



# HCMOS 5.0x3.2mm SMD Oscillator O5HS DATASHEET

(Former F510L, F540L, F530L, F550L Series)

- HCMOS Output
- Stabilities to  $\pm 20$  PPM
- Temperature Ranges to  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$
- Supply Voltages: 1.8V; 2.5V; 3.3V; 5.0V

## 1.8V ELECTRICAL CHARACTERISTICS

PARAMETERS	MAX (unless otherwise noted)
Frequency Range ( $F_o$ )	1 ~ 160MHz
Storage Temperature Range ( $T_{STG}$ )	$-55 \sim +125^{\circ}\text{C}$
Supply Voltage ( $V_{DD}$ )	$1.8V \pm 5\%$
Input Current ( $I_{DD}$ )	
1.000 ~ 32.000MHz	5 mA
$>32.000 \sim 70.000\text{MHz}$	10 mA
$>70.000 \sim 120.000\text{MHz}$	15 mA
$>120.000 \sim 160.000\text{MHz}$	30 mA
Standby Current	10 $\mu\text{A}$
Output Symmetry (50% $V_{DD}$ )	40% ~ 60%
Rise/Fall Time (20%/80% $V_{DD}$ Levels) ( $T_R/T_F$ )	
1.000 ~ 32.000MHz	5 nS
$>32.000 \sim 120.000\text{MHz}$	3.5 nS
$>120.000 \sim 160.000\text{MHz}$	3 nS
Output Voltage ( $V_{OL}$ )	20% $V_{DD}$
( $V_{OH}$ )	80% $V_{DD}$ Min
Output Load (HCMOS)	15 pF
Start-up Time ( $T_s$ )	10 mS
Output Disable Time <sup>1</sup>	300 nS
Output Enable Time <sup>1</sup>	10 mS

## 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

Frequency Stability	Operating Temperature ( $^{\circ}\text{C}$ )	Frequency Range (MHz)
$\pm 100\text{PPM}^2$	$-10 \sim +70$	1.000 ~ 160.000
$\pm 100\text{PPM}^2$	$-20 \sim +70$	1.000 ~ 160.000
$\pm 100\text{PPM}^2$	$-40 \sim +85$	1.000 ~ 160.000
$\pm 50\text{PPM}^2$	$-10 \sim +70$	1.000 ~ 160.000
$\pm 50\text{PPM}^2$	$-20 \sim +70$	1.000 ~ 160.000
$\pm 50\text{PPM}^2$	$-40 \sim +85$	1.000 ~ 160.000
$\pm 25\text{PPM}^2$	$-10 \sim +70$	1.000 ~ 160.000
$\pm 25\text{PPM}^2$	$-20 \sim +70$	1.000 ~ 160.000
$\pm 25\text{PPM}^3$	$-40 \sim +85$	1.000 ~ 160.000
$\pm 20\text{PPM}^3$	$-10 \sim +70$	1.000 ~ 160.000
$\pm 20\text{PPM}^3$	$-20 \sim +70$	1.000 ~ 160.000

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

<sup>3</sup> Inclusive of  $25^{\circ}\text{C}$  tolerance, operating temperature range.



<b>Title / Description:</b> O5HS SERIES STANDARD SPECIFICATIONS	
<b>Drawing Number:</b> O5HS-DOC-1	<b>Revision:</b> F
<b>Part Number:</b>	<b>Cage:</b> 61429
<b>Draftsperson:</b> BEC	<b>Approved:</b> MAJ
<b>Revision Date:</b> 11/12/2020	



## 2.5V ELECTRICAL CHARACTERISTICS

PARAMETERS	MAX (unless otherwise noted)
Frequency Range (F <sub>o</sub> )	1 ~ 160 MHz
Storage Temperature Range (T <sub>STG</sub> )	-55 ~ +125°C
Supply Voltage (V <sub>DD</sub> )	2.5V±5%
Input Current (I <sub>DD</sub> )	
1.000 ~ 32.000MHz	7 mA
>32.000 ~ 50.000MHz	12 mA
>50.000 ~ 125.000MHz	26 mA
>125.000 ~ 160.000MHz	35 mA
Standby Current	10 µA
Output Symmetry (50% V <sub>DD</sub> )	
1.000 ~ 50.000MHz	45% ~ 55%
> 50.000 ~ 160.000MHz	40% ~ 60%
Rise/Fall Time (10%/90% V <sub>DD</sub> Levels) (T <sub>R</sub> /T <sub>F</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>	150 nS
Output Enable Time <sup>1</sup>	10 mS

