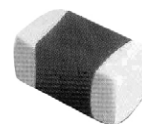




Multilayer Chip Power Inductor – DMPH Series

Operating Temp. : -40℃~+85℃



FEATURES

- Higher DC bias current and lower DC resistance due to trench technology
- Low profile and thin thickness
- Monolithic structure for high reliability
- Excellent solderability and high heat resistance
- No cross coupling due to magnetic shield

APPLICATIONS

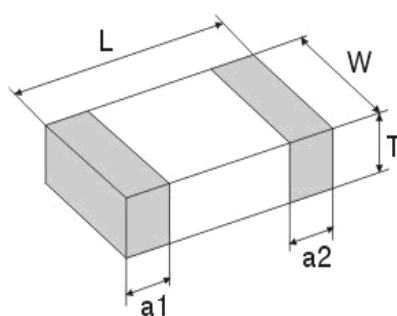
- DC-DC converter circuits for mobile phones, wearable devices, DVCs, HDDs, etc.

PRODUCT IDENTIFICATION

DMPH 2012 UF 2R2 M T - LF
 ① ② ③ ④ ⑤ ⑥ ⑦

- ① 产品系列 Product Symbol
- ② 产品尺寸 Dimensions (见 3)
- ③ 基本材料代码 Material Code (铁氧体材料 F;UF 等)
- ④ 电感量 Inductance Value (2R2: 2.2μH)
- ⑤ 允许容差 Inductance Tolerance (K:±10%; M:±20%; N:±30%)
- ⑥ 包装方式 (B: 散装; T: 盘装) Packaging Style (B:; Bulk; T: Tape & Reel)
- ⑦ 环保标识 Lead Free

SHAPE AND DIMENSIONS



Type 型号	Dimensions (mm) [inch]			
	L长	W宽	T高	a1, a2
1608 [0603]	1.60±0.15 [0.063±0.006]	0.80±0.15 [0.031±0.006]	0.80±0.15 [0.031±0.006]	0.30±0.20 [0.012±0.008]
2012 [0805]	2.00±0.20 [0.079±0.008]	1.25±0.20 [0.049±0.008]	0.80±0.20 [0.031±0.008]	0.50±0.30 [0.02±0.012]
2016[0806]	2.00±0.20 [0.079±0.008]	1.60±0.20 [0.063±0.008]	0.80±0.20[0.031±0.008]	0.50±0.30 [0.02±0.012]
2520[1008]	2.50±0.20[0.098±0.008]	2.00±0.20[0.079±0.008]	0.85±0.15[0.03±0.006]	0.50±0.30[0.02±0.012]
3216 [1206]	3.20±0.20 [0.126±0.008]	1.60±0.20 [0.063±0.008]	1.10±0.30 [0.043±0.012]	0.50±0.30 [0.02±0.012]
3225[1210]	3.20±0.20[0.126±0.008]	2.50±0.20[0.098±0.008]	1.25±0.20[0.049±0.008]	0.70±0.30[0.028±0.012]



SPECIFICATION

DMPH 1608 (0603) Series

Part No.	L (uH) ±20%	LTest Freq. (MHz)	SRF(MHz) /min	RDC(Ω) ±30%	Ir(mA)/max
DMPH1608F1R0□	1.0	1	125	0.18	1000
DMPH1608F1R5□	1.5	1	109	0.22	800
DMPH1608F2R2□	2.2	1	90	0.30	700
DMPH1608F3R3□	3.3	1	70	0.40	600
DMPH1608F4R7□	4.7	1	50	0.50	500
DMPH1608F6R8□	6.8	1	40	0.53	400
DMPH1608F100□	10.0	1	33	0.55	400
DMPH1608F150□	15.0	1	20	0.9	220
DMPH1608F220□	22.0	1	15	1.0	200
DMPH1608C1R0□	1.0	1	125	0.30	600
DMPH1608C1R5□	1.5	1	109	0.35	550
DMPH1608C2R2□	2.2	1	90	0.45	500
DMPH1608C3R3□	3.3	1	70	0.65	400
DMPH1608C4R7□	4.7	1	50	1.0	300



SPECIFICATION

DMPH 2012 (0805) Series

Part No.	L (uH) ± 20%	LTest Freq. (MHz)	SRF(MHz) /min	RDC(Ω) ± 30%	Ir(mA)/max
DMPH2012F1R0□	1.0	1	75	0.15	1400
DMPH2012F1R5□	1.5	1	60	0.16	1300
DMPH2012F2R2□	2.2	1	50	0.2	1200
DMPH2012F3R3□	3.3	1	41	0.22	1100
DMPH2012F4R7□	4.7	1	35	0.25	1000
DMPH2012F6R8□	6.8	1	29	0.27	550
DMPH2012F100□	10.0	1	24	0.32	500
DMPH2012F150□	15.0	1	19	0.5	400
DMPH2012F220□	22.0	1	18	0.7	300
DMPH2012C1R0□	1.0	1	75	0.18	1000
DMPH2012C1R5□	1.5	1	60	0.19	900
DMPH2012C2R2□	2.2	1	50	0.22	800
DMPH2012C3R3□	3.3	1	41	0.25	600
DMPH2012C4R7□	4.7	1	35	0.35	500
DMPH2012U1R0□	1.0	1	60	0.2	1400
DMPH2012U1R5□	1.5	1	50	0.25	1300
DMPH2012U2R2□	2.2	1	40	0.3	1200
DMPH2012U3R3□	3.3	1	30	0.4	1100
DMPH2012U4R7□	4.7	1	20	0.5	1000

