SMD transformers for automotive grade
Transformers for IGBT/FET

VGT series

**FEATURES**
- A power transformer for the IPM drive of the motor inverter.
- High flux density cores have been adopted to achieve miniaturization.
- The dielectric strength voltage is 2.6 kV.
- Operating temperature range: –40 to +130°C (including self-temperature rise)

**APPLICATION**
- For Intelligent Power Module drive power supply of an inverter motor

**PART NUMBER CONSTRUCTION**

<table>
<thead>
<tr>
<th>VGT</th>
<th>10SEE</th>
<th>-</th>
<th>200</th>
<th>S2A5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Series name</td>
<td>Core shape</td>
<td>Internal code</td>
<td>Type name</td>
<td></td>
</tr>
</tbody>
</table>

**PRODUCT LINEUP**

<table>
<thead>
<tr>
<th>Series name</th>
<th>Core shape</th>
<th>Internal code</th>
<th>Type name</th>
<th>Inductance*&lt;br&gt;NP (µH)</th>
<th>Tolerance</th>
<th>Leakage inductance*&lt;br&gt;NP(NS all shorted) (µH)max.</th>
<th>Withstanding voltage NP, NF-NS&lt;br&gt; Sense: 1mA</th>
<th>Coil-Core&lt;br&gt;Sense: 1mA</th>
<th>Turn ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>VGT10SEE-200S2A5</td>
<td>13.3x17.9x10.8(mm)max.</td>
<td>20</td>
<td>±25%</td>
<td>0.5</td>
<td>2.6kVrms/1min</td>
<td>1.3kVrms/1min</td>
<td>NP:PF:NS1:NS2 =1:1:1:1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VGT12EEM-200S1A4</td>
<td>13.9x15.3x10.0(mm)max.</td>
<td>10</td>
<td>±20%</td>
<td>0.2</td>
<td>2.6kVrms/1min</td>
<td>1.3kVrms/1min</td>
<td>NP:PF:NS =1:1:6:2.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VGT15EFD-200S3A6</td>
<td>20.3x24.5x10.2(mm)max.</td>
<td>8.0</td>
<td>±20%</td>
<td>0.2</td>
<td>2.6kVrms/1min</td>
<td>1.3kVrms/1min</td>
<td>NP:PF:NS1:NS2:NS3 =1:2:8:2:8:2:8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VGT15SEFD-200S1A4</td>
<td>15.9x19.9x10.0(mm)max.</td>
<td>10</td>
<td>±20%</td>
<td>0.2</td>
<td>2.6kVrms/1min</td>
<td>1.3kVrms/1min</td>
<td>NP:PF:NS =1:1:8:3:3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VGT15SEFD-250S4A7</td>
<td>23.3x22.4x12.0(mm)max.</td>
<td>2.6</td>
<td>±20%</td>
<td>0.2</td>
<td>2.6kVrms/1min</td>
<td>1.3kVrms/1min</td>
<td>NP:PF:NS1:NS2:NS3:NS4 =1:3:3:3:3:3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>VGT22EPC-200S6A12</td>
<td>33.5x27.8x13.7(mm)max.</td>
<td>2.5</td>
<td>±15%</td>
<td>0.3</td>
<td>2.6kVrms/1min</td>
<td>1.3kVrms/1min</td>
<td>NP:PF:NS1-P:NS1-N:NS2-P:NS2-N:NS3-P:NS3-N:NS4-P:NS4-N =1:1:2:0.7:1:2:0.7:1:2:0.7:1:2:0.7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\* Measuring conditions: 100kHz/1V

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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.**

20200109

trans_gate-drive_vgt_en
### ELECTRICAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Inductance* NP (µH)</th>
<th>Tolerance</th>
<th>Inductance* Leakage NP(NS all shorted) (µH)max.</th>
<th>Withstanding voltage NP, NF-NS Sense: 1mA</th>
<th>Withstanding voltage Coil-Core Sense: 1mA</th>
<th>Turn ratio NP:NP:NP1:NP2 =1:1:1:1</th>
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<td>VGT10SEE-200S2A5</td>
<td>20</td>
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</tr>
</tbody>
</table>

