

# Power Inductor

## Automotive Grade

### APSC Series



#### Overview

Power inductors are passive electronic components used in various circuits to store energy in a magnetic field when electrical current flows through them. They are critical in filtering, energy storage, and noise suppression in power electronic systems. They are designed to handle higher currents and are optimized for minimal power loss and thermal efficiency.

#### Benefits

1. Automotive grade available
2. Ferrite SMD Shielded Type
3. No thermal aging

#### Applications

1. Automotive Systems for Infotainment, Dashboard, ADAS
2. IPC Equipment
3. Net working

#### Product Information

| Series | L (mm) | W(mm) | T (mm) | Inductance (μH) |
|--------|--------|-------|--------|-----------------|
| APSC   | 3.2    | 3.2   | 1.6    | 0.47 ~ 1000     |
|        | 4.0    | 4.0   | 1.8    |                 |
|        | 4.0    | 4.0   | 3.0    |                 |
|        | 4.7    | 4.7   | 2.0    |                 |
|        | 4.7    | 4.7   | 3.0    |                 |
|        | 4.7    | 4.7   | 4.0    |                 |
|        | 5.7    | 5.7   | 2.0    |                 |
|        | 5.7    | 5.7   | 3.0    |                 |
|        | 6.7    | 6.7   | 3.0    |                 |
|        | 7.0    | 7.0   | 4.0    |                 |
|        | 7.5    | 7.5   | 4.6    |                 |
|        | 10.3   | 10.5  | 3.1    |                 |
|        | 10.3   | 10.5  | 4.0    |                 |
|        | 10.3   | 10.5  | 5.1    |                 |
|        | 12.5   | 12.5  | 4.5    |                 |
|        | 12.5   | 12.5  | 6.0    |                 |
|        | 12.5   | 12.5  | 8.0    |                 |

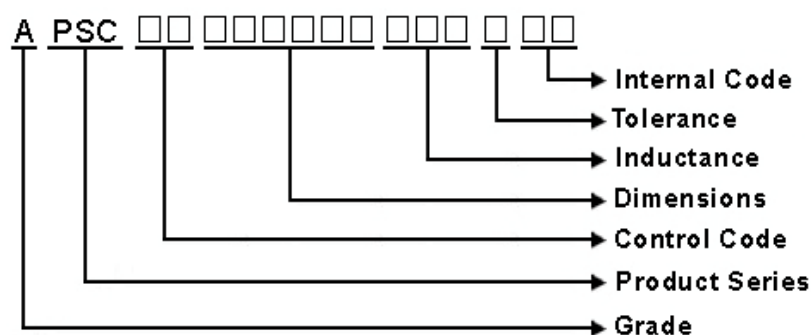


## APSC00050520 Series Specification

AEC-Q200

**1 Scope:** This specification applies to SMD Shielded Power Inductors

**2 Part Numbering:**



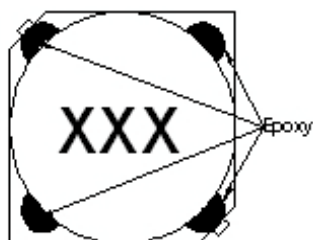
**3 Rating:**

Operating Temperature:  $-40^{\circ}\text{C} \sim +125^{\circ}\text{C}$  (Including self temp. rise)

Storage Temperature:  $-40^{\circ}\text{C} \sim +125^{\circ}\text{C}$  (For after the circuit board is mounted)

Storage Temperature: (on tape & reel):  $-20^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$ ; 75% RH max.

**4 Marking:**



**Ex Marking : 3R3**

**Marking color : Black**

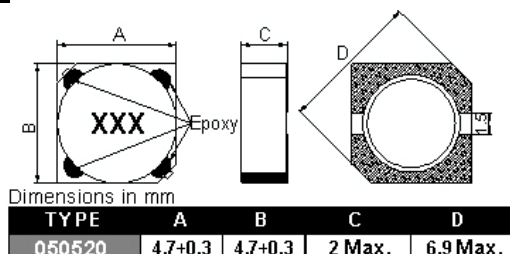
**5 Standard Testing Condition**

|             | Unless otherwise specified                           | In case of doubt             |
|-------------|------------------------------------------------------|------------------------------|
| Temperature | Ordinary Temperature( $15$ to $35^{\circ}\text{C}$ ) | $20$ to $30^{\circ}\text{C}$ |
| Humidity    | Ordinary Humidity( $25$ to $85\%$ RH)                | $50$ to $80\%$ RH            |

# APSC00050520 Series Specification

AEC-Q200

## 6 Configuration and Dimensions and Unit Weight:



### Net Weight (grms)

| SIZE CODE | Net Weight (grms) |
|-----------|-------------------|
| 050520    | 0.162(Typ.)       |

## 7 Electrical Characteristics:

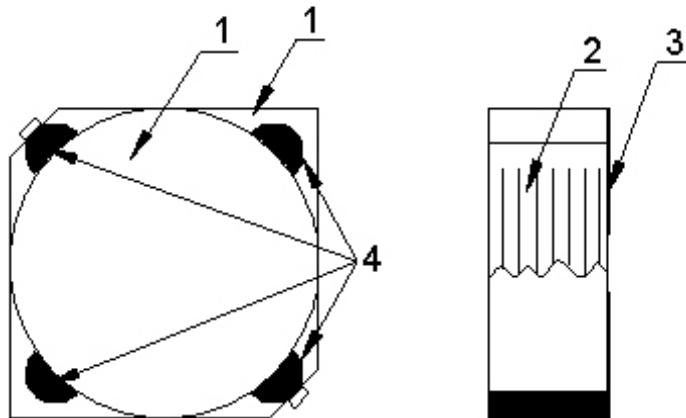
| Part No.           | Inductance (uH ) | Test Freq.    | RDC (Ω)Max. | Isat(A) Max(Typ) | Tolerance (±%) | Marking |
|--------------------|------------------|---------------|-------------|------------------|----------------|---------|
| APSC000505201R0□S0 | 1                | 7.96 MHz, 1 V | 0.045       | 1.72(2.50)       | 30             | 1R0     |
| APSC000505201R5□S0 | 1.5              | 7.96 MHz, 1 V | 0.06        | 1.50(1.80)       | 30             | 1R5     |
| APSC000505201R8□S0 | 1.8              | 7.96 MHz, 1 V | 0.07        | 1.35(1.70)       | 30             | 1R8     |
| APSC000505202R2□S0 | 2.2              | 7.96 MHz, 1 V | 0.075       | 1.30(1.60)       | 30             | 2R2     |
| APSC000505202R7□S0 | 2.7              | 7.96 MHz, 1 V | 0.105       | 1.20(1.50)       | 30             | 2R7     |
| APSC000505203R3□S0 | 3.3              | 7.96 MHz, 1 V | 0.11        | 1.04(1.30)       | 30             | 3R3     |
| APSC000505203R9□S0 | 3.9              | 7.96 MHz, 1 V | 0.155       | 0.88(1.20)       | 30             | 3R9     |
| APSC000505204R7□S0 | 4.7              | 7.96 MHz, 1 V | 0.162       | 0.84(1.10)       | 30             | 4R7     |
| APSC000505205R6□S0 | 5.6              | 7.96 MHz, 1 V | 0.17        | 0.80(1.00)       | 30             | 5R6     |
| APSC000505206R3□S0 | 6.3              | 7.96 MHz, 1 V | 0.18        | 0.78(0.95)       | 30             | 6R3     |
| APSC000505206R8□S0 | 6.8              | 7.96 MHz, 1 V | 0.2         | 0.76(0.85)       | 30             | 6R8     |
| APSC000505208R2□S0 | 8.2              | 7.96 MHz, 1 V | 0.245       | 0.68(0.80)       | 30             | 8R2     |
| APSC00050520100□S0 | 10               | 100 kHz, 1 V  | 0.28        | 0.61(0.75)       | 20,30          | 100     |
| APSC00050520120□S0 | 12               | 100 kHz, 1 V  | 0.32        | 0.56(0.70)       | 30             | 120     |
| APSC00050520150□S0 | 15               | 100 kHz, 1 V  | 0.36        | 0.50(0.65)       | 30             | 150     |
| APSC00050520180□S0 | 18               | 100 kHz, 1 V  | 0.4         | 0.48(0.60)       | 30             | 180     |
| APSC00050520220□S0 | 22               | 100 kHz, 1 V  | 0.48        | 0.41(0.55)       | 20,30          | 220     |
| APSC00050520270□S0 | 27               | 100 kHz, 1 V  | 0.57        | 0.35(0.50)       | 30             | 270     |
| APSC00050520330□S0 | 33               | 100 kHz, 1 V  | 0.694       | 0.32(0.45)       | 30             | 330     |
| APSC00050520390□S0 | 39               | 100 kHz, 1 V  | 0.8         | 0.30(0.40)       | 30             | 390     |
| APSC00050520470□S0 | 47               | 100 kHz, 1 V  | 0.95        | 0.28(0.38)       | 30             | 470     |
| APSC00050520560□S0 | 56               | 100 kHz, 1 V  | 1.08        | 0.26(0.35)       | 30             | 560     |
| APSC00050520680□S0 | 68               | 100 kHz, 1 V  | 1.3         | 0.24(0.34)       | 30             | 680     |
| APSC00050520101□S0 | 100              | 100 kHz, 1 V  | 2           | 0.20(0.30)       | 20,30          | 101     |

