Mn-Zn Ferrite

Material characteristics

- Ferrite for switching power supplies
- Ferrite for high-frequency power supplies
- Large size ferrite for high power
- Ferrite for telecommunication
Please be sure to read this manual thoroughly before using the products.

The products listed on this catalog are intended for use in general electronic equipment (AV equipment, telecommunications equipment, home appliances, amusement equipment, computer equipment, personal equipment, office equipment, measurement equipment, industrial robots) under a normal operation and use condition.

The products are not designed or warranted to meet the requirements of the applications listed below, whose performance and/or quality require a more stringent level of safety or reliability, or whose failure, malfunction or trouble could cause serious damage to society, person or property.

Please understand that we are not responsible for any damage or liability caused by use of the products in any of the applications below or for any other use exceeding the range or conditions set forth in this specification sheet.

If you intend to use the products in the applications listed below or if you have special requirements exceeding the range or conditions set forth in the each catalog, please contact us.

1. Aerospace/aviation equipment
2. Transportation equipment (cars, electric trains, ships, etc.)
3. Medical equipment
4. Power-generation control equipment
5. Atomic energy-related equipment
6. Seabed equipment
7. Transportation control equipment
8. Public information-processing equipment
9. Military equipment
10. Electric heating apparatus, burning equipment
11. Disaster prevention/crime prevention equipment
12. Safety equipment
13. Other applications that are not considered general-purpose applications

When using these products in general purposes and standard use, it is recommended that protection circuits are used, devices are secured, and backup circuits are kept for increased safety.
Please be sure to request delivery specifications that provide further details on the features and specifications of the products for proper and safe use. Please note that the contents may change without any prior notice due to reasons such as upgrading.

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Mn-Zn Material list of ferrite for switching power supplies

### MATERIAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Material</th>
<th>Initial permeability $\upmu_d$</th>
<th>Core loss volume density $P_{cv}$ (kW/m³) B=200mT 100kHz sine wave</th>
<th>Saturation magnetic flux density* $B_s$ (mT) $H=1194A/m$</th>
<th>Remanent flux density* $B_r$ (mT) $H=1194A/m$</th>
<th>Coercive force* $H_c$ (A/m) $H=1194A/m$</th>
<th>Curie temperature $T_c$ (°C)</th>
<th>Density* $d_b$ (kg/m³) $\times 10^3$</th>
<th>Electrical resistivity* $\rho_v$ (Ω • m)</th>
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<td></td>
<td></td>
<td>$25^\circ C$ $60^\circ C$ $100^\circ C$ $120^\circ C$</td>
<td>$25^\circ C$ $60^\circ C$ $100^\circ C$ $120^\circ C$</td>
<td>$25^\circ C$ $60^\circ C$ $100^\circ C$ $120^\circ C$</td>
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<td>$25^\circ C$ $60^\circ C$ $100^\circ C$ $120^\circ C$</td>
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<tr>
<td>PC47</td>
<td>$2500 \pm 25%$</td>
<td>600 400 250 360</td>
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<td>13 9 6 7</td>
<td>&gt;230</td>
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<tr>
<td>PC90</td>
<td>$2200 \pm 25%$</td>
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<td>540 500 450 420</td>
<td>170 95 60 65</td>
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<td>$3300 \pm 25%$</td>
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<td>530 480 410 380</td>
<td>85 70 60 55</td>
<td>9.5 7.5 6.5 6</td>
<td>&gt;215</td>
<td>4.9</td>
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* Typ.

<table>
<thead>
<tr>
<th>Material</th>
<th>Initial permeability $\upmu_d$</th>
<th>Relative loss factor* $\tan \delta / \mu_d \times 10^{-4}$</th>
<th>Saturation magnetic flux density* $B_s$ (mT) $H=1194A/m$ $25^\circ C$</th>
<th>Remanent flux density* $B_r$ (mT) $H=1194A/m$ $25^\circ C$</th>
<th>Coercive force* $H_c$ (A/m) $H=1194A/m$ $25^\circ C$</th>
<th>Curie temperature $T_c$ (°C)</th>
<th>Density* $d_b$ (kg/m³) $\times 10^3$</th>
<th>Electrical resistivity* $\rho_v$ (Ω • m)</th>
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<tr>
<td>HS72</td>
<td>$7500 \pm 25%$ (2000min. at 500kHz)</td>
<td>30(100kHz)</td>
<td>430</td>
<td>55</td>
<td>4</td>
<td>&gt;130</td>
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<td>0.2</td>
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<tr>
<td>HS10</td>
<td>$10000 \pm 25%$</td>
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<td>400</td>
<td>70</td>
<td>3</td>
<td>&gt;120</td>
<td>4.9</td>
<td>0.2</td>
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* Typ.

