

# LOW PROFILE SMD POWER INDUCTORS



『TZSH3010FC・TZSH3012FC・TZSH3015FC』

『TZSH4010FC・TZSH4012FC・TZSH4018FC』

『TZSH6010FC・TZSH6012FC・TZSH6015FC』

『TZSH6020FC・TZSH6028FC』

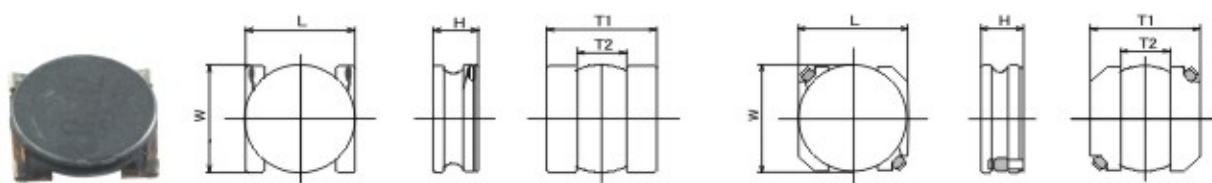
## ■Features

- ・ Small size and low profile.
- ・ Magnetically shielded construction and low DC resistance.
- ・ The magnetic shield structure containing magnetic powder.
- ・ High reliability for mechanical strength.
- ・ Variety of DC-DC converter inductor applications.

## ■特 長

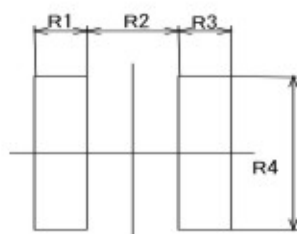
- ・ 小型で、低背タイプ。
- ・ 閉磁路で低電気抵抗タイプ。
- ・ 磁性レジンをを用いた磁気シールド構造
- ・ 高信頼で機械的強度が高い。
- ・ 種々のDC-DC コンバータに応用出来ます。

## ■Dimensions/形状寸法



| DSC Part Number | Dimensions |       |        |       |         |
|-----------------|------------|-------|--------|-------|---------|
|                 | L          | W     | H      | T1    | T2      |
| TZSH3010FC      | 3±0.2      | 3±0.2 | 1.0MAX | 3±0.2 | 1.0±0.2 |
| TZSH3012FC      |            |       | 1.2MAX |       |         |
| TZSH3015FC      |            |       | 1.5MAX |       |         |
| TZSH4010FC      | 4±0.2      | 4±0.2 | 1.0MAX | 4±0.2 | 1.4±0.2 |
| TZSH4012FC      |            |       | 1.2MAX |       |         |
| TZSH4018FC      |            |       | 1.8MAX |       |         |
| TZSH6010FC      | 6±0.2      | 6±0.2 | 1.0MAX | 6±0.2 | 2.7±0.2 |
| TZSH6012FC      |            |       | 1.2MAX |       |         |
| TZSH6015FC      |            |       | 1.5MAX |       |         |
| TZSH6020FC      |            |       | 2.0MAX |       |         |
| TZSH6028FC      |            |       | 2.8MAX |       |         |

## ■Recommended Patterns / ランドパターン



| DSC Part Number | Dimensions |     |     |     |
|-----------------|------------|-----|-----|-----|
|                 | R1         | R2  | R3  | R4  |
| TZSH3010FC      | 1.2        | 1.0 | 1.2 | 3.2 |
| TZSH3012FC      |            |     |     |     |
| TZSH3015FC      |            |     |     |     |
| TZSH4010FC      | 1.5        | 1.4 | 1.5 | 4.2 |
| TZSH4012FC      |            |     |     |     |
| TZSH4018FC      |            |     |     |     |
| TZSH6010FC      | 1.9        | 2.5 | 1.9 | 6.2 |
| TZSH6012FC      |            |     |     |     |
| TZSH6015FC      |            |     |     |     |
| TZSH6020FC      |            |     |     |     |
| TZSH6028FC      |            |     |     |     |

