2SK1835
Silicon N Channel MOS FET

Application
High speed power switching

Features
- High breakdown voltage \( V_{DSS} = 1500 \, \text{V} \)
- High speed switching
- Low drive current
- No secondary breakdown
- Suitable for switching regulator

Outline

RENESAS Package code: PRSS0004ZE-A
(Package name: TO-3P)

1. Gate
2. Drain (Flange)
3. Source
## Absolute Maximum Ratings

(Ta = 25°C)

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol</th>
<th>Ratings</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drain to source voltage</td>
<td>V_{DSS}</td>
<td>1500</td>
<td>V</td>
</tr>
<tr>
<td>Gate to source voltage</td>
<td>V_{GSS}</td>
<td>±20</td>
<td>V</td>
</tr>
<tr>
<td>Drain current</td>
<td>I_D</td>
<td>4</td>
<td>A</td>
</tr>
<tr>
<td>Drain peak current</td>
<td>I_D(pulse)\textsuperscript{Note1}</td>
<td>10</td>
<td>A</td>
</tr>
<tr>
<td>Body to drain diode reverse current</td>
<td>I_{DB}</td>
<td>4</td>
<td>A</td>
</tr>
<tr>
<td>Channel dissipation</td>
<td>P_{ch}\textsuperscript{Note2}</td>
<td>125</td>
<td>W</td>
</tr>
<tr>
<td>Channel temperature</td>
<td>T_{ch}</td>
<td>150</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>T_{stg}</td>
<td>–55 to +150</td>
<td>°C</td>
</tr>
</tbody>
</table>

Notes:
1. PW ≤ 10 µs, duty cycle ≤ 1 %
2. Value at Tc = 25°C

## Electrical Characteristics

(Ta = 25°C)

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
<th>Test Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drain to source breakdown voltage</td>
<td>V_{BRDSS}</td>
<td>1500</td>
<td></td>
<td></td>
<td>V</td>
<td>Id = 10 mA, V_{GS} = 0</td>
</tr>
<tr>
<td>Gate to source leak current</td>
<td>I_{GS}</td>
<td></td>
<td>±1</td>
<td></td>
<td>µA</td>
<td>V_{GS} = ±20 V, V_{DS} = 0</td>
</tr>
<tr>
<td>Zero gate voltage drain current</td>
<td>I_{DSS}</td>
<td></td>
<td>500</td>
<td></td>
<td>µA</td>
<td>V_{DS} = 1200 V, V_{GS} = 0</td>
</tr>
<tr>
<td>Gate to source cutoff voltage</td>
<td>V_{GS(off)}</td>
<td>2.0</td>
<td></td>
<td>4.0</td>
<td>V</td>
<td>Id = 1 mA, V_{DS} = 10 V</td>
</tr>
<tr>
<td>Static drain to source on state resistance</td>
<td>R_{DS(on)}</td>
<td></td>
<td>4.6</td>
<td>7.0</td>
<td>Ω</td>
<td>Id = 2 A, V_{GS} = 15 V\textsuperscript{Note3}</td>
</tr>
<tr>
<td>Forward transfer admittance</td>
<td></td>
<td></td>
<td>0.9</td>
<td>1.4</td>
<td>S</td>
<td>Id = 2 A, V_{DS} = 20 V\textsuperscript{Note3}</td>
</tr>
<tr>
<td>Input capacitance</td>
<td>C_{iss}</td>
<td></td>
<td>1700</td>
<td></td>
<td>pF</td>
<td>V_{DS} = 10 V, V_{GS} = 0, f = 1 MHz</td>
</tr>
<tr>
<td>Output capacitance</td>
<td>C_{oss}</td>
<td></td>
<td>230</td>
<td></td>
<td>pF</td>
<td></td>
</tr>
<tr>
<td>Reverse transfer capacitance</td>
<td>C_{rss}</td>
<td></td>
<td>100</td>
<td></td>
<td>pF</td>
<td></td>
</tr>
<tr>
<td>Turn-on delay time</td>
<td>t_{(on)}</td>
<td></td>
<td>25</td>
<td></td>
<td>ns</td>
<td>Id = 2A, V_{GS} = 10 V, R_{L} = 15 Ω</td>
</tr>
<tr>
<td>Rise time</td>
<td>t_r</td>
<td></td>
<td>80</td>
<td></td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Turn-off delay time</td>
<td>t_{(off)}</td>
<td></td>
<td>230</td>
<td></td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Fall time</td>
<td>t_f</td>
<td></td>
<td>80</td>
<td></td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Body to drain diode forward voltage</td>
<td>V_{DF}</td>
<td></td>
<td>0.85</td>
<td></td>
<td>V</td>
<td>I_{C} = 4 A, V_{GS} = 0</td>
</tr>
<tr>
<td>Body to drain diode reverse recovery time</td>
<td>t_r</td>
<td></td>
<td>2500</td>
<td></td>
<td>ns</td>
<td>I_{C} = 4 A, V_{GS} = 0, dI_{C}/dt = 100 A/µs</td>
</tr>
</tbody>
</table>

