

# Power Inductor

## Automotive Grade

### AFDI 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. Large size bottom termination
3. Low DCR
4. Large current

#### Applications

1. Automotive Systems
2. VRM/VRD
3. Industrial Control

#### Product Information

| Series | L (mm) | W(mm) | T (mm) | Inductance (μH) |
|--------|--------|-------|--------|-----------------|
| AFDI   | 12.0   | 12.0  | 9.0    | 0.47 ~ 120      |
|        | 12.0   | 12.0  | 10.0   |                 |
|        | 13.0   | 12.0  | 10.5   |                 |
|        | 13.0   | 12.0  | 12.0   |                 |
|        | 13.0   | 12.0  | 11.0   |                 |
|        | 13.0   | 12.0  | 10.0   |                 |
|        | 12.0   | 13.0  | 8.0    |                 |
|        | 15.5   | 13.0  | 11.0   |                 |
|        | 15.5   | 13.0  | 10.0   |                 |
|        | 15.5   | 13.0  | 10.4   |                 |
|        | 15.5   | 13.0  | 12.0   |                 |
|        | 19.5   | 19.0  | 8.5    |                 |
|        | 20.5   | 20.0  | 9.5    |                 |
|        | 28.0   | 28.0  | 10.5   |                 |
|        | 30.0   | 30.0  | 12.7   |                 |

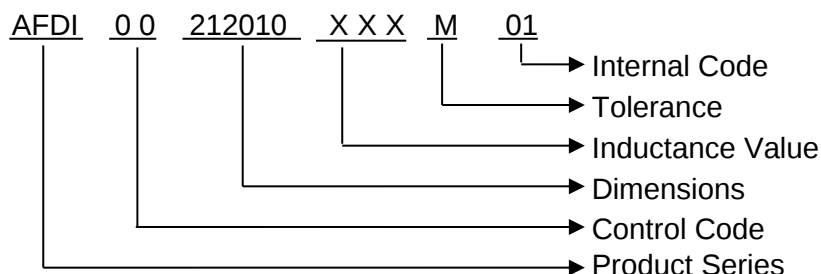


## AFDI00212010XXXM01 Series Specification

AEC-Q200

**1 Scope:** This specification applies to large current and low RDC DIP power inductor.

**2 Part Numbering:**



**3 Rating:**

Operating temperature range:  $-50^{\circ}\text{C} \sim 150^{\circ}\text{C}$  (Including self - temperature rise)

Storage condition:  $-20^{\circ}\text{C} \sim 40^{\circ}\text{C}$  ; 75%RH Max

**4 Marking:**



Marking color : White

Marking : xx uH  $\longrightarrow$  Inductance  
CEC  $\longrightarrow$  Chilisin

**5 Material List:**

| NO | Part        | Material                        |
|----|-------------|---------------------------------|
| 1  | Copper Wire | EIAIW ( $200^{\circ}\text{C}$ ) |
| 2  | Core        | Carbonyl iron powder            |
| 3  | coating     | paint Gray                      |
| 4  | Solder      | Sn96.5-Ag3.0-Cu0.5              |
| 5  | Ink         | M23-092(PIC-1083B)              |

