0



Available Options & Part Identification*

Example: **F** **O2HS** **C** **B** **M** **25.0**

F	O2HS	C	B	M	25.0
Fox	Model Number	Voltage	Stability	Operating Temperature	Frequency (MHz)
		K = 1.8V±5% H = 2.5V±5% B = 3.3V±5% V = 1.7 to 3.63V W = 2.25 to 3.63V	A = 100 PPM B = 50 PPM D = 25 PPM E = 20 PPM	F = -20 to +70°C M = -40 to +85°C	

*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_{DD}.



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	Title / Description: O2HS SERIES STANDARD SPECIFICATIONS		
	Drawing Number:		Size: A
	Part Number:		Cage: 61429
	Draftsperson: MAJ	Approved: BEC	Revision Date: 03/05/2019