# 2SK2203

Silicon N-Channel MOS FET

HITACHI

ADE-208-139
1st. Edition

## Application

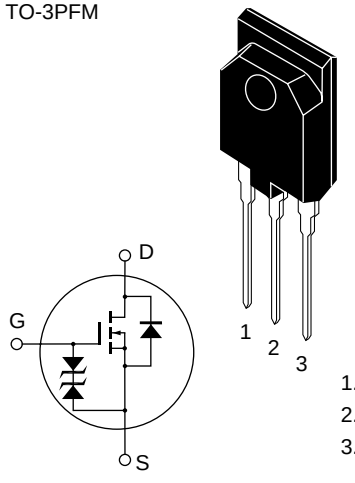
High speed power switching

## Features

- Low on-resistance
- High speed switching
- Low drive current
- 4 V gate drive device can be driven from 5 V source
- Suitable for Switching regulator, DC-DC converter

## Outline

TO-3PFM




1. Gate
2. Drain
3. Source

Hitachi semiconductor

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

| Item | Symbol | Ratings | Unit |
|---|---|---|---|
| Drain to source voltage | $V_{DSS}$ | 60 | V |
| Gate to source voltage | $V_{GSS}$ | ±20 | V |
| Drain current | $I_D$ | 50 | A |
| Drain peak current | $I_{D(pulse)}$*[1] | 200 | A |
| Body to drain diode reverse drain current | $I_{DR}$ | 50 | A |
| Avalanche current | $I_{AP}$*[3] | 50 | A |
| Avalanche energy | $E_{AR}$*[3] | 214 | mJ |
| Channel dissipation | Pch*[2] | 60 | W |
| Channel temperature | Tch | 150 | °C |
| Storage temperature | Tstg | –55 to +150 | °C |

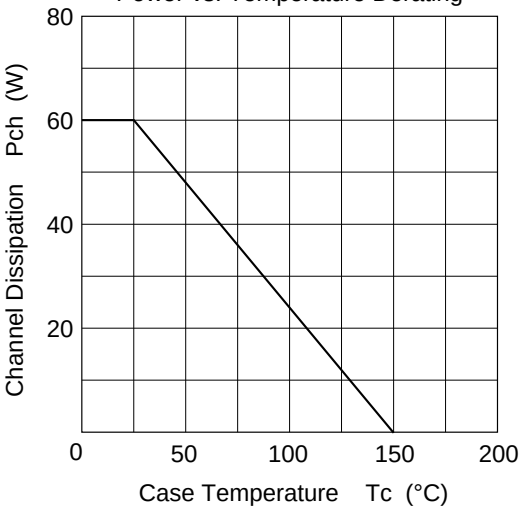
Notes 1. PW ≤ 10 µs, duty cycle ≤ 1 %
2. Value at Tc = 25 °C
3. Value at Tch = 25 °C, Rg ≥ 50 Ω