⚠️ Please be sure to request delivery specifications that provide further details on the features and specifications of the products for proper and safe use. Please note that the contents may change without any prior notice due to reasons such as upgrading.
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**MATERIAL CHARACTERISTICS**

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<th>60°C</th>
<th>100°C</th>
<th>120°C</th>
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<th>100°C</th>
<th>120°C</th>
<th>25°C</th>
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<th>100°C</th>
<th>120°C</th>
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<td><strong>Pcv</strong> (kW/m³)</td>
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<td><strong>Saturation magnetic flux density</strong></td>
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<tr>
<td><strong>Bs</strong> (mT)</td>
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<tr>
<td><strong>H=1194A/m</strong></td>
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<tr>
<td><strong>Remanent flux density</strong></td>
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<tr>
<td><strong>Br</strong> (mT)</td>
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<td><strong>H=1194A/m</strong></td>
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<td><strong>Hc</strong> (A/m)</td>
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<td><strong>Curie temperature</strong></td>
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<tr>
<td><strong>Tc</strong> (°C)</td>
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<tr>
<td><strong>db</strong> (kg/m³)</td>
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<td><strong>Electrical resistivity</strong></td>
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<tr>
<td><strong>ρ</strong> (Ω*m)</td>
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</table>

*Typ.

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**μi frequency characteristics (Typ.)**

**μi temperature characteristics (Typ.)**

**B-H temperature characteristics (Typ.)**

**Core loss (Typ.)**

**Temperature dependence of core loss (Typ.)**

⚠ Please be sure to request delivery specifications that provide further details on the features and specifications of the products for proper and safe use.

Please note that the contents may change without any prior notice due to reasons such as upgrading.

©TDK Corporation 2022
**MATERIAl CHARACTERISTICS**

<table>
<thead>
<tr>
<th>MATERIAL CHARACTERISTICS</th>
<th>Initial permeability</th>
<th>Core loss volume density*</th>
<th>Saturation magnetic flux density*</th>
<th>Remanent flux density*</th>
<th>Coercive force*</th>
<th>Curie temperature Tc (°C)</th>
<th>Density* (kg/m³)</th>
<th>Electrical resistivity* (Ω • m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>µ</td>
<td>Pcv</td>
<td>Bs</td>
<td>Hc</td>
<td>Hci</td>
<td>Tc</td>
<td>db</td>
<td>10^3</td>
<td>10^3</td>
</tr>
<tr>
<td>25°C</td>
<td>60°C</td>
<td>100°C</td>
<td>25°C</td>
<td>60°C</td>
<td>100°C</td>
<td>120°C</td>
<td>25°C</td>
<td>60°C</td>
</tr>
<tr>
<td>2200±25%</td>
<td>680</td>
<td>470</td>
<td>320</td>
<td>460</td>
<td>540</td>
<td>500</td>
<td>450</td>
<td>420</td>
</tr>
</tbody>
</table>

* Typ.

**µi frequency characteristics (Typ.)**

**µi temperature characteristics (Typ.)**

**B-H temperature characteristics (Typ.)**

**Core loss (Typ.)**

**Temperature dependence of core loss (Typ.)**

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Mn-Zn Ferrite for switching power supplies  Material list of PC95

**MATERIAL CHARACTERISTICS**

<table>
<thead>
<tr>
<th>Initial permeability µi</th>
<th>Core loss volume density (Core loss)* Pcv (kW/m³)</th>
<th>Saturation magnetic flux density* Bs (mT) H=1194A/m</th>
<th>Remanent flux density* Br (mT) H=1194A/m</th>
<th>Coercive force* Hc (A/m) H=1194A/m</th>
<th>Curie temperature Tc (°C)</th>
<th>Density* db (kg/m³)</th>
<th>Electrical resistivity* ρv (Ω•m)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>25°C  60°C  100°C  120°C</td>
<td>25°C  60°C  100°C  120°C</td>
<td>25°C  60°C  100°C  120°C</td>
<td>25°C  60°C  100°C  120°C</td>
<td>25°C  60°C  100°C  120°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3300±25%</td>
<td>350    290  350  530</td>
<td>480  410  380</td>
<td>85  70  60  55</td>
<td>9.5  7.5  6.5  6</td>
<td>&gt;215</td>
<td>4.9</td>
<td>6</td>
</tr>
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</table>

* Typ.

