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# 2SK1515, 2SK1516

Silicon N-Channel MOS FET

# HITACHI

November 1996

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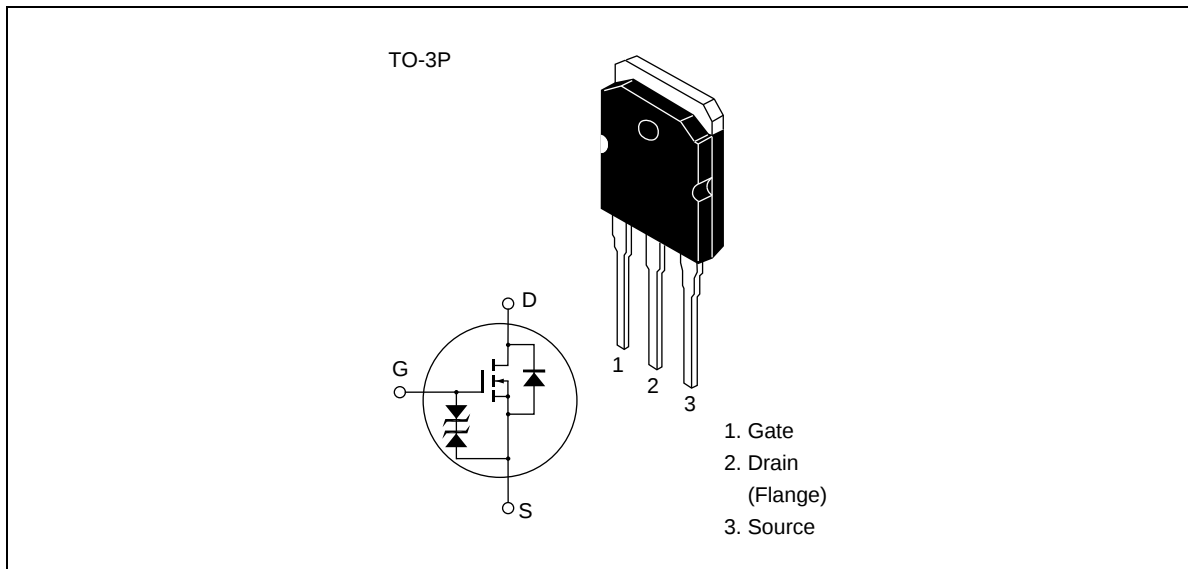
## Application

High speed power switching

## Features

- Low on-resistance
- High speed switching
- Low drive current
- Built-in fast recovery diode ( $t_r = 120 \text{ ns}$ )
- Suitable for motor control, switching regulator, DC-DC converter

## Outline



## 2SK1515, 2SK1516

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

| Item                                      |         | Symbol              | Ratings     | Unit |
|-------------------------------------------|---------|---------------------|-------------|------|
| Drain to source voltage                   | 2SK1515 | $V_{DSS}$           | 450         | V    |
|                                           | 2SK1516 |                     | 500         |      |
| Gate to source voltage                    |         | $V_{GSS}$           | ±30         | V    |
| Drain current                             |         | $I_D$               | 10          | A    |
| Drain peak current                        |         | $I_{D(pulse)}^{*1}$ | 30          | A    |
| Body to drain diode reverse drain current |         | $I_{DR}$            | 10          | A    |
| Channel dissipation                       |         | $P_{ch}^{*2}$       | 100         | W    |
| Channel temperature                       |         | Tch                 | 150         | °C   |
| Storage temperature                       |         | Tstg                | −55 to +150 | °C   |

Note 1.  $PW \leq 10 \mu s$ , duty cycle  $\leq 1\%$   
 2. Value at  $T_c = 25^\circ C$

