Leiditech

# LM4189

## P-Channel MOSFET

### General Description

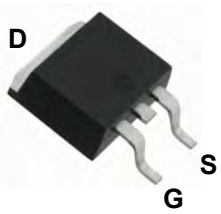
These P-Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

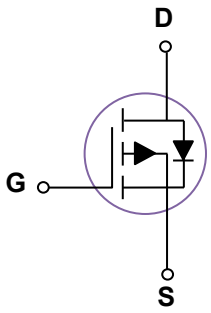
### Features

| | |
|---|---|
| $V_{DS}$ | -40V |
| $I_D$ (at $V_{GS}$=-10V) | -20A |
| $R_{DS(ON)}$ (at $V_{GS}$=-10V) | 45mΩ(Max) |
| $R_{DS(ON)}$ (at $V_{GS}$=-4.5V) | 65mΩ(Max) |

**100% UIS TESTED!**
**100% ΔVds TESTED!**

**TO252**




**Absolute Maximum Ratings** $T_A$=25°C unless otherwise noted

| Parameter | | Symbol | Maximum | Units |
|---|---|---|---|---|
| Drain-Source Voltage | | $V_{DS}$ | -40 | V |
| Gate-Source Voltage | | $V_{GS}$ | ±20 | V |
| Drain Current-Continuous | TC=25°C | $I_D$ | -20 | A |
| | TC=100°C | $I_D$ | -12 | A |
| Drain Current – Pulsed | | $I_{DM}$ | -80 | A |
| Maximum Power Dissipation | | $P_D$ | 33 | W |
| Junction and Storage Temperature Range | | $T_J$,$T_{STG}$ | -55 To 150 | ℃ |

**Thermal Characteristics**

| Parameter | Symbol | Typ | Max | Unit |
|---|---|---|---|---|
| Thermal Resistance junction-case | $R_{\theta Jc}$ | | 3.6 | ℃ /W |
| Thermal Resistance junction-to-Ambient | $R_{\theta JA}$ | | 62 | ℃ /W |

**Electrical Characteristics (TJ=25℃ unless otherwise noted)**

| Symbol | Parameter | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **STATIC PARAMETERS** | | | | | | |
| $BV_{DSS}$ | Drain-Source Breakdown Voltage | $V_{GS}$=0V $I_D$=-250μA | -40 | | | V |
| $I_{DSS}$ | Zero Gate Voltage Drain Current | $V_{DS}$=-40V,$V_{GS}$=0V | | | 1 | μA |
| $I_{GSS}$ | Gate-Body Leakage Current | $V_{GS}$=±20V,$V_{DS}$=0V | | | ±100 | nA |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{DS}$=$V_{GS}$,$I_D$=-250μA | -1.0 | -1.6 | -2.5 | V |
| $R_{DS(ON)}$ | Drain-Source On-State Resistance | $V_{GS}$=-10V, $I_D$=-10A | | 37 | 45 | mΩ |
| | | $V_{GS}$=-4.5V, $I_D$=-5A | | 57 | 65 | mΩ |
| **DYNAMIC PARAMETERS** | | | | | | |
| $C_{iss}$ | Input Capacitance | $V_{DS}$=-25V,$V_{GS}$=0V, F=1.0MHz | | 828 | | pF |
| $C_{oss}$ | Output Capacitance | | | 68 | | pF |
| $C_{rss}$ | Reverse Transfer Capacitance | | | 50 | | pF |
| **SWITCHING PARAMETERS** | | | | | | |
| $t_{d(on)}$ | Turn-on Delay Time | $V_{DS}$=-20V,$I_D$=-1A, $V_{GS}$=-10V, $R_G$=6Ω | | 12 | | nS |
| $t_r$ | Turn-on Rise Time | | | 13 | | nS |
| $t_{d(off)}$ | Turn-Off Delay Time | | | 47 | | nS |
| $t_f$ | Turn-Off Fall Time | | | 20 | | nS |
| $Q_g$ | Total Gate Charge | $V_{DS}$=-20V,$I_D$=-5A, $V_{GS}$=-4.5V | | 7.6 | | nC |
| $Q_{gs}$ | Gate-Source Charge | | | 2.3 | | nC |
| $Q_{gd}$ | Gate-Drain Charge | | | 3.1 | | nC |
| $V_{SD}$ | Diode Forward Voltage | $V_{GS}$=0V,$I_{SD}$=-1A | | 0.72 | 1.4 | V |

Note:

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.
3. Essentially independent of operating temperature.

