



A Product Line of
Diodes Incorporated



SPECIFICATION FOR APPROVAL

CUSTOMER

NOMINAL FREQUENCY

24.000000 MHz

PRODUCT TYPE

TYPE FL 3.2x2.5 SEAM SEALED CRYSTAL

PART NUMBER

FL2400148

CUSTOMER P/N

ISSUE DATE

September 14, 2018

VERSION

B

APPROVED	PREPARED	QA
Brenda Kuo	Claire Cheng	Dony Yang

Diodes Incorporated

No.2, Ziqiang 5th Rd., Zhongli Industrial Park,
Zhongli Dist., Taoyuan City 32063, Taiwan (R.O.C.)
TEL:886-3-451-8888
FAX:886-3-461-3865
<https://www.diodes.com>

*Pb-free

*RoHS Compliant

*HF-Halogen Free

*REACH Compliant

TYPE FL 3.2x2.5 SEAM SEALED CRYSTAL

FL2400148

VER.B 14-SEP-18

ELECTRICAL SPECIFICATIONS

Item	Symbol	Specifications	Units	Notes
Nominal Frequency	Fn	24.000000	MHz	
Mode of Oscillation	MO	AT Cut-Fundamental		
Calibration Load Capacitance	CL	10	pF	
Calibration Tolerance	FL	± 10	ppm	at 25°C $\pm 3^{\circ}\text{C}$
Operating Temperature Range	TR	-20 to +70	°C	
Frequency Stability(Frequency Deviation over the Operating Temperature Range)	F/T	± 10	ppm	Reference to the Frequency at 25°C
Operating Drive Level		10	μW	
Maximum Drive Level		200	μW	
Equivalent Series Resistance	ESR	40	Ω	Max.
Shunt Capacitance	C0	3	pF	Max.
Aging at 25°C		± 1	ppm	Max, per year
Storage Temperature		-55 to +125	°C	
Insulation Resistance		500	M Ω	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).

TYPE FL 3.2x2.5 SEAM SEALED CRYSTAL

FL2400148

VER.B 14-SEP-18

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:

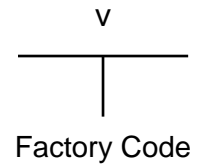
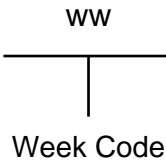
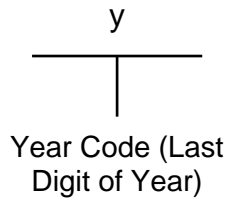
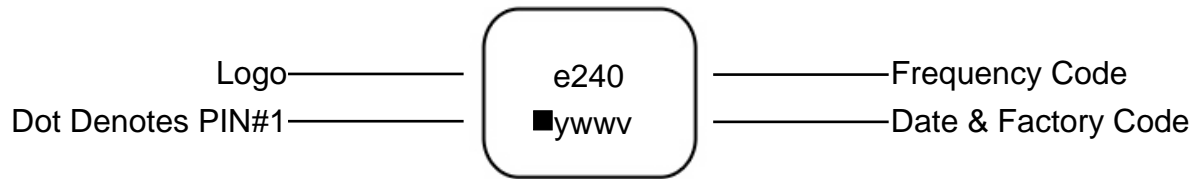
	Stage	Temperature	Time
A	Preheat	150~200°C	60~120 Sec
B	Primary Heat	217°C	60~150 Sec
C	Peak	260°C	10 Sec

