

FEATURES

- Low profile, high current power supplies.
- Low loss realized with low DCR.
- Ultra low buzz noise, due to composite construction.
- Frequency up to 5MHz.
- Available for automatic mounting in tape and reel package.

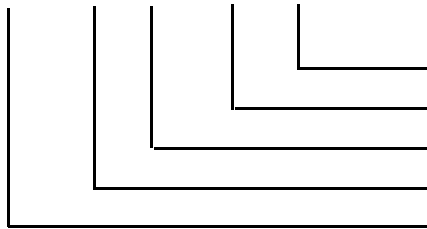


APPLICATIONS

- Excellent for power line DC-DC conversion application used in power switching, personal computer and other handheld electronic equipment.

PRODUCT IDENTIFICATION

MHP- 2520 12 -100 - M



Inductance Tolerance (K:10% ; M:20% ; N:30%)
 Inductance Value 4R7:4.7uH; 100: 10uH; 101:100uH
 Thickness
 Product dimensions
 Series name

Characteristics:

Saturation Current (I_{sat}) : The current will cause L_0 to drop approximately 30% typical

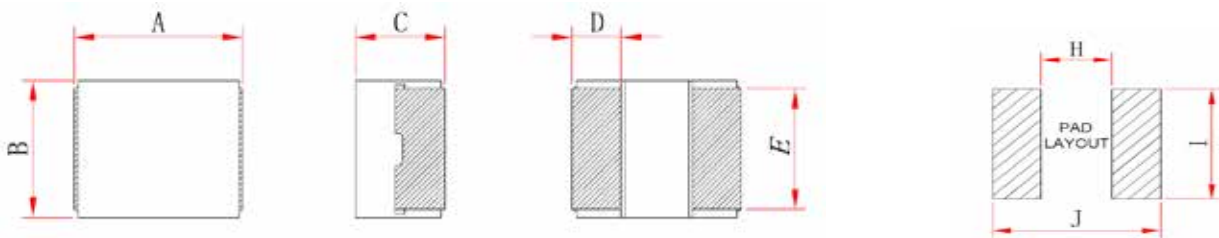
Temperature Rise Current (I_{rms}) : The current will

cause the coil temperature rise approximately $T=40^{\circ}\text{C}$

Operating Temperature : -55°C to 125°C

Storage Temperature: -55°C to 125°C

SHAPES AND DIMENSIONS



| Item | A | B | C | D | E | H | I | J |
|-----------|---------|---------|---------|---------|------|-----|-----|-----|
| MHP201610 | 2.0±0.2 | 1.6±0.2 | 1.0 Max | 0.5±0.2 | 1.44 | 0.9 | 1.6 | 2.3 |
| MHP201612 | 2.0±0.2 | 1.6±0.2 | 1.2 Max | 0.5±0.2 | 1.44 | 0.9 | 1.6 | 2.3 |
| MHP252010 | 2.5±0.2 | 2.0±0.2 | 1.0 Max | 0.6±0.2 | 1.84 | 1.2 | 2.0 | 2.8 |
| MHP252012 | 2.5±0.2 | 2.0±0.2 | 1.2 Max | 0.6±0.2 | 1.84 | 1.2 | 2.0 | 2.8 |

