德砚电子
DE YAN DIAN ZI

Data Sheet

RoHS ISO 9001 质量管理体系认证 ISO 14001 环境管理体系认证

Shenzhen Deyan Electronics Co., Ltd

1. Scope:

This specification applies the Shielded construction chip inductor DNR4020S470MT

2. Outline:

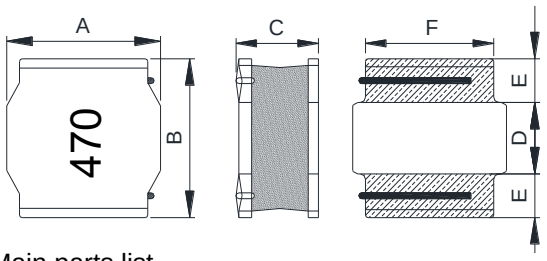
The products are used as choke coils for DC/DC converter and consist of drum core, coil, magnetic glue and terminals.

3. Safety Specification:

The products shall be used as secondary circuit parts, thus are not applied by any specific safety standards.

4. Specification:

4.1. Dimensions

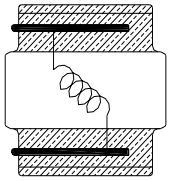


A	4.0±0.2	D	2.0 Ref.
B	4.0±0.2	E	1.0 Ref.
C	2.0 Max.	F	3.6 Ref.

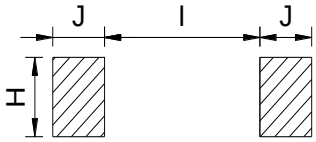
4.2. Main parts list

No.	Part name	Material	Qty
1	Drum Core	Ni-Zn Ferrite or Equivalent	1set
2	Coil	Cu/P180/Grand 1/Polyurethane enameled or Equivalent	1set
3	Solder	107H or Equivalent	0.15g
4	Magnetic Glue	Ferrite Powder & Resin	0.15g

4.3. Pin Connection:



4.4. Recommended Land Pattern:



I	1.9 Ref.
J	1.0 Ref.
H	3.5 Ref.

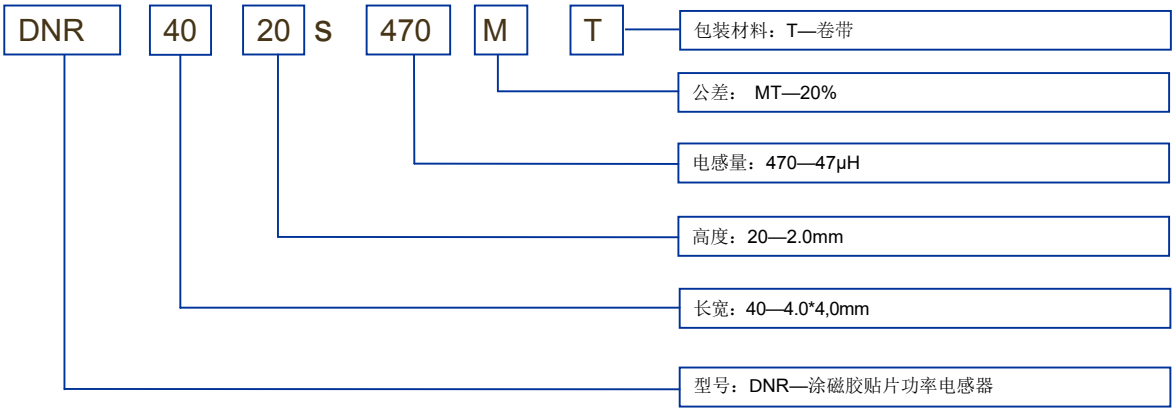
4.5. Electrical Specifications:

Part Number	Rated Inductance (1) (μH)	Test Condition	DC Resistance (mΩ)	Self -Resonant Frequency (MHz) Min.	Isat (2) Amperes (A)	Irms(3) Amperes (A)	Part Marking Designator
DNR4020S470MT	47uh±20%	100kHz,1Vrms	923Max710Typ.	10	0.74Max.0.81Typ.	0.44Max.0.61Typ.	470

