



A Product Line of
Diodes Incorporated



SPECIFICATION FOR APPROVAL

CUSTOMER

NOMINAL FREQUENCY

24.000000 MHz

HOLDER TYPE

TYPE FK 3.2x2.5 SEAM SEALED CRYSTAL CLOCK OSCILLATOR

SPEC. NO. (P/N)

FK2400013

CUSTOMER P/N

ISSUE DATE

January 11, 2018

VERSION

F

APPROVED	PREPARED	QA
		

Diodes Incorporated

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*Pb-free

*RoHS Compliant

*HF-Halogen Free

*REACH Compliant

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VERSION HISTORY

Version No.	Version Date	Description	Notes
A	Feb.23,2009	Initial Release	
B	Jun.5,2009	Revised OE/OD function.	
C	Dec.24,2009	Change to unit of Output Disable Delay from 50 μ s to 50 ns.	
D	Jul.10,2010	Change Logo.	
E	Jan.18,2011	Revised format.	
F	Jan.11,2018	Updated logo.	

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ELECTRICAL SPECIFICATIONS

SRe Part Number : FK2400013

Item	Symbol	Specifications	Units	Notes
Nominal Frequency	F ₀	24.000000	MHz	
Frequency Stability	FT	± 25	ppm	**See note
Operating Temperature Range	TR	-20 to +70	°C	
Supply Voltage	V _{DD}	+3.3 ± 5.0%	V	
Logic Type	LT	LVC MOS		
Supply Current, Output Enabled	I _{DD} /OE	10	mA	Max.
Supply Current, Output Disabled	I _{DD} /OD	10	μA	Max.
Duty Cycle (Symmetry)	DC/SY	45 / 55	%	Measured 50% of Waveform
Rise / Fall Time	T _R /T _F	5	ns	Max. measured 10/90% of Waveform
Output Voltage "0" Level	V _{OL}	10% V _{DD}	V	Max at I _{OL} = 4.0mA Min.
Output Voltage "1" Level	V _{OH}	90% V _{DD}	V	Min at I _{OH} = -4.0mA Max.
Output Load	CL	15	pF	Max.
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	0.8V _{DD}			V	Or Open
Input Voltage (Pin1), Output Disable (low power standby)			0.2V _{DD}	V	Output is Hi-Z
Output Disable Delay			0.1	μs	
Output Enable Delay			2	ms	

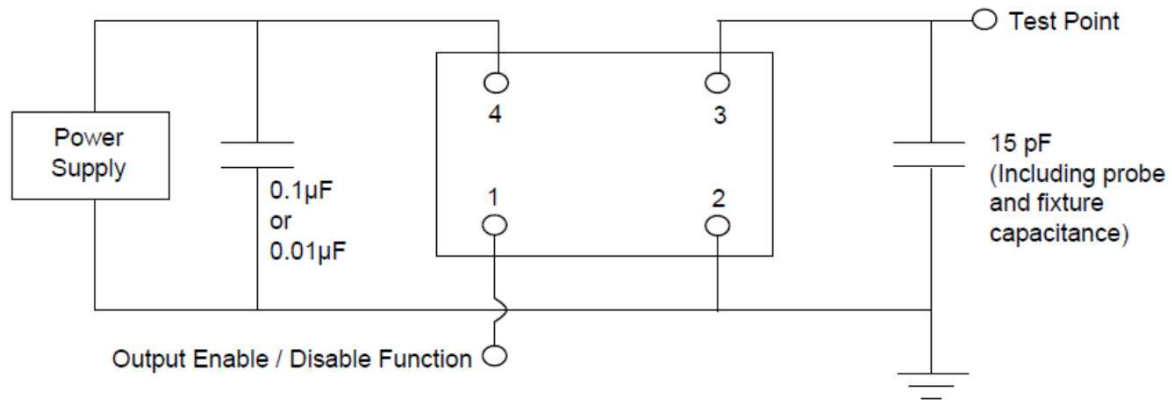


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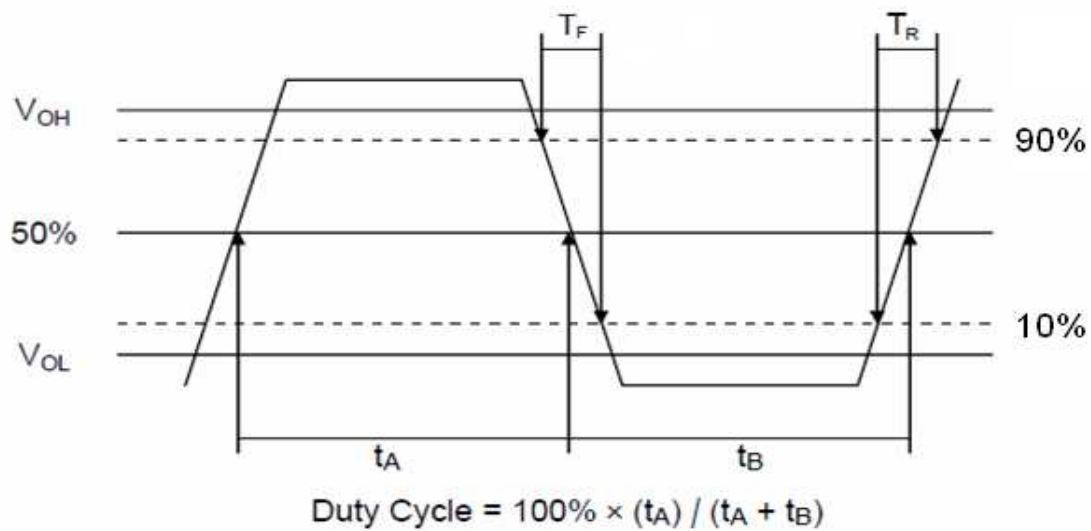
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TEST CIRCUIT



