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# 2SK1165, 2SK1166

Silicon N-Channel MOS FET

# HITACHI

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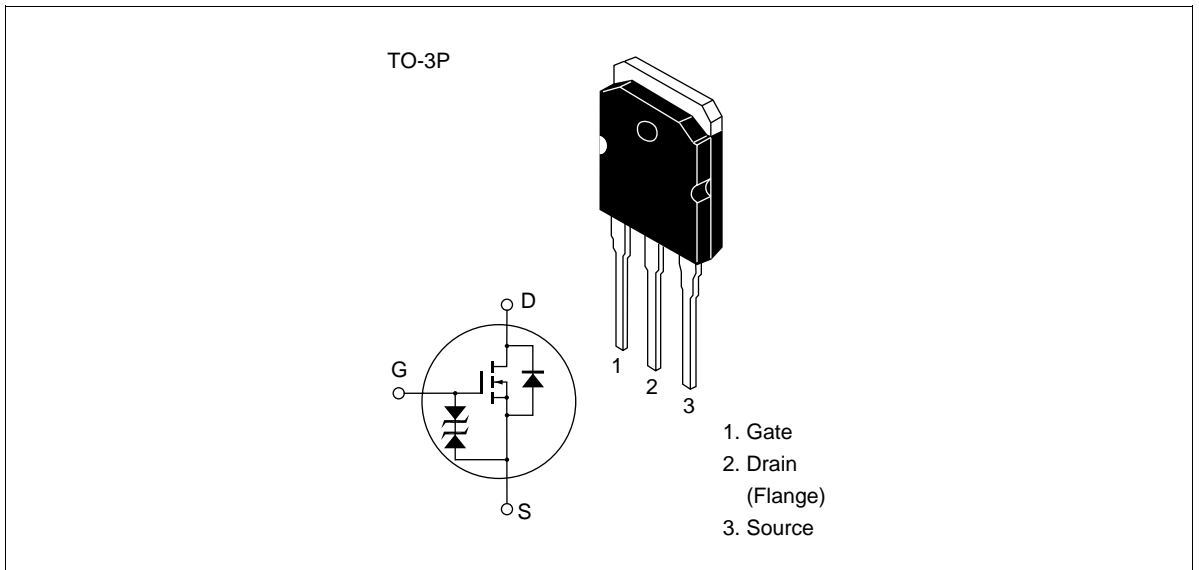
## Application

High speed power switching

## Features

- Low on-resistance
- High speed switching
- Low drive current
- No secondary breakdown
- Suitable for switching regulator and DC-DC converter

## Outline



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## 2SK1165, 2SK1166

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### Absolute Maximum Ratings (Ta = 25°C)

| Item                                      |         | Symbol              | Ratings     | Unit |
|---|---------|---------------------|-------------|------|
| Drain to source voltage                   | 2SK1165 | $V_{DSS}$           | 450         | V    |
|   | 2SK1166 |                     | 500         |      |
| Gate to source voltage                    |         | $V_{GSS}$           | ±30         | V    |
| Drain current                             |         | $I_D$               | 12          | A    |
| Drain peak current                        |         | $I_{D(pulse)}^{*1}$ | 48          | A    |
| Body to drain diode reverse drain current |         | $I_{DR}$            | 12          | A    |
| Channel dissipation                       |         | $Pch^{*2}$          | 100         | W    |
| Channel temperature                       |         | Tch                 | 150         | °C   |
| Storage temperature                       |         | Tstg                | -55 to +150 | °C   |