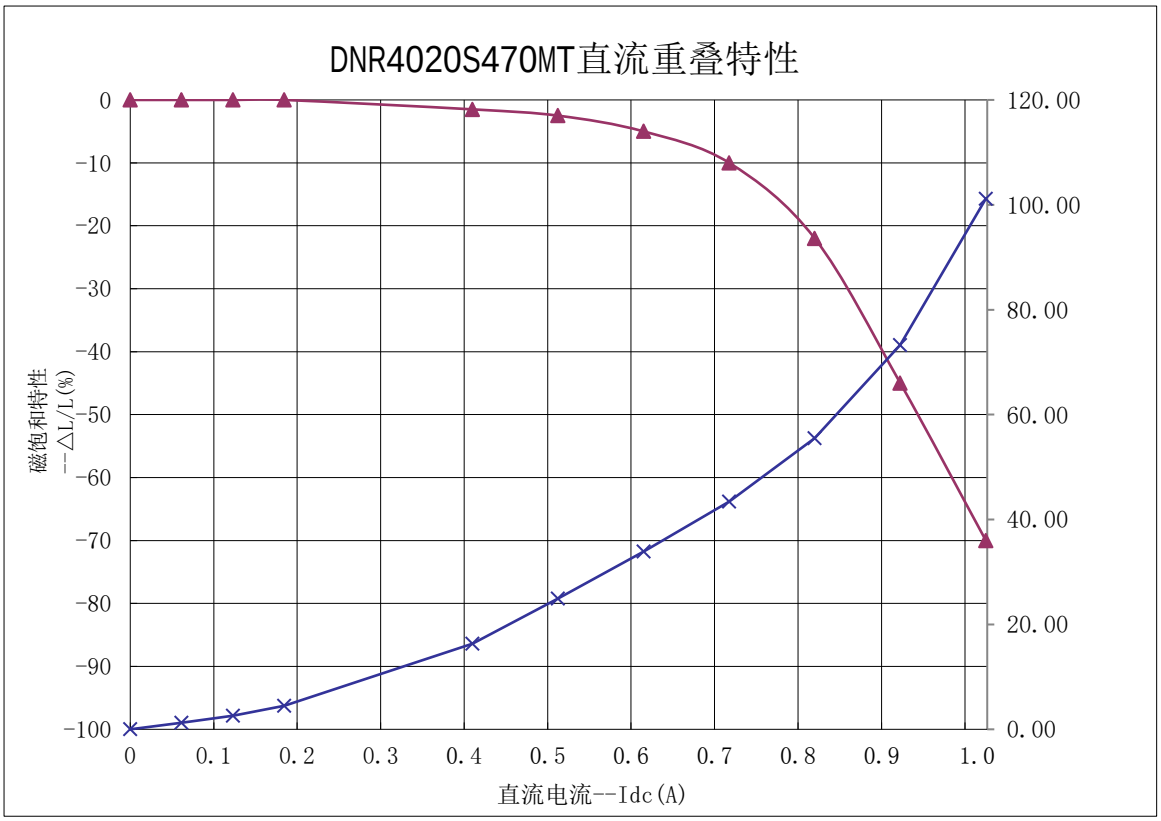
(1) Open Circuit Inductance Test Parameters: 100kHz, 1.0Vrms, 0.0Adc.
(2) Isat Amperes Typical for approximately 30% roll off (@25°C)
(3) Irms: current for an approximate ΔT of 40°C without core loss s(Ta=25°C). It is recommended that the temperature of the part not exceed 125°C. PCB layout, trace thickness and width, air-flow, and proximity of other heat generating components will affect the temperature rise. It is recommended that the temperature of the part not exceed 125°C under worst case operating conditions verified in the end application.
(4) Rated current：Isat and Irms whichever is lower.

