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# 2SK1165, 2SK1166

Silicon N-Channel MOS FET

# HITACHI

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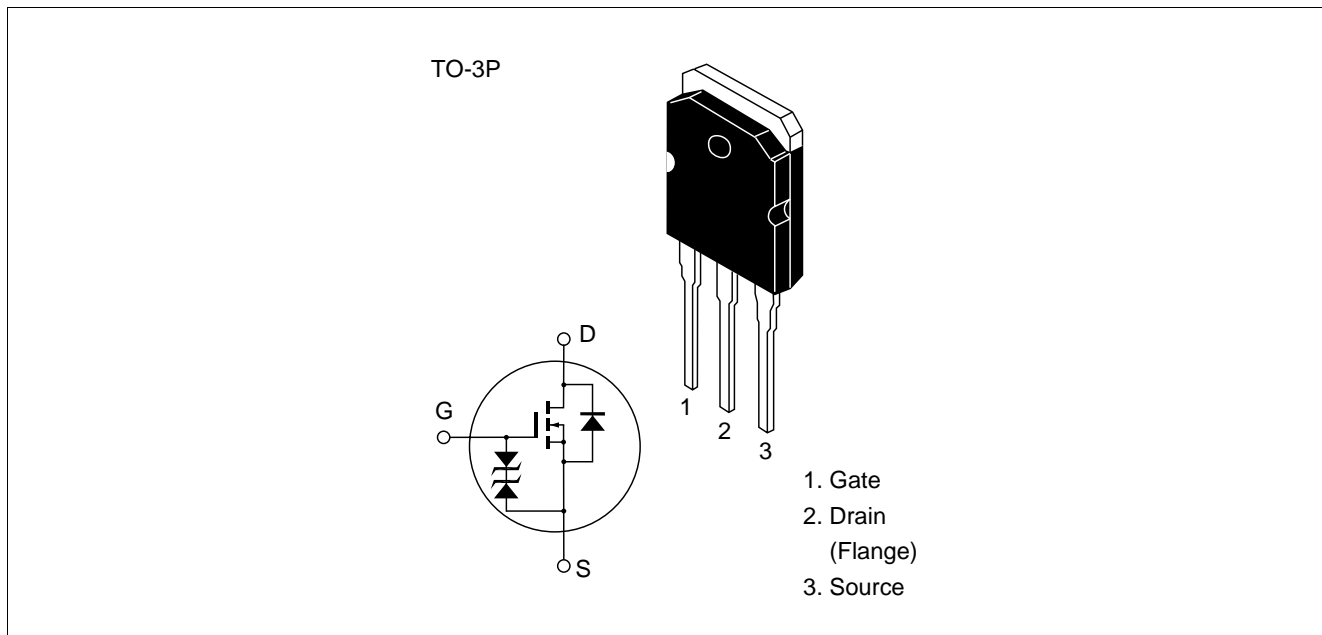
## Application

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                       |         | $P_{ch}^{*2}$       | 100         | W    |
| Channel temperature                       |         | Tch                 | 150         | °C   |
| Storage temperature                       |         | Tstg                | -55 to +150 | °C   |