**NOTE:** □-tolerance M=±20% / T=±30%

- Operating temperature range - 40 °C ~ 125 °C(Including self - temperature rise)
- Isat for Inductance drop 35% from its value without current.
- RDC test method: place testing device to the 2 solder ends of winding and test the value.
- The actual use current is suggested not to be out of Isat\*80%

**8 APSC00050520 Series**

**8.1 Construction:**



**8.2 Material List:**

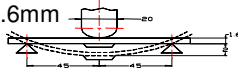
| No | Part     | Material        |
|----|----------|-----------------|
| 1  | Core     | Ferrite         |
| 2  | Wire     | Magnet Wire     |
| 3  | Terminal | Terminal Copper |
| 4  | Epoxy    | Epoxy Resin     |

# APSC00050520 Series Specification

AEC-Q200

## 9 Reliability Of Ferrite Wire Wound Power Inductor

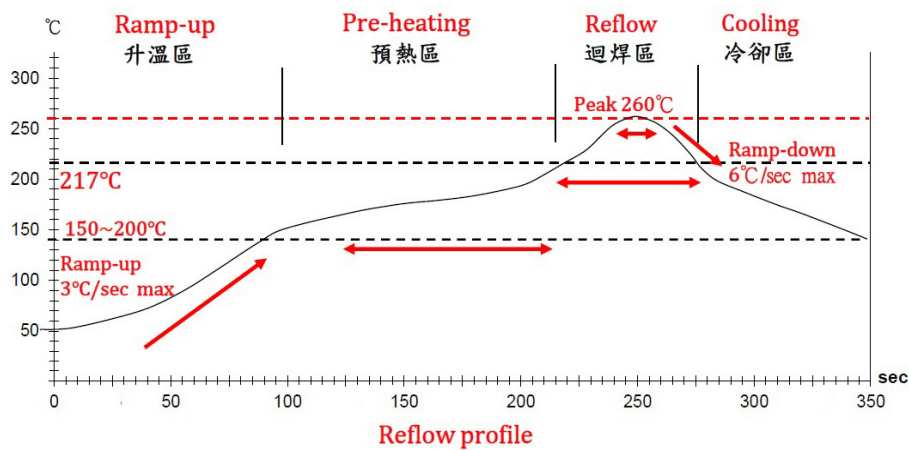
### 1-1.Mechanical Performance

| No    | Item                         | Specification                                                                                     | Test Method                                                                                                                                                                                                                                                                           |
|-------|------------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1-1-1 | Board Flex                   | The forces applied on the right conditions must not damage the terminal electrode and the ferrite | Refer to AEC-Q200-005<br>Test device shall be soldered on the substrate<br>Substrate Dimension: 100x40x1.6mm<br>Deflection: 2.0mm<br>Keeping Time: 60sec<br>                                       |
| 1-1-2 | Resistance to Soldering Heat | Appearance: No damage<br>Inductance change shall be within $\pm 10\%$ .                           | Refer to MIL-STD-202 Method 210<br>Pre-heating: 150°C, 1min<br>Solder Composition: Sn/Ag3.0/Cu0.5(Pb-Free)<br>Solder Temperature: 250 $\pm$ 5°C<br>Immersion Time: 10 $\pm$ 1sec                                                                                                      |
| 1-1-3 | Solder ability               | The electrodes shall be at least 95% covered with new solder coating                              | Refer to J-STD-002<br>Pre-heating: 150°C, 1min<br>Solder Composition: Sn/Ag3.0/Cu0.5(Pb-Free)<br>Solder Temperature: 245 $\pm$ 5°C (Pb-Free)<br>Immersion Time: 4 $\pm$ 1sec                                                                                                          |
| 1-1-4 | Terminal Strength Test       | Appearance: No damage                                                                             | Refer AEC-Q200-006<br>Soldered on PCB for testing as fig.<br>Force : 1.8kg<br>Keeping Time: 60 seconds.                                                                                                                                                                               |
| 1-1-5 | Resistance to Solvent        | There must be no change in appearance or obliteration of marking                                  | Refer to MIL-STD-202 Method 215<br>Inductors must withstand 6 minutes of alcohol or water<br>Sample Size : 15 pcs                                                                                                                                                                     |
| 1-1-6 | Vibration                    | Appearance: No damage<br>Inductance change shall be within $\pm 10\%$ .                           | Refer MIL-STD-202 Method 204<br>Vibration waveform: Sine waveform<br>Vibration frequency: 10Hz~2000Hz<br>Vibration acceleration: 5g<br>Sweep rate: 0.764386octave/minute<br>Duration of test: 12 cycles each of 3 orientations, 20 minutes for each cycle<br>Vibration axes: X, Y & Z |