SPECIFICATION

DMPH 2016 (0806) Series

Part No.	L (uH) ± 20%	LTest Freq. (MHz)	SRF(MHz) /min	RDC(Ω) ± 30%	Ir(mA)/max
DMPH2016F1R0□	1.0	1	60	0.11	1400
DMPH2016F1R5□	1.5	1	50	0.15	1200
DMPH2016F2R2□	2.2	1	40	0.20	1200
DMPH2016F3R3□	3.3	1	30	0.30	1200
DMPH2016F4R7□	4.7	1	20	0.35	1100
DMPH2016C1R0□	1.0	1	60	0.10	1200
DMPH2016C1R5□	1.5	1	50	0.13	1000
DMPH2016C2R2□	2.2	1	40	0.15	900
DMPH2016C3R3□	3.3	1	30	0.20	800
DMPH2016C4R7□	4.7	1	20	0.30	700
DMPH2016U1R0□	1.0	1	55	0.18	1400
DMPH2016U1R5□	1.5	1	45	0.23	1200
DMPH2016U2R2□	2.2	1	35	0.28	1200
DMPH2016U3R3□	3.3	1	25	0.35	1200
DMPH2016U4R7□	4.7	1	15	0.45	1100

DMPH 2520 (1008) Series

Part No.	L (uH) ± 20%	LTest Freq. (MHz)	SRF(MHz) /min	RDC(Ω) ± 30%	Ir(mA)/max
DMPH2520F1R0 □	1.0	1	60	0.15	1600
DMPH2520F1R5 □	1.5	1	50	0.18	1500
DMPH2520F2R2 □	2.2	1	40	0.25	1300
DMPH2520F3R3 □	3.3	1	30	0.30	1200
DMPH2520F4R7 □	4.7	1	20	0.32	1100
DMPH2520C1R0 □	1.0	1	60	0.11	1100
DMPH2520C1R5 □	1.5	1	50	0.13	1000
DMPH2520C2R2 □	2.2	1	40	0.15	950
DMPH2520C3R3 □	3.3	1	30	0.18	900
DMPH2520C4R7 □	4.7	1	20	0.25	850
DMPH2520U1R0 □	1.0	1	50	0.18	1700
DMPH2520U1R5 □	1.5	1	40	0.20	1600
DMPH2520U2R2 □	2.2	1	30	0.23	1500
DMPH2520U3R3 □	3.3	1	25	0.30	1300
DMPH2520U4R7 □	4.7	1	15	0.35	1200

SPECIFICATION

DMPH 3216 (1206) Series

Part No.	L (uH) ±20%	LTest Freq. (MHz)	SRF(MHz) /min	RDC(Ω) ±30%	Ir(mA)/max
DMPH3216F1R0□	1.0	1	90	0.10	1600
DMPH3216F1R5□	1.5	1	75	0.12	1500
DMPH3216F2R2□	2.2	1	58	0.15	1300
DMPH3216F3R3□	3.3	1	49	0.20	1200
DMPH3216F4R7□	4.7	1	41	0.32	980
DMPH3216F4R8□	6.8	1	34	0.41	830
DMPH3216F100 □	10.0	1	28	0.50	670
DMPH3216C1R0□	1.0	1	90	0.12	1400
DMPH3216C1R5□	1.5	1	75	0.15	1300
DMPH3216C2R2□	2.2	1	58	0.20	1200
DMPH3216C3R3□	3.3	1	49	0.25	1100
DMPH3216C4R7□	4.7	1	41	0.45	850

DMPH 3225 (1210) Series

Part No.	L (uH) ±20%	LTest Freq. (MHz)	SRF(MHz) /min	RDC(Ω) ±30%	Ir(mA)/max
DMPH3225F1R0□	1.0	1	90	0.08	1800
DMPH3225F1R5□	1.5	1	80	0.10	1600
DMPH3225F2R2□	2.2	1	58	0.15	1400
DMPH3225F3R3□	3.3	1	49	0.18	1300
DMPH3225F4R7□	4.7	1	41	0.22	1000
DMPH3225F6R8□	6.8	1	34	0.30	850
DMPH3225F100□	10.0	1	28	0.42	700
DMPH3225C1R0□	1.0	1	90	0.10	1600
DMPH3225C1R5□	1.5	1	80	0.12	1400
DMPH3225C2R2□	2.2	1	58	0.18	1300
DMPH3225C3R3□	3.3	1	49	0.21	1200
DMPH3225C4R7□	4.7	1	41	0.30	900

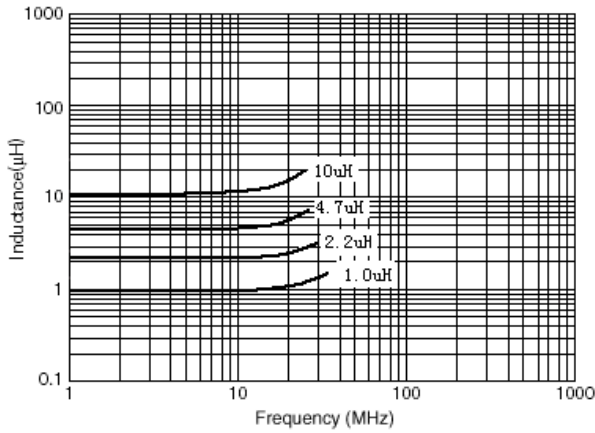
备注：额定电流 Rated Current

基于产品表面温度上升的标准值：产品表面温度达到+40℃时的电流值；Rated current based on increasing product temperature: Current when temperature of the product reaches +40℃

