

SMD POWER INDUCTOR

SPS201610D SERIES

1. PART NO. EXPRESSION :

S P S 2 0 1 6 1 0 D R 2 4 M F
 (a) (b) (c) (d) (e)(f)

(a) Series code

(d) Inductance code : R24 = 0.24 μ H

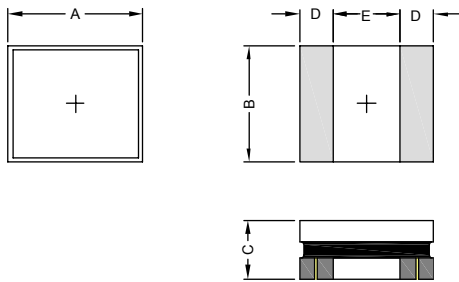
(b) Dimension code

(e) Tolerance code : M=±20%

(c) Material code

(f) F : RoHS Compliant

2. CONFIGURATION & DIMENSIONS :

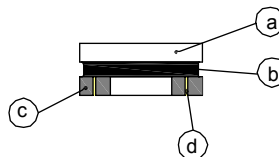


Unit:m/m

A	B	C	D	E
2.0 ^{+0.3} _{-0.1}	1.6 ^{+0.3} _{-0.1}	1.02 Max.	0.60 Ref.	0.80 Ref.

3. MATERIALS :

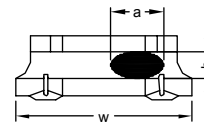
- (a) Core : Ferrite Core
- (b) Coating : Epoxy with magnetic powder
- (c) Termination : Tin Pb Free
- (d) Wire :Enameled Copper Wire



Exposed wire tolerance limit of coating resin part on product side.

Size of exposed wire occurring to coating resin is specified below.

1. Width direction (dimension a) : Acceptable when $a \leq w/2$
 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.



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4. ELECTRICAL CHARACTERISTICS :

Part Number	Inductance (μ H)	Tolerance (%)	Test Frequency (Hz)	DCR (Ω) Typ.	DCR (Ω) Max.	Isat (A) Typ.	Isat (A) Max.	Irms (A) Typ.	Irms (A) Max.
SPS201610DR24MF	0.24	$\pm 20\%$	0.1V/1M	0.035	0.045	5.20	4.40	3.30	2.90
SPS201610DR56MF	0.56	$\pm 20\%$	0.1V/1M	0.050	0.065	3.50	2.80	2.90	2.40
SPS201610DR68MF	0.68	$\pm 20\%$	0.1V/1M	0.055	0.065	3.20	2.60	2.80	2.50
SPS201610D1R0MF	1.0	$\pm 20\%$	0.1V/1M	0.090	0.108	2.80	2.50	2.30	2.00
SPS201610D2R2MF	2.2	$\pm 20\%$	0.1V/1M	0.150	0.180	1.60	1.45	1.60	1.45

5. GENERAL SPECIFICATION :

- (a) ambient temp. : 25°C
- (b) Isat : Based on inductance change ($\Delta L/L0$: $\leq -30\%$)
- (c) Irms : Based on temperature rise (ΔT : 40°C)
- (d) Operating Temperature : -40~+85°C (For products in unopened tape package, less than 40°C)



