



A Product Line of  
Diodes Incorporated



## SPECIFICATION FOR APPROVAL

|                   |  |
|-------------------|--|
| CUSTOMER          | _____  |
| NOMINAL FREQUENCY | 12.288000 MHz  |
| PRODUCT TYPE      | TYPE FD 5.0x3.2 SEAM SEALED CRYSTAL CLOCK OSCILLATOR |
| SPEC. NO. ( P/N ) | FD1220022  |
| CUSTOMER P/N      | _____  |
| ISSUE DATE        | September 29, 2017                                   |
| VERSION           | B  |

| APPROVED | PREPARED | QA |
|----------|----------|----|
|          |          |    |

### Diodes Incorporation

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

**TYPE FD 5.0x3.2 SEAM SEALED CRYSTAL CLOCK OSCILLATOR**

**FD1220022**

VER. B 29-Sep-17

**VERSION HISTORY**

| Version No. | Version Date | Customer Receipt Date | Supplier Receipt Date | Description     | Notes |
|-------------|--------------|-----------------------|-----------------------|-----------------|-------|
| A           | May.13,2015  |                       |                       | Initial Release |       |
| B           | Sep.29,2017  |                       |                       | Updated logo    |       |
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# TYPE FD 5.0x3.2 SEAM SEALED CRYSTAL CLOCK OSCILLATOR

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### ELECTRICAL SPECIFICATIONS

SRe Part Number : FD1220022

| Item                            | Symbol                         | Specifications      | Units | Notes                            |
|---------------------------------|--------------------------------|---------------------|-------|----------------------------------|
| Nominal Frequency               | F <sub>0</sub>                 | 12.288000           | MHz   |                                  |
| Frequency Stability             | FT                             | ±25                 | ppm   | **See note                       |
| Operating Temperature Range     | TR                             | -40 to +85          | °C    |                                  |
| Supply Voltage                  | V <sub>DD</sub>                | +1.8 to +3.3        | V     | at +2.5V Typ.                    |
| Logic Type                      | LT                             | LVC MOS             |       |                                  |
| Supply Current, Output Enabled  | I <sub>DD</sub> /OE            | 15                  | 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> | 10                  | ns    | Max. measured 20/80% of Waveform |
| Output Voltage "0" Level        | V <sub>OL</sub>                | 10% V <sub>DD</sub> | V     | Max.                             |
| Output Voltage "1" Level        | V <sub>OH</sub>                | 90% V <sub>DD</sub> | V     | Min.                             |
| Output Load                     | CL                             | 15                  | pF    | Max                              |
| Jitter, Phase                   | RMS                            | 1                   | ps    | Max. 12KHz ~ 5MHz Frequency Band |
| Jitter, Accumulated             | RMS(1-σ)                       | 5                   | ps    | Max. 20,000 Consecutive Periods  |
| Jitter, Peak to Peak            | PK-PK                          | 50                  | ps    | Max. 100,000 Random Periods      |
| 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 |
| Internal Pullup Resistance                               | 30                 |      |                    | KΩ    |                |
| Output Disable Delay                                     |                    |      | 50                 | ns    |                |

