DESCRIPTION
The 2SK1109 is suitable for converter of ECM.

FEATURES
- Compact package
- High forward transfer admittance
  \[ 1000 \mu S \text{ TYP. (Ioss = 100 } \mu A) \]
  \[ 1600 \mu S \text{ TYP. (Ioss = 200 } \mu A) \]
- Includes diode and high resistance at G - S

ORDERING INFORMATION

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>PACKAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2SK1109</td>
<td>SC-59 (MM)</td>
</tr>
</tbody>
</table>

ABSOLUTE MAXIMUM RATINGS (\( TA = 25^\circ C \))

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drain to Source Voltage</td>
<td>( V_{DSX} ) 20 V</td>
</tr>
<tr>
<td>Gate to Drain Voltage</td>
<td>( V_{GDO} ) –20 V</td>
</tr>
<tr>
<td>Drain Current</td>
<td>( I_D ) 10 mA</td>
</tr>
<tr>
<td>Gate Current</td>
<td>( I_G ) 10 mA</td>
</tr>
<tr>
<td>Total Power Dissipation</td>
<td>( P_T ) 80 mW</td>
</tr>
<tr>
<td>Junction Temperature</td>
<td>( T_J ) 125 °C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>( T_{STG} ) –55 to +125 °C</td>
</tr>
</tbody>
</table>

**Note** \( V_{GS} = –1.0 \) V

**Remark** Please take care of ESD (Electro Static Discharge) when you handle the device in this document.
**ELECTRICAL CHARACTERISTICS (TA = 25°C)**

<table>
<thead>
<tr>
<th>CHARACTERISTICS</th>
<th>SYMBOL</th>
<th>TEST CONDITIONS</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero Gate Voltage Drain Cut-off Current</td>
<td>I_{oss}</td>
<td>V_{DS} = 5.0 V, V_{GS} = 0 V</td>
<td>40</td>
<td>600</td>
<td>µA</td>
<td></td>
</tr>
<tr>
<td>Gate Cut-off Voltage</td>
<td>V_{GS(off)}</td>
<td>V_{DS} = 5.0 V, I_{D} = 1.0 µA</td>
<td>−0.1</td>
<td>−1.0</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>Forward Transfer Admittance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>y_{fs1}</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forward Transfer Admittance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>y_{fs2}</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Capacitance</td>
<td>C_{iss}</td>
<td>V_{DS} = 5.0 V, V_{GS} = 0 V, f = 1.0 MHz</td>
<td>7.0</td>
<td>8.0</td>
<td>pF</td>
<td></td>
</tr>
<tr>
<td>Noise Voltage</td>
<td>NV</td>
<td>See Test Circuit</td>
<td>1.8</td>
<td>3.0</td>
<td>µV</td>
<td></td>
</tr>
</tbody>
</table>

**I_{oss} RANK**

<table>
<thead>
<tr>
<th>MARKING</th>
<th>J32</th>
<th>J33</th>
<th>J34</th>
<th>J35</th>
<th>J36</th>
<th>J37</th>
</tr>
</thead>
<tbody>
<tr>
<td>I_{oss} (µA)</td>
<td>40 to 70</td>
<td>60 to 110</td>
<td>90 to 180</td>
<td>150 to 300</td>
<td>200 to 450</td>
<td>300 to 600</td>
</tr>
</tbody>
</table>

**NOISE VOLTAGE TEST CIRCUIT**

![Noise Voltage Test Circuit Diagram](image)
TYPICAL CHARACTERISTICS (TA = 25°C)

