

# 2SK1270

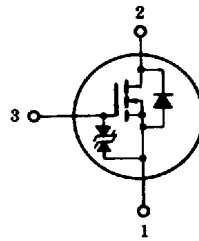
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HITACHI/(OPTOELECTRONICS) 61E D

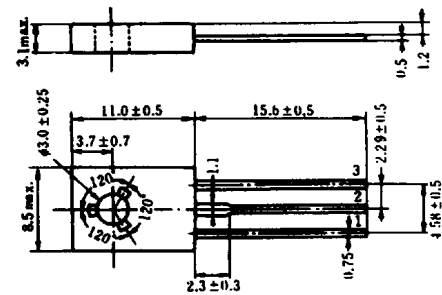
## SILICON N-CHANNEL MOS FET HIGH SPEED POWER SWITCHING

### FEATURES

- Low On-Resistance
- High Speed Switching
- 4 V Gate Drive Device
  - Can be driven from 5 V source
- Suitable for Motor Drive, DC-DC Converter, Power Switch and Solenoid Drive



1. Source  
2. Drain  
3. Gate  
(Dimensions in mm)



(JEDEC TO-126 MOD.)

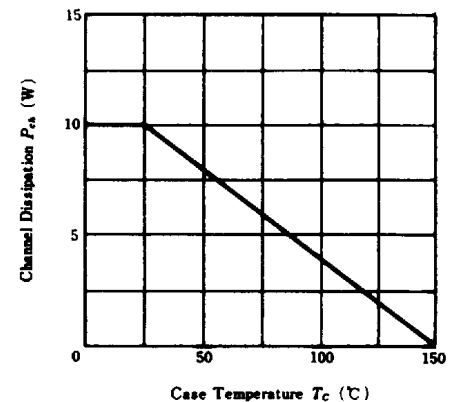
### ABSOLUTE MAXIMUM RATINGS ( $T_a=25^\circ\text{C}$ )

| Item                                   | Symbol           | Rating          | Unit             |
|----------------------------------------|------------------|-----------------|------------------|
| Drain-Source Voltage                   | $V_{DSS}$        | 60              | V                |
| Gate-Source Voltage                    | $V_{GSS}$        | $\pm 20$        | V                |
| Drain Current                          | $I_D$            | 2               | A                |
| Drain Peak Current                     | $I_{D(pulse)}$ * | 6               | A                |
| Body-Drain Diode Reverse Drain Current | $I_{DR}$         | 2               | A                |
| Channel Dissipation                    | $P_{ch}$ **      | 10              | W                |
| Channel Temperature                    | $T_{ch}$         | 150             | $^\circ\text{C}$ |
| Storage Temperature                    | $T_{stg}$        | $-55 \sim +150$ | $^\circ\text{C}$ |