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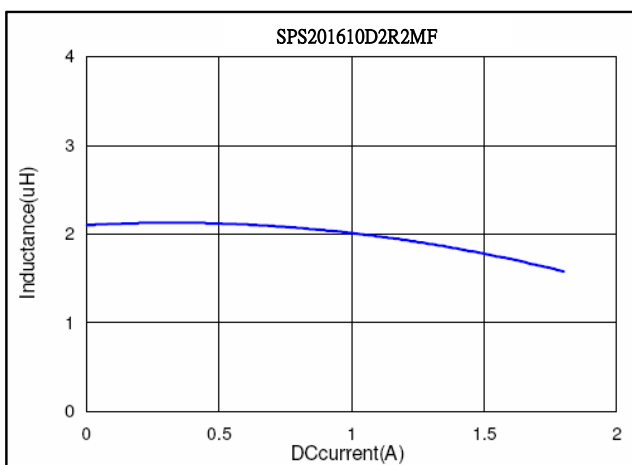
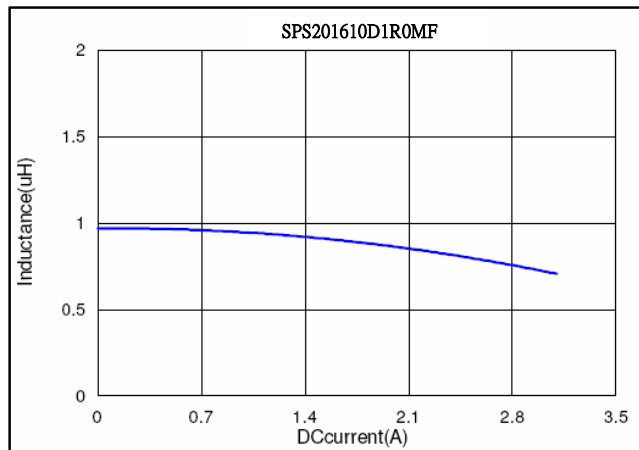
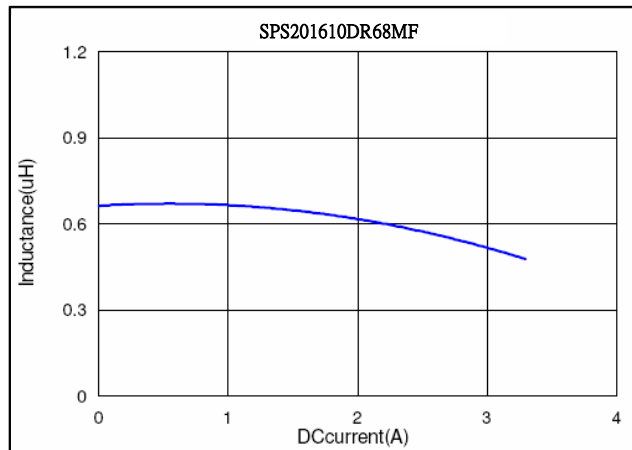
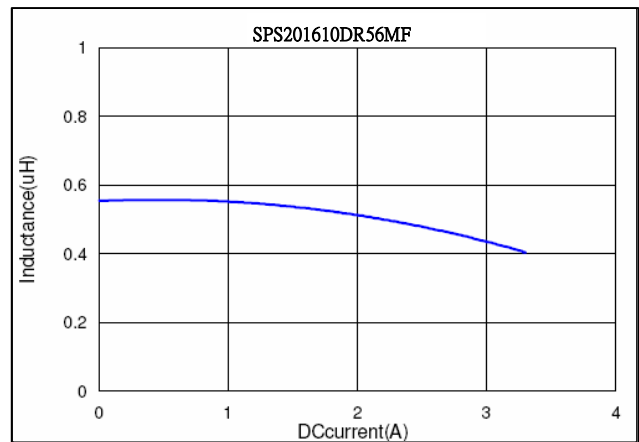
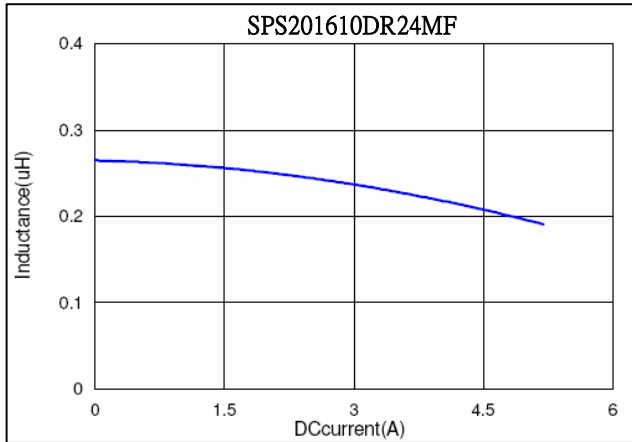
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6. CHARACTERISTIC CURVES :



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7. RELIABILITY & TEST CONDITION :