Notes: 1. PW 10 μs, duty cycle 1%

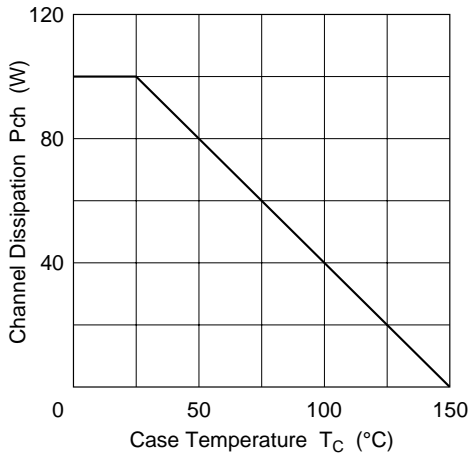
2. Value at T<sub>c</sub> = 25°C

**Electrical Characteristics (Ta = 25°C)**

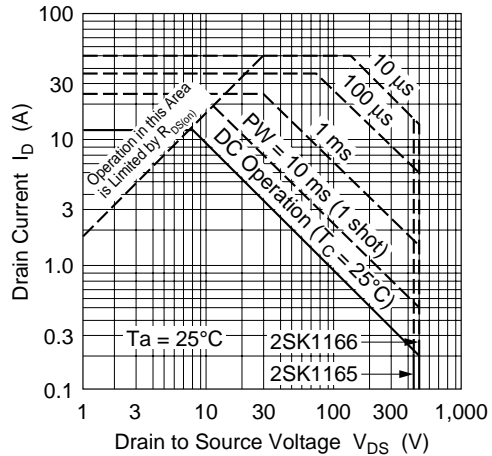
| Item  | Symbol                           | Min        | Typ          | Max          | Unit | Test conditions  |
|---|----------------------------------|------------|--------------|--------------|------|--|
| Drain to source<br>breakdown voltage          | 2SK1165 $V_{(BR)DSS}$<br>2SK1166 | 450<br>500 | —            | —            | V    | $I_D = 10 \text{ mA}, V_{GS} = 0$  |
| Gate to source breakdown<br>voltage           | $V_{(BR)GSS}$                    | ±30        | —            | —            | V    | $I_G = \pm 100 \mu\text{A}, V_{DS} = 0$                                      |
| Gate to source leak current                   | $I_{GSS}$                        | —          | —            | ±10          | μA   | $V_{GS} = \pm 25 \text{ V}, V_{DS} = 0$                                      |
| Zero gate voltage<br>drain current            | 2SK1165 $I_{DSS}$<br>2SK1166     | —          | —            | 250          | μA   | $V_{DS} = 360 \text{ V}, V_{GS} = 0$<br>$V_{DS} = 400 \text{ V}, V_{GS} = 0$ |
| Gate to source cutoff voltage                 | $V_{GS(off)}$                    | 2.0        | —            | 3.0          | V    | $I_D = 1 \text{ mA}, V_{DS} = 10 \text{ V}$                                  |
| Static Drain to source<br>on state resistance | 2SK1165 $R_{DS(on)}$<br>2SK1166  | —          | 0.40<br>0.45 | 0.55<br>0.60 |      | $I_D = 6 \text{ A}, V_{GS} = 10 \text{ V}^{*1}$                              |
| Forward transfer admittance                   | yfs                              | 6.0        | 10           | —            | S    | $I_D = 6 \text{ A}, V_{DS} = 10 \text{ V}^{*1}$                              |
| Input capacitance                             | Ciss                             | —          | 1450         | —            | pF   | $V_{DS} = 10 \text{ V}, V_{GS} = 0,$   |
| Output capacitance                            | Coss                             | —          | 410          | —            | pF   | $f = 1 \text{ MHz}$  |
| Reverse transfer capacitance                  | Crss                             | —          | 55           | —            | pF   |  |
| Turn-on delay time                            | $t_{d(on)}$                      | —          | 20           | —            | ns   | $I_D = 6 \text{ A}, V_{GS} = 10 \text{ V},$                                  |
| Rise time                                     | $t_r$                            | —          | 70           | —            | ns   | $R_L = 5$  |
| Turn-off delay time                           | $t_{d(off)}$                     | —          | 120          | —            | ns   |  |
| Fall time                                     | $t_f$                            | —          | 60           | —            | ns   |  |
| Body to drain diode forward<br>voltage        | $V_{DF}$                         | —          | 1.0          | —            | V    | $I_F = 12 \text{ A}, V_{GS} = 0$   |
| Body to drain diode reverse<br>recovery time  | $t_{rr}$                         | —          | 450          | —            | ns   | $I_F = 12 \text{ A}, V_{GS} = 0,$<br>$di_F/dt = 100 \text{ A}/\mu\text{s}$   |