\*  $PW \leq 10\mu\text{s}$ , duty cycle  $\leq 1\%$

\*\* Value at  $T_c=25^\circ\text{C}$

### POWER VS. TEMPERATURE DERATING

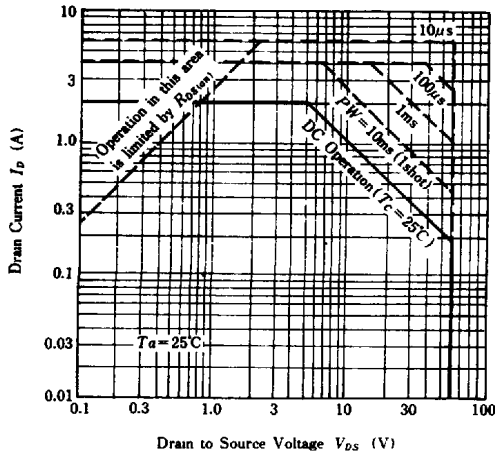


### ELECTRICAL CHARACTERISTICS ( $T_a=25^\circ\text{C}$ )

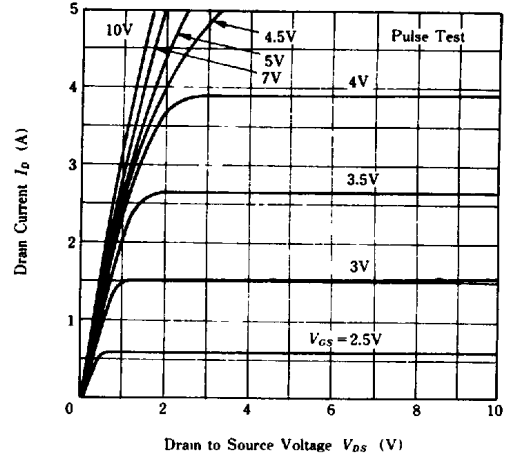
| Item                                    | Symbol        | Test Condition                                                     | min.     | typ. | max.     | Unit          |
|-----------------------------------------|---------------|--------------------------------------------------------------------|----------|------|----------|---------------|
| Drain-Source Breakdown Voltage          | $V_{(BR)DSS}$ | $I_D=10\text{mA}$ , $V_{GS}=0$                                     | 60       | —    | —        | V             |
| Gate-Source Breakdown Voltage           | $V_{(BR)GSS}$ | $I_G=\pm 100\mu\text{A}$ , $V_{DS}=0$                              | $\pm 20$ | —    | —        | V             |
| Gate-Source Leak Current                | $I_{GSS}$     | $V_{GS}=\pm 16\text{V}$ , $V_{DS}=0$                               | —        | —    | $\pm 10$ | $\mu\text{A}$ |
| Zero Gate Voltage Drain Current         | $I_{DSS}$     | $V_{DS}=50\text{V}$ , $V_{GS}=0$                                   | —        | —    | 100      | $\mu\text{A}$ |
| Gate-Source Cutoff Voltage              | $V_{GS(off)}$ | $I_D=1\text{mA}$ , $V_{DS}=10\text{V}$                             | 1.0      | —    | 2.0      | V             |
| Static Drain-Source on State Resistance | $R_{DS(on)}$  | $I_D=1\text{A}$ , $V_{GS}=10\text{V}$ *                            | —        | 0.3  | 0.4      | $\Omega$      |
|                                         |               | $I_D=1\text{A}$ , $V_{GS}=4\text{V}$ *                             | —        | 0.4  | 0.55     |               |
| Forward Transfer Admittance             | $ y_{fs} $    | $I_D=1\text{A}$ , $V_{DS}=10\text{V}$ *                            | 0.9      | 1.5  | —        | S             |
| Input Capacitance                       | $C_{iss}$     | $V_{DS}=10\text{V}$ , $V_{GS}=0$ ,<br>$f=1\text{MHz}$              | —        | 140  | —        | pF            |
| Output Capacitance                      | $C_{oss}$     |                                                                    | —        | 70   | —        | pF            |
| Reverse Transfer Capacitance            | $C_{rss}$     |                                                                    | —        | 20   | —        | pF            |
| Turn-on Delay Time                      | $t_{d(on)}$   | $I_D=1\text{A}$ , $V_{GS}=10\text{V}$ ,<br>$R_L=30\Omega$          | —        | 3    | —        | ns            |
| Rise Time                               | $t_r$         |                                                                    | —        | 12   | —        | ns            |
| Turn-off Delay Time                     | $t_{d(off)}$  |                                                                    | —        | 50   | —        | ns            |
| Fall Time                               | $t_f$         |                                                                    | —        | 30   | —        | ns            |
| Body-Drain Diode Forward Voltage        | $V_{DF}$      | $I_F=2\text{A}$ , $V_{GS}=0$                                       | —        | 0.9  | —        | V             |
| Body-Drain Diode Reverse Recovery Time  | $t_{rr}$      | $I_F=2\text{A}$ , $V_{GS}=0$ ,<br>$dI_F/dt=50\text{A}/\mu\text{s}$ | —        | 50   | —        | ns            |

