

# MSKSEMI

SEMICONDUCTOR



ESD



TVS



TSS



MOV



GDT



PLED

Product data sheet

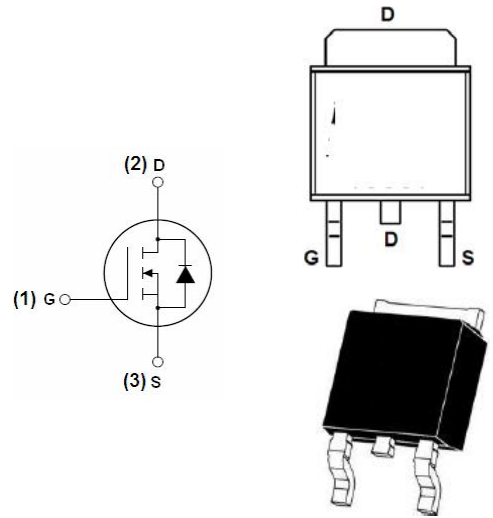
**FEATURE**

- High density cell design for ultra low  $R_{dson}$
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high  $E_{AS}$
- Excellent package for good heat dissipation
- Special process technology for high ESD capability

**APPLICATION**

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

**Schematic diagram**



TO-252

**Maximum ratings ( $T_a=25^{\circ}\text{C}$  unless otherwise noted)**

| Parameter                                   | Symbol          | Value      | Unit                        |
|---|-----------------|------------|-----------------------------|
| Drain-Source Voltage                        | $V_{DS}$        | 60         | V                           |
| Gate-Source Voltage                         | $V_{GS}$        | $\pm 20$   |                             |
| Continuous Drain Current                    | $I_D$           | 50         | A                           |
| Pulsed Drain Current                        | $I_{DM}$        | 220        |                             |
| Single Pulsed Avalanche Energy*             | $E_{AS}$        | 115        | mJ                          |
| Power Dissipation                           | $P_D$           | 1.25       | W                           |
| Thermal Resistance from Junction to Ambient | $R_{\theta JA}$ | 100        | $^{\circ}\text{C}/\text{W}$ |
| Junction Temperature                        | $T_J$           | 150        | $^{\circ}\text{C}$          |
| Storage Temperature                         | $T_{stg}$       | -50 ~ +150 |                             |

\* $E_{AS}$  condition:  $T_J=25^{\circ}\text{C}$ ,  $V_{DD}=50\text{V}$ ,  $L=0.5\text{mH}$ ,  $R_G=25\Omega$ , Starting  $T_J = 25^{\circ}\text{C}$

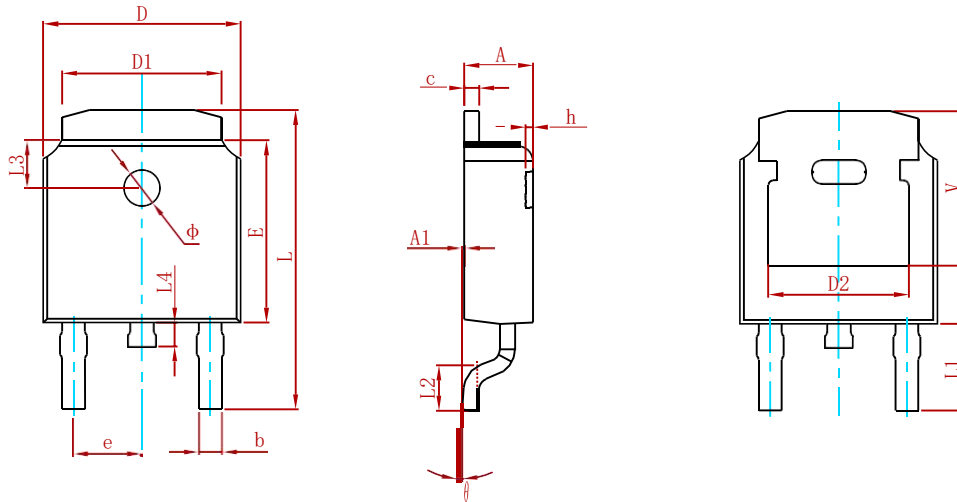
**Electrical characteristics (T<sub>a</sub>=25°C unless otherwise noted)**