## ■ Electric Specifications/電気特性

### ● TYPE TZSH3010FC(3.0×3.0mm, 1.0mm Height, Magnetic Resin Shielded)

| DSC Part Number | Inductance<br>( $\mu$ H) | Tolerance<br>(%) | DC Resistance<br>(m $\Omega$ ) $\pm$ 20% | Rated current                  |                                      |
|-----------------|--------------------------|------------------|------------------------------------------|--------------------------------|--------------------------------------|
|                 |                          |                  |                                          | Saturation current<br>(mA) Max | Temperature Rise Current<br>(mA) Max |
| TZSH3010FC-2R2  | 2.2                      | $\pm$ 20         | 95                                       | 1100                           | 1350                                 |
| TZSH3010FC-3R3  | 3.3                      | $\pm$ 20         | 120                                      | 900                            | 1200                                 |
| TZSH3010FC-4R7  | 4.7                      | $\pm$ 20         | 170                                      | 700                            | 1000                                 |
| TZSH3010FC-6R8  | 6.8                      | $\pm$ 20         | 300                                      | 570                            | 800                                  |
| TZSH3010FC-100  | 10                       | $\pm$ 20         | 400                                      | 500                            | 700                                  |
| TZSH3010FC-150  | 15                       | $\pm$ 20         | 650                                      | 400                            | 500                                  |
| TZSH3010FC-220  | 22                       | $\pm$ 20         | 850                                      | 350                            | 450                                  |
| TZSH3010FC-330  | 33                       | $\pm$ 20         | 1100                                     | 260                            | 350                                  |
| TZSH3010FC-470  | 47                       | $\pm$ 20         | 1700                                     | 230                            | 300                                  |

### ● TYPE TZSH3012FC(3.0×3.0mm, 1.2mm Height, Magnetic Resin Shielded)

| DSC Part Number | Inductance<br>( $\mu$ H) | Tolerance<br>(%) | DC Resistance<br>(m $\Omega$ ) $\pm$ 20% | Rated current                 |                              |
|-----------------|--------------------------|------------------|------------------------------------------|-------------------------------|------------------------------|
|                 |                          |                  |                                          | Inductor Decrease<br>(mA) Max | Temperature Rise<br>(mA) Max |
| TZSH3012FC-2R2  | 2.2                      | $\pm$ 20         | 80                                       | 1200                          | 1500                         |
| TZSH3012FC-3R3  | 3.3                      | $\pm$ 20         | 100                                      | 1100                          | 1300                         |
| TZSH3012FC-4R7  | 4.7                      | $\pm$ 20         | 130                                      | 880                           | 1200                         |
| TZSH3012FC-6R8  | 6.8                      | $\pm$ 20         | 190                                      | 700                           | 1000                         |
| TZSH3012FC-100  | 10                       | $\pm$ 20         | 290                                      | 600                           | 800                          |
| TZSH3012FC-150  | 15                       | $\pm$ 20         | 410                                      | 520                           | 650                          |
| TZSH3012FC-220  | 22                       | $\pm$ 20         | 630                                      | 380                           | 500                          |
| TZSH3012FC-330  | 33                       | $\pm$ 20         | 1000                                     | 340                           | 350                          |
| TZSH3012FC-470  | 47                       | $\pm$ 20         | 1300                                     | 290                           | 300                          |

### ● TYPE TZSH3015FC(3.0×3.0mm, 1.5mm Height, Magnetic Resin Shielded)

| DSC Part Number | Inductance<br>( $\mu$ H) | Tolerance<br>(%) | DC Resistance<br>(m $\Omega$ ) $\pm$ 20% | Rated current                           |                                      |
|-----------------|--------------------------|------------------|------------------------------------------|-----------------------------------------|--------------------------------------|
|                 |                          |                  |                                          | Inductance Decrease current<br>(mA) Max | Temperature Rise Current<br>(mA) Max |
| TZSH3015FC-2R2  | 2.2                      | $\pm$ 20         | 60                                       | 1550                                    | 1600                                 |
| TZSH3015FC-3R3  | 3.3                      | $\pm$ 20         | 80                                       | 1300                                    | 1400                                 |
| TZSH3015FC-4R7  | 4.7                      | $\pm$ 20         | 110                                      | 1050                                    | 1200                                 |
| TZSH3015FC-6R8  | 6.8                      | $\pm$ 20         | 160                                      | 950                                     | 1000                                 |
| TZSH3015FC-100  | 10                       | $\pm$ 20         | 200                                      | 770                                     | 850                                  |
| TZSH3015FC-150  | 15                       | $\pm$ 20         | 320                                      | 600                                     | 750                                  |
| TZSH3015FC-220  | 22                       | $\pm$ 20         | 550                                      | 480                                     | 550                                  |
| TZSH3015FC-330  | 33                       | $\pm$ 20         | 800                                      | 410                                     | 450                                  |
| TZSH3015FC-470  | 47                       | $\pm$ 20         | 1200                                     | 350                                     | 400                                  |

