

# For Automotive Electronics

# SPECIFICATIONS

Customer	
Product Name	Coupled Inductors For Automobile
Sunlord Part Number	ACPR1208S Series
Customer Part Number	

New Released,  Revised]

SPEC No.: ACPR04220000

【This SPEC is total 10 pages.】

【RoHS, Compliant Parts】

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### 【For Customer approval Only】

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**Version Change History**

Rev	Date	Item	Changed Contents	Change Reasons	Drawing	Check	Approval
01	/	/	/	New release	Yuanyi Chen	Zhenjian Yang	Yubo Su

for Automotive Electronics

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for Automotive Electronics

1. Scope

- 1) Scope of parts  
This specification applies to the **ACPR1208S Series** of Coupled Inductors For Automobile based on AEC-Q200.
- 2) Scope of application  
Product numbers recorded in this specification are to applications with the following modules:  
  - ☆SEPIC, Zeta, Flyback topology, etc.
  - ☆LED, power supplies
  - ☆Used as common mode choke
  - ☆Used as 1:1 transformer

2. Product Description and Identification (Part Number)

- 1) Description  
Coupled Inductors For Automobile, (L\*H)12\*08  
Product Identification (Part Number)

**A**   **CP**   **R**   **1208**   **S**   **XXX**   **M**   **I**  
①   ②   ③   ④   ⑤   ⑥   ⑦   ⑧

① Product Type	
A	Automobile

② Type	
CP	For coupled power inductors

③ Structure	
R	Structure Code

④ External Dimensions [L X H] (mm)	
1208	12.0 X 8.0

⑤ Feature Type	
S	Standard

⑥ Inductance (uH)	
XXX	Example:1R0=1.0uH,100=10uH,101=100uH

⑦ Tolerance Limits	
M	±20%

⑧ Packing	
T	Tape & Reel

3. Shape and Dimensions

- 1) Shape

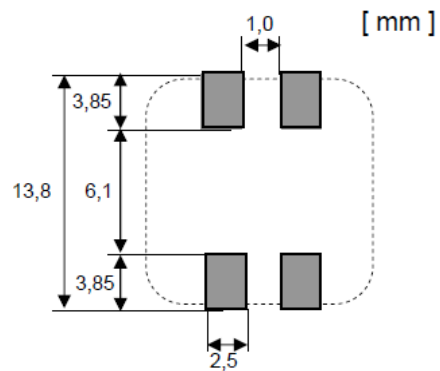
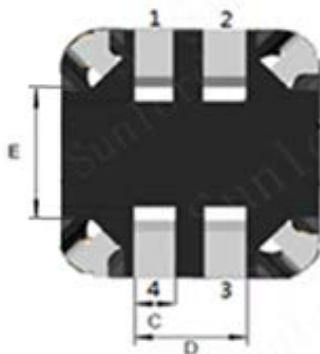
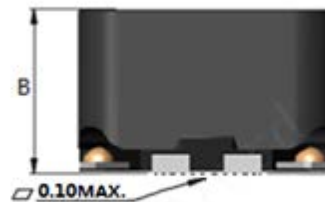
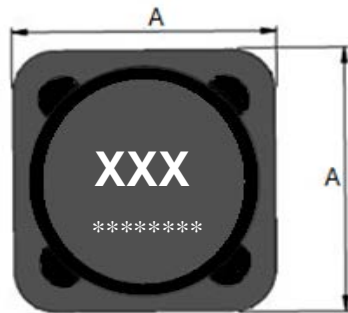


Fig.3.1

Recommend pad pattern

- 2) Dimension

Unit: mm

A	B	C	D	E
12.5Max.	8.5Max.	1.8±0.2	5.0±0.2	6.5±0.2

- 3) Appearance  
 There is no visible trace or other mechanical damage on the surface of the product by visual inspection. Marking must be clear and legible. Core and other parts assembled stably. Mounting dimensions and the position of the terminals should be in accord with standard.
- 4) Schematic

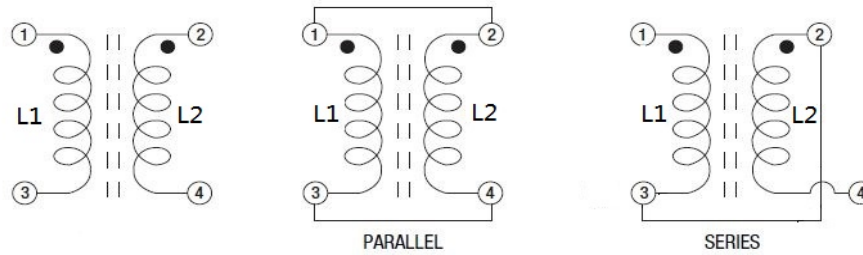


Fig.3.2

4. Electrical Characteristics

- 1) Operating and storage temperature range (individual product without packing): -50°C to +150°C
- 2) Storage temperature range (packaging conditions): -10°C~+40°C and RH 70% (Max.)
- 3) Moisture Sensitivity Level (MSL) 1