Note: 3. Pulse Test
Main Characteristics

### Power vs. Temperature Derating

- Channel Dissipation $P_{ch}$ (W)
- Case Temperature $T_C$ ($^\circ$C)

### Maximum Safe Operation Area

- Drain Current $I_D$ (A)
- Drain to Source Voltage $V_{DS}$ (V)

### Typical Output Characteristics

- Drain Current $I_D$ (A)
- Drain to Source Voltage $V_{DS}$ (V)

### Typical Transfer Characteristics

- Drain Current $I_D$ (A)
- Gate to Source Voltage $V_{GS}$ (V)

### Drain to Source Saturation Voltage vs. Gate to Source Voltage

- Drain to Source Saturation Voltage $V_{DS(on)}$ (V)
- Gate to Source Voltage $V_{GS}$ (V)

### Static Drain to Source on State Resistance vs. Drain Current

- Static Drain to Source on State Resistance $R_{DS(on)}$ ($\Omega$)
- Drain Current $I_D$ (A)
Reverse Drain Current vs. Source to Drain Voltage

Source to Drain Voltage $V_{SD}$ (V)

Reverse Drain Current $I_{DR}$ (A)

Normalized Transient Thermal Impedance $\gamma_s (t)$ Normalized Transient Thermal Impedance vs. Pulse Width

Switching Time Test Circuit

Waveforms

Vin Monitor

Vout Monitor

D.U.T

Vin Monitor

Vout Monitor

D.U.T

Vin 10 V

50 $\Omega$

RL

Vin 10 V

50 $\Omega$

VDD = 30 V

$V_{SD} = 15$ V

0 - 5 V

$V_{DD} = 30$ V

$D = 1$

$T_c = 25$ °C

$\theta_{ch} - c(t) = \gamma_s(t) \cdot \theta_{ch} - c$

$\theta_{ch} - c = 1.0$ °C / W, $T_c = 25$ °C

$P_{DM}$

$D = PW$

$\theta_{ch} - c(t) = \gamma_s(t) \cdot \theta_{ch} - c$

$\theta_{ch} - c = 1.0$ °C / W, $T_c = 25$ °C

Vin 10 %

90 %

Vin

Vout 10 %

90 %

90 %

10 %

$t_d (on)$

$t_f$

$t_d (off)$
Package Dimensions

<table>
<thead>
<tr>
<th>Package Name</th>
<th>JEITA Package Code</th>
<th>RENESAS Code</th>
<th>Previous Code</th>
<th>MASS (Typ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TO-3P</td>
<td>SC-65</td>
<td>PRSS00542E-A</td>
<td>TO-3P / TO-3PV</td>
<td>5.0g</td>
</tr>
</tbody>
</table>

Ordering Information

<table>
<thead>
<tr>
<th>Part Name</th>
<th>Quantity</th>
<th>Shipping Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>2SK1835-E</td>
<td>360 pcs</td>
<td>Box (Tube)</td>
</tr>
</tbody>
</table>
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