

High Current Ferrite Chip Bead(Lead Free)

HFZ2012PV-700T60

ECN HISTORY LIST					
REV	DATE	DESCRIPTION	APPROVED	CHECKED	DRAWN
1.0	22/11/16	新發行	鄧福興	浦冬生	王俞琴
2.0	22/12/05	更新可靠度及更正 Reflow 敘述	鄧福興	浦冬生	王俞琴
3.0	23/12/01	可靠度全面修訂為 REV E 版本	鄧福興	浦冬生	王俞琴
備 註					

High Current Ferrite Chip Bead(Lead Free)

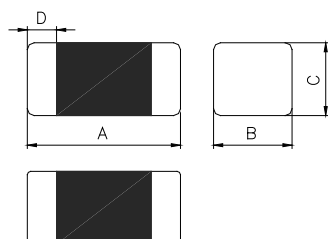
HFZ2012PV-700T60

1. Features

1. Monolithic inorganic material construction.
2. Closed magnetic circuit avoids crosstalk.
3. Suitable for reflow soldering.
4. Shapes and dimensions follow E.I.A. spec.
5. High Current Bead Low RDC
6. Excellent solder ability and heat resistance.
7. High reliability. Reliability test meet AEC-Q200.
8. 100% Lead(Pb) & Halogen-Free and RoHS compliant.
9. Low DC resistance structure of electrode to prevent wasteful electric power consumption.
10. Operating Temperature: -55~+150°C (Including self-temperature rise)



2. Dimensions



Chip Size	
A	2.00±0.20
B	1.25±0.20
C	0.85±0.20
D	0.50±0.30

Units: mm

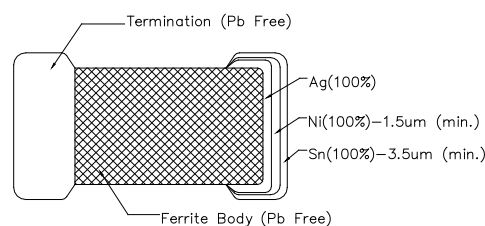
3. Part Numbering

HFZ 2012 P V - 700 T 60

A B C D E F G

A: Series
 B: Dimension
 C: Material
 D: Category Code
 E: Impedance
 F: Packaging
 G: Rated Current

L x W
 Lead Free Material
 V=Vehicle
 700=70Ω
 T=Taping and Reel, B=Bulk(Bags)
 60=6000mA

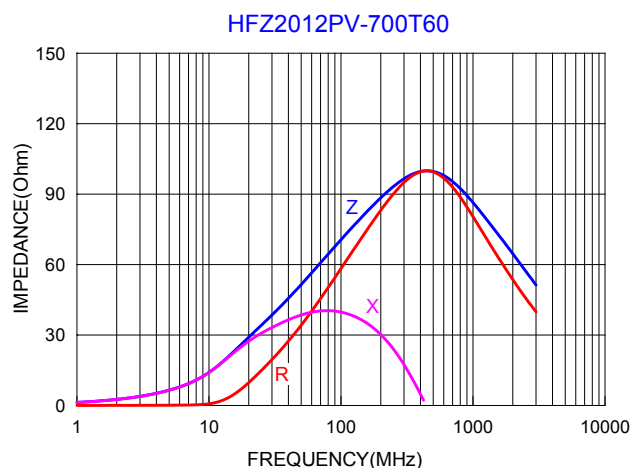


4. Specification

Tai-Tech Part Number	Impedance (Ω)	Test Frequency (Hz)	DC Resistance (Ω) max.	Rated Current (mA) max.
HFZ2012PV-700T60	70±25%	60mV/100M	0.009	6000

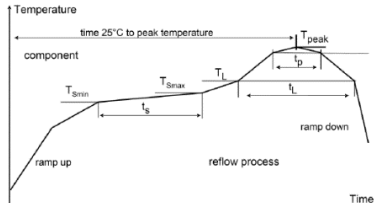
- Rated current: based on temperature rise test
- In compliance with EIA 595
- All test data referenced to 25°C ambient

