

Transistors

# 4V Drive Nch+Pch MOS FET

## SP8M24

●Structure

Silicon N-channel MOS FET /  
Silicon P-channel MOS FET

●Features

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

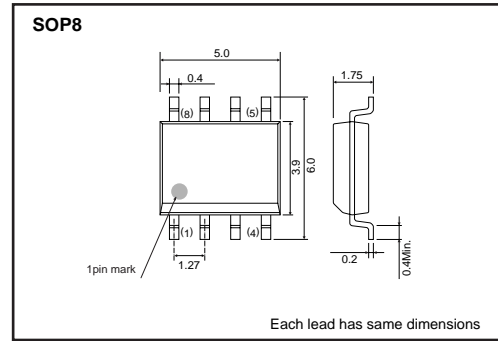
●Applications

Switching

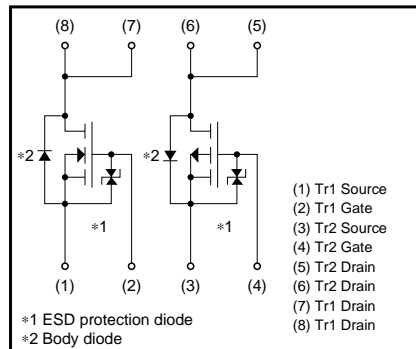
●Packaging specifications

| Type   | Package                      | Taping |
|--------|------------------------------|--------|
|        | Code                         | TB     |
|        | Basic ordering unit (pieces) | 2500   |
| SP8M24 |                              | ○      |

●External dimensions (Unit : mm)



●Inner circuit



●Absolute maximum ratings (Ta=25°C)

| Parameter                   | Symbol            | Limits             |            | Unit        |   |
|-----------------------------|-------------------|--------------------|------------|-------------|---|
|                             |                   | Tr1 : N-ch         | Tr2 : P-ch |             |   |
| Drain-source voltage        | V <sub>DSS</sub>  | 45                 | -45        | V           |   |
| Gate-source voltage         | V <sub>GSS</sub>  | 20                 | -20        | V           |   |
| Drain current               | Continuous        | I <sub>D</sub>     | ±4.5       | ±3.5        | A |
|                             | Pulsed            | I <sub>DP</sub> *1 | ±18        | ±14         | A |
| Source current (Body diode) | Continuous        | I <sub>S</sub>     | 1.0        | -1.0        | A |
|                             | Pulsed            | I <sub>SP</sub> *1 | 18         | -14         | A |
| Total power dissipation     | P <sub>D</sub> *2 | 2.0                |            | W / TOTAL   |   |
|                             |                   | 1.4                |            | W / ELEMENT |   |
| Channel temperature         | T <sub>ch</sub>   | 150                |            | °C          |   |
| Storage temperature         | T <sub>stg</sub>  | -55 to +150        |            | °C          |   |

\*1 Pw≤10μs, Duty cycle≤1%  
\*2 Mounted on a ceramic board.

## Transistors

## N-ch

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

| Parameter                               | Symbol                | Min. | Typ. | Max. | Unit | Conditions                                    |
|---|-----------------------|------|------|------|------|---|
| Gate-source leakage                     | I <sub>GSS</sub>      | –    | –    | 10   | μA   | V <sub>GS</sub> = 20V, V <sub>DS</sub> =0V    |
| Drain-source breakdown voltage          | V <sub>(BR) DSS</sub> | 45   | –    | –    | V    | I <sub>D</sub> = 1mA, V <sub>GS</sub> =0V     |
| Zero gate voltage drain current         | I <sub>DSS</sub>      | –    | –    | 1    | μA   | V <sub>DS</sub> = 45V, V <sub>GS</sub> =0V    |
| Gate threshold voltage                  | V <sub>GS(th)</sub>   | 1.0  | –    | 2.5  | V    | V <sub>DS</sub> = 10V, I <sub>D</sub> = 1mA   |
| Static drain-source on-state resistance | R <sub>DS(on)</sub> * | –    | 33   | 46   | mΩ   | I <sub>D</sub> = 4.5A, V <sub>GS</sub> = 10V  |
|   |                       | –    | 41   | 57   | mΩ   | I <sub>D</sub> = 4.5A, V <sub>GS</sub> = 4.5V |
|   |                       | –    | 46   | 64   | mΩ   | I <sub>D</sub> = 4.5A, V <sub>GS</sub> = 4V   |
| Forward transfer admittance             | Y <sub>fs</sub>  *    | 3.5  | –    | –    | S    | V <sub>DS</sub> = 10V, I <sub>D</sub> = 4.5A  |
| Input capacitance                       | C <sub>iss</sub>      | –    | 550  | –    | pF   | V <sub>DS</sub> = 10V                         |
| Output capacitance                      | C <sub>oss</sub>      | –    | 140  | –    | pF   | V <sub>GS</sub> = 0V                          |
| Reverse transfer capacitance            | C <sub>rss</sub>      | –    | 70   | –    | pF   | f=1MHz  |
| Turn-on delay time                      | t <sub>d(on)</sub> *  | –    | 12   | –    | ns   | V <sub>DD</sub> ≐ 25V                         |
| Rise time                               | t <sub>r</sub> *      | –    | 18   | –    | ns   | I <sub>D</sub> = 2.5A                         |
| Turn-off delay time                     | t <sub>d(off)</sub> * | –    | 42   | –    | ns   | V <sub>GS</sub> = 10V                         |
| Fall time                               | t <sub>f</sub> *      | –    | 12   | –    | ns   | R <sub>L</sub> = 10Ω                          |
| Total gate charge                       | Q <sub>g</sub> *      | –    | 6.8  | 9.6  | nC   | V <sub>DD</sub> ≐ 25V, V <sub>GS</sub> = 5V   |
| Gate-source charge                      | Q <sub>gs</sub> *     | –    | 2.0  | –    | nC   | I <sub>D</sub> = 4.5A                         |
| Gate-drain charge                       | Q <sub>gd</sub> *     | –    | 2.9  | –    | nC   | R <sub>L</sub> = 5.6Ω, R <sub>G</sub> = 10Ω   |

\*Pulsed

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

| Parameter       | Symbol            | Min. | Typ. | Max. | Unit | Conditions                                 |
|-----------------|-------------------|------|------|------|------|--|
| Forward voltage | V <sub>SD</sub> * | –    | –    | 1.2  | V    | I <sub>S</sub> = 4.5A, V <sub>GS</sub> =0V |

\* Pulsed

## Transistors

## P-ch

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

| Parameter                               | Symbol         | Min. | Typ. | Max. | Unit       | Conditions                        |
|---|----------------|------|------|------|------------|-----------------------------------|
| Gate-source leakage                     | $I_{GSS}$      | –    | –    | –10  | $\mu A$    | $V_{GS} = -20V, V_{DS} = 0V$      |
| 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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