## ■ Conditions/測定条件

- (1)The saturation current is the current value which causes 30% inductance reduction from the initial value.  
直流重畳許容電流は直流重畳された電流によりインダクタンスの値が低下し、30%以内となる直流電流の値である。
- (2)The temperature rise current is the DC current value having temperature increase up to 40°C.  
温度上昇許容電流は直流重畳された電流により温度上昇の値が40°Cとなる直流電流の値である。
- (3)The rated current is the DC current that satisfies both of the saturation current and temperature rise current value.  
定格電流は直流重畳許容電流と温度上昇許容電流の両方を満足する直流電流の値である。
- (4)The measuring frequency and surroundings temperature are 100 kHz and 25°C, respectively.  
測定周波数: 100kHz。測定周囲温度: 25°C。

## ■ Note/特記

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## ■ Electric Specifications/電気特性

### ● TYPE TZSH4010FC(4.0×4.0mm, 1.0mm Height, Magnetic Resin Shielded)

| DSC Part Number | Inductance<br>( $\mu$ H) | Inductance<br>Tolerance<br>(%) | DC Resistance<br>( $m\Omega$ ) $\pm 20\%$ | Rated current                 |                              |
|-----------------|--------------------------|--------------------------------|-------------------------------------------|-------------------------------|------------------------------|
|                 |                          |                                |                                           | Inductor Decrease<br>(mA) Max | Temperature Rise<br>(mA) Max |
| TZSH4010FC-2R2  | 2.2                      | $\pm 20$                       | 90                                        | 1250                          | 1600                         |
| TZSH4010FC-3R3  | 3.3                      | $\pm 20$                       | 110                                       | 1100                          | 1400                         |
| TZSH4010FC-4R7  | 4.7                      | $\pm 20$                       | 165                                       | 950                           | 1100                         |
| TZSH4010FC-6R8  | 6.8                      | $\pm 20$                       | 220                                       | 760                           | 950                          |
| TZSH4010FC-100  | 10                       | $\pm 20$                       | 300                                       | 620                           | 850                          |
| TZSH4010FC-150  | 15                       | $\pm 20$                       | 520                                       | 600                           | 650                          |
| TZSH4010FC-220  | 22                       | $\pm 20$                       | 650                                       | 450                           | 500                          |
| TZSH4010FC-330  | 33                       | $\pm 20$                       | 1100                                      | 370                           | 450                          |
| TZSH4010FC-470  | 47                       | $\pm 20$                       | 1500                                      | 300                           | 350                          |

### ● TYPE TZSH4012FC(4.0×4.0mm, 1.2mm Height, Magnetic Resin Shielded)

| DSC Part Number | Inductance<br>( $\mu$ H) | Inductance<br>Tolerance<br>(%) | DC Resistance<br>( $m\Omega$ ) $\pm 20\%$ | Rated current                 |                              |
|-----------------|--------------------------|--------------------------------|-------------------------------------------|-------------------------------|------------------------------|
|                 |                          |                                |                                           | Inductor Decrease<br>(mA) Max | Temperature Rise<br>(mA) Max |
| TZSH4012FC-2R2  | 2.2                      | $\pm 20$                       | 70                                        | 1800                          | 1800                         |
| TZSH4012FC-3R3  | 3.3                      | $\pm 20$                       | 100                                       | 1550                          | 1500                         |
| TZSH4012FC-4R7  | 4.7                      | $\pm 20$                       | 130                                       | 1200                          | 1300                         |
| TZSH4012FC-6R8  | 6.8                      | $\pm 20$                       | 180                                       | 1050                          | 1050                         |
| TZSH4012FC-100  | 10                       | $\pm 20$                       | 240                                       | 850                           | 950                          |
| TZSH4012FC-150  | 15                       | $\pm 20$                       | 350                                       | 800                           | 850                          |
| TZSH4012FC-220  | 22                       | $\pm 20$                       | 550                                       | 600                           | 600                          |
| TZSH4012FC-330  | 33                       | $\pm 20$                       | 810                                       | 490                           | 500                          |
| TZSH4012FC-470  | 47                       | $\pm 20$                       | 1100                                      | 400                           | 400                          |

