



## Description

The HDMG1013T7 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

## General Features

$V_{DS} = -20V$   $I_D = -0.66A$

$R_{DS(ON)} < 560\ m\Omega @ V_{GS} = -4.5V$

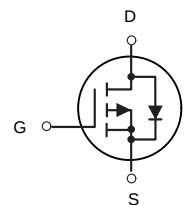
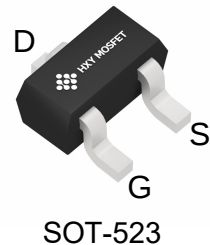
$R_{DS(ON)} < 780\ m\Omega @ V_{GS} = -2.5V$

## Application

Battery protection

Load switch

Uninterruptible power supply



P-Channel MOSFET

## Package Marking and Ordering Information

| Product ID | Pack    | Marking | Qty(PCS) |
|------------|---------|---------|----------|
| HDMG1013T7 | SOT-523 | 39K     | 3000     |

## Absolute Maximum Ratings ( $T_A = 25^\circ C$ unless otherwise noted)

| Symbol          | Parameter                                        | Limit      | Unit         |
|-----------------|--------------------------------------------------|------------|--------------|
| $V_{DS}$        | Drain-Source Voltage                             | -20        | V            |
| $V_{GS}$        | Gate-Source Voltage                              | $\pm 12$   | V            |
| $I_D$           | Drain Current-Continuous                         | -0.66      | A            |
| $P_D$           | Maximum Power Dissipation                        | 150        | mW           |
| $T_J, T_{STG}$  | Operating Junction and Storage Temperature Range | -55 To 150 | $^\circ C$   |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient (Note 2) | 833        | $^\circ C/W$ |



## Electrical Characteristics ( $T_J=25^{\circ}\text{C}$ , unless otherwise noted)

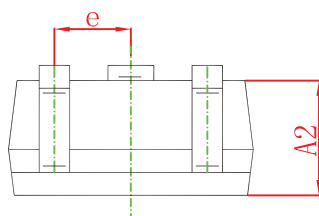
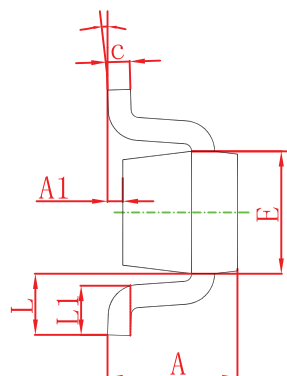
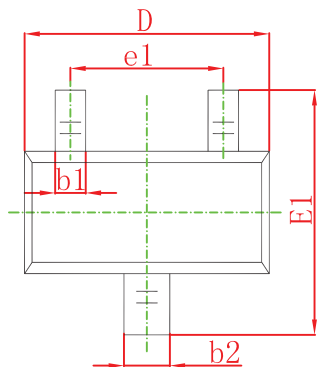
| Parameter                                                | Symbol               | Test conditions                                                                               | Min  | Typ  | Max  | Unit |
|----------------------------------------------------------|----------------------|-----------------------------------------------------------------------------------------------|------|------|------|------|
| STATIC CHARACTERISTICCE                                  |                      |                                                                                               |      |      |      |      |
| Drain-source breakdown voltage                           | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0V, I <sub>D</sub> =-250μA                                                  | -20  |      |      | V    |
| Zero gate voltage drain current                          | I <sub>DSS</sub>     | V <sub>DS</sub> =-20V,V <sub>GS</sub> = 0V                                                    |      |      | -1   | μA   |
| Gate-body leakage current                                | I <sub>GSS</sub>     | V <sub>GS</sub> =±10V, V <sub>DS</sub> = 0V                                                   |      |      | ±10  | μA   |
| Gate threshold voltage <small>(note2)</small>            | V <sub>GS(th)</sub>  | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA                                     | -0.4 | -0.7 | -1.0 | V    |
| Drain-source on-resistance <small>(note2)</small>        | R <sub>DS(on)</sub>  | V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-0.5A                                                 |      |      | 0.56 | Ω    |
|                                                          |                      | V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-0.2A                                                 |      |      | 0.78 | Ω    |
| Maximum Continuous Drain to Source Diode Forward Current | I <sub>S</sub>       | --                                                                                            |      |      | -0.6 | A    |
| Maximum Pulsed Drain to Source Diode Forward Current     | I <sub>SM</sub>      | --                                                                                            |      |      | -1.2 | A    |
| Diode forward voltage                                    | V <sub>SD</sub>      | I <sub>S</sub> =-0.5A, V <sub>GS</sub> = 0V                                                   |      |      | -1.2 | V    |
| DYNAMIC CHARACTERISTICS <small>(note4)</small>           |                      |                                                                                               |      |      |      |      |
| Input capacitance                                        | C <sub>iss</sub>     | V <sub>DS</sub> =-16V,V <sub>GS</sub> =0V,<br>f =1MHz                                         |      | 115  |      | pF   |
| Output capacitance                                       | C <sub>Oss</sub>     |                                                                                               |      | 15   |      | pF   |
| Reverse transfer capacitance                             | C <sub>rss</sub>     |                                                                                               |      | 9    |      | pF   |
| SWITCHING CHARACTERISTICS <small>(note4)</small>         |                      |                                                                                               |      |      |      |      |
| Turn-on delay time <small>(note3)</small>                | t <sub>d(on)</sub>   | V <sub>GS</sub> =-4.5V,V <sub>DS</sub> =-10V,<br>I <sub>D</sub> =-200mA,R <sub>GEN</sub> =10Ω |      | 9    |      | nS   |
| Turn-on rise time <small>(note3)</small>                 | t <sub>r</sub>       |                                                                                               |      | 6    |      | nS   |
| Turn-off delay time <small>(note3)</small>               | t <sub>d(off)</sub>  |                                                                                               |      | 33   |      | nS   |
| Turn-off fall time <small>(note3)</small>                | t <sub>f</sub>       |                                                                                               |      | 22   |      | nS   |

