Reliability and Test Conditions (可靠性及其測試條件)

■FCM/HCB/FCI Series:

Item 項目	Performance 標準	Test Condition 測試條件
Operating temperature 操作溫度	-55℃to+125℃ 攝氏負 55 度到正 125 度	
Storage temperature and Humidity range 儲存溫度與濕度範圍	40℃(max) 70%RH(max)	
Solder heat resistance 耐焊錫熱	No damage on chip More than 75% of terminal electrode should be covered with solder Impedance: within±20%of initial value Inductance: within±15%of initial value Q: within±30%of initial value 產品不能破損,端電極錫覆蓋面積達 75%以上 阻抗值:變異性在初始值 20%以內 電感值:變異性在初始值 15%以內 Q 值:變異性在初始值 30%以內	Preheat:150℃,60secs Solder : H63A Solder tamperature:260±5℃ Flux: rosin DIP time:10±0.5secs 預熱:150℃,60secs 錫爐溫度: 260±5°C 時間: 10±0.5secs 助焊劑:rosin Preheating Dipping Natural cooling; 260°C; 150°C; 60 second; 10±0.5 second
Solderability 端面焊錫性	More than 90% of the terminal electrode should be covered with solder 端電極之錫覆蓋面達 90%以上	Preheat:150℃,60secs Solder : H63A Solder tamperature:230±5℃ Flux: rosin DIP time:4±1secs 預熱:150℃,60secs 錫爐溫度: 230±5°C 時間:4±0.5secs 助焊劑:rosin Preheating Dipping Natural cooling; 230°C; 150°C; 60 second; 4±1 second
Terminal strength 端面強度	The terminal electrode and the dielectric must not be damaged by the forces applied on the right conditions. 端電極在右列測試條件下,不得與產品本體分離	Size / Force (Kfg) / Time(sec) 1005 0.2 1608 0.5 2012 0.6 2520 0.8 3216 1.0 >25 3225 1.0 4516 1.0 4532 1.5 5750 2.0 W
Flexure strength 彎折強度	The terminal electrode and the dielectric must not be damaged by the forces applied on the right conditions. 端電極在右列測試條件下,不得與產品本體分離	Solder a chip on a test substrate, bend the substrate by 2mm (0.079in)and return 20(.787); Bending; 45(1.772) 45(1.772); 40(1.575)
Heat resistance 高溫放置測試	Appearance: no damage Impedance: within±20%of initial value Inductance: within±15%of initial value Q: within±30%of initial value 外觀不能破損 阻抗值:變異性在初始值 20%以內 電感值:變異性在初始值 15%以內 Q 值:變異性在初始值 30%以內	Applied current: max rated current Temperature :85±5℃ Test time : 1008±12hrs Measure at room temperature after placing for 24hrs 須加電流:最大額定電流 溫度 : 85±5°C 放置時間 : 1008±12hrs 測試結束於室溫放置 24 小時,始可測試電氣特性 85°C; Room temperature; 1008 hours; 24 hours

Reliability and Test Conditions (可靠性及其測試條件)

■FCM/HCB/FCI Series:

Item 項目	Performance 標準	Test Condition 測試條件
Humidity resistance 高濕放置測試	Appearance: no damage Impedance: within±20%of initial value Inductance: within±15%of initial value Q: within±30%of initial value 外觀不能破損 阻抗值:變異性在初始值 20%以內 電感值:變異性在初始值 15%以內 Q 值:變異性在初始值 30%以內	Humidity :90~95RH Temperature :40±5°C Applied current: max rated current Test time : 1008±12hrs Measure at room temperature after placing for 24hrs 濕度:90~95RH, 溫度 : 40±5°C 須加電流:最大額定電流 放置時間 : 1008±12hrs 測試結束於室溫放置 24 小時,始可測試電氣特性 40°C / Room temperature / 1008 hours / 24 hours
Thermal shock (Temperature cycle) 熱衝擊試驗 (溫度週期)	Appearance: no damage Impedance: within±20%of initial value Inductance: within±15%of initial value Q: within±30%of initial value 外觀不能破損 阻抗值:變異性在初始值 20%以內 電感值:變異性在初始值 15%以內 Q 值:變異性在初始值 30%以內	Temperature :-40±5°Cto85±5°C and keep 30 times, cycle: 5cycles Measure at room temperature after placing for 24hrs 溫度 : -40±5°Cto85±5°C 各放置 30 分鐘達 5 個週期 測試結束於室溫放置 24 小時,始可測試電氣特性 1 cycle / +85°C / Room temperature / -40°C / 30 min / 30 min
Low temperature storage test 低溫放置測試	Appearance: no damage Impedance: within±20%of initial value Inductance: within±15%of initial value Q: within±30%of initial value 外觀不能破損 阻抗值:變異性在初始值 20%以內 電感值:變異性在初始值 15%以內 Q 值:變異性在初始值 30%以內	Temperature :-40±5°C Test time : 1008±12hrs Measure at room temperature after placing for 24hrs 溫度 : -40±5°C 放置時間 : 1008±12hrs 測試結束於室溫放置 24 小時,始可測試電氣特性