### ● TYPE TZSH4018FC(4.0×4.0mm, 1.8mm Height, Magnetic Resin Shielded)

| DSC Part Number | Inductance<br>( $\mu$ H) | Inductance<br>Tolerance<br>(%) | DC Resistance<br>( $m\Omega$ ) $\pm 20\%$ | Rated current                 |                              |
|-----------------|--------------------------|--------------------------------|-------------------------------------------|-------------------------------|------------------------------|
|                 |                          |                                |                                           | Inductor Decrease<br>(mA) Max | Temperature Rise<br>(mA) Max |
| TZSH4018FC-2R2  | 2.2                      | $\pm 20$                       | 50                                        | 2700                          | 2500                         |
| TZSH4018FC-3R3  | 3.3                      | $\pm 20$                       | 70                                        | 2350                          | 2200                         |
| TZSH4018FC-4R7  | 4.7                      | $\pm 20$                       | 90                                        | 1900                          | 1800                         |
| TZSH4018FC-6R8  | 6.8                      | $\pm 20$                       | 110                                       | 1600                          | 1600                         |
| TZSH4018FC-100  | 10                       | $\pm 20$                       | 180                                       | 1250                          | 1300                         |
| TZSH4018FC-150  | 15                       | $\pm 20$                       | 260                                       | 1020                          | 1000                         |
| TZSH4018FC-220  | 22                       | $\pm 20$                       | 360                                       | 950                           | 850                          |
| TZSH4018FC-330  | 33                       | $\pm 20$                       | 500                                       | 700                           | 700                          |
| TZSH4018FC-470  | 47                       | $\pm 20$                       | 700                                       | 600                           | 600                          |

## ■ Conditions/測定条件

- (1)The saturation current is the current value which causes 30% inductance reduction from the initial value.  
直流重畳許容電流は直流重畳された電流によりインダクタンスの値が低下し、30%以内となる直流電流の値である。
- (2)The temperature rise current is the DC current value having temperature increase up to 40°C.  
温度上昇許容電流は直流重畳された電流により温度上昇の値が40°Cとなる直流電流の値である。
- (3)The rated current is the DC current that satisfies both of the saturation current and temperature rise current value.  
定格電流は直流重畳許容電流と温度上昇許容電流の両方を満足する直流電流の値である。
- (4)The measuring frequency and surroundings temperature are 100 kHz and 25°C, respectively.  
測定周波数: 100kHz。測定周囲温度: 25°C。

## ■ Note/特記

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## ■ Electric Specifications/電気特性

### ● TYPE TZSH6010FC(6.0×6.0mm, 1.0mm Height, Magnetic Resin Shielded)

| DSC Part Number | Inductance<br>( $\mu$ H) | Inductance<br>Tolerance<br>(%) | DC Resistance<br>(m $\Omega$ ) $\pm$ 20% | Rated current                 |                              |
|-----------------|--------------------------|--------------------------------|------------------------------------------|-------------------------------|------------------------------|
|                 |                          |                                |                                          | Inductor Decrease<br>(mA) Max | Temperature Rise<br>(mA) Max |
| TZSH6010FC-2R2  | 2.2                      | $\pm$ 20                       | 85                                       | 1950                          | 2100                         |
| TZSH6010FC-3R3  | 3.3                      | $\pm$ 20                       | 120                                      | 1900                          | 1800                         |
| TZSH6010FC-4R7  | 4.7                      | $\pm$ 20                       | 150                                      | 1500                          | 1600                         |
| TZSH6010FC-6R8  | 6.8                      | $\pm$ 20                       | 220                                      | 1350                          | 1350                         |
| TZSH6010FC-100  | 10                       | $\pm$ 20                       | 300                                      | 1100                          | 1150                         |
| TZSH6010FC-150  | 15                       | $\pm$ 20                       | 470                                      | 900                           | 920                          |
| TZSH6010FC-220  | 22                       | $\pm$ 20                       | 620                                      | 720                           | 750                          |
| TZSH6010FC-330  | 33                       | $\pm$ 20                       | 1100                                     | 600                           | 570                          |
| TZSH6010FC-470  | 47                       | $\pm$ 20                       | 1550                                     | 450                           | 500                          |