ITEM	PERFORMANCE	TEST CONDITION
Electrical Characteristics Test		
Inductance L	Refer to standard electrical characteristics list	Agilent-4291, Agilent-4287
Q		Agilent-4192, Agilent-4285
SRF		Agilent-4291
DC Resistance		Agilent-4338
Rated Current	Base on temp. rise & $\Delta L/L0 \leq 30\%$.	Saturation DC Current (Isat) will cause L0 to drop approximately $\Delta L(\%)$.
Temperature Rise Test	$\Delta T 40^{\circ}\text{C}_{\text{Max}}$	Heat Rated Current (Irms) will cause the coil temperature rise approximately $\Delta T(^{\circ}\text{C})$ without core loss. 1. Applied the allowed DC current. 2. Temperature measured by digital surface thermometer
Mechanical Performance Test		
Resistance to Soldering Heat	Appearance : No damage. Inductance : within $\pm 10\%$ of initial value Q : Shall not exceed the specification value. RDC : Shall not exceed the specification value.	Preheat: $150^{\circ}\text{C}, 60\text{sec}$. Solder: Sn99.5%-Cu0.5% Solder temperature: $260 \pm 5^{\circ}\text{C}$ Flux for lead free: Rosin. 9.5% Depth: completely cover the termination. Dip time: $10 \pm 1\text{sec}$. Temp.: $260 \pm 5^{\circ}\text{C}$
Solderability Test	More than 95% of the terminal electrode should be covered with solder.	Preheat : $150^{\circ}\text{C}, 60\text{sec}$. Solder : Sn99.5%-Cu0.5% Solder Temperature : $245 \pm 5^{\circ}\text{C}$ Flux for lead free: Rosin.9.5% Dip Time : $4 \pm 1\text{sec}$. Depth: completely cover the termination
Terminal Strength	Appearance : No damage. Inductance : within $\pm 10\%$ of initial value Q : Shall not exceed the specification value. RDC : Shall not exceed the specification value.	Component mounted on a PCB apply a forc ($>0805:1\text{kg} \leq 0805:0.5\text{kg}$) 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 shock the component being tested.
Bending	Appearance : No damage. Inductance : within $\pm 10\%$ of initial value Q : Shall not exceed the specification value. RDC : Shall not exceed the specification value.	Shall be mounted on a FR4 substrate of the following dimensions: $\geq 0805:40 \times 100 \times 1.2\text{mm}$ $< 0805:40 \times 100 \times 0.8\text{mm}$ Bending depth: $\geq 0805:1.2\text{mm}$ $< 0805:0.8\text{mm}$ Duration of 10 sec for a min.

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7. RELIABILITY & TEST CONDITION :

ITEM	PERFORMANCE	TEST CONDITION															
Vibration Test	Appearance : No damage. Inductance : within±10% of initial value Q : Shall not exceed the specification value. RDC : Shall not exceed the specification value.	Oscillation Frequency: 10~2K~10Hz for 20 minutes Equipment : Vibration checker Total Amplitude:0.15mm±10% Testing Time : 12 hours(20 minutes, 12 cycles each of 3 orientations) °															
Shock	Appearance : No damage. Inductance : within±10% of initial value Q : Shall not exceed the specification value. RDC : Shall not exceed the specification value.	Test condition: <table border="1"> <thead> <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> </thead> <tbody> <tr> <td>SMD</td> <td>1.500</td> <td>0.5</td> <td>Half-sine</td> <td>15.4</td> </tr> <tr> <td>Lead</td> <td>100</td> <td>6</td> <td>Half-sine</td> <td>12.3</td> </tr> </tbody> </table>	Type	Peak Value (g's)	Normal duration (D)(ms)	Wave form	Velocity change (Vi)ft/sec	SMD	1.500	0.5	Half-sine	15.4	Lead	100	6	Half-sine	12.3
Type	Peak Value (g's)	Normal duration (D)(ms)	Wave form	Velocity change (Vi)ft/sec													
SMD	1.500	0.5	Half-sine	15.4													
Lead	100	6	Half-sine	12.3													
Life test	Appearance : No damage. Inductance : within±10% of initial value Q : Shall not exceed the specification value. RDC : Shall not exceed the specification value.	Temperature : 125±2°C (bead), 85±2°C (inductor) Applied Current : rated current Duration : 1000±12hrs Measured at room temperature after placing for 24±2 hrs.															
Load Humidity	Appearance : No damage. Inductance : within±10% of initial value Q : Shall not exceed the specification value. RDC : Shall not exceed the specification value.	Humidity : 85±2% RH. Temperature : 85±2°C Duration: 1000hrs Min. with 100% rated current Measured at room temperature after placing for 24±2 hrs.															
Thermal Shock	Appearance : No damage. Inductance : within±10% of initial value Q : Shall not exceed the specification value. RDC : Shall not exceed the specification value.	Condition for 1 cycle Step1 : -40±2°C 30±5 min. Step2 : +25±2°C ≤0.5min Step3: +105±2°C 30±5min Number of cycles : 500 Measured at room temperature after placing for 24±2 hrs.															
Moisture Resitance	Appearance : No damage. Inductance : within±10% of initial value Q : Shall not exceed the specification value. RDC : Shall not exceed the specification value.	Chip Inductor Only Condition for 1 cycle Step1 : -40±2°C 30±5 min. Step2 : +25±2°C ≤0.5min Step3: +105±2°C 30±5min Number of cycles : 500 Measured at room temperature after placing for 24±2 hrs.															
Insulation Resistance	IR>1GΩ	Chip Inductor Only Test Voltage:100±10%V for 30Sec.															



