

Features

- 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 (1.6V ~ 3.63V)

1.8V ELECTRICAL CHARACTERISTICS	
PARAMETERS	MAX (Unless otherwise noted)
Frequency Range (F_0)	32.768 kHz
Temperature Range	
Storage (T_{STG})	$-55^{\circ}\text{C} \sim +125^{\circ}\text{C}$
Supply Voltage (V_{DD})	$1.8\text{V} \pm 5\%$
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_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 μS
Output Enable Time ¹	3 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 ($^{\circ}\text{C}$)
$\pm 50\text{PPM}^2$	$-20 \sim +70$
$\pm 100\text{PPM}^2$	$-40 \sim +85$
$\pm 100\text{PPM}^2$	$-20 \sim +70$
$\pm 50\text{PPM}^3$	$-40 \sim +85$
$\pm 50\text{PPM}^3$	$-10 \sim +60$

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 and operating temperature range.

2.5V ELECTRICAL CHARACTERISTICS	
PARAMETERS	MAX (Unless otherwise noted)
Frequency Range (F_0)	32.768 kHz
Temperature Range	
Storage (T_{STG})	-55°C ~ +125°C
Supply Voltage (V_{DD})	2.5V±10%
Input Current (I_{DD})	126 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	
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 2.5V	
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 and operating temperature range.

3.3V ELECTRICAL CHARACTERISTICS	
PARAMETERS	MAX (Unless otherwise noted)
Frequency Range (F _o)	32.768 kHz
Temperature Range	
Storage (T _{STG})	-55°C ~ +125°C
Supply Voltage (V _{DD})	3.3V±5%
Input Current (I _{DD})	130μA
Standby Current	10μA
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	1μA
Output Enable Time ¹	3 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)
±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 and operating temperature range.

VARIABLE VOLTAGE ELECTRICAL CHARACTERISTICS	
PARAMETERS	MAX (Unless otherwise noted)
Frequency Range (F_0)	32.768 kHz
Temperature Range	
Storage (T_{STG})	-55°C ~ +125°C
Supply Voltage (V_{DD})	1.6V ~ 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 A
Output Enable Time ¹	3 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

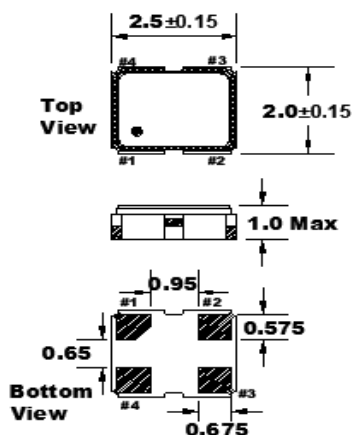
Available Options by Stability & Operating Temp	
Frequency Stability	Operating Temperature (°C)
$\pm 50\text{PPM}^2$	-20 ~ +70
$\pm 50\text{PPM}^2$	-40 ~ +85
$\pm 25\text{PPM}^2$	-20 ~ +70
$\pm 25\text{PPM}^3$	-40 ~ +85
$\pm 20\text{PPM}^3$	-10 ~ +60

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

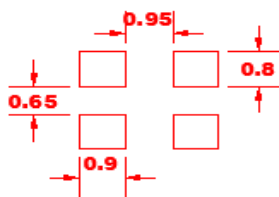
² Inclusive of 25°C tolerance, operating temperature range, input voltage change, load change, Reflow, one-year aging, shock, and vibration.

³ Inclusive of 25°C tolerance 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

Note:

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

2, Dimensional drawing is for reference to critical specifications defined by size measurements. Certain non-critical visual attributes, such as side castellations, etc. may vary.

STANDARD SPECIFICATIONS

PARAMETERS	MAX (Unless otherwise noted)
Maximum Soldering Temp / Time	260°C / 10 Seconds x 2
Moisture Sensitivity Level (MSL)	1
Termination Finish	Au (0.3~1μm) over Ni (1.27~8.89μm)
Seal Method	Seam
Lead (Pb) Free	Yes
ROHS/REACH Compliant	Yes

FO2HK

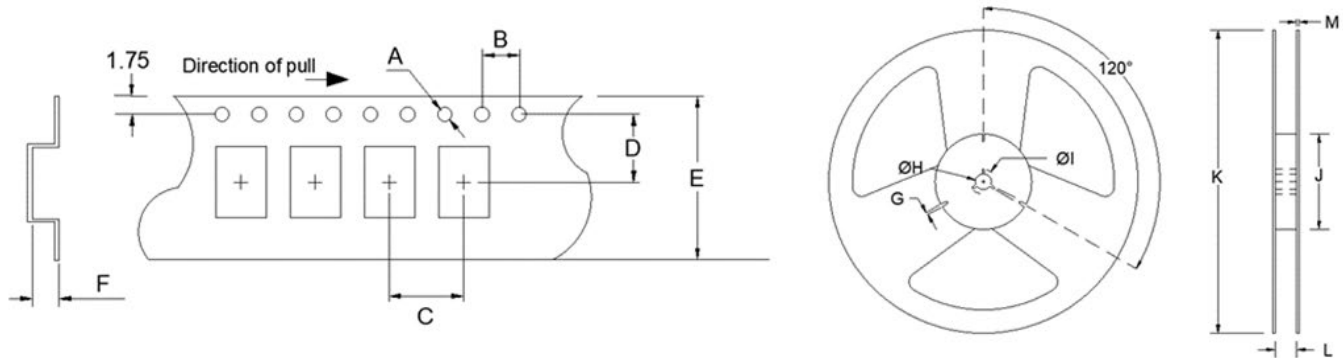
(Former FK21x, FK23x, FK24x,)

2.5mm x 2.0mm

SMD Oscillator



TAPE SPECIFICATIONS (mm)							REEL SPECIFICATIONS (mm)						
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	2.5	ø13	ø22	ø60	ø178	8.0	1.6



Available Options & Part Identification*

Sample PN: **FO2HKLBM0.032768-T3**

F	O2HK	L	B	M	0.032768	-T3
<u>Fox</u>	<u>Model Number</u>	<u>Voltage</u> L = 1.8V±10% J = 2.5V±10% C = 3.3V±10% V = 1.6V ~ 3.63V	<u>Stability</u> B = ±50 PPM D = ±25 PPM E = ±20 PPM	<u>Operating Temperature</u> D = -10 ~ +60°C F = -20 ~ +70°C M = -40 ~ +85°C	<u>Frequency (MHz)</u>	<u>Values Added Options</u> Blank = Bulk T1 = 1,000 pcs T2 = 2,000 pcs T3 = 3,000 pcs

Reliability Test Conditions

Please contact Abracon Quality Assurance department

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ABRACON:

[FO2HKLDM0.032768-T3](#) [FO2HKCDM0.032768-T3](#) [FO2HKCED0.032768-T3](#) [FO2HKJDM0.032768-T3](#)
[FO2HKLDM0.032768-T1](#) [FO2HKCBF0.032768-T3](#) [FO2HKCBM0.032768-T3](#) [FO2HKLBM0.032768-T1](#)
[FO2HKCBM0.032768-T1](#) [FO2HKLBM0.032768-T3](#) [FO2HKVDM0.032768-T1](#) [FO2HKVDM0.032768-T3](#)