\* Pulse Test

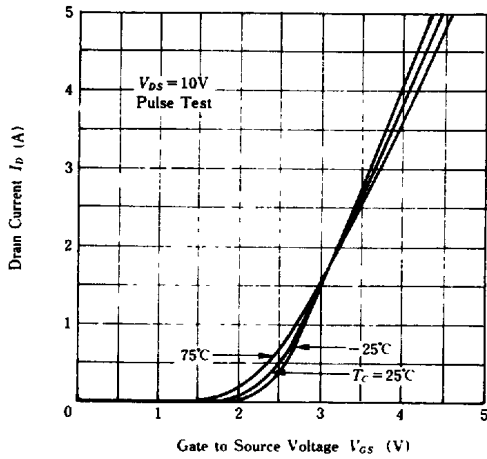
**MAXIMUM SAFE OPERATION AREA**



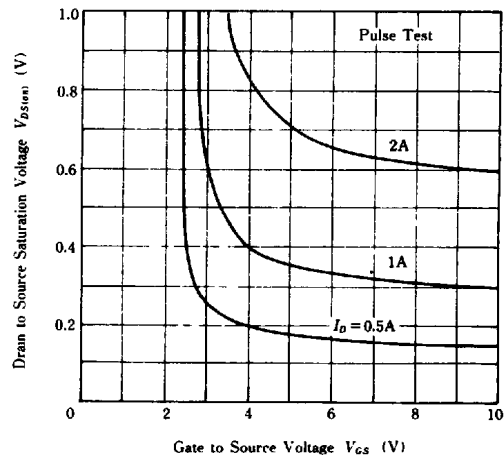
**TYPICAL OUTPUT CHARACTERISTICS**



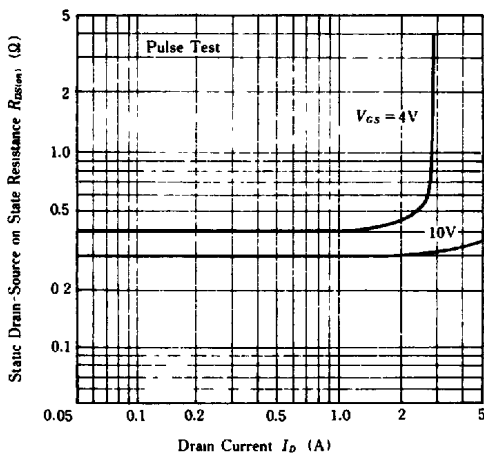
**TYPICAL TRANSFER CHARACTERISTICS**



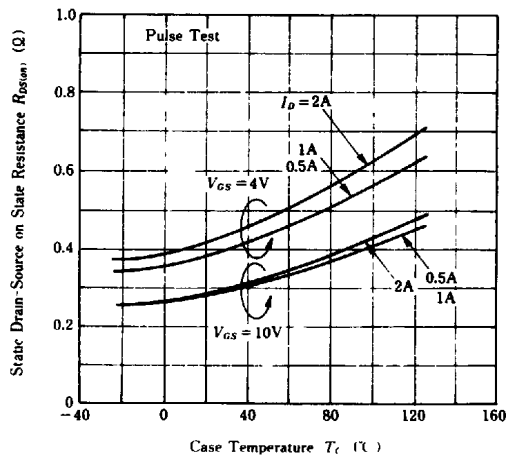
**DRAIN-SOURCE SATURATION VOLTAGE VS. GATE-SOURCE VOLTAGE**



