C T M :TELEWAVE

日期 : 2008/08/14

ITEM	BULL WILL PART NO.	PART No.
1	WCK2012F900T04	

承認印 APPROVED BY

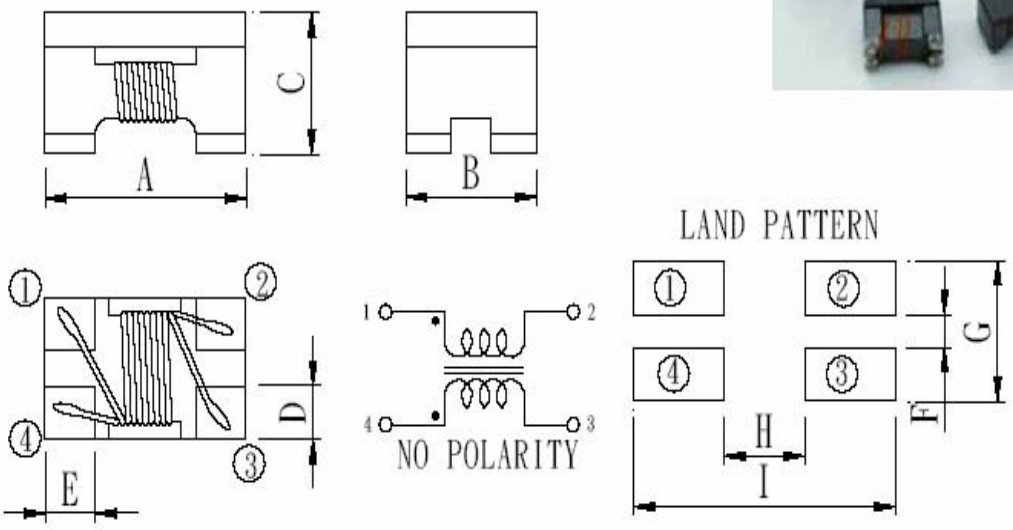
承認後請寄回本書一份
PLEASE RETURN ONE COPY
WITH YOUR APPROVED SIGNATURES

百 徽 股 份 有 限 公 司
台北市瑞光路188巷48號8樓
TEL:(02)2659-8282 FAX:(02)2659-6222

SPECIFICATION FOR APPROVAL

Dwg. No:	Customer	Part No.	Date:	Rev
T080702			2008/07/04	00

1.Configuration & Dimension: (Unit: m/m)



Location	A	B	C	D	E	F	G	H	I
Dimensions	2.0±0.2	1.2±0.2	1.2±0.2	0.45±0.1	0.5±0.1	0.40	1.3	0.8	2.6

2.Electrical Characteristics:

Part Number	Impedance Z (Ohm)	Test Frequency (MHz)	Rated Current (mA)	Rated Voltage (Vdc)	DC Resistance (Ω)max	Insulation Resistance (M Ohm) min.
WCK2012F900T04	90±20%	100	400	50	0.35	10

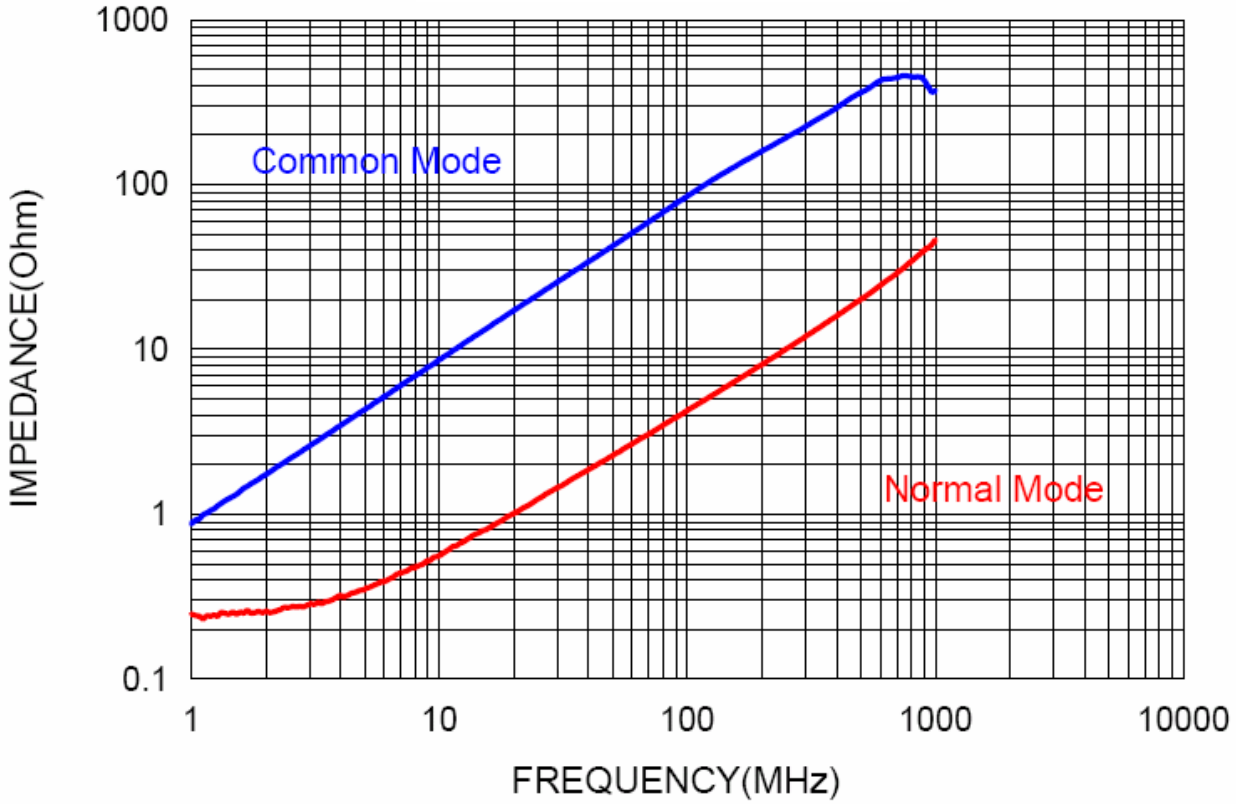
- ▶ When ordering, please specify tolerance and packaging code. Ex: WCK2012F900T04
- ▶ Tolerance : ±20%
- ▶ Packaging : Clear tape and reel (standard)
- ▶ Test Equipments : Z Agilent 4287A
  RDC ZENTECH 502BC
- ▶ InsulationResistance : Agilent 4339B
- ▶ Operating temperature range : –40ºC to + 85ºC

