



A Product Line of  
Diodes Incorporated



## SPECIFICATION FOR APPROVAL

CUSTOMER	_____
NOMINAL FREQUENCY	50.000000 MHz
HOLDER TYPE	TYPE FK 3.2x2.5 SEAM SEALED CRYSTAL CLOCK OSCILLATOR
SPEC. NO. ( P/N )	FK5000021
CUSTOMER P/N	_____
ISSUE DATE	June 1, 2018
VERSION	C

APPROVED	PREPARED	QA
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### Diodes Incorporated

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- \*Pb-free
- \*RoHS Compliant
- \*HF-Halogen Free
- \*REACH Compliant



# TYPE FK 3.2x2.5 SEAM SEALED CRYSTAL CLOCK OSCILLATOR

**FK5000021**

VER. C 1-Jun-18

## ELECTRICAL SPECIFICATIONS

**SRe Part Number : FK5000021**

Item	Symbol	Specifications	Units	Notes
Nominal Frequency	Fo	50.000000	MHz	
Frequency Stability	FT	± 25	ppm	**See note
Operating Temperature Range	TR	-40 to +85	°C	
Supply Voltage	V <sub>DD</sub>	+2.5 ± 5.0%	V	
Logic Type	LT	LVC MOS		
Supply Current, Output Enabled	I <sub>DD</sub> /OE	8	mA	Max.
Supply Current, Output Disabled	I <sub>DD</sub> /OD	10	µA	Max.
Duty Cycle (Symmetry)	DC/SY	45 / 55	%	Measured 50% of Waveform
Rise / Fall Time	T <sub>R</sub> /T <sub>F</sub>	5	ns	Max. measured 10/90% of Waveform
Output Voltage "0" Level	V <sub>OL</sub>	10% V <sub>DD</sub>	V	Max at I <sub>OL</sub> = 4.0mA Min.
Output Voltage "1" Level	V <sub>OH</sub>	90% V <sub>DD</sub>	V	Min at I <sub>OH</sub> = -4.0mA Max.
Output Load	CL	15	pF	Max.
Jitter, Phase	RMS	350	fs	Max. 12KHz ~ 20MHz Frequency Band
Jitter, Accumulated	RMS(1-σ)	5	ps	Max. 20,000 Consecutive Periods
Jitter, Peak to Peak	Pk-Pk	30	ps	Max. 100,000 Random Periods
Phase Noise Typ. at 10Hz offset		-80	dBc/Hz	Typ. at 10Hz offset
Phase Noise Typ. at 100Hz offset		-110	dBc/Hz	Typ. at 100Hz offset
Phase Noise Typ. at 1KHz offset		-133	dBc/Hz	Typ. at 1kHz offset
Phase Noise Typ. at 10KHz offset		-145	dBc/Hz	Typ. at 10kHz offset
Phase Noise Typ. at 100KHz offset		-150	dBc/Hz	Typ. at 100kHz offset
Phase Noise Typ. at 1MHz offset		-155	dBc/Hz	Typ. at 1MHz offset
Start Up Time		10	ms	Max.
Storage Temperature Range		-55 to +125	°C	

\* This product doesn't include harmful substance that stipulated by SONY SS-00259 Level 1 and S-AT2-001 Level 1 standard. RoHS Compliant (Pb - Free).

**\*\*Stability includes all combinations of Operating Temperature, Load changes, rated Input (Supply) Voltage changes, Initial Calibration Tolerance (25°C), Aging (1 year at 25°C Average Effective Ambient Temperature), Shock and Vibration.**