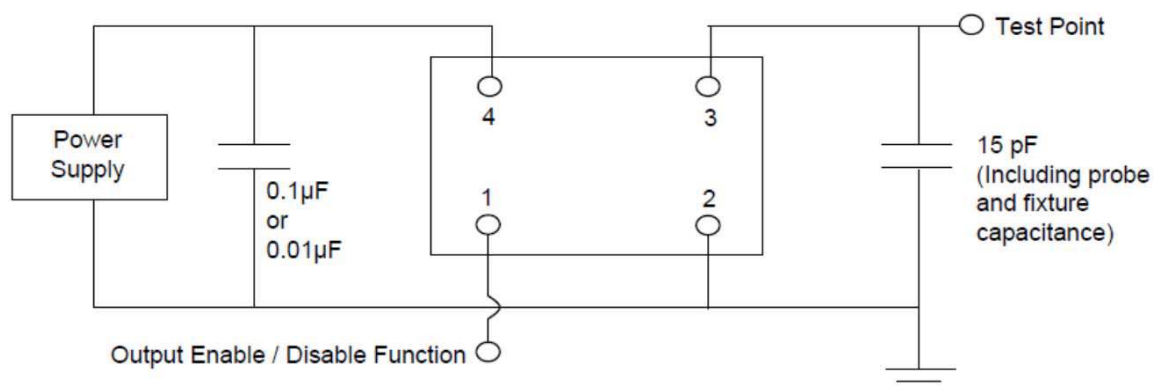


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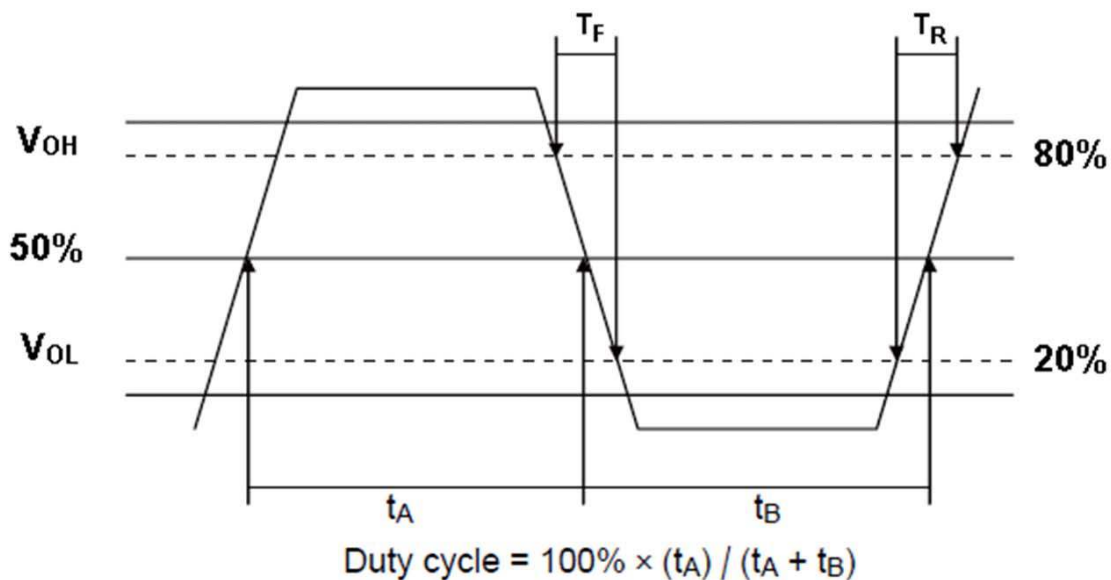
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### TEST CIRCUIT



### OUTPUT WAVEFORM



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## RELIABILITY SPECIFICATIONS

### ENVIRONMENTAL:

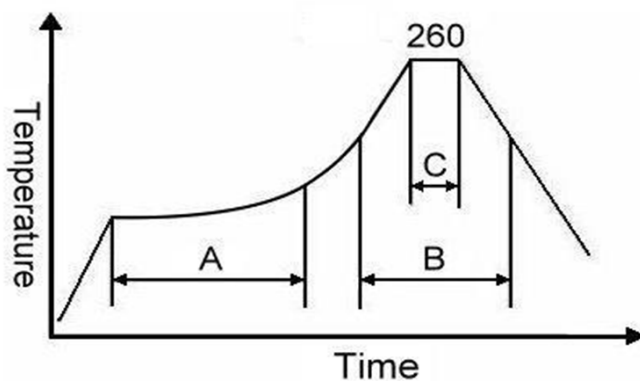
- a) THERMAL SHOCK: MIL-STD-883, Method 1011, Condition A
- b) MOISTURE RESISTANCE: MIL-STD-883, Method 1004
- c) VIBRATION: MIL-STD-883, Method 2007, Condition A
- d) RESISTANCE TO SOLDERING HEAT: J-STD-020D Table 5-2 Pb-free devices (except 2 cycles max)
- e) HAZARDOUS SUBSTANCE: Pb - free and RoHS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