### 1-2.Environmental Performance

| No    | Item                                | Specification                                                         | Test Method                                                                                                                                                                                                                                                       |
|-------|-------------------------------------|-----------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1-2-1 | Temperature Cycle                   | Appearance: No damage<br>Inductance change shall be within $\pm 30\%$ | Refer to JESD Method JA-104<br>Total cycles: 1000 cycles<br>Temperature Cycling Test Conditions : -40 to +125 °C<br>-40 °C Soak Mode Condition : 30 minutes<br>125 °C Soak Mode Condition : 30 minutes<br>Measured after exposure in the room condition for 24hrs |
| 1-2-2 | Biased Humidity Resistance          |                                                                       | Refer to MIL-STD-202 Method 103<br>Temperature: 85 $\pm$ 2°C<br>Relative Humidity:85% / Time: 1000hrs<br>Measured after exposure in the room condition for 24hrs                                                                                                  |
| 1-2-3 | High Temperature Exposure (Storage) |                                                                       | Refer to MIL-STD-202 Method 108<br>Temperature: 125 $\pm$ 3°C<br>Time: 1000hrs<br>Measured after exposure in the room condition for 24hrs                                                                                                                         |
| 1-2-4 | Operational Life                    |                                                                       | Refer to MIL-STD-202 Method 108<br>Temperature: 125 $\pm$ 3°C<br>Applied Current : Rated Current<br>Time: 1000hrs<br>Measured after exposure in the room condition for 24hrs                                                                                      |

## Reflow Soldering Profile



Lead-Free(LF)標準溫度分析範圍

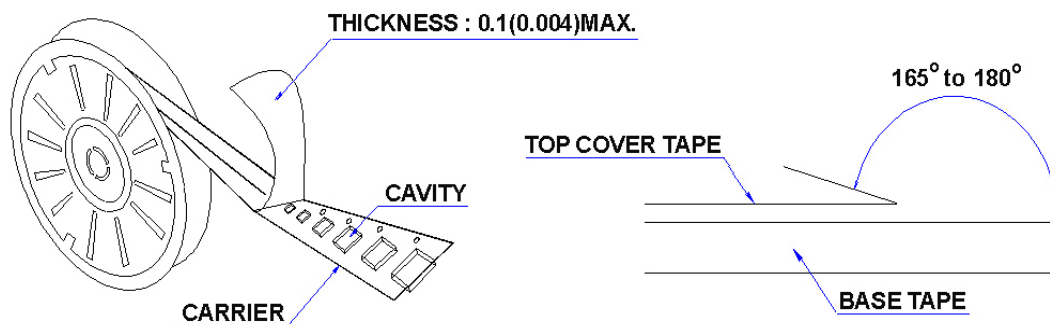
Refer to J-STD-020C

| 管制項目<br>Item.       | 升溫區<br>Ramp-up | 預熱區<br>Pre-heating | 迴焊區<br>Reflow | Peak Temp   | 冷卻區<br>Cooling   |
|---------------------|----------------|--------------------|---------------|-------------|------------------|
| 溫度範圍<br>Temp.scope  | R.T ~ 150°C    | 150°C ~ 200°C      | 217°C         | 260±5°C     | Peak Temp.~150°C |
| 標準時間<br>Time spec.  | —              | 60 ~ 180 sec       | 60 ~ 150 sec  | 20 ~ 40 sec | —                |
| 實際時間<br>Time result | —              | 75 ~ 100 sec       | 90 ~ 120 sec  | 20 ~ 35 sec | —                |

## 11 Packaging:

### 11.1 Packaging -Cover Tape

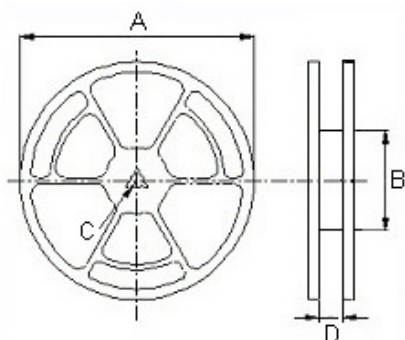
The force for tearing off cover tape is 10 to 130 grams in the arrow direction.



### 11.2 Packaging Quantity

| TYPE   | PCS/REEL |
|--------|----------|
| 050520 | 2000     |

### 11.3 Reel Dimensions

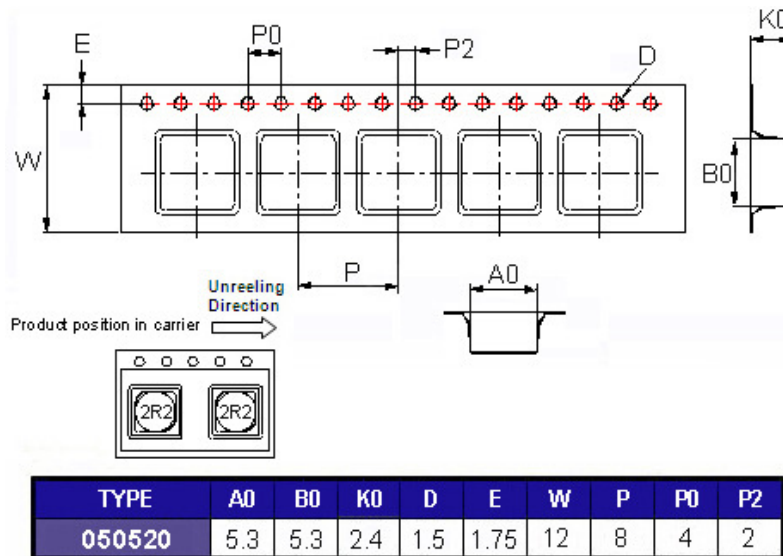


Dimensions in mm

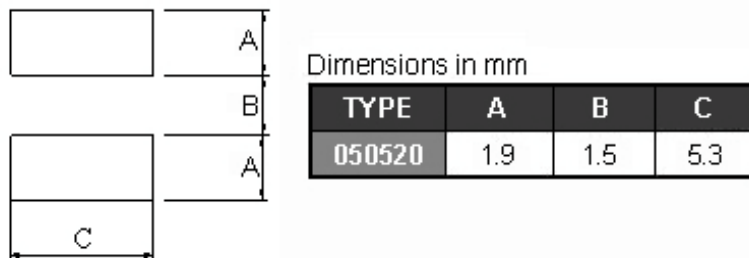
| TYPE   | A   | B   | C  | D    |
|--------|-----|-----|----|------|
| 050520 | 330 | 100 | 13 | 13.4 |

## 11 Packaging:

### 11.4 Tape Dimensions in mm



## 12 Recommended Land Pattern:



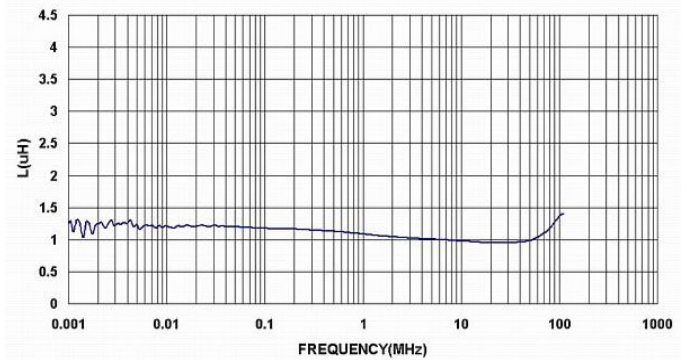
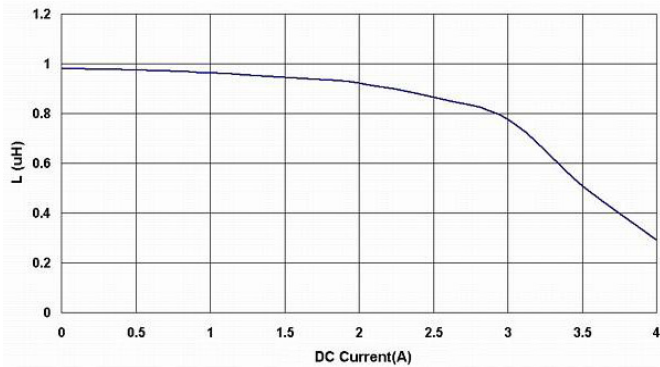
## 13 Note:

1. Please make sure that your product has been evaluated and confirmed against your specifications when our product is mounted to your product.
2. Do not knock nor drop.
3. All the items and parameters in this product specification have been prescribed on the premise that our product is used for the purpose, under the condition and in the environment agreed upon between you and us. You are requested not to use our product deviating from such agreement.
4. Please keep the distance between transformer/coil and other components (refer to the standard IEC 950)
5. The moisture sensitivity level (MSL) of products is classified as level 1.

