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Data Sheet

# 10V Drive Nch+Pch MOSFET

## SH8M70

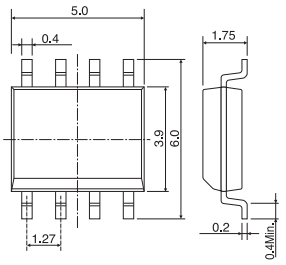
### ●Structure
Silicon N-channel / P-channel MOSFET

### ●Features
1) Low on-resistance.
2) Built-in G-S Protection Diode.
3) Small Surface Mount Package (SOP8).

### ●Application
Power switching, DC / DC converter.

### ●Dimensions (Unit : mm)

SOP8

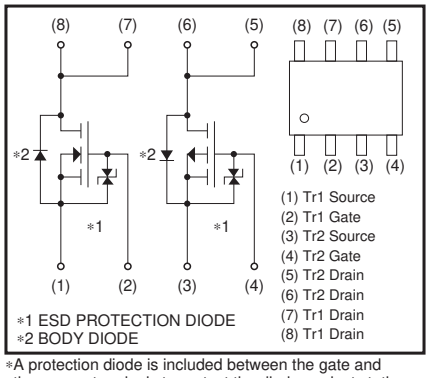



Each lead has same dimensions

### ●Packaging specifications

| | | |
|---|---|---|
| Type | Package | Taping |
| | Code | TB |
| | Basic ordering unit (pieces) | 2500 |
| SH8M70 | | ◯ |

### ●Inner circuit




*A protection diode is included between the gate and the source terminals to protect the diode against static electricity when the product is in use. Use the protection circuit when the fixed voltages are exceeded.

### ●Absolute maximum ratings (Ta=25°C)

| Parameter | | Symbol | Limits | | Unit |
|---|---|---|---|---|---|
| | | | N-ch | P-ch | |
| Drain-source voltage | | $V_{DSS}$ | 250 | −250 | V |
| Gate-source voltage | | $V_{GSS}$ | 30 | −20 | V |
| Drain current | Continuous | $I_D$ | ±3.0 | ±2.5 | A |
| | Pulsed | $I_{DP}$ *1 | ±12 | ±10 | A |
| Source current (Body diode) | Continuous | $I_S$ | 1.0 | −1.0 | A |
| | Pulsed | $I_{SP}$ *1 | 12 | −10 | A |
| Total power dissipation | | $P_D$ *2 | 2.0(TOTAL) | 1.4(ELEMENT) | W |
| Channel temperature | | Tch | 150 | | °C |
| Storage temperature | | Tstg | −55 to +150 | | °C |

*1 Pw≤10μs, Duty cycle≤1%
*2 MOUNTED ON A CERAMIC BOARD.

**N-ch**

●**Electrical characteristics** (Ta=25°C)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Gate-source leakage | $I_{GSS}$ | – | – | ±10 | μA | $V_{GS}$=±25V, $V_{DS}$=0V |
| Drain-source breakdown voltage | $V_{(BR)\ DSS}$ | 250 | – | – | V | $I_D$=1mA, $V_{GS}$=0V |
| Zero gate voltage drain current | $I_{DSS}$ | – | – | 25 | μA | $V_{DS}$=250V, $V_{GS}$=0V |
| Gate threshold voltage | $V_{GS\ (th)}$ | 2.0 | – | 4.0 | V | $V_{DS}$=10V, $I_D$=1mA |
| Static drain-source on-state resistance | $R_{DS\ (on)}$ * | – | 1.25 | 1.63 | Ω | $I_D$=1.5A, $V_{GS}$=10V |
| Forward transfer admittance | $\|Y_{fs}\|$ * | 0.75 | – | – | S | $I_D$=1.5A, $V_{DS}$=10V |
| Input capacitance | $C_{iss}$ | – | 180 | – | pF | $V_{DS}$=25V |
| Output capacitance | $C_{oss}$ | – | 70 | – | pF | $V_{GS}$=0V |
| Reverse transfer capacitance | $C_{rss}$ | – | 20 | – | pF | f=1MHz |
| Turn-on delay time | $t_{d\ (on)}$ * | – | 10 | – | ns | $I_D$=1.5A, $V_{DD}$≒125V |
| Rise time | $t_r$ * | – | 20 | – | ns | $V_{GS}$=10V |
| Turn-off delay time | $t_{d\ (off)}$ * | – | 20 | – | ns | $R_L$=83Ω |
| Fall time | $t_f$ * | – | 25 | – | ns | $R_G$=10Ω |
| Total gate charge | $Q_g$ * | – | 5.2 | – | nC | $V_{DD}$≒125V |
| Gate-source charge | $Q_{gs}$ * | – | 2.1 | – | nC | $V_{GS}$=10V $I_D$=3A |
| Gate-drain charge | $Q_{gd}$ * | – | 1.2 | – | nC | $R_L$=42Ω $R_G$=10Ω |

