



A Product Line of  
Diodes Incorporated



# SPECIFICATION FOR APPROVAL

CUSTOMER

NOMINAL FREQUENCY

**20.000000 MHz**

PRODUCT TYPE

**TYPE FL 3.2x2.5 SEAM SEALED CRYSTAL**

PART NUMBER

**FL2000072**


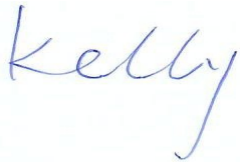

CUSTOMER P/N

ISSUE DATE

**January 18, 2018**

VERSION

**B**

APPROVED	PREPARED	QA
		

## Diodes Incorporated

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TEL:886-3-451-8888  
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\*Pb-free

\*RoHS Compliant

\*HF-Halogen Free

\*REACH Compliant

# TYPE FL 3.2x2.5 SEAM SEALED CRYSTAL

**FL2000072**

VER.B 18-JAN-18

## VERSION HISTORY

Version No.	Version Date	Description	Notes
A	Oct. 26, 2011	Initial Release	
B	Jan. 18, 2018	Updated logo	

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### ELECTRICAL SPECIFICATIONS

Item	Symbol	Specifications	Units	Notes
Nominal Frequency	Fn	20.000000	MHz	
Mode of Oscillation	MO	AT Cut-Fundamental		
Calibration Load Capacitance	CL	18	pF	
Calibration Tolerance	FL	$\pm 7$	ppm	at 25°C $\pm 3^{\circ}\text{C}$
Operating Temperature Range	TR	-20 to +100	°C	
Frequency Stability(Frequency Deviation over the Operating Temperature Range)	F/T	$\pm 15$	ppm	Reference to the Frequency at 25°C
Operating Drive Level		10	$\mu\text{W}$	
Maximum Drive Level		100	$\mu\text{W}$	
Equivalent Series Resistance	ESR	35	$\Omega$	Max.
Shunt Capacitance	C0	3.5	pF	Max.
MaxRR-MinRR at Drive Level Dependency Sweep	DLD2	18	$\Omega$	Max.
MaxFR-MinFR at Drive Level dependency Sweep	FDDL	10	ppm	Max.
Spurious Modes Suppression in dB (12.5 $\Omega$ fixture)	SPDB	3	dB	Min, down from the main mode
Aging at 25°C		$\pm 3$	ppm	Max, 1st year
Storage Temperature		-55 to +125	°C	
Insulation Resistance		500	M $\Omega$	Min

\*\* 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).

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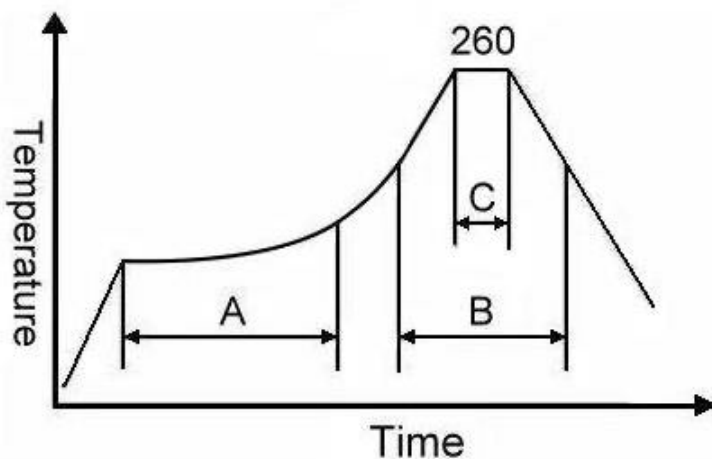
## RELIABILITY SPECIFICATIONS

### MECHANICAL AND ENVIRONMENTAL RATINGS:

- a) FINE LEAK TEST: JESD22-A109 (Condition 1A)
- b) GROSS LEAK TEST: JESD22-A109 (Condition C)
- c) MOISTURE RESISTANCE: JESD22-A113
- d) SHOCK: JESD22-B104 (Condition B)
- e) SOLDERABILITY : (RoHS version): J-STD-002
- f) VIBRATION: JESD22-B103
- g) SOLVENT RESISTANCE: JESD22-B107
- h) RESISTANCE TO SOLDERING HEAT (RoHS version): J-STD-020D Table 5.2 Pb free devices (3 cycles max)

## SUGGESTED IR REFLOW PROFILE

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



Note:

