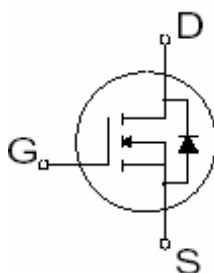


- Extremely high dv/dt capability
- Low Gate Charge Qg results in Simple Drive Requirement
- 100% avalanche tested
- Gate charge minimized
- Very low intrinsic capacitances
- Very good manufacturing repeatability



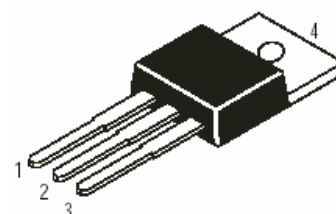
$$V_{DS} = 250V$$

$$I_{D25} = 23A$$

$$R_{DS(ON)} = 0.14 \Omega$$

## Description

StarMOS is a new generation of high voltage N-Channel enhancement mode power MOSFETs. This new technology minimises the JFET effect, increases packing density and reduces the on-resistance. StarMOS also achieves faster switching speeds through optimised gate layout with planar stripe DMOS technology.



Pin1-Gate

Pin2-Drain

Pin3-Source

## Application

- Switching application

## Absolute Maximum Ratings

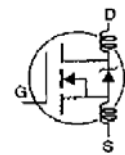
|                        | Parameter                                        | Max.                 | Units |
|------------------------|--------------------------------------------------|----------------------|-------|
| $I_D@T_C=25^{\circ}C$  | Continuous Drain Current, $V_{GS}@10V$           | 23                   | A     |
| $I_D@T_C=100^{\circ}C$ | Continuous Drain Current, $V_{GS}@10V$           | 15                   |       |
| $I_{DM}$               | Pulsed Drain Current ①                           | 92                   |       |
| $P_D@T_C=25^{\circ}C$  | Power Dissipation                                | 190                  | W     |
|                        | Linear Derating Factor                           | 1.5                  | W/°C  |
| $V_{GS}$               | Gate-to-Source Voltage                           | ±30                  | V     |
| $E_{AS}$               | Single Pulse Avalanche Energy ②                  | 410                  | mJ    |
| $I_{AR}$               | Avalanche Current ①                              | 23                   | A     |
| $E_{AR}$               | Repetitive Avalanche Energy ①                    | 19                   | mJ    |
| dv/dt                  | Peak Diode Recovery dv/dt ③                      | 4.8                  | V/ns  |
| $T_J$<br>$T_{STG}$     | Operating Junction and Storage Temperature Range | - 55 to +150         | °C    |
|                        | Soldering Temperature, for 10 seconds            | 300(1.6mm from case) |       |
|                        | Mounting Torque, 6-32 or M3 screw                | 10 lbf.in(1.1N.m)    |       |

## Thermal Resistance

|                 | Parameter                           | Min. | Typ. | Max. | Units |
|-----------------|-------------------------------------|------|------|------|-------|
| $R_{\theta JC}$ | Junction-to-case                    | —    | —    | 0.65 | °C/W  |
| $R_{\theta CS}$ | Case-to-Sink, Flat, Greased Surface | —    | 0.24 | —    |       |
| $R_{\theta JA}$ | Junction-to-Ambient                 | —    | —    | 40   |       |