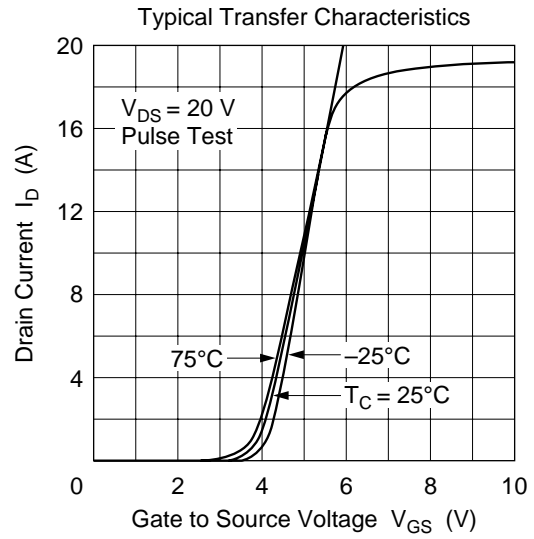
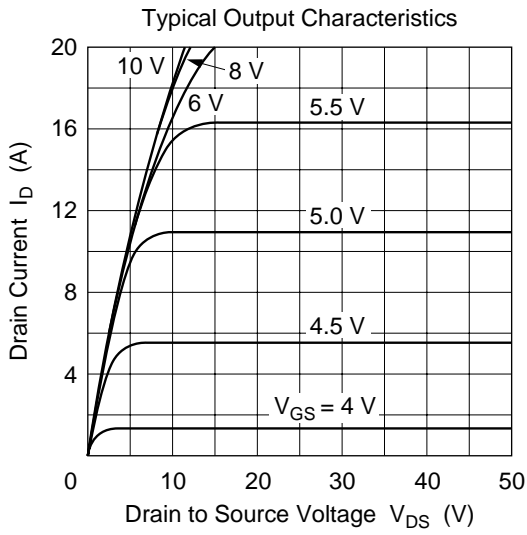
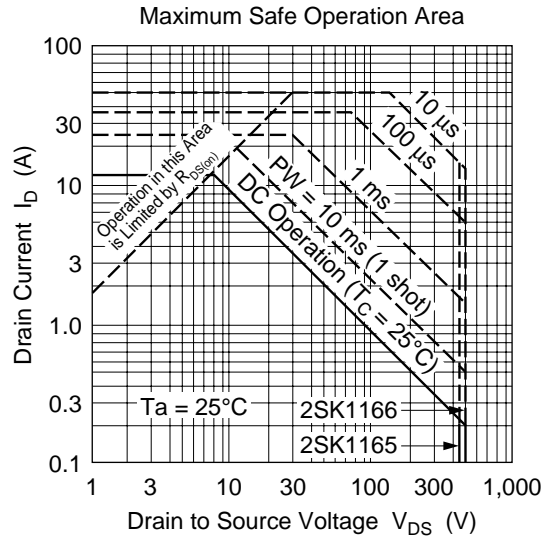
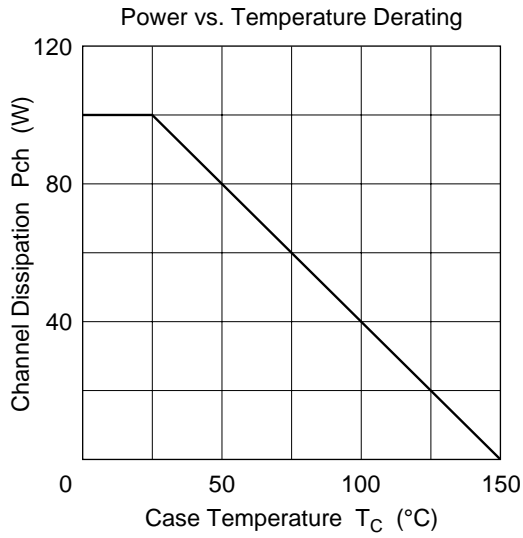
Notes: 1.  $PW \leq 10 \mu s$ , duty cycle  $\leq 1\%$