TYPE FL 3.2x2.5 SEAM SEALED CRYSTAL

FL2400148

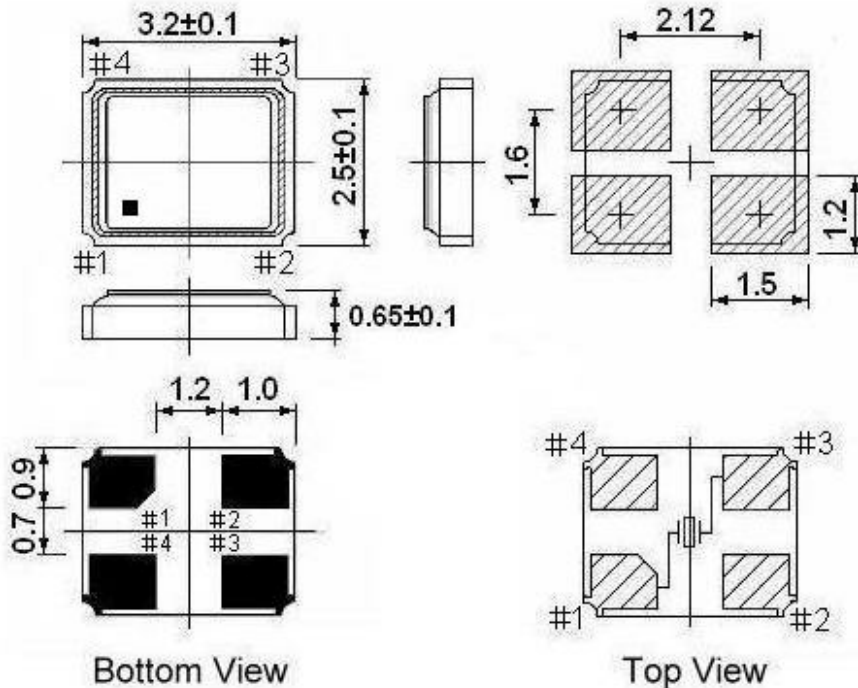
VER.B 14-SEP-18

MARKING



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

Recommended Land Pattern



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

Notes:

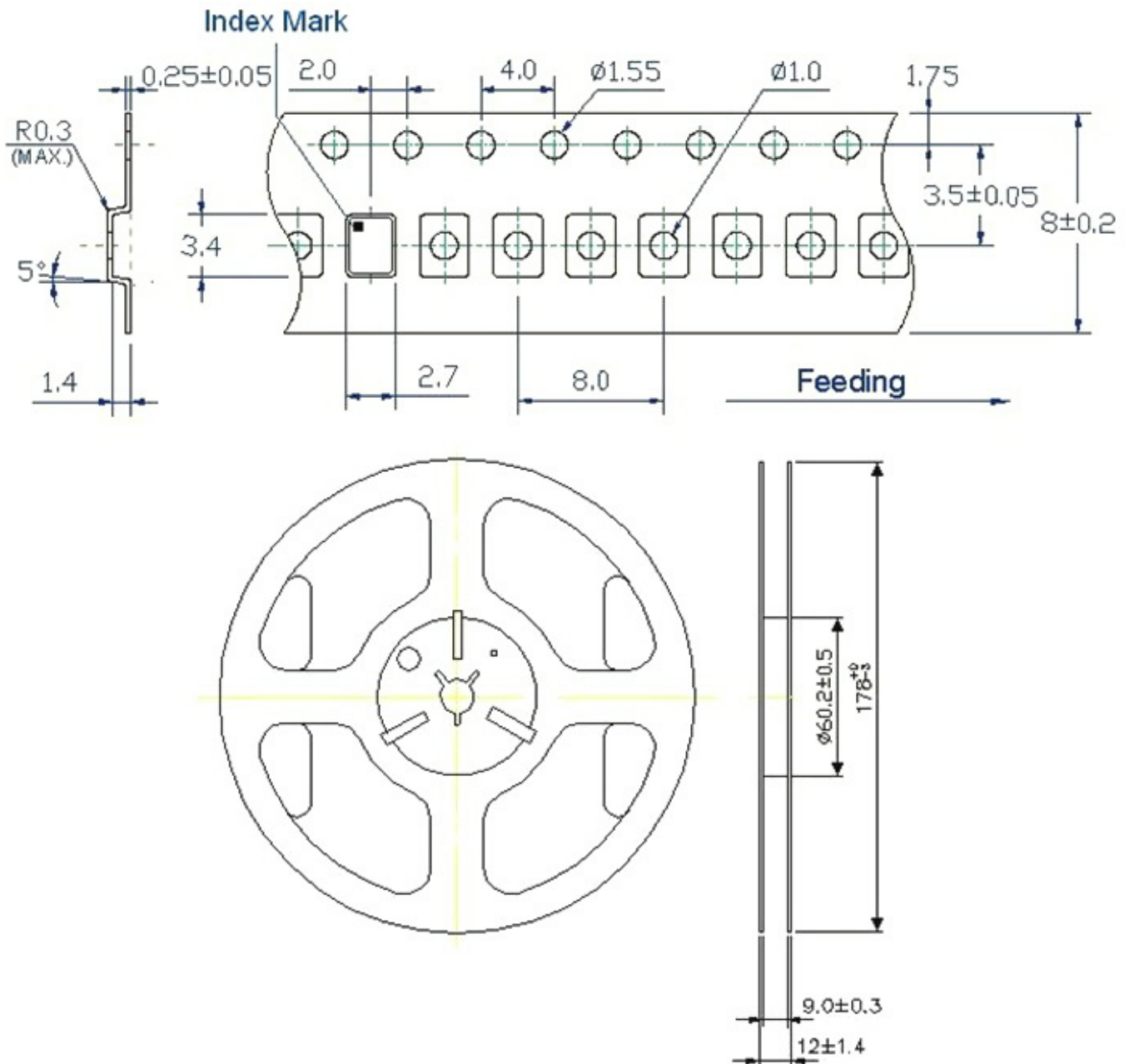
1. Package drawings are for reference only, and the appearances of objects may vary. Actual packages are based on the real product.
2. The marking dot denotes Pin#1.
3. The position and shape of the chamfer pin may vary and are based on the real product.