## 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

Frequency Stability <sup>2</sup>	Operating Temperature (°C)	Frequency Range (MHz)
±100PPM <sup>2</sup>	-10 ~ +70	1.000 ~ 160.000
±100PPM <sup>2</sup>	-20 ~ +70	1.000 ~ 160.000
±100PPM <sup>2</sup>	-40 ~ +85	1.000 ~ 160.000
±50PPM <sup>2</sup>	-10 ~ +70	1.000 ~ 160.000
±50PPM <sup>2</sup>	-20 ~ +70	1.000 ~ 160.000
±50PPM <sup>2</sup>	-40 ~ +85	1.000 ~ 160.000
±25PPM <sup>2</sup>	-10 ~ +70	1.000 ~ 160.000
±25PPM <sup>2</sup>	-20 ~ +70	1.000 ~ 160.000
±25PPM <sup>3</sup>	-40 ~ +85	1.000 ~ 160.000
±20PPM <sup>3</sup>	-10 ~ +70	1.000 ~ 160.000
±20PPM <sup>3</sup>	-20 ~ +70	1.000 ~ 160.000

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

<sup>3</sup> Inclusive of 25°C tolerance, operating temperature range.





## 3.3V ELECTRICAL CHARACTERISTICS

PARAMETERS	MAX (unless otherwise noted)
Frequency Range (F <sub>o</sub> )	1 ~ 170MHz
Storage Temperature Range (T <sub>STG</sub> )	-55 ~ +125°C
Supply Voltage (V <sub>DD</sub> )	3.3V±10%
Input Current (I <sub>DD</sub> )	
1.000 ~ 32.000MHz	15 mA
>32.000 ~ 50.000MHz	20 mA
>50.000 ~ 67.000MHz	25 mA
>67.000 ~ 170.000MHz	40 mA
Standby Current	10 µA
Output Symmetry (50% V <sub>DD</sub> )	
1.000 ~ 50.000MHz	45% ~ 55%
>50.000 ~ 170.000MHz	40% ~ 60%
Rise/Fall Time (10%/90% V <sub>DD</sub> Levels) (T <sub>R</sub> /T <sub>F</sub> )	
1.000 ~ 80.000MHz	6 nS
>80.000 ~ 125.000MHz	4 nS
>125.000 ~ 170.000MHz	3 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>	150 nS
Output Enable Time <sup>1</sup>	10 mS

## 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

Frequency Stability <sup>2</sup>	Operating Temperature (°C)	Frequency Range (MHz)
±100PPM <sup>2</sup>	-10 ~ +70	1.000 ~ 170.000
±100PPM <sup>2</sup>	-20 ~ +70	1.000 ~ 170.000
±100PPM <sup>2</sup>	-40 ~ +85	1.000 ~ 170.000
±50PPM <sup>2</sup>	-10 ~ +70	1.000 ~ 170.000
±50PPM <sup>2</sup>	-20 ~ +70	1.000 ~ 170.000
±50PPM <sup>2</sup>	-40 ~ +85	1.000 ~ 170.000
±25PPM <sup>2</sup>	-10 ~ +70	1.000 ~ 170.000
±25PPM <sup>2</sup>	-20 ~ +70	1.000 ~ 170.000
±25PPM <sup>3</sup>	-40 ~ +85	1.000 ~ 170.000
±20PPM <sup>3</sup>	-10 ~ +70	1.000 ~ 170.000
±20PPM <sup>3</sup>	-20 ~ +70	1.000 ~ 170.000

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

<sup>3</sup> Inclusive of 25°C tolerance, operating temperature range.



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## 5.0 V ELECTRICAL CHARACTERISTICS

PARAMETERS	MAX (unless otherwise noted)
Frequency Range (F <sub>o</sub> )	1.544 ~ 50MHz
Storage Temperature Range (T <sub>STG</sub> )	-55 ~ +125°C
Supply Voltage (V <sub>DD</sub> )	5.0V ± 10%
Input Current (I <sub>DD</sub> )	35 mA
Output Symmetry (50% V <sub>DD</sub> )	40% ~ 60%
Rise/Fall Time (10%/90% V <sub>DD</sub> Levels) (T <sub>R</sub> /T <sub>F</sub> )	10 nS
Output Voltage (V <sub>OL</sub> ) (V <sub>OH</sub> )	10% V <sub>DD</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>	100 nS
Output Enable Time <sup>1</sup>	100 nS

## 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 5.0V

Frequency Stability <sup>2</sup>	Operating Temperature (°C)	Frequency Range (MHz)
±100PPM <sup>2</sup>	-10 ~ +70	1.544 ~ 50.000
±100PPM <sup>2</sup>	-40 ~ +85	1.544 ~ 50.000
±50PPM <sup>2</sup>	-10 ~ +70	1.544 ~ 50.000
±50PPM <sup>2</sup>	-40 ~ +85	1.544 ~ 50.000
±25PPM <sup>2</sup>	-10 ~ +70	1.544 ~ 50.000
±25PPM <sup>3</sup>	-40 ~ +85	1.544 ~ 50.000
±20PPM <sup>3</sup>	-10 ~ +70	1.544 ~ 50.000