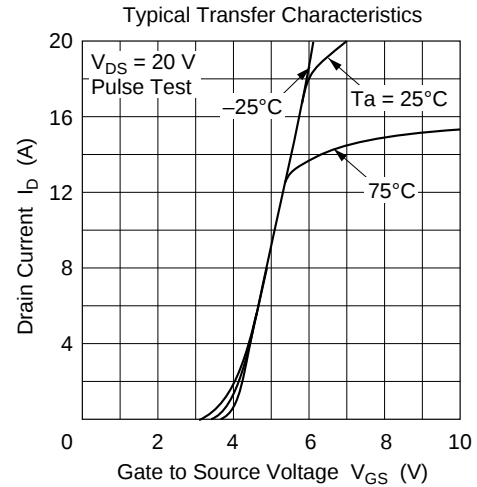
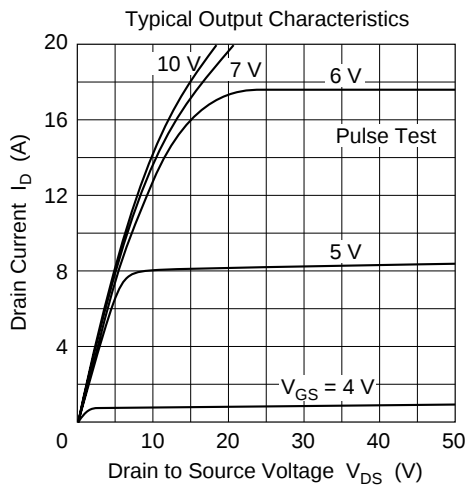
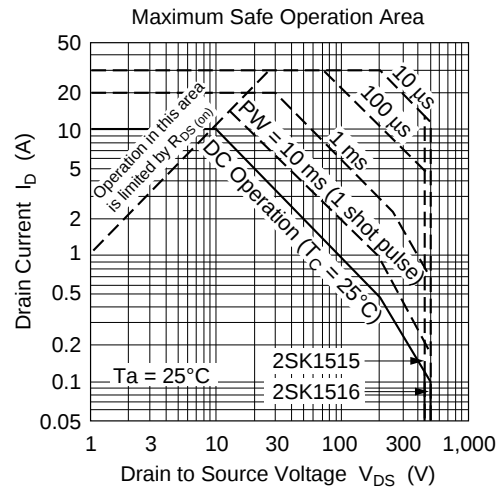
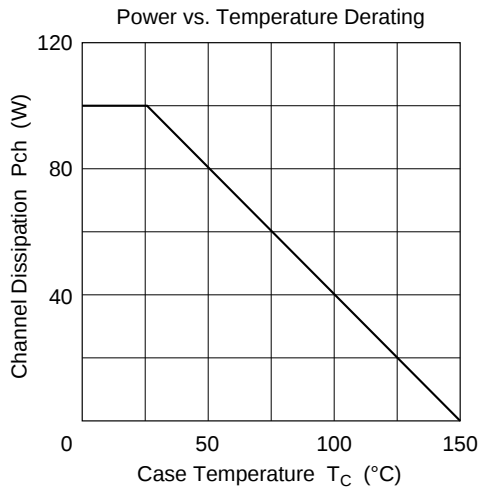
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### Electrical Characteristics (Ta = 25°C)