*Pulsed

●**Body diode characteristics** (Source-Drain) (Ta=25°C)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Forward voltage | $V_{SD}$ * | – | – | 1.5 | V | $I_S$=3A, $V_{GS}$=0V |

*Pulsed

**P-ch**

●**Electrical characteristics** (Ta=25°C)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Gate-source leakage | $I_{GSS}$ | – | – | ±10 | μA | $V_{GS}$=±15V, $V_{DS}$=0V |
| Drain-source breakdown voltage | $V_{(BR)\ DSS}$ | –250 | – | – | V | $I_D$= –1mA, $V_{GS}$=0V |
| Zero gate voltage drain current | $I_{DSS}$ | – | – | –25 | μA | $V_{DS}$= –250V, $V_{GS}$=0V |
| Gate threshold voltage | $V_{GS\ (th)}$ | –2.0 | – | –4.0 | V | $V_{DS}$= –10V, $I_D$= –1mA |
| Static drain-source on-state resistance | $R_{DS\ (on)}$ * | – | 2.2 | 2.8 | Ω | $I_D$= –1.25A, $V_{GS}$= –10V |
| Forward transfer admittance | $\|Y_{fs}\|$ * | 1.0 | – | – | S | $I_D$= –1.25A, $V_{DS}$= –10V |
| Input capacitance | $C_{iss}$ | – | 250 | – | pF | $V_{DS}$= –25V |
| Output capacitance | $C_{oss}$ | – | 40 | – | pF | $V_{GS}$=0V |
| Reverse transfer capacitance | $C_{rss}$ | – | 10 | – | pF | f=1MHz |
| Turn-on delay time | $t_{d\ (on)}$ * | – | 9 | – | ns | $I_D$= –1.25A, $V_{DD}$≒ –125V |
| Rise time | $t_r$ * | – | 15 | – | ns | $V_{GS}$= –10V |
| Turn-off delay time | $t_{d\ (off)}$ * | – | 30 | – | ns | $R_L$=100Ω |
| Fall time | $t_f$ * | – | 20 | – | ns | $R_G$ =10Ω |
| Total gate charge | $Q_g$ * | – | 8 | – | nC | $V_{DD}$≒ –125V, $I_D$= –2.5A |
| Gate-source charge | $Q_{gs}$ * | – | 2.5 | – | nC | $V_{GS}$= –10V |
| Gate-drain charge | $Q_{gd}$ * | – | 2.8 | – | nC | $R_L$=50Ω, $R_G$ =10Ω |

*Pulsed

●**Body diode characteristics** (Source-Drain) (Ta=25°C)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Forward voltage | $V_{SD}$ * | – | – | –1.5 | V | $I_S$=–2.5A, $V_{GS}$=0V |

