

## PE3XB Series 2.5 V PECL Clock Oscillators

January 2008

**Lead Free**

**Do Not Use for New Designs - use PE55 or PE77**

- Pletronics' PE3XB Series is a quartz crystal controlled precision square wave generator with an PECL output.
- Solder pad compatible with many 9x14 Plastic J lead packages.
- FR4 base with a mechanical metal cover.
- Tape and Reel packaging is available.
- 1 to 250 MHz
- 9.9 mm x 13.97 mm 'B' package
- Enable/Disable Function:  
    **PE33B** on pad 2  
    **PE37B** on pad 1
- Low Jitter

**Pletronics Inc. certifies this device is in accordance with the  
RoHS 6/6 (2002/95/EC) and WEEE (2002/96/EC) directives.**

Pletronics Inc. guarantees the device does not contain the following:

Cadmium, Hexavalent Chromium, Lead, Mercury, PBB's, PBDE's

Weight of the Device: 1.34 or .66 grams

Moisture Sensitivity Level: 1 As defined in J-STD-020C

Second Level Interconnect code: e4

### Absolute Maximum Ratings:

| Parameter                      | Unit                            |
|--------------------------------|---------------------------------|
| V <sub>CC</sub> Supply Voltage | -0.5V to +6.5V                  |
| V <sub>i</sub> Input Voltage   | -0.5V to V <sub>CC</sub> + 0.5V |
| V <sub>o</sub> Output Voltage  | -0.5V to V <sub>CC</sub> + 0.5V |

### Thermal Characteristics

The maximum die or junction temperature is 155°C

The thermal resistance junction to board is 60 to 100°C/Watt depending on the solder pads, ground plane and construction of the PCB.

## Part Number:

PE3x 45 B E W -125.0M -XX

## Part Marking:

|  |                                                                                                                                |                                                    |
|--|--------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
|  | <b>Packaging code or blank</b><br>T250 = 250 per Tape and Reel<br>T500 = 500 per Tape and Reel<br>T1K = 1000 per Tape and Reel | <b>PLE PE77</b><br><b>FFFFFM</b><br><b>• YMDXX</b> |
|  | <b>Frequency in MHz</b>                                                                                                        |                                                    |
|  | <b>Supply Voltage <math>V_{CC}</math></b><br><b>W</b> = 2.5V $\pm$ 10%                                                         |                                                    |
|  | <b>Optional Enhanced OTR</b><br><b>Blank</b> = Temp. range -10 to +70°C<br><b>E</b> = Temp. range -40 to +85°C                 |                                                    |
|  | <b>Series Model</b>                                                                                                            |                                                    |
|  | <b>Frequency Stability</b><br><b>45</b> = $\pm$ 50 ppm<br><b>44</b> = $\pm$ 25 ppm<br><b>20</b> = $\pm$ 20 ppm                 |                                                    |
|  | <b>Series Model</b><br>x is 3 = E/D on pad 2<br>x is 7 = E/D on pad 1                                                          |                                                    |

### Legend:

PLE = Pletronics

FFFFFM = Frequency in MHz

YMD or YYWW = Date of Manufacture (Year - month - day or year and week)

All other marking is internal factory codes

The marking is on the cover of the PE77 device

The marking is that of the PE77 device

Specifications such as frequency stability, supply voltage and operating temperature range, etc. are not identified from the marking. External packaging labels and packing list will correctly identify the ordered Pletronics part number.

### Codes for Date Code YMD

| Code | 6    | 7    | 8    | 9    | 0    | 1    | 2    |
|------|------|------|------|------|------|------|------|
| Year | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |

| Code  | A   | B   | C   | D   | E   | F   | G   | H   | J   | K   | L   | M   |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Month | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |

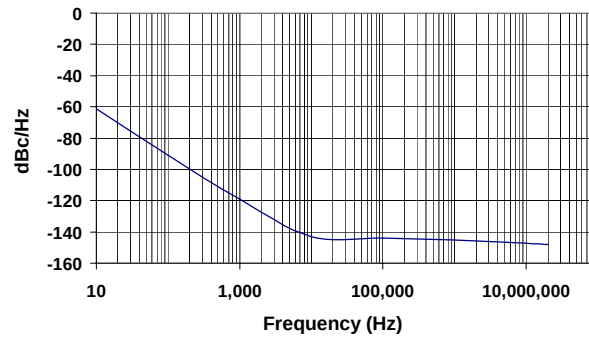
| Code | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | A  | B  | C  |
|------|----|----|----|----|----|----|----|----|----|----|----|----|
| Day  | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 |
| Code | D  | E  | F  | G  | H  | J  | K  | L  | M  | N  | P  | R  |
| Day  | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| Code | T  | U  | V  | W  | X  | Y  | Z  |    |    |    |    |    |
| Day  | 25 | 26 | 27 | 28 | 29 | 30 | 31 |    |    |    |    |    |

## Electrical Specification for 2.50V $\pm 5\%$ over the specified temperature range

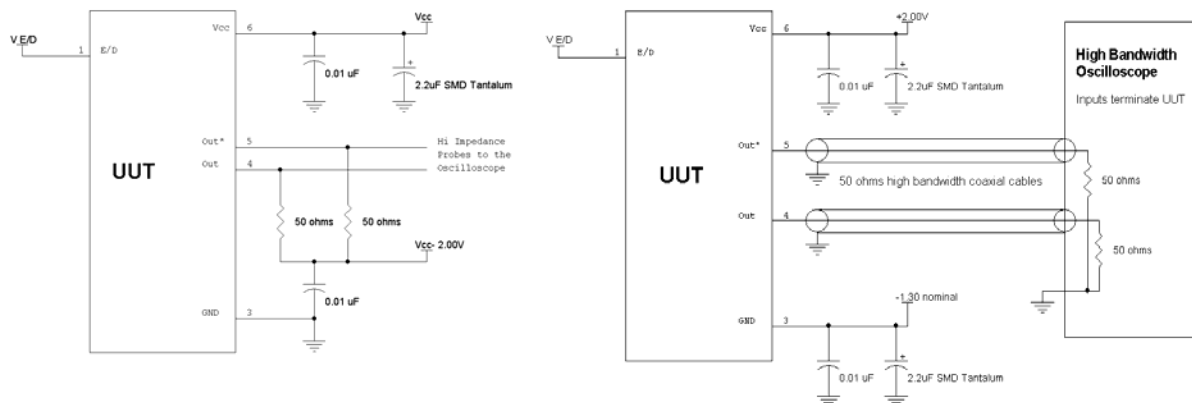
| Item                                              | Min       | Max    | Unit   | Condition                                                                                  |
|---------------------------------------------------|-----------|--------|--------|--------------------------------------------------------------------------------------------|
| Frequency Range                                   | 1         | 250    | MHz    |                                                                                            |
| Frequency Accuracy “45”                           | -50       | +50    | ppm    | For all supply voltages, load changes, aging for 1 year, shock, vibration and temperatures |
| “44”                                              | -25       | +25    |        |                                                                                            |
| “20”                                              | -20       | +20    |        |                                                                                            |
| Output Waveform                                   | PECL /ECL |        |        |                                                                                            |
| Output High Level (0°C to 85°C)                   | 1.475     | 1.760  | volts  | Referenced to Ground, V <sub>CC</sub> = 2.5 V                                              |
|                                                   | 0.975     | 1.260  | volts  | Referenced to termination voltage, V <sub>CC</sub> = 2.5 V                                 |
|                                                   | -1.025    | -0.740 | volts  | Referenced to Vcc, V <sub>CC</sub> = 2.5 V                                                 |
| Output High Level (-40°C)                         | 1.415     | 1.620  | volts  | Referenced to Ground, V <sub>CC</sub> = 2.5 V                                              |
|                                                   | 0.915     | 1.12   | volts  | Referenced to termination voltage, V <sub>CC</sub> = 2.5 V                                 |
|                                                   | -1.085    | -0.88  | volts  | Referenced to Vcc, V <sub>CC</sub> = 2.5 V                                                 |
| Output Low Level (0°C to 85°C)                    | 0.690     | 1.095  | volts  | Referenced to Ground, V <sub>CC</sub> = 2.5 V                                              |
|                                                   | 0.190     | 0.595  | volts  | Referenced to termination voltage, V <sub>CC</sub> = 2.5 V                                 |
|                                                   | -1.810    | -1.405 | volts  | Referenced to Vcc, V <sub>CC</sub> = 2.5 V                                                 |
| Output Low Level (-40°C)                          | 0.670     | 1.195  | volts  | Referenced to Ground, V <sub>CC</sub> = 2.5 V                                              |
|                                                   | 0.170     | 0.695  | volts  | Referenced to termination voltage, V <sub>CC</sub> = 2.5 V                                 |
|                                                   | -1.830    | -1.305 | volts  | Referenced to Vcc, V <sub>CC</sub> = 2.5 V                                                 |
| Output Symmetry                                   | 45        | 55     | %      | at 50% point of V <sub>CC</sub> (See load circuit)                                         |
| Jitter                                            | -         | 0.13   | pS RMS | 12 KHz to 20 MHz from the output frequency                                                 |
|                                                   | -         | 2.8    | pS RMS | 10 Hz to 1 MHz from the output frequency                                                   |
| Output T <sub>RISE</sub> and T <sub>FALL</sub>    | -         | 0.7    | nS     | V <sub>th</sub> is 20% and 80% of waveform                                                 |
| V <sub>CC</sub> Supply Current (I <sub>CC</sub> ) | -         | 90     | mA     |                                                                                            |
| Enable/Disable Internal Pull-up                   | 50        | -      | Kohm   | to V <sub>CC</sub>                                                                         |
| V disable                                         | -         | 0.6    | volts  | Referenced to pad 3                                                                        |
| V enable                                          | 1.7       | -      | volts  | Referenced to pad 3                                                                        |
| Output leakage V <sub>OUT</sub> = V <sub>CC</sub> | -10       | +10    | uA     | Pad 1 low, device disabled                                                                 |
| V <sub>OUT</sub> = 0V                             | -10       | +10    | uA     |                                                                                            |
| Enable time                                       | -         | 10     | nS     | Time for output to reach a logic state                                                     |
| Disable time                                      | -         | 10     | nS     | Time for output to reach a high Z state                                                    |
| Start up time                                     | -         | 10     | mS     | Time for output to reach specified frequency                                               |
| Operating Temperature Range                       | -10       | +70    | °C     | Standard Temperature Range                                                                 |
|                                                   | - 40      | +85    | °C     | Extended Temperature Range “E” Option                                                      |
| Storage Temperature Range                         | -55       | +125   | °C     |                                                                                            |
| Standby Current I <sub>CC</sub>                   | -         | 3      | uA     | Pad 1 low, device disabled                                                                 |