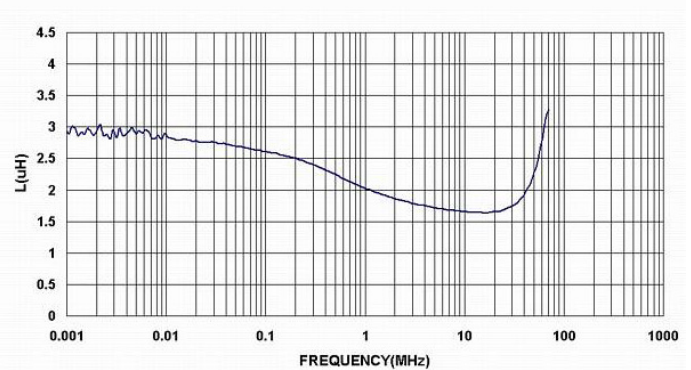
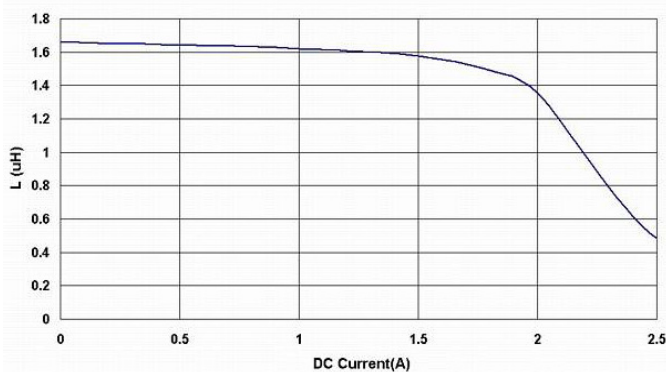


## 14 Graph:

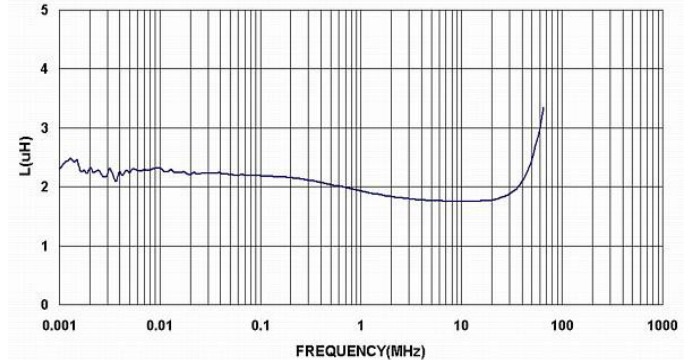
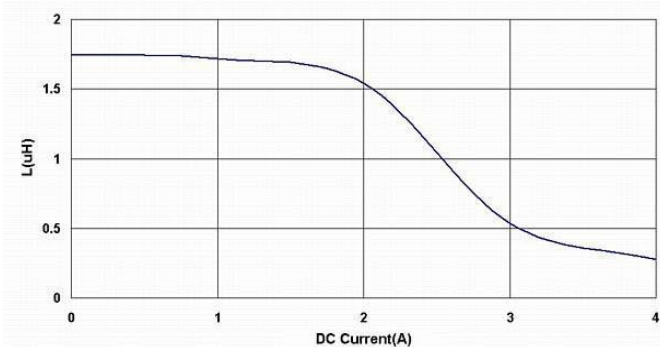
APSC000505201R0□S0



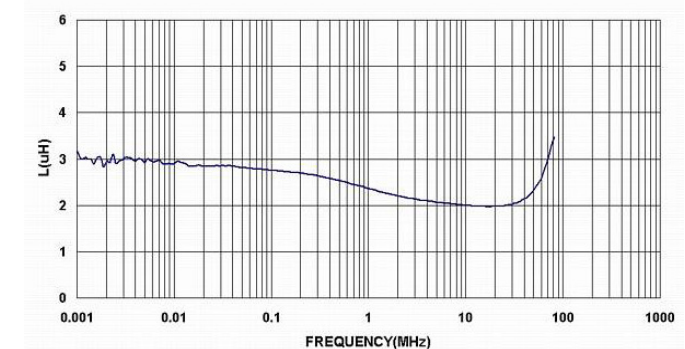
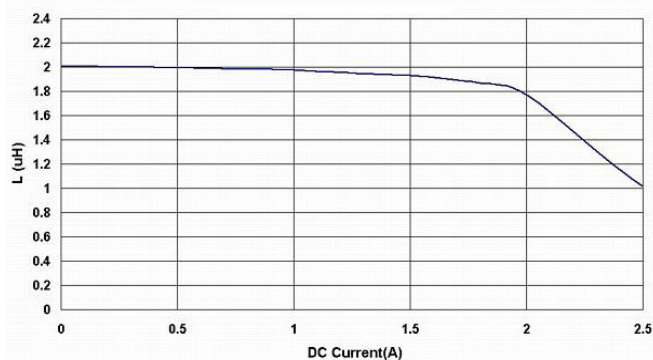
APSC000505201R5□S0



APSC000505201R8□S0



APSC000505202R2□S0

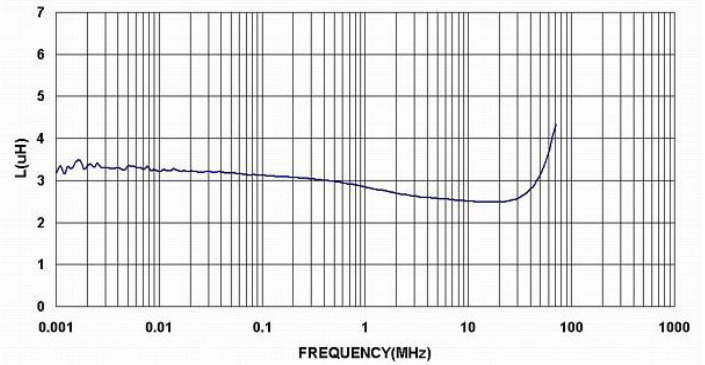
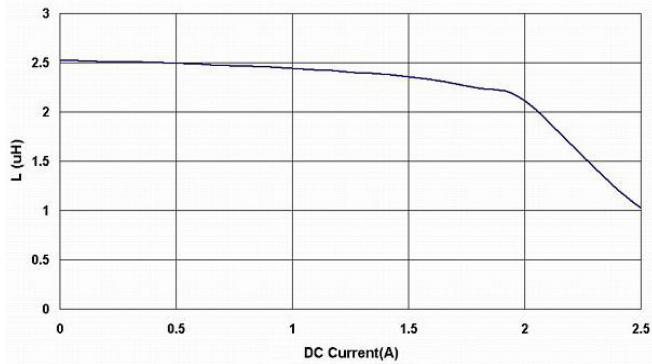


