

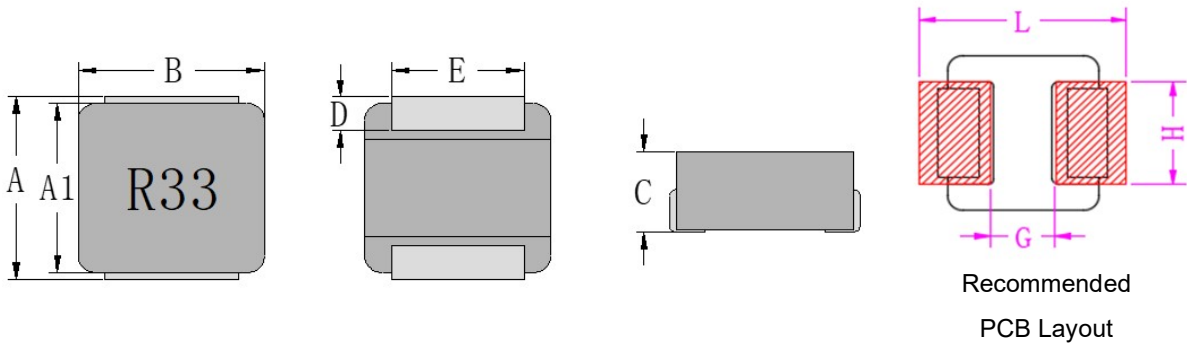
1. Part No. Expression

PHA0421SPR33MN

(a) (b) (c) (d) (e) (f)

- | | |
|--------------------|---------------------|
| (a) Series Code | (d) Inductance Code |
| (b) Dimension Code | (e) Tolerance Code |
| (c) Material Code | (f) Special Code |

2. Configuration & Dimensions (Unit: mm)

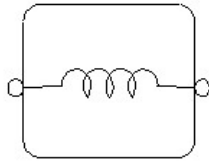


- Note:
1. The above PCB layout reference only.
 2. Recommend solder paste thickness at 0.12mm and above.
 3. Marking: Inductance Code

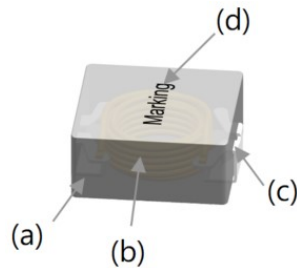
| A | A1 | B | C | D | E | L | G | H |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 4.2±0.3 | 4.0±0.3 | 4.1±0.2 | 1.9±0.2 | 0.8±0.3 | 3.0±0.2 | 5.2 Ref | 2.2 Ref | 3.5 Ref |

NOTE: Specifications subject to change without notice. Please check our website for latest information.

3. Schematic



4. Material List



- (a) Core
- (b) Wire
- (c) Clip
- (d) Ink

5. General Specifications

- (a) Operating Temp.: -40°C to +125°C (including self-temperature rise)
- (b) Storage Temp.: -40°C to +125°C (on board)
- (c) All test data referenced to 25°C ambient.
- (d) Heat Rated Current (Irms) will cause the coil temperature rise approximately ΔT of 40°C.
- (e) Saturation Current (Isat) will cause inductance L0 to drop approximately 30%.
- (f) Rated Current: The lower value of Isat and Irms.
- (g) Part Temperature (Ambient + Temp. Rise): Should not exceed 125°C under worst case operating conditions.
- (h) Storage Condition (Component in its packaging)
 - i) Temperature: Less than 40°C
 - ii) Humidity: Less than 85% RH

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6. Electrical Characteristics