* The unspecified dimensional tolerance is ±0.3. Dimensions in mm

### SHAPE & DIMENSIONS

### RECOMMENDED LAND PATTERN

### CIRCUIT DIAGRAM

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<tr>
<td>VGT12EEM-200S1A4</td>
<td>10</td>
<td>±20%</td>
<td>0.2</td>
<td>2.6kVrms/1min</td>
<td>1.3kVrms/1min</td>
<td>=1:1.6:2.9</td>
</tr>
</tbody>
</table>

SHAPE & DIMENSIONS

- Dimensions in mm: 10.8, 13.6, 17.3, 1.7, 7.4, 15.9, 7.4, 0.4±0.1, 0.7±0.1

The unspecified dimensional tolerance is ±0.3.

RECOMMENDED LAND PATTERN

Dimensions in mm

CIRCUIT DIAGRAM

Dimensions in mm

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VGT15EFD-200S3A6

**ELECTRICAL CHARACTERISTICS**

**CHARACTERISTICS SPECIFICATION TABLE**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Inductance* NP (µH)</th>
<th>Tolerance</th>
<th>Leakage inductance* NP(NS all shorted) (µH)max.</th>
<th>Withstanding voltage NP, NF-NS Sense: 1mA</th>
<th>Coil-Core Sense: 1mA</th>
<th>Turn ratio NP:NP1:NP2:NP3:NS1:NS2:NS3</th>
</tr>
</thead>
<tbody>
<tr>
<td>VGT15EFD-200S3A6</td>
<td>8.0</td>
<td>±20%</td>
<td>0.2</td>
<td>2.6kVrms/1min</td>
<td>1.3kVrms/1min</td>
<td>1:2.8:2.8:2.8:2.8:2.8:2.8</td>
</tr>
</tbody>
</table>

**SHAPE & DIMENSIONS**

The unspecified dimensional tolerance is ±0.3.

Dimensions in mm

**RECOMMENDED LAND PATTERN**

Dimensions in mm

**CIRCUIT DIAGRAM**

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(4/9)

20200109

trans_gate-drive_vgt_en
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<th>Part No.</th>
<th>Inductance* NP (µH)</th>
<th>Tolerance</th>
<th>Leakage inductance* NP(NS all shorted) (µH) max.</th>
<th>Withstanding voltage NP, NF-NS</th>
<th>Withstanding voltage Coil-Core Sense: 1mA</th>
<th>Turn ratio NP:NF:NS</th>
</tr>
</thead>
<tbody>
<tr>
<td>VGT15SEFD-200S1A4</td>
<td>10 ±20%</td>
<td>0.2</td>
<td>2.6kVrms/1min</td>
<td>1.3kVrms/1min</td>
<td>=1:1.8:3.3</td>
<td></td>
</tr>
</tbody>
</table>

---

**SHAPE & DIMENSIONS**

---

**RECOMMENDED LAND PATTERN**

---

**CIRCUIT DIAGRAM**

---

The unspecified dimensional tolerance is ±0.3.

Dimensions in mm

---

The unspecified dimensional tolerance is ±0.3.