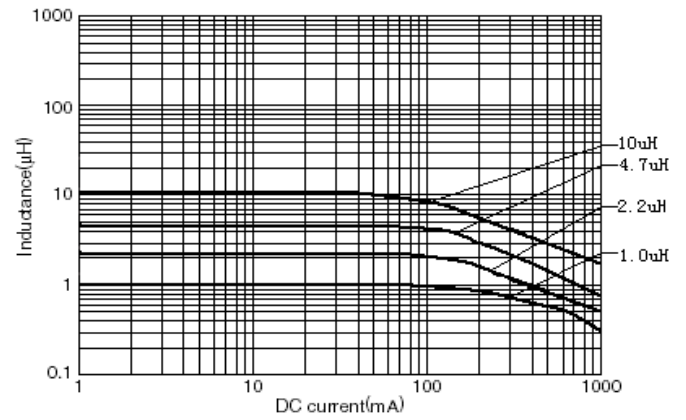
TYPICAL ELECTRICAL CHARACTERISTICS

DMPH 1608F(0603) Series

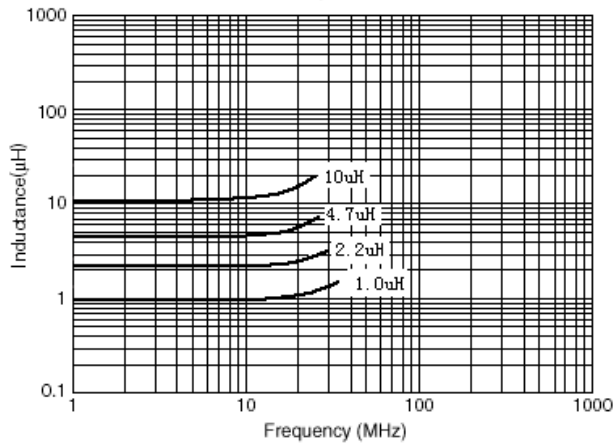
INDUCTANCE vs. FREQUENCY CHARACTERISTICS



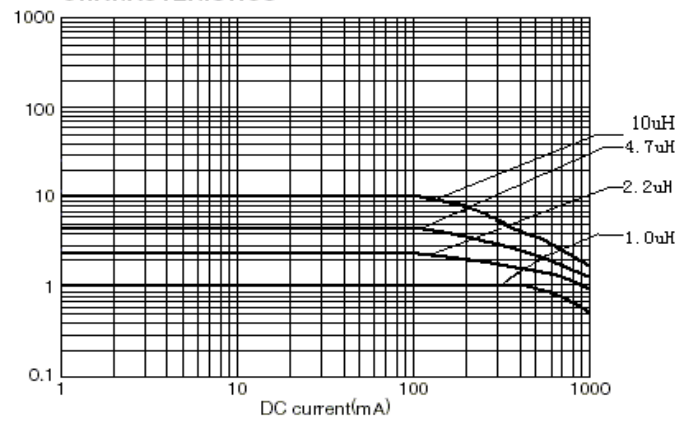
INDUCTANCE vs. DC SUPERPOSITION CHARACTERISTICS