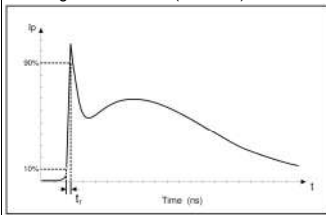
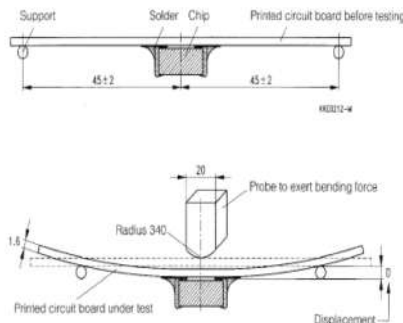
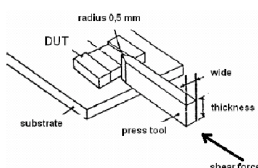
■ Impedance-Frequency Characteristics



5. Reliability and Test Condition

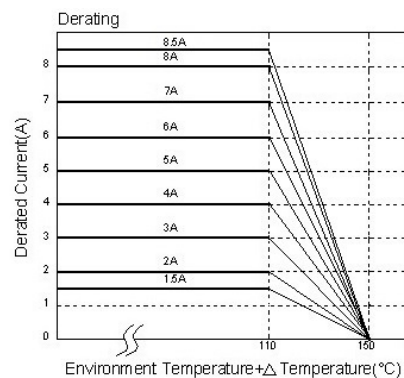
Item	Performance	Test Condition
Series No.	HFZ	--
Operating Temperature	-55~+150℃ (Including self-temperature rise)	--
Transportation Storage Temperature	-55~+150℃ (on board)	For long storage conditions, please see the Application Notice
Impedance (Z)	Refer to standard electrical characteristics list	Agilent4291 Agilent E4991 Agilent4287 Agilent16192
DC Resistance		Agilent 4338
Rated Current		DC Power Supply Over Rated Current requirements, there will be some risk
Temperature Rise Test	Rated Current < 1A ΔT 20℃Max Rated Current ≥ 1A ΔT 40℃Max	1. Applied the allowed DC current. 2. Temperature measured by digital surface Thermometer.
High Temperature Exposure(Storage)		Preconditioning:Run through reflow for 3 times.(IPC/JEDEC J-STD-020F Classification Reflow Profiles) Unpowered Temperature : 150±2℃ Upper Temperature: maximum specified operating temperature or maximum specified storage temperature (whichever is higher). Minimum test temperature shall be 85℃ (For ferrite EMI suppressors/filters only) Duration : 1000hrs Min. Measured at room temperature after placing for 24±4 hrs
Temperature Cycling	Appearance : No damage. Impedance : within±15% of initial value DCR : Within ±15% of initial value and shall not exceed the specification value	Preconditioning:Run through reflow for 3 times.(IPC/JEDEC J-STD-020F Classification Reflow Profiles) Unpowered Lower Temperature of the Chamber : -40℃(For Inductors/Transformers) -55℃(For ferrite EMI suppressors/filters) Upper Temperature of the Chamber: maximum specified operating temperature (temperature and shall not exceed 125℃) Condition for 1 cycle Step1 : -55±2℃ 30min Min Step2 : 125±2℃ transition time 1min MAX Step3 : 125±2℃ 30min Min. Step4 : Dwell Time (Soak Time) 15 minutes minimum, 30 minutes minimum if component weighs above 28g Transition Time: 1 minute maximum Number of cycles : 1000 Measured at room temperature at least 24 hours after test conclusion.
Humidity Bias	Appearance : No damage. Impedance : within±15% of initial value DCR : Within ±15% of initial value and shall not exceed the specification value	Preconditioning:Run through reflow for 3 times.(IPC/JEDEC J-STD-020F Classification Reflow Profiles) Unpowered(For Inductors/Transformers) Apply 10% of maximum rated power.(For ferrite EMI suppressors/filters) Humidity :85±3%RH. Temperature :85±2℃. Duration :1000 hrs Min. Measured at room temperature after placing for 24±4 hrs