### Output Enable / Disable Function

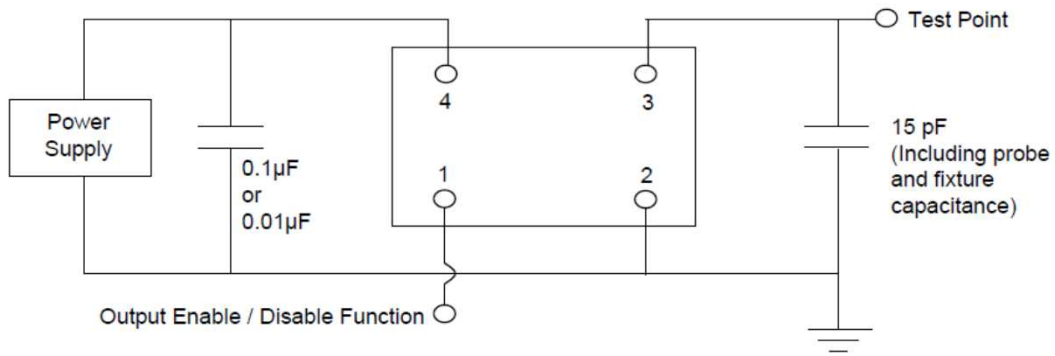
Parameter	Min.	Typ.	Max.	Units	Notes
Input Voltage (Pin1), Output Enable	0.7V <sub>DD</sub>			V	Or Open
Input Voltage (Pin1), Output Disable (low power standby)			0.3V <sub>DD</sub>	V	Output is Hi-Z
Output Disable Delay			200	ns	
Output Enable Delay			200	ns	

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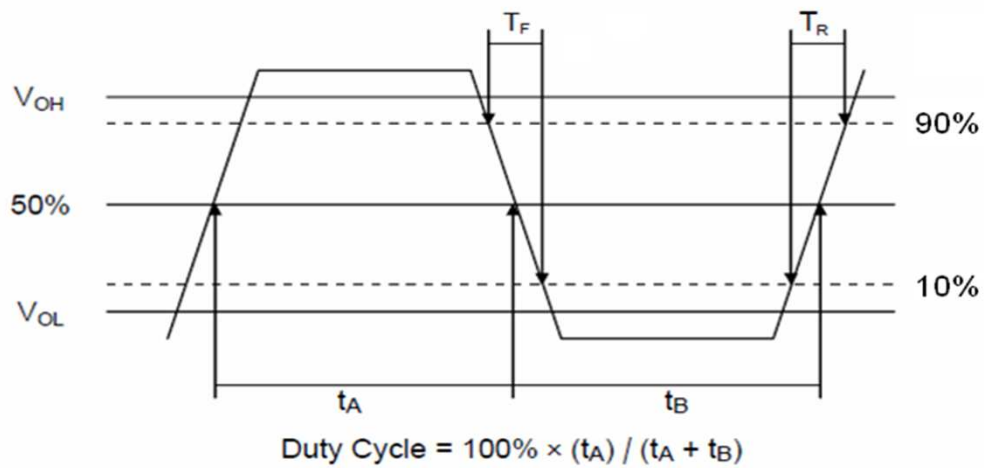
**FK5000021**

VER. C 1-Jun-18

## TEST CIRCUIT



## OUTPUT WAVEFORM



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**FK5000021**

VER. C 1-Jun-18

## RELIABILITY SPECIFICATIONS

### ENVIRONMENTAL:

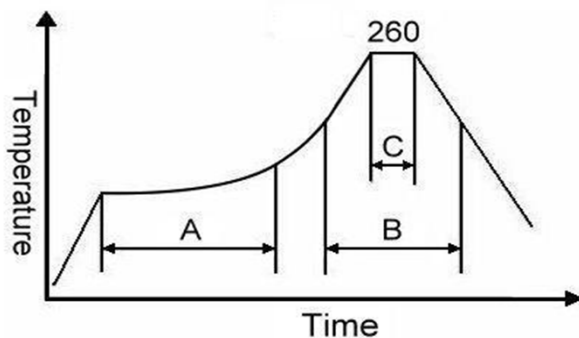
- a) THERMAL SHOCK: MIL-STD-883, Method 1011, Condition A
- b) MOISTURE RESISTANCE: MIL-STD-883, Method 1004
- c) VIBRATION: MIL-STD-883, Method 2007, Condition A
- d) RESISTANCE TO SOLDERING HEAT: J-STD-020D Table 5-2 Pb-free devices  
(except 2 cycles max)
- e) HAZARDOUS SUBSTANCE: Pb - free and RoHS Compliant.