Note: Beyond the above specification also could satisfy the special requirement

ELECTRICAL CHARACTERISTICS

| Part No. | Inductance L (μ H) | Tolerance (\pm %) | DCR (m Ω) | | I sat (A) | | I rms (A) | |
|----------------|-------------------------------|-------------------------|----------------------|-----|--------------|------|--------------|------|
| | | | Typ | Max | Typ | Max | Typ | Max |
| MHP201610-R24M | 0.24 | 20 | 20 | 24 | 4.8 | 4.3 | 4.0 | 3.5 |
| MHP201610-R33M | 0.33 | 20 | 29 | 36 | 4.2 | 3.7 | 3.4 | 3.0 |
| MHP201610-R47M | 0.47 | 20 | 36 | 46 | 3.56 | 3.2 | 2.7 | 2.43 |
| MHP201610-1R0M | 1.0 | 20 | 63 | 75 | 2.8 | 2.4 | 2.1 | 1.9 |
| MHP201610-1R5M | 1.5 | 20 | 105 | 137 | 2.2 | 2.0 | 1.8 | 1.6 |
| MHP201610-2R2M | 2.2 | 20 | 174 | 197 | 1.95 | 1.75 | 1.6 | 1.4 |
| MHP201612-R24M | 0.24 | 20 | 17 | 21 | 5.3 | 4.8 | 4.5 | 4.0 |
| MHP201612-R33M | 0.33 | 20 | 27 | 33 | 4.6 | 4.0 | 3.9 | 3.5 |
| MHP201612-R47M | 0.47 | 20 | 30 | 36 | 3.9 | 3.5 | 3.5 | 3.1 |
| MHP201612-1R0M | 1.0 | 20 | 60 | 72 | 2.9 | 2.6 | 2.4 | 2.2 |
| MHP201612-1R5M | 1.5 | 20 | 86 | 112 | 2.4 | 2.16 | 1.9 | 1.7 |
| MHP201612-2R2M | 2.2 | 20 | 146 | 186 | 2.1 | 1.7 | 1.5 | 1.35 |
| MHP252010-R33M | 0.33 | 20 | 19 | 26 | 5.3 | 4.77 | 4.4 | 4.0 |
| MHP252010-R47M | 0.47 | 20 | 28 | 41 | 4.5 | 4.05 | 3.5 | 3.1 |
| MHP252010-R68M | 0.68 | 20 | 31 | 45 | 4.3 | 3.6 | 3.3 | 3.0 |
| MHP252010-1R0M | 1.0 | 20 | 58 | 65 | 3.55 | 3.2 | 2.8 | 2.52 |
| MHP252010-1R5M | 1.5 | 20 | 76 | 95 | 3.0 | 2.7 | 2.2 | 1.98 |
| MHP252010-2R2M | 2.2 | 20 | 104 | 113 | 2.6 | 2.34 | 1.8 | 1.62 |
| MHP252012-R47M | 0.47 | 20 | 23 | 28 | 5.0 | 4.5 | 4.5 | 4.0 |
| MHP252012-1R0M | 1.0 | 20 | 48 | 55 | 3.8 | 3.3 | 3.1 | 2.7 |
| MHP252012-1R5M | 1.5 | 20 | 61 | 70 | 2.9 | 2.61 | 2.7 | 2.43 |
| MHP252012-2R2M | 2.2 | 20 | 92 | 105 | 2.5 | 2.2 | 2.3 | 2.0 |

If you require another part number please contact with us.

Note 1: Referenced ambient temperature 20°C.

Note 2: Test Condition :1MHz ,1.0 Vrms.

Note 3: I sat (Typ) : DC current (A) that will cause L0 to drop approximately 30%