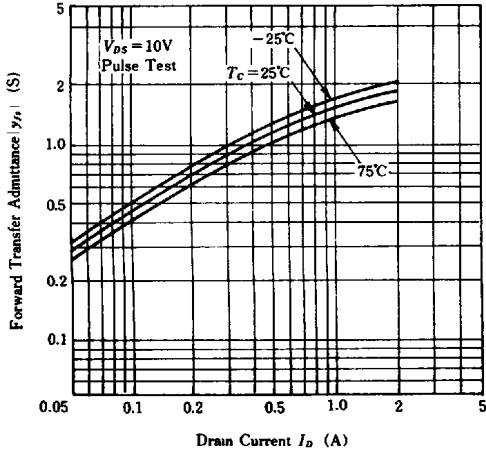
**STATIC DRAIN-SOURCE ON STATE RESISTANCE VS. DRAIN CURRENT**



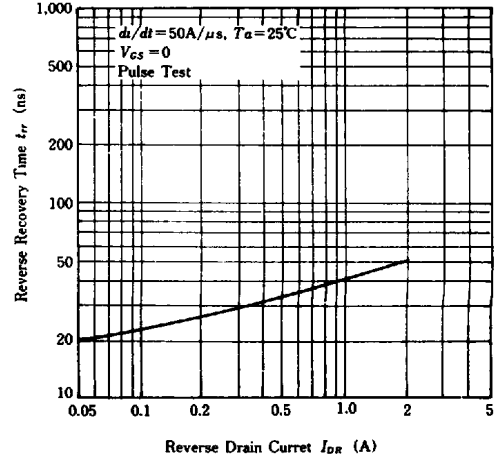
**STATIC DRAIN-SOURCE ON STATE RESISTANCE VS. TEMPERATURE**



**FORWARD TRANSFER ADMITTANCE  
VS. DRAIN CURRENT**

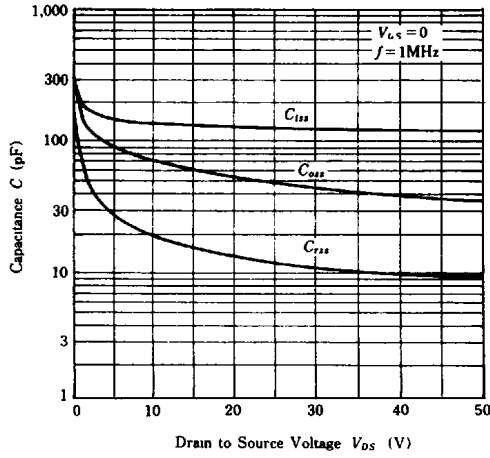


**FORWARD TRANSFER ADMITTANCE  
VS. FREQUENCY**

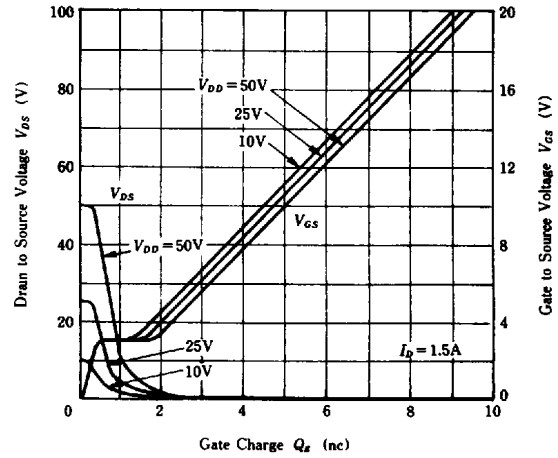


HITACHI/COPTOELECTRONICS.

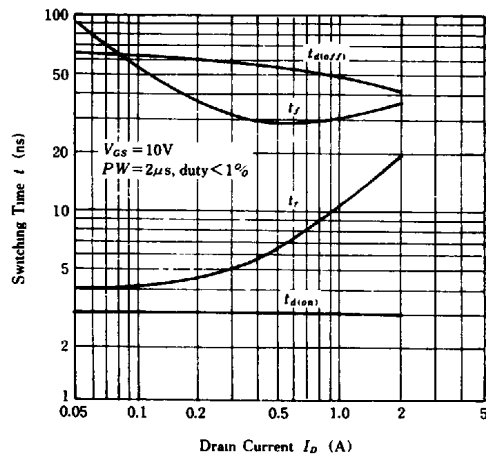
**TYPICAL CAPACITANCE  
VS. DRAIN-SOURCE VOLTAGE**



**DYNAMIC INPUT CHARACTERISTICS**



**SWITCHING CHARACTERISTICS**



**REVERSE DRAIN CURRENT VS.  
SOURCE TO DRAIN VOLTAGE**