*Pulsed

**N-ch**

**●Electrical characteristic curves**

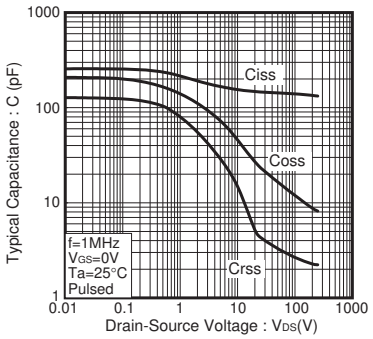



Fig.1 Typical Capacitance vs. Drain-Source Voltage

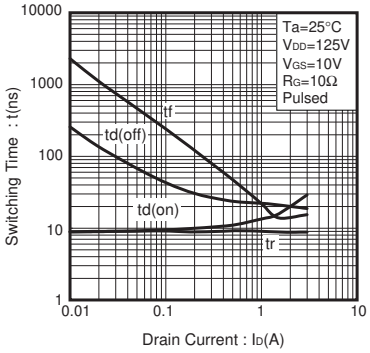



Fig.2 Switching Characteristics

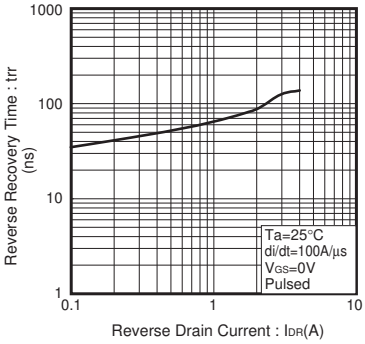



Fig.3 Reverse Recovery Time vs. Reverse Drain Current

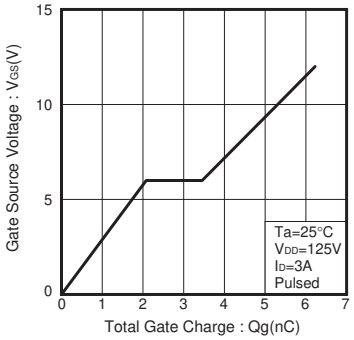



Fig.4 Dynamic Input Characteristics

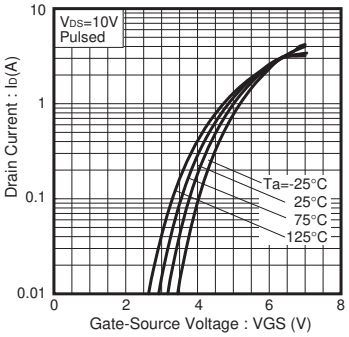



Fig.5 Typical Transfer Characteristics

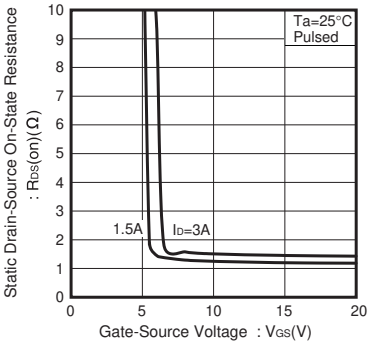



Fig.6 Static Drain-Source On-State Resistance vs.Gate-Source Voltage

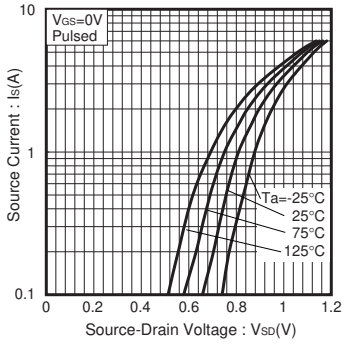



Fig.7 Source Current vs. Source-Drain Voltage

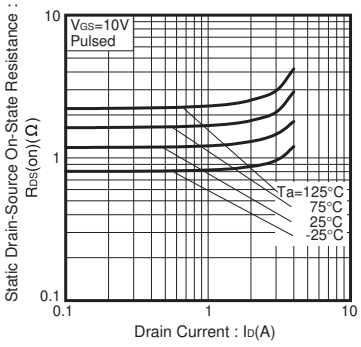



Fig.8 Static Drain-Source On-State Resistance vs. Drain Current

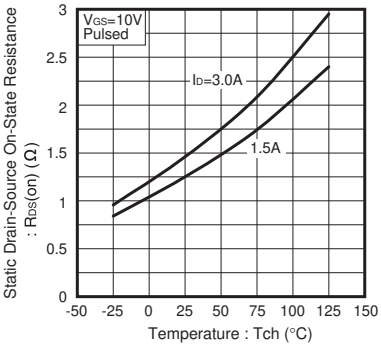



Fig.9 Static Drain-Source On-State Resistance vs. Channel Temperature

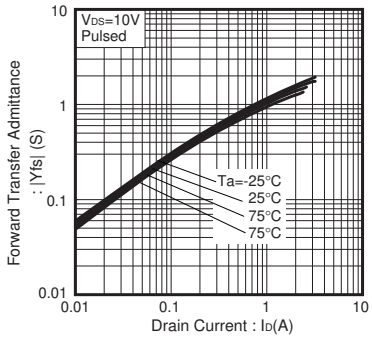



Fig.10 Forward Transfer Admittance vs. Drain Current

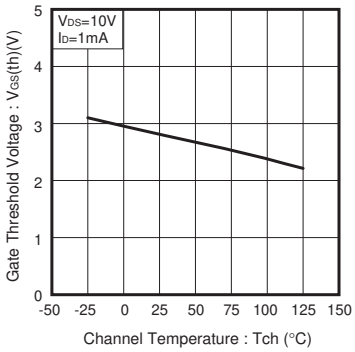



