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℃~+125℃(Including self heating)
  工作温度范围:-40℃~+125℃(包括自身温度上升)

APPLICATIONS 用途

- Smart phones, tablets, SSD, DVC, DSC, VC, 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	B
①	②		③	④	⑤	⑥

① Series Name	
AFL	Chip Power Inductors

② External Dimensions [LxWxT mm]	
201208	2.0x1.2x0.8
201210	2.0x1.2x1.0
201610	2.0x1.6x1.0
201612	2.0x1.6x1.2
252010	2.5x2.0x1.0
252012	2.5x2.0x1.2
404010	4.0x4.0x1.0

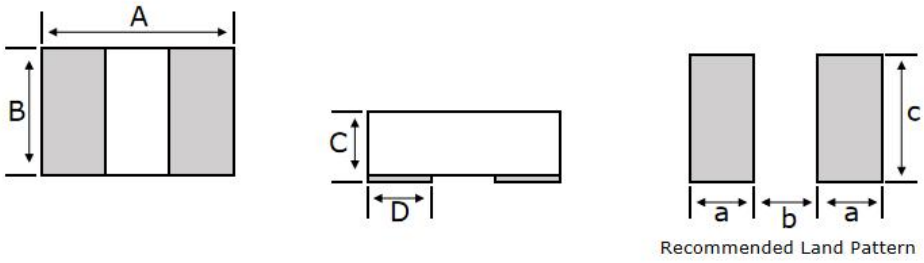
③ Inductance	
Code (example)	Nominal inductance［μH］
R24	0.24
2R2	2.2
4R7	4.7

④ Inductance Tolerance	
M	±20%

⑤ Internal Code
S

⑥ Type of Electrode	
B	Bottom Electrode

DIMENSIONS & RECOMMENDED LAND PATTERN 尺寸及推荐焊盘



Unit: mm

Dimensions					Recommended Land Pattern		
Series	A	B	C max.	D	a Typ.	b Typ.	c Typ.
AFL201208	2.0±0.2	1.2±0.2	0.8	0.6	0.80	0.50	1.45
AFL201210	2.0±0.2	1.2±0.2	1.0	0.6	0.80	0.50	1.45
AFL201610	2.0±0.2	1.6±0.2	1.0	0.6	0.80	0.50	1.70
AFL201612	2.0±0.2	1.6±0.2	1.2	0.6	0.80	0.50	1.70
AFL252010	2.5±0.2	2.0±0.2	1.0	0.7±0.2	1.00	0.60	2.10
AFL252012	2.5±0.2	2.0±0.2	1.2	0.7±0.2	1.00	0.60	2.10
AFL404010	4.0±0.2	4.0±0.2	1.0	1.0±0.2	1.40	2.00	4.40

ELECTRICAL CHARACTERISTICS 特性规格表

- AFL201208 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	
AFL201208-R24MSB	0.24	±20%	16	13	6.0	6.4	6.9	7.5
AFL201208-R33MSB	0.33	±20%	24	20	5.0	5.4	5.3	5.8
AFL201208-R47MSB	0.47	±20%	32.5	27	3.7	4.0	4.2	4.6
AFL201208-1R0MSB	1.0	±20%	70	58	2.1	2.3	3.0	3.3

- AFL201210 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	
AFL201210-R47MSB	0.47	±20%	30	26	4.1	4.5	5.0	5.4
AFL201210-1R0MSB	1.0	±20%	70	58	2.7	3.0	3.3	3.5

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-R24MSB	0.24	±20%	18	15	5.8	6.3	7.0	7.7
AFL201610-R33MSB	0.33	±20%	20	16	5.5	6.0	6.5	7.1
AFL201610-R47MSB	0.47	±20%	25	21	5.0	5.5	5.8	6.3
AFL201610-1R0MSB	1.0	±20%	50	44	3.5	3.8	4.2	4.5
AFL201610-1R5MSB	1.5	±20%	94	78	2.6	2.8	2.9	3.1
AFL201610-2R2MSB	2.2	±20%	125	114	1.9	2.1	2.2	2.4
AFL201610-4R7MSB	4.7	±20%	220	190	1.3	1.5	1.6	1.8

AFL201612 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	
AFL201612-R24MSB	0.24	±20%	18	15	5.8	6.3	7.0	7.7
AFL201612-R33MSB	0.33	±20%	20	16	5.5	6.0	6.5	7.1
AFL201612-R47MSB	0.47	±20%	25	21	5.0	5.5	5.8	6.3
AFL201612-1R0MSB	1.0	±20%	50	44	3.5	3.8	4.2	4.5
AFL201612-1R5MSB	1.5	±20%	94	78	2.6	2.8	2.9	3.1
AFL201612-2R2MSB	2.2	±20%	125	114	1.9	2.1	2.2	2.4

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-R24MSB	0.24	±20%	14	12	6.1	6.6	8.2	9.0
AFL252010-R33MSB	0.33	±20%	18	15	5.8	6.3	7.0	7.5
AFL252010-R47MSB	0.47	±20%	20	17	6.0	6.5	6.5	7.0
AFL252010-R68MSB	0.68	±20%	30	26	4.2	4.5	5.0	5.5
AFL252010-1R0MSB	1.0	±20%	40	35	4.1	4.5	4.8	5.2
AFL252010-1R2MSB	1.2	±20%	55	46	3.2	3.5	4.0	4.4
AFL252010-1R5MSB	1.5	±20%	62	51	2.9	3.3	3.6	4.0
AFL252010-2R2MSB	2.2	±20%	105	94	2.4	2.6	3.0	3.3
AFL252010-4R7MSB	4.7	±20%	235	200	1.6	1.8	1.6	1.8