### ● TYPE TZSH6012FC(6.0×6.0mm, 1.2mm Height, Magnetic Resin Shielded)

| DSC Part Number | Inductance<br>( $\mu$ H) | Inductance<br>Tolerance<br>(%) | DC Resistance<br>(m $\Omega$ ) $\pm$ 20% | Rated current                 |                              |
|-----------------|--------------------------|--------------------------------|------------------------------------------|-------------------------------|------------------------------|
|                 |                          |                                |                                          | Inductor Decrease<br>(mA) Max | Temperature Rise<br>(mA) Max |
| TZSH6012FC-2R2  | 2.2                      | $\pm$ 20                       | 65                                       | 2400                          | 2400                         |
| TZSH6012FC-3R3  | 3.3                      | $\pm$ 20                       | 75                                       | 2100                          | 2200                         |
| TZSH6012FC-4R7  | 4.7                      | $\pm$ 20                       | 110                                      | 1700                          | 1800                         |
| TZSH6012FC-6R8  | 6.8                      | $\pm$ 20                       | 150                                      | 1500                          | 1550                         |
| TZSH6012FC-100  | 10                       | $\pm$ 20                       | 220                                      | 1200                          | 1250                         |
| TZSH6012FC-150  | 15                       | $\pm$ 20                       | 300                                      | 950                           | 1000                         |
| TZSH6012FC-220  | 22                       | $\pm$ 20                       | 450                                      | 800                           | 800                          |
| TZSH6012FC-330  | 33                       | $\pm$ 20                       | 600                                      | 670                           | 700                          |
| TZSH6012FC-470  | 47                       | $\pm$ 20                       | 1000                                     | 550                           | 600                          |

### ● TYPE TZSH6015FC(6.0×6.0mm, 1.5mm Height, Magnetic Resin Shielded)

| DSC Part Number | Inductance<br>( $\mu$ H) | Inductance<br>Tolerance<br>(%) | DC Resistance<br>(m $\Omega$ ) $\pm$ 20% | Rated current                 |                              |
|-----------------|--------------------------|--------------------------------|------------------------------------------|-------------------------------|------------------------------|
|                 |                          |                                |                                          | Inductor Decrease<br>(mA) Max | Temperature Rise<br>(mA) Max |
| TZSH6015FC-2R2  | 2.2                      | $\pm$ 20                       | 50                                       | 3200                          | 3000                         |
| TZSH6015FC-3R3  | 3.3                      | $\pm$ 20                       | 70                                       | 2700                          | 2400                         |
| TZSH6015FC-4R7  | 4.7                      | $\pm$ 20                       | 105                                      | 2200                          | 2000                         |
| TZSH6015FC-6R8  | 6.8                      | $\pm$ 20                       | 130                                      | 1950                          | 1600                         |
| TZSH6015FC-100  | 10                       | $\pm$ 20                       | 190                                      | 1570                          | 1450                         |
| TZSH6015FC-150  | 15                       | $\pm$ 20                       | 270                                      | 1350                          | 1200                         |
| TZSH6015FC-220  | 22                       | $\pm$ 20                       | 390                                      | 1150                          | 1000                         |
| TZSH6015FC-330  | 33                       | $\pm$ 20                       | 550                                      | 920                           | 800                          |
| TZSH6015FC-470  | 47                       | $\pm$ 20                       | 790                                      | 770                           | 700                          |

## ■ Conditions/測定条件

- (1)The saturation current is the current value which causes 30% inductance reduction from the initial value.  
直流重畳許容電流は直流重畳された電流によりインダクタンスの値が低下し、30%以内となる直流電流の値である。
- (2)The temperature rise current is the DC current value having temperature increase up to 40°C.  
温度上昇許容電流は直流重畳された電流により温度上昇の値が40°Cとなる直流電流の値である。
- (3)The rated current is the DC current that satisfies both of the saturation current and temperature rise current value.  
定格電流は直流重畳許容電流と温度上昇許容電流の両方を満足する直流電流の値である。
- (4)The measuring frequency and surroundings temperature are 100 kHz and 25°C, respectively.  
測定周波数: 100kHz。測定周囲温度: 25°C。

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## ■ Electric Specifications/電気特性