P/N	Inductance (μH) @100K,0.1V	DCR (mΩ) Max.	I sat (30%) (A)		I rms (A) Typ.	HI-POT
			Max	Typ		
ACPR1208S4R7MT	4.7±20%	25	9.2	12.9	5.0	DC 500V/1Sec
ACPR1208S6R8MT	6.8±20%	29	8.1	11.4	4.5	DC 500V/1Sec
ACPR1208S100MT	10±20%	36	6.8	9.8	4.1	DC 500V/1Sec
ACPR1208S120MT	12±20%	38	6.0	8.0	3.8	DC 500V/1Sec
ACPR1208S150MT	15±20%	40	5.2	7.0	3.6	DC 500V/1Sec
ACPR1208S220MT	22±20%	72	4.7	6.7	3.0	DC 500V/1Sec
ACPR1208S270MT	27±20%	96	3.9	5.7	2.7	DC 500V/1Sec
ACPR1208S330MT	33±20%	105	3.6	5.2	2.5	DC 500V/1Sec
ACPR1208S470MT	47±20%	132	3.1	4.3	2.2	DC 500V/1Sec
ACPR1208S680MT	68±20%	206	2.5	3.6	1.8	DC 500V/1Sec
ACPR1208S101MT	100±20%	280	2.1	3.0	1.5	DC 500V/1Sec

Note:

- 1. Inductance is per winding. When leads are connected in parallel, inductance is the same value. When leads are connected in series, inductance is four times the value.
- 2. DCR is for each winding. When leads are connected in parallel, DCR is half the value. When leads are connected in series, DCR is twice the value.
- 3. Isat is the current flowing through one winding. The value of DC current when the inductance is over 70% of the initial value. When leads are connected in parallel, Isat is the same. When leads are connected in series, Isat is half the value.
- 4. Irms is the current flowing through one winding. The value of DC current when the temperature rise is Δt=40°C.(Ta=25°C) When leads are connected in parallel or series, the Irms can be calculated like this:  $I_1^2+I_2^2=I_R^2$ .

Typical Electrical Characteristics:

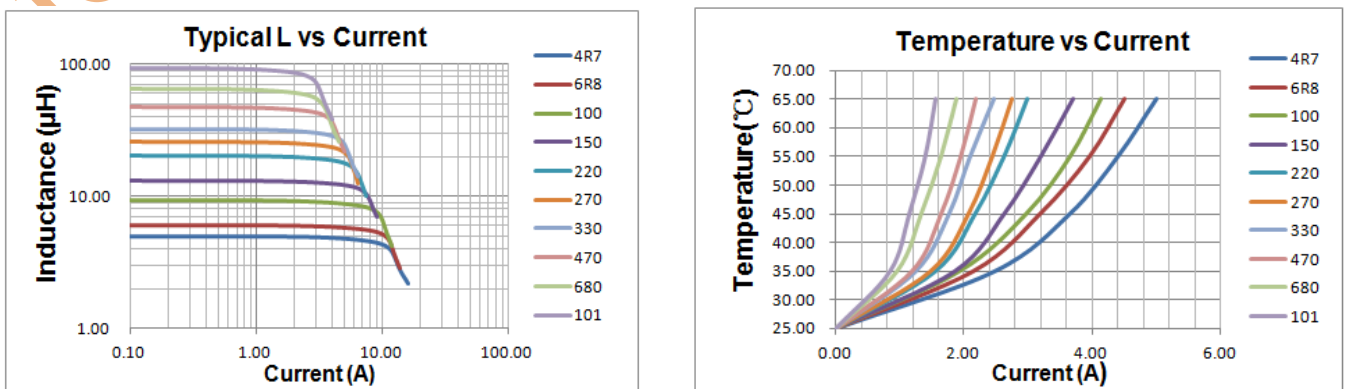


Fig.4.1

**5. Test and Measurement Procedures****5.1 Test Conditions**

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

- a. Ambient Temperature: 20±15°C
- b. Relative Humidity: 65%±20%
- c. Air Pressure: 86 KPa to 106 KPa

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

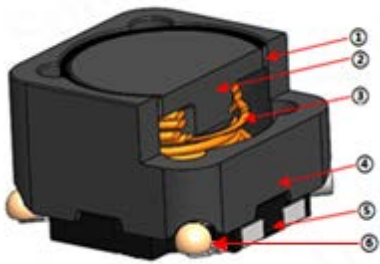
- a. Ambient Temperature: 20±2°C
- b. Relative Humidity: 65%±5%
- c. Air Pressure: 86KPa to 106 KPa

**5.2 Visual Examination**

- a. General visual and magnifie

**6. Structure**

The structure of product, please refer to **Fig.6.1**.