Note：The rated current is subject to change depending on the cooli

4.6. Ordering Code & Explanation of Part Numbers:



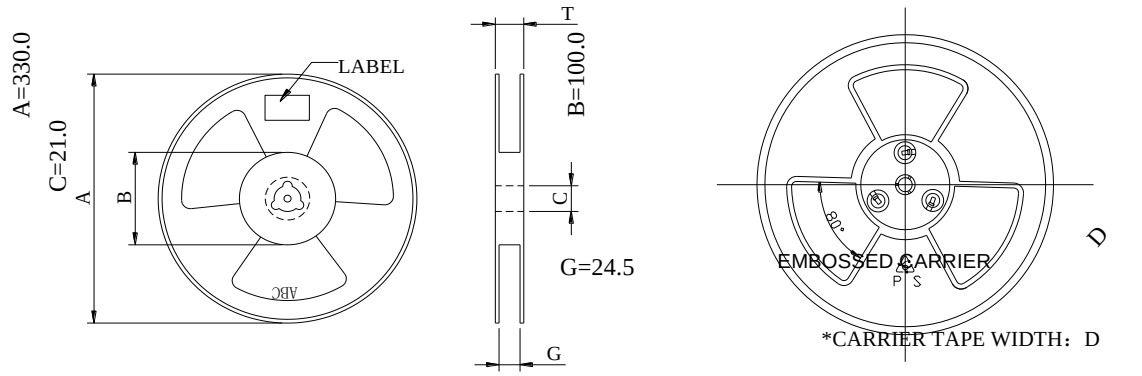
4.7. Bias Characteristic



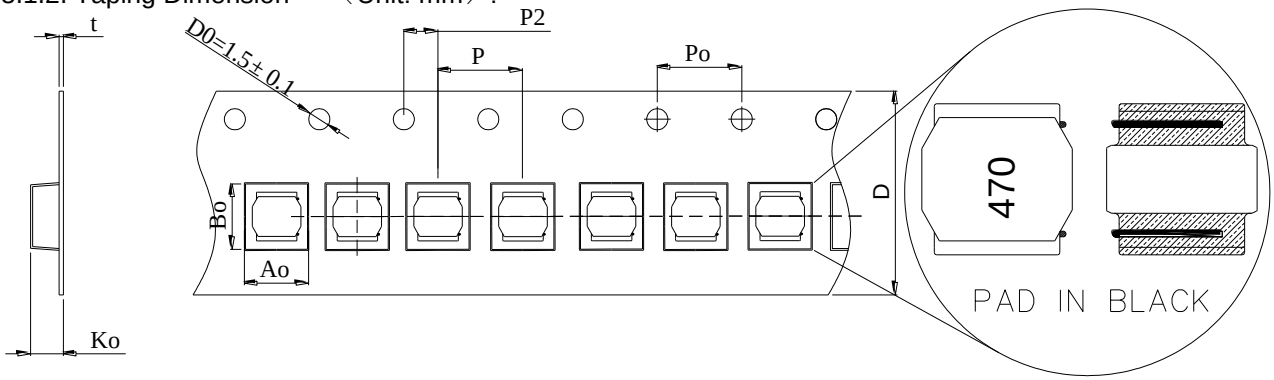
5.Package Specification：

5.1. Taping Specification：

5.1.1.Reel Dimension （Unit: mm）:



5.1.2. Taping Dimension （Unit: mm）:



STA YLE	Q'TY (PCS)	A	B	C	D	G	T	A0	B0	K0	t	P	Po	P2
13"	3000	330	100	12.0 ±0.2	12.0 ±0.2	12.0 ±0.2	16.4 Max	4.30 ±0.1	4.30 ±0.1	3.2 ±0.1	0.30 ±0.05	8.0 ±0.2	4.0 ±0.2	2.0 ±0.1

5.1.3. Tensile Strength：

5.1.3.1. Plastic tape ： ≧10N （≧1.0kgf）

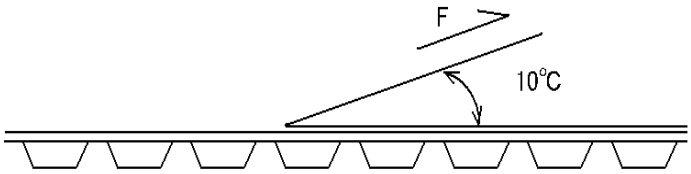
5.1.3.2.Material ：PS

5.1.3.3.Cover tape ： ≧5N （≧0.5kgf）

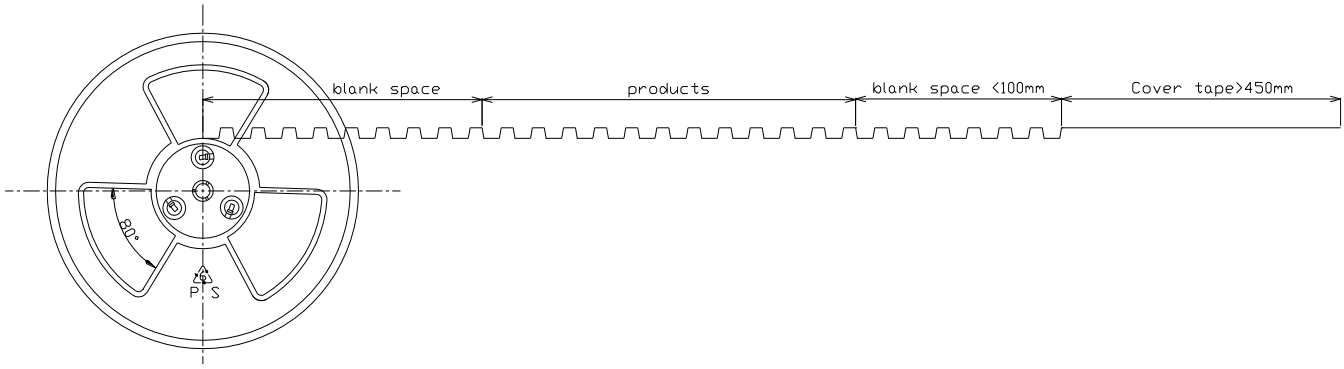
5.1.4. Tensile Strength of Cover Tape (Ref.):