### MECHANICAL:

- a) SHOCK: MIL-STD-883, Method 2002, Condition B
- b) SOLDERABILITY: JESD22-B102-D Method 2 (Preconditioning E)
- c) TERMINAL STRENGTH: MIL-STD-883, Method 2004, Test Condition D
- d) GROSS LEAK: MIL-STD-883, Method 1014, Condition C
- e) FINE LEAK: MIL-STD-883, Method 1014, Condition A2,  $R1=2 \times 10^{-8}$  atm cc/s
- f) SOLVENT RESISTANCE: MIL-STD-202, Method 215

## SUGGESTED IR REFLOW PROFILE

\*As per IPC-JEDEC J-STD-020D



Note:

	Stage	Temperature	Time
A	Preheat	150~200°C	60~120 Sec
B	Primary Heat	217°C	60~150 Sec
C	Peak	260°C	10 Sec

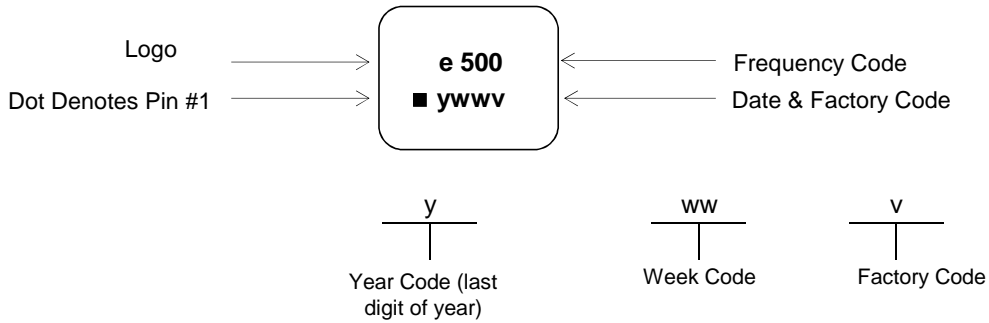


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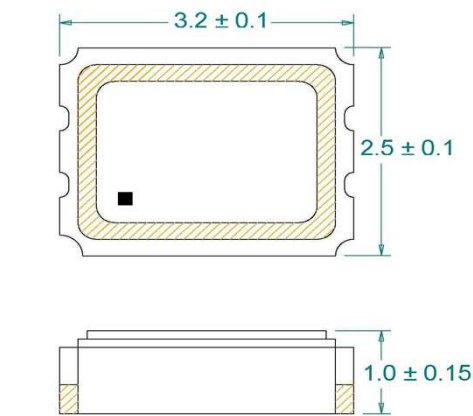
**FK5000021**

VER. C 1-Jun-18

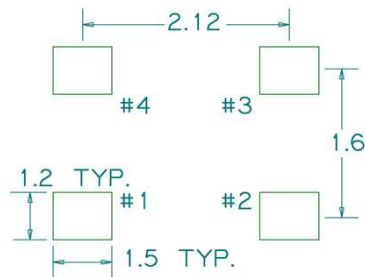
## MARKING



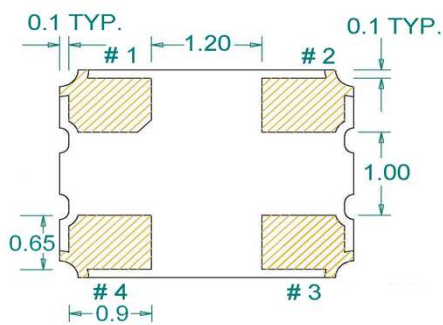
## MECHANICAL DRAWINGS ( Scale: None. Dimensions are in mm.)



### Recommended Land Pattern\*



\*External high-frequency power decoupling is recommended.(see test circuit for minimum recommendation). To ensure optimal performance, do not route traces beneath the package.