Dimensions in mm

---

Dimensions in mm
VGT15SEFD-250S4A7

■ ELECTRICAL CHARACTERISTICS

Characteristics Specification Table

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Inductance* NP (µH)</th>
<th>Tolerance</th>
<th>Leakage inductance* NP(NS all shorted) (µH)max.</th>
<th>Withstanding voltage NP, NF-NS</th>
<th>Withstanding voltage Coil-Core Sense: 1mA</th>
<th>Withstanding voltage Sense: 1mA</th>
<th>Turn ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>VGT15SEFD-250S4A7</td>
<td>2.6</td>
<td>±20%</td>
<td>0.2</td>
<td>2.6kVrms/1min</td>
<td>1.3kVrms/1min</td>
<td>NP: NF: NS1: NS2: NS3: NS4</td>
<td>=1:3:3:3:3:3</td>
</tr>
</tbody>
</table>

- The unspecified dimensional tolerance is ±0.3.
- Dimensions in mm

■ SHAPE & DIMENSIONS

![Dimensions Diagram](image)

■ RECOMMENDED LAND PATTERN

![Land Pattern Diagram](image)

Dimensions in mm

■ CIRCUIT DIAGRAM

![Circuit Diagram](image)

Dimensions in mm

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VGT22EPC-200S6A12

ELECTRICAL CHARACTERISTICS

CHARACTERISTICS SPECIFICATION TABLE

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Inductance NP (µH)</th>
<th>Inductance Tolerance</th>
<th>Leakage inductance NP(NS all shorted) (µH)max.</th>
<th>Withstanding voltage NP, NF-NS Sense: 1mA</th>
<th>Coi-Core Sense: 1mA</th>
<th>Turn ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>VGT22EPC-200S6A12</td>
<td>2.5</td>
<td>±15%</td>
<td>0.3</td>
<td>2.6kVRms/1min</td>
<td>1.3kVRms/1min</td>
<td></td>
</tr>
</tbody>
</table>

SHAPE & DIMENSIONS

The unspecified dimensional tolerance is ±0.3.
Dimensions in mm

RECOMMENDED LAND PATTERN

Dimensions in mm

CIRCUIT DIAGRAM

Pattern shorted

Dimensions in mm
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TRANSFORMERS

VGT series

**RECOMMENDED REFLOW PROFILE**

![Reflow Profile Diagram]

*When mounting the product, use our recommended reflow profile described above.

**TEMPERATURE RANGE, INDIVIDUAL WEIGHT**

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Temperature range</th>
<th>Individual weight (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VGT10SEE-200S2A5</td>
<td>-40 to +130</td>
<td>1.9</td>
</tr>
<tr>
<td>VGT12EEM-200S1A4</td>
<td>-40 to +130</td>
<td>1.9</td>
</tr>
<tr>
<td>VGT15SEFD-200S3A6</td>
<td>-40 to +130</td>
<td>4.1</td>
</tr>
<tr>
<td>VGT15SEFD-200S1A4</td>
<td>-40 to +130</td>
<td>3.9</td>
</tr>
<tr>
<td>VGT15SEFD-250S4A7</td>
<td>-40 to +130</td>
<td>4.6</td>
</tr>
<tr>
<td>VGT22EPC-200S6A12</td>
<td>-40 to +130</td>
<td>10.8</td>
</tr>
</tbody>
</table>

* Operating temperature range includes self-temperature rise.

**PACKAGING STYLE**

**REEL DIMENSIONS, PACKAGE QUANTITY**

![Reel Dimensions Diagram]

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Package quantity (pcs/reel)</th>
<th>Package quantity (pcs/box)</th>
</tr>
</thead>
<tbody>
<tr>
<td>VGT10SEE-200S2A5</td>
<td>36.9</td>
<td>250</td>
</tr>
<tr>
<td>VGT12EEM-200S1A4</td>
<td>36.9</td>
<td>250</td>
</tr>
<tr>
<td>VGT15SEFD-200S3A6</td>
<td>48.2</td>
<td>180</td>
</tr>
<tr>
<td>VGT15SEFD-200S1A4</td>
<td>48.2</td>
<td>200</td>
</tr>
<tr>
<td>VGT15SEFD-250S4A7</td>
<td>48.2</td>
<td>150</td>
</tr>
<tr>
<td>VGT22EPC-200S6A12</td>
<td>48.2</td>
<td>60</td>
</tr>
</tbody>
</table>

* These values are typical values.