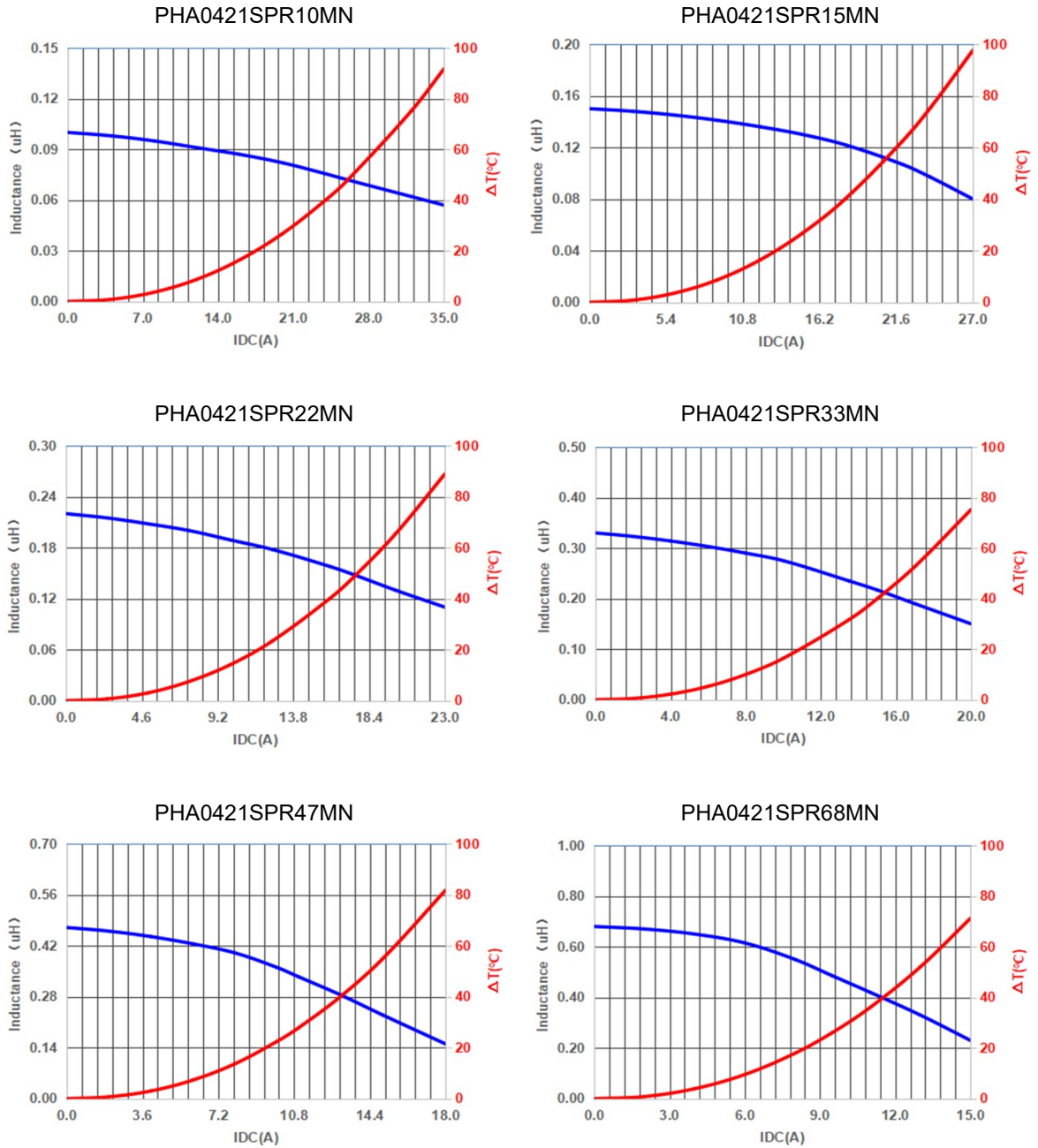
| Part Number | Inductance (μ H) $\pm 20\%$ | I _{rms} (A) | | I _{sat} (A) | | DCR (m Ω) | |
|----------------|--|-------------------------|------|-------------------------|------|----------------------|-------|
| | | Typ | Max | Typ | Max | Typ | Max |
| PHA0421SPR10MN | 0.10 | 24.0 | 22.0 | 26.0 | 23.0 | 1.6 | 2.0 |
| PHA0421SPR15MN | 0.15 | 18.0 | 16.0 | 22.0 | 20.0 | 2.9 | 3.5 |
| PHA0421SPR22MN | 0.22 | 16.0 | 14.0 | 16.0 | 13.0 | 4.1 | 4.9 |
| PHA0421SPR33MN | 0.33 | 15.0 | 13.0 | 13.5 | 11.5 | 4.8 | 5.8 |
| PHA0421SPR47MN | 0.47 | 13.0 | 11.0 | 11.0 | 9.5 | 6.0 | 7.0 |
| PHA0421SPR68MN | 0.68 | 11.0 | 10.0 | 9.5 | 8.2 | 7.6 | 8.8 |
| PHA0421SP1R0MN | 1.00 | 10.0 | 9.5 | 8.0 | 7.0 | 9.5 | 11.0 |
| PHA0421SP1R5MN | 1.50 | 8.5 | 7.8 | 6.8 | 6.2 | 14.0 | 16.0 |
| PHA0421SP2R2MN | 2.20 | 7.5 | 6.8 | 5.5 | 4.8 | 20.9 | 23.0 |
| PHA0421SP3R3MN | 3.30 | 5.6 | 5.2 | 5.0 | 4.4 | 38.0 | 45.6 |
| PHA0421SP4R7MN | 4.70 | 4.5 | 4.0 | 4.2 | 3.7 | 54.0 | 64.8 |
| PHA0421SP5R6MN | 5.60 | 4.1 | 3.6 | 3.5 | 3.1 | 63.0 | 75.6 |
| PHA0421SP6R8MN | 6.80 | 3.5 | 3.0 | 3.1 | 2.8 | 80.5 | 92.5 |
| PHA0421SP8R2MN | 8.20 | 3.2 | 2.8 | 2.9 | 2.6 | 103.0 | 118.5 |
| PHA0421SP100MN | 10.00 | 2.8 | 2.5 | 2.7 | 2.4 | 115.0 | 132.0 |

