Power Inductor

HPC4012TF-SERIES

ECN HISTORY LIST

REV	DATE	DESCRIPTION	APPROVED	CHECKED	DRAWN
1.0	17/04/12	新 發 行	羅宜春	梁周虎	張光
備 註					

Power Inductor

HPC4012TF-SERIES

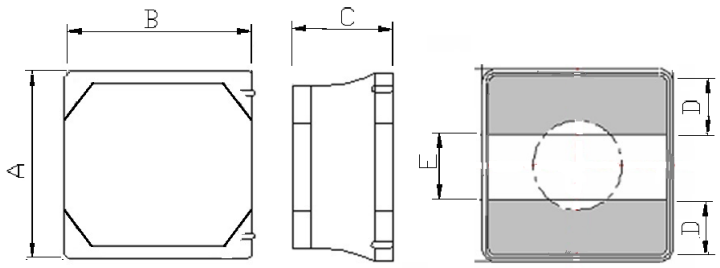
1. Features

1. This specification applies Low Profile Power Inductors.
2. 100% Lead(Pb) & Halogen-Free and RoHS compliant.

Halogen-free

Pb-free

2. Dimension



Series	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)
HPC4012TF	4.0±0.2	4.0±0.2	1.2 max.	1.2 ref.	1.6 ref.

Units: mm

3. Part Numbering

HPC	4012	TF	-	100	M
A	B	C		D	E

A: Series
B: Dimension
C: Lead Free
D: Inductance 100=10uH
E: Inductance Tolerance M=±20% ; Y=±30%

4. Specification

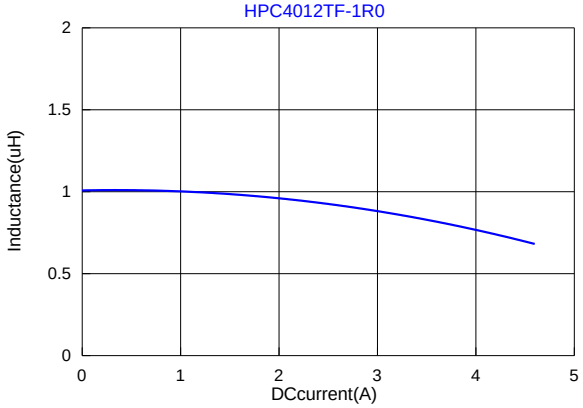
TAI-TECH Part Number	Inductance (uH)	Tolerance (%)	Test Frequency (Hz)	SRF (MHz) typ.	DCR (Ω) ±20%	I sat (A)typ.	I sat (A)Max.	I rms (A)typ.	I rms (A)Max.
HPC4012TF -1R0Y	1.0	±30%	1V100K	100	0.042	3.30	2.80	2.50	2.20
HPC4012TF -2R2M	2.2	±20%	1V100K	70	0.060	1.95	1.65	2.20	1.90
HPC4012TF -3R3M	3.3	±20%	1V100K	60	0.070	1.60	1.40	1.90	1.70
HPC4012TF -4R7M	4.7	±20%	1V100K	45	0.095	1.40	1.20	1.70	1.50
HPC4012TF -6R8M	6.8	±20%	1V100K	35	0.125	1.10	0.90	1.50	1.30
HPC4012TF -100M	10	±20%	1V100K	30	0.180	1.00	0.80	1.30	1.10
HPC4012TF -150M	15	±20%	1V100K	24	0.260	0.80	0.65	0.95	0.75
HPC4012TF -220M	22	±20%	1V100K	18	0.400	0.60	0.50	0.72	0.62

Note:

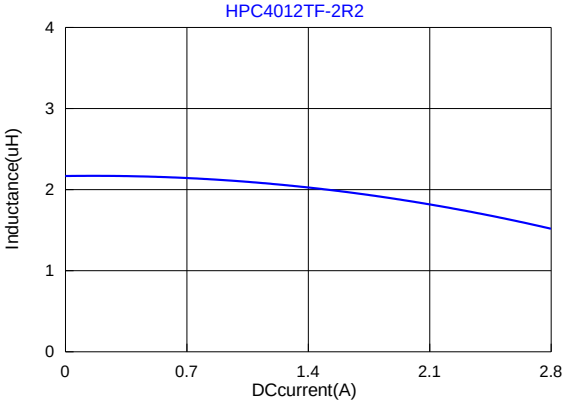
Isat：Based on inductance change （△L/L0：≦30%）@ ambient temp. 25℃