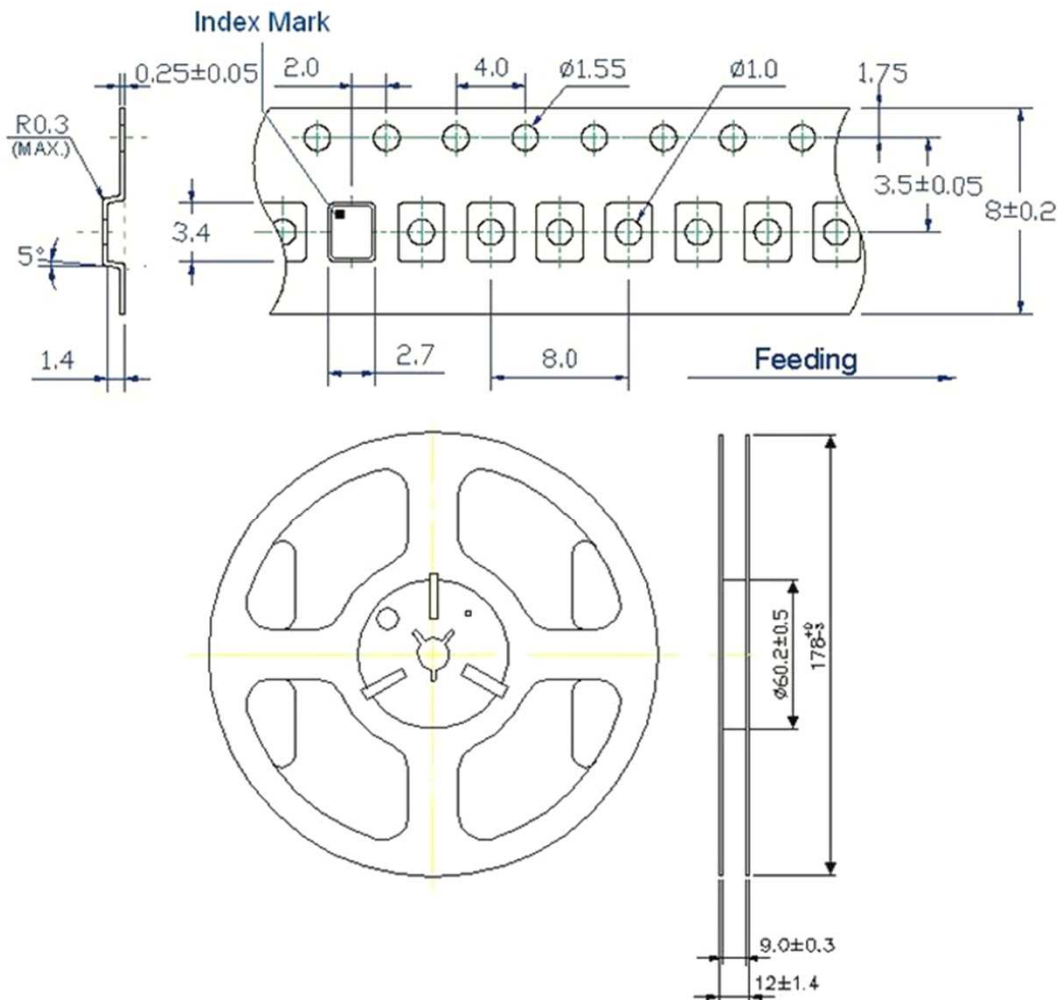
Pin	Function
1	OE
2	Ground
3	Clock Output
4	V <sub>DD</sub>

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VER. C 1-Jun-18

## TAPE&REEL



1. 230mm minimum leader which consist of carrier and/or tape followed by a minimum of 160mm of empty carrier tape sealed with cover tape.
2. 160mm minimum trailer of empty carrier tape sealed with cover tape.

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FK5000021

VER. C 1-Jun-18

## PACKING