# APSC00050520 Series Specification

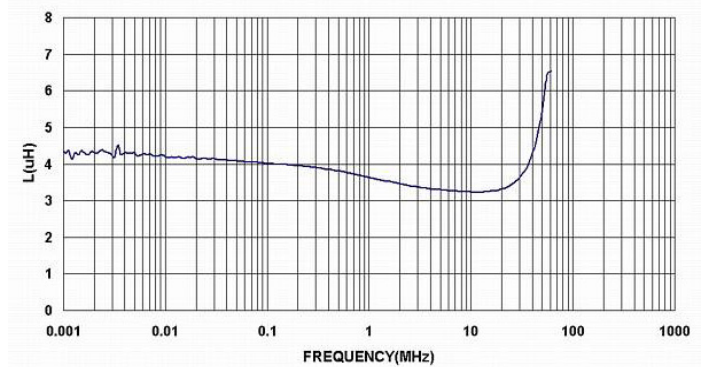
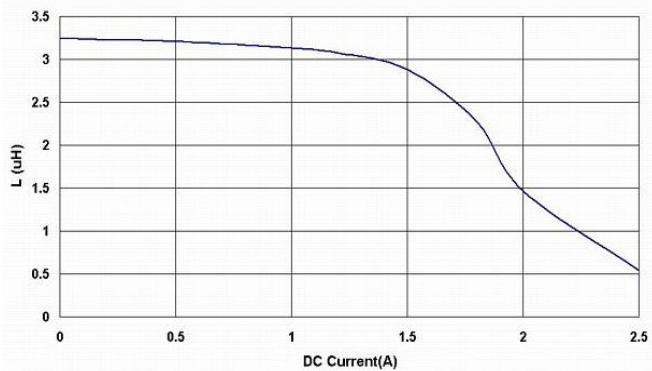
AEC-Q200

## 14 Graph:

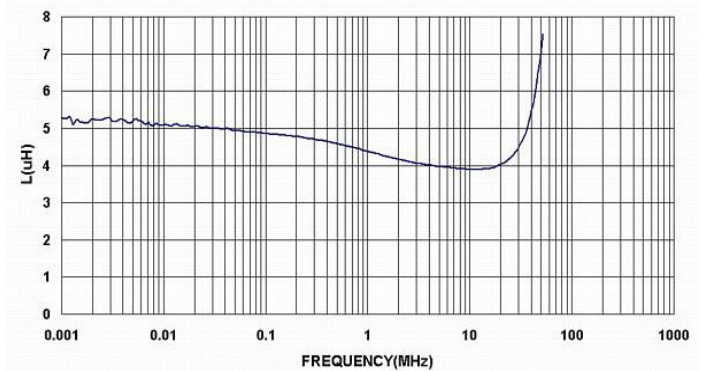
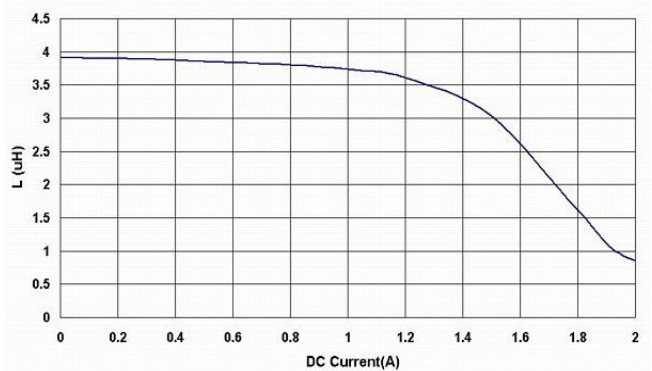
APSC000505202R7□S0



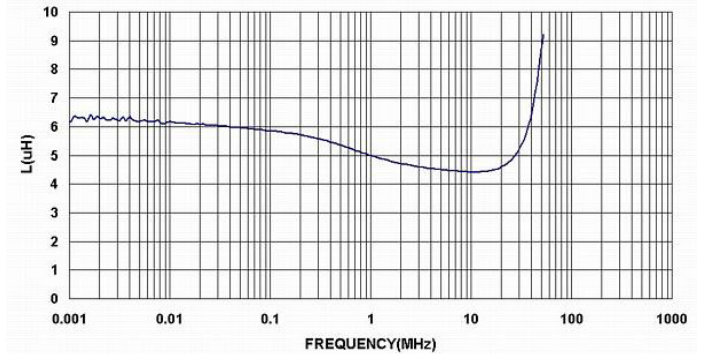
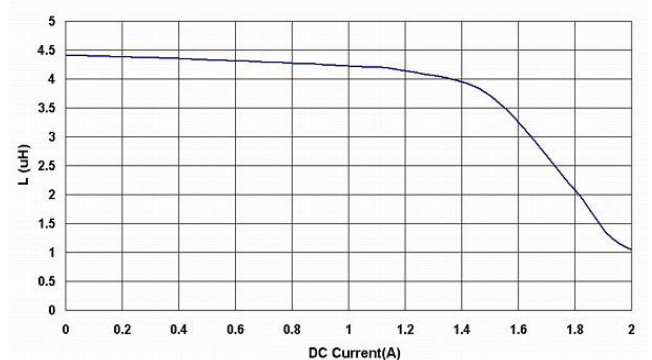
APSC000505203R3□S0



APSC000505203R9□S0



APSC000505204R7□S0

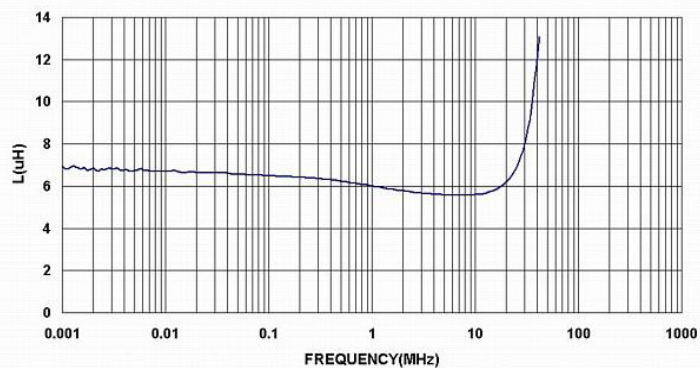
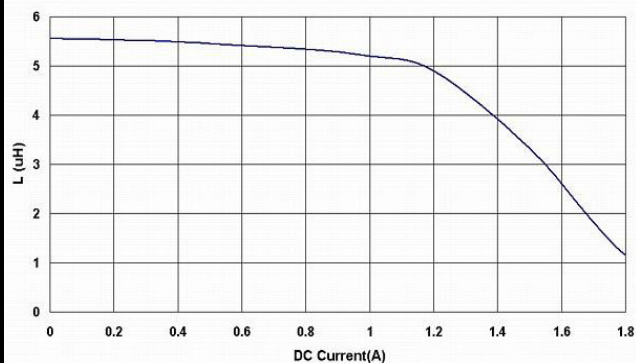