**µi frequency characteristics (Typ.)**

![Graph showing µi frequency characteristics](image)

**µi temperature characteristics (Typ.)**

![Graph showing µi temperature characteristics](image)

**B-H temperature characteristics (Typ.)**

![Graph showing B-H temperature characteristics](image)

**Core loss (Typ.)**

![Graph showing Core loss](image)

**Temperature dependence of core loss (Typ.)**

![Graph showing Temperature dependence of core loss](image)

⚠️ Please be sure to request delivery specifications that provide further details on the features and specifications of the products for proper and safe use. Please note that the contents may change without any prior notice due to reasons such as upgrading.
Mn-Zn Ferrite for switching power supplies  Material list of HS72

**MATERIAL CHARACTERISTICS**

<table>
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<tr>
<th></th>
<th>Initial permeability</th>
<th>Relative loss factor*</th>
<th>Saturation magnetic flux density*</th>
<th>Remanent flux density*</th>
<th>Coercive force*</th>
<th>Curie temperature</th>
<th>Density*</th>
<th>Electrical resistivity*</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>μi</td>
<td>tanδ/μi</td>
<td>Bs (mT) H=1194A/m 25°C</td>
<td>Br (mT) H=1194A/m 25°C</td>
<td>Hc (A/m)</td>
<td>Tc (°C)</td>
<td>db (kg/m³)</td>
<td>ρv (Ω•m)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;10⁻⁶</td>
<td></td>
<td></td>
<td>4</td>
<td>&gt;130</td>
<td>4.9</td>
<td>0.2</td>
</tr>
<tr>
<td>7500±25%</td>
<td>30(100kHz)</td>
<td>430</td>
<td>55</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2000min. at 500kHz)</td>
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* Typ.

- **μi frequency characteristics (Typ.)**

- **μi temperature characteristics (Typ.)**

- **B-H temperature characteristics (Typ.)**

- **tanδ/μi frequency characteristics (Typ.)**
Mn-Zn Ferrite for switching power supplies  
**Material list of HS10**

### MATERIAL CHARACTERISTICS

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<thead>
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<th><strong>μi</strong> frequency characteristics (Typ.)</th>
<th><strong>μi</strong> temperature characteristics (Typ.)</th>
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<thead>
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<th><strong>μi</strong></th>
<th>Relative loss factor*</th>
<th>Saturation magnetic flux density*</th>
<th>Remanent flux density*</th>
<th>Coercive force*</th>
<th>Curie temperature</th>
<th>Density*</th>
<th>Electrical resistivity*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>tan(μi) &lt; 10^{-6}</td>
<td>B_s (mT) H=1194A/m 25°C</td>
<td>B_r (mT) H=1194A/m 25°C</td>
<td>H_c (A/m)</td>
<td>T_c (°C)</td>
<td>d_b (kg/m³)</td>
<td>ρ_v (Ω·m)</td>
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<tr>
<td>10000±25%</td>
<td>0.3 (100kHz)</td>
<td>400</td>
<td>70</td>
<td>3</td>
<td>&gt;120</td>
<td>4.9</td>
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* Typ.

### B-H temperature characteristics (Typ.)

![B-H temperature characteristics](image)

### tanδμi frequency characteristics (Typ.)

![tanδμi frequency characteristics](image)
# Mn-Zn Material list of ferrite for high-frequency power supplies

## MATERIAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Material</th>
<th>Initial permeability µi</th>
<th>Core loss volume density (Core loss)* Pcv (kW/m³) sine wave</th>
<th>Saturation magnetic flux density* Bs (mT) H=1194A/m</th>
<th>Remanent flux density* Br (mT) H=1194A/m</th>
<th>Coercive force* Hc (A/m) H=1194A/m</th>
<th>Curie temperature Tc (°C)</th>
<th>Density* db (kg/m³) x10³</th>
<th>Electrical resistivity* (Ω • m)</th>
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</thead>
<tbody>
<tr>
<td>PC50</td>
<td>1400±25%</td>
<td>130 80 470 380 140 98 37 27 &gt;240 4.8 30</td>
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<tr>
<td>PC200</td>
<td>800±25%</td>
<td>145 180 160 200 485 410 141 144 &gt;280 4.9 22</td>
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* Typ.
Mn-Zn Ferrite for high-frequency power supplies **Material list of PC50**

### MATERIAL CHARACTERISTICS

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<th>Coercive force*</th>
<th>Curie temperature Tc (°C)</th>
<th>Density* db (kg/m³)</th>
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<tr>
<td>Pcv</td>
<td>kW/m³</td>
<td>mT</td>
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<td>A/m</td>
<td>°C</td>
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<td>130</td>
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*Typ.