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-R24MSB	0.24	±20%	14	12	6.1	6.6	8.2	9.0
AFL252012-R33MSB	0.33	±20%	18	15	5.8	6.3	7.0	7.5
AFL252012-R47MSB	0.47	±20%	20	17	6.0	6.5	6.5	7.0
AFL252012-R68MSB	0.68	±20%	30	26	4.2	4.5	5.0	5.5
AFL252012-1R0MSB	1.0	±20%	40	35	4.1	4.5	4.8	5.2
AFL252012-1R5MSB	1.5	±20%	62	51	2.9	3.3	3.6	4.0
AFL252012-2R2MSB	2.2	±20%	105	94	2.4	2.6	3.0	3.3
AFL252012-4R7MSB	4.7	±20%	235	200	1.6	1.8	1.6	1.8

- AFL404010 Series

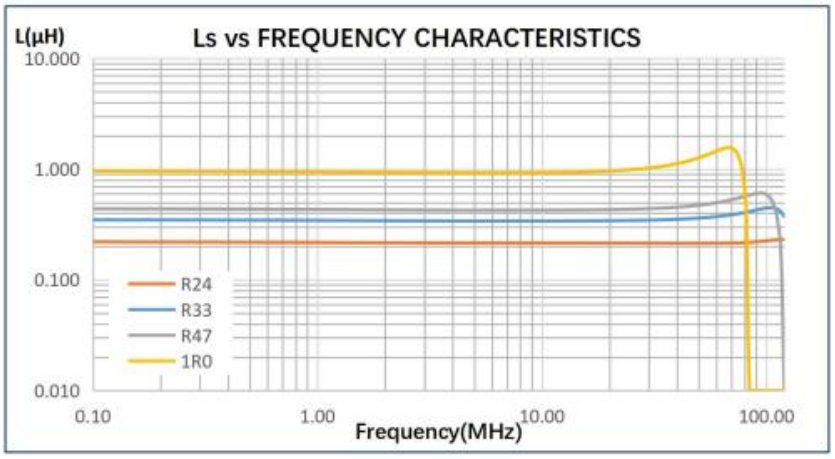
Part Number	Inductance	Inductance Tolerance	DC Resistance		Heat Rating Current		Saturation Current	
	@1MHz,1V		Max.	Typ.	Max.	Typ.	Max.	Typ.
Units	μH	-	mΩ		A		A	
Symbol	L	-	DCR		Irms		Isat	
AFL404010-100MSB	10	±20%	240	210	1.8	2.0	2.3	2.5

- Test Condition:1MHz, 1.0Vrms，referenced to 25 ℃ 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℃.
- Maximum rated voltage :DC 20 V.