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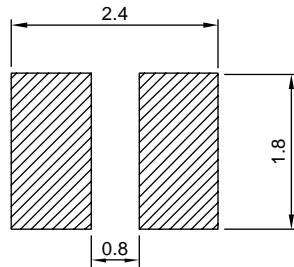
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8. SOLDERING AND MOUNTING :

8-1. Recommended PC Board Pattern



9-2. Soldering

Mildly activated rosin fluxes are preferred. The minimum amount of solder can lead to damage from the stresses caused by the difference in coefficients of expansion between solder, chip and substrate. The 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.

9-2.1 Lead Free Solder Re-flow :

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

9-2.2 Soldering Iron (Figure 2) :

Products attachment with 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.

Note :

- a) Preheat circuit and products to 150°C.
- b) 355°C tip temperature (max)
- c) Never contact the ceramic with the iron tip
- d) 1.0mm tip diameter (max)
- e) Use a 20 watt soldering iron with tip diameter of 1.0mm
- f) Limit soldering time to 4-5 secs.

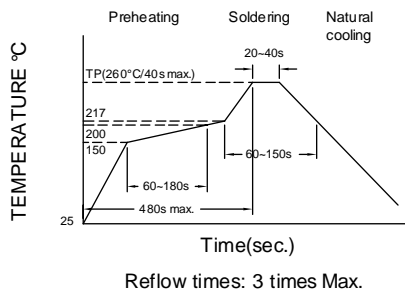


Fig.1

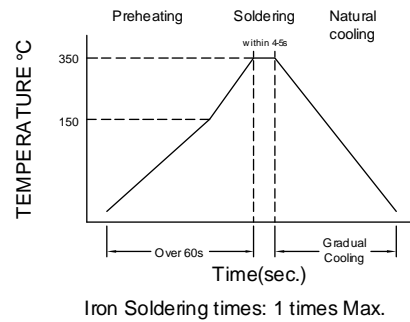


Fig.2



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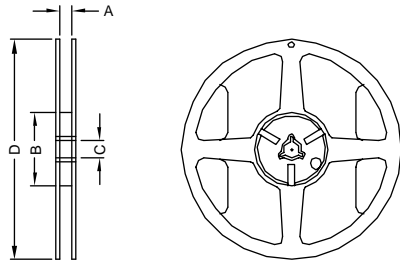
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9. PACKAGING INFORMATION :

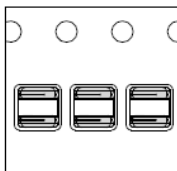
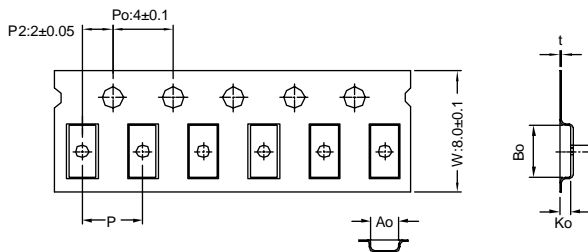
9-1. Reel Dimension



7" x 8mm

Type	A(mm)	B(mm)	C(mm)	D(mm)
7" x 8mm	8.4±1.0	50 Min.	13±0.8	178±2

9-2 Tape Dimension / 8mm



Bottom View

Series	Ao(mm)	Bo(mm)	Ko(mm)	P(mm)	t(mm)
SPS201610	2.45±0.1	3.10±0.1	1.40±0.1	4.0±0.1	0.23±0.05

9-3 Packaging Quantity

Series	SPS201610
Chip / Reel	2000



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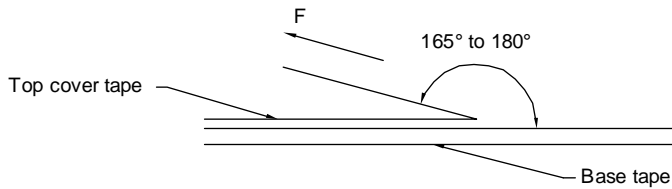
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9-4. Tearing Off Force



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

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

Application Notice

1. Storage Conditions :

To maintain the solderability of terminal electrodes :

- Temperature and humidity conditions : Less than 40°C and 60% RH.
- Recommended products should be used within 6 months from the time of delivery.
- The packaging material should be kept where no chlorine or sulfur exists in the air.

2. Transportation :

- Products should be handled with care to avoid damage or contamination from perspiration and skin oils.
- The use of tweezers or vacuum pick up is strongly recommended for individual components.
- Bulk handling should ensure that abrasion and mechanical shock are minimized.



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