**Fig.6.1**

NO.	Part Name	Material
①	Glue	Magnetic glue
②	Core	Ferrite
③	Wire	Polyurethane system Enameled copper wire
④	Core	Ferrite
⑤	Base	Lcp+Cu+Ni+Sn
⑥	Solder joint	Alloy body

Note: No printed wiring or printed contacts are allowed at the bottom of the solder joint.

**7. Reliability Test**

No.	Test Item	Test Method(According to AEC-Q200)	Requirements
1	Pre-and Post-Stress Electrical Test	User Spec.	Refer specifications
2	High Temperature Exposure (Storage)	1000 hrs. at rated operating temperature	1.No visible mechanical damage in appearance; 2.L value: the change rate before and after the test is within ±10%; 3.DCR value: meet the specification requirements.
3	Temperature shock test	Three reflow welding pretreatment, TL/heat preservation (30min)→TU/ heat preservation (30min), temperature zone conversion time within 20s, a total of 1000 cycles	1.No visible mechanical damage in appearance; 2.L value: the change rate before and after the test is within ±10%; 3.DCR value: meet the specification requirements.
4	High Temperature And High Humidity Storage test	Pretreatment of three reflow welding,85°C, 85%RH,1000h, no load required	1.No visible mechanical damage in appearance; 2.L value: the change rate before and after the test is within ±10%; 3.DCR value: meet the specification requirements.
5	Operational Life	Three reflow pretreatment, TU, 1000h, rated load	1.No visible mechanical damage in appearance; 2.L value: the change rate before and after the test is within ±10%; 3.DCR value: meet the specification requirements.
6	External Visual	Test under the condition of at least 10X (6 sides or 4 sides appearance drawing should be taken for 1PCS)	No visible mechanical damage in appearance
7	Physical Dimension	Caliper or microscope with dimension measuring function	The overall dimensions meet the requirements of the product specification
8	Terminal Strength	Three reflow pretreatment, X and Y	No visible mechanical damage in appearance

	(SMD)	directions,17.7N,60(+1)s	
9	Resistance to Solvents	Refer to method 211 of "WI-043-000-02"	1.No visible mechanical damage in appearance; 2. Mark without defect.
10	Mechanical Shock	Half sine wave, peak acceleration: 100g, pulse width,6ms,6 times in X, Y and Z directions, 18 times in total	1.No visible mechanical damage in appearance; 2.L value: the change rate before and after the test is within $\pm 10\%$ ; 3.DCR value: meet the specification requirements.
11	Vibration test	10~2000~10Hz, vibration acceleration is 5g, vibration period (10~2000~10Hz time) is 20min, according to X, Y,Z three directions, vibration in each direction 12 cycle 4h.Total 36 cycles for 12h	1.No visible mechanical damage in appearance; 2.L value: the change rate before and after the test is within $\pm 10\%$ ; 3.DCR value: meet the specification requirements.
12	Resistance to Soldering Heat	Reflow welding $260\pm 5^{\circ}\text{C}$ $10\pm 1\text{s}$ three times, depth: 1.5mm tin surface away from element body, speed: $25\text{mm/s}\pm 6\text{mm/s}$ , welding material: Sn/3.0ag / 0.5cu	1.No visible mechanical damage in appearance; 2.L value: the change rate before and after the test is within $\pm 10\%$ ; 3.DCR value: meet the specification requirements.
13	ESD	Contact discharge,8KV,+ , - polarity once	1.No visible mechanical damage in appearance; 2.L value: the change rate before and after the test is within $\pm 10\%$ ; 3.DCR value: meet the specification requirements.
14	Solderability	Pretreatment for group A: (1)high temperature $155^{\circ}\text{C}$ 4h; (2) $235^{\circ}\text{C}$ , $5+0/-0.5\text{s}$ , speed: $25\pm 6\text{mm/s}$ , depth: minimum 0.1mm; (3) welding materials: Sn/3.0Ag/0.5Cu; (4) 50X magnification conditions for observation. Pretreatment for group B :(1) steam aging at $8\text{h}\pm 15\text{min}$ ; (2) $235^{\circ}\text{C}$ , $5+0/-0.5\text{s}$ , speed: $25\pm 6\text{mm/s}$ , depth: minimum 0.1mm; (3) welding material Sn/3.0Ag/0.5Cu; (4) 50X magnification conditions for observation. Pretreatment for group C: (1) steam aging $8\text{h}\pm 15\text{min}$ (2) $260^{\circ}\text{C}$ , $7\pm 0.5\text{s}$ , speed: $25\pm 6\text{mm/s}$ , depth: tin surface completely covers the test terminal (3) welding material: Sn/ 3.0ag / 0.5cu;(4) 50X magnification conditions for observation.	The solder coverage of terminal electrode is more than 95%
15	Temperature characteristic	Test the inductance at $25^{\circ}\text{C}$ , $-50^{\circ}\text{C}$ and $150^{\circ}\text{C}$ , and take $25^{\circ}\text{C}$ as the reference temperature	The rate of change of L value is less than 20 percent
16	Flammability	Refer to method 115 of "WI-043-000-02"	Refer to method 115 of "WI-043-000-02"
17	Board Flex	Pretreatment with three reflow soldering,2mm, $60(+5)\text{s}$	No visible mechanical damage in appearance
18	DPA	Reference structure analysis	Shape structure, process characteristics meet the requirements
19	MSL	Refer to method 116 of "WI-043-000-02"	Refer to method 116 of "WI-043-000-02"