Test Frequency: 1.0V/100kHz

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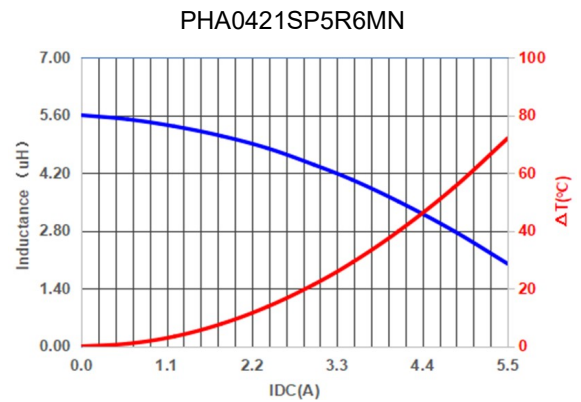
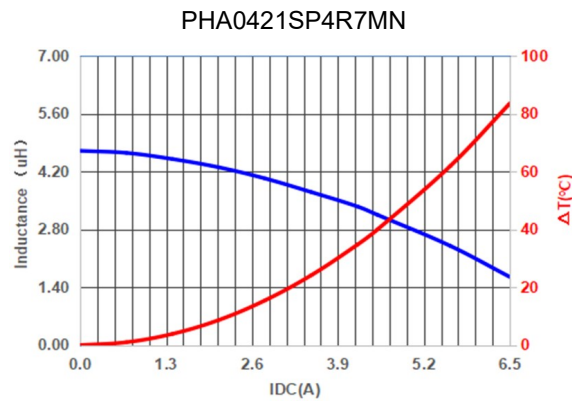
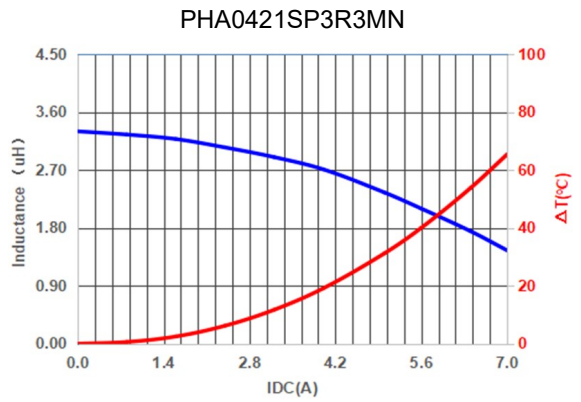
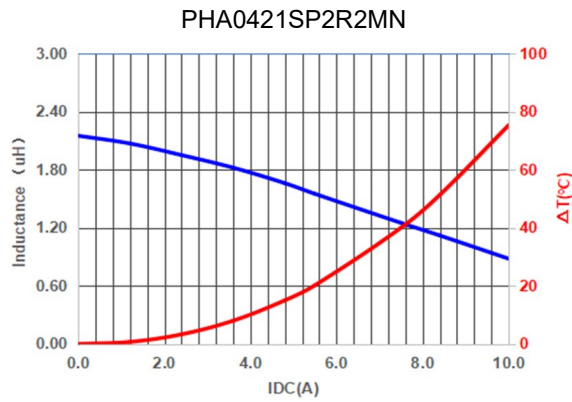
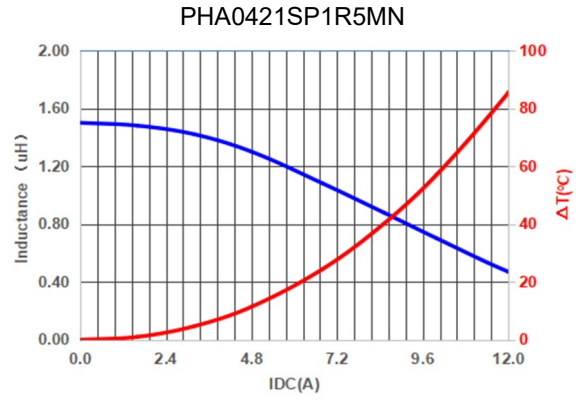
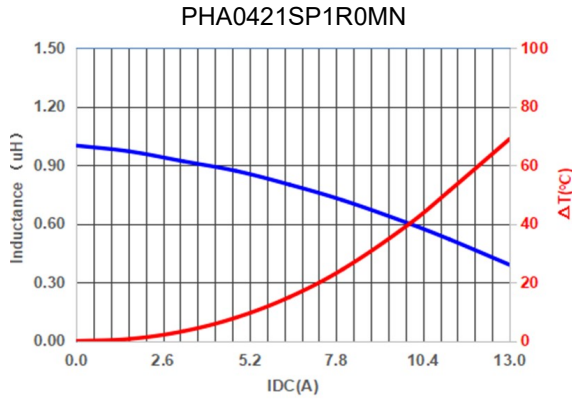