Item	Performance	Test Condition																																																												
High Temperature Operational Life	Appearance : No damage. Impedance : within±15% of initial value DCR : Within ±15% of initial value and shall not exceed the specification value	Preconditioning: Run through Reflow for 3 times. (IPC/JEDEC J-STD-020F Classification Reflow Profiles) Temperature : 150±2°C Upper Temperature of the Chamber: maximum specified operating temperature (not including heat rise) at maximum rated power and shall not exceed 125°C.(For Inductors/Transformers) Temperature of the Chamber: maximum specified operating temperature up to 150°C. .(For ferrite EMI suppressors/filters) Duration : 1000hrs Min. with 100% rated current. Measured at room temperature after placing for 24±4 hrs Rated I _L applied.(For ferrite EMI suppressors/filters)																																																												
External Visual	Appearance : No damage.	Inspect device construction, marking and workmanship. Pre and Post Electrical Test not required.																																																												
Physical Dimension	According to the product specification size measurement	Verify physical dimensions to the applicable component detail specification. Pre and Post Electrical Test not required.																																																												
Mechanical Shock	Appearance : No damage. Impedance : within±15% of initial value DCR : Within ±15% of initial value and shall not exceed the specification value	Preconditioning:Run through reflow for 3 times.(IPC/JEDEC J-STD-020F Classification Reflow Profiles Test condition: <table><tr><th>Type</th><th>Peak alue (g's)</th><th>Normal duration (D) (ms)</th><th>Wave form</th><th>Velocity change (Vi)/ft/sec</th></tr><tr><td>SMD</td><td>100</td><td>6</td><td>Half-sine</td><td>12.3</td></tr><tr><td>THT</td><td>100</td><td>6</td><td>Half-sine</td><td>12.3</td></tr></table> 3 shocks in each direction along 3 perpendicular axes (18shocks).	Type	Peak alue (g's)	Normal duration (D) (ms)	Wave form	Velocity change (Vi)/ft/sec	SMD	100	6	Half-sine	12.3	THT	100	6	Half-sine	12.3																																													
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Vibration		Preconditioning:Run through reflow for 3 times.(IPC/JEDEC J-STD-020F Classification Reflow Profiles Oscillation Frequency: 10Hz~2KHz~10Hz for 20 minute Equipment : Vibration checker Total Amplitude:5g Testing Time : 12 hours(20 minutes, 12 cycles each of 3 orientations) *																																																												
Resistance to Soldering Heat	Appearance : No damage. Impedance : within±15% of initial value DCR : Within ±15% of initial value and shall not exceed the specification value	Test condition : THT: Conditions B or C Number of heat cycles: 1 <table><tr><th>Solder technique simulation</th><th>Test condition</th><th>Temperature (°C)</th><th>Time (s)</th><th>Temperature ramp/immersion and emersion rate</th></tr><tr><td>Dip</td><td>B</td><td>260 ±5 (solder temp)</td><td>10±1</td><td>25mm/s±6mm/s</td></tr><tr><td>Wave: Topside board-mount product</td><td>C</td><td>260 ±5 (solder temp)</td><td>20±1</td><td></td></tr></table> Depth: completely cover the termination SMD: Condition K, time above 217°C , 60s – 150s * Number of heat cycles:3  <table><tr><th>Component Size</th><th>Ramp up to 217°C</th><th>T_{2min}</th><th>t₂</th><th>T₁</th><th>t₁</th><th>T_{peak}</th><th>t_{p+}</th><th>Ramp down</th></tr><tr><td>Through-hole > 1.27mm x 2.54mm (0.050" x 0.100")</td><td>< 100 °C/s</td><td>> 120 °C</td><td>> 10s</td><td>> 120 °C</td><td>> 10s</td><td>> 235 °C</td><td>> 10s</td><td>< 100 °C/s</td></tr><tr><td>Through-hole ≤ 1.27mm x 2.54mm (0.050" x 0.100")</td><td>< 100 °C/s</td><td>> 120 °C</td><td>> 10s</td><td>> 120 °C</td><td>> 10s</td><td>> 235 °C</td><td>> 10s</td><td>< 100 °C/s</td></tr><tr><td>Surface-mount > 1.27mm x 2.54mm (0.050" x 0.100")</td><td>< 100 °C/s</td><td>> 120 °C</td><td>> 10s</td><td>> 120 °C</td><td>> 10s</td><td>> 235 °C</td><td>> 10s</td><td>< 100 °C/s</td></tr><tr><td>Surface-mount ≤ 1.27mm x 2.54mm (0.050" x 0.100")</td><td>< 100 °C/s</td><td>> 120 °C</td><td>> 10s</td><td>> 120 °C</td><td>> 10s</td><td>> 235 °C</td><td>> 10s</td><td>< 100 °C/s</td></tr></table> *Table 1: Minimum requirements for lead-free