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

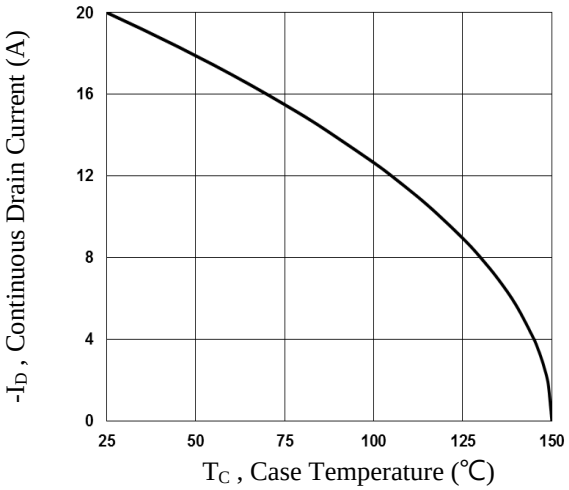



Fig.1 Continuous Drain Current vs. $T_C$

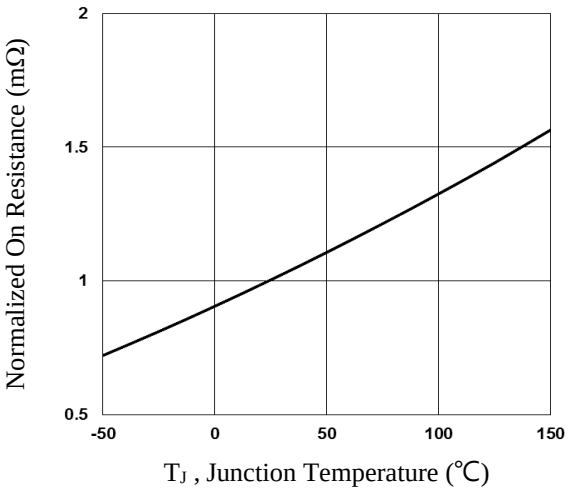



Fig.2 Normalized RDSON vs. $T_J$

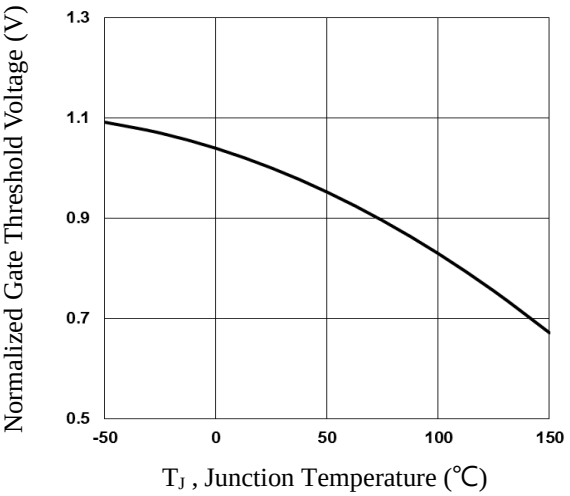



Fig.3 Normalized $V_{th}$ vs. $T_J$

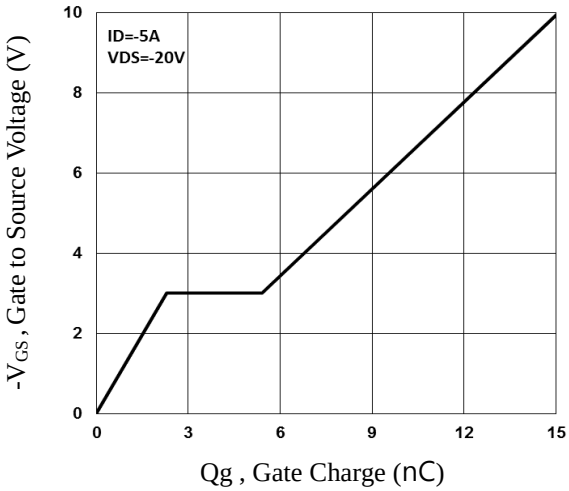



Fig.4 Gate Charge Waveform

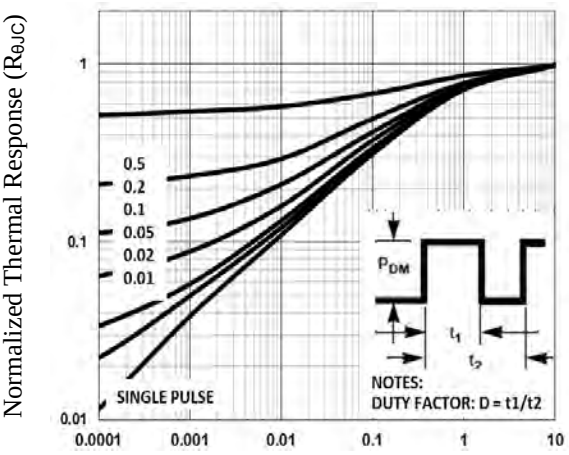



Fig.5 Normalized Transient Impedance

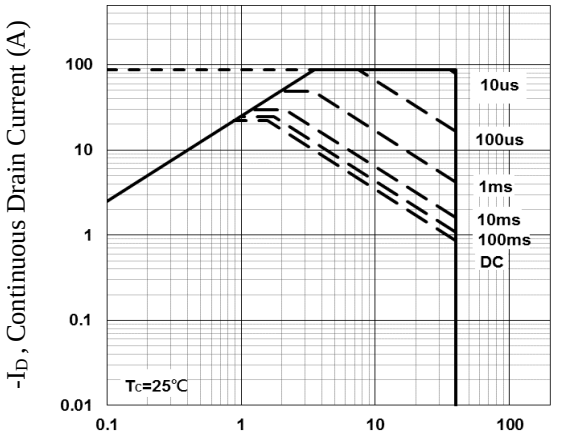



Fig.6 Maximum Safe Operation Area

## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

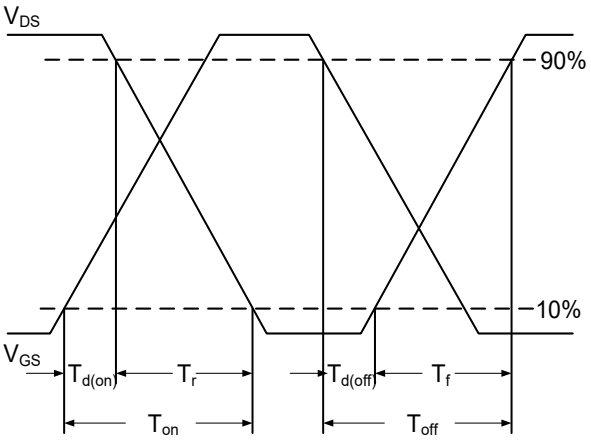



Fig.7 Switching Time Waveform

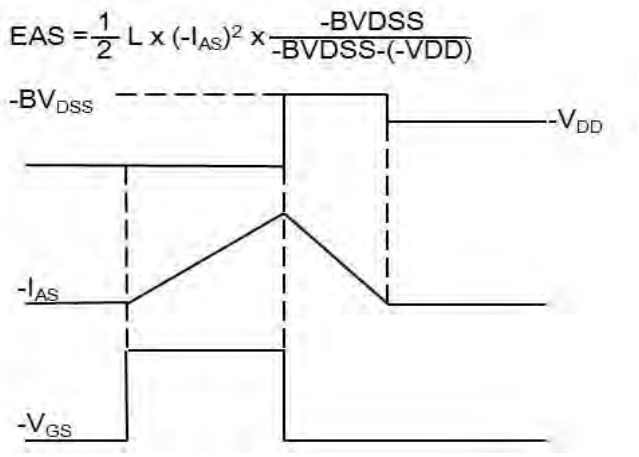
