

Specification For Approval



Item P/N	PHN4020AI-SERIES	Test Instrument	E4991 、 4338 、 6379
Product	Power Inductor	Test Frequency	100 KHz / 1V

Customer : _____

Customer P/N : _____

Description : Power Inductor

HT P/N : PHN4020AI-SERIES

Revision No. : Version: 1.2

Date : _____

Notes : Automobile Conform to AEC-Q200



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IATF 16949:2016 / ISO 9001:2015 / ISO 14001:2015

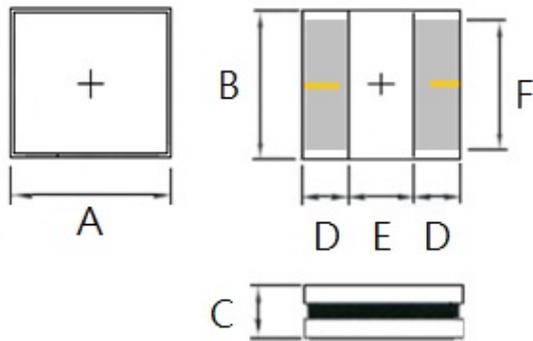
Ht Documented		Customer Approval
Approved	Jack	
Checked	George	
Prepared	Cherrie	

Specification



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■ Style and Dimensions (mm)



PHN4020	Dimensions
A	4.0 ± 0.2
B	4.0 ± 0.2
C	1.8 ± 0.2
D	1.1 Ref.
E	1.8 Ref.
F	3.7 Ref.

■ Explanation Of Part Numbers

① ② ③ ④ ⑤

PHN 4020 AI - 1R0 M

- ① Product Name
- ② Shapes and Dimensions
- ③ For Automobile Conform to ACE-Q200 Grade 1
- ④ Inductance 【at 100KHz】 100:10μH
- ⑤ Inductance Tolerance (N = 30% , M = 20%)

■ Electrical Characteristics

P/N	Inductance (μH)	DCR (mΩ) Max.	Isat (A) Typ.	Irms (A) typ.
PHN4020AI-R33□	0.33	10	14.0	7.0
PHN4020AI-R47□	0.47	17	12.0	6.0
PHN4020AI-1R0□	1.00	35	7.5	4.5
PHN4020AI-1R5□	1.50	45	6.5	3.8
PHN4020AI-2R2□	2.20	55	5.5	3.5
PHN4020AI-3R3□	3.30	75	4.5	3.0
PHN4020AI-4R7□	4.70	95	3.8	2.3
PHN4020AI-5R6□	5.60	105	3.4	2.0
PHN4020AI-6R8□	6.80	120	3.0	1.6
PHN4020AI-100□	10.00	160	2.5	1.3

Note :

- L: Agilent/HP E4991, 100KHz/1V
- RDC: Digital Milliohm Meter Agilent/HP4338B
- Isat & Irms: Microtest 6379, 100KHz/1V