■SMH2020/2320/2520/3225/4532 Series:

Item 項目	Performance 標準	Test Condition 測試條件
Electrical Characteristics Test		
Z(common mode) 共模阻抗值	Refer to standard electrical characteristics list. 參考標準特性規格表	HP-4286A
DC Resistance 直流阻抗		HP-4338B
I.R. 絕緣阻抗		Zentech 9053A(Ultra High Resistance Meter)
Rated Current 額定電流		Applied the current to coils the impedance change should be less than ±25% to initial value and temperature rise should not be more than 30°C.
Temperature Rise Test 溫昇測試	30°C Max.(Δt)	1.Applied the allowed DC current. 2.Temperature measured by digital surface thermometer
Mechanical Performance Test		
Solderability Test 焊錫性測試	More than 90% of terminal electrode should be covered with solder. 端電極之錫覆蓋面達 90%以上.	After fluxing,component shall be dipped in a melted solder bath at 230 ± 5 °C for 5 seconds. Preheating / Dipping / Natural cooling / 230°C / 150°C / 60 second / 5±0.5 second
Solder Heat Resistance 耐焊錫熱	1.Components should have not evidence of electrical and mechannical damage. 2. Impedance:within ±25% of initial value. 1.元件無明顯電性與機械性損壞. 2.共模阻抗值:變異性在初始值 25%以內.	Preheat:150°C 60secs. Solder:(63Sn/37Pb) Solder temperature: 260±5°C Flux:rosin. Dip time:10±5 secs. Preheating / Dipping / Natural cooling / 260°C / 150°C / 60 second / 10±0.5 second

■SMH2020/2320/2520/3225/4532 Series:

<table>
<tr><th>Item 項目</th><th>Performance 標準</th><th>Test Condition 測試條件</th></tr>
<tr><td>Component Adhesion (Push test)

元件黏著測試
(推力測試)</td><td>Series No. F(Kg)

SMH2020 0.5(min.)
SMH2320 0.5(min.)
SMH2520 0.8(min.)
SMH3225 1.0(min.)
SMH4532 1.5(min)</td><td>The device should be reflow soldered(230±5℃ for 10secs.)to a tinned copper substrate. A dynameters force gauge should be applied the side of the component. The device must with-ST-F Kg without allure of the termination attached to component.</td></tr>
<tr><td>Component Adhesion (Pull test)

元件黏著測試
(拉力測試)</td><td>Series No. F(Kg)

SMH2020 0.5(min.)
SMH2320 0.5(min.)
SMH2520 0.8(min.)
SMH3225 1.0(min.)
SMH4532 1.5(min)</td><td>1.Insert 10cm wire into the remaining open eye bend ,the ends of even wire lengths upward and wind together.
2.Terminal shall not be remarkably damaged.</td></tr>
<tr><td colspan="3">Mechanical Performance Test</td></tr>
<tr><td>Flexture Strength

彎折強度</td><td>The force applied should not damage the terminal electrode.

端電極在右列測試條件下,不得與產品本體分離.</td><td>Solder a chip on a test substrate, bend
the substrate by 2mm(0.079in.) and return.</td></tr>
<tr><td colspan="3">Reliability Test</td></tr>
<tr><td>High Temperature Life Test

高溫放置測試</td><td rowspan="4">1. Appearance:No damage.
2. Impedance:within ±25% of initial value.
No disconnection or short circuit.

