

FEATURES 特征

- Use magnetic materials with high saturation magnetic flux density to achieve good DC superposition characteristics in power circuits.
使用饱和磁通密度高的磁性材料，实现电源电路中良好直流重叠特性
- Achieve universality and stability of pad layout with SMD product shape and terminal structure.
贴片式产品形状和端子结构，实现焊盘布局通用性和稳定性
- Use closed magnetic circuit structure to control the minimum magnetic flux loss.
采用闭合磁路结构，控制最小磁通量损失
- Operating Temp : -40°C~+125°C(Including self heating)
工作温度范围:-40°C~+125°C(包括自身温度上升)



APPLICATIONS 用途

- Smart phones, tablets, SSD, DVC, DSC, VR, wristbands, watches, power modules, etc.
智能手机、平板、SSD、DVC、DSC、VR、手环、手表、微电源模块等

PART NUMBERING 产品型号

AFL	252010	-	2R2	M	S	A
①	②		③	④	⑤	⑥

① Series Name	
AFL	Chip Power Inductors

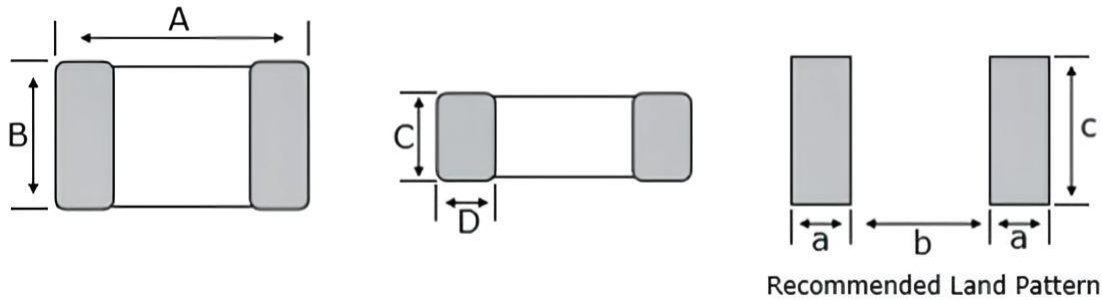
② External Dimensions [LxWxT mm]	
201610	2.0×1.6×1.0
252010	2.5×2.0×1.0
252012	2.5×2.0×1.2
322510	3.2×2.5×1.2

⑤ Internal Code	
	S

③ Inductance	
Code (example)	Nominal inductance [μH]
R24	0.24
2R2	2.2
4R7	4.7

④ Inductance Tolerance	
M	±20%

⑥ Type of Electrode	
	A

DIMENSIONS & RECOMMENDED LAND PATTERN 尺寸及推荐焊盘


Recommended Land Pattern

Unit: mm

Dimensions					Recommended Land Pattern		
Series	A	B	C max.	D	a Typ.	b Typ.	c Typ.
AFL201610	2.0±0.2	1.6±0.2	1.0	0.5±0.3	0.60	1.20	1.80
AFL252010	2.5±0.2	2.0±0.2	1.0	0.6±0.3	0.70	1.50	2.00
AFL252012	2.5±0.2	2.0±0.2	1.2	0.6±0.3	0.70	1.50	2.00
AFL322510	3.2±0.2	2.5±0.2	1.2	0.6±0.2	0.95	1.65	2.80

ELECTRICAL CHARACTERISTICS 特性规格表

● AFL201610 Series

Part Number	Inductance	Inductance Tolerance	DC Resistance		Heat Rating Current		Saturation Current	
	@1MHz,1V		Max.	Typ.	Max.	Typ.	Max.	Typ.
Units	μH	-	mΩ		A		A	
Symbol	L	-	DCR		Irms		Isat	
AFL201610-R24MSA	0.24	±20%	18	15	5.0	5.4	6.0	6.5
AFL201610-R33MSA	0.33	±20%	21	18	4.6	5.0	5.6	6.1
AFL201610-R47MSA	0.47	±20%	25	22	4.3	4.7	5.0	5.5
AFL201610-1R0MSA	1.0	±20%	55	48	3.4	3.8	4.0	4.4
AFL201610-2R2MSA	2.2	±20%	120	109	2.3	2.5	2.1	2.3