## Electrical Characteristics (Ta = 25°C)

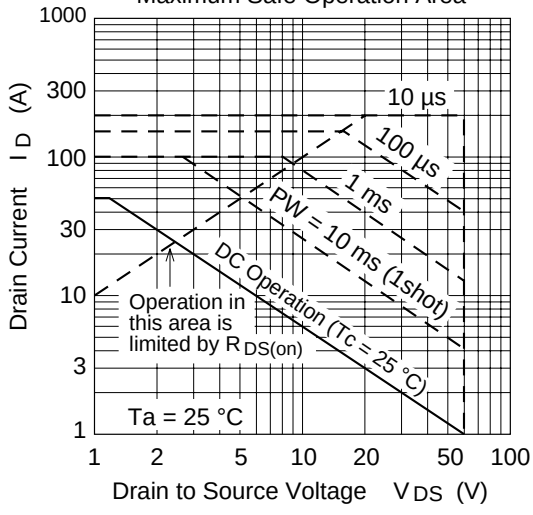
| Item | Symbol | Min | Typ | Max | Unit | Test conditions |
|---|---|---|---|---|---|---|
| Drain to source breakdown voltage | $V_{(BR)DSS}$ | 60 | — | — | V | $I_D$ = 10 mA, $V_{GS}$ = 0 |
| Gate to source breakdown voltage | $V_{(BR)GSS}$ | ±20 | — | — | V | $I_G$ = ±100 µA, $V_{DS}$ = 0 |
| Gate to source leak current | $I_{GSS}$ | — | — | ±10 | µA | $V_{GS}$ = ±16 V, $V_{DS}$ = 0 |
| Zero gate voltage drain current | $I_{DSS}$ | — | — | 250 | µA | $V_{DS}$ = 50 V, $V_{GS}$ = 0 |
| Gate to source cutoff voltage | $V_{GS(off)}$ | 1.0 | — | 2.25 | V | $I_D$ = 1 mA, $V_{DS}$ = 10 V |
| Static drain to source on state resistance | $R_{DS(on)}$ | — | 0.007 | 0.01 | Ω | $I_D$ = 25 A<br>$V_{GS}$ = 10 V*[1] |
| | | — | 0.009 | 0.013 | Ω | $I_D$ = 25 A<br>$V_{GS}$ = 4 V*[1] |
| Forward transfer admittance | $\|y_{fs}\|$ | 40 | 65 | — | S | $I_D$ = 25 A<br>$V_{DS}$ = 10 V*[1] |
| Input capacitance | Ciss | — | 8330 | — | pF | $V_{DS}$ = 10 V |
| Output capacitance | Coss | — | 3500 | — | pF | $V_{GS}$ = 0 |
| Reverse transfer capacitance | Crss | — | 550 | — | pF | f = 1 MHz |
| Turn-on delay time | $t_{d(on)}$ | — | 50 | — | ns | $I_D$ = 25 A |
| Rise time | $t_r$ | — | 270 | — | ns | $V_{GS}$ = 10 V |
| Turn-off delay time | $t_{d(off)}$ | — | 1400 | — | ns | $R_L$ = 1.2 Ω |
| Fall time | $t_f$ | — | 560 | — | ns | |
| Body to drain diode forward voltage | $V_{DF}$ | — | 0.95 | — | V | $I_F$ = 50 A, $V_{GS}$ = 0 |
| Body to drain diode reverse recovery time | $t_{rr}$ | — | 150 | — | ns | $I_F$ = 50 A, $V_{GS}$ = 0,<br>$di_F$ / dt = 50 A / µs |