Fig.11 Gate Threshold Voltage vs. Channel Temperature

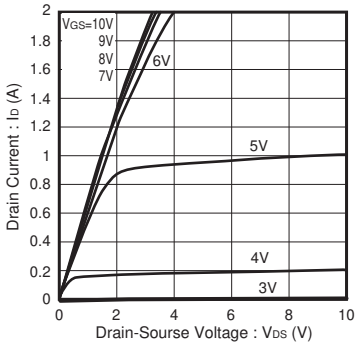



Fig.12 Typical Output Characteristics

## P-ch

### ●Electrical characteristic curves

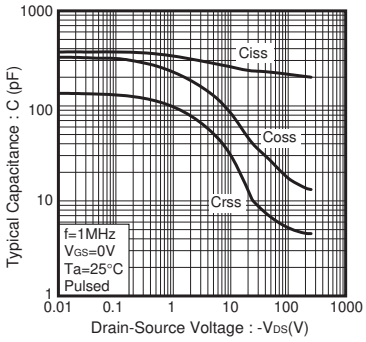



Fig.1 Typical Capacitance vs. Drain-Source Voltage

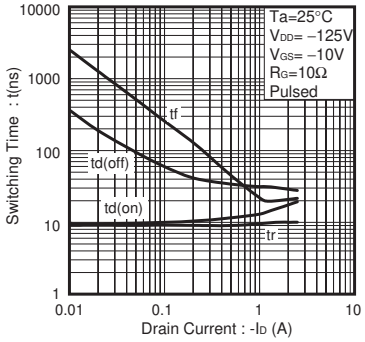



Fig.2 Switching Characteristics

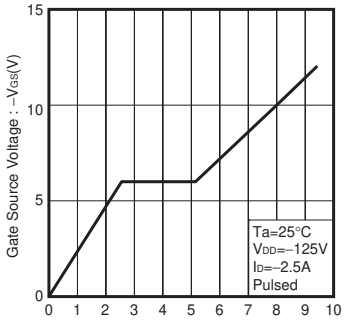



Fig.3 Dynamic Input Characteristics

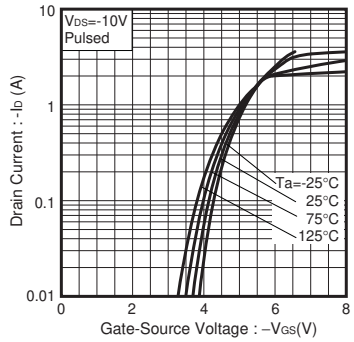



Fig.4 Typical Transfer Characteristics

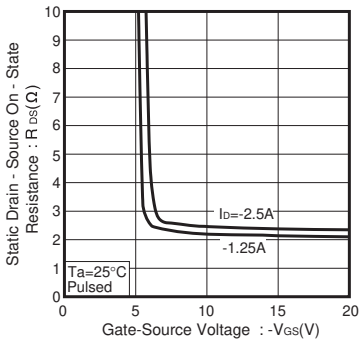



Fig.5 Static Drain-Source On-State Resistance vs. Gate-Source Voltage

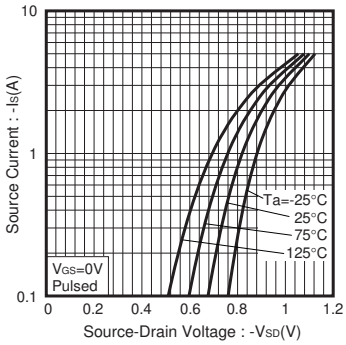



Fig.6 Source Current vs. Source-Drain Voltage

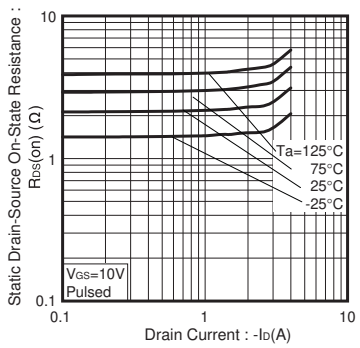



Fig.7 Static Drain-Source On-State Resistance vs. Drain Current

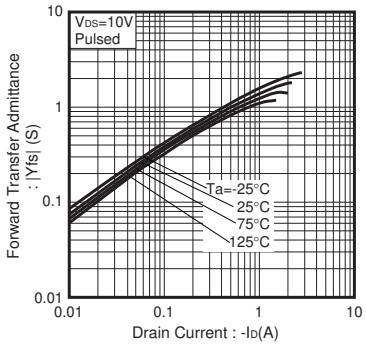



Fig.8 Forward Transfer Admittance vs. Drain Current

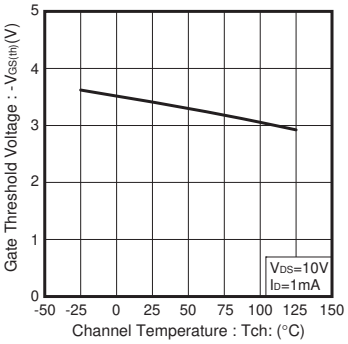



Fig.9 Gate Threshold Voltage vs. Channel Temperature

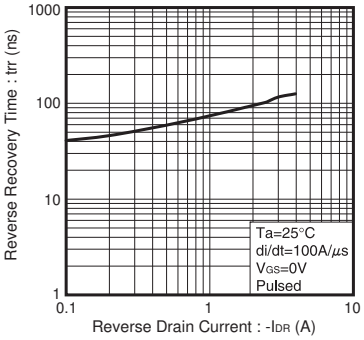



