

# 4V Drive Nch+Pch MOSFET

## SH8M24

### ●Structure

Silicon N-channel / P-channel MOSFET

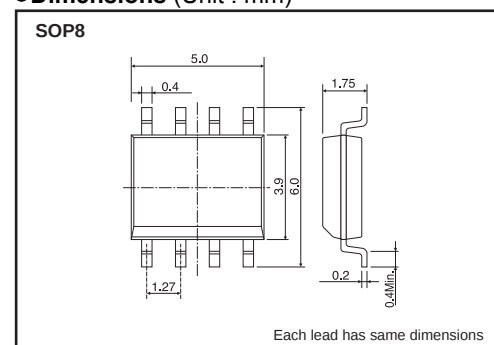
### ●Features

- 1) Low on-resistance.
- 2) Built-in G-S protection diode.
- 3) Small surface mount package (SOP8).

### ●Application

Switching

### ●Dimensions (Unit : mm)



### ●Packaging specifications

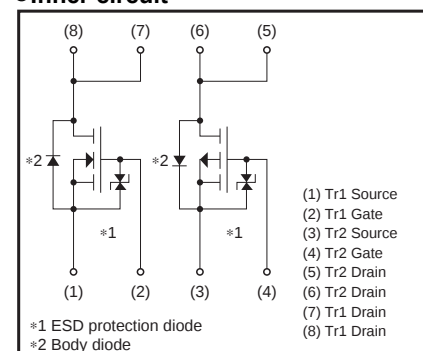
| Type   | Package                      | Taping |
|--------|------------------------------|--------|
|        | Code                         | TB     |
|        | Basic ordering unit (pieces) | 2500   |
| SH8M24 |                              | ○      |

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

| Parameter                   | Symbol     | Limits        |            | Unit        |
|-----------------------------|------------|---------------|------------|-------------|
|                             |            | Tr1 : N-ch    | Tr2 : P-ch |             |
| Drain-source voltage        | $V_{DS}$   | 45            | -45        | V           |
| Gate-source voltage         | $V_{GS}$   | ±20           | ±20        | V           |
| Drain current               | Continuous | $I_D$         | ±4.5       | A           |
|                             | Pulsed     | $I_{DP}^{*1}$ | ±18        | A           |
| Source current (Body diode) | Continuous | $I_S$         | 1.0        | A           |
|                             | Pulsed     | $I_{SP}^{*1}$ | 18         | A           |
| Total power dissipation     | $P_D^{*2}$ | 2.0           |            | W / TOTAL   |
|                             |            | 1.4           |            | W / ELEMENT |
| Channel temperature         | $T_{ch}$   | 150           |            | °C          |
| Storage temperature         | $T_{stg}$  | -55 to +150   |            | °C          |

<sup>\*1</sup>  $P_w \leq 10\mu s$ , Duty cycle  $\leq 1\%$ 
<sup>\*2</sup> Mounted on a ceramic board.

### ●Inner circuit



## N-ch

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

| Parameter                               | Symbol         | Min. | Typ. | Max. | Unit | Conditions                        |
|-----------------------------------------|----------------|------|------|------|------|-----------------------------------|
| Gate-source leakage                     | $I_{GSS}$      | —    | —    | ±10  | μA   | $V_{GS} = \pm 20V, V_{DS} = 0V$   |
| Drain-source breakdown voltage          | $V_{(BR) DSS}$ | 45   | —    | —    | V    | $I_D = 1mA, V_{GS} = 0V$          |
| Zero gate voltage drain current         | $I_{DSS}$      | —    | —    | 1    | μA   | $V_{DS} = 45V, V_{GS} = 0V$       |
| Gate threshold voltage                  | $V_{GS(th)}$   | 1.0  | —    | 2.5  | V    | $V_{DS} = 10V, I_D = 1mA$         |
| Static drain-source on-state resistance | $R_{DS(on)}^*$ | —    | 33   | 46   | mΩ   | $I_D = 4.5A, V_{GS} = 10V$        |
|                                         |                | —    | 41   | 57   | mΩ   | $I_D = 4.5A, V_{GS} = 4.5V$       |
|                                         |                | —    | 46   | 64   | mΩ   | $I_D = 4.5A, V_{GS} = 4V$         |
| Forward transfer admittance             | $ Y_{fs} ^*$   | 3.5  | —    | —    | S    | $V_{DS} = 10V, I_D = 4.5A$        |
| Input capacitance                       | $C_{iss}$      | —    | 550  | —    | pF   | $V_{DS} = 10V$                    |
| Output capacitance                      | $C_{oss}$      | —    | 140  | —    | pF   | $V_{GS} = 0V$                     |
| Reverse transfer capacitance            | $C_{rss}$      | —    | 70   | —    | pF   | $f = 1MHz$                        |
| Turn-on delay time                      | $t_{d(on)}^*$  | —    | 12   | —    | ns   | $V_{DD} \approx 25V$              |
| Rise time                               | $t_r^*$        | —    | 18   | —    | ns   | $I_D = 2.5A$                      |
| Turn-off delay time                     | $t_{d(off)}^*$ | —    | 42   | —    | ns   | $V_{GS} = 10V$                    |
| Fall time                               | $t_f^*$        | —    | 12   | —    | ns   | $R_L = 10\Omega$                  |
| Total gate charge                       | $Q_g^*$        | —    | 6.8  | 9.6  | nC   | $V_{DD} \approx 25V, V_{GS} = 5V$ |
| Gate-source charge                      | $Q_{gs}^*$     | —    | 2.0  | —    | nC   | $I_D = 4.5A$                      |
| Gate-drain charge                       | $Q_{gd}^*$     | —    | 2.9  | —    | nC   | $R_L = 5.6\Omega, R_G = 10\Omega$ |

