

High Performance, Programmable LVDS SMD MEMS Oscillator



3.2 x 2.5 x 0.75mm;
5.0 x 3.2 x 0.75mm;
7.0 x 5.0 x 0.9mm

ASTMUPLD



Moisture Sensitivity Level (MSL) – 1

FEATURES:

- Industry Standard package sizes: 3.2 x 2.5 x 0.75mm, 5 x 3.2 x 0.75mm, 7.0 x 5.0 x 0.9mm
- Any frequency between 1MHz and 625MHz
- Supply Voltage options: 3.3V, 2.8V, 2.25V~3.63V
- Ultra-low RMS phase jitter: 0.6ps typ. (@156.25MHz, integration bandwidth: 12kHz to 20MHz)
- Frequency Stability options: ±10ppm, ±20ppm, ±25ppm, ±50ppm over -20 to +70°C and -40 to +85°C

APPLICATIONS:

- 10GB Ethernet, SONET, SATA, SAS, Fiber Channel, PCI Express
- Storage
- Servers
- Networking
- Telecom
- Instrumentation
- Harsh environment (vibration, shock-prone and humid)

STANDARD SPECIFICATIONS:

| Parameters | | Min | Typ | Max | Unit | Notes |
|--|----------------------|---------------------|-----|---------------------|------|--|
| Output Frequency Range (F) | | 1 | | 625 | MHz | See Note 1 for Frequencies not supported |
| Frequency Stability (F _{stab}) | | -10 | | +10 | ppm | Inclusive of initial tolerance at 25°C, and variations over operating temperature, rated power supply voltage and load |
| | | -20 | | +20 | | |
| | | -25 | | +25 | | |
| | | -50 | | +50 | | |
| Operating Temperature Range (T _{use}) | | -20 | | +70 | °C | Option "E" |
| | | -40 | | +85 | | Option "L" |
| Aging@25°C | 1 st year | -2 | | +2 | ppm | |
| | 10 years | -5 | | +5 | | |
| Supply Voltage (V _{dd}) | | 2.25 | 2.5 | 2.75 | V | Option "25" |
| | | 2.97 | 3.3 | 3.63 | | Option "33" |
| | | 2.25 | - | 3.63 | | Option "Blank" (default) |
| Input High Voltage(V _{IH}) | | 70%*V _{dd} | | | V | Pin 1 |
| Input Low Voltage(V _{IL}) | | | | 30%*V _{dd} | V | Pin 1 |
| Input Pull-up Impedance (Z _{in}) | | | | 100 | kΩ | Pin 1, OE logic high or logic low, \overline{ST} logic high |
| | | | | 2 | MΩ | Pin 1, \overline{ST} logic low |
| Startup Time (T _{start}) | | | | 6 | ms | Measured from the time V _{dd} reaches its rated minimum value |
| Resume Time (T _{resume}) | | | | 6 | ms | In standby mode. Measured from the time \overline{ST} pin crosses 50% threshold |
| Duty Cycle | | | | 45 | % | |
| Output Type | | | | | | LVDS |
| Current Consumption (I _{dd}) | | | | 47 | mA | Excluding load termination current, V _{dd} =2.5V or 3.3V |
| OE Disable Current (I _{OD}) | | | | 35 | mA | OE=Low |
| Output Disable Leakage Current (I _{leak}) | | | | 1 | μA | OE=Low |
| Standby Current (I _{std}) | | | | 100 | μA | \overline{ST} =Low, for all V _{dd} |

Note: 1. Frequencies not supported:
 Range 1: From 209.000001MHz to 210.999999MHz
 Range 2: From 251.000001MHz to 263.999999MHz
 Range 3: From 314.000001MHz to 422.999999MHz
 Range 4: From 502.000001MHz to 527.999999MHz