DERATING FACTOR OF POWER DISSIPATION

GATE TO SOURCE CURRENT vs.
GATE TO SOURCE VOLTAGE

DERATING FACTOR OF POWER DISSIPATION

V GS - Gate to Source Voltage - V

GATE TO SOURCE CURRENT - μA

V DS - Gate to Source Voltage - V

DRAIN CURRENT vs.
GATE TO SOURCE VOLTAGE

DRAIN CURRENT vs.
GATE TO SOURCE VOLTAGE

V GS - Gate to Source Voltage - V

ID - Drain Current - mA

100 80 60 40 20 0

−1.0 0.4 0.6 0.8 1.0

IG - Gate Current - A

−40 0 20 40 60 80 100 120 140 160

TA - Ambient Temperature - °C

1.0 0.8 0.6 0.4 0.2

−0.4 −0.2 0 0.2

−0.6 −0.4 −0.2 0 0.2

V GS = 5 V

ID SS = 300 A

ID SS = 200 A

ID SS = 100 A

10 20 50 100

V DS = 5 V

f = 1.0 MHz

INPUT CAPACITANCE vs.
DRAIN TO SOURCE VOLTAGE

100 50 10 5 1

5.0 2.0 1.0

10 2 1

20 50 100 200 500 1000

V DS - Drain to Source Voltage - V

C iSS - Input Capacitance - pF

GATE TO SOURCE CUT-OFF VOLTAGE AND FORWARD TRANSFER ADMITTANCE vs. ZERO-GATE VOLTAGE

DRAIN CURRENT CO-RELATION

Zero-Gate Voltage Drain Current - μA

V GS (off) - Gate to Source Cut-off Voltage - V

|y fs | - Forward Transfer Admittance - S

V DS = 5 V

V DS = 0 V

f = 1.0 MHz

V GS (off)
The information in this document is current as of January, 2002. The information is subject to change without notice. For actual design-in, refer to the latest publications of NEC's data sheets or data books, etc., for the most up-to-date specifications of NEC semiconductor products. Not all products and/or types are available in every country. Please check with an NEC sales representative for availability and additional information.

No part of this document may be copied or reproduced in any form or by any means without prior written consent of NEC. NEC assumes no responsibility for any errors that may appear in this document.

NEC does not assume any liability for infringement of patents, copyrights or other intellectual property rights of third parties by or arising from the use of NEC semiconductor products listed in this document or any other liability arising from the use of such products. No license, express, implied or otherwise, is granted under any patents, copyrights or other intellectual property rights of NEC or others.

Descriptions of circuits, software and other related information in this document are provided for illustrative purposes in semiconductor product operation and application examples. The incorporation of these circuits, software and information in the design of customer's equipment shall be done under the full responsibility of customer. NEC assumes no responsibility for any losses incurred by customers or third parties arising from the use of these circuits, software and information.

While NEC endeavours to enhance the quality, reliability and safety of NEC semiconductor products, customers agree and acknowledge that the possibility of defects thereof cannot be eliminated entirely. To minimize risks of damage to property or injury (including death) to persons arising from defects in NEC semiconductor products, customers must incorporate sufficient safety measures in their design, such as redundancy, fire-containment, and anti-failure features.

NEC semiconductor products are classified into the following three quality grades: "Standard", "Special" and "Specific". The "Specific" quality grade applies only to semiconductor products developed based on a customer-designated "quality assurance program" for a specific application. The recommended applications of a semiconductor product depend on its quality grade, as indicated below.

Customers must check the quality grade of each semiconductor product before using it in a particular application.

"Standard": Computers, office equipment, communications equipment, test and measurement equipment, audio and visual equipment, home electronic appliances, machine tools, personal electronic equipment and industrial robots

"Special": Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)

"Specific": Aircraft, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems and medical equipment for life support, etc.

The quality grade of NEC semiconductor products is "Standard" unless otherwise expressly specified in NEC's data sheets or data books, etc. If customers wish to use NEC semiconductor products in applications not intended by NEC, they must contact an NEC sales representative in advance to determine NEC's willingness to support a given application.

(Note)

(1) "NEC" as used in this statement means NEC Corporation and also includes its majority-owned subsidiaries.

(2) "NEC semiconductor products" means any semiconductor product developed or manufactured by or for NEC (as defined above).