CHARACTERISTICS(REFERENCE) 特征曲线

- AFL201208 Series

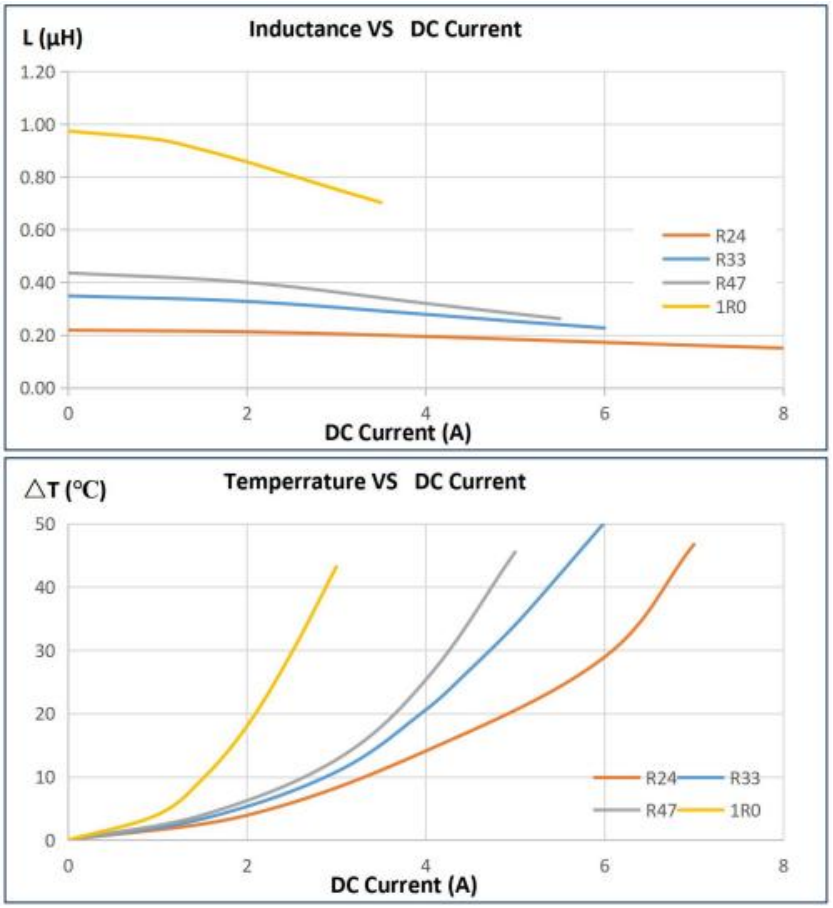
☆ L Frequency Characteristics



CHARACTERISTICS(REFERENCE) 特征曲线

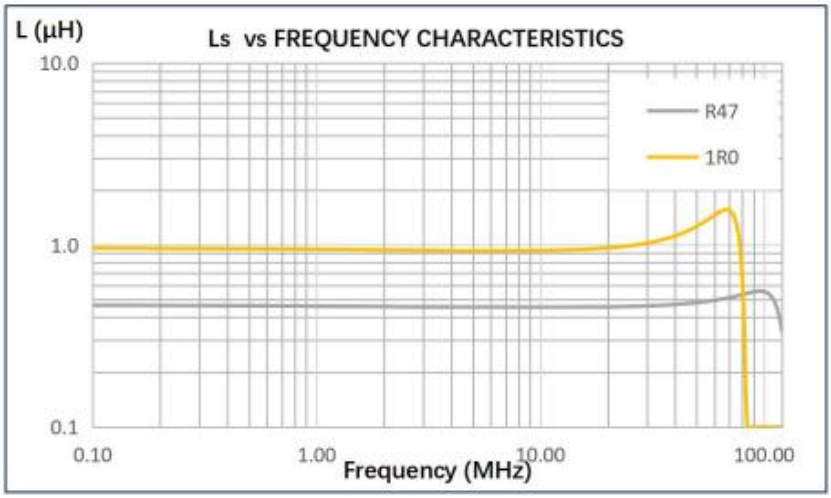
- AFL201208 Series

☆ Inductor DC Superposition Characteristics



- AFL201210 Series

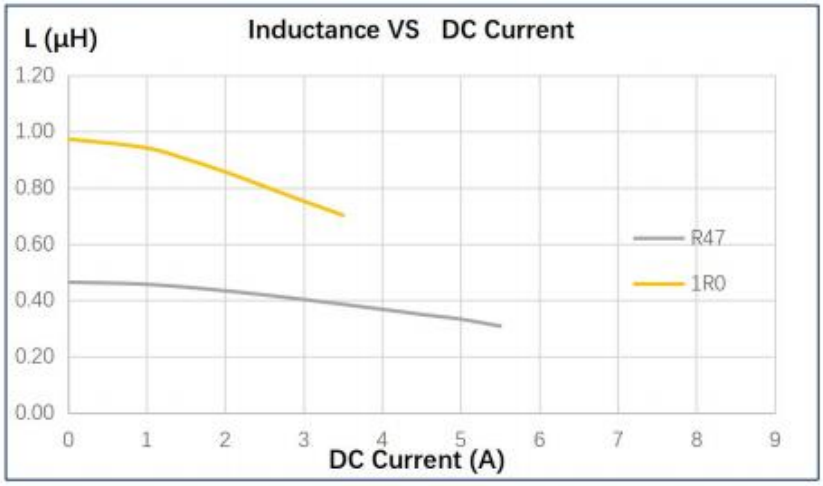
☆ L Frequency Characteristics

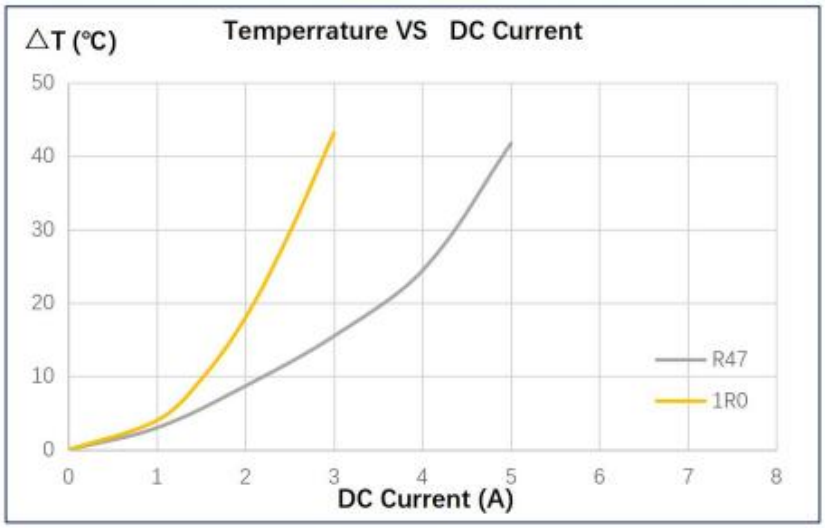


CHARACTERISTICS(REFERENCE) 特征曲线

- AFL201210 Series

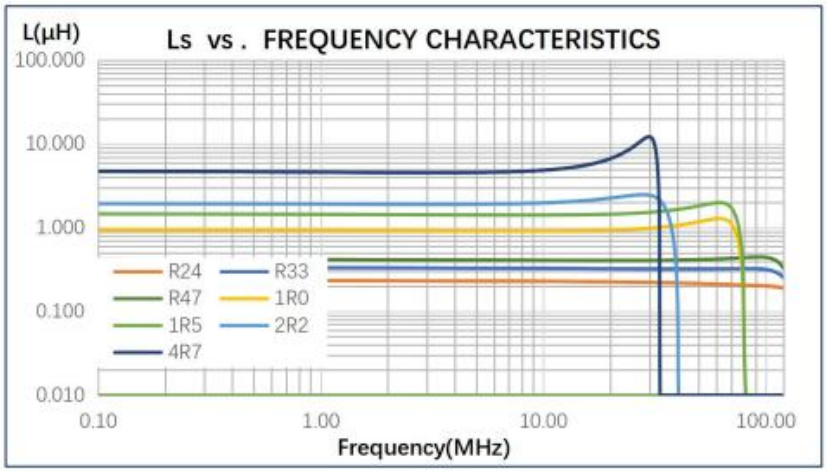
☆ Inductor DC Superposition Characteristics