Note 1. Pulse Test

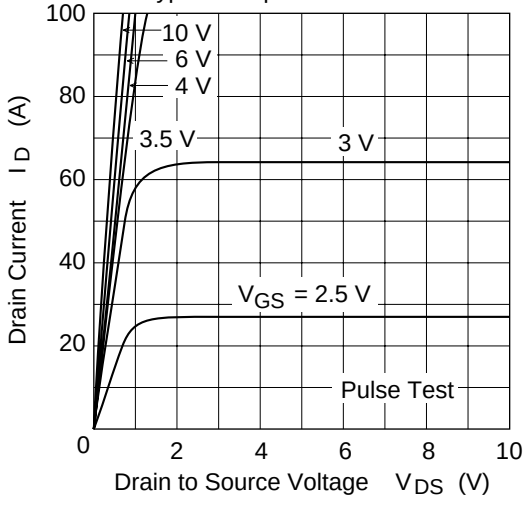
Power vs. Temperature Derating



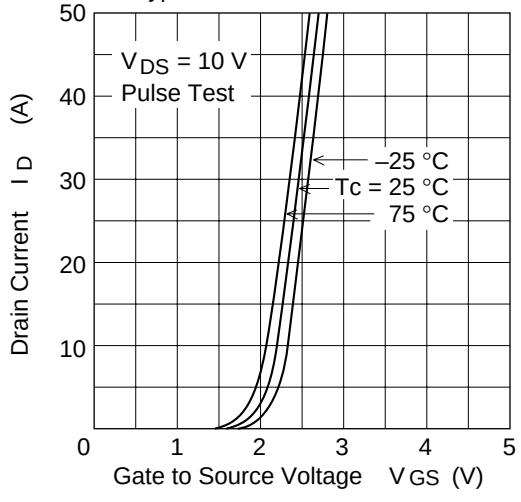

Maximum Safe Operation Area



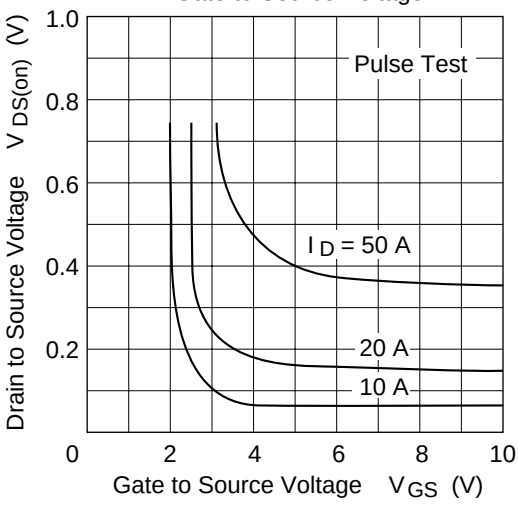

Typical Output Characteristics



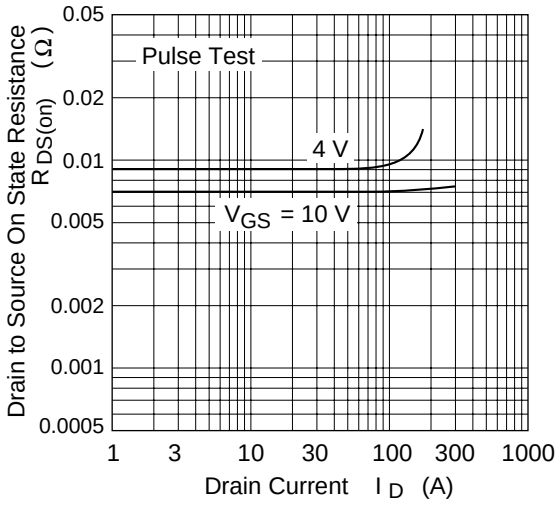

Typical Transfer Characteristics



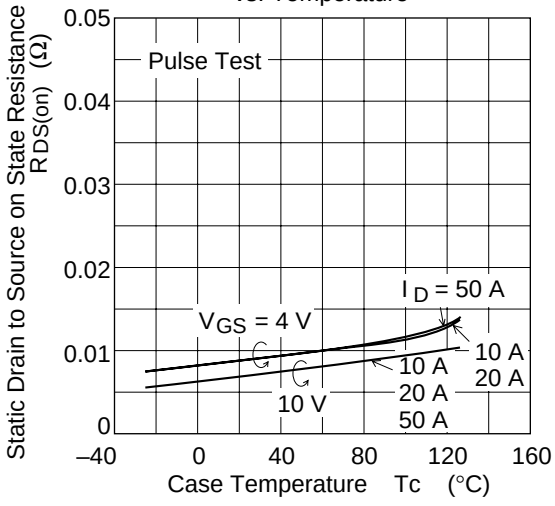
Drain to Source Saturation Voltage vs. Gate to Source Voltage