**6 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            |

### AFDI00212010XXXM01 Series Specification

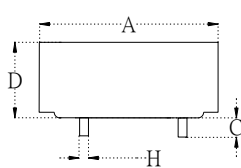
AEC-Q200

#### 7 Configuration and Dimensions:

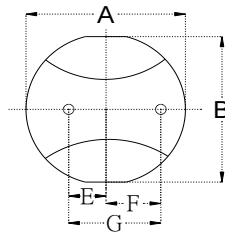
Top side



Side view



Bottom side



Product appearance

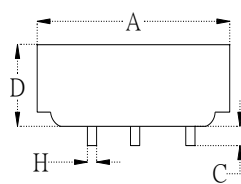


0.47uH~10uH

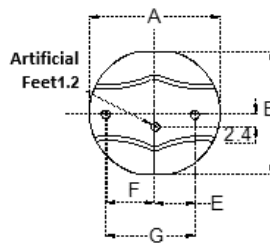
Top side



Side view



Bottom side



Product appearance



22uH~100uH

| Part No.           | A        | B        | C       | D       | E       | F       | G      | H       |
|--------------------|----------|----------|---------|---------|---------|---------|--------|---------|
| AFDI00212010R47M01 | 20.5±0.4 | 20.0±0.4 | 4.0±0.5 | 9.5±0.4 | 6±0.5   | 6±0.5   | 12±0.5 | 2.0±0.1 |
| AFDI002120101R0M01 | 20.5±0.4 | 20.0±0.4 | 4.0±0.5 | 9.5±0.4 | 6±0.5   | 6±0.5   | 12±0.5 | 1.8±0.1 |
| AFDI002120102R2M01 | 20.5±0.4 | 20.0±0.4 | 4.0±0.5 | 9.5±0.4 | 6±0.5   | 6±0.5   | 12±0.5 | 1.8±0.1 |
| AFDI002120103R3M01 | 20.5±0.4 | 20.0±0.4 | 4.0±0.5 | 9.5±0.4 | 5.5±0.5 | 6.5±0.5 | 12±0.5 | 1.6±0.1 |
| AFDI002120104R7M01 | 20.5±0.4 | 20.0±0.4 | 4.0±0.5 | 9.5±0.4 | 5±0.5   | 7±0.5   | 12±0.5 | 1.4±0.1 |
| AFDI002120106R8M01 | 20.5±0.4 | 20.0±0.4 | 4.0±0.5 | 9.5±0.4 | 5±0.5   | 7±0.5   | 12±0.5 | 1.4±0.1 |
| AFDI002120108R2M01 | 20.5±0.4 | 20.0±0.4 | 4.0±0.5 | 9.5±0.4 | 5±0.5   | 7±0.5   | 12±0.5 | 1.3±0.1 |
| AFDI00212010100M01 | 20.5±0.4 | 20.0±0.4 | 4.0±0.5 | 9.5±0.4 | 5±0.5   | 7±0.5   | 12±0.5 | 1.3±0.1 |
| AFDI00212010220M01 | 20.5±0.4 | 20.0±0.4 | 4.0±0.5 | 9.5±0.4 | 5±0.5   | 7±0.5   | 12±0.5 | 1.0±0.1 |
| AFDI00212010330M01 | 20.5±0.4 | 20.0±0.4 | 4.0±0.5 | 9.5±0.4 | 5±0.5   | 7±0.5   | 12±0.5 | 0.9±0.1 |
| AFDI00212010470M01 | 20.5±0.4 | 20.0±0.4 | 4.0±0.5 | 9.5±0.4 | 5±0.5   | 7±0.5   | 12±0.5 | 0.8±0.1 |
| AFDI00212010680M01 | 20.5±0.4 | 20.0±0.4 | 4.0±0.5 | 9.5±0.4 | 5±0.5   | 7±0.5   | 12±0.5 | 0.8±0.1 |
| AFDI00212010820M01 | 20.5±0.4 | 20.0±0.4 | 4.0±0.5 | 9.5±0.4 | 5±0.5   | 7±0.5   | 12±0.5 | 0.7±0.1 |
| AFDI00212010101M01 | 20.5±0.4 | 20.0±0.4 | 4.0±0.5 | 9.5±0.4 | 5±0.5   | 7±0.5   | 12±0.5 | 0.7±0.1 |

#### 8 Electrical Characteristics:

| Part No.           | Inductance (uH) | Test Freq.  | Tolerance (±%) | I <sub>rms</sub> (A)Typ. | I <sub>sat</sub> (A)Typ. | RDC(mΩ) Max(Typ) | Marking |
|--------------------|-----------------|-------------|----------------|--------------------------|--------------------------|------------------|---------|
| AFDI00212010R47M01 | 0.47            | 100kHz,1.0V | 20             | 65                       | 65                       | 0.44(0.31)       | 0.47uH  |
| AFDI002120101R0M01 | 1               | 100kHz,1.0V | 20             | 62                       | 60                       | 0.88(0.7)        | 1.0 uH  |
| AFDI002120102R2M01 | 2.2             | 100kHz,1.0V | 20             | 46                       | 40                       | 1.58(1.24)       | 2.2uH   |
| AFDI002120103R3M01 | 3.3             | 100kHz,1.0V | 20             | 35                       | 34                       | 2.3(1.81)        | 3.3uH   |
| AFDI002120104R7M01 | 4.7             | 100kHz,1.0V | 20             | 27                       | 30                       | 2.98(2.59)       | 4.7uH   |
| AFDI002120106R8M01 | 6.8             | 100kHz,1.0V | 20             | 25                       | 28                       | 4.12(3.72)       | 6.8uH   |
| AFDI002120108R2M01 | 8.2             | 100kHz,1.0V | 20             | 21                       | 26                       | 5.8(4.53)        | 8.2uH   |
| AFDI00212010100M01 | 10              | 100kHz,1.0V | 20             | 20                       | 25                       | 7(5.57)          | 10uH    |
| AFDI00212010220M01 | 22              | 100kHz,1.0V | 20             | 13                       | 16                       | 13.1(12.6)       | 22uH    |
| AFDI00212010330M01 | 33              | 100kHz,1.0V | 20             | 10                       | 12                       | 22(18.9)         | 33uH    |
| AFDI00212010470M01 | 47              | 100kHz,1.0V | 20             | 8                        | 10                       | 35.6(30.65)      | 47uH    |
| AFDI00212010680M01 | 68              | 100kHz,1.0V | 20             | 7                        | 11                       | 44.8(38)         | 68uH    |
| AFDI00212010820M01 | 82              | 100kHz,1.0V | 20             | 6.4                      | 9                        | 55.8(48.86)      | 82uH    |
| AFDI00212010101M01 | 100             | 100kHz,1.0V | 20             | 5.8                      | 9                        | 62(54.51)        | 100uH   |