Bull Will Co., Ltd.
8F.No.48,Lane 188,Ruiguang Rd, Neihu Taipei 11491, Taiwan, R.O.C
TEL: 886-2-26598282 FAX: 886-2-26596222
http：//www.bullwill.com.tw

Approved by	Check by	Drawn by
Jos	Iverson	Ally

Impedance vs Frequency Curve / Common Mode and Differential Mode

WCK2012F900T04



TEST DATA FOR PREPRODUTION SAMPLE

CUSTOMER	

PART NO.	MODEL NO.	SAMPLE ISSUE DATE.
		2008/07/04
PART NAME.	**SAMPLE ISSUE NO.**	**QUANTITY.**
COMMON MODE CHOKE COIL	WCK2012F900T04	5PCS

TEST ITEM	Z (Ω)	RDC (Ω)	A m/m	B M/m	C m/m	D m/m	E m/m	
TEST FREQ	100MHz/ 0.2V							
YOUR SPEC.	90±20%	0.35 MAX	2.0±0.2	1.2±0.2	1.2±0.2	0.45±0.1	0.5±0.1	
MAX. DATA	108	0.35	2.20	1.40	1.40	0.55	0.6	
MIN. DATA	72		1.80	1.00	1.00	0.35	0.4	
1	89.61	0.17	2.01	1.27	1.27	0.50	0.51	
2	92.35	0.17	2.01	1.29	1.26	0.49	0.50	
3	93.60	0.17	2.02	1.27	1.26	0.49	0.51	
4	90.00	0.17	2.00	1.26	1.27	0.50	0.50	
5	93.22	0.17	2.01	1.27	1.26	0.48	0.50	
$\overline{X}$(平均值)	91.76	0.17	2.01	1.27	1.26	0.49	0.50	
R(相對差)	3.99	0.00	0.02	0.03	0.01	0.02	0.01	

TEST INSTRUMENTS

IMPEDANCE TEST:
■ AGILENT 4287A ANALYZER

DC RESISTANCE TEST:
■ ZENTECH 502BC MILLIOHM METER

INSULATION RESISTANCE TEST:
■ AGILENT 4339B

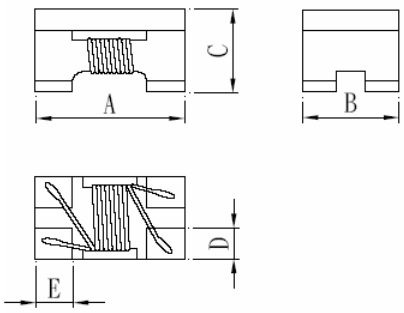
DIMENSION MEASURING TOOL
■ MITUTOYO 液晶外測分厘卡

TEST CONDITION

TEMPERATURE: 25 ℃
HUMIDITY: 65 % RH

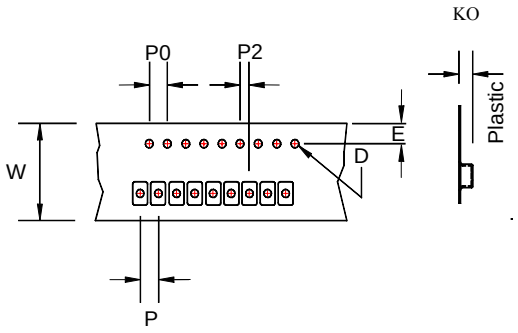
APPROVED BY	CHECKED BY	REPORTED BY
Jos	Iverson	Ally