### ● TYPE TZSH6020FC(6.0×6.0mm, 2.0mm Height, Magnetic Resin Shielded)

| DSC Part Number | Inductance<br>( $\mu$ H) | Inductance<br>Tolerance<br>(%) | DC Resistance<br>(m $\Omega$ ) $\pm$ 20% | Rated current                 |                              |
|-----------------|--------------------------|--------------------------------|------------------------------------------|-------------------------------|------------------------------|
|                 |                          |                                |                                          | Inductor Decrease<br>(mA) Max | Temperature Rise<br>(mA) Max |
| TZSH6020FC-2R2  | 2.2                      | $\pm$ 20                       | 38                                       | 3800                          | 3400                         |
| TZSH6020FC-3R3  | 3.3                      | $\pm$ 20                       | 44                                       | 3000                          | 3000                         |
| TZSH6020FC-4R7  | 4.7                      | $\pm$ 20                       | 58                                       | 2700                          | 2500                         |
| TZSH6020FC-6R8  | 6.8                      | $\pm$ 20                       | 80                                       | 2300                          | 2200                         |
| TZSH6020FC-100  | 10                       | $\pm$ 20                       | 110                                      | 1900                          | 1800                         |
| TZSH6020FC-150  | 15                       | $\pm$ 20                       | 160                                      | 1650                          | 1500                         |
| TZSH6020FC-220  | 22                       | $\pm$ 20                       | 220                                      | 1300                          | 1300                         |
| TZSH6020FC-330  | 33                       | $\pm$ 20                       | 330                                      | 1100                          | 1000                         |
| TZSH6020FC-470  | 47                       | $\pm$ 20                       | 500                                      | 900                           | 900                          |

### ● TYPE TZSH6028FC(6.0×6.0mm, 2.8mm Height, Magnetic Resin Shielded)

| DSC Part Number | Inductance<br>( $\mu$ H) | Inductance<br>Tolerance<br>(%) | DC Resistance<br>(m $\Omega$ ) $\pm$ 20% | Rated current                 |                              |
|-----------------|--------------------------|--------------------------------|------------------------------------------|-------------------------------|------------------------------|
|                 |                          |                                |                                          | Inductor Decrease<br>(mA) Max | Temperature Rise<br>(mA) Max |
| TZSH6028FC-2R2  | 2.2                      | $\pm$ 30                       | 20                                       | 4300                          | 4000                         |
| TZSH6028FC-3R3  | 3.3                      | $\pm$ 20                       | 30                                       | 3700                          | 3400                         |
| TZSH6028FC-4R7  | 4.7                      | $\pm$ 20                       | 40                                       | 3100                          | 2950                         |
| TZSH6028FC-6R8  | 6.8                      | $\pm$ 20                       | 50                                       | 2600                          | 2500                         |
| TZSH6028FC-100  | 10                       | $\pm$ 20                       | 60                                       | 2250                          | 2300                         |
| TZSH6028FC-150  | 15                       | $\pm$ 20                       | 120                                      | 1850                          | 1900                         |
| TZSH6028FC-220  | 22                       | $\pm$ 20                       | 135                                      | 1550                          | 1600                         |
| TZSH6028FC-330  | 33                       | $\pm$ 20                       | 200                                      | 1250                          | 1300                         |
| TZSH6028FC-470  | 47                       | $\pm$ 20                       | 270                                      | 1050                          | 1100                         |

## ■ Conditions/測定条件

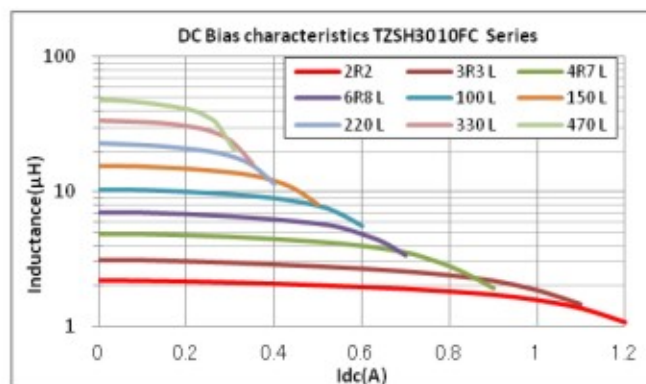
- (1)The saturation current is the current value which causes 30% inductance reduction from the initial value.  
直流重畳許容電流は直流重畳された電流によりインダクタンスの値が低下し、30%以内となる直流電流の値である。
- (2)The temperature rise current is the DC current value having temperature increase up to 40°C.  
温度上昇許容電流は直流重畳された電流により温度上昇の値が40°Cとなる直流電流の値である。
- (3)The rated current is the DC current that satisfies both of the saturation current and temperature rise current value.  
定格電流は直流重畳許容電流と温度上昇許容電流の両方を満足する直流電流の値である。
- (4)The measuring frequency and surroundings temperature are 100 kHz and 25°C, respectively.  
測定周波数:100kHz。測定周囲温度:25°C。