TYPE FL 3.2x2.5 SEAM SEALED CRYSTAL

FL2400148

VER.B 14-SEP-18

Tape & Reel



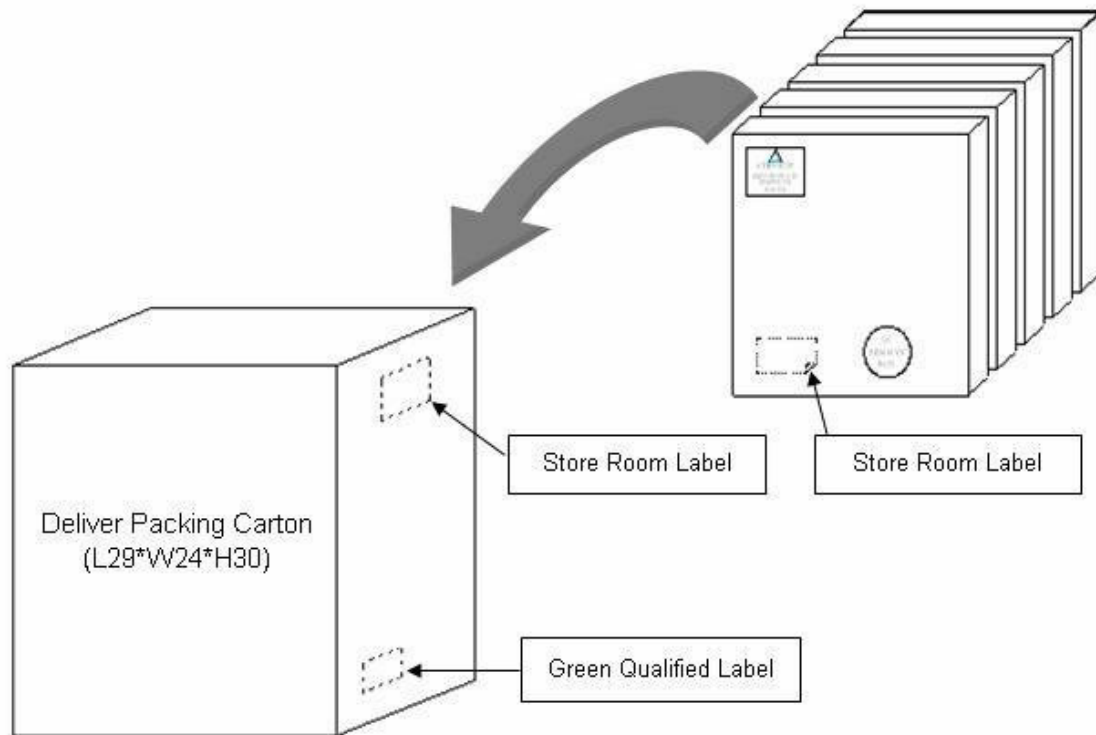
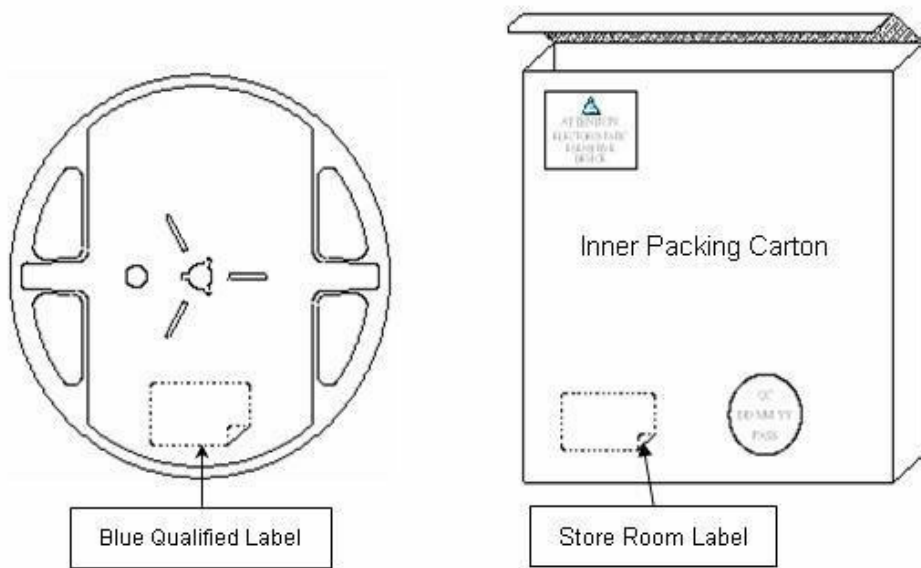
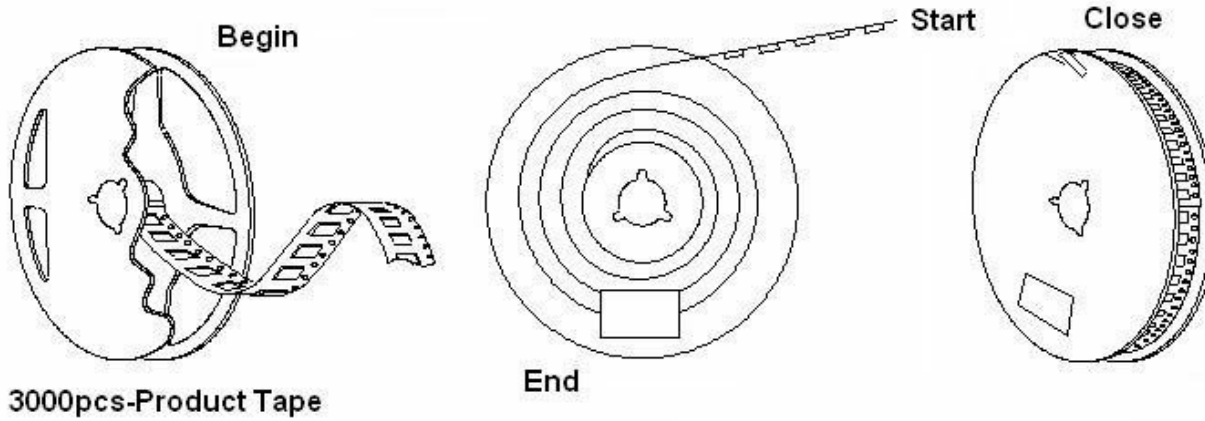
1. 230mm minimum leader which consist of carrier and/or tape followed by a minimum of 160mm of empty carrier tape sealed with cover tape.
2. 160mm minimum trailer of empty carrier tape sealed with cover tape.

TYPE FL 3.2x2.5 SEAM SEALED CRYSTAL

FL2400148

VER.B 14-SEP-18

PACKING



TYPE FL 3.2x2.5 SEAM SEALED CRYSTAL

FL2400148

VER.B 14-SEP-18

VERSION HISTORY

Version No.	Version Date	Description	Notes
A	Apr. 21, 2014	Initial Release	
B	Sep. 14, 2018	Updated logo	