- AFL201610 Series

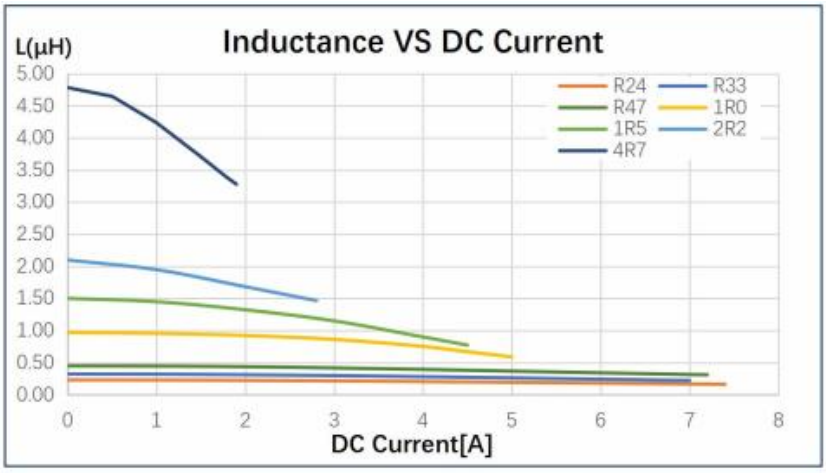
☆ L Frequency Characteristics

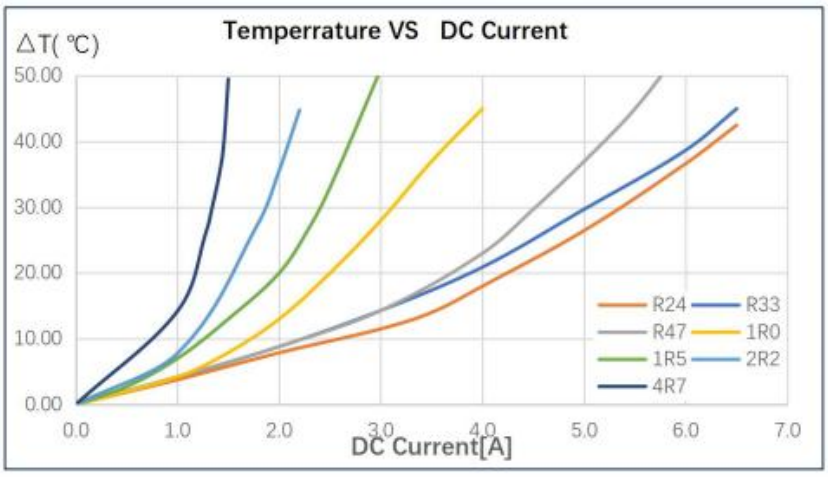


CHARACTERISTICS(REFERENCE) 特征曲线

- AFL201610 Series

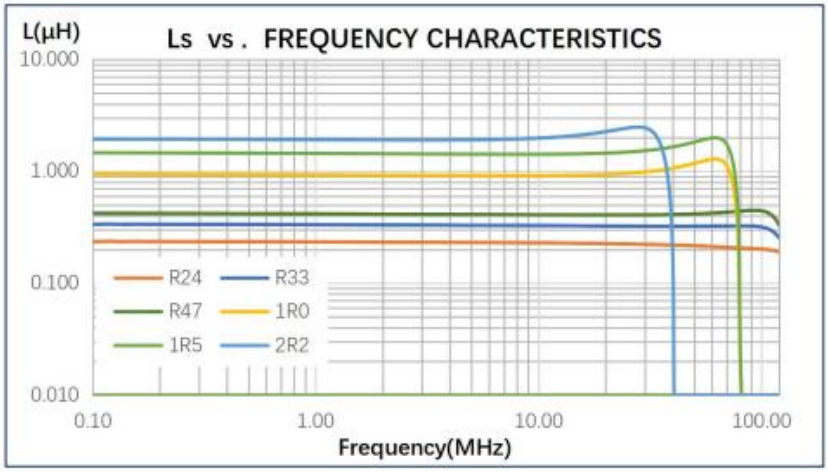
☆ Inductor DC Superposition Characteristics





