SPECIFICATIONS

Customer	
Product Name	**Wire Wound SMD Power Inductor**
A-PLUS Part Number	**SWPA6045S Series**
Customer Part Number	

[☒New Released, ☐Revised] **SPEC No.:SWPA05130000**

【This SPEC is total 12 pages.】

【ROHS Compliant Parts】

Approved By	Checked By	Issued By

A-PLUS POWER TECHNOLOGY CO., LTD.

【For Customer approval Only】 Date:_____

Qualification Status: Full Restricted Rejected

Approved By	Verified By	Re-checked By	Checked By

Comments:

【Version change history】

Rev.	Effective Date	Changed Contents	Change Reasons	Approved By
01	/	New released	/	Yabing Yang

1 Scope

This specification applies to the SWPA6045S Series of wire wound SMD power inductor.

2 Product Description and Identification (Part Number)

1） Description:

SWPA6045S series of Wire wound SMD power inductor.

2） Product Identification (Part Number)

SWPA	6045	S	□□□	□	T	□□□
①	②	③	④	⑤	⑥	⑦

① Type	
SWPA	Wire wound SMD power inductor

② External Dimensions(L×W×H) [mm]	
6045	6.0X6.0X 4.5

③ Feature type	
S	Standard Type

④ Nominal Inductance	
Example	Example
1R0	1.0uH
100	10uH
101	100uH

⑤ Inductance Tolerance	
N	±30%
M	±20%

⑥ Packing	
T	Tape Carrier Package

⑦ Special Process code	
□□□	Special Process code
* Standard product is blank	

3 Electrical Characteristics

Please refer to **Item 12**.

1) Operating and storage temperature range (individual chip without packing): -40℃ ~ +125℃（Including Self-heating）
2) Storage temperature range (packaging conditions): -10℃~+40℃ and RH 70% (Max.)

4 Test and Measurement Procedures

Test Conditions

Unless otherwise specified, the standard atmospheric conditions for measurement/test as:

a. Ambient Temperature: 20±15℃
b. Relative Humidity: 65±20%
c. Air Pressure: 86kPa to 106kPa

If any doubt on the results, measurements/tests should be made within the following limits:

a. Ambient Temperature: 20±2℃
b. Relative Humidity: 65±5%
c. Air Pressure: 86kPa to 106kPa

Visual Examination

Inspection Equipment: Visual.

Electrical Test

Inductance (L)

a. Refer to **Item 12**.Test equipment: WK3260B LCR meter or equivalent.
b. Test Frequency and Voltage: refers to **Item 12.**

Direct Current Resistance (DCR)

a. Refer to **Item 12**.
b. Test equipment: HIOKI 3540 or equivalent.

Saturation Current (Isat)

a. Refer to **Item 12.**
b. Test equipment: WK3260B LCR meter or equivalent.
c. Definition of saturation current (Isat): DC current at which the inductance drops approximate 30% from its value without current.

Temperature rise current (Irms)

a. Refer to **Item 12**.
b. Test equipment (**see Fig. 4.3.4-1, Fig. 4.3.4-2)**: Electric Power, Electric current meter, Thermometer.
c. Measurement method
   1. Set test current to be 0 mA.
   2. Measure initial temperature of choke surface.
   3. Gradually increase current and measure choke temperature for corresponding current.
   4. Definition of Temperature rise current: DC current that causes the temperature rise (△T =40°C) from 20°C ambient

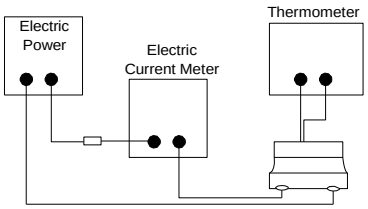


Fig. 4.3.4-1

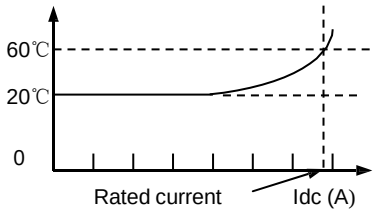


Fig. 4.3.4-2

5 Shape and Dimensions

Dimensions and recommended PCB pattern for reflow soldering, please see **Fig.5-1**, **Fig. 5-2** and **Table 5-1.**

