

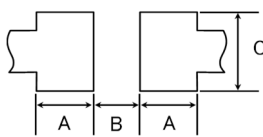
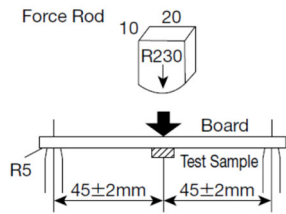
**Wire-wound Ferrite Power Inductors LSXN/LSXP series
for General Electronic Equipment for Consumer**
**Wire-wound Ferrite Power Inductors LLXN/LLXP series
for Medical Devices classified as GHTF Classes A or B (Japan Classes I or II)**

■ RELIABILITY DATA

1. Operating Temperature Range													
Specified Value	-25~+120°C (LSXN: 2020~3030 type, LSXP: 2020~3030 type) -25~+125°C (LSXN: 4040~8080 type) -25~+120°C (LLXN: 2020~3030 type, LLXP: 2020~3030 type) -25~+125°C (LLXN: 4040~8080 type)												
Test Methods and Remarks	Including self-generated heat												
2. Storage Temperature Range													
Specified Value	-40~+85°C												
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 3227 or equivalent)												
6. Self resonance frequency													
Specified Value	Within the specified tolerance												
Test Methods and Remarks	Measuring equipment : Impedance analyzer/material analyzer (HP4291A or equivalent HP4191A, 4192A or equivalent)												
7. Temperature characteristic													
Specified Value	Inductance change : Within $\pm 20\%$												
Test Methods and Remarks	Measurement of inductance shall be taken at temperature range within $-25^{\circ}\text{C} \sim +85^{\circ}\text{C}$. With reference to inductance value at $+20^{\circ}\text{C}$., change rate shall be calculated. Change of maximum inductance deviation in step 1 to 5 <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Step</th> <th>Temperature ($^{\circ}\text{C}$)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>20</td> </tr> <tr> <td>2</td> <td>Minimum operating temperature</td> </tr> <tr> <td>3</td> <td>20 (Standard temperature)</td> </tr> <tr> <td>4</td> <td>Maximum operating temperature</td> </tr> <tr> <td>5</td> <td>20</td> </tr> </tbody> </table>	Step	Temperature ($^{\circ}\text{C}$)	1	20	2	Minimum operating temperature	3	20 (Standard temperature)	4	Maximum operating temperature	5	20
Step	Temperature ($^{\circ}\text{C}$)												
1	20												
2	Minimum operating temperature												
3	20 (Standard temperature)												
4	Maximum operating temperature												
5	20												

▶ This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our specification.
For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (<http://www.ty-top.com/>).

8. Resistance to flexure of substrate

Specified Value	No damage																																			
Test Methods and Remarks	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.																																			
	Test board size	: 100 × 40 × 1.0																																		
	Test board material	: Glass epoxy-resin																																		
	Solder cream thickness	: 0.10mm (2020~3030 type)																																		
		: 0.15mm (4040~8080 type)																																		
	Land dimension																																			
																																				
		<table border="1"> <thead> <tr> <th>Type</th> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>2020</td> <td>0.65</td> <td>0.7</td> <td>2.0</td> </tr> <tr> <td>2424</td> <td>0.7</td> <td>0.75</td> <td>2.0</td> </tr> <tr> <td>3030</td> <td>0.8</td> <td>1.4</td> <td>2.7</td> </tr> <tr> <td>4040</td> <td>1.2</td> <td>1.6</td> <td>3.7</td> </tr> <tr> <td>5050</td> <td>1.5</td> <td>2.1</td> <td>4.0</td> </tr> <tr> <td>6060</td> <td>1.6</td> <td>3.1</td> <td>5.7</td> </tr> <tr> <td>8080</td> <td>1.8</td> <td>3.8</td> <td>7.5</td> </tr> </tbody> </table>	Type	A	B	C	2020	0.65	0.7	2.0	2424	0.7	0.75	2.0	3030	0.8	1.4	2.7	4040	1.2	1.6	3.7	5050	1.5	2.1	4.0	6060	1.6	3.1	5.7	8080	1.8	3.8	7.5		
Type	A	B	C																																	
2020	0.65	0.7	2.0																																	
2424	0.7	0.75	2.0																																	
3030	0.8	1.4	2.7																																	
4040	1.2	1.6	3.7																																	
5050	1.5	2.1	4.0																																	
6060	1.6	3.1	5.7																																	
8080	1.8	3.8	7.5																																	
																																				

9. Insulation resistance : between wires

Specified Value	—
-----------------	---

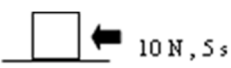
10. Insulation resistance : between wire and core

Specified Value	—
-----------------	---

11. Withstanding voltage : between wire and core

Specified Value	—
-----------------	---

12. Adhesion of terminal electrode

Specified Value	Shall not come off PC board			
Test Methods and Remarks	The test samples shall be soldered to the test board by the reflow.			
	Applied force	: 10N to X and Y directions.		
	Duration	: 5s.		
	Solder cream thickness	: 0.10mm (2020~3030 type)		
		: 0.15mm (4040~8080 type)		
				

