



2.5x2.0mm 32.768kHz SMD Oscillator

O2HK

(former FK21x, FK23x, FK24x Series)

DATASHEET

- HCMOS Output
- Stabilities to ± 20 PPM
- Temperature Ranges as wide as -40°C to $+85^{\circ}\text{C}$
- Supply Voltages: 1.8V; 2.5V; 3.3V; Variable (1.70 ~ 3.63V)

1.8V ELECTRICAL CHARACTERISTICS

PARAMETERS	MAX (unless otherwise noted)
Frequency (F_0)	32.768 kHz
Storage Temperature Range (T_{STG})	$-55 \sim +125^{\circ}\text{C}$
Supply Voltage (V_{DD})	$1.8\text{V} \pm 10\%$
Input Current (I_{DD})	120 μA
Standby Current	10 μA
Output Symmetry (50% V_{DD})	45% ~ 55%
Rise/Fall Time (10%~90% V_{DD} Levels) ($T_{\text{R}}/T_{\text{F}}$)	50 nS
Output Voltage (V_{OL})	10% V_{DD}
(V_{OH})	90% V_{DD} Min
Output Load (HCMOS)	15 pF
Start-up Time (T_{S})	3 mS
Output Disable Time ¹	1 μS
Output Enable Time ¹	3 mS

ENABLE/DISABLE FUNCTION

Pin 1	Output (pin3)
Open ¹	Active
'1' Level $V_{\text{IH}} \geq 70\% V_{\text{DD}}$	Active
'0' Level $V_{\text{IL}} \leq 30\% V_{\text{DD}}$	High Z

Frequency Stability	Operating Temperature ($^{\circ}\text{C}$)
$\pm 50\text{PPM}^2$	$-20 \sim +70$
$\pm 50\text{PPM}^2$	$-40 \sim +85$
$\pm 25\text{PPM}^2$	$-20 \sim +70$
$\pm 25\text{PPM}^3$	$-40 \sim +85$
$\pm 20\text{PPM}^3$	$-10 \sim +60$

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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2.5V ELECTRICAL CHARACTERISTICS

PARAMETERS	MAX (unless otherwise noted)
Frequency (F _O)	32.768 kHz
Storage Temperature Range (T _{STG})	-55 ~ +125°C
Supply Voltage (V _{DD})	2.5V±10%
Input Current (I _{DD})	126 µA
Standby Current	10 µA
Output Symmetry (50%V _{DD})	45% ~ 55%
Rise/Fall Time (10%~90%V _{DD} Levels) (T _R /T _F)	50 nS
Output Voltage (V _{OL}) (V _{OH})	10% V _{DD} 90% V _{DD} Min
Output Load (HCMOS)	15 pF
Start-up Time (T _S)	3 mS
Output Disable Time ¹	1 µS
Output Enable Time ¹	3 mS

ENABLE/DISABLE FUNCTION

Pin 1	Output (pin3)
Open ¹	Active
'1' Level V _{IH} ≥70%V _{DD}	Active
'0' Level V _{IL} ≤30%V _{DD}	High Z

Frequency Stability	Operating Temperature (°C)
±50PPM ²	-20 ~ +70
±50PPM ²	-40 ~ +85
±25PPM ²	-20 ~ +70
±25PPM ³	-40 ~ +85
±20PPM ³	-10 ~ +60

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 (F _o)	32.768 kHz
Storage Temperature Range (T _{STG})	-55 ~ +125°C
Supply Voltage (V _{DD})	3.3V±10%
Input Current (I _{DD})	130 µA
Standby Current	10 µA
Output Symmetry (50%V _{DD})	45% ~ 55%
Rise/Fall Time (10%~90%V _{DD} Levels) (T _R /T _F)	50 nS
Output Voltage (V _{OL}) (V _{OH})	10% V _{DD} 90% V _{DD} Min
Output Load (HCMOS)	15 pF
Start-up Time (T _S)	3 mS
Output Disable Time ¹	1 µS
Output Enable Time ¹	3 mS