OUTPUT WAVEFORM



RELIABILITY SPECIFICATIONS

ENVIRONMENTAL:

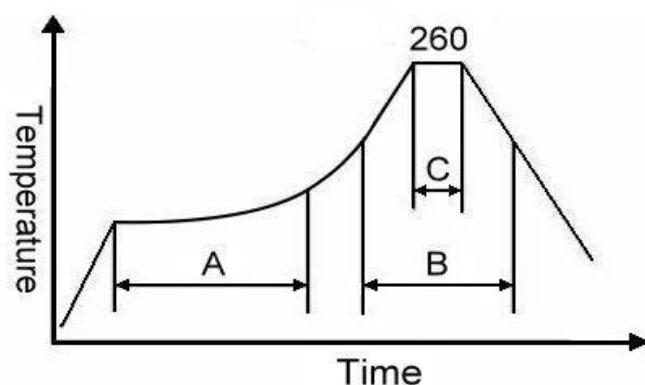
- a) THERMAL SHOCK: MIL-STD-883, Method 1011, Condition A
- b) MOISTURE RESISTANCE: MIL-STD-883, Method 1004
- c) VIBRATION: MIL-STD-883, Method 2007, Condition A
- d) RESISTANCE TO SOLDERING HEAT: J-STD-020D Table 5-2 Pb-free devices
(except 2 cycles max)
- e) HAZARDOUS SUBSTANCE: Pb - free and RoHS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

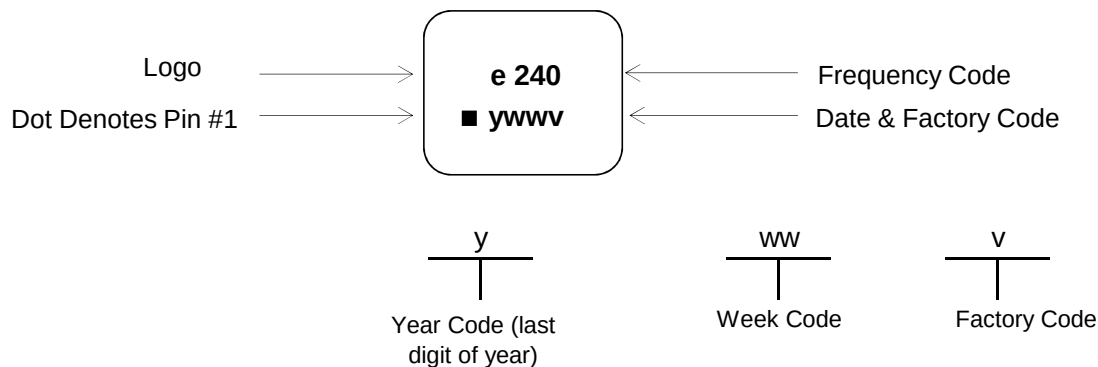
	Stage	Temperature	Time
A	Preheat	150~200°C	60~120 Sec
B	Primary Heat	217°C	60~150 Sec
C	Peak	260°C	10 Sec

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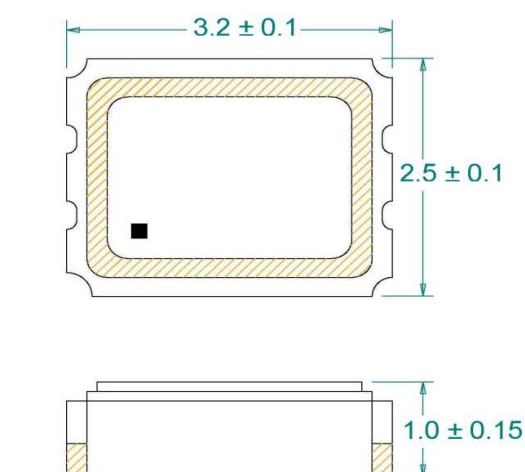
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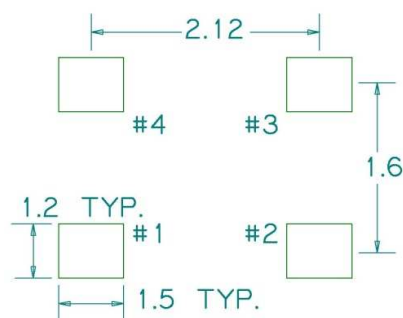
MARKING