Note: 1. Pulse test

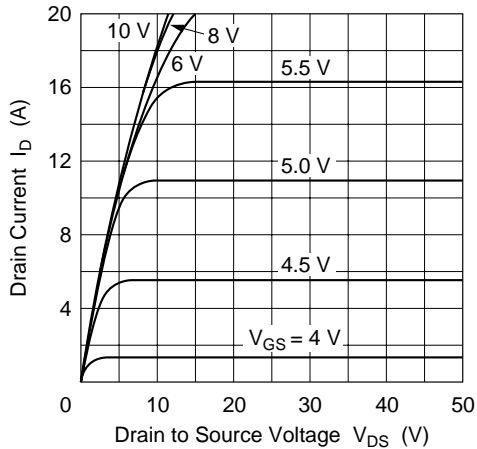
Power vs. Temperature Derating



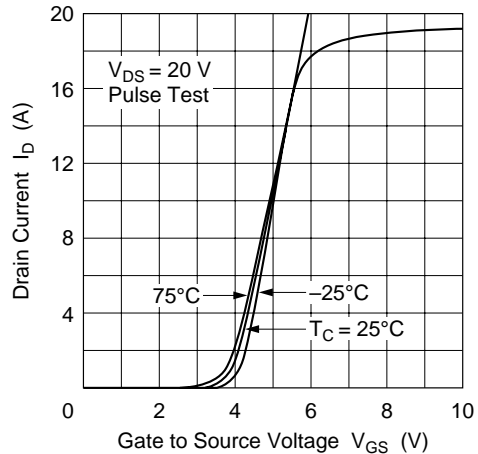
Maximum Safe Operation Area

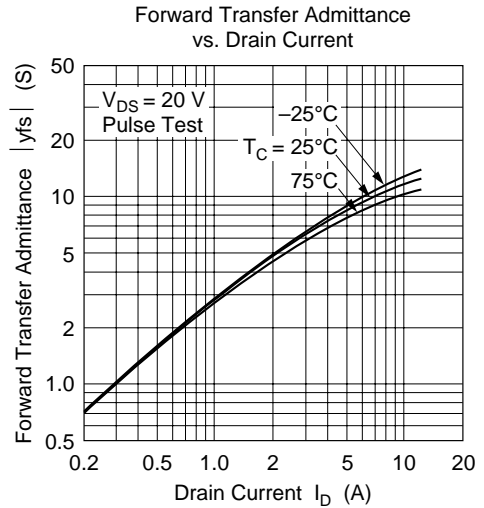
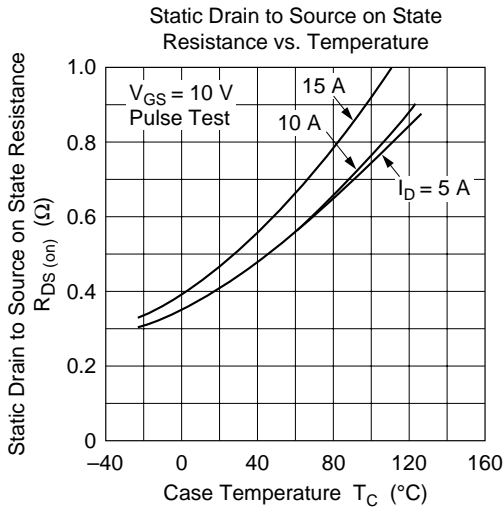
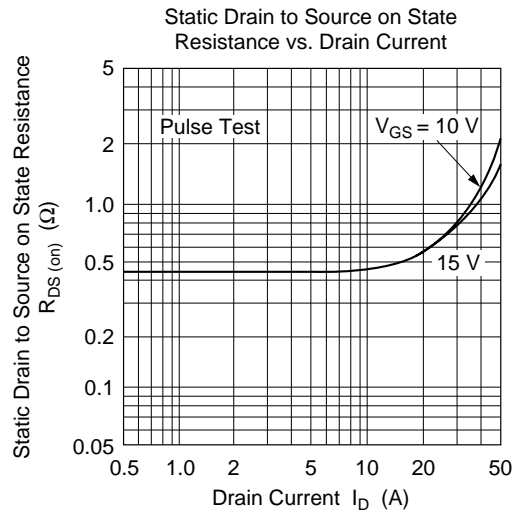
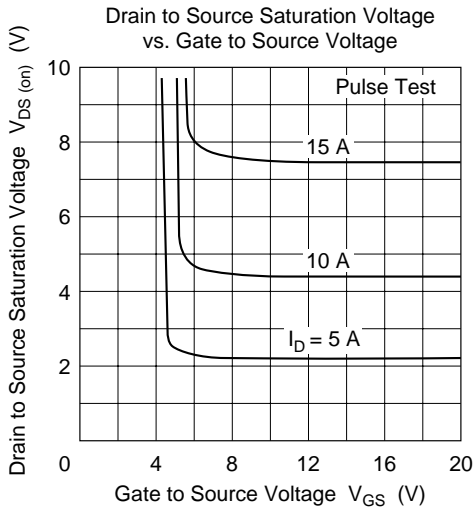