\* Pulsed

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

| Parameter       | Symbol     | Min. | Typ. | Max. | Unit | Conditions                |
|-----------------|------------|------|------|------|------|---------------------------|
| Forward voltage | $V_{SD}^*$ | —    | —    | 1.2  | V    | $I_S = 4.5A, V_{GS} = 0V$ |

\* Pulsed

## P-ch

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

| Parameter                               | Symbol         | Min. | Typ. | Max.     | Unit       | Conditions                        |
|-----------------------------------------|----------------|------|------|----------|------------|-----------------------------------|
| Gate-source leakage                     | $I_{GSS}$      | —    | —    | $\pm 10$ | $\mu A$    | $V_{GS} = \pm 20V, V_{DS} = 0V$   |
| Drain-source breakdown voltage          | $V_{(BR)DSS}$  | -45  | —    | —        | V          | $I_D = -1mA, V_{GS} = 0V$         |
| Zero gate voltage drain current         | $I_{DSS}$      | —    | —    | -1       | $\mu A$    | $V_{DS} = -45V, V_{GS} = 0V$      |
| Gate threshold voltage                  | $V_{GS(th)}$   | -1.0 | —    | -2.5     | V          | $V_{DS} = -10V, I_D = -1mA$       |
| Static drain-source on-state resistance | $R_{DS(on)}^*$ | —    | 45   | 63       | m $\Omega$ | $I_D = -3.5A, V_{GS} = -10V$      |
|                                         |                | —    | 60   | 84       | m $\Omega$ | $I_D = -3.5A, V_{GS} = -4.5V$     |
|                                         |                | —    | 66   | 92       | m $\Omega$ | $I_D = -3.5A, V_{GS} = -4V$       |
| Forward transfer admittance             | $ Y_{fs} ^*$   | 4.5  | —    | —        | S          | $V_{DS} = -10V, I_D = -3.5A$      |
| Input capacitance                       | $C_{iss}$      | —    | 1700 | —        | pF         | $V_{DS} = -10V$                   |
| Output capacitance                      | $C_{oss}$      | —    | 200  | —        | pF         | $V_{GS} = 0V$                     |
| Reverse transfer capacitance            | $C_{rss}$      | —    | 135  | —        | pF         | $f = 1MHz$                        |
| Turn-on delay time                      | $t_{d(on)}^*$  | —    | 16   | —        | ns         | $V_{DD} = -25V$                   |
| Rise time                               | $t_r^*$        | —    | 17   | —        | ns         | $I_D = -2.0A$                     |
| Turn-off delay time                     | $t_{d(off)}^*$ | —    | 70   | —        | ns         | $V_{GS} = -10V$                   |
| Fall time                               | $t_f^*$        | —    | 14   | —        | ns         | $R_L = 12.5\Omega$                |
| Total gate charge                       | $Q_g^*$        | —    | 13.0 | 18.2     | nC         | $V_{DD} = -25V, V_{GS} = -5V$     |
| Gate-source charge                      | $Q_{gs}^*$     | —    | 3.6  | —        | nC         | $I_D = -3.5A$                     |
| Gate-drain charge                       | $Q_{gd}^*$     | —    | 4.7  | —        | nC         | $R_L = 7.1\Omega, R_G = 10\Omega$ |

\* Pulsed

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

| Parameter       | Symbol     | Min. | Typ. | Max. | Unit | Conditions                 |
|-----------------|------------|------|------|------|------|----------------------------|
| Forward voltage | $V_{SD}^*$ | —    | —    | -1.2 | V    | $I_S = -3.5A, V_{GS} = 0V$ |

\* Pulsed

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