- **µi frequency characteristics (Typ.)**
- **µi temperature characteristics (Typ.)**
- **B-H temperature characteristics (Typ.)**
- **Core loss (Typ.)**
- **Temperature dependence of core loss (Typ.)**

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## MATERIAL CHARACTERISTICS

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<td></td>
<td></td>
</tr>
<tr>
<td>Frequency</td>
<td>kHz</td>
<td>kHz</td>
<td>kHz</td>
<td>kHz</td>
<td>kHz</td>
<td>kHz</td>
<td>kHz</td>
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<tr>
<td>Flux density B(mT)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Magnetic field H(A/m)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Saturation magnetic flux density*</td>
<td>Bf</td>
<td>kHz</td>
<td>kHz</td>
<td>kHz</td>
<td>kHz</td>
<td>kHz</td>
<td>kHz</td>
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<td>kHz</td>
<td>kHz</td>
<td>kHz</td>
<td>kHz</td>
<td>kHz</td>
</tr>
<tr>
<td>Remanent flux density*</td>
<td>Br</td>
<td>kHz</td>
<td>kHz</td>
<td>kHz</td>
<td>kHz</td>
<td>kHz</td>
<td>kHz</td>
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<td>kHz</td>
<td>kHz</td>
<td>kHz</td>
<td>kHz</td>
<td>kHz</td>
<td>kHz</td>
</tr>
<tr>
<td>Coercive force*</td>
<td>Hc</td>
<td>kHz</td>
<td>kHz</td>
<td>kHz</td>
<td>kHz</td>
<td>kHz</td>
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<td>kHz</td>
<td>kHz</td>
<td>kHz</td>
<td>kHz</td>
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</tr>
<tr>
<td>Curie temperature</td>
<td>Tc</td>
<td>°C</td>
<td>°C</td>
<td>°C</td>
<td>°C</td>
<td>°C</td>
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<td>°C</td>
<td>°C</td>
<td>°C</td>
<td>°C</td>
<td>°C</td>
<td>°C</td>
</tr>
<tr>
<td>Density*</td>
<td>db</td>
<td>kg/m³</td>
<td>kg/m³</td>
<td>kg/m³</td>
<td>kg/m³</td>
<td>kg/m³</td>
<td>kg/m³</td>
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<td>kg/m³</td>
<td>kg/m³</td>
<td>kg/m³</td>
<td>kg/m³</td>
</tr>
<tr>
<td>Electrical resistivity*</td>
<td>ρ</td>
<td>Ω·m</td>
<td>Ω·m</td>
<td>Ω·m</td>
<td>Ω·m</td>
<td>Ω·m</td>
<td>Ω·m</td>
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<td>Ω·m</td>
<td>Ω·m</td>
<td>Ω·m</td>
<td>Ω·m</td>
<td>Ω·m</td>
</tr>
<tr>
<td>800±25%</td>
<td>145</td>
<td>180</td>
<td>160</td>
<td>200</td>
<td>485</td>
<td>410</td>
<td>141</td>
<td>144</td>
<td>51</td>
<td>48</td>
<td>&gt;280</td>
<td>4.9</td>
<td>22</td>
<td></td>
</tr>
</tbody>
</table>

* Typ.

### µi frequency characteristics (Typ.)

![Graph showing permeability vs. frequency](image)

### µi temperature characteristics (Typ.)

![Graph showing permeability vs. temperature](image)

### B-H temperature characteristics (Typ.)

![Graph showing flux density vs. magnetic field](image)

### Core loss (Typ.)

![Graph showing core loss vs. flux density](image)

### Temperature dependence of core loss (Typ.)

![Graph showing core loss vs. temperature](image)

---

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## Mn-Zn Ferrite for high-frequency power supplies  
**Material list of PC200**

### PRECAUTIONS FOR USE OF PC200 MATERIALS

The characteristics of the PC200 material change as follows depending on the application of a DC magnetic field such as a magnet or the magnitude of the applied magnetic field ($H_{dc}$) at the time of use.

The characteristics of the PC200 material are changed as follows in the reliability test.

PC200 material recommends use by a little low magnetic field of a special quality change.