Irms：Based on temperature rise （△T：40℃ typ.）max

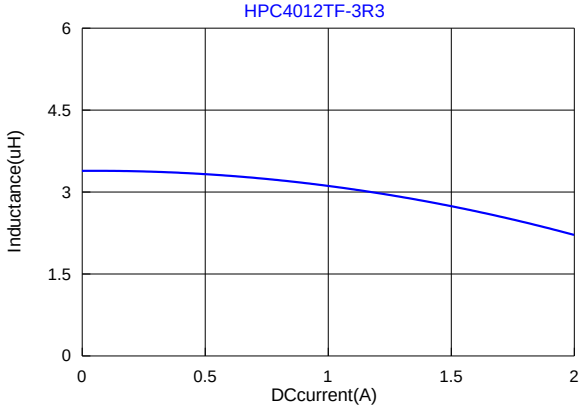
HPC4012TF-1R0



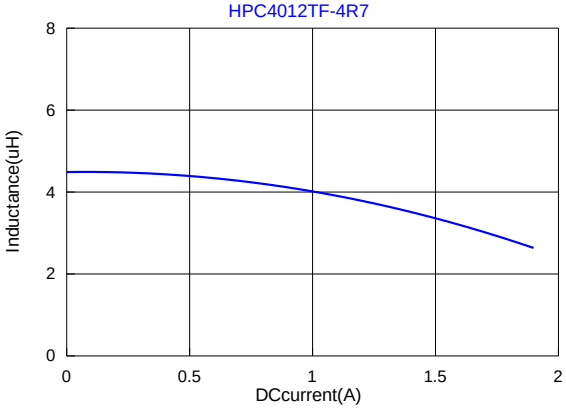
HPC4012TF-2R2



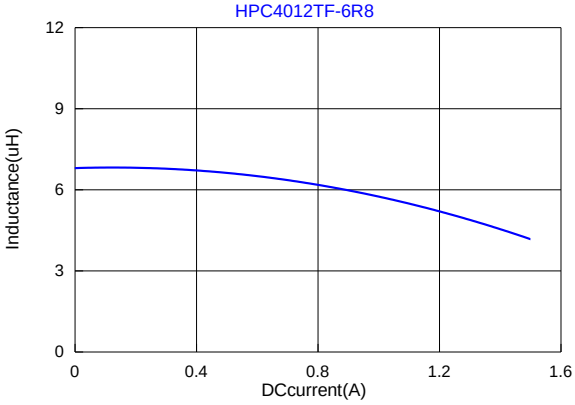
HPC4012TF-3R3



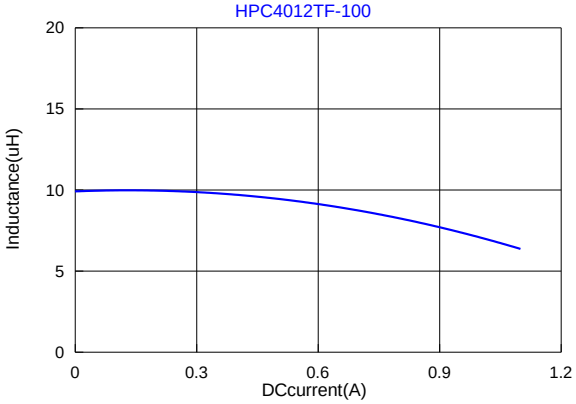
HPC4012TF-4R7



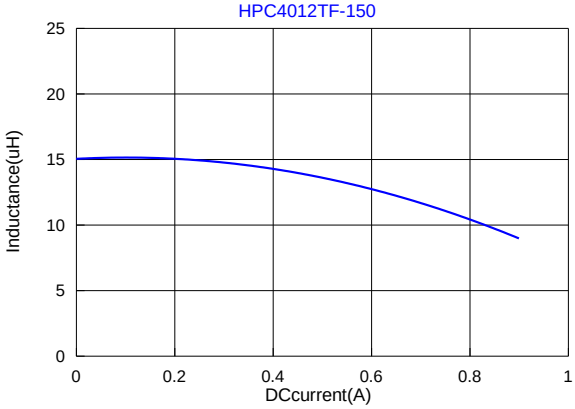
HPC4012TF-6R8



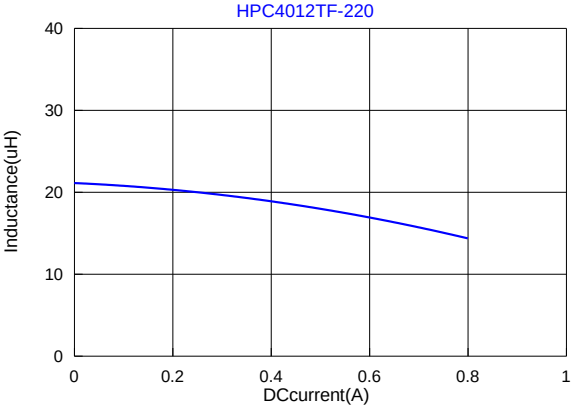
HPC4012TF-100



HPC4012TF-150

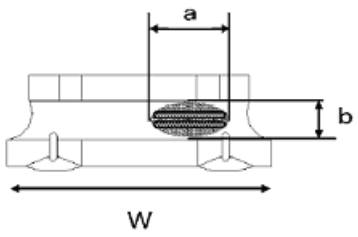


HPC4012TF-220



Void appearance tolerance Limit

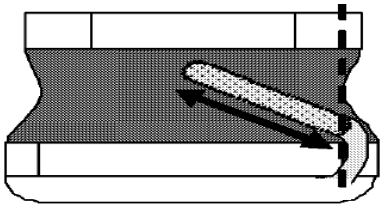
Size of voids occurring to coating resin is specified below.



Appearance of exposed wire tolerance limit :

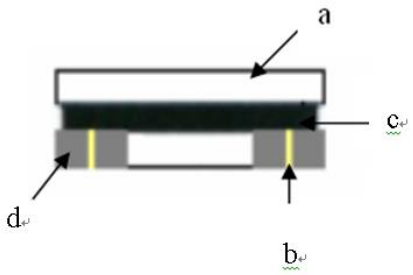
1. Width direction（dimension a）: Acceptable when a≦w/2
   Nonconforming when a＞w/2
2. Length direction（dimension b）: Dimension b is not specified.
3. The total area of exposed wire occurring to each sides is not greater than 50% of coating resin area, and is acceptable.

External appearance criterion for exposed wire
Exposed end of the winding wire at the secondary side should be 2mm and below.



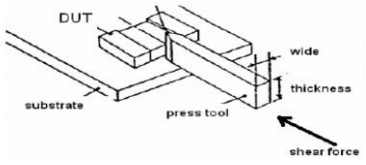
5. Material

No.	Description	Specification
a.	Core	Ferrite Core
b.	Wire	Enameled Copper Wire
c	Glue	Epoxy / Epoxy with magnetic powder
d	Terminal	Ag/Ni/Sn



6. Reliability and Test Condition

Item	Performance	Test Condition
Operating temperature	-40~+125℃ (Including self - temperature rise)	
Storage temperature	-40~+125℃ (on board)	
Electrical Performance Test		
Inductance	Refer to standard electrical characteristics list.	HP4284A,CH11025,CH3302,CH1320,CH1320S LCR Meter.
DCR		CH16502,Agilent33420A Micro-Ohm Meter.
Saturation Current (Isat)	△L≦30% typical.	Saturation DC Current (Isat) will cause L0 to drop △L(%)(keep quickly).