### Notes:

1. Surface mounted on FR4 board using the minimum recommended pad size.
2. Pulse Test : Pulse Width=300 $\mu$ s, Duty Cycle=2%.
3. Switching characteristics are independent of operating junction temperatures.
4. Guaranteed by design, not subject to producing.

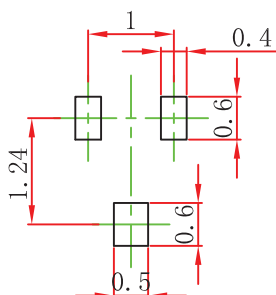


## SOT-523 Package Information



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min.                      | Max.  | Min.                 | Max.  |
| A      | 0.700                     | 0.900 | 0.028                | 0.035 |
| A1     | 0.000                     | 0.100 | 0.000                | 0.004 |
| A2     | 0.700                     | 0.800 | 0.028                | 0.031 |
| b1     | 0.150                     | 0.250 | 0.006                | 0.010 |
| b2     | 0.250                     | 0.350 | 0.010                | 0.014 |
| c      | 0.100                     | 0.200 | 0.004                | 0.008 |
| D      | 1.500                     | 1.700 | 0.059                | 0.067 |
| E      | 0.700                     | 0.900 | 0.028                | 0.035 |
| E1     | 1.450                     | 1.750 | 0.057                | 0.069 |
| e      | 0.500 TYP.                |       | 0.020 TYP.           |       |
| e1     | 0.900                     | 1.100 | 0.035                | 0.043 |
| L      | 0.400 REF.                |       | 0.016 REF.           |       |
| L1     | 0.260                     | 0.460 | 0.010                | 0.018 |
| θ      | 0°                        | 8°    | 0°                   | 8°    |

## SOT-523 Suggested Pad Layout



Note:

1. Controlling dimension: in millimeters.
2. General tolerance:  $\pm 0.05\text{mm}$ .
3. The pad layout is for reference purposes only.



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