● AFL252010 Series

Part Number	Inductance	Inductance Tolerance	DC Resistance		Heat Rating Current		Saturation Current	
	@1MHz,1V		Max.	Typ.	Max.	Typ.	Max.	Typ.
Units	μH	-	mΩ		A		A	
Symbol	L	-	DCR		Irms		Isat	
AFL252010-R24MSA	0.24	±20%	15	12	6.1	6.6	7.3	7.9
AFL252010-R33MSA	0.33	±20%	18	15	5.5	6.0	6.6	7.2
AFL252010-R47MSA	0.47	±20%	22	18	5.0	5.4	6.0	6.5
AFL252010-1R0MSA	1.0	±20%	44	37	4.0	4.3	4.5	4.9
AFL252010-2R2MSA	2.2	±20%	110	96	2.4	2.6	2.6	2.8
AFL252010-3R3MSA	3.3	±20%	156	130	1.9	2.1	2.1	2.4
AFL252010-4R7MSA	4.7	±20%	210	175	1.6	1.8	1.8	2.0

ELECTRICAL CHARACTERISTICS 特性规格表

● AFL252012 Series

Part Number	Inductance	Inductance Tolerance	DC Resistance		Heat Rating Current		Saturation Current	
	@1MHz,1V		Max.	Typ.	Max.	Typ.	Max.	Typ.
Units	μH	-	mΩ		A		A	
Symbol	L	-	DCR		Irms		Isat	
AFL252012-R82MSA	0.82	±20%	35	29	4.2	4.6	4.8	5.2
AFL252012-1R0MSA	1.0	±20%	44	37	4.0	4.3	4.5	4.9
AFL252012-1R5MSA	1.5	±20%	62	51	2.9	3.3	3.6	4.0
AFL252012-2R2MSA	2.2	±20%	110	96	2.4	2.6	2.6	2.8
AFL252012-3R3MSA	3.3	±20%	134	112	1.9	2.2	2.1	2.3
AFL252012-4R7MSA	4.7	±20%	210	175	1.6	1.8	1.8	2.0

● AFL322510 Series

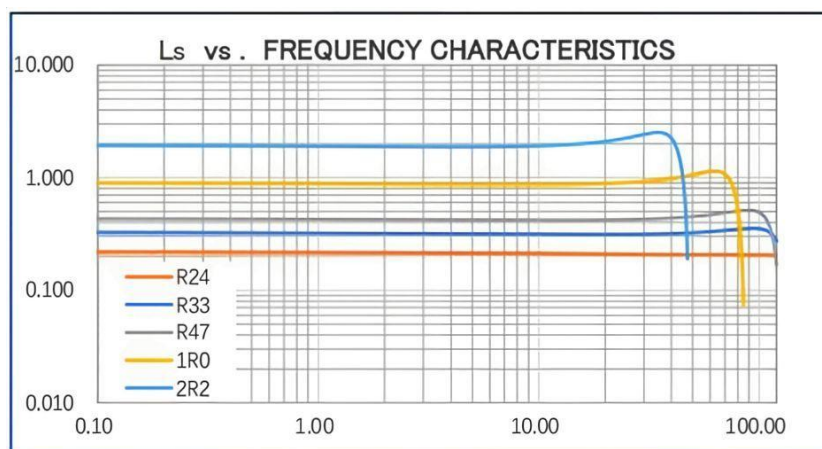
Part Number	Inductance	Inductance Tolerance	DC Resistance		Heat Rating Current		Saturation Current	
	@1MHz,1V		Max.	Typ.	Max.	Typ.	Max.	Typ.
Units	μH	-	mΩ		A		A	
Symbol	L	-	DCR		Irms		Isat	
AFL322510-1R0MSA	1	±20%	40	34	3.7	4.0	6.0	6.5

- Test Condition: 1MHz, 1.0V, referenced to 25 °C ambient.
- Rated Current: Isat or Itemp, whichever is smaller.
- Isat: the current (A) that will cause the L value to drop 30%.
- Irms: the current (A) that will cause a temperature rise of 40°C.
- Maximum rated voltage :DC 20 V.

