






A Product Line of  
Diodes Incorporated



# SPECIFICATION FOR APPROVAL

|                   |  |
|-------------------|--|
| CUSTOMER          |  |
| NOMINAL FREQUENCY | <b>48.000000 MHz</b>                       |
| PRODUCT TYPE      | <b>TYPE FL 3.2x2.5 SEAM SEALED CRYSTAL</b> |
| PART NUMBER       | <b>FL4800060</b>                           |
| CUSTOMER P/N      |  |
| ISSUE DATE        | <b>March 12, 2018</b>                      |
| VERSION           | <b>B</b>                                   |

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

## Diodes Incorporated

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

# TYPE FL 3.2x2.5 SEAM SEALED CRYSTAL

**FL4800060**

VER.B 12-MAR-18

## VERSION HISTORY

| Version No. | Version Date  | Description     | Notes |
|-------------|---------------|-----------------|-------|
| A           | Oct. 9, 2014  | Initial Release |       |
| B           | Mar. 12, 2018 | Updated logo    |       |

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### ELECTRICAL SPECIFICATIONS

| Item  | Symbol | Specifications     | Units         | Notes                              |
|---|--------|--------------------|---------------|------------------------------------|
| Nominal Frequency   | Fn     | 48.000000          | MHz           |                                    |
| Mode of Oscillation   | MO     | AT Cut-Fundamental |               |                                    |
| Calibration Load Capacitance  | CL     | 8                  | pF            |                                    |
| Calibration Tolerance   | FL     | $\pm 10$           | ppm           | at 25°C $\pm 3^{\circ}\text{C}$    |
| Operating Temperature Range   | TR     | -40 to +85         | °C            |                                    |
| Frequency Stability(Frequency Deviation over the Operating Temperature Range) | F/T    | $\pm 25$           | ppm           | Reference to the Frequency at 25°C |
| Operating Drive Level   |        | 10                 | $\mu\text{W}$ |                                    |
| Maximum Drive Level   |        | 350                | $\mu\text{W}$ |                                    |
| Equivalent Series Resistance  | ESR    | 25                 | $\Omega$      | Max.                               |
| Shunt Capacitance   | C0     | 2                  | pF            | Max.                               |
| 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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### PACKING