INDUCTANCE vs. FREQUENCY CHARACTERISTICS

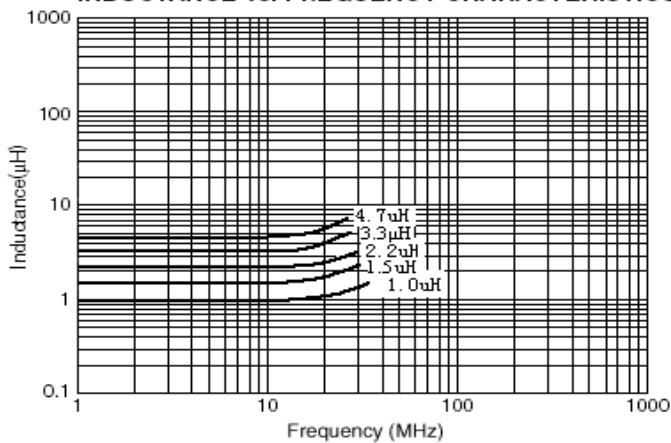


INDUCTANCE CHANGE vs. DC SUPERPOSITION CHARACTERISTICS

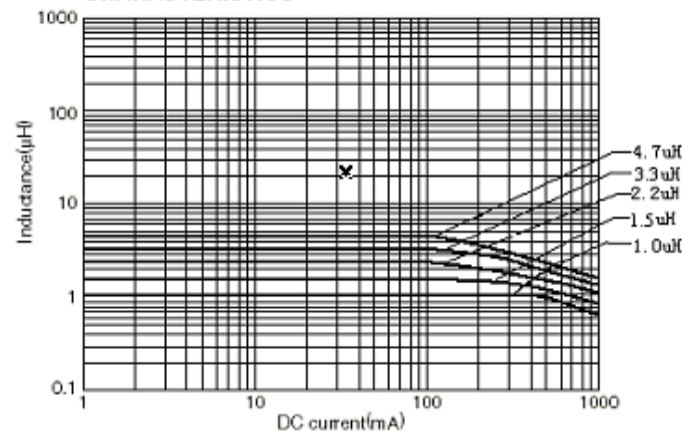


DMPH2012U (0805) Series

INDUCTANCE vs. FREQUENCY CHARACTERISTICS



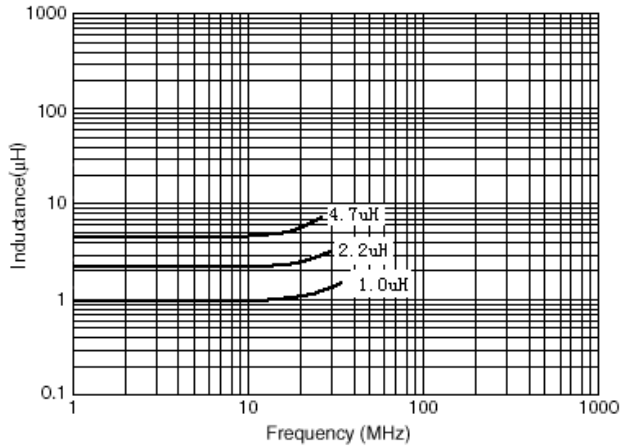
INDUCTANCE CHANGE vs. DC SUPERPOSITION CHARACTERISTICS