I sat (Max) : DC current (A) that will cause L0 to drop 30% Max

I rms (Typ) : DC current (A) that will cause an approximate Δ T of 40°C

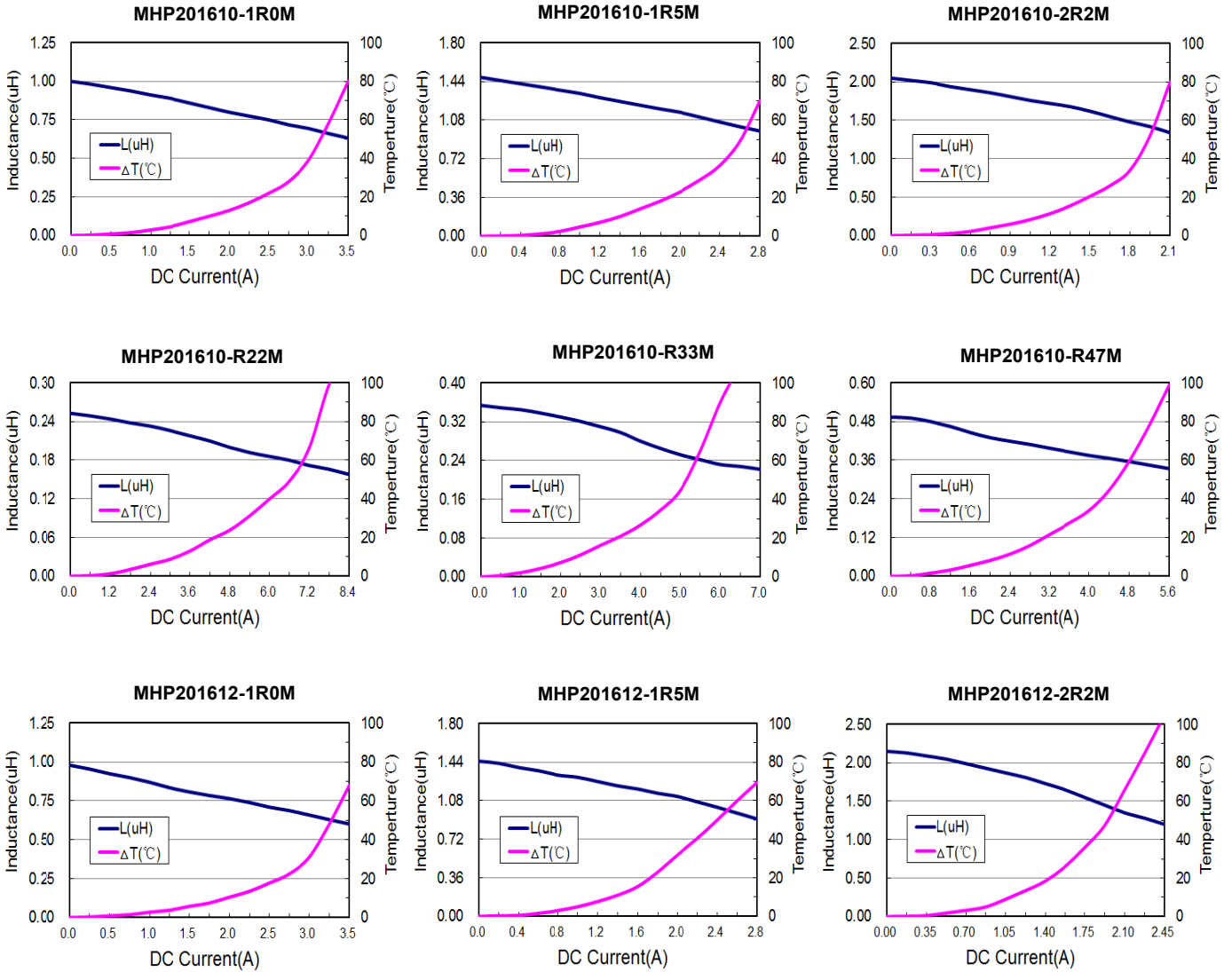
I rms (Max) : DC current (A) that will cause an Δ T of 40°C Max

Note 4: Operating temperature range includes self-temperature rise.