- AFL201612 Series

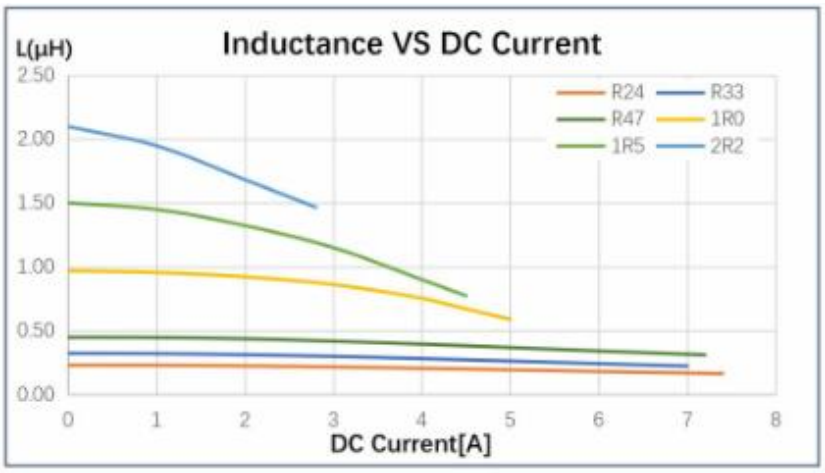
☆ L Frequency Characteristics

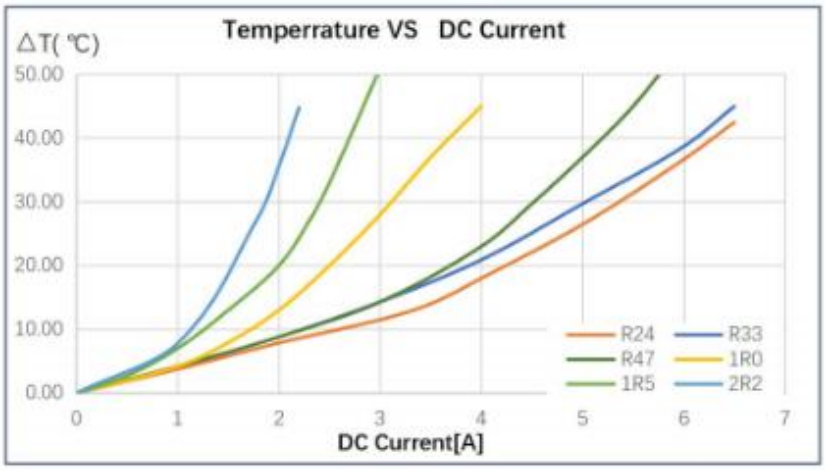


CHARACTERISTICS(REFERENCE) 特征曲线

- AFL201612 Series

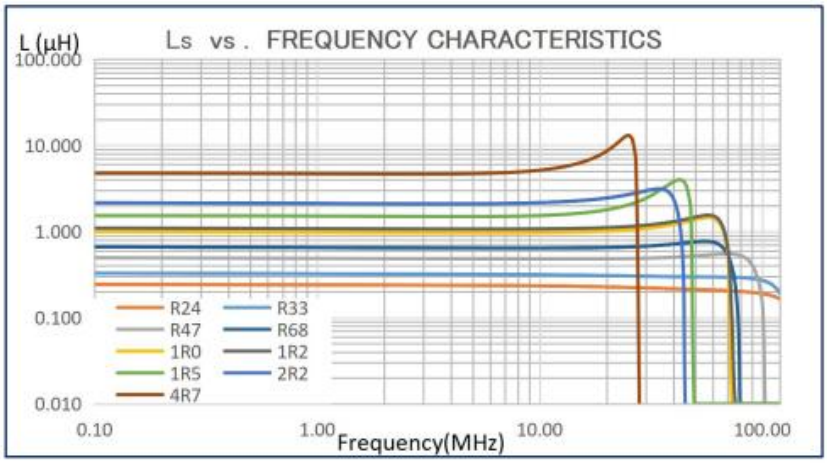
☆ Inductor DC Superposition Characteristics