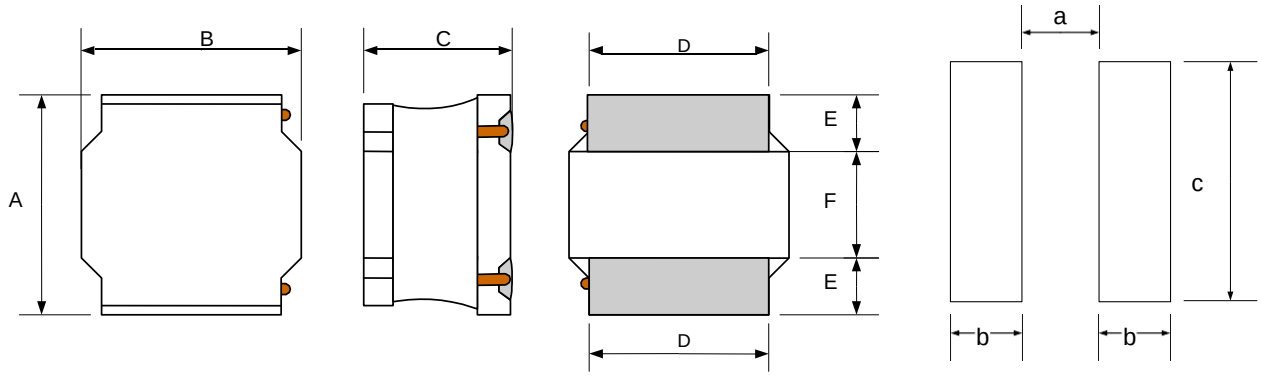


Fig.5-1

[Table 5-1] (Unit: mm)

Series	A	B	C.	D	E	F	a	b.	c.
SWPA6045S	6.0±0.3	6.0±0.3	4.5Max.	4.9±0.3	1.55±0.3	2.9±0.3	2.8Typ.	1.7Typ.	5.7Typ.

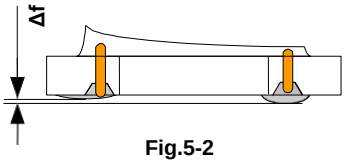


Fig.5-2

Δf: Clearance between terminal and the surface of plate must be 0.2mm max when coil is placed on a flat plate.

6 Structure

The structure of SWPA6045S product, please refer to **Fig.6-1** and **Table 6-1**.

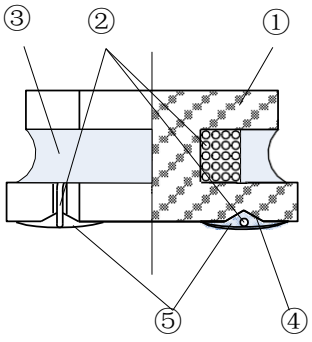


Fig. 6-1

[Table 6-1]

No.	Components	Material
①	Ferrite Core	Ni-Zn Ferrite
②	Wire	Polyurethane system enameled copper wire
③	Magnetic Glue	Epoxy resin and magnetic powder
④	Plating Electrodes	Plating: Ag/Ni/Sn
⑤	Outer Electrodes	Top surface solder coating:Sn96.5%/Ag3.0%/Cu0.5%

7 Product Marking

Please refer to **Fig. 7-1**.

The content of marking please refers to **Item 12**.

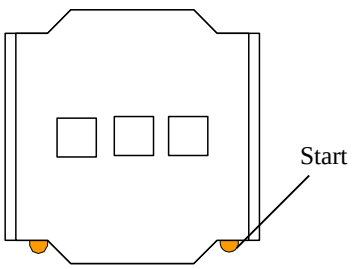
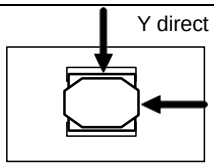
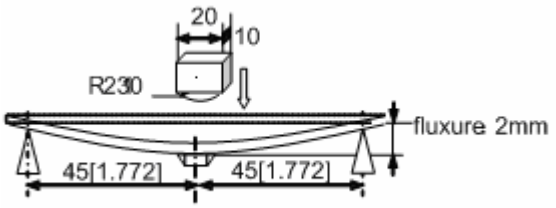
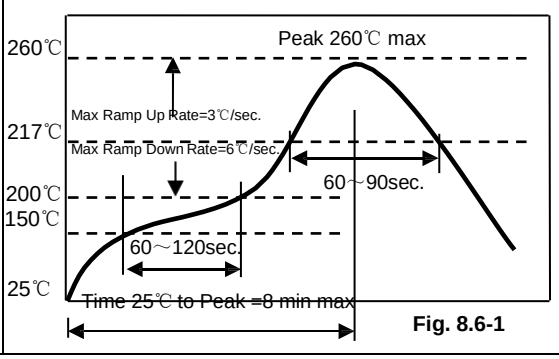
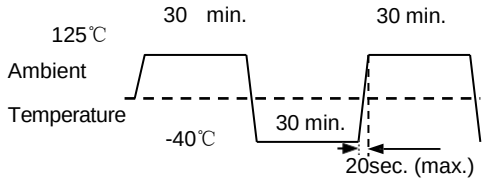


