

**Wire-wound Metal Power Inductors MCOIL™ LBDN series
for Telecommunications Infrastructure and Industrial Equipment**
**Wire-wound Metal Power Inductors MCOIL™ LMDN series
for Medical Devices classified as GHTF Class C (Japan Class III)**

■ RELIABILITY DATA

1. Operating Temperature Range	
Specified Value	-40~+125°C (Including self-generated heat)
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 : 1MHz 1V (4040F: 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	—
7. Temperature characteristic	
Specified Value	Inductance change : Within ±10%
Test Methods and Remarks	Measurement of inductance shall be taken at temperature range within -40°C~+125°C. With reference to inductance value at +20°C., change rate shall be calculated.
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 : 100×40×1.6 mm Test board material : glass epoxy-resin Solder cream thickness : 0.10 mm
9. Insulation resistance : between wires	
Specified Value	—
10. Insulation resistance : between wire and core	
Specified Value	—

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For details of each product (characteristics graph, reliability information, precautions for use, and so on), see our Web site (<http://www.ty-top.com/>).

11. Withstanding voltage : between wire and core

Specified Value	—
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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 : 0.1mm.

13. Resistance to vibration

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. Then it shall be submitted to below test conditions. <table border="1" style="margin-left: 20px;"> <tr> <td>Frequency Range</td> <td colspan="2">10~55Hz</td> </tr> <tr> <td>Total Amplitude</td> <td colspan="2">1.5mm (May not exceed acceleration 196m/s²)</td> </tr> <tr> <td>Sweeping Method</td> <td colspan="2">10Hz to 55Hz to 10Hz for 1min.</td> </tr> <tr> <td rowspan="3">Time</td> <td>X</td> <td rowspan="3">For 2 hours on each X, Y, and Z axis.</td> </tr> <tr> <td>Y</td> </tr> <tr> <td>Z</td> </tr> </table> 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
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														

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%. <table border="1" style="margin-left: 20px;"> <tr> <td>Solder Temperature</td> <td>245\pm5$^{\circ}$C</td> </tr> <tr> <td>Time</td> <td>5\pm1.0 sec.</td> </tr> </table> ※Immersion depth : All sides of mounting terminal shall be immersed.	Solder Temperature	245 \pm 5 $^{\circ}$ C	Time	5 \pm 1.0 sec.
Solder Temperature	245 \pm 5 $^{\circ}$ C				
Time	5 \pm 1.0 sec.				

15. Resistance to soldering heat

Specified Value	Inductance change : Within $\pm 10\%$ No significant abnormality in appearance.
Test Methods and Remarks	The test sample shall be exposed to reflow oven at 230 \pm 5 $^{\circ}$ C for 40 seconds, with peak temperature at 260 \pm 5 $^{\circ}$ 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 $\pm 10\%$ 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 1000 cycles. <table border="1" style="margin-left: 20px;"> <thead> <tr> <th colspan="3">Conditions of 1 cycle</th> </tr> <tr> <th>Step</th> <th>Temperature ($^{\circ}$C)</th> <th>Duration (min)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-40\pm3</td> <td>30\pm3</td> </tr> <tr> <td>2</td> <td>Room temperature</td> <td>Within 3</td> </tr> <tr> <td>3</td> <td>+85\pm2</td> <td>30\pm3</td> </tr> <tr> <td>4</td> <td>Room temperature</td> <td>Within 3</td> </tr> </tbody> </table>	Conditions of 1 cycle			Step	Temperature ($^{\circ}$ C)	Duration (min)	1	-40 \pm 3	30 \pm 3	2	Room temperature	Within 3	3	+85 \pm 2	30 \pm 3	4	Room temperature	Within 3
Conditions of 1 cycle																			
Step	Temperature ($^{\circ}$ C)	Duration (min)																	
1	-40 \pm 3	30 \pm 3																	
2	Room temperature	Within 3																	
3	+85 \pm 2	30 \pm 3																	
4	Room temperature	Within 3																	

17. Damp heat

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. The test samples shall be placed in thermostatic oven set at specified temperature and humidity as shown in below table. <table border="1" style="margin-left: 20px;"> <tr> <td>Temperature</td> <td>60\pm2$^{\circ}$C</td> </tr> <tr> <td>Humidity</td> <td>90~95%RH</td> </tr> <tr> <td>Time</td> <td>1000+24/-0 hour</td> </tr> </table>	Temperature	60 \pm 2 $^{\circ}$ C	Humidity	90~95%RH	Time	1000+24/-0 hour
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18. Loading under damp heat