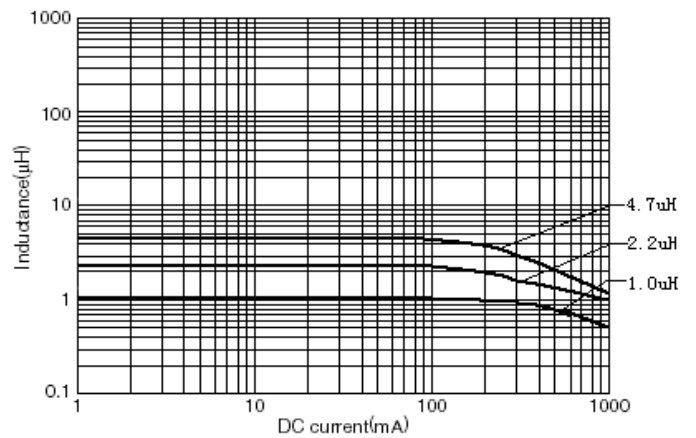
TYPICAL ELECTRICAL CHARACTERISTICS

DMPH 2016F(0806) Series

INDUCTANCE vs. FREQUENCY CHARACTERISTICS

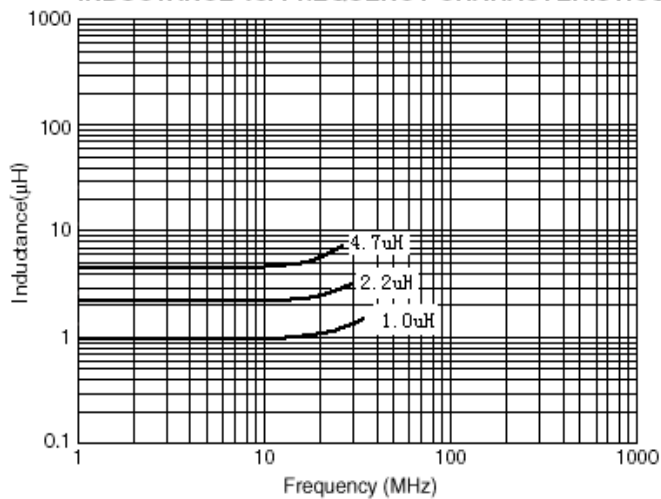


INDUCTANCE vs. DC SUPERPOSITION CHARACTERISTICS

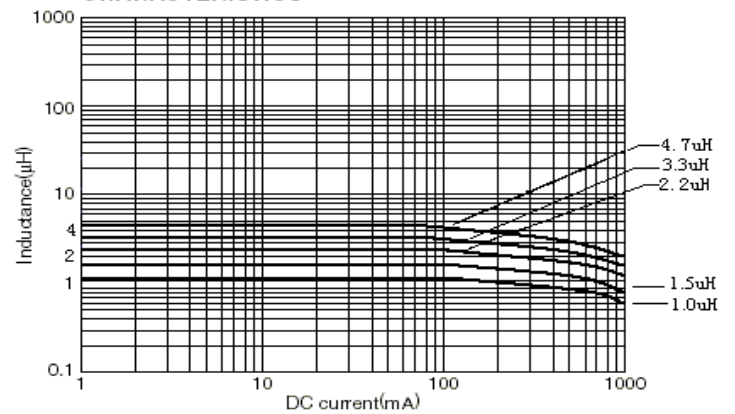


DMPH2016U(0806) Series

INDUCTANCE vs. FREQUENCY CHARACTERISTICS

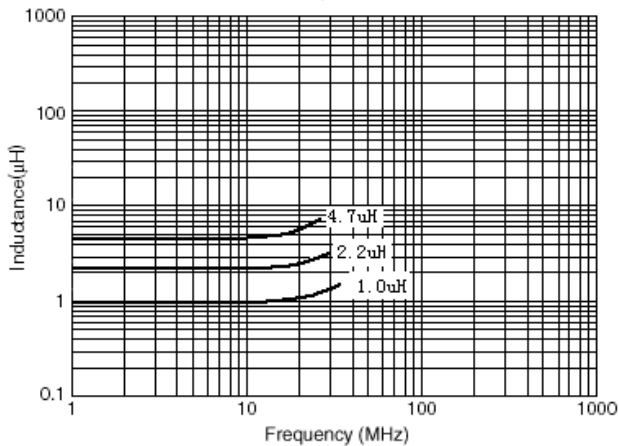


INDUCTANCE CHANGE vs. DC SUPERPOSITION CHARACTERISTICS

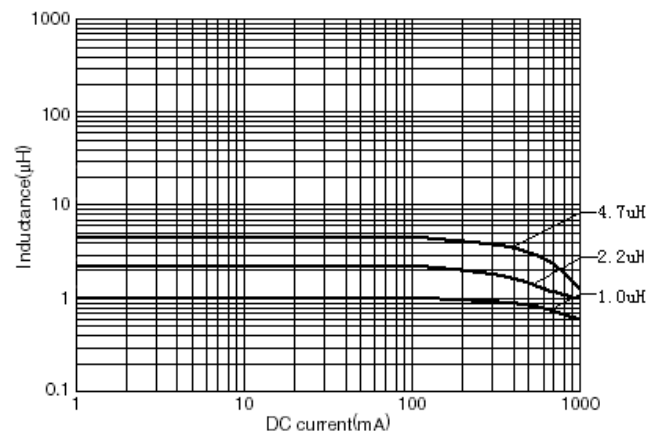


DMPH 2520F(1008) Series

INDUCTANCE vs. FREQUENCY CHARACTERISTICS

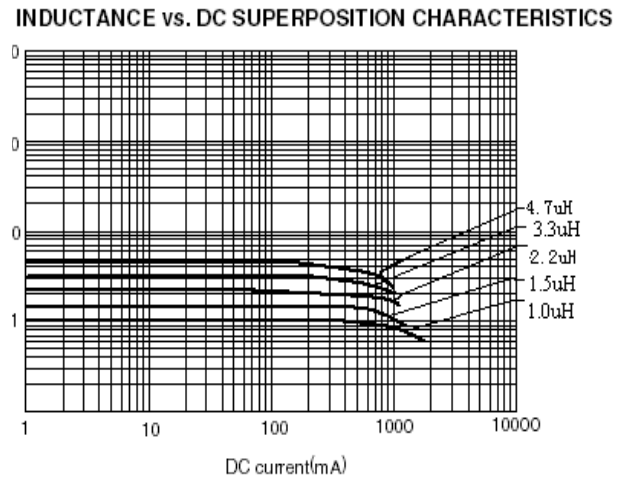
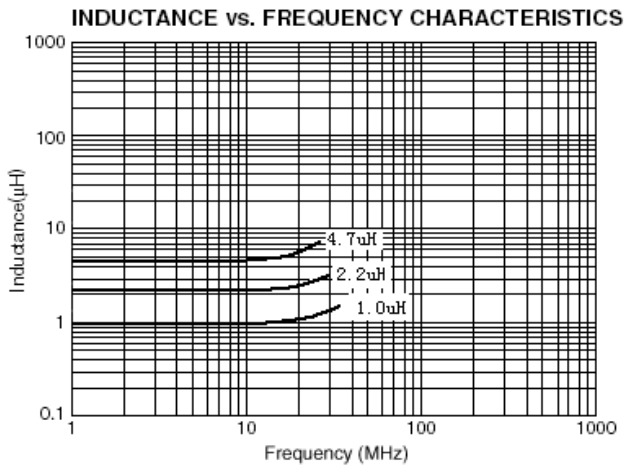


INDUCTANCE vs. DC SUPERPOSITION CHARACTERISTICS

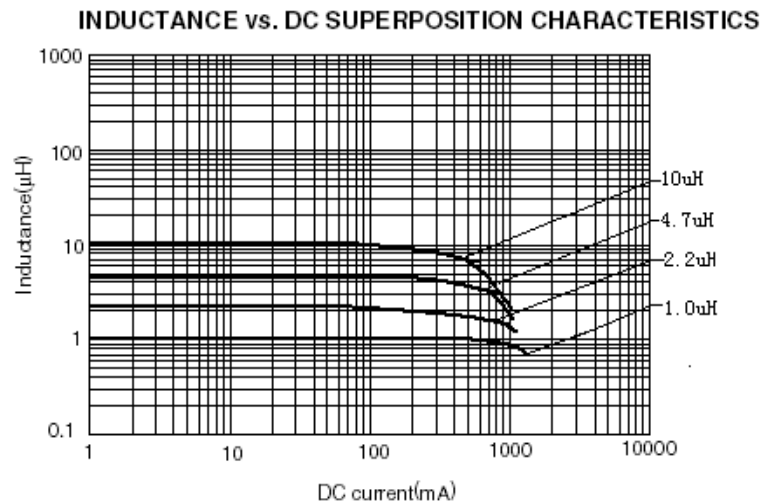
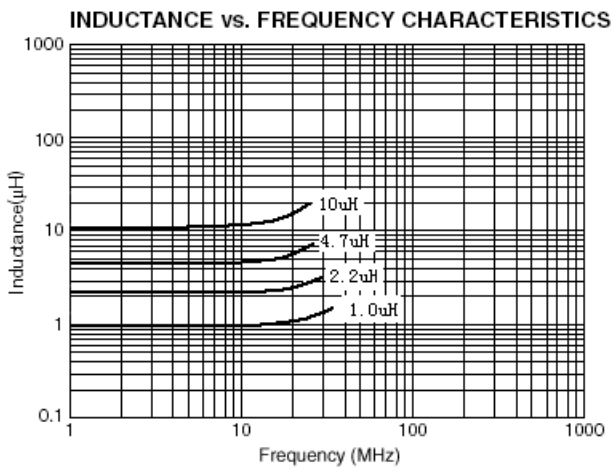