Fig 7-1

8 Reliability Test

Items	Requirements	Test Methods and Remarks
8.1 Terminal Strength	No removal or split of the termination or other defects shall occur.  **Fig.8.1-1**	① Solder the inductor to the testing jig (glass epoxy board shown in **Fig.8.1-1**) using eutectic solder. Then apply a force in the direction of the arrow. ② 10N force. ③ Keep time: 5s
8.2 Resistance to Flexure	No visible mechanical damage.  **Fig.8.2-1**	① Solder the chip to the test jig (glass epoxy board) using eutectic solder. Then apply a force in the direction shown as **Fig.8.2-1**. ② Flexure: 2mm ③ Pressurizing Speed: 0.5mm/sec ④ Keep time: 30±1s ⑤ Test board size: 100X40X1.0 ⑥ Land dimension: Please see **Fig.5-1**
8.3 Vibration	① No visible mechanical damage. ② Inductance change: Within ±10%	① Solder the chip to the testing jig (glass epoxy board shown as the following figure) using eutectic solder. ② The chip shall be subjected to a simple harmonic motion having total amplitude of 1.5mm, the frequency being varied uniformly between the approximate limits of 10 and 55 Hz. ③ The frequency range from 10 to 55 Hz and return to 10 Hz shall be traversed in approximately 1 minute. This motion shall be applied for a period of 2 hours in each 3 mutually perpendicular directions (total of 6 hours).
8.4 Temperature coefficient	Inductance change: Within ±20%	① Temperature: -40℃~+125℃ ② With a reference value of +20℃, change rate shall be calculated
8.5 Solderability	90% or more of electrode area shall be coated by new solder.	① The test samples shall be dipped in flux, and then immersed in molten solder. ② Solder temperature: 245±5℃ ③ Duration: 5±1 sec. ④ Solder: Sn/3.0Ag/0.5Cu ⑤ Flux: 25% resin and 75% ethanol in weight ⑥ Immersion depth: all sides of mounting terminal shall be immersed
8.6 Resistance to Soldering Heat	① No visible mechanical damage. ② Inductance change: Within ±10%	① Re-flowing Profile: Please refer to **Fig. 8.6-1**. ② Test board thickness: 1.0mm ③ Test board material: glass epoxy resin ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring  **Fig. 8.6-1**

8.7 Thermal Shock	① No visible mechanical damage. ② Inductance change: Within ±10%  **Fig.8.7-1**	① Temperature and time: -40±3℃ for 30±3 min→125℃ for 30±3min, please refer to **Fig. 8.7-1**. ② Transforming interval: Max. 20 sec ③ Tested cycle: 100 cycles ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring
8.8 Resistance to Low Temperature	① No visible mechanical damage ② Inductance change: Within ±10%	① Temperature: -40±3℃ ② Duration: $1000^{\pm 24}$ hours ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring
8.9 Resistance to High Temperature	① No mechanical damage. ② Inductance change: Within ±10%	① Temperature:125±2℃ ② Duration: $1000^{\pm 24}$ hours ③ The chip shall be stabilized at normal condition for 1~2 hours before measuring.
8.10 Damp Heat	① No mechanical damage. ② Inductance change: Within ±10%	① Temperature: 60±2℃ ② Humidity: 90% to 95%RH ③ Duration: $1000^{\pm 24}$ hours ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring
8.11 Loading Under Damp Heat	① No mechanical damage. ② Inductance change: Within ±10%	① Temperature: 60±2℃ ② Humidity: 90% to 95% RH ③ Applied current: Rated current ④ Duration:$1000^{\pm 24}$ hours ⑤ The chip shall be stabilized at normal condition for 1~2 hours before measuring
8.12 Loading at High Temperature	① No mechanical damage. ② Inductance change: Within ±10%	① Temperature: 85±2℃ ② Applied current: Rated current ③ Duration: $1000^{\pm 24}$ hours ④ The chip shall be stabilized at normal condition for 1~2 hours before measuring

9 Packaging and Storage

Tape and Reel Packaging Dimensions

Taping Dimensions (Unit: mm)

Please refer to **Fig. 9.1.1** and **Table 9.1.1**

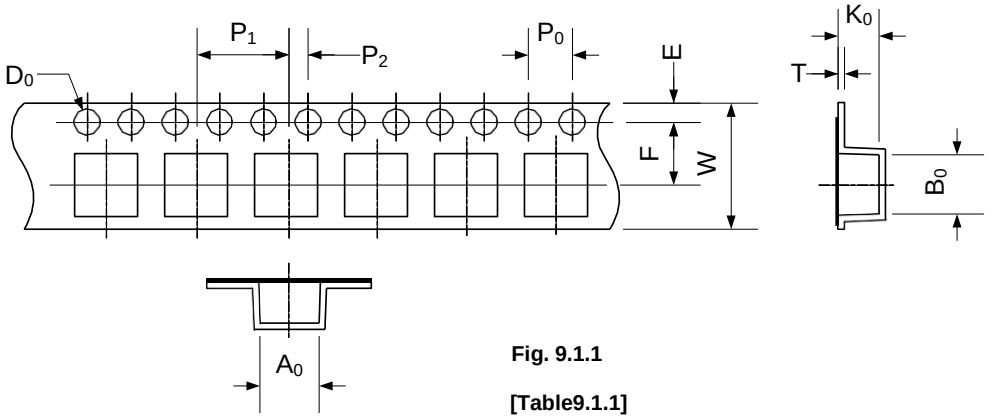


Fig. 9.1.1

[Table9.1.1]