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RoHS/RoHS II compliant

(Continued)

| Parameters | Min | Typ | Max | Unit | Notes |
|---|-------|-----|-------|------|--|
| Differential Output Voltage (V_{OD}) | 250 | 350 | 450 | mV | |
| V_{OD} Magnitude Change (ΔV_{OD}) | | | 50 | mV | |
| Offset Voltage (V_{OS}) | 1.125 | 1.2 | 1.375 | V | |
| V_{OS} Magnitude Change (ΔV_{OS}) | | | 50 | mV | |
| Rise/Fall Time (T_r/T_f) | | 495 | 700 | ps | 20%-80%, Freq. = 1MHz~220MHz |
| | | 495 | 600 | | 20%-80%, Freq. = 220MHz~625MHz |
| OE Enable/Disable Time (T_{oe}) | | | 115 | ns | F=212.5MHz, 220MHz. For other frequencies, $T_{oe}=100ns+3*cycles$ |
| RMS Period Jitter (T_{jitt}) | | 1.2 | 1.7 | ps | F=100MHz, 156.25MHz, 212.5MHz, 622.08MHz, $V_{dd}=2.5V$ or 3.3V |
| | | 1.4 | 1.7 | | F=266MHz, 312.5MHz, $V_{dd}=2.5V$ or 3.3V |
| RMS Phase Jitter (random) (T_{phj}) | | 0.6 | 0.85 | ps | F=156.25MHz, 312.5MHz, integration bandwidth=12kHz to 20MHz |

Standard Frequencies

| Standard Frequency (MHz) | | | | | | | |
|--------------------------|------------|------------|------------|------------|------------|------------|------------|
| 25.000000 | 50.000000 | 74.175824 | 74.250000 | 75.000000 | 98.304000 | 100.000000 | 106.250000 |
| 125.000000 | 133.000000 | 133.300000 | 133.330000 | 133.333000 | 133.333300 | 133.333330 | 133.333333 |
| 148.351648 | 148.500000 | 150.000000 | 155.520000 | 156.250000 | 161.132800 | 166.000000 | 166.600000 |
| 166.660000 | 166.666000 | 166.666600 | 166.666660 | 166.666666 | 200.000000 | 212.500000 | |

Absolute Maximum Ratings

Attempted operation outside the absolute maximum ratings may cause permanent damage to the part. Actual performance of the IC is only guaranteed within the operational specifications, not at absolute maximum ratings.

| Parameters | Min. | Max. | Unit |
|---|------|------|------|
| Storage Temperature | -65 | 150 | °C |
| V_{DD} | -0.5 | 4 | V |
| Electrostatic Discharge (HBM) | | 2000 | V |
| Soldering Temperature (follow standard Pb free soldering guidelines) | | 260 | °C |

Thermal Consideration

| Package | θ_{JA} , 4 Layer Board (°C/W) | θ_{JC} , Bottom (°C/W) |
|--------------------|---|----------------------------------|
| 7.0 x 5.0mm, 6-pin | 142 | 27 |
| 5.0 x 3.2mm, 6-pin | 97 | 20 |
| 3.2 x 2.5mm, 6-pin | 109 | 20 |