Typical Output Characteristics

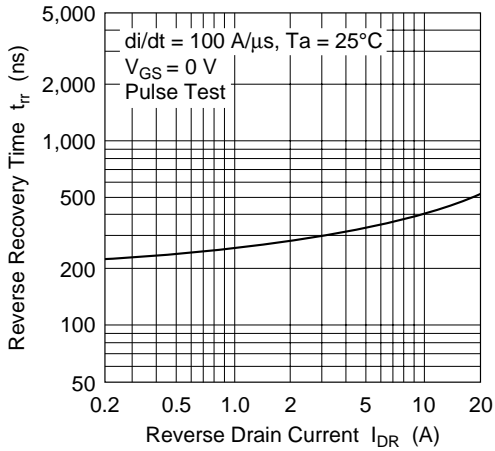


Typical Transfer Characteristics

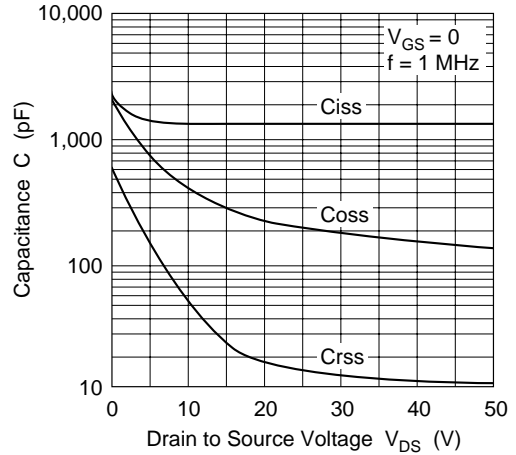




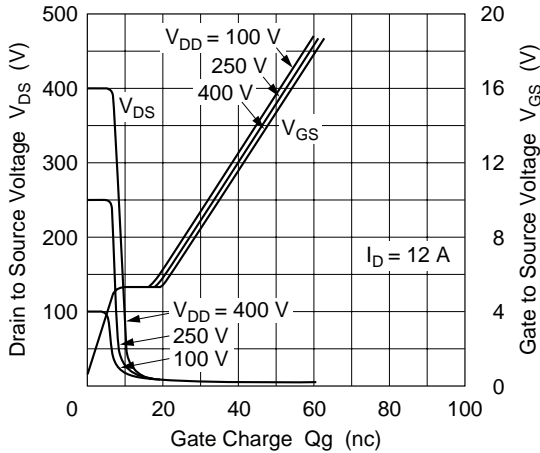
Body to Drain Diode Reverse Recovery Time



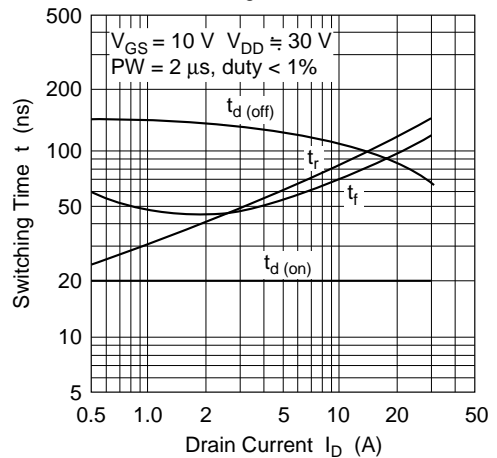
Typical Capacitance vs. Drain to Source Voltage