Characteristics

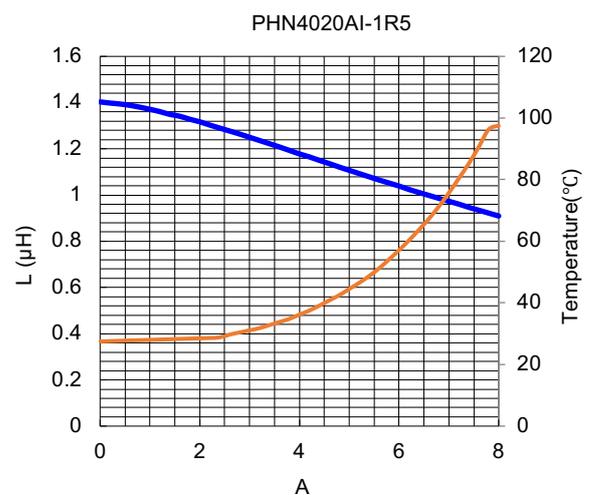
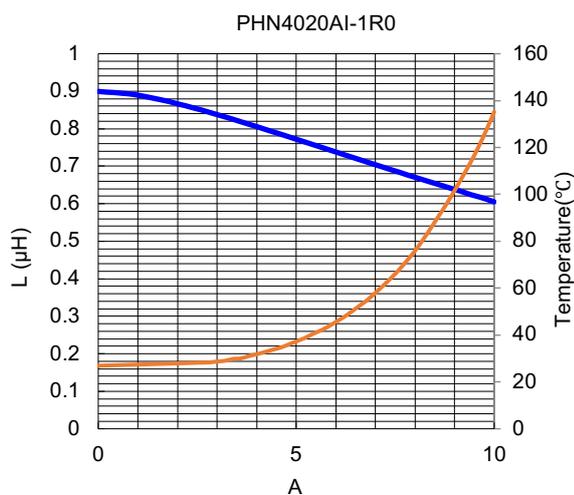
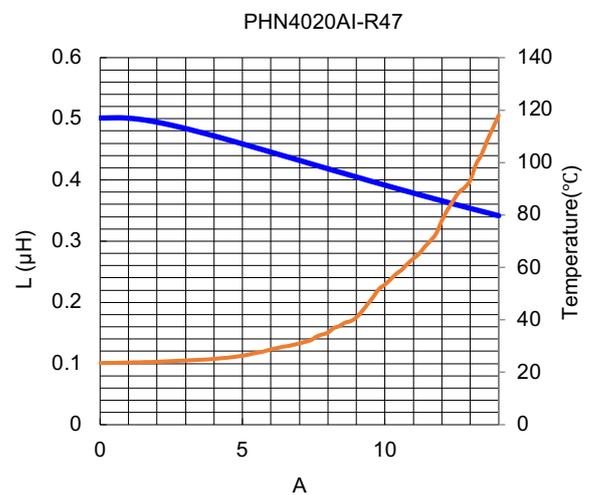
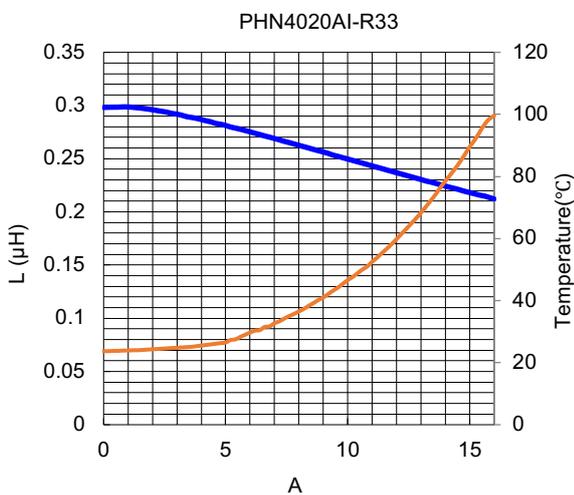


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Note :

- Isat for Inductance drop 30% from its value without current typical.
- Irms for a 40°C rise above 25°C ambient typical.
- If Use wave soldering is there will be some risk. (Crack、unwitting & Mark Shedding)
- Re-flow soldering temperatures below 240 degrees, there will be unwitting risk.
- Operating Temperature Range -55°C to +150°C (Including self-temperature rise)
- Storage temp. and humidity: Less than 40°C and 60% RH.
- When total area of exposed wire occurring to each side is not greater than 75% of coating resin area, that is acceptable.