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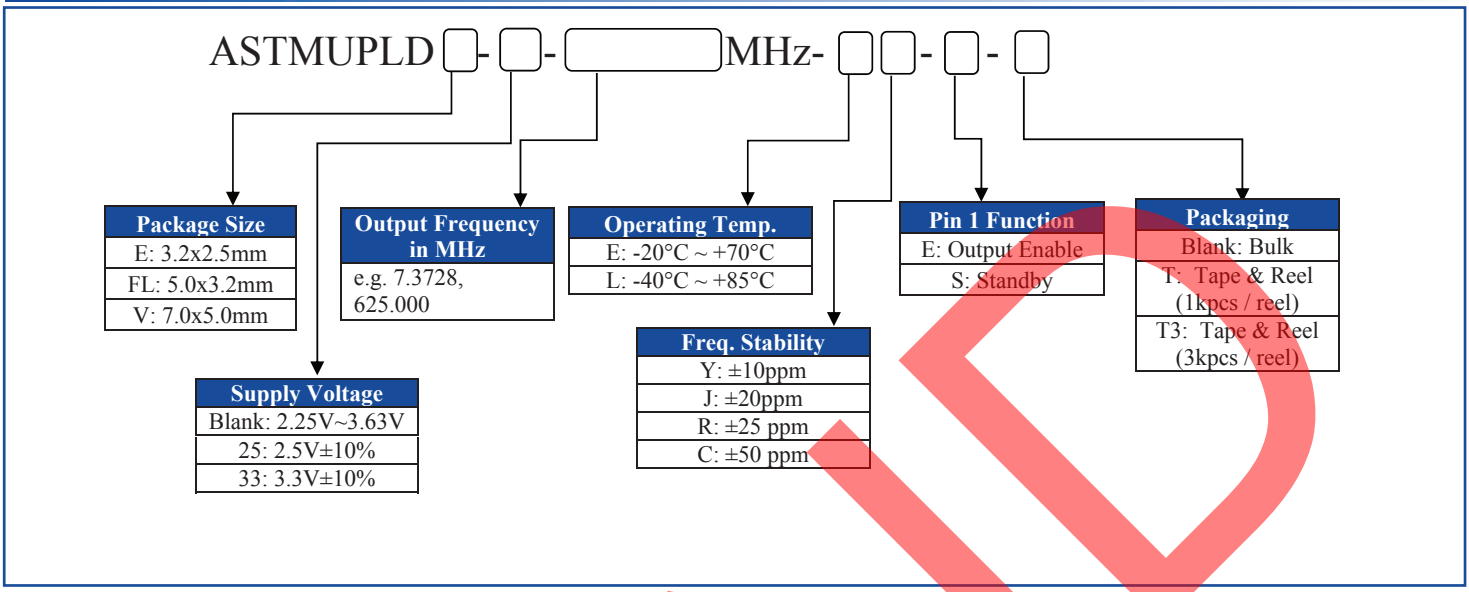


3.2 x 2.5 x 0.75mm;
5.0 x 3.2 x 0.75mm;
7.0 x 5.0 x 0.9mm

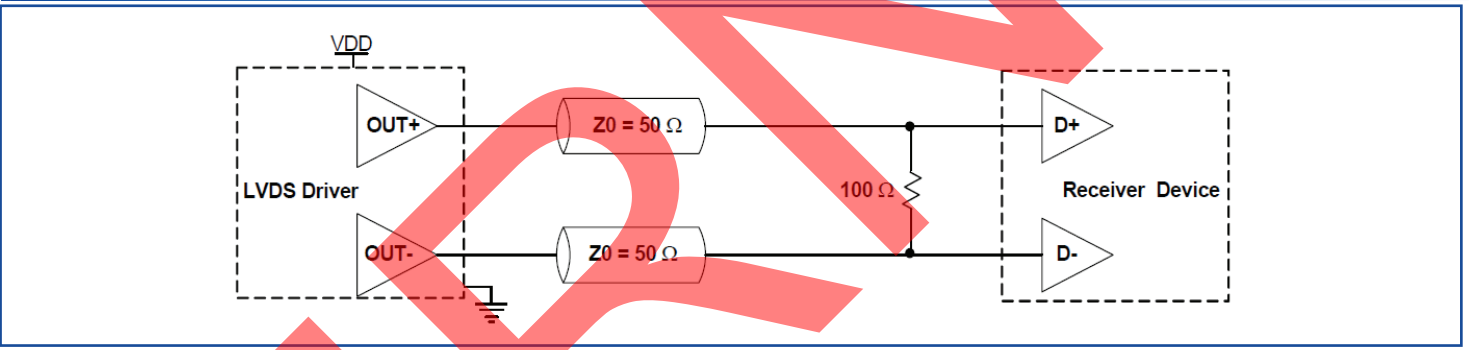
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Pb RoHS/RoHS II compliant