soldering *peak temperature is measured on the centre top of the component package **tp+ measured @ T _{peak} -5°C	Solder technique simulation	Test condition	Temperature (°C)	Time (s)	Temperature ramp/immersion and emersion rate	Dip	B	260 ±5 (solder temp)	10±1	25mm/s±6mm/s	Wave: Topside board-mount product	C	260 ±5 (solder temp)	20±1		Component Size	Ramp up to 217°C	T _{2min}	t ₂	T ₁	t ₁	T _{peak}	t _{p+}	Ramp down	Through-hole > 1.27mm x 2.54mm (0.050" x 0.100")	< 100 °C/s	> 120 °C	> 10s	> 120 °C	> 10s	> 235 °C	> 10s	< 100 °C/s	Through-hole ≤ 1.27mm x 2.54mm (0.050" x 0.100")	< 100 °C/s	> 120 °C	> 10s	> 120 °C	> 10s	> 235 °C	> 10s	< 100 °C/s	Surface-mount > 1.27mm x 2.54mm (0.050" x 0.100")	< 100 °C/s	> 120 °C	> 10s	> 120 °C	> 10s	> 235 °C	> 10s	< 100 °C/s	Surface-mount ≤ 1.27mm x 2.54mm (0.050" x 0.100")	< 100 °C/s	> 120 °C	> 10s	> 120 °C	> 10s	> 235 °C	> 10s	< 100 °C/s
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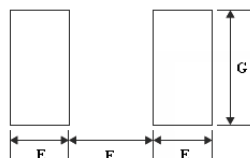
Item	Performance	Test Condition																																
ESD	Appearance : No damage. Impedance : within±15% of initial value DCR : Within ±15% of initial value and shall not exceed the specification value	Direct Contact and Air Discharge PASSIVE COMPONENT HBM ESD Discharge Waveform to a Coaxial Target Test method: AEC-Q200-002 Test mode : Contact Discharge Discharge level : 4 KV (Level: 2) 																																
Solder ability	More than 95% of the terminal electrode should be covered with solder.	<ul style="list-style-type: none">Through-hole Technology (THT) Method A1, Coating Durability Category 2SMD: Method B1, Coating Durability Category 2 Method D, Coating Durability Category 2 Magnification 50xPre and Post Electrical Test not required.Non-soldered type mounting/attach are not applicable. <table><tr><th>參照</th><th>Method A1</th><th>Method B1</th><th>Method D</th></tr><tr><td>焊接工藝</td><td>再流焊</td><td>其他器件的再流</td><td>無鉛銲接</td></tr><tr><td>焊接類型</td><td>錫銀銅焊料</td><td>錫銀銅焊料</td><td>錫銀銅焊料</td></tr><tr><td>浸入助焊劑</td><td>5-10s</td><td>5-10s</td><td>5-10s</td></tr><tr><td>浸入錫爐角</td><td>20 ° ~45 °</td><td>20 ° ~45 °</td><td>20 ° ~45 °</td></tr><tr><td>焊料溫度</td><td>245 ±5 °C</td><td>245 ±5 °C</td><td>260 ±5 °C</td></tr><tr><td>浸入焊料時</td><td>5+0/-0.5s</td><td>5+0/-0.5s</td><td>30+5/-0s</td></tr><tr><td>浸入和提出</td><td>25 ±6mm/s</td><td>25 ±6mm/s</td><td>25 ±6mm/s</td></tr></table>	參照	Method A1	Method B1	Method D	焊接工藝	再流焊	其他器件的再流	無鉛銲接	焊接類型	錫銀銅焊料	錫銀銅焊料	錫銀銅焊料	浸入助焊劑	5-10s	5-10s	5-10s	浸入錫爐角	20 ° ~45 °	20 ° ~45 °	20 ° ~45 °	焊料溫度	245 ±5 °C	245 ±5 °C	260 ±5 °C	浸入焊料時	5+0/-0.5s	5+0/-0.5s	30+5/-0s	浸入和提出	25 ±6mm/s	25 ±6mm/s	25 ±6mm/s
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浸入和提出	25 ±6mm/s	25 ±6mm/s	25 ±6mm/s																															
Electrical Characterization	Refer Specification for Approval	Parametrically test per lot and sample size requirements,(inductance only unless otherwise agreed upon) Summary to show minimum, maximum, mean and standard deviation at room, minimum and maximum operating temperatures. Pre and Post Electrical Test not required																																
Board Flex (SMD)	Appearance : No damage. Impedance : within±15% of initial value DCR : Within ±15% of initial value and shall not exceed the specification value 	Preconditioning: Run through Reflow for 3 times. (IPC/JEDEC J-STD-020F Classification Reflow Profiles) Place the 100mm X 40mm board into a fixture similar to the one shown in below Figure with the component facing down. The apparatus shall consist of mechanical means to apply a force which will bend the board (D) x = 2 mm minimum. The duration of the applied forces shall be 60 (+ 5) sec. The force is to be applied only once to the board.																																
Terminal strength (SMD)	Appearance : No damage. Impedance : within±15% of initial value DCR : Within ±15% of initial value and shall not exceed the specification value 	Preconditioning: Run through Reflow for 3 times. (IPC/JEDEC J-STD-020F Classification Reflow Profiles) With the component mounted on a PCB with the device to be tested, apply a 17.7 N (1.8 Kg) force to the side of a device being tested. This force shall be applied for 60 +1 seconds. Also the force shall be applied gradually as not to apply a shock to the component being tested.																																