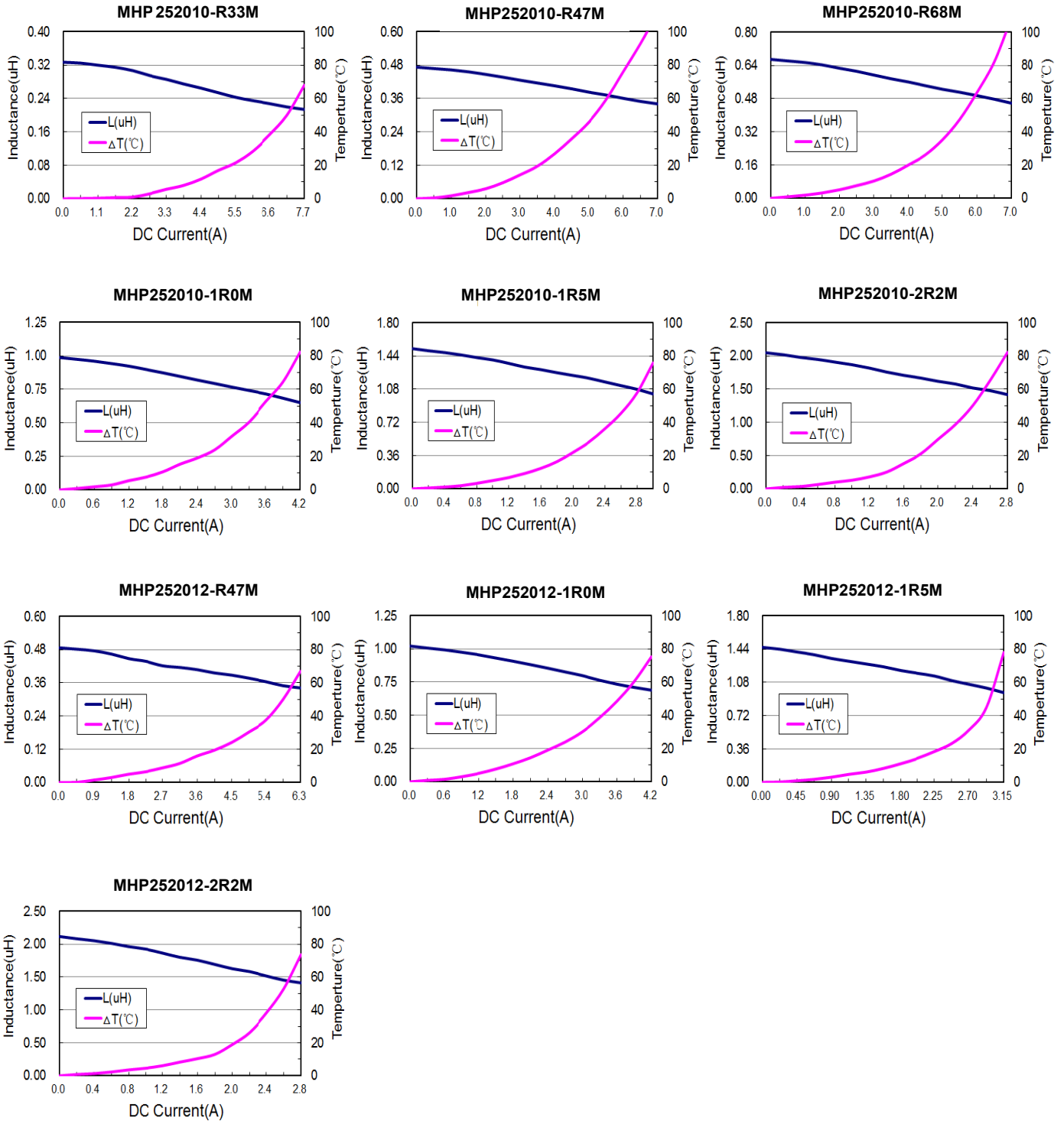
Note 5: The rated current as listed is either the saturation current or the heating current depending on which value is lower.

Note: Beyond the above specification also could satisfy the special requirement

Typical performance curves :

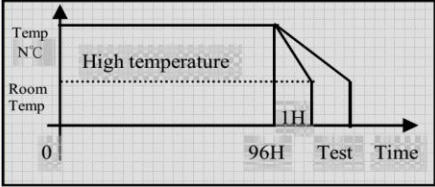
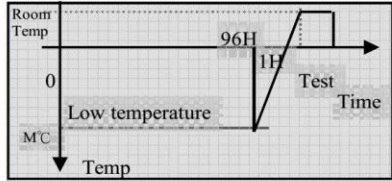
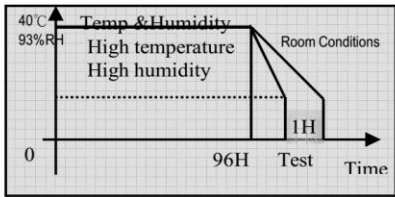
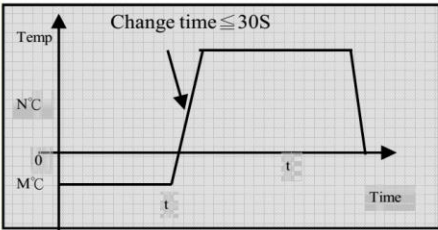


Typical performance curves :

