

# MIP708

## Silicon MOS IC

### ■ Features

- 3-pin intelligent power device
- Five protective functions (over-current, over-voltage, short circuit load, over heat, ESD) built-in
- Acceptable both AC and DC power supply

### ■ Applications

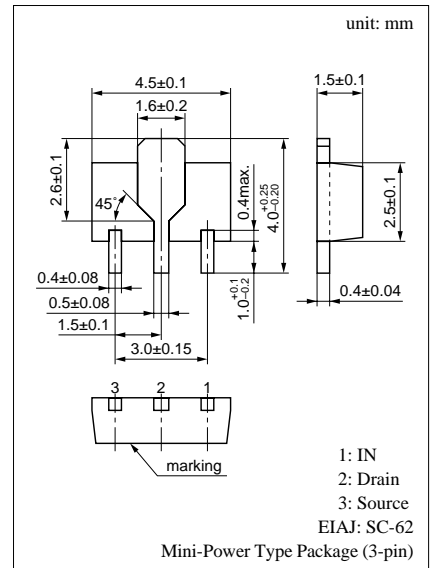
- For lamp and solenoid drive

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

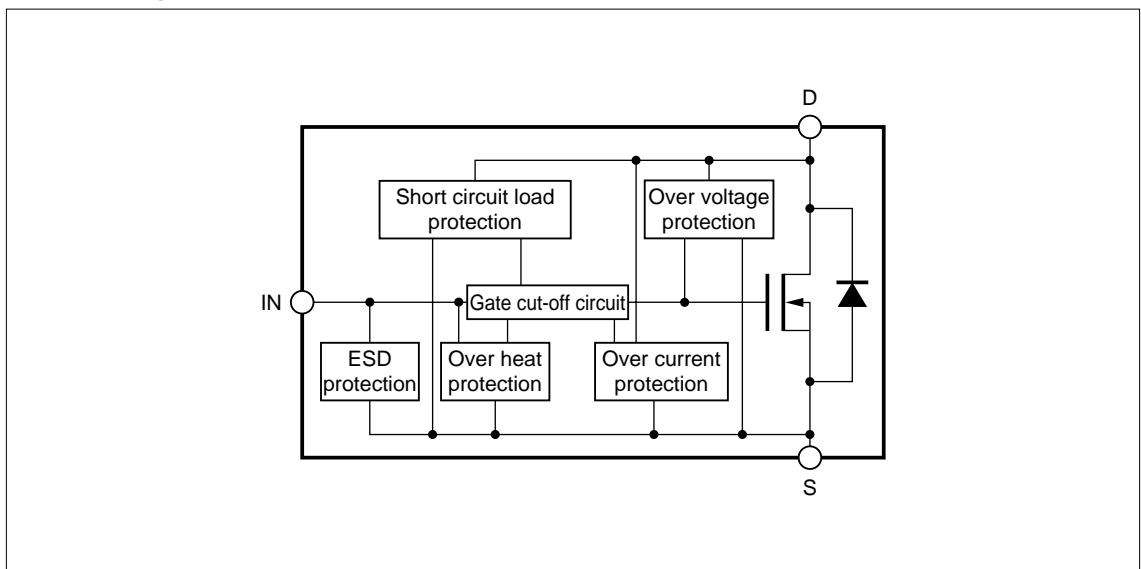
| Parameter                     | Symbol           | Ratings          | Unit              |
|-------------------------------|------------------|------------------|-------------------|
| Output voltage                | $V_{DS}$         | 40               | V                 |
| Output peak current           | $I_{OP}$         | $\pm 3$          | A                 |
| Output current                | $I_O$            | $\pm 1$          | A                 |
| Input voltage                 | $V_{IN}$         | -0.5 to 6        | V                 |
| Input current                 | $I_{IN}$         | $\pm 5$          | mA                |
| Drain clamp energy            | $E_{CLP}$        | 24 <sup>*1</sup> | mJ                |
| Allowable power dissipation   | Ta = 25°C        | $P_{D1}$         | 1 <sup>*2</sup> W |
|                               | Tc = 25°C        | $P_{D2}$         | 2 W               |
| Operating ambient temperature | T <sub>opr</sub> | -40 to +125      | °C                |
| Channel temperature           | T <sub>ch</sub>  | 150              | °C                |
| Storage temperature           | T <sub>stg</sub> | -55 to +150      | °C                |