### Characteristic change due to applied magnetic field *

![Characteristic change due to applied magnetic field](image)

### Reliability test results *

<table>
<thead>
<tr>
<th>Characteristics change by thermal shock test</th>
<th>Change rate (Typ.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pcv at 1MHz, 50mT, 100°C</td>
<td>–18%</td>
</tr>
<tr>
<td>$\mu_i$ at 100kHz, 25°C</td>
<td>–7%</td>
</tr>
</tbody>
</table>

Test conditions: –40 ~ 125°C, 1000 cycles. Exposure time = 30 minutes

<table>
<thead>
<tr>
<th>Characteristics change due to high temperature storage tests</th>
<th>Change rate (Typ.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pcv at 1MHz, 50mT, 100°C</td>
<td>–32%</td>
</tr>
<tr>
<td>$\mu_i$ at 100kHz, 25°C</td>
<td>–14%</td>
</tr>
</tbody>
</table>

Test conditions: 125±2°C. Retention time = 2000 hours

<table>
<thead>
<tr>
<th>Characteristics change due to low temperature storage tests</th>
<th>Change rate (Typ.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pcv at 1MHz, 50mT, 100°C</td>
<td>±5% max.</td>
</tr>
<tr>
<td>$\mu_i$ at 100kHz, 25°C</td>
<td>±5% max.</td>
</tr>
</tbody>
</table>

Test conditions: –40±3°C. Retention time = 2000 hours

<table>
<thead>
<tr>
<th>Characteristics change by humidity endurance tests</th>
<th>Change rate (Typ.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pcv at 1MHz, 50mT, 100°C</td>
<td>±5% max.</td>
</tr>
<tr>
<td>$\mu_i$ at 100kHz, 25°C</td>
<td>±5% max.</td>
</tr>
</tbody>
</table>

Test conditions: 60±2°C, 90-95% R.H. (Ⅲ) Retention time = 2000 hours

*Evaluated by toroidal shape  
Pcv: Core loss  
$\mu_i$: Initial permeability

⚠️ Please be sure to request delivery specifications that provide further details on the features and specifications of the products for proper and safe use.

Please note that the contents may change without any prior notice due to reasons such as upgrading.
Mn-Zn  Material list of large size ferrite for high power

### MATERIAL CHARACTERISTICS

| Material | Initial permeability* | Curie temperature Tc (°C) | Saturation magnetic flux density* Bs (mT) H=1194A/m | Remanent flux density* Br (mT) | Coercive force* Hc (A/m) | Core loss* Pcv (kW/m²) B=200mT 25kHz | 90°C | 100°C | 100kHz | 90°C, 100°C | 90°C, 100°C | 90°C, 100°C | 90°C, 100°C | 90°C, 100°C | 90°C, 100°C | 90°C, 100°C | 90°C, 100°C | 90°C, 100°C | 90°C, 100°C | 90°C, 100°C |
|----------|-----------------------|--------------------------|-----------------------------------------------------|--------------------------------|--------------------------|---------------------------------------|--|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PE22     | 1800                  | >200                     | 510                                               | 410                          | 140                      | 16                                    | 79                                                   | 80                           | 520                           | 3.0                       | 2.8                       | 12                        | 5                               | 800                        | 9                              | 1.2                       | –0.6                     |
| PC40     | 2300                  | >200                     | 500                                               | 380                          | 125                      | 15                                    | 64                                                   | 70                           | 420                           | 6.5                       | 5.4                       | 12                        | 5                               | 800                        | 9                              | 1.2                       | –0.6                     |

* Typ.

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Please be sure to request delivery specifications that provide further details on the features and specifications of the products for proper and safe use. Please note that the contents may change without any prior notice due to reasons such as upgrading.

**FERRITES**

**Mn-Zn Large size ferrite for high power** Material list of PE22

### MATERIAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Material</th>
<th>Initial permeability*</th>
<th>Curie temperature (°C)</th>
<th>Saturation magnetic flux density* (mT)</th>
<th>Remanent flux density* (mT)</th>
<th>Coercive force* (A/m)</th>
<th>Core loss* (kW/m³)</th>
<th>Electrical resistivity* (Ω·m)</th>
<th>Approximate density (kg/m³)</th>
<th>Thermal expansion coefficient (1/K)</th>
<th>Thermal conductivity (W/mK)</th>
<th>Specific heat (J/kg·K)</th>
<th>Bending strength (N/mm²)</th>
<th>Young’s modulus (N/mm²)</th>
<th>Magnetostriction (10⁻⁶)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PE22</td>
<td>1800</td>
<td>23°C</td>
<td>510</td>
<td>410</td>
<td>140</td>
<td>16</td>
<td>3.0</td>
<td>4.8</td>
<td>12</td>
<td>5</td>
<td>800</td>
<td>9</td>
<td>1.2</td>
<td>-0.6</td>
</tr>
</tbody>
</table>

* Typ.