PRODUCT DRAWING

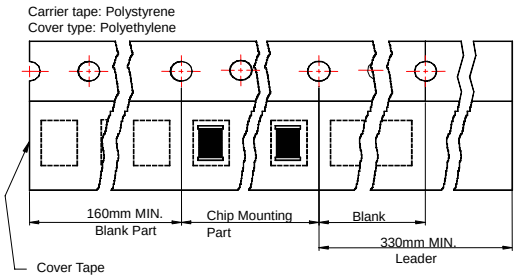


Tape & Reel Specifications (Unit:mm)

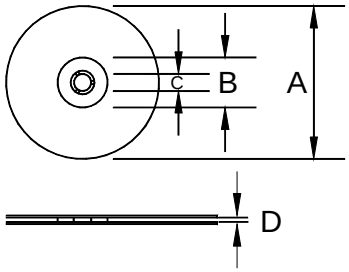
Tape Dimensions



Tape Material



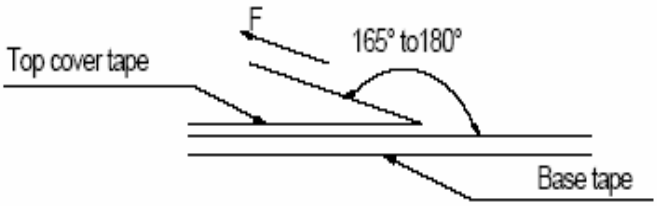
Reel Dimensions



Ordering Code

WCK	2012	F	900	T	04
A	B	C	D	E	F

A: Series
B: Dimension
C: Material (Ferrite)
D: Impedance (900=90Ω)
E: Packaging (T=Taping and Reel)
F: Rated Current (04=400mA)

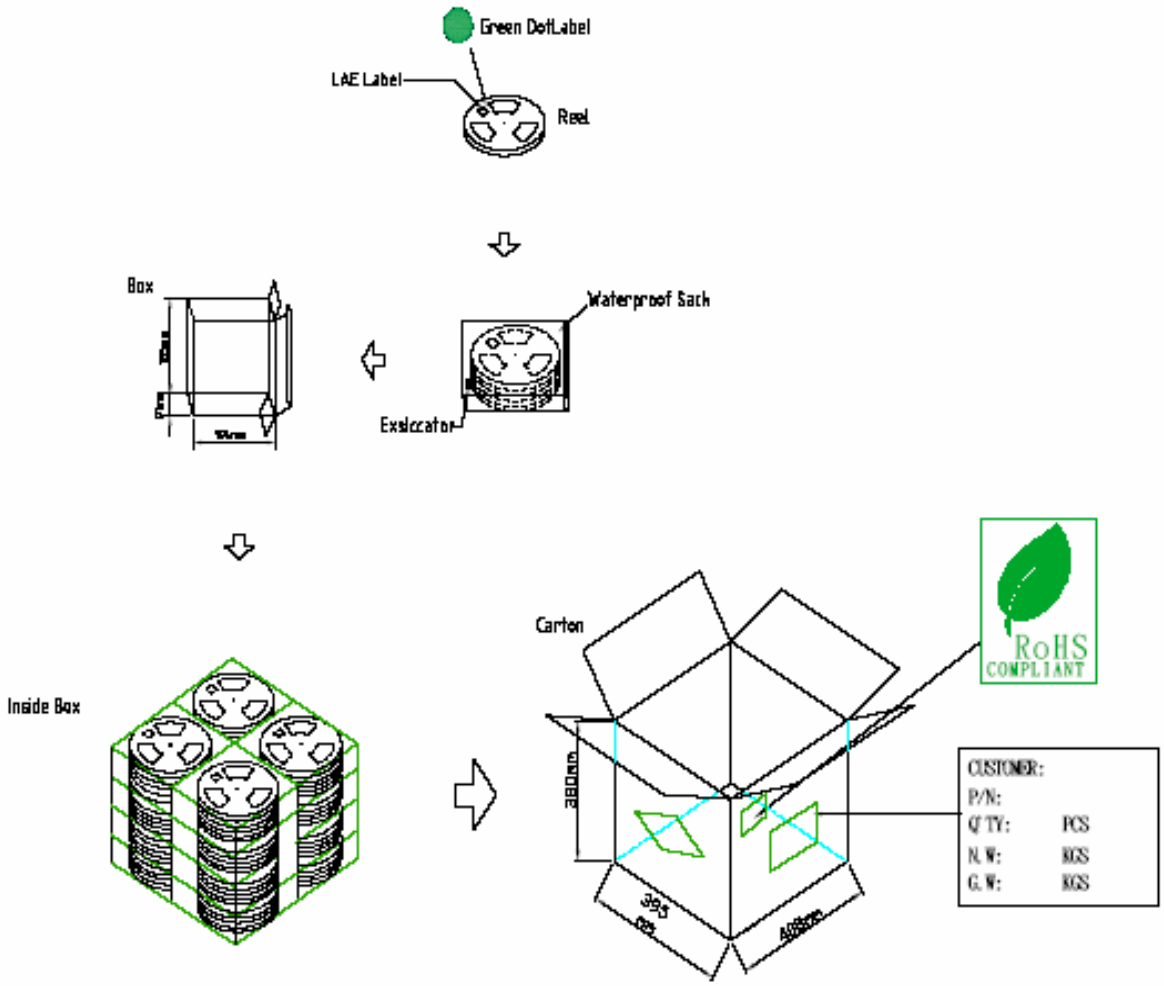


The force for tearing off cover tape is 15 to 60 grams in the arrow direction under the following conditions.