| Parameter                                     | Symbol               | Test Condition   | Min | Typ  | Max  | Unit |
|---|----------------------|--|-----|------|------|------|
| <b>Off characteristics</b>                    |                      |  |     |      |      |      |
| Drain-source breakdown voltage                | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA   | 60  |      |      | V    |
| Zero gate voltage drain current               | I <sub>DSS</sub>     | V <sub>DS</sub> = 60V, V <sub>GS</sub> = 0V  |     |      | 1    | μA   |
| Gate-body leakage current                     | I <sub>GSS</sub>     | V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±20V   |     |      | ±100 | nA   |
| <b>On characteristics (note1)</b>             |                      |  |     |      |      |      |
| Gate-threshold voltage                        | V <sub>GS(th)</sub>  | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA   | 1.5 |      | 2.5  | V    |
| Static drain-source on-resistance             | R <sub>DS(on)</sub>  | V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A  |     | 11.5 | 15   | mΩ   |
| Forward transconductance                      | g <sub>FS</sub>      | V <sub>DS</sub> = 25V, I <sub>D</sub> = 20A  | 24  |      |      | S    |
| <b>Dynamic characteristics (note 2)</b>       |                      |  |     |      |      |      |
| Input capacitance                             | C <sub>iss</sub>     | V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V,<br>f = 1MHz   |     | 900  |      | pF   |
| Output capacitance                            | C <sub>oss</sub>     |  |     | 104  |      |      |
| Reverse transfer capacitance                  | C <sub>rss</sub>     |  |     | 33   |      |      |
| <b>Switching characteristics (note 2)</b>     |                      |  |     |      |      |      |
| Total gate charge                             | Q <sub>g</sub>       | V <sub>DS</sub> = 30V, V <sub>GS</sub> = 10V,<br>I <sub>D</sub> = 50A  |     | 30   |      | nC   |
| Gate-source charge                            | Q <sub>gs</sub>      |  |     | 10   |      |      |
| Gate-drain charge                             | Q <sub>gd</sub>      |  |     | 5    |      |      |
| Turn-on delay time                            | t <sub>d(on)</sub>   | V <sub>DD</sub> = 30V, I <sub>D</sub> = 2A,<br>V <sub>GS</sub> = 10V, R <sub>G</sub> = 2.5Ω,<br>R <sub>L</sub> = 15Ω |     | 25   |      | ns   |
| Turn-on rise time                             | t <sub>r</sub>       |  |     | 5    |      |      |
| Turn-off delay time                           | t <sub>d(off)</sub>  |  |     | 50   |      |      |
| Turn-off fall time                            | t <sub>f</sub>       |  |     | 6    |      |      |
| <b>Drain-Source Diode Characteristics</b>     |                      |  |     |      |      |      |
| Drain-source diode forward voltage(note1)     | V <sub>SD</sub>      | V <sub>GS</sub> = 0V, I <sub>S</sub> = 40A   |     |      | 1.2  | V    |
| Continuous drain-source diode forward current | I <sub>S</sub>       |  |     |      | 50   | A    |
| Pulsed drain-source diode forward current     | I <sub>SM</sub>      |  |     |      | 220  | A    |

**Notes:**

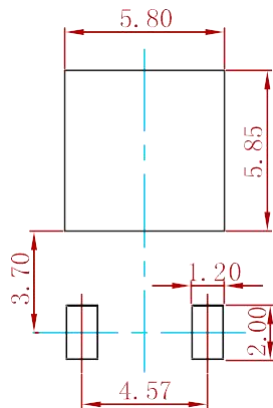
- Pulse Test : Pulse Width ≤ 300μs, duty cycle ≤ 2%.
- Guaranteed by design, not subject to production.

**PACKAGE MECHANICAL DATA**



| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min.                      | Max.   | Min.                 | Max.  |
| A      | 2.200                     | 2.400  | 0.087                | 0.094 |
| A1     | 0.000                     | 0.127  | 0.000                | 0.005 |
| b      | 0.635                     | 0.770  | 0.025                | 0.030 |
| c      | 0.460                     | 0.580  | 0.018                | 0.023 |
| D      | 6.500                     | 6.700  | 0.256                | 0.264 |
| D1     | 5.100                     | 5.460  | 0.201                | 0.215 |
| D2     | 4.830 REF.                |        | 0.190 REF.           |       |
| E      | 6.000                     | 6.200  | 0.236                | 0.244 |
| e      | 2.186                     | 2.386  | 0.086                | 0.094 |
| L      | 9.712                     | 10.312 | 0.382                | 0.406 |
| L1     | 2.900 REF.                |        | 0.114 REF.           |       |
| L2     | 1.400                     | 1.700  | 0.055                | 0.067 |
| L3     | 1.600 REF.                |        | 0.063 REF.           |       |
| L4     | 0.600                     | 1.000  | 0.024                | 0.039 |
| Φ      | 1.100                     | 1.300  | 0.043                | 0.051 |
| θ      | 0°                        | 8°     | 0°                   | 8°    |
| h      | 0.000                     | 0.300  | 0.000                | 0.012 |
| V      | 5.250 REF.                |        | 0.207 REF.           |       |

**Suggested Pad Layout**



Note:  
 1. Controlling dimension: in millimeters.  
 2. General tolerance: ± 0.05mm.  
 3. The pad layout is for reference purposes only.

**REEL SPECIFICATION**

| P/N     | PKG    | QTY  |
|---------|--------|------|
| MS50N06 | TO-252 | 2500 |

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