**Core loss vs. temperature characteristics (Typ.)**

**Saturation magnetic flux density vs. temperature characteristics (Typ.)**

**Initial magnetic permeability vs. temperature characteristics (Typ.)**

**Magnetic permeability vs. frequency characteristics (Typ.)**

⚠️ Please be sure to request delivery specifications that provide further details on the features and specifications of the products for proper and safe use. Please note that the contents may change without any prior notice due to reasons such as upgrading.
Mn-Zn Large size ferrite for high power  **Material list of PE22**

⚠️ Please be sure to request delivery specifications that provide further details on the features and specifications of the products for proper and safe use.

Please note that the contents may change without any prior notice due to reasons such as upgrading.
Mn-Zn Large size ferrite for high power  Material list of PC40

**MATERIAL CHARACTERISTICS**

<table>
<thead>
<tr>
<th>Initial permeability*</th>
<th>Curie temperature Tc (°C)</th>
<th>Saturation magnetic flux density* Bs (mT) H=1194A/m</th>
<th>Remanent flux density* Br (mT)</th>
<th>Coercive force* Hc (A/m)</th>
<th>Core loss* Pcv (kW/m³) B=200mT</th>
<th>Electrical resistivity* ρ (Ω•m)</th>
<th>Approximate density* dapp (kg/m³) x10³</th>
<th>Thermal expansion coefficient* α (1/K) x10⁻⁶</th>
<th>Thermal conductivity* k (W/mK)</th>
<th>Specific heat* Cp (J/kg•°C) x10¹¹</th>
<th>Bending strength* η (N/mm²) x10⁷</th>
<th>Young's modulus* E (N/mm²) x10¹¹</th>
<th>Magnetostriction* λs x10⁻⁶</th>
</tr>
</thead>
<tbody>
<tr>
<td>μi</td>
<td></td>
<td>23°C</td>
<td>23°C</td>
<td>100°C</td>
<td>25kHz-200mT</td>
<td>100kHz</td>
<td>0.4A/m</td>
<td>100°C</td>
<td>100°C</td>
<td>800</td>
<td>9</td>
<td>1.2</td>
<td>−0.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>23°C</td>
<td>23°C</td>
<td>100°C</td>
<td>200°C</td>
<td>200°C</td>
<td>6.5</td>
<td>4.8</td>
<td>5</td>
<td>800</td>
<td>9</td>
<td>1.2</td>
<td>−0.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>23°C</td>
<td>23°C</td>
<td>100°C</td>
<td>2300</td>
<td>23°C</td>
<td>500</td>
<td>380</td>
<td>125</td>
<td>64</td>
<td>70</td>
<td>420</td>
<td>6.5</td>
</tr>
</tbody>
</table>

* Typ.

⚠️ Please be sure to request delivery specifications that provide further details on the features and specifications of the products for proper and safe use.

⚠️ Please note that the contents may change without any prior notice due to reasons such as upgrading.
Mn-Zn Large size ferrite for high power  Material list of PC40

- Core loss vs. frequency characteristics

⚠️ Please be sure to request delivery specifications that provide further details on the features and specifications of the products for proper and safe use.

⚠️ Please note that the contents may change without any prior notice due to reasons such as upgrading.
## Mn-Zn Material list of ferrite core for telecommunication

### MATERIAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Material</th>
<th>Initial permeability μl</th>
<th>tan(μl) x10⁻⁶</th>
<th>Temperature factor of initial permeability qμl</th>
<th>Initial permeability at 25°C</th>
<th>Saturation flux density Bs (mT)</th>
<th>Residual flux density Br (mT)</th>
<th>Coercive force Hc (A/m)</th>
<th>Curie temperature Tc (°C)</th>
<th>Hysteresis material constant γB 10⁻⁶ mT</th>
<th>Disaccommodation factor DF</th>
<th>Density* (kg/m³) x10³</th>
<th>Electrical resistivity* ρ (Ω m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSA</td>
<td>3300 ±20%</td>
<td>&lt;2.5(10kHz)</td>
<td>&lt;10(100kHz)</td>
<td>−0.5 to 2.0</td>
<td>410</td>
<td>100</td>
<td>8.0</td>
<td>&gt;130</td>
<td>&lt;0.8</td>
<td>&lt;3</td>
<td>4.8</td>
<td>1</td>
</tr>
<tr>
<td>HSB2</td>
<td>7500±25%</td>
<td>&lt;6.5(10kHz)</td>
<td>0 to 1.8</td>
<td>0 to 1.8</td>
<td>420</td>
<td>40</td>
<td>5.6</td>
<td>&gt;130</td>
<td>&lt;1.0</td>
<td>&lt;3</td>
<td>4.9</td>
<td>0.1</td>
</tr>
<tr>
<td>HSC2</td>
<td>10000±30%</td>
<td>&lt;7.0(10kHz)</td>
<td>−0.5 to 1.5</td>
<td>−0.5 to 1.5</td>
<td>400</td>
<td>90</td>
<td>7.2</td>
<td>&gt;120</td>
<td>&lt;1.4</td>
<td>&lt;2</td>
<td>4.9</td>
<td>0.15</td>
</tr>
<tr>
<td>HSC3</td>
<td>15000±30%</td>
<td>&lt;7.0(10kHz)</td>
<td>−0.5 to 1.5</td>
<td>−0.5 to 1.5</td>
<td>400</td>
<td>105</td>
<td>4.4</td>
<td>&gt;105</td>
<td>&lt;0.5</td>
<td>&lt;2</td>
<td>4.95</td>
<td>0.15</td>
</tr>
<tr>
<td>HP5</td>
<td>5000±20%</td>
<td>&lt;3.5</td>
<td>±12.5%</td>
<td>±12.5%</td>
<td>400</td>
<td>65</td>
<td>7.2</td>
<td>&gt;140</td>
<td>&lt;0.4</td>
<td>&lt;3</td>
<td>4.8</td>
<td>0.15</td>
</tr>
</tbody>
</table>