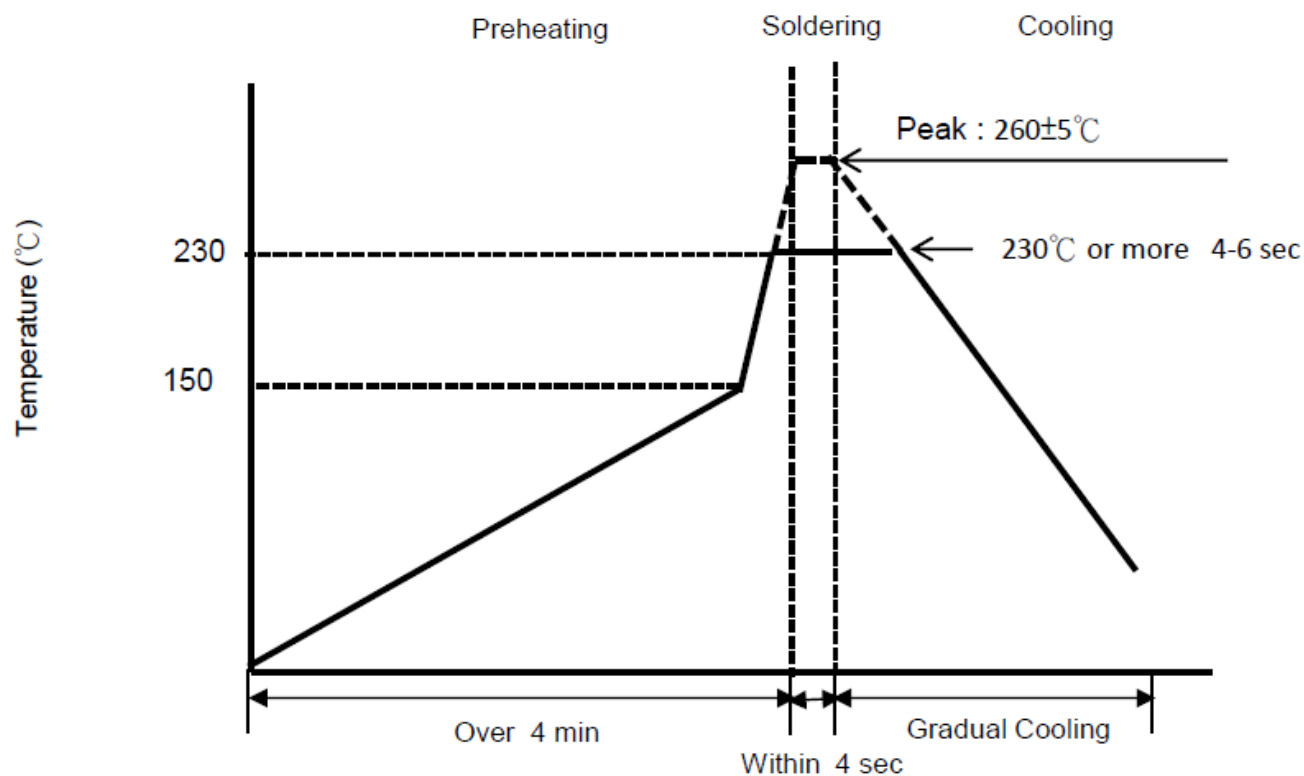
#### Note:

- Ambient + temperature rise range — 50°C~150°C(Including self - temperature rise)
- I<sub>sat</sub> for Inductance drop 20% from its value without current.
- I<sub>rms</sub> for a 40°C temprature rise from 25°C ambient.
- The part temperature (ambient + temp rise) should not exceed 150°C under worst case operating conditions.  
Circuit design 150°C under worst case operating conditions. Component placement, PWB trace size and thickness, airflow and other cooling provisions all affect the part temperature. Part temperature should be verified in the end application.