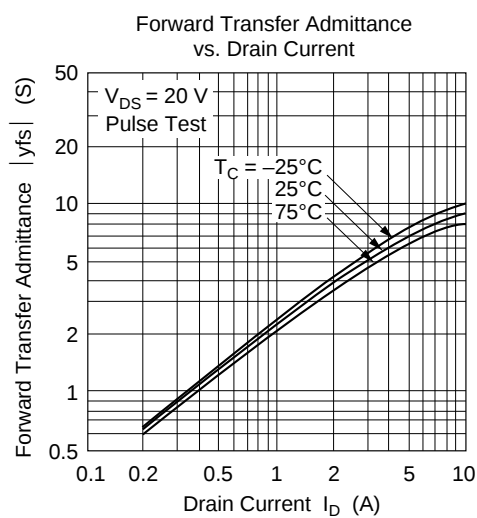
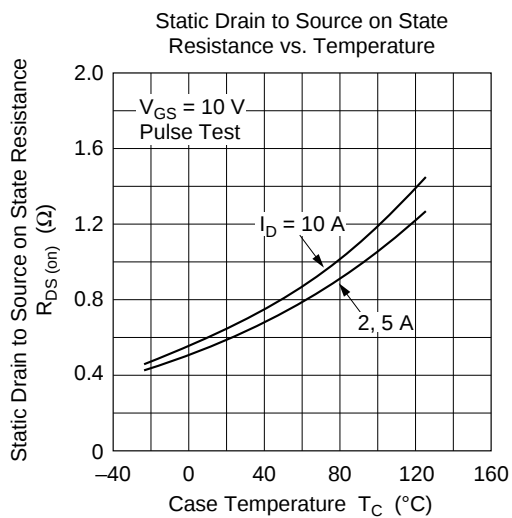
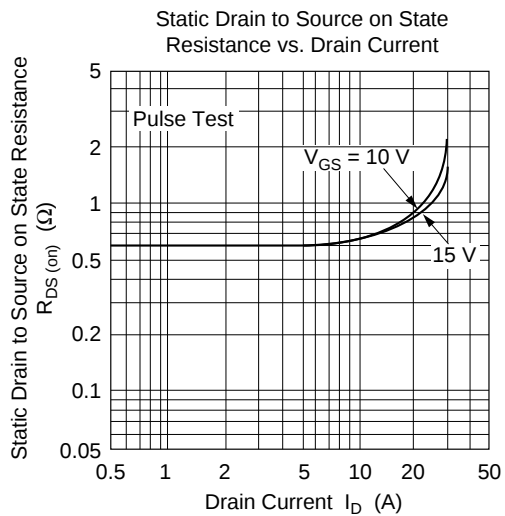
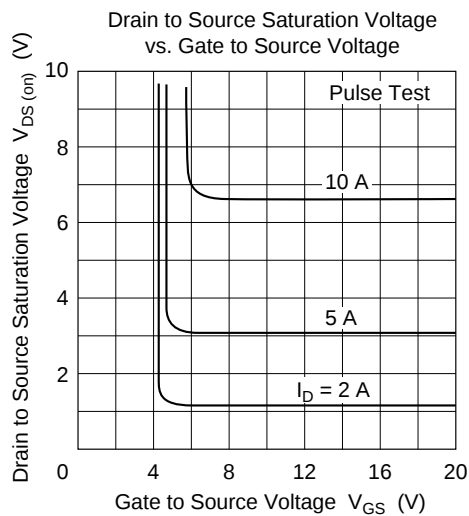
| Item                                          | Symbol                           | Min        | Typ        | Max        | Unit | Test conditions                                                                    |
|-----------------------------------------------|----------------------------------|------------|------------|------------|------|------------------------------------------------------------------------------------|
| Drain to source<br>breakdown voltage          | 2SK1515 $V_{(BR)DSS}$<br>2SK1516 | 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            | 2SK1515 $I_{DSS}$<br>2SK1516     | —          | —          | 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 | 2SK1515 $R_{DS(on)}$<br>2SK1516  | —<br>—     | 0.6<br>0.7 | 0.8<br>0.9 | Ω    | $I_D = 5 \text{ A}$ , $V_{GS} = 10 \text{ V}^{*1}$                                 |
| Forward transfer admittance                   | yfs                              | 4.0        | 7.0        | —          | S    | $I_D = 5 \text{ A}$ , $V_{DS} = 10 \text{ V}^{*1}$                                 |
| Input capacitance                             | Ciss                             | —          | 1100       | —          | pF   | $V_{DS} = 10 \text{ V}$ , $V_{GS} = 0$ ,                                           |
| Output capacitance                            | Coss                             | —          | 310        | —          | pF   | $f = 1 \text{ MHz}$                                                                |
| Reverse transfer capacitance                  | Crss                             | —          | 50         | —          | pF   |                                                                                    |
| Turn-on delay time                            | $t_{d(on)}$                      | —          | 15         | —          | ns   | $I_D = 5 \text{ A}$ , $V_{GS} = 10 \text{ V}$ ,                                    |
| Rise time                                     | $t_r$                            | —          | 65         | —          | ns   | $R_L = 6 \Omega$                                                                   |
| Turn-off delay time                           | $t_{d(off)}$                     | —          | 95         | —          | ns   |                                                                                    |
| Fall time                                     | $t_f$                            | —          | 55         | —          | ns   |                                                                                    |
| Body to drain diode forward<br>voltage        | $V_{DF}$                         | —          | 1.0        | —          | V    | $I_F = 10 \text{ A}$ , $V_{GS} = 0$                                                |
| Body to drain diode reverse<br>recovery time  | $t_{rr}$                         | —          | 120        | —          | ns   | $I_F = 10 \text{ A}$ , $V_{GS} = 0$ ,<br>$di_F/dt = 100 \text{ A}/\mu\text{s}$     |