■ Performance curves

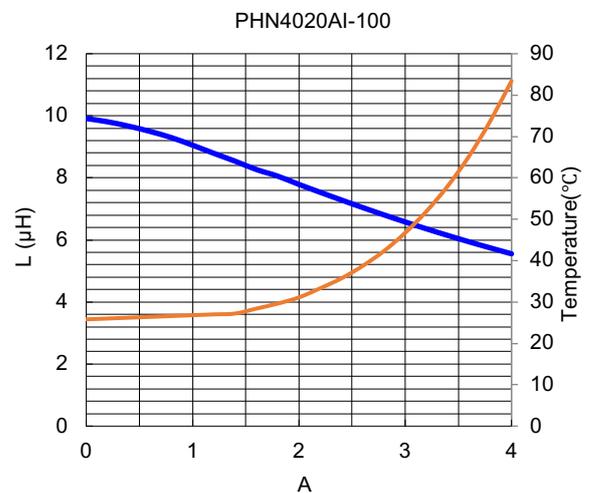
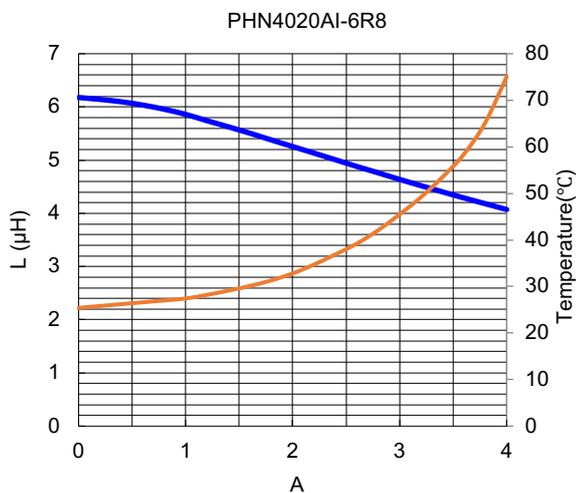
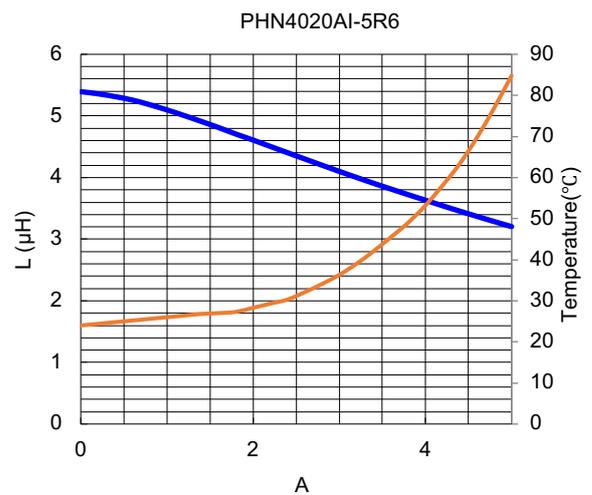
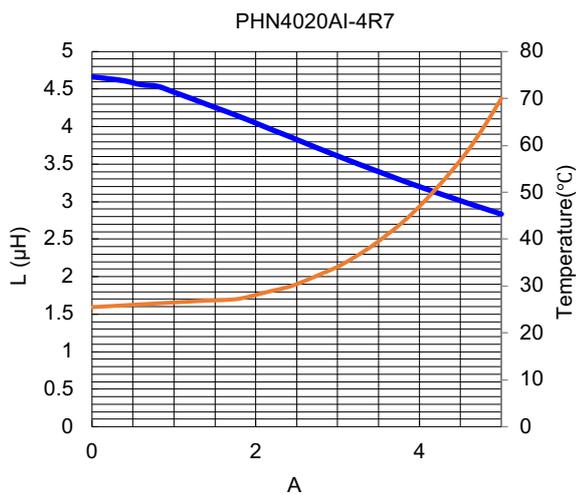
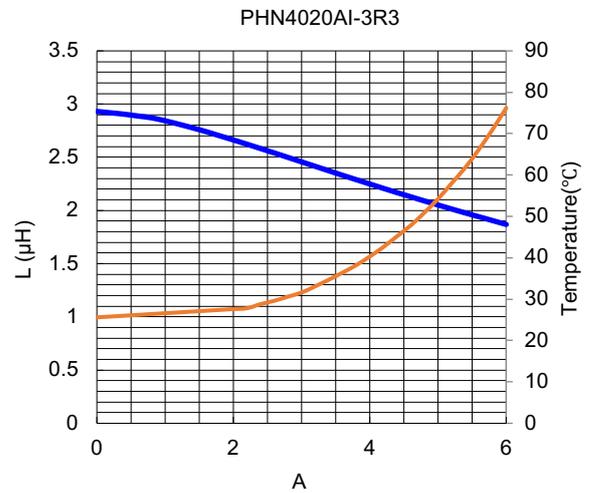
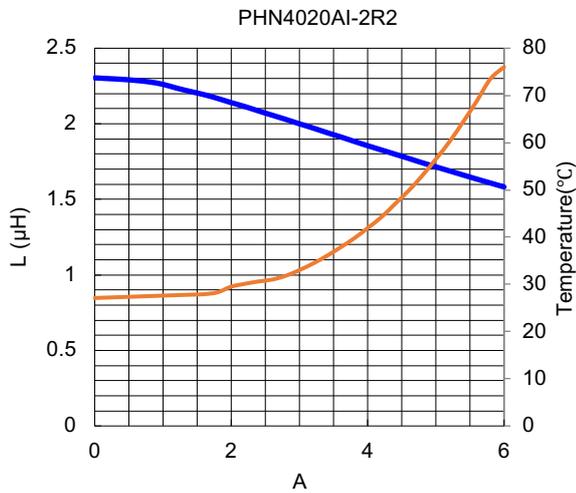