20	Low temperature Storage test	Pretreatment of three reflow welding, -55°C 1000h	1.No visible mechanical damage in appearance; 2.L value: the change rate before and after the test is within ±10%; 3.DCR value: meet the specification requirements.
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8. Packaging and Storage

8.1 Tape and Reel Packaging Dimensions

8.1.1 Taping Dimensions (Unit: mm)

Please refer to Fig. 8.1.1 and Table 8-1-1

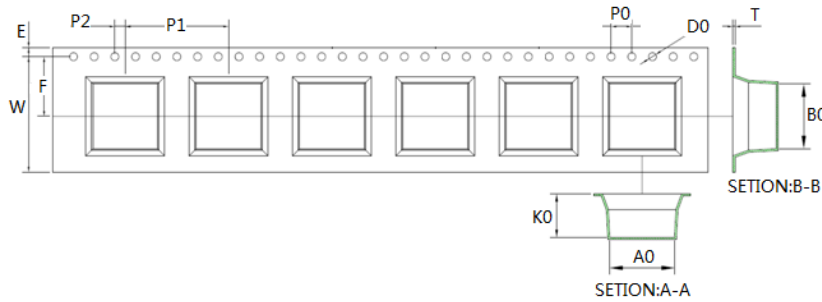


Fig. 8.1.1

Table 8-1-1

Item	A0	B0	K0	W	E	F	P0	P1	T	P2	D0
Dimension	12.50±0.15	12.50±0.15	8.40±0.15	24.00±0.30	1.75±0.10	11.50±0.10	4.00±0.10	20.00±0.10	0.5±0.05	2.00±0.10	1.50-0/+0.1

8.1.2 Direction of rolling

Please refer to Fig. 8.1.2.