CHARACTERISTICS(REFERENCE) 特征曲线

● AFL201610 Series

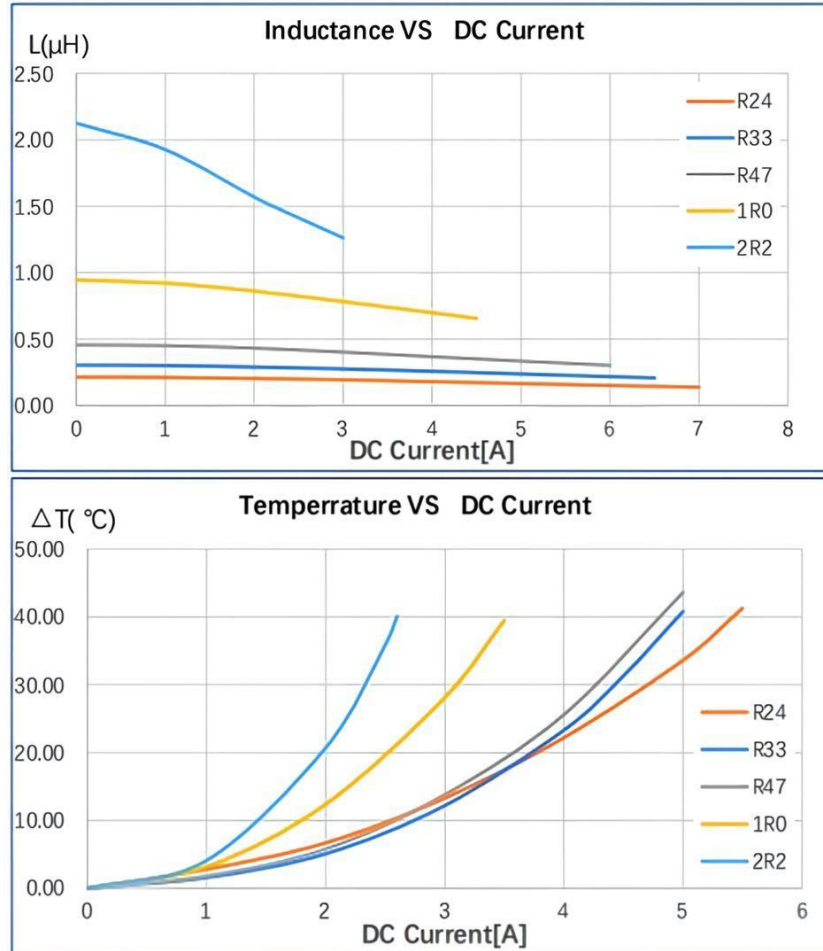
☆ L Frequency Characteristics



CHARACTERISTICS(REFERENCE) 特征曲线

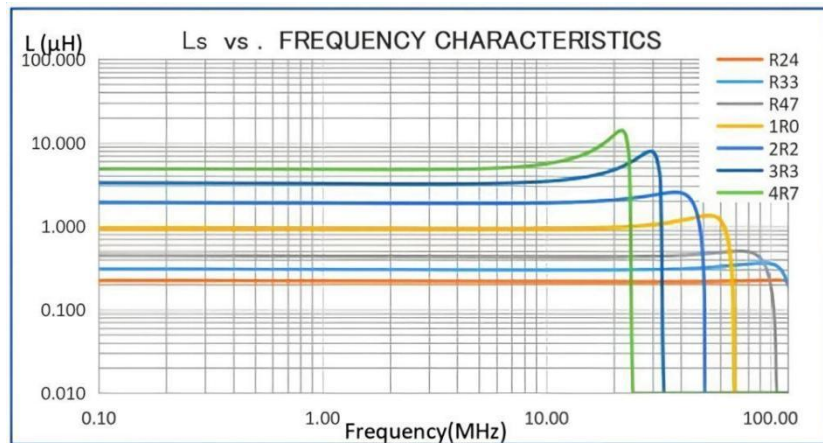
● AFL201610 Series

☆ Inductor DC Superposition Characteristics