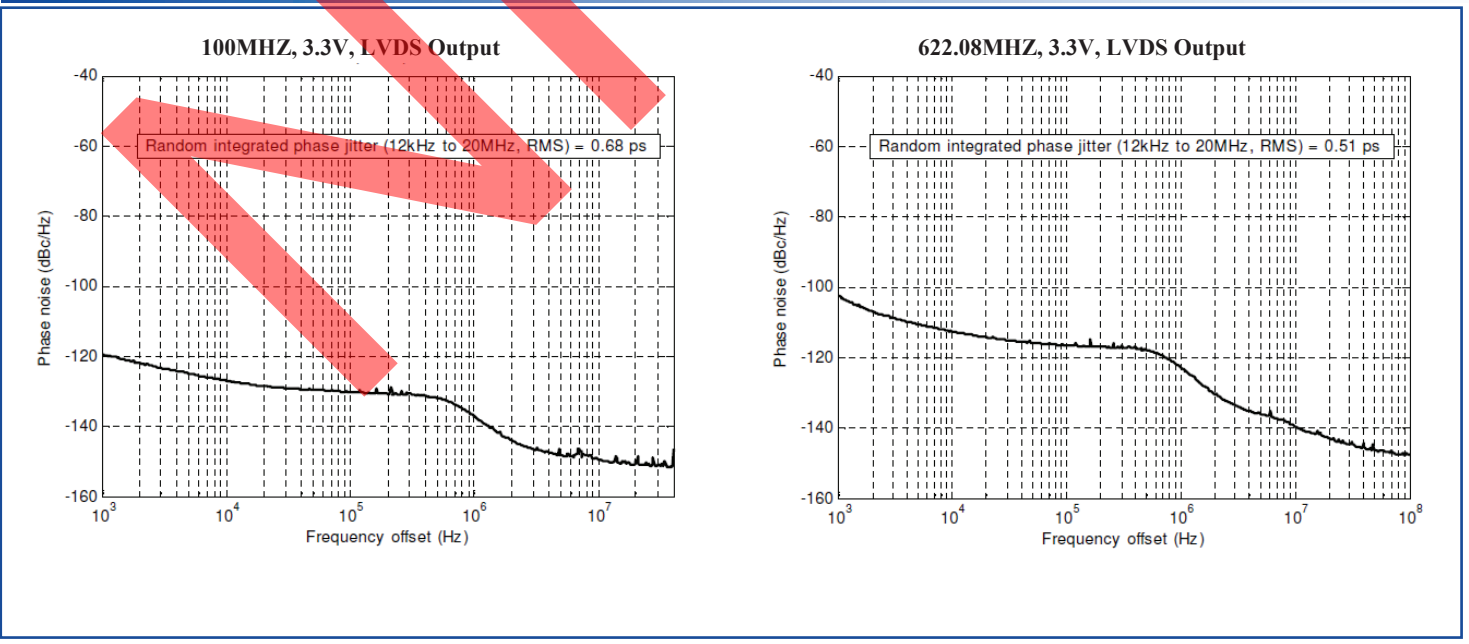
PART IDENTIFICATION:



RECOMMENDED TERMINATION DIAGRAM



TYPICAL PHASE NOISE



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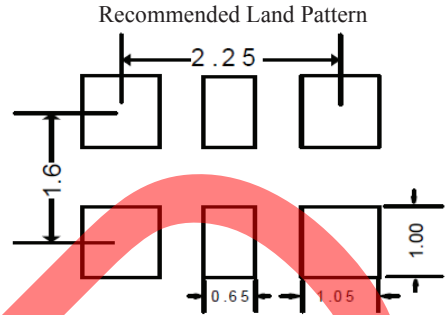
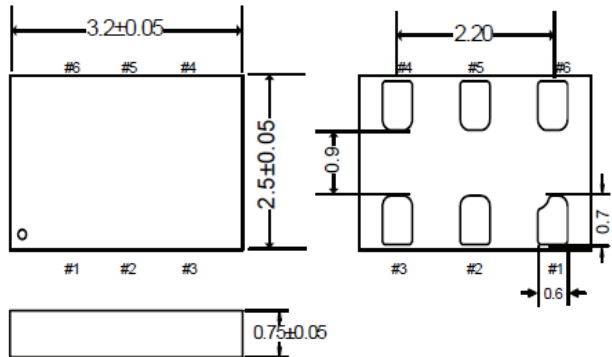
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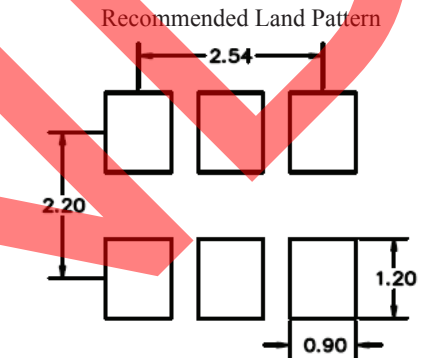
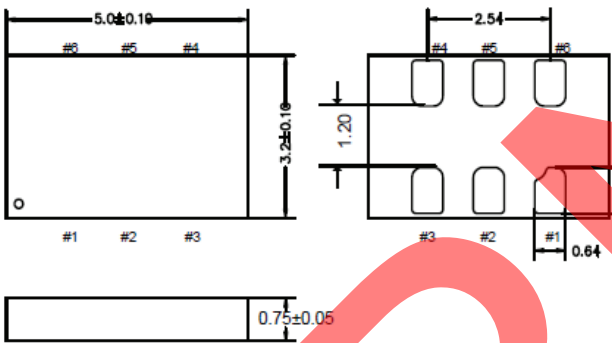
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OUTLINE DIMENSION:

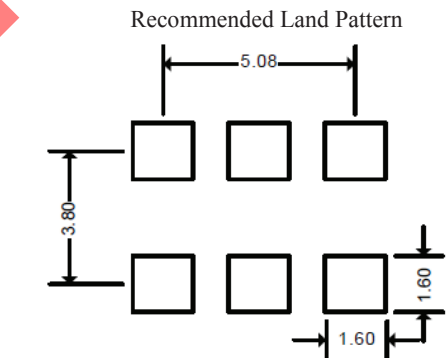
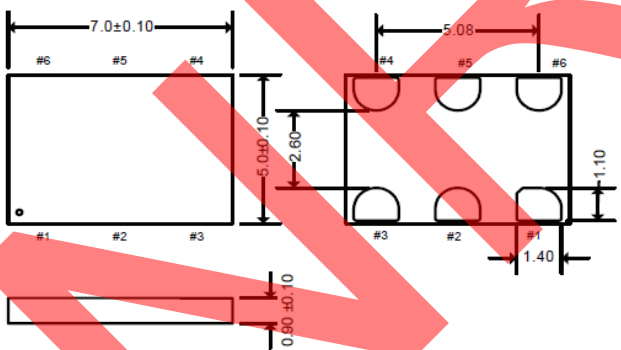
3.2 x 2.5mm Package (Option "E")



5.0 x 3.2mm Package (Option "FL")



7.0 x 5.0mm Package (Option "V")



Dimensions: mm

| Pin | Name | Functionality |
|-----|---------------------|--|
| 1 | OE/ \overline{ST} | Output Enable H or Open: specified frequency output L: output is high impedance. Only output driver is disabled |
| | Standby | H or Open: specified frequency output L: output is low (weak pull down). Device goes to sleep mode. Supply current reduces to I_{std} . |
| 2 | NC | No Connect Leave it floating or connect to GND for better heat dissipation |
| 3 | GND | Power V_{dd} power supply ground ⁽¹⁾ |
| 4 | Out+ | Output Oscillator output |
| 5 | Out- | Output Complementary oscillator output |
| 6 | V_{dd} | Power Power supply voltage ⁽¹⁾ |

Notes: 1. A capacitor value of 0.1μF between V_{dd} and GND is recommended.