F=0.2～0.9N

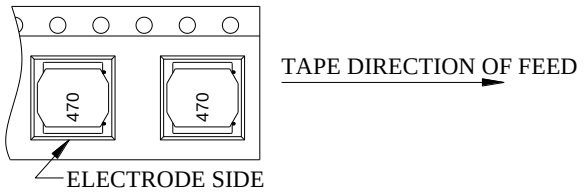
Angel of pull 0 ～ 15 ° opposite the forward direction, Velocity of pull: 300 mm/min.



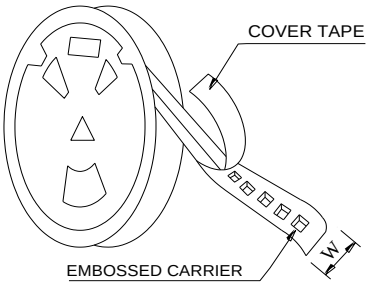
5.1.5.Packing Style of Taping （Unit: mm）



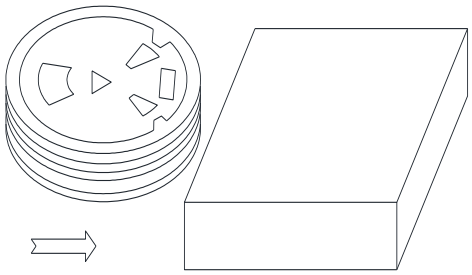
5.1.6. Packaging Style of Products:



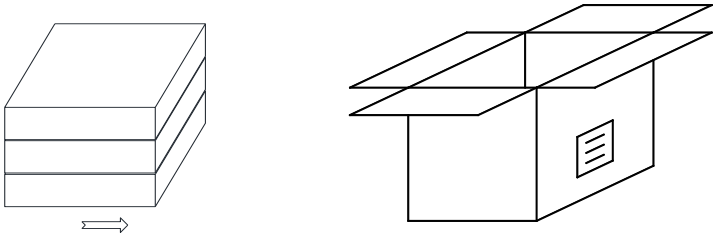
5.1.7. Packaging style of case
5.1.7.1. Packing cases are composed of the inner case and outer case.
5.1.7.2. Nine inners cases are put in an outer, thus 27,000 products put in an outer case.
5.1.7.3. Paper cushion are placed on the upper and bottom side in the outer case



3,000 pcs in 1 reel (inner) case



3 reels in 1 reels (inner) cases



3 reels (inner) cases in 1 packaging (outer) case

5.1.8. Indication：
5.1.8.1. Label attached on reel:

Production Label
P/N.:DNR4020S470MT
Qty.:3,000pcs
Lot No.:20210506N03
Made in China

Production Label

5.1.8.1. Label attached on packaging (outer) case:

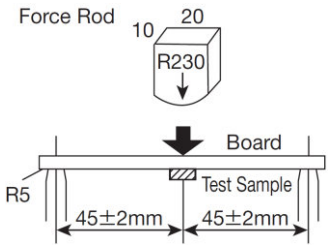
P/N.:DNR4020S470MT
Qty.:27,000pcs
Lot No.:20210506N03
Made in China

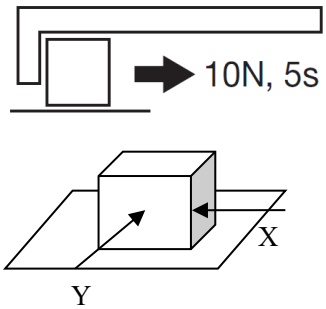
5.1.9. Notes：
5.1.9.1. This specification defines the standard packaging style and is subject to change depending on quantity or fractions.