TYPICAL ELECTRICAL CHARACTERISTICS

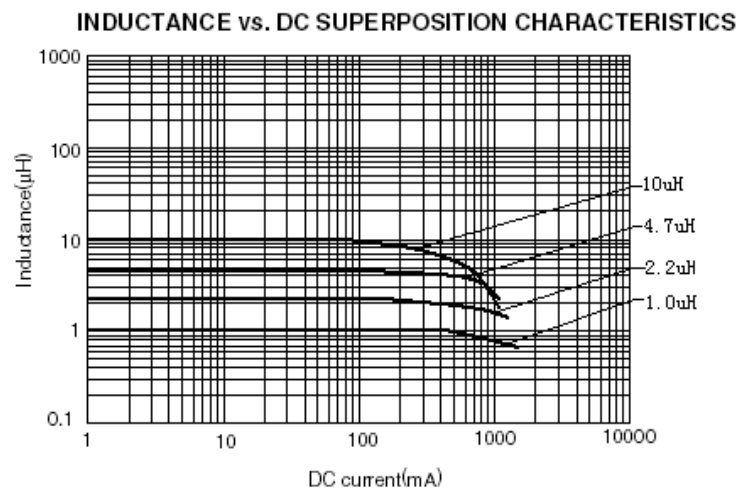
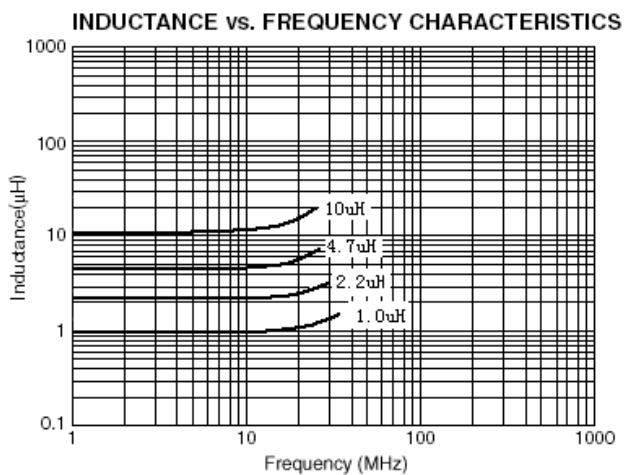
DMPH2520U (1008) Series

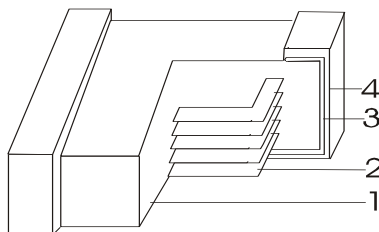


DMPH 3216F(1206) Series



DMPH 3225F(1210) Series





	构成 Composition	材料 Material	供应商 Supplier
1	基本材料 Base Material	铁氧体(Ni-Cu-Zn 系列) Ferrite (Ni-Cu-Zn series)	日本 Japan
2	内导体 Internal Conductor	银 Ag	日本 Japan
3	端电极 Terminal Electrode	银 Ag	日本 Japan
4	端电极 Terminal Electrode	镍-锡 Ni-Sn	美国 USA

测试条件 Testing Conditions

除非另有规定，否则在以下条件下测试 <Unless otherwise specified>

温度 Temperature : Ordinary Temperature (5 to 35℃)

湿度 Humidity : Ordinary Humidity (25 to 85% RH)

当对测量结果有疑问时<In case of doubt>

温度 Temperature : 20±2℃

湿度 Humidity : 60 to 75% RH

大气压强 Atmospheric Pressure : 86 to 106 kPa



电气特性 Electrical Performance

电感量;Inductance;

按表 1 所列条件测量时，电感量应符合条款 5。

Inductance; shall meet item 5 when measured on the condition of Table 1.

Table 1

测量设备 Measuring Equipment	阻抗分析仪 HP4291 或其他 Impedance analyzer HP4291 or equivalent
测量频率 Measuring Frequency	见条款 5 (see item 5)
测量信号 Measuring signal level	50mV

直流电阻 DC Resistance

按表 2 所列条件测量时，直流电阻应符合条款 5。

D.C Resistance shall meet item 5 when measured on the condition of Table 2.

Table 2

测量设备 Measuring Equipment	LCR 测量表 HP4263A 或其他 LCR Meter HP4263A or equivalent
-----------------------------	--

额定电流 Rated current

IR*1.基于电感变化的标准值:因直流重叠的特性而使电感值比初始值下降 30%的电流值。

Rated current based on inductance variation: Current when inductance decreases by 30% of the initial value due to direct current superimposed characteristics.

IR*2.基于产品温度上升的标准值:产品温度上升达到+40℃时的电流值。

Rated current based on increasing product temperature: Current when temperature of the product reaches +40℃

Table 4

测量设备 Measuring Equipment	直流电源 Chroma1302 和适配器 Chroma3302 DC power Chroma 1302 and Adapter Chroma 3302
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焊接变化率 Variance after Soldering

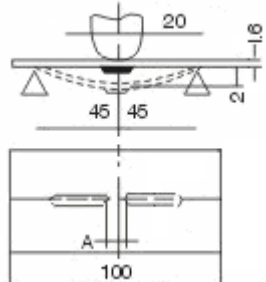
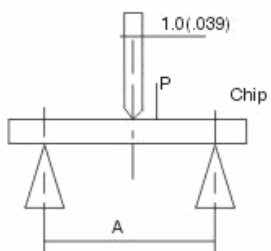
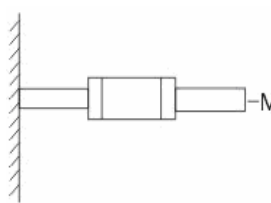
当经过焊接条件（255℃ 浸锡 3.5 秒）后，电感量变化率：0.001μH ~ 10μH：±10%；
10μH ~ 220μH：±20%。

Inductance change shall be within 0.001μH ~ 10μH：±10%; 10μH ~ 220μH：±20% and when the inductor is dipped into solder for 3.5 seconds which is 255℃.