Series	A_0	B_0	W	E	F	P_0	P_1	P_2	D_0	T	K_0
SWPA6045S	6.4±0.1	6.4±0.1	16.0±0.3	1.75±0.1	7.5±0.1	4.0±0.1	8.0±0.1	2.0±0.1	1.5+0.1/-0.0	0.4±0.03	4.7±0.1

Direction of rolling Please refer to **Fig. 9.1.2**.

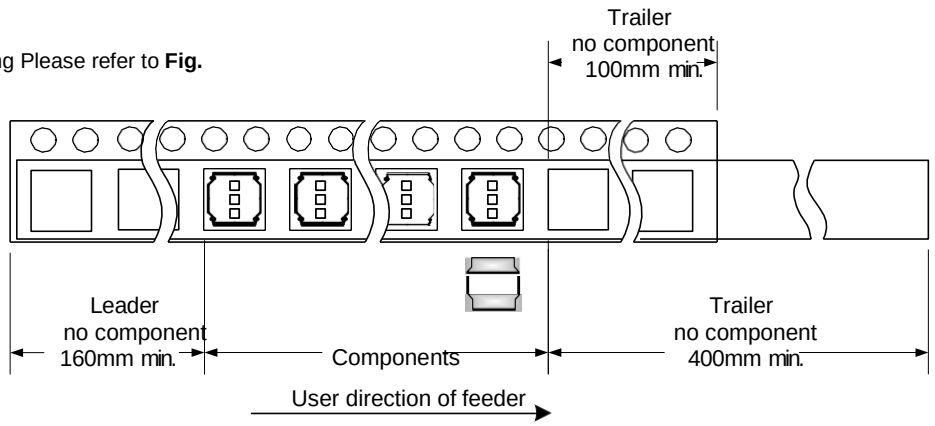


Fig. 9.1.2

Reel Dimensions (Unit: mm)

Please refer to **Fig. 9.1.3**

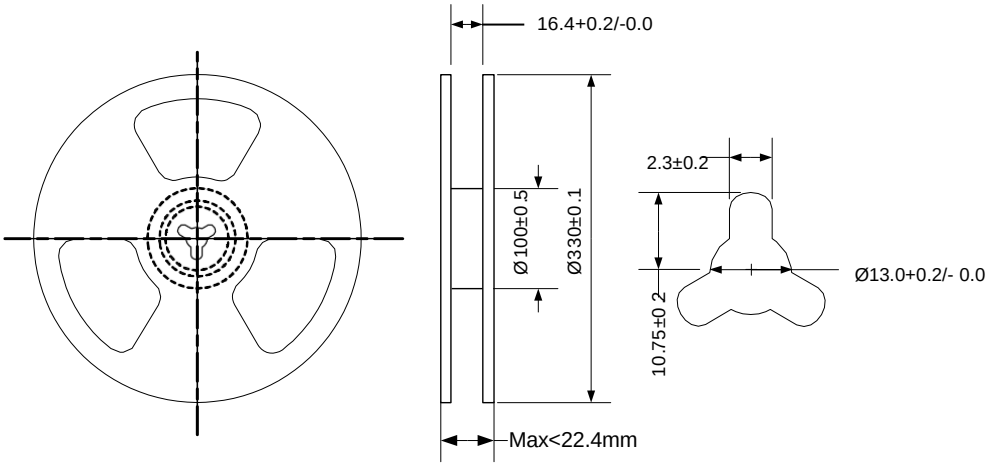


Fig.9.1.3

Top tape strength

Peel-off strength: 10~130gf.

Peel-off angle: 165°~180°, refers to **Fig.9.1.4.**

Peel-off speed: 300mm/min.

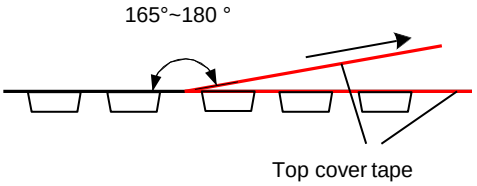


Fig. 9.1.4

The number of components

A tape & reel package contains1500 inductors.

The allowable number of empty chip cavities

Maximum two (2) chip cavities missing product may exist in a reel but they may not be consecutive two cavities.

Packing Documents and Marking

Packing Documents

Packing documents include the following:

1) Packaging list
2) Certificate of compliance (COC)

9.2.2Packing QTY.