- AFL252010 Series

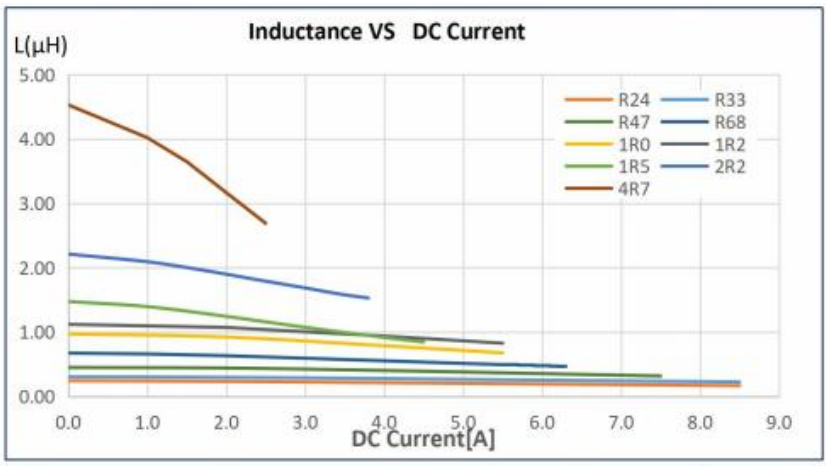
☆ L Frequency Characteristics

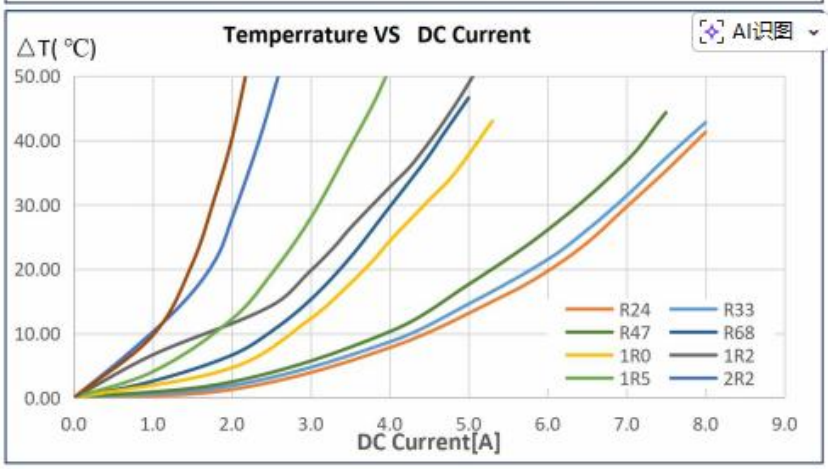


CHARACTERISTICS(REFERENCE) 特征曲线

- AFL252010 Series

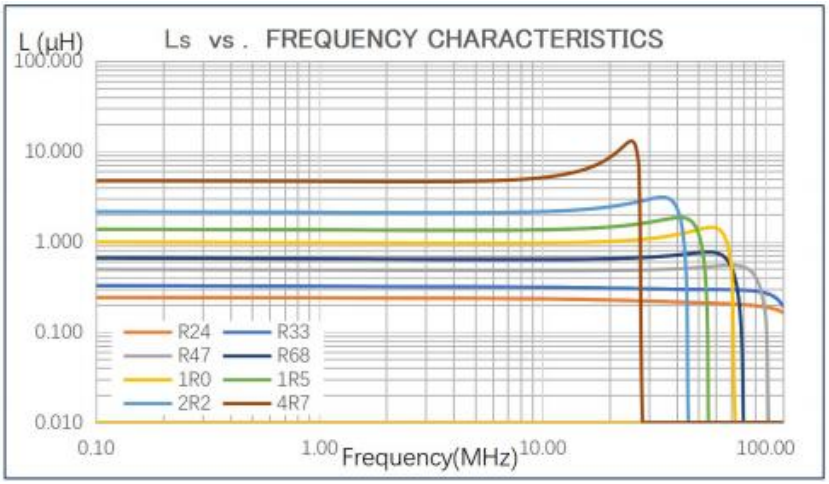
☆ Inductor DC Superposition Characteristics





- AFL252012 Series

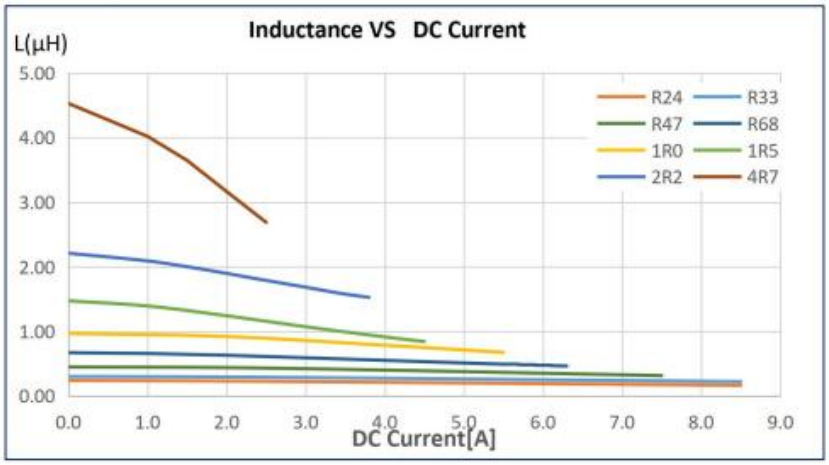
☆ L Frequency Characteristics

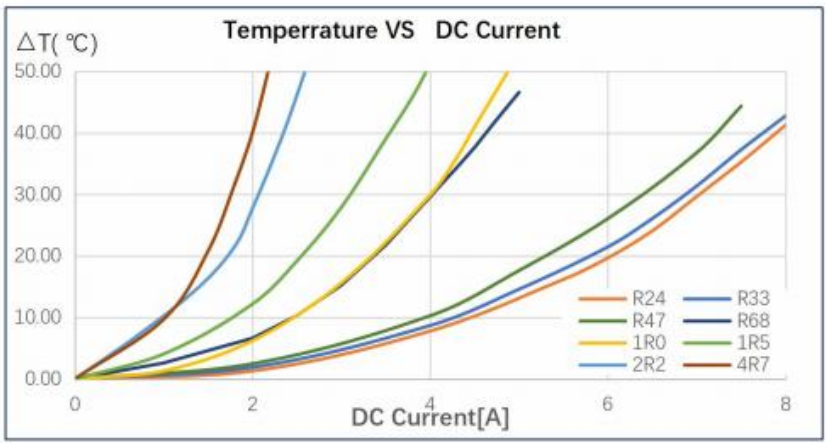


CHARACTERISTICS(REFERENCE) 特征曲线

- AFL252012 Series

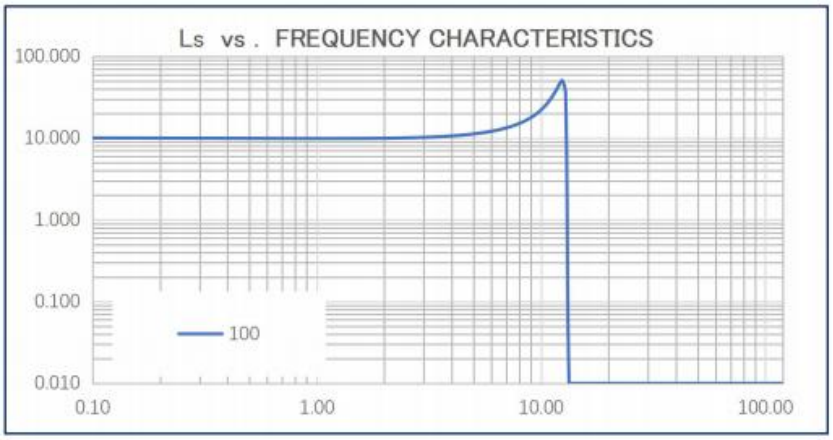
☆ Inductor DC Superposition Characteristics