Table 5

测量设备 Measuring Equipment	阻抗分析仪 HP4291 或其他；焊接炉 Impedance analyzer HP4291 or equivalent Solder furnace
-----------------------------	---

信赖性试验 Reliable Performance

NO.	Item 项目	Specifications 规范	Test Methods 测试方法						
1	Solder-Ability 可焊性	More than 90% of termination should be covered with new solder. 端电极焊锡覆盖率为 90%以上	Solder 焊锡: Sn 纯锡 Temperature 焊锡温度: 255℃+5℃/-0℃ Flux 助焊剂: rosin 松香 Duration 浸渍时间: 3.5±0.5s						
2	Leaching Resistance 耐焊性	More than 75% of termination Should be covered with new solder. 端电极焊锡覆盖率为 75%以上	Solder 焊锡: Sn 纯锡 Temperature 焊锡温度: 270℃+2℃/-0℃ Flux 助焊剂: rosin 松香 Duration 浸渍时间: 10±0.5s						
3	Bending Strength 弯曲试验	No mechanical damage should be noticed 不应见机械损伤	When the board curve to 2mm (0.079 inch) 当板弯曲挠度达 2mm 时: <table><tr><th>Size</th><th>A(mm)</th></tr><tr><td>2012</td><td>1.0</td></tr></table> 	Size	A(mm)	2012	1.0		
Size	A(mm)								
2012	1.0								
4	Body Strength 抗压强度	No mechanical damage should be noticed 不应见机械损伤	Applied specified pull strength in axial direction 在轴向上施加拉力如下: <table><tr><th>Size</th><th>A/mm</th><th>P/N</th></tr><tr><td>2012</td><td>1.4</td><td>9.8</td></tr></table> 	Size	A/mm	P/N	2012	1.4	9.8
Size	A/mm	P/N							
2012	1.4	9.8							
5	Terminal Strength 端头强度	The terminal and body should be no damage 端头和瓷体不应见损伤	Applied specified pull strength in axial 在轴向上施加拉力如下: <table><tr><th>Size</th><th>Pull Strength</th><th>Time (s)</th></tr><tr><td>2012</td><td>10 N</td><td>5±1</td></tr></table> 	Size	Pull Strength	Time (s)	2012	10 N	5±1
Size	Pull Strength	Time (s)							
2012	10 N	5±1							

NO.	Item 项目	Specifications 规范	Test Methods 测试方法
6	Drop 跌落	1.No mechanical damage shall be noticed 外观无可见机械损伤 2. Inductance shall be within 电感量变化率: 1μH ~ 4.7μH: ±5%	Drop 10 times on a concrete floor from a height of 1m. 从距混凝土地面 1m 高度自由落下, 重复 10 次
7	Vibration 振动		Frequency 频率: 10 to 55Hz Amplitude 振幅: 1.52mm Direction and time 方向及时间: X, Y and Z directions for 2 hours each.
8	Humidity resistance 耐潮湿		a. Test condition 试验条件 Temp. 温度: 60±2℃ Humidity 湿度: 90%~95% Test time 试验时间: 1000 h b. Measurement method 测量条件: The component should be stabilized at normal condition for 24 hours before test. 试验后常温常湿环境中放置 (24±2) 小时后测量
9	High temperature resistance 耐高温		a. Test condition 试验条件 Applied rated current 施加额定电流 Temp. 温度: 125±2℃ Test time 试验时间: 1000 h b. Measurement method 测量条件: The component should be stabilized at normal condition for 24 hours before test. 试验后常温常湿环境中放置 (24±2) 小时后测量
10	Low temperature resistance 耐低温		a. Test condition 试验条件 Temp. 温度: -55±2℃ Test time 试验时间: 1000 h b. Measurement method 测量条件: The component should be stabilized at normal condition for 24 hours before test. 试验后常温常湿环境中放置 (24±2) 小时后测量
11	Thermal shock 热冲击		a. Test condition 试验条件 1) Temp. 温度: -55℃, time 时间: 30±3min 2) Temp. 温度: +125℃, time 时间: 30±3min 100 cycles b. Measurement method 测量条件: The component should be stabilized at normal condition for 24 hours before test. 试验后常温常湿环境中放置 (24±2) 小时后测量

8 焊接条件 Recommended Soldering Conditions

产品可用于波峰焊和回流焊

Product can be applied to flow and reflow soldering.

(1) 焊剂 Flux, Solder

- ① 使用松香助焊剂，禁止使用卤化物含量超过 0.2wt% 的强酸性助焊剂。

Use rosin-based flux. Don't use highly acidic flux with halide content exceeding 0.2wt% (chlorine conversion value).

- ② 使用纯锡焊料

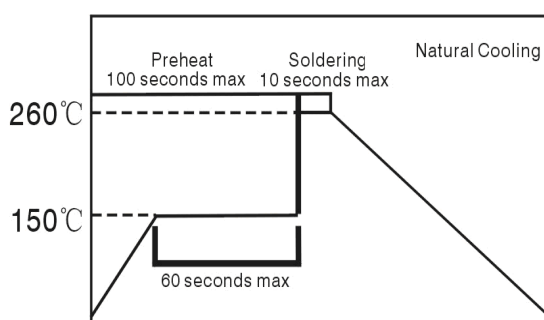
Use Sn solder.