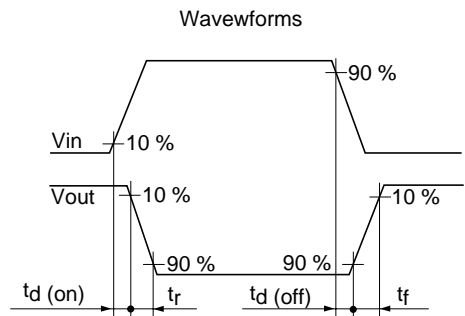
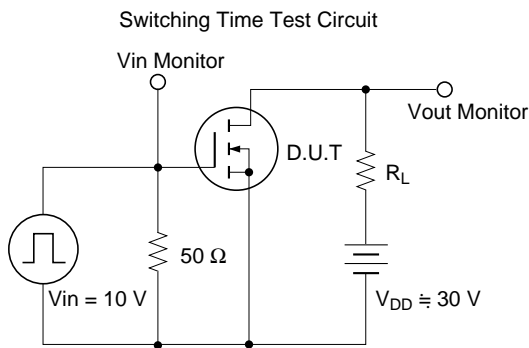
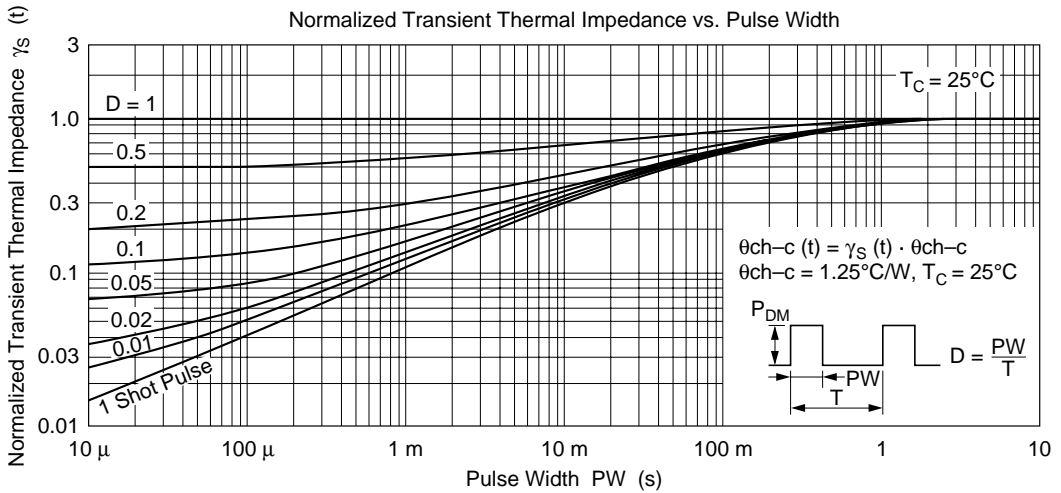
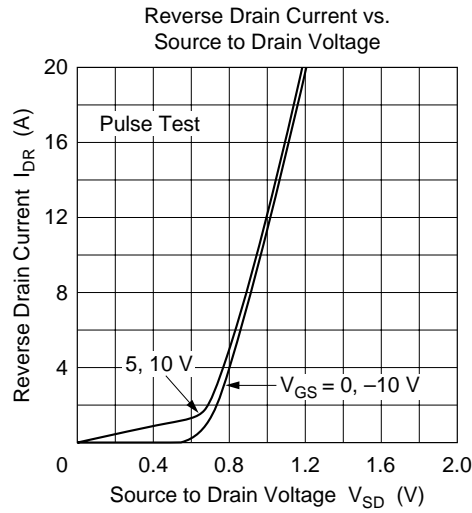


Dynamic Input Characteristics



Switching Characteristics





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