****Derating Curve**

For the ferrite chip bead which withstanding current over 1.5A, as the operating temperature over 110°C, the derating current information is necessary to consider with. For the detail derating of current, please refer to the Derated Current vs. Operating Temperature curve.

**6. Soldering and Mounting****6-1. Recommended PC Board Pattern**

Chip Size						Land Patterns For Reflow Soldering		
Series	Type	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)	F(mm)	G(mm)
HFZ	2012	2.0±0.20	1.25±0.20	0.85±0.20	0.50±0.30	1.05	1.00	1.45



PC board should be designed so that products can prevent damage from mechanical stress when warping the board.

6-2. Soldering

Mildly activated rosin fluxes are preferred. TAI-TECH 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.

6-2.1 Soldering Reflow:

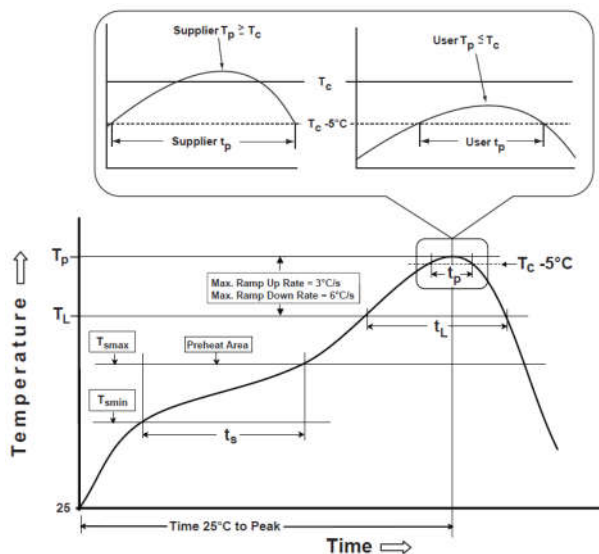
Recommended temperature profiles for lead free re-flow soldering in Figure 1. Table 1.1&1.2 (J-STD-020F)

6-2.2 Soldering Iron:

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.)