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■ Performance Curves



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■ Reliability and Test Condition

Item	Performance	Test Condition
Operating Temperature	-55~+150°C (Including self-temperature rise)	

Electrical Performance Test

Inductance (μH)	Refer to standard electrical characteristic list	Agilent E4991, Agilent 4287 Agilent E4982A、Agilent 4286 MICROTEST 6379
Q		
SRF		Agilent E4991
DC Resistance		Agilent 4338
Rated Current	Base on temp. rise & $\Delta L/L0A \leq 30\%$	Saturation DC Current (Isat) will cause L0A to drop approximately $\Delta L(\%)$
Temperature Rise Test	$\Delta T40^\circ\text{C}$ Max.	Heat Rated Current (Irms) Will cause the coil temperature rise approximately $\Delta T(^\circ\text{C})$ without core loss. 1. Applied the allowed DC current. 2. Temperature measured by digital surface thermometer

Mechanical Performance Test

Resistance to Soldering Heat MIL-STD-202 Method 210	1. Inductors shall be no evidence of electrical and mechanical damage. 2. Inductance within $\pm 10\%$ of initial value	Temp: $260 \pm 5^\circ\text{C}$ Time: 10 ± 1 Sec
Solderability Test ANSI/JSTD-002	More than 95% of terminal electrode should be covered with solder.	<p>be dipped in a melted solder bath at $235 \pm 5^\circ\text{C}$ for 4 ± 1 seconds.</p>

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■ Reliability and Test Condition

Item	Performance	Test Condition												
Reliability Test														
Humidity Test MIL-STD-202 ME THOD 103	1. Visual examination: No mechanical damage 2. Inductance: Within $\pm 10\%$ of initial value	1. Temperature: $+85 \pm 2^\circ\text{C}$ 2. Humidity: 90~95% 3. Time: 500 ± 8 hrs 4. Measured at Room Temperature After Placing for 2 to 3hrs												
Thermal Shock Test MIL-STD-202 ME THOD 107		Conditions for 1 cycle <table border="1"> <thead> <tr> <th>Step</th> <th>Temperature($^\circ\text{C}$)</th> <th>Times(min.)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-55 ± 2</td> <td>30 ± 3</td> </tr> <tr> <td>2</td> <td>Room</td> <td>Within 5</td> </tr> <tr> <td>3</td> <td>$+150 \pm 5$</td> <td>30 ± 3</td> </tr> </tbody> </table> Total: 100 cycle Measured at Room Temperature After Placing for 2 to 3hrs	Step	Temperature($^\circ\text{C}$)	Times(min.)	1	-55 ± 2	30 ± 3	2	Room	Within 5	3	$+150 \pm 5$	30 ± 3
Step		Temperature($^\circ\text{C}$)	Times(min.)											
1		-55 ± 2	30 ± 3											
2		Room	Within 5											
3	$+150 \pm 5$	30 ± 3												
High Temperature Life Test MIL-STD-202 ME THOD 108	1. Temperature: $150 \pm 2^\circ\text{C}$ 2. Time: 500 ± 8 hrs 3. Measured at Room Temperature After Placing for 2 to 3hrs													
Low Temperature Storage Test JESD22-A119	1. Temperature: $-55 \pm 2^\circ\text{C}$ 2. Time: 500 ± 8 hrs 3. Measured at Room Temperature After Placing for 2 to 3hrs													
Random Vibration Test MIL-STD-202 ME THOD 204	Appearance: Cracking, shipping, and any other defects harmful to the characteristics should not be allowed. Inductance: Within $\pm 10\%$	Frequency: 10-55-10Hz for 15 min. Amplitude: 1.52mm Directions and times: X, Y, Z directions for 15 min. This cycle shall be performed 12 times. In each of three mutually perpendicular directions (Total 9hrs).												