13. Resistance to vibration

Specified Value	Inductance change : Within ±10%																								
	No significant abnormality in appearance.																								
Test Methods and Remarks	The test samples shall be soldered to the test board by the reflow.																								
	Then it shall be submitted to below test conditions.																								
	<table border="1"> <thead> <tr> <th>Frequency Range</th> <td colspan="3">10~55Hz</td> </tr> <tr> <th>Total Amplitude</th> <td colspan="3">1.5mm (May not exceed acceleration 196m/s²)</td> </tr> <tr> <th>Sweeping Method</th> <td colspan="3">10Hz to 55Hz to 10Hz for 1min.</td> </tr> <tr> <th rowspan="3">Time</th> <td>X</td> <td colspan="2" rowspan="3">For 2 hours on each X, Y, and Z axis.</td> </tr> <tr> <td>Y</td> </tr> <tr> <td>Z</td> </tr> </thead> <tbody> <tr> <td colspan="4">Recovery : At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs.</td> </tr> </tbody> </table>	Frequency Range	10~55Hz			Total Amplitude	1.5mm (May not exceed acceleration 196m/s ²)			Sweeping Method	10Hz to 55Hz to 10Hz for 1min.			Time	X	For 2 hours on each X, Y, and Z axis.		Y	Z	Recovery : At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs.					
Frequency Range	10~55Hz																								
Total Amplitude	1.5mm (May not exceed acceleration 196m/s ²)																								
Sweeping Method	10Hz to 55Hz to 10Hz for 1min.																								
Time	X	For 2 hours on each X, Y, and Z axis.																							
	Y																								
	Z																								
Recovery : At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs.																									

► This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our specification. For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (<http://www.ty-top.com/>).

14. Solderability

Specified Value	At least 90% of surface of terminal electrode is covered by new solder.	
Test Methods and Remarks	The test samples shall be dipped in flux, and then immersed in molten solder as shown in below table. Flux : Ethanol solution containing rosin 25%.	
	Solder Temperature	245±5°C
	Time	5±1.0 sec.
※Immersion depth : All sides of mounting terminal shall be immersed.		

15. Resistance to soldering heat

Specified Value	Inductance change : Within ±10% No significant abnormality in appearance.	
Test Methods and Remarks	The test sample shall be exposed to reflow oven at 230±5°C for 40 seconds, with peak temperature at 260±5°C for 5 seconds, 2 times. Test board material : Glass epoxy-resin Test board thickness : 1.0mm	

16. Thermal shock

Specified Value	Inductance change : Within ±10% No significant abnormality in appearance.		
Test Methods and Remarks	The test samples shall be soldered to the test board by the reflow. The test samples shall be placed at specified temperature for specified time by step 1 to step 4 as shown in below table in sequence. The temperature cycle shall be repeated 100 cycles.		
	Conditions of 1 cycle		
	Step	Temperature (°C)	Duration (min)
	1	-40±3	30±3
	2	Room temperature	Within 3
3	+85±2	30±3	
4	Room temperature	Within 3	
Recovery : At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs.			

17. Damp heat

Specified Value	Inductance change : Within ±10% No significant abnormality in appearance.	
Test Methods and Remarks	The test samples shall be soldered to the test board by the reflow. The test samples shall be placed in thermostatic oven set at specified temperature and humidity as shown in below table.	
	Temperature	60±2°C
	Humidity	90~95%RH
	Time	500+24/-0 hour
Recovery : At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs.		

18. Loading under damp heat

Specified Value	Inductance change : Within ±10% No significant abnormality in appearance.	
Test Methods and Remarks	The test samples shall be soldered to the test board by the reflow. The test samples shall be placed in thermostatic oven set at specified temperature and humidity and applied the rated current continuously as shown in below table.	
	Temperature	60±2°C
	Humidity	90~95%RH
	Applied current	Rated current
	Time	500+24/-0 hour
Recovery : At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs.		

19. Low temperature life test

Specified Value	Inductance change : Within ±10% No significant abnormality in appearance.	
Test Methods and Remarks	The test samples shall be soldered to the test board by the reflow. After that, the test samples shall be placed at test conditions as shown in below table.	
	Temperature	-40±2°C
	Time	500+24/-0 hour
Recovery : At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs.		

▶ This catalog contains the typical specification only due to the limitation of space. When you consider the purchase of our products, please check our specification.
For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (<http://www.ty-top.com/>).

20. High temperature life test

Specified Value	—
-----------------	---

21. Loading at high temperature life test

Specified Value	Inductance change : Within $\pm 10\%$ No significant abnormality in appearance.	
Test Methods and Remarks	The test samples shall be soldered to the test board by the reflow soldering.	
	Temperature	$85 \pm 2^\circ\text{C}$
	Applied current	Rated current
	Time	$500 + 24 / - 0$ hour
	Recovery : At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48hrs.	

22. Standard condition

Specified Value	Standard test condition : Unless otherwise specified, temperature is $20 \pm 15^\circ\text{C}$ and $65 \pm 20\%$ of relative humidity. When there is any question concerning measurement result: In order to provide correlation data, the test shall be condition of $20 \pm 2^\circ\text{C}$ of temperature, $65 \pm 5\%$ relative humidity. Inductance is in accordance with our measured value.
-----------------	--