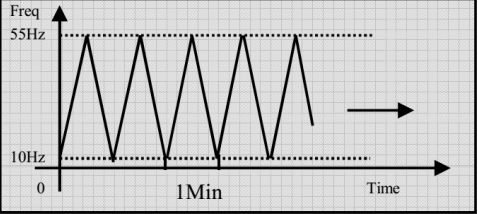
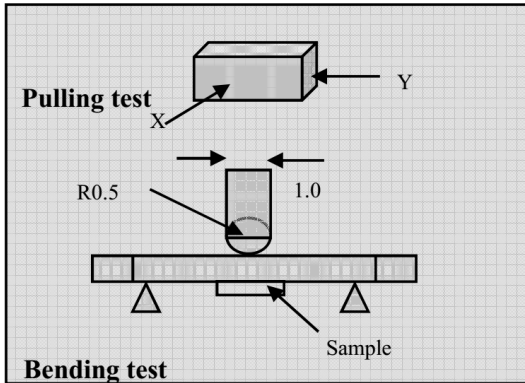


RELIABILITY TEST

FOR SMT/SMD and other similar types

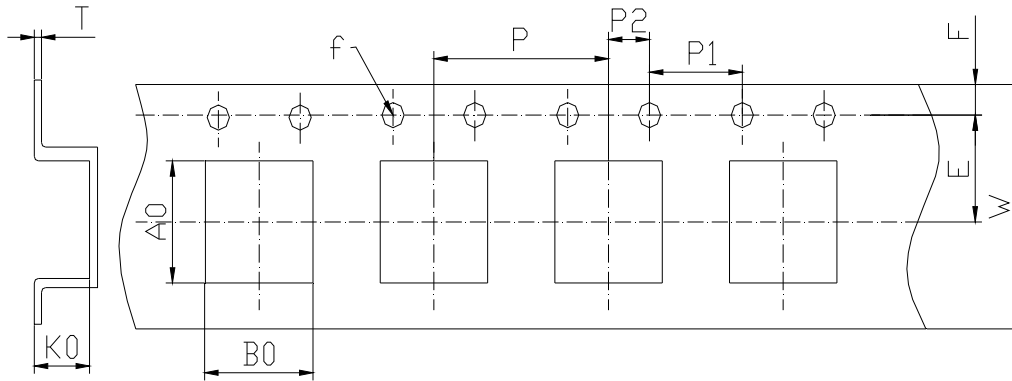
| Item (項目) | Required Characteristics (要求) | Test Method / Condition (測試方法) |
|---|--|--|
| High temperature Storage test Reference documents: MIL-STD-202G Method 108A 高溫儲存試驗 | 1.No case deformation or change in appearance. 2. $\Delta L/L \leq 10\%$ or 15% 3. $\Delta Q/Q \leq 30\%$ 4. $\Delta DCR/DCR \leq 10\%$ N:依據產品規格設定 1.無明顯的外觀缺陷 2.感值變化不超過10%或者15% 3.品質因數變化不超過30% 4.直流電阻變化不超過10% | Temperature: $N \pm 2^\circ\text{C}$ Time : 96 ± 2 hours Tested not less than 1 hour, nor more than 2 hours at room temperature.  溫度: $N \pm 2^\circ\text{C}$ 時間: 96 ± 2 小時 樣品在室溫下放置1小時,不超2小時必須測試. |
| Low temperature Storage test Reference documents: IEC 68-2-1A 6.1 6.2 低溫儲存試驗 | 1.No case deformation or change in appearance. 2. $\Delta L/L \leq 10\%$ or 15% 3. $\Delta Q/Q \leq 30\%$ 4. $\Delta DCR/DCR \leq 10\%$ M:依據產品規格設定 1.無明顯的外觀缺陷 2.感值變化不超過10%或者15% 3.品質因數變化不超過30% 4.直流電阻變化不超過10% | Temperature: $M \pm 2^\circ\text{C}$ Time : 96 ± 2 hours Tested not less than 1 hour, nor more than 2 hours at room temperature.  溫度: $M \pm 2^\circ\text{C}$ 時間: 96 ± 2 小時 樣品在室溫下放置1小時,不超2小時必須測試. |
| Humidity test Reference documents: MIL-STD-202G Method 103B 濕度測試 | 1.No case deformation or change in appearance. 2. $\Delta L/L \leq 10\%$ or 15% 3. $\Delta Q/Q \leq 30\%$ 4. $\Delta DCR/DCR \leq 10\%$ 1.無明顯的外觀缺陷 2.感值變化不超過10%或者15% 3.品質因數變化不超過30% 4.直流電阻變化不超過10% | Temperature: $40 \pm 2^\circ\text{C}$, Humidity: $93 \pm 3\% \text{RH}$ Time : 96 ± 2 hours Tested not less than 1 hour, nor more than 2 hours at room temperature.  溫度: $40 \pm 2^\circ\text{C}$, 溼度: $93 \pm 3\% \text{RH}$ 時間 : 96 ± 2 hours 樣品在室溫下放置1小時,不超2小時必須測試. |
| Thermal shock test Reference documents: MIL-STD-202G Method 107G 熱衝擊測試 | 1.No case deformation or change in appearance. 2. $\Delta L/L \leq 10\%$ or 15% 3. $\Delta Q/Q \leq 30\%$ 4. $\Delta DCR/DCR \leq 10\%$ For T: weight $\leq 28\text{g}$: 15Min; M:低溫設定 $28\text{g} \leq \text{weight} \leq 136\text{g}$: 30Min N:高溫設定 1.無明顯的外觀缺陷 2.感值變化小於10%或者15% 3.品質因數變化小於30% 4.直流電阻變化小於10% | First $M^\circ\text{C}$ for T time, last $N^\circ\text{C}$ for T time as 1 cycle. Go through 20 cycles.  從 -40°C 作用 T 分鐘,然後溫度衝擊到 125°C 作用 T 分鐘,作為一個循環,共作用 20 次. |