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■ Soldering and Mounting

Soldering

Mildly activated rosin fluxes are preferred. 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.

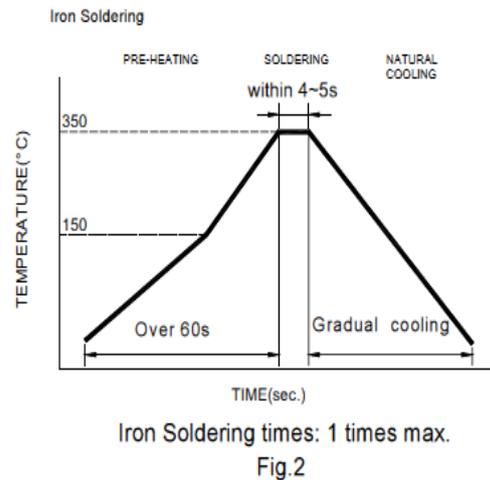
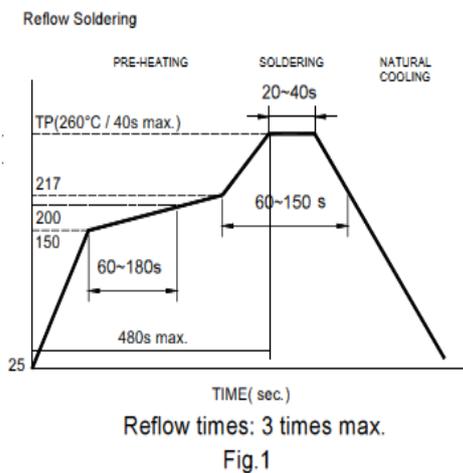
Solder re-flow:

Recommended temperature profiles for re-flow soldering in Figure 1.

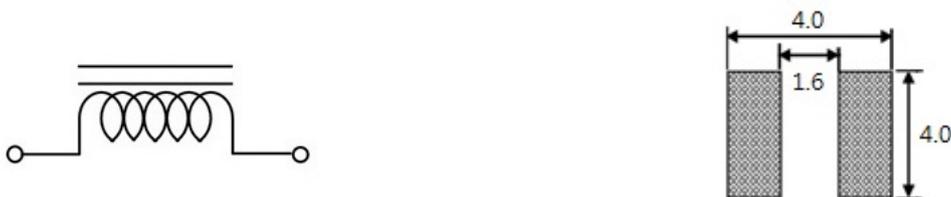
Soldering Iron (Figure 2):

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

- Preheat circuit and products to 150°C
- Never contact the ceramic with the iron tip
- Use a 20-watt soldering iron with tip diameter of 1.0mm
- 355°C tip temperature (max.)
- 1.0mm tip diameter (max.)

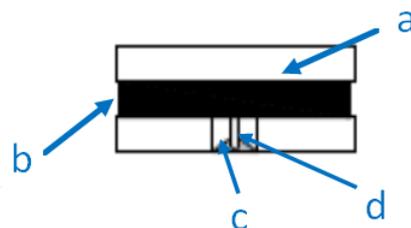


■ Recommended PC Board Pattern



■ Product Composition Diagram

No.	Description	Specification
a.	Core	Metal Core
b.	Coating	Epoxy with Metal powder
c.	Termination	Tin Pb Free
d.	Wire	Enameled Copper Wire



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■ Application Notice

●Storage Conditions(component level)

To maintain the solderability of terminal electrodes:

1. HUNGTRON products meet IPC/JEDEC J-STD-020D standard-MSL, level 1.
2. Temperature and humidity conditions: Less than 40°C and 60% RH.
3. Recommended products should be used within 12 months form the time of delivery.
4. The packaging material should be kept where no chlorine or sulfur exists in the air.

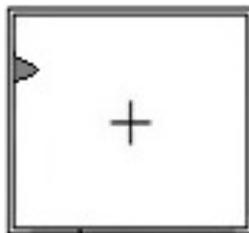
●Transportation

1. Products should be handled with care to avoid damage or contamination from perspiration and skin oils.
2. The use of tweezers or vacuum pick up is strongly recommended for individual components.
3. Bulk handling should ensure that abrasion and mechanical shock are minimized.