1.外觀不能破損
2.阻抗值:變異性在初始值 20%以內.
內部迴路無斷線或短路.</td><td>Temperature:85±5℃
Time:500±12hrs
Recovery: 4 to 24hrs of recovery under the standard condition after the removal from test chamber.</td></tr>
<tr><td>Low Temperature Life Test

低溫放置測試</td><td>Temperature:-40±5℃
Time: 500±12hrs
Recovery: 4 to 24hrs of recovery under the standard condition after the removal from test chamber.</td></tr>
<tr><td>Thermal Shock

熱衝擊試驗</td><td>Conditions of 1 cycle
<table><tr><th>Step</th><th>Temperature(℃)</th><th>Times(min.)</th></tr><tr><td>1</td><td>-25±3</td><td>30±3</td></tr><tr><td>2</td><td>Room Temperature</td><td>Within 3</td></tr><tr><td>3</td><td>85±3</td><td>30±3</td></tr><tr><td>4</td><td>Room Temperature</td><td>Within 3</td></tr></table>Total:10 cycle
Recovery: 4 to 24hrs of recovery under the standard condition after the removal from test chamber.</td></tr>
<tr><td>Humidity Resistance

高濕放置測試</td><td>Temperature:40±5℃
Humidity:90 to 95%
Applied current:Rated current
Time:500±12hrs
Recovery:4 to 24hrs of recovery under the standard condition after the removal from test chamber.</td></tr>
</table>

■B4W/B5W/T4W/T5W/SBT4F/SBT5FL/SBT5F Series:

<table>
<tr><th>Item 項目</th><th>Performance 標準</th><th>Test Condition 測試條件</th></tr>
<tr><td colspan="3">Electrical Characteristics Test</td></tr>
<tr><td>Z(common mode) 共模阻抗值</td><td rowspan="2">Refer to standard electrical characteristics list.

參考標準特性規格表</td><td>HP-4286A</td></tr>
<tr><td>DC Resistance 直流阻抗</td><td>HP-4338B</td></tr>
</table>

Reliability and Test Conditions (可靠性及其測試條件)

■B4W/B5W/T4W/T5W/SBT4F/SBT5FL/SBT5F Series:

Item 項目	Performance 標準	Test Condition 測試條件
I.R.絕緣阻抗		Zentech 9053A(Ultra High Resistance Meter)
Rated Current 額定電流		Applied the current to coils the impedance change should be less than ±25% to initial value and temperature rise should not be more than 30℃.
Temperature Rise Test 溫昇測試	30℃ Max.(Δt)	1.Applied the allowed DC current. 2.Temperature measured by digital surface thermometer
Mechanical Performance Test		
Solderability Test 焊錫性測試	More than 90% of terminal electrode should be covered with solder. 端電極之錫覆蓋面達 90%以上.	After fluxing,component shall be dipped in a melted solder bath at 230±5℃ for 5 seconds. Preheating Dipping Natural cooling 230℃ 150℃ 60 second 5±0.5 second
Solder Heat Resistance 耐焊錫熱	1.Components should have not evidence of electrical and mechannical damage. 2. Impedance:within ±25% of initial value. 1.元件無明顯電性與機械性損壞. 2.共模阻抗值:變異性在初始值25%以內.	Preheat:150℃ 60secs. Solder:(63Sn/37Pb) Solder temperature: 260±5℃ Flux:rosin. Dip time:10±5 secs. Preheating Dipping Natural cooling 260℃ 150℃ 60 second 10±0.5 second
Mechanical Performance Test		
Flexture Strength 彎折強度	The force applied should not damage the terminal electrode. 端電極在右列測試條件下,不得與產品本體分離.	Solder a chip on a test substrate, bend the substrate by 2mm(0.079in.) and return. 20(.787) Bending 45(1.772) 45(1.772) 40(1.575) 100(3.937)
Reliability Test		
High Temperature Life Test 高溫放置測試	1. Appearance:No damage. 2. Impedance:within ±25% of initial value. No disconnection or short circuit. 1.外觀不能破損. 2.共模阻抗值:變異性在初始值25%以內.	Temperature:85±5℃ Time:500±12hrs Recovery: 4 to 24hrs of recovery under the standard condition after the removal from test chamber.
Low Temperature Life Test 低溫放置測試		Temperature:-40±5℃ Time: 500±12hrs Recovery: 4 to 24hrs of recovery under the standard condition after the removal from test chamber.
Thermal Shock 熱衝擊試驗		Conditions of 1 cycle Step / Temperature(℃) / Times(min.) 1 / -25±3 / 30±3 2 / Room Temperature / Within 3 3 / 85±3 / 30±3 4 / Room Temperature / Within 3 Total:10 cycle Recovery: 4 to 24hrs of recovery under the standard condition after the removal from test chamber.
Humidity Resistance 高濕放置測試		Temperature:40±5℃ Humidity:90 to 95% Applied current:Rated current Time:500±12hrs Recovery:4 to 24hrs of recovery under the standard condition after the removal from test chamber.