Specifications with E/D pad open circuit

### Typical Phase-Noise Response

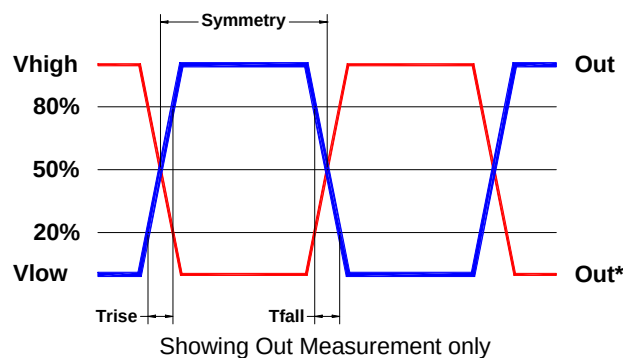


### Load Circuit



E/D shown on pad 1 for PE37B, will be on pad 2 for PE33B

### Test Waveform



Showing Out Measurement only

## Reliability: Environmental Compliance

| Parameter        | Condition                            |
|------------------|--------------------------------------|
| Mechanical Shock | MIL-STD-883 Method 2002, Condition B |
| Vibration        | MIL-STD-883 Method 2007, Condition A |
| Solderability    | MIL-STD-883 Method 2003              |
| Thermal Shock    | MIL-STD-883 Method 1011, Condition A |

## ESD Rating

| Model                | Minimum Voltage | Conditions              |
|----------------------|-----------------|-------------------------|
| Human Body Model     | 1500            | MIL-STD-883 Method 3115 |
| Charged Device Model | 1000            | JESD 22-C101            |