Heat Rated Current (Irms)	Approximately △T≦40℃	Heat Rated Current (Irms) will cause the coil temperature rise △T(℃) without core loss. 1.Applied the allowed DC current(keep 1 min.). 2.Temperature measured by digital surface thermometer
Reliability Test		
Life Test	Appearance：No damage. Inductance：within±10% of initial value Q：Shall not exceed the specification value. RDC：within ±15% of initial value and shall not exceed the specification value	Preconditioning: Run through IR reflow for 2 times.(IPC/JEDEC J-STD-020DClassification Reflow Profiles**)** Temperature： 125±2℃(Inductor) Applied current：rated current Duration：1000±12hrs Measured at room temperature after placing for 24±2 hrs
Load Humidity		Preconditioning: Run through IR reflow for 2 times.(IPC/JEDEC J-STD-020DClassification Reflow Profiles Humidity：85±2% R.H, Temperature：85℃±2℃ Duration：1000hrs Min. with 100% rated current Measured at room temperature after placing for 24±2 hrs
Moisture Resistance		Preconditioning: Run through IR reflow for 2 times.(IPC/JEDEC J-STD-020DClassification Reflow Profiles 1. Baked at50℃ for 25hrs, measured at room temperature after placing for 4 hrs. 2. Raise temperature to 65±2℃ 90-100%RH in 2.5hrs, and keep 3 hours, cool down to 25℃ in 2.5hrs. 3. Raise temperature to 65±2℃ 90-100%RH in 2.5hrs, and keep 3 hours, cool down to 25℃ in 2.5hrs,keep at 25℃ for 2 hrs then keep at -10℃ for 3 hrs 4. Keep at 25℃ 80-100%RH for 15min and vibrate at the frequency of 10 to 55 Hz to 10 Hz, measure at room temperature after placing for 1~2 hrs.
Thermal shock		Preconditioning: Run through IR reflow for 2 times.(IPC/JEDEC J-STD-020DClassification Reflow Profiles Condition for 1 cycle Step1：-40±2℃ 30±5min Step2：25±2℃ ≦0.5min Step3：125±2℃ 30±5min Number of cycles： 500 Measured at room temperature after placing for 24±2 hrs
Vibration		Oscillation Frequency: 10～2K～10Hz for 20 minutes Equipment： Vibration checker Total Amplitude:1.52mm±10% Testing Time : 12 hours(20 minutes, 12 cycles each of 3 orientations)。