# APSC00050520 Series Specification

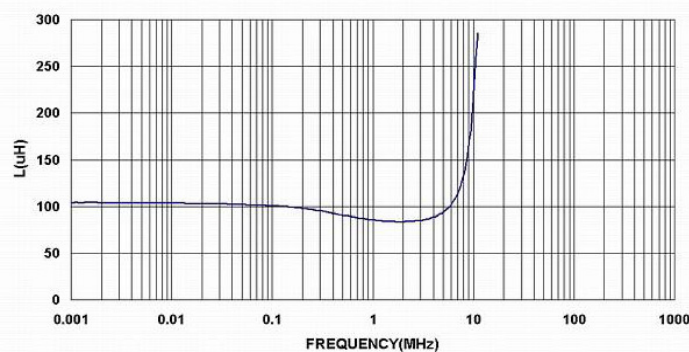
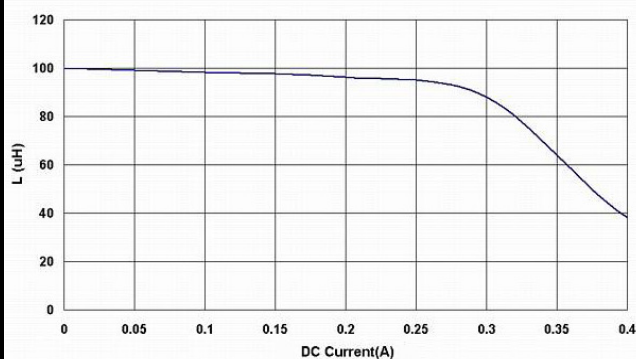
AEC-Q200

## 14 Graph:

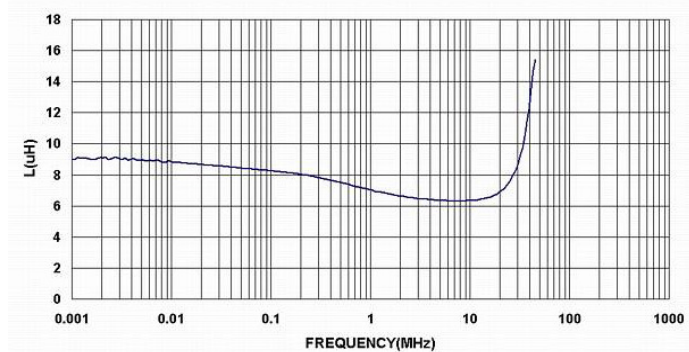
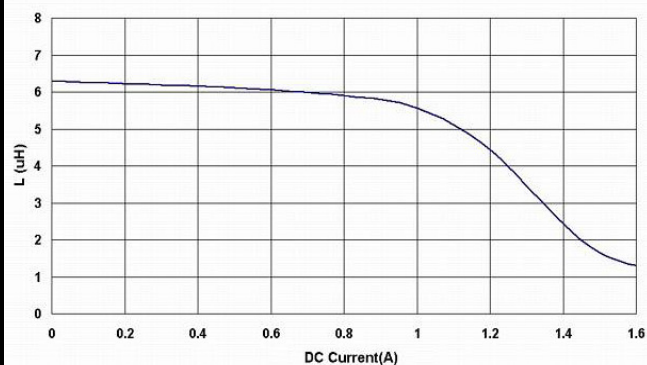
APSC000505205R6□S0



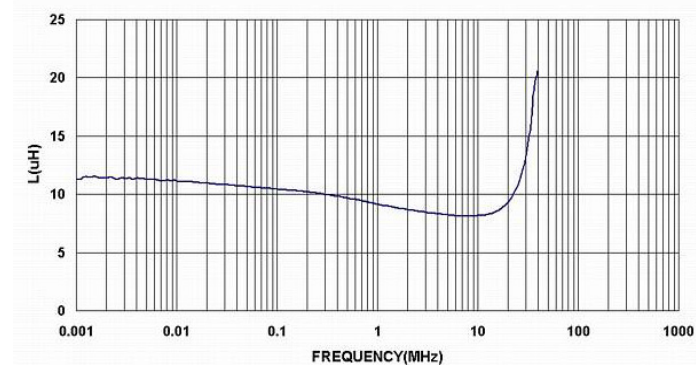
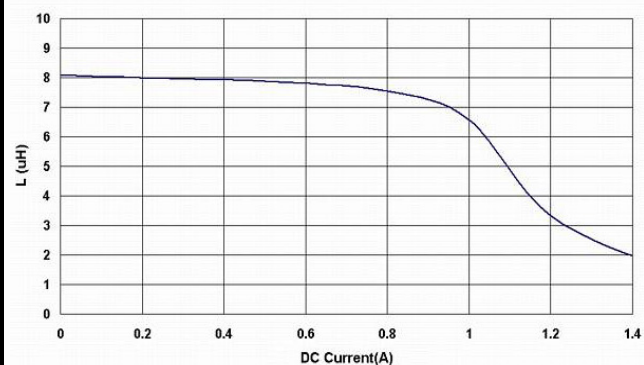
APSC00050520101□S0



APSC000505206R8□S0



APSC000505208R2□S0



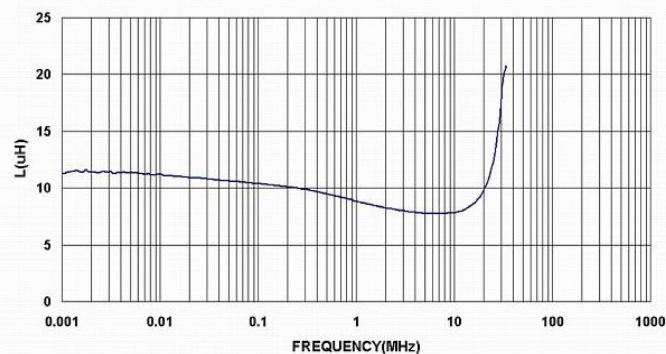
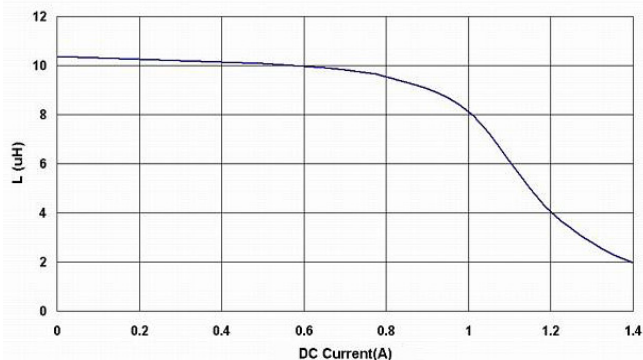