## Package Labeling

Label is 1" x 2.6" (25.4mm x 66.7mm)

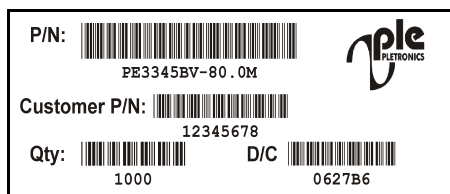
Font is Courier New

Bar code is 39-Full ASCII

The label does show the PE3 full part number

Label is 1" x 2.6" (25.4mm x 66.7mm)

Font is Arial

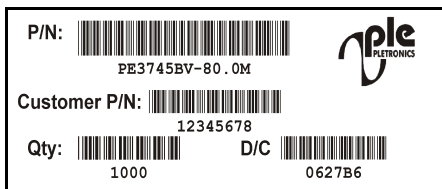


RoHS Compliant

2nd Lvl Interconnect

Category=e4

Max Safe Temp=245C for 10s 2X Max



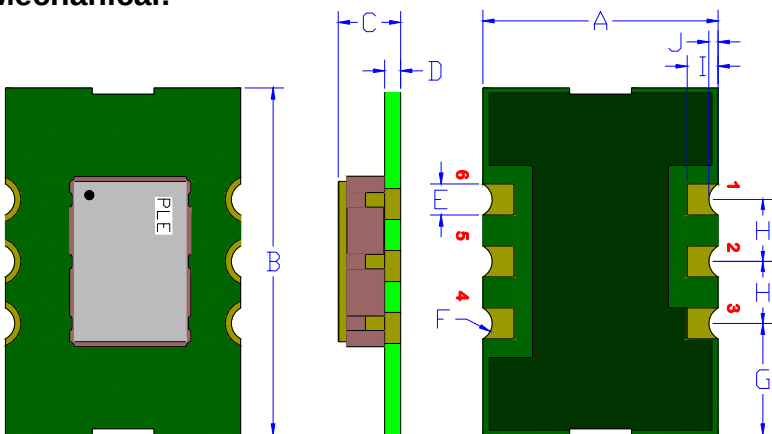
## Layout and application information

Recommend connecting Pad 1 and Pad 2 together to permit the design to accept Enable/Disable on both input pads

For Optimum Jitter Performance, Pletronics recommends:

- a ground plane under the device
- no large transient signals (both current and voltage) should be routed under the device
- do not layout near a large magnetic field such as a high frequency switching power supply
- do not place near piezoelectric buzzers or mechanical fans.

**Mechanical:**



FR4 PCB Base:  
Solder masked  
All via holes tented on bottom  
Copper Clad ½ oz. Typical  
Gold plated 0.02 µinch (0.5 µm)

Pin 3 Ground plane is typical

**Not to scale**

|                | Inches            | mm               |
|----------------|-------------------|------------------|
| A              | 0.380 $\pm$ 0.010 | 9.65 $\pm$ 0.25  |
| B              | 0.550 $\pm$ 0.010 | 13.97 $\pm$ 0.25 |
| C              | 0.134 $\pm$ 0.010 | 3.40 $\pm$ 0.25  |
| D <sup>1</sup> | 0.062             | 1.57             |
| E <sup>1</sup> | 0.050             | 1.27             |
| F <sup>1</sup> | 0.028 R           | 0.72 R           |
| G <sup>1</sup> | 0.180             | 4.57             |
| H <sup>1</sup> | 0.100             | 2.54             |
| I <sup>1</sup> | 0.050             | 1.27             |
| J <sup>1</sup> | 0.015             | 0.38             |