#### 9 Reliability verification conditions

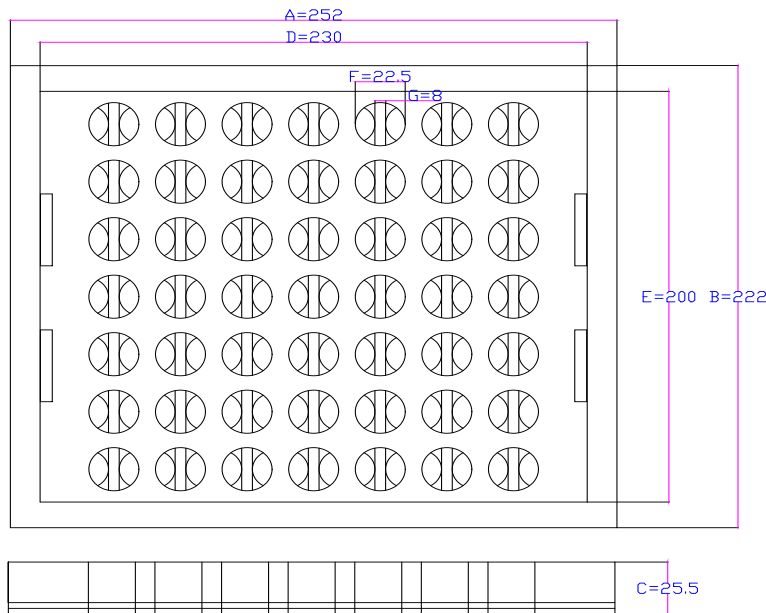
| No. | Stress                              | Reference              | Test Conditions                                                                                                                                                                                                                                                                                                                                                                                                    | Sample Size | Specification                                                                                                                                                                                                                                       | Result |
|-----|-------------------------------------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|
| 1   | High Temperature Exposure (Storage) | MIL-STD-202 Method 108 | 1000 hrs. at rated operating temperature, part can be stored for 1000 hrs. @ 150°C. Unpowered. Measurement at 24±4 hours after test conclusion.                                                                                                                                                                                                                                                                    | 77          | 1. Electrical characterization-Inductance change range<br>2. Appearance-No damage                                                                                                                                                                   | Pass   |
| 2   | Temperature Cycling                 | JESD22 Method JA-104   | 1000 cycles (-50°C to +150°C). Measurement at 24±4 hours after test conclusion. 30 min maximum dwell time at each temperature extreme. 1 min.                                                                                                                                                                                                                                                                      | 77          | 1. Electrical characterization-Inductance change range<br>2. Appearance-No damage                                                                                                                                                                   | Pass   |
| 3   | Biased Humidity                     | MIL-STD-202 Method 103 | 1000 hours 85°C/85%RH. Unpowered. Measurement at 24±4 hours after test conclusion.                                                                                                                                                                                                                                                                                                                                 | 77          | 1. Electrical characterization-Inductance change range<br>2. Appearance-No damage                                                                                                                                                                   | Pass   |
| 4   | Operational Life                    | MIL-PRF-27             | 1000 hrs. @ 150 °C.Measurement 24±4 hours after test conclusion.                                                                                                                                                                                                                                                                                                                                                   | 77          | 1. Electrical characterization-Inductance change range<br>2. Appearance-No damage                                                                                                                                                                   | Pass   |
| 5   | Physical Dimension                  | JESD22 Method JB-100   | Verify physical dimensions to the applicable device detail specification.                                                                                                                                                                                                                                                                                                                                          | 15          | Product spec                                                                                                                                                                                                                                        | Pass   |
| 6   | Resistance to Solvents              | MIL-STD-202 Method 215 | Immersion 3+0.5/-0 minutes in Terpene defluxer. Brush 10 strokes (wet bristle) 2 to 3 oz. Rinse in water. Air blow dry.                                                                                                                                                                                                                                                                                            | 5           | 1. Marking resistance to solvent-No constitute failure (≤3X magnification)<br>2. Component protective coating, encapsulation material and sleeve material resistance- No damage or degradation that has occurred due to solvent (10X magnification) | Pass   |
| 7   | Mechanical Shock                    | MIL-STD-202 Method 213 | Units are non-operating.<br>Pulse shape : Half-sine waveform<br>Impact acceleration : 100 g's<br>Pulse duration : 6 ms<br>Number of shocks : 18 shocks ( 3 shocks 5 g's for 20 minutes, 12 cycles each of 3 orientations. Note: Use 8"X5" PCB, .031" thick, 7 secure points on the long side and 2 secure points at corners of opposite sides. Parts mounted within 2" from any secure point. Test from 10-2000Hz. | 30          | 1. Electrical characterization-Inductance change range<br>2. Appearance-No damage (OM)                                                                                                                                                              | Pass   |
| 8   | Vibration                           | MIL-STD-202 Method 204 | 5 g's for 20 minutes, 12 cycles each of 3 orientations. Note: Use 8"X5" PCB, .031" thick, 7 secure points on the long side and 2 secure points at corners of opposite sides. Parts mounted within 2" from any secure point. Test from 10-2000Hz.                                                                                                                                                                   | 30          | 1. Electrical characterization-Inductance change range<br>2. Appearance-No damage (OM)                                                                                                                                                              | Pass   |
| 9   | Resistance to Soldering Heat        | MIL-STD-202 Method 210 | Test condition B: Solder dip-260±5°C (solder temp.), time 10±1 sec, immersion rate 25mm/s ±6 mm/s, 1 heat cycle.                                                                                                                                                                                                                                                                                                   | 30          | 1. Electrical characterization-Inductance change range<br>2. Appearance-No damage                                                                                                                                                                   | Pass   |
| 10  | Solderability                       | J-STD-002              | Pre-condition: Steam 8hr±15min @93° C.For both Leaded & SMD. Electrical test not required. Magnification 50X. Test Method B @ 245±5°C, dwell for 5+0/-0.5 seconds                                                                                                                                                                                                                                                  | 15          | All terminations shall exhibit a continuous solder coating free from defects for a minimum of 95% of the critical area of any individual termination. (10X magnification)                                                                           | Pass   |
| 11  | Board Flex                          | AEC-Q200-005           | Bend the board (D) X =2mm, 60sec minimum holding time.                                                                                                                                                                                                                                                                                                                                                             | 30          | No cracks                                                                                                                                                                                                                                           | Pass   |
| 12  | Terminal Strength                   | AEC-Q200-006           | Apply a 1.8Kg force to the side of a device bending tested. The force shall be applied for 60+1 seconds.                                                                                                                                                                                                                                                                                                           | 30          | No cracking or no part being sheared off from its pad                                                                                                                                                                                               | Pass   |