● AFL252010 Series

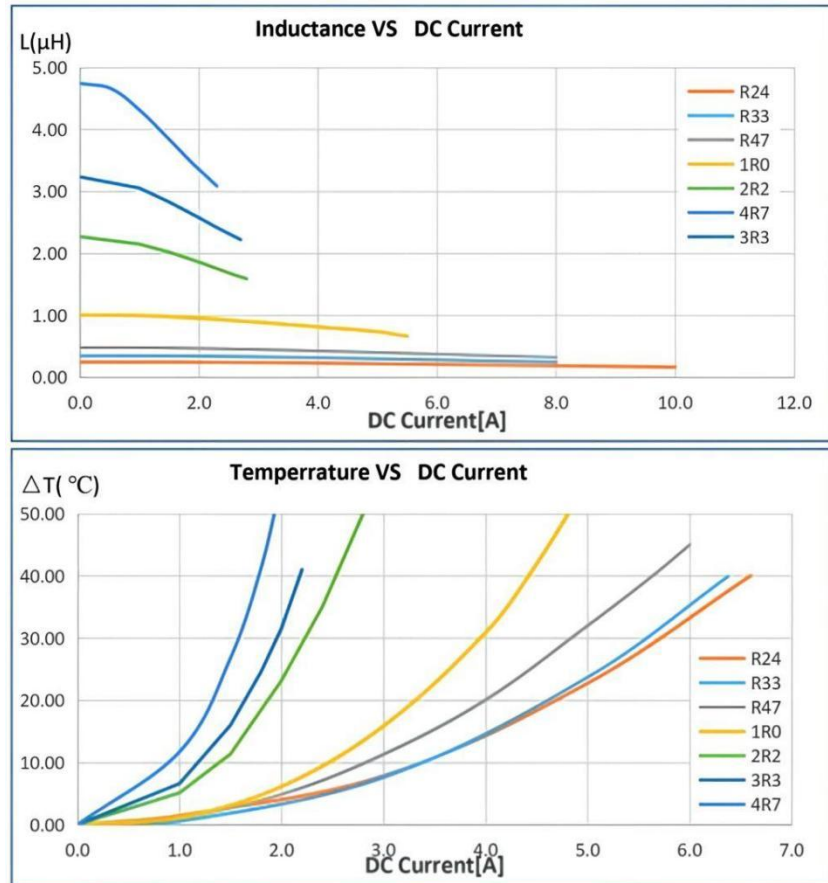
☆ L Frequency Characteristics



CHARACTERISTICS(REFERENCE) 特征曲线

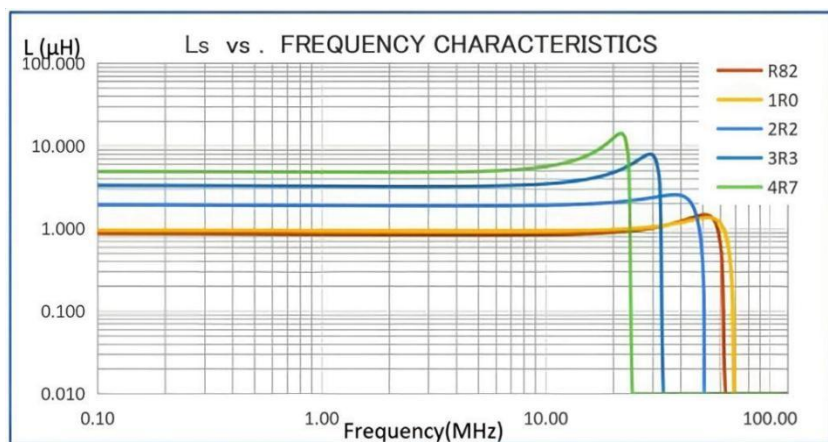
● AFL252010 Series

☆ Inductor DC Superposition Characteristics



● AFL252012 Series

