## Wire-wound Ferrite Power Inductors LAYP series for Automotive Powertrain and Safety

## RELIABILITY DATA

- NELIABILITI DA						
1. Operating Temp	erature Range					
Specified Value	-55~+150°C (Including self-generated heat)					
Test Methods and Remarks	Including self-generated heat					
2. Storage Temper						
Specified Value						
Test Methods and Remarks	-5 to 40°C for the product with taping.					
3. Rated current						
Specified Value	Within the specified tolerance					
4. Inductance						
Specified Value	Within the specified tolerance					
Test Methods and Remarks	Measuring equipment : LCR Meter (HP 4285A or equivalent) Measuring frequency : 100kHz, 1V					
5. DC Resistance						
Specified Value	Within the specified tolerance					
Test Methods and Remarks	Measuring equipment : DC ohmmeter (HIOKI 3541 or equivalent)					
6. Self resonance f	requency —					
7. Temperature cha	aracteristic					
Specified Value	Inductance change: Within ±20%					
Test Methods and Remarks	Measurement of inductance shall be taken at temperature range within $-55^{\circ}\text{C} \sim +150^{\circ}\text{C}$ . With reference to inductance value at $+20^{\circ}\text{C}$ ., change rate shall be calculated.					
8. Board Flex						
Specified Value	No damage					
Test Methods and Remarks	AEC-Q200 Test No.21qualified (AEC-Q200-005)  The test samples shall be soldered to the test board by the reflow. As illustrated below, apply force in the direction of the arrow indicating until deflection of the test board reaches to 2 mm for 60 s.  Test board size : 100 × 40 × 1.6  Test board material : glass epoxy-resin					
9. Insulation resista	ance : between wires					
Specified Value	_					
10.1						
	tance : between top side of sample and the terminal					
Specified Value	DC100V 100M Ωminimum					