Reliability and Test Conditions (可靠性及其測試條件)

■LPI Series:

Item 項目	Performance 標準	Test Condition 測試條件
Electrical Characteristics Test		
Inductance 電感值	Refer to standard electrical characteristics list. 參考標準特性規格表	HP-4286A
DC Resistance 直流阻抗		HP-4338B
Rated Current 額定電流		Applied the current to coils the inductance change should be less than ±10% to initial value and temperature rise should not be more than 40℃.
Temperature Rise Test 溫昇測試	40℃ Max.(Δt)	1.Applied the allowed DC current. 2.Temperature measured by digital surface thermometer
Mechanical Performance Test		
Solderability Test 焊錫性測試	More than 90% of terminal electrode should be covered with solder. 端電極之錫覆蓋面達 90%以上.	After fluxing,component shall be dipped in a melted solder bath at 230±5℃ for 5 seconds.
Solder Heat Resistance 耐焊錫熱	1.Components should have not evidence of electrical and mechannical damage. 2. inductance:within ±10% of initial value. 1.元件無明顯電性與機械性損壞. 2.電感值:變異性在初始值 10%以內.	Preheat:150℃ 60secs. Solder:(63Sn/37Pb) Solder temperature: 260±5℃ Flux:rosin. Dip time:10±5 secs.
Component Adhesion (Push test) 元件黏著測試 (推力測試)	Size / F(Kg): 4532 / 1.0(Min.) 3225 / 1.0(Min.) 3216 / 0.8(Min.) 2520 / 0.5(Min.) 2015 / 0.5(Min.)	The device should be reflow soldered(230±5℃ for 10secs.)to a tinned copper substrate. A dynameters force gauge should be applied the side of the component. The device must with-ST-F Kg without allure of the termination attached to component.
Component Adhesion (Pull test) 元件黏著測試 (拉力測試)	Size / F(Kg): 4532 / 1.0(Min.) 3225 / 1.0(Min.) 3216 / 0.8(Min.) 2520 / 0.5(Min.) 2015 / 0.5(Min.)	1.Insert 10cm wire into the remaining open eye bend ,the ends of even wire lengths upward and wind together. 2.Terminal shall not be remarkably damaged.
Mechanical Performance Test		
Flexture Strength 彎折強度	The force applied should not damage the terminal electrode. 端電極在右列測試條件下,不得與產品本體分離.	Solder a chip on a test substrate, bend the substrate by 2mm(0.079in.) and return.
Reliability Test		
High Temperature Life Test 高溫放置測試	1. Appearance:No damage. 2. Inductance:within ±10% of initial value. No disconnection or short circuit 1.元件無明顯電性與機械性損壞. 2.共模阻抗值:變異性在初始值 25%以內.	Temperature:85±5℃ Time:500±12hrs Recovery: 4 to 24hrs of recovery under the standard condition after the removal from test chamber.
Low Temperature Life Test 低溫放置測試		Temperature:-40±5℃ Time: 500±12hrs Recovery: 4 to 24hrs of recovery under the standard condition after the removal from test chamber.

Reliability and Test Conditions (可靠性及其測試條件)

■LPI Series:

<table>
<tr><th>Item 項目</th><th>Performance 標準</th><th>Test Condition 測試條件</th></tr>
<tr><td>Thermal Shock
熱衝擊試驗</td><td rowspan="2">1. Appearance:No damage.
2. Impedance:within ±25% of initial value.
No disconnection or short circuit.
1.外觀不能破損.
2.共模阻抗值:變異性在初始值 25%以內.</td><td>Conditions of 1 cycle<table><tr><th>Step</th><th>Temperature(℃)</th><th>Times(min.)</th></tr><tr><td>1</td><td>-25±3</td><td>30±3</td></tr><tr><td>2</td><td>Room Temperature</td><td>Within 3</td></tr><tr><td>3</td><td>85±3</td><td>30±3</td></tr><tr><td>4</td><td>Room Temperature</td><td>Within 3</td></tr></table>Total:10 cycle
Recovery: 4 to 24hrs of recovery under the standard condition after the removal from test chamber.</td></tr>
<tr><td>Humidity Resistance
高濕放置測試</td><td>Temperature:40±5℃
Humidity:90 to 95%
Applied current:Rated current
Time:500±12hrs
Recovery:4 to 24hrs of recovery under the standard condition after the removal from test chamber.</td></tr>
</table>