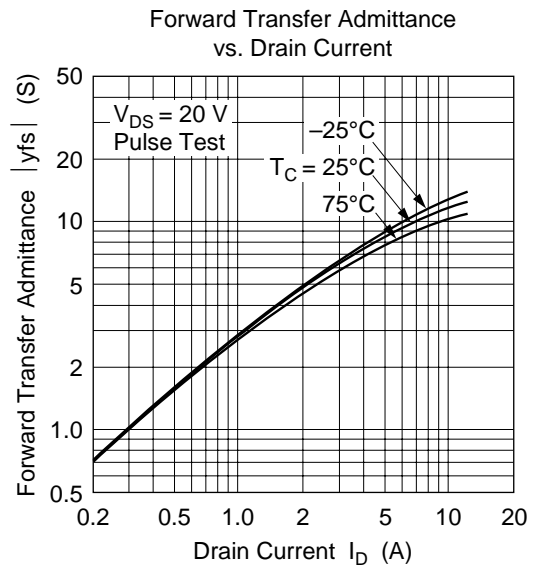
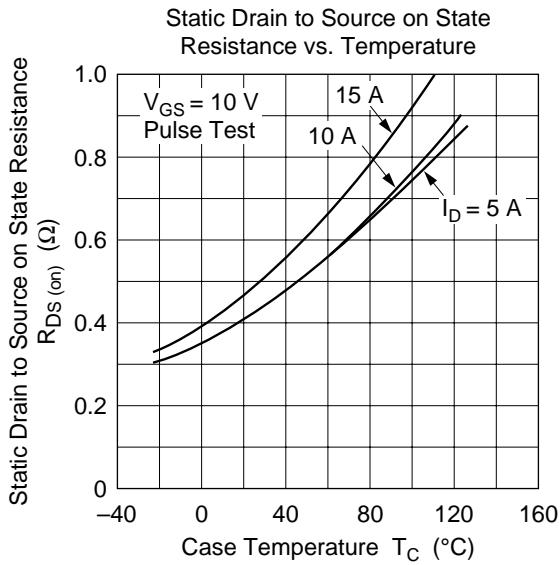
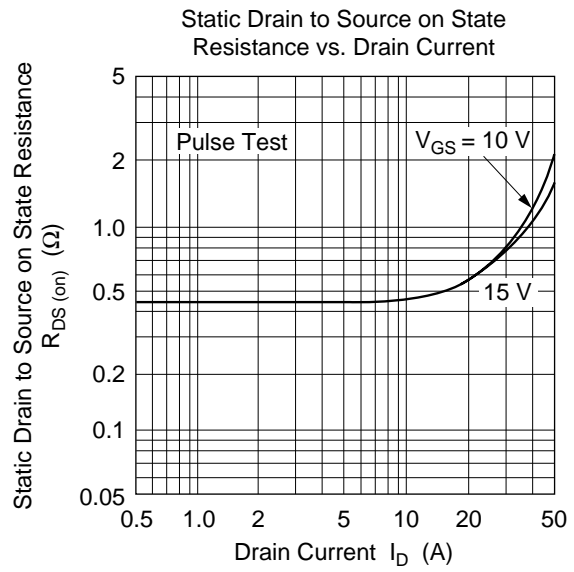
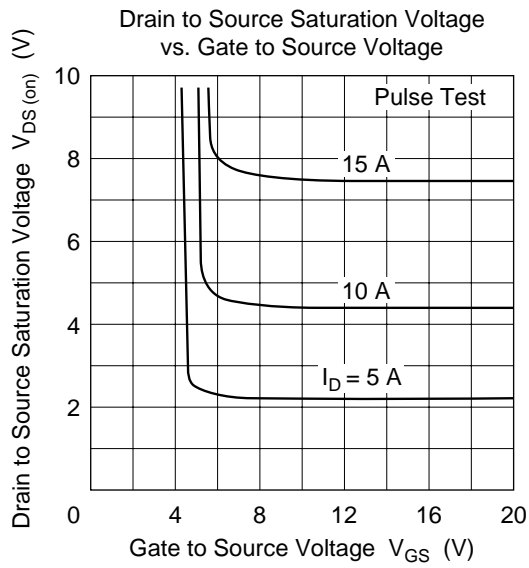
2. Value at  $T_c = 25^\circ C$

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

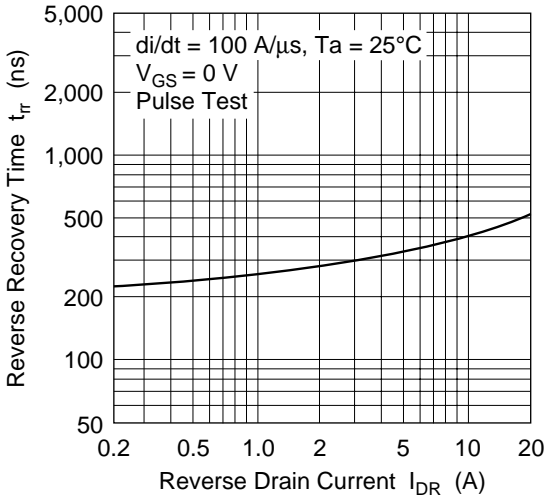
| Item                                       | Symbol                           | Min        | Typ          | Max          | Unit | Test conditions  |
|--|----------------------------------|------------|--------------|--------------|------|--|
| Drain to source breakdown voltage          | 2SK1165 $V_{(BR)DSS}$<br>2SK1166 | 450<br>500 | —            | —            | V    | $I_D = 10 \text{ mA}, V_{GS} = 0$  |
| Gate to source breakdown 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 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 on state resistance | 2SK1165 $R_{DS(on)}$<br>2SK1166  | —          | 0.40<br>0.45 | 0.55<br>0.60 | Ω    | $I_D = 6 \text{ A}, V_{GS} = 10 \text{ V}^{*1}$                              |
| 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 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   | $R_L = 5 \Omega$   |
| Turn-off delay time                        | $t_{d(off)}$                     | —          | 120          | —            | ns   |  |
| Fall time                                  | $t_f$                            | —          | 60           | —            | ns   |  |
| Body to drain diode forward voltage        | $V_{DF}$                         | —          | 1.0          | —            | V    | $I_F = 12 \text{ A}, V_{GS} = 0$   |
| Body to drain diode reverse 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