FOR SMT/SMD and other similar types

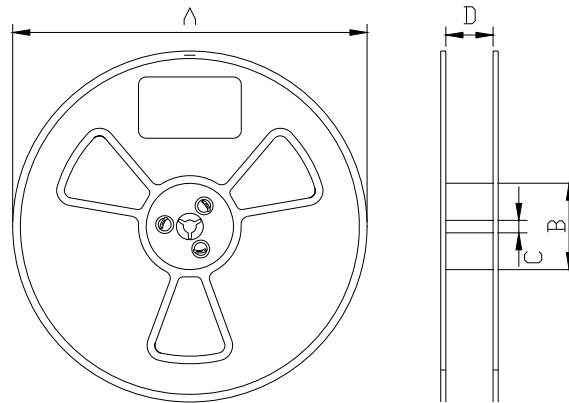
| Item (項目) | Required Characteristics (要求) | Test Method / Condition (測試方法) |
|---|---|---|
| Solderability test Reference documents: MIL-STD-202G Method 208H IPC J-STD-002C 可焊性測試 | Terminals area must have 95% min. solder coverage 端子必須有95%以上著錫 | 1. Dip pads in flux then dip in solder pot at $245\pm 5^{\circ}\text{C}$ for 5 seconds. 2. Solder: lead free 3. Flux: rosin flux 1. 端子浸入助焊劑, 然後浸入 $245\pm 5^{\circ}\text{C}$ 錫爐中5秒 2. 焊料: 無鉛焊料 3. 助焊劑: 松香助焊劑 |
| Heat endurance of Reflow soldering Reference documents: IPC J-STD-020D 過再流焊測試 | 1. No case deformation or change in appearance. 2. $\Delta L/L \leq 10\%$ or 15% 3. $\Delta Q/Q \leq 30\%$ 4. $\Delta \text{DCR}/\text{DCR} \leq 10\%$ 1. 無明顯的外觀缺陷 2. 感值變化不超過10%或者15% 3. 品質因數變化不超過30% 4. 直流電阻變化不超過10% | 1. Refer to the next page reflow curve Go through 3 times 2. The peak temperature : $260+0/-5^{\circ}\text{C}$ 1. 參照下頁回流焊曲線過三次 2. 峰值溫度為: $260+0/-5^{\circ}\text{C}$ |
| Vibration test Reference documents: MIL-STD-202G Method 201A 振動測試 | 1. No case deformation or change in appearance. 2. $\Delta L/L \leq 10\%$ 3. $\Delta Q/Q \leq 30\%$ 4. $\Delta \text{DCR}/\text{DCR} \leq 10\%$ 1. 無明顯的外觀缺陷 2. 感值變化不超過10% 3. 品質因數變化不超過30% 4. 直流電阻變化不超過10% | Apply frequency 10~55Hz. 1.5mm amplitude in each of perpendicular direction for 2 hours. (total 6 hours)  用10~55Hz 振動頻率, 振幅1.5mm, 振動周期為1min/cycle. 沿X,Y,Z方向各振動2小時.(共6小時) |
| Drop test Reference documents: MIL-STD-202G Method 203C 落下試驗 | 1. No case deformation or change in appearance. 2. $\Delta L/L \leq 10\%$ 3. $\Delta Q/Q \leq 30\%$ 4. $\Delta \text{DCR}/\text{DCR} \leq 10\%$ 1. 無明顯的外觀缺陷 2. 感值變化不超過10% 3. 品質因數變化不超過30% 4. 直流電阻變化不超過10% | Packaged & Drop down from 1m with 981m/s^2 (100G) attitude In 1 angle 1 ridges & 2 surfaces orientations. 將產品包裝後從1米高度自然落下至試驗板上 1角1稜2面 |
