

Power Inductor

Automotive Grade

AFSG 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

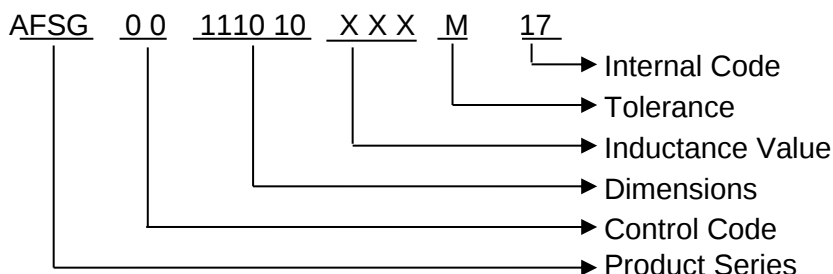
Series	L (mm)	W(mm)	T (mm)	Inductance (μH)
AFSG	11.8	10.5	10.0	0.52 ~ 47
	15.0	13.3	12.5	



AFSG00111010XXXM17 Series Specification AEC-Q200

1 Scope: This specification applies to large current and low RDC SMD 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 : Black

Marking : C —————> Chilisn
 XXX —————> Inductance

5 Material List:

NO	Part	Material
1	Flat copper wire	AIW (220°C)
2	Core	Carbonyl iron powder
3	coating	Paint Gray (127# matte)
4	Solder	Sn96.5-Ag3.0-Cu0.5
5	Ink	jet ink black (9210)
6	EPOXY	M02-039-AU(6461HF)

6 Standard Testing Condition

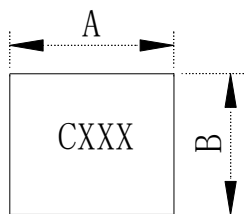
	Unless otherwise specified	In case of doubt
Temperature	Ordinary Temperature(15 to 35°C)	20 to 30°C
Humidity	Ordinary Humidity(25 to 85% RH)	50 to 80% RH

AFSG00111010XXM17 Series Specification

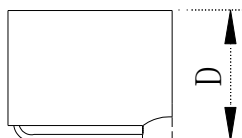
AEC-Q200

7 Configuration and Dimensions:

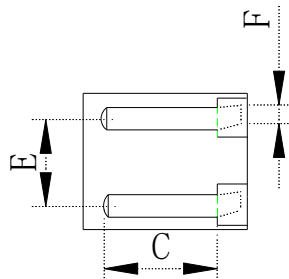
TOP VIEW



SIDE VIEW



BOTTOM VIEW



Product appearance



Part No.	A	B	C	D	E	F
AFSG00111010R52M17	11.8±0.3	10.5±0.3	8.4±0.3	10.0Max	6.0±0.3	1.6±0.1
AFSG00111010R80M17	11.8±0.3	10.5±0.3	8.4±0.3	10.0Max	6.0±0.3	1.6±0.1
AFSG001110101R2M17	11.8±0.3	10.5±0.3	8.4±0.3	10.0Max	6.0±0.3	1.6±0.1
AFSG001110101R5M17	11.8±0.3	10.5±0.3	8.4±0.3	10.0Max	6.0±0.3	1.6±0.1
AFSG001110102R2M17	11.8±0.3	10.5±0.3	8.4±0.3	10.0Max	6.0±0.3	1.6±0.1
AFSG001110103R3M17	11.8±0.3	10.5±0.3	8.4±0.3	10.0Max	6.0±0.3	1.6±0.1
AFSG001110104R7M17	11.8±0.3	10.5±0.3	8.4±0.3	10.0Max	6.0±0.3	1.6±0.1
AFSG001110105R6M17	11.8±0.3	10.5±0.3	8.4±0.3	10.0Max	6.0±0.3	1.6±0.1
AFSG001110106R8M17	11.8±0.3	10.5±0.3	8.4±0.3	10.0Max	6.0±0.3	1.6±0.1
AFSG001110108R2M17	11.8±0.3	10.5±0.3	8.4±0.3	10.0Max	6.0±0.3	1.6±0.1
AFSG00111010100M17	11.8±0.3	10.5±0.3	8.4±0.3	10.0Max	6.0±0.3	1.6±0.1
AFSG00111010150M17	11.8±0.3	10.5±0.3	8.4±0.3	10.0Max	6.0±0.3	1.6±0.1
AFSG00111010220M17	11.8±0.3	10.5±0.3	8.4±0.3	10.0Max	6.0±0.3	1.6±0.1
AFSG00111010330M17	11.8±0.3	10.5±0.3	8.4±0.3	10.0Max	6.0±0.3	1.6±0.1