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1. Withstanding voltage : between top side of sample and the terminal								
12. Terminal Strength	11. Withstanding vo	tage : between top side of sa	mple and the terminal					
Specified Value   Inductance change : Within ±105	Specified Value	AC100V No break of insu	ulation					
Specified Value   Inductance change : Within ±105								
Specified Value   Inductance change : Within ±10%	12. Terminal Streng	th						
AEC-Q200 Test No 22 qualified (AEC-Q200-006)			+10%					
Test Methods and Remarks  Test Methods and R	- Openiou value							
Applied Force : 17.7N   Duration : 80 s								
Test Methods and Remarks   Specified Value   Acc-Q200 Test No.13 qualified (MIL-STD-202 Method 213)   The stable between the stable between test board by the reflow.   The high stable between test board by the reflow.   The high stable between test board by the reflow.   The high stable between test conditions.   Frequency Range   10-2000Hz   Total Amplitude   5G   Sweeping Method   10Hz to 2000Hz to 10Hz for 20min.   Total Amplitude   5G   Sweeping Method   10Hz to 2000Hz to 10Hz for 20min.   Total Amplitude   5G   Sweeping Method   10Hz to 2000Hz to 10Hz for 20min.   Total Amplitude   5G   Sweeping Method   10Hz to 2000Hz to 10Hz for 20min.   The high stable stable between test board by the reflow.   The high stable		Applied force : 17.7N						
Inductance change: Within ±10%   No significant abnormality in appearance.	Duration : 60 s							
Inductance change: Within ±10%   No significant abnormality in appearance.								
Inductance change: Within ±10%   No significant abnormality in appearance.	10 1/1 1							
Acc-0200 Test No.14 qualified (MIL-STD-202 Method 204)   The test samples shall be soldered to the test board by the reflow.   The test samples shall be soldered to the test board by the reflow.   The test samples shall be soldered to the test board by the reflow.   The test samples shall be soldered to the test board by the reflow.   The test sample shall be soldered to the test board by the reflow.   The test sample shall be soldered to the test board by the reflow.   The test sample shall be soldered to the test board by the reflow.   The test sample shall be soldered to the test board by the reflow.   The test sample shall be soldered to the test board by the reflow.   The test sample shall be soldered to the test board by the reflow.   The test sample shall be soldered to the test board by the reflow.   The test sample shall be soldered to the test board by the reflow.   The test sample shall be soldered to the test board by the reflow.   The test sample shall be soldered to the test board by the reflow.   The test sample shall be soldered to the test board by the reflow.   The test sample shall be soldered to the test board by the reflow.   The test sample shall be soldered to the test board by the reflow.   The test sample shall be soldered to below test conditions.   Acceleration   981m/s²   Duration   6msec(Half sine pulse)   Direction   4x-4y-2x, -y, -y, -z   Number of time   Each 3 times, Total 18 times   The test sample shall be soldered to the test board by the reflow.   The test sample shall be soldered to below test conditions.   Acceleration   981m/s²   Direction   4x-4y-2x, -y, -y, -z   Number of time   Each 3 times, Total 18 times   The test sample shall be soldered to below test conditions.   Acceleration   981m/s²   Direction   4x-4y-2x, -y, -y, -z   Number of time   Each 3 times, Total 18 times   The test sample shall be soldered to the test board by the reflow.   The test sample shall be soldered to the test board by the reflow.   The test sample shall be soldered to the test board	13. Vibration	T I MEIL	1.100/					
Test Methods and Remarks    Test Methods and Remarks   Total Amplitude   5G   Sweeping Method   10Hz to 2000Hz to 10Hz for 20min.	Specified Value	=						
Then it shall be submitted to below test conditions.    Frequency Range		AEC-Q200 Test No.14 qua	alified (MIL-STD-202 M	lethod 204)				
Frequency Range		· ·		=				
Test Methods and Remarks    Total Amplitude   SG   Sweeping Method   10Hz to 2000Hz to 10Hz for 20min.				is.				
and Remarks    Sweeping Method   10Hz to 2000Hz to 10Hz for 20min.	Test Methods							
Number of cycle   X   Number of cycles on each X, Y, and Z axis.		·		OHz for 20min.				
All Mechanical Shock   Specified Value   Inductance change: Within ±10%   No significant abnormality in appearance.			Х					
14. Mechanical Shock  Specified Value  Inductance change: Within ±10% No significant abnormality in appearance.  AEC-Q200 Test No.13qualified (MIL-STD-202 Method213) The test samples shall be soldered to the test board by the reflow. Then it shall be submitted to below test conditions.  Acceleration 981m/s² Duration 8msec(Half sine pulse) Direction 4x, 4y, 4z, -x, -y, -z Number of time Each 3 times, Total 18 times  15. Solderability  Specified Value  At least 90% of surface of terminal electrode is covered by new solder.  AEC-Q200 Test No.18qualified (J-STD-002)  (a) Method B (c) Method D Preconditioning 155°C Abrs Steam 8hrs±15min Solder Temperature 235±5°C 260±5°C Time 5+0/-0.5 sec 30+0/-0.5 sec.  16. Resistance to Soldering Heat  Specified Value  Inductance change: Within ±10% No significant abnormality in appearance.  AEC-Q200 Test No.15 qualified (MIL-STD-202 Method210) Condition: K The test sample shall be exposed to reflow oven at 183°C for 90-120 seconds,		Number of cycle						