1) Inner Box: 1 reel in each box.
2) Outer Box: 2 or 4 inner boxes in each outer case.
3) 2 or 4 reels in each outer case.

9.2.3Marking

1)Marking label information on reels includes (see **Fig.9.2.3-1~2**):

a). P/O No.
b). Customer Part No.
c). A-PLUS Part No.
d). Quantity..
e). Lot No.
f). Date code
g). Inspection stamp
h). MFG address as 'Made In China'.

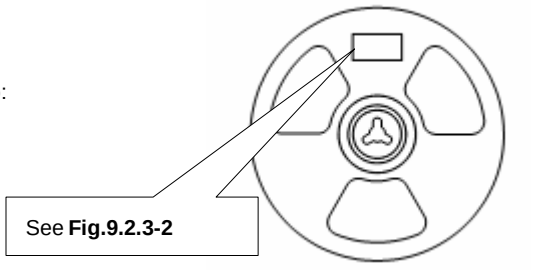


Fig.9.2.3-1

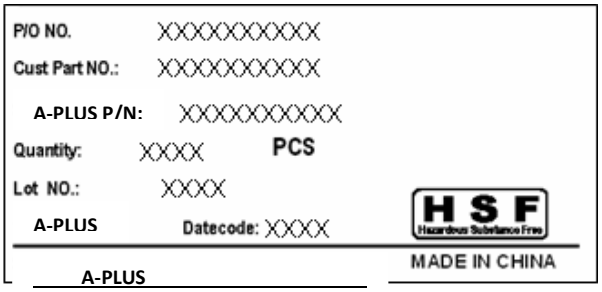


Fig.9.2.3-2

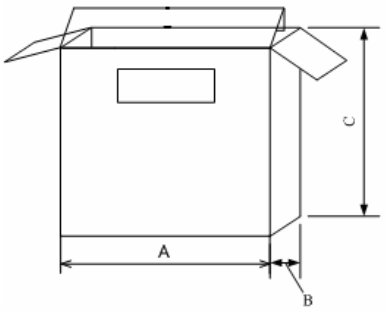


Fig.9.2.3-3

2)Marking label information on inner box

a). Inner box please refers to **Fig.9.2.3-3**and **Table 9.2.3-1.**

b). Marking Label on inner box

N/A.

Packaging type	A(mm)	B(mm)	C(mm)
Inner box	340	30	340

[Table 9.2.3-1]

3)Marking on outer case (see **Fig.9.2.3-4~6**):

Out case size pleases reefers to **Table 9.2.3-2**.

a). Manufacturer: A-PLUS ID:

"A-Plus Power Technology Co., Ltd."

b). Packing label include the following:

i) Customer

ii) Manufacturer

iii) Date code

iv) C/No.

Example; "1/10" means that this case is the 1st one Of total 10 cases

v) P/O No.

vi) Customer Part No.

vii) A-PLUS Part No.

viii) Quantity.

ix) Inspection Stamp.

Packaging type	L(mm)	W(mm)	H(mm)
TYP1	380	380	250
TYP2	380	380	190

[Table 9.2.3-2]