Fig.10 Reverse Recovery Time vs. Reverse Drain Current

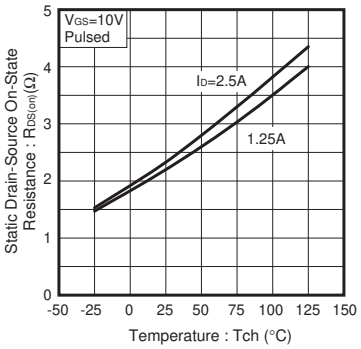



Fig.11 Static Drain-Source On-State Resistance vs.Channel Temperature

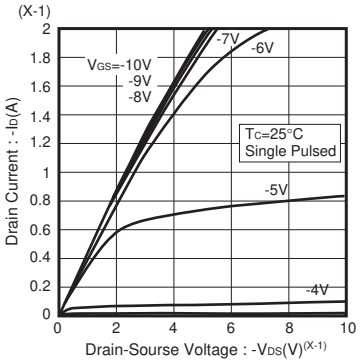



Fig.12 Typical Output Characteristics

## N-ch

### ●Measurement circuit

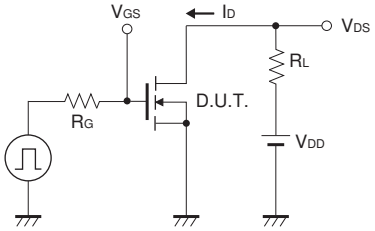



Fig.13 Switching Time Measurement Circuit

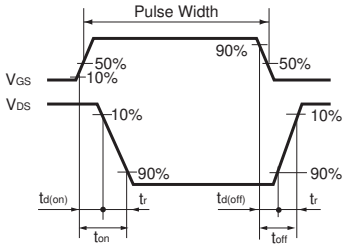



Fig.14 Switching Waveforms

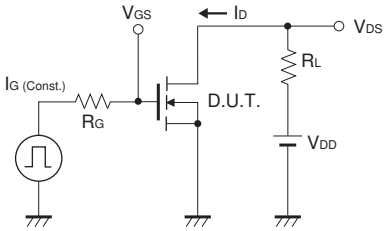



Fig.15 Gate Charge Measurement Circuit

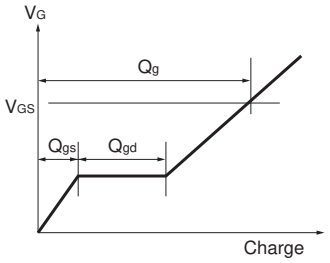



Fig.16 Gate Charge Waveform

## P-ch

### ● Measurement circuit

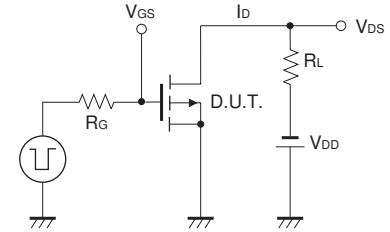



Fig.17 Switching Time Measurement Circuit

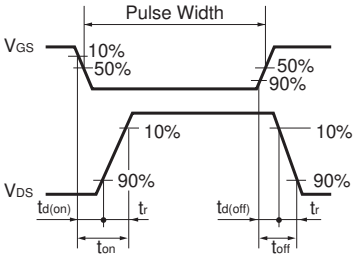



Fig.18 Switching Waveforms

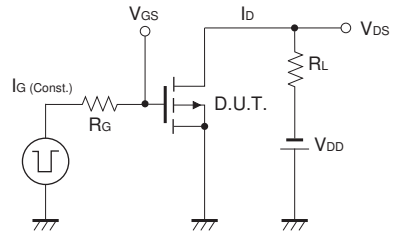



Fig.19 Gate Charge Measurement Circuit

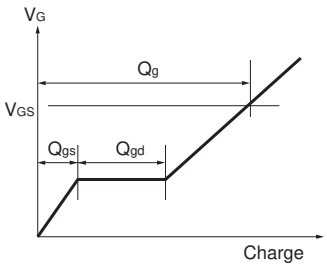



Fig.20 Gate Charge Waveform

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ROHM SEMICONDUCTOR

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