Inductance change : Within ±10%   No significant abnormality in appearance.		Z						
Inductance change : Within ±10%   No significant abnormality in appearance.								
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No significant abnormality in appearance.	14. Mechanical Sho							
The test samples shall be soldered to the test board by the reflow. Then it shall be submitted to below test conditions.    Acceleration   981m/s²     Duration   6msec(Half sine pulse)     Direction   +X, +Y, +Z, -X, -Y, -Z     Number of time   Each 3 times, Total 18 times	Specified Value	=						
Then it shall be submitted to below test conditions.    Acceleration   981 m/s²		AEC-Q200 Test No.13qualified (MIL-STD-202 Method213)						
Test Methods and Remarks    Acceleration   981m/s²   Duration   6msec(Half sine pulse)   Direction   +X, +Y, +Z, -X, -Y, -Z   Number of time   Each 3 times, Total 18 times		·						
Duration   6msec(Half sine pulse)   Direction   +X, +Y, +Z, -X, -Y, -Z   Number of time   Each 3 times, Total 18 times      15. Solderability				ns. T				
Direction +X, +Y, +Z, -X, -Y, -Z Number of time Each 3 times, Total 18 times  15. Solderability  Specified Value At least 90% of surface of terminal electrode is covered by new solder.  AEC-Q200 Test No.18qualified (J-STD-002)  (a) Method B (c) Method D Preconditioning 155°C_4hrs Steam 8hrs±15min Solder Temperature 235±5°C 260±5°C Time 5+0/-0.5 sec 30+0/-0.5 sec.  16. Resistance to Soldering Heat  Specified Value Inductance change: Within ±10% No significant abnormality in appearance.  AEC-Q200 Test No.15 qualified (MIL-STD-202 Method210) Condition: K Test Methods and Remarks The test sample shall be exposed to reflow oven at 183°C for 90-120 seconds,								
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Test Methods and Remarks  (a) Method B (c) Method D Preconditioning 155°C_4hrs Steam 8hrs±15min Solder Temperature 235±5°C Time 5+0/-0.5 sec 30+0/-0.5 sec.  16. Resistance to Soldering Heat  Specified Value  Inductance change: Within ±10% No significant abnormality in appearance.  AEC-Q200 Test No.15 qualified (MIL-STD-202 Method210) Condition: K The test sample shall be exposed to reflow oven at 183°C for 90-120 seconds,	Specified Value	At least 90% of surface of	terminal electrode is c	overed by new solder.				
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Remarks    Preconditioning   155°C_4hrs   Steam 8hrs±15min     Solder Temperature   235±5°C   260±5°C     Time   5+0/-0.5 sec   30+0/-0.5 sec.      16. Resistance to Soldering Heat	Test Methods and		(a) Method B	(c) Method D				
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17. Temperature C	Cycling						
Specified Value	Inductance change : Within ±10%						
	No significant abnormality in appearance.						
	AEC-Q200 Test No.04 qualified (JESD22 Method JA-104)						
	The test samples shall be soldered to the test board by the reflow. The test samples shall be placed at specified temperature for specified						
Talak Makhada	time by following condition.						
Test Methods and Remarks	1Cycle -55±3°C/30 min⇔150±3°C/30 min						
and Nemarks	Number of 1000 cycles						
	cycle						
18. Biased Humidit	to the second se						
To. Diased Humilan							
Specified Value	Inductance change : Within ±10%  No significant abnormality in appearance.						
	AEC-Q200 Test No.07 qualified (MIL-STD-202 Method 103)  The test samples shall be soldered to the test board by the reflow.						
Test Methods	The test samples shall be soldered to the test board by the reliow.  The test samples shall be placed in thermostatic oven set at specified temperature and humidity as shown in below table.						
and Remarks	Temperature 85±2°C						
and Nemarks	Humidity 85%RH						
	Time $1000 + 24/-0$ hour						
19. High Temperat	Ture Exposure						
10. High Temperat							
Specified Value	Inductance change: Within ±10%						
	No significant abnormality in appearance.						
	AEC-Q200 Test No.03 qualified (MIL-STD-202 Method 108)						
Test Methods and Remarks	The test samples shall be soldered to the test board by the reflow soldering.  Temperature 150±3°C						
and Remarks	Temperature						
	Time 1000 1 247 0 flour						
20. Operational Lif	'e						
Specified Value	Inductance change : Within ±10%						
	No significant abnormality in appearance.						
Test Methods and Remarks	AEC-Q200 Test No.08 qualified (MIL-PRF-27)						
	The test samples shall be soldered to the test board by the reflow soldering.						
	Temperature 125±3°C						
	Applied current Rated current						
	Time 1000+24/-0 hour						
21. Standard cond	ition						
•	Standard test condition:						
Specified Value	Unless otherwise specified, temperature is $20\pm15^{\circ}$ C and $65\pm20\%$ of relative humidity.  When there is any question concerning measurement result: In order to provide correlation data, the test shall be condition of $20\pm2^{\circ}$ C						

	Standard test condition:
	Unless otherwise specified, temperature is 20±15°C and 65±20%of relative humidity.
Specified Value	When there is any question concerning measurement result: In order to provide correlation data, the test shall be condition of $20\pm2^{\circ}$ C of
	temperature. 65 ± 5% relative humidity.

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Inductance is in accordance with our measured value.