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

Type	Tape Dimensions							Reel Dimensions				Quantity / Reel
	K0	D	E	W	P	P0	P2	A	B	C	D	
WCK2012F	1.4	1.55	1.75	8	4	4	2	178	60	13	9	2000pcs

Packaging List



說明:

1.每捲軸之標籤一律朝上(標籤需品保檢驗 OK,並蓋 PASS 章).
2.每捲軸之標籤右下角,加貼一綠色環保圓點標籤(直徑 8mm).
3.每五捲軸使用夾練袋密封,並放入一包乾燥劑裝入一內盒.
4.每個內盒上的標籤右下角,加貼一綠色環保圓點標籤(直徑 8mm).
5.每層放四個內盒共 20 軸,分四疊共計 80 軸,平放入外箱內.
6.每捲軸包入 2000PCS, 1 外箱裝 80 軸,共計 160KPCS,不足 160KPCS,使用 40 軸裝入中箱,每箱計 80KPCS.
7.外箱側麥左上角,需貼一環保標籤.

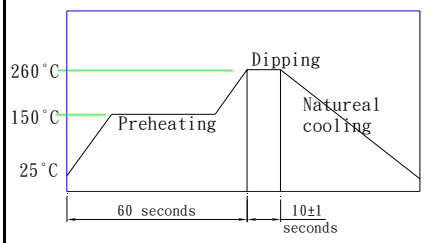
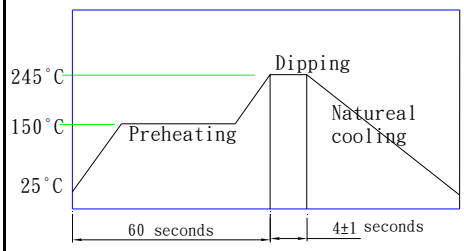
Application	Inside Box		Carton		
	Quantity/Pcs	G.W	Quantity/Pcs	N.W	G.W
WCK2012F	10000 (5 Reel)	0.55 KGS	160000 (16 Inside Box)	9.8KGS	10.8KGS

Reliability and Test Conditions

1-1 Electrical Characteristics

No	Item	Specification	Test Method
1-1-1	Impedance	Refer to standard electrical characteristics list	HP- 4287A or 4291A+Fixture 16197A
1-1-2	DC Resistant		HP- 34420A or Zentech 502BC Milliohm Meter
1-1-3	Insulation Resistance		HP-4339B
1-1-4	Rated Current		Applied the current to coils the impedance change should be less Then ± 25% to initial value and temperature rise should not be more Then 30 ℃.
1-1-5	Temperature Rise Test	30 ℃ Max. (Δt)	1.Applied the allowed DC current 2.Temperature measured by digital surface thermometer.

1-2 Mechanical Performance

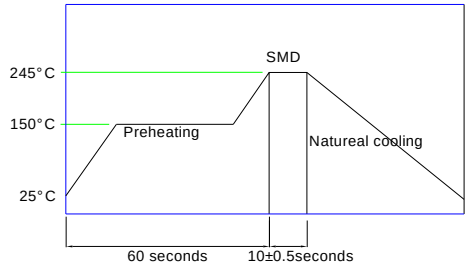
No	Item	Specification	Test Method
1-2-1	Vibration	Appearance: No damage Z change: within±10% Q change: within±30%	Test device shall be soldered on the substrate Oscillation Frequency: 10 to 55 to 10Hz for 1min Amplitude: 1.5mm Time: 2hrs for each axis (X, Y & Z), total 6hrs
1-2-2	Resistance to Soldering Heat	Appearance: No damage	Pre-heating: 150℃, 1min Solder Composition: Sn/Ag3.0/Cu0.5 (Pb –Free) Solder Temperature: 260±5℃ Immersion Time: 10±1sec 
1-2-3	Solder-ability	The electrodes shall be at least 95% covered with new solder coating	Pre-heating: 150℃, 1min Solder Composition: Sn/Ag3.0/Cu0.5 (Pb –Free) Solder Temperature: 245±5℃ (Pb-Free) Immersion Time: 4±1sec 