## ■ Note/特記

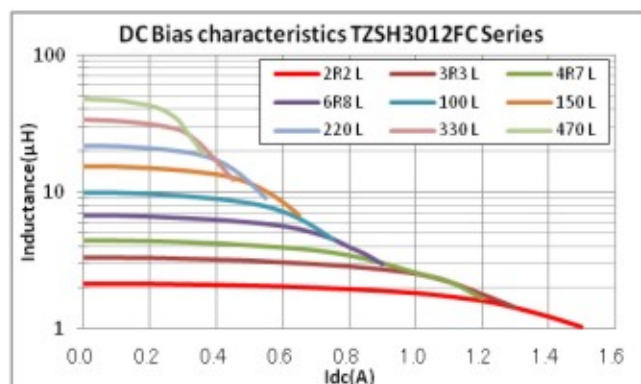
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本カタログには代表的な製品の仕様しか記載しておりません。カスタム品も製造しておりますので、ご遠慮なく申しつけください。

## ■ DC bias characteristics/直流重量特性

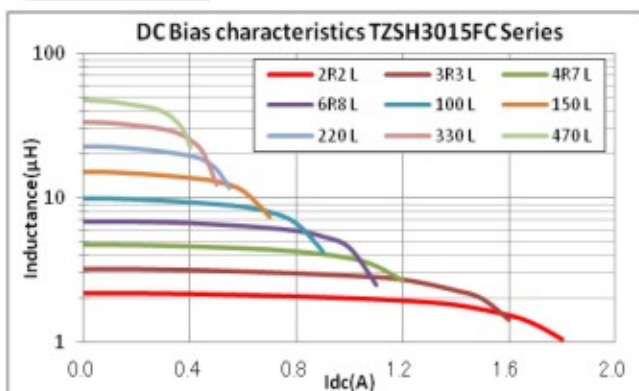
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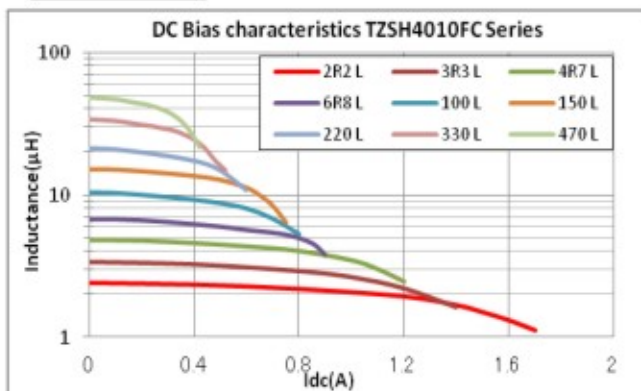
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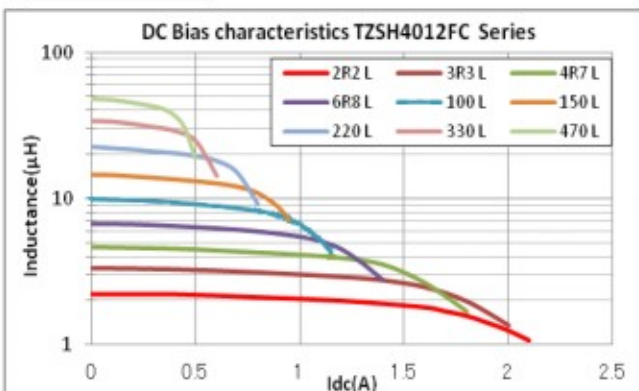
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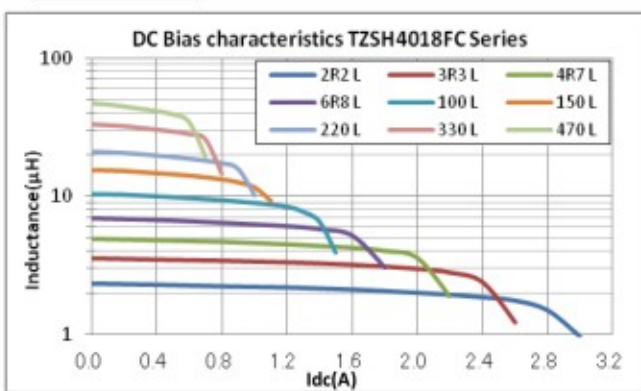