#### 10 Wave Soldering:

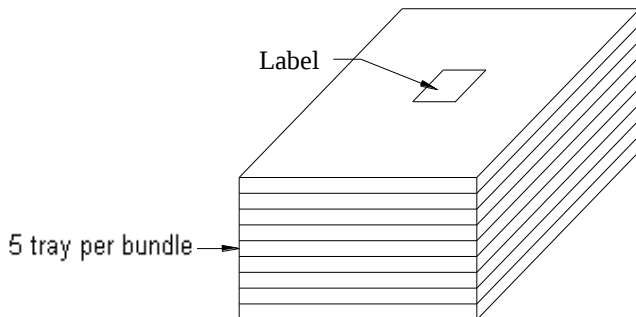


#### 12 Packaging:

##### 12.1 Small Pack: 49pcs per tray

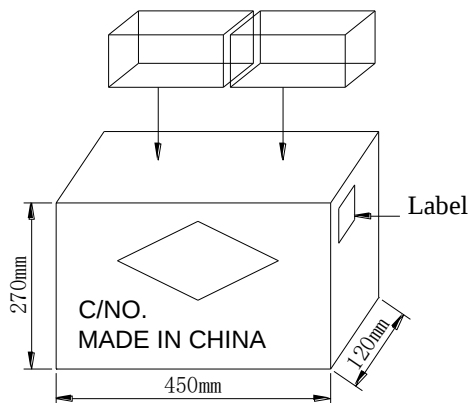


##### 12.2 Medium pack: 5 tray per bundle (245pcs)



|                     |                 |
|---------------------|-----------------|
| Inner carton number |                 |
| Partition           | M08.137         |
| Desiccant           | M66.002         |
| Plastic tray        | M47.128         |
| Label size          | 50*75mm         |
| Label type          | Self-adhesion   |
| Label location      | Top left corner |

##### 12.3 Large pack: 2 bundle per carton (490pcs)



|                |                                 |
|----------------|---------------------------------|
| Carton number  | 8402-134-01                     |
| Label location | Top left corner on side surface |
| Label size     | 75*100mm                        |
| Label type     | Self-adhesion                   |

#### 13 Graph :