Reliability and Test Conditions

1-3.Environmental Performance

<table>
<tr><th>No</th><th>Item</th><th>Specification</th><th>Test Method</th></tr>
<tr><td>1-3-1</td><td>Temperature Cycle</td><td rowspan="4">Appearance: No damage
L change: within±10%
Q change: within±30%</td><td>One cycle:
<table>
<tr><th>Step</th><th>Temperature (℃)</th><th>Time (min)</th></tr>
<tr><td>1</td><td>-25±3</td><td>30</td></tr>
<tr><td>2</td><td>25±2</td><td>3</td></tr>
<tr><td>3</td><td>85±3</td><td>30</td></tr>
<tr><td>4</td><td>25±2</td><td>3</td></tr>
</table>
Total: 100cycles
Measured after exposure in the room condition for 24hrs</td></tr>
<tr><td>1-3-2</td><td>Humidity Resistance</td><td>Temperature: 40±2℃
Relative Humidity: 90 ~ 95%
Time: 1000hrs
Measured after exposure in the room condition for 24hrs</td></tr>
<tr><td>1-3-3</td><td>High Temperature Resistance</td><td>Temperature: 85±3℃
Relative Humidity: 20%
Applied Current: Rated Current
Time: 1000hrs
Measured after exposure in the room condition for 24hrs</td></tr>
<tr><td>1-3-4</td><td>Low Temperature Resistance</td><td>Temperature: -25±3℃
Relative Humidity: 0%
Time: 1000hrs
Measured after exposure in the room condition for 24hrs</td></tr>
</table>

1-4. The Soldering Temperature Of Lead Free Product



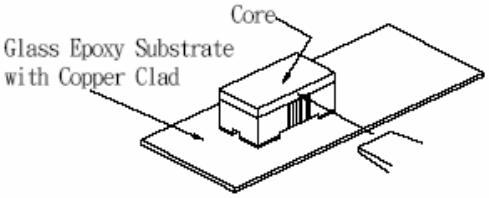
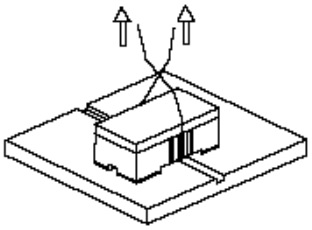
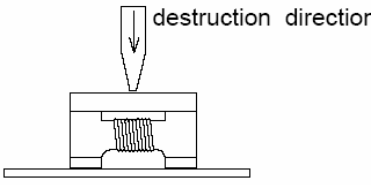
1-5. Soldering Iron

Chip inductor 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.
(If hand soldering cannot be avoided, the preferred technique is the utilization of hot air soldering tools.)

- Preheat circuit and inductor to 150°C.
- Never contact the chip inductors with the iron tip.
- Use a 20 watt soldering iron with tip diameter of 1.0mm.
- 280℃ tip temperature (max) .
- 1.0 mm tip diameter (max).
- Limit soldering time to 3 sec.

Destruction and Test Conditions

1.Conditions direction

<table>
<tr><th>Item</th><th>Performance</th><th>Test Condition</th></tr>
<tr><td>1.Component Adhesion
(Push of Test)</td><td>Pressure of value the withstanding
<table><tr><th>Series</th><th>Force (Kg)</th></tr><tr><td>WCK2012F</td><td>0.50 (Min)</td></tr></table></td><td>After applying the pressure load follow of the attached list for 10±1 seconds horizontally to the center of inductor side body which has no electrode and has been soldered beforehand on an substrate, there shall be found neither exfoliation nor its sign at the terminal electrode.
 
</td></tr>
<tr><td>2.Component Adhesion
(Pull of Test)</td><td>Pressure of value the withstanding
<table><tr><th>Series</th><th>Force (Kg)</th></tr><tr><td>WCK2012F</td><td>0.50 (Min)</td></tr></table></td><td>1. Insert approx 10cm wire into the remaining open eye bend, the ends of even wire lengths upward and wind together.
2. Terminal shall not be falls off or the destruction.
 
3. Epoxy weight: 1Kg /1KKpcs(Approx).</td></tr>
<tr><td>3.Component Crushes of Test
(Crushes of Test)</td><td>Pressure of value the withstanding
<table><tr><th>Series</th><th>Force (Kg)</th></tr><tr><td>WCK2012F</td><td>0.50 (Min)</td></tr></table></td><td>The destruction method is downward presses by the place above until breaks fiercely.
 