■WCI/WHI Series

<table>
<tr><th>Item 項目</th><th>Performance 標準</th><th>Test Condition 測試條件</th></tr>
<tr><td>Solderability
焊錫性測試</td><td>More than 90% of the terminal electrode shall be covered with fresh solder.
端電極之錫覆蓋面達 90%以上.</td><td>Preheat : 125±25℃ for 60 seconds
Solder : H63A(eutectic solder)
Solder temp.:230±5℃
Flux : Rosin
Dip time : 4±1 seconds</td></tr>
<tr><td>Thermal Shock Test
(Temp. cycle)
熱衝擊試驗
(溫度週期)</td><td>Visual examination：No mechanical damage
Inductance shall not change more than ±10%
Q: within±30%of initial value
目視檢查:無機械性損壞.
電感值:變異性在初始值 10%以內.
Q 值:變異性在初始值 30%以內.</td><td>Conditions of 1 cycle<table><tr><th>Step</th><th>Temperature(℃)</th><th>Times(min.)</th></tr><tr><td>1</td><td>-25±3</td><td>30±3</td></tr><tr><td>2</td><td>Room</td><td>Within 3</td></tr><tr><td>3</td><td>85±3</td><td>30±3</td></tr><tr><td>4</td><td>Room</td><td>Within 3</td></tr></table>Total:5 cycle
Recovery: 4 to 24hrs of recovery under the standard condition after the removal from test chamber.</td></tr>
<tr><td>Humidity Resistance Test
高濕放置測試</td><td></td><td>Temperature : 40±2℃
Humidity : 90~95%
Applied current : per spec.
Time : 500 hours</td></tr>
<tr><td>High temp. ResistanceTest
高溫放置測試</td><td></td><td>Temperature : 85±2℃
Applied current : per spec.
Time : 500 hours</td></tr>
</table>

Reliability and Test Conditions (可靠性及其測試條件)

■Surface Mount Power Inductors

Item 項目	Performance 標準	Test Condition 測試條件
Operating Temperature 工作溫度	-20~+105℃	
Storage temperature 儲存溫度	-40~+85℃	
Rated Current 額定電流	Refer to standard electrical characteristics list. 參考標準特性規格表	
Temperature Rise Test 溫昇測試	40℃ max. (Δt) 40 度最大。	
Solder heat Resistance 耐焊錫熱	Appearance: No significant abnormality. Inductance change: Within ± 20%. 外觀無破損變形。 電感值變化在± 20%內。	Preheat:150℃,60sec. Solder : H63A Solder tamperature:260 ±5℃ Flux: rosin Dip time:10±0.5sec. Preheating Dipping Natural cooling 260°C 150°C 60 second 10 ± 0.5 second
Solderability 焊錫性測試	More than 90% of the terminal electrode should be covered with solder. 端電極之錫覆蓋面達 90%以上.	Preheat:125 ± 25 ℃,60sec. Solder : H63A Solder tamperature:230 ±5℃ Flux: rosin Dip time:4±1sec. Preheating Dipping Natural cooling 230°C 125°C 60 second 4 ± 1 second
Thermal shock 熱衝擊試驗	Appearance: no damage Inductance: within ± 20%of initial value. 1.外觀不能破損. 2.電感值:變異性在初始值 25%以內	Condition for 1 cycle Step1:-25±2℃ 30±3 min. Step2:Room temperature 15 min. Step3:+85±5℃ 30±3 min. Step4:Room temperature 15 min. Number of cycles:50 Phase / Temperature(℃) / Time(min) 1 / -25±2℃ / 30±3 2 / Room Temp. / 15 3 / +85±2℃ / 30±3 4 / Room Temp. / 15 Measured:50 times
Humidity Resistance Test 高濕放置測試		Temperature:40±2℃. Applied current: rated current. Duration:500 hrs. Humidity:90~95%
High Temperature Resistance Test 高溫放置測試		Temperature:85±2℃. Applied current: rated current. Duration:500 hrs.