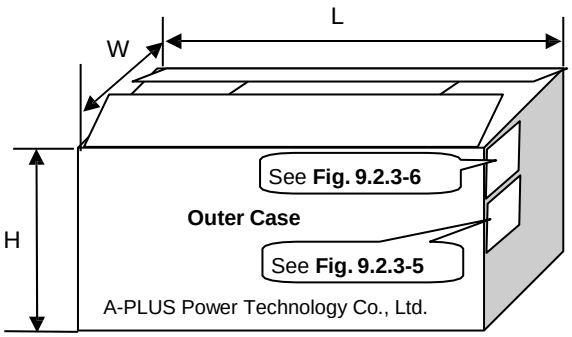


Fig. 9.2.3-4

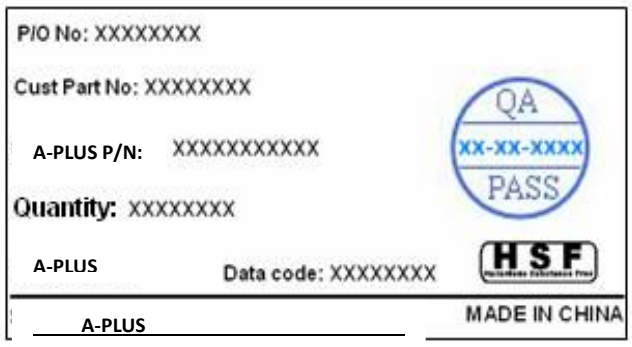


Fig.9.2.3-5

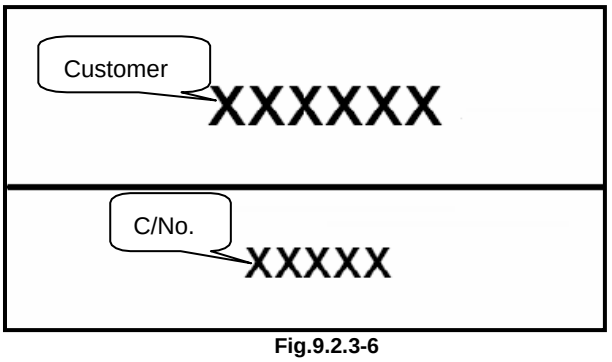
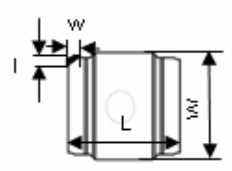
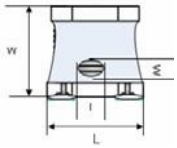
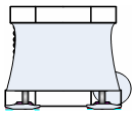
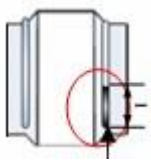
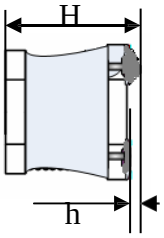
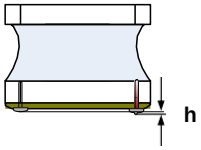
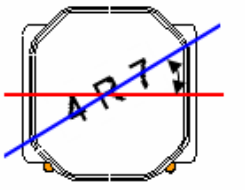


Fig.9.2.3-6

10 Visual inspection standard of product

File No:		Applied to Wire Wound SMD Power Inductor Series		REV:01
Effective date:				
No.	**Defect Item**	**Graphic**	**Rejection identification**	**Acceptance**
1	Core defect		The defect length/width (l or *w*) more than L/6 or W/6, NG.	AQL=0.65
2	Core crack		Visual cracks, NG.	AQL=0.65
3	Starvation		① Resin starved length, ***l***, more than L/2, NG. ② IF ***W***≥2mm, resin starved width, ***w***, more than W/2, NG. ③ IF ***W***≤2mm, resin starved width, ***w***, don't control.	AQL=0.65
4	Excessive glue		The length, width or height of product beyond specified value, NG.	AQL=0.65
5	Cold solder		① For SWPA252012S, cold solders ***l*** more than 0.5 mm, NG. ② For other series, cold solders ***l*** more than 1 mm, NG.	AQL=0.65
6	Solder icicle		① The height ***H*** of product beyond specified value, NG; ② The clearance ***Δf*** beyond specified value listed in **Item 5**, NG;	AQL=0.65
7	Electrode uneven		The clearance***Δf*** beyond specified value listed in **Item 5**, NG;	AQL=0.65
8	Marking defect		① The content of marking 1) is indistinct, 2) disagrees with current product P/N requirements, NG; ② Intersection angle by L1 and L2 more than 45°, NG.	AQL=0.65

11 Recommended Soldering Technologies

11.1Re-flowing Profile:

△ Preheat condition: 150~200℃/60~120sec.
△ Allowed time above 217℃: 60~90sec.
△ Max temp: 260℃
△ Max time at max temp:, 5sec.
Solder paste: Sn/3.0Ag/0.5Cu
△ Allowed Reflow time: 2x max
Please refer to **Fig. 11.1-1**.

[Note: The reflow profile in the above table is only for qualification and is not meant to specify board assembly profiles. Actual board assembly profiles must be based on the customer's specific board design, solder paste and process, and should not exceed the parameters as the Reflow profile shows.]

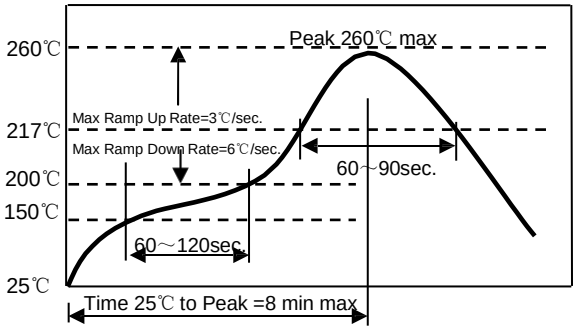


Fig. 11.1-1

11.2 Iron Soldering Profile:

△ Iron soldering power: Max. 30W
△ Pre-heating: 150℃/60sec.
△ Soldering Tip temperature: 350℃ Max.
△ Soldering time: 3sec. Max.
△ Solder paste: Sn/3.0Ag/0.5Cu
△ Max.1 times for iron soldering
Please refer to **Fig. 11.2-1**.

[Note: Take care not to apply the tip of the soldering iron to the terminal electrodes.]