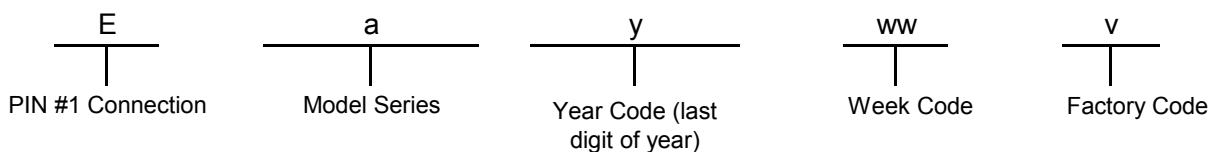
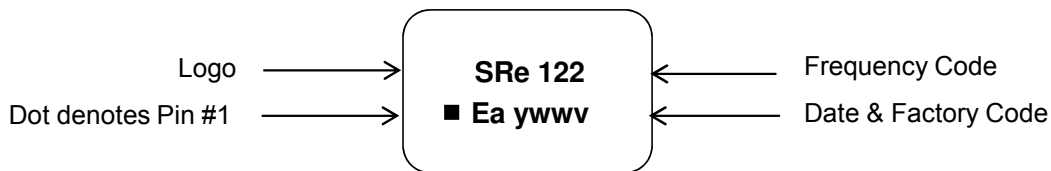
|   | Stage        | Temperature | Time       |
|---|--------------|-------------|------------|
| A | Preheat      | 150~200°C   | 60~120 Sec |
| B | Primary Heat | 217°C       | 60~150 Sec |
| C | Peak         | 260°C       | 10 Sec     |

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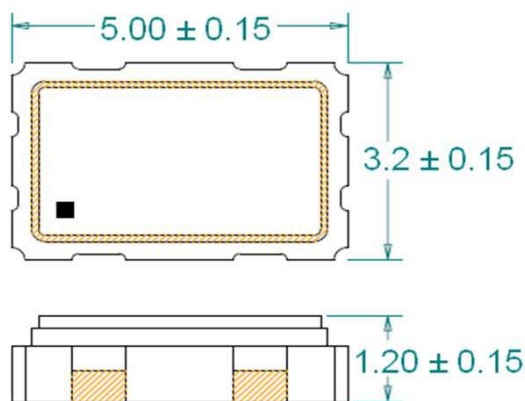
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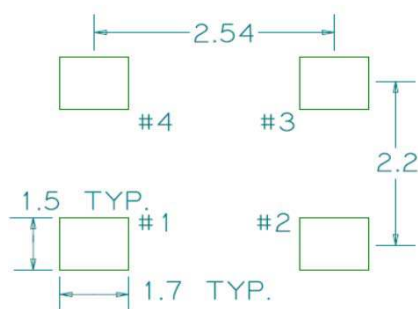
## MARKING



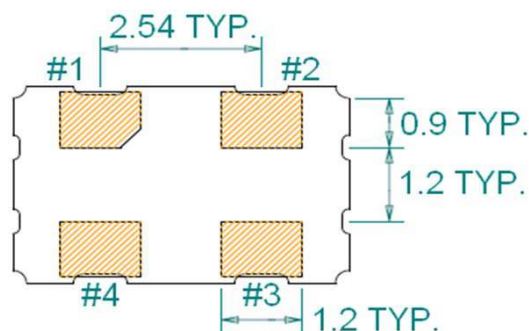
## MECHANICAL DRAWINGS ( Scale: None. Dimensions are in mm.)



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.