<sup>1</sup> Typical Dimensions

**Label:**

Laser engraved on the 5x7 mm oscillator that is mounted on the FR4 base

| PE33 Pad | PE37 Pad | Function                          | Note                                                                                                                                                                                                                                                                                          |
|----------|----------|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2        | 1        | Output Enable/Disable             | When this pad is not connected the oscillator shall operate.<br>When this pad is <0.30 volts, the output will be at a steady, non switching state. Recommend connecting this pad to V <sub>CC</sub> if the oscillator is to be always on.                                                     |
| 1        | 2        | No connect                        | There is no internal connection to this pad                                                                                                                                                                                                                                                   |
| 3        |          | Ground (GND)                      |                                                                                                                                                                                                                                                                                               |
| 4        |          | Output                            | The outputs must be terminated, 100 ohms between the outputs is the ideal termination.<br>When the device is disabled, the Output will be an active logic low and the Output* will be an active logic high.<br>The outputs can not be "wire-ORed" with other oscillators or signal generators |
| 5        |          | Output*                           |                                                                                                                                                                                                                                                                                               |
| 6        |          | Supply Voltage (V <sub>CC</sub> ) | Recommend connecting appropriate power supply bypass capacitors as close as possible.                                                                                                                                                                                                         |

## Mechanical (obsolete version):

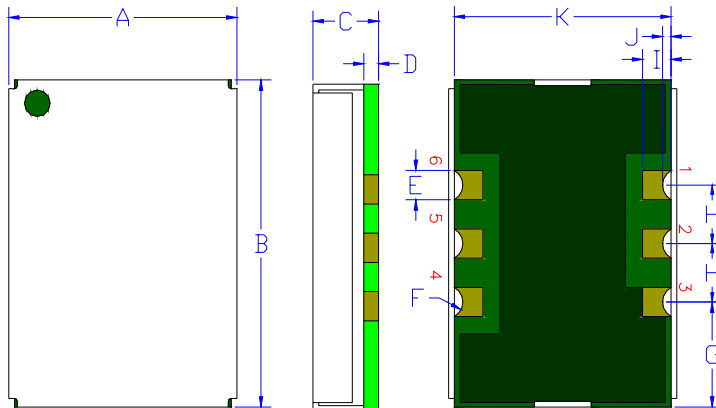
The cover is no longer being supplied over this part. This part is made with a hermetically sealed PE99xxDV series oscillator. This part is now exposed.

The cover has been deleted, the cover was causing problems with the newer high temperature RoHS lead free processes. The cover purpose was only cosmetic.

All parts with 2008 date codes will be made in the new fashion.

There is no change in electrical properties.

Pletronics does recommend that all designs should transition to the PE99xxDV ceramic part.



FR4 PCB Base:  
Solder masked  
All via holes tented on bottom  
Copper Clad ½ oz. Typical  
Gold plated 0.02 µinch (0.5 µm)  
Label:  
White Kapton with Black Letters  
—or—  
Blue Epoxy heat cure ink covering  
top with laser marked lettering

Cover:  
Centered on the base  
304 Stainless Steel  
0.010 inch (0.25µm)  
Electroless Nickel Plated  
1 µinch (25 µm) typical

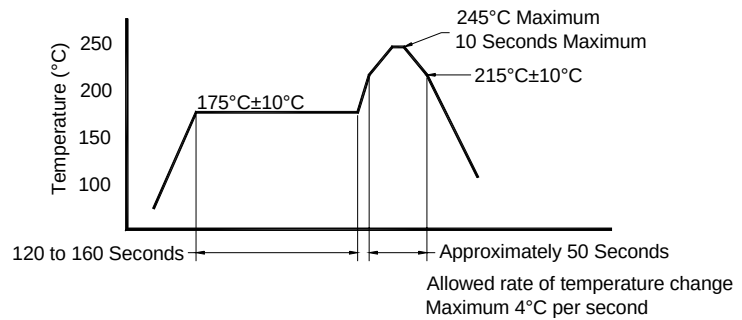
Pin 3 Ground plane is typical

**Not to scale**

|                | Inches       | mm          |
|----------------|--------------|-------------|
| B              | 0.550 ±0.010 | 13.97 ±0.25 |
| A              | 0.390 ±0.010 | 9.90 ±0.25  |
| C              | 0.105 ±0.010 | 2.67 ±0.25  |
| D <sup>1</sup> | 0.026 typ.   | 0.66        |
| E <sup>1</sup> | 0.050        | 1.27        |
| F <sup>1</sup> | 0.028 R      | 0.72 R      |
| G <sup>1</sup> | 0.180        | 4.57        |
| H <sup>1</sup> | 0.100        | 2.54        |
| I <sup>1</sup> | 0.050        | 1.27        |
| J <sup>1</sup> | 0.015        | 0.38        |
| K <sup>1</sup> | 0.380        | 9.65        |

- The package is not hermetically sealed.
- The sides are intentionally left open to permit cleaning material to freely flow in the package, thus minimizing the accumulation of contaminants during cleaning processes.
- The internal part of the package must be thoroughly dry before operating.