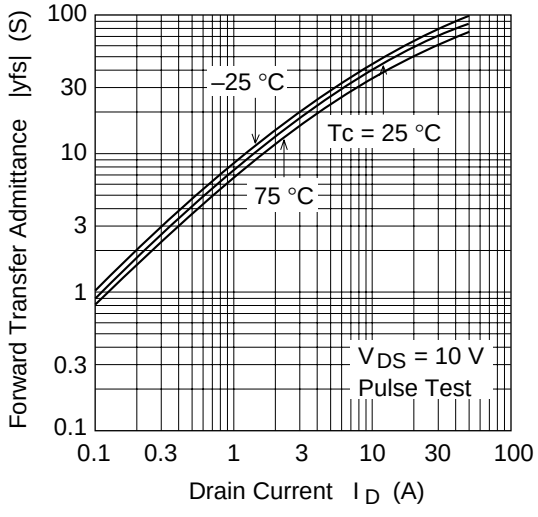

Static Drain to Source State Resistance vs. Drain Current



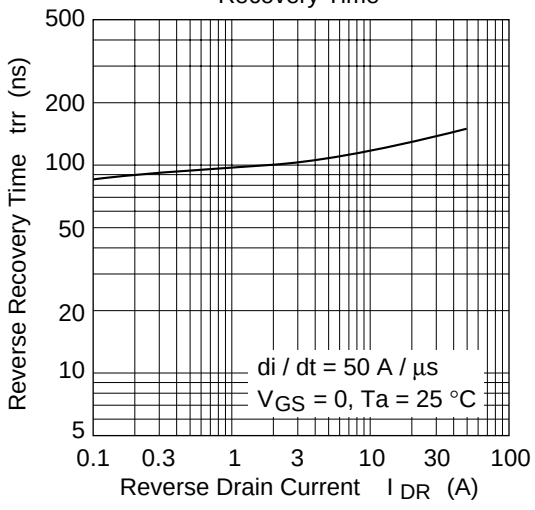

Static Drain to Source on State Resistance vs. Temperature



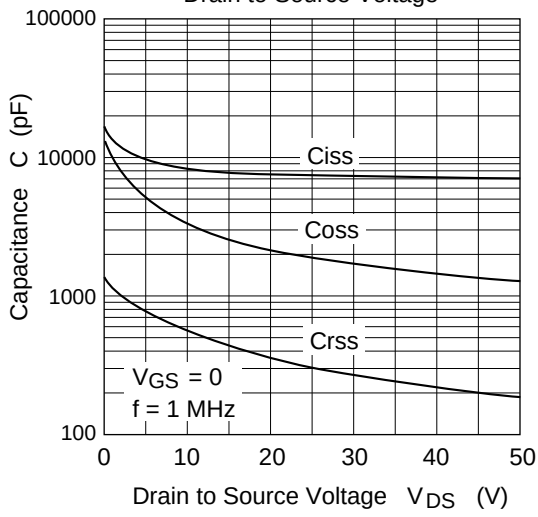

Forward Transfer Admittance vs. Drain Current



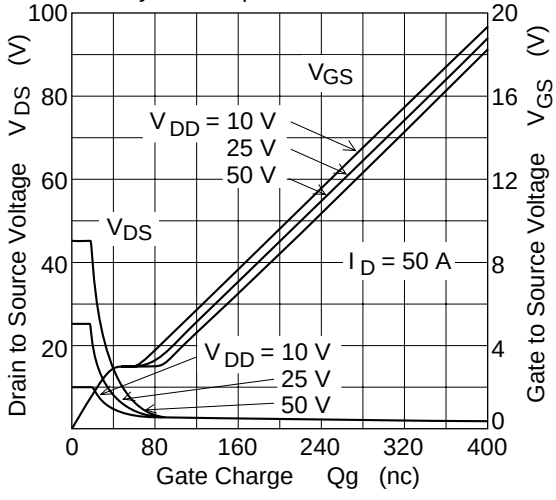
Body to Drain Diode Reverse Recovery Time