**Electrical Characteristics @T<sub>J</sub>=25 °C(unless otherwise specified)**

|                                        | Parameter                            | Min. | Typ. | Max. | Units | Test Conditions                                                   |
|----------------------------------------|--------------------------------------|------|------|------|-------|-------------------------------------------------------------------|
| V <sub>(BR)DSS</sub>                   | Drain-to-Source Breakdown Voltage    | 250  | —    | —    | V     | V <sub>GS</sub> =0V, I <sub>D</sub> =250μA                        |
| ΔV <sub>(BR)DSS</sub> /ΔT <sub>J</sub> | Breakdown Voltage Temp.Coefficient   | —    | 0.39 | —    | V/°C  | Reference to 25°C, I <sub>D</sub> =1mA                            |
| R <sub>DS(on)</sub>                    | Static Drain-to-Source On-resistance | —    | —    | 0.14 | Ω     | V <sub>GS</sub> =10V, I <sub>D</sub> =14A ④                       |
| V <sub>GS(th)</sub>                    | Gate Threshold Voltage               | 2.0  | —    | 4.0  | V     | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA          |
| g <sub>fs</sub>                        | Forward Transconductance             | 11   | —    | —    | S     | V <sub>DS</sub> =50V, I <sub>D</sub> =14A                         |
| I <sub>DSS</sub>                       | Drain-to-Source Leakage current      | —    | —    | 25   | μA    | V <sub>DS</sub> =250V, V <sub>GS</sub> =0V                        |
|                                        |                                      | —    | —    | 250  |       | V <sub>DS</sub> =200V, V <sub>GS</sub> =0V, T <sub>J</sub> =150°C |
| I <sub>GSS</sub>                       | Gate-to-Source Forward leakage       | —    | —    | 100  | nA    | V <sub>GS</sub> =30V                                              |
|                                        | Gate-to-Source Reverse leakage       | —    | —    | -100 |       | V <sub>GS</sub> =-30V                                             |
| Q <sub>g</sub>                         | Total Gate Charge                    | —    | —    | 140  | nC    | I <sub>D</sub> =23A                                               |
| Q <sub>gs</sub>                        | Gate-to-Source charge                | —    | —    | 24   |       | V <sub>DS</sub> =200V                                             |
| Q <sub>gd</sub>                        | Gate-to-Drain("Miller") charge       | —    | —    | 71   |       | V <sub>GS</sub> =10V                                              |
| t <sub>d(on)</sub>                     | Turn-on Delay Time                   | —    | 15   | —    | nS    | V <sub>DD</sub> =125V                                             |
| t <sub>r</sub>                         | Rise Time                            | —    | 63   | —    |       | I <sub>D</sub> =23A                                               |
| t <sub>d(off)</sub>                    | Turn-Off Delay Time                  | —    | 74   | —    |       | R <sub>G</sub> =6.2Ω                                              |
| t <sub>f</sub>                         | Fall Time                            | —    | 50   | —    |       | R <sub>D</sub> =5.4Ω                                              |
| L <sub>D</sub>                         | Internal Drain Inductance            | —    | 4.5  | —    | nH    | Between lead,<br>6mm(0.25in.)                                     |
| L <sub>S</sub>                         | Internal Source Inductance           | —    | 7.5  | —    |       | from package<br>and center of<br>die contact                      |
| C <sub>iss</sub>                       | Input Capacitance                    | —    | 2700 | —    | pF    | V <sub>GS</sub> =0V                                               |
| C <sub>oss</sub>                       | Output Capacitance                   | —    | 620  | —    |       | V <sub>DS</sub> =25V                                              |
| C <sub>rss</sub>                       | Reverse Transfer Capacitance         | —    | 180  | —    |       | f=1.0MHz                                                          |


**Source-Drain Ratings and Characteristics**

|                 | Parameter                              | Min.                                                                                            | Typ. | Max. | Units | Test Conditions                                                  |
|-----------------|----------------------------------------|-------------------------------------------------------------------------------------------------|------|------|-------|------------------------------------------------------------------|
| I <sub>S</sub>  | Continuous Source Current (Body Diode) | —                                                                                               | —    | 23   | A     | MOSFET symbol showing the integral reverse p-n junction diode.   |
| I <sub>SM</sub> | Pulsed Source Current (Body Diode) ①   | —                                                                                               | —    | 92   |       |                                                                  |
| V <sub>SD</sub> | Diode Forward Voltage                  | —                                                                                               | —    | 1.8  | V     | T <sub>J</sub> =25°C, I <sub>S</sub> =23A, V <sub>GS</sub> =0V ④ |
| t <sub>rr</sub> | Reverse Recovery Time                  | —                                                                                               | 370  | 560  | nS    | T <sub>J</sub> =25°C, I <sub>F</sub> =23A                        |
| Q <sub>rr</sub> | Reverse Recovery Charge                | —                                                                                               | 4.6  | 6.9  | μC    | di/dt=100A/μs ④                                                  |
| t <sub>on</sub> | Forward Turn-on Time                   | Intrinsic turn-on time is negligible (turn-on is dominated by L <sub>S</sub> + L <sub>D</sub> ) |      |      |       |                                                                  |

Notes:

① Repetitive rating;pulse width limited by max.junction temperature(see figure 11)

② L = 1.2mH, I<sub>AS</sub> = 23A, V<sub>DD</sub> = 50V, R<sub>G</sub> = 25Ω, Starting T<sub>J</sub> = 25°C

③ I<sub>SD</sub> ≤ 23A, di/dt ≤ 180A/μs, V<sub>DD</sub> ≤ V<sub>(BR)DSS</sub>, T<sub>J</sub> ≤ 25°C

④ Pulse width ≤ 300 μs; duty cycle ≤ 2%