



HCMOS 7x5mm SMD Oscillator

O7HS

(former F4500, F4400, F4100 Series)

DATASHEET

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

1.8V ELECTRICAL CHARACTERISTICS

| PARAMETERS | MAX (unless otherwise noted) |
|--|---------------------------------|
| Frequency Range (F_0) | 0.012 ~ 160.000MHz |
| Storage Temperature Range (T_{STG}) | $-55 \sim +125^{\circ}\text{C}$ |
| Supply Voltage (V_{DD}) | $1.8V \pm 5\%$ |
| Input Current (I_{DD}) | |
| 0.012 ~ 32.000MHz | 5 mA |
| >32.000 ~ 70.000MHz | 10 mA |
| >70.000 ~ 120.000MHz | 15 mA |
| >120.000 ~ 160.000MHz | 30 mA |
| Standby Current | 10 μA |
| Output Symmetry (50% V_{DD}) | 40% ~ 60% |
| Rise/Fall Time (20%/80% V_{DD} Levels) (T_R/T_F) | |
| 0.012 ~ 32.000MHz | 5.0 nS |
| >32.000 ~ 120.000MHz | 3.5 nS |
| >120.000 ~ 160.000MHz | 3.0 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 ¹ | 300 nS |
| Output Enable Time ¹ | 10 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 1.8V

| Frequency Stability | Operating Temperature ($^{\circ}\text{C}$) | Frequency Range (MHz) |
|-----------------------|--|-----------------------|
| $\pm 100\text{PPM}^2$ | $-10 \sim +70$ | 0.012 ~ 160.000 |
| $\pm 100\text{PPM}^2$ | $-20 \sim +70$ | 0.012 ~ 160.000 |
| $\pm 100\text{PPM}^2$ | $-40 \sim +85$ | 0.012 ~ 160.000 |
| $\pm 50\text{PPM}^2$ | $-10 \sim +70$ | 0.012 ~ 160.000 |
| $\pm 50\text{PPM}^2$ | $-20 \sim +70$ | 0.012 ~ 160.000 |
| $\pm 50\text{PPM}^2$ | $-40 \sim +85$ | 0.012 ~ 160.000 |
| $\pm 25\text{PPM}^2$ | $-10 \sim +70$ | 0.012 ~ 160.000 |
| $\pm 25\text{PPM}^2$ | $-20 \sim +70$ | 0.012 ~ 160.000 |
| $\pm 25\text{PPM}^3$ | $-40 \sim +85$ | 0.012 ~ 160.000 |
| $\pm 20\text{PPM}^3$ | $-10 \sim +70$ | 0.012 ~ 160.000 |
| $\pm 20\text{PPM}^3$ | $-20 \sim +70$ | 0.012 ~ 160.000 |

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

³ Inclusive of 25°C tolerance, operating temperature range.



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| | | |
|---|----------------------|----------------------------------|
| Title / Description: O7HS SERIES STANDARD SPECIFICATIONS | | |
| Drawing Number: O7HS-DOC-1 | | Size: A |
| Part Number: | | Cage: 61429 |
| Draftsperson: BEC | Approved: MAJ | Revision Date: 01/13/2020 |



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2.5V ELECTRICAL CHARACTERISTICS

| PARAMETERS | MAX (unless otherwise noted) |
|---|------------------------------|
| Frequency Range (F _o) | 0.012 ~ 170.000MHz |
| Storage Temperature Range (T _{STG}) | -55 ~ +125°C |
| Supply Voltage (V _{DD}) | 2.5V±5% |
| Input Current (I _{DD}) | |
| 0.012 ~ 32.000MHz | 7mA |
| >32.000 ~ 50.000MHz | 12mA |
| >50.000 ~ 125.000MHz | 26mA |
| >125.000 ~ 160.000MHz | 35mA |
| >160.000 ~ 170.000MHz | 40mA |
| Standby Current | 10µA |
| Output Symmetry (50% V _{DD}) | |
| 0.012 ~ 50.000MHz | 45% ~ 55% |
| >50.000 ~ 200.000MHz | 40% ~ 60% |
| Rise/Fall Time (10%/90% V _{DD} Levels) (T _R /T _F) | 5nS |
| Output Voltage (V _{OL}) | 10%V _{DD} |
| (V _{OH}) | 90%V _{DD} Min |
| Output Load (HCMOS) | 15pF |
| Start-up Time (T _s) | 10mS |
| Output Disable Time ¹ | 150nS |
| Output Enable Time ¹ | 10mS |

ENABLE / DISABLE FUNCTION

| Pin1 | Output (pin 3) |
|--|----------------|
| OPEN ¹ | Active |
| '1' Level V _{IH} ≥ 70%V _{DD} | Active |
| '0' Level V _{IL} ≤ 30%V _{DD} | High Z |