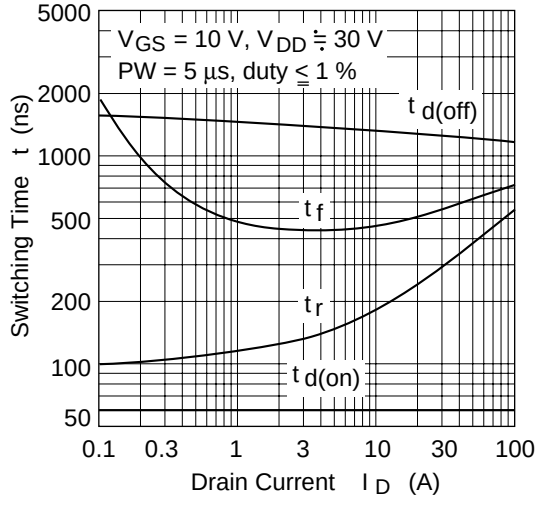

Typical Capacitance vs. Drain to Source Voltage



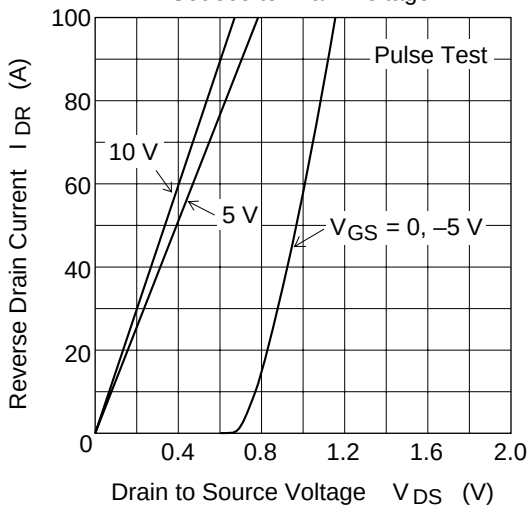

Dynamic Input Characteristics



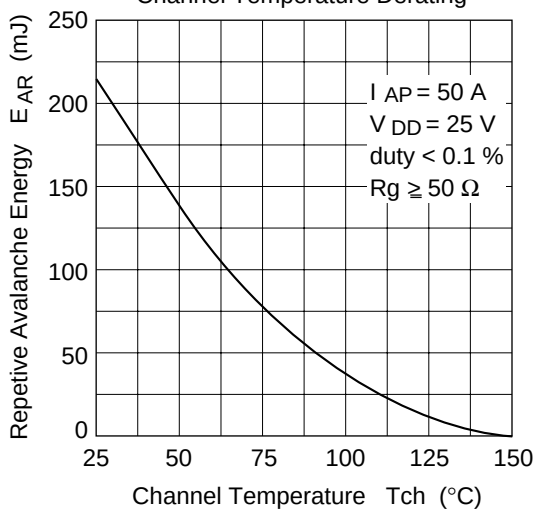

Switching Characteristics



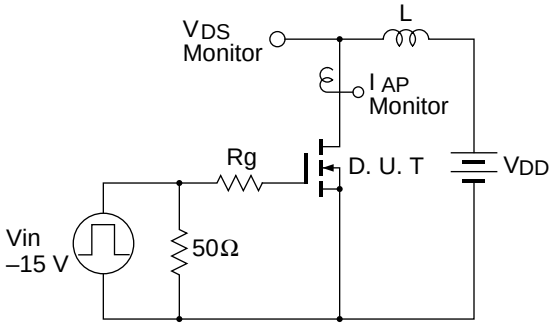
Reverse Drain Current vs.
Souece to Drain Voltage