<sup>\*1</sup> L = 10mH, I<sub>L</sub> = 2.19A, V<sub>DD</sub> = 20V, 1pulse, T<sub>C</sub> = 25°C

<sup>\*2</sup> Mounting on the PCB (the copper foil of the drain portion has a area of 100mm<sup>2</sup> or more and the thickness of glass epoxy board is 1.7mm.)



### ■ Block Diagram



■ Electrical Characteristics ( $T_C = 25 \pm 3^\circ\text{C}$ )

| Parameter                           | Symbol         | Conditions                               | min | typ  | max | Unit          |
|-------------------------------------|----------------|--|-----|------|-----|---------------|
| Drain to Source ON-resistance       | $R_{DS(on)}$   | $V_{IN} = 5\text{V}, I_{DS} = 1\text{A}$ |     | 0.5  | 0.8 | $\Omega$      |
| Drain to Source ON-voltage          | $V_{DS(on)}$   | $V_{IN} = 5\text{V}, I_{DS} = 1\text{A}$ |     | 0.5  | 0.8 | V             |
| Drain clamp voltage                 | $V_{DS(CLIP)}$ | $V_{IN} = 0, I_{DS} = 3\text{mA}$        | 40  | 49   |     | V             |
| Drain OFF current (1)               | $I_{DS(off)1}$ | $V_{IN} = 0, V_{DS} = 12\text{V}$        |     | 50   | 100 | $\mu\text{A}$ |
| Drain OFF current (2)               | $I_{DS(off)2}$ | $V_{IN} = 0, V_{DS} = 16\text{V}$        |     | 70   | 140 | mA            |
| Input voltage (High)                | $V_{IN(H)}$    | $I_{DS} = 1\text{A}$                     | 4   |      |     | V             |
| Input voltage (Low)                 | $V_{IN(L)}$    | $I_{DS} = 1\text{mA}$                    |     |      | 0.8 | V             |
| Input current                       | $I_{IN(on)}$   | $V_{IN} = 5\text{V}, V_{DS} = 0$         |     | 0.15 | 1   | mA            |
| Over current protection limit       | $I_{OCP}$      | $V_{IN} = 5\text{V}$                     | 2   | 3    |     | A             |
| Short circuit load protection limit | $V_{DS(SHT)}$  | $V_{IN} = 5\text{V}$                     | 2   | 4    |     | V             |

Note: The oscillation of the output current is caused when the drain voltage exceeds the short circuit load detection voltage under the ON state of output.

■ Electrical Characteristics ( $T_C = 25 \pm 2^\circ\text{C}$ )

| Parameter                        | Symbol       | Conditions                               | min | typ | max | Unit             |
|----------------------------------|--------------|--|-----|-----|-----|------------------|
| Over heat protection temperature | $T_{SHD}$    | $V_{IN} = 5\text{V}$                     | 160 | 190 |     | $^\circ\text{C}$ |
| Turn on delay time               | $t_{d(on)}$  | $V_{IN} = 5\text{V}, I_{DS} = 1\text{A}$ |     | 1   |     | $\mu\text{s}$    |
| Turn-on time                     | $t_{on}$     |  |     | 5.5 |     | $\mu\text{s}$    |
| Turn off delay time              | $t_{d(off)}$ | $V_{DD} = 12\text{V}, R_L = 12\Omega$    |     | 3.4 |     | $\mu\text{s}$    |
| Turn-off time                    | $t_{off}$    |  |     | 7.2 |     | $\mu\text{s}$    |

Note 1: The above values of characteristics are not guaranteed values and are only references for designing.

Note 2: If the chip temperature exceeds the "Over Heat Protection Temperature", output current is shut down.

■ Timing Chart