# APSC00050520 Series Specification

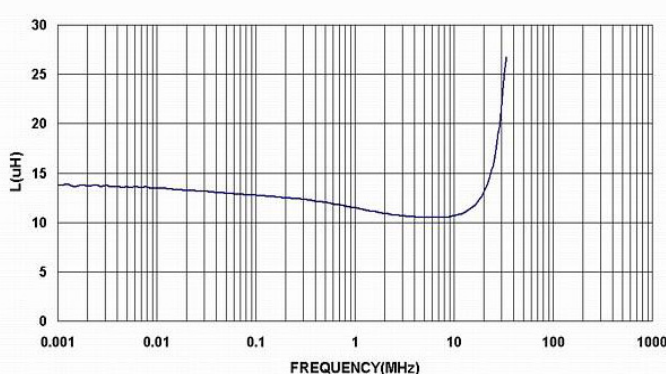
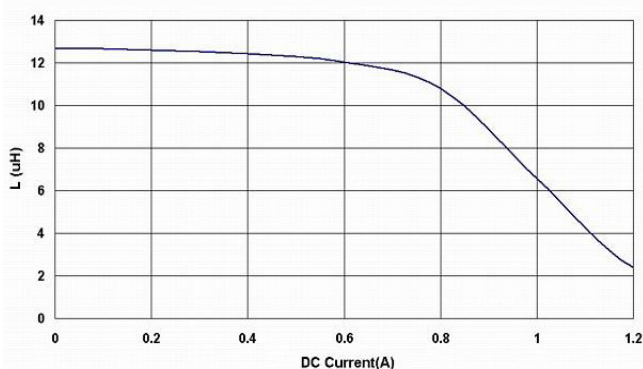
AEC-Q200

## 14 Graph:

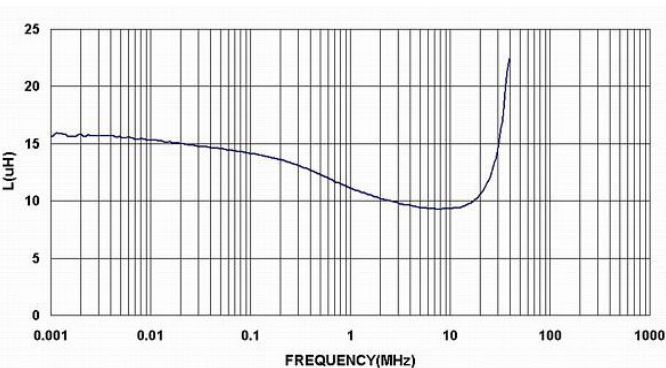
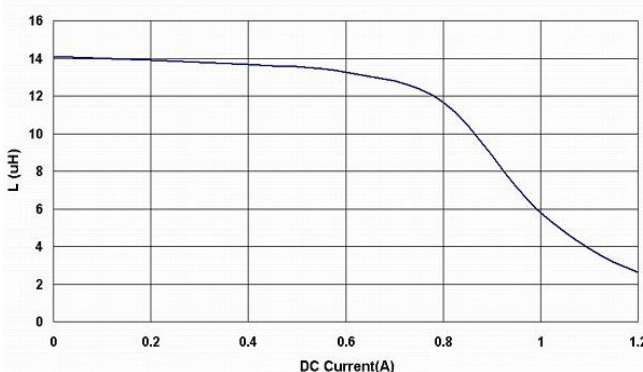
APSC00050520100□S0



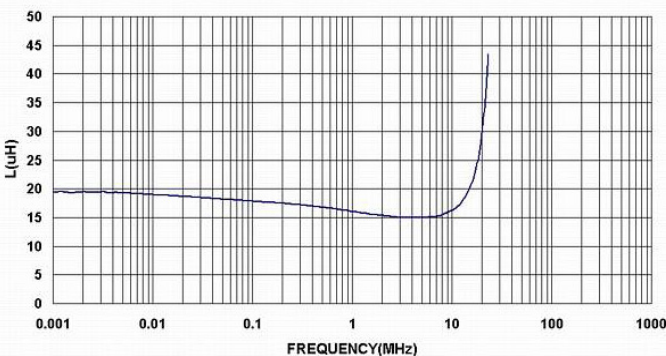
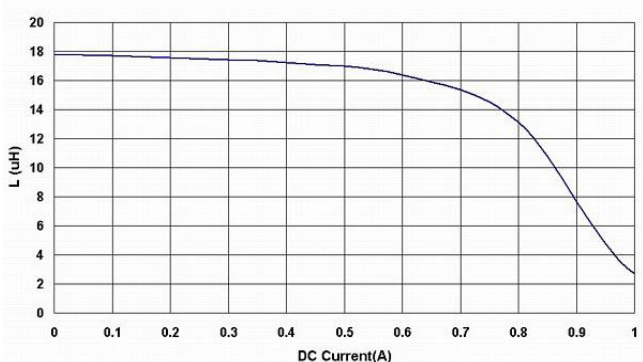
APSC00050520120□S0



APSC00050520150□S0

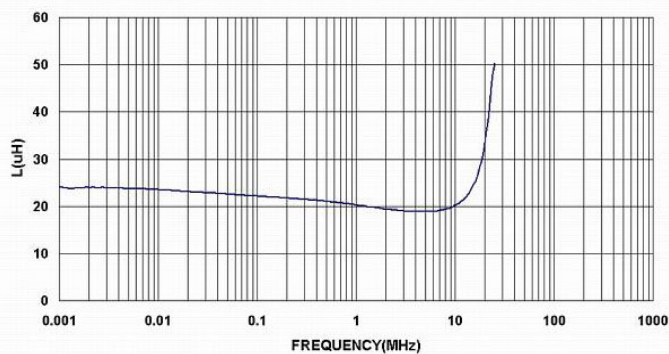
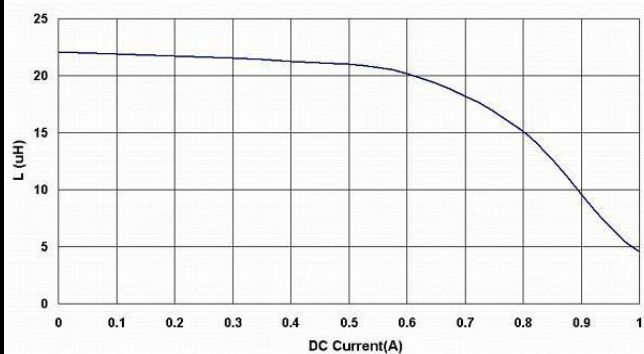


APSC00050520180□S0

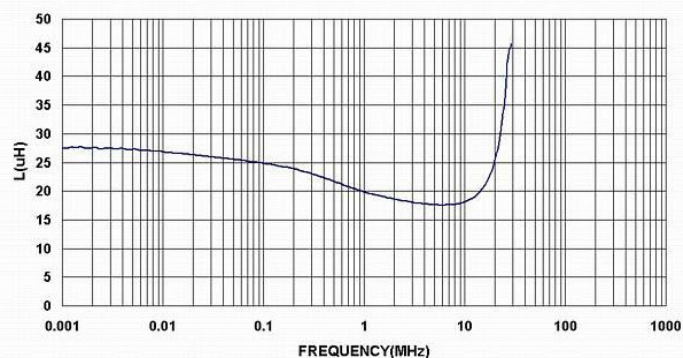
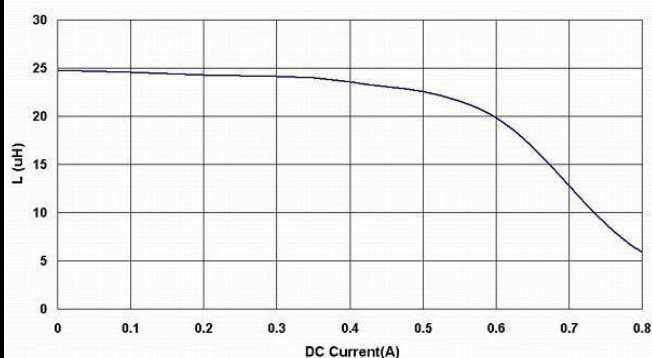