• Available Options by Stability & Operating Temp for 2.5V

| Frequency Stability | Operating Temperature (°C) | Frequency Range (MHz) |
|----------------------|----------------------------|-----------------------|
| ±100PPM ² | -10 ~ +70 | 0.012 ~ 170.000 |
| ±100PPM ² | -20 ~ +70 | 0.012 ~ 170.000 |
| ±100PPM ² | -40 ~ +85 | 0.012 ~ 170.000 |
| ±50PPM ² | -10 ~ +70 | 0.012 ~ 170.000 |
| ±50PPM ² | -20 ~ +70 | 0.012 ~ 170.000 |
| ±50PPM ² | -40 ~ +85 | 0.012 ~ 170.000 |
| ±25PPM ² | -10 ~ +70 | 0.012 ~ 170.000 |
| ±25PPM ² | -20 ~ +70 | 0.012 ~ 170.000 |
| ±25PPM ² | -40 ~ +85 | 0.012 ~ 170.000 |
| ±25PPM ³ | -10 ~ +70 | 0.012 ~ 170.000 |
| ±25PPM ³ | -20 ~ +70 | 0.012 ~ 170.000 |
| ±25PPM ³ | -40 ~ +85 | 0.012 ~ 170.000 |
| ±20PPM ³ | -10 ~ +70 | 0.012 ~ 170.000 |
| ±20PPM ³ | -20 ~ +70 | 0.012 ~ 170.000 |
| ±20PPM ³ | -40 ~ +85 | 0.012 ~ 170.000 |

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

³ Inclusive of 25°C tolerance, operating temperature range.



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3.3V ELECTRICAL CHARACTERISTICS

| PARAMETERS | MAX (unless otherwise noted) |
|---|------------------------------|
| Frequency Range (F _o) | 0.012 ~ 170.000MHz |
| Storage Temperature Range (T _{STG}) | -55 ~ +125°C |
| Supply Voltage (V _{DD}) | 3.3V±10% |
| Input Current (I _{DD}) | |
| 0.012 ~ 0.040MHz | 3 mA |
| >0.040 ~ 1.500MHz | 6 mA |
| >1.500 ~ 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 _{DD}) | |
| 0.012 ~ 50.000MHz | 45% ~ 55% |
| >50.000 ~ 170.000MHz | 40% ~ 60% |
| Rise/Fall Time (10%/90% V _{DD} Levels) (T _R /T _F) | |
| 0.012 ~ 80.000MHz | 6 nS |
| >80.000 ~ 125.000MHz | 4 nS |
| >125.000 ~ 170.000MHz | 3 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 | 150 nS |
| Output Enable Time ¹ | 10 mS |

ENABLE / DISABLE FUNCTION

| Pin1 | Output (pin 3) |
|--|----------------|
| OPEN ¹ | Active |
| '1' Level V _{IH} ≥ 70%V _{DD} | Active |
| '0' Level V _{IL} ≤ 30%V _{DD} | High Z |

• Available Options by Stability & Operating Temp for 3.3V

| Frequency Stability | Operating Temperature (°C) | Frequency Range (MHz) |
|----------------------|----------------------------|-----------------------|
| ±100PPM ² | -10 ~ +70 | 0.012 ~ 170.000 |
| ±100PPM ² | -20 ~ +70 | 0.012 ~ 170.000 |
| ±100PPM ² | -40 ~ +85 | 0.012 ~ 170.000 |
| ±50PPM ² | -10 ~ +70 | 0.012 ~ 170.000 |
| ±50PPM ² | -20 ~ +70 | 0.012 ~ 170.000 |
| ±50PPM ² | -40 ~ +85 | 0.012 ~ 170.000 |
| ±25PPM ² | -10 ~ +70 | 0.012 ~ 170.000 |
| ±25PPM ² | -20 ~ +70 | 0.012 ~ 170.000 |
| ±25PPM ³ | -40 ~ +85 | 0.012 ~ 170.000 |
| ±20PPM ³ | -10 ~ +70 | 0.012 ~ 170.000 |
| ±20PPM ³ | -20 ~ +70 | 0.012 ~ 170.000 |

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

³ Inclusive of 25°C tolerance, operating temperature range.



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DIMENSIONS / MECHANICAL SPECIFICATIONS



Recommended Solder Pad Layout



Dimensions in mm

Pin Connections

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

| | |
|----------------------------------|------------------------|
| Maximum Soldering Temp / Time | 260°C / 10 Seconds x 2 |
| 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 | 8.0 | 7.5 | 16.0 | 2.15 | -T1 = 1,000 -T2 = 2,000 | 2.0 | Ø13 | Ø21 | Ø80 | Ø255 | 17.5 | 2.0 |



Available Options & Part Identification*

Example: **F** O7HS **C** **B** **M** **25.0**

| F | O7HS | C | B | M | 25.0 |
|-----|--------------|---|--|---|----------------|
| Fox | Model Number | Voltage | Stability | Operating Temperature | Frequency(MHz) |
| | | K = 1.8V±5% H = 2.5V±5% C = 3.3V±10% | A = ±100PPM B = ±50PPM D = ±25PPM E = ±20PPM | E = -10 to +70°C 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 VDD.



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