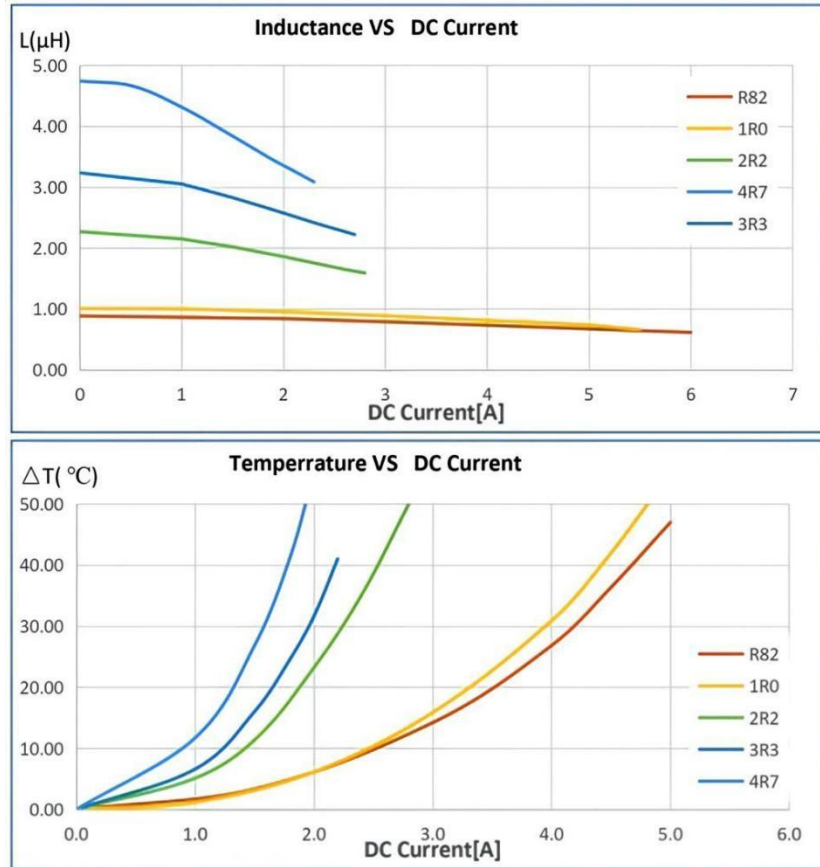
☆ L Frequency Characteristics



CHARACTERISTICS(REFERENCE) 特征曲线

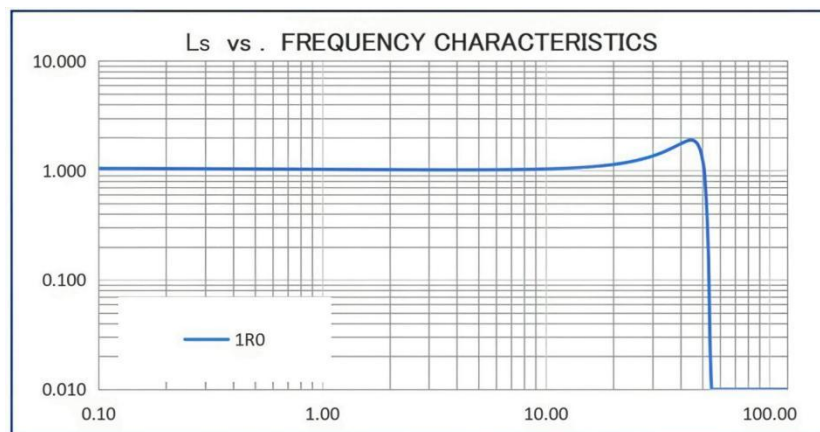
● AFL252012 Series

☆ Inductor DC Superposition Characteristics



● AFL322510 Series

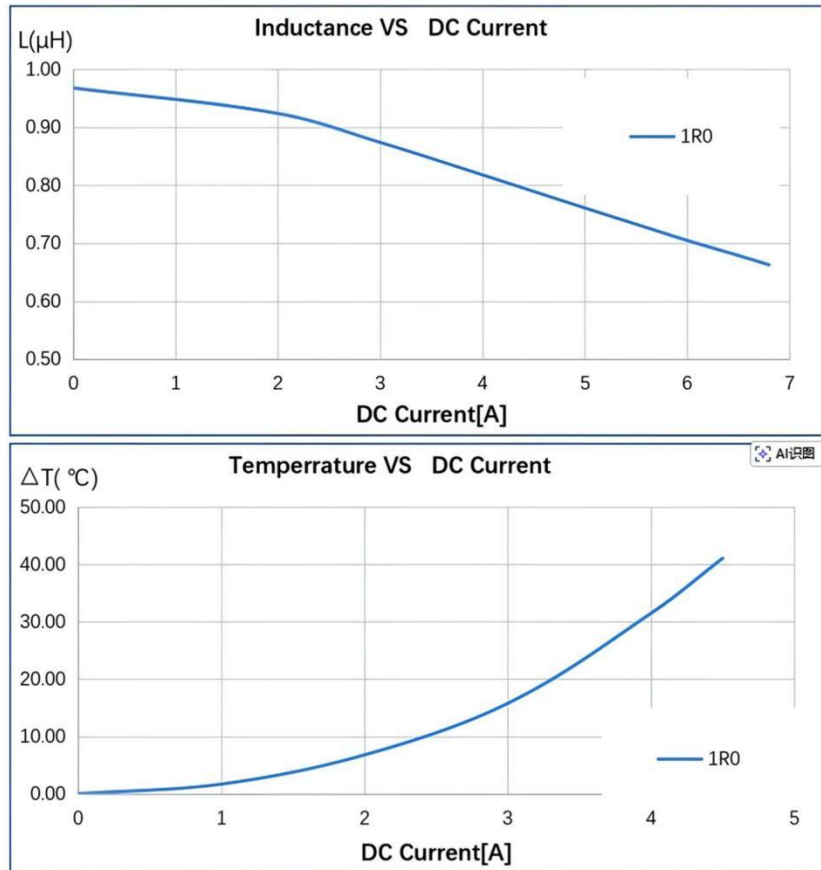
☆ L Frequency Characteristics



CHARACTERISTICS(REFERENCE) 特征曲线

● AFL322510 Series

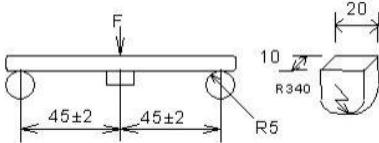
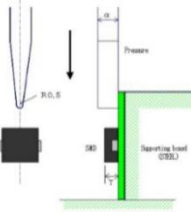
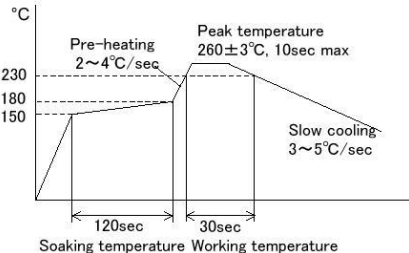
☆ Inductor DC Superposition Characteristics