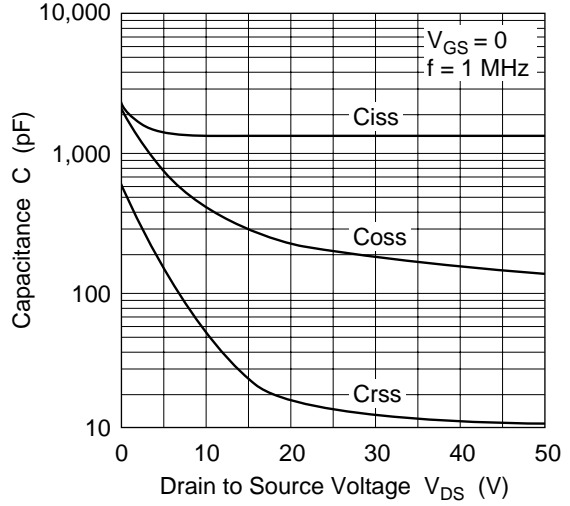




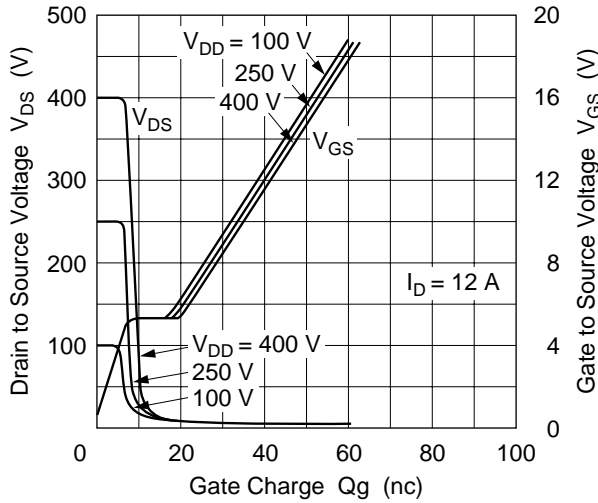
Body to Drain Diode Reverse Recovery Time



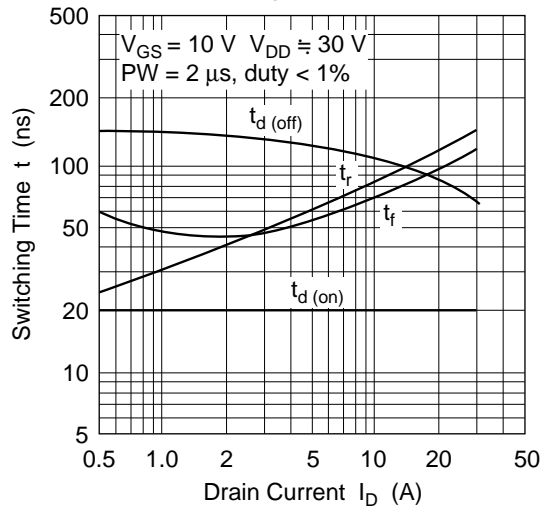
Typical Capacitance vs. Drain to Source Voltage