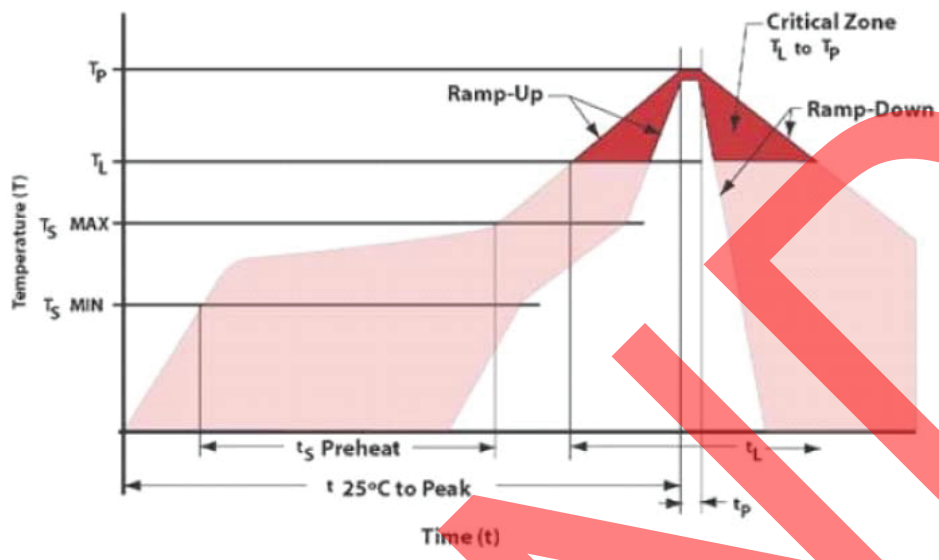


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Pb | RoHS/RoHS II compliant

REFLOW PROFILE:



| Item | Conditions |
|--|------------------|
| $T_s \text{ MAX}$ to T_L (Ramp-up Rate) | 3°C/second max |
| Preheat | |
| Temperature Minimum ($T_s \text{ MIN}$) | 150°C |
| Temperature Typical ($T_s \text{ TYP}$) | 175°C |
| Temperature Maximum ($T_s \text{ MAX}$) | 200°C |
| Time (t_s) | 60 – 180 seconds |
| Ramp-up Rate (T_L to T_p) | 3°C/second max |
| Time Maintained Above | |
| Temperature (T_L) | 217°C |
| Time (t_L) | 60 – 150 seconds |
| Peak Temperature (T_p) | 260°C max |
| Target Peak Temperature ($T_p \text{ Target}$) | 255°C |
| Time within 5°C of actual peak (t_p) | 20 – 40 seconds |
| Max. Number of Reflow Cycles | 3 |
| Ramp-down Rate | 6°C/second max |
| Time 25°C to Peak Temperature (t) | 8 minutes max |

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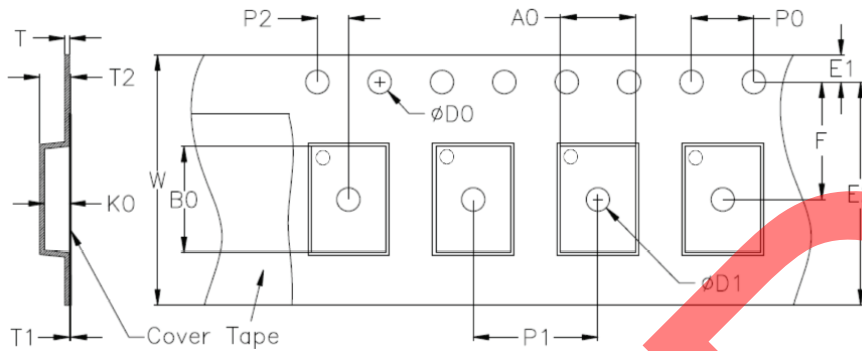