7. Characteristics Curve



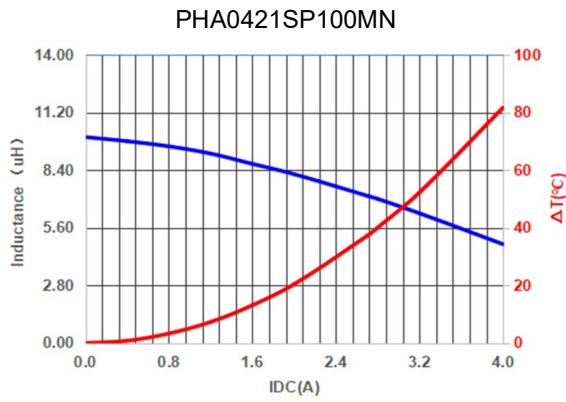
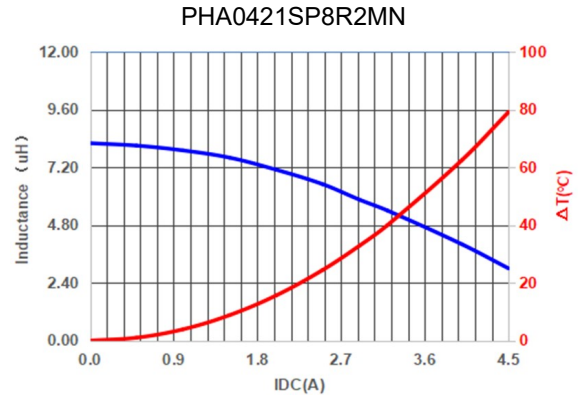
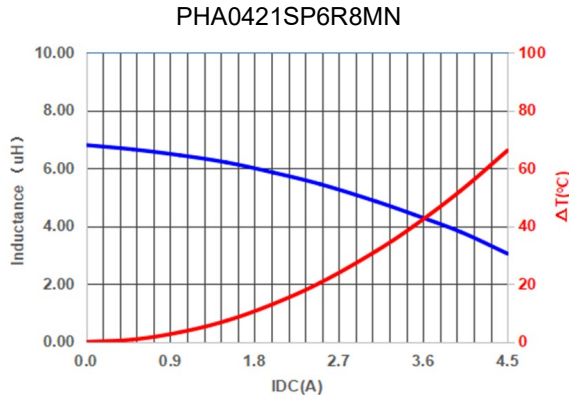
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8. Soldering Specification

Mildly activated rosin fluxes are preferred. Our terminations are suitable for re-flow soldering systems. If hand soldering cannot be avoided, the preferred technique is the utilization of hot air soldering tools.