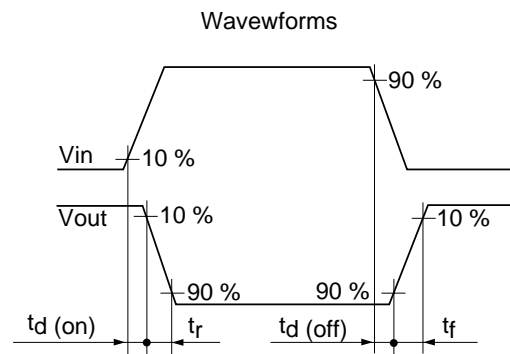
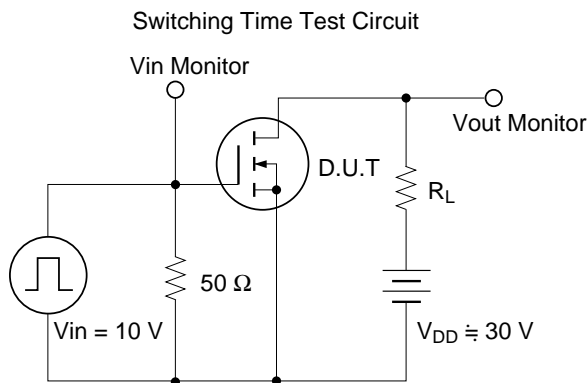
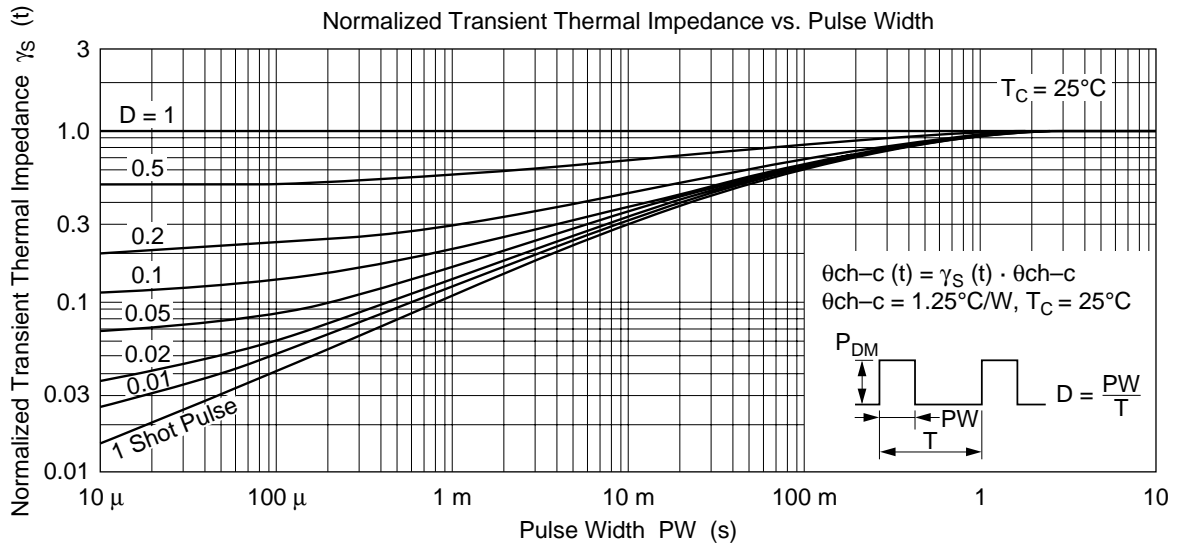
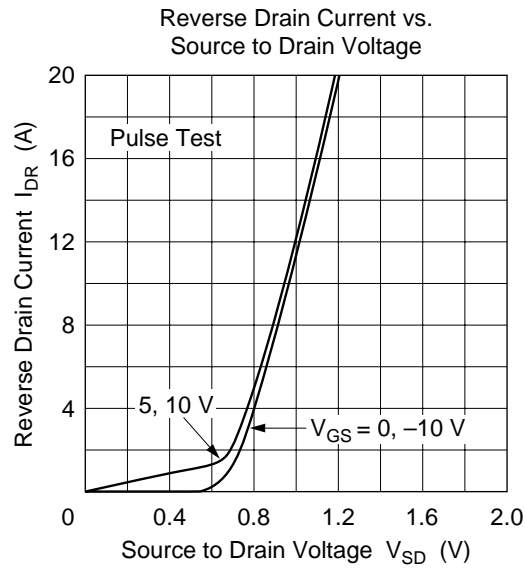