ENABLE/DISABLE FUNCTION

Pin 1	Output (pin3)
Open ¹	Active
'1' Level V _{IH} ≥70%V _{DD}	Active
'0' Level V _{IL} ≤30%V _{DD}	High Z

Frequency Stability	Operating Temperature (°C)
±50PPM ²	-20 ~ +70
±50PPM ²	-40 ~ +85
±25PPM ²	-20 ~ +70
±25PPM ³	-40 ~ +85
±20PPM ³	-10 ~ +60

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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VARIABLE VOLTAGE ELECTRICAL CHARACTERISTICS

PARAMETERS	MAX (unless otherwise noted)
Frequency (F_o)	32.768 kHz
Storage Temperature Range (T_{STG})	-55 ~ +125°C
Supply Voltage (V_{DD})	1.7V ~ 3.63V
Input Current (I_{DD})	130 μ A
Standby Current	10 μ A
Output Symmetry (50% V_{DD})	45% ~ 55%
Rise/Fall Time (10%~90% V_{DD} Levels) (T_R/T_F)	50 nS
Output Voltage (V_{OL})	10% V_{DD}
(V_{OH})	90% V_{DD} Min
Output Load (HCMOS)	15 pF
Start-up Time (T_S)	3 mS
Output Disable Time ¹	1 μ S
Output Enable Time ¹	3 mS

ENABLE/DISABLE FUNCTION

Pin 1	Output (pin3)
Open ¹	Active
'1' Level $V_{IH} \geq 70\%V_{DD}$	Active
'0' Level $V_{IL} \leq 30\%V_{DD}$	High Z

Frequency Stability	Operating Temperature (°C)
$\pm 50\text{PPM}^2$	-20 ~ +70
$\pm 50\text{PPM}^2$	-40 ~ +85
$\pm 25\text{PPM}^2$	-20 ~ +70
$\pm 25\text{PPM}^3$	-40 ~ +85
$\pm 20\text{PPM}^3$	-10 ~ +60

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.





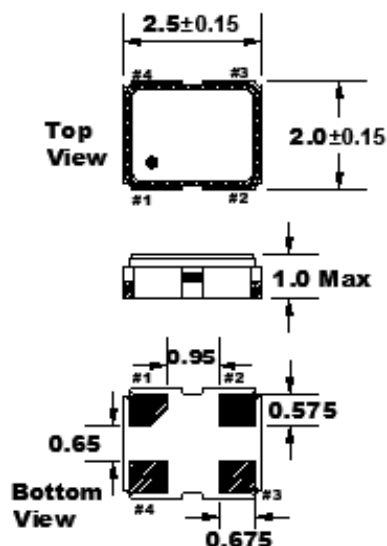
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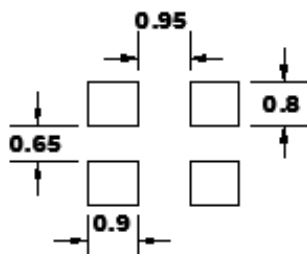
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DIMENSIONS / MECHANICAL SPECIFICATIONS



Recommended Solder Pad Layout



Dimensions are in millimeters.

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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Title / Description: O2HK SERIES STANDARD SPECIFICATIONS

Drawing Number: O2HK-DOC-1

Part Number:

Draftsperson: MAJ

Size: A

Cage: 61429

Approved: BEC

Revision Date: 02/25/2020



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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	1.4	-T3 = 3,000 -T2 = 2,000 -T1 = 1,000	2.5	Ø13	Ø22	Ø60	Ø178	8.0	1.6

Available Options & Part Identification

Example: **F O2HK L B M 0.032768**

F	O2HK	L	B	M	0.032768
Fox	Model Number	Voltage L = 1.8V±10% J = 2.5V±10% C = 3.3V±10% V = 1.7V ~ 3.63V	Stability B = ±50 PPM D = ±25 PPM E = ±20 PPM	Operating Temperature D = -10 ~ +60°C F = -20 ~ +70°C M = -40 ~ +85°C	Frequency



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