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

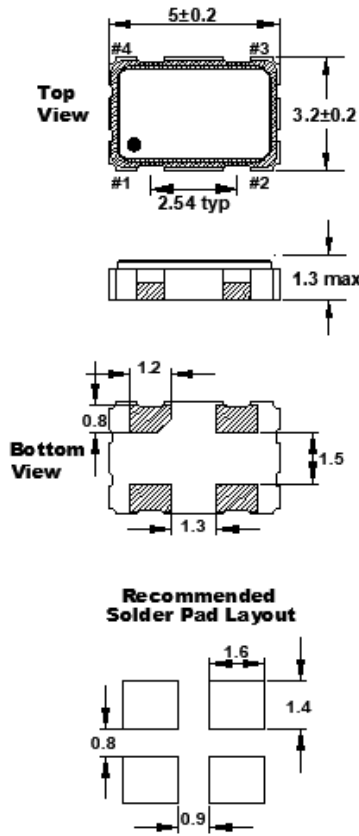
<sup>3</sup> Inclusive of 25°C tolerance, operating temperature range.



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## DIMENSIONS / MECHANICAL SPECIFICATIONS



Dimensions in millimeters

### Pin Connections

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

Maximum Soldering Temp / Time	260°C / 10 Seconds x 2
Moisture Sensitivity Level (MSL) per J-STD-033	N/A
Termination Finish	Au (0.3~1µm) over Ni (1.27~8.89µm)
Seal Method	Seam
Lead (Pb) Free	Yes
ROHS/REACH Compliant	Yes

### Notes:

\*A 0.01µF capacitor should be placed between V<sub>DD</sub> (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

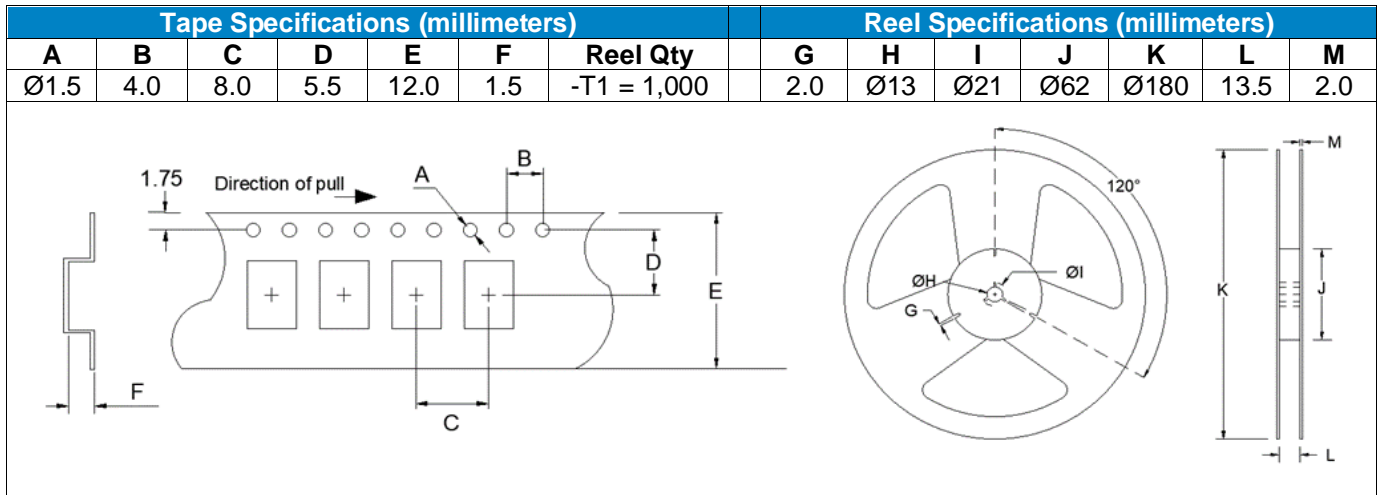


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# HCMOS 5.0x3.2mm SMD Oscillator O5HS DATASHEET

(Former F510L, F540L, F530L, F550L Series)



### Available Options & Part Identification\*

Example: F O5HS C B M 25.0

F	O5HS	C	B	M	25.0
Fox	Model Number	Voltage K = 1.8V±5% H = 2.5V±5% <b>C = 3.3V±10%</b> A = 5.0V±10%	Stability A = ±100 PPM <b>B = ±50 PPM</b> D = ±25 PPM E = ±20 PPM	Operating Temperature E = -10 to +70°C F = -20 to +70°C <b>M = -40 to +85°C</b>	Frequency

\*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>.



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