Dynamic Input Characteristics

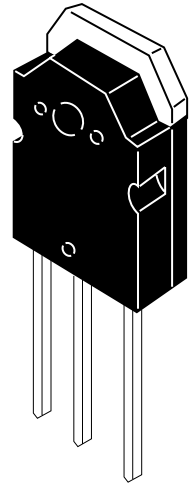
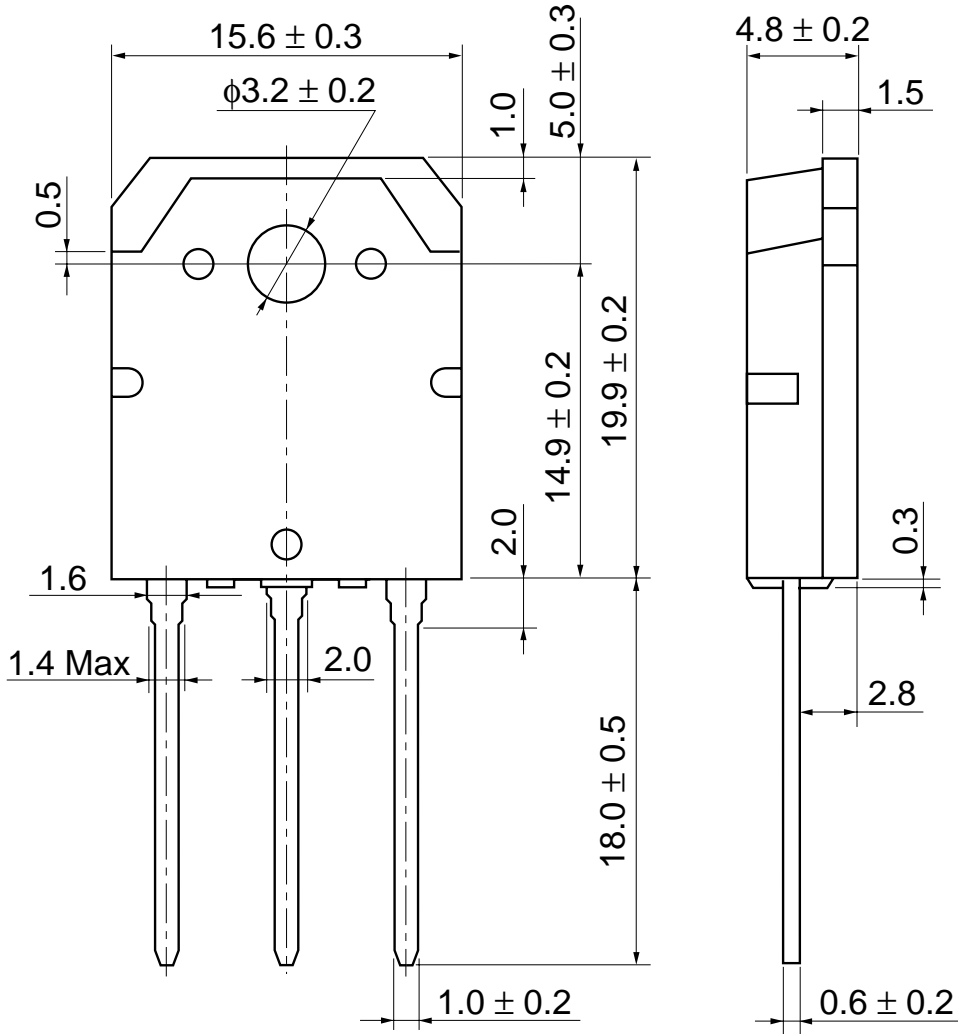


Switching Characteristics





Unit: mm



|                          |          |
|--------------------------|----------|
| Hitachi Code             | TO-3P    |
| JEDEC                    | —        |
| EIAJ                     | Conforms |
| Weight (reference value) | 5.0 g    |



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