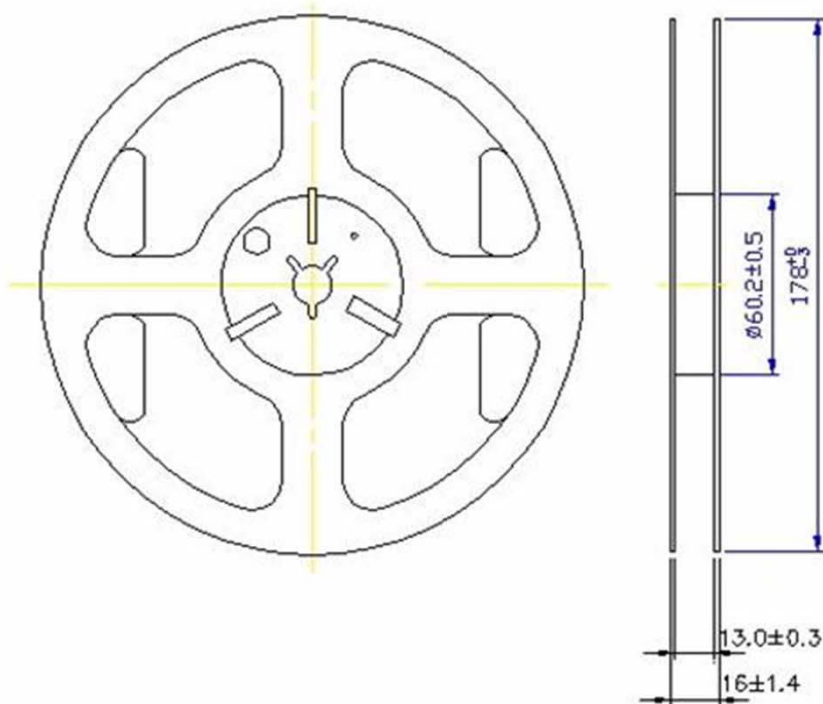
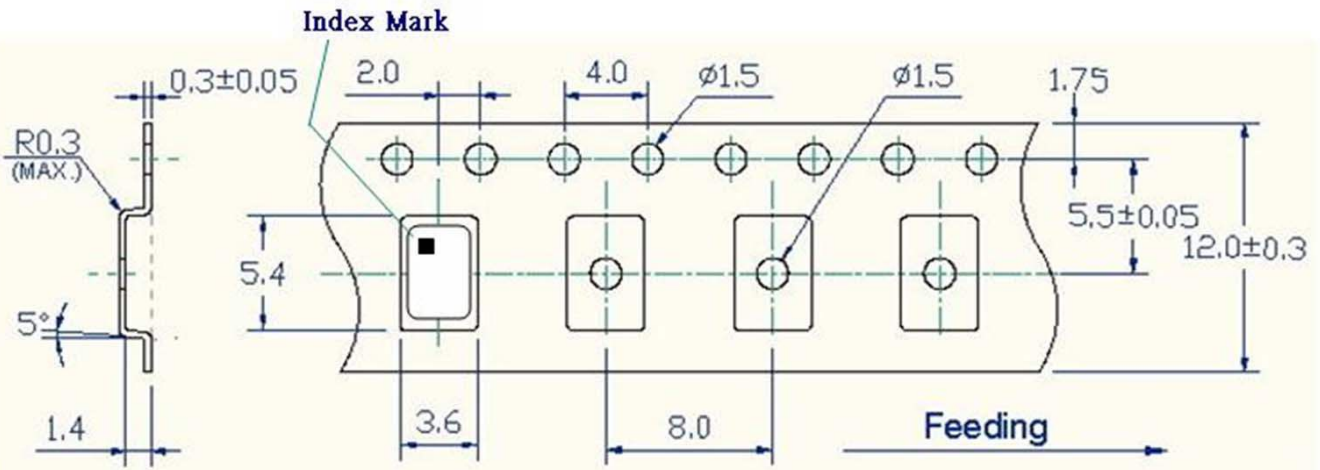
| Pin | Function        |
|-----|-----------------|
| 1   | OE              |
| 2   | Ground          |
| 3   | Clock Output    |
| 4   | V <sub>DD</sub> |

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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