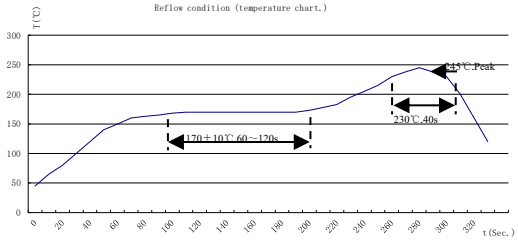
5.1.9.2. Inside of cases shall be filled with cushions to keep the products stable.

5.1.9.3. Inspection Certificate：Attach size data and the electric characteristic result for each shipping lot as "Inspection Certificate".

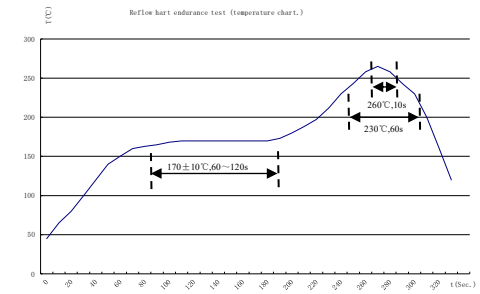
6. Reliability data:

Item	Specified Value	Test Method and Remarks
1.Operating Temperature Range	-40℃～+125℃	Including self-generated heat.
2. Storage Temperature Range	-40℃～+125℃	0～40℃ for the product with taping.
3.External Appearance	The coil has no external defects.	On visual inspection.
4.Rated current	Within the specified tolerance	The maximum DC value having inductance decrease within specified value and temperature increase within 40℃ by the application of DC bias. Inductance decrease.(Type: 30%)
5.Inductance	Within the specified tolerance	LCR Meter: HP 4194A or equivalent, 100KHz, 0.25V
6.DC Resistance	Within the specified tolerance	DC ohmmeter: TOS8001 or equivalent.
7.Self resonance frequency	Within the specification	Impedance analyzer/material analyzer: HP4291A , HP4194A, 4192A or equivalent.
8.Temperature characteristic	Inductance change: Within±15% 0～2000ppm/℃	Measurement of inductance shall be taken at temperature range within -40～+125℃. With reference to inductance value at +25℃, change rate shall be calculated. Change of maximum inductance deviation in step 1 to 5 Temperature at step 1: 25℃ Temperature at step 2: Minimum operating temperature Temperature at step 3: 25℃(Standard temperature) Temperature at step 4: Maximum operating temperature Temperature at step 5: 25℃and the value calculate based on the value applicable in a normal temperature and normal humidity shall be $\triangle L/L_{25℃}$ ≤±15% Measurement Equipments: HP 4194A(at 100 KHz) or equivalent.
9.Resistance to flexure of substrate	Inductance change: Within±5.0% There shall be no mechanical damage or electrical damage	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 3 mm. Test board size: 100*40*1.0 Test board material: glass epoxy-resin Solder cream thickness: 0.12mm. Keep time：3～5seconds Speed:0.5mm/sec  Printed board thickness: 1.0mm Unit: mm

<table>
<tr><th>Item</th><th>Specified Value</th><th>Test Method and Remarks</th></tr>
<tr><td>10.Insulation resistance</td><td>NL</td><td>Between Coils</td></tr>
<tr><td>11.Insulation resistance</td><td>Over 100MΩ at 100V D.C. for 1 minute.</td><td>Between coil and core. DC 100V voltage shall be applied for 1 minute ..across the top surface and the terminal of this sample(current：1 m A)</td></tr>
<tr><td>12.Withstanding voltage</td><td>No dielectric breakdown at 100V D.C. for 1 minute</td><td>Between coil and core. DC 100V voltage shall be applied for 1 minute ..across the top surface and the terminal of this sample(current：1 m A)</td></tr>
<tr><td>13.Adhesion of terminal electrode</td><td>Shall not come off PC board.</td><td>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: 0.12mm.
  </td></tr>
<tr><td>14.Resistance to vibration</td><td>Inductance change: Within±10%
There shall be no mechanical damage.</td><td>The test samples shall be soldered to the test board by the reflow.
Then it shall be submitted to below test conditions.
The test samples shall be soldered to the test board by the reflow.
Then it shall be submitted to below test conditions.
<table>
<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 196 m/s^2)</td></tr>
<tr><td>Sweeping Method</td><td colspan="2">10Hz to 55Hz to 10 Hz for 1 min.</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 sfter the test, followed by the measurement within 48 hrs.</td></tr>
<tr><td>15.Solderability</td><td>At least 90% of surface of terminal electrode is covered by new solder.</td><td>The test samples shall be dipped in flux, and then shall be preheated for 2 minutes in a temperature of 135～150℃ and after it has been immersed to a depth 0.5mm below for 5.0±1.0 seconds molten solder as shown in below table.
Flux: Methanol solution containing rosin 25%.
Solder Temperature: 245±5℃
Immersion depth：0.5mm.</td></tr>
</table>