- AFL404010 Series

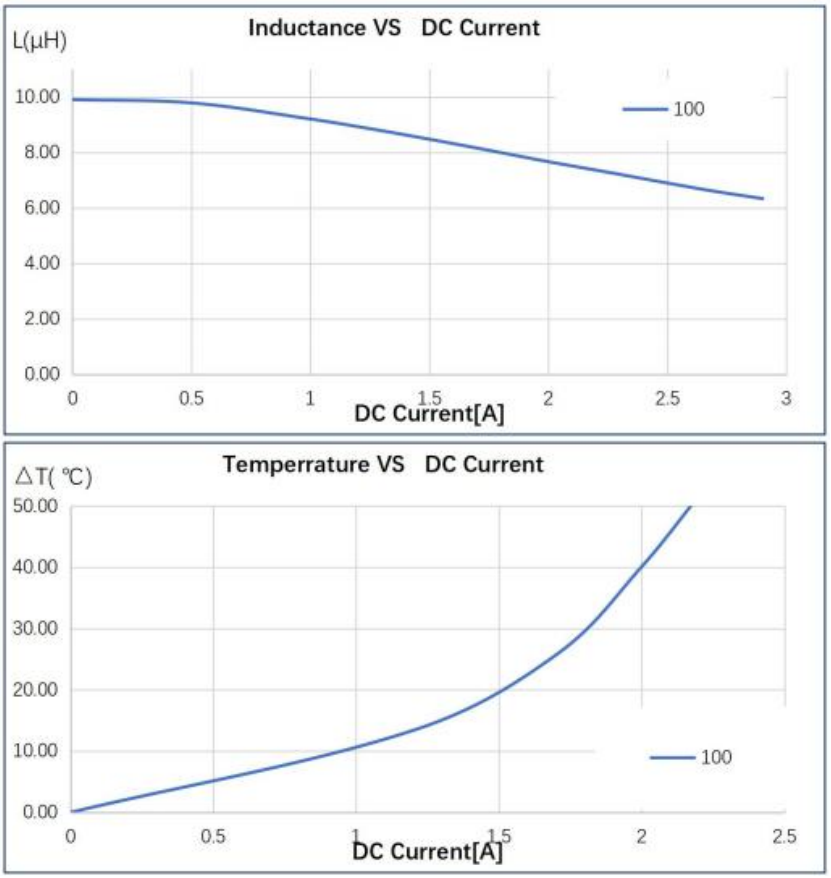
☆ L Frequency Characteristics



CHARACTERISTICS(REFERENCE) 特征曲线

- AFL404010 Series

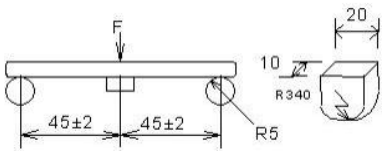
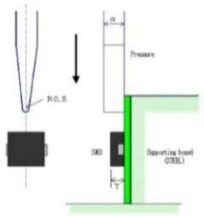
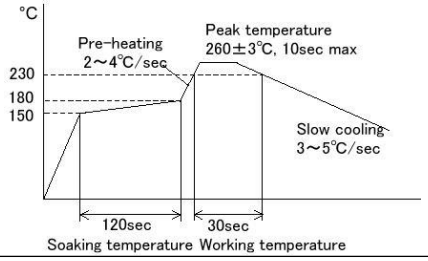
☆ Inductor DC Superposition Characteristics