**TAPE DIMENSIONS**

![Tape Dimensions Diagram]

<table>
<thead>
<tr>
<th>Part No.</th>
<th>P1</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td>VGT10SEE-200S2A5</td>
<td>20±0.1</td>
<td>32±0.3</td>
</tr>
<tr>
<td>VGT12EEM-200S1A4</td>
<td>20±0.1</td>
<td>32±0.3</td>
</tr>
<tr>
<td>VGT15SEFD-200S3A6</td>
<td>28±0.1</td>
<td>44±0.3</td>
</tr>
<tr>
<td>VGT15SEFD-200S1A4</td>
<td>24±0.1</td>
<td>44±0.3</td>
</tr>
<tr>
<td>VGT15SEFD-250S4A7</td>
<td>28±0.1</td>
<td>44±0.3</td>
</tr>
<tr>
<td>VGT22EPC-200S6A12</td>
<td>44±0.15</td>
<td>44±0.3</td>
</tr>
</tbody>
</table>
**Attentions for use**

Please read this specifications before using this product by all means.

**Attentions for safety**

For use of this product, please carefully read this caution and design the application safely.

⚠️ **Attention on designing**

- On designing a PCB layout, please refer to the land pattern of this catalogue.
- If leakage magnetics flux generates, please pay attention to the affection by the flux. It may be concerned as the cause of a malfunction.

⚠️ **Attention on handling**

- Please do not use a product which was dropped. It may be concerned as the cause of a malfunction.
- Since the top of the soldered pins are sharpened, please handle with care.
- When keeping the products, please avoid any dust, mist, water and sunlight. It may be concerned as the cause of a malfunction.
- In the environment which is exposed by any gas corrosion, i.e. natrium, acid and alkaline atmosphere, please do not use or store.
- When assembling, do not apply excess stress to the product by metal base tool. It may be concerned as the cause of a malfunction.

⚠️ **Attention**

- This product's structure and number of turns (magnetic design) are designed by consideration of the condition of power voltage and circuit drive (drive frequency and Max. on-duty). Do not operate under the out of the range of the designed condition. It may be any causes of a damage or a burnout.
- The range of the operating temperature and humidity, by its consideration of the characteristics of component parts and its self temperature rise. Do not exceed this range for the operation. It may be any causes of damage or burnout.
- Do not use this product under the condition which is possible contamination of any dust or wrong parts. It may be any causes of burnout.
- The products listed in this specification are intended for use of any general electronic equipment and transportation equipment (AV equipment, telecommunication applicants, home appliances, amusement equipment, computers, mobile equipment, office machines, measurement equipment, industrial robots, cars, electric trains, ships and etc.) under a normal operation and condition.
- This is not a product which warrants any quality, compatibility or performance to the following uses (hereafter called Special cases of uses) which malfunction, error or defect in those appliances which are required high level of safeness or reliability, may cause the enormous social impact or the risk to human life, heath of body, assets or else.
- About any damages which are caused by an use which is out of range or beyond the conditions of our specification, or an use in these special cases below, we are not able to take any responsibilities of the damages.
- If your purpose of this product will be an use beyond the scope or conditions of this specification, or for special cases listed below, please contact with one of our contact windows, in advance.
- In order to meet with an application of our customer, we would like to discuss its specification which will be different to this specification.

<<Special cases of use for>>

1. Aerospace/Aviation
2. Medical
3. Power-generation control
4. Nuclear power generation
5. Equipment on the sea bed
6. Transportation control
7. Public information-processing
8. Military
9. Electric heating, burning equipment
10. Disaster prevention/crime prevention equipment
11. Safety equipment
12. Other applications that are not considered as general purpose applications

When designing your equipment even for general-purpose applications, you are kindly requested to take into consideration securing protection circuit/device or providing backup circuits in your equipment.

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