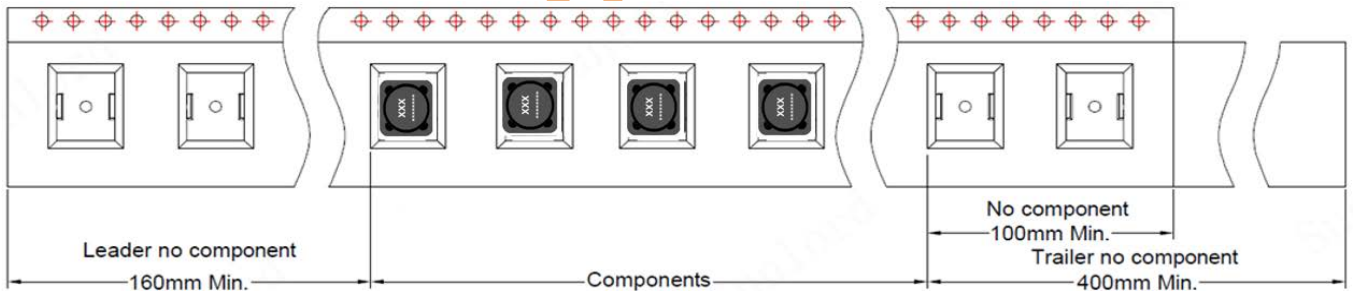


Fig. 8.1.2

8.1.3 Reel Dimensions (Unit: mm)

Please refer to Fig. 8.1.3

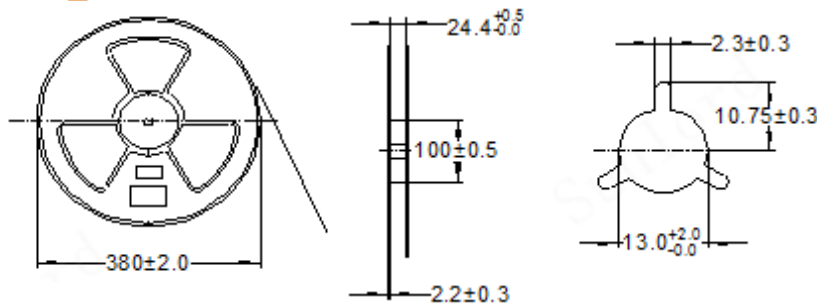


Fig. 8.1.3

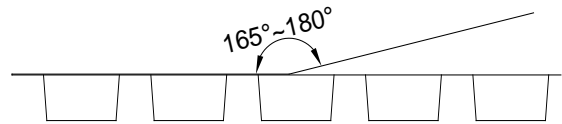


8.1.4 Top tape strength

Peel-off strength: 10~130gf.

Peel-off angle: 165°~180°, refers to Fig.8.1.4.

Peel-off speed: 300mm/min.



8.1.5 The number of components and weight

Single inductor weight is 3.7~4.7g.

A tape & reel package contains 500 inductors.

8.1.6 The allowable number of empty chip cavities

Maximum two inductors cavities missing product may exist in a reel but they may not be consecutive two cavities.

Fig. 8.1.4

9. Visual inspection Standard of Product

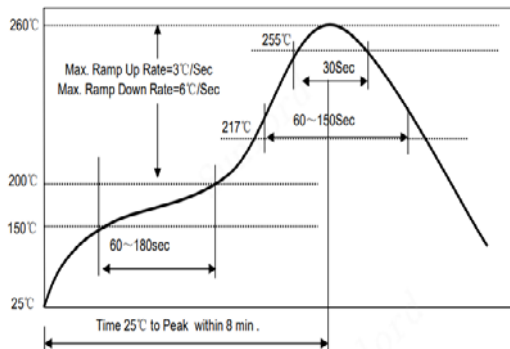
File No:		Applied to Coupled Inductors For Automobile	
Effective date:			
No.	Defect Item	Graphic	Rejection identification
1	Cover defect		Defect length and width greater than 2 mm
			No penetrating crack by visual inspection
2	Electrode foreign body		Foreign matter length and width greater than 0.2 mm
3	Printing		Visually unable to effectively recognize printed information

**10. Recommended Soldering Technologies**

This product is only for reflow soldering and iron soldering.

**10.1 Re-flowing Profile**

- △ Preheat condition: 150 ~200°C/60~180sec.
- △ Allowed time above 217°C: 60~150sec.
- △ Allowed time above 255°C: 30sec. ref.
- △ Max temp: 260°C.
- △ Max time at max temp: 5sec.
- Solder paste: Sn/3.0Ag/0.5Cu.
- △ Allowed Reflow time: 3x max:
- Please refer to **Fig. 10.1-1**.

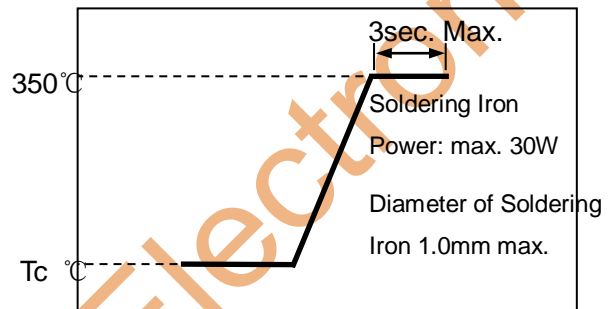
**Fig. 10.1-1.**

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.

**10.2 Iron Soldering Profile:**

- △ Iron soldering power: Max. 30W
- △ Pre-heating: 150°C/60sec.
- △ Soldering Tip temperature: 350°C Max.
- △ Soldering time: 3sec. Max.
- △ Solder paste: Sn/3.0Ag/0.5Cu
- △ Max.1 times for iron soldering
- Please refer to **Fig. 10.2-1**.

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

**Fig. 10.2-1.****11. Precautions****11.1 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°C for about 1 minute.
  - Put soldering iron on the land-pattern.
  - Soldering iron's temperature: 350°C 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.

**11.2 Handling**

- 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.

**11.3 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°C~40°C, 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.

**11.4 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.

**11.5 Guarantee**

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