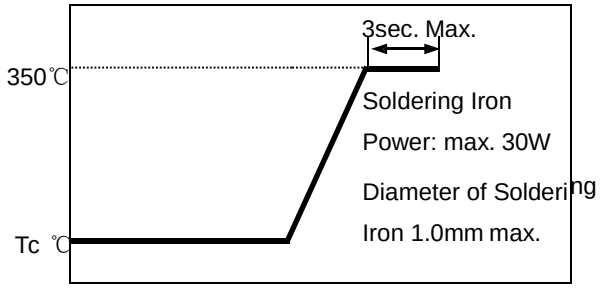


Fig. 11.2-1

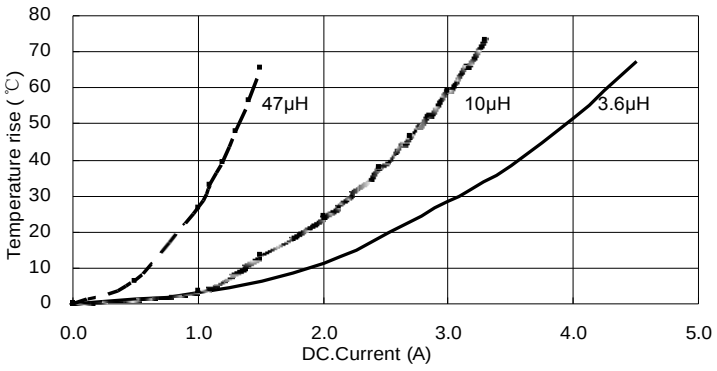
12 Electrical Characteristics

Part Number	Inductance	L Tolerance	Inductance Test Condition	DC Resistance (±30%)	Saturation Current	Temperature Rise Current	Min. Self-resonant frequency	Marking
Units	μH	-	-	Ω	A	A	MHz	-
Symbol	L	-	-	DCR	Isat	Irms	SRF	-
SWPA6045SR82NT	0.82	±30%	100KHz,1V	0.008	10.35	5.90	140	R82
SWPA6045S1R0NT	1.0	±30%	100KHz,1V	0.011	9.85	5.14	100	1R0
SWPA6045S1R2NT	1.2	±30%	100KHz,1V	0.010	8.35	5.40	100	1R2
SWPA6045S1R5NT	1.5	±30%	100KHz,1V	0.012	8.80	4.95	65	1R5
SWPA6045S1R8NT	1.8	±30%	100KHz,1V	0.012	7.60	4.95	74	1R8
SWPA6045S2R2NT	2.2	±30%	100KHz,1V	0.014	6.75	4.60	52	2R2
SWPA6045S2R3NT	2.3	±30%	100KHz,1V	0.021	6.00	3.50	60	2R3
SWPA6045S2R7NT	2.7	±30%	100KHz,1V	0.015	5.75	4.30	38	2R7
SWPA6045S3R0NT	3.0	±30%	100KHz,1V	0.020	5.60	3.80	35	3R0
SWPA6045S3R3NT	3.3	±30%	100KHz,1V	0.021	5.90	3.70	32	3R3
SWPA6045S3R6NT	3.6	±30%	100KHz,1V	0.021	5.25	3.70	28	3R6
SWPA6045S4R3MT	4.3	±20%	100KHz,1V	0.023	4.45	3.50	23	4R3
SWPA6045S4R7MT	4.7	±20%	100KHz,1V	0.026	4.97	3.30	24	4R7
SWPA6045S5R1MT	5.1	±20%	100KHz,1V	0.026	4.40	3.30	23	5R1
SWPA6045S5R6MT	5.6	±20%	100KHz,1V	0.029	4.15	3.15	23	5R6
SWPA6045S6R2MT	6.2	±20%	100KHz,1V	0.031	4.43	3.00	26	6R2
SWPA6045S6R8MT	6.8	±20%	100KHz,1V	0.031	3.90	3.00	20	6R8
SWPA6045S7R5MT	7.5	±20%	100KHz,1V	0.034	3.50	2.90	18	7R5
SWPA6045S8R2MT	8.2	±20%	100KHz,1V	0.043	3.90	2.60	21	8R2
SWPA6045S9R1MT	9.1	±20%	100KHz,1V	0.043	3.35	2.60	17	9R1