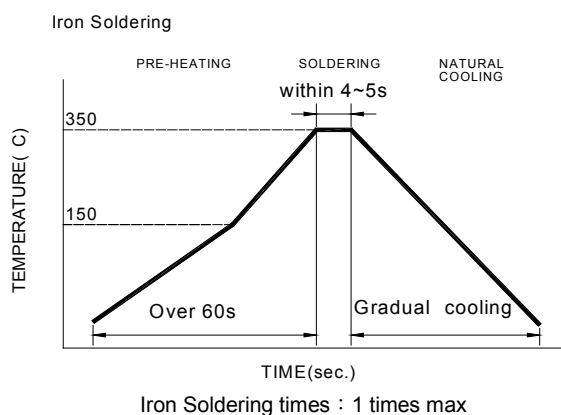
- Preheat circuit and products to 150°C
- Never contact the ceramic with the iron tip
- Use a 20 watt soldering iron with tip diameter of 1.0mm
- 350°C tip temperature (max)
- 1.0mm tip diameter (max)
- Limit soldering time to 4~5sec.

Fig.1 Soldering Reflow



Reflow times: 3 times max

Fig.2 Iron soldering temperature profiles



Iron Soldering times : 1 times max

Table (1.1): Reflow Profiles

Profile Type:	Pb-Free Assembly
Preheat -Temperature Min(T_{smin}) -Temperature Max(T_{smax}) -Time(t_s)from(T_{smin} to T_{smax})	150°C 200°C 60-120seconds
Ramp-up rate(T_L to T_p)	3°C/second max.
Liquidus temperature(T_L) Time(t_L)maintained above T_L	217°C 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 .

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

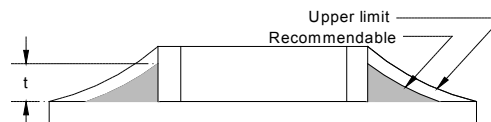
	Package Thickness	Volume mm ³ <350	Volume mm ³ 350-2000	Volume mm ³ >2000
PB-Free Assembly	<1.6mm	260°C	260°C	260°C
	1.6-2.5mm	260°C	250°C	245°C
	≥2.5mm	250°C	245°C	245°C

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

6-2.3 Solder Volume:

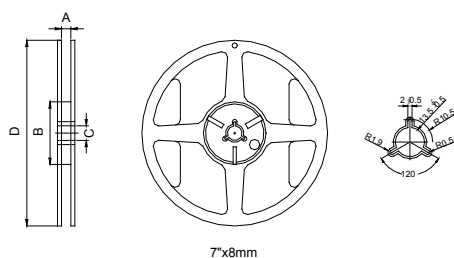
Accordingly increasing the solder volume, the mechanical stress to product is also increased. Exceeding solder volume may cause the failure of mechanical or electrical performance. Solder shall be used not to be exceed as shown in right side:

Minimum fillet height = soldering thickness + 25% product height



7. Packaging Information

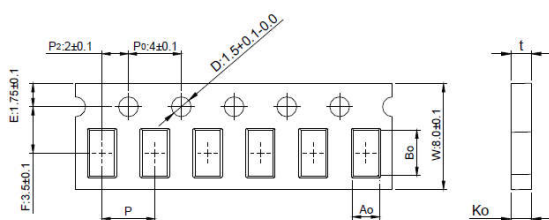
7-1. Reel Dimension



Type	A(mm)	B(mm)	C(mm)	D(mm)
7"x8mm	9.0±0.5	60±2	13.5±0.5	178±2

7-2.1 Tape Dimension / 8mm

■ Material of taping is paper

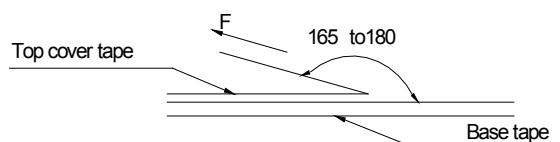


Size	Bo(mm)	Ao(mm)	Ko(mm)	P(mm)	t(mm)
201209	2.10±0.05	1.30±0.05	0.95±0.05	4.0±0.10	0.95±0.05

7-3. Packaging Quantity

Chip Size	201209
Chip / Reel	4000
Inner box	20000
Middle box	100000
Carton	200000

7-4. Tearing Off Force



The force for tearing off cover tape is 15 to 60 grams in the arrow direction under the following conditions.

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

Application Notice

• Storage Conditions(component level)

To maintain the solder ability of terminal electrodes:

1. TAI-TECH products meet IPC/JEDEC J-STD-020F 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 from 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.