</td></tr>
</table>

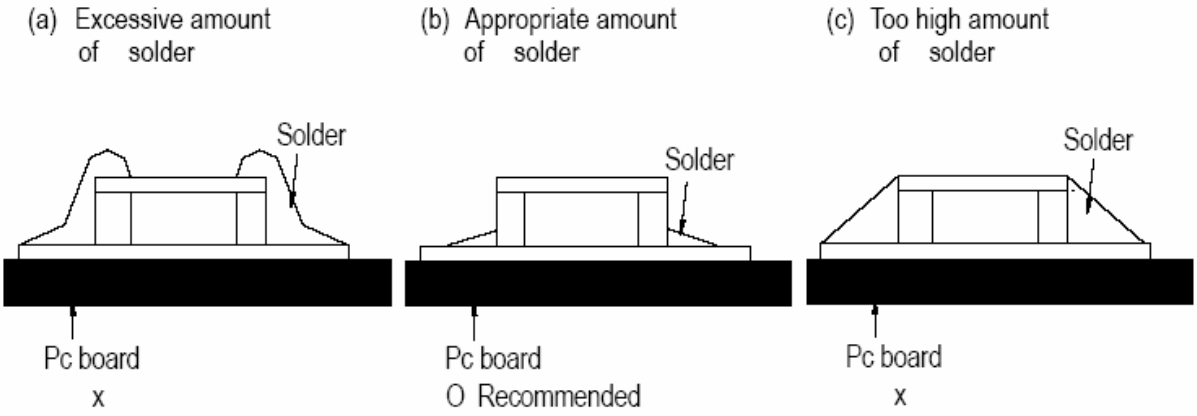
Storage and Handing Requirements

1. Recommended chip inductors should be used within 6 months from the time of delivery.
2. Storage conditions
   2-1 Products should be stored in the warehouse on the following conditions.
   Temperature : -25℃~ 85℃
   Humidity : 30% ~ 50% relative humidity
   No rapid change on temperature and humidity.
   The electrode of the products is coated with solder. Don't keep products in corrosive gases such as sulfur, chlorine gas or acid, or it may cause oxidization of electrode, resulting in poor solder ability.
   2-2 Products should not be storaged on bulk packaging condition to prevent the chipping of the core and the breaking of winding wire caused by the collision between the products.
   2-3 Products should be storaged on the palette for the prevention of the influence from humidity, dust and so on.
   2-4 Products should be storaged in the warehouse without heat shock, vibration, direct sunlight and so on.

3. Handing Condition
   3-1 Care should be taken when transporting or handing product to avoid excessive vibration or mechanical shock.
   3-2 Chip inductors should be handled with care to avoid damage or contamination from perspiration and skin oils.

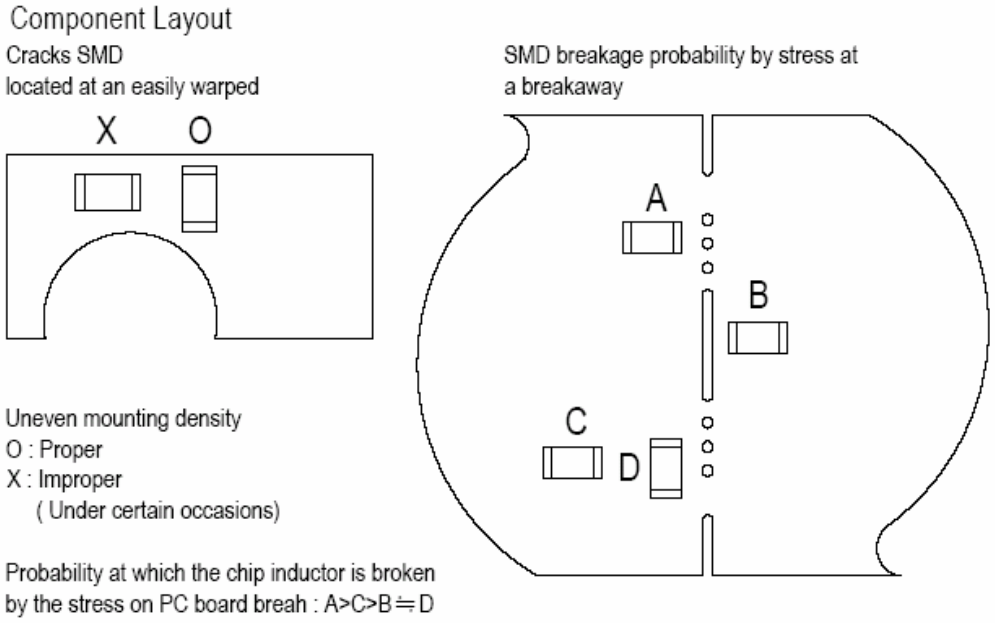
Recommended Layout and Solder

1-1 Recommended Amount of Solder



1-2 Component Layout

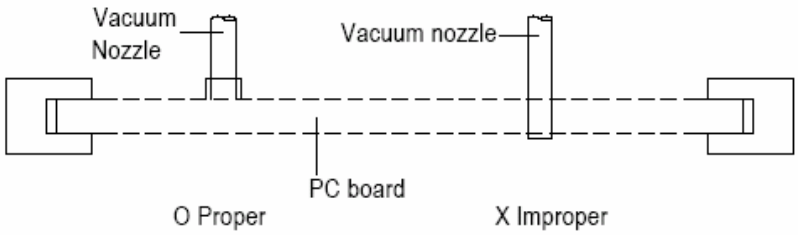
When placing/mounting the inductors/components near an area which is apt to bend or a grid grove on PC Board, it is advisable to have both electrodes subjected to uniform stresses, or to position the component electrode at right angles to the grid groove or bending line.



1-3 Chip Mounting Consideration

(1) In mounting the Inductors/components on a printed circuit board,/any bending and expanding force against them shall be kept minimum to prevent them from bending damaged or displacement, The following precautions and recommendations shall be observed carefully in the process.
Maximum stroke of the vacuum nozzle shall be adjusted so that the pushing force to the printed circuit board shall be limited to a static load of 1 to 3 N.