*Typ.
## MATERIAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Initial permeability</th>
<th>Relative loss factor</th>
<th>Temperature factor of initial permeability</th>
<th>Saturation magnetic flux density</th>
<th>Residual flux density</th>
<th>Coercive force</th>
<th>Curie temperature</th>
<th>Hysteresis material constant</th>
<th>Disaccommodation factor</th>
<th>Density</th>
<th>Electrical resistivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\mu_i$</td>
<td>$\tan \delta / \mu_i$</td>
<td>$\times 10^{-4}$</td>
<td>$B_s (mT)$</td>
<td>$H=1194A/m$</td>
<td>$25^\circ C$</td>
<td>$25^\circ C$</td>
<td>$\times 10^{-6}$</td>
<td>$\times 10^{-6}$</td>
<td>$&gt;130$</td>
<td>$&lt;0.8$</td>
</tr>
<tr>
<td>$&gt;2.5(10kHz)$</td>
<td>$&lt;10(100kHz)$</td>
<td>$&lt;-0.5$ to $2.0$</td>
<td>$410$</td>
<td>$100$</td>
<td>$8.0$</td>
<td>$&gt;130$</td>
<td>$&lt;0.8$</td>
<td></td>
<td>$&lt;3$</td>
<td>$4.8$</td>
</tr>
<tr>
<td>$300^\circ C$</td>
<td>$-0%$ to $+40%$</td>
<td>$-0.5$ to $2.0$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

*Typ.*

- **Initial permeability**
- **Relative loss factor**
- **Temperature factor of initial permeability**
- **Saturation magnetic flux density**
- **Residual flux density**
- **Coercive force**
- **Curie temperature**
- **Hysteresis material constant**
- **Disaccommodation factor**
- **Density**
- **Electrical resistivity**

![μ frequency characteristics (Typ.)](image1)

![μ temperature characteristics (Typ.)](image2)

![B-H temperature characteristics (Typ.)](image3)

![tanδ μ frequency characteristics (Typ.)](image4)
Mn-Zn Ferrite for telecommunication Material list of H5B2

MATERIAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Initial permeability μi</th>
<th>Relative loss factor tan(μiμi)</th>
<th>Temperature factor of initial permeability μiμiμi</th>
<th>Saturation magnetic flux density Bs (mT)</th>
<th>Residual flux density Br (mT)</th>
<th>Coercive force Hc (Am)</th>
<th>Curie temperature Tc (°C)</th>
<th>Hysteresis material constant μB</th>
<th>Disaccommodation factor DF</th>
<th>Density* (kg/m³)</th>
<th>Electrical resistivity* (Ω•m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7500±25%</td>
<td>&lt;6.5(10kHz)</td>
<td>0 to 1.8</td>
<td>420</td>
<td>40</td>
<td>5.6</td>
<td>&gt;130</td>
<td>&lt;1.0</td>
<td>&lt;3</td>
<td>4.9</td>
<td>0.1</td>
</tr>
</tbody>
</table>

* Typ.

μi frequency characteristics (Typ.)

μi temperature characteristics (Typ.)

B-H temperature characteristics (Typ.)

tan(μi) frequency characteristics (Typ.)