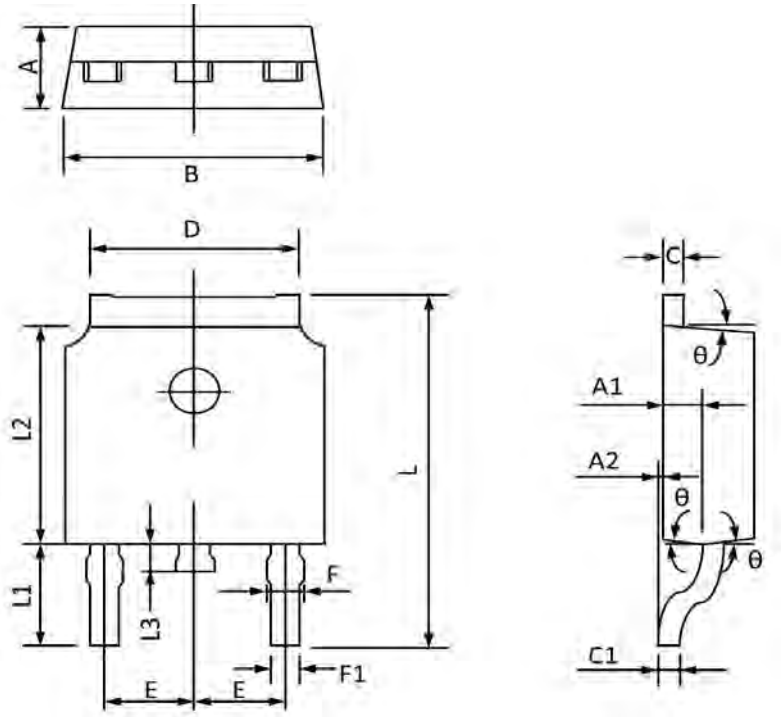



Fig.8 EAS Waveform

# TO252 PACKAGE INFORMATION




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | 2.20 | 2.40 | 0.087 | 0.094 |
| A1 | 0.91 | 1.11 | 0.036 | 0.044 |
| A2 | 0.00 | 0.15 | 0.000 | 0.006 |
| B | 6.50 | 6.70 | 0.256 | 0.264 |
| C | 0.46 | 0.580 | 0.018 | 0.230 |
| C1 | 0.46 | 0.580 | 0.018 | 0.030 |
| D | 5.10 | 5.46 | 0.201 | 0.215 |
| E | 2.186 | 2.386 | 0.086 | 0.094 |
| F | 0.74 | 0.94 | 0.029 | 0.037 |
| F1 | 0.660 | 0.860 | 0.026 | 0.034 |
| L | 9.80 | 10.40 | 0.386 | 0.409 |
| L1 | 2.9REF | | 0.114REF | |
| L2 | 6.00 | 6.20 | 0.236 | 0.244 |
| L3 | 0.60 | 1.00 | 0.024 | 0.039 |
| θ | 3° | 9° | 3° | 9° |

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