8 Electrical Characteristics:

Part No.	Inductance (uH)	Test Freq.	Tolerance (±%)	I _{rms} (A)Typ.	I _{sat} (A)Typ.	RDC (mΩ)Max	Marking
AFSG00111010R52M17	0.52	100kHz,1.0V	20	50.0	76.0	0.88(0.78typ)	CR52
AFSG00111010R80M17	0.80	100kHz,1.0V	20	46.0	64.0	1.25(1.0typ)	CR80
AFSG001110101R2M17	1.20	100kHz,1.0V	20	41.0	50.0	1.45(1.3typ)	C1R2
AFSG001110101R5M17	1.50	100kHz,1.0V	20	40.0	45.0	2.0(1.5typ)	C1R5
AFSG001110102R2M17	2.2	100kHz,1.0V	20	33.0	38.0	2.8(2.1typ)	C2R2
AFSG001110103R3M17	3.3	100kHz,1.0V	20	26.0	34.0	3.7(2.7typ)	C3R3
AFSG001110104R7M17	4.7	100kHz,1.0V	20	25.0	29.0	4.7(3.71typ)	C4R7
AFSG001110105R6M17	5.6	100kHz,1.0V	20	24.0	26.0	5.9(4.92typ)	C5R6
AFSG001110106R8M17	6.8	100kHz,1.0V	20	21.0	22.0	7.3(6.3typ)	C6R8
AFSG001110108R2M17	8.2	100kHz,1.0V	20	19.0	20.0	9.0(7.6typ)	C8R2
AFSG00111010100M17	10.0	100kHz,1.0V	20	18.0	18.0	9.7(8.9typ)	C100
AFSG00111010150M17	15.0	100kHz,1.0V	20	15.0	16.0	15.2(14.2typ)	C150
AFSG00111010220M17	22.0	100kHz,1.0V	20	13.0	13.0	22.5(21.5typ)	C220
AFSG00111010330M17	33.0	100kHz,1.0V	20	8.5	10.0	33.5(31.6typ)	C330

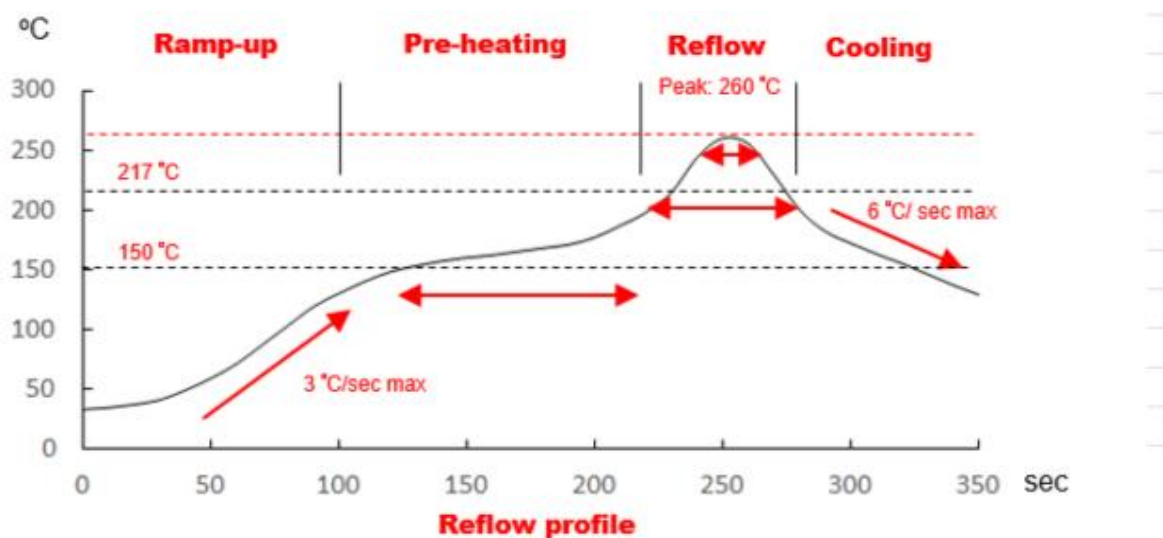
Note:

- Ambient + temperature rise range —50°C~150°C(Including self - temperature rise)
- I_{sat} for Inductance drop 30% from its value without current.
- I_{rms} 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 design150°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.
- Before loading the parts, glue in the middle of the corresponding PCB Layout size to consolidate the parts to prevent Reflow from causing displacement problems