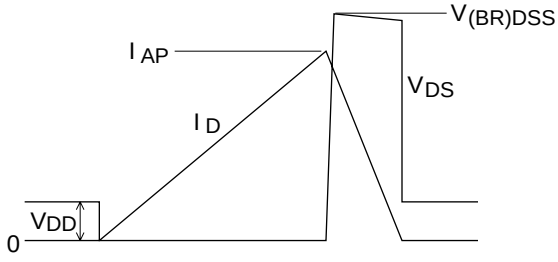

Maximun Avalanche Energy vs.
Channel Temperature Derating

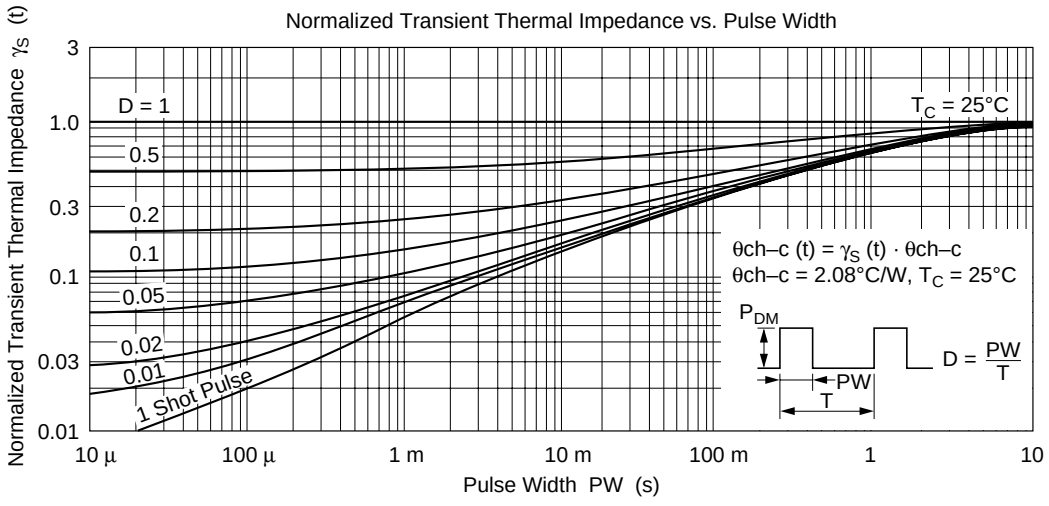



Avalanche Test Circuit and Waveform

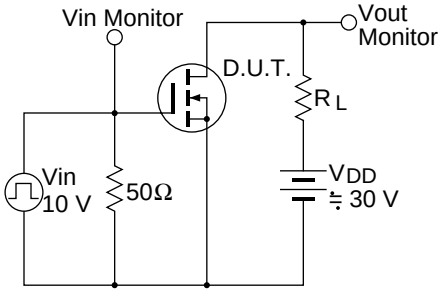



$$E_{AR} = \frac{1}{2} \cdot L \cdot I_{AP}^{2} \cdot \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$

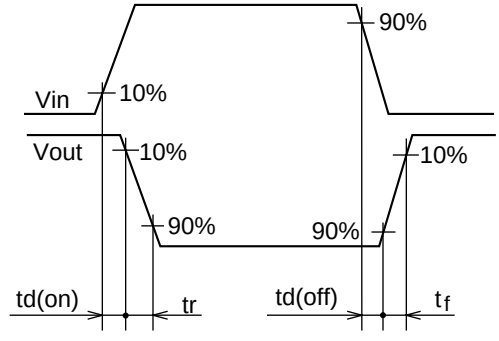




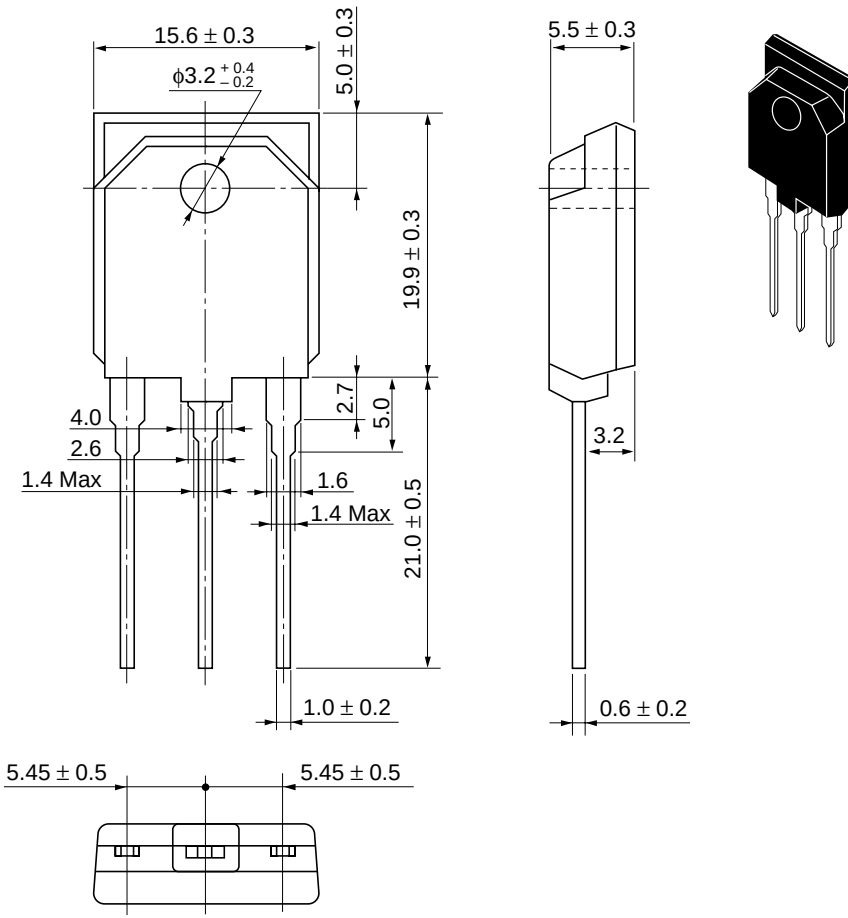

Switching Time Test Circuit




Waveform



Unit: mm




| | |
|---|---|
| Hitachi Code | TO-3PFM |
| JEDEC | — |
| EIAJ | — |
| Weight (reference value) | 5.6 g |

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