## Reflow Cycle (typical for lead free processing)



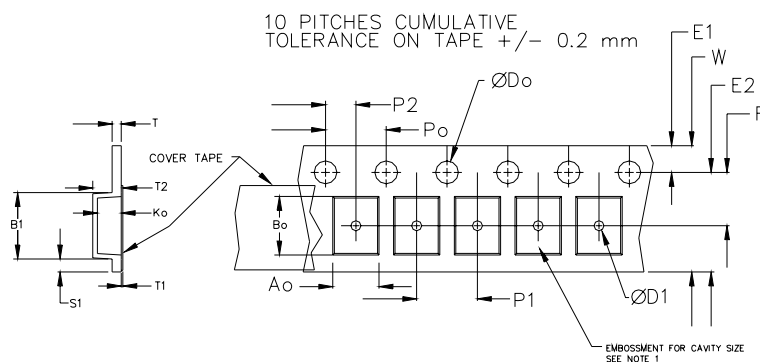
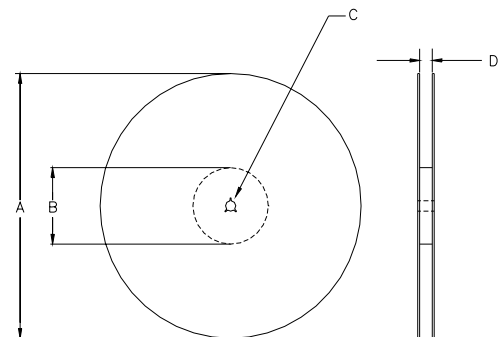
The part may be reflowed 2 times without degradation.

**Tape and Reel: available for quantities of 250 to 1000 per reel, cut tape for < 250**

| Constant Dimensions Table 1 |                         |        |                      |                     |              |        |       |        |
|-----------------------------|-------------------------|--------|----------------------|---------------------|--------------|--------|-------|--------|
| Tape Size                   | D0                      | D1 Min | E1                   | P0                  | P2           | S1 Min | T Max | T1 Max |
| 8mm                         | 1.5<br><br>+0.1<br>-0.0 | 1.0    | 1.75<br><br><br>±0.1 | 4.0<br><br><br>±0.1 | 2.0<br>±0.05 | 0.6    | 0.6   | 0.1    |
| 12mm                        |                         | 1.5    |                      |                     | 2.0<br>±0.1  |        |       |        |
| 16mm                        |                         | 1.5    |                      |                     |              |        |       |        |
| 24mm                        |                         | 1.5    |                      |                     |              |        |       |        |

| Variable Dimensions Table 2 |        |        |           |            |        |       |             |
|-----------------------------|--------|--------|-----------|------------|--------|-------|-------------|
| Tape Size                   | B1 Max | E2 Min | F         | P1         | T2 Max | W Max | Ao, Bo & Ko |
| 24 mm                       | 12.1   | 14.25  | 7.5 ± 0.1 | 16.0 ± 0.1 | 8.0    | 16.3  | Note 1      |

Note 1: Embossed cavity to conform to EIA-481-B Dimensions in mm Not to scale



USER DIRECTION OF UNREELING →

| REEL DIMENSIONS |        |                  |       |                      |
|-----------------|--------|------------------|-------|----------------------|
| A               | inches | 7.0              | 10.0  | 13.0                 |
|                 | mm     | 177.8            | 254.0 | 330.2                |
| B               | inches | 2.50             | 4.00  | 3.75                 |
|                 | mm     | 63.5             | 101.6 | 95.3                 |
| C               | mm     | 13.0 +0.5 / -0.2 |       |                      |
| D               | mm     | ---              | ---   | 24.4<br>+2.0<br>-0.0 |
|                 |        | 24.0             |       |                      |

Reel dimensions may vary from the above



## IMPORTANT NOTICE

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