<table>
<tr><th>Item</th><th>Performance</th><th>Test Condition</th></tr>
<tr><td>Shock</td><td rowspan="2">Appearance：No damage.
Inductance：within±10% of initial value
Q：Shall not exceed the specification value.
RDC：within ±15% of initial value and shall not exceed the specification value</td><td>
<table>
<tr><th>Type</th><th>Peak value (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>50</td><td>11</td><td>Half-sine</td><td>11.3</td></tr>
<tr><td>Lead</td><td>50</td><td>11</td><td>Half-sine</td><td>11.3</td></tr>
</table>
shocks in each direction along 3 perpendicular axes.
</td></tr>
<tr><td>Bending</td><td>Shall be mounted on a FR4 substrate of the following dimensions: >=0805:40x100x1.2mm
<0805:40x100x0.8mm
Bending depth:
>=0805inch(2012mm):1.2mm
<0805 inch(2012mm):0.8mm
duration of 10 sec.</td></tr>
<tr><td>Soderability</td><td>More than 95% of the terminal electrode should be covered with solder。</td><td>Preheat: 150℃,60sec.。
Solder: Sn96.5% Ag3% Cu0.5%
Temperature: 245±5℃。
Flux for lead free: Rosin. 9.5%。
Dip time: 4±1sec。
Depth: completely cover the termination</td></tr>
<tr><td>Resistance to Soldering Heat</td><td rowspan="2">Appearance：No damage.
Inductance：within±10% of initial value
Q：Shall not exceed the specification value.
RDC：within ±15% of initial value and shall not exceed the specification value</td><td>Number of heat cycles: 1
<table>
<tr><td>Temperature (°C)</td><td>Time(s)</td><td>Temperature ramp/immersion and emersion rate</td></tr>
<tr><td>260 ±5(solder temp)</td><td>10 ±1</td><td>25mm/s ±6 mm/s</td></tr>
</table>
</td></tr>
<tr><td>Terminal Strength</td><td>Preconditioning:Run through IR reflow for 2 times.(IPC/JEDEC J-STD-020DClassification Reflow Profiles
With the component mounted on a PCB with the device to be tested, apply a force (>0805 inch(2012mm):1kg , <=0805 inch(2012mm):0.5kg)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.


</td></tr>
</table>

7. Soldering and Mounting

7-1. Soldering

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

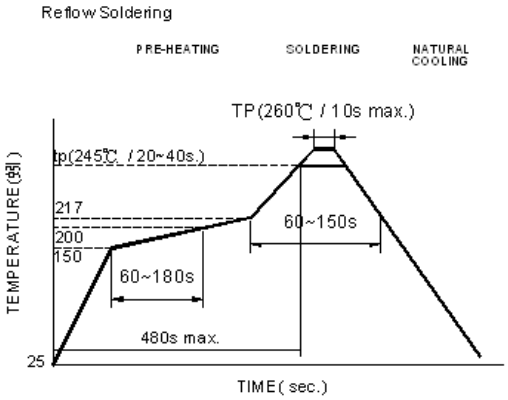
7-1.1 Solder re-flow:

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

7-1.2 Soldering Iron(Figure 2):

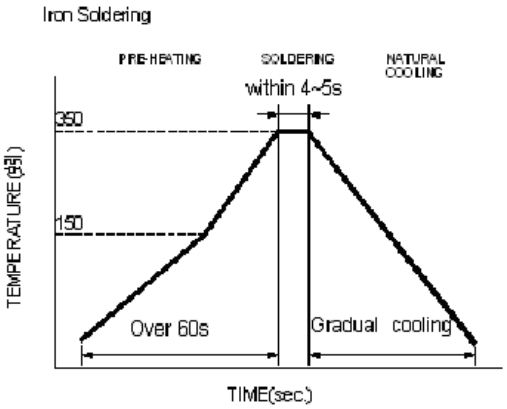
Products attachment with a soldering iron is discouraged due to the inherent process control limitations. In the event that a soldering iron must be employed the following precautions are recommended.

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



Reflow times: 3 times max.

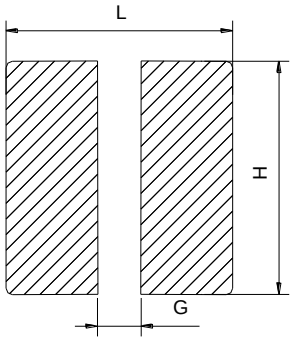
Fig.1



Iron Soldering times: 1 times max.

Fig.2

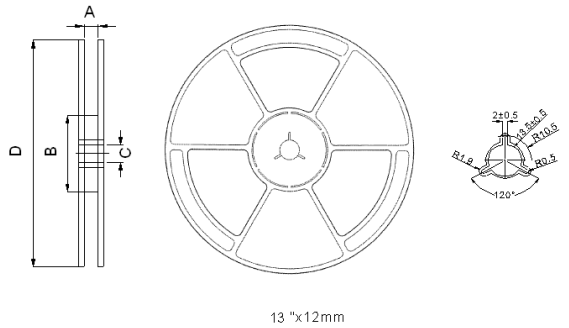
7-2. Recommended PC Board Pattern



L(mm)	G(mm)	H(mm)
4.2	1.2	4.2

8. Packaging Information

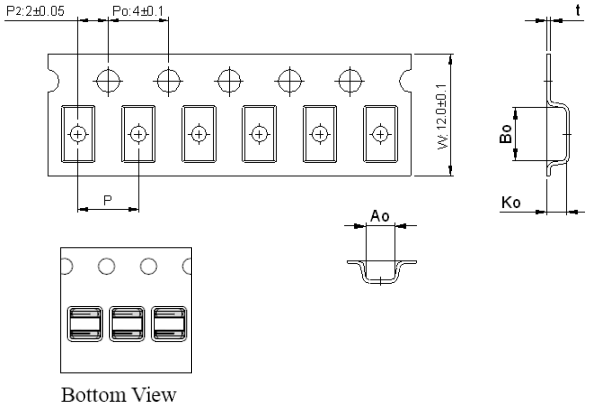
8-1. Reel Dimension



13 "x12mm

Type	A(mm)	B(mm)	C(mm)	D(mm)
13"x12mm	12±1.5	100±0.5	13.2±0.5	330±0.5

8-2. Tape Dimension / 12mm



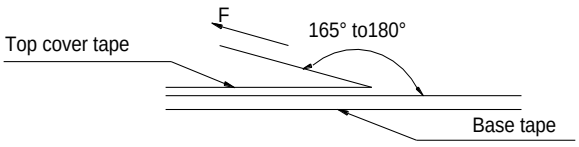
Bottom View

Series	Size	Bo(mm)	Ao(mm)	Ko(mm)	P(mm)	t(mm)
HPC	4012	4.35±0.1	4.50±0.1	1.55±0.1	8.0±0.10	0.25±0.05

8-3. Packaging Quantity

Chip size	4012
Chip / Reel	4500

8-4. Tearing Off Force



The force for tearing off cover tape is 15 to 80 grams in the arrow direction under the following conditions.

Room Temp. (℃)	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 solderability of terminal electrodes:
1. TAI-TECH products meet IPC/JEDEC J-STD-020D standard-MSL, level 1.
2. Temperature and humidity conditions: Less than 40℃ 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.