RoHS/RoHS II compliant



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TAPE & REEL:

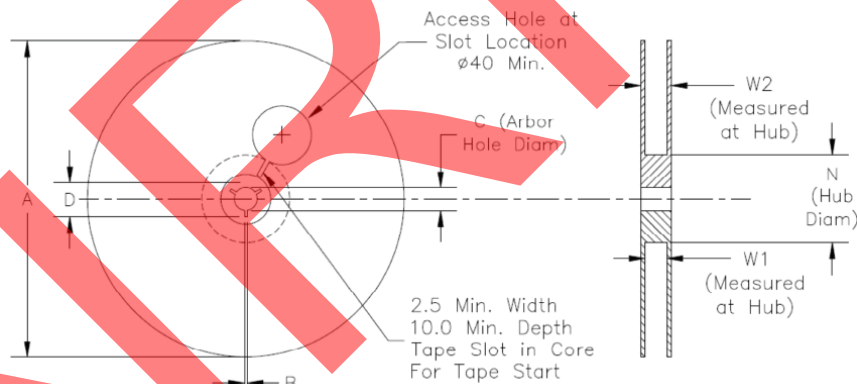


Unit: mm

| Device Size | D0 | D1 min. | E1 | E2 min. | F | P0 | P1 | P2 |
|-------------|--------------|---------|----------|---------|----------|---------|---------|----------|
| 3225 | 1.5+0.1/-0.0 | 1.5 | 1.75±0.1 | 10.25 | 5.5±0.05 | 4.0±0.1 | 4.0±0.1 | 2.0±0.05 |
| 5032 | 1.5+0.1/-0.0 | 1.5 | 1.75±0.1 | 10.25 | 5.5±0.05 | 4.0±0.1 | 8.0±0.1 | 2.0±0.05 |
| 7050 | 1.5+0.1/-0.0 | 1.5 | 1.75±0.1 | 14.25 | 7.5±0.1 | 4.0±0.1 | 8.0±0.1 | 2.0±0.1 |

Unit: mm

| Device Size | T | T1 max. | T2 max. | W max. | A0 | B0 | K0 |
|-------------|-----|---------|---------|--------|----------|----------|-----------|
| 3225 | 0.6 | 0.1 | 1.65 | 12.3 | 2.8±0.10 | 3.5±0.10 | 1.10±0.10 |
| 5032 | 0.6 | 0.1 | 1.65 | 12.3 | 3.5±0.10 | 5.3±0.10 | 1.10±0.10 |
| 7050 | 0.6 | 0.1 | 1.80 | 16.3 | 5.4±0.10 | 7.4±0.10 | 1.3±0.10 |



Unit: mm

| Tape Size | A max. | B min. | C | D min. | N | W1 | W2 max. |
|-----------|--------|--------|----------|--------|---------|-------------|---------|
| 12mm | 180 | 1.5 | 13.0±0.2 | 20.2 | 60±0.5 | 12.4+2.0/-0 | 18.4 |
| | 330 | 1.5 | 13.0±0.2 | 20.2 | 100±0.5 | 12.4+2.0/-0 | 18.4 |
| 16mm | 180 | 1.5 | 13.0±0.2 | 20.2 | 60±0.5 | 16.4+2.0/-0 | 22.4 |
| | 330 | 1.5 | 13.0±0.2 | 20.2 | 100±0.5 | 16.4+2.0/-0 | 22.4 |

| Device Size | "T" (1k/reel) | | "T3" (3k/reel) | |
|-------------|---------------|---------|----------------|----------|
| 3225 | 12mm Tape | 7" Reel | 12mm Tape | 7" Reel |
| 5032 | 12mm Tape | 7" Reel | 12mm Tape | 13" Reel |
| 7050 | 16mm Tape | 7" Reel | 16mm Tape | 13" Reel |

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