| Terminal strength push test Reference documents: JIS C 5321 :1997 端子強度試驗 | Pulling test: Define: A: sectional area of terminal $0.5\text{mm}^2 < A \leq 1.2\text{mm}^2$ force $\geq 20\text{N}$ time : 10sec $1.2\text{mm}^2 < A$ force $\geq 40\text{N}$ time: 10sec Bending test: Soldering the products on PCB, after the pulling test and bending test ,terminal should not pull off 推力測試: 定義: A: 焊接端子截面積 $0.5\text{mm}^2 < A \leq 1.2\text{mm}^2$ 推力 $\geq 20\text{N}$ 時間: 10S $1.2\text{mm}^2 < A$ 推力 $\geq 40\text{N}$ 時間10S 彎折測試: 將產品焊於PCB上, 分別經過推力測試和彎折測試後, 端子不會發生松脫 | Bend the testing PCB at middle point, the deflection shall be 2mm  將PCB對中彎折, 到達撓度2mm. |
| Resistance to solvent test Reference documents: IEC 68-2-45:1993 耐溶劑性試驗 | No case deformation or change in appearance, or obliteration of marking 無外觀破壞及標記破損 | To dip parts into IPA solvent for $5\pm 0.5\text{Min}$, then drying them at room temp for 5Min, at last, to brushing making 10 times. 在IPA溶劑中浸泡 5 ± 0.5 分鐘, 室溫下乾燥5分鐘, 然後擦拭10次. |

Physical characteristic tests (物理特性試驗)

Packaging



| SIZE | A0 | B0 | E | F | f | P | P1 | P2 | W | T | K0 |
|-----------|------|------|------|------|------|------|------|------|------|------|------|
| MHP201610 | 2.65 | 2.23 | 5.50 | 1.75 | 1.50 | 4.00 | 4.00 | 2.00 | 8.00 | 0.25 | 1.30 |
| MHP201612 | 2.65 | 2.23 | 5.50 | 1.75 | 1.50 | 4.00 | 4.00 | 2.00 | 8.00 | 0.25 | 1.50 |
| MHP252010 | 2.73 | 2.23 | 5.50 | 1.75 | 1.50 | 4.00 | 4.00 | 2.00 | 8.00 | 0.25 | 1.30 |
| MHP252012 | 2.73 | 2.23 | 5.50 | 1.75 | 1.50 | 4.00 | 4.00 | 2.00 | 8.00 | 0.25 | 1.50 |



| SIZE | A | B | C | D | Reel/PCS |
|---------|-----|-----|----|------|----------|
| MHP2016 | 330 | 100 | 13 | 12.5 | 3000 |
| MHP2520 | 330 | 100 | 13 | 12.5 | 3000 |

Note: Beyond the above specification also could satisfy the special requirement

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