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. 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	$60 \pm 2^\circ\text{C}$
	Humidity	90~95%RH
	Applied current	Rated current
	Time	1000+24/-0 hour

19. Low 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. After that, the test samples shall be placed at test conditions as shown in below table.	
	Temperature	$-40 \pm 2^\circ\text{C}$
	Time	1000+24/-0 hour

20. High temperature life test

Specified Value	—
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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. The test samples shall be placed in thermostatic oven set at specified temperature and applied the rated current continuously as shown in below table.	
	Temperature	$85 \pm 2^\circ\text{C}$
	Applied current	Rated current
	Time	1000+24/-0 hour

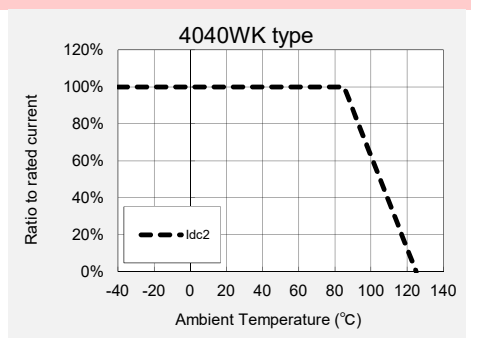
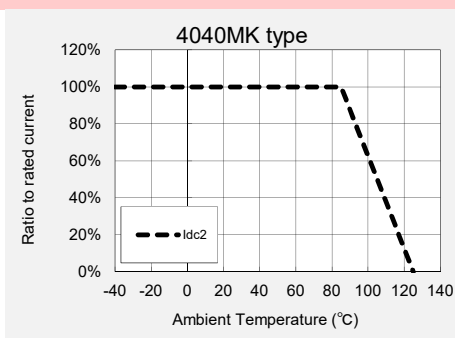
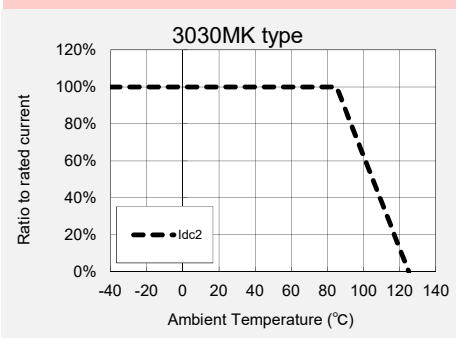
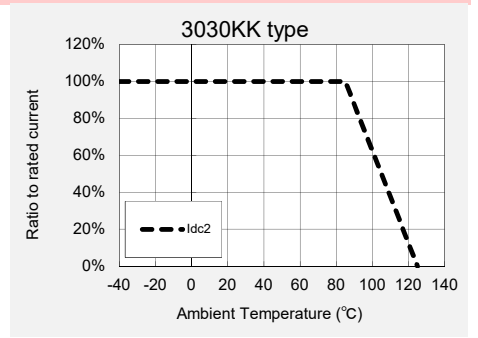
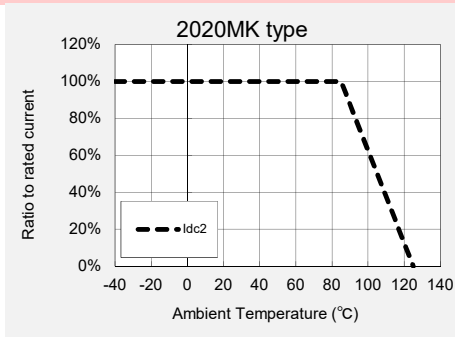
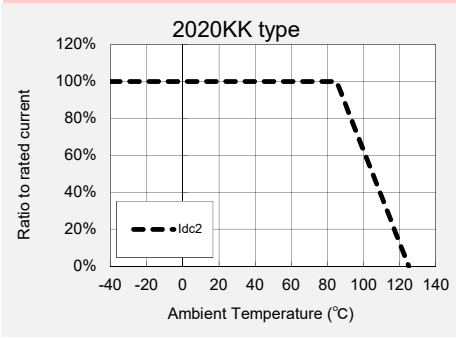
22. Standard condition

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.
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■ Derating of Rated Current

● LBDN series

Derating of current is necessary for LBDN series depending on ambient temperature. Please refer to the chart shown below for appropriate derating of current.



■ Derating of Rated Current

● LMDN series

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