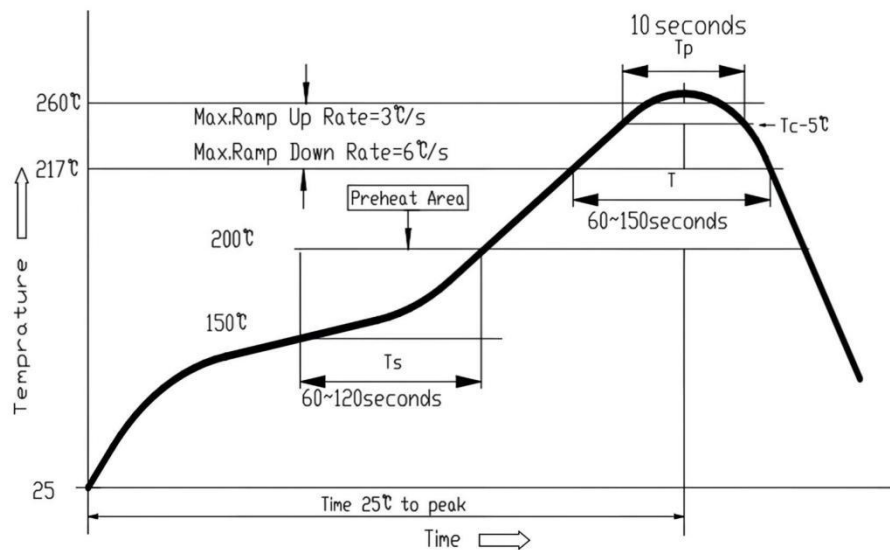
RELIABILITY TEST 可靠性测试

PROJECT	EXPERIMENTAL STANDARD	JUDGMENT CONDITIONS															
Solder attachment experiment	Dipped in tin 245°C±5°C, products placed in the tank for 2±0.5sec.	More than 95% of the surface must be covered by tin without detachment No abnormal appearance.															
Mechanical vibration experiment	Put the product to be verified on the substrate and solder Vibration frequency: 10Hz to 2000Hz to 10Hz, 20min/cycle Acceleration or amplitude*1: 10G or 1.5mmP-P, 12 cycle* XYZ each, total 36.	No abnormal appearance No open circuit or short circuit occurred. $\Delta L/L$ $\leq 10\%$.															
Mechanical shock experiment	Put the product to be verified on the substrate and solder Maximum acceleration 980m/S ² Sine half-wave pulse with an action time of 6msec Add 3 times in each of the 6 directions, a total of 18 times.	No abnormal appearance No open circuit or short circuit occurred. $\Delta L/L$ $\leq 10\%$.															
High temperature operation	Placed at 85±2°C 500hr±12hr through rated current Placed in room temperature and humidity for 1hr before testing.	No abnormal appearance No open circuit or short circuit occurred. $\Delta L/L$ $\leq 10\%$.															
Thermal shock experiment	The following table is for 1 cycle, after 500 cycles are completed. Measured after placing in room temperature and humidity for 1 hour. <table border="1"> <thead> <tr> <th></th><th>Temperature</th><th>Time</th></tr> </thead> <tbody> <tr> <td>1</td><td>-40±3°C</td><td>30 min.</td></tr> <tr> <td>2</td><td>room temperature</td><td>Within 1min</td></tr> <tr> <td>3</td><td>125±2°C</td><td>30 min.</td></tr> <tr> <td>4</td><td>room temperature</td><td>Within 1min</td></tr> </tbody> </table>		Temperature	Time	1	-40±3°C	30 min.	2	room temperature	Within 1min	3	125±2°C	30 min.	4	room temperature	Within 1min	No abnormal appearance No open circuit or short circuit occurred. $\Delta L/L$ $\leq 10\%$.
	Temperature	Time															
1	-40±3°C	30 min.															
2	room temperature	Within 1min															
3	125±2°C	30 min.															
4	room temperature	Within 1min															
High temperature storage	125±2°C under the condition of room humidity 500hr±12hr Placed in room temperature and humidity for 1h before testing.	No abnormal appearance No open circuit or short circuit occurred. $\Delta L/L$ $\leq 10\%$.															
Low temperature storage	Stored at -40±2°C 500h±12h Placed in room temperature and humidity for 1hr post-test	No abnormal appearance No open circuit or short circuit occurred. $\Delta L/L$ $\leq 10\%$.															
High temperature and high humidity storage	85±2°C 85%RH 500hr±12hr Placed in room temperature and humidity for 1hr before testing	No abnormal appearance No open circuit or short circuit occurred. $\Delta L/L$ $\leq 10\%$.															

RELIABILITY TEST 可靠性测试

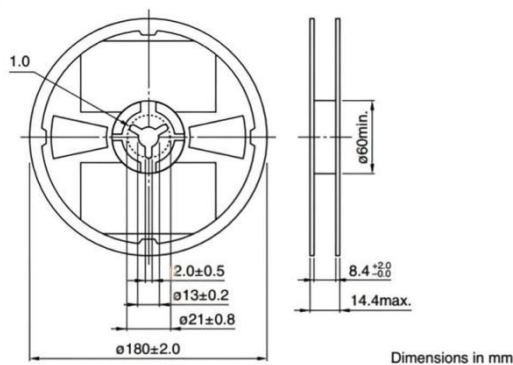
PROJECT	EXPERIMENTAL STANDARD	JUDGMENT CONDITIONS
Substrate bending	Put the sample on the substrate to solder, apply pressure in the direction of the arrow until the amount of bending becomes about 3mm, hold for 30 seconds 	No abnormal appearance No open circuit or short circuit occurred. $\Delta L/L \leq 10\%$.
Electrode strength	Apply 0.5mm/sec on the side of the sample using a specified pressure jig (see Figure 1). The tip of the fixture that is in contact with the sample should be centered on the sample surface. Apply a force parallel to the substrate (shear force) to observe the adhesion of the glass epoxy substrate to the product. 	>10N
Reflow soldering test	Substrate reflow 3 times 	No abnormal appearance No open circuit or short circuit occurred. $\Delta L/L \leq 10\%$.