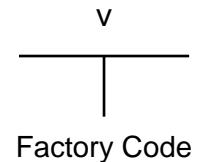
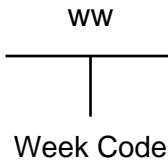
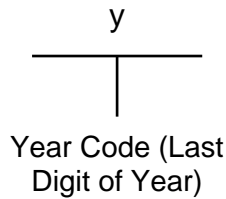
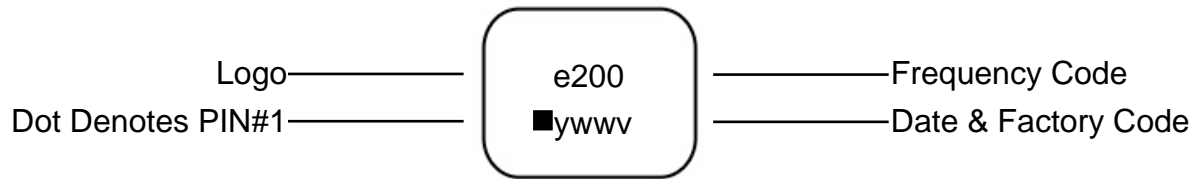
	Stage	Temperature	Time
A	Preheat	150~200°C	60~120 Sec
B	Primary Heat	217°C	60~150 Sec
C	Peak	260°C	10 Sec

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## MARKING



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

### Recommended Land Pattern



\*\* Recommended - Pin 1 & 3 : CRYSTAL  
Pin 2 & 4 : GND

### Notes:

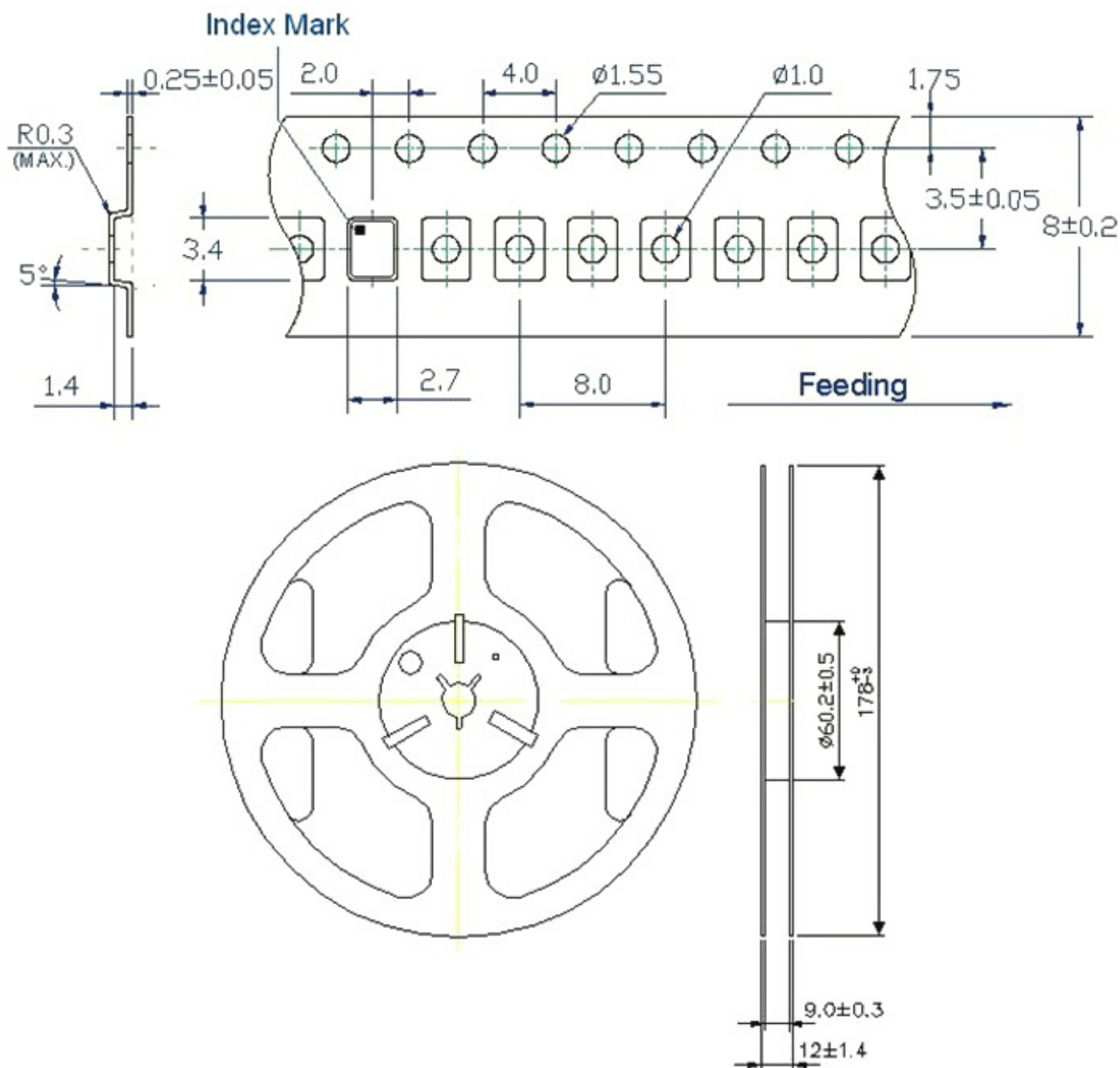
1. Package drawings are for reference only, and the appearances of objects may vary. Actual packages are based on the real product.
2. The marking dot denotes Pin#1.
3. The position and shape of the chamfer pin may vary and are based on the real product.

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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