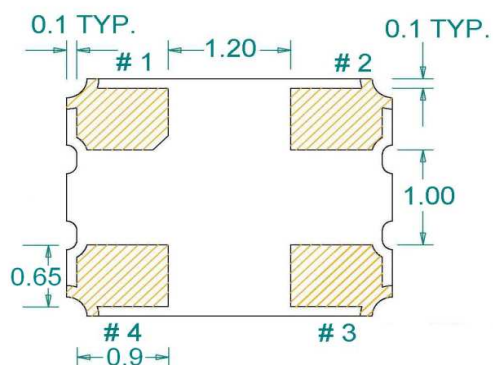
MECHANICAL DRAWINGS (Scale: None. Dimensions are in mm.)



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.



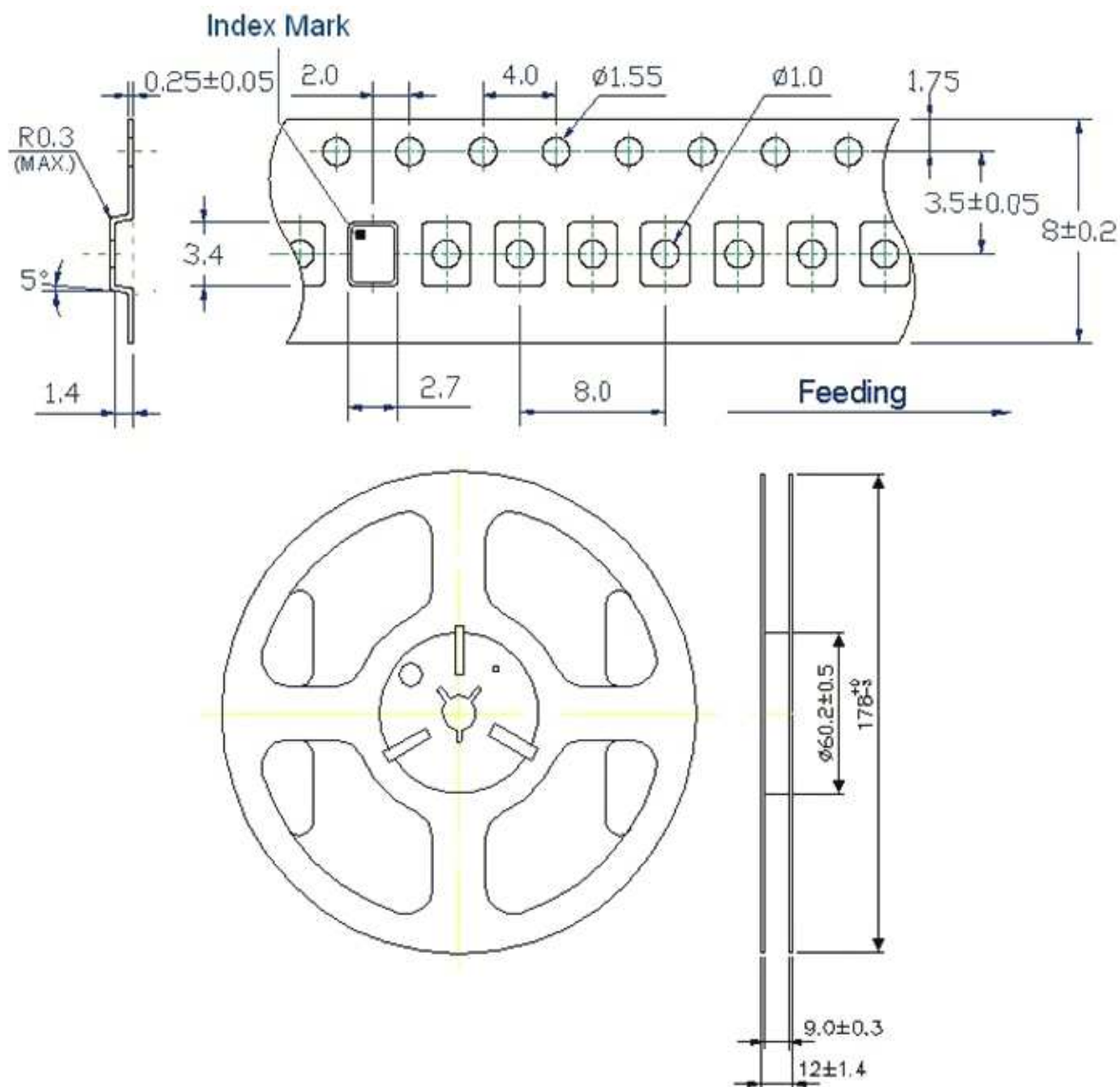
Pin	Function
1	OE
2	Ground
3	Clock Output
4	V _{DD}

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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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PACKING