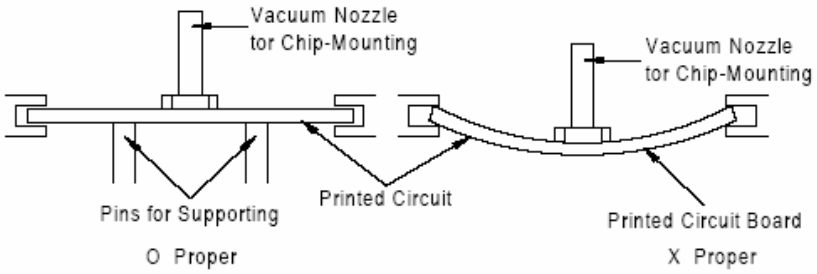
Bottom dead point height of the vacuum nozzle



(2) Maximum stroke of the nozzle shall be adjusted so that the maximum bending of printed circuit board does not exceed 0.5 mm.

(3) The printed circuit board shall be supported by means of adequate supporting pins.

Backup pins



BULL WILL CO., LTD.
Reliability Test Report

Date: OCT.05.2007

Product Type : Common Mode Chip Choke Coil

Product Number : WCK2012F900T04

Equipment:

a. LCR Meter : HP4291A + FIXTURE 16197A
b. Automatic Component Analyzer : Zentech 3305
c. Bias Current Source : Zentech 1320
d. Temperature Chamber : WIT TH-2P-C
e. Temperature Recorder : YOKOGAMA MV200
f. Digital Temperature Meter : DE-3003
g. High Temperature Oven : C SUN 150C
h. Force Gauge : ALGOL AK-5

Test Item:

1. Resistance to Soldering Heat

Pre-heating : 150℃,
Operating Time : 10 Sec+/-1Sec
Solder Composition : Sn / Ag3% / Cu 0.5%,
Temperature : 260℃
Times : From Sep.28.2007 AM09:30 To Sep.28.2007 AM09:40
Total : 10 Sec

Condition	@ 100MHz, 0.2Vrms		Meet spec
25℃	Z	Q	Yes/No
Before test	89 Ω	1.9	Yes
After test	90 Ω	1.9	Yes

After request test: No damage

Test Result: OK

Approved: 張水祥 Check: 張育銓 Prepare: 呂秀雯

BULL WILL CO., LTD.
Reliability Test Report

Date: OCT.05.2007

Product Type : Common Mode Chip Choke Coil

Product Number : WCK2012F900T04

Test Item:

2. Solderability

Pre-heating : 150℃,

Operating Time : 4 Sec±1Sec

Solder Composition : Sn / Ag3% / Cu 0.5%

Temperature : 260℃

Times : From Sep.28.2007 AM09:50 To Sep.28.2007 AM10:00

Total : 4 Sec

Condition	@ 100MHz, 0.2Vrms		Meet spec
25℃	Z	Q	Yes/No
Before test	89 Ω	1.8	Yes
After test	90 Ω	1.7	Yes

After request test: The electrodes shall be at least 95% Covered with new solder coating.

Test Result: OK

Approved: 張水祥 Check: 張育銓 Prepare: 呂秀雯

BULL WILL CO., LTD.
Reliability Test Report

Date: OCT.05.2007

Product Type : Common Mode Chip Choke Coil

Product Number : WCK2012F900T04

Test Item:

3. Low Temperature Resistance Test.

Temperature : -25℃

Relative Humidity : 0%

Time : 1000Hrs

Times : From Aug.01.2007 AM09:10 To Sep.27.2007 AM10:15

Total : 4 Sec

Condition	@ 100MHz, 0.2Vrms		Meet spec
25℃	Z	Q	Yes/No
Before test	89 Ω	1.9	Yes
After test	88 Ω	1.9	Yes

Measured after exposure in the room condition for 24 Hrs

Inductance: within +/-5% of initial value

Q change: within +/-15% of initial value

After request test: No damage

Test Result: OK

Approved: 張永祥 Check: 張育銓 Prepare: 呂秀雯

BULL WILL CO., LTD.
Reliability Test Report

Date: OCT.05.2007

Product Type : Common Mode Chip Choke Coil

Product Number : WCK2012F900T04

Test Item:

4. High Temperature Resistance Test.

Temperature : 85℃±3℃

Relative Humidity : 20%

Applied Current : Rated Current

Time : 1000Hrs

Times : From Jun.06.2007 AM09:10 To Jul.31.2007 AM09:40

Condition	@ 100MHz, 0.2Vrms		Meet spec
25℃	Z	Q	Yes/No
Before test	87 Ω	1.9	Yes
After test	88 Ω	1.9	Yes

Measured after exposure in the room condition for 24 Hrs

Inductance: within +/-5% of initial value

Q change: within +/-15% of initial value

After request test: No damage

Test Result: OK

Approved: 張水祥 Check: 張育銓 Prepare: 呂秀雯

BULL WILL CO., LTD.
Reliability Test Report

Date: OCT.05.2007

Product Type : Common Mode Chip Choke Coil

Product Number : WCK2012F900T04

Test Item:

5. Humidity Resistance Test.

Temperature : 40℃±2℃

Relative Humidity : 90% ～ 95%

Time : 1000Hrs

Times : From Apr.09.2007 AM09:10 To Jun.05.2007 PM15:50

Condition	@ 100MHz, 0.2Vrms		Meet spec
25℃	Z	Q	Yes/No
Before test	88 Ω	1.8	Yes
After test	88 Ω	1.8	Yes