8-1. IR Soldering Reflow

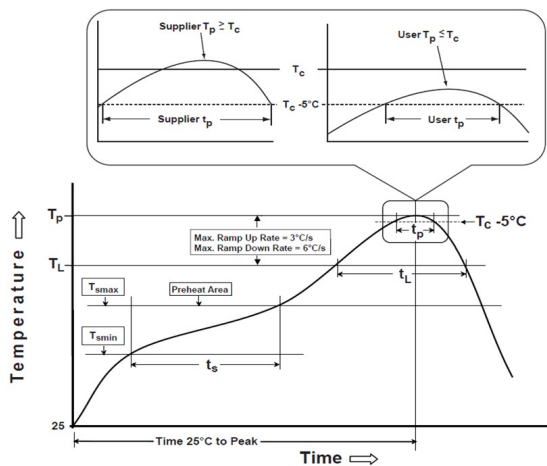
Recommended temperature profiles for lead free re-flow soldering in Figure 1, Table 1.1 & 1.2 (J-STD-020E).

8-2. Iron Reflow

Products attachment with a soldering iron is discouraged due to the inherent process control limitations. In the event that a soldering iron must be employed the following precautions are recommended (Figure 2).

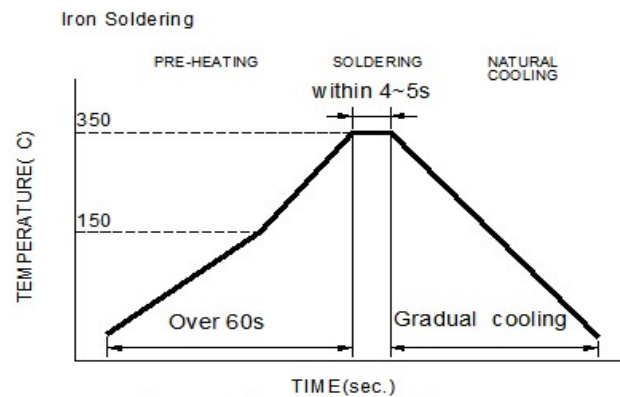
Note:

- (a) Preheat circuit and products to 150°C.
- (b) 355°C tip temperature (Max.)
- (c) Never contact the ceramic with the iron tip
- (d) 1.0mm tip diameter (Max.)
- (e) Use a 20 watt soldering iron with tip diameter of 1.0mm
- (f) Limit soldering time to 4~5 sec.



Reflow times: 3 times Max

Figure 1: IR Soldering Reflow



Iron Soldering times: 1 times max.

Soldering iron method: 350±5°C Max

Figure 2: Iron soldering temperature profiles

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Table (1.1) Reflow Profiles

| | |
|--|------------------|
| Profile Type: | Pb-Free Assembly |
| Preheat | |
| -Temperature Min (T_{smin}) | 150°C |
| -Temperature Max (T_{smax}) | 200°C |
| -Time (t_s) from (T_{smin} to T_{smax}) | 60-120seconds |
| Ramp-up rate (T_L to T_p) | 3°C /second max. |
| Liquids temperature (T_L) | 217°C |
| Time (t_L) maintained above T_L | 60-150 seconds |
| Classification temperature (T_c) | See Table (1.2) |
| Time (t_p) at $T_c - 5^\circ\text{C}$ (T_p should be equal to or less than T_c .) | * < 30 seconds |
| Ramp-down rate (T_p to T_L) | 6°C /second max. |
| Time 25°C to peak temperature | 8 minutes max. |

T_p: maximum peak package body temperature, **T_c**: the classification temperature.

For user (customer) **T_p** should be equal to or less than **T_c**.

*Tolerance for peak profile temperature (T_p) is defined as a supplier minimum and a user maximum.

Table (1.2) Package Thickness/Volume and Classification Temperature (T_c)

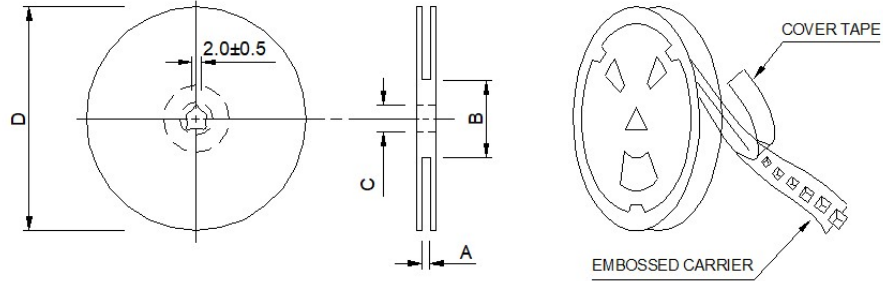
| | Package Thickness | Volume mm ³ <350 | Volume mm ³ 350-2000 | Volume mm ³ >2000 |
|------------------|-------------------|-----------------------------|---------------------------------|------------------------------|
| PB-Free Assembly | <1.6mm | 260°C | 260°C | 260°C |
| | 1.6-2.5mm | 260°C | 250°C | 245°C |
| | ≥2.5mm | 250°C | 245°C | 245°C |

Reflow is referred to standard IPC/JEDEC J-STD-020E.