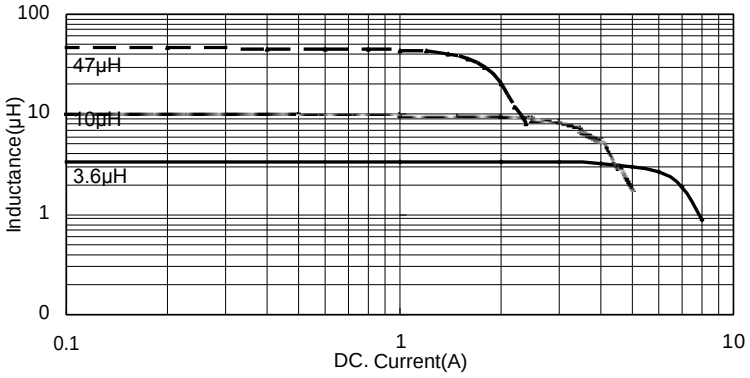
SWPA6045S100MT	10	±20%	100KHz,1V	0.048	3.20	2.45	15	100
SWPA6045S120MT	12	±20%	100KHz,1V	0.058	2.80	2.20	13	120
SWPA6045S150MT	15	±20%	100KHz,1V	0.068	2.50	2.05	12	150
SWPA6045S180MT	18	±20%	100KHz,1V	0.081	2.20	1.85	10	180
SWPA6045S220MT	22	±20%	100KHz,1V	0.089	2.05	1.80	10	220
SWPA6045S270MT	27	±20%	100KHz,1V	0.102	1.90	1.65	9.2	270
SWPA6045S300MT	30	±20%	100KHz,1V	0.132	1.70	1.50	7.8	300
SWPA6045S330MT	33	±20%	100KHz,1V	0.137	1.65	1.45	7.8	330
SWPA6045S360MT	36	±20%	100KHz,1V	0.173	1.62	1.40	7.8	360
SWPA6045S390MT	39	±20%	100KHz,1V	0.180	1.50	1.25	7.8	390
SWPA6045S430MT	43	±20%	100KHz,1V	0.200	1.63	1.20	7.7	430
SWPA6045S470MT	47	±20%	100KHz,1V	0.200	1.40	1.20	6.4	470
SWPA6045S510MT	51	±20%	100KHz,1V	0.207	1.35	1.15	6.4	510
SWPA6045S560MT	56	±20%	100KHz,1V	0.221	1.30	1.10	6.4	560
SWPA6045S620MT	62	±20%	100KHz,1V	0.235	1.25	1.10	6.4	620
SWPA6045S680MT	68	±20%	100KHz,1V	0.289	1.20	1.00	6.4	680
SWPA6045S750MT	75	±20%	100KHz,1V	0.305	1.15	0.95	5.0	750
SWPA6045S820MT	82	±20%	100KHz,1V	0.341	1.05	0.90	4.9	820
SWPA6045S910MT	91	±20%	100KHz,1V	0.359	1.00	0.85	4.9	910
SWPA6045S101MT	100	±20%	100KHz,1V	0.433	0.95	0.80	4.2	101
SWPA6045S121MT	120	±20%	100KHz,1V	0.484	0.85	0.77	4.2	121
SWPA6045S151MT	150	±20%	100KHz,1V	0.580	0.80	0.70	4.2	151
SWPA6045S221MT	220	±20%	100KHz,1V	0.834	0.70	0.59	3.5	221
SWPA6045S331MT	330	±20%	100KHz,1V	1.270	0.57	0.57	2.8	331

Typical Electrical Characteristics

Temperature vs. DC Current Characteristics



Inductance vs. DC Current Characteristics



13 Precautions

Surface mounting

- Mounting and soldering condition should be checked beforehand.
- Applicable soldering process to this product is reflow soldering only.
- Recommended conditions for repair by soldering iron:
  Preheat the circuit board with product to repair at 150℃ for about 1 minute.
  Put soldering iron on the land-pattern.
  Soldering iron's temperature: 350℃ maximum/Duration: 3 seconds maximum/1 time for each terminal.
  The soldering iron should not directly touch the inductor.
  Product once removes from the circuit board may not be used again.

Handing

- Keep the products away from all magnets and magnetic objects.
- Be careful not to subject the products to excessive mechanical shocks.
- Please avoid applying impact to the products after mounted on pc board.
- Avoid ultrasonic cleaning.

Storage

- To maintain the solderability of terminal electrodes and to keep the packing material in good condition, temperature and humidity in the storage area should be controlled.
- Recommended conditions: -10℃~40℃, 70%RH (Max.)
- Even under ideal storage conditions, solderability of products electrodes may decrease as time passes. For this reason, product should be used with one year from the time of delivery.
- In case of storage over 6 months, solderability shall be checked before actual usage.

Regarding Regulations

- Any Class-Ⅰ or Class-Ⅱ ozone-depleting substance (ODS) listed in the Clean Air Act in US for regulation is not included in the products or applied to the products at any stage of whose manufacturing processes.
- Certain brominated flame retardants (PBBs,PBDEs) are not used at all.
- The products of this specification are not subject to the Export Trade Control Order in China or the Export Administration Regulations in US.

Guarantee

- The guaranteed operating conditions of the products are in accordance with the conditions specified in this specification.
- Please note that A-PLUS takes no responsibility for any failure and/or abnormality which is caused by use under other than the aforesaid operating conditions.

14 Supplier Information

Supplier:

A-PLUS POWER TECHNOLOGY CO., LTD.