Measured after exposure in the room condition for 24 Hrs

Inductance: within +/-5% of initial value

Q change: within +/-15% of initial value

After request test: No damage

Test Result: OK

Approved: 張水祥 Check: 張育銓 Prepare: 呂秀雯

BULL WILL CO., LTD.
Reliability Test Report

Date: OCT.05.2007

Product Type : Common Mode Chip Choke Coil

Product Number : WCK2012F900T04

Test Item:

6. Temperature Cycle Test.

Times : From Mar.01.2006 AM09:10 To Apr.04.2007 AM09:10

One cycle:

Step	Temperature (℃)	Time (Min)
1	-25 +/-3	30
2	25 +/-2	3
3	85 +/-3	30
4	25 +/-2	3

Total: 100 cycles

Measured after exposure in the room condition for 24Hrs.

Condition	@ 100MHz, 0.2Vrms		Meet spec
25℃	Z	Q	Yes/No
Before test	88 Ω	1.7	Yes
After test	89 Ω	1.7	Yes

Measured after exposure in the room condition for 24 Hrs

Inductance: within +/-5% of initial value

Q change: within +/-15% of initial value

After request test: No damage

Test Result: OK

Approved: 張水祥 Check: 張育銓 Prepare: 呂秀雯

BULL WILL CO., LTD.
Reliability Test Report

Date: OCT.05.2007

Product Type : Common Mode Chip Choke Coil

Product Number : WCK2012F900T04

Test Item:

7. Demo MTBF

Rated Current		:	0.30A Max. Load: 0.30 A
Temperature at 85℃/ RH 60%	Life	:	25,000Hrs.min
Temperature at 60℃/ RH 60%	Life	:	35,000Hrs.min
Temperature at 40℃/ RH 60%	Life	:	54,000Hrs.min
Quantity		:	50 pcs
Times		:	From Dec.09.2006 AM09:00 to Jan.24.2007 AM09:00
Total:		:	45 Day × 24 Hrs × 50 Pcs =54000 Hrs

7-1、The magnetic wire quantity of Thermal class according to the ASTM D2307 standard is 20000 thermal life hours.

7-2、Body Temperature test climbing rate (△T 40℃)

Temperature at 85℃ / RH 60%

Rated Current: 0.32 A Max. Load: 0.32A

Quantity: 4 pcs

Times：From Oct.01.2007 AM09:30 to Oct.04.2007 PM14:55

Sample	Product Number	Room Temperature	Climbing Rate	△T ℃	Test Result
1.	WCK2012F900T04	25℃	32℃	<40℃	OK
2.	WCK2012F900T04	25℃	31℃	<40℃	OK
3.	WCK2012F900T04	25℃	32℃	<40℃	OK
4.	WCK2012F900T04	25℃	31℃	<40℃	OK

Measured after exposure in the room condition for 24 Hrs

Inductance: within +/-5% of initial value

Q change: within +/-10% of initial value

After request test: No damage

Test Result: OK

Approved: 張永祥 Check: 沈育鈺 Prepare: 呂秀雯

BULL WILL CO., LTD.
Reliability Test Report

Date: OCT.05.2007

Product Type : Common Mode Chip Choke Coil

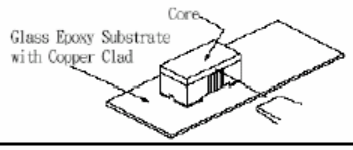
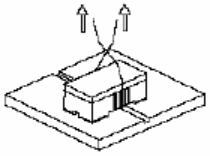
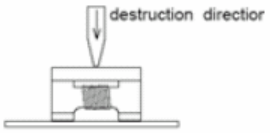
Product Number : WCK2012F900T04

Test Item:

8. Component Adhesion Test

Times : From Sep.28.2007 AM:09:00 To Sep.28.2007 AM10:00

Test Condition

Push Test	Pull Test	Crushes Test
After applying the pressure load follow of the attached list for 10±1 seconds horizontally to the center of inductor side body which has no electrode and has been soldered beforehand on an substrate, there shall be found neither exfoliation nor its sign at the terminal electrode. 	1. Insert approx 10cm wire into the remaining open eye bend, the ends of even wire lengths upward and wind together. 2. Terminal shall not be falls off or the destruction.  3. Epoxy weight: 1Kg /1KKpcs(Approx).	The destruction method is downward presses by the place above until breaks fiercely. 

Sample	Product Number	Push Test	Pull Test	Crushes Test
		0.50 (Min)	0.50 (Min)	0.50 (Min)
1.	WCK2012F900T04	2.15	2.10	2.20
2.	WCK2012F900T04	1.90	2.55	2.40
3.	WCK2012F900T04	2.80	2.20	2.10
4.	WCK2012F900T04	2.40	2.05	2.20
5.	WCK2012F900T04	2.30	2.30	2.00

Test Result: OK

Approved: 張永祥 **Check:** 張育銓 **Prepare:** 呂秀雯