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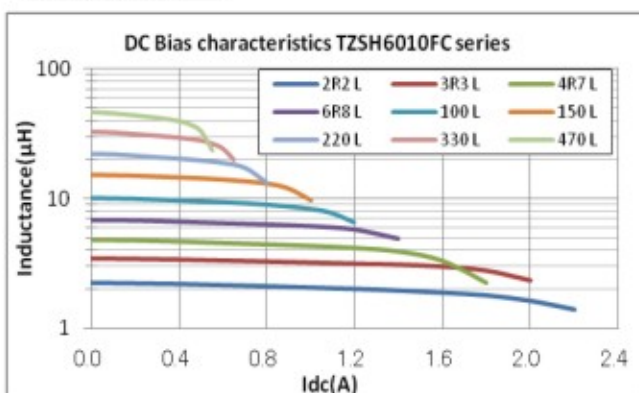
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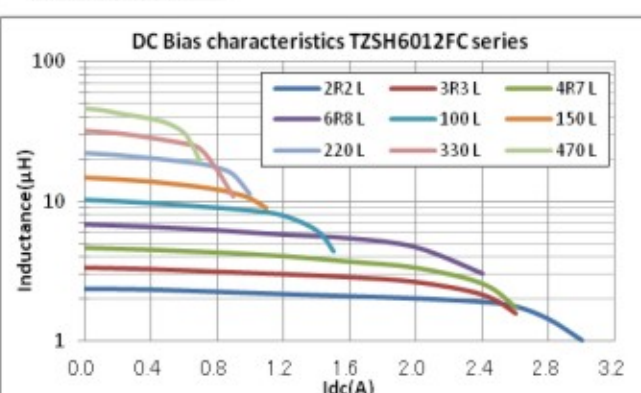
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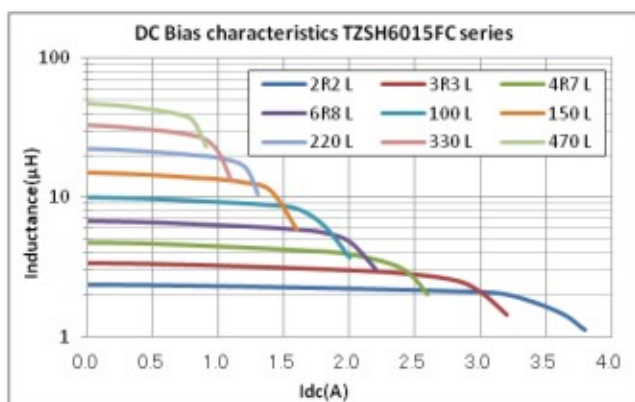


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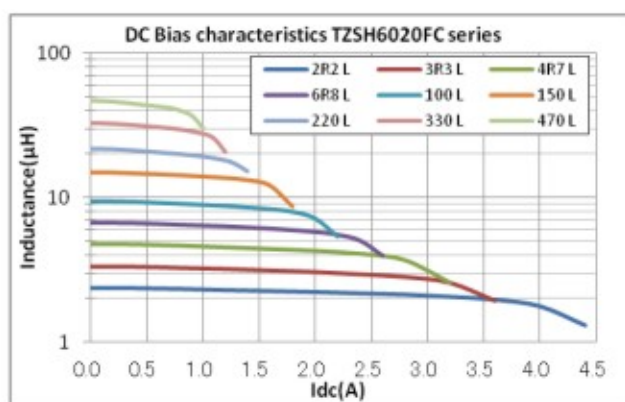


## ■ DC bias characteristics/直流重畳特性

TZSH6015FC



TZSH6020FC



TZSH6028FC