Note 1. Pulse test

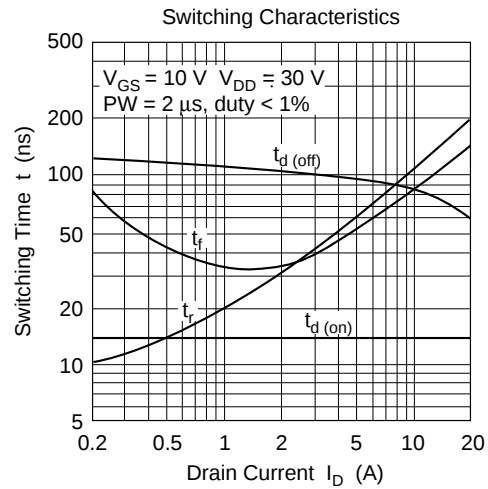
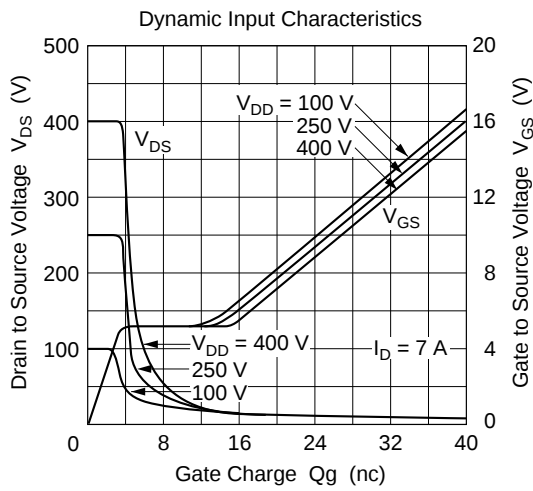
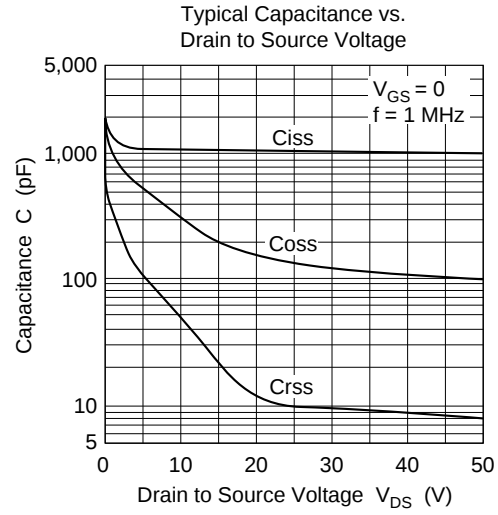
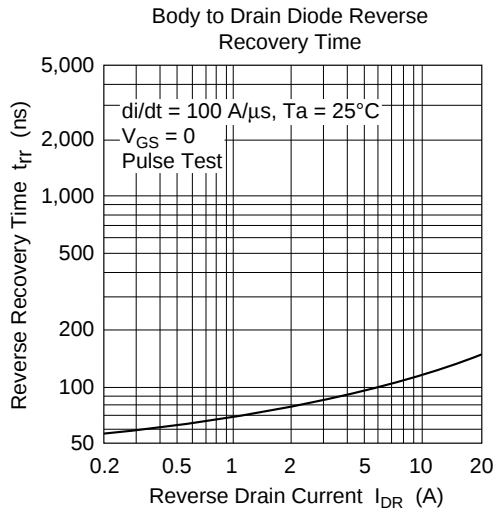
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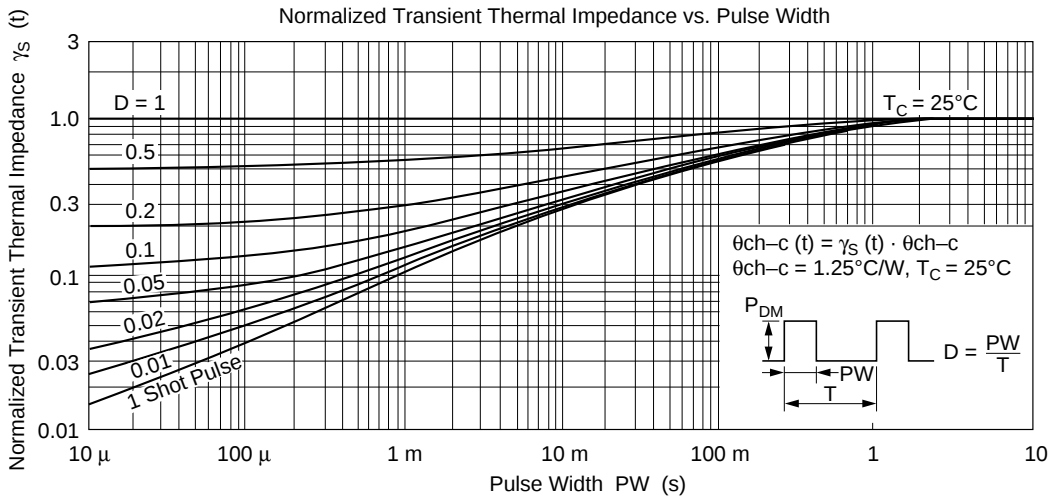
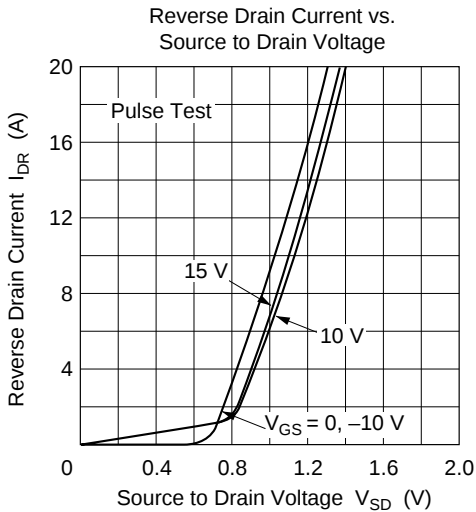
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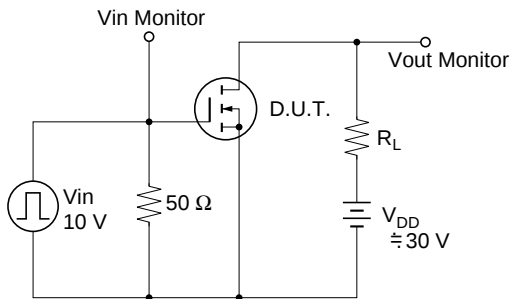
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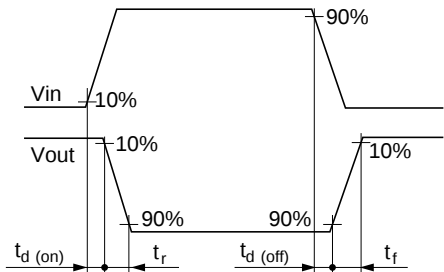
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Switching Time Test Circuit



Waveforms



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