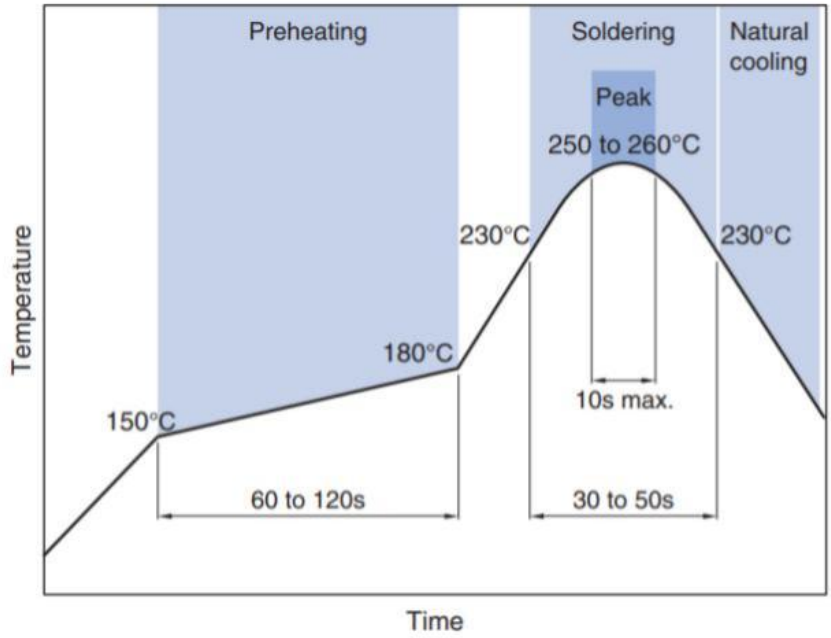
RELIABILITY TEST 可靠性测试

<table>
<tr><th>PROJECT</th><th>EXPERIMENTAL STANDARD</th><th>JUDGMENT CONDITIONS</th></tr>
<tr><td>Solder attachment experiment</td><td>Dipped in tin 245°C±5°C, products placed in the tank for 2±0.5sec.</td><td>More than 95% of the surface must be covered by tin without detachment
No abnormal appearance.</td></tr>
<tr><td>Mechanical vibration experiment</td><td>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.</td><td>No abnormal appearance
No open circuit or short circuit occurred.
｜△L/L ｜≦ 10%.</td></tr>
<tr><td>Mechanical shock experiment</td><td>Put the product to be verified on the substrate and solder
Maximum acceleration 980m/S2
Sine half-wave pulse with an action time of 6msec
Add 3 times in each of the 6 directions, a total of 18 times.</td><td>No abnormal appearance
No open circuit or short circuit occurred.
｜△L/L ｜≦ 10%.</td></tr>
<tr><td>High temperature operation</td><td>Placed at 85±2°C
500hr±12hr through rated current
Placed in room temperature and humidity for 1hr before testing.</td><td>No abnormal appearance
No open circuit or short circuit occurred.
｜△L/L ｜≦ 10%.</td></tr>
<tr><td>Thermal shock experiment</td><td>The following table is for 1 cycle, after 500 cycles are completed. Measured after placing in room temperature and humidity for 1 hour.
<table>
<tr><th></th><th>Temperature</th><th>Time</th></tr>
<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>
</table></td><td>No abnormal appearance
No open circuit or short circuit occurred.
｜△L/L ｜≦ 10%.</td></tr>
<tr><td>High temperature storage</td><td>125±2°C under the condition of room humidity
500hr±12hr
Placed in room temperature and humidity for 1h before testing.</td><td>No abnormal appearance
No open circuit or short circuit occurred.
｜△L/L ｜≦ 10%.</td></tr>
<tr><td>Low temperature storage</td><td>Stored at -40±2°C
500h±12h
Placed in room temperature and humidity for 1hr post-test</td><td>No abnormal appearance
No open circuit or short circuit occurred.
｜△L/L ｜≦ 10%.</td></tr>
<tr><td>High temperature and high humidity storage</td><td>85±2°C 85%RH
500hr±12hr
Placed in room temperature and humidity for 1hr before testing</td><td>No abnormal appearance
No open circuit or short circuit occurred.
｜△L/L ｜≦ 10%.</td></tr>
</table>

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. ｜△L/L ｜≦ 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. ｜△L/L ｜≦ 10%.

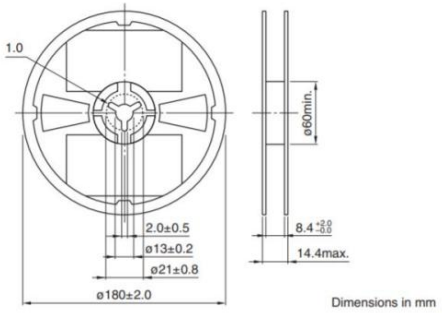
RECOMMENDED SOLDERING TECHNOLOGIES 焊接工艺建议



PACKAGING 包装

● Roll size

☆ AFL201208~AFL252012

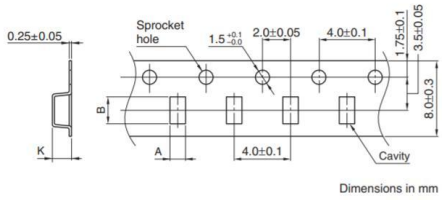


● Packing Quantity

Type	Reel
AFL201208	3000/PCS
AFL201210	3000/PCS
AFL201610	3000/PCS
AFL201612	3000/PCS
AFL252010	3000/PCS
AFL252012	3000/PCS

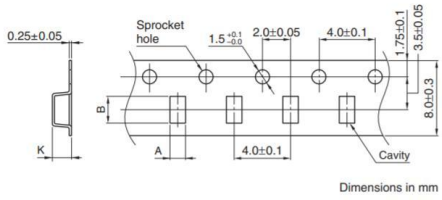
● Tape size

☆ AFL201208~AFL201612



Type	A0	K0	K
AFL201610	1.95	2.35	1.15
AFL201210	1.55	2.30	1.15
AFL201610	1.95	2.35	1.15
AFL201612	1.95	2.35	1.15

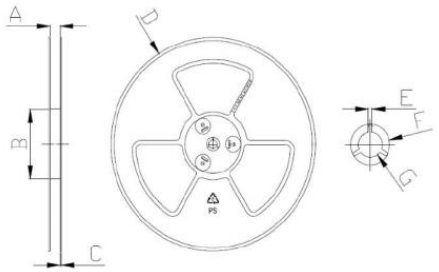
☆ AFL252010~AFL252012



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

PACKAGING 包装

- Roll size
- ☆ AFL404010

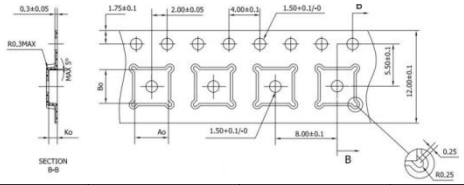


A	B	C	D
12.5±1.0	100±1.5	2.0±0.1	330±1.0
E	F	G	
1.9±0.4	21±0.4	13±0.4	

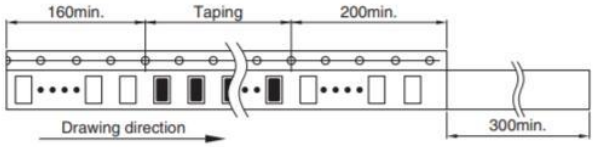
- Packing Quantity

Type	Reel
AFL404010	4000/PCS

- Tape size
- ☆ AFL404010



Type	A0	K0	K
AFL404010	4.35±0.1	4.35±0.1	1.1±0.05



Dimensions in mm

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.