9 Reliability verification conditions

No.	Stress	Reference	Test Conditions	Sample Size	Specification	Result
1	High Temperature Exposure (Storage)	MIL-STD-202 Method 108	1000hrs. 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 2. Appearance-No damage (OM)	PASS
2	Temperature Cycling	JESD22 Method JA-104	1000 cycles (-50°C to +150°C). Measurement at 24±4 hours after test conclusion. 30min maximum dwell time at each temperature extreme. 1 min. maximum transition time.	77	1. Electrical characterization-Inductance change range 2. Appearance-No damage (OM)	PASS
3	Biased Humidity	MIL-STD-202 Method 103	preconditioning : reflow 3 times ;Temperature:85°C ;Humidity:85%;Time:1000hrs;Unpowered. Measurement at 24±4 hours after test conclusion.	77	1. Electrical characterization-Inductance change range 2. Appearance-No damage (OM)	PASS
4	Operational Life	MIL-PRF-27	1000 hrs. @ 150 °C. @Applied Current: Rated Current .Measurement 24±4 hours after test conclusion.	77	1. Electrical characterization-Inductance change range 2. Appearance-No damage (OM)	PASS
5	Physical Dimension	JESD22 Method JB-100	Verify physical dimensions to the applicable device detail specification.	30	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) 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. Pulse shape : Half-sine waveform Impact acceleration : 100 g's Pulse duration : 6 ms Number of shocks : 18 shocks (3 shocks for each face)	30	1. Electrical characterization-Inductance change range 2. Appearance-No damage (OM)	PASS
8	Vibration	MIL-STD-202 Method 204	Pulse Shape:sine wave Amplitude :5g Sweep time and duration:10Hz to 2000Hz to 10Hz in 20minutes as a period Number of Vibrations :12 cycles each of 3 orientations.	30	1. Electrical characterization-Inductance change range 2. Appearance-No damage (OM)	PASS
10	Solderability	J-STD-002	Method B1 : 1 - preconditioning : 8hours steam age test 2 - Solder temperature 245±5°C ,time 5.0±0.5sec. 3 - Speed: 25±6mm/s. Method D : 1 - preconditioning : 8hours steam age test 2 - Solder temperature 260±5°C ,time 30+5/-0sec. 3 - Speed: 25±6mm/s.	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	1. Electrical characterization-Inductance change range 2. Appearance-No damage (OM)	PASS
12	Terminal Strength (SMD)	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	1. Electrical characterization-Inductance change range 2. Appearance-No damage (OM)	PASS

10 Reflow Profile:



Lead-Free(LF)

Refer to J-STD-020F

Item	Ramp-up	Pre-heating	Reflow	Peak Temp.	Cooling
Temp. scope	R.T. ~150 °C	150 °C~200 °C	217 °C	260±5 °C	Peak Temp. 150 °C
Time spec	-	60~120 sec	60~150 sec	20~40 sec	-

NOTE :

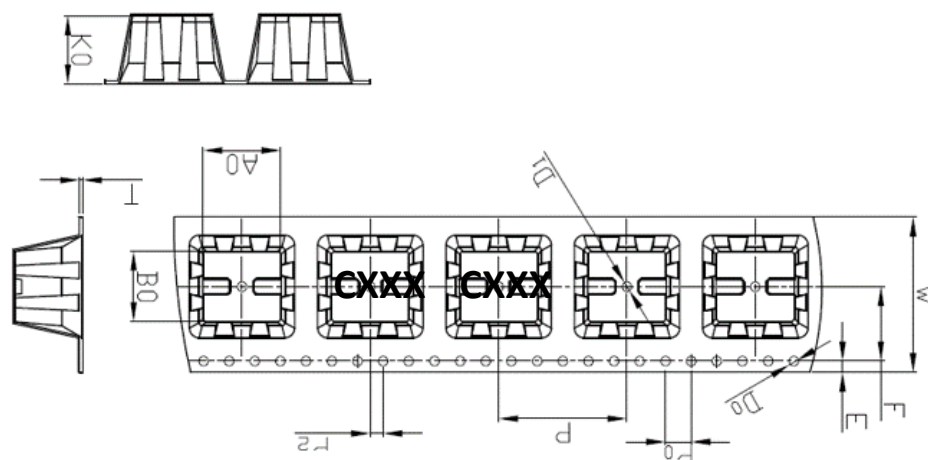
1. Re-flow possible times : within 2 times
2. Nitrogen adopted is recommended while in re-flow

AFSG00111010XXM17 Series Specification

AEC-Q200

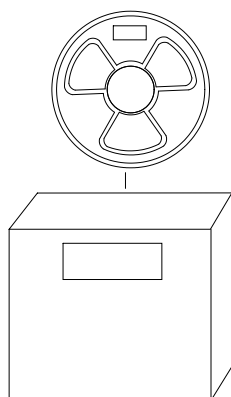
11 Packaging:

11.1 Small Pack: 240pcs per reel



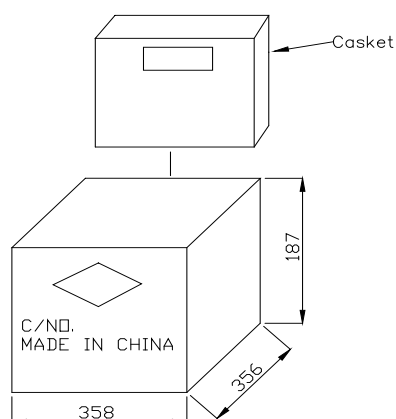
项目	W	A ₀	B ₀	K ₀	K ₁	P	F	E	D ₀	D ₁	P ₀	P ₂	T
尺寸	24.00 ^{+0.38} _{-0.38}	12.15 ^{±0.10}	10.90 ^{±0.10}	10.50 ^{±0.10}		20.00 ^{±0.10}	11.50 ^{±0.10}	1.75 ^{±0.10}	1.50 ^{+0.10} _{-0.00}	1.50 ^{+0.10} _{-0.00}	4.00 ^{±0.10}	2.00 ^{±0.10}	0.50 ^{±0.05}

11.2 Medium pack: 2 reel per casket (480pcs)



Inner carton number	8401-013-01
Carrier	M30-021-883-0
Cover	M30-010-05-1
Reel	M34-006-12
Desiccant	M66.002
pouch	M32-002-09
Label type	Self-adhesion

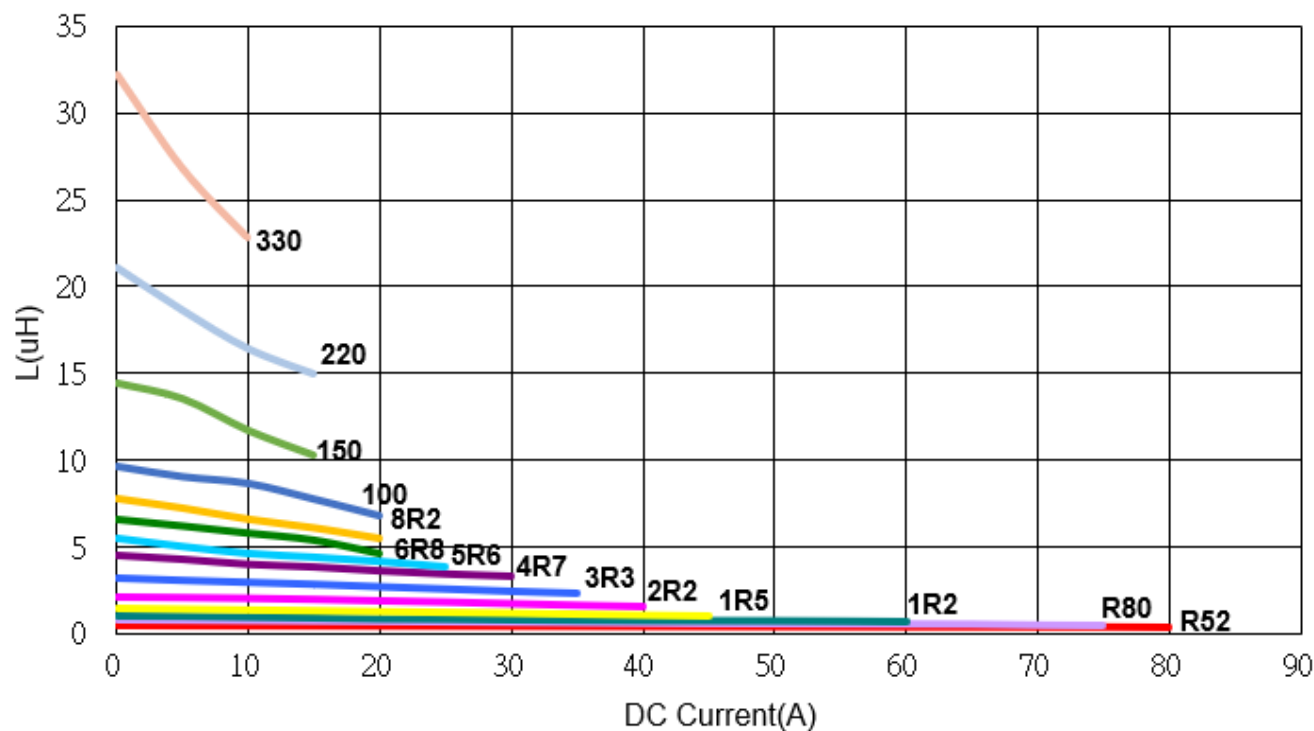
11.3 Large pack: 2 small carton per carton (960pcs)



Carton number	8402-049-01
Label location	Top left corner on side surface
Label size	
Label type	Self-adhesion

12 Graph :

Inductance vs. DC Current



Temperature Change vs. DC Current