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Mn-Zn Ferrite for telecommunication  Material list of H5C2

### MATERIAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Initial permeability</th>
<th>Relative loss factor</th>
<th>Temperature factor of initial permeability</th>
<th>Saturation magnetic flux density*</th>
<th>Residual flux density*</th>
<th>Coercive force*</th>
<th>Curie temperature</th>
<th>Hysteresis material constant</th>
<th>Disaccommo mation factor</th>
<th>Density*</th>
<th>Electrical resistivity*</th>
</tr>
</thead>
<tbody>
<tr>
<td>µi</td>
<td>tanδi/µi</td>
<td>&gt;10⁻⁴</td>
<td>Bs (mT) H=1944A/m</td>
<td>Br (mT)</td>
<td>Hc (A/m)</td>
<td>To (°C)</td>
<td>µB (10⁻⁶ m⁻¹)</td>
<td>DF (10⁻⁶)</td>
<td>db (kg/m³)</td>
<td>µv (Ω • m)</td>
</tr>
<tr>
<td>10000±30%</td>
<td>&lt;7.0(10kHz)</td>
<td>~10⁻⁴</td>
<td>25°C</td>
<td>25°C</td>
<td>&gt;120</td>
<td>&lt;1.4</td>
<td>&lt;2</td>
<td>4.9</td>
<td>0.15</td>
<td></td>
</tr>
</tbody>
</table>

* Typ.

- **µi frequency characteristics (Typ.)**

- **µi temperature characteristics (Typ.)**

- **B-H temperature characteristics (Typ.)**

- **tanδ/ µi frequency characteristics (Typ.)**

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Please note that the contents may change without any prior notice due to reasons such as upgrading.

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Mn-Zn Ferrite for telecommunication Material list of H5C3

### MATERIAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Initial permeability</th>
<th>Relative loss factor</th>
<th>Temperature factor of initial permeability</th>
<th>Saturation magnetic flux density*</th>
<th>Residual flux density*</th>
<th>Coercive force*</th>
<th>Curie temperature</th>
<th>Hysteresis material constant</th>
<th>Disaccommodation factor</th>
<th>Density*</th>
<th>Electrical resistivity*</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\mu_i$</td>
<td>$\tan \delta \mu_i$</td>
<td>$&lt;10^{-6}$</td>
<td>$&lt;10^{-4}$</td>
<td>$-0.5$ to $1.5$</td>
<td>$-0.5$ to $1.5$</td>
<td>$360$</td>
<td>$105$</td>
<td>$4.4$</td>
<td>$&gt;105$</td>
<td>$&lt;0.5$</td>
</tr>
<tr>
<td>15000 ± 30%</td>
<td>$&lt;7.0 (10kHz)$</td>
<td>$25^\circ C$</td>
<td>$H=1944A/m$</td>
<td>$25^\circ C$</td>
<td>$25^\circ C$</td>
<td>$20^\circ C$</td>
<td>$70^\circ C$</td>
<td>$60^\circ C$</td>
<td>$30^\circ C$</td>
<td>$&gt;10^5$</td>
</tr>
</tbody>
</table>

*Typ.

- $\mu_i$ frequency characteristics (Typ.)
- $\mu_i$ temperature characteristics (Typ.)
- B-H temperature characteristics (Typ.)
- $\tan \delta \mu_i$ frequency characteristics (Typ.)

Please be sure to request delivery specifications that provide further details on the features and specifications of the products for proper and safe use. Please note that the contents may change without any prior notice due to reasons such as upgrading.
Mn-Zn Ferrite for telecommunication  Material list of HP5

## MATERIAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Initial permeability μi</th>
<th>Relative loss factor tanδ/μi</th>
<th>Temperature factor of initial permeability μi/μi</th>
<th>Saturation magnetic flux density* Bs (mT)</th>
<th>Residual flux density* Br (mT)</th>
<th>Coercive force* Hc (A/m)</th>
<th>Curie temperature Tc (°C)</th>
<th>Hysteresis material constant μB 10⁻⁵ m⁻¹</th>
<th>Disaccommodation factor DF &gt;10⁻⁶</th>
<th>Density* db (kg/m³)</th>
<th>Electrical resistivity* ρv (Ω•m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.000±20%</td>
<td>&lt;3.5</td>
<td>±12.5% ±12.5%</td>
<td>400</td>
<td>65</td>
<td>7.2</td>
<td>&gt;140</td>
<td>&lt;0.4</td>
<td>&lt;3</td>
<td>4.8</td>
<td>0.15</td>
</tr>
</tbody>
</table>

* Typ.

- **μi frequency characteristics (Typ.)**
  ![μi frequency characteristics](image)

- **μi temperature characteristics (Typ.)**
  ![μi temperature characteristics](image)

- **B-H temperature characteristics (Typ.)**
  ![B-H temperature characteristics](image)

- **tanδ/μi frequency characteristics (Typ.)**
  ![tanδ/μi frequency characteristics](image)