(2) 波峰焊条件 Flow soldering conditions

- ① 预热时，产品表温与焊料温度的温差最大不允许超出 150℃，焊接完后冷却时，产品表温与溶剂温度之间的温差最大不允许超出 100℃。预热不足有可能引发产品表面裂纹，导致产品品质下降。

Pre-heating should be in such a way that the temperature difference between solder and product surface is limited to 150℃ max. Cooling into solvent after soldering also should be in such a way that temperature difference is limited to 100℃ max. Unwrought pre-heating may cause cracks on the product, resulting in the deterioration of products quality.

- ② 标准波峰焊曲线 Standard soldering profile.



预热 Pre-heating	150℃, 1 minute min
最高温度 Peak	260℃, 10 seconds max

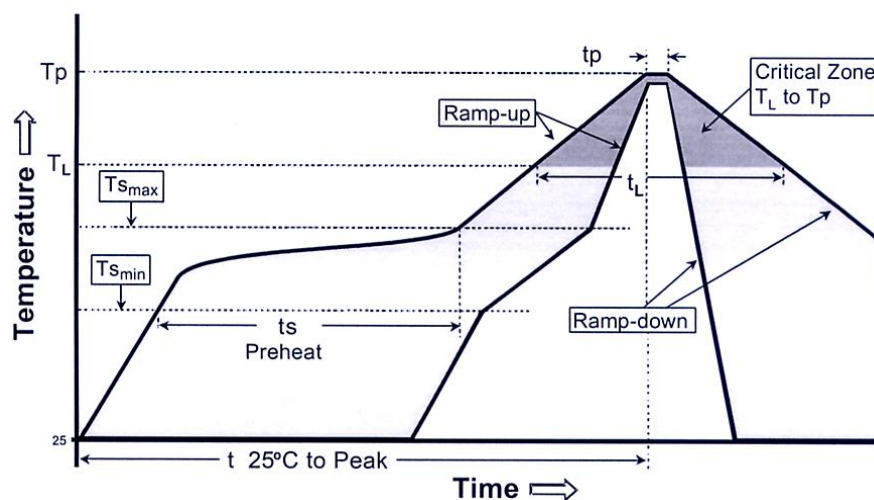
(3) 回流焊条件 Reflow soldering conditions

Profile Feature	Lead-Free Assembly
Average Ramp-Up Rate (T _{smax} to T _p)	3℃ /second max.
Preheat - Temperature Min (T_{smin}) - Temperature Max (T_{smax}) - Time (t_{smin} to t_{smax}) min to t_{smax})	150 °C 200 °C 60-180 seconds

Profile Feature	Lead-Free Assembly
Time maintained above: – Temperature (TL) – Time (tL)	217 °C 60-150 seconds
Peak/Classification Temperature (Tp) Peak/Classification Time (Tp)	260 °C 3-4 seconds
Time within 5 °C of actual Peak Temperature (tp)	20-40 seconds
Ramp-Down Rate	6°C/second max.
Time 25 °C to Peak Temperature	8 minutes max.

Note 1: All temperatures refer to topside of the package, measured on the package body surface.

标准回流焊曲线 Standard soldering profile



(4) 手工返工 Reworking with soldering iron

当使用电烙铁进行手工焊接时，以下条件必须严格遵守

The following conditions must be strictly followed when using a soldering iron.

预热 Pre-heating	150°C, 1 minute
尖端温度 Tip temperature	350°C max
输出功率 Soldering iron output	80w max
电烙铁头尖端尺寸 End of soldering iron	φ 1mm max
焊接时间 Soldering time	3 seconds max



9 清洗条件 Cleaning Conditions

产品清洗时应遵循以下条件

Products shall be cleaned on the following conditions.

- (1) 清洗温度最高不超过 60℃。(若是氟化物类和酒精类清洁剂, 温度最高不超过 40℃)

Cleaning temperature shall be limited to 60℃ max.(40℃ max for fluoride and alcohol type cleaner.)

- (2) 为了避免印刷线路板及其上所安装器件出现共振现象, 在进行超声波清洗时, 应严格遵循以下条件

Ultrasonic cleaning shall comply with the following conditions with avoiding the resonance phenomenon at the mounted products and P.C.B.

功率 Power : 20W/t max

频率 Frequency: 40 kHz 以下

时间 Time : 5 minutes max

- (3) 清洁剂 Cleaner

- a) 可选类型 Alternative cleaner

异丙基醇 Isopropyl alcohol (IPA) HCFC-225

- b) 含水剂 Aqueous agent

表面活性剂类 Surface Active Agent Type (CLEANTHROUGH 750H)

碳氢化合物类 Hydrocarbon Type (TECHNOCLEANER 335)

高分子醇类 Higher Alcohol Type (PINE ALPHA ST-100S)

碱性皂类 Alkali Saponification Type (*AQUACLEANER 240)

- (4) 清洗后, 产品上不应有助焊剂和清洁剂驻留; 若使用了含水剂, 为了彻底洗去清洁剂, 产品应在去离子水冲洗后完全晾干或烘干。

There shall be no residual flux and residual cleaner after cleaning. In the case of using aqueous agent, products shall be dried completely after rinse with de-ionized water in order to remove the cleaner.

- (5) 其他清洁方式 Other cleaning

请联系我们 Please contact us.