## 14 Graph:

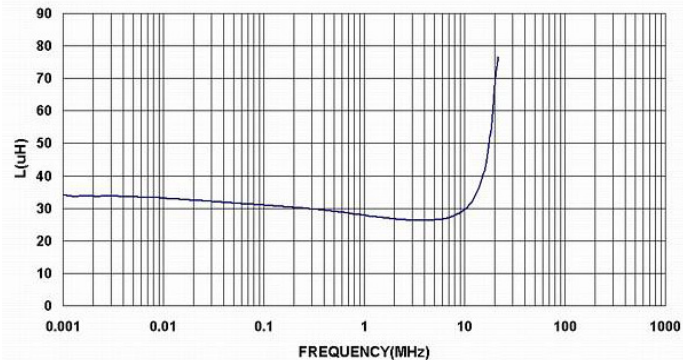
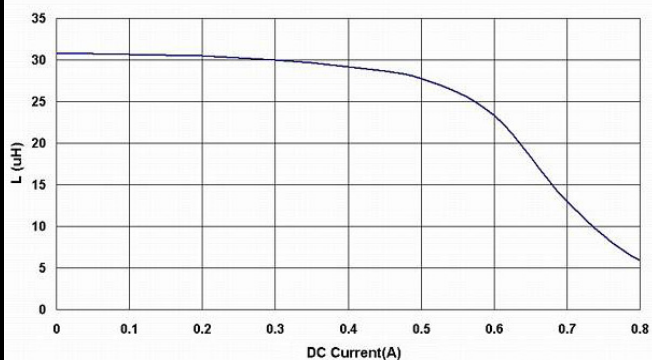
APSC00050520220□S0



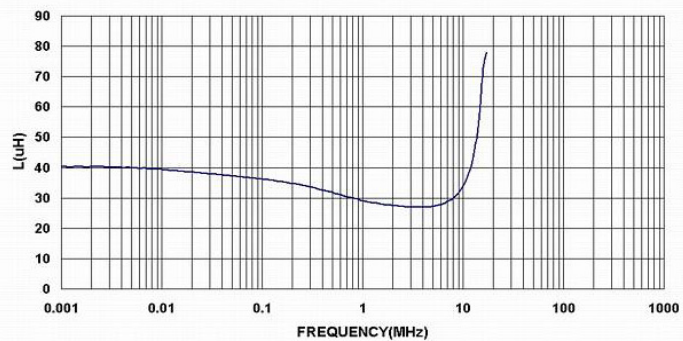
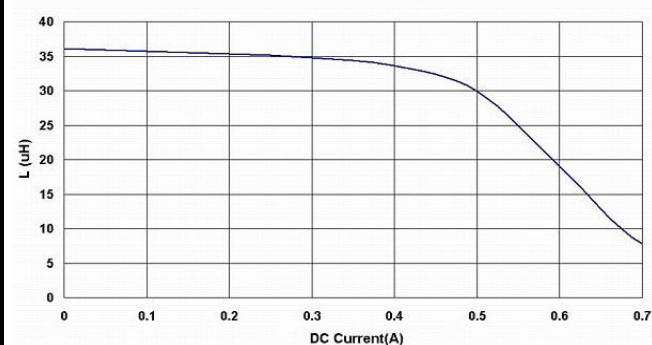
APSC00050520270□S0



APSC00050520330□S0



APSC00050520390□S0

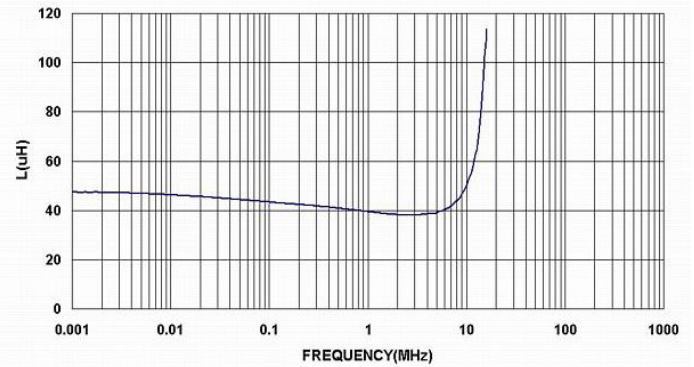
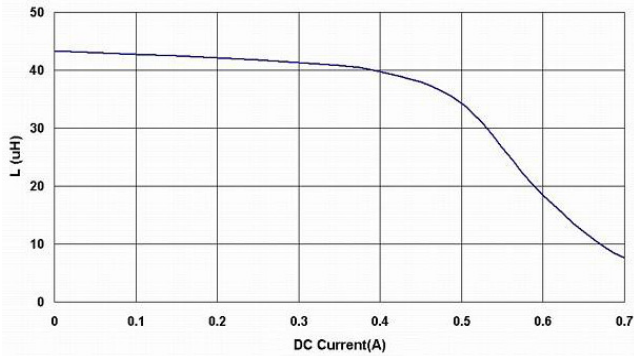


# APSC00050520 Series Specification

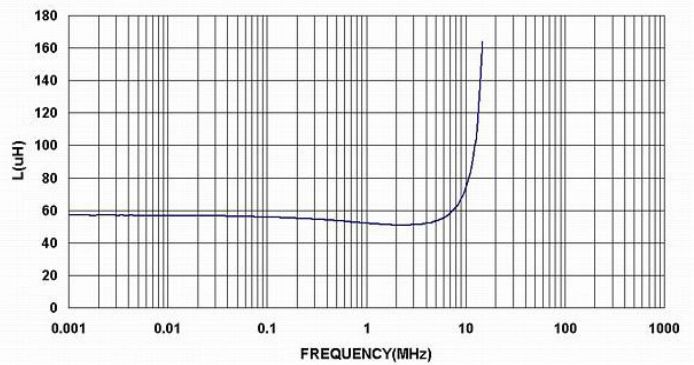
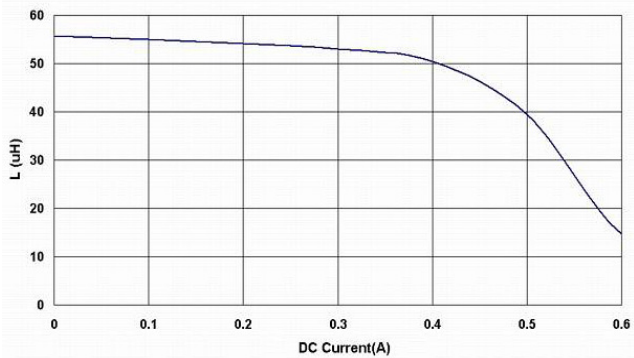
AEC-Q200

## 14 Graph:

APSC00050520470□S0



APSC00050520560□S0



APSC00050520680□S0