■ Appearance Standard

●Core chipping

The appearance standard of the top and bottom ferrite core chipping size, the top or bottom area is less than 5%.



●Exposed wire tolerance limit of coating resin part on product side,

Size of exposed wire occurring to coating resin is specified below.

1. Width direction(dimension a) : Acceptable when $a \leq w/2$ Nonconforming when $a > w/2$
2. Length direction (dimension b) : Dimension b is not specified.
3. When total area of exposed wire occurring to each sides is not greater than 50% of coating resin area, that is

acceptable.

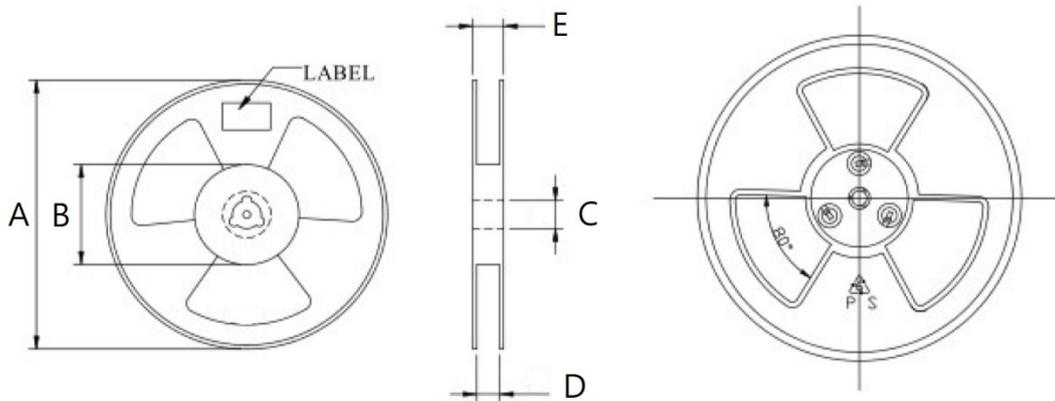


Packing For SMD

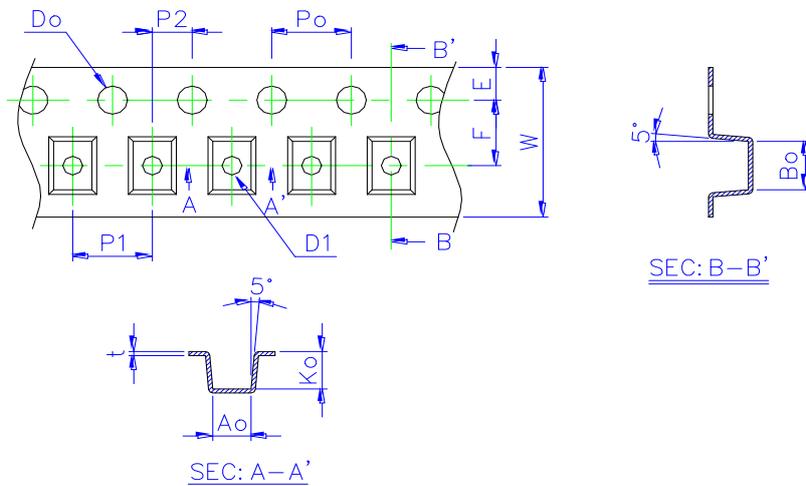


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■ Reel Dimension & Tape Dimension



Type	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)
13"X12mm	330±1.0	100±2	13.5±0.5	12.7±0.5	16.7±0.5



Size	t(mm)	Ao(mm)	Bo(mm)	Ko(mm)	W(mm)	E(mm)	F(mm)	Po(mm)	P1(mm)	P2(mm)	Do(mm)
4020	0.25±0.05	4.25±0.10	4.25±0.10	2.05±0.10	12.00±0.20	1.75±0.10	5.50±0.05	4.0±0.2	8.0±0.10	2.0±0.05	1.5±0.1,-0

■ Packaging Quantity

Chip Size	4020
13" Reel	2000