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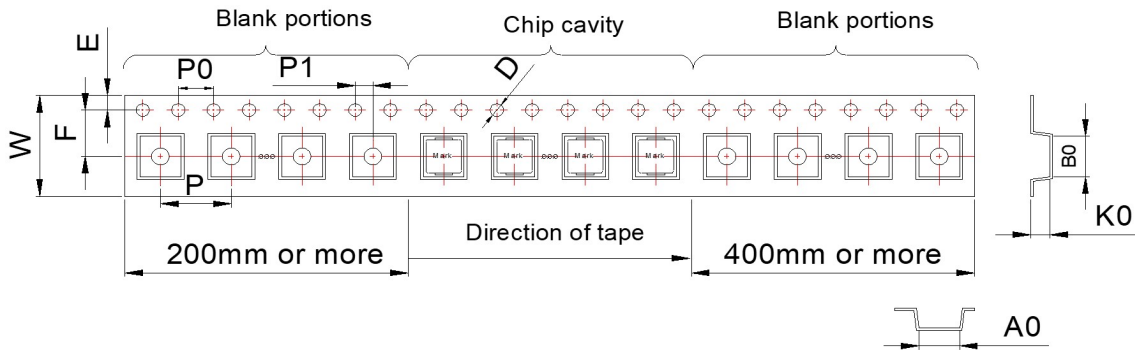
9. Packaging Information

9-1. Reel Dimension (Unit: mm)



| Type | A(mm) | B(mm) | C(mm) | D(mm) |
|------------|---------------|-----------|---------------|-----------|
| 13" x 12mm | 12.4+2.0/-0.0 | 100.0±2.0 | 13.0+0.5/-0.2 | 330.0±0.3 |

9-2. Tape Dimension (Unit: mm)



| | | | | |
|-----------|-----------|-----------|------------|-----------|
| B0 | A0 | K0 | W | P |
| 5.10±0.10 | 4.40±0.10 | 2.40±0.10 | 12.00±0.30 | 8.00±0.10 |
| P0 | P1 | F | E | D |
| 4.00±0.10 | 2.00±0.10 | 5.50±0.10 | 1.75±0.10 | 1.50±0.10 |

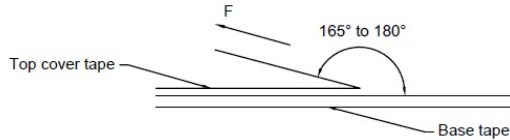
NOTE: Specifications subject to change without notice. Please check our website for latest information.



9-3. Packaging Quantity (Unit: Pcs)

| | |
|------------|-------|
| Chip/ Reel | 3,000 |
|------------|-------|

9-4. Tearing Off Force



The force for tearing off cover tape is according to the follow table, in the arrow direction under the following conditions.

(Referenced ANSI/EIA-481-D-2008 of 4.11 standard)

| Room Temp. (°C) | Room Humidity (%) | Room atm (hPa) | Tearing Speed (mm/min) |
|-----------------|-------------------|----------------|------------------------|
| 5~35 | 45~85 | 860~1060 | 300±10 |

| Tape Size | 8 mm | 12 to 56 mm | 72 mm or Wider |
|---------------------------|--------|-------------|----------------|
| Tearing Off Force (grams) | 10~100 | 10~130 | 10~150 |

Application Notice

1. Storage Conditions

To maintain the solderability of terminal electrodes:

- (a) Recommended products should be used within 12 months from the time of delivery.
- (b) The packaging material should be kept where no chlorine or sulfur exists in the air.

2. Transportation

- (a) Products should be handled with care to avoid damage or contamination from perspiration and skin oils.
- (b) Vacuum pick up is strongly recommended for individual components.
- (c) Bulk handling should ensure that abrasion and mechanical shock are minimized.

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