RECOMMENDED SOLDERING TECHNOLOGIES 焊接工艺建议



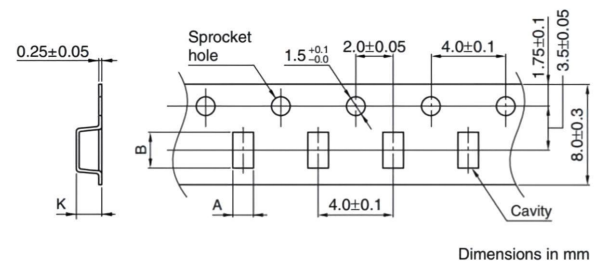
PACKAGING 包装

● Roll size



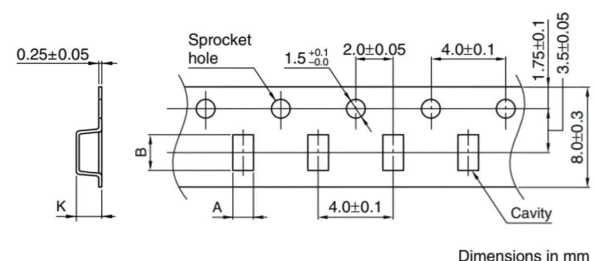
● Tape size

☆ AFL201610



Type	A0	K0	K
AFL201610	1.95	2.35	1.15

☆ AFL252010~AFL322510



Type	A0	K0	t
AFL252010	2.39±0.1	1.15±0.1	0.22±0.05
AFL252012	2.50±0.1	1.25±0.1	0.22±0.05
AFL322510	2.80±0.1	1.15±0.1	0.22±0.05

● Packing Quantity

Type	Reel
AFL201610	3000/PCS
AFL252010	3000/PCS
AFL252012	3000/PCS
AFL322510	3000/PCS

■ PRECAUTIONS 注意事项

● Precautions on Use.

- 1.The storage period is less than 12 months. Be sure to follow the storage conditions (temperature: 5 ~ 40°C; humidity 20 ~ 75%RH or less). If the storage period elapses, the soldering of the terminal electrodes may deteriorate.
- 2.Do not use and store in gas corrosive environments (salt, acid, alkali, etc.).
- 3.Before soldering, be sure to preheat components.
The preheating temperature should be set so that the difference between soldering temperature and chip temperature does not exceed 150°C.
- 4.Soldering corrections after mounting should be within the conditions determined in the specification. Excessive heating may result in short circuit, performance degradation, or shortened lifespan.
- 5.When embedding a printed circuit board where a chip is mounted to a set, be sure that residual stress is not given to the chip due to the overall distortion of the printed circuit board and partial distortion such as at screw tightening portions.
- 6.Self-heating (temperature increase) occurs when the power is turned ON, so the tolerance should be sufficient for the set thermal design.
- 7.Carefully lay out the coil for the circuit board design of the non-magnetic shield type. A malfunction may occur due to magnetic interference.
- 8.Use a wrist band to discharge static electricity in your body through the grounding wire.
- 9.Do not expose the products to magnets or magnetic fields.
- 10.Do not use for a purpose outside of the range specified in the product specification.
- 11.The products listed in this catalog are intended for use in general electronic equipment (AV equipment, telecommunication equipment, home appliances, entertainment equipment, computer equipment, personal equipment, office equipment, measuring equipment, industrial robots), and under a normal operation and use condition. The products are not designed or warranted to meet the requirements of the applications listed below, of which the performance and/or quality require a more stringent level of safety or reliability, or of which the failure, malfunction or trouble could cause serious damage to society, person or property.

■ SAFETY REMINDERS 注意事项

SAFETY REMINDERS

● All products listed in this specification are developed, designed and intended for use in general electronics equipment. The products are not designed or Warranted to meet the requirements of the applications listed below, whose performance and/or quality require especially high reliability, or whose failure, malfunction or trouble might directly cause damage to society, person, or property. Please understand that we are not responsible for any damage or liability caused by use of the products in any of the applications below. Please contact us for more details if you intend to use our products in the following applications.

- ☆ 1. Aerospace/aviation equipment
- ☆ 2. Transportation equipment (cars, electric trains, ships, etc.)
- ☆ 3. Medical equipment
- ☆ 4. Power-generation control equipment
- ☆ 5. Atomic energy-related equipment
- ☆ 6. Seabed equipment
- ☆ 7. Transportation control equipment
- ☆ 8. Public information-processing equipment
- ☆ 9. Military equipment
- ☆ 10. Electric heating apparatus, burning equipment
- ☆ 11. Disaster prevention/crime prevention equipment
- ☆ 12. Safety equipment
- ☆ 13. Other applications that are not considered general-purpose applications

● When designing your equipment even for general-purpose applications, you are kindly requested to take into consideration securing protection circuit/device or providing backup circuits in your equipment.