Item	Specified Value	Test Method and Remarks
16.Resistance to soldering heat	Inductance change: Within±10% No significant abnormality in appearance.	The test sample shall be exposed to reflow oven at 230±5℃ for 40 seconds, with peak temperature at 260±5℃ for 5 seconds, 2 times. Test board thickness: 1.0 mm Test board material: glass epoxy-resin. 
17.Thermal shock	Inductance change: Within±10% No significant abnormality in appearance.	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(℃) / Duration(min) 1 / -40±3 / 30±3 2 / Room temperature / Within 3 3 / +85±2 / 30±3 4 / Room temperature / Within 3
18.Damp heat	Inductance change: Within±10% No significant abnormality in appearance.	Recovery : At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48 hrs. 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℃ Humidity / 90～95%RH Time / 500±24hour
19.Loading under damp heat	Inductance change: Within±10% No significant abnormality in appearance.	Recovery: At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48 hrs. 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℃ Humidity / 90～95%RH Time / 500±24hour

<table>
<tr><th>Item</th><th>Specified Value</th><th>Test Method and Remarks</th></tr>
<tr><td>20.Low temperature life test</td><td>Inductance change：Within±10%
No significant abnormality in appearance.</td><td>Recovery ： At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48 hrs.
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.<table><tr><td>Temperature</td><td>-40±3℃</td></tr><tr><td>Time</td><td>500±24hour</td></tr></table></td></tr>
<tr><td>21.High temperature life test</td><td>Inductance change：Within±10%
No significant abnormality in appearance.</td><td>Recovery ： At least 2hrs of recovery under the standard condition after the test, followed by the measurement within 48 hrs.<table><tr><td>Temperature</td><td>125±3℃</td></tr><tr><td>Time</td><td>500±24hour</td></tr></table></td></tr>
<tr><td>22.Loading at high temperature life test</td><td>Inductance change：Within±10%
No significant abnormality in appearance.</td><td>The test samples shall be soldered to the test board by the reflow soldering.<table><tr><td>Temperature</td><td>85±3℃</td></tr><tr><td>Applied current</td><td>Rated current</td></tr><tr><td>Time</td><td>500±24hour</td></tr></table></td></tr>
<tr><td>23.Standard condition</td><td>Standard test condition ： Unless otherwise specified, temperature is 25±15℃ and 65±20%of relative humidity.
When there are question concerning measurement result : In order to provide correlation date, the test shall be condition of 25±2℃ of temperature, 65±5% relative humidity.
Inductance is in accordance with our measured value.</td><td></td></tr>
</table>

Item	Specified Value	Test Method and Remarks
24.Heat endurance of reflow soldering	Electric no variation Appearance no deformation. Inductance change：Within±10％ No significant abnormality in appearance.	 The test should be made under the conditions according to the chart, after the test it is kept for 2 hours under the normal temperature and humidity. Then, no mechanical and electrical defect should be found out. The reflow test can be done twice, but the interval should be more than one hour under the normal conditions. The reflow test conditions are based on the testing instruments available in VCOIL.

7. Others:

7.1. The contents of this document only assures the characteristics and quality of the sole components. Regarding its use, please evaluate and check that they work correctly when fixed to your equipments.

7.2. We will not take any responsibility for any troubles caused by usage beyond the range that this document specifies.

7.3. The products in this specification are targeted for use in general electrical equipments. Please do not apply on equipments that need. Especially high reliability and/or the defects caused by the product will have direct influence on a person's life or property.

7.4. Period of quality assurance shall be 1 year from the date of shipment. The products must be controlled normal conditions, thus in cases where the products are put under abnormally high temperature and humidity or contamination and damage by natural disasters or other reasons, the above quality assurance period will not be valid.

7.5. Please return this document with signature of receipt within 30 days after our issued date. In case this document is not returned with signature of receipt within 30 days, it is seen as you have approved this document.

7.6. When additions or modifications are needed to this document, both parties shall discuss the revision of the document.

7.7. Both parties are under confidentiality obligation regarding the information contained in this document.